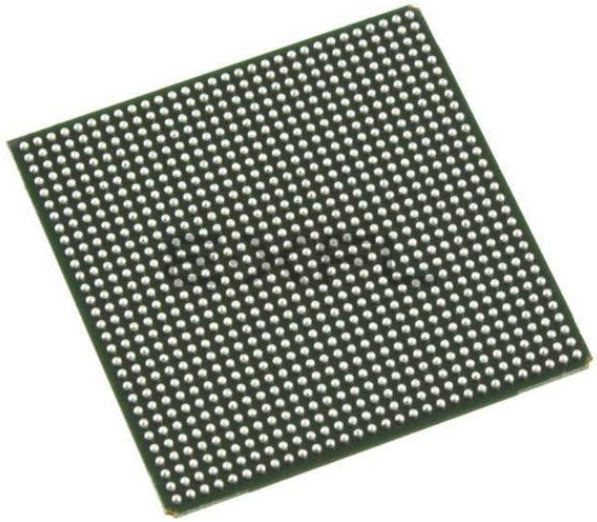
# Lattice Semiconductor Corporation - LFSCM3GA15EP1-7F900C Datasheet



**Welcome to E-XFL.COM**

## 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 | 3750 |
| Number of Logic Elements/Cells | 15000 |
| Total RAM Bits | 1054720 |
| Number of I/O | 300 |
| Number of Gates | - |
| Voltage - Supply | 0.95V ~ 1.26V |
| Mounting Type | Surface Mount |
| Operating Temperature | 0°C ~ 85°C (TJ) |
| Package / Case | 900-BBGA |
| Supplier Device Package | 900-FPBGA (31x31) |
| Purchase URL | https://www.e-xfl.com/product-detail/lattice-semiconductor/lfscm3ga15ep1-7f900c |

DLLs and dynamic glitch free clock MUXs which are required in today's high end system designs. High-speed, high-bandwidth I/O make this family ideal for high-throughput systems.

The ispLEVER® design tool from Lattice allows large complex designs to be efficiently implemented using the LatticeSC family of FPGA devices. Synthesis library support for LatticeSC is available for popular logic synthesis tools. The ispLEVER tool uses the synthesis tool output along with the constraints from its floor planning tools to place and route the design in the LatticeSC device. The ispLEVER tool extracts the timing from the routing and back-annotates it into the design for timing verification.

Lattice provides many pre-designed IP (Intellectual Property) ispLeverCORE™ modules for the LatticeSC family. By using these IPs as standardized blocks, designers are free to concentrate on the unique aspects of their design, increasing their productivity.

Innovative high-performance FPGA architecture, high-speed SERDES with PCS support, sysMEM embedded memory and high performance I/O are combined in the LatticeSC to provide excellent performance for today's leading edge systems designs. Table 1-3 details the performance of several common functions implemented within the LatticeSC.

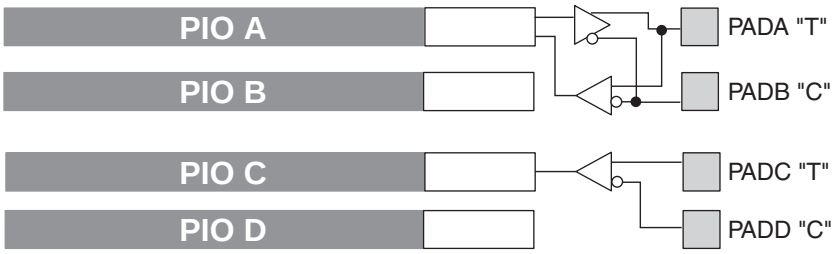
***Table1-3. Speed Performance for Typical Functions[1]***

| Functions | Performance (MHz)[2] |
|---|---|
| 32-bit Address Decoder | 539 |
| 64-bit Address Decoder | 517 |
| 32:1 Multiplexer | 779 |
| 64-bit Adder (ripple) | 353 |
| 32x8 Distributed Single Port (SP) RAM | 768 |
| 64-bit Counter (up or down counter, non-loadable) | 369 |
| True Dual-Port 1024x18 bits | 372 |
| FIFO Port A: x36 bits, B: x9 bits | 375 |

1. For additional information, see Typical Building BLock Function Performance table in this data sheet.
2. Advance information (-7 speed grade).

high-speed interfaces in the LatticeSC devices. Figure 2-18 shows how differential receivers and drivers are arranged between PIOs.

***Figure 2-18. Differential Drivers and Receivers***




*Differential Driver only available on right and left of the device.

## PIO

The PIO contains five blocks: an input register block, output register block, tristate register block, update block, and a control logic block. These blocks contain registers for both single data rate (SDR), double data rate (DDR), and shift register operation along with the necessary clock and selection logic.

## Input Register Block

The input register block contains delay elements and registers that can be used to condition signals before they are passed to the device core. Figure 2-20 show the diagram of the input register block. The signal from the PURESPEED I/O buffer (DI) enters the input register block and can be used for three purposes, as a source for the combinatorial (INDD) and clock outputs (INCK), the input into the SDR register/latch block and the input to the delay block. The output of the delay block can be used as combinatorial (INDD) and clock (INCK) outputs, an input to the DDR/Shift Register Block or an input into the SDR register block.

### Input SDR Register/Latch Block

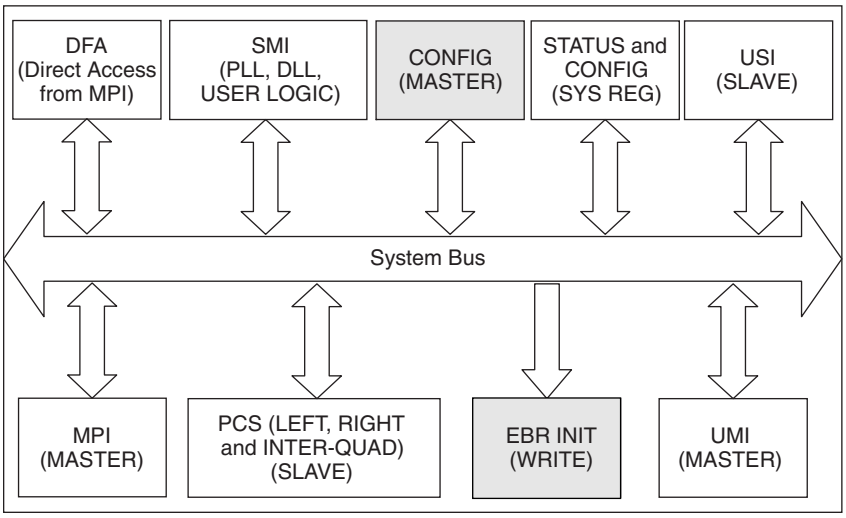
The SDR register/latch block has a latch and a register/latch that can be used in a variety of combinations to provide a registered or latched output (INFF). The latch operates off high-speed input clocks and latches data on the positive going edge. The register/latch operates off the low-speed input clock and registers/latches data on the positive going edge. Both the latch and the register/latch have a clock enable input that is driven by the input clock enable. In addition both have a variety of programmable options for set/reset including, set or reset, asynchronous or synchronous Local Set Reset LSR (LSR has precedence over CE) and Global Set Reset GSR enable or disable. The register and latch LSR inputs are driven from LSRI, which is generated from the PIO control MUX. The GSR inputs are driven from the GSR output of the PIO control MUX, which allows the global set-reset to be disabled on a PIO basis.

### Input Delay Block

The delay block uses 144 tapped delay lines to obtain coarse and fine delay resolution. These delays can be adjusted during configuration or automatically via DLL or AIL blocks. The Adaptive Input Logic (AIL) uses this delay block to adjust automatically the delay in the data path to ensure that it has sufficient setup and hold time.

The delay line in this block matches the delay line that is used in the 12 on-chip DLLs. The delay line can be set via configuration bits or driven from a calibration bus that allows the setting to be controlled either from one of the on-chip DLLs or user logic. Controlling the delay from one of the on-chip DLLs allow the delay to be calibrated to the DLL clock and hence compensated for the variations in process, voltage and temperature.

***Figure 2-31. LatticeSC System Bus Interfaces***




Several interfaces exist between the System Bus and other FPGA elements. The MPI interface acts as a bridge between the external microprocessor bus and System Bus. The MPI may work in an independent clock domain from the System Bus if the System Bus clock is not sourced from the external microprocessor clock. Pipelined operation allows high-speed memory interface to the EBR and peripheral access without the requirement for additional cycles on the bus. Burst transfers allow optimal use of the memory interface by giving advance information of the nature of the transfers.

Details for the majority of the peripherals can be found in the associated technical documentation, see details at the end of this data sheet. Additional details of the MPI are provided below.

## Microprocessor Interface (MPI)

The LatticeSC family devices have a dedicated synchronous MPI function block. The MPI is programmable to operate with PowerPC/PowerQUICC MPC860/MPC8260 series microprocessors. The MPI implements an 8-, 16-, or 32-bit interface with 1-bit, 2-bit, or 4-bit parity to the host processor (PowerPC) that can be used for configuration and read-back of the FPGA as well as for user-defined data processing and general monitoring of FPGA functions.

The control portion of the MPI is available following power-up of the FPGA if the mode pins specify MPI mode, even if the FPGA is not yet configured. The width of the data port is selectable among 8-, 16-, or 32-bit and the parity bus can be 1-, 2-, or 4-bit. In configuration mode the data and parity bus width are related to the state of the M[0:3] mode pins. For post-configuration use, the MPI must be included in the configuration bit stream by using an MPI library element in your design from the ispLEVER primitive library, or by setting the bit of the MPI configuration control register prior to the start of configuration. The user can also enable and disable the parity bus through the configuration bit stream. These pads can be used as general I/O when they are not needed for MPI use.

The MPI block also provides the capability to interface directly to the FPGA fabric with a databus after configuration.The bus protocol is still handled by the MPI block but the direct FPGA access allows high-speed block data transfers such as DMA transactions. Figure 2-32 shows one of the ways a PowerPC is connected to MPI.

## LFSC/M15 Logic Signal Connections: 256 fpBGA[1,2] (Cont.)

| Ball Number | LFSC/M15 | | |
|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function |
| M4 | PL43B | 6 | |
| P1 | PL45A | 6 | LLC_DLLT_IN_F/LLC_DLLT_FB_E |
| R1 | PL45B | 6 | LLC_DLLC_IN_F/LLC_DLLC_FB_E |
| R2 | XRES | - | |
| P3 | TEMP | 6 | |
| R3 | PB3A | 5 | LLC_PLLT_IN_A/LLC_PLLT_FB_B |
| N4 | PB3B | 5 | LLC_PLLC_IN_A/LLC_PLLC_FB_B |
| T3 | PB3C | 5 | LLC_DLLT_IN_C/LLC_DLLT_FB_D |
| T2 | PB3D | 5 | LLC_DLLC_IN_C/LLC_DLLC_FB_D |
| N5 | PB5D | 5 | VREF1_5 |
| P5 | PB8A | 5 | |
| R5 | PB8B | 5 | |
| T4 | PB9A | 5 | |
| T5 | PB9B | 5 | |
| R6 | PB12A | 5 | PCLKT5_3 |
| T6 | PB12B | 5 | PCLKC5_3 |
| L5 | PB13C | 5 | |
| P6 | PB15A | 5 | PCLKT5_0 |
| T7 | PB15B | 5 | PCLKC5_0 |
| M7 | PB15D | 5 | VREF2_5 |
| R8 | PB16A | 5 | PCLKT5_1 |
| T8 | PB16B | 5 | PCLKC5_1 |
| N7 | PB17A | 5 | PCLKT5_2 |
| N8 | PB17B | 5 | PCLKC5_2 |
| R9 | PB20A | 5 | |
| T9 | PB20B | 5 | |
| M8 | PB21A | 5 | |
| M9 | PB21B | 5 | |
| P8 | PB24A | 5 | |
| P9 | PB24B | 5 | |
| T10 | PB28A | 4 | |
| R11 | PB28B | 4 | |
| N9 | PB31A | 4 | |
| N10 | PB31B | 4 | |
| T11 | PB32A | 4 | |
| R12 | PB32B | 4 | |
| P11 | PB35A | 4 | PCLKT4_2 |
| M10 | PB35B | 4 | PCLKC4_2 |
| T12 | PB36A | 4 | PCLKT4_1 |
| P12 | PB36B | 4 | PCLKC4_1 |
| T13 | PB37A | 4 | PCLKT4_0 |
| T14 | PB37B | 4 | PCLKC4_0 |
| R15 | PB37C | 4 | VREF2_4 |

## LFSC/M15 Logic Signal Connections: 256 fpBGA[1,2] (Cont.)

| Ball Number | LFSC/M15 | | |
|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function |
| J9 | VCC | - | |
| K8 | VCC | - | |
| F6 | VCC12 | - | |
| F11 | VCC12 | - | |
| L11 | VCC12 | - | |
| L6 | VCC12 | - | |
| K7 | VCC12 | - | |
| K10 | VCC12 | - | |
| F10 | VCCAUX | - | |
| F7 | VCCAUX | - | |
| T1 | GND | - | |
| G11 | VCCAUX | - | |
| K11 | VCCAUX | - | |
| L10 | VCCAUX | - | |
| L9 | VCCAUX | - | |
| L7 | VCCAUX | - | |
| L8 | VCCAUX | - | |
| T16 | GND | - | |
| G6 | VCCAUX | - | |
| K6 | VCCAUX | - | |
| B13 | VCCIO1 | - | |
| D11 | VCCIO1 | - | |
| D14 | VCCIO1 | - | |
| F12 | VCCIO2 | - | |
| G15 | VCCIO2 | - | |
| K14 | VCCIO3 | - | |
| N15 | VCCIO3 | - | |
| M11 | VCCIO4 | - | |
| P13 | VCCIO4 | - | |
| R10 | VCCIO4 | - | |
| N6 | VCCIO5 | - | |
| P7 | VCCIO5 | - | |
| R4 | VCCIO5 | - | |
| K2 | VCCIO6 | - | |
| N3 | VCCIO6 | - | |
| F4 | VCCIO7 | - | |
| G3 | VCCIO7 | - | |
| D4 | VCC12 | - | |
| D7 | VCC12 | - | |
| D5 | VCC12 | - | |
| D6 | VCC12 | - | |

1. Differential pair grouping within a PIC is A (True) and B (Complement) and C (True) and D (Complement).
2. The LatticeSC/M15 in a 256-pin package does not support an MPI interface.

# LFSC/M15, LFSC/M25 Logic Signal Connections: 900 fpBGA[1, 2] (Cont.)

| Ball Number | LFSC/M15 | | | LFSC/M25 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| P22 | VCCIO2 | - | | VCCIO2 | - | |
| R22 | VCCIO2 | - | | VCCIO2 | - | |
| AA23 | VCCIO3 | - | | VCCIO3 | - | |
| AA24 | VCCIO3 | - | | VCCIO3 | - | |
| AB23 | VCCIO3 | - | | VCCIO3 | - | |
| AB24 | VCCIO3 | - | | VCCIO3 | - | |
| T22 | VCCIO3 | - | | VCCIO3 | - | |
| U22 | VCCIO3 | - | | VCCIO3 | - | |
| V22 | VCCIO3 | - | | VCCIO3 | - | |
| W22 | VCCIO3 | - | | VCCIO3 | - | |
| Y22 | VCCIO3 | - | | VCCIO3 | - | |
| Y23 | VCCIO3 | - | | VCCIO3 | - | |
| Y24 | VCCIO3 | - | | VCCIO3 | - | |
| AB16 | VCCIO4 | - | | VCCIO4 | - | |
| AB17 | VCCIO4 | - | | VCCIO4 | - | |
| AB18 | VCCIO4 | - | | VCCIO4 | - | |
| AB19 | VCCIO4 | - | | VCCIO4 | - | |
| AB20 | VCCIO4 | - | | VCCIO4 | - | |
| AC20 | VCCIO4 | - | | VCCIO4 | - | |
| AC21 | VCCIO4 | - | | VCCIO4 | - | |
| AC22 | VCCIO4 | - | | VCCIO4 | - | |
| AD20 | VCCIO4 | - | | VCCIO4 | - | |
| AD21 | VCCIO4 | - | | VCCIO4 | - | |
| AD22 | VCCIO4 | - | | VCCIO4 | - | |
| AB11 | VCCIO5 | - | | VCCIO5 | - | |
| AB12 | VCCIO5 | - | | VCCIO5 | - | |
| AB13 | VCCIO5 | - | | VCCIO5 | - | |
| AB14 | VCCIO5 | - | | VCCIO5 | - | |
| AB15 | VCCIO5 | - | | VCCIO5 | - | |
| AC10 | VCCIO5 | - | | VCCIO5 | - | |
| AC11 | VCCIO5 | - | | VCCIO5 | - | |
| AC9 | VCCIO5 | - | | VCCIO5 | - | |
| AD10 | VCCIO5 | - | | VCCIO5 | - | |
| AD11 | VCCIO5 | - | | VCCIO5 | - | |
| AD9 | VCCIO5 | - | | VCCIO5 | - | |
| AA7 | VCCIO6 | - | | VCCIO6 | - | |
| AA8 | VCCIO6 | - | | VCCIO6 | - | |
| AB7 | VCCIO6 | - | | VCCIO6 | - | |
| AB8 | VCCIO6 | - | | VCCIO6 | - | |
| T9 | VCCIO6 | - | | VCCIO6 | - | |
| U9 | VCCIO6 | - | | VCCIO6 | - | |
| V9 | VCCIO6 | - | | VCCIO6 | - | |
| W9 | VCCIO6 | - | | VCCIO6 | - | |
| Y7 | VCCIO6 | - | | VCCIO6 | - | |
| Y8 | VCCIO6 | - | | VCCIO6 | - | |

# LFSC/M15, LFSC/M25 Logic Signal Connections: 900 fpBGA[1, 2] (Cont.)

| Ball Number | LFSC/M15 | | | LFSC/M25 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| Y9 | VCCIO6 | - | | VCCIO6 | - | |
| J7 | VCCIO7 | - | | VCCIO7 | - | |
| J8 | VCCIO7 | - | | VCCIO7 | - | |
| K7 | VCCIO7 | - | | VCCIO7 | - | |
| K8 | VCCIO7 | - | | VCCIO7 | - | |
| L8 | VCCIO7 | - | | VCCIO7 | - | |
| L9 | VCCIO7 | - | | VCCIO7 | - | |
| M9 | VCCIO7 | - | | VCCIO7 | - | |
| N9 | VCCIO7 | - | | VCCIO7 | - | |
| P9 | VCCIO7 | - | | VCCIO7 | - | |
| R9 | VCCIO7 | - | | VCCIO7 | - | |
| A1 | GND | - | | GND | - | |
| A30 | GND | - | | GND | - | |
| AA15 | GND | - | | GND | - | |
| AA16 | GND | - | | GND | - | |
| AK1 | GND | - | | GND | - | |
| AK30 | GND | - | | GND | - | |
| K15 | GND | - | | GND | - | |
| K16 | GND | - | | GND | - | |
| L11 | GND | - | | GND | - | |
| L12 | GND | - | | GND | - | |
| L13 | GND | - | | GND | - | |
| L14 | GND | - | | GND | - | |
| L15 | GND | - | | GND | - | |
| L16 | GND | - | | GND | - | |
| L17 | GND | - | | GND | - | |
| L18 | GND | - | | GND | - | |
| L19 | GND | - | | GND | - | |
| L20 | GND | - | | GND | - | |
| M11 | GND | - | | GND | - | |
| M12 | GND | - | | GND | - | |
| M13 | GND | - | | GND | - | |
| M14 | GND | - | | GND | - | |
| M15 | GND | - | | GND | - | |
| M16 | GND | - | | GND | - | |
| M17 | GND | - | | GND | - | |
| M18 | GND | - | | GND | - | |
| M19 | GND | - | | GND | - | |
| M20 | GND | - | | GND | - | |
| N11 | GND | - | | GND | - | |
| N12 | GND | - | | GND | - | |
| N13 | GND | - | | GND | - | |
| N14 | GND | - | | GND | - | |
| N15 | GND | - | | GND | - | |
| N16 | GND | - | | GND | - | |

# LFSC/M15, LFSC/M25 Logic Signal Connections: 900 fpBGA[1, 2] (Cont.)

| Ball Number | LFSC/M15 | | | LFSC/M25 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AJ27 | GND | - | | GND | - | |
| AF23 | GND | - | | GND | - | |
| AF22 | GND | - | | GND | - | |
| AE27 | GND | - | | GND | - | |
| AA27 | GND | - | | GND | - | |
| AB29 | GND | - | | GND | - | |
| Y26 | GND | - | | GND | - | |
| AC30 | GND | - | | GND | - | |
| Y29 | GND | - | | GND | - | |
| F30 | GND | - | | GND | - | |
| E27 | GND | - | | GND | - | |
| F27 | GND | - | | GND | - | |
| P25 | GND | - | | GND | - | |
| H29 | GND | - | | GND | - | |
| K29 | GND | - | | GND | - | |
| R24 | GND | - | | GND | - | |
| M28 | GND | - | | GND | - | |
| J27 | GND | - | | GND | - | |
| N26 | GND | - | | GND | - | |
| E20 | GND | - | | GND | - | |
| E21 | GND | - | | GND | - | |
| F21 | GND | - | | GND | - | |
| F23 | GND | - | | GND | - | |
| G23 | GND | - | | GND | - | |
| D21 | GND | - | | GND | - | |
| D20 | GND | - | | GND | - | |
| E18 | GND | - | | GND | - | |
| C20 | GND | - | | GND | - | |
| C11 | GND | - | | GND | - | |
| A12 | GND | - | | GND | - | |
| E11 | GND | - | | GND | - | |
| F8 | GND | - | | GND | - | |
| G8 | GND | - | | GND | - | |
| D11 | GND | - | | GND | - | |
| D10 | GND | - | | GND | - | |
| H7 | GND | - | | GND | - | |
| F10 | GND | - | | GND | - | |
| E10 | GND | - | | GND | - | |
| AC16 | NC | - | | NC | - | |
| J22 | VCC | - | | VCC | - | |
| J9 | VCC | - | | VCC | - | |
| B2 | NC | - | | NC | - | |
| C2 | RESPN_ULC | - | | RESPN_ULC | - | |
| C29 | RESPN_URC | - | | RESPN_URC | - | |

# LFSC/M25, LFSC/M40 Logic Signal Connections: 1020 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M25 | | | LFSC/M40 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| B30 | A_HDOUTN0_L | - | PCS 360 CH 0 OUT N | A_HDOUTN0_L | - | PCS 360 CH 0 OUT N |
| D30 | A_VDDOB0_L | - | | A_VDDOB0_L | - | |
| A30 | A_HDOUTP0_L | - | PCS 360 CH 0 OUT P | A_HDOUTP0_L | - | PCS 360 CH 0 OUT P |
| C31 | A_HDINN0_L | - | PCS 360 CH 0 IN N | A_HDINN0_L | - | PCS 360 CH 0 IN N |
| C32 | A_HDINP0_L | - | PCS 360 CH 0 IN P | A_HDINP0_L | - | PCS 360 CH 0 IN P |
| B31 | A_VDDIB0_L | - | | A_VDDIB0_L | - | |
| AL25 | NC | - | | PB26A | 5 | |
| AL24 | NC | - | | PB26B | 5 | |
| AG27 | NC | - | | PB26C | 5 | |
| AH27 | NC | - | | PB26D | 5 | |
| AM25 | NC | - | | PB27A | 5 | |
| AM24 | NC | - | | PB27B | 5 | |
| AL9 | NC | - | | PB62A | 4 | |
| AL8 | NC | - | | PB62B | 4 | |
| AK9 | NC | - | | PB63A | 4 | |
| AJ9 | NC | - | | PB63B | 4 | |
| AG10 | NC | - | | PB63C | 4 | |
| AG11 | NC | - | | PB63D | 4 | |
| J30 | NC | - | | PL26A | 7 | |
| H30 | NC | - | | PL26B | 7 | |
| M28 | NC | - | | PL26C | 7 | |
| N28 | NC | - | | PL26D | 7 | |
| J32 | NC | - | | PL27A | 7 | |
| J31 | NC | - | | PL27B | 7 | |
| N26 | NC | - | | PL27C | 7 | |
| N27 | NC | - | | PL27D | 7 | |
| K31 | NC | - | | PL29A | 7 | |
| K32 | NC | - | | PL29B | 7 | |
| P25 | NC | - | | PL29C | 7 | |
| P26 | NC | - | | PL29D | 7 | |
| L27 | NC | - | | PL22C | 7 | |
| L28 | NC | - | | PL22D | 7 | |
| M29 | NC | - | | PL30A | 7 | |
| L29 | NC | - | | PL30B | 7 | |
| M30 | NC | - | | PL31A | 7 | |
| L30 | NC | - | | PL31B | 7 | |
| L31 | NC | - | | PL34A | 7 | |
| M31 | NC | - | | PL34B | 7 | |
| AA29 | NC | - | | PL56A | 6 | |
| AA30 | NC | - | | PL56B | 6 | |
| AB31 | NC | - | | PL57A | 6 | |
| AA31 | NC | - | | PL57B | 6 | |
| AG30 | NC | - | | PL57C | 6 | |
| AG29 | NC | - | | PL57D | 6 | |
| AB29 | NC | - | | PL58A | 6 | |
| AB30 | NC | - | | PL58B | 6 | |
| Y25 | NC | - | | PL58C | 6 | |
| AA25 | NC | - | | PL58D | 6 | |
| AA8 | NC | - | | PR58D | 3 | |
| Y8 | NC | - | | PR58C | 3 | |

# LFSC/M25, LFSC/M40 Logic Signal Connections: 1020 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M25 | | | LFSC/M40 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AA7 | VCCIO3 | - | | VCCIO3 | - | |
| AB9 | VCCIO3 | - | | VCCIO3 | - | |
| AC4 | VCCIO3 | - | | VCCIO3 | - | |
| AD6 | VCCIO3 | - | | VCCIO3 | - | |
| AF3 | VCCIO3 | - | | VCCIO3 | - | |
| T3 | VCCIO3 | - | | VCCIO3 | - | |
| U4 | VCCIO3 | - | | VCCIO3 | - | |
| V6 | VCCIO3 | - | | VCCIO3 | - | |
| W10 | VCCIO3 | - | | VCCIO3 | - | |
| Y3 | VCCIO3 | - | | VCCIO3 | - | |
| AC11 | VCCIO4 | - | | VCCIO4 | - | |
| AD14 | VCCIO4 | - | | VCCIO4 | - | |
| AF15 | VCCIO4 | - | | VCCIO4 | - | |
| AF9 | VCCIO4 | - | | VCCIO4 | - | |
| AG12 | VCCIO4 | - | | VCCIO4 | - | |
| AJ13 | VCCIO4 | - | | VCCIO4 | - | |
| AJ7 | VCCIO4 | - | | VCCIO4 | - | |
| AK10 | VCCIO4 | - | | VCCIO4 | - | |
| AK16 | VCCIO4 | - | | VCCIO4 | - | |
| AK4 | VCCIO4 | - | | VCCIO4 | - | |
| AC19 | VCCIO5 | - | | VCCIO5 | - | |
| AD22 | VCCIO5 | - | | VCCIO5 | - | |
| AF21 | VCCIO5 | - | | VCCIO5 | - | |
| AG18 | VCCIO5 | - | | VCCIO5 | - | |
| AG24 | VCCIO5 | - | | VCCIO5 | - | |
| AJ17 | VCCIO5 | - | | VCCIO5 | - | |
| AJ23 | VCCIO5 | - | | VCCIO5 | - | |
| AJ30 | VCCIO5 | - | | VCCIO5 | - | |
| AK20 | VCCIO5 | - | | VCCIO5 | - | |
| AK26 | VCCIO5 | - | | VCCIO5 | - | |
| AA27 | VCCIO6 | - | | VCCIO6 | - | |
| AB23 | VCCIO6 | - | | VCCIO6 | - | |
| AC30 | VCCIO6 | - | | VCCIO6 | - | |
| AD26 | VCCIO6 | - | | VCCIO6 | - | |
| AF29 | VCCIO6 | - | | VCCIO6 | - | |
| T29 | VCCIO6 | - | | VCCIO6 | - | |
| U30 | VCCIO6 | - | | VCCIO6 | - | |
| V26 | VCCIO6 | - | | VCCIO6 | - | |
| W24 | VCCIO6 | - | | VCCIO6 | - | |
| Y29 | VCCIO6 | - | | VCCIO6 | - | |
| G30 | VCCIO7 | - | | VCCIO7 | - | |
| J27 | VCCIO7 | - | | VCCIO7 | - | |
| K29 | VCCIO7 | - | | VCCIO7 | - | |
| L24 | VCCIO7 | - | | VCCIO7 | - | |
| M26 | VCCIO7 | - | | VCCIO7 | - | |
| N30 | VCCIO7 | - | | VCCIO7 | - | |
| P23 | VCCIO7 | - | | VCCIO7 | - | |
| R27 | VCCIO7 | - | | VCCIO7 | - | |
| AA11 | VCCAUX | - | | VCCAUX | - | |
| AA12 | VCCAUX | - | | VCCAUX | - | |

# LFSC/M40, LFSC/M80 Logic Signal Connections: 1152 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M40 | | | LFSC/M80 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| F15 | PT55A | 1 | D5/MPI_DATA5 | PT74A | 1 | D5/MPI_DATA5 |
| K14 | PT54D | 1 | D4/MPI_DATA4 | PT73D | 1 | D4/MPI_DATA4 |
| K13 | PT54C | 1 | D3/MPI_DATA3 | PT73C | 1 | D3/MPI_DATA3 |
| B15 | PT53B | 1 | D2/MPI_DATA2 | PT73B | 1 | D2/MPI_DATA2 |
| A15 | PT53A | 1 | D1/MPI_DATA1 | PT73A | 1 | D1/MPI_DATA1 |
| J14 | PT51D | 1 | D16/PCLKC1_3/MPI_DATA16 | PT71D | 1 | D16/PCLKC1_3/MPI_DATA16 |
| H14 | PT51C | 1 | D17/PCLKT1_3/MPI_DATA17 | PT71C | 1 | D17/PCLKT1_3/MPI_DATA17 |
| A16 | PT51B | 1 | D0/MPI_DATA0 | PT71B | 1 | D0/MPI_DATA0 |
| B16 | PT51A | 1 | QOUT/CEON | PT71A | 1 | QOUT/CEON |
| J13 | PT50D | 1 | VREF2_1 | PT70D | 1 | VREF2_1 |
| H13 | PT50C | 1 | D18/MPI_DATA18 | PT70C | 1 | D18/MPI_DATA18 |
| D15 | PT50B | 1 | DOUT | PT70B | 1 | DOUT |
| E15 | PT50A | 1 | MCA_DONE_IN | PT70A | 1 | MCA_DONE_IN |
| J16 | PT49D | 1 | D19/PCLKC1_2/MPI_DATA19 | PT69D | 1 | D19/PCLKC1_2/MPI_DATA19 |
| J17 | PT49C | 1 | D20/PCLKT1_2/MPI_DATA20 | PT69C | 1 | D20/PCLKT1_2/MPI_DATA20 |
| D16 | PT49B | 1 | MCA_CLK_P1_OUT | PT69B | 1 | MCA_CLK_P1_OUT |
| E16 | PT49A | 1 | MCA_CLK_P1_IN | PT69A | 1 | MCA_CLK_P1_IN |
| H15 | PT47D | 1 | D21/PCLKC1_1/MPI_DATA21 | PT67D | 1 | D21/PCLKC1_1/MPI_DATA21 |
| H16 | PT47C | 1 | D22/PCLKT1_1/MPI_DATA22 | PT67C | 1 | D22/PCLKT1_1/MPI_DATA22 |
| C15 | PT47B | 1 | MCA_CLK_P2_OUT | PT67B | 1 | MCA_CLK_P2_OUT |
| C16 | PT47A | 1 | MCA_CLK_P2_IN | PT67A | 1 | MCA_CLK_P2_IN |
| L17 | PT46D | 1 | MCA_DONE_OUT | PT66D | 1 | MCA_DONE_OUT |
| K17 | PT46C | 1 | BUSYN/RCLK/SCK | PT66C | 1 | BUSYN/RCLK/SCK |
| E17 | PT46B | 1 | DP0/MPI_PAR0 | PT66B | 1 | DP0/MPI_PAR0 |
| F17 | PT46A | 1 | MPI_TA | PT66A | 1 | MPI_TA |
| G17 | PT45D | 1 | D23/MPI_DATA23 | PT65D | 1 | D23/MPI_DATA23 |
| H17 | PT45C | 1 | DP2/MPI_PAR2 | PT65C | 1 | DP2/MPI_PAR2 |
| A17 | PT45B | 1 | PCLKC1_0 | PT65B | 1 | PCLKC1_0 |
| B17 | PT45A | 1 | PCLKT1_0/MPI_CLK | PT65A | 1 | PCLKT1_0/MPI_CLK |
| G18 | PT43D | 1 | DP3/PCLKC1_4/MPI_PAR3 | PT63D | 1 | DP3/PCLKC1_4/MPI_PAR3 |
| H18 | PT43C | 1 | D24/PCLKT1_4/MPI_DATA24 | PT63C | 1 | D24/PCLKT1_4/MPI_DATA24 |
| E18 | PT43B | 1 | MPI_RETRY | PT63B | 1 | MPI_RETRY |
| F18 | PT43A | 1 | A0/MPI_ADDR14 | PT63A | 1 | A0/MPI_ADDR14 |
| J18 | PT42D | 1 | A1/MPI_ADDR15 | PT61D | 1 | A1/MPI_ADDR15 |
| J19 | PT42C | 1 | A2/MPI_ADDR16 | PT61C | 1 | A2/MPI_ADDR16 |
| C20 | PT42B | 1 | A3/MPI_ADDR17 | PT61B | 1 | A3/MPI_ADDR17 |
| C19 | PT42A | 1 | A4/MPI_ADDR18 | PT61A | 1 | A4/MPI_ADDR18 |
| K18 | PT41D | 1 | D25/PCLKC1_5/MPI_DATA25 | PT60D | 1 | D25/PCLKC1_5/MPI_DATA25 |
| L18 | PT41C | 1 | D26/PCLKT1_5/MPI_DATA26 | PT60C | 1 | D26/PCLKT1_5/MPI_DATA26 |
| D19 | PT41B | 1 | A5/MPI_ADDR19 | PT60B | 1 | A5/MPI_ADDR19 |
| E19 | PT41A | 1 | A6/MPI_ADDR20 | PT60A | 1 | A6/MPI_ADDR20 |
| H19 | PT39D | 1 | D27/MPI_DATA27 | PT59D | 1 | D27/MPI_DATA27 |
| H20 | PT39C | 1 | VREF1_1 | PT59C | 1 | VREF1_1 |
| A18 | PT39B | 1 | A7/MPI_ADDR21 | PT59B | 1 | A7/MPI_ADDR21 |
| B18 | PT39A | 1 | A8/MPI_ADDR22 | PT59A | 1 | A8/MPI_ADDR22 |

# LFSC/M40, LFSC/M80 Logic Signal Connections: 1152 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M40 | | | LFSC/M80 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| W7 | GND | - | | GND | - | |
| AA14 | VCC | - | | VCC | - | |
| AA16 | VCC | - | | VCC | - | |
| AA17 | VCC | - | | VCC | - | |
| AA18 | VCC | - | | VCC | - | |
| AA19 | VCC | - | | VCC | - | |
| AA21 | VCC | - | | VCC | - | |
| AB13 | VCC | - | | VCC | - | |
| AB22 | VCC | - | | VCC | - | |
| N13 | VCC | - | | VCC | - | |
| N22 | VCC | - | | VCC | - | |
| P14 | VCC | - | | VCC | - | |
| P16 | VCC | - | | VCC | - | |
| P17 | VCC | - | | VCC | - | |
| P18 | VCC | - | | VCC | - | |
| P19 | VCC | - | | VCC | - | |
| P21 | VCC | - | | VCC | - | |
| R15 | VCC | - | | VCC | - | |
| R17 | VCC | - | | VCC | - | |
| R18 | VCC | - | | VCC | - | |
| R20 | VCC | - | | VCC | - | |
| T14 | VCC | - | | VCC | - | |
| T16 | VCC | - | | VCC | - | |
| T19 | VCC | - | | VCC | - | |
| T21 | VCC | - | | VCC | - | |
| U14 | VCC | - | | VCC | - | |
| U15 | VCC | - | | VCC | - | |
| U17 | VCC | - | | VCC | - | |
| U18 | VCC | - | | VCC | - | |
| U20 | VCC | - | | VCC | - | |
| U21 | VCC | - | | VCC | - | |
| V14 | VCC | - | | VCC | - | |
| V15 | VCC | - | | VCC | - | |
| V17 | VCC | - | | VCC | - | |
| V18 | VCC | - | | VCC | - | |
| V20 | VCC | - | | VCC | - | |
| V21 | VCC | - | | VCC | - | |
| W14 | VCC | - | | VCC | - | |
| W16 | VCC | - | | VCC | - | |
| W19 | VCC | - | | VCC | - | |
| W21 | VCC | - | | VCC | - | |
| Y15 | VCC | - | | VCC | - | |
| Y17 | VCC | - | | VCC | - | |
| Y18 | VCC | - | | VCC | - | |
| Y20 | VCC | - | | VCC | - | |

## LFSC/M115 Logic Signal Connections: 1152 fcBGA[1, 2]

| 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/M115 Logic Signal Connections: 1152 fcBGA[1, 2]

| Ball Number | LFSC/M115 | | |
|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function |
| J3 | PR45A | 2 | |
| M8 | PR43D | 2 | DIFFR_2 |
| L8 | PR43C | 2 | VREF1_2 |
| K4 | PR43B | 2 | |
| J4 | PR43A | 2 | |
| M7 | PR26D | 2 | |
| L7 | PR26C | 2 | |
| J5 | PR26B | 2 | |
| H5 | PR26A | 2 | |
| N9 | PR19D | 2 | |
| P9 | PR19C | 2 | |
| G3 | PR19B | 2 | |
| F3 | PR19A | 2 | |
| J6 | PR18D | 2 | VREF2_2 |
| H6 | PR18C | 2 | |
| E2 | PR18B | 2 | URC_DLLC_IN_D/URC_DLLC_FB_C |
| D2 | PR18A | 2 | URC_DLLT_IN_D/URC_DLLT_FB_C |
| P10 | PR17D | 2 | URC_PLLC_IN_B/URC_PLLC_FB_A |
| N10 | PR17C | 2 | URC_PLLT_IN_B/URC_PLLT_FB_A |
| G4 | PR17B | 2 | URC_DLLC_IN_C/URC_DLLC_FB_D |
| F4 | PR17A | 2 | URC_DLLT_IN_C/URC_DLLT_FB_D |
| J7 | PR15D | 2 | |
| H7 | PR15C | 2 | |
| G5 | PR15B | 2 | URC_PLLC_IN_A/URC_PLLC_FB_B |
| F5 | PR15A | 2 | URC_PLLT_IN_A/URC_PLLT_FB_B |
| C2 | VCCJ | - | |
| M9 | TDO | - | TDO |
| L9 | TMS | - | |
| D1 | TCK | - | |
| C1 | TDI | - | |
| J8 | PROGRAMN | 1 | |
| K8 | MPIIRQN | 1 | CFGIRQN/MPI_IRQ_N |
| B2 | CCLK | 1 | |
| H9 | RESP_URC | - | |
| H10 | VCC12 | - | |
| H8 | A_REFCLKN_R | - | |
| G8 | A_REFCLKP_R | - | |
| C3 | VCC12 | - | |
| D3 | A_VDDIB0_R | - | |
| A3 | A_HDINP0_R | - | PCS 3E0 CH 0 IN P |
| B3 | A_HDINN0_R | - | PCS 3E0 CH 0 IN N |
| E5 | VCC12 | - | |
| A4 | A_HDOUTP0_R | - | PCS 3E0 CH 0 OUT P |

## LFSC/M115 Logic Signal Connections: 1152 fcBGA[1, 2]

| Ball Number | LFSC/M115 | | |
|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function |
| F25 | B_HDINN0_L | - | PCS 361 CH 0 IN N |
| E25 | B_HDINP0_L | - | PCS 361 CH 0 IN P |
| D28 | B_VDDIB0_L | - | |
| G25 | VCC12 | - | |
| D29 | A_VDDIB3_L | - | |
| C25 | VCC12 | - | |
| A25 | A_HDINP3_L | - | PCS 360 CH 3 IN P |
| B25 | A_HDINN3_L | - | PCS 360 CH 3 IN N |
| A26 | A_HDOUTP3_L | - | PCS 360 CH 3 OUT P |
| E27 | VCC12 | - | |
| B26 | A_HDOUTN3_L | - | PCS 360 CH 3 OUT N |
| F26 | A_VDDOB3_L | - | |
| B27 | A_HDOUTN2_L | - | PCS 360 CH 2 OUT N |
| F27 | A_VDDOB2_L | - | |
| A27 | A_HDOUTP2_L | - | PCS 360 CH 2 OUT P |
| E28 | VCC12 | - | |
| B28 | A_HDINN2_L | - | PCS 360 CH 2 IN N |
| A28 | A_HDINP2_L | - | PCS 360 CH 2 IN P |
| D30 | A_VDDIB2_L | - | |
| C28 | VCC12 | - | |
| D31 | A_VDDIB1_L | - | |
| C29 | VCC12 | - | |
| A29 | A_HDINP1_L | - | PCS 360 CH 1 IN P |
| B29 | A_HDINN1_L | - | PCS 360 CH 1 IN N |
| A30 | A_HDOUTP1_L | - | PCS 360 CH 1 OUT P |
| E29 | VCC12 | - | |
| B30 | A_HDOUTN1_L | - | PCS 360 CH 1 OUT N |
| F28 | A_VDDOB1_L | - | |
| B31 | A_HDOUTN0_L | - | PCS 360 CH 0 OUT N |
| F29 | A_VDDOB0_L | - | |
| A31 | A_HDOUTP0_L | - | PCS 360 CH 0 OUT P |
| E30 | VCC12 | - | |
| B32 | A_HDINN0_L | - | PCS 360 CH 0 IN N |
| A32 | A_HDINP0_L | - | PCS 360 CH 0 IN P |
| D32 | A_VDDIB0_L | - | |
| C32 | VCC12 | - | |
| E34 | PL30A | 7 | |
| F34 | PL30B | 7 | |
| F33 | PL34A | 7 | |
| G33 | PL34B | 7 | |
| K30 | PL38A | 7 | |
| L30 | PL38B | 7 | |
| G34 | PL40A | 7 | |

# LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M80 | | | LFSC/M115 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| BB12 | PB88B | 4 | | PB102B | 4 | |
| AM17 | PB88C | 4 | | PB102C | 4 | |
| AL17 | PB88D | 4 | | PB102D | 4 | |
| AW14 | PB89A | 4 | | PB103A | 4 | |
| AW13 | PB89B | 4 | | PB103B | 4 | |
| AP16 | PB89C | 4 | | PB103C | 4 | |
| AN16 | PB89D | 4 | | PB103D | 4 | |
| BA13 | PB91A | 4 | | PB105A | 4 | |
| BA12 | PB91B | 4 | | PB105B | 4 | |
| AU13 | PB91C | 4 | | PB105C | 4 | |
| AU12 | PB91D | 4 | | PB105D | 4 | |
| BB11 | PB92A | 4 | | PB106A | 4 | |
| BB10 | PB92B | 4 | | PB106B | 4 | |
| AP15 | PB92C | 4 | | PB106C | 4 | |
| AN15 | PB92D | 4 | | PB106D | 4 | |
| AV13 | PB93A | 4 | | PB107A | 4 | |
| AV12 | PB93B | 4 | | PB107B | 4 | |
| AT13 | PB93C | 4 | | PB107C | 4 | |
| AT12 | PB93D | 4 | | PB107D | 4 | |
| BA11 | PB95A | 4 | | PB109A | 4 | |
| BA10 | PB95B | 4 | | PB109B | 4 | |
| AR13 | PB95C | 4 | | PB109C | 4 | |
| AR12 | PB95D | 4 | | PB109D | 4 | |
| AY11 | PB96A | 4 | | PB110A | 4 | |
| AY10 | PB96B | 4 | | PB110B | 4 | |
| AP14 | PB96C | 4 | | PB110C | 4 | |
| AN14 | PB96D | 4 | | PB110D | 4 | |
| BB9 | PB97A | 4 | | PB111A | 4 | |
| BB8 | PB97B | 4 | | PB111B | 4 | |
| AU11 | PB97C | 4 | | PB111C | 4 | |
| AU10 | PB97D | 4 | | PB111D | 4 | |
| AW11 | PB99A | 4 | | PB113A | 4 | |
| AW10 | PB99B | 4 | | PB113B | 4 | |
| AJ16 | PB99C | 4 | | PB113C | 4 | |
| AJ17 | PB99D | 4 | | PB113D | 4 | |
| BA9 | PB100A | 4 | | PB114A | 4 | |
| BA8 | PB100B | 4 | | PB114B | 4 | |
| AM15 | PB100C | 4 | | PB114C | 4 | |
| AL15 | PB100D | 4 | | PB114D | 4 | |
| AV11 | PB101A | 4 | | PB115A | 4 | |
| AV10 | PB101B | 4 | | PB115B | 4 | |
| AP13 | PB101C | 4 | | PB115C | 4 | |
| AP12 | PB101D | 4 | | PB115D | 4 | |
| BB7 | PB103A | 4 | | PB117A | 4 | |
| BB6 | PB103B | 4 | | PB117B | 4 | |

# LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M80 | | | LFSC/M115 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AP1 | PR90B | 3 | | PR109B | 3 | |
| AN1 | PR90A | 3 | | PR109A | 3 | |
| AK10 | PR89D | 3 | VREF2_3 | PR107D | 3 | VREF2_3 |
| AJ10 | PR89C | 3 | | PR107C | 3 | |
| AM5 | PR89B | 3 | | PR107B | 3 | |
| AL5 | PR89A | 3 | | PR107A | 3 | |
| AL7 | PR86D | 3 | | PR104D | 3 | |
| AK7 | PR86C | 3 | | PR104C | 3 | |
| AM1 | PR86B | 3 | | PR104B | 3 | |
| AL1 | PR86A | 3 | | PR104A | 3 | |
| AJ11 | PR85D | 3 | | PR103D | 3 | |
| AH11 | PR85C | 3 | | PR103C | 3 | |
| AK5 | PR85B | 3 | | PR103B | 3 | |
| AJ5 | PR85A | 3 | | PR103A | 3 | |
| AK9 | PR84D | 3 | | PR99D | 3 | |
| AJ9 | PR84C | 3 | | PR99C | 3 | |
| AK3 | PR84B | 3 | | PR99B | 3 | |
| AJ3 | PR84A | 3 | | PR99A | 3 | |
| AK6 | PR82D | 3 | | PR98D | 3 | |
| AJ6 | PR82C | 3 | | PR98C | 3 | |
| AK2 | PR82B | 3 | | PR98B | 3 | |
| AJ2 | PR82A | 3 | | PR98A | 3 | |
| AH10 | PR81D | 3 | | PR96D | 3 | |
| AG10 | PR81C | 3 | | PR96C | 3 | |
| AK1 | PR81B | 3 | | PR96B | 3 | |
| AJ1 | PR81A | 3 | | PR96A | 3 | |
| AH9 | PR80D | 3 | | PR94D | 3 | |
| AG9 | PR80C | 3 | | PR94C | 3 | |
| AH2 | PR80B | 3 | | PR94B | 3 | |
| AG2 | PR80A | 3 | | PR94A | 3 | |
| AH8 | PR78D | 3 | | PR92D | 3 | |
| AG8 | PR78C | 3 | | PR92C | 3 | |
| AG1 | PR78B | 3 | | PR92B | 3 | |
| AH1 | PR78A | 3 | | PR92A | 3 | |
| AG14 | PR77D | 3 | | PR91D | 3 | |
| AF14 | PR77C | 3 | | PR91C | 3 | |
| AG4 | PR77B | 3 | | PR91B | 3 | |
| AF4 | PR77A | 3 | | PR91A | 3 | |
| AH7 | PR76D | 3 | DIFFR_3 | PR90D | 3 | DIFFR_3 |
| AG7 | PR76C | 3 | | PR90C | 3 | |
| AG3 | PR76B | 3 | | PR90B | 3 | |
| AF3 | PR76A | 3 | | PR90A | 3 | |
| AH6 | PR74D | 3 | | PR88D | 3 | |
| AG6 | PR74C | 3 | | PR88C | 3 | |
| AF1 | PR74B | 3 | | PR88B | 3 | |

# LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M80 | | | LFSC/M115 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| AB6 | PR57D | 3 | | PR71D | 3 | |
| AA6 | PR57C | 3 | | PR71C | 3 | |
| Y2 | PR57B | 3 | | PR71B | 3 | |
| W2 | PR57A | 3 | | PR71A | 3 | |
| AB7 | PR56D | 3 | | PR70D | 3 | |
| AA7 | PR56C | 3 | | PR70C | 3 | |
| Y3 | PR56B | 3 | | PR70B | 3 | |
| W3 | PR56A | 3 | | PR70A | 3 | |
| AC11 | PR55D | 3 | | PR69D | 3 | |
| AB11 | PR55C | 3 | VREF1_3 | PR69C | 3 | VREF1_3 |
| Y4 | PR55B | 3 | | PR69B | 3 | |
| W4 | PR55A | 3 | | PR69A | 3 | |
| AB8 | PR52D | 3 | PCLKC3_2 | PR66D | 3 | PCLKC3_2 |
| AA8 | PR52C | 3 | PCLKT3_2 | PR66C | 3 | PCLKT3_2 |
| Y5 | PR52B | 3 | | PR66B | 3 | |
| W5 | PR52A | 3 | | PR66A | 3 | |
| AC12 | PR51D | 3 | PCLKC3_3 | PR65D | 3 | PCLKC3_3 |
| AB12 | PR51C | 3 | PCLKT3_3 | PR65C | 3 | PCLKT3_3 |
| V1 | PR51B | 3 | | PR65B | 3 | |
| U1 | PR51A | 3 | | PR65A | 3 | |
| W7 | PR50D | 3 | PCLKC3_1 | PR64D | 3 | PCLKC3_1 |
| V7 | PR50C | 3 | PCLKT3_1 | PR64C | 3 | PCLKT3_1 |
| V2 | PR50B | 3 | PCLKC3_0 | PR64B | 3 | PCLKC3_0 |
| U2 | PR50A | 3 | PCLKT3_0 | PR64A | 3 | PCLKT3_0 |
| AB9 | PR48D | 2 | PCLKC2_2 | PR62D | 2 | PCLKC2_2 |
| AA9 | PR48C | 2 | PCLKT2_2 | PR62C | 2 | PCLKT2_2 |
| T1 | PR48B | 2 | PCLKC2_0 | PR62B | 2 | PCLKC2_0 |
| R1 | PR48A | 2 | PCLKT2_0 | PR62A | 2 | PCLKT2_0 |
| AB10 | PR47D | 2 | PCLKC2_3 | PR61D | 2 | PCLKC2_3 |
| AA10 | PR47C | 2 | PCLKT2_3 | PR61C | 2 | PCLKT2_3 |
| U3 | PR47B | 2 | PCLKC2_1 | PR61B | 2 | PCLKC2_1 |
| T3 | PR47A | 2 | PCLKT2_1 | PR61A | 2 | PCLKT2_1 |
| Y9 | PR46D | 2 | | PR60D | 2 | |
| W9 | PR46C | 2 | | PR60C | 2 | |
| V5 | PR46B | 2 | | PR60B | 2 | |
| U5 | PR46A | 2 | | PR60A | 2 | |
| AA11 | PR43D | 2 | | PR57D | 2 | |
| Y11 | PR43C | 2 | | PR57C | 2 | |
| Y6 | PR43B | 2 | | PR57B | 2 | |
| W6 | PR43A | 2 | | PR57A | 2 | |
| Y10 | PR42D | 2 | | PR56D | 2 | |
| W10 | PR42C | 2 | | PR56C | 2 | |
| T2 | PR42B | 2 | | PR56B | 2 | |
| R2 | PR42A | 2 | | PR56A | 2 | |
| W8 | PR41D | 2 | | PR55D | 2 | |

# LFSC/M80, LFSC/M115 Logic Signal Connections: 1704 fcBGA[1, 2] (Cont.)

| Ball Number | LFSC/M80 | | | LFSC/M115 | | |
|---|---|---|---|---|---|---|
| | Ball Function | VCCIO Bank | Dual Function | Ball Function | VCCIO Bank | Dual Function |
| V8 | PR41C | 2 | | PR55C | 2 | |
| T4 | PR41B | 2 | | PR55B | 2 | |
| U4 | PR41A | 2 | | PR55A | 2 | |
| V9 | PR39D | 2 | | PR53D | 2 | |
| U9 | PR39C | 2 | | PR53C | 2 | |
| V6 | PR39B | 2 | | PR53B | 2 | |
| U6 | PR39A | 2 | | PR53A | 2 | |
| AA12 | PR38D | 2 | | PR52D | 2 | |
| Y12 | PR38C | 2 | | PR52C | 2 | |
| P1 | PR38B | 2 | | PR52B | 2 | |
| N1 | PR38A | 2 | | PR52A | 2 | |
| T7 | PR37D | 2 | | PR51D | 2 | |
| R7 | PR37C | 2 | | PR51C | 2 | |
| T5 | PR37B | 2 | | PR51B | 2 | |
| R5 | PR37A | 2 | | PR51A | 2 | |
| U10 | PR35D | 2 | | PR49D | 2 | |
| V10 | PR35C | 2 | | PR49C | 2 | |
| P2 | PR35B | 2 | | PR49B | 2 | |
| N2 | PR35A | 2 | | PR49A | 2 | |
| T8 | PR34D | 2 | | PR48D | 2 | |
| R8 | PR34C | 2 | | PR48C | 2 | |
| N3 | PR34B | 2 | | PR48B | 2 | |
| P3 | PR34A | 2 | | PR48A | 2 | |
| M6 | PR33D | 2 | | PR47D | 2 | |
| M7 | PR33C | 2 | | PR47C | 2 | |
| T6 | PR33B | 2 | | PR47B | 2 | |
| R6 | PR33A | 2 | | PR47A | 2 | |
| V11 | PR31D | 2 | | PR45D | 2 | |
| U11 | PR31C | 2 | | PR45C | 2 | |
| M1 | PR31B | 2 | | PR45B | 2 | |
| L1 | PR31A | 2 | | PR45A | 2 | |
| Y14 | PR30D | 2 | | PR44D | 2 | |
| W14 | PR30C | 2 | | PR44C | 2 | |
| M2 | PR30B | 2 | | PR44B | 2 | |
| L2 | PR30A | 2 | | PR44A | 2 | |
| T9 | PR29D | 2 | DIFFR_2 | PR43D | 2 | DIFFR_2 |
| R9 | PR29C | 2 | VREF1_2 | PR43C | 2 | VREF1_2 |
| P4 | PR29B | 2 | | PR43B | 2 | |
| N4 | PR29A | 2 | | PR43A | 2 | |
| N7 | PR26D | 2 | | PR40D | 2 | |
| N8 | PR26C | 2 | | PR40C | 2 | |
| P5 | PR26B | 2 | | PR40B | 2 | |
| N5 | PR26A | 2 | | PR40A | 2 | |
| K7 | PR25D | 2 | | PR38D | 2 | |
| J7 | PR25C | 2 | | PR38C | 2 | |

**Commercial, Cont.**

| Part Number | Grade | Package | Balls | Temp. | LUTs (K) |
|---|---|---|---|---|---|
| LFSC3GA80E-7FCN1152C[1] | -7 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-6FCN1152C[1] | -6 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-5FCN1152C[1] | -5 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-7FFN1152C | -7 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-6FFN1152C | -6 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-5FFN1152C | -5 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSC3GA80E-7FCN1704C[1] | -7 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSC3GA80E-6FCN1704C[1] | -6 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSC3GA80E-5FCN1704C[1] | -5 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSC3GA80E-7FFN1704C | -7 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |
| LFSC3GA80E-6FFN1704C | -6 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |
| LFSC3GA80E-5FFN1704C | -5 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |

1. Converted to organic flip-chip BGA package per PCN #01A-10.

| Part Number | Grade | Package | Balls | Temp. | LUTs (K) |
|---|---|---|---|---|---|
| LFSCM3GA80EP1-7FCN1152C[1] | -7 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-6FCN1152C[1] | -6 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-5FCN1152C[1] | -5 | Lead-Free Ceramic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-7FFN1152C | -7 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-6FFN1152C | -6 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-5FFN1152C | -5 | Lead-Free Organic fcBGA | 1152 | COM | 80.1 |
| LFSCM3GA80EP1-7FCN1704C[1] | -7 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSCM3GA80EP1-6FCN1704C[1] | -6 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSCM3GA80EP1-5FCN1704C[1] | -5 | Lead-Free Ceramic fcBGA | 1704 | COM | 80.1 |
| LFSCM3GA80EP1-7FFN1704C | -7 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |
| LFSCM3GA80EP1-6FFN1704C | -6 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |
| LFSCM3GA80EP1-5FFN1704C | -5 | Lead-Free Organic fcBGA | 1704 | COM | 80.1 |

1. Converted to organic flip-chip BGA package per PCN #01A-10.

| Part Number | Grade | Package | Balls | Temp. | LUTs (K) |
|---|---|---|---|---|---|
| LFSC3GA115E-6FCN1152C[1] | -6 | Lead-Free Ceramic fcBGA | 1152 | COM | 115.2 |
| LFSC3GA115E-5FCN1152C[1] | -5 | Lead-Free Ceramic fcBGA | 1152 | COM | 115.2 |
| LFSC3GA115E-6FFN1152C | -6 | Lead-Free Organic fcBGA | 1152 | COM | 115.2 |
| LFSC3GA115E-5FFN1152C | -5 | Lead-Free Organic fcBGA | 1152 | COM | 115.2 |
| LFSC3GA115E-6FCN1704C[1] | -6 | Lead-Free Ceramic fcBGA | 1704 | COM | 115.2 |
| LFSC3GA115E-5FCN1704C[1] | -5 | Lead-Free Ceramic fcBGA | 1704 | COM | 115.2 |
| LFSC3GA115E-6FFN1704C | -6 | Lead-Free Organic fcBGA | 1704 | COM | 115.2 |
| LFSC3GA115E-5FFN1704C | -5 | Lead-Free Organic fcBGA | 1704 | COM | 115.2 |

1. Converted to organic flip-chip BGA package per PCN #01A-10.