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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                  | 113                                                                                                                                                                     |
| Number of Gates                | -                                                                                                                                                                       |
| Voltage - Supply               | 1.71V ~ 3.465V                                                                                                                                                          |
| Mounting Type                  | Surface Mount                                                                                                                                                           |
| Operating Temperature          | 0°C ~ 85°C (TJ)                                                                                                                                                         |
| Package / Case                 | 144-LQFP                                                                                                                                                                |
| Supplier Device Package        | 144-TQFP (20x20)                                                                                                                                                        |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200c-5t144c">https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200c-5t144c</a> |

The devices use look-up tables (LUTs) and embedded block memories traditionally associated with FPGAs for flexible and efficient logic implementation. Through non-volatile technology, the devices provide the single-chip, high-security, instant-on capabilities traditionally associated with CPLDs. Finally, advanced process technology and careful design will provide the high pin-to-pin performance also associated with CPLDs.

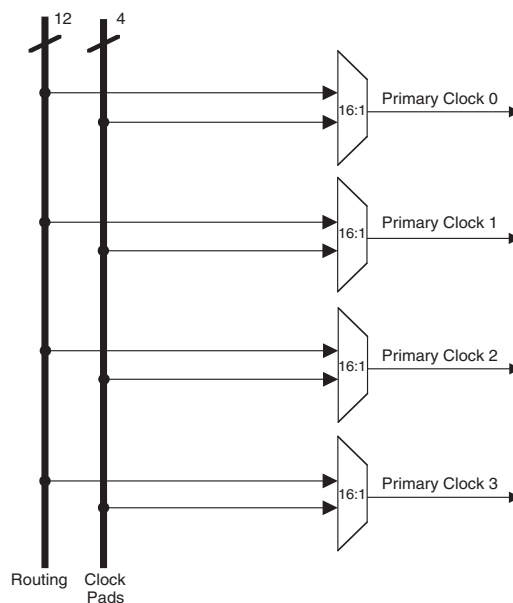
The ispLEVER® design tools from Lattice allow complex designs to be efficiently implemented using the MachXO family of devices. Popular logic synthesis tools provide synthesis library support for MachXO. The ispLEVER tools use the synthesis tool output along with the constraints from its floor planning tools to place and route the design in the MachXO device. The ispLEVER tool extracts the timing from the routing and back-annotates it into the design for timing verification.

The ispLEVER design tool takes the output of the synthesis tool and places and routes the design. Generally, the place and route tool is completely automatic, although an interactive routing editor is available to optimize the design.

## Clock/Control Distribution Network

The MachXO family of devices provides global signals that are available to all PFUs. These signals consist of four primary clocks and four secondary clocks. Primary clock signals are generated from four 16:1 muxes as shown in Figure 2-7 and Figure 2-8. The available clock sources for the MachXO256 and MachXO640 devices are four dual function clock pins and 12 internal routing signals. The available clock sources for the MachXO1200 and MachXO2280 devices are four dual function clock pins, up to nine internal routing signals and up to six PLL outputs.

**Figure 2-7. Primary Clocks for MachXO256 and MachXO640 Devices**



## 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**

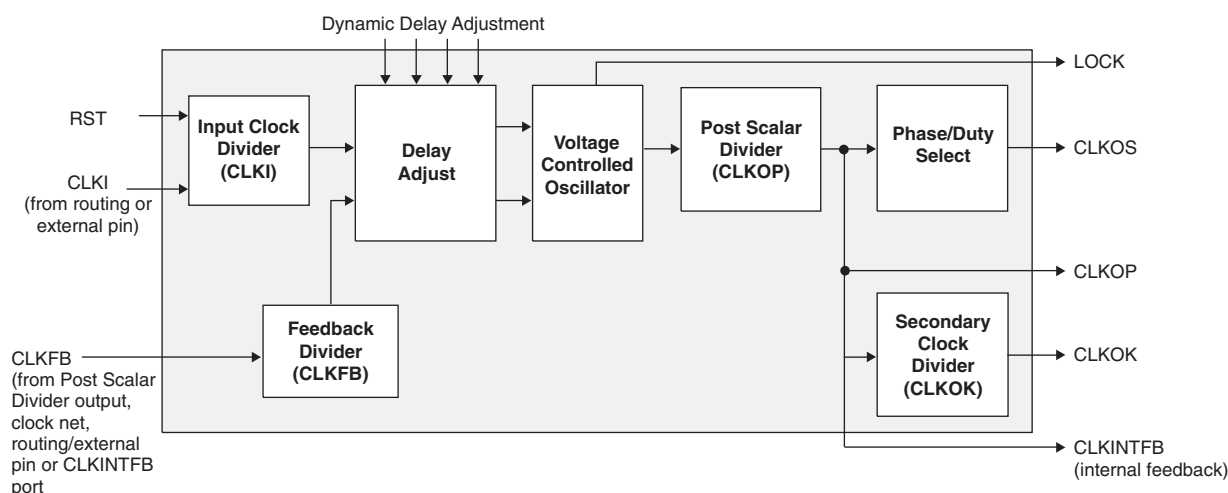
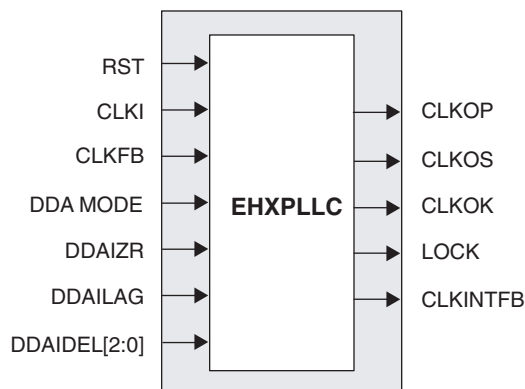


Figure 2-11 shows the available macros for the PLL. Table 2-5 provides signal description of the PLL Block.

**Figure 2-11. PLL Primitive**



### Absolute Maximum Ratings<sup>1, 2, 3</sup>

|                                                        | LCMXO E (1.2V)          | LCMXO C (1.8V/2.5V/3.3V) |
|--------------------------------------------------------|-------------------------|--------------------------|
| Supply Voltage $V_{CC}$ . . . . .                      | -0.5 to 1.32V . . . . . | -0.5 to 3.75V            |
| Supply Voltage $V_{CCAUX}$ . . . . .                   | -0.5 to 3.75V . . . . . | -0.5 to 3.75V            |
| Output Supply Voltage $V_{CCIO}$ . . . . .             | -0.5 to 3.75V . . . . . | -0.5 to 3.75V            |
| I/O Tristate Voltage Applied <sup>4</sup> . . . . .    | -0.5 to 3.75V . . . . . | -0.5 to 3.75V            |
| Dedicated Input Voltage Applied <sup>4</sup> . . . . . | -0.5 to 3.75V . . . . . | -0.5 to 4.25V            |
| Storage Temperature (ambient) . . . . .                | -65 to 150°C . . . . .  | -65 to 150°C             |
| Junction Temp. (Tj) . . . . .                          | +125°C . . . . .        | +125°C                   |

1. Stress above those listed under the "Absolute Maximum Ratings" may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.
2. Compliance with the Lattice *Thermal Management* document is required.
3. All voltages referenced to GND.
4. Overshoot and undershoot of -2V to ( $V_{IHMAX} + 2$ ) volts is permitted for a duration of <20ns.

### Recommended Operating Conditions<sup>1</sup>

| Symbol          | Parameter                                           | Min.  | Max.  | Units |
|-----------------|-----------------------------------------------------|-------|-------|-------|
| $V_{CC}$        | Core Supply Voltage for 1.2V Devices                | 1.14  | 1.26  | V     |
|                 | Core Supply Voltage for 1.8V/2.5V/3.3V Devices      | 1.71  | 3.465 | V     |
| $V_{CCAUX}^3$   | Auxiliary Supply Voltage                            | 3.135 | 3.465 | V     |
| $V_{CCIO}^2$    | I/O Driver Supply Voltage                           | 1.14  | 3.465 | V     |
| $t_{JCOM}$      | Junction Temperature Commercial Operation           | 0     | +85   | °C    |
| $t_{JIND}$      | Junction Temperature Industrial Operation           | -40   | 100   | °C    |
| $t_{JFLASHCOM}$ | Junction Temperature, Flash Programming, Commercial | 0     | +85   | °C    |
| $t_{JFLASHIND}$ | Junction Temperature, Flash Programming, Industrial | -40   | 100   | °C    |

1. Like power supplies must be tied together. For example, if  $V_{CCIO}$  and  $V_{CC}$  are both 2.5V, they must also be the same supply. 3.3V  $V_{CCIO}$  and 1.2V  $V_{CCIO}$  should be tied to  $V_{CCAUX}$  or 1.2V  $V_{CC}$  respectively.
2. See recommended voltages by I/O standard in subsequent table.
3.  $V_{CC}$  must reach minimum  $V_{CC}$  value before  $V_{CCAUX}$  reaches 2.5V.

### MachXO Programming/Erase Specifications

| Symbol          | Parameter                                    | Min. | Max.   | Units  |
|-----------------|----------------------------------------------|------|--------|--------|
| $N_{PROG CYC}$  | Flash Programming Cycles per $t_{RETENTION}$ |      | 1,000  | Cycles |
|                 | Flash Functional Programming Cycles          |      | 10,000 | Cycles |
| $t_{RETENTION}$ | Data Retention at 125° Junction Temperature  | 10   |        | Years  |

### MachXO256 and MachXO640 Hot Socketing Specifications<sup>1, 2, 3</sup>

| Symbol   | Parameter                    | Condition                         | Min. | Typ. | Max     | Units   |
|----------|------------------------------|-----------------------------------|------|------|---------|---------|
| $I_{DK}$ | Input or I/O leakage Current | $0 \leq V_{IN} \leq V_{IH} (MAX)$ | —    | —    | +/-1000 | $\mu A$ |

1. Insensitive to sequence of  $V_{CC}$ ,  $V_{CCAUX}$ , and  $V_{CCIO}$ . However, assumes monotonic rise/fall rates for  $V_{CC}$ ,  $V_{CCAUX}$ , and  $V_{CCIO}$ .
2.  $0 \leq V_{CC} \leq V_{CC} (MAX)$ ,  $0 \leq V_{CCIO} \leq V_{CCIO} (MAX)$  and  $0 \leq V_{CCAUX} \leq V_{CCAUX} (MAX)$ .
3.  $I_{DK}$  is additive to  $I_{PU}$ ,  $I_{PD}$  or  $I_{BH}$ .

### MachXO1200 and MachXO2280 Hot Socketing Specifications<sup>1, 2, 3</sup>

| Symbol                                 | Parameter                    | Condition                          | Min. | Typ. | Max.    | Units   |
|----------------------------------------|------------------------------|------------------------------------|------|------|---------|---------|
| <b>Non-LVDS General Purpose sysIOs</b> |                              |                                    |      |      |         |         |
| $I_{DK}$                               | Input or I/O Leakage Current | $0 \leq V_{IN} \leq V_{IH} (MAX.)$ | —    | —    | +/-1000 | $\mu A$ |
| <b>LVDS General Purpose sysIOs</b>     |                              |                                    |      |      |         |         |
| $I_{DK\_LVDS}$                         | Input or I/O Leakage Current | $V_{IN} \leq V_{CCIO}$             | —    | —    | +/-1000 | $\mu A$ |
|                                        |                              | $V_{IN} > V_{CCIO}$                | —    | 35   | —       | mA      |

1. Insensitive to sequence of  $V_{CC}$ ,  $V_{CCAUX}$ , and  $V_{CCIO}$ . However, assumes monotonic rise/fall rates for  $V_{CC}$ ,  $V_{CCAUX}$ , and  $V_{CCIO}$ .
2.  $0 \leq V_{CC} \leq V_{CC} (MAX)$ ,  $0 \leq V_{CCIO} \leq V_{CCIO} (MAX)$ , and  $0 \leq V_{CCAUX} \leq V_{CCAUX} (MAX)$ .
3.  $I_{DK}$  is additive to  $I_{PU}$ ,  $I_{PW}$  or  $I_{BH}$ .

## DC Electrical Characteristics

### Over Recommended Operating Conditions

| Symbol                                 | Parameter                                | Condition                                                                                       | Min.           | Typ. | Max.           | Units   |
|----------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------|----------------|------|----------------|---------|
| $I_{IL}$ , $I_{IH}$ <sup>1, 4, 5</sup> | Input or I/O Leakage                     | $0 \leq V_{IN} \leq (V_{CCIO} - 0.2V)$                                                          | —              | —    | 10             | $\mu A$ |
|                                        |                                          | $(V_{CCIO} - 0.2V) < V_{IN} \leq 3.6V$                                                          | —              | —    | 40             | $\mu A$ |
| $I_{PU}$                               | I/O Active Pull-up Current               | $0 \leq V_{IN} \leq 0.7 V_{CCIO}$                                                               | -30            | —    | -150           | $\mu A$ |
| $I_{PD}$                               | I/O Active Pull-down Current             | $V_{IL} (MAX) \leq V_{IN} \leq V_{IH} (MAX)$                                                    | 30             | —    | 150            | $\mu A$ |
| $I_{BHLS}$                             | Bus Hold Low sustaining current          | $V_{IN} = V_{IL} (MAX)$                                                                         | 30             | —    | —              | $\mu A$ |
| $I_{BHHS}$                             | Bus Hold High sustaining current         | $V_{IN} = 0.7V_{CCIO}$                                                                          | -30            | —    | —              | $\mu A$ |
| $I_{BHLO}$                             | Bus Hold Low Overdrive current           | $0 \leq V_{IN} \leq V_{IH} (MAX)$                                                               | —              | —    | 150            | $\mu A$ |
| $I_{BHHO}$                             | Bus Hold High Overdrive current          | $0 \leq V_{IN} \leq V_{IH} (MAX)$                                                               | —              | —    | -150           | $\mu A$ |
| $V_{BHT}$ <sup>3</sup>                 | Bus Hold trip Points                     | $0 \leq V_{IN} \leq V_{IH} (MAX)$                                                               | $V_{IL} (MAX)$ | —    | $V_{IH} (MIN)$ | V       |
| C1                                     | I/O Capacitance <sup>2</sup>             | $V_{CCIO} = 3.3V, 2.5V, 1.8V, 1.5V, 1.2V$ ,<br>$V_{CC} = Typ.$ , $V_{IO} = 0$ to $V_{IH} (MAX)$ | —              | 8    | —              | pf      |
| C2                                     | Dedicated Input Capacitance <sup>2</sup> | $V_{CCIO} = 3.3V, 2.5V, 1.8V, 1.5V, 1.2V$ ,<br>$V_{CC} = Typ.$ , $V_{IO} = 0$ to $V_{IH} (MAX)$ | —              | 8    | —              | pf      |

1. Input or I/O leakage current is measured with the pin configured as an input or as an I/O with the output driver tri-stated. It is not measured with the output driver active. Bus maintenance circuits are disabled.
2.  $T_A = 25^\circ C$ ,  $f = 1.0MHz$
3. Please refer to  $V_{IL}$  and  $V_{IH}$  in the sysIO Single-Ended DC Electrical Characteristics table of this document.
4. Not applicable to SLEEPN pin.
5. When  $V_{IH}$  is higher than  $V_{CCIO}$ , a transient current typically of 30ns in duration or less with a peak current of 6mA can occur on the high-to-low transition. For MachXO1200 and MachXO2280 true LVDS output pins,  $V_{IH}$  must be less than or equal to  $V_{CCIO}$ .

**Table 3-2. BLVDS DC Conditions<sup>1</sup>**

**Over Recommended Operating Conditions**

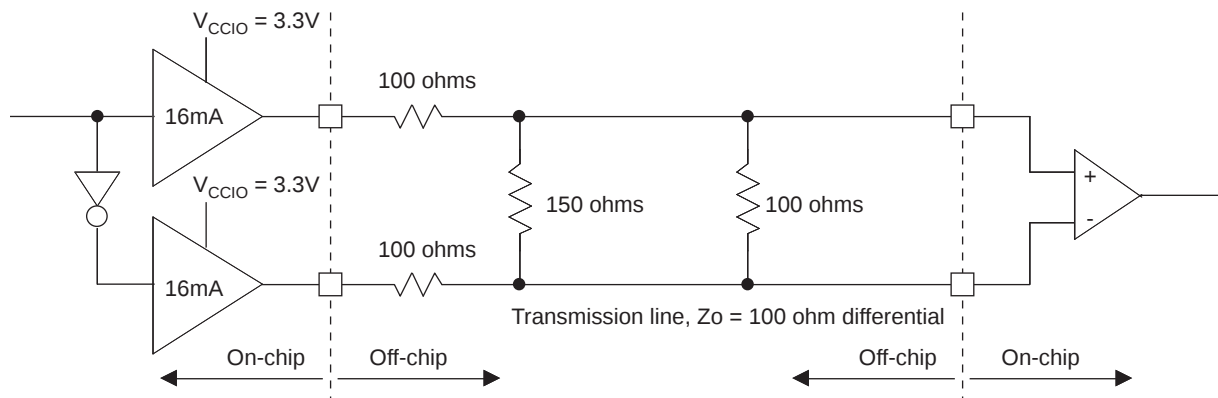
| Symbol              | Description                 | Nominal             |                     | Units |
|---------------------|-----------------------------|---------------------|---------------------|-------|
|                     |                             | Z <sub>o</sub> = 45 | Z <sub>o</sub> = 90 |       |
| Z <sub>OUT</sub>    | Output impedance            | 100                 | 100                 | Ohms  |
| R <sub>TLEFT</sub>  | Left end termination        | 45                  | 90                  | Ohms  |
| R <sub>TRIGHT</sub> | Right end termination       | 45                  | 90                  | Ohms  |
| V <sub>OH</sub>     | Output high voltage         | 1.375               | 1.48                | V     |
| V <sub>OL</sub>     | Output low voltage          | 1.125               | 1.02                | V     |
| V <sub>OD</sub>     | Output differential voltage | 0.25                | 0.46                | V     |
| V <sub>CM</sub>     | Output common mode voltage  | 1.25                | 1.25                | V     |
| I <sub>DC</sub>     | DC output current           | 11.2                | 10.2                | mA    |

1. For input buffer, see LVDS table.

### LVPECL

The MachXO family supports the differential LVPECL standard through emulation. This output standard is emulated using complementary LVCMOS outputs in conjunction with a parallel resistor across the driver outputs on all the devices. The LVPECL input standard is supported by the LVDS differential input buffer on certain devices. The scheme shown in Figure 3-3 is one possible solution for point-to-point signals.

**Figure 3-3. Differential LVPECL**



**Table 3-3. LVPECL DC Conditions<sup>1</sup>**

**Over Recommended Operating Conditions**

| Symbol            | Description                 | Nominal | Units |
|-------------------|-----------------------------|---------|-------|
| Z <sub>OUT</sub>  | Output impedance            | 100     | Ohms  |
| R <sub>P</sub>    | Driver parallel resistor    | 150     | Ohms  |
| R <sub>T</sub>    | Receiver termination        | 100     | Ohms  |
| V <sub>OH</sub>   | Output high voltage         | 2.03    | V     |
| V <sub>OL</sub>   | Output low voltage          | 1.27    | V     |
| V <sub>OD</sub>   | Output differential voltage | 0.76    | V     |
| V <sub>CM</sub>   | Output common mode voltage  | 1.65    | V     |
| Z <sub>BACK</sub> | Back impedance              | 85.7    | Ohms  |
| I <sub>DC</sub>   | DC output current           | 12.7    | mA    |

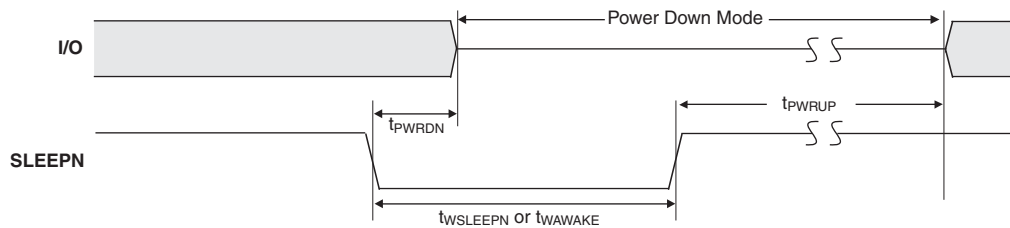
1. For input buffer, see LVDS table.

### 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



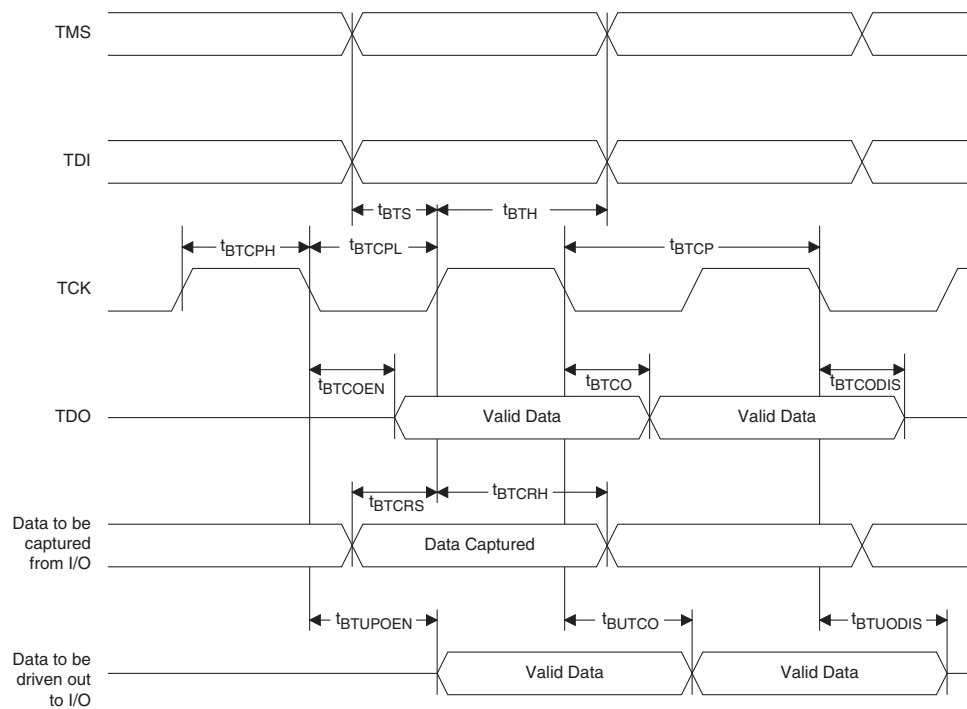
| Symbol        | Parameter                                                                        | Min.      | Typ. | Max. | Units |
|---------------|----------------------------------------------------------------------------------|-----------|------|------|-------|
| $t_{REFRESH}$ | Minimum $V_{CC}$ 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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**Figure 3-5. JTAG Port Timing Waveforms**



**Power Supply and NC (Cont.)**

| Signal           | 132 csBGA <sup>1</sup>                                 | 256 caBGA / 256 ftBGA <sup>1</sup>                                                                                                                                                                                                                                                                            | 324 ftBGA <sup>1</sup>                                                                                              |
|------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| VCC              | H3, P6, G12, C7                                        | G7, G10, K7, K10                                                                                                                                                                                                                                                                                              | F14, G11, G9, H7, L7, M9                                                                                            |
| VCCIO0           | LCMXO640: B11, C5<br>LCMXO1200/2280: C5                | LCMXO640: F8, F7, F9, F10<br>LCMXO1200/2280: F8, F7                                                                                                                                                                                                                                                           | G8, G7                                                                                                              |
| VCCIO1           | LCMXO640: L12, E12<br>LCMXO1200/2280: B11              | LCMXO640: H11, G11, K11, J11<br>LCMXO1200/2280: F9, F10                                                                                                                                                                                                                                                       | G12, G10                                                                                                            |
| VCCIO2           | LCMXO640: N2, M10<br>LCMXO1200/2280: E12               | LCMXO640: L9, L10, L8, L7<br>LCMXO1200/2280: H11, G11                                                                                                                                                                                                                                                         | J12, H12                                                                                                            |
| VCCIO3           | LCMXO640: D2, K3<br>LCMXO1200/2280: L12                | LCMXO640: K6, J6, H6, G6<br>LCMXO1200/2280: K11, J11                                                                                                                                                                                                                                                          | L12, K12                                                                                                            |
| VCCIO4           | LCMXO640: None<br>LCMXO1200/2280: M10                  | LCMXO640: None<br>LCMXO1200/2280: L9, L10                                                                                                                                                                                                                                                                     | M12, M11                                                                                                            |
| VCCIO5           | LCMXO640: None<br>LCMXO1200/2280: N2                   | LCMXO640: None<br>LCMXO1200/2280: L8, L7                                                                                                                                                                                                                                                                      | M8, R9                                                                                                              |
| VCCIO6           | LCMXO640: None<br>LCMXO1200/2280: K3                   | LCMXO640: None<br>LCMXO1200/2280: K6, J6                                                                                                                                                                                                                                                                      | M7, K7                                                                                                              |
| VCCIO7           | LCMXO640: None<br>LCMXO1200/2280: D2                   | LCMXO640: None<br>LCMXO1200/2280: H6, G6                                                                                                                                                                                                                                                                      | H6, J7                                                                                                              |
| VCCAUX           | P7, A7                                                 | T9, A8                                                                                                                                                                                                                                                                                                        | M10, F9                                                                                                             |
| GND <sup>2</sup> | F1, P9, J14, C9, A10, B4, L13,<br>D13, P2, N11, E1, L2 | A1, A16, F11, G8, G9, H7, H8, H9,<br>H10, J7, J8, J9, J10, K8, K9, L6,<br>T1, T16                                                                                                                                                                                                                             | E14, F16, H10, H11, H8, H9, J10,<br>J11, J4, J8, J9, K10, K11, K17, K8,<br>K9, L10, L11, L8, L9, N2, P14, P5,<br>R7 |
| NC <sup>3</sup>  | —                                                      | LCMXO640: E4, E5, F5, F6, C3,<br>C2, G4, G5, H4, H5, K5, K4, M5,<br>M4, P2, P3, N5, N6, M7, M8, N10,<br>N11, R15, R16, P15, P16, M11,<br>L11, N12, N13, M13, M12, K12,<br>J12, F12, F13, E12, E13, D13,<br>D14, B15, A15, C14, B14, E11,<br>E10, E7, E6, D4, D3, B3, B2<br>LCMXO1200: None<br>LCMXO2280: None | —                                                                                                                   |

1. Pin orientation A1 starts from the upper left corner of the top side view with alphabetical order ascending vertically and numerical order ascending horizontally.
2. All grounds must be electrically connected at the board level. For fpBGA and ftBGA packages, the total number of GND balls is less than the actual number of GND logic connections from the die to the common package GND plane.
3. NC pins should not be connected to any active signals, VCC or GND.

## LCMX01200 and LCMX02280 Logic Signal Connections: 100 TQFP

| Pin Number | LCMX01200        |      |                |              | LCMX02280        |      |                |              |
|------------|------------------|------|----------------|--------------|------------------|------|----------------|--------------|
|            | Ball Function    | Bank | Dual Function  | Differential | Ball Function    | Bank | Dual Function  | Differential |
| 1          | PL2A             | 7    |                | T            | PL2A             | 7    | LUM0_PLLT_FB_A | T            |
| 2          | PL2B             | 7    |                | C            | PL2B             | 7    | LUM0_PLLC_FB_A | C            |
| 3          | PL3C             | 7    |                | T            | PL3C             | 7    | LUM0_PLLT_IN_A | T            |
| 4          | PL3D             | 7    |                | C            | PL3D             | 7    | LUM0_PLLC_IN_A | C            |
| 5          | PL4B             | 7    |                |              | PL4B             | 7    |                |              |
| 6          | VCCIO7           | 7    |                |              | VCCIO7           | 7    |                |              |
| 7          | PL6A             | 7    |                | T*           | PL7A             | 7    |                | T*           |
| 8          | PL6B             | 7    | GSRN           | C*           | PL7B             | 7    | GSRN           | C*           |
| 9          | GND              | -    |                |              | GND              | -    |                |              |
| 10         | PL7C             | 7    |                | T            | PL9C             | 7    |                | T            |
| 11         | PL7D             | 7    |                | C            | PL9D             | 7    |                | C            |
| 12         | PL8C             | 7    |                | T            | PL10C            | 7    |                | T            |
| 13         | PL8D             | 7    |                | C            | PL10D            | 7    |                | C            |
| 14         | PL9C             | 6    |                |              | PL11C            | 6    |                |              |
| 15         | PL10A            | 6    |                | T*           | PL13A            | 6    |                | T*           |
| 16         | PL10B            | 6    |                | C*           | PL13B            | 6    |                | C*           |
| 17         | VCC              | -    |                |              | VCC              | -    |                |              |
| 18         | PL11B            | 6    |                |              | PL14D            | 6    |                | C            |
| 19         | PL11C            | 6    | TSALL          |              | PL14C            | 6    | TSALL          | T            |
| 20         | VCCIO6           | 6    |                |              | VCCIO6           | 6    |                |              |
| 21         | PL13C            | 6    |                |              | PL16C            | 6    |                |              |
| 22         | PL14A            | 6    | LLM0_PLLT_FB_A | T*           | PL17A            | 6    | LLM0_PLLT_FB_A | T*           |
| 23         | PL14B            | 6    | LLM0_PLLC_FB_A | C*           | PL17B            | 6    | LLM0_PLLC_FB_A | C*           |
| 24         | PL15A            | 6    | LLM0_PLLT_IN_A | T*           | PL18A            | 6    | LLM0_PLLT_IN_A | T*           |
| 25         | PL15B            | 6    | LLM0_PLLC_IN_A | C*           | PL18B            | 6    | LLM0_PLLC_IN_A | C*           |
| 26**       | GNDIO6<br>GNDIO5 | -    |                |              | GNDIO6<br>GNDIO5 | -    |                |              |
| 27         | VCCIO5           | 5    |                |              | VCCIO5           | 5    |                |              |
| 28         | TMS              | 5    | TMS            |              | TMS              | 5    | TMS            |              |
| 29         | TCK              | 5    | TCK            |              | TCK              | 5    | TCK            |              |
| 30         | PB3B             | 5    |                |              | PB3B             | 5    |                |              |
| 31         | PB4A             | 5    |                | T            | PB4A             | 5    |                | T            |
| 32         | PB4B             | 5    |                | C            | PB4B             | 5    |                | C            |
| 33         | TDO              | 5    | TDO            |              | TDO              | 5    | TDO            |              |
| 34         | TDI              | 5    | TDI            |              | TDI              | 5    | TDI            |              |
| 35         | VCC              | -    |                |              | VCC              | -    |                |              |
| 36         | VCCAUX           | -    |                |              | VCCAUX           | -    |                |              |
| 37         | PB6E             | 5    |                | T            | PB8E             | 5    |                | T            |
| 38         | PB6F             | 5    |                | C            | PB8F             | 5    |                | C            |
| 39         | PB7B             | 4    | PCLK4_1****    |              | PB10F            | 4    | PCLK4_1****    |              |
| 40         | PB7F             | 4    | PCLK4_0****    |              | PB10B            | 4    | PCLK4_0****    |              |
| 41         | GND              | -    |                |              | GND              | -    |                |              |

**LCMXO1200 and LCMXO2280 Logic Signal Connections: 100 TQFP (Cont.)**

| Pin Number | LCMXO1200        |      |               |              | LCMXO2280        |      |               |              |
|------------|------------------|------|---------------|--------------|------------------|------|---------------|--------------|
|            | Ball Function    | Bank | Dual Function | Differential | Ball Function    | Bank | Dual Function | Differential |
| 82         | PT9A             | 1    |               |              | PT12C            | 1    |               | T            |
| 83         | GND              | -    |               |              | GND              | -    |               |              |
| 84         | PT8B             | 1    |               | C            | PT11B            | 1    |               | C            |
| 85         | PT8A             | 1    |               | T            | PT11A            | 1    |               | T            |
| 86         | PT7D             | 1    | PCLK1_1****   |              | PT10B            | 1    | PCLK1_1****   |              |
| 87         | PT6F             | 0    | PCLK0_0****   |              | PT9B             | 1    | PCLK1_0****   |              |
| 88         | PT6D             | 0    |               | C            | PT8F             | 0    |               | C            |
| 89         | PT6C             | 0    |               | T            | PT8E             | 0    |               | T            |
| 90         | VCCAUX           | -    |               |              | VCCAUX           | -    |               |              |
| 91         | VCC              | -    |               |              | VCC              | -    |               |              |
| 92         | PT5B             | 0    |               |              | PT6D             | 0    |               |              |
| 93         | PT4B             | 0    |               |              | PT6F             | 0    |               |              |
| 94         | VCCIO0           | 0    |               |              | VCCIO0           | 0    |               |              |
| 95         | PT3D             | 0    |               | C            | PT4B             | 0    |               | C            |
| 96         | PT3C             | 0    |               | T            | PT4A             | 0    |               | T            |
| 97         | PT3B             | 0    |               |              | PT3B             | 0    |               |              |
| 98         | PT2B             | 0    |               | C            | PT2B             | 0    |               | C            |
| 99         | PT2A             | 0    |               | T            | PT2A             | 0    |               | T            |
| 100**      | GNDIO0<br>GNDIO7 | -    |               |              | GNDIO0<br>GNDIO7 | -    |               |              |

\*Supports true LVDS outputs.

\*\*Double bonded to the pin.

\*\*\*NC for "E" devices.

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

**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: 256 caBGA / 256 ftBGA

| 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 |
| GND         | GNDIO3        | 3    |               |              | GND         | GNDIO7        | 7    |               |              | GND         | GNDIO7        | 7    |                |              |
| VCCIO3      | VCCIO3        | 3    |               |              | VCCIO7      | VCCIO7        | 7    |               |              | VCCIO7      | VCCIO7        | 7    |                |              |
| E4          | NC            |      |               |              | E4          | PL2A          | 7    |               | T            | E4          | PL2A          | 7    | LUM0_PLLT_FB_A | T            |
| E5          | NC            |      |               |              | E5          | PL2B          | 7    |               | C            | E5          | PL2B          | 7    | LUM0_PLLC_FB_A | C            |
| F5          | NC            |      |               |              | F5          | PL3A          | 7    |               | T*           | F5          | PL3A          | 7    |                | T*           |
| F6          | NC            |      |               |              | F6          | PL3B          | 7    |               | C*           | F6          | PL3B          | 7    |                | C*           |
| F3          | PL3A          | 3    |               | T            | F3          | PL3C          | 7    |               | T            | F3          | PL3C          | 7    | LUM0_PLLT_IN_A | T            |
| F4          | PL3B          | 3    |               | C            | F4          | PL3D          | 7    |               | C            | F4          | PL3D          | 7    | LUM0_PLLC_IN_A | C            |
| E3          | PL2C          | 3    |               | T            | E3          | PL4A          | 7    |               | T*           | E3          | PL4A          | 7    |                | T*           |
| E2          | PL2D          | 3    |               | C            | E2          | PL4B          | 7    |               | C*           | E2          | PL4B          | 7    |                | C*           |
| C3          | NC            |      |               |              | C3          | PL4C          | 7    |               | T            | C3          | PL4C          | 7    |                | T            |
| C2          | NC            |      |               |              | C2          | PL4D          | 7    |               | C            | C2          | PL4D          | 7    |                | C            |
| B1          | PL2A          | 3    |               | T            | B1          | PL5A          | 7    |               | T*           | B1          | PL5A          | 7    |                | T*           |
| C1          | PL2B          | 3    |               | C            | C1          | PL5B          | 7    |               | C*           | C1          | PL5B          | 7    |                | C*           |
| VCCIO3      | VCCIO3        | 3    |               |              | VCCIO7      | VCCIO7        | 7    |               |              | VCCIO7      | VCCIO7        | 7    |                |              |
| GND         | GNDIO3        | 3    |               |              | GND         | GNDIO7        | 7    |               |              | GND         | GNDIO7        | 7    |                |              |
| D2          | PL3C          | 3    |               | T            | D2          | PL5C          | 7    |               | T            | D2          | PL6C          | 7    |                | T            |
| D1          | PL3D          | 3    |               | C            | D1          | PL5D          | 7    |               | C            | D1          | PL6D          | 7    |                | C            |
| F2          | PL5A          | 3    |               | T            | F2          | PL6A          | 7    |               | T*           | F2          | PL7A          | 7    |                | T*           |
| G2          | PL5B          | 3    | GSRN          | C            | G2          | PL6B          | 7    | GSRN          | C*           | G2          | PL7B          | 7    | GSRN           | C*           |
| E1          | PL4A          | 3    |               | T            | E1          | PL6C          | 7    |               | T            | E1          | PL7C          | 7    |                | T            |
| F1          | PL4B          | 3    |               | C            | F1          | PL6D          | 7    |               | C            | F1          | PL7D          | 7    |                | C            |
| G4          | NC            |      |               |              | G4          | PL7A          | 7    |               | T*           | G4          | PL8A          | 7    |                | T*           |
| G5          | NC            |      |               |              | G5          | PL7B          | 7    |               | C*           | G5          | PL8B          | 7    |                | C*           |
| GND         | GND           | -    |               |              | GND         | GND           | -    |               |              | GND         | GND           | -    |                |              |
| G3          | PL4C          | 3    |               | T            | G3          | PL7C          | 7    |               | T            | G3          | PL8C          | 7    |                | T            |
| H3          | PL4D          | 3    |               | C            | H3          | PL7D          | 7    |               | C            | H3          | PL8D          | 7    |                | C            |
| H4          | NC            |      |               |              | H4          | PL8A          | 7    |               | T*           | H4          | PL9A          | 7    |                | T*           |
| H5          | NC            |      |               |              | H5          | PL8B          | 7    |               | C*           | H5          | PL9B          | 7    |                | C*           |
| -           | -             |      |               |              | VCCIO7      | VCCIO7        | 7    |               |              | VCCIO7      | VCCIO7        | 7    |                |              |
| -           | -             |      |               |              | GND         | GNDIO7        | 7    |               |              | GND         | GNDIO7        | 7    |                |              |
| G1          | PL5C          | 3    |               | T            | G1          | PL8C          | 7    |               | T            | G1          | PL10C         | 7    |                | T            |
| H1          | PL5D          | 3    |               | C            | H1          | PL8D          | 7    |               | C            | H1          | PL10D         | 7    |                | C            |
| H2          | PL6A          | 3    |               | T            | H2          | PL9A          | 6    |               | T*           | H2          | PL11A         | 6    |                | T*           |
| J2          | PL6B          | 3    |               | C            | J2          | PL9B          | 6    |               | C*           | J2          | PL11B         | 6    |                | C*           |
| J3          | PL7C          | 3    |               | T            | J3          | PL9C          | 6    |               | T            | J3          | PL11C         | 6    |                | T            |
| K3          | PL7D          | 3    |               | C            | K3          | PL9D          | 6    |               | C            | K3          | PL11D         | 6    |                | C            |
| J1          | PL6C          | 3    |               | T            | J1          | PL10A         | 6    |               | T*           | J1          | PL12A         | 6    |                | T*           |
| -           | -             |      |               |              | VCCIO6      | VCCIO6        | 6    |               |              | VCCIO6      | VCCIO6        | 6    |                |              |
| -           | -             |      |               |              | GND         | GNDIO6        | 6    |               |              | GND         | GNDIO6        | 6    |                |              |
| K1          | PL6D          | 3    |               | C            | K1          | PL10B         | 6    |               | C*           | K1          | PL12B         | 6    |                | C*           |
| K2          | PL9A          | 3    |               | T            | K2          | PL10C         | 6    |               | T            | K2          | PL12C         | 6    |                | T            |
| L2          | PL9B          | 3    |               | C            | L2          | PL10D         | 6    |               | C            | L2          | PL12D         | 6    |                | C            |
| L1          | PL7A          | 3    |               | T            | L1          | PL11A         | 6    |               | T*           | L1          | PL13A         | 6    |                | T*           |
| M1          | PL7B          | 3    |               | C            | M1          | PL11B         | 6    |               | C*           | M1          | PL13B         | 6    |                | C*           |
| P1          | PL8D          | 3    |               | C            | P1          | PL11D         | 6    |               | C            | P1          | PL14D         | 6    |                | C            |
| N1          | PL8C          | 3    | TSALL         | T            | N1          | PL11C         | 6    | TSALL         | T            | N1          | PL14C         | 6    | TSALL          | T            |
| L3          | PL10A         | 3    |               | T            | L3          | PL12A         | 6    |               | T*           | L3          | PL15A         | 6    |                | T*           |
| M3          | PL10B         | 3    |               | C            | M3          | PL12B         | 6    |               | C*           | M3          | PL15B         | 6    |                | C*           |
| M2          | PL9C          | 3    |               | T            | M2          | PL12C         | 6    |               | T            | M2          | PL15C         | 6    |                | T            |
| N2          | PL9D          | 3    |               | C            | N2          | PL12D         | 6    |               | C            | N2          | PL15D         | 6    |                | C            |
| VCCIO3      | VCCIO3        | 3    |               |              | VCCIO6      | VCCIO6        | 6    |               |              | VCCIO6      | VCCIO6        | 6    |                |              |
| GND         | GNDIO3        | 3    |               |              | GND         | GNDIO6        | 6    |               |              | GND         | GNDIO6        | 6    |                |              |

### 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 |
| J4          | PL8A          | 3    |               | T            | J4          | PL13A         | 6    |                | T*           | J4          | PL16A         | 6    |                | T*           |
| J5          | PL8B          | 3    |               | C            | J5          | PL13B         | 6    |                | C*           | J5          | PL16B         | 6    |                | C*           |
| R1          | PL11A         | 3    |               | T            | R1          | PL13C         | 6    |                | T            | R1          | PL16C         | 6    |                | T            |
| R2          | PL11B         | 3    |               | C            | R2          | PL13D         | 6    |                | C            | R2          | PL16D         | 6    |                | C            |
| -           | -             | -    |               |              | -           | -             | -    |                |              | GND         | GND           | -    |                |              |
| K5          | NC            |      |               |              | K5          | PL14A         | 6    | LLM0_PLLT_FB_A | T*           | K5          | PL17A         | 6    | LLM0_PLLT_FB_A | T*           |
| K4          | NC            |      |               |              | K4          | PL14B         | 6    | LLM0_PLLC_FB_A | C*           | K4          | PL17B         | 6    | LLM0_PLLC_FB_A | C*           |
| L5          | PL10C         | 3    |               | T            | L5          | PL14C         | 6    |                | T            | L5          | PL17C         | 6    |                | T            |
| L4          | PL10D         | 3    |               | C            | L4          | PL14D         | 6    |                | C            | L4          | PL17D         | 6    |                | C            |
| M5          | NC            |      |               |              | M5          | PL15A         | 6    | LLM0_PLLT_IN_A | T*           | M5          | PL18A         | 6    | LLM0_PLLT_IN_A | T*           |
| M4          | NC            |      |               |              | M4          | PL15B         | 6    | LLM0_PLLC_IN_A | C*           | M4          | PL18B         | 6    | LLM0_PLLC_IN_A | C*           |
| N4          | PL11C         | 3    |               | T            | N4          | PL16A         | 6    |                | T            | N4          | PL19A         | 6    |                | T            |
| N3          | PL11D         | 3    |               | C            | N3          | PL16B         | 6    |                | C            | N3          | PL19B         | 6    |                | C            |
| VCCIO3      | VCCIO3        | 3    |               |              | VCCIO6      | VCCIO6        | 6    |                |              | VCCIO6      | VCCIO6        | 6    |                |              |
| GND         | GNDIO3        | 3    |               |              | GND         | GNDIO6        | 6    |                |              | GND         | GNDIO6        | 6    |                |              |
| GND         | GNDIO2        | 2    |               |              | GND         | GNDIO5        | 5    |                |              | GND         | GNDIO5        | 5    |                |              |
| VCCIO2      | VCCIO2        | 2    |               |              | VCCIO5      | VCCIO5        | 5    |                |              | VCCIO5      | VCCIO5        | 5    |                |              |
| P4          | TMS           | 2    | TMS           |              | P4          | TMS           | 5    | TMS            |              | P4          | TMS           | 5    | TMS            |              |
| P2          | NC            |      |               |              | P2          | PB2A          | 5    |                | T            | P2          | PB2A          | 5    |                | T            |
| P3          | NC            |      |               |              | P3          | PB2B          | 5    |                | C            | P3          | PB2B          | 5    |                | C            |
| N5          | NC            |      |               |              | N5          | PB2C          | 5    |                | T            | N5          | PB2C          | 5    |                | T            |
| R3          | TCK           | 2    | TCK           |              | R3          | TCK           | 5    | TCK            |              | R3          | TCK           | 5    | TCK            |              |
| N6          | NC            |      |               |              | N6          | PB2D          | 5    |                | C            | N6          | PB2D          | 5    |                | C            |
| T2          | PB2A          | 2    |               | T            | T2          | PB3A          | 5    |                | T            | T2          | PB3A          | 5    |                | T            |
| T3          | PB2B          | 2    |               | C            | T3          | PB3B          | 5    |                | C            | T3          | PB3B          | 5    |                | C            |
| R4          | PB2C          | 2    |               | T            | R4          | PB3C          | 5    |                | T            | R4          | PB3C          | 5    |                | T            |
| R5          | PB2D          | 2    |               | C            | R5          | PB3D          | 5    |                | C            | R5          | PB3D          | 5    |                | C            |
| P5          | PB3A          | 2    |               | T            | P5          | PB4A          | 5    |                | T            | P5          | PB4A          | 5    |                | T            |
| P6          | PB3B          | 2    |               | C            | P6          | PB4B          | 5    |                | C            | P6          | PB4B          | 5    |                | C            |
| T5          | PB3C          | 2    |               | T            | T5          | PB4C          | 5    |                | T            | T5          | PB4C          | 5    |                | T            |
| M6          | TDO           | 2    | TDO           |              | M6          | TDO           | 5    | TDO            |              | M6          | TDO           | 5    | TDO            |              |
| T4          | PB3D          | 2    |               | C            | T4          | PB4D          | 5    |                | C            | T4          | PB4D          | 5    |                | C            |
| R6          | PB4A          | 2    |               | T            | R6          | PB5A          | 5    |                | T            | R6          | PB5A          | 5    |                | T            |
| GND         | GNDIO2        | 2    |               |              | GND         | GNDIO5        | 5    |                |              | GND         | GNDIO5        | 5    |                |              |
| VCCIO2      | VCCIO2        | 2    |               |              | VCCIO5      | VCCIO5        | 5    |                |              | VCCIO5      | VCCIO5        | 5    |                |              |
| T6          | PB4B          | 2    |               | C            | T6          | PB5B          | 5    |                | C            | T6          | PB5B          | 5    |                | C            |
| N7          | TDI           | 2    | TDI           |              | N7          | TDI           | 5    | TDI            |              | N7          | TDI           | 5    | TDI            |              |
| T8          | PB4C          | 2    |               | T            | T8          | PB5C          | 5    |                | T            | T8          | PB6A          | 5    |                | T            |
| T7          | PB4D          | 2    |               | C            | T7          | PB5D          | 5    |                | C            | T7          | PB6B          | 5    |                | C            |
| M7          | NC            |      |               |              | M7          | PB6A          | 5    |                | T            | M7          | PB7C          | 5    |                | T            |
| M8          | NC            |      |               |              | M8          | PB6B          | 5    |                | C            | M8          | PB7D          | 5    |                | C            |
| T9          | VCCAUX        | -    |               |              | T9          | VCCAUX        | -    |                |              | T9          | VCCAUX        | -    |                |              |
| R7          | PB4E          | 2    |               | T            | R7          | PB6C          | 5    |                | T            | R7          | PB8C          | 5    |                | T            |
| R8          | PB4F          | 2    |               | C            | R8          | PB6D          | 5    |                | C            | R8          | PB8D          | 5    |                | C            |
| -           | -             |      |               |              | VCCIO5      | VCCIO5        | 5    |                |              | VCCIO5      | VCCIO5        | 5    |                |              |
| -           | -             |      |               |              | GND         | GNDIO5        | 5    |                |              | GND         | GNDIO5        | 5    |                |              |
| P7          | PB5C          | 2    |               | T            | P7          | PB6E          | 5    |                | T            | P7          | PB9A          | 4    |                | T            |
| P8          | PB5D          | 2    |               | C            | P8          | PB6F          | 5    |                | C            | P8          | PB9B          | 4    |                | C            |
| N8          | PB5A          | 2    |               | T            | N8          | PB7A          | 4    |                | T            | N8          | PB10E         | 4    |                | T            |
| N9          | PB5B          | 2    | PCLK2_1***    | C            | N9          | PB7B          | 4    | PCLK4_1***     | C            | N9          | PB10F         | 4    | PCLK4_1***     | C            |
| P10         | PB7B          | 2    |               | C            | P10         | PB7D          | 4    |                | C            | P10         | PB10D         | 4    |                | C            |
| P9          | PB7A          | 2    |               | T            | P9          | PB7C          | 4    |                | T            | P9          | PB10C         | 4    |                | T            |
| M9          | PB6B          | 2    | PCLK2_0***    | C            | M9          | PB7F          | 4    | PCLK4_0***     | C            | M9          | PB10B         | 4    | PCLK4_0***     | C            |

## 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 |
| E11         | NC            |      |               |              | E11         | PT10D         | 1    |               | C            | E11         | PT15B         | 1    |               | C            |
| E10         | NC            |      |               |              | E10         | PT10C         | 1    |               | T            | E10         | PT15A         | 1    |               | T            |
| D12         | PT9D          | 0    |               | C            | D12         | PT10B         | 1    |               | C            | D12         | PT14D         | 1    |               | C            |
| D11         | PT9C          | 0    |               | T            | D11         | PT10A         | 1    |               | T            | D11         | PT14C         | 1    |               | T            |
| A14         | PT7F          | 0    |               | C            | A14         | PT9F          | 1    |               | C            | A14         | PT14B         | 1    |               | C            |
| A13         | PT7E          | 0    |               | T            | A13         | PT9E          | 1    |               | T            | A13         | PT14A         | 1    |               | T            |
| C12         | PT8B          | 0    |               | C            | C12         | PT9D          | 1    |               | C            | C12         | PT13D         | 1    |               | C            |
| C11         | PT8A          | 0    |               | T            | C11         | PT9C          | 1    |               | T            | C11         | PT13C         | 1    |               | T            |
| -           | -             |      |               |              | VCCIO1      | VCCIO1        | 1    |               |              | VCCIO1      | VCCIO1        | 1    |               |              |
| -           | -             |      |               |              | GND         | GNDIO1        | 1    |               |              | GND         | GNDIO1        | 1    |               |              |
| B12         | PT7B          | 0    |               | C            | B12         | PT9B          | 1    |               | C            | B12         | PT12D         | 1    |               | C            |
| B11         | PT7A          | 0    |               | T            | B11         | PT9A          | 1    |               | T            | B11         | PT12C         | 1    |               | T            |
| A12         | PT7D          | 0    |               | C            | A12         | PT8F          | 1    |               | C            | A12         | PT12B         | 1    |               | C            |
| A11         | PT7C          | 0    |               | T            | A11         | PT8E          | 1    |               | T            | A11         | PT12A         | 1    |               | T            |
| GND         | GND           | -    |               |              | GND         | GND           | -    |               |              | GND         | GND           | -    |               |              |
| B10         | PT5D          | 0    |               | C            | B10         | PT8D          | 1    |               | C            | B10         | PT11B         | 1    |               | C            |
| B9          | PT5C          | 0    |               | T            | B9          | PT8C          | 1    |               | T            | B9          | PT11A         | 1    |               | T            |
| D10         | PT8D          | 0    |               | C            | D10         | PT8B          | 1    |               | C            | D10         | PT10F         | 1    |               | C            |
| D9          | PT8C          | 0    |               | T            | D9          | PT8A          | 1    |               | T            | D9          | PT10E         | 1    |               | T            |
| -           | -             |      |               |              | VCCIO1      | VCCIO1        | 1    |               |              | VCCIO1      | VCCIO1        | 1    |               |              |
| -           | -             |      |               |              | GND         | GNDIO1        | 1    |               |              | GND         | GNDIO1        | 1    |               |              |
| C10         | PT6D          | 0    |               | C            | C10         | PT7F          | 1    |               | C            | C10         | PT10D         | 1    |               | C            |
| C9          | PT6C          | 0    |               | T            | C9          | PT7E          | 1    |               | T            | C9          | PT10C         | 1    |               | T            |
| A9          | PT6B          | 0    | PCLK0_1***    | C            | A9          | PT7D          | 1    | PCLK1_1***    | C            | A9          | PT10B         | 1    | PCLK1_1***    | C            |
| A10         | PT6A          | 0    |               | T            | A10         | PT7C          | 1    |               | T            | A10         | PT10A         | 1    |               | T            |
| E9          | PT9B          | 0    |               | C            | E9          | PT7B          | 1    |               | C            | E9          | PT9D          | 1    |               | C            |
| E8          | PT9A          | 0    |               | T            | E8          | PT7A          | 1    |               | T            | E8          | PT9C          | 1    |               | T            |
| D7          | PT5B          | 0    | PCLK0_0***    | C            | D7          | PT6F          | 0    | PCLK1_0***    | C            | D7          | PT9B          | 1    | PCLK1_0***    | C            |
| D8          | PT5A          | 0    |               | T            | D8          | PT6E          | 0    |               | T            | D8          | PT9A          | 1    |               | T            |
| VCCIO0      | VCCIO0        | 0    |               |              | VCCIO0      | VCCIO0        | 0    |               |              | VCCIO0      | VCCIO0        | 0    |               |              |
| GND         | GNDIO0        | 0    |               |              | GND         | GNDIO0        | 0    |               |              | GND         | GNDIO0        | 0    |               |              |
| C8          | PT4F          | 0    |               | C            | C8          | PT6D          | 0    |               | C            | C8          | PT8D          | 0    |               | C            |
| B8          | PT4E          | 0    |               | T            | B8          | PT6C          | 0    |               | T            | B8          | PT8C          | 0    |               | T            |
| A8          | VCCAUX        | -    |               |              | A8          | VCCAUX        | -    |               |              | A8          | VCCAUX        | -    |               |              |
| A7          | PT4D          | 0    |               | C            | A7          | PT6B          | 0    |               | C            | A7          | PT7D          | 0    |               | C            |
| A6          | PT4C          | 0    |               | T            | A6          | PT6A          | 0    |               | T            | A6          | PT7C          | 0    |               | T            |
| VCC         | VCC           | -    |               |              | VCC         | VCC           | -    |               |              | VCC         | VCC           | -    |               |              |
| B7          | PT4B          | 0    |               | C            | B7          | PT5F          | 0    |               | C            | B7          | PT7B          | 0    |               | C            |
| B6          | PT4A          | 0    |               | T            | B6          | PT5E          | 0    |               | T            | B6          | PT7A          | 0    |               | T            |
| C6          | PT3C          | 0    |               | T            | C6          | PT5C          | 0    |               | T            | C6          | PT6A          | 0    |               | T            |
| C7          | PT3D          | 0    |               | C            | C7          | PT5D          | 0    |               | C            | C7          | PT6B          | 0    |               | C            |
| A5          | PT3E          | 0    |               | T            | A5          | PT5A          | 0    |               | T            | A5          | PT6C          | 0    |               | T            |
| A4          | PT3F          | 0    |               | C            | A4          | PT5B          | 0    |               | C            | A4          | PT6D          | 0    |               | C            |
| E7          | NC            |      |               |              | E7          | PT4C          | 0    |               | T            | E7          | PT6E          | 0    |               | T            |
| E6          | NC            |      |               |              | E6          | PT4D          | 0    |               | C            | E6          | PT6F          | 0    |               | C            |
| B5          | PT3B          | 0    |               | C            | B5          | PT3F          | 0    |               | C            | B5          | PT5D          | 0    |               | C            |
| B4          | PT3A          | 0    |               | T            | B4          | PT3E          | 0    |               | T            | B4          | PT5C          | 0    |               | T            |
| D5          | PT2D          | 0    |               | C            | D5          | PT3D          | 0    |               | C            | D5          | PT5B          | 0    |               | C            |
| D6          | PT2C          | 0    |               | T            | D6          | PT3C          | 0    |               | T            | D6          | PT5A          | 0    |               | T            |
| C4          | PT2E          | 0    |               | T            | C4          | PT4A          | 0    |               | T            | C4          | PT4A          | 0    |               | T            |
| C5          | PT2F          | 0    |               | C            | C5          | PT4B          | 0    |               | C            | C5          | PT4B          | 0    |               | C            |
| -           | -             | -    |               |              | -           | -             | -    |               |              | GND         | GND           | -    |               |              |
| D4          | NC            |      |               |              | D4          | PT2D          | 0    |               | C            | D4          | PT3D          | 0    |               | C            |

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

| LCMX02280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential |
| T2          | PL20B         | 6    |               | C            |
| P6          | TMS           | 5    | TMS           |              |
| V1          | PB2A          | 5    |               | T            |
| U2          | PB2B          | 5    |               | C            |
| T3          | PB2C          | 5    |               | T            |
| N7          | TCK           | 5    | TCK           |              |
| R4          | PB2D          | 5    |               | C            |
| R5          | PB3A          | 5    |               | T            |
| T4          | PB3B          | 5    |               | C            |
| VCC         | VCC           | -    |               |              |
| R6          | PB3C          | 5    |               | T            |
| P7          | PB3D          | 5    |               | C            |
| U3          | PB4A          | 5    |               | T            |
| T5          | PB4B          | 5    |               | C            |
| V2          | PB4C          | 5    |               | T            |
| N8          | TDO           | 5    | TDO           |              |
| V3          | PB4D          | 5    |               | C            |
| T6          | PB5A          | 5    |               | T            |
| GND         | GNDIO5        | 5    |               |              |
| VCCIO5      | VCCIO5        | 5    |               |              |
| U4          | PB5B          | 5    |               | C            |
| P8          | PB5C          | 5    |               | T            |
| T7          | PB5D          | 5    |               | C            |
| V4          | TDI           | 5    | TDI           |              |
| R8          | PB6A          | 5    |               | T            |
| N9          | PB6B          | 5    |               | C            |
| U5          | PB6C          | 5    |               | T            |
| V5          | PB6D          | 5    |               | C            |
| U6          | PB7A          | 5    |               | T            |
| VCC         | VCC           | -    |               |              |
| V6          | PB7B          | 5    |               | C            |
| P9          | PB7C          | 5    |               | T            |
| T8          | PB7D          | 5    |               | C            |
| U7          | PB8A          | 5    |               | T            |
| V7          | PB8B          | 5    |               | C            |
| M10         | VCCAUX        | -    |               |              |
| U8          | PB8C          | 5    |               | T            |
| V8          | PB8D          | 5    |               | C            |
| VCCIO5      | VCCIO5        | 5    |               |              |
| GND         | GNDIO5        | 5    |               |              |
| T9          | PB8E          | 5    |               | T            |
| U9          | PB8F          | 5    |               | C            |
| V9          | PB9A          | 4    |               | T            |

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

| LCMX02280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential |
| GND         | GNDIO3        | 3    |               |              |
| VCCIO3      | VCCIO3        | 3    |               |              |
| P15         | PR20B         | 3    |               | C            |
| N14         | PR20A         | 3    |               | T            |
| N15         | PR19B         | 3    |               | C            |
| M13         | PR19A         | 3    |               | T            |
| R15         | PR18B         | 3    |               | C*           |
| T16         | PR18A         | 3    |               | T*           |
| N16         | PR17D         | 3    |               | C            |
| M14         | PR17C         | 3    |               | T            |
| U17         | PR17B         | 3    |               | C*           |
| VCC         | VCC           | -    |               |              |
| U18         | PR17A         | 3    |               | T*           |
| R17         | PR16D         | 3    |               | C            |
| R16         | PR16C         | 3    |               | T            |
| P16         | PR16B         | 3    |               | C*           |
| VCCIO3      | VCCIO3        | 3    |               |              |
| GND         | GNDIO3        | 3    |               |              |
| P17         | PR16A         | 3    |               | T*           |
| L13         | PR15D         | 3    |               | C            |
| M15         | PR15C         | 3    |               | T            |
| T17         | PR15B         | 3    |               | C*           |
| T18         | PR15A         | 3    |               | T*           |
| L14         | PR14D         | 3    |               | C            |
| L15         | PR14C         | 3    |               | T            |
| R18         | PR14B         | 3    |               | C*           |
| P18         | PR14A         | 3    |               | T*           |
| GND         | GND           | -    |               |              |
| K15         | PR13D         | 3    |               | C            |
| K13         | PR13C         | 3    |               | T            |
| N17         | PR13B         | 3    |               | C*           |
| N18         | PR13A         | 3    |               | T*           |
| K16         | PR12D         | 3    |               | C            |
| K14         | PR12C         | 3    |               | T            |
| M16         | PR12B         | 3    |               | C*           |
| L16         | PR12A         | 3    |               | T*           |
| GND         | GNDIO3        | 3    |               |              |
| VCCIO3      | VCCIO3        | 3    |               |              |
| J16         | PR11D         | 3    |               | C            |
| J14         | PR11C         | 3    |               | T            |
| M17         | PR11B         | 3    |               | C*           |
| L17         | PR11A         | 3    |               | T*           |
| J15         | PR10D         | 2    |               | C            |

**Conventional Packaging**
**Industrial**

| Part Number      | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO256C-3T100I | 256  | 1.8V/2.5V/3.3V | 78   | -3    | TQFP    | 100  | IND   |
| LCMXO256C-4T100I | 256  | 1.8V/2.5V/3.3V | 78   | -4    | TQFP    | 100  | IND   |
| LCMXO256C-3M100I | 256  | 1.8V/2.5V/3.3V | 78   | -3    | csBGA   | 100  | IND   |
| LCMXO256C-4M100I | 256  | 1.8V/2.5V/3.3V | 78   | -4    | csBGA   | 100  | IND   |

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|-------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO640C-3T100I  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | TQFP    | 100  | IND   |
| LCMXO640C-4T100I  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | TQFP    | 100  | IND   |
| LCMXO640C-3M100I  | 640  | 1.8V/2.5V/3.3V | 74   | -3    | csBGA   | 100  | IND   |
| LCMXO640C-4M100I  | 640  | 1.8V/2.5V/3.3V | 74   | -4    | csBGA   | 100  | IND   |
| LCMXO640C-3T144I  | 640  | 1.8V/2.5V/3.3V | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO640C-4T144I  | 640  | 1.8V/2.5V/3.3V | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO640C-3M132I  | 640  | 1.8V/2.5V/3.3V | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO640C-4M132I  | 640  | 1.8V/2.5V/3.3V | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO640C-3B256I  | 640  | 1.8V/2.5V/3.3V | 159  | -3    | caBGA   | 256  | IND   |
| LCMXO640C-4B256I  | 640  | 1.8V/2.5V/3.3V | 159  | -4    | caBGA   | 256  | IND   |
| LCMXO640C-3FT256I | 640  | 1.8V/2.5V/3.3V | 159  | -3    | ftBGA   | 256  | IND   |
| LCMXO640C-4FT256I | 640  | 1.8V/2.5V/3.3V | 159  | -4    | ftBGA   | 256  | IND   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|--------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO1200C-3T100I  | 1200 | 1.8V/2.5V/3.3V | 73   | -3    | TQFP    | 100  | IND   |
| LCMXO1200C-4T100I  | 1200 | 1.8V/2.5V/3.3V | 73   | -4    | TQFP    | 100  | IND   |
| LCMXO1200C-3T144I  | 1200 | 1.8V/2.5V/3.3V | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO1200C-4T144I  | 1200 | 1.8V/2.5V/3.3V | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO1200C-3M132I  | 1200 | 1.8V/2.5V/3.3V | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO1200C-4M132I  | 1200 | 1.8V/2.5V/3.3V | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO1200C-3B256I  | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | caBGA   | 256  | IND   |
| LCMXO1200C-4B256I  | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | caBGA   | 256  | IND   |
| LCMXO1200C-3FT256I | 1200 | 1.8V/2.5V/3.3V | 211  | -3    | ftBGA   | 256  | IND   |
| LCMXO1200C-4FT256I | 1200 | 1.8V/2.5V/3.3V | 211  | -4    | ftBGA   | 256  | IND   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|--------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO2280C-3T100I  | 2280 | 1.8V/2.5V/3.3V | 73   | -3    | TQFP    | 100  | IND   |
| LCMXO2280C-4T100I  | 2280 | 1.8V/2.5V/3.3V | 73   | -4    | TQFP    | 100  | IND   |
| LCMXO2280C-3T144I  | 2280 | 1.8V/2.5V/3.3V | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO2280C-4T144I  | 2280 | 1.8V/2.5V/3.3V | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO2280C-3M132I  | 2280 | 1.8V/2.5V/3.3V | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO2280C-4M132I  | 2280 | 1.8V/2.5V/3.3V | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO2280C-3B256I  | 2280 | 1.8V/2.5V/3.3V | 211  | -3    | caBGA   | 256  | IND   |
| LCMXO2280C-4B256I  | 2280 | 1.8V/2.5V/3.3V | 211  | -4    | caBGA   | 256  | IND   |
| LCMXO2280C-3FT256I | 2280 | 1.8V/2.5V/3.3V | 211  | -3    | ftBGA   | 256  | IND   |
| LCMXO2280C-4FT256I | 2280 | 1.8V/2.5V/3.3V | 211  | -4    | ftBGA   | 256  | IND   |
| LCMXO2280C-3FT324I | 2280 | 1.8V/2.5V/3.3V | 271  | -3    | ftBGA   | 324  | IND   |
| LCMXO2280C-4FT324I | 2280 | 1.8V/2.5V/3.3V | 271  | -4    | ftBGA   | 324  | IND   |

**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   |

| Date                  | Version         | Section                             | Change Summary                                                                                            |
|-----------------------|-----------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------|
| April 2006<br>(cont.) | 02.0<br>(cont.) | Architecture<br>(cont.)             | "Top View of the MachXO1200 Device" figure updated.                                                       |
|                       |                 |                                     | "Top View of the MachXO640 Device" figure updated.                                                        |
|                       |                 |                                     | "Top View of the MachXO256 Device" figure updated.                                                        |
|                       |                 |                                     | "Slice Diagram" figure updated.                                                                           |
|                       |                 |                                     | Slice Signal Descriptions table updated.                                                                  |
|                       |                 |                                     | Routing section updated.                                                                                  |
|                       |                 |                                     | sysCLOCK Phase Locked Loops (PLLs) section updated.                                                       |
|                       |                 |                                     | PLL Diagram updated.                                                                                      |
|                       |                 |                                     | PLL Signal Descriptions table updated.                                                                    |
|                       |                 |                                     | sysMEM Memory section has been updated.                                                                   |
|                       |                 |                                     | PIO Groups section has been updated.                                                                      |
|                       |                 |                                     | PIO section has been updated.                                                                             |
|                       |                 |                                     | MachXO PIO Block Diagram updated.                                                                         |
|                       |                 |                                     | Supported Input Standards table updated.                                                                  |
|                       |                 |                                     | MachXO Configuration and Programming diagram updated.                                                     |
|                       |                 | DC and Switching<br>Characteristics | Recommended Operating Conditions table - footnotes updated.                                               |
|                       |                 |                                     | MachXO256 and MachXO640 Hot Socketing Specifications - footnotes updated.                                 |
|                       |                 |                                     | Added MachXO1200 and MachXO2280 Hot Socketing Specifications table.                                       |
|                       |                 |                                     | DC Electrical Characteristics, footnotes have been updated.                                               |
|                       |                 |                                     | Supply Current (Sleep Mode) table has been updated, removed "4W" references. Footnotes have been updated. |
|                       |                 |                                     | Supply Current (Standby) table and associated footnotes updated.                                          |
|                       |                 |                                     | Initialization Supply Current table and footnotes updated.                                                |
|                       |                 |                                     | Programming and Erase Flash Supply Current table and associated footnotes have been updated.              |
|                       |                 |                                     | Register-to-Register Performance table updated (rev. A 0.19).                                             |
|                       |                 |                                     | MachXO External Switching Characteristics updated (rev. A 0.19).                                          |
|                       |                 |                                     | MachXO Internal Timing Parameters updated (rev. A 0.19).                                                  |
|                       |                 |                                     | MachXO Family Timing Adders updated (rev. A 0.19).                                                        |
|                       |                 |                                     | sysCLOCK Timing updated (rev. A 0.19).                                                                    |
|                       |                 |                                     | MachXO "C" Sleep Mode Timing updated (A 0.19).                                                            |
|                       |                 |                                     | JTAG Port Timing Specification updated (rev. A 0.19).                                                     |
|                       |                 |                                     | Test Fixture Required Components table updated.                                                           |
|                       |                 | Pinout Information                  | Signal Descriptions have been updated.                                                                    |
|                       |                 |                                     | Pin Information Summary has been updated. Footnote has been added.                                        |
|                       |                 |                                     | Power Supply and NC Connection table has been updated.                                                    |
|                       |                 |                                     | Logic Signal Connections have been updated (PCLKTx_x --> PCLKx_x)                                         |
|                       |                 | Ordering Information                | Removed "4W" references.                                                                                  |
|                       |                 |                                     | Added 256-ftBGA Ordering Part Numbers for MachXO640.                                                      |
| May 2006              | 02.1            | Pinout Information                  | Removed [LOC][0]_PLL_RST from Signal Description table.                                                   |
|                       |                 |                                     | PCLK footnote has been added to all appropriate pins.                                                     |
| August 2006           | 02.2            | Multiple                            | Removed 256 fpBGA information for MachXO640.                                                              |