

More of the Best Product Selector Guide



Lattice Solutions

Introduction

Lattice Semiconductor offers the industry's broadest and most diverse portfolio of programmable system solutions.

- **Extreme Performance FPGAs – LatticeSC™ family with Embedded ASIC blocks, 3.8Gbps SERDES, and PURESPEED I/Os**
- **Non-Volatile FPGAs/PLDs – LatticeXP2 and LatticeXP families of flash-based FPGAs and the new MachXO™ "Crossover" PLDs**
- **Low-Cost FPGAs – The new LatticeECP2/M, LatticeEC and LatticeECP families**
- **Complex PLDs (CPLDs) – Industry-leading zero-power options and 3rd generation ispXPLD™ devices with on-chip memory**
- **Programmable Mixed-Signal PLDs – Power Manager II and ispClock™**

Lattice delivers the industry's broadest offering of ISP solutions. From FPGAs to innovative programmable mixed signal devices, Lattice offers design engineers the means to reduce time-to-market and greatly simplify the system design process.

Field Programmable Gate Arrays

The LatticeSC (System Chip) family of FPGA combines a high-performance FPGA fabric, 3.8Gbps SERDES and PCS, high-performance I/Os, large embedded RAM, and embedded ASIC blocks in a single industry-leading architecture. This FPGA family is fabricated in a state-of-the-art 90nm technology to provide the highest performing FPGAs in the industry.

LatticeXP2 and LatticeXP FPGA devices utilize a combination of non-volatile Flash cells and SRAM technology to deliver a single-chip solution supporting "instant-on" start-up and infinite reconfigurability. A non-volatile Flash cell array distributed within these FPGA devices stores the device configuration. At power-up the configuration is transferred from Flash memory to configuration SRAM in less than 1mS providing an instant-on FPGA. In addition, LatticeXP2 and LatticeXP FPGA devices provide security by eliminating the need for an external configuration bit-stream and by providing non-volatile security features.

The LatticeECP2™ (Economy Plus 2nd generation) and LatticeECP2M families, collectively referred to as the LatticeECP2/M, redefine the low-cost FPGA category. By integrating features and capabilities previously only available on higher cost / high performance FPGAs, these families dramatically expand the range of applications that can take advantage of low cost FPGA products.

The LatticeECP™ (Economy Plus) FPGA concept combines an efficient FPGA fabric with high-speed dedicated functions. Lattice's first family to implement this approach is the LatticeECP-DSP (Economy Plus DSP) family, providing dedicated high-performance DSP blocks on-chip. The LatticeEC (Economy) family supports all the general-purpose features of LatticeECP devices without dedicated function blocks to achieve even lower cost solutions. LatticeECP and EC FPGAs offer numerous features

including support for direct boot-up from low-cost SPI Flash memories, and dedicated pre-engineered DDR memory interface solutions that are easy and reliable.

Interface Products

Lattice also delivers the ispGDX2 (in-system programmable Generic Digital Crosspoint) bus switching and interface products. These flexible devices offer low-cost SERDES solutions and high-performance programmable crossbar switching. ispGDX2 devices replace discrete transceivers and significantly reduce the number of board layers.

Crossover PLDs

The MachXO™ family of non-volatile, infinitely reconfigurable Programmable Logic Devices (PLDs) is designed for applications traditionally implemented using CPLDs or low-capacity FPGAs. The MachXO family combines an optimized Look-Up Table (LUT) fabric with Lattice's ispXP™ technology to provide the high pin-to-pin performance and instant-on associated with CPLDs together with the flexibility of FPGAs, all in a low-cost device.

Complex Programmable Logic Devices

Through its optimized portfolio of CPLDs, Lattice delivers products a generation ahead of other CPLD solutions. These architectures are optimized to fit a variety of CPLD design challenges. This contrasts to the "one size fits all" approach of other CPLD vendors.

The ispXPLD 5000MX family combines memory with Lattice's SuperWIDE™ architecture and SuperBIG™ density. The ispXPLD 5000MX family represents a new class of devices called eXpanded Programmable Logic Devices (XPLDs). These devices are built around a new building block, the Multi-Function Block (MFB). MFBs can be individually configured as SuperWIDE (136-input) logic, single- or dual-port memory, FIFO, or CAM depending on the application. This architecture delivers the ultimate PLD flexibility through ispXP™.

The ispMACH™ 4000Z family of zero-power CPLDs features standby currents down to 10µA and are available in space-saving Chip Scale BGA (csBGA) packages (6mm x 6mm body size).

Power Manager and ispClock Products

The Power Manager II family offers standard power management support for any microprocessor or DSP CPU. These devices integrate hot-swap controllers, power supply sequencers, CPU reset generators, voltage supervisors and watchdog timers. ISP allows complete customization of each feature per circuit board.

The ispClock is a special-purpose PLD for clock frequency generation and distribution functions. These devices integrate zero-delay buffers, fan-out buffers, clock generators, etc. In addition, these devices offer programmable skew, programmable termination, programmable input and output interface, and JTAG

boundary scan allowing designers to standardize on ispClock for most of their clocking needs.

Design Tools and Intellectual Property

Lattice’s ispLEVER® software is a complete design tool suite, supporting all Lattice programmable logic families with one powerful and easy-to-use interface. The ispLEVER suite includes a complete set of tools for all design tasks, including project management, IP integration, device mapping, place and route, in-system logic analysis, and more. ispLEVER (Windows) also includes industry leading 3rd party tools from Lattice partners Synplicity and Mentor Graphics for Synthesis and Simulation. This comprehensive solution includes all the tools needed to take a design from concept to finished product.

The ispVM™ System software makes in-system programming quick and easy. ispVM System manages all aspects of getting your design into a physical device. Special tools and features of ispVM System handle everything from chain programming,

gang programming, embedded system programming, boot-PROM (Flash) programming, programming file management and much more.

ispVM System is regularly updated to support the latest products and industry standards, and can be downloaded from the Lattice web site.

Lattice’s PAC-Designer® software supports all Lattice mixed-signal devices and includes schematic entry, filter macros, simulation and programming tools.

Lattice and its ispLeverCORE™ Connection partners offer a wide range of bus interface, communications, digital signal processing, microcontroller and other IP cores to speed the implementation of complex functions in any design.

Hardware support, including evaluation boards, programming cables and desktop programmers, provides a complete evaluation, design and programming solution.

Quick Reference Guide

Category	Product Family	Design Requirements	Page
Extreme Performance FPGAs	LatticeSC	<ul style="list-style-type: none"> High Performance FPGAs High Speed SERDES and flexiPCS™ PURESPEED™ Technology: 2Gbps Parallel I/O Embedded Structured ASIC blocks 	4 - 5
Low Cost Non Volatile FPGAs	LatticeXP2 and LatticeXP	<ul style="list-style-type: none"> Low-Cost, Non-Volatile FPGAs Instant-on, Single-chip Solution High Security Pre-Engineered DDR Memory Interfaces 	
Low Cost High Performance FPGAs	LatticeECP2 and LatticeECP2M LatticeECP and LatticeEC	<ul style="list-style-type: none"> Second Generation Low-Cost FPGAs 3Gbps SERDES and Up to 5.3Mb Embedded Memory (ECP2M) High Performance sysDSP™ Blocks Pre-Engineered Source Synchronous I/O Enhanced Configuration: Dual Boot, Bitstream Encryption, TransFR™ Low-Cost FPGAs Optimized for Mainstream Applications High Performance sysDSP™ Blocks (LatticeECP-DSP) Pre-Engineered DDR Memory Interfaces 	
Crossover PLDs	MachXO	<ul style="list-style-type: none"> Low-Cost Alternative to CPLDs or Low-Capacity FPGAs High Pin-to-Pin Performance Instant-on, Single-chip Solution 	7 - 8
CPLDs	ispXPLD 5000MC/B/V	<ul style="list-style-type: none"> CPLD + Memory / FIFO Infinitely Reconfigurable, Multiple I/O Standards 	
	ispMACH 4000C/B/V	<ul style="list-style-type: none"> High-Performance Mainstream CPLD Industry’s Highest Performance (t_{PD} = 2.5ns) 	
	ispMACH 4000Z ispMACH 4A5	<ul style="list-style-type: none"> Zero-Power, Mainstream CPLD Mainstream 5V CPLD 	
SPLDs	ispGAL®	<ul style="list-style-type: none"> In System Programmable SPLD World’s Fastest PLD at 2.3ns t_{PD} 	10
	GAL®	<ul style="list-style-type: none"> Industry Standard SPLD Architectures 	
Interface	ispGDX2	<ul style="list-style-type: none"> High-Speed Programmable Crossbar Switch 800Mbps SERDES, Multiple I/O Standards 	6
Programmable Mixed Signal	Power Manager II	<ul style="list-style-type: none"> Programmable Analog + Digital Power Supply Sequencing, Monitoring, Trimming, & Measurement Manages Multiple Power Supplies 	9
	ispClock	<ul style="list-style-type: none"> In-System Programmable Clock Generator Integrated Universal Fan-out Buffer 	
Automotive / Extended Temperature Grade	MachXO	<ul style="list-style-type: none"> Low-Cost Alternative to CPLDs or Low-Capacity FPGAs 	7, 11
	ispMACH 4000V/Z	<ul style="list-style-type: none"> Mainstream CPLDs Including Zero-Power 	7, 11
	Power Manager	<ul style="list-style-type: none"> Power Supply Sequencing and Monitoring 	9, 11
Military	ispLSI® 1000	<ul style="list-style-type: none"> Mainstream CPLD 	11
	GAL	<ul style="list-style-type: none"> Mainstream SPLDs 	See Website
Design Tools, Hardware and Intellectual Property	Design Support for All Lattice Products	<ul style="list-style-type: none"> Design Software Evaluation Boards, Programming Cables & Other Hardware ispLeverCORE IP & Third-Party Partner IP 	12-15

LatticeSC (1.2V / 1.0V) Family¹ — Programmable System Chip

	Speed Grade (Fastest to Slowest)			Package I/O / SERDES Combinations					Lead-Free/RoHS	LUTs (K)	Distributed RAM Bits (M)	EBR SRAM Bits (M)	EBR SRAM Blocks (18Kb/Block)	Max. SERDES Channels	PLLs / DLLs	Maco Blocks ³	JTAG Boundary Scan Test	ispTRACY Capability	SPI Boot Flash Interface Support	I/O Standards
	-7	-6 ²	-5 ²	F256 17x17 1.0mm	F900 31x31 1.0mm	FF1020 33x33 1.0mm	FC1152 35x35 1.0mm	FC1704 42.5x42.5 1.0mm												
				256-ball fpBGA	900-ball fpBGA	1020-ball fcBGA	1152-ball fcBGA	1704-ball fcBGA												
LFSC15/SCM15	✓	✓	✓	139/4	300/8				✓	15.2	0.24	1.03	56	8	8/12	4	✓	✓	✓	3.3/2.5/1.8/1.5/1.2 LVCMOS, LVTTTL, PCI, PCIx, AGP, SSTL, SSTLD, HSTL, HSTLD, GTL, GTL Plus, LVDS, Mini-LVDS, MLVDS, RSDS, HYPT, LVPECL, BLVDS
LFSC25/SCM25	✓	✓	✓		378/8	476/16			✓	25.4	0.41	1.92	104	16	8/12	6	✓	✓	✓	
LFSC40/SCM40	✓	✓	✓			562/16	604/16		✓	40.4	0.65	3.98	216	16	8/12	10	✓	✓	✓	
LFSC80/SCM80	✓	✓	✓				660/16	904/32	✓	80.1	1.28	5.68	308	32	8/12	10	✓	✓	✓	
LFSC115/SCM115	✓	✓	✓				660/16	942/32	✓	115.2	1.84	7.80	424	32	8/12	12	✓	✓	✓	

1. Preliminary information. Contact factory for availability.
2. Available in Industrial Grade.
3. SCM products only.

LatticeXP2 (1.2V) Family — Low-Cost Flash-based FPGAs

	Speed Grade (Fastest to Slowest)			Package (I/O)						Lead-Free/RoHS	LUTs (K)	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	sysDSP Blocks	18x18 Multipliers	PLLs	Instant-on Start-up	High Security	JTAG Boundary Scan Test	ISP Programming	ispTRACY Capability	I/O Standards
	-7	-6 ¹	-5 ¹	M132 8x8 0.5mm	T144 20x20 0.5mm	Q208 28x28 0.5mm	FT256 17x17 1.0mm	F484 23x23 1.0mm	F672 27x27 1.0mm														
				132-ball csBGA	144-pin TQFP	208-pin PQFP	256-ball fpBGA	484-ball fpBGA	672-ball fpBGA														
LFXP2-5	✓	✓	✓	86	100	146	172			✓	5	10	166	9	3	12	2	✓	✓	ispXP	✓	3.3/2.5/1.8/1.5/1.2V LVCMOS, LVTTTL, SSTL 3/2 Class I, II, SSTL 18 Class I, HSTL 18 Class I, II, III, HSTL 15 Class I, III, PCI33, LVDS, Bus-LVDS, LVPECL, RSDS	
LFXP2-8	✓	✓	✓	86	100	146	201			✓	8	18	221	12	4	16	2	✓	✓	ispXP	✓		
LFXP2-17	✓	✓	✓			146	201	358		✓	17	35	276	15	5	20	4	✓	✓	ispXP	✓		
LFXP2-30	✓	✓	✓				201	363	472	✓	29	56	387	21	7	28	4	✓	✓	ispXP	✓		
LFXP2-40	✓	✓	✓					363	540	✓	40	83	885	48	8	32	4	✓	✓	ispXP	✓		

1. Available in Industrial Grade.

LatticeXP (C=1.8/2.5/3.3V, E=1.2V) Family — Low-Cost Flash-based FPGAs

	Speed Grade (Fastest to Slowest)			Package (I/O)						Lead-Free/RoHS	LUTs (K)	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	PFU/PFF Rows	PFU/PFF Columns	PLLs	Instant-on Start-up	High Security	JTAG Boundary Scan Test	ISP Programming	ispTRACY Capability	I/O Standards
	-5	-4 ¹	-3 ¹	T100 14x14 0.5mm	T144 20x20 0.5mm	Q208 28x28 0.5mm	F256 17x17 1.0mm	F388 23x23 1.0mm	F484 23x23 1.0mm														
				100-pin TQFP	144-pin TQFP	208-pin PQFP	256-ball fpBGA	388-ball fpBGA	484-ball fpBGA														
LFXP3C/E	✓	✓	✓	62	100	136				✓	3.1	12	54	6	16	24	2	✓	✓	ispXP	✓	3.3/2.5/1.8/1.5/1.2V LVCMOS, LVTTTL, SSTL 3/2 Class I, II, SSTL 18 Class I, HSTL 18 Class I, II, III, HSTL 15 Class I, III, PCI33, LVDS, Bus-LVDS, LVPECL, RSDS	
LFXP6C/E	✓	✓	✓		100	142	188			✓	5.8	23	72	8	24	30	2	✓	✓	ispXP	✓		
LFXP10C/E	✓	✓	✓				188	244		✓	9.7	39	216	24	32	38	4	✓	✓	ispXP	✓		
LFXP15C/E	✓	✓	✓				188	268	300	✓	15.4	61	324	36	40	46	4	✓	✓	ispXP	✓		
LFXP20C/E	✓	✓	✓				188	268	340	✓	19.7	79	396	44	44	56	4	✓	✓	ispXP	✓		

1. Available in Industrial Grade.

LatticeECP2 (1.2V) Family¹ — Second Generation Low-Cost FPGAs + DSP Blocks

	Speed Grade (Fastest to Slowest)			Package (I/O)						Lead-Free/RoHS	LUTs (K)	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	sysDSP Blocks	18x18 Multipliers	PLLs/DLLs	JTAG Boundary Scan Test	ispTRACY Capability	SPI Boot Flash Interface Support	I/O Standards
	-7	-6 ²	-5 ²	T144 20x20 0.5mm	Q208 28x28 0.5mm	F256 17x17 1.0mm	F484 23x23 1.0mm	F672 27x27 1.0mm	F900 31x31 1.0mm												
				144-pin TQFP	208-pin PQFP	256-ball fpBGA	484-ball fpBGA	672-ball fpBGA	900-ball fpBGA												
LFE2-6E/SE	✓	✓	✓	90		190				✓	6	12	55.3	3	3	12	2/2	✓	✓	3.3/2.5/1.8/1.5/1.2 LVCMOS33/25/18/15/12, LVTTL, SSTL 3/2/18 I, II, HSTL15 I and HSTL18 I, II, Differential HSTL and SSTL, PCI, LVDS, RSDS, Bus-LVDS, MLVDS, LVPECL	
LFE2-12E/SE	✓	✓	✓	93	131	193	297			✓	12	24.2	221.2	12	6	24	2/2	✓	✓		
LFE2-20E/SE	✓	✓	✓		131	193	331	402		✓	21	42.3	276.5	15	7	28	2/2	✓	✓		
LFE2-35E/SE	✓	✓	✓				331	450		✓	32	64.5	331.8	18	8	32	2/2	✓	✓		
LFE2-50E/SE	✓	✓	✓				339	500		✓	48	95.9	387.1	21	18	72	4/2	✓	✓		
LFE2-70E/SE	✓	✓	✓					500	583	✓	68	136.2	1032.2	56	22	88	6/2	✓	✓		

1. Includes "S-Series".
2. Available in Industrial Grade.

LatticeECP2M (1.2V) Family¹ — Low-Cost FPGAs + SERDES + Extra Memory + DSP Blocks

	Speed Grade (Fastest to Slowest)			Package (I/O)					Lead-Free/RoHS	LUTs (K)	SERDES Channels	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	sysDSP Blocks	18x18 Multipliers	PLLs/DLLs	JTAG Boundary Scan Test	ispTRACY Capability	SPI Boot Flash Interface Support	I/O Standards
	-7	-6 ²	-5 ²	F256 17x17 1.0mm	F484 23x23 1.0mm	F672 27x27 1.0mm	F900 31x31 1.0mm	F1152 35x35 1.0mm													
				256-ball fpBGA	484-ball fpBGA	672-ball fpBGA	900-ball fpBGA	1152-ball fpBGA													
LFE2M20E/SE	✓	✓	✓	140	304				✓	19	4	41	1217	66	6	24	8/2	✓	✓	3.3/2.5/1.8/1.5/1.2 LVCMOS33/25/18/15/12, LVTTL, SSTL 3/2/18 I, II, HSTL15 I and HSTL18 I, II, Differential HSTL and SSTL, PCI, LVDS, RSDS, Bus-LVDS, MLVDS, LVPECL	
LFE2M35E/SE	✓	✓	✓	140	303	410			✓	34	4	71	2101	114	8	32	8/2	✓	✓		
LFE2M50E/SE	✓	✓	✓		270	372	410		✓	48	4/8	101	4147	225	22	88	8/2	✓	✓		
LFE2M70E/SE	✓	✓	✓				416	436	✓	67	8/16	145	4534	246	24	96	8/2	✓	✓		
LFE2M100E/SE	✓	✓	✓				416	520	✓	95	16	202	5308	288	42	168	8/2	✓	✓		

1. Includes "S-Series". Preliminary information. Contact factory for availability.
2. Available in Industrial Grade.

LatticeECP-DSP & LatticeEC (1.2V) Families — Low-Cost SRAM-based FPGAs + DSP Blocks

	Speed Grade (Fastest to Slowest)			Package (I/O)						Lead-Free/RoHS	LUTs (K)	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	sysDSP Blocks ²	18x18 Multipliers ²	PLLs	JTAG Boundary Scan Test	ispTRACY Capability	SPI Boot Flash Interface Support	I/O Standards
	-5	-4 ¹	-3 ¹	T100 14x14 0.5mm	T144 20x20 0.5mm	Q208 28x28 0.5mm	F256 17x17 1.0mm	F484 23x23 1.0mm	F672 27x27 1.0mm												
				100-pin TQFP	144-pin TQFP	208-pin PQFP	256-ball fpBGA	484-ball fpBGA	672-ball fpBGA												
LFEC1	✓	✓	✓	67	97	112				✓	1.5	6	18	2	-	-	2	✓	✓	3.3/2.5/1.8/1.5/1.2V LVCMOS, LVTTL, SSTL 3/2 Class I, II, SSTL 18 Class I, HSTL 18 Class I, II, III, HSTL 15 Class I, III, PCI33, LVDS, Bus-LVDS, LVPECL, RSDS	
LFEC3	✓	✓	✓	67	97	145	160			✓	3.1	12	55	6	-	-	2	✓	✓		
LFEC/EC6	✓	✓	✓		97	147	195	224		✓	6.1	25	92	10	4	16	2	✓	✓		
LFEC/EC10	✓	✓	✓			147	195	288		✓	10.2	41	276	30	5	20	4	✓	✓		
LFEC/EC15	✓	✓	✓				195	352		✓	15.4	61	350	38	6	24	4	✓	✓		
LFEC/EC20	✓	✓	✓					360	400	✓	19.7	79	424	46	7	28	4	✓	✓		
LFEC/EC33	✓	✓	✓					360	496	✓	32.8	131	498	54	8	32	4	✓	✓		

1. Available in Industrial Grade.
2. LatticeECP-DSP devices only.

ispGDX2 – C/B/V (1.8V/2.5V/3.3V) Family — Programmable SERDES + Interconnect

	Speed Grade				Package (I/O)			Lead-Free/RoHS	I/O	GDX Blocks	Max. Bandwidth Gbps (SERDES)	Max. Bandwidth Gbps (w/o SERDES)	LVDS/Bus LVDS (pairs)	800 Mbps Duplex sysHSL Channels	PLLs	ISP Programming	JTAG Boundary Scan Test	I/O Standards
	-3	-32	-35	-5	F100 11x11 1.0mm	F208 17x17 1.0mm	F484 23x23 1.0mm											
	t _{PD} (ns)	3	3.2	3.5	5	100-ball fpBGA	208-ball fpBGA											
f _{MAX} (MHz)	360	330	300	180														
LX64C/B/V	✓			✓	64			✓	64	4	3.2	11	32	4	2	JTAG	✓	5/3.3/2.5/1.8V LVTTTL, LVCMOS, PCI33, PCI-X, GTL+, HSTL I, III, IV, SSTL 2 I, II, SSTL 3 I, II, AGP-1X, CTT, LVDS, BLVDS, LVPECL
LX128C/B/V		✓		✓		128		✓	128	8	6.4	21	64	8	2	JTAG	✓	
LX256C/B/V			✓	✓			256	✓	256	16	12.8	38	128	16	4	JTAG	✓	
LX64EC/EB/EV	✓			✓ ¹	64			✓	64	4	3.2	11	32	–	2	JTAG	✓	
LX128EC/EB/EV		✓		✓ ¹		128		✓	128	8	6.4	21	64	–	2	JTAG	✓	
LX256EC/EB/EV			✓	✓ ¹			256	✓	256	16	12.8	38	128	–	4	JTAG	✓	

1. Available in Industrial grade.

MachXO (C=1.8V/2.5V/3.3V, E=1.2V) Family — Instant-on, Low Cost, Flexible LUT Fabric

	Speed Grade ¹ (Fastest to Slowest)			Package (I/O)						Lead-Free/RoHS	LUTs	Macrocells ²	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	PLLs	ISP Programming	JTAG Boundary Scan Test	I/O Standards
	-5	-4	-3	T100 14x14 0.5mm	T144 20x20 0.5mm	M100 8x8 0.5mm	M132 8x8 0.5mm	FT256 17x17 1.0mm	FT324 19x19 1.0mm										
				100-pin TQFP	144-pin TQFP	100-ball csBGA	132-ball csBGA	256-ball fBGA	324-ball fBGA										
LCMXO256C/E	✓	✓	✓	78		78				✓	256	128	2.0	-	-	-	JTAG	✓	3.3/2.5/1.8/1.5/ 1.2V LVTTTL, LVCMOS, PCI, LVDS, Bus-LVDS, LVPECL, RSDS
LCMXO640C/E	✓	✓	✓	74	113	74	101	159		✓	640	320	6.1	-	-	-	JTAG	✓	
LCMXO1200C/E	✓	✓	✓	73	113		101	211		✓	1200	600	6.4	9.2	1	1	JTAG	✓	
LCMXO2280C/E	✓	✓	✓	73	113		101	211	271	✓	2280	1140	7.7	27.6	3	2	JTAG	✓	

1. Available in Industrial temperature ranges. See data sheet for specific device options.
2. Assumes 1 macrocell = 2 LUTs.

ispMACH 4000C/B/V (1.8V/2.5V/3.3V) Family — Highest Speed, Lowest Power CPLDs

	Speed Grade ¹						Package (I/O + Dedicated Inputs)							Lead-Free/RoHS	Macrocells	Total Registers	ISP Programming	JTAG Boundary Scan Test	Typical Icc (mA)	I/O Standards	
	-25	-27	-3	-35	-5	-75	-10	T44 10x10 0.5mm	T48 7x7 0.5mm	T100 14x14 0.5mm	T128 14x14 0.4mm	T144 ² 20x20 0.5mm	T176 24x24 0.5mm								F256 17x17 1.0mm
	t _{PD} (ns)	t _S (ns)	t _{CO} (ns)	f _{MAX} (MHz)				44-pin TQFP	48-pin TQFP	100-pin TQFP	128-pin TQFP	144-pin TQFP	176-pin TQFP								256-ball fBGA
LC4032C/B/V	✓				✓	✓	✓	30 + 2	32 + 4						✓	32	32	JTAG	✓	1.3	5/3.3/2.5/1.8V LVTTTL, LVCMOS, Extended LVCMOS, PCI33
LC4064C/B/V	✓				✓	✓	✓	30 + 2	32 + 4	64 + 10				✓	64	64	JTAG	✓	1.5		
LC4128C/B/V		✓			✓	✓	✓			64 + 10	92 + 4	96 + 4		✓	128	128	JTAG	✓	1.5		
LC4256C/B/V			✓		✓	✓	✓			64 + 10		96 + 4	128 + 4 160 + 4	✓	256	256	JTAG	✓	2.0		
LC4384C/B/V				✓	✓	✓	✓					128 + 4	192 + 4	✓	384	384	JTAG	✓	2.5		
LC4512C/B/V				✓	✓	✓	✓					128 + 4	208 + 4	✓	512	512	JTAG	✓	3.0		

1. Available in Industrial and Automotive temperature ranges. See data sheet for specific device options.
2. 3.3V (4000V) only.

ispMACH 4000Z (1.8V) Family — Zero Power, High Speed CPLDs

	Speed Grade ¹					Package (I/O + Dedicated Inputs)					Lead-Free/RoHS	Macrocells	Total Registers	ISP Programming	JTAG Boundary Scan Test	Typical Static Icc (µA)	I/O Standards
	-35	-37	-42	-5	-75	M56 6x6 0.5mm	M132 8x8 0.5mm	T48 7x7 0.5mm	T100 14x14 0.5mm	T176 24x24 0.5mm							
	t _{PD} (ns)	t _S (ns)	t _{CO} (ns)	f _{MAX} (MHz)		56-ball csBGA	132-ball csBGA	48-pin TQFP	100-pin TQFP	176-pin TQFP							
LC4032ZC	✓			✓	✓	32 + 4		32 + 4			✓	32	32	JTAG	✓	10	5/3.3/2.5/1.8V LVTTTL, LVCMOS, Extended LVCMOS, PCI33
LC4064ZC		✓		✓	✓	32 + 12	64 + 10	32 + 4	64 + 10		✓	64	64	JTAG	✓	11	
LC4128ZC			✓		✓		96 + 4		64 + 10		✓	128	128	JTAG	✓	12	
LC4256ZC				✓	✓		96 + 6		64 + 10	128 + 4	✓	256	256	JTAG	✓	13	

1. Available in Industrial and Automotive temperature ranges. See data sheet for specific device options.

ispXPLD 5000MC/MB/MV (1.8V/2.5V/3.3V) Family — High-Density CPLD + Memory

	Speed Grade					Package (I/O)				Lead-Free/RoHS	Macrocells	System Gates (K)	Memory (kbit)	PLLs	ISP Programming	JTAG Boundary Scan Test	I/O Standards
	-4	-45	-5 ¹	-52	-75 ¹	Q208 28x28 0.5mm	F256 17x17 1.0mm	F484 23x23 1.0mm	F672 27x27 1.0mm								
	t _{PD} (ns)	4.0	4.5	5.0	5.2	7.5	208-pin PQFP	256-ball fpBGA	484-ball fpBGA								
t _S (ns)	2.2	2.9	3.0	3.0	4.9												
t _{CO} (ns)	2.8	3.0	3.8	3.8	5.0												
f _{MAX} (MHz)	300	250	240	235	150												
LC5256MC/MB/MV	✓		✓		✓		141			✓	256	75	128	2	ispXP	✓	5/3.3/2.5/1.8V LVCMOS, SSTL 2 I, II, SSTL 3 I, II, HSTL I, III, IV, PCI33, GTL+, LVDS, LVPECL, LVTTTL
LC5512MC/MB/MV		✓			✓	149	193	253		✓	512	150	256	2	ispXP	✓	
LC5768MC/MB/MV			✓		✓		193	317		✓	768	225	384	2	ispXP	✓	
LC51024MC/MB/MV				✓	✓			317	381	✓	1024	300	512	2	ispXP	✓	

1. Available in Industrial grade.

ispMACH 4A5 (5V) Family — High Performance CPLDs

	Speed Grade ¹							Package (I/O + Dedicated Inputs)							Lead-Free/RoHS ²	Macrocells	Total Registers	ISP Programming	JTAG Boundary Scan Test	Typical Icc (mA)	I/O Standards
	-5	-55	-6	-65	-7	-10	-12	J 16.5x16.5 1.27mm	V 10x10 0.8mm	V48 7x7 0.5mm	Y 14x20 0.65mm	V 14x14 0.5mm	V 20x20 0.5mm	Y 28x28 0.5mm							
	t _{PD} (ns)	5	5.5	6	6.5	7.5	10	12	44-pin PLCC	44-pin TQFP	48-pin TQFP	100-pin PQFP	100-pin TQFP	144-pin TQFP							
t _{SS} (ns)	3	3.5	3.5	3.5	5	5.5	7														
t _{CO} (ns)	4	4	4.5	5	5.5	6	6.5														
f _{MAX} (MHz)	182	167	160	154	125	118	95														
M4A5-32/32	✓				✓	✓	✓	32+2	32+2	32+2					✓	32	32	JTAG	✓	20	5/3.3V LVTTTL, TTL, PCI33
M4A5-64/32		✓			✓	✓	✓	32+2	32+2	32+2					✓	64	96	JTAG	✓	25	
M4A5-96/48		✓			✓	✓	✓					48+8				96	144	JTAG	✓	40	
M4A5-128/64		✓			✓	✓	✓				64+6	64+6			✓	128	192	JTAG	✓	55	
M4A5-192/96			✓		✓	✓	✓						96 +16		✓	192	288	JTAG	✓	85	
M4A5-256/128				✓	✓	✓	✓							128 +14		256	384	JTAG	✓	100	

1. Available in Commercial and Industrial temperature grades. See data sheet for specific device options.

2. Select packages only. Refer to data sheet for details.

Note: All ispMACH 4A devices have SpeedLocked™ performance at <=20 product terms per output.

Power Manager Family – Optimized Power Supply Management

Power Manager II and Power Manager Devices

	Monitoring Precision	Programmable Power Supply Sense Inputs	Trim Outputs (DACs)	ADC Support	I ² C Interface	FET Drivers/Digital Outputs	CPLD Macrocells	Power Supply Voltage	Packaging	Temp. Range		Lead-Free/RoHS
										Ind.	Auto.	
ispPAC-POWR1220AT8	0.2%	12 (0.7V - 5.75V) + GND Detect	8	Yes	Yes	4/16	48	2.8V - 3.9V	100-pin TQFP	✓	–	✓
ispPAC-POWR1014	0.3%	10 (0.7V - 5.75V) + GND Detect	–	–	–	2/12	24	2.8V - 3.9V	48-pin TQFP	✓	–	✓
ispPAC-POWR1014A	0.3%	10 (0.7V - 5.75V) + GND Detect	–	Yes	Yes	2/12	24	2.8V - 3.9V	48-pin TQFP	✓	–	✓
ispPAC-POWR607	0.3%	6 (0.7V - 5.75V) + GND Detect	–	–	–	2/5	16	2.6V - 3.9V	32-pin QFN	✓	–	✓
ispPAC-POWR6AT6	–	6 (0.7V - 5.75V) + GND Detect	6	Yes	Yes	–	–	2.8V - 3.9V	32-pin QFN	✓	–	✓
ispPAC-POWR1208P1	0.5%	12 (0.7V - 5.9V) + GND Detect	–	–	–	4/4	16	2.7V - 5.5V	44-pin TQFP	✓	–	✓
ispPAC-POWR1208	0.9%	12 (1V - 5.7V)	–	–	–	44	16	2.25V - 5.5V	44-pin TQFP	✓	✓	✓
ispPAC-POWR604	0.9%	6 (1V - 5.7V)	–	–	–	0/4	8	2.25V - 5.5V	44-pin TQFP	✓	✓	✓

Applications

	Power Supply Sequencing	Tracking	Softstart	Monotonic Supply Ramp	Reset Generation	Push Button Reset Input	Over & Under Voltage Indication	Watchdog Timer	Power Supply Trimming / Margining	Supply Voltage Measurement	Sleep Mode
ispPAC-POWR1220AT8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
ispPAC-POWR1014	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–
ispPAC-POWR1014A	✓	✓	✓	✓	✓	✓	✓	✓	–	✓	–
ispPAC-POWR607	✓	✓	✓	✓	✓	✓	✓	✓	–	–	✓
ispPAC-POWR6AT6	–	–	–	–	✓	–	–	–	✓	✓	–
ispPAC-POWR1208P1	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–
ispPAC-POWR1208	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–
ispPAC-POWR604	✓	–	–	–	✓	✓	✓	✓	–	–	–

ispClock5600 and 5300 Families – Optimized Clock Network Management

ispClock Devices

	Programmable Reference Inputs	Programmable Clock Outputs	Programmable Skew Steps	Output Clock Dividers	Input Dividers	Feedback Dividers	Power Supply Voltage	Packaging	Temp. Range		Lead-Free/RoHS
									Ind.	Auto.	
ispClock5600A	2 (8 - 400MHz)	10 or 20 (4 to 400MHz)	16 (156ps)	5 (2:80)	1 (1:40)	1 (1:40)	3.3V	48-pin TQFP 100-pin TQFP	✓	–	✓
ispClock5300S	2 (8 - 267MHz)	4, 8, 16, 32 or 20 (5 to 267MHz)	8 (156ps)	3 (1,2,4,8,16,32)	–	–	3.3V	48-pin TQFP 64-pin TQFP	✓	–	✓

Applications

	Clock Multiplication	Clock Division	Multiple Clock Generation	Universal Fan-out Buffers	Signal Translation	Match Trace Impedance	Match Trace Delay	Clock Slew Control
ispClock5600A	2 to 80	1 to 40	5 Frequencies	10 or 20	LVTTTL, LVCMOS, SSTL, HSTL, LVDS, LVPECL, Diff. SSTL, Diff. HSTL	20, 40 to 70Ω, 5Ω Steps	156ps Steps to 12ns	16 Steps
ispClock5300S	1 to 32	–	3 Frequencies	4, 8, 12, 16 or 20	LVTTTL, LVCMOS, SSTL, HSTL, LVDS, LVPECL, Diff. SSTL, Diff. HSTL	20, 40 to 70Ω, 5Ω Steps	156ps Steps to 12ns	8 Steps

ispGAL Family — In-System Programmable PLDs

		Commercial	Industrial	28-pin PLCC	28-pin SSOP	32-pin QFN	Lead-Free/RoHS ²	Tpd (ns)	Fmax (MHz)	Icc Typ (mA)	Icc Max (mA)	I/Os	Dedicated Inputs	MAX. PT per Output	Features
ispGAL 22V10AC	ispGAL22V10AC-23L	✓				✓		2.3	455	0.15 ¹	80	10	11	8-16	1.8V In-System Programmable 22V10
	ispGAL22V10AC-28L	✓		✓				2.8	357	0.15 ¹	80				
	ispGAL22V10AC-5L	✓	✓	✓		✓		5	200	0.15 ¹	80				
	ispGAL22V10AC-75L	✓	✓	✓		✓		7.5	166	0.15 ¹	80				
ispGAL 22V10AB	ispGAL22V10AB-23L	✓				✓		2.3	455	7 ¹	90	10	11	8-16	2.5V In-System Programmable 22V10
	ispGAL22V10AB-28L	✓		✓				2.8	357	7 ¹	90				
	ispGAL22V10AB-5L	✓	✓	✓		✓		5	200	7 ¹	90				
	ispGAL22V10AB-75L	✓	✓	✓		✓		7.5	166	7 ¹	90				
ispGAL 22V10AV	ispGAL22V10AV-23L	✓				✓	✓	2.3	455	7 ¹	90	10	11	8-16	3.3V In-System Programmable 22V10
	ispGAL22V10AV-28L	✓		✓				2.8	357	7 ¹	90				
	ispGAL22V10AV-5L	✓	✓	✓		✓	✓	5	200	7 ¹	90				
	ispGAL22V10AV-75L	✓	✓	✓		✓	✓	7.5	166	7 ¹	90				
ispGAL 22V10	ispGAL22V10C-7L	✓		✓	✓		✓	7.5	111	90	140	10	11	8-16	5V In-System Programmable 22V10
	ispGAL22V10C-10L	✓		✓	✓		✓	10	105	90	140				
	ispGAL22V10C-15L	✓	✓	✓	✓		✓	15	83.3	90	140				
ispGAL 22LV10	ispGAL22LV10-4L	✓		✓	✓			4	250	90	130	10	11	8-16	3.3V In-System Programmable 22V10
	ispGAL22LV10-5L	✓		✓	✓			5	200	90	130				
	ispGAL22LV10-7L	✓	✓	✓	✓			7.5	166	90	130				
	ispGAL22LV10-10L	✓	✓	✓	✓			10	111	90	130				
	ispGAL22LV10-15L	✓	✓	✓	✓			15	83.3	90	130				

1. Typical standby current.
2. Select packages and temperature grades only. Refer to data sheet for details.

CMOS GAL Families — World's Fastest and Lowest Power PLDs

	Speed Grade ¹									20-pin PLCC	20-pin PDIP	24-pin PDIP	28-pin PLCC	28-pin PDIP	Lead-Free/RoHS ²	Tpd (ns)	Fmax (MHz)	Icc Max (mA)	I/Os	Dedicated Inputs	Features
	-3	-4	-5	-7	-10	-15	-20	-25	-30												
	GAL16V8			✓	✓	✓	✓	✓	✓												
GAL16LV8	✓		✓		✓	✓				✓					✓	3.5 - 15	250 - 62.5	65	8	8	3.3V
GAL20V8				✓	✓	✓	✓	✓				✓	✓		✓	7.5 - 25	125 - 41.6	55 - 115	8	12	Half & Quarter Power
GAL22V10		✓	✓	✓	✓	✓	✓	✓				✓	✓		✓	4 - 25	250 - 38.5	55 - 150	10	12	Half & Quarter Power
GAL18V10					✓	✓	✓			✓	✓					10 - 20	105 - 62.5	115	10	8	22V10 Subset
GAL20RA10				✓	✓	✓	✓		✓			✓	✓			7.5 - 30	83.3 - 25	100	10	10	Asynchronous Clock
GAL26V12				✓	✓	✓	✓					✓				7.5 - 20	142.8 - 62.5	105 - 130	12	14	22V10 Superset
GAL26CV12				✓	✓	✓	✓					✓	✓			7.5 - 20	142.8 - 62.5	130 - 150			

1. Available in Commercial and Industrial temperature grades. Refer to data sheet for details.
2. Select packages and temperature grades only. Refer to data sheet for details.

LA-MachXO Automotive Family (-40 to 125°C T_J)

	Speed Grade	Package (I/O) ¹				LUTs	Macrocells ²	Distributed RAM Bits (K)	EBR SRAM Bits (K)	EBR SRAM Blocks	PLLs	AEC-Q100 Qualified	ISP Programming	JTAG Boundary Scan Test	I/O Standards
		TN100 14x14 0.5mm	TN144 20x20 0.5mm	FTN256 17x17 1.0mm	FTN324 19x19 1.0mm										
		100-pin TQFP	144-pin TQFP	256-ball ftBGA	324-ball ftBGA										
LA-MXO256C/E (1.8/2.5/3.3V)	✓	78				256	128	2.0	-	-	-	✓	JTAG	✓	3.3/2.5/1.8/1.5/ 1.2V LVTTTL, LVC MOS, PCI, LVDS, Bus-LVDS, LVPECL, RSDS
LA-MXO640C/E (1.8/2.5/3.3V)	✓	74	113	159		640	320	6.0	-	-	-	✓	JTAG	✓	
LA-MXO1200E (1.2V)	✓	73	113	211		1200	600	6.25	9.2	1	1	✓	JTAG	✓	
LA-MXO2280E (1.2V)	✓	73	113	211	271	2280	1140	7.5	27.6	3	2	✓	JTAG	✓	

1. Lead-free/RoHS only.
2. Assumes 1 macrocell = 2 LUTs.

LA-ispMACH 4000V/Z Automotive Families (-40 to 125°C T_A)

	Speed Grade	Package (I/O + Dedicated Inputs) ¹					Macrocells	Total Registers	AEC-Q100 Qualified	ISP Programming	JTAG Boundary Scan Test	Typical Static I _{CC}	I/O Standards	
		-75	TN44 10x10 0.5mm	TN48 7x7 0.5mm	TN100 14x14 0.5mm	TN128 14x14 0.4mm								TN144 20x20 0.4mm
		t _{PD} (ns)	44-pin TQFP	48-pin TQFP	100-pin TQFP	128-pin TQFP								144-pin TQFP
t _{PD} (ns)	7.5													
t _S (ns)	4.5													
t _{CO} (ns)	4.5													
f _{MAX} (MHz)	168													
LA-4032V (3.3V)	✓	30 + 2	32 + 4				32	32	✓	JTAG	✓	11.3mA	5/3.3/2.5/1.8V: LVTTTL, LVC MOS3.3, Extended LVC MOS3.3, LVC MOS2.5/1.8, PCI3.3	
LA-4064V (3.3V)	✓	30 + 2	32 + 4	64 + 10			64	64	✓	JTAG	✓	11.5mA		
LA-4128V (3.3V)	✓			64 + 10	92 + 4	96 + 4	128	128	✓	JTAG	✓	11.5mA		
LA-4032ZC (1.8V)	✓		32 + 4				32	32	✓	JTAG	✓	10µA	5/3.3/2.5/1.8V: LVTTTL, LVC MOS3.3, Extended LVC MOS3.3, LVC MOS2.5/1.8, PCI3.3	
LA-4064ZC (1.8V)	✓		32 + 4	64 + 10			64	64	✓	JTAG	✓	11µA		
LA-4128ZC (1.8V)	✓			64 + 10			128	128	✓	JTAG	✓	12µA		

1. Lead-free/RoHS only.

Extended Temperature Grade (-40 to 125°C T_A) Devices

	Speed Grade	Package (I/O + Dedicated Inputs)						Lead-Free/RoHS	Macrocells	Total Registers	ISP Programming	JTAG Boundary Scan Test	Typical Static I _{CC}	I/O Standards	
		-75	T44 10x10 0.5mm	T48 7x7 0.5mm	T100 14x14 0.5mm	T128 14x14 0.4mm	T144 ² 20x20 0.4mm								T176 24x24 0.5mm
		t _{PD} (ns)	44-pin TQFP	48-pin TQFP	100-pin TQFP	128-pin TQFP	144-pin TQFP								176-pin TQFP
t _{PD} (ns)	7.5														
t _S (ns)	4.5														
t _{CO} (ns)	4.5														
f _{MAX} (MHz)	168														
LC4032V (3.3V)	✓	30 + 2	32 + 4					✓	32	32	JTAG	✓	11.3mA	5/3.3/2.5/1.8V: LVTTTL, LVC MOS3.3, Extended LVC MOS3.3, LVC MOS2.5/1.8, PCI3.3	
LC4064V (3.3V)	✓	30 + 2	32 + 4	64 + 10				✓	64	64	JTAG	✓	11.5mA		
LC4128V (3.3V)	✓			64 + 10	92 + 4	96 + 4		✓	128	128	JTAG	✓	11.5mA		
LC4256V (3.3V)	✓			64 + 10		96 + 4	128 + 4	✓	256	256	JTAG	✓	12mA		
LC4032ZC (1.8V)	✓		32 + 4					✓	32	32	JTAG	✓	22µA		
LC4064ZC (1.8V)	✓		32 + 4	64 + 10				✓	64	64	JTAG	✓	37µA		
LC4128ZC (1.8V)	✓			64 + 10				✓	128	128	JTAG	✓	42µA		
LC4256ZC (1.8V)	✓			64 + 10			128 + 4	✓	256	256	JTAG	✓	135µA		
ispPAC-POWR1208	See page 11 for Power Manager Family details.														
ispPAC-POWR604															

CPLD Military Grade Products (883 Qualified / 5V)

	Part #	SMD #	Macrocells	I/O	t _{PD} (ns)	f _{MAX} (MHz)	I _{CC}		Package
							Typ (mA)	Max (mA)	
ispLSI 1016	ispLSI 1016-60LH/883	5962-9476201MXC	64	32	20	60	100	170	44-Pin JLCC
ispLSI 1024	ispLSI 1024-60LH/883	5962-9476101MXC	96	48	20	60	135	220	68-Pin JLCC
ispLSI 1032	ispLSI 1032-60LG/883	5962-9308501MXC	128	64	20	60	135	220	84-Pin CPGA
ispLSI 1048C	ispLSI 1048C-50LG/883	5962-9558701MXC	192	96	22	50	165	235	133-Pin CPGA

Lattice Software Offering

		ispLEVER Starter	ispLEVER Windows®	ispLEVER UNIX	ispLEVER Linux
Device Support	LatticeSC & LatticeSCM		✓	✓	✓
	LatticeXP	✓	✓	✓	✓
	LatticeECP2M		✓	✓	✓
	LatticeECP2	✓	✓	✓	✓
	LatticeECP	✓	✓	✓	✓
	LatticeEC	✓	✓	✓	✓
	MachXO	✓	✓	✓	✓
	ispXPGA		✓	✓	✓
	ispXPLD	✓	✓	✓	✓
	ORCA® FPGA		✓	✓	✓
	ORCA FPSC		✓	✓	✓
	ispMACH & MACH	✓	✓	✓	ispMACH Only
	ispLSI	✓	✓	✓	
	ispGDX	✓	✓	✓	✓
	ispGAL & GAL	✓	✓	✓	✓
Design Entry	VHDL & Verilog Synthesis	Mentor Graphics®	✓	✓	
		Synplicity®	✓	✓	
	Schematic	Lattice	✓	✓	
	Tcl/Tk Recorder/Editor		✓	✓	✓
	sysDSP Library for MATLAB®/Simulink®		✓	✓	✓
	Block Modular Design for FPGA		✓	✓	✓
	Text Editor		✓	✓	✓
	Project Wizard		✓	✓	✓
	LatticeMICO32 Embedded Microprocessor		✓	✓	
	IPexpress™		✓	✓	✓
	ABEL		✓	✓	✓
Simulation	VHDL and Verilog RTL	Modelsim®		✓	
		Modelsim		✓	
	Timing	Lattice	✓	✓	
	Functional		SPLD/GDX/CPLD Only	✓	
	Power Calculator		✓	✓	✓
Static Timing Analyzer / Performance Analyst		✓	✓	✓	
Design Assistants	HDL Explorer™		✓	✓	✓
	Constraint / Preference Editor		✓	✓	✓
	Revision Control		✓	✓	✓
	ispExplorer		✓	✓	✓
	EPIC Device Editor		✓	✓	✓
	Power Calculator		✓	✓	✓
On-Chip De-bug	ispTRACY™ Core Generator		✓	✓	✓
	ispTRACY Logic Analyzer		✓	✓	✓
Programming Mgmt.	ispVM System		✓	✓	✓
Operating System	Windows 2000/XP		✓		
	Solaris 2.8			✓	
	Linux Redhat Enterprise v3 and v4				✓
License	Single User		✓		
	Floating		Optional	✓	✓



Part Number	Downloadable	LS-HDL-BASE-PC-N	LS-ADV-WS-F	LS-ADV-LX-F
Maintenance Part Number	—	LS-HDL-BASE-PCM-N	LS-ADV-WSM-F	LS-ADV-LXM-F

Development Kits

	Development Kit Contents		Ordering Part Number
FPGA Development Kits	LatticeEC6 – Standard	LatticeEC6 Standard Board, ispLEVER (Windows), USB Download Cable	LS-EC6-BASE-PC-N
	LatticeXP10 – Standard	LatticeXP10 Standard Board, ispLEVER (Windows), USB Download Cable	LS-XP10-BASE-PC-N
	MachXO2280 – Standard	MachXO-2280 Standard Board, ispLEVER (Windows), USB Download Cable	LS-X2280-BASE-PC-N
Programmable Mixed Signal/Clock Development Kits	ispPAC80/81	Evaluation Board, ispDOWNLOAD Cable, PAC-Designer Software	PAC-SYSTEM80/81
	ispPAC Power Manager 1220AT8	Evaluation Board, ispDOWNLOAD Cable, PAC-Designer Software	PAC-SYSPOWR1220AT8
	ispPAC Power Manager 1208P1	Evaluation Board, ispDOWNLOAD Cable, PAC-Designer Software	PAC-SYSTEMPOWR1208P1
	ispClock5620/A	Evaluation Board, ispDOWNLOAD Cable, PAC-Designer Software	PAC-SYCLK5620AV

Evaluation Boards

	Option	Lattice Device Included on Board	Other Included Items	Ordering Part Number
FPGA / FPSC Evaluation Boards (see the Lattice website for additional boards)	LatticeSC/M – Comm.	Communications	LFSCM3GA25E-6F900C	ispDOWNLOAD Cable, AC Adapter Contact Lattice
	LatticeSC/M – PCIe x8	PCIe x8	LFSCM3GA80E-6FF1152C	ispDOWNLOAD Cable, AC Adapter LFSC80E-P8-EV
	LatticeSC/M – PCIe x1	PCIe x1	LFSCM3GA25E-6F900C	ispDOWNLOAD Cable, AC Adapter LFSC25E-P1-EV
	LatticeXP – Advanced Board	Advanced	LFXP10C-5F388C	ispDOWNLOAD Cable, AC Adapter LFXP10C-H-EV
	LatticeXP – Standard Board	Standard	LFXP10C-5F256C	ispDOWNLOAD Cable, AC Adapter LFXP10C-L-EV
	LatticeECP2M – PCIe x4	PCIe x4	LFE2M35E-6FF672C	ispDOWNLOAD Cable, AC Adapter LFE2M35E-P4-EV
	LatticeECP2M – SERDES	SERDES	LFE2M35E-6FF672C	ispDOWNLOAD Cable, AC Adapter LFE2M35E-S-EV
	LatticeECP2 – Advanced Board	Advanced	LFE2-50E-6F672C	ispDOWNLOAD Cable, AC Adapter LFE2-50E-H-EV
	LatticeECP2 – Standard Board	Standard	LFE2-50E-6F484C	ispDOWNLOAD Cable, AC Adapter LFE2-50E-L-EV
	LatticeEC – Advanced Board	Advanced	LFEC20E-5F672C LFEC20E-5F672C	ispDOWNLOAD Cable, AC Adapter ispDOWNLOAD Cable, AC Adapter LFEC20E-H-EV
LatticeEC – Standard Board	Standard	LFEC20E-4F484C	ispDOWNLOAD Cable, AC Adapter LFEC20E-L-EV	
		LFEC20E-4F484C	ispDOWNLOAD Cable, AC Adapter LFEC20E-L-EV	
		LFEC6E-4F484C	ispDOWNLOAD Cable, AC Adapter LFEC6E-L-EV	
CPLD Evaluation Boards	MachXO - Standard Board	MachXO-640	LCMXO640C-4F256C, ispPAC-CLK5610V-01T48C	ispDOWNLOAD Cable, AC Adapter LCMXO640C-L-EV
		MachXO-2280	LCMXO2280C-4F256C, ispPAC-CLK5610V-01T48C	ispDOWNLOAD Cable, AC Adapter LCMXO2280C-L-EV
	MachXO - Starter Board	Starter	LCMXO256C-4T100C	ispDOWNLOAD Cable, AC Adapter LCMXO256C-S-EV
	ispXPLD	–	LC5512MC-45256C	ispDOWNLOAD Cable, AC Adapter LC5512M-PAC-EV
	ispMACH 4032Z	–	LC4032ZC-35T48C	ispDOWNLOAD Cable, AC Adapter LC4032ZC-EV
ispMACH 4064Z	–	LC4064ZC-75T48C	ispDOWNLOAD Cable, AC Adapter LC4064ZC-EV	
Programmable Mixed Signal/Clock/Analog Evaluation Boards	ispPAC80/81	–	ispPAC80-01P1, ispPAC81-01P1	– PAC80/81-EV
	ispPAC Power Mgr. 1220AT8	–	ispPAC-POWR1220AT8-01T100I	– PAC-POWR1220AT8-EV
	ispPAC Power Mgr. 1208P1	–	ispPAC-POWR1208P1-01T44I	– PACPOWR1208P1-EV
	ispPAC Power Mgr. 1208/604	–	ispPAC-POWR1208-01T44I	– PACPOWR1208-EV
	ispClock5620/A	–	ispPAC-CLK5620-01T100I	– PACCLK5620-EV

ispDOWNLOAD Cables

	Programming Voltages Supported						OPN
	5	3.3	2.5	1.8	1.5	1.2	
PC Parallel Port	✓	✓	✓	✓	✓		HW-DL-3C
USB	✓	✓	✓	✓	✓	✓	HW-USB-2A

Desktop Programmers and Adapters

	Power Supply	OPN
Model 300	60Hz	pDS4102-PM300

Note: Programming adapters are device-specific. See the Lattice Semiconductor web site for a complete list of adapters available from Lattice and other vendors.

PAC-Designer – Mixed Signal Product Development Tool

Device Support	Design Entry	Simulation	Programming Mgmt.	License	Operating System
Power Manager II	Schematic, LogiBuilder, Design Utilities	Waveform Simulation	PAC-Designer and ispVM System	Single User, Floating	Windows 2000/ XP
ispClock5600A					
ispClock5300S					
Power Manager					
ispClock5600V					
ispPAC80					

Intellectual Property (IP)

The tables below show a selection of IP Cores available from Lattice and our ispLeverCORE Connections partners. See the Lattice Semiconductor web site at <http://www.latticesemi.com/products/intellectualproperty> for additional cores.



Lattice IP Cores

		Ordering Part Number				
		LatticeECP2M	LatticeECP2	LatticeSC	LatticeXP	LatticeECP/EC
Connectivity Cores	PCI Target 32-bit	PCI-T32-PM-U5	PCI-T32-P2-U5	PCI-T32-SC-U5	PCI-T32-XM-U5	PCI-T32-E2-U5
	PCI Master/Target 32-bit	PCI-MT32-PM-U5	PCI-MT32-P2-U5	PCI-MT32-SC-U5	PCI-MT32-XM-U5	PCI-MT32-E2-U5
	PCI Target 64-bit	PCI-T64-PM-U5	PCI-T64-P2-U5	PCI-T64-SC-U5	PCI-T64-XM-U5	PCI-T64-E2-U5
	PCI Master/Target 64-bit	PCI-MT64-PM-U5	PCI-MT64-P2-U5	PCI-MT64-SC-U5	PCI-MT64-XM-U5	PCI-MT64-E2-U5
	PCI Express x1 Endpoint	PCI-EXP1-PM-U2	-	-	-	-
Communications Cores	CPRI	Contact Lattice	-	CPRI-SC-U1	-	-
	OBSAI RP3	OBSAI-RP3-PM-U2	-	OBSAI-RP3-SC-U2	-	-
	SGMII	SGMII-PM-U2	-	SGMII-SC-U2	-	-
	SPI4.2	SPI-42-PM-U2	SPI-42-P2-U2	-	-	-
	Ten-Gigabit Ethernet MAC	ETHER-10G-PM-U2	ETHER-10G-P2-U2	ETHER-10G-SC-U2	-	-
	Tri-Speed Ethernet MAC	Contact Lattice	TS-MAC-P2-U2	TS-MAC-SC-U2	TS-MAC-XM-U2	TS-MAC-E2-U2
Processors, Controllers and Peripherals Cores	DDR SDRAM Controller - Non-Pipelined	-	-	-	DDRCT-NP-XM-N3	DDRCT-NP-E2-N3
	DDR SDRAM Controller - Pipelined	DDRCT-GEN-PM-U6	DDRCT-GEN-P2-U6	DDRCT-GEN-SC-U6	DDRCT-GEN-XM-U6	DDRCT-GEN-E2-U6
	DDR2 SDRAM Controller - Pipelined	DDR2-P-PM-U6	DDR2-P-P2-U6	DDR2-P-SC-U6	-	-
	FCRAM I Controller	-	-	-	FCRAM-ONE-XM-N1	FCRAM-ONE-E2-N1
	Multi-Channel DMA Controller	-	-	DMA-MC-SC-N3	DMA-MC-XM-N3	DMA-MC-E2-N3
	Soft Error Detection	-	-	SED-CORE-SC-U1	-	-
Digital Signal Processing Cores	Block Convolutional Encoder	Contact Lattice	CONV-BLK-P2-U3	CONV-BLK-SC-U3	CONV-BLK-XM-U3	CONV-BLK-E2-U3
	Block Viterbi Decoder	Contact Lattice	VTERB-BLK-P2-U4	VTERB-BLK-SC-U4	VTERB-BLK-XM-U4	VTERB-BLK-E2-U4
	Cascaded Integrator-Comb (CIC) Filter	CIC-FILTR-PM-U2	CIC-FILTR-P2-U2	CIC-FILTR-SC-U2	CIC-FILTR-XM-U2	CIC-FILTR-E2-U2
	Color Space Converter	Contact Lattice	CSC-P2-U1	-	-	-
	Correlator IP Core	-	-	-	-	CORR-8BIT-E2-N1
	DA-FIR Filter Generator	DAFIR-GEN-PM-U1	DAFIR-GEN-P2-U1	-	-	-
	Dynamic Block Reed-Solomon Decoder	RSDEC-DBLK-PM-U4	RSDEC-DBLK-P2-U4	RSDEC-DBLK-SC-U4	RSDEC-DBLK-XM-U4	RSDEC-DBLK-E2-U4
	Dynamic Block Reed-Solomon Encoder	RSENC-DBLK-PM-U4	RSENC-DBLK-P2-U4	RSENC-DBLK-SC-U4	RSENC-DBLK-XM-U4	RSENC-DBLK-E2-U4
	FFT Compiler	Contact Lattice	FFT-COMP-P2-U2	-	-	FFT-COMP-E2-U2
	FIR Filter Generator	FIR-COMP-PM-U2	FIR-COMP-P2-U2	-	-	FIR-COMP-E2-U2
	Interleaver/De-interleaver	INTV-DINT-PM-U3	INTV-DINT-P2-U3	INTV-DINT-SC-U3	INTV-DINT-XM-U3	INTV-DINT-E2-U3
	Numerically-Controlled Oscillator	NCO-DDS-PM-U2	NCO-DDS-P2-U2	NCO-DDS-SC-U2	NCO-DDS-XM-U2	NCO-DDS-E2-U2
	Turbo Decoder	Contact Lattice	TURBO-DECO-P2-U3	TURBO-DECO-SC-U3	TURBO-DECO-XP-U3	TURBO-DECO-E2-U3
	Turbo Encoder	Contact Lattice	TURBO-ENCO-P2-U3	TURBO-ENCO-SC-U3	TURBO-ENCO-XP-U3	TURBO-ENCO-E2-U3

ispLeverCORE Connection Partners

		LatticeSC	LatticeXP	LatticeECP2M	LatticeECP2	LatticeECP/EC
Digital Core Design (www.dcd.pl)						
Connectivity	DI2CM: I2C Bus Interface - Master	✓	✓	✓	✓	✓
	DI2CS: I2C Bus Interface - Slave	✓	✓	✓	✓	✓
	DI2CSB: I2C Bus Interface Slave - Base version	✓	✓	✓	✓	✓
	DSPI: Serial Peripheral Interface - Master/Slave	✓	✓	✓	✓	✓
	DSPI_FIFO: Serial Peripheral Interface with FIFO – Master/Slave	✓	✓	✓	✓	✓
	DSPIS: Serial Peripheral Interface – Slave	✓	✓	✓	✓	✓
Communications	D16450: Configurable UART	✓	✓	✓	✓	✓
	D16550: Configurable UART with FIFO	✓	✓	✓	✓	✓
	D16750: Configurable UART with FIFO	✓	✓	✓	✓	✓
Processor, Controller and Peripherals	D8254: Programmable Interval Timer		✓			✓
	D8259: Programmable Interrupt Controller		✓			✓
	DF6805: 8-bit FAST Microcontrollers Family		✓			✓
	DF6808: 8-bit FAST Microcontrollers Family		✓			✓
	DF6811: 8-bit FAST MCU Family		✓			✓
	DF6811CPU: 8-bit FAST MCU Family		✓			✓
	DFPIC1655X: High Performance Configurable 8-bit RISC MCU		✓			✓
	DFPIC165X: High Performance 8-bit RISC MCU		✓			✓
	DP8051: Pipelined High Performance 8-bit MCU	✓	✓	✓	✓	✓
	DP8051CPU: Pipelined High Performance 8-bit MCU	✓	✓	✓	✓	✓
	DP8051XP: Pipelined High Performance 8-bit MCU		✓			✓
	DRPIC1655X: High Performance Configurable 8-bit RISC MCU		✓			✓
DRPIC166X: High Performance Configurable 8-bit RISC MCU		✓			✓	
Cast, Inc. (www.cast-inc.com)						
Connectivity	C1394A: IEEE-1394a Link Layer Controller Core	✓			✓	✓
	CAN		✓			✓
	CUSB: USB 1.1 Device Controller Core	✓	✓		✓	
	CUSB2: USB 2.0 Device Controller Core	✓			✓	
	SPI_MS: Serial Peripheral Interface Master/Slave Core	✓			✓	
	USB 2.0 On-The-Go (OTG) Controller	✓	✓		✓	✓
Communications	H16550S: UART with FIFOs & Synchronous CPU Interface Core	✓	✓		✓	✓
	SDLC: Controller Core	✓			✓	
Processor, Controller and Peripherals	C8051: Legacy-Speed 8-Bit Processor Core	✓			✓	
	R8051: 8-bit RISC-like MCU Core	✓			✓	
Eureka Technology, Inc. (www.eurekatech.com)						
Connectivity	EP100: PowerPC Bus Slave		✓			✓
	EP201: PowerPC Bus Master		✓			✓
	EP300: PowerPC Bus Arbiter		✓			✓
Processor, Controller and Peripherals	EP501: NAND Flash Controller	✓	✓			✓
	EP510: CompactFlash/PCMCIA Host Adapter	✓	✓		✓	✓
	EP550: SD/SDIO Controller	✓	✓		✓	✓
Northwest Logic (www.nwlogic.com)						
Connectivity	PCI Express Endpoint x1 Core (PIPE Compliant)		✓			✓
	PCI Express Endpoint x1 x4 and x8 Cores	✓				
Elliptic Semiconductor (www.ellipticsemi.com)						
Digital Signal Processing	CLP-02 DES/3DES	✓				✓
	CLP-03 AES	✓				✓
	CLP-11 Tiny AES	✓				✓
	CLP-17 Elliptic Curve Point Multiplier Core				✓	
Art of Silicon (www.artofsilicon.com)						
Multimedia	JPEG Decoder - Color	✓	✓		✓	
	JPEG Decoder - Grayscale	✓	✓		✓	
	JPEG Encoder - Color	✓	✓		✓	
	JPEG Encoder - Grayscale	✓	✓		✓	
Mercury Computer (www.mc.com)						
Connectivity	Serial RapidIO x1 and x4 Endpoint Cores	✓				
IntelliProp (www.intelliprop.com)						
Connectivity	CE-ATA Device Storage Interface Core	✓	✓		✓	✓
	CE-ATA Host Storage Interface Core	✓	✓		✓	✓
Western Design Center (www.westerndesigncenter.com)						
Processor, Contr. & Periph.	W65C02RTL: 8-Bit 65xx Microprocessor		✓			
TurboConcept (www.turboconcept.com)						
Communications	TC1000-WiMAX: 802.16 CTC Decoder	✓				
ANAGRAM Technologies (www.anagramtech.com)						
DSP	SoftAMP Digital Class-D Amplifier			✓	✓	✓
	SoftDAC 24bit Stereo DAC			✓	✓	✓

Note: Contact ispLeverCORE Connection partner for ordering part numbers (OPN), and availability of IP for other Lattice devices.



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