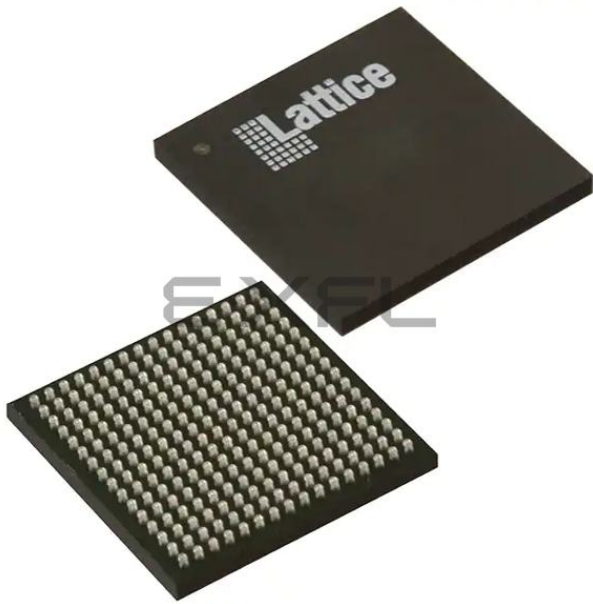




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## Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

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                 | Active                                                                                                                                                                    |
| Number of LABs/CLBs            | 150                                                                                                                                                                       |
| Number of Logic Elements/Cells | 1200                                                                                                                                                                      |
| Total RAM Bits                 | 9421                                                                                                                                                                      |
| Number of I/O                  | 211                                                                                                                                                                       |
| Number of Gates                | -                                                                                                                                                                         |
| Voltage - Supply               | 1.14V ~ 1.26V                                                                                                                                                             |
| Mounting Type                  | Surface Mount                                                                                                                                                             |
| Operating Temperature          | -40°C ~ 100°C (TJ)                                                                                                                                                        |
| Package / Case                 | 256-LFBGA, CSPBGA                                                                                                                                                         |
| Supplier Device Package        | 256-CABGA (14x14)                                                                                                                                                         |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200e-3bn256i">https://www.e-xfl.com/product-detail/lattice-semiconductor/lcmxo1200e-3bn256i</a> |

### Bus Size Matching

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

### RAM Initialization and ROM Operation

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

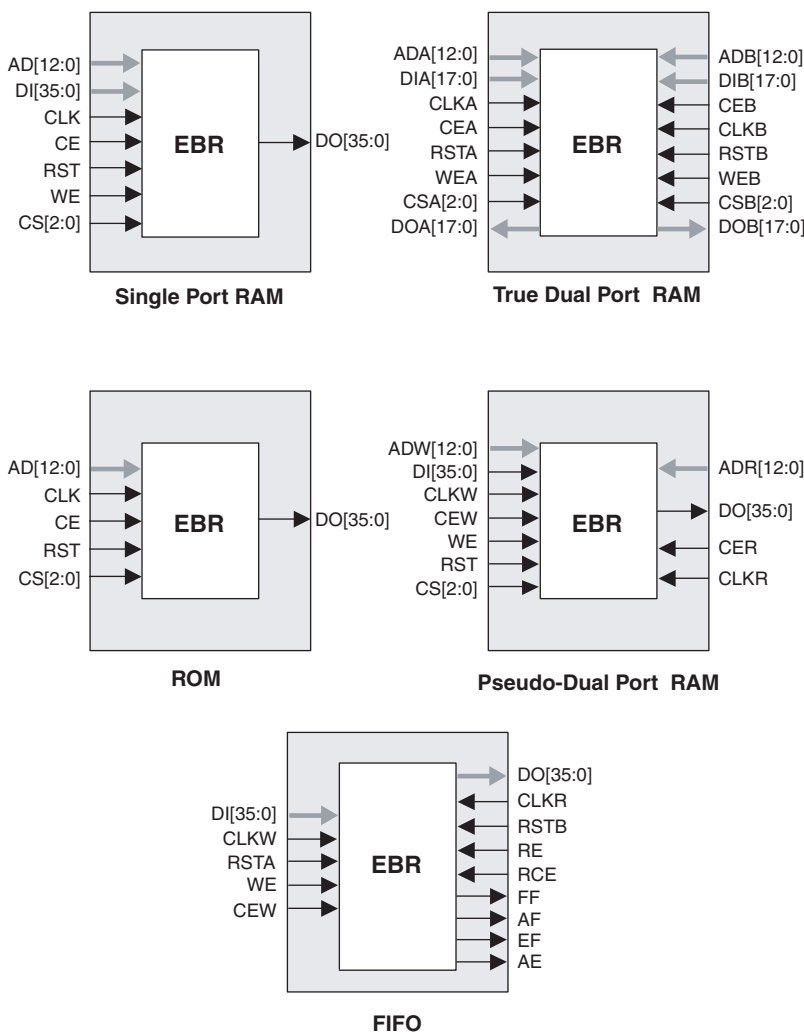
### Memory Cascading

Larger and deeper blocks of RAMs can be created using EBR sysMEM Blocks. Typically, the Lattice design tools cascade memory transparently, based on specific design inputs.

### Single, Dual, Pseudo-Dual Port and FIFO Modes

Figure 2-12 shows the five basic memory configurations and their input/output names. In all the sysMEM RAM modes, the input data and address for the ports are registered at the input of the memory array. The output data of the memory is optionally registered at the memory array output.

**Figure 2-12. sysMEM Memory Primitives**



The EBR memory supports three forms of write behavior for single or dual port operation:

1. **Normal** – data on the output appears only during the read cycle. During a write cycle, the data (at the current address) does not appear on the output. This mode is supported for all data widths.
2. **Write Through** – a copy of the input data appears at the output of the same port. This mode is supported for all data widths.
3. **Read-Before-Write** – when new data is being written, the old contents of the address appears at the output. This mode is supported for x9, x18 and x36 data widths.

### FIFO Configuration

The FIFO has a write port with Data-in, CEW, WE and CLKW signals. There is a separate read port with Data-out, RCE, RE and CLKR signals. The FIFO internally generates Almost Full, Full, Almost Empty and Empty Flags. The Full and Almost Full flags are registered with CLKW. The Empty and Almost Empty flags are registered with CLKR. The range of programming values for these flags are in Table 2-7.

**Table 2-7. Programmable FIFO Flag Ranges**

| Flag Name         | Programming Range     |
|-------------------|-----------------------|
| Full (FF)         | 1 to (up to $2^N-1$ ) |
| Almost Full (AF)  | 1 to Full-1           |
| Almost Empty (AE) | 1 to Full-1           |
| Empty (EF)        | 0                     |

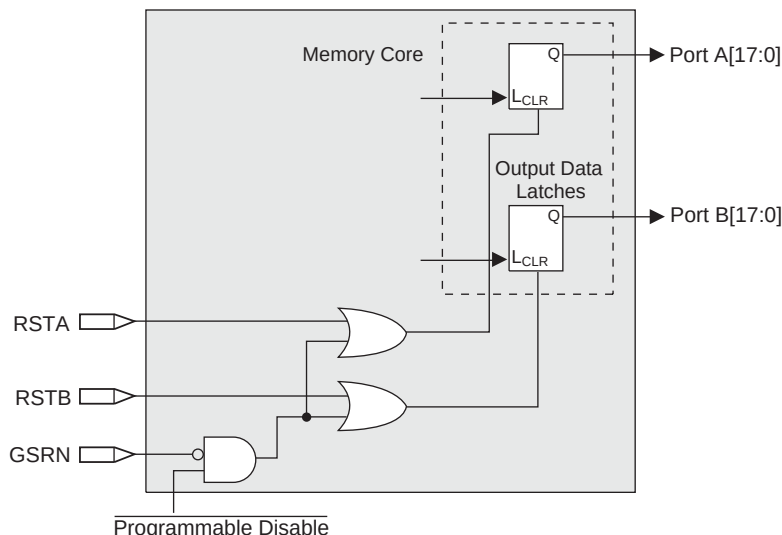
N = Address bit width

The FIFO state machine supports two types of reset signals: RSTA and RSTB. The RSTA signal is a global reset that clears the contents of the FIFO by resetting the read/write pointer and puts the FIFO flags in their initial reset state. The RSTB signal is used to reset the read pointer. The purpose of this reset is to retransmit the data that is in the FIFO. In these applications it is important to keep careful track of when a packet is written into or read from the FIFO.

### Memory Core Reset

The memory array in the EBR utilizes latches at the A and B output ports. These latches can be reset asynchronously. RSTA and RSTB are local signals, which reset the output latches associated with Port A and Port B respectively. The Global Reset (GSRN) signal resets both ports. The output data latches and associated resets for both ports are as shown in Figure 2-13.

**Figure 2-13. Memory Core Reset**

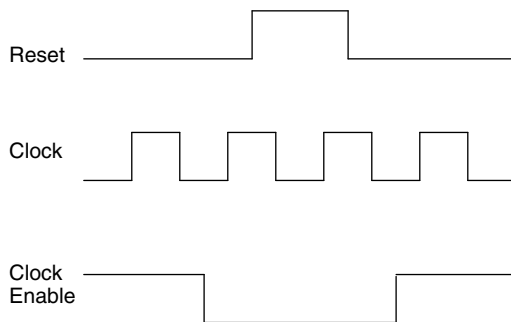


For further information on the sysMEM EBR block, see the details of additional technical documentation at the end of this data sheet.

### EBR Asynchronous Reset

EBR asynchronous reset or GSR (if used) can only be applied if all clock enables are low for a clock cycle before the reset is applied and released a clock cycle after the reset is released, as shown in Figure 2-14. The GSR input to the EBR is always asynchronous.

**Figure 2-14. EBR Asynchronous Reset (Including GSR) Timing Diagram**



If all clock enables remain enabled, the EBR asynchronous reset or GSR may only be applied and released after the EBR read and write clock inputs are in a steady state condition for a minimum of  $1/f_{MAX}$  (EBR clock). The reset release must adhere to the EBR synchronous reset setup time before the next active read or write clock edge.

If an EBR is pre-loaded during configuration, the GSR input must be disabled or the release of the GSR during device Wake Up must occur before the release of the device I/Os becoming active.

These instructions apply to all EBR RAM, ROM and FIFO implementations. For the EBR FIFO mode, the GSR signal is always enabled and the WE and RE signals act like the clock enable signals in Figure 2-14. The reset timing rules apply to the RPRreset input vs the RE input and the RST input vs. the WE and RE inputs. Both RST and RPRreset are always asynchronous EBR inputs.

Note that there are no reset restrictions if the EBR synchronous reset is used and the EBR GSR input is disabled

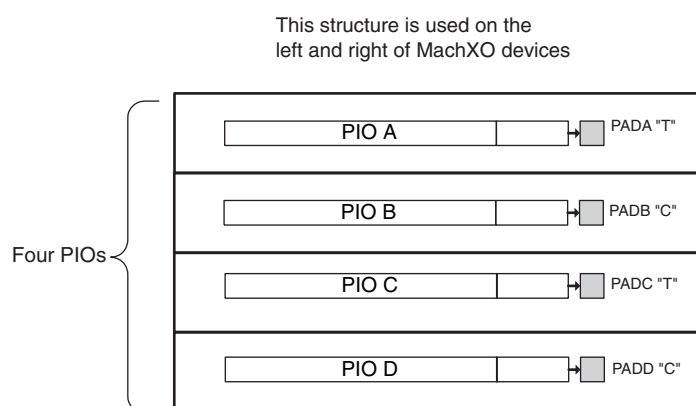
## PIO Groups

On the MachXO devices, PIO cells are assembled into two different types of PIO groups, those with four PIO cells and those with six PIO cells. PIO groups with four IOs are placed on the left and right sides of the device while PIO groups with six IOs are placed on the top and bottom. The individual PIO cells are connected to their respective sysIO buffers and PADs.

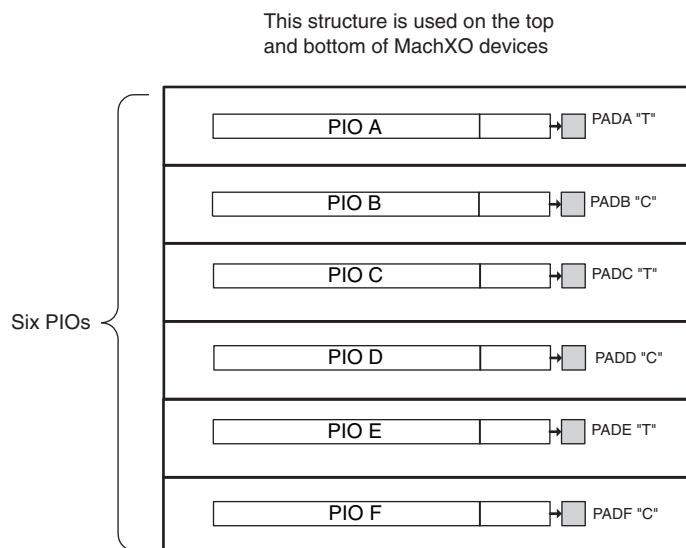
On all MachXO devices, two adjacent PIOs can be joined to provide a complementary Output driver pair. The I/O pin pairs are labeled as "T" and "C" to distinguish between the true and complement pins.

The MachXO1200 and MachXO2280 devices contain enhanced I/O capability. All PIO pairs on these larger devices can implement differential receivers. In addition, half of the PIO pairs on the left and right sides of these devices can be configured as LVDS transmit/receive pairs. PIOs on the top of these larger devices also provide PCI support.

**Figure 2-15. Group of Four Programmable I/O Cells**



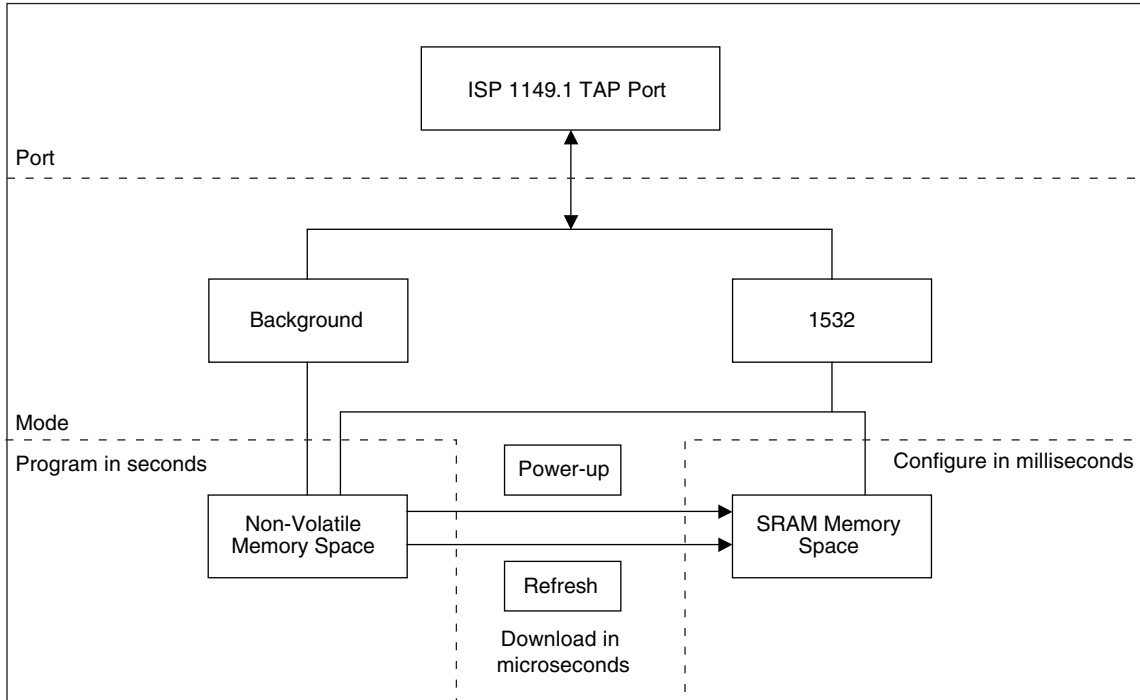
**Figure 2-16. Group of Six Programmable I/O Cells**



## PIO

The PIO blocks provide the interface between the sysIO buffers and the internal PFU array blocks. These blocks receive output data from the PFU array and a fast output data signal from adjacent PFUs. The output data and fast

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



## Density Shifting

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

### MachXO Internal Timing Parameters<sup>1</sup>

Over Recommended Operating Conditions

| Parameter                                   | Description                                                  | -5    |      | -4    |      | -3    |      | Units |
|---------------------------------------------|--------------------------------------------------------------|-------|------|-------|------|-------|------|-------|
|                                             |                                                              | Min.  | Max. | Min.  | Max. | Min.  | Max. |       |
| PFU/PFF Logic Mode Timing                   |                                                              |       |      |       |      |       |      |       |
| t <sub>LUT4_PFU</sub>                       | LUT4 delay (A to D inputs to F output)                       | —     | 0.28 | —     | 0.34 | —     | 0.39 | ns    |
| t <sub>LUT6_PFU</sub>                       | LUT6 delay (A to D inputs to OFX output)                     | —     | 0.44 | —     | 0.53 | —     | 0.62 | ns    |
| t <sub>LSR_PFU</sub>                        | Set/Reset to output of PFU                                   | —     | 0.90 | —     | 1.08 | —     | 1.26 | ns    |
| t <sub>SUM_PFU</sub>                        | Clock to Mux (M0,M1) input setup time                        | 0.10  | —    | 0.13  | —    | 0.15  | —    | ns    |
| t <sub>HM_PFU</sub>                         | Clock to Mux (M0,M1) input hold time                         | -0.05 | —    | -0.06 | —    | -0.07 | —    | ns    |
| t <sub>SUD_PFU</sub>                        | Clock to D input setup time                                  | 0.13  | —    | 0.16  | —    | 0.18  | —    | ns    |
| t <sub>HD_PFU</sub>                         | Clock to D input hold time                                   | -0.03 | —    | -0.03 | —    | -0.04 | —    | ns    |
| t <sub>CK2Q_PFU</sub>                       | Clock to Q delay, D-type register configuration              | —     | 0.40 | —     | 0.48 | —     | 0.56 | ns    |
| t <sub>LE2Q_PFU</sub>                       | Clock to Q delay latch configuration                         | —     | 0.53 | —     | 0.64 | —     | 0.74 | ns    |
| t <sub>LD2Q_PFU</sub>                       | D to Q throughput delay when latch is enabled                | —     | 0.55 | —     | 0.66 | —     | 0.77 | ns    |
| PFU Dual Port Memory Mode Timing            |                                                              |       |      |       |      |       |      |       |
| t <sub>CORAM_PFU</sub>                      | Clock to Output                                              | —     | 0.40 | —     | 0.48 | —     | 0.56 | ns    |
| t <sub>SUDATA_PFU</sub>                     | Data Setup Time                                              | -0.18 | —    | -0.22 | —    | -0.25 | —    | ns    |
| t <sub>HDATA_PFU</sub>                      | Data Hold Time                                               | 0.28  | —    | 0.34  | —    | 0.39  | —    | ns    |
| t <sub>SUADDR_PFU</sub>                     | Address Setup Time                                           | -0.46 | —    | -0.56 | —    | -0.65 | —    | ns    |
| t <sub>HADDR_PFU</sub>                      | Address Hold Time                                            | 0.71  | —    | 0.85  | —    | 0.99  | —    | ns    |
| t <sub>SUWREN_PFU</sub>                     | Write/Read Enable Setup Time                                 | -0.22 | —    | -0.26 | —    | -0.30 | —    | ns    |
| t <sub>HWREN_PFU</sub>                      | Write/Read Enable Hold Time                                  | 0.33  | —    | 0.40  | —    | 0.47  | —    | ns    |
| PIO Input/Output Buffer Timing              |                                                              |       |      |       |      |       |      |       |
| t <sub>IN_PIO</sub>                         | Input Buffer Delay                                           | —     | 0.75 | —     | 0.90 | —     | 1.06 | ns    |
| t <sub>OUT_PIO</sub>                        | Output Buffer Delay                                          | —     | 1.29 | —     | 1.54 | —     | 1.80 | ns    |
| EBR Timing (1200 and 2280 Devices Only)     |                                                              |       |      |       |      |       |      |       |
| t <sub>CO_EBR</sub>                         | Clock to output from Address or Data with no output register | —     | 2.24 | —     | 2.69 | —     | 3.14 | ns    |
| t <sub>COO_EBR</sub>                        | Clock to output from EBR output Register                     | —     | 0.54 | —     | 0.64 | —     | 0.75 | ns    |
| t <sub>SUDATA_EBR</sub>                     | Setup Data to EBR Memory                                     | -0.26 | —    | -0.31 | —    | -0.37 | —    | ns    |
| t <sub>HDATA_EBR</sub>                      | Hold Data to EBR Memory                                      | 0.41  | —    | 0.49  | —    | 0.57  | —    | ns    |
| t <sub>SUADDR_EBR</sub>                     | Setup Address to EBR Memory                                  | -0.26 | —    | -0.31 | —    | -0.37 | —    | ns    |
| t <sub>HADDR_EBR</sub>                      | Hold Address to EBR Memory                                   | 0.41  | —    | 0.49  | —    | 0.57  | —    | ns    |
| t <sub>SUWREN_EBR</sub>                     | Setup Write/Read Enable to EBR Memory                        | -0.17 | —    | -0.20 | —    | -0.23 | —    | ns    |
| t <sub>HWREN_EBR</sub>                      | Hold Write/Read Enable to EBR Memory                         | 0.26  | —    | 0.31  | —    | 0.36  | —    | ns    |
| t <sub>SUCE_EBR</sub>                       | Clock Enable Setup Time to EBR Output Register               | 0.19  | —    | 0.23  | —    | 0.27  | —    | ns    |
| t <sub>HCE_EBR</sub>                        | Clock Enable Hold Time to EBR Output Register                | -0.13 | —    | -0.16 | —    | -0.18 | —    | ns    |
| t <sub>RSTO_EBR</sub>                       | Reset To Output Delay Time from EBR Output Register          | —     | 1.03 | —     | 1.23 | —     | 1.44 | ns    |
| PLL Parameters (1200 and 2280 Devices Only) |                                                              |       |      |       |      |       |      |       |
| t <sub>RSTREC</sub>                         | Reset Recovery to Rising Clock                               | 1.00  | —    | 1.00  | —    | 1.00  | —    | ns    |
| t <sub>RSTSU</sub>                          | Reset Signal Setup Time                                      | 1.00  | —    | 1.00  | —    | 1.00  | —    | ns    |

1. Internal parameters are characterized but not tested on every device.

Rev. A 0.19

## Power Supply and NC

| Signal           | 100 TQFP <sup>1</sup>                                                                                                                          | 144 TQFP <sup>1</sup>                             | 100 csBGA <sup>2</sup>                                                                              |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| VCC              | LCMXO256/640: 35, 90<br>LCMXO1200/2280: 17, 35, 66, 91                                                                                         | 21, 52, 93, 129                                   | P7, B6                                                                                              |
| VCCIO0           | LCMXO256: 60, 74, 92<br>LCMXO640: 80, 92<br>LCMXO1200/2280: 94                                                                                 | LCMXO640: 117, 135<br>LCMXO1200/2280: 135         | LCMXO256: H14, A14, B5<br>LCMXO640: B12, B5                                                         |
| VCCIO1           | LCMXO256: 10, 24, 41<br>LCMXO640: 60, 74<br>LCMXO1200/2280: 80                                                                                 | LCMXO640: 82, 98<br>LCMXO1200/2280: 117           | LCMXO256: G1, P1, P10<br>LCMXO640: H14, A14                                                         |
| VCCIO2           | LCMXO256: None<br>LCMXO640: 29, 41<br>LCMXO1200/2280: 70                                                                                       | LCMXO640: 38, 63<br>LCMXO1200/2280: 98            | LCMXO256: None<br>LCMXO640: P4, P10                                                                 |
| VCCIO3           | LCMXO256: None<br>LCMXO640: 10, 24<br>LCMXO1200/2280: 56                                                                                       | LCMXO640: 10, 26<br>LCMXO1200/2280: 82            | LCMXO256: None<br>LCMXO640: G1, P1                                                                  |
| VCCIO4           | LCMXO256/640: None<br>LCMXO1200/2280: 44                                                                                                       | LCMXO640: None<br>LCMXO1200/2280: 63              | —                                                                                                   |
| VCCIO5           | LCMXO256/640: None<br>LCMXO1200/2280: 27                                                                                                       | LCMXO640: None<br>LCMXO1200/2280: 38              | —                                                                                                   |
| VCCIO6           | LCMXO256/640: None<br>LCMXO1200/2280: 20                                                                                                       | LCMXO640: None<br>LCMXO1200/2280: 26              | —                                                                                                   |
| VCCIO7           | LCMXO256/640: None<br>LCMXO1200/2280: 6                                                                                                        | LCMXO640: None<br>LCMXO1200/2280: 10              | —                                                                                                   |
| VCCAUX           | LCMXO256/640: 88<br>LCMXO1200/2280: 36, 90                                                                                                     | 53, 128                                           | B7                                                                                                  |
| GND <sup>3</sup> | LCMXO256: 40, 84, 62, 75, 93, 12, 25, 42<br>LCMXO640: 40, 84, 81, 93, 62, 75, 30, 42, 12, 25<br>LCMXO1200/2280: 9, 41, 59, 83, 100, 76, 50, 26 | 16, 59, 88, 123, 118, 136, 83, 99, 37, 64, 11, 27 | LCMXO256: N9, B9, G14, B13, A4, H1, N2, N10<br>LCMXO640: N9, B9, A10, A4, G14, B13, N3, N10, H1, N2 |
| NC <sup>4</sup>  |                                                                                                                                                |                                                   | —                                                                                                   |

1. Pin orientation follows the conventional order from pin 1 marking of the top side view and counter-clockwise.

2. Pin orientation A1 starts from the upper left corner of the top side view with alphabetical order ascending vertically and numerical order ascending horizontally.

3. 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.

4. NC pins should not be connected to any active signals, VCC or GND.



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

| Pin Number | LCMX0256      |      |               |              | LCMX0640      |      |               |              |
|------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|
|            | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential |
| 43         | PB4A          | 1    |               | T            | PB8B          | 2    |               |              |
| 44         | PB4B          | 1    |               | C            | PB8C          | 2    |               | T            |
| 45         | PB4C          | 1    |               | T            | PB8D          | 2    |               | C            |
| 46         | PB4D          | 1    |               | C            | PB9A          | 2    |               |              |
| 47         | PB5A          | 1    |               |              | PB9C          | 2    |               | T            |
| 48*        | SLEEPN        | -    | SLEEPN        |              | SLEEPN        | -    | SLEEPN        |              |
| 49         | PB5C          | 1    |               | T            | PB9D          | 2    |               | C            |
| 50         | PB5D          | 1    |               | C            | PB9F          | 2    |               |              |
| 51         | PR9B          | 0    |               | C            | PR11D         | 1    |               | C            |
| 52         | PR9A          | 0    |               | T            | PR11B         | 1    |               | C            |
| 53         | PR8B          | 0    |               | C            | PR11C         | 1    |               | T            |
| 54         | PR8A          | 0    |               | T            | PR11A         | 1    |               | T            |
| 55         | PR7D          | 0    |               | C            | PR10D         | 1    |               | C            |
| 56         | PR7C          | 0    |               | T            | PR10C         | 1    |               | T            |
| 57         | PR7B          | 0    |               | C            | PR10B         | 1    |               | C            |
| 58         | PR7A          | 0    |               | T            | PR10A         | 1    |               | T            |
| 59         | PR6B          | 0    |               | C            | PR9D          | 1    |               |              |
| 60         | VCCIO0        | 0    |               |              | VCCIO1        | 1    |               |              |
| 61         | PR6A          | 0    |               | T            | PR9B          | 1    |               |              |
| 62         | GNDIO0        | 0    |               |              | GNDIO1        | 1    |               |              |
| 63         | PR5D          | 0    |               | C            | PR7B          | 1    |               |              |
| 64         | PR5C          | 0    |               | T            | PR6C          | 1    |               |              |
| 65         | PR5B          | 0    |               | C            | PR6B          | 1    |               |              |
| 66         | PR5A          | 0    |               | T            | PR5D          | 1    |               |              |
| 67         | PR4B          | 0    |               | C            | PR5B          | 1    |               |              |
| 68         | PR4A          | 0    |               | T            | PR4D          | 1    |               |              |
| 69         | PR3D          | 0    |               | C            | PR4B          | 1    |               |              |
| 70         | PR3C          | 0    |               | T            | PR3D          | 1    |               |              |
| 71         | PR3B          | 0    |               | C            | PR3B          | 1    |               |              |
| 72         | PR3A          | 0    |               | T            | PR2D          | 1    |               |              |
| 73         | PR2B          | 0    |               | C            | PR2B          | 1    |               |              |
| 74         | VCCIO0        | 0    |               |              | VCCIO1        | 1    |               |              |
| 75         | GNDIO0        | 0    |               |              | GNDIO1        | 1    |               |              |
| 76         | PR2A          | 0    |               | T            | PT9F          | 0    |               | C            |
| 77         | PT5C          | 0    |               |              | PT9E          | 0    |               | T            |
| 78         | PT5B          | 0    |               | C            | PT9C          | 0    |               |              |
| 79         | PT5A          | 0    |               | T            | PT9A          | 0    |               |              |
| 80         | PT4F          | 0    |               | C            | VCCIO0        | 0    |               |              |
| 81         | PT4E          | 0    |               | T            | GNDIO0        | 0    |               |              |
| 82         | PT4D          | 0    |               | C            | PT7E          | 0    |               |              |
| 83         | PT4C          | 0    |               | T            | PT7A          | 0    |               |              |
| 84         | GND           | -    |               |              | 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              | -    |                |              |

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

| Pin Number | LCMXO640      |      |               |              | LCMXO1200     |      |               |              | LCMXO2280     |      |               |              |
|------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|---------------|------|---------------|--------------|
|            | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential | Ball Function | Bank | Dual Function | Differential |
| 51         | TDI           | 2    | TDI           |              | TDI           | 5    | TDI           |              | TDI           | 5    | TDI           |              |
| 52         | VCC           | -    |               |              | VCC           | -    |               |              | VCC           | -    |               |              |
| 53         | VCCAUX        | -    |               |              | VCCAUX        | -    |               |              | VCCAUX        | -    |               |              |
| 54         | PB5A          | 2    |               | T            | PB6F          | 5    |               |              | PB8F          | 5    |               |              |
| 55         | PB5B          | 2    | PCLKT2_1***   | C            | PB7B          | 4    | PCLK4_1***    |              | PB10F         | 4    | PCLK4_1***    |              |
| 56         | PB5D          | 2    |               |              | PB7C          | 4    |               | T            | PB10C         | 4    |               | T            |
| 57         | PB6A          | 2    |               | T            | PB7D          | 4    |               | C            | PB10D         | 4    |               | C            |
| 58         | PB6B          | 2    | PCLKT2_0***   | C            | PB7F          | 4    | PCLK4_0***    |              | PB10B         | 4    | PCLK4_0***    |              |
| 59         | GND           | -    |               |              | GND           | -    |               |              | GND           | -    |               |              |
| 60         | PB7C          | 2    |               |              | PB9A          | 4    |               | T            | PB12A         | 4    |               | T            |
| 61         | PB7E          | 2    |               |              | PB9B          | 4    |               | C            | PB12B         | 4    |               | C            |
| 62         | PB8A          | 2    |               |              | PB9E          | 4    |               |              | PB12E         | 4    |               |              |
| 63         | VCCIO2        | 2    |               |              | VCCIO4        | 4    |               |              | VCCIO4        | 4    |               |              |
| 64         | GNDIO2        | 2    |               |              | GNDIO4        | 4    |               |              | GNDIO4        | 4    |               |              |
| 65         | PB8C          | 2    |               | T            | PB10A         | 4    |               | T            | PB13A         | 4    |               | T            |
| 66         | PB8D          | 2    |               | C            | PB10B         | 4    |               | C            | PB13B         | 4    |               | C            |
| 67         | PB9A          | 2    |               | T            | PB10C         | 4    |               | T            | PB13C         | 4    |               | T            |
| 68         | PB9C          | 2    |               | T            | PB10D         | 4    |               | C            | PB13D         | 4    |               | C            |
| 69         | PB9B          | 2    |               | C            | PB10F         | 4    |               |              | PB14D         | 4    |               |              |
| 70**       | SLEEPN        | -    | SLEEPN        |              | SLEEPN        | -    | SLEEPN        |              | SLEEPN        | -    | SLEEPN        |              |
| 71         | PB9D          | 2    |               | C            | PB11C         | 4    |               | T            | PB16C         | 4    |               | T            |
| 72         | PB9F          | 2    |               |              | PB11D         | 4    |               | C            | PB16D         | 4    |               | C            |
| 73         | PR11D         | 1    |               | C            | PR16B         | 3    |               | C            | PR20B         | 3    |               | C            |
| 74         | PR11B         | 1    |               | C            | PR16A         | 3    |               | T            | PR20A         | 3    |               | T            |
| 75         | PR11C         | 1    |               | T            | PR15B         | 3    |               | C*           | PR19B         | 3    |               | C            |
| 76         | PR10D         | 1    |               | C            | PR15A         | 3    |               | T*           | PR19A         | 3    |               | T            |
| 77         | PR11A         | 1    |               | T            | PR14D         | 3    |               | C            | PR17D         | 3    |               | C            |
| 78         | PR10B         | 1    |               | C            | PR14C         | 3    |               | T            | PR17C         | 3    |               | T            |
| 79         | PR10C         | 1    |               | T            | PR14B         | 3    |               | C*           | PR17B         | 3    |               | C*           |
| 80         | PR10A         | 1    |               | T            | PR14A         | 3    |               | T*           | PR17A         | 3    |               | T*           |
| 81         | PR9D          | 1    |               |              | PR13D         | 3    |               |              | PR16D         | 3    |               |              |
| 82         | VCCIO1        | 1    |               |              | VCCIO3        | 3    |               |              | VCCIO3        | 3    |               |              |
| 83         | GNDIO1        | 1    |               |              | GNDIO3        | 3    |               |              | GNDIO3        | 3    |               |              |
| 84         | PR9A          | 1    |               |              | PR12B         | 3    |               | C*           | PR15B         | 3    |               | C*           |
| 85         | PR8C          | 1    |               |              | PR12A         | 3    |               | T*           | PR15A         | 3    |               | T*           |
| 86         | PR8A          | 1    |               |              | PR11B         | 3    |               | C*           | PR14B         | 3    |               | C*           |
| 87         | PR7D          | 1    |               |              | PR11A         | 3    |               | T*           | PR14A         | 3    |               | T*           |
| 88         | GND           | -    |               |              | GND           | -    |               |              | GND           | -    |               |              |
| 89         | PR7B          | 1    |               | C            | PR10B         | 3    |               | C*           | PR13B         | 3    |               | C*           |
| 90         | PR7A          | 1    |               | T            | PR10A         | 3    |               | T*           | PR13A         | 3    |               | T*           |
| 91         | PR6D          | 1    |               | C            | PR8B          | 2    |               | C*           | PR10B         | 2    |               | C*           |
| 92         | PR6C          | 1    |               | T            | PR8A          | 2    |               | T*           | PR10A         | 2    |               | T*           |
| 93         | VCC           | -    |               |              | VCC           | -    |               |              | VCC           | -    |               |              |
| 94         | PR5D          | 1    |               |              | PR6B          | 2    |               | C*           | PR8B          | 2    |               | C*           |
| 95         | PR5B          | 1    |               |              | PR6A          | 2    |               | T*           | PR8A          | 2    |               | T*           |
| 96         | PR4D          | 1    |               |              | PR5B          | 2    |               | C*           | PR7B          | 2    |               | C*           |
| 97         | PR4B          | 1    |               | C            | PR5A          | 2    |               | T*           | PR7A          | 2    |               | T*           |
| 98         | VCCIO1        | 1    |               |              | VCCIO2        | 2    |               |              | VCCIO2        | 2    |               |              |
| 99         | GNDIO1        | 1    |               |              | GNDIO2        | 2    |               |              | GNDIO2        | 2    |               |              |
| 100        | PR4A          | 1    |               | T            | PR4C          | 2    |               |              | PR5C          | 2    |               |              |

## 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 |
| 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            |

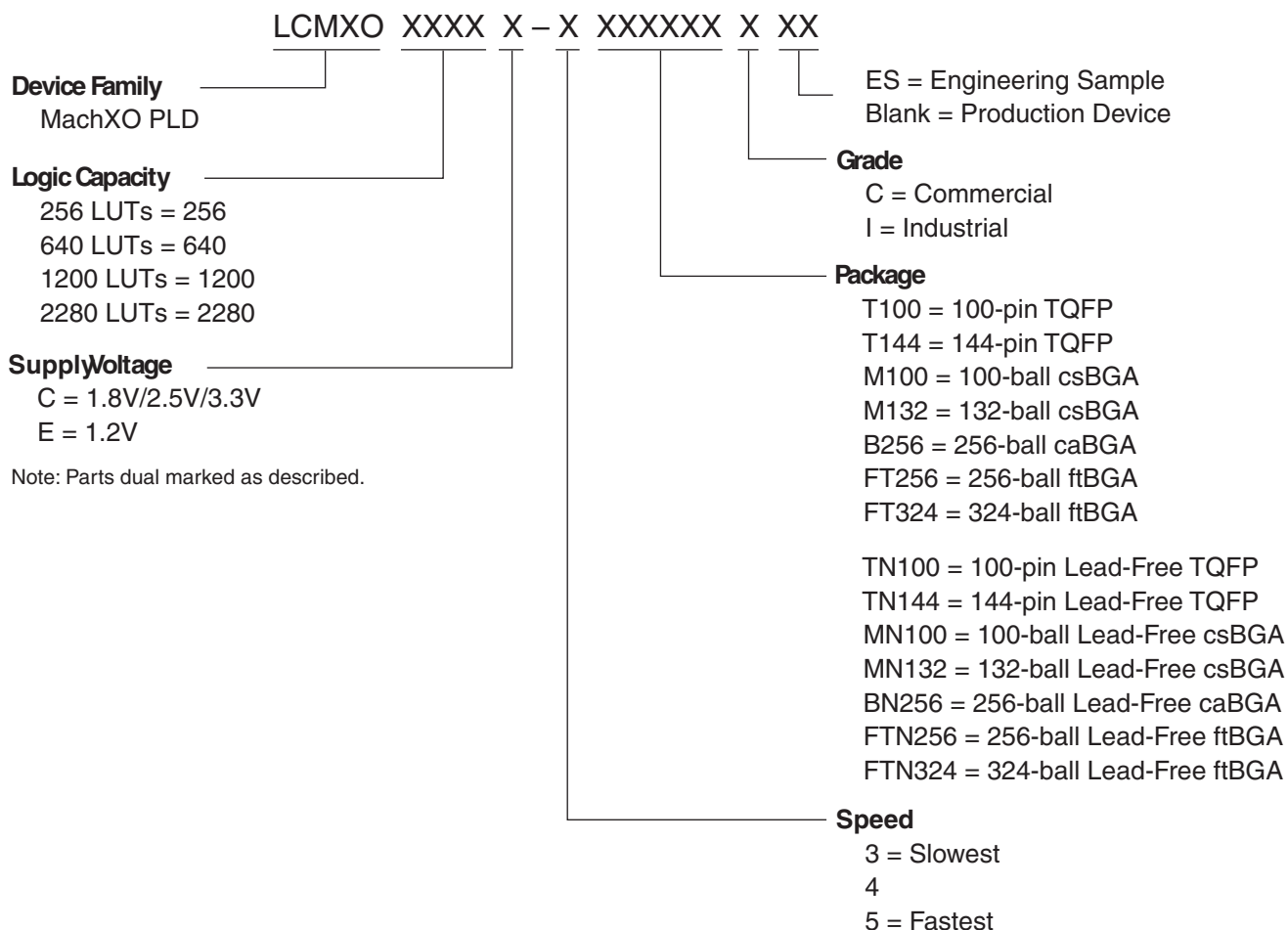
**LCMX02280 Logic Signal Connections: 324 ftBGA (Cont.)**

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

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

| LCMX02280   |               |      |               |              |
|-------------|---------------|------|---------------|--------------|
| Ball Number | Ball Function | Bank | Dual Function | Differential |
| E13         | PT16D         | 1    |               | C            |
| C15         | PT16C         | 1    |               | T            |
| F13         | PT16B         | 1    |               | C            |
| D14         | PT16A         | 1    |               | T            |
| A18         | PT15D         | 1    |               | C            |
| B17         | PT15C         | 1    |               | T            |
| A16         | PT15B         | 1    |               | C            |
| A17         | PT15A         | 1    |               | T            |
| VCC         | VCC           | -    |               |              |
| D13         | PT14D         | 1    |               | C            |
| F12         | PT14C         | 1    |               | T            |
| C14         | PT14B         | 1    |               | C            |
| E12         | PT14A         | 1    |               | T            |
| C13         | PT13D         | 1    |               | C            |
| B16         | PT13C         | 1    |               | T            |
| B15         | PT13B         | 1    |               | C            |
| A15         | PT13A         | 1    |               | T            |
| VCCIO1      | VCCIO1        | 1    |               |              |
| GND         | GNDIO1        | 1    |               |              |
| B14         | PT12F         | 1    |               | C            |
| A14         | PT12E         | 1    |               | T            |
| D12         | PT12D         | 1    |               | C            |
| F11         | PT12C         | 1    |               | T            |
| B13         | PT12B         | 1    |               | C            |
| A13         | PT12A         | 1    |               | T            |
| C12         | PT11D         | 1    |               | C            |
| GND         | GND           | -    |               |              |
| B12         | PT11C         | 1    |               | T            |
| E11         | PT11B         | 1    |               | C            |
| D11         | PT11A         | 1    |               | T            |
| C11         | PT10F         | 1    |               | C            |
| A12         | PT10E         | 1    |               | T            |
| VCCIO1      | VCCIO1        | 1    |               |              |
| GND         | GNDIO1        | 1    |               |              |
| F10         | PT10D         | 1    |               | C            |
| D10         | PT10C         | 1    |               | T            |
| B11         | PT10B         | 1    | PCLK1_1***    | C            |
| A11         | PT10A         | 1    |               | T            |
| E10         | PT9D          | 1    |               | C            |
| C10         | PT9C          | 1    |               | T            |
| D9          | PT9B          | 1    | PCLK1_0***    | C            |
| E9          | PT9A          | 1    |               | T            |
| B10         | PT8F          | 0    |               | C            |

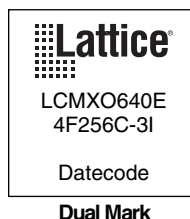
### Part Number Description



Note: Parts dual marked as described.

### Ordering Information

Note: MachXO devices are dual marked except the slowest commercial speed grade device. For example the commercial speed grade LCMXO640E-4F256C is also marked with industrial grade -3I grade. The slowest commercial speed grade does not have industrial markings. The markings appears as follows:





**Conventional Packaging**
**Commercial**

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

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

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

**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   |

| Part Number      | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO256E-3T100I | 256  | 1.2V           | 78   | -3    | TQFP    | 100  | IND   |
| LCMXO256E-4T100I | 256  | 1.2V           | 78   | -4    | TQFP    | 100  | IND   |
| LCMXO256E-3M100I | 256  | 1.2V           | 78   | -3    | csBGA   | 100  | IND   |
| LCMXO256E-4M100I | 256  | 1.2V           | 78   | -4    | csBGA   | 100  | IND   |

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|-------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO640E-3T100I  | 640  | 1.2V           | 74   | -3    | TQFP    | 100  | IND   |
| LCMXO640E-4T100I  | 640  | 1.2V           | 74   | -4    | TQFP    | 100  | IND   |
| LCMXO640E-3M100I  | 640  | 1.2V           | 74   | -3    | csBGA   | 100  | IND   |
| LCMXO640E-4M100I  | 640  | 1.2V           | 74   | -4    | csBGA   | 100  | IND   |
| LCMXO640E-3T144I  | 640  | 1.2V           | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO640E-4T144I  | 640  | 1.2V           | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO640E-3M132I  | 640  | 1.2V           | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO640E-4M132I  | 640  | 1.2V           | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO640E-3B256I  | 640  | 1.2V           | 159  | -3    | caBGA   | 256  | IND   |
| LCMXO640E-4B256I  | 640  | 1.2V           | 159  | -4    | caBGA   | 256  | IND   |
| LCMXO640E-3FT256I | 640  | 1.2V           | 159  | -3    | ftBGA   | 256  | IND   |
| LCMXO640E-4FT256I | 640  | 1.2V           | 159  | -4    | ftBGA   | 256  | IND   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|--------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO1200E-3T100I  | 1200 | 1.2V           | 73   | -3    | TQFP    | 100  | IND   |
| LCMXO1200E-4T100I  | 1200 | 1.2V           | 73   | -4    | TQFP    | 100  | IND   |
| LCMXO1200E-3T144I  | 1200 | 1.2V           | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO1200E-4T144I  | 1200 | 1.2V           | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO1200E-3M132I  | 1200 | 1.2V           | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO1200E-4M132I  | 1200 | 1.2V           | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO1200E-3B256I  | 1200 | 1.2V           | 211  | -3    | caBGA   | 256  | IND   |
| LCMXO1200E-4B256I  | 1200 | 1.2V           | 211  | -4    | caBGA   | 256  | IND   |
| LCMXO1200E-3FT256I | 1200 | 1.2V           | 211  | -3    | ftBGA   | 256  | IND   |
| LCMXO1200E-4FT256I | 1200 | 1.2V           | 211  | -4    | ftBGA   | 256  | IND   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package | Pins | Temp. |
|--------------------|------|----------------|------|-------|---------|------|-------|
| LCMXO2280E-3T100I  | 2280 | 1.2V           | 73   | -3    | TQFP    | 100  | IND   |
| LCMXO2280E-4T100I  | 2280 | 1.2V           | 73   | -4    | TQFP    | 100  | IND   |
| LCMXO2280E-3T144I  | 2280 | 1.2V           | 113  | -3    | TQFP    | 144  | IND   |
| LCMXO2280E-4T144I  | 2280 | 1.2V           | 113  | -4    | TQFP    | 144  | IND   |
| LCMXO2280E-3M132I  | 2280 | 1.2V           | 101  | -3    | csBGA   | 132  | IND   |
| LCMXO2280E-4M132I  | 2280 | 1.2V           | 101  | -4    | csBGA   | 132  | IND   |
| LCMXO2280E-3B256I  | 2280 | 1.2V           | 211  | -3    | caBGA   | 256  | IND   |
| LCMXO2280E-4B256I  | 2280 | 1.2V           | 211  | -4    | caBGA   | 256  | IND   |
| LCMXO2280E-3FT256I | 2280 | 1.2V           | 211  | -3    | ftBGA   | 256  | IND   |
| LCMXO2280E-4FT256I | 2280 | 1.2V           | 211  | -4    | ftBGA   | 256  | IND   |
| LCMXO2280E-3FT324I | 2280 | 1.2V           | 271  | -3    | ftBGA   | 324  | IND   |
| LCMXO2280E-4FT324I | 2280 | 1.2V           | 271  | -4    | ftBGA   | 324  | IND   |

| Part Number         | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|---------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO2280C-3TN100C  | 2280 | 1.8V/2.5V/3.3V | 73   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280C-4TN100C  | 2280 | 1.8V/2.5V/3.3V | 73   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280C-5TN100C  | 2280 | 1.8V/2.5V/3.3V | 73   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO2280C-3TN144C  | 2280 | 1.8V/2.5V/3.3V | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280C-4TN144C  | 2280 | 1.8V/2.5V/3.3V | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280C-5TN144C  | 2280 | 1.8V/2.5V/3.3V | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO2280C-3MN132C  | 2280 | 1.8V/2.5V/3.3V | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280C-4MN132C  | 2280 | 1.8V/2.5V/3.3V | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280C-5MN132C  | 2280 | 1.8V/2.5V/3.3V | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO2280C-3BN256C  | 2280 | 1.8V/2.5V/3.3V | 211  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280C-4BN256C  | 2280 | 1.8V/2.5V/3.3V | 211  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280C-5BN256C  | 2280 | 1.8V/2.5V/3.3V | 211  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO2280C-3FTN256C | 2280 | 1.8V/2.5V/3.3V | 211  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280C-4FTN256C | 2280 | 1.8V/2.5V/3.3V | 211  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280C-5FTN256C | 2280 | 1.8V/2.5V/3.3V | 211  | -5    | Lead-Free ftBGA | 256  | COM   |
| LCMXO2280C-3FTN324C | 2280 | 1.8V/2.5V/3.3V | 271  | -3    | Lead-Free ftBGA | 324  | COM   |
| LCMXO2280C-4FTN324C | 2280 | 1.8V/2.5V/3.3V | 271  | -4    | Lead-Free ftBGA | 324  | COM   |
| LCMXO2280C-5FTN324C | 2280 | 1.8V/2.5V/3.3V | 271  | -5    | Lead-Free ftBGA | 324  | COM   |

| Part Number       | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|-------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO256E-3TN100C | 256  | 1.2V           | 78   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256E-4TN100C | 256  | 1.2V           | 78   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256E-5TN100C | 256  | 1.2V           | 78   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO256E-3MN100C | 256  | 1.2V           | 78   | -3    | Lead-Free csBGA | 100  | COM   |
| LCMXO256E-4MN100C | 256  | 1.2V           | 78   | -4    | Lead-Free csBGA | 100  | COM   |
| LCMXO256E-5MN100C | 256  | 1.2V           | 78   | -5    | Lead-Free csBGA | 100  | COM   |

| Part Number        | LUTs | Supply Voltage | I/Os | Grade | Package         | Pins | Temp. |
|--------------------|------|----------------|------|-------|-----------------|------|-------|
| LCMXO640E-3TN100C  | 640  | 1.2V           | 74   | -3    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640E-4TN100C  | 640  | 1.2V           | 74   | -4    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640E-5TN100C  | 640  | 1.2V           | 74   | -5    | Lead-Free TQFP  | 100  | COM   |
| LCMXO640E-3MN100C  | 640  | 1.2V           | 74   | -3    | Lead-Free csBGA | 100  | COM   |
| LCMXO640E-4MN100C  | 640  | 1.2V           | 74   | -4    | Lead-Free csBGA | 100  | COM   |
| LCMXO640E-5MN100C  | 640  | 1.2V           | 74   | -5    | Lead-Free csBGA | 100  | COM   |
| LCMXO640E-3TN144C  | 640  | 1.2V           | 113  | -3    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640E-4TN144C  | 640  | 1.2V           | 113  | -4    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640E-5TN144C  | 640  | 1.2V           | 113  | -5    | Lead-Free TQFP  | 144  | COM   |
| LCMXO640E-3MN132C  | 640  | 1.2V           | 101  | -3    | Lead-Free csBGA | 132  | COM   |
| LCMXO640E-4MN132C  | 640  | 1.2V           | 101  | -4    | Lead-Free csBGA | 132  | COM   |
| LCMXO640E-5MN132C  | 640  | 1.2V           | 101  | -5    | Lead-Free csBGA | 132  | COM   |
| LCMXO640E-3BN256C  | 640  | 1.2V           | 159  | -3    | Lead-Free caBGA | 256  | COM   |
| LCMXO640E-4BN256C  | 640  | 1.2V           | 159  | -4    | Lead-Free caBGA | 256  | COM   |
| LCMXO640E-5BN256C  | 640  | 1.2V           | 159  | -5    | Lead-Free caBGA | 256  | COM   |
| LCMXO640E-3FTN256C | 640  | 1.2V           | 159  | -3    | Lead-Free ftBGA | 256  | COM   |
| LCMXO640E-4FTN256C | 640  | 1.2V           | 159  | -4    | Lead-Free ftBGA | 256  | COM   |
| LCMXO640E-5FTN256C | 640  | 1.2V           | 159  | -5    | Lead-Free ftBGA | 256  | COM   |

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

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

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

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