

## Introduction

This data sheet module describes the various pins on a Spartan®-3 FPGA and how they connect to the supported component packages.

- The **Pin Types** section categorizes all of the FPGA pins by their function type.
- The **Pin Definitions** section provides a top-level description for each pin on the device.
- The **Detailed, Functional Pin Descriptions** section offers significantly more detail about each pin, especially for the dual- or special-function pins used during device configuration.
- Some pins have associated behavior that is controlled by settings in the configuration bitstream. These options are described in the **Bitstream Options** section.

- The **Package Overview** section describes the various packaging options available for Spartan-3 FPGAs. Detailed pin list tables and footprint diagrams are provided for each package solution.

## Pin Descriptions

### Pin Types

A majority of the pins on a Spartan-3 FPGA are general-purpose, user-defined I/O pins. There are, however, up to 12 different functional types of pins on Spartan-3 device packages, as outlined in **Table 68**. In the package footprint drawings that follow, the individual pins are color-coded according to pin type as in the table.

Table 68: Types of Pins on Spartan-3 FPGAs

| Type/<br>Color<br>Code | Description                                                                                                                                                                                                                                                                                                                                                                                      | Pin Name(s) in Type                                                                                                                                                                                                 |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I/O                    | Unrestricted, general-purpose user-I/O pin. Most pins can be paired together to form differential I/Os.                                                                                                                                                                                                                                                                                          | IO,<br>IO_Lxxy_#                                                                                                                                                                                                    |
| DUAL                   | Dual-purpose pin used in some configuration modes during the configuration process and then usually available as a user I/O after configuration. If the pin is not used during configuration, this pin behaves as an I/O-type pin. There are 12 dual-purpose configuration pins on every package. The INIT_B pin has an internal pull-up resistor to VCCO_4 or VCCO_BOTTOM during configuration. | IO_Lxxy_#/DIN/D0,<br>IO_Lxxy_#/D1, IO_Lxxy_#/D2,<br>IO_Lxxy_#/D3, IO_Lxxy_#/D4,<br>IO_Lxxy_#/D5, IO_Lxxy_#/D6,<br>IO_Lxxy_#/D7,<br>IO_Lxxy_#/CS_B,<br>IO_Lxxy_#/RDWR_B,<br>IO_Lxxy_#/BUSY/DOUT,<br>IO_Lxxy_#/INIT_B |
| CONFIG                 | Dedicated configuration pin. Not available as a user-I/O pin. Every package has seven dedicated configuration pins. These pins are powered by VCCAUX and have a dedicated internal pull-up resistor to VCCAUX during configuration.                                                                                                                                                              | CCLK, DONE, M2, M1, M0,<br>PROG_B, HSWAP_EN                                                                                                                                                                         |
| JTAG                   | Dedicated JTAG pin. Not available as a user-I/O pin. Every package has four dedicated JTAG pins. These pins are powered by VCCAUX and have a dedicated internal pull-up resistor to VCCAUX during configuration.                                                                                                                                                                                 | TDI, TMS, TCK, TDO                                                                                                                                                                                                  |
| DCI                    | Dual-purpose pin that is either a user-I/O pin or used to calibrate output buffer impedance for a specific bank using Digital Controlled Impedance (DCI). There are two DCI pins per I/O bank.                                                                                                                                                                                                   | IO/VRN_#<br>IO_Lxxy_#/VRN_#<br>IO/VRP_#<br>IO_Lxxy_#/VRP_#                                                                                                                                                          |

Table 68: Types of Pins on Spartan-3 FPGAs (Continued)

| Type/<br>Color<br>Code | Description                                                                                                                                                                                                                                                       | Pin Name(s) in Type                                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VREF                   | Dual-purpose pin that is either a user-I/O pin or, along with all other VREF pins in the same bank, provides a reference voltage input for certain I/O standards. If used for a reference voltage within a bank, all VREF pins within the bank must be connected. | IO/VREF_#<br>IO_Lxxy_#/VREF_#                                                                                                                               |
| GND                    | Dedicated ground pin. The number of GND pins depends on the package used. All must be connected.                                                                                                                                                                  | GND                                                                                                                                                         |
| VCCAUX                 | Dedicated auxiliary power supply pin. The number of VCCAUX pins depends on the package used. All must be connected to +2.5V.                                                                                                                                      | VCCAUX                                                                                                                                                      |
| VCCINT                 | Dedicated internal core logic power supply pin. The number of VCCINT pins depends on the package used. All must be connected to +1.2V.                                                                                                                            | VCCINT                                                                                                                                                      |
| VCCO                   | Dedicated I/O bank, output buffer power supply pin. Along with other VCCO pins in the same bank, this pin supplies power to the output buffers within the I/O bank and sets the input threshold voltage for some I/O standards.                                   | VCCO_#<br><b>CP132 and TQ144 Packages Only:</b><br>VCCO_LEFT, VCCO_TOP,<br>VCCO_RIGHT,<br>VCCO_BOTTOM                                                       |
| GCLK                   | Dual-purpose pin that is either a user-I/O pin or an input to a specific global buffer input. Every package has eight dedicated GCLK pins.                                                                                                                        | IO_Lxxy_#/GCLK0,<br>IO_Lxxy_#/GCLK1,<br>IO_Lxxy_#/GCLK2,<br>IO_Lxxy_#/GCLK3,<br>IO_Lxxy_#/GCLK4,<br>IO_Lxxy_#/GCLK5,<br>IO_Lxxy_#/GCLK6,<br>IO_Lxxy_#/GCLK7 |
| N.C.                   | This package pin is not connected in this specific device/package combination but may be connected in larger devices in the same package.                                                                                                                         | N.C.                                                                                                                                                        |

**Notes:**

1. # = I/O bank number, an integer between 0 and 7.

I/Os with Lxxy\_# are part of a differential output pair. 'L' indicates differential output capability. The "xx" field is a two-digit integer, unique to each bank that identifies a differential pin-pair. The 'y' field is either 'P' for the true signal or 'N' for the inverted signal in the differential pair. The '#' field is the I/O bank number.

**Pin Definitions**

Table 69 provides a brief description of each pin listed in the Spartan-3 FPGA pinout tables and package footprint diagrams. Pins are categorized by their pin type, as listed in Table 68. See **Detailed, Functional Pin Descriptions** for more information.

Table 69: Spartan-3 FPGA Pin Definitions

| Pin Name                                                                                                           | Direction                                                                                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I/O: General-purpose I/O pins                                                                                      |                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| I/O                                                                                                                | User-defined as input, output, bidirectional, three-state output, open-drain output, open-source output                                                 | <b>User I/O:</b><br>Unrestricted single-ended user-I/O pin. Supports all I/O standards except the differential standards.                                                                                                                                                                                                                                                                                                                                                                    |
| I/O_Lxxy_#                                                                                                         | User-defined as input, output, bidirectional, three-state output, open-drain output, open-source output                                                 | <b>User I/O, Half of Differential Pair:</b><br>Unrestricted single-ended user-I/O pin or half of a differential pair. Supports all I/O standards including the differential standards.                                                                                                                                                                                                                                                                                                       |
| <b>DUAL: Dual-purpose configuration pins</b>                                                                       |                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| IO_Lxxy_#/DIN/D0, IO_Lxxy_#/D1, IO_Lxxy_#/D2, IO_Lxxy_#/D3, IO_Lxxy_#/D4, IO_Lxxy_#/D5, IO_Lxxy_#/D6, IO_Lxxy_#/D7 | Input during configuration<br>Possible bidirectional I/O after configuration if SelectMap port is retained<br>Otherwise, user I/O after configuration   | <b>Configuration Data Port:</b><br>In Parallel (SelectMAP) modes, D0-D7 are byte-wide configuration data pins. These pins become user I/Os after configuration unless the SelectMAP port is retained via the Persist bitstream option.<br>In Serial modes, DIN (D0) serves as the single configuration data input. This pin becomes a user I/O after configuration unless retained by the Persist bitstream option.                                                                          |
| IO_Lxxy_#/CS_B                                                                                                     | Input during Parallel mode configuration<br>Possible input after configuration if SelectMap port is retained<br>Otherwise, user I/O after configuration | <b>Chip Select for Parallel Mode Configuration:</b><br>In Parallel (SelectMAP) modes, this is the active-Low Chip Select signal. This pin becomes a user I/O after configuration unless the SelectMAP port is retained via the Persist bitstream option.                                                                                                                                                                                                                                     |
| IO_Lxxy_#/RDWR_B                                                                                                   | Input during Parallel mode configuration<br>Possible input after configuration if SelectMap port is retained<br>Otherwise, user I/O after configuration | <b>Read/Write Control for Parallel Mode Configuration:</b><br>In Parallel (SelectMAP) modes, this is the active-Low Write Enable, active-High Read Enable signal. This pin becomes a user I/O after configuration unless the SelectMAP port is retained via the Persist bitstream option.                                                                                                                                                                                                    |
| IO_Lxxy_#/BUSY/DOUT                                                                                                | Output during configuration<br>Possible output after configuration if SelectMap port is retained<br>Otherwise, user I/O after configuration             | <b>Configuration Data Rate Control for Parallel Mode, Serial Data Output for Serial Mode:</b><br>In Parallel (SelectMAP) modes, BUSY throttles the rate at which configuration data is loaded. This pin becomes a user I/O after configuration unless the SelectMAP port is retained via the Persist bitstream option.<br>In Serial modes, DOUT provides preamble and configuration data to downstream devices in a multi-FPGA daisy-chain. This pin becomes a user I/O after configuration. |

Table 69: Spartan-3 FPGA Pin Definitions (Continued)

| Pin Name                                                                                                                                                    | Direction                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IO_Lxyy_#/INIT_B                                                                                                                                            | Bidirectional (open-drain) during configuration<br>User I/O after configuration       | <b>Initializing Configuration Memory/Detected Configuration Error:</b><br>When Low, this pin indicates that configuration memory is being cleared. When held Low, this pin delays the start of configuration. After this pin is released or configuration memory is cleared, the pin goes High. During configuration, a Low on this output indicates that a configuration data error occurred. This pin always has an internal pull-up resistor to VCCO_4 or VCCO_BOTTOM during configuration, regardless of the HSWAP_EN pin. This pin becomes a user I/O after configuration. |
| <b>DCI:</b> Digitally Controlled Impedance reference resistor input pins                                                                                    |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IO_Lxyy_#/VRN_# or IO/VRN_#                                                                                                                                 | Input when using DCI<br>Otherwise, same as I/O                                        | <b>DCI Reference Resistor for NMOS I/O Transistor (per bank):</b><br>If using DCI, a 1% precision impedance-matching resistor is connected between this pin and the VCCO supply for this bank. Otherwise, this pin is a user I/O.                                                                                                                                                                                                                                                                                                                                               |
| IO_Lxyy_#/VRP_# or IO/VRP_#                                                                                                                                 | Input when using DCI<br>Otherwise, same as I/O                                        | <b>DCI Reference Resistor for PMOS I/O Transistor (per bank):</b><br>If using DCI, a 1% precision impedance-matching resistor is connected between this pin and the ground supply. Otherwise, this pin is a user I/O.                                                                                                                                                                                                                                                                                                                                                           |
| <b>GCLK:</b> Global clock buffer inputs                                                                                                                     |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IO_Lxyy_#/GCLK0,<br>IO_Lxyy_#/GCLK1,<br>IO_Lxyy_#/GCLK2,<br>IO_Lxyy_#/GCLK3,<br>IO_Lxyy_#/GCLK4,<br>IO_Lxyy_#/GCLK5,<br>IO_Lxyy_#/GCLK6,<br>IO_Lxyy_#/GCLK7 | Input if connected to global clock buffers<br>Otherwise, same as I/O                  | <b>Global Buffer Input:</b><br>Direct input to a low-skew global clock buffer. If not connected to a global clock buffer, this pin is a user I/O.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>VREF:</b> I/O bank input reference voltage pins                                                                                                          |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| IO_Lxyy_#/VREF_# or IO/VREF_#                                                                                                                               | Voltage supply input when VREF pins are used within a bank.<br>Otherwise, same as I/O | <b>Input Buffer Reference Voltage for Special I/O Standards (per bank):</b><br>If required to support special I/O standards, all the VREF pins within a bank connect to a input threshold voltage source.<br><br>If not used as input reference voltage pins, these pins are available as individual user-I/O pins.                                                                                                                                                                                                                                                             |
| <b>CONFIG:</b> Dedicated configuration pins (pull-up resistor to VCCAUX always active during configuration, regardless of HSWAP_EN pin)                     |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| CCLK                                                                                                                                                        | Input in Slave configuration modes<br>Output in Master configuration modes            | <b>Configuration Clock:</b><br>The configuration clock signal synchronizes configuration data. This pin has an internal pull-up resistor to VCCAUX during configuration.                                                                                                                                                                                                                                                                                                                                                                                                        |
| PROG_B                                                                                                                                                      | Input                                                                                 | <b>Program/Configure Device:</b><br>Active Low asynchronous reset to configuration logic. Asserting PROG_B Low for an extended period delays the configuration process. This pin has an internal pull-up resistor to VCCAUX during configuration.                                                                                                                                                                                                                                                                                                                               |

Table 69: Spartan-3 FPGA Pin Definitions (Continued)

| Pin Name                                                                                                                     | Direction                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DONE                                                                                                                         | Bidirectional with open-drain or totem-pole Output | <p><b>Configuration Done, Delay Start-up Sequence:</b></p> <p>A Low-to-High output transition on this bidirectional pin signals the end of the configuration process.</p> <p>The FPGA produces a Low-to-High transition on this pin to indicate that the configuration process is complete. The DriveDone bitstream generation option defines whether this pin functions as a totem-pole output that actively drives High or as an open-drain output. An open-drain output requires a pull-up resistor to produce a High logic level. The open-drain option permits the DONE lines of multiple FPGAs to be tied together, so that the common node transitions High only after all of the FPGAs have completed configuration. Externally holding the open-drain output Low delays the start-up sequence, which marks the transition to user mode.</p> |
| M0, M1, M2                                                                                                                   | Input                                              | <p><b>Configuration Mode Selection:</b></p> <p>These inputs select the configuration mode. The logic levels applied to the mode pins are sampled on the rising edge of INIT_B. See Table 74. These pins have an internal pull-up resistor to VCCAUX during configuration, making Slave Serial the default configuration mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| HSWAP_EN                                                                                                                     | Input                                              | <p><b>Disable Pull-up Resistors During Configuration:</b></p> <p>A Low on this pin enables pull-up resistors on all pins that are not actively involved in the configuration process. A High value disables all pull-ups, allowing the non-configuration pins to float.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>JTAG: JTAG interface pins (pull-up resistor to VCCAUX always active during configuration, regardless of HSWAP_EN pin)</b> |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| TCK                                                                                                                          | Input                                              | <p><b>JTAG Test Clock:</b></p> <p>The TCK clock signal synchronizes all JTAG port operations. This pin has an internal pull-up resistor to VCCAUX during configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| TDI                                                                                                                          | Input                                              | <p><b>JTAG Test Data Input:</b></p> <p>TDI is the serial data input for all JTAG instruction and data registers. This pin has an internal pull-up resistor to VCCAUX during configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| TMS                                                                                                                          | Input                                              | <p><b>JTAG Test Mode Select:</b></p> <p>The serial TMS input controls the operation of the JTAG port. This pin has an internal pull-up resistor to VCCAUX during configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| TDO                                                                                                                          | Output                                             | <p><b>JTAG Test Data Output:</b></p> <p>TDO is the serial data output for all JTAG instruction and data registers. This pin has an internal pull-up resistor to VCCAUX during configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>VCCO: I/O bank output voltage supply pins</b>                                                                             |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| VCCO_#                                                                                                                       | Supply                                             | <p><b>Power Supply for Output Buffer Drivers (per bank):</b></p> <p>These pins power the output drivers within a specific I/O bank.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Table 69: Spartan-3 FPGA Pin Definitions (Continued)

| Pin Name                                         | Direction | Description                                                                                                                                                                                                                                     |
|--------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>VCCAUX: Auxiliary voltage supply pins</b>     |           |                                                                                                                                                                                                                                                 |
| VCCAUX                                           | Supply    | <b>Power Supply for Auxiliary Circuits:</b><br>+2.5V power pins for auxiliary circuits, including the Digital Clock Managers (DCMs), the dedicated configuration pins (CONFIG), and the dedicated JTAG pins. All VCCAUX pins must be connected. |
| <b>VCCINT: Internal core voltage supply pins</b> |           |                                                                                                                                                                                                                                                 |
| VCCINT                                           | Supply    | <b>Power Supply for Internal Core Logic:</b><br>+1.2V power pins for the internal logic. All pins must be connected.                                                                                                                            |
| <b>GND: Ground supply pins</b>                   |           |                                                                                                                                                                                                                                                 |
| GND                                              | Supply    | <b>Ground:</b><br>Ground pins, which are connected to the power supply's return path. All pins must be connected.                                                                                                                               |
| <b>N.C.: Unconnected package pins</b>            |           |                                                                                                                                                                                                                                                 |
| N.C.                                             |           | <b>Unconnected Package Pin:</b><br>These package pins are unconnected.                                                                                                                                                                          |

**Notes:**

1. All unused inputs and bidirectional pins must be tied either High or Low. For unused enable inputs, apply the level that disables the associated function. One common approach is to activate internal pull-up or pull-down resistors. An alternative approach is to externally connect the pin to either VCCO or GND.
2. All outputs are of the totem-pole type — i.e., they can drive High as well as Low logic levels — except for the cases where “Open Drain” is indicated. The latter can only drive a Low logic level and require a pull-up resistor to produce a High logic level.

## Detailed, Functional Pin Descriptions

### I/O Type: Unrestricted, General-purpose I/O Pins

After configuration, I/O-type pins are inputs, outputs, bidirectional I/O, three-state outputs, open-drain outputs, or open-source outputs, as defined in the application

Pins labeled "IO" support all SelectIO™ interface signal standards except differential standards. A given device at most only has a few of these pins.

A majority of the general-purpose I/O pins are labeled in the format "IO\_Lxxy\_#". These pins support all SelectIO signal standards, including the differential standards such as LVDS, ULVDS, BLVDS, RSDS, or LDT.

For additional information, see **IOBs, page 12**

#### Differential Pair Labeling

A pin supports differential standards if the pin is labeled in the format "Lxxy\_#". The pin name suffix has the following significance. **Figure 38** provides a specific example showing a differential input to and a differential output from Bank 2.

- 'L' indicates differential capability.

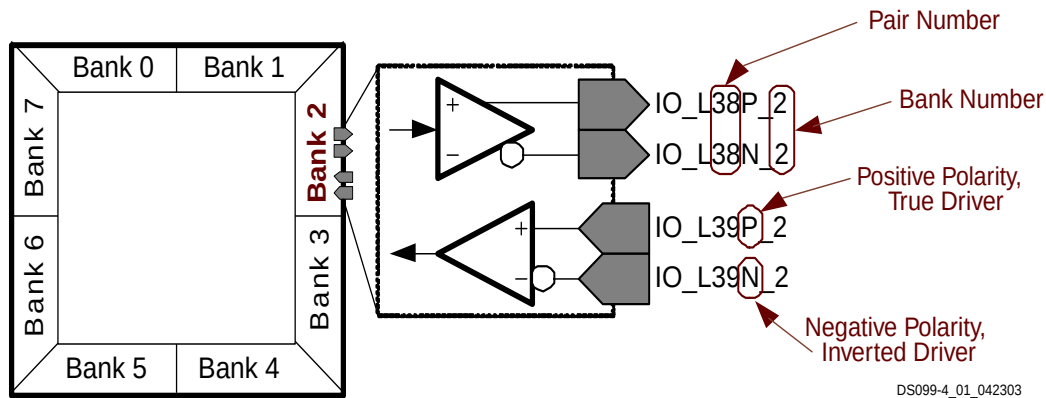
- "xx" is a two-digit integer, unique for each bank, that identifies a differential pin-pair.
- 'y' is replaced by 'P' for the true signal or 'N' for the inverted. These two pins form one differential pin-pair.
- '#' is an integer, 0 through 7, indicating the associated I/O bank.

If unused, these pins are in a high impedance state. The Bitstream generator option UnusedPin enables a pull-up or pull-down resistor on all unused I/O pins.

#### Behavior from Power-On through End of Configuration

During the configuration process, all pins that are not actively involved in the configuration process are in a high-impedance state. The CONFIG- and JTAG-type pins have an internal pull-up resistor to VCCAUX during configuration. For all other I/O pins, the HSWAP\_EN input determines whether or not pull-up resistors are activated during configuration. HSWAP\_EN = 0 enables the pull-up resistors. HSWAP\_EN = 1 disables the pull-up resistors allowing the pins to float, which is the desired state for hot-swap applications.





DS099-4\_01\_042303

Figure 38: Differential Pair Labelling

## DUAL Type: Dual-Purpose Configuration and I/O Pins

These pins serve dual purposes. The user-I/O pins are temporarily borrowed during the configuration process to load configuration data into the FPGA. After configuration, these pins are then usually available as a user I/O in the application. If a pin is not applicable to the specific configuration mode—controlled by the mode select pins M2, M1, and M0—then the pin behaves as an I/O-type pin.

There are 12 dual-purpose configuration pins on every package, six of which are part of I/O Bank 4, the other six part of I/O Bank 5. Only a few of the pins in Bank 4 are used in the Serial configuration modes.

See “Pin Behavior During Configuration, page 114”.

## Serial Configuration Modes

This section describes the dual-purpose pins used during either Master or Slave Serial mode. See Table 74 for Mode Select pin settings required for Serial modes. All such pins are in Bank 4 and powered by VCCO\_4.

In both the Master and Slave Serial modes, DIN is the serial configuration data input. The D1-D7 inputs are unused in serial mode and behave like general-purpose I/O pins.

In all the cases, the configuration data is synchronized to the rising edge of the CCLK clock signal.

The DIN, DOUT, and INIT\_B pins can be retained in the application to support reconfiguration by setting the Persist bitstream generation option. However, the serial modes do not support device readback.

Table 70: Dual-Purpose Pins Used in Master or Slave Serial Mode

| Pin Name | Direction                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIN      | Input                      | <p><b>Serial Data Input:</b></p> <p>During the Master or Slave Serial configuration modes, DIN is the serial configuration data input, and all data is synchronized to the rising CCLK edge. After configuration, this pin is available as a user I/O.</p> <p>This signal is located in Bank 4 and its output voltage determined by VCCO_4.</p> <p>The BitGen option <b>Persist</b> permits this pin to retain its configuration function in the User mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DOUT     | Output                     | <p><b>Serial Data Output:</b></p> <p>In a multi-FPGA design where all the FPGAs use serial mode, connect the DOUT output of one FPGA—in either Master or Slave Serial mode—to the DIN input of the next FPGA—in Slave Serial mode—so that configuration data passes from one to the next, in daisy-chain fashion. This “daisy chain” permits sequential configuration of multiple FPGAs.</p> <p>This signal is located in Bank 4 and its output voltage determined by VCCO_4.</p> <p>The BitGen option <b>Persist</b> permits this pin to retain its configuration function in the User mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| INIT_B   | Bidirectional (open-drain) | <p><b>Initializing Configuration Memory/Configuration Error:</b></p> <p>Just after power is applied, the FPGA produces a Low-to-High transition on this pin indicating that initialization (i.e., clearing) of the configuration memory has finished. Before entering the User mode, this pin functions as an open-drain output, which requires a pull-up resistor in order to produce a High logic level. In a multi-FPGA design, tie (wire AND) the INIT_B pins from all FPGAs together so that the common node transitions High only after all of the FPGAs have been successfully initialized.</p> <p>Externally holding this pin Low beyond the initialization phase delays the start of configuration. This action stalls the FPGA at the configuration step just before the mode select pins are sampled.</p> <p>During configuration, the FPGA indicates the occurrence of a data (i.e., CRC) error by asserting INIT_B Low.</p> <p>This signal is located in Bank 4 and its output voltage determined by VCCO_4.</p> <p>The BitGen option <b>Persist</b> permits this pin to retain its configuration function in the User mode.</p> |

| Configuration Data Byte | I/O Bank 4 (VCCO_4) |    |    |    | I/O Bank 5 (VCCO_5) |    |    |    |
|-------------------------|---------------------|----|----|----|---------------------|----|----|----|
|                         | High Nibble         |    |    |    | Low Nibble          |    |    |    |
| 0xFC =                  | D0                  | D1 | D2 | D3 | D4                  | D5 | D6 | D7 |
|                         | 1                   | 1  | 1  | 1  | 1                   | 1  | 0  | 0  |
|                         | (MSB)               |    |    |    | (LSB)               |    |    |    |

Figure 39: Configuration Data Byte Mapping to D0-D7 Bits

### Parallel Configuration Modes (SelectMAP)

This section describes the dual-purpose configuration pins used during the Master and Slave Parallel configuration modes, sometimes also called the SelectMAP modes. In both Master and Slave Parallel configuration modes, D0-D7 form the byte-wide configuration data input. See [Table 74](#) for Mode Select pin settings required for Parallel modes.

As shown in [Figure 39](#), D0 is the most-significant bit while D7 is the least-significant bit. Bits D0-D3 form the high nibble of the byte and bits D4-D7 form the low nibble.

In the Parallel configuration modes, both the VCCO\_4 and VCCO\_5 voltage supplies are required and must both equal the voltage of the attached configuration device, typically either 2.5V or 3.3V.



Assert Low both the chip-select pin, CS\_B, and the read/write control pin, RDWR\_B, to write the configuration data byte presented on the D0-D7 pins to the FPGA on a rising-edge of the configuration clock, CCLK. The order of CS\_B and RDWR\_B does not matter, although RDWR\_B must be asserted throughout the configuration process. If RDWR\_B is de-asserted during configuration, the FPGA aborts the configuration operation.

After configuration, these pins are available as general-purpose user I/O. However, the SelectMAP configuration interface is optionally available for debugging and dynamic

reconfiguration. To use these SelectMAP pins after configuration, set the Persist bitstream generation option.

The Readback debugging option, for example, requires the Persist bitstream generation option. During Readback mode, assert CS\_B Low, along with RDWR\_B High, to read a configuration data byte from the FPGA to the D0-D7 bus on a rising CCLK edge. During Readback mode, D0-D7 are output pins.

In all the cases, the configuration data and control signals are synchronized to the rising edge of the CCLK clock signal.

Table 71: Dual-Purpose Configuration Pins for Parallel (SelectMAP) Configuration Modes

| Pin Name       | Direction                                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |          |   |                                                                            |   |                                                    |
|----------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|---|----------------------------------------------------------------------------|---|----------------------------------------------------|
| D0, D1, D2, D3 | Input during configuration<br><br>Output during readback                   | <b>Configuration Data Port (high nibble):</b><br>Collectively, the D0-D7 pins are the byte-wide configuration data port for the Parallel (SelectMAP) configuration modes. Configuration data is synchronized to the rising edge of CCLK clock signal.<br><br>The D0-D3 pins are the high nibble of the configuration data byte and located in Bank 4 and powered by VCCO_4.<br><br>The BitGen option Persist permits this pin to retain its configuration function in the User mode.                                                                                                                                                                                                                                                                                      |      |          |   |                                                                            |   |                                                    |
| D4, D5, D6, D7 | Input during configuration<br><br>Output during readback                   | <b>Configuration Data Port (low nibble):</b><br>The D4-D7 pins are the low nibble of the configuration data byte. However, these signals are located in Bank 5 and powered by VCCO_5.<br><br>The BitGen option Persist permits this pin to retain its configuration function in the User mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |          |   |                                                                            |   |                                                    |
| CS_B           | Input                                                                      | <b>Chip Select for Parallel Mode Configuration:</b><br>Assert this pin Low, together with RDWR_B to write a configuration data byte from the D0-D7 bus to the FPGA on a rising CCLK edge.<br><br>During Readback, assert this pin Low, along with RDWR_B High, to read a configuration data byte from the FPGA to the D0-D7 bus on a rising CCLK edge.<br><br>This signal is located in Bank 5 and powered by VCCO_5.<br><br>The BitGen option Persist permits this pin to retain its configuration function in the User mode. <table><tr><th>CS_B</th><th>Function</th></tr><tr><td>0</td><td>FPGA selected. SelectMAP inputs are valid on the next rising edge of CCLK.</td></tr><tr><td>1</td><td>FPGA deselected. All SelectMAP inputs are ignored.</td></tr></table> | CS_B | Function | 0 | FPGA selected. SelectMAP inputs are valid on the next rising edge of CCLK. | 1 | FPGA deselected. All SelectMAP inputs are ignored. |
| CS_B           | Function                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |          |   |                                                                            |   |                                                    |
| 0              | FPGA selected. SelectMAP inputs are valid on the next rising edge of CCLK. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |          |   |                                                                            |   |                                                    |
| 1              | FPGA deselected. All SelectMAP inputs are ignored.                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |          |   |                                                                            |   |                                                    |

Table 71: Dual-Purpose Configuration Pins for Parallel (SelectMAP) Configuration Modes (Continued)

| Pin Name | Direction                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|---|-------------------------------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------|
| RDWR_B   | Input                                                                                                                                | <p><b>Read/Write Control for Parallel Mode Configuration:</b></p> <p>In Master and Slave Parallel modes, assert this pin Low together with CS_B to write a configuration data byte from the D0-D7 bus to the FPGA on a rising CCLK edge. Once asserted during configuration, RDWR_B must remain asserted until configuration is complete.</p> <p>During Readback, assert this pin High with CS_B Low to read a configuration data byte from the FPGA to the D0-D7 bus on a rising CCLK edge.</p> <p>This signal is located in Bank 5 and powered by VCCO_5.</p> <p>The BitGen option Persist permits this pin to retain its configuration function in the User mode.</p> <table><tr><th>RDWR_B</th><th>Function</th></tr><tr><td>0</td><td>If CS_B is Low, then load (write) configuration data to the FPGA.</td></tr><tr><td>1</td><td>This option is valid only if the Persist bitstream option is set to Yes. If CS_B is Low, then read configuration data from the FPGA.</td></tr></table>                                                                                                                                                                                                                                                 | RDWR_B | Function | 0 | If CS_B is Low, then load (write) configuration data to the FPGA. | 1 | This option is valid only if the Persist bitstream option is set to Yes. If CS_B is Low, then read configuration data from the FPGA. |      |                                               |
| RDWR_B   | Function                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| 0        | If CS_B is Low, then load (write) configuration data to the FPGA.                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| 1        | This option is valid only if the Persist bitstream option is set to Yes. If CS_B is Low, then read configuration data from the FPGA. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| BUSY     | Output                                                                                                                               | <p><b>Configuration Data Rate Control for Parallel Mode:</b></p> <p>In the Slave and Master Parallel modes, BUSY throttles the rate at which configuration data is loaded. BUSY is only necessary if CCLK operates at greater than 50 MHz. Ignore BUSY for frequencies of 50 MHz and below.</p> <p>When BUSY is Low, the FPGA accepts the next configuration data byte on the next rising CCLK edge for which CS_B and RDWR_B are Low. When BUSY is High, the FPGA ignores the next configuration data byte. The next configuration data value must be held or reloaded until the next rising CCLK edge when BUSY is Low. When CS_B is High, BUSY is in a high impedance state.</p> <table><tr><th>BUSY</th><th>Function</th></tr><tr><td>0</td><td>The FPGA is ready to accept the next configuration data byte.</td></tr><tr><td>1</td><td>The FPGA is busy processing the current configuration data byte and is not ready to accept the next byte.</td></tr><tr><td>Hi-Z</td><td>If CS_B is High, then BUSY is high impedance.</td></tr></table> <p>This signal is located in Bank 4 and its output voltage is determined by VCCO_4. The BitGen option Persist permits this pin to retain its configuration function in the User mode.</p> | BUSY   | Function | 0 | The FPGA is ready to accept the next configuration data byte.     | 1 | The FPGA is busy processing the current configuration data byte and is not ready to accept the next byte.                            | Hi-Z | If CS_B is High, then BUSY is high impedance. |
| BUSY     | Function                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| 0        | The FPGA is ready to accept the next configuration data byte.                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| 1        | The FPGA is busy processing the current configuration data byte and is not ready to accept the next byte.                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| Hi-Z     | If CS_B is High, then BUSY is high impedance.                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |
| INIT_B   | Bidirectional (open-drain)                                                                                                           | <p><b>Initializing Configuration Memory/Configuration Error (active-Low):</b></p> <p>See description under <b>Serial Configuration Modes</b>, <a href="#">page 105</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |          |   |                                                                   |   |                                                                                                                                      |      |                                               |

### JTAG Configuration Mode

In the JTAG configuration mode all dual-purpose configuration pins are unused and behave exactly like user-I/O pins, as shown in [Table 78](#). See [Table 74](#) for Mode Select pin settings required for JTAG mode.

### Dual-Purpose Pin I/O Standard During Configuration

During configuration, the dual-purpose pins default to CMOS input and output levels for the associated VCCO voltage supply pins. For example, in the Parallel configuration modes, both VCCO\_4 and VCCO\_5 are required. If connected to +2.5V, then the associated pins conform to the

LVC MOS25 I/O standard. If connected to +3.3V, then the pins drive LVC MOS output levels and accept either LV TTL or LVC MOS input levels.

### Dual-Purpose Pin Behavior After Configuration

After the configuration process completes, these pins, if they were borrowed during configuration, become user-I/O pins available to the application. If a dual-purpose configuration pin is not used during the configuration process—i.e., the parallel configuration pins when using serial mode—then the pin behaves exactly like a general-purpose I/O. See [I/O Type: Unrestricted, General-purpose I/O Pins](#) section above.

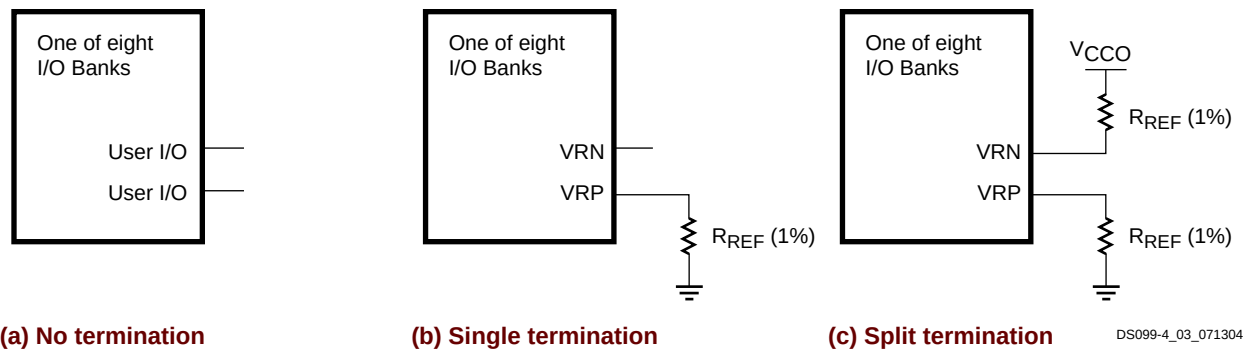


Figure 40: DCI Termination Types

## DCI: User I/O or Digitally Controlled Impedance Resistor Reference Input

These pins are individual user-I/O pins unless one of the I/O standards used in the bank requires the Digitally Controlled Impedance (DCI) feature. If DCI is used, then 1% precision resistors connected to the VRP\_# and VRN\_# pins match the impedance on the input or output buffers of the I/O standards that use DCI within the bank.

The '#' character in the pin name indicates the associated I/O bank and is an integer, 0 through 7.

There are two DCI pins per I/O bank, except in the CP132 and TQ144 packages, which do not have any DCI inputs for Bank 5.

### VRP and VRN Impedance Resistor Reference Inputs

The 1% precision impedance-matching resistor attached to the VRP\_# pin controls the pull-up impedance of PMOS transistor in the input or output buffer. Consequently, the VRP\_# pin must connect to ground. The 'P' character in "VRP" indicates that this pin controls the I/O buffer's PMOS transistor impedance. The VRP\_# pin is used for both single and split termination.

The 1% precision impedance-matching resistor attached to the VRN\_# pin controls the pull-down impedance of NMOS transistor in the input or output buffer. Consequently, the VRN\_# pin must connect to VCCO. The 'N' character in "VRN" indicates that this pin controls the I/O buffer's NMOS transistor impedance. The VRN\_# pin is only used for split termination.

Each VRN or VRP reference input requires its own resistor. A single resistor cannot be shared between VRN or VRP pins associated with different banks.

During configuration, these pins behave exactly like user-I/O pins. The associated DCI behavior is not active or valid until after configuration completes.

Also see **Digitally Controlled Impedance (DCI)**, page 16.

## DCI Termination Types

If the I/O in an I/O bank do not use the DCI feature, then no external resistors are required and both the VRP\_# and VRN\_# pins are available for user I/O, as shown in **Figure 40a**.

If the I/O standards within the associated I/O bank require single termination—such as GTL\_DCI, GTLP\_DCI, or HSTL\_III\_DCI—then only the VRP\_# signal connects to a 1% precision impedance-matching resistor, as shown in **Figure 40b**. A resistor is not required for the VRN\_# pin.

Finally, if the I/O standards with the associated I/O bank require split termination—such as HSTL\_I\_DCI, SSTL2\_I\_DCI, SSTL2\_II\_DCI, or LVDS\_25\_DCI and LVDSEXT\_25\_DCI receivers—then both the VRP\_# and VRN\_# pins connect to separate 1% precision impedance-matching resistors, as shown in **Figure 40c**. Neither pin is available for user I/O.

## GCLK: Global Clock Buffer Inputs or General-Purpose I/O Pins

These pins are user-I/O pins unless they specifically connect to one of the eight low-skew global clock buffers on the device, specified using the IBUFG primitive.

There are eight GCLK pins per device and two each appear in the top-edge banks, Bank 0 and 1, and the bottom-edge banks, Banks 4 and 5. See **Figure 38** for a picture of bank labeling.

During configuration, these pins behave exactly like user-I/O pins.

Also see **Global Clock Network**, page 41.

## CONFIG: Dedicated Configuration Pins

The dedicated configuration pins control the configuration process and are not available as user-I/O pins. Every package has seven dedicated configuration pins. All CONFIG-type pins are powered by the +2.5V VCCAUX supply.

Also see **Configuration**, page 45.

### CCLK: Configuration Clock

The configuration clock signal on this pin synchronizes the reading or writing of configuration data. The CCLK pin is an input-only pin for the Slave Serial and Slave Parallel configuration modes. In the Master Serial and Master Parallel configuration modes, the FPGA drives the CCLK pin and CCLK should be treated as a full bidirectional I/O pin for signal integrity analysis.

Although the CCLK frequency is relatively low, Spartan-3 FPGA output edge rates are fast. Any potential signal integrity problems on the CCLK board trace can cause FPGA configuration to fail. Therefore, pay careful attention to the CCLK signal integrity on the printed circuit board. Signal integrity simulation with IBIS is recommended. For all configuration modes except JTAG, consider the signal integrity at every CCLK trace destination, including the FPGA's CCLK pin.

During configuration, the CCLK pin has a pull-up resistor to VCCAUX, regardless of the HSWAP\_EN pin. After configuration, the CCLK pin is pulled High to VCCAUX by default as defined by the **CclkPin** bitstream selection, although this behavior is programmable. Any clocks applied to CCLK after configuration are ignored unless the bitstream option **Persist** is set to **Yes**, which retains the configuration interface. **Persist** is set to **No** by default. However, if **Persist** is set to **Yes**, then all clock edges are potentially active events, depending on the other configuration control signals.

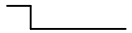
The bitstream generator option **ConfigRate** determines the frequency of the internally-generated CCLK oscillator required for the Master configuration modes. The actual frequency is approximate due to the characteristics of the silicon oscillator and varies by up to 50% over the temperature and voltage range. By default, CCLK operates at approximately 6 MHz. Via the **ConfigRate** option, the oscillator frequency is set at approximately 3, 6, 12, 25, or 50 MHz. At power-on, CCLK always starts operation at its lowest frequency. The device does not start operating at the higher frequency until the ConfigRate control bits are loaded during the configuration process.

### PROG\_B: Program/Configure Device

This asynchronous pin initiates the configuration or re-configuration processes. A Low-going pulse resets the configuration logic, initializing the configuration memory. This initialization process cannot finish until PROG\_B returns High. Asserting PROG\_B Low for an extended period delays the configuration process. At power-up, there is always a pull-up resistor to VCCAUX on this pin, regardless of the HSWAP\_EN input. After configuration, the bitstream generator option **ProgPin** determines whether or not the pull-up resistor is present. By default, the **ProgPin** option retains the pull-up resistor.

After configuration, hold the PROG\_B input High. Any Low-going pulse on PROG\_B, lasting 300 ns or longer, restarts the configuration process.

Table 72: PROG\_B Operation

| PROG_B Input                                                                                                | Response                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power-up</b>                                                                                             | Automatically initiates configuration process.                                                                                                     |
| <b>Low-going pulse</b><br> | Initiate (re-)configuration process and continue to completion.                                                                                    |
| <b>Extended Low</b><br>   | Initiate (re-)configuration process and stall process at step where configuration memory is cleared. Process is stalled until PROG_B returns High. |
| <b>1</b>                                                                                                    | If the configuration process is started, continue to completion. If configuration process is complete, stay in User mode.                          |

### DONE: Configuration Done, Delay Start-Up Sequence

The FPGA produces a Low-to-High transition on this pin indicating that the configuration process is complete. The bitstream generator option **DriveDone** determines whether this pin functions as a totem-pole output that can drive High or as an open-drain output. If configured as an open-drain output—which is the default behavior—then a pull-up resistor is required to produce a High logic level. There is a bitstream option that provides an internal pull-up resistor, otherwise an external pull-up resistor is required.

The open-drain option permits the DONE lines of multiple FPGAs to be tied together, so that the common node transitions High only after all of the FPGAs have completed configuration. Externally holding the open-drain DONE pin Low delays the start-up sequence, which marks the transition to user mode.

Once the FPGA enters User mode after completing configuration, the DONE pin no longer drives the DONE pin Low. The bitstream generator option **DonePin** determines whether or not a pull-up resistor is present on the DONE pin to pull the pin to VCCAUX. If the pull-up resistor is eliminated, then the DONE pin must be pulled High using an external pull-up resistor or one of the FPGAs in the design must actively drive the DONE pin High via the **DriveDone** bitstream generator option.

The bitstream generator option **DriveDone** causes the FPGA to actively drive the DONE output High after configuration. This option should only be used in single-FPGA designs or on the last FPGA in a multi-FPGA daisy-chain.

By default, the bitstream generator software retains the pull-up resistor and does not actively drive the DONE pin as highlighted in Table 73. Table 73 shows the interaction of these bitstream options in single- and multi-FPGA designs.

Table 73: DonePin and DriveDone Bitstream Option Interaction

| DonePin  | DriveDone | Single- or Multi-FPGA Design | Comments                                                                                                          |
|----------|-----------|------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Pullnone | No        | Single                       | External pull-up resistor, with value between 330Ω to 3.3kΩ, required on DONE.                                    |
| Pullnone | No        | Multi                        | External pull-up resistor, with value between 330Ω to 3.3kΩ, required on common node connecting to all DONE pins. |
| Pullnone | Yes       | Single                       | OK, no external requirements.                                                                                     |
| Pullnone | Yes       | Multi                        | DriveDone on last device in daisy-chain only. No external requirements.                                           |
| Pullup   | No        | Single                       | OK, but pull-up on DONE pin has slow rise time. May require 330Ω pull-up resistor for high CCLK frequencies.      |
| Pullup   | No        | Multi                        | External pull-up resistor, with value between 330Ω to 3.3kΩ, required on common node connecting to all DONE pins. |
| Pullup   | Yes       | Single                       | OK, no external requirements.                                                                                     |
| Pullup   | Yes       | Multi                        | DriveDone on last device in daisy-chain only. No external requirements.                                           |

### M2, M1, M0: Configuration Mode Selection

The M2, M1, and M0 inputs select the FPGA configuration mode, as described in Table 74. The logic levels applied to the mode pins are sampled on the rising edge of INIT\_B.

Table 74: Spartan-3 Mode Select Settings

| Configuration Mode  | M2 | M1 | M0 |
|---------------------|----|----|----|
| Master Serial       | 0  | 0  | 0  |
| Slave Serial        | 1  | 1  | 1  |
| Master Parallel     | 0  | 1  | 1  |
| Slave Parallel      | 1  | 1  | 0  |
| JTAG                | 1  | 0  | 1  |
| Reserved            | 0  | 0  | 1  |
| Reserved            | 0  | 1  | 0  |
| Reserved            | 1  | 0  | 0  |
| After Configuration | X  | X  | X  |

#### Notes:

1. X = don't care, either 0 or 1.

Before and during configuration, the mode pins have an internal pull-up resistor to VCCAUX, regardless of the HSWAP\_EN pin. If the mode pins are unconnected, then the FPGA defaults to the Slave Serial configuration mode. After configuration successfully completes, any levels applied to these input are ignored. Furthermore, the bitstream generator options **M0Pin**, **M1Pin**, and **M2Pin** determines whether a pull-up resistor, pull-down resistor, or no resistor is present on its respective mode pin, M0, M1, or M2.

### HSWAP\_EN: Disable Pull-up Resistors During Configuration

As shown in Table 75, a Low on this asynchronous pin enables pull-up resistors on all user I/Os not actively involved in the

configuration process, although only until device configuration completes. A High disables the pull-up resistors during configuration, which is the desired state for some applications.

The dedicated configuration CONFIG pins (CCLK, DONE, PROG\_B, HSWAP\_EN, M2, M1, M0), the JTAG pins (TDI, TMS, TCK, TDO) and the INIT\_B always have active pull-up resistors during configuration, regardless of the value on HSWAP\_EN.

After configuration, HSWAP\_EN becomes a "don't care" input and any pull-up resistors previously enabled by HSWAP\_EN are disabled. If a user I/O in the application requires a pull-up resistor after configuration, place a PULLUP primitive on the associated I/O pin or, for some pins, set the associated bitstream generator option.

Table 75: HSWAP\_EN Encoding

| HSWAP_EN                              | Function                                                                                                                                                       |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>During Configuration</b>           |                                                                                                                                                                |
| 0                                     | Enable pull-up resistors on all pins not actively involved in the configuration process. Pull-ups are only active until configuration completes. See Table 78. |
| 1                                     | No pull-up resistors during configuration.                                                                                                                     |
| <b>After Configuration, User Mode</b> |                                                                                                                                                                |
| X                                     | This pin has no function except during device configuration.                                                                                                   |

#### Notes:

1. X = don't care, either 0 or 1.

The Bitstream generator option **HswapenPin** determines whether a pull-up resistor to VCCAUX, a pull-down resistor, or no resistor is present on HSWAP\_EN after configuration.



Table 76: JTAG Pin Descriptions

| Pin Name | Direction | Description                                                                                                                                                                                                                                                                 | Bitstream Generation Option                                                                                          |
|----------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| TCK      | Input     | <b>Test Clock:</b> The TCK clock signal synchronizes all boundary scan operations on its rising edge.                                                                                                                                                                       | The BitGen option <i>TckPin</i> determines whether a pull-up resistor, pull-down resistor or no resistor is present. |
| TDI      | Input     | <b>Test Data Input:</b> TDI is the serial data input for all JTAG instruction and data registers. This input is sampled on the rising edge of TCK.                                                                                                                          | The BitGen option <i>TdiPin</i> determines whether a pull-up resistor, pull-down resistor or no resistor is present. |
| TMS      | Input     | <b>Test Mode Select:</b> The TMS input controls the sequence of states through which the JTAG TAP state machine passes. This input is sampled on the rising edge of TCK.                                                                                                    | The BitGen option <i>TmsPin</i> determines whether a pull-up resistor, pull-down resistor or no resistor is present. |
| TDO      | Output    | <b>Test Data Output:</b> The TDO pin is the data output for all JTAG instruction and data registers. This output is sampled on the rising edge of TCK. The TDO output is an active totem-pole driver and is not like the open-collector TDO output on Virtex®-II Pro FPGAs. | The BitGen option <i>TdoPin</i> determines whether a pull-up resistor, pull-down resistor or no resistor is present. |

## JTAG: Dedicated JTAG Port Pins

These pins are dedicated connections to the four-wire IEEE 1532/IEEE 1149.1 JTAG port, shown in Figure 41 and described in Table 76. The JTAG port is used for boundary-scan testing, device configuration, application debugging, and possibly an additional serial port for the application. These pins are dedicated and are not available as user-I/O pins. Every package has four dedicated JTAG pins and these pins are powered by the +2.5V VCCAUX supply.

For additional information on JTAG configuration, see **Boundary-Scan (JTAG) Mode**, page 49.

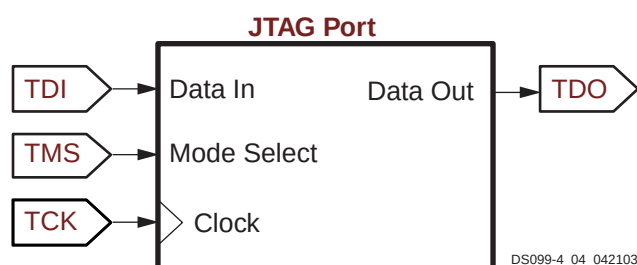


Figure 41: JTAG Port

## IDCODE Register

Spartan-3 FPGAs contain a 32-bit identification register called the IDCODE register, as defined in the IEEE 1149.1 JTAG standard. The fixed value electrically identifies the manufacture (Xilinx) and the type of device being addressed over a JTAG chain. This register allows the JTAG host to identify the device being tested or programmed via JTAG.

Table 77: Spartan-3 JTAG IDCODE Register Values (hexadecimal)

| Part Number | IDCODE Register |
|-------------|-----------------|
| XC3S50      | 0x0140C093      |
| XC3S200     | 0x01414093      |
| XC3S400     | 0x0141C093      |
| XC3S1000    | 0x01428093      |
| XC3S1500    | 0x01434093      |
| XC3S2000    | 0x01440093      |
| XC3S4000    | 0x01448093      |
| XC3S5000    | 0x01450093      |

## Using JTAG Port After Configuration

The JTAG port is always active and available before, during, and after FPGA configuration. Add the BSCAN\_SPARTAN3 primitive to the design to create user-defined JTAG instructions and JTAG chains to communicate with internal logic.

Furthermore, the contents of the User ID register within the JTAG port can be specified as a Bitstream Generation option. By default, the 32-bit User ID register contains 0xFFFFFFFF.

## Precautions When Using the JTAG Port in 3.3V Environments

The JTAG port is powered by the +2.5V VCCAUX power supply. When connecting to a 3.3V interface, the JTAG input pins must be current-limited using a series resistor. Similarly, the TDO pin is a CMOS output powered from +2.5V.



The TDO output can directly drive a 3.3V input but with reduced noise immunity. See **3.3V-Tolerant Configuration Interface**, [page 46](#) or [XAPP453: The 3.3V Configuration of Spartan-3 FPGAs](#) for additional details.

The following interface precautions are recommended when connecting the JTAG port to a 3.3V interface.

1. Avoid actively driving the JTAG input signals High with 3.3V signal levels. If required in the application, use series current-limiting resistors to keep the current below 10 mA per pin.
2. If possible, drive the FPGA JTAG inputs with drivers that can be placed in high-impedance (Hi-Z) after using the JTAG port. Alternatively, drive the FPGA JTAG inputs with open-drain outputs, which only drive Low. In both cases, pull-up resistors are required. The FPGA JTAG pins have pull-up resistors to VCCAUX before configuration and optional pull-up resistors after configuration, controlled by **Bitstream Options**, [page 117](#).

### VREF: User I/O or Input Buffer Reference Voltage for Special Interface Standards

These pins are individual user-I/O pins unless collectively they supply an input reference voltage, VREF\_#, for any SSTL, HSTL, GTL, or GTLP I/Os implemented in the associated I/O bank.

The '#' character in the pin name represents an integer, 0 through 7, that indicates the associated I/O bank.

The VREF function becomes active for this pin whenever a signal standard requiring a reference voltage is used in the associated bank.

If used as a user I/O, then each pin behaves as an independent I/O described in the I/O type section. If used for a reference voltage within a bank, then *all* VREF pins within the bank must be connected to the same reference voltage.

Spartan-3 devices are designed and characterized to support certain I/O standards when VREF is connected to +1.25V, +1.10V, +1.00V, +0.90V, +0.80V, and +0.75V.

During configuration, the VREF pins behave exactly like user-I/O pins.

If designing for footprint compatibility across the range of devices in a specific package, and if the VREF\_# pins within a bank connect to an input reference voltage, then also connect any N.C. (not connected) pins on the smaller devices in that package to the input reference voltage. More details are provided later for each package type.

### N.C. Type: Unconnected Package Pins

Pins marked as "N.C." are unconnected for the specific device/package combination. For other devices in this same package, this pin may be used as an I/O or VREF connection.

In both the pinout tables and the footprint diagrams, unconnected pins are noted with either a black diamond symbol (◆) or a black square symbol (■).

If designing for footprint compatibility across multiple device densities, check the pin types of the other Spartan-3 devices available in the same footprint. If the N.C. pin matches to VREF pins in other devices, and the VREF pins are used in the associated I/O bank, then connect the N.C. to the VREF voltage source.

### VCCO Type: Output Voltage Supply for I/O Bank

Each I/O bank has its own set of voltage supply pins that determines the output voltage for the output buffers in the I/O bank. Furthermore, for some I/O standards such as LVCMOS, LVCMOS25, LVTTL, etc., VCCO sets the input threshold voltage on the associated input buffers.

Spartan-3 devices are designed and characterized to support various I/O standards for VCCO values of +1.2V, +1.5V, +1.8V, +2.5V, and +3.3V.

Most VCCO pins are labeled as VCCO\_# where the '#' symbol represents the associated I/O bank number, an integer ranging from 0 to 7. In the 144-pin TQFP package (TQ144) however, the VCCO pins along an edge of the device are combined into a single VCCO input. For example, the VCCO inputs for Bank 0 and Bank 1 along the top edge of the package are combined and relabeled VCCO\_TOP. The bottom, left, and right edges are similarly combined.

In Serial configuration mode, VCCO\_4 must be at a level compatible with the attached configuration memory or data source. In Parallel configuration mode, both VCCO\_4 and VCCO\_5 must be at the same compatible voltage level.

All VCCO inputs to a bank must be connected together and to the voltage supply. Furthermore, there must be sufficient supply decoupling to guarantee problem-free operation, as described in [XAPP623: Power Distribution System \(PDS\) Design: Using Bypass/Decoupling Capacitors](#).

### VCCINT Type: Voltage Supply for Internal Core Logic

Internal core logic circuits such as the configurable logic blocks (CLBs) and programmable interconnect operate from the VCCINT voltage supply inputs. VCCINT must be +1.2V.

All VCCINT inputs must be connected together and to the +1.2V voltage supply. Furthermore, there must be sufficient supply decoupling to guarantee problem-free operation, as described in [XAPP623: Power Distribution System \(PDS\) Design: Using Bypass/Decoupling Capacitors](#).

## VCCAUX Type: Voltage Supply for Auxiliary Logic

The VCCAUX pins supply power to various auxiliary circuits, such as to the Digital Clock Managers (DCMs), the JTAG pins, and to the dedicated configuration pins (CONFIG type). VCCAUX must be +2.5V.

All VCCAUX inputs must be connected together and to the +2.5V voltage supply. Furthermore, there must be sufficient supply decoupling to guarantee problem-free operation, as described in [XAPP623: Power Distribution System \(PDS\) Design: Using Bypass/Decoupling Capacitors](#).

Because VCCAUX connects to the DCMs and the DCMs are sensitive to voltage changes, be sure that the VCCAUX supply and the ground return paths are designed for low noise and low voltage drop, especially that caused by a large number of simultaneous switching I/Os.

## GND Type: Ground

All GND pins must be connected and have a low resistance path back to the various VCCO, VCCINT, and VCCAUX supplies.

## Pin Behavior During Configuration

**Table 78** shows how various pins behave during the FPGA configuration process. The actual behavior depends on the values applied to the M2, M1, and M0 mode select pins and the HSWAP\_EN pin. The mode select pins determine which of the DUAL type pins are active during configuration. In

JTAG configuration mode, none of the DUAL-type pins are used for configuration and all behave as user-I/O pins.

All DUAL-type pins not actively used during configuration and all I/O-type, DCI-type, VREF-type, GCLK-type pins are high impedance (floating, three-stated, Hi-Z) during the configuration process. These pins are indicated in **Table 78** as shaded table entries or cells. These pins have a pull-up resistor to their associated VCCO if the HSWAP\_EN pin is Low. When HSWAP\_EN is High, these pull-up resistors are disabled during configuration.

Some pins always have an active pull-up resistor during configuration, regardless of the value applied to the HSWAP\_EN pin. After configuration, these pull-up resistors are controlled by **Bitstream Options**.

- All the dedicated CONFIG-type configuration pins (CCLK, PROG\_B, DONE, M2, M1, M0, and HSWAP\_EN) have a pull-up resistor to VCCAUX.
- All JTAG-type pins (TCK, TDI, TMS, TDO) have a pull-up resistor to VCCAUX.
- The INIT\_B DUAL-purpose pin has a pull-up resistor to VCCO\_4 or VCCO\_BOTTOM, depending on package style.

After configuration completes, some pins have optional behavior controlled by the configuration bitstream loaded into the part. For example, via the bitstream, all unused I/O pins can be collectively configured as input pins with either a pull-up resistor, a pull-down resistor, or be left in a high-impedance state.

**Table 78: Pin Behavior After Power-Up, During Configuration**

| Pin Name                              | Configuration Mode Settings <M2:M1:M0> |               |                          |               |                   | Bitstream Configuration Option |
|---------------------------------------|----------------------------------------|---------------|--------------------------|---------------|-------------------|--------------------------------|
|                                       | Serial Modes                           |               | SelectMap Parallel Modes |               | JTAG Mode <1:0:1> |                                |
|                                       | Master <0:0:0>                         | Slave <1:1:1> | Master <0:1:1>           | Slave <1:1:0> |                   |                                |
| I/O: General-purpose I/O pins         |                                        |               |                          |               |                   |                                |
| IO                                    |                                        |               |                          |               |                   | UnusedPin                      |
| IO_Lxxy_#                             |                                        |               |                          |               |                   | UnusedPin                      |
| DUAL: Dual-purpose configuration pins |                                        |               |                          |               |                   |                                |
| IO_Lxxy_#/DIN/D0                      | DIN (I)                                | DIN (I)       | D0 (I/O)                 | D0 (I/O)      |                   | Persist UnusedPin              |
| IO_Lxxy_#/D1                          |                                        |               | D1 (I/O)                 | D1 (I/O)      |                   | Persist UnusedPin              |
| IO_Lxxy_#/D2                          |                                        |               | D2 (I/O)                 | D2 (I/O)      |                   | Persist UnusedPin              |
| IO_Lxxy_#/D3                          |                                        |               | D3 (I/O)                 | D3 (I/O)      |                   | Persist UnusedPin              |
| IO_Lxxy_#/D4                          |                                        |               | D4 (I/O)                 | D4 (I/O)      |                   | Persist UnusedPin              |

Table 78: Pin Behavior After Power-Up, During Configuration (Continued)

| Pin Name                                                                                                                                                      | Configuration Mode Settings <M2:M1:M0> |                      |                          |                      |                                     | Bitstream Configuration Option |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------|--------------------------|----------------------|-------------------------------------|--------------------------------|
|                                                                                                                                                               | Serial Modes                           |                      | SelectMap Parallel Modes |                      | JTAG Mode <1:0:1>                   |                                |
|                                                                                                                                                               | Master <0:0:0>                         | Slave <1:1:1>        | Master <0:1:1>           | Slave <1:1:0>        |                                     |                                |
| IO_Lxxy_#/D5                                                                                                                                                  |                                        |                      | D5 (I/O)                 | D5 (I/O)             |                                     | Persist UnusedPin              |
| IO_Lxxy_#/D6                                                                                                                                                  |                                        |                      | D6 (I/O)                 | D6 (I/O)             |                                     | Persist UnusedPin              |
| IO_Lxxy_#/D7                                                                                                                                                  |                                        |                      | D7 (I/O)                 | D7 (I/O)             |                                     | Persist UnusedPin              |
| IO_Lxxy_#/CS_B                                                                                                                                                |                                        |                      | CS_B (I)                 | CS_B (I)             |                                     | Persist UnusedPin              |
| IO_Lxxy_#/RDWR_B                                                                                                                                              |                                        |                      | RDWR_B (I)               | RDWR_B (I)           |                                     | Persist UnusedPin              |
| IO_Lxxy_#/BUSY/DOUT                                                                                                                                           | DOUT (O)                               | DOUT (O)             | BUSY (O)                 | BUSY (O)             |                                     | Persist UnusedPin              |
| DUAL: Dual-purpose configuration pins (INIT_B has a pull-up resistor to VCCO_4 or VCCO_BOTTOM always active during configuration, regardless of HSWAP_EN pin) |                                        |                      |                          |                      |                                     |                                |
| IO_Lxxy_#/INIT_B                                                                                                                                              | INIT_B (I/OD)                          | INIT_B (I/OD)        | INIT_B (I/OD)            | INIT_B (I/OD)        |                                     | UnusedPin                      |
| DCI: Digitally Controlled Impedance reference resistor input pins                                                                                             |                                        |                      |                          |                      |                                     |                                |
| IO_Lxxy_#/VRN_#                                                                                                                                               |                                        |                      |                          |                      |                                     | UnusedPin                      |
| IO/VRN_#                                                                                                                                                      |                                        |                      |                          |                      |                                     | UnusedPin                      |
| IO_Lxxy_#/VRP_#                                                                                                                                               |                                        |                      |                          |                      |                                     | UnusedPin                      |
| IO/VRP_#                                                                                                                                                      |                                        |                      |                          |                      |                                     | UnusedPin                      |
| GCLK: Global clock buffer inputs                                                                                                                              |                                        |                      |                          |                      |                                     |                                |
| IO_Lxxy_#/GCLK0through GCLK7                                                                                                                                  |                                        |                      |                          |                      |                                     | UnusedPin                      |
| VREF: I/O bank input reference voltage pins                                                                                                                   |                                        |                      |                          |                      |                                     |                                |
| IO_Lxxy_#/VREF_#                                                                                                                                              |                                        |                      |                          |                      |                                     | UnusedPin                      |
| IO/VREF_#                                                                                                                                                     |                                        |                      |                          |                      |                                     | UnusedPin                      |
| CONFIG: Dedicated configuration pins (pull-up resistor to VCCAUX always active during configuration, regardless of HSWAP_EN pin)                              |                                        |                      |                          |                      |                                     |                                |
| CCLK                                                                                                                                                          | CCLK (I/O)                             | CCLK (I)             | CCLK (I/O)               | CCLK (I)             |                                     | CclkPin ConfigRate             |
| PROG_B                                                                                                                                                        | PROG_B (I) (pull-up)                   | PROG_B (I) (pull-up) | PROG_B (I) (pull-up)     | PROG_B (I) (pull-up) | PROG_B (I), Via JPROG_B instruction | ProgPin                        |
| DONE                                                                                                                                                          | DONE (I/OD)                            | DONE (I/OD)          | DONE (I/OD)              | DONE (I/OD)          | DONE (I/OD)                         | DriveDone DonePin DonePipe     |
| M2                                                                                                                                                            | M2=0 (I)                               | M2=1 (I)             | M2=0 (I)                 | M2=1 (I)             | M2=1 (I)                            | M2Pin                          |

Table 78: Pin Behavior After Power-Up, During Configuration (Continued)

| Pin Name                                                                                                              | Configuration Mode Settings <M2:M1:M0> |                                    |                                    |                                    |                   | Bitstream Configuration Option |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------|--------------------------------|
|                                                                                                                       | Serial Modes                           |                                    | SelectMap Parallel Modes           |                                    | JTAG Mode <1:0:1> |                                |
|                                                                                                                       | Master <0:0:0>                         | Slave <1:1:1>                      | Master <0:1:1>                     | Slave <1:1:0>                      |                   |                                |
| M1                                                                                                                    | M1=0 (I)                               | M1=1 (I)                           | M1=1 (I)                           | M1=1 (I)                           | M1=0 (I)          | M1Pin                          |
| M0                                                                                                                    | M0=0 (I)                               | M0=1 (I)                           | M0=1 (I)                           | M0=0 (I)                           | M0=1 (I)          | M0Pin                          |
| HSWAP_EN                                                                                                              | HSWAP_EN (I)                           | HSWAP_EN (I)                       | HSWAP_EN (I)                       | HSWAP_EN (I)                       | HSWAP_EN (I)      | HswapenPin                     |
| JTAG: JTAG interface pins (pull-up resistor to VCCAUX always active during configuration, regardless of HSWAP_EN pin) |                                        |                                    |                                    |                                    |                   |                                |
| TDI                                                                                                                   | TDI (I)                                | TDI (I)                            | TDI (I)                            | TDI (I)                            | TDI (I)           | TdiPin                         |
| TMS                                                                                                                   | TMS (I)                                | TMS (I)                            | TMS (I)                            | TMS (I)                            | TMS (I)           | TmsPin                         |
| TCK                                                                                                                   | TCK (I)                                | TCK (I)                            | TCK (I)                            | TCK (I)                            | TCK (I)           | TckPin                         |
| TDO                                                                                                                   | TDO (O)                                | TDO (O)                            | TDO (O)                            | TDO (O)                            | TDO (O)           | TdoPin                         |
| VCCO: I/O bank output voltage supply pins                                                                             |                                        |                                    |                                    |                                    |                   |                                |
| VCCO_4 (for DUAL pins)                                                                                                | Same voltage as external interface     | Same voltage as external interface | Same voltage as external interface | Same voltage as external interface | VCCO_4            |                                |
| VCCO_5 (for DUAL pins)                                                                                                | VCCO_5                                 | VCCO_5                             | Same voltage as external interface | Same voltage as external interface | VCCO_5            |                                |
| VCCO_#                                                                                                                | VCCO_#                                 | VCCO_#                             | VCCO_#                             | VCCO_#                             | VCCO_#            |                                |
| VCCAUX: Auxiliary voltage supply pins                                                                                 |                                        |                                    |                                    |                                    |                   |                                |
| VCCAUX                                                                                                                | +2.5V                                  | +2.5V                              | +2.5V                              | +2.5V                              | +2.5V             |                                |
| VCCINT: Internal core voltage supply pins                                                                             |                                        |                                    |                                    |                                    |                   |                                |
| VCCINT                                                                                                                | +1.2V                                  | +1.2V                              | +1.2V                              | +1.2V                              | +1.2V             |                                |
| GND: Ground supply pins                                                                                               |                                        |                                    |                                    |                                    |                   |                                |
| GND                                                                                                                   | GND                                    | GND                                | GND                                | GND                                | GND               |                                |

**Notes:**

1. # = I/O bank number, an integer from 0 to 7.
2. (I) = input, (O) = output, (OD) = open-drain output, (I/O) = bidirectional, (I/OD) = bidirectional with open-drain output. Open-drain output requires pull-up to create logic High level.
3.  Shaded cell indicates that the pin is high-impedance during configuration. To enable a soft pull-up resistor during configuration, drive or tie HSWAP\_EN Low.

## Bitstream Options

**Table 79** lists the various bitstream options that affect pins on a Spartan-3 FPGA. The table shows the names of the affected pins, describes the function of the bitstream option,

the name of the bitstream generator option variable, and the legal values for each variable. The default option setting for each variable is indicated with bold, underlined text.

**Table 79: Bitstream Options Affecting Spartan-3 Pins**

| Affected Pin Name(s)                                                                                                                                                               | Bitstream Generation Function                                                                                                                                                                                                                                                                                                                                      | Option Variable Name | Values (default value)                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------|
| All unused I/O pins of type I/O, DUAL, GCLK, DCI, VREF                                                                                                                             | For all I/O pins that are unused in the application after configuration, this option defines whether the I/Os are individually tied to VCCO via a pull-up resistor, tied ground via a pull-down resistor, or left floating. If left floating, the unused pins should be connected to a defined logic level, either from a source internal to the FPGA or external. | UnusedPin            | <ul style="list-style-type: none"> <li><b><u>Pulldown</u></b></li> <li>Pullup</li> <li>Pullnone</li> </ul> |
| IO_Lxyy_#/DIN, IO_Lxyy_#/DOUT, IO_Lxyy_#/INIT_B                                                                                                                                    | Serial configuration mode: If set to Yes, then these pins retain their functionality after configuration completes, allowing for device (re-)configuration. Readback is not supported in with serial mode.                                                                                                                                                         | Persist              | <ul style="list-style-type: none"> <li><b><u>No</u></b></li> <li>Yes</li> </ul>                            |
| IO_Lxyy_#/D0, IO_Lxyy_#/D1, IO_Lxyy_#/D2, IO_Lxyy_#/D3, IO_Lxyy_#/D4, IO_Lxyy_#/D5, IO_Lxyy_#/D6, IO_Lxyy_#/D7, IO_Lxyy_#/CS_B, IO_Lxyy_#/RDWR_B, IO_Lxyy_#/BUSY, IO_Lxyy_#/INIT_B | Parallel configuration mode (also called SelectMAP): If set to Yes, then these pins retain their SelectMAP functionality after configuration completes, allowing for device readback and for partial or complete (re-)configuration.                                                                                                                               | Persist              | <ul style="list-style-type: none"> <li><b><u>No</u></b></li> <li>Yes</li> </ul>                            |
| CCLK                                                                                                                                                                               | After configuration, this bitstream option either pulls CCLK to VCCAUX via a pull-up resistor, or allows CCLK to float.                                                                                                                                                                                                                                            | CclkPin              | <ul style="list-style-type: none"> <li><b><u>Pullup</u></b></li> <li>Pullnone</li> </ul>                   |
| CCLK                                                                                                                                                                               | For Master configuration modes, this option sets the approximate frequency, in MHz, for the internal silicon oscillator.                                                                                                                                                                                                                                           | ConfigRate           | 3, <b><u>6</u></b> , 12, 25, 50                                                                            |
| PROG_B                                                                                                                                                                             | A pull-up resistor to VCCAUX exists on PROG_B during configuration. After configuration, this bitstream option either pulls PROG_B to VCCAUX via a pull-up resistor, or allows PROG_B to float.                                                                                                                                                                    | ProgPin              | <ul style="list-style-type: none"> <li><b><u>Pullup</u></b></li> <li>Pullnone</li> </ul>                   |
| DONE                                                                                                                                                                               | After configuration, this bitstream option either pulls DONE to VCCAUX via a pull-up resistor, or allows DONE to float. See also DriveDone option.                                                                                                                                                                                                                 | DonePin              | <ul style="list-style-type: none"> <li><b><u>Pullup</u></b></li> <li>Pullnone</li> </ul>                   |
| DONE                                                                                                                                                                               | If set to Yes, this option allows the FPGA's DONE pin to drive High when configuration completes. By default, the DONE is an open-drain output and can only drive Low. Only single FPGAs and the last FPGA in a multi-FPGA daisy-chain should use this option.                                                                                                     | DriveDone            | <ul style="list-style-type: none"> <li><b><u>No</u></b></li> <li>Yes</li> </ul>                            |
| M2                                                                                                                                                                                 | After configuration, this bitstream option either pulls M2 to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows M2 to float.                                                                                                                                                                                                            | M2Pin                | <ul style="list-style-type: none"> <li><b><u>Pullup</u></b></li> <li>Pulldown</li> <li>Pullnone</li> </ul> |
| M1                                                                                                                                                                                 | After configuration, this bitstream option either pulls M1 to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows M1 to float.                                                                                                                                                                                                            | M1Pin                | <ul style="list-style-type: none"> <li><b><u>Pullup</u></b></li> <li>Pulldown</li> <li>Pullnone</li> </ul> |

Table 79: Bitstream Options Affecting Spartan-3 Pins (Continued)

| Affected Pin Name(s) | Bitstream Generation Function                                                                                                                                       | Option Variable Name | Values (default value)                                                                                    |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------|
| M0                   | After configuration, this bitstream option either pulls M0 to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows M0 to float.             | M0Pin                | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |
| HSWAP_EN             | After configuration, this bitstream option either pulls HSWAP_EN to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows HSWAP_EN to float. | HswapenPin           | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |
| TDI                  | After configuration, this bitstream option either pulls TDI to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows TDI to float.           | TdiPin               | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |
| TMS                  | After configuration, this bitstream option either pulls TMS to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows TMS to float.           | TmsPin               | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |
| TCK                  | After configuration, this bitstream option either pulls TCK to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows TCK to float.           | TckPin               | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |
| TDO                  | After configuration, this bitstream option either pulls TDO to VCCAUX via a pull-up resistor, to ground via a pull-down resistor, or allows TDO to float.           | TdoPin               | <ul style="list-style-type: none"> <li>• <b>Pullup</b></li> <li>• Pulldown</li> <li>• Pullnone</li> </ul> |

### Setting Bitstream Generator Options

Refer to the [“BitGen” chapter](#) in the Xilinx ISE® software documentation.



## Package Overview

Table 80 shows the 10 low-cost, space-saving production package styles for the Spartan-3 family. Each package style is available as a standard and an environmentally-friendly lead-free (Pb-free) option. The Pb-free packages include an extra 'G' in the package style name. For example, the standard "VQ100" package becomes "VQG100" when ordered

as the Pb-free option. The mechanical dimensions of the standard and Pb-free packages are similar, as shown in the mechanical drawings provided in Table 82.

Not all Spartan-3 densities are available in all packages. However, for a specific package there is a common footprint for that supports the various devices available in that package. See the footprint diagrams that follow.

Table 80: Spartan-3 Family Package Options

| Package                         | Leads | Type                             | Maximum I/O | Pitch (mm) | Area (mm)   | Height (mm) |
|---------------------------------|-------|----------------------------------|-------------|------------|-------------|-------------|
| VQ100 / VQG100                  | 100   | Very-thin Quad Flat Pack         | 63          | 0.5        | 16 x 16     | 1.20        |
| CP132 / CPG132                  | 132   | Chip-Scale Package               | 89          | 0.5        | 8 x 8       | 1.10        |
| TQ144 / TQG144                  | 144   | Thin Quad Flat Pack              | 97          | 0.5        | 22 x 22     | 1.60        |
| PQ208 / PQG208                  | 208   | Quad Flat Pack                   | 141         | 0.5        | 30.6 x 30.6 | 4.10        |
| FT256 / FTG256                  | 256   | Fine-pitch, Thin Ball Grid Array | 173         | 1.0        | 17 x 17     | 1.55        |
| FG320 / FGG320                  | 320   | Fine-pitch Ball Grid Array       | 221         | 1.0        | 19 x 19     | 2.00        |
| FG456 / FGG456                  | 456   | Fine-pitch Ball Grid Array       | 333         | 1.0        | 23 x 23     | 2.60        |
| FG676 / FGG676                  | 676   | Fine-pitch Ball Grid Array       | 489         | 1.0        | 27 x 27     | 2.60        |
| FG900 / FGG900                  | 900   | Fine-pitch Ball Grid Array       | 633         | 1.0        | 31 x 31     | 2.60        |
| FG1156 / FGG1156 <sup>(1)</sup> | 1156  | Fine-pitch Ball Grid Array       | 784         | 1.0        | 35 x 35     | 2.60        |

### Notes:

- The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

## Selecting the Right Package Option

Spartan-3 FPGAs are available in both quad-flat pack (QFP) and ball grid array (BGA) packaging options. While QFP packaging offers the lowest absolute cost, the BGA

packages are superior in almost every other aspect, as summarized in Table 81. Consequently, Xilinx recommends using BGA packaging whenever possible.

Table 81: Comparing Spartan-3 Packaging Options

| Characteristic                              | Quad Flat-Pack (QFP) | Ball Grid Array (BGA) |
|---------------------------------------------|----------------------|-----------------------|
| Maximum User I/O                            | 141                  | 633                   |
| Packing Density (Logic/Area)                | Good                 | Better                |
| Signal Integrity                            | Fair                 | Better                |
| Simultaneous Switching Output (SSO) Support | Limited              | Better                |
| Thermal Dissipation                         | Fair                 | Better                |
| Minimum Printed Circuit Board (PCB) Layers  | 4                    | 6                     |
| Hand Assembly/Rework                        | Possible             | Very Difficult        |

## Mechanical Drawings

Detailed mechanical drawings for each package type are available from the Xilinx website at the specified location in [Table 82](#).

Material Declaration Data Sheets (MDDS) are also available on the [Xilinx website](#) for each package.

**Table 82: Xilinx Package Mechanical Drawings**

| Package                         | Web Link (URL)                                                                                                                                          |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| VQ100 / VQG100                  | <a href="http://www.xilinx.com/support/documentation/package_specs/vq100.pdf">http://www.xilinx.com/support/documentation/package_specs/vq100.pdf</a>   |
| CP132/ CPG132                   | <a href="http://www.xilinx.com/support/documentation/package_specs/cp132.pdf">http://www.xilinx.com/support/documentation/package_specs/cp132.pdf</a>   |
| TQ144 / TQG144                  | <a href="http://www.xilinx.com/support/documentation/package_specs/tq144.pdf">http://www.xilinx.com/support/documentation/package_specs/tq144.pdf</a>   |
| PQ208 / PQG208                  | <a href="http://www.xilinx.com/support/documentation/package_specs/pq208.pdf">http://www.xilinx.com/support/documentation/package_specs/pq208.pdf</a>   |
| FT256 / FTG256                  | <a href="http://www.xilinx.com/support/documentation/package_specs/ft256.pdf">http://www.xilinx.com/support/documentation/package_specs/ft256.pdf</a>   |
| FG320 / FGG320                  | <a href="http://www.xilinx.com/support/documentation/package_specs/fg320.pdf">http://www.xilinx.com/support/documentation/package_specs/fg320.pdf</a>   |
| FG456 / FGG456                  | <a href="http://www.xilinx.com/support/documentation/package_specs/fg456.pdf">http://www.xilinx.com/support/documentation/package_specs/fg456.pdf</a>   |
| FG676 / FGG676                  | <a href="http://www.xilinx.com/support/documentation/package_specs/fg676.pdf">http://www.xilinx.com/support/documentation/package_specs/fg676.pdf</a>   |
| FG900 / FGG900                  | <a href="http://www.xilinx.com/support/documentation/package_specs/fg900.pdf">http://www.xilinx.com/support/documentation/package_specs/fg900.pdf</a>   |
| FG1156 / FGG1156 <sup>(1)</sup> | <a href="http://www.xilinx.com/support/documentation/package_specs/fg1156.pdf">http://www.xilinx.com/support/documentation/package_specs/fg1156.pdf</a> |

**Notes:**

1. The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

## Power, Ground, and I/O by Package

Each package has three separate voltage supply inputs—VCCINT, VCCAUX, and VCCO—and a common ground return, GND. The numbers of pins dedicated to these functions varies by package, as shown in [Table 83](#).

A majority of package pins are user-defined I/O pins. However, the numbers and characteristics of these I/O depends on the device type and the package in which it is available, as shown in [Table 84](#). The table shows the maximum number of single-ended I/O pins available, assuming that all I/O-, DUAL-, DCI-, VREF-, and GCLK-type pins are used as general-purpose I/O. Likewise, the table shows the maximum number of differential pin-pairs available on the package. Finally, the table shows how the total maximum user I/Os are distributed by pin type, including the number of unconnected—i.e., N.C.—pins on the device.

**Table 83: Power and Ground Supply Pins by Package**

| Package               | VCCINT | VCCAUX | VCCO | GND |
|-----------------------|--------|--------|------|-----|
| VQ100                 | 4      | 4      | 8    | 10  |
| CP132                 | 4      | 4      | 12   | 12  |
| TQ144                 | 4      | 4      | 12   | 16  |
| PQ208                 | 4      | 8      | 12   | 28  |
| FT256                 | 8      | 8      | 24   | 32  |
| FG320                 | 12     | 8      | 28   | 40  |
| FG456                 | 12     | 8      | 40   | 52  |
| FG676                 | 20     | 16     | 64   | 76  |
| FG900                 | 32     | 24     | 80   | 120 |
| FG1156 <sup>(1)</sup> | 40     | 32     | 104  | 184 |

**Notes:**

1. The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

Table 84: Maximum User I/Os by Package

| Device   | Package               | Maximum User I/Os | Maximum Differential Pairs | All Possible I/O Pins by Type |      |     |      |      | N.C. |
|----------|-----------------------|-------------------|----------------------------|-------------------------------|------|-----|------|------|------|
|          |                       |                   |                            | I/O                           | DUAL | DCI | VREF | GCLK |      |
| XC3S50   | VQ100                 | 63                | 29                         | 22                            | 12   | 14  | 7    | 8    | 0    |
| XC3S200  | VQ100                 | 63                | 29                         | 22                            | 12   | 14  | 7    | 8    | 0    |
| XC3S50   | CP132                 | 89                | 44                         | 44                            | 12   | 14  | 11   | 8    | 0    |
| XC3S50   | TQ144                 | 97                | 46                         | 51                            | 12   | 14  | 12   | 8    | 0    |
| XC3S200  | TQ144                 | 97                | 46                         | 51                            | 12   | 14  | 12   | 8    | 0    |
| XC3S400  | TQ144                 | 97                | 46                         | 51                            | 12   | 14  | 12   | 8    | 0    |
| XC3S50   | PQ208                 | 124               | 56                         | 72                            | 12   | 16  | 16   | 8    | 17   |
| XC3S200  | PQ208                 | 141               | 62                         | 83                            | 12   | 16  | 22   | 8    | 0    |
| XC3S400  | PQ208                 | 141               | 62                         | 83                            | 12   | 16  | 22   | 8    | 0    |
| XC3S200  | FT256                 | 173               | 76                         | 113                           | 12   | 16  | 24   | 8    | 0    |
| XC3S400  | FT256                 | 173               | 76                         | 113                           | 12   | 16  | 24   | 8    | 0    |
| XC3S1000 | FT256                 | 173               | 76                         | 113                           | 12   | 16  | 24   | 8    | 0    |
| XC3S400  | FG320                 | 221               | 100                        | 156                           | 12   | 16  | 29   | 8    | 0    |
| XC3S1000 | FG320                 | 221               | 100                        | 156                           | 12   | 16  | 29   | 8    | 0    |
| XC3S1500 | FG320                 | 221               | 100                        | 156                           | 12   | 16  | 29   | 8    | 0    |
| XC3S400  | FG456                 | 264               | 116                        | 196                           | 12   | 16  | 32   | 8    | 69   |
| XC3S1000 | FG456                 | 333               | 149                        | 261                           | 12   | 16  | 36   | 8    | 0    |
| XC3S1500 | FG456                 | 333               | 149                        | 261                           | 12   | 16  | 36   | 8    | 0    |
| XC3S2000 | FG456                 | 333               | 149                        | 261                           | 12   | 16  | 36   | 8    | 0    |
| XC3S1000 | FG676                 | 391               | 175                        | 315                           | 12   | 16  | 40   | 8    | 98   |
| XC3S1500 | FG676                 | 487               | 221                        | 403                           | 12   | 16  | 48   | 8    | 2    |
| XC3S2000 | FG676                 | 489               | 221                        | 405                           | 12   | 16  | 48   | 8    | 0    |
| XC3S4000 | FG676                 | 489               | 221                        | 405                           | 12   | 16  | 48   | 8    | 0    |
| XC3S5000 | FG676                 | 489               | 221                        | 405                           | 12   | 16  | 48   | 8    | 0    |
| XC3S2000 | FG900                 | 565               | 270                        | 481                           | 12   | 16  | 48   | 8    | 68   |
| XC3S4000 | FG900                 | 633               | 300                        | 549                           | 12   | 16  | 48   | 8    | 0    |
| XC3S5000 | FG900                 | 633               | 300                        | 549                           | 12   | 16  | 48   | 8    | 0    |
| XC3S4000 | FG1156 <sup>(1)</sup> | 712               | 312                        | 621                           | 12   | 16  | 55   | 8    | 73   |
| XC3S5000 | FG1156 <sup>(1)</sup> | 784               | 344                        | 692                           | 12   | 16  | 56   | 8    | 1    |

**Notes:**

1. The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

Electronic versions of the package pinout tables and footprints are available for download from the Xilinx website. Using a spreadsheet program, the data can be sorted and reformatted according to any specific needs. Similarly, the

ASCII-text file is easily parsed by most scripting programs. Download the files from the following location:

[http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip)

## Package Thermal Characteristics

The power dissipated by an FPGA application has implications on package selection and system design. The power consumed by a Spartan-3 FPGA is reported using either the [XPower](#) Estimator (XPE) or the XPower Analyzer integrated in the Xilinx ISE development software. [Table 85](#) provides the thermal characteristics for the various Spartan-3 package offerings.

The junction-to-case thermal resistance ( $\theta_{JC}$ ) indicates the difference between the temperature measured on the pack-

age body (case) and the die junction temperature per watt of power consumption. The junction-to-board ( $\theta_{JB}$ ) value similarly reports the difference between the board and junction temperature. The junction-to-ambient ( $\theta_{JA}$ ) value reports the temperature difference per watt between the ambient environment and the junction temperature. The  $\theta_{JA}$  value is reported at different air velocities, measured in linear feet per minute (LFM). The “Still Air (0 LFM)” column shows the  $\theta_{JA}$  value in a system without a fan. The thermal resistance drops with increasing air flow.

Table 85: Spartan-3 Package Thermal Characteristics

| Package                  | Device   | Junction-to-Case ( $\theta_{JC}$ ) | Junction-to-Board ( $\theta_{JB}$ ) | Junction-to-Ambient ( $\theta_{JA}$ )<br>at Different Air Flows |         |         |         | Units   |
|--------------------------|----------|------------------------------------|-------------------------------------|-----------------------------------------------------------------|---------|---------|---------|---------|
|                          |          |                                    |                                     | Still Air<br>(0 LFM)                                            | 250 LFM | 500 LFM | 750 LFM |         |
| VQ(G)100                 | XC3S50   | 12.0                               | -                                   | 46.2                                                            | 38.4    | 35.8    | 34.9    | °C/Watt |
|                          | XC3S200  | 10.0                               | -                                   | 40.5                                                            | 33.7    | 31.3    | 30.5    |         |
| CP(G)132                 | XC3S50   | 14.5                               | 32.8                                | 53.0                                                            | 46.4    | 44.0    | 42.5    |         |
| TQ(G)144                 | XC3S50   | 7.6                                | -                                   | 41.0                                                            | 31.9    | 27.2    | 25.6    |         |
|                          | XC3S200  | 6.6                                | -                                   | 34.5                                                            | 26.9    | 23.0    | 21.6    |         |
|                          | XC3S400  | 6.1                                | -                                   | 32.8                                                            | 25.5    | 21.8    | 20.4    |         |
| PQ(G)208                 | XC3S50   | 10.6                               | -                                   | 37.4                                                            | 27.6    | 24.4    | 22.6    |         |
|                          | XC3S200  | 8.6                                | -                                   | 36.2                                                            | 26.7    | 23.6    | 21.9    |         |
|                          | XC3S400  | 7.5                                | -                                   | 35.4                                                            | 26.1    | 23.1    | 21.4    |         |
| FT(G)256                 | XC3S200  | 9.9                                | 22.9                                | 31.7                                                            | 25.6    | 24.5    | 24.2    |         |
|                          | XC3S400  | 7.9                                | 19.0                                | 28.4                                                            | 22.8    | 21.5    | 21.0    |         |
|                          | XC3S1000 | 5.6                                | 14.7                                | 24.8                                                            | 19.2    | 18.0    | 17.5    |         |
| FG(G)320                 | XC3S400  | 8.9                                | 13.9                                | 24.4                                                            | 19.0    | 17.8    | 17.0    |         |
|                          | XC3S1000 | 7.8                                | 11.8                                | 22.3                                                            | 17.0    | 15.8    | 15.0    |         |
|                          | XC3S1500 | 6.7                                | 9.8                                 | 20.3                                                            | 15.18   | 13.8    | 13.1    |         |
| FG(G)456                 | XC3S400  | 8.4                                | 13.6                                | 20.8                                                            | 15.1    | 13.9    | 13.4    |         |
|                          | XC3S1000 | 6.4                                | 10.6                                | 19.3                                                            | 13.4    | 12.3    | 11.7    |         |
|                          | XC3S1500 | 4.9                                | 8.3                                 | 18.3                                                            | 12.4    | 11.2    | 10.7    |         |
|                          | XC3S2000 | 3.7                                | 6.5                                 | 17.7                                                            | 11.7    | 10.5    | 10.0    |         |
| FG(G)676                 | XC3S1000 | 6.0                                | 10.4                                | 17.9                                                            | 13.7    | 12.6    | 12.0    |         |
|                          | XC3S1500 | 4.9                                | 8.8                                 | 16.8                                                            | 12.4    | 11.3    | 10.7    |         |
|                          | XC3S2000 | 4.1                                | 7.9                                 | 15.6                                                            | 11.1    | 9.9     | 9.3     |         |
|                          | XC3S4000 | 3.6                                | 7.0                                 | 15.0                                                            | 10.5    | 9.3     | 8.7     |         |
|                          | XC3S5000 | 3.4                                | 6.3                                 | 14.7                                                            | 10.3    | 9.1     | 8.5     |         |
| FG(G)900                 | XC3S2000 | 3.7                                | 7.0                                 | 14.3                                                            | 10.3    | 9.3     | 8.8     |         |
|                          | XC3S4000 | 3.3                                | 6.4                                 | 13.6                                                            | 9.7     | 8.7     | 8.2     |         |
|                          | XC3S5000 | 2.9                                | 5.9                                 | 13.1                                                            | 9.2     | 8.1     | 7.6     |         |
| FG(G)1156 <sup>(1)</sup> | XC3S4000 | 1.9                                | -                                   | 14.7                                                            | 11.4    | 10.1    | 9.0     |         |
|                          | XC3S5000 | 1.9                                | 8.9                                 | 14.5                                                            | 11.3    | 10.0    | 8.9     |         |

**Notes:**

- The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

## VQ100: 100-lead Very-thin Quad Flat Package

The XC3S50 and the XC3S200 devices are available in the 100-lead very-thin quad flat package, VQ100. Both devices share a common footprint for this package as shown in [Table 86](#) and [Figure 42](#).

All the package pins appear in [Table 86](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx website at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 86: VQ100 Package Pinout

| Bank | XC3S50<br>XC3S200<br>Pin Name | VQ100 Pin<br>Number | Type |
|------|-------------------------------|---------------------|------|
| 0    | IO_L01N_0/VRP_0               | P97                 | DCI  |
| 0    | IO_L01P_0/VRN_0               | P96                 | DCI  |
| 0    | IO_L31N_0                     | P92                 | I/O  |
| 0    | IO_L31P_0/VREF_0              | P91                 | VREF |
| 0    | IO_L32N_0/GCLK7               | P90                 | GCLK |
| 0    | IO_L32P_0/GCLK6               | P89                 | GCLK |
| 0    | VCCO_0                        | P94                 | VCCO |
| 1    | IO                            | P81                 | I/O  |
| 1    | IO_L01N_1/VRP_1               | P80                 | DCI  |
| 1    | IO_L01P_1/VRN_1               | P79                 | DCI  |
| 1    | IO_L31N_1/VREF_1              | P86                 | VREF |
| 1    | IO_L31P_1                     | P85                 | I/O  |
| 1    | IO_L32N_1/GCLK5               | P88                 | GCLK |
| 1    | IO_L32P_1/GCLK4               | P87                 | GCLK |
| 1    | VCCO_1                        | P83                 | VCCO |
| 2    | IO_L01N_2/VRP_2               | P75                 | DCI  |
| 2    | IO_L01P_2/VRN_2               | P74                 | DCI  |
| 2    | IO_L21N_2                     | P72                 | I/O  |
| 2    | IO_L21P_2                     | P71                 | I/O  |
| 2    | IO_L24N_2                     | P68                 | I/O  |
| 2    | IO_L24P_2                     | P67                 | I/O  |
| 2    | IO_L40N_2                     | P65                 | I/O  |
| 2    | IO_L40P_2/VREF_2              | P64                 | VREF |
| 2    | VCCO_2                        | P70                 | VCCO |
| 3    | IO                            | P55                 | I/O  |
| 3    | IO                            | P59                 | I/O  |

Table 86: VQ100 Package Pinout

| Bank | XC3S50<br>XC3S200<br>Pin Name | VQ100 Pin<br>Number | Type |
|------|-------------------------------|---------------------|------|
| 3    | IO_L01N_3/VRP_3               | P54                 | DCI  |
| 3    | IO_L01P_3/VRN_3               | P53                 | DCI  |
| 3    | IO_L24N_3                     | P61                 | I/O  |
| 3    | IO_L24P_3                     | P60                 | I/O  |
| 3    | IO_L40N_3/VREF_3              | P63                 | VREF |
| 3    | IO_L40P_3                     | P62                 | I/O  |
| 3    | VCCO_3                        | P57                 | VCCO |
| 4    | IO_L01N_4/VRP_4               | P50                 | DCI  |
| 4    | IO_L01P_4/VRN_4               | P49                 | DCI  |
| 4    | IO_L27N_4/DIN/D0              | P48                 | DUAL |
| 4    | IO_L27P_4/D1                  | P47                 | DUAL |
| 4    | IO_L30N_4/D2                  | P44                 | DUAL |
| 4    | IO_L30P_4/D3                  | P43                 | DUAL |
| 4    | IO_L31N_4/INIT_B              | P42                 | DUAL |
| 4    | IO_L31P_4/DOOUT/BUSY          | P40                 | DUAL |
| 4    | IO_L32N_4/GCLK1               | P39                 | GCLK |
| 4    | IO_L32P_4/GCLK0               | P38                 | GCLK |
| 4    | VCCO_4                        | P46                 | VCCO |
| 5    | IO_L01N_5/RDWR_B              | P28                 | DUAL |
| 5    | IO_L01P_5/CS_B                | P27                 | DUAL |
| 5    | IO_L28N_5/D6                  | P32                 | DUAL |
| 5    | IO_L28P_5/D7                  | P30                 | DUAL |
| 5    | IO_L31N_5/D4                  | P35                 | DUAL |
| 5    | IO_L31P_5/D5                  | P34                 | DUAL |
| 5    | IO_L32N_5/GCLK3               | P37                 | GCLK |
| 5    | IO_L32P_5/GCLK2               | P36                 | GCLK |
| 5    | VCCO_5                        | P31                 | VCCO |
| 6    | IO                            | P17                 | I/O  |
| 6    | IO                            | P21                 | I/O  |
| 6    | IO_L01N_6/VRP_6               | P23                 | DCI  |
| 6    | IO_L01P_6/VRN_6               | P22                 | DCI  |
| 6    | IO_L24N_6/VREF_6              | P16                 | VREF |
| 6    | IO_L24P_6                     | P15                 | I/O  |
| 6    | IO_L40N_6                     | P14                 | I/O  |
| 6    | IO_L40P_6/VREF_6              | P13                 | VREF |
| 6    | VCCO_6                        | P19                 | VCCO |
| 7    | IO_L01N_7/VRP_7               | P2                  | DCI  |
| 7    | IO_L01P_7/VRN_7               | P1                  | DCI  |
| 7    | IO_L21N_7                     | P5                  | I/O  |
| 7    | IO_L21P_7                     | P4                  | I/O  |
| 7    | IO_L23N_7                     | P9                  | I/O  |



Table 86: VQ100 Package Pinout

| Bank | XC3S50<br>XC3S200<br>Pin Name | VQ100 Pin<br>Number | Type   |
|------|-------------------------------|---------------------|--------|
| 7    | IO_L23P_7                     | P8                  | I/O    |
| 7    | IO_L40N_7/VREF_7              | P12                 | VREF   |
| 7    | IO_L40P_7                     | P11                 | I/O    |
| 7    | VCCO_7                        | P6                  | VCCO   |
| N/A  | GND                           | P3                  | GND    |
| N/A  | GND                           | P10                 | GND    |
| N/A  | GND                           | P20                 | GND    |
| N/A  | GND                           | P29                 | GND    |
| N/A  | GND                           | P41                 | GND    |
| N/A  | GND                           | P56                 | GND    |
| N/A  | GND                           | P66                 | GND    |
| N/A  | GND                           | P73                 | GND    |
| N/A  | GND                           | P82                 | GND    |
| N/A  | GND                           | P95                 | GND    |
| N/A  | VCCAUX                        | P7                  | VCCAUX |
| N/A  | VCCAUX                        | P33                 | VCCAUX |
| N/A  | VCCAUX                        | P58                 | VCCAUX |
| N/A  | VCCAUX                        | P84                 | VCCAUX |
| N/A  | VCCINT                        | P18                 | VCCINT |

Table 86: VQ100 Package Pinout

| Bank   | XC3S50<br>XC3S200<br>Pin Name | VQ100 Pin<br>Number | Type   |
|--------|-------------------------------|---------------------|--------|
| N/A    | VCCINT                        | P45                 | VCCINT |
| N/A    | VCCINT                        | P69                 | VCCINT |
| N/A    | VCCINT                        | P93                 | VCCINT |
| VCCAUX | CCLK                          | P52                 | CONFIG |
| VCCAUX | DONE                          | P51                 | CONFIG |
| VCCAUX | HSWAP_EN                      | P98                 | CONFIG |
| VCCAUX | M0                            | P25                 | CONFIG |
| VCCAUX | M1                            | P24                 | CONFIG |
| VCCAUX | M2                            | P26                 | CONFIG |
| VCCAUX | PROG_B                        | P99                 | CONFIG |
| VCCAUX | TCK                           | P77                 | JTAG   |
| VCCAUX | TDI                           | P100                | JTAG   |
| VCCAUX | TDO                           | P76                 | JTAG   |
| VCCAUX | TMS                           | P78                 | JTAG   |

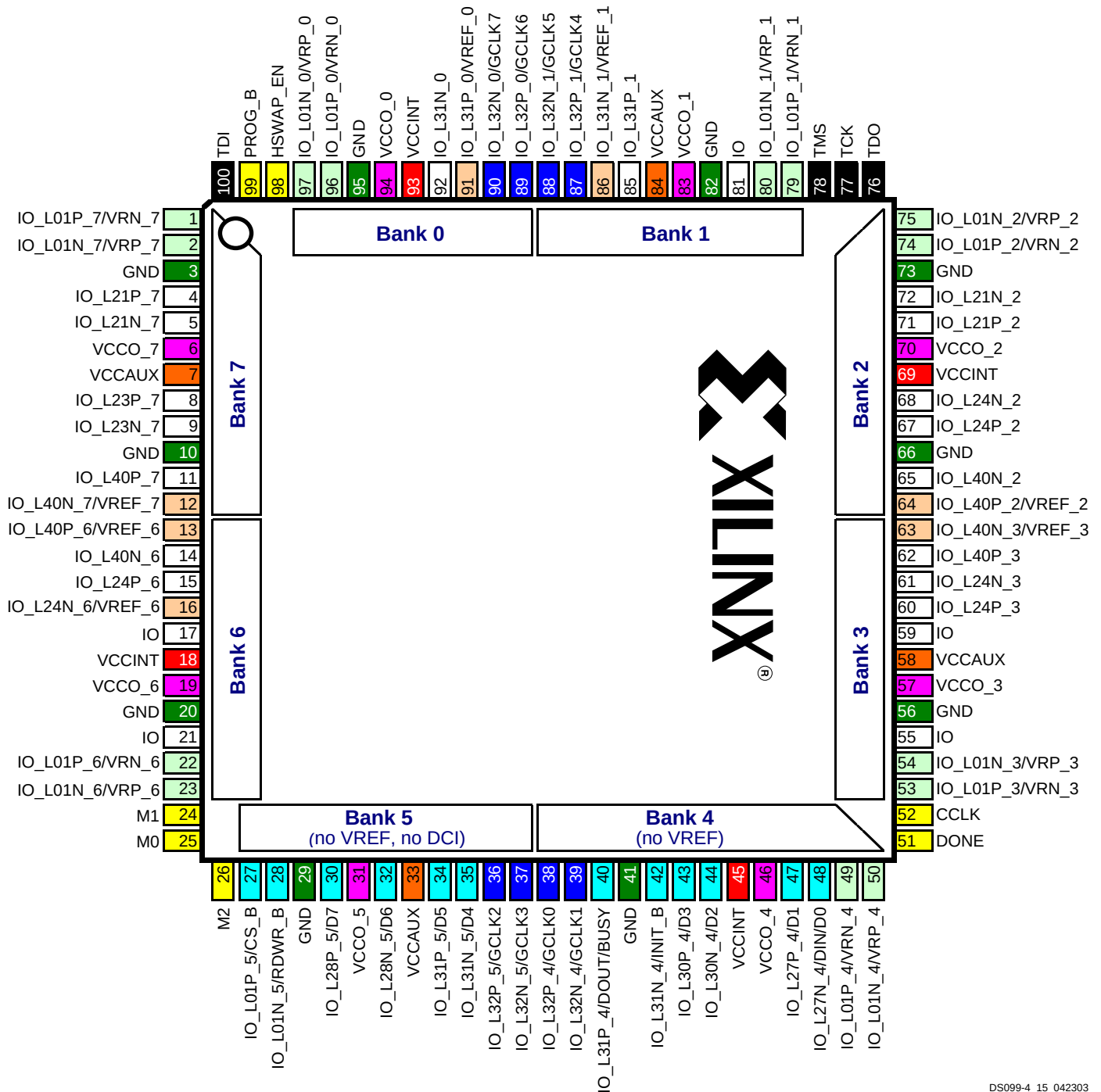
### User I/Os by Bank

Table 87 indicates how the available user-I/O pins are distributed between the eight I/O banks on the VQ100 package.

Table 87: User I/Os Per Bank in VQ100 Package

| Package Edge | I/O Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|----------------|-------------------------------|------|-----|------|------|
|              |          |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 6              | 1                             | 0    | 2   | 1    | 2    |
|              | 1        | 7              | 2                             | 0    | 2   | 1    | 2    |
| Right        | 2        | 8              | 5                             | 0    | 2   | 1    | 0    |
|              | 3        | 8              | 5                             | 0    | 2   | 1    | 0    |
| Bottom       | 4        | 10             | 0                             | 6    | 2   | 0    | 2    |
|              | 5        | 8              | 0                             | 6    | 0   | 0    | 2    |
| Left         | 6        | 8              | 4                             | 0    | 2   | 2    | 0    |
|              | 7        | 8              | 5                             | 0    | 2   | 1    | 0    |

## VQ100 Footprint



DS099-4\_15\_042303

Figure 42: VQ100 Package Footprint (top view). Note pin 1 indicator in top-left corner and logo orientation.

|    |                                                    |    |                                                 |   |                                                    |
|----|----------------------------------------------------|----|-------------------------------------------------|---|----------------------------------------------------|
| 22 | I/O: Unrestricted, general-purpose user I/O        | 12 | DUAL: Configuration pin, then possible user I/O | 7 | VREF: User I/O or input voltage reference for bank |
| 14 | DCI: User I/O or reference resistor input for bank | 8  | GCLK: User I/O or global clock buffer input     | 8 | VCCO: Output voltage supply for bank               |
| 7  | CONFIG: Dedicated configuration pins               | 4  | JTAG: Dedicated JTAG port pins                  | 4 | VCCINT: Internal core voltage supply (+1.2V)       |
| 0  | N.C.: No unconnected pins in this package          | 10 | GND: Ground                                     | 4 | VCCAUX: Auxiliary voltage supply (+2.5V)           |

## CP132: 132-ball Chip-Scale Package

The XC3S50 is available in the 132-ball chip-scale package, CP132. The pinout and footprint for this package appear in [Table 88](#) and [Figure 44](#).

All the package pins appear in [Table 88](#) and are sorted by bank number, then by pin name. Pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

The CP132 footprint has eight I/O banks. However, the voltage supplies for the two I/O banks along an edge are connected together internally. Consequently, there are four output voltage supplies, labeled VCCO\_TOP, VCCO\_RIGHT, VCCO\_BOTTOM, and VCCO\_LEFT.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx website at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 88: CP132 Package Pinout

| Bank | XC3S50 Pin Name  | CP132 Ball | Type |
|------|------------------|------------|------|
| 0    | IO_L01N_0/VRP_0  | A3         | DCI  |
| 0    | IO_L01P_0/VRN_0  | C4         | DCI  |
| 0    | IO_L27N_0        | C5         | I/O  |
| 0    | IO_L27P_0        | B5         | I/O  |
| 0    | IO_L30N_0        | B6         | I/O  |
| 0    | IO_L30P_0        | A6         | I/O  |
| 0    | IO_L31N_0        | C7         | I/O  |
| 0    | IO_L31P_0/VREF_0 | B7         | VREF |
| 0    | IO_L32N_0/GCLK7  | A7         | GCLK |
| 0    | IO_L32P_0/GCLK6  | C8         | GCLK |
| 1    | IO_L01N_1/VRP_1  | A13        | DCI  |
| 1    | IO_L01P_1/VRN_1  | B13        | DCI  |
| 1    | IO_L27N_1        | C11        | I/O  |
| 1    | IO_L27P_1        | A12        | I/O  |
| 1    | IO_L28N_1        | A11        | I/O  |
| 1    | IO_L28P_1        | B11        | I/O  |
| 1    | IO_L31N_1/VREF_1 | C9         | VREF |
| 1    | IO_L31P_1        | A10        | I/O  |
| 1    | IO_L32N_1/GCLK5  | A8         | GCLK |
| 1    | IO_L32P_1/GCLK4  | A9         | GCLK |
| 2    | IO_L01N_2/VRP_2  | D12        | DCI  |
| 2    | IO_L01P_2/VRN_2  | C14        | DCI  |
| 2    | IO_L20N_2        | E12        | I/O  |
| 2    | IO_L20P_2        | E13        | I/O  |

Table 88: CP132 Package Pinout

| Bank | XC3S50 Pin Name     | CP132 Ball | Type |
|------|---------------------|------------|------|
| 2    | IO_L21N_2           | E14        | I/O  |
| 2    | IO_L21P_2           | F12        | I/O  |
| 2    | IO_L23N_2/VREF_2    | F13        | VREF |
| 2    | IO_L23P_2           | F14        | I/O  |
| 2    | IO_L24N_2           | G12        | I/O  |
| 2    | IO_L24P_2           | G13        | I/O  |
| 2    | IO_L40N_2           | G14        | I/O  |
| 2    | IO_L40P_2/VREF_2    | H12        | VREF |
| 3    | IO_L01N_3/VRP_3     | N13        | DCI  |
| 3    | IO_L01P_3/VRN_3     | N14        | DCI  |
| 3    | IO_L20N_3           | L12        | I/O  |
| 3    | IO_L20P_3           | M14        | I/O  |
| 3    | IO_L22N_3           | L14        | I/O  |
| 3    | IO_L22P_3           | L13        | I/O  |
| 3    | IO_L23N_3           | K13        | I/O  |
| 3    | IO_L23P_3/VREF_3    | K12        | VREF |
| 3    | IO_L24N_3           | J12        | I/O  |
| 3    | IO_L24P_3           | K14        | I/O  |
| 3    | IO_L40N_3/VREF_3    | H14        | VREF |
| 3    | IO_L40P_3           | J13        | I/O  |
| 4    | IO/VREF_4           | N12        | VREF |
| 4    | IO_L01N_4/VRP_4     | P12        | DCI  |
| 4    | IO_L01P_4/VRN_4     | M11        | DCI  |
| 4    | IO_L27N_4/DIN/D0    | M10        | DUAL |
| 4    | IO_L27P_4/D1        | N10        | DUAL |
| 4    | IO_L30N_4/D2        | N9         | DUAL |
| 4    | IO_L30P_4/D3        | P9         | DUAL |
| 4    | IO_L31N_4/INIT_B    | M8         | DUAL |
| 4    | IO_L31P_4/DOUT/BUSY | N8         | DUAL |
| 4    | IO_L32N_4/GCLK1     | P8         | GCLK |
| 4    | IO_L32P_4/GCLK0     | M7         | GCLK |
| 5    | IO_L01N_5/RDWR_B    | P2         | DUAL |
| 5    | IO_L01P_5/CS_B      | N2         | DUAL |
| 5    | IO_L27N_5/VREF_5    | M4         | VREF |
| 5    | IO_L27P_5           | P3         | I/O  |
| 5    | IO_L28N_5/D6        | P4         | DUAL |
| 5    | IO_L28P_5/D7        | N4         | DUAL |
| 5    | IO_L31N_5/D4        | M6         | DUAL |
| 5    | IO_L31P_5/D5        | P5         | DUAL |
| 5    | IO_L32N_5/GCLK3     | P7         | GCLK |
| 5    | IO_L32P_5/GCLK2     | P6         | GCLK |
| 6    | IO_L01N_6/VRP_6     | L3         | DCI  |

Table 88: CP132 Package Pinout

| Bank | XC3S50 Pin Name  | CP132 Ball | Type |
|------|------------------|------------|------|
| 6    | IO_L01P_6/VRN_6  | M1         | DCI  |
| 6    | IO_L20N_6        | K3         | I/O  |
| 6    | IO_L20P_6        | K2         | I/O  |
| 6    | IO_L22N_6        | K1         | I/O  |
| 6    | IO_L22P_6        | J3         | I/O  |
| 6    | IO_L23N_6        | J2         | I/O  |
| 6    | IO_L23P_6        | J1         | I/O  |
| 6    | IO_L24N_6/VREF_6 | H3         | VREF |
| 6    | IO_L24P_6        | H2         | I/O  |
| 6    | IO_L40N_6        | H1         | I/O  |
| 6    | IO_L40P_6/VREF_6 | G3         | VREF |
| 7    | IO_L01N_7/VRP_7  | B2         | DCI  |
| 7    | IO_L01P_7/VRN_7  | B1         | DCI  |
| 7    | IO_L21N_7        | C1         | I/O  |
| 7    | IO_L21P_7        | D3         | I/O  |
| 7    | IO_L22N_7        | D1         | I/O  |
| 7    | IO_L22P_7        | D2         | I/O  |
| 7    | IO_L23N_7        | E2         | I/O  |
| 7    | IO_L23P_7        | E3         | I/O  |
| 7    | IO_L24N_7        | F3         | I/O  |
| 7    | IO_L24P_7        | E1         | I/O  |
| 7    | IO_L40N_7/VREF_7 | G1         | VREF |
| 7    | IO_L40P_7        | F2         | I/O  |
| 0,1  | VCCO_TOP         | B12        | VCCO |
| 0,1  | VCCO_TOP         | A4         | VCCO |
| 0,1  | VCCO_TOP         | B8         | VCCO |
| 2,3  | VCCO_RIGHT       | D13        | VCCO |
| 2,3  | VCCO_RIGHT       | H13        | VCCO |
| 2,3  | VCCO_RIGHT       | M12        | VCCO |
| 4,5  | VCCO_BOTTOM      | N7         | VCCO |
| 4,5  | VCCO_BOTTOM      | P11        | VCCO |
| 4,5  | VCCO_BOTTOM      | N3         | VCCO |
| 6,7  | VCCO_LEFT        | G2         | VCCO |
| 6,7  | VCCO_LEFT        | L2         | VCCO |

Table 88: CP132 Package Pinout

| Bank   | XC3S50 Pin Name | CP132 Ball | Type   |
|--------|-----------------|------------|--------|
| 6,7    | VCCO_LEFT       | C3         | VCCO   |
| N/A    | GND             | B4         | GND    |
| N/A    | GND             | B9         | GND    |
| N/A    | GND             | C2         | GND    |
| N/A    | GND             | C12        | GND    |
| N/A    | GND             | D14        | GND    |
| N/A    | GND             | F1         | GND    |
| N/A    | GND             | J14        | GND    |
| N/A    | GND             | L1         | GND    |
| N/A    | GND             | M3         | GND    |
| N/A    | GND             | M13        | GND    |
| N/A    | GND             | N6         | GND    |
| N/A    | GND             | N11        | GND    |
| N/A    | VCCAUX          | A5         | VCCAUX |
| N/A    | VCCAUX          | C10        | VCCAUX |
| N/A    | VCCAUX          | M5         | VCCAUX |
| N/A    | VCCAUX          | P10        | VCCAUX |
| N/A    | VCCINT          | B10        | VCCINT |
| N/A    | VCCINT          | C6         | VCCINT |
| N/A    | VCCINT          | M9         | VCCINT |
| N/A    | VCCINT          | N5         | VCCINT |
| VCCAUX | CCLK            | P14        | CONFIG |
| VCCAUX | DONE            | P13        | CONFIG |
| VCCAUX | HSWAP_EN        | B3         | CONFIG |
| VCCAUX | M0              | N1         | CONFIG |
| VCCAUX | M1              | M2         | CONFIG |
| VCCAUX | M2              | P1         | CONFIG |
| VCCAUX | PROG_B          | A2         | CONFIG |
| VCCAUX | TCK             | B14        | JTAG   |
| VCCAUX | TDI             | A1         | JTAG   |
| VCCAUX | TDO             | C13        | JTAG   |
| VCCAUX | TMS             | A14        | JTAG   |

## User I/Os by Bank

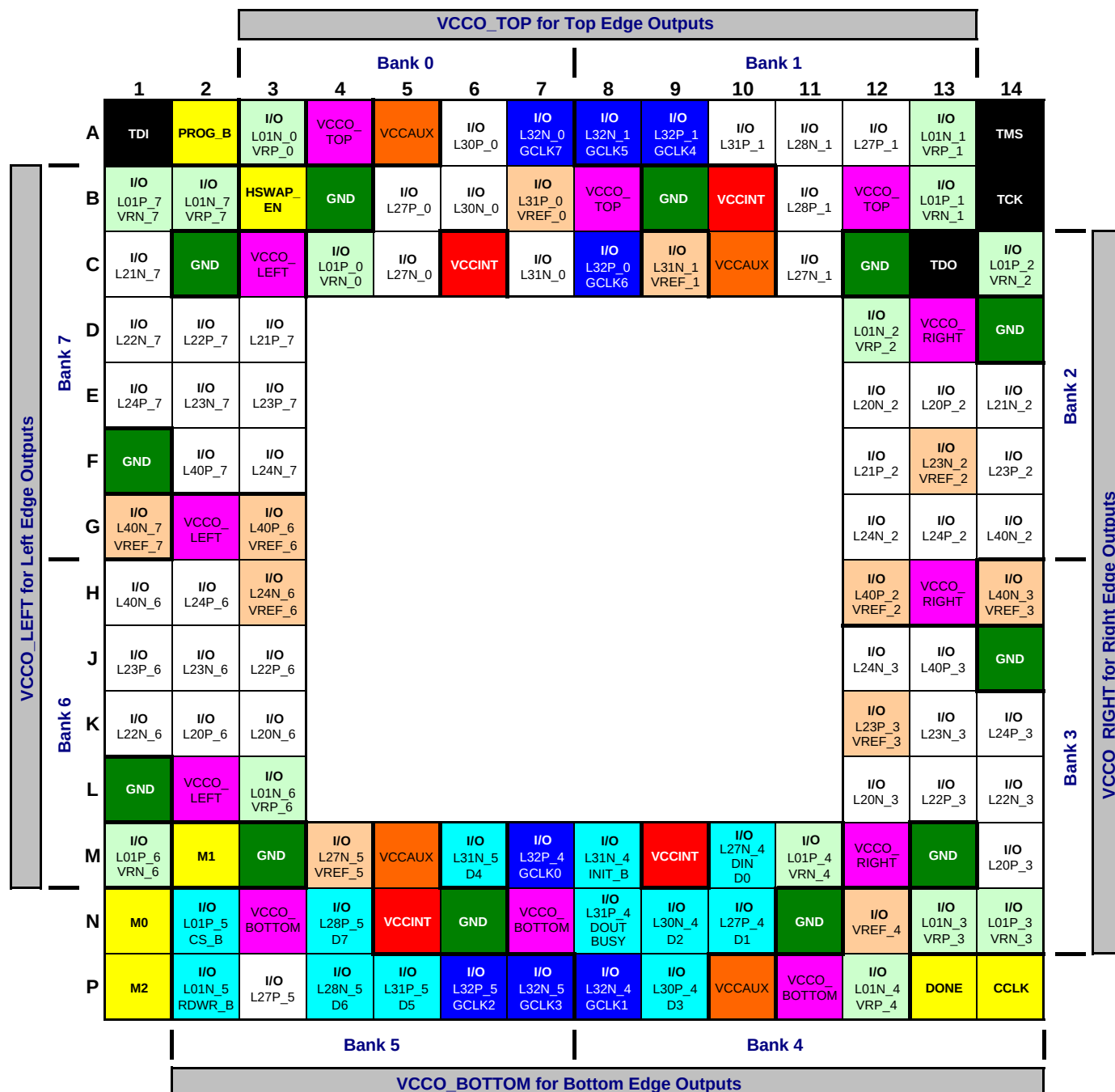
Table 89 indicates how the 89 available user-I/O pins are distributed between the eight I/O banks on the CP132 package.

age. There are only four output banks, each with its own VCCO voltage input.

Table 89: User I/Os Per Bank for XC3S50 in CP132 Package

| Package Edge | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|-------------|-------------------------------|------|-----|------|------|
|              |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 10          | 5                             | 0    | 2   | 1    | 2    |
|              | 1        | 10          | 5                             | 0    | 2   | 1    | 2    |
| Right        | 2        | 12          | 8                             | 0    | 2   | 2    | 0    |
|              | 3        | 12          | 8                             | 0    | 2   | 2    | 0    |
| Bottom       | 4        | 11          | 0                             | 6    | 2   | 1    | 2    |
|              | 5        | 10          | 1                             | 6    | 0   | 1    | 2    |
| Left         | 6        | 12          | 8                             | 0    | 2   | 2    | 0    |
|              | 7        | 12          | 9                             | 0    | 2   | 1    | 0    |

## CP132 Footprint



DS099-4\_17\_011005

Figure 43: CP132 Package Footprint (top view). Note pin 1 indicator in top-left corner and logo orientation.

|    |                                                    |    |                                                 |    |                                                    |
|----|----------------------------------------------------|----|-------------------------------------------------|----|----------------------------------------------------|
| 44 | I/O: Unrestricted, general-purpose user I/O        | 12 | DUAL: Configuration pin, then possible user I/O | 11 | VREF: User I/O or input voltage reference for bank |
| 14 | DCI: User I/O or reference resistor input for bank | 8  | GCLK: User I/O, input, or global buffer input   | 12 | VCCO: Output voltage supply for bank               |
| 7  | CONFIG: Dedicated configuration pins               | 4  | JTAG: Dedicated JTAG port pins                  | 4  | VCCINT: Internal core voltage supply (+1.2V)       |
| 0  | N.C.: No unconnected pins in this package          | 12 | GND: Ground                                     | 4  | VCCAUX: Auxiliary voltage supply (+2.5V)           |



## TQ144: 144-lead Thin Quad Flat Package

The XC3S50, the XC3S200, and the XC3S400 are available in the 144-lead thin quad flat package, TQ144. All devices share a common footprint for this package as shown in in [Table 90](#) and [Figure 44](#).

The TQ144 package only has four separate VCCO inputs, unlike the other packages, which have eight separate VCCO inputs. The TQ144 package has a separate VCCO input for the top, bottom, left, and right. However, there are still eight separate I/O banks, as shown in [Table 90](#) and [Figure 44](#). Banks 0 and 1 share the VCCO\_TOP input, Banks 2 and 3 share the VCCO\_RIGHT input, Banks 4 and 5 share the VCCO\_BOTTOM input, and Banks 6 and 7 share the VCCO\_LEFT input.

All the package pins appear in [Table 90](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 90: TQ144 Package Pinout

| Bank | XC3S50<br>XC3S200<br>XC3S400<br>Pin Name | TQ144 Pin<br>Number | Type |
|------|------------------------------------------|---------------------|------|
| 0    | IO_L01N_0/VRP_0                          | P141                | DCI  |
| 0    | IO_L01P_0/VRN_0                          | P140                | DCI  |
| 0    | IO_L27N_0                                | P137                | I/O  |
| 0    | IO_L27P_0                                | P135                | I/O  |
| 0    | IO_L30N_0                                | P132                | I/O  |
| 0    | IO_L30P_0                                | P131                | I/O  |
| 0    | IO_L31N_0                                | P130                | I/O  |
| 0    | IO_L31P_0/VREF_0                         | P129                | VREF |
| 0    | IO_L32N_0/GCLK7                          | P128                | GCLK |
| 0    | IO_L32P_0/GCLK6                          | P127                | GCLK |
| 1    | IO                                       | P116                | I/O  |
| 1    | IO_L01N_1/VRP_1                          | P113                | DCI  |
| 1    | IO_L01P_1/VRN_1                          | P112                | DCI  |
| 1    | IO_L28N_1                                | P119                | I/O  |
| 1    | IO_L28P_1                                | P118                | I/O  |
| 1    | IO_L31N_1/VREF_1                         | P123                | VREF |
| 1    | IO_L31P_1                                | P122                | I/O  |
| 1    | IO_L32N_1/GCLK5                          | P125                | GCLK |

Table 90: TQ144 Package Pinout (Continued)

| Bank | XC3S50<br>XC3S200<br>XC3S400<br>Pin Name | TQ144 Pin<br>Number | Type |
|------|------------------------------------------|---------------------|------|
| 1    | IO_L32P_1/GCLK4                          | P124                | GCLK |
| 2    | IO_L01N_2/VRP_2                          | P108                | DCI  |
| 2    | IO_L01P_2/VRN_2                          | P107                | DCI  |
| 2    | IO_L20N_2                                | P105                | I/O  |
| 2    | IO_L20P_2                                | P104                | I/O  |
| 2    | IO_L21N_2                                | P103                | I/O  |
| 2    | IO_L21P_2                                | P102                | I/O  |
| 2    | IO_L22N_2                                | P100                | I/O  |
| 2    | IO_L22P_2                                | P99                 | I/O  |
| 2    | IO_L23N_2/VREF_2                         | P98                 | VREF |
| 2    | IO_L23P_2                                | P97                 | I/O  |
| 2    | IO_L24N_2                                | P96                 | I/O  |
| 2    | IO_L24P_2                                | P95                 | I/O  |
| 2    | IO_L40N_2                                | P93                 | I/O  |
| 2    | IO_L40P_2/VREF_2                         | P92                 | VREF |
| 3    | IO                                       | P76                 | I/O  |
| 3    | IO_L01N_3/VRP_3                          | P74                 | DCI  |
| 3    | IO_L01P_3/VRN_3                          | P73                 | DCI  |
| 3    | IO_L20N_3                                | P78                 | I/O  |
| 3    | IO_L20P_3                                | P77                 | I/O  |
| 3    | IO_L21N_3                                | P80                 | I/O  |
| 3    | IO_L21P_3                                | P79                 | I/O  |
| 3    | IO_L22N_3                                | P83                 | I/O  |
| 3    | IO_L22P_3                                | P82                 | I/O  |
| 3    | IO_L23N_3                                | P85                 | I/O  |
| 3    | IO_L23P_3/VREF_3                         | P84                 | VREF |
| 3    | IO_L24N_3                                | P87                 | I/O  |
| 3    | IO_L24P_3                                | P86                 | I/O  |
| 3    | IO_L40N_3/VREF_3                         | P90                 | VREF |
| 3    | IO_L40P_3                                | P89                 | I/O  |
| 4    | IO/VREF_4                                | P70                 | VREF |
| 4    | IO_L01N_4/VRP_4                          | P69                 | DCI  |
| 4    | IO_L01P_4/VRN_4                          | P68                 | DCI  |
| 4    | IO_L27N_4/DIN/D0                         | P65                 | DUAL |
| 4    | IO_L27P_4/D1                             | P63                 | DUAL |
| 4    | IO_L30N_4/D2                             | P60                 | DUAL |
| 4    | IO_L30P_4/D3                             | P59                 | DUAL |
| 4    | IO_L31N_4/INIT_B                         | P58                 | DUAL |
| 4    | IO_L31P_4/DOOUT/BUSY                     | P57                 | DUAL |
| 4    | IO_L32N_4/GCLK1                          | P56                 | GCLK |
| 4    | IO_L32P_4/GCLK0                          | P55                 | GCLK |
| 5    | IO/VREF_5                                | P44                 | VREF |

Table 90: TQ144 Package Pinout (Continued)

| Bank | XC3S50<br>XC3S200<br>XC3S400<br>Pin Name | TQ144 Pin<br>Number | Type |
|------|------------------------------------------|---------------------|------|
| 5    | IO_L01N_5/RDWR_B                         | P41                 | DUAL |
| 5    | IO_L01P_5/CS_B                           | P40                 | DUAL |
| 5    | IO_L28N_5/D6                             | P47                 | DUAL |
| 5    | IO_L28P_5/D7                             | P46                 | DUAL |
| 5    | IO_L31N_5/D4                             | P51                 | DUAL |
| 5    | IO_L31P_5/D5                             | P50                 | DUAL |
| 5    | IO_L32N_5/GCLK3                          | P53                 | GCLK |
| 5    | IO_L32P_5/GCLK2                          | P52                 | GCLK |
| 6    | IO_L01N_6/VRP_6                          | P36                 | DCI  |
| 6    | IO_L01P_6/VRN_6                          | P35                 | DCI  |
| 6    | IO_L20N_6                                | P33                 | I/O  |
| 6    | IO_L20P_6                                | P32                 | I/O  |
| 6    | IO_L21N_6                                | P31                 | I/O  |
| 6    | IO_L21P_6                                | P30                 | I/O  |
| 6    | IO_L22N_6                                | P28                 | I/O  |
| 6    | IO_L22P_6                                | P27                 | I/O  |
| 6    | IO_L23N_6                                | P26                 | I/O  |
| 6    | IO_L23P_6                                | P25                 | I/O  |
| 6    | IO_L24N_6/VREF_6                         | P24                 | VREF |
| 6    | IO_L24P_6                                | P23                 | I/O  |
| 6    | IO_L40N_6                                | P21                 | I/O  |
| 6    | IO_L40P_6/VREF_6                         | P20                 | VREF |
| 7    | IO/VREF_7                                | P4                  | VREF |
| 7    | IO_L01N_7/VRP_7                          | P2                  | DCI  |
| 7    | IO_L01P_7/VRN_7                          | P1                  | DCI  |
| 7    | IO_L20N_7                                | P6                  | I/O  |
| 7    | IO_L20P_7                                | P5                  | I/O  |
| 7    | IO_L21N_7                                | P8                  | I/O  |
| 7    | IO_L21P_7                                | P7                  | I/O  |
| 7    | IO_L22N_7                                | P11                 | I/O  |
| 7    | IO_L22P_7                                | P10                 | I/O  |
| 7    | IO_L23N_7                                | P13                 | I/O  |
| 7    | IO_L23P_7                                | P12                 | I/O  |
| 7    | IO_L24N_7                                | P15                 | I/O  |
| 7    | IO_L24P_7                                | P14                 | I/O  |
| 7    | IO_L40N_7/VREF_7                         | P18                 | VREF |
| 7    | IO_L40P_7                                | P17                 | I/O  |
| 0,1  | VCCO_TOP                                 | P126                | VCCO |
| 0,1  | VCCO_TOP                                 | P138                | VCCO |
| 0,1  | VCCO_TOP                                 | P115                | VCCO |
| 2,3  | VCCO_RIGHT                               | P106                | VCCO |
| 2,3  | VCCO_RIGHT                               | P75                 | VCCO |

Table 90: TQ144 Package Pinout (Continued)

| Bank   | XC3S50<br>XC3S200<br>XC3S400<br>Pin Name | TQ144 Pin<br>Number | Type   |
|--------|------------------------------------------|---------------------|--------|
| 2,3    | VCCO_RIGHT                               | P91                 | VCCO   |
| 4,5    | VCCO_BOTTOM                              | P54                 | VCCO   |
| 4,5    | VCCO_BOTTOM                              | P43                 | VCCO   |
| 4,5    | VCCO_BOTTOM                              | P66                 | VCCO   |
| 6,7    | VCCO_LEFT                                | P19                 | VCCO   |
| 6,7    | VCCO_LEFT                                | P34                 | VCCO   |
| 6,7    | VCCO_LEFT                                | P3                  | VCCO   |
| N/A    | GND                                      | P136                | GND    |
| N/A    | GND                                      | P139                | GND    |
| N/A    | GND                                      | P114                | GND    |
| N/A    | GND                                      | P117                | GND    |
| N/A    | GND                                      | P94                 | GND    |
| N/A    | GND                                      | P101                | GND    |
| N/A    | GND                                      | P81                 | GND    |
| N/A    | GND                                      | P88                 | GND    |
| N/A    | GND                                      | P64                 | GND    |
| N/A    | GND                                      | P67                 | GND    |
| N/A    | GND                                      | P42                 | GND    |
| N/A    | GND                                      | P45                 | GND    |
| N/A    | GND                                      | P22                 | GND    |
| N/A    | GND                                      | P29                 | GND    |
| N/A    | GND                                      | P9                  | GND    |
| N/A    | GND                                      | P16                 | GND    |
| N/A    | VCCAUX                                   | P134                | VCCAUX |
| N/A    | VCCAUX                                   | P120                | VCCAUX |
| N/A    | VCCAUX                                   | P62                 | VCCAUX |
| N/A    | VCCAUX                                   | P48                 | VCCAUX |
| N/A    | VCCINT                                   | P133                | VCCINT |
| N/A    | VCCINT                                   | P121                | VCCINT |
| N/A    | VCCINT                                   | P61                 | VCCINT |
| N/A    | VCCINT                                   | P49                 | VCCINT |
| VCCAUX | CCLK                                     | P72                 | CONFIG |
| VCCAUX | DONE                                     | P71                 | CONFIG |
| VCCAUX | HSWAP_EN                                 | P142                | CONFIG |
| VCCAUX | M0                                       | P38                 | CONFIG |
| VCCAUX | M1                                       | P37                 | CONFIG |
| VCCAUX | M2                                       | P39                 | CONFIG |
| VCCAUX | PROG_B                                   | P143                | CONFIG |
| VCCAUX | TCK                                      | P110                | JTAG   |
| VCCAUX | TDI                                      | P144                | JTAG   |
| VCCAUX | TDO                                      | P109                | JTAG   |
| VCCAUX | TMS                                      | P111                | JTAG   |

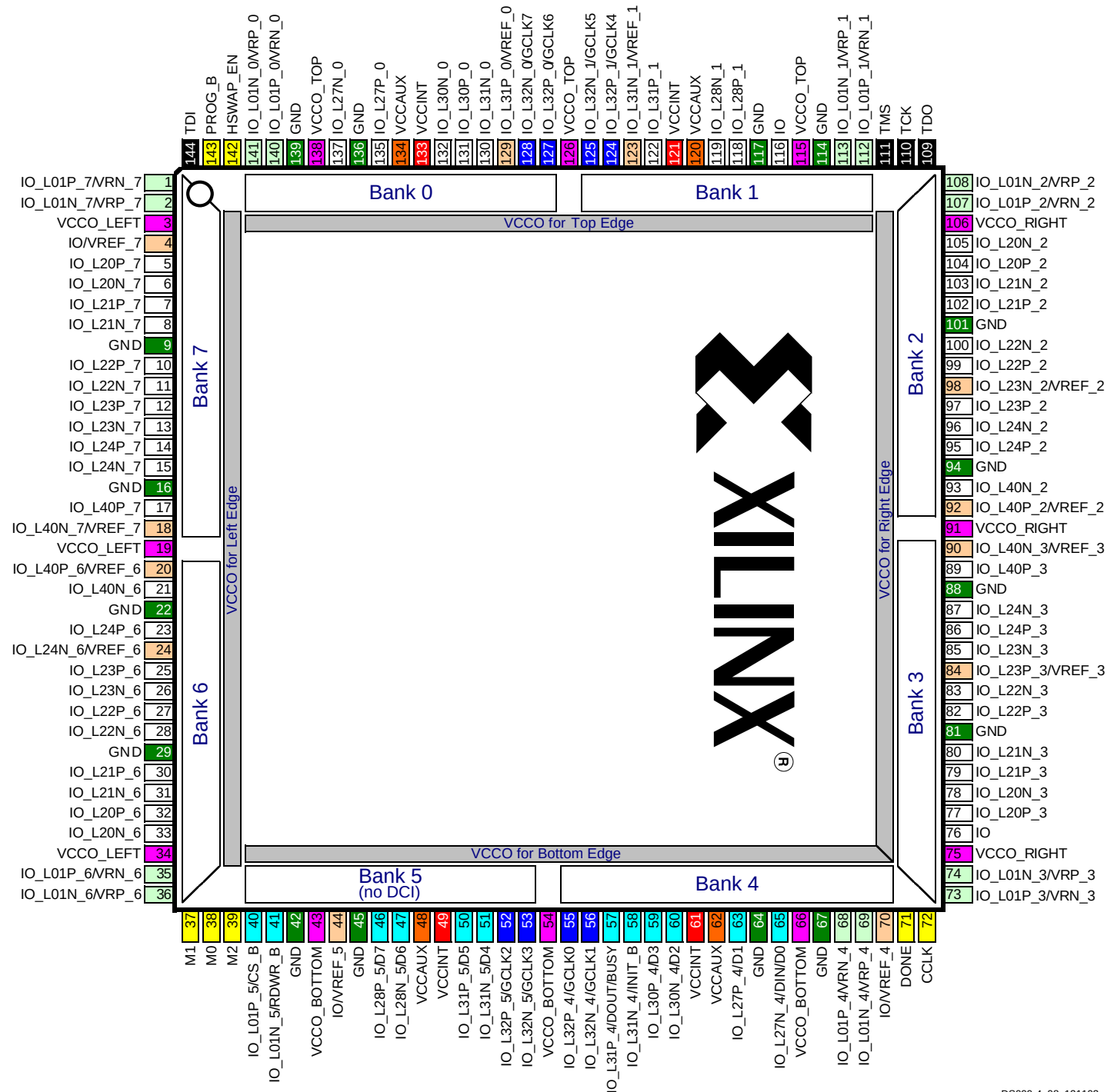
## User I/Os by Bank

**Table 91** indicates how the available user-I/O pins are distributed between the eight I/O banks on the TQ144 package.

*Table 91: User I/Os Per Bank in TQ144 Package*

| Package Edge | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|-------------|-------------------------------|------|-----|------|------|
|              |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 10          | 5                             | 0    | 2   | 1    | 2    |
|              | 1        | 9           | 4                             | 0    | 2   | 1    | 2    |
| Right        | 2        | 14          | 10                            | 0    | 2   | 2    | 0    |
|              | 3        | 15          | 11                            | 0    | 2   | 2    | 0    |
| Bottom       | 4        | 11          | 0                             | 6    | 2   | 1    | 2    |
|              | 5        | 9           | 0                             | 6    | 0   | 1    | 2    |
| Left         | 6        | 14          | 10                            | 0    | 2   | 2    | 0    |
|              | 7        | 15          | 11                            | 0    | 2   | 2    | 0    |

## TQ144 Footprint



DS099-4\_08\_121103

Figure 44: TQ144 Package Footprint (top view). Note pin 1 indicator in top-left corner and logo orientation.

|    |                                                    |    |                                                 |    |                                                    |
|----|----------------------------------------------------|----|-------------------------------------------------|----|----------------------------------------------------|
| 51 | I/O: Unrestricted, general-purpose user I/O        | 12 | DUAL: Configuration pin, then possible user I/O | 12 | VREF: User I/O or input voltage reference for bank |
| 14 | DCI: User I/O or reference resistor input for bank | 8  | GCLK: User I/O or global clock buffer input     | 12 | VCCO: Output voltage supply for bank               |
| 7  | CONFIG: Dedicated configuration pins               | 4  | JTAG: Dedicated JTAG port pins                  | 4  | VCCINT: Internal core voltage supply (+1.2V)       |
| 0  | N.C.: No unconnected pins in this package          | 16 | GND: Ground                                     | 4  | VCCAUX: Auxiliary voltage supply (+2.5V)           |

## PQ208: 208-lead Plastic Quad Flat Pack

The 208-lead plastic quad flat package, PQ208, supports three different Spartan-3 devices, including the XC3S50, the XC3S200, and the XC3S400. The footprints for the XC3S200 and XC3S400 are identical, as shown in [Table 92](#) and [Figure 45](#). The XC3S50, however, has fewer I/O pins resulting in 17 unconnected pins on the PQ208 package, labeled as “N.C.” In [Table 92](#) and [Figure 45](#), these unconnected pins are indicated with a black diamond symbol (◆).

All the package pins appear in [Table 92](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

If there is a difference between the XC3S50 pinout and the pinout for the XC3S200 and XC3S400, then that difference is highlighted in [Table 92](#). If the table entry is shaded grey, then there is an unconnected pin on the XC3S50 that maps to a user-I/O pin on the XC3S200 and XC3S400. If the table entry is shaded tan, then the unconnected pin on the XC3S50 maps to a VREF-type pin on the XC3S200 and XC3S400. If the other VREF pins in the bank all connect to a voltage reference to support a special I/O standard, then also connect the N.C. pin on the XC3S50 to the same VREF voltage. This provides maximum flexibility as you could potentially migrate a design from the XC3S50 device to an XC3S200 or XC3S400 FPGA without changing the printed circuit board.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 92: PQ208 Package Pinout

| Bank | XC3S50<br>Pin Name  | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|---------------------|--------------------------------|------------------------|------|
| 0    | IO                  | IO                             | P189                   | I/O  |
| 0    | IO                  | IO                             | P197                   | I/O  |
| 0    | N.C. (◆)            | IO/VREF_0                      | P200                   | VREF |
| 0    | IO/VREF_0           | IO/VREF_0                      | P205                   | VREF |
| 0    | IO_L01N_0/<br>VRP_0 | IO_L01N_0/<br>VRP_0            | P204                   | DCI  |
| 0    | IO_L01P_0/<br>VRN_0 | IO_L01P_0/<br>VRN_0            | P203                   | DCI  |
| 0    | IO_L25N_0           | IO_L25N_0                      | P199                   | I/O  |
| 0    | IO_L25P_0           | IO_L25P_0                      | P198                   | I/O  |
| 0    | IO_L27N_0           | IO_L27N_0                      | P196                   | I/O  |
| 0    | IO_L27P_0           | IO_L27P_0                      | P194                   | I/O  |
| 0    | IO_L30N_0           | IO_L30N_0                      | P191                   | I/O  |

Table 92: PQ208 Package Pinout (Continued)

| Bank | XC3S50<br>Pin Name   | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|----------------------|--------------------------------|------------------------|------|
| 0    | IO_L30P_0            | IO_L30P_0                      | P190                   | I/O  |
| 0    | IO_L31N_0            | IO_L31N_0                      | P187                   | I/O  |
| 0    | IO_L31P_0/<br>VREF_0 | IO_L31P_0/<br>VREF_0           | P185                   | VREF |
| 0    | IO_L32N_0/<br>GCLK7  | IO_L32N_0/<br>GCLK7            | P184                   | GCLK |
| 0    | IO_L32P_0/<br>GCLK6  | IO_L32P_0/<br>GCLK6            | P183                   | GCLK |
| 0    | VCCO_0               | VCCO_0                         | P188                   | VCCO |
| 0    | VCCO_0               | VCCO_0                         | P201                   | VCCO |
| 1    | IO                   | IO                             | P167                   | I/O  |
| 1    | IO                   | IO                             | P175                   | I/O  |
| 1    | IO                   | IO                             | P182                   | I/O  |
| 1    | IO_L01N_1/<br>VRP_1  | IO_L01N_1/<br>VRP_1            | P162                   | DCI  |
| 1    | IO_L01P_1/<br>VRN_1  | IO_L01P_1/<br>VRN_1            | P161                   | DCI  |
| 1    | IO_L10N_1/<br>VREF_1 | IO_L10N_1/<br>VREF_1           | P166                   | VREF |
| 1    | IO_L10P_1            | IO_L10P_1                      | P165                   | I/O  |
| 1    | IO_L27N_1            | IO_L27N_1                      | P169                   | I/O  |
| 1    | IO_L27P_1            | IO_L27P_1                      | P168                   | I/O  |
| 1    | IO_L28N_1            | IO_L28N_1                      | P172                   | I/O  |
| 1    | IO_L28P_1            | IO_L28P_1                      | P171                   | I/O  |
| 1    | IO_L31N_1/<br>VREF_1 | IO_L31N_1/<br>VREF_1           | P178                   | VREF |
| 1    | IO_L31P_1            | IO_L31P_1                      | P176                   | I/O  |
| 1    | IO_L32N_1/<br>GCLK5  | IO_L32N_1/<br>GCLK5            | P181                   | GCLK |
| 1    | IO_L32P_1/<br>GCLK4  | IO_L32P_1/<br>GCLK4            | P180                   | GCLK |
| 1    | VCCO_1               | VCCO_1                         | P164                   | VCCO |
| 1    | VCCO_1               | VCCO_1                         | P177                   | VCCO |
| 2    | N.C. (◆)             | IO/VREF_2                      | P154                   | VREF |
| 2    | IO_L01N_2/<br>VRP_2  | IO_L01N_2/<br>VRP_2            | P156                   | DCI  |
| 2    | IO_L01P_2/<br>VRN_2  | IO_L01P_2/<br>VRN_2            | P155                   | DCI  |
| 2    | IO_L19N_2            | IO_L19N_2                      | P152                   | I/O  |
| 2    | IO_L19P_2            | IO_L19P_2                      | P150                   | I/O  |
| 2    | IO_L20N_2            | IO_L20N_2                      | P149                   | I/O  |
| 2    | IO_L20P_2            | IO_L20P_2                      | P148                   | I/O  |
| 2    | IO_L21N_2            | IO_L21N_2                      | P147                   | I/O  |
| 2    | IO_L21P_2            | IO_L21P_2                      | P146                   | I/O  |
| 2    | IO_L22N_2            | IO_L22N_2                      | P144                   | I/O  |

Table 92: PQ208 Package Pinout (Continued)

| Bank | XC3S50<br>Pin Name   | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|----------------------|--------------------------------|------------------------|------|
| 2    | IO_L22P_2            | IO_L22P_2                      | P143                   | I/O  |
| 2    | IO_L23N_2/<br>VREF_2 | IO_L23N_2/<br>VREF_2           | P141                   | VREF |
| 2    | IO_L23P_2            | IO_L23P_2                      | P140                   | I/O  |
| 2    | IO_L24N_2            | IO_L24N_2                      | P139                   | I/O  |
| 2    | IO_L24P_2            | IO_L24P_2                      | P138                   | I/O  |
| 2    | N.C. (◆)             | IO_L39N_2                      | P137                   | I/O  |
| 2    | N.C. (◆)             | IO_L39P_2                      | P135                   | I/O  |
| 2    | IO_L40N_2            | IO_L40N_2                      | P133                   | I/O  |
| 2    | IO_L40P_2/<br>VREF_2 | IO_L40P_2/<br>VREF_2           | P132                   | VREF |
| 2    | VCCO_2               | VCCO_2                         | P136                   | VCCO |
| 2    | VCCO_2               | VCCO_2                         | P153                   | VCCO |
| 3    | IO_L01N_3/<br>VRP_3  | IO_L01N_3/<br>VRP_3            | P107                   | DCI  |
| 3    | IO_L01P_3/<br>VRN_3  | IO_L01P_3/<br>VRN_3            | P106                   | DCI  |
| 3    | N.C. (◆)             | IO_L17N_3                      | P109                   | I/O  |
| 3    | N.C. (◆)             | IO_L17P_3/<br>VREF_3           | P108                   | VREF |
| 3    | IO_L19N_3            | IO_L19N_3                      | P113                   | I/O  |
| 3    | IO_L19P_3            | IO_L19P_3                      | P111                   | I/O  |
| 3    | IO_L20N_3            | IO_L20N_3                      | P115                   | I/O  |
| 3    | IO_L20P_3            | IO_L20P_3                      | P114                   | I/O  |
| 3    | IO_L21N_3            | IO_L21N_3                      | P117                   | I/O  |
| 3    | IO_L21P_3            | IO_L21P_3                      | P116                   | I/O  |
| 3    | IO_L22N_3            | IO_L22N_3                      | P120                   | I/O  |
| 3    | IO_L22P_3            | IO_L22P_3                      | P119                   | I/O  |
| 3    | IO_L23N_3            | IO_L23N_3                      | P123                   | I/O  |
| 3    | IO_L23P_3/<br>VREF_3 | IO_L23P_3/<br>VREF_3           | P122                   | VREF |
| 3    | IO_L24N_3            | IO_L24N_3                      | P125                   | I/O  |
| 3    | IO_L24P_3            | IO_L24P_3                      | P124                   | I/O  |
| 3    | N.C. (◆)             | IO_L39N_3                      | P128                   | I/O  |
| 3    | N.C. (◆)             | IO_L39P_3                      | P126                   | I/O  |
| 3    | IO_L40N_3/<br>VREF_3 | IO_L40N_3/<br>VREF_3           | P131                   | VREF |
| 3    | IO_L40P_3            | IO_L40P_3                      | P130                   | I/O  |
| 3    | VCCO_3               | VCCO_3                         | P110                   | VCCO |
| 3    | VCCO_3               | VCCO_3                         | P127                   | VCCO |
| 4    | IO                   | IO                             | P93                    | I/O  |
| 4    | N.C. (◆)             | IO                             | P97                    | I/O  |
| 4    | IO/VREF_4            | IO/VREF_4                      | P85                    | VREF |

Table 92: PQ208 Package Pinout (Continued)

| Bank | XC3S50<br>Pin Name      | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|-------------------------|--------------------------------|------------------------|------|
| 4    | N.C. (◆)                | IO/VREF_4                      | P96                    | VREF |
| 4    | IO/VREF_4               | IO/VREF_4                      | P102                   | VREF |
| 4    | IO_L01N_4/<br>VRP_4     | IO_L01N_4/<br>VRP_4            | P101                   | DCI  |
| 4    | IO_L01P_4/<br>VRN_4     | IO_L01P_4/<br>VRN_4            | P100                   | DCI  |
| 4    | IO_L25N_4               | IO_L25N_4                      | P95                    | I/O  |
| 4    | IO_L25P_4               | IO_L25P_4                      | P94                    | I/O  |
| 4    | IO_L27N_4/<br>DIN/D0    | IO_L27N_4/<br>DIN/D0           | P92                    | DUAL |
| 4    | IO_L27P_4/<br>D1        | IO_L27P_4/<br>D1               | P90                    | DUAL |
| 4    | IO_L30N_4/<br>D2        | IO_L30N_4/<br>D2               | P87                    | DUAL |
| 4    | IO_L30P_4/<br>D3        | IO_L30P_4/<br>D3               | P86                    | DUAL |
| 4    | IO_L31N_4/<br>INIT_B    | IO_L31N_4/<br>INIT_B           | P83                    | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY        | P81                    | DUAL |
| 4    | IO_L32N_4/<br>GCLK1     | IO_L32N_4/<br>GCLK1            | P80                    | GCLK |
| 4    | IO_L32P_4/<br>GCLK0     | IO_L32P_4/<br>GCLK0            | P79                    | GCLK |
| 4    | VCCO_4                  | VCCO_4                         | P84                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                         | P98                    | VCCO |
| 5    | IO                      | IO                             | P63                    | I/O  |
| 5    | IO                      | IO                             | P71                    | I/O  |
| 5    | IO/VREF_5               | IO/VREF_5                      | P78                    | VREF |
| 5    | IO_L01N_5/<br>RDWR_B    | IO_L01N_5/<br>RDWR_B           | P58                    | DUAL |
| 5    | IO_L01P_5/<br>CS_B      | IO_L01P_5/<br>CS_B             | P57                    | DUAL |
| 5    | IO_L10N_5/<br>VRP_5     | IO_L10N_5/<br>VRP_5            | P62                    | DCI  |
| 5    | IO_L10P_5/<br>VRN_5     | IO_L10P_5/<br>VRN_5            | P61                    | DCI  |
| 5    | IO_L27N_5/<br>VREF_5    | IO_L27N_5/<br>VREF_5           | P65                    | VREF |
| 5    | IO_L27P_5               | IO_L27P_5                      | P64                    | I/O  |
| 5    | IO_L28N_5/<br>D6        | IO_L28N_5/<br>D6               | P68                    | DUAL |
| 5    | IO_L28P_5/<br>D7        | IO_L28P_5/<br>D7               | P67                    | DUAL |
| 5    | IO_L31N_5/<br>D4        | IO_L31N_5/<br>D4               | P74                    | DUAL |

Table 92: PQ208 Package Pinout (Continued)

| Bank | XC3S50<br>Pin Name   | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|----------------------|--------------------------------|------------------------|------|
| 5    | IO_L31P_5/<br>D5     | IO_L31P_5/<br>D5               | P72                    | DUAL |
| 5    | IO_L32N_5/<br>GCLK3  | IO_L32N_5/<br>GCLK3            | P77                    | GCLK |
| 5    | IO_L32P_5/<br>GCLK2  | IO_L32P_5/<br>GCLK2            | P76                    | GCLK |
| 5    | VCCO_5               | VCCO_5                         | P60                    | VCCO |
| 5    | VCCO_5               | VCCO_5                         | P73                    | VCCO |
| 6    | N.C. (◆)             | IO/VREF_6                      | P50                    | VREF |
| 6    | IO_L01N_6/<br>VRP_6  | IO_L01N_6/<br>VRP_6            | P52                    | DCI  |
| 6    | IO_L01P_6/<br>VRN_6  | IO_L01P_6/<br>VRN_6            | P51                    | DCI  |
| 6    | IO_L19N_6            | IO_L19N_6                      | P48                    | I/O  |
| 6    | IO_L19P_6            | IO_L19P_6                      | P46                    | I/O  |
| 6    | IO_L20N_6            | IO_L20N_6                      | P45                    | I/O  |
| 6    | IO_L20P_6            | IO_L20P_6                      | P44                    | I/O  |
| 6    | IO_L21N_6            | IO_L21N_6                      | P43                    | I/O  |
| 6    | IO_L21P_6            | IO_L21P_6                      | P42                    | I/O  |
| 6    | IO_L22N_6            | IO_L22N_6                      | P40                    | I/O  |
| 6    | IO_L22P_6            | IO_L22P_6                      | P39                    | I/O  |
| 6    | IO_L23N_6            | IO_L23N_6                      | P37                    | I/O  |
| 6    | IO_L23P_6            | IO_L23P_6                      | P36                    | I/O  |
| 6    | IO_L24N_6/<br>VREF_6 | IO_L24N_6/<br>VREF_6           | P35                    | VREF |
| 6    | IO_L24P_6            | IO_L24P_6                      | P34                    | I/O  |
| 6    | N.C. (◆)             | IO_L39N_6                      | P33                    | I/O  |
| 6    | N.C. (◆)             | IO_L39P_6                      | P31                    | I/O  |
| 6    | IO_L40N_6            | IO_L40N_6                      | P29                    | I/O  |
| 6    | IO_L40P_6/<br>VREF_6 | IO_L40P_6/<br>VREF_6           | P28                    | VREF |
| 6    | VCCO_6               | VCCO_6                         | P32                    | VCCO |
| 6    | VCCO_6               | VCCO_6                         | P49                    | VCCO |
| 7    | IO_L01N_7/<br>VRP_7  | IO_L01N_7/<br>VRP_7            | P3                     | DCI  |
| 7    | IO_L01P_7/<br>VRN_7  | IO_L01P_7/<br>VRN_7            | P2                     | DCI  |
| 7    | N.C. (◆)             | IO_L16N_7                      | P5                     | I/O  |
| 7    | N.C. (◆)             | IO_L16P_7/<br>VREF_7           | P4                     | VREF |
| 7    | IO_L19N_7/<br>VREF_7 | IO_L19N_7/<br>VREF_7           | P9                     | VREF |
| 7    | IO_L19P_7            | IO_L19P_7                      | P7                     | I/O  |
| 7    | IO_L20N_7            | IO_L20N_7                      | P11                    | I/O  |
| 7    | IO_L20P_7            | IO_L20P_7                      | P10                    | I/O  |

Table 92: PQ208 Package Pinout (Continued)

| Bank | XC3S50<br>Pin Name   | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type |
|------|----------------------|--------------------------------|------------------------|------|
| 7    | IO_L21N_7            | IO_L21N_7                      | P13                    | I/O  |
| 7    | IO_L21P_7            | IO_L21P_7                      | P12                    | I/O  |
| 7    | IO_L22N_7            | IO_L22N_7                      | P16                    | I/O  |
| 7    | IO_L22P_7            | IO_L22P_7                      | P15                    | I/O  |
| 7    | IO_L23N_7            | IO_L23N_7                      | P19                    | I/O  |
| 7    | IO_L23P_7            | IO_L23P_7                      | P18                    | I/O  |
| 7    | IO_L24N_7            | IO_L24N_7                      | P21                    | I/O  |
| 7    | IO_L24P_7            | IO_L24P_7                      | P20                    | I/O  |
| 7    | N.C. (◆)             | IO_L39N_7                      | P24                    | I/O  |
| 7    | N.C. (◆)             | IO_L39P_7                      | P22                    | I/O  |
| 7    | IO_L40N_7/<br>VREF_7 | IO_L40N_7/<br>VREF_7           | P27                    | VREF |
| 7    | IO_L40P_7            | IO_L40P_7                      | P26                    | I/O  |
| 7    | VCCO_7               | VCCO_7                         | P6                     | VCCO |
| 7    | VCCO_7               | VCCO_7                         | P23                    | VCCO |
| N/A  | GND                  | GND                            | P1                     | GND  |
| N/A  | GND                  | GND                            | P186                   | GND  |
| N/A  | GND                  | GND                            | P195                   | GND  |
| N/A  | GND                  | GND                            | P202                   | GND  |
| N/A  | GND                  | GND                            | P163                   | GND  |
| N/A  | GND                  | GND                            | P170                   | GND  |
| N/A  | GND                  | GND                            | P179                   | GND  |
| N/A  | GND                  | GND                            | P134                   | GND  |
| N/A  | GND                  | GND                            | P145                   | GND  |
| N/A  | GND                  | GND                            | P151                   | GND  |
| N/A  | GND                  | GND                            | P157                   | GND  |
| N/A  | GND                  | GND                            | P112                   | GND  |
| N/A  | GND                  | GND                            | P118                   | GND  |
| N/A  | GND                  | GND                            | P129                   | GND  |
| N/A  | GND                  | GND                            | P82                    | GND  |
| N/A  | GND                  | GND                            | P91                    | GND  |
| N/A  | GND                  | GND                            | P99                    | GND  |
| N/A  | GND                  | GND                            | P105                   | GND  |
| N/A  | GND                  | GND                            | P53                    | GND  |
| N/A  | GND                  | GND                            | P59                    | GND  |
| N/A  | GND                  | GND                            | P66                    | GND  |
| N/A  | GND                  | GND                            | P75                    | GND  |
| N/A  | GND                  | GND                            | P30                    | GND  |
| N/A  | GND                  | GND                            | P41                    | GND  |
| N/A  | GND                  | GND                            | P47                    | GND  |
| N/A  | GND                  | GND                            | P8                     | GND  |
| N/A  | GND                  | GND                            | P14                    | GND  |



Table 92: PQ208 Package Pinout (Continued)

| Bank   | XC3S50<br>Pin Name | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type   |
|--------|--------------------|--------------------------------|------------------------|--------|
| N/A    | GND                | GND                            | P25                    | GND    |
| N/A    | VCCAUX             | VCCAUX                         | P193                   | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P173                   | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P142                   | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P121                   | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P89                    | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P69                    | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P38                    | VCCAUX |
| N/A    | VCCAUX             | VCCAUX                         | P17                    | VCCAUX |
| N/A    | VCCINT             | VCCINT                         | P192                   | VCCINT |
| N/A    | VCCINT             | VCCINT                         | P174                   | VCCINT |
| N/A    | VCCINT             | VCCINT                         | P88                    | VCCINT |
| N/A    | VCCINT             | VCCINT                         | P70                    | VCCINT |
| VCCAUX | CCLK               | CCLK                           | P104                   | CONFIG |
| VCCAUX | DONE               | DONE                           | P103                   | CONFIG |

Table 92: PQ208 Package Pinout (Continued)

| Bank   | XC3S50<br>Pin Name | XC3S200<br>XC3S400<br>Pin Name | PQ208<br>Pin<br>Number | Type   |
|--------|--------------------|--------------------------------|------------------------|--------|
| VCCAUX | HSWAP_EN           | HSWAP_EN                       | P206                   | CONFIG |
| VCCAUX | M0                 | M0                             | P55                    | CONFIG |
| VCCAUX | M1                 | M1                             | P54                    | CONFIG |
| VCCAUX | M2                 | M2                             | P56                    | CONFIG |
| VCCAUX | PROG_B             | PROG_B                         | P207                   | CONFIG |
| VCCAUX | TCK                | TCK                            | P159                   | JTAG   |
| VCCAUX | TDI                | TDI                            | P208                   | JTAG   |
| VCCAUX | TDO                | TDO                            | P158                   | JTAG   |
| VCCAUX | TMS                | TMS                            | P160                   | JTAG   |

### User I/Os by Bank

Table 93 indicates how the available user-I/O pins are distributed between the eight I/O banks for the XC3S50 in the PQ208 package. Similarly, Table 94 shows how the available user-I/O pins are distributed between the eight I/O banks for the XC3S200 and XC3S400 in the PQ208 package.

Table 93: User I/Os Per Bank for XC3S50 in PQ208 Package

| Package Edge | I/O Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|----------------|-------------------------------|------|-----|------|------|
|              |          |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 15             | 9                             | 0    | 2   | 2    | 2    |
|              | 1        | 15             | 9                             | 0    | 2   | 2    | 2    |
| Right        | 2        | 16             | 13                            | 0    | 2   | 2    | 0    |
|              | 3        | 16             | 12                            | 0    | 2   | 2    | 0    |
| Bottom       | 4        | 15             | 3                             | 6    | 2   | 2    | 2    |
|              | 5        | 15             | 3                             | 6    | 2   | 2    | 2    |
| Left         | 6        | 16             | 12                            | 0    | 2   | 2    | 0    |
|              | 7        | 16             | 12                            | 0    | 2   | 2    | 0    |

Table 94: User I/Os Per Bank for XC3S200 and XC3S400 in PQ208 Package

| Package Edge | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|-------------|-------------------------------|------|-----|------|------|
|              |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 16          | 9                             | 0    | 2   | 3    | 2    |
|              | 1        | 15          | 9                             | 0    | 2   | 2    | 2    |
| Right        | 2        | 19          | 14                            | 0    | 2   | 3    | 0    |
|              | 3        | 20          | 15                            | 0    | 2   | 3    | 0    |
| Bottom       | 4        | 17          | 4                             | 6    | 2   | 3    | 2    |
|              | 5        | 15          | 3                             | 6    | 2   | 2    | 2    |
| Left         | 6        | 19          | 14                            | 0    | 2   | 3    | 0    |
|              | 7        | 20          | 15                            | 0    | 2   | 3    | 0    |

## PQ208 Footprint

### Left Half of Package (top view)

#### XC3S50

(124 max. user I/O)

72 I/O: Unrestricted,  
general-purpose user I/O

16 VREF: User I/O or input  
voltage reference for bank

17 N.C.: Unconnected pins for  
XC3S50 (◆)

#### XC3S200, XC3S400

(141 max user I/O)

83 I/O: Unrestricted,  
general-purpose user I/O

22 VREF: User I/O or input  
voltage reference for bank

0 N.C.: No unconnected pins  
in this package

#### All devices

12 DUAL: Configuration pin,  
then possible user I/O

8 GCLK: User I/O or global  
clock buffer input

16 DCI: User I/O or reference  
resistor input for bank

7 CONFIG: Dedicated  
configuration pins

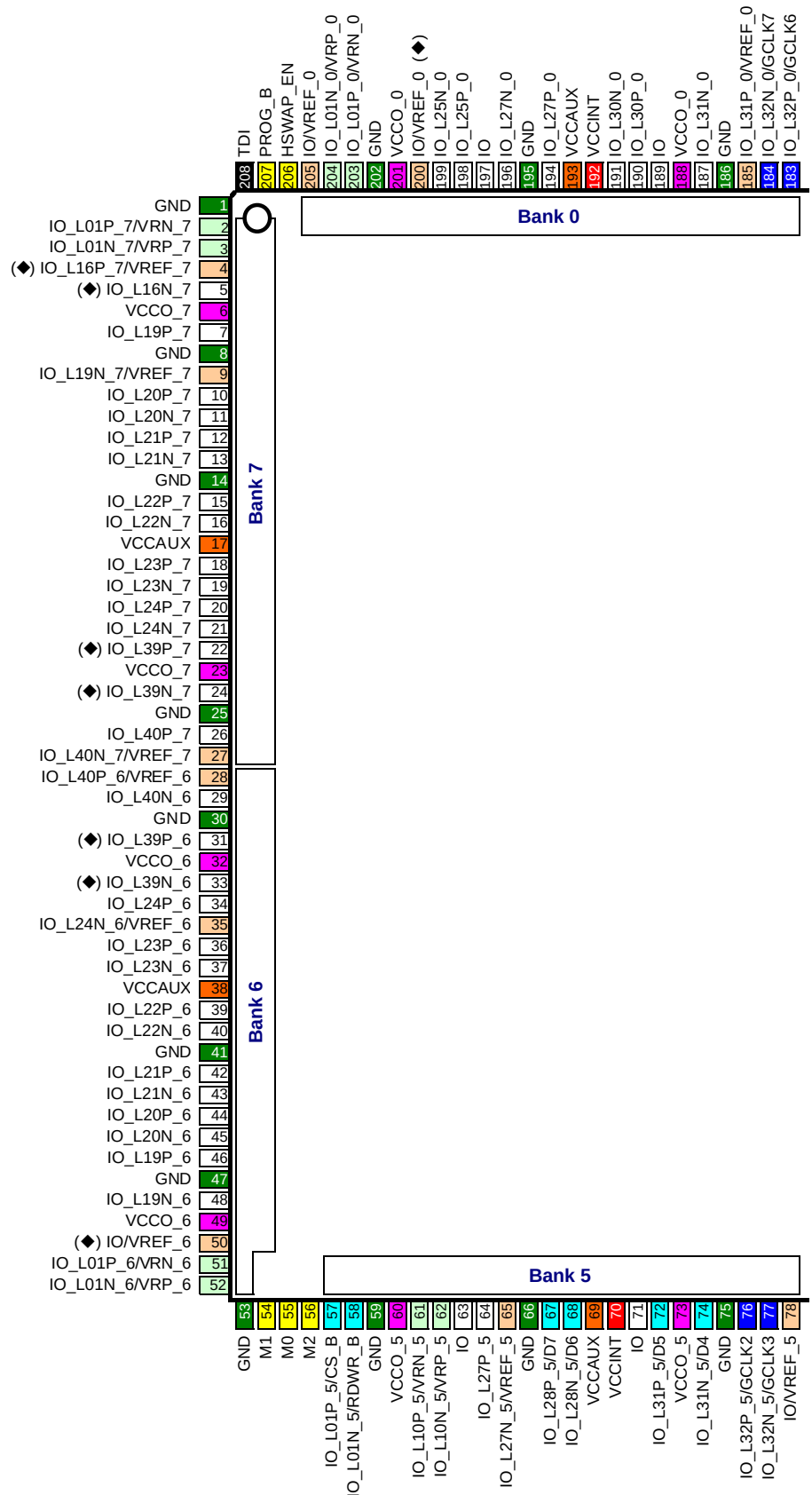
4 JTAG: Dedicated JTAG  
port pins

4 VCCINT: Internal core  
voltage supply (+1.2V)

12 VCCO: Output voltage  
supply for bank

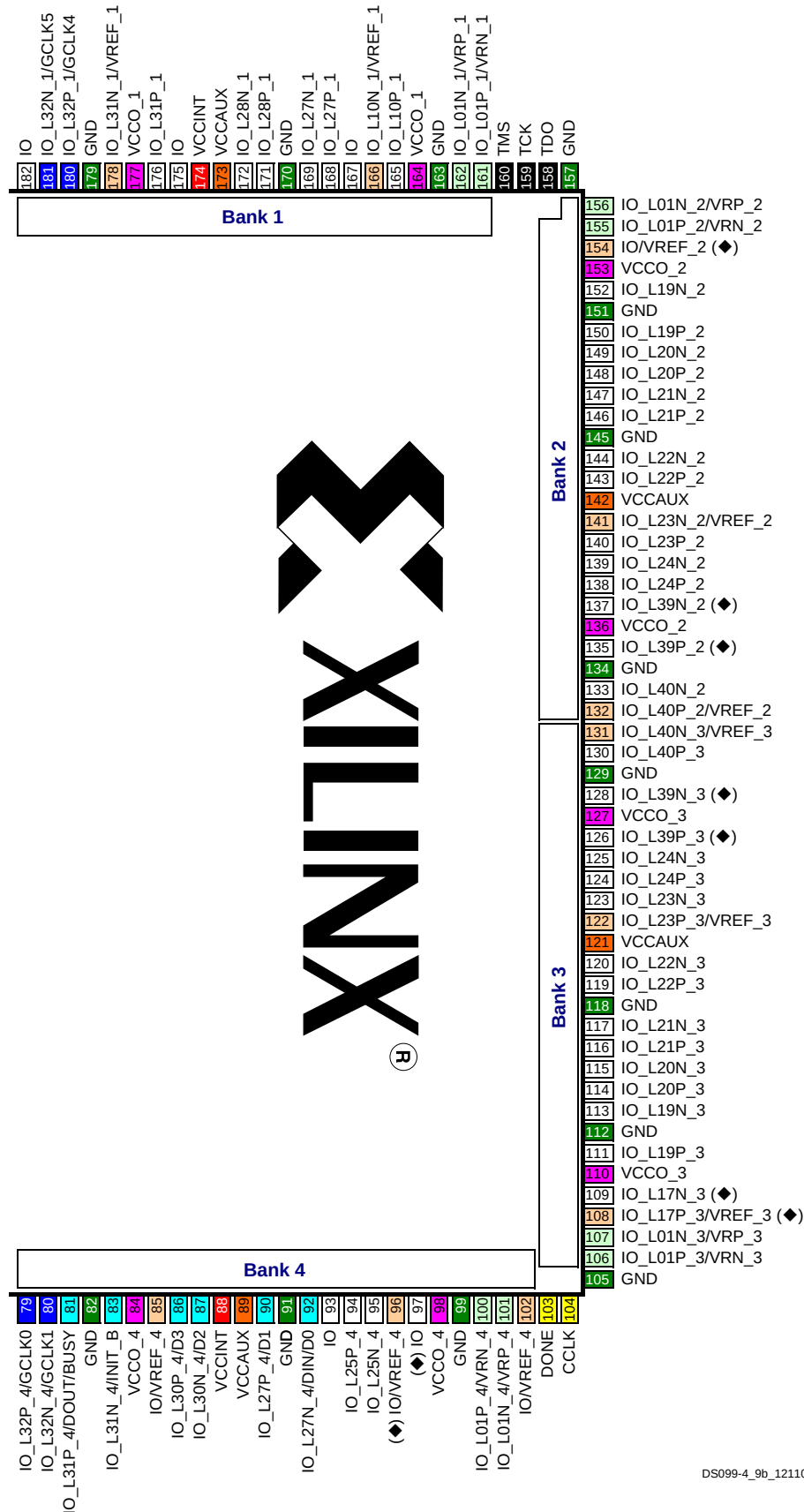
8 VCCAUX: Auxiliary voltage  
supply (+2.5V)

28 GND: Ground



DS099-4\_09a\_121103

Figure 45: PQ208 Package Footprint (top view). Note pin 1 indicator in top-left corner and logo orientation.



*Right Half of Package  
(top view)*

DS099-4\_9b\_121103

## FT256: 256-lead Fine-pitch Thin Ball Grid Array

The 256-lead fine-pitch thin ball grid array package, FT256, supports three different Spartan-3 devices, including the XC3S200, the XC3S400, and the XC3S1000. The footprints for all three devices are identical, as shown in [Table 95](#) and [Figure 46](#).

All the package pins appear in [Table 95](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx website at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 95: FT256 Package Pinout

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 0    | IO                                         | A5                     | I/O  |
| 0    | IO                                         | A7                     | I/O  |
| 0    | IO/VREF_0                                  | A3                     | VREF |
| 0    | IO/VREF_0                                  | D5                     | VREF |
| 0    | IO_L01N_0/VRP_0                            | B4                     | DCI  |
| 0    | IO_L01P_0/VRN_0                            | A4                     | DCI  |
| 0    | IO_L25N_0                                  | C5                     | I/O  |
| 0    | IO_L25P_0                                  | B5                     | I/O  |
| 0    | IO_L27N_0                                  | E6                     | I/O  |
| 0    | IO_L27P_0                                  | D6                     | I/O  |
| 0    | IO_L28N_0                                  | C6                     | I/O  |
| 0    | IO_L28P_0                                  | B6                     | I/O  |
| 0    | IO_L29N_0                                  | E7                     | I/O  |
| 0    | IO_L29P_0                                  | D7                     | I/O  |
| 0    | IO_L30N_0                                  | C7                     | I/O  |
| 0    | IO_L30P_0                                  | B7                     | I/O  |
| 0    | IO_L31N_0                                  | D8                     | I/O  |
| 0    | IO_L31P_0/VREF_0                           | C8                     | VREF |
| 0    | IO_L32N_0/GCLK7                            | B8                     | GCLK |
| 0    | IO_L32P_0/GCLK6                            | A8                     | GCLK |
| 0    | VCCO_0                                     | E8                     | VCCO |
| 0    | VCCO_0                                     | F7                     | VCCO |
| 0    | VCCO_0                                     | F8                     | VCCO |
| 1    | IO                                         | A9                     | I/O  |
| 1    | IO                                         | A12                    | I/O  |

Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 1    | IO                                         | C10                    | I/O  |
| 1    | IO/VREF_1                                  | D12                    | VREF |
| 1    | IO_L01N_1/VRP_1                            | A14                    | DCI  |
| 1    | IO_L01P_1/VRN_1                            | B14                    | DCI  |
| 1    | IO_L10N_1/VREF_1                           | A13                    | VREF |
| 1    | IO_L10P_1                                  | B13                    | I/O  |
| 1    | IO_L27N_1                                  | B12                    | I/O  |
| 1    | IO_L27P_1                                  | C12                    | I/O  |
| 1    | IO_L28N_1                                  | D11                    | I/O  |
| 1    | IO_L28P_1                                  | E11                    | I/O  |
| 1    | IO_L29N_1                                  | B11                    | I/O  |
| 1    | IO_L29P_1                                  | C11                    | I/O  |
| 1    | IO_L30N_1                                  | D10                    | I/O  |
| 1    | IO_L30P_1                                  | E10                    | I/O  |
| 1    | IO_L31N_1/VREF_1                           | A10                    | VREF |
| 1    | IO_L31P_1                                  | B10                    | I/O  |
| 1    | IO_L32N_1/GCLK5                            | C9                     | GCLK |
| 1    | IO_L32P_1/GCLK4                            | D9                     | GCLK |
| 1    | VCCO_1                                     | E9                     | VCCO |
| 1    | VCCO_1                                     | F9                     | VCCO |
| 1    | VCCO_1                                     | F10                    | VCCO |
| 2    | IO                                         | G16                    | I/O  |
| 2    | IO_L01N_2/VRP_2                            | B16                    | DCI  |
| 2    | IO_L01P_2/VRN_2                            | C16                    | DCI  |
| 2    | IO_L16N_2                                  | C15                    | I/O  |
| 2    | IO_L16P_2                                  | D14                    | I/O  |
| 2    | IO_L17N_2                                  | D15                    | I/O  |
| 2    | IO_L17P_2/VREF_2                           | D16                    | VREF |
| 2    | IO_L19N_2                                  | E13                    | I/O  |
| 2    | IO_L19P_2                                  | E14                    | I/O  |
| 2    | IO_L20N_2                                  | E15                    | I/O  |
| 2    | IO_L20P_2                                  | E16                    | I/O  |
| 2    | IO_L21N_2                                  | F12                    | I/O  |
| 2    | IO_L21P_2                                  | F13                    | I/O  |
| 2    | IO_L22N_2                                  | F14                    | I/O  |
| 2    | IO_L22P_2                                  | F15                    | I/O  |
| 2    | IO_L23N_2/VREF_2                           | G12                    | VREF |
| 2    | IO_L23P_2                                  | G13                    | I/O  |
| 2    | IO_L24N_2                                  | G14                    | I/O  |
| 2    | IO_L24P_2                                  | G15                    | I/O  |

Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 2    | IO_L39N_2                                  | H13                    | I/O  |
| 2    | IO_L39P_2                                  | H14                    | I/O  |
| 2    | IO_L40N_2                                  | H15                    | I/O  |
| 2    | IO_L40P_2/VREF_2                           | H16                    | VREF |
| 2    | VCCO_2                                     | G11                    | VCCO |
| 2    | VCCO_2                                     | H11                    | VCCO |
| 2    | VCCO_2                                     | H12                    | VCCO |
| 3    | IO                                         | K15                    | I/O  |
| 3    | IO_L01N_3/VRP_3                            | P16                    | DCI  |
| 3    | IO_L01P_3/VRN_3                            | R16                    | DCI  |
| 3    | IO_L16N_3                                  | P15                    | I/O  |
| 3    | IO_L16P_3                                  | P14                    | I/O  |
| 3    | IO_L17N_3                                  | N16                    | I/O  |
| 3    | IO_L17P_3/VREF_3                           | N15                    | VREF |
| 3    | IO_L19N_3                                  | M14                    | I/O  |
| 3    | IO_L19P_3                                  | N14                    | I/O  |
| 3    | IO_L20N_3                                  | M16                    | I/O  |
| 3    | IO_L20P_3                                  | M15                    | I/O  |
| 3    | IO_L21N_3                                  | L13                    | I/O  |
| 3    | IO_L21P_3                                  | M13                    | I/O  |
| 3    | IO_L22N_3                                  | L15                    | I/O  |
| 3    | IO_L22P_3                                  | L14                    | I/O  |
| 3    | IO_L23N_3                                  | K12                    | I/O  |
| 3    | IO_L23P_3/VREF_3                           | L12                    | VREF |
| 3    | IO_L24N_3                                  | K14                    | I/O  |
| 3    | IO_L24P_3                                  | K13                    | I/O  |
| 3    | IO_L39N_3                                  | J14                    | I/O  |
| 3    | IO_L39P_3                                  | J13                    | I/O  |
| 3    | IO_L40N_3/VREF_3                           | J16                    | VREF |
| 3    | IO_L40P_3                                  | K16                    | I/O  |
| 3    | VCCO_3                                     | J11                    | VCCO |
| 3    | VCCO_3                                     | J12                    | VCCO |
| 3    | VCCO_3                                     | K11                    | VCCO |
| 4    | IO                                         | T12                    | I/O  |
| 4    | IO                                         | T14                    | I/O  |
| 4    | IO/VREF_4                                  | N12                    | VREF |
| 4    | IO/VREF_4                                  | P13                    | VREF |
| 4    | IO/VREF_4                                  | T10                    | VREF |
| 4    | IO_L01N_4/VRP_4                            | R13                    | DCI  |
| 4    | IO_L01P_4/VRN_4                            | T13                    | DCI  |

Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 4    | IO_L25N_4                                  | P12                    | I/O  |
| 4    | IO_L25P_4                                  | R12                    | I/O  |
| 4    | IO_L27N_4/DIN/D0                           | M11                    | DUAL |
| 4    | IO_L27P_4/D1                               | N11                    | DUAL |
| 4    | IO_L28N_4                                  | P11                    | I/O  |
| 4    | IO_L28P_4                                  | R11                    | I/O  |
| 4    | IO_L29N_4                                  | M10                    | I/O  |
| 4    | IO_L29P_4                                  | N10                    | I/O  |
| 4    | IO_L30N_4/D2                               | P10                    | DUAL |
| 4    | IO_L30P_4/D3                               | R10                    | DUAL |
| 4    | IO_L31N_4/INIT_B                           | N9                     | DUAL |
| 4    | IO_L31P_4/DOUT/BUSY                        | P9                     | DUAL |
| 4    | IO_L32N_4/GCLK1                            | R9                     | GCLK |
| 4    | IO_L32P_4/GCLK0                            | T9                     | GCLK |
| 4    | VCCO_4                                     | L9                     | VCCO |
| 4    | VCCO_4                                     | L10                    | VCCO |
| 4    | VCCO_4                                     | M9                     | VCCO |
| 5    | IO                                         | N5                     | I/O  |
| 5    | IO                                         | P7                     | I/O  |
| 5    | IO                                         | T5                     | I/O  |
| 5    | IO/VREF_5                                  | T8                     | VREF |
| 5    | IO_L01N_5/RDWR_B                           | T3                     | DUAL |
| 5    | IO_L01P_5/CS_B                             | R3                     | DUAL |
| 5    | IO_L10N_5/VRP_5                            | T4                     | DCI  |
| 5    | IO_L10P_5/VRN_5                            | R4                     | DCI  |
| 5    | IO_L27N_5/VREF_5                           | R5                     | VREF |
| 5    | IO_L27P_5                                  | P5                     | I/O  |
| 5    | IO_L28N_5/D6                               | N6                     | DUAL |
| 5    | IO_L28P_5/D7                               | M6                     | DUAL |
| 5    | IO_L29N_5                                  | R6                     | I/O  |
| 5    | IO_L29P_5/VREF_5                           | P6                     | VREF |
| 5    | IO_L30N_5                                  | N7                     | I/O  |
| 5    | IO_L30P_5                                  | M7                     | I/O  |
| 5    | IO_L31N_5/D4                               | T7                     | DUAL |
| 5    | IO_L31P_5/D5                               | R7                     | DUAL |
| 5    | IO_L32N_5/GCLK3                            | P8                     | GCLK |
| 5    | IO_L32P_5/GCLK2                            | N8                     | GCLK |
| 5    | VCCO_5                                     | L7                     | VCCO |
| 5    | VCCO_5                                     | L8                     | VCCO |

Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 5    | VCCO_5                                     | M8                     | VCCO |
| 6    | IO                                         | K1                     | I/O  |
| 6    | IO_L01N_6/VRP_6                            | R1                     | DCI  |
| 6    | IO_L01P_6/VRN_6                            | P1                     | DCI  |
| 6    | IO_L16N_6                                  | P2                     | I/O  |
| 6    | IO_L16P_6                                  | N3                     | I/O  |
| 6    | IO_L17N_6                                  | N2                     | I/O  |
| 6    | IO_L17P_6/VREF_6                           | N1                     | VREF |
| 6    | IO_L19N_6                                  | M4                     | I/O  |
| 6    | IO_L19P_6                                  | M3                     | I/O  |
| 6    | IO_L20N_6                                  | M2                     | I/O  |
| 6    | IO_L20P_6                                  | M1                     | I/O  |
| 6    | IO_L21N_6                                  | L5                     | I/O  |
| 6    | IO_L21P_6                                  | L4                     | I/O  |
| 6    | IO_L22N_6                                  | L3                     | I/O  |
| 6    | IO_L22P_6                                  | L2                     | I/O  |
| 6    | IO_L23N_6                                  | K5                     | I/O  |
| 6    | IO_L23P_6                                  | K4                     | I/O  |
| 6    | IO_L24N_6/VREF_6                           | K3                     | VREF |
| 6    | IO_L24P_6                                  | K2                     | I/O  |
| 6    | IO_L39N_6                                  | J4                     | I/O  |
| 6    | IO_L39P_6                                  | J3                     | I/O  |
| 6    | IO_L40N_6                                  | J2                     | I/O  |
| 6    | IO_L40P_6/VREF_6                           | J1                     | VREF |
| 6    | VCCO_6                                     | J5                     | VCCO |
| 6    | VCCO_6                                     | J6                     | VCCO |
| 6    | VCCO_6                                     | K6                     | VCCO |
| 7    | IO                                         | G2                     | I/O  |
| 7    | IO_L01N_7/VRP_7                            | C1                     | DCI  |
| 7    | IO_L01P_7/VRN_7                            | B1                     | DCI  |
| 7    | IO_L16N_7                                  | C2                     | I/O  |
| 7    | IO_L16P_7/VREF_7                           | C3                     | VREF |
| 7    | IO_L17N_7                                  | D1                     | I/O  |
| 7    | IO_L17P_7                                  | D2                     | I/O  |
| 7    | IO_L19N_7/VREF_7                           | E3                     | VREF |
| 7    | IO_L19P_7                                  | D3                     | I/O  |
| 7    | IO_L20N_7                                  | E1                     | I/O  |
| 7    | IO_L20P_7                                  | E2                     | I/O  |
| 7    | IO_L21N_7                                  | F4                     | I/O  |
| 7    | IO_L21P_7                                  | E4                     | I/O  |

Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type |
|------|--------------------------------------------|------------------------|------|
| 7    | IO_L22N_7                                  | F2                     | I/O  |
| 7    | IO_L22P_7                                  | F3                     | I/O  |
| 7    | IO_L23N_7                                  | G5                     | I/O  |
| 7    | IO_L23P_7                                  | F5                     | I/O  |
| 7    | IO_L24N_7                                  | G3                     | I/O  |
| 7    | IO_L24P_7                                  | G4                     | I/O  |
| 7    | IO_L39N_7                                  | H3                     | I/O  |
| 7    | IO_L39P_7                                  | H4                     | I/O  |
| 7    | IO_L40N_7/VREF_7                           | H1                     | VREF |
| 7    | IO_L40P_7                                  | G1                     | I/O  |
| 7    | VCCO_7                                     | G6                     | VCCO |
| 7    | VCCO_7                                     | H5                     | VCCO |
| 7    | VCCO_7                                     | H6                     | VCCO |
| N/A  | GND                                        | A1                     | GND  |
| N/A  | GND                                        | A16                    | GND  |
| N/A  | GND                                        | B2                     | GND  |
| N/A  | GND                                        | B9                     | GND  |
| N/A  | GND                                        | B15                    | GND  |
| N/A  | GND                                        | F6                     | GND  |
| N/A  | GND                                        | F11                    | GND  |
| N/A  | GND                                        | G7                     | GND  |
| N/A  | GND                                        | G8                     | GND  |
| N/A  | GND                                        | G9                     | GND  |
| N/A  | GND                                        | G10                    | GND  |
| N/A  | GND                                        | H2                     | GND  |
| N/A  | GND                                        | H7                     | GND  |
| N/A  | GND                                        | H8                     | GND  |
| N/A  | GND                                        | H9                     | GND  |
| N/A  | GND                                        | H10                    | GND  |
| N/A  | GND                                        | J7                     | GND  |
| N/A  | GND                                        | J8                     | GND  |
| N/A  | GND                                        | J9                     | GND  |
| N/A  | GND                                        | J10                    | GND  |
| N/A  | GND                                        | J15                    | GND  |
| N/A  | GND                                        | K7                     | GND  |
| N/A  | GND                                        | K8                     | GND  |
| N/A  | GND                                        | K9                     | GND  |
| N/A  | GND                                        | K10                    | GND  |
| N/A  | GND                                        | L6                     | GND  |
| N/A  | GND                                        | L11                    | GND  |



Table 95: FT256 Package Pinout (Continued)

| Bank | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type   |
|------|--------------------------------------------|------------------------|--------|
| N/A  | GND                                        | R2                     | GND    |
| N/A  | GND                                        | R8                     | GND    |
| N/A  | GND                                        | R15                    | GND    |
| N/A  | GND                                        | T1                     | GND    |
| N/A  | GND                                        | T16                    | GND    |
| N/A  | VCCAUX                                     | A6                     | VCCAUX |
| N/A  | VCCAUX                                     | A11                    | VCCAUX |
| N/A  | VCCAUX                                     | F1                     | VCCAUX |
| N/A  | VCCAUX                                     | F16                    | VCCAUX |
| N/A  | VCCAUX                                     | L1                     | VCCAUX |
| N/A  | VCCAUX                                     | L16                    | VCCAUX |
| N/A  | VCCAUX                                     | T6                     | VCCAUX |
| N/A  | VCCAUX                                     | T11                    | VCCAUX |
| N/A  | VCCINT                                     | D4                     | VCCINT |
| N/A  | VCCINT                                     | D13                    | VCCINT |
| N/A  | VCCINT                                     | E5                     | VCCINT |
| N/A  | VCCINT                                     | E12                    | VCCINT |
| N/A  | VCCINT                                     | M5                     | VCCINT |

Table 95: FT256 Package Pinout (Continued)

| Bank   | XC3S200<br>XC3S400<br>XC3S1000<br>Pin Name | FT256<br>Pin<br>Number | Type   |
|--------|--------------------------------------------|------------------------|--------|
| N/A    | VCCINT                                     | M12                    | VCCINT |
| N/A    | VCCINT                                     | N4                     | VCCINT |
| N/A    | VCCINT                                     | N13                    | VCCINT |
| VCCAUX | CCLK                                       | T15                    | CONFIG |
| VCCAUX | DONE                                       | R14                    | CONFIG |
| VCCAUX | HSWAP_EN                                   | C4                     | CONFIG |
| VCCAUX | M0                                         | P3                     | CONFIG |
| VCCAUX | M1                                         | T2                     | CONFIG |
| VCCAUX | M2                                         | P4                     | CONFIG |
| VCCAUX | PROG_B                                     | B3                     | CONFIG |
| VCCAUX | TCK                                        | C14                    | JTAG   |
| VCCAUX | TDI                                        | A2                     | JTAG   |
| VCCAUX | TDO                                        | A15                    | JTAG   |
| VCCAUX | TMS                                        | C13                    | JTAG   |

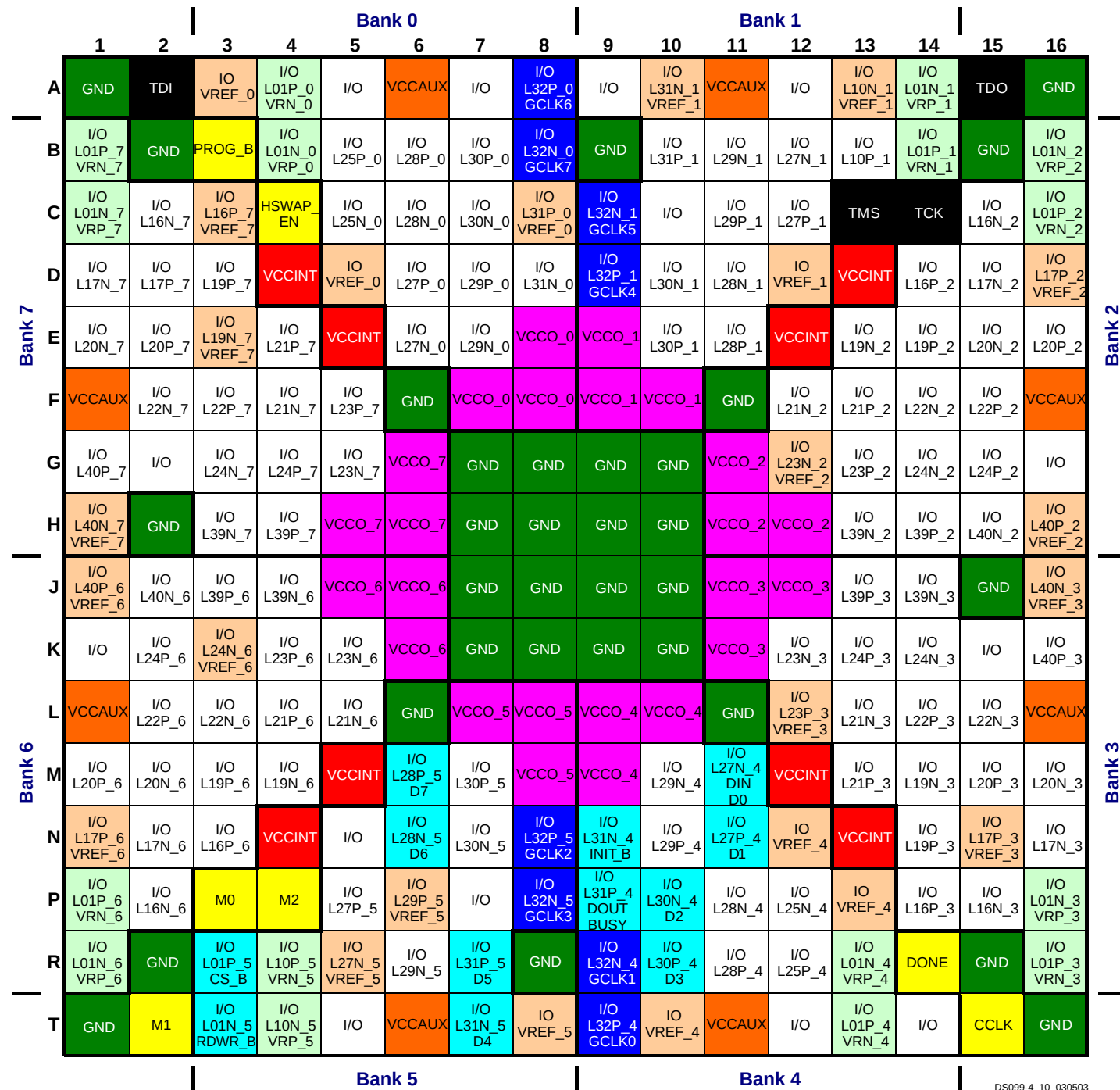
### User I/Os by Bank

Table 96 indicates how the available user-I/O pins are distributed between the eight I/O banks on the FT256 package.

Table 96: User I/Os Per Bank in FT256 Package

| Package Edge | I/O Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|----------------|-------------------------------|------|-----|------|------|
|              |          |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 20             | 13                            | 0    | 2   | 3    | 2    |
|              | 1        | 20             | 13                            | 0    | 2   | 3    | 2    |
| Right        | 2        | 23             | 18                            | 0    | 2   | 3    | 0    |
|              | 3        | 23             | 18                            | 0    | 2   | 3    | 0    |
| Bottom       | 4        | 21             | 8                             | 6    | 2   | 3    | 2    |
|              | 5        | 20             | 7                             | 6    | 2   | 3    | 2    |
| Left         | 6        | 23             | 18                            | 0    | 2   | 3    | 0    |
|              | 7        | 23             | 18                            | 0    | 2   | 3    | 0    |

## FT256 Footprint



DS099-4\_10\_030503

Figure 46: FT256 Package Footprint (top view)

|     |                                                    |    |                                                 |    |                                                    |
|-----|----------------------------------------------------|----|-------------------------------------------------|----|----------------------------------------------------|
| 113 | I/O: Unrestricted, general-purpose user I/O        | 12 | DUAL: Configuration pin, then possible user I/O | 24 | VREF: User I/O or input voltage reference for bank |
| 16  | DCI: User I/O or reference resistor input for bank | 8  | GCLK: User I/O or global clock buffer input     | 24 | VCCO: Output voltage supply for bank               |
| 7   | CONFIG: Dedicated configuration pins               | 4  | JTAG: Dedicated JTAG port pins                  | 8  | VCCINT: Internal core voltage supply (+1.2V)       |
| 0   | N.C.: No unconnected pins in this package          | 32 | GND: Ground                                     | 8  | VCCAUX: Auxiliary voltage supply (+2.5V)           |

## FG320: 320-lead Fine-pitch Ball Grid Array

The 320-lead fine-pitch ball grid array package, FG320, supports three different Spartan-3 devices, including the XC3S400, the XC3S1000, and the XC3S1500. The footprint for all three devices is identical, as shown in [Table 97](#) and [Figure 47](#).

The FG320 package is an 18 x 18 array of solder balls minus the four center balls.

All the package pins appear in [Table 97](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 97: FG320 Package Pinout

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 0    | IO                                          | D9                     | I/O  |
| 0    | IO                                          | E7                     | I/O  |
| 0    | IO/VREF_0                                   | B3                     | VREF |
| 0    | IO/VREF_0                                   | D6                     | VREF |
| 0    | IO_L01N_0/VRP_0                             | A2                     | DCI  |
| 0    | IO_L01P_0/VRN_0                             | A3                     | DCI  |
| 0    | IO_L09N_0                                   | B4                     | I/O  |
| 0    | IO_L09P_0                                   | C4                     | I/O  |
| 0    | IO_L10N_0                                   | C5                     | I/O  |
| 0    | IO_L10P_0                                   | D5                     | I/O  |
| 0    | IO_L15N_0                                   | A4                     | I/O  |
| 0    | IO_L15P_0                                   | A5                     | I/O  |
| 0    | IO_L25N_0                                   | B5                     | I/O  |
| 0    | IO_L25P_0                                   | B6                     | I/O  |
| 0    | IO_L27N_0                                   | C7                     | I/O  |
| 0    | IO_L27P_0                                   | D7                     | I/O  |
| 0    | IO_L28N_0                                   | C8                     | I/O  |
| 0    | IO_L28P_0                                   | D8                     | I/O  |
| 0    | IO_L29N_0                                   | E8                     | I/O  |
| 0    | IO_L29P_0                                   | F8                     | I/O  |
| 0    | IO_L30N_0                                   | A7                     | I/O  |
| 0    | IO_L30P_0                                   | A8                     | I/O  |
| 0    | IO_L31N_0                                   | B9                     | I/O  |
| 0    | IO_L31P_0/VREF_0                            | A9                     | VREF |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 0    | IO_L32N_0/GCLK7                             | E9                     | GCLK |
| 0    | IO_L32P_0/GCLK6                             | F9                     | GCLK |
| 0    | VCCO_0                                      | B8                     | VCCO |
| 0    | VCCO_0                                      | C6                     | VCCO |
| 0    | VCCO_0                                      | G8                     | VCCO |
| 0    | VCCO_0                                      | G9                     | VCCO |
| 1    | IO                                          | A11                    | I/O  |
| 1    | IO                                          | B13                    | I/O  |
| 1    | IO                                          | D10                    | I/O  |
| 1    | IO/VREF_1                                   | A12                    | VREF |
| 1    | IO_L01N_1/VRP_1                             | A16                    | DCI  |
| 1    | IO_L01P_1/VRN_1                             | A17                    | DCI  |
| 1    | IO_L10N_1/VREF_1                            | A15                    | VREF |
| 1    | IO_L10P_1                                   | B15                    | I/O  |
| 1    | IO_L15N_1                                   | C14                    | I/O  |
| 1    | IO_L15P_1                                   | C15                    | I/O  |
| 1    | IO_L16N_1                                   | A14                    | I/O  |
| 1    | IO_L16P_1                                   | B14                    | I/O  |
| 1    | IO_L24N_1                                   | D14                    | I/O  |
| 1    | IO_L24P_1                                   | D13                    | I/O  |
| 1    | IO_L27N_1                                   | E13                    | I/O  |
| 1    | IO_L27P_1                                   | E12                    | I/O  |
| 1    | IO_L28N_1                                   | C12                    | I/O  |
| 1    | IO_L28P_1                                   | D12                    | I/O  |
| 1    | IO_L29N_1                                   | F11                    | I/O  |
| 1    | IO_L29P_1                                   | E11                    | I/O  |
| 1    | IO_L30N_1                                   | C11                    | I/O  |
| 1    | IO_L30P_1                                   | D11                    | I/O  |
| 1    | IO_L31N_1/VREF_1                            | A10                    | VREF |
| 1    | IO_L31P_1                                   | B10                    | I/O  |
| 1    | IO_L32N_1/GCLK5                             | E10                    | GCLK |
| 1    | IO_L32P_1/GCLK4                             | F10                    | GCLK |
| 1    | VCCO_1                                      | B11                    | VCCO |
| 1    | VCCO_1                                      | C13                    | VCCO |
| 1    | VCCO_1                                      | G10                    | VCCO |
| 1    | VCCO_1                                      | G11                    | VCCO |
| 2    | IO                                          | J13                    | I/O  |
| 2    | IO_L01N_2/VRP_2                             | C16                    | DCI  |
| 2    | IO_L01P_2/VRN_2                             | C17                    | DCI  |
| 2    | IO_L16N_2                                   | B18                    | I/O  |
| 2    | IO_L16P_2                                   | C18                    | I/O  |
| 2    | IO_L17N_2                                   | D17                    | I/O  |
| 2    | IO_L17P_2/VREF_2                            | D18                    | VREF |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 2    | IO_L19N_2                                   | D16                    | I/O  |
| 2    | IO_L19P_2                                   | E16                    | I/O  |
| 2    | IO_L20N_2                                   | E17                    | I/O  |
| 2    | IO_L20P_2                                   | E18                    | I/O  |
| 2    | IO_L21N_2                                   | F15                    | I/O  |
| 2    | IO_L21P_2                                   | E15                    | I/O  |
| 2    | IO_L22N_2                                   | F14                    | I/O  |
| 2    | IO_L22P_2                                   | G14                    | I/O  |
| 2    | IO_L23N_2/VREF_2                            | G18                    | VREF |
| 2    | IO_L23P_2                                   | F17                    | I/O  |
| 2    | IO_L24N_2                                   | G15                    | I/O  |
| 2    | IO_L24P_2                                   | G16                    | I/O  |
| 2    | IO_L27N_2                                   | H13                    | I/O  |
| 2    | IO_L27P_2                                   | H14                    | I/O  |
| 2    | IO_L34N_2/VREF_2                            | H16                    | VREF |
| 2    | IO_L34P_2                                   | H15                    | I/O  |
| 2    | IO_L35N_2                                   | H17                    | I/O  |
| 2    | IO_L35P_2                                   | H18                    | I/O  |
| 2    | IO_L39N_2                                   | J18                    | I/O  |
| 2    | IO_L39P_2                                   | J17                    | I/O  |
| 2    | IO_L40N_2                                   | J15                    | I/O  |
| 2    | IO_L40P_2/VREF_2                            | J14                    | VREF |
| 2    | VCCO_2                                      | F16                    | VCCO |
| 2    | VCCO_2                                      | H12                    | VCCO |
| 2    | VCCO_2                                      | J12                    | VCCO |
| 3    | IO                                          | K15                    | I/O  |
| 3    | IO_L01N_3/VRP_3                             | T17                    | DCI  |
| 3    | IO_L01P_3/VRN_3                             | T16                    | DCI  |
| 3    | IO_L16N_3                                   | T18                    | I/O  |
| 3    | IO_L16P_3                                   | U18                    | I/O  |
| 3    | IO_L17N_3                                   | P16                    | I/O  |
| 3    | IO_L17P_3/VREF_3                            | R16                    | VREF |
| 3    | IO_L19N_3                                   | R17                    | I/O  |
| 3    | IO_L19P_3                                   | R18                    | I/O  |
| 3    | IO_L20N_3                                   | P18                    | I/O  |
| 3    | IO_L20P_3                                   | P17                    | I/O  |
| 3    | IO_L21N_3                                   | P15                    | I/O  |
| 3    | IO_L21P_3                                   | N15                    | I/O  |
| 3    | IO_L22N_3                                   | M14                    | I/O  |
| 3    | IO_L22P_3                                   | N14                    | I/O  |
| 3    | IO_L23N_3                                   | M15                    | I/O  |
| 3    | IO_L23P_3/VREF_3                            | M16                    | VREF |
| 3    | IO_L24N_3                                   | M18                    | I/O  |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 3    | IO_L24P_3                                   | N17                    | I/O  |
| 3    | IO_L27N_3                                   | L14                    | I/O  |
| 3    | IO_L27P_3                                   | L13                    | I/O  |
| 3    | IO_L34N_3                                   | L15                    | I/O  |
| 3    | IO_L34P_3/VREF_3                            | L16                    | VREF |
| 3    | IO_L35N_3                                   | L18                    | I/O  |
| 3    | IO_L35P_3                                   | L17                    | I/O  |
| 3    | IO_L39N_3                                   | K13                    | I/O  |
| 3    | IO_L39P_3                                   | K14                    | I/O  |
| 3    | IO_L40N_3/VREF_3                            | K17                    | VREF |
| 3    | IO_L40P_3                                   | K18                    | I/O  |
| 3    | VCCO_3                                      | K12                    | VCCO |
| 3    | VCCO_3                                      | L12                    | VCCO |
| 3    | VCCO_3                                      | N16                    | VCCO |
| 4    | IO                                          | P12                    | I/O  |
| 4    | IO                                          | V14                    | I/O  |
| 4    | IO/VREF_4                                   | R10                    | VREF |
| 4    | IO/VREF_4                                   | U13                    | VREF |
| 4    | IO/VREF_4                                   | V17                    | VREF |
| 4    | IO_L01N_4/VRP_4                             | U16                    | DCI  |
| 4    | IO_L01P_4/VRN_4                             | V16                    | DCI  |
| 4    | IO_L06N_4/VREF_4                            | P14                    | VREF |
| 4    | IO_L06P_4                                   | R14                    | I/O  |
| 4    | IO_L09N_4                                   | U15                    | I/O  |
| 4    | IO_L09P_4                                   | V15                    | I/O  |
| 4    | IO_L10N_4                                   | T14                    | I/O  |
| 4    | IO_L10P_4                                   | U14                    | I/O  |
| 4    | IO_L25N_4                                   | R13                    | I/O  |
| 4    | IO_L25P_4                                   | P13                    | I/O  |
| 4    | IO_L27N_4/DIN/D0                            | T12                    | DUAL |
| 4    | IO_L27P_4/D1                                | R12                    | DUAL |
| 4    | IO_L28N_4                                   | V12                    | I/O  |
| 4    | IO_L28P_4                                   | V11                    | I/O  |
| 4    | IO_L29N_4                                   | R11                    | I/O  |
| 4    | IO_L29P_4                                   | T11                    | I/O  |
| 4    | IO_L30N_4/D2                                | N11                    | DUAL |
| 4    | IO_L30P_4/D3                                | P11                    | DUAL |
| 4    | IO_L31N_4/INIT_B                            | U10                    | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY                     | V10                    | DUAL |
| 4    | IO_L32N_4/GCLK1                             | N10                    | GCLK |
| 4    | IO_L32P_4/GCLK0                             | P10                    | GCLK |
| 4    | VCCO_4                                      | M10                    | VCCO |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 4    | VCCO_4                                      | M11                    | VCCO |
| 4    | VCCO_4                                      | T13                    | VCCO |
| 4    | VCCO_4                                      | U11                    | VCCO |
| 5    | IO                                          | N8                     | I/O  |
| 5    | IO                                          | P8                     | I/O  |
| 5    | IO                                          | U6                     | I/O  |
| 5    | IO/VREF_5                                   | R9                     | VREF |
| 5    | IO_L01N_5/RDWR_B                            | V3                     | DUAL |
| 5    | IO_L01P_5/CS_B                              | V2                     | DUAL |
| 5    | IO_L06N_5                                   | T5                     | I/O  |
| 5    | IO_L06P_5                                   | T4                     | I/O  |
| 5    | IO_L10N_5/VRP_5                             | V4                     | DCI  |
| 5    | IO_L10P_5/VRN_5                             | U4                     | DCI  |
| 5    | IO_L15N_5                                   | R6                     | I/O  |
| 5    | IO_L15P_5                                   | R5                     | I/O  |
| 5    | IO_L16N_5                                   | V5                     | I/O  |
| 5    | IO_L16P_5                                   | U5                     | I/O  |
| 5    | IO_L27N_5/VREF_5                            | P6                     | VREF |
| 5    | IO_L27P_5                                   | P7                     | I/O  |
| 5    | IO_L28N_5/D6                                | R7                     | DUAL |
| 5    | IO_L28P_5/D7                                | T7                     | DUAL |
| 5    | IO_L29N_5                                   | V8                     | I/O  |
| 5    | IO_L29P_5/VREF_5                            | V7                     | VREF |
| 5    | IO_L30N_5                                   | R8                     | I/O  |
| 5    | IO_L30P_5                                   | T8                     | I/O  |
| 5    | IO_L31N_5/D4                                | U9                     | DUAL |
| 5    | IO_L31P_5/D5                                | V9                     | DUAL |
| 5    | IO_L32N_5/GCLK3                             | N9                     | GCLK |
| 5    | IO_L32P_5/GCLK2                             | P9                     | GCLK |
| 5    | VCCO_5                                      | M8                     | VCCO |
| 5    | VCCO_5                                      | M9                     | VCCO |
| 5    | VCCO_5                                      | T6                     | VCCO |
| 5    | VCCO_5                                      | U8                     | VCCO |
| 6    | IO                                          | K6                     | I/O  |
| 6    | IO_L01N_6/VRP_6                             | T3                     | DCI  |
| 6    | IO_L01P_6/VRN_6                             | T2                     | DCI  |
| 6    | IO_L16N_6                                   | U1                     | I/O  |
| 6    | IO_L16P_6                                   | T1                     | I/O  |
| 6    | IO_L17N_6                                   | R2                     | I/O  |
| 6    | IO_L17P_6/VREF_6                            | R1                     | VREF |
| 6    | IO_L19N_6                                   | R3                     | I/O  |
| 6    | IO_L19P_6                                   | P3                     | I/O  |
| 6    | IO_L20N_6                                   | P2                     | I/O  |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 6    | IO_L20P_6                                   | P1                     | I/O  |
| 6    | IO_L21N_6                                   | N4                     | I/O  |
| 6    | IO_L21P_6                                   | P4                     | I/O  |
| 6    | IO_L22N_6                                   | N5                     | I/O  |
| 6    | IO_L22P_6                                   | M5                     | I/O  |
| 6    | IO_L23N_6                                   | M3                     | I/O  |
| 6    | IO_L23P_6                                   | M4                     | I/O  |
| 6    | IO_L24N_6/VREF_6                            | N2                     | VREF |
| 6    | IO_L24P_6                                   | M1                     | I/O  |
| 6    | IO_L27N_6                                   | L6                     | I/O  |
| 6    | IO_L27P_6                                   | L5                     | I/O  |
| 6    | IO_L34N_6/VREF_6                            | L3                     | VREF |
| 6    | IO_L34P_6                                   | L4                     | I/O  |
| 6    | IO_L35N_6                                   | L2                     | I/O  |
| 6    | IO_L35P_6                                   | L1                     | I/O  |
| 6    | IO_L39N_6                                   | K5                     | I/O  |
| 6    | IO_L39P_6                                   | K4                     | I/O  |
| 6    | IO_L40N_6                                   | K1                     | I/O  |
| 6    | IO_L40P_6/VREF_6                            | K2                     | VREF |
| 6    | VCCO_6                                      | K7                     | VCCO |
| 6    | VCCO_6                                      | L7                     | VCCO |
| 6    | VCCO_6                                      | N3                     | VCCO |
| 7    | IO                                          | J6                     | I/O  |
| 7    | IO_L01N_7/VRP_7                             | C3                     | DCI  |
| 7    | IO_L01P_7/VRN_7                             | C2                     | DCI  |
| 7    | IO_L16N_7                                   | C1                     | I/O  |
| 7    | IO_L16P_7/VREF_7                            | B1                     | VREF |
| 7    | IO_L17N_7                                   | D1                     | I/O  |
| 7    | IO_L17P_7                                   | D2                     | I/O  |
| 7    | IO_L19N_7/VREF_7                            | E3                     | VREF |
| 7    | IO_L19P_7                                   | D3                     | I/O  |
| 7    | IO_L20N_7                                   | E2                     | I/O  |
| 7    | IO_L20P_7                                   | E1                     | I/O  |
| 7    | IO_L21N_7                                   | E4                     | I/O  |
| 7    | IO_L21P_7                                   | F4                     | I/O  |
| 7    | IO_L22N_7                                   | G5                     | I/O  |
| 7    | IO_L22P_7                                   | F5                     | I/O  |
| 7    | IO_L23N_7                                   | G1                     | I/O  |
| 7    | IO_L23P_7                                   | F2                     | I/O  |
| 7    | IO_L24N_7                                   | G4                     | I/O  |
| 7    | IO_L24P_7                                   | G3                     | I/O  |
| 7    | IO_L27N_7                                   | H5                     | I/O  |
| 7    | IO_L27P_7/VREF_7                            | H6                     | VREF |

Table 97: FG320 Package Pinout (Continued)

| Bank | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type |
|------|---------------------------------------------|------------------------|------|
| 7    | IO_L34N_7                                   | H4                     | I/O  |
| 7    | IO_L34P_7                                   | H3                     | I/O  |
| 7    | IO_L35N_7                                   | H1                     | I/O  |
| 7    | IO_L35P_7                                   | H2                     | I/O  |
| 7    | IO_L39N_7                                   | J1                     | I/O  |
| 7    | IO_L39P_7                                   | J2                     | I/O  |
| 7    | IO_L40N_7/VREF_7                            | J5                     | VREF |
| 7    | IO_L40P_7                                   | J4                     | I/O  |
| 7    | VCCO_7                                      | F3                     | VCCO |
| 7    | VCCO_7                                      | H7                     | VCCO |
| 7    | VCCO_7                                      | J7                     | VCCO |
| N/A  | GND                                         | A1                     | GND  |
| N/A  | GND                                         | A13                    | GND  |
| N/A  | GND                                         | A18                    | GND  |
| N/A  | GND                                         | A6                     | GND  |
| N/A  | GND                                         | B17                    | GND  |
| N/A  | GND                                         | B2                     | GND  |
| N/A  | GND                                         | C10                    | GND  |
| N/A  | GND                                         | C9                     | GND  |
| N/A  | GND                                         | F1                     | GND  |
| N/A  | GND                                         | F18                    | GND  |
| N/A  | GND                                         | G12                    | GND  |
| N/A  | GND                                         | G7                     | GND  |
| N/A  | GND                                         | H10                    | GND  |
| N/A  | GND                                         | H11                    | GND  |
| N/A  | GND                                         | H8                     | GND  |
| N/A  | GND                                         | H9                     | GND  |
| N/A  | GND                                         | J11                    | GND  |
| N/A  | GND                                         | J16                    | GND  |
| N/A  | GND                                         | J3                     | GND  |
| N/A  | GND                                         | J8                     | GND  |
| N/A  | GND                                         | K11                    | GND  |
| N/A  | GND                                         | K16                    | GND  |
| N/A  | GND                                         | K3                     | GND  |
| N/A  | GND                                         | K8                     | GND  |
| N/A  | GND                                         | L10                    | GND  |
| N/A  | GND                                         | L11                    | GND  |
| N/A  | GND                                         | L8                     | GND  |
| N/A  | GND                                         | L9                     | GND  |
| N/A  | GND                                         | M12                    | GND  |
| N/A  | GND                                         | M7                     | GND  |
| N/A  | GND                                         | N1                     | GND  |
| N/A  | GND                                         | N18                    | GND  |

Table 97: FG320 Package Pinout (Continued)

| Bank   | XC3S400<br>XC3S1000<br>XC3S1500<br>Pin Name | FG320<br>Pin<br>Number | Type   |
|--------|---------------------------------------------|------------------------|--------|
| N/A    | GND                                         | T10                    | GND    |
| N/A    | GND                                         | T9                     | GND    |
| N/A    | GND                                         | U17                    | GND    |
| N/A    | GND                                         | U2                     | GND    |
| N/A    | GND                                         | V1                     | GND    |
| N/A    | GND                                         | V13                    | GND    |
| N/A    | GND                                         | V18                    | GND    |
| N/A    | GND                                         | V6                     | GND    |
| N/A    | VCCAUX                                      | B12                    | VCCAUX |
| N/A    | VCCAUX                                      | B7                     | VCCAUX |
| N/A    | VCCAUX                                      | G17                    | VCCAUX |
| N/A    | VCCAUX                                      | G2                     | VCCAUX |
| N/A    | VCCAUX                                      | M17                    | VCCAUX |
| N/A    | VCCAUX                                      | M2                     | VCCAUX |
| N/A    | VCCAUX                                      | U12                    | VCCAUX |
| N/A    | VCCAUX                                      | U7                     | VCCAUX |
| N/A    | VCCINT                                      | F12                    | VCCINT |
| N/A    | VCCINT                                      | F13                    | VCCINT |
| N/A    | VCCINT                                      | F6                     | VCCINT |
| N/A    | VCCINT                                      | F7                     | VCCINT |
| N/A    | VCCINT                                      | G13                    | VCCINT |
| N/A    | VCCINT                                      | G6                     | VCCINT |
| N/A    | VCCINT                                      | M13                    | VCCINT |
| N/A    | VCCINT                                      | M6                     | VCCINT |
| N/A    | VCCINT                                      | N12                    | VCCINT |
| N/A    | VCCINT                                      | N13                    | VCCINT |
| N/A    | VCCINT                                      | N6                     | VCCINT |
| N/A    | VCCINT                                      | N7                     | VCCINT |
| VCCAUX | CCLK                                        | T15                    | CONFIG |
| VCCAUX | DONE                                        | R15                    | CONFIG |
| VCCAUX | HSWAP_EN                                    | E6                     | CONFIG |
| VCCAUX | M0                                          | P5                     | CONFIG |
| VCCAUX | M1                                          | U3                     | CONFIG |
| VCCAUX | M2                                          | R4                     | CONFIG |
| VCCAUX | PROG_B                                      | E5                     | CONFIG |
| VCCAUX | TCK                                         | E14                    | JTAG   |
| VCCAUX | TDI                                         | D4                     | JTAG   |
| VCCAUX | TDO                                         | D15                    | JTAG   |
| VCCAUX | TMS                                         | B16                    | JTAG   |

## User I/Os by Bank

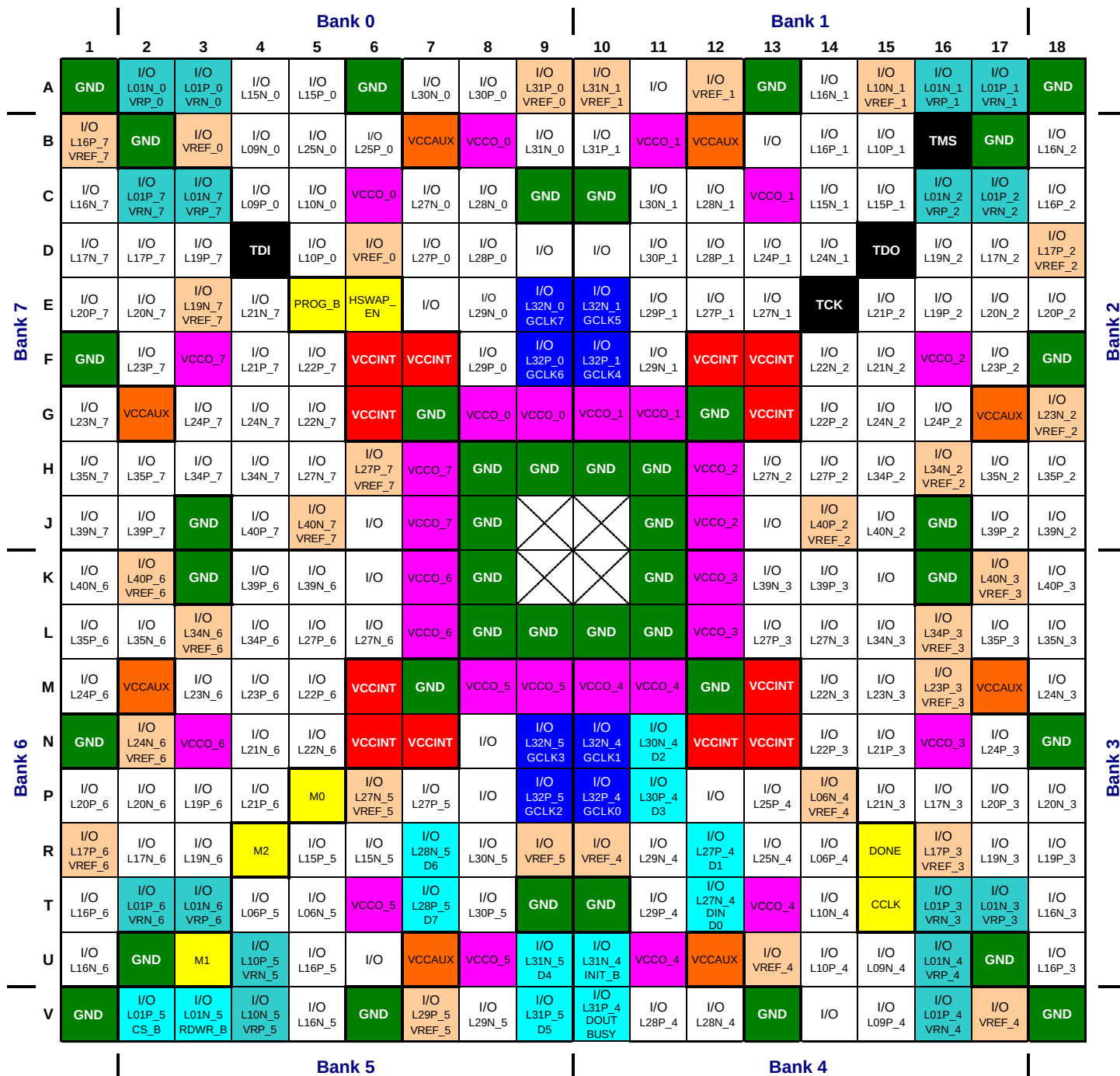
Table 98 indicates how the available user-I/O pins are distributed between the eight I/O banks on the FG320 package.

Table 98: User I/Os Per Bank in FG320 Package

| Package Edge | I/O Bank | Maximum I/O | Maximum LVDS Pairs | All Possible I/O Pins by Type |      |     |      |      |
|--------------|----------|-------------|--------------------|-------------------------------|------|-----|------|------|
|              |          |             |                    | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0        | 26          | 11                 | 19                            | 0    | 2   | 3    | 2    |
|              | 1        | 26          | 11                 | 19                            | 0    | 2   | 3    | 2    |
| Right        | 2        | 29          | 14                 | 23                            | 0    | 2   | 4    | 0    |
|              | 3        | 29          | 14                 | 23                            | 0    | 2   | 4    | 0    |
| Bottom       | 4        | 27          | 11                 | 13                            | 6    | 2   | 4    | 2    |
|              | 5        | 26          | 11                 | 13                            | 6    | 2   | 3    | 2    |
| Left         | 6        | 29          | 14                 | 23                            | 0    | 2   | 4    | 0    |
|              | 7        | 29          | 14                 | 23                            | 0    | 2   | 4    | 0    |



## FG320 Footprint



ds099-3\_16\_121103

Figure 47: FG320 Package Footprint (top view)

|     |                                                    |    |                                                 |    |                                                    |
|-----|----------------------------------------------------|----|-------------------------------------------------|----|----------------------------------------------------|
| 156 | I/O: Unrestricted, general-purpose user I/O        | 12 | DUAL: Configuration pin, then possible user I/O | 29 | VREF: User I/O or input voltage reference for bank |
| 16  | DCI: User I/O or reference resistor input for bank | 8  | GCLK: User I/O or global clock buffer input     | 28 | VCCO: Output voltage supply for bank               |
| 7   | CONFIG: Dedicated configuration pins               | 4  | JTAG: Dedicated JTAG port pins                  | 12 | VCCINT: Internal core voltage supply (+1.2V)       |
| 0   | N.C.: No unconnected pins in this package          | 40 | GND: Ground                                     | 8  | VCCAUX: Auxiliary voltage supply (+2.5V)           |

## FG456: 456-lead Fine-pitch Ball Grid Array

The 456-lead fine-pitch ball grid array package, FG456, supports four different Spartan-3 devices, including the XC3S400, the XC3S1000, the XC3S1500, and the XC3S2000. The footprints for the XC3S1000, the XC3S1500, and the XC3S2000 are identical, as shown in [Table 99](#) and [Figure 48](#). The XC3S400, however, has fewer I/O pins which consequently results in 69 unconnected pins on the FG456 package, labeled as “N.C.” In [Table 99](#) and [Figure 48](#), these unconnected pins are indicated with a black diamond symbol (◆).

All the package pins appear in [Table 99](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

If there is a difference between the XC3S400 pinout and the pinout for the XC3S1000, the XC3S1500, or the XC3S2000, then that difference is highlighted in [Table 99](#). If the table entry is shaded grey, then there is an unconnected pin on the XC3S400 that maps to a user-I/O pin on the XC3S1000, XC3S1500, and XC3S2000. If the table entry is shaded tan, then the unconnected pin on the XC3S400 maps to a VREF-type pin on the XC3S1000, the XC3S1500, or the XC3S2000. If the other VREF pins in the bank all connect to a voltage reference to support a special I/O standard, then also connect the N.C. pin on the XC3S400 to the same VREF voltage. This provides maximum flexibility as you could potentially migrate a design from the XC3S400 device to an XC3S1000, an XC3S1500, or an XC3S2000 FPGA without changing the printed circuit board.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 99: FG456 Package Pinout

| Bank | 3S400<br>Pin Name   | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|---------------------|----------------------------------------|------------------------|------|
| 0    | IO                  | IO                                     | A10                    | I/O  |
| 0    | IO                  | IO                                     | D9                     | I/O  |
| 0    | IO                  | IO                                     | D10                    | I/O  |
| 0    | IO                  | IO                                     | F6                     | I/O  |
| 0    | IO/VREF_0           | IO/VREF_0                              | A3                     | VREF |
| 0    | IO/VREF_0           | IO/VREF_0                              | C7                     | VREF |
| 0    | N.C. (◆)            | IO/VREF_0                              | E5                     | VREF |
| 0    | IO/VREF_0           | IO/VREF_0                              | F7                     | VREF |
| 0    | IO_L01N_0/<br>VRP_0 | IO_L01N_0/<br>VRP_0                    | B4                     | DCI  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 0    | IO_L01P_0/<br>VRN_0  | IO_L01P_0/<br>VRN_0                    | A4                     | DCI  |
| 0    | IO_L06N_0            | IO_L06N_0                              | D5                     | I/O  |
| 0    | IO_L06P_0            | IO_L06P_0                              | C5                     | I/O  |
| 0    | IO_L09N_0            | IO_L09N_0                              | B5                     | I/O  |
| 0    | IO_L09P_0            | IO_L09P_0                              | A5                     | I/O  |
| 0    | IO_L10N_0            | IO_L10N_0                              | E6                     | I/O  |
| 0    | IO_L10P_0            | IO_L10P_0                              | D6                     | I/O  |
| 0    | IO_L15N_0            | IO_L15N_0                              | C6                     | I/O  |
| 0    | IO_L15P_0            | IO_L15P_0                              | B6                     | I/O  |
| 0    | IO_L16N_0            | IO_L16N_0                              | E7                     | I/O  |
| 0    | IO_L16P_0            | IO_L16P_0                              | D7                     | I/O  |
| 0    | N.C. (◆)             | IO_L19N_0                              | B7                     | I/O  |
| 0    | N.C. (◆)             | IO_L19P_0                              | A7                     | I/O  |
| 0    | N.C. (◆)             | IO_L22N_0                              | E8                     | I/O  |
| 0    | N.C. (◆)             | IO_L22P_0                              | D8                     | I/O  |
| 0    | IO_L24N_0            | IO_L24N_0                              | B8                     | I/O  |
| 0    | IO_L24P_0            | IO_L24P_0                              | A8                     | I/O  |
| 0    | IO_L25N_0            | IO_L25N_0                              | F9                     | I/O  |
| 0    | IO_L25P_0            | IO_L25P_0                              | E9                     | I/O  |
| 0    | IO_L27N_0            | IO_L27N_0                              | B9                     | I/O  |
| 0    | IO_L27P_0            | IO_L27P_0                              | A9                     | I/O  |
| 0    | IO_L28N_0            | IO_L28N_0                              | F10                    | I/O  |
| 0    | IO_L28P_0            | IO_L28P_0                              | E10                    | I/O  |
| 0    | IO_L29N_0            | IO_L29N_0                              | C10                    | I/O  |
| 0    | IO_L29P_0            | IO_L29P_0                              | B10                    | I/O  |
| 0    | IO_L30N_0            | IO_L30N_0                              | F11                    | I/O  |
| 0    | IO_L30P_0            | IO_L30P_0                              | E11                    | I/O  |
| 0    | IO_L31N_0            | IO_L31N_0                              | D11                    | I/O  |
| 0    | IO_L31P_0/<br>VREF_0 | IO_L31P_0/<br>VREF_0                   | C11                    | VREF |
| 0    | IO_L32N_0/<br>GCLK7  | IO_L32N_0/<br>GCLK7                    | B11                    | GCLK |
| 0    | IO_L32P_0/<br>GCLK6  | IO_L32P_0/<br>GCLK6                    | A11                    | GCLK |
| 0    | VCCO_0               | VCCO_0                                 | C8                     | VCCO |
| 0    | VCCO_0               | VCCO_0                                 | F8                     | VCCO |
| 0    | VCCO_0               | VCCO_0                                 | G9                     | VCCO |
| 0    | VCCO_0               | VCCO_0                                 | G10                    | VCCO |
| 0    | VCCO_0               | VCCO_0                                 | G11                    | VCCO |
| 1    | IO                   | IO                                     | A12                    | I/O  |
| 1    | IO                   | IO                                     | E16                    | I/O  |
| 1    | IO                   | IO                                     | F12                    | I/O  |
| 1    | IO                   | IO                                     | F13                    | I/O  |
| 1    | IO                   | IO                                     | F16                    | I/O  |
| 1    | IO                   | IO                                     | F17                    | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 1    | IO/VREF_1            | IO/VREF_1                              | E13                    | VREF |
| 1    | N.C. (◆)             | IO/VREF_1                              | F14                    | VREF |
| 1    | IO_L01N_1/<br>VRP_1  | IO_L01N_1/<br>VRP_1                    | C19                    | DCI  |
| 1    | IO_L01P_1/<br>VRN_1  | IO_L01P_1/<br>VRN_1                    | B20                    | DCI  |
| 1    | IO_L06N_1/<br>VREF_1 | IO_L06N_1/<br>VREF_1                   | A19                    | VREF |
| 1    | IO_L06P_1            | IO_L06P_1                              | B19                    | I/O  |
| 1    | IO_L09N_1            | IO_L09N_1                              | C18                    | I/O  |
| 1    | IO_L09P_1            | IO_L09P_1                              | D18                    | I/O  |
| 1    | IO_L10N_1/<br>VREF_1 | IO_L10N_1/<br>VREF_1                   | A18                    | VREF |
| 1    | IO_L10P_1            | IO_L10P_1                              | B18                    | I/O  |
| 1    | IO_L15N_1            | IO_L15N_1                              | D17                    | I/O  |
| 1    | IO_L15P_1            | IO_L15P_1                              | E17                    | I/O  |
| 1    | IO_L16N_1            | IO_L16N_1                              | B17                    | I/O  |
| 1    | IO_L16P_1            | IO_L16P_1                              | C17                    | I/O  |
| 1    | N.C. (◆)             | IO_L19N_1                              | C16                    | I/O  |
| 1    | N.C. (◆)             | IO_L19P_1                              | D16                    | I/O  |
| 1    | N.C. (◆)             | IO_L22N_1                              | A16                    | I/O  |
| 1    | N.C. (◆)             | IO_L22P_1                              | B16                    | I/O  |
| 1    | IO_L24N_1            | IO_L24N_1                              | D15                    | I/O  |
| 1    | IO_L24P_1            | IO_L24P_1                              | E15                    | I/O  |
| 1    | IO_L25N_1            | IO_L25N_1                              | B15                    | I/O  |
| 1    | IO_L25P_1            | IO_L25P_1                              | A15                    | I/O  |
| 1    | IO_L27N_1            | IO_L27N_1                              | D14                    | I/O  |
| 1    | IO_L27P_1            | IO_L27P_1                              | E14                    | I/O  |
| 1    | IO_L28N_1            | IO_L28N_1                              | A14                    | I/O  |
| 1    | IO_L28P_1            | IO_L28P_1                              | B14                    | I/O  |
| 1    | IO_L29N_1            | IO_L29N_1                              | C13                    | I/O  |
| 1    | IO_L29P_1            | IO_L29P_1                              | D13                    | I/O  |
| 1    | IO_L30N_1            | IO_L30N_1                              | A13                    | I/O  |
| 1    | IO_L30P_1            | IO_L30P_1                              | B13                    | I/O  |
| 1    | IO_L31N_1/<br>VREF_1 | IO_L31N_1/<br>VREF_1                   | D12                    | VREF |
| 1    | IO_L31P_1            | IO_L31P_1                              | E12                    | I/O  |
| 1    | IO_L32N_1/<br>GCLK5  | IO_L32N_1/<br>GCLK5                    | B12                    | GCLK |
| 1    | IO_L32P_1/<br>GCLK4  | IO_L32P_1/<br>GCLK4                    | C12                    | GCLK |
| 1    | VCCO_1               | VCCO_1                                 | C15                    | VCCO |
| 1    | VCCO_1               | VCCO_1                                 | F15                    | VCCO |
| 1    | VCCO_1               | VCCO_1                                 | G12                    | VCCO |
| 1    | VCCO_1               | VCCO_1                                 | G13                    | VCCO |
| 1    | VCCO_1               | VCCO_1                                 | G14                    | VCCO |
| 2    | IO                   | IO                                     | C22                    | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 2    | IO_L01N_2/<br>VRP_2  | IO_L01N_2/<br>VRP_2                    | C20                    | DCI  |
| 2    | IO_L01P_2/<br>VRN_2  | IO_L01P_2/<br>VRN_2                    | C21                    | DCI  |
| 2    | IO_L16N_2            | IO_L16N_2                              | D20                    | I/O  |
| 2    | IO_L16P_2            | IO_L16P_2                              | D19                    | I/O  |
| 2    | IO_L17N_2            | IO_L17N_2                              | D21                    | I/O  |
| 2    | IO_L17P_2/<br>VREF_2 | IO_L17P_2/<br>VREF_2                   | D22                    | VREF |
| 2    | IO_L19N_2            | IO_L19N_2                              | E18                    | I/O  |
| 2    | IO_L19P_2            | IO_L19P_2                              | F18                    | I/O  |
| 2    | IO_L20N_2            | IO_L20N_2                              | E19                    | I/O  |
| 2    | IO_L20P_2            | IO_L20P_2                              | E20                    | I/O  |
| 2    | IO_L21N_2            | IO_L21N_2                              | E21                    | I/O  |
| 2    | IO_L21P_2            | IO_L21P_2                              | E22                    | I/O  |
| 2    | IO_L22N_2            | IO_L22N_2                              | G17                    | I/O  |
| 2    | IO_L22P_2            | IO_L22P_2                              | G18                    | I/O  |
| 2    | IO_L23N_2/<br>VREF_2 | IO_L23N_2/<br>VREF_2                   | F19                    | VREF |
| 2    | IO_L23P_2            | IO_L23P_2                              | G19                    | I/O  |
| 2    | IO_L24N_2            | IO_L24N_2                              | F20                    | I/O  |
| 2    | IO_L24P_2            | IO_L24P_2                              | F21                    | I/O  |
| 2    | N.C. (◆)             | IO_L26N_2                              | G20                    | I/O  |
| 2    | N.C. (◆)             | IO_L26P_2                              | H19                    | I/O  |
| 2    | IO_L27N_2            | IO_L27N_2                              | G21                    | I/O  |
| 2    | IO_L27P_2            | IO_L27P_2                              | G22                    | I/O  |
| 2    | N.C. (◆)             | IO_L28N_2                              | H18                    | I/O  |
| 2    | N.C. (◆)             | IO_L28P_2                              | J17                    | I/O  |
| 2    | N.C. (◆)             | IO_L29N_2                              | H21                    | I/O  |
| 2    | N.C. (◆)             | IO_L29P_2                              | H22                    | I/O  |
| 2    | N.C. (◆)             | IO_L31N_2                              | J18                    | I/O  |
| 2    | N.C. (◆)             | IO_L31P_2                              | J19                    | I/O  |
| 2    | N.C. (◆)             | IO_L32N_2                              | J21                    | I/O  |
| 2    | N.C. (◆)             | IO_L32P_2                              | J22                    | I/O  |
| 2    | N.C. (◆)             | IO_L33N_2                              | K17                    | I/O  |
| 2    | N.C. (◆)             | IO_L33P_2                              | K18                    | I/O  |
| 2    | IO_L34N_2/<br>VREF_2 | IO_L34N_2/<br>VREF_2                   | K19                    | VREF |
| 2    | IO_L34P_2            | IO_L34P_2                              | K20                    | I/O  |
| 2    | IO_L35N_2            | IO_L35N_2                              | K21                    | I/O  |
| 2    | IO_L35P_2            | IO_L35P_2                              | K22                    | I/O  |
| 2    | IO_L38N_2            | IO_L38N_2                              | L17                    | I/O  |
| 2    | IO_L38P_2            | IO_L38P_2                              | L18                    | I/O  |
| 2    | IO_L39N_2            | IO_L39N_2                              | L19                    | I/O  |
| 2    | IO_L39P_2            | IO_L39P_2                              | L20                    | I/O  |
| 2    | IO_L40N_2            | IO_L40N_2                              | L21                    | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 2    | IO_L40P_2/<br>VREF_2 | IO_L40P_2/<br>VREF_2                   | L22                    | VREF |
| 2    | VCCO_2               | VCCO_2                                 | H17                    | VCCO |
| 2    | VCCO_2               | VCCO_2                                 | H20                    | VCCO |
| 2    | VCCO_2               | VCCO_2                                 | J16                    | VCCO |
| 2    | VCCO_2               | VCCO_2                                 | K16                    | VCCO |
| 2    | VCCO_2               | VCCO_2                                 | L16                    | VCCO |
| 3    | IO                   | IO                                     | Y21                    | I/O  |
| 3    | IO_L01N_3/<br>VRP_3  | IO_L01N_3/<br>VRP_3                    | Y20                    | DCI  |
| 3    | IO_L01P_3/<br>VRN_3  | IO_L01P_3/<br>VRN_3                    | Y19                    | DCI  |
| 3    | IO_L16N_3            | IO_L16N_3                              | W22                    | I/O  |
| 3    | IO_L16P_3            | IO_L16P_3                              | Y22                    | I/O  |
| 3    | IO_L17N_3            | IO_L17N_3                              | V19                    | I/O  |
| 3    | IO_L17P_3/<br>VREF_3 | IO_L17P_3/<br>VREF_3                   | W19                    | VREF |
| 3    | IO_L19N_3            | IO_L19N_3                              | W21                    | I/O  |
| 3    | IO_L19P_3            | IO_L19P_3                              | W20                    | I/O  |
| 3    | IO_L20N_3            | IO_L20N_3                              | U19                    | I/O  |
| 3    | IO_L20P_3            | IO_L20P_3                              | V20                    | I/O  |
| 3    | IO_L21N_3            | IO_L21N_3                              | V22                    | I/O  |
| 3    | IO_L21P_3            | IO_L21P_3                              | V21                    | I/O  |
| 3    | IO_L22N_3            | IO_L22N_3                              | T17                    | I/O  |
| 3    | IO_L22P_3            | IO_L22P_3                              | U18                    | I/O  |
| 3    | IO_L23N_3            | IO_L23N_3                              | U21                    | I/O  |
| 3    | IO_L23P_3/<br>VREF_3 | IO_L23P_3/<br>VREF_3                   | U20                    | VREF |
| 3    | IO_L24N_3            | IO_L24N_3                              | R18                    | I/O  |
| 3    | IO_L24P_3            | IO_L24P_3                              | T18                    | I/O  |
| 3    | N.C. (◆)             | IO_L26N_3                              | T20                    | I/O  |
| 3    | N.C. (◆)             | IO_L26P_3                              | T19                    | I/O  |
| 3    | IO_L27N_3            | IO_L27N_3                              | T22                    | I/O  |
| 3    | IO_L27P_3            | IO_L27P_3                              | T21                    | I/O  |
| 3    | N.C. (◆)             | IO_L28N_3                              | R22                    | I/O  |
| 3    | N.C. (◆)             | IO_L28P_3                              | R21                    | I/O  |
| 3    | N.C. (◆)             | IO_L29N_3                              | P19                    | I/O  |
| 3    | N.C. (◆)             | IO_L29P_3                              | R19                    | I/O  |
| 3    | N.C. (◆)             | IO_L31N_3                              | P18                    | I/O  |
| 3    | N.C. (◆)             | IO_L31P_3                              | P17                    | I/O  |
| 3    | N.C. (◆)             | IO_L32N_3                              | P22                    | I/O  |
| 3    | N.C. (◆)             | IO_L32P_3                              | P21                    | I/O  |
| 3    | N.C. (◆)             | IO_L33N_3                              | N18                    | I/O  |
| 3    | N.C. (◆)             | IO_L33P_3                              | N17                    | I/O  |
| 3    | IO_L34N_3            | IO_L34N_3                              | N20                    | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 3    | IO_L34P_3/<br>VREF_3 | IO_L34P_3/<br>VREF_3                   | N19                    | VREF |
| 3    | IO_L35N_3            | IO_L35N_3                              | N22                    | I/O  |
| 3    | IO_L35P_3            | IO_L35P_3                              | N21                    | I/O  |
| 3    | IO_L38N_3            | IO_L38N_3                              | M18                    | I/O  |
| 3    | IO_L38P_3            | IO_L38P_3                              | M17                    | I/O  |
| 3    | IO_L39N_3            | IO_L39N_3                              | M20                    | I/O  |
| 3    | IO_L39P_3            | IO_L39P_3                              | M19                    | I/O  |
| 3    | IO_L40N_3/<br>VREF_3 | IO_L40N_3/<br>VREF_3                   | M22                    | VREF |
| 3    | IO_L40P_3            | IO_L40P_3                              | M21                    | I/O  |
| 3    | VCCO_3               | VCCO_3                                 | M16                    | VCCO |
| 3    | VCCO_3               | VCCO_3                                 | N16                    | VCCO |
| 3    | VCCO_3               | VCCO_3                                 | P16                    | VCCO |
| 3    | VCCO_3               | VCCO_3                                 | R17                    | VCCO |
| 3    | VCCO_3               | VCCO_3                                 | R20                    | VCCO |
| 4    | IO                   | IO                                     | U16                    | I/O  |
| 4    | IO                   | IO                                     | U17                    | I/O  |
| 4    | IO                   | IO                                     | W13                    | I/O  |
| 4    | IO                   | IO                                     | W14                    | I/O  |
| 4    | IO/VREF_4            | IO/VREF_4                              | AB13                   | VREF |
| 4    | IO/VREF_4            | IO/VREF_4                              | V18                    | VREF |
| 4    | IO/VREF_4            | IO/VREF_4                              | Y16                    | VREF |
| 4    | IO_L01N_4/<br>VRP_4  | IO_L01N_4/<br>VRP_4                    | AA20                   | DCI  |
| 4    | IO_L01P_4/<br>VRN_4  | IO_L01P_4/<br>VRN_4                    | AB20                   | DCI  |
| 4    | N.C. (◆)             | IO_L05N_4                              | AA19                   | I/O  |
| 4    | N.C. (◆)             | IO_L05P_4                              | AB19                   | I/O  |
| 4    | IO_L06N_4/<br>VREF_4 | IO_L06N_4/<br>VREF_4                   | W18                    | VREF |
| 4    | IO_L06P_4            | IO_L06P_4                              | Y18                    | I/O  |
| 4    | IO_L09N_4            | IO_L09N_4                              | AA18                   | I/O  |
| 4    | IO_L09P_4            | IO_L09P_4                              | AB18                   | I/O  |
| 4    | IO_L10N_4            | IO_L10N_4                              | V17                    | I/O  |
| 4    | IO_L10P_4            | IO_L10P_4                              | W17                    | I/O  |
| 4    | IO_L15N_4            | IO_L15N_4                              | Y17                    | I/O  |
| 4    | IO_L15P_4            | IO_L15P_4                              | AA17                   | I/O  |
| 4    | IO_L16N_4            | IO_L16N_4                              | V16                    | I/O  |
| 4    | IO_L16P_4            | IO_L16P_4                              | W16                    | I/O  |
| 4    | N.C. (◆)             | IO_L19N_4                              | AA16                   | I/O  |
| 4    | N.C. (◆)             | IO_L19P_4                              | AB16                   | I/O  |
| 4    | N.C. (◆)             | IO_L22N_4/<br>VREF_4                   | V15                    | VREF |
| 4    | N.C. (◆)             | IO_L22P_4                              | W15                    | I/O  |
| 4    | IO_L24N_4            | IO_L24N_4                              | AA15                   | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name       | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|-------------------------|----------------------------------------|------------------------|------|
| 4    | IO_L24P_4               | IO_L24P_4                              | AB15                   | I/O  |
| 4    | IO_L25N_4               | IO_L25N_4                              | U14                    | I/O  |
| 4    | IO_L25P_4               | IO_L25P_4                              | V14                    | I/O  |
| 4    | IO_L27N_4/<br>DIN/D0    | IO_L27N_4/<br>DIN/D0                   | AA14                   | DUAL |
| 4    | IO_L27P_4/<br>D1        | IO_L27P_4/<br>D1                       | AB14                   | DUAL |
| 4    | IO_L28N_4               | IO_L28N_4                              | U13                    | I/O  |
| 4    | IO_L28P_4               | IO_L28P_4                              | V13                    | I/O  |
| 4    | IO_L29N_4               | IO_L29N_4                              | Y13                    | I/O  |
| 4    | IO_L29P_4               | IO_L29P_4                              | AA13                   | I/O  |
| 4    | IO_L30N_4/<br>D2        | IO_L30N_4/<br>D2                       | U12                    | DUAL |
| 4    | IO_L30P_4/<br>D3        | IO_L30P_4/<br>D3                       | V12                    | DUAL |
| 4    | IO_L31N_4/<br>INIT_B    | IO_L31N_4/<br>INIT_B                   | W12                    | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY                | Y12                    | DUAL |
| 4    | IO_L32N_4/<br>GCLK1     | IO_L32N_4/<br>GCLK1                    | AA12                   | GCLK |
| 4    | IO_L32P_4/<br>GCLK0     | IO_L32P_4/<br>GCLK0                    | AB12                   | GCLK |
| 4    | VCCO_4                  | VCCO_4                                 | T12                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                                 | T13                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                                 | T14                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                                 | U15                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                                 | Y15                    | VCCO |
| 5    | IO                      | IO                                     | U7                     | I/O  |
| 5    | N.C. (◆)                | IO                                     | U9                     | I/O  |
| 5    | IO                      | IO                                     | U10                    | I/O  |
| 5    | IO                      | IO                                     | U11                    | I/O  |
| 5    | IO                      | IO                                     | V7                     | I/O  |
| 5    | IO                      | IO                                     | V10                    | I/O  |
| 5    | IO/VREF_5               | IO/VREF_5                              | AB11                   | VREF |
| 5    | IO/VREF_5               | IO/VREF_5                              | U6                     | VREF |
| 5    | IO_L01N_5/<br>RDWR_B    | IO_L01N_5/<br>RDWR_B                   | Y4                     | DUAL |
| 5    | IO_L01P_5/<br>CS_B      | IO_L01P_5/<br>CS_B                     | AA3                    | DUAL |
| 5    | IO_L06N_5               | IO_L06N_5                              | AB4                    | I/O  |
| 5    | IO_L06P_5               | IO_L06P_5                              | AA4                    | I/O  |
| 5    | IO_L09N_5               | IO_L09N_5                              | Y5                     | I/O  |
| 5    | IO_L09P_5               | IO_L09P_5                              | W5                     | I/O  |
| 5    | IO_L10N_5/<br>VRP_5     | IO_L10N_5/<br>VRP_5                    | AB5                    | DCI  |
| 5    | IO_L10P_5/<br>VRN_5     | IO_L10P_5/<br>VRN_5                    | AA5                    | DCI  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 5    | IO_L15N_5            | IO_L15N_5                              | W6                     | I/O  |
| 5    | IO_L15P_5            | IO_L15P_5                              | V6                     | I/O  |
| 5    | IO_L16N_5            | IO_L16N_5                              | AA6                    | I/O  |
| 5    | IO_L16P_5            | IO_L16P_5                              | Y6                     | I/O  |
| 5    | N.C. (◆)             | IO_L19N_5                              | Y7                     | I/O  |
| 5    | N.C. (◆)             | IO_L19P_5/<br>VREF_5                   | W7                     | VREF |
| 5    | N.C. (◆)             | IO_L22N_5                              | AB7                    | I/O  |
| 5    | N.C. (◆)             | IO_L22P_5                              | AA7                    | I/O  |
| 5    | IO_L24N_5            | IO_L24N_5                              | W8                     | I/O  |
| 5    | IO_L24P_5            | IO_L24P_5                              | V8                     | I/O  |
| 5    | IO_L25N_5            | IO_L25N_5                              | AB8                    | I/O  |
| 5    | IO_L25P_5            | IO_L25P_5                              | AA8                    | I/O  |
| 5    | IO_L27N_5/<br>VREF_5 | IO_L27N_5/<br>VREF_5                   | W9                     | VREF |
| 5    | IO_L27P_5            | IO_L27P_5                              | V9                     | I/O  |
| 5    | IO_L28N_5/<br>D6     | IO_L28N_5/<br>D6                       | AB9                    | DUAL |
| 5    | IO_L28P_5/<br>D7     | IO_L28P_5/<br>D7                       | AA9                    | DUAL |
| 5    | IO_L29N_5            | IO_L29N_5                              | Y10                    | I/O  |
| 5    | IO_L29P_5/<br>VREF_5 | IO_L29P_5/<br>VREF_5                   | W10                    | VREF |
| 5    | IO_L30N_5            | IO_L30N_5                              | AB10                   | I/O  |
| 5    | IO_L30P_5            | IO_L30P_5                              | AA10                   | I/O  |
| 5    | IO_L31N_5/<br>D4     | IO_L31N_5/<br>D4                       | W11                    | DUAL |
| 5    | IO_L31P_5/<br>D5     | IO_L31P_5/<br>D5                       | V11                    | DUAL |
| 5    | IO_L32N_5/<br>GCLK3  | IO_L32N_5/<br>GCLK3                    | AA11                   | GCLK |
| 5    | IO_L32P_5/<br>GCLK2  | IO_L32P_5/<br>GCLK2                    | Y11                    | GCLK |
| 5    | VCCO_5               | VCCO_5                                 | T9                     | VCCO |
| 5    | VCCO_5               | VCCO_5                                 | T10                    | VCCO |
| 5    | VCCO_5               | VCCO_5                                 | T11                    | VCCO |
| 5    | VCCO_5               | VCCO_5                                 | U8                     | VCCO |
| 5    | VCCO_5               | VCCO_5                                 | Y8                     | VCCO |
| 6    | IO                   | IO                                     | Y1                     | I/O  |
| 6    | IO_L01N_6/<br>VRP_6  | IO_L01N_6/<br>VRP_6                    | Y3                     | DCI  |
| 6    | IO_L01P_6/<br>VRN_6  | IO_L01P_6/<br>VRN_6                    | Y2                     | DCI  |
| 6    | IO_L16N_6            | IO_L16N_6                              | W4                     | I/O  |
| 6    | IO_L16P_6            | IO_L16P_6                              | W3                     | I/O  |
| 6    | IO_L17N_6            | IO_L17N_6                              | W2                     | I/O  |
| 6    | IO_L17P_6/<br>VREF_6 | IO_L17P_6/<br>VREF_6                   | W1                     | VREF |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 6    | IO_L19N_6            | IO_L19N_6                              | V5                     | I/O  |
| 6    | IO_L19P_6            | IO_L19P_6                              | U5                     | I/O  |
| 6    | IO_L20N_6            | IO_L20N_6                              | V4                     | I/O  |
| 6    | IO_L20P_6            | IO_L20P_6                              | V3                     | I/O  |
| 6    | IO_L21N_6            | IO_L21N_6                              | V2                     | I/O  |
| 6    | IO_L21P_6            | IO_L21P_6                              | V1                     | I/O  |
| 6    | IO_L22N_6            | IO_L22N_6                              | T6                     | I/O  |
| 6    | IO_L22P_6            | IO_L22P_6                              | T5                     | I/O  |
| 6    | IO_L23N_6            | IO_L23N_6                              | U4                     | I/O  |
| 6    | IO_L23P_6            | IO_L23P_6                              | T4                     | I/O  |
| 6    | IO_L24N_6/<br>VREF_6 | IO_L24N_6/<br>VREF_6                   | U3                     | VREF |
| 6    | IO_L24P_6            | IO_L24P_6                              | U2                     | I/O  |
| 6    | N.C. (◆)             | IO_L26N_6                              | T3                     | I/O  |
| 6    | N.C. (◆)             | IO_L26P_6                              | R4                     | I/O  |
| 6    | IO_L27N_6            | IO_L27N_6                              | T2                     | I/O  |
| 6    | IO_L27P_6            | IO_L27P_6                              | T1                     | I/O  |
| 6    | N.C. (◆)             | IO_L28N_6                              | R5                     | I/O  |
| 6    | N.C. (◆)             | IO_L28P_6                              | P6                     | I/O  |
| 6    | N.C. (◆)             | IO_L29N_6                              | R2                     | I/O  |
| 6    | N.C. (◆)             | IO_L29P_6                              | R1                     | I/O  |
| 6    | N.C. (◆)             | IO_L31N_6                              | P5                     | I/O  |
| 6    | N.C. (◆)             | IO_L31P_6                              | P4                     | I/O  |
| 6    | N.C. (◆)             | IO_L32N_6                              | P2                     | I/O  |
| 6    | N.C. (◆)             | IO_L32P_6                              | P1                     | I/O  |
| 6    | N.C. (◆)             | IO_L33N_6                              | N6                     | I/O  |
| 6    | N.C. (◆)             | IO_L33P_6                              | N5                     | I/O  |
| 6    | IO_L34N_6/<br>VREF_6 | IO_L34N_6/<br>VREF_6                   | N4                     | VREF |
| 6    | IO_L34P_6            | IO_L34P_6                              | N3                     | I/O  |
| 6    | IO_L35N_6            | IO_L35N_6                              | N2                     | I/O  |
| 6    | IO_L35P_6            | IO_L35P_6                              | N1                     | I/O  |
| 6    | IO_L38N_6            | IO_L38N_6                              | M6                     | I/O  |
| 6    | IO_L38P_6            | IO_L38P_6                              | M5                     | I/O  |
| 6    | IO_L39N_6            | IO_L39N_6                              | M4                     | I/O  |
| 6    | IO_L39P_6            | IO_L39P_6                              | M3                     | I/O  |
| 6    | IO_L40N_6            | IO_L40N_6                              | M2                     | I/O  |
| 6    | IO_L40P_6/<br>VREF_6 | IO_L40P_6/<br>VREF_6                   | M1                     | VREF |
| 6    | VCCO_6               | VCCO_6                                 | M7                     | VCCO |
| 6    | VCCO_6               | VCCO_6                                 | N7                     | VCCO |
| 6    | VCCO_6               | VCCO_6                                 | P7                     | VCCO |
| 6    | VCCO_6               | VCCO_6                                 | R3                     | VCCO |
| 6    | VCCO_6               | VCCO_6                                 | R6                     | VCCO |
| 7    | IO                   | IO                                     | C2                     | I/O  |

Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 7    | IO_L01N_7/<br>VRP_7  | IO_L01N_7/<br>VRP_7                    | C3                     | DCI  |
| 7    | IO_L01P_7/<br>VRN_7  | IO_L01P_7/<br>VRN_7                    | C4                     | DCI  |
| 7    | IO_L16N_7            | IO_L16N_7                              | D1                     | I/O  |
| 7    | IO_L16P_7/<br>VREF_7 | IO_L16P_7/<br>VREF_7                   | C1                     | VREF |
| 7    | IO_L17N_7            | IO_L17N_7                              | E4                     | I/O  |
| 7    | IO_L17P_7            | IO_L17P_7                              | D4                     | I/O  |
| 7    | IO_L19N_7/<br>VREF_7 | IO_L19N_7/<br>VREF_7                   | D3                     | VREF |
| 7    | IO_L19P_7            | IO_L19P_7                              | D2                     | I/O  |
| 7    | IO_L20N_7            | IO_L20N_7                              | F4                     | I/O  |
| 7    | IO_L20P_7            | IO_L20P_7                              | E3                     | I/O  |
| 7    | IO_L21N_7            | IO_L21N_7                              | E1                     | I/O  |
| 7    | IO_L21P_7            | IO_L21P_7                              | E2                     | I/O  |
| 7    | IO_L22N_7            | IO_L22N_7                              | G6                     | I/O  |
| 7    | IO_L22P_7            | IO_L22P_7                              | F5                     | I/O  |
| 7    | IO_L23N_7            | IO_L23N_7                              | F2                     | I/O  |
| 7    | IO_L23P_7            | IO_L23P_7                              | F3                     | I/O  |
| 7    | IO_L24N_7            | IO_L24N_7                              | H5                     | I/O  |
| 7    | IO_L24P_7            | IO_L24P_7                              | G5                     | I/O  |
| 7    | N.C. (◆)             | IO_L26N_7                              | G3                     | I/O  |
| 7    | N.C. (◆)             | IO_L26P_7                              | G4                     | I/O  |
| 7    | IO_L27N_7            | IO_L27N_7                              | G1                     | I/O  |
| 7    | IO_L27P_7/<br>VREF_7 | IO_L27P_7/<br>VREF_7                   | G2                     | VREF |
| 7    | N.C. (◆)             | IO_L28N_7                              | H1                     | I/O  |
| 7    | N.C. (◆)             | IO_L28P_7                              | H2                     | I/O  |
| 7    | N.C. (◆)             | IO_L29N_7                              | J4                     | I/O  |
| 7    | N.C. (◆)             | IO_L29P_7                              | H4                     | I/O  |
| 7    | N.C. (◆)             | IO_L31N_7                              | J5                     | I/O  |
| 7    | N.C. (◆)             | IO_L31P_7                              | J6                     | I/O  |
| 7    | N.C. (◆)             | IO_L32N_7                              | J1                     | I/O  |
| 7    | N.C. (◆)             | IO_L32P_7                              | J2                     | I/O  |
| 7    | N.C. (◆)             | IO_L33N_7                              | K5                     | I/O  |
| 7    | N.C. (◆)             | IO_L33P_7                              | K6                     | I/O  |
| 7    | IO_L34N_7            | IO_L34N_7                              | K3                     | I/O  |
| 7    | IO_L34P_7            | IO_L34P_7                              | K4                     | I/O  |
| 7    | IO_L35N_7            | IO_L35N_7                              | K1                     | I/O  |
| 7    | IO_L35P_7            | IO_L35P_7                              | K2                     | I/O  |
| 7    | IO_L38N_7            | IO_L38N_7                              | L5                     | I/O  |
| 7    | IO_L38P_7            | IO_L38P_7                              | L6                     | I/O  |
| 7    | IO_L39N_7            | IO_L39N_7                              | L3                     | I/O  |
| 7    | IO_L39P_7            | IO_L39P_7                              | L4                     | I/O  |



Table 99: FG456 Package Pinout (Continued)

| Bank | 3S400<br>Pin Name    | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------------|------------------------|------|
| 7    | IO_L40N_7/<br>VREF_7 | IO_L40N_7/<br>VREF_7                   | L1                     | VREF |
| 7    | IO_L40P_7            | IO_L40P_7                              | L2                     | I/O  |
| 7    | VCCO_7               | VCCO_7                                 | H3                     | VCCO |
| 7    | VCCO_7               | VCCO_7                                 | H6                     | VCCO |
| 7    | VCCO_7               | VCCO_7                                 | J7                     | VCCO |
| 7    | VCCO_7               | VCCO_7                                 | K7                     | VCCO |
| 7    | VCCO_7               | VCCO_7                                 | L7                     | VCCO |
| N/A  | GND                  | GND                                    | A1                     | GND  |
| N/A  | GND                  | GND                                    | A22                    | GND  |
| N/A  | GND                  | GND                                    | AA2                    | GND  |
| N/A  | GND                  | GND                                    | AA21                   | GND  |
| N/A  | GND                  | GND                                    | AB1                    | GND  |
| N/A  | GND                  | GND                                    | AB22                   | GND  |
| N/A  | GND                  | GND                                    | B2                     | GND  |
| N/A  | GND                  | GND                                    | B21                    | GND  |
| N/A  | GND                  | GND                                    | C9                     | GND  |
| N/A  | GND                  | GND                                    | C14                    | GND  |
| N/A  | GND                  | GND                                    | J3                     | GND  |
| N/A  | GND                  | GND                                    | J9                     | GND  |
| N/A  | GND                  | GND                                    | J10                    | GND  |
| N/A  | GND                  | GND                                    | J11                    | GND  |
| N/A  | GND                  | GND                                    | J12                    | GND  |
| N/A  | GND                  | GND                                    | J13                    | GND  |
| N/A  | GND                  | GND                                    | J14                    | GND  |
| N/A  | GND                  | GND                                    | J20                    | GND  |
| N/A  | GND                  | GND                                    | K9                     | GND  |
| N/A  | GND                  | GND                                    | K10                    | GND  |
| N/A  | GND                  | GND                                    | K11                    | GND  |
| N/A  | GND                  | GND                                    | K12                    | GND  |
| N/A  | GND                  | GND                                    | K13                    | GND  |
| N/A  | GND                  | GND                                    | K14                    | GND  |
| N/A  | GND                  | GND                                    | L9                     | GND  |
| N/A  | GND                  | GND                                    | L10                    | GND  |
| N/A  | GND                  | GND                                    | L11                    | GND  |
| N/A  | GND                  | GND                                    | L12                    | GND  |
| N/A  | GND                  | GND                                    | L13                    | GND  |
| N/A  | GND                  | GND                                    | L14                    | GND  |
| N/A  | GND                  | GND                                    | M9                     | GND  |
| N/A  | GND                  | GND                                    | M10                    | GND  |
| N/A  | GND                  | GND                                    | M11                    | GND  |
| N/A  | GND                  | GND                                    | M12                    | GND  |
| N/A  | GND                  | GND                                    | M13                    | GND  |
| N/A  | GND                  | GND                                    | M14                    | GND  |
| N/A  | GND                  | GND                                    | N9                     | GND  |
| N/A  | GND                  | GND                                    | N10                    | GND  |

Table 99: FG456 Package Pinout (Continued)

| Bank   | 3S400<br>Pin Name | 3S1000<br>3S1500<br>3S2000<br>Pin Name | FG456<br>Pin<br>Number | Type   |
|--------|-------------------|----------------------------------------|------------------------|--------|
| N/A    | GND               | GND                                    | N11                    | GND    |
| N/A    | GND               | GND                                    | N12                    | GND    |
| N/A    | GND               | GND                                    | N13                    | GND    |
| N/A    | GND               | GND                                    | N14                    | GND    |
| N/A    | GND               | GND                                    | P3                     | GND    |
| N/A    | GND               | GND                                    | P9                     | GND    |
| N/A    | GND               | GND                                    | P10                    | GND    |
| N/A    | GND               | GND                                    | P11                    | GND    |
| N/A    | GND               | GND                                    | P12                    | GND    |
| N/A    | GND               | GND                                    | P13                    | GND    |
| N/A    | GND               | GND                                    | P14                    | GND    |
| N/A    | GND               | GND                                    | P20                    | GND    |
| N/A    | GND               | GND                                    | Y9                     | GND    |
| N/A    | GND               | GND                                    | Y14                    | GND    |
| N/A    | VCCAUX            | VCCAUX                                 | A6                     | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | A17                    | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | AB6                    | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | AB17                   | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | F1                     | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | F22                    | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | U1                     | VCCAUX |
| N/A    | VCCAUX            | VCCAUX                                 | U22                    | VCCAUX |
| N/A    | VCCINT            | VCCINT                                 | G7                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | G8                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | G15                    | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | G16                    | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | H7                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | H16                    | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | R7                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | R16                    | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | T7                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | T8                     | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | T15                    | VCCINT |
| N/A    | VCCINT            | VCCINT                                 | T16                    | VCCINT |
| VCCAUX | CCLK              | CCLK                                   | AA22                   | CONFIG |
| VCCAUX | DONE              | DONE                                   | AB21                   | CONFIG |
| VCCAUX | HSWAP_EN          | HSWAP_EN                               | B3                     | CONFIG |
| VCCAUX | M0                | M0                                     | AB2                    | CONFIG |
| VCCAUX | M1                | M1                                     | AA1                    | CONFIG |
| VCCAUX | M2                | M2                                     | AB3                    | CONFIG |
| VCCAUX | PROG_B            | PROG_B                                 | A2                     | CONFIG |
| VCCAUX | TCK               | TCK                                    | A21                    | JTAG   |
| VCCAUX | TDI               | TDI                                    | B1                     | JTAG   |
| VCCAUX | TDO               | TDO                                    | B22                    | JTAG   |
| VCCAUX | TMS               | TMS                                    | A20                    | JTAG   |



## User I/Os by Bank

**Table 100** indicates how the available user-I/O pins are distributed between the eight I/O banks for the XC3S400 in the FG456 package. Similarly, **Table 101** shows how the avail-

able user-I/O pins are distributed between the eight I/O banks for the XC3S1000, XC3S1500, and XC3S2000 in the FG456 package.

**Table 100: User I/Os Per Bank for XC3S400 in FG456 Package**

| Edge   | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|----------|-------------|-------------------------------|------|-----|------|------|
|        |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0        | 35          | 27                            | 0    | 2   | 4    | 2    |
|        | 1        | 35          | 27                            | 0    | 2   | 4    | 2    |
| Right  | 2        | 31          | 25                            | 0    | 2   | 4    | 0    |
|        | 3        | 31          | 25                            | 0    | 2   | 4    | 0    |
| Bottom | 4        | 35          | 21                            | 6    | 2   | 4    | 2    |
|        | 5        | 35          | 21                            | 6    | 2   | 4    | 2    |
| Left   | 6        | 31          | 25                            | 0    | 2   | 4    | 0    |
|        | 7        | 31          | 25                            | 0    | 2   | 4    | 0    |

**Table 101: User I/Os Per Bank for XC3S1000, XC3S1500, and XC3S2000 in FG456 Package**

| Edge   | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|----------|-------------|-------------------------------|------|-----|------|------|
|        |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0        | 40          | 31                            | 0    | 2   | 5    | 2    |
|        | 1        | 40          | 31                            | 0    | 2   | 5    | 2    |
| Right  | 2        | 43          | 37                            | 0    | 2   | 4    | 0    |
|        | 3        | 43          | 37                            | 0    | 2   | 4    | 0    |
| Bottom | 4        | 41          | 26                            | 6    | 2   | 5    | 2    |
|        | 5        | 40          | 25                            | 6    | 2   | 5    | 2    |
| Left   | 6        | 43          | 37                            | 0    | 2   | 4    | 0    |
|        | 7        | 43          | 37                            | 0    | 2   | 4    | 0    |

## FG456 Footprint

### Left Half of FG456 Package (top view)

#### XC3S400

(264 max. user I/O)

196 I/O: Unrestricted, general-purpose user I/O

32 VREF: User I/O or input voltage reference for bank

69 N.C.: Unconnected pins for XC3S400 (◆)

#### XC3S1000, XC3S1500, XC3S2000

(333 max user I/O)

261 I/O: Unrestricted, general-purpose user I/O

36 VREF: User I/O or input voltage reference for bank

0 N.C.: No unconnected pins in this package

#### All devices

12 DUAL: Configuration pin, then possible user I/O

8 GCLK: User I/O or global clock buffer input

16 DCI: User I/O or reference resistor input for bank

7 CONFIG: Dedicated configuration pins

4 JTAG: Dedicated JTAG port pins

12 VCCINT: Internal core voltage supply (+1.2V)

40 VCCO: Output voltage supply for bank

8 VCCAUX: Auxiliary voltage supply (+2.5V)

52 GND: Ground

|   | 1                 | 2                 | 3                 | 4                 | 5                | 6          | Bank 0            | 7          | 8                 | 9                 | 10                | 11               |
|---|-------------------|-------------------|-------------------|-------------------|------------------|------------|-------------------|------------|-------------------|-------------------|-------------------|------------------|
| A | GND               | PROG_B            | I/O VREF_0        | I/O L01P_0 VRN_0  | I/O L09P_0       | VCCAUX     | I/O L19P_0        | I/O L24P_0 | I/O L27P_0        | I/O               | I/O               | I/O L32P_0 GCLK6 |
| B | TDI               | GND               | HSWAP_EN          | I/O L01N_0 VRP_0  | I/O L09N_0       | I/O L15P_0 | I/O L19N_0        | I/O L24N_0 | I/O L27N_0        | I/O L29P_0        | I/O               | I/O L32N_0 GCLK7 |
| C | I/O L16P_7 VREF_7 | I/O               | I/O L01N_7 VRP_7  | I/O L01P_7 VRN_7  | I/O L06P_0       | I/O L15N_0 | I/O VREF_0        | VCCO_0     | GND               | I/O L29N_0        | I/O L31P_0 VREF_0 | I/O              |
| D | I/O L16N_7        | I/O L19P_7        | I/O L19N_7 VREF_7 | I/O L17P_7        | I/O L06N_0       | I/O L10P_0 | I/O L16P_0        | I/O L22P_0 | I/O               | I/O               | I/O               | I/O L31N_0       |
| E | I/O L21N_7        | I/O L21P_7        | I/O L20P_7        | I/O L17N_7        | I/O VREF_0       | I/O L10N_0 | I/O L16N_0        | I/O L22N_0 | I/O L25P_0        | I/O L28P_0        | I/O L30P_0        | I/O              |
| F | VCCAUX            | I/O L23N_7        | I/O L23P_7        | I/O L20N_7        | I/O L22P_7       | I/O        | I/O VREF_0        | VCCO_0     | I/O L25N_0        | I/O L28N_0        | I/O L30N_0        | I/O              |
| G | I/O L27N_7        | I/O L27P_7 VREF_7 | I/O L26N_7        | I/O L26P_7        | I/O L24P_7       | I/O L22N_7 | VCCINT            | VCCINT     | VCCO_0            | VCCO_0            | VCCO_0            | VCCO_0           |
| H | I/O L28N_7        | I/O L28P_7        | VCCO_7            | I/O L29P_7        | I/O L24N_7       | VCCO_7     | VCCINT            |            |                   |                   |                   |                  |
| J | I/O L32N_7        | I/O L32P_7        | GND               | I/O L29N_7        | I/O L31N_7       | I/O L31P_7 | VCCO_7            |            | GND               | GND               | GND               |                  |
| K | I/O L35N_7        | I/O L35P_7        | I/O L34N_7        | I/O L34P_7        | I/O L33N_7       | I/O L33P_7 | VCCO_7            |            | GND               | GND               | GND               |                  |
| L | I/O L40N_7 VREF_7 | I/O L40P_7        | I/O L39N_7        | I/O L39P_7        | I/O L38N_7       | I/O L38P_7 | VCCO_7            |            | GND               | GND               | GND               |                  |
| M | I/O L40P_6 VREF_6 | I/O L40N_6        | I/O L39P_6        | I/O L39N_6        | I/O L38P_6       | I/O L38N_6 | VCCO_6            |            | GND               | GND               | GND               |                  |
| N | I/O L35P_6        | I/O L35N_6        | I/O L34P_6        | I/O L34N_6 VREF_6 | I/O L33P_6       | I/O L33N_6 | VCCO_6            |            | GND               | GND               | GND               |                  |
| P | I/O L32P_6        | I/O L32N_6        | GND               | I/O L31P_6        | I/O L31N_6       | I/O L28P_6 | VCCO_6            |            | GND               | GND               | GND               |                  |
| R | I/O L29P_6        | I/O L29N_6        | VCCO_6            | I/O L26P_6        | I/O L26N_6       | VCCO_6     | VCCINT            |            |                   |                   |                   |                  |
| T | I/O L27P_6        | I/O L27N_6        | I/O L26N_6        | I/O L23P_6        | I/O L22P_6       | I/O L22N_6 | VCCINT            | VCCINT     | VCCO_5            | VCCO_5            | VCCO_5            | VCCO_5           |
| U | VCCAUX            | I/O L24P_6        | I/O L24N_6 VREF_6 | I/O L23N_6        | I/O L19P_6       | I/O VREF_5 | I/O               | VCCO_5     | I/O               | I/O               | I/O               | I/O              |
| V | I/O L21P_6        | I/O L21N_6        | I/O L20P_6        | I/O L20N_6        | I/O L19N_6       | I/O L15P_5 | I/O               | I/O L24P_5 | I/O L27P_5        | I/O               | I/O L31P_5 D5     | I/O              |
| W | I/O L17P_6 VREF_6 | I/O L17N_6        | I/O L16P_6        | I/O L16N_6        | I/O L09P_5       | I/O L15N_5 | I/O L19P_5 VREF_5 | I/O L24N_5 | I/O L27N_5 VREF_5 | I/O L29P_5 VREF_5 | I/O L31N_5 D4     | I/O              |
| Y | I/O               | I/O L01P_6 VRN_6  | I/O L01N_6 VRP_6  | I/O L01N_5 RDWR_B | I/O L09N_5       | I/O L16P_5 | I/O L19N_5        | VCCO_5     | GND               | I/O L29N_5        | I/O L32P_5 GCLK2  | I/O              |
| A | M1                | GND               | I/O L01P_5 CS_B   | I/O L06P_5        | I/O L10P_5 VRN_5 | I/O L16N_5 | I/O L22P_5        | I/O L25P_5 | I/O L28P_5 D7     | I/O L30P_5        | I/O L32N_5 GCLK3  | I/O              |
| A | GND               | M0                | M2                | I/O L06N_5        | I/O L10N_5 VRP_5 | VCCAUX     | I/O L10N_5        | I/O L22N_5 | I/O L25N_5        | I/O L28N_5 D6     | I/O L30N_5        | I/O VREF_5       |
| B |                   |                   |                   |                   |                  |            |                   |            |                   |                   |                   |                  |
|   |                   |                   |                   |                   |                  |            | Bank 5            |            |                   |                   |                   |                  |

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Figure 48: FG456 Package Footprint (top view)

| Bank 1                     |            |                        |                           |                 |                 |                      |                      |                      |                     |                      |     |  |  |  |  |  |  |  |  |  |  |
|----------------------------|------------|------------------------|---------------------------|-----------------|-----------------|----------------------|----------------------|----------------------|---------------------|----------------------|-----|--|--|--|--|--|--|--|--|--|--|
| 12                         | 13         | 14                     | 15                        | 16              | 17              | 18                   | 19                   | 20                   | 21                  | 22                   |     |  |  |  |  |  |  |  |  |  |  |
| I/O                        | I/O L30N_1 | I/O L28N_1             | I/O L25P_1                | I/O L22N_1<br>◆ | VCCAUX          | I/O L10N_1<br>VREF_1 | I/O L06N_1<br>VREF_1 | TMS                  | TCK                 | GND                  | A   |  |  |  |  |  |  |  |  |  |  |
| I/O L32N_1<br>GCLK5        | I/O L30P_1 | I/O L28P_1             | I/O L25N_1                | I/O L22P_1<br>◆ | I/O L16N_1      | I/O L10P_1           | I/O L06P_1           | I/O L01P_1<br>VRN_1  | GND                 | TDO                  | B   |  |  |  |  |  |  |  |  |  |  |
| I/O L32P_1<br>GCLK4        | I/O L29N_1 | GND                    | VCCO_1                    | I/O L19N_1<br>◆ | I/O L16P_1      | I/O L09N_1           | I/O L01N_1<br>VRP_1  | I/O L01N_2<br>VRP_2  | I/O L01P_2<br>VRN_2 | I/O                  | C   |  |  |  |  |  |  |  |  |  |  |
| I/O L31N_1<br>VREF_1       | I/O L29P_1 | I/O L27N_1             | I/O L24N_1                | I/O L19P_1<br>◆ | I/O L15N_1      | I/O L09P_1           | I/O L16P_2           | I/O L16N_2           | I/O L17N_2          | I/O L17P_2<br>VREF_2 | D   |  |  |  |  |  |  |  |  |  |  |
| I/O L31P_1                 | I/O VREF_1 | I/O L27P_1             | I/O L24P_1                | I/O             | I/O L15P_1      | I/O L19N_2           | I/O L20N_2           | I/O L20P_2           | I/O L21N_2          | I/O L21P_2           | E   |  |  |  |  |  |  |  |  |  |  |
| I/O                        | I/O        | I/O VREF_1<br>◆        | VCCO_1                    | I/O             | I/O             | I/O L19P_2           | I/O L23N_2<br>VREF_2 | I/O L24N_2           | I/O L24P_2          | VCCAUX               | F   |  |  |  |  |  |  |  |  |  |  |
| VCCO_1                     | VCCO_1     | VCCO_1                 | VCCINT                    | VCCINT          | I/O L22N_2      | I/O L22P_2           | I/O L23P_2           | I/O L26N_2<br>◆      | I/O L27N_2          | I/O L27P_2           | G   |  |  |  |  |  |  |  |  |  |  |
|                            |            |                        |                           | VCCINT          | VCCO_2          | I/O L28N_2<br>◆      | I/O L26P_2<br>◆      | VCCO_2               | I/O L29N_2<br>◆     | I/O L29P_2<br>◆      | H   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_2          | I/O L28P_2<br>◆ | I/O L31N_2<br>◆      | I/O L31P_2<br>◆      | GND                  | I/O L32N_2<br>◆     | I/O L32P_2<br>◆      | J   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_2          | I/O L33N_2<br>◆ | I/O L33P_2<br>◆      | I/O L34N_2<br>VREF_2 | I/O L34P_2           | I/O L35N_2          | I/O L35P_2           | K   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_2          | I/O L38N_2      | I/O L38P_2           | I/O L39N_2           | I/O L39P_2           | I/O L40N_2          | I/O L40P_2<br>VREF_2 | L   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_3          | I/O L38P_3      | I/O L38N_3           | I/O L39P_3           | I/O L39N_3           | I/O L40P_3          | I/O L40N_3<br>VREF_3 | M   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_3          | I/O L33P_3<br>◆ | I/O L33N_3<br>◆      | I/O L34P_3<br>VREF_3 | I/O L34N_3           | I/O L35P_3          | I/O L35N_3           | N   |  |  |  |  |  |  |  |  |  |  |
| GND                        | GND        | GND                    |                           | VCCO_3          | I/O L31P_3<br>◆ | I/O L31N_3<br>◆      | I/O L29N_3<br>◆      | GND                  | I/O L32P_3<br>◆     | I/O L32N_3<br>◆      | P   |  |  |  |  |  |  |  |  |  |  |
|                            |            |                        |                           | VCCINT          | VCCO_3          | I/O L24N_3<br>◆      | I/O L29P_3<br>◆      | VCCO_3               | I/O L28P_3<br>◆     | I/O L28N_3<br>◆      | R   |  |  |  |  |  |  |  |  |  |  |
| VCCO_4                     | VCCO_4     | VCCO_4                 | VCCINT                    | VCCINT          | I/O L22N_3      | I/O L24P_3           | I/O L26P_3<br>◆      | I/O L26N_3<br>◆      | I/O L27P_3          | I/O L27N_3           | T   |  |  |  |  |  |  |  |  |  |  |
| I/O L30N_4<br>D2           | I/O L28N_4 | I/O L25N_4             | VCCO_4                    | I/O             | I/O             | I/O L22P_3           | I/O L20N_3           | I/O L23P_3<br>VREF_3 | I/O L23N_3          | VCCAUX               | U   |  |  |  |  |  |  |  |  |  |  |
| I/O L30P_4<br>D3           | I/O L28P_4 | I/O L25P_4             | I/O L22N_4<br>VREF_4<br>◆ | I/O L16N_4      | I/O L10N_4      | I/O VREF_4           | I/O L17N_3           | I/O L20P_3           | I/O L21P_3          | I/O L21N_3           | V   |  |  |  |  |  |  |  |  |  |  |
| I/O L31N_4<br>INIT_B       | I/O        | I/O                    | I/O L22P_4<br>◆           | I/O L16P_4      | I/O L10P_4      | I/O L06N_4<br>VREF_4 | I/O L17P_3<br>VREF_3 | I/O L19P_3           | I/O L19N_3          | I/O L16N_3           | W   |  |  |  |  |  |  |  |  |  |  |
| I/O L31P_4<br>DOUT<br>BUSY | I/O L29N_4 | GND                    | VCCO_4                    | I/O VREF_4      | I/O L15N_4      | I/O L06P_4           | I/O L01P_3<br>VRN_3  | I/O L01N_3<br>VRP_3  | I/O                 | I/O L16P_3           | Y   |  |  |  |  |  |  |  |  |  |  |
| I/O L32N_4<br>GCLK1        | I/O L29P_4 | I/O L27N_4<br>DN<br>D0 | I/O L24N_4                | I/O L19N_4<br>◆ | I/O L15P_4      | I/O L09N_4           | I/O L05N_4<br>◆      | I/O L01N_4<br>VRP_4  | GND                 | CCLK                 | A A |  |  |  |  |  |  |  |  |  |  |
| I/O L32P_4<br>GCLK0        | I/O VREF_4 | I/O L27P_4<br>D1       | I/O L24P_4                | I/O L19P_4<br>◆ | VCCAUX          | I/O L09P_4           | I/O L05P_4<br>◆      | I/O L01P_4<br>VRN_4  | DONE                | GND                  | A B |  |  |  |  |  |  |  |  |  |  |

Right Half of FG456  
Package (top view)

Bank 4

DS099-4\_11b\_030503

## FG676: 676-lead Fine-pitch Ball Grid Array

The 676-lead fine-pitch ball grid array package, FG676, supports five different Spartan-3 devices, including the XC3S1000, XC3S1500, XC3S2000, XC3S4000, and XC3S5000. All five have nearly identical footprints but are slightly different, primarily due to unconnected pins on the XC3S1000 and XC3S1500. For example, because the XC3S1000 has fewer I/O pins, this device has 98 unconnected pins on the FG676 package, labeled as “N.C.” In [Table 102](#) and [Figure 49](#), these unconnected pins are indicated with a black diamond symbol (◆). The XC3S1500, however, has only two unconnected pins, also labeled “N.C.” in the pinout table but indicated with a black square symbol (■).

All the package pins appear in [Table 102](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

### Pinout Table

Table 102: FG676 Package Pinout

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name   | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|------------------------|---------------------|------|
| 0    | IO                   | IO                   | IO                   | IO                   | IO_L04N_0 <sup>3</sup> | A3                  | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | A5                  | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | A6                  | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO_L04P_0 <sup>3</sup> | C4                  | I/O  |
| 0    | N.C. (◆)             | IO                   | IO                   | IO                   | IO_L13N_0 <sup>3</sup> | C8                  | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | C12                 | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | E13                 | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | H11                 | I/O  |
| 0    | IO                   | IO                   | IO                   | IO                   | IO                     | H12                 | I/O  |
| 0    | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0              | B3                  | VREF |
| 0    | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0              | F7                  | VREF |
| 0    | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0            | IO/VREF_0              | G10                 | VREF |
| 0    | IO_L01N_0/VRP_0      | IO_L01N_0/VRP_0      | IO_L01N_0/VRP_0      | IO_L01N_0/VRP_0      | IO_L01N_0/VRP_0        | E5                  | DCI  |
| 0    | IO_L01P_0/VRN_0      | IO_L01P_0/VRN_0      | IO_L01P_0/VRN_0      | IO_L01P_0/VRN_0      | IO_L01P_0/VRN_0        | D5                  | DCI  |
| 0    | IO_L05N_0            | IO_L05N_0            | IO_L05N_0            | IO_L05N_0            | IO_L05N_0              | B4                  | I/O  |
| 0    | IO_L05P_0/VREF_0     | IO_L05P_0/VREF_0     | IO_L05P_0/VREF_0     | IO_L05P_0/VREF_0     | IO_L05P_0/VREF_0       | A4                  | VREF |
| 0    | IO_L06N_0            | IO_L06N_0            | IO_L06N_0            | IO_L06N_0            | IO_L06N_0              | C5                  | I/O  |
| 0    | IO_L06P_0            | IO_L06P_0            | IO_L06P_0            | IO_L06P_0            | IO_L06P_0              | B5                  | I/O  |
| 0    | IO_L07N_0            | IO_L07N_0            | IO_L07N_0            | IO_L07N_0            | IO_L07N_0              | E6                  | I/O  |
| 0    | IO_L07P_0            | IO_L07P_0            | IO_L07P_0            | IO_L07P_0            | IO_L07P_0              | D6                  | I/O  |
| 0    | IO_L08N_0            | IO_L08N_0            | IO_L08N_0            | IO_L08N_0            | IO_L08N_0              | C6                  | I/O  |
| 0    | IO_L08P_0            | IO_L08P_0            | IO_L08P_0            | IO_L08P_0            | IO_L08P_0              | B6                  | I/O  |
| 0    | IO_L09N_0            | IO_L09N_0            | IO_L09N_0            | IO_L09N_0            | IO_L09N_0              | E7                  | I/O  |
| 0    | IO_L09P_0            | IO_L09P_0            | IO_L09P_0            | IO_L09P_0            | IO_L09P_0              | D7                  | I/O  |
| 0    | IO_L10N_0            | IO_L10N_0            | IO_L10N_0            | IO_L10N_0            | IO_L10N_0              | B7                  | I/O  |
| 0    | IO_L10P_0            | IO_L10P_0            | IO_L10P_0            | IO_L10P_0            | IO_L10P_0              | A7                  | I/O  |

If there is a difference between the XC3S1000, XC3S1500, XC3S2000, XC3S4000, and XC3S5000 pinouts, then that difference is highlighted in [Table 102](#). If the table entry is shaded grey, then there is an unconnected pin on either the XC3S1000 or XC3S1500 that maps to a user-I/O pin on the XC3S2000, XC3S4000, and XC3S5000. If the table entry is shaded tan, then the unconnected pin on either the XC3S1000 or XC3S1500 maps to a VREF-type pin on the XC3S2000, XC3S4000, and XC3S5000. If the other VREF pins in the bank all connect to a voltage reference to support a special I/O standard, then also connect the N.C. pin on the XC3S1000 or XC3S1500 to the same VREF voltage. This provides maximum flexibility as you could potentially migrate a design from the XC3S1000 through to the XC3S5000 FPGA without changing the printed circuit board.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name   | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|------------------------|---------------------|------|
| 0    | N.C. (◆)             | IO_L11N_0            | IO_L11N_0            | IO_L11N_0            | IO_L11N_0              | G8                  | I/O  |
| 0    | N.C. (◆)             | IO_L11P_0            | IO_L11P_0            | IO_L11P_0            | IO_L11P_0              | F8                  | I/O  |
| 0    | N.C. (◆)             | IO_L12N_0            | IO_L12N_0            | IO_L12N_0            | IO <sup>3</sup>        | E8                  | I/O  |
| 0    | N.C. (◆)             | IO_L12P_0            | IO_L12P_0            | IO_L12P_0            | IO <sup>3</sup>        | D8                  | I/O  |
| 0    | IO_L15N_0            | IO_L15N_0            | IO_L15N_0            | IO_L15N_0            | IO_L13P_0 <sup>3</sup> | B8                  | I/O  |
| 0    | IO_L15P_0            | IO_L15P_0            | IO_L15P_0            | IO_L15P_0            | IO <sup>3</sup>        | A8                  | I/O  |
| 0    | IO_L16N_0            | IO_L16N_0            | IO_L16N_0            | IO_L16N_0            | IO_L16N_0              | G9                  | I/O  |
| 0    | IO_L16P_0            | IO_L16P_0            | IO_L16P_0            | IO_L16P_0            | IO_L16P_0              | F9                  | I/O  |
| 0    | N.C. (◆)             | IO_L17N_0            | IO_L17N_0            | IO_L17N_0            | IO_L17N_0              | E9                  | I/O  |
| 0    | N.C. (◆)             | IO_L17P_0            | IO_L17P_0            | IO_L17P_0            | IO_L17P_0              | D9                  | I/O  |
| 0    | N.C. (◆)             | IO_L18N_0            | IO_L18N_0            | IO_L18N_0            | IO_L18N_0              | C9                  | I/O  |
| 0    | N.C. (◆)             | IO_L18P_0            | IO_L18P_0            | IO_L18P_0            | IO_L18P_0              | B9                  | I/O  |
| 0    | IO_L19N_0            | IO_L19N_0            | IO_L19N_0            | IO_L19N_0            | IO_L19N_0              | F10                 | I/O  |
| 0    | IO_L19P_0            | IO_L19P_0            | IO_L19P_0            | IO_L19P_0            | IO_L19P_0              | E10                 | I/O  |
| 0    | IO_L22N_0            | IO_L22N_0            | IO_L22N_0            | IO_L22N_0            | IO_L22N_0              | D10                 | I/O  |
| 0    | IO_L22P_0            | IO_L22P_0            | IO_L22P_0            | IO_L22P_0            | IO_L22P_0              | C10                 | I/O  |
| 0    | N.C. (◆)             | IO_L23N_0            | IO_L23N_0            | IO_L23N_0            | IO_L23N_0              | B10                 | I/O  |
| 0    | N.C. (◆)             | IO_L23P_0            | IO_L23P_0            | IO_L23P_0            | IO_L23P_0              | A10                 | I/O  |
| 0    | IO_L24N_0            | IO_L24N_0            | IO_L24N_0            | IO_L24N_0            | IO_L24N_0              | G11                 | I/O  |
| 0    | IO_L24P_0            | IO_L24P_0            | IO_L24P_0            | IO_L24P_0            | IO_L24P_0              | F11                 | I/O  |
| 0    | IO_L25N_0            | IO_L25N_0            | IO_L25N_0            | IO_L25N_0            | IO_L25N_0              | E11                 | I/O  |
| 0    | IO_L25P_0            | IO_L25P_0            | IO_L25P_0            | IO_L25P_0            | IO_L25P_0              | D11                 | I/O  |
| 0    | N.C. (◆)             | IO_L26N_0            | IO_L26N_0            | IO_L26N_0            | IO_L26N_0              | B11                 | I/O  |
| 0    | N.C. (◆)             | IO_L26P_0/<br>VREF_0 | IO_L26P_0/<br>VREF_0 | IO_L26P_0/<br>VREF_0 | IO_L26P_0/<br>VREF_0   | A11                 | VREF |
| 0    | IO_L27N_0            | IO_L27N_0            | IO_L27N_0            | IO_L27N_0            | IO_L27N_0              | G12                 | I/O  |
| 0    | IO_L27P_0            | IO_L27P_0            | IO_L27P_0            | IO_L27P_0            | IO_L27P_0              | H13                 | I/O  |
| 0    | IO_L28N_0            | IO_L28N_0            | IO_L28N_0            | IO_L28N_0            | IO_L28N_0              | F12                 | I/O  |
| 0    | IO_L28P_0            | IO_L28P_0            | IO_L28P_0            | IO_L28P_0            | IO_L28P_0              | E12                 | I/O  |
| 0    | IO_L29N_0            | IO_L29N_0            | IO_L29N_0            | IO_L29N_0            | IO_L29N_0              | B12                 | I/O  |
| 0    | IO_L29P_0            | IO_L29P_0            | IO_L29P_0            | IO_L29P_0            | IO_L29P_0              | A12                 | I/O  |
| 0    | IO_L30N_0            | IO_L30N_0            | IO_L30N_0            | IO_L30N_0            | IO_L30N_0              | G13                 | I/O  |
| 0    | IO_L30P_0            | IO_L30P_0            | IO_L30P_0            | IO_L30P_0            | IO_L30P_0              | F13                 | I/O  |
| 0    | IO_L31N_0            | IO_L31N_0            | IO_L31N_0            | IO_L31N_0            | IO_L31N_0              | D13                 | I/O  |
| 0    | IO_L31P_0/VREF_0     | IO_L31P_0/VREF_0     | IO_L31P_0/VREF_0     | IO_L31P_0/VREF_0     | IO_L31P_0/VREF_0       | C13                 | VREF |
| 0    | IO_L32N_0/GCLK7      | IO_L32N_0/GCLK7      | IO_L32N_0/GCLK7      | IO_L32N_0/GCLK7      | IO_L32N_0/GCLK7        | B13                 | GCLK |
| 0    | IO_L32P_0/GCLK6      | IO_L32P_0/GCLK6      | IO_L32P_0/GCLK6      | IO_L32P_0/GCLK6      | IO_L32P_0/GCLK6        | A13                 | GCLK |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | C7                  | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | C11                 | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | H9                  | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | H10                 | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | J11                 | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | J12                 | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | J13                 | VCCO |
| 0    | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0               | VCCO_0                 | K13                 | VCCO |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                     | A14                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                     | A22                 | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name          | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|-------------------------------|---------------------|------|
| 1    | IO                   | IO                   | IO                   | IO                   | IO                            | A23                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                            | D16                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO_L17P_1 <sup>3</sup>        | E18                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                            | F14                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                            | F20                 | I/O  |
| 1    | IO                   | IO                   | IO                   | IO                   | IO                            | G19                 | I/O  |
| 1    | IO/VREF_1            | IO/VREF_1            | IO/VREF_1            | IO/VREF_1            | IO/VREF_1                     | C15                 | VREF |
| 1    | IO/VREF_1            | IO/VREF_1            | IO/VREF_1            | IO/VREF_1            | IO/VREF_1                     | C17                 | VREF |
| 1    | N.C. (◆)             | IO/VREF_1            | IO/VREF_1            | IO/VREF_1            | IO_L17N_1/VREF_1 <sup>3</sup> | D18                 | VREF |
| 1    | IO_L01N_1/VRP_1      | IO_L01N_1/VRP_1      | IO_L01N_1/VRP_1      | IO_L01N_1/VRP_1      | IO_L01N_1/VRP_1               | D22                 | DCI  |
| 1    | IO_L01P_1/VRN_1      | IO_L01P_1/VRN_1      | IO_L01P_1/VRN_1      | IO_L01P_1/VRN_1      | IO_L01P_1/VRN_1               | E22                 | DCI  |
| 1    | IO_L04N_1            | IO_L04N_1            | IO_L04N_1            | IO_L04N_1            | IO_L04N_1                     | B23                 | I/O  |
| 1    | IO_L04P_1            | IO_L04P_1            | IO_L04P_1            | IO_L04P_1            | IO_L04P_1                     | C23                 | I/O  |
| 1    | IO_L05N_1            | IO_L05N_1            | IO_L05N_1            | IO_L05N_1            | IO_L05N_1                     | E21                 | I/O  |
| 1    | IO_L05P_1            | IO_L05P_1            | IO_L05P_1            | IO_L05P_1            | IO_L05P_1                     | F21                 | I/O  |
| 1    | IO_L06N_1/VREF_1     | IO_L06N_1/VREF_1     | IO_L06N_1/VREF_1     | IO_L06N_1/VREF_1     | IO_L06N_1/VREF_1              | B22                 | VREF |
| 1    | IO_L06P_1            | IO_L06P_1            | IO_L06P_1            | IO_L06P_1            | IO_L06P_1                     | C22                 | I/O  |
| 1    | IO_L07N_1            | IO_L07N_1            | IO_L07N_1            | IO_L07N_1            | IO_L07N_1                     | C21                 | I/O  |
| 1    | IO_L07P_1            | IO_L07P_1            | IO_L07P_1            | IO_L07P_1            | IO_L07P_1                     | D21                 | I/O  |
| 1    | IO_L08N_1            | IO_L08N_1            | IO_L08N_1            | IO_L08N_1            | IO_L08N_1                     | A21                 | I/O  |
| 1    | IO_L08P_1            | IO_L08P_1            | IO_L08P_1            | IO_L08P_1            | IO_L08P_1                     | B21                 | I/O  |
| 1    | IO_L09N_1            | IO_L09N_1            | IO_L09N_1            | IO_L09N_1            | IO_L09N_1                     | D20                 | I/O  |
| 1    | IO_L09P_1            | IO_L09P_1            | IO_L09P_1            | IO_L09P_1            | IO_L09P_1                     | E20                 | I/O  |
| 1    | IO_L10N_1/VREF_1     | IO_L10N_1/VREF_1     | IO_L10N_1/VREF_1     | IO_L10N_1/VREF_1     | IO_L10N_1/VREF_1              | A20                 | VREF |
| 1    | IO_L10P_1            | IO_L10P_1            | IO_L10P_1            | IO_L10P_1            | IO_L10P_1                     | B20                 | I/O  |
| 1    | N.C. (◆)             | IO_L11N_1            | IO_L11N_1            | IO_L11N_1            | IO_L11N_1                     | E19                 | I/O  |
| 1    | N.C. (◆)             | IO_L11P_1            | IO_L11P_1            | IO_L11P_1            | IO_L11P_1                     | F19                 | I/O  |
| 1    | N.C. (◆)             | IO_L12N_1            | IO_L12N_1            | IO_L12N_1            | IO_L12N_1                     | C19                 | I/O  |
| 1    | N.C. (◆)             | IO_L12P_1            | IO_L12P_1            | IO_L12P_1            | IO_L12P_1                     | D19                 | I/O  |
| 1    | IO_L15N_1            | IO_L15N_1            | IO_L15N_1            | IO_L15N_1            | IO_L15N_1                     | A19                 | I/O  |
| 1    | IO_L15P_1            | IO_L15P_1            | IO_L15P_1            | IO_L15P_1            | IO_L15P_1                     | B19                 | I/O  |
| 1    | IO_L16N_1            | IO_L16N_1            | IO_L16N_1            | IO_L16N_1            | IO_L16N_1                     | F18                 | I/O  |
| 1    | IO_L16P_1            | IO_L16P_1            | IO_L16P_1            | IO_L16P_1            | IO_L16P_1                     | G18                 | I/O  |
| 1    | N.C. (◆)             | IO_L18N_1            | IO_L18N_1            | IO_L18N_1            | IO <sup>3</sup>               | B18                 | I/O  |
| 1    | N.C. (◆)             | IO_L18P_1            | IO_L18P_1            | IO_L18P_1            | IO <sup>3</sup>               | C18                 | I/O  |
| 1    | IO_L19N_1            | IO_L19N_1            | IO_L19N_1            | IO_L19N_1            | IO_L19N_1                     | F17                 | I/O  |
| 1    | IO_L19P_1            | IO_L19P_1            | IO_L19P_1            | IO_L19P_1            | IO_L19P_1                     | G17                 | I/O  |
| 1    | IO_L22N_1            | IO_L22N_1            | IO_L22N_1            | IO_L22N_1            | IO_L22N_1                     | D17                 | I/O  |
| 1    | IO_L22P_1            | IO_L22P_1            | IO_L22P_1            | IO_L22P_1            | IO_L22P_1                     | E17                 | I/O  |
| 1    | N.C. (◆)             | IO_L23N_1            | IO_L23N_1            | IO_L23N_1            | IO_L23N_1                     | A17                 | I/O  |
| 1    | N.C. (◆)             | IO_L23P_1            | IO_L23P_1            | IO_L23P_1            | IO_L23P_1                     | B17                 | I/O  |
| 1    | IO_L24N_1            | IO_L24N_1            | IO_L24N_1            | IO_L24N_1            | IO_L24N_1                     | G16                 | I/O  |
| 1    | IO_L24P_1            | IO_L24P_1            | IO_L24P_1            | IO_L24P_1            | IO_L24P_1                     | H16                 | I/O  |
| 1    | IO_L25N_1            | IO_L25N_1            | IO_L25N_1            | IO_L25N_1            | IO_L25N_1                     | E16                 | I/O  |
| 1    | IO_L25P_1            | IO_L25P_1            | IO_L25P_1            | IO_L25P_1            | IO_L25P_1                     | F16                 | I/O  |
| 1    | N.C. (◆)             | IO_L26N_1            | IO_L26N_1            | IO_L26N_1            | IO_L26N_1                     | A16                 | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name          | XC3S2000<br>Pin Name           | XC3S4000<br>Pin Name           | XC3S5000<br>Pin Name   | FG676<br>Pin Number | Type              |
|------|----------------------|-------------------------------|--------------------------------|--------------------------------|------------------------|---------------------|-------------------|
| 1    | N.C. (◆)             | IO_L26P_1                     | IO_L26P_1                      | IO_L26P_1                      | IO_L26P_1              | B16                 | I/O               |
| 1    | IO_L27N_1            | IO_L27N_1                     | IO_L27N_1                      | IO_L27N_1                      | IO_L27N_1              | G15                 | I/O               |
| 1    | IO_L27P_1            | IO_L27P_1                     | IO_L27P_1                      | IO_L27P_1                      | IO_L27P_1              | H15                 | I/O               |
| 1    | IO_L28N_1            | IO_L28N_1                     | IO_L28N_1                      | IO_L28N_1                      | IO_L28N_1              | E15                 | I/O               |
| 1    | IO_L28P_1            | IO_L28P_1                     | IO_L28P_1                      | IO_L28P_1                      | IO_L28P_1              | F15                 | I/O               |
| 1    | IO_L29N_1            | IO_L29N_1                     | IO_L29N_1                      | IO_L29N_1                      | IO_L29N_1              | A15                 | I/O               |
| 1    | IO_L29P_1            | IO_L29P_1                     | IO_L29P_1                      | IO_L29P_1                      | IO_L29P_1              | B15                 | I/O               |
| 1    | IO_L30N_1            | IO_L30N_1                     | IO_L30N_1                      | IO_L30N_1                      | IO_L30N_1              | G14                 | I/O               |
| 1    | IO_L30P_1            | IO_L30P_1                     | IO_L30P_1                      | IO_L30P_1                      | IO_L30P_1              | H14                 | I/O               |
| 1    | IO_L31N_1/VREF_1     | IO_L31N_1/VREF_1              | IO_L31N_1/VREF_1               | IO_L31N_1/VREF_1               | IO_L31N_1/VREF_1       | D14                 | VREF              |
| 1    | IO_L31P_1            | IO_L31P_1                     | IO_L31P_1                      | IO_L31P_1                      | IO_L31P_1              | E14                 | I/O               |
| 1    | IO_L32N_1/GCLK5      | IO_L32N_1/GCLK5               | IO_L32N_1/GCLK5                | IO_L32N_1/GCLK5                | IO_L32N_1/GCLK5        | B14                 | GCLK              |
| 1    | IO_L32P_1/GCLK4      | IO_L32P_1/GCLK4               | IO_L32P_1/GCLK4                | IO_L32P_1/GCLK4                | IO_L32P_1/GCLK4        | C14                 | GCLK              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | C16                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | C20                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | H17                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | H18                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | J14                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | J15                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | J16                 | VCCO              |
| 1    | VCCO_1               | VCCO_1                        | VCCO_1                         | VCCO_1                         | VCCO_1                 | K14                 | VCCO              |
| 2    | N.C. (◆)             | N.C. (■)                      | IO                             | IO                             | IO                     | F22                 | I/O               |
| 2    | IO_L01N_2/VRP_2      | IO_L01N_2/VRP_2               | IO_L01N_2/VRP_2                | IO_L01N_2/VRP_2                | IO_L01N_2/VRP_2        | C25                 | DCI               |
| 2    | IO_L01P_2/VRN_2      | IO_L01P_2/VRN_2               | IO_L01P_2/VRN_2                | IO_L01P_2/VRN_2                | IO_L01P_2/VRN_2        | C26                 | DCI               |
| 2    | IO_L02N_2            | IO_L02N_2                     | IO_L02N_2                      | IO_L02N_2                      | IO_L02N_2              | E23                 | I/O               |
| 2    | IO_L02P_2            | IO_L02P_2                     | IO_L02P_2                      | IO_L02P_2                      | IO_L02P_2              | E24                 | I/O               |
| 2    | IO_L03N_2/VREF_2     | IO_L03N_2/VREF_2 <sup>1</sup> | IO_L03N_2/VREF_2               | IO_L03N_2/VREF_2               | IO_L03N_2/VREF_2       | D25                 | VREF <sup>1</sup> |
| 2    | IO_L03P_2            | IO_L03P_2                     | IO_L03P_2                      | IO_L03P_2                      | IO_L03P_2              | D26                 | I/O               |
| 2    | N.C. (◆)             | IO_L05N_2                     | IO_L05N_2                      | IO_L05N_2                      | IO_L05N_2              | E25                 | I/O               |
| 2    | N.C. (◆)             | IO_L05P_2                     | IO_L05P_2                      | IO_L05P_2                      | IO_L05P_2              | E26                 | I/O               |
| 2    | N.C. (◆)             | IO_L06N_2                     | IO_L06N_2                      | IO_L06N_2                      | IO_L06N_2              | G20                 | I/O               |
| 2    | N.C. (◆)             | IO_L06P_2                     | IO_L06P_2                      | IO_L06P_2                      | IO_L06P_2              | G21                 | I/O               |
| 2    | N.C. (◆)             | IO_L07N_2                     | IO_L07N_2                      | IO_L07N_2                      | IO_L07N_2              | F23                 | I/O               |
| 2    | N.C. (◆)             | IO_L07P_2                     | IO_L07P_2                      | IO_L07P_2                      | IO_L07P_2              | F24                 | I/O               |
| 2    | N.C. (◆)             | IO_L08N_2                     | IO_L08N_2                      | IO_L08N_2                      | IO_L08N_2              | G22                 | I/O               |
| 2    | N.C. (◆)             | IO_L08P_2                     | IO_L08P_2                      | IO_L08P_2                      | IO_L08P_2              | G23                 | I/O               |
| 2    | N.C. (◆)             | IO_L09N_2/VREF_2 <sup>1</sup> | IO_L09N_2/VREF_2               | IO_L09N_2/VREF_2               | IO_L09N_2/VREF_2       | F25                 | VREF <sup>1</sup> |
| 2    | N.C. (◆)             | IO_L09P_2                     | IO_L09P_2                      | IO_L09P_2                      | IO_L09P_2              | F26                 | I/O               |
| 2    | N.C. (◆)             | IO_L10N_2                     | IO_L10N_2                      | IO_L10N_2                      | IO_L10N_2              | G25                 | I/O               |
| 2    | N.C. (◆)             | IO_L10P_2                     | IO_L10P_2                      | IO_L10P_2                      | IO_L10P_2              | G26                 | I/O               |
| 2    | IO_L14N_2            | IO_L14N_2                     | IO_L14N_2 <sup>2</sup>         | IO_L11N_2 <sup>2</sup>         | IO_L11N_2              | H20                 | I/O               |
| 2    | IO_L14P_2            | IO_L14P_2                     | IO_L14P_2 <sup>2</sup>         | IO_L11P_2 <sup>2</sup>         | IO_L11P_2              | H21                 | I/O               |
| 2    | IO_L16N_2            | IO_L16N_2                     | IO_L16N_2 <sup>2</sup>         | IO_L12N_2 <sup>2</sup>         | IO_L12N_2              | H22                 | I/O               |
| 2    | IO_L16P_2            | IO_L16P_2                     | IO_L16P_2 <sup>2</sup>         | IO_L12P_2 <sup>2</sup>         | IO_L12P_2              | J21                 | I/O               |
| 2    | IO_L17N_2            | IO_L17N_2                     | IO_L17N_2 <sup>2</sup>         | IO_L13N_2 <sup>2</sup>         | IO <sup>3</sup>        | H23                 | I/O               |
| 2    | IO_L17P_2/VREF_2     | IO_L17P_2/VREF_2              | IO_L17P_2 <sup>2</sup> /VREF_2 | IO_L13P_2 <sup>2</sup> /VREF_2 | IO/VREF_2 <sup>3</sup> | H24                 | VREF              |



Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 2    | IO_L19N_2            | IO_L19N_2            | IO_L19N_2            | IO_L19N_2            | IO_L19N_2            | H25                 | I/O  |
| 2    | IO_L19P_2            | IO_L19P_2            | IO_L19P_2            | IO_L19P_2            | IO_L19P_2            | H26                 | I/O  |
| 2    | IO_L20N_2            | IO_L20N_2            | IO_L20N_2            | IO_L20N_2            | IO_L20N_2            | J20                 | I/O  |
| 2    | IO_L20P_2            | IO_L20P_2            | IO_L20P_2            | IO_L20P_2            | IO_L20P_2            | K20                 | I/O  |
| 2    | IO_L21N_2            | IO_L21N_2            | IO_L21N_2            | IO_L21N_2            | IO_L21N_2            | J22                 | I/O  |
| 2    | IO_L21P_2            | IO_L21P_2            | IO_L21P_2            | IO_L21P_2            | IO_L21P_2            | J23                 | I/O  |
| 2    | IO_L22N_2            | IO_L22N_2            | IO_L22N_2            | IO_L22N_2            | IO_L22N_2            | J24                 | I/O  |
| 2    | IO_L22P_2            | IO_L22P_2            | IO_L22P_2            | IO_L22P_2            | IO_L22P_2            | J25                 | I/O  |
| 2    | IO_L23N_2/VREF_2     | IO_L23N_2/VREF_2     | IO_L23N_2/VREF_2     | IO_L23N_2/VREF_2     | IO_L23N_2/VREF_2     | K21                 | VREF |
| 2    | IO_L23P_2            | IO_L23P_2            | IO_L23P_2            | IO_L23P_2            | IO_L23P_2            | K22                 | I/O  |
| 2    | IO_L24N_2            | IO_L24N_2            | IO_L24N_2            | IO_L24N_2            | IO_L24N_2            | K23                 | I/O  |
| 2    | IO_L24P_2            | IO_L24P_2            | IO_L24P_2            | IO_L24P_2            | IO_L24P_2            | K24                 | I/O  |
| 2    | IO_L26N_2            | IO_L26N_2            | IO_L26N_2            | IO_L26N_2            | IO_L26N_2            | K25                 | I/O  |
| 2    | IO_L26P_2            | IO_L26P_2            | IO_L26P_2            | IO_L26P_2            | IO_L26P_2            | K26                 | I/O  |
| 2    | IO_L27N_2            | IO_L27N_2            | IO_L27N_2            | IO_L27N_2            | IO_L27N_2            | L19                 | I/O  |
| 2    | IO_L27P_2            | IO_L27P_2            | IO_L27P_2            | IO_L27P_2            | IO_L27P_2            | L20                 | I/O  |
| 2    | IO_L28N_2            | IO_L28N_2            | IO_L28N_2            | IO_L28N_2            | IO_L28N_2            | L21                 | I/O  |
| 2    | IO_L28P_2            | IO_L28P_2            | IO_L28P_2            | IO_L28P_2            | IO_L28P_2            | L22                 | I/O  |
| 2    | IO_L29N_2            | IO_L29N_2            | IO_L29N_2            | IO_L29N_2            | IO_L29N_2            | L25                 | I/O  |
| 2    | IO_L29P_2            | IO_L29P_2            | IO_L29P_2            | IO_L29P_2            | IO_L29P_2            | L26                 | I/O  |
| 2    | IO_L31N_2            | IO_L31N_2            | IO_L31N_2            | IO_L31N_2            | IO_L31N_2            | M19                 | I/O  |
| 2    | IO_L31P_2            | IO_L31P_2            | IO_L31P_2            | IO_L31P_2            | IO_L31P_2            | M20                 | I/O  |
| 2    | IO_L32N_2            | IO_L32N_2            | IO_L32N_2            | IO_L32N_2            | IO_L32N_2            | M21                 | I/O  |
| 2    | IO_L32P_2            | IO_L32P_2            | IO_L32P_2            | IO_L32P_2            | IO_L32P_2            | M22                 | I/O  |
| 2    | IO_L33N_2            | IO_L33N_2            | IO_L33N_2            | IO_L33N_2            | IO_L33N_2            | L23                 | I/O  |
| 2    | IO_L33P_2            | IO_L33P_2            | IO_L33P_2            | IO_L33P_2            | IO_L33P_2            | M24                 | I/O  |
| 2    | IO_L34N_2/VREF_2     | IO_L34N_2/VREF_2     | IO_L34N_2/VREF_2     | IO_L34N_2/VREF_2     | IO_L34N_2/VREF_2     | M25                 | VREF |
| 2    | IO_L34P_2            | IO_L34P_2            | IO_L34P_2            | IO_L34P_2            | IO_L34P_2            | M26                 | I/O  |
| 2    | IO_L35N_2            | IO_L35N_2            | IO_L35N_2            | IO_L35N_2            | IO_L35N_2            | N19                 | I/O  |
| 2    | IO_L35P_2            | IO_L35P_2            | IO_L35P_2            | IO_L35P_2            | IO_L35P_2            | N20                 | I/O  |
| 2    | IO_L38N_2            | IO_L38N_2            | IO_L38N_2            | IO_L38N_2            | IO_L38N_2            | N21                 | I/O  |
| 2    | IO_L38P_2            | IO_L38P_2            | IO_L38P_2            | IO_L38P_2            | IO_L38P_2            | N22                 | I/O  |
| 2    | IO_L39N_2            | IO_L39N_2            | IO_L39N_2            | IO_L39N_2            | IO_L39N_2            | N23                 | I/O  |
| 2    | IO_L39P_2            | IO_L39P_2            | IO_L39P_2            | IO_L39P_2            | IO_L39P_2            | N24                 | I/O  |
| 2    | IO_L40N_2            | IO_L40N_2            | IO_L40N_2            | IO_L40N_2            | IO_L40N_2            | N25                 | I/O  |
| 2    | IO_L40P_2/VREF_2     | IO_L40P_2/VREF_2     | IO_L40P_2/VREF_2     | IO_L40P_2/VREF_2     | IO_L40P_2/VREF_2     | N26                 | VREF |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | G24                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | J19                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | K19                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | L18                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | L24                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | M18                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | N17                 | VCCO |
| 2    | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | VCCO_2               | N18                 | VCCO |
| 3    | IO_L01N_3/VRP_3      | IO_L01N_3/VRP_3      | IO_L01N_3/VRP_3      | IO_L01N_3/VRP_3      | IO_L01N_3/VRP_3      | AA22                | DCI  |
| 3    | IO_L01P_3/VRN_3      | IO_L01P_3/VRN_3      | IO_L01P_3/VRN_3      | IO_L01P_3/VRN_3      | IO_L01P_3/VRN_3      | AA21                | DCI  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 3    | IO_L02N_3/VREF_3     | IO_L02N_3/VREF_3     | IO_L02N_3/VREF_3     | IO_L02N_3/VREF_3     | IO_L02N_3/VREF_3     | AB24                | VREF |
| 3    | IO_L02P_3            | IO_L02P_3            | IO_L02P_3            | IO_L02P_3            | IO_L02P_3            | AB23                | I/O  |
| 3    | IO_L03N_3            | IO_L03N_3            | IO_L03N_3            | IO_L03N_3            | IO_L03N_3            | AC26                | I/O  |
| 3    | IO_L03P_3            | IO_L03P_3            | IO_L03P_3            | IO_L03P_3            | IO_L03P_3            | AC25                | I/O  |
| 3    | N.C. (◆)             | IO_L05N_3            | IO_L05N_3            | IO_L05N_3            | IO_L05N_3            | Y21                 | I/O  |
| 3    | N.C. (◆)             | IO_L05P_3            | IO_L05P_3            | IO_L05P_3            | IO_L05P_3            | Y20                 | I/O  |
| 3    | N.C. (◆)             | IO_L06N_3            | IO_L06N_3            | IO_L06N_3            | IO_L06N_3            | AB26                | I/O  |
| 3    | N.C. (◆)             | IO_L06P_3            | IO_L06P_3            | IO_L06P_3            | IO_L06P_3            | AB25                | I/O  |
| 3    | N.C. (◆)             | IO_L07N_3            | IO_L07N_3            | IO_L07N_3            | IO_L07N_3            | AA24                | I/O  |
| 3    | N.C. (◆)             | IO_L07P_3            | IO_L07P_3            | IO_L07P_3            | IO_L07P_3            | AA23                | I/O  |
| 3    | N.C. (◆)             | IO_L08N_3            | IO_L08N_3            | IO_L08N_3            | IO_L08N_3            | Y23                 | I/O  |
| 3    | N.C. (◆)             | IO_L08P_3            | IO_L08P_3            | IO_L08P_3            | IO_L08P_3            | Y22                 | I/O  |
| 3    | N.C. (◆)             | IO_L09N_3            | IO_L09N_3            | IO_L09N_3            | IO_L09N_3            | AA26                | I/O  |
| 3    | N.C. (◆)             | IO_L09P_3/VREF_3     | IO_L09P_3/VREF_3     | IO_L09P_3/VREF_3     | IO_L09P_3/VREF_3     | AA25                | VREF |
| 3    | N.C. (◆)             | IO_L10N_3            | IO_L10N_3            | IO_L10N_3            | IO_L10N_3            | W21                 | I/O  |
| 3    | N.C. (◆)             | IO_L10P_3            | IO_L10P_3            | IO_L10P_3            | IO_L10P_3            | W20                 | I/O  |
| 3    | IO_L14N_3            | IO_L14N_3            | IO_L14N_3            | IO_L14N_3            | IO_L14N_3            | Y26                 | I/O  |
| 3    | IO_L14P_3            | IO_L14P_3            | IO_L14P_3            | IO_L14P_3            | IO_L14P_3            | Y25                 | I/O  |
| 3    | IO_L16N_3            | IO_L16N_3            | IO_L16N_3            | IO_L16N_3            | IO_L16N_3            | V21                 | I/O  |
| 3    | IO_L16P_3            | IO_L16P_3            | IO_L16P_3            | IO_L16P_3            | IO_L16P_3            | W22                 | I/O  |
| 3    | IO_L17N_3            | IO_L17N_3            | IO_L17N_3            | IO_L17N_3            | IO_L17N_3            | W24                 | I/O  |
| 3    | IO_L17P_3/VREF_3     | IO_L17P_3/VREF_3     | IO_L17P_3/VREF_3     | IO_L17P_3/VREF_3     | IO_L17P_3/VREF_3     | W23                 | VREF |
| 3    | IO_L19N_3            | IO_L19N_3            | IO_L19N_3            | IO_L19N_3            | IO_L19N_3            | W26                 | I/O  |
| 3    | IO_L19P_3            | IO_L19P_3            | IO_L19P_3            | IO_L19P_3            | IO_L19P_3            | W25                 | I/O  |
| 3    | IO_L20N_3            | IO_L20N_3            | IO_L20N_3            | IO_L20N_3            | IO_L20N_3            | U20                 | I/O  |
| 3    | IO_L20P_3            | IO_L20P_3            | IO_L20P_3            | IO_L20P_3            | IO_L20P_3            | V20                 | I/O  |
| 3    | IO_L21N_3            | IO_L21N_3            | IO_L21N_3            | IO_L21N_3            | IO_L21N_3            | V23                 | I/O  |
| 3    | IO_L21P_3            | IO_L21P_3            | IO_L21P_3            | IO_L21P_3            | IO_L21P_3            | V22                 | I/O  |
| 3    | IO_L22N_3            | IO_L22N_3            | IO_L22N_3            | IO_L22N_3            | IO_L22N_3            | V25                 | I/O  |
| 3    | IO_L22P_3            | IO_L22P_3            | IO_L22P_3            | IO_L22P_3            | IO_L22P_3            | V24                 | I/O  |
| 3    | IO_L23N_3            | IO_L23N_3            | IO_L23N_3            | IO_L23N_3            | IO_L23N_3            | U22                 | I/O  |
| 3    | IO_L23P_3/VREF_3     | IO_L23P_3/VREF_3     | IO_L23P_3/VREF_3     | IO_L23P_3/VREF_3     | IO_L23P_3/VREF_3     | U21                 | VREF |
| 3    | IO_L24N_3            | IO_L24N_3            | IO_L24N_3            | IO_L24N_3            | IO_L24N_3            | U24                 | I/O  |
| 3    | IO_L24P_3            | IO_L24P_3            | IO_L24P_3            | IO_L24P_3            | IO_L24P_3            | U23                 | I/O  |
| 3    | IO_L26N_3            | IO_L26N_3            | IO_L26N_3            | IO_L26N_3            | IO_L26N_3            | U26                 | I/O  |
| 3    | IO_L26P_3            | IO_L26P_3            | IO_L26P_3            | IO_L26P_3            | IO_L26P_3            | U25                 | I/O  |
| 3    | IO_L27N_3            | IO_L27N_3            | IO_L27N_3            | IO_L27N_3            | IO_L27N_3            | T20                 | I/O  |
| 3    | IO_L27P_3            | IO_L27P_3            | IO_L27P_3            | IO_L27P_3            | IO_L27P_3            | T19                 | I/O  |
| 3    | IO_L28N_3            | IO_L28N_3            | IO_L28N_3            | IO_L28N_3            | IO_L28N_3            | T22                 | I/O  |
| 3    | IO_L28P_3            | IO_L28P_3            | IO_L28P_3            | IO_L28P_3            | IO_L28P_3            | T21                 | I/O  |
| 3    | IO_L29N_3            | IO_L29N_3            | IO_L29N_3            | IO_L29N_3            | IO_L29N_3            | T26                 | I/O  |
| 3    | IO_L29P_3            | IO_L29P_3            | IO_L29P_3            | IO_L29P_3            | IO_L29P_3            | T25                 | I/O  |
| 3    | IO_L31N_3            | IO_L31N_3            | IO_L31N_3            | IO_L31N_3            | IO_L31N_3            | R20                 | I/O  |
| 3    | IO_L31P_3            | IO_L31P_3            | IO_L31P_3            | IO_L31P_3            | IO_L31P_3            | R19                 | I/O  |
| 3    | IO_L32N_3            | IO_L32N_3            | IO_L32N_3            | IO_L32N_3            | IO_L32N_3            | R22                 | I/O  |
| 3    | IO_L32P_3            | IO_L32P_3            | IO_L32P_3            | IO_L32P_3            | IO_L32P_3            | R21                 | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 3    | IO_L33N_3            | IO_L33N_3            | IO_L33N_3            | IO_L33N_3            | IO_L33N_3            | R24                 | I/O  |
| 3    | IO_L33P_3            | IO_L33P_3            | IO_L33P_3            | IO_L33P_3            | IO_L33P_3            | T23                 | I/O  |
| 3    | IO_L34N_3            | IO_L34N_3            | IO_L34N_3            | IO_L34N_3            | IO_L34N_3            | R26                 | I/O  |
| 3    | IO_L34P_3/VREF_3     | IO_L34P_3/VREF_3     | IO_L34P_3/VREF_3     | IO_L34P_3/VREF_3     | IO_L34P_3/VREF_3     | R25                 | VREF |
| 3    | IO_L35N_3            | IO_L35N_3            | IO_L35N_3            | IO_L35N_3            | IO_L35N_3            | P20                 | I/O  |
| 3    | IO_L35P_3            | IO_L35P_3            | IO_L35P_3            | IO_L35P_3            | IO_L35P_3            | P19                 | I/O  |
| 3    | IO_L38N_3            | IO_L38N_3            | IO_L38N_3            | IO_L38N_3            | IO_L38N_3            | P22                 | I/O  |
| 3    | IO_L38P_3            | IO_L38P_3            | IO_L38P_3            | IO_L38P_3            | IO_L38P_3            | P21                 | I/O  |
| 3    | IO_L39N_3            | IO_L39N_3            | IO_L39N_3            | IO_L39N_3            | IO_L39N_3            | P24                 | I/O  |
| 3    | IO_L39P_3            | IO_L39P_3            | IO_L39P_3            | IO_L39P_3            | IO_L39P_3            | P23                 | I/O  |
| 3    | IO_L40N_3/VREF_3     | IO_L40N_3/VREF_3     | IO_L40N_3/VREF_3     | IO_L40N_3/VREF_3     | IO_L40N_3/VREF_3     | P26                 | VREF |
| 3    | IO_L40P_3            | IO_L40P_3            | IO_L40P_3            | IO_L40P_3            | IO_L40P_3            | P25                 | I/O  |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | P17                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | P18                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | R18                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | T18                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | T24                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | U19                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | V19                 | VCCO |
| 3    | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | VCCO_3               | Y24                 | VCCO |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | AA20                | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | AD15                | I/O  |
| 4    | N.C. (◆)             | IO                   | IO                   | IO                   | IO                   | AD19                | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | AD23                | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | AF21                | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | AF22                | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | W15                 | I/O  |
| 4    | IO                   | IO                   | IO                   | IO                   | IO                   | W16                 | I/O  |
| 4    | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | AB14                | VREF |
| 4    | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | AD25                | VREF |
| 4    | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | IO/VREF_4            | Y17                 | VREF |
| 4    | IO_L01N_4/VRP_4      | IO_L01N_4/VRP_4      | IO_L01N_4/VRP_4      | IO_L01N_4/VRP_4      | IO_L01N_4/VRP_4      | AB22                | DCI  |
| 4    | IO_L01P_4/VRN_4      | IO_L01P_4/VRN_4      | IO_L01P_4/VRN_4      | IO_L01P_4/VRN_4      | IO_L01P_4/VRN_4      | AC22                | DCI  |
| 4    | IO_L04N_4            | IO_L04N_4            | IO_L04N_4            | IO_L04N_4            | IO_L04N_4            | AE24                | I/O  |
| 4    | IO_L04P_4            | IO_L04P_4            | IO_L04P_4            | IO_L04P_4            | IO_L04P_4            | AF24                | I/O  |
| 4    | IO_L05N_4            | IO_L05N_4            | IO_L05N_4            | IO_L05N_4            | IO_L05N_4            | AE23                | I/O  |
| 4    | IO_L05P_4            | IO_L05P_4            | IO_L05P_4            | IO_L05P_4            | IO_L05P_4            | AF23                | I/O  |
| 4    | IO_L06N_4/VREF_4     | IO_L06N_4/VREF_4     | IO_L06N_4/VREF_4     | IO_L06N_4/VREF_4     | IO_L06N_4/VREF_4     | AD22                | VREF |
| 4    | IO_L06P_4            | IO_L06P_4            | IO_L06P_4            | IO_L06P_4            | IO_L06P_4            | AE22                | I/O  |
| 4    | IO_L07N_4            | IO_L07N_4            | IO_L07N_4            | IO_L07N_4            | IO_L07N_4            | AB21                | I/O  |
| 4    | IO_L07P_4            | IO_L07P_4            | IO_L07P_4            | IO_L07P_4            | IO_L07P_4            | AC21                | I/O  |
| 4    | IO_L08N_4            | IO_L08N_4            | IO_L08N_4            | IO_L08N_4            | IO_L08N_4            | AD21                | I/O  |
| 4    | IO_L08P_4            | IO_L08P_4            | IO_L08P_4            | IO_L08P_4            | IO_L08P_4            | AE21                | I/O  |
| 4    | IO_L09N_4            | IO_L09N_4            | IO_L09N_4            | IO_L09N_4            | IO_L09N_4            | AB20                | I/O  |
| 4    | IO_L09P_4            | IO_L09P_4            | IO_L09P_4            | IO_L09P_4            | IO_L09P_4            | AC20                | I/O  |
| 4    | IO_L10N_4            | IO_L10N_4            | IO_L10N_4            | IO_L10N_4            | IO_L10N_4            | AE20                | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name    | XC3S1500<br>Pin Name    | XC3S2000<br>Pin Name    | XC3S4000<br>Pin Name    | XC3S5000<br>Pin Name    | FG676<br>Pin Number | Type |
|------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------|------|
| 4    | IO_L10P_4               | IO_L10P_4               | IO_L10P_4               | IO_L10P_4               | IO_L10P_4               | AF20                | I/O  |
| 4    | N.C. (◆)                | IO_L11N_4               | IO_L11N_4               | IO_L11N_4               | IO_L11N_4               | Y19                 | I/O  |
| 4    | N.C. (◆)                | IO_L11P_4               | IO_L11P_4               | IO_L11P_4               | IO_L11P_4               | AA19                | I/O  |
| 4    | N.C. (◆)                | IO_L12N_4               | IO_L12N_4               | IO_L12N_4               | IO_L12N_4               | AB19                | I/O  |
| 4    | N.C. (◆)                | IO_L12P_4               | IO_L12P_4               | IO_L12P_4               | IO_L12P_4               | AC19                | I/O  |
| 4    | IO_L15N_4               | IO_L15N_4               | IO_L15N_4               | IO_L15N_4               | IO_L15N_4               | AE19                | I/O  |
| 4    | IO_L15P_4               | IO_L15P_4               | IO_L15P_4               | IO_L15P_4               | IO_L15P_4               | AF19                | I/O  |
| 4    | IO_L16N_4               | IO_L16N_4               | IO_L16N_4               | IO_L16N_4               | IO_L16N_4               | Y18                 | I/O  |
| 4    | IO_L16P_4               | IO_L16P_4               | IO_L16P_4               | IO_L16P_4               | IO_L16P_4               | AA18                | I/O  |
| 4    | N.C. (◆)                | IO_L17N_4               | IO_L17N_4               | IO_L17N_4               | IO_L17N_4               | AB18                | I/O  |
| 4    | N.C. (◆)                | IO_L17P_4               | IO_L17P_4               | IO_L17P_4               | IO_L17P_4               | AC18                | I/O  |
| 4    | N.C. (◆)                | IO_L18N_4               | IO_L18N_4               | IO_L18N_4               | IO_L18N_4               | AD18                | I/O  |
| 4    | N.C. (◆)                | IO_L18P_4               | IO_L18P_4               | IO_L18P_4               | IO_L18P_4               | AE18                | I/O  |
| 4    | IO_L19N_4               | IO_L19N_4               | IO_L19N_4               | IO_L19N_4               | IO_L19N_4               | AC17                | I/O  |
| 4    | IO_L19P_4               | IO_L19P_4               | IO_L19P_4               | IO_L19P_4               | IO_L19P_4               | AA17                | I/O  |
| 4    | IO_L22N_4/VREF_4        | IO_L22N_4/VREF_4        | IO_L22N_4/VREF_4        | IO_L22N_4/VREF_4        | IO_L22N_4/VREF_4        | AD17                | VREF |
| 4    | IO_L22P_4               | IO_L22P_4               | IO_L22P_4               | IO_L22P_4               | IO_L22P_4               | AB17                | I/O  |
| 4    | N.C. (◆)                | IO_L23N_4               | IO_L23N_4               | IO_L23N_4               | IO_L23N_4               | AE17                | I/O  |
| 4    | N.C. (◆)                | IO_L23P_4               | IO_L23P_4               | IO_L23P_4               | IO_L23P_4               | AF17                | I/O  |
| 4    | IO_L24N_4               | IO_L24N_4               | IO_L24N_4               | IO_L24N_4               | IO_L24N_4               | Y16                 | I/O  |
| 4    | IO_L24P_4               | IO_L24P_4               | IO_L24P_4               | IO_L24P_4               | IO_L24P_4               | AA16                | I/O  |
| 4    | IO_L25N_4               | IO_L25N_4               | IO_L25N_4               | IO_L25N_4               | IO_L25N_4               | AB16                | I/O  |
| 4    | IO_L25P_4               | IO_L25P_4               | IO_L25P_4               | IO_L25P_4               | IO_L25P_4               | AC16                | I/O  |
| 4    | N.C. (◆)                | IO_L26N_4               | IO_L26N_4               | IO_L26N_4               | IO_L26N_4               | AE16                | I/O  |
| 4    | N.C. (◆)                | IO_L26P_4/VREF_4        | IO_L26P_4/VREF_4        | IO_L26P_4/VREF_4        | IO_L26P_4/VREF_4        | AF16                | VREF |
| 4    | IO_L27N_4/DIN/D0        | IO_L27N_4/DIN/D0        | IO_L27N_4/DIN/D0        | IO_L27N_4/DIN/D0        | IO_L27N_4/DIN/D0        | Y15                 | DUAL |
| 4    | IO_L27P_4/D1            | IO_L27P_4/D1            | IO_L27P_4/D1            | IO_L27P_4/D1            | IO_L27P_4/D1            | W14                 | DUAL |
| 4    | IO_L28N_4               | IO_L28N_4               | IO_L28N_4               | IO_L28N_4               | IO_L28N_4               | AA15                | I/O  |
| 4    | IO_L28P_4               | IO_L28P_4               | IO_L28P_4               | IO_L28P_4               | IO_L28P_4               | AB15                | I/O  |
| 4    | IO_L29N_4               | IO_L29N_4               | IO_L29N_4               | IO_L29N_4               | IO_L29N_4               | AE15                | I/O  |
| 4    | IO_L29P_4               | IO_L29P_4               | IO_L29P_4               | IO_L29P_4               | IO_L29P_4               | AF15                | I/O  |
| 4    | IO_L30N_4/D2            | IO_L30N_4/D2            | IO_L30N_4/D2            | IO_L30N_4/D2            | IO_L30N_4/D2            | Y14                 | DUAL |
| 4    | IO_L30P_4/D3            | IO_L30P_4/D3            | IO_L30P_4/D3            | IO_L30P_4/D3            | IO_L30P_4/D3            | AA14                | DUAL |
| 4    | IO_L31N_4/INIT_B        | IO_L31N_4/INIT_B        | IO_L31N_4/INIT_B        | IO_L31N_4/INIT_B        | IO_L31N_4/INIT_B        | AC14                | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY | AD14                | DUAL |
| 4    | IO_L32N_4/GCLK1         | IO_L32N_4/GCLK1         | IO_L32N_4/GCLK1         | IO_L32N_4/GCLK1         | IO_L32N_4/GCLK1         | AE14                | GCLK |
| 4    | IO_L32P_4/GCLK0         | IO_L32P_4/GCLK0         | IO_L32P_4/GCLK0         | IO_L32P_4/GCLK0         | IO_L32P_4/GCLK0         | AF14                | GCLK |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | AD16                | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | AD20                | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | U14                 | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | V14                 | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | V15                 | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | V16                 | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | W17                 | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | VCCO_4                  | W18                 | VCCO |
| 5    | IO                      | IO                      | IO                      | IO                      | IO                      | AA7                 | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name   | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|------------------------|---------------------|------|
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | AA13                | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO_L17P_5 <sup>3</sup> | AB9                 | I/O  |
| 5    | N.C. (◆)             | IO                   | IO                   | IO                   | IO_L17N_5 <sup>3</sup> | AC9                 | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | AC11                | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | AD10                | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | AD12                | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | AF4                 | I/O  |
| 5    | IO                   | IO                   | IO                   | IO                   | IO                     | Y8                  | I/O  |
| 5    | IO/VREF_5            | IO/VREF_5            | IO/VREF_5            | IO/VREF_5            | IO/VREF_5              | AF5                 | VREF |
| 5    | IO/VREF_5            | IO/VREF_5            | IO/VREF_5            | IO/VREF_5            | IO/VREF_5              | AF13                | VREF |
| 5    | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B   | AC5                 | DUAL |
| 5    | IO_L01P_5/CS_B       | IO_L01P_5/CS_B       | IO_L01P_5/CS_B       | IO_L01P_5/CS_B       | IO_L01P_5/CS_B         | AB5                 | DUAL |
| 5    | IO_L04N_5            | IO_L04N_5            | IO_L04N_5            | IO_L04N_5            | IO_L04N_5              | AE4                 | I/O  |
| 5    | IO_L04P_5            | IO_L04P_5            | IO_L04P_5            | IO_L04P_5            | IO_L04P_5              | AD4                 | I/O  |
| 5    | IO_L05N_5            | IO_L05N_5            | IO_L05N_5            | IO_L05N_5            | IO_L05N_5              | AB6                 | I/O  |
| 5    | IO_L05P_5            | IO_L05P_5            | IO_L05P_5            | IO_L05P_5            | IO_L05P_5              | AA6                 | I/O  |
| 5    | IO_L06N_5            | IO_L06N_5            | IO_L06N_5            | IO_L06N_5            | IO_L06N_5              | AE5                 | I/O  |
| 5    | IO_L06P_5            | IO_L06P_5            | IO_L06P_5            | IO_L06P_5            | IO_L06P_5              | AD5                 | I/O  |
| 5    | IO_L07N_5            | IO_L07N_5            | IO_L07N_5            | IO_L07N_5            | IO_L07N_5              | AD6                 | I/O  |
| 5    | IO_L07P_5            | IO_L07P_5            | IO_L07P_5            | IO_L07P_5            | IO_L07P_5              | AC6                 | I/O  |
| 5    | IO_L08N_5            | IO_L08N_5            | IO_L08N_5            | IO_L08N_5            | IO_L08N_5              | AF6                 | I/O  |
| 5    | IO_L08P_5            | IO_L08P_5            | IO_L08P_5            | IO_L08P_5            | IO_L08P_5              | AE6                 | I/O  |
| 5    | IO_L09N_5            | IO_L09N_5            | IO_L09N_5            | IO_L09N_5            | IO_L09N_5              | AC7                 | I/O  |
| 5    | IO_L09P_5            | IO_L09P_5            | IO_L09P_5            | IO_L09P_5            | IO_L09P_5              | AB7                 | I/O  |
| 5    | IO_L10N_5/VRP_5      | IO_L10N_5/VRP_5      | IO_L10N_5/VRP_5      | IO_L10N_5/VRP_5      | IO_L10N_5/VRP_5        | AF7                 | DCI  |
| 5    | IO_L10P_5/VRN_5      | IO_L10P_5/VRN_5      | IO_L10P_5/VRN_5      | IO_L10P_5/VRN_5      | IO_L10P_5/VRN_5        | AE7                 | DCI  |
| 5    | N.C. (◆)             | IO_L11N_5/VREF_5     | IO_L11N_5/VREF_5     | IO_L11N_5/VREF_5     | IO_L11N_5/VREF_5       | AB8                 | VREF |
| 5    | N.C. (◆)             | IO_L11P_5            | IO_L11P_5            | IO_L11P_5            | IO_L11P_5              | AA8                 | I/O  |
| 5    | N.C. (◆)             | IO_L12N_5            | IO_L12N_5            | IO_L12N_5            | IO_L12N_5              | AD8                 | I/O  |
| 5    | N.C. (◆)             | IO_L12P_5            | IO_L12P_5            | IO_L12P_5            | IO_L12P_5              | AC8                 | I/O  |
| 5    | IO_L15N_5            | IO_L15N_5            | IO_L15N_5            | IO_L15N_5            | IO_L15N_5              | AF8                 | I/O  |
| 5    | IO_L15P_5            | IO_L15P_5            | IO_L15P_5            | IO_L15P_5            | IO_L15P_5              | AE8                 | I/O  |
| 5    | IO_L16N_5            | IO_L16N_5            | IO_L16N_5            | IO_L16N_5            | IO_L16N_5              | AA9                 | I/O  |
| 5    | IO_L16P_5            | IO_L16P_5            | IO_L16P_5            | IO_L16P_5            | IO_L16P_5              | Y9                  | I/O  |
| 5    | N.C. (◆)             | IO_L18N_5            | IO_L18N_5            | IO_L18N_5            | IO_L18N_5              | AE9                 | I/O  |
| 5    | N.C. (◆)             | IO_L18P_5            | IO_L18P_5            | IO_L18P_5            | IO_L18P_5              | AD9                 | I/O  |
| 5    | IO_L19N_5            | IO_L19N_5            | IO_L19N_5            | IO_L19N_5            | IO_L19N_5              | AA10                | I/O  |
| 5    | IO_L19P_5/VREF_5     | IO_L19P_5/VREF_5     | IO_L19P_5/VREF_5     | IO_L19P_5/VREF_5     | IO_L19P_5/VREF_5       | Y10                 | VREF |
| 5    | IO_L22N_5            | IO_L22N_5            | IO_L22N_5            | IO_L22N_5            | IO_L22N_5              | AC10                | I/O  |
| 5    | IO_L22P_5            | IO_L22P_5            | IO_L22P_5            | IO_L22P_5            | IO_L22P_5              | AB10                | I/O  |
| 5    | N.C. (◆)             | IO_L23N_5            | IO_L23N_5            | IO_L23N_5            | IO_L23N_5              | AF10                | I/O  |
| 5    | N.C. (◆)             | IO_L23P_5            | IO_L23P_5            | IO_L23P_5            | IO_L23P_5              | AE10                | I/O  |
| 5    | IO_L24N_5            | IO_L24N_5            | IO_L24N_5            | IO_L24N_5            | IO_L24N_5              | Y11                 | I/O  |
| 5    | IO_L24P_5            | IO_L24P_5            | IO_L24P_5            | IO_L24P_5            | IO_L24P_5              | W11                 | I/O  |
| 5    | IO_L25N_5            | IO_L25N_5            | IO_L25N_5            | IO_L25N_5            | IO_L25N_5              | AB11                | I/O  |
| 5    | IO_L25P_5            | IO_L25P_5            | IO_L25P_5            | IO_L25P_5            | IO_L25P_5              | AA11                | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 5    | N.C. (◆)             | IO_L26N_5            | IO_L26N_5            | IO_L26N_5            | IO_L26N_5            | AF11                | I/O  |
| 5    | N.C. (◆)             | IO_L26P_5            | IO_L26P_5            | IO_L26P_5            | IO_L26P_5            | AE11                | I/O  |
| 5    | IO_L27N_5/VREF_5     | IO_L27N_5/VREF_5     | IO_L27N_5/VREF_5     | IO_L27N_5/VREF_5     | IO_L27N_5/VREF_5     | Y12                 | VREF |
| 5    | IO_L27P_5            | IO_L27P_5            | IO_L27P_5            | IO_L27P_5            | IO_L27P_5            | W12                 | I/O  |
| 5    | IO_L28N_5/D6         | IO_L28N_5/D6         | IO_L28N_5/D6         | IO_L28N_5/D6         | IO_L28N_5/D6         | AB12                | DUAL |
| 5    | IO_L28P_5/D7         | IO_L28P_5/D7         | IO_L28P_5/D7         | IO_L28P_5/D7         | IO_L28P_5/D7         | AA12                | DUAL |
| 5    | IO_L29N_5            | IO_L29N_5            | IO_L29N_5            | IO_L29N_5            | IO_L29N_5            | AF12                | I/O  |
| 5    | IO_L29P_5/VREF_5     | IO_L29P_5/VREF_5     | IO_L29P_5/VREF_5     | IO_L29P_5/VREF_5     | IO_L29P_5/VREF_5     | AE12                | VREF |
| 5    | IO_L30N_5            | IO_L30N_5            | IO_L30N_5            | IO_L30N_5            | IO_L30N_5            | Y13                 | I/O  |
| 5    | IO_L30P_5            | IO_L30P_5            | IO_L30P_5            | IO_L30P_5            | IO_L30P_5            | W13                 | I/O  |
| 5    | IO_L31N_5/D4         | IO_L31N_5/D4         | IO_L31N_5/D4         | IO_L31N_5/D4         | IO_L31N_5/D4         | AC13                | DUAL |
| 5    | IO_L31P_5/D5         | IO_L31P_5/D5         | IO_L31P_5/D5         | IO_L31P_5/D5         | IO_L31P_5/D5         | AB13                | DUAL |
| 5    | IO_L32N_5/GCLK3      | IO_L32N_5/GCLK3      | IO_L32N_5/GCLK3      | IO_L32N_5/GCLK3      | IO_L32N_5/GCLK3      | AE13                | GCLK |
| 5    | IO_L32P_5/GCLK2      | IO_L32P_5/GCLK2      | IO_L32P_5/GCLK2      | IO_L32P_5/GCLK2      | IO_L32P_5/GCLK2      | AD13                | GCLK |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | AD7                 | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | AD11                | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | U13                 | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | V11                 | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | V12                 | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | V13                 | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | W9                  | VCCO |
| 5    | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | VCCO_5               | W10                 | VCCO |
| 6    | N.C. (◆)             | N.C. (■)             | IO                   | IO                   | IO                   | AA5                 | I/O  |
| 6    | IO_L01N_6/VRP_6      | IO_L01N_6/VRP_6      | IO_L01N_6/VRP_6      | IO_L01N_6/VRP_6      | IO_L01N_6/VRP_6      | AD2                 | DCI  |
| 6    | IO_L01P_6/VRN_6      | IO_L01P_6/VRN_6      | IO_L01P_6/VRN_6      | IO_L01P_6/VRN_6      | IO_L01P_6/VRN_6      | AD1                 | DCI  |
| 6    | IO_L02N_6            | IO_L02N_6            | IO_L02N_6            | IO_L02N_6            | IO_L02N_6            | AB4                 | I/O  |
| 6    | IO_L02P_6            | IO_L02P_6            | IO_L02P_6            | IO_L02P_6            | IO_L02P_6            | AB3                 | I/O  |
| 6    | IO_L03N_6/VREF_6     | IO_L03N_6/VREF_6     | IO_L03N_6/VREF_6     | IO_L03N_6/VREF_6     | IO_L03N_6/VREF_6     | AC2                 | VREF |
| 6    | IO_L03P_6            | IO_L03P_6            | IO_L03P_6            | IO_L03P_6            | IO_L03P_6            | AC1                 | I/O  |
| 6    | N.C. (◆)             | IO_L05N_6            | IO_L05N_6            | IO_L05N_6            | IO_L05N_6            | AB2                 | I/O  |
| 6    | N.C. (◆)             | IO_L05P_6            | IO_L05P_6            | IO_L05P_6            | IO_L05P_6            | AB1                 | I/O  |
| 6    | N.C. (◆)             | IO_L06N_6            | IO_L06N_6            | IO_L06N_6            | IO_L06N_6            | Y7                  | I/O  |
| 6    | N.C. (◆)             | IO_L06P_6            | IO_L06P_6            | IO_L06P_6            | IO_L06P_6            | Y6                  | I/O  |
| 6    | N.C. (◆)             | IO_L07N_6            | IO_L07N_6            | IO_L07N_6            | IO_L07N_6            | AA4                 | I/O  |
| 6    | N.C. (◆)             | IO_L07P_6            | IO_L07P_6            | IO_L07P_6            | IO_L07P_6            | AA3                 | I/O  |
| 6    | N.C. (◆)             | IO_L08N_6            | IO_L08N_6            | IO_L08N_6            | IO_L08N_6            | Y5                  | I/O  |
| 6    | N.C. (◆)             | IO_L08P_6            | IO_L08P_6            | IO_L08P_6            | IO_L08P_6            | Y4                  | I/O  |
| 6    | N.C. (◆)             | IO_L09N_6/VREF_6     | IO_L09N_6/VREF_6     | IO_L09N_6/VREF_6     | IO_L09N_6/VREF_6     | AA2                 | VREF |
| 6    | N.C. (◆)             | IO_L09P_6            | IO_L09P_6            | IO_L09P_6            | IO_L09P_6            | AA1                 | I/O  |
| 6    | N.C. (◆)             | IO_L10N_6            | IO_L10N_6            | IO_L10N_6            | IO_L10N_6            | Y2                  | I/O  |
| 6    | N.C. (◆)             | IO_L10P_6            | IO_L10P_6            | IO_L10P_6            | IO_L10P_6            | Y1                  | I/O  |
| 6    | IO_L14N_6            | IO_L14N_6            | IO_L14N_6            | IO_L14N_6            | IO_L14N_6            | W7                  | I/O  |
| 6    | IO_L14P_6            | IO_L14P_6            | IO_L14P_6            | IO_L14P_6            | IO_L14P_6            | W6                  | I/O  |
| 6    | IO_L16N_6            | IO_L16N_6            | IO_L16N_6            | IO_L16N_6            | IO_L16N_6            | V6                  | I/O  |
| 6    | IO_L16P_6            | IO_L16P_6            | IO_L16P_6            | IO_L16P_6            | IO_L16P_6            | W5                  | I/O  |
| 6    | IO_L17N_6            | IO_L17N_6            | IO_L17N_6            | IO_L17N_6            | IO_L17N_6            | W4                  | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 6    | IO_L17P_6/VREF_6     | IO_L17P_6/VREF_6     | IO_L17P_6/VREF_6     | IO_L17P_6/VREF_6     | IO_L17P_6/VREF_6     | W3                  | VREF |
| 6    | IO_L19N_6            | IO_L19N_6            | IO_L19N_6            | IO_L19N_6            | IO_L19N_6            | W2                  | I/O  |
| 6    | IO_L19P_6            | IO_L19P_6            | IO_L19P_6            | IO_L19P_6            | IO_L19P_6            | W1                  | I/O  |
| 6    | IO_L20N_6            | IO_L20N_6            | IO_L20N_6            | IO_L20N_6            | IO_L20N_6            | V7                  | I/O  |
| 6    | IO_L20P_6            | IO_L20P_6            | IO_L20P_6            | IO_L20P_6            | IO_L20P_6            | U7                  | I/O  |
| 6    | IO_L21N_6            | IO_L21N_6            | IO_L21N_6            | IO_L21N_6            | IO_L21N_6            | V5                  | I/O  |
| 6    | IO_L21P_6            | IO_L21P_6            | IO_L21P_6            | IO_L21P_6            | IO_L21P_6            | V4                  | I/O  |
| 6    | IO_L22N_6            | IO_L22N_6            | IO_L22N_6            | IO_L22N_6            | IO_L22N_6            | V3                  | I/O  |
| 6    | IO_L22P_6            | IO_L22P_6            | IO_L22P_6            | IO_L22P_6            | IO_L22P_6            | V2                  | I/O  |
| 6    | IO_L23N_6            | IO_L23N_6            | IO_L23N_6            | IO_L23N_6            | IO_L23N_6            | U6                  | I/O  |
| 6    | IO_L23P_6            | IO_L23P_6            | IO_L23P_6            | IO_L23P_6            | IO_L23P_6            | U5                  | I/O  |
| 6    | IO_L24N_6/VREF_6     | IO_L24N_6/VREF_6     | IO_L24N_6/VREF_6     | IO_L24N_6/VREF_6     | IO_L24N_6/VREF_6     | U4                  | VREF |
| 6    | IO_L24P_6            | IO_L24P_6            | IO_L24P_6            | IO_L24P_6            | IO_L24P_6            | U3                  | I/O  |
| 6    | IO_L26N_6            | IO_L26N_6            | IO_L26N_6            | IO_L26N_6            | IO_L26N_6            | U2                  | I/O  |
| 6    | IO_L26P_6            | IO_L26P_6            | IO_L26P_6            | IO_L26P_6            | IO_L26P_6            | U1                  | I/O  |
| 6    | IO_L27N_6            | IO_L27N_6            | IO_L27N_6            | IO_L27N_6            | IO_L27N_6            | T8                  | I/O  |
| 6    | IO_L27P_6            | IO_L27P_6            | IO_L27P_6            | IO_L27P_6            | IO_L27P_6            | T7                  | I/O  |
| 6    | IO_L28N_6            | IO_L28N_6            | IO_L28N_6            | IO_L28N_6            | IO_L28N_6            | T6                  | I/O  |
| 6    | IO_L28P_6            | IO_L28P_6            | IO_L28P_6            | IO_L28P_6            | IO_L28P_6            | T5                  | I/O  |
| 6    | IO_L29N_6            | IO_L29N_6            | IO_L29N_6            | IO_L29N_6            | IO_L29N_6            | T2                  | I/O  |
| 6    | IO_L29P_6            | IO_L29P_6            | IO_L29P_6            | IO_L29P_6            | IO_L29P_6            | T1                  | I/O  |
| 6    | IO_L31N_6            | IO_L31N_6            | IO_L31N_6            | IO_L31N_6            | IO_L31N_6            | R8                  | I/O  |
| 6    | IO_L31P_6            | IO_L31P_6            | IO_L31P_6            | IO_L31P_6            | IO_L31P_6            | R7                  | I/O  |
| 6    | IO_L32N_6            | IO_L32N_6            | IO_L32N_6            | IO_L32N_6            | IO_L32N_6            | R6                  | I/O  |
| 6    | IO_L32P_6            | IO_L32P_6            | IO_L32P_6            | IO_L32P_6            | IO_L32P_6            | R5                  | I/O  |
| 6    | IO_L33N_6            | IO_L33N_6            | IO_L33N_6            | IO_L33N_6            | IO_L33N_6            | T4                  | I/O  |
| 6    | IO_L33P_6            | IO_L33P_6            | IO_L33P_6            | IO_L33P_6            | IO_L33P_6            | R3                  | I/O  |
| 6    | IO_L34N_6/VREF_6     | IO_L34N_6/VREF_6     | IO_L34N_6/VREF_6     | IO_L34N_6/VREF_6     | IO_L34N_6/VREF_6     | R2                  | VREF |
| 6    | IO_L34P_6            | IO_L34P_6            | IO_L34P_6            | IO_L34P_6            | IO_L34P_6            | R1                  | I/O  |
| 6    | IO_L35N_6            | IO_L35N_6            | IO_L35N_6            | IO_L35N_6            | IO_L35N_6            | P8                  | I/O  |
| 6    | IO_L35P_6            | IO_L35P_6            | IO_L35P_6            | IO_L35P_6            | IO_L35P_6            | P7                  | I/O  |
| 6    | IO_L38N_6            | IO_L38N_6            | IO_L38N_6            | IO_L38N_6            | IO_L38N_6            | P6                  | I/O  |
| 6    | IO_L38P_6            | IO_L38P_6            | IO_L38P_6            | IO_L38P_6            | IO_L38P_6            | P5                  | I/O  |
| 6    | IO_L39N_6            | IO_L39N_6            | IO_L39N_6            | IO_L39N_6            | IO_L39N_6            | P4                  | I/O  |
| 6    | IO_L39P_6            | IO_L39P_6            | IO_L39P_6            | IO_L39P_6            | IO_L39P_6            | P3                  | I/O  |
| 6    | IO_L40N_6            | IO_L40N_6            | IO_L40N_6            | IO_L40N_6            | IO_L40N_6            | P2                  | I/O  |
| 6    | IO_L40P_6/VREF_6     | IO_L40P_6/VREF_6     | IO_L40P_6/VREF_6     | IO_L40P_6/VREF_6     | IO_L40P_6/VREF_6     | P1                  | VREF |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | P9                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | P10                 | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | R9                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | T3                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | T9                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | U8                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | V8                  | VCCO |
| 6    | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | VCCO_6               | Y3                  | VCCO |
| 7    | IO_L01N_7/VRP_7      | IO_L01N_7/VRP_7      | IO_L01N_7/VRP_7      | IO_L01N_7/VRP_7      | IO_L01N_7/VRP_7      | F5                  | DCI  |



Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 7    | IO_L01P_7/VRN_7      | IO_L01P_7/VRN_7      | IO_L01P_7/VRN_7      | IO_L01P_7/VRN_7      | IO_L01P_7/VRN_7      | F6                  | DCI  |
| 7    | IO_L02N_7            | IO_L02N_7            | IO_L02N_7            | IO_L02N_7            | IO_L02N_7            | E3                  | I/O  |
| 7    | IO_L02P_7            | IO_L02P_7            | IO_L02P_7            | IO_L02P_7            | IO_L02P_7            | E4                  | I/O  |
| 7    | IO_L03N_7/VREF_7     | IO_L03N_7/VREF_7     | IO_L03N_7/VREF_7     | IO_L03N_7/VREF_7     | IO_L03N_7/VREF_7     | D1                  | VREF |
| 7    | IO_L03P_7            | IO_L03P_7            | IO_L03P_7            | IO_L03P_7            | IO_L03P_7            | D2                  | I/O  |
| 7    | N.C. (◆)             | IO_L05N_7            | IO_L05N_7            | IO_L05N_7            | IO_L05N_7            | G6                  | I/O  |
| 7    | N.C. (◆)             | IO_L05P_7            | IO_L05P_7            | IO_L05P_7            | IO_L05P_7            | G7                  | I/O  |
| 7    | N.C. (◆)             | IO_L06N_7            | IO_L06N_7            | IO_L06N_7            | IO_L06N_7            | E1                  | I/O  |
| 7    | N.C. (◆)             | IO_L06P_7            | IO_L06P_7            | IO_L06P_7            | IO_L06P_7            | E2                  | I/O  |
| 7    | N.C. (◆)             | IO_L07N_7            | IO_L07N_7            | IO_L07N_7            | IO_L07N_7            | F3                  | I/O  |
| 7    | N.C. (◆)             | IO_L07P_7            | IO_L07P_7            | IO_L07P_7            | IO_L07P_7            | F4                  | I/O  |
| 7    | N.C. (◆)             | IO_L08N_7            | IO_L08N_7            | IO_L08N_7            | IO_L08N_7            | G4                  | I/O  |
| 7    | N.C. (◆)             | IO_L08P_7            | IO_L08P_7            | IO_L08P_7            | IO_L08P_7            | G5                  | I/O  |
| 7    | N.C. (◆)             | IO_L09N_7            | IO_L09N_7            | IO_L09N_7            | IO_L09N_7            | F1                  | I/O  |
| 7    | N.C. (◆)             | IO_L09P_7            | IO_L09P_7            | IO_L09P_7            | IO_L09P_7            | F2                  | I/O  |
| 7    | N.C. (◆)             | IO_L10N_7            | IO_L10N_7            | IO_L10N_7            | IO_L10N_7            | H6                  | I/O  |
| 7    | N.C. (◆)             | IO_L10P_7/VREF_7     | IO_L10P_7/VREF_7     | IO_L10P_7/VREF_7     | IO_L10P_7/VREF_7     | H7                  | VREF |
| 7    | IO_L14N_7            | IO_L14N_7            | IO_L14N_7            | IO_L14N_7            | IO_L14N_7            | G1                  | I/O  |
| 7    | IO_L14P_7            | IO_L14P_7            | IO_L14P_7            | IO_L14P_7            | IO_L14P_7            | G2                  | I/O  |
| 7    | IO_L16N_7            | IO_L16N_7            | IO_L16N_7            | IO_L16N_7            | IO_L16N_7            | J6                  | I/O  |
| 7    | IO_L16P_7/VREF_7     | IO_L16P_7/VREF_7     | IO_L16P_7/VREF_7     | IO_L16P_7/VREF_7     | IO_L16P_7/VREF_7     | H5                  | VREF |
| 7    | IO_L17N_7            | IO_L17N_7            | IO_L17N_7            | IO_L17N_7            | IO_L17N_7            | H3                  | I/O  |
| 7    | IO_L17P_7            | IO_L17P_7            | IO_L17P_7            | IO_L17P_7            | IO_L17P_7            | H4                  | I/O  |
| 7    | IO_L19N_7/VREF_7     | IO_L19N_7/VREF_7     | IO_L19N_7/VREF_7     | IO_L19N_7/VREF_7     | IO_L19N_7/VREF_7     | H1                  | VREF |
| 7    | IO_L19P_7            | IO_L19P_7            | IO_L19P_7            | IO_L19P_7            | IO_L19P_7            | H2                  | I/O  |
| 7    | IO_L20N_7            | IO_L20N_7            | IO_L20N_7            | IO_L20N_7            | IO_L20N_7            | K7                  | I/O  |
| 7    | IO_L20P_7            | IO_L20P_7            | IO_L20P_7            | IO_L20P_7            | IO_L20P_7            | J7                  | I/O  |
| 7    | IO_L21N_7            | IO_L21N_7            | IO_L21N_7            | IO_L21N_7            | IO_L21N_7            | J4                  | I/O  |
| 7    | IO_L21P_7            | IO_L21P_7            | IO_L21P_7            | IO_L21P_7            | IO_L21P_7            | J5                  | I/O  |
| 7    | IO_L22N_7            | IO_L22N_7            | IO_L22N_7            | IO_L22N_7            | IO_L22N_7            | J2                  | I/O  |
| 7    | IO_L22P_7            | IO_L22P_7            | IO_L22P_7            | IO_L22P_7            | IO_L22P_7            | J3                  | I/O  |
| 7    | IO_L23N_7            | IO_L23N_7            | IO_L23N_7            | IO_L23N_7            | IO_L23N_7            | K5                  | I/O  |
| 7    | IO_L23P_7            | IO_L23P_7            | IO_L23P_7            | IO_L23P_7            | IO_L23P_7            | K6                  | I/O  |
| 7    | IO_L24N_7            | IO_L24N_7            | IO_L24N_7            | IO_L24N_7            | IO_L24N_7            | K3                  | I/O  |
| 7    | IO_L24P_7            | IO_L24P_7            | IO_L24P_7            | IO_L24P_7            | IO_L24P_7            | K4                  | I/O  |
| 7    | IO_L26N_7            | IO_L26N_7            | IO_L26N_7            | IO_L26N_7            | IO_L26N_7            | K1                  | I/O  |
| 7    | IO_L26P_7            | IO_L26P_7            | IO_L26P_7            | IO_L26P_7            | IO_L26P_7            | K2                  | I/O  |
| 7    | IO_L27N_7            | IO_L27N_7            | IO_L27N_7            | IO_L27N_7            | IO_L27N_7            | L7                  | I/O  |
| 7    | IO_L27P_7/VREF_7     | IO_L27P_7/VREF_7     | IO_L27P_7/VREF_7     | IO_L27P_7/VREF_7     | IO_L27P_7/VREF_7     | L8                  | VREF |
| 7    | IO_L28N_7            | IO_L28N_7            | IO_L28N_7            | IO_L28N_7            | IO_L28N_7            | L5                  | I/O  |
| 7    | IO_L28P_7            | IO_L28P_7            | IO_L28P_7            | IO_L28P_7            | IO_L28P_7            | L6                  | I/O  |
| 7    | IO_L29N_7            | IO_L29N_7            | IO_L29N_7            | IO_L29N_7            | IO_L29N_7            | L1                  | I/O  |
| 7    | IO_L29P_7            | IO_L29P_7            | IO_L29P_7            | IO_L29P_7            | IO_L29P_7            | L2                  | I/O  |
| 7    | IO_L31N_7            | IO_L31N_7            | IO_L31N_7            | IO_L31N_7            | IO_L31N_7            | M7                  | I/O  |
| 7    | IO_L31P_7            | IO_L31P_7            | IO_L31P_7            | IO_L31P_7            | IO_L31P_7            | M8                  | I/O  |
| 7    | IO_L32N_7            | IO_L32N_7            | IO_L32N_7            | IO_L32N_7            | IO_L32N_7            | M6                  | I/O  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| 7    | IO_L32P_7            | IO_L32P_7            | IO_L32P_7            | IO_L32P_7            | IO_L32P_7            | M5                  | I/O  |
| 7    | IO_L33N_7            | IO_L33N_7            | IO_L33N_7            | IO_L33N_7            | IO_L33N_7            | M3                  | I/O  |
| 7    | IO_L33P_7            | IO_L33P_7            | IO_L33P_7            | IO_L33P_7            | IO_L33P_7            | L4                  | I/O  |
| 7    | IO_L34N_7            | IO_L34N_7            | IO_L34N_7            | IO_L34N_7            | IO_L34N_7            | M1                  | I/O  |
| 7    | IO_L34P_7            | IO_L34P_7            | IO_L34P_7            | IO_L34P_7            | IO_L34P_7            | M2                  | I/O  |
| 7    | IO_L35N_7            | IO_L35N_7            | IO_L35N_7            | IO_L35N_7            | IO_L35N_7            | N7                  | I/O  |
| 7    | IO_L35P_7            | IO_L35P_7            | IO_L35P_7            | IO_L35P_7            | IO_L35P_7            | N8                  | I/O  |
| 7    | IO_L38N_7            | IO_L38N_7            | IO_L38N_7            | IO_L38N_7            | IO_L38N_7            | N5                  | I/O  |
| 7    | IO_L38P_7            | IO_L38P_7            | IO_L38P_7            | IO_L38P_7            | IO_L38P_7            | N6                  | I/O  |
| 7    | IO_L39N_7            | IO_L39N_7            | IO_L39N_7            | IO_L39N_7            | IO_L39N_7            | N3                  | I/O  |
| 7    | IO_L39P_7            | IO_L39P_7            | IO_L39P_7            | IO_L39P_7            | IO_L39P_7            | N4                  | I/O  |
| 7    | IO_L40N_7/VREF_7     | IO_L40N_7/VREF_7     | IO_L40N_7/VREF_7     | IO_L40N_7/VREF_7     | IO_L40N_7/VREF_7     | N1                  | VREF |
| 7    | IO_L40P_7            | IO_L40P_7            | IO_L40P_7            | IO_L40P_7            | IO_L40P_7            | N2                  | I/O  |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | G3                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | J8                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | K8                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | L3                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | L9                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | M9                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | N9                  | VCCO |
| 7    | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | VCCO_7               | N10                 | VCCO |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | A1                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | A26                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AC4                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AC12                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AC15                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AC23                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AD3                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AD24                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AE2                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AE25                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AF1                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | AF26                | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | B2                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | B25                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | C3                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | C24                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | D4                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | D12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | D15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | D23                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | K11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | K12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | K15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | K16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L10                 | GND  |

Table 102: FG676 Package Pinout (Continued)

| Bank | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type |
|------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------|
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | L17                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M4                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M10                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M17                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | M23                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | N16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | P16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R4                  | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R10                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R16                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R17                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | R23                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T10                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T11                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T12                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T13                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T14                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T15                 | GND  |
| N/A  | GND                  | GND                  | GND                  | GND                  | GND                  | T16                 | GND  |

Table 102: FG676 Package Pinout (Continued)

| Bank       | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type   |
|------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|--------|
| N/A        | GND                  | GND                  | GND                  | GND                  | GND                  | T17                 | GND    |
| N/A        | GND                  | GND                  | GND                  | GND                  | GND                  | U11                 | GND    |
| N/A        | GND                  | GND                  | GND                  | GND                  | GND                  | U12                 | GND    |
| N/A        | GND                  | GND                  | GND                  | GND                  | GND                  | U15                 | GND    |
| N/A        | GND                  | GND                  | GND                  | GND                  | GND                  | U16                 | GND    |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | A2                  | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | A9                  | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | A18                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | A25                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AE1                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AE26                | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AF2                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AF9                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AF18                | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | AF25                | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | B1                  | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | B26                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | J1                  | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | J26                 | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | V1                  | VCCAUX |
| N/A        | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | VCCAUX               | V26                 | VCCAUX |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | H8                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | H19                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | J9                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | J10                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | J17                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | J18                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | K9                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | K10                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | K17                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | K18                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | U9                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | U10                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | U17                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | U18                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | V9                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | V10                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | V17                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | V18                 | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | W8                  | VCCINT |
| N/A        | VCCINT               | VCCINT               | VCCINT               | VCCINT               | VCCINT               | W19                 | VCCINT |
| VCC<br>AUX | CCLK                 | CCLK                 | CCLK                 | CCLK                 | CCLK                 | AD26                | CONFIG |
| VCC<br>AUX | DONE                 | DONE                 | DONE                 | DONE                 | DONE                 | AC24                | CONFIG |
| VCC<br>AUX | HSWAP_EN             | HSWAP_EN             | HSWAP_EN             | HSWAP_EN             | HSWAP_EN             | C2                  | CONFIG |

Table 102: FG676 Package Pinout (Continued)

| Bank       | XC3S1000<br>Pin Name | XC3S1500<br>Pin Name | XC3S2000<br>Pin Name | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG676<br>Pin Number | Type   |
|------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|--------|
| VCC<br>AUX | M0                   | M0                   | M0                   | M0                   | M0                   | AE3                 | CONFIG |
| VCC<br>AUX | M1                   | M1                   | M1                   | M1                   | M1                   | AC3                 | CONFIG |
| VCC<br>AUX | M2                   | M2                   | M2                   | M2                   | M2                   | AF3                 | CONFIG |
| VCC<br>AUX | PROG_B               | PROG_B               | PROG_B               | PROG_B               | PROG_B               | D3                  | CONFIG |
| VCC<br>AUX | TCK                  | TCK                  | TCK                  | TCK                  | TCK                  | B24                 | JTAG   |
| VCC<br>AUX | TDI                  | TDI                  | TDI                  | TDI                  | TDI                  | C1                  | JTAG   |
| VCC<br>AUX | TDO                  | TDO                  | TDO                  | TDO                  | TDO                  | D24                 | JTAG   |
| VCC<br>AUX | TMS                  | TMS                  | TMS                  | TMS                  | TMS                  | A24                 | JTAG   |

**Notes:**

- XC3S1500 balls D25 and F25 are not VREF pins although they are designated as such. If a design uses an IOSTANDARD requiring VREF in bank 2 then apply the workaround in [Answer Record 20519](#).
- XC3S4000 is pin compatible with XC3S2000 but uses alternate differential pair labeling on six package balls (H20, H21, H22, H23, H24, J21).
- XC3S5000 is pin compatible with XC3S4000 but uses alternate differential pair functionality on fifteen package balls (A3, A8, B8, B18, C4, C8, C18, D8, D18, E8, E18, H23, H24, AB9, and AC9).

## User I/Os by Bank

**Table 103** indicates how the available user-I/O pins are distributed between the eight I/O banks for the XC3S1000 in the FG676 package. Similarly, **Table 104** shows how the

available user-I/O pins are distributed between the eight I/O banks for the XC3S1500 in the FG676 package. Finally, **Table 105** shows the same information for the XC3S2000, XC3S4000, and XC3S5000 in the FG676 package.

Table 103: User I/Os Per Bank for XC3S1000 in FG676 Package

| Edge   | I/O<br>Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|-------------|----------------|-------------------------------|------|-----|------|------|
|        |             |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0           | 49             | 40                            | 0    | 2   | 5    | 2    |
|        | 1           | 50             | 41                            | 0    | 2   | 5    | 2    |
| Right  | 2           | 48             | 41                            | 0    | 2   | 5    | 0    |
|        | 3           | 48             | 41                            | 0    | 2   | 5    | 0    |
| Bottom | 4           | 50             | 35                            | 6    | 2   | 5    | 2    |
|        | 5           | 50             | 35                            | 6    | 2   | 5    | 2    |
| Left   | 6           | 48             | 41                            | 0    | 2   | 5    | 0    |
|        | 7           | 48             | 41                            | 0    | 2   | 5    | 0    |

Table 104: User I/Os Per Bank for XC3S1500 in FG676 Package

| Edge   | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|----------|-------------|-------------------------------|------|-----|------|------|
|        |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0        | 62          | 52                            | 0    | 2   | 6    | 2    |
|        | 1        | 61          | 51                            | 0    | 2   | 6    | 2    |
| Right  | 2        | 60          | 52                            | 0    | 2   | 6    | 0    |
|        | 3        | 60          | 52                            | 0    | 2   | 6    | 0    |
| Bottom | 4        | 63          | 47                            | 6    | 2   | 6    | 2    |
|        | 5        | 61          | 45                            | 6    | 2   | 6    | 2    |
| Left   | 6        | 60          | 52                            | 0    | 2   | 6    | 0    |
|        | 7        | 60          | 52                            | 0    | 2   | 6    | 0    |

Table 105: User I/Os Per Bank for XC3S2000, XC3S4000, and XC3S5000 in FG676 Package

| Edge   | I/O Bank | Maximum I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|----------|-------------|-------------------------------|------|-----|------|------|
|        |          |             | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0        | 62          | 52                            | 0    | 2   | 6    | 2    |
|        | 1        | 61          | 51                            | 0    | 2   | 6    | 2    |
| Right  | 2        | 61          | 53                            | 0    | 2   | 6    | 0    |
|        | 3        | 60          | 52                            | 0    | 2   | 6    | 0    |
| Bottom | 4        | 63          | 47                            | 6    | 2   | 6    | 2    |
|        | 5        | 61          | 45                            | 6    | 2   | 6    | 2    |
| Left   | 6        | 61          | 53                            | 0    | 2   | 6    | 0    |
|        | 7        | 60          | 52                            | 0    | 2   | 6    | 0    |





## FG676 Footprint

### Left Half of Package (top view)

#### XC3S1000

(391 max. user I/O)

**315** I/O: Unrestricted,  
general-purpose user I/O

**40** VREF: User I/O or input  
voltage reference for bank

**98** N.C.: Unconnected pins for  
XC3S1000 (◆)

#### XC3S1500

(487 max user I/O)

**403** I/O: Unrestricted,  
general-purpose user I/O

**48** VREF: User I/O or input  
voltage reference for bank

**2** N.C.: Unconnected pins for  
XC3S1500 (■)

#### XC3S2000, XC3S4000, XC3S5000

(489 max user I/O)

**405** I/O: Unrestricted,  
general-purpose user I/O

**48** VREF: User I/O or input  
voltage reference for bank

**0** N.C.: No unconnected pins

#### All devices

**12** DUAL: Configuration pin,  
then possible user I/O

**8** GCLK: User I/O or global  
clock buffer input

**16** DCI: User I/O or reference  
resistor input for bank

**7** CONFIG: Dedicated  
configuration pins

**4** JTAG: Dedicated JTAG  
port pins

**20** VCCINT: Internal core  
voltage supply (+1.2V)

**64** VCCO: Output voltage  
supply for bank

**16** VCCAUX: Auxiliary voltage  
supply (+2.5V)

**76** GND: Ground

| Bank 0 |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|--------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1      | 2                    | 3                    | 4                    | 5                    | 6                    | 7                    | 8                    | 9                    | 10                   | 11                   | 12                   | 13                   |
| A      | GND                  | VCCAUX               | I/O L05P_0<br>VREF_0 | I/O                  | I/O                  | I/O L10P_0<br>L15P_0 | VCCAUX               | I/O L26P_0<br>VREF_0 | I/O L23P_0<br>L29P_0 | I/O L29P_0           | I/O L32P_0<br>GCLK6  | I/O L32P_0<br>GCLK6  |
| B      | VCCAUX               | GND                  | I/O VREF_0           | I/O L05N_0           | I/O L06P_0           | I/O L08P_0           | I/O L10N_0           | I/O L15N_0           | I/O L18P_0<br>L23N_0 | I/O L26N_0           | I/O L29N_0           | I/O L32N_0<br>GCLK7  |
| C      | TDI                  | HSWAP<br>EN          | GND                  | I/O                  | I/O L06N_0           | I/O L08N_0           | VCCO_0               | I/O L18N_0<br>L22P_0 | VCCO_0               | I/O                  | I/O L31P_0<br>VREF_0 | I/O L31P_0<br>VREF_0 |
| D      | I/O L03N_7<br>VREF_7 | I/O L03P_7           | PROG_B               | GND                  | I/O L01P_0<br>VRP_0  | I/O L07P_0           | I/O L09P_0           | I/O L12P_0<br>L17P_0 | I/O L17P_0           | I/O L22N_0           | I/O L25P_0           | GND                  |
| E      | I/O L06N_7           | I/O L06P_7           | I/O L02N_7           | I/O L02P_7           | I/O L01N_0<br>VRP_0  | I/O L07N_0           | I/O L09N_0           | I/O L12N_0           | I/O L17N_0           | I/O L19P_0           | I/O L25N_0           | I/O L28P_0           |
| F      | I/O L09N_7           | I/O L09P_7           | I/O L07N_7           | I/O L07P_7           | I/O L01N_7<br>VRP_7  | I/O L01P_7<br>VRN_7  | I/O VREF_0           | I/O L11P_0           | I/O L16P_0           | I/O L19N_0           | I/O L24P_0           | I/O L28N_0           |
| G      | I/O L14N_7           | I/O L14P_7           | VCCO_7               | I/O L08N_7           | I/O L08P_7           | I/O L05N_7           | I/O L05P_7           | I/O L11N_0           | I/O L16N_0           | I/O VREF_0           | I/O L24N_0           | I/O L27N_0           |
| H      | I/O L19N_7<br>VREF_7 | I/O L19P_7           | I/O L17N_7           | I/O L17P_7           | I/O L16P_7<br>VREF_7 | I/O L10N_7           | I/O L10P_7<br>VREF_7 | VCCINT               | VCCO_0               | VCCO_0               | I/O                  | I/O L27P_0           |
| J      | VCCAUX               | I/O L22N_7           | I/O L22P_7           | I/O L21N_7           | I/O L21P_7           | I/O L16N_7           | I/O L20P_7           | VCCO_7               | VCCINT               | VCCINT               | VCCO_0               | VCCO_0               |
| K      | I/O L26N_7           | I/O L26P_7           | I/O L24N_7           | I/O L24P_7           | I/O L23N_7           | I/O L23P_7           | I/O L20N_7           | VCCO_7               | VCCINT               | VCCINT               | GND                  | GND                  |
| L      | I/O L29N_7           | I/O L29P_7           | VCCO_7               | I/O L33P_7           | I/O L28N_7           | I/O L28P_7           | I/O L27N_7           | I/O L27P_7<br>VREF_7 | VCCO_7               | GND                  | GND                  | GND                  |
| M      | I/O L34N_7           | I/O L34P_7           | I/O L33N_7           | GND                  | I/O L32P_7           | I/O L32N_7           | I/O L31N_7           | I/O L31P_7           | VCCO_7               | GND                  | GND                  | GND                  |
| N      | I/O L40N_7<br>VREF_7 | I/O L40P_7           | I/O L39N_7           | I/O L39P_7           | I/O L38N_7           | I/O L38P_7           | I/O L35N_7           | I/O L35P_7           | VCCO_7               | VCCO_7               | GND                  | GND                  |
| P      | I/O L40P_6<br>VREF_6 | I/O L40N_6           | I/O L39P_6           | I/O L39N_6           | I/O L38P_6           | I/O L38N_6           | I/O L35P_6           | I/O L35N_6           | VCCO_6               | VCCO_6               | GND                  | GND                  |
| R      | I/O L34P_6           | I/O L34N_6           | I/O L33P_6           | GND                  | I/O L32P_6           | I/O L32N_6           | I/O L31P_6           | I/O L31N_6           | VCCO_6               | GND                  | GND                  | GND                  |
| T      | I/O L29P_6           | I/O L29N_6           | VCCO_6               | I/O L33N_6           | I/O L28P_6           | I/O L28N_6           | I/O L27P_6           | I/O L27N_6           | VCCO_6               | GND                  | GND                  | GND                  |
| U      | I/O L26P_6           | I/O L26N_6           | I/O L24P_6           | I/O L24N_6<br>VREF_6 | I/O L23P_6           | I/O L23N_6           | I/O L20P_6           | VCCO_6               | VCCINT               | VCCINT               | GND                  | GND                  |
| V      | VCCAUX               | I/O L22P_6           | I/O L22N_6           | I/O L21P_6           | I/O L21N_6           | I/O L16N_6           | I/O L20N_6           | VCCO_6               | VCCINT               | VCCINT               | VCCO_5               | VCCO_5               |
| W      | I/O L19P_6           | I/O L19N_6           | I/O L17P_6<br>VREF_6 | I/O L17N_6           | I/O L16P_6           | I/O L14P_6           | I/O L14N_6           | VCCINT               | VCCO_5               | VCCO_5               | I/O L24P_5           | I/O L27P_5           |
| Y      | I/O L10P_6           | I/O L10N_6           | VCCO_6               | I/O L08P_6           | I/O L08N_6           | I/O L06P_6           | I/O L06N_6           | I/O                  | I/O L16P_5           | I/O L19P_5<br>VREF_5 | I/O L24N_5           | I/O L27N_5<br>VREF_5 |
| A      | I/O L09P_6           | I/O L09N_6<br>VREF_6 | I/O L07P_6           | I/O L07N_6           | I/O                  | I/O L05P_5           | I/O                  | I/O L11P_5           | I/O L16N_5           | I/O L19N_5           | I/O L25P_5           | I/O L28P_5<br>D7     |
| A      | I/O L05P_6           | I/O L05N_6           | I/O L02P_6           | I/O L02N_6           | I/O L01P_5<br>CS_B   | I/O L05N_5           | I/O L09P_5           | I/O L11N_5<br>VREF_5 | I/O                  | I/O L22P_5           | I/O L25N_5           | I/O L28N_5<br>D6     |
| A      | I/O L03P_6           | I/O L03N_6<br>VREF_6 | M1                   | GND                  | I/O L01N_5<br>RDWR_B | I/O L07P_5           | I/O L09N_5           | I/O L12P_5           | I/O                  | I/O L22N_5           | I/O                  | GND                  |
| A      | I/O L01P_6<br>VRN_6  | I/O L01N_6<br>VRP_6  | GND                  | I/O L04P_5           | I/O L06P_5           | I/O L07N_5           | VCCO_5               | I/O L12N_5           | I/O L18P_5           | I/O                  | VCCO_5               | I/O L32P_5<br>GCLK2  |
| A      | VCCAUX               | GND                  | M0                   | I/O L04N_5           | I/O L06N_5           | I/O L08P_5           | I/O L10P_5<br>VRN_5  | I/O L15P_5           | I/O L18N_5           | I/O L23P_5           | I/O L26P_5<br>VREF_5 | I/O L29P_5<br>GCLK3  |
| A      | GND                  | VCCAUX               | M2                   | I/O                  | I/O VREF_5           | I/O L08N_5           | I/O L10N_5<br>VRP_5  | I/O L15N_5           | VCCAUX               | I/O L23N_5           | I/O L26N_5           | I/O L29N_5<br>VREF_5 |

Bank 5

DS099-4\_12a\_030203

Figure 49: FG676 Package Footprint (top view)

| Bank 1                        |                            |                              |                         |                    |                    |                           |                           |                           |                           |                                     |                         |                         |                      |  |  |
|-------------------------------|----------------------------|------------------------------|-------------------------|--------------------|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|-------------------------------------|-------------------------|-------------------------|----------------------|--|--|
| 14                            | 15                         | 16                           | 17                      | 18                 | 19                 | 20                        | 21                        | 22                        | 23                        | 24                                  | 25                      | 26                      |                      |  |  |
| I/O<br>L29N_1                 | I/O<br>L29P_1              | I/O<br>L26N_1<br>◆           | I/O<br>L23N_1<br>◆      | VCCAUX             | I/O<br>L15N_1      | I/O<br>L10N_1<br>VREF_1   | I/O<br>L08N_1             | I/O                       | I/O                       | TMS                                 | VCCAUX                  | GND                     | A                    |  |  |
| I/O<br>L32N_1<br>GCLK5        | I/O<br>L29P_1              | I/O<br>L26P_1<br>◆           | I/O<br>L23P_1<br>◆      | I/O<br>L18N_1<br>◆ | I/O<br>L15P_1      | I/O<br>L10P_1             | I/O<br>L08P_1             | I/O<br>L06N_1<br>VREF_1   | I/O<br>L04N_1             | TCK                                 | GND                     | VCCAUX                  | B                    |  |  |
| I/O<br>L32P_1<br>GCLK4        | I/O<br>VREF_1              | VCCO_1                       | I/O<br>VREF_1           | I/O<br>L18P_1<br>◆ | I/O<br>L12N_1<br>◆ | VCCO_1                    | I/O<br>L07N_1             | I/O<br>L06P_1             | I/O<br>L04P_1             | GND                                 | I/O<br>L01N_2<br>VRP_2  | I/O<br>L01P_2<br>VRN_2  | C                    |  |  |
| I/O<br>L31N_1<br>VREF_1       | GND                        | I/O                          | I/O<br>L22N_1           | I/O<br>VREF_1<br>◆ | I/O<br>L12P_1<br>◆ | I/O<br>L09N_1             | I/O<br>L07P_1             | I/O<br>L01N_1<br>VRP_1    | GND                       | TDO                                 | I/O<br>L03N_2<br>VREF_2 | I/O<br>L03P_2           | D                    |  |  |
| I/O<br>L31P_1                 | I/O<br>L28N_1              | I/O<br>L25N_1                | I/O<br>L22P_1           | I/O                | I/O<br>L11N_1<br>◆ | I/O<br>L09P_1             | I/O<br>L05N_1             | I/O<br>L01P_1<br>VRN_1    | I/O<br>L02N_2             | I/O<br>L02P_2                       | I/O<br>L05N_2<br>◆      | I/O<br>L05P_2<br>◆      | E                    |  |  |
| I/O                           | I/O<br>L28P_1              | I/O<br>L25P_1                | I/O<br>L19N_1           | I/O<br>L16N_1      | I/O<br>L11P_1<br>◆ | I/O                       | I/O<br>L05P_1             | I/O<br>◆<br>◆             | I/O<br>L07N_2<br>◆        | I/O<br>L07P_2<br>◆                  | I/O<br>L09N_2<br>VREF_2 | I/O<br>L09P_2<br>◆      | F                    |  |  |
| I/O<br>L30N_1                 | I/O<br>L27N_1              | I/O<br>L24N_1                | I/O<br>L19P_1           | I/O<br>L16P_1      | I/O                | I/O<br>L06N_2<br>◆        | I/O<br>L06P_2             | I/O<br>L08N_2<br>◆        | I/O<br>L08P_2<br>◆        | VCCO_2                              | I/O<br>L10N_2<br>◆      | I/O<br>L10P_2<br>◆      | G                    |  |  |
| I/O<br>L30P_1                 | I/O<br>L27P_1              | I/O<br>L24P_1                | VCCO_1                  | VCCO_1             | VCCINT             | I/O<br>L14N_2<br>(L11N_2) | I/O<br>L14P_2<br>(L11P_2) | I/O<br>L16N_2<br>(L12N_2) | I/O<br>L17N_2<br>(L13N_2) | I/O<br>L17P_2<br>(L13P_2)<br>VREF_2 | I/O<br>L19N_2           | I/O<br>L19P_2           | H                    |  |  |
| VCCO_1                        | VCCO_1                     | VCCO_1                       | VCCINT                  | VCCINT             | VCCO_2             | I/O<br>L20N_2             | I/O<br>L16P_2<br>(L12P_2) | I/O<br>L21N_2             | I/O<br>L21P_2             | I/O<br>L22N_2                       | I/O<br>L22P_2           | VCCAUX                  | J                    |  |  |
| VCCO_1                        | GND                        | GND                          | VCCINT                  | VCCINT             | VCCO_2             | I/O<br>L20P_2             | I/O<br>L23N_2<br>VREF_2   | I/O<br>L23P_2             | I/O<br>L24N_2             | I/O<br>L24P_2                       | I/O<br>L26N_2           | I/O<br>L26P_2           | K                    |  |  |
| GND                           | GND                        | GND                          | GND                     | VCCO_2             | I/O<br>L27N_2      | I/O<br>L27P_2             | I/O<br>L28N_2             | I/O<br>L28P_2             | I/O<br>L33N_2             | VCCO_2                              | I/O<br>L29N_2           | I/O<br>L29P_2           | L                    |  |  |
| GND                           | GND                        | GND                          | GND                     | VCCO_2             | I/O<br>L31N_2      | I/O<br>L31P_2             | I/O<br>L32N_2             | I/O<br>L32P_2             | GND                       | I/O<br>L33P_2                       | I/O<br>L34N_2<br>VREF_2 | I/O<br>L34P_2           | M                    |  |  |
| GND                           | GND                        | GND                          | VCCO_2                  | VCCO_2             | I/O<br>L35N_2      | I/O<br>L35P_2             | I/O<br>L38N_2             | I/O<br>L38P_2             | I/O<br>L39N_2             | I/O<br>L39P_2                       | I/O<br>L40N_2           | I/O<br>L40P_2<br>VREF_2 | N                    |  |  |
| GND                           | GND                        | GND                          | VCCO_3                  | VCCO_3             | I/O<br>L35P_3      | I/O<br>L35N_3             | I/O<br>L38P_3             | I/O<br>L38N_3             | I/O<br>L39P_3             | I/O<br>L39N_3                       | I/O<br>L40P_3           | I/O<br>L40N_3<br>VREF_3 | P                    |  |  |
| GND                           | GND                        | GND                          | GND                     | VCCO_3             | I/O<br>L31P_3      | I/O<br>L31N_3             | I/O<br>L32P_3             | I/O<br>L32N_3             | GND                       | I/O<br>L33N_3                       | I/O<br>L34P_3<br>VREF_3 | I/O<br>L34N_3           | R                    |  |  |
| GND                           | GND                        | GND                          | GND                     | VCCO_3             | I/O<br>L27P_3      | I/O<br>L27N_3             | I/O<br>L28P_3             | I/O<br>L28N_3             | I/O<br>L33P_3             | VCCO_3                              | I/O<br>L29P_3           | I/O<br>L29N_3           | T                    |  |  |
| VCCO_4                        | GND                        | GND                          | VCCINT                  | VCCINT             | VCCO_3             | I/O<br>L20N_3             | I/O<br>L23P_3<br>VREF_3   | I/O<br>L23N_3             | I/O<br>L24P_3             | I/O<br>L24N_3                       | I/O<br>L26P_3           | I/O<br>L26N_3           | U                    |  |  |
| VCCO_4                        | VCCO_4                     | VCCO_4                       | VCCINT                  | VCCINT             | VCCO_3             | I/O<br>L20P_3             | I/O<br>L16N_3             | I/O<br>L21P_3             | I/O<br>L21N_3             | I/O<br>L22P_3                       | I/O<br>L22N_3           | VCCAUX                  | V                    |  |  |
| I/O<br>L27P_4<br>D1           | I/O                        | I/O                          | VCCO_4                  | VCCO_4             | VCCINT             | I/O<br>L10P_3<br>◆        | I/O<br>L10N_3<br>◆        | I/O<br>L16P_3             | I/O<br>L17P_3<br>VREF_3   | I/O<br>L17N_3                       | I/O<br>L19P_3           | I/O<br>L19N_3           | W                    |  |  |
| I/O<br>L30N_4<br>D2           | I/O<br>L27N_4<br>DIN<br>D0 | I/O<br>L24N_4                | I/O<br>VREF_4           | I/O<br>L16N_4      | I/O<br>L11N_4<br>◆ | I/O<br>L05P_3<br>◆        | I/O<br>L05N_3             | I/O<br>L08P_3<br>◆        | I/O<br>L08N_3             | VCCO_3                              | I/O<br>L14P_3           | I/O<br>L14N_3           | Y                    |  |  |
| I/O<br>L30P_4<br>D3           | I/O<br>L28N_4              | I/O<br>L24P_4                | I/O<br>L19P_4           | I/O<br>L16P_4      | I/O<br>L11P_4<br>◆ | I/O                       | I/O<br>L01P_3<br>VRN_3    | I/O<br>L01N_3<br>VRP_3    | I/O<br>L07P_3<br>◆        | I/O<br>L07N_3<br>◆                  | I/O<br>L09P_3<br>VREF_3 | I/O<br>L09N_3<br>◆      | A                    |  |  |
| I/O<br>VREF_4                 | I/O<br>L28P_4              | I/O<br>L25N_4                | I/O<br>L22P_4           | I/O<br>L17N_4<br>◆ | I/O<br>L12N_4<br>◆ | I/O<br>L09N_4             | I/O<br>L07N_4             | I/O<br>L01N_4<br>VRP_4    | I/O<br>L02P_3             | I/O<br>L02N_3<br>VREF_3             | I/O<br>L06P_3<br>◆      | I/O<br>L06N_3<br>◆      | A                    |  |  |
| I/O<br>L31P_4<br>DOUT<br>BUSY | GND                        | I/O<br>L25P_4                | I/O<br>L19N_4           | I/O<br>L17P_4<br>◆ | I/O<br>L12P_4<br>◆ | I/O<br>L09P_4             | I/O<br>L07P_4             | I/O<br>L01P_4<br>VRN_4    | GND                       | YELLOW                              | I/O<br>L03P_3           | I/O<br>L03N_3           | A                    |  |  |
| I/O<br>L31N_4<br>GCLK1        | I/O                        | VCCO_4                       | I/O<br>L22N_4<br>VREF_4 | I/O<br>L18N_4<br>◆ | I/O<br>◆           | VCCO_4                    | I/O<br>L08N_4             | I/O<br>L06N_4<br>VREF_4   | I/O                       | GND                                 | I/O<br>VREF_4           | CCLK                    | A                    |  |  |
| I/O<br>L32N_4<br>GCLK1        | I/O<br>L29N_4              | I/O<br>L26N_4<br>◆           | I/O<br>L23N_4<br>◆      | I/O<br>L18P_4<br>◆ | I/O<br>L15N_4      | I/O<br>L10N_4             | I/O<br>L08P_4             | I/O<br>L06P_4             | I/O<br>L05N_4             | I/O<br>L04N_4                       | GND                     | VCCAUX                  | A                    |  |  |
| I/O<br>L32P_4<br>GCLK0        | I/O<br>L29P_4              | I/O<br>L26P_4<br>VREF_4<br>◆ | I/O<br>L23P_4<br>◆      | VCCAUX             | I/O<br>L15P_4      | I/O<br>L10P_4             | I/O                       | I/O                       | I/O<br>L05P_4             | I/O<br>L04P_4                       | VCCAUX                  | GND                     | A                    |  |  |
| Bank 4                        |                            |                              |                         |                    |                    |                           |                           |                           |                           |                                     |                         |                         |                      |  |  |
|                               |                            |                              |                         |                    |                    |                           |                           |                           |                           |                                     |                         |                         | DS9094_1, 12b_011205 |  |  |

Right Half of Package  
(top view)

#### Notes:

- Differential pair assignments shown in parentheses on balls H20, H21, H22, H23, H24, and J21 are for XC3S4000 only.
- Differential pair assignments for the XC3S5000 are different on 15 balls (see [Table 102](#) for details.)

## FG900: 900-lead Fine-pitch Ball Grid Array

The 900-lead fine-pitch ball grid array package, FG900, supports three different Spartan-3 devices, including the XC3S2000, the XC3S4000, and the XC3S5000. The footprints for the XC3S4000 and XC3S5000 are identical, as shown in Table 106 and Figure 50. The XC3S2000, however, has fewer I/O pins which consequently results in 68 unconnected pins on the FG900 package, labeled as “N.C.” In Table 106 and Figure 50, these unconnected pins are indicated with a black diamond symbol (◆).

All the package pins appear in Table 106 and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

If there is a difference between the XC3S2000 pinout and the pinout for the XC3S4000 and XC3S5000, then that difference is highlighted in Table 106. If the table entry is shaded, then there is an unconnected pin on the XC3S2000 that maps to a user-I/O pin on the XC3S4000 and XC3S5000.

An electronic version of this package pinout table and footprint diagram is available for download from the Xilinx web-site at [http://www.xilinx.com/support/documentation/data\\_sheets/s3\\_pin.zip](http://www.xilinx.com/support/documentation/data_sheets/s3_pin.zip).

### Pinout Table

Table 106: FG900 Package Pinout

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 0    | IO                   | IO                               | E15                    | I/O  |
| 0    | IO                   | IO                               | K15                    | I/O  |
| 0    | IO                   | IO                               | D13                    | I/O  |
| 0    | IO                   | IO                               | K13                    | I/O  |
| 0    | IO                   | IO                               | G8                     | I/O  |
| 0    | IO/VREF_0            | IO/VREF_0                        | F9                     | VREF |
| 0    | IO/VREF_0            | IO/VREF_0                        | C4                     | VREF |
| 0    | IO_L01N_0/<br>VRP_0  | IO_L01N_0/<br>VRP_0              | B4                     | DCI  |
| 0    | IO_L01P_0/<br>VRN_0  | IO_L01P_0/<br>VRN_0              | A4                     | DCI  |
| 0    | IO_L02N_0            | IO_L02N_0                        | B5                     | I/O  |
| 0    | IO_L02P_0            | IO_L02P_0                        | A5                     | I/O  |
| 0    | IO_L03N_0            | IO_L03N_0                        | D5                     | I/O  |
| 0    | IO_L03P_0            | IO_L03P_0                        | E6                     | I/O  |
| 0    | IO_L04N_0            | IO_L04N_0                        | C6                     | I/O  |
| 0    | IO_L04P_0            | IO_L04P_0                        | B6                     | I/O  |
| 0    | IO_L05N_0            | IO_L05N_0                        | F6                     | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 0    | IO_L05P_0/<br>VREF_0 | IO_L05P_0/<br>VREF_0             | F7                     | VREF |
| 0    | IO_L06N_0            | IO_L06N_0                        | D7                     | I/O  |
| 0    | IO_L06P_0            | IO_L06P_0                        | C7                     | I/O  |
| 0    | IO_L07N_0            | IO_L07N_0                        | F8                     | I/O  |
| 0    | IO_L07P_0            | IO_L07P_0                        | E8                     | I/O  |
| 0    | IO_L08N_0            | IO_L08N_0                        | D8                     | I/O  |
| 0    | IO_L08P_0            | IO_L08P_0                        | C8                     | I/O  |
| 0    | IO_L09N_0            | IO_L09N_0                        | B8                     | I/O  |
| 0    | IO_L09P_0            | IO_L09P_0                        | A8                     | I/O  |
| 0    | IO_L10N_0            | IO_L10N_0                        | J9                     | I/O  |
| 0    | IO_L10P_0            | IO_L10P_0                        | H9                     | I/O  |
| 0    | IO_L11N_0            | IO_L11N_0                        | G10                    | I/O  |
| 0    | IO_L11P_0            | IO_L11P_0                        | F10                    | I/O  |
| 0    | IO_L12N_0            | IO_L12N_0                        | C10                    | I/O  |
| 0    | IO_L12P_0            | IO_L12P_0                        | B10                    | I/O  |
| 0    | IO_L13N_0            | IO_L13N_0                        | J10                    | I/O  |
| 0    | IO_L13P_0            | IO_L13P_0                        | K11                    | I/O  |
| 0    | IO_L14N_0            | IO_L14N_0                        | H11                    | I/O  |
| 0    | IO_L14P_0            | IO_L14P_0                        | G11                    | I/O  |
| 0    | IO_L15N_0            | IO_L15N_0                        | F11                    | I/O  |
| 0    | IO_L15P_0            | IO_L15P_0                        | E11                    | I/O  |
| 0    | IO_L16N_0            | IO_L16N_0                        | D11                    | I/O  |
| 0    | IO_L16P_0            | IO_L16P_0                        | C11                    | I/O  |
| 0    | IO_L17N_0            | IO_L17N_0                        | B11                    | I/O  |
| 0    | IO_L17P_0            | IO_L17P_0                        | A11                    | I/O  |
| 0    | IO_L18N_0            | IO_L18N_0                        | K12                    | I/O  |
| 0    | IO_L18P_0            | IO_L18P_0                        | J12                    | I/O  |
| 0    | IO_L19N_0            | IO_L19N_0                        | H12                    | I/O  |
| 0    | IO_L19P_0            | IO_L19P_0                        | G12                    | I/O  |
| 0    | IO_L20N_0            | IO_L20N_0                        | F12                    | I/O  |
| 0    | IO_L20P_0            | IO_L20P_0                        | E12                    | I/O  |
| 0    | IO_L21N_0            | IO_L21N_0                        | D12                    | I/O  |
| 0    | IO_L21P_0            | IO_L21P_0                        | C12                    | I/O  |
| 0    | IO_L22N_0            | IO_L22N_0                        | B12                    | I/O  |
| 0    | IO_L22P_0            | IO_L22P_0                        | A12                    | I/O  |
| 0    | IO_L23N_0            | IO_L23N_0                        | J13                    | I/O  |
| 0    | IO_L23P_0            | IO_L23P_0                        | H13                    | I/O  |
| 0    | IO_L24N_0            | IO_L24N_0                        | F13                    | I/O  |
| 0    | IO_L24P_0            | IO_L24P_0                        | E13                    | I/O  |
| 0    | IO_L25N_0            | IO_L25N_0                        | B13                    | I/O  |
| 0    | IO_L25P_0            | IO_L25P_0                        | A13                    | I/O  |
| 0    | IO_L26N_0            | IO_L26N_0                        | K14                    | I/O  |
| 0    | IO_L26P_0/<br>VREF_0 | IO_L26P_0/<br>VREF_0             | J14                    | VREF |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 0    | IO_L27N_0            | IO_L27N_0                        | G14                    | I/O  |
| 0    | IO_L27P_0            | IO_L27P_0                        | F14                    | I/O  |
| 0    | IO_L28N_0            | IO_L28N_0                        | C14                    | I/O  |
| 0    | IO_L28P_0            | IO_L28P_0                        | B14                    | I/O  |
| 0    | IO_L29N_0            | IO_L29N_0                        | J15                    | I/O  |
| 0    | IO_L29P_0            | IO_L29P_0                        | H15                    | I/O  |
| 0    | IO_L30N_0            | IO_L30N_0                        | G15                    | I/O  |
| 0    | IO_L30P_0            | IO_L30P_0                        | F15                    | I/O  |
| 0    | IO_L31N_0            | IO_L31N_0                        | D15                    | I/O  |
| 0    | IO_L31P_0/<br>VREF_0 | IO_L31P_0/<br>VREF_0             | C15                    | VREF |
| 0    | IO_L32N_0/<br>GCLK7  | IO_L32N_0/<br>GCLK7              | B15                    | GCLK |
| 0    | IO_L32P_0/<br>GCLK6  | IO_L32P_0/<br>GCLK6              | A15                    | GCLK |
| 0    | N.C. (◆)             | IO_L35N_0                        | B7                     | I/O  |
| 0    | N.C. (◆)             | IO_L35P_0                        | A7                     | I/O  |
| 0    | N.C. (◆)             | IO_L36N_0                        | G7                     | I/O  |
| 0    | N.C. (◆)             | IO_L36P_0                        | H8                     | I/O  |
| 0    | N.C. (◆)             | IO_L37N_0                        | E9                     | I/O  |
| 0    | N.C. (◆)             | IO_L37P_0                        | D9                     | I/O  |
| 0    | N.C. (◆)             | IO_L38N_0                        | B9                     | I/O  |
| 0    | N.C. (◆)             | IO_L38P_0                        | A9                     | I/O  |
| 0    | VCCO_0               | VCCO_0                           | C5                     | VCCO |
| 0    | VCCO_0               | VCCO_0                           | E7                     | VCCO |
| 0    | VCCO_0               | VCCO_0                           | C9                     | VCCO |
| 0    | VCCO_0               | VCCO_0                           | G9                     | VCCO |
| 0    | VCCO_0               | VCCO_0                           | J11                    | VCCO |
| 0    | VCCO_0               | VCCO_0                           | L12                    | VCCO |
| 0    | VCCO_0               | VCCO_0                           | C13                    | VCCO |
| 0    | VCCO_0               | VCCO_0                           | G13                    | VCCO |
| 0    | VCCO_0               | VCCO_0                           | L13                    | VCCO |
| 0    | VCCO_0               | VCCO_0                           | L14                    | VCCO |
| 1    | IO                   | IO                               | E25                    | I/O  |
| 1    | IO                   | IO                               | J21                    | I/O  |
| 1    | IO                   | IO                               | K20                    | I/O  |
| 1    | IO                   | IO                               | F18                    | I/O  |
| 1    | IO                   | IO                               | F16                    | I/O  |
| 1    | IO                   | IO                               | A16                    | I/O  |
| 1    | IO/VREF_1            | IO/VREF_1                        | J17                    | VREF |
| 1    | IO_L01N_1/<br>VRP_1  | IO_L01N_1/<br>VRP_1              | A27                    | DCI  |
| 1    | IO_L01P_1/<br>VRN_1  | IO_L01P_1/<br>VRN_1              | B27                    | DCI  |
| 1    | IO_L02N_1            | IO_L02N_1                        | D26                    | I/O  |
| 1    | IO_L02P_1            | IO_L02P_1                        | C27                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 1    | IO_L03N_1            | IO_L03N_1                        | A26                    | I/O  |
| 1    | IO_L03P_1            | IO_L03P_1                        | B26                    | I/O  |
| 1    | IO_L04N_1            | IO_L04N_1                        | B25                    | I/O  |
| 1    | IO_L04P_1            | IO_L04P_1                        | C25                    | I/O  |
| 1    | IO_L05N_1            | IO_L05N_1                        | F24                    | I/O  |
| 1    | IO_L05P_1            | IO_L05P_1                        | F25                    | I/O  |
| 1    | IO_L06N_1/<br>VREF_1 | IO_L06N_1/<br>VREF_1             | C24                    | VREF |
| 1    | IO_L06P_1            | IO_L06P_1                        | D24                    | I/O  |
| 1    | IO_L07N_1            | IO_L07N_1                        | A24                    | I/O  |
| 1    | IO_L07P_1            | IO_L07P_1                        | B24                    | I/O  |
| 1    | IO_L08N_1            | IO_L08N_1                        | H23                    | I/O  |
| 1    | IO_L08P_1            | IO_L08P_1                        | G24                    | I/O  |
| 1    | IO_L09N_1            | IO_L09N_1                        | F23                    | I/O  |
| 1    | IO_L09P_1            | IO_L09P_1                        | G23                    | I/O  |
| 1    | IO_L10N_1/<br>VREF_1 | IO_L10N_1/<br>VREF_1             | C23                    | VREF |
| 1    | IO_L10P_1            | IO_L10P_1                        | D23                    | I/O  |
| 1    | IO_L11N_1            | IO_L11N_1                        | A23                    | I/O  |
| 1    | IO_L11P_1            | IO_L11P_1                        | B23                    | I/O  |
| 1    | IO_L12N_1            | IO_L12N_1                        | H22                    | I/O  |
| 1    | IO_L12P_1            | IO_L12P_1                        | J22                    | I/O  |
| 1    | IO_L13N_1            | IO_L13N_1                        | F22                    | I/O  |
| 1    | IO_L13P_1            | IO_L13P_1                        | E23                    | I/O  |
| 1    | IO_L14N_1            | IO_L14N_1                        | D22                    | I/O  |
| 1    | IO_L14P_1            | IO_L14P_1                        | E22                    | I/O  |
| 1    | IO_L15N_1            | IO_L15N_1                        | A22                    | I/O  |
| 1    | IO_L15P_1            | IO_L15P_1                        | B22                    | I/O  |
| 1    | IO_L16N_1            | IO_L16N_1                        | F21                    | I/O  |
| 1    | IO_L16P_1            | IO_L16P_1                        | G21                    | I/O  |
| 1    | IO_L17N_1/<br>VREF_1 | IO_L17N_1/<br>VREF_1             | B21                    | VREF |
| 1    | IO_L17P_1            | IO_L17P_1                        | C21                    | I/O  |
| 1    | IO_L18N_1            | IO_L18N_1                        | G20                    | I/O  |
| 1    | IO_L18P_1            | IO_L18P_1                        | H20                    | I/O  |
| 1    | IO_L19N_1            | IO_L19N_1                        | E20                    | I/O  |
| 1    | IO_L19P_1            | IO_L19P_1                        | F20                    | I/O  |
| 1    | IO_L20N_1            | IO_L20N_1                        | C20                    | I/O  |
| 1    | IO_L20P_1            | IO_L20P_1                        | D20                    | I/O  |
| 1    | IO_L21N_1            | IO_L21N_1                        | A20                    | I/O  |
| 1    | IO_L21P_1            | IO_L21P_1                        | B20                    | I/O  |
| 1    | IO_L22N_1            | IO_L22N_1                        | J19                    | I/O  |
| 1    | IO_L22P_1            | IO_L22P_1                        | K19                    | I/O  |
| 1    | IO_L23N_1            | IO_L23N_1                        | G19                    | I/O  |
| 1    | IO_L23P_1            | IO_L23P_1                        | H19                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 1    | IO_L24N_1            | IO_L24N_1                        | E19                    | I/O  |
| 1    | IO_L24P_1            | IO_L24P_1                        | F19                    | I/O  |
| 1    | IO_L25N_1            | IO_L25N_1                        | C19                    | I/O  |
| 1    | IO_L25P_1            | IO_L25P_1                        | D19                    | I/O  |
| 1    | IO_L26N_1            | IO_L26N_1                        | A19                    | I/O  |
| 1    | IO_L26P_1            | IO_L26P_1                        | B19                    | I/O  |
| 1    | IO_L27N_1            | IO_L27N_1                        | F17                    | I/O  |
| 1    | IO_L27P_1            | IO_L27P_1                        | G17                    | I/O  |
| 1    | IO_L28N_1            | IO_L28N_1                        | B17                    | I/O  |
| 1    | IO_L28P_1            | IO_L28P_1                        | C17                    | I/O  |
| 1    | IO_L29N_1            | IO_L29N_1                        | J16                    | I/O  |
| 1    | IO_L29P_1            | IO_L29P_1                        | K16                    | I/O  |
| 1    | IO_L30N_1            | IO_L30N_1                        | G16                    | I/O  |
| 1    | IO_L30P_1            | IO_L30P_1                        | H16                    | I/O  |
| 1    | IO_L31N_1/<br>VREF_1 | IO_L31N_1/<br>VREF_1             | D16                    | VREF |
| 1    | IO_L31P_1            | IO_L31P_1                        | E16                    | I/O  |
| 1    | IO_L32N_1/<br>GCLK5  | IO_L32N_1/<br>GCLK5              | B16                    | GCLK |
| 1    | IO_L32P_1/<br>GCLK4  | IO_L32P_1/<br>GCLK4              | C16                    | GCLK |
| 1    | N.C. (◆)             | IO_L37N_1                        | H18                    | I/O  |
| 1    | N.C. (◆)             | IO_L37P_1                        | J18                    | I/O  |
| 1    | N.C. (◆)             | IO_L38N_1                        | D18                    | I/O  |
| 1    | N.C. (◆)             | IO_L38P_1                        | E18                    | I/O  |
| 1    | N.C. (◆)             | IO_L39N_1                        | A18                    | I/O  |
| 1    | N.C. (◆)             | IO_L39P_1                        | B18                    | I/O  |
| 1    | N.C. (◆)             | IO_L40N_1                        | K17                    | I/O  |
| 1    | N.C. (◆)             | IO_L40P_1                        | K18                    | I/O  |
| 1    | VCCO_1               | VCCO_1                           | L17                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | C18                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | G18                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | L18                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | L19                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | J20                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | C22                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | G22                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | E24                    | VCCO |
| 1    | VCCO_1               | VCCO_1                           | C26                    | VCCO |
| 2    | IO                   | IO                               | J25                    | I/O  |
| 2    | IO_L01N_2/<br>VRP_2  | IO_L01N_2/<br>VRP_2              | C29                    | DCI  |
| 2    | IO_L01P_2/<br>VRN_2  | IO_L01P_2/<br>VRN_2              | C30                    | DCI  |
| 2    | IO_L02N_2            | IO_L02N_2                        | D27                    | I/O  |
| 2    | IO_L02P_2            | IO_L02P_2                        | D28                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 2    | IO_L03N_2/<br>VREF_2 | IO_L03N_2/<br>VREF_2             | D29                    | VREF |
| 2    | IO_L03P_2            | IO_L03P_2                        | D30                    | I/O  |
| 2    | IO_L04N_2            | IO_L04N_2                        | E29                    | I/O  |
| 2    | IO_L04P_2            | IO_L04P_2                        | E30                    | I/O  |
| 2    | IO_L05N_2            | IO_L05N_2                        | F28                    | I/O  |
| 2    | IO_L05P_2            | IO_L05P_2                        | F29                    | I/O  |
| 2    | IO_L06N_2            | IO_L06N_2                        | G27                    | I/O  |
| 2    | IO_L06P_2            | IO_L06P_2                        | G28                    | I/O  |
| 2    | IO_L07N_2            | IO_L07N_2                        | G29                    | I/O  |
| 2    | IO_L07P_2            | IO_L07P_2                        | G30                    | I/O  |
| 2    | IO_L08N_2            | IO_L08N_2                        | G25                    | I/O  |
| 2    | IO_L08P_2            | IO_L08P_2                        | H24                    | I/O  |
| 2    | IO_L09N_2/<br>VREF_2 | IO_L09N_2/<br>VREF_2             | H25                    | VREF |
| 2    | IO_L09P_2            | IO_L09P_2                        | H26                    | I/O  |
| 2    | IO_L10N_2            | IO_L10N_2                        | H27                    | I/O  |
| 2    | IO_L10P_2            | IO_L10P_2                        | H28                    | I/O  |
| 2    | IO_L12N_2            | IO_L12N_2                        | H29                    | I/O  |
| 2    | IO_L12P_2            | IO_L12P_2                        | H30                    | I/O  |
| 2    | IO_L13N_2            | IO_L13N_2                        | J26                    | I/O  |
| 2    | IO_L13P_2/<br>VREF_2 | IO_L13P_2/<br>VREF_2             | J27                    | VREF |
| 2    | IO_L14N_2            | IO_L14N_2                        | J29                    | I/O  |
| 2    | IO_L14P_2            | IO_L14P_2                        | J30                    | I/O  |
| 2    | IO_L15N_2            | IO_L15N_2                        | J23                    | I/O  |
| 2    | IO_L15P_2            | IO_L15P_2                        | K22                    | I/O  |
| 2    | IO_L16N_2            | IO_L16N_2                        | K24                    | I/O  |
| 2    | IO_L16P_2            | IO_L16P_2                        | K25                    | I/O  |
| 2    | IO_L19N_2            | IO_L19N_2                        | L25                    | I/O  |
| 2    | IO_L19P_2            | IO_L19P_2                        | L26                    | I/O  |
| 2    | IO_L20N_2            | IO_L20N_2                        | L27                    | I/O  |
| 2    | IO_L20P_2            | IO_L20P_2                        | L28                    | I/O  |
| 2    | IO_L21N_2            | IO_L21N_2                        | L29                    | I/O  |
| 2    | IO_L21P_2            | IO_L21P_2                        | L30                    | I/O  |
| 2    | IO_L22N_2            | IO_L22N_2                        | M22                    | I/O  |
| 2    | IO_L22P_2            | IO_L22P_2                        | M23                    | I/O  |
| 2    | IO_L23N_2/<br>VREF_2 | IO_L23N_2/<br>VREF_2             | M24                    | VREF |
| 2    | IO_L23P_2            | IO_L23P_2                        | M25                    | I/O  |
| 2    | IO_L24N_2            | IO_L24N_2                        | M27                    | I/O  |
| 2    | IO_L24P_2            | IO_L24P_2                        | M28                    | I/O  |
| 2    | IO_L26N_2            | IO_L26N_2                        | M21                    | I/O  |
| 2    | IO_L26P_2            | IO_L26P_2                        | N21                    | I/O  |
| 2    | IO_L27N_2            | IO_L27N_2                        | N22                    | I/O  |
| 2    | IO_L27P_2            | IO_L27P_2                        | N23                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 2    | IO_L28N_2            | IO_L28N_2                        | M26                    | I/O  |
| 2    | IO_L28P_2            | IO_L28P_2                        | N25                    | I/O  |
| 2    | IO_L29N_2            | IO_L29N_2                        | N26                    | I/O  |
| 2    | IO_L29P_2            | IO_L29P_2                        | N27                    | I/O  |
| 2    | IO_L31N_2            | IO_L31N_2                        | N29                    | I/O  |
| 2    | IO_L31P_2            | IO_L31P_2                        | N30                    | I/O  |
| 2    | IO_L32N_2            | IO_L32N_2                        | P21                    | I/O  |
| 2    | IO_L32P_2            | IO_L32P_2                        | P22                    | I/O  |
| 2    | IO_L33N_2            | IO_L33N_2                        | P24                    | I/O  |
| 2    | IO_L33P_2            | IO_L33P_2                        | P25                    | I/O  |
| 2    | IO_L34N_2/<br>VREF_2 | IO_L34N_2/<br>VREF_2             | P28                    | VREF |
| 2    | IO_L34P_2            | IO_L34P_2                        | P29                    | I/O  |
| 2    | IO_L35N_2            | IO_L35N_2                        | R21                    | I/O  |
| 2    | IO_L35P_2            | IO_L35P_2                        | R22                    | I/O  |
| 2    | IO_L37N_2            | IO_L37N_2                        | R23                    | I/O  |
| 2    | IO_L37P_2            | IO_L37P_2                        | R24                    | I/O  |
| 2    | IO_L38N_2            | IO_L38N_2                        | R25                    | I/O  |
| 2    | IO_L38P_2            | IO_L38P_2                        | R26                    | I/O  |
| 2    | IO_L39N_2            | IO_L39N_2                        | R27                    | I/O  |
| 2    | IO_L39P_2            | IO_L39P_2                        | R28                    | I/O  |
| 2    | IO_L40N_2            | IO_L40N_2                        | R29                    | I/O  |
| 2    | IO_L40P_2/<br>VREF_2 | IO_L40P_2/<br>VREF_2             | R30                    | VREF |
| 2    | N.C. (◆)             | IO_L41N_2                        | E27                    | I/O  |
| 2    | N.C. (◆)             | IO_L41P_2                        | F26                    | I/O  |
| 2    | N.C. (◆)             | IO_L45N_2                        | K28                    | I/O  |
| 2    | N.C. (◆)             | IO_L45P_2                        | K29                    | I/O  |
| 2    | N.C. (◆)             | IO_L46N_2                        | K21                    | I/O  |
| 2    | N.C. (◆)             | IO_L46P_2                        | L21                    | I/O  |
| 2    | N.C. (◆)             | IO_L47N_2                        | L23                    | I/O  |
| 2    | N.C. (◆)             | IO_L47P_2                        | L24                    | I/O  |
| 2    | N.C. (◆)             | IO_L50N_2                        | M29                    | I/O  |
| 2    | N.C. (◆)             | IO_L50P_2                        | M30                    | I/O  |
| 2    | VCCO_2               | VCCO_2                           | M20                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | N20                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | P20                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | L22                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | J24                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | N24                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | G26                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | E28                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | J28                    | VCCO |
| 2    | VCCO_2               | VCCO_2                           | N28                    | VCCO |
| 3    | IO                   | IO                               | AB25                   | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 3    | IO_L01N_3/<br>VRP_3  | IO_L01N_3/<br>VRP_3              | AH30                   | DCI  |
| 3    | IO_L01P_3/<br>VRN_3  | IO_L01P_3/<br>VRN_3              | AH29                   | DCI  |
| 3    | IO_L02N_3/<br>VREF_3 | IO_L02N_3/<br>VREF_3             | AG28                   | VREF |
| 3    | IO_L02P_3            | IO_L02P_3                        | AG27                   | I/O  |
| 3    | IO_L03N_3            | IO_L03N_3                        | AG30                   | I/O  |
| 3    | IO_L03P_3            | IO_L03P_3                        | AG29                   | I/O  |
| 3    | IO_L04N_3            | IO_L04N_3                        | AF30                   | I/O  |
| 3    | IO_L04P_3            | IO_L04P_3                        | AF29                   | I/O  |
| 3    | IO_L05N_3            | IO_L05N_3                        | AE26                   | I/O  |
| 3    | IO_L05P_3            | IO_L05P_3                        | AF27                   | I/O  |
| 3    | IO_L06N_3            | IO_L06N_3                        | AE29                   | I/O  |
| 3    | IO_L06P_3            | IO_L06P_3                        | AE28                   | I/O  |
| 3    | IO_L07N_3            | IO_L07N_3                        | AD28                   | I/O  |
| 3    | IO_L07P_3            | IO_L07P_3                        | AD27                   | I/O  |
| 3    | IO_L08N_3            | IO_L08N_3                        | AD30                   | I/O  |
| 3    | IO_L08P_3            | IO_L08P_3                        | AD29                   | I/O  |
| 3    | IO_L09N_3            | IO_L09N_3                        | AC24                   | I/O  |
| 3    | IO_L09P_3/<br>VREF_3 | IO_L09P_3/<br>VREF_3             | AD25                   | VREF |
| 3    | IO_L10N_3            | IO_L10N_3                        | AC26                   | I/O  |
| 3    | IO_L10P_3            | IO_L10P_3                        | AC25                   | I/O  |
| 3    | IO_L11N_3            | IO_L11N_3                        | AC28                   | I/O  |
| 3    | IO_L11P_3            | IO_L11P_3                        | AC27                   | I/O  |
| 3    | IO_L13N_3/<br>VREF_3 | IO_L13N_3/<br>VREF_3             | AC30                   | VREF |
| 3    | IO_L13P_3            | IO_L13P_3                        | AC29                   | I/O  |
| 3    | IO_L14N_3            | IO_L14N_3                        | AB27                   | I/O  |
| 3    | IO_L14P_3            | IO_L14P_3                        | AB26                   | I/O  |
| 3    | IO_L15N_3            | IO_L15N_3                        | AB30                   | I/O  |
| 3    | IO_L15P_3            | IO_L15P_3                        | AB29                   | I/O  |
| 3    | IO_L16N_3            | IO_L16N_3                        | AA22                   | I/O  |
| 3    | IO_L16P_3            | IO_L16P_3                        | AB23                   | I/O  |
| 3    | IO_L17N_3            | IO_L17N_3                        | AA25                   | I/O  |
| 3    | IO_L17P_3/<br>VREF_3 | IO_L17P_3/<br>VREF_3             | AA24                   | VREF |
| 3    | IO_L19N_3            | IO_L19N_3                        | AA29                   | I/O  |
| 3    | IO_L19P_3            | IO_L19P_3                        | AA28                   | I/O  |
| 3    | IO_L20N_3            | IO_L20N_3                        | Y21                    | I/O  |
| 3    | IO_L20P_3            | IO_L20P_3                        | AA21                   | I/O  |
| 3    | IO_L21N_3            | IO_L21N_3                        | Y24                    | I/O  |
| 3    | IO_L21P_3            | IO_L21P_3                        | Y23                    | I/O  |
| 3    | IO_L22N_3            | IO_L22N_3                        | Y26                    | I/O  |
| 3    | IO_L22P_3            | IO_L22P_3                        | Y25                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 3    | IO_L23N_3            | IO_L23N_3                        | Y28                    | I/O  |
| 3    | IO_L23P_3/<br>VREF_3 | IO_L23P_3/<br>VREF_3             | Y27                    | VREF |
| 3    | IO_L24N_3            | IO_L24N_3                        | Y30                    | I/O  |
| 3    | IO_L24P_3            | IO_L24P_3                        | Y29                    | I/O  |
| 3    | IO_L26N_3            | IO_L26N_3                        | W30                    | I/O  |
| 3    | IO_L26P_3            | IO_L26P_3                        | W29                    | I/O  |
| 3    | IO_L27N_3            | IO_L27N_3                        | V21                    | I/O  |
| 3    | IO_L27P_3            | IO_L27P_3                        | W21                    | I/O  |
| 3    | IO_L28N_3            | IO_L28N_3                        | V23                    | I/O  |
| 3    | IO_L28P_3            | IO_L28P_3                        | V22                    | I/O  |
| 3    | IO_L29N_3            | IO_L29N_3                        | V25                    | I/O  |
| 3    | IO_L29P_3            | IO_L29P_3                        | W26                    | I/O  |
| 3    | IO_L31N_3            | IO_L31N_3                        | V30                    | I/O  |
| 3    | IO_L31P_3            | IO_L31P_3                        | V29                    | I/O  |
| 3    | IO_L32N_3            | IO_L32N_3                        | U22                    | I/O  |
| 3    | IO_L32P_3            | IO_L32P_3                        | U21                    | I/O  |
| 3    | IO_L33N_3            | IO_L33N_3                        | U25                    | I/O  |
| 3    | IO_L33P_3            | IO_L33P_3                        | U24                    | I/O  |
| 3    | IO_L34N_3            | IO_L34N_3                        | U29                    | I/O  |
| 3    | IO_L34P_3/<br>VREF_3 | IO_L34P_3/<br>VREF_3             | U28                    | VREF |
| 3    | IO_L35N_3            | IO_L35N_3                        | T22                    | I/O  |
| 3    | IO_L35P_3            | IO_L35P_3                        | T21                    | I/O  |
| 3    | IO_L37N_3            | IO_L37N_3                        | T24                    | I/O  |
| 3    | IO_L37P_3            | IO_L37P_3                        | T23                    | I/O  |
| 3    | IO_L38N_3            | IO_L38N_3                        | T26                    | I/O  |
| 3    | IO_L38P_3            | IO_L38P_3                        | T25                    | I/O  |
| 3    | IO_L39N_3            | IO_L39N_3                        | T28                    | I/O  |
| 3    | IO_L39P_3            | IO_L39P_3                        | T27                    | I/O  |
| 3    | IO_L40N_3/<br>VREF_3 | IO_L40N_3/<br>VREF_3             | T30                    | VREF |
| 3    | IO_L40P_3            | IO_L40P_3                        | T29                    | I/O  |
| 3    | N.C. (◆)             | IO_L46N_3                        | W23                    | I/O  |
| 3    | N.C. (◆)             | IO_L46P_3                        | W22                    | I/O  |
| 3    | N.C. (◆)             | IO_L47N_3                        | W25                    | I/O  |
| 3    | N.C. (◆)             | IO_L47P_3                        | W24                    | I/O  |
| 3    | N.C. (◆)             | IO_L48N_3                        | W28                    | I/O  |
| 3    | N.C. (◆)             | IO_L48P_3                        | W27                    | I/O  |
| 3    | N.C. (◆)             | IO_L50N_3                        | V27                    | I/O  |
| 3    | N.C. (◆)             | IO_L50P_3                        | V26                    | I/O  |
| 3    | VCCO_3               | VCCO_3                           | U20                    | VCCO |
| 3    | VCCO_3               | VCCO_3                           | V20                    | VCCO |
| 3    | VCCO_3               | VCCO_3                           | W20                    | VCCO |
| 3    | VCCO_3               | VCCO_3                           | Y22                    | VCCO |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 3    | VCCO_3               | VCCO_3                           | V24                    | VCCO |
| 3    | VCCO_3               | VCCO_3                           | AB24                   | VCCO |
| 3    | VCCO_3               | VCCO_3                           | AD26                   | VCCO |
| 3    | VCCO_3               | VCCO_3                           | V28                    | VCCO |
| 3    | VCCO_3               | VCCO_3                           | AB28                   | VCCO |
| 3    | VCCO_3               | VCCO_3                           | AF28                   | VCCO |
| 4    | IO                   | IO                               | AA16                   | I/O  |
| 4    | IO                   | IO                               | AG18                   | I/O  |
| 4    | IO                   | IO                               | AA18                   | I/O  |
| 4    | IO                   | IO                               | AE22                   | I/O  |
| 4    | IO                   | IO                               | AD23                   | I/O  |
| 4    | IO                   | IO                               | AH27                   | I/O  |
| 4    | IO/VREF_4            | IO/VREF_4                        | AF16                   | VREF |
| 4    | IO/VREF_4            | IO/VREF_4                        | AK28                   | VREF |
| 4    | IO_L01N_4/<br>VRP_4  | IO_L01N_4/<br>VRP_4              | AJ27                   | DCI  |
| 4    | IO_L01P_4/<br>VRN_4  | IO_L01P_4/<br>VRN_4              | AK27                   | DCI  |
| 4    | IO_L02N_4            | IO_L02N_4                        | AJ26                   | I/O  |
| 4    | IO_L02P_4            | IO_L02P_4                        | AK26                   | I/O  |
| 4    | IO_L03N_4            | IO_L03N_4                        | AG26                   | I/O  |
| 4    | IO_L03P_4            | IO_L03P_4                        | AF25                   | I/O  |
| 4    | IO_L04N_4            | IO_L04N_4                        | AD24                   | I/O  |
| 4    | IO_L04P_4            | IO_L04P_4                        | AC23                   | I/O  |
| 4    | IO_L05N_4            | IO_L05N_4                        | AE23                   | I/O  |
| 4    | IO_L05P_4            | IO_L05P_4                        | AF23                   | I/O  |
| 4    | IO_L06N_4/<br>VREF_4 | IO_L06N_4/<br>VREF_4             | AG23                   | VREF |
| 4    | IO_L06P_4            | IO_L06P_4                        | AH23                   | I/O  |
| 4    | IO_L07N_4            | IO_L07N_4                        | AJ23                   | I/O  |
| 4    | IO_L07P_4            | IO_L07P_4                        | AK23                   | I/O  |
| 4    | IO_L08N_4            | IO_L08N_4                        | AB22                   | I/O  |
| 4    | IO_L08P_4            | IO_L08P_4                        | AC22                   | I/O  |
| 4    | IO_L09N_4            | IO_L09N_4                        | AF22                   | I/O  |
| 4    | IO_L09P_4            | IO_L09P_4                        | AG22                   | I/O  |
| 4    | IO_L10N_4            | IO_L10N_4                        | AJ22                   | I/O  |
| 4    | IO_L10P_4            | IO_L10P_4                        | AK22                   | I/O  |
| 4    | IO_L11N_4            | IO_L11N_4                        | AD21                   | I/O  |
| 4    | IO_L11P_4            | IO_L11P_4                        | AE21                   | I/O  |
| 4    | IO_L12N_4            | IO_L12N_4                        | AH21                   | I/O  |
| 4    | IO_L12P_4            | IO_L12P_4                        | AJ21                   | I/O  |
| 4    | IO_L13N_4            | IO_L13N_4                        | AB21                   | I/O  |
| 4    | IO_L13P_4            | IO_L13P_4                        | AA20                   | I/O  |
| 4    | IO_L14N_4            | IO_L14N_4                        | AC20                   | I/O  |
| 4    | IO_L14P_4            | IO_L14P_4                        | AD20                   | I/O  |



Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name    | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|-------------------------|----------------------------------|------------------------|------|
| 4    | IO_L15N_4               | IO_L15N_4                        | AE20                   | I/O  |
| 4    | IO_L15P_4               | IO_L15P_4                        | AF20                   | I/O  |
| 4    | IO_L16N_4               | IO_L16N_4                        | AG20                   | I/O  |
| 4    | IO_L16P_4               | IO_L16P_4                        | AH20                   | I/O  |
| 4    | IO_L17N_4               | IO_L17N_4                        | AJ20                   | I/O  |
| 4    | IO_L17P_4               | IO_L17P_4                        | AK20                   | I/O  |
| 4    | IO_L18N_4               | IO_L18N_4                        | AA19                   | I/O  |
| 4    | IO_L18P_4               | IO_L18P_4                        | AB19                   | I/O  |
| 4    | IO_L19N_4               | IO_L19N_4                        | AC19                   | I/O  |
| 4    | IO_L19P_4               | IO_L19P_4                        | AD19                   | I/O  |
| 4    | IO_L20N_4               | IO_L20N_4                        | AE19                   | I/O  |
| 4    | IO_L20P_4               | IO_L20P_4                        | AF19                   | I/O  |
| 4    | IO_L21N_4               | IO_L21N_4                        | AG19                   | I/O  |
| 4    | IO_L21P_4               | IO_L21P_4                        | AH19                   | I/O  |
| 4    | IO_L22N_4/<br>VREF_4    | IO_L22N_4/<br>VREF_4             | AJ19                   | VREF |
| 4    | IO_L22P_4               | IO_L22P_4                        | AK19                   | I/O  |
| 4    | IO_L23N_4               | IO_L23N_4                        | AB18                   | I/O  |
| 4    | IO_L23P_4               | IO_L23P_4                        | AC18                   | I/O  |
| 4    | IO_L24N_4               | IO_L24N_4                        | AE18                   | I/O  |
| 4    | IO_L24P_4               | IO_L24P_4                        | AF18                   | I/O  |
| 4    | IO_L25N_4               | IO_L25N_4                        | AJ18                   | I/O  |
| 4    | IO_L25P_4               | IO_L25P_4                        | AK18                   | I/O  |
| 4    | IO_L26N_4               | IO_L26N_4                        | AA17                   | I/O  |
| 4    | IO_L26P_4/<br>VREF_4    | IO_L26P_4/<br>VREF_4             | AB17                   | VREF |
| 4    | IO_L27N_4/<br>DIN/D0    | IO_L27N_4/<br>DIN/D0             | AD17                   | DUAL |
| 4    | IO_L27P_4/<br>D1        | IO_L27P_4/<br>D1                 | AE17                   | DUAL |
| 4    | IO_L28N_4               | IO_L28N_4                        | AH17                   | I/O  |
| 4    | IO_L28P_4               | IO_L28P_4                        | AJ17                   | I/O  |
| 4    | IO_L29N_4               | IO_L29N_4                        | AB16                   | I/O  |
| 4    | IO_L29P_4               | IO_L29P_4                        | AC16                   | I/O  |
| 4    | IO_L30N_4/<br>D2        | IO_L30N_4/<br>D2                 | AD16                   | DUAL |
| 4    | IO_L30P_4/<br>D3        | IO_L30P_4/<br>D3                 | AE16                   | DUAL |
| 4    | IO_L31N_4/<br>INIT_B    | IO_L31N_4/<br>INIT_B             | AG16                   | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY          | AH16                   | DUAL |
| 4    | IO_L32N_4/<br>GCLK1     | IO_L32N_4/<br>GCLK1              | AJ16                   | GCLK |
| 4    | IO_L32P_4/<br>GCLK0     | IO_L32P_4/<br>GCLK0              | AK16                   | GCLK |
| 4    | N.C. (◆)                | IO_L33N_4                        | AH25                   | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 4    | N.C. (◆)             | IO_L33P_4                        | AJ25                   | I/O  |
| 4    | N.C. (◆)             | IO_L34N_4                        | AE25                   | I/O  |
| 4    | N.C. (◆)             | IO_L34P_4                        | AE24                   | I/O  |
| 4    | N.C. (◆)             | IO_L35N_4                        | AG24                   | I/O  |
| 4    | N.C. (◆)             | IO_L35P_4                        | AH24                   | I/O  |
| 4    | N.C. (◆)             | IO_L38N_4                        | AJ24                   | I/O  |
| 4    | N.C. (◆)             | IO_L38P_4                        | AK24                   | I/O  |
| 4    | VCCO_4               | VCCO_4                           | Y17                    | VCCO |
| 4    | VCCO_4               | VCCO_4                           | Y18                    | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AD18                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AH18                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | Y19                    | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AB20                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AD22                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AH22                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AF24                   | VCCO |
| 4    | VCCO_4               | VCCO_4                           | AH26                   | VCCO |
| 5    | IO                   | IO                               | AE6                    | I/O  |
| 5    | IO                   | IO                               | AB10                   | I/O  |
| 5    | IO                   | IO                               | AA11                   | I/O  |
| 5    | IO                   | IO                               | AA15                   | I/O  |
| 5    | IO                   | IO                               | AE15                   | I/O  |
| 5    | IO/VREF_5            | IO/VREF_5                        | AH4                    | VREF |
| 5    | IO/VREF_5            | IO/VREF_5                        | AK15                   | VREF |
| 5    | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B             | AK4                    | DUAL |
| 5    | IO_L01P_5/<br>CS_B   | IO_L01P_5/<br>CS_B               | AJ4                    | DUAL |
| 5    | IO_L02N_5            | IO_L02N_5                        | AK5                    | I/O  |
| 5    | IO_L02P_5            | IO_L02P_5                        | AJ5                    | I/O  |
| 5    | IO_L03N_5            | IO_L03N_5                        | AF6                    | I/O  |
| 5    | IO_L03P_5            | IO_L03P_5                        | AG5                    | I/O  |
| 5    | IO_L04N_5            | IO_L04N_5                        | AJ6                    | I/O  |
| 5    | IO_L04P_5            | IO_L04P_5                        | AH6                    | I/O  |
| 5    | IO_L05N_5            | IO_L05N_5                        | AE7                    | I/O  |
| 5    | IO_L05P_5            | IO_L05P_5                        | AD7                    | I/O  |
| 5    | IO_L06N_5            | IO_L06N_5                        | AH7                    | I/O  |
| 5    | IO_L06P_5            | IO_L06P_5                        | AG7                    | I/O  |
| 5    | IO_L07N_5            | IO_L07N_5                        | AK8                    | I/O  |
| 5    | IO_L07P_5            | IO_L07P_5                        | AJ8                    | I/O  |
| 5    | IO_L08N_5            | IO_L08N_5                        | AC9                    | I/O  |
| 5    | IO_L08P_5            | IO_L08P_5                        | AB9                    | I/O  |
| 5    | IO_L09N_5            | IO_L09N_5                        | AG9                    | I/O  |
| 5    | IO_L09P_5            | IO_L09P_5                        | AF9                    | I/O  |



Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 5    | IO_L10N_5/<br>VRP_5  | IO_L10N_5/<br>VRP_5              | AK9                    | DCI  |
| 5    | IO_L10P_5/<br>VRN_5  | IO_L10P_5/<br>VRN_5              | AJ9                    | DCI  |
| 5    | IO_L11N_5/<br>VREF_5 | IO_L11N_5/<br>VREF_5             | AE10                   | VREF |
| 5    | IO_L11P_5            | IO_L11P_5                        | AE9                    | I/O  |
| 5    | IO_L12N_5            | IO_L12N_5                        | AJ10                   | I/O  |
| 5    | IO_L12P_5            | IO_L12P_5                        | AH10                   | I/O  |
| 5    | IO_L13N_5            | IO_L13N_5                        | AD11                   | I/O  |
| 5    | IO_L13P_5            | IO_L13P_5                        | AD10                   | I/O  |
| 5    | IO_L14N_5            | IO_L14N_5                        | AF11                   | I/O  |
| 5    | IO_L14P_5            | IO_L14P_5                        | AE11                   | I/O  |
| 5    | IO_L15N_5            | IO_L15N_5                        | AH11                   | I/O  |
| 5    | IO_L15P_5            | IO_L15P_5                        | AG11                   | I/O  |
| 5    | IO_L16N_5            | IO_L16N_5                        | AK11                   | I/O  |
| 5    | IO_L16P_5            | IO_L16P_5                        | AJ11                   | I/O  |
| 5    | IO_L17N_5            | IO_L17N_5                        | AB12                   | I/O  |
| 5    | IO_L17P_5            | IO_L17P_5                        | AC11                   | I/O  |
| 5    | IO_L18N_5            | IO_L18N_5                        | AD12                   | I/O  |
| 5    | IO_L18P_5            | IO_L18P_5                        | AC12                   | I/O  |
| 5    | IO_L19N_5            | IO_L19N_5                        | AF12                   | I/O  |
| 5    | IO_L19P_5/<br>VREF_5 | IO_L19P_5/<br>VREF_5             | AE12                   | VREF |
| 5    | IO_L20N_5            | IO_L20N_5                        | AH12                   | I/O  |
| 5    | IO_L20P_5            | IO_L20P_5                        | AG12                   | I/O  |
| 5    | IO_L21N_5            | IO_L21N_5                        | AK12                   | I/O  |
| 5    | IO_L21P_5            | IO_L21P_5                        | AJ12                   | I/O  |
| 5    | IO_L22N_5            | IO_L22N_5                        | AA13                   | I/O  |
| 5    | IO_L22P_5            | IO_L22P_5                        | AA12                   | I/O  |
| 5    | IO_L23N_5            | IO_L23N_5                        | AC13                   | I/O  |
| 5    | IO_L23P_5            | IO_L23P_5                        | AB13                   | I/O  |
| 5    | IO_L24N_5            | IO_L24N_5                        | AG13                   | I/O  |
| 5    | IO_L24P_5            | IO_L24P_5                        | AF13                   | I/O  |
| 5    | IO_L25N_5            | IO_L25N_5                        | AK13                   | I/O  |
| 5    | IO_L25P_5            | IO_L25P_5                        | AJ13                   | I/O  |
| 5    | IO_L26N_5            | IO_L26N_5                        | AB14                   | I/O  |
| 5    | IO_L26P_5            | IO_L26P_5                        | AA14                   | I/O  |
| 5    | IO_L27N_5/<br>VREF_5 | IO_L27N_5/<br>VREF_5             | AE14                   | VREF |
| 5    | IO_L27P_5            | IO_L27P_5                        | AE13                   | I/O  |
| 5    | IO_L28N_5/<br>D6     | IO_L28N_5/<br>D6                 | AJ14                   | DUAL |
| 5    | IO_L28P_5/<br>D7     | IO_L28P_5/<br>D7                 | AH14                   | DUAL |
| 5    | IO_L29N_5            | IO_L29N_5                        | AC15                   | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 5    | IO_L29P_5/<br>VREF_5 | IO_L29P_5/<br>VREF_5             | AB15                   | VREF |
| 5    | IO_L30N_5            | IO_L30N_5                        | AD15                   | I/O  |
| 5    | IO_L30P_5            | IO_L30P_5                        | AD14                   | I/O  |
| 5    | IO_L31N_5/<br>D4     | IO_L31N_5/<br>D4                 | AG15                   | DUAL |
| 5    | IO_L31P_5/<br>D5     | IO_L31P_5/<br>D5                 | AF15                   | DUAL |
| 5    | IO_L32N_5/<br>GCLK3  | IO_L32N_5/<br>GCLK3              | AJ15                   | GCLK |
| 5    | IO_L32P_5/<br>GCLK2  | IO_L32P_5/<br>GCLK2              | AH15                   | GCLK |
| 5    | N.C. (◆)             | IO_L35N_5                        | AK7                    | I/O  |
| 5    | N.C. (◆)             | IO_L35P_5                        | AJ7                    | I/O  |
| 5    | N.C. (◆)             | IO_L36N_5                        | AD8                    | I/O  |
| 5    | N.C. (◆)             | IO_L36P_5                        | AC8                    | I/O  |
| 5    | N.C. (◆)             | IO_L37N_5                        | AF8                    | I/O  |
| 5    | N.C. (◆)             | IO_L37P_5                        | AE8                    | I/O  |
| 5    | N.C. (◆)             | IO_L38N_5                        | AH8                    | I/O  |
| 5    | N.C. (◆)             | IO_L38P_5                        | AG8                    | I/O  |
| 5    | VCCO_5               | VCCO_5                           | AH5                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AF7                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AD9                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AH9                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AB11                   | VCCO |
| 5    | VCCO_5               | VCCO_5                           | Y12                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | Y13                    | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AD13                   | VCCO |
| 5    | VCCO_5               | VCCO_5                           | AH13                   | VCCO |
| 5    | VCCO_5               | VCCO_5                           | Y14                    | VCCO |
| 6    | IO                   | IO                               | AB6                    | I/O  |
| 6    | IO_L01N_6/<br>VRP_6  | IO_L01N_6/<br>VRP_6              | AH2                    | DCI  |
| 6    | IO_L01P_6/<br>VRN_6  | IO_L01P_6/<br>VRN_6              | AH1                    | DCI  |
| 6    | IO_L02N_6            | IO_L02N_6                        | AG4                    | I/O  |
| 6    | IO_L02P_6            | IO_L02P_6                        | AG3                    | I/O  |
| 6    | IO_L03N_6/<br>VREF_6 | IO_L03N_6/<br>VREF_6             | AG2                    | VREF |
| 6    | IO_L03P_6            | IO_L03P_6                        | AG1                    | I/O  |
| 6    | IO_L04N_6            | IO_L04N_6                        | AF2                    | I/O  |
| 6    | IO_L04P_6            | IO_L04P_6                        | AF1                    | I/O  |
| 6    | IO_L05N_6            | IO_L05N_6                        | AF4                    | I/O  |
| 6    | IO_L05P_6            | IO_L05P_6                        | AE5                    | I/O  |
| 6    | IO_L06N_6            | IO_L06N_6                        | AE3                    | I/O  |
| 6    | IO_L06P_6            | IO_L06P_6                        | AE2                    | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 6    | IO_L07N_6            | IO_L07N_6                        | AD4                    | I/O  |
| 6    | IO_L07P_6            | IO_L07P_6                        | AD3                    | I/O  |
| 6    | IO_L08N_6            | IO_L08N_6                        | AD2                    | I/O  |
| 6    | IO_L08P_6            | IO_L08P_6                        | AD1                    | I/O  |
| 6    | IO_L09N_6/<br>VREF_6 | IO_L09N_6/<br>VREF_6             | AD6                    | VREF |
| 6    | IO_L09P_6            | IO_L09P_6                        | AC7                    | I/O  |
| 6    | IO_L10N_6            | IO_L10N_6                        | AC6                    | I/O  |
| 6    | IO_L10P_6            | IO_L10P_6                        | AC5                    | I/O  |
| 6    | IO_L11N_6            | IO_L11N_6                        | AC4                    | I/O  |
| 6    | IO_L11P_6            | IO_L11P_6                        | AC3                    | I/O  |
| 6    | IO_L13N_6            | IO_L13N_6                        | AC2                    | I/O  |
| 6    | IO_L13P_6/<br>VREF_6 | IO_L13P_6/<br>VREF_6             | AC1                    | VREF |
| 6    | IO_L14N_6            | IO_L14N_6                        | AB5                    | I/O  |
| 6    | IO_L14P_6            | IO_L14P_6                        | AB4                    | I/O  |
| 6    | IO_L15N_6            | IO_L15N_6                        | AB2                    | I/O  |
| 6    | IO_L15P_6            | IO_L15P_6                        | AB1                    | I/O  |
| 6    | IO_L16N_6            | IO_L16N_6                        | AB8                    | I/O  |
| 6    | IO_L16P_6            | IO_L16P_6                        | AA9                    | I/O  |
| 6    | IO_L17N_6            | IO_L17N_6                        | AA7                    | I/O  |
| 6    | IO_L17P_6/<br>VREF_6 | IO_L17P_6/<br>VREF_6             | AA6                    | VREF |
| 6    | IO_L19N_6            | IO_L19N_6                        | AA3                    | I/O  |
| 6    | IO_L19P_6            | IO_L19P_6                        | AA2                    | I/O  |
| 6    | IO_L20N_6            | IO_L20N_6                        | AA10                   | I/O  |
| 6    | IO_L20P_6            | IO_L20P_6                        | Y10                    | I/O  |
| 6    | IO_L21N_6            | IO_L21N_6                        | Y8                     | I/O  |
| 6    | IO_L21P_6            | IO_L21P_6                        | Y7                     | I/O  |
| 6    | IO_L22N_6            | IO_L22N_6                        | Y6                     | I/O  |
| 6    | IO_L22P_6            | IO_L22P_6                        | Y5                     | I/O  |
| 6    | IO_L24N_6/<br>VREF_6 | IO_L24N_6/<br>VREF_6             | Y2                     | VREF |
| 6    | IO_L24P_6            | IO_L24P_6                        | Y1                     | I/O  |
| 6    | N.C. (◆)             | IO_L25N_6                        | W9                     | I/O  |
| 6    | N.C. (◆)             | IO_L25P_6                        | W8                     | I/O  |
| 6    | IO_L26N_6            | IO_L26N_6                        | W7                     | I/O  |
| 6    | IO_L26P_6            | IO_L26P_6                        | W6                     | I/O  |
| 6    | IO_L27N_6            | IO_L27N_6                        | W4                     | I/O  |
| 6    | IO_L27P_6            | IO_L27P_6                        | W3                     | I/O  |
| 6    | IO_L28N_6            | IO_L28N_6                        | W2                     | I/O  |
| 6    | IO_L28P_6            | IO_L28P_6                        | W1                     | I/O  |
| 6    | IO_L29N_6            | IO_L29N_6                        | W10                    | I/O  |
| 6    | IO_L29P_6            | IO_L29P_6                        | V10                    | I/O  |
| 6    | N.C. (◆)             | IO_L30N_6                        | V9                     | I/O  |
| 6    | N.C. (◆)             | IO_L30P_6                        | V8                     | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 6    | IO_L31N_6            | IO_L31N_6                        | W5                     | I/O  |
| 6    | IO_L31P_6            | IO_L31P_6                        | V6                     | I/O  |
| 6    | IO_L32N_6            | IO_L32N_6                        | V5                     | I/O  |
| 6    | IO_L32P_6            | IO_L32P_6                        | V4                     | I/O  |
| 6    | IO_L33N_6            | IO_L33N_6                        | V2                     | I/O  |
| 6    | IO_L33P_6            | IO_L33P_6                        | V1                     | I/O  |
| 6    | IO_L34N_6/<br>VREF_6 | IO_L34N_6/<br>VREF_6             | U10                    | VREF |
| 6    | IO_L34P_6            | IO_L34P_6                        | U9                     | I/O  |
| 6    | IO_L35N_6            | IO_L35N_6                        | U7                     | I/O  |
| 6    | IO_L35P_6            | IO_L35P_6                        | U6                     | I/O  |
| 6    | N.C. (◆)             | IO_L36N_6                        | U3                     | I/O  |
| 6    | N.C. (◆)             | IO_L36P_6                        | U2                     | I/O  |
| 6    | IO_L37N_6            | IO_L37N_6                        | T10                    | I/O  |
| 6    | IO_L37P_6            | IO_L37P_6                        | T9                     | I/O  |
| 6    | IO_L38N_6            | IO_L38N_6                        | T6                     | I/O  |
| 6    | IO_L38P_6            | IO_L38P_6                        | T5                     | I/O  |
| 6    | IO_L39N_6            | IO_L39N_6                        | T4                     | I/O  |
| 6    | IO_L39P_6            | IO_L39P_6                        | T3                     | I/O  |
| 6    | IO_L40N_6            | IO_L40N_6                        | T2                     | I/O  |
| 6    | IO_L40P_6/<br>VREF_6 | IO_L40P_6/<br>VREF_6             | T1                     | VREF |
| 6    | N.C. (◆)             | IO_L45N_6                        | Y4                     | I/O  |
| 6    | N.C. (◆)             | IO_L45P_6                        | Y3                     | I/O  |
| 6    | N.C. (◆)             | IO_L52N_6                        | T8                     | I/O  |
| 6    | N.C. (◆)             | IO_L52P_6                        | T7                     | I/O  |
| 6    | VCCO_6               | VCCO_6                           | V3                     | VCCO |
| 6    | VCCO_6               | VCCO_6                           | AB3                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | AF3                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | AD5                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | V7                     | VCCO |
| 6    | VCCO_6               | VCCO_6                           | AB7                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | Y9                     | VCCO |
| 6    | VCCO_6               | VCCO_6                           | U11                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | V11                    | VCCO |
| 6    | VCCO_6               | VCCO_6                           | W11                    | VCCO |
| 7    | IO                   | IO                               | J6                     | I/O  |
| 7    | IO_L01N_7/<br>VRP_7  | IO_L01N_7/<br>VRP_7              | C1                     | DCI  |
| 7    | IO_L01P_7/<br>VRN_7  | IO_L01P_7/<br>VRN_7              | C2                     | DCI  |
| 7    | IO_L02N_7            | IO_L02N_7                        | D3                     | I/O  |
| 7    | IO_L02P_7            | IO_L02P_7                        | D4                     | I/O  |
| 7    | IO_L03N_7/<br>VREF_7 | IO_L03N_7/<br>VREF_7             | D1                     | VREF |
| 7    | IO_L03P_7            | IO_L03P_7                        | D2                     | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 7    | IO_L04N_7            | IO_L04N_7                        | E1                     | I/O  |
| 7    | IO_L04P_7            | IO_L04P_7                        | E2                     | I/O  |
| 7    | IO_L05N_7            | IO_L05N_7                        | F5                     | I/O  |
| 7    | IO_L05P_7            | IO_L05P_7                        | E4                     | I/O  |
| 7    | IO_L06N_7            | IO_L06N_7                        | F2                     | I/O  |
| 7    | IO_L06P_7            | IO_L06P_7                        | F3                     | I/O  |
| 7    | IO_L07N_7            | IO_L07N_7                        | G3                     | I/O  |
| 7    | IO_L07P_7            | IO_L07P_7                        | G4                     | I/O  |
| 7    | IO_L08N_7            | IO_L08N_7                        | G1                     | I/O  |
| 7    | IO_L08P_7            | IO_L08P_7                        | G2                     | I/O  |
| 7    | IO_L09N_7            | IO_L09N_7                        | H7                     | I/O  |
| 7    | IO_L09P_7            | IO_L09P_7                        | G6                     | I/O  |
| 7    | IO_L10N_7            | IO_L10N_7                        | H5                     | I/O  |
| 7    | IO_L10P_7/<br>VREF_7 | IO_L10P_7/<br>VREF_7             | H6                     | VREF |
| 7    | IO_L11N_7            | IO_L11N_7                        | H3                     | I/O  |
| 7    | IO_L11P_7            | IO_L11P_7                        | H4                     | I/O  |
| 7    | IO_L13N_7            | IO_L13N_7                        | H1                     | I/O  |
| 7    | IO_L13P_7            | IO_L13P_7                        | H2                     | I/O  |
| 7    | IO_L14N_7            | IO_L14N_7                        | J4                     | I/O  |
| 7    | IO_L14P_7            | IO_L14P_7                        | J5                     | I/O  |
| 7    | IO_L15N_7            | IO_L15N_7                        | J1                     | I/O  |
| 7    | IO_L15P_7            | IO_L15P_7                        | J2                     | I/O  |
| 7    | IO_L16N_7            | IO_L16N_7                        | K9                     | I/O  |
| 7    | IO_L16P_7/<br>VREF_7 | IO_L16P_7/<br>VREF_7             | J8                     | VREF |
| 7    | IO_L17N_7            | IO_L17N_7                        | K6                     | I/O  |
| 7    | IO_L17P_7            | IO_L17P_7                        | K7                     | I/O  |
| 7    | IO_L19N_7/<br>VREF_7 | IO_L19N_7/<br>VREF_7             | K2                     | VREF |
| 7    | IO_L19P_7            | IO_L19P_7                        | K3                     | I/O  |
| 7    | IO_L20N_7            | IO_L20N_7                        | L10                    | I/O  |
| 7    | IO_L20P_7            | IO_L20P_7                        | K10                    | I/O  |
| 7    | IO_L21N_7            | IO_L21N_7                        | L7                     | I/O  |
| 7    | IO_L21P_7            | IO_L21P_7                        | L8                     | I/O  |
| 7    | IO_L22N_7            | IO_L22N_7                        | L5                     | I/O  |
| 7    | IO_L22P_7            | IO_L22P_7                        | L6                     | I/O  |
| 7    | IO_L23N_7            | IO_L23N_7                        | L3                     | I/O  |
| 7    | IO_L23P_7            | IO_L23P_7                        | L4                     | I/O  |
| 7    | IO_L24N_7            | IO_L24N_7                        | L1                     | I/O  |
| 7    | IO_L24P_7            | IO_L24P_7                        | L2                     | I/O  |
| 7    | N.C. (◆)             | IO_L25N_7                        | M6                     | I/O  |
| 7    | N.C. (◆)             | IO_L25P_7                        | M7                     | I/O  |
| 7    | IO_L26N_7            | IO_L26N_7                        | M3                     | I/O  |
| 7    | IO_L26P_7            | IO_L26P_7                        | M4                     | I/O  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| 7    | IO_L27N_7            | IO_L27N_7                        | M1                     | I/O  |
| 7    | IO_L27P_7/<br>VREF_7 | IO_L27P_7/<br>VREF_7             | M2                     | VREF |
| 7    | IO_L28N_7            | IO_L28N_7                        | N10                    | I/O  |
| 7    | IO_L28P_7            | IO_L28P_7                        | M10                    | I/O  |
| 7    | IO_L29N_7            | IO_L29N_7                        | N8                     | I/O  |
| 7    | IO_L29P_7            | IO_L29P_7                        | N9                     | I/O  |
| 7    | IO_L31N_7            | IO_L31N_7                        | N1                     | I/O  |
| 7    | IO_L31P_7            | IO_L31P_7                        | N2                     | I/O  |
| 7    | IO_L32N_7            | IO_L32N_7                        | P9                     | I/O  |
| 7    | IO_L32P_7            | IO_L32P_7                        | P10                    | I/O  |
| 7    | IO_L33N_7            | IO_L33N_7                        | P6                     | I/O  |
| 7    | IO_L33P_7            | IO_L33P_7                        | P7                     | I/O  |
| 7    | IO_L34N_7            | IO_L34N_7                        | P2                     | I/O  |
| 7    | IO_L34P_7            | IO_L34P_7                        | P3                     | I/O  |
| 7    | IO_L35N_7            | IO_L35N_7                        | R9                     | I/O  |
| 7    | IO_L35P_7            | IO_L35P_7                        | R10                    | I/O  |
| 7    | IO_L37N_7            | IO_L37N_7                        | R7                     | I/O  |
| 7    | IO_L37P_7/<br>VREF_7 | IO_L37P_7/<br>VREF_7             | R8                     | VREF |
| 7    | IO_L38N_7            | IO_L38N_7                        | R5                     | I/O  |
| 7    | IO_L38P_7            | IO_L38P_7                        | R6                     | I/O  |
| 7    | IO_L39N_7            | IO_L39N_7                        | R3                     | I/O  |
| 7    | IO_L39P_7            | IO_L39P_7                        | R4                     | I/O  |
| 7    | IO_L40N_7/<br>VREF_7 | IO_L40N_7/<br>VREF_7             | R1                     | VREF |
| 7    | IO_L40P_7            | IO_L40P_7                        | R2                     | I/O  |
| 7    | N.C. (◆)             | IO_L46N_7                        | M8                     | I/O  |
| 7    | N.C. (◆)             | IO_L46P_7                        | M9                     | I/O  |
| 7    | N.C. (◆)             | IO_L49N_7                        | N6                     | I/O  |
| 7    | N.C. (◆)             | IO_L49P_7                        | M5                     | I/O  |
| 7    | N.C. (◆)             | IO_L50N_7                        | N4                     | I/O  |
| 7    | N.C. (◆)             | IO_L50P_7                        | N5                     | I/O  |
| 7    | VCCO_7               | VCCO_7                           | E3                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | J3                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | N3                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | G5                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | J7                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | N7                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | L9                     | VCCO |
| 7    | VCCO_7               | VCCO_7                           | M11                    | VCCO |
| 7    | VCCO_7               | VCCO_7                           | N11                    | VCCO |
| 7    | VCCO_7               | VCCO_7                           | P11                    | VCCO |
| N/A  | GND                  | GND                              | A1                     | GND  |
| N/A  | GND                  | GND                              | B1                     | GND  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| N/A  | GND                  | GND                              | F1                     | GND  |
| N/A  | GND                  | GND                              | K1                     | GND  |
| N/A  | GND                  | GND                              | P1                     | GND  |
| N/A  | GND                  | GND                              | U1                     | GND  |
| N/A  | GND                  | GND                              | AA1                    | GND  |
| N/A  | GND                  | GND                              | AE1                    | GND  |
| N/A  | GND                  | GND                              | AJ1                    | GND  |
| N/A  | GND                  | GND                              | AK1                    | GND  |
| N/A  | GND                  | GND                              | A2                     | GND  |
| N/A  | GND                  | GND                              | B2                     | GND  |
| N/A  | GND                  | GND                              | AJ2                    | GND  |
| N/A  | GND                  | GND                              | E5                     | GND  |
| N/A  | GND                  | GND                              | K5                     | GND  |
| N/A  | GND                  | GND                              | P5                     | GND  |
| N/A  | GND                  | GND                              | U5                     | GND  |
| N/A  | GND                  | GND                              | AA5                    | GND  |
| N/A  | GND                  | GND                              | AF5                    | GND  |
| N/A  | GND                  | GND                              | A6                     | GND  |
| N/A  | GND                  | GND                              | AK6                    | GND  |
| N/A  | GND                  | GND                              | K8                     | GND  |
| N/A  | GND                  | GND                              | P8                     | GND  |
| N/A  | GND                  | GND                              | U8                     | GND  |
| N/A  | GND                  | GND                              | AA8                    | GND  |
| N/A  | GND                  | GND                              | A10                    | GND  |
| N/A  | GND                  | GND                              | E10                    | GND  |
| N/A  | GND                  | GND                              | H10                    | GND  |
| N/A  | GND                  | GND                              | AC10                   | GND  |
| N/A  | GND                  | GND                              | AF10                   | GND  |
| N/A  | GND                  | GND                              | AK10                   | GND  |
| N/A  | GND                  | GND                              | R12                    | GND  |
| N/A  | GND                  | GND                              | T12                    | GND  |
| N/A  | GND                  | GND                              | N13                    | GND  |
| N/A  | GND                  | GND                              | P13                    | GND  |
| N/A  | GND                  | GND                              | R13                    | GND  |
| N/A  | GND                  | GND                              | T13                    | GND  |
| N/A  | GND                  | GND                              | U13                    | GND  |
| N/A  | GND                  | GND                              | V13                    | GND  |
| N/A  | GND                  | GND                              | A14                    | GND  |
| N/A  | GND                  | GND                              | E14                    | GND  |
| N/A  | GND                  | GND                              | H14                    | GND  |
| N/A  | GND                  | GND                              | N14                    | GND  |
| N/A  | GND                  | GND                              | P14                    | GND  |
| N/A  | GND                  | GND                              | R14                    | GND  |
| N/A  | GND                  | GND                              | T14                    | GND  |
| N/A  | GND                  | GND                              | U14                    | GND  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type |
|------|----------------------|----------------------------------|------------------------|------|
| N/A  | GND                  | GND                              | V14                    | GND  |
| N/A  | GND                  | GND                              | AC14                   | GND  |
| N/A  | GND                  | GND                              | AF14                   | GND  |
| N/A  | GND                  | GND                              | AK14                   | GND  |
| N/A  | GND                  | GND                              | M15                    | GND  |
| N/A  | GND                  | GND                              | N15                    | GND  |
| N/A  | GND                  | GND                              | P15                    | GND  |
| N/A  | GND                  | GND                              | R15                    | GND  |
| N/A  | GND                  | GND                              | T15                    | GND  |
| N/A  | GND                  | GND                              | U15                    | GND  |
| N/A  | GND                  | GND                              | V15                    | GND  |
| N/A  | GND                  | GND                              | W15                    | GND  |
| N/A  | GND                  | GND                              | M16                    | GND  |
| N/A  | GND                  | GND                              | N16                    | GND  |
| N/A  | GND                  | GND                              | P16                    | GND  |
| N/A  | GND                  | GND                              | R16                    | GND  |
| N/A  | GND                  | GND                              | T16                    | GND  |
| N/A  | GND                  | GND                              | U16                    | GND  |
| N/A  | GND                  | GND                              | V16                    | GND  |
| N/A  | GND                  | GND                              | W16                    | GND  |
| N/A  | GND                  | GND                              | A17                    | GND  |
| N/A  | GND                  | GND                              | E17                    | GND  |
| N/A  | GND                  | GND                              | H17                    | GND  |
| N/A  | GND                  | GND                              | N17                    | GND  |
| N/A  | GND                  | GND                              | P17                    | GND  |
| N/A  | GND                  | GND                              | R17                    | GND  |
| N/A  | GND                  | GND                              | T17                    | GND  |
| N/A  | GND                  | GND                              | U17                    | GND  |
| N/A  | GND                  | GND                              | V17                    | GND  |
| N/A  | GND                  | GND                              | AC17                   | GND  |
| N/A  | GND                  | GND                              | AF17                   | GND  |
| N/A  | GND                  | GND                              | AK17                   | GND  |
| N/A  | GND                  | GND                              | N18                    | GND  |
| N/A  | GND                  | GND                              | P18                    | GND  |
| N/A  | GND                  | GND                              | R18                    | GND  |
| N/A  | GND                  | GND                              | T18                    | GND  |
| N/A  | GND                  | GND                              | U18                    | GND  |
| N/A  | GND                  | GND                              | V18                    | GND  |
| N/A  | GND                  | GND                              | R19                    | GND  |
| N/A  | GND                  | GND                              | T19                    | GND  |
| N/A  | GND                  | GND                              | A21                    | GND  |
| N/A  | GND                  | GND                              | E21                    | GND  |
| N/A  | GND                  | GND                              | H21                    | GND  |
| N/A  | GND                  | GND                              | AC21                   | GND  |
| N/A  | GND                  | GND                              | AF21                   | GND  |

Table 106: FG900 Package Pinout (Continued)

| Bank | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type   |
|------|----------------------|----------------------------------|------------------------|--------|
| N/A  | GND                  | GND                              | AK21                   | GND    |
| N/A  | GND                  | GND                              | K23                    | GND    |
| N/A  | GND                  | GND                              | P23                    | GND    |
| N/A  | GND                  | GND                              | U23                    | GND    |
| N/A  | GND                  | GND                              | AA23                   | GND    |
| N/A  | GND                  | GND                              | A25                    | GND    |
| N/A  | GND                  | GND                              | AK25                   | GND    |
| N/A  | GND                  | GND                              | E26                    | GND    |
| N/A  | GND                  | GND                              | K26                    | GND    |
| N/A  | GND                  | GND                              | P26                    | GND    |
| N/A  | GND                  | GND                              | U26                    | GND    |
| N/A  | GND                  | GND                              | AA26                   | GND    |
| N/A  | GND                  | GND                              | AF26                   | GND    |
| N/A  | GND                  | GND                              | A29                    | GND    |
| N/A  | GND                  | GND                              | B29                    | GND    |
| N/A  | GND                  | GND                              | AJ29                   | GND    |
| N/A  | GND                  | GND                              | AK29                   | GND    |
| N/A  | GND                  | GND                              | A30                    | GND    |
| N/A  | GND                  | GND                              | B30                    | GND    |
| N/A  | GND                  | GND                              | F30                    | GND    |
| N/A  | GND                  | GND                              | K30                    | GND    |
| N/A  | GND                  | GND                              | P30                    | GND    |
| N/A  | GND                  | GND                              | U30                    | GND    |
| N/A  | GND                  | GND                              | AA30                   | GND    |
| N/A  | GND                  | GND                              | AE30                   | GND    |
| N/A  | GND                  | GND                              | AJ30                   | GND    |
| N/A  | GND                  | GND                              | AK30                   | GND    |
| N/A  | GND                  | GND                              | AK2                    | GND    |
| N/A  | VCCAUX               | VCCAUX                           | F4                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | K4                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | P4                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | U4                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AA4                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AE4                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D6                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AG6                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D10                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AG10                   | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D14                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AG14                   | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D17                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AG17                   | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D21                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | AG21                   | VCCAUX |
| N/A  | VCCAUX               | VCCAUX                           | D25                    | VCCAUX |

Table 106: FG900 Package Pinout (Continued)

| Bank   | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type   |
|--------|----------------------|----------------------------------|------------------------|--------|
| N/A    | VCCAUX               | VCCAUX                           | AG25                   | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | F27                    | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | K27                    | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | P27                    | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | U27                    | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | AA27                   | VCCAUX |
| N/A    | VCCAUX               | VCCAUX                           | AE27                   | VCCAUX |
| N/A    | VCCINT               | VCCINT                           | L11                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | R11                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | T11                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | Y11                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | N12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | P12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | U12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | V12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W12                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M13                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W13                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M14                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W14                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | L15                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | Y15                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | L16                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | Y16                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M17                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W17                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M18                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W18                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | M19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | N19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | P19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | U19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | V19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | W19                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | L20                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | R20                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | T20                    | VCCINT |
| N/A    | VCCINT               | VCCINT                           | Y20                    | VCCINT |
| VCCAUX | CCLK                 | CCLK                             | AH28                   | CONFIG |
| VCCAUX | DONE                 | DONE                             | AJ28                   | CONFIG |
| VCCAUX | HSWAP_EN             | HSWAP_EN                         | A3                     | CONFIG |
| VCCAUX | M0                   | M0                               | AJ3                    | CONFIG |
| VCCAUX | M1                   | M1                               | AH3                    | CONFIG |
| VCCAUX | M2                   | M2                               | AK3                    | CONFIG |

Table 106: FG900 Package Pinout (Continued)

| Bank   | XC3S2000<br>Pin Name | XC3S4000<br>XC3S5000<br>Pin Name | FG900<br>Pin<br>Number | Type   |
|--------|----------------------|----------------------------------|------------------------|--------|
| VCCAUX | PROG_B               | PROG_B                           | B3                     | CONFIG |
| VCCAUX | TCK                  | TCK                              | B28                    | JTAG   |
| VCCAUX | TDI                  | TDI                              | C3                     | JTAG   |
| VCCAUX | TDO                  | TDO                              | C28                    | JTAG   |
| VCCAUX | TMS                  | TMS                              | A28                    | JTAG   |

## User I/Os by Bank

Table 107 indicates how the available user-I/O pins are distributed between the eight I/O banks for the XC3S2000 in the FG900 package. Similarly, Table 108 shows how the available user-I/O pins are distributed between the eight I/O banks for the XC3S4000 and XC3S5000 in the FG900 package.

Table 107: User I/Os Per Bank for XC3S2000 in FG900 Package

| Edge   | I/O<br>Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|-------------|----------------|-------------------------------|------|-----|------|------|
|        |             |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0           | 71             | 62                            | 0    | 2   | 5    | 2    |
|        | 1           | 71             | 62                            | 0    | 2   | 5    | 2    |
| Right  | 2           | 69             | 61                            | 0    | 2   | 6    | 0    |
|        | 3           | 71             | 62                            | 0    | 2   | 7    | 0    |
| Bottom | 4           | 72             | 57                            | 6    | 2   | 5    | 2    |
|        | 5           | 71             | 55                            | 6    | 2   | 6    | 2    |
| Left   | 6           | 69             | 60                            | 0    | 2   | 7    | 0    |
|        | 7           | 71             | 62                            | 0    | 2   | 7    | 0    |

Table 108: User I/Os Per Bank for XC3S4000 and XC3S5000 in FG900 Package

| Edge   | I/O<br>Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------|-------------|----------------|-------------------------------|------|-----|------|------|
|        |             |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top    | 0           | 79             | 70                            | 0    | 2   | 5    | 2    |
|        | 1           | 79             | 70                            | 0    | 2   | 5    | 2    |
| Right  | 2           | 79             | 71                            | 0    | 2   | 6    | 0    |
|        | 3           | 79             | 70                            | 0    | 2   | 7    | 0    |
| Bottom | 4           | 80             | 65                            | 6    | 2   | 5    | 2    |
|        | 5           | 79             | 63                            | 6    | 2   | 6    | 2    |
| Left   | 6           | 79             | 70                            | 0    | 2   | 7    | 0    |
|        | 7           | 79             | 70                            | 0    | 2   | 7    | 0    |

## FG900 Footprint

### Left Half of FG900 Package (top view)

#### XC3S2000

(565 max. user I/O)

481 I/O: Unrestricted, general-purpose user I/O

48 VREF: User I/O or input voltage reference for bank

68 N.C.: Unconnected pins for XC3S2000 (◆)

#### XC3S4000, XC3S5000

(633 max user I/O)

549 I/O: Unrestricted, general-purpose user I/O

48 VREF: User I/O or input voltage reference for bank

0 N.C.: No unconnected pins in this package

#### All devices

12 DUAL: Configuration pin, then possible user I/O

8 GCLK: User I/O or global clock buffer input

16 DCI: User I/O or reference resistor input for bank

7 CONFIG: Dedicated configuration pins

4 JTAG: Dedicated JTAG port pins

32 VCCINT: Internal core voltage supply (+1.2V)

80 VCCO: Output voltage supply for bank

24 VCCAUX: Auxiliary voltage supply (+2.5V)

120 GND: Ground

| Bank 0 |                   |                   |                   |                  |                   |                   |                   |                   |            |                   |                   |            |                   |                   |                   |                   |
|--------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------|-------------------|-------------------|------------|-------------------|-------------------|-------------------|-------------------|
|        | 1                 | 2                 | 3                 | 4                | 5                 | 6                 | 7                 | 8                 | 9          | 10                | 11                | 12         | 13                | 14                | 15                |                   |
| A      | GND               | GND               | HSWAP_EN          | I/O L01P_0 VRN_0 | I/O L02P_0        | GND               | I/O L35P_0        | I/O L09P_0        | I/O L38P_0 | GND               | I/O L17P_0        | I/O L22P_0 | I/O L25P_0        | GND               | I/O L32P_0 GCLK6  |                   |
| B      | GND               | GND               | PROG_B            | I/O L01N_0 VRP_0 | I/O L02N_0        | I/O L04P_0        | I/O L35N_0        | I/O L09N_0        | I/O L38N_0 | I/O L12P_0        | I/O L17N_0        | I/O L22N_0 | I/O L25N_0        | I/O L28P_0        | I/O L32N_0 GCLK7  |                   |
| C      | I/O L01N_7 VRP_7  | I/O L01P_7 VRN_7  | TDI               | I/O VREF_0       | VCCO_0            | I/O L04N_0        | I/O L06P_0        | I/O L08P_0        | VCCO_0     | I/O L12N_0        | I/O L16P_0        | I/O L21P_0 | VCCO_0            | I/O L28N_0        | I/O L31P_0 VREF_0 |                   |
| D      | I/O L03N_7 VREF_7 | I/O L03P_7        | I/O L02N_7        | I/O L02P_7       | I/O L03N_0        | VCCAUX            | I/O L06N_0        | I/O L08N_0        | I/O L37P_0 | VCCAUX            | I/O L16N_0        | I/O L21N_0 | I/O               | VCCAUX            | I/O L31N_0        |                   |
| E      | I/O L04N_7        | I/O L04P_7        | VCCO_7            | I/O L05P_7       | GND               | I/O L03P_0        | VCCO_0            | I/O L07P_0        | I/O L37N_0 | GND               | I/O L15P_0        | I/O L20P_0 | I/O L24P_0        | GND               | I/O               |                   |
| F      | GND               | I/O L06N_7        | I/O L06P_7        | VCCAUX           | I/O L05N_7        | I/O L05N_0        | I/O L05P_0 VREF_0 | I/O L07N_0        | I/O VREF_0 | I/O L11P_0        | I/O L15N_0        | I/O L20N_0 | I/O L24N_0        | I/O L27P_0        | I/O L30P_0        |                   |
| G      | I/O L08N_7        | I/O L08P_7        | I/O L07N_7        | I/O L07P_7       | VCCO_7            | I/O L09P_7        | I/O L36N_0        | I/O               | VCCO_0     | I/O L11N_0        | I/O L14P_0        | I/O L19P_0 | VCCO_0            | I/O L27N_0        | I/O L30N_0        |                   |
| H      | I/O L13N_7        | I/O L13P_7        | I/O L11N_7        | I/O L11P_7       | I/O L10N_7        | I/O L10P_7 VREF_7 | I/O L09N_7        | I/O L36P_0        | I/O L10P_0 | GND               | I/O L14N_0        | I/O L19N_0 | I/O L23P_0        | GND               | I/O L29P_0        |                   |
| J      | I/O L15N_7        | I/O L15P_7        | VCCO_7            | I/O L14N_7       | I/O L14P_7        | I/O               | VCCO_7            | I/O L16P_7 VREF_7 | I/O L10N_0 | I/O L13N_0        | VCCO_0            | I/O L18P_0 | I/O L23N_0        | I/O L26P_0 VREF_0 | I/O L29N_0        |                   |
| K      | GND               | I/O L19N_7 VREF_7 | I/O L19P_7        | VCCAUX           | GND               | I/O L17N_7        | I/O L17P_7        | GND               | I/O L16N_7 | I/O L20P_7        | I/O L13P_0        | I/O L18N_0 | I/O               | I/O L26N_0        | I/O               |                   |
| L      | I/O L24N_7        | I/O L24P_7        | I/O L23N_7        | I/O L23P_7       | I/O L22N_7        | I/O L22P_7        | I/O L21N_7        | I/O L21P_7        | VCCO_7     | I/O L20N_7        | VCCINT            | VCCO_0     | VCCO_0            | VCCO_0            | VCCINT            |                   |
| M      | I/O L27N_7        | I/O L27P_7 VREF_7 | I/O L26N_7        | I/O L26P_7       | I/O L49P_7        | I/O L25N_7        | I/O L25P_7        | I/O L46N_7        | I/O L46P_7 | I/O L28P_7        | VCCO_7            | VCCINT     | VCCINT            | VCCINT            | GND               |                   |
| N      | I/O L31N_7        | I/O L31P_7        | VCCO_7            | I/O L34P_7       | I/O L50P_7        | I/O L49N_7        | VCCO_7            | I/O L29N_7        | I/O L29P_7 | I/O L28N_7        | VCCO_7            | VCCINT     | GND               | GND               | GND               |                   |
| P      | GND               | I/O L34N_7        | I/O L34P_7        | VCCAUX           | GND               | I/O L33N_7        | I/O L33P_7        | GND               | I/O L32N_7 | I/O L32P_7        | VCCO_7            | VCCINT     | GND               | GND               | GND               |                   |
| R      | I/O L40N_7 VREF_7 | I/O L40P_7        | I/O L39N_7        | I/O L39P_7       | I/O L38N_7        | I/O L38P_7        | I/O L37N_7        | I/O L37P_7 VREF_7 | I/O L35N_7 | I/O L35P_7        | VCCINT            | GND        | GND               | GND               | GND               |                   |
| T      | I/O L40P_6 VREF_6 | I/O L40N_6        | I/O L39P_6        | I/O L39N_6       | I/O L38P_6        | I/O L38N_6        | I/O L52P_6        | I/O L52N_6        | I/O L37P_6 | I/O L37N_6        | VCCINT            | GND        | GND               | GND               | GND               |                   |
| U      | GND               | I/O L36P_6        | I/O L36N_6        | VCCAUX           | GND               | I/O L35P_6        | I/O L35N_6        | GND               | I/O L34P_6 | I/O L34N_6 VREF_6 | VCCO_6            | VCCINT     | GND               | GND               | GND               |                   |
| V      | I/O L33P_6        | I/O L33N_6        | VCCO_6            | I/O L32P_6       | I/O L32N_6        | I/O L31P_6        | VCCO_6            | I/O L30P_6        | I/O L30N_6 | I/O L29P_6        | VCCO_6            | VCCINT     | GND               | GND               | GND               |                   |
| W      | I/O L28P_6        | I/O L28N_6        | I/O L27P_6        | I/O L27N_6       | I/O L31N_6        | I/O L26P_6        | I/O L26N_6        | I/O L25P_6        | I/O L25N_6 | I/O L29N_6        | VCCO_6            | VCCINT     | VCCINT            | VCCINT            | GND               |                   |
| Y      | I/O L24P_6        | I/O L24N_6 VREF_6 | I/O L45P_6        | I/O L45N_6       | I/O L22P_6        | I/O L22N_6        | I/O L21P_6        | I/O L21N_6        | VCCO_6     | I/O L20P_6        | VCCINT            | VCCO_5     | VCCO_5            | VCCO_5            | VCCINT            |                   |
| Bank 6 | A                 | GND               | I/O L19P_6        | I/O L19N_6       | VCCAUX            | GND               | I/O L17P_6 VREF_6 | I/O L17N_6        | GND        | I/O L16P_6        | I/O L20N_6        | I/O        | I/O L22P_5        | I/O L22N_5        | I/O L26P_5        | I/O               |
|        | B                 | I/O L15P_6        | I/O L15N_6        | VCCO_6           | I/O L14P_6        | I/O L14N_6        | I/O               | VCCO_6            | I/O L16N_6 | I/O L08P_5        | I/O               | VCCO_5     | I/O L17N_5        | I/O L23P_5        | I/O L26N_5        | I/O L29P_5 VREF_5 |
|        | C                 | I/O L13P_6 VREF_6 | I/O L13N_6        | I/O L11P_6       | I/O L11N_6        | I/O L10P_6        | I/O L10N_6        | I/O L09P_6        | I/O L36P_5 | I/O L08N_5        | GND               | I/O L17P_5 | I/O L18P_5        | I/O L23N_5        | GND               | I/O L29N_5        |
|        | D                 | I/O L08P_6        | I/O L08N_6        | I/O L07P_6       | I/O L07N_6        | VCCO_6            | I/O L09N_6 VREF_6 | I/O L05P_5        | I/O L36N_5 | VCCO_5            | I/O L13P_5        | I/O L13N_5 | I/O L18N_5        | VCCO_5            | I/O L30P_5        | I/O L30N_5        |
|        | E                 | GND               | I/O L06P_6        | I/O L06N_6       | VCCAUX            | I/O L05P_6        | I/O               | I/O L05N_5        | I/O L37P_5 | I/O L11P_5        | I/O L11N_5 VREF_5 | I/O L14P_5 | I/O L19P_5 VREF_5 | I/O L27P_5        | I/O L27N_5 VREF_5 | I/O               |
|        | F                 | I/O L04P_6        | I/O L04N_6        | VCCO_6           | I/O L05N_6        | GND               | I/O L03N_5        | VCCO_5            | I/O L37N_5 | I/O L09P_5        | GND               | I/O L14N_5 | I/O L19N_5        | I/O L24P_5        | GND               | I/O L31P_5 D5     |
|        | G                 | I/O L03P_6        | I/O L03N_6 VREF_6 | I/O L02P_6       | I/O L02N_6        | I/O L03P_5        | VCCAUX            | I/O L06P_5        | I/O L38P_5 | I/O L09N_5        | VCCAUX            | I/O L15P_5 | I/O L20P_5        | I/O L24N_5        | VCCAUX            | I/O L31N_5 D4     |
|        | H                 | I/O L01P_6 VRN_6  | I/O L01N_6 VRP_6  | M1               | I/O VREF_5        | VCCO_5            | I/O L04P_5        | I/O L06N_5        | I/O L38N_5 | I/O L12P_5        | VCCO_5            | I/O L15N_5 | I/O L20N_5        | VCCO_5            | I/O L28P_5 D7     | I/O L32P_5 GCLK2  |
|        | J                 | GND               | GND               | M0               | I/O L01P_5 CS_B   | I/O L02P_5        | I/O L04N_5        | I/O L35P_5        | I/O L07P_5 | I/O L10P_5 VRN_5  | I/O L12N_5        | I/O L16P_5 | I/O L21P_5        | I/O L25P_5        | I/O L28N_5 D6     | I/O L32N_5 GCLK3  |
|        | K                 | GND               | GND               | M2               | I/O L01N_5 RDWR_B | I/O L02N_5        | GND               | I/O L35N_5        | I/O L07N_5 | I/O L10N_5 VRP_5  | GND               | I/O L16N_5 | I/O L21N_5        | I/O L25N_5        | GND               | I/O VREF_5        |
|        | Bank 5            |                   |                   |                  |                   |                   |                   |                   |            |                   |                   |            |                   |                   |                   |                   |

Figure 50: FG900 Package Footprint (top view)

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| Bank 1                  |                      |                 |                      |            |                      |                 |                      |                      |                      |                 |                      |                      |                      | Bank 2               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|----------------------|-----------------|----------------------|------------|----------------------|-----------------|----------------------|----------------------|----------------------|-----------------|----------------------|----------------------|----------------------|----------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 16                      | 17                   | 18              | 19                   | 20         | 21                   | 22              | 23                   | 24                   | 25                   | 26              | 27                   | 28                   | 29                   | 30                   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O                     | GND                  | I/O L39N_1<br>◆ | I/O L26N_1           | I/O L21N_1 | GND                  | I/O L15N_1      | I/O L11N_1           | I/O L07N_1           | GND                  | I/O L03N_1      | I/O L01N_1<br>VRP_1  | TMS                  | GND                  | GND                  | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L32N_1<br>GCLK5     | I/O L28N_1           | I/O L39P_1<br>◆ | I/O L26P_1           | I/O L21P_1 | I/O L17N_1<br>VREF_1 | I/O L15P_1      | I/O L11P_1           | I/O L07P_1           | I/O L04N_1           | I/O L03P_1      | I/O L01P_1<br>VRN_1  | TCK                  | GND                  | GND                  | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L32P_1<br>GCLK4     | I/O L28P_1           | VCCO_1          | I/O L25N_1           | I/O L20N_1 | I/O L17P_1           | VCCO_1          | I/O L10N_1<br>VREF_1 | I/O L06N_1<br>VREF_1 | I/O L04P_1           | VCCO_1          | I/O L02P_1           | TDO                  | I/O L01N_2<br>VRP_2  | I/O L01P_2<br>VRN_2  | C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L31N_1<br>VREF_1    | VCCAUX               | I/O L38N_1<br>◆ | I/O L25P_1           | I/O L20P_1 | VCCAUX               | I/O L14N_1      | I/O L10P_1           | I/O L06P_1           | VCCAUX               | I/O L02N_1      | I/O L02N_2           | I/O L02P_2           | I/O L03N_2<br>VREF_2 | I/O L03P_2           | D |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L31P_1              | GND                  | I/O L38P_1<br>◆ | I/O L24N_1           | I/O L19N_1 | GND                  | I/O L14P_1      | I/O L13P_1           | VCCO_1               | I/O                  | GND             | I/O L41N_2<br>◆      | VCCO_2               | I/O L04N_2           | I/O L04P_2           | E |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O                     | I/O L27N_1           | I/O             | I/O L24P_1           | I/O L19P_1 | I/O L16N_1           | I/O L13N_1      | I/O L09N_1           | I/O L05N_1           | I/O L05P_1           | I/O L41P_2<br>◆ | VCCAUX               | I/O L05N_2           | I/O L05P_2           | GND                  | F |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L30N_1              | I/O L27P_1           | VCCO_1          | I/O L23N_1           | I/O L18N_1 | I/O L16P_1           | VCCO_1          | I/O L09P_1           | I/O L08P_1           | I/O L08N_2           | VCCO_2          | I/O L06N_2           | I/O L06P_2           | I/O L07N_2           | I/O L07P_2           | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L30P_1              | GND                  | I/O L37N_1<br>◆ | I/O L23P_1           | I/O L18P_1 | GND                  | I/O L12N_1      | I/O L08N_1           | I/O L08P_2           | I/O L09N_2<br>VREF_2 | I/O L09P_2      | I/O L10N_2           | I/O L10P_2           | I/O L12N_2           | I/O L12P_2           | H |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L29N_1              | I/O VREF_1           | I/O L37P_1<br>◆ | I/O L22N_1           | VCCO_1     | I/O                  | I/O L12P_1      | I/O L15N_2           | VCCO_2               | I/O                  | I/O L13N_2      | I/O L13P_2<br>VREF_2 | VCCO_2               | I/O L14N_2           | I/O L14P_2           | J |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L29P_1              | I/O L40N_1<br>◆      | I/O L40P_1<br>◆ | I/O L22P_1           | I/O        | I/O L46N_2<br>◆      | I/O L15P_2      | GND                  | I/O L16N_2           | I/O L16P_2           | GND             | VCCAUX               | I/O L45N_2<br>◆      | I/O L45P_2<br>◆      | GND                  | K |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| VCCINT                  | VCCO_1               | VCCO_1          | VCCO_1               | VCCINT     | I/O L46P_2<br>◆      | VCCO_2          | I/O L47N_2<br>◆      | I/O L47P_2<br>◆      | I/O L19N_2           | I/O L19P_2      | I/O L20N_2           | I/O L20P_2           | I/O L21N_2           | I/O L21P_2           | L |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | VCCINT               | VCCINT          | VCCINT               | VCCO_2     | I/O L26N_2           | I/O L22N_2      | I/O L22P_2           | I/O L23N_2<br>VREF_2 | I/O L23P_2           | I/O L28N_2      | I/O L24N_2           | I/O L24P_2           | I/O L50N_2<br>◆      | I/O L50P_2<br>◆      | M |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | VCCINT               | VCCO_2     | I/O L26P_2           | I/O L27N_2      | I/O L27P_2           | VCCO_2               | I/O L28P_2           | I/O L29N_2      | I/O L29P_2           | VCCO_2               | I/O L31N_2           | I/O L31P_2           | N |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | VCCINT               | VCCO_2     | I/O L32N_2           | I/O L32P_2      | GND                  | I/O L33N_2           | I/O L33P_2           | GND             | VCCAUX               | I/O L34N_2<br>VREF_2 | I/O L34P_2           | GND                  | P |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | GND                  | VCCINT     | I/O L35N_2           | I/O L35P_2      | I/O L37N_2           | I/O L37P_2           | I/O L38N_2           | I/O L38P_2      | I/O L39N_2           | I/O L39P_2           | I/O L40N_2           | I/O L40P_2<br>VREF_2 | R |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | GND                  | VCCINT     | I/O L35P_3           | I/O L35N_3      | I/O L37P_3           | I/O L37N_3           | I/O L38P_3           | I/O L38N_3      | I/O L39P_3           | I/O L39N_3           | I/O L40P_3           | I/O L40N_3<br>VREF_3 | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | VCCINT               | VCCO_3     | I/O L32P_3           | I/O L32N_3      | GND                  | I/O L33P_3           | I/O L33N_3           | GND             | VCCAUX               | I/O L34P_3<br>VREF_3 | I/O L34N_3           | GND                  | U |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | GND                  | GND             | VCCINT               | VCCO_3     | I/O L27N_3           | I/O L28P_3      | I/O L28N_3           | VCCO_3               | I/O L29N_3           | I/O L50P_3<br>◆ | I/O L50N_3<br>◆      | VCCO_3               | I/O L31P_3           | I/O L31N_3           | V |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| GND                     | VCCINT               | VCCINT          | VCCINT               | VCCO_3     | I/O L27P_3           | I/O L46P_3<br>◆ | I/O L46N_3<br>◆      | I/O L47P_3<br>◆      | I/O L47N_3<br>◆      | I/O L29P_3      | I/O L48P_3<br>◆      | I/O L48N_3<br>◆      | I/O L26P_3           | I/O L26N_3           | W |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| VCCINT                  | VCCO_4               | VCCO_4          | VCCO_4               | VCCINT     | I/O L20N_3           | VCCO_3          | I/O L21P_3           | I/O L21N_3           | I/O L22P_3           | I/O L22N_3      | I/O L23P_3<br>VREF_3 | I/O L23N_3           | I/O L24P_3           | I/O L24N_3           | Y |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O                     | I/O L26N_4           | I/O             | I/O L18N_4           | I/O L13P_4 | I/O L20P_3           | I/O L16N_3      | GND                  | I/O L17P_3<br>VREF_3 | I/O L17N_3           | GND             | VCCAUX               | I/O L19P_3           | I/O L19N_3           | GND                  | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L29N_4              | I/O L26P_4<br>VREF_4 | I/O L23N_4      | I/O L18P_4           | VCCO_4     | I/O L13N_4           | I/O L08N_4      | I/O L16P_3           | VCCO_3               | I/O                  | I/O L14P_3      | I/O L14N_3           | VCCO_3               | I/O L15P_3           | I/O L15N_3           | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L29P_4              | GND                  | I/O L23P_4      | I/O L19N_4           | I/O L14N_4 | GND                  | I/O L08P_4      | I/O L04P_4           | I/O L09N_3           | I/O L10P_3           | I/O L10N_3      | I/O L11P_3           | I/O L11N_3           | I/O L13P_3           | I/O L13N_3<br>VREF_3 | C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L30N_4<br>D2        | I/O L27N_4<br>DIN_D0 | VCCO_4          | I/O L19P_4           | I/O L14P_4 | I/O L11N_4           | VCCO_4          | I/O                  | I/O L04N_4           | I/O L09P_3<br>VREF_3 | VCCO_3          | I/O L07P_3           | I/O L07N_3           | I/O L08P_3           | I/O L08N_3           | D |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L30P_4<br>D3        | I/O L27P_4<br>D1     | I/O L24N_4      | I/O L20N_4           | I/O L15N_4 | I/O L11P_4           | I/O             | I/O L05N_4           | I/O L34P_4<br>◆      | I/O L34N_4<br>◆      | I/O L05N_3      | VCCAUX               | I/O L06P_3           | I/O L06N_3           | GND                  | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O VREF_4              | GND                  | I/O L24P_4      | I/O L20P_4           | I/O L15P_4 | GND                  | I/O L09N_4      | I/O L05P_4           | VCCO_4               | I/O L03P_4           | GND             | I/O L05P_3           | VCCO_3               | I/O L04P_3           | I/O L04N_3           | F |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L31N_4<br>INIT_B    | VCCAUX               | I/O             | I/O L21N_4           | I/O L16N_4 | VCCAUX               | I/O L09P_4      | I/O L06N_4<br>VREF_4 | I/O L35N_4<br>◆      | VCCAUX               | I/O L03N_4      | I/O L02P_3           | I/O L02N_3<br>VREF_3 | I/O L03P_3           | I/O L03N_3           | G |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L31P_4<br>DOUT_BUSY | I/O L28N_4           | VCCO_4          | I/O L21P_4           | I/O L16P_4 | I/O L12N_4           | VCCO_4          | I/O L06P_4           | I/O L35P_4<br>◆      | I/O L33N_4<br>◆      | VCCO_4          | I/O                  | CCLK                 | I/O L01P_3<br>VRN_3  | I/O L01N_3<br>VRP_3  | H |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L32N_4<br>GCLK1     | I/O L28P_4           | I/O L25N_4      | I/O L22N_4<br>VREF_4 | I/O L17N_4 | I/O L12P_4           | I/O L10N_4      | I/O L07N_4           | I/O L38N_4<br>◆      | I/O L33P_4<br>◆      | I/O L02N_4      | I/O L01N_4<br>VRP_4  | DONE                 | GND                  | GND                  | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| I/O L32P_4<br>GCLK0     | GND                  | I/O L25P_4      | I/O L22P_4           | I/O L17P_4 | GND                  | I/O L10P_4      | I/O L07P_4           | I/O L38P_4<br>◆      | GND                  | I/O L02P_4      | I/O L01P_4<br>VRN_4  | I/O VREF_4           | GND                  | GND                  | A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bank 4                  |                      |                 |                      |            |                      |                 |                      |                      |                      |                 |                      |                      |                      | Bank 3               |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                         |                      |                 |                      |            |                      |                 |                      |                      |                      |                 |                      |                      |                      | DS099-4.13b.121103   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



## FG1156: 1156-lead Fine-pitch Ball Grid Array

**Note:** The FG(G)1156 package is being discontinued and is not recommended for new designs. See [http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates.

The 1,156-lead fine-pitch ball grid array package, FG1156, supports two different Spartan-3 devices, namely the XC3S4000 and the XC3S5000. The XC3S4000, however, has fewer I/O pins, which consequently results in 73 unconnected pins on the FG1156 package, labeled as "N.C." In [Table 109](#) and [Figure 51](#), these unconnected pins are indicated with a black diamond symbol (◆).

The XC3S5000 has a single unconnected package pin, ball AK31, which is also unconnected for the XC3S4000.

All the package pins appear in [Table 109](#) and are sorted by bank number, then by pin name. Pairs of pins that form a differential I/O pair appear together in the table. The table also shows the pin number for each pin and the pin type, as defined earlier.

If there is a difference between the XC3S4000 and XC3S5000 pinouts, then that difference is highlighted in [Table 109](#). If the table entry is shaded grey, then there is an unconnected pin on the XC3S4000 that maps to a user-I/O pin on the XC3S5000. If the table entry is shaded tan, which only occurs on ball L29 in I/O Bank 2, then the unconnected pin on the XC3S4000 maps to a VREF-type pin on the XC3S5000. If the other VREF\_2 pins all connect to a voltage reference to support a special I/O standard, then also connect the N.C. pin on the XC3S4000 to the same VREF\_2 voltage.

### Pinout Table

Table 109: FG1156 Package Pinout

| Bank | XC3S4000 Pin Name | XC3S5000 Pin Name | FG1156 Pin Number | Type |
|------|-------------------|-------------------|-------------------|------|
| 0    | IO                | IO                | B9                | I/O  |
| 0    | IO                | IO                | E17               | I/O  |
| 0    | IO                | IO                | F6                | I/O  |
| 0    | IO                | IO                | F8                | I/O  |
| 0    | IO                | IO                | G12               | I/O  |
| 0    | IO                | IO                | H8                | I/O  |
| 0    | IO                | IO                | H9                | I/O  |
| 0    | IO                | IO                | J11               | I/O  |
| 0    | N.C. (◆)          | IO                | J9                | I/O  |
| 0    | N.C. (◆)          | IO                | K11               | I/O  |
| 0    | IO                | IO                | K13               | I/O  |
| 0    | IO                | IO                | K16               | I/O  |
| 0    | IO                | IO                | K17               | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000 Pin Name    | XC3S5000 Pin Name    | FG1156 Pin Number | Type |
|------|----------------------|----------------------|-------------------|------|
| 0    | IO                   | IO                   | L13               | I/O  |
| 0    | IO                   | IO                   | L16               | I/O  |
| 0    | IO                   | IO                   | L17               | I/O  |
| 0    | IO/VREF_0            | IO/VREF_0            | D5                | VREF |
| 0    | IO/VREF_0            | IO/VREF_0            | E10               | VREF |
| 0    | IO/VREF_0            | IO/VREF_0            | J14               | VREF |
| 0    | IO/VREF_0            | IO/VREF_0            | L15               | VREF |
| 0    | IO_L01N_0/<br>VRP_0  | IO_L01N_0/<br>VRP_0  | B3                | DCI  |
| 0    | IO_L01P_0/<br>VRN_0  | IO_L01P_0/<br>VRN_0  | A3                | DCI  |
| 0    | IO_L02N_0            | IO_L02N_0            | B4                | I/O  |
| 0    | IO_L02P_0            | IO_L02P_0            | A4                | I/O  |
| 0    | IO_L03N_0            | IO_L03N_0            | C5                | I/O  |
| 0    | IO_L03P_0            | IO_L03P_0            | B5                | I/O  |
| 0    | IO_L04N_0            | IO_L04N_0            | D6                | I/O  |
| 0    | IO_L04P_0            | IO_L04P_0            | C6                | I/O  |
| 0    | IO_L05N_0            | IO_L05N_0            | B6                | I/O  |
| 0    | IO_L05P_0/<br>VREF_0 | IO_L05P_0/<br>VREF_0 | A6                | VREF |
| 0    | IO_L06N_0            | IO_L06N_0            | F7                | I/O  |
| 0    | IO_L06P_0            | IO_L06P_0            | E7                | I/O  |
| 0    | IO_L07N_0            | IO_L07N_0            | G9                | I/O  |
| 0    | IO_L07P_0            | IO_L07P_0            | F9                | I/O  |
| 0    | IO_L08N_0            | IO_L08N_0            | D9                | I/O  |
| 0    | IO_L08P_0            | IO_L08P_0            | C9                | I/O  |
| 0    | IO_L09N_0            | IO_L09N_0            | J10               | I/O  |
| 0    | IO_L09P_0            | IO_L09P_0            | H10               | I/O  |
| 0    | IO_L10N_0            | IO_L10N_0            | G10               | I/O  |
| 0    | IO_L10P_0            | IO_L10P_0            | F10               | I/O  |
| 0    | IO_L11N_0            | IO_L11N_0            | L12               | I/O  |
| 0    | IO_L11P_0            | IO_L11P_0            | K12               | I/O  |
| 0    | IO_L12N_0            | IO_L12N_0            | J12               | I/O  |
| 0    | IO_L12P_0            | IO_L12P_0            | H12               | I/O  |
| 0    | IO_L13N_0            | IO_L13N_0            | F12               | I/O  |
| 0    | IO_L13P_0            | IO_L13P_0            | E12               | I/O  |
| 0    | IO_L14N_0            | IO_L14N_0            | D12               | I/O  |
| 0    | IO_L14P_0            | IO_L14P_0            | C12               | I/O  |
| 0    | IO_L15N_0            | IO_L15N_0            | B12               | I/O  |
| 0    | IO_L15P_0            | IO_L15P_0            | A12               | I/O  |
| 0    | IO_L16N_0            | IO_L16N_0            | H13               | I/O  |
| 0    | IO_L16P_0            | IO_L16P_0            | G13               | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 0    | IO_L17N_0            | IO_L17N_0            | D13                     | I/O  |
| 0    | IO_L17P_0            | IO_L17P_0            | C13                     | I/O  |
| 0    | IO_L18N_0            | IO_L18N_0            | L14                     | I/O  |
| 0    | IO_L18P_0            | IO_L18P_0            | K14                     | I/O  |
| 0    | IO_L19N_0            | IO_L19N_0            | H14                     | I/O  |
| 0    | IO_L19P_0            | IO_L19P_0            | G14                     | I/O  |
| 0    | IO_L20N_0            | IO_L20N_0            | F14                     | I/O  |
| 0    | IO_L20P_0            | IO_L20P_0            | E14                     | I/O  |
| 0    | IO_L21N_0            | IO_L21N_0            | D14                     | I/O  |
| 0    | IO_L21P_0            | IO_L21P_0            | C14                     | I/O  |
| 0    | IO_L22N_0            | IO_L22N_0            | B14                     | I/O  |
| 0    | IO_L22P_0            | IO_L22P_0            | A14                     | I/O  |
| 0    | IO_L23N_0            | IO_L23N_0            | K15                     | I/O  |
| 0    | IO_L23P_0            | IO_L23P_0            | J15                     | I/O  |
| 0    | IO_L24N_0            | IO_L24N_0            | G15                     | I/O  |
| 0    | IO_L24P_0            | IO_L24P_0            | F15                     | I/O  |
| 0    | IO_L25N_0            | IO_L25N_0            | D15                     | I/O  |
| 0    | IO_L25P_0            | IO_L25P_0            | C15                     | I/O  |
| 0    | IO_L26N_0            | IO_L26N_0            | B15                     | I/O  |
| 0    | IO_L26P_0/<br>VREF_0 | IO_L26P_0/<br>VREF_0 | A15                     | VREF |
| 0    | IO_L27N_0            | IO_L27N_0            | G16                     | I/O  |
| 0    | IO_L27P_0            | IO_L27P_0            | F16                     | I/O  |
| 0    | IO_L28N_0            | IO_L28N_0            | C16                     | I/O  |
| 0    | IO_L28P_0            | IO_L28P_0            | B16                     | I/O  |
| 0    | IO_L29N_0            | IO_L29N_0            | J17                     | I/O  |
| 0    | IO_L29P_0            | IO_L29P_0            | H17                     | I/O  |
| 0    | IO_L30N_0            | IO_L30N_0            | G17                     | I/O  |
| 0    | IO_L30P_0            | IO_L30P_0            | F17                     | I/O  |
| 0    | IO_L31N_0            | IO_L31N_0            | D17                     | I/O  |
| 0    | IO_L31P_0/<br>VREF_0 | IO_L31P_0/<br>VREF_0 | C17                     | VREF |
| 0    | IO_L32N_0/<br>GCLK7  | IO_L32N_0/<br>GCLK7  | B17                     | GCLK |
| 0    | IO_L32P_0/<br>GCLK6  | IO_L32P_0/<br>GCLK6  | A17                     | GCLK |
| 0    | N.C. (◆)             | IO_L33N_0            | D7                      | I/O  |
| 0    | N.C. (◆)             | IO_L33P_0            | C7                      | I/O  |
| 0    | N.C. (◆)             | IO_L34N_0            | B7                      | I/O  |
| 0    | N.C. (◆)             | IO_L34P_0            | A7                      | I/O  |
| 0    | IO_L35N_0            | IO_L35N_0            | E8                      | I/O  |
| 0    | IO_L35P_0            | IO_L35P_0            | D8                      | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 0    | IO_L36N_0            | IO_L36N_0            | B8                      | I/O  |
| 0    | IO_L36P_0            | IO_L36P_0            | A8                      | I/O  |
| 0    | IO_L37N_0            | IO_L37N_0            | D10                     | I/O  |
| 0    | IO_L37P_0            | IO_L37P_0            | C10                     | I/O  |
| 0    | IO_L38N_0            | IO_L38N_0            | B10                     | I/O  |
| 0    | IO_L38P_0            | IO_L38P_0            | A10                     | I/O  |
| 0    | N.C. (◆)             | IO_L39N_0            | G11                     | I/O  |
| 0    | N.C. (◆)             | IO_L39P_0            | F11                     | I/O  |
| 0    | N.C. (◆)             | IO_L40N_0            | B11                     | I/O  |
| 0    | N.C. (◆)             | IO_L40P_0            | A11                     | I/O  |
| 0    | VCCO_0               | VCCO_0               | B13                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | C4                      | VCCO |
| 0    | VCCO_0               | VCCO_0               | C8                      | VCCO |
| 0    | VCCO_0               | VCCO_0               | D11                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | D16                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | F13                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | G8                      | VCCO |
| 0    | VCCO_0               | VCCO_0               | H11                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | H15                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | M13                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | M14                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | M15                     | VCCO |
| 0    | VCCO_0               | VCCO_0               | M16                     | VCCO |
| 1    | IO                   | IO                   | B26                     | I/O  |
| 1    | IO                   | IO                   | A18                     | I/O  |
| 1    | IO                   | IO                   | C23                     | I/O  |
| 1    | IO                   | IO                   | E21                     | I/O  |
| 1    | IO                   | IO                   | E25                     | I/O  |
| 1    | IO                   | IO                   | F18                     | I/O  |
| 1    | IO                   | IO                   | F27                     | I/O  |
| 1    | IO                   | IO                   | F29                     | I/O  |
| 1    | IO                   | IO                   | H23                     | I/O  |
| 1    | IO                   | IO                   | H26                     | I/O  |
| 1    | N.C. (◆)             | IO                   | J26                     | I/O  |
| 1    | IO                   | IO                   | K19                     | I/O  |
| 1    | IO                   | IO                   | L19                     | I/O  |
| 1    | IO                   | IO                   | L20                     | I/O  |
| 1    | IO                   | IO                   | L21                     | I/O  |
| 1    | N.C. (◆)             | IO                   | L23                     | I/O  |
| 1    | IO                   | IO                   | L24                     | I/O  |
| 1    | IO/VREF_1            | IO/VREF_1            | D30                     | VREF |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 1    | IO/VREF_1            | IO/VREF_1            | K21                     | VREF |
| 1    | IO/VREF_1            | IO/VREF_1            | L18                     | VREF |
| 1    | IO_L01N_1/<br>VRP_1  | IO_L01N_1/<br>VRP_1  | A32                     | DCI  |
| 1    | IO_L01P_1/<br>VRN_1  | IO_L01P_1/<br>VRN_1  | B32                     | DCI  |
| 1    | IO_L02N_1            | IO_L02N_1            | A31                     | I/O  |
| 1    | IO_L02P_1            | IO_L02P_1            | B31                     | I/O  |
| 1    | IO_L03N_1            | IO_L03N_1            | B30                     | I/O  |
| 1    | IO_L03P_1            | IO_L03P_1            | C30                     | I/O  |
| 1    | IO_L04N_1            | IO_L04N_1            | C29                     | I/O  |
| 1    | IO_L04P_1            | IO_L04P_1            | D29                     | I/O  |
| 1    | IO_L05N_1            | IO_L05N_1            | A29                     | I/O  |
| 1    | IO_L05P_1            | IO_L05P_1            | B29                     | I/O  |
| 1    | IO_L06N_1/<br>VREF_1 | IO_L06N_1/<br>VREF_1 | E28                     | VREF |
| 1    | IO_L06P_1            | IO_L06P_1            | F28                     | I/O  |
| 1    | IO_L07N_1            | IO_L07N_1            | D27                     | I/O  |
| 1    | IO_L07P_1            | IO_L07P_1            | E27                     | I/O  |
| 1    | IO_L08N_1            | IO_L08N_1            | A27                     | I/O  |
| 1    | IO_L08P_1            | IO_L08P_1            | B27                     | I/O  |
| 1    | IO_L09N_1            | IO_L09N_1            | F26                     | I/O  |
| 1    | IO_L09P_1            | IO_L09P_1            | G26                     | I/O  |
| 1    | IO_L10N_1/<br>VREF_1 | IO_L10N_1/<br>VREF_1 | C26                     | VREF |
| 1    | IO_L10P_1            | IO_L10P_1            | D26                     | I/O  |
| 1    | IO_L11N_1            | IO_L11N_1            | H25                     | I/O  |
| 1    | IO_L11P_1            | IO_L11P_1            | J25                     | I/O  |
| 1    | IO_L12N_1            | IO_L12N_1            | F25                     | I/O  |
| 1    | IO_L12P_1            | IO_L12P_1            | G25                     | I/O  |
| 1    | IO_L13N_1            | IO_L13N_1            | C25                     | I/O  |
| 1    | IO_L13P_1            | IO_L13P_1            | D25                     | I/O  |
| 1    | IO_L14N_1            | IO_L14N_1            | A25                     | I/O  |
| 1    | IO_L14P_1            | IO_L14P_1            | B25                     | I/O  |
| 1    | IO_L15N_1            | IO_L15N_1            | A24                     | I/O  |
| 1    | IO_L15P_1            | IO_L15P_1            | B24                     | I/O  |
| 1    | IO_L16N_1            | IO_L16N_1            | J23                     | I/O  |
| 1    | IO_L16P_1            | IO_L16P_1            | K23                     | I/O  |
| 1    | IO_L17N_1/<br>VREF_1 | IO_L17N_1/<br>VREF_1 | F23                     | VREF |
| 1    | IO_L17P_1            | IO_L17P_1            | G23                     | I/O  |
| 1    | IO_L18N_1            | IO_L18N_1            | D23                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 1    | IO_L18P_1            | IO_L18P_1            | E23                     | I/O  |
| 1    | IO_L19N_1            | IO_L19N_1            | A23                     | I/O  |
| 1    | IO_L19P_1            | IO_L19P_1            | B23                     | I/O  |
| 1    | IO_L20N_1            | IO_L20N_1            | K22                     | I/O  |
| 1    | IO_L20P_1            | IO_L20P_1            | L22                     | I/O  |
| 1    | IO_L21N_1            | IO_L21N_1            | G22                     | I/O  |
| 1    | IO_L21P_1            | IO_L21P_1            | H22                     | I/O  |
| 1    | IO_L22N_1            | IO_L22N_1            | C22                     | I/O  |
| 1    | IO_L22P_1            | IO_L22P_1            | D22                     | I/O  |
| 1    | IO_L23N_1            | IO_L23N_1            | H21                     | I/O  |
| 1    | IO_L23P_1            | IO_L23P_1            | J21                     | I/O  |
| 1    | IO_L24N_1            | IO_L24N_1            | F21                     | I/O  |
| 1    | IO_L24P_1            | IO_L24P_1            | G21                     | I/O  |
| 1    | IO_L25N_1            | IO_L25N_1            | C21                     | I/O  |
| 1    | IO_L25P_1            | IO_L25P_1            | D21                     | I/O  |
| 1    | IO_L26N_1            | IO_L26N_1            | A21                     | I/O  |
| 1    | IO_L26P_1            | IO_L26P_1            | B21                     | I/O  |
| 1    | IO_L27N_1            | IO_L27N_1            | F19                     | I/O  |
| 1    | IO_L27P_1            | IO_L27P_1            | G19                     | I/O  |
| 1    | IO_L28N_1            | IO_L28N_1            | B19                     | I/O  |
| 1    | IO_L28P_1            | IO_L28P_1            | C19                     | I/O  |
| 1    | IO_L29N_1            | IO_L29N_1            | J18                     | I/O  |
| 1    | IO_L29P_1            | IO_L29P_1            | K18                     | I/O  |
| 1    | IO_L30N_1            | IO_L30N_1            | G18                     | I/O  |
| 1    | IO_L30P_1            | IO_L30P_1            | H18                     | I/O  |
| 1    | IO_L31N_1/<br>VREF_1 | IO_L31N_1/<br>VREF_1 | D18                     | VREF |
| 1    | IO_L31P_1            | IO_L31P_1            | E18                     | I/O  |
| 1    | IO_L32N_1/<br>GCLK5  | IO_L32N_1/<br>GCLK5  | B18                     | GCLK |
| 1    | IO_L32P_1/<br>GCLK4  | IO_L32P_1/<br>GCLK4  | C18                     | GCLK |
| 1    | N.C. (◆)             | IO_L33N_1            | C28                     | I/O  |
| 1    | N.C. (◆)             | IO_L33P_1            | D28                     | I/O  |
| 1    | N.C. (◆)             | IO_L34N_1            | A28                     | I/O  |
| 1    | N.C. (◆)             | IO_L34P_1            | B28                     | I/O  |
| 1    | N.C. (◆)             | IO_L35N_1            | J24                     | I/O  |
| 1    | N.C. (◆)             | IO_L35P_1            | K24                     | I/O  |
| 1    | N.C. (◆)             | IO_L36N_1            | F24                     | I/O  |
| 1    | N.C. (◆)             | IO_L36P_1            | G24                     | I/O  |
| 1    | IO_L37N_1            | IO_L37N_1            | J20                     | I/O  |
| 1    | IO_L37P_1            | IO_L37P_1            | K20                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 1    | IO_L38N_1            | IO_L38N_1            | F20                     | I/O  |
| 1    | IO_L38P_1            | IO_L38P_1            | G20                     | I/O  |
| 1    | IO_L39N_1            | IO_L39N_1            | C20                     | I/O  |
| 1    | IO_L39P_1            | IO_L39P_1            | D20                     | I/O  |
| 1    | IO_L40N_1            | IO_L40N_1            | A20                     | I/O  |
| 1    | IO_L40P_1            | IO_L40P_1            | B20                     | I/O  |
| 1    | VCCO_1               | VCCO_1               | B22                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | C27                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | C31                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | D19                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | D24                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | F22                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | G27                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | H20                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | H24                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | M19                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | M20                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | M21                     | VCCO |
| 1    | VCCO_1               | VCCO_1               | M22                     | VCCO |
| 2    | IO                   | IO                   | G33                     | I/O  |
| 2    | IO                   | IO                   | G34                     | I/O  |
| 2    | IO                   | IO                   | U25                     | I/O  |
| 2    | IO                   | IO                   | U26                     | I/O  |
| 2    | IO_L01N_2/<br>VRP_2  | IO_L01N_2/<br>VRP_2  | C33                     | DCI  |
| 2    | IO_L01P_2/<br>VRN_2  | IO_L01P_2/<br>VRN_2  | C34                     | DCI  |
| 2    | IO_L02N_2            | IO_L02N_2            | D33                     | I/O  |
| 2    | IO_L02P_2            | IO_L02P_2            | D34                     | I/O  |
| 2    | IO_L03N_2/<br>VREF_2 | IO_L03N_2/<br>VREF_2 | E32                     | VREF |
| 2    | IO_L03P_2            | IO_L03P_2            | E33                     | I/O  |
| 2    | IO_L04N_2            | IO_L04N_2            | F31                     | I/O  |
| 2    | IO_L04P_2            | IO_L04P_2            | F32                     | I/O  |
| 2    | IO_L05N_2            | IO_L05N_2            | G29                     | I/O  |
| 2    | IO_L05P_2            | IO_L05P_2            | G30                     | I/O  |
| 2    | IO_L06N_2            | IO_L06N_2            | H29                     | I/O  |
| 2    | IO_L06P_2            | IO_L06P_2            | H30                     | I/O  |
| 2    | IO_L07N_2            | IO_L07N_2            | H33                     | I/O  |
| 2    | IO_L07P_2            | IO_L07P_2            | H34                     | I/O  |
| 2    | IO_L08N_2            | IO_L08N_2            | J28                     | I/O  |
| 2    | IO_L08P_2            | IO_L08P_2            | J29                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 2    | IO_L09N_2/<br>VREF_2 | IO_L09N_2/<br>VREF_2 | H31                     | VREF |
| 2    | IO_L09P_2            | IO_L09P_2            | J31                     | I/O  |
| 2    | IO_L10N_2            | IO_L10N_2            | J32                     | I/O  |
| 2    | IO_L10P_2            | IO_L10P_2            | J33                     | I/O  |
| 2    | IO_L11N_2            | IO_L11N_2            | J27                     | I/O  |
| 2    | IO_L11P_2            | IO_L11P_2            | K26                     | I/O  |
| 2    | IO_L12N_2            | IO_L12N_2            | K27                     | I/O  |
| 2    | IO_L12P_2            | IO_L12P_2            | K28                     | I/O  |
| 2    | IO_L13N_2            | IO_L13N_2            | K29                     | I/O  |
| 2    | IO_L13P_2/<br>VREF_2 | IO_L13P_2/<br>VREF_2 | K30                     | VREF |
| 2    | IO_L14N_2            | IO_L14N_2            | K31                     | I/O  |
| 2    | IO_L14P_2            | IO_L14P_2            | K32                     | I/O  |
| 2    | IO_L15N_2            | IO_L15N_2            | K33                     | I/O  |
| 2    | IO_L15P_2            | IO_L15P_2            | K34                     | I/O  |
| 2    | IO_L16N_2            | IO_L16N_2            | L25                     | I/O  |
| 2    | IO_L16P_2            | IO_L16P_2            | L26                     | I/O  |
| 2    | N.C. (◆)             | IO_L17N_2            | L28                     | I/O  |
| 2    | N.C. (◆)             | IO_L17P_2/<br>VREF_2 | L29                     | VREF |
| 2    | IO_L19N_2            | IO_L19N_2            | M29                     | I/O  |
| 2    | IO_L19P_2            | IO_L19P_2            | M30                     | I/O  |
| 2    | IO_L20N_2            | IO_L20N_2            | M31                     | I/O  |
| 2    | IO_L20P_2            | IO_L20P_2            | M32                     | I/O  |
| 2    | IO_L21N_2            | IO_L21N_2            | M26                     | I/O  |
| 2    | IO_L21P_2            | IO_L21P_2            | N25                     | I/O  |
| 2    | IO_L22N_2            | IO_L22N_2            | N27                     | I/O  |
| 2    | IO_L22P_2            | IO_L22P_2            | N28                     | I/O  |
| 2    | IO_L23N_2/<br>VREF_2 | IO_L23N_2/<br>VREF_2 | N31                     | VREF |
| 2    | IO_L23P_2            | IO_L23P_2            | N32                     | I/O  |
| 2    | IO_L24N_2            | IO_L24N_2            | N24                     | I/O  |
| 2    | IO_L24P_2            | IO_L24P_2            | P24                     | I/O  |
| 2    | IO_L26N_2            | IO_L26N_2            | P29                     | I/O  |
| 2    | IO_L26P_2            | IO_L26P_2            | P30                     | I/O  |
| 2    | IO_L27N_2            | IO_L27N_2            | P31                     | I/O  |
| 2    | IO_L27P_2            | IO_L27P_2            | P32                     | I/O  |
| 2    | IO_L28N_2            | IO_L28N_2            | P33                     | I/O  |
| 2    | IO_L28P_2            | IO_L28P_2            | P34                     | I/O  |
| 2    | IO_L29N_2            | IO_L29N_2            | R24                     | I/O  |
| 2    | IO_L29P_2            | IO_L29P_2            | R25                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 2    | IO_L30N_2            | IO_L30N_2            | R28                     | I/O  |
| 2    | IO_L30P_2            | IO_L30P_2            | R29                     | I/O  |
| 2    | IO_L31N_2            | IO_L31N_2            | R31                     | I/O  |
| 2    | IO_L31P_2            | IO_L31P_2            | R32                     | I/O  |
| 2    | IO_L32N_2            | IO_L32N_2            | R33                     | I/O  |
| 2    | IO_L32P_2            | IO_L32P_2            | R34                     | I/O  |
| 2    | IO_L33N_2            | IO_L33N_2            | R26                     | I/O  |
| 2    | IO_L33P_2            | IO_L33P_2            | T25                     | I/O  |
| 2    | IO_L34N_2/<br>VREF_2 | IO_L34N_2/<br>VREF_2 | T28                     | VREF |
| 2    | IO_L34P_2            | IO_L34P_2            | T29                     | I/O  |
| 2    | IO_L35N_2            | IO_L35N_2            | T32                     | I/O  |
| 2    | IO_L35P_2            | IO_L35P_2            | T33                     | I/O  |
| 2    | IO_L37N_2            | IO_L37N_2            | U27                     | I/O  |
| 2    | IO_L37P_2            | IO_L37P_2            | U28                     | I/O  |
| 2    | IO_L38N_2            | IO_L38N_2            | U29                     | I/O  |
| 2    | IO_L38P_2            | IO_L38P_2            | U30                     | I/O  |
| 2    | IO_L39N_2            | IO_L39N_2            | U31                     | I/O  |
| 2    | IO_L39P_2            | IO_L39P_2            | U32                     | I/O  |
| 2    | IO_L40N_2            | IO_L40N_2            | U33                     | I/O  |
| 2    | IO_L40P_2/<br>VREF_2 | IO_L40P_2/<br>VREF_2 | U34                     | VREF |
| 2    | IO_L41N_2            | IO_L41N_2            | F33                     | I/O  |
| 2    | IO_L41P_2            | IO_L41P_2            | F34                     | I/O  |
| 2    | N.C. (◆)             | IO_L42N_2            | G31                     | I/O  |
| 2    | N.C. (◆)             | IO_L42P_2            | G32                     | I/O  |
| 2    | IO_L45N_2            | IO_L45N_2            | L33                     | I/O  |
| 2    | IO_L45P_2            | IO_L45P_2            | L34                     | I/O  |
| 2    | IO_L46N_2            | IO_L46N_2            | M24                     | I/O  |
| 2    | IO_L46P_2            | IO_L46P_2            | M25                     | I/O  |
| 2    | IO_L47N_2            | IO_L47N_2            | M27                     | I/O  |
| 2    | IO_L47P_2            | IO_L47P_2            | M28                     | I/O  |
| 2    | IO_L48N_2            | IO_L48N_2            | M33                     | I/O  |
| 2    | IO_L48P_2            | IO_L48P_2            | M34                     | I/O  |
| 2    | N.C. (◆)             | IO_L49N_2            | P25                     | I/O  |
| 2    | N.C. (◆)             | IO_L49P_2            | P26                     | I/O  |
| 2    | IO_L50N_2            | IO_L50N_2            | P27                     | I/O  |
| 2    | IO_L50P_2            | IO_L50P_2            | P28                     | I/O  |
| 2    | N.C. (◆)             | IO_L51N_2            | T24                     | I/O  |
| 2    | N.C. (◆)             | IO_L51P_2            | U24                     | I/O  |
| 2    | VCCO_2               | VCCO_2               | D32                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | H28                     | VCCO |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 2    | VCCO_2               | VCCO_2               | H32                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | L27                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | L31                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | N23                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | N29                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | N33                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | P23                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | R23                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | R27                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | T23                     | VCCO |
| 2    | VCCO_2               | VCCO_2               | T31                     | VCCO |
| 3    | IO                   | IO                   | AH33                    | I/O  |
| 3    | IO                   | IO                   | AH34                    | I/O  |
| 3    | IO                   | IO                   | V25                     | I/O  |
| 3    | IO                   | IO                   | V26                     | I/O  |
| 3    | IO_L01N_3/<br>VRP_3  | IO_L01N_3/<br>VRP_3  | AM34                    | DCI  |
| 3    | IO_L01P_3/<br>VRN_3  | IO_L01P_3/<br>VRN_3  | AM33                    | DCI  |
| 3    | IO_L02N_3/<br>VREF_3 | IO_L02N_3/<br>VREF_3 | AL34                    | VREF |
| 3    | IO_L02P_3            | IO_L02P_3            | AL33                    | I/O  |
| 3    | IO_L03N_3            | IO_L03N_3            | AK33                    | I/O  |
| 3    | IO_L03P_3            | IO_L03P_3            | AK32                    | I/O  |
| 3    | IO_L04N_3            | IO_L04N_3            | AJ32                    | I/O  |
| 3    | IO_L04P_3            | IO_L04P_3            | AJ31                    | I/O  |
| 3    | IO_L05N_3            | IO_L05N_3            | AJ34                    | I/O  |
| 3    | IO_L05P_3            | IO_L05P_3            | AJ33                    | I/O  |
| 3    | IO_L06N_3            | IO_L06N_3            | AH30                    | I/O  |
| 3    | IO_L06P_3            | IO_L06P_3            | AH29                    | I/O  |
| 3    | IO_L07N_3            | IO_L07N_3            | AG30                    | I/O  |
| 3    | IO_L07P_3            | IO_L07P_3            | AG29                    | I/O  |
| 3    | IO_L08N_3            | IO_L08N_3            | AG34                    | I/O  |
| 3    | IO_L08P_3            | IO_L08P_3            | AG33                    | I/O  |
| 3    | IO_L09N_3            | IO_L09N_3            | AF29                    | I/O  |
| 3    | IO_L09P_3/<br>VREF_3 | IO_L09P_3/<br>VREF_3 | AF28                    | VREF |
| 3    | IO_L10N_3            | IO_L10N_3            | AF31                    | I/O  |
| 3    | IO_L10P_3            | IO_L10P_3            | AG31                    | I/O  |
| 3    | IO_L11N_3            | IO_L11N_3            | AF33                    | I/O  |
| 3    | IO_L11P_3            | IO_L11P_3            | AF32                    | I/O  |
| 3    | IO_L12N_3            | IO_L12N_3            | AE26                    | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 3    | IO_L12P_3            | IO_L12P_3            | AF27                    | I/O  |
| 3    | IO_L13N_3/<br>VREF_3 | IO_L13N_3/<br>VREF_3 | AE28                    | VREF |
| 3    | IO_L13P_3            | IO_L13P_3            | AE27                    | I/O  |
| 3    | IO_L14N_3            | IO_L14N_3            | AE30                    | I/O  |
| 3    | IO_L14P_3            | IO_L14P_3            | AE29                    | I/O  |
| 3    | IO_L15N_3            | IO_L15N_3            | AE32                    | I/O  |
| 3    | IO_L15P_3            | IO_L15P_3            | AE31                    | I/O  |
| 3    | IO_L16N_3            | IO_L16N_3            | AE34                    | I/O  |
| 3    | IO_L16P_3            | IO_L16P_3            | AE33                    | I/O  |
| 3    | IO_L17N_3            | IO_L17N_3            | AD26                    | I/O  |
| 3    | IO_L17P_3/<br>VREF_3 | IO_L17P_3/<br>VREF_3 | AD25                    | VREF |
| 3    | IO_L19N_3            | IO_L19N_3            | AD34                    | I/O  |
| 3    | IO_L19P_3            | IO_L19P_3            | AD33                    | I/O  |
| 3    | IO_L20N_3            | IO_L20N_3            | AC25                    | I/O  |
| 3    | IO_L20P_3            | IO_L20P_3            | AC24                    | I/O  |
| 3    | IO_L21N_3            | IO_L21N_3            | AC28                    | I/O  |
| 3    | IO_L21P_3            | IO_L21P_3            | AC27                    | I/O  |
| 3    | IO_L22N_3            | IO_L22N_3            | AC30                    | I/O  |
| 3    | IO_L22P_3            | IO_L22P_3            | AC29                    | I/O  |
| 3    | IO_L23N_3            | IO_L23N_3            | AC32                    | I/O  |
| 3    | IO_L23P_3/<br>VREF_3 | IO_L23P_3/<br>VREF_3 | AC31                    | VREF |
| 3    | IO_L24N_3            | IO_L24N_3            | AB25                    | I/O  |
| 3    | IO_L24P_3            | IO_L24P_3            | AC26                    | I/O  |
| 3    | IO_L26N_3            | IO_L26N_3            | AA28                    | I/O  |
| 3    | IO_L26P_3            | IO_L26P_3            | AA27                    | I/O  |
| 3    | IO_L27N_3            | IO_L27N_3            | AA30                    | I/O  |
| 3    | IO_L27P_3            | IO_L27P_3            | AA29                    | I/O  |
| 3    | IO_L28N_3            | IO_L28N_3            | AA32                    | I/O  |
| 3    | IO_L28P_3            | IO_L28P_3            | AA31                    | I/O  |
| 3    | IO_L29N_3            | IO_L29N_3            | AA34                    | I/O  |
| 3    | IO_L29P_3            | IO_L29P_3            | AA33                    | I/O  |
| 3    | IO_L30N_3            | IO_L30N_3            | Y29                     | I/O  |
| 3    | IO_L30P_3            | IO_L30P_3            | Y28                     | I/O  |
| 3    | IO_L31N_3            | IO_L31N_3            | Y32                     | I/O  |
| 3    | IO_L31P_3            | IO_L31P_3            | Y31                     | I/O  |
| 3    | IO_L32N_3            | IO_L32N_3            | Y34                     | I/O  |
| 3    | IO_L32P_3            | IO_L32P_3            | Y33                     | I/O  |
| 3    | IO_L33N_3            | IO_L33N_3            | W25                     | I/O  |
| 3    | IO_L33P_3            | IO_L33P_3            | Y26                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 3    | IO_L34N_3            | IO_L34N_3            | W29                     | I/O  |
| 3    | IO_L34P_3/<br>VREF_3 | IO_L34P_3/<br>VREF_3 | W28                     | VREF |
| 3    | IO_L35N_3            | IO_L35N_3            | W33                     | I/O  |
| 3    | IO_L35P_3            | IO_L35P_3            | W32                     | I/O  |
| 3    | IO_L37N_3            | IO_L37N_3            | V28                     | I/O  |
| 3    | IO_L37P_3            | IO_L37P_3            | V27                     | I/O  |
| 3    | IO_L38N_3            | IO_L38N_3            | V30                     | I/O  |
| 3    | IO_L38P_3            | IO_L38P_3            | V29                     | I/O  |
| 3    | IO_L39N_3            | IO_L39N_3            | V32                     | I/O  |
| 3    | IO_L39P_3            | IO_L39P_3            | V31                     | I/O  |
| 3    | IO_L40N_3/<br>VREF_3 | IO_L40N_3/<br>VREF_3 | V34                     | VREF |
| 3    | IO_L40P_3            | IO_L40P_3            | V33                     | I/O  |
| 3    | N.C. (◆)             | IO_L41N_3            | AH32                    | I/O  |
| 3    | N.C. (◆)             | IO_L41P_3            | AH31                    | I/O  |
| 3    | N.C. (◆)             | IO_L44N_3            | AD29                    | I/O  |
| 3    | N.C. (◆)             | IO_L44P_3            | AD28                    | I/O  |
| 3    | IO_L45N_3            | IO_L45N_3            | AC34                    | I/O  |
| 3    | IO_L45P_3            | IO_L45P_3            | AC33                    | I/O  |
| 3    | IO_L46N_3            | IO_L46N_3            | AB28                    | I/O  |
| 3    | IO_L46P_3            | IO_L46P_3            | AB27                    | I/O  |
| 3    | IO_L47N_3            | IO_L47N_3            | AB32                    | I/O  |
| 3    | IO_L47P_3            | IO_L47P_3            | AB31                    | I/O  |
| 3    | IO_L48N_3            | IO_L48N_3            | AA24                    | I/O  |
| 3    | IO_L48P_3            | IO_L48P_3            | AB24                    | I/O  |
| 3    | N.C. (◆)             | IO_L49N_3            | AA26                    | I/O  |
| 3    | N.C. (◆)             | IO_L49P_3            | AA25                    | I/O  |
| 3    | IO_L50N_3            | IO_L50N_3            | Y25                     | I/O  |
| 3    | IO_L50P_3            | IO_L50P_3            | Y24                     | I/O  |
| 3    | N.C. (◆)             | IO_L51N_3            | V24                     | I/O  |
| 3    | N.C. (◆)             | IO_L51P_3            | W24                     | I/O  |
| 3    | VCCO_3               | VCCO_3               | AA23                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AB23                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AB29                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AB33                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AD27                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AD31                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AG28                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AG32                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | AL32                    | VCCO |
| 3    | VCCO_3               | VCCO_3               | W23                     | VCCO |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 3    | VCCO_3               | VCCO_3               | W31                     | VCCO |
| 3    | VCCO_3               | VCCO_3               | Y23                     | VCCO |
| 3    | VCCO_3               | VCCO_3               | Y27                     | VCCO |
| 4    | IO                   | IO                   | AD18                    | I/O  |
| 4    | IO                   | IO                   | AD19                    | I/O  |
| 4    | IO                   | IO                   | AD20                    | I/O  |
| 4    | IO                   | IO                   | AD22                    | I/O  |
| 4    | IO                   | IO                   | AE18                    | I/O  |
| 4    | IO                   | IO                   | AE19                    | I/O  |
| 4    | IO                   | IO                   | AE22                    | I/O  |
| 4    | N.C. (◆)             | IO                   | AE24                    | I/O  |
| 4    | IO                   | IO                   | AF24                    | I/O  |
| 4    | N.C. (◆)             | IO                   | AF26                    | I/O  |
| 4    | IO                   | IO                   | AG26                    | I/O  |
| 4    | IO                   | IO                   | AG27                    | I/O  |
| 4    | IO                   | IO                   | AJ27                    | I/O  |
| 4    | IO                   | IO                   | AJ29                    | I/O  |
| 4    | IO                   | IO                   | AK25                    | I/O  |
| 4    | IO                   | IO                   | AN26                    | I/O  |
| 4    | IO/VREF_4            | IO/VREF_4            | AF21                    | VREF |
| 4    | IO/VREF_4            | IO/VREF_4            | AH23                    | VREF |
| 4    | IO/VREF_4            | IO/VREF_4            | AK18                    | VREF |
| 4    | IO/VREF_4            | IO/VREF_4            | AL30                    | VREF |
| 4    | IO_L01N_4/<br>VRP_4  | IO_L01N_4/<br>VRP_4  | AN32                    | DCI  |
| 4    | IO_L01P_4/<br>VRN_4  | IO_L01P_4/<br>VRN_4  | AP32                    | DCI  |
| 4    | IO_L02N_4            | IO_L02N_4            | AN31                    | I/O  |
| 4    | IO_L02P_4            | IO_L02P_4            | AP31                    | I/O  |
| 4    | IO_L03N_4            | IO_L03N_4            | AM30                    | I/O  |
| 4    | IO_L03P_4            | IO_L03P_4            | AN30                    | I/O  |
| 4    | IO_L04N_4            | IO_L04N_4            | AN27                    | I/O  |
| 4    | IO_L04P_4            | IO_L04P_4            | AP27                    | I/O  |
| 4    | IO_L05N_4            | IO_L05N_4            | AH26                    | I/O  |
| 4    | IO_L05P_4            | IO_L05P_4            | AJ26                    | I/O  |
| 4    | IO_L06N_4/<br>VREF_4 | IO_L06N_4/<br>VREF_4 | AL26                    | VREF |
| 4    | IO_L06P_4            | IO_L06P_4            | AM26                    | I/O  |
| 4    | IO_L07N_4            | IO_L07N_4            | AF25                    | I/O  |
| 4    | IO_L07P_4            | IO_L07P_4            | AG25                    | I/O  |
| 4    | IO_L08N_4            | IO_L08N_4            | AH25                    | I/O  |
| 4    | IO_L08P_4            | IO_L08P_4            | AJ25                    | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 4    | IO_L09N_4            | IO_L09N_4            | AL25                    | I/O  |
| 4    | IO_L09P_4            | IO_L09P_4            | AM25                    | I/O  |
| 4    | IO_L10N_4            | IO_L10N_4            | AN25                    | I/O  |
| 4    | IO_L10P_4            | IO_L10P_4            | AP25                    | I/O  |
| 4    | IO_L11N_4            | IO_L11N_4            | AD23                    | I/O  |
| 4    | IO_L11P_4            | IO_L11P_4            | AE23                    | I/O  |
| 4    | IO_L12N_4            | IO_L12N_4            | AF23                    | I/O  |
| 4    | IO_L12P_4            | IO_L12P_4            | AG23                    | I/O  |
| 4    | IO_L13N_4            | IO_L13N_4            | AJ23                    | I/O  |
| 4    | IO_L13P_4            | IO_L13P_4            | AK23                    | I/O  |
| 4    | IO_L14N_4            | IO_L14N_4            | AL23                    | I/O  |
| 4    | IO_L14P_4            | IO_L14P_4            | AM23                    | I/O  |
| 4    | IO_L15N_4            | IO_L15N_4            | AN23                    | I/O  |
| 4    | IO_L15P_4            | IO_L15P_4            | AP23                    | I/O  |
| 4    | IO_L16N_4            | IO_L16N_4            | AG22                    | I/O  |
| 4    | IO_L16P_4            | IO_L16P_4            | AH22                    | I/O  |
| 4    | IO_L17N_4            | IO_L17N_4            | AL22                    | I/O  |
| 4    | IO_L17P_4            | IO_L17P_4            | AM22                    | I/O  |
| 4    | IO_L18N_4            | IO_L18N_4            | AD21                    | I/O  |
| 4    | IO_L18P_4            | IO_L18P_4            | AE21                    | I/O  |
| 4    | IO_L19N_4            | IO_L19N_4            | AG21                    | I/O  |
| 4    | IO_L19P_4            | IO_L19P_4            | AH21                    | I/O  |
| 4    | IO_L20N_4            | IO_L20N_4            | AJ21                    | I/O  |
| 4    | IO_L20P_4            | IO_L20P_4            | AK21                    | I/O  |
| 4    | IO_L21N_4            | IO_L21N_4            | AL21                    | I/O  |
| 4    | IO_L21P_4            | IO_L21P_4            | AM21                    | I/O  |
| 4    | IO_L22N_4/<br>VREF_4 | IO_L22N_4/<br>VREF_4 | AN21                    | VREF |
| 4    | IO_L22P_4            | IO_L22P_4            | AP21                    | I/O  |
| 4    | IO_L23N_4            | IO_L23N_4            | AE20                    | I/O  |
| 4    | IO_L23P_4            | IO_L23P_4            | AF20                    | I/O  |
| 4    | IO_L24N_4            | IO_L24N_4            | AH20                    | I/O  |
| 4    | IO_L24P_4            | IO_L24P_4            | AJ20                    | I/O  |
| 4    | IO_L25N_4            | IO_L25N_4            | AL20                    | I/O  |
| 4    | IO_L25P_4            | IO_L25P_4            | AM20                    | I/O  |
| 4    | IO_L26N_4            | IO_L26N_4            | AN20                    | I/O  |
| 4    | IO_L26P_4/<br>VREF_4 | IO_L26P_4/<br>VREF_4 | AP20                    | VREF |
| 4    | IO_L27N_4/<br>DIN/D0 | IO_L27N_4/<br>DIN/D0 | AH19                    | DUAL |
| 4    | IO_L27P_4/<br>D1     | IO_L27P_4/<br>D1     | AJ19                    | DUAL |



Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name    | XC3S5000<br>Pin Name    | FG1156<br>Pin<br>Number | Type |
|------|-------------------------|-------------------------|-------------------------|------|
| 4    | IO_L28N_4               | IO_L28N_4               | AM19                    | I/O  |
| 4    | IO_L28P_4               | IO_L28P_4               | AN19                    | I/O  |
| 4    | IO_L29N_4               | IO_L29N_4               | AF18                    | I/O  |
| 4    | IO_L29P_4               | IO_L29P_4               | AG18                    | I/O  |
| 4    | IO_L30N_4/<br>D2        | IO_L30N_4/<br>D2        | AH18                    | DUAL |
| 4    | IO_L30P_4/<br>D3        | IO_L30P_4/<br>D3        | AJ18                    | DUAL |
| 4    | IO_L31N_4/<br>INIT_B    | IO_L31N_4/<br>INIT_B    | AL18                    | DUAL |
| 4    | IO_L31P_4/<br>DOUT/BUSY | IO_L31P_4/<br>DOUT/BUSY | AM18                    | DUAL |
| 4    | IO_L32N_4/<br>GCLK1     | IO_L32N_4/<br>GCLK1     | AN18                    | GCLK |
| 4    | IO_L32P_4/<br>GCLK0     | IO_L32P_4/<br>GCLK0     | AP18                    | GCLK |
| 4    | IO_L33N_4               | IO_L33N_4               | AL29                    | I/O  |
| 4    | IO_L33P_4               | IO_L33P_4               | AM29                    | I/O  |
| 4    | IO_L34N_4               | IO_L34N_4               | AN29                    | I/O  |
| 4    | IO_L34P_4               | IO_L34P_4               | AP29                    | I/O  |
| 4    | IO_L35N_4               | IO_L35N_4               | AJ28                    | I/O  |
| 4    | IO_L35P_4               | IO_L35P_4               | AK28                    | I/O  |
| 4    | N.C. (◆)                | IO_L36N_4               | AL28                    | I/O  |
| 4    | N.C. (◆)                | IO_L36P_4               | AM28                    | I/O  |
| 4    | N.C. (◆)                | IO_L37N_4               | AN28                    | I/O  |
| 4    | N.C. (◆)                | IO_L37P_4               | AP28                    | I/O  |
| 4    | IO_L38N_4               | IO_L38N_4               | AK27                    | I/O  |
| 4    | IO_L38P_4               | IO_L38P_4               | AL27                    | I/O  |
| 4    | N.C. (◆)                | IO_L39N_4               | AH24                    | I/O  |
| 4    | N.C. (◆)                | IO_L39P_4               | AJ24                    | I/O  |
| 4    | N.C. (◆)                | IO_L40N_4               | AN24                    | I/O  |
| 4    | N.C. (◆)                | IO_L40P_4               | AP24                    | I/O  |
| 4    | VCCO_4                  | VCCO_4                  | AC19                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AC20                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AC21                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AC22                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AG20                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AG24                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AH27                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AJ22                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AL19                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AL24                    | VCCO |
| 4    | VCCO_4                  | VCCO_4                  | AM27                    | VCCO |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 4    | VCCO_4               | VCCO_4               | AM31                    | VCCO |
| 4    | VCCO_4               | VCCO_4               | AN22                    | VCCO |
| 5    | IO                   | IO                   | AD11                    | I/O  |
| 5    | N.C. (◆)             | IO                   | AD12                    | I/O  |
| 5    | IO                   | IO                   | AD14                    | I/O  |
| 5    | IO                   | IO                   | AD15                    | I/O  |
| 5    | IO                   | IO                   | AD16                    | I/O  |
| 5    | IO                   | IO                   | AD17                    | I/O  |
| 5    | IO                   | IO                   | AE14                    | I/O  |
| 5    | IO                   | IO                   | AE16                    | I/O  |
| 5    | N.C. (◆)             | IO                   | AF9                     | I/O  |
| 5    | IO                   | IO                   | AG9                     | I/O  |
| 5    | IO                   | IO                   | AG12                    | I/O  |
| 5    | IO                   | IO                   | AJ6                     | I/O  |
| 5    | IO                   | IO                   | AJ17                    | I/O  |
| 5    | IO                   | IO                   | AK10                    | I/O  |
| 5    | IO                   | IO                   | AK14                    | I/O  |
| 5    | IO                   | IO                   | AM12                    | I/O  |
| 5    | IO                   | IO                   | AN9                     | I/O  |
| 5    | IO/VREF_5            | IO/VREF_5            | AJ8                     | VREF |
| 5    | IO/VREF_5            | IO/VREF_5            | AL5                     | VREF |
| 5    | IO/VREF_5            | IO/VREF_5            | AP17                    | VREF |
| 5    | IO_L01N_5/<br>RDWR_B | IO_L01N_5/<br>RDWR_B | AP3                     | DUAL |
| 5    | IO_L01P_5/<br>CS_B   | IO_L01P_5/<br>CS_B   | AN3                     | DUAL |
| 5    | IO_L02N_5            | IO_L02N_5            | AP4                     | I/O  |
| 5    | IO_L02P_5            | IO_L02P_5            | AN4                     | I/O  |
| 5    | IO_L03N_5            | IO_L03N_5            | AN5                     | I/O  |
| 5    | IO_L03P_5            | IO_L03P_5            | AM5                     | I/O  |
| 5    | IO_L04N_5            | IO_L04N_5            | AM6                     | I/O  |
| 5    | IO_L04P_5            | IO_L04P_5            | AL6                     | I/O  |
| 5    | IO_L05N_5            | IO_L05N_5            | AP6                     | I/O  |
| 5    | IO_L05P_5            | IO_L05P_5            | AN6                     | I/O  |
| 5    | IO_L06N_5            | IO_L06N_5            | AK7                     | I/O  |
| 5    | IO_L06P_5            | IO_L06P_5            | AJ7                     | I/O  |
| 5    | IO_L07N_5            | IO_L07N_5            | AG10                    | I/O  |
| 5    | IO_L07P_5            | IO_L07P_5            | AF10                    | I/O  |
| 5    | IO_L08N_5            | IO_L08N_5            | AJ10                    | I/O  |
| 5    | IO_L08P_5            | IO_L08P_5            | AH10                    | I/O  |
| 5    | IO_L09N_5            | IO_L09N_5            | AM10                    | I/O  |
| 5    | IO_L09P_5            | IO_L09P_5            | AL10                    | I/O  |



Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 5    | IO_L10N_5/<br>VRP_5  | IO_L10N_5/<br>VRP_5  | AP10                    | DCI  |
| 5    | IO_L10P_5/<br>VRN_5  | IO_L10P_5/<br>VRN_5  | AN10                    | DCI  |
| 5    | IO_L11N_5/<br>VREF_5 | IO_L11N_5/<br>VREF_5 | AP11                    | VREF |
| 5    | IO_L11P_5            | IO_L11P_5            | AN11                    | I/O  |
| 5    | IO_L12N_5            | IO_L12N_5            | AF12                    | I/O  |
| 5    | IO_L12P_5            | IO_L12P_5            | AE12                    | I/O  |
| 5    | IO_L13N_5            | IO_L13N_5            | AJ12                    | I/O  |
| 5    | IO_L13P_5            | IO_L13P_5            | AH12                    | I/O  |
| 5    | IO_L14N_5            | IO_L14N_5            | AL12                    | I/O  |
| 5    | IO_L14P_5            | IO_L14P_5            | AK12                    | I/O  |
| 5    | IO_L15N_5            | IO_L15N_5            | AP12                    | I/O  |
| 5    | IO_L15P_5            | IO_L15P_5            | AN12                    | I/O  |
| 5    | IO_L16N_5            | IO_L16N_5            | AE13                    | I/O  |
| 5    | IO_L16P_5            | IO_L16P_5            | AD13                    | I/O  |
| 5    | IO_L17N_5            | IO_L17N_5            | AH13                    | I/O  |
| 5    | IO_L17P_5            | IO_L17P_5            | AG13                    | I/O  |
| 5    | IO_L18N_5            | IO_L18N_5            | AM13                    | I/O  |
| 5    | IO_L18P_5            | IO_L18P_5            | AL13                    | I/O  |
| 5    | IO_L19N_5            | IO_L19N_5            | AG14                    | I/O  |
| 5    | IO_L19P_5/<br>VREF_5 | IO_L19P_5/<br>VREF_5 | AF14                    | VREF |
| 5    | IO_L20N_5            | IO_L20N_5            | AJ14                    | I/O  |
| 5    | IO_L20P_5            | IO_L20P_5            | AH14                    | I/O  |
| 5    | IO_L21N_5            | IO_L21N_5            | AM14                    | I/O  |
| 5    | IO_L21P_5            | IO_L21P_5            | AL14                    | I/O  |
| 5    | IO_L22N_5            | IO_L22N_5            | AP14                    | I/O  |
| 5    | IO_L22P_5            | IO_L22P_5            | AN14                    | I/O  |
| 5    | IO_L23N_5            | IO_L23N_5            | AF15                    | I/O  |
| 5    | IO_L23P_5            | IO_L23P_5            | AE15                    | I/O  |
| 5    | IO_L24N_5            | IO_L24N_5            | AJ15                    | I/O  |
| 5    | IO_L24P_5            | IO_L24P_5            | AH15                    | I/O  |
| 5    | IO_L25N_5            | IO_L25N_5            | AM15                    | I/O  |
| 5    | IO_L25P_5            | IO_L25P_5            | AL15                    | I/O  |
| 5    | IO_L26N_5            | IO_L26N_5            | AP15                    | I/O  |
| 5    | IO_L26P_5            | IO_L26P_5            | AN15                    | I/O  |
| 5    | IO_L27N_5/<br>VREF_5 | IO_L27N_5/<br>VREF_5 | AJ16                    | VREF |
| 5    | IO_L27P_5            | IO_L27P_5            | AH16                    | I/O  |
| 5    | IO_L28N_5/<br>D6     | IO_L28N_5/<br>D6     | AN16                    | DUAL |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 5    | IO_L28P_5/<br>D7     | IO_L28P_5/<br>D7     | AM16                    | DUAL |
| 5    | IO_L29N_5            | IO_L29N_5            | AF17                    | I/O  |
| 5    | IO_L29P_5/<br>VREF_5 | IO_L29P_5/<br>VREF_5 | AE17                    | VREF |
| 5    | IO_L30N_5            | IO_L30N_5            | AH17                    | I/O  |
| 5    | IO_L30P_5            | IO_L30P_5            | AG17                    | I/O  |
| 5    | IO_L31N_5/<br>D4     | IO_L31N_5/<br>D4     | AL17                    | DUAL |
| 5    | IO_L31P_5/<br>D5     | IO_L31P_5/<br>D5     | AK17                    | DUAL |
| 5    | IO_L32N_5/<br>GCLK3  | IO_L32N_5/<br>GCLK3  | AN17                    | GCLK |
| 5    | IO_L32P_5/<br>GCLK2  | IO_L32P_5/<br>GCLK2  | AM17                    | GCLK |
| 5    | N.C. (◆)             | IO_L33N_5            | AM7                     | I/O  |
| 5    | N.C. (◆)             | IO_L33P_5            | AL7                     | I/O  |
| 5    | N.C. (◆)             | IO_L34N_5            | AP7                     | I/O  |
| 5    | N.C. (◆)             | IO_L34P_5            | AN7                     | I/O  |
| 5    | IO_L35N_5            | IO_L35N_5            | AL8                     | I/O  |
| 5    | IO_L35P_5            | IO_L35P_5            | AK8                     | I/O  |
| 5    | IO_L36N_5            | IO_L36N_5            | AP8                     | I/O  |
| 5    | IO_L36P_5            | IO_L36P_5            | AN8                     | I/O  |
| 5    | IO_L37N_5            | IO_L37N_5            | AJ9                     | I/O  |
| 5    | IO_L37P_5            | IO_L37P_5            | AH9                     | I/O  |
| 5    | IO_L38N_5            | IO_L38N_5            | AM9                     | I/O  |
| 5    | IO_L38P_5            | IO_L38P_5            | AL9                     | I/O  |
| 5    | N.C. (◆)             | IO_L39N_5            | AF11                    | I/O  |
| 5    | N.C. (◆)             | IO_L39P_5            | AE11                    | I/O  |
| 5    | N.C. (◆)             | IO_L40N_5            | AJ11                    | I/O  |
| 5    | N.C. (◆)             | IO_L40P_5            | AH11                    | I/O  |
| 5    | VCCO_5               | VCCO_5               | AC13                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AC14                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AC15                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AC16                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AG11                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AG15                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AH8                     | VCCO |
| 5    | VCCO_5               | VCCO_5               | AJ13                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AL11                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AL16                    | VCCO |
| 5    | VCCO_5               | VCCO_5               | AM4                     | VCCO |
| 5    | VCCO_5               | VCCO_5               | AM8                     | VCCO |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 5    | VCCO_5               | VCCO_5               | AN13                    | VCCO |
| 6    | IO                   | IO                   | AH1                     | I/O  |
| 6    | IO                   | IO                   | AH2                     | I/O  |
| 6    | IO                   | IO                   | V9                      | I/O  |
| 6    | IO                   | IO                   | V10                     | I/O  |
| 6    | IO_L01N_6/<br>VRP_6  | IO_L01N_6/<br>VRP_6  | AM2                     | DCI  |
| 6    | IO_L01P_6/<br>VRN_6  | IO_L01P_6/<br>VRN_6  | AM1                     | DCI  |
| 6    | IO_L02N_6            | IO_L02N_6            | AL2                     | I/O  |
| 6    | IO_L02P_6            | IO_L02P_6            | AL1                     | I/O  |
| 6    | IO_L03N_6/<br>VREF_6 | IO_L03N_6/<br>VREF_6 | AK3                     | VREF |
| 6    | IO_L03P_6            | IO_L03P_6            | AK2                     | I/O  |
| 6    | IO_L04N_6            | IO_L04N_6            | AJ4                     | I/O  |
| 6    | IO_L04P_6            | IO_L04P_6            | AJ3                     | I/O  |
| 6    | IO_L05N_6            | IO_L05N_6            | AJ2                     | I/O  |
| 6    | IO_L05P_6            | IO_L05P_6            | AJ1                     | I/O  |
| 6    | IO_L06N_6            | IO_L06N_6            | AH6                     | I/O  |
| 6    | IO_L06P_6            | IO_L06P_6            | AH5                     | I/O  |
| 6    | IO_L07N_6            | IO_L07N_6            | AG6                     | I/O  |
| 6    | IO_L07P_6            | IO_L07P_6            | AG5                     | I/O  |
| 6    | IO_L08N_6            | IO_L08N_6            | AG2                     | I/O  |
| 6    | IO_L08P_6            | IO_L08P_6            | AG1                     | I/O  |
| 6    | IO_L09N_6/<br>VREF_6 | IO_L09N_6/<br>VREF_6 | AF7                     | VREF |
| 6    | IO_L09P_6            | IO_L09P_6            | AF6                     | I/O  |
| 6    | IO_L10N_6            | IO_L10N_6            | AG4                     | I/O  |
| 6    | IO_L10P_6            | IO_L10P_6            | AF4                     | I/O  |
| 6    | IO_L11N_6            | IO_L11N_6            | AF3                     | I/O  |
| 6    | IO_L11P_6            | IO_L11P_6            | AF2                     | I/O  |
| 6    | IO_L12N_6            | IO_L12N_6            | AF8                     | I/O  |
| 6    | IO_L12P_6            | IO_L12P_6            | AE9                     | I/O  |
| 6    | IO_L13N_6            | IO_L13N_6            | AE8                     | I/O  |
| 6    | IO_L13P_6/<br>VREF_6 | IO_L13P_6/<br>VREF_6 | AE7                     | VREF |
| 6    | IO_L14N_6            | IO_L14N_6            | AE6                     | I/O  |
| 6    | IO_L14P_6            | IO_L14P_6            | AE5                     | I/O  |
| 6    | IO_L15N_6            | IO_L15N_6            | AE4                     | I/O  |
| 6    | IO_L15P_6            | IO_L15P_6            | AE3                     | I/O  |
| 6    | IO_L16N_6            | IO_L16N_6            | AE2                     | I/O  |
| 6    | IO_L16P_6            | IO_L16P_6            | AE1                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 6    | IO_L17N_6            | IO_L17N_6            | AD10                    | I/O  |
| 6    | IO_L17P_6/<br>VREF_6 | IO_L17P_6/<br>VREF_6 | AD9                     | VREF |
| 6    | IO_L19N_6            | IO_L19N_6            | AD2                     | I/O  |
| 6    | IO_L19P_6            | IO_L19P_6            | AD1                     | I/O  |
| 6    | IO_L20N_6            | IO_L20N_6            | AC11                    | I/O  |
| 6    | IO_L20P_6            | IO_L20P_6            | AC10                    | I/O  |
| 6    | IO_L21N_6            | IO_L21N_6            | AC8                     | I/O  |
| 6    | IO_L21P_6            | IO_L21P_6            | AC7                     | I/O  |
| 6    | IO_L22N_6            | IO_L22N_6            | AC6                     | I/O  |
| 6    | IO_L22P_6            | IO_L22P_6            | AC5                     | I/O  |
| 6    | IO_L23N_6            | IO_L23N_6            | AC2                     | I/O  |
| 6    | IO_L23P_6            | IO_L23P_6            | AC1                     | I/O  |
| 6    | IO_L24N_6/<br>VREF_6 | IO_L24N_6/<br>VREF_6 | AC9                     | VREF |
| 6    | IO_L24P_6            | IO_L24P_6            | AB10                    | I/O  |
| 6    | IO_L25N_6            | IO_L25N_6            | AB8                     | I/O  |
| 6    | IO_L25P_6            | IO_L25P_6            | AB7                     | I/O  |
| 6    | IO_L26N_6            | IO_L26N_6            | AB4                     | I/O  |
| 6    | IO_L26P_6            | IO_L26P_6            | AB3                     | I/O  |
| 6    | IO_L27N_6            | IO_L27N_6            | AB11                    | I/O  |
| 6    | IO_L27P_6            | IO_L27P_6            | AA11                    | I/O  |
| 6    | IO_L28N_6            | IO_L28N_6            | AA8                     | I/O  |
| 6    | IO_L28P_6            | IO_L28P_6            | AA7                     | I/O  |
| 6    | IO_L29N_6            | IO_L29N_6            | AA6                     | I/O  |
| 6    | IO_L29P_6            | IO_L29P_6            | AA5                     | I/O  |
| 6    | IO_L30N_6            | IO_L30N_6            | AA4                     | I/O  |
| 6    | IO_L30P_6            | IO_L30P_6            | AA3                     | I/O  |
| 6    | IO_L31N_6            | IO_L31N_6            | AA2                     | I/O  |
| 6    | IO_L31P_6            | IO_L31P_6            | AA1                     | I/O  |
| 6    | IO_L32N_6            | IO_L32N_6            | Y11                     | I/O  |
| 6    | IO_L32P_6            | IO_L32P_6            | Y10                     | I/O  |
| 6    | IO_L33N_6            | IO_L33N_6            | Y4                      | I/O  |
| 6    | IO_L33P_6            | IO_L33P_6            | Y3                      | I/O  |
| 6    | IO_L34N_6/<br>VREF_6 | IO_L34N_6/<br>VREF_6 | Y2                      | VREF |
| 6    | IO_L34P_6            | IO_L34P_6            | Y1                      | I/O  |
| 6    | IO_L35N_6            | IO_L35N_6            | Y9                      | I/O  |
| 6    | IO_L35P_6            | IO_L35P_6            | W10                     | I/O  |
| 6    | IO_L36N_6            | IO_L36N_6            | W7                      | I/O  |
| 6    | IO_L36P_6            | IO_L36P_6            | W6                      | I/O  |
| 6    | IO_L37N_6            | IO_L37N_6            | W3                      | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 6    | IO_L37P_6            | IO_L37P_6            | W2                      | I/O  |
| 6    | IO_L38N_6            | IO_L38N_6            | V6                      | I/O  |
| 6    | IO_L38P_6            | IO_L38P_6            | V5                      | I/O  |
| 6    | IO_L39N_6            | IO_L39N_6            | V4                      | I/O  |
| 6    | IO_L39P_6            | IO_L39P_6            | V3                      | I/O  |
| 6    | IO_L40N_6            | IO_L40N_6            | V2                      | I/O  |
| 6    | IO_L40P_6/<br>VREF_6 | IO_L40P_6/<br>VREF_6 | V1                      | VREF |
| 6    | N.C. (◆)             | IO_L41N_6            | AH4                     | I/O  |
| 6    | N.C. (◆)             | IO_L41P_6            | AH3                     | I/O  |
| 6    | N.C. (◆)             | IO_L44N_6            | AD7                     | I/O  |
| 6    | N.C. (◆)             | IO_L44P_6            | AD6                     | I/O  |
| 6    | IO_L45N_6            | IO_L45N_6            | AC4                     | I/O  |
| 6    | IO_L45P_6            | IO_L45P_6            | AC3                     | I/O  |
| 6    | N.C. (◆)             | IO_L46N_6            | AA10                    | I/O  |
| 6    | N.C. (◆)             | IO_L46P_6            | AA9                     | I/O  |
| 6    | IO_L48N_6            | IO_L48N_6            | Y7                      | I/O  |
| 6    | IO_L48P_6            | IO_L48P_6            | Y6                      | I/O  |
| 6    | N.C. (◆)             | IO_L49N_6            | W11                     | I/O  |
| 6    | N.C. (◆)             | IO_L49P_6            | V11                     | I/O  |
| 6    | IO_L52N_6            | IO_L52N_6            | V8                      | I/O  |
| 6    | IO_L52P_6            | IO_L52P_6            | V7                      | I/O  |
| 6    | VCCO_6               | VCCO_6               | AA12                    | VCCO |
| 6    | VCCO_6               | VCCO_6               | AB12                    | VCCO |
| 6    | VCCO_6               | VCCO_6               | AB2                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AB6                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AD4                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AD8                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AG3                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AG7                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | AL3                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | W12                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | W4                      | VCCO |
| 6    | VCCO_6               | VCCO_6               | Y12                     | VCCO |
| 6    | VCCO_6               | VCCO_6               | Y8                      | VCCO |
| 7    | IO                   | IO                   | G1                      | I/O  |
| 7    | IO                   | IO                   | G2                      | I/O  |
| 7    | IO                   | IO                   | U10                     | I/O  |
| 7    | IO                   | IO                   | U9                      | I/O  |
| 7    | IO_L01N_7/<br>VRP_7  | IO_L01N_7/<br>VRP_7  | C1                      | DCI  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 7    | IO_L01P_7/<br>VRN_7  | IO_L01P_7/<br>VRN_7  | C2                      | DCI  |
| 7    | IO_L02N_7            | IO_L02N_7            | D1                      | I/O  |
| 7    | IO_L02P_7            | IO_L02P_7            | D2                      | I/O  |
| 7    | IO_L03N_7/<br>VREF_7 | IO_L03N_7/<br>VREF_7 | E2                      | VREF |
| 7    | IO_L03P_7            | IO_L03P_7            | E3                      | I/O  |
| 7    | IO_L04N_7            | IO_L04N_7            | F3                      | I/O  |
| 7    | IO_L04P_7            | IO_L04P_7            | F4                      | I/O  |
| 7    | IO_L05N_7            | IO_L05N_7            | F1                      | I/O  |
| 7    | IO_L05P_7            | IO_L05P_7            | F2                      | I/O  |
| 7    | IO_L06N_7            | IO_L06N_7            | G5                      | I/O  |
| 7    | IO_L06P_7            | IO_L06P_7            | G6                      | I/O  |
| 7    | IO_L07N_7            | IO_L07N_7            | H5                      | I/O  |
| 7    | IO_L07P_7            | IO_L07P_7            | H6                      | I/O  |
| 7    | IO_L08N_7            | IO_L08N_7            | H1                      | I/O  |
| 7    | IO_L08P_7            | IO_L08P_7            | H2                      | I/O  |
| 7    | IO_L09N_7            | IO_L09N_7            | J6                      | I/O  |
| 7    | IO_L09P_7            | IO_L09P_7            | J7                      | I/O  |
| 7    | IO_L10N_7            | IO_L10N_7            | J4                      | I/O  |
| 7    | IO_L10P_7/<br>VREF_7 | IO_L10P_7/<br>VREF_7 | H4                      | VREF |
| 7    | IO_L11N_7            | IO_L11N_7            | J2                      | I/O  |
| 7    | IO_L11P_7            | IO_L11P_7            | J3                      | I/O  |
| 7    | IO_L12N_7            | IO_L12N_7            | K9                      | I/O  |
| 7    | IO_L12P_7            | IO_L12P_7            | J8                      | I/O  |
| 7    | IO_L13N_7            | IO_L13N_7            | K7                      | I/O  |
| 7    | IO_L13P_7            | IO_L13P_7            | K8                      | I/O  |
| 7    | IO_L14N_7            | IO_L14N_7            | K5                      | I/O  |
| 7    | IO_L14P_7            | IO_L14P_7            | K6                      | I/O  |
| 7    | IO_L15N_7            | IO_L15N_7            | K3                      | I/O  |
| 7    | IO_L15P_7            | IO_L15P_7            | K4                      | I/O  |
| 7    | IO_L16N_7            | IO_L16N_7            | K1                      | I/O  |
| 7    | IO_L16P_7/<br>VREF_7 | IO_L16P_7/<br>VREF_7 | K2                      | VREF |
| 7    | IO_L17N_7            | IO_L17N_7            | L9                      | I/O  |
| 7    | IO_L17P_7            | IO_L17P_7            | L10                     | I/O  |
| 7    | IO_L19N_7/<br>VREF_7 | IO_L19N_7/<br>VREF_7 | L1                      | VREF |
| 7    | IO_L19P_7            | IO_L19P_7            | L2                      | I/O  |
| 7    | IO_L20N_7            | IO_L20N_7            | M10                     | I/O  |
| 7    | IO_L20P_7            | IO_L20P_7            | M11                     | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 7    | IO_L21N_7            | IO_L21N_7            | M7                      | I/O  |
| 7    | IO_L21P_7            | IO_L21P_7            | M8                      | I/O  |
| 7    | IO_L22N_7            | IO_L22N_7            | M5                      | I/O  |
| 7    | IO_L22P_7            | IO_L22P_7            | M6                      | I/O  |
| 7    | IO_L23N_7            | IO_L23N_7            | M3                      | I/O  |
| 7    | IO_L23P_7            | IO_L23P_7            | M4                      | I/O  |
| 7    | IO_L24N_7            | IO_L24N_7            | N10                     | I/O  |
| 7    | IO_L24P_7            | IO_L24P_7            | M9                      | I/O  |
| 7    | IO_L25N_7            | IO_L25N_7            | N3                      | I/O  |
| 7    | IO_L25P_7            | IO_L25P_7            | N4                      | I/O  |
| 7    | IO_L26N_7            | IO_L26N_7            | P11                     | I/O  |
| 7    | IO_L26P_7            | IO_L26P_7            | N11                     | I/O  |
| 7    | IO_L27N_7            | IO_L27N_7            | P7                      | I/O  |
| 7    | IO_L27P_7/<br>VREF_7 | IO_L27P_7/<br>VREF_7 | P8                      | VREF |
| 7    | IO_L28N_7            | IO_L28N_7            | P5                      | I/O  |
| 7    | IO_L28P_7            | IO_L28P_7            | P6                      | I/O  |
| 7    | IO_L29N_7            | IO_L29N_7            | P3                      | I/O  |
| 7    | IO_L29P_7            | IO_L29P_7            | P4                      | I/O  |
| 7    | IO_L30N_7            | IO_L30N_7            | R6                      | I/O  |
| 7    | IO_L30P_7            | IO_L30P_7            | R7                      | I/O  |
| 7    | IO_L31N_7            | IO_L31N_7            | R3                      | I/O  |
| 7    | IO_L31P_7            | IO_L31P_7            | R4                      | I/O  |
| 7    | IO_L32N_7            | IO_L32N_7            | R1                      | I/O  |
| 7    | IO_L32P_7            | IO_L32P_7            | R2                      | I/O  |
| 7    | IO_L33N_7            | IO_L33N_7            | T10                     | I/O  |
| 7    | IO_L33P_7            | IO_L33P_7            | R9                      | I/O  |
| 7    | IO_L34N_7            | IO_L34N_7            | T6                      | I/O  |
| 7    | IO_L34P_7            | IO_L34P_7            | T7                      | I/O  |
| 7    | IO_L35N_7            | IO_L35N_7            | T2                      | I/O  |
| 7    | IO_L35P_7            | IO_L35P_7            | T3                      | I/O  |
| 7    | IO_L37N_7            | IO_L37N_7            | U7                      | I/O  |
| 7    | IO_L37P_7/<br>VREF_7 | IO_L37P_7/<br>VREF_7 | U8                      | VREF |
| 7    | IO_L38N_7            | IO_L38N_7            | U5                      | I/O  |
| 7    | IO_L38P_7            | IO_L38P_7            | U6                      | I/O  |
| 7    | IO_L39N_7            | IO_L39N_7            | U3                      | I/O  |
| 7    | IO_L39P_7            | IO_L39P_7            | U4                      | I/O  |
| 7    | IO_L40N_7/<br>VREF_7 | IO_L40N_7/<br>VREF_7 | U1                      | VREF |
| 7    | IO_L40P_7            | IO_L40P_7            | U2                      | I/O  |
| 7    | N.C. (◆)             | IO_L41N_7            | G3                      | I/O  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| 7    | N.C. (◆)             | IO_L41P_7            | G4                      | I/O  |
| 7    | N.C. (◆)             | IO_L44N_7            | L6                      | I/O  |
| 7    | N.C. (◆)             | IO_L44P_7            | L7                      | I/O  |
| 7    | IO_L45N_7            | IO_L45N_7            | M1                      | I/O  |
| 7    | IO_L45P_7            | IO_L45P_7            | M2                      | I/O  |
| 7    | IO_L46N_7            | IO_L46N_7            | N7                      | I/O  |
| 7    | IO_L46P_7            | IO_L46P_7            | N8                      | I/O  |
| 7    | N.C. (◆)             | IO_L47N_7            | P9                      | I/O  |
| 7    | N.C. (◆)             | IO_L47P_7            | P10                     | I/O  |
| 7    | IO_L49N_7            | IO_L49N_7            | P1                      | I/O  |
| 7    | IO_L49P_7            | IO_L49P_7            | P2                      | I/O  |
| 7    | IO_L50N_7            | IO_L50N_7            | R10                     | I/O  |
| 7    | IO_L50P_7            | IO_L50P_7            | R11                     | I/O  |
| 7    | N.C. (◆)             | IO_L51N_7            | U11                     | I/O  |
| 7    | N.C. (◆)             | IO_L51P_7            | T11                     | I/O  |
| 7    | VCCO_7               | VCCO_7               | D3                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | H3                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | H7                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | L4                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | L8                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | N12                     | VCCO |
| 7    | VCCO_7               | VCCO_7               | N2                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | N6                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | P12                     | VCCO |
| 7    | VCCO_7               | VCCO_7               | R12                     | VCCO |
| 7    | VCCO_7               | VCCO_7               | R8                      | VCCO |
| 7    | VCCO_7               | VCCO_7               | T12                     | VCCO |
| 7    | VCCO_7               | VCCO_7               | T4                      | VCCO |
| N/A  | GND                  | GND                  | A1                      | GND  |
| N/A  | GND                  | GND                  | A13                     | GND  |
| N/A  | GND                  | GND                  | A16                     | GND  |
| N/A  | GND                  | GND                  | A19                     | GND  |
| N/A  | GND                  | GND                  | A2                      | GND  |
| N/A  | GND                  | GND                  | A22                     | GND  |
| N/A  | GND                  | GND                  | A26                     | GND  |
| N/A  | GND                  | GND                  | A30                     | GND  |
| N/A  | GND                  | GND                  | A33                     | GND  |
| N/A  | GND                  | GND                  | A34                     | GND  |
| N/A  | GND                  | GND                  | A5                      | GND  |
| N/A  | GND                  | GND                  | A9                      | GND  |
| N/A  | GND                  | GND                  | AA14                    | GND  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| N/A  | GND                  | GND                  | AA15                    | GND  |
| N/A  | GND                  | GND                  | AA16                    | GND  |
| N/A  | GND                  | GND                  | AA17                    | GND  |
| N/A  | GND                  | GND                  | AA18                    | GND  |
| N/A  | GND                  | GND                  | AA19                    | GND  |
| N/A  | GND                  | GND                  | AA20                    | GND  |
| N/A  | GND                  | GND                  | AA21                    | GND  |
| N/A  | GND                  | GND                  | AB1                     | GND  |
| N/A  | GND                  | GND                  | AB17                    | GND  |
| N/A  | GND                  | GND                  | AB18                    | GND  |
| N/A  | GND                  | GND                  | AB26                    | GND  |
| N/A  | GND                  | GND                  | AB30                    | GND  |
| N/A  | GND                  | GND                  | AB34                    | GND  |
| N/A  | GND                  | GND                  | AB5                     | GND  |
| N/A  | GND                  | GND                  | AB9                     | GND  |
| N/A  | GND                  | GND                  | AD3                     | GND  |
| N/A  | GND                  | GND                  | AD32                    | GND  |
| N/A  | GND                  | GND                  | AE10                    | GND  |
| N/A  | GND                  | GND                  | AE25                    | GND  |
| N/A  | GND                  | GND                  | AF1                     | GND  |
| N/A  | GND                  | GND                  | AF13                    | GND  |
| N/A  | GND                  | GND                  | AF16                    | GND  |
| N/A  | GND                  | GND                  | AF19                    | GND  |
| N/A  | GND                  | GND                  | AF22                    | GND  |
| N/A  | GND                  | GND                  | AF30                    | GND  |
| N/A  | GND                  | GND                  | AF34                    | GND  |
| N/A  | GND                  | GND                  | AF5                     | GND  |
| N/A  | GND                  | GND                  | AH28                    | GND  |
| N/A  | GND                  | GND                  | AH7                     | GND  |
| N/A  | GND                  | GND                  | AK1                     | GND  |
| N/A  | GND                  | GND                  | AK13                    | GND  |
| N/A  | GND                  | GND                  | AK16                    | GND  |
| N/A  | GND                  | GND                  | AK19                    | GND  |
| N/A  | GND                  | GND                  | AK22                    | GND  |
| N/A  | GND                  | GND                  | AK26                    | GND  |
| N/A  | GND                  | GND                  | AK30                    | GND  |
| N/A  | GND                  | GND                  | AK34                    | GND  |
| N/A  | GND                  | GND                  | AK5                     | GND  |
| N/A  | GND                  | GND                  | AK9                     | GND  |
| N/A  | GND                  | GND                  | AM11                    | GND  |
| N/A  | GND                  | GND                  | AM24                    | GND  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| N/A  | GND                  | GND                  | AM3                     | GND  |
| N/A  | GND                  | GND                  | AM32                    | GND  |
| N/A  | GND                  | GND                  | AN1                     | GND  |
| N/A  | GND                  | GND                  | AN2                     | GND  |
| N/A  | GND                  | GND                  | AN33                    | GND  |
| N/A  | GND                  | GND                  | AN34                    | GND  |
| N/A  | GND                  | GND                  | AP1                     | GND  |
| N/A  | GND                  | GND                  | AP13                    | GND  |
| N/A  | GND                  | GND                  | AP16                    | GND  |
| N/A  | GND                  | GND                  | AP19                    | GND  |
| N/A  | GND                  | GND                  | AP2                     | GND  |
| N/A  | GND                  | GND                  | AP22                    | GND  |
| N/A  | GND                  | GND                  | AP26                    | GND  |
| N/A  | GND                  | GND                  | AP30                    | GND  |
| N/A  | GND                  | GND                  | AP33                    | GND  |
| N/A  | GND                  | GND                  | AP34                    | GND  |
| N/A  | GND                  | GND                  | AP5                     | GND  |
| N/A  | GND                  | GND                  | AP9                     | GND  |
| N/A  | GND                  | GND                  | B1                      | GND  |
| N/A  | GND                  | GND                  | B2                      | GND  |
| N/A  | GND                  | GND                  | B33                     | GND  |
| N/A  | GND                  | GND                  | B34                     | GND  |
| N/A  | GND                  | GND                  | C11                     | GND  |
| N/A  | GND                  | GND                  | C24                     | GND  |
| N/A  | GND                  | GND                  | C3                      | GND  |
| N/A  | GND                  | GND                  | C32                     | GND  |
| N/A  | GND                  | GND                  | E1                      | GND  |
| N/A  | GND                  | GND                  | E13                     | GND  |
| N/A  | GND                  | GND                  | E16                     | GND  |
| N/A  | GND                  | GND                  | E19                     | GND  |
| N/A  | GND                  | GND                  | E22                     | GND  |
| N/A  | GND                  | GND                  | E26                     | GND  |
| N/A  | GND                  | GND                  | E30                     | GND  |
| N/A  | GND                  | GND                  | E34                     | GND  |
| N/A  | GND                  | GND                  | E5                      | GND  |
| N/A  | GND                  | GND                  | E9                      | GND  |
| N/A  | GND                  | GND                  | G28                     | GND  |
| N/A  | GND                  | GND                  | G7                      | GND  |
| N/A  | GND                  | GND                  | J1                      | GND  |
| N/A  | GND                  | GND                  | J13                     | GND  |
| N/A  | GND                  | GND                  | J16                     | GND  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| N/A  | GND                  | GND                  | J19                     | GND  |
| N/A  | GND                  | GND                  | J22                     | GND  |
| N/A  | GND                  | GND                  | J30                     | GND  |
| N/A  | GND                  | GND                  | J34                     | GND  |
| N/A  | GND                  | GND                  | J5                      | GND  |
| N/A  | GND                  | GND                  | K10                     | GND  |
| N/A  | GND                  | GND                  | K25                     | GND  |
| N/A  | GND                  | GND                  | L3                      | GND  |
| N/A  | GND                  | GND                  | L32                     | GND  |
| N/A  | GND                  | GND                  | N1                      | GND  |
| N/A  | GND                  | GND                  | N17                     | GND  |
| N/A  | GND                  | GND                  | N18                     | GND  |
| N/A  | GND                  | GND                  | N26                     | GND  |
| N/A  | GND                  | GND                  | N30                     | GND  |
| N/A  | GND                  | GND                  | N34                     | GND  |
| N/A  | GND                  | GND                  | N5                      | GND  |
| N/A  | GND                  | GND                  | N9                      | GND  |
| N/A  | GND                  | GND                  | P14                     | GND  |
| N/A  | GND                  | GND                  | P15                     | GND  |
| N/A  | GND                  | GND                  | P16                     | GND  |
| N/A  | GND                  | GND                  | P17                     | GND  |
| N/A  | GND                  | GND                  | P18                     | GND  |
| N/A  | GND                  | GND                  | P19                     | GND  |
| N/A  | GND                  | GND                  | P20                     | GND  |
| N/A  | GND                  | GND                  | P21                     | GND  |
| N/A  | GND                  | GND                  | R14                     | GND  |
| N/A  | GND                  | GND                  | R15                     | GND  |
| N/A  | GND                  | GND                  | R16                     | GND  |
| N/A  | GND                  | GND                  | R17                     | GND  |
| N/A  | GND                  | GND                  | R18                     | GND  |
| N/A  | GND                  | GND                  | R19                     | GND  |
| N/A  | GND                  | GND                  | R20                     | GND  |
| N/A  | GND                  | GND                  | R21                     | GND  |
| N/A  | GND                  | GND                  | T1                      | GND  |
| N/A  | GND                  | GND                  | T14                     | GND  |
| N/A  | GND                  | GND                  | T15                     | GND  |
| N/A  | GND                  | GND                  | T16                     | GND  |
| N/A  | GND                  | GND                  | T17                     | GND  |
| N/A  | GND                  | GND                  | T18                     | GND  |
| N/A  | GND                  | GND                  | T19                     | GND  |
| N/A  | GND                  | GND                  | T20                     | GND  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type |
|------|----------------------|----------------------|-------------------------|------|
| N/A  | GND                  | GND                  | T21                     | GND  |
| N/A  | GND                  | GND                  | T26                     | GND  |
| N/A  | GND                  | GND                  | T30                     | GND  |
| N/A  | GND                  | GND                  | T34                     | GND  |
| N/A  | GND                  | GND                  | T5                      | GND  |
| N/A  | GND                  | GND                  | T9                      | GND  |
| N/A  | GND                  | GND                  | U13                     | GND  |
| N/A  | GND                  | GND                  | U14                     | GND  |
| N/A  | GND                  | GND                  | U15                     | GND  |
| N/A  | GND                  | GND                  | U16                     | GND  |
| N/A  | GND                  | GND                  | U17                     | GND  |
| N/A  | GND                  | GND                  | U18                     | GND  |
| N/A  | GND                  | GND                  | U19                     | GND  |
| N/A  | GND                  | GND                  | U20                     | GND  |
| N/A  | GND                  | GND                  | U21                     | GND  |
| N/A  | GND                  | GND                  | U22                     | GND  |
| N/A  | GND                  | GND                  | V13                     | GND  |
| N/A  | GND                  | GND                  | V14                     | GND  |
| N/A  | GND                  | GND                  | V15                     | GND  |
| N/A  | GND                  | GND                  | V16                     | GND  |
| N/A  | GND                  | GND                  | V17                     | GND  |
| N/A  | GND                  | GND                  | V18                     | GND  |
| N/A  | GND                  | GND                  | V19                     | GND  |
| N/A  | GND                  | GND                  | V20                     | GND  |
| N/A  | GND                  | GND                  | V21                     | GND  |
| N/A  | GND                  | GND                  | V22                     | GND  |
| N/A  | GND                  | GND                  | W1                      | GND  |
| N/A  | GND                  | GND                  | W14                     | GND  |
| N/A  | GND                  | GND                  | W15                     | GND  |
| N/A  | GND                  | GND                  | W16                     | GND  |
| N/A  | GND                  | GND                  | W17                     | GND  |
| N/A  | GND                  | GND                  | W18                     | GND  |
| N/A  | GND                  | GND                  | W19                     | GND  |
| N/A  | GND                  | GND                  | W20                     | GND  |
| N/A  | GND                  | GND                  | W21                     | GND  |
| N/A  | GND                  | GND                  | W26                     | GND  |
| N/A  | GND                  | GND                  | W30                     | GND  |
| N/A  | GND                  | GND                  | W34                     | GND  |
| N/A  | GND                  | GND                  | W5                      | GND  |
| N/A  | GND                  | GND                  | W9                      | GND  |
| N/A  | GND                  | GND                  | Y14                     | GND  |

Table 109: FG1156 Package Pinout (Continued)

| Bank | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type   |
|------|----------------------|----------------------|-------------------------|--------|
| N/A  | GND                  | GND                  | Y15                     | GND    |
| N/A  | GND                  | GND                  | Y16                     | GND    |
| N/A  | GND                  | GND                  | Y17                     | GND    |
| N/A  | GND                  | GND                  | Y18                     | GND    |
| N/A  | GND                  | GND                  | Y19                     | GND    |
| N/A  | GND                  | GND                  | Y20                     | GND    |
| N/A  | GND                  | GND                  | Y21                     | GND    |
| N/A  | N.C. (◆)             | N.C. (■)             | AK31                    | N.C.   |
| N/A  | VCCAUX               | VCCAUX               | AD30                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AD5                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AG16                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AG19                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AJ30                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AJ5                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK11                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK15                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK20                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK24                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK29                    | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | AK6                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E11                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E15                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E20                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E24                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E29                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | E6                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | F30                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | F5                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | H16                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | H19                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | L30                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | L5                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | R30                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | R5                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | T27                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | T8                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | W27                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | W8                      | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | Y30                     | VCCAUX |
| N/A  | VCCAUX               | VCCAUX               | Y5                      | VCCAUX |
| N/A  | VCCINT               | VCCINT               | AA13                    | VCCINT |

Table 109: FG1156 Package Pinout (Continued)

| Bank   | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type   |
|--------|----------------------|----------------------|-------------------------|--------|
| N/A    | VCCINT               | VCCINT               | AA22                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB13                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB14                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB15                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB16                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB19                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB20                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB21                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AB22                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AC12                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AC17                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AC18                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | AC23                    | VCCINT |
| N/A    | VCCINT               | VCCINT               | M12                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | M17                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | M18                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | M23                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N14                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N15                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N16                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N19                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N20                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N21                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | N22                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | P13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | P22                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | R13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | R22                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | T13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | T22                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | U12                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | U23                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | V12                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | V23                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | W13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | W22                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | Y13                     | VCCINT |
| N/A    | VCCINT               | VCCINT               | Y22                     | VCCINT |
| VCCAUX | CCLK                 | CCLK                 | AL31                    | CONFIG |
| VCCAUX | DONE                 | DONE                 | AD24                    | CONFIG |

Table 109: FG1156 Package Pinout (Continued)

| Bank   | XC3S4000<br>Pin Name | XC3S5000<br>Pin Name | FG1156<br>Pin<br>Number | Type   |
|--------|----------------------|----------------------|-------------------------|--------|
| VCCAUX | HSWAP_EN             | HSWAP_EN             | L11                     | CONFIG |
| VCCAUX | M0                   | M0                   | AL4                     | CONFIG |
| VCCAUX | M1                   | M1                   | AK4                     | CONFIG |
| VCCAUX | M2                   | M2                   | AG8                     | CONFIG |
| VCCAUX | PROG_B               | PROG_B               | D4                      | CONFIG |
| VCCAUX | TCK                  | TCK                  | D31                     | JTAG   |
| VCCAUX | TDI                  | TDI                  | E4                      | JTAG   |
| VCCAUX | TDO                  | TDO                  | E31                     | JTAG   |
| VCCAUX | TMS                  | TMS                  | H27                     | JTAG   |

## User I/Os by Bank

**Note:** The FG(G)1156 package is being discontinued and is not recommended for new designs. See

[http://www.xilinx.com/support/documentation/spartan-3\\_customer\\_notices.htm](http://www.xilinx.com/support/documentation/spartan-3_customer_notices.htm) for the latest updates

Table 110 indicates how the available user-I/O pins are distributed between the eight I/O banks for the XC3S4000 in the FG1156 package. Similarly, Table 111 shows how the available user-I/O pins are distributed between the eight I/O banks for the XC3S5000 in the FG1156 package.

Table 110: User I/Os Per Bank for XC3S4000 in FG1156 Package

| Package Edge | I/O<br>Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|-------------|----------------|-------------------------------|------|-----|------|------|
|              |             |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0           | 90             | 79                            | 0    | 2   | 7    | 2    |
|              | 1           | 90             | 79                            | 0    | 2   | 7    | 2    |
| Right        | 2           | 88             | 80                            | 0    | 2   | 6    | 0    |
|              | 3           | 88             | 79                            | 0    | 2   | 7    | 0    |
| Bottom       | 4           | 90             | 73                            | 6    | 2   | 7    | 2    |
|              | 5           | 90             | 73                            | 6    | 2   | 7    | 2    |
| Left         | 6           | 88             | 79                            | 0    | 2   | 7    | 0    |
|              | 7           | 88             | 79                            | 0    | 2   | 7    | 0    |

Table 111: User I/Os Per Bank for XC3S5000 in FG1156 Package

| Package Edge | I/O<br>Bank | Maximum<br>I/O | All Possible I/O Pins by Type |      |     |      |      |
|--------------|-------------|----------------|-------------------------------|------|-----|------|------|
|              |             |                | I/O                           | DUAL | DCI | VREF | GCLK |
| Top          | 0           | 100            | 89                            | 0    | 2   | 7    | 2    |
|              | 1           | 100            | 89                            | 0    | 2   | 7    | 2    |
| Right        | 2           | 96             | 87                            | 0    | 2   | 7    | 0    |
|              | 3           | 96             | 87                            | 0    | 2   | 7    | 0    |
| Bottom       | 4           | 100            | 83                            | 6    | 2   | 7    | 2    |
|              | 5           | 100            | 83                            | 6    | 2   | 7    | 2    |
| Left         | 6           | 96             | 87                            | 0    | 2   | 7    | 0    |
|              | 7           | 96             | 87                            | 0    | 2   | 7    | 0    |



## FG1156 Footprint

### Top Left Corner of FG1156 XC3S4000 Package (top view)

621 I/O: Unrestricted,  
general-purpose user I/O

55 VREF: User I/O or input voltage  
reference for bank

73 N.C.: Unconnected pins for  
XC3S4000 (◆)

XC3S5000  
(784 max. user I/O)

692 I/O: Unrestricted,  
general-purpose user I/O

56 VREF: User I/O or input voltage  
reference for bank

1 N.C.: Unconnected pins for  
XC3S5000 (■)

Figure 51: FG1156 Package Footprint (top view)

|        |   | Bank 0                  |                         |                        |                         |               |                         |                    |                         |                    |                    |                    |               |               |               |                         |               |                         |
|--------|---|-------------------------|-------------------------|------------------------|-------------------------|---------------|-------------------------|--------------------|-------------------------|--------------------|--------------------|--------------------|---------------|---------------|---------------|-------------------------|---------------|-------------------------|
|        |   | 1                       | 2                       | 3                      | 4                       | 5             | 6                       | 7                  | 8                       | 9                  | 10                 | 11                 | 12            | 13            | 14            | 15                      | 16            | 17                      |
| Bank 7 | A | GND                     | GND                     | I/O<br>L01P_0<br>VRN_0 | I/O<br>L02P_0           | GND           | I/O<br>L05P_0<br>VREF_0 | I/O<br>L34P_0<br>◆ | I/O<br>L36P_0           | GND                | I/O<br>L38P_0      | I/O<br>L40P_0<br>◆ | I/O<br>L15P_0 | GND           | I/O<br>L22P_0 | I/O<br>L26P_0<br>VREF_0 | GND           | I/O<br>L32P_0<br>GCLK6  |
|        | B | GND                     | GND                     | I/O<br>L01N_0<br>VRP_0 | I/O<br>L02N_0           | I/O<br>L03P_0 | I/O<br>L05N_0           | I/O<br>L34N_0<br>◆ | I/O<br>L36N_0           | I/O                | I/O<br>L38N_0      | I/O<br>L40N_0<br>◆ | I/O<br>L15N_0 | VCCO_0        | I/O<br>L22N_0 | I/O<br>L26N_0           | I/O<br>L28P_0 | I/O<br>L32N_0<br>GCLK7  |
|        | C | I/O<br>L01N_7<br>VRP_7  | I/O<br>L01P_7<br>VRN_7  | GND                    | VCCO_0                  | I/O<br>L03N_0 | I/O<br>L04P_0           | I/O<br>L33P_0<br>◆ | VCCO_0                  | I/O<br>L08P_0      | I/O<br>L37P_0      | GND                | I/O<br>L14P_0 | I/O<br>L17P_0 | I/O<br>L21P_0 | I/O<br>L25P_0           | I/O<br>L28N_0 | I/O<br>L31P_0<br>VREF_0 |
|        | D | I/O<br>L02N_7           | I/O<br>L02P_7           | VCCO_7                 | PROG_B                  | IO<br>VREF_0  | I/O<br>L04N_0           | I/O<br>L33N_0<br>◆ | I/O<br>L35P_0           | I/O<br>L08N_0      | I/O<br>L37N_0      | VCCO_0             | I/O<br>L14N_0 | I/O<br>L17N_0 | I/O<br>L21N_0 | I/O<br>L25N_0           | VCCO_0        | I/O<br>L31N_0           |
|        | E | GND                     | I/O<br>L03N_7<br>VREF_7 | I/O<br>L03P_7          | TDI                     | GND           | VCCAUX                  | I/O<br>L06P_0      | I/O<br>L35N_0           | GND                | IO<br>VREF_0       | VCCAUX             | I/O<br>L13P_0 | GND           | I/O<br>L20P_0 | VCCAUX                  | GND           | I/O                     |
|        | F | I/O<br>L05N_7           | I/O<br>L05P_7           | I/O<br>L04N_7          | I/O<br>L04P_7           | VCCAUX        | I/O                     | I/O<br>L06N_0      | I/O                     | I/O<br>L07P_0      | I/O<br>L10P_0      | I/O<br>L39P_0<br>◆ | I/O<br>L13N_0 | VCCO_0        | I/O<br>L20N_0 | I/O<br>L24P_0           | I/O<br>L27P_0 | I/O<br>L30P_0           |
|        | G | I/O                     | I/O                     | I/O<br>L41N_7<br>◆     | I/O<br>L41P_7<br>◆      | I/O<br>L06N_7 | I/O<br>L06P_7           | GND                | VCCO_0                  | I/O<br>L07N_0      | I/O<br>L10N_0      | I/O<br>L39N_0<br>◆ | I/O           | I/O<br>L16P_0 | I/O<br>L19P_0 | I/O<br>L24N_0           | I/O<br>L27N_0 | I/O<br>L30N_0           |
|        | H | I/O<br>L08N_7           | I/O<br>L08P_7           | VCCO_7                 | I/O<br>L10P_7<br>VREF_7 | I/O<br>L07N_7 | I/O<br>L07P_7           | VCCO_7             | I/O                     | I/O                | I/O<br>L09P_0      | VCCO_0             | I/O<br>L12P_0 | I/O<br>L16N_0 | I/O<br>L19N_0 | VCCO_0                  | VCCAUX        | I/O<br>L29P_0           |
|        | J | GND                     | I/O<br>L11N_7           | I/O<br>L11P_7          | I/O<br>L10N_7           | GND           | I/O<br>L09N_7           | I/O<br>L09P_7      | I/O<br>L12P_7           | I/O<br>◆           | I/O<br>L09N_0      | I/O                | I/O<br>L12N_0 | GND           | IO<br>VREF_0  | I/O<br>L23P_0           | GND           | I/O<br>L29N_0           |
|        | K | I/O<br>L16N_7           | I/O<br>L16P_7<br>VREF_7 | I/O<br>L15N_7          | I/O<br>L15P_7           | I/O<br>L14N_7 | I/O<br>L14P_7           | I/O<br>L13N_7      | I/O<br>L13P_7           | I/O<br>L12N_7      | GND                | I/O<br>◆           | I/O<br>L11P_0 | I/O           | I/O<br>L18P_0 | I/O<br>L23N_0           | I/O           | I/O                     |
|        | L | I/O<br>L19N_7<br>VREF_7 | I/O<br>L19P_7           | GND                    | VCCO_7                  | VCCAUX        | I/O<br>L44N_7<br>◆      | I/O<br>L44P_7<br>◆ | VCCO_7                  | I/O<br>L17N_7      | I/O<br>L17P_7      | HSWAP_EN           | I/O<br>L11N_0 | I/O           | I/O<br>L18N_0 | IO<br>VREF_0            | I/O           | I/O                     |
|        | M | I/O<br>L45N_7           | I/O<br>L45P_7           | I/O<br>L23N_7          | I/O<br>L23P_7           | I/O<br>L22N_7 | I/O<br>L22P_7           | I/O<br>L21N_7      | I/O<br>L21P_7           | I/O<br>L24P_7      | I/O<br>L20N_7      | I/O<br>L20P_7      | VCCINT        | VCCO_0        | VCCO_0        | VCCO_0                  | VCCO_0        | VCCINT                  |
|        | N | GND                     | VCCO_7                  | I/O<br>L25N_7          | I/O<br>L25P_7           | GND           | VCCO_7                  | I/O<br>L46N_7      | I/O<br>L46P_7           | GND                | I/O<br>L24N_7      | I/O<br>L26P_7      | VCCO_7        | VCCINT        | VCCINT        | VCCINT                  | VCCINT        | GND                     |
|        | P | I/O<br>L49N_7           | I/O<br>L49P_7           | I/O<br>L29N_7          | I/O<br>L29P_7           | I/O<br>L28N_7 | I/O<br>L28P_7           | I/O<br>L27N_7      | I/O<br>L27P_7<br>VREF_7 | I/O<br>L47N_7<br>◆ | I/O<br>L47P_7<br>◆ | I/O<br>L26N_7      | VCCO_7        | VCCINT        | GND           | GND                     | GND           | GND                     |
|        | R | I/O<br>L32N_7           | I/O<br>L32P_7           | I/O<br>L31N_7          | I/O<br>L31P_7           | VCCAUX        | I/O<br>L30N_7           | I/O<br>L30P_7      | VCCO_7                  | I/O<br>L33P_7      | I/O<br>L50N_7      | I/O<br>L50P_7      | VCCO_7        | VCCINT        | GND           | GND                     | GND           | GND                     |
|        | T | GND                     | I/O<br>L35N_7           | I/O<br>L35P_7          | VCCO_7                  | GND           | I/O<br>L34N_7           | I/O<br>L34P_7      | VCCAUX                  | GND                | I/O<br>L33N_7      | I/O<br>L51P_7<br>◆ | VCCO_7        | VCCINT        | GND           | GND                     | GND           | GND                     |
|        | U | I/O<br>L40N_7<br>VREF_7 | I/O<br>L40P_7           | I/O<br>L39N_7          | I/O<br>L39P_7           | I/O<br>L38N_7 | I/O<br>L38P_7           | I/O<br>L37N_7      | I/O<br>L37P_7<br>VREF_7 | I/O                | I/O                | I/O<br>L51N_7<br>◆ | VCCINT        | GND           | GND           | GND                     | GND           | GND                     |

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## All Devices

|                                                                  |                                                                     |                                                             |
|------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------|
| <b>12</b> <b>DUAL:</b> Configuration pin, then possible user I/O | <b>16</b> <b>DCI:</b> User I/O or reference resistor input for bank | <b>8</b> <b>GCLK:</b> User I/O or global clock buffer input |
| <b>7</b> <b>CONFIG:</b> Dedicated configuration pins             | <b>4</b> <b>JTAG:</b> Dedicated JTAG port pins                      | <b>104</b> <b>VCCO:</b> Output voltage supply for bank      |
| <b>40</b> <b>VCCINT:</b> Internal core voltage supply (+1.2V)    | <b>32</b> <b>VCCAUX:</b> Auxiliary voltage supply (+2.5V)           | <b>184</b> <b>GND:</b> Ground                               |

## Top Right Corner of FG1156 Package (top view)

| Bank 1               |            |            |            |            |                      |                 |                 |                      |            |                      |                           |                      |                      |                      |                     |                      |   |
|----------------------|------------|------------|------------|------------|----------------------|-----------------|-----------------|----------------------|------------|----------------------|---------------------------|----------------------|----------------------|----------------------|---------------------|----------------------|---|
| 18                   | 19         | 20         | 21         | 22         | 23                   | 24              | 25              | 26                   | 27         | 28                   | 29                        | 30                   | 31                   | 32                   | 33                  | 34                   |   |
| I/O                  | GND        | I/O L40N_1 | I/O L26N_1 | GND        | I/O L19N_1           | I/O L15N_1      | I/O L14N_1      | GND                  | I/O L08N_1 | I/O L34N_1<br>♦      | I/O L05N_1                | GND                  | I/O L02N_1           | I/O L01N_1<br>VRP_1  | GND                 | GND                  | A |
| I/O L32N_1<br>GCLK5  | I/O L28N_1 | I/O L40P_1 | I/O L26P_1 | VCCO_1     | I/O L19P_1           | I/O L15P_1      | I/O L14P_1      | I/O                  | I/O L08P_1 | I/O L34P_1<br>♦      | I/O L05P_1                | I/O L03N_1           | I/O L02P_1           | I/O L01P_1<br>VRN_1  | GND                 | GND                  | B |
| I/O L32P_1<br>GCLK4  | I/O L28P_1 | I/O L39N_1 | I/O L25N_1 | I/O L22N_1 | I/O                  | GND             | I/O L13N_1      | I/O L10N_1<br>VREF_1 | VCCO_1     | I/O L33N_1<br>♦      | I/O L04N_1                | I/O L03P_1           | VCCO_1               | GND                  | I/O L01N_2<br>VRP_2 | I/O L01P_2<br>VRN_2  | C |
| I/O L31N_1<br>VREF_1 | VCCO_1     | I/O L39P_1 | I/O L25P_1 | I/O L22P_1 | I/O L18N_1           | VCCO_1          | I/O L13P_1      | I/O L10P_1           | I/O L07N_1 | I/O L33P_1<br>♦      | I/O L04P_1                | I/O VREF_1           | TCK                  | VCCO_2               | I/O L02N_2          | I/O L02P_2           | D |
| I/O L31P_1           | GND        | VCCAUX     | I/O        | GND        | I/O L18P_1           | VCCAUX          | I/O             | GND                  | I/O L07P_1 | I/O L06N_1<br>VREF_1 | VCCAUX                    | GND                  | TDO                  | I/O L03N_2<br>VREF_2 | I/O L03P_2          | GND                  | E |
| I/O                  | I/O L27N_1 | I/O L38N_1 | I/O L24N_1 | VCCO_1     | I/O L17N_1<br>VREF_1 | I/O L36N_1<br>♦ | I/O L12N_1      | I/O L09N_1           | I/O        | I/O L06P_1           | I/O                       | VCCAUX               | I/O L04N_2           | I/O L04P_2           | I/O L41N_2          | I/O L41P_2           | F |
| I/O L30N_1           | I/O L27P_1 | I/O L38P_1 | I/O L24P_1 | I/O L21N_1 | I/O L17P_1           | I/O L36P_1<br>♦ | I/O L12P_1      | I/O L09P_1           | VCCO_1     | GND                  | I/O L05N_2                | I/O L05P_2           | I/O L42N_2<br>♦      | I/O L42P_2<br>♦      | I/O                 | I/O                  | G |
| I/O L30P_1           | VCCAUX     | VCCO_1     | I/O L23N_1 | I/O L21P_1 | I/O                  | VCCO_1          | I/O L11N_1      | I/O                  | TMS        | VCCO_2               | I/O L06N_2                | I/O L06P_2           | I/O L09N_2<br>VREF_2 | VCCO_2               | I/O L07N_2          | I/O L07P_2           | H |
| I/O L29N_1           | GND        | I/O L37N_1 | I/O L23P_1 | GND        | I/O L16N_1           | I/O L35N_1<br>♦ | I/O L11P_1      | I/O                  | I/O L11N_2 | I/O L08N_2           | I/O L08P_2                | GND                  | I/O L09P_2           | I/O L10N_2           | I/O L10P_2          | GND                  | J |
| I/O L29P_1           | I/O        | I/O L37P_1 | I/O VREF_1 | I/O L20N_1 | I/O L16P_1           | I/O L35P_1<br>♦ | GND             | I/O L11P_2           | I/O L12N_2 | I/O L12P_2           | I/O L13N_2                | I/O L13P_2<br>VREF_2 | I/O L14N_2           | I/O L14P_2           | I/O L15N_2          | I/O L15P_2           | K |
| I/O VREF_1           | I/O        | I/O        | I/O        | I/O L20P_1 | I/O                  | I/O             | I/O L16N_2      | I/O L16P_2           | VCCO_2     | I/O L17N_2<br>♦      | I/O L17P_2<br>VREF_2<br>♦ | VCCAUX               | VCCO_2               | GND                  | I/O L45N_2          | I/O L45P_2           | L |
| VCCINT               | VCCO_1     | VCCO_1     | VCCO_1     | VCCO_1     | VCCINT               | I/O L46N_2      | I/O L46P_2      | I/O L21N_2           | I/O L47N_2 | I/O L47P_2           | I/O L19N_2                | I/O L19P_2           | I/O L20N_2           | I/O L20P_2           | I/O L48N_2          | I/O L48P_2           | M |
| GND                  | VCCINT     | VCCINT     | VCCINT     | VCCINT     | VCCO_2               | I/O L24N_2      | I/O L21P_2      | GND                  | I/O L22N_2 | I/O L22P_2           | VCCO_2                    | GND                  | I/O L23N_2<br>VREF_2 | I/O L23P_2           | VCCO_2              | GND                  | N |
| GND                  | GND        | GND        | GND        | VCCINT     | VCCO_2               | I/O L24P_2<br>♦ | I/O L49N_2<br>♦ | I/O L49P_2<br>♦      | I/O L50N_2 | I/O L50P_2           | I/O L26N_2                | I/O L26P_2           | I/O L27N_2           | I/O L27P_2           | I/O L28N_2          | I/O L28P_2           | P |
| GND                  | GND        | GND        | GND        | VCCINT     | VCCO_2               | I/O L29N_2      | I/O L29P_2      | I/O L33N_2           | VCCO_2     | I/O L30N_2           | I/O L30P_2                | VCCAUX               | I/O L31N_2           | I/O L31P_2           | I/O L32N_2          | I/O L32P_2           | R |
| GND                  | GND        | GND        | GND        | VCCINT     | VCCO_2               | I/O L51N_2<br>♦ | I/O L33P_2      | GND                  | VCCAUX     | I/O L34N_2<br>VREF_2 | I/O L34P_2                | GND                  | VCCO_2               | I/O L35N_2           | I/O L35P_2          | GND                  | T |
| GND                  | GND        | GND        | GND        | GND        | VCCINT               | I/O L51P_2<br>♦ | I/O             | I/O                  | I/O L37N_2 | I/O L37P_2           | I/O L38N_2                | I/O L38P_2           | I/O L39N_2           | I/O L39P_2           | I/O L40N_2          | I/O L40P_2<br>VREF_2 | U |

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**Bottom Left Corner of  
FG1156 Package  
(top view)**

| 18                         | 19                      | 20                   | 21                   | 22         | 23         | 24              | 25                   | 26                   | 27         | 28                   | 29              | 30         | 31                   | 32                  | 33                  | 34                   |   |
|----------------------------|-------------------------|----------------------|----------------------|------------|------------|-----------------|----------------------|----------------------|------------|----------------------|-----------------|------------|----------------------|---------------------|---------------------|----------------------|---|
| GND                        | GND                     | GND                  | GND                  | GND        | VCCINT     | I/O L51N_3<br>◆ | I/O                  | I/O                  | I/O L37P_3 | I/O L37N_3           | I/O L38P_3      | I/O L38N_3 | I/O L39P_3           | I/O L39N_3          | I/O L40P_3          | I/O L40N_3<br>VREF_3 | V |
| GND                        | GND                     | GND                  | GND                  | VCCINT     | VCCO_3     | I/O L51P_3<br>◆ | I/O L33N_3           | GND                  | VCCAUX     | I/O L34P_3<br>VREF_3 | I/O L34N_3      | GND        | VCCO_3               | I/O L35P_3          | I/O L35N_3          | GND                  | W |
| GND                        | GND                     | GND                  | GND                  | VCCINT     | VCCO_3     | I/O L50P_3      | I/O L50N_3           | I/O L33P_3           | VCCO_3     | I/O L30P_3           | I/O L30N_3      | VCCAUX     | I/O L31P_3           | I/O L31N_3          | I/O L32P_3          | I/O L32N_3           | Y |
| GND                        | GND                     | GND                  | GND                  | VCCINT     | VCCO_3     | I/O L48N_3<br>◆ | I/O L49P_3<br>◆      | I/O L49N_3<br>◆      | I/O L26P_3 | I/O L26N_3           | I/O L27P_3      | I/O L27N_3 | I/O L28P_3           | I/O L28N_3          | I/O L29P_3          | I/O L29N_3           | A |
| GND                        | VCCINT                  | VCCINT               | VCCINT               | VCCINT     | VCCO_3     | I/O L48P_3      | I/O L24N_3           | GND                  | I/O L46P_3 | I/O L46N_3           | VCCO_3          | GND        | I/O L47P_3           | I/O L47N_3          | VCCO_3              | GND                  | A |
| VCCINT                     | VCCO_4                  | VCCO_4               | VCCO_4               | VCCO_4     | VCCINT     | I/O L20P_3      | I/O L20N_3           | I/O L24P_3           | I/O L21P_3 | I/O L21N_3           | I/O L22P_3      | I/O L22N_3 | I/O L23P_3<br>VREF_3 | I/O L23N_3          | I/O L45P_3          | I/O L45N_3           | A |
| I/O                        | I/O                     | I/O                  | I/O L18N_4           | I/O        | I/O L11N_4 | DONE            | I/O L17P_3<br>VREF_3 | I/O L17N_3           | VCCO_3     | I/O L44P_3<br>◆      | I/O L44N_3<br>◆ | VCCAUX     | VCCO_3               | GND                 | I/O L19P_3          | I/O L19N_3           | A |
| I/O                        | I/O                     | I/O                  | I/O L18P_4           | I/O        | I/O L11P_4 | I/O<br>◆        | GND                  | I/O L12N_3           | I/O L13P_3 | I/O L13N_3<br>VREF_3 | I/O L14P_3      | I/O L14N_3 | I/O L15P_3           | I/O L15N_3          | I/O L16P_3          | I/O L16N_3           | D |
| I/O L29N_4                 | GND                     | I/O L23P_4           | I/O VREF_4           | GND        | I/O L12N_4 | I/O             | I/O L07N_4           | I/O<br>◆             | I/O L12P_3 | I/O L09P_3<br>VREF_3 | I/O L09N_3      | GND        | I/O L10N_3           | I/O L11P_3          | I/O L11N_3          | GND                  | E |
| I/O L29P_4                 | VCCAUX                  | VCCO_4               | I/O L19N_4           | I/O L16N_4 | I/O L12P_4 | VCCO_4          | I/O L07P_4           | I/O                  | I/O        | VCCO_3               | I/O L07P_3      | I/O L07N_3 | I/O L10P_3           | VCCO_3              | I/O L08P_3          | I/O L08N_3           | F |
| I/O L30N_4<br>D2           | I/O L27N_4<br>DIN<br>D0 | I/O L24N_4           | I/O L19P_4           | I/O L16P_4 | I/O VREF_4 | I/O L39N_4<br>◆ | I/O L08N_4           | I/O L05N_4           | VCCO_4     | GND                  | I/O L06P_3      | I/O L06N_3 | I/O L41P_3<br>◆      | I/O L41N_3<br>◆     | I/O                 | I/O                  | G |
| I/O L30P_4<br>D3           | I/O L27P_4<br>D1        | I/O L24P_4           | I/O L20N_4           | VCCO_4     | I/O L13N_4 | I/O L39P_4<br>◆ | I/O L08P_4           | I/O L05P_4           | I/O        | I/O L35N_4           | I/O             | VCCAUX     | I/O L04P_3           | I/O L04N_3          | I/O L05P_3          | I/O L05N_3           | H |
| I/O VREF_4                 | GND                     | VCCAUX               | I/O L20P_4           | GND        | I/O L13P_4 | VCCAUX          | I/O                  | GND                  | I/O L38N_4 | I/O L35P_4           | VCCAUX          | GND        | N.C.<br>◆            | I/O L03P_3          | I/O L03N_3          | GND                  | J |
| I/O L31N_4<br>INIT_B       | VCCO_4                  | I/O L25N_4           | I/O L21N_4           | I/O L17N_4 | I/O L14N_4 | VCCO_4          | I/O L09N_4           | I/O L06N_4<br>VREF_4 | I/O L38P_4 | I/O L36N_4<br>◆      | I/O L33N_4      | I/O VREF_4 | CCLK                 | VCCO_3              | I/O L02P_3          | I/O L02N_3<br>VREF_3 | K |
| I/O L31P_4<br>DOUT<br>BUSY | I/O L28N_4              | I/O L25P_4           | I/O L21P_4           | I/O L17P_4 | I/O L14P_4 | GND             | I/O L09P_4           | I/O L06P_4           | VCCO_4     | I/O L36P_4<br>◆      | I/O L33P_4      | I/O L03N_4 | VCCO_4               | GND                 | I/O L01P_3<br>VRN_3 | I/O L01N_3<br>VRP_3  | L |
| I/O L32N_4<br>GCLK1        | I/O L28P_4              | I/O L26N_4           | I/O L22N_4<br>VREF_4 | VCCO_4     | I/O L15N_4 | I/O L40N_4<br>◆ | I/O L10N_4           | I/O                  | I/O L04N_4 | I/O L37N_4<br>◆      | I/O L34N_4      | I/O L03P_4 | I/O L02N_4           | I/O L01N_4<br>VRP_4 | GND                 | GND                  | M |
| I/O L32P_4<br>GCLK0        | GND                     | I/O L26P_4<br>VREF_4 | I/O L22P_4           | GND        | I/O L15P_4 | I/O L40P_4<br>◆ | I/O L10P_4           | GND                  | I/O L04P_4 | I/O L37P_4<br>◆      | I/O L34P_4      | GND        | I/O L02P_4           | I/O L01P_4<br>VRN_4 | GND                 | GND                  | N |
|                            |                         |                      |                      |            |            |                 |                      |                      |            |                      |                 |            |                      |                     |                     |                      | P |

Bank 4

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Bottom Right Corner  
of FG1156 Package  
(top view)

## Revision History

| Date     | Version No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 04/03/03 | 1.0         | Initial Xilinx release.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 04/21/03 | 1.1         | Added information on the VQ100 package footprint, including a complete pinout table (Table 86) and footprint diagram (Figure 42). Updated Table 84 with final I/O counts for the VQ100 package. Also added final differential I/O pair counts for the TQ144 package. Added clarifying comments to HSWAP_EN pin description on page 111. Updated the footprint diagram for the FG900 package shown in Figure 50a and Figure 50b. Some thick lines separating I/O banks were incorrect. Made cosmetic changes to Figure 38, Figure 40, and Figure 41. Updated Xilinx hypertext links. Added XC3S200 and XC3S400 to Pin Name column in Table 90. |
| 05/12/03 | 1.1.1       | AM32 pin was missing GND label in FG1156 package diagram (Figure 51).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 07/11/03 | 1.1.2       | Corrected misspellings of GCLK in Table 68 and Table 69. Changed CMOS25 to LVCMOS25 in <b>Dual-Purpose Pin I/O Standard During Configuration</b> section. Clarified references to Module 2. For XC3S5000 in FG1156 package, corrected N.C. symbol to a black square in Table 109, key, and package drawing.                                                                                                                                                                                                                                                                                                                                   |
| 07/29/03 | 1.2         | Corrected pin names on FG1156 package. Some package balls incorrectly included LVDS pair names. The affected balls on the FG1156 package include G1, G2, G33, G34, U9, U10, U25, U26, V9, V10, V25, V26, AH1, AH2, AH33, AH34. The number of LVDS pairs is unaffected. Modified affected balls and re-sorted rows in Table 109. Updated affected balls in Figure 51. Also updated ASCII and Excel electronic versions of FG1156 pinout.                                                                                                                                                                                                       |
| 08/19/03 | 1.2.1       | Removed 100 MHz ConfigRate option in <b>CCLK: Configuration Clock</b> section and in Table 79. Added note that TDO is a totem-pole output in Table 76.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 10/09/03 | 1.2.2       | Some pins had incorrect bank designations and were improperly sorted in Table 92. No pin names or functions changed. Renamed DCI_IN to DCI and added black diamond to N.C. pins in Table 92. In Figure 45, removed some extraneous text from pin 106 and corrected spelling of pins 45, 48, and 81.                                                                                                                                                                                                                                                                                                                                           |
| 12/17/03 | 1.3         | Added FG320 pin tables and pinout diagram ( <b>FG320: 320-lead Fine-pitch Ball Grid Array</b> ). Made cosmetic changes to the TQ144 footprint (Figure 44), the PQ208 footprint (Figure 45), the FG676 footprint (Figure 49), and the FG900 footprint (Figure 50). Clarified wording in <b>Precautions When Using the JTAG Port in 3.3V Environments</b> section.                                                                                                                                                                                                                                                                              |
| 02/27/04 | 1.4         | Clarified wording in <b>Using JTAG Port After Configuration</b> section. In Table 80, reduced package height for FG320 and increased maximum I/O values for the FG676, FG900, and FG1156 packages.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 07/13/04 | 1.5         | Added information on lead-free (Pb-free) package options to the <b>Package Overview</b> section plus Table 80 and Table 82. Clarified the VRN_# reference resistor requirements for I/O standards that use single termination as described in the <b>DCI Termination Types</b> section and in Figure 40b. Graduated from Advance Product Specification to Product Specification.                                                                                                                                                                                                                                                              |
| 08/24/04 | 1.5.1       | Removed XC3S2000 references from <b>FG1156: 1156-lead Fine-pitch Ball Grid Array</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 01/17/05 | 1.6         | Added XC3S50 in CP132 package option. Added XC3S2000 in FG456 package option. Added XC3S4000 in FG676 package option. Added <b>Selecting the Right Package Option</b> section. Modified or added Table 80, Table 82, Table 83, Table 84, Table 88, Table 89, Table 99, Table 101, Table 102, Table 105, Figure 43, and Figure 49.                                                                                                                                                                                                                                                                                                             |
| 08/19/05 | 1.7         | Removed term "weak" from the description of pull-up and pull-down resistors. Added <b>IDCODE Register</b> values. Added signal integrity precautions to <b>CCLK: Configuration Clock</b> and indicated that CCLK should be treated as an I/O during Master mode in Table 78.                                                                                                                                                                                                                                                                                                                                                                  |
| 04/03/06 | 2.0         | Added <b>Package Thermal Characteristics</b> . Updated Figure 39 to make it a more obvious example. Added detail about which pins have dedicated pull-up resistors during configuration, regardless of the HSWAP_EN value to Table 69 and to <b>Pin Behavior During Configuration</b> . Updated <b>Precautions When Using the JTAG Port in 3.3V Environments</b> .                                                                                                                                                                                                                                                                            |
| 04/26/06 | 2.1         | Corrected swapped data row in Table 85. The Theta-JA with zero airflow column was swapped with the Theta-JC column. Made additional notations on CONFIG and JTAG pins that have pull-up resistors during configuration, regardless of the HSWAP_EN input.                                                                                                                                                                                                                                                                                                                                                                                     |
| 05/25/07 | 2.2         | Added link on page 120 to Material Declaration Data Sheets. Corrected units typo in Table 73. Added Note 1 to Table 102 about VREF for XC3S1500 in FG676.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 11/30/07 | 2.3         | Added XC3S5000 FG(G)676 package. Noted that the FG(G)1156 package is being discontinued. Updated Table 85 with latest thermal characteristics data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 06/25/08 | 2.4         | Updated formatting and links.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |