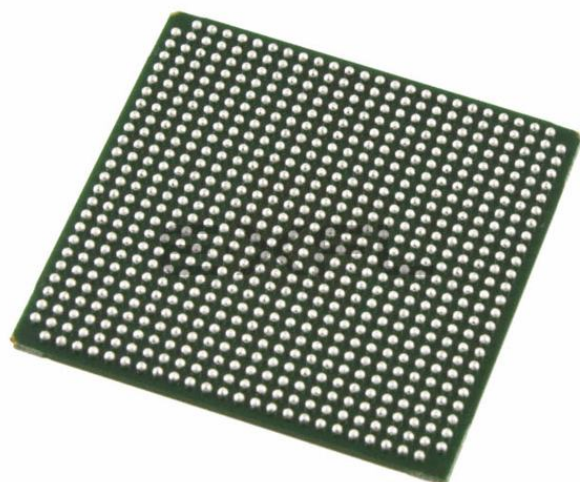




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### Understanding [Embedded - FPGAs \(Field Programmable Gate Array\)](#)

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

### Applications of Embedded - FPGAs

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

#### Details

|                                |                                                                                                                                                                     |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Status                 | Obsolete                                                                                                                                                            |
| Number of LABs/CLBs            | 4000                                                                                                                                                                |
| Number of Logic Elements/Cells | 32000                                                                                                                                                               |
| Total RAM Bits                 | 339968                                                                                                                                                              |
| Number of I/O                  | 450                                                                                                                                                                 |
| Number of Gates                | -                                                                                                                                                                   |
| Voltage - Supply               | 1.14V ~ 1.26V                                                                                                                                                       |
| Mounting Type                  | Surface Mount                                                                                                                                                       |
| Operating Temperature          | 0°C ~ 85°C (TJ)                                                                                                                                                     |
| Package / Case                 | 672-BBGA                                                                                                                                                            |
| Supplier Device Package        | 672-FPBGA (27x27)                                                                                                                                                   |
| Purchase URL                   | <a href="https://www.e-xfl.com/product-detail/lattice-semiconductor/lfe2-35e-6f672c">https://www.e-xfl.com/product-detail/lattice-semiconductor/lfe2-35e-6f672c</a> |

## sysMEM Memory

LatticeECP2/M devices contains a number of sysMEM Embedded Block RAM (EBR). The EBR consists of an 18-Kbit RAM with dedicated input and output registers.

### sysMEM Memory Block

The sysMEM block can implement single port, dual port or pseudo dual port memories. Each block can be used in a variety of depths and widths as shown in Table 2-6. FIFOs can be implemented in sysMEM EBR blocks by implementing support logic with PFUs. The EBR block facilitates parity checking by supporting an optional parity bit for each data byte. EBR blocks provide byte-enable support for configurations with 18-bit and 36-bit data widths.

**Table 2-6. sysMEM Block Configurations**

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

### 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 RAM can be created using EBR sysMEM Blocks. Typically, the Lattice design tools cascade memory transparently, based on specific design inputs.

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

In all the sysMEM RAM modes the input data and address for the ports are registered at the input of the memory array. The output data of the memory is optionally registered at the output.

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

1. Normal – Data on the output appears only during a read cycle. During a write cycle, the data (at the current address) does not appear on the output. This mode is supported for all data widths.

## LatticeECP2/M DSP Performance

Table 2-11 lists the maximum performance in millions of MAC operations per second (MMAC) for each member of the LatticeECP2/M family.

**Table 2-11. DSP Performance**

| Device   | DSP Block | DSP Performance<br>GMAC |
|----------|-----------|-------------------------|
| ECP2-6   | 3         | 3.9                     |
| ECP2-12  | 6         | 7.8                     |
| ECP2-20  | 7         | 9.1                     |
| ECP2-35  | 8         | 10.4                    |
| ECP2-50  | 18        | 23.4                    |
| ECP2-70  | 22        | 28.6                    |
| ECP2M20  | 6         | 7.8                     |
| ECP2M35  | 8         | 10.4                    |
| ECP2M50  | 22        | 28.6                    |
| ECP2M70  | 24        | 31.2                    |
| ECP2M100 | 42        | 54.6                    |

For further information about the sysDSP block, please see the list of additional technical information at the end of this data sheet.

## Programmable I/O Cells (PIC)

Each PIC contains two PIOs connected to their respective sysI/O buffers as shown in Figure 2-28. The PIO Block supplies the output data (DO) and the tri-state control signal (TO) to the sysI/O buffer and receives input from the buffer. Table 2-12 provides the PIO signal list.

**Table 2-12. PIO Signals List**

| Name                                    | Type                            | Description                                                             |
|-----------------------------------------|---------------------------------|-------------------------------------------------------------------------|
| CE0, CE1                                | Control from the core           | Clock enables for input and output block flip-flops                     |
| CLK0, CLK1                              | Control from the core           | System clocks for input and output blocks                               |
| ECLK1, ECLK2                            | Control from the core           | Fast edge clocks                                                        |
| LSR                                     | Control from the core           | Local Set/Reset                                                         |
| GSRN                                    | Control from routing            | Global Set/Reset (active low)                                           |
| INCK <sup>2</sup>                       | Input to the core               | Input to Primary Clock Network or PLL reference inputs                  |
| DQS                                     | Input to PIO                    | DQS signal from logic (routing) to PIO                                  |
| INDD                                    | Input to the core               | Unregistered data input to core                                         |
| INFF                                    | Input to the core               | Registered input on positive edge of the clock (CLK0)                   |
| IPOS0, IPOS1                            | Input to the core               | Double data rate registered inputs to the core                          |
| QPOS0 <sup>1</sup> , QPOS1 <sup>1</sup> | Input to the core               | Gearbox pipelined inputs to the core                                    |
| QNEG0 <sup>1</sup> , QNEG1 <sup>1</sup> | Input to the core               | Gearbox pipelined inputs to the core                                    |
| OPOS0, ONEG0, OPOS2, ONEG2              | Output data from the core       | Output signals from the core for SDR and DDR operation                  |
| OPOS1 ONEG1                             | Tristate control from the core  | Signals to Tristate Register block for DDR operation                    |
| DEL[3:0]                                | Control from the core           | Dynamic input delay control bits                                        |
| TD                                      | Tristate control from the core  | Tristate signal from the core used in SDR operation                     |
| DDRCLKPOL                               | Control from clock polarity bus | Controls the polarity of the clock (CLK0) that feed the DDR input block |
| DQSXFER                                 | Control from core               | Controls signal to the Output block                                     |

1. Signals available on left/right/bottom only.

2. Selected I/O.

## PIO

The PIO contains four blocks: an input register block, output register block, tristate register block and a control logic block. These blocks contain registers for operating in a variety of modes along with the necessary clock and selection logic.

### Input Register Block

The input register blocks for PIOs in left, right and bottom edges contain delay elements and registers that can be used to condition high-speed interface signals, such as DDR memory interfaces and source synchronous interfaces, before they are passed to the device core. Figure 2-29 shows the diagram of the input register block for left, right and bottom edges. The input register block for the top edge contains one memory element to register the input signal as shown in Figure 2-30. The following description applies to the input register block for PIOs in the left, right and bottom edges of the device.

Input signals are fed from the sysI/O buffer to the input register block (as signal DI). If desired, the input signal can bypass the register and delay elements and be used directly as a combinatorial signal (INDD), a clock (INCK) and, in selected blocks, the input to the DQS delay block. If an input delay is desired, designers can select either a fixed delay or a dynamic delay DEL[3:0]. The delay, if selected, reduces input register hold time requirements when using a global clock.

The input block allows three modes of operation. In the single data rate (SDR) the data is registered, by one of the registers in the single data rate sync register block, with the system clock. In DDR Mode, two registers are used to sample the data on the positive and negative edges of the DQS signal, creating two data streams, D0 and D1. These two data streams are synchronized with the system clock before entering the core. Further discussion on this topic is in the DDR Memory section of this data sheet.



# LatticeECP2/M Family Data Sheet

## DC and Switching Characteristics

September 2013

Data Sheet DS1006

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

Supply Voltage  $V_{CC}$  . . . . . -0.5 to 1.32V

Supply Voltage  $V_{CCAUX}$  . . . . . -0.5 to 3.75V

Supply Voltage  $V_{CCJ}$  . . . . . -0.5 to 3.75V

Output Supply Voltage  $V_{CCIO}$  . . . . . -0.5 to 3.75V

Input or I/O Tristate Voltage Applied<sup>4</sup> . . . . . -0.5 to 3.75V

Storage Temperature (Ambient) . . . . . -65 to 150°C

Junction Temperature ( $T_j$ ) . . . . . +125°C

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

### Recommended Operating Conditions<sup>7</sup>

| Symbol                                                             | Parameter                                       | Min.  | Max.  | Units |
|--------------------------------------------------------------------|-------------------------------------------------|-------|-------|-------|
| $V_{CC}^{1, 4, 5}$                                                 | Core Supply Voltage                             | 1.14  | 1.26  | V     |
| $V_{CCAUX}^{1, 3, 4, 5}$                                           | Auxiliary Supply Voltage                        | 3.135 | 3.465 | V     |
| $V_{CCPLL}$                                                        | PLL Supply Voltage                              | 1.14  | 1.26  | V     |
| $V_{CCIO}^{1, 2, 4}$                                               | I/O Driver Supply Voltage                       | 1.14  | 3.465 | V     |
| $V_{CCJ}^1$                                                        | Supply Voltage for IEEE 1149.1 Test Access Port | 1.14  | 3.465 | V     |
| $t_{JCOM}$                                                         | Junction Temperature, Commercial Operation      | 0     | 85    | °C    |
| $t_{JIND}$                                                         | Junction Temperature, Industrial Operation      | -40   | 100   | °C    |
| <b>SERDES External Power Supply (For LatticeECP2M Family Only)</b> |                                                 |       |       |       |
| $V_{CCIB}$                                                         | Input Buffer Power Supply (1.2V)                | 1.14  | 1.26  | V     |
|                                                                    | Input Buffer Power Supply (1.5V)                | 1.425 | 1.575 | V     |
| $V_{CCOB}$                                                         | Output Buffer Power Supply (1.2V)               | 1.14  | 1.26  | V     |
|                                                                    | Output Buffer Power Supply (1.5V)               | 1.425 | 1.575 | V     |
| $V_{CCAUX33}$                                                      | Termination Resistor Switching Power Supply     | 3.135 | 3.465 | V     |
| $V_{CCR}^6$                                                        | Receive Power Supply                            | 1.14  | 1.26  | V     |
| $V_{CCT}^6$                                                        | Transmit Power Supply                           | 1.14  | 1.26  | V     |

**LatticeECP2/M External Switching Characteristics<sup>9</sup> (Continued)**

Over Recommended Operating Conditions

| Parameter            | Description                                                    | Device   | -7   |      | -6   |      | -5   |      | Units |
|----------------------|----------------------------------------------------------------|----------|------|------|------|------|------|------|-------|
|                      |                                                                |          | Min. | Max. | Min. | Max. | Min. | Max. |       |
| t <sub>SUE</sub>     | Clock to Data Setup - PIO Input Register                       | LFE2-6   | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2-12  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2-20  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2-35  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2-50  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2-70  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2M20  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2M35  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2M50  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2M70  | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
|                      |                                                                | LFE2M100 | 0.00 | —    | 0.00 | —    | 0.00 | —    | ns    |
| t <sub>HE</sub>      | Clock to Data Hold - PIO Input Register                        | LFE2-6   | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2-12  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2-20  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2-35  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2-50  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2-70  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2M20  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2M35  | 0.90 | —    | 1.10 | —    | 1.30 | —    | ns    |
|                      |                                                                | LFE2M50  | 1.20 | —    | 1.40 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2M70  | 1.20 | —    | 1.40 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2M100 | 1.20 | —    | 1.40 | —    | 1.60 | —    | ns    |
| t <sub>SU_DELE</sub> | Clock to Data Setup - PIO Input Register with Data Input Delay | LFE2-6   | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2-12  | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2-20  | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2-35  | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2-50  | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2-70  | 1.00 | —    | 1.30 | —    | 1.60 | —    | ns    |
|                      |                                                                | LFE2M20  | 1.20 | —    | 1.60 | —    | 1.90 | —    | ns    |
|                      |                                                                | LFE2M35  | 1.20 | —    | 1.60 | —    | 1.90 | —    | ns    |
|                      |                                                                | LFE2M50  | 1.20 | —    | 1.60 | —    | 1.90 | —    | ns    |
|                      |                                                                | LFE2M70  | 1.20 | —    | 1.60 | —    | 1.90 | —    | ns    |
|                      |                                                                | LFE2M100 | 1.20 | —    | 1.60 | —    | 1.90 | —    | ns    |

## LatticeECP2 Power Supply and NC (Cont.)

| Signals          | 672 fpBGA <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 900 fpBGA <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VCC              | <b>LFE2-20:</b> R8, P18, M8, L20, L12, L13, L14, L15, M11, M12, M15, M16, N11, N16, P11, P16, R11, R12, R15, R16, T12, T13, T14, T15<br><b>LFE2-35/LFE2-50:</b> L12, L13, L14, L15, M11, M12, M15, M16, N11, N16, P11, P16, R11, R12, R15, R16, T12, T13, T14, T15<br><b>LFE2-70:</b> L12, L13, L14, L15, M11, M12, M15, M16, N11, N16, P11, P16, R11, R12, R15, R16, T12, T13, T14, T15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | AA11, AA20, K11, K21, K22, L11, L12, L13, L18, L19, L20, M11, M20, N11, N20, V11, V20, W11, W20, Y10, Y11, Y12, Y13, Y18, Y19, Y20                                                                                                                                                                                                                                                                                                                                                                                                     |
| VCCIO0           | D11, D6, G9, J12, K12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | J13, J14, K12, K13, K14, K15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| VCCIO1           | D16, D21, G18, J15, K15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | J17, J18, J20, K17, K18, K20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| VCCIO2           | F23, J20, L23, M17, M18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | L21, M21, M22, N21, N22, R21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| VCCIO3           | AA23, R17, R18, T23, V20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | U21, U22, V21, V22, W21, Y22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| VCCIO4           | AC16, AC21, U15, V15, Y18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | AA16, AA17, AA18, AA19, AB17, AB18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| VCCIO5           | AC11, AC6, U12, V12, Y9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | AA12, AA13, AA14, AB12, AB13, AB14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| VCCIO6           | AA4, R10, R9, T4, V7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | U10, U9, V10, W10, W9, Y9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| VCCIO7           | F4, J7, L4, M10, M9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | L10, L9, M10, N10, P10, R10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| VCCIO8           | AE25, V18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | AA21, Y21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| VCCJ             | AB5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AD3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| VCCAUX           | J10, J11, J16, J17, K18, L18, T18, U18, V16, V17, V10, V11, T9, U9, K9, L9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AA15, AB11, AB19, AB20, J11, J12, J19, K19, L22, M9, N9, P21, P9, T10, T21, V9, W22                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| VCCPLL           | <b>LFE2-20:</b> None<br><b>LFE2-35/LFE2-70:</b> R8, P18<br><b>LFE2-50:</b> R8, P18, M8, L20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | P22, P8, T22, Y7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| GND <sup>1</sup> | A2, A25, AA18, AA24, AA3, AA9, AD11, AD16, AD21, AD6, AE1, AE26, AF2, AF25, B1, B26, C11, C16, C21, C6, F18, F24, F3, F9, J13, J14, J21, J6, K10, K11, K13, K14, K16, K17, L10, L11, L16, L17, L24, L3, M13, M14, N10, N12, N13, N14, N15, N17, P10, P12, P13, P14, P15, P17, R13, R14, T10, T11, T16, T17, T24, T3, U10, U11, U13, U14, U16, U17, V13, V14, V21, V6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | A1, A30, AC28, AC3, AH13, AH18, AH23, AH28, AH3, AH8, AK1, AK30, C13, C18, C23, C28, C3, C8, H28, H3, L14, L15, L16, L17, M12, M13, M14, M15, M16, M17, M18, M19, N12, N13, N14, N15, N16, N17, N18, N19, N28, N3, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, U11, U12, U13, U14, U15, U16, U17, U18, U19, U20, V12, V13, V14, V15, V16, V17, V18, V19, V28, V3, W12, W13, W14, W15, W16, W17, W18, W19, Y14, Y15, Y16, Y17 |
| NC <sup>2</sup>  | <b>LFE2-20:</b> E4, E3, E2, E1, H6, H5, F2, F1, H8, J9, G4, G3, K3, K2, K1, L2, L1, M2, M1, N2, T1, T2, P8, P6, P5, P4, U1, V1, P3, R3, R4, U2, V2, W2, T6, R5, AA19, W17, Y19, Y17, AF20, AE20, AA20, W18, AD20, AE21, AF21, AF22, R22, T21, P26, P25, R24, R23, P20, R19, P21, P19, P23, P22, N22, R21, N26, N25, J26, J25, J23, K23, H26, H25, H24, H23, F22, E24, D25, C25, D24, B25, H21, G22, B24, C24, D23, C23, E19, C19, B21, B20, D19, B19, G17, E18, G19, F17, A20, A19, E17, D18, M3, N6, P24<br><b>LFE2-35:</b> K3, K2, K1, L2, L1, M2, M1, N2, M8, P3, R3, R4, U2, V2, W2, AF20, AE20, AA20, W18, AD20, AE21, AF21, AF22, P26, P25, R24, R23, P20, R19, L20, J26, J25, J23, K23, H26, H25, H24, H23, E19, C19, B21, B20, D19, B19, G17, E18, G19, F17, A20, A19, E17, D18, M3, N6, P24<br><b>LFE2-50:</b> N6, P24, M3<br><b>LFE2-70:</b> M8, L20, M3, P24, N6 | A2, A3, A4, A5, AB28, AC4, AD23, AE1, AE2, AE29, AE3, AE30, AE4, AE5, AE6, AF1, AF2, AF23, AF26, AF27, AF28, AF29, AF3, AF30, AF4, AF5, AG1, AG13, AG16, AG18, AG2, AG26, AG27, AG28, AG29, AG3, AG30, AG4, AG8, AH1, AH16, AH2, AH26, AH27, AH29, AH30, AH4, AJ1, AJ2, AJ27, AJ28, AJ29, AJ3, AJ30, AK2, AK27, AK28, AK29, AK3, B1, B2, B3, B30, B4, B5, C1, C2, C29, C30, C4, D13, D18, D23, D28, D29, D3, D30, D4, E25, E26, E27, E28, E29, E3, E30, E4, E5, E6, F25, F5, F6, G6, G7, K10, K9, N27, N4, R1, R2, V27, V4             |

1. All grounds must be electrically connected at the board level. For fpBGA 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.

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

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

## LFE2-35E/SE and LFE2-50E/SE Logic Signal Connections: 484 fpBGA (Cont.)

| LFE2-35E/SE |                   |      |                |              | LFE2-50E/SE       |      |                       |              |
|-------------|-------------------|------|----------------|--------------|-------------------|------|-----------------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function  | Differential | Ball/Pad Function | Bank | Dual Function         | Differential |
| J22         | PR29B             | 3    | RDQ31          | C (LVDS)*    | PR48B             | 3    | RDQ50                 | C (LVDS)*    |
| H22         | PR29A             | 3    | RDQ31          | T (LVDS)*    | PR48A             | 3    | RDQ50                 | T (LVDS)*    |
| VCCIO       | VCCIO3            | 3    |                |              | VCCIO             | 3    |                       |              |
| M20         | PR28B             | 3    | VREF2_3/RDQ31  | C            | PR47B             | 3    | VREF2_3/RDQ50         | C            |
| L21         | PR28A             | 3    | VREF1_3/RDQ31  | T            | PR47A             | 3    | VREF1_3/RDQ50         | T            |
| K21         | PR27B             | 3    | PCLKC3_0/RDQ31 | C (LVDS)*    | PR46B             | 3    | PCLKC3_0/RDQ50        | C (LVDS)*    |
| J21         | PR27A             | 3    | PCLKT3_0/RDQ31 | T (LVDS)*    | PR46A             | 3    | PCLKT3_0/RDQ50        | T (LVDS)*    |
| M18         | PR25B             | 2    | PCLKC2_0/RDQ22 | C            | PR44B             | 2    | PCLKC2_0/RDQ41        | C            |
| L17         | PR25A             | 2    | PCLKT2_0/RDQ22 | T            | PR44A             | 2    | PCLKT2_0/RDQ41        | T            |
| GNDIO       | GNDIO2            | -    |                |              | GNDIO2            | -    |                       |              |
| L19         | PR24B             | 2    | RDQ22          | C (LVDS)*    | PR43B             | 2    | RDQ41                 | C (LVDS)*    |
| L20         | PR24A             | 2    | RDQ22          | T (LVDS)*    | PR43A             | 2    | RDQ41                 | T (LVDS)*    |
| L18         | PR23B             | 2    | RDQ22          | C            | PR42B             | 2    | RDQ41                 | C            |
| K17         | PR23A             | 2    | RDQ22          | T            | PR42A             | 2    | RDQ41                 | T            |
| VCCIO       | VCCIO2            | 2    |                |              | VCCIO             | 2    |                       |              |
| K18         | PR22B             | 2    | RDQ22          | C (LVDS)*    | PR41B             | 2    | RDQ41                 | C (LVDS)*    |
| K19         | PR22A             | 2    | RDQS22         | T (LVDS)*    | PR41A             | 2    | RDQS41                | T (LVDS)*    |
| G22         | PR21B             | 2    | RDQ22          | C            | PR40B             | 2    | RDQ41                 | C            |
| GNDIO       | GNDIO2            | -    |                |              | GNDIO2            | -    |                       |              |
| F22         | PR21A             | 2    | RDQ22          | T            | PR40A             | 2    | RDQ41                 | T            |
| J17         | PR20B             | 2    | RDQ22          | C (LVDS)*    | PR39B             | 2    | RDQ41                 | C (LVDS)*    |
| J18         | PR20A             | 2    | RDQ22          | T (LVDS)*    | PR39A             | 2    | RDQ41                 | T (LVDS)*    |
| K20         | PR19B             | 2    | RDQ22          | C            | PR38B             | 2    | RDQ41                 | C            |
| VCCIO       | VCCIO2            | 2    |                |              | VCCIO             | 2    |                       |              |
| J19         | PR19A             | 2    | RDQ22          | T            | PR38A             | 2    | RDQ41                 | T            |
| H21         | PR18B             | 2    | RDQ22          | C (LVDS)*    | PR37B             | 2    | RDQ41                 | C (LVDS)*    |
| G21         | PR18A             | 2    | RDQ22          | T (LVDS)*    | PR37A             | 2    | RDQ41                 | T (LVDS)*    |
| -           | -                 | -    |                |              | GNDIO2            | -    |                       |              |
| -           | -                 | -    |                |              | VCCIO             | 2    |                       |              |
| H17         | NC                | -    |                |              | PR26B             | 2    | RUM0_SPLLC_FB_A/RDQ24 | C            |
| H16         | NC                | -    |                |              | PR26A             | 2    | RUM0_SPLLT_FB_A/RDQ24 | T            |
| H20         | NC                | -    |                |              | PR25B             | 2    | RUM0_SPLLC_IN_A/RDQ24 | C            |
| H18         | NC                | -    |                |              | PR25A             | 2    | RUM0_SPLLT_IN_A/RDQ24 | T            |
| -           | -                 | -    |                |              | GNDIO2            | -    |                       |              |
| -           | -                 | -    |                |              | VCCIO             | 2    |                       |              |
| F21         | PR17B             | 2    | RDQ14          | C            | PR19B             | 2    | RDQ16                 | C            |
| GNDIO       | GNDIO2            | -    |                |              | GNDIO2            | -    |                       |              |
| E22         | PR17A             | 2    | RDQ14          | T            | PR19A             | 2    | RDQ16                 | T            |
| D22         | PR16B             | 2    | RDQ14          | C (LVDS)*    | PR18B             | 2    | RDQ16                 | C (LVDS)*    |
| E21         | PR16A             | 2    | RDQ14          | T (LVDS)*    | PR18A             | 2    | RDQ16                 | T (LVDS)*    |
| G20         | PR15B             | 2    | RDQ14          | C            | PR17B             | 2    | RDQ16                 | C            |
| VCCIO       | VCCIO2            | 2    |                |              | VCCIO             | 2    |                       |              |
| F20         | PR15A             | 2    | RDQ14          | T            | PR17A             | 2    | RDQ16                 | T            |
| H19         | PR14B             | 2    | RDQ14          | C (LVDS)*    | PR16B             | 2    | RDQ16                 | C (LVDS)*    |
| G19         | PR14A             | 2    | RDQS14         | T (LVDS)*    | PR16A             | 2    | RDQS16                | T (LVDS)*    |
| GNDIO       | GNDIO2            | -    |                |              | GNDIO2            | -    |                       |              |

## LFE2-35E/SE and LFE2-50E/SE Logic Signal Connections: 484 fpBGA (Cont.)

| LFE2-35E/SE |                   |      |               |              | LFE2-50E/SE       |      |               |              |
|-------------|-------------------|------|---------------|--------------|-------------------|------|---------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function | Differential | Ball/Pad Function | Bank | Dual Function | Differential |
| K8          | GND               | -    |               |              | GND               | -    |               |              |
| L10         | GND               | -    |               |              | GND               | -    |               |              |
| L11         | GND               | -    |               |              | GND               | -    |               |              |
| L12         | GND               | -    |               |              | GND               | -    |               |              |
| L13         | GND               | -    |               |              | GND               | -    |               |              |
| L15         | GND               | -    |               |              | GND               | -    |               |              |
| L8          | GND               | -    |               |              | GND               | -    |               |              |
| M10         | GND               | -    |               |              | GND               | -    |               |              |
| M11         | GND               | -    |               |              | GND               | -    |               |              |
| M12         | GND               | -    |               |              | GND               | -    |               |              |
| M13         | GND               | -    |               |              | GND               | -    |               |              |
| M15         | GND               | -    |               |              | GND               | -    |               |              |
| M8          | GND               | -    |               |              | GND               | -    |               |              |
| N10         | GND               | -    |               |              | GND               | -    |               |              |
| N11         | GND               | -    |               |              | GND               | -    |               |              |
| N12         | GND               | -    |               |              | GND               | -    |               |              |
| N13         | GND               | -    |               |              | GND               | -    |               |              |
| N15         | GND               | -    |               |              | GND               | -    |               |              |
| N8          | GND               | -    |               |              | GND               | -    |               |              |
| P14         | GND               | -    |               |              | GND               | -    |               |              |
| P20         | GND               | -    |               |              | GND               | -    |               |              |
| P3          | GND               | -    |               |              | GND               | -    |               |              |
| P9          | GND               | -    |               |              | GND               | -    |               |              |
| R10         | GND               | -    |               |              | GND               | -    |               |              |
| R11         | GND               | -    |               |              | GND               | -    |               |              |
| R12         | GND               | -    |               |              | GND               | -    |               |              |
| R13         | GND               | -    |               |              | GND               | -    |               |              |
| U17         | GND               | -    |               |              | GND               | -    |               |              |
| U6          | GND               | -    |               |              | GND               | -    |               |              |
| W2          | GND               | -    |               |              | GND               | -    |               |              |
| W21         | GND               | -    |               |              | GND               | -    |               |              |
| Y14         | GND               | -    |               |              | GND               | -    |               |              |
| Y9          | GND               | -    |               |              | GND               | -    |               |              |
| A1          | GND               | -    |               |              | GND               | -    |               |              |
| N18         | VCCPLL            | -    |               |              | VCCPLL            | -    |               |              |
| K6          | NC                | -    |               |              | VCCPLL            | -    |               |              |
| N6          | VCCPLL            | -    |               |              | VCCPLL            | -    |               |              |
| J16         | NC                | -    |               |              | VCCPLL            | -    |               |              |

\* Supports true LVDS. Other differential signals must be emulated with external resistors.

\*\* These dedicated input pins can be used for GPLLs or GDLLs within the respective quadrant.

\*\*\*Due to packaging bond out option, this DQS does not have all the necessary DQ pins bonded out for a full 8-bit data width.

Note: VCCIO and GND pads are used to determine the average DC current drawn by I/Os between GND/VCCIO connections, or between the last GND/VCCIO in an I/O bank and the end of an I/O bank. The substrate pads listed in the Pin Table do not necessarily have a one to one connection with a package ball or pin.

## LFE2-20E/SE and LFE2-35E/SE Logic Signal Connections: 672 fpBGA (Cont.)

| LFE2-20E/20SE |                   |      |               |              | LFE2-35E/35SE     |      |               |              |  |
|---------------|-------------------|------|---------------|--------------|-------------------|------|---------------|--------------|--|
| Ball Number   | Ball/Pad Function | Bank | Dual Function | Differential | Ball/Pad Function | Bank | Dual Function | Differential |  |
| AE17          | PB51B             | 4    | BDQ51         | C            | PB51B             | 4    | BDQ51         | C            |  |
| AB19          | PB52A             | 4    | BDQ51         | T            | PB52A             | 4    | BDQ51         | T            |  |
| AE19          | PB52B             | 4    | BDQ51         | C            | PB52B             | 4    | BDQ51         | C            |  |
| AF17          | PB53A             | 4    | BDQ51         | T            | PB53A             | 4    | BDQ51         | T            |  |
| AE18          | PB53B             | 4    | BDQ51         | C            | PB53B             | 4    | BDQ51         | C            |  |
| VCCIO         | VCCIO4            | 4    |               |              | VCCIO4            | 4    |               |              |  |
| W16           | PB54A             | 4    | BDQ51         | T            | PB54A             | 4    | BDQ51         | T            |  |
| AA17          | PB54B             | 4    | BDQ51         | C            | PB54B             | 4    | BDQ51         | C            |  |
| AF18          | PB55A             | 4    | BDQ51         | T            | PB55A             | 4    | BDQ51         | T            |  |
| AF19          | PB55B             | 4    | BDQ51         | C            | PB55B             | 4    | BDQ51         | C            |  |
| GND           | GNDIO4            | -    |               |              | GNDIO4            | -    |               |              |  |
| AA19          | NC                | -    |               |              | PB56A             | 4    | BDQ60         | T            |  |
| W17           | NC                | -    |               |              | PB56B             | 4    | BDQ60         | C            |  |
| Y19           | NC                | -    |               |              | PB57A             | 4    | BDQ60         | T            |  |
| Y17           | NC                | -    |               |              | PB57B             | 4    | BDQ60         | C            |  |
| AF20          | NC                | -    |               |              | NC                | -    |               |              |  |
| VCCIO         | VCCIO4            | 4    |               |              | VCCIO4            | 4    |               |              |  |
| AE20          | NC                | -    |               |              | NC                | -    |               |              |  |
| AA20          | NC                | -    |               |              | NC                | -    |               |              |  |
| W18           | NC                | -    |               |              | NC                | -    |               |              |  |
| AD20          | NC                | -    |               |              | NC                | -    |               |              |  |
| GND           | GNDIO4            | -    |               |              | GNDIO4            | -    |               |              |  |
| AE21          | NC                | -    |               |              | NC                | -    |               |              |  |
| AF21          | NC                | -    |               |              | NC                | -    |               |              |  |
| AF22          | NC                | -    |               |              | NC                | -    |               |              |  |
| VCCIO         | VCCIO4            | 4    |               |              | VCCIO4            | 4    |               |              |  |
| GND           | GNDIO4            | -    |               |              | GNDIO4            | -    |               |              |  |
| AE22          | PB56A             | 4    | BDQ60         | T            | PB65A             | 4    | BDQ69         | T            |  |
| AD22          | PB56B             | 4    | BDQ60         | C            | PB65B             | 4    | BDQ69         | C            |  |
| AF23          | PB57A             | 4    | BDQ60         | T            | PB66A             | 4    | BDQ69         | T            |  |
| AE23          | PB57B             | 4    | BDQ60         | C            | PB66B             | 4    | BDQ69         | C            |  |
| AD23          | PB58A             | 4    | BDQ60         | T            | PB67A             | 4    | BDQ69         | T            |  |
| AC23          | PB58B             | 4    | BDQ60         | C            | PB67B             | 4    | BDQ69         | C            |  |
| VCCIO         | VCCIO4            | 4    |               |              | VCCIO4            | 4    |               |              |  |
| AB20          | PB59A             | 4    | BDQ60         | T            | PB68A             | 4    | BDQ69         | T            |  |
| AC20          | PB59B             | 4    | BDQ60         | C            | PB68B             | 4    | BDQ69         | C            |  |
| GND           | GNDIO4            | -    |               |              | GNDIO4            | -    |               |              |  |
| AB21          | PB60A             | 4    | BDQS60        | T            | PB69A             | 4    | BDQS69        | T            |  |
| AC22          | PB60B             | 4    | BDQ60         | C            | PB69B             | 4    | BDQ69         | C            |  |
| W19           | PB61A             | 4    | BDQ60         | T            | PB70A             | 4    | BDQ69         | T            |  |
| AA21          | PB61B             | 4    | BDQ60         | C            | PB70B             | 4    | BDQ69         | C            |  |
| AF24          | PB62A             | 4    | BDQ60         | T            | PB71A             | 4    | BDQ69         | T            |  |
| AE24          | PB62B             | 4    | BDQ60         | C            | PB71B             | 4    | BDQ69         | C            |  |
| VCCIO         | VCCIO4            | 4    |               |              | VCCIO4            | 4    |               |              |  |
| Y20           | PB63A             | 4    | BDQ60         | T            | PB72A             | 4    | BDQ69         | T            |  |
| AB22          | PB63B             | 4    | BDQ60         | C            | PB72B             | 4    | BDQ69         | C            |  |

## LFE2-50E/SE and LFE2-70E/SE Logic Signal Connections: 672 fpBGA (Cont.)

| LFE2-50E/SE |                   |      |                       |              | LFE2-70E/SE       |      |                       |              |  |
|-------------|-------------------|------|-----------------------|--------------|-------------------|------|-----------------------|--------------|--|
| Ball Number | Ball/Pad Function | Bank | Dual Function         | Differential | Ball/Pad Function | Bank | Dual Function         | Differential |  |
| L2          | PL24B             | 7    | LDQ24                 | C (LVDS)*    | PL37B             | 7    | LDQ37                 | C (LVDS)*    |  |
| L1          | PL25A             | 7    | LUM0_SPLLT_IN_A/LDQ24 | T            | PL38A             | 7    | LUM0_SPLLT_IN_A/LDQ37 | T            |  |
| VCCIO       | VCCIO7            | 7    |                       |              | VCCIO7            | 7    |                       |              |  |
| M2          | PL25B             | 7    | LUM0_SPLLC_IN_A/LDQ24 | C            | PL38B             | 7    | LUM0_SPLLC_IN_A/LDQ37 | C            |  |
| M1          | PL26A             | 7    | LUM0_SPLLT_FB_A/LDQ24 | T            | PL39A             | 7    | LUM0_SPLLT_FB_A/LDQ37 | T            |  |
| N2          | PL26B             | 7    | LUM0_SPLLC_FB_A/LDQ24 | C            | PL39B             | 7    | LUM0_SPLLC_FB_A/LDQ37 | C            |  |
| GND         | GNDIO7            | -    |                       |              | GNDIO7            | -    |                       |              |  |
| M8          | VCCPLL            | 7    |                       |              | NC                | -    |                       |              |  |
| VCCIO       | VCCIO7            | 7    |                       |              | VCCIO7            | 7    |                       |              |  |
| GND         | GNDIO7            | -    |                       |              | GNDIO7            | -    |                       |              |  |
| N1          | PL37A             | 7    | LDQ41                 |              | PL50A             | 7    | LDQ54                 |              |  |
| L8          | PL38A             | 7    | LDQ41                 | T            | PL51A             | 7    | LDQ54                 | T            |  |
| K8          | PL38B             | 7    | LDQ41                 | C            | PL51B             | 7    | LDQ54                 | C            |  |
| VCCIO       | VCCIO7            | 7    |                       |              | VCCIO7            | 7    |                       |              |  |
| L6          | PL39A             | 7    | LDQ41                 | T (LVDS)*    | PL52A             | 7    | LDQ54                 | T (LVDS)*    |  |
| K5          | PL39B             | 7    | LDQ41                 | C (LVDS)*    | PL52B             | 7    | LDQ54                 | C (LVDS)*    |  |
| L7          | PL40A             | 7    | LDQ41                 | T            | PL53A             | 7    | LDQ54                 | T            |  |
| L5          | PL40B             | 7    | LDQ41                 | C            | PL53B             | 7    | LDQ54                 | C            |  |
| GND         | GNDIO7            | -    |                       |              | GNDIO7            | -    |                       |              |  |
| P1          | PL41A             | 7    | LDQS41                | T (LVDS)*    | PL54A             | 7    | LDQS54                | T (LVDS)*    |  |
| P2          | PL41B             | 7    | LDQ41                 | C (LVDS)*    | PL54B             | 7    | LDQ54                 | C (LVDS)*    |  |
| M6          | PL42A             | 7    | LDQ41                 | T            | PL55A             | 7    | LDQ54                 | T            |  |
| VCCIO       | VCCIO7            | 7    |                       |              | VCCIO7            | 7    |                       |              |  |
| N8          | PL42B             | 7    | LDQ41                 | C            | PL55B             | 7    | LDQ54                 | C            |  |
| R1          | PL43A             | 7    | LDQ41                 | T (LVDS)*    | PL56A             | 7    | LDQ54                 | T (LVDS)*    |  |
| R2          | PL43B             | 7    | LDQ41                 | C (LVDS)*    | PL56B             | 7    | LDQ54                 | C (LVDS)*    |  |
| M7          | PL44A             | 7    | PCLKT7_0/LDQ41        | T            | PL57A             | 7    | PCLKT7_0/LDQ54        | T            |  |
| GND         | GNDIO7            | -    |                       |              | GNDIO7            | -    |                       |              |  |
| N9          | PL44B             | 7    | PCLKC7_0/LDQ41        | C            | PL57B             | 7    | PCLKC7_0/LDQ54        | C            |  |
| M4          | PL46A             | 6    | PCLKT6_0/LDQ50        | T (LVDS)*    | PL59A             | 6    | PCLKT6_0/LDQ63        | T (LVDS)*    |  |
| M5          | PL46B             | 6    | PCLKC6_0/LDQ50        | C (LVDS)*    | PL59B             | 6    | PCLKC6_0/LDQ63        | C (LVDS)*    |  |
| N7          | PL47A             | 6    | VREF2_6/LDQ50         | T            | PL60A             | 6    | VREF2_6/LDQ63         | T            |  |
| P9          | PL47B             | 6    | VREF1_6/LDQ50         | C            | PL60B             | 6    | VREF1_6/LDQ63         | C            |  |
| N3          | PL48A             | 6    | LDQ50                 | T (LVDS)*    | PL61A             | 6    | LDQ63                 | T (LVDS)*    |  |
| VCCIO       | VCCIO6            | 6    |                       |              | VCCIO6            | 6    |                       |              |  |
| N4          | PL48B             | 6    | LDQ50                 | C (LVDS)*    | PL61B             | 6    | LDQ63                 | C (LVDS)*    |  |
| N5          | PL49A             | 6    | LDQ50                 | T            | PL62A             | 6    | LDQ63                 | T            |  |
| P7          | PL49B             | 6    | LDQ50                 | C            | PL62B             | 6    | LDQ63                 | C            |  |
| T1          | PL50A             | 6    | LDQS50                | T (LVDS)*    | PL63A             | 6    | LDQS63                | T (LVDS)*    |  |
| GND         | GNDIO6            | -    |                       |              | GNDIO6            | -    |                       |              |  |
| T2          | PL50B             | 6    | LDQ50                 | C (LVDS)*    | PL63B             | 6    | LDQ63                 | C (LVDS)*    |  |
| P8          | PL51A             | 6    | LDQ50                 | T            | PL64A             | 6    | LDQ63                 | T            |  |
| P6          | PL51B             | 6    | LDQ50                 | C            | PL64B             | 6    | LDQ63                 | C            |  |
| VCCIO       | VCCIO6            | 6    |                       |              | VCCIO6            | 6    |                       |              |  |
| P5          | PL52A             | 6    | LDQ50                 | T (LVDS)*    | PL65A             | 6    | LDQ63                 | T (LVDS)*    |  |
| P4          | PL52B             | 6    | LDQ50                 | C (LVDS)*    | PL65B             | 6    | LDQ63                 | C (LVDS)*    |  |

## LFE2-50E/SE and LFE2-70E/SE Logic Signal Connections: 672 fpBGA (Cont.)

| LFE2-50E/SE |                   |      |               |              | LFE2-70E/SE       |      |               |              |
|-------------|-------------------|------|---------------|--------------|-------------------|------|---------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function | Differential | Ball/Pad Function | Bank | Dual Function | Differential |
| GND         | GNDIO5            | -    |               |              | GNDIO5            | -    |               |              |
| W10         | PB20A             | 5    | BDQ24         | T            | PB29A             | 5    | BDQ33         | T            |
| Y10         | PB20B             | 5    | BDQ24         | C            | PB29B             | 5    | BDQ33         | C            |
| W11         | PB21A             | 5    | BDQ24         | T            | PB30A             | 5    | BDQ33         | T            |
| AA10        | PB21B             | 5    | BDQ24         | C            | PB30B             | 5    | BDQ33         | C            |
| AC8         | PB22A             | 5    | BDQ24         | T            | PB31A             | 5    | BDQ33         | T            |
| AD8         | PB22B             | 5    | BDQ24         | C            | PB31B             | 5    | BDQ33         | C            |
| VCCIO       | VCCIO5            | 5    |               |              | VCCIO5            | 5    |               |              |
| AB8         | PB23A             | 5    | BDQ24         | T            | PB32A             | 5    | BDQ33         | T            |
| AB10        | PB23B             | 5    | BDQ24         | C            | PB32B             | 5    | BDQ33         | C            |
| GND         | GNDIO5            | -    |               |              | GNDIO5            | -    |               |              |
| AE6         | PB24A             | 5    | BDQS24        | T            | PB33A             | 5    | BDQS33        | T            |
| AF6         | PB24B             | 5    | BDQ24         | C            | PB33B             | 5    | BDQ33         | C            |
| AA11        | PB25A             | 5    | BDQ24         | T            | PB34A             | 5    | BDQ33         | T            |
| AC9         | PB25B             | 5    | BDQ24         | C            | PB34B             | 5    | BDQ33         | C            |
| AB9         | PB26A             | 5    | BDQ24         | T            | PB35A             | 5    | BDQ33         | T            |
| AD9         | PB26B             | 5    | BDQ24         | C            | PB35B             | 5    | BDQ33         | C            |
| VCCIO       | VCCIO5            | 5    |               |              | VCCIO5            | 5    |               |              |
| Y11         | PB27A             | 5    | BDQ24         | T            | PB36A             | 5    | BDQ33         | T            |
| AB11        | PB27B             | 5    | BDQ24         | C            | PB36B             | 5    | BDQ33         | C            |
| AE7         | PB28A             | 5    | BDQ24         | T            | PB37A             | 5    | BDQ33         | T            |
| AF7         | PB28B             | 5    | BDQ24         | C            | PB37B             | 5    | BDQ33         | C            |
| GND         | GNDIO5            | -    |               |              | GNDIO5            | -    |               |              |
| AC10        | PB29A             | 5    | BDQ33         | T            | PB38A             | 5    | BDQ42         | T            |
| AD10        | PB29B             | 5    | BDQ33         | C            | PB38B             | 5    | BDQ42         | C            |
| AA12        | PB30A             | 5    | BDQ33         | T            | PB39A             | 5    | BDQ42         | T            |
| W12         | PB30B             | 5    | BDQ33         | C            | PB39B             | 5    | BDQ42         | C            |
| AB12        | PB31A             | 5    | BDQ33         | T            | PB40A             | 5    | BDQ42         | T            |
| VCCIO       | VCCIO5            | 5    |               |              | VCCIO5            | 5    |               |              |
| Y12         | PB31B             | 5    | BDQ33         | C            | PB40B             | 5    | BDQ42         | C            |
| AD12        | PB32A             | 5    | BDQ33         | T            | PB41A             | 5    | BDQ42         | T            |
| AC12        | PB32B             | 5    | BDQ33         | C            | PB41B             | 5    | BDQ42         | C            |
| AC13        | PB33A             | 5    | BDQS33        | T            | PB42A             | 5    | BDQS42        | T            |
| GND         | GNDIO5            | -    |               |              | GNDIO5            | -    |               |              |
| AA13        | PB33B             | 5    | BDQ33         | C            | PB42B             | 5    | BDQ42         | C            |
| AD13        | PB34A             | 5    | BDQ33         | T            | PB43A             | 5    | BDQ42         | T            |
| AC14        | PB34B             | 5    | BDQ33         | C            | PB43B             | 5    | BDQ42         | C            |
| AE8         | PB35A             | 5    | BDQ33         | T            | PB44A             | 5    | BDQ42         | T            |
| VCCIO       | VCCIO5            | 5    |               |              | VCCIO5            | 5    |               |              |
| AF8         | PB35B             | 5    | BDQ33         | C            | PB44B             | 5    | BDQ42         | C            |
| AB15        | PB36A             | 5    | BDQ33         | T            | PB45A             | 5    | BDQ42         | T            |
| Y13         | PB36B             | 5    | BDQ33         | C            | PB45B             | 5    | BDQ42         | C            |
| AE9         | PB37A             | 5    | BDQ33         | T            | PB46A             | 5    | BDQ42         | T            |
| GND         | GNDIO5            | -    |               |              | GNDIO5            | -    |               |              |
| AF9         | PB37B             | 5    | BDQ33         | C            | PB46B             | 5    | BDQ42         | C            |
| W13         | PB38A             | 5    | BDQ42         | T            | PB47A             | 5    | BDQ51         | T            |

**LFE2-70E/SE Logic Signal Connections: 900 fpBGA (Cont.)**

| LFE2-70E/SE |                   |      |                |              |
|-------------|-------------------|------|----------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function  | Differential |
| AH12        | PB45A             | 5    | BDQ42          | T            |
| AF14        | PB45B             | 5    | BDQ42          | C            |
| AJ13        | PB46A             | 5    | BDQ42          | T            |
| GND         | GNDIO5            | -    |                |              |
| AK13        | PB46B             | 5    | BDQ42          | C            |
| AB15        | PB47A             | 5    | BDQ51          | T            |
| AD15        | PB47B             | 5    | BDQ51          | C            |
| AE15        | PB48A             | 5    | BDQ51          | T            |
| AF15        | PB48B             | 5    | BDQ51          | C            |
| AG15        | PB49A             | 5    | BDQ51          | T            |
| AG14        | PB49B             | 5    | BDQ51          | C            |
| VCCIO       | VCCIO5            | 5    |                |              |
| AH15        | PB50A             | 5    | BDQ51          | T            |
| AH14        | PB50B             | 5    | BDQ51          | C            |
| GND         | GNDIO5            | -    |                |              |
| AJ14        | PB51A             | 5    | BDQS51         | T            |
| AK14        | PB51B             | 5    | BDQ51          | C            |
| AD16        | PB52A             | 5    | BDQ51          | T            |
| AF16        | PB52B             | 5    | BDQ51          | C            |
| AJ15        | PB53A             | 5    | PCLKT5_0/BDQ51 | T            |
| AK15        | PB53B             | 5    | PCLKC5_0/BDQ51 | C            |
| VCCIO       | VCCIO5            | 5    |                |              |
| GND         | GNDIO5            | -    |                |              |
| AE16        | PB58A             | 4    | PCLKT4_0/BDQ60 | T            |
| VCCIO       | VCCIO4            | 4    |                |              |
| AC15        | PB58B             | 4    | PCLKC4_0/BDQ60 | C            |
| AJ16        | PB59A             | 4    | BDQ60          | T            |
| AK16        | PB59B             | 4    | BDQ60          | C            |
| AC16        | PB60A             | 4    | BDQS60         | T            |
| GND         | GNDIO4            | -    |                |              |
| AB16        | PB60B             | 4    | BDQ60          | C            |
| AH17        | PB61A             | 4    | BDQ60          | T            |
| AG17        | PB61B             | 4    | BDQ60          | C            |
| AF17        | PB62A             | 4    | BDQ60          | T            |
| VCCIO       | VCCIO4            | 4    |                |              |
| AD17        | PB62B             | 4    | BDQ60          | C            |
| AE17        | PB63A             | 4    | BDQ60          | T            |
| AC17        | PB63B             | 4    | BDQ60          | C            |
| AJ17        | PB64A             | 4    | BDQ60          | T            |
| GND         | GNDIO4            | -    |                |              |
| AK17        | PB64B             | 4    | BDQ60          | C            |
| AK18        | PB65A             | 4    | BDQ69          | T            |
| AJ18        | PB65B             | 4    | BDQ69          | C            |

**LFE2-70E/SE Logic Signal Connections: 900 fpBGA (Cont.)**

| LFE2-70E/SE |                   |      |                       |              |
|-------------|-------------------|------|-----------------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function         | Differential |
| P25         | PR51B             | 2    | RDQ54                 | C            |
| VCCIO       | VCCIO2            | 2    |                       |              |
| P23         | PR51A             | 2    | RDQ54                 | T            |
| P27         | PR50B             | 2    | RDQ54                 | C (LVDS)*    |
| P28         | PR50A             | 2    | RDQ54                 | T (LVDS)*    |
| GND         | GNDIO2            | -    |                       |              |
| VCCIO       | VCCIO2            | 2    |                       |              |
| N24         | PR39B             | 2    | RUM0_SPLLC_FB_A/RDQ37 | C            |
| N26         | PR39A             | 2    | RUM0_SPLLT_FB_A/RDQ37 | T            |
| N23         | PR38B             | 2    | RUM0_SPLLC_IN_A/RDQ37 | C            |
| N25         | PR38A             | 2    | RUM0_SPLLT_IN_A/RDQ37 | T            |
| VCCIO       | VCCIO2            | 2    |                       |              |
| P29         | PR37B             | 2    | RDQ37                 | C (LVDS)*    |
| P30         | PR37A             | 2    | RDQS37                | T (LVDS)*    |
| M26         | PR36B             | 2    | RDQ37                 | C            |
| GND         | GNDIO2            | -    |                       |              |
| M24         | PR36A             | 2    | RDQ37                 | T            |
| N29         | PR35B             | 2    | RDQ37                 | C (LVDS)*    |
| N30         | PR35A             | 2    | RDQ37                 | T (LVDS)*    |
| M25         | PR34B             | 2    | RDQ37                 | C            |
| VCCIO       | VCCIO2            | 2    |                       |              |
| M23         | PR34A             | 2    | RDQ37                 | T            |
| M27         | PR33B             | 2    | RDQ37                 | C (LVDS)*    |
| M28         | PR33A             | 2    | RDQ37                 | T (LVDS)*    |
| L26         | PR32B             | 2    | RDQ29                 | C            |
| GND         | GNDIO2            | -    |                       |              |
| L24         | PR32A             | 2    | RDQ29                 | T            |
| M29         | PR31B             | 2    | RDQ29                 | C (LVDS)*    |
| M30         | PR31A             | 2    | RDQ29                 | T (LVDS)*    |
| L25         | PR30B             | 2    | RDQ29                 | C            |
| VCCIO       | VCCIO2            | 2    |                       |              |
| L23         | PR30A             | 2    | RDQ29                 | T            |
| L27         | PR29B             | 2    | RDQ29                 | C (LVDS)*    |
| L28         | PR29A             | 2    | RDQS29                | T (LVDS)*    |
| GND         | GNDIO2            | -    |                       |              |
| K24         | PR28B             | 2    | RDQ29                 | C            |
| K26         | PR28A             | 2    | RDQ29                 | T            |
| L29         | PR27B             | 2    | RDQ29                 | C (LVDS)*    |
| L30         | PR27A             | 2    | RDQ29                 | T (LVDS)*    |
| VCCIO       | VCCIO2            | 2    |                       |              |
| K23         | PR26B             | 2    | RDQ29                 | C            |
| K25         | PR26A             | 2    | RDQ29                 | T            |
| K27         | PR25B             | 2    | RDQ29                 | C (LVDS)*    |

**LFE2-70E/SE Logic Signal Connections: 900 fpBGA (Cont.)**

| LFE2-70E/SE |                   |      |               |              |
|-------------|-------------------|------|---------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function | Differential |
| AG4         | NC                | -    |               |              |
| AG8         | NC                | -    |               |              |
| AH1         | NC                | -    |               |              |
| AH16        | NC                | -    |               |              |
| AH2         | NC                | -    |               |              |
| AH26        | NC                | -    |               |              |
| AH27        | NC                | -    |               |              |
| AH29        | NC                | -    |               |              |
| AH30        | NC                | -    |               |              |
| AH4         | NC                | -    |               |              |
| AJ1         | NC                | -    |               |              |
| AJ2         | NC                | -    |               |              |
| AJ27        | NC                | -    |               |              |
| AJ28        | NC                | -    |               |              |
| AJ29        | NC                | -    |               |              |
| AJ3         | NC                | -    |               |              |
| AJ30        | NC                | -    |               |              |
| AK2         | NC                | -    |               |              |
| AK27        | NC                | -    |               |              |
| AK28        | NC                | -    |               |              |
| AK29        | NC                | -    |               |              |
| AK3         | NC                | -    |               |              |
| B1          | NC                | -    |               |              |
| B2          | NC                | -    |               |              |
| B3          | NC                | -    |               |              |
| B30         | NC                | -    |               |              |
| B4          | NC                | -    |               |              |
| B5          | NC                | -    |               |              |
| C1          | NC                | -    |               |              |
| C2          | NC                | -    |               |              |
| C29         | NC                | -    |               |              |
| C30         | NC                | -    |               |              |
| C4          | NC                | -    |               |              |
| D13         | NC                | -    |               |              |
| D18         | NC                | -    |               |              |
| D23         | NC                | -    |               |              |
| D28         | NC                | -    |               |              |
| D29         | NC                | -    |               |              |
| D3          | NC                | -    |               |              |
| D30         | NC                | -    |               |              |
| D4          | NC                | -    |               |              |
| E25         | NC                | -    |               |              |
| E26         | NC                | -    |               |              |

## LFE2M20E/SE and LFE2M35E/SE Logic Signal Connections: 484 fpBGA (Cont.)

| LFE2M20E/SE |                   |      |               |              | LFE2M35E/SE       |      |               |              |
|-------------|-------------------|------|---------------|--------------|-------------------|------|---------------|--------------|
| Ball Number | Ball/Pad Function | Bank | Dual Function | Differential | Ball/Pad Function | Bank | Dual Function | Differential |
| F15         | NC                | -    |               |              | NC                | -    |               |              |
| F14         | NC                | -    |               |              | NC                | -    |               |              |
| F13         | NC                | -    |               |              | NC                | -    |               |              |
| G12         | NC                | -    |               |              | NC                | -    |               |              |
| G13         | NC                | -    |               |              | NC                | -    |               |              |

\* Supports true LVDS. Other differential signals must be emulated with external resistors.

\*\* These dedicated input pins can be used for GPLLs or GDLLs within the respective quadrant.

\*\*\*For density migration, board design must take into account that these sysCONFIG pins are dual function for the lower density devices (ECP2M20 and ECP2M35). They can be either sysCONFIG pins or general purpose I/Os. These pins are dedicated sysCONFIG pins for the higher density devices (ECP2M50, ECP2M70 and ECP2M100).

\*\*\*\*Due to packaging bond out option, this DQS does not have all the necessary DQ pins bonded out for a full 8-bit data width.

Note: VCCIO and GND pads are used to determine the average DC current drawn by I/Os between GND/VCCIO connections, or between the last GND/VCCIO in an I/O bank and the end of an I/O bank. The substrate pads listed in the Pin Table do not necessarily have a one to one connection with a package ball or pin.

## LFE2M50E/SE and LFE2M70E/SE Logic Signal Connections: 900 fpBGA (Cont.)

| LFE2M50E/SE |                   |      |                       |              | LFE2M70E/SE       |      |                       |              |  |
|-------------|-------------------|------|-----------------------|--------------|-------------------|------|-----------------------|--------------|--|
| Ball Number | Ball/Pad Function | Bank | Dual Function         | Differential | Ball/Pad Function | Bank | Dual Function         | Differential |  |
| T29         | PR48B             | 3    | RDQ52                 | C (LVDS)*    | PR60B             | 3    | RDQ64                 | C (LVDS)*    |  |
| T28         | PR48A             | 3    | RDQ52                 | T (LVDS)*    | PR60A             | 3    | RDQ64                 | T (LVDS)*    |  |
| R23         | PR46B             | 3    | RLM3_SPLLC_FB_A       | C            | PR58B             | 3    | RLM3_SPLLC_FB_A/RDQ55 | C            |  |
| GNDIO       | GNDIO3            | -    |                       |              | GNDIO3            | -    |                       |              |  |
| VCCIO       | VCCIO3            | 3    |                       |              | -                 | -    |                       |              |  |
| R22         | PR46A             | 3    | RLM3_SPLLT_FB_A       | T            | PR58A             | 3    | RLM3_SPLLT_FB_A/RDQ55 | T            |  |
| P30         | PR45B             | 3    | RLM3_SPLLC_IN_A       | C (LVDS)*    | PR57B             | 3    | RLM3_SPLLC_IN_A/RDQ55 | C (LVDS)*    |  |
| R29         | PR45A             | 3    | RLM3_SPLLT_IN_A       | T (LVDS)*    | PR57A             | 3    | RLM3_SPLLT_IN_A/RDQ55 | T (LVDS)*    |  |
| T27         | PR44B             | 3    |                       | C            | PR56B             | 3    | RDQ55                 | C            |  |
| -           | -                 | -    |                       |              | VCCIO3            | 3    |                       |              |  |
| T26         | PR44A             | 3    |                       | T            | PR56A             | 3    | RDQ55                 | T            |  |
| GNDIO       | GNDIO3            | -    |                       |              | GNDIO3            | -    |                       |              |  |
| N30         | PR43B             | 3    |                       | C (LVDS)*    | PR53B             | 3    | RDQ55                 | C (LVDS)*    |  |
| N29         | PR43A             | 3    |                       | T (LVDS)*    | PR53A             | 3    | RDQ55                 | T (LVDS)*    |  |
| VCCIO       | VCCIO3            | 3    |                       |              | VCCIO3            | 3    |                       |              |  |
| R27         | PR42B             | 3    | VREF2_3               | C            | PR52B             | 3    | VREF2_3/RDQ55         | C            |  |
| R28         | PR42A             | 3    | VREF1_3               | T            | PR52A             | 3    | VREF1_3/RDQ55         | T            |  |
| P29         | PR41B             | 3    | PCLKC3_0              | C (LVDS)*    | PR51B             | 3    | PCLKC3_0/RDQ55        | C (LVDS)*    |  |
| P28         | PR41A             | 3    | PCLKT3_0              | T (LVDS)*    | PR51A             | 3    | PCLKT3_0/RDQ55        | T (LVDS)*    |  |
| M30         | PR39B             | 2    | PCLKC2_0/RDQ36        | C            | PR49B             | 2    | PCLKC2_0/RDQ46        | C            |  |
| M29         | PR39A             | 2    | PCLKT2_0/RDQ36        | T            | PR49A             | 2    | PCLKT2_0/RDQ46        | T            |  |
| GNDIO       | GNDIO2            | -    |                       |              | GNDIO2            | -    |                       |              |  |
| P23         | PR38B             | 2    | RDQ36                 | C (LVDS)*    | PR48B             | 2    | RDQ46                 | C (LVDS)*    |  |
| P24         | PR38A             | 2    | RDQ36                 | T (LVDS)*    | PR48A             | 2    | RDQ46                 | T (LVDS)*    |  |
| R26         | PR37B             | 2    | RDQ36                 | C            | PR47B             | 2    | RDQ46                 | C            |  |
| P27         | PR37A             | 2    | RDQ36                 | T            | PR47A             | 2    | RDQ46                 | T            |  |
| VCCIO       | VCCIO2            | 2    |                       |              | VCCIO2            | 2    |                       |              |  |
| P25         | PR36B             | 2    | RDQ36                 | C (LVDS)*    | PR46B             | 2    | RDQ46                 | C (LVDS)*    |  |
| P26         | PR36A             | 2    | RDQS36                | T (LVDS)*    | PR46A             | 2    | RDQS46                | T (LVDS)*    |  |
| K30         | PR35B             | 2    | RDQ36                 | C            | PR45B             | 2    | RDQ46                 | C            |  |
| GNDIO       | GNDIO2            | -    |                       |              | GNDIO2            | -    |                       |              |  |
| K29         | PR35A             | 2    | RDQ36                 | T            | PR45A             | 2    | RDQ46                 | T            |  |
| N22         | PR34B             | 2    | RDQ36                 | C (LVDS)*    | PR44B             | 2    | RDQ46                 | C (LVDS)*    |  |
| P22         | PR34A             | 2    | RDQ36                 | T (LVDS)*    | PR44A             | 2    | RDQ46                 | T (LVDS)*    |  |
| J30         | PR33B             | 2    | RUM3_SPLLC_FB_A/RDQ36 | C            | PR43B             | 2    | RUM3_SPLLC_FB_A/RDQ46 | C            |  |
| VCCIO       | VCCIO2            | 2    |                       |              | VCCIO2            | 2    |                       |              |  |
| J29         | PR33A             | 2    | RUM3_SPLLT_FB_A/RDQ36 | T            | PR43A             | 2    | RUM3_SPLLT_FB_A/RDQ46 | T            |  |
| N24         | PR32B             | 2    | RUM3_SPLLC_IN_A/RDQ36 | C (LVDS)*    | PR42B             | 2    | RUM3_SPLLC_IN_A/RDQ46 | C (LVDS)*    |  |
| N23         | PR32A             | 2    | RUM3_SPLLT_IN_A/RDQ36 | T (LVDS)*    | PR42A             | 2    | RUM3_SPLLT_IN_A/RDQ46 | T (LVDS)*    |  |
| N25         | PR30B             | 2    | RDQ27                 | C            | PR40B             | 2    | RDQ37                 | C            |  |
| N26         | PR30A             | 2    | RDQ27                 | T            | PR40A             | 2    | RDQ37                 | T            |  |
| GNDIO       | GNDIO2            | -    |                       |              | GNDIO2            | -    |                       |              |  |
| M27         | PR29B             | 2    | RDQ27                 | C (LVDS)*    | PR39B             | 2    | RDQ37                 | C (LVDS)*    |  |
| M28         | PR29A             | 2    | RDQ27                 | T (LVDS)*    | PR39A             | 2    | RDQ37                 | T (LVDS)*    |  |
| H30         | PR28B             | 2    | RDQ27                 | C            | PR38B             | 2    | RDQ37                 | C            |  |
| G30         | PR28A             | 2    | RDQ27                 | T            | PR38A             | 2    | RDQ37                 | T            |  |
| VCCIO       | VCCIO2            | 2    |                       |              | VCCIO2            | 2    |                       |              |  |
| M25         | PR27B             | 2    | RDQ27                 | C (LVDS)*    | PR37B             | 2    | RDQ37                 | C (LVDS)*    |  |

**LFE2M100E/SE Logic Signal Connections: 900 fpBGA (Cont.)**

| LFE2M100E/SE |                   |      |                       |              |
|--------------|-------------------|------|-----------------------|--------------|
| Ball Number  | Ball/Pad Function | Bank | Dual Function         | Differential |
| J2           | PL34B             | 7    | LDQ32                 | C (LVDS)*    |
| H1           | PL35A             | 7    | LDQ32                 | T            |
| GNDIO        | GNDIO7            | -    |                       |              |
| J1           | PL35B             | 7    | LDQ32                 | C            |
| GNDIO        | GNDIO7            | -    |                       |              |
| L5           | PL41A             | 7    | LDQ45                 | T (LVDS)*    |
| L4           | PL41B             | 7    | LDQ45                 | C (LVDS)*    |
| N9           | PL42A             | 7    | LDQ45                 | T            |
| N7           | PL42B             | 7    | LDQ45                 | C            |
| K2           | PL43A             | 7    | LDQ45                 | T (LVDS)*    |
| K1           | PL43B             | 7    | LDQ45                 | C (LVDS)*    |
| P9           | PL44A             | 7    | LDQ45                 | T            |
| P7           | PL44B             | 7    | LDQ45                 | C            |
| GNDIO        | GNDIO7            | -    |                       |              |
| M6           | PL45A             | 7    | LDQS45                | T (LVDS)*    |
| M5           | PL45B             | 7    | LDQ45                 | C (LVDS)*    |
| N5           | PL46A             | 7    | LDQ45                 | T            |
| N6           | PL46B             | 7    | LDQ45                 | C            |
| M4           | PL47A             | 7    | LDQ45                 | T (LVDS)*    |
| M3           | PL47B             | 7    | LDQ45                 | C (LVDS)*    |
| P6           | PL48A             | 7    | LDQ45                 | T            |
| GNDIO        | GNDIO7            | -    |                       |              |
| P8           | PL48B             | 7    | LDQ45                 | C            |
| L3           | PL50A             | 7    | LUM3_SPLLT_IN_A/LDQ54 | T (LVDS)*    |
| L2           | PL50B             | 7    | LUM3_SPLLC_IN_A/LDQ54 | C (LVDS)*    |
| P5           | PL51A             | 7    | LUM3_SPLLT_FB_A/LDQ54 | T            |
| P4           | PL51B             | 7    | LUM3_SPLLC_FB_A/LDQ54 | C            |
| L1           | PL52A             | 7    | LDQ54                 | T (LVDS)*    |
| M2           | PL52B             | 7    | LDQ54                 | C (LVDS)*    |
| R5           | PL53A             | 7    | LDQ54                 | T            |
| R4           | PL53B             | 7    | LDQ54                 | C            |
| GNDIO        | GNDIO7            | -    |                       |              |
| M1           | PL54A             | 7    | LDQS54                | T (LVDS)*    |
| N2           | PL54B             | 7    | LDQ54                 | C (LVDS)*    |
| R8           | PL55A             | 7    | LDQ54                 | T            |
| T9           | PL55B             | 7    | LDQ54                 | C            |
| P3           | PL56A             | 7    | LDQ54                 | T (LVDS)*    |
| P2           | PL56B             | 7    | LDQ54                 | C (LVDS)*    |
| N1           | PL57A             | 7    | PCLKT7_0/LDQ54        | T            |
| GNDIO        | GNDIO7            | -    |                       |              |
| P1           | PL57B             | 7    | PCLKC7_0/LDQ54        | C            |
| T5           | PL59A             | 6    | PCLKT6_0/LDQ63        | T (LVDS)*    |
| T4           | PL59B             | 6    | PCLKC6_0/LDQ63        | C (LVDS)*    |

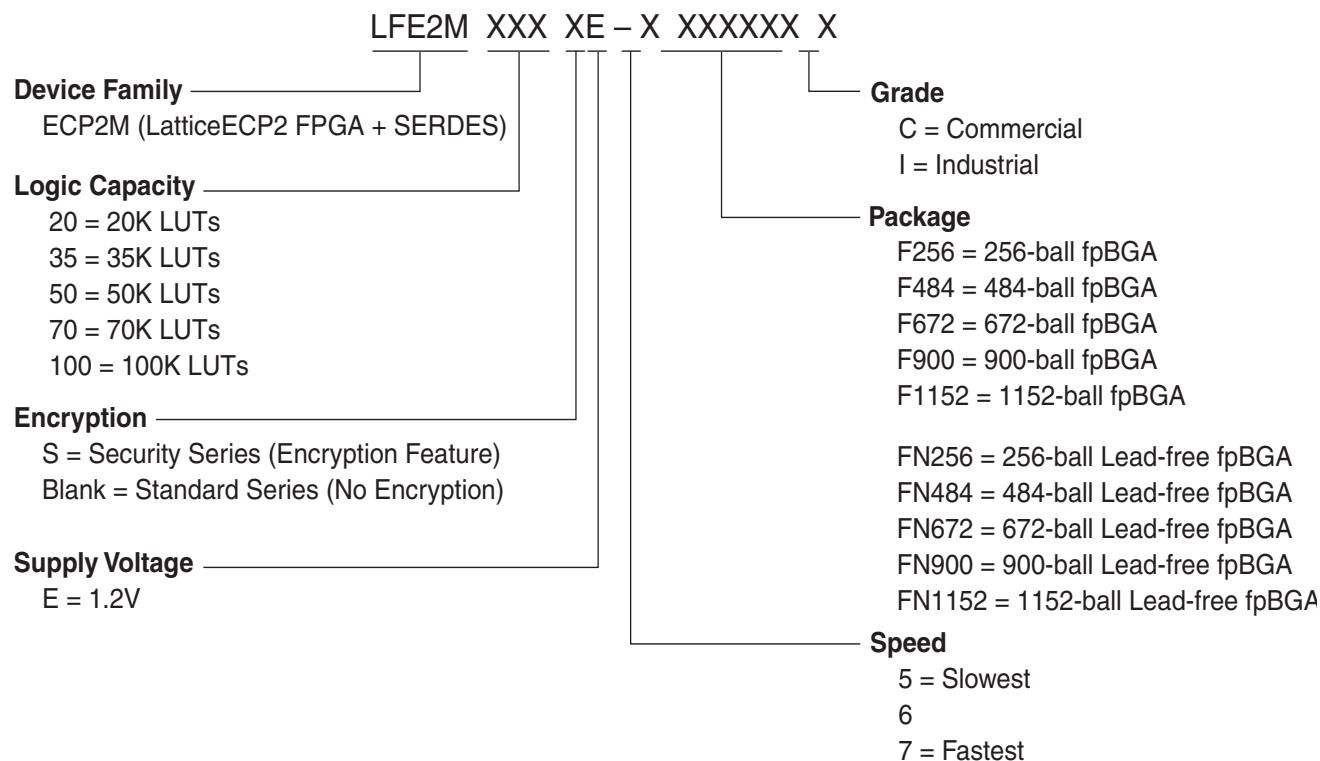
| Part Number     | I/Os | Voltage | Grade | Package | Pins | Temp. | LUTs (K) |
|-----------------|------|---------|-------|---------|------|-------|----------|
| LFE2-20E-5Q208I | 131  | 1.2V    | -5    | PQFP    | 208  | IND   | 20       |
| LFE2-20E-6Q208I | 131  | 1.2V    | -6    | PQFP    | 208  | IND   | 20       |
| LFE2-20E-5F256I | 193  | 1.2V    | -5    | fpBGA   | 256  | IND   | 20       |
| LFE2-20E-6F256I | 193  | 1.2V    | -6    | fpBGA   | 256  | IND   | 20       |
| LFE2-20E-5F484I | 331  | 1.2V    | -5    | fpBGA   | 484  | IND   | 20       |
| LFE2-20E-6F484I | 331  | 1.2V    | -6    | fpBGA   | 484  | IND   | 20       |
| LFE2-20E-5F672I | 402  | 1.2V    | -5    | fpBGA   | 672  | IND   | 20       |
| LFE2-20E-6F672I | 402  | 1.2V    | -6    | fpBGA   | 672  | IND   | 20       |

| Part Number     | I/Os | Voltage | Grade | Package | Pins | Temp. | LUTs (K) |
|-----------------|------|---------|-------|---------|------|-------|----------|
| LFE2-35E-5F484I | 331  | 1.2V    | -5    | fpBGA   | 484  | IND   | 35       |
| LFE2-35E-6F484I | 331  | 1.2V    | -6    | fpBGA   | 484  | IND   | 35       |
| LFE2-35E-5F672I | 450  | 1.2V    | -5    | fpBGA   | 672  | IND   | 35       |
| LFE2-35E-6F672I | 450  | 1.2V    | -6    | fpBGA   | 672  | IND   | 35       |

| Part Number     | I/Os | Voltage | Grade | Package | Pins | Temp. | LUTs (K) |
|-----------------|------|---------|-------|---------|------|-------|----------|
| LFE2-50E-5F484I | 339  | 1.2V    | -5    | fpBGA   | 484  | IND   | 50       |
| LFE2-50E-6F484I | 339  | 1.2V    | -6    | fpBGA   | 484  | IND   | 50       |
| LFE2-50E-5F672I | 500  | 1.2V    | -5    | fpBGA   | 672  | IND   | 50       |
| LFE2-50E-6F672I | 500  | 1.2V    | -6    | fpBGA   | 672  | IND   | 50       |

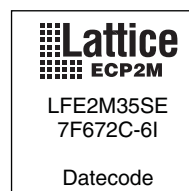
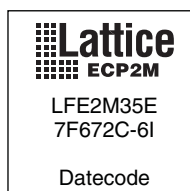
| Part Number     | I/Os | Voltage | Grade | Package | Pins | Temp. | LUTs (K) |
|-----------------|------|---------|-------|---------|------|-------|----------|
| LFE2-70E-5F672I | 500  | 1.2V    | -5    | fpBGA   | 672  | IND   | 70       |
| LFE2-70E-6F672I | 500  | 1.2V    | -6    | fpBGA   | 672  | IND   | 70       |
| LFE2-70E-5F900I | 583  | 1.2V    | -5    | fpBGA   | 900  | IND   | 70       |
| LFE2-70E-6F900I | 583  | 1.2V    | -6    | fpBGA   | 900  | IND   | 70       |

### LatticeECP2M Part Number Description



### Ordering Information

Note: LatticeECP2M devices are dual marked. For example, the commercial speed grade LFE2M50E-7F672C is also marked with industrial grade -6I (LFE2M50E-6F672I). The commercial grade is one speed grade faster than the associated dual mark industrial grade. The slowest commercial grade does not have industrial markings. The markings appear as follows:



| Part Number        | I/Os | Voltage | Grade | Package         | Pins | Temp. | LUTs (K) |
|--------------------|------|---------|-------|-----------------|------|-------|----------|
| LFE2M100E-5FN1152C | 520  | 1.2V    | -5    | Lead-Free fpBGA | 1152 | COM   | 100      |
| LFE2M100E-6FN1152C | 520  | 1.2V    | -6    | Lead-Free fpBGA | 1152 | COM   | 100      |
| LFE2M100E-7FN1152C | 520  | 1.2V    | -7    | Lead-Free fpBGA | 1152 | COM   | 100      |
| LFE2M100E-5FN900C  | 416  | 1.2V    | -5    | Lead-Free fpBGA | 900  | COM   | 100      |
| LFE2M100E-6FN900C  | 416  | 1.2V    | -6    | Lead-Free fpBGA | 900  | COM   | 100      |
| LFE2M100E-7FN900C  | 416  | 1.2V    | -7    | Lead-Free fpBGA | 900  | COM   | 100      |

### Industrial

| Part Number      | I/Os | Voltage | Grade | Package         | Pins | Temp. | LUTs (K) |
|------------------|------|---------|-------|-----------------|------|-------|----------|
| LFE2M20E-5FN484I | 304  | 1.2V    | -5    | Lead-Free fpBGA | 484  | IND   | 20       |
| LFE2M20E-6FN484I | 304  | 1.2V    | -6    | Lead-Free fpBGA | 484  | IND   | 20       |
| LFE2M20E-5FN256I | 140  | 1.2V    | -5    | Lead-Free fpBGA | 256  | IND   | 20       |
| LFE2M20E-6FN256I | 140  | 1.2V    | -6    | Lead-Free fpBGA | 256  | IND   | 20       |

| Part Number      | I/Os | Voltage | Grade | Package         | Pins | Temp. | LUTs (K) |
|------------------|------|---------|-------|-----------------|------|-------|----------|
| LFE2M35E-5FN672I | 410  | 1.2V    | -5    | Lead-Free fpBGA | 672  | IND   | 35       |
| LFE2M35E-6FN672I | 410  | 1.2V    | -6    | Lead-Free fpBGA | 672  | IND   | 35       |
| LFE2M35E-5FN484I | 303  | 1.2V    | -5    | Lead-Free fpBGA | 484  | IND   | 35       |
| LFE2M35E-6FN484I | 303  | 1.2V    | -6    | Lead-Free fpBGA | 484  | IND   | 35       |
| LFE2M35E-5FN256I | 140  | 1.2V    | -5    | Lead-Free fpBGA | 256  | IND   | 35       |
| LFE2M35E-6FN256I | 140  | 1.2V    | -6    | Lead-Free fpBGA | 256  | IND   | 35       |

| Part Number      | I/Os | Voltage | Grade | Package         | Pins | Temp. | LUTs (K) |
|------------------|------|---------|-------|-----------------|------|-------|----------|
| LFE2M50E-5FN900I | 410  | 1.2V    | -5    | Lead-Free fpBGA | 900  | Ind   | 50       |
| LFE2M50E-6FN900I | 410  | 1.2V    | -6    | Lead-Free fpBGA | 900  | Ind   | 50       |
| LFE2M50E-5FN672I | 372  | 1.2V    | -5    | Lead-Free fpBGA | 672  | Ind   | 50       |
| LFE2M50E-6FN672I | 372  | 1.2V    | -6    | Lead-Free fpBGA | 672  | Ind   | 50       |
| LFE2M50E-5FN484I | 270  | 1.2V    | -5    | Lead-Free fpBGA | 484  | Ind   | 50       |
| LFE2M50E-6FN484I | 270  | 1.2V    | -6    | Lead-Free fpBGA | 484  | Ind   | 50       |

| Part Number       | I/Os | Voltage | Grade | Package         | Pins | Temp. | LUTs (K) |
|-------------------|------|---------|-------|-----------------|------|-------|----------|
| LFE2M70E-5FN1152I | 436  | 1.2V    | -5    | Lead-Free fpBGA | 1152 | Ind   | 70       |
| LFE2M70E-6FN1152I | 436  | 1.2V    | -6    | Lead-Free fpBGA | 1152 | Ind   | 70       |
| LFE2M70E-5FN900I  | 416  | 1.2V    | -5    | Lead-Free fpBGA | 900  | Ind   | 70       |
| LFE2M70E-6FN900I  | 416  | 1.2V    | -6    | Lead-Free fpBGA | 900  | Ind   | 70       |