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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	4250
Number of Logic Elements/Cells	34000
Total RAM Bits	2151424
Number of I/O	410
Number of Gates	-
Voltage - Supply	1.14V ~ 1.26V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 100°C (TJ)
Package / Case	672-BBGA
Supplier Device Package	672-FPBGA (27x27)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lfe2m35e-6f672i

Modes of Operation

Each slice has up to four potential modes of operation: Logic, Ripple, RAM and ROM.

Logic Mode

In this mode, the LUTs in each slice are configured as 4-input combinatorial lookup tables. A LUT4 can have 16 possible input combinations. Any four input logic functions can be generated by programming this lookup table. Since there are two LUT4s per slice, a LUT5 can be constructed within one slice. Larger look-up tables such as LUT6, LUT7 and LUT8 can be constructed by concatenating other slices. Note LUT8 requires more than four slices.

Ripple Mode

Ripple mode supports the efficient implementation of small arithmetic functions. In ripple mode, the following functions can be implemented by each slice:

- Addition 2-bit
- Subtraction 2-bit
- Add/Subtract 2-bit using dynamic control
- Up counter 2-bit
- Down counter 2-bit
- Up/Down counter with Async clear
- Up/Down counter with preload (sync)
- Ripple mode multiplier building block
- Multiplier support
- Comparator functions of A and B inputs
  - A greater-than-or-equal-to B
  - A not-equal-to B
  - A less-than-or-equal-to B

Ripple Mode includes an optional configuration that performs arithmetic using fast carry chain methods. In this configuration (also referred to as CCU2 mode) two additional signals, Carry Generate and Carry Propagate, are generated on a per slice basis to allow fast arithmetic functions to be constructed by concatenating Slices.

RAM Mode

In this mode, a 16x4-bit distributed single port RAM (SPR) can be constructed using each LUT block in Slice 0 and Slice 2 as a 16x1-bit memory. Slice 1 is used to provide memory address and control signals. A 16x2-bit pseudo dual port RAM (PDPR) memory is created by using one Slice as the read-write port and the other companion slice as the read-only port.

The Lattice design tools support the creation of a variety of different size memories. Where appropriate, the software will construct these using distributed memory primitives that represent the capabilities of the PFU. Table 2-3 shows the number of slices required to implement different distributed RAM primitives. For more information about using RAM in LatticeECP2/M devices, please see the list of additional technical documentation at the end of this data sheet.

Table 2-3. Number of Slices Required to Implement Distributed RAM

	SPR 16X4	PDPR 16X4
Number of slices	3	3

Note: SPR = Single Port RAM, PDPR = Pseudo Dual Port RAM

LFE2-12E/SE and LFE2-20E/SE Logic Signal Connections: 484 fpBGA (Cont.)

LFE2-12E/12SE					LFE2-20E/20SE			
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
B15	PT40B	1		C	PT49B	1		C
GNDIO	GNDIO1	-			GNDIO1	-		
A15	PT40A	1		T	PT49A	1		T
VCCIO	VCCIO1	1			VCCIO1	1		
A14	PT39A	1		T	PT48A	1		T
B14	PT39B	1		C	PT48B	1		C
D14	PT37B	1		C	PT46B	1		C
E14	PT36B	1		C	PT45B	1		C
GNDIO	GNDIO1	-			GNDIO1	-		
C13	PT37A	1		T	PT46A	1		T
F14	PT36A	1		T	PT45A	1		T
A13	PT35B	1		C	PT44B	1		C
E13	PT34B	1		C	PT43B	1		C
VCCIO	VCCIO1	1			VCCIO1	1		
B13	PT35A	1		T	PT44A	1		T
D13	PT34A	1		T	PT43A	1		T
E12	PT33B	1		C	PT42B	1		C
GNDIO	GNDIO1	-			GNDIO1	-		
D12	PT33A	1		T	PT42A	1		T
A12	PT31B	1		C	PT40B	1		C
B12	PT30B	1	PCLKC1_0	C	PT39B	1	PCLKC1_0	C
VCCIO	VCCIO1	1			VCCIO1	1		
A11	PT31A	1		T	PT40A	1		T
C12	PT30A	1	PCLKT1_0	T	PT39A	1	PCLKT1_0	T
F12	XRES	1			XRES	1		
B10	PT28B	0	PCLKC0_0	C	PT37B	0	PCLKC0_0	C
GNDIO	GNDIO0	-			GNDIO0	-		
B11	PT28A	0	PCLKT0_0	T	PT37A	0	PCLKT0_0	T
C11	PT26B	0		C	PT35B	0		C
A10	PT27B	0		C	PT36B	0		C
C10	PT26A	0		T	PT35A	0		T
VCCIO	VCCIO0	0			VCCIO0	0		
A9	PT27A	0		T	PT36A	0		T
A8	PT24B	0		C	PT33B	0		C
E11	PT25B	0		C	PT34B	0		C
A7	PT24A	0		T	PT33A	0		T
F11	PT25A	0		T	PT34A	0		T
GNDIO	GNDIO0	-			GNDIO0	-		
B8	PT23B	0		C	PT32B	0		C
VCCIO	VCCIO0	0			VCCIO0	0		
B9	PT23A	0		T	PT32A	0		T
C8	PT20B	0		C	PT29B	0		C
B7	PT21B	0		C	PT30B	0		C
D8	PT20A	0		T	PT29A	0		T

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
N16	VCCIO3	3			VCCIO3	3		
P16	VCCIO3	3			VCCIO3	3		
R14	VCCIO4	4			VCCIO4	4		
T12	VCCIO4	4			VCCIO4	4		
T13	VCCIO4	4			VCCIO4	4		
T14	VCCIO4	4			VCCIO4	4		
R9	VCCIO5	5			VCCIO5	5		
T10	VCCIO5	5			VCCIO5	5		
T11	VCCIO5	5			VCCIO5	5		
T9	VCCIO5	5			VCCIO5	5		
N7	VCCIO6	6			VCCIO6	6		
P7	VCCIO6	6			VCCIO6	6		
P8	VCCIO6	6			VCCIO6	6		
R8	VCCIO6	6			VCCIO6	6		
J8	VCCIO7	7			VCCIO7	7		
K7	VCCIO7	7			VCCIO7	7		
L7	VCCIO7	7			VCCIO7	7		
M7	VCCIO7	7			VCCIO7	7		
P15	VCCIO8	8			VCCIO8	8		
R15	VCCIO8	8			VCCIO8	8		
A22	GND	-			GND	-		
AA19	GND	-			GND	-		
AA4	GND	-			GND	-		
AB1	GND	-			GND	-		
AB22	GND	-			GND	-		
B19	GND	-			GND	-		
B4	GND	-			GND	-		
C14	GND	-			GND	-		
C9	GND	-			GND	-		
D2	GND	-			GND	-		
D21	GND	-			GND	-		
F17	GND	-			GND	-		
F6	GND	-			GND	-		
H10	GND	-			GND	-		
H11	GND	-			GND	-		
H12	GND	-			GND	-		
H13	GND	-			GND	-		
J14	GND	-			GND	-		
J20	GND	-			GND	-		
J3	GND	-			GND	-		
J9	GND	-			GND	-		
K10	GND	-			GND	-		
K11	GND	-			GND	-		
K12	GND	-			GND	-		
K13	GND	-			GND	-		
K15	GND	-			GND	-		

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
D4	PT7B	0		C	PT7B	0		C
D3	PT7A	0		T	PT7A	0		T
C2	PT6B	0		C	PT6B	0		C
C1	PT6A	0		T	PT6A	0		T
G8	PT5B	0		C	PT5B	0		C
GND	GNDIO0	-			GNDIO0	-		
G7	PT5A	0		T	PT5A	0		T
E7	PT4B	0		C	PT4B	0		C
VCCIO	VCCIO0	0			VCCIO0	0		
F7	PT4A	0		T	PT4A	0		T
E6	PT3B	0		C	PT3B	0		C
E5	PT3A	0		T	PT3A	0		T
G6	PT2B	0	VREF2_0	C	PT2B	0	VREF2_0	C
G5	PT2A	0	VREF1_0	T	PT2A	0	VREF1_0	T
L12	VCC	-			VCC	-		
L13	VCC	-			VCC	-		
L14	VCC	-			VCC	-		
L15	VCC	-			VCC	-		
M11	VCC	-			VCC	-		
M12	VCC	-			VCC	-		
M15	VCC	-			VCC	-		
M16	VCC	-			VCC	-		
N11	VCC	-			VCC	-		
N16	VCC	-			VCC	-		
P11	VCC	-			VCC	-		
P16	VCC	-			VCC	-		
R11	VCC	-			VCC	-		
R12	VCC	-			VCC	-		
R15	VCC	-			VCC	-		
R16	VCC	-			VCC	-		
T12	VCC	-			VCC	-		
T13	VCC	-			VCC	-		
T14	VCC	-			VCC	-		
T15	VCC	-			VCC	-		
D11	VCCIO0	0			VCCIO0	0		
D6	VCCIO0	0			VCCIO0	0		
G9	VCCIO0	0			VCCIO0	0		
K12	VCCIO0	0			VCCIO0	0		
J12	VCCIO0	0			VCCIO0	0		
D16	VCCIO1	1			VCCIO1	1		
D21	VCCIO1	1			VCCIO1	1		
G18	VCCIO1	1			VCCIO1	1		
J15	VCCIO1	1			VCCIO1	1		
K15	VCCIO1	1			VCCIO1	1		
F23	VCCIO2	2			VCCIO2	2		
J20	VCCIO2	2			VCCIO2	2		

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
D4	PT7B	0		C	PT7B	0		C
D3	PT7A	0		T	PT7A	0		T
C2	PT6B	0		C	PT6B	0		C
C1	PT6A	0		T	PT6A	0		T
G8	PT5B	0		C	PT5B	0		C
GND	GNDIO0	-			GNDIO0	-		
G7	PT5A	0		T	PT5A	0		T
E7	PT4B	0		C	PT4B	0		C
VCCIO	VCCIO0	0			VCCIO0	0		
F7	PT4A	0		T	PT4A	0		T
E6	PT3B	0		C	PT3B	0		C
E5	PT3A	0		T	PT3A	0		T
G6	PT2B	0	VREF2_0	C	PT2B	0	VREF2_0	C
G5	PT2A	0	VREF1_0	T	PT2A	0	VREF1_0	T
L12	VCC	-			VCC	-		
L13	VCC	-			VCC	-		
L14	VCC	-			VCC	-		
L15	VCC	-			VCC	-		
M11	VCC	-			VCC	-		
M12	VCC	-			VCC	-		
M15	VCC	-			VCC	-		
M16	VCC	-			VCC	-		
N11	VCC	-			VCC	-		
N16	VCC	-			VCC	-		
P11	VCC	-			VCC	-		
P16	VCC	-			VCC	-		
R11	VCC	-			VCC	-		
R12	VCC	-			VCC	-		
R15	VCC	-			VCC	-		
R16	VCC	-			VCC	-		
T12	VCC	-			VCC	-		
T13	VCC	-			VCC	-		
T14	VCC	-			VCC	-		
T15	VCC	-			VCC	-		
D11	VCCIO0	0			VCCIO0	0		
D6	VCCIO0	0			VCCIO0	0		
G9	VCCIO0	0			VCCIO0	0		
K12	VCCIO0	0			VCCIO0	0		
J12	VCCIO0	0			VCCIO0	0		
D16	VCCIO1	1			VCCIO1	1		
D21	VCCIO1	1			VCCIO1	1		
G18	VCCIO1	1			VCCIO1	1		
J15	VCCIO1	1			VCCIO1	1		
K15	VCCIO1	1			VCCIO1	1		
F23	VCCIO2	2			VCCIO2	2		
J20	VCCIO2	2			VCCIO2	2		

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

LFE2-70E/SE				
Ball Number	**Ball/Pad Function**	**Bank**	**Dual Function**	**Differential**
W18	GND	-		
W19	GND	-		
Y14	GND	-		
Y15	GND	-		
Y16	GND	-		
Y17	GND	-		
A2	NC	-		
A3	NC	-		
A4	NC	-		
A5	NC	-		
AB28	NC	-		
AC4	NC	-		
AD23	NC	-		
AE1	NC	-		
AE2	NC	-		
AE29	NC	-		
AE3	NC	-		
AE30	NC	-		
AE4	NC	-		
AE5	NC	-		
AE6	NC	-		
AF1	NC	-		
AF2	NC	-		
AF23	NC	-		
AF26	NC	-		
AF27	NC	-		
AF28	NC	-		
AF29	NC	-		
AF3	NC	-		
AF30	NC	-		
AF4	NC	-		
AF5	NC	-		
AG1	NC	-		
AG13	NC	-		
AG16	NC	-		
AG18	NC	-		
AG2	NC	-		
AG26	NC	-		
AG27	NC	-		
AG28	NC	-		
AG29	NC	-		
AG3	NC	-		
AG30	NC	-		

LFE2M20E/SE and LFE2M35E/SE Logic Signal Connections: 484 fpBGA

LFE2M20E/SE					LFE2M35E/SE			
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
D1	PL2A	7	LDQ6	T (LVDS)*	PL2A	7	LDQ6	T (LVDS)*
E1	PL2B	7	LDQ6	C (LVDS)*	PL2B	7	LDQ6	C (LVDS)*
F1	PL3A	7	LDQ6	T	PL3A	7	LDQ6	T
F2	PL3B	7	LDQ6	C	PL3B	7	LDQ6	C
F5	PL4A	7	LDQ6	T (LVDS)*	PL4A	7	LDQ6	T (LVDS)*
VCCIO	VCCIO7	7			VCCIO7	7		
G6	PL4B	7	LDQ6	C (LVDS)*	PL4B	7	LDQ6	C (LVDS)*
F4	PL5A	7	LDQ6	T	PL5A	7	LDQ6	T
F3	PL5B	7	LDQ6	C	PL5B	7	LDQ6	C
G1	PL6A	7	LDQS6	T (LVDS)*	PL6A	7	LDQS6	T (LVDS)*
GNDIO	GNDIO7	-			GNDIO7	-		
G2	PL6B	7	LDQ6	C (LVDS)*	PL6B	7	LDQ6	C (LVDS)*
H1	PL7A	7	LDQ6	T	PL7A	7	LDQ6	T
H2	PL7B	7	LDQ6	C	PL7B	7	LDQ6	C
VCCIO	VCCIO7	7			VCCIO7	7		
H7	PL8A	7	LDQ6	T (LVDS)*	PL8A	7	LDQ6	T (LVDS)*
H6	PL8B	7	LDQ6	C (LVDS)*	PL8B	7	LDQ6	C (LVDS)*
G3	PL9A	7	VREF2_7/LDQ6	T	PL9A	7	VREF2_7/LDQ6	T
H3	PL9B	7	VREF1_7/LDQ6	C	PL9B	7	VREF1_7/LDQ6	C
GNDIO	GNDIO7	-			GNDIO7	-		
H5	PL11A	7	LUM0_SPLLT_IN_A	T (LVDS)*	PL11A	7	LUM0_SPLLT_IN_A/LDQ15	T (LVDS)*
H4	PL11B	7	LUM0_SPLLC_IN_A	C (LVDS)*	PL11B	7	LUM0_SPLLC_IN_A/LDQ15	C (LVDS)*
J1	PL12A	7	LUM0_SPLLT_FB_A	T	PL12A	7	LUM0_SPLLT_FB_A/LDQ15	T
J2	PL12B	7	LUM0_SPLLC_FB_A	C	PL12B	7	LUM0_SPLLC_FB_A/LDQ15	C
J3	PL13A	7		T (LVDS)*	PL13A	7	LDQ15	T (LVDS)*
VCCIO	VCCIO7	7			VCCIO7	7		
J4	PL13B	7		C (LVDS)*	PL13B	7	LDQ15	C (LVDS)*
J7	PL14A	7		T	PL14A	7	LDQ15	T
J6	PL14B	7		C	PL14B	7	LDQ15	C
GNDIO	GNDIO7	-			GNDIO7	-		
VCCIO	VCCIO7	7			VCCIO7	7		
K1	PL18A	7	LUM1_SPLLT_IN_A/LDQ22	T (LVDS)*	PL28A	7	LUM1_SPLLT_IN_A/LDQ32	T (LVDS)*
K2	PL18B	7	LUM1_SPLLC_IN_A/LDQ22	C (LVDS)*	PL28B	7	LUM1_SPLLC_IN_A/LDQ32	C (LVDS)*
J5	PL19A	7	LUM1_SPLLT_FB_A/LDQ22	T	PL29A	7	LUM1_SPLLT_FB_A/LDQ32	T
K5	PL19B	7	LUM1_SPLLC_FB_A/LDQ22	C	PL29B	7	LUM1_SPLLC_FB_A/LDQ32	C
VCCIO	VCCIO7	7			VCCIO7	7		
K7	PL20A	7	LDQ22	T (LVDS)*	PL30A	7	LDQ32	T (LVDS)*
K6	PL20B	7	LDQ22	C (LVDS)*	PL30B	7	LDQ32	C (LVDS)*
L6	PL21A	7	LDQ22	T	PL31A	7	LDQ32	T
L7	PL21B	7	LDQ22	C	PL31B	7	LDQ32	C
GNDIO	GNDIO7	-			GNDIO7	-		
L1	PL22A	7	LDQS22	T (LVDS)*	PL32A	7	LDQS32	T (LVDS)*
L2	PL22B	7	LDQ22	C (LVDS)*	PL32B	7	LDQ32	C (LVDS)*
M7	PL23A	7	LDQ22	T	PL33A	7	LDQ32	T
VCCIO	VCCIO7	7			VCCIO7	7		
L5	PL23B	7	LDQ22	C	PL33B	7	LDQ32	C
L3	PL24A	7	LDQ22	T (LVDS)*	PL34A	7	LDQ32	T (LVDS)*

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
G19	GND	-			GND	-		
G4	GND	-			GND	-		
H10	GND	-			GND	-		
H13	GND	-			GND	-		
J14	GND	-			GND	-		
J9	GND	-			GND	-		
K10	GND	-			GND	-		
K11	GND	-			GND	-		
K12	GND	-			GND	-		
K13	GND	-			GND	-		
K15	GND	-			GND	-		
K20	GND	-			GND	-		
K3	GND	-			GND	-		
K8	GND	-			GND	-		
L10	GND	-			GND	-		
L11	GND	-			GND	-		
L12	GND	-			GND	-		
L13	GND	-			GND	-		
M10	GND	-			GND	-		
M11	GND	-			GND	-		
M12	GND	-			GND	-		
M13	GND	-			GND	-		
N10	GND	-			GND	-		
N11	GND	-			GND	-		
N12	GND	-			GND	-		
N13	GND	-			GND	-		
N15	GND	-			GND	-		
N20	GND	-			GND	-		
N3	GND	-			GND	-		
N8	GND	-			GND	-		
P14	GND	-			GND	-		
P9	GND	-			GND	-		
R10	GND	-			GND	-		
R13	GND	-			GND	-		
T19	GND	-			GND	-		
T4	GND	-			GND	-		
W16	GND	-			GND	-		
W2	GND	-			GND	-		
W21	GND	-			GND	-		
W7	GND	-			GND	-		
Y10	GND	-			GND	-		
Y13	GND	-			GND	-		
D15	NC	-			NC	-		
G14	NC	-			NC	-		
G15	NC	-			NC	-		
D14	NC	-			NC	-		
E15	NC	-			NC	-		
E14	NC	-			NC	-		

LFE2M35E/SE and LFE2M50E/SE Logic Signal Connections: 672 fpBGA (Cont.)

LFE2M35E/SE					LFE2M50E/SE			
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
GNDIO	GNDIO7	-			GNDIO7	-		
K5	PL23A	7	LDQS23	T (LVDS)*	PL27A	7	LDQS27	T*
L5	PL23B	7	LDQ23	C (LVDS)*	PL27B	7	LDQ27	C*
K4	PL24A	7	LDQ23	T	PL28A	7	LDQ27	T
VCCIO	VCCIO7	7			VCCIO7	7		
L4	PL24B	7	LDQ23	C	PL28B	7	LDQ27	C
K3	PL25A	7	LDQ23	T (LVDS)*	PL29A	7	LDQ27	T*
L3	PL25B	7	LDQ23	C (LVDS)*	PL29B	7	LDQ27	C*
J1	PL26A	7	LDQ23	T	PL30A	7	LDQ27	T
GNDIO	GNDIO7	-			GNDIO7	-		
K2	PL26B	7	LDQ23	C	PL30B	7	LDQ27	C
K1	PL28A	7	LUM1_SPLLT_IN_A/LDQ32	T (LVDS)*	PL32A	7	LUM3_SPLLT_IN_A/LDQ36	T*
L1	PL28B	7	LUM1_SPLLC_IN_A/LDQ32	C (LVDS)*	PL32B	7	LUM3_SPLLC_IN_A/LDQ36	C*
K8	PL29A	7	LUM1_SPLLT_FB_A/LDQ32	T	PL33A	7	LUM3_SPLLT_FB_A/LDQ36	T
M5	PL29B	7	LUM1_SPLLC_FB_A/LDQ32	C	PL33B	7	LUM3_SPLLC_FB_A/LDQ36	C
VCCIO	VCCIO7	7			VCCIO7	7		
M4	PL30A	7	LDQ32	T (LVDS)*	PL34A	7	LDQ36	T*
M3	PL30B	7	LDQ32	C (LVDS)*	PL34B	7	LDQ36	C*
L8	PL31A	7	LDQ32	T	PL35A	7	LDQ36	T
M6	PL31B	7	LDQ32	C	PL35B	7	LDQ36	C
GNDIO	GNDIO7	-			GNDIO7	-		
M1	PL32A	7	LDQS32	T (LVDS)*	PL36A	7	LDQS36	T*
N1	PL32B	7	LDQ32	C (LVDS)*	PL36B	7	LDQ36	C*
N3	PL33A	7	LDQ32	T	PL37A	7	LDQ36	T
VCCIO	VCCIO7	7			VCCIO7	7		
N2	PL33B	7	LDQ32	C	PL37B	7	LDQ36	C
N5	PL34A	7	LDQ32	T (LVDS)*	PL38A	7	LDQ36	T*
N4	PL34B	7	LDQ32	C (LVDS)*	PL38B	7	LDQ36	C*
M7	PL35A	7	PCLKT7_0/LDQ32	T	PL39A	7	PCLKT7_0/LDQ36	T
GNDIO	GNDIO7	-			GNDIO7	-		
M8	PL35B	7	PCLKC7_0/LDQ32	C	PL39B	7	PCLKC7_0/LDQ36	C
P3	PL37A	6	PCLKT6_0	T (LVDS)*	PL41A	6	PCLKT6_0	T*
P2	PL37B	6	PCLKC6_0	C (LVDS)*	PL41B	6	PCLKC6_0	C*
P5	PL38A	6	VREF2_6	T	PL42A	6	VREF2_6	T
N6	PL38B	6	VREF1_6	C	PL42B	6	VREF1_6	C
P4	PL39A	6		T (LVDS)*	PL43A	6		T*
VCCIO	VCCIO6	6			VCCIO6	6		
R3	PL39B	6		C (LVDS)*	PL43B	6		C*
P6	PL40A	6		T	PL44A	6		T
N7	NC	-			PL44B	6		C
P1	PL41A	6	LLM2_SPLLT_IN_A	T (LVDS)*	PL45A	6	LLM3_SPLLT_IN_A	T*
GNDIO	GNDIO6	-			GNDIO6	-		
R1	PL41B	6	LLM2_SPLLC_IN_A	C (LVDS)*	PL45B	6	LLM3_SPLLC_IN_A	C*
N8	PL42A	6	LLM2_SPLLT_FB_A	T	PL46A	6	LLM3_SPLLT_FB_A	T
R5	PL42B	6	LLM2_SPLLC_FB_A	C	PL46B	6	LLM3_SPLLC_FB_A	C
VCCIO	VCCIO6	6			VCCIO6	6		
T3	PL44A	6	LDQ48	T (LVDS)*	PL48A	6	LDQ52	T*
T4	PL44B	6	LDQ48	C (LVDS)*	PL48B	6	LDQ52	C*

LFE2M35E/SE and LFE2M50E/SE Logic Signal Connections: 672 fpBGA (Cont.)

LFE2M35E/SE					LFE2M50E/SE			
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
F11	VCCIO0	0			VCCIO0	0		
J13	VCCIO0	0			VCCIO0	0		
K12	VCCIO0	0			VCCIO0	1		
D18	VCCIO1	1			VCCIO1	1		
F16	VCCIO1	1			VCCIO1	1		
J14	VCCIO1	1			VCCIO1	1		
K15	VCCIO1	1			VCCIO1	1		
G25	VCCIO2	2			VCCIO2	2		
L21	VCCIO2	2			VCCIO2	2		
M17	VCCIO2	2			VCCIO2	2		
M25	VCCIO2	2			VCCIO2	2		
N18	VCCIO2	2			VCCIO2	2		
P18	VCCIO3	3			VCCIO3	3		
R17	VCCIO3	3			VCCIO3	3		
R25	VCCIO3	3			VCCIO3	3		
T21	VCCIO3	3			VCCIO3	3		
Y25	VCCIO3	3			VCCIO3	3		
AA16	VCCIO4	4			VCCIO4	4		
AC18	VCCIO4	4			VCCIO4	4		
U15	VCCIO4	4			VCCIO4	4		
V14	VCCIO4	4			VCCIO4	4		
AA11	VCCIO5	5			VCCIO5	5		
V13	VCCIO5	5			VCCIO5	5		
AE12	VCCIO5	5			VCCIO5	5		
AE7	VCCIO5	5			VCCIO5	5		
U12	VCCIO5	5			VCCIO5	5		
P9	VCCIO6	6			VCCIO6	6		
R10	VCCIO6	6			VCCIO6	6		
R2	VCCIO6	6			VCCIO6	6		
T6	VCCIO6	6			VCCIO6	6		
Y2	VCCIO6	6			VCCIO6	6		
G2	VCCIO7	7			VCCIO7	7		
L6	VCCIO7	7			VCCIO7	7		
M10	VCCIO7	7			VCCIO7	7		
M2	VCCIO7	7			VCCIO7	7		
N9	VCCIO7	7			VCCIO7	7		
AC24	VCCIO8	8			VCCIO8	8		
U17	VCCIO8	8			VCCIO8	8		
J11	VCCAUX	-			VCCAUX	-		
J12	VCCAUX	-			VCCAUX	-		
J15	VCCAUX	-			VCCAUX	-		
J16	VCCAUX	-			VCCAUX	-		
L18	VCCAUX	-			VCCAUX	-		
L9	VCCAUX	-			VCCAUX	-		
M18	VCCAUX	-			VCCAUX	-		
M9	VCCAUX	-			VCCAUX	-		
R18	VCCAUX	-			VCCAUX	-		
R9	VCCAUX	-			VCCAUX	-		

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
K13	VCCIO0	0			VCCIO0	0		
D17	VCCIO1	1			VCCIO1	1		
E22	VCCIO1	1			VCCIO1	1		
E25	VCCIO1	1			VCCIO1	1		
F19	VCCIO1	1			VCCIO1	1		
K18	VCCIO1	1			VCCIO1	1		
K19	VCCIO1	1			VCCIO1	1		
F28	VCCIO2	2			VCCIO2	2		
J25	VCCIO2	2			VCCIO2	2		
K28	VCCIO2	2			VCCIO2	2		
M21	VCCIO2	2			VCCIO2	2		
M24	VCCIO2	2			VCCIO2	2		
N21	VCCIO2	2			VCCIO2	2		
N28	VCCIO2	2			VCCIO2	2		
P21	VCCIO2	2			VCCIO2	2		
R25	VCCIO2	2			VCCIO2	2		
AA28	VCCIO3	3			VCCIO3	3		
AB25	VCCIO3	3			VCCIO3	3		
AE28	VCCIO3	3			VCCIO3	3		
T25	VCCIO3	3			VCCIO3	3		
U21	VCCIO3	3			VCCIO3	3		
V21	VCCIO3	3			VCCIO3	3		
V28	VCCIO3	3			VCCIO3	3		
W21	VCCIO3	3			VCCIO3	3		
W24	VCCIO3	3			VCCIO3	3		
AA18	VCCIO4	4			VCCIO4	4		
AA19	VCCIO4	4			VCCIO4	4		
AE19	VCCIO4	4			VCCIO4	4		
AF22	VCCIO4	4			VCCIO4	4		
AG17	VCCIO4	4			VCCIO4	4		
AG25	VCCIO4	4			VCCIO4	4		
AA12	VCCIO5	5			VCCIO5	5		
AA13	VCCIO5	5			VCCIO5	5		
AE12	VCCIO5	5			VCCIO5	5		
AF9	VCCIO5	5			VCCIO5	5		
AG14	VCCIO5	5			VCCIO5	5		
AG6	VCCIO5	5			VCCIO5	5		
AA3	VCCIO6	6			VCCIO6	6		
AB6	VCCIO6	6			VCCIO6	6		
AE3	VCCIO6	6			VCCIO6	6		
T6	VCCIO6	6			VCCIO6	6		
U10	VCCIO6	6			VCCIO6	6		
V10	VCCIO6	6			VCCIO6	6		
V3	VCCIO6	6			VCCIO6	6		
W10	VCCIO6	6			VCCIO6	6		
W7	VCCIO6	6			VCCIO6	6		
F3	VCCIO7	7			VCCIO7	7		
J6	VCCIO7	7			VCCIO7	7		

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
G7	PL8A	7	LDQ6	T (LVDS)*	NC	-		
G8	PL6A	7	LDQS6****	T (LVDS)*	NC	-		
G9	PL5A	7	LDQ6	T	NC	-		
H19	NC	-			NC	-		
H20	NC	-			NC	-		
H21	NC	-			NC	-		
H22	NC	-			NC	-		
H6	PL8B	7	LDQ6	C (LVDS)*	NC	-		
H8	PL5B	7	LDQ6	C	NC	-		
H9	PL2A	7	LDQ6	T (LVDS)*	NC	-		
J10	PL2B	7	LDQ6	C (LVDS)*	NC	-		
J20	NC	-			NC	-		
J21	NC	-			NC	-		
J9	PL4A	7	LDQ6	T (LVDS)*	NC	-		
K9	PL4B	7	LDQ6	C (LVDS)*	NC	-		
R9	NC	-			NC	-		
U22	NC	-			NC	-		
W9	NC	-			NC	-		
N13	VCCPLL	-			VCCPLL	-		
N18	VCCPLL	-			VCCPLL	-		
V13	VCCPLL	-			VCCPLL	-		
V18	VCCPLL	-			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.
*** These sysCONFIG pins are dedicated I/O pins for configuration. The outpus are actively driven during normal device operation.
****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.

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

LFE2M100E/SE				
Ball Number	**Ball/Pad Function**	**Bank**	**Dual Function**	**Differential**
AG2	PB34A	5	BDQ33	T
AG3	PB34B	5	BDQ33	C
AD13	PB35A	5	BDQ33	T
VCCIO	VCCIO5	5		
AC13	PB35B	5	BDQ33	C
AE14	PB36A	5	BDQ33	T
AC14	PB36B	5	BDQ33	C
AF3	PB37A	5	BDQ33	T
GNDIO	GNDIO5	-		
AF4	PB37B	5	BDQ33	C
-	-	-		
AG4	PB38A	5	BDQ42	T
AG5	PB38B	5	BDQ42	C
GNDIO	GNDIO5	-		
-	-	-		
AD11	PB48A	5	BDQ51	T
AF13	PB48B	5	BDQ51	C
AF12	PB49A	5	BDQ51	T
VCCIO	VCCIO5	5		
AD14	PB49B	5	BDQ51	C
AG8	PB50A	5	BDQ51	T
AF8	PB50B	5	BDQ51	C
AE15	PB51A	5	BDQS51****	T
GNDIO	GNDIO5	-		
-	-	-		
AC15	PB51B	5	BDQ51	C
VCCIO	VCCIO5	5		
GNDIO	GNDIO5	-		
AD15	PB56A	5	BDQ60	T
AF15	PB56B	5	BDQ60	C
AG10	PB57A	5	BDQ60	T
AG9	PB57B	5	BDQ60	C
AH14	PB58A	5	BDQ60	T
AG12	PB58B	5	BDQ60	C
VCCIO	VCCIO5	5		
AG15	PB59A	5	BDQ60	T
AG13	PB59B	5	BDQ60	C
GNDIO	GNDIO5	-		
AF16	PB60A	5	BDQS60	T
AH15	PB60B	5	BDQ60	C
AC16	PB61A	5	VREF2_5/BDQ60	T
AE16	PB61B	5	VREF1_5/BDQ60	C
AG11	PB62A	5	PCLKT5_0/BDQ60	T