

Virtex-5 FPGA Packaging and Pinout Specification

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Revision History

The following table shows the revision history for this document.

| Date | Version | Revision |
|----------|---------|---|
| 04/14/06 | 1.0 | Initial Xilinx release. |
| 05/12/06 | 1.2 | Added UG112 to list of documents. Added units to tables in Chapter 5. |
| 09/05/06 | 2.0 | Added the LXT platform devices throughout document. In Chapter 1, Added a reference to UG112 for package electrical characteristic information in the “Introduction” section. Corrected the description for pin names: CC and GC, removed Note 2, and changed PROGRAM_B_0 to PROGRAM_B (Table 1-6.) In Chapter 2, added Note 1 to each table and added note number to each pin affected by the note content. Added Chapter 6. |
| 10/13/06 | 2.1 | Added system monitor pin information throughout document. Added LX85T devices to appropriate tables. Updated Table 1-3, page 12. Added Note 2 to Table 2-2, Table 2-3, Table 2-4, Table 2-5, Table 2-6, Table 2-8, and Table 2-10. |
| 02/02/07 | 3.0 | Added the SXT devices, added LX220T. Added the “FLOAT” pin and the System Monitor analog inputs to Table 1-6 on page 15. Added RSVD Note 3 to Table 2-2, Table 2-3, Table 2-4, Table 2-5, Table 2-6, Table 2-8, and Table 2-10. Updated No Connect column to add LX110T device in Table 2-8. Replaced all figures in this chapter. Corrected the LX85 data in Table 6-1, page 406, and the LX85T and LX330T in Table 6-2, page 407. |
| 02/08/07 | 3.0.1 | Minor typographical error. |
| 03/21/07 | 3.1 | Added LX220T to Figure 3-22. Fixed MGTTXN and MGTTXP in the legends of Figure 3-5, Figure 3-11, Figure 3-13, Figure 3-21, and Figure 3-25. These legends are now correct and match the pinout tables. Revised all the SelectIO bank diagrams in Chapter 3. Some power pins had been represented as I/O. |
| 08/14/07 | 3.2 | In Table 1-6: <ul style="list-style-type: none">◆ Clarified general purpose I/O descriptions.◆ Revised the description of RSVD. These pins MUST be tied to ground.◆ Revised direction of FS_n.◆ Added note 2 to VCCO_#.◆ Added note 3 to and updated directions for grounding Dedicated System Monitor Pins when not using the System Monitor function. Removed LX30 from the No Connect (NC) column in Table 2-4 for bank 21, pin numbers AC20, AB23, and AE24. Updated the No Connect (NC) column by adding LX110T, LX220T for MGTAVCC_128 through MGTAVCC_134 in Table 2-8. Revised the pinout diagrams in Chapter 3 to replace some NC designations with open spaces matching the actual package configuration. |

| Date | Version | Revision |
|----------|---------|--|
| 12/11/07 | 3.3 | <p>Updated the tables in Chapter 1 to include LX20T, LX155, and LX155T devices and the FF323 package. Added center column discussion to description of CC in Table 1-6.</p> <p>Added Table 2-1. Updated Table 2-5 and Table 2-8 to include the LX155T. To avoid confusion, removed some No Connect designations in these tables as well. Updated Table 2-6 and Table 2-10 to include the LX155.</p> <p>Added Figure 3-1 and Figure 3-2. Added LX155 and LX155T to other figures in Chapter 3, "Pinout and SelectIO Bank Diagrams". Updated Figure 3-11 and Figure 3-21.</p> <p>Added Figure 4-1, page 392 to Chapter 4.</p> <p>Updated Table 6-1 to include the LX155, and Table 6-2 to include the LX20T and LX155T as well as the added package FF323.</p> |
| 03/31/08 | 4.0 | <p>Added FXT platform to entire document.</p> <p>To include the GTX serial transceivers, added Table 1-4, page 12 and updated Table 1-5, page 13 and added a note to Table 1-6.</p> <p>Added new devices to Table 2-3, Table 2-5, and Table 2-8.</p> <p>Added Figure 3-24 and Figure 3-25.</p> <p>Updated Figure 4-1 and Figure 4-2 with current JEDEC specification reference.</p> <p>Added new devices to Table 6-2.</p> |
| 04/25/08 | 4.1 | <p>Added XC5VSX240T device to the entire document including Table 1-3, Table 1-5, Table 2-8, Figure 3-25, Figure 3-26, and Table 6-2.</p> <p>Updated ADDRn in Table 1-6.</p> <p>Revised Table 2-8 bank NA, Pin C9 and C15.</p> |
| 05/19/08 | 4.2 | <p>Clarified the direction for Multi-Function Pins, Other Pins, Dedicated System Monitor Pins, and RocketIO Serial Transceiver Pins (GTP_DUAL or GTX_DUAL) in Table 1-6.</p> |
| 06/18/08 | 4.3 | <p>Revised no connect column for MGTAVCC_124 and MGTAVCC_126 in Table 2-5.</p> |
| 09/23/08 | 4.4 | <p>Added TXT platform to entire document.</p> |
| 01/19/09 | 4.5 | <p>Chapter 3: Corrected name of "FF1156 Package—TX150T," page 376.</p> <p>Added Chapter 5, "Recommended PCB Design Rules for BGA Packages".</p> <p>Chapter 6: Added TXT thermal resistance data to Table 6-2, page 407.</p> |

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Chapter 7: Package Marking

About This Guide

This guide describes Virtex®-5 device pinouts and package specifications; it also includes pinout diagrams and thermal data.

Organization of This Guide

This document is comprised of the following chapters:

- [Chapter 1, “Packaging Overview”](#)
Provides an introduction to the Virtex-5 family with a summary of maximum I/Os available in each device/package combination. Also includes table of pin definitions.
- [Chapter 2, “Pinout Tables”](#)
Provides pinout information for all Virtex-5 devices and packages.
- [Chapter 3, “Pinout and SelectIO Bank Diagrams”](#)
Provides pinout diagrams for all Virtex-5 FPGA package/device combinations.
- [Chapter 4, “Mechanical Drawings”](#)
Provides mechanical drawings of Virtex-5 FPGA packages.
- [Chapter 5, “Recommended PCB Design Rules for BGA Packages”](#)
Provides PCB design rules for BGA packages.
- [Chapter 6, “Thermal Specifications”](#)
Provides thermal data associated with Virtex-5 FPGA packages. Discusses Virtex-5 FPGA power management strategy and thermal management options.
- [Chapter 7, “Package Marking”](#)
Provides an example and a description of the marking on top of the package (topmark).

Related Documentation

The following documents are also available for download at <http://www.xilinx.com/virtex5>.

- Virtex-5 Family Overview
The features and product selection of the Virtex-5 family are outlined in this overview.
- Virtex-5 FPGA User Guide
This guide includes chapters on:
 - ◆ Clocking Resources
 - ◆ Clock Management Technology (CMT)
 - ◆ Phase-Locked Loops (PLLs)
 - ◆ Block RAM
 - ◆ Configurable Logic Blocks (CLBs)
 - ◆ SelectIO™ Resources
 - ◆ SelectIO Logic Resources
 - ◆ Advanced SelectIO Logic Resources
- Virtex-5 FPGA Data Sheet: DC and Switching Characteristics
This data sheet contains the DC and Switching Characteristic specifications for the Virtex-5 family.
- Virtex-5 FPGA RocketIO GTP Transceiver User Guide
This guide describes the RocketIO™ GTP transceivers available in the Virtex-5 LXT and SXT platforms.
- Virtex-5 FPGA RocketIO GTX Transceiver User Guide
This guide describes the RocketIO GTX transceivers available in the Virtex-5 TXT and FXT platforms.
- Virtex-5 FPGA Embedded Processor Block for Virtex-5 FPGAs
This reference guide is a description of the embedded processor block available in the Virtex-5 FXT platform.
- Virtex-5 FPGA Embedded Tri-Mode Ethernet MAC User Guide
This guide describes the dedicated Tri-Mode Ethernet Media Access Controller available in the Virtex-5 LXT, SXT, TXT and FXT platforms.
- Virtex-5 FPGA Integrated Endpoint Block User Guide for PCI Express Designs
This guide describes the integrated Endpoint blocks in the Virtex-5 LXT, SXT, TXT and FXT platforms used for PCI Express® designs.
- Virtex-5 FPGA XtremeDSP Design Considerations
This guide describes the XtremeDSP™ slice and includes reference designs for using the DSP48E slice.

- **Virtex-5 FPGA Configuration Guide**
This all-encompassing configuration guide includes chapters on configuration interfaces (serial and SelectMAP), bitstream encryption, Boundary-Scan and JTAG configuration, reconfiguration techniques, and readback through the SelectMAP and JTAG interfaces.
- **Virtex-5 FPGA System Monitor User Guide**
The System Monitor functionality available in all the Virtex-5 devices is outlined in this guide.
- **Virtex-5 FPGA PCB Designer’s Guide**
This guide provides information on PCB design for Virtex-5 devices, with a focus on strategies for making design decisions at the PCB and interface level.

Additional Resources

To search the database of silicon and software questions and answers, or to create a technical support case in WebCase, visit the following Xilinx website:

<http://www.xilinx.com/support>

Typographical Conventions

The following typographical conventions are used in this document:

| Convention | Meaning or Use | Example |
|-----------------|---------------------------------|---|
| Italic font | References to other documents | See the <i>Virtex-5 FPGA Configuration Guide</i> for more information. |
| | Emphasis in text | The address (F) is asserted <i>after</i> clock event 2. |
| Underlined Text | Indicates a link to a web page. | http://www.xilinx.com/virtex5 |

Packaging Overview

Summary

This chapter covers the following topics:

- [Introduction](#)
 - [Device/Package Combinations and Maximum I/Os](#)
 - [Pin Definitions](#)
-
-

Introduction

This section describes the pinouts for Virtex®-5 devices in the 1.00 mm pitch flip-chip fine-pitch BGA packages.

Virtex-5 devices are offered exclusively in high performance flip-chip BGA packages that are optimally designed for improved signal integrity and jitter. Package inductance is minimized as a result of optimal placement and even distribution as well as an increased number of Power and GND pins.

All of the devices supported in a particular package are pinout compatible and are listed in the same table (one table per package). Pins that are not available for the smaller devices are listed in the “No Connects” column of each table.

Each device is split into eight or more I/O banks to allow for flexibility in the choice of I/O standards (see UG190: *Virtex-5 FPGA User Guide*). Global pins, including JTAG, configuration, and power/ground pins, are listed at the end of each table. [Table 1-6](#) provides definitions for all pin types.

For information on package electrical characteristics and how the characteristics are measured, refer to UG112: *Device Package User Guide* found on the Xilinx website.

For the latest Virtex-5 FPGA pinout information, check the Xilinx website for any updates to this document.

Device/Package Combinations and Maximum I/Os

[Table 1-1](#) shows the maximum number of user I/Os possible in Virtex-5 FPGA flip-chip packages. FF denotes flip-chip fine-pitch BGA (1.00 mm pitch).

Table 1-1: Flip-Chip Packages

| Package Specifications | Packages | | | | | | | | | |
|------------------------|----------|---------|---------|---------|---------|---------|---------|-------------|-------------|-------------|
| | FF323 | FF324 | FF665 | FF676 | FF1136 | FF1153 | FF1156 | FF1738 | FF1759 | FF1760 |
| Pitch (mm) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Size (mm) | 19 x 19 | 19 x 19 | 27 x 27 | 27 x 27 | 35 x 35 | 35 x 35 | 35 x 35 | 42.5 x 42.5 | 42.5 x 42.5 | 42.5 x 42.5 |
| Maximum I/Os | 172 | 220 | 360 | 440 | 640 | 800 | 360 | 960 | 680 | 1200 |

The number of I/Os per package includes all user I/Os *except* the 19 pins listed in Table 1-2 and the RocketIO™ GTP transceiver I/O channels for the devices listed in Table 1-3 or the GTX transceiver I/O channels for the devices listed in Table 1-4. Table 1-5 shows the number of available I/Os and the number of differential I/O pairs for each Virtex-5 device/package combination.

Table 1-2: Virtex-5 FPGA I/O Pins in the Dedicated Configuration Bank (Bank0)

| | | | | |
|-----------|---------|----------|------|------------|
| DXP | HSWAPEN | INIT_B_0 | M0_0 | TDI |
| DXN | D_IN | CS_B_0 | M1_0 | D_OUT_BUSY |
| VBATT | DONE | RDWR_B_0 | M2_0 | TDO_0 |
| PROGRAM_B | CCLK_0 | TCK_0 | TMS | |

Table 1-3: Number of GTP Transceiver I/O Channels/Device

| I/O Channels | Device | | | | | | | | | | | |
|--------------|--------|----------------------|-------|----------------------|----------------------|-------|-------|--------|--------|--------|--------|--------|
| | LX20T | LX30T ⁽¹⁾ | SX35T | LX50T ⁽²⁾ | SX50T ⁽³⁾ | LX85T | SX95T | LX110T | LX155T | LX220T | SX240T | LX330T |
| MGTRXP | 4 | 4 or 8 | 8 | 8 or 12 | 8 or 12 | 12 | 16 | 16 | 16 | 16 | 24 | 24 |
| MGTRXN | 4 | 4 or 8 | 8 | 8 or 12 | 8 or 12 | 12 | 16 | 16 | 16 | 16 | 24 | 24 |
| MGTXP | 4 | 4 or 8 | 8 | 8 or 12 | 8 or 12 | 12 | 16 | 16 | 16 | 16 | 24 | 24 |
| MGTXN | 4 | 4 or 8 | 8 | 8 or 12 | 8 or 12 | 12 | 16 | 16 | 16 | 16 | 24 | 24 |

Notes:

1. The XC5VLX30T has 4 GTP I/O channels in the FF323/FFG323 package and 8 GTP I/O channels in the FF665/FFG665 package.
2. The XC5VLX50T has 8 GTP I/O channels in the FF665/FFG665 package and 12 GTP I/O channels in the FF1136/FFG1136 package.
3. The XC5VSX50T has 8 GTP I/O channels in the FF665/FFG665 package and 12 GTP I/O channels in the FF1136/FFG1136 package.

Table 1-4: Number of GTX Transceiver I/O Channels/Device

| I/O Channels | Device | | | | | | |
|--------------|--------|----------------------|--------|--------|--------|--------|--------|
| | FX30T | FX70T ⁽¹⁾ | FX100T | FX130T | TX150T | FX200T | TX240T |
| MGTRXP | 8 | 8 or 16 | 16 | 20 | 40 | 24 | 48 |
| MGTRXN | 8 | 8 or 16 | 16 | 20 | 40 | 24 | 48 |
| MGTXP | 8 | 8 or 16 | 16 | 20 | 40 | 24 | 48 |
| MGTXN | 8 | 8 or 16 | 16 | 20 | 40 | 24 | 48 |

Notes:

1. The XC5VFX70T has 8 GTX I/O channels in the FF665/FFG665 package and 16 GTX I/O channels in the FF1136/FFG1136 package.

Table 1-5: Available I/O Pin/Device/Package Combinations

| Virtex-5 Device | User I/Os Pins | Virtex-5 FPGA Package | | | | | | | | | |
|-----------------|------------------------|-----------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| | | FF323 | FF324 | FF665 | FF676 | FF1136 | FF1153 | FF1156 | FF1738 | FF1759 | FF1760 |
| XC5VLX20T | Available User I/Os | 172 | - | - | - | - | - | - | - | - | - |
| | Differential I/O Pairs | 86 | - | - | - | - | - | - | - | - | - |
| XC5VLX30 | Available User I/Os | - | 220 | - | 400 | - | - | - | - | - | - |
| | Differential I/O Pairs | - | 110 | - | 200 | - | - | - | - | - | - |
| XC5VLX30T | Available User I/Os | 172 | - | 360 | - | - | - | - | - | - | - |
| | Differential I/O Pairs | 86 | - | 180 | - | - | - | - | - | - | - |
| XC5VFX30T | Available User I/Os | - | - | 360 | - | - | - | - | - | - | - |
| | Differential I/O Pairs | - | - | 180 | - | - | - | - | - | - | - |
| XC5VSX35T | Available User I/Os | - | - | 360 | - | - | - | - | - | - | - |
| | Differential I/O Pairs | - | - | 180 | - | - | - | - | - | - | - |
| XC5VLX50 | Available User I/Os | - | 220 | - | 440 | - | 560 | - | - | - | - |
| | Differential I/O Pairs | - | 110 | - | 220 | - | 280 | - | - | - | - |
| XC5VLX50T | Available User I/Os | - | - | 360 | - | 480 | - | - | - | - | - |
| | Differential I/O Pairs | - | - | 180 | - | 240 | - | - | - | - | - |
| XC5VSX50T | Available User I/Os | - | - | 360 | - | 480 | - | - | - | - | - |
| | Differential I/O Pairs | - | - | 180 | - | 240 | - | - | - | - | - |
| XC5VFX70T | Available User I/Os | - | - | 360 | - | 640 | - | - | - | - | - |
| | Differential I/O Pairs | - | - | 180 | - | 320 | - | - | - | - | - |
| XC5VLX85 | Available User I/Os | - | - | - | 440 | - | 560 | - | - | - | - |
| | Differential I/O Pairs | - | - | - | 220 | - | 280 | - | - | - | - |
| XC5VLX85T | Available User I/Os | - | - | - | - | 480 | - | - | - | - | - |
| | Differential I/O Pairs | - | - | - | - | 240 | - | - | - | - | - |
| XC5VSX95T | Available User I/Os | - | - | - | - | 640 | - | - | - | - | - |
| | Differential I/O Pairs | - | - | - | - | 320 | - | - | - | - | - |
| XC5VFX100T | Available User I/Os | - | - | - | - | 640 | - | - | 680 | - | - |
| | Differential I/O Pairs | - | - | - | - | 320 | - | - | 340 | - | - |
| XC5VLX110 | Available User I/Os | - | - | - | 440 | - | 800 | - | - | - | 800 |
| | Differential I/O Pairs | - | - | - | 220 | - | 400 | - | - | - | 400 |
| XC5VLX155 | Available User I/Os | - | - | - | - | - | 800 | - | - | - | 800 |
| | Differential I/O Pairs | - | - | - | - | - | 400 | - | - | - | 400 |

Table 1-5: Available I/O Pin/Device/Package Combinations (Continued)

| Virtex-5 Device | User I/Os Pins | Virtex-5 FPGA Package | | | | | | | | | |
|-----------------|------------------------|-----------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| | | FF323 | FF324 | FF665 | FF676 | FF1136 | FF1153 | FF1156 | FF1738 | FF1759 | FF1760 |
| XC5VLX110T | Available User I/Os | - | - | - | - | 640 | - | - | 680 | - | - |
| | Differential I/O Pairs | - | - | - | - | 320 | - | - | 340 | - | - |
| XC5VFX130T | Available User I/Os | - | - | - | - | - | - | - | 840 | - | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | 420 | - | - |
| XC5VTX150T | Available User I/Os | - | - | - | - | - | - | 360 | - | 680 | - |
| | Differential I/O Pairs | - | - | - | - | - | - | 180 | - | 340 | - |
| XC5VLX155T | Available User I/Os | - | - | - | - | 640 | - | - | 680 | - | - |
| | Differential I/O Pairs | - | - | - | - | 320 | - | - | 340 | - | - |
| XC5VFX200T | Available User I/Os | - | - | - | - | - | - | - | 960 | - | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | 480 | - | - |
| XC5VLX220 | Available User I/Os | - | - | - | - | - | - | - | - | - | 800 |
| | Differential I/O Pairs | - | - | - | - | - | - | - | - | - | 400 |
| XC5VLX220T | Available User I/Os | - | - | - | - | - | - | - | 680 | - | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | 340 | - | - |
| XC5VSX240T | Available User I/Os | - | - | - | - | - | - | - | 960 | - | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | 480 | - | - |
| XC5VTX240T | Available User I/Os | - | - | - | - | - | - | - | - | 680 | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | - | 340 | - |
| XC5VLX330 | Available User I/Os | - | - | - | - | - | - | - | - | - | 1200 |
| | Differential I/O Pairs | - | - | - | - | - | - | - | - | - | 600 |
| XC5VLX330T | Available User I/Os | - | - | - | - | - | - | - | 960 | - | - |
| | Differential I/O Pairs | - | - | - | - | - | - | - | 480 | - | - |

Pin Definitions

Table 1-6 lists the pin definitions used in Virtex-5 FPGA packages.

Table 1-6: Virtex-5 FPGA Pin Definitions

| Pin Name | Direction | Description |
|----------------------------|------------------|--|
| User I/O Pins | | |
| IO_LXXY_# | Input/ Output | All user I/O pins are capable of differential signaling and can implement pairs. Each user I/O is labeled "IO_LXXY_#", where: IO indicates a user I/O pin. LXXY indicates a differential pair, with XX a unique pair in the bank and Y = [P N] for the positive/negative sides of the differential pair. |
| Multi-Function Pins | | |
| IO_LXXY_ZZZ_# | | Multi-function pins are labelled "IO_LXXY_ZZZ_#", where ZZZ represents one or more of the following functions in addition to being general purpose user I/O. If not used for their special function, these pins can be user I/O. |
| Dn | Input | In SelectMAP mode, D0 through D31 are configuration data pins. These pins become user I/Os after configuration, unless the SelectMAP port is retained. |
| ADDRn | Output | ADDR0–ADDR25 BPI address output. These pins become user I/O after configuration. |
| RSn | Output | RS0 and RS1 revision select output. |
| FCS_B | Output | BPI and SPI flash chip select. |
| FOE_B | Output | BPI flash output enable. |
| FWE_B | Output | BPI flash write enable. |
| MOSI | Output | SPI flash data output enable. |
| CSO_B | Output | Parallel daisy chain chip select. |
| FSn | Input | FS0–FS2 SPI Flash vendor selection. |
| CC | Input | These clock pins connect to Clock Capable I/Os. These pins become regular user I/Os when not needed for clocks. If a single-ended clock is connected to the differential CC pair of pins, it must be connected to the positive (P) side of the pair. Clock capable I/Os in the center column can not drive BUFs. |
| GC | Input | These clock pins connect to Global Clock Buffers. These pins become regular user I/Os when not needed for clocks. If a single-ended clock is connected to the differential GC pair of pins, it must be connected to the positive (P) side of the pair. |
| SMnP/SMnN | Input | System Monitor analog inputs. |
| VREF | N/A | These are input threshold voltage pins. They become user I/Os when an external threshold voltage is not needed (per bank). |
| VRN | N/A | This pin is for the DCI voltage reference resistor of N transistor (per bank, to be pulled High with reference resistor). |
| VRP | N/A | This pin is for the DCI voltage reference resistor of P transistor (per bank, to be pulled Low with reference resistor). |

Table 1-6: Virtex-5 FPGA Pin Definitions (Continued)

| Pin Name | Direction | Description |
|---|-------------------------------|---|
| Dedicated Configuration Pins⁽¹⁾ | | |
| CCLK_0 | Input/ Output | Configuration clock. Output and input in Master mode or Input in Slave mode. |
| CS_B_0 | Input | In SelectMAP mode, this is the active-low Chip Select signal. |
| D_IN_0 | Input | In bit-serial modes, D_IN is the single-data input. |
| DONE_0 | Input/ Output | DONE is a bidirectional signal with an optional internal pull-up resistor. As an output, this pin indicates completion of the configuration process. As an input, a Low level on DONE can be configured to delay the start-up sequence. |
| D_OUT_BUSY_0 | Output | In SelectMAP mode, BUSY controls the rate at which configuration data is loaded. In bit-serial modes, DOUT gives preamble and configuration data to downstream devices in a daisy chain. |
| HSWAPEN_0 | Input | Enable I/O pullups during configuration |
| INIT_B_0 | Bidirectional (open-drain) | When Low, this pin indicates that the configuration memory is being cleared. When held Low, the start of configuration is delayed. During configuration, a Low on this output indicates that a configuration data error has occurred. |
| M0_0, M1_0, M2_0 | Input | Configuration mode selection |
| PROGRAM_B | Input | Active Low asynchronous reset to configuration logic. This pin has a permanent weak pull-up resistor. |
| RDWR_B_0 | Input | In SelectMAP mode, this is the active-low Write Enable signal. |
| TCK_0 | Input | Boundary-Scan Clock. |
| TDI_0 | Input | Boundary-Scan Data Input. |
| TDO_0 | Output | Boundary-Scan Data Output. |
| TMS_0 | Input | Boundary-Scan Mode Select. |
| DXP_0, DXN_0 | N/A | Temperature-sensing diode pins (Anode: DXP; Cathode: DXN). |
| Reserved Pins | | |
| RSVD | N/A | Reserved pins—must be tied to ground. |
| FLOAT | N/A | Do not connect this pin to the board. Leave floating. |
| Other Pins | | |
| GND | N/A | Ground. |
| VBATT_0 | N/A | Decryptor key memory backup supply; this pin should be tied to V _{CC} or GND. |
| VCCAUX | N/A | Power-supply pins for auxiliary circuits. |
| VCCINT | N/A | Power-supply pins for the internal core logic. |
| VCCO_ ⁽²⁾ | N/A | Power-supply pins for the output drivers (per bank). |

Table 1-6: Virtex-5 FPGA Pin Definitions (Continued)

| Pin Name | Direction | Description |
|--|-----------|--|
| Dedicated System Monitor Pins | | |
| AVDD_0 ⁽³⁾ | N/A | System Monitor's ADC analog positive supply voltage. |
| AVSS_0 ⁽³⁾ | N/A | System Monitor's ADC analog ground reference. |
| VP_0 ⁽³⁾ | Input | System Monitor dedicated differential analog input (positive side). |
| VN_0 ⁽³⁾ | Input | System Monitor dedicated differential analog input (negative side). |
| VREFP_0 ⁽³⁾ | N/A | External System Monitor 2.5V positive reference voltage. |
| VREFN_0 ⁽³⁾ | N/A | External System Monitor 2.5V ground reference voltage. |
| RocketIO Serial Transceiver Pins (GTP_DUAL or GTX_DUAL) | | |
| MGTAVCC | N/A | Power-supply pin for transceiver mixed-signal circuitry. |
| MGTAVCCPLL | N/A | Power-supply pin for PLL. ⁽⁴⁾ |
| MGTAVTTRX | N/A | Power-supply pin for RX circuitry. |
| MGTAVTTRXC | N/A | Power-supply pin for the resistor calibration circuit. |
| MGTAVTTTX | N/A | Power-supply pin for TX circuitry. |
| MGTREFCLKP | Input | Positive differential reference clock. |
| MGTREFCLKN | Input | Negative differential reference clock (negative). |
| MGTRREF | Input | Precision reference resistor pin for internal calibration termination. |
| MGTRXP | Input | Positive differential receive port. |
| MGTRXN | Input | Negative differential receive port. |
| MGTTXP | Output | Positive differential transmit port. |
| MGTTXN | Output | Negative differential transmit port. |

Notes:

1. All dedicated pins (JTAG and configuration) are powered by V_{CC_CONFIG} .
2. V_{CCO} pins in unbonded banks must be connected to the V_{CCO} for that bank for package migration. Do NOT connect unbonded V_{CCO} pins to different supplies. Without a package migration requirement, V_{CCO} pins in unbonded banks can be left unconnected or tied to a common supply (V_{CCO} or ground).
3. When not using System Monitor, these pins must be grounded. See "Disabling the System Monitor" in UG192: *Virtex-5 FPGA System Monitor User Guide*.
4. MGTAVCCPLL voltage for GTP transceivers is not the same as the MGTAVCCPLL voltage for GTX transceivers, see DS202: *Virtex-5 FPGA Data Sheet*. UG196: *Virtex-5 FPGA RocketIO GTP Transceiver User Guide* and UG198: *Virtex-5 FPGA RocketIO GTX Transceiver User Guide* contain board design guidelines for these transceivers.

Pinout Tables

Summary

This chapter includes the pinout information tables for the following packages:

- Table 2-1, “FF323 Package—LX20T and LX30T,” on page 19
- Table 2-2, “FF324 Package—LX30 and LX50,” on page 30
- Table 2-3, “FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T,” on page 40
- Table 2-4, “FF676 Package—LX30, LX50, LX85, and LX110,” on page 61
- Table 2-5, “FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T,” on page 82
- Table 2-6, “FF1153 Package—LX50, LX85, LX110, and LX155,” on page 118
- Table 2-7, “FF1156 Package—TX150T,” on page 154
- Table 2-8, “FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T,” on page 190
- Table 2-9, “FF1759 Package—TX150T and TX240T,” on page 251
- Table 2-10, “FF1760 Package—LX110, LX155, LX220, and LX330,” on page 305

FF323 Package—LX20T and LX30T

Table 2-1: FF323 Package—LX20T and LX30T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 0 | DXP_0 | K10 | |
| 0 | DXN_0 | K9 | |
| 0 | AVDD_0 | G10 | |
| 0 | AVSS_0 | G9 | |
| 0 | VP_0 | H10 | |
| 0 | VN_0 | J9 | |
| 0 | VREFP_0 | J10 | |
| 0 | VREFN_0 | H9 | |
| 0 | VBATT_0 | D5 | |
| 0 | PROGRAM_B_0 | E11 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------|------------|-----------------|
| 0 | HSWAPEN_0 | F11 | |
| 0 | D_IN_0 | F6 | |
| 0 | DONE_0 | F9 | |
| 0 | CCLK_0 | E10 | |
| 0 | INIT_B_0 | B5 | |
| 0 | CS_B_0 | A4 | |
| 0 | RDWR_B_0 | E6 | |
| 0 | RSVD ⁽³⁾ | L9 | |
| 0 | RSVD ⁽³⁾ | L10 | |
| 0 | TCK_0 | M6 | |
| 0 | M0_0 | G6 | |
| 0 | M2_0 | M9 | |
| 0 | M1_0 | H5 | |
| 0 | TMS_0 | N1 | |
| 0 | TDI_0 | M5 | |
| 0 | D_OUT_BUSY_0 | N3 | |
| 0 | TDO_0 | N5 | |
| 1 | IO_L0P_A19_1 | A7 | |
| 1 | IO_L0N_A18_1 | A6 | |
| 1 | IO_L1P_A17_1 | E9 | |
| 1 | IO_L1N_A16_1 | D8 | |
| 1 | IO_L2P_A15_D31_1 | D10 | |
| 1 | IO_L2N_A14_D30_1 | D9 | |
| 1 | IO_L3P_A13_D29_1 | C8 | |
| 1 | IO_L3N_A12_D28_1 | C7 | |
| 1 | IO_L4P_A11_D27_1 | B9 | |
| 1 | IO_L4N_VREF_A10_D26_1 | B8 | |
| 1 | IO_L5P_A9_D25_1 | B6 | |
| 1 | IO_L5N_A8_D24_1 | C6 | |
| 1 | IO_L6P_A7_D23_1 | A8 | |
| 1 | IO_L6N_A6_D22_1 | A9 | |
| 1 | IO_L7P_A5_D21_1 | D7 | |
| 1 | IO_L7N_A4_D20_1 | E7 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L8P_CC_A3_D19_1 | B10 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | C10 | |
| 1 | IO_L9P_CC_A1_D17_1 | F8 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | F7 | |
| 2 | IO_L0P_CC_RS1_2 | R1 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | T1 | |
| 2 | IO_L1P_CC_A25_2 | V1 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | U1 | |
| 2 | IO_L2P_A23_2 | P2 | |
| 2 | IO_L2N_A22_2 | P3 | |
| 2 | IO_L3P_A21_2 | V2 | |
| 2 | IO_L3N_A20_2 | V3 | |
| 2 | IO_L4P_FCS_B_2 | R2 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | T2 | |
| 2 | IO_L5P_FWE_B_2 | U4 | |
| 2 | IO_L5N_CSO_B_2 | U3 | |
| 2 | IO_L6P_D7_2 | P4 | |
| 2 | IO_L6N_D6_2 | R4 | |
| 2 | IO_L7P_D5_2 | U5 | |
| 2 | IO_L7N_D4_2 | V5 | |
| 2 | IO_L8P_D3_2 | P5 | |
| 2 | IO_L8N_D2_FS2_2 | R5 | |
| 2 | IO_L9P_D1_FS1_2 | T4 | |
| 2 | IO_L9N_D0_FS0_2 | T3 | |
| 4 | IO_L0P_GC_D15_4 | R9 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | P9 | |
| 4 | IO_L1P_GC_D13_4 | N7 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | N6 | |
| 4 | IO_L2P_GC_D11_4 | T9 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | U9 | |
| 4 | IO_L3P_GC_D9_4 | T6 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | R6 | |
| 4 | IO_L4P_GC_4 | T8 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | U8 | |
| 4 | IO_L5P_GC_4 | V6 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | U6 | |
| 4 | IO_L6P_GC_4 | V8 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | V7 | |
| 4 | IO_L7P_GC_VRN_4 | N8 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | M8 | |
| 4 | IO_L8P_CC_GC_4 | T7 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | R7 | |
| 4 | IO_L9P_CC_GC_4 | P8 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | P7 | |
| 11 | IO_L0P_11 | D13 | |
| 11 | IO_L0N_11 | D14 | |
| 11 | IO_L1P_11 | E15 | |
| 11 | IO_L1N_11 | D15 | |
| 11 | IO_L2P_11 | E14 | |
| 11 | IO_L2N_11 | F14 | |
| 11 | IO_L3P_11 | A11 | |
| 11 | IO_L3N_11 | A12 | |
| 11 | IO_L4P_11 | C12 | |
| 11 | IO_L4N_VREF_11 | C13 | |
| 11 | IO_L5P_11 | B13 | |
| 11 | IO_L5N_11 | A13 | |
| 11 | IO_L6P_11 | G14 | |
| 11 | IO_L6N_11 | G15 | |
| 11 | IO_L7P_11 | B14 | |
| 11 | IO_L7N_11 | A14 | |
| 11 | IO_L8P_CC_11 | G13 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | F13 | |
| 11 | IO_L9P_CC_11 | C15 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | B15 | |
| 11 | IO_L10P_CC_SM15P_11 | B16 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | A16 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------------|-------------------|------------------------|
| 11 | IO_L11P_CC_SM14P_11 | F16 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | G16 | |
| 11 | IO_L12P_VRN_11 | A18 | |
| 11 | IO_L12N_VRP_11 | A17 | |
| 11 | IO_L13P_11 | E17 | |
| 11 | IO_L13N_11 | E16 | |
| 11 | IO_L14P_11 | C17 | |
| 11 | IO_L14N_VREF_11 | C16 | |
| 11 | IO_L15P_SM13P_11 | D12 | |
| 11 | IO_L15N_SM13N_11 | E12 | |
| 11 | IO_L16P_SM12P_11 | C18 | |
| 11 | IO_L16N_SM12N_11 | B18 | |
| 11 | IO_L17P_SM11P_11 | F18 | |
| 11 | IO_L17N_SM11N_11 | F17 | |
| 11 | IO_L18P_SM10P_11 | D18 | |
| 11 | IO_L18N_SM10N_11 | D17 | |
| 11 | IO_L19P_SM9P_11 | B11 | |
| 11 | IO_L19N_SM9N_11 | C11 | |
| 13 | IO_L0P_SM8P_13 | H13 | |
| 13 | IO_L0N_SM8N_13 | J14 | |
| 13 | IO_L1P_SM7P_13 | H17 | |
| 13 | IO_L1N_SM7N_13 | G18 | |
| 13 | IO_L2P_SM6P_13 | J15 | |
| 13 | IO_L2N_SM6N_13 | K15 | |
| 13 | IO_L3P_SM5P_13 | H18 | |
| 13 | IO_L3N_SM5N_13 | J18 | |
| 13 | IO_L4P_13 | K12 | |
| 13 | IO_L4N_VREF_13 | L12 | |
| 13 | IO_L5P_SM4P_13 | J17 | |
| 13 | IO_L5N_SM4N_13 | K17 | |
| 13 | IO_L6P_SM3P_13 | H15 | |
| 13 | IO_L6N_SM3N_13 | H16 | |
| 13 | IO_L7P_SM2P_13 | L18 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L7N_SM2N_13 | L17 | |
| 13 | IO_L8P_CC_SM1P_13 | N12 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | M11 | |
| 13 | IO_L9P_CC_SM0P_13 | K16 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | L16 | |
| 13 | IO_L10P_CC_13 | N18 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | M18 | |
| 13 | IO_L11P_CC_13 | M14 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | L13 | |
| 13 | IO_L12P_VRN_13 | P18 | |
| 13 | IO_L12N_VRP_13 | N17 | |
| 13 | IO_L13P_13 | L14 | |
| 13 | IO_L13N_13 | K14 | |
| 13 | IO_L14P_13 | R17 | |
| 13 | IO_L14N_VREF_13 | P17 | |
| 13 | IO_L15P_13 | N13 | |
| 13 | IO_L15N_13 | M13 | |
| 13 | IO_L16P_13 | R15 | |
| 13 | IO_L16N_13 | R16 | |
| 13 | IO_L17P_13 | P14 | |
| 13 | IO_L17N_13 | P15 | |
| 13 | IO_L18P_13 | N16 | |
| 13 | IO_L18N_13 | M16 | |
| 13 | IO_L19P_13 | N15 | |
| 13 | IO_L19N_13 | M15 | |
| 17 | IO_L4P_17 | M10 | |
| 17 | IO_L4N_VREF_17 | N11 | |
| 17 | IO_L5P_17 | T17 | |
| 17 | IO_L5N_17 | T16 | |
| 17 | IO_L6P_17 | T12 | |
| 17 | IO_L6N_17 | R12 | |
| 17 | IO_L7P_17 | T18 | |
| 17 | IO_L7N_17 | U18 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 17 | IO_L8P_CC_17 | P10 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | N10 | |
| 17 | IO_L9P_CC_17 | U16 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | U15 | |
| 17 | IO_L10P_CC_17 | V18 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | V17 | |
| 17 | IO_L11P_CC_17 | R10 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | R11 | |
| 17 | IO_L12P_VRN_17 | V16 | |
| 17 | IO_L12N_VRP_17 | V15 | |
| 17 | IO_L13P_17 | T11 | |
| 17 | IO_L13N_17 | U11 | |
| 17 | IO_L14P_17 | R14 | |
| 17 | IO_L14N_VREF_17 | T14 | |
| 17 | IO_L15P_17 | V10 | |
| 17 | IO_L15N_17 | U10 | |
| 17 | IO_L16P_17 | U14 | |
| 17 | IO_L16N_17 | T13 | |
| 17 | IO_L17P_17 | P12 | |
| 17 | IO_L17N_17 | P13 | |
| 17 | IO_L18P_17 | U13 | |
| 17 | IO_L18N_17 | V13 | |
| 17 | IO_L19P_17 | V12 | |
| 17 | IO_L19N_17 | V11 | |
| NA | MGTTXP0_112 | A2 | |
| NA | MGTAVTTTX_112 | F3 | |
| NA | MGTTXN0_112 | B2 | |
| NA | MGTRXP0_112 | B1 | |
| NA | MGTAVTTRX_112 | B3 | |
| NA | MGTRXN0_112 | C1 | |
| NA | MGTAVCCPLL_112 | E4 | |
| NA | MGTRXN1_112 | D1 | |
| NA | MGTREFCLKN_112 | C4 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTRXP1_112 | E1 | |
| NA | MGTREFCLKP_112 | C3 | |
| NA | MGTTXN1_112 | E2 | |
| NA | MGTTXP1_112 | F2 | |
| NA | MGTRREF_112 | F5 | |
| NA | MGTTXP0_114 | G2 | |
| NA | MGTAVTTTX_114 | M3 | |
| NA | MGTTXN0_114 | H2 | |
| NA | MGTRXP0_114 | H1 | |
| NA | MGTAVTTRX_114 | H3 | |
| NA | MGTRXN0_114 | J1 | |
| NA | MGTAVCCPLL_114 | L4 | |
| NA | MGTRXN1_114 | K1 | |
| NA | MGTREFCLKN_114 | J4 | |
| NA | MGTRXP1_114 | L1 | |
| NA | MGTREFCLKP_114 | J3 | |
| NA | MGTTXN1_114 | L2 | |
| NA | MGTTXP1_114 | M2 | |
| NA | MGTAVTTRXC | G4 | |
| NA | GND | A1 | |
| NA | GND | A3 | |
| NA | GND | A5 | |
| NA | GND | B17 | |
| NA | GND | B4 | |
| NA | GND | C14 | |
| NA | GND | C2 | |
| NA | GND | C5 | |
| NA | GND | C9 | |
| NA | GND | D11 | |
| NA | GND | D2 | |
| NA | GND | D4 | |
| NA | GND | D6 | |
| NA | GND | E18 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | E3 | |
| NA | GND | E5 | |
| NA | GND | F1 | |
| NA | GND | F10 | |
| NA | GND | F12 | |
| NA | GND | F15 | |
| NA | GND | F4 | |
| NA | GND | G1 | |
| NA | GND | G11 | |
| NA | GND | G17 | |
| NA | GND | G3 | |
| NA | GND | G5 | |
| NA | GND | G7 | |
| NA | GND | H12 | |
| NA | GND | H4 | |
| NA | GND | H6 | |
| NA | GND | H8 | |
| NA | GND | J11 | |
| NA | GND | J16 | |
| NA | GND | J2 | |
| NA | GND | J5 | |
| NA | GND | J7 | |
| NA | GND | K13 | |
| NA | GND | K2 | |
| NA | GND | K4 | |
| NA | GND | K6 | |
| NA | GND | K8 | |
| NA | GND | L11 | |
| NA | GND | L3 | |
| NA | GND | L5 | |
| NA | GND | L7 | |
| NA | GND | M1 | |
| NA | GND | M12 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | M17 | |
| NA | GND | M4 | |
| NA | GND | N14 | |
| NA | GND | N2 | |
| NA | GND | N9 | |
| NA | GND | P1 | |
| NA | GND | P6 | |
| NA | GND | R18 | |
| NA | GND | T10 | |
| NA | GND | T15 | |
| NA | GND | U12 | |
| NA | GND | U7 | |
| NA | GND | V4 | |
| NA | VCCAUX | G12 | |
| NA | VCCAUX | J13 | |
| NA | VCCAUX | K7 | |
| NA | VCCAUX | L6 | |
| NA | VCCAUX | L8 | |
| NA | VCCINT | G8 | |
| NA | VCCINT | H11 | |
| NA | VCCINT | H7 | |
| NA | VCCINT | J12 | |
| NA | VCCINT | J6 | |
| NA | VCCINT | J8 | |
| NA | VCCINT | K11 | |
| 0 | VCCO_0 | K5 | |
| 0 | VCCO_0 | N4 | |
| 1 | VCCO_1 | A10 | |
| 1 | VCCO_1 | B7 | |
| 1 | VCCO_1 | E8 | |
| 2 | VCCO_2 | R3 | |
| 2 | VCCO_2 | T5 | |
| 2 | VCCO_2 | U2 | |

Table 2-1: FF323 Package—LX20T and LX30T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 4 | VCCO_4 | R8 | |
| 4 | VCCO_4 | V9 | |
| 4 | VCCO_4 | M7 | |
| 11 | VCCO_11 | A15 | |
| 11 | VCCO_11 | B12 | |
| 11 | VCCO_11 | D16 | |
| 11 | VCCO_11 | E13 | |
| 13 | VCCO_13 | H14 | |
| 13 | VCCO_13 | K18 | |
| 13 | VCCO_13 | L15 | |
| 13 | VCCO_13 | P16 | |
| 17 | VCCO_17 | P11 | |
| 17 | VCCO_17 | R13 | |
| 17 | VCCO_17 | U17 | |
| 17 | VCCO_17 | V14 | |
| NA | MGTAVCC_112 | D3 | |
| NA | MGTAVCC_114 | K3 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF324 Package—LX30 and LX50

Table 2-2: FF324 Package—LX30 and LX50

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | L10 | |
| 0 | DXN_0 | L9 | |
| 0 | AVDD_0 | H10 | |
| 0 | AVSS_0 | H9 | |
| 0 | VP_0 | J10 | |
| 0 | VN_0 | K9 | |
| 0 | VREFP_0 | K10 | |
| 0 | VREFN_0 | J9 | |
| 0 | VBATT_0 | T18 | |
| 0 | PROGRAM_B_0 | U18 | |
| 0 | HSWAPEN_0 | T17 | |
| 0 | D_IN_0 | R7 | |
| 0 | DONE_0 | P8 | |
| 0 | CCLK_0 | N8 | |
| 0 | INIT_B_0 | M8 | |
| 0 | CS_B_0 | R16 | |
| 0 | RDWR_B_0 | P15 | |
| 0 | RSVD ⁽³⁾ | R14 | |
| 0 | RSVD ⁽³⁾ | P14 | |
| 0 | TCK_0 | M9 | |
| 0 | M0_0 | N12 | |
| 0 | M2_0 | N13 | |
| 0 | M1_0 | L11 | |
| 0 | TMS_0 | V5 | |
| 0 | TDI_0 | U5 | |
| 0 | D_OUT_BUSY_0 | T6 | |
| 0 | TDO_0 | U6 | |
| 1 | IO_L0P_A19_1 | F11 | |
| 1 | IO_L0N_A18_1 | G11 | |
| 1 | IO_L1P_A17_1 | G10 | |
| 1 | IO_L1N_A16_1 | F9 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | E12 | |
| 1 | IO_L2N_A14_D30_1 | D12 | |
| 1 | IO_L3P_A13_D29_1 | F8 | |
| 1 | IO_L3N_A12_D28_1 | G9 | |
| 1 | IO_L4P_A11_D27_1 | C12 | |
| 1 | IO_L4N_VREF_A10_D26_1 | D13 | |
| 1 | IO_L5P_A9_D25_1 | G8 | |
| 1 | IO_L5N_A8_D24_1 | F7 | |
| 1 | IO_L6P_A7_D23_1 | F12 | |
| 1 | IO_L6N_A6_D22_1 | F13 | |
| 1 | IO_L7P_A5_D21_1 | D8 | |
| 1 | IO_L7N_A4_D20_1 | E7 | |
| 1 | IO_L8P_CC_A3_D19_1 | G13 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | H13 | |
| 1 | IO_L9P_CC_A1_D17_1 | D7 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | C6 | |
| 2 | IO_L0P_CC_RS1_2 | T8 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | T7 | |
| 2 | IO_L1P_CC_A25_2 | R15 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | T16 | |
| 2 | IO_L2P_A23_2 | R9 | |
| 2 | IO_L2N_A22_2 | T9 | |
| 2 | IO_L3P_A21_2 | V18 | |
| 2 | IO_L3N_A20_2 | V17 | |
| 2 | IO_L4P_FCS_B_2 | P10 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | P9 | |
| 2 | IO_L5P_FWE_B_2 | U16 | |
| 2 | IO_L5N_CSO_B_2 | V16 | |
| 2 | IO_L6P_D7_2 | N10 | |
| 2 | IO_L6N_D6_2 | M10 | |
| 2 | IO_L7P_D5_2 | T14 | |
| 2 | IO_L7N_D4_2 | T13 | |
| 2 | IO_L8P_D3_2 | N11 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|--|------------|-----------------|
| 2 | IO_L8N_D2_FS2_2 | M11 | |
| 2 | IO_L9P_D1_FS1_2 | P13 | |
| 2 | IO_L9N_D0_FS0_2 | P12 | |
| 3 | IO_L0P_CC_GC_3 | A8 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | A9 | |
| 3 | IO_L1P_CC_GC_3 | B9 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | B10 | |
| 3 | IO_L2P_GC_VRN_3 | E9 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | D9 | |
| 3 | IO_L3P_GC_3 | E10 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | E11 | |
| 3 | IO_L4P_GC_3 | C8 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | B8 | |
| 3 | IO_L5P_GC_3 | D10 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | C10 | |
| 3 | IO_L6P_GC_3 | A6 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | A7 | |
| 3 | IO_L7P_GC_3 | B11 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | C11 | |
| 3 | IO_L8P_GC_3 | B6 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | C7 | |
| 3 | IO_L9P_GC_3 | A11 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | A12 | |
| 4 | IO_L0P_GC_D15_4 | U15 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | V15 | |
| 4 | IO_L1P_GC_D13_4 | V7 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | V6 | |
| 4 | IO_L2P_GC_D11_4 | V13 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | V12 | |
| 4 | IO_L3P_GC_D9_4 | V8 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | U8 | |
| 4 | IO_L4P_GC_4 | U14 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | U13 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------------|-------------------|------------------------|
| 4 | IO_L5P_GC_4 | U10 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | U9 | |
| 4 | IO_L6P_GC_4 | R12 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | T12 | |
| 4 | IO_L7P_GC_VRN_4 | V11 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | V10 | |
| 4 | IO_L8P_CC_GC_4 | U11 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | T11 | |
| 4 | IO_L9P_CC_GC_4 | R11 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | R10 | |
| 11 | IO_L0P_11 | C15 | |
| 11 | IO_L0N_11 | C16 | |
| 11 | IO_L1P_11 | A13 | |
| 11 | IO_L1N_11 | A14 | |
| 11 | IO_L2P_11 | B14 | |
| 11 | IO_L2N_11 | B15 | |
| 11 | IO_L3P_11 | B16 | |
| 11 | IO_L3N_11 | A16 | |
| 11 | IO_L4P_11 | D14 | |
| 11 | IO_L4N_VREF_11 | E14 | |
| 11 | IO_L5P_11 | A17 | |
| 11 | IO_L5N_11 | A18 | |
| 11 | IO_L6P_11 | C13 | |
| 11 | IO_L6N_11 | B13 | |
| 11 | IO_L7P_11 | B18 | |
| 11 | IO_L7N_11 | C17 | |
| 11 | IO_L8P_CC_11 | F14 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | G14 | |
| 11 | IO_L9P_CC_11 | F16 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | E16 | |
| 11 | IO_L10P_CC_SM15P_11 | E17 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | D17 | |
| 11 | IO_L11P_CC_SM14P_11 | D15 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | E15 | |
| 11 | IO_L12P_VRN_11 | D18 | |
| 11 | IO_L12N_VRP_11 | C18 | |
| 11 | IO_L13P_11 | H15 | |
| 11 | IO_L13N_11 | G15 | |
| 11 | IO_L14P_11 | F18 | |
| 11 | IO_L14N_VREF_11 | F17 | |
| 11 | IO_L15P_SM13P_11 | H16 | |
| 11 | IO_L15N_SM13N_11 | G16 | |
| 11 | IO_L16P_SM12P_11 | H18 | |
| 11 | IO_L16N_SM12N_11 | G18 | |
| 11 | IO_L17P_SM11P_11 | H17 | |
| 11 | IO_L17N_SM11N_11 | J17 | |
| 11 | IO_L18P_SM10P_11 | K17 | |
| 11 | IO_L18N_SM10N_11 | J18 | |
| 11 | IO_L19P_SM9P_11 | J15 | |
| 11 | IO_L19N_SM9N_11 | J14 | |
| 12 | IO_L0P_12 | E6 | |
| 12 | IO_L0N_12 | F6 | |
| 12 | IO_L1P_12 | B5 | |
| 12 | IO_L1N_12 | C5 | |
| 12 | IO_L2P_12 | D5 | |
| 12 | IO_L2N_12 | D4 | |
| 12 | IO_L3P_12 | B4 | |
| 12 | IO_L3N_12 | A4 | |
| 12 | IO_L4P_12 | E5 | |
| 12 | IO_L4N_VREF_12 | E4 | |
| 12 | IO_L5P_12 | A3 | |
| 12 | IO_L5N_12 | B3 | |
| 12 | IO_L6P_12 | G5 | |
| 12 | IO_L6N_12 | G6 | |
| 12 | IO_L7P_12 | C3 | |
| 12 | IO_L7N_12 | D3 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 12 | IO_L8P_CC_12 | H6 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | H5 | |
| 12 | IO_L9P_CC_12 | D2 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | C2 | |
| 12 | IO_L10P_CC_12 | A1 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | A2 | |
| 12 | IO_L11P_CC_12 | G4 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | F4 | |
| 12 | IO_L12P_VRN_12 | C1 | |
| 12 | IO_L12N_VRP_12 | B1 | |
| 12 | IO_L13P_12 | G3 | |
| 12 | IO_L13N_12 | F3 | |
| 12 | IO_L14P_12 | F1 | |
| 12 | IO_L14N_VREF_12 | E1 | |
| 12 | IO_L15P_12 | J5 | |
| 12 | IO_L15N_12 | J4 | |
| 12 | IO_L16P_12 | H3 | |
| 12 | IO_L16N_12 | J3 | |
| 12 | IO_L17P_12 | H2 | |
| 12 | IO_L17N_12 | J2 | |
| 12 | IO_L18P_12 | E2 | |
| 12 | IO_L18N_12 | F2 | |
| 12 | IO_L19P_12 | G1 | |
| 12 | IO_L19N_12 | H1 | |
| 13 | IO_L0P_SM8P_13 | K15 | |
| 13 | IO_L0N_SM8N_13 | L16 | |
| 13 | IO_L1P_SM7P_13 | L17 | |
| 13 | IO_L1N_SM7N_13 | K16 | |
| 13 | IO_L2P_SM6P_13 | K14 | |
| 13 | IO_L2N_SM6N_13 | L14 | |
| 13 | IO_L3P_SM5P_13 | M18 | |
| 13 | IO_L3N_SM5N_13 | L18 | |
| 13 | IO_L4P_13 | L13 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L4N_VREF_13 | M13 | |
| 13 | IO_L5P_SM4P_13 | P18 | |
| 13 | IO_L5N_SM4N_13 | N18 | |
| 13 | IO_L6P_SM3P_13 | M14 | |
| 13 | IO_L6N_SM3N_13 | N15 | |
| 13 | IO_L7P_SM2P_13 | P17 | |
| 13 | IO_L7N_SM2N_13 | R17 | |
| 13 | IO_L8P_CC_SM1P_13 | M15 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | M16 | |
| 13 | IO_L9P_CC_SM0P_13 | N16 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | N17 | |
| 18 | IO_L0P_18 | K5 | |
| 18 | IO_L0N_18 | K4 | |
| 18 | IO_L1P_18 | K2 | |
| 18 | IO_L1N_18 | K1 | |
| 18 | IO_L2P_18 | L6 | |
| 18 | IO_L2N_18 | M6 | |
| 18 | IO_L3P_18 | L2 | |
| 18 | IO_L3N_18 | L1 | |
| 18 | IO_L4P_18 | L4 | |
| 18 | IO_L4N_VREF_18 | L3 | |
| 18 | IO_L5P_18 | N1 | |
| 18 | IO_L5N_18 | M1 | |
| 18 | IO_L6P_18 | M4 | |
| 18 | IO_L6N_18 | M3 | |
| 18 | IO_L7P_18 | N2 | |
| 18 | IO_L7N_18 | N3 | |
| 18 | IO_L8P_CC_18 | N5 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | M5 | |
| 18 | IO_L9P_CC_18 | P2 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | P3 | |
| 18 | IO_L10P_CC_18 | R2 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | R1 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 18 | IO_L11P_CC_18 | N6 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | P5 | |
| 18 | IO_L12P_VRN_18 | T2 | |
| 18 | IO_L12N_VRP_18 | T1 | |
| 18 | IO_L13P_18 | N7 | |
| 18 | IO_L13N_18 | P7 | |
| 18 | IO_L14P_18 | V1 | |
| 18 | IO_L14N_VREF_18 | U1 | |
| 18 | IO_L15P_18 | P4 | |
| 18 | IO_L15N_18 | R4 | |
| 18 | IO_L16P_18 | V2 | |
| 18 | IO_L16N_18 | V3 | |
| 18 | IO_L17P_18 | R5 | |
| 18 | IO_L17N_18 | R6 | |
| 18 | IO_L18P_18 | U3 | |
| 18 | IO_L18N_18 | T3 | |
| 18 | IO_L19P_18 | T4 | |
| 18 | IO_L19N_18 | U4 | |
| NA | GND | D1 | |
| NA | GND | J1 | |
| NA | GND | P1 | |
| NA | GND | B2 | |
| NA | GND | M2 | |
| NA | GND | U2 | |
| NA | GND | E3 | |
| NA | GND | R3 | |
| NA | GND | H4 | |
| NA | GND | V4 | |
| NA | GND | A5 | |
| NA | GND | L5 | |
| NA | GND | D6 | |
| NA | GND | K6 | |
| NA | GND | P6 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | G7 | |
| NA | GND | J7 | |
| NA | GND | L7 | |
| NA | GND | U7 | |
| NA | GND | H8 | |
| NA | GND | K8 | |
| NA | GND | C9 | |
| NA | GND | N9 | |
| NA | GND | F10 | |
| NA | GND | T10 | |
| NA | GND | J11 | |
| NA | GND | B12 | |
| NA | GND | H12 | |
| NA | GND | K12 | |
| NA | GND | M12 | |
| NA | GND | E13 | |
| NA | GND | J13 | |
| NA | GND | R13 | |
| NA | GND | H14 | |
| NA | GND | V14 | |
| NA | GND | A15 | |
| NA | GND | L15 | |
| NA | GND | D16 | |
| NA | GND | P16 | |
| NA | GND | B17 | |
| NA | GND | G17 | |
| NA | GND | U17 | |
| NA | GND | E18 | |
| NA | GND | K18 | |
| NA | VCCAUX | J6 | |
| NA | VCCAUX | H7 | |
| NA | VCCAUX | M7 | |
| NA | VCCAUX | G12 | |

Table 2-2: FF324 Package—LX30 and LX50 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCAUX | K13 | |
| NA | VCCINT | K7 | |
| NA | VCCINT | J8 | |
| NA | VCCINT | L8 | |
| NA | VCCINT | H11 | |
| NA | VCCINT | K11 | |
| NA | VCCINT | J12 | |
| NA | VCCINT | L12 | |
| 0 | VCCO_0 | R18 | |
| 0 | VCCO_0 | T15 | |
| 1 | VCCO_1 | B7 | |
| 1 | VCCO_1 | E8 | |
| 2 | VCCO_2 | R8 | |
| 2 | VCCO_2 | V9 | |
| 3 | VCCO_3 | A10 | |
| 3 | VCCO_3 | D11 | |
| 4 | VCCO_4 | P11 | |
| 4 | VCCO_4 | U12 | |
| 11 | VCCO_11 | C14 | |
| 11 | VCCO_11 | F15 | |
| 11 | VCCO_11 | J16 | |
| 12 | VCCO_12 | C4 | |
| 12 | VCCO_12 | F5 | |
| 12 | VCCO_12 | G2 | |
| 13 | VCCO_13 | M17 | |
| 13 | VCCO_13 | N14 | |
| 18 | VCCO_18 | K3 | |
| 18 | VCCO_18 | N4 | |
| 18 | VCCO_18 | T5 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | R15 | |
| 0 | DXN_0 | R14 | |
| 0 | AVDD_0 | M15 | |
| 0 | AVSS_0 | M14 | |
| 0 | VP_0 | N15 | |
| 0 | VN_0 | P14 | |
| 0 | VREFP_0 | P15 | |
| 0 | VREFN_0 | N14 | |
| 0 | VBATT_0 | J19 | |
| 0 | PROGRAM_B_0 | J20 | |
| 0 | HSWAPEN_0 | K20 | |
| 0 | D_IN_0 | J10 | |
| 0 | DONE_0 | K11 | |
| 0 | CCLK_0 | J11 | |
| 0 | INIT_B_0 | H12 | |
| 0 | CS_B_0 | L20 | |
| 0 | RDWR_B_0 | M20 | |
| 0 | RSVD ⁽³⁾ | P20 | |
| 0 | RSVD ⁽³⁾ | R20 | |
| 0 | TCK_0 | V11 | |
| 0 | M0_0 | T20 | |
| 0 | M2_0 | U20 | |
| 0 | M1_0 | W20 | |
| 0 | TMS_0 | W13 | |
| 0 | TDI_0 | V13 | |
| 0 | D_OUT_BUSY_0 | U12 | |
| 0 | TDO_0 | V12 | |
| 1 | IO_L0P_A19_1 | G15 | |
| 1 | IO_L0N_A18_1 | G16 | |
| 1 | IO_L1P_A17_1 | H13 | |
| 1 | IO_L1N_A16_1 | G14 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | G17 | |
| 1 | IO_L2N_A14_D30_1 | F17 | |
| 1 | IO_L3P_A13_D29_1 | F15 | |
| 1 | IO_L3N_A12_D28_1 | F14 | |
| 1 | IO_L4P_A11_D27_1 | F18 | |
| 1 | IO_L4N_VREF_A10_D26_1 | G19 | |
| 1 | IO_L5P_A9_D25_1 | F13 | |
| 1 | IO_L5N_A8_D24_1 | G12 | |
| 1 | IO_L6P_A7_D23_1 | H18 | |
| 1 | IO_L6N_A6_D22_1 | H19 | |
| 1 | IO_L7P_A5_D21_1 | G11 | |
| 1 | IO_L7N_A4_D20_1 | H11 | |
| 1 | IO_L8P_CC_A3_D19_1 | G20 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | H21 | |
| 1 | IO_L9P_CC_A1_D17_1 ⁽²⁾ | G10 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | H9 | |
| 2 | IO_L0P_CC_RS1_2 | W11 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | Y10 | |
| 2 | IO_L1P_CC_A25_2 | Y20 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AA19 | |
| 2 | IO_L2P_A23_2 | AA10 | |
| 2 | IO_L2N_A22_2 | Y11 | |
| 2 | IO_L3P_A21_2 | AA18 | |
| 2 | IO_L3N_A20_2 | Y18 | |
| 2 | IO_L4P_FCS_B_2 | Y12 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AA12 | |
| 2 | IO_L5P_FWE_B_2 | AA17 | |
| 2 | IO_L5N_CSO_B_2 | Y17 | |
| 2 | IO_L6P_D7_2 | AA13 | |
| 2 | IO_L6N_D6_2 | AA14 | |
| 2 | IO_L7P_D5_2 | Y16 | |
| 2 | IO_L7N_D4_2 | W16 | |
| 2 | IO_L8P_D3_2 | Y13 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|--|------------|-----------------|
| 2 | IO_L8N_D2_FS2_2 | W14 | |
| 2 | IO_L9P_D1_FS1_2 | Y15 | |
| 2 | IO_L9N_D0_FS0_2 | AA15 | |
| 3 | IO_L0P_CC_GC_3 | D15 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | E15 | |
| 3 | IO_L1P_CC_GC_3 | D16 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | E16 | |
| 3 | IO_L2P_GC_VRN_3 | D14 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | D13 | |
| 3 | IO_L3P_GC_3 | E17 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | D18 | |
| 3 | IO_L4P_GC_3 | E13 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | E12 | |
| 3 | IO_L5P_GC_3 | E18 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | F19 | |
| 3 | IO_L6P_GC_3 | F12 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | E11 | |
| 3 | IO_L7P_GC_3 | E20 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | E21 | |
| 3 | IO_L8P_GC_3 | E10 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | F10 | |
| 3 | IO_L9P_GC_3 | F20 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | G21 | |
| 4 | IO_L0P_GC_D15_4 | Y21 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AA20 | |
| 4 | IO_L1P_GC_D13_4 | AB10 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AB11 | |
| 4 | IO_L2P_GC_D11_4 | AB21 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AB20 | |
| 4 | IO_L3P_GC_D9_4 | AC11 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AB12 | |
| 4 | IO_L4P_GC_4 | AB19 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AC19 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 4 | IO_L5P_GC_4 | AC12 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AC13 | |
| 4 | IO_L6P_GC_4 | AC18 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AB17 | |
| 4 | IO_L7P_GC_VRN_4 | AB14 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AC14 | |
| 4 | IO_L8P_CC_GC_4 | AC17 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AB16 | |
| 4 | IO_L9P_CC_GC_4 | AB15 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AC16 | |
| 11 | IO_L0P_11 | E26 | |
| 11 | IO_L0N_11 | E25 | |
| 11 | IO_L1P_11 | F25 | |
| 11 | IO_L1N_11 | G26 | |
| 11 | IO_L2P_11 | H26 | |
| 11 | IO_L2N_11 | G25 | |
| 11 | IO_L3P_11 | F24 | |
| 11 | IO_L3N_11 | G24 | |
| 11 | IO_L4P_11 | E23 | |
| 11 | IO_L4N_VREF_11 | E22 | |
| 11 | IO_L5P_11 | F23 | |
| 11 | IO_L5N_11 | F22 | |
| 11 | IO_L6P_11 | G22 | |
| 11 | IO_L6N_11 | H22 | |
| 11 | IO_L7P_11 | H23 | |
| 11 | IO_L7N_11 | J23 | |
| 11 | IO_L8P_CC_11 | J21 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | K21 | |
| 11 | IO_L9P_CC_11 | K22 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | K23 | |
| 11 | IO_L10P_CC_SM15P_11 | L23 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | L22 | |
| 11 | IO_L11P_CC_SM14P_11 | M21 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | N21 | |
| 11 | IO_L12P_VRN_11 | H24 | |
| 11 | IO_L12N_VRP_11 | J24 | |
| 11 | IO_L13P_11 | J25 | |
| 11 | IO_L13N_11 | J26 | |
| 11 | IO_L14P_11 | K26 | |
| 11 | IO_L14N_VREF_11 | L25 | |
| 11 | IO_L15P_SM13P_11 | L24 | |
| 11 | IO_L15N_SM13N_11 | K25 | |
| 11 | IO_L16P_SM12P_11 | N26 | |
| 11 | IO_L16N_SM12N_11 | M26 | |
| 11 | IO_L17P_SM11P_11 | M25 | |
| 11 | IO_L17N_SM11N_11 | M24 | |
| 11 | IO_L18P_SM10P_11 | N24 | |
| 11 | IO_L18N_SM10N_11 | N23 | |
| 11 | IO_L19P_SM9P_11 | N22 | |
| 11 | IO_L19N_SM9N_11 | M22 | |
| 12 | IO_L0P_12 | Y6 | |
| 12 | IO_L0N_12 | Y5 | |
| 12 | IO_L1P_12 | G6 | |
| 12 | IO_L1N_12 | H6 | |
| 12 | IO_L2P_12 | Y4 | |
| 12 | IO_L2N_12 | W4 | |
| 12 | IO_L3P_12 | G5 | |
| 12 | IO_L3N_12 | F5 | |
| 12 | IO_L4P_12 | W5 | |
| 12 | IO_L4N_VREF_12 | W6 | |
| 12 | IO_L5P_12 | G4 | |
| 12 | IO_L5N_12 | H4 | |
| 12 | IO_L6P_12 | V6 | |
| 12 | IO_L6N_12 | V7 | |
| 12 | IO_L7P_12 | J5 | |
| 12 | IO_L7N_12 | J6 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 12 | IO_L8P_CC_12 | U7 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | T8 | |
| 12 | IO_L9P_CC_12 | K5 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | L5 | |
| 12 | IO_L10P_CC_12 | K6 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | K7 | |
| 12 | IO_L11P_CC_12 | U6 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | U5 | |
| 12 | IO_L12P_VRN_12 | K8 | |
| 12 | IO_L12N_VRP_12 | L7 | |
| 12 | IO_L13P_12 | T5 | |
| 12 | IO_L13N_12 | R5 | |
| 12 | IO_L14P_12 | M7 | |
| 12 | IO_L14N_VREF_12 | L8 | |
| 12 | IO_L15P_12 | R6 | |
| 12 | IO_L15N_12 | T7 | |
| 12 | IO_L16P_12 | P6 | |
| 12 | IO_L16N_12 | N6 | |
| 12 | IO_L17P_12 | M6 | |
| 12 | IO_L17N_12 | N7 | |
| 12 | IO_L18P_12 | N8 | |
| 12 | IO_L18N_12 | P8 | |
| 12 | IO_L19P_12 | R8 | |
| 12 | IO_L19N_12 | R7 | |
| 13 | IO_L0P_SM8P_13 | P26 | |
| 13 | IO_L0N_SM8N_13 | R26 | |
| 13 | IO_L1P_SM7P_13 | P25 | |
| 13 | IO_L1N_SM7N_13 | R25 | |
| 13 | IO_L2P_SM6P_13 | P24 | |
| 13 | IO_L2N_SM6N_13 | P23 | |
| 13 | IO_L3P_SM5P_13 | R23 | |
| 13 | IO_L3N_SM5N_13 | R22 | |
| 13 | IO_L4P_13 | U26 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L4N_VREF_13 | V26 | |
| 13 | IO_L5P_SM4P_13 | U25 | |
| 13 | IO_L5N_SM4N_13 | T25 | |
| 13 | IO_L6P_SM3P_13 | T24 | |
| 13 | IO_L6N_SM3N_13 | T23 | |
| 13 | IO_L7P_SM2P_13 | U24 | |
| 13 | IO_L7N_SM2N_13 | V24 | |
| 13 | IO_L8P_CC_SM1P_13 | W26 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | W25 | |
| 13 | IO_L9P_CC_SM0P_13 | W24 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | V23 | |
| 13 | IO_L10P_CC_13 | AA22 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | Y22 | |
| 13 | IO_L11P_CC_13 | Y23 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | W23 | |
| 13 | IO_L12P_VRN_13 | Y26 | |
| 13 | IO_L12N_VRP_13 | Y25 | |
| 13 | IO_L13P_13 | AA25 | |
| 13 | IO_L13N_13 | AB26 | |
| 13 | IO_L14P_13 | AB25 | |
| 13 | IO_L14N_VREF_13 | AA24 | |
| 13 | IO_L15P_13 | AB24 | |
| 13 | IO_L15N_13 | AA23 | |
| 13 | IO_L16P_13 | P21 | |
| 13 | IO_L16N_13 | R21 | |
| 13 | IO_L17P_13 | T22 | |
| 13 | IO_L17N_13 | U22 | |
| 13 | IO_L18P_13 | U21 | |
| 13 | IO_L18N_13 | V22 | |
| 13 | IO_L19P_13 | V21 | |
| 13 | IO_L19N_13 | W21 | |
| 15 | IO_L0P_15 | C13 | |
| 15 | IO_L0N_15 | C14 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 15 | IO_L1P_15 | B14 | |
| 15 | IO_L1N_15 | A13 | |
| 15 | IO_L2P_15 | A14 | |
| 15 | IO_L2N_15 | A15 | |
| 15 | IO_L3P_15 | B15 | |
| 15 | IO_L3N_15 | C16 | |
| 15 | IO_L4P_15 | B16 | |
| 15 | IO_L4N_VREF_15 | C17 | |
| 15 | IO_L5P_15 | B17 | |
| 15 | IO_L5N_15 | A17 | |
| 15 | IO_L6P_15 | A18 | |
| 15 | IO_L6N_15 | A19 | |
| 15 | IO_L7P_15 | B19 | |
| 15 | IO_L7N_15 | C18 | |
| 15 | IO_L8P_CC_15 | A20 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | B20 | |
| 15 | IO_L9P_CC_15 | C19 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | D19 | |
| 15 | IO_L10P_CC_15 | D21 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | D20 | |
| 15 | IO_L11P_CC_15 | B21 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | C21 | |
| 15 | IO_L12P_VRN_15 | D23 | |
| 15 | IO_L12N_VRP_15 | C22 | |
| 15 | IO_L13P_15 | B22 | |
| 15 | IO_L13N_15 | A22 | |
| 15 | IO_L14P_15 | A23 | |
| 15 | IO_L14N_VREF_15 | A24 | |
| 15 | IO_L15P_15 | B24 | |
| 15 | IO_L15N_15 | C23 | |
| 15 | IO_L16P_15 | D24 | |
| 15 | IO_L16N_15 | C24 | |
| 15 | IO_L17P_15 | B25 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 15 | IO_L17N_15 | A25 | |
| 15 | IO_L18P_15 | B26 | |
| 15 | IO_L18N_15 | C26 | |
| 15 | IO_L19P_15 | D26 | |
| 15 | IO_L19N_15 | D25 | |
| 16 | IO_L0P_16 | H7 | |
| 16 | IO_L0N_16 | G7 | |
| 16 | IO_L1P_16 | F7 | |
| 16 | IO_L1N_16 | F8 | |
| 16 | IO_L2P_16 | F9 | |
| 16 | IO_L2N_16 | G9 | |
| 16 | IO_L3P_16 | H8 | |
| 16 | IO_L3N_16 | J8 | |
| 16 | IO_L4P_16 | A9 | |
| 16 | IO_L4N_VREF_16 | A8 | |
| 16 | IO_L5P_16 | E8 | |
| 16 | IO_L5N_16 | E7 | |
| 16 | IO_L6P_16 | B9 | |
| 16 | IO_L6N_16 | C8 | |
| 16 | IO_L7P_16 | E6 | |
| 16 | IO_L7N_16 | D6 | |
| 16 | IO_L8P_CC_16 | C9 | |
| 16 | IO_L8N_CC_16 ⁽²⁾ | D8 | |
| 16 | IO_L9P_CC_16 | C7 | |
| 16 | IO_L9N_CC_16 ⁽²⁾ | C6 | |
| 16 | IO_L10P_CC_16 | A7 | |
| 16 | IO_L10N_CC_16 ⁽²⁾ | B7 | |
| 16 | IO_L11P_CC_16 | D9 | |
| 16 | IO_L11N_CC_16 ⁽²⁾ | D10 | |
| 16 | IO_L12P_VRN_16 | B6 | |
| 16 | IO_L12N_VRP_16 | A5 | |
| 16 | IO_L13P_16 | B10 | |
| 16 | IO_L13N_16 | A10 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 16 | IO_L14P_16 | A4 | |
| 16 | IO_L14N_VREF_16 | A3 | |
| 16 | IO_L15P_16 | B11 | |
| 16 | IO_L15N_16 | A12 | |
| 16 | IO_L16P_16 | B4 | |
| 16 | IO_L16N_16 | B5 | |
| 16 | IO_L17P_16 | B12 | |
| 16 | IO_L17N_16 | C12 | |
| 16 | IO_L18P_16 | D5 | |
| 16 | IO_L18N_16 | E5 | |
| 16 | IO_L19P_16 | C11 | |
| 16 | IO_L19N_16 | D11 | |
| 17 | IO_L0P_17 | AC26 | |
| 17 | IO_L0N_17 | AD26 | |
| 17 | IO_L1P_17 | AD25 | |
| 17 | IO_L1N_17 | AD24 | |
| 17 | IO_L2P_17 | AE25 | |
| 17 | IO_L2N_17 | AE26 | |
| 17 | IO_L3P_17 | AF25 | |
| 17 | IO_L3N_17 | AF24 | |
| 17 | IO_L4P_17 | AF23 | |
| 17 | IO_L4N_VREF_17 | AE23 | |
| 17 | IO_L5P_17 | AE22 | |
| 17 | IO_L5N_17 | AD23 | |
| 17 | IO_L6P_17 | AC24 | |
| 17 | IO_L6N_17 | AC23 | |
| 17 | IO_L7P_17 | AC22 | |
| 17 | IO_L7N_17 | AB22 | |
| 17 | IO_L8P_CC_17 | AF22 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | AE21 | |
| 17 | IO_L9P_CC_17 | AF20 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | AE20 | |
| 17 | IO_L10P_CC_17 | AD19 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L10N_CC_17 ⁽²⁾ | AD20 | |
| 17 | IO_L11P_CC_17 | AC21 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AD21 | |
| 17 | IO_L12P_VRN_17 | AF19 | |
| 17 | IO_L12N_VRP_17 | AF18 | |
| 17 | IO_L13P_17 | AE18 | |
| 17 | IO_L13N_17 | AD18 | |
| 17 | IO_L14P_17 | AE17 | |
| 17 | IO_L14N_VREF_17 | AF17 | |
| 17 | IO_L15P_17 | AE16 | |
| 17 | IO_L15N_17 | AD16 | |
| 17 | IO_L16P_17 | AD15 | |
| 17 | IO_L16N_17 | AE15 | |
| 17 | IO_L17P_17 | AF15 | |
| 17 | IO_L17N_17 | AF14 | |
| 17 | IO_L18P_17 | AF13 | |
| 17 | IO_L18N_17 | AE13 | |
| 17 | IO_L19P_17 | AD13 | |
| 17 | IO_L19N_17 | AD14 | |
| 18 | IO_L0P_18 | AF12 | |
| 18 | IO_L0N_18 | AE12 | |
| 18 | IO_L1P_18 | V8 | |
| 18 | IO_L1N_18 | V9 | |
| 18 | IO_L2P_18 | AE11 | |
| 18 | IO_L2N_18 | AD11 | |
| 18 | IO_L3P_18 | W9 | |
| 18 | IO_L3N_18 | W8 | |
| 18 | IO_L4P_18 | AD10 | |
| 18 | IO_L4N_VREF_18 | AE10 | |
| 18 | IO_L5P_18 | Y7 | |
| 18 | IO_L5N_18 | Y8 | |
| 18 | IO_L6P_18 | AF9 | |
| 18 | IO_L6N_18 | AF10 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 18 | IO_L7P_18 | AA7 | |
| 18 | IO_L7N_18 | AA8 | |
| 18 | IO_L8P_CC_18 | AF7 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | AF8 | |
| 18 | IO_L9P_CC_18 | AA5 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | AB5 | |
| 18 | IO_L10P_CC_18 | AB6 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AB7 | |
| 18 | IO_L11P_CC_18 | AE8 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | AE7 | |
| 18 | IO_L12P_VRN_18 | AC6 | |
| 18 | IO_L12N_VRP_18 | AD5 | |
| 18 | IO_L13P_18 | AE6 | |
| 18 | IO_L13N_18 | AF5 | |
| 18 | IO_L14P_18 | AE5 | |
| 18 | IO_L14N_VREF_18 | AD4 | |
| 18 | IO_L15P_18 | AF4 | |
| 18 | IO_L15N_18 | AF3 | |
| 18 | IO_L16P_18 | AD6 | |
| 18 | IO_L16N_18 | AC7 | |
| 18 | IO_L17P_18 | AC8 | |
| 18 | IO_L17N_18 | AD8 | |
| 18 | IO_L18P_18 | AD9 | |
| 18 | IO_L18N_18 | AC9 | |
| 18 | IO_L19P_18 | AB9 | |
| 18 | IO_L19N_18 | AA9 | |
| NA | MGTTPX0_112 | H2 | |
| NA | MGTAVTTTX_112 | H3 | |
| NA | MGTTXN0_112 | J2 | |
| NA | MGTRXP0_112 | J1 | |
| NA | MGTAVTTRX_112 | J3 | |
| NA | MGTRXN0_112 | K1 | |
| NA | MGTAVCCPLL_112 | M3 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---|
| NA | MGTRXN1_112 | L1 | |
| NA | MGTREFCLKN_112 | K3 | |
| NA | MGTRXP1_112 | M1 | |
| NA | MGTREFCLKP_112 | K4 | |
| NA | MGTTXN1_112 | M2 | |
| NA | MGTAVTTTX_112 | N3 | |
| NA | MGTTXP1_112 | N2 | |
| NA | MGTAVTTRXC | P5 | |
| NA | MGTRREF_112 | P4 | |
| NC | NC | M5 | LX30T, FX30T, LX50T, SX35T, SX50T, FX70T |
| NA | MGTTXP0_114 | P2 | |
| NA | MGTAVTTTX_114 | P3 | |
| NA | MGTTXN0_114 | R2 | |
| NA | MGTRXP0_114 | R1 | |
| NA | MGTAVTTRX_114 | R3 | |
| NA | MGTRXN0_114 | T1 | |
| NA | MGTAVCCPLL_114 | V3 | |
| NA | MGTRXN1_114 | U1 | |
| NA | MGTREFCLKN_114 | T3 | |
| NA | MGTRXP1_114 | V1 | |
| NA | MGTREFCLKP_114 | T4 | |
| NA | MGTTXN1_114 | V2 | |
| NA | MGTAVTTTX_114 | W3 | |
| NA | MGTTXP1_114 | W2 | |
| NA | MGTTXP0_116 | B2 | |
| NA | MGTAVTTTX_116 | B3 | |
| NA | MGTTXN0_116 | C2 | |
| NA | MGTRXP0_116 | C1 | |
| NA | MGTAVTTRX_116 | C3 | |
| NA | MGTRXN0_116 | D1 | |
| NA | MGTAVCCPLL_116 | F3 | |
| NA | MGTRXN1_116 | E1 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTREFCLKN_116 | D3 | |
| NA | MGTRXP1_116 | F1 | |
| NA | MGTREFCLKP_116 | D4 | |
| NA | MGTTXN1_116 | F2 | |
| NA | MGTAVTTTX_116 | G3 | |
| NA | MGTTXP1_116 | G2 | |
| NA | MGTTXP0_118 | Y2 | |
| NA | MGTAVTTTX_118 | Y3 | |
| NA | MGTTXN0_118 | AA2 | |
| NA | MGTRXP0_118 | AA1 | |
| NA | MGTAVTTRX_118 | AA3 | |
| NA | MGTRXN0_118 | AB1 | |
| NA | MGTAVCCPLL_118 | AD3 | |
| NA | MGTRXN1_118 | AC1 | |
| NA | MGTREFCLKN_118 | AB3 | |
| NA | MGTRXP1_118 | AD1 | |
| NA | MGTREFCLKP_118 | AB4 | |
| NA | MGTTXN1_118 | AD2 | |
| NA | MGTAVTTTX_118 | AE3 | |
| NA | MGTTXP1_118 | AE2 | |
| NA | GND | A2 | |
| NA | GND | D2 | |
| NA | GND | E2 | |
| NA | GND | K2 | |
| NA | GND | L2 | |
| NA | GND | T2 | |
| NA | GND | U2 | |
| NA | GND | AB2 | |
| NA | GND | AC2 | |
| NA | GND | AF2 | |
| NA | GND | C4 | |
| NA | GND | F4 | |
| NA | GND | J4 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | M4 | |
| NA | GND | R4 | |
| NA | GND | V4 | |
| NA | GND | AA4 | |
| NA | GND | AE4 | |
| NA | GND | C5 | |
| NA | GND | N5 | |
| NA | GND | V5 | |
| NA | GND | AC5 | |
| NA | GND | A6 | |
| NA | GND | F6 | |
| NA | GND | T6 | |
| NA | GND | AF6 | |
| NA | GND | J7 | |
| NA | GND | W7 | |
| NA | GND | B8 | |
| NA | GND | M8 | |
| NA | GND | AB8 | |
| NA | GND | E9 | |
| NA | GND | L9 | |
| NA | GND | N9 | |
| NA | GND | R9 | |
| NA | GND | U9 | |
| NA | GND | Y9 | |
| NA | GND | AE9 | |
| NA | GND | H10 | |
| NA | GND | K10 | |
| NA | GND | M10 | |
| NA | GND | P10 | |
| NA | GND | T10 | |
| NA | GND | V10 | |
| NA | GND | A11 | |
| NA | GND | L11 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | N11 | |
| NA | GND | R11 | |
| NA | GND | U11 | |
| NA | GND | AA11 | |
| NA | GND | AF11 | |
| NA | GND | D12 | |
| NA | GND | K12 | |
| NA | GND | M12 | |
| NA | GND | P12 | |
| NA | GND | T12 | |
| NA | GND | W12 | |
| NA | GND | AD12 | |
| NA | GND | G13 | |
| NA | GND | J13 | |
| NA | GND | L13 | |
| NA | GND | N13 | |
| NA | GND | R13 | |
| NA | GND | U13 | |
| NA | GND | H14 | |
| NA | GND | K14 | |
| NA | GND | T14 | |
| NA | GND | V14 | |
| NA | GND | Y14 | |
| NA | GND | C15 | |
| NA | GND | J15 | |
| NA | GND | L15 | |
| NA | GND | U15 | |
| NA | GND | W15 | |
| NA | GND | AC15 | |
| NA | GND | A16 | |
| NA | GND | F16 | |
| NA | GND | H16 | |
| NA | GND | K16 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | M16 | |
| NA | GND | P16 | |
| NA | GND | T16 | |
| NA | GND | V16 | |
| NA | GND | AF16 | |
| NA | GND | J17 | |
| NA | GND | L17 | |
| NA | GND | N17 | |
| NA | GND | R17 | |
| NA | GND | U17 | |
| NA | GND | W17 | |
| NA | GND | B18 | |
| NA | GND | K18 | |
| NA | GND | M18 | |
| NA | GND | P18 | |
| NA | GND | T18 | |
| NA | GND | V18 | |
| NA | GND | AB18 | |
| NA | GND | E19 | |
| NA | GND | L19 | |
| NA | GND | N19 | |
| NA | GND | R19 | |
| NA | GND | U19 | |
| NA | GND | W19 | |
| NA | GND | AE19 | |
| NA | GND | C20 | |
| NA | GND | H20 | |
| NA | GND | V20 | |
| NA | GND | A21 | |
| NA | GND | L21 | |
| NA | GND | T21 | |
| NA | GND | AA21 | |
| NA | GND | AF21 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | D22 | |
| NA | GND | P22 | |
| NA | GND | AD22 | |
| NA | GND | G23 | |
| NA | GND | U23 | |
| NA | GND | K24 | |
| NA | GND | Y24 | |
| NA | GND | C25 | |
| NA | GND | N25 | |
| NA | GND | AC25 | |
| NA | GND | A26 | |
| NA | GND | F26 | |
| NA | GND | L26 | |
| NA | GND | T26 | |
| NA | GND | AA26 | |
| NA | GND | AF26 | |
| NA | VCCAUX | U8 | |
| NA | VCCAUX | K9 | |
| NA | VCCAUX | M9 | |
| NA | VCCAUX | P9 | |
| NA | VCCAUX | T9 | |
| NA | VCCAUX | W10 | |
| NA | VCCAUX | M19 | |
| NA | VCCAUX | P19 | |
| NA | VCCAUX | T19 | |
| NA | VCCAUX | V19 | |
| NA | VCCAUX | Y19 | |
| NA | VCCAUX | N20 | |
| NA | VCCINT | L10 | |
| NA | VCCINT | N10 | |
| NA | VCCINT | R10 | |
| NA | VCCINT | U10 | |
| NA | VCCINT | M11 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | P11 | |
| NA | VCCINT | T11 | |
| NA | VCCINT | L12 | |
| NA | VCCINT | N12 | |
| NA | VCCINT | R12 | |
| NA | VCCINT | K13 | |
| NA | VCCINT | M13 | |
| NA | VCCINT | P13 | |
| NA | VCCINT | T13 | |
| NA | VCCINT | J14 | |
| NA | VCCINT | L14 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | H15 | |
| NA | VCCINT | K15 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | J16 | |
| NA | VCCINT | L16 | |
| NA | VCCINT | N16 | |
| NA | VCCINT | R16 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | H17 | |
| NA | VCCINT | K17 | |
| NA | VCCINT | M17 | |
| NA | VCCINT | P17 | |
| NA | VCCINT | T17 | |
| NA | VCCINT | V17 | |
| NA | VCCINT | J18 | |
| NA | VCCINT | L18 | |
| NA | VCCINT | N18 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | U18 | |
| NA | VCCINT | W18 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | K19 | |
| 0 | VCCO_0 | F11 | |
| 0 | VCCO_0 | J12 | |
| 1 | VCCO_1 | B13 | |
| 1 | VCCO_1 | E14 | |
| 2 | VCCO_2 | AA16 | |
| 2 | VCCO_2 | AD17 | |
| 3 | VCCO_3 | D17 | |
| 3 | VCCO_3 | G18 | |
| 4 | VCCO_4 | AB13 | |
| 4 | VCCO_4 | AE14 | |
| 11 | VCCO_11 | J22 | |
| 11 | VCCO_11 | M23 | |
| 11 | VCCO_11 | H25 | |
| 12 | VCCO_12 | H5 | |
| 12 | VCCO_12 | L6 | |
| 12 | VCCO_12 | P7 | |
| 13 | VCCO_13 | W22 | |
| 13 | VCCO_13 | R24 | |
| 13 | VCCO_13 | V25 | |
| 15 | VCCO_15 | F21 | |
| 15 | VCCO_15 | B23 | |
| 15 | VCCO_15 | E24 | |
| 16 | VCCO_16 | D7 | |
| 16 | VCCO_16 | G8 | |
| 16 | VCCO_16 | C10 | |
| 17 | VCCO_17 | AC20 | |
| 17 | VCCO_17 | AB23 | |
| 17 | VCCO_17 | AE24 | |
| 18 | VCCO_18 | AA6 | |
| 18 | VCCO_18 | AD7 | |
| 18 | VCCO_18 | AC10 | |
| NA | MGTAVCC_112 | L3 | |

Table 2-3: FF665 Package—LX30T, FX30T, LX50T, SX35T, SX50T, and FX70T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTAVCC_112 | L4 | |
| NA | MGTAVCC_114 | U3 | |
| NA | MGTAVCC_114 | U4 | |
| NA | MGTAVCC_116 | E3 | |
| NA | MGTAVCC_116 | E4 | |
| NA | MGTAVCC_118 | AC3 | |
| NA | MGTAVCC_118 | AC4 | |
| NA | FLOAT | N4 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF676 Package—LX30, LX50, LX85, and LX110

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | R14 | |
| 0 | DXN_0 | R13 | |
| 0 | AVDD_0 | M14 | |
| 0 | AVSS_0 | M13 | |
| 0 | VP_0 | N14 | |
| 0 | VN_0 | P13 | |
| 0 | VREFP_0 | P14 | |
| 0 | VREFN_0 | N13 | |
| 0 | VBATT_0 | K18 | |
| 0 | PROGRAM_B_0 | J18 | |
| 0 | HSWAPEN_0 | L18 | |
| 0 | D_IN_0 | K11 | |
| 0 | DONE_0 | K10 | |
| 0 | CCLK_0 | J10 | |
| 0 | INIT_B_0 | J11 | |
| 0 | CS_B_0 | N18 | |
| 0 | RDWR_B_0 | P18 | |
| 0 | RSVD ⁽³⁾ | R18 | |
| 0 | RSVD ⁽³⁾ | T18 | |
| 0 | TCK_0 | U11 | |
| 0 | M0_0 | W18 | |
| 0 | M2_0 | V18 | |
| 0 | M1_0 | Y17 | |
| 0 | TMS_0 | V12 | |
| 0 | TDI_0 | V11 | |
| 0 | D_OUT_BUSY_0 | W11 | |
| 0 | TDO_0 | W10 | |
| 1 | IO_L0P_A19_1 | G14 | |
| 1 | IO_L0N_A18_1 | F13 | |
| 1 | IO_L1P_A17_1 | H14 | |
| 1 | IO_L1N_A16_1 | H13 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | F15 | |
| 1 | IO_L2N_A14_D30_1 | G15 | |
| 1 | IO_L3P_A13_D29_1 | G12 | |
| 1 | IO_L3N_A12_D28_1 | H12 | |
| 1 | IO_L4P_A11_D27_1 | G16 | |
| 1 | IO_L4N_VREF_A10_D26_1 | H16 | |
| 1 | IO_L5P_A9_D25_1 | H11 | |
| 1 | IO_L5N_A8_D24_1 | G11 | |
| 1 | IO_L6P_A7_D23_1 | H17 | |
| 1 | IO_L6N_A6_D22_1 | G17 | |
| 1 | IO_L7P_A5_D21_1 | G10 | |
| 1 | IO_L7N_A4_D20_1 | G9 | |
| 1 | IO_L8P_CC_A3_D19_1 | G19 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | H18 | |
| 1 | IO_L9P_CC_A1_D17_1 | H9 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | H8 | |
| 2 | IO_L0P_CC_RS1_2 | Y10 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | Y11 | |
| 2 | IO_L1P_CC_A25_2 | AA18 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | Y18 | |
| 2 | IO_L2P_A23_2 | Y8 | |
| 2 | IO_L2N_A22_2 | AA8 | |
| 2 | IO_L3P_A21_2 | AA17 | |
| 2 | IO_L3N_A20_2 | AB17 | |
| 2 | IO_L4P_FCS_B_2 | AA10 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AA9 | |
| 2 | IO_L5P_FWE_B_2 | AB15 | |
| 2 | IO_L5N_CSO_B_2 | AB16 | |
| 2 | IO_L6P_D7_2 | Y12 | |
| 2 | IO_L6N_D6_2 | Y13 | |
| 2 | IO_L7P_D5_2 | AA15 | |
| 2 | IO_L7N_D4_2 | AB14 | |
| 2 | IO_L8P_D3_2 | AA12 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------------|-------------------|------------------------|
| 2 | IO_L8N_D2_FS2_2 | AB11 | |
| 2 | IO_L9P_D1_FS1_2 | AA13 | |
| 2 | IO_L9N_D0_FS0_2 | AA14 | |
| 3 | IO_L0P_CC_GC_3 | F14 | |
| 3 | IO_L0N_CC_GC_3 ^{(1) (2)} | E13 | |
| 3 | IO_L1P_CC_GC_3 | D13 | |
| 3 | IO_L1N_CC_GC_3 ^{(1) (2)} | D14 | |
| 3 | IO_L2P_GC_VRN_3 | E12 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | F12 | |
| 3 | IO_L3P_GC_3 | D15 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | E15 | |
| 3 | IO_L4P_GC_3 | E10 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | E11 | |
| 3 | IO_L5P_GC_3 | E16 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | E17 | |
| 3 | IO_L6P_GC_3 | F9 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | F10 | |
| 3 | IO_L7P_GC_3 | E18 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | F19 | |
| 3 | IO_L8P_GC_3 | F8 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | E8 | |
| 3 | IO_L9P_GC_3 | F18 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | F17 | |
| 4 | IO_L0P_GC_D15_4 | AD18 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AC18 | |
| 4 | IO_L1P_GC_D13_4 | AB10 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AB9 | |
| 4 | IO_L2P_GC_D11_4 | AC17 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AC16 | |
| 4 | IO_L3P_GC_D9_4 | AC8 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AC9 | |
| 4 | IO_L4P_GC_4 | AD15 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AD14 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 4 | IO_L5P_GC_4 | AD8 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AC7 | |
| 4 | IO_L6P_GC_4 | AD13 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AC14 | |
| 4 | IO_L7P_GC_VRN_4 | AB12 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AC11 | |
| 4 | IO_L8P_CC_GC_4 | AC13 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AC12 | |
| 4 | IO_L9P_CC_GC_4 | AD11 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AD10 | |
| 11 | IO_L0P_11 | G20 | |
| 11 | IO_L0N_11 | F20 | |
| 11 | IO_L1P_11 | E21 | |
| 11 | IO_L1N_11 | E20 | |
| 11 | IO_L2P_11 | E22 | |
| 11 | IO_L2N_11 | E23 | |
| 11 | IO_L3P_11 | F22 | |
| 11 | IO_L3N_11 | F23 | |
| 11 | IO_L4P_11 | G21 | |
| 11 | IO_L4N_VREF_11 | G22 | |
| 11 | IO_L5P_11 | H21 | |
| 11 | IO_L5N_11 | H22 | |
| 11 | IO_L6P_11 | J19 | |
| 11 | IO_L6N_11 | H19 | |
| 11 | IO_L7P_11 | H23 | |
| 11 | IO_L7N_11 | J23 | |
| 11 | IO_L8P_CC_11 | J21 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | J20 | |
| 11 | IO_L9P_CC_11 | K21 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | K20 | |
| 11 | IO_L10P_CC_SM15P_11 | K23 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | K22 | |
| 11 | IO_L11P_CC_SM14P_11 | L20 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------------|-------------------|------------------------|
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | L19 | |
| 11 | IO_L12P_VRN_11 | L23 | |
| 11 | IO_L12N_VRP_11 | L22 | |
| 11 | IO_L13P_11 | M22 | |
| 11 | IO_L13N_11 | M21 | |
| 11 | IO_L14P_11 | P19 | |
| 11 | IO_L14N_VREF_11 | N19 | |
| 11 | IO_L15P_SM13P_11 | M20 | |
| 11 | IO_L15N_SM13N_11 | M19 | |
| 11 | IO_L16P_SM12P_11 | P23 | |
| 11 | IO_L16N_SM12N_11 | N23 | |
| 11 | IO_L17P_SM11P_11 | N22 | |
| 11 | IO_L17N_SM11N_11 | N21 | |
| 11 | IO_L18P_SM10P_11 | R22 | |
| 11 | IO_L18N_SM10N_11 | R23 | |
| 11 | IO_L19P_SM9P_11 | P21 | |
| 11 | IO_L19N_SM9N_11 | P20 | |
| 12 | IO_L0P_12 | E7 | |
| 12 | IO_L0N_12 | F7 | |
| 12 | IO_L1P_12 | E6 | |
| 12 | IO_L1N_12 | E5 | |
| 12 | IO_L2P_12 | G6 | |
| 12 | IO_L2N_12 | G7 | |
| 12 | IO_L3P_12 | F5 | |
| 12 | IO_L3N_12 | F4 | |
| 12 | IO_L4P_12 | J6 | |
| 12 | IO_L4N_VREF_12 | H7 | |
| 12 | IO_L5P_12 | H6 | |
| 12 | IO_L5N_12 | G5 | |
| 12 | IO_L6P_12 | H4 | |
| 12 | IO_L6N_12 | G4 | |
| 12 | IO_L7P_12 | J5 | |
| 12 | IO_L7N_12 | J4 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 12 | IO_L8P_CC_12 | K6 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | K7 | |
| 12 | IO_L9P_CC_12 | L7 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | M7 | |
| 12 | IO_L10P_CC_12 | K5 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | L5 | |
| 12 | IO_L11P_CC_12 | L4 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | L3 | |
| 12 | IO_L12P_VRN_12 | M5 | |
| 12 | IO_L12N_VRP_12 | M6 | |
| 12 | IO_L13P_12 | N7 | |
| 12 | IO_L13N_12 | N6 | |
| 12 | IO_L14P_12 | P3 | |
| 12 | IO_L14N_VREF_12 | N3 | |
| 12 | IO_L15P_12 | M4 | |
| 12 | IO_L15N_12 | N4 | |
| 12 | IO_L16P_12 | P5 | |
| 12 | IO_L16N_12 | P4 | |
| 12 | IO_L17P_12 | R3 | |
| 12 | IO_L17N_12 | T3 | |
| 12 | IO_L18P_12 | R6 | |
| 12 | IO_L18N_12 | R5 | |
| 12 | IO_L19P_12 | P6 | |
| 12 | IO_L19N_12 | R7 | |
| 13 | IO_L0P_SM8P_13 | F24 | |
| 13 | IO_L0N_SM8N_13 | F25 | |
| 13 | IO_L1P_SM7P_13 | E25 | |
| 13 | IO_L1N_SM7N_13 | E26 | |
| 13 | IO_L2P_SM6P_13 | G26 | |
| 13 | IO_L2N_SM6N_13 | H26 | |
| 13 | IO_L3P_SM5P_13 | G24 | |
| 13 | IO_L3N_SM5N_13 | G25 | |
| 13 | IO_L4P_13 | J25 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|----------------------------------|-------------------|------------------------|
| 13 | IO_L4N_VREF_13 | J26 | |
| 13 | IO_L5P_SM4P_13 | H24 | |
| 13 | IO_L5N_SM4N_13 | J24 | |
| 13 | IO_L6P_SM3P_13 | L24 | |
| 13 | IO_L6N_SM3N_13 | L25 | |
| 13 | IO_L7P_SM2P_13 | K25 | |
| 13 | IO_L7N_SM2N_13 | K26 | |
| 13 | IO_L8P_CC_SM1P_13 | M25 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | M26 | |
| 13 | IO_L9P_CC_SM0P_13 | M24 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | N24 | |
| 13 | IO_L10P_CC_13 | P26 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | N26 | |
| 13 | IO_L11P_CC_13 | P25 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | P24 | |
| 13 | IO_L12P_VRN_13 | R25 | |
| 13 | IO_L12N_VRP_13 | R26 | |
| 13 | IO_L13P_13 | T24 | |
| 13 | IO_L13N_13 | T25 | |
| 13 | IO_L14P_13 | V26 | |
| 13 | IO_L14N_VREF_13 | U26 | |
| 13 | IO_L15P_13 | U24 | |
| 13 | IO_L15N_13 | U25 | |
| 13 | IO_L16P_13 | W25 | |
| 13 | IO_L16N_13 | W26 | |
| 13 | IO_L17P_13 | Y25 | |
| 13 | IO_L17N_13 | Y26 | |
| 13 | IO_L18P_13 | AB25 | |
| 13 | IO_L18N_13 | AA25 | |
| 13 | IO_L19P_13 | AC26 | |
| 13 | IO_L19N_13 | AB26 | |
| 14 | IO_L0P_14 | E2 | |
| 14 | IO_L0N_14 | E1 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 14 | IO_L1P_14 | F3 | |
| 14 | IO_L1N_14 | E3 | |
| 14 | IO_L2P_14 | G1 | |
| 14 | IO_L2N_14 | H1 | |
| 14 | IO_L3P_14 | F2 | |
| 14 | IO_L3N_14 | G2 | |
| 14 | IO_L4P_14 | K3 | |
| 14 | IO_L4N_VREF_14 | K2 | |
| 14 | IO_L5P_14 | H3 | |
| 14 | IO_L5N_14 | J3 | |
| 14 | IO_L6P_14 | L2 | |
| 14 | IO_L6N_14 | K1 | |
| 14 | IO_L7P_14 | J1 | |
| 14 | IO_L7N_14 | H2 | |
| 14 | IO_L8P_CC_14 | M1 | |
| 14 | IO_L8N_CC_14 ⁽²⁾ | N1 | |
| 14 | IO_L9P_CC_14 | M2 | |
| 14 | IO_L9N_CC_14 ⁽²⁾ | N2 | |
| 14 | IO_L10P_CC_14 | P1 | |
| 14 | IO_L10N_CC_14 ⁽²⁾ | R1 | |
| 14 | IO_L11P_CC_14 | T2 | |
| 14 | IO_L11N_CC_14 ⁽²⁾ | R2 | |
| 14 | IO_L12P_VRN_14 | U2 | |
| 14 | IO_L12N_VRP_14 | U1 | |
| 14 | IO_L13P_14 | V2 | |
| 14 | IO_L13N_14 | V1 | |
| 14 | IO_L14P_14 | Y1 | |
| 14 | IO_L14N_VREF_14 | W1 | |
| 14 | IO_L15P_14 | AA2 | |
| 14 | IO_L15N_14 | Y2 | |
| 14 | IO_L16P_14 | AB2 | |
| 14 | IO_L16N_14 | AB1 | |
| 14 | IO_L17P_14 | AC2 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 14 | IO_L17N_14 | AC1 | |
| 14 | IO_L18P_14 | AE1 | |
| 14 | IO_L18N_14 | AD1 | |
| 14 | IO_L19P_14 | AF2 | |
| 14 | IO_L19N_14 | AE2 | |
| 15 | IO_L0P_15 | C14 | |
| 15 | IO_L0N_15 | B14 | |
| 15 | IO_L1P_15 | A14 | |
| 15 | IO_L1N_15 | A15 | |
| 15 | IO_L2P_15 | B15 | |
| 15 | IO_L2N_15 | B16 | |
| 15 | IO_L3P_15 | D16 | |
| 15 | IO_L3N_15 | C16 | |
| 15 | IO_L4P_15 | D18 | |
| 15 | IO_L4N_VREF_15 | C17 | |
| 15 | IO_L5P_15 | B17 | |
| 15 | IO_L5N_15 | A17 | |
| 15 | IO_L6P_15 | A18 | |
| 15 | IO_L6N_15 | A19 | |
| 15 | IO_L7P_15 | B19 | |
| 15 | IO_L7N_15 | C18 | |
| 15 | IO_L8P_CC_15 | A20 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | B20 | |
| 15 | IO_L9P_CC_15 | C19 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | D19 | |
| 15 | IO_L10P_CC_15 | D21 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | D20 | |
| 15 | IO_L11P_CC_15 | C21 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | B21 | |
| 15 | IO_L12P_VRN_15 | D23 | |
| 15 | IO_L12N_VRP_15 | C22 | |
| 15 | IO_L13P_15 | B22 | |
| 15 | IO_L13N_15 | A22 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 15 | IO_L14P_15 | A23 | |
| 15 | IO_L14N_VREF_15 | A24 | |
| 15 | IO_L15P_15 | B24 | |
| 15 | IO_L15N_15 | C23 | |
| 15 | IO_L16P_15 | D24 | |
| 15 | IO_L16N_15 | C24 | |
| 15 | IO_L17P_15 | B25 | |
| 15 | IO_L17N_15 | A25 | |
| 15 | IO_L18P_15 | B26 | |
| 15 | IO_L18N_15 | C26 | |
| 15 | IO_L19P_15 | D26 | |
| 15 | IO_L19N_15 | D25 | |
| 16 | IO_L0P_16 | D11 | |
| 16 | IO_L0N_16 | D10 | |
| 16 | IO_L1P_16 | C11 | |
| 16 | IO_L1N_16 | C12 | |
| 16 | IO_L2P_16 | C13 | |
| 16 | IO_L2N_16 | B12 | |
| 16 | IO_L3P_16 | A13 | |
| 16 | IO_L3N_16 | A12 | |
| 16 | IO_L4P_16 | C9 | |
| 16 | IO_L4N_VREF_16 | D9 | |
| 16 | IO_L5P_16 | B9 | |
| 16 | IO_L5N_16 | B10 | |
| 16 | IO_L6P_16 | B11 | |
| 16 | IO_L6N_16 | A10 | |
| 16 | IO_L7P_16 | A9 | |
| 16 | IO_L7N_16 | A8 | |
| 16 | IO_L8P_CC_16 | D8 | |
| 16 | IO_L8N_CC_16 ⁽²⁾ | C8 | |
| 16 | IO_L9P_CC_16 | B7 | |
| 16 | IO_L9N_CC_16 ⁽²⁾ | A7 | |
| 16 | IO_L10P_CC_16 | D5 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 16 | IO_L10N_CC_16 ⁽²⁾ | D6 | |
| 16 | IO_L11P_CC_16 | C6 | |
| 16 | IO_L11N_CC_16 ⁽²⁾ | C7 | |
| 16 | IO_L12P_VRN_16 | A4 | |
| 16 | IO_L12N_VRP_16 | A5 | |
| 16 | IO_L13P_16 | B5 | |
| 16 | IO_L13N_16 | B6 | |
| 16 | IO_L14P_16 | D3 | |
| 16 | IO_L14N_VREF_16 | D4 | |
| 16 | IO_L15P_16 | C4 | |
| 16 | IO_L15N_16 | B4 | |
| 16 | IO_L16P_16 | C2 | |
| 16 | IO_L16N_16 | C3 | |
| 16 | IO_L17P_16 | A2 | |
| 16 | IO_L17N_16 | A3 | |
| 16 | IO_L18P_16 | D1 | |
| 16 | IO_L18N_16 | C1 | |
| 16 | IO_L19P_16 | B1 | |
| 16 | IO_L19N_16 | B2 | |
| 17 | IO_L0P_17 | T23 | |
| 17 | IO_L0N_17 | T22 | |
| 17 | IO_L1P_17 | R21 | |
| 17 | IO_L1N_17 | R20 | |
| 17 | IO_L2P_17 | T20 | |
| 17 | IO_L2N_17 | T19 | |
| 17 | IO_L3P_17 | U22 | |
| 17 | IO_L3N_17 | U21 | |
| 17 | IO_L4P_17 | W24 | |
| 17 | IO_L4N_VREF_17 | W23 | |
| 17 | IO_L5P_17 | V24 | |
| 17 | IO_L5N_17 | V23 | |
| 17 | IO_L6P_17 | AA23 | |
| 17 | IO_L6N_17 | AA24 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L7P_17 | Y23 | |
| 17 | IO_L7N_17 | Y22 | |
| 17 | IO_L8P_CC_17 | AC23 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | AC22 | |
| 17 | IO_L9P_CC_17 | AB24 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | AC24 | |
| 17 | IO_L10P_CC_17 | AB22 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | AA22 | |
| 17 | IO_L11P_CC_17 | AC21 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AB21 | |
| 17 | IO_L12P_VRN_17 | V21 | |
| 17 | IO_L12N_VRP_17 | V22 | |
| 17 | IO_L13P_17 | W21 | |
| 17 | IO_L13N_17 | W20 | |
| 17 | IO_L14P_17 | U19 | |
| 17 | IO_L14N_VREF_17 | U20 | |
| 17 | IO_L15P_17 | V19 | |
| 17 | IO_L15N_17 | W19 | |
| 17 | IO_L16P_17 | Y21 | |
| 17 | IO_L16N_17 | Y20 | |
| 17 | IO_L17P_17 | AD19 | |
| 17 | IO_L17N_17 | AC19 | |
| 17 | IO_L18P_17 | AB20 | |
| 17 | IO_L18N_17 | AB19 | |
| 17 | IO_L19P_17 | AA20 | |
| 17 | IO_L19N_17 | AA19 | |
| 18 | IO_L0P_18 | V3 | |
| 18 | IO_L0N_18 | U4 | |
| 18 | IO_L1P_18 | T5 | |
| 18 | IO_L1N_18 | T4 | |
| 18 | IO_L2P_18 | T7 | |
| 18 | IO_L2N_18 | U7 | |
| 18 | IO_L3P_18 | U5 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 18 | IO_L3N_18 | U6 | |
| 18 | IO_L4P_18 | V4 | |
| 18 | IO_L4N_VREF_18 | W4 | |
| 18 | IO_L5P_18 | W3 | |
| 18 | IO_L5N_18 | Y3 | |
| 18 | IO_L6P_18 | V6 | |
| 18 | IO_L6N_18 | V7 | |
| 18 | IO_L7P_18 | W5 | |
| 18 | IO_L7N_18 | W6 | |
| 18 | IO_L8P_CC_18 | Y6 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | Y5 | |
| 18 | IO_L9P_CC_18 | AA4 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | AA5 | |
| 18 | IO_L10P_CC_18 | Y7 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AA7 | |
| 18 | IO_L11P_CC_18 | AB4 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | AA3 | |
| 18 | IO_L12P_VRN_18 | AC4 | |
| 18 | IO_L12N_VRP_18 | AC3 | |
| 18 | IO_L13P_18 | AD4 | |
| 18 | IO_L13N_18 | AD3 | |
| 18 | IO_L14P_18 | AB6 | |
| 18 | IO_L14N_VREF_18 | AB5 | |
| 18 | IO_L15P_18 | AC6 | |
| 18 | IO_L15N_18 | AB7 | |
| 18 | IO_L16P_18 | AF3 | |
| 18 | IO_L16N_18 | AE3 | |
| 18 | IO_L17P_18 | AD6 | |
| 18 | IO_L17N_18 | AD5 | |
| 18 | IO_L18P_18 | AF5 | |
| 18 | IO_L18N_18 | AF4 | |
| 18 | IO_L19P_18 | AE6 | |
| 18 | IO_L19N_18 | AE5 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L0P_21 | AD24 | LX30 |
| 21 | IO_L0N_21 | AD23 | LX30 |
| 21 | IO_L1P_21 | AE26 | LX30 |
| 21 | IO_L1N_21 | AD26 | LX30 |
| 21 | IO_L2P_21 | AF24 | LX30 |
| 21 | IO_L2N_21 | AF25 | LX30 |
| 21 | IO_L3P_21 | AE25 | LX30 |
| 21 | IO_L3N_21 | AD25 | LX30 |
| 21 | IO_L4P_21 | AF23 | LX30 |
| 21 | IO_L4N_VREF_21 | AE23 | LX30 |
| 21 | IO_L5P_21 | AD20 | LX30 |
| 21 | IO_L5N_21 | AD21 | LX30 |
| 21 | IO_L6P_21 | AE20 | LX30 |
| 21 | IO_L6N_21 | AE21 | LX30 |
| 21 | IO_L7P_21 | AF22 | LX30 |
| 21 | IO_L7N_21 | AE22 | LX30 |
| 21 | IO_L8P_CC_21 | AF18 | LX30 |
| 21 | IO_L8N_CC_21 ⁽²⁾ | AE18 | LX30 |
| 21 | IO_L9P_CC_21 | AF19 | LX30 |
| 21 | IO_L9N_CC_21 ⁽²⁾ | AF20 | LX30 |
| 21 | IO_L10P_CC_21 | AF17 | LX30 |
| 21 | IO_L10N_CC_21 ⁽²⁾ | AE17 | LX30 |
| 21 | IO_L11P_CC_21 | AE16 | LX30 |
| 21 | IO_L11N_CC_21 ⁽²⁾ | AD16 | LX30 |
| 21 | IO_L12P_VRN_21 | AF15 | LX30 |
| 21 | IO_L12N_VRP_21 | AE15 | LX30 |
| 21 | IO_L13P_21 | AF14 | LX30 |
| 21 | IO_L13N_21 | AF13 | LX30 |
| 21 | IO_L14P_21 | AF12 | LX30 |
| 21 | IO_L14N_VREF_21 | AE13 | LX30 |
| 21 | IO_L15P_21 | AE12 | LX30 |
| 21 | IO_L15N_21 | AE11 | LX30 |
| 21 | IO_L16P_21 | AF10 | LX30 |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 21 | IO_L16N_21 | AE10 | LX30 |
| 21 | IO_L17P_21 | AF9 | LX30 |
| 21 | IO_L17N_21 | AF8 | LX30 |
| 21 | IO_L18P_21 | AF7 | LX30 |
| 21 | IO_L18N_21 | AE7 | LX30 |
| 21 | IO_L19P_21 | AE8 | LX30 |
| 21 | IO_L19N_21 | AD9 | LX30 |
| NA | GND | A1 | |
| NA | GND | F1 | |
| NA | GND | L1 | |
| NA | GND | T1 | |
| NA | GND | AA1 | |
| NA | GND | AF1 | |
| NA | GND | D2 | |
| NA | GND | P2 | |
| NA | GND | AD2 | |
| NA | GND | B3 | |
| NA | GND | G3 | |
| NA | GND | M3 | |
| NA | GND | U3 | |
| NA | GND | K4 | |
| NA | GND | Y4 | |
| NA | GND | AE4 | |
| NA | GND | C5 | |
| NA | GND | N5 | |
| NA | GND | AC5 | |
| NA | GND | A6 | |
| NA | GND | F6 | |
| NA | GND | T6 | |
| NA | GND | AF6 | |
| NA | GND | J7 | |
| NA | GND | P7 | |
| NA | GND | W7 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | B8 | |
| NA | GND | K8 | |
| NA | GND | M8 | |
| NA | GND | P8 | |
| NA | GND | T8 | |
| NA | GND | V8 | |
| NA | GND | AB8 | |
| NA | GND | E9 | |
| NA | GND | J9 | |
| NA | GND | L9 | |
| NA | GND | N9 | |
| NA | GND | R9 | |
| NA | GND | U9 | |
| NA | GND | W9 | |
| NA | GND | AE9 | |
| NA | GND | H10 | |
| NA | GND | M10 | |
| NA | GND | P10 | |
| NA | GND | T10 | |
| NA | GND | V10 | |
| NA | GND | A11 | |
| NA | GND | L11 | |
| NA | GND | N11 | |
| NA | GND | R11 | |
| NA | GND | AA11 | |
| NA | GND | AF11 | |
| NA | GND | D12 | |
| NA | GND | K12 | |
| NA | GND | M12 | |
| NA | GND | P12 | |
| NA | GND | T12 | |
| NA | GND | AD12 | |
| NA | GND | B13 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | G13 | |
| NA | GND | J13 | |
| NA | GND | L13 | |
| NA | GND | U13 | |
| NA | GND | W13 | |
| NA | GND | K14 | |
| NA | GND | T14 | |
| NA | GND | V14 | |
| NA | GND | Y14 | |
| NA | GND | AE14 | |
| NA | GND | C15 | |
| NA | GND | J15 | |
| NA | GND | L15 | |
| NA | GND | N15 | |
| NA | GND | R15 | |
| NA | GND | U15 | |
| NA | GND | W15 | |
| NA | GND | AC15 | |
| NA | GND | A16 | |
| NA | GND | F16 | |
| NA | GND | K16 | |
| NA | GND | M16 | |
| NA | GND | P16 | |
| NA | GND | T16 | |
| NA | GND | V16 | |
| NA | GND | Y16 | |
| NA | GND | AF16 | |
| NA | GND | J17 | |
| NA | GND | L17 | |
| NA | GND | N17 | |
| NA | GND | R17 | |
| NA | GND | U17 | |
| NA | GND | W17 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | B18 | |
| NA | GND | G18 | |
| NA | GND | M18 | |
| NA | GND | U18 | |
| NA | GND | AB18 | |
| NA | GND | E19 | |
| NA | GND | K19 | |
| NA | GND | R19 | |
| NA | GND | Y19 | |
| NA | GND | AE19 | |
| NA | GND | H20 | |
| NA | GND | V20 | |
| NA | GND | A21 | |
| NA | GND | L21 | |
| NA | GND | AA21 | |
| NA | GND | AF21 | |
| NA | GND | D22 | |
| NA | GND | P22 | |
| NA | GND | AD22 | |
| NA | GND | G23 | |
| NA | GND | U23 | |
| NA | GND | K24 | |
| NA | GND | Y24 | |
| NA | GND | C25 | |
| NA | GND | N25 | |
| NA | GND | AC25 | |
| NA | GND | A26 | |
| NA | GND | F26 | |
| NA | GND | L26 | |
| NA | GND | T26 | |
| NA | GND | AA26 | |
| NA | GND | AF26 | |
| NA | VCCAUX | J8 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCAUX | L8 | |
| NA | VCCAUX | N8 | |
| NA | VCCAUX | R8 | |
| NA | VCCAUX | U8 | |
| NA | VCCAUX | W8 | |
| NA | VCCAUX | W16 | |
| NA | VCCAUX | K17 | |
| NA | VCCAUX | M17 | |
| NA | VCCAUX | P17 | |
| NA | VCCAUX | T17 | |
| NA | VCCAUX | V17 | |
| NA | VCCINT | K9 | |
| NA | VCCINT | M9 | |
| NA | VCCINT | P9 | |
| NA | VCCINT | T9 | |
| NA | VCCINT | V9 | |
| NA | VCCINT | L10 | |
| NA | VCCINT | N10 | |
| NA | VCCINT | R10 | |
| NA | VCCINT | U10 | |
| NA | VCCINT | M11 | |
| NA | VCCINT | P11 | |
| NA | VCCINT | T11 | |
| NA | VCCINT | J12 | |
| NA | VCCINT | L12 | |
| NA | VCCINT | N12 | |
| NA | VCCINT | R12 | |
| NA | VCCINT | U12 | |
| NA | VCCINT | K13 | |
| NA | VCCINT | T13 | |
| NA | VCCINT | V13 | |
| NA | VCCINT | J14 | |
| NA | VCCINT | L14 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | U14 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | H15 | |
| NA | VCCINT | K15 | |
| NA | VCCINT | M15 | |
| NA | VCCINT | P15 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | J16 | |
| NA | VCCINT | L16 | |
| NA | VCCINT | N16 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | R16 | |
| 0 | VCCO_0 | Y9 | |
| 0 | VCCO_0 | W12 | |
| 1 | VCCO_1 | C10 | |
| 1 | VCCO_1 | F11 | |
| 2 | VCCO_2 | AA16 | |
| 2 | VCCO_2 | AD17 | |
| 3 | VCCO_3 | E14 | |
| 3 | VCCO_3 | D17 | |
| 4 | VCCO_4 | AC10 | |
| 4 | VCCO_4 | AB13 | |
| 11 | VCCO_11 | F21 | |
| 11 | VCCO_11 | J22 | |
| 11 | VCCO_11 | H25 | |
| 12 | VCCO_12 | J2 | |
| 12 | VCCO_12 | H5 | |
| 12 | VCCO_12 | L6 | |
| 13 | VCCO_13 | N20 | |
| 13 | VCCO_13 | M23 | |
| 13 | VCCO_13 | R24 | |

Table 2-4: FF676 Package—LX30, LX50, LX85, and LX110 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 14 | VCCO_14 | W2 | |
| 14 | VCCO_14 | R4 | |
| 14 | VCCO_14 | V5 | |
| 15 | VCCO_15 | C20 | |
| 15 | VCCO_15 | B23 | |
| 15 | VCCO_15 | E24 | |
| 16 | VCCO_16 | E4 | |
| 16 | VCCO_16 | D7 | |
| 16 | VCCO_16 | G8 | |
| 17 | VCCO_17 | T21 | |
| 17 | VCCO_17 | W22 | |
| 17 | VCCO_17 | V25 | |
| 18 | VCCO_18 | AB3 | |
| 18 | VCCO_18 | AA6 | |
| 18 | VCCO_18 | AD7 | |
| 21 | VCCO_21 | AC20 | |
| 21 | VCCO_21 | AB23 | |
| 21 | VCCO_21 | AE24 | |

Notes:

1. Do not connect a single ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T, and FX100T

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | W18 | |
| 0 | DXN_0 | W17 | |
| 0 | AVDD_0 | T18 | |
| 0 | AVSS_0 | T17 | |
| 0 | VP_0 | U18 | |
| 0 | VN_0 | V17 | |
| 0 | VREFP_0 | V18 | |
| 0 | VREFN_0 | U17 | |
| 0 | VBATT_0 | L23 | |
| 0 | PROGRAM_B_0 | M22 | |
| 0 | HSWAPEN_0 | M23 | |
| 0 | D_IN_0 | P15 | |
| 0 | DONE_0 | M15 | |
| 0 | CCLK_0 | N15 | |
| 0 | INIT_B_0 | N14 | |
| 0 | CS_B_0 | N22 | |
| 0 | RDWR_B_0 | N23 | |
| 0 | RSVD ⁽³⁾ | AB23 | |
| 0 | RSVD ⁽³⁾ | AC23 | |
| 0 | TCK_0 | AB15 | |
| 0 | M0_0 | AD21 | |
| 0 | M2_0 | AD22 | |
| 0 | M1_0 | AC22 | |
| 0 | TMS_0 | AC14 | |
| 0 | TDI_0 | AC15 | |
| 0 | D_OUT_BUSY_0 | AD15 | |
| 0 | TDO_0 | AD14 | |
| 1 | IO_L0P_A19_1 | L21 | |
| 1 | IO_L0N_A18_1 | L20 | |
| 1 | IO_L1P_A17_1 | L15 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L1N_A16_1 | L16 | |
| 1 | IO_L2P_A15_D31_1 | J22 | |
| 1 | IO_L2N_A14_D30_1 | K21 | |
| 1 | IO_L3P_A13_D29_1 | K16 | |
| 1 | IO_L3N_A12_D28_1 | J15 | |
| 1 | IO_L4P_A11_D27_1 | G22 | |
| 1 | IO_L4N_VREF_A10_D26_1 | H22 | |
| 1 | IO_L5P_A9_D25_1 | L14 | |
| 1 | IO_L5N_A8_D24_1 | K14 | |
| 1 | IO_L6P_A7_D23_1 | K23 | |
| 1 | IO_L6N_A6_D22_1 | K22 | |
| 1 | IO_L7P_A5_D21_1 | J12 | |
| 1 | IO_L7N_A4_D20_1 | H12 | |
| 1 | IO_L8P_CC_A3_D19_1 | G23 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | H23 | |
| 1 | IO_L9P_CC_A1_D17_1 | K13 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | K12 | |
| 2 | IO_L0P_CC_RS1_2 | AE13 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AE12 | |
| 2 | IO_L1P_CC_A25_2 | AF23 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AG23 | |
| 2 | IO_L2P_A23_2 | AF13 | |
| 2 | IO_L2N_A22_2 | AG12 | |
| 2 | IO_L3P_A21_2 | AE22 | |
| 2 | IO_L3N_A20_2 | AE23 | |
| 2 | IO_L4P_FCS_B_2 | AE14 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AF14 | |
| 2 | IO_L5P_FWE_B_2 | AF20 | |
| 2 | IO_L5N_CSO_B_2 | AF21 | |
| 2 | IO_L6P_D7_2 | AF15 | |
| 2 | IO_L6N_D6_2 | AE16 | |
| 2 | IO_L7P_D5_2 | AE21 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|--|------------|-----------------|
| 2 | IO_L7N_D4_2 | AD20 | |
| 2 | IO_L8P_D3_2 | AF16 | |
| 2 | IO_L8N_D2_FS2_2 | AE17 | |
| 2 | IO_L9P_D1_FS1_2 | AE19 | |
| 2 | IO_L9N_D0_FS0_2 | AD19 | |
| 3 | IO_L0P_CC_GC_3 | H17 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | H18 | |
| 3 | IO_L1P_CC_GC_3 | K17 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | L18 | |
| 3 | IO_L2P_GC_VRN_3 | G15 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | G16 | |
| 3 | IO_L3P_GC_3 | K18 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | J19 | |
| 3 | IO_L4P_GC_3 | J16 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | J17 | |
| 3 | IO_L5P_GC_3 | L19 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | K19 | |
| 3 | IO_L6P_GC_3 | H14 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | H15 | |
| 3 | IO_L7P_GC_3 | J20 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | J21 | |
| 3 | IO_L8P_GC_3 | J14 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | H13 | |
| 3 | IO_L9P_GC_3 | H19 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | H20 | |
| 4 | IO_L0P_GC_D15_4 | AG22 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AH22 | |
| 4 | IO_L1P_GC_D13_4 | AH12 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AG13 | |
| 4 | IO_L2P_GC_D11_4 | AH20 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AH19 | |
| 4 | IO_L3P_GC_D9_4 | AH14 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|---------------------|
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AH13 | |
| 4 | IO_L4P_GC_4 | AG21 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AG20 | |
| 4 | IO_L5P_GC_4 | AH15 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AG15 | |
| 4 | IO_L6P_GC_4 | AG18 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AF19 | |
| 4 | IO_L7P_GC_VRN_4 | AH17 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AG16 | |
| 4 | IO_L8P_CC_GC_4 | AF18 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AE18 | |
| 4 | IO_L9P_CC_GC_4 | AH18 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AG17 | |
| 5 | IO_L0P_5 | B16 | LX50T, LX85T, SX50T |
| 5 | IO_L0N_5 | B15 | LX50T, LX85T, SX50T |
| 5 | IO_L1P_5 | A15 | LX50T, LX85T, SX50T |
| 5 | IO_L1N_5 | A14 | LX50T, LX85T, SX50T |
| 5 | IO_L2P_5 | B17 | LX50T, LX85T, SX50T |
| 5 | IO_L2N_5 | A16 | LX50T, LX85T, SX50T |
| 5 | IO_L3P_5 | C14 | LX50T, LX85T, SX50T |
| 5 | IO_L3N_5 | C15 | LX50T, LX85T, SX50T |
| 5 | IO_L4P_5 | E19 | LX50T, LX85T, SX50T |
| 5 | IO_L4N_VREF_5 | F19 | LX50T, LX85T, SX50T |
| 5 | IO_L5P_5 | C17 | LX50T, LX85T, SX50T |
| 5 | IO_L5N_5 | D17 | LX50T, LX85T, SX50T |
| 5 | IO_L6P_5 | E21 | LX50T, LX85T, SX50T |
| 5 | IO_L6N_5 | D20 | LX50T, LX85T, SX50T |
| 5 | IO_L7P_5 | D16 | LX50T, LX85T, SX50T |
| 5 | IO_L7N_5 | D15 | LX50T, LX85T, SX50T |
| 5 | IO_L8P_CC_5 | G20 | LX50T, LX85T, SX50T |
| 5 | IO_L8N_CC_5 ⁽²⁾ | F20 | LX50T, LX85T, SX50T |
| 5 | IO_L9P_CC_5 | D14 | LX50T, LX85T, SX50T |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 5 | IO_L9N_CC_5 ⁽²⁾ | E14 | LX50T, LX85T, SX50T |
| 5 | IO_L10P_CC_5 | E17 | LX50T, LX85T, SX50T |
| 5 | IO_L10N_CC_5 ⁽²⁾ | E16 | LX50T, LX85T, SX50T |
| 5 | IO_L11P_CC_5 | F21 | LX50T, LX85T, SX50T |
| 5 | IO_L11N_CC_5 ⁽²⁾ | G21 | LX50T, LX85T, SX50T |
| 5 | IO_L12P_VRN_5 | E18 | LX50T, LX85T, SX50T |
| 5 | IO_L12N_VRP_5 | D19 | LX50T, LX85T, SX50T |
| 5 | IO_L13P_5 | D21 | LX50T, LX85T, SX50T |
| 5 | IO_L13N_5 | D22 | LX50T, LX85T, SX50T |
| 5 | IO_L14P_5 | F18 | LX50T, LX85T, SX50T |
| 5 | IO_L14N_VREF_5 | G18 | LX50T, LX85T, SX50T |
| 5 | IO_L15P_5 | E22 | LX50T, LX85T, SX50T |
| 5 | IO_L15N_5 | F23 | LX50T, LX85T, SX50T |
| 5 | IO_L16P_5 | G17 | LX50T, LX85T, SX50T |
| 5 | IO_L16N_5 | F16 | LX50T, LX85T, SX50T |
| 5 | IO_L17P_5 | D24 | LX50T, LX85T, SX50T |
| 5 | IO_L17N_5 | E23 | LX50T, LX85T, SX50T |
| 5 | IO_L18P_5 | F14 | LX50T, LX85T, SX50T |
| 5 | IO_L18N_5 | F15 | LX50T, LX85T, SX50T |
| 5 | IO_L19P_5 | F24 | LX50T, LX85T, SX50T |
| 5 | IO_L19N_5 | E24 | LX50T, LX85T, SX50T |
| 6 | IO_L0P_6 | AH24 | LX50T, LX85T, SX50T |
| 6 | IO_L0N_6 | AJ24 | LX50T, LX85T, SX50T |
| 6 | IO_L1P_6 | AK12 | LX50T, LX85T, SX50T |
| 6 | IO_L1N_6 | AJ12 | LX50T, LX85T, SX50T |
| 6 | IO_L2P_6 | AH23 | LX50T, LX85T, SX50T |
| 6 | IO_L2N_6 | AJ22 | LX50T, LX85T, SX50T |
| 6 | IO_L3P_6 | AL13 | LX50T, LX85T, SX50T |
| 6 | IO_L3N_6 | AK13 | LX50T, LX85T, SX50T |
| 6 | IO_L4P_6 | AK24 | LX50T, LX85T, SX50T |
| 6 | IO_L4N_VREF_6 | AL23 | LX50T, LX85T, SX50T |
| 6 | IO_L5P_6 | AJ14 | LX50T, LX85T, SX50T |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 6 | IO_L5N_6 | AK14 | LX50T, LX85T, SX50T |
| 6 | IO_L6P_6 | AK23 | LX50T, LX85T, SX50T |
| 6 | IO_L6N_6 | AK22 | LX50T, LX85T, SX50T |
| 6 | IO_L7P_6 | AL15 | LX50T, LX85T, SX50T |
| 6 | IO_L7N_6 | AL14 | LX50T, LX85T, SX50T |
| 6 | IO_L8P_CC_6 | AJ21 | LX50T, LX85T, SX50T |
| 6 | IO_L8N_CC_6 ⁽²⁾ | AJ20 | LX50T, LX85T, SX50T |
| 6 | IO_L9P_CC_6 | AJ16 | LX50T, LX85T, SX50T |
| 6 | IO_L9N_CC_6 ⁽²⁾ | AJ15 | LX50T, LX85T, SX50T |
| 6 | IO_L10P_CC_6 | AK16 | LX50T, LX85T, SX50T |
| 6 | IO_L10N_CC_6 ⁽²⁾ | AL16 | LX50T, LX85T, SX50T |
| 6 | IO_L11P_CC_6 | AL21 | LX50T, LX85T, SX50T |
| 6 | IO_L11N_CC_6 ⁽²⁾ | AK21 | LX50T, LX85T, SX50T |
| 6 | IO_L12P_VRN_6 | AK17 | LX50T, LX85T, SX50T |
| 6 | IO_L12N_VRP_6 | AJ17 | LX50T, LX85T, SX50T |
| 6 | IO_L13P_6 | AL19 | LX50T, LX85T, SX50T |
| 6 | IO_L13N_6 | AL20 | LX50T, LX85T, SX50T |
| 6 | IO_L14P_6 | AK18 | LX50T, LX85T, SX50T |
| 6 | IO_L14N_VREF_6 | AL18 | LX50T, LX85T, SX50T |
| 6 | IO_L15P_6 | AJ19 | LX50T, LX85T, SX50T |
| 6 | IO_L15N_6 | AK19 | LX50T, LX85T, SX50T |
| 6 | IO_L16P_6 | AM15 | LX50T, LX85T, SX50T |
| 6 | IO_L16N_6 | AM16 | LX50T, LX85T, SX50T |
| 6 | IO_L17P_6 | AP16 | LX50T, LX85T, SX50T |
| 6 | IO_L17N_6 | AP17 | LX50T, LX85T, SX50T |
| 6 | IO_L18P_6 | AN15 | LX50T, LX85T, SX50T |
| 6 | IO_L18N_6 | AP15 | LX50T, LX85T, SX50T |
| 6 | IO_L19P_6 | AM17 | LX50T, LX85T, SX50T |
| 6 | IO_L19N_6 | AN17 | LX50T, LX85T, SX50T |
| 11 | IO_L0P_11 | B32 | |
| 11 | IO_L0N_11 | A33 | |
| 11 | IO_L1P_11 | B33 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L1N_11 | C33 | |
| 11 | IO_L2P_11 | C32 | |
| 11 | IO_L2N_11 | D32 | |
| 11 | IO_L3P_11 | C34 | |
| 11 | IO_L3N_11 | D34 | |
| 11 | IO_L4P_11 | G32 | |
| 11 | IO_L4N_VREF_11 | H32 | |
| 11 | IO_L5P_11 | F33 | |
| 11 | IO_L5N_11 | E34 | |
| 11 | IO_L6P_11 | E32 | |
| 11 | IO_L6N_11 | E33 | |
| 11 | IO_L7P_11 | G33 | |
| 11 | IO_L7N_11 | F34 | |
| 11 | IO_L8P_CC_11 | J32 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | H33 | |
| 11 | IO_L9P_CC_11 | H34 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | J34 | |
| 11 | IO_L10P_CC_SM15P_11 | L34 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | K34 | |
| 11 | IO_L11P_CC_SM14P_11 | K33 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | K32 | |
| 11 | IO_L12P_VRN_11 | N33 | |
| 11 | IO_L12N_VRP_11 | M33 | |
| 11 | IO_L13P_11 | L33 | |
| 11 | IO_L13N_11 | M32 | |
| 11 | IO_L14P_11 | P34 | |
| 11 | IO_L14N_VREF_11 | N34 | |
| 11 | IO_L15P_SM13P_11 | P32 | |
| 11 | IO_L15N_SM13N_11 | N32 | |
| 11 | IO_L16P_SM12P_11 | T33 | |
| 11 | IO_L16N_SM12N_11 | R34 | |
| 11 | IO_L17P_SM11P_11 | R33 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 11 | IO_L17N_SM11N_11 | R32 | |
| 11 | IO_L18P_SM10P_11 | U33 | |
| 11 | IO_L18N_SM10N_11 | T34 | |
| 11 | IO_L19P_SM9P_11 | U32 | |
| 11 | IO_L19N_SM9N_11 | U31 | |
| 12 | IO_L0P_12 | M6 | |
| 12 | IO_L0N_12 | M5 | |
| 12 | IO_L1P_12 | N8 | |
| 12 | IO_L1N_12 | N7 | |
| 12 | IO_L2P_12 | M7 | |
| 12 | IO_L2N_12 | L6 | |
| 12 | IO_L3P_12 | N5 | |
| 12 | IO_L3N_12 | P5 | |
| 12 | IO_L4P_12 | L4 | |
| 12 | IO_L4N_VREF_12 | L5 | |
| 12 | IO_L5P_12 | P7 | |
| 12 | IO_L5N_12 | P6 | |
| 12 | IO_L6P_12 | K7 | |
| 12 | IO_L6N_12 | K6 | |
| 12 | IO_L7P_12 | R6 | |
| 12 | IO_L7N_12 | T6 | |
| 12 | IO_L8P_CC_12 | J6 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | J5 | |
| 12 | IO_L9P_CC_12 | R7 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | R8 | |
| 12 | IO_L10P_CC_12 | T8 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | U7 | |
| 12 | IO_L11P_CC_12 | H7 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | J7 | |
| 12 | IO_L12P_VRN_12 | R9 | |
| 12 | IO_L12N_VRP_12 | P9 | |
| 12 | IO_L13P_12 | H5 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 12 | IO_L13N_12 | G5 | |
| 12 | IO_L14P_12 | R11 | |
| 12 | IO_L14N_VREF_12 | P10 | |
| 12 | IO_L15P_12 | F5 | |
| 12 | IO_L15N_12 | F6 | |
| 12 | IO_L16P_12 | T10 | |
| 12 | IO_L16N_12 | T11 | |
| 12 | IO_L17P_12 | G6 | |
| 12 | IO_L17N_12 | G7 | |
| 12 | IO_L18P_12 | T9 | |
| 12 | IO_L18N_12 | U10 | |
| 12 | IO_L19P_12 | E6 | |
| 12 | IO_L19N_12 | E7 | |
| 13 | IO_L0P_SM8P_13 | V32 | |
| 13 | IO_L0N_SM8N_13 | V33 | |
| 13 | IO_L1P_SM7P_13 | W34 | |
| 13 | IO_L1N_SM7N_13 | V34 | |
| 13 | IO_L2P_SM6P_13 | Y33 | |
| 13 | IO_L2N_SM6N_13 | AA33 | |
| 13 | IO_L3P_SM5P_13 | AA34 | |
| 13 | IO_L3N_SM5N_13 | Y34 | |
| 13 | IO_L4P_13 | Y32 | |
| 13 | IO_L4N_VREF_13 | W32 | |
| 13 | IO_L5P_SM4P_13 | AC34 | |
| 13 | IO_L5N_SM4N_13 | AD34 | |
| 13 | IO_L6P_SM3P_13 | AC32 | |
| 13 | IO_L6N_SM3N_13 | AB32 | |
| 13 | IO_L7P_SM2P_13 | AC33 | |
| 13 | IO_L7N_SM2N_13 | AB33 | |
| 13 | IO_L8P_CC_SM1P_13 | AF33 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AE33 | |
| 13 | IO_L9P_CC_SM0P_13 | AF34 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AE34 | |
| 13 | IO_L10P_CC_13 | AH34 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | AJ34 | |
| 13 | IO_L11P_CC_13 | AD32 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AE32 | |
| 13 | IO_L12P_VRN_13 | AG33 | |
| 13 | IO_L12N_VRP_13 | AH33 | |
| 13 | IO_L13P_13 | AK34 | |
| 13 | IO_L13N_13 | AK33 | |
| 13 | IO_L14P_13 | AG32 | |
| 13 | IO_L14N_VREF_13 | AH32 | |
| 13 | IO_L15P_13 | AJ32 | |
| 13 | IO_L15N_13 | AK32 | |
| 13 | IO_L16P_13 | AL34 | |
| 13 | IO_L16N_13 | AL33 | |
| 13 | IO_L17P_13 | AM33 | |
| 13 | IO_L17N_13 | AM32 | |
| 13 | IO_L18P_13 | AN34 | |
| 13 | IO_L18N_13 | AN33 | |
| 13 | IO_L19P_13 | AN32 | |
| 13 | IO_L19N_13 | AP32 | |
| 15 | IO_L0P_15 | E29 | |
| 15 | IO_L0N_15 | F29 | |
| 15 | IO_L1P_15 | G30 | |
| 15 | IO_L1N_15 | F30 | |
| 15 | IO_L2P_15 | H29 | |
| 15 | IO_L2N_15 | J29 | |
| 15 | IO_L3P_15 | F31 | |
| 15 | IO_L3N_15 | E31 | |
| 15 | IO_L4P_15 | L29 | |
| 15 | IO_L4N_VREF_15 | K29 | |
| 15 | IO_L5P_15 | H30 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 15 | IO_L5N_15 | G31 | |
| 15 | IO_L6P_15 | J30 | |
| 15 | IO_L6N_15 | J31 | |
| 15 | IO_L7P_15 | L30 | |
| 15 | IO_L7N_15 | M30 | |
| 15 | IO_L8P_CC_15 | N29 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | P29 | |
| 15 | IO_L9P_CC_15 | K31 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | L31 | |
| 15 | IO_L10P_CC_15 | P31 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | P30 | |
| 15 | IO_L11P_CC_15 | M31 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | N30 | |
| 15 | IO_L12P_VRN_15 | R28 | |
| 15 | IO_L12N_VRP_15 | R29 | |
| 15 | IO_L13P_15 | T31 | |
| 15 | IO_L13N_15 | R31 | |
| 15 | IO_L14P_15 | U30 | |
| 15 | IO_L14N_VREF_15 | T30 | |
| 15 | IO_L15P_15 | T28 | |
| 15 | IO_L15N_15 | T29 | |
| 15 | IO_L16P_15 | U27 | |
| 15 | IO_L16N_15 | U28 | |
| 15 | IO_L17P_15 | R26 | |
| 15 | IO_L17N_15 | R27 | |
| 15 | IO_L18P_15 | U26 | |
| 15 | IO_L18N_15 | T26 | |
| 15 | IO_L19P_15 | U25 | |
| 15 | IO_L19N_15 | T25 | |
| 17 | IO_L0P_17 | W24 | |
| 17 | IO_L0N_17 | V24 | |
| 17 | IO_L1P_17 | Y26 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L1N_17 | W26 | |
| 17 | IO_L2P_17 | V25 | |
| 17 | IO_L2N_17 | W25 | |
| 17 | IO_L3P_17 | Y27 | |
| 17 | IO_L3N_17 | W27 | |
| 17 | IO_L4P_17 | V30 | |
| 17 | IO_L4N_VREF_17 | W30 | |
| 17 | IO_L5P_17 | V28 | |
| 17 | IO_L5N_17 | V27 | |
| 17 | IO_L6P_17 | W31 | |
| 17 | IO_L6N_17 | Y31 | |
| 17 | IO_L7P_17 | W29 | |
| 17 | IO_L7N_17 | V29 | |
| 17 | IO_L8P_CC_17 | Y28 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | Y29 | |
| 17 | IO_L9P_CC_17 | AB31 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | AA31 | |
| 17 | IO_L10P_CC_17 | AB30 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | AC30 | |
| 17 | IO_L11P_CC_17 | AA29 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AA30 | |
| 17 | IO_L12P_VRN_17 | AD31 | |
| 17 | IO_L12N_VRP_17 | AE31 | |
| 17 | IO_L13P_17 | AD30 | |
| 17 | IO_L13N_17 | AC29 | |
| 17 | IO_L14P_17 | AF31 | |
| 17 | IO_L14N_VREF_17 | AG31 | |
| 17 | IO_L15P_17 | AE29 | |
| 17 | IO_L15N_17 | AD29 | |
| 17 | IO_L16P_17 | AJ31 | |
| 17 | IO_L16N_17 | AK31 | |
| 17 | IO_L17P_17 | AF29 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L17N_17 | AF30 | |
| 17 | IO_L18P_17 | AJ30 | |
| 17 | IO_L18N_17 | AH30 | |
| 17 | IO_L19P_17 | AH29 | |
| 17 | IO_L19N_17 | AG30 | |
| 18 | IO_L0P_18 | AC4 | |
| 18 | IO_L0N_18 | AC5 | |
| 18 | IO_L1P_18 | AB6 | |
| 18 | IO_L1N_18 | AB7 | |
| 18 | IO_L2P_18 | AA5 | |
| 18 | IO_L2N_18 | AB5 | |
| 18 | IO_L3P_18 | AC7 | |
| 18 | IO_L3N_18 | AD7 | |
| 18 | IO_L4P_18 | Y8 | |
| 18 | IO_L4N_VREF_18 | Y9 | |
| 18 | IO_L5P_18 | AD4 | |
| 18 | IO_L5N_18 | AD5 | |
| 18 | IO_L6P_18 | AA6 | |
| 18 | IO_L6N_18 | Y7 | |
| 18 | IO_L7P_18 | AD6 | |
| 18 | IO_L7N_18 | AE6 | |
| 18 | IO_L8P_CC_18 | W6 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | Y6 | |
| 18 | IO_L9P_CC_18 | AE7 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | AF6 | |
| 18 | IO_L10P_CC_18 | AG5 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AF5 | |
| 18 | IO_L11P_CC_18 | W7 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | V7 | |
| 18 | IO_L12P_VRN_18 | AH5 | |
| 18 | IO_L12N_VRP_18 | AG6 | |
| 18 | IO_L13P_18 | Y11 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 18 | IO_L13N_18 | W11 | |
| 18 | IO_L14P_18 | AH7 | |
| 18 | IO_L14N_VREF_18 | AG7 | |
| 18 | IO_L15P_18 | W10 | |
| 18 | IO_L15N_18 | W9 | |
| 18 | IO_L16P_18 | AJ7 | |
| 18 | IO_L16N_18 | AJ6 | |
| 18 | IO_L17P_18 | V8 | |
| 18 | IO_L17N_18 | U8 | |
| 18 | IO_L18P_18 | AK7 | |
| 18 | IO_L18N_18 | AK6 | |
| 18 | IO_L19P_18 | V10 | |
| 18 | IO_L19N_18 | V9 | |
| 19 | IO_L0P_19 | K24 | |
| 19 | IO_L0N_19 | L24 | |
| 19 | IO_L1P_19 | L25 | |
| 19 | IO_L1N_19 | L26 | |
| 19 | IO_L2P_19 | J24 | |
| 19 | IO_L2N_19 | J25 | |
| 19 | IO_L3P_19 | M25 | |
| 19 | IO_L3N_19 | M26 | |
| 19 | IO_L4P_19 | J27 | |
| 19 | IO_L4N_VREF_19 | J26 | |
| 19 | IO_L5P_19 | G25 | |
| 19 | IO_L5N_19 | G26 | |
| 19 | IO_L6P_19 | H25 | |
| 19 | IO_L6N_19 | H24 | |
| 19 | IO_L7P_19 | F25 | |
| 19 | IO_L7N_19 | F26 | |
| 19 | IO_L8P_CC_19 | G27 | |
| 19 | IO_L8N_CC_19 ⁽²⁾ | H27 | |
| 19 | IO_L9P_CC_19 | H28 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 19 | IO_L9N_CC_19 ⁽²⁾ | G28 | |
| 19 | IO_L10P_CC_19 | E28 | |
| 19 | IO_L10N_CC_19 ⁽²⁾ | F28 | |
| 19 | IO_L11P_CC_19 | E26 | |
| 19 | IO_L11N_CC_19 ⁽²⁾ | E27 | |
| 19 | IO_L12P_VRN_19 | N27 | |
| 19 | IO_L12N_VRP_19 | M27 | |
| 19 | IO_L13P_19 | K28 | |
| 19 | IO_L13N_19 | L28 | |
| 19 | IO_L14P_19 | K27 | |
| 19 | IO_L14N_VREF_19 | K26 | |
| 19 | IO_L15P_19 | M28 | |
| 19 | IO_L15N_19 | N28 | |
| 19 | IO_L16P_19 | P26 | |
| 19 | IO_L16N_19 | P27 | |
| 19 | IO_L17P_19 | N24 | |
| 19 | IO_L17N_19 | P24 | |
| 19 | IO_L18P_19 | P25 | |
| 19 | IO_L18N_19 | N25 | |
| 19 | IO_L19P_19 | R24 | |
| 19 | IO_L19N_19 | T24 | |
| 20 | IO_L0P_20 | E9 | |
| 20 | IO_L0N_20 | E8 | |
| 20 | IO_L1P_20 | F9 | |
| 20 | IO_L1N_20 | F8 | |
| 20 | IO_L2P_20 | F10 | |
| 20 | IO_L2N_20 | G10 | |
| 20 | IO_L3P_20 | G8 | |
| 20 | IO_L3N_20 | H8 | |
| 20 | IO_L4P_20 | D11 | |
| 20 | IO_L4N_VREF_20 | D10 | |
| 20 | IO_L5P_20 | K11 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 20 | IO_L5N_20 | J11 | |
| 20 | IO_L6P_20 | D12 | |
| 20 | IO_L6N_20 | C12 | |
| 20 | IO_L7P_20 | H10 | |
| 20 | IO_L7N_20 | H9 | |
| 20 | IO_L8P_CC_20 | A13 | |
| 20 | IO_L8N_CC_20 ⁽²⁾ | B12 | |
| 20 | IO_L9P_CC_20 | J10 | |
| 20 | IO_L9N_CC_20 ⁽²⁾ | J9 | |
| 20 | IO_L10P_CC_20 | K8 | |
| 20 | IO_L10N_CC_20 ⁽²⁾ | K9 | |
| 20 | IO_L11P_CC_20 | B13 | |
| 20 | IO_L11N_CC_20 ⁽²⁾ | C13 | |
| 20 | IO_L12P_VRN_20 | L10 | |
| 20 | IO_L12N_VRP_20 | L11 | |
| 20 | IO_L13P_20 | G11 | |
| 20 | IO_L13N_20 | G12 | |
| 20 | IO_L14P_20 | M8 | |
| 20 | IO_L14N_VREF_20 | L8 | |
| 20 | IO_L15P_20 | F11 | |
| 20 | IO_L15N_20 | E11 | |
| 20 | IO_L16P_20 | M10 | |
| 20 | IO_L16N_20 | L9 | |
| 20 | IO_L17P_20 | E12 | |
| 20 | IO_L17N_20 | E13 | |
| 20 | IO_L18P_20 | N10 | |
| 20 | IO_L18N_20 | N9 | |
| 20 | IO_L19P_20 | F13 | |
| 20 | IO_L19N_20 | G13 | |
| 21 | IO_L0P_21 | AA25 | |
| 21 | IO_L0N_21 | AA26 | |
| 21 | IO_L1P_21 | AB27 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L1N_21 | AC27 | |
| 21 | IO_L2P_21 | Y24 | |
| 21 | IO_L2N_21 | AA24 | |
| 21 | IO_L3P_21 | AB25 | |
| 21 | IO_L3N_21 | AB26 | |
| 21 | IO_L4P_21 | AC28 | |
| 21 | IO_L4N_VREF_21 | AD27 | |
| 21 | IO_L5P_21 | AB28 | |
| 21 | IO_L5N_21 | AA28 | |
| 21 | IO_L6P_21 | AG28 | |
| 21 | IO_L6N_21 | AH28 | |
| 21 | IO_L7P_21 | AE28 | |
| 21 | IO_L7N_21 | AF28 | |
| 21 | IO_L8P_CC_21 | AK26 | |
| 21 | IO_L8N_CC_21 ⁽²⁾ | AJ27 | |
| 21 | IO_L9P_CC_21 | AK29 | |
| 21 | IO_L9N_CC_21 ⁽²⁾ | AJ29 | |
| 21 | IO_L10P_CC_21 | AK28 | |
| 21 | IO_L10N_CC_21 ⁽²⁾ | AK27 | |
| 21 | IO_L11P_CC_21 | AH27 | |
| 21 | IO_L11N_CC_21 ⁽²⁾ | AJ26 | |
| 21 | IO_L12P_VRN_21 | AJ25 | |
| 21 | IO_L12N_VRP_21 | AH25 | |
| 21 | IO_L13P_21 | AF24 | |
| 21 | IO_L13N_21 | AG25 | |
| 21 | IO_L14P_21 | AG27 | |
| 21 | IO_L14N_VREF_21 | AG26 | |
| 21 | IO_L15P_21 | AF25 | |
| 21 | IO_L15N_21 | AF26 | |
| 21 | IO_L16P_21 | AE27 | |
| 21 | IO_L16N_21 | AE26 | |
| 21 | IO_L17P_21 | AC25 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L17N_21 | AC24 | |
| 21 | IO_L18P_21 | AD26 | |
| 21 | IO_L18N_21 | AD25 | |
| 21 | IO_L19P_21 | AD24 | |
| 21 | IO_L19N_21 | AE24 | |
| 22 | IO_L0P_22 | AN14 | |
| 22 | IO_L0N_22 | AP14 | |
| 22 | IO_L1P_22 | AB10 | |
| 22 | IO_L1N_22 | AA10 | |
| 22 | IO_L2P_22 | AN13 | |
| 22 | IO_L2N_22 | AM13 | |
| 22 | IO_L3P_22 | AA8 | |
| 22 | IO_L3N_22 | AA9 | |
| 22 | IO_L4P_22 | AP12 | |
| 22 | IO_L4N_VREF_22 | AN12 | |
| 22 | IO_L5P_22 | AC8 | |
| 22 | IO_L5N_22 | AB8 | |
| 22 | IO_L6P_22 | AM12 | |
| 22 | IO_L6N_22 | AM11 | |
| 22 | IO_L7P_22 | AC10 | |
| 22 | IO_L7N_22 | AC9 | |
| 22 | IO_L8P_CC_22 | AL11 | |
| 22 | IO_L8N_CC_22 ⁽²⁾ | AL10 | |
| 22 | IO_L9P_CC_22 | AE8 | |
| 22 | IO_L9N_CC_22 ⁽²⁾ | AD9 | |
| 22 | IO_L10P_CC_22 | AD10 | |
| 22 | IO_L10N_CC_22 ⁽²⁾ | AD11 | |
| 22 | IO_L11P_CC_22 | AK11 | |
| 22 | IO_L11N_CC_22 ⁽²⁾ | AJ11 | |
| 22 | IO_L12P_VRN_22 | AF8 | |
| 22 | IO_L12N_VRP_22 | AE9 | |
| 22 | IO_L13P_22 | AK8 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 22 | IO_L13N_22 | AK9 | |
| 22 | IO_L14P_22 | AF9 | |
| 22 | IO_L14N_VREF_22 | AF10 | |
| 22 | IO_L15P_22 | AJ9 | |
| 22 | IO_L15N_22 | AJ10 | |
| 22 | IO_L16P_22 | AF11 | |
| 22 | IO_L16N_22 | AE11 | |
| 22 | IO_L17P_22 | AH9 | |
| 22 | IO_L17N_22 | AH10 | |
| 22 | IO_L18P_22 | AG8 | |
| 22 | IO_L18N_22 | AH8 | |
| 22 | IO_L19P_22 | AG10 | |
| 22 | IO_L19N_22 | AG11 | |
| 23 | IO_L0P_23 | C20 | LX50T, LX85T, SX50T |
| 23 | IO_L0N_23 | B20 | LX50T, LX85T, SX50T |
| 23 | IO_L1P_23 | B21 | LX50T, LX85T, SX50T |
| 23 | IO_L1N_23 | A21 | LX50T, LX85T, SX50T |
| 23 | IO_L2P_23 | C19 | LX50T, LX85T, SX50T |
| 23 | IO_L2N_23 | C18 | LX50T, LX85T, SX50T |
| 23 | IO_L3P_23 | C22 | LX50T, LX85T, SX50T |
| 23 | IO_L3N_23 | B22 | LX50T, LX85T, SX50T |
| 23 | IO_L4P_23 | B18 | LX50T, LX85T, SX50T |
| 23 | IO_L4N_VREF_23 | A18 | LX50T, LX85T, SX50T |
| 23 | IO_L5P_23 | C23 | LX50T, LX85T, SX50T |
| 23 | IO_L5N_23 | B23 | LX50T, LX85T, SX50T |
| 23 | IO_L6P_23 | A19 | LX50T, LX85T, SX50T |
| 23 | IO_L6N_23 | A20 | LX50T, LX85T, SX50T |
| 23 | IO_L7P_23 | A23 | LX50T, LX85T, SX50T |
| 23 | IO_L7N_23 | A24 | LX50T, LX85T, SX50T |
| 23 | IO_L8P_CC_23 | C24 | LX50T, LX85T, SX50T |
| 23 | IO_L8N_CC_23 ⁽²⁾ | D25 | LX50T, LX85T, SX50T |
| 23 | IO_L9P_CC_23 | B26 | LX50T, LX85T, SX50T |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 23 | IO_L9N_CC_23 ⁽²⁾ | A25 | LX50T, LX85T, SX50T |
| 23 | IO_L10P_CC_23 | B27 | LX50T, LX85T, SX50T |
| 23 | IO_L10N_CC_23 ⁽²⁾ | A26 | LX50T, LX85T, SX50T |
| 23 | IO_L11P_CC_23 | B25 | LX50T, LX85T, SX50T |
| 23 | IO_L11N_CC_23 ⁽²⁾ | C25 | LX50T, LX85T, SX50T |
| 23 | IO_L12P_VRN_23 | C29 | LX50T, LX85T, SX50T |
| 23 | IO_L12N_VRP_23 | B28 | LX50T, LX85T, SX50T |
| 23 | IO_L13P_23 | D26 | LX50T, LX85T, SX50T |
| 23 | IO_L13N_23 | C27 | LX50T, LX85T, SX50T |
| 23 | IO_L14P_23 | A29 | LX50T, LX85T, SX50T |
| 23 | IO_L14N_VREF_23 | A28 | LX50T, LX85T, SX50T |
| 23 | IO_L15P_23 | C28 | LX50T, LX85T, SX50T |
| 23 | IO_L15N_23 | D27 | LX50T, LX85T, SX50T |
| 23 | IO_L16P_23 | B31 | LX50T, LX85T, SX50T |
| 23 | IO_L16N_23 | A31 | LX50T, LX85T, SX50T |
| 23 | IO_L17P_23 | C30 | LX50T, LX85T, SX50T |
| 23 | IO_L17N_23 | D29 | LX50T, LX85T, SX50T |
| 23 | IO_L18P_23 | D31 | LX50T, LX85T, SX50T |
| 23 | IO_L18N_23 | D30 | LX50T, LX85T, SX50T |
| 23 | IO_L19P_23 | A30 | LX50T, LX85T, SX50T |
| 23 | IO_L19N_23 | B30 | LX50T, LX85T, SX50T |
| 25 | IO_L0P_25 | AL29 | LX50T, LX85T, SX50T |
| 25 | IO_L0N_25 | AL30 | LX50T, LX85T, SX50T |
| 25 | IO_L1P_25 | AM31 | LX50T, LX85T, SX50T |
| 25 | IO_L1N_25 | AL31 | LX50T, LX85T, SX50T |
| 25 | IO_L2P_25 | AN30 | LX50T, LX85T, SX50T |
| 25 | IO_L2N_25 | AM30 | LX50T, LX85T, SX50T |
| 25 | IO_L3P_25 | AP30 | LX50T, LX85T, SX50T |
| 25 | IO_L3N_25 | AP31 | LX50T, LX85T, SX50T |
| 25 | IO_L4P_25 | AM27 | LX50T, LX85T, SX50T |
| 25 | IO_L4N_VREF_25 | AL28 | LX50T, LX85T, SX50T |
| 25 | IO_L5P_25 | AP29 | LX50T, LX85T, SX50T |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 25 | IO_L5N_25 | AN29 | LX50T, LX85T, SX50T |
| 25 | IO_L6P_25 | AP27 | LX50T, LX85T, SX50T |
| 25 | IO_L6N_25 | AN27 | LX50T, LX85T, SX50T |
| 25 | IO_L7P_25 | AN28 | LX50T, LX85T, SX50T |
| 25 | IO_L7N_25 | AM28 | LX50T, LX85T, SX50T |
| 25 | IO_L8P_CC_25 | AN25 | LX50T, LX85T, SX50T |
| 25 | IO_L8N_CC_25 ⁽²⁾ | AM25 | LX50T, LX85T, SX50T |
| 25 | IO_L9P_CC_25 | AM26 | LX50T, LX85T, SX50T |
| 25 | IO_L9N_CC_25 ⁽²⁾ | AL26 | LX50T, LX85T, SX50T |
| 25 | IO_L10P_CC_25 | AP26 | LX50T, LX85T, SX50T |
| 25 | IO_L10N_CC_25 ⁽²⁾ | AP25 | LX50T, LX85T, SX50T |
| 25 | IO_L11P_CC_25 | AL25 | LX50T, LX85T, SX50T |
| 25 | IO_L11N_CC_25 ⁽²⁾ | AL24 | LX50T, LX85T, SX50T |
| 25 | IO_L12P_VRN_25 | AN24 | LX50T, LX85T, SX50T |
| 25 | IO_L12N_VRP_25 | AP24 | LX50T, LX85T, SX50T |
| 25 | IO_L13P_25 | AM21 | LX50T, LX85T, SX50T |
| 25 | IO_L13N_25 | AM20 | LX50T, LX85T, SX50T |
| 25 | IO_L14P_25 | AN23 | LX50T, LX85T, SX50T |
| 25 | IO_L14N_VREF_25 | AM23 | LX50T, LX85T, SX50T |
| 25 | IO_L15P_25 | AN20 | LX50T, LX85T, SX50T |
| 25 | IO_L15N_25 | AP20 | LX50T, LX85T, SX50T |
| 25 | IO_L16P_25 | AN22 | LX50T, LX85T, SX50T |
| 25 | IO_L16N_25 | AM22 | LX50T, LX85T, SX50T |
| 25 | IO_L17P_25 | AN18 | LX50T, LX85T, SX50T |
| 25 | IO_L17N_25 | AM18 | LX50T, LX85T, SX50T |
| 25 | IO_L18P_25 | AP22 | LX50T, LX85T, SX50T |
| 25 | IO_L18N_25 | AP21 | LX50T, LX85T, SX50T |
| 25 | IO_L19P_25 | AN19 | LX50T, LX85T, SX50T |
| 25 | IO_L19N_25 | AP19 | LX50T, LX85T, SX50T |
| NA | MGTTPX0_112 | M2 | |
| NA | MGTAVTTTX_112 | M3 | |
| NA | MGTTXN0_112 | N2 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---|
| NA | MGTRXP0_112 | N1 | |
| NA | MGTAVTTRX_112 | N3 | |
| NA | MGTRXN0_112 | P1 | |
| NA | MGTAVCCPLL_112 | T3 | |
| NA | MGTRXN1_112 | R1 | |
| NA | MGTREFCLKN_112 | P3 | |
| NA | MGTRXP1_112 | T1 | |
| NA | MGTREFCLKP_112 | P4 | |
| NA | MGTTXN1_112 | T2 | |
| NA | MGTAVTTTX_112 | U3 | |
| NA | MGTTXP1_112 | U2 | |
| NA | MGTAVTTRXC | V5 | |
| NA | MGTREF_112 | V4 | |
| NC | NC | U5 | LX50T, LX85T, LX110T, LX155T, SX50T, SX95T, FX70T, FX100T |
| NA | MGTTXP0_114 | V2 | |
| NA | MGTAVTTTX_114 | AC3 | |
| NA | MGTTXN0_114 | W2 | |
| NA | MGTRXP0_114 | W1 | |
| NA | MGTAVTTRX_114 | W3 | |
| NA | MGTRXN0_114 | Y1 | |
| NA | MGTAVCCPLL_114 | AB3 | |
| NA | MGTRXN1_114 | AA1 | |
| NA | MGTREFCLKN_114 | Y3 | |
| NA | MGTRXP1_114 | AB1 | |
| NA | MGTREFCLKP_114 | Y4 | |
| NA | MGTTXN1_114 | AB2 | |
| NA | MGTAVTTTX_114 | V3 | |
| NA | MGTTXP1_114 | AC2 | |
| NA | MGTTXP0_116 | F2 | |
| NA | MGTAVTTTX_116 | F3 | |
| NA | MGTTXN0_116 | G2 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTRXP0_116 | G1 | |
| NA | MGTAVTTRX_116 | G3 | |
| NA | MGTRXN0_116 | H1 | |
| NA | MGTAVCCPLL_116 | K3 | |
| NA | MGTRXN1_116 | J1 | |
| NA | MGTREFCLKN_116 | H3 | |
| NA | MGTRXP1_116 | K1 | |
| NA | MGTREFCLKP_116 | H4 | |
| NA | MGTTXN1_116 | K2 | |
| NA | MGTAVTTTX_116 | L3 | |
| NA | MGTTXP1_116 | L2 | |
| NA | MGTTPX0_118 | AD2 | |
| NA | MGTAVTTTX_118 | AD3 | |
| NA | MGTTXN0_118 | AE2 | |
| NA | MGTRXP0_118 | AE1 | |
| NA | MGTAVTTRX_118 | AE3 | |
| NA | MGTRXN0_118 | AF1 | |
| NA | MGTAVCCPLL_118 | AH3 | |
| NA | MGTRXN1_118 | AG1 | |
| NA | MGTREFCLKN_118 | AF3 | |
| NA | MGTRXP1_118 | AH1 | |
| NA | MGTREFCLKP_118 | AF4 | |
| NA | MGTTXN1_118 | AH2 | |
| NA | MGTAVTTTX_118 | AJ3 | |
| NA | MGTTPX1_118 | AJ2 | |
| NA | MGTTPX0_120 | B4 | |
| NA | MGTAVTTTX_120 | C4 | |
| NA | MGTTXN0_120 | B3 | |
| NA | MGTRXP0_120 | A3 | |
| NA | MGTAVTTRX_120 | C3 | |
| NA | MGTRXN0_120 | A2 | |
| NA | MGTAVCCPLL_120 | D3 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---------------------|
| NA | MGTRXN1_120 | C1 | |
| NA | MGTREFCLKN_120 | D4 | |
| NA | MGTRXP1_120 | D1 | |
| NA | MGTREFCLKP_120 | E4 | |
| NA | MGTTXN1_120 | D2 | |
| NA | MGTAVTTTX_120 | E3 | |
| NA | MGTTXP1_120 | E2 | |
| NA | MGTTXP0_122 | AK2 | |
| NA | MGTAVTTTX_122 | AK3 | |
| NA | MGTTXN0_122 | AL2 | |
| NA | MGTRXP0_122 | AL1 | |
| NA | MGTAVTTRX_122 | AL3 | |
| NA | MGTRXN0_122 | AM1 | |
| NA | MGTAVCCPLL_122 | AM4 | |
| NA | MGTRXN1_122 | AP2 | |
| NA | MGTREFCLKN_122 | AL4 | |
| NA | MGTRXP1_122 | AP3 | |
| NA | MGTREFCLKP_122 | AL5 | |
| NA | MGTTXN1_122 | AN3 | |
| NA | MGTAVTTTX_122 | AM3 | |
| NA | MGTTXP1_122 | AN4 | |
| NA | MGTTXP0_124 | B10 | LX50T, LX85T, SX50T |
| NA | MGTAVTTTX_124 | C10 | LX50T, LX85T, SX50T |
| NA | MGTTXN0_124 | B9 | LX50T, LX85T, SX50T |
| NA | MGTRXP0_124 | A9 | LX50T, LX85T, SX50T |
| NA | MGTAVTTRX_124 | C9 | LX50T, LX85T, SX50T |
| NA | MGTRXN0_124 | A8 | LX50T, LX85T, SX50T |
| NA | MGTAVCCPLL_124 | C6 | LX50T, LX85T, SX50T |
| NA | MGTRXN1_124 | A7 | LX50T, LX85T, SX50T |
| NA | MGTREFCLKN_124 | C8 | LX50T, LX85T, SX50T |
| NA | MGTRXP1_124 | A6 | LX50T, LX85T, SX50T |
| NA | MGTREFCLKP_124 | D8 | LX50T, LX85T, SX50T |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---------------------|
| NA | MGTTXN1_124 | B6 | LX50T, LX85T, SX50T |
| NA | MGTAVTTTX_124 | C5 | LX50T, LX85T, SX50T |
| NA | MGTTXP1_124 | B5 | LX50T, LX85T, SX50T |
| NA | MGTTXP0_126 | AN5 | LX50T, LX85T, SX50T |
| NA | MGTAVTTTX_126 | AM10 | LX50T, LX85T, SX50T |
| NA | MGTTXN0_126 | AN6 | LX50T, LX85T, SX50T |
| NA | MGTRXP0_126 | AP6 | LX50T, LX85T, SX50T |
| NA | MGTAVTTRX_126 | AM6 | LX50T, LX85T, SX50T |
| NA | MGTRXN0_126 | AP7 | LX50T, LX85T, SX50T |
| NA | MGTAVCCPLL_126 | AM9 | LX50T, LX85T, SX50T |
| NA | MGTRXN1_126 | AP8 | LX50T, LX85T, SX50T |
| NA | MGTREFCLKN_126 | AM7 | LX50T, LX85T, SX50T |
| NA | MGTRXP1_126 | AP9 | LX50T, LX85T, SX50T |
| NA | MGTREFCLKP_126 | AL7 | LX50T, LX85T, SX50T |
| NA | MGTTXN1_126 | AN9 | LX50T, LX85T, SX50T |
| NA | MGTAVTTTX_126 | AM5 | LX50T, LX85T, SX50T |
| NA | MGTTXP1_126 | AN10 | LX50T, LX85T, SX50T |
| NA | GND | B1 | |
| NA | GND | AN1 | |
| NA | GND | B2 | |
| NA | GND | C2 | |
| NA | GND | H2 | |
| NA | GND | J2 | |
| NA | GND | P2 | |
| NA | GND | R2 | |
| NA | GND | Y2 | |
| NA | GND | AA2 | |
| NA | GND | AF2 | |
| NA | GND | AG2 | |
| NA | GND | AM2 | |
| NA | GND | AN2 | |
| NA | GND | G4 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | K4 | |
| NA | GND | M4 | |
| NA | GND | N4 | |
| NA | GND | T4 | |
| NA | GND | W4 | |
| NA | GND | AB4 | |
| NA | GND | AE4 | |
| NA | GND | AH4 | |
| NA | GND | AK4 | |
| NA | GND | E5 | |
| NA | GND | K5 | |
| NA | GND | R5 | |
| NA | GND | T5 | |
| NA | GND | W5 | |
| NA | GND | Y5 | |
| NA | GND | AE5 | |
| NA | GND | AJ5 | |
| NA | GND | D6 | |
| NA | GND | H6 | |
| NA | GND | U6 | |
| NA | GND | V6 | |
| NA | GND | AH6 | |
| NA | GND | AL6 | |
| NA | GND | B7 | |
| NA | GND | F7 | |
| NA | GND | L7 | |
| NA | GND | AA7 | |
| NA | GND | AN7 | |
| NA | GND | B8 | |
| NA | GND | P8 | |
| NA | GND | AD8 | |
| NA | GND | AN8 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | D9 | |
| NA | GND | G9 | |
| NA | GND | U9 | |
| NA | GND | AG9 | |
| NA | GND | AL9 | |
| NA | GND | K10 | |
| NA | GND | R10 | |
| NA | GND | Y10 | |
| NA | GND | AE10 | |
| NA | GND | AK10 | |
| NA | GND | A11 | |
| NA | GND | B11 | |
| NA | GND | C11 | |
| NA | GND | N11 | |
| NA | GND | U11 | |
| NA | GND | AA11 | |
| NA | GND | AC11 | |
| NA | GND | AN11 | |
| NA | GND | AP11 | |
| NA | GND | A12 | |
| NA | GND | F12 | |
| NA | GND | M12 | |
| NA | GND | P12 | |
| NA | GND | T12 | |
| NA | GND | V12 | |
| NA | GND | Y12 | |
| NA | GND | AB12 | |
| NA | GND | AD12 | |
| NA | GND | AF12 | |
| NA | GND | J13 | |
| NA | GND | L13 | |
| NA | GND | N13 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | R13 | |
| NA | GND | U13 | |
| NA | GND | W13 | |
| NA | GND | AA13 | |
| NA | GND | AC13 | |
| NA | GND | AJ13 | |
| NA | GND | AP13 | |
| NA | GND | B14 | |
| NA | GND | M14 | |
| NA | GND | P14 | |
| NA | GND | T14 | |
| NA | GND | V14 | |
| NA | GND | Y14 | |
| NA | GND | AB14 | |
| NA | GND | AM14 | |
| NA | GND | E15 | |
| NA | GND | K15 | |
| NA | GND | R15 | |
| NA | GND | U15 | |
| NA | GND | W15 | |
| NA | GND | AA15 | |
| NA | GND | AE15 | |
| NA | GND | H16 | |
| NA | GND | M16 | |
| NA | GND | P16 | |
| NA | GND | T16 | |
| NA | GND | V16 | |
| NA | GND | Y16 | |
| NA | GND | AB16 | |
| NA | GND | AD16 | |
| NA | GND | AH16 | |
| NA | GND | A17 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | L17 | |
| NA | GND | N17 | |
| NA | GND | R17 | |
| NA | GND | AA17 | |
| NA | GND | AC17 | |
| NA | GND | AF17 | |
| NA | GND | AL17 | |
| NA | GND | D18 | |
| NA | GND | J18 | |
| NA | GND | M18 | |
| NA | GND | P18 | |
| NA | GND | Y18 | |
| NA | GND | AB18 | |
| NA | GND | AD18 | |
| NA | GND | AP18 | |
| NA | GND | G19 | |
| NA | GND | N19 | |
| NA | GND | R19 | |
| NA | GND | U19 | |
| NA | GND | W19 | |
| NA | GND | AA19 | |
| NA | GND | AC19 | |
| NA | GND | AG19 | |
| NA | GND | K20 | |
| NA | GND | M20 | |
| NA | GND | P20 | |
| NA | GND | T20 | |
| NA | GND | V20 | |
| NA | GND | Y20 | |
| NA | GND | AB20 | |
| NA | GND | AE20 | |
| NA | GND | AK20 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | C21 | |
| NA | GND | H21 | |
| NA | GND | N21 | |
| NA | GND | R21 | |
| NA | GND | U21 | |
| NA | GND | W21 | |
| NA | GND | AA21 | |
| NA | GND | AC21 | |
| NA | GND | AN21 | |
| NA | GND | A22 | |
| NA | GND | F22 | |
| NA | GND | L22 | |
| NA | GND | P22 | |
| NA | GND | T22 | |
| NA | GND | V22 | |
| NA | GND | Y22 | |
| NA | GND | AB22 | |
| NA | GND | AF22 | |
| NA | GND | J23 | |
| NA | GND | R23 | |
| NA | GND | U23 | |
| NA | GND | W23 | |
| NA | GND | AA23 | |
| NA | GND | AJ23 | |
| NA | GND | AP23 | |
| NA | GND | B24 | |
| NA | GND | M24 | |
| NA | GND | AB24 | |
| NA | GND | AG24 | |
| NA | GND | AM24 | |
| NA | GND | E25 | |
| NA | GND | K25 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | R25 | |
| NA | GND | Y25 | |
| NA | GND | AE25 | |
| NA | GND | H26 | |
| NA | GND | N26 | |
| NA | GND | V26 | |
| NA | GND | AC26 | |
| NA | GND | AH26 | |
| NA | GND | A27 | |
| NA | GND | L27 | |
| NA | GND | AA27 | |
| NA | GND | AF27 | |
| NA | GND | AL27 | |
| NA | GND | D28 | |
| NA | GND | P28 | |
| NA | GND | AD28 | |
| NA | GND | AP28 | |
| NA | GND | B29 | |
| NA | GND | G29 | |
| NA | GND | U29 | |
| NA | GND | AG29 | |
| NA | GND | K30 | |
| NA | GND | Y30 | |
| NA | GND | AK30 | |
| NA | GND | C31 | |
| NA | GND | N31 | |
| NA | GND | AC31 | |
| NA | GND | AN31 | |
| NA | GND | A32 | |
| NA | GND | F32 | |
| NA | GND | T32 | |
| NA | GND | AF32 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | D33 | |
| NA | GND | J33 | |
| NA | GND | W33 | |
| NA | GND | AJ33 | |
| NA | GND | AP33 | |
| NA | GND | B34 | |
| NA | GND | G34 | |
| NA | GND | M34 | |
| NA | GND | U34 | |
| NA | GND | AB34 | |
| NA | GND | AG34 | |
| NA | GND | AM34 | |
| NA | VCCAUX | M11 | |
| NA | VCCAUX | P11 | |
| NA | VCCAUX | V11 | |
| NA | VCCAUX | AB11 | |
| NA | VCCAUX | L12 | |
| NA | VCCAUX | AC12 | |
| NA | VCCAUX | M21 | |
| NA | VCCAUX | P23 | |
| NA | VCCAUX | T23 | |
| NA | VCCAUX | V23 | |
| NA | VCCAUX | Y23 | |
| NA | VCCAUX | U24 | |
| NA | VCCINT | N12 | |
| NA | VCCINT | R12 | |
| NA | VCCINT | U12 | |
| NA | VCCINT | W12 | |
| NA | VCCINT | AA12 | |
| NA | VCCINT | M13 | |
| NA | VCCINT | P13 | |
| NA | VCCINT | T13 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | V13 | |
| NA | VCCINT | Y13 | |
| NA | VCCINT | AB13 | |
| NA | VCCINT | AD13 | |
| NA | VCCINT | R14 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | N16 | |
| NA | VCCINT | R16 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | W16 | |
| NA | VCCINT | AA16 | |
| NA | VCCINT | AC16 | |
| NA | VCCINT | M17 | |
| NA | VCCINT | P17 | |
| NA | VCCINT | Y17 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AD17 | |
| NA | VCCINT | N18 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | AA18 | |
| NA | VCCINT | AC18 | |
| NA | VCCINT | M19 | |
| NA | VCCINT | P19 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | Y19 | |
| NA | VCCINT | AB19 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | N20 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | U20 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AC20 | |
| NA | VCCINT | P21 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | V21 | |
| NA | VCCINT | Y21 | |
| NA | VCCINT | AB21 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | U22 | |
| NA | VCCINT | W22 | |
| 0 | VCCO_0 | AA22 | |
| 0 | VCCO_0 | AD23 | |
| 1 | VCCO_1 | D13 | |
| 1 | VCCO_1 | G14 | |
| 2 | VCCO_2 | AM19 | |
| 2 | VCCO_2 | AH21 | |
| 3 | VCCO_3 | E20 | |
| 3 | VCCO_3 | D23 | |
| 4 | VCCO_4 | AL12 | |
| 4 | VCCO_4 | AG14 | |
| 5 | VCCO_5 | C16 | |
| 5 | VCCO_5 | F17 | |
| 5 | VCCO_5 | B19 | |
| 6 | VCCO_6 | AK15 | |
| 6 | VCCO_6 | AN16 | |
| 6 | VCCO_6 | AJ18 | |
| 11 | VCCO_11 | T27 | |
| 11 | VCCO_11 | R30 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 11 | VCCO_11 | V31 | |
| 12 | VCCO_12 | N6 | |
| 12 | VCCO_12 | T7 | |
| 12 | VCCO_12 | M9 | |
| 13 | VCCO_13 | W28 | |
| 13 | VCCO_13 | AB29 | |
| 13 | VCCO_13 | AA32 | |
| 15 | VCCO_15 | M29 | |
| 15 | VCCO_15 | L32 | |
| 15 | VCCO_15 | P33 | |
| 17 | VCCO_17 | AE30 | |
| 17 | VCCO_17 | AH31 | |
| 17 | VCCO_17 | AD33 | |
| 18 | VCCO_18 | AC6 | |
| 18 | VCCO_18 | W8 | |
| 18 | VCCO_18 | AB9 | |
| 19 | VCCO_19 | J28 | |
| 19 | VCCO_19 | E30 | |
| 19 | VCCO_19 | H31 | |
| 20 | VCCO_20 | J8 | |
| 20 | VCCO_20 | E10 | |
| 20 | VCCO_20 | H11 | |
| 21 | VCCO_21 | AJ28 | |
| 21 | VCCO_21 | AM29 | |
| 21 | VCCO_21 | AL32 | |
| 22 | VCCO_22 | AF7 | |
| 22 | VCCO_22 | AJ8 | |
| 22 | VCCO_22 | AH11 | |
| 23 | VCCO_23 | G24 | |
| 23 | VCCO_23 | C26 | |
| 23 | VCCO_23 | F27 | |
| 25 | VCCO_25 | AL22 | |

Table 2-5: FF1136 Package—LX50T, FX70T, LX85T, LX110T, LX155T, SX50T, SX95T and FX100T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---------------------|
| 25 | VCCO_25 | AK25 | |
| 25 | VCCO_25 | AN26 | |
| NA | MGTAVCC_112 | R3 | |
| NA | MGTAVCC_112 | R4 | |
| NA | MGTAVCC_114 | AA3 | |
| NA | MGTAVCC_114 | AA4 | |
| NA | MGTAVCC_116 | J3 | |
| NA | MGTAVCC_116 | J4 | |
| NA | MGTAVCC_118 | AG3 | |
| NA | MGTAVCC_118 | AG4 | |
| NA | MGTAVCC_120 | D5 | |
| NA | MGTAVCC_120 | F4 | |
| NA | MGTAVCC_122 | AJ4 | |
| NA | MGTAVCC_122 | AK5 | |
| NA | MGTAVCC_124 | C7 | LX50T, LX85T, SX50T |
| NA | MGTAVCC_124 | D7 | LX50T, LX85T, SX50T |
| NA | MGTAVCC_126 | AL8 | LX50T, LX85T, SX50T |
| NA | MGTAVCC_126 | AM8 | LX50T, LX85T, SX50T |
| NA | FLOAT | U4 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1153 Package—LX50, LX85, LX110, and LX155

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | W18 | |
| 0 | DXN_0 | W17 | |
| 0 | AVDD_0 | T18 | |
| 0 | AVSS_0 | T17 | |
| 0 | VP_0 | U18 | |
| 0 | VN_0 | V17 | |
| 0 | VREFP_0 | V18 | |
| 0 | VREFN_0 | U17 | |
| 0 | VBATT_0 | P22 | |
| 0 | PROGRAM_B_0 | M22 | |
| 0 | HSWAPEN_0 | N22 | |
| 0 | D_IN_0 | N13 | |
| 0 | DONE_0 | N14 | |
| 0 | CCLK_0 | M13 | |
| 0 | INIT_B_0 | L13 | |
| 0 | CS_B_0 | M23 | |
| 0 | RDWR_B_0 | N23 | |
| 0 | RSVD ⁽³⁾ | AB23 | |
| 0 | RSVD ⁽³⁾ | AC23 | |
| 0 | TCK_0 | AA13 | |
| 0 | M0_0 | AD21 | |
| 0 | M2_0 | AD22 | |
| 0 | M1_0 | AC22 | |
| 0 | TMS_0 | AB13 | |
| 0 | TDI_0 | AC13 | |
| 0 | D_OUT_BUSY_0 | AD14 | |
| 0 | TDO_0 | AC14 | |
| 1 | IO_L0P_A19_1 | L20 | |
| 1 | IO_L0N_A18_1 | L19 | |
| 1 | IO_L1P_A17_1 | K17 | |
| 1 | IO_L1N_A16_1 | K18 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | K21 | |
| 1 | IO_L2N_A14_D30_1 | L21 | |
| 1 | IO_L3P_A13_D29_1 | K16 | |
| 1 | IO_L3N_A12_D28_1 | L16 | |
| 1 | IO_L4P_A11_D27_1 | J19 | |
| 1 | IO_L4N_VREF_A10_D26_1 | K19 | |
| 1 | IO_L5P_A9_D25_1 | K12 | |
| 1 | IO_L5N_A8_D24_1 | J12 | |
| 1 | IO_L6P_A7_D23_1 | K22 | |
| 1 | IO_L6N_A6_D22_1 | J22 | |
| 1 | IO_L7P_A5_D21_1 | K13 | |
| 1 | IO_L7N_A4_D20_1 | K14 | |
| 1 | IO_L8P_CC_A3_D19_1 | L23 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | K23 | |
| 1 | IO_L9P_CC_A1_D17_1 | L14 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | L15 | |
| 2 | IO_L0P_CC_RS1_2 | AC15 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AD15 | |
| 2 | IO_L1P_CC_A25_2 | AE22 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AE23 | |
| 2 | IO_L2P_A23_2 | AF15 | |
| 2 | IO_L2N_A22_2 | AE14 | |
| 2 | IO_L3P_A21_2 | AG23 | |
| 2 | IO_L3N_A20_2 | AF23 | |
| 2 | IO_L4P_FCS_B_2 | AE12 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AE13 | |
| 2 | IO_L5P_FWE_B_2 | AD20 | |
| 2 | IO_L5N_CSO_B_2 | AE21 | |
| 2 | IO_L6P_D7_2 | AE16 | |
| 2 | IO_L6N_D6_2 | AF16 | |
| 2 | IO_L7P_D5_2 | AD19 | |
| 2 | IO_L7N_D4_2 | AE19 | |
| 2 | IO_L8P_D3_2 | AD16 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 2 | IO_L8N_D2_FS2_2 | AE17 | |
| 2 | IO_L9P_D1_FS1_2 | AC19 | |
| 2 | IO_L9N_D0_FS0_2 | AC20 | |
| 3 | IO_L0P_CC_GC_3 | H18 | |
| 3 | IO_L0N_CC_GC_3 ^{(1) (2)} | J17 | |
| 3 | IO_L1P_CC_GC_3 | H19 | |
| 3 | IO_L1N_CC_GC_3 ^{(1) (2)} | H20 | |
| 3 | IO_L2P_GC_VRN_3 | J16 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | J15 | |
| 3 | IO_L3P_GC_3 | J20 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | J21 | |
| 3 | IO_L4P_GC_3 | J14 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | H15 | |
| 3 | IO_L5P_GC_3 | G20 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | F20 | |
| 3 | IO_L6P_GC_3 | H13 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | H14 | |
| 3 | IO_L7P_GC_3 | G21 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | G22 | |
| 3 | IO_L8P_GC_3 | H12 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | G13 | |
| 3 | IO_L9P_GC_3 | H22 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | H23 | |
| 4 | IO_L0P_GC_D15_4 | AG22 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AF21 | |
| 4 | IO_L1P_GC_D13_4 | AG13 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AF13 | |
| 4 | IO_L2P_GC_D11_4 | AG21 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AH20 | |
| 4 | IO_L3P_GC_D9_4 | AH12 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AG12 | |
| 4 | IO_L4P_GC_4 | AK19 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AJ19 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 4 | IO_L5P_GC_4 | AG15 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AF14 | |
| 4 | IO_L6P_GC_4 | AH19 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AG20 | |
| 4 | IO_L7P_GC_VRN_4 | AG17 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AG16 | |
| 4 | IO_L8P_CC_GC_4 | AF20 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AF19 | |
| 4 | IO_L9P_CC_GC_4 | AE18 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AF18 | |
| 5 | IO_L0P_5 | D15 | LX50, LX85 |
| 5 | IO_L0N_5 | D14 | LX50, LX85 |
| 5 | IO_L1P_5 | D12 | LX50, LX85 |
| 5 | IO_L1N_5 | E11 | LX50, LX85 |
| 5 | IO_L2P_5 | D16 | LX50, LX85 |
| 5 | IO_L2N_5 | D17 | LX50, LX85 |
| 5 | IO_L3P_5 | E12 | LX50, LX85 |
| 5 | IO_L3N_5 | E13 | LX50, LX85 |
| 5 | IO_L4P_5 | F19 | LX50, LX85 |
| 5 | IO_L4N_VREF_5 | F18 | LX50, LX85 |
| 5 | IO_L5P_5 | E18 | LX50, LX85 |
| 5 | IO_L5N_5 | E17 | LX50, LX85 |
| 5 | IO_L6P_5 | D19 | LX50, LX85 |
| 5 | IO_L6N_5 | E19 | LX50, LX85 |
| 5 | IO_L7P_5 | E16 | LX50, LX85 |
| 5 | IO_L7N_5 | F16 | LX50, LX85 |
| 5 | IO_L8P_CC_5 | D21 | LX50, LX85 |
| 5 | IO_L8N_CC_5 ⁽²⁾ | D20 | LX50, LX85 |
| 5 | IO_L9P_CC_5 | G18 | LX50, LX85 |
| 5 | IO_L9N_CC_5 ⁽²⁾ | G17 | LX50, LX85 |
| 5 | IO_L10P_CC_5 | G16 | LX50, LX85 |
| 5 | IO_L10N_CC_5 ⁽²⁾ | H17 | LX50, LX85 |
| 5 | IO_L11P_CC_5 | E21 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 5 | IO_L11N_CC_5 ⁽²⁾ | F21 | LX50, LX85 |
| 5 | IO_L12P_VRN_5 | F15 | LX50, LX85 |
| 5 | IO_L12N_VRP_5 | E14 | LX50, LX85 |
| 5 | IO_L13P_5 | D22 | LX50, LX85 |
| 5 | IO_L13N_5 | E23 | LX50, LX85 |
| 5 | IO_L14P_5 | G15 | LX50, LX85 |
| 5 | IO_L14N_VREF_5 | F14 | LX50, LX85 |
| 5 | IO_L15P_5 | E22 | LX50, LX85 |
| 5 | IO_L15N_5 | F23 | LX50, LX85 |
| 5 | IO_L16P_5 | G12 | LX50, LX85 |
| 5 | IO_L16N_5 | F13 | LX50, LX85 |
| 5 | IO_L17P_5 | D24 | LX50, LX85 |
| 5 | IO_L17N_5 | E24 | LX50, LX85 |
| 5 | IO_L18P_5 | G11 | LX50, LX85 |
| 5 | IO_L18N_5 | F11 | LX50, LX85 |
| 5 | IO_L19P_5 | F24 | LX50, LX85 |
| 5 | IO_L19N_5 | G23 | LX50, LX85 |
| 6 | IO_L0P_6 | AH22 | LX50, LX85 |
| 6 | IO_L0N_6 | AH23 | LX50, LX85 |
| 6 | IO_L1P_6 | AH14 | LX50, LX85 |
| 6 | IO_L1N_6 | AH13 | LX50, LX85 |
| 6 | IO_L2P_6 | AH24 | LX50, LX85 |
| 6 | IO_L2N_6 | AJ24 | LX50, LX85 |
| 6 | IO_L3P_6 | AJ14 | LX50, LX85 |
| 6 | IO_L3N_6 | AH15 | LX50, LX85 |
| 6 | IO_L4P_6 | AJ22 | LX50, LX85 |
| 6 | IO_L4N_VREF_6 | AJ21 | LX50, LX85 |
| 6 | IO_L5P_6 | AJ11 | LX50, LX85 |
| 6 | IO_L5N_6 | AJ12 | LX50, LX85 |
| 6 | IO_L6P_6 | AJ20 | LX50, LX85 |
| 6 | IO_L6N_6 | AK21 | LX50, LX85 |
| 6 | IO_L7P_6 | AK14 | LX50, LX85 |
| 6 | IO_L7N_6 | AJ15 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 6 | IO_L8P_CC_6 | AK22 | LX50, LX85 |
| 6 | IO_L8N_CC_6 ⁽²⁾ | AK23 | LX50, LX85 |
| 6 | IO_L9P_CC_6 | AJ16 | LX50, LX85 |
| 6 | IO_L9N_CC_6 ⁽²⁾ | AH17 | LX50, LX85 |
| 6 | IO_L10P_CC_6 | AJ17 | LX50, LX85 |
| 6 | IO_L10N_CC_6 ⁽²⁾ | AK16 | LX50, LX85 |
| 6 | IO_L11P_CC_6 | AL23 | LX50, LX85 |
| 6 | IO_L11N_CC_6 ⁽²⁾ | AK24 | LX50, LX85 |
| 6 | IO_L12P_VRN_6 | AK17 | LX50, LX85 |
| 6 | IO_L12N_VRP_6 | AK18 | LX50, LX85 |
| 6 | IO_L13P_6 | AL20 | LX50, LX85 |
| 6 | IO_L13N_6 | AL21 | LX50, LX85 |
| 6 | IO_L14P_6 | AG18 | LX50, LX85 |
| 6 | IO_L14N_VREF_6 | AH18 | LX50, LX85 |
| 6 | IO_L15P_6 | AL18 | LX50, LX85 |
| 6 | IO_L15N_6 | AL19 | LX50, LX85 |
| 6 | IO_L16P_6 | AK13 | LX50, LX85 |
| 6 | IO_L16N_6 | AK12 | LX50, LX85 |
| 6 | IO_L17P_6 | AL15 | LX50, LX85 |
| 6 | IO_L17N_6 | AL16 | LX50, LX85 |
| 6 | IO_L18P_6 | AK11 | LX50, LX85 |
| 6 | IO_L18N_6 | AL11 | LX50, LX85 |
| 6 | IO_L19P_6 | AL13 | LX50, LX85 |
| 6 | IO_L19N_6 | AL14 | LX50, LX85 |
| 11 | IO_L0P_11 | B32 | |
| 11 | IO_L0N_11 | A33 | |
| 11 | IO_L1P_11 | B33 | |
| 11 | IO_L1N_11 | C33 | |
| 11 | IO_L2P_11 | C32 | |
| 11 | IO_L2N_11 | D32 | |
| 11 | IO_L3P_11 | C34 | |
| 11 | IO_L3N_11 | D34 | |
| 11 | IO_L4P_11 | G32 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L4N_VREF_11 | H32 | |
| 11 | IO_L5P_11 | F33 | |
| 11 | IO_L5N_11 | E34 | |
| 11 | IO_L6P_11 | E32 | |
| 11 | IO_L6N_11 | E33 | |
| 11 | IO_L7P_11 | G33 | |
| 11 | IO_L7N_11 | F34 | |
| 11 | IO_L8P_CC_11 | J32 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | H33 | |
| 11 | IO_L9P_CC_11 | H34 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | J34 | |
| 11 | IO_L10P_CC_SM15P_11 | L34 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | K34 | |
| 11 | IO_L11P_CC_SM14P_11 | K33 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | K32 | |
| 11 | IO_L12P_VRN_11 | N33 | |
| 11 | IO_L12N_VRP_11 | M33 | |
| 11 | IO_L13P_11 | L33 | |
| 11 | IO_L13N_11 | M32 | |
| 11 | IO_L14P_11 | P34 | |
| 11 | IO_L14N_VREF_11 | N34 | |
| 11 | IO_L15P_SM13P_11 | P32 | |
| 11 | IO_L15N_SM13N_11 | N32 | |
| 11 | IO_L16P_SM12P_11 | T33 | |
| 11 | IO_L16N_SM12N_11 | R34 | |
| 11 | IO_L17P_SM11P_11 | R33 | |
| 11 | IO_L17N_SM11N_11 | R32 | |
| 11 | IO_L18P_SM10P_11 | U33 | |
| 11 | IO_L18N_SM10N_11 | T34 | |
| 11 | IO_L19P_SM9P_11 | U31 | |
| 11 | IO_L19N_SM9N_11 | U32 | |
| 12 | IO_L0P_12 | A3 | |
| 12 | IO_L0N_12 | B3 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 12 | IO_L1P_12 | C2 | |
| 12 | IO_L1N_12 | B1 | |
| 12 | IO_L2P_12 | C3 | |
| 12 | IO_L2N_12 | B2 | |
| 12 | IO_L3P_12 | D2 | |
| 12 | IO_L3N_12 | D1 | |
| 12 | IO_L4P_12 | E3 | |
| 12 | IO_L4N_VREF_12 | F3 | |
| 12 | IO_L5P_12 | E2 | |
| 12 | IO_L5N_12 | E1 | |
| 12 | IO_L6P_12 | G3 | |
| 12 | IO_L6N_12 | G2 | |
| 12 | IO_L7P_12 | F1 | |
| 12 | IO_L7N_12 | G1 | |
| 12 | IO_L8P_CC_12 | K3 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | L3 | |
| 12 | IO_L9P_CC_12 | J2 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | K2 | |
| 12 | IO_L10P_CC_12 | K1 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | J1 | |
| 12 | IO_L11P_CC_12 | H2 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | H3 | |
| 12 | IO_L12P_VRN_12 | M1 | |
| 12 | IO_L12N_VRP_12 | L1 | |
| 12 | IO_L13P_12 | M3 | |
| 12 | IO_L13N_12 | N3 | |
| 12 | IO_L14P_12 | P2 | |
| 12 | IO_L14N_VREF_12 | R3 | |
| 12 | IO_L15P_12 | N2 | |
| 12 | IO_L15N_12 | M2 | |
| 12 | IO_L16P_12 | T1 | |
| 12 | IO_L16N_12 | R1 | |
| 12 | IO_L17P_12 | P1 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 12 | IO_L17N_12 | R2 | |
| 12 | IO_L18P_12 | U1 | |
| 12 | IO_L18N_12 | U2 | |
| 12 | IO_L19P_12 | U3 | |
| 12 | IO_L19N_12 | T3 | |
| 13 | IO_L0P_SM8P_13 | V33 | |
| 13 | IO_L0N_SM8N_13 | V32 | |
| 13 | IO_L1P_SM7P_13 | W34 | |
| 13 | IO_L1N_SM7N_13 | V34 | |
| 13 | IO_L2P_SM6P_13 | AA33 | |
| 13 | IO_L2N_SM6N_13 | Y33 | |
| 13 | IO_L3P_SM5P_13 | AA34 | |
| 13 | IO_L3N_SM5N_13 | Y34 | |
| 13 | IO_L4P_13 | Y32 | |
| 13 | IO_L4N_VREF_13 | W32 | |
| 13 | IO_L5P_SM4P_13 | AC34 | |
| 13 | IO_L5N_SM4N_13 | AD34 | |
| 13 | IO_L6P_SM3P_13 | AC32 | |
| 13 | IO_L6N_SM3N_13 | AB32 | |
| 13 | IO_L7P_SM2P_13 | AC33 | |
| 13 | IO_L7N_SM2N_13 | AB33 | |
| 13 | IO_L8P_CC_SM1P_13 | AF33 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AE33 | |
| 13 | IO_L9P_CC_SM0P_13 | AF34 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AE34 | |
| 13 | IO_L10P_CC_13 | AH34 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | AJ34 | |
| 13 | IO_L11P_CC_13 | AD32 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AE32 | |
| 13 | IO_L12P_VRN_13 | AG33 | |
| 13 | IO_L12N_VRP_13 | AH33 | |
| 13 | IO_L13P_13 | AK34 | |
| 13 | IO_L13N_13 | AK33 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 13 | IO_L14P_13 | AG32 | |
| 13 | IO_L14N_VREF_13 | AH32 | |
| 13 | IO_L15P_13 | AJ32 | |
| 13 | IO_L15N_13 | AK32 | |
| 13 | IO_L16P_13 | AL34 | |
| 13 | IO_L16N_13 | AL33 | |
| 13 | IO_L17P_13 | AM33 | |
| 13 | IO_L17N_13 | AM32 | |
| 13 | IO_L18P_13 | AN34 | |
| 13 | IO_L18N_13 | AN33 | |
| 13 | IO_L19P_13 | AN32 | |
| 13 | IO_L19N_13 | AP32 | |
| 14 | IO_L0P_14 | V4 | |
| 14 | IO_L0N_14 | V3 | |
| 14 | IO_L1P_14 | W1 | |
| 14 | IO_L1N_14 | V2 | |
| 14 | IO_L2P_14 | Y3 | |
| 14 | IO_L2N_14 | Y2 | |
| 14 | IO_L3P_14 | W2 | |
| 14 | IO_L3N_14 | Y1 | |
| 14 | IO_L4P_14 | AC3 | |
| 14 | IO_L4N_VREF_14 | AB2 | |
| 14 | IO_L5P_14 | AB1 | |
| 14 | IO_L5N_14 | AA1 | |
| 14 | IO_L6P_14 | AB3 | |
| 14 | IO_L6N_14 | AA3 | |
| 14 | IO_L7P_14 | AC2 | |
| 14 | IO_L7N_14 | AD1 | |
| 14 | IO_L8P_CC_14 | AE2 | |
| 14 | IO_L8N_CC_14 ⁽²⁾ | AD2 | |
| 14 | IO_L9P_CC_14 | AF1 | |
| 14 | IO_L9N_CC_14 ⁽²⁾ | AE1 | |
| 14 | IO_L10P_CC_14 | AG1 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 14 | IO_L10N_CC_14 ⁽²⁾ | AG2 | |
| 14 | IO_L11P_CC_14 | AF3 | |
| 14 | IO_L11N_CC_14 ⁽²⁾ | AE3 | |
| 14 | IO_L12P_VRN_14 | AJ1 | |
| 14 | IO_L12N_VRP_14 | AK1 | |
| 14 | IO_L13P_14 | AK2 | |
| 14 | IO_L13N_14 | AK3 | |
| 14 | IO_L14P_14 | AH2 | |
| 14 | IO_L14N_VREF_14 | AJ2 | |
| 14 | IO_L15P_14 | AG3 | |
| 14 | IO_L15N_14 | AH3 | |
| 14 | IO_L16P_14 | AL1 | |
| 14 | IO_L16N_14 | AM1 | |
| 14 | IO_L17P_14 | AN2 | |
| 14 | IO_L17N_14 | AP2 | |
| 14 | IO_L18P_14 | AM2 | |
| 14 | IO_L18N_14 | AL3 | |
| 14 | IO_L19P_14 | AM3 | |
| 14 | IO_L19N_14 | AN3 | |
| 15 | IO_L0P_15 | E29 | |
| 15 | IO_L0N_15 | F29 | |
| 15 | IO_L1P_15 | G30 | |
| 15 | IO_L1N_15 | F30 | |
| 15 | IO_L2P_15 | H29 | |
| 15 | IO_L2N_15 | J29 | |
| 15 | IO_L3P_15 | F31 | |
| 15 | IO_L3N_15 | E31 | |
| 15 | IO_L4P_15 | K29 | |
| 15 | IO_L4N_VREF_15 | L29 | |
| 15 | IO_L5P_15 | H30 | |
| 15 | IO_L5N_15 | G31 | |
| 15 | IO_L6P_15 | J30 | |
| 15 | IO_L6N_15 | J31 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 15 | IO_L7P_15 | L30 | |
| 15 | IO_L7N_15 | M30 | |
| 15 | IO_L8P_CC_15 | N29 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | P29 | |
| 15 | IO_L9P_CC_15 | K31 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | L31 | |
| 15 | IO_L10P_CC_15 | P31 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | P30 | |
| 15 | IO_L11P_CC_15 | N30 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | M31 | |
| 15 | IO_L12P_VRN_15 | R28 | |
| 15 | IO_L12N_VRP_15 | R29 | |
| 15 | IO_L13P_15 | T31 | |
| 15 | IO_L13N_15 | R31 | |
| 15 | IO_L14P_15 | U30 | |
| 15 | IO_L14N_VREF_15 | T30 | |
| 15 | IO_L15P_15 | T28 | |
| 15 | IO_L15N_15 | T29 | |
| 15 | IO_L16P_15 | U27 | |
| 15 | IO_L16N_15 | U28 | |
| 15 | IO_L17P_15 | R26 | |
| 15 | IO_L17N_15 | R27 | |
| 15 | IO_L18P_15 | U26 | |
| 15 | IO_L18N_15 | T26 | |
| 15 | IO_L19P_15 | U25 | |
| 15 | IO_L19N_15 | T25 | |
| 16 | IO_L0P_16 | J6 | |
| 16 | IO_L0N_16 | K6 | |
| 16 | IO_L1P_16 | G5 | |
| 16 | IO_L1N_16 | F5 | |
| 16 | IO_L2P_16 | J5 | |
| 16 | IO_L2N_16 | H5 | |
| 16 | IO_L3P_16 | E4 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 16 | IO_L3N_16 | F4 | |
| 16 | IO_L4P_16 | L6 | |
| 16 | IO_L4N_VREF_16 | M6 | |
| 16 | IO_L5P_16 | H4 | |
| 16 | IO_L5N_16 | J4 | |
| 16 | IO_L6P_16 | M5 | |
| 16 | IO_L6N_16 | L5 | |
| 16 | IO_L7P_16 | K4 | |
| 16 | IO_L7N_16 | L4 | |
| 16 | IO_L8P_CC_16 | N4 | |
| 16 | IO_L8N_CC_16 ⁽²⁾ | N5 | |
| 16 | IO_L9P_CC_16 | P4 | |
| 16 | IO_L9N_CC_16 ⁽²⁾ | R4 | |
| 16 | IO_L10P_CC_16 | U5 | |
| 16 | IO_L10N_CC_16 ⁽²⁾ | T4 | |
| 16 | IO_L11P_CC_16 | P5 | |
| 16 | IO_L11N_CC_16 ⁽²⁾ | P6 | |
| 16 | IO_L12P_VRN_16 | R9 | |
| 16 | IO_L12N_VRP_16 | R8 | |
| 16 | IO_L13P_16 | U6 | |
| 16 | IO_L13N_16 | T5 | |
| 16 | IO_L14P_16 | R6 | |
| 16 | IO_L14N_VREF_16 | R7 | |
| 16 | IO_L15P_16 | U7 | |
| 16 | IO_L15N_16 | T6 | |
| 16 | IO_L16P_16 | U8 | |
| 16 | IO_L16N_16 | T8 | |
| 16 | IO_L17P_16 | R11 | |
| 16 | IO_L17N_16 | T10 | |
| 16 | IO_L18P_16 | U10 | |
| 16 | IO_L18N_16 | T9 | |
| 16 | IO_L19P_16 | U11 | |
| 16 | IO_L19N_16 | T11 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 17 | IO_L0P_17 | W24 | |
| 17 | IO_L0N_17 | V24 | |
| 17 | IO_L1P_17 | Y26 | |
| 17 | IO_L1N_17 | W26 | |
| 17 | IO_L2P_17 | V25 | |
| 17 | IO_L2N_17 | W25 | |
| 17 | IO_L3P_17 | Y27 | |
| 17 | IO_L3N_17 | W27 | |
| 17 | IO_L4P_17 | V30 | |
| 17 | IO_L4N_VREF_17 | W30 | |
| 17 | IO_L5P_17 | V28 | |
| 17 | IO_L5N_17 | V27 | |
| 17 | IO_L6P_17 | W31 | |
| 17 | IO_L6N_17 | Y31 | |
| 17 | IO_L7P_17 | W29 | |
| 17 | IO_L7N_17 | V29 | |
| 17 | IO_L8P_CC_17 | Y28 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | Y29 | |
| 17 | IO_L9P_CC_17 | AB31 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | AA31 | |
| 17 | IO_L10P_CC_17 | AC30 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | AB30 | |
| 17 | IO_L11P_CC_17 | AA29 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AA30 | |
| 17 | IO_L12P_VRN_17 | AD31 | |
| 17 | IO_L12N_VRP_17 | AE31 | |
| 17 | IO_L13P_17 | AD30 | |
| 17 | IO_L13N_17 | AC29 | |
| 17 | IO_L14P_17 | AF31 | |
| 17 | IO_L14N_VREF_17 | AG31 | |
| 17 | IO_L15P_17 | AE29 | |
| 17 | IO_L15N_17 | AD29 | |
| 17 | IO_L16P_17 | AJ31 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L16N_17 | AK31 | |
| 17 | IO_L17P_17 | AF29 | |
| 17 | IO_L17N_17 | AF30 | |
| 17 | IO_L18P_17 | AJ30 | |
| 17 | IO_L18N_17 | AH30 | |
| 17 | IO_L19P_17 | AH29 | |
| 17 | IO_L19N_17 | AG30 | |
| 18 | IO_L0P_18 | Y11 | |
| 18 | IO_L0N_18 | W11 | |
| 18 | IO_L1P_18 | W9 | |
| 18 | IO_L1N_18 | Y9 | |
| 18 | IO_L2P_18 | W10 | |
| 18 | IO_L2N_18 | V10 | |
| 18 | IO_L3P_18 | V9 | |
| 18 | IO_L3N_18 | V8 | |
| 18 | IO_L4P_18 | W7 | |
| 18 | IO_L4N_VREF_18 | V7 | |
| 18 | IO_L5P_18 | W5 | |
| 18 | IO_L5N_18 | V5 | |
| 18 | IO_L6P_18 | Y7 | |
| 18 | IO_L6N_18 | Y8 | |
| 18 | IO_L7P_18 | Y6 | |
| 18 | IO_L7N_18 | W6 | |
| 18 | IO_L8P_CC_18 | AA6 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | AA5 | |
| 18 | IO_L9P_CC_18 | Y4 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | W4 | |
| 18 | IO_L10P_CC_18 | AA4 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AB5 | |
| 18 | IO_L11P_CC_18 | AB6 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | AC5 | |
| 18 | IO_L12P_VRN_18 | AC4 | |
| 18 | IO_L12N_VRP_18 | AD4 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 18 | IO_L13P_18 | AD5 | |
| 18 | IO_L13N_18 | AD6 | |
| 18 | IO_L14P_18 | AE4 | |
| 18 | IO_L14N_VREF_18 | AF4 | |
| 18 | IO_L15P_18 | AF5 | |
| 18 | IO_L15N_18 | AE6 | |
| 18 | IO_L16P_18 | AH4 | |
| 18 | IO_L16N_18 | AJ4 | |
| 18 | IO_L17P_18 | AF6 | |
| 18 | IO_L17N_18 | AG6 | |
| 18 | IO_L18P_18 | AK4 | |
| 18 | IO_L18N_18 | AJ5 | |
| 18 | IO_L19P_18 | AG5 | |
| 18 | IO_L19N_18 | AH5 | |
| 19 | IO_L0P_19 | K24 | |
| 19 | IO_L0N_19 | L24 | |
| 19 | IO_L1P_19 | L25 | |
| 19 | IO_L1N_19 | L26 | |
| 19 | IO_L2P_19 | J24 | |
| 19 | IO_L2N_19 | J25 | |
| 19 | IO_L3P_19 | M25 | |
| 19 | IO_L3N_19 | M26 | |
| 19 | IO_L4P_19 | J27 | |
| 19 | IO_L4N_VREF_19 | J26 | |
| 19 | IO_L5P_19 | G25 | |
| 19 | IO_L5N_19 | G26 | |
| 19 | IO_L6P_19 | H25 | |
| 19 | IO_L6N_19 | H24 | |
| 19 | IO_L7P_19 | F25 | |
| 19 | IO_L7N_19 | F26 | |
| 19 | IO_L8P_CC_19 | G27 | |
| 19 | IO_L8N_CC_19 ⁽²⁾ | H27 | |
| 19 | IO_L9P_CC_19 | H28 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 19 | IO_L9N_CC_19 ⁽²⁾ | G28 | |
| 19 | IO_L10P_CC_19 | E28 | |
| 19 | IO_L10N_CC_19 ⁽²⁾ | F28 | |
| 19 | IO_L11P_CC_19 | E26 | |
| 19 | IO_L11N_CC_19 ⁽²⁾ | E27 | |
| 19 | IO_L12P_VRN_19 | N27 | |
| 19 | IO_L12N_VRP_19 | M27 | |
| 19 | IO_L13P_19 | K28 | |
| 19 | IO_L13N_19 | L28 | |
| 19 | IO_L14P_19 | K27 | |
| 19 | IO_L14N_VREF_19 | K26 | |
| 19 | IO_L15P_19 | M28 | |
| 19 | IO_L15N_19 | N28 | |
| 19 | IO_L16P_19 | P26 | |
| 19 | IO_L16N_19 | P27 | |
| 19 | IO_L17P_19 | N24 | |
| 19 | IO_L17N_19 | P24 | |
| 19 | IO_L18P_19 | P25 | |
| 19 | IO_L18N_19 | N25 | |
| 19 | IO_L19P_19 | R24 | |
| 19 | IO_L19N_19 | T24 | |
| 20 | IO_L0P_20 | K11 | |
| 20 | IO_L0N_20 | J11 | |
| 20 | IO_L1P_20 | H10 | |
| 20 | IO_L1N_20 | G10 | |
| 20 | IO_L2P_20 | J10 | |
| 20 | IO_L2N_20 | J9 | |
| 20 | IO_L3P_20 | F10 | |
| 20 | IO_L3N_20 | E9 | |
| 20 | IO_L4P_20 | L11 | |
| 20 | IO_L4N_VREF_20 | L10 | |
| 20 | IO_L5P_20 | E7 | |
| 20 | IO_L5N_20 | E8 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 20 | IO_L6P_20 | M11 | |
| 20 | IO_L6N_20 | M10 | |
| 20 | IO_L7P_20 | F9 | |
| 20 | IO_L7N_20 | F8 | |
| 20 | IO_L8P_CC_20 | K9 | |
| 20 | IO_L8N_CC_20 ⁽²⁾ | L9 | |
| 20 | IO_L9P_CC_20 | H9 | |
| 20 | IO_L9N_CC_20 ⁽²⁾ | G8 | |
| 20 | IO_L10P_CC_20 | F6 | |
| 20 | IO_L10N_CC_20 ⁽²⁾ | E6 | |
| 20 | IO_L11P_CC_20 | L8 | |
| 20 | IO_L11N_CC_20 ⁽²⁾ | K8 | |
| 20 | IO_L12P_VRN_20 | H7 | |
| 20 | IO_L12N_VRP_20 | H8 | |
| 20 | IO_L13P_20 | K7 | |
| 20 | IO_L13N_20 | J7 | |
| 20 | IO_L14P_20 | G6 | |
| 20 | IO_L14N_VREF_20 | G7 | |
| 20 | IO_L15P_20 | M8 | |
| 20 | IO_L15N_20 | M7 | |
| 20 | IO_L16P_20 | P7 | |
| 20 | IO_L16N_20 | N7 | |
| 20 | IO_L17P_20 | N9 | |
| 20 | IO_L17N_20 | N10 | |
| 20 | IO_L18P_20 | P9 | |
| 20 | IO_L18N_20 | N8 | |
| 20 | IO_L19P_20 | P11 | |
| 20 | IO_L19N_20 | P10 | |
| 21 | IO_L0P_21 | AA25 | |
| 21 | IO_L0N_21 | AA26 | |
| 21 | IO_L1P_21 | AB27 | |
| 21 | IO_L1N_21 | AC27 | |
| 21 | IO_L2P_21 | Y24 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L2N_21 | AA24 | |
| 21 | IO_L3P_21 | AB25 | |
| 21 | IO_L3N_21 | AB26 | |
| 21 | IO_L4P_21 | AC28 | |
| 21 | IO_L4N_VREF_21 | AD27 | |
| 21 | IO_L5P_21 | AB28 | |
| 21 | IO_L5N_21 | AA28 | |
| 21 | IO_L6P_21 | AG28 | |
| 21 | IO_L6N_21 | AH28 | |
| 21 | IO_L7P_21 | AE28 | |
| 21 | IO_L7N_21 | AF28 | |
| 21 | IO_L8P_CC_21 | AK26 | |
| 21 | IO_L8N_CC_21 ⁽²⁾ | AJ27 | |
| 21 | IO_L9P_CC_21 | AK29 | |
| 21 | IO_L9N_CC_21 ⁽²⁾ | AJ29 | |
| 21 | IO_L10P_CC_21 | AK28 | |
| 21 | IO_L10N_CC_21 ⁽²⁾ | AK27 | |
| 21 | IO_L11P_CC_21 | AH27 | |
| 21 | IO_L11N_CC_21 ⁽²⁾ | AJ26 | |
| 21 | IO_L12P_VRN_21 | AJ25 | |
| 21 | IO_L12N_VRP_21 | AH25 | |
| 21 | IO_L13P_21 | AF24 | |
| 21 | IO_L13N_21 | AG25 | |
| 21 | IO_L14P_21 | AG27 | |
| 21 | IO_L14N_VREF_21 | AG26 | |
| 21 | IO_L15P_21 | AF25 | |
| 21 | IO_L15N_21 | AF26 | |
| 21 | IO_L16P_21 | AE27 | |
| 21 | IO_L16N_21 | AE26 | |
| 21 | IO_L17P_21 | AC25 | |
| 21 | IO_L17N_21 | AC24 | |
| 21 | IO_L18P_21 | AD26 | |
| 21 | IO_L18N_21 | AD25 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 21 | IO_L19P_21 | AD24 | |
| 21 | IO_L19N_21 | AE24 | |
| 22 | IO_L0P_22 | AA10 | |
| 22 | IO_L0N_22 | AA11 | |
| 22 | IO_L1P_22 | AA8 | |
| 22 | IO_L1N_22 | AA9 | |
| 22 | IO_L2P_22 | AB11 | |
| 22 | IO_L2N_22 | AB10 | |
| 22 | IO_L3P_22 | AB8 | |
| 22 | IO_L3N_22 | AB7 | |
| 22 | IO_L4P_22 | AC8 | |
| 22 | IO_L4N_VREF_22 | AC7 | |
| 22 | IO_L5P_22 | AJ7 | |
| 22 | IO_L5N_22 | AJ6 | |
| 22 | IO_L6P_22 | AE7 | |
| 22 | IO_L6N_22 | AD7 | |
| 22 | IO_L7P_22 | AG7 | |
| 22 | IO_L7N_22 | AH7 | |
| 22 | IO_L8P_CC_22 | AD9 | |
| 22 | IO_L8N_CC_22 ⁽²⁾ | AC9 | |
| 22 | IO_L9P_CC_22 | AG8 | |
| 22 | IO_L9N_CC_22 ⁽²⁾ | AH8 | |
| 22 | IO_L10P_CC_22 | AE8 | |
| 22 | IO_L10N_CC_22 ⁽²⁾ | AF8 | |
| 22 | IO_L11P_CC_22 | AC10 | |
| 22 | IO_L11N_CC_22 ⁽²⁾ | AD10 | |
| 22 | IO_L12P_VRN_22 | AK6 | |
| 22 | IO_L12N_VRP_22 | AK7 | |
| 22 | IO_L13P_22 | AE9 | |
| 22 | IO_L13N_22 | AF9 | |
| 22 | IO_L14P_22 | AH9 | |
| 22 | IO_L14N_VREF_22 | AJ9 | |
| 22 | IO_L15P_22 | AF10 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 22 | IO_L15N_22 | AG10 | |
| 22 | IO_L16P_22 | AK9 | |
| 22 | IO_L16N_22 | AK8 | |
| 22 | IO_L17P_22 | AG11 | |
| 22 | IO_L17N_22 | AF11 | |
| 22 | IO_L18P_22 | AJ10 | |
| 22 | IO_L18N_22 | AH10 | |
| 22 | IO_L19P_22 | AD11 | |
| 22 | IO_L19N_22 | AE11 | |
| 23 | IO_L0P_23 | C20 | LX50, LX85 |
| 23 | IO_L0N_23 | B20 | LX50, LX85 |
| 23 | IO_L1P_23 | B21 | LX50, LX85 |
| 23 | IO_L1N_23 | A21 | LX50, LX85 |
| 23 | IO_L2P_23 | C19 | LX50, LX85 |
| 23 | IO_L2N_23 | C18 | LX50, LX85 |
| 23 | IO_L3P_23 | C22 | LX50, LX85 |
| 23 | IO_L3N_23 | B22 | LX50, LX85 |
| 23 | IO_L4P_23 | B18 | LX50, LX85 |
| 23 | IO_L4N_VREF_23 | A18 | LX50, LX85 |
| 23 | IO_L5P_23 | C23 | LX50, LX85 |
| 23 | IO_L5N_23 | B23 | LX50, LX85 |
| 23 | IO_L6P_23 | A19 | LX50, LX85 |
| 23 | IO_L6N_23 | A20 | LX50, LX85 |
| 23 | IO_L7P_23 | A23 | LX50, LX85 |
| 23 | IO_L7N_23 | A24 | LX50, LX85 |
| 23 | IO_L8P_CC_23 | C24 | LX50, LX85 |
| 23 | IO_L8N_CC_23 ⁽²⁾ | D25 | LX50, LX85 |
| 23 | IO_L9P_CC_23 | B26 | LX50, LX85 |
| 23 | IO_L9N_CC_23 ⁽²⁾ | A25 | LX50, LX85 |
| 23 | IO_L10P_CC_23 | B27 | LX50, LX85 |
| 23 | IO_L10N_CC_23 ⁽²⁾ | A26 | LX50, LX85 |
| 23 | IO_L11P_CC_23 | B25 | LX50, LX85 |
| 23 | IO_L11N_CC_23 ⁽²⁾ | C25 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 23 | IO_L12P_VRN_23 | C29 | LX50, LX85 |
| 23 | IO_L12N_VRP_23 | B28 | LX50, LX85 |
| 23 | IO_L13P_23 | D26 | LX50, LX85 |
| 23 | IO_L13N_23 | C27 | LX50, LX85 |
| 23 | IO_L14P_23 | A29 | LX50, LX85 |
| 23 | IO_L14N_VREF_23 | A28 | LX50, LX85 |
| 23 | IO_L15P_23 | C28 | LX50, LX85 |
| 23 | IO_L15N_23 | D27 | LX50, LX85 |
| 23 | IO_L16P_23 | B31 | LX50, LX85 |
| 23 | IO_L16N_23 | A31 | LX50, LX85 |
| 23 | IO_L17P_23 | C30 | LX50, LX85 |
| 23 | IO_L17N_23 | D29 | LX50, LX85 |
| 23 | IO_L18P_23 | D31 | LX50, LX85 |
| 23 | IO_L18N_23 | D30 | LX50, LX85 |
| 23 | IO_L19P_23 | A30 | LX50, LX85 |
| 23 | IO_L19N_23 | B30 | LX50, LX85 |
| 24 | IO_L0P_24 | A15 | LX50, LX85 |
| 24 | IO_L0N_24 | A14 | LX50, LX85 |
| 24 | IO_L1P_24 | C14 | LX50, LX85 |
| 24 | IO_L1N_24 | C13 | LX50, LX85 |
| 24 | IO_L2P_24 | B15 | LX50, LX85 |
| 24 | IO_L2N_24 | C15 | LX50, LX85 |
| 24 | IO_L3P_24 | B13 | LX50, LX85 |
| 24 | IO_L3N_24 | A13 | LX50, LX85 |
| 24 | IO_L4P_24 | B16 | LX50, LX85 |
| 24 | IO_L4N_VREF_24 | A16 | LX50, LX85 |
| 24 | IO_L5P_24 | B12 | LX50, LX85 |
| 24 | IO_L5N_24 | C12 | LX50, LX85 |
| 24 | IO_L6P_24 | B17 | LX50, LX85 |
| 24 | IO_L6N_24 | C17 | LX50, LX85 |
| 24 | IO_L7P_24 | A11 | LX50, LX85 |
| 24 | IO_L7N_24 | B11 | LX50, LX85 |
| 24 | IO_L8P_CC_24 | D11 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 24 | IO_L8N_CC_24 ⁽²⁾ | D10 | LX50, LX85 |
| 24 | IO_L9P_CC_24 | A10 | LX50, LX85 |
| 24 | IO_L9N_CC_24 ⁽²⁾ | A9 | LX50, LX85 |
| 24 | IO_L10P_CC_24 | B8 | LX50, LX85 |
| 24 | IO_L10N_CC_24 ⁽²⁾ | A8 | LX50, LX85 |
| 24 | IO_L11P_CC_24 | B10 | LX50, LX85 |
| 24 | IO_L11N_CC_24 ⁽²⁾ | C10 | LX50, LX85 |
| 24 | IO_L12P_VRN_24 | A5 | LX50, LX85 |
| 24 | IO_L12N_VRP_24 | A6 | LX50, LX85 |
| 24 | IO_L13P_24 | B6 | LX50, LX85 |
| 24 | IO_L13N_24 | B7 | LX50, LX85 |
| 24 | IO_L14P_24 | B5 | LX50, LX85 |
| 24 | IO_L14N_VREF_24 | A4 | LX50, LX85 |
| 24 | IO_L15P_24 | C8 | LX50, LX85 |
| 24 | IO_L15N_24 | C7 | LX50, LX85 |
| 24 | IO_L16P_24 | C4 | LX50, LX85 |
| 24 | IO_L16N_24 | C5 | LX50, LX85 |
| 24 | IO_L17P_24 | D9 | LX50, LX85 |
| 24 | IO_L17N_24 | C9 | LX50, LX85 |
| 24 | IO_L18P_24 | D5 | LX50, LX85 |
| 24 | IO_L18N_24 | D4 | LX50, LX85 |
| 24 | IO_L19P_24 | D6 | LX50, LX85 |
| 24 | IO_L19N_24 | D7 | LX50, LX85 |
| 25 | IO_L0P_25 | AL29 | LX50, LX85 |
| 25 | IO_L0N_25 | AL30 | LX50, LX85 |
| 25 | IO_L1P_25 | AM31 | LX50, LX85 |
| 25 | IO_L1N_25 | AL31 | LX50, LX85 |
| 25 | IO_L2P_25 | AN30 | LX50, LX85 |
| 25 | IO_L2N_25 | AM30 | LX50, LX85 |
| 25 | IO_L3P_25 | AP30 | LX50, LX85 |
| 25 | IO_L3N_25 | AP31 | LX50, LX85 |
| 25 | IO_L4P_25 | AM27 | LX50, LX85 |
| 25 | IO_L4N_VREF_25 | AL28 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 25 | IO_L5P_25 | AP29 | LX50, LX85 |
| 25 | IO_L5N_25 | AN29 | LX50, LX85 |
| 25 | IO_L6P_25 | AP27 | LX50, LX85 |
| 25 | IO_L6N_25 | AN27 | LX50, LX85 |
| 25 | IO_L7P_25 | AN28 | LX50, LX85 |
| 25 | IO_L7N_25 | AM28 | LX50, LX85 |
| 25 | IO_L8P_CC_25 | AN25 | LX50, LX85 |
| 25 | IO_L8N_CC_25 ⁽²⁾ | AM25 | LX50, LX85 |
| 25 | IO_L9P_CC_25 | AM26 | LX50, LX85 |
| 25 | IO_L9N_CC_25 ⁽²⁾ | AL26 | LX50, LX85 |
| 25 | IO_L10P_CC_25 | AP26 | LX50, LX85 |
| 25 | IO_L10N_CC_25 ⁽²⁾ | AP25 | LX50, LX85 |
| 25 | IO_L11P_CC_25 | AL25 | LX50, LX85 |
| 25 | IO_L11N_CC_25 ⁽²⁾ | AL24 | LX50, LX85 |
| 25 | IO_L12P_VRN_25 | AN24 | LX50, LX85 |
| 25 | IO_L12N_VRP_25 | AP24 | LX50, LX85 |
| 25 | IO_L13P_25 | AM21 | LX50, LX85 |
| 25 | IO_L13N_25 | AM20 | LX50, LX85 |
| 25 | IO_L14P_25 | AN23 | LX50, LX85 |
| 25 | IO_L14N_VREF_25 | AM23 | LX50, LX85 |
| 25 | IO_L15P_25 | AN20 | LX50, LX85 |
| 25 | IO_L15N_25 | AP20 | LX50, LX85 |
| 25 | IO_L16P_25 | AN22 | LX50, LX85 |
| 25 | IO_L16N_25 | AM22 | LX50, LX85 |
| 25 | IO_L17P_25 | AN18 | LX50, LX85 |
| 25 | IO_L17N_25 | AM18 | LX50, LX85 |
| 25 | IO_L18P_25 | AP22 | LX50, LX85 |
| 25 | IO_L18N_25 | AP21 | LX50, LX85 |
| 25 | IO_L19P_25 | AN19 | LX50, LX85 |
| 25 | IO_L19N_25 | AP19 | LX50, LX85 |
| 26 | IO_L0P_26 | AL5 | LX50, LX85 |
| 26 | IO_L0N_26 | AL6 | LX50, LX85 |
| 26 | IO_L1P_26 | AN5 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 26 | IO_L1N_26 | AN4 | LX50, LX85 |
| 26 | IO_L2P_26 | AM5 | LX50, LX85 |
| 26 | IO_L2N_26 | AL4 | LX50, LX85 |
| 26 | IO_L3P_26 | AP5 | LX50, LX85 |
| 26 | IO_L3N_26 | AP4 | LX50, LX85 |
| 26 | IO_L4P_26 | AL8 | LX50, LX85 |
| 26 | IO_L4N_VREF_26 | AL9 | LX50, LX85 |
| 26 | IO_L5P_26 | AN7 | LX50, LX85 |
| 26 | IO_L5N_26 | AM6 | LX50, LX85 |
| 26 | IO_L6P_26 | AM8 | LX50, LX85 |
| 26 | IO_L6N_26 | AM7 | LX50, LX85 |
| 26 | IO_L7P_26 | AN9 | LX50, LX85 |
| 26 | IO_L7N_26 | AN8 | LX50, LX85 |
| 26 | IO_L8P_CC_26 | AM10 | LX50, LX85 |
| 26 | IO_L8N_CC_26 ⁽²⁾ | AL10 | LX50, LX85 |
| 26 | IO_L9P_CC_26 | AP7 | LX50, LX85 |
| 26 | IO_L9N_CC_26 ⁽²⁾ | AP6 | LX50, LX85 |
| 26 | IO_L10P_CC_26 | AP9 | LX50, LX85 |
| 26 | IO_L10N_CC_26 ⁽²⁾ | AP10 | LX50, LX85 |
| 26 | IO_L11P_CC_26 | AN10 | LX50, LX85 |
| 26 | IO_L11N_CC_26 ⁽²⁾ | AM11 | LX50, LX85 |
| 26 | IO_L12P_VRN_26 | AM12 | LX50, LX85 |
| 26 | IO_L12N_VRP_26 | AN12 | LX50, LX85 |
| 26 | IO_L13P_26 | AN17 | LX50, LX85 |
| 26 | IO_L13N_26 | AM17 | LX50, LX85 |
| 26 | IO_L14P_26 | AN13 | LX50, LX85 |
| 26 | IO_L14N_VREF_26 | AM13 | LX50, LX85 |
| 26 | IO_L15P_26 | AP16 | LX50, LX85 |
| 26 | IO_L15N_26 | AP17 | LX50, LX85 |
| 26 | IO_L16P_26 | AP11 | LX50, LX85 |
| 26 | IO_L16N_26 | AP12 | LX50, LX85 |
| 26 | IO_L17P_26 | AM15 | LX50, LX85 |
| 26 | IO_L17N_26 | AM16 | LX50, LX85 |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 26 | IO_L18P_26 | AP14 | LX50, LX85 |
| 26 | IO_L18N_26 | AN14 | LX50, LX85 |
| 26 | IO_L19P_26 | AP15 | LX50, LX85 |
| 26 | IO_L19N_26 | AN15 | LX50, LX85 |
| NA | GND | A1 | |
| NA | GND | A12 | |
| NA | GND | A17 | |
| NA | GND | A2 | |
| NA | GND | A22 | |
| NA | GND | A27 | |
| NA | GND | A32 | |
| NA | GND | A7 | |
| NA | GND | AA15 | |
| NA | GND | AA17 | |
| NA | GND | AA19 | |
| NA | GND | AA2 | |
| NA | GND | AA21 | |
| NA | GND | AA23 | |
| NA | GND | AA27 | |
| NA | GND | AA7 | |
| NA | GND | AB12 | |
| NA | GND | AB14 | |
| NA | GND | AB16 | |
| NA | GND | AB18 | |
| NA | GND | AB20 | |
| NA | GND | AB22 | |
| NA | GND | AB24 | |
| NA | GND | AB34 | |
| NA | GND | AB4 | |
| NA | GND | AC1 | |
| NA | GND | AC11 | |
| NA | GND | AC17 | |
| NA | GND | AC21 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AC26 | |
| NA | GND | AC31 | |
| NA | GND | AD12 | |
| NA | GND | AD18 | |
| NA | GND | AD28 | |
| NA | GND | AD8 | |
| NA | GND | AE10 | |
| NA | GND | AE15 | |
| NA | GND | AE20 | |
| NA | GND | AE25 | |
| NA | GND | AE5 | |
| NA | GND | AF12 | |
| NA | GND | AF2 | |
| NA | GND | AF22 | |
| NA | GND | AF32 | |
| NA | GND | AG19 | |
| NA | GND | AG29 | |
| NA | GND | AG34 | |
| NA | GND | AG9 | |
| NA | GND | AH1 | |
| NA | GND | AH16 | |
| NA | GND | AH26 | |
| NA | GND | AH6 | |
| NA | GND | AJ13 | |
| NA | GND | AJ23 | |
| NA | GND | AJ3 | |
| NA | GND | AJ33 | |
| NA | GND | AK10 | |
| NA | GND | AK20 | |
| NA | GND | AK30 | |
| NA | GND | AL17 | |
| NA | GND | AL2 | |
| NA | GND | AL27 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AL7 | |
| NA | GND | AM14 | |
| NA | GND | AM24 | |
| NA | GND | AM34 | |
| NA | GND | AM4 | |
| NA | GND | AN1 | |
| NA | GND | AN11 | |
| NA | GND | AN21 | |
| NA | GND | AN26 | |
| NA | GND | AN31 | |
| NA | GND | AP13 | |
| NA | GND | AP18 | |
| NA | GND | AP23 | |
| NA | GND | AP28 | |
| NA | GND | AP3 | |
| NA | GND | AP33 | |
| NA | GND | AP8 | |
| NA | GND | B14 | |
| NA | GND | B24 | |
| NA | GND | B34 | |
| NA | GND | B4 | |
| NA | GND | C1 | |
| NA | GND | C11 | |
| NA | GND | C21 | |
| NA | GND | C31 | |
| NA | GND | D18 | |
| NA | GND | D28 | |
| NA | GND | D3 | |
| NA | GND | D33 | |
| NA | GND | D8 | |
| NA | GND | E15 | |
| NA | GND | E25 | |
| NA | GND | E5 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | F12 | |
| NA | GND | F2 | |
| NA | GND | F22 | |
| NA | GND | F32 | |
| NA | GND | G19 | |
| NA | GND | G29 | |
| NA | GND | G34 | |
| NA | GND | G9 | |
| NA | GND | H1 | |
| NA | GND | H11 | |
| NA | GND | H16 | |
| NA | GND | H26 | |
| NA | GND | H6 | |
| NA | GND | J13 | |
| NA | GND | J18 | |
| NA | GND | J23 | |
| NA | GND | J28 | |
| NA | GND | J3 | |
| NA | GND | J33 | |
| NA | GND | K10 | |
| NA | GND | K15 | |
| NA | GND | K20 | |
| NA | GND | K25 | |
| NA | GND | K30 | |
| NA | GND | L17 | |
| NA | GND | L2 | |
| NA | GND | L22 | |
| NA | GND | L27 | |
| NA | GND | L7 | |
| NA | GND | M12 | |
| NA | GND | M14 | |
| NA | GND | M16 | |
| NA | GND | M18 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | M20 | |
| NA | GND | M24 | |
| NA | GND | M34 | |
| NA | GND | M4 | |
| NA | GND | M9 | |
| NA | GND | N1 | |
| NA | GND | N11 | |
| NA | GND | N15 | |
| NA | GND | N17 | |
| NA | GND | N19 | |
| NA | GND | N21 | |
| NA | GND | N26 | |
| NA | GND | N31 | |
| NA | GND | P12 | |
| NA | GND | P14 | |
| NA | GND | P16 | |
| NA | GND | P18 | |
| NA | GND | P20 | |
| NA | GND | P28 | |
| NA | GND | P8 | |
| NA | GND | R10 | |
| NA | GND | R13 | |
| NA | GND | R15 | |
| NA | GND | R17 | |
| NA | GND | R19 | |
| NA | GND | R21 | |
| NA | GND | R23 | |
| NA | GND | R25 | |
| NA | GND | R5 | |
| NA | GND | T12 | |
| NA | GND | T14 | |
| NA | GND | T16 | |
| NA | GND | T2 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | T20 | |
| NA | GND | T22 | |
| NA | GND | T27 | |
| NA | GND | T32 | |
| NA | GND | U13 | |
| NA | GND | U15 | |
| NA | GND | U19 | |
| NA | GND | U21 | |
| NA | GND | U23 | |
| NA | GND | U29 | |
| NA | GND | U34 | |
| NA | GND | U9 | |
| NA | GND | V1 | |
| NA | GND | V12 | |
| NA | GND | V14 | |
| NA | GND | V16 | |
| NA | GND | V20 | |
| NA | GND | V22 | |
| NA | GND | V26 | |
| NA | GND | V6 | |
| NA | GND | W13 | |
| NA | GND | W15 | |
| NA | GND | W19 | |
| NA | GND | W21 | |
| NA | GND | W23 | |
| NA | GND | W3 | |
| NA | GND | W33 | |
| NA | GND | Y10 | |
| NA | GND | Y12 | |
| NA | GND | Y14 | |
| NA | GND | Y16 | |
| NA | GND | Y18 | |
| NA | GND | Y20 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | Y22 | |
| NA | GND | Y25 | |
| NA | GND | Y30 | |
| NA | VCCAUX | AA12 | |
| NA | VCCAUX | AC12 | |
| NA | VCCAUX | AD23 | |
| NA | VCCAUX | L12 | |
| NA | VCCAUX | N12 | |
| NA | VCCAUX | P23 | |
| NA | VCCAUX | R12 | |
| NA | VCCAUX | T23 | |
| NA | VCCAUX | U24 | |
| NA | VCCAUX | V11 | |
| NA | VCCAUX | V23 | |
| NA | VCCAUX | Y23 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | AA16 | |
| NA | VCCINT | AA18 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AA22 | |
| NA | VCCINT | AB15 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AB19 | |
| NA | VCCINT | AB21 | |
| NA | VCCINT | AC16 | |
| NA | VCCINT | AC18 | |
| NA | VCCINT | AD17 | |
| NA | VCCINT | L18 | |
| NA | VCCINT | M15 | |
| NA | VCCINT | M17 | |
| NA | VCCINT | M19 | |
| NA | VCCINT | M21 | |
| NA | VCCINT | N16 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | N18 | |
| NA | VCCINT | N20 | |
| NA | VCCINT | P13 | |
| NA | VCCINT | P15 | |
| NA | VCCINT | P17 | |
| NA | VCCINT | P19 | |
| NA | VCCINT | P21 | |
| NA | VCCINT | R14 | |
| NA | VCCINT | R16 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | T13 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | U12 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | U20 | |
| NA | VCCINT | U22 | |
| NA | VCCINT | V13 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | V21 | |
| NA | VCCINT | W12 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | W16 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | W22 | |
| NA | VCCINT | Y13 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | Y17 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | Y19 | |
| NA | VCCINT | Y21 | |
| 0 | VCCO_0 | AD13 | |
| 0 | VCCO_0 | AG14 | |
| 1 | VCCO_1 | D13 | |
| 1 | VCCO_1 | G14 | |
| 11 | VCCO_11 | P33 | |
| 11 | VCCO_11 | R30 | |
| 11 | VCCO_11 | V31 | |
| 12 | VCCO_12 | T7 | |
| 12 | VCCO_12 | U4 | |
| 12 | VCCO_12 | W8 | |
| 13 | VCCO_13 | AA32 | |
| 13 | VCCO_13 | AB29 | |
| 13 | VCCO_13 | W28 | |
| 14 | VCCO_14 | AB9 | |
| 14 | VCCO_14 | AC6 | |
| 14 | VCCO_14 | Y5 | |
| 15 | VCCO_15 | H31 | |
| 15 | VCCO_15 | L32 | |
| 15 | VCCO_15 | M29 | |
| 16 | VCCO_16 | K5 | |
| 16 | VCCO_16 | N6 | |
| 16 | VCCO_16 | P3 | |
| 17 | VCCO_17 | AD33 | |
| 17 | VCCO_17 | AE30 | |
| 17 | VCCO_17 | AH31 | |
| 18 | VCCO_18 | AD3 | |
| 18 | VCCO_18 | AF7 | |
| 18 | VCCO_18 | AG4 | |
| 19 | VCCO_19 | B29 | |
| 19 | VCCO_19 | E30 | |
| 19 | VCCO_19 | F27 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 2 | VCCO_2 | AH21 | |
| 2 | VCCO_2 | AL22 | |
| 20 | VCCO_20 | F7 | |
| 20 | VCCO_20 | G4 | |
| 20 | VCCO_20 | J8 | |
| 21 | VCCO_21 | AJ28 | |
| 21 | VCCO_21 | AL32 | |
| 21 | VCCO_21 | AM29 | |
| 22 | VCCO_22 | AJ8 | |
| 22 | VCCO_22 | AK5 | |
| 22 | VCCO_22 | AN6 | |
| 23 | VCCO_23 | C26 | |
| 23 | VCCO_23 | D23 | |
| 23 | VCCO_23 | G24 | |
| 24 | VCCO_24 | B9 | |
| 24 | VCCO_24 | C6 | |
| 24 | VCCO_24 | E10 | |
| 25 | VCCO_25 | AF27 | |
| 25 | VCCO_25 | AG24 | |
| 25 | VCCO_25 | AK25 | |
| 26 | VCCO_26 | AH11 | |
| 26 | VCCO_26 | AL12 | |
| 26 | VCCO_26 | AM9 | |
| 3 | VCCO_3 | E20 | |
| 3 | VCCO_3 | H21 | |
| 4 | VCCO_4 | AF17 | |
| 4 | VCCO_4 | AK15 | |
| 5 | VCCO_5 | B19 | |
| 5 | VCCO_5 | C16 | |
| 5 | VCCO_5 | F17 | |
| 6 | VCCO_6 | AJ18 | |
| 6 | VCCO_6 | AM19 | |

Table 2-6: FF1153 Package—LX50, LX85, LX110, and LX155 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 6 | VCCO_6 | AN16 | |

Notes:

1. Do not connect a single ended clock to the N-side of the differential clock pair of pins, for example IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1156 Package—TX150T

Table 2-7: FF1156 Package—TX150T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------|------------|-----------------|
| 0 | DXP_0 | W18 | |
| 0 | DXN_0 | W17 | |
| 0 | AVDD_0 | T18 | |
| 0 | AVSS_0 | T17 | |
| 0 | VP_0 | U18 | |
| 0 | VN_0 | V17 | |
| 0 | VREFP_0 | V18 | |
| 0 | VREFN_0 | U17 | |
| 0 | VBATT_0 | P24 | |
| 0 | PROGRAM_B_0 | U26 | |
| 0 | HSWAPEN_0 | T26 | |
| 0 | D_IN_0 | K11 | |
| 0 | DONE_0 | L11 | |
| 0 | CCLK_0 | M10 | |
| 0 | INIT_B_0 | L10 | |
| 0 | CS_B_0 | AA25 | |
| 0 | RDWR_B_0 | T25 | |
| 0 | RSVD_0 ⁽³⁾ | AC24 | |
| 0 | RSVD_0 ⁽³⁾ | AC23 | |
| 0 | TCK_0 | AB10 | |
| 0 | M0_0 | AB20 | |
| 0 | M2_0 | AC20 | |
| 0 | M1_0 | AD20 | |
| 0 | TMS_0 | AC10 | |
| 0 | TDI_0 | AC9 | |
| 0 | D_OUT_BUSY_0 | AD10 | |
| 0 | TDO_0 | AD9 | |
| 1 | IO_L0P_A19_1 | K17 | |
| 1 | IO_L0N_A18_1 | J16 | |
| 1 | IO_L1P_A17_1 | H15 | |
| 1 | IO_L1N_A16_1 | J15 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------------|-------------------|------------------------|
| 1 | IO_L2P_A15_D31_1 | L16 | |
| 1 | IO_L2N_A14_D30_1 | K16 | |
| 1 | IO_L3P_A13_D29_1 | M15 | |
| 1 | IO_L3N_A12_D28_1 | N15 | |
| 1 | IO_L4P_A11_D27_1 | M16 | |
| 1 | IO_L4N_VREF_A10_D26_1 | L15 | |
| 1 | IO_L5P_A9_D25_1 | L14 | |
| 1 | IO_L5N_A8_D24_1 | L13 | |
| 1 | IO_L6P_A7_D23_1 | M17 | |
| 1 | IO_L6N_A6_D22_1 | L18 | |
| 1 | IO_L7P_A5_D21_1 | M11 | |
| 1 | IO_L7N_A4_D20_1 | M12 | |
| 1 | IO_L8P_CC_A3_D19_1 | M18 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | N17 | |
| 1 | IO_L9P_CC_A1_D17_1 | M13 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | N13 | |
| 2 | IO_L0P_CC_RS1_2 | AC14 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AD14 | |
| 2 | IO_L1P_CC_A25_2 | AE19 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AD19 | |
| 2 | IO_L2P_A23_2 | AE13 | |
| 2 | IO_L2N_A22_2 | AF14 | |
| 2 | IO_L3P_A21_2 | AE18 | |
| 2 | IO_L3N_A20_2 | AE17 | |
| 2 | IO_L4P_FCS_B_2 | AE14 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AF15 | |
| 2 | IO_L5P_FWE_B_2 | AE16 | |
| 2 | IO_L5N_CSO_B_2 | AF16 | |
| 2 | IO_L6P_D7_2 | AD15 | |
| 2 | IO_L6N_D6_2 | AD16 | |
| 2 | IO_L7P_D5_2 | AC17 | |
| 2 | IO_L7N_D4_2 | AD17 | |
| 2 | IO_L8P_D3_2 | AC15 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|--|------------|-----------------|
| 2 | IO_L8N_D2_FS2_2 | AB16 | |
| 2 | IO_L9P_D1_FS1_2 | AB18 | |
| 2 | IO_L9N_D0_FS0_2 | AC19 | |
| 3 | IO_L0P_CC_GC_3 | G17 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | H17 | |
| 3 | IO_L1P_CC_GC_3 | B18 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾ ⁽²⁾ | C18 | |
| 3 | IO_L2P_GC_VRN_3 | D17 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | E17 | |
| 3 | IO_L3P_GC_3 | E18 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | E19 | |
| 3 | IO_L4P_GC_3 | B17 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | C17 | |
| 3 | IO_L5P_GC_3 | F18 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | G18 | |
| 3 | IO_L6P_GC_3 | F16 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | G16 | |
| 3 | IO_L7P_GC_3 | H18 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | J17 | |
| 3 | IO_L8P_GC_3 | E16 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | F15 | |
| 3 | IO_L9P_GC_3 | K18 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | L19 | |
| 4 | IO_L0P_GC_D15_4 | AG18 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AH18 | |
| 4 | IO_L1P_GC_D13_4 | AG13 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AF13 | |
| 4 | IO_L2P_GC_D11_4 | AK18 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AL18 | |
| 4 | IO_L3P_GC_D9_4 | AH13 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AG12 | |
| 4 | IO_L4P_GC_4 | AK17 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AK16 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------------|-------------------|------------------------|
| 4 | IO_L5P_GC_4 | AJ14 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AH14 | |
| 4 | IO_L6P_GC_4 | AJ17 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AH17 | |
| 4 | IO_L7P_GC_VRN_4 | AH15 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AG15 | |
| 4 | IO_L8P_CC_GC_4 | AG17 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AG16 | |
| 4 | IO_L9P_CC_GC_4 | AJ16 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AJ15 | |
| 11 | IO_L0P_11 | AD25 | |
| 11 | IO_L0N_11 | AE26 | |
| 11 | IO_L1P_11 | AF28 | |
| 11 | IO_L1N_11 | AE27 | |
| 11 | IO_L2P_11 | AD26 | |
| 11 | IO_L2N_11 | AD27 | |
| 11 | IO_L3P_11 | AC28 | |
| 11 | IO_L3N_11 | AB28 | |
| 11 | IO_L4P_11 | W27 | |
| 11 | IO_L4N_VREF_11 | V27 | |
| 11 | IO_L5P_11 | AE28 | |
| 11 | IO_L5N_11 | AD29 | |
| 11 | IO_L6P_11 | Y28 | |
| 11 | IO_L6N_11 | Y27 | |
| 11 | IO_L7P_11 | AA28 | |
| 11 | IO_L7N_11 | AA29 | |
| 11 | IO_L8P_CC_11 | U25 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | V25 | |
| 11 | IO_L9P_CC_11 | AG28 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | AH29 | |
| 11 | IO_L10P_CC_SM15P_11 | AF29 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | AE29 | |
| 11 | IO_L11P_CC_SM14P_11 | AB27 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | AC27 | |
| 11 | IO_L12P_VRN_11 | AD30 | |
| 11 | IO_L12N_VRP_11 | AC29 | |
| 11 | IO_L13P_11 | AA26 | |
| 11 | IO_L13N_11 | AB26 | |
| 11 | IO_L14P_11 | AB30 | |
| 11 | IO_L14N_VREF_11 | AC30 | |
| 11 | IO_L15P_SM13P_11 | AB25 | |
| 11 | IO_L15N_SM13N_11 | AC25 | |
| 11 | IO_L16P_SM12P_11 | W29 | |
| 11 | IO_L16N_SM12N_11 | Y29 | |
| 11 | IO_L17P_SM11P_11 | Y26 | |
| 11 | IO_L17N_SM11N_11 | W26 | |
| 11 | IO_L18P_SM10P_11 | Y24 | |
| 11 | IO_L18N_SM10N_11 | W24 | |
| 11 | IO_L19P_SM9P_11 | V24 | |
| 11 | IO_L19N_SM9N_11 | W25 | |
| 12 | IO_L0P_12 | F9 | |
| 12 | IO_L0N_12 | F8 | |
| 12 | IO_L1P_12 | J11 | |
| 12 | IO_L1N_12 | J10 | |
| 12 | IO_L2P_12 | F10 | |
| 12 | IO_L2N_12 | G10 | |
| 12 | IO_L3P_12 | H10 | |
| 12 | IO_L3N_12 | H9 | |
| 12 | IO_L4P_12 | F11 | |
| 12 | IO_L4N_VREF_12 | E11 | |
| 12 | IO_L5P_12 | G8 | |
| 12 | IO_L5N_12 | H8 | |
| 12 | IO_L6P_12 | G12 | |
| 12 | IO_L6N_12 | G11 | |
| 12 | IO_L7P_12 | F6 | |
| 12 | IO_L7N_12 | G6 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 12 | IO_L8P_CC_12 | K12 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | J12 | |
| 12 | IO_L9P_CC_12 | H7 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | J7 | |
| 12 | IO_L10P_CC_12 | K8 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | J9 | |
| 12 | IO_L11P_CC_12 | H12 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | G13 | |
| 12 | IO_L12P_VRN_12 | K6 | |
| 12 | IO_L12N_VRP_12 | J6 | |
| 12 | IO_L13P_12 | F13 | |
| 12 | IO_L13N_12 | F14 | |
| 12 | IO_L14P_12 | L8 | |
| 12 | IO_L14N_VREF_12 | K9 | |
| 12 | IO_L15P_12 | G15 | |
| 12 | IO_L15N_12 | H14 | |
| 12 | IO_L16P_12 | M8 | |
| 12 | IO_L16N_12 | L9 | |
| 12 | IO_L17P_12 | H13 | |
| 12 | IO_L17N_12 | J14 | |
| 12 | IO_L18P_12 | L6 | |
| 12 | IO_L18N_12 | K7 | |
| 12 | IO_L19P_12 | K13 | |
| 12 | IO_L19N_12 | K14 | |
| 13 | IO_L0P_SM8P_13 | AF26 | |
| 13 | IO_L0N_SM8N_13 | AG27 | |
| 13 | IO_L1P_SM7P_13 | AD21 | |
| 13 | IO_L1N_SM7N_13 | AE21 | |
| 13 | IO_L2P_SM6P_13 | AG26 | |
| 13 | IO_L2N_SM6N_13 | AH27 | |
| 13 | IO_L3P_SM5P_13 | AD22 | |
| 13 | IO_L3N_SM5N_13 | AE22 | |
| 13 | IO_L4P_13 | AH28 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L4N_VREF_13 | AJ27 | |
| 13 | IO_L5P_SM4P_13 | AF19 | |
| 13 | IO_L5N_SM4N_13 | AF18 | |
| 13 | IO_L6P_SM3P_13 | AJ25 | |
| 13 | IO_L6N_SM3N_13 | AK26 | |
| 13 | IO_L7P_SM2P_13 | AH20 | |
| 13 | IO_L7N_SM2N_13 | AH19 | |
| 13 | IO_L8P_CC_SM1P_13 | AE24 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AF25 | |
| 13 | IO_L9P_CC_SM0P_13 | AK19 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AJ19 | |
| 13 | IO_L10P_CC_13 | AF20 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | AG20 | |
| 13 | IO_L11P_CC_13 | AJ24 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AK24 | |
| 13 | IO_L12P_VRN_13 | AJ20 | |
| 13 | IO_L12N_VRP_13 | AJ21 | |
| 13 | IO_L13P_13 | AH25 | |
| 13 | IO_L13N_13 | AG25 | |
| 13 | IO_L14P_13 | AF21 | |
| 13 | IO_L14N_VREF_13 | AG21 | |
| 13 | IO_L15P_13 | AH23 | |
| 13 | IO_L15N_13 | AH24 | |
| 13 | IO_L16P_13 | AE23 | |
| 13 | IO_L16N_13 | AD24 | |
| 13 | IO_L17P_13 | AG22 | |
| 13 | IO_L17N_13 | AG23 | |
| 13 | IO_L18P_13 | AF24 | |
| 13 | IO_L18N_13 | AF23 | |
| 13 | IO_L19P_13 | AJ22 | |
| 13 | IO_L19N_13 | AH22 | |
| 14 | IO_L0P_14 | AB8 | |
| 14 | IO_L0N_14 | AA8 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 14 | IO_L1P_14 | T9 | |
| 14 | IO_L1N_14 | T10 | |
| 14 | IO_L2P_14 | AA6 | |
| 14 | IO_L2N_14 | Y6 | |
| 14 | IO_L3P_14 | V10 | |
| 14 | IO_L3N_14 | U10 | |
| 14 | IO_L4P_14 | Y7 | |
| 14 | IO_L4N_VREF_14 | W7 | |
| 14 | IO_L5P_14 | V8 | |
| 14 | IO_L5N_14 | V9 | |
| 14 | IO_L6P_14 | W6 | |
| 14 | IO_L6N_14 | V7 | |
| 14 | IO_L7P_14 | U8 | |
| 14 | IO_L7N_14 | T8 | |
| 14 | IO_L8P_CC_14 | AA10 | |
| 14 | IO_L8N_CC_14 ⁽²⁾ | AA9 | |
| 14 | IO_L9P_CC_14 | R8 | |
| 14 | IO_L9N_CC_14 ⁽²⁾ | R9 | |
| 14 | IO_L10P_CC_14 | W9 | |
| 14 | IO_L10N_CC_14 ⁽²⁾ | W10 | |
| 14 | IO_L11P_CC_14 | U7 | |
| 14 | IO_L11N_CC_14 ⁽²⁾ | U6 | |
| 14 | IO_L12P_VRN_14 | P9 | |
| 14 | IO_L12N_VRP_14 | N9 | |
| 14 | IO_L13P_14 | R6 | |
| 14 | IO_L13N_14 | T6 | |
| 14 | IO_L14P_14 | P10 | |
| 14 | IO_L14N_VREF_14 | N10 | |
| 14 | IO_L15P_14 | R7 | |
| 14 | IO_L15N_14 | P6 | |
| 14 | IO_L16P_14 | N8 | |
| 14 | IO_L16N_14 | P7 | |
| 14 | IO_L17P_14 | L5 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 14 | IO_L17N_14 | M5 | |
| 14 | IO_L18P_14 | M7 | |
| 14 | IO_L18N_14 | M6 | |
| 14 | IO_L19P_14 | Y8 | |
| 14 | IO_L19N_14 | Y9 | |
| 23 | IO_L0P_23 | F28 | |
| 23 | IO_L0N_23 | G28 | |
| 23 | IO_L1P_23 | P25 | |
| 23 | IO_L1N_23 | R26 | |
| 23 | IO_L2P_23 | G27 | |
| 23 | IO_L2N_23 | H27 | |
| 23 | IO_L3P_23 | N25 | |
| 23 | IO_L3N_23 | P26 | |
| 23 | IO_L4P_23 | J26 | |
| 23 | IO_L4N_VREF_23 | J27 | |
| 23 | IO_L5P_23 | R28 | |
| 23 | IO_L5N_23 | P27 | |
| 23 | IO_L6P_23 | H28 | |
| 23 | IO_L6N_23 | H29 | |
| 23 | IO_L7P_23 | U28 | |
| 23 | IO_L7N_23 | U27 | |
| 23 | IO_L8P_CC_23 | J29 | |
| 23 | IO_L8N_CC_23 ⁽²⁾ | K29 | |
| 23 | IO_L9P_CC_23 | V29 | |
| 23 | IO_L9N_CC_23 ⁽²⁾ | V28 | |
| 23 | IO_L10P_CC_23 | R27 | |
| 23 | IO_L10N_CC_23 ⁽²⁾ | T28 | |
| 23 | IO_L11P_CC_23 | L26 | |
| 23 | IO_L11N_CC_23 ⁽²⁾ | K26 | |
| 23 | IO_L12P_VRN_23 | N27 | |
| 23 | IO_L12N_VRP_23 | N28 | |
| 23 | IO_L13P_23 | K28 | |
| 23 | IO_L13N_23 | K27 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 23 | IO_L14P_23 | M26 | |
| 23 | IO_L14N_VREF_23 | M25 | |
| 23 | IO_L15P_23 | L29 | |
| 23 | IO_L15N_23 | L28 | |
| 23 | IO_L16P_23 | T29 | |
| 23 | IO_L16N_23 | R29 | |
| 23 | IO_L17P_23 | M30 | |
| 23 | IO_L17N_23 | L30 | |
| 23 | IO_L18P_23 | P29 | |
| 23 | IO_L18N_23 | N29 | |
| 23 | IO_L19P_23 | M27 | |
| 23 | IO_L19N_23 | M28 | |
| 26 | IO_L0P_26 | AD7 | |
| 26 | IO_L0N_26 | AE7 | |
| 26 | IO_L1P_26 | AE6 | |
| 26 | IO_L1N_26 | AF6 | |
| 26 | IO_L2P_26 | AD5 | |
| 26 | IO_L2N_26 | AD6 | |
| 26 | IO_L3P_26 | AG6 | |
| 26 | IO_L3N_26 | AG7 | |
| 26 | IO_L4P_26 | AC8 | |
| 26 | IO_L4N_VREF_26 | AC7 | |
| 26 | IO_L5P_26 | AE8 | |
| 26 | IO_L5N_26 | AF8 | |
| 26 | IO_L6P_26 | AB5 | |
| 26 | IO_L6N_26 | AC5 | |
| 26 | IO_L7P_26 | AE9 | |
| 26 | IO_L7N_26 | AF9 | |
| 26 | IO_L8P_CC_26 | AB6 | |
| 26 | IO_L8N_CC_26 ⁽²⁾ | AB7 | |
| 26 | IO_L9P_CC_26 | AF10 | |
| 26 | IO_L9N_CC_26 ⁽²⁾ | AG10 | |
| 26 | IO_L10P_CC_26 | AH8 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 26 | IO_L10N_CC_26 ⁽²⁾ | AG8 | |
| 26 | IO_L11P_CC_26 | AD12 | |
| 26 | IO_L11N_CC_26 ⁽²⁾ | AC12 | |
| 26 | IO_L12P_VRN_26 | AJ7 | |
| 26 | IO_L12N_VRP_26 | AH7 | |
| 26 | IO_L13P_26 | AJ12 | |
| 26 | IO_L13N_26 | AH12 | |
| 26 | IO_L14P_26 | AJ10 | |
| 26 | IO_L14N_VREF_26 | AH9 | |
| 26 | IO_L15P_26 | AJ11 | |
| 26 | IO_L15N_26 | AK11 | |
| 26 | IO_L16P_26 | AE11 | |
| 26 | IO_L16N_26 | AF11 | |
| 26 | IO_L17P_26 | AJ9 | |
| 26 | IO_L17N_26 | AK9 | |
| 26 | IO_L18P_26 | AD11 | |
| 26 | IO_L18N_26 | AE12 | |
| 26 | IO_L19P_26 | AH10 | |
| 26 | IO_L19N_26 | AG11 | |
| 27 | IO_L0P_27 | H24 | |
| 27 | IO_L0N_27 | H23 | |
| 27 | IO_L1P_27 | G22 | |
| 27 | IO_L1N_27 | H22 | |
| 27 | IO_L2P_27 | F21 | |
| 27 | IO_L2N_27 | G21 | |
| 27 | IO_L3P_27 | H19 | |
| 27 | IO_L3N_27 | G20 | |
| 27 | IO_L4P_27 | F19 | |
| 27 | IO_L4N_VREF_27 | F20 | |
| 27 | IO_L5P_27 | J20 | |
| 27 | IO_L5N_27 | H20 | |
| 27 | IO_L6P_27 | G23 | |
| 27 | IO_L6N_27 | F23 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 27 | IO_L7P_27 | K19 | |
| 27 | IO_L7N_27 | J19 | |
| 27 | IO_L8P_CC_27 | F24 | |
| 27 | IO_L8N_CC_27 ⁽²⁾ | E24 | |
| 27 | IO_L9P_CC_27 | M20 | |
| 27 | IO_L9N_CC_27 ⁽²⁾ | L20 | |
| 27 | IO_L10P_CC_27 | J21 | |
| 27 | IO_L10N_CC_27 ⁽²⁾ | K21 | |
| 27 | IO_L11P_CC_27 | G25 | |
| 27 | IO_L11N_CC_27 ⁽²⁾ | F25 | |
| 27 | IO_L12P_VRN_27 | J22 | |
| 27 | IO_L12N_VRP_27 | K22 | |
| 27 | IO_L13P_27 | G26 | |
| 27 | IO_L13N_27 | F26 | |
| 27 | IO_L14P_27 | L23 | |
| 27 | IO_L14N_VREF_27 | K23 | |
| 27 | IO_L15P_27 | J25 | |
| 27 | IO_L15N_27 | H25 | |
| 27 | IO_L16P_27 | L21 | |
| 27 | IO_L16N_27 | M21 | |
| 27 | IO_L17P_27 | K24 | |
| 27 | IO_L17N_27 | J24 | |
| 27 | IO_L18P_27 | N22 | |
| 27 | IO_L18N_27 | M22 | |
| 27 | IO_L19P_27 | L24 | |
| 27 | IO_L19N_27 | L25 | |
| NA | MGTTXP0_111 | M33 | |
| NA | MGTAVTTTX_111 | U32 | |
| NA | MGTTXN0_111 | N33 | |
| NA | MGTAVCC_111 | R32 | |
| NA | MGTRXP0_111 | N34 | |
| NA | MGTAVTTRX_111 | N32 | |
| NA | MGTRXN0_111 | P34 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTAVCCPLL_111 | T32 | |
| NA | MGTRXN1_111 | R34 | |
| NA | MGTREFCLKN_111 | P32 | |
| NA | MGTRXP1_111 | T34 | |
| NA | MGTREFCLKP_111 | P31 | |
| NA | MGTTXN1_111 | T33 | |
| NA | MGTTXP1_111 | U33 | |
| NA | MGTAVTTRXC_L | U31 | |
| NA | MGTRREF_111 | V31 | |
| NA | MGTTXP0_112 | M2 | |
| NA | MGTAVT'TTX_112 | U3 | |
| NA | MGTTXN0_112 | N2 | |
| NA | MGTAVCC_112 | R3 | |
| NA | MGTRXP0_112 | N1 | |
| NA | MGTAVTTRX_112 | N3 | |
| NA | MGTRXN0_112 | P1 | |
| NA | MGTAVCCPLL_112 | T3 | |
| NA | MGTRXN1_112 | R1 | |
| NA | MGTREFCLKN_112 | P3 | |
| NA | MGTRXP1_112 | T1 | |
| NA | MGTREFCLKP_112 | P4 | |
| NA | MGTTXN1_112 | T2 | |
| NA | MGTTXP1_112 | U2 | |
| NA | MGTAVTTRXC_R | U4 | |
| NA | MGTRREF_112 | V4 | |
| NA | MGTTXP0_113 | V33 | |
| NA | MGTAVT'TTX_113 | AC32 | |
| NA | MGTTXN0_113 | W33 | |
| NA | MGTAVCC_113 | AA32 | |
| NA | MGTRXP0_113 | W34 | |
| NA | MGTAVTTRX_113 | W32 | |
| NA | MGTRXN0_113 | Y34 | |
| NA | MGTAVCCPLL_113 | AB32 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTRXN1_113 | AA34 | |
| NA | MGTREFCLKN_113 | Y32 | |
| NA | MGTRXP1_113 | AB34 | |
| NA | MGTREFCLKP_113 | Y31 | |
| NA | MGTTXN1_113 | AB33 | |
| NA | MGTTXP1_113 | AC33 | |
| NA | MGTTXP0_114 | V2 | |
| NA | MGTAVT'TTX_114 | AC3 | |
| NA | MGTTXN0_114 | W2 | |
| NA | MGTAVCC_114 | AA3 | |
| NA | MGTRXP0_114 | W1 | |
| NA | MGTAVT'TRX_114 | W3 | |
| NA | MGTRXN0_114 | Y1 | |
| NA | MGTAVCCPLL_114 | AB3 | |
| NA | MGTRXN1_114 | AA1 | |
| NA | MGTREFCLKN_114 | Y3 | |
| NA | MGTRXP1_114 | AB1 | |
| NA | MGTREFCLKP_114 | Y4 | |
| NA | MGTTXN1_114 | AB2 | |
| NA | MGTTXP1_114 | AC2 | |
| NA | MGTTXP0_115 | F33 | |
| NA | MGTAVT'TTX_115 | L32 | |
| NA | MGTTXN0_115 | G33 | |
| NA | MGTAVCC_115 | J32 | |
| NA | MGTRXP0_115 | G34 | |
| NA | MGTAVT'TRX_115 | G32 | |
| NA | MGTRXN0_115 | H34 | |
| NA | MGTAVCCPLL_115 | K32 | |
| NA | MGTRXN1_115 | J34 | |
| NA | MGTREFCLKN_115 | H32 | |
| NA | MGTRXP1_115 | K34 | |
| NA | MGTREFCLKP_115 | H31 | |
| NA | MGTTXN1_115 | K33 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTTXP1_115 | L33 | |
| NA | MGTTXP0_116 | F2 | |
| NA | MGTAVTTTX_116 | L3 | |
| NA | MGTTXN0_116 | G2 | |
| NA | MGTAVCC_116 | J3 | |
| NA | MGTRXP0_116 | G1 | |
| NA | MGTAVTTRX_116 | G3 | |
| NA | MGTRXN0_116 | H1 | |
| NA | MGTAVCCPLL_116 | K3 | |
| NA | MGTRXN1_116 | J1 | |
| NA | MGTREFCLKN_116 | H3 | |
| NA | MGTRXP1_116 | K1 | |
| NA | MGTREFCLKP_116 | H4 | |
| NA | MGTTXN1_116 | K2 | |
| NA | MGTTXP1_116 | L2 | |
| NA | MGTTXP0_117 | AD33 | |
| NA | MGTAVTTTX_117 | AJ32 | |
| NA | MGTTXN0_117 | AE33 | |
| NA | MGTAVCC_117 | AG32 | |
| NA | MGTRXP0_117 | AE34 | |
| NA | MGTAVTTRX_117 | AE32 | |
| NA | MGTRXN0_117 | AF34 | |
| NA | MGTAVCCPLL_117 | AH32 | |
| NA | MGTRXN1_117 | AG34 | |
| NA | MGTREFCLKN_117 | AF32 | |
| NA | MGTRXP1_117 | AH34 | |
| NA | MGTREFCLKP_117 | AF31 | |
| NA | MGTTXN1_117 | AH33 | |
| NA | MGTTXP1_117 | AJ33 | |
| NA | MGTTXP0_118 | AD2 | |
| NA | MGTAVTTTX_118 | AJ3 | |
| NA | MGTTXN0_118 | AE2 | |
| NA | MGTAVCC_118 | AG3 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTRXP0_118 | AE1 | |
| NA | MGTAVTTRX_118 | AE3 | |
| NA | MGTRXN0_118 | AF1 | |
| NA | MGTAVCCPLL_118 | AH3 | |
| NA | MGTRXN1_118 | AG1 | |
| NA | MGTREFCLKN_118 | AF3 | |
| NA | MGTRXP1_118 | AH1 | |
| NA | MGTREFCLKP_118 | AF4 | |
| NA | MGTTXN1_118 | AH2 | |
| NA | MGTTXP1_118 | AJ2 | |
| NA | MGTTXP0_119 | B32 | |
| NA | MGTAVTTTX_119 | E32 | |
| NA | MGTTXN0_119 | B33 | |
| NA | MGTAVCC_119 | D31 | |
| NA | MGTRXP0_119 | A33 | |
| NA | MGTAVTTRX_119 | C32 | |
| NA | MGTRXN0_119 | A34 | |
| NA | MGTAVCCPLL_119 | D32 | |
| NA | MGTRXN1_119 | C34 | |
| NA | MGTREFCLKN_119 | E31 | |
| NA | MGTRXP1_119 | D34 | |
| NA | MGTREFCLKP_119 | F31 | |
| NA | MGTTXN1_119 | D33 | |
| NA | MGTTXP1_119 | E33 | |
| NA | MGTTXP0_120 | B3 | |
| NA | MGTAVTTTX_120 | E3 | |
| NA | MGTTXN0_120 | B2 | |
| NA | MGTAVCC_120 | D4 | |
| NA | MGTRXP0_120 | A2 | |
| NA | MGTAVTTRX_120 | C3 | |
| NA | MGTRXN0_120 | A1 | |
| NA | MGTAVCCPLL_120 | D3 | |
| NA | MGTRXN1_120 | C1 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTREFCLKN_120 | E4 | |
| NA | MGTRXP1_120 | D1 | |
| NA | MGTREFCLKP_120 | F4 | |
| NA | MGTTXN1_120 | D2 | |
| NA | MGTTXP1_120 | E2 | |
| NA | MGTTXP0_121 | AK33 | |
| NA | MGTAVTTTX_121 | AM32 | |
| NA | MGTTXN0_121 | AL33 | |
| NA | MGTAVCC_121 | AL31 | |
| NA | MGTRXP0_121 | AL34 | |
| NA | MGTAVTTRX_121 | AL32 | |
| NA | MGTRXN0_121 | AM34 | |
| NA | MGTAVCCPLL_121 | AM31 | |
| NA | MGTRXN1_121 | AP34 | |
| NA | MGTREFCLKN_121 | AL30 | |
| NA | MGTRXP1_121 | AP33 | |
| NA | MGTREFCLKP_121 | AK30 | |
| NA | MGTTXN1_121 | AN33 | |
| NA | MGTTXP1_121 | AN32 | |
| NA | MGTTXP0_122 | AK2 | |
| NA | MGTAVTTTX_122 | AM3 | |
| NA | MGTTXN0_122 | AL2 | |
| NA | MGTAVCC_122 | AL4 | |
| NA | MGTRXP0_122 | AL1 | |
| NA | MGTAVTTRX_122 | AL3 | |
| NA | MGTRXN0_122 | AM1 | |
| NA | MGTAVCCPLL_122 | AM4 | |
| NA | MGTRXN1_122 | AP1 | |
| NA | MGTREFCLKN_122 | AL5 | |
| NA | MGTRXP1_122 | AP2 | |
| NA | MGTREFCLKP_122 | AK5 | |
| NA | MGTTXN1_122 | AN2 | |
| NA | MGTTXP1_122 | AN3 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTTXP0_123 | B26 | |
| NA | MGTAVTTTX_123 | C30 | |
| NA | MGTTXN0_123 | B27 | |
| NA | MGTAVCC_123 | C27 | |
| NA | MGTRXP0_123 | A27 | |
| NA | MGTAVTTRX_123 | C26 | |
| NA | MGTRXN0_123 | A28 | |
| NA | MGTAVCCPLL_123 | C29 | |
| NA | MGTRXN1_123 | A29 | |
| NA | MGTREFCLKN_123 | D28 | |
| NA | MGTRXP1_123 | A30 | |
| NA | MGTREFCLKP_123 | D27 | |
| NA | MGTTXN1_123 | B30 | |
| NA | MGTTXP1_123 | B31 | |
| NA | MGTTXP0_124 | B9 | |
| NA | MGTAVTTTX_124 | C5 | |
| NA | MGTTXN0_124 | B8 | |
| NA | MGTAVCC_124 | C8 | |
| NA | MGTRXP0_124 | A8 | |
| NA | MGTAVTTRX_124 | C9 | |
| NA | MGTRXN0_124 | A7 | |
| NA | MGTAVCCPLL_124 | C6 | |
| NA | MGTRXN1_124 | A6 | |
| NA | MGTREFCLKN_124 | D7 | |
| NA | MGTRXP1_124 | A5 | |
| NA | MGTREFCLKP_124 | D8 | |
| NA | MGTTXN1_124 | B5 | |
| NA | MGTTXP1_124 | B4 | |
| NA | MGTTXP0_125 | AN31 | |
| NA | MGTAVTTTX_125 | AM25 | |
| NA | MGTTXN0_125 | AN30 | |
| NA | MGTAVCC_125 | AM27 | |
| NA | MGTRXP0_125 | AP30 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTAVTTRX_125 | AM29 | |
| NA | MGTRXN0_125 | AP29 | |
| NA | MGTAVCCPLL_125 | AM26 | |
| NA | MGTRXN1_125 | AP28 | |
| NA | MGTREFCLKN_125 | AM28 | |
| NA | MGTRXP1_125 | AP27 | |
| NA | MGTREFCLKP_125 | AL28 | |
| NA | MGTTXN1_125 | AN27 | |
| NA | MGTTXP1_125 | AN26 | |
| NA | MGTTXP0_126 | AN4 | |
| NA | MGTAVTTTX_126 | AM10 | |
| NA | MGTTXN0_126 | AN5 | |
| NA | MGTAVCC_126 | AM8 | |
| NA | MGTRXP0_126 | AP5 | |
| NA | MGTAVTTRX_126 | AM6 | |
| NA | MGTRXN0_126 | AP6 | |
| NA | MGTAVCCPLL_126 | AM9 | |
| NA | MGTRXN1_126 | AP7 | |
| NA | MGTREFCLKN_126 | AM7 | |
| NA | MGTRXP1_126 | AP8 | |
| NA | MGTREFCLKP_126 | AL7 | |
| NA | MGTTXN1_126 | AN8 | |
| NA | MGTTXP1_126 | AN9 | |
| NA | MGTTXP0_127 | B20 | |
| NA | MGTAVTTTX_127 | C24 | |
| NA | MGTTXN0_127 | B21 | |
| NA | MGTAVCC_127 | C21 | |
| NA | MGTRXP0_127 | A21 | |
| NA | MGTAVTTRX_127 | C20 | |
| NA | MGTRXN0_127 | A22 | |
| NA | MGTAVCCPLL_127 | C23 | |
| NA | MGTRXN1_127 | A23 | |
| NA | MGTREFCLKN_127 | D22 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTRXP1_127 | A24 | |
| NA | MGTREFCLKP_127 | D21 | |
| NA | MGTTXN1_127 | B24 | |
| NA | MGTTXP1_127 | B25 | |
| NA | MGTTXP0_128 | B15 | |
| NA | MGTAVTTTX_128 | C11 | |
| NA | MGTTXN0_128 | B14 | |
| NA | MGTAVCC_128 | C14 | |
| NA | MGTRXP0_128 | A14 | |
| NA | MGTAVTTRX_128 | C15 | |
| NA | MGTRXN0_128 | A13 | |
| NA | MGTAVCCPLL_128 | C12 | |
| NA | MGTRXN1_128 | A12 | |
| NA | MGTREFCLKN_128 | D13 | |
| NA | MGTRXP1_128 | A11 | |
| NA | MGTREFCLKP_128 | D14 | |
| NA | MGTTXN1_128 | B11 | |
| NA | MGTTXP1_128 | B10 | |
| NA | MGTTXP0_129 | AN25 | |
| NA | MGTAVTTTX_129 | AP19 | |
| NA | MGTTXN0_129 | AN24 | |
| NA | MGTAVCC_129 | AM21 | |
| NA | MGTRXP0_129 | AP24 | |
| NA | MGTAVTTRX_129 | AM23 | |
| NA | MGTRXN0_129 | AP23 | |
| NA | MGTAVCCPLL_129 | AM20 | |
| NA | MGTRXN1_129 | AP22 | |
| NA | MGTREFCLKN_129 | AM22 | |
| NA | MGTRXP1_129 | AP21 | |
| NA | MGTREFCLKP_129 | AL22 | |
| NA | MGTTXN1_129 | AN21 | |
| NA | MGTTXP1_129 | AN20 | |
| NA | MGTTXP0_130 | AN10 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTAVTTTX_130 | AP16 | |
| NA | MGTTXN0_130 | AN11 | |
| NA | MGTAVCC_130 | AM14 | |
| NA | MGTRXP0_130 | AP11 | |
| NA | MGTAVTTRX_130 | AM12 | |
| NA | MGTRXN0_130 | AP12 | |
| NA | MGTAVCCPLL_130 | AM15 | |
| NA | MGTRXN1_130 | AP13 | |
| NA | MGTREFCLKN_130 | AM13 | |
| NA | MGTRXP1_130 | AP14 | |
| NA | MGTREFCLKP_130 | AL13 | |
| NA | MGTTXN1_130 | AN14 | |
| NA | MGTTXP1_130 | AN15 | |
| NA | GND | A3 | |
| NA | GND | A4 | |
| NA | GND | A9 | |
| NA | GND | A10 | |
| NA | GND | A15 | |
| NA | GND | A16 | |
| NA | GND | A17 | |
| NA | GND | A19 | |
| NA | GND | A20 | |
| NA | GND | A25 | |
| NA | GND | A26 | |
| NA | GND | A31 | |
| NA | GND | A32 | |
| NA | GND | AA2 | |
| NA | GND | AA4 | |
| NA | GND | AA5 | |
| NA | GND | AA7 | |
| NA | GND | AA11 | |
| NA | GND | AA13 | |
| NA | GND | AA15 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AA17 | |
| NA | GND | AA19 | |
| NA | GND | AA21 | |
| NA | GND | AA23 | |
| NA | GND | AA27 | |
| NA | GND | AA30 | |
| NA | GND | AA31 | |
| NA | GND | AA33 | |
| NA | GND | AB4 | |
| NA | GND | AB9 | |
| NA | GND | AB14 | |
| NA | GND | AB22 | |
| NA | GND | AB24 | |
| NA | GND | AB31 | |
| NA | GND | AC1 | |
| NA | GND | AC4 | |
| NA | GND | AC11 | |
| NA | GND | AC13 | |
| NA | GND | AC21 | |
| NA | GND | AC31 | |
| NA | GND | AC34 | |
| NA | GND | AD1 | |
| NA | GND | AD3 | |
| NA | GND | AD4 | |
| NA | GND | AD8 | |
| NA | GND | AD18 | |
| NA | GND | AD23 | |
| NA | GND | AD28 | |
| NA | GND | AD31 | |
| NA | GND | AD32 | |
| NA | GND | AD34 | |
| NA | GND | AE4 | |
| NA | GND | AE5 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AE15 | |
| NA | GND | AE25 | |
| NA | GND | AE30 | |
| NA | GND | AE31 | |
| NA | GND | AF2 | |
| NA | GND | AF5 | |
| NA | GND | AF12 | |
| NA | GND | AF22 | |
| NA | GND | AF30 | |
| NA | GND | AF33 | |
| NA | GND | AG2 | |
| NA | GND | AG4 | |
| NA | GND | AG5 | |
| NA | GND | AG9 | |
| NA | GND | AG19 | |
| NA | GND | AG29 | |
| NA | GND | AG30 | |
| NA | GND | AG31 | |
| NA | GND | AG33 | |
| NA | GND | AH4 | |
| NA | GND | AH5 | |
| NA | GND | AH6 | |
| NA | GND | AH16 | |
| NA | GND | AH26 | |
| NA | GND | AH30 | |
| NA | GND | AH31 | |
| NA | GND | AJ1 | |
| NA | GND | AJ4 | |
| NA | GND | AJ5 | |
| NA | GND | AJ6 | |
| NA | GND | AJ8 | |
| NA | GND | AJ13 | |
| NA | GND | AJ23 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AJ28 | |
| NA | GND | AJ29 | |
| NA | GND | AJ30 | |
| NA | GND | AJ31 | |
| NA | GND | AJ34 | |
| NA | GND | AK1 | |
| NA | GND | AK3 | |
| NA | GND | AK4 | |
| NA | GND | AK6 | |
| NA | GND | AK7 | |
| NA | GND | AK8 | |
| NA | GND | AK10 | |
| NA | GND | AK12 | |
| NA | GND | AK13 | |
| NA | GND | AK14 | |
| NA | GND | AK15 | |
| NA | GND | AK20 | |
| NA | GND | AK21 | |
| NA | GND | AK22 | |
| NA | GND | AK23 | |
| NA | GND | AK25 | |
| NA | GND | AK27 | |
| NA | GND | AK28 | |
| NA | GND | AK29 | |
| NA | GND | AK31 | |
| NA | GND | AK32 | |
| NA | GND | AK34 | |
| NA | GND | AL6 | |
| NA | GND | AL8 | |
| NA | GND | AL9 | |
| NA | GND | AL10 | |
| NA | GND | AL11 | |
| NA | GND | AL12 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AL14 | |
| NA | GND | AL15 | |
| NA | GND | AL16 | |
| NA | GND | AL17 | |
| NA | GND | AL19 | |
| NA | GND | AL20 | |
| NA | GND | AL21 | |
| NA | GND | AL23 | |
| NA | GND | AL24 | |
| NA | GND | AL25 | |
| NA | GND | AL26 | |
| NA | GND | AL27 | |
| NA | GND | AL29 | |
| NA | GND | AM2 | |
| NA | GND | AM5 | |
| NA | GND | AM11 | |
| NA | GND | AM16 | |
| NA | GND | AM17 | |
| NA | GND | AM18 | |
| NA | GND | AM19 | |
| NA | GND | AM24 | |
| NA | GND | AM30 | |
| NA | GND | AM33 | |
| NA | GND | AN1 | |
| NA | GND | AN6 | |
| NA | GND | AN7 | |
| NA | GND | AN12 | |
| NA | GND | AN13 | |
| NA | GND | AN16 | |
| NA | GND | AN17 | |
| NA | GND | AN18 | |
| NA | GND | AN19 | |
| NA | GND | AN22 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AN23 | |
| NA | GND | AN28 | |
| NA | GND | AN29 | |
| NA | GND | AN34 | |
| NA | GND | AP3 | |
| NA | GND | AP4 | |
| NA | GND | AP9 | |
| NA | GND | AP10 | |
| NA | GND | AP15 | |
| NA | GND | AP17 | |
| NA | GND | AP18 | |
| NA | GND | AP20 | |
| NA | GND | AP25 | |
| NA | GND | AP26 | |
| NA | GND | AP31 | |
| NA | GND | AP32 | |
| NA | GND | B1 | |
| NA | GND | B6 | |
| NA | GND | B7 | |
| NA | GND | B12 | |
| NA | GND | B13 | |
| NA | GND | B16 | |
| NA | GND | B19 | |
| NA | GND | B22 | |
| NA | GND | B23 | |
| NA | GND | B28 | |
| NA | GND | B29 | |
| NA | GND | B34 | |
| NA | GND | C2 | |
| NA | GND | C4 | |
| NA | GND | C7 | |
| NA | GND | C10 | |
| NA | GND | C13 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | C16 | |
| NA | GND | C19 | |
| NA | GND | C22 | |
| NA | GND | C25 | |
| NA | GND | C28 | |
| NA | GND | C31 | |
| NA | GND | C33 | |
| NA | GND | D5 | |
| NA | GND | D6 | |
| NA | GND | D9 | |
| NA | GND | D10 | |
| NA | GND | D11 | |
| NA | GND | D12 | |
| NA | GND | D15 | |
| NA | GND | D16 | |
| NA | GND | D18 | |
| NA | GND | D19 | |
| NA | GND | D20 | |
| NA | GND | D23 | |
| NA | GND | D24 | |
| NA | GND | D25 | |
| NA | GND | D26 | |
| NA | GND | D29 | |
| NA | GND | D30 | |
| NA | GND | E1 | |
| NA | GND | E5 | |
| NA | GND | E6 | |
| NA | GND | E7 | |
| NA | GND | E8 | |
| NA | GND | E9 | |
| NA | GND | E10 | |
| NA | GND | E12 | |
| NA | GND | E13 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | E14 | |
| NA | GND | E15 | |
| NA | GND | E20 | |
| NA | GND | E21 | |
| NA | GND | E22 | |
| NA | GND | E23 | |
| NA | GND | E25 | |
| NA | GND | E26 | |
| NA | GND | E27 | |
| NA | GND | E28 | |
| NA | GND | E29 | |
| NA | GND | E30 | |
| NA | GND | E34 | |
| NA | GND | F1 | |
| NA | GND | F3 | |
| NA | GND | F5 | |
| NA | GND | F7 | |
| NA | GND | F12 | |
| NA | GND | F22 | |
| NA | GND | F27 | |
| NA | GND | F29 | |
| NA | GND | F30 | |
| NA | GND | F32 | |
| NA | GND | F34 | |
| NA | GND | G4 | |
| NA | GND | G5 | |
| NA | GND | G9 | |
| NA | GND | G19 | |
| NA | GND | G29 | |
| NA | GND | G30 | |
| NA | GND | G31 | |
| NA | GND | H2 | |
| NA | GND | H5 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | H6 | |
| NA | GND | H16 | |
| NA | GND | H26 | |
| NA | GND | H30 | |
| NA | GND | H33 | |
| NA | GND | J2 | |
| NA | GND | J4 | |
| NA | GND | J5 | |
| NA | GND | J13 | |
| NA | GND | J23 | |
| NA | GND | J30 | |
| NA | GND | J31 | |
| NA | GND | J33 | |
| NA | GND | K4 | |
| NA | GND | K5 | |
| NA | GND | K10 | |
| NA | GND | K20 | |
| NA | GND | K30 | |
| NA | GND | K31 | |
| NA | GND | L1 | |
| NA | GND | L4 | |
| NA | GND | L7 | |
| NA | GND | L17 | |
| NA | GND | L27 | |
| NA | GND | L31 | |
| NA | GND | L34 | |
| NA | GND | M1 | |
| NA | GND | M3 | |
| NA | GND | M4 | |
| NA | GND | M9 | |
| NA | GND | M14 | |
| NA | GND | M24 | |
| NA | GND | M31 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | M32 | |
| NA | GND | M34 | |
| NA | GND | N4 | |
| NA | GND | N5 | |
| NA | GND | N6 | |
| NA | GND | N11 | |
| NA | GND | N19 | |
| NA | GND | N21 | |
| NA | GND | N23 | |
| NA | GND | N30 | |
| NA | GND | N31 | |
| NA | GND | P2 | |
| NA | GND | P5 | |
| NA | GND | P8 | |
| NA | GND | P12 | |
| NA | GND | P14 | |
| NA | GND | P16 | |
| NA | GND | P18 | |
| NA | GND | P20 | |
| NA | GND | P22 | |
| NA | GND | P28 | |
| NA | GND | P30 | |
| NA | GND | P33 | |
| NA | GND | R2 | |
| NA | GND | R4 | |
| NA | GND | R5 | |
| NA | GND | R11 | |
| NA | GND | R13 | |
| NA | GND | R15 | |
| NA | GND | R17 | |
| NA | GND | R19 | |
| NA | GND | R21 | |
| NA | GND | R23 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | R25 | |
| NA | GND | R30 | |
| NA | GND | R31 | |
| NA | GND | R33 | |
| NA | GND | T4 | |
| NA | GND | T5 | |
| NA | GND | T12 | |
| NA | GND | T14 | |
| NA | GND | T16 | |
| NA | GND | T20 | |
| NA | GND | T22 | |
| NA | GND | T24 | |
| NA | GND | T30 | |
| NA | GND | T31 | |
| NA | GND | U1 | |
| NA | GND | U5 | |
| NA | GND | U9 | |
| NA | GND | U11 | |
| NA | GND | U13 | |
| NA | GND | U15 | |
| NA | GND | U19 | |
| NA | GND | U21 | |
| NA | GND | U23 | |
| NA | GND | U29 | |
| NA | GND | U30 | |
| NA | GND | U34 | |
| NA | GND | V1 | |
| NA | GND | V3 | |
| NA | GND | V5 | |
| NA | GND | V6 | |
| NA | GND | V12 | |
| NA | GND | V14 | |
| NA | GND | V16 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | V20 | |
| NA | GND | V22 | |
| NA | GND | V26 | |
| NA | GND | V30 | |
| NA | GND | V32 | |
| NA | GND | V34 | |
| NA | GND | W4 | |
| NA | GND | W5 | |
| NA | GND | W11 | |
| NA | GND | W13 | |
| NA | GND | W15 | |
| NA | GND | W19 | |
| NA | GND | W21 | |
| NA | GND | W23 | |
| NA | GND | W28 | |
| NA | GND | W30 | |
| NA | GND | W31 | |
| NA | GND | Y2 | |
| NA | GND | Y5 | |
| NA | GND | Y10 | |
| NA | GND | Y12 | |
| NA | GND | Y14 | |
| NA | GND | Y16 | |
| NA | GND | Y18 | |
| NA | GND | Y20 | |
| NA | GND | Y22 | |
| NA | GND | Y30 | |
| NA | GND | Y33 | |
| 0 | VCCO_0 | AC22 | |
| 0 | VCCO_0 | M19 | |
| 1 | VCCO_1 | K15 | |
| 1 | VCCO_1 | L12 | |
| 1 | VCCO_1 | N16 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 2 | VCCO_2 | AB19 | |
| 2 | VCCO_2 | AC16 | |
| 2 | VCCO_2 | AD13 | |
| 3 | VCCO_3 | A18 | |
| 3 | VCCO_3 | F17 | |
| 3 | VCCO_3 | J18 | |
| 4 | VCCO_4 | AF17 | |
| 4 | VCCO_4 | AG14 | |
| 4 | VCCO_4 | AJ18 | |
| 11 | VCCO_11 | AB29 | |
| 11 | VCCO_11 | AC26 | |
| 11 | VCCO_11 | AF27 | |
| 11 | VCCO_11 | Y25 | |
| 12 | VCCO_12 | G7 | |
| 12 | VCCO_12 | G14 | |
| 12 | VCCO_12 | H11 | |
| 12 | VCCO_12 | J8 | |
| 13 | VCCO_13 | AE20 | |
| 13 | VCCO_13 | AG24 | |
| 13 | VCCO_13 | AH21 | |
| 13 | VCCO_13 | AJ26 | |
| 14 | VCCO_14 | N7 | |
| 14 | VCCO_14 | R10 | |
| 14 | VCCO_14 | T7 | |
| 14 | VCCO_14 | W8 | |
| 23 | VCCO_23 | J28 | |
| 23 | VCCO_23 | M29 | |
| 23 | VCCO_23 | N26 | |
| 23 | VCCO_23 | T27 | |
| 26 | VCCO_26 | AC6 | |
| 26 | VCCO_26 | AE10 | |
| 26 | VCCO_26 | AF7 | |
| 26 | VCCO_26 | AH11 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 27 | VCCO_27 | G24 | |
| 27 | VCCO_27 | H21 | |
| 27 | VCCO_27 | K25 | |
| 27 | VCCO_27 | L22 | |
| NA | VCCAUX | P23 | |
| NA | VCCAUX | AB11 | |
| NA | VCCAUX | T23 | |
| NA | VCCAUX | M23 | |
| NA | VCCAUX | N12 | |
| NA | VCCAUX | N24 | |
| NA | VCCAUX | P11 | |
| NA | VCCAUX | R24 | |
| NA | VCCAUX | T11 | |
| NA | VCCAUX | U24 | |
| NA | VCCAUX | V11 | |
| NA | VCCAUX | Y11 | |
| NA | VCCINT | AA12 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | AA16 | |
| NA | VCCINT | AA18 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AA22 | |
| NA | VCCINT | AB15 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AB21 | |
| NA | VCCINT | AC18 | |
| NA | VCCINT | N14 | |
| NA | VCCINT | N18 | |
| NA | VCCINT | N20 | |
| NA | VCCINT | P13 | |
| NA | VCCINT | P15 | |
| NA | VCCINT | P17 | |
| NA | VCCINT | P19 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | P21 | |
| NA | VCCINT | AA24 | |
| NA | VCCINT | R12 | |
| NA | VCCINT | R14 | |
| NA | VCCINT | R16 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | T13 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | AB23 | |
| NA | VCCINT | U12 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | U20 | |
| NA | VCCINT | U22 | |
| NA | VCCINT | V13 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | V21 | |
| NA | VCCINT | V23 | |
| NA | VCCINT | W12 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | W16 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | W22 | |
| NA | VCCINT | Y13 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | Y17 | |
| NA | VCCINT | Y19 | |
| NA | VCCINT | Y21 | |

Table 2-7: FF1156 Package—TX150T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| NA | VCCINT | Y23 | |
| NA | RSVD ⁽³⁾ | AB12 | |
| NA | RSVD ⁽³⁾ | AB13 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | AC22 | |
| 0 | DXN_0 | AC21 | |
| 0 | AVDD_0 | Y22 | |
| 0 | AVSS_0 | Y21 | |
| 0 | VP_0 | AA22 | |
| 0 | VN_0 | AB21 | |
| 0 | VREFP_0 | AB22 | |
| 0 | VREFN_0 | AA21 | |
| 0 | VBATT_0 | P30 | |
| 0 | PROGRAM_B_0 | R29 | |
| 0 | HSWAPEN_0 | P15 | |
| 0 | D_IN_0 | R15 | |
| 0 | DONE_0 | R14 | |
| 0 | CCLK_0 | AH14 | |
| 0 | INIT_B_0 | T14 | |
| 0 | CS_B_0 | T30 | |
| 0 | RDWR_B_0 | R30 | |
| 0 | RSVD ⁽³⁾ | V31 | |
| 0 | RSVD ⁽³⁾ | AF30 | |
| 0 | TCK_0 | AG29 | |
| 0 | M0_0 | AH29 | |
| 0 | M2_0 | AJ28 | |
| 0 | M1_0 | AH30 | |
| 0 | TMS_0 | AH15 | |
| 0 | TDI_0 | AH16 | |
| 0 | D_OUT_BUSY_0 | AJ16 | |
| 0 | TDO_0 | AJ15 | |
| 1 | IO_L0P_A19_1 | N25 | |
| 1 | IO_L0N_A18_1 | P25 | |
| 1 | IO_L1P_A17_1 | P18 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L1N_A16_1 | P17 | |
| 1 | IO_L2P_A15_D31_1 | P26 | |
| 1 | IO_L2N_A14_D30_1 | N26 | |
| 1 | IO_L3P_A13_D29_1 | M16 | |
| 1 | IO_L3N_A12_D28_1 | N16 | |
| 1 | IO_L4P_A11_D27_1 | P27 | |
| 1 | IO_L4N_VREF_A10_D26_1 | P28 | |
| 1 | IO_L5P_A9_D25_1 | N15 | |
| 1 | IO_L5N_A8_D24_1 | N14 | |
| 1 | IO_L6P_A7_D23_1 | N28 | |
| 1 | IO_L6N_A6_D22_1 | N29 | |
| 1 | IO_L7P_A5_D21_1 | M14 | |
| 1 | IO_L7N_A4_D20_1 | M13 | |
| 1 | IO_L8P_CC_A3_D19_1 | N30 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | M29 | |
| 1 | IO_L9P_CC_A1_D17_1 | N13 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | P13 | |
| 2 | IO_L0P_CC_RS1_2 | AK12 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AK13 | |
| 2 | IO_L1P_CC_A25_2 | AJ30 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AK30 | |
| 2 | IO_L2P_A23_2 | AK15 | |
| 2 | IO_L2N_A22_2 | AK14 | |
| 2 | IO_L3P_A21_2 | AL30 | |
| 2 | IO_L3N_A20_2 | AM29 | |
| 2 | IO_L4P_FCS_B_2 | AL14 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AM13 | |
| 2 | IO_L5P_FWE_B_2 | AM28 | |
| 2 | IO_L5N_CSO_B_2 | AL29 | |
| 2 | IO_L6P_D7_2 | AN13 | |
| 2 | IO_L6N_D6_2 | AP13 | |
| 2 | IO_L7P_D5_2 | AK28 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 2 | IO_L7N_D4_2 | AK29 | |
| 2 | IO_L8P_D3_2 | AN14 | |
| 2 | IO_L8N_D2_FS2_2 | AM14 | |
| 2 | IO_L9P_D1_FS1_2 | AK27 | |
| 2 | IO_L9N_D0_FS0_2 | AJ26 | |
| 3 | IO_L0P_CC_GC_3 | J16 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾⁽²⁾ | J15 | |
| 3 | IO_L1P_CC_GC_3 | M26 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾⁽²⁾ | L27 | |
| 3 | IO_L2P_GC_VRN_3 | J17 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | K17 | |
| 3 | IO_L3P_GC_3 | M27 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | M28 | |
| 3 | IO_L4P_GC_3 | L17 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | M17 | |
| 3 | IO_L5P_GC_3 | L29 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | K28 | |
| 3 | IO_L6P_GC_3 | L16 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | L15 | |
| 3 | IO_L7P_GC_3 | K29 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | J30 | |
| 3 | IO_L8P_GC_3 | L14 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | K15 | |
| 3 | IO_L9P_GC_3 | K30 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | L30 | |
| 4 | IO_L0P_GC_D15_4 | AN30 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AP30 | |
| 4 | IO_L1P_GC_D13_4 | AK17 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AL17 | |
| 4 | IO_L2P_GC_D11_4 | AN29 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AP28 | |
| 4 | IO_L3P_GC_D9_4 | AL15 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AL16 | |
| 4 | IO_L4P_GC_4 | AP27 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AN28 | |
| 4 | IO_L5P_GC_4 | AM16 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AM17 | |
| 4 | IO_L6P_GC_4 | AM27 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AM26 | |
| 4 | IO_L7P_GC_VRN_4 | AN15 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AN16 | |
| 4 | IO_L8P_CC_GC_4 | AL27 | |
| 4 | IO_L8N_CC_GC_4 ⁽¹⁾⁽²⁾ | AL26 | |
| 4 | IO_L9P_CC_GC_4 | AP16 | |
| 4 | IO_L9N_CC_GC_4 ⁽¹⁾⁽²⁾ | AP15 | |
| 5 | IO_L0P_5 | L24 | |
| 5 | IO_L0N_5 | M24 | |
| 5 | IO_L1P_5 | E18 | |
| 5 | IO_L1N_5 | E17 | |
| 5 | IO_L2P_5 | K24 | |
| 5 | IO_L2N_5 | L25 | |
| 5 | IO_L3P_5 | F16 | |
| 5 | IO_L3N_5 | F17 | |
| 5 | IO_L4P_5 | K25 | |
| 5 | IO_L4N_VREF_5 | J25 | |
| 5 | IO_L5P_5 | G16 | |
| 5 | IO_L5N_5 | H16 | |
| 5 | IO_L6P_5 | H26 | |
| 5 | IO_L6N_5 | J26 | |
| 5 | IO_L7P_5 | G18 | |
| 5 | IO_L7N_5 | G17 | |
| 5 | IO_L8P_CC_5 | J28 | |
| 5 | IO_L8N_CC_5 ⁽²⁾ | J27 | |
| 5 | IO_L9P_CC_5 | J18 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 5 | IO_L9N_CC_5 ⁽²⁾ | H18 | |
| 5 | IO_L10P_CC_5 | K18 | |
| 5 | IO_L10N_CC_5 ⁽²⁾ | K19 | |
| 5 | IO_L11P_CC_5 | K27 | |
| 5 | IO_L11N_CC_5 ⁽²⁾ | L26 | |
| 5 | IO_L12P_VRN_5 | N20 | |
| 5 | IO_L12N_VRP_5 | P20 | |
| 5 | IO_L13P_5 | G27 | |
| 5 | IO_L13N_5 | F27 | |
| 5 | IO_L14P_5 | M19 | |
| 5 | IO_L14N_VREF_5 | N19 | |
| 5 | IO_L15P_5 | G28 | |
| 5 | IO_L15N_5 | H28 | |
| 5 | IO_L16P_5 | M18 | |
| 5 | IO_L16N_5 | N18 | |
| 5 | IO_L17P_5 | G29 | |
| 5 | IO_L17N_5 | F29 | |
| 5 | IO_L18P_5 | L20 | |
| 5 | IO_L18N_5 | L19 | |
| 5 | IO_L19P_5 | H29 | |
| 5 | IO_L19N_5 | H30 | |
| 6 | IO_L0P_6 | AR29 | |
| 6 | IO_L0N_6 | AR28 | |
| 6 | IO_L1P_6 | AT14 | |
| 6 | IO_L1N_6 | AR14 | |
| 6 | IO_L2P_6 | AR30 | |
| 6 | IO_L2N_6 | AT30 | |
| 6 | IO_L3P_6 | AT15 | |
| 6 | IO_L3N_6 | AR15 | |
| 6 | IO_L4P_6 | AT29 | |
| 6 | IO_L4N_VREF_6 | AU29 | |
| 6 | IO_L5P_6 | AT17 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------------------------|
| 6 | IO_L5N_6 | AT16 | |
| 6 | IO_L6P_6 | AU28 | |
| 6 | IO_L6N_6 | AT27 | |
| 6 | IO_L7P_6 | AP17 | |
| 6 | IO_L7N_6 | AR17 | |
| 6 | IO_L8P_CC_6 | AT26 | |
| 6 | IO_L8N_CC_6 ⁽²⁾ | AR27 | |
| 6 | IO_L9P_CC_6 | AN20 | |
| 6 | IO_L9N_CC_6 ⁽²⁾ | AN19 | |
| 6 | IO_L10P_CC_6 | AN18 | |
| 6 | IO_L10N_CC_6 ⁽²⁾ | AM18 | |
| 6 | IO_L11P_CC_6 | AN26 | |
| 6 | IO_L11N_CC_6 ⁽²⁾ | AP26 | |
| 6 | IO_L12P_VRN_6 | AR18 | |
| 6 | IO_L12N_VRP_6 | AP18 | |
| 6 | IO_L13P_6 | AN25 | |
| 6 | IO_L13N_6 | AP25 | |
| 6 | IO_L14P_6 | AT19 | |
| 6 | IO_L14N_VREF_6 | AR19 | |
| 6 | IO_L15P_6 | AM24 | |
| 6 | IO_L15N_6 | AN24 | |
| 6 | IO_L16P_6 | AK18 | |
| 6 | IO_L16N_6 | AK19 | |
| 6 | IO_L17P_6 | AK24 | |
| 6 | IO_L17N_6 | AK25 | |
| 6 | IO_L18P_6 | AM19 | |
| 6 | IO_L18N_6 | AL19 | |
| 6 | IO_L19P_6 | AL25 | |
| 6 | IO_L19N_6 | AL24 | |
| 7 | IO_L0P_7 | M23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L0N_7 | M22 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 7 | IO_L1P_7 | M21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L1N_7 | L21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L2P_7 | N24 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L2N_7 | N23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L3P_7 | N22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L3N_7 | N21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L4P_7 | H21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L4N_VREF_7 | J21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L5P_7 | J20 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L5N_7 | K20 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L6P_7 | L22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L6N_7 | K23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L7P_7 | K22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L7N_7 | J22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L8P_CC_7 | F22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L8N_CC_7 ⁽²⁾ | G22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L9P_CC_7 | G21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L9N_CC_7 ⁽²⁾ | F21 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L10P_CC_7 | E22 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L10N_CC_7 ⁽²⁾ | E23 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 7 | IO_L11P_CC_7 | F24 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L11N_CC_7 ⁽²⁾ | G23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L12P_VRN_7 | E19 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L12N_VRP_7 | D18 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L13P_7 | J23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L13N_7 | H23 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L14P_7 | E20 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L14N_VREF_7 | F20 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L15P_7 | G24 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L15N_7 | H24 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L16P_7 | F19 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L16N_7 | G19 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L17P_7 | F26 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L17N_7 | F25 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L18P_7 | H19 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L18N_7 | H20 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L19P_7 | H25 | FX100T, LX110T, LX155T, LX220T |
| 7 | IO_L19N_7 | G26 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L0P_8 | AL21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L0N_8 | AL22 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 8 | IO_L1P_8 | AK23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L1N_8 | AK22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L2P_8 | AJ22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L2N_8 | AJ21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L3P_8 | AK20 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L3N_8 | AL20 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L4P_8 | AU26 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L4N_VREF_8 | AU27 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L5P_8 | AU19 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L5N_8 | AU18 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L6P_8 | AR25 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L6N_8 | AT25 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L7P_8 | AR20 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L7N_8 | AT20 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L8P_CC_8 | AT24 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L8N_CC_8 ⁽²⁾ | AR24 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L9P_CC_8 | AU21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L9N_CC_8 ⁽²⁾ | AT21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L10P_CC_8 | AV21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L10N_CC_8 ⁽²⁾ | AV20 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 8 | IO_L11P_CC_8 | AU24 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L11N_CC_8 ⁽²⁾ | AV25 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L12P_VRN_8 | AU23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L12N_VRP_8 | AU22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L13P_8 | AV23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L13N_8 | AV24 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L14P_8 | AR23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L14N_VREF_8 | AP22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L15P_8 | AR22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L15N_8 | AT22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L16P_8 | AM22 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L16N_8 | AM23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L17P_8 | AN23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L17N_8 | AP23 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L18P_8 | AP20 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L18N_8 | AP21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L19P_8 | AN21 | FX100T, LX110T, LX155T, LX220T |
| 8 | IO_L19N_8 | AM21 | FX100T, LX110T, LX155T, LX220T |
| 11 | IO_L0P_11 | F42 | |
| 11 | IO_L0N_11 | G42 | |
| 11 | IO_L1P_11 | F41 | |
| 11 | IO_L1N_11 | G41 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L2P_11 | H41 | |
| 11 | IO_L2N_11 | J41 | |
| 11 | IO_L3P_11 | J42 | |
| 11 | IO_L3N_11 | K42 | |
| 11 | IO_L4P_11 | L40 | |
| 11 | IO_L4N_VREF_11 | L41 | |
| 11 | IO_L5P_11 | L42 | |
| 11 | IO_L5N_11 | M41 | |
| 11 | IO_L6P_11 | M42 | |
| 11 | IO_L6N_11 | N41 | |
| 11 | IO_L7P_11 | N40 | |
| 11 | IO_L7N_11 | P40 | |
| 11 | IO_L8P_CC_11 | W40 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | Y40 | |
| 11 | IO_L9P_CC_11 | AA40 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | AA39 | |
| 11 | IO_L10P_CC_SM15P_11 | Y39 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | Y38 | |
| 11 | IO_L11P_CC_SM14P_11 | Y37 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | AA37 | |
| 11 | IO_L12P_VRN_11 | R42 | |
| 11 | IO_L12N_VRP_11 | P42 | |
| 11 | IO_L13P_11 | P41 | |
| 11 | IO_L13N_11 | R40 | |
| 11 | IO_L14P_11 | T40 | |
| 11 | IO_L14N_VREF_11 | T41 | |
| 11 | IO_L15P_SM13P_11 | T42 | |
| 11 | IO_L15N_SM13N_11 | U41 | |
| 11 | IO_L16P_SM12P_11 | U42 | |
| 11 | IO_L16N_SM12N_11 | V41 | |
| 11 | IO_L17P_SM11P_11 | V40 | |
| 11 | IO_L17N_SM11N_11 | W41 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 11 | IO_L18P_SM10P_11 | W42 | |
| 11 | IO_L18N_SM10N_11 | Y42 | |
| 11 | IO_L19P_SM9P_11 | AA42 | |
| 11 | IO_L19N_SM9N_11 | AA41 | |
| 12 | IO_L0P_12 | AA7 | |
| 12 | IO_L0N_12 | AA6 | |
| 12 | IO_L1P_12 | G6 | |
| 12 | IO_L1N_12 | H5 | |
| 12 | IO_L2P_12 | W5 | |
| 12 | IO_L2N_12 | W6 | |
| 12 | IO_L3P_12 | H6 | |
| 12 | IO_L3N_12 | J5 | |
| 12 | IO_L4P_12 | Y7 | |
| 12 | IO_L4N_VREF_12 | W7 | |
| 12 | IO_L5P_12 | J6 | |
| 12 | IO_L5N_12 | K5 | |
| 12 | IO_L6P_12 | W8 | |
| 12 | IO_L6N_12 | V8 | |
| 12 | IO_L7P_12 | K4 | |
| 12 | IO_L7N_12 | L5 | |
| 12 | IO_L8P_CC_12 | V5 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | V6 | |
| 12 | IO_L9P_CC_12 | L6 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | M6 | |
| 12 | IO_L10P_CC_12 | N5 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | N6 | |
| 12 | IO_L11P_CC_12 | U7 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | U6 | |
| 12 | IO_L12P_VRN_12 | P5 | |
| 12 | IO_L12N_VRP_12 | P6 | |
| 12 | IO_L13P_12 | T7 | |
| 12 | IO_L13N_12 | T6 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 12 | IO_L14P_12 | R4 | |
| 12 | IO_L14N_VREF_12 | R5 | |
| 12 | IO_L15P_12 | T5 | |
| 12 | IO_L15N_12 | T4 | |
| 12 | IO_L16P_12 | AA11 | |
| 12 | IO_L16N_12 | AA10 | |
| 12 | IO_L17P_12 | AA9 | |
| 12 | IO_L17N_12 | Y10 | |
| 12 | IO_L18P_12 | W11 | |
| 12 | IO_L18N_12 | W10 | |
| 12 | IO_L19P_12 | Y9 | |
| 12 | IO_L19N_12 | Y8 | |
| 13 | IO_L0P_SM8P_13 | AB41 | |
| 13 | IO_L0N_SM8N_13 | AB42 | |
| 13 | IO_L1P_SM7P_13 | AC41 | |
| 13 | IO_L1N_SM7N_13 | AD42 | |
| 13 | IO_L2P_SM6P_13 | AE42 | |
| 13 | IO_L2N_SM6N_13 | AD41 | |
| 13 | IO_L3P_SM5P_13 | AF41 | |
| 13 | IO_L3N_SM5N_13 | AF42 | |
| 13 | IO_L4P_13 | AF40 | |
| 13 | IO_L4N_VREF_13 | AG41 | |
| 13 | IO_L5P_SM4P_13 | AG42 | |
| 13 | IO_L5N_SM4N_13 | AH41 | |
| 13 | IO_L6P_SM3P_13 | AJ42 | |
| 13 | IO_L6N_SM3N_13 | AJ41 | |
| 13 | IO_L7P_SM2P_13 | AH40 | |
| 13 | IO_L7N_SM2N_13 | AJ40 | |
| 13 | IO_L8P_CC_SM1P_13 | AB37 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AB38 | |
| 13 | IO_L9P_CC_SM0P_13 | AB39 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AC38 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 13 | IO_L10P_CC_13 | AE40 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | AD40 | |
| 13 | IO_L11P_CC_13 | AC40 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AC39 | |
| 13 | IO_L12P_VRN_13 | AK40 | |
| 13 | IO_L12N_VRP_13 | AL40 | |
| 13 | IO_L13P_13 | AL41 | |
| 13 | IO_L13N_13 | AK42 | |
| 13 | IO_L14P_13 | AL42 | |
| 13 | IO_L14N_VREF_13 | AM42 | |
| 13 | IO_L15P_13 | AM41 | |
| 13 | IO_L15N_13 | AN41 | |
| 13 | IO_L16P_13 | AP42 | |
| 13 | IO_L16N_13 | AP41 | |
| 13 | IO_L17P_13 | AR42 | |
| 13 | IO_L17N_13 | AT42 | |
| 13 | IO_L18P_13 | AT41 | |
| 13 | IO_L18N_13 | AU41 | |
| 13 | IO_L19P_13 | AU42 | |
| 13 | IO_L19N_13 | AV41 | |
| 15 | IO_L0P_15 | H38 | |
| 15 | IO_L0N_15 | H39 | |
| 15 | IO_L1P_15 | G38 | |
| 15 | IO_L1N_15 | G39 | |
| 15 | IO_L2P_15 | F39 | |
| 15 | IO_L2N_15 | F40 | |
| 15 | IO_L3P_15 | E39 | |
| 15 | IO_L3N_15 | E40 | |
| 15 | IO_L4P_15 | R39 | |
| 15 | IO_L4N_VREF_15 | R38 | |
| 15 | IO_L5P_15 | R37 | |
| 15 | IO_L5N_15 | P37 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 15 | IO_L6P_15 | P38 | |
| 15 | IO_L6N_15 | N38 | |
| 15 | IO_L7P_15 | N39 | |
| 15 | IO_L7N_15 | M39 | |
| 15 | IO_L8P_CC_15 | M38 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | L39 | |
| 15 | IO_L9P_CC_15 | K38 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | J38 | |
| 15 | IO_L10P_CC_15 | H40 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | J40 | |
| 15 | IO_L11P_CC_15 | K40 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | K39 | |
| 15 | IO_L12P_VRN_15 | V38 | |
| 15 | IO_L12N_VRP_15 | U37 | |
| 15 | IO_L13P_15 | T37 | |
| 15 | IO_L13N_15 | U38 | |
| 15 | IO_L14P_15 | T39 | |
| 15 | IO_L14N_VREF_15 | U39 | |
| 15 | IO_L15P_15 | V39 | |
| 15 | IO_L15N_15 | W38 | |
| 15 | IO_L16P_15 | AA35 | |
| 15 | IO_L16N_15 | AA36 | |
| 15 | IO_L17P_15 | AA34 | |
| 15 | IO_L17N_15 | Y34 | |
| 15 | IO_L18P_15 | Y35 | |
| 15 | IO_L18N_15 | W35 | |
| 15 | IO_L19P_15 | W36 | |
| 15 | IO_L19N_15 | W37 | |
| 17 | IO_L0P_17 | AB34 | |
| 17 | IO_L0N_17 | AC34 | |
| 17 | IO_L1P_17 | AC35 | |
| 17 | IO_L1N_17 | AB36 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L2P_17 | AC36 | |
| 17 | IO_L2N_17 | AD35 | |
| 17 | IO_L3P_17 | AD36 | |
| 17 | IO_L3N_17 | AD37 | |
| 17 | IO_L4P_17 | AE37 | |
| 17 | IO_L4N_VREF_17 | AD38 | |
| 17 | IO_L5P_17 | AE39 | |
| 17 | IO_L5N_17 | AE38 | |
| 17 | IO_L6P_17 | AF39 | |
| 17 | IO_L6N_17 | AG38 | |
| 17 | IO_L7P_17 | AG37 | |
| 17 | IO_L7N_17 | AF37 | |
| 17 | IO_L8P_CC_17 | AN40 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | AP40 | |
| 17 | IO_L9P_CC_17 | AR40 | |
| 17 | IO_L9N_CC_17 ⁽²⁾ | AT40 | |
| 17 | IO_L10P_CC_17 | AV40 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | AU39 | |
| 17 | IO_L11P_CC_17 | AT39 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AR39 | |
| 17 | IO_L12P_VRN_17 | AG39 | |
| 17 | IO_L12N_VRP_17 | AH39 | |
| 17 | IO_L13P_17 | AJ38 | |
| 17 | IO_L13N_17 | AK39 | |
| 17 | IO_L14P_17 | AK38 | |
| 17 | IO_L14N_VREF_17 | AK37 | |
| 17 | IO_L15P_17 | AJ37 | |
| 17 | IO_L15N_17 | AH38 | |
| 17 | IO_L16P_17 | AL39 | |
| 17 | IO_L16N_17 | AM39 | |
| 17 | IO_L17P_17 | AN39 | |
| 17 | IO_L17N_17 | AP38 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 17 | IO_L18P_17 | AN38 | |
| 17 | IO_L18N_17 | AM38 | |
| 17 | IO_L19P_17 | AM37 | |
| 17 | IO_L19N_17 | AL37 | |
| 18 | IO_L0P_18 | AJ7 | |
| 18 | IO_L0N_18 | AK7 | |
| 18 | IO_L1P_18 | AB11 | |
| 18 | IO_L1N_18 | AC10 | |
| 18 | IO_L2P_18 | AL5 | |
| 18 | IO_L2N_18 | AK5 | |
| 18 | IO_L3P_18 | AB9 | |
| 18 | IO_L3N_18 | AB8 | |
| 18 | IO_L4P_18 | AJ6 | |
| 18 | IO_L4N_VREF_18 | AJ5 | |
| 18 | IO_L5P_18 | AC8 | |
| 18 | IO_L5N_18 | AC9 | |
| 18 | IO_L6P_18 | AH6 | |
| 18 | IO_L6N_18 | AH5 | |
| 18 | IO_L7P_18 | AD10 | |
| 18 | IO_L7N_18 | AD11 | |
| 18 | IO_L8P_CC_18 | AG4 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | AH4 | |
| 18 | IO_L9P_CC_18 | AB7 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | AB6 | |
| 18 | IO_L10P_CC_18 | AC5 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AC6 | |
| 18 | IO_L11P_CC_18 | AF5 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | AF6 | |
| 18 | IO_L12P_VRN_18 | AD6 | |
| 18 | IO_L12N_VRP_18 | AD7 | |
| 18 | IO_L13P_18 | AG6 | |
| 18 | IO_L13N_18 | AG7 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 18 | IO_L14P_18 | AE5 | |
| 18 | IO_L14N_VREF_18 | AD5 | |
| 18 | IO_L15P_18 | AF7 | |
| 18 | IO_L15N_18 | AE7 | |
| 18 | IO_L16P_18 | AD8 | |
| 18 | IO_L16N_18 | AE8 | |
| 18 | IO_L17P_18 | AF9 | |
| 18 | IO_L17N_18 | AF10 | |
| 18 | IO_L18P_18 | AE9 | |
| 18 | IO_L18N_18 | AE10 | |
| 18 | IO_L19P_18 | AF11 | |
| 18 | IO_L19N_18 | AF12 | |
| 19 | IO_L0P_19 | R34 | |
| 19 | IO_L0N_19 | P35 | |
| 19 | IO_L1P_19 | N35 | |
| 19 | IO_L1N_19 | M36 | |
| 19 | IO_L2P_19 | L37 | |
| 19 | IO_L2N_19 | M37 | |
| 19 | IO_L3P_19 | N36 | |
| 19 | IO_L3N_19 | P36 | |
| 19 | IO_L4P_19 | L36 | |
| 19 | IO_L4N_VREF_19 | L35 | |
| 19 | IO_L5P_19 | K35 | |
| 19 | IO_L5N_19 | J35 | |
| 19 | IO_L6P_19 | H35 | |
| 19 | IO_L6N_19 | J36 | |
| 19 | IO_L7P_19 | K37 | |
| 19 | IO_L7N_19 | J37 | |
| 19 | IO_L8P_CC_19 | U34 | |
| 19 | IO_L8N_CC_19 ⁽²⁾ | T35 | |
| 19 | IO_L9P_CC_19 | T34 | |
| 19 | IO_L9N_CC_19 ⁽²⁾ | U33 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 19 | IO_L10P_CC_19 | R35 | |
| 19 | IO_L10N_CC_19 ⁽²⁾ | T36 | |
| 19 | IO_L11P_CC_19 | U36 | |
| 19 | IO_L11N_CC_19 ⁽²⁾ | V36 | |
| 19 | IO_L12P_VRN_19 | H36 | |
| 19 | IO_L12N_VRP_19 | G37 | |
| 19 | IO_L13P_19 | F36 | |
| 19 | IO_L13N_19 | G36 | |
| 19 | IO_L14P_19 | F37 | |
| 19 | IO_L14N_VREF_19 | E37 | |
| 19 | IO_L15P_19 | E38 | |
| 19 | IO_L15N_19 | D37 | |
| 19 | IO_L16P_19 | V35 | |
| 19 | IO_L16N_19 | V34 | |
| 19 | IO_L17P_19 | V33 | |
| 19 | IO_L17N_19 | W33 | |
| 19 | IO_L18P_19 | Y33 | |
| 19 | IO_L18N_19 | W32 | |
| 19 | IO_L19P_19 | Y32 | |
| 19 | IO_L19N_19 | AA32 | |
| 20 | IO_L0P_20 | N9 | |
| 20 | IO_L0N_20 | N8 | |
| 20 | IO_L1P_20 | E9 | |
| 20 | IO_L1N_20 | E8 | |
| 20 | IO_L2P_20 | P7 | |
| 20 | IO_L2N_20 | P8 | |
| 20 | IO_L3P_20 | D7 | |
| 20 | IO_L3N_20 | E7 | |
| 20 | IO_L4P_20 | R7 | |
| 20 | IO_L4N_VREF_20 | R8 | |
| 20 | IO_L5P_20 | F7 | |
| 20 | IO_L5N_20 | F6 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 20 | IO_L6P_20 | R9 | |
| 20 | IO_L6N_20 | T9 | |
| 20 | IO_L7P_20 | E5 | |
| 20 | IO_L7N_20 | F5 | |
| 20 | IO_L8P_CC_20 | V9 | |
| 20 | IO_L8N_CC_20 ⁽²⁾ | V10 | |
| 20 | IO_L9P_CC_20 | F9 | |
| 20 | IO_L9N_CC_20 ⁽²⁾ | G9 | |
| 20 | IO_L10P_CC_20 | G7 | |
| 20 | IO_L10N_CC_20 ⁽²⁾ | G8 | |
| 20 | IO_L11P_CC_20 | U8 | |
| 20 | IO_L11N_CC_20 ⁽²⁾ | U9 | |
| 20 | IO_L12P_VRN_20 | H8 | |
| 20 | IO_L12N_VRP_20 | H9 | |
| 20 | IO_L13P_20 | T10 | |
| 20 | IO_L13N_20 | T11 | |
| 20 | IO_L14P_20 | J8 | |
| 20 | IO_L14N_VREF_20 | J7 | |
| 20 | IO_L15P_20 | U11 | |
| 20 | IO_L15N_20 | V11 | |
| 20 | IO_L16P_20 | K8 | |
| 20 | IO_L16N_20 | K9 | |
| 20 | IO_L17P_20 | K7 | |
| 20 | IO_L17N_20 | L7 | |
| 20 | IO_L18P_20 | M7 | |
| 20 | IO_L18N_20 | M8 | |
| 20 | IO_L19P_20 | M9 | |
| 20 | IO_L19N_20 | L9 | |
| 21 | IO_L0P_21 | AB33 | |
| 21 | IO_L0N_21 | AB32 | |
| 21 | IO_L1P_21 | AC33 | |
| 21 | IO_L1N_21 | AD32 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L2P_21 | AD33 | |
| 21 | IO_L2N_21 | AE32 | |
| 21 | IO_L3P_21 | AE33 | |
| 21 | IO_L3N_21 | AE34 | |
| 21 | IO_L4P_21 | AV39 | |
| 21 | IO_L4N_VREF_21 | AV38 | |
| 21 | IO_L5P_21 | AU38 | |
| 21 | IO_L5N_21 | AU37 | |
| 21 | IO_L6P_21 | AT37 | |
| 21 | IO_L6N_21 | AR38 | |
| 21 | IO_L7P_21 | AR37 | |
| 21 | IO_L7N_21 | AT36 | |
| 21 | IO_L8P_CC_21 | AE35 | |
| 21 | IO_L8N_CC_21 ⁽²⁾ | AF34 | |
| 21 | IO_L9P_CC_21 | AF35 | |
| 21 | IO_L9N_CC_21 ⁽²⁾ | AF36 | |
| 21 | IO_L10P_CC_21 | AH34 | |
| 21 | IO_L10N_CC_21 ⁽²⁾ | AG34 | |
| 21 | IO_L11P_CC_21 | AH35 | |
| 21 | IO_L11N_CC_21 ⁽²⁾ | AG36 | |
| 21 | IO_L12P_VRN_21 | AP37 | |
| 21 | IO_L12N_VRP_21 | AP36 | |
| 21 | IO_L13P_21 | AP35 | |
| 21 | IO_L13N_21 | AN36 | |
| 21 | IO_L14P_21 | AM36 | |
| 21 | IO_L14N_VREF_21 | AN35 | |
| 21 | IO_L15P_21 | AN34 | |
| 21 | IO_L15N_21 | AM34 | |
| 21 | IO_L16P_21 | AH36 | |
| 21 | IO_L16N_21 | AJ36 | |
| 21 | IO_L17P_21 | AJ35 | |
| 21 | IO_L17N_21 | AK35 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 21 | IO_L18P_21 | AL36 | |
| 21 | IO_L18N_21 | AL35 | |
| 21 | IO_L19P_21 | AL34 | |
| 21 | IO_L19N_21 | AK34 | |
| 23 | IO_L0P_23 | N33 | |
| 23 | IO_L0N_23 | N34 | |
| 23 | IO_L1P_23 | M34 | |
| 23 | IO_L1N_23 | M33 | |
| 23 | IO_L2P_23 | M32 | |
| 23 | IO_L2N_23 | M31 | |
| 23 | IO_L3P_23 | N31 | |
| 23 | IO_L3N_23 | P31 | |
| 23 | IO_L4P_23 | H34 | |
| 23 | IO_L4N_VREF_23 | G34 | |
| 23 | IO_L5P_23 | G33 | |
| 23 | IO_L5N_23 | H33 | |
| 23 | IO_L6P_23 | G32 | |
| 23 | IO_L6N_23 | G31 | |
| 23 | IO_L7P_23 | H31 | |
| 23 | IO_L7N_23 | J31 | |
| 23 | IO_L8P_CC_23 | F35 | |
| 23 | IO_L8N_CC_23 ⁽²⁾ | E35 | |
| 23 | IO_L9P_CC_23 | E34 | |
| 23 | IO_L9N_CC_23 ⁽²⁾ | F34 | |
| 23 | IO_L10P_CC_23 | F31 | |
| 23 | IO_L10N_CC_23 ⁽²⁾ | F32 | |
| 23 | IO_L11P_CC_23 | E32 | |
| 23 | IO_L11N_CC_23 ⁽²⁾ | E33 | |
| 23 | IO_L12P_VRN_23 | L34 | |
| 23 | IO_L12N_VRP_23 | K34 | |
| 23 | IO_L13P_23 | K33 | |
| 23 | IO_L13N_23 | J33 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 23 | IO_L14P_23 | K32 | |
| 23 | IO_L14N_VREF_23 | J32 | |
| 23 | IO_L15P_23 | L32 | |
| 23 | IO_L15N_23 | L31 | |
| 23 | IO_L16P_23 | P33 | |
| 23 | IO_L16N_23 | P32 | |
| 23 | IO_L17P_23 | R33 | |
| 23 | IO_L17N_23 | R32 | |
| 23 | IO_L18P_23 | T32 | |
| 23 | IO_L18N_23 | U32 | |
| 23 | IO_L19P_23 | U31 | |
| 23 | IO_L19N_23 | T31 | |
| 24 | IO_L0P_24 | J12 | |
| 24 | IO_L0N_24 | H11 | |
| 24 | IO_L1P_24 | G12 | |
| 24 | IO_L1N_24 | G11 | |
| 24 | IO_L2P_24 | F12 | |
| 24 | IO_L2N_24 | F11 | |
| 24 | IO_L3P_24 | E10 | |
| 24 | IO_L3N_24 | F10 | |
| 24 | IO_L4P_24 | K14 | |
| 24 | IO_L4N_VREF_24 | K13 | |
| 24 | IO_L5P_24 | K12 | |
| 24 | IO_L5N_24 | J11 | |
| 24 | IO_L6P_24 | J13 | |
| 24 | IO_L6N_24 | H13 | |
| 24 | IO_L7P_24 | H10 | |
| 24 | IO_L7N_24 | J10 | |
| 24 | IO_L8P_CC_24 | H14 | |
| 24 | IO_L8N_CC_24 ⁽²⁾ | H15 | |
| 24 | IO_L9P_CC_24 | K10 | |
| 24 | IO_L9N_CC_24 ⁽²⁾ | L10 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 24 | IO_L10P_CC_24 | L12 | |
| 24 | IO_L10N_CC_24 ⁽²⁾ | L11 | |
| 24 | IO_L11P_CC_24 | G13 | |
| 24 | IO_L11N_CC_24 ⁽²⁾ | G14 | |
| 24 | IO_L12P_VRN_24 | M11 | |
| 24 | IO_L12N_VRP_24 | M12 | |
| 24 | IO_L13P_24 | F14 | |
| 24 | IO_L13N_24 | E13 | |
| 24 | IO_L14P_24 | N11 | |
| 24 | IO_L14N_VREF_24 | P12 | |
| 24 | IO_L15P_24 | E12 | |
| 24 | IO_L15N_24 | D12 | |
| 24 | IO_L16P_24 | P11 | |
| 24 | IO_L16N_24 | N10 | |
| 24 | IO_L17P_24 | D13 | |
| 24 | IO_L17N_24 | E14 | |
| 24 | IO_L18P_24 | R10 | |
| 24 | IO_L18N_24 | P10 | |
| 24 | IO_L19P_24 | E15 | |
| 24 | IO_L19N_24 | F15 | |
| 25 | IO_L0P_25 | AG31 | |
| 25 | IO_L0N_25 | AF31 | |
| 25 | IO_L1P_25 | AF32 | |
| 25 | IO_L1N_25 | AG33 | |
| 25 | IO_L2P_25 | AH33 | |
| 25 | IO_L2N_25 | AG32 | |
| 25 | IO_L3P_25 | AH31 | |
| 25 | IO_L3N_25 | AJ31 | |
| 25 | IO_L4P_25 | AV35 | |
| 25 | IO_L4N_VREF_25 | AV36 | |
| 25 | IO_L5P_25 | AU36 | |
| 25 | IO_L5N_25 | AT35 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 25 | IO_L6P_25 | AU34 | |
| 25 | IO_L6N_25 | AT34 | |
| 25 | IO_L7P_25 | AR35 | |
| 25 | IO_L7N_25 | AR34 | |
| 25 | IO_L8P_CC_25 | AU32 | |
| 25 | IO_L8N_CC_25 ⁽²⁾ | AU33 | |
| 25 | IO_L9P_CC_25 | AV33 | |
| 25 | IO_L9N_CC_25 ⁽²⁾ | AV34 | |
| 25 | IO_L10P_CC_25 | AV31 | |
| 25 | IO_L10N_CC_25 ⁽²⁾ | AU31 | |
| 25 | IO_L11P_CC_25 | AT32 | |
| 25 | IO_L11N_CC_25 ⁽²⁾ | AT31 | |
| 25 | IO_L12P_VRN_25 | AP31 | |
| 25 | IO_L12N_VRP_25 | AN31 | |
| 25 | IO_L13P_25 | AR32 | |
| 25 | IO_L13N_25 | AP32 | |
| 25 | IO_L14P_25 | AR33 | |
| 25 | IO_L14N_VREF_25 | AP33 | |
| 25 | IO_L15P_25 | AN33 | |
| 25 | IO_L15N_25 | AM33 | |
| 25 | IO_L16P_25 | AK33 | |
| 25 | IO_L16N_25 | AJ33 | |
| 25 | IO_L17P_25 | AJ32 | |
| 25 | IO_L17N_25 | AK32 | |
| 25 | IO_L18P_25 | AL32 | |
| 25 | IO_L18N_25 | AM32 | |
| 25 | IO_L19P_25 | AL31 | |
| 25 | IO_L19N_25 | AM31 | |
| 26 | IO_L0P_26 | AT7 | |
| 26 | IO_L0N_26 | AR7 | |
| 26 | IO_L1P_26 | AG12 | |
| 26 | IO_L1N_26 | AG11 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 26 | IO_L2P_26 | AT6 | |
| 26 | IO_L2N_26 | AR5 | |
| 26 | IO_L3P_26 | AG9 | |
| 26 | IO_L3N_26 | AH9 | |
| 26 | IO_L4P_26 | AT5 | |
| 26 | IO_L4N_VREF_26 | AU6 | |
| 26 | IO_L5P_26 | AH10 | |
| 26 | IO_L5N_26 | AH11 | |
| 26 | IO_L6P_26 | AV6 | |
| 26 | IO_L6N_26 | AV5 | |
| 26 | IO_L7P_26 | AJ11 | |
| 26 | IO_L7N_26 | AJ10 | |
| 26 | IO_L8P_CC_26 | AM9 | |
| 26 | IO_L8N_CC_26 ⁽²⁾ | AN9 | |
| 26 | IO_L9P_CC_26 | AG8 | |
| 26 | IO_L9N_CC_26 ⁽²⁾ | AH8 | |
| 26 | IO_L10P_CC_26 | AK8 | |
| 26 | IO_L10N_CC_26 ⁽²⁾ | AJ8 | |
| 26 | IO_L11P_CC_26 | AN8 | |
| 26 | IO_L11N_CC_26 ⁽²⁾ | AP8 | |
| 26 | IO_L12P_VRN_26 | AK9 | |
| 26 | IO_L12N_VRP_26 | AK10 | |
| 26 | IO_L13P_26 | AP7 | |
| 26 | IO_L13N_26 | AR8 | |
| 26 | IO_L14P_26 | AL9 | |
| 26 | IO_L14N_VREF_26 | AL10 | |
| 26 | IO_L15P_26 | AP6 | |
| 26 | IO_L15N_26 | AP5 | |
| 26 | IO_L16P_26 | AL6 | |
| 26 | IO_L16N_26 | AL7 | |
| 26 | IO_L17P_26 | AN4 | |
| 26 | IO_L17N_26 | AN5 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 26 | IO_L18P_26 | AN6 | |
| 26 | IO_L18N_26 | AM6 | |
| 26 | IO_L19P_26 | AM7 | |
| 26 | IO_L19N_26 | AM8 | |
| 27 | IO_L0P_27 | D31 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L0N_27 | C31 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L1P_27 | C30 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L1N_27 | B31 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L2P_27 | A30 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L2N_27 | A31 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L3P_27 | A32 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L3N_27 | B32 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L4P_27 | B33 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L4N_VREF_27 | C33 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L5P_27 | D32 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L5N_27 | D33 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L6P_27 | C34 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L6N_27 | B34 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L7P_27 | A34 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L7N_27 | A35 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L8P_CC_27 | D35 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L8N_CC_27 ⁽²⁾ | D36 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|--------------------------------|
| 27 | IO_L9P_CC_27 | C36 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L9N_CC_27 ⁽²⁾ | C35 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L10P_CC_27 | A37 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L10N_CC_27 ⁽²⁾ | A36 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L11P_CC_27 | B37 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L11N_CC_27 ⁽²⁾ | B36 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L12P_VRN_27 | C38 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L12N_VRP_27 | D38 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L13P_27 | C39 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L13N_27 | C40 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L14P_27 | B39 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L14N_VREF_27 | B38 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L15P_27 | A39 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L15N_27 | A40 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L16P_27 | A41 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L16N_27 | B41 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L17P_27 | B42 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L17N_27 | C41 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L18P_27 | D40 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L18N_27 | D41 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--------------------------------|
| 27 | IO_L19P_27 | E42 | FX100T, LX110T, LX155T, LX220T |
| 27 | IO_L19N_27 | D42 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L0P_29 | AY42 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L0N_29 | AW42 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L1P_29 | AW41 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L1N_29 | AW40 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L2P_29 | AY40 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L2N_29 | BA41 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L3P_29 | BA42 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L3N_29 | BB41 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L4P_29 | BA40 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L4N_VREF_29 | BB39 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L5P_29 | BB38 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L5N_29 | BA39 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L6P_29 | AY38 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L6N_29 | AW37 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L7P_29 | AW38 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L7N_29 | AY39 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L8P_CC_29 | BB37 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L8N_CC_29 ⁽²⁾ | BA37 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|--------------------------------|
| 29 | IO_L9P_CC_29 | AY37 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L9N_CC_29 ⁽²⁾ | AW36 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L10P_CC_29 | BB36 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L10N_CC_29 ⁽²⁾ | BA36 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L11P_CC_29 | AY35 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L11N_CC_29 ⁽²⁾ | AW35 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L12P_VRN_29 | BB34 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L12N_VRP_29 | BA35 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L13P_29 | BB33 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L13N_29 | BA34 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L14P_29 | AY33 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L14N_VREF_29 | AY34 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L15P_29 | AW33 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L15N_29 | AW32 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L16P_29 | AY32 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L16N_29 | BA32 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L17P_29 | BB32 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L17N_29 | BB31 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L18P_29 | BA30 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L18N_29 | BA31 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--|
| 29 | IO_L19P_29 | AY30 | FX100T, LX110T, LX155T, LX220T |
| 29 | IO_L19N_29 | AW31 | FX100T, LX110T, LX155T, LX220T |
| 31 | IO_L0P_31 | D20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L0N_31 | D21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L1P_31 | C21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L1N_31 | C20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L2P_31 | A20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L2N_31 | A21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L3P_31 | A22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L3N_31 | B21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L4P_31 | D22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L4N_VREF_31 | D23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L5P_31 | C23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L5N_31 | B22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L6P_31 | B23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L6N_31 | A24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L7P_31 | B24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L7N_31 | C24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L8P_CC_31 | E24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L8N_CC_31 ⁽²⁾ | E25 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|--|
| 31 | IO_L9P_CC_31 | D25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L9N_CC_31 ⁽²⁾ | D26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L10P_CC_31 | E28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L10N_CC_31 ⁽²⁾ | E27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L11P_CC_31 | D27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L11N_CC_31 ⁽²⁾ | C26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L12P_VRN_31 | C25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L12N_VRP_31 | B26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L13P_31 | A26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L13N_31 | A25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L14P_31 | A27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L14N_VREF_31 | B27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L15P_31 | B28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L15N_31 | A29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L16P_31 | F30 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L16N_31 | E30 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L17P_31 | E29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L17N_31 | D30 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L18P_31 | C29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L18N_31 | B29 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--|
| 31 | IO_L19P_31 | C28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 31 | IO_L19N_31 | D28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L0P_33 | BB29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L0N_33 | BB28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L1P_33 | BB27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L1N_33 | BA27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L2P_33 | BB26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L2N_33 | BA26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L3P_33 | BA25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L3N_33 | AY25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L4P_33 | AW30 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L4N_VREF_33 | AV30 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L5P_33 | AV29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L5N_33 | AW28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L6P_33 | AY27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L6N_33 | AY28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L7P_33 | AY29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L7N_33 | BA29 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L8P_CC_33 | BB24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L8N_CC_33 ⁽²⁾ | BA24 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|--|
| 33 | IO_L9P_CC_33 | AY24 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L9N_CC_33 ⁽²⁾ | AW25 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L10P_CC_33 | AV28 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L10N_CC_33 ⁽²⁾ | AW27 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L11P_CC_33 | AV26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L11N_CC_33 ⁽²⁾ | AW26 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L12P_VRN_33 | BB22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L12N_VRP_33 | BB23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L13P_33 | BB21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L13N_33 | BA22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L14P_33 | AY22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L14N_VREF_33 | AY23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L15P_33 | AW23 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L15N_33 | AW22 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L16P_33 | BB20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L16N_33 | BA21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L17P_33 | BA20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L17N_33 | BA19 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L18P_33 | AY19 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L18N_33 | AY20 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|--|
| 33 | IO_L19P_33 | AW21 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 33 | IO_L19N_33 | AW20 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L0P_34 | AW18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L0N_34 | AV19 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L1P_34 | AL11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L1N_34 | AL12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L2P_34 | AV18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L2N_34 | AU17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L3P_34 | AM11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L3N_34 | AM12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L4P_34 | AV16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L4N_VREF_34 | AU16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L5P_34 | AN11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L5N_34 | AN10 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L6P_34 | AV15 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L6N_34 | AV14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L7P_34 | AP10 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L7N_34 | AR9 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L8P_CC_34 | AW13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L8N_CC_34 ⁽²⁾ | AV13 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|--|
| 34 | IO_L9P_CC_34 | AP11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L9N_CC_34 ⁽²⁾ | AP12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L10P_CC_34 | AR10 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L10N_CC_34 ⁽²⁾ | AT10 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L11P_CC_34 | AW12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L11N_CC_34 ⁽²⁾ | AV11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L12P_VRN_34 | AT11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L12N_VRP_34 | AR12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L13P_34 | AU11 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L13N_34 | AU12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L14P_34 | AR13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L14N_VREF_34 | AT12 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L15P_34 | AU14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L15N_34 | AU13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L16P_34 | AW7 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L16N_34 | AV8 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L17P_34 | AV10 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L17N_34 | AV9 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L18P_34 | AU9 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L18N_34 | AT9 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|--|
| 34 | IO_L19P_34 | AU8 | FX100T, LX110T, FX130T, LX155T, LX220T |
| 34 | IO_L19N_34 | AU7 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXP0_112 | T2 | |
| NA | MGTAVT'TTX_112 | AA3 | |
| NA | MGTTXN0_112 | U2 | |
| NA | MGTRXP0_112 | U1 | |
| NA | MGTAVT'TRX_112 | U3 | |
| NA | MGTRXN0_112 | V1 | |
| NA | MGTAVCCPLL_112 | Y3 | |
| NA | MGTRXN1_112 | W1 | |
| NA | MGTREFCLKN_112 | V3 | |
| NA | MGTRXP1_112 | Y1 | |
| NA | MGTREFCLKP_112 | V4 | |
| NA | MGTTXN1_112 | Y2 | |
| NA | MGTAVT'TTX_112 | T3 | |
| NA | MGTTXP1_112 | AA2 | |
| NA | MGTAVT'TRXC | AA5 | |
| NA | MGTRREF_112 | AB4 | |
| NC | NC | Y5 | FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, LX330T |
| NA | MGTTXP0_114 | AB2 | |
| NA | MGTAVT'TTX_114 | AB3 | |
| NA | MGTTXN0_114 | AC2 | |
| NA | MGTRXP0_114 | AC1 | |
| NA | MGTAVT'TRX_114 | AC3 | |
| NA | MGTRXN0_114 | AD1 | |
| NA | MGTAVCCPLL_114 | AF3 | |
| NA | MGTRXN1_114 | AE1 | |
| NA | MGTREFCLKN_114 | AD3 | |
| NA | MGTRXP1_114 | AF1 | |
| NA | MGTREFCLKP_114 | AD4 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTTXN1_114 | AF2 | |
| NA | MGTAVTTTX_114 | AG3 | |
| NA | MGTTXP1_114 | AG2 | |
| NA | MGTTXP0_116 | K2 | |
| NA | MGTAVTTTX_116 | K3 | |
| NA | MGTTXN0_116 | L2 | |
| NA | MGTRXP0_116 | L1 | |
| NA | MGTAVTTRX_116 | L3 | |
| NA | MGTRXN0_116 | M1 | |
| NA | MGTAVCCPLL_116 | P3 | |
| NA | MGTRXN1_116 | N1 | |
| NA | MGTREFCLKN_116 | M3 | |
| NA | MGTRXP1_116 | P1 | |
| NA | MGTREFCLKP_116 | M4 | |
| NA | MGTTXN1_116 | P2 | |
| NA | MGTAVTTTX_116 | R3 | |
| NA | MGTTXP1_116 | R2 | |
| NA | MGTTXP0_118 | AH2 | |
| NA | MGTAVTTTX_118 | AH3 | |
| NA | MGTTXN0_118 | AJ2 | |
| NA | MGTRXP0_118 | AJ1 | |
| NA | MGTAVTTRX_118 | AJ3 | |
| NA | MGTRXN0_118 | AK1 | |
| NA | MGTAVCCPLL_118 | AM3 | |
| NA | MGTRXN1_118 | AL1 | |
| NA | MGTREFCLKN_118 | AK3 | |
| NA | MGTRXP1_118 | AM1 | |
| NA | MGTREFCLKP_118 | AK4 | |
| NA | MGTTXN1_118 | AM2 | |
| NA | MGTAVTTTX_118 | AN3 | |
| NA | MGTTXP1_118 | AN2 | |
| NA | MGTTXP0_120 | D2 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTAVTTTX_120 | D3 | |
| NA | MGTTXN0_120 | E2 | |
| NA | MGTRXP0_120 | E1 | |
| NA | MGTAVTTRX_120 | E3 | |
| NA | MGTRXN0_120 | F1 | |
| NA | MGTAVCCPLL_120 | H3 | |
| NA | MGTRXN1_120 | G1 | |
| NA | MGTREFCLKN_120 | F3 | |
| NA | MGTRXP1_120 | H1 | |
| NA | MGTREFCLKP_120 | F4 | |
| NA | MGTTXN1_120 | H2 | |
| NA | MGTAVTTTX_120 | J3 | |
| NA | MGTTXP1_120 | J2 | |
| NA | MGTTXP0_122 | AP2 | |
| NA | MGTAVTTTX_122 | AP3 | |
| NA | MGTTXN0_122 | AR2 | |
| NA | MGTRXP0_122 | AR1 | |
| NA | MGTAVTTRX_122 | AR3 | |
| NA | MGTRXN0_122 | AT1 | |
| NA | MGTAVCCPLL_122 | AV3 | |
| NA | MGTRXN1_122 | AU1 | |
| NA | MGTREFCLKN_122 | AT3 | |
| NA | MGTRXP1_122 | AV1 | |
| NA | MGTREFCLKP_122 | AT4 | |
| NA | MGTTXN1_122 | AV2 | |
| NA | MGTAVTTTX_122 | AW3 | |
| NA | MGTTXP1_122 | AW2 | |
| NA | MGTTXP0_124 | B6 | |
| NA | MGTAVTTTX_124 | C1 | |
| NA | MGTTXN0_124 | B5 | |
| NA | MGTRXP0_124 | A5 | |
| NA | MGTAVTTRX_124 | C5 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------------------------|
| NA | MGTRXN0_124 | A4 | |
| NA | MGTAVCCPLL_124 | C2 | |
| NA | MGTRXN1_124 | A3 | |
| NA | MGTREFCLKN_124 | C3 | |
| NA | MGTRXP1_124 | A2 | |
| NA | MGTREFCLKP_124 | C4 | |
| NA | MGTTXN1_124 | B2 | |
| NA | MGTAVTTTX_124 | C6 | |
| NA | MGTTXP1_124 | B1 | |
| NA | MGTTXP0_126 | BA1 | |
| NA | MGTAVTTTX_126 | AY1 | |
| NA | MGTTXN0_126 | BA2 | |
| NA | MGTRXP0_126 | BB2 | |
| NA | MGTAVTTRX_126 | AY2 | |
| NA | MGTRXN0_126 | BB3 | |
| NA | MGTAVCCPLL_126 | AY5 | |
| NA | MGTRXN1_126 | BB4 | |
| NA | MGTREFCLKN_126 | AY4 | |
| NA | MGTRXP1_126 | BB5 | |
| NA | MGTREFCLKP_126 | AW4 | |
| NA | MGTTXN1_126 | BA5 | |
| NA | MGTAVTTTX_126 | AY6 | |
| NA | MGTTXP1_126 | BA6 | |
| NA | MGTTXP0_128 | B12 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVTTTX_128 | C12 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXN0_128 | B11 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXP0_128 | A11 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVTTRX_128 | C11 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXN0_128 | A10 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|--------------------------------|
| NA | MGTAVCCPLL_128 | C8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXN1_128 | A9 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTREFCLKN_128 | C10 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXP1_128 | A8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTREFCLKP_128 | D10 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXN1_128 | B8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVTTTX_128 | C7 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXP1_128 | B7 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXP0_130 | BA7 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVTTTX_130 | AY12 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXN0_130 | BA8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXP0_130 | BB8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVTTRX_130 | AY8 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXN0_130 | BB9 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTAVCCPLL_130 | AY11 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXN1_130 | BB10 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTREFCLKN_130 | AY9 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTRXP1_130 | BB11 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTREFCLKP_130 | AW9 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXN1_130 | BA11 | FX100T, LX110T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|--|
| NA | MGTAVTTTX_130 | AY7 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXP1_130 | BA12 | FX100T, LX110T, LX155T, LX220T |
| NA | MGTTXP0_132 | B18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVTTTX_132 | C13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXN0_132 | B17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXP0_132 | A17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVTTRX_132 | C17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXN0_132 | A16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVCCPLL_132 | C14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXN1_132 | A15 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTREFCLKN_132 | C16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXP1_132 | A14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTREFCLKP_132 | D16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXN1_132 | B14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVTTTX_132 | C18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXP1_132 | B13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXP0_134 | BA13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVTTTX_134 | AY13 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXN0_134 | BA14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXP0_134 | BB14 | FX100T, LX110T, FX130T, LX155T, LX220T |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|--|
| NA | MGTAVTTRX_134 | AY14 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXN0_134 | BB15 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVCCPLL_134 | AY17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXN1_134 | BB16 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTREFCLKN_134 | AY15 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTRXP1_134 | BB17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTREFCLKP_134 | AW15 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXN1_134 | BA17 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTAVTTTX_134 | AY18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | MGTTXP1_134 | BA18 | FX100T, LX110T, FX130T, LX155T, LX220T |
| NA | GND | F2 | |
| NA | GND | G2 | |
| NA | GND | M2 | |
| NA | GND | N2 | |
| NA | GND | V2 | |
| NA | GND | W2 | |
| NA | GND | AD2 | |
| NA | GND | AE2 | |
| NA | GND | AK2 | |
| NA | GND | AL2 | |
| NA | GND | AT2 | |
| NA | GND | AU2 | |
| NA | GND | B3 | |
| NA | GND | BA3 | |
| NA | GND | B4 | |
| NA | GND | E4 | |
| NA | GND | H4 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | J4 | |
| NA | GND | L4 | |
| NA | GND | P4 | |
| NA | GND | U4 | |
| NA | GND | Y4 | |
| NA | GND | AC4 | |
| NA | GND | AF4 | |
| NA | GND | AJ4 | |
| NA | GND | AM4 | |
| NA | GND | AP4 | |
| NA | GND | AR4 | |
| NA | GND | AV4 | |
| NA | GND | BA4 | |
| NA | GND | G5 | |
| NA | GND | M5 | |
| NA | GND | U5 | |
| NA | GND | AB5 | |
| NA | GND | AG5 | |
| NA | GND | AM5 | |
| NA | GND | AU5 | |
| NA | GND | D6 | |
| NA | GND | K6 | |
| NA | GND | Y6 | |
| NA | GND | AK6 | |
| NA | GND | AR6 | |
| NA | GND | AW6 | |
| NA | GND | N7 | |
| NA | GND | AC7 | |
| NA | GND | AN7 | |
| NA | GND | D8 | |
| NA | GND | F8 | |
| NA | GND | T8 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AF8 | |
| NA | GND | AT8 | |
| NA | GND | AW8 | |
| NA | GND | B9 | |
| NA | GND | J9 | |
| NA | GND | W9 | |
| NA | GND | AJ9 | |
| NA | GND | BA9 | |
| NA | GND | B10 | |
| NA | GND | M10 | |
| NA | GND | AB10 | |
| NA | GND | AM10 | |
| NA | GND | BA10 | |
| NA | GND | D11 | |
| NA | GND | E11 | |
| NA | GND | K11 | |
| NA | GND | R11 | |
| NA | GND | Y11 | |
| NA | GND | AC11 | |
| NA | GND | AE11 | |
| NA | GND | AR11 | |
| NA | GND | AW11 | |
| NA | GND | H12 | |
| NA | GND | N12 | |
| NA | GND | T12 | |
| NA | GND | V12 | |
| NA | GND | Y12 | |
| NA | GND | AB12 | |
| NA | GND | AD12 | |
| NA | GND | AH12 | |
| NA | GND | AN12 | |
| NA | GND | AV12 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | L13 | |
| NA | GND | R13 | |
| NA | GND | U13 | |
| NA | GND | W13 | |
| NA | GND | AA13 | |
| NA | GND | AC13 | |
| NA | GND | AE13 | |
| NA | GND | AG13 | |
| NA | GND | AJ13 | |
| NA | GND | AL13 | |
| NA | GND | D14 | |
| NA | GND | P14 | |
| NA | GND | V14 | |
| NA | GND | Y14 | |
| NA | GND | AB14 | |
| NA | GND | AD14 | |
| NA | GND | AF14 | |
| NA | GND | AJ14 | |
| NA | GND | AP14 | |
| NA | GND | AW14 | |
| NA | GND | B15 | |
| NA | GND | G15 | |
| NA | GND | M15 | |
| NA | GND | U15 | |
| NA | GND | W15 | |
| NA | GND | AA15 | |
| NA | GND | AC15 | |
| NA | GND | AE15 | |
| NA | GND | AG15 | |
| NA | GND | AM15 | |
| NA | GND | AU15 | |
| NA | GND | BA15 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | B16 | |
| NA | GND | E16 | |
| NA | GND | K16 | |
| NA | GND | P16 | |
| NA | GND | T16 | |
| NA | GND | V16 | |
| NA | GND | Y16 | |
| NA | GND | AB16 | |
| NA | GND | AD16 | |
| NA | GND | AF16 | |
| NA | GND | AK16 | |
| NA | GND | BA16 | |
| NA | GND | D17 | |
| NA | GND | N17 | |
| NA | GND | R17 | |
| NA | GND | U17 | |
| NA | GND | W17 | |
| NA | GND | AA17 | |
| NA | GND | AC17 | |
| NA | GND | AE17 | |
| NA | GND | AG17 | |
| NA | GND | AJ17 | |
| NA | GND | AN17 | |
| NA | GND | AW17 | |
| NA | GND | F18 | |
| NA | GND | L18 | |
| NA | GND | T18 | |
| NA | GND | V18 | |
| NA | GND | Y18 | |
| NA | GND | AB18 | |
| NA | GND | AD18 | |
| NA | GND | AF18 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AH18 | |
| NA | GND | AL18 | |
| NA | GND | AT18 | |
| NA | GND | A19 | |
| NA | GND | B19 | |
| NA | GND | C19 | |
| NA | GND | J19 | |
| NA | GND | P19 | |
| NA | GND | R19 | |
| NA | GND | U19 | |
| NA | GND | W19 | |
| NA | GND | AA19 | |
| NA | GND | AC19 | |
| NA | GND | AE19 | |
| NA | GND | AG19 | |
| NA | GND | AJ19 | |
| NA | GND | AW19 | |
| NA | GND | BB19 | |
| NA | GND | B20 | |
| NA | GND | M20 | |
| NA | GND | T20 | |
| NA | GND | V20 | |
| NA | GND | Y20 | |
| NA | GND | AB20 | |
| NA | GND | AD20 | |
| NA | GND | AF20 | |
| NA | GND | AH20 | |
| NA | GND | AM20 | |
| NA | GND | E21 | |
| NA | GND | K21 | |
| NA | GND | R21 | |
| NA | GND | U21 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | W21 | |
| NA | GND | AE21 | |
| NA | GND | AG21 | |
| NA | GND | AK21 | |
| NA | GND | AR21 | |
| NA | GND | H22 | |
| NA | GND | P22 | |
| NA | GND | T22 | |
| NA | GND | V22 | |
| NA | GND | AD22 | |
| NA | GND | AF22 | |
| NA | GND | AH22 | |
| NA | GND | AN22 | |
| NA | GND | AV22 | |
| NA | GND | A23 | |
| NA | GND | L23 | |
| NA | GND | R23 | |
| NA | GND | U23 | |
| NA | GND | W23 | |
| NA | GND | AA23 | |
| NA | GND | AC23 | |
| NA | GND | AE23 | |
| NA | GND | AG23 | |
| NA | GND | AJ23 | |
| NA | GND | AL23 | |
| NA | GND | BA23 | |
| NA | GND | D24 | |
| NA | GND | J24 | |
| NA | GND | P24 | |
| NA | GND | T24 | |
| NA | GND | V24 | |
| NA | GND | Y24 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AB24 | |
| NA | GND | AD24 | |
| NA | GND | AF24 | |
| NA | GND | AH24 | |
| NA | GND | AP24 | |
| NA | GND | G25 | |
| NA | GND | M25 | |
| NA | GND | R25 | |
| NA | GND | U25 | |
| NA | GND | W25 | |
| NA | GND | AA25 | |
| NA | GND | AC25 | |
| NA | GND | AE25 | |
| NA | GND | AG25 | |
| NA | GND | AJ25 | |
| NA | GND | AM25 | |
| NA | GND | AU25 | |
| NA | GND | BB25 | |
| NA | GND | K26 | |
| NA | GND | T26 | |
| NA | GND | V26 | |
| NA | GND | Y26 | |
| NA | GND | AB26 | |
| NA | GND | AD26 | |
| NA | GND | AF26 | |
| NA | GND | AH26 | |
| NA | GND | AK26 | |
| NA | GND | AY26 | |
| NA | GND | C27 | |
| NA | GND | N27 | |
| NA | GND | R27 | |
| NA | GND | U27 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | W27 | |
| NA | GND | AA27 | |
| NA | GND | AC27 | |
| NA | GND | AE27 | |
| NA | GND | AG27 | |
| NA | GND | AJ27 | |
| NA | GND | AN27 | |
| NA | GND | A28 | |
| NA | GND | F28 | |
| NA | GND | L28 | |
| NA | GND | T28 | |
| NA | GND | V28 | |
| NA | GND | Y28 | |
| NA | GND | AB28 | |
| NA | GND | AD28 | |
| NA | GND | AF28 | |
| NA | GND | AH28 | |
| NA | GND | AT28 | |
| NA | GND | J29 | |
| NA | GND | P29 | |
| NA | GND | U29 | |
| NA | GND | W29 | |
| NA | GND | AA29 | |
| NA | GND | AC29 | |
| NA | GND | AE29 | |
| NA | GND | AJ29 | |
| NA | GND | AP29 | |
| NA | GND | AW29 | |
| NA | GND | B30 | |
| NA | GND | M30 | |
| NA | GND | V30 | |
| NA | GND | Y30 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AB30 | |
| NA | GND | AD30 | |
| NA | GND | AM30 | |
| NA | GND | BB30 | |
| NA | GND | E31 | |
| NA | GND | K31 | |
| NA | GND | R31 | |
| NA | GND | W31 | |
| NA | GND | AA31 | |
| NA | GND | AC31 | |
| NA | GND | AE31 | |
| NA | GND | AK31 | |
| NA | GND | AR31 | |
| NA | GND | H32 | |
| NA | GND | N32 | |
| NA | GND | V32 | |
| NA | GND | AC32 | |
| NA | GND | AH32 | |
| NA | GND | AN32 | |
| NA | GND | AV32 | |
| NA | GND | A33 | |
| NA | GND | L33 | |
| NA | GND | T33 | |
| NA | GND | AA33 | |
| NA | GND | AF33 | |
| NA | GND | AL33 | |
| NA | GND | BA33 | |
| NA | GND | D34 | |
| NA | GND | P34 | |
| NA | GND | W34 | |
| NA | GND | AD34 | |
| NA | GND | AP34 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | G35 | |
| NA | GND | M35 | |
| NA | GND | U35 | |
| NA | GND | AG35 | |
| NA | GND | AU35 | |
| NA | GND | BB35 | |
| NA | GND | K36 | |
| NA | GND | Y36 | |
| NA | GND | AK36 | |
| NA | GND | AY36 | |
| NA | GND | C37 | |
| NA | GND | N37 | |
| NA | GND | AC37 | |
| NA | GND | AN37 | |
| NA | GND | A38 | |
| NA | GND | F38 | |
| NA | GND | T38 | |
| NA | GND | AF38 | |
| NA | GND | AT38 | |
| NA | GND | BA38 | |
| NA | GND | J39 | |
| NA | GND | W39 | |
| NA | GND | AJ39 | |
| NA | GND | AW39 | |
| NA | GND | B40 | |
| NA | GND | M40 | |
| NA | GND | AB40 | |
| NA | GND | AM40 | |
| NA | GND | BB40 | |
| NA | GND | E41 | |
| NA | GND | R41 | |
| NA | GND | AE41 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AR41 | |
| NA | GND | AY41 | |
| NA | GND | C42 | |
| NA | GND | H42 | |
| NA | GND | N42 | |
| NA | GND | V42 | |
| NA | GND | AC42 | |
| NA | GND | AH42 | |
| NA | GND | AN42 | |
| NA | GND | AV42 | |
| NA | VCCAUX | R12 | |
| NA | VCCAUX | U12 | |
| NA | VCCAUX | W12 | |
| NA | VCCAUX | AA12 | |
| NA | VCCAUX | AC12 | |
| NA | VCCAUX | AE12 | |
| NA | VCCAUX | AJ12 | |
| NA | VCCAUX | T13 | |
| NA | VCCAUX | AF13 | |
| NA | VCCAUX | AH13 | |
| NA | VCCAUX | T29 | |
| NA | VCCAUX | AF29 | |
| NA | VCCAUX | U30 | |
| NA | VCCAUX | W30 | |
| NA | VCCAUX | AA30 | |
| NA | VCCAUX | AC30 | |
| NA | VCCAUX | AE30 | |
| NA | VCCAUX | Y31 | |
| NA | VCCAUX | AB31 | |
| NA | VCCAUX | AD31 | |
| NA | VCCINT | V13 | |
| NA | VCCINT | Y13 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | AB13 | |
| NA | VCCINT | AD13 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | AC14 | |
| NA | VCCINT | AE14 | |
| NA | VCCINT | AG14 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | AB15 | |
| NA | VCCINT | AD15 | |
| NA | VCCINT | AF15 | |
| NA | VCCINT | R16 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | W16 | |
| NA | VCCINT | AA16 | |
| NA | VCCINT | AC16 | |
| NA | VCCINT | AE16 | |
| NA | VCCINT | AG16 | |
| NA | VCCINT | T17 | |
| NA | VCCINT | V17 | |
| NA | VCCINT | Y17 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AD17 | |
| NA | VCCINT | AF17 | |
| NA | VCCINT | AH17 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | U18 | |
| NA | VCCINT | W18 | |
| NA | VCCINT | AA18 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | AC18 | |
| NA | VCCINT | AE18 | |
| NA | VCCINT | AG18 | |
| NA | VCCINT | AJ18 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | Y19 | |
| NA | VCCINT | AB19 | |
| NA | VCCINT | AD19 | |
| NA | VCCINT | AF19 | |
| NA | VCCINT | AH19 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | U20 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AC20 | |
| NA | VCCINT | AE20 | |
| NA | VCCINT | AG20 | |
| NA | VCCINT | AJ20 | |
| NA | VCCINT | P21 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | V21 | |
| NA | VCCINT | AD21 | |
| NA | VCCINT | AF21 | |
| NA | VCCINT | AH21 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | U22 | |
| NA | VCCINT | W22 | |
| NA | VCCINT | AE22 | |
| NA | VCCINT | AG22 | |
| NA | VCCINT | P23 | |
| NA | VCCINT | T23 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | V23 | |
| NA | VCCINT | Y23 | |
| NA | VCCINT | AB23 | |
| NA | VCCINT | AD23 | |
| NA | VCCINT | AF23 | |
| NA | VCCINT | AH23 | |
| NA | VCCINT | R24 | |
| NA | VCCINT | U24 | |
| NA | VCCINT | W24 | |
| NA | VCCINT | AA24 | |
| NA | VCCINT | AC24 | |
| NA | VCCINT | AE24 | |
| NA | VCCINT | AG24 | |
| NA | VCCINT | AJ24 | |
| NA | VCCINT | T25 | |
| NA | VCCINT | V25 | |
| NA | VCCINT | Y25 | |
| NA | VCCINT | AB25 | |
| NA | VCCINT | AD25 | |
| NA | VCCINT | AF25 | |
| NA | VCCINT | AH25 | |
| NA | VCCINT | R26 | |
| NA | VCCINT | U26 | |
| NA | VCCINT | W26 | |
| NA | VCCINT | AA26 | |
| NA | VCCINT | AC26 | |
| NA | VCCINT | AE26 | |
| NA | VCCINT | AG26 | |
| NA | VCCINT | T27 | |
| NA | VCCINT | V27 | |
| NA | VCCINT | Y27 | |
| NA | VCCINT | AB27 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | AD27 | |
| NA | VCCINT | AF27 | |
| NA | VCCINT | AH27 | |
| NA | VCCINT | R28 | |
| NA | VCCINT | U28 | |
| NA | VCCINT | W28 | |
| NA | VCCINT | AA28 | |
| NA | VCCINT | AC28 | |
| NA | VCCINT | AE28 | |
| NA | VCCINT | AG28 | |
| NA | VCCINT | V29 | |
| NA | VCCINT | Y29 | |
| NA | VCCINT | AB29 | |
| NA | VCCINT | AD29 | |
| 0 | VCCO_0 | AL28 | |
| 0 | VCCO_0 | AG30 | |
| 1 | VCCO_1 | F13 | |
| 1 | VCCO_1 | J14 | |
| 2 | VCCO_2 | AR26 | |
| 2 | VCCO_2 | AV27 | |
| 3 | VCCO_3 | E26 | |
| 3 | VCCO_3 | H27 | |
| 4 | VCCO_4 | AT13 | |
| 4 | VCCO_4 | AR16 | |
| 5 | VCCO_5 | C22 | |
| 5 | VCCO_5 | F23 | |
| 5 | VCCO_5 | B25 | |
| 6 | VCCO_6 | AY21 | |
| 6 | VCCO_6 | AT23 | |
| 6 | VCCO_6 | AW24 | |
| 7 | VCCO_7 | H17 | |
| 7 | VCCO_7 | D19 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 7 | VCCO_7 | G20 | |
| 8 | VCCO_8 | AV17 | |
| 8 | VCCO_8 | AP19 | |
| 8 | VCCO_8 | AU20 | |
| 11 | VCCO_11 | V37 | |
| 11 | VCCO_11 | AA38 | |
| 11 | VCCO_11 | Y41 | |
| 12 | VCCO_12 | V7 | |
| 12 | VCCO_12 | AA8 | |
| 12 | VCCO_12 | U10 | |
| 13 | VCCO_13 | AB35 | |
| 13 | VCCO_13 | AE36 | |
| 13 | VCCO_13 | AD39 | |
| 15 | VCCO_15 | R36 | |
| 15 | VCCO_15 | P39 | |
| 15 | VCCO_15 | U40 | |
| 17 | VCCO_17 | AH37 | |
| 17 | VCCO_17 | AG40 | |
| 17 | VCCO_17 | AK41 | |
| 18 | VCCO_18 | AE6 | |
| 18 | VCCO_18 | AD9 | |
| 18 | VCCO_18 | AG10 | |
| 19 | VCCO_19 | L38 | |
| 19 | VCCO_19 | G40 | |
| 19 | VCCO_19 | K41 | |
| 20 | VCCO_20 | R6 | |
| 20 | VCCO_20 | L8 | |
| 20 | VCCO_20 | P9 | |
| 21 | VCCO_21 | AJ34 | |
| 21 | VCCO_21 | AM35 | |
| 21 | VCCO_21 | AL38 | |
| 23 | VCCO_23 | E36 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 23 | VCCO_23 | H37 | |
| 23 | VCCO_23 | D39 | |
| 24 | VCCO_24 | E6 | |
| 24 | VCCO_24 | H7 | |
| 24 | VCCO_24 | G10 | |
| 25 | VCCO_25 | AR36 | |
| 25 | VCCO_25 | AP39 | |
| 25 | VCCO_25 | AU40 | |
| 26 | VCCO_26 | AH7 | |
| 26 | VCCO_26 | AL8 | |
| 26 | VCCO_26 | AK11 | |
| 27 | VCCO_27 | F33 | |
| 27 | VCCO_27 | J34 | |
| 27 | VCCO_27 | B35 | |
| 29 | VCCO_29 | AT33 | |
| 29 | VCCO_29 | AW34 | |
| 29 | VCCO_29 | AV37 | |
| 31 | VCCO_31 | D29 | |
| 31 | VCCO_31 | G30 | |
| 31 | VCCO_31 | C32 | |
| 33 | VCCO_33 | BA28 | |
| 33 | VCCO_33 | AU30 | |
| 33 | VCCO_33 | AY31 | |
| 34 | VCCO_34 | AV7 | |
| 34 | VCCO_34 | AP9 | |
| 34 | VCCO_34 | AU10 | |
| NA | MGTAVCC_112 | W3 | |
| NA | MGTAVCC_112 | W4 | |
| NA | MGTAVCC_114 | AE3 | |
| NA | MGTAVCC_114 | AE4 | |
| NA | MGTAVCC_116 | N3 | |
| NA | MGTAVCC_116 | N4 | |

Table 2-8: FF1738 Package—FX100T, LX110T, FX130T, LX155T, FX200T, LX220T, SX240T, and LX330T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---|
| NA | MGTAVCC_118 | AL3 | |
| NA | MGTAVCC_118 | AL4 | |
| NA | MGTAVCC_120 | G3 | |
| NA | MGTAVCC_120 | G4 | |
| NA | MGTAVCC_122 | AU3 | |
| NA | MGTAVCC_122 | AU4 | |
| NA | MGTAVCC_124 | D4 | |
| NA | MGTAVCC_124 | D5 | |
| NA | MGTAVCC_126 | AW5 | |
| NA | MGTAVCC_126 | AY3 | |
| NA | MGTAVCC_128 | C9 | LX110T, LX155T, LX220T, FX100T |
| NA | MGTAVCC_128 | D9 | LX110T, LX155T, LX220T, FX100T |
| NA | MGTAVCC_130 | AW10 | LX110T, LX155T, LX220T, FX100T |
| NA | MGTAVCC_130 | AY10 | LX110T, LX155T, LX220T, FX100T |
| NA | MGTAVCC_132 | C15 | LX110T, LX155T, LX220T, FX100T, FX130T |
| NA | MGTAVCC_132 | D15 | LX110T, LX155T, LX220T, FX100T, FX130T |
| NA | MGTAVCC_134 | AW16 | LX110T, LX155T, LX220T, FX100T, FX130T |
| NA | MGTAVCC_134 | AY16 | LX110T, LX155T, LX220T, FX100T, FX130T |
| NA | FLOAT | AA4 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1759 Package—TX150T and TX240T

Table 2-9: FF1759 Package—TX150T and TX240T

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | AC22 | |
| 0 | DXN_0 | AC21 | |
| 0 | AVDD_0 | Y22 | |
| 0 | AVSS_0 | Y21 | |
| 0 | VP_0 | AA22 | |
| 0 | VN_0 | AB21 | |
| 0 | VREFP_0 | AB22 | |
| 0 | VREFN_0 | AA21 | |
| 0 | VBATT_0 | R28 | |
| 0 | PROGRAM_B_0 | R29 | |
| 0 | HSWAPEN_0 | T29 | |
| 0 | D_IN_0 | R15 | |
| 0 | DONE_0 | R14 | |
| 0 | CCLK_0 | AJ16 | |
| 0 | INIT_B_0 | T14 | |
| 0 | CS_B_0 | T30 | |
| 0 | RDWR_B_0 | P15 | |
| 0 | RSVD ⁽³⁾ | U29 | |
| 0 | RSVD ⁽³⁾ | AF29 | |
| 0 | TCK_0 | AF16 | |
| 0 | M0_0 | AJ28 | |
| 0 | M2_0 | AH28 | |
| 0 | M1_0 | AJ27 | |
| 0 | TMS_0 | AF15 | |
| 0 | TDI_0 | AG16 | |
| 0 | D_OUT_BUSY_0 | AG29 | |
| 0 | TDO_0 | AH16 | |
| 1 | IO_L0P_A19_1 | P26 | |
| 1 | IO_L0N_A18_1 | P25 | |
| 1 | IO_L1P_A17_1 | N19 | |
| 1 | IO_L1N_A16_1 | P18 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | N26 | |
| 1 | IO_L2N_A14_D30_1 | N25 | |
| 1 | IO_L3P_A13_D29_1 | N18 | |
| 1 | IO_L3N_A12_D28_1 | P17 | |
| 1 | IO_L4P_A11_D27_1 | N28 | |
| 1 | IO_L4N_VREF_A10_D26_1 | P27 | |
| 1 | IO_L5P_A9_D25_1 | L14 | |
| 1 | IO_L5N_A8_D24_1 | M14 | |
| 1 | IO_L6P_A7_D23_1 | M29 | |
| 1 | IO_L6N_A6_D22_1 | N29 | |
| 1 | IO_L7P_A5_D21_1 | M16 | |
| 1 | IO_L7N_A4_D20_1 | N16 | |
| 1 | IO_L8P_CC_A3_D19_1 | P28 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | R27 | |
| 1 | IO_L9P_CC_A1_D17_1 | N15 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | N14 | |
| 2 | IO_L0P_CC_RS1_2 | AJ17 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AK17 | |
| 2 | IO_L1P_CC_A25_2 | AK28 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AK27 | |
| 2 | IO_L2P_A23_2 | AK18 | |
| 2 | IO_L2N_A22_2 | AJ18 | |
| 2 | IO_L3P_A21_2 | AL27 | |
| 2 | IO_L3N_A20_2 | AM27 | |
| 2 | IO_L4P_FCS_B_2 | AL17 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AM17 | |
| 2 | IO_L5P_FWE_B_2 | AR27 | |
| 2 | IO_L5N_CSO_B_2 | AP27 | |
| 2 | IO_L6P_D7_2 | AM18 | |
| 2 | IO_L6N_D6_2 | AM19 | |
| 2 | IO_L7P_D5_2 | AP26 | |
| 2 | IO_L7N_D4_2 | AN26 | |
| 2 | IO_L8P_D3_2 | AL19 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------------|-------------------|------------------------|
| 2 | IO_L8N_D2_FS2_2 | AK19 | |
| 2 | IO_L9P_D1_FS1_2 | AP25 | |
| 2 | IO_L9N_D0_FS0_2 | AR25 | |
| 3 | IO_L0P_CC_GC_3 | L19 | |
| 3 | IO_L0N_CC_GC_3 ^{(1) (2)} | M19 | |
| 3 | IO_L1P_CC_GC_3 | N24 | |
| 3 | IO_L1N_CC_GC_3 ^{(1) (2)} | M24 | |
| 3 | IO_L2P_GC_VRN_3 | J15 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | J16 | |
| 3 | IO_L3P_GC_3 | M26 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | L25 | |
| 3 | IO_L4P_GC_3 | L15 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | K15 | |
| 3 | IO_L5P_GC_3 | L26 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | L27 | |
| 3 | IO_L6P_GC_3 | M17 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | M18 | |
| 3 | IO_L7P_GC_3 | K27 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | K28 | |
| 3 | IO_L8P_GC_3 | L16 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | L17 | |
| 3 | IO_L9P_GC_3 | M28 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | M27 | |
| 4 | IO_L0P_GC_D15_4 | AL26 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AM26 | |
| 4 | IO_L1P_GC_D13_4 | AN20 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AN19 | |
| 4 | IO_L2P_GC_D11_4 | AN25 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AM24 | |
| 4 | IO_L3P_GC_D9_4 | AR20 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AT20 | |
| 4 | IO_L4P_GC_4 | AJ25 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AK25 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 4 | IO_L5P_GC_4 | AP21 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AP20 | |
| 4 | IO_L6P_GC_4 | AL25 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AL24 | |
| 4 | IO_L7P_GC_VRN_4 | AL21 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AM21 | |
| 4 | IO_L8P_CC_GC_4 | AK23 | |
| 4 | IO_L8N_CC_GC_4 ^{(1) (2)} | AK24 | |
| 4 | IO_L9P_CC_GC_4 | AK20 | |
| 4 | IO_L9N_CC_GC_4 ^{(1) (2)} | AL20 | |
| 5 | IO_L0P_5 | K23 | |
| 5 | IO_L0N_5 | J23 | |
| 5 | IO_L1P_5 | E20 | |
| 5 | IO_L1N_5 | F20 | |
| 5 | IO_L2P_5 | K24 | |
| 5 | IO_L2N_5 | L24 | |
| 5 | IO_L3P_5 | H20 | |
| 5 | IO_L3N_5 | H19 | |
| 5 | IO_L4P_5 | H23 | |
| 5 | IO_L4N_VREF_5 | H24 | |
| 5 | IO_L5P_5 | F19 | |
| 5 | IO_L5N_5 | G19 | |
| 5 | IO_L6P_5 | G24 | |
| 5 | IO_L6N_5 | H25 | |
| 5 | IO_L7P_5 | G18 | |
| 5 | IO_L7N_5 | G17 | |
| 5 | IO_L8P_CC_5 | F26 | |
| 5 | IO_L8N_CC_5 ⁽²⁾ | G26 | |
| 5 | IO_L9P_CC_5 | J17 | |
| 5 | IO_L9N_CC_5 ⁽²⁾ | K17 | |
| 5 | IO_L10P_CC_5 | K18 | |
| 5 | IO_L10N_CC_5 ⁽²⁾ | K19 | |
| 5 | IO_L11P_CC_5 | K25 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 5 | IO_L11N_CC_5 ⁽²⁾ | J25 | |
| 5 | IO_L12P_VRN_5 | J18 | |
| 5 | IO_L12N_VRP_5 | H18 | |
| 5 | IO_L13P_5 | G27 | |
| 5 | IO_L13N_5 | F27 | |
| 5 | IO_L14P_5 | E19 | |
| 5 | IO_L14N_VREF_5 | E18 | |
| 5 | IO_L15P_5 | J26 | |
| 5 | IO_L15N_5 | H26 | |
| 5 | IO_L16P_5 | F17 | |
| 5 | IO_L16N_5 | F16 | |
| 5 | IO_L17P_5 | H28 | |
| 5 | IO_L17N_5 | G28 | |
| 5 | IO_L18P_5 | H16 | |
| 5 | IO_L18N_5 | G16 | |
| 5 | IO_L19P_5 | J28 | |
| 5 | IO_L19N_5 | J27 | |
| 6 | IO_L0P_6 | AR24 | |
| 6 | IO_L0N_6 | AT24 | |
| 6 | IO_L1P_6 | AV18 | |
| 6 | IO_L1N_6 | AV19 | |
| 6 | IO_L2P_6 | AV24 | |
| 6 | IO_L2N_6 | AU24 | |
| 6 | IO_L3P_6 | BA22 | |
| 6 | IO_L3N_6 | BB21 | |
| 6 | IO_L4P_6 | BB22 | |
| 6 | IO_L4N_VREF_6 | BB23 | |
| 6 | IO_L5P_6 | BA21 | |
| 6 | IO_L5N_6 | AY22 | |
| 6 | IO_L6P_6 | AV23 | |
| 6 | IO_L6N_6 | AU23 | |
| 6 | IO_L7P_6 | AT19 | |
| 6 | IO_L7N_6 | AU19 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 6 | IO_L8P_CC_6 | AM23 | |
| 6 | IO_L8N_CC_6 ⁽²⁾ | AN24 | |
| 6 | IO_L9P_CC_6 | AV20 | |
| 6 | IO_L9N_CC_6 ⁽²⁾ | AW20 | |
| 6 | IO_L10P_CC_6 | AN21 | |
| 6 | IO_L10N_CC_6 ⁽²⁾ | AM22 | |
| 6 | IO_L11P_CC_6 | AW23 | |
| 6 | IO_L11N_CC_6 ⁽²⁾ | AY23 | |
| 6 | IO_L12P_VRN_6 | AL22 | |
| 6 | IO_L12N_VRP_6 | AK22 | |
| 6 | IO_L13P_6 | AN23 | |
| 6 | IO_L13N_6 | AP23 | |
| 6 | IO_L14P_6 | BA20 | |
| 6 | IO_L14N_VREF_6 | AY20 | |
| 6 | IO_L15P_6 | AR23 | |
| 6 | IO_L15N_6 | AT22 | |
| 6 | IO_L16P_6 | AW21 | |
| 6 | IO_L16N_6 | AW22 | |
| 6 | IO_L17P_6 | AR22 | |
| 6 | IO_L17N_6 | AP22 | |
| 6 | IO_L18P_6 | AV21 | |
| 6 | IO_L18N_6 | AU22 | |
| 6 | IO_L19P_6 | AU21 | |
| 6 | IO_L19N_6 | AT21 | |
| 7 | IO_L0P_7 | J22 | |
| 7 | IO_L0N_7 | J21 | |
| 7 | IO_L1P_7 | N21 | |
| 7 | IO_L1N_7 | M21 | |
| 7 | IO_L2P_7 | M22 | |
| 7 | IO_L2N_7 | L22 | |
| 7 | IO_L3P_7 | D23 | |
| 7 | IO_L3N_7 | E22 | |
| 7 | IO_L4P_7 | D22 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 7 | IO_L4N_VREF_7 | C23 | |
| 7 | IO_L5P_7 | F22 | |
| 7 | IO_L5N_7 | G22 | |
| 7 | IO_L6P_7 | C21 | |
| 7 | IO_L6N_7 | D21 | |
| 7 | IO_L7P_7 | K22 | |
| 7 | IO_L7N_7 | L21 | |
| 7 | IO_L8P_CC_7 | B22 | |
| 7 | IO_L8N_CC_7 ⁽²⁾ | B23 | |
| 7 | IO_L9P_CC_7 | F21 | |
| 7 | IO_L9N_CC_7 ⁽²⁾ | G21 | |
| 7 | IO_L10P_CC_7 | J20 | |
| 7 | IO_L10N_CC_7 ⁽²⁾ | H21 | |
| 7 | IO_L11P_CC_7 | B21 | |
| 7 | IO_L11N_CC_7 ⁽²⁾ | A22 | |
| 7 | IO_L12P_VRN_7 | D20 | |
| 7 | IO_L12N_VRP_7 | C20 | |
| 7 | IO_L13P_7 | G23 | |
| 7 | IO_L13N_7 | F24 | |
| 7 | IO_L14P_7 | A20 | |
| 7 | IO_L14N_VREF_7 | A21 | |
| 7 | IO_L15P_7 | M23 | |
| 7 | IO_L15N_7 | N23 | |
| 7 | IO_L16P_7 | L20 | |
| 7 | IO_L16N_7 | K20 | |
| 7 | IO_L17P_7 | E24 | |
| 7 | IO_L17N_7 | E23 | |
| 7 | IO_L18P_7 | P21 | |
| 7 | IO_L18N_7 | P22 | |
| 7 | IO_L19P_7 | F25 | |
| 7 | IO_L19N_7 | E25 | |
| 11 | IO_L0P_11 | Y30 | |
| 11 | IO_L0N_11 | Y29 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------------|------------|-----------------|
| 11 | IO_L1P_11 | W35 | |
| 11 | IO_L1N_11 | W36 | |
| 11 | IO_L2P_11 | AA37 | |
| 11 | IO_L2N_11 | Y37 | |
| 11 | IO_L3P_11 | W37 | |
| 11 | IO_L3N_11 | V36 | |
| 11 | IO_L4P_11 | AA36 | |
| 11 | IO_L4N_VREF_11 | AB37 | |
| 11 | IO_L5P_11 | W33 | |
| 11 | IO_L5N_11 | W32 | |
| 11 | IO_L6P_11 | Y32 | |
| 11 | IO_L6N_11 | AA32 | |
| 11 | IO_L7P_11 | V35 | |
| 11 | IO_L7N_11 | V34 | |
| 11 | IO_L8P_CC_11 | Y33 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | Y34 | |
| 11 | IO_L9P_CC_11 | U37 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | T37 | |
| 11 | IO_L10P_CC_SM15P_11 | W30 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | W31 | |
| 11 | IO_L11P_CC_SM14P_11 | AA30 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | AA31 | |
| 11 | IO_L12P_VRN_11 | T35 | |
| 11 | IO_L12N_VRP_11 | T36 | |
| 11 | IO_L13P_11 | AA35 | |
| 11 | IO_L13N_11 | Y35 | |
| 11 | IO_L14P_11 | U33 | |
| 11 | IO_L14N_VREF_11 | U34 | |
| 11 | IO_L15P_SM13P_11 | AC36 | |
| 11 | IO_L15N_SM13N_11 | AB36 | |
| 11 | IO_L16P_SM12P_11 | U32 | |
| 11 | IO_L16N_SM12N_11 | V33 | |
| 11 | IO_L17P_SM11P_11 | AB34 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 11 | IO_L17N_SM11N_11 | AA34 | |
| 11 | IO_L18P_SM10P_11 | U31 | |
| 11 | IO_L18N_SM10N_11 | V31 | |
| 11 | IO_L19P_SM9P_11 | AB32 | |
| 11 | IO_L19N_SM9N_11 | AB31 | |
| 12 | IO_L0P_12 | R5 | |
| 12 | IO_L0N_12 | P5 | |
| 12 | IO_L1P_12 | Y7 | |
| 12 | IO_L1N_12 | Y8 | |
| 12 | IO_L2P_12 | T6 | |
| 12 | IO_L2N_12 | T5 | |
| 12 | IO_L3P_12 | AA9 | |
| 12 | IO_L3N_12 | Y10 | |
| 12 | IO_L4P_12 | V6 | |
| 12 | IO_L4N_VREF_12 | U6 | |
| 12 | IO_L5P_12 | AA7 | |
| 12 | IO_L5N_12 | AA6 | |
| 12 | IO_L6P_12 | W8 | |
| 12 | IO_L6N_12 | Y9 | |
| 12 | IO_L7P_12 | AB6 | |
| 12 | IO_L7N_12 | AC6 | |
| 12 | IO_L8P_CC_12 | W7 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | W6 | |
| 12 | IO_L9P_CC_12 | AB8 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | AB7 | |
| 12 | IO_L10P_CC_12 | AA11 | |
| 12 | IO_L10N_CC_12 ⁽²⁾ | AA10 | |
| 12 | IO_L11P_CC_12 | U7 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | T7 | |
| 12 | IO_L12P_VRN_12 | AC8 | |
| 12 | IO_L12N_VRP_12 | AB9 | |
| 12 | IO_L13P_12 | W11 | |
| 12 | IO_L13N_12 | W10 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 12 | IO_L14P_12 | AC9 | |
| 12 | IO_L14N_VREF_12 | AD8 | |
| 12 | IO_L15P_12 | V8 | |
| 12 | IO_L15N_12 | V9 | |
| 12 | IO_L16P_12 | AD11 | |
| 12 | IO_L16N_12 | AC10 | |
| 12 | IO_L17P_12 | R7 | |
| 12 | IO_L17N_12 | P7 | |
| 12 | IO_L18P_12 | AC11 | |
| 12 | IO_L18N_12 | AB11 | |
| 12 | IO_L19P_12 | P6 | |
| 12 | IO_L19N_12 | N6 | |
| 13 | IO_L0P_SM8P_13 | AC35 | |
| 13 | IO_L0N_SM8N_13 | AC34 | |
| 13 | IO_L1P_SM7P_13 | AG32 | |
| 13 | IO_L1N_SM7N_13 | AG31 | |
| 13 | IO_L2P_SM6P_13 | AB33 | |
| 13 | IO_L2N_SM6N_13 | AC33 | |
| 13 | IO_L3P_SM5P_13 | AG34 | |
| 13 | IO_L3N_SM5N_13 | AG33 | |
| 13 | IO_L4P_13 | AD37 | |
| 13 | IO_L4N_VREF_13 | AD36 | |
| 13 | IO_L5P_SM4P_13 | AF32 | |
| 13 | IO_L5N_SM4N_13 | AF31 | |
| 13 | IO_L6P_SM3P_13 | AD35 | |
| 13 | IO_L6N_SM3N_13 | AE35 | |
| 13 | IO_L7P_SM2P_13 | AL37 | |
| 13 | IO_L7N_SM2N_13 | AL36 | |
| 13 | IO_L8P_CC_SM1P_13 | AC31 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AC30 | |
| 13 | IO_L9P_CC_SM0P_13 | AM38 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AN38 | |
| 13 | IO_L10P_CC_13 | AF34 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 13 | IO_L10N_CC_13 ⁽²⁾ | AE34 | |
| 13 | IO_L11P_CC_13 | AF37 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AE37 | |
| 13 | IO_L12P_VRN_13 | AE33 | |
| 13 | IO_L12N_VRP_13 | AE32 | |
| 13 | IO_L13P_13 | AH38 | |
| 13 | IO_L13N_13 | AG38 | |
| 13 | IO_L14P_13 | AK37 | |
| 13 | IO_L14N_VREF_13 | AJ37 | |
| 13 | IO_L15P_13 | AD32 | |
| 13 | IO_L15N_13 | AD33 | |
| 13 | IO_L16P_13 | AD31 | |
| 13 | IO_L16N_13 | AD30 | |
| 13 | IO_L17P_13 | AF36 | |
| 13 | IO_L17N_13 | AF35 | |
| 13 | IO_L18P_13 | AJ36 | |
| 13 | IO_L18N_13 | AH36 | |
| 13 | IO_L19P_13 | AG36 | |
| 13 | IO_L19N_13 | AG37 | |
| 14 | IO_L0P_14 | AG12 | |
| 14 | IO_L0N_14 | AF12 | |
| 14 | IO_L1P_14 | AD7 | |
| 14 | IO_L1N_14 | AD6 | |
| 14 | IO_L2P_14 | AF11 | |
| 14 | IO_L2N_14 | AG11 | |
| 14 | IO_L3P_14 | AE8 | |
| 14 | IO_L3N_14 | AF7 | |
| 14 | IO_L4P_14 | AH11 | |
| 14 | IO_L4N_VREF_14 | AH10 | |
| 14 | IO_L5P_14 | AF5 | |
| 14 | IO_L5N_14 | AF6 | |
| 14 | IO_L6P_14 | AK9 | |
| 14 | IO_L6N_14 | AL9 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 14 | IO_L7P_14 | AG6 | |
| 14 | IO_L7N_14 | AH5 | |
| 14 | IO_L8P_CC_14 | AF10 | |
| 14 | IO_L8N_CC_14 ⁽²⁾ | AG9 | |
| 14 | IO_L9P_CC_14 | AG7 | |
| 14 | IO_L9N_CC_14 ⁽²⁾ | AH6 | |
| 14 | IO_L10P_CC_14 | AG8 | |
| 14 | IO_L10N_CC_14 ⁽²⁾ | AH8 | |
| 14 | IO_L11P_CC_14 | AK8 | |
| 14 | IO_L11N_CC_14 ⁽²⁾ | AL7 | |
| 14 | IO_L12P_VRN_14 | AJ6 | |
| 14 | IO_L12N_VRP_14 | AJ7 | |
| 14 | IO_L13P_14 | AH9 | |
| 14 | IO_L13N_14 | AJ8 | |
| 14 | IO_L14P_14 | AK7 | |
| 14 | IO_L14N_VREF_14 | AL6 | |
| 14 | IO_L15P_14 | AP5 | |
| 14 | IO_L15N_14 | AP6 | |
| 14 | IO_L16P_14 | AF9 | |
| 14 | IO_L16N_14 | AE9 | |
| 14 | IO_L17P_14 | AD10 | |
| 14 | IO_L17N_14 | AE10 | |
| 14 | IO_L18P_14 | AM5 | |
| 14 | IO_L18N_14 | AN5 | |
| 14 | IO_L19P_14 | AM6 | |
| 14 | IO_L19N_14 | AM7 | |
| 23 | IO_L0P_23 | J33 | |
| 23 | IO_L0N_23 | H34 | |
| 23 | IO_L1P_23 | R37 | |
| 23 | IO_L1N_23 | P37 | |
| 23 | IO_L2P_23 | H35 | |
| 23 | IO_L2N_23 | H36 | |
| 23 | IO_L3P_23 | R38 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 23 | IO_L3N_23 | P38 | |
| 23 | IO_L4P_23 | G37 | |
| 23 | IO_L4N_VREF_23 | H38 | |
| 23 | IO_L5P_23 | R35 | |
| 23 | IO_L5N_23 | P36 | |
| 23 | IO_L6P_23 | K34 | |
| 23 | IO_L6N_23 | K33 | |
| 23 | IO_L7P_23 | P35 | |
| 23 | IO_L7N_23 | N35 | |
| 23 | IO_L8P_CC_23 | J37 | |
| 23 | IO_L8N_CC_23 ⁽²⁾ | J38 | |
| 23 | IO_L9P_CC_23 | R34 | |
| 23 | IO_L9N_CC_23 ⁽²⁾ | T34 | |
| 23 | IO_L10P_CC_23 | N36 | |
| 23 | IO_L10N_CC_23 ⁽²⁾ | M36 | |
| 23 | IO_L11P_CC_23 | P33 | |
| 23 | IO_L11N_CC_23 ⁽²⁾ | N33 | |
| 23 | IO_L12P_VRN_23 | L35 | |
| 23 | IO_L12N_VRP_23 | L36 | |
| 23 | IO_L13P_23 | R33 | |
| 23 | IO_L13N_23 | R32 | |
| 23 | IO_L14P_23 | N34 | |
| 23 | IO_L14N_VREF_23 | M34 | |
| 23 | IO_L15P_23 | J36 | |
| 23 | IO_L15N_23 | J35 | |
| 23 | IO_L16P_23 | M37 | |
| 23 | IO_L16N_23 | L37 | |
| 23 | IO_L17P_23 | K37 | |
| 23 | IO_L17N_23 | K38 | |
| 23 | IO_L18P_23 | T31 | |
| 23 | IO_L18N_23 | T32 | |
| 23 | IO_L19P_23 | L34 | |
| 23 | IO_L19N_23 | K35 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 24 | IO_L0P_24 | V11 | |
| 24 | IO_L0N_24 | U12 | |
| 24 | IO_L1P_24 | G7 | |
| 24 | IO_L1N_24 | G8 | |
| 24 | IO_L2P_24 | V10 | |
| 24 | IO_L2N_24 | U11 | |
| 24 | IO_L3P_24 | E7 | |
| 24 | IO_L3N_24 | E8 | |
| 24 | IO_L4P_24 | L6 | |
| 24 | IO_L4N_VREF_24 | K5 | |
| 24 | IO_L5P_24 | G6 | |
| 24 | IO_L5N_24 | F6 | |
| 24 | IO_L6P_24 | U9 | |
| 24 | IO_L6N_24 | U8 | |
| 24 | IO_L7P_24 | H6 | |
| 24 | IO_L7N_24 | H5 | |
| 24 | IO_L8P_CC_24 | R8 | |
| 24 | IO_L8N_CC_24 ⁽²⁾ | T9 | |
| 24 | IO_L9P_CC_24 | J8 | |
| 24 | IO_L9N_CC_24 ⁽²⁾ | H8 | |
| 24 | IO_L10P_CC_24 | P10 | |
| 24 | IO_L10N_CC_24 ⁽²⁾ | R10 | |
| 24 | IO_L11P_CC_24 | R9 | |
| 24 | IO_L11N_CC_24 ⁽²⁾ | P8 | |
| 24 | IO_L12P_VRN_24 | K9 | |
| 24 | IO_L12N_VRP_24 | L9 | |
| 24 | IO_L13P_24 | T11 | |
| 24 | IO_L13N_24 | T10 | |
| 24 | IO_L14P_24 | J6 | |
| 24 | IO_L14N_VREF_24 | J5 | |
| 24 | IO_L15P_24 | M8 | |
| 24 | IO_L15N_24 | N8 | |
| 24 | IO_L16P_24 | N9 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 24 | IO_L16N_24 | M9 | |
| 24 | IO_L17P_24 | M7 | |
| 24 | IO_L17N_24 | M6 | |
| 24 | IO_L18P_24 | J7 | |
| 24 | IO_L18N_24 | K8 | |
| 24 | IO_L19P_24 | K7 | |
| 24 | IO_L19N_24 | L7 | |
| 25 | IO_L0P_25 | AJ33 | |
| 25 | IO_L0N_25 | AK34 | |
| 25 | IO_L1P_25 | AT36 | |
| 25 | IO_L1N_25 | AU37 | |
| 25 | IO_L2P_25 | AV36 | |
| 25 | IO_L2N_25 | AU36 | |
| 25 | IO_L3P_25 | AJ31 | |
| 25 | IO_L3N_25 | AJ32 | |
| 25 | IO_L4P_25 | AR35 | |
| 25 | IO_L4N_VREF_25 | AT35 | |
| 25 | IO_L5P_25 | AT37 | |
| 25 | IO_L5N_25 | AR37 | |
| 25 | IO_L6P_25 | AM34 | |
| 25 | IO_L6N_25 | AN34 | |
| 25 | IO_L7P_25 | AP36 | |
| 25 | IO_L7N_25 | AP35 | |
| 25 | IO_L8P_CC_25 | AN33 | |
| 25 | IO_L8N_CC_25 ⁽²⁾ | AM33 | |
| 25 | IO_L9P_CC_25 | AL34 | |
| 25 | IO_L9N_CC_25 ⁽²⁾ | AK35 | |
| 25 | IO_L10P_CC_25 | AH34 | |
| 25 | IO_L10N_CC_25 ⁽²⁾ | AH33 | |
| 25 | IO_L11P_CC_25 | AP32 | |
| 25 | IO_L11N_CC_25 ⁽²⁾ | AP33 | |
| 25 | IO_L12P_VRN_25 | AH35 | |
| 25 | IO_L12N_VRP_25 | AJ35 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 25 | IO_L13P_25 | AK32 | |
| 25 | IO_L13N_25 | AK33 | |
| 25 | IO_L14P_25 | AP37 | |
| 25 | IO_L14N_VREF_25 | AP38 | |
| 25 | IO_L15P_25 | AN31 | |
| 25 | IO_L15N_25 | AP31 | |
| 25 | IO_L16P_25 | AN36 | |
| 25 | IO_L16N_25 | AN35 | |
| 25 | IO_L17P_25 | AM31 | |
| 25 | IO_L17N_25 | AM32 | |
| 25 | IO_L18P_25 | AL35 | |
| 25 | IO_L18N_25 | AM36 | |
| 25 | IO_L19P_25 | AL31 | |
| 25 | IO_L19N_25 | AL32 | |
| 26 | IO_L0P_26 | AR8 | |
| 26 | IO_L0N_26 | AR9 | |
| 26 | IO_L1P_26 | AR10 | |
| 26 | IO_L1N_26 | AT9 | |
| 26 | IO_L2P_26 | AL10 | |
| 26 | IO_L2N_26 | AK10 | |
| 26 | IO_L3P_26 | AP10 | |
| 26 | IO_L3N_26 | AN11 | |
| 26 | IO_L4P_26 | AJ10 | |
| 26 | IO_L4N_VREF_26 | AJ11 | |
| 26 | IO_L5P_26 | AP11 | |
| 26 | IO_L5N_26 | AP12 | |
| 26 | IO_L6P_26 | AN9 | |
| 26 | IO_L6N_26 | AN10 | |
| 26 | IO_L7P_26 | AM11 | |
| 26 | IO_L7N_26 | AL11 | |
| 26 | IO_L8P_CC_26 | AR7 | |
| 26 | IO_L8N_CC_26 ⁽²⁾ | AT7 | |
| 26 | IO_L9P_CC_26 | AJ12 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 26 | IO_L9N_CC_26 ⁽²⁾ | AK12 | |
| 26 | IO_L10P_CC_26 | AM12 | |
| 26 | IO_L10N_CC_26 ⁽²⁾ | AL12 | |
| 26 | IO_L11P_CC_26 | AU8 | |
| 26 | IO_L11N_CC_26 ⁽²⁾ | AV7 | |
| 26 | IO_L12P_VRN_26 | AU9 | |
| 26 | IO_L12N_VRP_26 | AT10 | |
| 26 | IO_L13P_26 | AU6 | |
| 26 | IO_L13N_26 | AT6 | |
| 26 | IO_L14P_26 | AU11 | |
| 26 | IO_L14N_VREF_26 | AV11 | |
| 26 | IO_L15P_26 | AP8 | |
| 26 | IO_L15N_26 | AN8 | |
| 26 | IO_L16P_26 | AP13 | |
| 26 | IO_L16N_26 | AR12 | |
| 26 | IO_L17P_26 | AM9 | |
| 26 | IO_L17N_26 | AM8 | |
| 26 | IO_L18P_26 | AM13 | |
| 26 | IO_L18N_26 | AN13 | |
| 26 | IO_L19P_26 | AR6 | |
| 26 | IO_L19N_26 | AP7 | |
| 27 | IO_L0P_27 | L30 | |
| 27 | IO_L0N_27 | K30 | |
| 27 | IO_L1P_27 | J32 | |
| 27 | IO_L1N_27 | H33 | |
| 27 | IO_L2P_27 | F35 | |
| 27 | IO_L2N_27 | G36 | |
| 27 | IO_L3P_27 | F34 | |
| 27 | IO_L3N_27 | G34 | |
| 27 | IO_L4P_27 | E36 | |
| 27 | IO_L4N_VREF_27 | E35 | |
| 27 | IO_L5P_27 | G32 | |
| 27 | IO_L5N_27 | F32 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 27 | IO_L6P_27 | E37 | |
| 27 | IO_L6N_27 | F37 | |
| 27 | IO_L7P_27 | H31 | |
| 27 | IO_L7N_27 | J31 | |
| 27 | IO_L8P_CC_27 | L31 | |
| 27 | IO_L8N_CC_27 ⁽²⁾ | K32 | |
| 27 | IO_L9P_CC_27 | K29 | |
| 27 | IO_L9N_CC_27 ⁽²⁾ | L29 | |
| 27 | IO_L10P_CC_27 | J30 | |
| 27 | IO_L10N_CC_27 ⁽²⁾ | H30 | |
| 27 | IO_L11P_CC_27 | M33 | |
| 27 | IO_L11N_CC_27 ⁽²⁾ | L32 | |
| 27 | IO_L12P_VRN_27 | G31 | |
| 27 | IO_L12N_VRP_27 | F31 | |
| 27 | IO_L13P_27 | M31 | |
| 27 | IO_L13N_27 | M32 | |
| 27 | IO_L14P_27 | F30 | |
| 27 | IO_L14N_VREF_27 | E30 | |
| 27 | IO_L15P_27 | N31 | |
| 27 | IO_L15N_27 | N30 | |
| 27 | IO_L16P_27 | E29 | |
| 27 | IO_L16N_27 | F29 | |
| 27 | IO_L17P_27 | P31 | |
| 27 | IO_L17N_27 | P32 | |
| 27 | IO_L18P_27 | G29 | |
| 27 | IO_L18N_27 | H29 | |
| 27 | IO_L19P_27 | P30 | |
| 27 | IO_L19N_27 | R30 | |
| 28 | IO_L0P_28 | F10 | |
| 28 | IO_L0N_28 | F9 | |
| 28 | IO_L1P_28 | J11 | |
| 28 | IO_L1N_28 | H10 | |
| 28 | IO_L2P_28 | G11 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 28 | IO_L2N_28 | F11 | |
| 28 | IO_L3P_28 | G9 | |
| 28 | IO_L3N_28 | H9 | |
| 28 | IO_L4P_28 | E12 | |
| 28 | IO_L4N_VREF_28 | E13 | |
| 28 | IO_L5P_28 | J10 | |
| 28 | IO_L5N_28 | K10 | |
| 28 | IO_L6P_28 | K14 | |
| 28 | IO_L6N_28 | J13 | |
| 28 | IO_L7P_28 | K13 | |
| 28 | IO_L7N_28 | K12 | |
| 28 | IO_L8P_CC_28 | H11 | |
| 28 | IO_L8N_CC_28 ⁽²⁾ | J12 | |
| 28 | IO_L9P_CC_28 | L12 | |
| 28 | IO_L9N_CC_28 ⁽²⁾ | M12 | |
| 28 | IO_L10P_CC_28 | L10 | |
| 28 | IO_L10N_CC_28 ⁽²⁾ | L11 | |
| 28 | IO_L11P_CC_28 | G12 | |
| 28 | IO_L11N_CC_28 ⁽²⁾ | F12 | |
| 28 | IO_L12P_VRN_28 | N13 | |
| 28 | IO_L12N_VRP_28 | M13 | |
| 28 | IO_L13P_28 | H13 | |
| 28 | IO_L13N_28 | G13 | |
| 28 | IO_L14P_28 | M11 | |
| 28 | IO_L14N_VREF_28 | N10 | |
| 28 | IO_L15P_28 | E14 | |
| 28 | IO_L15N_28 | F14 | |
| 28 | IO_L16P_28 | P11 | |
| 28 | IO_L16N_28 | N11 | |
| 28 | IO_L17P_28 | F15 | |
| 28 | IO_L17N_28 | G14 | |
| 28 | IO_L18P_28 | P12 | |
| 28 | IO_L18N_28 | R12 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 28 | IO_L19P_28 | H14 | |
| 28 | IO_L19N_28 | H15 | |
| 29 | IO_L0P_29 | AH30 | |
| 29 | IO_L0N_29 | AH29 | |
| 29 | IO_L1P_29 | AN28 | |
| 29 | IO_L1N_29 | AP28 | |
| 29 | IO_L2P_29 | AH31 | |
| 29 | IO_L2N_29 | AJ30 | |
| 29 | IO_L3P_29 | AT26 | |
| 29 | IO_L3N_29 | AT25 | |
| 29 | IO_L4P_29 | AK29 | |
| 29 | IO_L4N_VREF_29 | AK30 | |
| 29 | IO_L5P_29 | AV26 | |
| 29 | IO_L5N_29 | AV25 | |
| 29 | IO_L6P_29 | AU34 | |
| 29 | IO_L6N_29 | AT34 | |
| 29 | IO_L7P_29 | AU27 | |
| 29 | IO_L7N_29 | AT27 | |
| 29 | IO_L8P_CC_29 | AR34 | |
| 29 | IO_L8N_CC_29 ⁽²⁾ | AR33 | |
| 29 | IO_L9P_CC_29 | AM28 | |
| 29 | IO_L9N_CC_29 ⁽²⁾ | AN29 | |
| 29 | IO_L10P_CC_29 | AR28 | |
| 29 | IO_L10N_CC_29 ⁽²⁾ | AR29 | |
| 29 | IO_L11P_CC_29 | AU32 | |
| 29 | IO_L11N_CC_29 ⁽²⁾ | AU33 | |
| 29 | IO_L12P_VRN_29 | AR30 | |
| 29 | IO_L12N_VRP_29 | AP30 | |
| 29 | IO_L13P_29 | AR32 | |
| 29 | IO_L13N_29 | AT32 | |
| 29 | IO_L14P_29 | AT29 | |
| 29 | IO_L14N_VREF_29 | AU28 | |
| 29 | IO_L15P_29 | AM29 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 29 | IO_L15N_29 | AN30 | |
| 29 | IO_L16P_29 | AU29 | |
| 29 | IO_L16N_29 | AV30 | |
| 29 | IO_L17P_29 | AL29 | |
| 29 | IO_L17N_29 | AL30 | |
| 29 | IO_L18P_29 | AV31 | |
| 29 | IO_L18N_29 | AU31 | |
| 29 | IO_L19P_29 | AT30 | |
| 29 | IO_L19N_29 | AT31 | |
| 30 | IO_L0P_30 | AR19 | |
| 30 | IO_L0N_30 | AR18 | |
| 30 | IO_L1P_30 | AJ15 | |
| 30 | IO_L1N_30 | AH15 | |
| 30 | IO_L2P_30 | AN18 | |
| 30 | IO_L2N_30 | AP18 | |
| 30 | IO_L3P_30 | AH14 | |
| 30 | IO_L3N_30 | AG13 | |
| 30 | IO_L4P_30 | AL16 | |
| 30 | IO_L4N_VREF_30 | AM16 | |
| 30 | IO_L5P_30 | AH13 | |
| 30 | IO_L5N_30 | AJ13 | |
| 30 | IO_L6P_30 | AU18 | |
| 30 | IO_L6N_30 | AU17 | |
| 30 | IO_L7P_30 | AK13 | |
| 30 | IO_L7N_30 | AK14 | |
| 30 | IO_L8P_CC_30 | AT17 | |
| 30 | IO_L8N_CC_30 ⁽²⁾ | AR17 | |
| 30 | IO_L9P_CC_30 | AT12 | |
| 30 | IO_L9N_CC_30 ⁽²⁾ | AR13 | |
| 30 | IO_L10P_CC_30 | AN14 | |
| 30 | IO_L10N_CC_30 ⁽²⁾ | AN15 | |
| 30 | IO_L11P_CC_30 | AN16 | |
| 30 | IO_L11N_CC_30 ⁽²⁾ | AP17 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 30 | IO_L12P_VRN_30 | AU13 | |
| 30 | IO_L12N_VRP_30 | AT14 | |
| 30 | IO_L13P_30 | AT16 | |
| 30 | IO_L13N_30 | AU16 | |
| 30 | IO_L14P_30 | AP15 | |
| 30 | IO_L14N_VREF_30 | AR14 | |
| 30 | IO_L15P_30 | AR15 | |
| 30 | IO_L15N_30 | AP16 | |
| 30 | IO_L16P_30 | AM14 | |
| 30 | IO_L16N_30 | AL14 | |
| 30 | IO_L17P_30 | AU14 | |
| 30 | IO_L17N_30 | AT15 | |
| 30 | IO_L18P_30 | AU12 | |
| 30 | IO_L18N_30 | AV13 | |
| 30 | IO_L19P_30 | AK15 | |
| 30 | IO_L19N_30 | AL15 | |
| NA | MGTTXP0_111 | T41 | |
| NA | MGTAVTTTX_111 | AA40 | |
| NA | MGTTXN0_111 | U41 | |
| NA | MGTAVCC_111 | W40 | |
| NA | MGTRXP0_111 | U42 | |
| NA | MGTAVTTRX_111 | U40 | |
| NA | MGTRXN0_111 | V42 | |
| NA | MGTAVCCPLL_111 | Y40 | |
| NA | MGTRXN1_111 | W42 | |
| NA | MGTREFCLKN_111 | V40 | |
| NA | MGTRXP1_111 | Y42 | |
| NA | MGTREFCLKP_111 | V39 | |
| NA | MGTTXN1_111 | Y41 | |
| NA | MGTTXP1_111 | AA41 | |
| NA | MGTAVTTRXC_L | AA39 | |
| NA | MGTRREF_111 | AB39 | |
| NA | MGTTXP0_112 | T2 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTAVTTTX_112 | AA3 | |
| NA | MGTTXN0_112 | U2 | |
| NA | MGTAVCC_112 | W3 | |
| NA | MGTRXP0_112 | U1 | |
| NA | MGTAVTTRX_112 | U3 | |
| NA | MGTRXN0_112 | V1 | |
| NA | MGTAVCCPLL_112 | Y3 | |
| NA | MGTRXN1_112 | W1 | |
| NA | MGTREFCLKN_112 | V3 | |
| NA | MGTRXP1_112 | Y1 | |
| NA | MGTREFCLKP_112 | V4 | |
| NA | MGTTXN1_112 | Y2 | |
| NA | MGTTXP1_112 | AA2 | |
| NA | MGTAVTTRXC_R | AA4 | |
| NA | MGTRREF_112 | AB4 | |
| NA | MGTTXP0_113 | AB41 | |
| NA | MGTAVTTTX_113 | AG40 | |
| NA | MGTTXN0_113 | AC41 | |
| NA | MGTAVCC_113 | AE40 | |
| NA | MGTRXP0_113 | AC42 | |
| NA | MGTAVTTRX_113 | AC40 | |
| NA | MGTRXN0_113 | AD42 | |
| NA | MGTAVCCPLL_113 | AF40 | |
| NA | MGTRXN1_113 | AE42 | |
| NA | MGTREFCLKN_113 | AD40 | |
| NA | MGTRXP1_113 | AF42 | |
| NA | MGTREFCLKP_113 | AD39 | |
| NA | MGTTXN1_113 | AF41 | |
| NA | MGTTXP1_113 | AG41 | |
| NA | MGTTXP0_114 | AB2 | |
| NA | MGTAVTTTX_114 | AG3 | |
| NA | MGTTXN0_114 | AC2 | |
| NA | MGTAVCC_114 | AE3 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTRXP0_114 | AC1 | |
| NA | MGTAVTTRX_114 | AC3 | |
| NA | MGTRXN0_114 | AD1 | |
| NA | MGTAVCCPLL_114 | AF3 | |
| NA | MGTRXN1_114 | AE1 | |
| NA | MGTREFCLKN_114 | AD3 | |
| NA | MGTRXP1_114 | AF1 | |
| NA | MGTREFCLKP_114 | AD4 | |
| NA | MGTTXN1_114 | AF2 | |
| NA | MGTTXP1_114 | AG2 | |
| NA | MGTTXP0_115 | K41 | |
| NA | MGTAVTTTX_115 | R40 | |
| NA | MGTTXN0_115 | L41 | |
| NA | MGTAVCC_115 | N40 | |
| NA | MGTRXP0_115 | L42 | |
| NA | MGTAVTTRX_115 | L40 | |
| NA | MGTRXN0_115 | M42 | |
| NA | MGTAVCCPLL_115 | P40 | |
| NA | MGTRXN1_115 | N42 | |
| NA | MGTREFCLKN_115 | M40 | |
| NA | MGTRXP1_115 | P42 | |
| NA | MGTREFCLKP_115 | M39 | |
| NA | MGTTXN1_115 | P41 | |
| NA | MGTTXP1_115 | R41 | |
| NA | MGTTXP0_116 | K2 | |
| NA | MGTAVTTTX_116 | R3 | |
| NA | MGTTXN0_116 | L2 | |
| NA | MGTAVCC_116 | N3 | |
| NA | MGTRXP0_116 | L1 | |
| NA | MGTAVTTRX_116 | L3 | |
| NA | MGTRXN0_116 | M1 | |
| NA | MGTAVCCPLL_116 | P3 | |
| NA | MGTRXN1_116 | N1 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTREFCLKN_116 | M3 | |
| NA | MGTRXP1_116 | P1 | |
| NA | MGTREFCLKP_116 | M4 | |
| NA | MGTTXN1_116 | P2 | |
| NA | MGTTXP1_116 | R2 | |
| NA | MGTTXP0_117 | AH41 | |
| NA | MGTAVTTTX_117 | AN40 | |
| NA | MGTTXN0_117 | AJ41 | |
| NA | MGTAVCC_117 | AL40 | |
| NA | MGTRXP0_117 | AJ42 | |
| NA | MGTAVTTRX_117 | AJ40 | |
| NA | MGTRXN0_117 | AK42 | |
| NA | MGTAVCCPLL_117 | AM40 | |
| NA | MGTRXN1_117 | AL42 | |
| NA | MGTREFCLKN_117 | AK40 | |
| NA | MGTRXP1_117 | AM42 | |
| NA | MGTREFCLKP_117 | AK39 | |
| NA | MGTTXN1_117 | AM41 | |
| NA | MGTTXP1_117 | AN41 | |
| NA | MGTTXP0_118 | AH2 | |
| NA | MGTAVTTTX_118 | AN3 | |
| NA | MGTTXN0_118 | AJ2 | |
| NA | MGTAVCC_118 | AL3 | |
| NA | MGTRXP0_118 | AJ1 | |
| NA | MGTAVTTRX_118 | AJ3 | |
| NA | MGTRXN0_118 | AK1 | |
| NA | MGTAVCCPLL_118 | AM3 | |
| NA | MGTRXN1_118 | AL1 | |
| NA | MGTREFCLKN_118 | AK3 | |
| NA | MGTRXP1_118 | AM1 | |
| NA | MGTREFCLKP_118 | AK4 | |
| NA | MGTTXN1_118 | AM2 | |
| NA | MGTTXP1_118 | AN2 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTTXP0_119 | D41 | |
| NA | MGTAVTTTX_119 | J40 | |
| NA | MGTTXN0_119 | E41 | |
| NA | MGTAVCC_119 | G40 | |
| NA | MGTRXP0_119 | E42 | |
| NA | MGTAVTTRX_119 | E40 | |
| NA | MGTRXN0_119 | F42 | |
| NA | MGTAVCCPLL_119 | H40 | |
| NA | MGTRXN1_119 | G42 | |
| NA | MGTREFCLKN_119 | F40 | |
| NA | MGTRXP1_119 | H42 | |
| NA | MGTREFCLKP_119 | F39 | |
| NA | MGTTXN1_119 | H41 | |
| NA | MGTTXP1_119 | J41 | |
| NA | MGTTXP0_120 | D2 | |
| NA | MGTAVTTTX_120 | J3 | |
| NA | MGTTXN0_120 | E2 | |
| NA | MGTAVCC_120 | G3 | |
| NA | MGTRXP0_120 | E1 | |
| NA | MGTAVTTRX_120 | E3 | |
| NA | MGTRXN0_120 | F1 | |
| NA | MGTAVCCPLL_120 | H3 | |
| NA | MGTRXN1_120 | G1 | |
| NA | MGTREFCLKN_120 | F3 | |
| NA | MGTRXP1_120 | H1 | |
| NA | MGTREFCLKP_120 | F4 | |
| NA | MGTTXN1_120 | H2 | |
| NA | MGTTXP1_120 | J2 | |
| NA | MGTTXP0_121 | AP41 | |
| NA | MGTAVTTTX_121 | AW40 | |
| NA | MGTTXN0_121 | AR41 | |
| NA | MGTAVCC_121 | AU40 | |
| NA | MGTRXP0_121 | AR42 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTAVTTRX_121 | AR40 | |
| NA | MGTRXN0_121 | AT42 | |
| NA | MGTAVCCPLL_121 | AV40 | |
| NA | MGTRXN1_121 | AU42 | |
| NA | MGTREFCLKN_121 | AT40 | |
| NA | MGTRXP1_121 | AV42 | |
| NA | MGTREFCLKP_121 | AT39 | |
| NA | MGTTXN1_121 | AV41 | |
| NA | MGTTXP1_121 | AW41 | |
| NA | MGTTXP0_122 | AP2 | |
| NA | MGTAVTTRX_122 | AW3 | |
| NA | MGTTXN0_122 | AR2 | |
| NA | MGTAVCC_122 | AU3 | |
| NA | MGTRXP0_122 | AR1 | |
| NA | MGTAVTTRX_122 | AR3 | |
| NA | MGTRXN0_122 | AT1 | |
| NA | MGTAVCCPLL_122 | AV3 | |
| NA | MGTRXN1_122 | AU1 | |
| NA | MGTREFCLKN_122 | AT3 | |
| NA | MGTRXP1_122 | AV1 | |
| NA | MGTREFCLKP_122 | AT4 | |
| NA | MGTTXN1_122 | AV2 | |
| NA | MGTTXP1_122 | AW2 | |
| NA | MGTTXP0_123 | B37 | |
| NA | MGTAVTTRX_123 | C42 | |
| NA | MGTTXN0_123 | B38 | |
| NA | MGTAVCC_123 | D39 | |
| NA | MGTRXP0_123 | A38 | |
| NA | MGTAVTTRX_123 | C38 | |
| NA | MGTRXN0_123 | A39 | |
| NA | MGTAVCCPLL_123 | C41 | |
| NA | MGTRXN1_123 | A40 | |
| NA | MGTREFCLKN_123 | C40 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTRXP1_123 | A41 | |
| NA | MGTREFCLKP_123 | C39 | |
| NA | MGTTXN1_123 | B41 | |
| NA | MGTTXP1_123 | B42 | |
| NA | MGTTXP0_124 | B6 | |
| NA | MGTAVTTTX_124 | C1 | |
| NA | MGTTXN0_124 | B5 | |
| NA | MGTAVCC_124 | D4 | |
| NA | MGTRXP0_124 | A5 | |
| NA | MGTAVTTRX_124 | C5 | |
| NA | MGTRXN0_124 | A4 | |
| NA | MGTAVCCPLL_124 | C2 | |
| NA | MGTRXN1_124 | A3 | |
| NA | MGTREFCLKN_124 | C3 | |
| NA | MGTRXP1_124 | A2 | |
| NA | MGTREFCLKP_124 | C4 | |
| NA | MGTTXN1_124 | B2 | |
| NA | MGTTXP1_124 | B1 | |
| NA | MGTTXP0_125 | BA42 | |
| NA | MGTAVTTTX_125 | AY37 | |
| NA | MGTTXN0_125 | BA41 | |
| NA | MGTAVCC_125 | AW38 | |
| NA | MGTRXP0_125 | BB41 | |
| NA | MGTAVTTRX_125 | AY41 | |
| NA | MGTRXN0_125 | BB40 | |
| NA | MGTAVCCPLL_125 | AY38 | |
| NA | MGTRXN1_125 | BB39 | |
| NA | MGTREFCLKN_125 | AY39 | |
| NA | MGTRXP1_125 | BB38 | |
| NA | MGTREFCLKP_125 | AW39 | |
| NA | MGTTXN1_125 | BA38 | |
| NA | MGTTXP1_125 | BA37 | |
| NA | MGTTXP0_126 | BA1 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTAVTTTX_126 | AY6 | |
| NA | MGTTXN0_126 | BA2 | |
| NA | MGTAVCC_126 | AW5 | |
| NA | MGTRXP0_126 | BB2 | |
| NA | MGTAVTTRX_126 | AY2 | |
| NA | MGTRXN0_126 | BB3 | |
| NA | MGTAVCCPLL_126 | AY5 | |
| NA | MGTRXN1_126 | BB4 | |
| NA | MGTREFCLKN_126 | AY4 | |
| NA | MGTRXP1_126 | BB5 | |
| NA | MGTREFCLKP_126 | AW4 | |
| NA | MGTTXN1_126 | BA5 | |
| NA | MGTTXP1_126 | BA6 | |
| NA | MGTTXP0_127 | B31 | |
| NA | MGTAVTTTX_127 | C36 | |
| NA | MGTTXN0_127 | B32 | |
| NA | MGTAVCC_127 | C34 | |
| NA | MGTRXP0_127 | A32 | |
| NA | MGTAVTTRX_127 | C32 | |
| NA | MGTRXN0_127 | A33 | |
| NA | MGTAVCCPLL_127 | C35 | |
| NA | MGTRXN1_127 | A34 | |
| NA | MGTREFCLKN_127 | C33 | |
| NA | MGTRXP1_127 | A35 | |
| NA | MGTREFCLKP_127 | D33 | |
| NA | MGTTXN1_127 | B35 | |
| NA | MGTTXP1_127 | B36 | |
| NA | MGTTXP0_128 | B12 | |
| NA | MGTAVTTTX_128 | C7 | |
| NA | MGTTXN0_128 | B11 | |
| NA | MGTAVCC_128 | C9 | |
| NA | MGTRXP0_128 | A11 | |
| NA | MGTAVTTRX_128 | C11 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTRXN0_128 | A10 | |
| NA | MGTAVCCPLL_128 | C8 | |
| NA | MGTRXN1_128 | A9 | |
| NA | MGTREFCLKN_128 | C10 | |
| NA | MGTRXP1_128 | A8 | |
| NA | MGTREFCLKP_128 | D10 | |
| NA | MGTTXN1_128 | B8 | |
| NA | MGTTXP1_128 | B7 | |
| NA | MGTTXP0_129 | BA36 | |
| NA | MGTAVTTTX_129 | AY31 | |
| NA | MGTTXN0_129 | BA35 | |
| NA | MGTAVCC_129 | AY33 | |
| NA | MGTRXP0_129 | BB35 | |
| NA | MGTAVTTRX_129 | AY35 | |
| NA | MGTRXN0_129 | BB34 | |
| NA | MGTAVCCPLL_129 | AY32 | |
| NA | MGTRXN1_129 | BB33 | |
| NA | MGTREFCLKN_129 | AY34 | |
| NA | MGTRXP1_129 | BB32 | |
| NA | MGTREFCLKP_129 | AW34 | |
| NA | MGTTXN1_129 | BA32 | |
| NA | MGTTXP1_129 | BA31 | |
| NA | MGTTXP0_130 | BA7 | |
| NA | MGTAVTTTX_130 | AY12 | |
| NA | MGTTXN0_130 | BA8 | |
| NA | MGTAVCC_130 | AY10 | |
| NA | MGTRXP0_130 | BB8 | |
| NA | MGTAVTTRX_130 | AY8 | |
| NA | MGTRXN0_130 | BB9 | |
| NA | MGTAVCCPLL_130 | AY11 | |
| NA | MGTRXN1_130 | BB10 | |
| NA | MGTREFCLKN_130 | AY9 | |
| NA | MGTRXP1_130 | BB11 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | MGTREFCLKP_130 | AW9 | |
| NA | MGTTXN1_130 | BA11 | |
| NA | MGTTXP1_130 | BA12 | |
| NA | MGTTXP0_131 | B25 | TX150T |
| NA | MGTAVTTTX_131 | C30 | TX150T |
| NA | MGTTXN0_131 | B26 | TX150T |
| NA | MGTAVCC_131 | C28 | TX150T |
| NA | MGTRXP0_131 | A26 | TX150T |
| NA | MGTAVTTRX_131 | C26 | TX150T |
| NA | MGTRXN0_131 | A27 | TX150T |
| NA | MGTAVCCPLL_131 | C29 | TX150T |
| NA | MGTRXN1_131 | A28 | TX150T |
| NA | MGTREFCLKN_131 | C27 | TX150T |
| NA | MGTRXP1_131 | A29 | TX150T |
| NA | MGTREFCLKP_131 | D27 | TX150T |
| NA | MGTTXN1_131 | B29 | TX150T |
| NA | MGTTXP1_131 | B30 | TX150T |
| NA | MGTTXP0_132 | B18 | TX150T |
| NA | MGTAVTTTX_132 | C13 | TX150T |
| NA | MGTTXN0_132 | B17 | TX150T |
| NA | MGTAVCC_132 | C15 | TX150T |
| NA | MGTRXP0_132 | A17 | TX150T |
| NA | MGTAVTTRX_132 | C17 | TX150T |
| NA | MGTRXN0_132 | A16 | TX150T |
| NA | MGTAVCCPLL_132 | C14 | TX150T |
| NA | MGTRXN1_132 | A15 | TX150T |
| NA | MGTREFCLKN_132 | C16 | TX150T |
| NA | MGTRXP1_132 | A14 | TX150T |
| NA | MGTREFCLKP_132 | D16 | TX150T |
| NA | MGTTXN1_132 | B14 | TX150T |
| NA | MGTTXP1_132 | B13 | TX150T |
| NA | MGTTXP0_133 | BA30 | TX150T |
| NA | MGTAVTTTX_133 | AY25 | TX150T |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | MGTTXN0_133 | BA29 | TX150T |
| NA | MGTAVCC_133 | AY27 | TX150T |
| NA | MGTRXP0_133 | BB29 | TX150T |
| NA | MGTAVTTRX_133 | AY29 | TX150T |
| NA | MGTRXN0_133 | BB28 | TX150T |
| NA | MGTAVCCPLL_133 | AY26 | TX150T |
| NA | MGTRXN1_133 | BB27 | TX150T |
| NA | MGTREFCLKN_133 | AY28 | TX150T |
| NA | MGTRXP1_133 | BB26 | TX150T |
| NA | MGTREFCLKP_133 | AW28 | TX150T |
| NA | MGTTXN1_133 | BA26 | TX150T |
| NA | MGTTXP1_133 | BA25 | TX150T |
| NA | MGTTXP0_134 | BA13 | TX150T |
| NA | MGTAVTTRX_134 | AY18 | TX150T |
| NA | MGTTXN0_134 | BA14 | TX150T |
| NA | MGTAVCC_134 | AY16 | TX150T |
| NA | MGTRXP0_134 | BB14 | TX150T |
| NA | MGTAVTTRX_134 | AY14 | TX150T |
| NA | MGTRXN0_134 | BB15 | TX150T |
| NA | MGTAVCCPLL_134 | AY17 | TX150T |
| NA | MGTRXN1_134 | BB16 | TX150T |
| NA | MGTREFCLKN_134 | AY15 | TX150T |
| NA | MGTRXP1_134 | BB17 | TX150T |
| NA | MGTREFCLKP_134 | AW15 | TX150T |
| NA | MGTTXN1_134 | BA17 | TX150T |
| NA | MGTTXP1_134 | BA18 | TX150T |
| NA | GND | A6 | |
| NA | GND | A7 | |
| NA | GND | A12 | |
| NA | GND | A13 | |
| NA | GND | A18 | |
| NA | GND | A19 | |
| NA | GND | A23 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | A24 | |
| NA | GND | A25 | |
| NA | GND | A30 | |
| NA | GND | A31 | |
| NA | GND | A36 | |
| NA | GND | A37 | |
| NA | GND | AA1 | |
| NA | GND | AA5 | |
| NA | GND | AA13 | |
| NA | GND | AA15 | |
| NA | GND | AA17 | |
| NA | GND | AA19 | |
| NA | GND | AA23 | |
| NA | GND | AA25 | |
| NA | GND | AA27 | |
| NA | GND | AA29 | |
| NA | GND | AA33 | |
| NA | GND | AA38 | |
| NA | GND | AA42 | |
| NA | GND | AB1 | |
| NA | GND | AB3 | |
| NA | GND | AB5 | |
| NA | GND | AB10 | |
| NA | GND | AB12 | |
| NA | GND | AB14 | |
| NA | GND | AB16 | |
| NA | GND | AB18 | |
| NA | GND | AB20 | |
| NA | GND | AB24 | |
| NA | GND | AB26 | |
| NA | GND | AB28 | |
| NA | GND | AB30 | |
| NA | GND | AB38 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AB40 | |
| NA | GND | AB42 | |
| NA | GND | AC4 | |
| NA | GND | AC5 | |
| NA | GND | AC7 | |
| NA | GND | AC13 | |
| NA | GND | AC15 | |
| NA | GND | AC17 | |
| NA | GND | AC19 | |
| NA | GND | AC23 | |
| NA | GND | AC25 | |
| NA | GND | AC27 | |
| NA | GND | AC29 | |
| NA | GND | AC37 | |
| NA | GND | AC38 | |
| NA | GND | AC39 | |
| NA | GND | AD2 | |
| NA | GND | AD5 | |
| NA | GND | AD12 | |
| NA | GND | AD14 | |
| NA | GND | AD16 | |
| NA | GND | AD18 | |
| NA | GND | AD20 | |
| NA | GND | AD22 | |
| NA | GND | AD24 | |
| NA | GND | AD26 | |
| NA | GND | AD28 | |
| NA | GND | AD34 | |
| NA | GND | AD38 | |
| NA | GND | AD41 | |
| NA | GND | AE2 | |
| NA | GND | AE4 | |
| NA | GND | AE5 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AE6 | |
| NA | GND | AE11 | |
| NA | GND | AE13 | |
| NA | GND | AE15 | |
| NA | GND | AE17 | |
| NA | GND | AE19 | |
| NA | GND | AE21 | |
| NA | GND | AE23 | |
| NA | GND | AE25 | |
| NA | GND | AE27 | |
| NA | GND | AE29 | |
| NA | GND | AE31 | |
| NA | GND | AE38 | |
| NA | GND | AE39 | |
| NA | GND | AE41 | |
| NA | GND | AF4 | |
| NA | GND | AF8 | |
| NA | GND | AF18 | |
| NA | GND | AF20 | |
| NA | GND | AF22 | |
| NA | GND | AF24 | |
| NA | GND | AF26 | |
| NA | GND | AF28 | |
| NA | GND | AF30 | |
| NA | GND | AF38 | |
| NA | GND | AF39 | |
| NA | GND | AG1 | |
| NA | GND | AG4 | |
| NA | GND | AG5 | |
| NA | GND | AG15 | |
| NA | GND | AG17 | |
| NA | GND | AG19 | |
| NA | GND | AG21 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AG23 | |
| NA | GND | AG25 | |
| NA | GND | AG27 | |
| NA | GND | AG35 | |
| NA | GND | AG39 | |
| NA | GND | AG42 | |
| NA | GND | AH1 | |
| NA | GND | AH3 | |
| NA | GND | AH4 | |
| NA | GND | AH12 | |
| NA | GND | AH18 | |
| NA | GND | AH20 | |
| NA | GND | AH22 | |
| NA | GND | AH24 | |
| NA | GND | AH26 | |
| NA | GND | AH32 | |
| NA | GND | AH39 | |
| NA | GND | AH40 | |
| NA | GND | AH42 | |
| NA | GND | AJ4 | |
| NA | GND | AJ5 | |
| NA | GND | AJ9 | |
| NA | GND | AJ19 | |
| NA | GND | AJ21 | |
| NA | GND | AJ23 | |
| NA | GND | AJ29 | |
| NA | GND | AJ38 | |
| NA | GND | AJ39 | |
| NA | GND | AK2 | |
| NA | GND | AK5 | |
| NA | GND | AK6 | |
| NA | GND | AK16 | |
| NA | GND | AK26 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AK36 | |
| NA | GND | AK38 | |
| NA | GND | AK41 | |
| NA | GND | AL2 | |
| NA | GND | AL4 | |
| NA | GND | AL5 | |
| NA | GND | AL13 | |
| NA | GND | AL23 | |
| NA | GND | AL33 | |
| NA | GND | AL38 | |
| NA | GND | AL39 | |
| NA | GND | AL41 | |
| NA | GND | AM4 | |
| NA | GND | AM10 | |
| NA | GND | AM20 | |
| NA | GND | AM30 | |
| NA | GND | AM39 | |
| NA | GND | AN1 | |
| NA | GND | AN4 | |
| NA | GND | AN7 | |
| NA | GND | AN17 | |
| NA | GND | AN27 | |
| NA | GND | AN37 | |
| NA | GND | AN39 | |
| NA | GND | AN42 | |
| NA | GND | AP1 | |
| NA | GND | AP3 | |
| NA | GND | AP4 | |
| NA | GND | AP14 | |
| NA | GND | AP24 | |
| NA | GND | AP34 | |
| NA | GND | AP39 | |
| NA | GND | AP40 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AP42 | |
| NA | GND | AR4 | |
| NA | GND | AR5 | |
| NA | GND | AR11 | |
| NA | GND | AR21 | |
| NA | GND | AR31 | |
| NA | GND | AR38 | |
| NA | GND | AR39 | |
| NA | GND | AT2 | |
| NA | GND | AT5 | |
| NA | GND | AT8 | |
| NA | GND | AT18 | |
| NA | GND | AT28 | |
| NA | GND | AT38 | |
| NA | GND | AT41 | |
| NA | GND | AU2 | |
| NA | GND | AU4 | |
| NA | GND | AU5 | |
| NA | GND | AU10 | |
| NA | GND | AU15 | |
| NA | GND | AU25 | |
| NA | GND | AU35 | |
| NA | GND | AU38 | |
| NA | GND | AU39 | |
| NA | GND | AU41 | |
| NA | GND | AV4 | |
| NA | GND | AV5 | |
| NA | GND | AV6 | |
| NA | GND | AV8 | |
| NA | GND | AV9 | |
| NA | GND | AV10 | |
| NA | GND | AV12 | |
| NA | GND | AV14 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | AV15 | |
| NA | GND | AV16 | |
| NA | GND | AV17 | |
| NA | GND | AV22 | |
| NA | GND | AV27 | |
| NA | GND | AV28 | |
| NA | GND | AV29 | |
| NA | GND | AV32 | |
| NA | GND | AV33 | |
| NA | GND | AV34 | |
| NA | GND | AV35 | |
| NA | GND | AV37 | |
| NA | GND | AV38 | |
| NA | GND | AV39 | |
| NA | GND | AW1 | |
| NA | GND | AW6 | |
| NA | GND | AW7 | |
| NA | GND | AW8 | |
| NA | GND | AW10 | |
| NA | GND | AW11 | |
| NA | GND | AW12 | |
| NA | GND | AW13 | |
| NA | GND | AW14 | |
| NA | GND | AW16 | |
| NA | GND | AW17 | |
| NA | GND | AW18 | |
| NA | GND | AW19 | |
| NA | GND | AW24 | |
| NA | GND | AW25 | |
| NA | GND | AW26 | |
| NA | GND | AW27 | |
| NA | GND | AW29 | |
| NA | GND | AW30 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AW31 | |
| NA | GND | AW32 | |
| NA | GND | AW33 | |
| NA | GND | AW35 | |
| NA | GND | AW36 | |
| NA | GND | AW37 | |
| NA | GND | AW42 | |
| NA | GND | AY1 | |
| NA | GND | AY3 | |
| NA | GND | AY7 | |
| NA | GND | AY13 | |
| NA | GND | AY19 | |
| NA | GND | AY24 | |
| NA | GND | AY30 | |
| NA | GND | AY36 | |
| NA | GND | AY40 | |
| NA | GND | AY42 | |
| NA | GND | B3 | |
| NA | GND | B4 | |
| NA | GND | B9 | |
| NA | GND | B10 | |
| NA | GND | B15 | |
| NA | GND | B16 | |
| NA | GND | B19 | |
| NA | GND | B20 | |
| NA | GND | B24 | |
| NA | GND | B27 | |
| NA | GND | B28 | |
| NA | GND | B33 | |
| NA | GND | B34 | |
| NA | GND | B39 | |
| NA | GND | B40 | |
| NA | GND | BA3 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | BA4 | |
| NA | GND | BA9 | |
| NA | GND | BA10 | |
| NA | GND | BA15 | |
| NA | GND | BA16 | |
| NA | GND | BA19 | |
| NA | GND | BA23 | |
| NA | GND | BA24 | |
| NA | GND | BA27 | |
| NA | GND | BA28 | |
| NA | GND | BA33 | |
| NA | GND | BA34 | |
| NA | GND | BA39 | |
| NA | GND | BA40 | |
| NA | GND | BB6 | |
| NA | GND | BB7 | |
| NA | GND | BB12 | |
| NA | GND | BB13 | |
| NA | GND | BB18 | |
| NA | GND | BB19 | |
| NA | GND | BB20 | |
| NA | GND | BB24 | |
| NA | GND | BB25 | |
| NA | GND | BB30 | |
| NA | GND | BB31 | |
| NA | GND | BB36 | |
| NA | GND | BB37 | |
| NA | GND | C6 | |
| NA | GND | C12 | |
| NA | GND | C18 | |
| NA | GND | C19 | |
| NA | GND | C24 | |
| NA | GND | C25 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | C31 | |
| NA | GND | C37 | |
| NA | GND | D1 | |
| NA | GND | D3 | |
| NA | GND | D5 | |
| NA | GND | D6 | |
| NA | GND | D7 | |
| NA | GND | D8 | |
| NA | GND | D9 | |
| NA | GND | D11 | |
| NA | GND | D12 | |
| NA | GND | D13 | |
| NA | GND | D14 | |
| NA | GND | D15 | |
| NA | GND | D17 | |
| NA | GND | D18 | |
| NA | GND | D19 | |
| NA | GND | D24 | |
| NA | GND | D25 | |
| NA | GND | D26 | |
| NA | GND | D28 | |
| NA | GND | D29 | |
| NA | GND | D30 | |
| NA | GND | D31 | |
| NA | GND | D32 | |
| NA | GND | D34 | |
| NA | GND | D35 | |
| NA | GND | D36 | |
| NA | GND | D37 | |
| NA | GND | D38 | |
| NA | GND | D40 | |
| NA | GND | D42 | |
| NA | GND | E4 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | E5 | |
| NA | GND | E6 | |
| NA | GND | E9 | |
| NA | GND | E10 | |
| NA | GND | E11 | |
| NA | GND | E15 | |
| NA | GND | E16 | |
| NA | GND | E17 | |
| NA | GND | E21 | |
| NA | GND | E26 | |
| NA | GND | E27 | |
| NA | GND | E28 | |
| NA | GND | E31 | |
| NA | GND | E32 | |
| NA | GND | E33 | |
| NA | GND | E34 | |
| NA | GND | E38 | |
| NA | GND | E39 | |
| NA | GND | F2 | |
| NA | GND | F5 | |
| NA | GND | F8 | |
| NA | GND | F18 | |
| NA | GND | F28 | |
| NA | GND | F33 | |
| NA | GND | F38 | |
| NA | GND | F41 | |
| NA | GND | G2 | |
| NA | GND | G4 | |
| NA | GND | G5 | |
| NA | GND | G15 | |
| NA | GND | G25 | |
| NA | GND | G35 | |
| NA | GND | G38 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | G39 | |
| NA | GND | G41 | |
| NA | GND | H4 | |
| NA | GND | H12 | |
| NA | GND | H22 | |
| NA | GND | H32 | |
| NA | GND | H39 | |
| NA | GND | J1 | |
| NA | GND | J4 | |
| NA | GND | J9 | |
| NA | GND | J19 | |
| NA | GND | J29 | |
| NA | GND | J39 | |
| NA | GND | J42 | |
| NA | GND | K1 | |
| NA | GND | K3 | |
| NA | GND | K4 | |
| NA | GND | K6 | |
| NA | GND | K16 | |
| NA | GND | K26 | |
| NA | GND | K36 | |
| NA | GND | K39 | |
| NA | GND | K40 | |
| NA | GND | K42 | |
| NA | GND | L4 | |
| NA | GND | L5 | |
| NA | GND | L13 | |
| NA | GND | L23 | |
| NA | GND | L33 | |
| NA | GND | L38 | |
| NA | GND | L39 | |
| NA | GND | M2 | |
| NA | GND | M5 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | M10 | |
| NA | GND | M20 | |
| NA | GND | M30 | |
| NA | GND | M38 | |
| NA | GND | M41 | |
| NA | GND | N2 | |
| NA | GND | N4 | |
| NA | GND | N5 | |
| NA | GND | N7 | |
| NA | GND | N17 | |
| NA | GND | N27 | |
| NA | GND | N37 | |
| NA | GND | N38 | |
| NA | GND | N39 | |
| NA | GND | N41 | |
| NA | GND | P4 | |
| NA | GND | P14 | |
| NA | GND | P16 | |
| NA | GND | P20 | |
| NA | GND | P24 | |
| NA | GND | P34 | |
| NA | GND | P39 | |
| NA | GND | R1 | |
| NA | GND | R4 | |
| NA | GND | R11 | |
| NA | GND | R13 | |
| NA | GND | R17 | |
| NA | GND | R19 | |
| NA | GND | R21 | |
| NA | GND | R23 | |
| NA | GND | R25 | |
| NA | GND | R31 | |
| NA | GND | R39 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | R42 | |
| NA | GND | T1 | |
| NA | GND | T3 | |
| NA | GND | T4 | |
| NA | GND | T8 | |
| NA | GND | T12 | |
| NA | GND | T16 | |
| NA | GND | T18 | |
| NA | GND | T20 | |
| NA | GND | T22 | |
| NA | GND | T24 | |
| NA | GND | T26 | |
| NA | GND | T28 | |
| NA | GND | T38 | |
| NA | GND | T39 | |
| NA | GND | T40 | |
| NA | GND | T42 | |
| NA | GND | U4 | |
| NA | GND | U5 | |
| NA | GND | U13 | |
| NA | GND | U15 | |
| NA | GND | U17 | |
| NA | GND | U19 | |
| NA | GND | U21 | |
| NA | GND | U23 | |
| NA | GND | U25 | |
| NA | GND | U27 | |
| NA | GND | U35 | |
| NA | GND | U38 | |
| NA | GND | U39 | |
| NA | GND | V2 | |
| NA | GND | V5 | |
| NA | GND | V12 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | V14 | |
| NA | GND | V16 | |
| NA | GND | V18 | |
| NA | GND | V20 | |
| NA | GND | V22 | |
| NA | GND | V24 | |
| NA | GND | V26 | |
| NA | GND | V28 | |
| NA | GND | V30 | |
| NA | GND | V32 | |
| NA | GND | V37 | |
| NA | GND | V38 | |
| NA | GND | V41 | |
| NA | GND | W2 | |
| NA | GND | W4 | |
| NA | GND | W5 | |
| NA | GND | W9 | |
| NA | GND | W13 | |
| NA | GND | W15 | |
| NA | GND | W17 | |
| NA | GND | W19 | |
| NA | GND | W21 | |
| NA | GND | W23 | |
| NA | GND | W25 | |
| NA | GND | W27 | |
| NA | GND | W29 | |
| NA | GND | W38 | |
| NA | GND | W39 | |
| NA | GND | W41 | |
| NA | GND | Y4 | |
| NA | GND | Y5 | |
| NA | GND | Y6 | |
| NA | GND | Y12 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | Y14 | |
| NA | GND | Y16 | |
| NA | GND | Y18 | |
| NA | GND | Y20 | |
| NA | GND | Y24 | |
| NA | GND | Y26 | |
| NA | GND | Y28 | |
| NA | GND | Y36 | |
| NA | GND | Y38 | |
| NA | GND | Y39 | |
| NA | VCCAUX | AA12 | |
| NA | VCCAUX | AA28 | |
| NA | VCCAUX | AB29 | |
| NA | VCCAUX | AC12 | |
| NA | VCCAUX | AD13 | |
| NA | VCCAUX | AD29 | |
| NA | VCCAUX | AE12 | |
| NA | VCCAUX | AE30 | |
| NA | VCCAUX | AF13 | |
| NA | VCCAUX | AG28 | |
| NA | VCCAUX | AG30 | |
| NA | VCCAUX | T13 | |
| NA | VCCAUX | U28 | |
| NA | VCCAUX | V13 | |
| NA | VCCAUX | V29 | |
| NA | VCCAUX | W12 | |
| NA | VCCAUX | W28 | |
| NA | VCCAUX | Y13 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | AA16 | |
| NA | VCCINT | AA18 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AA24 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | AA26 | |
| NA | VCCINT | AB13 | |
| NA | VCCINT | AB15 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AB19 | |
| NA | VCCINT | AB23 | |
| NA | VCCINT | AB25 | |
| NA | VCCINT | AB27 | |
| NA | VCCINT | AC14 | |
| NA | VCCINT | AC16 | |
| NA | VCCINT | AC18 | |
| NA | VCCINT | AC20 | |
| NA | VCCINT | AC24 | |
| NA | VCCINT | AC26 | |
| NA | VCCINT | AC28 | |
| NA | VCCINT | AD15 | |
| NA | VCCINT | AD17 | |
| NA | VCCINT | AD19 | |
| NA | VCCINT | AD21 | |
| NA | VCCINT | AD23 | |
| NA | VCCINT | AD25 | |
| NA | VCCINT | AD27 | |
| NA | VCCINT | AE14 | |
| NA | VCCINT | AE16 | |
| NA | VCCINT | AE18 | |
| NA | VCCINT | AE20 | |
| NA | VCCINT | AE22 | |
| NA | VCCINT | AE24 | |
| NA | VCCINT | AE26 | |
| NA | VCCINT | AE28 | |
| NA | VCCINT | AF17 | |
| NA | VCCINT | AF19 | |
| NA | VCCINT | AF21 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | AF23 | |
| NA | VCCINT | AF25 | |
| NA | VCCINT | AF27 | |
| NA | VCCINT | AG18 | |
| NA | VCCINT | AG20 | |
| NA | VCCINT | AG22 | |
| NA | VCCINT | AG24 | |
| NA | VCCINT | AG26 | |
| NA | VCCINT | AH19 | |
| NA | VCCINT | AH21 | |
| NA | VCCINT | AH23 | |
| NA | VCCINT | AH25 | |
| NA | VCCINT | AH27 | |
| NA | VCCINT | AJ20 | |
| NA | VCCINT | AJ22 | |
| NA | VCCINT | AJ26 | |
| NA | VCCINT | N20 | |
| NA | VCCINT | P23 | |
| NA | VCCINT | R18 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | R24 | |
| NA | VCCINT | T15 | |
| NA | VCCINT | T17 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | T23 | |
| NA | VCCINT | T25 | |
| NA | VCCINT | T27 | |
| NA | VCCINT | U14 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | U18 | |
| NA | VCCINT | U20 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | U22 | |
| NA | VCCINT | U24 | |
| NA | VCCINT | U26 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | V17 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | V21 | |
| NA | VCCINT | V23 | |
| NA | VCCINT | V25 | |
| NA | VCCINT | V27 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | W16 | |
| NA | VCCINT | W18 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | W22 | |
| NA | VCCINT | W24 | |
| NA | VCCINT | W26 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | Y17 | |
| NA | VCCINT | Y19 | |
| NA | VCCINT | Y23 | |
| NA | VCCINT | Y25 | |
| NA | VCCINT | Y27 | |
| 0 | VCCO_0 | P13 | |
| 0 | VCCO_0 | R16 | |
| 1 | VCCO_1 | M15 | |
| 1 | VCCO_1 | P19 | |
| 1 | VCCO_1 | P29 | |
| 1 | VCCO_1 | R26 | |
| 2 | VCCO_2 | AH17 | |
| 2 | VCCO_2 | AL18 | |
| 2 | VCCO_2 | AL28 | |
| 2 | VCCO_2 | AR26 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 3 | VCCO_3 | J14 | |
| 3 | VCCO_3 | L18 | |
| 3 | VCCO_3 | L28 | |
| 3 | VCCO_3 | M25 | |
| 4 | VCCO_4 | AJ24 | |
| 4 | VCCO_4 | AK21 | |
| 4 | VCCO_4 | AM25 | |
| 4 | VCCO_4 | AP19 | |
| 5 | VCCO_5 | G20 | |
| 5 | VCCO_5 | H17 | |
| 5 | VCCO_5 | H27 | |
| 5 | VCCO_5 | J24 | |
| 6 | VCCO_6 | AN22 | |
| 6 | VCCO_6 | AT23 | |
| 6 | VCCO_6 | AU20 | |
| 6 | VCCO_6 | AY21 | |
| 7 | VCCO_7 | C22 | |
| 7 | VCCO_7 | F23 | |
| 7 | VCCO_7 | K21 | |
| 7 | VCCO_7 | N22 | |
| 11 | VCCO_11 | AB35 | |
| 11 | VCCO_11 | U30 | |
| 11 | VCCO_11 | U36 | |
| 11 | VCCO_11 | W34 | |
| 11 | VCCO_11 | Y31 | |
| 12 | VCCO_12 | AA8 | |
| 12 | VCCO_12 | AD9 | |
| 12 | VCCO_12 | R6 | |
| 12 | VCCO_12 | V7 | |
| 12 | VCCO_12 | Y11 | |
| 13 | VCCO_13 | AC32 | |
| 13 | VCCO_13 | AE36 | |
| 13 | VCCO_13 | AF33 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 13 | VCCO_13 | AH37 | |
| 13 | VCCO_13 | AM37 | |
| 14 | VCCO_14 | AE7 | |
| 14 | VCCO_14 | AG10 | |
| 14 | VCCO_14 | AH7 | |
| 14 | VCCO_14 | AL8 | |
| 14 | VCCO_14 | AN6 | |
| 23 | VCCO_23 | H37 | |
| 23 | VCCO_23 | J34 | |
| 23 | VCCO_23 | M35 | |
| 23 | VCCO_23 | R36 | |
| 23 | VCCO_23 | T33 | |
| 24 | VCCO_24 | F7 | |
| 24 | VCCO_24 | H7 | |
| 24 | VCCO_24 | L8 | |
| 24 | VCCO_24 | P9 | |
| 24 | VCCO_24 | U10 | |
| 25 | VCCO_25 | AJ34 | |
| 25 | VCCO_25 | AM35 | |
| 25 | VCCO_25 | AN32 | |
| 25 | VCCO_25 | AR36 | |
| 26 | VCCO_26 | AK11 | |
| 26 | VCCO_26 | AN12 | |
| 26 | VCCO_26 | AP9 | |
| 26 | VCCO_26 | AT11 | |
| 26 | VCCO_26 | AU7 | |
| 27 | VCCO_27 | F36 | |
| 27 | VCCO_27 | G30 | |
| 27 | VCCO_27 | G33 | |
| 27 | VCCO_27 | K31 | |
| 27 | VCCO_27 | N32 | |
| 28 | VCCO_28 | F13 | |
| 28 | VCCO_28 | G10 | |

Table 2-9: FF1759 Package—TX150T and TX240T (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 28 | VCCO_28 | K11 | |
| 28 | VCCO_28 | N12 | |
| 29 | VCCO_29 | AK31 | |
| 29 | VCCO_29 | AP29 | |
| 29 | VCCO_29 | AT33 | |
| 29 | VCCO_29 | AU26 | |
| 29 | VCCO_29 | AU30 | |
| 30 | VCCO_30 | AJ14 | |
| 30 | VCCO_30 | AM15 | |
| 30 | VCCO_30 | AR16 | |
| 30 | VCCO_30 | AT13 | |
| NA | RSVD ⁽³⁾ | AF14 | |
| NA | RSVD ⁽³⁾ | AG14 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

FF1760 Package—LX110, LX155, LX220, and LX330

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|---------------------|------------|-----------------|
| 0 | DXP_0 | AC22 | |
| 0 | DXN_0 | AC21 | |
| 0 | AVDD_0 | Y22 | |
| 0 | AVSS_0 | Y21 | |
| 0 | VP_0 | AA22 | |
| 0 | VN_0 | AB21 | |
| 0 | VREFP_0 | AB22 | |
| 0 | VREFN_0 | AA21 | |
| 0 | VBATT_0 | R29 | |
| 0 | PROGRAM_B_0 | T29 | |
| 0 | HSWAPEN_0 | T14 | |
| 0 | D_IN_0 | R14 | |
| 0 | DONE_0 | T15 | |
| 0 | CCLK_0 | AF15 | |
| 0 | INIT_B_0 | U14 | |
| 0 | CS_B_0 | T30 | |
| 0 | RDWR_B_0 | R30 | |
| 0 | RSVD ⁽³⁾ | V31 | |
| 0 | RSVD ⁽³⁾ | AD31 | |
| 0 | TCK_0 | AE30 | |
| 0 | M0_0 | AG29 | |
| 0 | M2_0 | AH28 | |
| 0 | M1_0 | AF30 | |
| 0 | TMS_0 | AF14 | |
| 0 | TDI_0 | AG14 | |
| 0 | D_OUT_BUSY_0 | AH15 | |
| 0 | TDO_0 | AH14 | |
| 1 | IO_L0P_A19_1 | R28 | |
| 1 | IO_L0N_A18_1 | R27 | |
| 1 | IO_L1P_A17_1 | M13 | |
| 1 | IO_L1N_A16_1 | N13 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------------|------------|-----------------|
| 1 | IO_L2P_A15_D31_1 | P27 | |
| 1 | IO_L2N_A14_D30_1 | P26 | |
| 1 | IO_L3P_A13_D29_1 | P17 | |
| 1 | IO_L3N_A12_D28_1 | R17 | |
| 1 | IO_L4P_A11_D27_1 | N28 | |
| 1 | IO_L4N_VREF_A10_D26_1 | P28 | |
| 1 | IO_L5P_A9_D25_1 | N15 | |
| 1 | IO_L5N_A8_D24_1 | P15 | |
| 1 | IO_L6P_A7_D23_1 | N29 | |
| 1 | IO_L6N_A6_D22_1 | M29 | |
| 1 | IO_L7P_A5_D21_1 | N14 | |
| 1 | IO_L7N_A4_D20_1 | P13 | |
| 1 | IO_L8P_CC_A3_D19_1 | P30 | |
| 1 | IO_L8N_CC_A2_D18_1 ⁽²⁾ | N30 | |
| 1 | IO_L9P_CC_A1_D17_1 | P16 | |
| 1 | IO_L9N_CC_A0_D16_1 ⁽²⁾ | R15 | |
| 2 | IO_L0P_CC_RS1_2 | AH16 | |
| 2 | IO_L0N_CC_RS0_2 ⁽²⁾ | AJ15 | |
| 2 | IO_L1P_CC_A25_2 | AH30 | |
| 2 | IO_L1N_CC_A24_2 ⁽²⁾ | AH29 | |
| 2 | IO_L2P_A23_2 | AJ16 | |
| 2 | IO_L2N_A22_2 | AJ17 | |
| 2 | IO_L3P_A21_2 | AK30 | |
| 2 | IO_L3N_A20_2 | AJ30 | |
| 2 | IO_L4P_FCS_B_2 | AK14 | |
| 2 | IO_L4N_VREF_FOE_B_MOSI_2 | AK15 | |
| 2 | IO_L5P_FWE_B_2 | AL29 | |
| 2 | IO_L5N_CSO_B_2 | AL30 | |
| 2 | IO_L6P_D7_2 | AJ13 | |
| 2 | IO_L6N_D6_2 | AK13 | |
| 2 | IO_L7P_D5_2 | AJ28 | |
| 2 | IO_L7N_D4_2 | AK29 | |
| 2 | IO_L8P_D3_2 | AL15 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|----------------------------------|-------------------|------------------------|
| 2 | IO_L8N_D2_FS2_2 | AL14 | |
| 2 | IO_L9P_D1_FS1_2 | AJ26 | |
| 2 | IO_L9N_D0_FS0_2 | AJ27 | |
| 3 | IO_L0P_CC_GC_3 | K15 | |
| 3 | IO_L0N_CC_GC_3 ⁽¹⁾⁽²⁾ | K14 | |
| 3 | IO_L1P_CC_GC_3 | M27 | |
| 3 | IO_L1N_CC_GC_3 ⁽¹⁾⁽²⁾ | N26 | |
| 3 | IO_L2P_GC_VRN_3 | K13 | |
| 3 | IO_L2N_GC_VRP_3 ⁽¹⁾ | J13 | |
| 3 | IO_L3P_GC_3 | L27 | |
| 3 | IO_L3N_GC_3 ⁽¹⁾ | M28 | |
| 3 | IO_L4P_GC_3 | L15 | |
| 3 | IO_L4N_GC_VREF_3 ⁽¹⁾ | L16 | |
| 3 | IO_L5P_GC_3 | K28 | |
| 3 | IO_L5N_GC_3 ⁽¹⁾ | K29 | |
| 3 | IO_L6P_GC_3 | M14 | |
| 3 | IO_L6N_GC_3 ⁽¹⁾ | L14 | |
| 3 | IO_L7P_GC_3 | J30 | |
| 3 | IO_L7N_GC_3 ⁽¹⁾ | K30 | |
| 3 | IO_L8P_GC_3 | N16 | |
| 3 | IO_L8N_GC_3 ⁽¹⁾ | M16 | |
| 3 | IO_L9P_GC_3 | L29 | |
| 3 | IO_L9N_GC_3 ⁽¹⁾ | L30 | |
| 4 | IO_L0P_GC_D15_4 | AK28 | |
| 4 | IO_L0N_GC_D14_4 ⁽¹⁾ | AK27 | |
| 4 | IO_L1P_GC_D13_4 | AL16 | |
| 4 | IO_L1N_GC_D12_4 ⁽¹⁾ | AK17 | |
| 4 | IO_L2P_GC_D11_4 | AM29 | |
| 4 | IO_L2N_GC_D10_4 ⁽¹⁾ | AN30 | |
| 4 | IO_L3P_GC_D9_4 | AN16 | |
| 4 | IO_L3N_GC_D8_4 ⁽¹⁾ | AM16 | |
| 4 | IO_L4P_GC_4 | AP30 | |
| 4 | IO_L4N_GC_VREF_4 ⁽¹⁾ | AN29 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 4 | IO_L5P_GC_4 | AM13 | |
| 4 | IO_L5N_GC_4 ⁽¹⁾ | AM14 | |
| 4 | IO_L6P_GC_4 | AM28 | |
| 4 | IO_L6N_GC_4 ⁽¹⁾ | AN28 | |
| 4 | IO_L7P_GC_VRN_4 | AN15 | |
| 4 | IO_L7N_GC_VRP_4 ⁽¹⁾ | AN14 | |
| 4 | IO_L8P_CC_GC_4 | AL27 | |
| 4 | IO_L8N_CC_GC_4 ⁽¹⁾⁽²⁾ | AM27 | |
| 4 | IO_L9P_CC_GC_4 | AP13 | |
| 4 | IO_L9N_CC_GC_4 ⁽¹⁾⁽²⁾ | AN13 | |
| 5 | IO_L0P_5 | M24 | |
| 5 | IO_L0N_5 | N24 | |
| 5 | IO_L1P_5 | G14 | |
| 5 | IO_L1N_5 | H14 | |
| 5 | IO_L2P_5 | L25 | |
| 5 | IO_L2N_5 | L24 | |
| 5 | IO_L3P_5 | H16 | |
| 5 | IO_L3N_5 | G16 | |
| 5 | IO_L4P_5 | K25 | |
| 5 | IO_L4N_VREF_5 | K24 | |
| 5 | IO_L5P_5 | J17 | |
| 5 | IO_L5N_5 | J16 | |
| 5 | IO_L6P_5 | M26 | |
| 5 | IO_L6N_5 | L26 | |
| 5 | IO_L7P_5 | H15 | |
| 5 | IO_L7N_5 | J15 | |
| 5 | IO_L8P_CC_5 | P25 | |
| 5 | IO_L8N_CC_5 ⁽²⁾ | N25 | |
| 5 | IO_L9P_CC_5 | K19 | |
| 5 | IO_L9N_CC_5 ⁽²⁾ | L19 | |
| 5 | IO_L10P_CC_5 | M18 | |
| 5 | IO_L10N_CC_5 ⁽²⁾ | M19 | |
| 5 | IO_L11P_CC_5 | J26 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 5 | IO_L11N_CC_5 ⁽²⁾ | J27 | |
| 5 | IO_L12P_VRN_5 | K17 | |
| 5 | IO_L12N_VRP_5 | K18 | |
| 5 | IO_L13P_5 | J28 | |
| 5 | IO_L13N_5 | K27 | |
| 5 | IO_L14P_5 | M17 | |
| 5 | IO_L14N_VREF_5 | L17 | |
| 5 | IO_L15P_5 | G27 | |
| 5 | IO_L15N_5 | H28 | |
| 5 | IO_L16P_5 | N18 | |
| 5 | IO_L16N_5 | N19 | |
| 5 | IO_L17P_5 | G28 | |
| 5 | IO_L17N_5 | G29 | |
| 5 | IO_L18P_5 | R18 | |
| 5 | IO_L18N_5 | P18 | |
| 5 | IO_L19P_5 | H29 | |
| 5 | IO_L19N_5 | H30 | |
| 6 | IO_L0P_6 | AL26 | |
| 6 | IO_L0N_6 | AM26 | |
| 6 | IO_L1P_6 | AK18 | |
| 6 | IO_L1N_6 | AL17 | |
| 6 | IO_L2P_6 | AP28 | |
| 6 | IO_L2N_6 | AP27 | |
| 6 | IO_L3P_6 | AM18 | |
| 6 | IO_L3N_6 | AM17 | |
| 6 | IO_L4P_6 | AN26 | |
| 6 | IO_L4N_VREF_6 | AN25 | |
| 6 | IO_L5P_6 | AN18 | |
| 6 | IO_L5N_6 | AP17 | |
| 6 | IO_L6P_6 | AP26 | |
| 6 | IO_L6N_6 | AR27 | |
| 6 | IO_L7P_6 | AN19 | |
| 6 | IO_L7N_6 | AP18 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 6 | IO_L8P_CC_6 | AR28 | |
| 6 | IO_L8N_CC_6 ⁽²⁾ | AR29 | |
| 6 | IO_L9P_CC_6 | AR15 | |
| 6 | IO_L9N_CC_6 ⁽²⁾ | AP15 | |
| 6 | IO_L10P_CC_6 | AR13 | |
| 6 | IO_L10N_CC_6 ⁽²⁾ | AR14 | |
| 6 | IO_L11P_CC_6 | AT30 | |
| 6 | IO_L11N_CC_6 ⁽²⁾ | AR30 | |
| 6 | IO_L12P_VRN_6 | AP16 | |
| 6 | IO_L12N_VRP_6 | AR17 | |
| 6 | IO_L13P_6 | AU29 | |
| 6 | IO_L13N_6 | AT29 | |
| 6 | IO_L14P_6 | AT14 | |
| 6 | IO_L14N_VREF_6 | AT15 | |
| 6 | IO_L15P_6 | AL25 | |
| 6 | IO_L15N_6 | AM24 | |
| 6 | IO_L16P_6 | AK19 | |
| 6 | IO_L16N_6 | AJ18 | |
| 6 | IO_L17P_6 | AJ25 | |
| 6 | IO_L17N_6 | AK24 | |
| 6 | IO_L18P_6 | AL19 | |
| 6 | IO_L18N_6 | AM19 | |
| 6 | IO_L19P_6 | AL24 | |
| 6 | IO_L19N_6 | AK25 | |
| 7 | IO_L0P_7 | M23 | LX110, LX155, LX220 |
| 7 | IO_L0N_7 | N23 | LX110, LX155, LX220 |
| 7 | IO_L1P_7 | P20 | LX110, LX155, LX220 |
| 7 | IO_L1N_7 | N20 | LX110, LX155, LX220 |
| 7 | IO_L2P_7 | P23 | LX110, LX155, LX220 |
| 7 | IO_L2N_7 | P22 | LX110, LX155, LX220 |
| 7 | IO_L3P_7 | P21 | LX110, LX155, LX220 |
| 7 | IO_L3N_7 | N21 | LX110, LX155, LX220 |
| 7 | IO_L4P_7 | L22 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 7 | IO_L4N_VREF_7 | M22 | LX110, LX155, LX220 |
| 7 | IO_L5P_7 | N22 | LX110, LX155, LX220 |
| 7 | IO_L5N_7 | M21 | LX110, LX155, LX220 |
| 7 | IO_L6P_7 | K22 | LX110, LX155, LX220 |
| 7 | IO_L6N_7 | K23 | LX110, LX155, LX220 |
| 7 | IO_L7P_7 | J21 | LX110, LX155, LX220 |
| 7 | IO_L7N_7 | H21 | LX110, LX155, LX220 |
| 7 | IO_L8P_CC_7 | J22 | LX110, LX155, LX220 |
| 7 | IO_L8N_CC_7 ⁽²⁾ | J23 | LX110, LX155, LX220 |
| 7 | IO_L9P_CC_7 | G21 | LX110, LX155, LX220 |
| 7 | IO_L9N_CC_7 ⁽²⁾ | H20 | LX110, LX155, LX220 |
| 7 | IO_L10P_CC_7 | H19 | LX110, LX155, LX220 |
| 7 | IO_L10N_CC_7 ⁽²⁾ | G19 | LX110, LX155, LX220 |
| 7 | IO_L11P_CC_7 | G22 | LX110, LX155, LX220 |
| 7 | IO_L11N_CC_7 ⁽²⁾ | F22 | LX110, LX155, LX220 |
| 7 | IO_L12P_VRN_7 | G17 | LX110, LX155, LX220 |
| 7 | IO_L12N_VRP_7 | G18 | LX110, LX155, LX220 |
| 7 | IO_L13P_7 | H23 | LX110, LX155, LX220 |
| 7 | IO_L13N_7 | G23 | LX110, LX155, LX220 |
| 7 | IO_L14P_7 | J18 | LX110, LX155, LX220 |
| 7 | IO_L14N_VREF_7 | H18 | LX110, LX155, LX220 |
| 7 | IO_L15P_7 | H24 | LX110, LX155, LX220 |
| 7 | IO_L15N_7 | G24 | LX110, LX155, LX220 |
| 7 | IO_L16P_7 | K20 | LX110, LX155, LX220 |
| 7 | IO_L16N_7 | J20 | LX110, LX155, LX220 |
| 7 | IO_L17P_7 | H25 | LX110, LX155, LX220 |
| 7 | IO_L17N_7 | J25 | LX110, LX155, LX220 |
| 7 | IO_L18P_7 | L20 | LX110, LX155, LX220 |
| 7 | IO_L18N_7 | L21 | LX110, LX155, LX220 |
| 7 | IO_L19P_7 | G26 | LX110, LX155, LX220 |
| 7 | IO_L19N_7 | H26 | LX110, LX155, LX220 |
| 8 | IO_L0P_8 | AJ23 | LX110, LX155, LX220 |
| 8 | IO_L0N_8 | AJ22 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|---------------------|
| 8 | IO_L1P_8 | AJ21 | LX110, LX155, LX220 |
| 8 | IO_L1N_8 | AJ20 | LX110, LX155, LX220 |
| 8 | IO_L2P_8 | AK23 | LX110, LX155, LX220 |
| 8 | IO_L2N_8 | AK22 | LX110, LX155, LX220 |
| 8 | IO_L3P_8 | AK20 | LX110, LX155, LX220 |
| 8 | IO_L3N_8 | AL20 | LX110, LX155, LX220 |
| 8 | IO_L4P_8 | AP25 | LX110, LX155, LX220 |
| 8 | IO_L4N_VREF_8 | AR25 | LX110, LX155, LX220 |
| 8 | IO_L5P_8 | AM21 | LX110, LX155, LX220 |
| 8 | IO_L5N_8 | AL21 | LX110, LX155, LX220 |
| 8 | IO_L6P_8 | AT27 | LX110, LX155, LX220 |
| 8 | IO_L6N_8 | AT26 | LX110, LX155, LX220 |
| 8 | IO_L7P_8 | AP20 | LX110, LX155, LX220 |
| 8 | IO_L7N_8 | AN20 | LX110, LX155, LX220 |
| 8 | IO_L8P_CC_8 | AT25 | LX110, LX155, LX220 |
| 8 | IO_L8N_CC_8 ⁽²⁾ | AT24 | LX110, LX155, LX220 |
| 8 | IO_L9P_CC_8 | AN21 | LX110, LX155, LX220 |
| 8 | IO_L9N_CC_8 ⁽²⁾ | AP21 | LX110, LX155, LX220 |
| 8 | IO_L10P_CC_8 | AR18 | LX110, LX155, LX220 |
| 8 | IO_L10N_CC_8 ⁽²⁾ | AR19 | LX110, LX155, LX220 |
| 8 | IO_L11P_CC_8 | AR23 | LX110, LX155, LX220 |
| 8 | IO_L11N_CC_8 ⁽²⁾ | AR24 | LX110, LX155, LX220 |
| 8 | IO_L12P_VRN_8 | AT16 | LX110, LX155, LX220 |
| 8 | IO_L12N_VRP_8 | AT17 | LX110, LX155, LX220 |
| 8 | IO_L13P_8 | AP23 | LX110, LX155, LX220 |
| 8 | IO_L13N_8 | AN24 | LX110, LX155, LX220 |
| 8 | IO_L14P_8 | AR20 | LX110, LX155, LX220 |
| 8 | IO_L14N_VREF_8 | AT19 | LX110, LX155, LX220 |
| 8 | IO_L15P_8 | AM23 | LX110, LX155, LX220 |
| 8 | IO_L15N_8 | AN23 | LX110, LX155, LX220 |
| 8 | IO_L16P_8 | AT20 | LX110, LX155, LX220 |
| 8 | IO_L16N_8 | AT21 | LX110, LX155, LX220 |
| 8 | IO_L17P_8 | AL22 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------------|-------------------|------------------------|
| 8 | IO_L17N_8 | AM22 | LX110, LX155, LX220 |
| 8 | IO_L18P_8 | AU21 | LX110, LX155, LX220 |
| 8 | IO_L18N_8 | AT22 | LX110, LX155, LX220 |
| 8 | IO_L19P_8 | AR22 | LX110, LX155, LX220 |
| 8 | IO_L19N_8 | AP22 | LX110, LX155, LX220 |
| 11 | IO_L0P_11 | F42 | |
| 11 | IO_L0N_11 | G42 | |
| 11 | IO_L1P_11 | F41 | |
| 11 | IO_L1N_11 | G41 | |
| 11 | IO_L2P_11 | H41 | |
| 11 | IO_L2N_11 | J41 | |
| 11 | IO_L3P_11 | J42 | |
| 11 | IO_L3N_11 | K42 | |
| 11 | IO_L4P_11 | L40 | |
| 11 | IO_L4N_VREF_11 | L41 | |
| 11 | IO_L5P_11 | L42 | |
| 11 | IO_L5N_11 | M41 | |
| 11 | IO_L6P_11 | M42 | |
| 11 | IO_L6N_11 | N41 | |
| 11 | IO_L7P_11 | N40 | |
| 11 | IO_L7N_11 | P40 | |
| 11 | IO_L8P_CC_11 | W40 | |
| 11 | IO_L8N_CC_11 ⁽²⁾ | Y40 | |
| 11 | IO_L9P_CC_11 | AA40 | |
| 11 | IO_L9N_CC_11 ⁽²⁾ | AA39 | |
| 11 | IO_L10P_CC_SM15P_11 | Y39 | |
| 11 | IO_L10N_CC_SM15N_11 ⁽²⁾ | Y38 | |
| 11 | IO_L11P_CC_SM14P_11 | Y37 | |
| 11 | IO_L11N_CC_SM14N_11 ⁽²⁾ | AA37 | |
| 11 | IO_L12P_VRN_11 | R42 | |
| 11 | IO_L12N_VRP_11 | P42 | |
| 11 | IO_L13P_11 | P41 | |
| 11 | IO_L13N_11 | R40 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 11 | IO_L14P_11 | T40 | |
| 11 | IO_L14N_VREF_11 | T41 | |
| 11 | IO_L15P_SM13P_11 | T42 | |
| 11 | IO_L15N_SM13N_11 | U41 | |
| 11 | IO_L16P_SM12P_11 | U42 | |
| 11 | IO_L16N_SM12N_11 | V41 | |
| 11 | IO_L17P_SM11P_11 | V40 | |
| 11 | IO_L17N_SM11N_11 | W41 | |
| 11 | IO_L18P_SM10P_11 | W42 | |
| 11 | IO_L18N_SM10N_11 | Y42 | |
| 11 | IO_L19P_SM9P_11 | AA42 | |
| 11 | IO_L19N_SM9N_11 | AA41 | |
| 12 | IO_L0P_12 | E2 | |
| 12 | IO_L0N_12 | F2 | |
| 12 | IO_L1P_12 | G2 | |
| 12 | IO_L1N_12 | F1 | |
| 12 | IO_L2P_12 | J2 | |
| 12 | IO_L2N_12 | J1 | |
| 12 | IO_L3P_12 | G1 | |
| 12 | IO_L3N_12 | H1 | |
| 12 | IO_L4P_12 | L2 | |
| 12 | IO_L4N_VREF_12 | M2 | |
| 12 | IO_L5P_12 | K2 | |
| 12 | IO_L5N_12 | L1 | |
| 12 | IO_L6P_12 | M1 | |
| 12 | IO_L6N_12 | N1 | |
| 12 | IO_L7P_12 | M3 | |
| 12 | IO_L7N_12 | N3 | |
| 12 | IO_L8P_CC_12 | P3 | |
| 12 | IO_L8N_CC_12 ⁽²⁾ | R3 | |
| 12 | IO_L9P_CC_12 | P2 | |
| 12 | IO_L9N_CC_12 ⁽²⁾ | P1 | |
| 12 | IO_L10P_CC_12 | R2 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 12 | IO_L10N_CC_12 ⁽²⁾ | T2 | |
| 12 | IO_L11P_CC_12 | U1 | |
| 12 | IO_L11N_CC_12 ⁽²⁾ | T1 | |
| 12 | IO_L12P_VRN_12 | U3 | |
| 12 | IO_L12N_VRP_12 | U2 | |
| 12 | IO_L13P_12 | V3 | |
| 12 | IO_L13N_12 | V4 | |
| 12 | IO_L14P_12 | W2 | |
| 12 | IO_L14N_VREF_12 | W3 | |
| 12 | IO_L15P_12 | W1 | |
| 12 | IO_L15N_12 | V1 | |
| 12 | IO_L16P_12 | AA4 | |
| 12 | IO_L16N_12 | Y4 | |
| 12 | IO_L17P_12 | Y5 | |
| 12 | IO_L17N_12 | AA5 | |
| 12 | IO_L18P_12 | AA1 | |
| 12 | IO_L18N_12 | AA2 | |
| 12 | IO_L19P_12 | Y2 | |
| 12 | IO_L19N_12 | Y3 | |
| 13 | IO_L0P_SM8P_13 | AB41 | |
| 13 | IO_L0N_SM8N_13 | AB42 | |
| 13 | IO_L1P_SM7P_13 | AC41 | |
| 13 | IO_L1N_SM7N_13 | AD42 | |
| 13 | IO_L2P_SM6P_13 | AE42 | |
| 13 | IO_L2N_SM6N_13 | AD41 | |
| 13 | IO_L3P_SM5P_13 | AF41 | |
| 13 | IO_L3N_SM5N_13 | AF42 | |
| 13 | IO_L4P_13 | AF40 | |
| 13 | IO_L4N_VREF_13 | AG41 | |
| 13 | IO_L5P_SM4P_13 | AG42 | |
| 13 | IO_L5N_SM4N_13 | AH41 | |
| 13 | IO_L6P_SM3P_13 | AJ42 | |
| 13 | IO_L6N_SM3N_13 | AJ41 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|----------------------------------|------------|-----------------|
| 13 | IO_L7P_SM2P_13 | AH40 | |
| 13 | IO_L7N_SM2N_13 | AJ40 | |
| 13 | IO_L8P_CC_SM1P_13 | AB37 | |
| 13 | IO_L8N_CC_SM1N_13 ⁽²⁾ | AB38 | |
| 13 | IO_L9P_CC_SM0P_13 | AB39 | |
| 13 | IO_L9N_CC_SM0N_13 ⁽²⁾ | AC38 | |
| 13 | IO_L10P_CC_13 | AE40 | |
| 13 | IO_L10N_CC_13 ⁽²⁾ | AD40 | |
| 13 | IO_L11P_CC_13 | AC40 | |
| 13 | IO_L11N_CC_13 ⁽²⁾ | AC39 | |
| 13 | IO_L12P_VRN_13 | AK40 | |
| 13 | IO_L12N_VRP_13 | AL40 | |
| 13 | IO_L13P_13 | AL41 | |
| 13 | IO_L13N_13 | AK42 | |
| 13 | IO_L14P_13 | AL42 | |
| 13 | IO_L14N_VREF_13 | AM42 | |
| 13 | IO_L15P_13 | AM41 | |
| 13 | IO_L15N_13 | AN41 | |
| 13 | IO_L16P_13 | AP42 | |
| 13 | IO_L16N_13 | AP41 | |
| 13 | IO_L17P_13 | AR42 | |
| 13 | IO_L17N_13 | AT42 | |
| 13 | IO_L18P_13 | AT41 | |
| 13 | IO_L18N_13 | AU41 | |
| 13 | IO_L19P_13 | AU42 | |
| 13 | IO_L19N_13 | AV41 | |
| 14 | IO_L0P_14 | AB6 | |
| 14 | IO_L0N_14 | AC6 | |
| 14 | IO_L1P_14 | AC4 | |
| 14 | IO_L1N_14 | AC5 | |
| 14 | IO_L2P_14 | AC3 | |
| 14 | IO_L2N_14 | AD3 | |
| 14 | IO_L3P_14 | AB3 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 14 | IO_L3N_14 | AB4 | |
| 14 | IO_L4P_14 | AD2 | |
| 14 | IO_L4N_VREF_14 | AE3 | |
| 14 | IO_L5P_14 | AB2 | |
| 14 | IO_L5N_14 | AB1 | |
| 14 | IO_L6P_14 | AC1 | |
| 14 | IO_L6N_14 | AD1 | |
| 14 | IO_L7P_14 | AE2 | |
| 14 | IO_L7N_14 | AF1 | |
| 14 | IO_L8P_CC_14 | AF2 | |
| 14 | IO_L8N_CC_14 ⁽²⁾ | AG2 | |
| 14 | IO_L9P_CC_14 | AG3 | |
| 14 | IO_L9N_CC_14 ⁽²⁾ | AH3 | |
| 14 | IO_L10P_CC_14 | AJ2 | |
| 14 | IO_L10N_CC_14 ⁽²⁾ | AJ3 | |
| 14 | IO_L11P_CC_14 | AH1 | |
| 14 | IO_L11N_CC_14 ⁽²⁾ | AG1 | |
| 14 | IO_L12P_VRN_14 | AL2 | |
| 14 | IO_L12N_VRP_14 | AK3 | |
| 14 | IO_L13P_14 | AK2 | |
| 14 | IO_L13N_14 | AJ1 | |
| 14 | IO_L14P_14 | AM3 | |
| 14 | IO_L14N_VREF_14 | AM2 | |
| 14 | IO_L15P_14 | AM1 | |
| 14 | IO_L15N_14 | AL1 | |
| 14 | IO_L16P_14 | AR2 | |
| 14 | IO_L16N_14 | AP2 | |
| 14 | IO_L17P_14 | AP1 | |
| 14 | IO_L17N_14 | AN1 | |
| 14 | IO_L18P_14 | AT1 | |
| 14 | IO_L18N_14 | AT2 | |
| 14 | IO_L19P_14 | AU2 | |
| 14 | IO_L19N_14 | AU1 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 15 | IO_L0P_15 | H38 | |
| 15 | IO_L0N_15 | H39 | |
| 15 | IO_L1P_15 | G38 | |
| 15 | IO_L1N_15 | G39 | |
| 15 | IO_L2P_15 | F39 | |
| 15 | IO_L2N_15 | F40 | |
| 15 | IO_L3P_15 | E39 | |
| 15 | IO_L3N_15 | E40 | |
| 15 | IO_L4P_15 | R39 | |
| 15 | IO_L4N_VREF_15 | R38 | |
| 15 | IO_L5P_15 | R37 | |
| 15 | IO_L5N_15 | P37 | |
| 15 | IO_L6P_15 | P38 | |
| 15 | IO_L6N_15 | N38 | |
| 15 | IO_L7P_15 | N39 | |
| 15 | IO_L7N_15 | M39 | |
| 15 | IO_L8P_CC_15 | M38 | |
| 15 | IO_L8N_CC_15 ⁽²⁾ | L39 | |
| 15 | IO_L9P_CC_15 | K38 | |
| 15 | IO_L9N_CC_15 ⁽²⁾ | J38 | |
| 15 | IO_L10P_CC_15 | H40 | |
| 15 | IO_L10N_CC_15 ⁽²⁾ | J40 | |
| 15 | IO_L11P_CC_15 | K40 | |
| 15 | IO_L11N_CC_15 ⁽²⁾ | K39 | |
| 15 | IO_L12P_VRN_15 | V38 | |
| 15 | IO_L12N_VRP_15 | U37 | |
| 15 | IO_L13P_15 | T37 | |
| 15 | IO_L13N_15 | U38 | |
| 15 | IO_L14P_15 | T39 | |
| 15 | IO_L14N_VREF_15 | U39 | |
| 15 | IO_L15P_15 | V39 | |
| 15 | IO_L15N_15 | W38 | |
| 15 | IO_L16P_15 | AA35 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 15 | IO_L16N_15 | AA36 | |
| 15 | IO_L17P_15 | AA34 | |
| 15 | IO_L17N_15 | Y34 | |
| 15 | IO_L18P_15 | Y35 | |
| 15 | IO_L18N_15 | W35 | |
| 15 | IO_L19P_15 | W36 | |
| 15 | IO_L19N_15 | W37 | |
| 16 | IO_L0P_16 | G4 | |
| 16 | IO_L0N_16 | F4 | |
| 16 | IO_L1P_16 | E3 | |
| 16 | IO_L1N_16 | E4 | |
| 16 | IO_L2P_16 | H4 | |
| 16 | IO_L2N_16 | J3 | |
| 16 | IO_L3P_16 | H3 | |
| 16 | IO_L3N_16 | G3 | |
| 16 | IO_L4P_16 | L5 | |
| 16 | IO_L4N_VREF_16 | L4 | |
| 16 | IO_L5P_16 | K3 | |
| 16 | IO_L5N_16 | K4 | |
| 16 | IO_L6P_16 | N5 | |
| 16 | IO_L6N_16 | P5 | |
| 16 | IO_L7P_16 | N4 | |
| 16 | IO_L7N_16 | M4 | |
| 16 | IO_L8P_CC_16 | T6 | |
| 16 | IO_L8N_CC_16 ⁽²⁾ | T5 | |
| 16 | IO_L9P_CC_16 | R5 | |
| 16 | IO_L9N_CC_16 ⁽²⁾ | R4 | |
| 16 | IO_L10P_CC_16 | U4 | |
| 16 | IO_L10N_CC_16 ⁽²⁾ | T4 | |
| 16 | IO_L11P_CC_16 | U6 | |
| 16 | IO_L11N_CC_16 ⁽²⁾ | V5 | |
| 16 | IO_L12P_VRN_16 | W7 | |
| 16 | IO_L12N_VRP_16 | W8 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------------------|------------|-----------------|
| 16 | IO_L13P_16 | W5 | |
| 16 | IO_L13N_16 | V6 | |
| 16 | IO_L14P_16 | Y7 | |
| 16 | IO_L14N_VREF_16 | W6 | |
| 16 | IO_L15P_16 | AA7 | |
| 16 | IO_L15N_16 | AA6 | |
| 16 | IO_L16P_16 | Y8 | |
| 16 | IO_L16N_16 | AA9 | |
| 16 | IO_L17P_16 | Y10 | |
| 16 | IO_L17N_16 | Y9 | |
| 16 | IO_L18P_16 | W11 | |
| 16 | IO_L18N_16 | W10 | |
| 16 | IO_L19P_16 | AA11 | |
| 16 | IO_L19N_16 | AA10 | |
| 17 | IO_L0P_17 | AB34 | |
| 17 | IO_L0N_17 | AC34 | |
| 17 | IO_L1P_17 | AC35 | |
| 17 | IO_L1N_17 | AB36 | |
| 17 | IO_L2P_17 | AC36 | |
| 17 | IO_L2N_17 | AD35 | |
| 17 | IO_L3P_17 | AD36 | |
| 17 | IO_L3N_17 | AD37 | |
| 17 | IO_L4P_17 | AE37 | |
| 17 | IO_L4N_VREF_17 | AD38 | |
| 17 | IO_L5P_17 | AE39 | |
| 17 | IO_L5N_17 | AE38 | |
| 17 | IO_L6P_17 | AF39 | |
| 17 | IO_L6N_17 | AG38 | |
| 17 | IO_L7P_17 | AG37 | |
| 17 | IO_L7N_17 | AF37 | |
| 17 | IO_L8P_CC_17 | AN40 | |
| 17 | IO_L8N_CC_17 ⁽²⁾ | AP40 | |
| 17 | IO_L9P_CC_17 | AR40 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 17 | IO_L9N_CC_17 ⁽²⁾ | AT40 | |
| 17 | IO_L10P_CC_17 | AV40 | |
| 17 | IO_L10N_CC_17 ⁽²⁾ | AU39 | |
| 17 | IO_L11P_CC_17 | AT39 | |
| 17 | IO_L11N_CC_17 ⁽²⁾ | AR39 | |
| 17 | IO_L12P_VRN_17 | AG39 | |
| 17 | IO_L12N_VRP_17 | AH39 | |
| 17 | IO_L13P_17 | AJ38 | |
| 17 | IO_L13N_17 | AK39 | |
| 17 | IO_L14P_17 | AK38 | |
| 17 | IO_L14N_VREF_17 | AK37 | |
| 17 | IO_L15P_17 | AJ37 | |
| 17 | IO_L15N_17 | AH38 | |
| 17 | IO_L16P_17 | AL39 | |
| 17 | IO_L16N_17 | AM39 | |
| 17 | IO_L17P_17 | AN39 | |
| 17 | IO_L17N_17 | AP38 | |
| 17 | IO_L18P_17 | AN38 | |
| 17 | IO_L18N_17 | AM38 | |
| 17 | IO_L19P_17 | AM37 | |
| 17 | IO_L19N_17 | AL37 | |
| 18 | IO_L0P_18 | AB11 | |
| 18 | IO_L0N_18 | AC11 | |
| 18 | IO_L1P_18 | AD11 | |
| 18 | IO_L1N_18 | AD10 | |
| 18 | IO_L2P_18 | AC10 | |
| 18 | IO_L2N_18 | AC9 | |
| 18 | IO_L3P_18 | AB8 | |
| 18 | IO_L3N_18 | AB9 | |
| 18 | IO_L4P_18 | AC8 | |
| 18 | IO_L4N_VREF_18 | AB7 | |
| 18 | IO_L5P_18 | AD5 | |
| 18 | IO_L5N_18 | AE5 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 18 | IO_L6P_18 | AD6 | |
| 18 | IO_L6N_18 | AE7 | |
| 18 | IO_L7P_18 | AD7 | |
| 18 | IO_L7N_18 | AD8 | |
| 18 | IO_L8P_CC_18 | AE4 | |
| 18 | IO_L8N_CC_18 ⁽²⁾ | AF4 | |
| 18 | IO_L9P_CC_18 | AF6 | |
| 18 | IO_L9N_CC_18 ⁽²⁾ | AF5 | |
| 18 | IO_L10P_CC_18 | AG6 | |
| 18 | IO_L10N_CC_18 ⁽²⁾ | AH6 | |
| 18 | IO_L11P_CC_18 | AH4 | |
| 18 | IO_L11N_CC_18 ⁽²⁾ | AG4 | |
| 18 | IO_L12P_VRN_18 | AJ5 | |
| 18 | IO_L12N_VRP_18 | AK4 | |
| 18 | IO_L13P_18 | AJ6 | |
| 18 | IO_L13N_18 | AH5 | |
| 18 | IO_L14P_18 | AL6 | |
| 18 | IO_L14N_VREF_18 | AL5 | |
| 18 | IO_L15P_18 | AK5 | |
| 18 | IO_L15N_18 | AL4 | |
| 18 | IO_L16P_18 | AP3 | |
| 18 | IO_L16N_18 | AN3 | |
| 18 | IO_L17P_18 | AN4 | |
| 18 | IO_L17N_18 | AM4 | |
| 18 | IO_L18P_18 | AR3 | |
| 18 | IO_L18N_18 | AR4 | |
| 18 | IO_L19P_18 | AM6 | |
| 18 | IO_L19N_18 | AN5 | |
| 19 | IO_L0P_19 | R34 | |
| 19 | IO_L0N_19 | P35 | |
| 19 | IO_L1P_19 | N35 | |
| 19 | IO_L1N_19 | M36 | |
| 19 | IO_L2P_19 | L37 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 19 | IO_L2N_19 | M37 | |
| 19 | IO_L3P_19 | N36 | |
| 19 | IO_L3N_19 | P36 | |
| 19 | IO_L4P_19 | L36 | |
| 19 | IO_L4N_VREF_19 | L35 | |
| 19 | IO_L5P_19 | K35 | |
| 19 | IO_L5N_19 | J35 | |
| 19 | IO_L6P_19 | H35 | |
| 19 | IO_L6N_19 | J36 | |
| 19 | IO_L7P_19 | K37 | |
| 19 | IO_L7N_19 | J37 | |
| 19 | IO_L8P_CC_19 | U34 | |
| 19 | IO_L8N_CC_19 ⁽²⁾ | T35 | |
| 19 | IO_L9P_CC_19 | T34 | |
| 19 | IO_L9N_CC_19 ⁽²⁾ | U33 | |
| 19 | IO_L10P_CC_19 | R35 | |
| 19 | IO_L10N_CC_19 ⁽²⁾ | T36 | |
| 19 | IO_L11P_CC_19 | U36 | |
| 19 | IO_L11N_CC_19 ⁽²⁾ | V36 | |
| 19 | IO_L12P_VRN_19 | H36 | |
| 19 | IO_L12N_VRP_19 | G37 | |
| 19 | IO_L13P_19 | F36 | |
| 19 | IO_L13N_19 | G36 | |
| 19 | IO_L14P_19 | F37 | |
| 19 | IO_L14N_VREF_19 | E37 | |
| 19 | IO_L15P_19 | E38 | |
| 19 | IO_L15N_19 | D37 | |
| 19 | IO_L16P_19 | V35 | |
| 19 | IO_L16N_19 | V34 | |
| 19 | IO_L17P_19 | V33 | |
| 19 | IO_L17N_19 | W33 | |
| 19 | IO_L18P_19 | Y33 | |
| 19 | IO_L18N_19 | W32 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 19 | IO_L19P_19 | Y32 | |
| 19 | IO_L19N_19 | AA32 | |
| 20 | IO_L0P_20 | G6 | |
| 20 | IO_L0N_20 | F6 | |
| 20 | IO_L1P_20 | F5 | |
| 20 | IO_L1N_20 | E5 | |
| 20 | IO_L2P_20 | G7 | |
| 20 | IO_L2N_20 | H6 | |
| 20 | IO_L3P_20 | J5 | |
| 20 | IO_L3N_20 | H5 | |
| 20 | IO_L4P_20 | J7 | |
| 20 | IO_L4N_VREF_20 | K7 | |
| 20 | IO_L5P_20 | K5 | |
| 20 | IO_L5N_20 | J6 | |
| 20 | IO_L6P_20 | M7 | |
| 20 | IO_L6N_20 | M6 | |
| 20 | IO_L7P_20 | L7 | |
| 20 | IO_L7N_20 | L6 | |
| 20 | IO_L8P_CC_20 | P8 | |
| 20 | IO_L8N_CC_20 ⁽²⁾ | N9 | |
| 20 | IO_L9P_CC_20 | M8 | |
| 20 | IO_L9N_CC_20 ⁽²⁾ | M9 | |
| 20 | IO_L10P_CC_20 | P7 | |
| 20 | IO_L10N_CC_20 ⁽²⁾ | N8 | |
| 20 | IO_L11P_CC_20 | N6 | |
| 20 | IO_L11N_CC_20 ⁽²⁾ | P6 | |
| 20 | IO_L12P_VRN_20 | T10 | |
| 20 | IO_L12N_VRP_20 | R10 | |
| 20 | IO_L13P_20 | R9 | |
| 20 | IO_L13N_20 | T9 | |
| 20 | IO_L14P_20 | R7 | |
| 20 | IO_L14N_VREF_20 | R8 | |
| 20 | IO_L15P_20 | U7 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 20 | IO_L15N_20 | T7 | |
| 20 | IO_L16P_20 | U8 | |
| 20 | IO_L16N_20 | U9 | |
| 20 | IO_L17P_20 | U11 | |
| 20 | IO_L17N_20 | T11 | |
| 20 | IO_L18P_20 | V9 | |
| 20 | IO_L18N_20 | V8 | |
| 20 | IO_L19P_20 | V11 | |
| 20 | IO_L19N_20 | V10 | |
| 21 | IO_L0P_21 | AB33 | |
| 21 | IO_L0N_21 | AB32 | |
| 21 | IO_L1P_21 | AC33 | |
| 21 | IO_L1N_21 | AD32 | |
| 21 | IO_L2P_21 | AD33 | |
| 21 | IO_L2N_21 | AE32 | |
| 21 | IO_L3P_21 | AE33 | |
| 21 | IO_L3N_21 | AE34 | |
| 21 | IO_L4P_21 | AV39 | |
| 21 | IO_L4N_VREF_21 | AV38 | |
| 21 | IO_L5P_21 | AU38 | |
| 21 | IO_L5N_21 | AU37 | |
| 21 | IO_L6P_21 | AT37 | |
| 21 | IO_L6N_21 | AR38 | |
| 21 | IO_L7P_21 | AR37 | |
| 21 | IO_L7N_21 | AT36 | |
| 21 | IO_L8P_CC_21 | AE35 | |
| 21 | IO_L8N_CC_21 ⁽²⁾ | AF34 | |
| 21 | IO_L9P_CC_21 | AF35 | |
| 21 | IO_L9N_CC_21 ⁽²⁾ | AF36 | |
| 21 | IO_L10P_CC_21 | AH34 | |
| 21 | IO_L10N_CC_21 ⁽²⁾ | AG34 | |
| 21 | IO_L11P_CC_21 | AH35 | |
| 21 | IO_L11N_CC_21 ⁽²⁾ | AG36 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 21 | IO_L12P_VRN_21 | AP37 | |
| 21 | IO_L12N_VRP_21 | AP36 | |
| 21 | IO_L13P_21 | AP35 | |
| 21 | IO_L13N_21 | AN36 | |
| 21 | IO_L14P_21 | AM36 | |
| 21 | IO_L14N_VREF_21 | AN35 | |
| 21 | IO_L15P_21 | AN34 | |
| 21 | IO_L15N_21 | AM34 | |
| 21 | IO_L16P_21 | AH36 | |
| 21 | IO_L16N_21 | AJ36 | |
| 21 | IO_L17P_21 | AJ35 | |
| 21 | IO_L17N_21 | AK35 | |
| 21 | IO_L18P_21 | AL36 | |
| 21 | IO_L18N_21 | AL35 | |
| 21 | IO_L19P_21 | AL34 | |
| 21 | IO_L19N_21 | AK34 | |
| 22 | IO_L0P_22 | AF11 | |
| 22 | IO_L0N_22 | AE10 | |
| 22 | IO_L1P_22 | AE9 | |
| 22 | IO_L1N_22 | AE8 | |
| 22 | IO_L2P_22 | AF10 | |
| 22 | IO_L2N_22 | AF9 | |
| 22 | IO_L3P_22 | AG7 | |
| 22 | IO_L3N_22 | AF7 | |
| 22 | IO_L4P_22 | AH8 | |
| 22 | IO_L4N_VREF_22 | AG8 | |
| 22 | IO_L5P_22 | AJ7 | |
| 22 | IO_L5N_22 | AK7 | |
| 22 | IO_L6P_22 | AH9 | |
| 22 | IO_L6N_22 | AJ8 | |
| 22 | IO_L7P_22 | AH10 | |
| 22 | IO_L7N_22 | AG9 | |
| 22 | IO_L8P_CC_22 | AG12 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 22 | IO_L8N_CC_22 ⁽²⁾ | AF12 | |
| 22 | IO_L9P_CC_22 | AH11 | |
| 22 | IO_L9N_CC_22 ⁽²⁾ | AG11 | |
| 22 | IO_L10P_CC_22 | AK8 | |
| 22 | IO_L10N_CC_22 ⁽²⁾ | AL7 | |
| 22 | IO_L11P_CC_22 | AL9 | |
| 22 | IO_L11N_CC_22 ⁽²⁾ | AK9 | |
| 22 | IO_L12P_VRN_22 | AM7 | |
| 22 | IO_L12N_VRP_22 | AN6 | |
| 22 | IO_L13P_22 | AN8 | |
| 22 | IO_L13N_22 | AM8 | |
| 22 | IO_L14P_22 | AR5 | |
| 22 | IO_L14N_VREF_22 | AP5 | |
| 22 | IO_L15P_22 | AP7 | |
| 22 | IO_L15N_22 | AP6 | |
| 22 | IO_L16P_22 | AV5 | |
| 22 | IO_L16N_22 | AV4 | |
| 22 | IO_L17P_22 | AU4 | |
| 22 | IO_L17N_22 | AT4 | |
| 22 | IO_L18P_22 | AT5 | |
| 22 | IO_L18N_22 | AT6 | |
| 22 | IO_L19P_22 | AV3 | |
| 22 | IO_L19N_22 | AU3 | |
| 23 | IO_L0P_23 | N33 | |
| 23 | IO_L0N_23 | N34 | |
| 23 | IO_L1P_23 | M34 | |
| 23 | IO_L1N_23 | M33 | |
| 23 | IO_L2P_23 | M32 | |
| 23 | IO_L2N_23 | M31 | |
| 23 | IO_L3P_23 | N31 | |
| 23 | IO_L3N_23 | P31 | |
| 23 | IO_L4P_23 | H34 | |
| 23 | IO_L4N_VREF_23 | G34 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 23 | IO_L5P_23 | G33 | |
| 23 | IO_L5N_23 | H33 | |
| 23 | IO_L6P_23 | G32 | |
| 23 | IO_L6N_23 | G31 | |
| 23 | IO_L7P_23 | H31 | |
| 23 | IO_L7N_23 | J31 | |
| 23 | IO_L8P_CC_23 | F35 | |
| 23 | IO_L8N_CC_23 ⁽²⁾ | E35 | |
| 23 | IO_L9P_CC_23 | E34 | |
| 23 | IO_L9N_CC_23 ⁽²⁾ | F34 | |
| 23 | IO_L10P_CC_23 | F31 | |
| 23 | IO_L10N_CC_23 ⁽²⁾ | F32 | |
| 23 | IO_L11P_CC_23 | E32 | |
| 23 | IO_L11N_CC_23 ⁽²⁾ | E33 | |
| 23 | IO_L12P_VRN_23 | L34 | |
| 23 | IO_L12N_VRP_23 | K34 | |
| 23 | IO_L13P_23 | K33 | |
| 23 | IO_L13N_23 | J33 | |
| 23 | IO_L14P_23 | K32 | |
| 23 | IO_L14N_VREF_23 | J32 | |
| 23 | IO_L15P_23 | L32 | |
| 23 | IO_L15N_23 | L31 | |
| 23 | IO_L16P_23 | P33 | |
| 23 | IO_L16N_23 | P32 | |
| 23 | IO_L17P_23 | R33 | |
| 23 | IO_L17N_23 | R32 | |
| 23 | IO_L18P_23 | T32 | |
| 23 | IO_L18N_23 | U32 | |
| 23 | IO_L19P_23 | U31 | |
| 23 | IO_L19N_23 | T31 | |
| 24 | IO_L0P_24 | P12 | |
| 24 | IO_L0N_24 | P11 | |
| 24 | IO_L1P_24 | P10 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 24 | IO_L1N_24 | N10 | |
| 24 | IO_L2P_24 | M12 | |
| 24 | IO_L2N_24 | L12 | |
| 24 | IO_L3P_24 | N11 | |
| 24 | IO_L3N_24 | M11 | |
| 24 | IO_L4P_24 | L9 | |
| 24 | IO_L4N_VREF_24 | K10 | |
| 24 | IO_L5P_24 | L11 | |
| 24 | IO_L5N_24 | L10 | |
| 24 | IO_L6P_24 | K12 | |
| 24 | IO_L6N_24 | J12 | |
| 24 | IO_L7P_24 | J10 | |
| 24 | IO_L7N_24 | J11 | |
| 24 | IO_L8P_CC_24 | H13 | |
| 24 | IO_L8N_CC_24 ⁽²⁾ | G13 | |
| 24 | IO_L9P_CC_24 | H11 | |
| 24 | IO_L9N_CC_24 ⁽²⁾ | G12 | |
| 24 | IO_L10P_CC_24 | E12 | |
| 24 | IO_L10N_CC_24 ⁽²⁾ | E13 | |
| 24 | IO_L11P_CC_24 | F12 | |
| 24 | IO_L11N_CC_24 ⁽²⁾ | G11 | |
| 24 | IO_L12P_VRN_24 | F10 | |
| 24 | IO_L12N_VRP_24 | F11 | |
| 24 | IO_L13P_24 | H9 | |
| 24 | IO_L13N_24 | H10 | |
| 24 | IO_L14P_24 | E10 | |
| 24 | IO_L14N_VREF_24 | E9 | |
| 24 | IO_L15P_24 | F9 | |
| 24 | IO_L15N_24 | G9 | |
| 24 | IO_L16P_24 | H8 | |
| 24 | IO_L16N_24 | J8 | |
| 24 | IO_L17P_24 | K8 | |
| 24 | IO_L17N_24 | K9 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|-----------------|
| 24 | IO_L18P_24 | E7 | |
| 24 | IO_L18N_24 | E8 | |
| 24 | IO_L19P_24 | F7 | |
| 24 | IO_L19N_24 | G8 | |
| 25 | IO_L0P_25 | AG31 | |
| 25 | IO_L0N_25 | AF31 | |
| 25 | IO_L1P_25 | AF32 | |
| 25 | IO_L1N_25 | AG33 | |
| 25 | IO_L2P_25 | AH33 | |
| 25 | IO_L2N_25 | AG32 | |
| 25 | IO_L3P_25 | AH31 | |
| 25 | IO_L3N_25 | AJ31 | |
| 25 | IO_L4P_25 | AV35 | |
| 25 | IO_L4N_VREF_25 | AV36 | |
| 25 | IO_L5P_25 | AU36 | |
| 25 | IO_L5N_25 | AT35 | |
| 25 | IO_L6P_25 | AU34 | |
| 25 | IO_L6N_25 | AT34 | |
| 25 | IO_L7P_25 | AR35 | |
| 25 | IO_L7N_25 | AR34 | |
| 25 | IO_L8P_CC_25 | AU32 | |
| 25 | IO_L8N_CC_25 ⁽²⁾ | AU33 | |
| 25 | IO_L9P_CC_25 | AV33 | |
| 25 | IO_L9N_CC_25 ⁽²⁾ | AV34 | |
| 25 | IO_L10P_CC_25 | AV31 | |
| 25 | IO_L10N_CC_25 ⁽²⁾ | AU31 | |
| 25 | IO_L11P_CC_25 | AT32 | |
| 25 | IO_L11N_CC_25 ⁽²⁾ | AT31 | |
| 25 | IO_L12P_VRN_25 | AP31 | |
| 25 | IO_L12N_VRP_25 | AN31 | |
| 25 | IO_L13P_25 | AR32 | |
| 25 | IO_L13N_25 | AP32 | |
| 25 | IO_L14P_25 | AR33 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 25 | IO_L14N_VREF_25 | AP33 | |
| 25 | IO_L15P_25 | AN33 | |
| 25 | IO_L15N_25 | AM33 | |
| 25 | IO_L16P_25 | AK33 | |
| 25 | IO_L16N_25 | AJ33 | |
| 25 | IO_L17P_25 | AJ32 | |
| 25 | IO_L17N_25 | AK32 | |
| 25 | IO_L18P_25 | AL32 | |
| 25 | IO_L18N_25 | AM32 | |
| 25 | IO_L19P_25 | AL31 | |
| 25 | IO_L19N_25 | AM31 | |
| 26 | IO_L0P_26 | AV6 | |
| 26 | IO_L0N_26 | AU7 | |
| 26 | IO_L1P_26 | AU8 | |
| 26 | IO_L1N_26 | AV8 | |
| 26 | IO_L2P_26 | AT7 | |
| 26 | IO_L2N_26 | AU6 | |
| 26 | IO_L3P_26 | AR7 | |
| 26 | IO_L3N_26 | AR8 | |
| 26 | IO_L4P_26 | AU9 | |
| 26 | IO_L4N_VREF_26 | AT9 | |
| 26 | IO_L5P_26 | AV10 | |
| 26 | IO_L5N_26 | AV9 | |
| 26 | IO_L6P_26 | AU13 | |
| 26 | IO_L6N_26 | AU12 | |
| 26 | IO_L7P_26 | AV11 | |
| 26 | IO_L7N_26 | AU11 | |
| 26 | IO_L8P_CC_26 | AT10 | |
| 26 | IO_L8N_CC_26 ⁽²⁾ | AT11 | |
| 26 | IO_L9P_CC_26 | AR9 | |
| 26 | IO_L9N_CC_26 ⁽²⁾ | AR10 | |
| 26 | IO_L10P_CC_26 | AR12 | |
| 26 | IO_L10N_CC_26 ⁽²⁾ | AT12 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 26 | IO_L11P_CC_26 | AP11 | |
| 26 | IO_L11N_CC_26 ⁽²⁾ | AP12 | |
| 26 | IO_L12P_VRN_26 | AN9 | |
| 26 | IO_L12N_VRP_26 | AP8 | |
| 26 | IO_L13P_26 | AM9 | |
| 26 | IO_L13N_26 | AN10 | |
| 26 | IO_L14P_26 | AN11 | |
| 26 | IO_L14N_VREF_26 | AP10 | |
| 26 | IO_L15P_26 | AM12 | |
| 26 | IO_L15N_26 | AM11 | |
| 26 | IO_L16P_26 | AL11 | |
| 26 | IO_L16N_26 | AL12 | |
| 26 | IO_L17P_26 | AK10 | |
| 26 | IO_L17N_26 | AL10 | |
| 26 | IO_L18P_26 | AJ10 | |
| 26 | IO_L18N_26 | AJ11 | |
| 26 | IO_L19P_26 | AJ12 | |
| 26 | IO_L19N_26 | AK12 | |
| 27 | IO_L0P_27 | D31 | LX110, LX155, LX220 |
| 27 | IO_L0N_27 | C31 | LX110, LX155, LX220 |
| 27 | IO_L1P_27 | B31 | LX110, LX155, LX220 |
| 27 | IO_L1N_27 | C30 | LX110, LX155, LX220 |
| 27 | IO_L2P_27 | A30 | LX110, LX155, LX220 |
| 27 | IO_L2N_27 | A31 | LX110, LX155, LX220 |
| 27 | IO_L3P_27 | A32 | LX110, LX155, LX220 |
| 27 | IO_L3N_27 | B32 | LX110, LX155, LX220 |
| 27 | IO_L4P_27 | B33 | LX110, LX155, LX220 |
| 27 | IO_L4N_VREF_27 | C33 | LX110, LX155, LX220 |
| 27 | IO_L5P_27 | D32 | LX110, LX155, LX220 |
| 27 | IO_L5N_27 | D33 | LX110, LX155, LX220 |
| 27 | IO_L6P_27 | C34 | LX110, LX155, LX220 |
| 27 | IO_L6N_27 | B34 | LX110, LX155, LX220 |
| 27 | IO_L7P_27 | A34 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 27 | IO_L7N_27 | A35 | LX110, LX155, LX220 |
| 27 | IO_L8P_CC_27 | D35 | LX110, LX155, LX220 |
| 27 | IO_L8N_CC_27 ⁽²⁾ | D36 | LX110, LX155, LX220 |
| 27 | IO_L9P_CC_27 | C36 | LX110, LX155, LX220 |
| 27 | IO_L9N_CC_27 ⁽²⁾ | C35 | LX110, LX155, LX220 |
| 27 | IO_L10P_CC_27 | A37 | LX110, LX155, LX220 |
| 27 | IO_L10N_CC_27 ⁽²⁾ | A36 | LX110, LX155, LX220 |
| 27 | IO_L11P_CC_27 | B37 | LX110, LX155, LX220 |
| 27 | IO_L11N_CC_27 ⁽²⁾ | B36 | LX110, LX155, LX220 |
| 27 | IO_L12P_VRN_27 | C38 | LX110, LX155, LX220 |
| 27 | IO_L12N_VRP_27 | D38 | LX110, LX155, LX220 |
| 27 | IO_L13P_27 | C39 | LX110, LX155, LX220 |
| 27 | IO_L13N_27 | C40 | LX110, LX155, LX220 |
| 27 | IO_L14P_27 | B39 | LX110, LX155, LX220 |
| 27 | IO_L14N_VREF_27 | B38 | LX110, LX155, LX220 |
| 27 | IO_L15P_27 | A39 | LX110, LX155, LX220 |
| 27 | IO_L15N_27 | A40 | LX110, LX155, LX220 |
| 27 | IO_L16P_27 | A41 | LX110, LX155, LX220 |
| 27 | IO_L16N_27 | B41 | LX110, LX155, LX220 |
| 27 | IO_L17P_27 | B42 | LX110, LX155, LX220 |
| 27 | IO_L17N_27 | C41 | LX110, LX155, LX220 |
| 27 | IO_L18P_27 | D40 | LX110, LX155, LX220 |
| 27 | IO_L18N_27 | D41 | LX110, LX155, LX220 |
| 27 | IO_L19P_27 | E42 | LX110, LX155, LX220 |
| 27 | IO_L19N_27 | D42 | LX110, LX155, LX220 |
| 28 | IO_L0P_28 | C13 | LX110, LX155, LX220 |
| 28 | IO_L0N_28 | D13 | LX110, LX155, LX220 |
| 28 | IO_L1P_28 | B11 | LX110, LX155, LX220 |
| 28 | IO_L1N_28 | C11 | LX110, LX155, LX220 |
| 28 | IO_L2P_28 | B12 | LX110, LX155, LX220 |
| 28 | IO_L2N_28 | A12 | LX110, LX155, LX220 |
| 28 | IO_L3P_28 | D11 | LX110, LX155, LX220 |
| 28 | IO_L3N_28 | D12 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 28 | IO_L4P_28 | C9 | LX110, LX155, LX220 |
| 28 | IO_L4N_VREF_28 | D8 | LX110, LX155, LX220 |
| 28 | IO_L5P_28 | A11 | LX110, LX155, LX220 |
| 28 | IO_L5N_28 | A10 | LX110, LX155, LX220 |
| 28 | IO_L6P_28 | C10 | LX110, LX155, LX220 |
| 28 | IO_L6N_28 | D10 | LX110, LX155, LX220 |
| 28 | IO_L7P_28 | A9 | LX110, LX155, LX220 |
| 28 | IO_L7N_28 | B9 | LX110, LX155, LX220 |
| 28 | IO_L8P_CC_28 | C8 | LX110, LX155, LX220 |
| 28 | IO_L8N_CC_28 ⁽²⁾ | B8 | LX110, LX155, LX220 |
| 28 | IO_L9P_CC_28 | B6 | LX110, LX155, LX220 |
| 28 | IO_L9N_CC_28 ⁽²⁾ | C6 | LX110, LX155, LX220 |
| 28 | IO_L10P_CC_28 | D7 | LX110, LX155, LX220 |
| 28 | IO_L10N_CC_28 ⁽²⁾ | D6 | LX110, LX155, LX220 |
| 28 | IO_L11P_CC_28 | A7 | LX110, LX155, LX220 |
| 28 | IO_L11N_CC_28 ⁽²⁾ | B7 | LX110, LX155, LX220 |
| 28 | IO_L12P_VRN_28 | A5 | LX110, LX155, LX220 |
| 28 | IO_L12N_VRP_28 | A6 | LX110, LX155, LX220 |
| 28 | IO_L13P_28 | B4 | LX110, LX155, LX220 |
| 28 | IO_L13N_28 | A4 | LX110, LX155, LX220 |
| 28 | IO_L14P_28 | C5 | LX110, LX155, LX220 |
| 28 | IO_L14N_VREF_28 | D5 | LX110, LX155, LX220 |
| 28 | IO_L15P_28 | D3 | LX110, LX155, LX220 |
| 28 | IO_L15N_28 | C4 | LX110, LX155, LX220 |
| 28 | IO_L16P_28 | B3 | LX110, LX155, LX220 |
| 28 | IO_L16N_28 | C3 | LX110, LX155, LX220 |
| 28 | IO_L17P_28 | C1 | LX110, LX155, LX220 |
| 28 | IO_L17N_28 | B1 | LX110, LX155, LX220 |
| 28 | IO_L18P_28 | A2 | LX110, LX155, LX220 |
| 28 | IO_L18N_28 | B2 | LX110, LX155, LX220 |
| 28 | IO_L19P_28 | D1 | LX110, LX155, LX220 |
| 28 | IO_L19N_28 | D2 | LX110, LX155, LX220 |
| 29 | IO_L0P_29 | AY42 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------------|-------------------|------------------------|
| 29 | IO_L0N_29 | AW42 | LX110, LX155, LX220 |
| 29 | IO_L1P_29 | AW41 | LX110, LX155, LX220 |
| 29 | IO_L1N_29 | AW40 | LX110, LX155, LX220 |
| 29 | IO_L2P_29 | AY40 | LX110, LX155, LX220 |
| 29 | IO_L2N_29 | BA41 | LX110, LX155, LX220 |
| 29 | IO_L3P_29 | BA42 | LX110, LX155, LX220 |
| 29 | IO_L3N_29 | BB41 | LX110, LX155, LX220 |
| 29 | IO_L4P_29 | BA40 | LX110, LX155, LX220 |
| 29 | IO_L4N_VREF_29 | BB39 | LX110, LX155, LX220 |
| 29 | IO_L5P_29 | BB38 | LX110, LX155, LX220 |
| 29 | IO_L5N_29 | BA39 | LX110, LX155, LX220 |
| 29 | IO_L6P_29 | AY38 | LX110, LX155, LX220 |
| 29 | IO_L6N_29 | AW37 | LX110, LX155, LX220 |
| 29 | IO_L7P_29 | AW38 | LX110, LX155, LX220 |
| 29 | IO_L7N_29 | AY39 | LX110, LX155, LX220 |
| 29 | IO_L8P_CC_29 | BB37 | LX110, LX155, LX220 |
| 29 | IO_L8N_CC_29 ⁽²⁾ | BA37 | LX110, LX155, LX220 |
| 29 | IO_L9P_CC_29 | AY37 | LX110, LX155, LX220 |
| 29 | IO_L9N_CC_29 ⁽²⁾ | AW36 | LX110, LX155, LX220 |
| 29 | IO_L10P_CC_29 | BB36 | LX110, LX155, LX220 |
| 29 | IO_L10N_CC_29 ⁽²⁾ | BA36 | LX110, LX155, LX220 |
| 29 | IO_L11P_CC_29 | AY35 | LX110, LX155, LX220 |
| 29 | IO_L11N_CC_29 ⁽²⁾ | AW35 | LX110, LX155, LX220 |
| 29 | IO_L12P_VRN_29 | BB34 | LX110, LX155, LX220 |
| 29 | IO_L12N_VRP_29 | BA35 | LX110, LX155, LX220 |
| 29 | IO_L13P_29 | BB33 | LX110, LX155, LX220 |
| 29 | IO_L13N_29 | BA34 | LX110, LX155, LX220 |
| 29 | IO_L14P_29 | AY33 | LX110, LX155, LX220 |
| 29 | IO_L14N_VREF_29 | AY34 | LX110, LX155, LX220 |
| 29 | IO_L15P_29 | AW33 | LX110, LX155, LX220 |
| 29 | IO_L15N_29 | AW32 | LX110, LX155, LX220 |
| 29 | IO_L16P_29 | AY32 | LX110, LX155, LX220 |
| 29 | IO_L16N_29 | BA32 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 29 | IO_L17P_29 | BB32 | LX110, LX155, LX220 |
| 29 | IO_L17N_29 | BB31 | LX110, LX155, LX220 |
| 29 | IO_L18P_29 | BA30 | LX110, LX155, LX220 |
| 29 | IO_L18N_29 | BA31 | LX110, LX155, LX220 |
| 29 | IO_L19P_29 | AY30 | LX110, LX155, LX220 |
| 29 | IO_L19N_29 | AW31 | LX110, LX155, LX220 |
| 30 | IO_L0P_30 | AV1 | LX110, LX155, LX220 |
| 30 | IO_L0N_30 | AW1 | LX110, LX155, LX220 |
| 30 | IO_L1P_30 | AW2 | LX110, LX155, LX220 |
| 30 | IO_L1N_30 | AY2 | LX110, LX155, LX220 |
| 30 | IO_L2P_30 | BA1 | LX110, LX155, LX220 |
| 30 | IO_L2N_30 | BA2 | LX110, LX155, LX220 |
| 30 | IO_L3P_30 | AY3 | LX110, LX155, LX220 |
| 30 | IO_L3N_30 | AW3 | LX110, LX155, LX220 |
| 30 | IO_L4P_30 | BB2 | LX110, LX155, LX220 |
| 30 | IO_L4N_VREF_30 | BB3 | LX110, LX155, LX220 |
| 30 | IO_L5P_30 | AY5 | LX110, LX155, LX220 |
| 30 | IO_L5N_30 | AW5 | LX110, LX155, LX220 |
| 30 | IO_L6P_30 | AY4 | LX110, LX155, LX220 |
| 30 | IO_L6N_30 | BA4 | LX110, LX155, LX220 |
| 30 | IO_L7P_30 | BA5 | LX110, LX155, LX220 |
| 30 | IO_L7N_30 | BB4 | LX110, LX155, LX220 |
| 30 | IO_L8P_CC_30 | BB7 | LX110, LX155, LX220 |
| 30 | IO_L8N_CC_30 ⁽²⁾ | BA7 | LX110, LX155, LX220 |
| 30 | IO_L9P_CC_30 | AW7 | LX110, LX155, LX220 |
| 30 | IO_L9N_CC_30 ⁽²⁾ | AW6 | LX110, LX155, LX220 |
| 30 | IO_L10P_CC_30 | BB6 | LX110, LX155, LX220 |
| 30 | IO_L10N_CC_30 ⁽²⁾ | BA6 | LX110, LX155, LX220 |
| 30 | IO_L11P_CC_30 | AY7 | LX110, LX155, LX220 |
| 30 | IO_L11N_CC_30 ⁽²⁾ | AW8 | LX110, LX155, LX220 |
| 30 | IO_L12P_VRN_30 | BB8 | LX110, LX155, LX220 |
| 30 | IO_L12N_VRP_30 | BA9 | LX110, LX155, LX220 |
| 30 | IO_L13P_30 | AY10 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|-----------------------------|-------------------|------------------------|
| 30 | IO_L13N_30 | AW10 | LX110, LX155, LX220 |
| 30 | IO_L14P_30 | BB9 | LX110, LX155, LX220 |
| 30 | IO_L14N_VREF_30 | BA10 | LX110, LX155, LX220 |
| 30 | IO_L15P_30 | AY8 | LX110, LX155, LX220 |
| 30 | IO_L15N_30 | AY9 | LX110, LX155, LX220 |
| 30 | IO_L16P_30 | AW11 | LX110, LX155, LX220 |
| 30 | IO_L16N_30 | AW12 | LX110, LX155, LX220 |
| 30 | IO_L17P_30 | BA12 | LX110, LX155, LX220 |
| 30 | IO_L17N_30 | BB12 | LX110, LX155, LX220 |
| 30 | IO_L18P_30 | BB11 | LX110, LX155, LX220 |
| 30 | IO_L18N_30 | BA11 | LX110, LX155, LX220 |
| 30 | IO_L19P_30 | AY13 | LX110, LX155, LX220 |
| 30 | IO_L19N_30 | AY12 | LX110, LX155, LX220 |
| 31 | IO_L0P_31 | E14 | LX110, LX155, LX220 |
| 31 | IO_L0N_31 | D15 | LX110, LX155, LX220 |
| 31 | IO_L1P_31 | E15 | LX110, LX155, LX220 |
| 31 | IO_L1N_31 | F14 | LX110, LX155, LX220 |
| 31 | IO_L2P_31 | D16 | LX110, LX155, LX220 |
| 31 | IO_L2N_31 | D17 | LX110, LX155, LX220 |
| 31 | IO_L3P_31 | F16 | LX110, LX155, LX220 |
| 31 | IO_L3N_31 | F15 | LX110, LX155, LX220 |
| 31 | IO_L4P_31 | F17 | LX110, LX155, LX220 |
| 31 | IO_L4N_VREF_31 | E17 | LX110, LX155, LX220 |
| 31 | IO_L5P_31 | E20 | LX110, LX155, LX220 |
| 31 | IO_L5N_31 | F20 | LX110, LX155, LX220 |
| 31 | IO_L6P_31 | D18 | LX110, LX155, LX220 |
| 31 | IO_L6N_31 | E18 | LX110, LX155, LX220 |
| 31 | IO_L7P_31 | E19 | LX110, LX155, LX220 |
| 31 | IO_L7N_31 | F19 | LX110, LX155, LX220 |
| 31 | IO_L8P_CC_31 | D22 | LX110, LX155, LX220 |
| 31 | IO_L8N_CC_31 ⁽²⁾ | D23 | LX110, LX155, LX220 |
| 31 | IO_L9P_CC_31 | D21 | LX110, LX155, LX220 |
| 31 | IO_L9N_CC_31 ⁽²⁾ | D20 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 31 | IO_L10P_CC_31 | F21 | LX110, LX155, LX220 |
| 31 | IO_L10N_CC_31 ⁽²⁾ | E22 | LX110, LX155, LX220 |
| 31 | IO_L11P_CC_31 | E23 | LX110, LX155, LX220 |
| 31 | IO_L11N_CC_31 ⁽²⁾ | F24 | LX110, LX155, LX220 |
| 31 | IO_L12P_VRN_31 | D25 | LX110, LX155, LX220 |
| 31 | IO_L12N_VRP_31 | D26 | LX110, LX155, LX220 |
| 31 | IO_L13P_31 | E24 | LX110, LX155, LX220 |
| 31 | IO_L13N_31 | E25 | LX110, LX155, LX220 |
| 31 | IO_L14P_31 | F27 | LX110, LX155, LX220 |
| 31 | IO_L14N_VREF_31 | E27 | LX110, LX155, LX220 |
| 31 | IO_L15P_31 | F26 | LX110, LX155, LX220 |
| 31 | IO_L15N_31 | F25 | LX110, LX155, LX220 |
| 31 | IO_L16P_31 | E29 | LX110, LX155, LX220 |
| 31 | IO_L16N_31 | E28 | LX110, LX155, LX220 |
| 31 | IO_L17P_31 | D27 | LX110, LX155, LX220 |
| 31 | IO_L17N_31 | D28 | LX110, LX155, LX220 |
| 31 | IO_L18P_31 | F30 | LX110, LX155, LX220 |
| 31 | IO_L18N_31 | F29 | LX110, LX155, LX220 |
| 31 | IO_L19P_31 | D30 | LX110, LX155, LX220 |
| 31 | IO_L19N_31 | E30 | LX110, LX155, LX220 |
| 32 | IO_L0P_32 | A29 | LX110, LX155, LX220 |
| 32 | IO_L0N_32 | B29 | LX110, LX155, LX220 |
| 32 | IO_L1P_32 | B27 | LX110, LX155, LX220 |
| 32 | IO_L1N_32 | A26 | LX110, LX155, LX220 |
| 32 | IO_L2P_32 | C29 | LX110, LX155, LX220 |
| 32 | IO_L2N_32 | C28 | LX110, LX155, LX220 |
| 32 | IO_L3P_32 | B28 | LX110, LX155, LX220 |
| 32 | IO_L3N_32 | A27 | LX110, LX155, LX220 |
| 32 | IO_L4P_32 | B24 | LX110, LX155, LX220 |
| 32 | IO_L4N_VREF_32 | A25 | LX110, LX155, LX220 |
| 32 | IO_L5P_32 | C24 | LX110, LX155, LX220 |
| 32 | IO_L5N_32 | C25 | LX110, LX155, LX220 |
| 32 | IO_L6P_32 | B23 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 32 | IO_L6N_32 | A24 | LX110, LX155, LX220 |
| 32 | IO_L7P_32 | C26 | LX110, LX155, LX220 |
| 32 | IO_L7N_32 | B26 | LX110, LX155, LX220 |
| 32 | IO_L8P_CC_32 | C23 | LX110, LX155, LX220 |
| 32 | IO_L8N_CC_32 ⁽²⁾ | B22 | LX110, LX155, LX220 |
| 32 | IO_L9P_CC_32 | C21 | LX110, LX155, LX220 |
| 32 | IO_L9N_CC_32 ⁽²⁾ | C20 | LX110, LX155, LX220 |
| 32 | IO_L10P_CC_32 | A20 | LX110, LX155, LX220 |
| 32 | IO_L10N_CC_32 ⁽²⁾ | B21 | LX110, LX155, LX220 |
| 32 | IO_L11P_CC_32 | A21 | LX110, LX155, LX220 |
| 32 | IO_L11N_CC_32 ⁽²⁾ | A22 | LX110, LX155, LX220 |
| 32 | IO_L12P_VRN_32 | A19 | LX110, LX155, LX220 |
| 32 | IO_L12N_VRP_32 | B19 | LX110, LX155, LX220 |
| 32 | IO_L13P_32 | C18 | LX110, LX155, LX220 |
| 32 | IO_L13N_32 | C19 | LX110, LX155, LX220 |
| 32 | IO_L14P_32 | A16 | LX110, LX155, LX220 |
| 32 | IO_L14N_VREF_32 | A17 | LX110, LX155, LX220 |
| 32 | IO_L15P_32 | B17 | LX110, LX155, LX220 |
| 32 | IO_L15N_32 | B18 | LX110, LX155, LX220 |
| 32 | IO_L16P_32 | A14 | LX110, LX155, LX220 |
| 32 | IO_L16N_32 | A15 | LX110, LX155, LX220 |
| 32 | IO_L17P_32 | B16 | LX110, LX155, LX220 |
| 32 | IO_L17N_32 | C16 | LX110, LX155, LX220 |
| 32 | IO_L18P_32 | C14 | LX110, LX155, LX220 |
| 32 | IO_L18N_32 | C15 | LX110, LX155, LX220 |
| 32 | IO_L19P_32 | B13 | LX110, LX155, LX220 |
| 32 | IO_L19N_32 | B14 | LX110, LX155, LX220 |
| 33 | IO_L0P_33 | AV29 | LX110, LX155, LX220 |
| 33 | IO_L0N_33 | AW28 | LX110, LX155, LX220 |
| 33 | IO_L1P_33 | AV26 | LX110, LX155, LX220 |
| 33 | IO_L1N_33 | AU26 | LX110, LX155, LX220 |
| 33 | IO_L2P_33 | AV30 | LX110, LX155, LX220 |
| 33 | IO_L2N_33 | AW30 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 33 | IO_L3P_33 | AV25 | LX110, LX155, LX220 |
| 33 | IO_L3N_33 | AU24 | LX110, LX155, LX220 |
| 33 | IO_L4P_33 | AU28 | LX110, LX155, LX220 |
| 33 | IO_L4N_VREF_33 | AU27 | LX110, LX155, LX220 |
| 33 | IO_L5P_33 | AW23 | LX110, LX155, LX220 |
| 33 | IO_L5N_33 | AW22 | LX110, LX155, LX220 |
| 33 | IO_L6P_33 | AW27 | LX110, LX155, LX220 |
| 33 | IO_L6N_33 | AV28 | LX110, LX155, LX220 |
| 33 | IO_L7P_33 | AV24 | LX110, LX155, LX220 |
| 33 | IO_L7N_33 | AV23 | LX110, LX155, LX220 |
| 33 | IO_L8P_CC_33 | AW26 | LX110, LX155, LX220 |
| 33 | IO_L8N_CC_33 ⁽²⁾ | AW25 | LX110, LX155, LX220 |
| 33 | IO_L9P_CC_33 | AU23 | LX110, LX155, LX220 |
| 33 | IO_L9N_CC_33 ⁽²⁾ | AU22 | LX110, LX155, LX220 |
| 33 | IO_L10P_CC_33 | AV21 | LX110, LX155, LX220 |
| 33 | IO_L10N_CC_33 ⁽²⁾ | AV20 | LX110, LX155, LX220 |
| 33 | IO_L11P_CC_33 | AW21 | LX110, LX155, LX220 |
| 33 | IO_L11N_CC_33 ⁽²⁾ | AW20 | LX110, LX155, LX220 |
| 33 | IO_L12P_VRN_33 | AU18 | LX110, LX155, LX220 |
| 33 | IO_L12N_VRP_33 | AU19 | LX110, LX155, LX220 |
| 33 | IO_L13P_33 | AW18 | LX110, LX155, LX220 |
| 33 | IO_L13N_33 | AV19 | LX110, LX155, LX220 |
| 33 | IO_L14P_33 | AU17 | LX110, LX155, LX220 |
| 33 | IO_L14N_VREF_33 | AU16 | LX110, LX155, LX220 |
| 33 | IO_L15P_33 | AW17 | LX110, LX155, LX220 |
| 33 | IO_L15N_33 | AV18 | LX110, LX155, LX220 |
| 33 | IO_L16P_33 | AV13 | LX110, LX155, LX220 |
| 33 | IO_L16N_33 | AW13 | LX110, LX155, LX220 |
| 33 | IO_L17P_33 | AW16 | LX110, LX155, LX220 |
| 33 | IO_L17N_33 | AV16 | LX110, LX155, LX220 |
| 33 | IO_L18P_33 | AU14 | LX110, LX155, LX220 |
| 33 | IO_L18N_33 | AV14 | LX110, LX155, LX220 |
| 33 | IO_L19P_33 | AW15 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|------------------------------|------------|---------------------|
| 33 | IO_L19N_33 | AV15 | LX110, LX155, LX220 |
| 34 | IO_L0P_34 | BB13 | LX110, LX155, LX220 |
| 34 | IO_L0N_34 | BA14 | LX110, LX155, LX220 |
| 34 | IO_L1P_34 | AY14 | LX110, LX155, LX220 |
| 34 | IO_L1N_34 | AY15 | LX110, LX155, LX220 |
| 34 | IO_L2P_34 | BB16 | LX110, LX155, LX220 |
| 34 | IO_L2N_34 | BA16 | LX110, LX155, LX220 |
| 34 | IO_L3P_34 | BA15 | LX110, LX155, LX220 |
| 34 | IO_L3N_34 | BB14 | LX110, LX155, LX220 |
| 34 | IO_L4P_34 | BB18 | LX110, LX155, LX220 |
| 34 | IO_L4N_VREF_34 | BB19 | LX110, LX155, LX220 |
| 34 | IO_L5P_34 | BB17 | LX110, LX155, LX220 |
| 34 | IO_L5N_34 | BA17 | LX110, LX155, LX220 |
| 34 | IO_L6P_34 | AY19 | LX110, LX155, LX220 |
| 34 | IO_L6N_34 | BA19 | LX110, LX155, LX220 |
| 34 | IO_L7P_34 | AY17 | LX110, LX155, LX220 |
| 34 | IO_L7N_34 | AY18 | LX110, LX155, LX220 |
| 34 | IO_L8P_CC_34 | BA21 | LX110, LX155, LX220 |
| 34 | IO_L8N_CC_34 ⁽²⁾ | BA22 | LX110, LX155, LX220 |
| 34 | IO_L9P_CC_34 | BB21 | LX110, LX155, LX220 |
| 34 | IO_L9N_CC_34 ⁽²⁾ | BB22 | LX110, LX155, LX220 |
| 34 | IO_L10P_CC_34 | BA20 | LX110, LX155, LX220 |
| 34 | IO_L10N_CC_34 ⁽²⁾ | AY20 | LX110, LX155, LX220 |
| 34 | IO_L11P_CC_34 | AY22 | LX110, LX155, LX220 |
| 34 | IO_L11N_CC_34 ⁽²⁾ | AY23 | LX110, LX155, LX220 |
| 34 | IO_L12P_VRN_34 | AY25 | LX110, LX155, LX220 |
| 34 | IO_L12N_VRP_34 | AY24 | LX110, LX155, LX220 |
| 34 | IO_L13P_34 | BB23 | LX110, LX155, LX220 |
| 34 | IO_L13N_34 | BA24 | LX110, LX155, LX220 |
| 34 | IO_L14P_34 | BB26 | LX110, LX155, LX220 |
| 34 | IO_L14N_VREF_34 | BA26 | LX110, LX155, LX220 |
| 34 | IO_L15P_34 | BB24 | LX110, LX155, LX220 |
| 34 | IO_L15N_34 | BA25 | LX110, LX155, LX220 |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|---------------------|
| 34 | IO_L16P_34 | BA27 | LX110, LX155, LX220 |
| 34 | IO_L16N_34 | BB27 | LX110, LX155, LX220 |
| 34 | IO_L17P_34 | AY27 | LX110, LX155, LX220 |
| 34 | IO_L17N_34 | AY28 | LX110, LX155, LX220 |
| 34 | IO_L18P_34 | BB29 | LX110, LX155, LX220 |
| 34 | IO_L18N_34 | BB28 | LX110, LX155, LX220 |
| 34 | IO_L19P_34 | BA29 | LX110, LX155, LX220 |
| 34 | IO_L19N_34 | AY29 | LX110, LX155, LX220 |
| NA | GND | E1 | |
| NA | GND | K1 | |
| NA | GND | R1 | |
| NA | GND | Y1 | |
| NA | GND | AE1 | |
| NA | GND | AK1 | |
| NA | GND | AR1 | |
| NA | GND | AY1 | |
| NA | GND | C2 | |
| NA | GND | H2 | |
| NA | GND | N2 | |
| NA | GND | V2 | |
| NA | GND | AC2 | |
| NA | GND | AH2 | |
| NA | GND | AN2 | |
| NA | GND | AV2 | |
| NA | GND | A3 | |
| NA | GND | L3 | |
| NA | GND | AA3 | |
| NA | GND | AL3 | |
| NA | GND | BA3 | |
| NA | GND | D4 | |
| NA | GND | P4 | |
| NA | GND | AD4 | |
| NA | GND | AP4 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | B5 | |
| NA | GND | G5 | |
| NA | GND | U5 | |
| NA | GND | AG5 | |
| NA | GND | AU5 | |
| NA | GND | BB5 | |
| NA | GND | K6 | |
| NA | GND | Y6 | |
| NA | GND | AK6 | |
| NA | GND | AY6 | |
| NA | GND | C7 | |
| NA | GND | N7 | |
| NA | GND | AC7 | |
| NA | GND | AN7 | |
| NA | GND | A8 | |
| NA | GND | F8 | |
| NA | GND | T8 | |
| NA | GND | AF8 | |
| NA | GND | AT8 | |
| NA | GND | J9 | |
| NA | GND | W9 | |
| NA | GND | AJ9 | |
| NA | GND | AW9 | |
| NA | GND | B10 | |
| NA | GND | M10 | |
| NA | GND | U10 | |
| NA | GND | AB10 | |
| NA | GND | AM10 | |
| NA | GND | BB10 | |
| NA | GND | E11 | |
| NA | GND | K11 | |
| NA | GND | R11 | |
| NA | GND | Y11 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AE11 | |
| NA | GND | AK11 | |
| NA | GND | AR11 | |
| NA | GND | H12 | |
| NA | GND | N12 | |
| NA | GND | T12 | |
| NA | GND | V12 | |
| NA | GND | Y12 | |
| NA | GND | AB12 | |
| NA | GND | AD12 | |
| NA | GND | AH12 | |
| NA | GND | AN12 | |
| NA | GND | AV12 | |
| NA | GND | A13 | |
| NA | GND | L13 | |
| NA | GND | R13 | |
| NA | GND | U13 | |
| NA | GND | W13 | |
| NA | GND | AA13 | |
| NA | GND | AC13 | |
| NA | GND | AE13 | |
| NA | GND | AG13 | |
| NA | GND | AL13 | |
| NA | GND | BA13 | |
| NA | GND | D14 | |
| NA | GND | P14 | |
| NA | GND | V14 | |
| NA | GND | Y14 | |
| NA | GND | AB14 | |
| NA | GND | AD14 | |
| NA | GND | AJ14 | |
| NA | GND | AP14 | |
| NA | GND | G15 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | M15 | |
| NA | GND | U15 | |
| NA | GND | W15 | |
| NA | GND | AA15 | |
| NA | GND | AC15 | |
| NA | GND | AE15 | |
| NA | GND | AG15 | |
| NA | GND | AM15 | |
| NA | GND | AU15 | |
| NA | GND | BB15 | |
| NA | GND | K16 | |
| NA | GND | R16 | |
| NA | GND | T16 | |
| NA | GND | V16 | |
| NA | GND | Y16 | |
| NA | GND | AB16 | |
| NA | GND | AD16 | |
| NA | GND | AF16 | |
| NA | GND | AK16 | |
| NA | GND | AY16 | |
| NA | GND | C17 | |
| NA | GND | N17 | |
| NA | GND | U17 | |
| NA | GND | W17 | |
| NA | GND | AA17 | |
| NA | GND | AC17 | |
| NA | GND | AE17 | |
| NA | GND | AG17 | |
| NA | GND | AN17 | |
| NA | GND | A18 | |
| NA | GND | F18 | |
| NA | GND | L18 | |
| NA | GND | T18 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | V18 | |
| NA | GND | Y18 | |
| NA | GND | AB18 | |
| NA | GND | AD18 | |
| NA | GND | AF18 | |
| NA | GND | AH18 | |
| NA | GND | AL18 | |
| NA | GND | AT18 | |
| NA | GND | J19 | |
| NA | GND | P19 | |
| NA | GND | R19 | |
| NA | GND | U19 | |
| NA | GND | W19 | |
| NA | GND | AA19 | |
| NA | GND | AC19 | |
| NA | GND | AE19 | |
| NA | GND | AG19 | |
| NA | GND | AJ19 | |
| NA | GND | AW19 | |
| NA | GND | B20 | |
| NA | GND | M20 | |
| NA | GND | T20 | |
| NA | GND | V20 | |
| NA | GND | Y20 | |
| NA | GND | AB20 | |
| NA | GND | AD20 | |
| NA | GND | AF20 | |
| NA | GND | AH20 | |
| NA | GND | AM20 | |
| NA | GND | BB20 | |
| NA | GND | E21 | |
| NA | GND | K21 | |
| NA | GND | R21 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | U21 | |
| NA | GND | W21 | |
| NA | GND | AE21 | |
| NA | GND | AG21 | |
| NA | GND | AK21 | |
| NA | GND | AR21 | |
| NA | GND | H22 | |
| NA | GND | T22 | |
| NA | GND | V22 | |
| NA | GND | AD22 | |
| NA | GND | AF22 | |
| NA | GND | AH22 | |
| NA | GND | AN22 | |
| NA | GND | AV22 | |
| NA | GND | A23 | |
| NA | GND | L23 | |
| NA | GND | R23 | |
| NA | GND | U23 | |
| NA | GND | W23 | |
| NA | GND | AA23 | |
| NA | GND | AC23 | |
| NA | GND | AE23 | |
| NA | GND | AG23 | |
| NA | GND | AL23 | |
| NA | GND | BA23 | |
| NA | GND | D24 | |
| NA | GND | P24 | |
| NA | GND | T24 | |
| NA | GND | V24 | |
| NA | GND | Y24 | |
| NA | GND | AB24 | |
| NA | GND | AD24 | |
| NA | GND | AF24 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AH24 | |
| NA | GND | AP24 | |
| NA | GND | G25 | |
| NA | GND | M25 | |
| NA | GND | R25 | |
| NA | GND | U25 | |
| NA | GND | W25 | |
| NA | GND | AA25 | |
| NA | GND | AC25 | |
| NA | GND | AE25 | |
| NA | GND | AG25 | |
| NA | GND | AM25 | |
| NA | GND | AU25 | |
| NA | GND | BB25 | |
| NA | GND | K26 | |
| NA | GND | T26 | |
| NA | GND | V26 | |
| NA | GND | Y26 | |
| NA | GND | AB26 | |
| NA | GND | AD26 | |
| NA | GND | AF26 | |
| NA | GND | AH26 | |
| NA | GND | AK26 | |
| NA | GND | AY26 | |
| NA | GND | C27 | |
| NA | GND | N27 | |
| NA | GND | U27 | |
| NA | GND | W27 | |
| NA | GND | AA27 | |
| NA | GND | AC27 | |
| NA | GND | AE27 | |
| NA | GND | AG27 | |
| NA | GND | AN27 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | A28 | |
| NA | GND | F28 | |
| NA | GND | L28 | |
| NA | GND | T28 | |
| NA | GND | V28 | |
| NA | GND | Y28 | |
| NA | GND | AB28 | |
| NA | GND | AD28 | |
| NA | GND | AF28 | |
| NA | GND | AT28 | |
| NA | GND | J29 | |
| NA | GND | P29 | |
| NA | GND | U29 | |
| NA | GND | W29 | |
| NA | GND | AA29 | |
| NA | GND | AC29 | |
| NA | GND | AE29 | |
| NA | GND | AJ29 | |
| NA | GND | AP29 | |
| NA | GND | AW29 | |
| NA | GND | B30 | |
| NA | GND | M30 | |
| NA | GND | V30 | |
| NA | GND | Y30 | |
| NA | GND | AB30 | |
| NA | GND | AD30 | |
| NA | GND | AM30 | |
| NA | GND | BB30 | |
| NA | GND | E31 | |
| NA | GND | K31 | |
| NA | GND | R31 | |
| NA | GND | W31 | |
| NA | GND | AA31 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | GND | AC31 | |
| NA | GND | AE31 | |
| NA | GND | AK31 | |
| NA | GND | AR31 | |
| NA | GND | H32 | |
| NA | GND | N32 | |
| NA | GND | V32 | |
| NA | GND | AC32 | |
| NA | GND | AH32 | |
| NA | GND | AN32 | |
| NA | GND | AV32 | |
| NA | GND | A33 | |
| NA | GND | L33 | |
| NA | GND | T33 | |
| NA | GND | AA33 | |
| NA | GND | AF33 | |
| NA | GND | AL33 | |
| NA | GND | BA33 | |
| NA | GND | D34 | |
| NA | GND | J34 | |
| NA | GND | P34 | |
| NA | GND | W34 | |
| NA | GND | AD34 | |
| NA | GND | AP34 | |
| NA | GND | G35 | |
| NA | GND | U35 | |
| NA | GND | AG35 | |
| NA | GND | AU35 | |
| NA | GND | BB35 | |
| NA | GND | K36 | |
| NA | GND | Y36 | |
| NA | GND | AK36 | |
| NA | GND | AY36 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | GND | C37 | |
| NA | GND | N37 | |
| NA | GND | AC37 | |
| NA | GND | AN37 | |
| NA | GND | A38 | |
| NA | GND | F38 | |
| NA | GND | T38 | |
| NA | GND | AF38 | |
| NA | GND | AT38 | |
| NA | GND | BA38 | |
| NA | GND | J39 | |
| NA | GND | W39 | |
| NA | GND | AJ39 | |
| NA | GND | AW39 | |
| NA | GND | B40 | |
| NA | GND | M40 | |
| NA | GND | AB40 | |
| NA | GND | AM40 | |
| NA | GND | BB40 | |
| NA | GND | E41 | |
| NA | GND | R41 | |
| NA | GND | AE41 | |
| NA | GND | AK41 | |
| NA | GND | AR41 | |
| NA | GND | AY41 | |
| NA | GND | C42 | |
| NA | GND | H42 | |
| NA | GND | N42 | |
| NA | GND | V42 | |
| NA | GND | AC42 | |
| NA | GND | AH42 | |
| NA | GND | AN42 | |
| NA | GND | AV42 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCAUX | R12 | |
| NA | VCCAUX | AF29 | |
| NA | VCCAUX | U12 | |
| NA | VCCAUX | U30 | |
| NA | VCCAUX | W12 | |
| NA | VCCAUX | W30 | |
| NA | VCCAUX | AA12 | |
| NA | VCCAUX | AA30 | |
| NA | VCCAUX | AC12 | |
| NA | VCCAUX | AC30 | |
| NA | VCCAUX | AE12 | |
| NA | VCCAUX | Y31 | |
| NA | VCCAUX | T13 | |
| NA | VCCAUX | AB31 | |
| NA | VCCAUX | AD13 | |
| NA | VCCAUX | AF13 | |
| NA | VCCAUX | AH13 | |
| NA | VCCAUX | V29 | |
| NA | VCCAUX | AB29 | |
| NA | VCCAUX | AD29 | |
| NA | VCCINT | V13 | |
| NA | VCCINT | Y13 | |
| NA | VCCINT | AB13 | |
| NA | VCCINT | W14 | |
| NA | VCCINT | AA14 | |
| NA | VCCINT | AC14 | |
| NA | VCCINT | AE14 | |
| NA | VCCINT | V15 | |
| NA | VCCINT | Y15 | |
| NA | VCCINT | AB15 | |
| NA | VCCINT | AD15 | |
| NA | VCCINT | U16 | |
| NA | VCCINT | W16 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | AA16 | |
| NA | VCCINT | AC16 | |
| NA | VCCINT | AE16 | |
| NA | VCCINT | AG16 | |
| NA | VCCINT | T17 | |
| NA | VCCINT | V17 | |
| NA | VCCINT | Y17 | |
| NA | VCCINT | AB17 | |
| NA | VCCINT | AD17 | |
| NA | VCCINT | AF17 | |
| NA | VCCINT | AH17 | |
| NA | VCCINT | U18 | |
| NA | VCCINT | W18 | |
| NA | VCCINT | AA18 | |
| NA | VCCINT | AC18 | |
| NA | VCCINT | AE18 | |
| NA | VCCINT | AG18 | |
| NA | VCCINT | T19 | |
| NA | VCCINT | V19 | |
| NA | VCCINT | Y19 | |
| NA | VCCINT | AB19 | |
| NA | VCCINT | AD19 | |
| NA | VCCINT | AF19 | |
| NA | VCCINT | AH19 | |
| NA | VCCINT | R20 | |
| NA | VCCINT | U20 | |
| NA | VCCINT | W20 | |
| NA | VCCINT | AA20 | |
| NA | VCCINT | AC20 | |
| NA | VCCINT | AE20 | |
| NA | VCCINT | AG20 | |
| NA | VCCINT | T21 | |
| NA | VCCINT | V21 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| NA | VCCINT | AD21 | |
| NA | VCCINT | AF21 | |
| NA | VCCINT | AH21 | |
| NA | VCCINT | R22 | |
| NA | VCCINT | U22 | |
| NA | VCCINT | W22 | |
| NA | VCCINT | AE22 | |
| NA | VCCINT | AG22 | |
| NA | VCCINT | T23 | |
| NA | VCCINT | V23 | |
| NA | VCCINT | Y23 | |
| NA | VCCINT | AB23 | |
| NA | VCCINT | AD23 | |
| NA | VCCINT | AF23 | |
| NA | VCCINT | AH23 | |
| NA | VCCINT | R24 | |
| NA | VCCINT | U24 | |
| NA | VCCINT | W24 | |
| NA | VCCINT | AA24 | |
| NA | VCCINT | AC24 | |
| NA | VCCINT | AE24 | |
| NA | VCCINT | AG24 | |
| NA | VCCINT | AJ24 | |
| NA | VCCINT | T25 | |
| NA | VCCINT | V25 | |
| NA | VCCINT | Y25 | |
| NA | VCCINT | AB25 | |
| NA | VCCINT | AD25 | |
| NA | VCCINT | AF25 | |
| NA | VCCINT | AH25 | |
| NA | VCCINT | R26 | |
| NA | VCCINT | U26 | |
| NA | VCCINT | W26 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| NA | VCCINT | AA26 | |
| NA | VCCINT | AC26 | |
| NA | VCCINT | AE26 | |
| NA | VCCINT | AG26 | |
| NA | VCCINT | T27 | |
| NA | VCCINT | V27 | |
| NA | VCCINT | Y27 | |
| NA | VCCINT | AB27 | |
| NA | VCCINT | AD27 | |
| NA | VCCINT | AF27 | |
| NA | VCCINT | AH27 | |
| NA | VCCINT | U28 | |
| NA | VCCINT | W28 | |
| NA | VCCINT | AA28 | |
| NA | VCCINT | AC28 | |
| NA | VCCINT | AE28 | |
| NA | VCCINT | AG28 | |
| NA | VCCINT | Y29 | |
| 0 | VCCO_0 | AL28 | |
| 0 | VCCO_0 | AG30 | |
| 1 | VCCO_1 | J14 | |
| 1 | VCCO_1 | E16 | |
| 2 | VCCO_2 | AR26 | |
| 2 | VCCO_2 | AV27 | |
| 3 | VCCO_3 | J24 | |
| 3 | VCCO_3 | E26 | |
| 4 | VCCO_4 | AV17 | |
| 4 | VCCO_4 | BA18 | |
| 5 | VCCO_5 | C22 | |
| 5 | VCCO_5 | F23 | |
| 5 | VCCO_5 | B25 | |
| 6 | VCCO_6 | AY21 | |
| 6 | VCCO_6 | AT23 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 6 | VCCO_6 | AW24 | |
| 7 | VCCO_7 | H17 | |
| 7 | VCCO_7 | D19 | |
| 7 | VCCO_7 | G20 | |
| 8 | VCCO_8 | AR16 | |
| 8 | VCCO_8 | AP19 | |
| 8 | VCCO_8 | AU20 | |
| 11 | VCCO_11 | V37 | |
| 11 | VCCO_11 | U40 | |
| 11 | VCCO_11 | Y41 | |
| 12 | VCCO_12 | W4 | |
| 12 | VCCO_12 | AB5 | |
| 12 | VCCO_12 | AA8 | |
| 13 | VCCO_13 | AB35 | |
| 13 | VCCO_13 | AA38 | |
| 13 | VCCO_13 | AD39 | |
| 14 | VCCO_14 | AE6 | |
| 14 | VCCO_14 | AD9 | |
| 14 | VCCO_14 | AG10 | |
| 15 | VCCO_15 | M35 | |
| 15 | VCCO_15 | R36 | |
| 15 | VCCO_15 | P39 | |
| 16 | VCCO_16 | T3 | |
| 16 | VCCO_16 | R6 | |
| 16 | VCCO_16 | V7 | |
| 17 | VCCO_17 | AE36 | |
| 17 | VCCO_17 | AH37 | |
| 17 | VCCO_17 | AG40 | |
| 18 | VCCO_18 | AF3 | |
| 18 | VCCO_18 | AJ4 | |
| 18 | VCCO_18 | AH7 | |
| 19 | VCCO_19 | H37 | |
| 19 | VCCO_19 | L38 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|-------------|------------------------|-------------------|------------------------|
| 19 | VCCO_19 | K41 | |
| 20 | VCCO_20 | M5 | |
| 20 | VCCO_20 | L8 | |
| 20 | VCCO_20 | P9 | |
| 21 | VCCO_21 | AJ34 | |
| 21 | VCCO_21 | AM35 | |
| 21 | VCCO_21 | AL38 | |
| 22 | VCCO_22 | AM5 | |
| 22 | VCCO_22 | AL8 | |
| 22 | VCCO_22 | AP9 | |
| 23 | VCCO_23 | E36 | |
| 23 | VCCO_23 | D39 | |
| 23 | VCCO_23 | G40 | |
| 24 | VCCO_24 | F3 | |
| 24 | VCCO_24 | J4 | |
| 24 | VCCO_24 | H7 | |
| 25 | VCCO_25 | AR36 | |
| 25 | VCCO_25 | AP39 | |
| 25 | VCCO_25 | AU40 | |
| 26 | VCCO_26 | AT3 | |
| 26 | VCCO_26 | AW4 | |
| 26 | VCCO_26 | AR6 | |
| 27 | VCCO_27 | C32 | |
| 27 | VCCO_27 | F33 | |
| 27 | VCCO_27 | B35 | |
| 28 | VCCO_28 | E6 | |
| 28 | VCCO_28 | D9 | |
| 28 | VCCO_28 | G10 | |
| 29 | VCCO_29 | AT33 | |
| 29 | VCCO_29 | AW34 | |
| 29 | VCCO_29 | AV37 | |
| 30 | VCCO_30 | AV7 | |
| 30 | VCCO_30 | BA8 | |

Table 2-10: FF1760 Package—LX110, LX155, LX220, and LX330 (Continued)

| Bank | Pin Description | Pin Number | No Connect (NC) |
|------|-----------------|------------|-----------------|
| 30 | VCCO_30 | AU10 | |
| 31 | VCCO_31 | H27 | |
| 31 | VCCO_31 | D29 | |
| 31 | VCCO_31 | G30 | |
| 32 | VCCO_32 | C12 | |
| 32 | VCCO_32 | F13 | |
| 32 | VCCO_32 | B15 | |
| 33 | VCCO_33 | BA28 | |
| 33 | VCCO_33 | AU30 | |
| 33 | VCCO_33 | AY31 | |
| 34 | VCCO_34 | AY11 | |
| 34 | VCCO_34 | AT13 | |
| 34 | VCCO_34 | AW14 | |

Notes:

1. Do not connect a single-ended clock to the N-side of the differential clock pair of pins, for example, IO_L3N_GC_3.
2. Do not connect a single-ended clock to the N-side of clock capable pins, for example, IO_L8N_CC_11.
3. RSVD pins must be tied to GND (logic 0).

Pinout and SelectIO Bank Diagrams

Summary

This chapter provides pinout diagrams for each Virtex®-5 package/device combination.

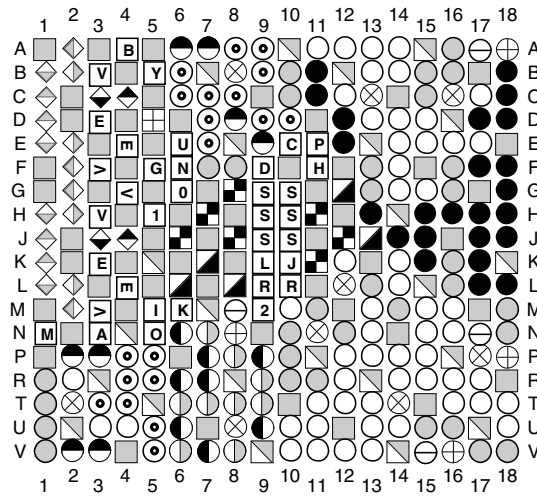
- “FF323 Package—LX20T and LX30T,” page 360
- “FF324 Package—LX30 and LX50,” page 361
- “FF665 Package—LX30T, FX30T, SX35T, LX50T, SX50T, and FX70T,” page 362
- “FF676 Package—LX30,” page 364
- “FF676 Package—LX50, LX85, and LX110,” page 366
- “FF1136 Package—LX50T, SX50T, and LX85T,” page 368
- “FF1136 Package—FX70T, SX95T, FX100T, LX110T, and LX155T,” page 370
- “FF1153 Package—LX50 and LX85,” page 372
- “FF1153 Package—LX110 and LX155,” page 374
- “FF1156 Package—TX150T,” page 376
- “FF1738 Package—FX100T, LX110T, LX155T, and LX220T,” page 378
- “FF1738 Package—FX130T,” page 380
- “FF1738 Package—FX200T, SX240T, and LX330T,” page 382
- “FF1759 Package—TX150T and TX240T,” page 384
- “FF1760 Package—LX110, LX155, and LX220,” page 386
- “FF1760 Package—LX330,” page 388

Multi-function I/O pins are represented in these diagrams by symbols for only one of the pins available functions, with precedence given to functionality in the following order:

- VREF, VRP, or VRN
- GC
- CC
- D0 – D31
- A0 – A25

For example, a pin description such as IO_L8P_CC_A3_D19_1 is represented with a CC symbol, a pin description such as IO_L14N_VREF_12 is represented with a VREF symbol, and a pin description such as IO_L2P_A15_D31_1 is represented with a D0–D31 symbol.

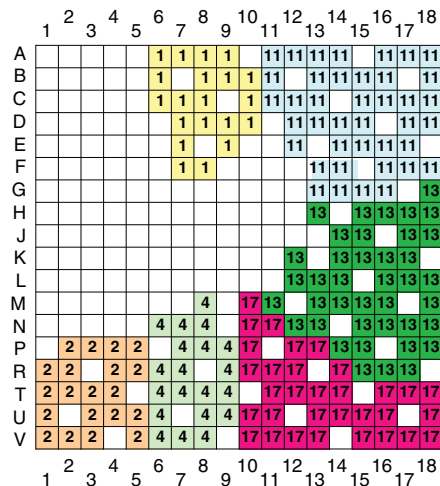
FF323 Package—LX20T and LX30T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | ⊞ PROGRAM_B | □ GND | ⊞ MGTAVCC | ◇ MGTRXP |
| ⊕ VRN | ⊕ VRN | ⊞ CS_B | ⊞ RDWR_B | ⊞ RSVD | ⊞ MGTAVCCPLL | ◇ MGTRXN |
| ⊖ VRP | ⊖ VRP | ⊞ D_IN | ⊞ TCK | ⊞ VBATT | ⊞ MGTAVTTRX | ◇ MGTTXN |
| ⊖ P_GC | ⊖ P_GC | ⊞ DONE | ⊞ TDI | ⊞ VCCAUX | ⊞ MGTAVTTRXC | ◇ MGTTXP |
| ● N_GC | ● N_GC | ⊞ D_OUT_BUSY | ⊞ TDO | ⊞ VCCINT | ⊞ MGTAVTTTX | |
| ○ CC | ○ CC | ⊞ HSWAPEN | ⊞ TMS | ⊞ VCCO | ◇ MGTREFCLKP | |
| ⊙ D0 - D31 | ⊙ D0 - D31 | ⊞ INIT | ⊞ DXP | ⊞ NC | ◇ MGTREFCLKN | |
| ● A0 - A25 | ● A0 - A25 | ⊞ M2, M1, M0 | ⊞ DXN | ⊞ FLOAT | ⊞ MGTREF | |
| ● SM | ● SM | ⊞ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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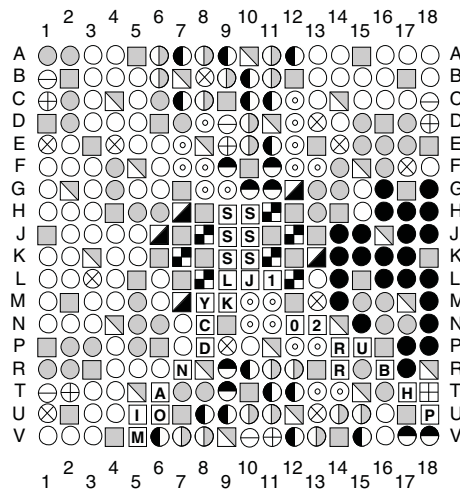
Figure 3-1: FF323—Package LX20T and LX30T Pinout Diagram



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Figure 3-2: FF323—Package LX20T and LX30T SelectIO Bank Diagram

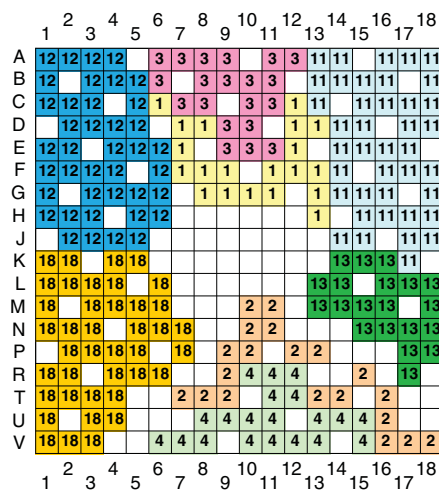
FF324 Package—LX30 and LX50



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|--|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | Ⓢ CCLK | Ⓟ PROGRAM_B | ■ GND |
| | ⊕ VRN | Ⓛ CS_B | Ⓤ RDWR_B | Ⓡ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⊕ VBATT |
| | Ⓢ P_GC | Ⓣ DONE | Ⓛ TDI | ▴ VCCAUX |
| | ◐ N_GC | Ⓛ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ○ CC | Ⓛ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⦿ D0 - D31 | Ⓨ INIT | Ⓤ DXP | Ⓛ NO CONNECT |
| | ◑ A0 - A25 | Ⓛ M2, M1, M0 | Ⓛ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

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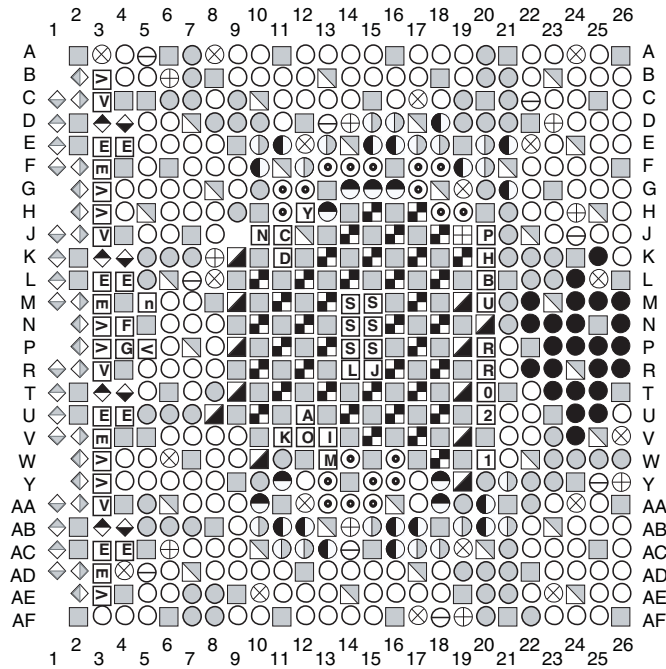
Figure 3-3: FF324 Package—LX30 and LX50 Pinout Diagram



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Figure 3-4: FF324 Package—LX30 and LX50 SelectIO Bank Diagram

FF665 Package—LX30T, FX30T, SX35T, LX50T, SX50T, and FX70T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | Ⓟ PROGRAM_B | Ⓜ GND | Ⓜ MGTAVCC | ⊠ MGTRXP |
| | ⊕ VRN | Ⓜ CS_B | Ⓜ RDWR_B | Ⓜ RSVD | Ⓜ MGTAVCCPLL | ⊠ MGTRXN |
| | ⊖ VRP | Ⓜ D_IN | Ⓜ TCK | Ⓜ VBATT | Ⓜ MGTAVTTRX | ⊠ MGTTXN |
| | Ⓜ P_GC | Ⓜ DONE | Ⓜ TDI | Ⓜ VCCAUX | Ⓜ MGTAVTTRXC | ⊠ MGTTXP |
| | ● N_GC | Ⓜ D_OUT_BUSY | Ⓜ TDO | Ⓜ VCCINT | Ⓜ MGTAVTTTX | |
| | ○ CC | Ⓜ HSWAPEN | Ⓜ TMS | Ⓜ VCCO | ⊠ MGTREFCLKP | |
| | ⊙ D0 - D31 | Ⓜ INIT | Ⓜ DXP | Ⓜ NC | ⊠ MGTREFCLKN | |
| | ⊙ A0 - A25 | Ⓜ 210 M2, M1, M0 | Ⓜ DXN | Ⓜ FLOAT | Ⓜ MGTREF | |
| | ● SM | Ⓜ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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Figure 3-5: FF665 Package—LX30T, FX30T, SX35T, LX50T, SX50T, and FX70T Pinout Diagram

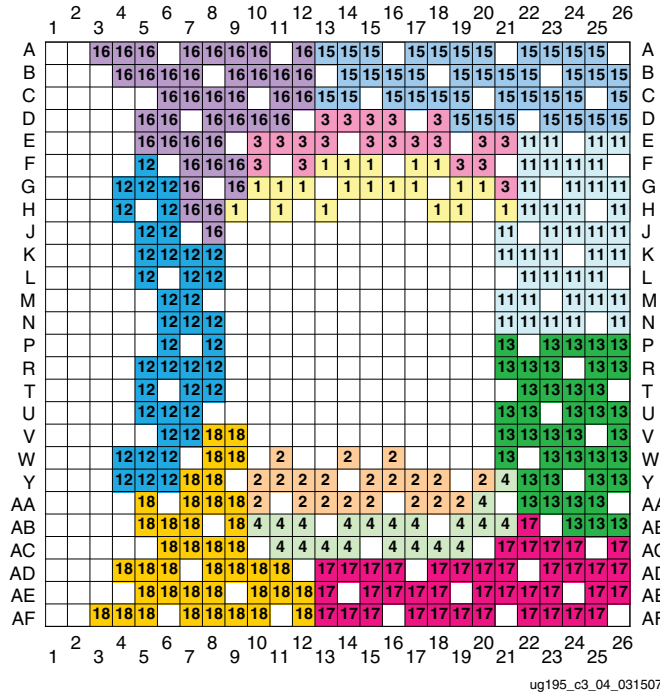
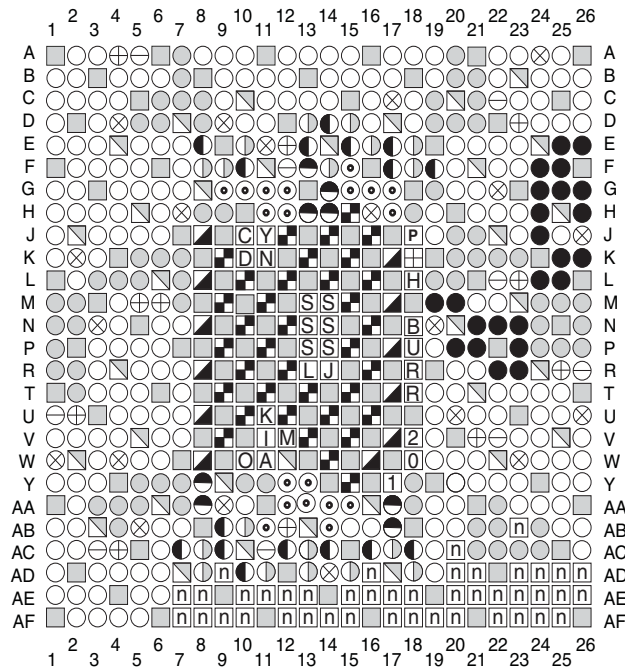


Figure 3-6: FF665 Package—LX30T, FX30T, SX35T, LX50T, SX50T, and FX70T SelectIO Bank Diagram

FF676 Package—LX30



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|---|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | ⓑ PROGRAM_B | ■ GND |
| | ⊕ VRN | ⓑ CS_B | ⓓ RDWR_B | ⓓ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⓔ VBATT |
| | ⓐ P_GC | ⓓ DONE | Ⓛ TDI | ⓕ VCCAUX |
| | ● N_GC | ⓐ D_OUT_BUSY | ⓐ TDO | ⓖ VCCINT |
| | ○ CC | ⓓ HSWAPEN | ⓓ TMS | ⓗ VCCO |
| | ⓐ D0 - D31 | ⓓ INIT | ⓓ DXP | ⓓ NO CONNECT |
| | ● A0 - A25 | ⓓ M2, M1, M0 | ⓓ DXN | |
| | ● SM | ⓓ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

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Figure 3-7: FF676 Package—LX30 Pinout Diagram

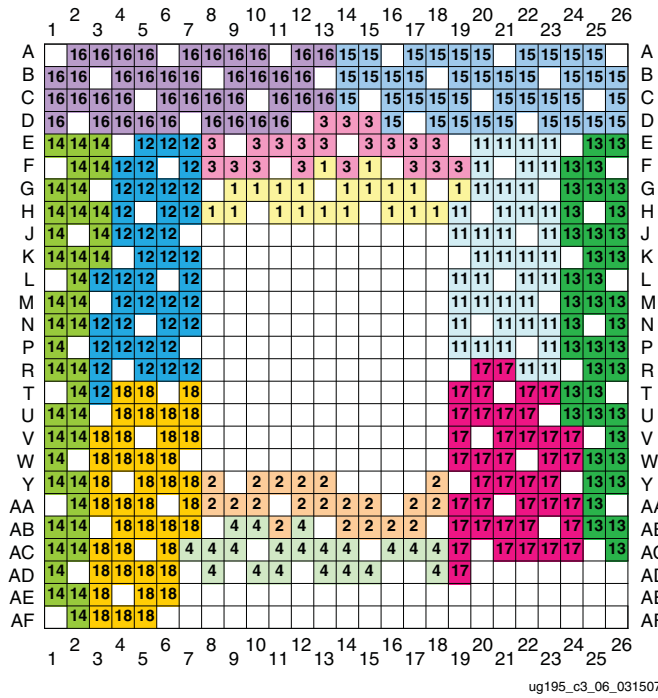
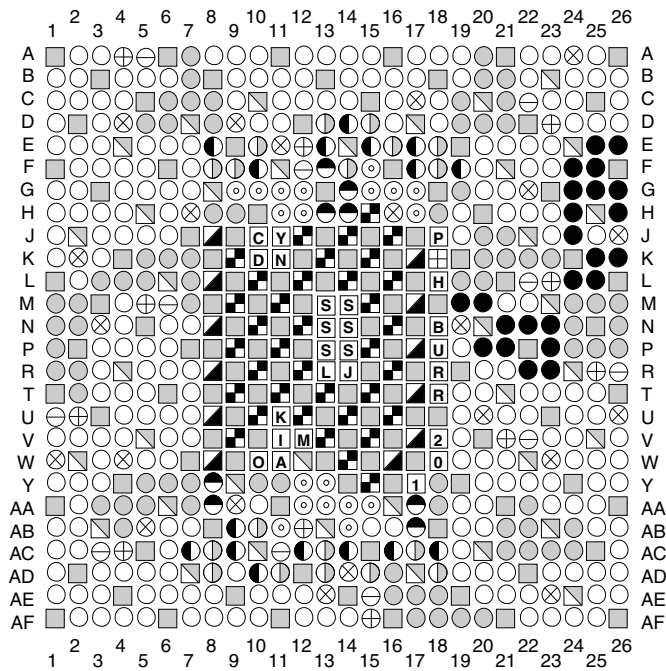


Figure 3-8: FF676 Package—LX30 SelectIO Bank Diagram

FF676 Package—LX50, LX85, and LX110



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|--|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | Ⓒ CCLK | ⒫ PROGRAM_B | ■ GND |
| | ⊕ VRN | Ⓑ CS_B | Ⓤ RDWR_B | Ⓡ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | Ⓢ VBATT |
| | Ⓟ P_GC | ⓓ DONE | Ⓡ TDI | ▣ VCCAUX |
| | ◐ N_GC | Ⓐ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ● CC | Ⓜ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⊙ D0 - D31 | Ⓨ INIT | Ⓜ DXP | Ⓝ NO CONNECT |
| | ◑ A0 - A25 | Ⓜ M2, M1, M0 | Ⓡ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

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Figure 3-9: FF676 Package—LX50, LX85, and LX110 Pinout Diagram

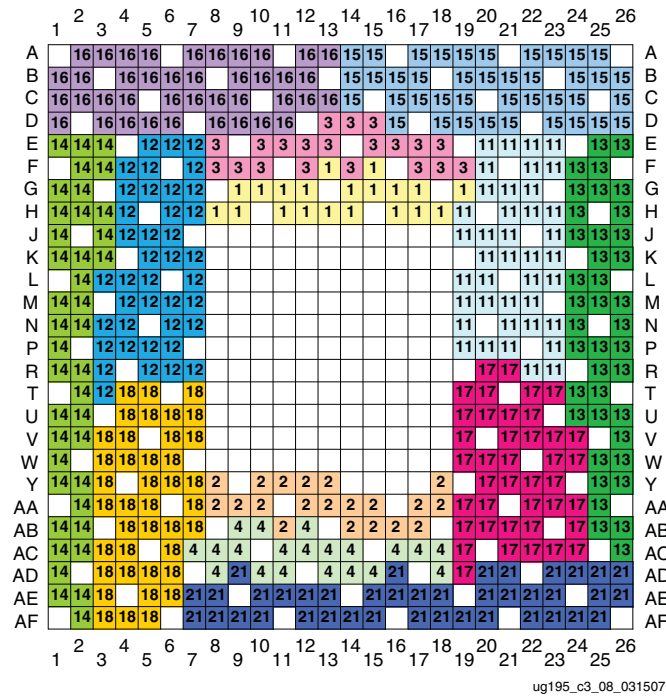
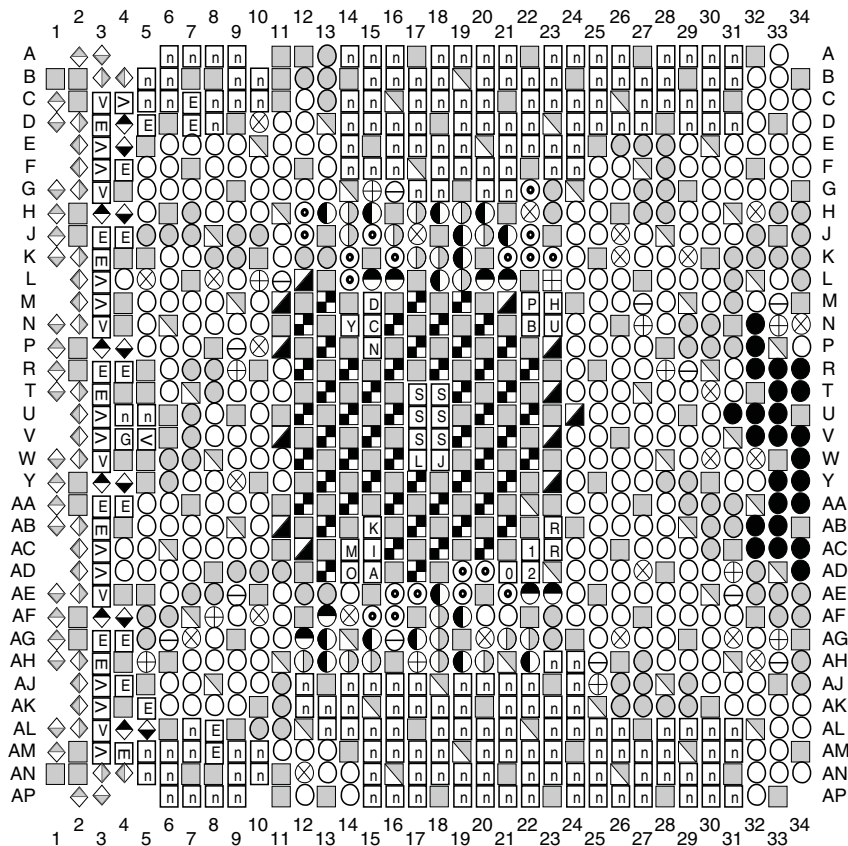


Figure 3-10: FF676 Package—LX50, LX85, and LX110 SelectIO Bank Diagram

FF1136 Package—LX50T, SX50T, and LX85T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | ⓑ PROGRAM_B | Ⓜ GND | Ⓨ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | ⓑ CS_B | ⓓ RDWR_B | Ⓡ RSVD | Ⓩ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | Ⓢ VBATT | ⓐ MGTAVTTRX | ◇ MGTTXP |
| | ⓐ P_GC | ⓓ DONE | Ⓛ TDI | Ⓦ VCCAUX | ⓑ MGTAVTTRXC | ◇ MGTTXN |
| | ⓑ N_GC | ⓐ D_OUT_BUSY | ⓐ TDO | Ⓦ VCCINT | Ⓩ MGTAVTTTX | |
| | ⓐ CC | Ⓢ HSWAPEN | Ⓜ TMS | Ⓩ VCCO | ◇ MGTREFCLKP | |
| | ⓐ D0 - D31 | Ⓨ INIT | ⓐ DXP | Ⓝ NC | ◇ MGTREFCLKN | |
| | ⓐ A0 - A25 | ⓐ M2, M1, M0 | Ⓛ DXN | Ⓡ FLOAT | ⓐ MGTREF | |
| | ● SM | Ⓨ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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Figure 3-11: FF1136 Package—LX50T, SX50T, and LX85T Pinout Diagram

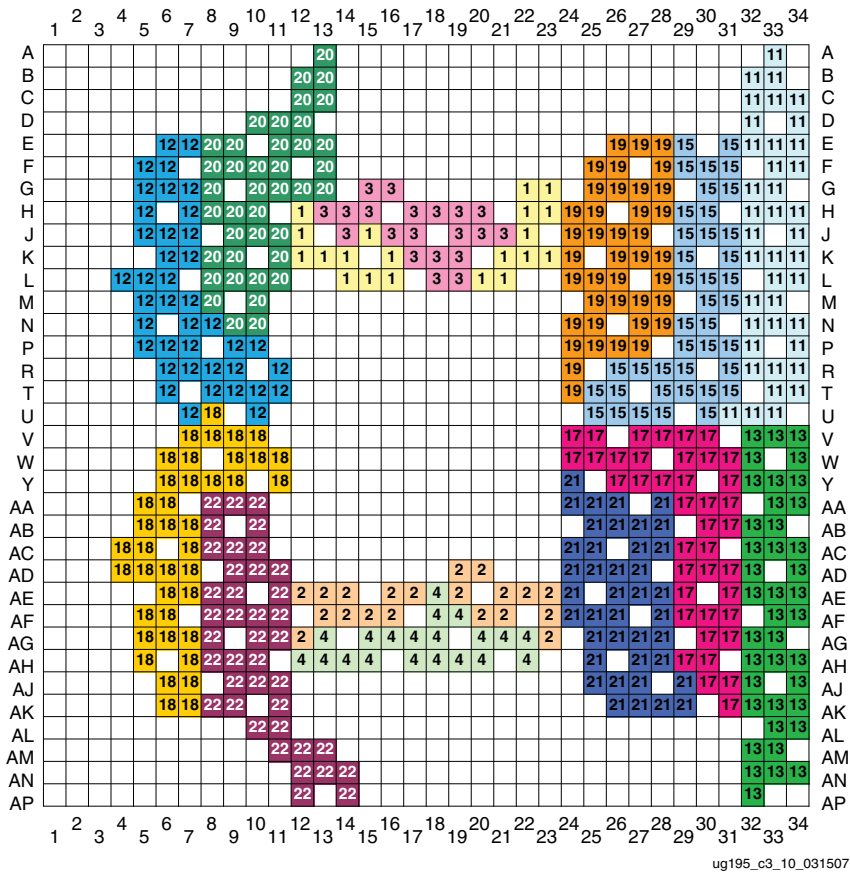
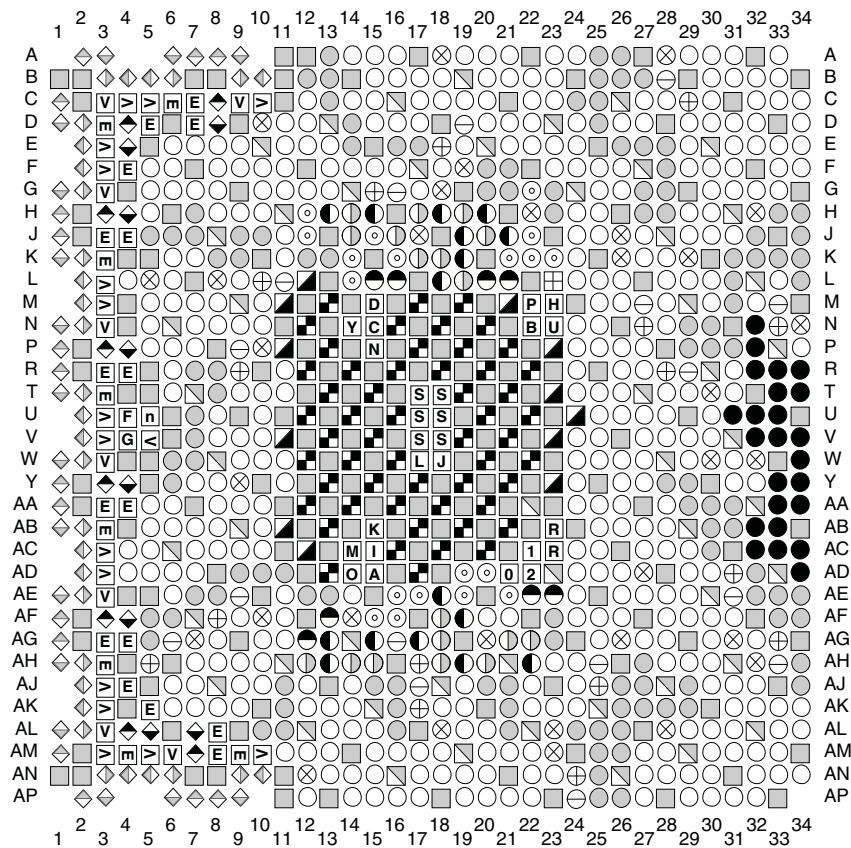


Figure 3-12: FF1136 Package—LX50T, SX50T, and LX85T SelectIO Bank Diagram

FF1136 Package—FX70T, SX95T, FX100T, LX110T, and LX155T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | Ⓟ PROGRAM_B | ■ GND | ⊞ MGTAVCC | ⊞ MGTRXP |
| | ⊕ VRN | Ⓛ CS_B | Ⓛ RDWR_B | Ⓛ RSVD | Ⓛ MGTAVCCPLL | ⊞ MGTRXN |
| | ⊖ VRP | Ⓛ D_IN | Ⓛ TCK | Ⓛ VBATT | Ⓛ MGTAVTTRX | ⊞ MGTTXN |
| | Ⓛ P_GC | Ⓛ DONE | Ⓛ TDI | Ⓛ VCCAUX | Ⓛ MGTAVTTRXC | ⊞ MGTTXP |
| | Ⓛ N_GC | Ⓛ D_OUT_BUSY | Ⓛ TDO | Ⓛ VCCINT | Ⓛ MGTAVTTTX | |
| | Ⓛ CC | Ⓛ HSWAPEN | Ⓛ TMS | Ⓛ VCCO | ⊞ MGTREFCLKP | |
| | Ⓛ D0 - D31 | Ⓛ INIT | Ⓛ DXP | Ⓛ NC | ⊞ MGTREFCLKN | |
| | Ⓛ A0 - A25 | Ⓛ M2, M1, M0 | Ⓛ DXN | Ⓛ FLOAT | ⊞ MGTREF | |
| | ● SM | Ⓛ AVDD_0, AVSS_0, VP_0, VN_0, VREFF_0, VREFN_0 | | | | |

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Figure 3-13: FF1136 Package—FX70T, SX95T, FX100T, LX110T, and LX155T Pinout Diagram

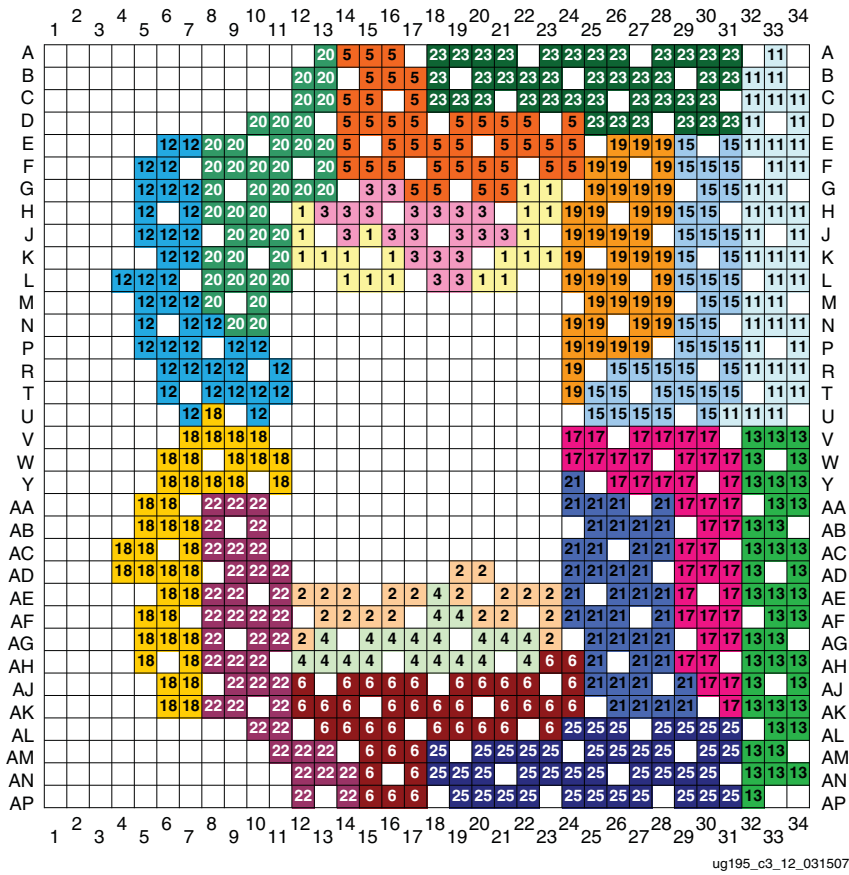
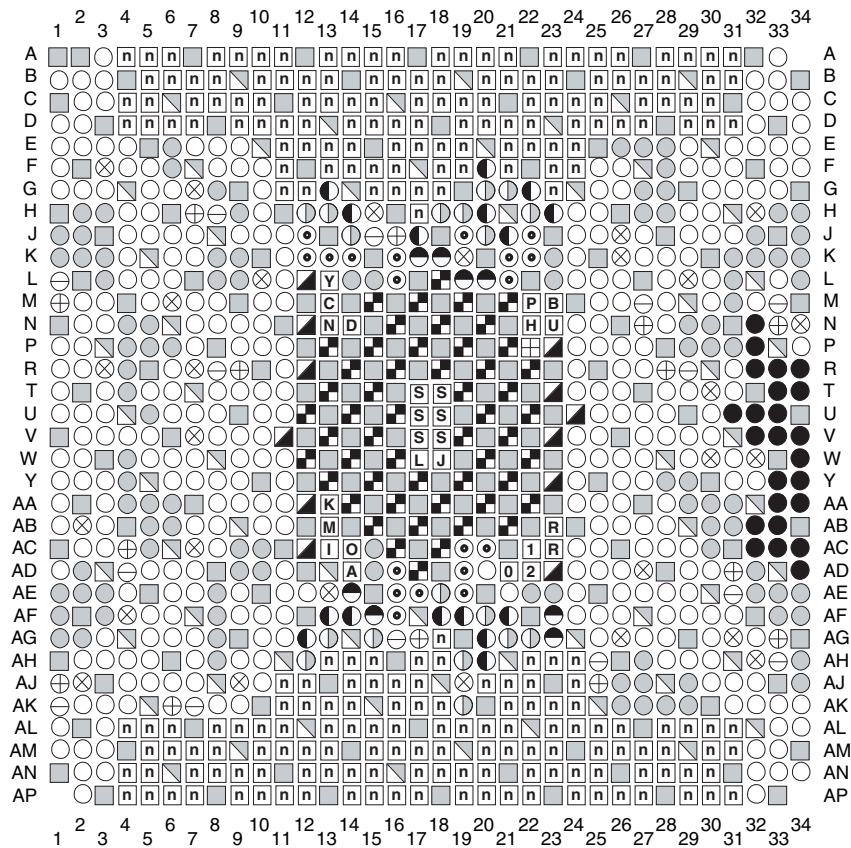


Figure 3-14: FF1136 Package—FX70T, SX95T, FX100T, LX110T, and LX155T SelectIO Bank Diagram

FF1153 Package—LX50 and LX85



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|--|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | Ⓒ CCLK | ⒫ PROGRAM_B | ■ GND |
| | ⊕ VRN | Ⓑ CS_B | Ⓤ RDWR_B | Ⓓ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⊞ VBATT |
| | Ⓟ P_GC | Ⓓ DONE | Ⓛ TDI | ▣ VCCAUX |
| | ◐ N_GC | Ⓐ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ● CC | Ⓜ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⦿ D0 - D31 | Ⓨ INIT | Ⓜ DXP | Ⓝ NO CONNECT |
| | ◑ A0 - A25 | ②①① M2, M1, M0 | Ⓛ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

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Figure 3-15: FF1153 Package—LX50 and LX85 Pinout Diagram

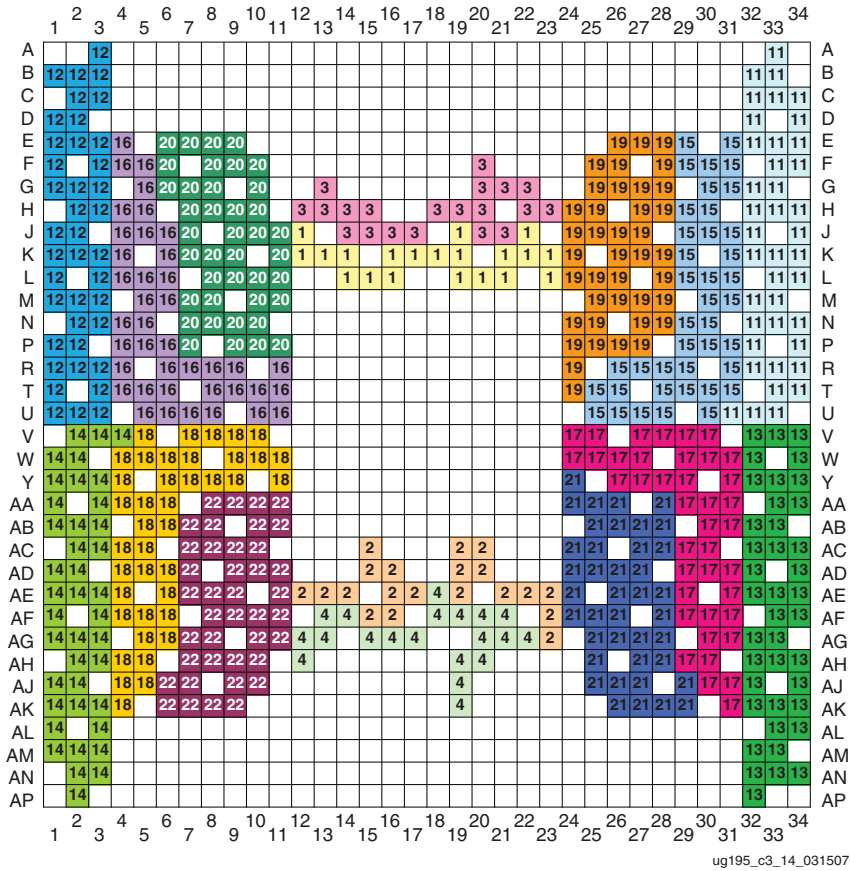
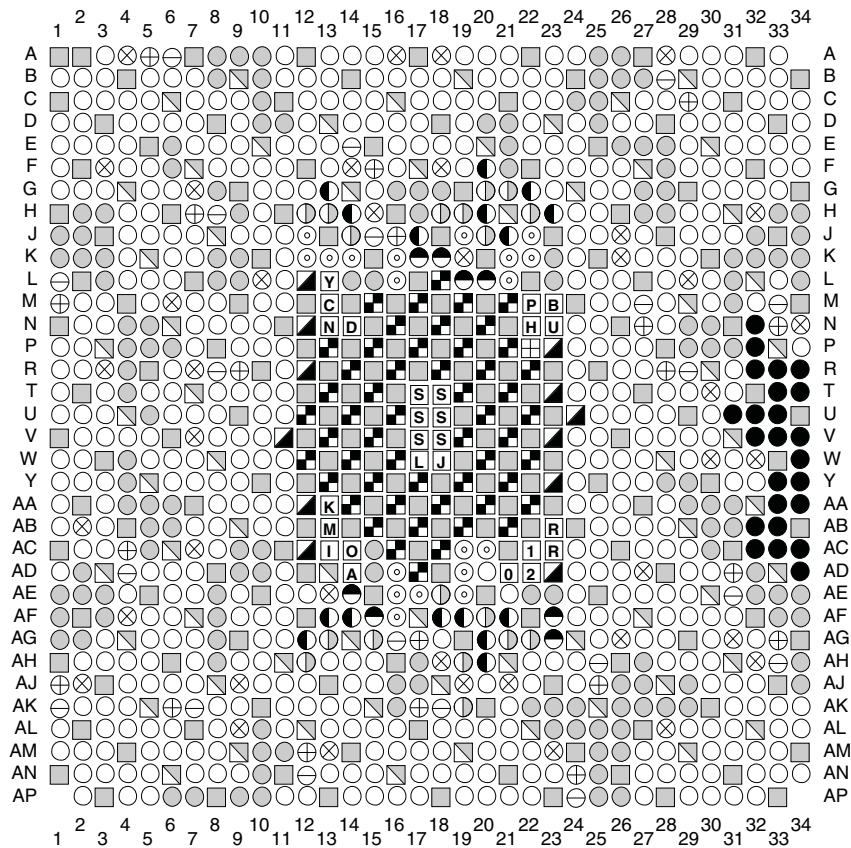


Figure 3-16: FF1153 Package—LX50 and LX85 SelectIO Bank Diagram

FF1153 Package—LX110 and LX155



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|---|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | Ⓒ CCLK | Ⓟ PROGRAM_B | ■ GND |
| | ⊕ VRN | Ⓑ CS_B | Ⓤ RDWR_B | Ⓡ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⊕ VBATT |
| | Ⓟ P_GC | ⓓ DONE | Ⓛ TDI | ▣ VCCAUX |
| | ◐ N_GC | Ⓐ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ● CC | ⓗ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⦿ D0 - D31 | Ⓨ INIT | Ⓜ DXP | Ⓝ NO CONNECT |
| | ◐ A0 - A25 | Ⓜ M2, M1, M0 | Ⓛ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

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Figure 3-17: FF1153 Package—LX110 and LX155 Pinout Diagram

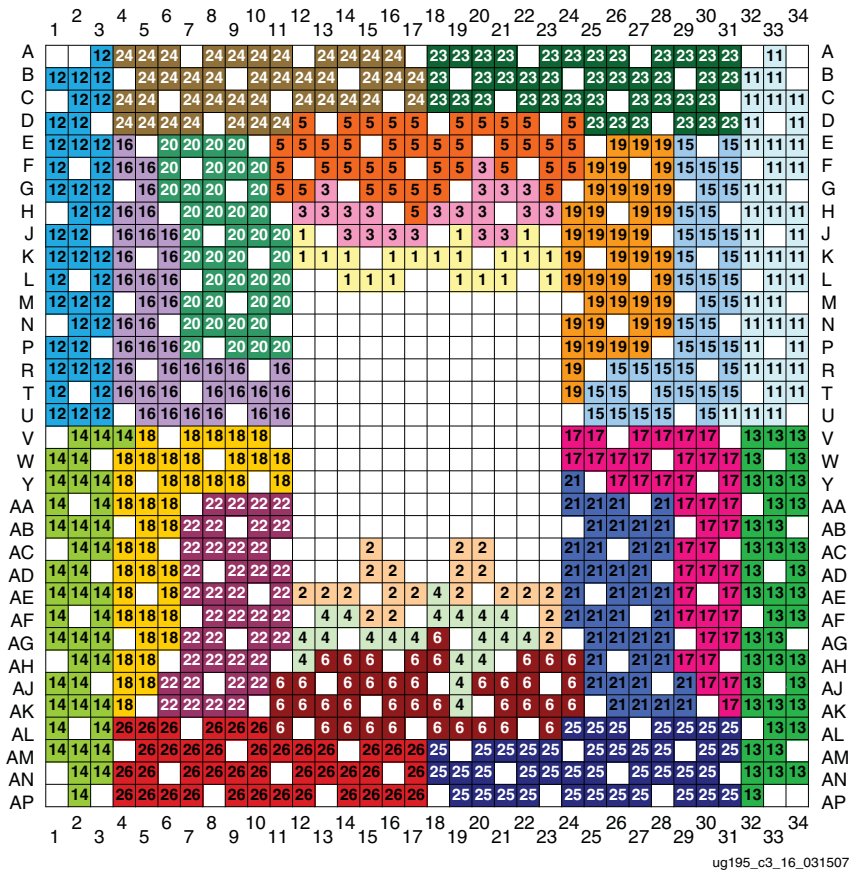
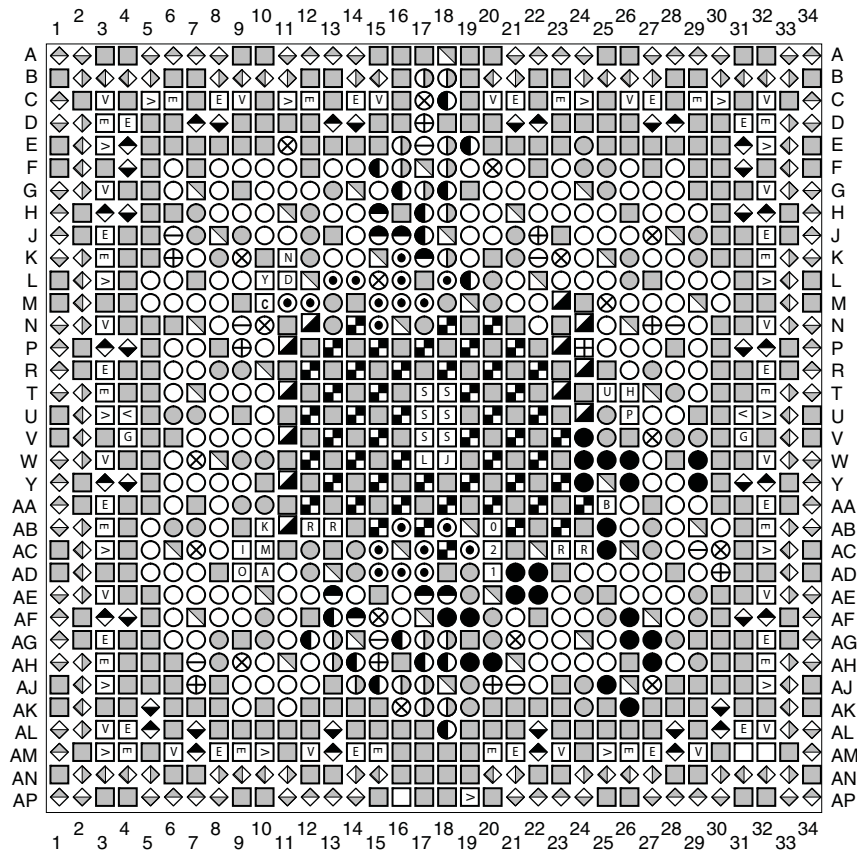


Figure 3-18: FF1153 Package—LX110 and LX155 SelectIO Bank Diagram

FF1156 Package—TX150T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | ⊞ PROGRAM_B | □ GND | ⊞ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | ⊞ CS_B | ⊞ RDWR_B | ⊞ RSVD | ⊞ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | ⊞ D_IN | ⊞ TCK | ⊞ VBATT | ⊞ MGTAVTTRX | ◇ MGTTXN |
| | ⊕ P_GC | ⊞ DONE | ⊞ TDI | ⊞ VCCAUX | ⊞ MGTAVTTRXC | ◇ MGTTXP |
| | ● N_GC | ⊞ D_OUT_BUSY | ⊞ TDO | ⊞ VCCINT | ⊞ MGTAVTTTX | |
| | ○ CC | ⊞ HSWAPEN | ⊞ TMS | ⊞ VCCO | ◇ MGTREFCLKP | |
| | ⊙ D0 - D31 | ⊞ INIT | ⊞ DXP | ⊞ NC | ◇ MGTREFCLKN | |
| | ● A0 - A25 | ⊞ M2, M1, M0 | ⊞ DXN | ⊞ FLOAT | ⊞ MGTREF | |
| | ● SM | ⊞ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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Figure 3-19: FF1156 Package—TX150T Pinout Diagram

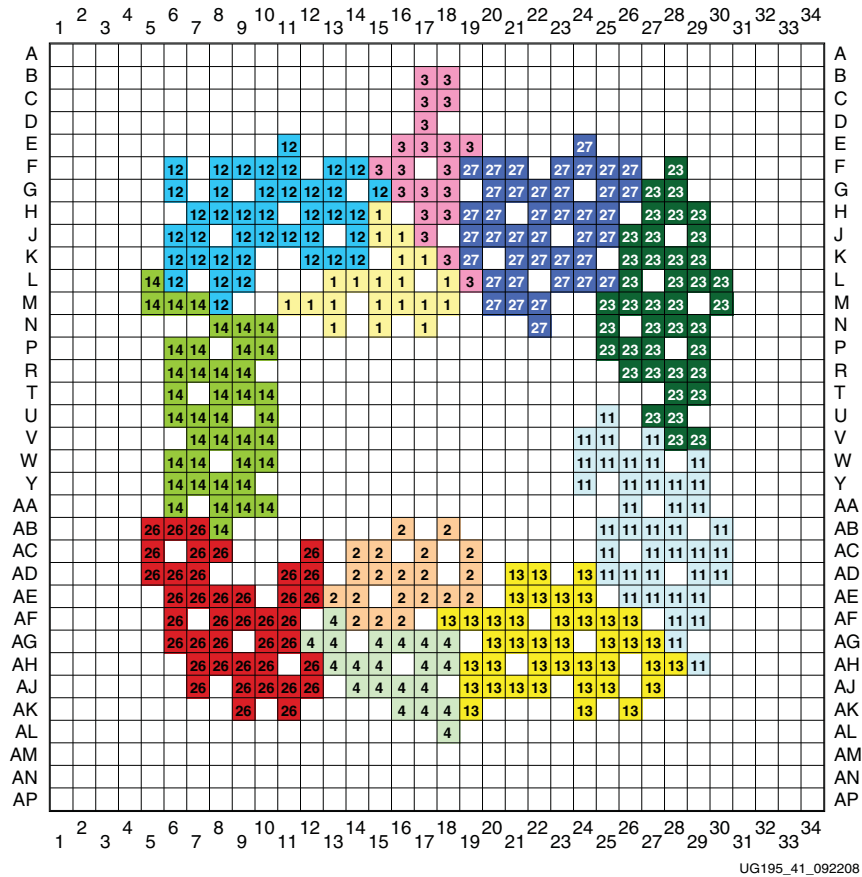
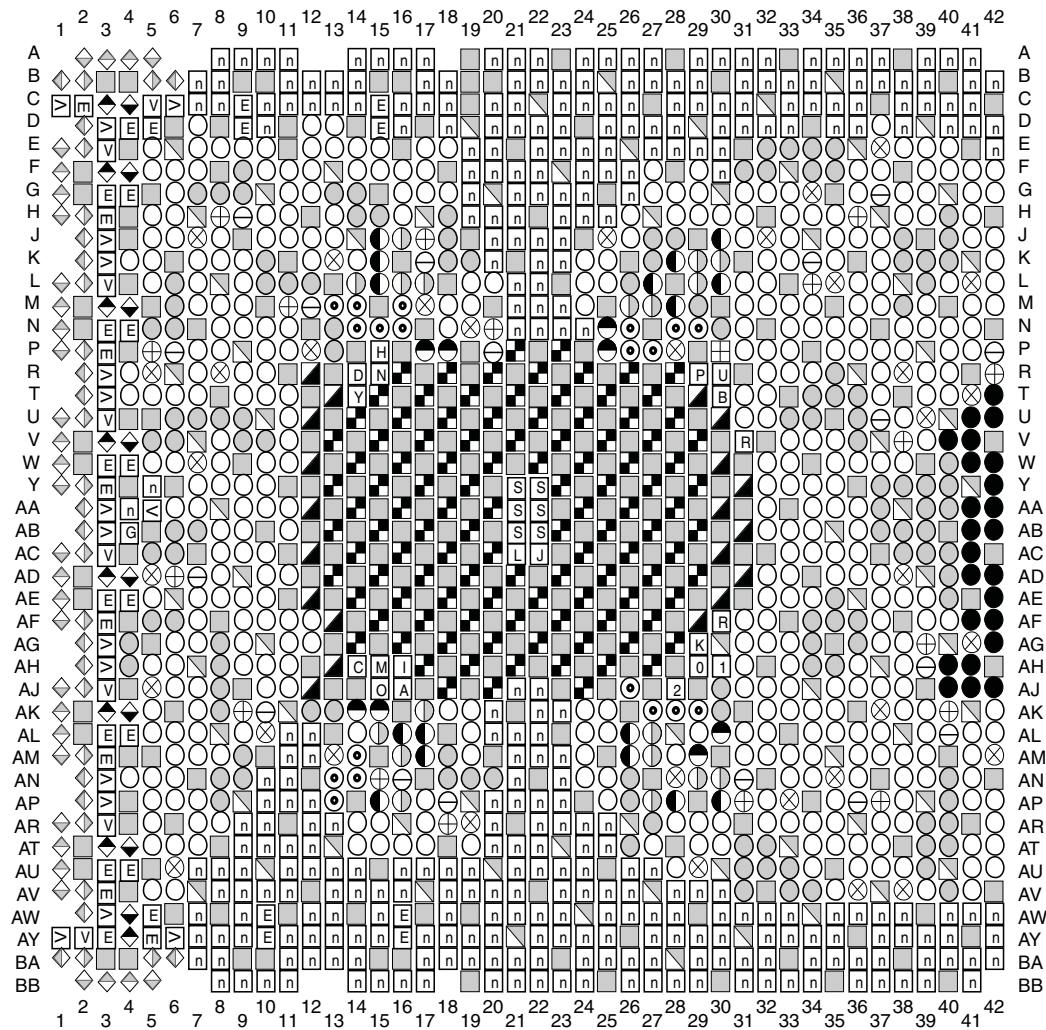


Figure 3-20: FF1156 Package—TX150T SelectIO Bank Diagram

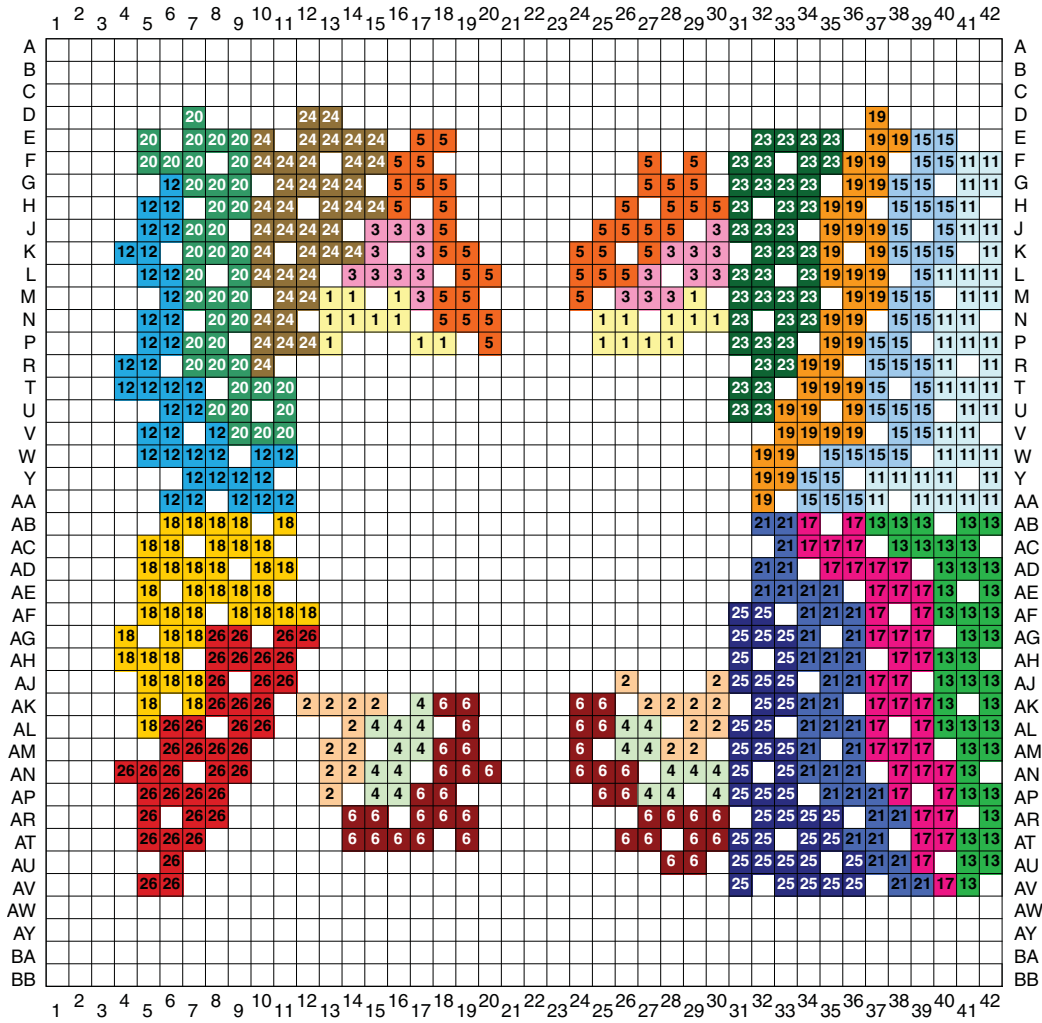
FF1738 Package—FX100T, LX110T, LX155T, and LX220T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | Ⓟ PROGRAM_B | □ GND | Ⓜ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | Ⓛ CS_B | Ⓛ RDWR_B | Ⓛ RSVD | Ⓜ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | Ⓛ D_IN | Ⓛ TCK | Ⓛ VBATT | Ⓜ MGTAVTTRX | ◇ MGTTXN |
| | Ⓛ P_GC | Ⓛ DONE | Ⓛ TDI | Ⓛ VCCAUX | Ⓜ MGTAVTTRXC | ◇ MGTTXP |
| | Ⓛ N_GC | Ⓛ D_OUT_BUSY | Ⓛ TDO | Ⓛ VCCINT | Ⓜ MGTAVTTTX | |
| | ○ CC | Ⓛ HSWAPEN | Ⓛ TMS | Ⓛ VCCO | ◇ MGTREFCLKP | |
| | ⊙ D0 - D31 | Ⓛ INIT | Ⓛ DXP | Ⓛ NC | ◇ MGTREFCLKN | |
| | ⊙ A0 - A25 | Ⓛ M2, M1, M0 | Ⓛ DXN | Ⓛ FLOAT | Ⓛ MGTREF | |
| | ● SM | Ⓛ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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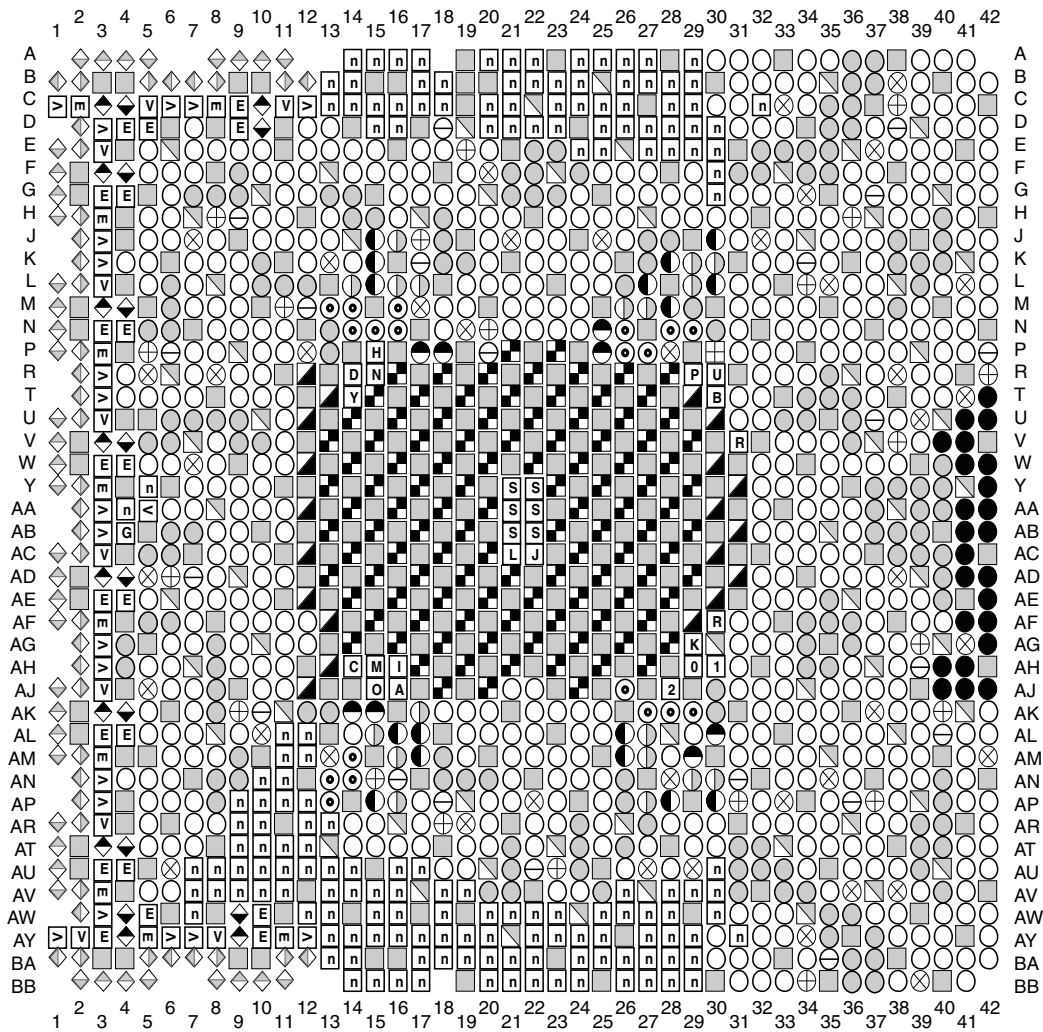
Figure 3-21: FF1738 Package—FX100T, LX110T, LX155T, and LX220T Pinout Diagram



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Figure 3-22: FF1738 Package—FX100T, LX110T, LX155T, and LX220T SelectIO Bank Diagram

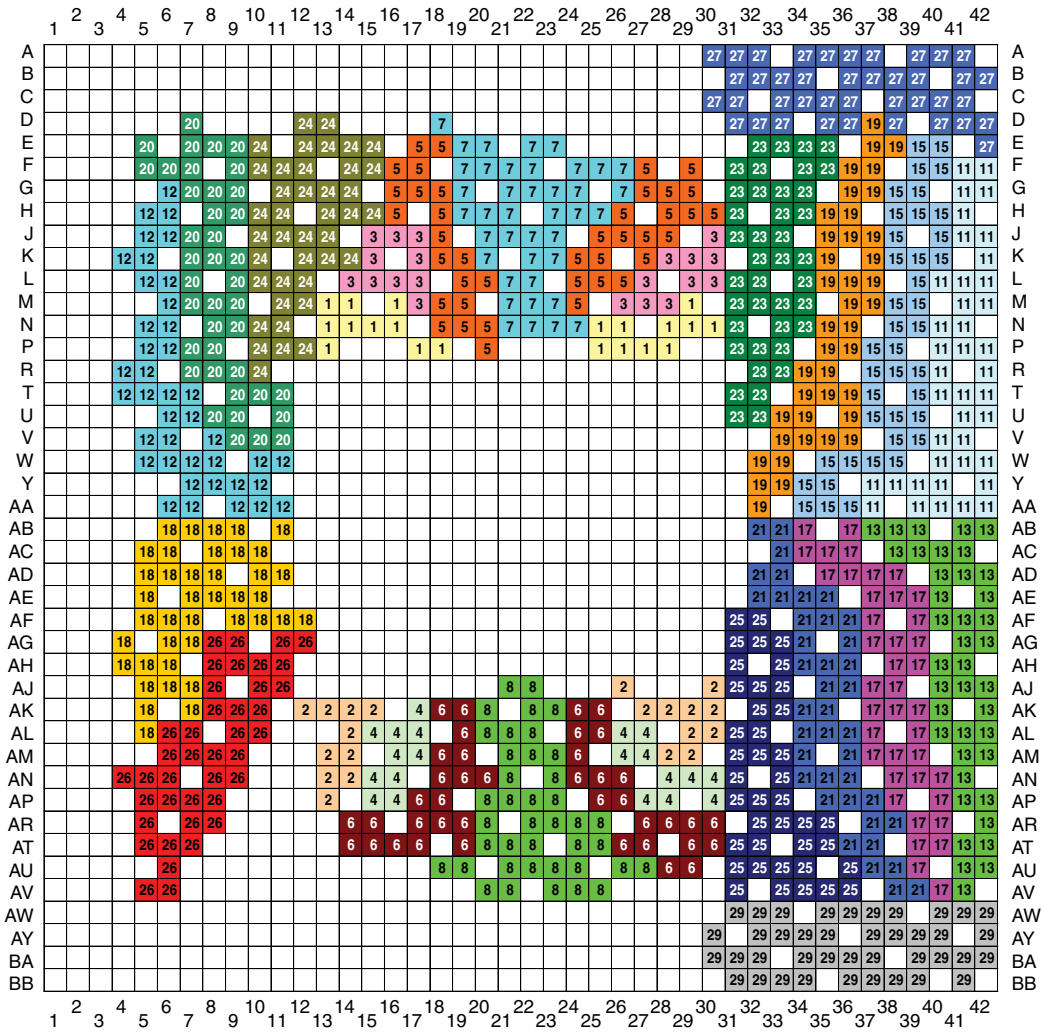
FF1738 Package—FX130T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | ⓑ PROGRAM_B | □ GND | ⓓ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | ⓑ CS_B | ⓓ RDWR_B | ⓓ RSVD | ⓔ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | ⓓ D_IN | ⓓ TCK | ⓔ VBATT | ⓕ MGTAVTTRX | ◇ MGTTXN |
| | ⓓ P_GC | ⓓ DONE | ⓓ TDI | ⓕ VCCAUX | ⓖ MGTAVTTRXC | ◇ MGTTXP |
| | ● N_GC | ⓓ D_OUT_BUSY | ⓓ TDO | ⓖ VCCINT | ⓖ MGTAVTTTX | |
| | ○ CC | ⓓ HSWAPEN | ⓓ TMS | ⓖ VCCO | ◇ MGTREFCLKP | |
| | ⊙ D0 - D31 | ⓓ INIT | ⓓ DXP | ⓖ NC | ◇ MGTREFCLKN | |
| | ● A0 - A25 | ⓓ M2, M1, M0 | ⓓ DXN | ⓖ FLOAT | ⓖ MGTREF | |
| | ● SM | ⓓ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

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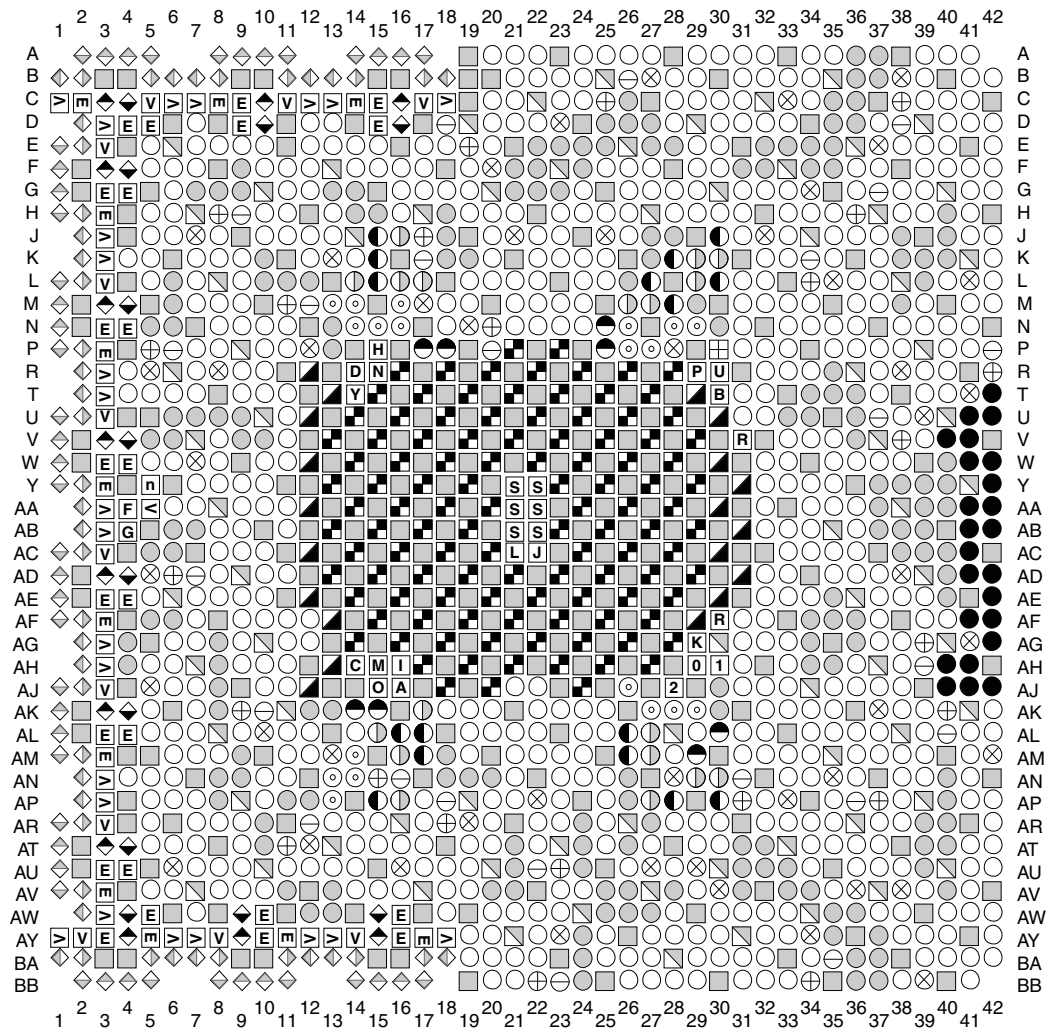
Figure 3-23: FF1738 Package—FX130T Pinout Diagram



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Figure 3-24: FF1738 Package—FX130T SelectIO Bank Diagram

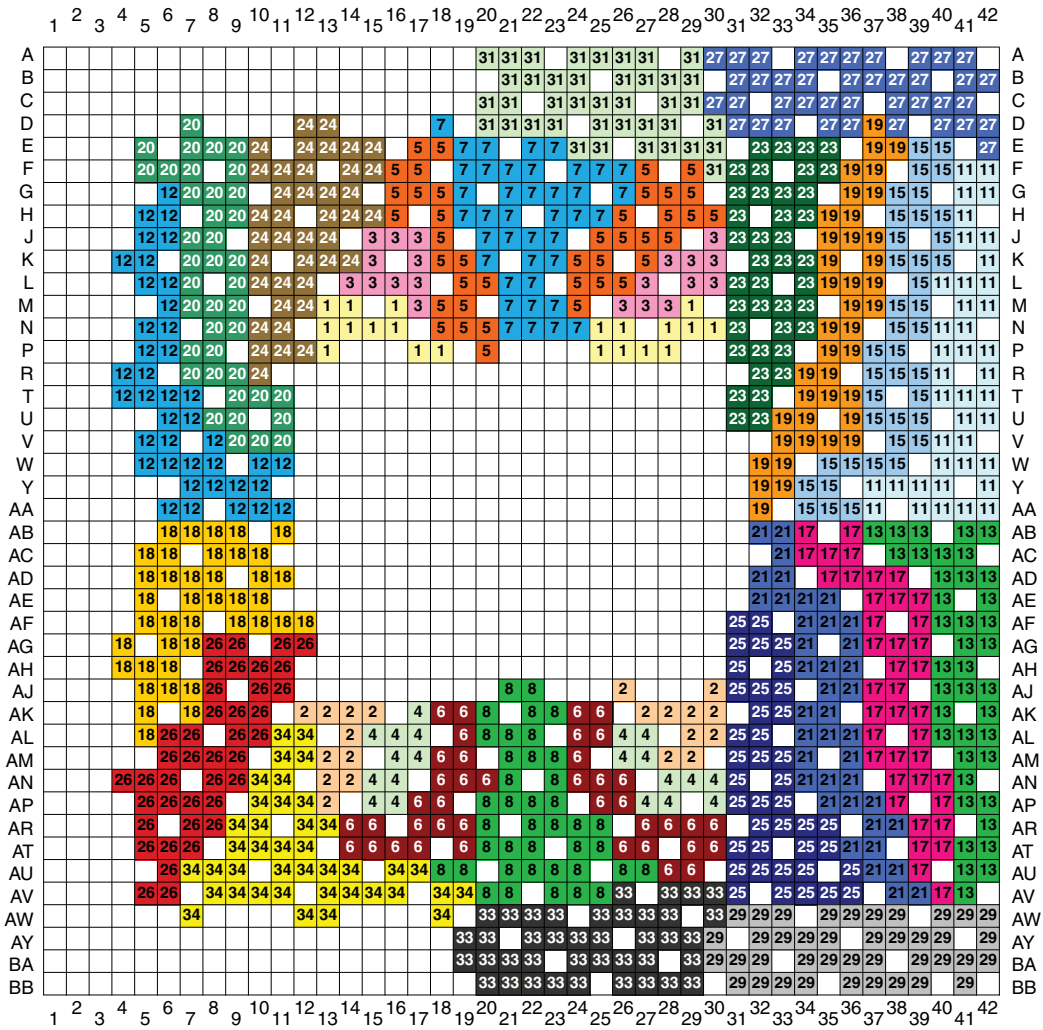
FF1738 Package—FX200T, SX240T, and LX330T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | ⓑ PROGRAM_B | Ⓜ GND | Ⓨ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | ⓑ CS_B | ⓓ RDWR_B | Ⓡ RSVD | Ⓩ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | Ⓝ D_IN | Ⓧ TCK | Ⓢ VBATT | ⓐ MGTAVTTRX | ◇ MGTTXN |
| | ⓐ P_GC | ⓓ DONE | Ⓨ TDI | Ⓣ VCCAUX | ⓑ MGTAVTTRXC | ◇ MGTTXP |
| | ⓑ N_GC | Ⓛ D_OUT_BUSY | Ⓩ TDO | Ⓤ VCCINT | Ⓝ MGTAVTTTX | |
| | ○ CC | Ⓢ HSWAPEN | Ⓜ TMS | Ⓨ VCCO | ◇ MGTREFCLKP | |
| | ⓐ D0 - D31 | Ⓨ INIT | Ⓤ DXP | Ⓨ NC | ◇ MGTREFCLKN | |
| | ⓑ A0 - A25 | Ⓣ M2, M1, M0 | Ⓦ DXN | Ⓨ FLOAT | ⓐ MGTREF | |
| | ● SM | Ⓨ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

ug195_c3_19_080707

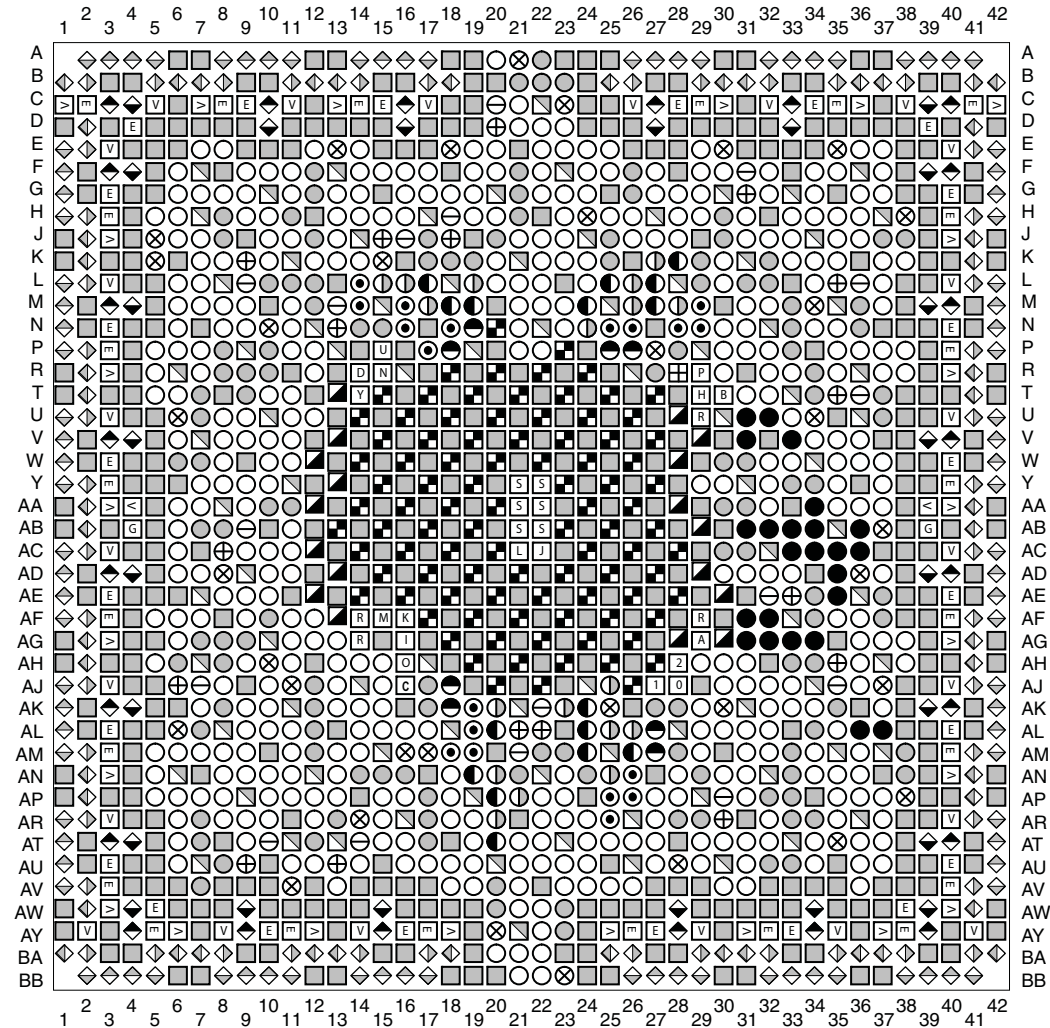
Figure 3-25: FF1738 Package—FX200T, SX240T, and LX330T Pinout Diagram



ug195_c3_20_121707

Figure 3-26: FF1738 Package—FX200T, SX240T, and LX330T SelectIO Bank Diagram

FF1759 Package—TX150T and TX240T



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins | | |
|---------------|---------------------|--|-------------|------------|--------------|----------|
| ○ IO_LXXY_# | ⊗ VREF | ⊞ CCLK | ⊞ PROGRAM_B | ▢ GND | ⊞ MGTAVCC | ◇ MGTRXP |
| | ⊕ VRN | ⊞ CS_B | ⊞ RDWR_B | ⊞ RSVD | ⊞ MGTAVCCPLL | ◇ MGTRXN |
| | ⊖ VRP | ⊞ D_IN | ⊞ TCK | ⊞ VBATT | ⊞ MGTAVTTRX | ◇ MGTTXN |
| | ⊕ P_GC | ⊞ DONE | ⊞ TDI | ▣ VCCAUX | ⊞ MGTAVTTRXC | ◇ MGTTXP |
| | ● N_GC | ⊞ D_OUT_BUSY | ⊞ TDO | ▣ VCCINT | ⊞ MGTAVTTTX | |
| | ● CC | ⊞ HSWAPEN | ⊞ TMS | ▣ VCCO | ◇ MGTREFCLKP | |
| | ● D0 - D31 | ⊞ INIT | ⊞ DXP | ▢ NC | ◇ MGTREFCLKN | |
| | ● A0 - A25 | ⊞ M2, M1, M0 | ⊞ DXN | ▢ FLOAT | ⊞ MGTTRREF | |
| | ● SM | ⊞ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | | | |

ug195_c3_42_092208

Figure 3-27: FF1759 Package—TX150T and TX240T Pinout Diagram

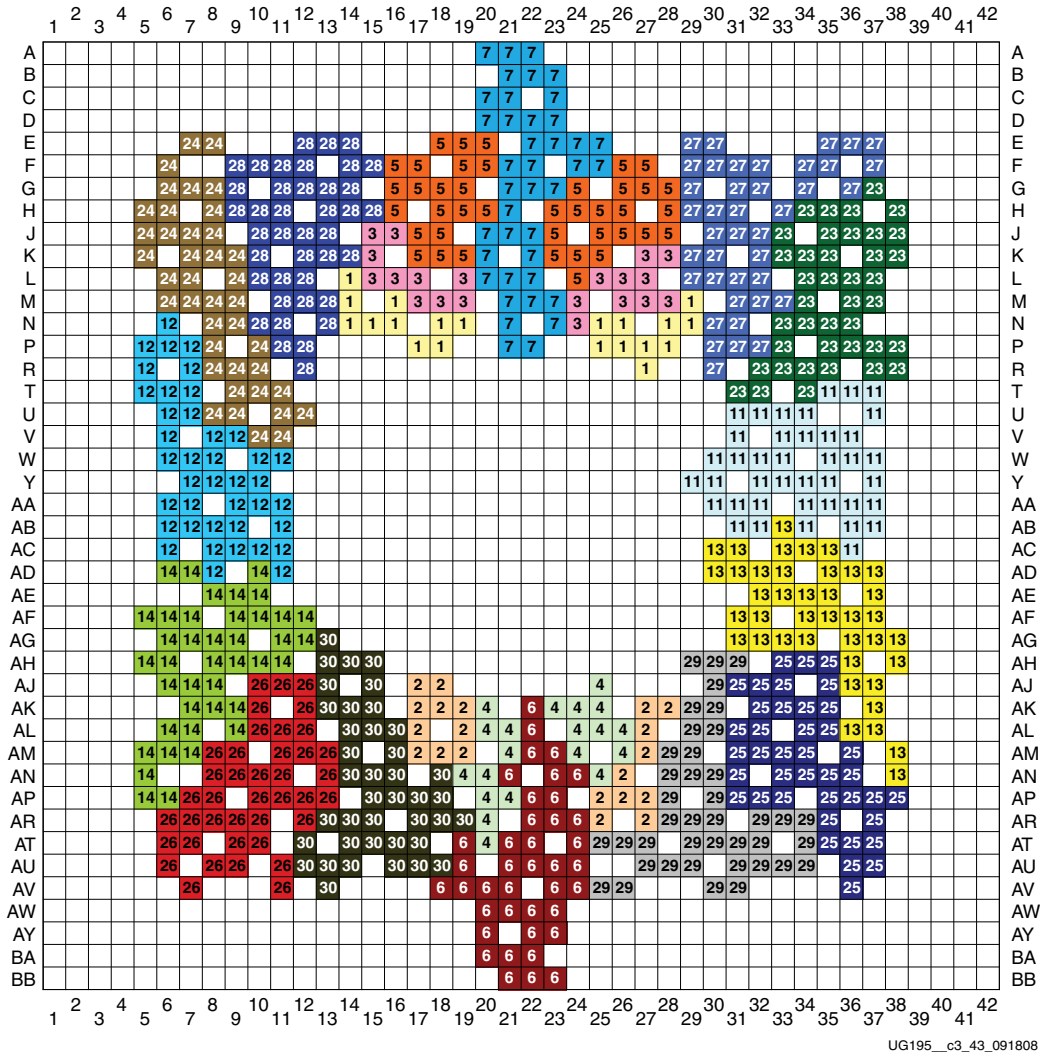
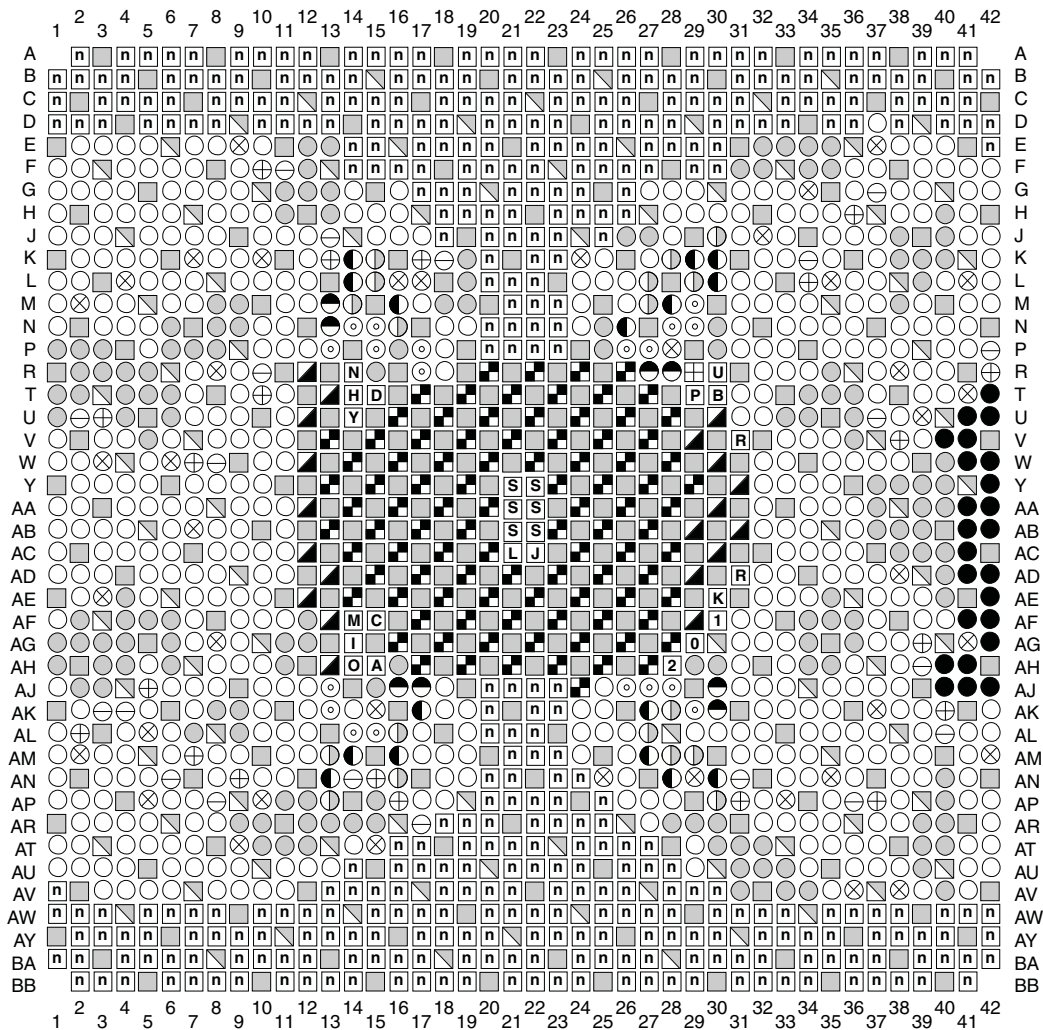


Figure 3-28: FF1759 Package—TX150T and TX240T SelectIO Bank Diagram

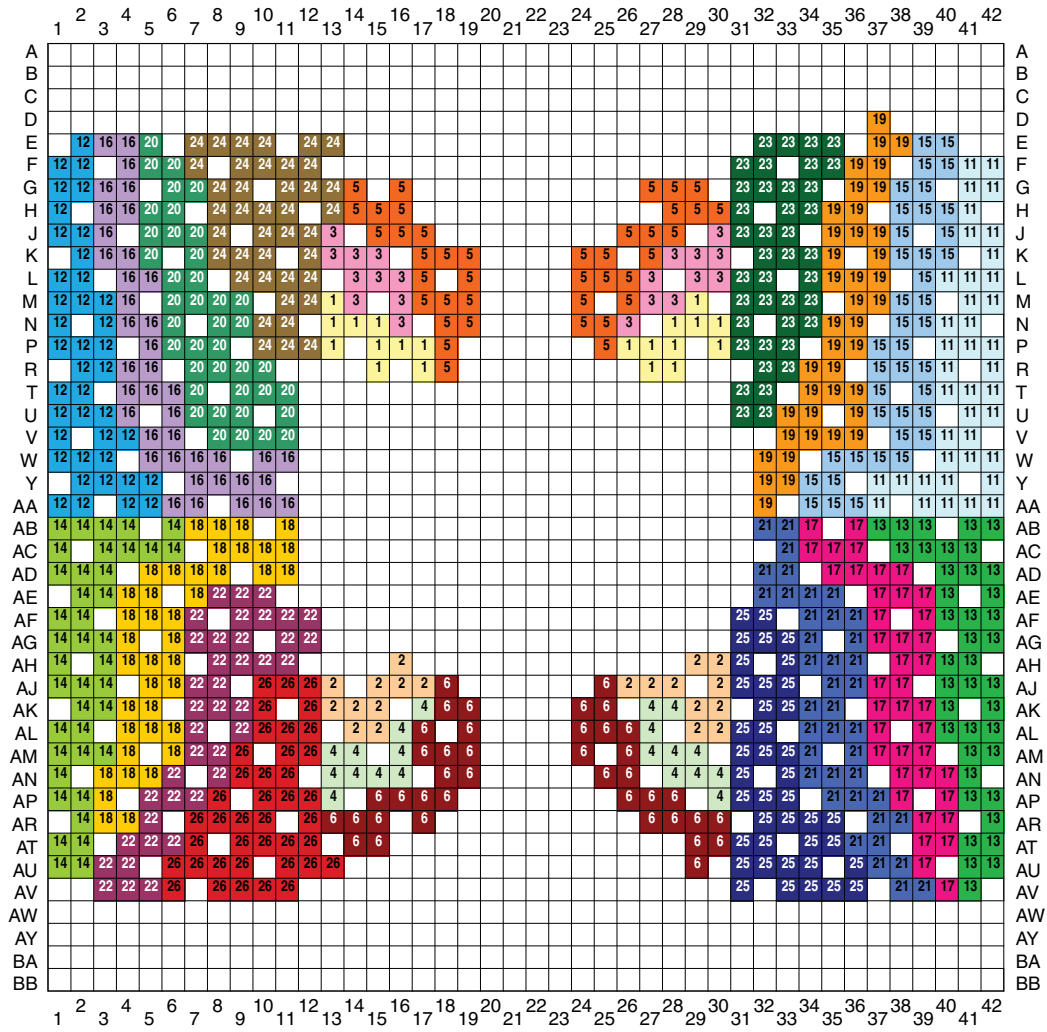
FF1760 Package—LX110, LX155, and LX220



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|---|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | Ⓟ PROGRAM_B | ■ GND |
| | ⊕ VRN | ⓑ CS_B | Ⓡ RDWR_B | Ⓡ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⊕ VBATT |
| | Ⓢ P_GC | ⓓ DONE | Ⓛ TDI | ▣ VCCAUX |
| | ● N_GC | ⓐ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ○ CC | ⓗ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⦿ D0 - D31 | Ⓨ INIT | Ⓜ DXP | Ⓝ NO CONNECT |
| | ◐ A0 - A25 | ②①① M2, M1, M0 | Ⓛ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

ug195_c3_21_080707

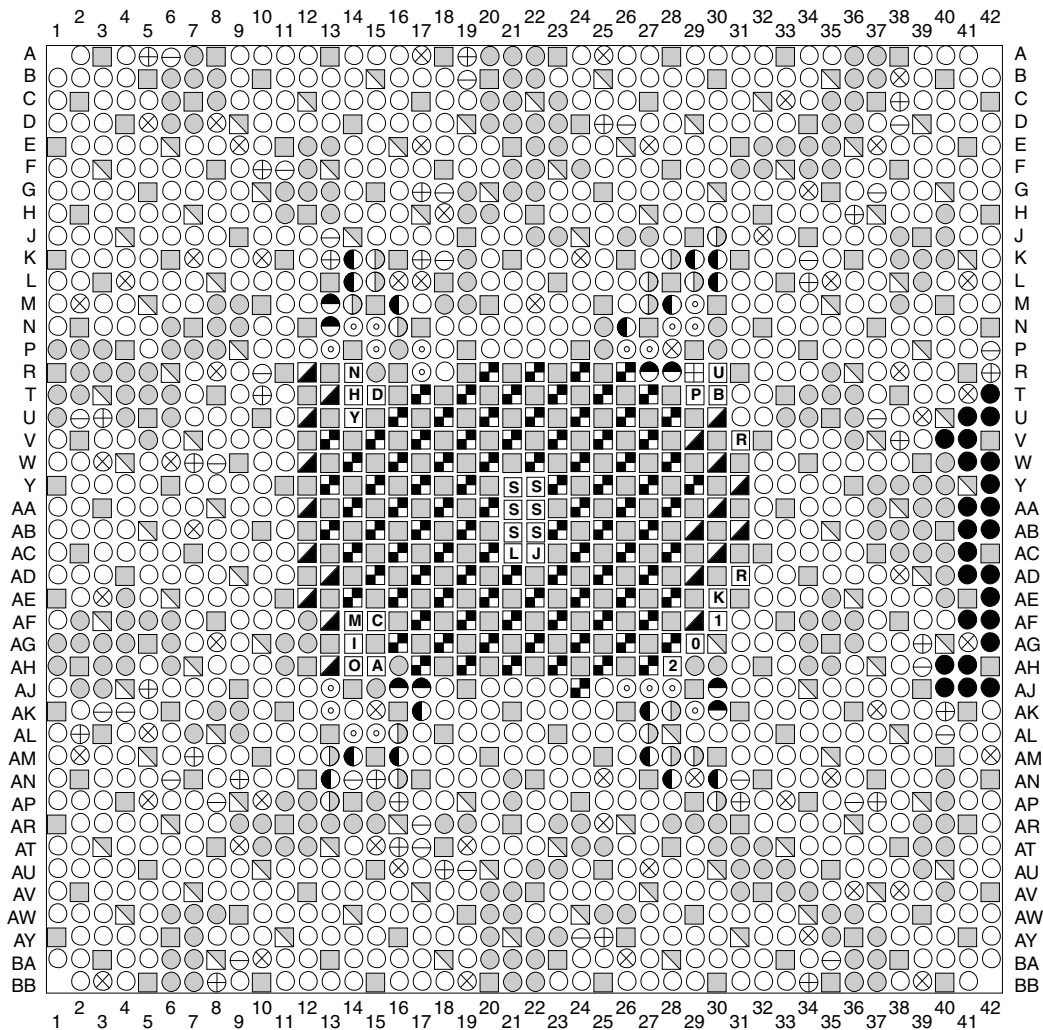
Figure 3-29: FF1760 Package—LX110, LX155, and LX220 Pinout Diagram



ug195_c3_22_031507

Figure 3-30: FF1760 Package—LX110, LX155, and LX220 SelectIO Bank Diagram

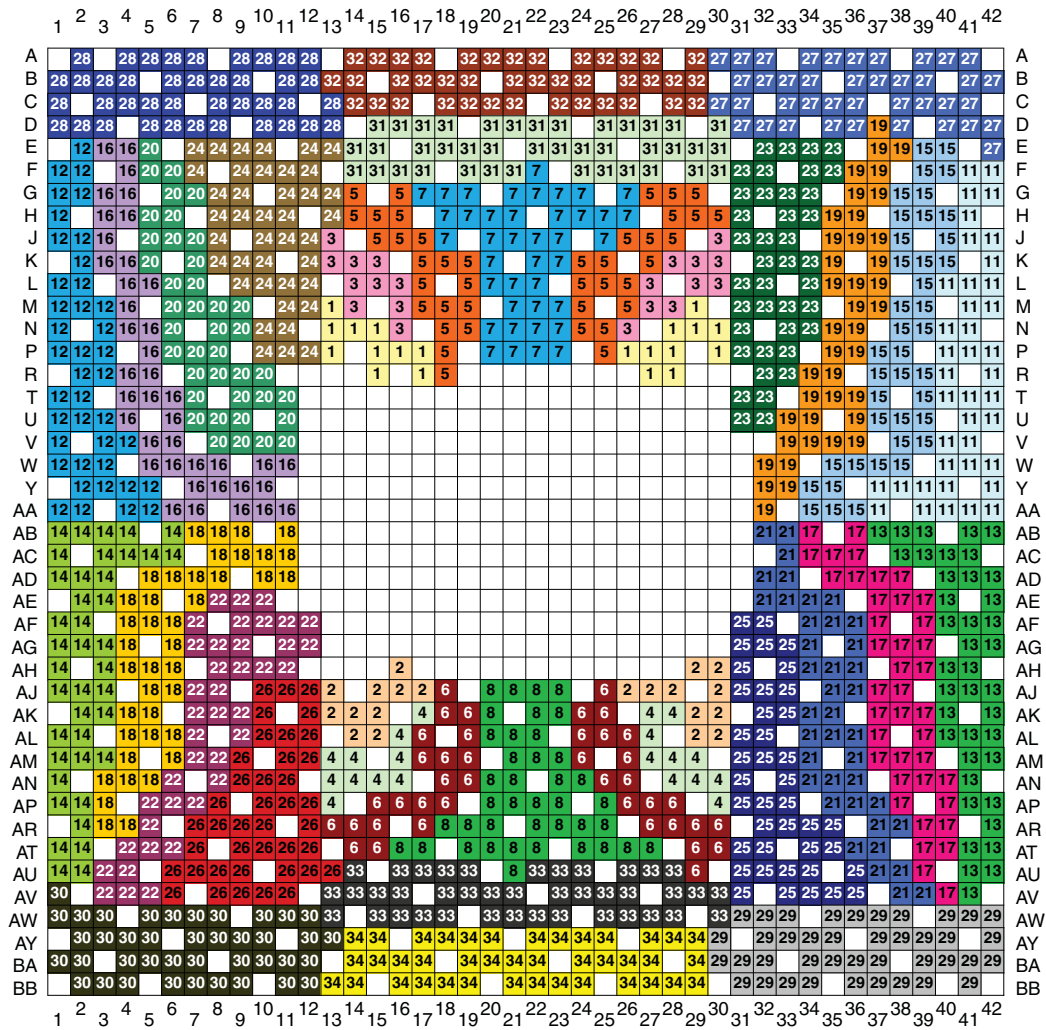
FF1760 Package—LX330



| User I/O Pins | Multi-Function Pins | Dedicated Pins | | Other Pins |
|---------------|---------------------|---|-------------|--------------|
| ○ IO_LXXY_# | ⊗ VREF | ⓐ CCLK | Ⓟ PROGRAM_B | ■ GND |
| | ⊕ VRN | ⓑ CS_B | Ⓢ RDWR_B | Ⓡ RSVD |
| | ⊖ VRP | Ⓝ D_IN | Ⓚ TCK | ⊞ VBATT |
| | Ⓢ P_GC | ⓓ DONE | Ⓛ TDI | ▣ VCCAUX |
| | ● N_GC | ⓐ D_OUT_BUSY | Ⓞ TDO | ▣ VCCINT |
| | ○ CC | ⓗ HSWAPEN | Ⓜ TMS | ▤ VCCO |
| | ⦿ D0 - D31 | Ⓨ INIT | Ⓜ DXP | Ⓝ NO CONNECT |
| | ◐ A0 - A25 | ②①① M2, M1, M0 | Ⓛ DXN | |
| | ● SM | Ⓢ AVDD_0, AVSS_0, VP_0, VN_0, VREFP_0, VREFN_0 | | |

ug195_c3_23_080707

Figure 3-31: FF1760 Package—LX330 Pinout Diagram



ug195_c3_24_121707

Figure 3-32: FF1760 Package—LX330 SelectIO Bank Diagram

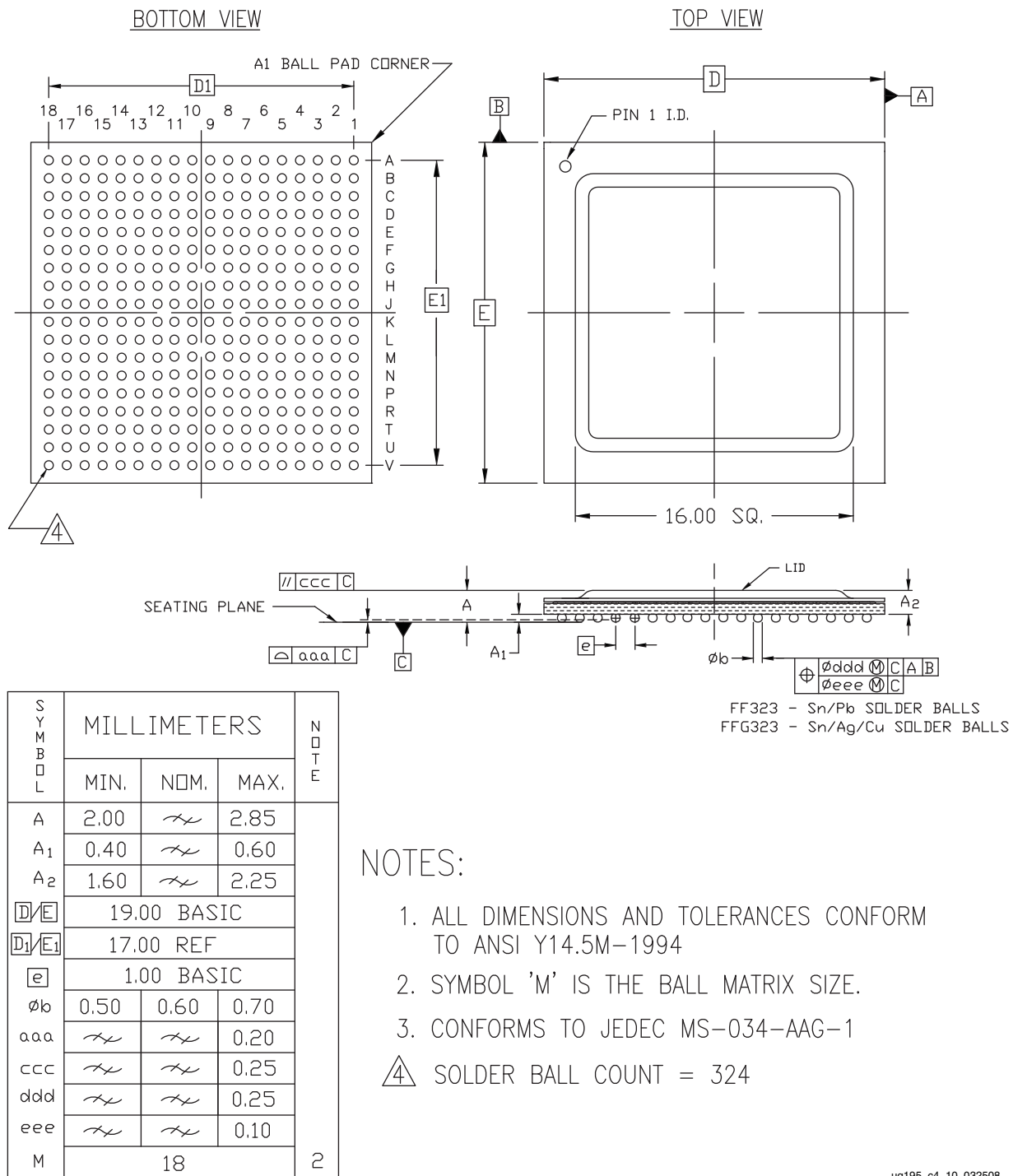
Mechanical Drawings

Summary

This chapter provides mechanical drawings of the following Virtex®-5 packages:

- “FF323 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 392
- “FF324 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 393
- “FF665 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 394
- “FF676 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 395
- “FF1136 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 396
- “FF1153 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 397
- “FF1156 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 398
- “FF1738 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 399
- “FF1759 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 400
- “FF1760 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch),” page 401

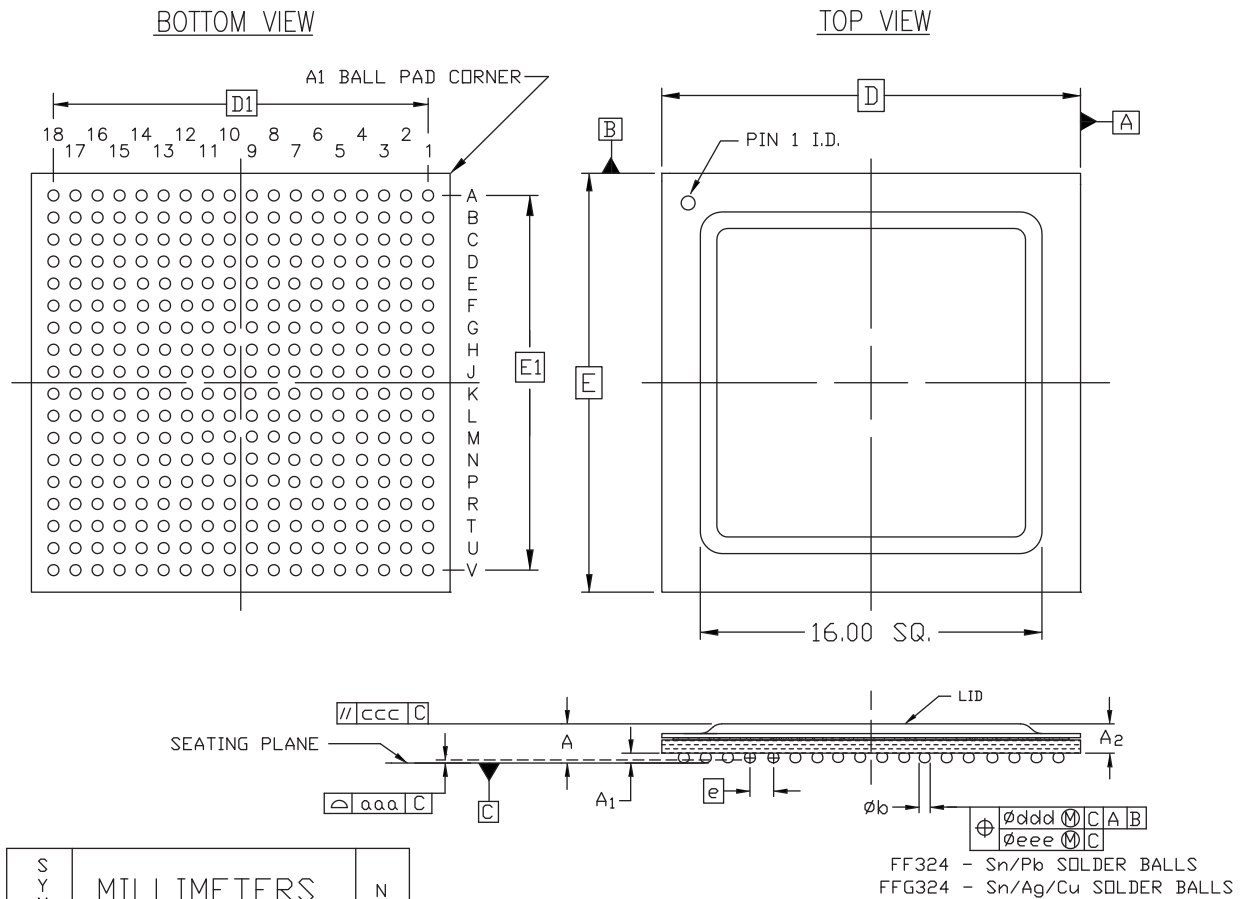
FF323 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



ug195_c4_10_032508

Figure 4-1: FF323 Flip-Chip Fine-Pitch BGA Package Specifications

FF324 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



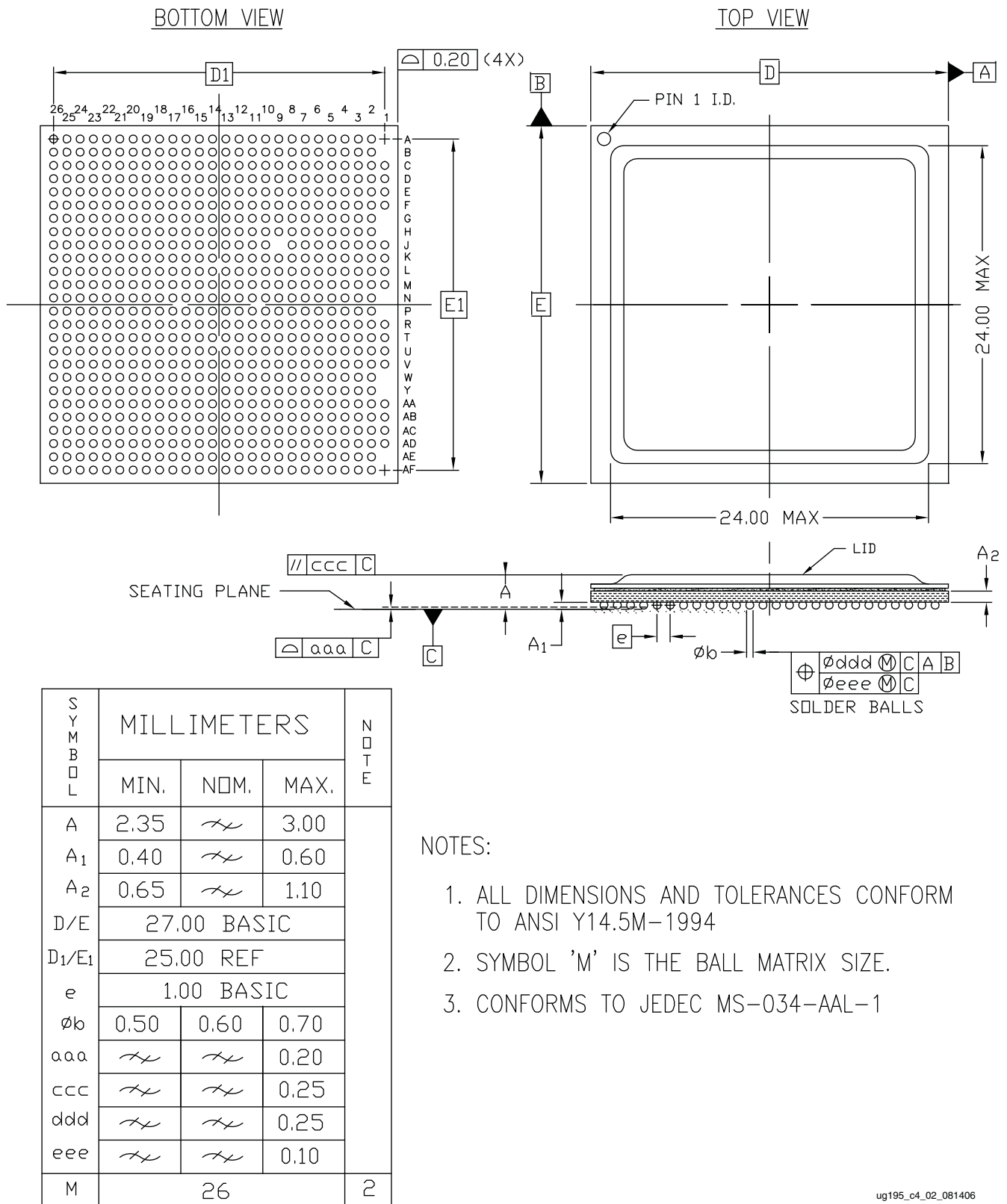
NOTES:

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1994
2. SYMBOL 'M' IS THE BALL MATRIX SIZE.
3. CONFORMS TO JEDEC MS-034-AAG-1

ug195_c4_01_032508

Figure 4-2: FF324 Flip-Chip Fine-Pitch BGA Package Specifications

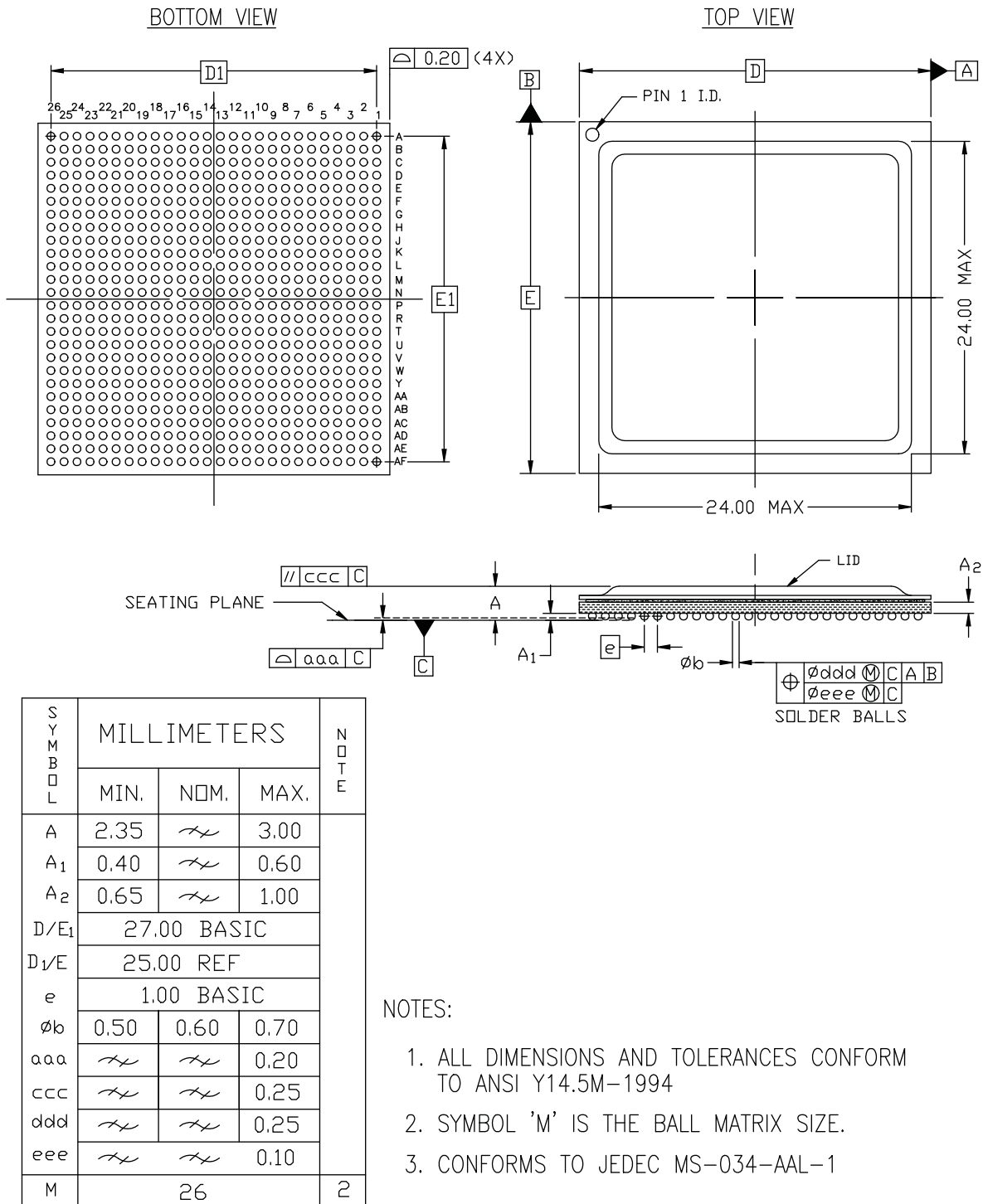
FF665 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



ug195_c4_02_081406

Figure 4-3: FF665 Flip-Chip Fine-Pitch BGA Package Specifications

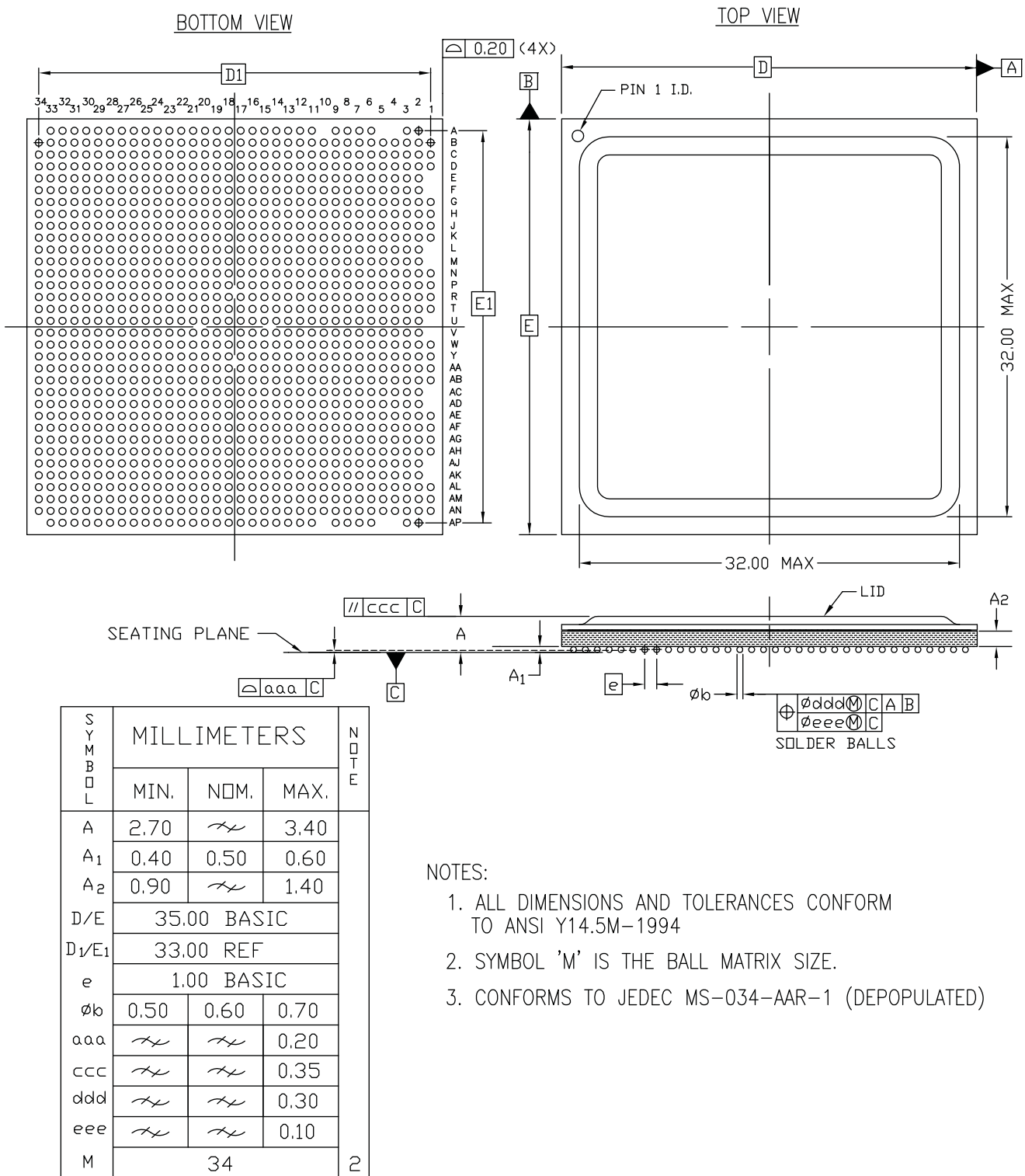
FF676 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



ug195_c4_03_081406

Figure 4-4: FF676 Flip-Chip Fine-Pitch BGA Package Specifications

FF1136 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)

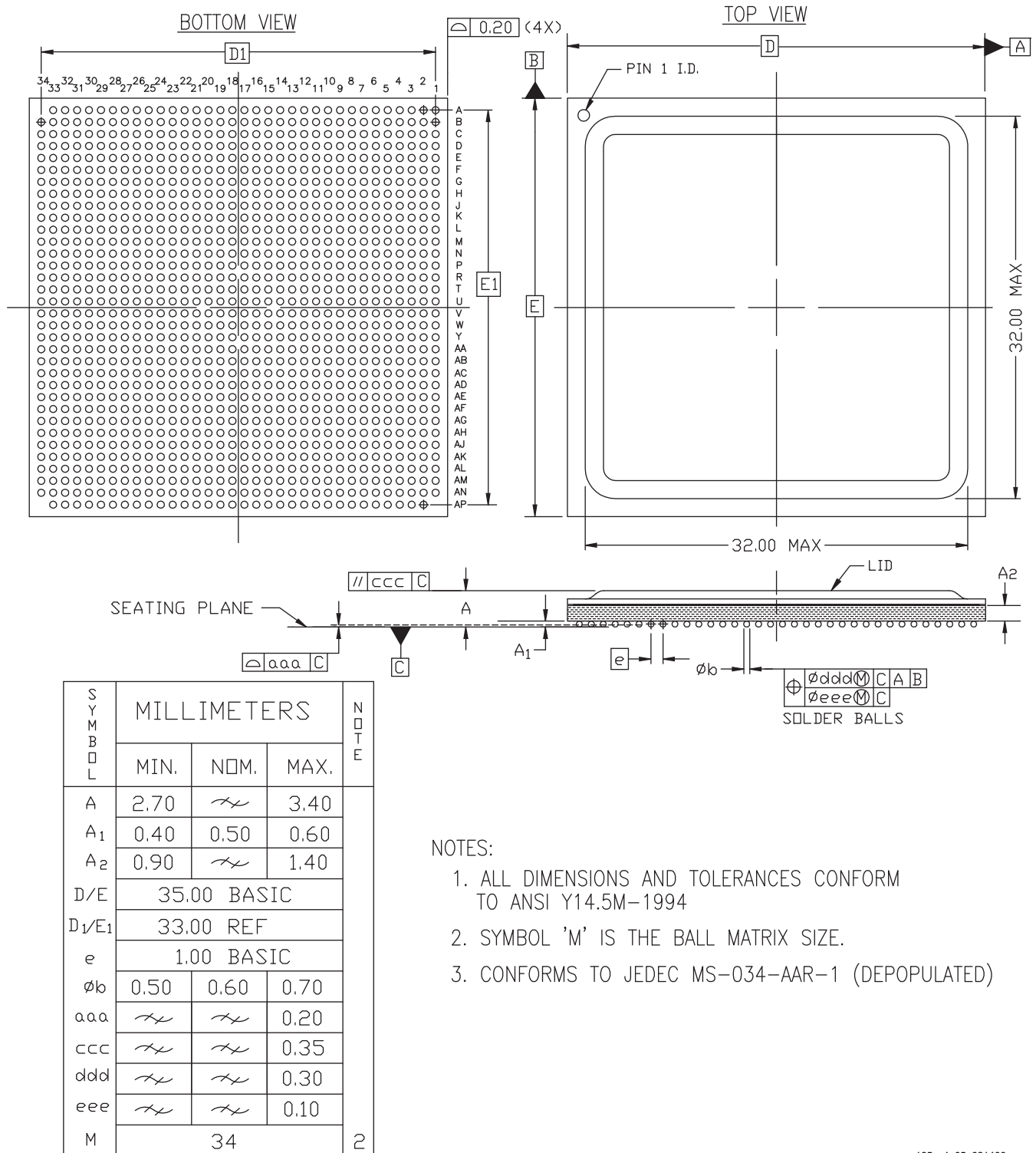


- NOTES:
1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ANSI Y14.5M-1994
 2. SYMBOL 'M' IS THE BALL MATRIX SIZE.
 3. CONFORMS TO JEDEC MS-034-AAR-1 (DEPOPULATED)

ug195_c4_04_081406

Figure 4-5: FF1136 Flip-Chip Fine-Pitch BGA Package Specifications

FF1153 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



ug195_c4_05_081406

Figure 4-6: FF1153 Flip-Chip Fine-Pitch BGA Package Specifications

FF1156 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)

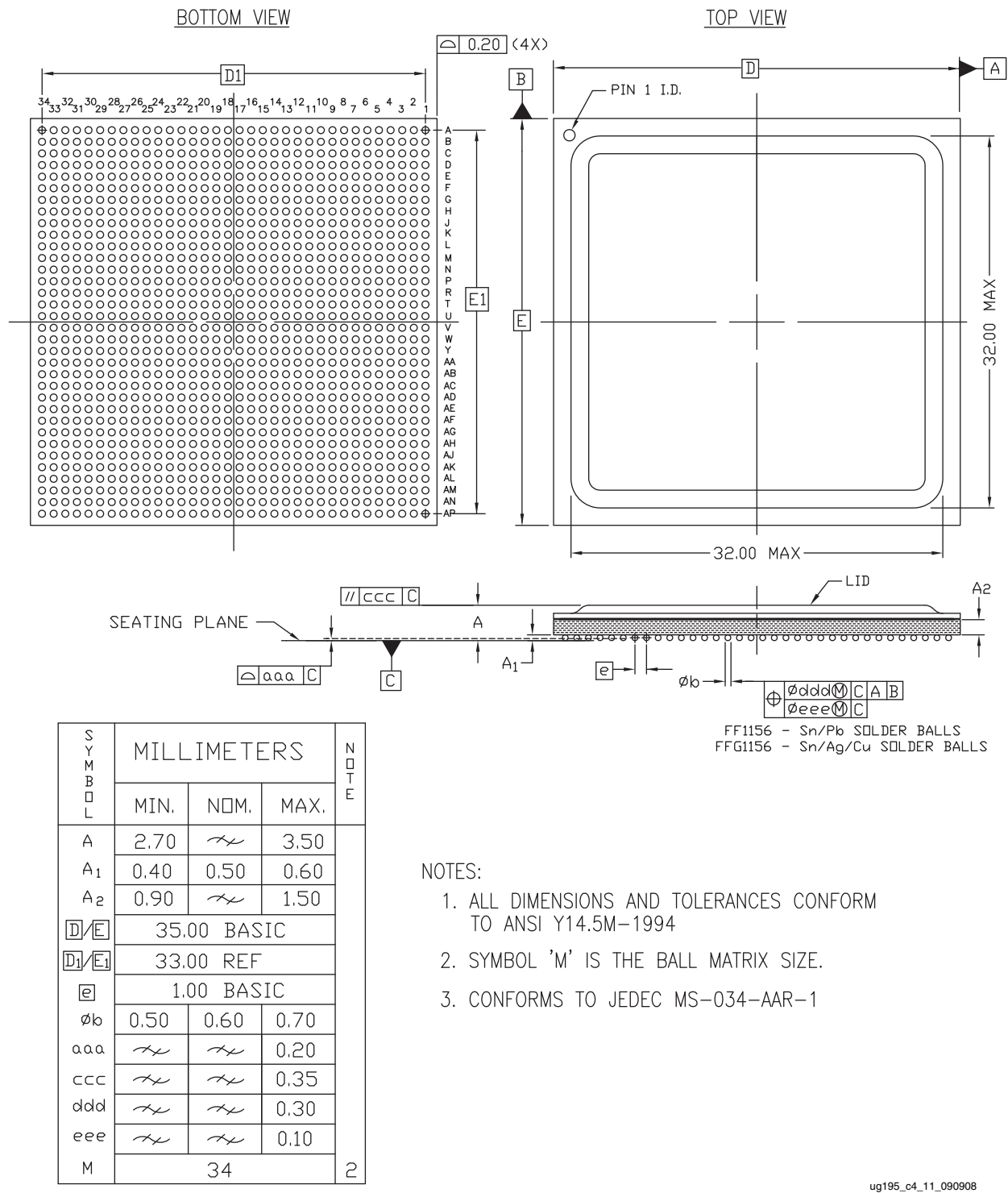
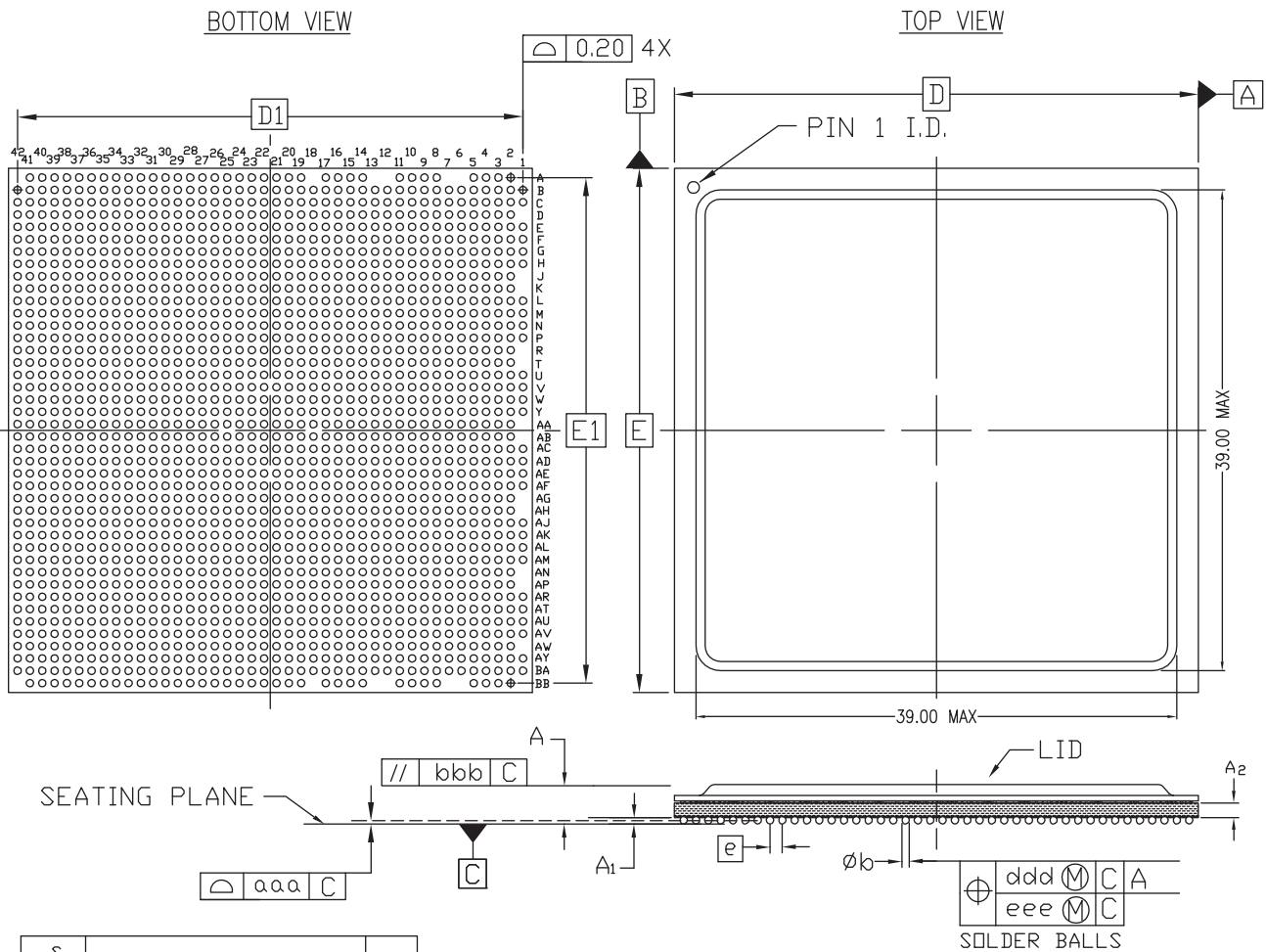


Figure 4-7: FF1156 Flip-Chip Fine-Pitch BGA Package Specifications

ug195_c4_11_090908

FF1738 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



| SYMBOL | MILLIMETERS | | | NOTE |
|--------------------------------|-------------|-----------|------|------|
| | MIN. | NOM. | MAX. | |
| A | 2.70 | \approx | 3.50 | 2 |
| A ₁ | 0.40 | 0.50 | 0.60 | |
| A ₂ | 1.00 | \approx | 1.40 | |
| D/E | 42.50 BASIC | | | |
| D ₁ /E ₁ | 41.00 REF | | | |
| e | 1.00 BASIC | | | |
| phi b | 0.50 | 0.60 | 0.70 | |
| aaa | \approx | \approx | 0.20 | |
| bbb | \approx | \approx | 0.25 | |
| ddd | \approx | \approx | 0.25 | |
| eee | \approx | \approx | 0.10 | |
| M | 42 | | | |

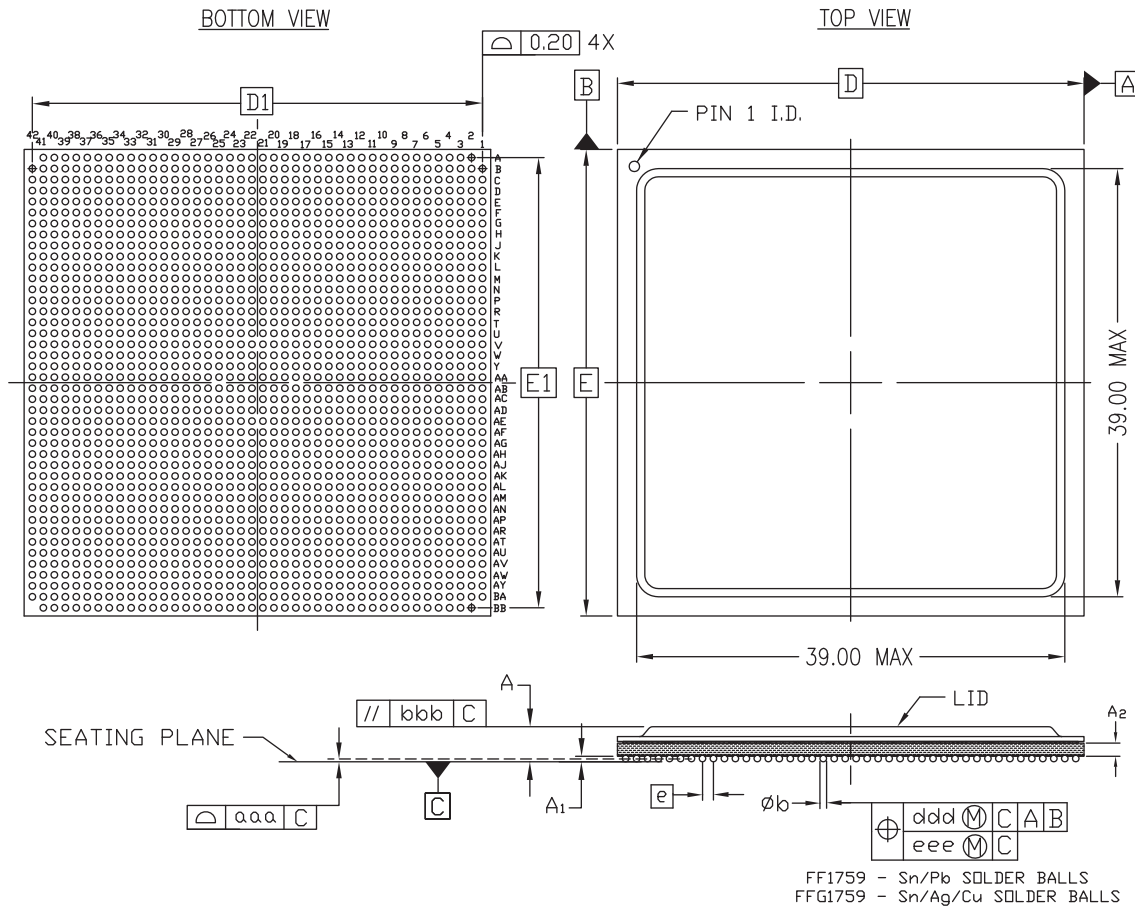
NOTES:

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ASME Y14.5M-1994
2. SYMBOL "M" IS THE PIN MATRIX SIZE.
3. CONFORMS TO JEDEC MS-034-AAV-1 (DEPOPULATED)

ug195_c4_06_081406

Figure 4-8: FF1738 Flip-Chip Fine-Pitch BGA Package Specifications

FF1759 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)



| SYMBOL | MILLIMETERS | | | NOTE |
|-------------------|-------------|----------|------|------|
| | MIN. | NOM. | MAX. | |
| A | 2.80 | <i>~</i> | 3.50 | 4 |
| A ₁ | 0.40 | 0.50 | 0.60 | |
| A ₂ | 1.10 | <i>~</i> | 1.50 | |
| $\frac{D}{E}$ | 42.50 BASIC | | | |
| $\frac{D_1}{E_1}$ | 41.00 REF | | | 2 |
| $\frac{e}{e}$ | 1.00 BASIC | | | |
| ϕb | 0.50 | 0.60 | 0.70 | |
| aaa | <i>~</i> | <i>~</i> | 0.20 | |
| bbb | <i>~</i> | <i>~</i> | 0.25 | |
| ddd | <i>~</i> | <i>~</i> | 0.25 | |
| eee | <i>~</i> | <i>~</i> | 0.10 | |
| M | 42 | | | |

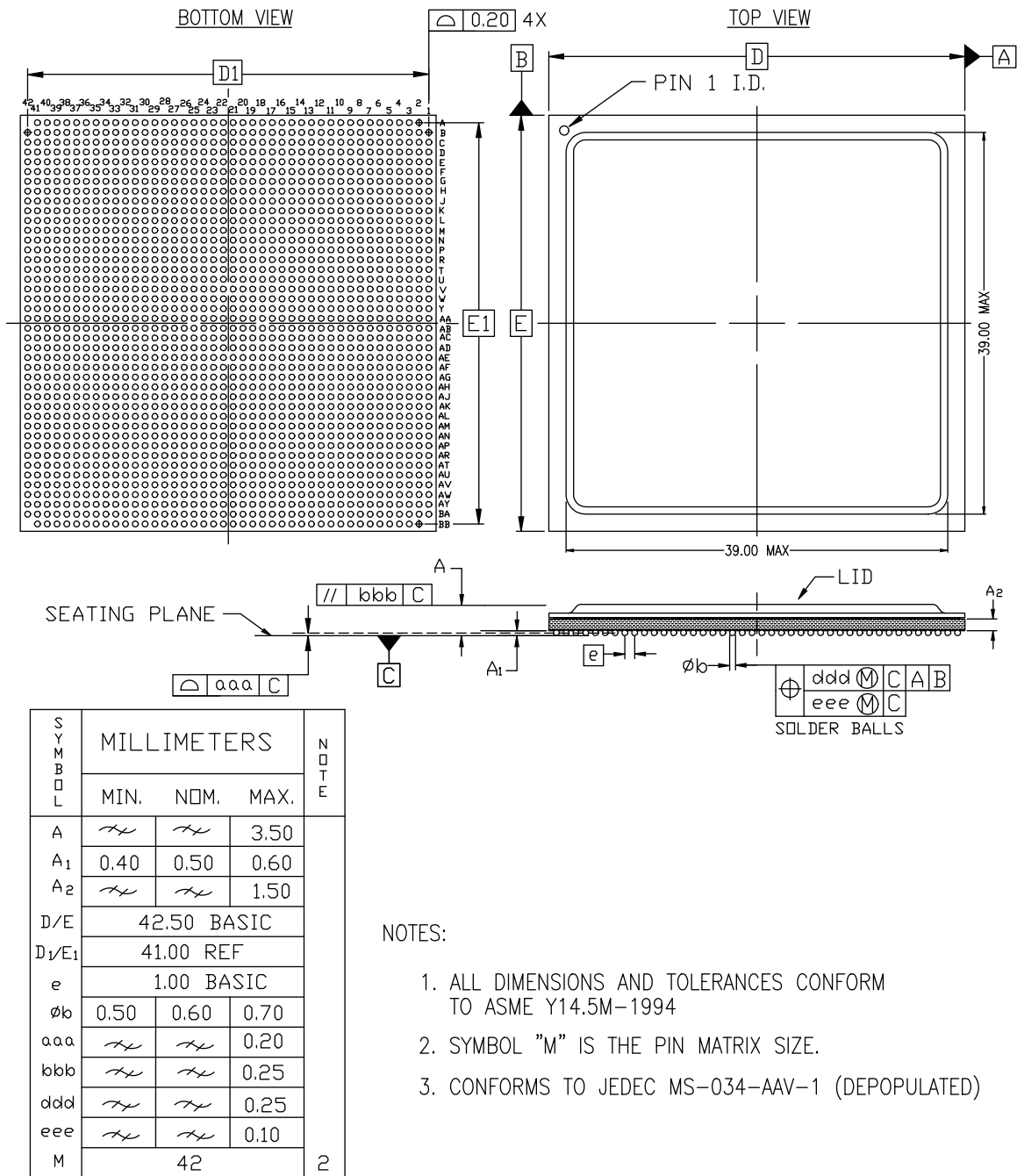
NOTES:

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ASME Y14.5M-1994
2. SYMBOL "M" IS THE PIN MATRIX SIZE.
3. CONFORMS TO JEDEC MS-034-AAV-1 (DEPOPULATED)
4. ACTUAL SOLDER BALL COUNT = 1760

ug195_c4_11_090908

Figure 4-9: FF1759 Flip-Chip Fine-Pitch BGA Package Specification

FF1760 Flip-Chip Fine-Pitch BGA Package Specifications (1.00 mm Pitch)

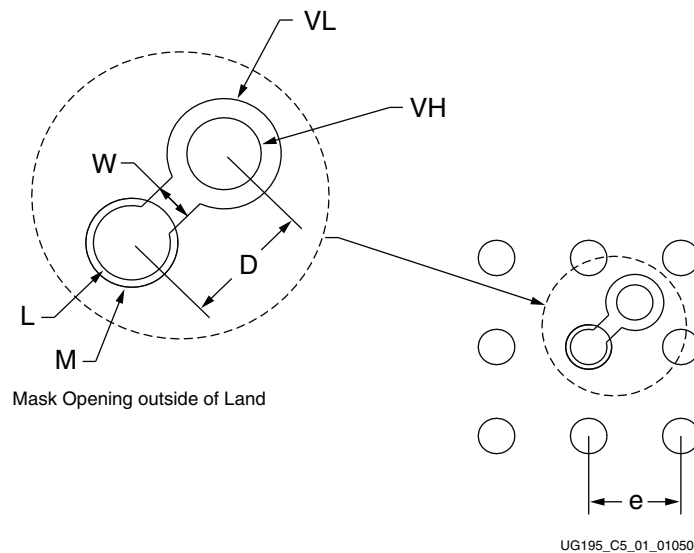


ug195_c4_07_081406

Figure 4-10: FF1760 Flip-Chip Fine-Pitch BGA Package Specification

Recommended PCB Design Rules for BGA Packages

Xilinx provides the diameter of a land pad on the component side. This information is required prior to the start of the board layout so the board pads can be designed to match the component-side land geometry. The typical values of these land pads are described in [Figure 5-1](#) and summarized in [Table 5-1](#). For Xilinx® BGA packages, Non-Solder Mask Defined (NSMD) pads on the board are suggested to allow a clearance between the land metal (diameter L) and the solder mask opening (diameter M) as shown in [Figure 5-1](#). The space between the NSMD pad and the solder mask as well as the actual signal trace widths depend on the capability of the PCB vendor. The cost of the PCB is higher when the line width and spaces are smaller.



Notes:

1. 3 x 3 matrix is shown for illustration purposes only. One land pad is shown with via connection.

Figure 5-1: Suggested Board Layout of Soldered Pads for BGA Packages

Table 5-1: Recommended PCB Design Rules (Dimensions in mm)

| | FF323, FFG323, FF324, FFG324, FF665, FFG665, FF668, FFG668, FF672, FFG672, FF676, FFG676, FF896, FFG896 | FF1136, FFG1136, FF1148, FFG1148, FF1152, FFG1152, FF1153, FFG1153, FF1156, FFG1156 FF1696, FFG1696 | FF1513, FFG1513, FF1517, FFG1517, FF1704, FFG1704, FF1738, FFG1738, FF1759, FFG1759, FF1760, FFG1760 | SF363 |
|--|---|--|---|-------|
| Component Land Pad Diameter (SMD) ⁽¹⁾ | 0.53 | 0.53 | 0.53 | 0.40 |
| Solder Land (L) Diameter | 0.45 | 0.45 | 0.45 | 0.33 |
| Opening in Solder Mask (M) Diameter | 0.55 | 0.55 | 0.55 | 0.50 |
| Solder (Ball) Land Pitch (e) | 1.00 | 1.00 | 1.00 | 0.80 |
| Line Width Between Via and Land (w) | 0.13 | 0.13 | 0.13 | 0.13 |
| Distance Between Via and Land (D) | 0.70 | 0.70 | 0.70 | 0.56 |
| Via Land (VL) Diameter | 0.61 | 0.61 | 0.61 | 0.50 |
| Through Hole (VH) Diameter | 0.300 | 0.300 | 0.300 | 0.300 |

Notes:

1. Component land pad diameter refers to the pad opening on the component side (solder mask defined).

Thermal Specifications

Summary

This chapter provides thermal data associated with Virtex®-5 FPGA packages. The following topics are discussed:

- [Introduction](#)
 - [Power Management Strategy](#)
 - [Some Thermal Management Options](#)
 - [Support for Compact Thermal Models \(CTM\)](#)
 - [References](#)
-
-

Introduction

Virtex-5 devices are offered exclusively in thermally efficient flip-chip BGA packages. These 1.0 mm flip-chip packages range in pin-count from the smaller 19 x 19 mm FF324 to the 42.5 x 42.5 mm FF1760. The suite of packages is used to address the various power requirements of the Virtex-5 devices. All Virtex-5 devices are implemented in the 65 nm process technology.

Similar to Virtex-4 FPGAs, all Virtex-5 devices feature versatile SelectIO™ resources that support a variety of I/O standards. They also include Digital Clock Managers (DCM), DSPs, and other traditional features and blocks (such as block RAM) contained in earlier Virtex products.

In line with Moore's law, the transistor count in this family of devices has been increased substantially. Though several innovative features at the silicon level have been deployed to minimize power dissipation, including leakage at the 65 nm node, these products have more densely packed transistors and embedded blocks with the capability to run faster than before. Thus, a fully configured Virtex-5 design that exploits the fabric speed and incorporates several embedded circuits and systems can present power consumption challenges that must be managed.

Unlike features in an ASIC or a microprocessor, the combination of FPGA features used in an user application are not known to the component supplier. Therefore, it remains a challenge for Xilinx to predict the power requirements of a given FPGA when it leaves the factory. Accurate estimates are obtained when the board design takes shape. For this purpose, Xilinx offers and supports a suite of integrated device power analysis tools to help users quickly and accurately estimate their design power requirements. Virtex-5 devices are supported similarly to previous FPGA products. The uncertainty of design

power requirements makes it difficult to apply canned thermal solutions to fit all users. Therefore, Xilinx devices do not come with preset thermal solutions. The user's operating conditions dictate the appropriate solution.

Table 6-1 and Table 6-2 show the thermal resistance data for Virtex-5 devices (grouped in the packages offered). The data includes junction-to-ambient in still air, junction-to-case, and junction-to-board data based on standard JEDEC four-layer measurements.

- Thermal data is available on the Xilinx website at:
<http://www.xilinx.com/cgi-bin/thermal/thermal.pl>.
- Compact package thermal models for these products are available on the Xilinx support download center at:
http://www.xilinx.com/xlnx/xil_sw_updates_home.jsp.

Table 6-1: Thermal Resistance Data—LX Devices

| Package | Package Body Size | Devices | θ_{JA} (°C/W) | θ_{JB} (°C/W) | θ_{JC} (°C/W) | θ_{JA} (°C/W) @ 250 LFM | θ_{JA} (°C/W) @ 500 LFM | θ_{JA} (°C/W) @ 750 LFM |
|-------------------|-------------------|-----------|----------------------|----------------------|----------------------|--------------------------------|--------------------------------|--------------------------------|
| FF324 FFG324 | 19x19 | XC5VLX30 | 18.5 | 4.5 | 0.18 | 12.9 | 11.4 | 10.5 |
| | | XC5VLX50 | 18.5 | 4.5 | 0.18 | 12.9 | 11.4 | 10.5 |
| FF676 FFG676 | 27x27 | XC5VLX30 | 12.1 | 3.2 | 0.19 | 7.8 | 6.6 | 6.1 |
| | | XC5VLX50 | 12.1 | 3.2 | 0.19 | 7.8 | 6.6 | 6.1 |
| | | XC5VLX85 | 12.0 | 3.1 | 0.17 | 7.7 | 6.5 | 6.0 |
| | | XC5VLX110 | 11.7 | 2.8 | 0.12 | 7.4 | 6.3 | 5.7 |
| FF1153 FFG1153 | 35x35 | XC5VLX50 | 10.2 | 2.7 | 0.19 | 6.3 | 5.3 | 4.8 |
| | | XC5VLX85 | 10.0 | 2.6 | 0.17 | 6.1 | 5.1 | 4.7 |
| | | XC5VLX110 | 9.8 | 2.5 | 0.13 | 6.0 | 5.0 | 4.5 |
| | | XC5VLX155 | 9.7 | 2.5 | 0.10 | 5.9 | 4.9 | 4.4 |
| FF1760 FFG1760 | 42.5x42.5 | XC5VLX110 | 8.0 | 2.0 | 0.12 | 4.9 | 4.0 | 3.6 |
| | | XC5VLX155 | 8.0 | 2.2 | 0.10 | 4.9 | 4.0 | 3.6 |
| | | XC5VLX220 | 7.6 | 1.6 | 0.10 | 4.5 | 3.6 | 3.3 |
| | | XC5VLX330 | 7.6 | 1.6 | 0.10 | 4.5 | 3.6 | 3.3 |

Table 6-2: Thermal Resistance Data—LXT, SXT, TXT, and FXT Devices

| Package | Package Body Size | Devices | θ_{JA} (°C/W) | θ_{JB} (°C/W) | θ_{JC} (°C/W) | θ_{JA} (°C/W) @ 250 LFM | θ_{JA} (°C/W) @ 500 LFM | θ_{JA} (°C/W) @ 750 LFM |
|-------------------|-------------------|------------|----------------------|----------------------|----------------------|--------------------------------|--------------------------------|--------------------------------|
| FF323 FFG323 | 19x19 | XC5VLX20T | 18.9 | 5.3 | 0.44 | 13.7 | 11.9 | 11.1 |
| | | XC5VLX30T | 18.6 | 4.6 | 0.27 | 13.4 | 11.6 | 10.8 |
| FF665 FFG665 | 27x27 | XC5VLX30T | 12.1 | 3.2 | 0.19 | 7.8 | 6.6 | 6.1 |
| | | XC5VFX30T | 11.9 | 3.2 | 0.13 | 7.6 | 6.4 | 5.9 |
| | | XC5VSX35T | 11.8 | 2.9 | 0.15 | 7.5 | 6.3 | 5.8 |
| | | XC5VLX50T | 12.1 | 3.2 | 0.19 | 7.8 | 6.6 | 6.1 |
| | | XC5VSX50T | 11.8 | 2.9 | 0.15 | 7.5 | 6.3 | 5.8 |
| | | XC5VFX70T | 11.9 | 3.2 | 0.13 | 7.6 | 6.4 | 5.9 |
| FF1136 FFG1136 | 35x35 | XC5VLX50T | 10.2 | 2.7 | 0.19 | 6.3 | 5.3 | 4.8 |
| | | XC5VSX50T | 9.9 | 2.5 | 0.12 | 6.0 | 5.0 | 4.6 |
| | | XC5VFX70T | 9.9 | 2.7 | 0.14 | 6.1 | 5.1 | 4.6 |
| | | XC5VLX85T | 10.0 | 2.6 | 0.17 | 6.1 | 5.1 | 4.7 |
| | | XC5VSX95T | 9.7 | 2.3 | 0.12 | 5.8 | 4.8 | 4.4 |
| | | XC5VFX100T | 9.6 | 2.0 | 0.10 | 5.7 | 4.7 | 4.3 |
| | | XC5VLX110T | 9.8 | 2.4 | 0.13 | 6.0 | 5.0 | 4.5 |
| | | XC5VLX155T | 9.7 | 2.5 | 0.10 | 5.9 | 4.9 | 4.4 |
| FF1156 FFG1156 | 35x35 | XC5VTX150T | 9.7 | 2.4 | 0.10 | 5.8 | 4.8 | 4.3 |
| FF1759 FFG1759 | 42.5x42.5 | XC5VTX150T | 8.0 | 2.0 | 0.10 | 4.8 | 3.9 | 3.5 |
| | | XC5VTX240T | 7.8 | 1.8 | 0.10 | 4.7 | 3.8 | 3.3 |
| FF1738 FFG1738 | 42.5x42.5 | XC5VFX100T | 7.8 | 2.0 | 0.10 | 4.8 | 3.9 | 3.5 |
| | | XC5VLX110T | 8.0 | 2.0 | 0.12 | 4.9 | 4.0 | 3.6 |
| | | XC5VFX130T | 7.8 | 2.0 | 0.10 | 4.8 | 3.9 | 3.5 |
| | | XC5VLX155T | 8.0 | 2.2 | 0.10 | 4.9 | 4.0 | 3.6 |
| | | XC5VFX200T | 7.7 | 1.8 | 0.10 | 4.6 | 3.7 | 3.3 |
| | | XC5VLX220T | 7.8 | 1.8 | 0.10 | 4.6 | 3.8 | 3.4 |
| | | XC5VSX240T | 7.7 | 1.8 | 0.10 | 4.6 | 3.7 | 3.3 |
| | | XC5VLX330T | 7.6 | 1.6 | 0.10 | 4.4 | 3.6 | 3.2 |

Power Management Strategy

Xilinx relies on a multi-prong approach with regards to the heat-dissipating potential of Virtex-5 devices:

- Design and Silicon

Significant power reduction in Virtex devices at the 90 nm and 65 nm nodes is achieved through innovative process and circuit design. For example, transistor static leakage current is minimized by more than 50 percent (comparable devices) by deploying multi-gate oxide transistors in the power-efficient Virtex-4 and Virtex-5 architectures. Despite these improvements and a lower operating voltage, the base transistor counts are higher for these Virtex-5 devices. They pack higher gate densities and the fabric is faster. Compared to previous generations, the power consumption is lower for the same design (same function and gate density) in a Virtex-5 FPGA implementation.

However, the increased resources and functionality associated with these higher gate density devices and faster switching fabric implies that more computation is possible in shorter time. Associated with this improved functionality is potential higher power dissipation that would have been worse without the silicon and device-based innovations.

- Packaging

At the package component level, Xilinx has selected the more efficient flip-chip BGA packages, which present a low thermal path to the outside. This package incorporates a heat spreader with a thermal interface material (TIM), as shown in Figure 6-1.

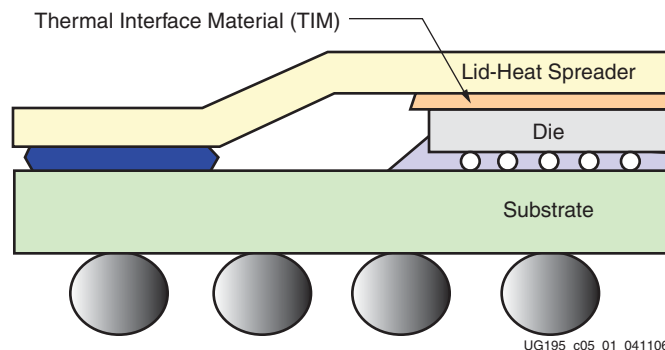


Figure 6-1: Heat Spreader with Thermal Interface Material

Materials with better thermal conductivity and consistent process applications deliver low thermal resistance up to the heat spreader. The junction-to-case thermal resistance (top of heat spreader) of all Virtex-5 FPGA packages is typically less than 0.20°C/W. These packages deliver a low resistance platform for heat sink applications.

The parallel effort to ensure optimized package electrical return paths has produced an added benefit of enhanced power and ground plane arrangement in the packages. The boost in copper density on the planes improves the overall thermal conductivity through the laminate. In addition, the extra dense and distributed via fields in the package increase the vertical thermal conductivity. These packages offer up to 20 percent lower θ_{JB} compared to previous flip-chips packages.

- Heat Sinking Solutions at the System Level

Depending on the system's physical as well as mechanical constraints, the expectation is that the thermal budget is maintained with custom or OEM heat sink solutions, providing the third prong in the thermal management strategy. At this point, Xilinx has left the heat sink solution to the system-level designers who can tailor the design and solution to the constraints of their systems, being fully aware that the part has certain inherent capabilities for delivering the heat to the surface.

Heat sink solutions do exist and can be effective on these low θ_{JB} flip-chip platforms. Table 6-3 below illustrates a finned heat sink solution matrix in Network environment (1U and 2U) arrangement for 35 mm packages and up for power ranging from 15W to 40W. The AAVID standard finned heat sink offerings are used to illustrate the coverage given thermal budgets of $\Delta T = 35^\circ\text{C}$ and $\Delta T = 45^\circ\text{C}$ scenarios. Other heat sink configurations can be explored similarly.

Table 6-3: Finned Heat Sink Solution Matrix for Large Flip-chip BGA in Network

| Package Power (W) | | 35 x 35 mm FF1136/FF1153/FF1156 | | 42.5 x 42.5 mm FF1738/FF1759/FF1760 | |
|-------------------|-------------------|------------------------------------|-----------------------------|--|-----------------------------|
| | | $\Delta T=35^\circ\text{C}$ | $\Delta T=45^\circ\text{C}$ | $\Delta T=35^\circ\text{C}$ | $\Delta T=45^\circ\text{C}$ |
| 15W | 1U ⁽⁵⁾ | Note 1 | | Note 1 | |
| | 2U ⁽⁶⁾ | Note 1 | | Note 1 | |
| 25W | 1U ⁽⁵⁾ | Note 4 | Note 2 | Note 4 | Note 2 |
| | 2U ⁽⁶⁾ | Note 2 | Note 1 | Note 2 | Note 1 |
| 35W | 1U ⁽⁵⁾ | Note 4 | Note 3 | Note 4 | Note 3 |
| | 2U ⁽⁶⁾ | Note 4 | Note 2 | Note 4 | Note 2 |
| 40W | 1U ⁽⁵⁾ | - | | Note 4 | Note 3 |
| | 2U ⁽⁶⁾ | - | | Note 3 | Note 2 |

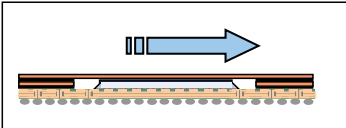
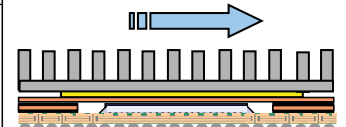
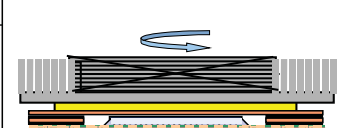
Notes:

1. Solution available at 200 LFM, for example, AAVID finned part number 68520, 72390, 72415.
2. Solution available at 400 LFM, for example, AAVID finned part number 68520, 69920.
3. Solution available at 600 LFM, for example, AAVID finned part number 72390, 69920, 74590.
4. No standard. AAVID finned solution below 600 LFM—custom finned might be required.
5. For 1U Height—(max heat sink height = 26 mm)
6. For 2U Height—(max heat sink height = 64 mm)

The Virtex-5 FPGA packages can be grouped into medium- and high-performance packages based on their power handling capabilities. All Virtex-5 FPGA packages can use thermal enhancements, ranging from simple airflow to schemes that can include passive as well as active heat sinks. This is particularly true for the bigger flip-chip BGA packages where system designers have the option to further enhance the packages with bigger and more elaborate heat sinks to handle excesses of 25W with arrangements that consider system –physical constraints as illustrated in Table 6-3.

Some Thermal Management Options

The flip-chip thermal management chart in Figure 6-2 illustrates simple but incremental power management schemes that can be applied on a flip-chip BGA package.

| | | | |
|--------------------|--|--|---|
| Low End 1–6W | Bare Package with Moderate Air 8–12°C/W | Bare Package Package can be used with moderate airflow within a system |  |
| Mid Range 4–10W | Passive H/S + Air 5–10°C/W | Packaged Used with Various Forms of Passive Heat Sinks Heat spreader techniques |  |
| High End 8–25W | Active Heat Sink 2–3°C/W or Better | Package Used with Active Heat Sinks TEC and board level heat spreader techniques |  |

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Figure 6-2: Thermal Management Options for Flip-Chip BGA Packages

- For moderate power dissipation (less than 6W), the use of passive heat sinks and heat spreaders attached with thermally conductive double-sided tapes or retainers (with TIM around 0.2°C/W) can offer quick thermal solutions in these packages.
- The use of lightweight, finned, external, passive heat sinks can be effective for dissipating up to 10–25W in the bigger packages. The more efficient external heat sinks tend to be tall and heavy. To help protect component joints from heat sink induced stress cracks, the use of spring-loaded pins or clips that transfer the mounting stress to a circuit board is advisable whenever a bulky heat sink is considered.
- As stated earlier, the flip-chip BGA packages offered for Virtex-5 devices are thermally enhanced BGAs with the die facing down. These packages have an exposed metal heat sink at the top. These high-end thermal packages lend themselves to the application of efficient external heat sinks (passive or active) for further heat removal efficiency. Again, precautions must be taken to prevent component damage when a bulky heat sink is attached. The thermal interface resistance needs to be controlled to take full advantage of these packages.
- An active heat sink might include a simple heat sink incorporating a mini fan or even a Peltier Thermoelectric Cooler (TEC) with a fan to carry away any dissipated heat. When considering the use of a TEC for heat management, consultation with experts in using the device is important because these devices can be reversed and cause damage to components. Also condensation can be an issue with these devices.
- The printed circuit board on which the package is mounted can have a significant impact on thermal performance. As much as 60 to 80 percent of the dissipated heat can go through the BGA balls and thus to the board. A typical systems board is larger than the standard 4 x 4 in JEDEC thermal board. Components mounted on these boards with multiple copper layers and several internal vias show low effective junction-to-ambient thermal resistances.

Table 6-4 shows this impact as an FF1148 flip-chip package's effective junction to ambient resistance is changed depending on the mounting board.

Table 6-4: Impact of Mounted Board Characteristics on θ_{JA} (FF1148)

| Xilinx 35 x 35mm FF1148 | | θ_{JA} (°C/W) for Different Board Sizes | | |
|---------------------------------|----|--|------------|------------|
| | | 4 x 4 in | 10 x 10 in | 20 x 20 in |
| Layer Count of Mounted Board | 4 | 9.1 ⁽¹⁾ | 8.3 | – |
| | 8 | 8.0 | 5.5 | 4.9 |
| | 12 | 7.5 | 4.7 | 4.4 |
| | 16 | 7.2 | 4.5 | 4.2 |
| | 24 | – | 4.3 | 4.0 |

Notes:

1. Base JEDEC Mount Conditions

- Designs can be implemented to take advantage of the board's ability to spread heat. The effect of the board is dependent on its size and how it conducts heat. Board size, the level of copper traces, and the number of buried copper planes all lower the junction-to-ambient thermal resistance for a package mounted on the board. The cold ring junction-to-board thermal data for Virtex-5 FPGA packages are given in [Table 6-1](#). Users need to be aware that a direct heat path to the board from a component also exposes the component to the effect of other heat sources on the board, particularly if the board is not cooled effectively. An otherwise cooler component can be heated by other heat contributing components on the board.

Support for Compact Thermal Models (CTM)

[Table 6-1](#) provides the traditional thermal resistance data for Virtex-5 devices. These resistances are measured using a prescribed JEDEC standard that might not necessarily reflect the user's actual board conditions and environment. The quoted θ_{JA} , and θ_{JC} numbers are environmentally dependent, and JEDEC has traditionally recommended that these be used with that awareness. For more accurate junction temperature prediction, these might not be enough, and a system-level thermal simulation might be required. Though Xilinx continues to support these figure of merit data, for Virtex-5 FPGAs, boundary conditions independent compact thermal models (BCI-CTM) are also available to assist users in their thermal simulations.

Two-resistor as well as eight to ten-resistor network models are offered for all Virtex-5 devices. These compact models seek to capture the thermal behavior of the packages more accurately at predetermined critical points (junction, case, top, leads, and so on) with the reduced set of nodes as illustrated in [Figure 6-3](#).

Unlike a full 3D model, these are computationally efficient and work well in an integrated system simulation environment. Delphi CTM models are available on the Xilinx support download center at: http://www.xilinx.com/xlnx/xil_sw_updates_home.jsp.

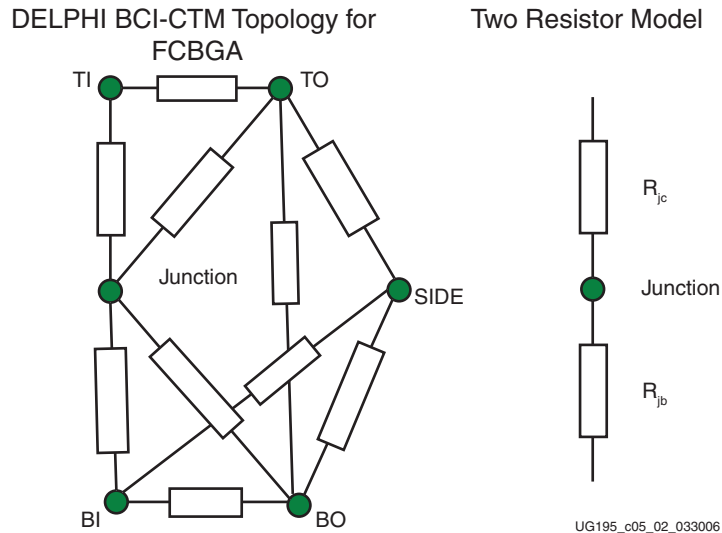


Figure 6-3: Thermal Model Topologies

The CTM models are based on the DELPHI approach that JEDEC has proposed. Since the JEDEC neutral (XML) format proposal has not been adopted yet, the DELPHI approach is used to generate these files and the data saved in the NATIVE and proprietary file formats of the targeted CFD tools - rather than follow a neutral file format. The CTM libraries are available in Flotherm (PDML) format – good for V5.1 and above and Icepak (version 4.2 and above) format.

References

The following websites contain additional information on heat management and contact information.

- <http://www.wakefield.com>
- <http://www.aavidthermalloy.com>
- <http://www.qats.com>

Refer to the following websites for interface material sources:

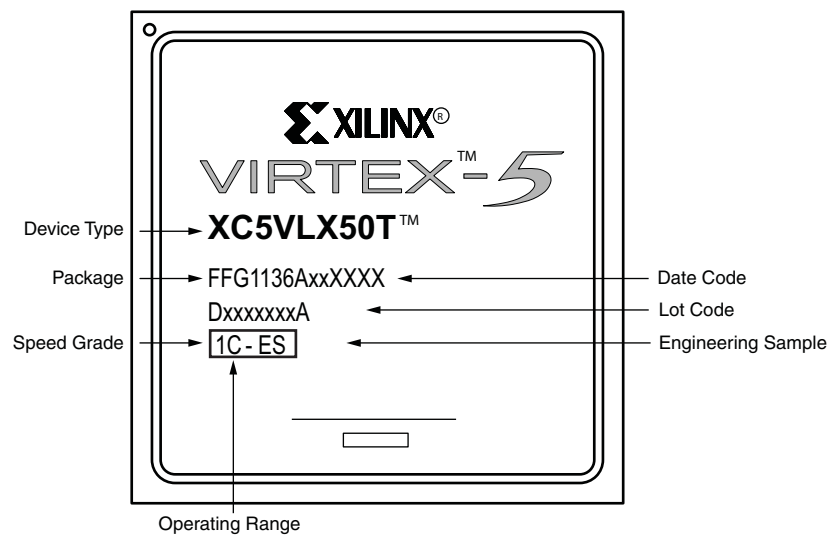
- Power Devices - <http://www.powerdevices.com>
- Bergquist Company - <http://www.bergquistcompany.com>
- AOS Thermal Compound - <http://www.aosco.com>
- Chometrics - <http://www.chometrics.com>
- Kester - <http://www.kester.com>

Refer to the following websites for CFD tools Xilinx supports with thermal models.

- Flotherm - Flotherm & FloPCB - <http://www.flotherm.com>
- Fluent - Icepak - <http://www.icepak.com>

Package Marking

All Virtex-5 devices have package top-markings similar to the example shown in [Figure 7-1](#) and explained in [Table 7-1](#).



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Figure 7-1: Virtex-5 Device Package Marking

Table 7-1: Xilinx Device Marking Definition—Example

| Item | Definition |
|-------------------|---|
| Xilinx Logo | Xilinx logo, Xilinx name with trademark, and trademark-registered status. |
| Family Brand Logo | Virtex-5 family name with trademark and trademark-registered status. This line is optional and could appear blank. |
| 1st Line | Device type. |
| 2nd Line | Package type and pin count, circuit design revision, the location code for the wafer fab, the geometry code, and date code. A G in the third letter of a package type indicates a Pb-free RoHS compliant package. For more details on Xilinx Pb-Free and RoHS Compliant Products, see: http://www.xilinx.com/pbfree . |
| 3rd Line | Ten alphanumeric characters for Assembly, Lot, and Step information. The last digit is usually an A or an M if a stepping version does not exist. In this example, the last number on this line indicates the stepping version (2) of the device. |

Table 7-1: Xilinx Device Marking Definition—Example (Continued)

| Item | Definition | |
|----------|--|---|
| 4th Line | Device speed grade and temperature range. If a grade is not marked on the package, the product is considered commercial grade. Other variations for the 4th line: | |
| | 1C-xxxx | The <i>xxxx</i> indicates the SCD for the device. An SCD is a special ordering code that is not always marked in the device top mark. |
| | 1C-ES | The <i>ES</i> indicates an Engineering Sample. |