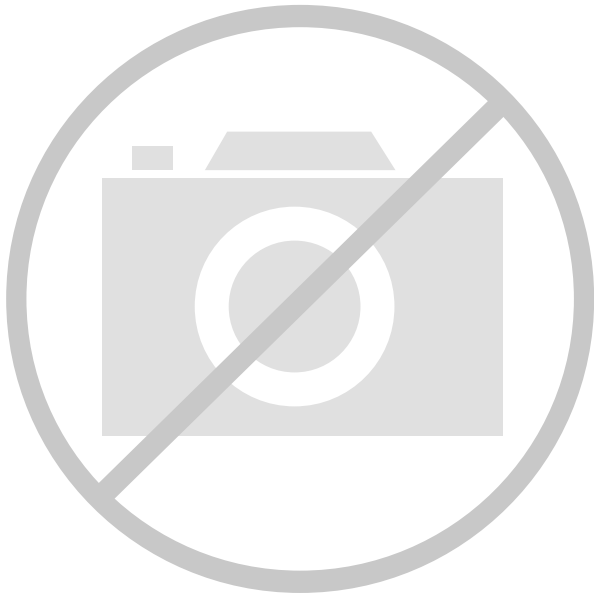




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## Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

Embedded - FPGAs, or Field Programmable Gate Arrays, are advanced integrated circuits that offer unparalleled flexibility and performance for digital systems. Unlike traditional fixed-function logic devices, FPGAs can be programmed and reprogrammed to execute a wide array of logical operations, enabling customized functionality tailored to specific applications. This reprogrammability allows developers to iterate designs quickly and implement complex functions without the need for custom hardware.

## Applications of Embedded - FPGAs

The versatility of Embedded - FPGAs makes them indispensable in numerous fields. In telecommunications.

### Details

|                                |                                                                                                                                                                             |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status                 | Obsolete                                                                                                                                                                    |
| Number of LABs/CLBs            | 10000                                                                                                                                                                       |
| Number of Logic Elements/Cells | 40000                                                                                                                                                                       |
| Total RAM Bits                 | 4075520                                                                                                                                                                     |
| Number of I/O                  | 604                                                                                                                                                                         |
| Number of Gates                | -                                                                                                                                                                           |
| Voltage - Supply               | 0.95V ~ 1.26V                                                                                                                                                               |
| Mounting Type                  | Surface Mount                                                                                                                                                               |
| Operating Temperature          | 0°C ~ 85°C (TJ)                                                                                                                                                             |
| Package / Case                 | 1152-BCBGA, FCBGA                                                                                                                                                           |
| Supplier Device Package        | 1152-CFCBGA (35x35)                                                                                                                                                         |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/lattice-semiconductor/lfsc3ga40e-6fc1152c">https://www.e-xfl.com/product-detail/lattice-semiconductor/lfsc3ga40e-6fc1152c</a> |

**Table 2-5. sysMEM Block Configurations**

| Memory Mode      | Configurations                                                              |
|------------------|-----------------------------------------------------------------------------|
| Single Port      | 16,384 x 1<br>8,192 x 2<br>4,096 x 4<br>2,048 x 9<br>1,024 x 18<br>512 x 36 |
| True Dual Port   | 16,384 x 1<br>8,192 x 2<br>4,096 x 4<br>2,048 x 9<br>1,024 x 18             |
| Pseudo Dual Port | 16,384 x 1<br>8,192 x 2<br>4,096 x 4<br>2,048 x 9<br>1,024 x 18<br>512 x 36 |
| FIFO             | 16,384 x 1<br>8,192 x 2<br>4,096 x 4<br>2,048 x 9<br>1,024 x 18<br>512 x 36 |

## Bus Size Matching

All of the multi-port memory modes support different widths on each of the ports. The RAM bits are mapped LSB word 0 to MSB word 0, LSB word 1 to MSB word 1 and so on. Although the word size and number of words for each port varies, this mapping scheme applies to each port.

## RAM Initialization and ROM Operation

If desired, the contents of the RAM can be pre-loaded during device configuration. By preloading the RAM block during the chip configuration cycle and disabling the write controls, the sysMEM block can also be utilized as a ROM.

## Single, Dual and Pseudo-Dual Port Modes

In all the sysMEM RAM modes the input data and address for the ports are registered at the input of the memory array. The output data of the memory is optionally registered at the output. A clock is required even in asynchronous read mode.

The EBR memory supports two forms of write behavior for dual port operation:

1. **Normal** — data on the output appears only during a read cycle. During a write cycle, the data (at the current address) does not appear on the output.
2. **Write Through** — a copy of the input data appears at the output of the same port.

## FIFO Configuration

The FIFO has a write port with Data-in, WCE, WE and WCLK signals. There is a separate read port with Data-out, RCE, RE and RCLK signals. The FIFO internally generates Almost Full, Full, Almost Empty, and Empty Flags. The Full and Almost Full flags are registered with WCLK. The Empty and Almost Empty flags are registered with RCLK.

**PURESPEED I/O Single-Ended DC Electrical Characteristics**

Over Recommended Operating Conditions

| Input/Output<br>Standard                       | V <sub>IL</sub> |              | V <sub>IH</sub> |          | V <sub>OL</sub> Max.<br>(V) | V <sub>OH</sub> Min.<br>(V) | I <sub>OL</sub><br>(mA) | I <sub>OH</sub><br>(mA) |
|------------------------------------------------|-----------------|--------------|-----------------|----------|-----------------------------|-----------------------------|-------------------------|-------------------------|
|                                                | Min. (V)        | Max. (V)     | Min. (V)        | Max. (V) |                             |                             |                         |                         |
| LVC MOS 33                                     | -0.3            | 0.8          | 2               | 3.465    | 0.4                         | 2.4                         | 24, 16, 8               | -24, -16, -8            |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| LVTTL                                          | -0.3            | 0.8          | 2               | 3.465    | 0.4                         | 2.4                         | 24, 16, 8               | -24, -16, -8            |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| LVC MOS 25                                     | -0.3            | 0.7          | 1.7             | 2.65     | 0.4                         | VCCIO - 0.4                 | 16, 12, 8, 4            | -16, -12, -8, -4        |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| LVC MOS 18                                     | -0.3            | 0.35VCCIO    | 0.65VCCIO       | 2.65     | 0.4                         | VCCIO - 0.4                 | 16, 12, 8, 4            | -16, -12, -8, -4        |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| LVC MOS 15                                     | -0.3            | 0.35VCCIO    | 0.65VCCIO       | 2.65     | 0.4                         | VCCIO - 0.4                 | 16, 12, 8, 4            | -16, -12, -8, -4        |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| LVC MOS 12                                     | -0.3            | 0.35VCCIO    | 0.65VCCIO       | 2.65     | 0.3                         | VCCIO - 0.3                 | 12, 8, 4, 2             | -12, -8, -4, -2         |
|                                                |                 |              |                 |          | 0.2                         | VCCIO - 0.2                 | 0.1                     | -0.1                    |
| PCIX15                                         | -0.3            | 0.3VCCIO     | 0.5VCCIO        | 1.5      | 0.1VCCIO                    | 0.9VCCIO                    | 1.5                     | -0.5                    |
| PCI33                                          | -0.3            | 0.3VCCIO     | 0.5VCCIO        | 3.465    | 0.1VCCIO                    | 0.9VCCIO                    | 1.5                     | -0.5                    |
| PCIX33                                         | -0.3            | 0.35VCCIO    | 0.5VCCIO        | 3.465    | 0.1VCCIO                    | 0.9VCCIO                    | 1.5                     | -0.5                    |
| AGP-1X, AGP-2X                                 | -0.3            | 0.3VCCIO     | 0.5VCCIO        | 3.465    | 0.1VCCIO                    | 0.9VCCIO                    | 1.5                     | -0.5                    |
| SSTL3_I                                        | -0.3            | VREF - 0.2   | VREF + 0.2      | 3.465    | 0.7                         | VCCIO - 1.1                 | 8                       | -8                      |
| SSTS3_I OST <sup>2</sup>                       | -0.3            | VREF - 0.2   | VREF + 0.2      | 3.465    | 0.9                         | VCCIO - 1.3                 | 8                       | -8                      |
| SSTL3_II                                       | -0.3            | VREF - 0.2   | VREF + 0.2      | 3.465    | 0.5                         | VCCIO - 0.9                 | 16                      | -16                     |
| SSTL3_II OST <sup>2</sup>                      | -0.3            | VREF - 0.2   | VREF + 0.2      | 3.465    | 0.9                         | VCCIO - 0.13                | 16                      | -16                     |
| SSTL2_I                                        | -0.3            | VREF - 0.18  | VREF + 0.18     | 2.65     | 0.54                        | VCCIO - 0.62                | 7.6                     | -7.6                    |
| SSTL2_I OST <sup>2</sup>                       | -0.3            | VREF - 0.18  | VREF + 0.18     | 2.65     | 0.73                        | VCCIO - 0.81                | 7.6                     | -7.6                    |
| SSTL2_II                                       | -0.3            | VREF - 0.18  | VREF + 0.18     | 2.65     | 0.35                        | VCCIO - 0.43                | 15.2                    | -15.2                   |
| SSTL2_II OST <sup>2</sup>                      | -0.3            | VREF - 0.18  | VREF + 0.18     | 2.65     | 0.73                        | VCCIO - 0.81                | 15.2                    | -15.2                   |
| SSTL18_I                                       | -0.3            | VREF - 0.125 | VREF + 0.125    | 2.65     | 0.28                        | VCCIO - 0.28                | 13.4                    | -13.4                   |
| SSTL18_II                                      | -0.3            | VREF - 0.125 | VREF + 0.125    | 2.65     | 0.28                        | VCCIO - 0.28                | 13.4                    | -13.4                   |
| HSTL15_I                                       | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | 0.4                         | VCCIO - 0.4                 | 8                       | -8                      |
| HSTL15_II                                      | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | 0.4                         | VCCIO - 0.4                 | 16                      | -16                     |
| HSTL15_III <sup>1</sup>                        | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | N/A                         | N/A                         | N/A                     | N/A                     |
| HSTL15_IV <sup>1</sup>                         | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | N/A                         | N/A                         | N/A                     | N/A                     |
| HSTL18_I                                       | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | 0.4                         | VCCIO - 0.4                 | 9.6                     | -9.6                    |
| HSTL18_II                                      | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | 0.4                         | VCCIO - 0.4                 | 19.2                    | -19.2                   |
| HSTL18_III <sup>1</sup>                        | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | N/A                         | N/A                         | N/A                     | N/A                     |
| HSTL18_IV <sup>1</sup>                         | -0.3            | VREF - 0.1   | VREF + 0.1      | 2.65     | N/A                         | N/A                         | N/A                     | N/A                     |
| GTL12 <sup>1</sup> ,<br>GTLPLUS15 <sup>1</sup> | -0.3            | VREF - 0.2   | VREF + 0.2      | N/A      | N/A                         | N/A                         | N/A                     | N/A                     |

1. Input only.

2. Input with on-chip series termination.

**LatticeSC/M Family Timing Adders (Continued)**

Over Recommended Operating Conditions at VCC = 1.2V +/- 5%

| Buffer Type             | Description                   | -7     |        | -6     |        | -5     |        | Units |
|-------------------------|-------------------------------|--------|--------|--------|--------|--------|--------|-------|
|                         |                               | Min.   | Max.   | Min.   | Max.   | Min.   | Max.   |       |
| GTLPLUS15               | GTLPLUS15                     | -0.013 | -0.017 | 0.012  | 0.004  | 0.037  | 0.024  | ns    |
| GTL12                   | GTL12                         | -0.063 | -0.071 | -0.007 | -0.048 | 0.056  | -0.032 | ns    |
| <b>Output Adjusters</b> |                               |        |        |        |        |        |        |       |
| LVDS                    | LVDS                          | 0.708  | 0.854  | 0.856  | 1.021  | 1.005  | 1.189  | ns    |
| RSDS                    | RSDS                          | 0.708  | 0.854  | 0.856  | 1.021  | 1.005  | 1.189  | ns    |
| BLVDS25                 | BLVDS                         | -0.129 | 0.05   | -0.136 | 0.069  | -0.136 | 0.083  | ns    |
| MLVDS25                 | MLVDS                         | -0.059 | 0.059  | -0.057 | 0.096  | -0.054 | 0.133  | ns    |
| LVPECL33                | LVPECL                        | -0.334 | -0.181 | -0.325 | -1.389 | -0.315 | -2.598 | ns    |
| HSTL18_I                | HSTL_18 class I               | 0.132  | 0.209  | 0.153  | 0.24   | 0.175  | 0.272  | ns    |
| HSTL18_II               | HSTL_18 class II              | 0.24   | 0.176  | 0.268  | 0.255  | 0.298  | 0.333  | ns    |
| HSTL18D_I               | Differential HSTL 18 class I  | 0.132  | 0.209  | 0.153  | 0.24   | 0.175  | 0.272  | ns    |
| HSTL18D_II              | Differential HSTL 18 class II | 0.24   | 0.176  | 0.268  | 0.255  | 0.298  | 0.333  | ns    |
| HSTL15_I                | HSTL_15 class I               | 0.096  | 0.172  | 0.112  | 0.198  | 0.129  | 0.224  | ns    |
| HSTL15_II               | HSTL_15 class II              | 0.208  | 0.131  | 0.233  | 0.203  | 0.259  | 0.275  | ns    |
| HSTL15D_I               | Differential HSTL 15 class I  | 0.096  | 0.172  | 0.112  | 0.198  | 0.129  | 0.224  | ns    |
| HSTL15D_II              | Differential HSTL 15 class II | 0.208  | 0.131  | 0.233  | 0.203  | 0.259  | 0.275  | ns    |
| SSTL33_I                | SSTL_3 class I                | 0.133  | 0.177  | 0.11   | 0.166  | 0.088  | 0.154  | ns    |
| SSTL33_II               | SSTL_3 class II               | 0.173  | 0.247  | 0.164  | 0.253  | 0.156  | 0.258  | ns    |
| SSTL33D_I               | Differential SSTL_3 class I   | 0.133  | 0.177  | 0.11   | 0.166  | 0.088  | 0.154  | ns    |
| SSTL33D_II              | Differential SSTL_3 class II  | 0.173  | 0.247  | 0.164  | 0.253  | 0.156  | 0.258  | ns    |
| SSTL25_I                | SSTL_2 class I                | 0.215  | 0.125  | 0.239  | 0.228  | 0.264  | 0.331  | ns    |
| SSTL25_II               | SSTL_2 class II               | 0.277  | 0.181  | 0.311  | 0.284  | 0.345  | 0.387  | ns    |
| SSTL25D_I               | Differential SSTL_2 class I   | 0.215  | 0.125  | 0.239  | 0.228  | 0.264  | 0.331  | ns    |
| SSTL25D_II              | Differential SSTL_2 class II  | 0.277  | 0.181  | 0.311  | 0.284  | 0.345  | 0.387  | ns    |
| SSTL18_I                | SSTL_2 class I                | 0.16   | 0.081  | 0.179  | 0.173  | 0.199  | 0.265  | ns    |
| SSTL18_II               | SSTL_2 class II               | 0.238  | 0.15   | 0.263  | 0.244  | 0.295  | 0.338  | ns    |
| SSTL18D_I               | Differential SSTL_2 class I   | 0.16   | 0.081  | 0.179  | 0.173  | 0.199  | 0.265  | ns    |
| SSTL18D_II              | Differential SSTL_2 class II  | 0.238  | 0.15   | 0.263  | 0.244  | 0.295  | 0.338  | ns    |
| LVTTTL33_8mA            | LVTTTL 8mA drive              | -0.346 | -0.165 | -0.496 | -0.296 | -0.646 | -0.428 | ns    |
| LVTTTL33_16mA           | LVTTTL 16mA drive             | -0.11  | -0.18  | -0.218 | -0.32  | -0.325 | -0.46  | ns    |
| LVTTTL33_24mA           | LVTTTL 24mA drive             | -0.012 | -0.18  | -0.099 | -0.321 | -0.185 | -0.463 | ns    |
| LVC MOS33_8mA           | LVC MOS 3.3 8mA drive         | -0.346 | -0.165 | -0.496 | -0.296 | -0.646 | -0.428 | ns    |
| LVC MOS33_16mA          | LVC MOS 3.3 16mA drive        | -0.11  | -0.18  | -0.218 | -0.32  | -0.325 | -0.46  | ns    |
| LVC MOS33_24mA          | LVC MOS 3.3 24mA drive        | -0.012 | -0.18  | -0.099 | -0.321 | -0.185 | -0.463 | ns    |
| LVC MOS25_4mA           | LVC MOS 2.5 4mA drive         | -0.174 | 0.004  | -0.195 | 0.002  | -0.215 | 0      | ns    |
| LVC MOS25_8mA           | LVC MOS 2.5 8mA drive         | 0      | 0      | 0      | 0      | 0      | 0      | ns    |
| LVC MOS25_12mA          | LVC MOS 2.5 12mA drive        | 0.094  | -0.025 | 0.107  | 0.096  | 0.12   | 0.216  | ns    |
| LVC MOS25_16mA          | LVC MOS 2.5 16mA drive        | 0.145  | -0.054 | 0.162  | 0.063  | 0.181  | 0.179  | ns    |
| LVC MOS25_OD            | LVC MOS 2.5 open drain        | 0.073  | -0.125 | 0.081  | -0.081 | 0.091  | -0.09  | ns    |
| LVC MOS18_4mA           | LVC MOS 1.8 4mA drive         | -0.278 | -0.099 | -0.312 | -0.115 | -0.345 | -0.131 | ns    |
| LVC MOS18_8mA           | LVC MOS 1.8 8mA drive         | -0.073 | -0.078 | -0.078 | -0.084 | -0.083 | -0.089 | ns    |

**LatticeSC/M Family Timing Adders (Continued)**

Over Recommended Operating Conditions at VCC = 1.2V +/- 5%

| Buffer Type    | Description            | -7     |        | -6     |        | -5     |        | Units |
|----------------|------------------------|--------|--------|--------|--------|--------|--------|-------|
|                |                        | Min.   | Max.   | Min.   | Max.   | Min.   | Max.   |       |
| LVC MOS18_12mA | LVC MOS 1.8 12mA drive | 0.024  | -0.106 | 0.019  | -0.004 | 0.016  | 0.099  | ns    |
| LVC MOS18_16mA | LVC MOS 1.8 16mA drive | 0.074  | -0.134 | 0.08   | -0.022 | 0.088  | 0.089  | ns    |
| LVC MOS18_OD   | LVC MOS 1.8 open drain | 0.002  | -0.206 | 0      | -0.196 | -0.002 | -0.221 | ns    |
| LVC MOS15_4mA  | LVC MOS 1.5 4mA drive  | -0.344 | -0.164 | -0.379 | -0.186 | -0.412 | -0.209 | ns    |
| LVC MOS15_8mA  | LVC MOS 1.5 8mA drive  | -0.125 | -0.137 | -0.145 | -0.157 | -0.164 | -0.176 | ns    |
| LVC MOS15_12mA | LVC MOS 1.5 12mA drive | -0.027 | -0.166 | -0.043 | -0.07  | -0.059 | 0.026  | ns    |
| LVC MOS15_16mA | LVC MOS 1.5 16mA drive | 0.025  | -0.195 | 0.013  | -0.089 | 0.003  | 0.017  | ns    |
| LVC MOS15_OD   | LVC MOS 1.5 open drain | -0.047 | -0.267 | -0.067 | -0.267 | -0.087 | -0.299 | ns    |
| LVC MOS12_2mA  | LVC MOS 1.2 2mA drive  | -0.473 | -0.293 | -0.505 | -0.317 | -0.537 | -0.34  | ns    |
| LVC MOS12_4mA  | LVC MOS 1.2 4mA drive  | -0.218 | -0.239 | -0.25  | -0.271 | -0.28  | -0.303 | ns    |
| LVC MOS12_8mA  | LVC MOS 1.2 8mA drive  | -0.109 | -0.269 | -0.143 | -0.181 | -0.176 | -0.093 | ns    |
| LVC MOS12_12mA | LVC MOS 1.2 12mA drive | -0.054 | -0.3   | -0.085 | -0.203 | -0.114 | -0.106 | ns    |
| LVC MOS12_OD   | LVC MOS 1.2 open drain | -0.126 | -0.371 | -0.166 | -0.398 | -0.204 | -0.43  | ns    |
| PCI33          | PCI                    | -0.216 | -0.791 | -0.417 | -1.263 | -0.618 | -1.735 | ns    |
| PCIX33         | PCI-X 3.3              | -0.216 | -0.791 | -0.417 | -1.263 | -0.618 | -1.735 | ns    |
| PCIX15         | PCI-X 1.5              | 0.208  | 0.227  | 0.233  | 0.312  | 0.259  | 0.398  | ns    |
| AGP1X33        | AGP-1X 3.3             | -0.216 | -0.791 | -0.417 | -1.263 | -0.618 | -1.735 | ns    |
| AGP2X33        | AGP-2X                 | -0.216 | -0.791 | -0.417 | -1.263 | -0.618 | -1.735 | ns    |

Switching Test Conditions

Figure 3-15 shows the output test load that is used for AC testing. The specific values for resistance, capacitance, voltage, and other test conditions are shown in Table 3-4.

Figure 3-15. Output Test Load, LVTTTL and LVCMOS Standards

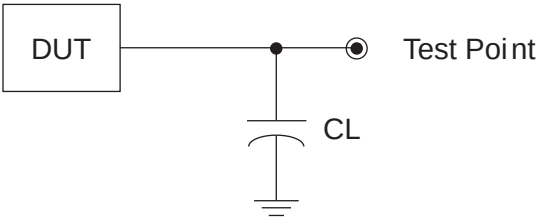


Table 3-4. Test Fixture Required Components, Non-Terminated Interfaces

| Test Condition                                    | C <sub>L</sub> | Timing Ref.                       | V <sub>T</sub>  |
|---------------------------------------------------|----------------|-----------------------------------|-----------------|
| LVTTTL and other LVCMOS settings (L -> H, H -> L) | 30pF           | LVCMOS 3.3 = 1.5V                 | —               |
|                                                   |                | LVCMOS 2.5 = V <sub>CCIO</sub> /2 | —               |
|                                                   |                | LVCMOS 1.8 = V <sub>CCIO</sub> /2 | —               |
|                                                   |                | LVCMOS 1.5 = V <sub>CCIO</sub> /2 | —               |
|                                                   |                | LVCMOS 1.2 = V <sub>CCIO</sub> /2 | —               |
| LVCMOS 2.5 I/O (Z -> H)                           | 30pF           | V <sub>CCIO</sub> /2              | V <sub>OL</sub> |
| LVCMOS 2.5 I/O (Z -> L)                           |                | V <sub>CCIO</sub> /2              | V <sub>OH</sub> |
| LVCMOS 2.5 I/O (H -> Z)                           |                | V <sub>OH</sub> - 0.15            | V <sub>OL</sub> |
| LVCMOS 2.5 I/O (L -> Z)                           |                | V <sub>OL</sub> + 0.15            | V <sub>OH</sub> |

Note: Output test conditions for all other interfaces are determined by the respective standards.

### Signal Descriptions

| Signal Name                            | I/O | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General Purpose</b>                 |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| P[Edge] [Row/Column Number*]_[A/B/C/D] | I/O | <p>[Edge] indicates the edge of the device on which the pad is located. Valid edge designations are L (Left), B (Bottom), R (Right), T (Top).</p> <p>[Row/Column Number] indicates the PIC row or the column of the device on which the PIC exists. When Edge is T (Top) or (Bottom), only need to specify Row Number. When Edge is L (Left) or R (Right), only need to specify Column Number.</p> <p>[A/B/C/D] indicates the PIO within the PIC to which the pad is connected.</p> <p>Some of these user programmable pins are shared with special function pins. These pin when not used as special purpose pins can be programmed as I/Os for user logic.</p> <p>During configuration the user-programmable I/Os are tri-stated with an internal pull-up resistor enabled. If any pin is not used (or not bonded to a package pin), it is also tri-stated with an internal pull-up resistor enabled after configuration.</p> |
| VREF1_x, VREF2_x                       | —   | The reference supply pins for I/O bank x. Any I/O pin in a bank can be assigned as a reference supply pin, but software defaults use designated pin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| NC                                     | —   | No connect. NC pins should not be connected to any active signals, VCC or GND.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Non-SERDES Power Supplies</b>       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| VCCIOx                                 | —   | VCCIO - The power supply pins for I/O bank x. Dedicated pins.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| VCC12 <sup>1</sup>                     | —   | 1.2V supply for configuration logic, PLLs and SERDES Rx, Tx and PLL. All VCC12 pins must be connected. As VCC12 supplies power for analog circuitry, VCC12 should be quiet and isolated from noisy digital board supplies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| VTT_x                                  | —   | Termination voltage for bank x. When VTT termination is not required, or used to provide the common mode termination voltage (VCMT), these pins can be left unconnected on the device. VCMT function is not used in the bank. If the internal or external VCMT function for differential input termination is used, the VTT pins should be unconnected and allowed to float.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| GND                                    | —   | GND - Ground. Dedicated pins. All grounds must be electrically connected at the board level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| VCC                                    | —   | VCC - The power supply pins for core logic. Dedicated pins (1.2V/1.0V).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| VCCAUX                                 | —   | VCCAUX - Auxiliary power supply pin - powers all differential and referenced input buffers. Dedicated pins (2.5V).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| VCCJ                                   | —   | VCCJ - The power supply pin for JTAG Test Access Port.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PROBE_VCC                              | —   | VCC signal - Connected to internal VCC node. Can be used for feedback to control an external board power converter. Can be unconnected if not used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**LFSC/M15, LFSC/M25 Logic Signal Connections: 900 fpBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M15      |            |                    | LFSC/M25      |            |                    |
|-------------|---------------|------------|--------------------|---------------|------------|--------------------|
|             | Ball Function | VCCIO Bank | Dual Function      | Ball Function | VCCIO Bank | Dual Function      |
| D14         | PT15B         | 1          | A15/MPI_ADDR29     | PT25B         | 1          | A15/MPI_ADDR29     |
| D13         | PT15A         | 1          | A17/MPI_ADDR31     | PT25A         | 1          | A17/MPI_ADDR31     |
| F12         | PT13D         | 1          | A19/MPI_TSI21      | PT24D         | 1          | A19/MPI_TSI21      |
| F13         | PT13C         | 1          | A20/MPI_BDIP       | PT24C         | 1          | A20/MPI_BDIP       |
| B12         | PT11B         | 1          | A18/MPI_TSI20      | PT24B         | 1          | A18/MPI_TSI20      |
| B11         | PT11A         | 1          | MPI_TEA            | PT24A         | 1          | MPI_TEA            |
| E12         | PT10D         | 1          | D14/MPI_DATA14     | PT23D         | 1          | D14/MPI_DATA14     |
| D12         | PT10C         | 1          | DP1/MPI_PAR1       | PT23C         | 1          | DP1/MPI_PAR1       |
| G10         | PT9B          | 1          | A21/MPI_BURST      | PT23B         | 1          | A21/MPI_BURST      |
| G9          | PT9A          | 1          | D15/MPI_DATA15     | PT23A         | 1          | D15/MPI_DATA15     |
| C10         | A_VDDIB3_L    | -          |                    | A_VDDIB3_L    | -          |                    |
| E9          | VCC12         | -          |                    | VCC12         | -          |                    |
| B10         | A_HDINP3_L    | -          | PCS 360 CH 3 IN P  | A_HDINP3_L    | -          | PCS 360 CH 3 IN P  |
| B9          | A_HDINN3_L    | -          | PCS 360 CH 3 IN N  | A_HDINN3_L    | -          | PCS 360 CH 3 IN N  |
| A10         | A_HDOUTP3_L   | -          | PCS 360 CH 3 OUT P | A_HDOUTP3_L   | -          | PCS 360 CH 3 OUT P |
| D9          | VCC12         | -          |                    | VCC12         | -          |                    |
| A9          | A_HDOUTN3_L   | -          | PCS 360 CH 3 OUT N | A_HDOUTN3_L   | -          | PCS 360 CH 3 OUT N |
| C9          | A_VDDOB3_L    | -          |                    | A_VDDOB3_L    | -          |                    |
| A8          | A_HDOUTN2_L   | -          | PCS 360 CH 2 OUT N | A_HDOUTN2_L   | -          | PCS 360 CH 2 OUT N |
| C8          | A_VDDOB2_L    | -          |                    | A_VDDOB2_L    | -          |                    |
| A7          | A_HDOUTP2_L   | -          | PCS 360 CH 2 OUT P | A_HDOUTP2_L   | -          | PCS 360 CH 2 OUT P |
| E8          | VCC12         | -          |                    | VCC12         | -          |                    |
| B8          | A_HDINN2_L    | -          | PCS 360 CH 2 IN N  | A_HDINN2_L    | -          | PCS 360 CH 2 IN N  |
| B7          | A_HDINP2_L    | -          | PCS 360 CH 2 IN P  | A_HDINP2_L    | -          | PCS 360 CH 2 IN P  |
| C7          | A_VDDIB2_L    | -          |                    | A_VDDIB2_L    | -          |                    |
| D8          | VCC12         | -          |                    | VCC12         | -          |                    |
| C6          | A_VDDIB1_L    | -          |                    | A_VDDIB1_L    | -          |                    |
| E7          | VCC12         | -          |                    | VCC12         | -          |                    |
| B6          | A_HDINP1_L    | -          | PCS 360 CH 1 IN P  | A_HDINP1_L    | -          | PCS 360 CH 1 IN P  |
| B5          | A_HDINN1_L    | -          | PCS 360 CH 1 IN N  | A_HDINN1_L    | -          | PCS 360 CH 1 IN N  |
| A6          | A_HDOUTP1_L   | -          | PCS 360 CH 1 OUT P | A_HDOUTP1_L   | -          | PCS 360 CH 1 OUT P |
| D7          | VCC12         | -          |                    | VCC12         | -          |                    |
| A5          | A_HDOUTN1_L   | -          | PCS 360 CH 1 OUT N | A_HDOUTN1_L   | -          | PCS 360 CH 1 OUT N |
| C5          | A_VDDOB1_L    | -          |                    | A_VDDOB1_L    | -          |                    |
| A4          | A_HDOUTN0_L   | -          | PCS 360 CH 0 OUT N | A_HDOUTN0_L   | -          | PCS 360 CH 0 OUT N |
| C4          | A_VDDOB0_L    | -          |                    | A_VDDOB0_L    | -          |                    |
| A3          | A_HDOUTP0_L   | -          | PCS 360 CH 0 OUT P | A_HDOUTP0_L   | -          | PCS 360 CH 0 OUT P |
| E6          | VCC12         | -          |                    | VCC12         | -          |                    |
| B4          | A_HDINN0_L    | -          | PCS 360 CH 0 IN N  | A_HDINN0_L    | -          | PCS 360 CH 0 IN N  |
| B3          | A_HDINP0_L    | -          | PCS 360 CH 0 IN P  | A_HDINP0_L    | -          | PCS 360 CH 0 IN P  |
| C3          | A_VDDIB0_L    | -          |                    | A_VDDIB0_L    | -          |                    |
| D6          | VCC12         | -          |                    | VCC12         | -          |                    |
| L5          | NC            | -          |                    | PL21A         | 7          |                    |
| M5          | NC            | -          |                    | PL21B         | 7          |                    |
| G2          | NC            | -          |                    | PL20A         | 7          |                    |



**LFSC/M25, LFSC/M40 Logic Signal Connections: 1020 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M25      |            |                             | LFSC/M40      |            |                             |
|-------------|---------------|------------|-----------------------------|---------------|------------|-----------------------------|
|             | Ball Function | VCCIO Bank | Dual Function               | Ball Function | VCCIO Bank | Dual Function               |
| AJ1         | PB69A         | 4          | LRC_PLLT_IN_A/LRC_PLLT_FB_B | PB85A         | 4          | LRC_PLLT_IN_A/LRC_PLLT_FB_B |
| AK1         | PB69B         | 4          | LRC_PLLC_IN_A/LRC_PLLC_FB_B | PB85B         | 4          | LRC_PLLC_IN_A/LRC_PLLC_FB_B |
| AJ2         | PB69C         | 4          | LRC_DLLT_IN_D/LRC_DLLT_FB_C | PB85C         | 4          | LRC_DLLT_IN_D/LRC_DLLT_FB_C |
| AH3         | PB69D         | 4          | LRC_DLLC_IN_D/LRC_DLLC_FB_C | PB85D         | 4          | LRC_DLLC_IN_D/LRC_DLLC_FB_C |
| AH1         | PROBE_VCC     | -          |                             | PROBE_VCC     | -          |                             |
| AH2         | PROBE_GND     | -          |                             | PROBE_GND     | -          |                             |
| AD9         | PR57D         | 3          | LRC_PLLC_IN_B/LRC_PLLC_FB_A | PR71D         | 3          | LRC_PLLC_IN_B/LRC_PLLC_FB_A |
| AC10        | PR57C         | 3          | LRC_PLLT_IN_B/LRC_PLLT_FB_A | PR71C         | 3          | LRC_PLLT_IN_B/LRC_PLLT_FB_A |
| AG2         | PR57B         | 3          | LRC_DLLC_IN_F/LRC_DLLC_FB_E | PR71B         | 3          | LRC_DLLC_IN_F/LRC_DLLC_FB_E |
| AG1         | PR57A         | 3          | LRC_DLLT_IN_F/LRC_DLLT_FB_E | PR71A         | 3          | LRC_DLLT_IN_F/LRC_DLLT_FB_E |
| AD8         | PR56D         | 3          |                             | PR70D         | 3          |                             |
| AC9         | PR56C         | 3          |                             | PR70C         | 3          |                             |
| AF2         | PR56B         | 3          |                             | PR70B         | 3          |                             |
| AF1         | PR56A         | 3          |                             | PR70A         | 3          |                             |
| AE6         | PR55D         | 3          | LRC_DLLC_IN_E/LRC_DLLC_FB_F | PR69D         | 3          | LRC_DLLC_IN_E/LRC_DLLC_FB_F |
| AE7         | PR55C         | 3          | LRC_DLLT_IN_E/LRC_DLLT_FB_F | PR69C         | 3          | LRC_DLLT_IN_E/LRC_DLLT_FB_F |
| AE1         | PR55B         | 3          |                             | PR69B         | 3          |                             |
| AE2         | PR55A         | 3          |                             | PR69A         | 3          |                             |
| AB8         | PR53D         | 3          |                             | PR67D         | 3          |                             |
| AC8         | PR53C         | 3          |                             | PR67C         | 3          |                             |
| AE4         | PR53B         | 3          |                             | PR67B         | 3          |                             |
| AE3         | PR53A         | 3          |                             | PR67A         | 3          |                             |
| AA10        | PR52D         | 3          |                             | PR66D         | 3          |                             |
| AA9         | PR52C         | 3          |                             | PR66C         | 3          |                             |
| AD1         | PR52B         | 3          |                             | PR66B         | 3          |                             |
| AC1         | PR52A         | 3          |                             | PR66A         | 3          |                             |
| AC7         | PR51D         | 3          | VREF2_3                     | PR65D         | 3          | VREF2_3                     |
| AB7         | PR51C         | 3          |                             | PR65C         | 3          |                             |
| AD5         | PR51B         | 3          |                             | PR65B         | 3          |                             |
| AC5         | PR51A         | 3          |                             | PR65A         | 3          |                             |
| AE5         | PR49D         | 3          |                             | PR62D         | 3          |                             |
| AF5         | PR49C         | 3          |                             | PR62C         | 3          |                             |
| AD3         | PR49B         | 3          |                             | PR62B         | 3          |                             |
| AD4         | PR49A         | 3          |                             | PR62A         | 3          |                             |
| Y10         | PR48D         | 3          |                             | PR61D         | 3          |                             |
| Y9          | PR48C         | 3          |                             | PR61C         | 3          |                             |
| AC2         | PR48B         | 3          |                             | PR61B         | 3          |                             |
| AD2         | PR48A         | 3          |                             | PR61A         | 3          |                             |
| AC6         | PR47D         | 3          |                             | PR60D         | 3          |                             |
| AB6         | PR47C         | 3          |                             | PR60C         | 3          |                             |
| AA1         | PR47B         | 3          |                             | PR60B         | 3          |                             |
| AB1         | PR47A         | 3          |                             | PR60A         | 3          |                             |
| AA5         | PR44D         | 3          |                             | PR53D         | 3          |                             |
| AB5         | PR44C         | 3          |                             | PR53C         | 3          |                             |
| Y1          | PR44B         | 3          |                             | PR53B         | 3          |                             |
| W1          | PR44A         | 3          |                             | PR53A         | 3          |                             |
| W8          | PR43D         | 3          |                             | PR52D         | 3          |                             |
| Y7          | PR43C         | 3          |                             | PR52C         | 3          |                             |
| Y5          | PR43B         | 3          |                             | PR52B         | 3          |                             |
| W5          | PR43A         | 3          |                             | PR52A         | 3          |                             |

**LFSC/M25, LFSC/M40 Logic Signal Connections: 1020 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M25      |            |               | LFSC/M40      |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| Y6          | PR42D         | 3          | DIFFR_3       | PR51D         | 3          | DIFFR_3       |
| W6          | PR42C         | 3          |               | PR51C         | 3          |               |
| Y2          | PR42B         | 3          |               | PR51B         | 3          |               |
| W2          | PR42A         | 3          |               | PR51A         | 3          |               |
| W7          | PR40D         | 3          |               | PR49D         | 3          |               |
| V8          | PR40C         | 3          |               | PR49C         | 3          |               |
| W4          | PR40B         | 3          |               | PR49B         | 3          |               |
| W3          | PR40A         | 3          |               | PR49A         | 3          |               |
| V5          | PR39D         | 3          |               | PR48D         | 3          |               |
| U6          | PR39C         | 3          |               | PR48C         | 3          |               |
| V3          | PR39B         | 3          |               | PR48B         | 3          |               |
| V4          | PR39A         | 3          |               | PR48A         | 3          |               |
| V10         | PR38D         | 3          |               | PR47D         | 3          |               |
| V9          | PR38C         | 3          |               | PR47C         | 3          |               |
| V2          | PR38B         | 3          |               | PR47B         | 3          |               |
| V1          | PR38A         | 3          |               | PR47A         | 3          |               |
| U8          | PR36D         | 3          |               | PR45D         | 3          |               |
| U7          | PR36C         | 3          |               | PR45C         | 3          |               |
| U2          | PR36B         | 3          |               | PR45B         | 3          |               |
| U1          | PR36A         | 3          |               | PR45A         | 3          |               |
| U5          | PR35D         | 3          |               | PR44D         | 3          |               |
| T6          | PR35C         | 3          |               | PR44C         | 3          |               |
| T1          | PR35B         | 3          |               | PR44B         | 3          |               |
| T2          | PR35A         | 3          |               | PR44A         | 3          |               |
| U9          | PR34D         | 3          |               | PR43D         | 3          |               |
| U10         | PR34C         | 3          | VREF1_3       | PR43C         | 3          | VREF1_3       |
| R1          | PR34B         | 3          |               | PR43B         | 3          |               |
| R2          | PR34A         | 3          |               | PR43A         | 3          |               |
| T7          | PR31D         | 3          | PCLKC3_2      | PR40D         | 3          | PCLKC3_2      |
| T8          | PR31C         | 3          | PCLKT3_2      | PR40C         | 3          | PCLKT3_2      |
| R4          | PR31B         | 3          |               | PR40B         | 3          |               |
| R3          | PR31A         | 3          |               | PR40A         | 3          |               |
| T5          | PR30D         | 3          | PCLKC3_3      | PR39D         | 3          | PCLKC3_3      |
| R5          | PR30C         | 3          | PCLKT3_3      | PR39C         | 3          | PCLKT3_3      |
| P2          | PR30B         | 3          |               | PR39B         | 3          |               |
| P1          | PR30A         | 3          |               | PR39A         | 3          |               |
| T9          | PR29D         | 3          | PCLKC3_1      | PR38D         | 3          | PCLKC3_1      |
| T10         | PR29C         | 3          | PCLKT3_1      | PR38C         | 3          | PCLKT3_1      |
| P4          | PR29B         | 3          | PCLKC3_0      | PR38B         | 3          | PCLKC3_0      |
| P3          | PR29A         | 3          | PCLKT3_0      | PR38A         | 3          | PCLKT3_0      |
| P5          | PR27D         | 2          | PCLKC2_2      | PR36D         | 2          | PCLKC2_2      |
| P6          | PR27C         | 2          | PCLKT2_2      | PR36C         | 2          | PCLKT2_2      |
| N1          | PR27B         | 2          | PCLKC2_0      | PR36B         | 2          | PCLKC2_0      |
| N2          | PR27A         | 2          | PCLKT2_0      | PR36A         | 2          | PCLKT2_0      |
| R9          | PR26D         | 2          | PCLKC2_3      | PR35D         | 2          | PCLKC2_3      |
| R8          | PR26C         | 2          | PCLKT2_3      | PR35C         | 2          | PCLKT2_3      |
| M1          | PR26B         | 2          | PCLKC2_1      | PR35B         | 2          | PCLKC2_1      |
| L1          | PR26A         | 2          | PCLKT2_1      | PR35A         | 2          | PCLKT2_1      |
| N9          | PR25D         | 2          | DIFFR_2       | PR23D         | 2          | DIFFR_2       |
| M9          | PR25C         | 2          | VREF1_2       | PR23C         | 2          | VREF1_2       |

**LFSC/M25, LFSC/M40 Logic Signal Connections: 1020 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M25      |            |               | LFSC/M40      |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| P10         | GND           | -          |               | GND           | -          |               |
| P13         | GND           | -          |               | GND           | -          |               |
| P15         | GND           | -          |               | GND           | -          |               |
| P18         | GND           | -          |               | GND           | -          |               |
| P20         | GND           | -          |               | GND           | -          |               |
| P24         | GND           | -          |               | GND           | -          |               |
| R12         | GND           | -          |               | GND           | -          |               |
| R14         | GND           | -          |               | GND           | -          |               |
| R16         | GND           | -          |               | GND           | -          |               |
| R17         | GND           | -          |               | GND           | -          |               |
| R19         | GND           | -          |               | GND           | -          |               |
| R21         | GND           | -          |               | GND           | -          |               |
| R26         | GND           | -          |               | GND           | -          |               |
| R6          | GND           | -          |               | GND           | -          |               |
| T15         | GND           | -          |               | GND           | -          |               |
| T18         | GND           | -          |               | GND           | -          |               |
| T30         | GND           | -          |               | GND           | -          |               |
| T4          | GND           | -          |               | GND           | -          |               |
| U15         | GND           | -          |               | GND           | -          |               |
| U18         | GND           | -          |               | GND           | -          |               |
| U29         | GND           | -          |               | GND           | -          |               |
| U3          | GND           | -          |               | GND           | -          |               |
| V12         | GND           | -          |               | GND           | -          |               |
| V14         | GND           | -          |               | GND           | -          |               |
| V16         | GND           | -          |               | GND           | -          |               |
| V17         | GND           | -          |               | GND           | -          |               |
| V19         | GND           | -          |               | GND           | -          |               |
| V21         | GND           | -          |               | GND           | -          |               |
| V27         | GND           | -          |               | GND           | -          |               |
| V7          | GND           | -          |               | GND           | -          |               |
| W13         | GND           | -          |               | GND           | -          |               |
| W15         | GND           | -          |               | GND           | -          |               |
| W18         | GND           | -          |               | GND           | -          |               |
| W20         | GND           | -          |               | GND           | -          |               |
| W23         | GND           | -          |               | GND           | -          |               |
| W9          | GND           | -          |               | GND           | -          |               |
| Y12         | GND           | -          |               | GND           | -          |               |
| Y14         | GND           | -          |               | GND           | -          |               |
| Y19         | GND           | -          |               | GND           | -          |               |
| Y21         | GND           | -          |               | GND           | -          |               |
| Y30         | GND           | -          |               | GND           | -          |               |
| Y4          | GND           | -          |               | GND           | -          |               |
| N13         | VCC           | -          |               | VCC           | -          |               |
| N15         | VCC           | -          |               | VCC           | -          |               |
| N16         | VCC           | -          |               | VCC           | -          |               |
| N17         | VCC           | -          |               | VCC           | -          |               |
| N18         | VCC           | -          |               | VCC           | -          |               |
| N20         | VCC           | -          |               | VCC           | -          |               |
| P14         | VCC           | -          |               | VCC           | -          |               |
| P16         | VCC           | -          |               | VCC           | -          |               |

**LFSC/M40, LFSC/M80 Logic Signal Connections: 1152 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M40      |            |               | LFSC/M80      |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AH11        | PB57D         | 4          |               | PB79D         | 4          |               |
| AN13        | PB58A         | 4          | PCLKT4_3      | PB80A         | 4          | PCLKT4_3      |
| AN12        | PB58B         | 4          | PCLKC4_3      | PB80B         | 4          | PCLKC4_3      |
| AD14        | PB58C         | 4          | PCLKT4_4      | PB80C         | 4          | PCLKT4_4      |
| AD15        | PB58D         | 4          | PCLKC4_4      | PB80D         | 4          | PCLKC4_4      |
| AP13        | PB61A         | 4          |               | PB73A         | 4          |               |
| AP12        | PB61B         | 4          |               | PB73B         | 4          |               |
| AK13        | PB61C         | 4          |               | PB73C         | 4          |               |
| AK12        | PB61D         | 4          |               | PB73D         | 4          |               |
| AP11        | PB62A         | 4          |               | PB83A         | 4          |               |
| AP10        | PB62B         | 4          |               | PB83B         | 4          |               |
| AN11        | PB63A         | 4          |               | PB99A         | 4          |               |
| AN10        | PB63B         | 4          |               | PB99B         | 4          |               |
| AF14        | PB63C         | 4          |               | PB99C         | 4          |               |
| AF13        | PB63D         | 4          |               | PB99D         | 4          |               |
| AM10        | PB67A         | 4          |               | PB101A        | 4          |               |
| AM9         | PB67B         | 4          |               | PB101B        | 4          |               |
| AE14        | PB67C         | 4          |               | PB101C        | 4          |               |
| AE13        | PB67D         | 4          |               | PB101D        | 4          |               |
| AP9         | PB69A         | 4          |               | PB104A        | 4          |               |
| AP8         | PB69B         | 4          |               | PB104B        | 4          |               |
| AK11        | PB69C         | 4          |               | PB104C        | 4          |               |
| AK10        | PB69D         | 4          |               | PB104D        | 4          |               |
| AL10        | PB70A         | 4          |               | PB107A        | 4          |               |
| AL9         | PB70B         | 4          |               | PB107B        | 4          |               |
| AF12        | PB70C         | 4          |               | PB107C        | 4          |               |
| AF11        | PB70D         | 4          |               | PB107D        | 4          |               |
| AN9         | PB73A         | 4          |               | PB109A        | 4          |               |
| AN8         | PB73B         | 4          |               | PB109B        | 4          |               |
| AG11        | PB73C         | 4          |               | PB109C        | 4          |               |
| AG10        | PB73D         | 4          |               | PB109D        | 4          |               |
| AP7         | PB74A         | 4          |               | PB111A        | 4          |               |
| AP6         | PB74B         | 4          |               | PB111B        | 4          |               |
| AG13        | PB74C         | 4          |               | PB111C        | 4          |               |
| AG12        | PB74D         | 4          |               | PB111D        | 4          |               |
| AN7         | PB75A         | 4          |               | PB113A        | 4          |               |
| AN6         | PB75B         | 4          |               | PB113B        | 4          |               |
| AK9         | PB75C         | 4          |               | PB113C        | 4          |               |
| AK8         | PB75D         | 4          |               | PB113D        | 4          |               |
| AP5         | PB77A         | 4          |               | PB115A        | 4          |               |
| AP4         | PB77B         | 4          |               | PB115B        | 4          |               |
| AD11        | PB77C         | 4          |               | PB115C        | 4          |               |
| AE11        | PB77D         | 4          |               | PB115D        | 4          |               |
| AM7         | PB78A         | 4          |               | PB117A        | 4          |               |
| AM6         | PB78B         | 4          |               | PB117B        | 4          |               |

**LFSC/M40, LFSC/M80 Logic Signal Connections: 1152 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M40      |            |                    | LFSC/M80      |            |                    |
|-------------|---------------|------------|--------------------|---------------|------------|--------------------|
|             | Ball Function | VCCIO Bank | Dual Function      | Ball Function | VCCIO Bank | Dual Function      |
| C2          | VCCJ          | -          |                    | VCCJ          | -          |                    |
| M9          | TDO           | -          | TDO                | TDO           | -          | TDO                |
| L9          | TMS           | -          |                    | TMS           | -          |                    |
| D1          | TCK           | -          |                    | TCK           | -          |                    |
| C1          | TDI           | -          |                    | TDI           | -          |                    |
| J8          | PROGRAMN      | 1          |                    | PROGRAMN      | 1          |                    |
| K8          | MPIIRQN       | 1          | CFGIRQN/MPI_IRQ_N  | MPIIRQN       | 1          | CFGIRQN/MPI_IRQ_N  |
| B2          | CCLK          | 1          |                    | CCLK          | 1          |                    |
| H9          | RESP_URC      | -          |                    | RESP_URC      | -          |                    |
| H10         | VCC12         | -          |                    | VCC12         | -          |                    |
| H8          | A_REFCLKN_R   | -          |                    | A_REFCLKN_R   | -          |                    |
| G8          | A_REFCLKP_R   | -          |                    | A_REFCLKP_R   | -          |                    |
| C3          | VCC12         | -          |                    | VCC12         | -          |                    |
| D3          | A_VDDIB0_R    | -          |                    | A_VDDIB0_R    | -          |                    |
| A3          | A_HDINP0_R    | -          | PCS 3E0 CH 0 IN P  | A_HDINP0_R    | -          | PCS 3E0 CH 0 IN P  |
| B3          | A_HDINN0_R    | -          | PCS 3E0 CH 0 IN N  | A_HDINN0_R    | -          | PCS 3E0 CH 0 IN N  |
| E5          | VCC12         | -          |                    | VCC12         | -          |                    |
| A4          | A_HDOUTP0_R   | -          | PCS 3E0 CH 0 OUT P | A_HDOUTP0_R   | -          | PCS 3E0 CH 0 OUT P |
| F6          | A_VDDOB0_R    | -          |                    | A_VDDOB0_R    | -          |                    |
| B4          | A_HDOUTN0_R   | -          | PCS 3E0 CH 0 OUT N | A_HDOUTN0_R   | -          | PCS 3E0 CH 0 OUT N |
| F7          | A_VDDOB1_R    | -          |                    | A_VDDOB1_R    | -          |                    |
| B5          | A_HDOUTN1_R   | -          | PCS 3E0 CH 1 OUT N | A_HDOUTN1_R   | -          | PCS 3E0 CH 1 OUT N |
| E6          | VCC12         | -          |                    | VCC12         | -          |                    |
| A5          | A_HDOUTP1_R   | -          | PCS 3E0 CH 1 OUT P | A_HDOUTP1_R   | -          | PCS 3E0 CH 1 OUT P |
| B6          | A_HDINN1_R    | -          | PCS 3E0 CH 1 IN N  | A_HDINN1_R    | -          | PCS 3E0 CH 1 IN N  |
| A6          | A_HDINP1_R    | -          | PCS 3E0 CH 1 IN P  | A_HDINP1_R    | -          | PCS 3E0 CH 1 IN P  |
| C6          | VCC12         | -          |                    | VCC12         | -          |                    |
| D4          | A_VDDIB1_R    | -          |                    | A_VDDIB1_R    | -          |                    |
| C7          | VCC12         | -          |                    | VCC12         | -          |                    |
| D5          | A_VDDIB2_R    | -          |                    | A_VDDIB2_R    | -          |                    |
| A7          | A_HDINP2_R    | -          | PCS 3E0 CH 2 IN P  | A_HDINP2_R    | -          | PCS 3E0 CH 2 IN P  |
| B7          | A_HDINN2_R    | -          | PCS 3E0 CH 2 IN N  | A_HDINN2_R    | -          | PCS 3E0 CH 2 IN N  |
| E7          | VCC12         | -          |                    | VCC12         | -          |                    |
| A8          | A_HDOUTP2_R   | -          | PCS 3E0 CH 2 OUT P | A_HDOUTP2_R   | -          | PCS 3E0 CH 2 OUT P |
| F8          | A_VDDOB2_R    | -          |                    | A_VDDOB2_R    | -          |                    |
| B8          | A_HDOUTN2_R   | -          | PCS 3E0 CH 2 OUT N | A_HDOUTN2_R   | -          | PCS 3E0 CH 2 OUT N |
| F9          | A_VDDOB3_R    | -          |                    | A_VDDOB3_R    | -          |                    |
| B9          | A_HDOUTN3_R   | -          | PCS 3E0 CH 3 OUT N | A_HDOUTN3_R   | -          | PCS 3E0 CH 3 OUT N |
| E8          | VCC12         | -          |                    | VCC12         | -          |                    |
| A9          | A_HDOUTP3_R   | -          | PCS 3E0 CH 3 OUT P | A_HDOUTP3_R   | -          | PCS 3E0 CH 3 OUT P |
| B10         | A_HDINN3_R    | -          | PCS 3E0 CH 3 IN N  | A_HDINN3_R    | -          | PCS 3E0 CH 3 IN N  |
| A10         | A_HDINP3_R    | -          | PCS 3E0 CH 3 IN P  | A_HDINP3_R    | -          | PCS 3E0 CH 3 IN P  |
| C10         | VCC12         | -          |                    | VCC12         | -          |                    |
| D6          | A_VDDIB3_R    | -          |                    | A_VDDIB3_R    | -          |                    |
| G10         | VCC12         | -          |                    | VCC12         | -          |                    |

**LFSC/M40, LFSC/M80 Logic Signal Connections: 1152 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M40      |            |               | LFSC/M80      |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AB15        | VCC12         | -          |               | VCC12         | -          |               |
| AB20        | VCC12         | -          |               | VCC12         | -          |               |
| N15         | VCC12         | -          |               | VCC12         | -          |               |
| N20         | VCC12         | -          |               | VCC12         | -          |               |
| R13         | VCC12         | -          |               | VCC12         | -          |               |
| R22         | VCC12         | -          |               | VCC12         | -          |               |
| Y13         | VCC12         | -          |               | VCC12         | -          |               |
| Y22         | VCC12         | -          |               | VCC12         | -          |               |
| AA12        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AA23        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB12        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB16        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB17        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB18        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB19        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AB23        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC12        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC13        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| Y19         | GND           | -          |               | GND           | -          |               |
| AC14        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC17        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC21        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC22        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| AC23        | VCCAUX        | -          |               | VCCAUX        | -          |               |
| M13         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| M14         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| M18         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| M21         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| M22         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N12         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N16         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N17         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N18         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N19         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| N23         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| P12         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| P23         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| T13         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| T22         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| U12         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| U13         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| U22         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| V13         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| V22         | VCCAUX        | -          |               | VCCAUX        | -          |               |
| V23         | VCCAUX        | -          |               | VCCAUX        | -          |               |

**LFSC/M115 Logic Signal Connections: 1152 fcBGA<sup>1, 2</sup>**

| Ball Number | LFSC/M115     |            |               |
|-------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function |
| AP27        | PB26A         | 5          |               |
| AP26        | PB26B         | 5          |               |
| AK25        | PB26C         | 5          |               |
| AK24        | PB26D         | 5          |               |
| AN25        | PB29A         | 5          |               |
| AN24        | PB29B         | 5          |               |
| AE22        | PB29C         | 5          |               |
| AE21        | PB29D         | 5          |               |
| AM26        | PB31A         | 5          |               |
| AM25        | PB31B         | 5          |               |
| AF22        | PB31C         | 5          |               |
| AF21        | PB31D         | 5          |               |
| AN23        | PB47A         | 5          |               |
| AN22        | PB47B         | 5          |               |
| AP23        | PB57A         | 5          |               |
| AP22        | PB57B         | 5          |               |
| AG21        | PB57C         | 5          |               |
| AG20        | PB57D         | 5          |               |
| AP25        | PB50A         | 5          | PCLKT5_3      |
| AP24        | PB50B         | 5          | PCLKC5_3      |
| AD21        | PB50C         | 5          | PCLKT5_4      |
| AD20        | PB50D         | 5          | PCLKC5_4      |
| AL23        | PB51A         | 5          | PCLKT5_5      |
| AL22        | PB51B         | 5          | PCLKC5_5      |
| AH24        | PB51C         | 5          |               |
| AH23        | PB51D         | 5          |               |
| AM23        | PB53A         | 5          | PCLKT5_0      |
| AM22        | PB53B         | 5          | PCLKC5_0      |
| AJ24        | PB53C         | 5          |               |
| AJ23        | PB53D         | 5          | VREF2_5       |
| AN21        | PB54A         | 5          | PCLKT5_1      |
| AN20        | PB54B         | 5          | PCLKC5_1      |
| AE19        | PB54C         | 5          | PCLKT5_6      |
| AD19        | PB54D         | 5          | PCLKC5_6      |
| AK21        | PB55A         | 5          | PCLKT5_2      |
| AK20        | PB55B         | 5          | PCLKC5_2      |
| AK23        | PB55C         | 5          | PCLKT5_7      |
| AK22        | PB55D         | 5          | PCLKC5_7      |
| AL20        | PB58A         | 5          |               |
| AL19        | PB58B         | 5          |               |
| AG19        | PB58C         | 5          |               |
| AF19        | PB58D         | 5          |               |
| AP21        | PB61A         | 5          |               |

**LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M80      |            |               | LFSC/M115     |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AY41        | PB12A         | 5          |               | PB13A         | 5          |               |
| BA41        | PB12B         | 5          |               | PB13B         | 5          |               |
| AT39        | PB12C         | 5          |               | PB13C         | 5          |               |
| AT38        | PB12D         | 5          |               | PB13D         | 5          |               |
| AV37        | PB13A         | 5          |               | PB15A         | 5          |               |
| AV36        | PB13B         | 5          |               | PB15B         | 5          |               |
| AM31        | PB13C         | 5          |               | PB15C         | 5          |               |
| AM32        | PB13D         | 5          |               | PB15D         | 5          |               |
| BA40        | PB15A         | 5          |               | PB16A         | 5          |               |
| BB40        | PB15B         | 5          |               | PB16B         | 5          |               |
| AM29        | PB15C         | 5          |               | PB16C         | 5          |               |
| AL29        | PB15D         | 5          |               | PB16D         | 5          |               |
| AY39        | PB16A         | 5          |               | PB17A         | 5          |               |
| AY38        | PB16B         | 5          |               | PB17B         | 5          |               |
| AN33        | PB16C         | 5          |               | PB17C         | 5          |               |
| AN32        | PB16D         | 5          |               | PB17D         | 5          |               |
| BA39        | PB17A         | 5          |               | PB19A         | 5          |               |
| BA38        | PB17B         | 5          |               | PB19B         | 5          |               |
| AT37        | PB17C         | 5          |               | PB19C         | 5          |               |
| AT36        | PB17D         | 5          |               | PB19D         | 5          |               |
| AW36        | PB19A         | 5          |               | PB20A         | 5          |               |
| AW35        | PB19B         | 5          |               | PB20B         | 5          |               |
| AM28        | PB19C         | 5          |               | PB20C         | 5          |               |
| AL28        | PB19D         | 5          |               | PB20D         | 5          |               |
| BB38        | PB20A         | 5          |               | PB21A         | 5          |               |
| BB39        | PB20B         | 5          |               | PB21B         | 5          |               |
| AR34        | PB20C         | 5          |               | PB21C         | 5          |               |
| AR33        | PB20D         | 5          |               | PB21D         | 5          |               |
| AV35        | PB21A         | 5          |               | PB23A         | 5          |               |
| AV34        | PB21B         | 5          |               | PB23B         | 5          |               |
| AT33        | PB21C         | 5          |               | PB23C         | 5          |               |
| AT34        | PB21D         | 5          |               | PB23D         | 5          |               |
| BA37        | PB23A         | 5          |               | PB25A         | 5          |               |
| BA36        | PB23B         | 5          |               | PB25B         | 5          |               |
| AP33        | PB23C         | 5          |               | PB25C         | 5          |               |
| AP32        | PB23D         | 5          |               | PB25D         | 5          |               |
| AY36        | PB24A         | 5          |               | PB26A         | 5          |               |
| AY35        | PB24B         | 5          |               | PB26B         | 5          |               |
| AN31        | PB24C         | 5          |               | PB26C         | 5          |               |
| AN30        | PB24D         | 5          |               | PB26D         | 5          |               |
| BB37        | PB25A         | 5          |               | PB27A         | 5          |               |
| BB36        | PB25B         | 5          |               | PB27B         | 5          |               |
| AP31        | PB25C         | 5          |               | PB27C         | 5          |               |
| AP30        | PB25D         | 5          |               | PB27D         | 5          |               |
| AV33        | PB27A         | 5          |               | PB29A         | 5          |               |



**LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M80      |            |                    | LFSC/M115     |            |                    |
|-------------|---------------|------------|--------------------|---------------|------------|--------------------|
|             | Ball Function | VCCIO Bank | Dual Function      | Ball Function | VCCIO Bank | Dual Function      |
| F5          | VCC12         | -          |                    | VCC12         | -          |                    |
| B14         | C_HDOUTP3_R   | -          | PCS 3E2 CH 3 OUT P | C_HDOUTP3_R   | -          | PCS 3E2 CH 3 OUT P |
| E13         | C_HDINN3_R    | -          | PCS 3E2 CH 3 IN N  | C_HDINN3_R    | -          | PCS 3E2 CH 3 IN N  |
| D13         | C_HDINP3_R    | -          | PCS 3E2 CH 3 IN P  | C_HDINP3_R    | -          | PCS 3E2 CH 3 IN P  |
| F12         | VCC12         | -          |                    | VCC12         | -          |                    |
| G14         | C_VDDIB3_R    | -          |                    | C_VDDIB3_R    | -          |                    |
| F11         | VCC12         | -          |                    | VCC12         | -          |                    |
| K15         | C_REFCLKN_R   | -          |                    | C_REFCLKN_R   | -          |                    |
| J15         | C_REFCLKP_R   | -          |                    | C_REFCLKP_R   | -          |                    |
| G15         | VCC12         | -          |                    | VCC12         | -          |                    |
| H16         | D_VDDIB0_R    | -          |                    | D_VDDIB0_R    | -          |                    |
| D14         | D_HDINP0_R    | -          | PCS 3E3 CH 0 IN P  | D_HDINP0_R    | -          | PCS 3E3 CH 0 IN P  |
| E14         | D_HDINN0_R    | -          | PCS 3E3 CH 0 IN N  | D_HDINN0_R    | -          | PCS 3E3 CH 0 IN N  |
| F6          | VCC12         | -          |                    | VCC12         | -          |                    |
| B15         | D_HDOUTP0_R   | -          | PCS 3E3 CH 0 OUT P | D_HDOUTP0_R   | -          | PCS 3E3 CH 0 OUT P |
| M13         | D_VDDOB0_R    | -          |                    | D_VDDOB0_R    | -          |                    |
| A15         | D_HDOUTN0_R   | -          | PCS 3E3 CH 0 OUT N | D_HDOUTN0_R   | -          | PCS 3E3 CH 0 OUT N |
| F8          | D_VDDOB1_R    | -          |                    | D_VDDOB1_R    | -          |                    |
| A16         | D_HDOUTN1_R   | -          | PCS 3E3 CH 1 OUT N | D_HDOUTN1_R   | -          | PCS 3E3 CH 1 OUT N |
| F7          | VCC12         | -          |                    | VCC12         | -          |                    |
| B16         | D_HDOUTP1_R   | -          | PCS 3E3 CH 1 OUT P | D_HDOUTP1_R   | -          | PCS 3E3 CH 1 OUT P |
| F15         | D_HDINN1_R    | -          | PCS 3E3 CH 1 IN N  | D_HDINN1_R    | -          | PCS 3E3 CH 1 IN N  |
| E15         | D_HDINP1_R    | -          | PCS 3E3 CH 1 IN P  | D_HDINP1_R    | -          | PCS 3E3 CH 1 IN P  |
| K17         | VCC12         | -          |                    | VCC12         | -          |                    |
| F13         | D_VDDIB1_R    | -          |                    | D_VDDIB1_R    | -          |                    |
| C14         | VCC12         | -          |                    | VCC12         | -          |                    |
| C15         | D_VDDIB2_R    | -          |                    | D_VDDIB2_R    | -          |                    |
| D16         | D_HDINP2_R    | -          | PCS 3E3 CH 2 IN P  | D_HDINP2_R    | -          | PCS 3E3 CH 2 IN P  |
| E16         | D_HDINN2_R    | -          | PCS 3E3 CH 2 IN N  | D_HDINN2_R    | -          | PCS 3E3 CH 2 IN N  |
| C11         | VCC12         | -          |                    | VCC12         | -          |                    |
| B17         | D_HDOUTP2_R   | -          | PCS 3E3 CH 2 OUT P | D_HDOUTP2_R   | -          | PCS 3E3 CH 2 OUT P |
| C9          | D_VDDOB2_R    | -          |                    | D_VDDOB2_R    | -          |                    |
| A17         | D_HDOUTN2_R   | -          | PCS 3E3 CH 2 OUT N | D_HDOUTN2_R   | -          | PCS 3E3 CH 2 OUT N |
| D17         | D_VDDOB3_R    | -          |                    | D_VDDOB3_R    | -          |                    |
| A18         | D_HDOUTN3_R   | -          | PCS 3E3 CH 3 OUT N | D_HDOUTN3_R   | -          | PCS 3E3 CH 3 OUT N |
| C17         | VCC12         | -          |                    | VCC12         | -          |                    |
| B18         | D_HDOUTP3_R   | -          | PCS 3E3 CH 3 OUT P | D_HDOUTP3_R   | -          | PCS 3E3 CH 3 OUT P |
| F17         | D_HDINN3_R    | -          | PCS 3E3 CH 3 IN N  | D_HDINN3_R    | -          | PCS 3E3 CH 3 IN N  |
| E17         | D_HDINP3_R    | -          | PCS 3E3 CH 3 IN P  | D_HDINP3_R    | -          | PCS 3E3 CH 3 IN P  |
| F14         | VCC12         | -          |                    | VCC12         | -          |                    |
| F16         | D_VDDIB3_R    | -          |                    | D_VDDIB3_R    | -          |                    |
| G16         | VCC12         | -          |                    | VCC12         | -          |                    |
| M17         | D_REFCLKN_R   | -          |                    | D_REFCLKN_R   | -          |                    |
| L17         | D_REFCLKP_R   | -          |                    | D_REFCLKP_R   | -          |                    |
| G18         | PT77D         | 1          | HDC/SI             | PT93D         | 1          | HDC/SI             |

**LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M80      |            |                         | LFSC/M115     |            |                         |
|-------------|---------------|------------|-------------------------|---------------|------------|-------------------------|
|             | Ball Function | VCCIO Bank | Dual Function           | Ball Function | VCCIO Bank | Dual Function           |
| H18         | PT77C         | 1          | LDCN/SCS                | PT93C         | 1          | LDCN/SCS                |
| F18         | PT77B         | 1          | D8/MPI_DATA8            | PT93B         | 1          | D8/MPI_DATA8            |
| E18         | PT77A         | 1          | CS1/MPI_CS1             | PT93A         | 1          | CS1/MPI_CS1             |
| H19         | PT75D         | 1          | D9/MPI_DATA9            | PT90D         | 1          | D9/MPI_DATA9            |
| G19         | PT75C         | 1          | D10/MPI_DATA10          | PT90C         | 1          | D10/MPI_DATA10          |
| D19         | PT75B         | 1          | CS0N/MPI_CS0N           | PT90B         | 1          | CS0N/MPI_CS0N           |
| D18         | PT75A         | 1          | RDN/MPI_STRB_N          | PT90A         | 1          | RDN/MPI_STRB_N          |
| J20         | PT74D         | 1          | WRN/MPI_WR_N            | PT89D         | 1          | WRN/MPI_WR_N            |
| K20         | PT74C         | 1          | D7/MPI_DATA7            | PT89C         | 1          | D7/MPI_DATA7            |
| E19         | PT74B         | 1          | D6/MPI_DATA6            | PT89B         | 1          | D6/MPI_DATA6            |
| F19         | PT74A         | 1          | D5/MPI_DATA5            | PT89A         | 1          | D5/MPI_DATA5            |
| K18         | PT73D         | 1          | D4/MPI_DATA4            | PT87D         | 1          | D4/MPI_DATA4            |
| J18         | PT73C         | 1          | D3/MPI_DATA3            | PT87C         | 1          | D3/MPI_DATA3            |
| A19         | PT73B         | 1          | D2/MPI_DATA2            | PT87B         | 1          | D2/MPI_DATA2            |
| B19         | PT73A         | 1          | D1/MPI_DATA1            | PT87A         | 1          | D1/MPI_DATA1            |
| H17         | PT71D         | 1          | D16/PCLKC1_3/MPI_DATA16 | PT86D         | 1          | D16/PCLKC1_3/MPI_DATA16 |
| J17         | PT71C         | 1          | D17/PCLKT1_3/MPI_DATA17 | PT86C         | 1          | D17/PCLKT1_3/MPI_DATA17 |
| B20         | PT71B         | 1          | D0/MPI_DATA0            | PT86B         | 1          | D0/MPI_DATA0            |
| C20         | PT71A         | 1          | QOUT/CEON               | PT86A         | 1          | QOUT/CEON               |
| M20         | PT70D         | 1          | VREF2_1                 | PT83D         | 1          | VREF2_1                 |
| L20         | PT70C         | 1          | D18/MPI_DATA18          | PT83C         | 1          | D18/MPI_DATA18          |
| F20         | PT70B         | 1          | DOUT                    | PT83B         | 1          | DOUT                    |
| G20         | PT70A         | 1          | MCA_DONE_IN             | PT83A         | 1          | MCA_DONE_IN             |
| K19         | PT69D         | 1          | D19/PCLKC1_2/MPI_DATA19 | PT81D         | 1          | D19/PCLKC1_2/MPI_DATA19 |
| J19         | PT69C         | 1          | D20/PCLKT1_2/MPI_DATA20 | PT81C         | 1          | D20/PCLKT1_2/MPI_DATA20 |
| D20         | PT69B         | 1          | MCA_CLK_P1_OUT          | PT81B         | 1          | MCA_CLK_P1_OUT          |
| E20         | PT69A         | 1          | MCA_CLK_P1_IN           | PT81A         | 1          | MCA_CLK_P1_IN           |
| H21         | PT67D         | 1          | D21/PCLKC1_1/MPI_DATA21 | PT78D         | 1          | D21/PCLKC1_1/MPI_DATA21 |
| G21         | PT67C         | 1          | D22/PCLKT1_1/MPI_DATA22 | PT78C         | 1          | D22/PCLKT1_1/MPI_DATA22 |
| B21         | PT67B         | 1          | MCA_CLK_P2_OUT          | PT78B         | 1          | MCA_CLK_P2_OUT          |
| C21         | PT67A         | 1          | MCA_CLK_P2_IN           | PT78A         | 1          | MCA_CLK_P2_IN           |
| M21         | PT66D         | 1          | MCA_DONE_OUT            | PT75D         | 1          | MCA_DONE_OUT            |
| L21         | PT66C         | 1          | BUSYN/RCLK/SCK          | PT75C         | 1          | BUSYN/RCLK/SCK          |
| A21         | PT66B         | 1          | DP0/MPI_PAR0            | PT75B         | 1          | DP0/MPI_PAR0            |
| A20         | PT66A         | 1          | MPI_TA                  | PT75A         | 1          | MPI_TA                  |
| J21         | PT65D         | 1          | D23/MPI_DATA23          | PT73D         | 1          | D23/MPI_DATA23          |
| K21         | PT65C         | 1          | DP2/MPI_PAR2            | PT73C         | 1          | DP2/MPI_PAR2            |
| E21         | PT65B         | 1          | PCLKC1_0                | PT73B         | 1          | PCLKC1_0                |
| F21         | PT65A         | 1          | PCLKT1_0/MPI_CLK        | PT73A         | 1          | PCLKT1_0/MPI_CLK        |
| G22         | PT63D         | 1          | DP3/PCLKC1_4/MPI_PAR3   | PT71D         | 1          | DP3/PCLKC1_4/MPI_PAR3   |
| H22         | PT63C         | 1          | D24/PCLKT1_4/MPI_DATA24 | PT71C         | 1          | D24/PCLKT1_4/MPI_DATA24 |
| A23         | PT63B         | 1          | MPI_RETRY               | PT71B         | 1          | MPI_RETRY               |
| A22         | PT63A         | 1          | A0/MPI_ADDR14           | PT71A         | 1          | A0/MPI_ADDR14           |
| L22         | PT61D         | 1          | A1/MPI_ADDR15           | PT69D         | 1          | A1/MPI_ADDR15           |
| M22         | PT61C         | 1          | A2/MPI_ADDR16           | PT69C         | 1          | A2/MPI_ADDR16           |

**LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M80      |            |                    | LFSC/M115     |            |                    |
|-------------|---------------|------------|--------------------|---------------|------------|--------------------|
|             | Ball Function | VCCIO Bank | Dual Function      | Ball Function | VCCIO Bank | Dual Function      |
| E37         | B_HDINN0_L    | -          | PCS 361 CH 0 IN N  | B_HDINN0_L    | -          | PCS 361 CH 0 IN N  |
| D37         | B_HDINP0_L    | -          | PCS 361 CH 0 IN P  | B_HDINP0_L    | -          | PCS 361 CH 0 IN P  |
| F34         | B_VDDIB0_L    | -          |                    | B_VDDIB0_L    | -          |                    |
| N29         | VCC12         | -          |                    | VCC12         | -          |                    |
| L30         | A_VDDIB3_L    | -          |                    | A_VDDIB3_L    | -          |                    |
| K31         | VCC12         | -          |                    | VCC12         | -          |                    |
| D38         | A_HDINP3_L    | -          | PCS 360 CH 3 IN P  | A_HDINP3_L    | -          | PCS 360 CH 3 IN P  |
| E38         | A_HDINN3_L    | -          | PCS 360 CH 3 IN N  | A_HDINN3_L    | -          | PCS 360 CH 3 IN N  |
| A37         | A_HDOUTP3_L   | -          | PCS 360 CH 3 OUT P | A_HDOUTP3_L   | -          | PCS 360 CH 3 OUT P |
| G37         | VCC12         | -          |                    | VCC12         | -          |                    |
| B37         | A_HDOUTN3_L   | -          | PCS 360 CH 3 OUT N | A_HDOUTN3_L   | -          | PCS 360 CH 3 OUT N |
| L33         | A_VDDOB3_L    | -          |                    | A_VDDOB3_L    | -          |                    |
| B38         | A_HDOUTN2_L   | -          | PCS 360 CH 2 OUT N | A_HDOUTN2_L   | -          | PCS 360 CH 2 OUT N |
| D41         | A_VDDOB2_L    | -          |                    | A_VDDOB2_L    | -          |                    |
| A38         | A_HDOUTP2_L   | -          | PCS 360 CH 2 OUT P | A_HDOUTP2_L   | -          | PCS 360 CH 2 OUT P |
| K34         | VCC12         | -          |                    | VCC12         | -          |                    |
| E39         | A_HDINN2_L    | -          | PCS 360 CH 2 IN N  | A_HDINN2_L    | -          | PCS 360 CH 2 IN N  |
| D39         | A_HDINP2_L    | -          | PCS 360 CH 2 IN P  | A_HDINP2_L    | -          | PCS 360 CH 2 IN P  |
| M32         | A_VDDIB2_L    | -          |                    | A_VDDIB2_L    | -          |                    |
| J32         | VCC12         | -          |                    | VCC12         | -          |                    |
| E41         | A_VDDIB1_L    | -          |                    | A_VDDIB1_L    | -          |                    |
| M33         | VCC12         | -          |                    | VCC12         | -          |                    |
| D40         | A_HDINP1_L    | -          | PCS 360 CH 1 IN P  | A_HDINP1_L    | -          | PCS 360 CH 1 IN P  |
| E40         | A_HDINN1_L    | -          | PCS 360 CH 1 IN N  | A_HDINN1_L    | -          | PCS 360 CH 1 IN N  |
| B39         | A_HDOUTP1_L   | -          | PCS 360 CH 1 OUT P | A_HDOUTP1_L   | -          | PCS 360 CH 1 OUT P |
| B41         | VCC12         | -          |                    | VCC12         | -          |                    |
| A39         | A_HDOUTN1_L   | -          | PCS 360 CH 1 OUT N | A_HDOUTN1_L   | -          | PCS 360 CH 1 OUT N |
| C41         | A_VDDOB1_L    | -          |                    | A_VDDOB1_L    | -          |                    |
| B40         | A_HDOUTN0_L   | -          | PCS 360 CH 0 OUT N | A_HDOUTN0_L   | -          | PCS 360 CH 0 OUT N |
| E42         | A_VDDOB0_L    | -          |                    | A_VDDOB0_L    | -          |                    |
| A40         | A_HDOUTP0_L   | -          | PCS 360 CH 0 OUT P | A_HDOUTP0_L   | -          | PCS 360 CH 0 OUT P |
| F42         | VCC12         | -          |                    | VCC12         | -          |                    |
| D42         | A_HDINN0_L    | -          | PCS 360 CH 0 IN N  | A_HDINN0_L    | -          | PCS 360 CH 0 IN N  |
| C42         | A_HDINP0_L    | -          | PCS 360 CH 0 IN P  | A_HDINP0_L    | -          | PCS 360 CH 0 IN P  |
| H39         | A_VDDIB0_L    | -          |                    | A_VDDIB0_L    | -          |                    |
| F41         | VCC12         | -          |                    | VCC12         | -          |                    |
| P16         | VDDAX25_R     | -          |                    | VDDAX25_R     | -          |                    |
| P27         | VDDAX25_L     | -          |                    | VDDAX25_L     | -          |                    |
| K39         | NC            | -          |                    | PL32A         | 7          |                    |
| L39         | NC            | -          |                    | PL32B         | 7          |                    |
| M38         | NC            | -          |                    | PL35A         | 7          |                    |
| K40         | NC            | -          |                    | PL36A         | 7          |                    |
| L40         | NC            | -          |                    | PL36B         | 7          |                    |
| N37         | NC            | -          |                    | PL39A         | 7          |                    |
| P37         | NC            | -          |                    | PL39B         | 7          |                    |

**LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA<sup>1, 2</sup> (Cont.)**

| Ball Number | LFSC/M80      |            |               | LFSC/M115     |            |               |
|-------------|---------------|------------|---------------|---------------|------------|---------------|
|             | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| L8          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| M3          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| P7          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| R4          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| T12         | VCCIO2        | -          |               | VCCIO2        | -          |               |
| U8          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| V3          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| W11         | VCCIO2        | -          |               | VCCIO2        | -          |               |
| Y7          | VCCIO2        | -          |               | VCCIO2        | -          |               |
| AB3         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AC7         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AD11        | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AE4         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AF8         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AG12        | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AH3         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AJ7         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AK11        | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AL4         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AM8         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AP3         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AR7         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AU4         | VCCIO3        | -          |               | VCCIO3        | -          |               |
| AL16        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AM13        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AM19        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AR11        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AR17        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AT14        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AT20        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AT8         | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AW15        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AW21        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AW9         | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AY12        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AY18        | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AY6         | VCCIO4        | -          |               | VCCIO4        | -          |               |
| AL27        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AM24        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AM30        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AR26        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AR32        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AT23        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AT29        | VCCIO5        | -          |               | VCCIO5        | -          |               |
| AT35        | VCCIO5        | -          |               | VCCIO5        | -          |               |

## Commercial, Cont.

| Part Number                      | Grade | Package                  | Balls | Temp. | LUTs (K) |
|----------------------------------|-------|--------------------------|-------|-------|----------|
| LFSC3GA40E-7FF1020C <sup>1</sup> | -7    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSC3GA40E-6FF1020C <sup>1</sup> | -6    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSC3GA40E-5FF1020C <sup>1</sup> | -5    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSC3GA40E-7FFA1020C             | -7    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSC3GA40E-6FFA1020C             | -6    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSC3GA40E-5FFA1020C             | -5    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSC3GA40E-7FC1152C <sup>2</sup> | -7    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSC3GA40E-6FC1152C <sup>2</sup> | -6    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSC3GA40E-5FC1152C <sup>2</sup> | -5    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSC3GA40E-7FF1152C              | -7    | Organic fcBGA            | 1152  | COM   | 40.4     |
| LFSC3GA40E-6FF1152C              | -6    | Organic fcBGA            | 1152  | COM   | 40.4     |
| LFSC3GA40E-5FF1152C              | -5    | Organic fcBGA            | 1152  | COM   | 40.4     |

1. Converted to organic flip-chip BGA package revision 2 per [PCN #02A-10](#).

2. Converted to organic flip-chip BGA package per [PCN #01A-10](#).

| Part Number                         | Grade | Package                  | Balls | Temp. | LUTs (K) |
|-------------------------------------|-------|--------------------------|-------|-------|----------|
| LFSCM3GA40EP1-7FF1020C <sup>1</sup> | -7    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-6FF1020C <sup>1</sup> | -6    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-5FF1020C <sup>1</sup> | -5    | Organic fcBGA            | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-7FFA1020C             | -7    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-6FFA1020C             | -6    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-5FFA1020C             | -5    | Organic fcBGA Revision 2 | 1020  | COM   | 40.4     |
| LFSCM3GA40EP1-7FC1152C <sup>2</sup> | -7    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSCM3GA40EP1-6FC1152C <sup>2</sup> | -6    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSCM3GA40EP1-5FC1152C <sup>2</sup> | -5    | Ceramic fcBGA            | 1152  | COM   | 40.4     |
| LFSCM3GA40EP1-7FF1152C              | -7    | Organic fcBGA            | 1152  | COM   | 40.4     |
| LFSCM3GA40EP1-6FF1152C              | -6    | Organic fcBGA            | 1152  | COM   | 40.4     |
| LFSCM3GA40EP1-5FF1152C              | -5    | Organic fcBGA            | 1152  | COM   | 40.4     |

1. Converted to organic flip-chip BGA package revision 2 per [PCN #02A-10](#).

2. Converted to organic flip-chip BGA package per [PCN #01A-10](#).