PRODUCT SELECTOR GUIDE

FEBRUARY 2015

LATTICE SEMICONDUCTOR™

FPGAs • CPLDs • REFERENCE DESIGNS • INTELLECTUAL PROPERTY • DEVELOPMENT KITS • DESIGN TOOLS

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The Lattice Advantage

Customizable Solutions

Lattice Semiconductor leads the industry in ultra-low power, small form factor, customizable solutions for today's quickly changing connected world. From heterogeneous networks and micro servers, to smartphones, tablets and wearables, Lattice FPGAs and CPLDs are at the heart of solutions that give designers the ability to quickly innovate, or build and add features to their systems that uniquely differentiate their products.

iCE40 Portfolio: World's Smallest FPGAs

Lattice's iCE40 family offers the world's smallest FPGAs at very low power enabling flexible and fast customization on standard platforms - perfect for implementing killer features on smartphones, tablets, wearables and other mobile devices.

MachXO Portfolio: Bridging and I/O Expansion FPGAs

The award-winning MachXO2 FPGA family and new MachXO3 family - the world's smallest, lowest-cost-per I/O, instant-on programmable platform - can be used to quickly implement system control functions, I/O expansion and bridging in applications such as routers, base stations, servers, storage, industrial, medical and consumer.

ECP Portfolio: Connectivity and Acceleration FPGAs

The LatticeECP3 and ECP5 families are optimized for data and control path bridge and interfacing, architected with high-performance SERDES, full-featured DSP blocks, and for state-of-the-art memory interfaces for supporting a wide range of applications including wireless and wireline communication, video processing, security and surveillance, and industrial automation.

Power and Thermal Management Products

Lattice's Platform Manager 2 devices implement Circuit board hardware management functions (Power Management, Control Plane Functions and Thermal Management). The Platform Manager 2 device family comprises of a Platform Manager 2 device (Programmable Analog + FPGA) and a Programmable Analog Sense and Control device (L-ASC10). In simpler boards, the Power Management functions can be integrated into Lattice Power Manager II products.

Making Designs Easy and Agile

Lattice's portfolio of FPGAs, CPLDs and Power and Thermal management devices are supported by complete software tools, intellectual property (IP) cores, reference designs, and development kits for integrating a myriad of systems. From the new MIPI DSI and CSI-2 standards for mobile, to PCIe, memory and more mature interfaces, Lattice simplifies your design efforts by offering proven IP cores and the tools to implement them.

For more information go to LATTICESEMI.COM

FPGA Products

ECP Series - Connectivity and Acceleration FPGAs

Features			ECP5™						LatticeECP3™					LatticeECP2/M™											
Device			LFE5UM-25	LFE5UM-45	LFE5UM-85	LFE5U-25	LFE5U-45	LFE5U-85	LFE3-17EA	LFE3-35EA	LFE3-70EA	LFE3-95EA	LFE3-150EA	LFE2M20E/SE	LFE2M35E/SE	LFE2M50E/SE	LFE2M70E/SE	LFE2M100E/SE	LFE2-6E/SE	LFE2-12E/SE	LFE2-20E/SE™	LFE2-35E/SE	LFE2-50E/SE	LFE2-70E/SE
LUTs			24 k	44 k	84 k	24 k	44 k	84 k	17 k	33 k	67 k	92 k	149 k	19 k	34 k	48 k	67 k	95 k	6 k	12 k	21 k	32 k	48 k	68 k
EBR SRAM	# of Blocks		56	108	208	56	108	208	38	72	240	240	372	66	114	225	246	288	3	12	15	18	21	60
	kbits		1008	1944	3744	1008	1944	3744	700	1,327	4,420	4,420	6,850	1,217	2,101	4,147	4,534	5,308	55	221	276	332	387	1,032
Distrib RAM	kbits		194	351	669	194	351	669	36	68	145	188	303	41	71	101	145	202	12	24	42	64	96	136
sysDSP™ Blocks	Multipliers		28	72	156	28	72	156	24	64	128	128	320	24	32	88	96	168	12	24	28	32	72	88
SERDES	Max. Chan.		1/2	2/4		0			4		12		16	4		8	16							
	Max. Rate		3.2 Gbit/s						3.2 Gbit/s					3.2 Gbit/s										
PLL + DLL			2+2	4+4		2+2	4+4		2+2	4+2	10+2			8+2					2+2				4+2	6+2
DDR Support			DDR2 800, DDR3 800, LPDDR2 800, LPDDR3 800						DDR3 800, DDR2 533, DDR 400					DDR2 533, DDR 400					DDR2 533, DDR 400					
Boot Flash			External						External					External					External					
Dual Boot			✓						✓					✓					✓					
Bit-stream Encryption			✓						✓					SE only					SE only					
Core Vcc			1.1 V						1.2 V					1.2 V					1.2 V					
Temp.	C		✓						✓					✓					✓					
	I		✓						✓					✓					✓					
	AEC-Q100		✓						✓															
0.5 mm Spacing			I/O Count / SERDES																					
csfBGA	285	10 x 10 mm	118/2	118/2	118/2	118/0	118/0	118/0																
csBGA	328	10 x 10 mm							116/2															
TQFP	144	20 x 20 mm																	90/0	93/0				
PQFP	208	28 x 28 mm																		131/0	131/0			
0.8 mm Spacing			I/O Count / SERDES																					
caBGA	381	17 x 17 mm	197/2	203/4	205/4	197/0	203/0	205/0																
	554	23 x 23 mm		245/4	259/4		245/0	259/0																
	756	27 x 27 mm			365/4			365/0																
1.0 mm Spacing			I/O Count / SERDES																					
ftBGA	256	17 x 17 mm							133/4	133/4														
fpBGA	256	17 x 17 mm												140/4					190/0	193/0	193/0			
	484	23 x 23 mm							222/4	295/4	295/4	295/4		304/4	303/4	270/4				297/0	331/0	331/0	339/0	
	672	27 x 27 mm								310/4	380/8	380/8	380/8		410/4	372/8					402/0	450/0	500/0	500/0
	900	31 x 31 mm														410/8	416/16	416/16						583/0
	1152	35 x 35 mm															436/16	520/16						
	1156	35 x 35 mm									490/12	490/12	586/16											

1) No PLL Available

MachXO & LatticeXP series - Bridging and I/O Expansion FPGAs

Features		MachXO3™					MachXO2™								MachXO™								LatticeXP2™				
Device		LCMXO3L-640	LCMXO3L-1300	LCMXO3L-2100	LCMXO3L-4300	LCMXO3L-6900	LCMXO2-256	LCMXO2-640	LCMXO2-640U	LCMXO2-1200	LCMXO2-1200U	LCMXO2-2000	LCMXO2-2000U	LCMXO2-4000	LCMXO2-7000	LCMXO256E	LCMXO256C	LCMXO640E	LCMXO640C	LCMXO1200E	LCMXO1200C	LCMXO2280E	LCMXO2280C	LFXP2-5E	LFXP2-8E	LFXP2-17E	LFXP2-30E	LFXP2-40E
LUTs		640	1300	2100	4300	6900	256	640	640	1280	1280	2112	2112	4320	6864	256		640		1200		2280		5 k	8 k	17 k	29 k	40 k
EBR SRAM	# of Blocks						0	2	7	7	8	8	10	10	26					1		3		9	12	15	21	48
kbits		64	64	74	92	240	0	18	64	64	74	74	92	92	240					9.2		27.6		166	221	276	387	885
Distrib. RAM	kbits	10	10	16	34	54	2	5	5	10	10	16	16	34	54	2		6.1		6.4		7.7		10	18	35	56	83
UFM	kbits						0	24	64	64	80	80	96	96	256													
sysDSP™ Blocks	18x18 Blocks																							3	4	5	7	8
	Multipliers																							12	16	20	28	32
PLL + DLL		2+1			2+2				1+2				2+2							1+0		2+0		2+0		4+0		
DDR Support									DDR 266, DDR2 266, LPDDR266															DDR/2 400				
Configuration Memory		Internal NVM					Internal Flash									Internal Flash								Internal Flash				
Dual Boot[4]		✓					✓									✓								✓				
Bit-stream Encryption																								✓				
Embedded Function Blocks							I²C (2), SPI (1), Timer (1)																					
Core Vcc	1.2 V	E					ZE & HE									✓		✓		✓		✓		✓				
	1.8 - 3.3 V																✓		✓		✓		✓					
	2.5 - 3.3 V	C					HC									HC								HC				
Temp.	C	✓					✓									✓								✓				
	I	✓					✓									✓								✓				
	AEC-Q100																	✓				✓			✓			
0.4 mm Spacing		I/O Count																										
WLCSP	25	2.5 x 2.5 mm								18																		
	36[2]	2.5 x 2.5 mm	28																									
	49[2]	3.2 x 3.2 mm		38																								
	81[2]	3.8 x 3.8 mm			63																							
ucBGA	64	4 x 4 mm					44																					
0.5 mm Spacing		I/O Count																										
QFN	32	5 x 5 mm					21																					
csBGA	100	8 x 8 mm														78		74										
	132	8 x 8 mm					55	79		104		104		104				101										
	184[1]	8 x 8 mm												150[1]														
csfBGA	121[2]	6 x 6 mm	100																									
	132	8 x 8 mm																						86				
	256[2]	9 x 9 mm		206																								
	324[2]	10 x 10 mm			281																							
TQFP	100	14 x 14 mm					55	78		79		79				78		74		73								
	144	20 x 20 mm							107	107		111		114	114			113						100				
0.8 mm Spacing		I/O Count																										
caBGA	256	14 x 14 mm		206[3]								206		206	206			159		211								
	324	15 x 15 mm			279[3]																							
	332	17 x 17 mm												274	278													
	400	17 x 17 mm				335[3]																						
1.0 mm Spacing		I/O Count																										
ftBGA	256	17 x 17 mm									206	206		206	206			159		211				172	201			
	324	19 x 19 mm																				271						
fpBGA	484	23 x 23 mm											278	278	334											358	363	
	672	27 x 27 mm																									472	540

1) Contact your Lattice sales representative for the support of the 184-ball csBGA package, available with the HE option only.
2) Package is only available for E=1.2 V devices.
3) Package is only available for C=2.5 V/3.3 V devices.
4) Dual Boot supported with external boot Flash.

FPGA Products (cont)

iCE40 Series - World's Smallest FPGAs

Features			iCE40 UltraLite		iCE40 Ultra			iCE40 LM			iCE40 LP					iCE40 HX		
Device			UL640	UL1K	LP1K	LP2K	LP4K	LM1K	LM2K	LM4K	LP384	LP640	LP1K	LP4K	LP8K	HX1K	HX4K	HX8K
Logic			640	1248	3520	2048	3520	1100	2048	3520	384	640	1280	3520	8680	1280	3520	7680
NVCM			Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Static Power			35 µA	35 µA	71 µA	71 µA	71 µA	100 µA	100 µA	100 µA	21 µA	100 µA	100 µA	250 µA	250 µA	296 µA	1140 µA	1140 µA
EBR			56 kb	56 kb	80 kb	80 kb	80 kb	64 kb	80 kb	80 kb	0	64 kb	64 kb	80 kb	128 kb	64 k	80 k	128 k
PLL			1	1	1	1	1	1	1	1			1	2	2	1	2	2
I²C core			2	2	2	2	2	1	2	2								
SPI Core					2	2	2	1	2	2								
Strobe (low)								1	1	1								
Strobe (high)								1	1	1								
Low Power Oscillator			1	1	1	1	1											
High Frequency Oscillator			1	1	1	1	1											
24 mA Drive			3	3	3	3	3	3	3	3		3	3[3]					
100 mA + 400 mA Drive			1	1														
500 mA Drive					1	1	1											
Mult 16 x 16, Accum 32 bit					2	4	4											
PWM Generator			Yes	Yes	Yes	Yes	No											
0.35 mm Spacing			Total I/Os (Dedicated I/Os)[4,5]															
WLCSP	16	1.40 x1.40 mm										11(1)[1]	11(1)[1]					
	16	1.40 x 1.48 mm	10	10														
	25	1.71 x 1.71 mm						20(2)	20(2)	20(2)								
	36	2.08 x 2.08 mm			27(1)	27(1)	27(1)											
0.4 mm Spacing			Total I/Os (Dedicated I/Os)[4,5]															
WLCSP	36	2.5 x 2.5 mm	26	26				30(2)	30(2)	30(2)	27(2)		27(2)[1]					
ucBGA	49	3 x 3 mm						39(2)	39(2)	39(2)	39(2)		37(2)[1]					
	81	4 x 4 mm											65(2)	65(2)[2]	65(2)[2]			
	121	5 x 5 mm											97(2)	95(2)	95(2)			
	225	7 x 7 mm												180(2)	180(2)			180(2)
0.5 mm Spacing			Total I/Os (Dedicated I/Os)[4,5]															
QFN	32	5 x 5 mm									23(2)							
	84	7 x 7 mm											69(2)[1]					
csBGA	81	5 x 5 mm											64(2)[1]					
	121	6 x 6 mm											94(2)					
	132	8 x 8 mm														97(2)	97(2)	97(2)
VQFP	100	14 x 14 mm														74(2)[1]		
TQFP	144	20 x 20 mm														98(2)	109(2)	
0.8 mm Spacing			Total I/Os (Dedicated I/Os)[4,5]															
caBGA	256	14 x 14 mm																208(2)

1) No PLL available on the 16 WLCSP, 36 ucBGA, 81 csBGA, 84 QFN and 100 VQFP packages.
2) Only one PLL available on the 81 ucBGA package.
3) 24 mA constant current sink available on the 16 WLCSP package only.
4) Total I/Os include Dedicated I/Os.
5) Dedicated I/Os are defined to be pins that are dedicated and cannot be used by user logic after configuration.

Lattice Power and Thermal Management Products

	Power & Thermal Management		Power Management				
Features	**L-ASC10**	**LPTM21**	**POWR1220AT8**	**POWR101**	**POWR1220AT8**	**POWR607**	**POWR605**
Voltage Monitoring Inputs	10	10	12	10	10	6	6
Current Monitoring Inputs	2	2					
Temperature Monitoring Inputs	2	2					
Number of Trimming Channels	4	4	8				
MOSFET Drives	4	4	4	2	2	2	
On-Chip Non-Volatile Fault Log	Yes	Yes	No	No	No	No	No
Number of LUTs		1280					
Distributed RAM (Kbits)		10					
EBR SRAM (kBits)		64					
Number of EBR Blocks (9 kBits)		7					
Number of PLLs		1					
Number of Macrocells			48	24	24	16	16
Communication I/F	I^2C	I^2C/JTAG	I^2C	I^2C			
Programming Interface	I^2C	I^2C/JTAG	JTAG	JTAG	JTAG	JTAG	JTAG
Operating Voltage	3.3	2.8V to 12V	3.3V	3.3V	3.3V	3.3V	3.3V
In-system Update Support	Yes	Yes	No	No	No	No	No
Package Options	**Digital I/Os**						
48-pin QFN (7 x 7)	9(e)						
237-Ball ftBGA (1 mm) (17 x 17)		95 + 10(d)					
100-pin TQFP (14 x 14)			22(a)				
48-pin TQFP (7 x 7)				16(b)	16(b)		
32-pin QFN (5 x 5)						7(c)	
24-pin QFN (4 x 4)						7(c)	7(c)

1) POWR1220AT8 provides 6 (5V Tolerant) Digital inputs and 16 (5V Tolerant) Open-drain Digital Outputs
2) POWR1014 & PWOR1014A provide 4 (5V Tolerant) Digital inputs and 14 (5V Tolerant) Open-drain Digital Outputs
3) POWR607 & PWOR605 provide 2 (5V Tolerant) Digital inputs and 5 (5V Tolerant) Open Drain I/O
4) LPTM21 provide 95 (3.3V Tolerant) Logic I/Os 10 (5V tolerant) open-drain I/Os
5) 5V Tolerant Open Drain I/O

CPLD Products

ispMACH 4000 Series

Features			ispMACH® 4000ZE				ispMACH® 4000V/B/C					
Parameter			4032ZE	4064ZE	4128ZE	4256ZE	4032	4064	4128	4256	4384	4512
Macrocells			32	64	128	256	32	64	128	256	384	512
tpd (ns)			4.4	4.7	5.8	5.8	2.5	2.5	2.7	3.0	3.5	3.5
tco (ns)			3.0	3.2	3.8	3.8	2.2	2.2	2.7	2.7	2.7	2.7
ts (ns)			2.2	2.5	2.9	2.9	1.8	1.8	1.8	2.0	2.0	2.0
fMAX (MHz)			260	241	200	200	400	400	333	322	322	322
Supply Voltage (V)			ZE=1.8				V=3.3/B=2.5/C=1.8					
I/O Standard Support			LVTTL, LVCMOS3.3/2.5/1.8/1.5, PCI3.3				LVTTL, LVCMOS3.3/2.5/1.8, PCI3.3					
Embedded Oscillator			✓	✓	✓	✓						
5 V Tolerant I/Os			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Typ. Standby Current (@ 3.3 V)			10 µA	11 µA	12 µA	13 µA	11.3 mA	11.5 mA	11.5 mA	12 mA	12.5 mA	13 mA
Temperature Grades			C/I	C/I	C/I	C/I	C/I/E/A	C/I/E/A	C/I/E/A	C/I/E	C/I	C/I
0.4 mm Spacing			I/O Count + Inputs									
ucBGA	64	4 x 4 mm		48 + 4								
	132	6 x 6 mm			96 + 4							
TQFP	128	14 x 14 mm							92 + 4			
0.5 mm Spacing			I/O Count + Inputs									
TQFP	48	7 x 7 mm	32 + 4	32 + 4			32 + 4	32 + 4				
	100	14 x 14 mm		64 + 10	64 + 10	64 + 10		64 + 10	64 + 10	64 + 10		
	144	20 x 20 mm			96 + 4	96 + 14			96 + 4	96 + 14		
	176	24 x 24 mm								128 + 4	128 + 4	128 + 4
csBGA	64	5 x 5 mm	32 + 4	48 + 4								
	144	7 x 7 mm		64 + 10	96 + 4	108 + 4						
0.8 mm Spacing			I/O Count + Inputs									
TQFP	44	10 x 10 mm					30 + 2	30 + 2				
1.0 mm Spacing			Total I/Os (Dedicated I/Os)[4,5]									
ftBGA	256	17 x 17 mm								160 + 4	192 + 4	208 + 4

Lattice IP Cores and Reference Designs

Lattice IP Cores

Lattice IP Cores are pre-tested, reusable functions, that allow designers to focus on their unique system architectures. These IP cores provide industry-standard functions such as PCI Express, DDR, Ethernet, CPRI, and embedded microprocessors. In addition, a number of independent IP providers have teamed with Lattice to offer additional high quality, reusable IP cores. Partners are selected for their industry leadership, high development standards, and commitment to customer support. For a complete listing of IP cores from Lattice and its 3rd party partners, please go to latticesemi.com/IP. Note that a Diamond Subscription License and the IP license are required to use the IPs for production.

	IP Core	ECP5	LatticeECP3	LatticeECP2/M	LatticeECP2	MachXO2	MachXO	LatticeXP2
Communications	10 Gigabit Ethernet MAC	✓	✓	✓	✓			
	2.5 Gb Ethernet MAC	✓						
	2.5 Gb Ethernet PCS	✓	✓					
	CPRI	✓	✓	✓				
	SGMII and Gigabit Ethernet PCS	✓	✓	✓				
	Triple Speed 10/100/1G Ethernet MAC	✓	✓	✓	✓			✓
	XAUI	✓	✓	✓				
Connectivity	PCI Express x1 Endpoint	✓	✓	✓				
	PCI Express x2 Endpoint	✓						
	PCI Express x4 Endpoint	✓	✓	✓				
	PCI Express Root Complex Lite X1		✓	✓				
	PCI Express Root Complex Lite X4		✓	✓				
	PCIe w. Multi Function	✓						
	PIPE		✓					
	PCI Master/Target 33		✓	✓	✓	✓	✓	✓
	PCI Master/Target 66		✓	✓	✓			✓
	PCI Target 33		✓	✓	✓	✓	✓	✓
	PCI Target 66		✓	✓	✓		✓	✓
	Tri-Rate Serial Digital Interface (SDI) PHY	✓	✓					
	JESD204A		✓					
	JESD204B	✓	✓					
	JESD207	✓	✓					
Digital Signal Processing	2D Edge Detector		✓	✓	✓			✓
	2D FIR Filter		✓	✓	✓			✓
	2D Scaler	✓	✓	✓	✓			✓
	Block Convolutional Encoder		✓	✓	✓			✓
	Block Viterbi Decoder		✓	✓	✓			✓
	Cascaded Integrator-Comb (CIC) Filter		✓	✓	✓			✓
	Color Space Converter	✓	✓	✓	✓			✓
	CORDIC		✓	✓	✓			✓
	Deinterlacer	✓	✓	✓	✓			✓
	Distributed Arithmetic (DA) FIR Filter		✓	✓	✓			✓
	Divider		✓	✓	✓			✓
	Dynamic Block Reed-Solomon Decoder		✓	✓	✓	✓		✓
	Dynamic Block Reed-Solomon Encoder		✓	✓	✓	✓		✓
	FFT Compiler	✓	✓	✓	✓			✓
	FIR Filter Generator	✓	✓	✓	✓			✓
	Gamma Corrector	✓	✓	✓	✓			✓
	Interleaver/De-interleaver		✓	✓	✓			✓
	Median Filter		✓	✓	✓			✓
	Numerically-Controlled Oscillator (NCO)		✓	✓	✓			✓
	Peak Cancellation Crest Factor Reduction (CFR)	✓	✓					
Processor, Controller & Peripheral	DDR SDRAM Controller		✓	✓	✓			✓
	DDR SDRAM Controller Pipelined					✓		
	DDR2 SDRAM Controller	✓	✓	✓	✓	✓		✓
	DDR2 SDRAM Controller Pipelined					✓		
	DDR3 SDRAM Contoller	✓	✓					
	DDR3 SDRAM PHY	✓	✓					
	LatticeMico32 - Embedded Processor	✓	✓	✓	✓			✓
	LatticeMico8 - Embedded Processor	✓	✓	✓	✓	✓	✓	✓
	LPDDR SDRAM Controller					✓		
	LPDDR3 SDRAM Controller	✓						
	Scatter Gather DMA	✓	✓	✓	✓			✓
Video & Imaging	Display Interface Mux					✓		
	DVB-ASI		✓					
	Video Frame Buffer	✓	✓	✓	✓			✓

Lattice IP Cores and Reference Designs (cont)

Lattice IP Suites provide many of the IP cores required to develop a total solution for common FPGA applications. In addition, multiple Lattice FPGA families are supported with each IP Suite, so designers can develop solutions across multiple Lattice families, taking advantage of the best features of each. The following table summarizes which IP cores are included in each IP Suite, and which FPGA families are supported.

	IP Core	ECP5	Lattice ECP3	Lattice ECP2M	Lattice ECP2	Mach XO2	Mach XO	Lattice XP2	Suite (One Year Subscription)	Annual License Renewal (After First Year)
Value Suite	DDR SDRAM Controller		✓	✓	✓			✓	Order #: DS-VAL-ST-U1	Order #: DS-VAL-ST-UR1
	DDR2 SDRAM Controller	✓	✓	✓	✓	✓		✓		
	DDR3 SDRAM Controller	✓	✓							
	LPDDR SDRAM Controller					✓				
	LPDDR3 SDRAM Controller	✓								
	FIR Filter Generator	✓	✓	✓	✓			✓		
	Tri-Speed Ethernet MAC	✓	✓	✓	✓			✓		
PCI Express Suite	PCI Express x1 Endpoint	✓	✓	✓					Order #: DS-PCIE-ST-U1	Order #: DS-PCIE-ST-UR1
	PCI Express x2 Endpoint	✓								
	PCI Express x4 Endpoint	✓	✓	✓						
	PCIe Root Complex Lite x1		✓	✓						
	PCIe Root Complex Lite x4		✓	✓						
	PCIe w. Multi Function	✓								
	Scatter Gather DMA	✓	✓	✓	✓			✓		
	PCI Master/Target 33		✓	✓	✓	✓	✓	✓		
	PCI Master/Target 66		✓	✓	✓			✓		
	PCI Target 33		✓	✓	✓	✓	✓	✓		
	PCI Target 66		✓	✓	✓		✓	✓		
	DDR SDRAM Controller		✓	✓	✓			✓		
	DDR2 SDRAM Controller	✓	✓	✓	✓	✓		✓		
	DDR3 SDRAM Controller	✓	✓							
	LPDDR SDRAM Controller					✓				
	LPDDR3 SDRAM Controller	✓								
Ethernet Suite	10 Gigabit Ethernet MAC	✓	✓	✓	✓				Order #: DS-ETH-ST-U1	Order #: DS-ETH-ST-UR1
	SGMII and Gigabit Ethernet PCS	✓	✓	✓						
	Triple Speed 10/100/1G Ethernet MAC	✓	✓	✓	✓			✓		
	XAUI	✓	✓	✓						
	Scatter Gather DMA	✓	✓	✓	✓			✓		
	DDR SDRAM Controller		✓	✓	✓			✓		
	DDR2 SDRAM Controller	✓	✓	✓	✓	✓		✓		
	DDR3 SDRAM Controller	✓	✓							
Digital Signal Processing (DSP) Design Suite	Block Convolutional Encoder		✓	✓	✓			✓	Order #: DS-DSP-ST-U1	Order #: DS-DSP-ST-UR1
	Block Viterbi Decoder		✓	✓	✓			✓		
	Cascaded Integrator-Comb (CIC) Filter		✓	✓	✓			✓		
	CORDIC		✓	✓	✓			✓		
	Distributed Arithmetic (DA) FIR Filter		✓	✓	✓			✓		
	Dynamic Block Reed-Solomon Decoder		✓	✓	✓	✓		✓		
	Dynamic Block Reed-Solomon Encoder		✓	✓	✓	✓		✓		
	FFT Compiler	✓	✓	✓	✓			✓		
	FIR Filter Generator	✓	✓	✓	✓			✓		
	Interleaver/De-Interleaver		✓	✓	✓			✓		
	Numerically Controlled Oscillators (NCO)		✓	✓	✓			✓		
Video and Display Suite	2D Edge Detector		✓	✓	✓			✓	Order #: DS-VDS-ST-U1	Order #: DS-VDS-ST-UR1
	2D FIR Filter		✓	✓	✓			✓		
	2D Scaler	✓	✓	✓	✓			✓		
	Color Space Converter	✓	✓	✓	✓			✓		
	Deinterlacer	✓	✓	✓	✓			✓		
	Median Filter		✓	✓	✓			✓		
	DVB-ASI		✓							
	Tri-rate Serial Digital Interface (SDI) PHY	✓	✓							
	DDR SDRAM Controller		✓	✓	✓			✓		
	DDR2 SDRAM Controller	✓	✓	✓	✓	✓		✓		
	DDR3 SDRAM Controller	✓	✓							

Lattice IP Cores and Reference Designs (cont)

Lattice Reference Designs are reusable as-is codes that allow designers to quickly build their unique applications. These reference designs provide functions such as 7:1 LVDS, Barcode Emulation, Sensor Interfacing & Preprocessing, I²C, SPI, and MIPI solutions. For a complete listing of reference designs from Lattice please go to latticesemi.com/IP.

											Format	
Name	Reference Design No.	ECP5	Lattice ECP3	Mach XO3	Mach XO2	Mach XO	Lattice XP2	iCE40 LP/HX/LM	iCE40 Ultra	WISHBONE Compatible	Verilog	VHDL
7:1 LVDS Video Interface	RD1030		✓				✓				✓	✓
8b/10b Encoder/Decoder	RD1012		✓		✓	✓	✓				✓	✓
ADC Interface	RD1089		✓								✓	✓
BSCAN - Multiple Boundary Scan Port Adressable Buffer (BSCAN1)	RD1001				✓	✓	✓					
BSCAN - Multiple Boundary Scan Port Linker (BSCAN 2)	RD1002	✓			✓	✓	✓					
Controller Area Network (CAN) Controller	RD1170							✓			✓	
FPGA Loader	AN8077				✓	✓	✓					
GPIO Expander	RD1065		✓			✓	✓				✓	✓
HDMI/DVI Interface	RD1097	✓	✓								✓	✓
HiSPi-to-Parallel Sensor Bridge	RD1120	✓	✓	✓	✓		✓				✓	✓
I²C Bus Controller for Serial EEPROM	RD1006	✓	✓	✓	✓	✓	✓				✓	✓
I²C Master Controller	RD1005	✓	✓	✓	✓	✓	✓				✓	✓
I²C Master Controller	RD1139							✓			✓	
I²C Master with WISHBONE Controller	RD1046	✓	✓	✓	✓	✓	✓			✓	✓	✓
I²C Slave Controller	RD1140							✓			✓	
I²C Slave Peripheral Using Embedded Function Block	RD1124			✓	✓					✓	✓	✓
I²C Slave to SPI Master Bridge	RD1094					✓					✓	✓
I²C Slave/Peripheral	RD1054	✓	✓			✓	✓				✓	✓
I²C to SPI Bridge	RD1172							✓			✓	✓
I2S Controller	RD1101			✓	✓	✓					✓	✓
I2S Controller	RD1171							✓			✓	✓
iCE40 Ultra Barcode Emulation Reference Design	UG73								✓		✓	
iCE40 Ultra Pedometer	UG76								✓		✓	
iCE40 Ultra RGB LED Controller	UG75								✓		✓	
iCE40 Ultra Self-Learning IR Remote	UG74								✓		✓	
iCE40LM Barcode Emulation	RD1191							✓			✓	
iCE40LM Phillips IR Rx	RD1192							✓			✓	
iCE40LM Sensor Interfacing and Preprocessing	RD1189							✓	✓		✓	
iCE40LM Sony IR Tx Reference Design	RD1190							✓			✓	
Keypad Scanner	RD1180							✓				✓
LatticeMico8 Microcontroller User's Guide	RD1026			✓	✓	✓	✓				✓	✓
LatticeMico8 to WISHBONE Interface Adapter	RD1043					✓	✓			✓	✓	✓
LED/OLED Driver	RD1103			✓	✓	✓					✓	
LPC Bus Controller	RD1049		✓		✓	✓	✓				✓	✓
MachXO2 Display Interface	RD1093				✓						✓	✓
MachXO2 I²C Embedded Programming Access Firmware	RD1129				✓					✓	✓	
MachXO2 Soft I²C Slave with Clock Stretching	RD1186				✓					✓	✓	
MDIO Peripheral - WISHBONE Compatible	RD1074		✓			✓				✓	✓	✓
MIPI CSI-2-to-CMOS Parallel Sensor Bridge	RD1146			✓	✓						✓	
MIPI DPHY Interface IP	RD1182		✓		✓						✓	
MIPI DSI RX to Parallel Bridge	RD1185			✓	✓						✓	
MxN Channel PWM	RD1175							✓				✓
NAND Flash Controller	RD1055				✓	✓	✓				✓	✓
Panasonic Area Sensor-to-Parallel Bridge	RD1121				✓		✓				✓	
Parallel to MIPI CSI-2 TX Bridge	RD1183			✓	✓						✓	
Parallel to MIPI DSI TX Bridge	RD1184			✓	✓						✓	
PCI Target 32 bit/33 MHz	RD1008		✓		✓	✓	✓				✓	✓
PCI/WISHBONE Bridge	RD1045		✓			✓	✓			✓	✓	✓
PWM Fan Controller	RD1060			✓	✓	✓	✓			✓	✓	✓
PWM Generator	RD1178							✓				✓
RAM-Type Interface for Embedded User Flash Memory	RD1126				✓					✓	✓	
RC4 Based PRNG Generator	RD1179							✓				✓
Read and Write Usercode	RD1041			✓	✓	✓					✓	✓
RGMII to GMII Bridge	RD1022	✓	✓								✓	✓
SD Flash Controller - WISHBONE Compatible	RD1048					✓	✓				✓	✓
SD Host Controller	RD1165							✓			✓	✓
SDR SDRAM Controller	RD1174			✓				✓			✓	
SDR SDRAM Controller – Advanced	RD1010	✓	✓		✓	✓	✓				✓	✓
Simple Sigma-Delta ADC	RD1066				✓	✓	✓				✓	✓

Continued on next page

Lattice IP Cores and Reference Designs (cont)

Name	Reference Design No.	ECP5	Lattice ECP3	Mach XO3	Mach XO2	Mach XO	Lattice XP2	iCE40 LP/HX/LM	iCE40 Ultra	WISHBONE Compatible	Format: Verilog	Format: VHDL
SMPTE SDI Dual HD from/to 3G Level-B Converter	RD1132		✓								✓	
SPI Master Controller	RD1141							✓			✓	
SPI Peripheral	RD1075					✓					✓	✓
SPI Slave Controller	RD1142							✓			✓	✓
SPI Slave Peripheral Using the Embedded Function Block	RD1125			✓	✓					✓	✓	✓
SPI Slave Port Expander	RD1168							✓				✓
SPI to I²C Bridge	RD1173							✓			✓	
SPI to UART Expander	RD1143							✓				✓
SPI Wishbone Compatible	RD1044			✓	✓	✓	✓			✓	✓	✓
Sub-LVDS Serial to CMOS Parallel Sensor Bridge	RD1130				✓						✓	
Sub-LVDS-to-Parallel Sensor Bridge	RD1122	✓	✓		✓		✓				✓	✓
UART - WISHBONE Compatible	RD1042			✓	✓	✓	✓			✓	✓	✓
UART (Universal Asynchronous Receiver/ Transmitter)	RD1011					✓	✓					✓
UART 16550 Transceiver	RD1138							✓			✓	

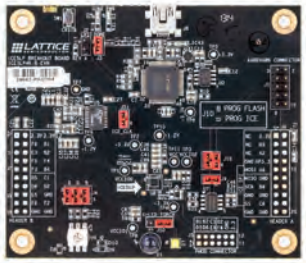
ispMACH 4000 Reference Designs

Name	Reference Design Number	WISHBONE Compatible	Format: Verilog	Format: VHDL	Format: BLIF NGO
8b/10b Encoder/Decoder	RD1012				✓
GPIO Expander	RD1065		✓	✓	
I²C Bus Controller for Serial EEPROMs	RD1006	✓	✓		✓
I²C (Inter-Integrated Circuit) Bus Master	RD1005	✓			✓
I²C (Inter-Integrated Circuit) Slave / Peripheral	RD1054	✓			
LPC (Low Pin Count) Bus Controller	RD1049	✓	✓		✓
Multiple Scan Port Addressable Buffer (BSCAN1)	RD1001	✓			
Multiple Scan Port Linker (BSCAN 2)	RD1002				✓
PCI Target 32 bit/33 MHz	RD1008		✓	✓	
PWM Fan Controller	RD1060		✓	✓	
Read and Write Usercode	RD1041		✓	✓	
SDR SDRAM Controller - Advanced	RD1010	✓	✓		✓
SPI GPIO Expander	RD1073		✓		
SPI Controller - WISHBONE Compatible	RD1044	✓	✓	✓	
SPI (Serial Peripheral Interface) Peripheral	RD1075	✓	✓		✓
UART (Universal Asynchronous Receiver/ Transmitter)	RD1011	✓			

Development Kits

iCE40 Ultra Breakout

Featuring the world's smallest FGPA, optimized for mobile applications. Typical mobile interfaces like RGB & Ir and Torch LEDs are included, as well as access to every device IO.



Features

- iCE5LP-4K FPGA in 0.35 mm pitch 36-ball WLCSP
- RGB LED
- High-brightness "Torch" LED
- Infrared (Ir) LED
- Status LEDs
- Access to all device IO
- On-board 32 Mbit SPI flash for reconfiguration
- Windows & Mac-based GUI for interface to the RGB LED, includes FPGA source code.
- USB A to USB B (mini) Cable for FPGA Power and Programming via a PC
- QuickSTART Guide

Ordering Part Number
ICE5LP4K-B-EVN

iCE40LM4K Sensor

A rich assortment of sensors for FGPA development in mobile applications. Interfaces to Snapdragon development board.

Features

- iCE40LM4K FPGA in 25-WLCSP (0.35 mm ball pitch)
- Infrared transmit and Receive
- Numerous Sensors
  - Proximity sensor
  - RGB Color, Infrared, and Temperature Sensors
  - Barometric Pressure sensor Accelerometer and Gyro Magnetometer/compass/accelerometer
  - Humidity & Temp sensor
  - Hall Sensor
- High-current LED output
- Barcode LED/emulation
- VLT Adapter board for connection to Snapdragon APQ8060A
- Configuration SPI Flash
- USB A to USB B (mini) Cable for Power and Programming via a PC

Ordering Part Number
ICE40LM4K-S-EVN

iCE40-HX8K Breakout

A simple, low-cost board with and iCE40—HX8K FPGA, and generous IO access.

Features

- iCE40HX-8k CT256 device
- 8 user accessible LEDs
- SPI Flash for programming configuration
- 40 pin 0.1" header for user connectivity
- 0.1" holes for user connectivity
- FTDI 2232H for USB interface
- 12 MHz oscillator
- Jumpers to select programming the SPI flash or iCE40HX-8k
- USB A to USB B (mini) Cable for FPGA Programming via a PC
- Demo designs available for download

Ordering Part Number
ICE40HX8K-B-EVN

iCE40 16-WLCSP Evaluation Kit

Features the worlds smallest FPGA – 1K LUTs in a 16-ball WLCSP package (0.35 mm ball pitch), only 1.4 mm x 1.48 mm. RGB LED control GUI available for PC or Mac interface.

Features

- iCE40LP1K in 16-WLCSP package (0.35 mm ball pitch)
- High-current tri-color LED (RGB)
- Infrared Transmit LED
- Barcode Emulation LED
- 27 MHz on-board oscillator
- SMA Connector for external clock input.
- SPI Configuration Flash
- Power & Programming via USB (cable included)
- Windows & Mac-based GUI for interface to the RGB LED, includes FPGA source code.
- USB A to USB B (mini) Cable for FPGA Power and Programming via a PC

Ordering Part Number
ICE40LP1K-SWG16-EVN

Development Kits

iCE40

iCEstick Evaluation Kit

Low-cost evaluation of the iCE40 FPGA in a convenient USB-drive form-factor. Includes PMOD connector for versatile interfacing.

Features

- USB thumb drive form factor
- iCE40HX-1k on board
- 2 x 6 position Digilent Pmod™ connector for multiple peripheral connections
- Vishay TFDU4101 IrDA transceiver
- FTDI 2232H USB device allows iCE device programming and UART interface to a PC
- Five user LEDs
- Discera 12 MHz MEMS oscillator
- Micron 32 Mbit N25Q32 SPI flash
- USB connector provides the power supply
- 16 LVCMOS/LVTTL (3.3 V) digital I/O connections on 0.1" through-hole connections
- IrDA & Tx/Rx Reference Design available for download

Ordering Part Number
ICE40HX1K-STICK-EVN

MachXO

MachXO2 Boards and Kits

MachXO2 Breakout Features

- MachXO2 LCMXO2-7000HE
- Access to all device IO via four 2 x 20 expansion header landings for IO, JTAG and external power
- 60-hole prototype area
- USB mini connector for power and programming (cable included)
- Eight general purpose LEDs
- 3.3 V and 1.2 V supply rails

MachXO2 Pico Features

- MachXO2 LCMXO2-1200ZE
- 4-character 16-segment LCD display
- 4 capacitive touch sense buttons
- 1 Mbit SPI Flash
- I^2C temperature sensor
- Current and voltage sensor circuits
- Expansion header for JTAG, I^2C
- Standard USB cable for device programming and I^2C communication
- RS-232/USB & JTAG/USB interface
- RoHS-compliant packaging and process
- Watch battery
- QuickSTART Guide

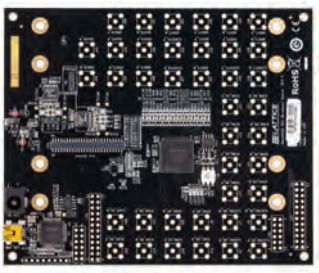
MachXO2 Control Features

- MachXO2 LCMXO2-4000HC
- Power Manager II ispPAC-POWR1014A
- 128 Mbit LPDDR memory, 4 Mbit SPI Flash
- Current and voltage sensor circuits
- SD memory card socket
- Microphone
- Audio Amplifier and Delta-Sigma ADC
- Up to two DVI sources and one DVI output.
- Up to two Display Inputs (7:1 LVDS) and one Display Output (7:1 LVDS)
- Audio output channel
- Expansion header for JTAG, SPI, I^2C and PLD I/Os.
- LEDs & switches
- Standard USB cable for device programming
- RS-232/USB & JTAG/USB interface
- RoHS-compliant packaging and process
- AC adapter (international plugs)
- QuickSTART Guide

Ordering Part Number	
Breakout Board	LCMXO2-7000HE-B-EVN
Pico Development Kit	LCMXO2-1200ZE-P1-EVN
Control Development Kit	LCMXO2-4000HC-C-EVN

MachXO3L Breakout Boards

Available in two versions; for DSI video applications with 50 pin Harwin Archer connector (pictured), or Breakout with 40 SMA connectors for general LVDS IO evaluation.



Features

- Two MachXO3L FPGAs
  - XO3L-6900E in 256caBGA
  - XO3L-2100E in 49WLCSP
- Two optional configurations
  - 50 pin Harwin Archer connector for interface to DSI screen (screen not included)
  - 40 SMA connectors for LVDS IO evaluation
- Generous prototyping/breakout access
- Switches and LEDs for user input and feedback
- Discrete resistors to support SLVS, subLVDS or DPHY Tx, and DPHY Rx, LP mode
- USB A to USB B (mini) Cable for power and FPGA Programming via a PC
- DC jack for supplemental power input
- QuickSTART Guide

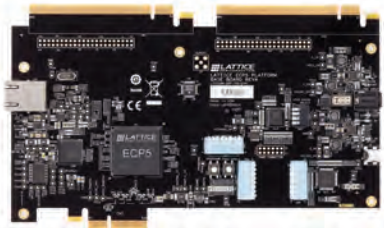
Ordering Part Number	
MachXO3L SMA Breakout	LCMXO3L-SMA-EVN
MachXO3L DSI Breakout	LCMXO3L-DSI-EVN

Development Kits

ECP

ECP5 PCI Express Development Kit

For evaluation and development with the ECP5 FPGA, including PCIe and DDR3 on-board.



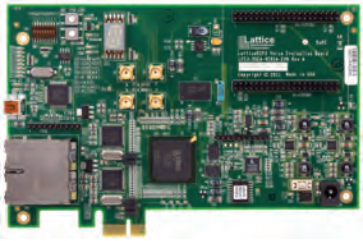
Features

- ECP5 FPGA: LFE5-85UM in 756 caBGA package
- PCI Express x4 Edge Connector
- Two 44 pin expansion connectors
- RJ45 interface to gigabit for Ethernet to RGMII
- USB Mini for FPGA Programming
- 128 Mbit Serial Flash memory
- 8 GB LPDDR3
- Switches and LEDs for general user input/ output
- Easy power measurements via probable powerresistors
- PCI Express Demos available for download
- USB A to USB B (mini) Cable for FPGA Programming via a PC
- 12 V AC Power Adapter with International Plugs
- QuickSTART Guide

Ordering Part Number
LFE5UM-85F-PB-EVN

LatticeECP3 Versa Development Kit

Industry's lowest cost platform for designing PCI Express and Gigabit Ethernet based systems. The kit includes free demos and reference designs.



Features

- The LatticeECP3 Versa Evaluation Board:
  - PCI Express 1.1 x1 Edge Connector Interface
  - Two Gigabit Ethernet Ports (RJ45)
  - 4 SMA Connectors for SERDES Access
  - USB Mini for FPGA Programming
  - LatticeECP3 FPGA: LFE3-35EA-FF484
  - 64 Mbit Serial Flash memory
  - 1 GB DDR3 Memory
  - 14 segment alpha-numeric display
  - Switches and LEDs for demos
- SERDES Eye Quality Demo
- 4 PCI Express Demos
- Gigabit Ethernet MAC Demo using Mico32
- DDR3 Memory Controller Demo
- Available on Windows and Linux platforms
- USB A to USB B (Mini) Cable for FPGA Programming via a PC
- 12 V AC Power Adapter and International Plug Adapters
- QuickSTART Guide

Ordering Part Number
LFE3-35EA-VERSA-EVN

Video

HDR-60 Video Camera System

This is a family of inter-connectable boards that showcase the video processing capabilities of the LatticeECP3 FPGA in a compact standard format.

Features

- LatticeECP3-70 in 484 fpBGA package
- Production-ready HDR camera design
- 1080p / 60 frames-per-second
- Extremely Low-latency
- Auto-exposure
- Supports dual-sensors simultaneously
- Direct HDMI/DVI output from FPGA
- On-board Ethernet PHY
- HDR Image processing reference design
- > 120 dB HDR Performance
- Additional image processing IP library
- Image shows HDR-60, plus Dual-Sensor Interface and two NanoVesta sensor boards.

Ordering Part Number	
HDR-60 with MT9M024 NanoVesta	LFE3-70EA-HDR60-DKN
HDR-60 without NanoVesta	LFE3-70EA-HDR60-EVN
Dual Sensor Interface	LCMXO2-4000HE-DSIB-EVN
CSI2-to-Parallel Bridge	LF-C2P-EVN
MT9M024 Sensor NanoVesta	LF-9MT024NV-EVN
MN34041 Sensor NanoVesta	LF-PNV-EVN

Industrial

HMI Development Kit

An FPGA-based Human-Machine Interface kit with touchscreen. Scalable firmware and software makes adapting to your target system a breeze!

Features

- Includes LatticeECP3 Versa Board
- 480 x 272 Touchscreen included
- SD Card for loading new projects
- Licensable HMI-on-chip (HoC) solution features
  - Scalable IP for high-end graphics
  - Fast response times
  - Easy design/re-configuration via GUI
  - No OS or custom coding – all GUI
  - Implement on ECP3 or XO2/3L
  - Only 8 k LUTs of FPGA required
  - Eval version included with the board
- USB A to USB B (mini) Cable for FPGA Programming via a PC
- 12 V AC Power Adapter with International Plugs
- QuickSTART Guide

Ordering Part Number
LFE3-35EA-HMI-DKN

Development Kits

LPTM21

LPTM21 Development Kit

The Platform Manager 2 Development Kit is a versatile, ready-to-use hardware platform for evaluating and designing with Platform Manager 2 and L-ASC10 devices. This kit includes a board, programming cable, and assorted example designs and documentation available for download. You can implement and debug your hardware management functions (power, thermal and control plane management) and test them out with this kit.

Features

- LPTM21 (Platform Manager 2 device) & L-ASC10 (Hardware Management expander)
- Temperature monitor & Measurement, with temperature control using fan (Included)
- Fault logging under various types of hardware management faults
- 4 potentiometers & 2 POLs for Sequencing, VID/Voltage scaling, margining, fault creation
- Background programming support with Dual boot from golden image stored on the SPI flash
- Hardware management expansion through external L-ASC10 boards
- 3-digit LCD for additional code debug support

POWR1220

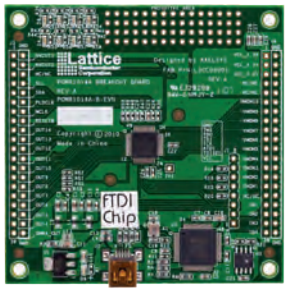
POWR1220 Hercules Development Kit

The Power Manager II Hercules Development Kits are versatile, ready to use hardware platforms for evaluating and designing with Power Manager II devices.

POWR1014

POWR1014 Breakout Board

The POWR1014A Breakout Board is a simple, low-cost board that provides convenient access to densely-spaced IOs. Each I/O on the device is connected to 100-mil header holes.



POWR607

POWR607 Board

The POWR607/6AT6 Evaluation Board, an easy-to-use platform for evaluating and designing with the Lattice Power Manager II devices, POWR607 and POWR6AT6.

Development Kits

POWR607

POWR605 (ProcessorPM) Development Kit

The kit is a versatile, ready to use hardware platform for evaluating and designing with POWR605 (ProcessorPM) power management devices.

LatticeXP2

LatticeXP2 Brevia2 Development Kit

Easy-to-use, low-cost platform for evaluating and designing with LatticeXP2 FPGAs.

Features

- LatticeXP2 FPGA: LFXP2-5E-6TN144C
- 2 Mbit SPI Flash Memory
- 1 Mbit SRAM
- Programmed via included mini-USB Cable
- 2 x 20 and 2 x 5 Expansion Headers
- Push buttons for General Purpose I/O and Reset
- 4 bit DIP Switch for user-defined inputs
- 8 Status LEDs for user-defined outputs

Ordering Part Number
LFXP2-5E-B2-EVN

More

Additional Boards and Kits

Lattice and our hardware partners produce many additional boards with a rich selection of features to match your needs.

To explore our full catalog, download additional information and place an order, visit latticesemi.com/boards

Programming Hardware

Programming Cables

Lattice Programming Cables are used to communicate between a PC and a Lattice device on a target board or system. The most common application is to download your completed program/configuration. Programming Cables can also be used to help debug your hardware designs with Lattice software like the Reveal Logic Analyzer.

Lattice offers three programming cables to suit you needs.

- **ispDOWNLOAD Parallel Cable (HW-DLN-3C).** This connects to a PC parallel port and is best for basic JTAG programming.
- **ispDOWNLOAD USB Cable (HW-USBN-2A).** In addition to basic programming,use for Reveal Logic analyzer and other debug applications.
- **USB Programming Cable (HW-USBN-2B - pictured).** The latest-generation cable adds I²C programming and various other features.

Ordering Part Number	
ispDOWNLOAD Parallel Cable	HW-DLN-3C
ispDOWNLOAD USB Cable	HW-USBN-2A
USB Programming Cable	HW-USBN-2B

Desktop Programmers

Lattice offers two desktop programmers for prototype “off-board” programming of Lattice products with non-volatile memory elements.

The Lattice Model 300 Desktop Programmer (pictured) supports most Lattice FPGA and CPLD products (1.8 V, 2.5 V, 3.3 V, and 5 V programming voltages).

The iCEprog Desktop Programmer supports all Lattice iCE products.

Operation of the Desktop Programmers is controlled by Lattice’s Diamond Programmer software. A Lattice programming cable is included with each Desktop Programmer to facilitate communication with the PC.

A Socket Adapter is required for the specific device/package you wish to program. These are available separately, and are designed specifically for one desktop programmer or the other.

Ordering Part Number	
Model 300 Desktop Programmer	PDS4102-PM300N
iCEprog Desktop Programmer	ICEPROGM1050-01

Socket Adapters

Lattice Socket Adapters are used in conjunction with a Lattice Desktop programmer to facilitate low-volume, manual programming of Lattice devices that are not mounted onto a board.

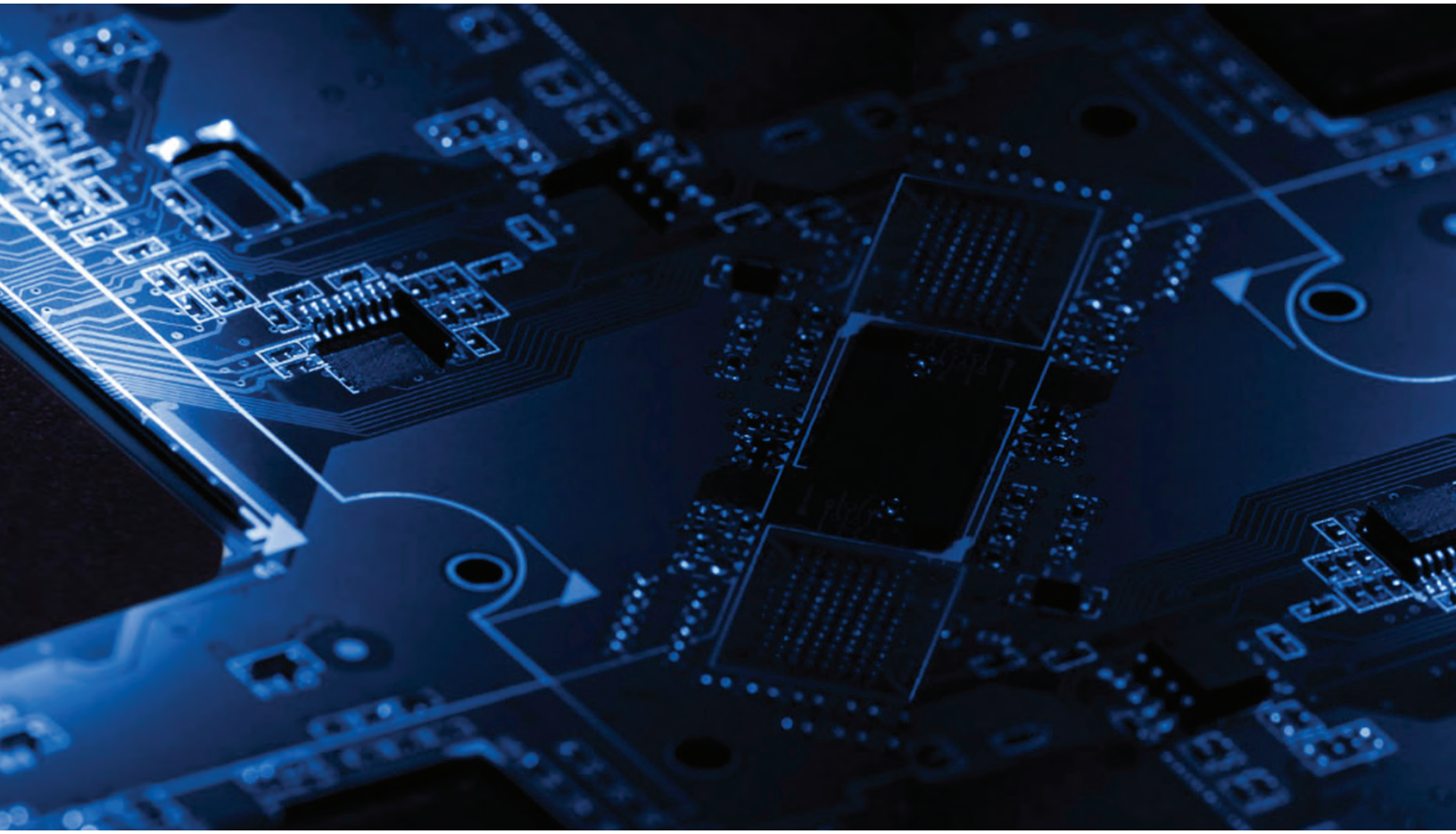
Socket adapters are available for all Lattice products that include non-volatile memory elements. Socket adapters are generally designed for a device family/ package combination. For example, a single Socket Adapter - PN-FT256/LFXP2 - is used to program any LatticeXP2 FPGA device in the 256-ball ftBGA package.

Please note that iCE Socket Adapters work only with the iCEprog Desktop Programmer. All other Lattice Socket Adapters work only with the Model300 Desktop Programmer.

More information and a complete list of Lattice Socket Adapter products is available for download on the Lattice website.

FPGA and CPLD Design Software

Complete Design Flows - High Ease of Use		Lattice Diamond™ (Subscription License) Windows/Linux	Lattice Diamond™ (Free) Windows/Linux	ispLEVER™ Classic (Free) Windows	iCEcube2™ (Free) Windows/Linux	PAC-Designer
Device Families	ECP5	✓				
	LatticeECP3	✓				
	LatticeECP2M/S	✓				
	LatticeECP2S	✓				
	MachXO2	✓	✓			
	MachXO3	✓	✓			
	MachXO	✓	✓			
	LatticeXP2	✓	✓			
	LatticeXP	✓	✓			
	LatticeECP2	✓	✓			
	iCE40				✓	
	ispMACH 4000B/C/V/ZE			✓		
	Platform Manager 2	Lattice Diamond Supports Platform Manager 2 & L-ASC10	Lattice Diamond (free) supports designing with Platform Manager 2 and L-ASC10			PAC-Designer supports Power manager II products
	L-ASC10Power Manager II	Lattice Diamond Supports Platform Manager 2 & L-ASC10	Lattice Diamond (free) supports designing with Platform Manager 2 and L-ASC10			PAC-Designer supports Power manager II products
Software Features	Design Exploration	✓	✓		✓	
	Project Management	✓	✓	✓	✓	
	VHDL & Verilog Support	✓	✓	✓	✓	
	EDIF Support	✓	✓	✓	✓	
	Schematic Support	✓	✓	✓	✓	
	ABEL			✓		ABEL language is supported in PAC-Designer software
	Synopsys® Synplify Pro™ for Lattice-Synthesis	✓	✓	✓	✓	
	Lattice Synthesis Engine (LSE)	MachXO2/MachXO Only	MachXO2/MachXO Only		✓	
	IP and Module Configuration	✓	✓	Module Only	Module Only	
	Power Estimation & Calculation	✓	✓		✓	
	Timing Analysis	✓	✓	✓	✓	
	Integrated HDL Analysis	✓	✓		✓	
	Floorplanning	✓	✓	✓	✓	
	EPIC Device Editor	✓	✓	ORCA FPGA Only		
	On-Chip Debug	✓	✓	ispXPGA Only		
	TCL Scripting Dictionaries	✓	✓			
	Aldec® Active-HDL Lattice Edition Simulation	Windows Only	Windows Only	Windows Only	✓	
Operating Systems	Windows 7/8/XP/Vista (32 bit and 64 bit)	✓	✓	✓	✓	
	Linux (Red Hat Enterprise v4, v5, v6; 32 bit and 64 bit)	✓	✓		✓	
Licensing & Updates	License Terms	One Year Subscription	One Year – Renewable	One Year – Renewable	One Year – Renewable	
	Node-Locked License	✓	✓	✓	✓	
	Floating License	✓			✓	



Software Licensing
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Web: latticesemi.com/licensing

Technical Support
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Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru