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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            | 150                                                                                                                                                                     |
| Number of Logic Elements/Cells | 1200                                                                                                                                                                    |
| Total RAM Bits                 | 9421                                                                                                                                                                    |
| Number of I/O                  | 73                                                                                                                                                                      |
| Number of Gates                | -                                                                                                                                                                       |
| Voltage - Supply               | 1.14V ~ 1.26V                                                                                                                                                           |
| Mounting Type                  | Surface Mount                                                                                                                                                           |
| Operating Temperature          | -40°C ~ 100°C (TJ)                                                                                                                                                      |
| Package / Case                 | 100-LQFP                                                                                                                                                                |
| Supplier Device Package        | 100-TQFP (14x14)                                                                                                                                                        |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200e-3t100i">https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200e-3t100i</a> |

## Architecture Overview

The MachXO family architecture contains an array of logic blocks surrounded by Programmable I/O (PIO). Some devices in this family have sysCLOCK PLLs and blocks of sysMEM™ Embedded Block RAM (EBRs). Figures 2-1, 2-2, and 2-3 show the block diagrams of the various family members.

The logic blocks are arranged in a two-dimensional grid with rows and columns. The EBR blocks are arranged in a column to the left of the logic array. The PIO cells are located at the periphery of the device, arranged into Banks. The PIOs utilize a flexible I/O buffer referred to as a sysIO interface that supports operation with a variety of interface standards. The blocks are connected with many vertical and horizontal routing channel resources. The place and route software tool automatically allocates these routing resources.

There are two kinds of logic blocks, the Programmable Functional Unit (PFU) and the Programmable Functional unit without RAM (PFF). The PFU contains the building blocks for logic, arithmetic, RAM, ROM, and register functions. The PFF block contains building blocks for logic, arithmetic, ROM, and register functions. Both the PFU and PFF blocks are optimized for flexibility, allowing complex designs to be implemented quickly and effectively. Logic blocks are arranged in a two-dimensional array. Only one type of block is used per row.

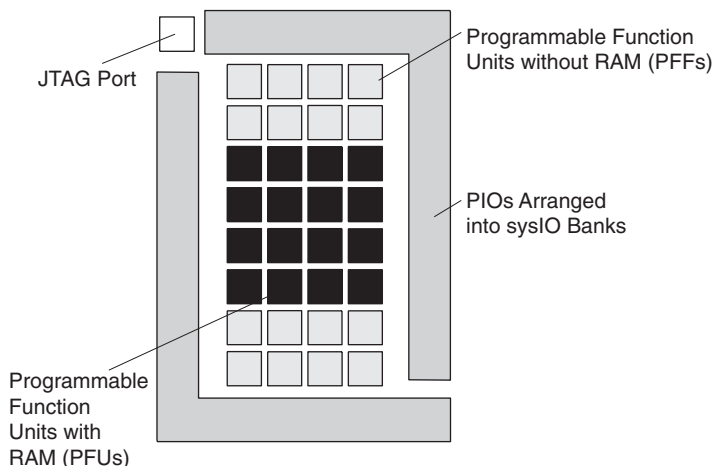
In the MachXO family, the number of sysIO Banks varies by device. There are different types of I/O Buffers on different Banks. See the details in later sections of this document. The sysMEM EBRs are large, dedicated fast memory blocks; these blocks are found only in the larger devices. These blocks can be configured as RAM, ROM or FIFO. FIFO support includes dedicated FIFO pointer and flag “hard” control logic to minimize LUT use.

The MachXO registers in PFU and sysI/O can be configured to be SET or RESET. After power up and device is configured, the device enters into user mode with these registers SET/RESET according to the configuration setting, allowing device entering to a known state for predictable system function.

The MachXO architecture provides up to two sysCLOCK™ Phase Locked Loop (PLL) blocks on larger devices. These blocks are located at either end of the memory blocks. The PLLs have multiply, divide, and phase shifting capabilities that are used to manage the frequency and phase relationships of the clocks.

Every device in the family has a JTAG Port that supports programming and configuration of the device as well as access to the user logic. The MachXO devices are available for operation from 3.3V, 2.5V, 1.8V, and 1.2V power supplies, providing easy integration into the overall system.

**Figure 2-3. Top View of the MachXO256 Device**

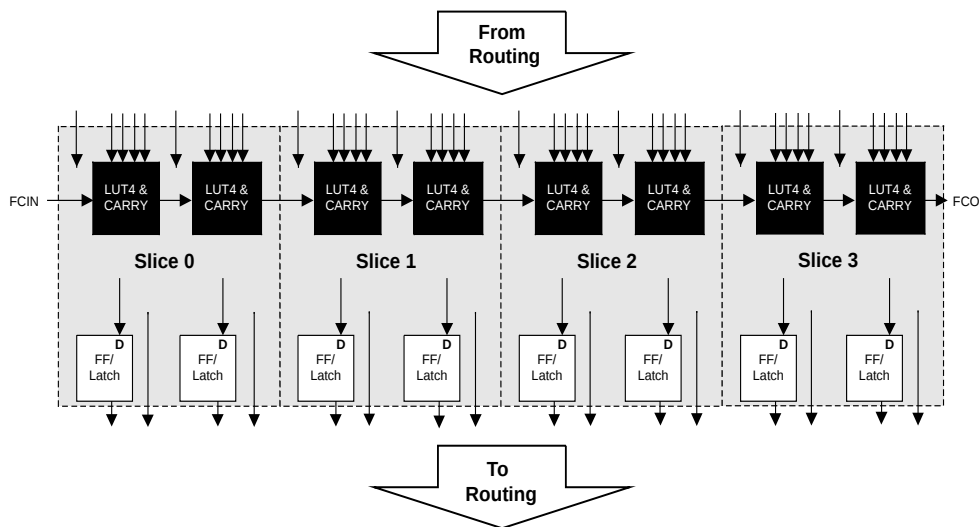


## PFU Blocks

The core of the MachXO devices consists of PFU and PFF blocks. The PFUs can be programmed to perform Logic, Arithmetic, Distributed RAM, and Distributed ROM functions. PFF blocks can be programmed to perform Logic, Arithmetic, and Distributed ROM functions. Except where necessary, the remainder of this data sheet will use the term PFU to refer to both PFU and PFF blocks.

Each PFU block consists of four interconnected Slices, numbered 0-3 as shown in Figure 2-4. There are 53 inputs and 25 outputs associated with each PFU block.

**Figure 2-4. PFU Diagram**



## Slice

Each Slice contains two LUT4 lookup tables feeding two registers (programmed to be in FF or Latch mode), and some associated logic that allows the LUTs to be combined to perform functions such as LUT5, LUT6, LUT7, and LUT8. There is control logic to perform set/reset functions (programmable as synchronous/asynchronous), clock select, chip-select, and wider RAM/ROM functions. Figure 2-5 shows an overview of the internal logic of the Slice. The registers in the Slice can be configured for positive/negative and edge/level clocks.

## sysCLOCK Phase Locked Loops (PLLs)

The MachXO1200 and MachXO2280 provide PLL support. The source of the PLL input divider can come from an external pin or from internal routing. There are four sources of feedback signals to the feedback divider: from CLKINTFB (internal feedback port), from the global clock nets, from the output of the post scalar divider, and from the routing (or from an external pin). There is a PLL\_LOCK signal to indicate that the PLL has locked on to the input clock signal. Figure 2-10 shows the sysCLOCK PLL diagram.

The setup and hold times of the device can be improved by programming a delay in the feedback or input path of the PLL which will advance or delay the output clock with reference to the input clock. This delay can be either programmed during configuration or can be adjusted dynamically. In dynamic mode, the PLL may lose lock after adjustment and not relock until the  $t_{LOCK}$  parameter has been satisfied. Additionally, the phase and duty cycle block allows the user to adjust the phase and duty cycle of the CLKOS output.

The sysCLOCK PLLs provide the ability to synthesize clock frequencies. Each PLL has four dividers associated with it: input clock divider, feedback divider, post scalar divider, and secondary clock divider. The input clock divider is used to divide the input clock signal, while the feedback divider is used to multiply the input clock signal. The post scalar divider allows the VCO to operate at higher frequencies than the clock output, thereby increasing the frequency range. The secondary divider is used to derive lower frequency outputs.

**Figure 2-10. PLL Diagram**

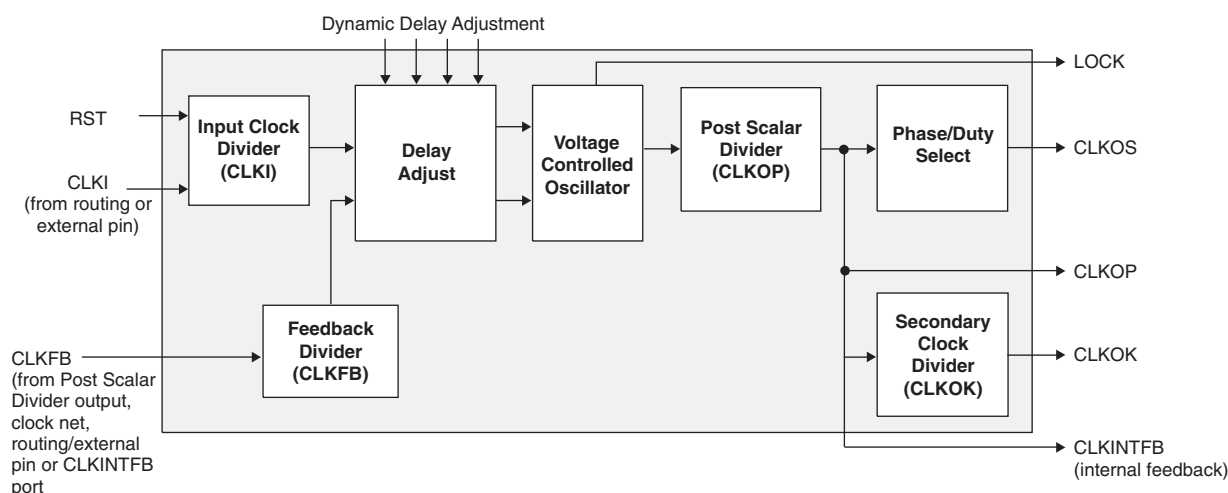
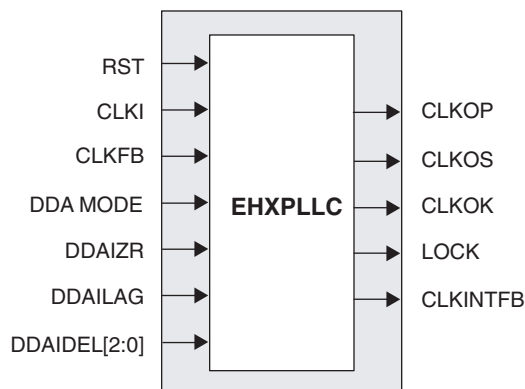
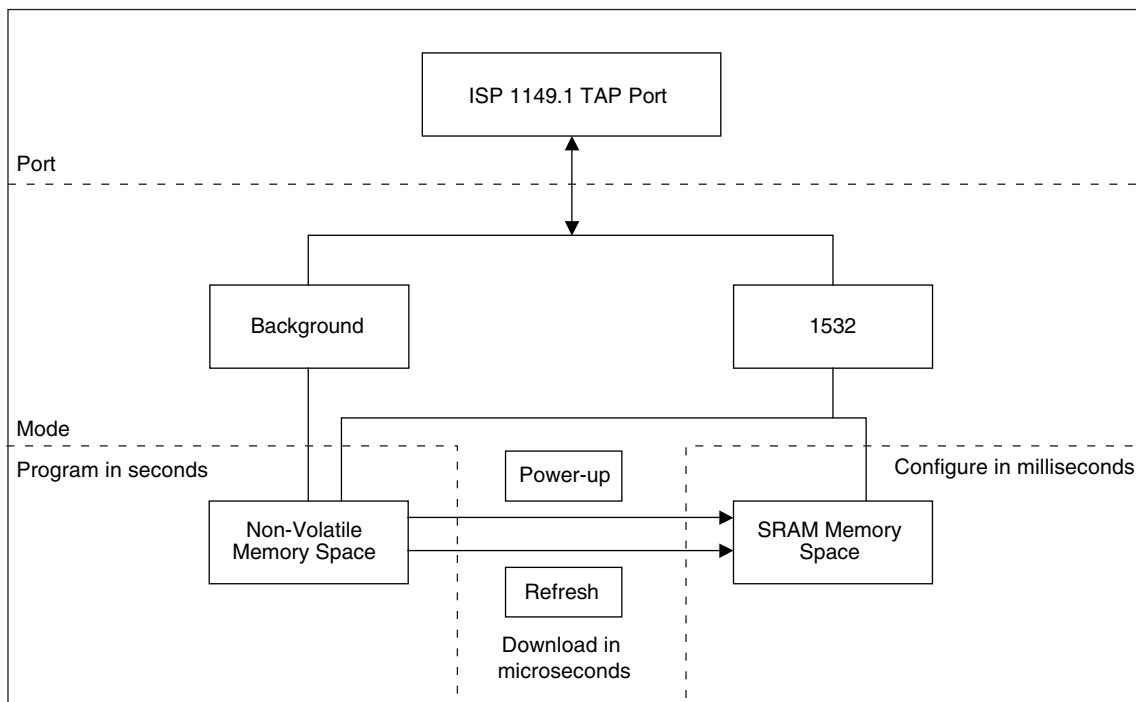


Figure 2-11 shows the available macros for the PLL. Table 2-5 provides signal description of the PLL Block.

**Figure 2-11. PLL Primitive**



**Figure 2-22. MachXO Configuration and Programming**



## Density Shifting

The MachXO family has been designed to enable density migration in the same package. Furthermore, the architecture ensures a high success rate when performing design migration from lower density parts to higher density parts. In many cases, it is also possible to shift a lower utilization design targeted for a high-density device to a lower density device. However, the exact details of the final resource utilization will impact the likely success in each case.

## Supply Current (Sleep Mode)<sup>1, 2</sup>

| Symbol      | Parameter                      | Device                | Typ. <sup>3</sup> | Max. | Units   |
|-------------|--------------------------------|-----------------------|-------------------|------|---------|
| $I_{CC}$    | Core Power Supply              | LCMXO256C             | 12                | 25   | $\mu A$ |
|             |                                | LCMXO640C             | 12                | 25   | $\mu A$ |
|             |                                | LCMXO1200C            | 12                | 25   | $\mu A$ |
|             |                                | LCMXO2280C            | 12                | 25   | $\mu A$ |
| $I_{CCAUX}$ | Auxiliary Power Supply         | LCMXO256C             | 1                 | 15   | $\mu A$ |
|             |                                | LCMXO640C             | 1                 | 25   | $\mu A$ |
|             |                                | LCMXO1200C            | 1                 | 45   | $\mu A$ |
|             |                                | LCMXO2280C            | 1                 | 85   | $\mu A$ |
| $I_{CCIO}$  | Bank Power Supply <sup>4</sup> | All LCMXO 'C' Devices | 2                 | 30   | $\mu A$ |

1. Assumes all inputs are configured as LVCMOS and held at the VCCIO or GND.

2. Frequency = 0MHz.

3.  $T_A = 25^\circ C$ , power supplies at nominal voltage.

4. Per Bank.

## Supply Current (Standby)<sup>1, 2, 3, 4</sup>

### Over Recommended Operating Conditions

| Symbol      | Parameter                                    | Device       | Typ. <sup>5</sup> | Units |
|-------------|----------------------------------------------|--------------|-------------------|-------|
| $I_{CC}$    | Core Power Supply                            | LCMXO256C    | 7                 | mA    |
|             |                                              | LCMXO640C    | 9                 | mA    |
|             |                                              | LCMXO1200C   | 14                | mA    |
|             |                                              | LCMXO2280C   | 20                | mA    |
|             |                                              | LCMXO256E    | 4                 | mA    |
|             |                                              | LCMXO640E    | 6                 | mA    |
|             |                                              | LCMXO1200E   | 10                | mA    |
|             |                                              | LCMXO2280E   | 12                | mA    |
| $I_{CCAUX}$ | Auxiliary Power Supply<br>$V_{CCAUX} = 3.3V$ | LCMXO256E/C  | 5                 | mA    |
|             |                                              | LCMXO640E/C  | 7                 | mA    |
|             |                                              | LCMXO1200E/C | 12                | mA    |
|             |                                              | LCMXO2280E/C | 13                | mA    |
| $I_{CCIO}$  | Bank Power Supply <sup>6</sup>               | All devices  | 2                 | mA    |

1. For further information on supply current, please see details of additional technical documentation at the end of this data sheet.

2. Assumes all outputs are tristated, all inputs are configured as LVCMOS and held at VCCIO or GND.

3. Frequency = 0MHz.

4. User pattern = blank.

5.  $T_J = 25^\circ C$ , power supplies at nominal voltage.

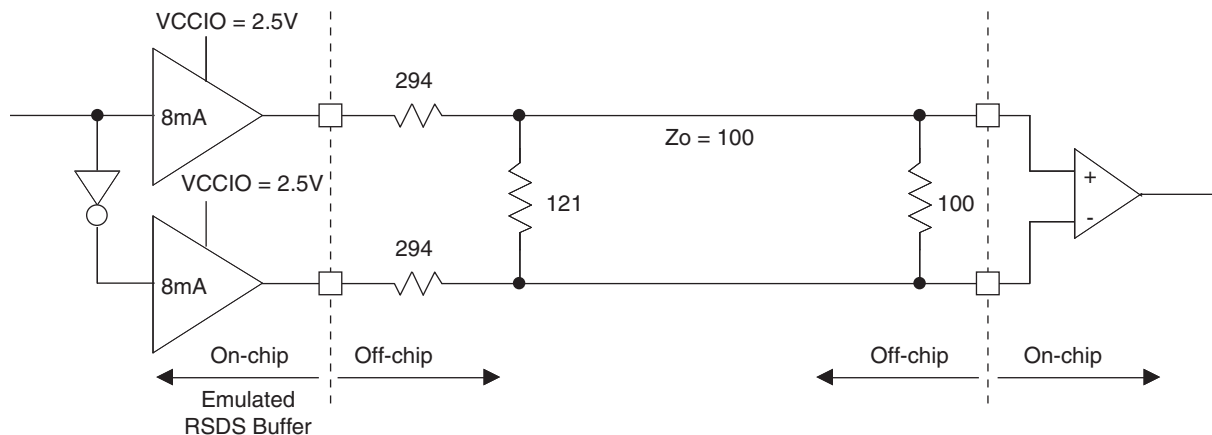
6. Per Bank. VCCIO = 2.5V. Does not include pull-up/pull-down.

For further information on LVPECL, BLVDS and other differential interfaces please see details of additional technical documentation at the end of the data sheet.

### RSDS

The MachXO family supports the differential RSDS standard. The output standard is emulated using complementary LVCMOS outputs in conjunction with a parallel resistor across the driver outputs on all the devices. The RSDS input standard is supported by the LVDS differential input buffer on certain devices. The scheme shown in Figure 3-4 is one possible solution for RSDS standard implementation. Use LVDS25E mode with suggested resistors for RSDS operation. Resistor values in Figure 3-4 are industry standard values for 1% resistors.

**Figure 3-4. RSDS (Reduced Swing Differential Standard)**



**Table 3-4. RSDS DC Conditions**

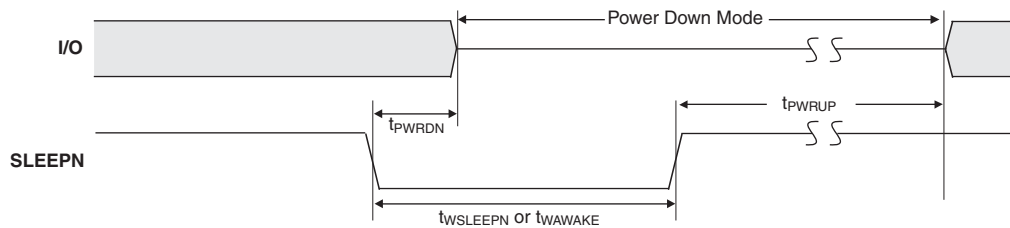
| Parameter  | Description                 | Typical | Units |
|------------|-----------------------------|---------|-------|
| $Z_{OUT}$  | Output impedance            | 20      | Ohms  |
| $R_S$      | Driver series resistor      | 294     | Ohms  |
| $R_P$      | Driver parallel resistor    | 121     | Ohms  |
| $R_T$      | Receiver termination        | 100     | Ohms  |
| $V_{OH}$   | Output high voltage         | 1.35    | V     |
| $V_{OL}$   | Output low voltage          | 1.15    | V     |
| $V_{OD}$   | Output differential voltage | 0.20    | V     |
| $V_{CM}$   | Output common mode voltage  | 1.25    | V     |
| $Z_{BACK}$ | Back impedance              | 101.5   | Ohms  |
| $I_{DC}$   | DC output current           | 3.66    | mA    |

### MachXO “C” Sleep Mode Timing

| Symbol        | Parameter                | Device    | Min. | Typ. | Max  | Units |
|---------------|--------------------------|-----------|------|------|------|-------|
| $t_{PWRDN}$   | SLEEPN Low to Power Down | All       | —    | —    | 400  | ns    |
| $t_{PWRUP}$   | SLEEPN High to Power Up  | LCMXO256  | —    | —    | 400  | μs    |
|               |                          | LCMXO640  | —    | —    | 600  | μs    |
|               |                          | LCMXO1200 | —    | —    | 800  | μs    |
|               |                          | LCMXO2280 | —    | —    | 1000 | μs    |
| $t_{WSLEEPN}$ | SLEEPN Pulse Width       | All       | 400  | —    | —    | ns    |
| $t_{WAWAKE}$  | SLEEPN Pulse Rejection   | All       | —    | —    | 100  | ns    |

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### Flash Download Time



| Symbol        | Parameter                                                                        | Min.      | Typ. | Max. | Units |
|---------------|----------------------------------------------------------------------------------|-----------|------|------|-------|
| $t_{REFRESH}$ | Minimum $V_{CC}$ or $V_{CCAUX}$ (later of the two supplies) to Device I/O Active | LCMXO256  | —    | 0.4  | ms    |
|               |                                                                                  | LCMXO640  | —    | 0.6  | ms    |
|               |                                                                                  | LCMXO1200 | —    | 0.8  | ms    |
|               |                                                                                  | LCMXO2280 | —    | 1.0  | ms    |

### JTAG Port Timing Specifications

| Symbol        | Parameter                                                            | Min. | Max. | Units |
|---------------|----------------------------------------------------------------------|------|------|-------|
| $f_{MAX}$     | TCK [BSCAN] clock frequency                                          | —    | 25   | MHz   |
| $t_{BTCP}$    | TCK [BSCAN] clock pulse width                                        | 40   | —    | ns    |
| $t_{BTCPH}$   | TCK [BSCAN] clock pulse width high                                   | 20   | —    | ns    |
| $t_{BTCPL}$   | TCK [BSCAN] clock pulse width low                                    | 20   | —    | ns    |
| $t_{BTS}$     | TCK [BSCAN] setup time                                               | 8    | —    | ns    |
| $t_{BTH}$     | TCK [BSCAN] hold time                                                | 10   | —    | ns    |
| $t_{BTRF}$    | TCK [BSCAN] rise/fall time                                           | 50   | —    | mV/ns |
| $t_{BTCO}$    | TAP controller falling edge of clock to output valid                 | —    | 10   | ns    |
| $t_{BTCODIS}$ | TAP controller falling edge of clock to output disabled              | —    | 10   | ns    |
| $t_{BTCOEN}$  | TAP controller falling edge of clock to output enabled               | —    | 10   | ns    |
| $t_{BTCRS}$   | BSCAN test capture register setup time                               | 8    | —    | ns    |
| $t_{BTCRH}$   | BSCAN test capture register hold time                                | 25   | —    | ns    |
| $t_{BUTCO}$   | BSCAN test update register, falling edge of clock to output valid    | —    | 25   | ns    |
| $t_{BTUODIS}$ | BSCAN test update register, falling edge of clock to output disabled | —    | 25   | ns    |
| $t_{BTUPOEN}$ | BSCAN test update register, falling edge of clock to output enabled  | —    | 25   | ns    |

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**LCMX0256 and LCMX0640 Logic Signal Connections: 100 TQFP**

| Pin Number | LCMX0256      |      |               |              | LCMX0640      |      |               |              |
|------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|
|            | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential |
| 1          | PL2A          | 1    |               | T            | PL2A          | 3    |               | T            |
| 2          | PL2B          | 1    |               | C            | PL2C          | 3    |               | T            |
| 3          | PL3A          | 1    |               | T            | PL2B          | 3    |               | C            |
| 4          | PL3B          | 1    |               | C            | PL2D          | 3    |               | C            |
| 5          | PL3C          | 1    |               | T            | PL3A          | 3    |               | T            |
| 6          | PL3D          | 1    |               | C            | PL3B          | 3    |               | C            |
| 7          | PL4A          | 1    |               | T            | PL3C          | 3    |               | T            |
| 8          | PL4B          | 1    |               | C            | PL3D          | 3    |               | C            |
| 9          | PL5A          | 1    |               | T            | PL4A          | 3    |               |              |
| 10         | VCCIO1        | 1    |               |              | VCCIO3        | 3    |               |              |
| 11         | PL5B          | 1    |               | C            | PL4C          | 3    |               | T            |
| 12         | GNDIO1        | 1    |               |              | GNDIO3        | 3    |               |              |
| 13         | PL5C          | 1    |               | T            | PL4D          | 3    |               | C            |
| 14         | PL5D          | 1    | GSRN          | C            | PL5B          | 3    | GSRN          |              |
| 15         | PL6A          | 1    |               | T            | PL7B          | 3    |               |              |
| 16         | PL6B          | 1    | TSALL         | C            | PL8C          | 3    | TSALL         | T            |
| 17         | PL7A          | 1    |               | T            | PL8D          | 3    |               | C            |
| 18         | PL7B          | 1    |               | C            | PL9A          | 3    |               |              |
| 19         | PL7C          | 1    |               | T            | PL9C          | 3    |               |              |
| 20         | PL7D          | 1    |               | C            | PL10A         | 3    |               |              |
| 21         | PL8A          | 1    |               | T            | PL10C         | 3    |               |              |
| 22         | PL8B          | 1    |               | C            | PL11A         | 3    |               |              |
| 23         | PL9A          | 1    |               | T            | PL11C         | 3    |               |              |
| 24         | VCCIO1        | 1    |               |              | VCCIO3        | 3    |               |              |
| 25         | GNDIO1        | 1    |               |              | GNDIO3        | 3    |               |              |
| 26         | TMS           | 1    | TMS           |              | TMS           | 2    | TMS           |              |
| 27         | PL9B          | 1    |               | C            | PB2C          | 2    |               |              |
| 28         | TCK           | 1    | TCK           |              | TCK           | 2    | TCK           |              |
| 29         | PB2A          | 1    |               | T            | VCCIO2        | 2    |               |              |
| 30         | PB2B          | 1    |               | C            | GNDIO2        | 2    |               |              |
| 31         | TDO           | 1    | TDO           |              | TDO           | 2    | TDO           |              |
| 32         | PB2C          | 1    |               | T            | PB4C          | 2    |               |              |
| 33         | TDI           | 1    | TDI           |              | TDI           | 2    | TDI           |              |
| 34         | PB2D          | 1    |               | C            | PB4E          | 2    |               |              |
| 35         | VCC           | -    |               |              | VCC           | -    |               |              |
| 36         | PB3A          | 1    | PCLK1_1**     | T            | PB5B          | 2    | PCLK2_1**     |              |
| 37         | PB3B          | 1    |               | C            | PB5D          | 2    |               |              |
| 38         | PB3C          | 1    | PCLK1_0**     | T            | PB6B          | 2    | PCLK2_0**     |              |
| 39         | PB3D          | 1    |               | C            | PB6C          | 2    |               |              |
| 40         | GND           | -    |               |              | GND           | -    |               |              |
| 41         | VCCIO1        | 1    |               |              | VCCIO2        | 2    |               |              |
| 42         | GNDIO1        | 1    |               |              | GNDIO2        | 2    |               |              |

**LCMX0256 and LCMX0640 Logic Signal Connections: 100 csBGA (Cont.)**

| LCMX0256    |               |      |               |              | LCMX0640    |               |      |               |              |
|-------------|---------------|------|---------------|--------------|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential | Ball Number | Ball Function | Bank | Dual Function | Differential |
| P13         | PB5A          | 1    |               |              | P13         | PB9C          | 2    |               | T            |
| M12*        | SLEEPN        | -    | SLEEPN        |              | M12*        | SLEEPN        | -    | SLEEPN        |              |
| P14         | PB5C          | 1    |               | T            | P14         | PB9D          | 2    |               | C            |
| N13         | PB5D          | 1    |               | C            | N13         | PB9F          | 2    |               |              |
| N14         | PR9B          | 0    |               | C            | N14         | PR11D         | 1    |               | C            |
| M14         | PR9A          | 0    |               | T            | M14         | PR11B         | 1    |               | C            |
| L13         | PR8B          | 0    |               | C            | L13         | PR11C         | 1    |               | T            |
| L14         | PR8A          | 0    |               | T            | L14         | PR11A         | 1    |               | T            |
| M13         | PR7D          | 0    |               | C            | M13         | PR10D         | 1    |               | C            |
| K14         | PR7C          | 0    |               | T            | K14         | PR10C         | 1    |               | T            |
| K13         | PR7B          | 0    |               | C            | K13         | PR10B         | 1    |               | C            |
| J14         | PR7A          | 0    |               | T            | J14         | PR10A         | 1    |               | T            |
| J13         | PR6B          | 0    |               | C            | J13         | PR9D          | 1    |               |              |
| H13         | PR6A          | 0    |               | T            | H13         | PR9B          | 1    |               |              |
| G14         | GNDIO0        | 0    |               |              | G14         | GNDIO1        | 1    |               |              |
| G13         | PR5D          | 0    |               | C            | G13         | PR7B          | 1    |               |              |
| F14         | PR5C          | 0    |               | T            | F14         | PR6C          | 1    |               |              |
| F13         | PR5B          | 0    |               | C            | F13         | PR6B          | 1    |               |              |
| E14         | PR5A          | 0    |               | T            | E14         | PR5D          | 1    |               |              |
| E13         | PR4B          | 0    |               | C            | E13         | PR5B          | 1    |               |              |
| D14         | PR4A          | 0    |               | T            | D14         | PR4D          | 1    |               |              |
| D13         | PR3D          | 0    |               | C            | D13         | PR4B          | 1    |               |              |
| C14         | PR3C          | 0    |               | T            | C14         | PR3D          | 1    |               |              |
| C13         | PR3B          | 0    |               | C            | C13         | PR3B          | 1    |               |              |
| B14         | PR3A          | 0    |               | T            | B14         | PR2D          | 1    |               |              |
| C12         | PR2B          | 0    |               | C            | C12         | PR2B          | 1    |               |              |
| B13         | GNDIO0        | 0    |               |              | B13         | GNDIO1        | 1    |               |              |
| A13         | PR2A          | 0    |               | T            | A13         | PT9F          | 0    |               | C            |
| A12         | PT5C          | 0    |               |              | A12         | PT9E          | 0    |               | T            |
| B11         | PT5B          | 0    |               | C            | B11         | PT9C          | 0    |               |              |
| A11         | PT5A          | 0    |               | T            | A11         | PT9A          | 0    |               |              |
| B12         | PT4F          | 0    |               | C            | B12         | VCCIO0        | 0    |               |              |
| A10         | PT4E          | 0    |               | T            | A10         | GNDIO0        | 0    |               |              |
| B10         | PT4D          | 0    |               | C            | B10         | PT7E          | 0    |               |              |
| A9          | PT4C          | 0    |               | T            | A9          | PT7A          | 0    |               |              |
| A8          | PT4B          | 0    | PCLK0_1**     | C            | A8          | PT6B          | 0    | PCLK0_1**     |              |
| B8          | PT4A          | 0    | PCLK0_0**     | T            | B8          | PT5B          | 0    | PCLK0_0**     | C            |
| A7          | PT3D          | 0    |               | C            | A7          | PT5A          | 0    |               | T            |
| B7          | VCCAUX        | -    |               |              | B7          | VCCAUX        | -    |               |              |
| A6          | PT3C          | 0    |               | T            | A6          | PT4F          | 0    |               |              |
| B6          | VCC           | -    |               |              | B6          | VCC           | -    |               |              |
| A5          | PT3B          | 0    |               | C            | A5          | PT3F          | 0    |               |              |

**LCMX0256 and LCMX0640 Logic Signal Connections: 100 csBGA (Cont.)**

| LCMX0256    |               |      |               |              | LCMX0640    |               |      |               |              |
|-------------|---------------|------|---------------|--------------|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential | Ball Number | Ball Function | Bank | Dual Function | Differential |
| A4          | GNDIO0        | 0    |               |              | A4          | GNDIO0        | 0    |               |              |
| B4          | PT3A          | 0    |               | T            | B4          | PT3B          | 0    |               | C            |
| A3          | PT2F          | 0    |               | C            | A3          | PT3A          | 0    |               | T            |
| B3          | PT2E          | 0    |               | T            | B3          | PT2F          | 0    |               | C            |
| A2          | PT2D          | 0    |               | C            | A2          | PT2E          | 0    |               | T            |
| C3          | PT2C          | 0    |               | T            | C3          | PT2B          | 0    |               | C            |
| A1          | PT2B          | 0    |               | C            | A1          | PT2C          | 0    |               |              |
| B2          | PT2A          | 0    |               | T            | B2          | PT2A          | 0    |               | T            |
| N9          | GND           | -    |               |              | N9          | GND           | -    |               |              |
| B9          | GND           | -    |               |              | B9          | GND           | -    |               |              |
| B5          | VCCIO0        | 0    |               |              | B5          | VCCIO0        | 0    |               |              |
| A14         | VCCIO0        | 0    |               |              | A14         | VCCIO1        | 1    |               |              |
| H14         | VCCIO0        | 0    |               |              | H14         | VCCIO1        | 1    |               |              |
| P10         | VCCIO1        | 1    |               |              | P10         | VCCIO2        | 2    |               |              |
| G1          | VCCIO1        | 1    |               |              | G1          | VCCIO3        | 3    |               |              |
| P1          | VCCIO1        | 1    |               |              | P1          | VCCIO3        | 3    |               |              |

\*NC for "E" devices.

\*\*Primary clock inputs are single-ended.

## LCMXO640, LCMXO1200 and LCMXO2280 Logic Signal Connections: 132 csBGA

| LCMXO640 |               |      |               |              | LCMXO1200 |               |      |                |              | LCMXO2280 |               |      |                |              |
|----------|---------------|------|---------------|--------------|-----------|---------------|------|----------------|--------------|-----------|---------------|------|----------------|--------------|
| Ball #   | Ball Function | Bank | Dual Function | Differential | Ball #    | Ball Function | Bank | Dual Function  | Differential | Ball #    | Ball Function | Bank | Dual Function  | Differential |
| B1       | PL2A          | 3    |               | T            | B1        | PL2A          | 7    |                | T            | B1        | PL2A          | 7    | LUM0_PLLT_FB_A | T            |
| C1       | PL2B          | 3    |               | C            | C1        | PL3C          | 7    |                | T            | C1        | PL3C          | 7    | LUM0_PLLT_IN_A | T            |
| B2       | PL2C          | 3    |               | T            | B2        | PL2B          | 7    |                | C            | B2        | PL2B          | 7    | LUM0_PLLC_FB_A | C            |
| C2       | PL2D          | 3    |               | C            | C2        | PL4A          | 7    |                | T*           | C2        | PL4A          | 7    |                | T*           |
| C3       | PL3A          | 3    |               | T            | C3        | PL3D          | 7    |                | C            | C3        | PL3D          | 7    | LUM0_PLLC_IN_A | C            |
| D1       | PL3B          | 3    |               | C            | D1        | PL4B          | 7    |                | C*           | D1        | PL4B          | 7    |                | C*           |
| D3       | PL3D          | 3    |               |              | D3        | PL4C          | 7    |                |              | D3        | PL4C          | 7    |                |              |
| E1       | GNDIO3        | 3    |               |              | E1        | GNDIO7        | 7    |                |              | E1        | GNDIO7        | 7    |                |              |
| E2       | PL5A          | 3    |               | T            | E2        | PL6A          | 7    |                | T*           | E2        | PL7A          | 7    |                | T*           |
| E3       | PL5B          | 3    | GSRN          | C            | E3        | PL6B          | 7    | GSRN           | C*           | E3        | PL7B          | 7    | GSRN           | C*           |
| F2       | PL5D          | 3    |               |              | F2        | PL6D          | 7    |                |              | F2        | PL7D          | 7    |                |              |
| F3       | PL6B          | 3    |               |              | F3        | PL7C          | 7    |                | T            | F3        | PL9C          | 7    |                | T            |
| G1       | PL6C          | 3    |               | T            | G1        | PL7D          | 7    |                | C            | G1        | PL9D          | 7    |                | C            |
| G2       | PL6D          | 3    |               | C            | G2        | PL8C          | 7    |                | T            | G2        | PL10C         | 7    |                | T            |
| G3       | PL7A          | 3    |               | T            | G3        | PL8D          | 7    |                | C            | G3        | PL10D         | 7    |                | C            |
| H2       | PL7B          | 3    |               | C            | H2        | PL10A         | 6    |                | T*           | H2        | PL12A         | 6    |                | T*           |
| H1       | PL7C          | 3    |               |              | H1        | PL10B         | 6    |                | C*           | H1        | PL12B         | 6    |                | C*           |
| H3       | VCC           | -    |               |              | H3        | VCC           | -    |                |              | H3        | VCC           | -    |                |              |
| J1       | PL8A          | 3    |               |              | J1        | PL11B         | 6    |                |              | J1        | PL14D         | 6    |                | C            |
| J2       | PL8C          | 3    | TSALL         |              | J2        | PL11C         | 6    | TSALL          | T            | J2        | PL14C         | 6    | TSALL          | T            |
| J3       | PL9A          | 3    |               | T            | J3        | PL11D         | 6    |                | C            | J3        | PL14B         | 6    |                |              |
| K2       | PL9B          | 3    |               | C            | K2        | PL12A         | 6    |                | T*           | K2        | PL15A         | 6    |                | T*           |
| K1       | PL9C          | 3    |               |              | K1        | PL12B         | 6    |                | C*           | K1        | PL15B         | 6    |                | C*           |
| L2       | GNDIO3        | 3    |               |              | L2        | GNDIO6        | 6    |                |              | L2        | GNDIO6        | 6    |                |              |
| L1       | PL10A         | 3    |               | T            | L1        | PL14A         | 6    | LLM0_PLLT_FB_A | T*           | L1        | PL17A         | 6    | LLM0_PLLT_FB_A | T*           |
| L3       | PL10B         | 3    |               | C            | L3        | PL14B         | 6    | LLM0_PLLC_FB_A | C*           | L3        | PL17B         | 6    | LLM0_PLLC_FB_A | C*           |
| M1       | PL11A         | 3    |               | T            | M1        | PL15A         | 6    | LLM0_PLLT_IN_A | T*           | M1        | PL18A         | 6    | LLM0_PLLT_IN_A | T*           |
| N1       | PL11B         | 3    |               | C            | N1        | PL16A         | 6    |                | T            | N1        | PL19A         | 6    |                | T            |
| M2       | PL11C         | 3    |               | T            | M2        | PL15B         | 6    | LLM0_PLLC_IN_A | C*           | M2        | PL18B         | 6    | LLM0_PLLC_IN_A | C*           |
| P1       | PL11D         | 3    |               | C            | P1        | PL16B         | 6    |                | C            | P1        | PL19B         | 6    |                | C            |
| P2       | GNDIO2        | 2    |               |              | P2        | GNDIO5        | 5    |                |              | P2        | GNDIO5        | 5    |                |              |
| P3       | TMS           | 2    | TMS           |              | P3        | TMS           | 5    | TMS            |              | P3        | TMS           | 5    | TMS            |              |
| M3       | PB2C          | 2    |               | T            | M3        | PB2C          | 5    |                | T            | M3        | PB2A          | 5    |                | T            |
| N3       | PB2D          | 2    |               | C            | N3        | PB2D          | 5    |                | C            | N3        | PB2B          | 5    |                | C            |
| P4       | TCK           | 2    | TCK           |              | P4        | TCK           | 5    | TCK            |              | P4        | TCK           | 5    | TCK            |              |
| M4       | PB3B          | 2    |               |              | M4        | PB3B          | 5    |                |              | M4        | PB3B          | 5    |                |              |
| N4       | PB3C          | 2    |               | T            | N4        | PB4A          | 5    |                | T            | N4        | PB4A          | 5    |                | T            |
| P5       | PB3D          | 2    |               | C            | P5        | PB4B          | 5    |                | C            | P5        | PB4B          | 5    |                | C            |
| N5       | TDO           | 2    | TDO           |              | N5        | TDO           | 5    | TDO            |              | N5        | TDO           | 5    | TDO            |              |
| M5       | TDI           | 2    | TDI           |              | M5        | TDI           | 5    | TDI            |              | M5        | TDI           | 5    | TDI            |              |
| N6       | PB4E          | 2    |               | T            | N6        | PB5C          | 5    |                |              | N6        | PB6C          | 5    |                |              |
| P6       | VCC           | -    |               |              | P6        | VCC           | -    |                |              | P6        | VCC           | -    |                |              |
| M6       | PB4F          | 2    |               | C            | M6        | PB6A          | 5    |                |              | M6        | PB8A          | 5    |                |              |
| P7       | VCCAUX        | -    |               |              | P7        | VCCAUX        | -    |                |              | P7        | VCCAUX        | -    |                |              |
| N7       | PB5A          | 2    |               | T            | N7        | PB6F          | 5    |                |              | N7        | PB8F          | 5    |                |              |
| M7       | PB5B          | 2    | PCLK2_1***    | C            | M7        | PB7B          | 4    | PCLK4_1***     |              | M7        | PB10F         | 4    | PCLK4_1***     |              |
| N8       | PB5D          | 2    |               |              | N8        | PB7C          | 4    |                | T            | N8        | PB10C         | 4    |                | T            |
| P8       | PB6A          | 2    |               | T            | P8        | PB7D          | 4    |                | C            | P8        | PB10D         | 4    |                | C            |
| M8       | PB6B          | 2    | PCLK2_0***    | C            | M8        | PB7F          | 4    | PCLK4_0***     |              | M8        | PB10B         | 4    | PCLK4_0***     |              |
| N9       | PB7A          | 2    |               | T            | N9        | PB9A          | 4    |                | T            | N9        | PB12A         | 4    |                | T            |

## LCMXO640, LCMXO1200 and LCMXO2280 Logic Signal Connections: 144 TQFP (Cont.)

| Pin Number | LCMXO640      |      |               |              | LCMXO1200     |      |               |              | LCMXO2280     |      |               |              |
|------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|
|            | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential |
| 101        | PR3D          | 1    |               | C            | PR4B          | 2    |               | C*           | PR5B          | 2    |               | C*           |
| 102        | PR3C          | 1    |               | T            | PR4A          | 2    |               | T*           | PR5A          | 2    |               | T*           |
| 103        | PR3B          | 1    |               | C            | PR3D          | 2    |               | C            | PR4D          | 2    |               | C            |
| 104        | PR2D          | 1    |               | C            | PR3C          | 2    |               | T            | PR4C          | 2    |               | T            |
| 105        | PR3A          | 1    |               | T            | PR3B          | 2    |               | C*           | PR4B          | 2    |               | C*           |
| 106        | PR2B          | 1    |               | C            | PR3A          | 2    |               | T*           | PR4A          | 2    |               | T*           |
| 107        | PR2C          | 1    |               | T            | PR2B          | 2    |               | C            | PR3B          | 2    |               | C*           |
| 108        | PR2A          | 1    |               | T            | PR2A          | 2    |               | T            | PR3A          | 2    |               | T*           |
| 109        | PT9F          | 0    |               | C            | PT11D         | 1    |               | C            | PT16D         | 1    |               | C            |
| 110        | PT9D          | 0    |               | C            | PT11C         | 1    |               | T            | PT16C         | 1    |               | T            |
| 111        | PT9E          | 0    |               | T            | PT11B         | 1    |               | C            | PT16B         | 1    |               | C            |
| 112        | PT9B          | 0    |               | C            | PT11A         | 1    |               | T            | PT16A         | 1    |               | T            |
| 113        | PT9C          | 0    |               | T            | PT10F         | 1    |               | C            | PT15D         | 1    |               | C            |
| 114        | PT9A          | 0    |               | T            | PT10E         | 1    |               | T            | PT15C         | 1    |               | T            |
| 115        | PT8C          | 0    |               |              | PT10D         | 1    |               | C            | PT14B         | 1    |               | C            |
| 116        | PT8B          | 0    |               | C            | PT10C         | 1    |               | T            | PT14A         | 1    |               | T            |
| 117        | VCCIO0        | 0    |               |              | VCCIO1        | 1    |               |              | VCCIO1        | 1    |               |              |
| 118        | GNDIO0        | 0    |               |              | GNDIO1        | 1    |               |              | GNDIO1        | 1    |               |              |
| 119        | PT8A          | 0    |               | T            | PT9F          | 1    |               | C            | PT12F         | 1    |               | C            |
| 120        | PT7E          | 0    |               |              | PT9E          | 1    |               | T            | PT12E         | 1    |               | T            |
| 121        | PT7C          | 0    |               |              | PT9B          | 1    |               | C            | PT12D         | 1    |               | C            |
| 122        | PT7A          | 0    |               |              | PT9A          | 1    |               | T            | PT12C         | 1    |               | T            |
| 123        | GND           | -    |               |              | GND           | -    |               |              | GND           | -    |               |              |
| 124        | PT6B          | 0    | PCLK0_1***    | C            | PT7D          | 1    | PCLK1_1***    |              | PT10B         | 1    | PCLK1_1***    |              |
| 125        | PT6A          | 0    |               | T            | PT7B          | 1    |               | C            | PT9D          | 1    |               | C            |
| 126        | PT5C          | 0    |               |              | PT7A          | 1    |               | T            | PT9C          | 1    |               | T            |
| 127        | PT5B          | 0    | PCLK0_0***    |              | PT6F          | 0    | PCLK1_0***    |              | PT9B          | 1    | PCLK1_0***    |              |
| 128        | VCCAUX        | -    |               |              | VCCAUX        | -    |               |              | VCCAUX        | -    |               |              |
| 129        | VCC           | -    |               |              | VCC           | -    |               |              | VCC           | -    |               |              |
| 130        | PT4D          | 0    |               |              | PT5D          | 0    |               | C            | PT7B          | 0    |               | C            |
| 131        | PT4B          | 0    |               | C            | PT5C          | 0    |               | T            | PT7A          | 0    |               | T            |
| 132        | PT4A          | 0    |               | T            | PT5B          | 0    |               | C            | PT6D          | 0    |               |              |
| 133        | PT3F          | 0    |               |              | PT5A          | 0    |               | T            | PT6E          | 0    |               | T            |
| 134        | PT3D          | 0    |               |              | PT4B          | 0    |               |              | PT6F          | 0    |               | C            |
| 135        | VCCIO0        | 0    |               |              | VCCIO0        | 0    |               |              | VCCIO0        | 0    |               |              |
| 136        | GNDIO0        | 0    |               |              | GNDIO0        | 0    |               |              | GNDIO0        | 0    |               |              |
| 137        | PT3B          | 0    |               | C            | PT3D          | 0    |               | C            | PT4B          | 0    |               | T            |
| 138        | PT2F          | 0    |               | C            | PT3C          | 0    |               | T            | PT4A          | 0    |               | C            |
| 139        | PT3A          | 0    |               | T            | PT3B          | 0    |               | C            | PT3B          | 0    |               | C            |
| 140        | PT2D          | 0    |               | C            | PT3A          | 0    |               | T            | PT3A          | 0    |               | T            |
| 141        | PT2E          | 0    |               | T            | PT2D          | 0    |               | C            | PT2D          | 0    |               | C            |
| 142        | PT2B          | 0    |               | C            | PT2C          | 0    |               | T            | PT2C          | 0    |               | T            |
| 143        | PT2C          | 0    |               | T            | PT2B          | 0    |               | C            | PT2B          | 0    |               | C            |
| 144        | PT2A          | 0    |               | T            | PT2A          | 0    |               | T            | PT2A          | 0    |               | T            |

\*Supports true LVDS outputs.

\*\*NC for "E" devices.

\*\*\*Primary clock inputs are single-ended.

## LCMXO640, LCMXO1200 and LCMXO2280 Logic Signal Connections: 256 caBGA / 256 ftBGA (Cont.)

| LCMXO640    |               |      |               |              | LCMXO1200   |               |      |               |              | LCMXO2280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|-------------|---------------|------|---------------|--------------|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential | Ball Number | Ball Function | Bank | Dual Function | Differential | Ball Number | Ball Function | Bank | Dual Function | Differential |
| D3          | NC            |      |               |              | D3          | PT2C          | 0    |               | T            | D3          | PT3C          | 0    |               | T            |
| A3          | PT2B          | 0    |               | C            | A3          | PT3B          | 0    |               | C            | A3          | PT3B          | 0    |               | C            |
| A2          | PT2A          | 0    |               | T            | A2          | PT3A          | 0    |               | T            | A2          | PT3A          | 0    |               | T            |
| B3          | NC            |      |               |              | B3          | PT2B          | 0    |               | C            | B3          | PT2D          | 0    |               | C            |
| B2          | NC            |      |               |              | B2          | PT2A          | 0    |               | T            | B2          | PT2C          | 0    |               | T            |
| VCCIO0      | VCCIO0        | 0    |               |              | VCCIO0      | VCCIO0        | 0    |               |              | VCCIO0      | VCCIO0        | 0    |               |              |
| GND         | GNDIO0        | 0    |               |              | GND         | GNDIO0        | 0    |               |              | GND         | GNDIO0        | 0    |               |              |
| A1          | GND           | -    |               |              | A1          | GND           | -    |               |              | A1          | GND           | -    |               |              |
| A16         | GND           | -    |               |              | A16         | GND           | -    |               |              | A16         | GND           | -    |               |              |
| F11         | GND           | -    |               |              | F11         | GND           | -    |               |              | F11         | GND           | -    |               |              |
| G8          | GND           | -    |               |              | G8          | GND           | -    |               |              | G8          | GND           | -    |               |              |
| G9          | GND           | -    |               |              | G9          | GND           | -    |               |              | G9          | GND           | -    |               |              |
| H7          | GND           | -    |               |              | H7          | GND           | -    |               |              | H7          | GND           | -    |               |              |
| H8          | GND           | -    |               |              | H8          | GND           | -    |               |              | H8          | GND           | -    |               |              |
| H9          | GND           | -    |               |              | H9          | GND           | -    |               |              | H9          | GND           | -    |               |              |
| H10         | GND           | -    |               |              | H10         | GND           | -    |               |              | H10         | GND           | -    |               |              |
| J7          | GND           | -    |               |              | J7          | GND           | -    |               |              | J7          | GND           | -    |               |              |
| J8          | GND           | -    |               |              | J8          | GND           | -    |               |              | J8          | GND           | -    |               |              |
| J9          | GND           | -    |               |              | J9          | GND           | -    |               |              | J9          | GND           | -    |               |              |
| J10         | GND           | -    |               |              | J10         | GND           | -    |               |              | J10         | GND           | -    |               |              |
| K8          | GND           | -    |               |              | K8          | GND           | -    |               |              | K8          | GND           | -    |               |              |
| K9          | GND           | -    |               |              | K9          | GND           | -    |               |              | K9          | GND           | -    |               |              |
| L6          | GND           | -    |               |              | L6          | GND           | -    |               |              | L6          | GND           | -    |               |              |
| T1          | GND           | -    |               |              | T1          | GND           | -    |               |              | T1          | GND           | -    |               |              |
| T16         | GND           | -    |               |              | T16         | GND           | -    |               |              | T16         | GND           | -    |               |              |
| G7          | VCC           | -    |               |              | G7          | VCC           | -    |               |              | G7          | VCC           | -    |               |              |
| G10         | VCC           | -    |               |              | G10         | VCC           | -    |               |              | G10         | VCC           | -    |               |              |
| K7          | VCC           | -    |               |              | K7          | VCC           | -    |               |              | K7          | VCC           | -    |               |              |
| K10         | VCC           | -    |               |              | K10         | VCC           | -    |               |              | K10         | VCC           | -    |               |              |
| H6          | VCCIO3        | 3    |               |              | H6          | VCCIO7        | 7    |               |              | H6          | VCCIO7        | 7    |               |              |
| G6          | VCCIO3        | 3    |               |              | G6          | VCCIO7        | 7    |               |              | G6          | VCCIO7        | 7    |               |              |
| K6          | VCCIO3        | 3    |               |              | K6          | VCCIO6        | 6    |               |              | K6          | VCCIO6        | 6    |               |              |
| J6          | VCCIO3        | 3    |               |              | J6          | VCCIO6        | 6    |               |              | J6          | VCCIO6        | 6    |               |              |
| L8          | VCCIO2        | 2    |               |              | L8          | VCCIO5        | 5    |               |              | L8          | VCCIO5        | 5    |               |              |
| L7          | VCCIO2        | 2    |               |              | L7          | VCCIO5        | 5    |               |              | L7          | VCCIO5        | 5    |               |              |
| L9          | VCCIO2        | 2    |               |              | L9          | VCCIO4        | 4    |               |              | L9          | VCCIO4        | 4    |               |              |
| L10         | VCCIO2        | 2    |               |              | L10         | VCCIO4        | 4    |               |              | L10         | VCCIO4        | 4    |               |              |
| K11         | VCCIO1        | 1    |               |              | K11         | VCCIO3        | 3    |               |              | K11         | VCCIO3        | 3    |               |              |
| J11         | VCCIO1        | 1    |               |              | J11         | VCCIO3        | 3    |               |              | J11         | VCCIO3        | 3    |               |              |
| H11         | VCCIO1        | 1    |               |              | H11         | VCCIO2        | 2    |               |              | H11         | VCCIO2        | 2    |               |              |
| G11         | VCCIO1        | 1    |               |              | G11         | VCCIO2        | 2    |               |              | G11         | VCCIO2        | 2    |               |              |
| F9          | VCCIO0        | 0    |               |              | F9          | VCCIO1        | 1    |               |              | F9          | VCCIO1        | 1    |               |              |
| F10         | VCCIO0        | 0    |               |              | F10         | VCCIO1        | 1    |               |              | F10         | VCCIO1        | 1    |               |              |
| F8          | VCCIO0        | 0    |               |              | F8          | VCCIO0        | 0    |               |              | F8          | VCCIO0        | 0    |               |              |
| F7          | VCCIO0        | 0    |               |              | F7          | VCCIO0        | 0    |               |              | F7          | VCCIO0        | 0    |               |              |

\* Supports true LVDS outputs.

\*\* NC for "E" devices.

\*\*\* Primary clock inputs are single-ended.

**LCMX02280 Logic Signal Connections: 324 ftBGA (Cont.)**

| LCMX02280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential |
| V10         | PB9B          | 4    |               | C            |
| N10         | PB9C          | 4    |               | T            |
| R10         | PB9D          | 4    |               | C            |
| P10         | PB10F         | 4    | PCLK4_1***    | C            |
| T10         | PB10E         | 4    |               | T            |
| U10         | PB10D         | 4    |               | C            |
| V11         | PB10C         | 4    |               | T            |
| U11         | PB10B         | 4    | PCLK4_0***    | C            |
| VCCIO4      | VCCIO4        | 4    |               |              |
| GND         | GNDIO4        | 4    |               |              |
| T11         | PB10A         | 4    |               | T            |
| U12         | PB11A         | 4    |               | T            |
| R11         | PB11B         | 4    |               | C            |
| GND         | GND           | -    |               |              |
| T12         | PB11C         | 4    |               | T            |
| P11         | PB11D         | 4    |               | C            |
| V12         | PB12A         | 4    |               | T            |
| V13         | PB12B         | 4    |               | C            |
| R12         | PB12C         | 4    |               | T            |
| N11         | PB12D         | 4    |               | C            |
| U13         | PB12E         | 4    |               | T            |
| VCCIO4      | VCCIO4        | 4    |               |              |
| GND         | GNDIO4        | 4    |               |              |
| V14         | PB12F         | 4    |               | C            |
| T13         | PB13A         | 4    |               | T            |
| P12         | PB13B         | 4    |               | C            |
| R13         | PB13C         | 4    |               | T            |
| N12         | PB13D         | 4    |               | C            |
| V15         | PB14A         | 4    |               | T            |
| U14         | PB14B         | 4    |               | C            |
| V16         | PB14C         | 4    |               | T            |
| GND         | GND           | -    |               |              |
| T14         | PB14D         | 4    |               | C            |
| U15         | PB15A         | 4    |               | T            |
| V17         | PB15B         | 4    |               | C            |
| P13**       | SLEEPN        | -    | SLEEPN        |              |
| T15         | PB15D         | 4    |               |              |
| U16         | PB16A         | 4    |               | T            |
| V18         | PB16B         | 4    |               | C            |
| N13         | PB16C         | 4    |               | T            |
| R14         | PB16D         | 4    |               | C            |
| VCCIO4      | VCCIO4        | 4    |               |              |
| GND         | GNDIO4        | 4    |               |              |

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**LCMXO2280 Logic Signal Connections: 324 ftBGA (Cont.)**

| LCMXO2280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential |
| G8          | VCCIO0        | 0    |               |              |
| G7          | VCCIO0        | 0    |               |              |

\* Supports true LVDS outputs.

\*\* NC for "E" devices.

\*\*\* Primary clock inputs are single-ended.

**Conventional Packaging**
**Commercial**

| Part Number      | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO256C-3T100C | 256  | 1.8V/2.5V/3.3V | 78   | -3    | TQFP    | 100  | COM   |
| LCMXO256C-4T100C | 256  | 1.8V/2.5V/3.3V | 78   | -4    | TQFP    | 100  | COM   |
| LCMXO256C-5T100C | 256  | 1.8V/2.5V/3.3V | 78   | -5    | TQFP    | 100  | COM   |
| LCMXO256C-3M100C | 256  | 1.8V/2.5V/3.3V | 78   | -3    | csBGA   | 100  | COM   |
| LCMXO256C-4M100C | 256  | 1.8V/2.5V/3.3V | 78   | -4    | csBGA   | 100  | COM   |
| LCMXO256C-5M100C | 256  | 1.8V/2.5V/3.3V | 78   | -5    | csBGA   | 100  | COM   |

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|-------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO640C-3T100C  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | TQFP    | 100  | COM   |
| LCMXO640C-4T100C  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | TQFP    | 100  | COM   |
| LCMXO640C-5T100C  | 640  | 1.8V/2.5V/3.3V | 74   | -5    | TQFP    | 100  | COM   |
| LCMXO640C-3M100C  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | csBGA   | 100  | COM   |
| LCMXO640C-4M100C  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | csBGA   | 100  | COM   |
| LCMXO640C-5M100C  | 640  | 1.8V/2.5V/3.3V | 74   | -5    | csBGA   | 100  | COM   |
| LCMXO640C-3T144C  | 640  | 1.8V/2.5V/3.3V | 113  | -3    | TQFP    | 144  | COM   |
| LCMXO640C-4T144C  | 640  | 1.8V/2.5V/3.3V | 113  | -4    | TQFP    | 144  | COM   |
| LCMXO640C-5T144C  | 640  | 1.8V/2.5V/3.3V | 113  | -5    | TQFP    | 144  | COM   |
| LCMXO640C-3M132C  | 640  | 1.8V/2.5V/3.3V | 101  | -3    | csBGA   | 132  | COM   |
| LCMXO640C-4M132C  | 640  | 1.8V/2.5V/3.3V | 101  | -4    | csBGA   | 132  | COM   |
| LCMXO640C-5M132C  | 640  | 1.8V/2.5V/3.3V | 101  | -5    | csBGA   | 132  | COM   |
| LCMXO640C-3B256C  | 640  | 1.8V/2.5V/3.3V | 159  | -3    | caBGA   | 256  | COM   |
| LCMXO640C-4B256C  | 640  | 1.8V/2.5V/3.3V | 159  | -4    | caBGA   | 256  | COM   |
| LCMXO640C-5B256C  | 640  | 1.8V/2.5V/3.3V | 159  | -5    | caBGA   | 256  | COM   |
| LCMXO640C-3FT256C | 640  | 1.8V/2.5V/3.3V | 159  | -3    | ftBGA   | 256  | COM   |
| LCMXO640C-4FT256C | 640  | 1.8V/2.5V/3.3V | 159  | -4    | ftBGA   | 256  | COM   |
| LCMXO640C-5FT256C | 640  | 1.8V/2.5V/3.3V | 159  | -5    | ftBGA   | 256  | COM   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|--------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO1200C-3T100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -3    | TQFP    | 100  | COM   |
| LCMXO1200C-4T100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -4    | TQFP    | 100  | COM   |
| LCMXO1200C-5T100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -5    | TQFP    | 100  | COM   |
| LCMXO1200C-3T144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -3    | TQFP    | 144  | COM   |
| LCMXO1200C-4T144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -4    | TQFP    | 144  | COM   |
| LCMXO1200C-5T144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -5    | TQFP    | 144  | COM   |
| LCMXO1200C-3M132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -3    | csBGA   | 132  | COM   |
| LCMXO1200C-4M132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -4    | csBGA   | 132  | COM   |
| LCMXO1200C-5M132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -5    | csBGA   | 132  | COM   |
| LCMXO1200C-3B256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | caBGA   | 256  | COM   |
| LCMXO1200C-4B256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | caBGA   | 256  | COM   |
| LCMXO1200C-5B256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -5    | caBGA   | 256  | COM   |
| LCMXO1200C-3FT256C | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | ftBGA   | 256  | COM   |
| LCMXO1200C-4FT256C | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | ftBGA   | 256  | COM   |
| LCMXO1200C-5FT256C | 1200 | 1.8V/2.5V/3.3V | 211  | -5    | ftBGA   | 256  | COM   |

**Lead-Free Packaging**
**Commercial**

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|-------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO256C-3TN100C | 256  | 1.8V/2.5V/3.3V | 78   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256C-4TN100C | 256  | 1.8V/2.5V/3.3V | 78   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256C-5TN100C | 256  | 1.8V/2.5V/3.3V | 78   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256C-3MN100C | 256  | 1.8V/2.5V/3.3V | 78   | -3    | Lead-Free csBGA | 100  | COM   |
| LCMXO256C-4MN100C | 256  | 1.8V/2.5V/3.3V | 78   | -4    | Lead-Free csBGA | 100  | COM   |
| LCMXO256C-5MN100C | 256  | 1.8V/2.5V/3.3V | 78   | -5    | Lead-Free csBGA | 100  | COM   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|--------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO640C-3TN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640C-4TN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640C-5TN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640C-3MN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | Lead-Free csBGA | 100  | COM   |
| LCMXO640C-4MN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | Lead-Free csBGA | 100  | COM   |
| LCMXO640C-5MN100C  | 640  | 1.8V/2.5V/3.3V | 74   | -5    | Lead-Free csBGA | 100  | COM   |
| LCMXO640C-3TN144C  | 640  | 1.8V/2.5V/3.3V | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640C-4TN144C  | 640  | 1.8V/2.5V/3.3V | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640C-5TN144C  | 640  | 1.8V/2.5V/3.3V | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640C-3MN132C  | 640  | 1.8V/2.5V/3.3V | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO640C-4MN132C  | 640  | 1.8V/2.5V/3.3V | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO640C-5MN132C  | 640  | 1.8V/2.5V/3.3V | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO640C-3BN256C  | 640  | 1.8V/2.5V/3.3V | 159  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO640C-4BN256C  | 640  | 1.8V/2.5V/3.3V | 159  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO640C-5BN256C  | 640  | 1.8V/2.5V/3.3V | 159  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO640C-3FTN256C | 640  | 1.8V/2.5V/3.3V | 159  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO640C-4FTN256C | 640  | 1.8V/2.5V/3.3V | 159  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO640C-5FTN256C | 640  | 1.8V/2.5V/3.3V | 159  | -5    | Lead-Free ftBGA | 256  | COM   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO1200C-3TN100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200C-4TN100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200C-5TN100C  | 1200 | 1.8V/2.5V/3.3V | 73   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200C-3TN144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200C-4TN144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200C-5TN144C  | 1200 | 1.8V/2.5V/3.3V | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200C-3MN132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200C-4MN132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200C-5MN132C  | 1200 | 1.8V/2.5V/3.3V | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200C-3BN256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200C-4BN256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200C-5BN256C  | 1200 | 1.8V/2.5V/3.3V | 211  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200C-3FTN256C | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO1200C-4FTN256C | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO1200C-5FTN256C | 1200 | 1.8V/2.5V/3.3V | 211  | -5    | Lead-Free ftBGA | 256  | COM   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO1200E-3TN100C  | 1200 | 1.2V           | 73   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200E-4TN100C  | 1200 | 1.2V           | 73   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200E-5TN100C  | 1200 | 1.2V           | 73   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO1200E-3TN144C  | 1200 | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200E-4TN144C  | 1200 | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200E-5TN144C  | 1200 | 1.2V           | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO1200E-3MN132C  | 1200 | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200E-4MN132C  | 1200 | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200E-5MN132C  | 1200 | 1.2V           | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO1200E-3BN256C  | 1200 | 1.2V           | 211  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200E-4BN256C  | 1200 | 1.2V           | 211  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200E-5BN256C  | 1200 | 1.2V           | 211  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO1200E-3FTN256C | 1200 | 1.2V           | 211  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO1200E-4FTN256C | 1200 | 1.2V           | 211  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO1200E-5FTN256C | 1200 | 1.2V           | 211  | -5    | Lead-Free ftBGA | 256  | COM   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO2280E-3TN100C  | 2280 | 1.2V           | 73   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280E-4TN100C  | 2280 | 1.2V           | 73   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280E-5TN100C  | 2280 | 1.2V           | 73   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280E-3TN144C  | 2280 | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280E-4TN144C  | 2280 | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280E-5TN144C  | 2280 | 1.2V           | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280E-3MN132C  | 2280 | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280E-4MN132C  | 2280 | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280E-5MN132C  | 2280 | 1.2V           | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280E-3BN256C  | 2280 | 1.2V           | 211  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280E-4BN256C  | 2280 | 1.2V           | 211  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280E-5BN256C  | 2280 | 1.2V           | 211  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280E-3FTN256C | 2280 | 1.2V           | 211  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280E-4FTN256C | 2280 | 1.2V           | 211  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280E-5FTN256C | 2280 | 1.2V           | 211  | -5    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280E-3FTN324C | 2280 | 1.2V           | 271  | -3    | Lead-Free ftBGA | 324  | COM   |
| LCMXO2280E-4FTN324C | 2280 | 1.2V           | 271  | -4    | Lead-Free ftBGA | 324  | COM   |
| LCMXO2280E-5FTN324C | 2280 | 1.2V           | 271  | -5    | Lead-Free ftBGA | 324  | COM   |

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|-------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO256E-3TN100I | 256  | 1.2V           | 78   | -3    | Lead-Free TQFP  | 100  | IND   |
| LCMXO256E-4TN100I | 256  | 1.2V           | 78   | -4    | Lead-Free TQFP  | 100  | IND   |
| LCMXO256E-3MN100I | 256  | 1.2V           | 78   | -3    | Lead-Free csBGA | 100  | IND   |
| LCMXO256E-4MN100I | 256  | 1.2V           | 78   | -4    | Lead-Free csBGA | 100  | IND   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|--------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO640E-3TN100I  | 640  | 1.2V           | 74   | -3    | Lead-Free TQFP  | 100  | IND   |
| LCMXO640E-4TN100I  | 640  | 1.2V           | 74   | -4    | Lead-Free TQFP  | 100  | IND   |
| LCMXO640E-3MN100I  | 640  | 1.2V           | 74   | -3    | Lead-Free csBGA | 100  | IND   |
| LCMXO640E-4MN100I  | 640  | 1.2V           | 74   | -4    | Lead-Free csBGA | 100  | IND   |
| LCMXO640E-3TN144I  | 640  | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | IND   |
| LCMXO640E-4TN144I  | 640  | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | IND   |
| LCMXO640E-3MN132I  | 640  | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | IND   |
| LCMXO640E-4MN132I  | 640  | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | IND   |
| LCMXO640E-3BN256I  | 640  | 1.2V           | 159  | -3    | Lead-Free caBGA | 256  | IND   |
| LCMXO640E-4BN256I  | 640  | 1.2V           | 159  | -4    | Lead-Free caBGA | 256  | IND   |
| LCMXO640E-3FTN256I | 640  | 1.2V           | 159  | -3    | Lead-Free ftBGA | 256  | IND   |
| LCMXO640E-4FTN256I | 640  | 1.2V           | 159  | -4    | Lead-Free ftBGA | 256  | IND   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO1200E-3TN100I  | 1200 | 1.2V           | 73   | -3    | Lead-Free TQFP  | 100  | IND   |
| LCMXO1200E-4TN100I  | 1200 | 1.2V           | 73   | -4    | Lead-Free TQFP  | 100  | IND   |
| LCMXO1200E-3TN144I  | 1200 | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | IND   |
| LCMXO1200E-4TN144I  | 1200 | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | IND   |
| LCMXO1200E-3MN132I  | 1200 | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | IND   |
| LCMXO1200E-4MN132I  | 1200 | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | IND   |
| LCMXO1200E-3BN256I  | 1200 | 1.2V           | 211  | -3    | Lead-Free caBGA | 256  | IND   |
| LCMXO1200E-4BN256I  | 1200 | 1.2V           | 211  | -4    | Lead-Free caBGA | 256  | IND   |
| LCMXO1200E-3FTN256I | 1200 | 1.2V           | 211  | -3    | Lead-Free ftBGA | 256  | IND   |
| LCMXO1200E-4FTN256I | 1200 | 1.2V           | 211  | -4    | Lead-Free ftBGA | 256  | IND   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO2280E-3TN100I  | 2280 | 1.2V           | 73   | -3    | Lead-Free TQFP  | 100  | IND   |
| LCMXO2280E-4TN100I  | 2280 | 1.2V           | 73   | -4    | Lead-Free TQFP  | 100  | IND   |
| LCMXO2280E-3TN144I  | 2280 | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | IND   |
| LCMXO2280E-4TN144I  | 2280 | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | IND   |
| LCMXO2280E-3MN132I  | 2280 | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | IND   |
| LCMXO2280E-4MN132I  | 2280 | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | IND   |
| LCMXO2280E-3BN256I  | 2280 | 1.2V           | 211  | -3    | Lead-Free caBGA | 256  | IND   |
| LCMXO2280E-4BN256I  | 2280 | 1.2V           | 211  | -4    | Lead-Free caBGA | 256  | IND   |
| LCMXO2280E-3FTN256I | 2280 | 1.2V           | 211  | -3    | Lead-Free ftBGA | 256  | IND   |
| LCMXO2280E-4FTN256I | 2280 | 1.2V           | 211  | -4    | Lead-Free ftBGA | 256  | IND   |
| LCMXO2280E-3FTN324I | 2280 | 1.2V           | 271  | -3    | Lead-Free ftBGA | 324  | IND   |
| LCMXO2280E-4FTN324I | 2280 | 1.2V           | 271  | -4    | Lead-Free ftBGA | 324  | IND   |

### Revision History

| Date          | Version | Section                          | Change Summary                                                                                                         |
|---------------|---------|----------------------------------|------------------------------------------------------------------------------------------------------------------------|
| February 2005 | 01.0    | —                                | Initial release.                                                                                                       |
| October 2005  | 01.1    | Introduction                     | Distributed RAM information in family table updated. Added footnote 1 - fpBGA packaging to the family selection guide. |
|               |         | Architecture                     | sysIO Buffer section updated.                                                                                          |
|               |         |                                  | Hot Socketing section updated.                                                                                         |
|               |         |                                  | Sleep Mode section updated.                                                                                            |
|               |         |                                  | SLEEP Pin Characteristics section updated.                                                                             |
|               |         |                                  | Oscillator section updated.                                                                                            |
|               |         |                                  | Security section updated.                                                                                              |
|               |         | DC and Switching Characteristics | Recommended Operating Conditions table updated.                                                                        |
|               |         |                                  | DC Electrical Characteristics table updated.                                                                           |
|               |         |                                  | Supply Current (Sleep Mode) table added with LCMXO256/640 data.                                                        |
|               |         |                                  | Supply Current (Standby) table updated with LCMXO256/640 data.                                                         |
|               |         |                                  | Initialization Supply Current table updated with LCMXO256/640 data.                                                    |
|               |         |                                  | Programming and Erase Flash Supply Current table updated with LCMXO256/640 data.                                       |
|               |         |                                  | Register-to-Register Performance table updated (rev. A 0.16).                                                          |
|               |         |                                  | External Switching Characteristics table updated (rev. A 0.16).                                                        |
|               |         |                                  | Internal Timing Parameter table updated (rev. A 0.16).                                                                 |
|               |         |                                  | Family Timing Adders updated (rev. A 0.16).                                                                            |
|               |         |                                  | sysCLOCK Timing updated (rev. A 0.16).                                                                                 |
|               |         |                                  | MachXO "C" Sleep Mode Timing updated (A 0.16).                                                                         |
|               |         |                                  | JTAG Port Timing Specification updated (rev. A 0.16).                                                                  |
|               |         | Pinout Information               | SLEEPIN description updated.                                                                                           |
|               |         |                                  | Pin Information Summary updated.                                                                                       |
|               |         |                                  | Power Supply and NC Connection table has been updated.                                                                 |
|               |         |                                  | Logic Signal Connection section has been updated to include all devices/packages.                                      |
|               |         | Ordering Information             | Part Number Description section has been updated.                                                                      |
|               |         |                                  | Ordering Part Number section has been updated (added LCMXO256C/LCMXO640C "4W").                                        |
|               |         | Supplemental Information         | MachXO Density Migration Technical Note (TN1097) added.                                                                |
| November 2005 | 01.2    | Pinout Information               | Added "Power Supply and NC Connections" summary information for LCMXO1200 and LCMXO2280 in 100 TQFP package.           |
| December 2005 | 01.3    | DC and Switching Characteristics | Supply Current (Standby) table updated with LCMXO1200/2280 data.                                                       |
|               |         | Ordering Information             | Ordering Part Number section updated (added LCMXO2280C "4W").                                                          |
| April 2006    | 02.0    | Introduction                     | Introduction paragraphs updated.                                                                                       |
|               |         | Architecture                     | Architecture Overview paragraphs updated.                                                                              |