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#### Understanding <u>Embedded - FPGAs (Field</u> <u>Programmable Gate Array)</u>

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	2625
Number of Logic Elements/Cells	21000
Total RAM Bits	282624
Number of I/O	193
Number of Gates	-
Voltage - Supply	1.14V ~ 1.26V
Mounting Type	Surface Mount
Operating Temperature	-40°C ~ 100°C (TJ)
Package / Case	256-BGA
Supplier Device Package	256-FPBGA (17x17)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lfe2-20se-6f256i

Email: info@E-XFL.COM

Address: Room A, 16/F, Full Win Commercial Centre, 573 Nathan Road, Mongkok, Hong Kong



#### Figure 2-4. Slice Diagram



WCK is CLK

DI[3:2] for Slice 2 and DI[1:0] for Slice 0 data

WAD [A:D] is a 4bit address from slice 1 LUT input

Table 2-2. Slice Signal Descriptions

Function	Туре	Signal Names	Description
Input	Data signal	A0, B0, C0, D0	Inputs to LUT4
Input	Data signal	A1, B1, C1, D1	Inputs to LUT4
Input	Multi-purpose	MO	Multipurpose Input
Input	Multi-purpose	M1	Multipurpose Input
Input	Control signal	CE	Clock Enable
Input	Control signal	LSR	Local Set/Reset
Input	Control signal	CLK	System Clock
Input	Inter-PFU signal	FC	Fast Carry-in <sup>1</sup>
Input	Inter-slice signal	FXA	Intermediate signal to generate LUT6 and LUT7
Input	Inter-slice signal	FXB	Intermediate signal to generate LUT6 and LUT7
Output	Data signals	F0, F1	LUT4 output register bypass signals
Output	Data signals	Q0, Q1	Register outputs
Output	Data signals	OFX0	Output of a LUT5 MUX
Output	Data signals	OFX1	Output of a LUT6, LUT7, LUT8 <sup>2</sup> MUX depending on the slice
Output	Inter-PFU signal	FCO	Slice 2 of each PFU is the fast carry chain output <sup>1</sup>

1. See Figure 2-4 for connection details.

2. Requires two PFUs.

WRE is from LSR



#### Figure 2-9. Clock Divider Connections



### **Clock Distribution Network**

LatticeECP2/M devices have eight quadrant-based primary clocks and eight flexible region-based secondary clocks/control signals. Two high performance edge clocks are available on each edge of the device to support high speed interfaces. These clock inputs are selected from external I/Os, the sysCLOCK PLLs, DLLs or routing. These clock inputs are fed throughout the chip via a clock distribution system.

#### **Primary Clock Sources**

LatticeECP2/M devices derive clocks from five primary sources: PLL (GPLL and SPLL) outputs, DLL outputs, CLK-DIV outputs, dedicated clock inputs and routing. LatticeECP2/M devices have two to eight sysCLOCK PLLs and two DLLs, located on the left and right sides of the device. There are eight dedicated clock inputs, two on each side of the device, with the exception of the LatticeECP2M 256-fpBGA package devices which have six dedicated clock inputs on the device. Figure 2-10 shows the primary clock sources.



### 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 with18-bit and 36-bit data widths.

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

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



### DQSXFER

LatticeECP2/M devices provide a DQSXFER signal to the output buffer to assist it in data transfer to DDR memories that require DQS strobe be shifted 90°. This shifted DQS strobe is generated by the DQSDEL block. The DQSXFER signal runs the span of the data bus.

### sysl/O Buffer

Each I/O is associated with a flexible buffer referred to as a sysI/O buffer. These buffers are arranged around the periphery of the device in groups referred to as banks. The sysI/O buffers allow users to implement the wide variety of standards that are found in today's systems including LVCMOS, SSTL, HSTL, LVDS and LVPECL.

#### sysl/O Buffer Banks

LatticeECP2/M devices have nine sysl/O buffer banks: eight banks for user I/Os arranged two per side. The ninth sysl/O buffer bank (Bank 8) is located adjacent to Bank 3 and has dedicated/shared I/Os for configuration. When a shared pin is not used for configuration it is available as a user I/O. Each bank is capable of supporting multiple I/O standards. Each sysl/O bank has its own I/O supply voltage ( $V_{CCIO}$ ). In addition, each bank, except Bank 8, has voltage references,  $V_{REF1}$  and  $V_{REF2}$ , which allow it to be completely independent from the others. Bank 8 shares two voltage references,  $V_{REF1}$  and  $V_{REF2}$ , with Bank 3. Figure 2-37 shows the nine banks and their associated supplies.

In LatticeECP2/M devices, single-ended output buffers and ratioed input buffers (LVTTL, LVCMOS and PCI) are powered using  $V_{CCIO}$ . LVTTL, LVCMOS33, LVCMOS25 and LVCMOS12 can also be set as fixed threshold inputs independent of  $V_{CCIO}$ .

Each bank can support up to two separate  $V_{REF}$  voltages,  $V_{REF1}$  and  $V_{REF2}$ , that set the threshold for the referenced input buffers. Some dedicated I/O pins in a bank can be configured to be a reference voltage supply pin. Each I/O is individually configurable based on the bank's supply and reference voltages.



sets of single-ended input buffers (both ratioed and referenced). One of the referenced input buffers can also be configured as a differential input.

The two pads in the pair are described as "true" and "comp", where the true pad is associated with the positive side of the differential input buffer and the comp (complementary) pad is associated with the negative side of the differential input buffer.

# 3. Left and Right (Banks 2, 3, 6 and 7) sysl/O Buffer Pairs (50% Differential and 100% Single-Ended Outputs)

The sysl/O buffer pairs in the left and right banks of the device consist of two single-ended output drivers, two sets of single-ended input buffers (both ratioed and referenced) and one differential output driver. One of the referenced input buffers can also be configured as a differential input. In these banks the two pads in the pair are described as "true" and "comp", where the true pad is associated with the positive side of the differential I/O, and the comp (complementary) pad is associated with the negative side of the differential I/O.

LVDS differential output drivers are available on 50% of the buffer pairs on the left and right banks.

4. Bank 8 sysl/O Buffer Pairs (Single-Ended Outputs, Only on Shared Pins When Not Used by Configuration)

The sysl/O buffers in Bank 8 consist of single-ended output drivers and single-ended input buffers (both ratioed and referenced). The referenced input buffer can also be configured as a differential input.

The two pads in the pair are described as "true" and "comp", where the true pad is associated with the positive side of the differential input buffer and the comp (complementary) pad is associated with the negative side of the differential input buffer.

In LatticeECP2 devices, only the I/Os on the bottom banks have programmable PCI clamps. In LatticeECP2M devices, the I/Os on the left and bottom banks have programmable PCI clamps.

#### Typical sysI/O I/O Behavior During Power-up

The internal power-on-reset (POR) signal is deactivated when  $V_{CC}$ ,  $V_{CCIO8}$  and  $V_{CCAUX}$  have reached satisfactory levels. After the POR signal is deactivated, the FPGA core logic becomes active. It is the user's responsibility to ensure that all other  $V_{CCIO}$  banks are active with valid input logic levels to properly control the output logic states of all the I/O banks that are critical to the application. For more information about controlling the output logic state with valid input logic levels during power-up in LatticeECP2/M devices, see the list of additional technical documentation at the end of this data sheet.

The V<sub>CC</sub> and V<sub>CCAUX</sub> supply the power to the FPGA core fabric, whereas the V<sub>CCIO</sub> supplies power to the I/O buffers. In order to simplify system design while providing consistent and predictable I/O behavior, it is recommended that the I/O buffers be powered-up prior to the FPGA core fabric. V<sub>CCIO</sub> supplies should be powered-up before or together with the V<sub>CC</sub> and V<sub>CCAUX</sub> supplies.

Prior to and throughout programming of the FPGA, the I/O of the device have a weak-pullup resistor to  $V_{CCIO}$  on the input buffer and the output buffer is tri-stated. A pullup to  $V_{CCIO}$  is present on the input until the user programs the input differently in the FPGA design. See the DC Electrical Characteristics table of this data sheet. The pullup value will be between 20-30K ohms based on the  $V_{CCIO}$  voltage supplied on the board. This pullup will also remain active if the design does not use a particular I/O.

#### Supported sysl/O Standards

The LatticeECP2/M sysl/O buffer supports both single-ended and differential standards. Single-ended standards can be further subdivided into LVCMOS, LVTTL and other standards. The buffers support the LVTTL, LVCMOS 1.2V, 1.5V, 1.8V, 2.5V and 3.3V standards. In the LVCMOS and LVTTL modes, the buffer has individual configuration options for drive strength, bus maintenance (weak pull-up, weak pull-down, or a bus-keeper latch) and open drain. Other single-ended standards supported include SSTL and HSTL. Differential standards supported include LVDS, MLVDS, BLVDS, LVPECL, RSDS, differential SSTL and differential HSTL. Tables 2-13 and 2-14 show the I/



## SERDES and PCS (Physical Coding Sublayer)

LatticeECP2M devices feature up to 16 channels of embedded SERDES arranged in quads at the corners of the devices. Figure 2-39 shows the position of the quad blocks in relation to the PFU array for LatticeECP2M70 and LatticeECP2M100 devices. Table 2-15 shows the location of Quads for all the devices.

Each quad contains four dedicated SERDES (Ch0 to Ch3) for high-speed, full-duplex serial data transfer. Each quad also has a PCS block that interfaces to the SERDES channels and contains digital logic to support an array of popular data protocols. PCS also contains logic to the interface to FPGA core.

#### Figure 2-39. SERDES Quads (LatticeECP2M70/LatticeECP2M100)

ULC SERDES Quad	URC SERDES Quad
Ch 3 Ch 2 Ch 1 Ch 0	Ch 3 Ch 2 Ch 1 Ch 0
PCS Digital Logic	PCS Digital Logic
PCS Digital Logic	PCS Digital Logic
Ch 3 Ch 2 Ch 1 Ch 0	Ch 3 Ch 2 Ch 1 Ch 0

LLC SERDES Quad

LRC SERDES Quad

#### Table 2-15. Available SERDES Quads per LatticeECP2M Devices

Device	URC Quad	ULC Quad	LRC Quad	LLC Quad
ECP2M20	Available	—	_	—
ECP2M35	Available	—	_	—
ECP2M50	Available	—	Available	—
ECP2M70	Available	Available	Available	Available
ECP2M100	Available	Available	Available	Available

#### SERDES Block

A differential receiver receives the serial encoded data stream, equalizes the signal, extracts the buried clock and de-serializes the data-stream before passing the 8- or 10-bit data to the PCS logic. The transmit channel receives the parallel (8- or 10-bit) encoded data, serializes the data and transmits the serial bit stream through the differential buffers. There is a single transmit clock per quad. Figure 2-40 shows a single channel SERDES and its interface to the PCS logic. Each SERDES receiver channel provides a recovered clock to the PCS block and to the FPGA core logic.



## **DC Electrical Characteristics**

Symbol	Parameter	Condition	Min.	Тур.	Max.	Units
$I_{\rm IL}, I_{\rm IH}^{1,2}$	Input or I/O Low Leakage	$0 \le V_{IN} \le (V_{CCIO} - 0.2V)$	—	_	10	μΑ
I <sub>IH</sub> <sup>1, 3</sup>	Input or I/O High Leakage	$(V_{CCIO} - 0.2V) < V_{IN} \le 3.6V$	—	_	150	μΑ
I <sub>PU</sub>	I/O Active Pull-up Current	$0 \le V_{IN} \le 0.7 V_{CCIO}$	-30	—	-210	μΑ
I <sub>PD</sub>	I/O Active Pull-down Current	$V_{IL}$ (MAX) $\leq V_{IN} \leq V_{IH}$ (MAX)	30	—	210	μΑ
I <sub>BHLS</sub>	Bus Hold Low Sustaining Current	$V_{IN} = V_{IL}$ (MAX)	30	_	—	μΑ
I <sub>BHHS</sub>	Bus Hold High Sustaining Current	$V_{IN} = 0.7 V_{CCIO}$	-30	—	—	μΑ
I <sub>BHLO</sub>	Bus Hold Low Overdrive Current	$0 \le V_{IN} \le V_{CCIO}$	_	—	210	μΑ
I <sub>BHHO</sub>	Bus Hold High Overdrive Current	$0 \le V_{IN} \le V_{CCIO}$	_	—	-210	μΑ
V <sub>BHT</sub>	Bus Hold Trip Points	$0 \le V_{IN} \le V_{IH}$ (MAX)	$V_{IL}$ (MAX)	—	$V_{\rm IH}$ (MIN)	V
C1⁴	I/O Capacitance	$V_{CCIO} = 3.3V, 2.5V, 1.8V, 1.5V, 1.2V, V_{CC} = 1.2V, V_{IO} = 0 \text{ to } V_{IH} \text{ (MAX)}$	_	5	8	pf
C2⁴	Dedicated Input Capacitance	$V_{CCIO} = 3.3V, 2.5V, 1.8V, 1.5V, 1.2V, V_{CC} = 1.2V, V_{IO} = 0 \text{ to } V_{IH} \text{ (MAX)}$	—	5	6	pf

#### **Over Recommended Operating Conditions**

1. Input or I/O leakage current is measured with the pin configured as an input or as an I/O with the output driver tri-stated. It is not measured with the output driver active. Bus maintenance circuits are disabled.

2. When used as  $V_{\text{REF}}$  maximum leakage = 25uA

3. Applicable to general purpose I/Os in top and bottom banks. 4.  $T_A 25^{\circ}C$ , f = 1.0MHz.



#### MLVDS

The LatticeECP2/M devices support the differential MLVDS standard. This standard is emulated using complementary LVCMOS outputs in conjunction with a parallel resistor across the driver outputs. The MLVDS input standard is supported by the LVDS differential input buffer. The scheme shown in Figure 3-5 is one possible solution for MLVDS standard implementation. Resistor values in Figure 3-5 are industry standard values for 1% resistors.





Table 3-6. MLVDS DC Conditions<sup>1</sup>

		Typical		
Parameter	Description	<b>Ζο=50</b> Ω	<b>Ζο=70</b> Ω	Units
V <sub>CCIO</sub>	Output Driver Supply (+/-5%)	2.50	2.50	V
Z <sub>OUT</sub>	Driver Impedance	10.00	10.00	Ω
R <sub>S</sub>	Driver Series Resistor (+/-1%)	35.00	35.00	Ω
R <sub>TL</sub>	Driver Parallel Resistor (+/-1%)	50.00	70.00	Ω
R <sub>TR</sub>	Receiver Termination (+/-1%)	50.00	70.00	Ω
V <sub>OH</sub>	Output High Voltage	1.52	1.60	V
V <sub>OL</sub>	Output Low Voltage	0.98	0.90	V
V <sub>OD</sub>	Output Differential Voltage	0.54	0.70	V
V <sub>CM</sub>	Output Common Mode Voltage	1.25	1.25	V
I <sub>DC</sub>	DC Output Current	21.74	20.00	mA

1. For input buffer, see LVDS table.

For further information about LVPECL, RSDS, MLVDS, BLVDS and other differential interfaces please see the list of additional technical information at the end of this data sheet.



LFE2-20E/SE									
Ball Number	Ball Number	Ball/Pad Function	Bank	Dual Function	Differential				
J13	J13	PR28B	3	RLM0_GDLLC_FB_A/RDQ25	С				
J12	J12	PR28A	3	RLM0_GDLLT_FB_A/RDQ25	Т				
H12	H12	PR27B	3	RLM0_GDLLC_IN_A**/RDQ25	C (LVDS)*				
GND	GND	GNDIO3	-						
H13	H13	PR27A	3	RLM0_GDLLT_IN_A**/RDQ25	T (LVDS)*				
H15	H15	PR22B	3	VREF2_3/RDQ25	С				
VCCIO	VCCIO	VCCIO3	3						
H16	H16	PR22A	3	VREF1_3/RDQ25	Т				
H11	H11	PR21B	3	PCLKC3_0/RDQ25	C (LVDS)*				
J11	J11	PR21A	3	PCLKT3_0/RDQ25	T (LVDS)*				
G16	G16	PR19B	2	PCLKC2_0/RDQ16	С				
GND	GND	GNDIO2	-						
G15	G15	PR19A	2	PCLKT2_0/RDQ16	Т				
F15	F15	PR17B	2	RDQ16	С				
G11	G11	PR18B	2	RDQ16	C (LVDS)*				
F14	F14	PR17A	2	RDQ16	Т				
VCCIO	VCCIO	VCCIO2	2						
F12	F12	PR18A	2	RDQ16	T (LVDS)*				
G14	G14	PR16B	2	RDQ16	C (LVDS)*				
G13	G13	PR16A	2	RDQS16	T (LVDS)*				
GND	GND	GNDIO2	-						
F16	F16	PR14B	2	RDQ16	C (LVDS)*				
F9	F9	PR15B	2	RDQ16	С				
E16	E16	PR14A	2	RDQ16	T (LVDS)*				
F10	F10	PR15A	2	RDQ16	Т				
VCCIO	VCCIO	VCCIO2	2						
D16	D16	PR13B	2	RDQ16	С				
D15	D15	PR13A	2	RDQ16	Т				
C15	C15	PR6B	2	RDQ8	C (LVDS)*				
C16	C16	PR7B	2	RDQ8	С				
GND	GND	GNDIO2	-						
D14	D14	PR6A	2	RDQ8	T (LVDS)*				
B16	B16	PR7A	2	RDQ8	Т				
F13	F13	PR2B	2	VREF2_2	C (LVDS)*				
VCCIO	VCCIO	VCCIO2	2						
E13	E13	PR2A	2	VREF1_2	T (LVDS)*				
F11	F11	PT64B	1	VREF2_1	С				
E11	E11	PT64A	1	VREF1_1	Т				
GND	GND	GNDIO1	-						
A15	A15	PT63B	1		С				
E12	E12	PT62B	1		С				
B15	B15	PT63A	1		Т				



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

Ball/Pad DistBall/Pad Pad Pad Pad PadBall/Pad <br< th=""><th></th><th colspan="5">LFE2-35E/SE</th><th colspan="4">LFE2-50E/SE</th></br<>		LFE2-35E/SE					LFE2-50E/SE			
D15         PTS2A         1         C         PTG1A         1         C         T           E15         PTS1B         1         C         PTG0A         1         C         T           GNDIO         GNDIO1         -         C         OTG0A         1         T         T           GNDIO         GNDIO1         -         C         OTG0A         1         T         T           GNDIO         VCCIO         1         C         PTS8B         1         C         T           AT         PT48B         1         C         PTS7B         1         T         T           AT         PT48A         1         C         PT57B         1         C         C           AT         PT48A         1         C         PT57B         1         C         C           GNDIO         GNDIO1         -         C         PT57B         1         C         C           GNDIO         GNDIO1         -         C         PT57B         1         C         C           GNDIO         GNDIO1         -         C         PT57B         1         C         C           GNDIO	Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential	
E15         PTS1B         1         C         PT60B         1         CC           F15         PTS1A         1         T         PT60B         1         T           GNDI0         GNDI01         -         C         GNDI01         -         C           B15         PT38B         1         C         PTS8B         1         C         C           GNDI0         A1         PT49A         1         C         PT57A         1         C         C           A14         PT48B         1         C         PT57A         1         C         C           GNDI0         GNDI01         -         C         PT57A         1         C         C           GNDI0         GNDI01	D15	PT52A	1		Т	PT61A	1		Т	
Fis         PTSIA         I         PTGAA         I         PTGAA         I         PTGAA           BISDIO         GNDIOI         I         C         PTSBA         I         C           BIS         PT49B         I         C         PTSBA         I         C           BIS         PT49B         I         T         PTSBA         I         C           BI4         PT48B         I         C         PTSBA         I         C           AIS         PT48B         I         C         PTSBA         I         C           AI4         PT48B         I         C         PTSBA         I         C         C           AI4         PT48B         I         C         PTSBA         I         C         C           BI00         GND101         -         C         PTSBA         I         C         C           F14         PT48B         I         C         PTSBA         I         C         C           B13         PT44A         I         C         PTSBA         I         C         C           B13         PT44B         I         C         PTSBA         I	E15	PT51B	1		C	PT60B	1		С	
GND(0)         C         GND(0)         C         GND(0)         C           B15         PT48B         1         C         PT58B         1         C           VCCIO         VCCIO         1         T         PT58B         1         C           A15         PT48A         1         T         PT57B         1         C           A14         PT48B         1         C         PT57B         1         C           C13         PT48A         1         T         PT57A         1         C           GNDIO         SNDIO1         C         PT58A         1         C         C           GNDIO         SNDIO1         C         PT58A </td <td>F15</td> <td>PT51A</td> <td>1</td> <td></td> <td>Т</td> <td>PT60A</td> <td>1</td> <td></td> <td>Т</td>	F15	PT51A	1		Т	PT60A	1		Т	
Bits         PT48B         1         C         PT58B         1         C         C           A15         PT49A         1         T         PT58A         1         T         T           B14         PT48A         1         C         PT57B         1         C         T           B14         PT48A         1         C         PT57A         1         C         C           D14         PT48A         1         C         PT57A         1         C         C           D14         PT48A         1         C         PT57A         1         C         C           B13         PT48A         1         C         PT53B         1         C         C           B13         PT44B         1         C         PT52B         1         C         C           B13         PT44B         1         C         PT52B         1         C         C           D12         PT42B         1         C         PT52B         1         C         C           D13         PT43A         1         C         PT52B         1         C         C           D14         PT42B	GNDIO	GNDIO1	-			GNDIO1	-			
VCCIO         VCCIO         VCCIO         I         I           A15         PT49A         1         T         PT57A         1         T           B14         PT49A         1         T         PT57A         1         C         C           B14         PT49A         1         T         PT57A         1         C         C           B14         PT49B         1         C         PT57B         1         C         C           GNDIO         GNDIO1         -         C         PT58A         1         C         C           E14         PT48B         1         C         PT54A         1         C         C           B13         PT44A         1         C         PT52B         1         C         C           B13         PT43B         1         C         PT52B         1         C         C           D13         PT43A         1         C         PT52B         1         C         C           D12         PT42A         1         C         PT51A         1         C         C           D13         PT42A         1         C         PT51A <t< td=""><td>B15</td><td>PT49B</td><td>1</td><td></td><td>С</td><td>PT58B</td><td>1</td><td></td><td>C</td></t<>	B15	PT49B	1		С	PT58B	1		C	
A15       P149A       1       T       P158A       1       T         B14       P148B       1       C       P157B       1       C         A14       P148B       1       C       P157B       1       C         D14       P148B       1       C       P155A       1       C         GNDIO       GNDIO1       -       C       P155A       1       C         GNDIO       GNDIO1       -       GNDIO1       -       C       C         F14       P146A       1       C       P153A       1       C       C         F14       P145B       1       C       P153A       1       C       C         F14       P145A       1       C       P153A       1       C       C         B13       P144A       1       C       P153A       1       C       C         F13       P143B       1       C       P153A       1       C       C         D12       P142B       1       C       P151B       1       C       C         D12       P142B       1       C       P151B       1       C       C	VCCIO	VCCIO1	1		_	VCCIO	1		_	
B14         P148B         1         C         P157A         1         C           D14         PT46A         1         T         PT57A         1         T           D14         PT46A         1         C         PT57A         1         C           G13         PT46A         1         C         PT57A         1         C           B14         PT46B         1         C         PT57A         1         C           E14         PT48B         1         C         PT54B         1         C           B13         PT44A         1         C         PT53A         1         C         C           B13         PT44A         1         C         PT53A         1         C         C           B13         PT44A         1         C         PT52A         1         C         C           B13         PT43A         1         C         PT52A         1         C         C           B13         PT43A         1         C         PT52A         1         C         C           B13         PT42A         1         C         PT52A         1         C         C </td <td>A15</td> <td>PT49A</td> <td>1</td> <td></td> <td>T</td> <td>PT58A</td> <td>1</td> <td></td> <td>T</td>	A15	PT49A	1		T	PT58A	1		T	
Ai4       P148B       1       T       P157A       1       T         Di4       P148B       1       C       P755B       1       C         C13       P746A       1       T       P755B       1       T         GND(0       GND(1       -       GND(1       -       T         E14       P745B       1       C       P754B       1       C         F14       P745B       1       C       P754B       1       C         F14       P745B       1       C       P753B       1       T         A13       P744A       1       C       P753B       1       C       T         VCCIO       VCCIO1       1       C       P752A       1       T       T         D13       P743B       1       C       P752A       1       T       C         D12       P742A       1       C       P751B       1       C       C         D13       P742A       1       T       P752A       1       T       C         D14       P742B       1       C       P751B       1       C       C         D	B14	PT48B	1		C	PT57B	1		С	
D14         P146B         1         C         P155B         1         C         C           GNDIO         GNDIO1         -         T         PT55B         1         T <td>A14</td> <td>PT48A</td> <td>1</td> <td></td> <td>T</td> <td>PT57A</td> <td>1</td> <td></td> <td>T</td>	A14	PT48A	1		T	PT57A	1		T	
C13       P146A       1       T       P155A       1       T         GNDIO       GNDIO1       -       GNDIO1       -       C         E14       P745B       1       C       P754A       1       C         F14       P745A       1       T       P754A       1       T         A13       P744B       1       T       P753B       1       C         B13       P744A       1       T       P753B       1       T         VCCIO       VCCIO1       1       T       P753B       1       T         B13       P743B       1       C       P753B       1       T       T         TE12       P743B       1       C       P752B       1       T       T         B13       P743A       1       T       T       P752A       1       T       T         B13       P743A       1       C       P753B       1       C       T       T         B13       P743A       1       T       P754A       1       T       T         B14       P742A       1       T       T       P71A       T       T	D14	PT46B	1		C	PT55B	1		C –	
GNDIO         GNDIO1         -         GNDIO1         -           E14         PT45B         1         C         PT54B         1         C           F14         PT45A         1         T         PT54A         1         C           B13         PT44B         1         C         PT53B         1         C           B13         PT44A         1         C         PT53B         1         C           E13         PT43B         1         C         PT53B         1         C           E13         PT43A         1         C         PT52B         1         C           E12         PT42B         1         C         PT51B         1         C         C           D12         PT42B         1         C         PT51A         1         T         T           GNDIO         GNDIO1         -         GNDIO1         -         C         C         T           GNDIO         GNDIO         -         T         PT63A         1         T         T           GNDIO         GNDIO         -         T         PT48A         1         PCLKC1_0         C           E12	C13	PT46A	1		Т	PT55A	1		Т	
E14       PT45B       1       C       PT54B       1       C         F14       PT45A       1       T       PT53B       1       T         H33       PT44B       1       T       PT53B       1       T         B13       PT44B       1       T       PT53A       1       T         VCIO       VCCIO1       1       T       PT53B       1       T         VCIO       VCCIO1       1       T       PT53A       1       T         VCIO       VCCIO1       1       T       PT53A       1       T         D13       PT43B       1       C       PT51B       1       C       T         D12       PT42A       1       T       PT51A       1       T       T         GNDIO       GNDIO1       -       GNDIO1       -       T       T         A11       PT40A       1       T       T       PT49B       1       T         GNDIO       GNDIO1       -       T       PT49A       1       T       T         B12       PT39B       1       PCLKC1_0       T       PT48A       1       PCLKC1_0 <t< td=""><td>GNDIO</td><td>GNDIO1</td><td>-</td><td></td><td></td><td>GNDIO1</td><td>-</td><td></td><td>_</td></t<>	GNDIO	GNDIO1	-			GNDIO1	-		_	
Fi4       PT45A       1       T       PT5AA       1       T         A13       PT44B       1       C       PT53B       1       C         B13       PT44A       1       T       PT53B       1       C         VCCIO       VCCIO1       1       T       PT53B       1       C         B13       PT43A       1       C       PT52B       1       C         D13       PT43A       1       C       PT52B       1       C         D13       PT43A       1       C       PT52B       1       C         D13       PT43A       1       C       PT52B       1       C         D14       PT42B       1       C       PT51A       1       C         D12       PT42A       1       C       PT51A       1       C         A11       PT40B       1       C       PT49B       1       C         A11       PT40A       1       PCLKC1_0       C       PT48B       1       PCLKC1_0       C         C12       PT39A       1       PCLKC1_0       C       PT48B       1       PCLKT_0       T	E14	PT45B	1		C	PT54B	1		C	
A13       PT44B       1       C       PT53B       1       C       T         B13       PT44A       1       T       PT53A       1       T         VCCIO       VCCIO1       1       VCCIO       1       T         E13       PT43B       1       C       PT53A       1       C         B13       PT43B       1       C       PT52B       1       C         D13       PT43B       1       C       PT52A       1       C         D12       PT42A       1       C       PT51A       1       C         D12       PT42A       1       C       PT51A       1       C         GNDIO       GNDIO1       -       GNDIO1       -       C         A12       PT40A       1       T       PT51A       1       C         GNDIO       VCCIO       1       T       PT49B       1       C       C         B12       PT39A       1       PCLKC1_0       C       PT48A       1       PCLKC1_0       C         B10       PT37B       0       PCLKT0_0       T       PT48A       0       PCLKC0_0       C      <	F14	PT45A	1		Т	PT54A	1		Т	
B13         PT44A         1         T         PT53A         1         T           VCCIO         VCCIO1         1          VCCIO         1            E13         PT43B         1         C         PT52B         1          C           D13         PT43A         1         T         PT52A         1          C           D12         PT42A         1         C         PT51B         1          C           BNID         GNDIO1         -          GNDIO1         -          T           A12         PT40B         1          C         PT49A         1          T           VCCIO         VCCIO1         1          T         PT49A         1          T           VCCIO         VCCIO1         1          T         PT49A         1          T           VCCIO         VCCIO1         1          T         PT49A         1         PCLKC1_0         C           VCCIO         VCCIO1         1          T         PT49A         1         PCLKC1_0	A13	PT44B	1		С	PT53B	1		С	
VCCIO         VCCIO         1         VCCIO         1           E13         PT43B         1         C         PT52B         1         C           D13         PT43A         1         T         PT52A         1         T           E12         PT42B         1         C         PT51B         1         C           D12         PT42A         1         T         PT51A         1         T           GNDIO         -         GNDIO1         -         GNDIO1         -         T           A12         PT40B         1         C         PT49B         1         T         T           VCCIO         VCCIO1         1         T         PT49B         1         T         T           VCCIO         VCCIO1         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         C           B12         PT39A         1         PCLKT1_0         T         PT48B         1         PCLKC1_0         C           F12         XRES         1          XRES         1          C           B10         PT37A         0         PCLKT0_0         T         PT	B13	PT44A	1		Т	PT53A	1		Т	
E13       PT438       1       C       PT528       1       C         D13       PT43A       1       T       PT52A       1       T         E12       PT42B       1       C       PT51B       1       C         D10       GNDIO       -       T       PT51A       1       C         GNDIO       GNDIO1       -       GNDIO1       -       T         A12       PT40A       1       T       PT51A       1       T         A12       PT40B       1       C       PT49B       1       C         A11       PT40A       1       T       PT49A       1       T         VCCIO       VCCIO1       1       PCLKC1_0       C       PT48B       1       PCLKC1_0       C         B12       PT39B       1       PCLKC1_0       T       PT48B       1       PCLKC1_0       C         B10       PT37B       0       PCLKC0_0       C       PT48B       0       PCLKC0_0       C         B11       PT37B       0       PCLKT0_0       T       PT46A       0       PCLKT0_0       T         A11       PT37B       0	VCCIO	VCCIO1	1			VCCIO	1			
D13         PT43A         1         T         PT52A         1         T           E12         PT42B         1         C         PT51A         1         C           D12         PT42A         1         T         PT51A         1         T           GNDIO         GMDIO1         -         GNDIO1         -         T         T           A12         PT40B         1         C         PT49A         1         C         T           A11         PT40A         1         T         PT49A         1         T         T           A11         PT40B         1         C         PT49A         1         C         C           A11         PT30A         1         PCLKC1_0         C         PT48B         1         PCLK1_0         T           B12         PT39A         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         C           B10         PT37B         0         PCLKC0_0         C         PT46A         0         PCLKC0_0         C           B11         PT36A         0         C         PT46A         0         C         C           A9 <td>E13</td> <td>PT43B</td> <td>1</td> <td></td> <td>С</td> <td>PT52B</td> <td>1</td> <td></td> <td>С</td>	E13	PT43B	1		С	PT52B	1		С	
E12       PT42B       1       C       PT51B       1       C       C         D12       PT42A       1       T       PT51B       1       T       T         GNDIO       -       GNDIO1       -       GNDIO1       -       T       T         A12       PT40B       1       C       PT49B       1       C       T         A11       PT40A       1       T       PT49A       1       T       T         VCCIO       VCCIO1       1       T       PT49A       1       PCLKC1_0       C         B12       PT39B       1       PCLKC1_0       C       PT48B       1       PCLKT1_0       T         F12       XRES       1       PCLKC1_0       T       PT48B       0       PCLKT1_0       T         F12       XRES       1       PCLKC0_0       C       PT46B       0       PCLKC0_0       C         GNDIO       GNDIO0       -       PT37B       0       PCLKC0_0       T       T         B11       PT37A       0       PCLKT0_0       T       PT46A       0       PCLKT0_0       T         A10       PT36A       0	D13	PT43A	1		Т	PT52A	1		Т	
D12         PT42A         1         T         PT51A         1         T         PT61A         1           GNDIO         GNDIO1         -         GNDIO1         -         GNDIO1         -            A12         PT40B         1         C         PT49B         1         C         GNDIO1         -         C           A11         PT40A         1         T         PT49A         1         T         T           VCCIO         VCCIO1         1         T         PT49A         1         T         T           B12         PT39B         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         T           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           B11         PT37A         0         PCLKT0_0         T         PT46A         0         PCLKT0_0         T           A10         PT36B         0         C         PT45B         0         C         C           A11         PT36B         0         C         PT45A         0         C         C           A10         PT35B	E12	PT42B	1		С	PT51B	1		С	
GNDIO         GNDIO1         -         GNDIO1         -           A12         PT40B         1         C         PT49B         1         C           A11         PT40A         1         T         PT49B         1         C           A11         PT40A         1         T         PT49B         1         C           VCCIO         VCCIO1         1         T         PT49A         1         PCLKC1_0         C           B12         PT39B         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         C           C12         PT39A         1         PCLKC1_0         T         PT48A         1         PCLKC1_0         T           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           B11         PT37A         0         PCLKT0_0         T         PT46A         0         C         C           A10         PT36A         0         C         PT44B         0         C         C     <	D12	PT42A	1		Т	PT51A	1		Т	
A12       PT40B       1       C       PT49B       1       C         A11       PT40A       1       T       PT49A       1       T         VCCI0       VCCI01       1       T       VC10       1       T         B12       PT39B       1       PCLKC1_0       C       PT48A       1       PCLKC1_0       C         C12       PT39A       1       PCLKC1_0       T       PT48A       1       PCLKC1_0       T         F12       XRES       1       PCLKC1_0       T       PT48B       0       PCLKC0_0       T         B10       PT37B       0       PCLKC0_0       C       PT46B       0       PCLKC0_0       C         GNDIO       -        GNDIO0       0       -       -       GNDIO0       0       -         B11       PT37A       0       PCLKT0_0       T       PT46A       0       PCLKT0_0       T         A10       PT36B       0       C       PT45A       0       C       C         A11       PT36A       0       C       PT45A       0       C       C         C11       PT36A       0       C	GNDIO	GNDIO1	-			GNDIO1	-			
A11PT40A1TPT49A1TVCCI0VCCI011VCCI01VCCI01B12PT39B1PCLKC1_0CPT48B1PCLKC1_0CC12PT39A1PCLKT1_0TPT48A1PCLKT1_0TF12XRES1PCLKT0_0CPT48B1PCLKC0_0CB10PT37B0PCLKC0_0CPT48B0PCLKC0_0CGNDI0GNDI00-CPT46A0PCLKC0_0TB11PT37A0PCLKT0_0TPT46A0PCLKT0_0TA10PT36B0CPT45B0CCA9PT36A0CPT45A0CCA9PT35B0CCPT44B0CCC11PT35B0CCPT44B0CCC11PT35A0CPT45A0CCC10PT35A0CPT43A0CCC11PT34A0CPT43A0CCC11PT35A0CPT45B0CCC11PT34A0CPT43A0CCC11PT34A0CPT43A0CCC11PT34B0CCPT43A0CC11PT3	A12	PT40B	1		С	PT49B	1		С	
VCCIO         VCCIO1         1         PCLKC1_0         VCCIO         1         PCLKC1_0         C           B12         PT39B         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         C           C12         PT39A         1         PCLKT1_0         T         PT48A         1         PCLKC1_0         T           F12         XRES         1         PCLKC0_0         C         PT48B         0         PCLKC0_0         C           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           B11         PT37A         0         PCLKT0_0         T         GNDIO0         0         C         T           B11         PT37A         0         PCLKT0_0         T         GNDIO0         0         C         T           A10         PT36A         0         C         PT46A         0         C         C           A11         PT36B         0         C         PT45B         0         C         C           A11         PT36A         0         C         PT45B         0         C         C           VCCIO	A11	PT40A	1		Т	PT49A	1		Т	
B12         PT39B         1         PCLKC1_0         C         PT48B         1         PCLKC1_0         C           C12         PT39A         1         PCLKT1_0         T         PT48A         1         PCLKT1_0         T           F12         XRES         1          XRES         1           XRES         1           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           GNDIO         -          GNDIO0         0          C         GNDIO0         0            B11         PT37A         0         PCLKT0_0         T         PT46A         0         PCLKT0_0         T           A10         PT36B         0          C         PT45B         0         C         C           A9         PT36A         0          C         PT45A         0         C         C           C11         PT35B         0          C         PT44B         0         C         C           VCCI0         VCCI00         0          T         PT44A         0	VCCIO	VCCIO1	1			VCCIO	1			
C12         PT39A         1         PCLKT1_0         T         PT48A         1         PCLKT1_0         T           F12         XRES         1          XRES         1	B12	PT39B	1	PCLKC1_0	С	PT48B	1	PCLKC1_0	С	
F12         XRES         1         XRES         1           B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           GNDIO         GNDIO0         -         GNDIO0         0         C         GNDIO0         0         C           B11         PT37A         0         PCLKT0_0         T         PT46A         0         PCLKT0_0         T           A10         PT36B         0         C         PT45B         0         C         C           A9         PT36A         0         C         PT45A         0         C         C           A9         PT35B         0         C         PT45B         0         C         C           C11         PT35B         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         T         PT44A         0         T         C           F11         PT34B         0         C         PT43B         0         C         C	C12	PT39A	1	PCLKT1_0	Т	PT48A	1	PCLKT1_0	Т	
B10         PT37B         0         PCLKC0_0         C         PT46B         0         PCLKC0_0         C           GNDIO         GNDIO0         -         GNDIO         GNDIO0         0             GNDIO0         0            GNDIO         0          T          GNDIO         0          T          GNDIO         T          T          T          T          T          T          T          T	F12	XRES	1			XRES	1			
GNDIO         GNDIO0         -         GNDIO         0         C           B11         PT37A         0         PCLKT0_0         T         PT46A         0         PCLKT0_0         T           A10         PT36B         0         C         PT45B         0         C         C           A9         PT36A         0         T         PT45A         0         T         T           C11         PT35B         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         T         PT44B         0         C         C           VCCIO         VCCIO0         0         T         PT44A         0         T         T           E11         PT34B         0         C         PT43B         0         C         C           F11         PT34A         0         C         C         PT42B         0         C           A7         PT3	B10	PT37B	0	PCLKC0_0	С	PT46B	0	PCLKC0_0	С	
B11         PT37A         0         PCLKT0_0         T         PT46A         0         PCLKT0_0         T           A10         PT36B         0         C         PT45B         0         C         C           A9         PT36A         0         T         PT45A         0         T         T           C11         PT35B         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         C         PT44B         0         C         C           VCCIO         VCCIO0         0         T         PT44A         0         C         C           VCCIO         VCCIO0         0         T         PT44A         0         T         C           C10         PT35A         0         T         PT44A         0         T         T           E11         PT34B         0         C         PT43B         0         C         C           F11         PT34A         0         T         PT43A         0         C         C           A8         PT33B         0         C         PT42B         0         C         C	GNDIO	GNDIO0	-			GNDIO0	0			
A10         PT36B         0         C         PT45B         0         C           A9         PT36A         0         T         PT45A         0         T           C11         PT35B         0         C         PT44B         0         C           VCCIO         VCCIO0         0         C         PT44B         0         C           VCCIO         VCCIO0         0         VCCIO         0         T           C10         PT35A         0         T         PT44A         0         T           E11         PT34B         0         C         PT43B         0         C           F11         PT34A         0         T         PT43A         0         T           A8         PT33B         0         C         PT42B         0         C           A7         PT33A         0         C         PT42B         0         C           B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C           B9         PT32A         0         T         PT41A         0	B11	PT37A	0	PCLKT0_0	Т	PT46A	0	PCLKT0_0	Т	
A9         PT36A         0         T         PT45A         0         T           C11         PT35B         0         C         PT44B         0         C           VCCIO         VCCIO0         0         VCCIO         0         C         T           C10         PT35A         0         T         PT44A         0         T           E11         PT34B         0         C         PT43B         0         C           F11         PT34A         0         C         PT43B         0         C           F11         PT34A         0         T         PT43A         0         T           A8         PT33B         0         C         PT42B         0         C           A7         PT33A         0         C         PT42B         0         C           A7         PT33A         0         C         PT42A         0         C           B8         PT32B         0         C         PT41B         0         C           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         C         <	A10	PT36B	0		С	PT45B	0		С	
C11         PT35B         0         C         PT44B         0         C           VCCIO         VCCIO0         0         VCCIO         0         T         VCCIO         0         T           C10         PT35A         0         T         PT44A         0         T         T           E11         PT34B         0         C         PT43B         0         C         T           F11         PT34A         0         T         PT43A         0         T         C           F11         PT34A         0         T         PT43A         0         T         C           F38         PT33B         0         C         PT41B         0         C         C           B8         PT32B         0         C         PT41B         0         C         C           GNDIO         GNDIO0         -         GNDIO0         0         C         C           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         VCCIO         0         T           B7         PT30B         0         C	A9	PT36A	0		Т	PT45A	0		Т	
VCCIO         VCCIO         0         VCCIO         0           C10         PT35A         0         T         PT44A         0         T           E11         PT34B         0         C         PT43B         0         C           F11         PT34A         0         T         PT43A         0         T           A8         PT33B         0         C         PT42B         0         C           A7         PT33A         0         C         PT42B         0         C           B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         PT41A         0         T           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         PT39B         0         C           B7         PT30B         0         C         PT39B         0         C	C11	PT35B	0		С	PT44B	0		С	
C10       PT35A       0       T       PT44A       0       T         E11       PT34B       0       C       PT43B       0       C         F11       PT34A       0       T       PT43A       0       T         A8       PT33B       0       C       PT42B       0       C         A7       PT33A       0       C       PT42B       0       C         B8       PT32B       0       C       PT41B       0       C         GNDIO       GNDIO0       -       C       PT41B       0       C         B9       PT32A       0       T       PT41A       0       T         VCCIO       VCCIO0       0       T       PT41A       0       T         B7       PT30B       0       C       PT39B       0       C         A6       PT30A       0       T       PT39A       0       T	VCCIO	VCCIO0	0			VCCIO	0			
E11         PT34B         0         C         PT43B         0         C           F11         PT34A         0         T         PT43B         0         T           A8         PT33B         0         C         PT42B         0         C           A7         PT33A         0         T         PT42A         0         T           B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         VCCIO         0         C           B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	C10	PT35A	0		Т	PT44A	0		Т	
F11       PT34A       0       T       PT43A       0       T         A8       PT33B       0       C       PT42B       0       C         A7       PT33A       0       T       PT42A       0       T         B8       PT32B       0       C       PT41B       0       C         GNDIO       GNDIO0       -       C       GNDIO0       0       C         B9       PT32A       0       T       PT41A       0       T         VCCIO       VCCIO0       0       T       VCCIO       0       C         B7       PT30B       0       C       PT39B       0       C         A6       PT30A       0       T       PT39A       0       T	E11	PT34B	0		С	PT43B	0		С	
A8         PT33B         0         C         PT42B         0         C           A7         PT33A         0         T         PT42A         0         T           B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C         C           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         VCCIO         0         T           B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	F11	PT34A	0		Т	PT43A	0		Т	
A7         PT33A         0         T         PT42A         0         T           B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C         GNDIO0         0           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         T         VCCIO         0         T           B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	A8	PT33B	0		С	PT42B	0		С	
B8         PT32B         0         C         PT41B         0         C           GNDIO         GNDIO0         -         GNDIO0         0         C         GNDIO0         0         C           B9         PT32A         0         T         PT41A         0         T         T           VCCIO         VCCIOO         0         C         VCCIO         0         C         C           B7         PT30B         0         C         PT39B         0         C         C           A6         PT30A         0         T         PT39A         0         T         T	A7	PT33A	0		Т	PT42A	0		Т	
GNDIO         GNDIO0         -         GNDIO         0         GNDIO0         0           B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         VCCIO         0         T         VCCIO         0         C           B7         PT30B         0         C         PT39B         0         C         C           A6         PT30A         0         T         PT39A         0         T	B8	PT32B	0		С	PT41B	0		С	
B9         PT32A         0         T         PT41A         0         T           VCCIO         VCCIO0         0         VCCIO         0         T           B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	GNDIO	GNDIO0	-			GNDIO0	0		1	
VCCIO         VCCIO         0         VCCIO         0           B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	B9	PT32A	0		Т	PT41A	0		Т	
B7         PT30B         0         C         PT39B         0         C           A6         PT30A         0         T         PT39A         0         T	VCCIO	VCCIO0	0			VCCIO	0			
A6 PT30A 0 T PT39A 0 T	B7	PT30B	0		С	PT39B	0		С	
	A6	PT30A	0		Т	PT39A	0		Т	



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

		L	FE2-35E/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	-		1
A1	GND	-			GND	-		1
N18	VCCPLL	-			VCCPLL	-		1
K6	NC	-			VCCPLL	-		1
N6	VCCPLL	-			VCCPLL	-		1
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.



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

		I	LFE2-50E/SE	LFE2-70E/SE				
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
U24	PR63B	3	RLM0_GPLLC_IN_A**/RDQ67	C (LVDS)*	PR76B	3	RLM0_GPLLC_IN_A**/RDQ80	C (LVDS)*
U25	PR63A	3	RLM0_GPLLT_IN_A**/RDQ67	T (LVDS)*	PR76A	3	RLM0_GPLLT_IN_A**/RDQ80	T (LVDS)*
R20	RLM0_PLLCAP	3			RLM0_PLLCAP	3		
P18	VCCPLL	3			VCCPLL	-		
T19	PR61B	3	RLM0_GDLLC_FB_A/RDQ58	С	PR74B	3	RLM0_GDLLC_FB_A/RDQ71	C
U20	PR61A	3	RLM0_GDLLT_FB_A/RDQ58	Т	PR74A	3	RLM0_GDLLT_FB_A/RDQ71	Т
GND	GNDIO3	-			GNDIO3	-		
T25	PR60B	3	RLM0_GDLLC_IN_A**/RDQ58	C (LVDS)*	PR73B	3	RLM0_GDLLC_IN_A**/RDQ71	C (LVDS)*
T26	PR60A	3	RLM0_GDLLT_IN_A**/RDQ58	T (LVDS)*	PR73A	3	RLM0_GDLLT_IN_A**/RDQ71	T (LVDS)*
T20	PR59B	3	RDQ58	С	PR72B	3	RDQ71	С
T22	PR59A	3	RDQ58	Т	PR72A	3	RDQ71	Т
VCCIO	VCCIO3	3			VCCIO3	3		
R26	PR58B	3	RDQ58	C (LVDS)*	PR71B	3	RDQ71	C (LVDS)*
R25	PR58A	3	RDQS58	T (LVDS)*	PR71A	3	RDQS71	T (LVDS)*
R22	PR57B	3	RDQ58	С	PR70B	3	RDQ71	С
GND	GNDIO3	-			GNDIO3	-		
T21	PR57A	3	RDQ58	Т	PR70A	3	RDQ71	Т
P26	PR56B	3	RDQ58	C (LVDS)*	PR69B	3	RDQ71	C (LVDS)*
P25	PR56A	3	RDQ58	T (LVDS)*	PR69A	3	RDQ71	T (LVDS)*
R24	PR55B	3	RDQ58	С	PR68B	3	RDQ71	С
VCCIO	VCCIO3	3			VCCIO3	3		
R23	PR55A	3	RDQ58	Т	PR68A	3	RDQ71	Т
P20	PR54B	3	RDQ58	C (LVDS)*	PR67B	3	RDQ71	C (LVDS)*
R19	PR54A	3	RDQ58	T (LVDS)*	PR67A	3	RDQ71	T (LVDS)*
P21	PR53B	3	RDQ50	С	PR66B	3	RDQ63	С
GND	GNDIO3	-			GNDIO3	-		
P19	PR53A	3	RDQ50	Т	PR66A	3	RDQ63	Т
P23	PR52B	3	RDQ50	C (LVDS)*	PR65B	3	RDQ63	C (LVDS)*
P22	PR52A	3	RDQ50	T (LVDS)*	PR65A	3	RDQ63	T (LVDS)*
N22	PR51B	3	RDQ50	С	PR64B	3	RDQ63	С
VCCIO	VCCIO3	3			VCCIO3	3		
R21	PR51A	3	RDQ50	Т	PR64A	3	RDQ63	Т
N26	PR50B	3	RDQ50	C (LVDS)*	PR63B	3	RDQ63	C (LVDS)*
N25	PR50A	3	RDQS50	T (LVDS)*	PR63A	3	RDQS63	T (LVDS)*
GND	GNDIO3	-			GNDIO3	-		
N19	PR49B	3	RDQ50	С	PR62B	3	RDQ63	С
N20	PR49A	3	RDQ50	Т	PR62A	3	RDQ63	Т
M26	PR48B	3	RDQ50	C (LVDS)*	PR61B	3	RDQ63	C (LVDS)*
M25	PR48A	3	RDQ50	T (LVDS)*	PR61A	3	RDQ63	T (LVDS)*
VCCIO	VCCIO3	3			VCCIO3	3		
N18	PR47B	3	VREF2_3/RDQ50	С	PR60B	3	VREF2_3/RDQ63	С
N21	PR47A	3	VREF1_3/RDQ50	Т	PR60A	3	VREF1_3/RDQ63	Т
L26	PR46B	3	PCLKC3_0/RDQ50	C (LVDS)*	PR59B	3	PCLKC3_0/RDQ63	C (LVDS)*
L25	PR46A	3	PCLKT3_0/RDQ50	T (LVDS)*	PR59A	3	PCLKT3_0/RDQ63	T (LVDS)*
N24	PR44B	2	PCLKC2_0/RDQ41	С	PR57B	2	PCLKC2_0/RDQ54	С
M23	PR44A	2	PCLKT2_0/RDQ41	Т	PR57A	2	PCLKT2_0/RDQ54	Т



LFE2-70E/SE									
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential					
AJ6	PB16A	5	BDQ15	Т					
AK6	PB16B	5	BDQ15	С					
VCCIO	VCCIO5	5							
GND	GNDIO5	-							
AD10	PB29A	5	BDQ33	Т					
AF10	PB29B	5	BDQ33	С					
AC11	PB30A	5	BDQ33	Т					
AD11	PB30B	5	BDQ33	С					
AG9	PB31A	5	BDQ33	Т					
AH9	PB31B	5	BDQ33	С					
VCCIO	VCCIO5	99							
AE11	PB32A	5	BDQ33	Т					
AG10	PB32B	5	BDQ33	С					
GND	GNDIO5	-							
AJ9	PB33A	5	BDQS33	Т					
AK9	PB33B	5	BDQ33	С					
AF11	PB34A	5	BDQ33	Т					
AH10	PB34B	5	BDQ33	С					
AC12	PB35A	5	BDQ33	Т					
AE12	PB35B	5	BDQ33	С					
VCCIO	VCCIO5	5							
AD12	PB36A	5	BDQ33	Т					
AF12	PB36B	5	BDQ33	С					
AJ10	PB37A	5	BDQ33	Т					
AK10	PB37B	5	BDQ33	С					
GND	GNDIO5	-							
AG11	PB38A	5	BDQ42	Т					
AH11	PB38B	5	BDQ42	С					
AE13	PB39A	5	BDQ42	Т					
AC13	PB39B	5	BDQ42	С					
AF13	PB40A	5	BDQ42	Т					
VCCIO	VCCIO5	5							
AD13	PB40B	5	BDQ42	С					
AJ11	PB41A	5	BDQ42	Т					
AK11	PB41B	5	BDQ42	С					
AD14	PB42A	5	BDQS42	Т					
GND	GNDIO5	-							
AC14	PB42B	5	BDQ42	С					
AG12	PB43A	5	BDQ42	Т					
AE14	PB43B	5	BDQ42	С					
AJ12	PB44A	5	BDQ42	Т					
VCCIO	VCCIO5	5							
AK12	PB44B	5	BDQ42	С					



LFE2-70E/SE								
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential				
AD18	PB66A	4	BDQ69	Т				
AF18	PB66B	4	BDQ69	С				
AC18	PB67A	4	BDQ69	Т				
AE18	PB67B	4	BDQ69	С				
VCCIO	VCCIO4	4						
AG19	PB68A	4	BDQ69	Т				
AH19	PB68B	4	BDQ69	С				
GND	GNDIO4	-						
AE19	PB69A	4	BDQS69	Т				
AF19	PB69B	4	BDQ69	С				
AC19	PB70A	4	BDQ69	Т				
AD19	PB70B	4	BDQ69	С				
AJ19	PB71A	4	BDQ69	Т				
AK19	PB71B	4	BDQ69	С				
VCCIO	VCCIO4	4						
AF20	PB72A	4	BDQ69	Т				
AH20	PB72B	4	BDQ69	С				
AE20	PB73A	4	BDQ69	Т				
AG20	PB73B	4	BDQ69	С				
GND	GNDIO4	-						
AD20	PB74A	4	BDQ78	Т				
AC20	PB74B	4	BDQ78	С				
AH21	PB75A	4	BDQ78	Т				
AF21	PB75B	4	BDQ78	С				
AJ20	PB76A	4	BDQ78	Т				
VCCIO	VCCIO4	4						
AK20	PB76B	4	BDQ78	С				
AG21	PB77A	4	BDQ78	Т				
AE21	PB77B	4	BDQ78	С				
AD21	PB78A	4	BDQS78	Т				
GND	GNDIO4	-						
AC21	PB78B	4	BDQ78	С				
AD22	PB79A	4	BDQ78	Т				
AB21	PB79B	4	BDQ78	С				
AJ21	PB80A	4	BDQ78	Т				
VCCIO	VCCIO4	4						
AK21	PB80B	4	BDQ78	С				
GND	GNDIO4	-						
VCCIO	VCCIO4	4						
AJ25	PB87A	4	BDQS87***	Т				
AK24	PB87B	4	BDQ87	С				
AJ24	PB88A	4	BDQ87	Т				
AK25	PB88B	4	BDQ87	С				



LFE2-70E/SE							
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential			
AB24	PR87B	8	D3	С			
GND	GNDIO4	-					
AB23	PR87A	8	D4	Т			
AB25	PR86B	8	D5	С			
AB26	PR86A	8	D6	Т			
AC27	PR85B	8	D7/SPID0	С			
VCCIO	VCCIO8	8					
AB27	PR85A	8	DI/CSSPI0N	Т			
AD29	PR84B	8	DOUT/CSON	С			
AD30	PR84A	8	BUSY/SISPI	Т			
AA25	PR83B	3	RDQ80	С			
GND	GNDIO3	-					
AA23	PR83A	3	RDQ80	Т			
AC29	PR82B	3	RDQ80	C (LVDS)*			
AC30	PR82A	3	RDQ80	T (LVDS)*			
AA26	PR81B	3	RDQ80	С			
VCCIO	VCCIO3	3					
AA24	PR81A	3	RDQ80	Т			
AB29	PR80B	3	RDQ80	C (LVDS)*			
AB30	PR80A	3	RDQS80	T (LVDS)*			
GND	GNDIO3	-					
Y23	PR79B	3	RDQ80	С			
Y25	PR79A	3	RDQ80	Т			
AA27	PR78B	3	RDQ80	C (LVDS)*			
AA28	PR78A	3	RDQ80	T (LVDS)*			
VCCIO	VCCIO3	3					
Y24	PR77B	3	RLM0_GPLLC_FB_A/RDQ80	С			
Y26	PR77A	3	RLM0_GPLLT_FB_A/RDQ80	Т			
AA29	PR76B	3	RLM0_GPLLC_IN_A**/RDQ80	C (LVDS)*			
AA30	PR76A	3	RLM0_GPLLT_IN_A**/RDQ80	T (LVDS)*			
R22	RLM0_PLLCAP	3					
W23	PR74B	3	RLM0_GDLLC_FB_A/RDQ71	С			
W25	PR74A	3	RLM0_GDLLT_FB_A/RDQ71	Т			
GND	GNDIO3	-					
Y27	PR73B	3	RLM0_GDLLC_IN_A**/RDQ71	C (LVDS)*			
Y28	PR73A	3	RLM0_GDLLT_IN_A**/RDQ71	T (LVDS)*			
W24	PR72B	3	RDQ71	С			
W26	PR72A	3	RDQ71	Т			
VCCIO	VCCIO3	3					
Y29	PR71B	3	RDQ71	C (LVDS)*			
Y30	PR71A	3	RDQS71	T (LVDS)*			
V25	PR70B	3	RDQ71	С			
GND	GNDIO3	-					



Ball Number         Ball/Pad Function         Bank         Dual Function         Differential           D25         PT99A         1         T           J22         PT98B         1         C           J21         PT98A         1         T           VCCIO         VCCIO1         1         T           B25         PT97B         1         C           B25         PT97B         1         C           A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         T           GND         GNDI01         -         C           F23         PT95B         1         C           H22         PT96A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         T           VCCIO         VCCIO1         1         C	LFE2-70E/SE							
D25         PT99A         1         T           J22         PT98B         1         C           J21         PT98A         1         T           VCCIO         VCCIO1         1         T           B25         PT97B         1         C           A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         C           F23         PT95B         1         C           H22         PT95A         1         C           H22         PT94B         1         C           C24         PT94B         1         T           VCCIO         VCCIO1         1         T           E23         PT94B         1         C	Ball Number	Ball/Pad Function	Bank	Dual Function	Differential			
J22         PT98B         1         C           J21         PT98A         1         T           VCCIO         VCCIO1         1         T           B25         PT97B         1         C           A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         T           GND         GNDI01         -         C           F23         PT95B         1         C           H22         PT95A         1         C           D24         PT94B         1         C           C24         PT94B         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	D25	PT99A	1		Т			
J21       PT98A       1       T         VCCIO       VCCIO1       1        C         B25       PT97B       1       C       C         A25       PT97A       1       T       T         E24       PT96B       1       C       C         F24       PT96B       1       C       C         F23       PT95B       1       C       C         H22       PT95A       1       C       C         H22       PT95A       1       C       C         Q44       PT94B       1       C       C         VCCIO       VCCIO1       1       C       C         E23       PT93B       1       C       C	J22	PT98B	1		С			
VCCIO         VCCIO1         1           B25         PT97B         1         C           A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         C           GND         GNDIO1         -         T           F23         PT95B         1         C           H22         PT95A         1         C           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	J21	PT98A	1		Т			
B25         PT97B         1         C           A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         T           GND         GNDIO1         -         T           F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           VCCIO         VCCIO1         1         T           E23         PT93B         1         C	VCCIO	VCCIO1	1					
A25         PT97A         1         T           E24         PT96B         1         C           F24         PT96A         1         T           GND         GNDIO1         -         T           F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           VCCIO         VCCIO1         1         T           E23         PT93B         1         C	B25	PT97B	1		С			
E24         PT96B         1         C           F24         PT96A         1         T           GND         GNDIO1         -         T           F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	A25	PT97A	1		Т			
F24         PT96A         1         T           GND         GNDIO1         -            F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	E24	PT96B	1		С			
GND         GNDIO1         -         C           F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	F24	PT96A	1		Т			
F23         PT95B         1         C           H22         PT95A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	GND	GNDIO1	-					
H22         PT95A         1         T           D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	F23	PT95B	1		С			
D24         PT94B         1         C           C24         PT94A         1         T           VCCIO         VCCIO1         1         C           E23         PT93B         1         C	H22	PT95A	1		Т			
C24         PT94A         1         T           VCCIO         VCCIO1         1            E23         PT93B         1         C	D24	PT94B	1		С			
VCCIO         VCCIO1         1           E23         PT93B         1         C	C24	PT94A	1		Т			
E23 PT93B 1 C	VCCIO	VCCIO1	1					
	E23	PT93B	1		С			
G23 PT93A 1 T	G23	PT93A	1		Т			
B24 PT92B 1 C	B24	PT92B	1		С			
A24 PT92A 1 T	A24	PT92A	1		Т			
C27 PT91B 1 C	C27	PT91B	1		С			
GND GNDIO1 -	GND	GNDIO1	-					
D27 PT91A 1 T	D27	PT91A	1		Т			
C26 PT90B 1 C	C26	PT90B	1		С			
D26 PT90A 1 T	D26	PT90A	1		Т			
A27 PT89B 1 C	A27	PT89B	1		С			
VCCIO VCCIO1 1	VCCIO	VCCIO1	1					
B27 PT89A 1 T	B27	PT89A	1		Т			
A28 PT88B 1 C	A28	PT88B	1		С			
B28 PT88A 1 T	B28	PT88A	1		Т			
A29 PT87B 1 C	A29	PT87B	1		С			
B29 PT87A 1 T	B29	PT87A	1		Т			
GND GNDIO1 -	GND	GNDIO1	-					
VCCIO VCCIO1 1	VCCIO	VCCIO1	1					
H21 PT80B 1 C	H21	PT80B	1		С			
F22 PT80A 1 T	F22	PT80A	1		Т			
VCCIO VCCIO1 1	VCCIO	VCCIO1	1					
B23 PT79B 1 C	B23	PT79B	1		С			
A23 PT79A 1 T	A23	PT79A	1		Т			
G24 PT78B 1 C	G24	PT78B	1		C			
E22 PT78A 1 T	E22	PT78A	1		Т			
GND GNDIO1 -	GND	GNDIO1	-					
D22 PT77B 1 C	D22	PT77B	1		C			
C22 PT77A 1 T	C22	PT77A	1		Т			
G22 PT76B 1 C	G22	PT76B	1		C			



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

		LFE2	M20E/SE		LFE2M35E/SE			
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential	Ball/Pad Function	Bank	Dual Function	Differential
V5	PL51A	6	LDQS51	T (LVDS)*	PL66A	6	LDQS66	T (LVDS)*
U4	PL51B	6	LDQ51	C (LVDS)*	PL66B	6	LDQ66	C (LVDS)*
V1	PL52A	6	LDQ51	Т	PL67A	6	LDQ66	Т
VCCIO	VCCIO6	6			VCCIO6	6		
V3	PL52B	6	LDQ51	С	PL67B	6	LDQ66	С
W1	PL53A	6	LDQ51	T (LVDS)*	PL68A	6	LDQ66	T (LVDS)*
Y1	PL53B	6	LDQ51	C (LVDS)*	PL68B	6	LDQ66	C (LVDS)*
AA1	PL54A	6	LDQ51	Т	PL69A	6	LDQ66	Т
GNDIO	GNDIO6	-			GNDIO6	-		
AA2	PL54B	6	LDQ51	С	PL69B	6	LDQ66	С
V4	TCK	-			TCK	-		
Y2	TDI	-			TDI	-		
Y3	TMS	-			TMS	-		
W3	TDO	-			TDO	-		
W4	VCCJ	-			VCCJ	-		
W5	PB2A	5	BDQ6	Т	PB2A	5	BDQ6	Т
Y4	PB2B	5	BDQ6	С	PB2B	5	BDQ6	С
W6	PB3A	5	BDQ6	Т	PB3A	5	BDQ6	Т
V6	PB3B	5	BDQ6	С	PB3B	5	BDQ6	С
AA3	PB4A	5	BDQ6	Т	PB4A	5	BDQ6	Т
VCCIO	VCCIO5	5			VCCIO5	5		
AB2	PB4B	5	BDQ6	С	PB4B	5	BDQ6	С
T8	PB5A	5	BDQ6	Т	PB5A	5	BDQ6	Т
U7	PB5B	5	BDQ6	С	PB5B	5	BDQ6	С
U8	PB6A	5	BDQS6	Т	PB6A	5	BDQS6	Т
GNDIO	GNDIO5	-			GNDIO5	-		
Т9	PB6B	5	BDQ6	С	PB6B	5	BDQ6	С
V8	PB7A	5	BDQ6	Т	PB7A	5	BDQ6	Т
W8	PB7B	5	BDQ6	С	PB7B	5	BDQ6	С
Y6	PB8A	5	BDQ6	Т	PB8A	5	BDQ6	Т
VCCIO	VCCIO5	5			VCCIO5	5		
Y5	PB8B	5	BDQ6	С	PB8B	5	BDQ6	С
AB3	PB9A	5	BDQ6	Т	PB9A	5	BDQ6	Т
AB4	PB9B	5	BDQ6	С	PB9B	5	BDQ6	С
AB5	PB10A	5	BDQ6	Т	PB10A	5	BDQ6	Т
GNDIO	GNDIO5	-			GNDIO5	-		
AA6	PB10B	5	BDQ6	С	PB10B	5	BDQ6	С
V9	PB13A	5	BDQ15	Т	PB31A	5	BDQ33	Т
U9	PB13B	5	BDQ15	С	PB31B	5	BDQ33	С
VCCIO	VCCIO5	5			VCCIO5	5		
-	-	-			GNDIO5	-		
U10	PB14A	5	BDQ15	Т	PB32A	5	BDQ33	Т
T10	PB14B	5	BDQ15	С	PB32B	5	BDQ33	С
GNDIO	GNDIO5	-			GNDIO5	-		
W9	PB15A	5	BDQS15****	Т	PB33A	5	BDQS33****	Т
Y8	PB15B	5	BDQ15	С	PB33B	5	BDQ33	С
AA7	PB16A	5	VREF2_5/BDQ15	Т	PB34A	5	VREF2_5/BDQ33	Т
Y7	PB16B	5	VREF1_5/BDQ15	С	PB34B	5	VREF1_5/BDQ33	С



LFE2M50E/SE								
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential				
W19	NC	-						
W18	NC	-						
V17	NC	-						
V18	NC	-						
D15	NC	-						
G14	NC	-						
G15	NC	-						
D14	NC	-						
E15	NC	-						
E14	NC	-						
F15	NC	-						
F14	NC	-						
F13	NC	-						
G12	NC	-						
G13	NC	-						
H8	VCCPLL	-						
H15	VCCPLL	-						
R8	VCCPLL	-						
R15	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.

\*\*\*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 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						LFI	E2M70E/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	Т	NC	-		
H19	NC	-			NC	-		
H20	NC	-			NC	-		
H21	NC	-			NC	-		
H22	NC	-			NC	-		
H6	PL8B	7	LDQ6	C (LVDS)*	NC	-		
H8	PL5B	7	LDQ6	С	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						
Ball Number	Ball/Pad Function	Bank	Dual Function	Differential		
AE27	GND	-				
AE4	GND	-				
AE9	GND	-				
AF14	GND	-				
AF17	GND	-				
AF25	GND	-				
AF6	GND	-				
AJ10	GND	-				
AJ21	GND	-				
AJ27	GND	-				
AJ4	GND	-				
AK1	GND	-				
AK13	GND	-				
AK18	GND	-				
AK24	GND	-				
AK30	GND	-				
AK7	GND	-				
B10	GND	-				
B21	GND	-				
B27	GND	-				
B4	GND	-				
D25	GND	-				
D6	GND	-				
E14	GND	-				
E17	GND	-				
F22	GND	-				
F27	GND	-				
F4	GND	-				
F9	GND	-				
G12	GND	-				
G19	GND	-				
J24	GND	-				
J7	GND	-				
K14	GND	-				
K15	GND	-				
K16	GND	-				
K17	GND	-				
K27	GND	-		1		
K4	GND	-				
L14	GND	-				
L15	GND	-		1		
L16	GND	-		1		
L17	GND	-				
				•		