Lattice Semiconductor Corporation - LC4064V-25TN100C Datasheet

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Understanding Embedded - CPLDs (Complex Programmable Logic Devices)

Embedded - CPLDs, or Complex Programmable Logic Devices, are highly versatile digital logic devices used in electronic systems. These programmable components are designed to perform complex logical operations and can be customized for specific applications. Unlike fixed-function ICs, CPLDs offer the flexibility to reprogram their configuration, making them an ideal choice for various embedded systems. They consist of a set of logic gates and programmable interconnects, allowing designers to implement complex logic circuits without needing custom hardware.

Applications of Embedded - CPLDs

Details	
Product Status	Active
Programmable Type	In System Programmable
Delay Time tpd(1) Max	2.5 ns
Voltage Supply - Internal	3V ~ 3.6V
Number of Logic Elements/Blocks	4
Number of Macrocells	64
Number of Gates	-
Number of I/O	64
Operating Temperature	0°C ~ 90°C (TJ)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-TQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lc4064v-25tn100c

FPGA Products

iCE40 Series - World's Smallest FPGAs

Features			iCE40 UltraPlus		iCE40 UltraLite		iCE40 Ultra			iCE40 LM			iCE40 LP					iCE40 HX		
Device			UP3K	UP5K	UL640	UL1K	LP1K	LP2K	LP4K	LM1K	LM2K	LM4K	LP384	LP640	LP1K	LP4K	LP8K	HX1K	HX4K	HX8K
Logic			2800	5280	640	1248	1100	2048	3520	1100	2048	3520	384	640	1280	3520	8680	1280	3520	7680
NVCM			Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Static Power (µA)			75	75	35	35	71	71	71	100	100	100	21	100	100	250	250	296	1140	1140
EBR			80 kb	120 kb	56 kb	56 kb	64 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	1			1	2	2	1	2	2
I²C core			2	2	2	2	2	2	2	1	2	2								
SPI Core			2	2			2	2	2	1	2	2								
Strobe (low)										1	1	1								
Strobe (high)										1	1	1								
Low Power Oscillator			1	1	1	1	1	1	1											
High Frequency Oscillator			1	1	1	1	1	1	1											
24 mA Drive			3	3	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			4	8			2	4	4											
PWM Generator			Yes	Yes	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	30	2.15 x 2.55 mm	21	21																
	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)							
	48	7 x 7 mm		39																
	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.

MachXO3 Series - Bridging and I/O Expansion FPGAs

Features			MachXO3LF™						MachXO3L™					
Device			LCMXO3LF-640	LCMXO3LF-1300	LCMXO3LF-2100	LCMXO3LF-4300	LCMXO3LF-6900	LCMXO3LF-9400	LCMXO3L-640	LCMXO3L-1300	LCMXO3L-2100	LCMXO3L-4300	LCMXO3L-6900	LCMXO3L-9400
LUTs			640	1300	2100	4300	6900	9400	640	1300	2100	4300	6900	9400
EBR SRAM	# of Blocks		2	7	8	10	26	48	2	7	8	10	26	48
kbits			18	64	74	92	240	432	18	64	74	92	240	432
Distrib. RAM	kbits		5	10	16	34	54	75	5	10	16	34	54	75
UFM	kbits		24	64	80	96	256	456						
Configuration Memory			Flash						Internal NVM					
Dual Boot[4]			✓						✓					
Embedded Function Blocks			I²C (2), SPI (1), Timer (1)						I²C (2), SPI (1), Timer (1)					
Core Vcc	1.2 V		E						E					
	2.5 - 3.3 V		C						C					
Temp.	C		✓						✓					
	I		✓						✓					
0.4 mm Spacing			I/O Count											
WLCSP	36[2]	2.5 x 2.5 mm		28						28				
	49[2]	3.2 x 3.2 mm			38						38			
	81[2]	3.8 x 3.8 mm				63						63		
0.5 mm Spacing			I/O Count											
csfBGA	121[2]	6 x 6 mm	100						100					
	256[2]	9 x 9 mm		206						206				
	324[2]	10 x 10 mm			281						281			
0.8 mm Spacing			I/O Count											
caBGA	256	14 x 14 mm		206[3]						206[3]				
	324	15 x 15 mm			279[3]						279[3]			
	400	17 x 17 mm				335[3]						335[3]		
	484	19 x 19 mm						384						384

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

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

Features			MachXO2™									MachXO™								LatticeXP2™				
Device			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			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			0	18	64	64	74	74	92	92	240					9.2		27.6		166	221	276	387	885
Distrib. RAM	kbits		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					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 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		ZE & HE									✓		✓		✓		✓		✓				
	1.8 - 3.3 V												✓		✓		✓		✓					
	2.5 - 3.3 V		HC									HC								HC				
Temp.	C		✓									✓								✓				
	I		✓									✓								✓				
	AEC-Q100												✓					✓			✓			
0.4 mm Spacing																								
WLCSP	25	2.5 x 2.5 mm				18			18															
	49[2]	3.2 x 3.2 mm						38																
ucBGA	64	4 x 4 mm	44																					
0.5 mm Spacing																								
QFN	32	5 x 5 mm	21				21																	
	48	7 x 7 mm	40	40																				
	84	7 x 7 mm								68														
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]														
	132	8 x 8 mm																		86				
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																								
caBGA	256	14 x 14 mm						206		206	206			159		211								
	332	17 x 17 mm								274	278													
1.0 mm Spacing																								
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.

CPLD Products

ispMACH 4000 Series

Features			ispMACH® 4000ZE				ispMACH® 4000V					
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					
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

Power and Thermal Management Products

		Power & Thermal Management		Power Management				
Features		**L-ASC10**	**LPTM21**	**POWR1220AT8**	**POWR1014A**	**POWR1014**	**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		✓	✓					
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		✓	✓					
Temp.	**I**	✓	✓	✓	✓	✓	✓	✓
	AEC-Q100				✓	✓		
Package Options		**Digital I/Os**						
48-pin QFN (7 x 7)		9[5]						
237-Ball ftBGA (1 mm) (17 x 17)			95 + 10[4]					
100-pin TQFP (14 x 14)				22[1]				
48-pin TQFP (7 x 7)					16[2]	16[2]		
32-pin QFN (5 x 5)							7[3]	
24-pin QFN (4 x 4)							7[3]	7[3]

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 12 (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

IP Cores and Reference Designs

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/ ECP5-5G	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	✓[1]	✓	✓	✓	✓		✓		
	DDR3 SDRAM Controller	✓	✓							
	LPDDR SDRAM Controller					✓				
	LPDDR3 SDRAM Controller	✓								
	FIR Filter Generator		✓	✓[1]	✓[1]			✓		
	Triple Speed Ethernet MAC	✓	✓	✓[1]	✓[1]			✓		
PCI Express Suite	PCI Express x1 Endpoint	✓	✓	✓[1]					Order #: DS-PCIE-ST-U1	Order #: DS-PCIE-ST-UR1
	PCI Express x2 Endpoint	✓								
	PCI Express x4 Endpoint	✓	✓	✓[1]						
	PCIe Root Complex Lite x1	✓	✓							
	PCIe Root Complex Lite x4	✓	✓							
	Scatter Gather DMA	✓	✓	✓[1]	✓[1]			✓		
	PCI Master/Target 33		✓	✓[1]	✓[1]	✓	✓	✓		
	PCI Master/Target 66		✓	✓[1]	✓[1]			✓		
	PCI Target 33		✓	✓[1]	✓[1]	✓	✓	✓		
	PCI Target 66		✓	✓[1]	✓[1]		✓	✓		
	DDR SDRAM Controller		✓[1]	✓[1]	✓[1]			✓[1]		
	DDR2 SDRAM Controller	✓[1]	✓	✓[1]	✓[1]			✓		
	DDR3 SDRAM Controller	✓	✓							
	LPDDR SDRAM Controller					✓				
	LPDDR3 SDRAM Controller	✓								
Ethernet Suite	10 Gigabit Ethernet MAC	✓	✓	✓[1]	✓[1]				Order #: DS-ETH-ST-U1	Order #: DS-ETH-ST-UR1
	SGMII and Gigabit Ethernet PCS	✓	✓	✓[1]						
	Triple Speed 10/100/1G Ethernet MAC	✓	✓	✓[1]	✓[1]			✓		
	XAUI	✓	✓	✓[1]						
	Scatter Gather DMA	✓	✓	✓[1]	✓[1]			✓		
	DDR SDRAM Controller		✓[1]	✓[1]	✓[1]			✓[1]		
	DDR2 SDRAM Controller	✓[1]	✓	✓[1]	✓[1]			✓		
	DDR3 SDRAM Controller	✓	✓							
Digital Signal Processing (DSP) Design Suite	Block Convolutional Encoder		✓[1]	✓[1]	✓[1]			✓[1]	Order #: DS-DSP-ST-U1	Order #: DS-DSP-ST-UR1
	Block Viterbi Decoder		✓[1]	✓[1]	✓[1]			✓[1]		
	Cascaded Integrator-Comb (CIC) Filter		✓[1]	✓[1]	✓[1]			✓[1]		
	CORDIC		✓[1]	✓[1]	✓[1]			✓[1]		
	Distributed Arithmetic (DA) FIR Filter		✓[1]	✓[1]	✓[1]			✓[1]		
	Dynamic Block Reed-Solomon Decoder		✓[1]	✓[1]	✓[1]			✓[1]		
	FFT Compiler		✓[1]	✓[1]	✓[1]			✓[1]		
	FIR Filter Generator		✓	✓[1]	✓[1]			✓		
	Interleaver/De-Interleaver		✓[1]	✓[1]	✓[1]			✓[1]		
	Numerically Controlled Oscillators (NCO)		✓	✓[1]	✓[1]			✓		
Video and Display Suite	2D Edge Detector		✓[1]	✓[1]	✓[1]			✓[1]	Order #: DS-VDS-ST-U1	Order #: DS-VDS-ST-UR1
	2D FIR Filter		✓[1]	✓[1]	✓[1]			✓[1]		
	2D Scaler	✓[1]	✓	✓[1]	✓[1]			✓		
	Color Space Converter	✓	✓	✓[1]	✓[1]	✓		✓		
	Deinterlacer	✓[1]	✓	✓[1]	✓[1]			✓		
	Median Filter		✓[1]	✓[1]	✓[1]			✓[1]		
	DVB-ASI		✓							
	Tri-rate Serial Digital Interface (SDI) PHY	✓	✓							
	DDR SDRAM Controller		✓[1]	✓[1]	✓[1]			✓[1]		
	DDR2 SDRAM Controller	✓[1]	✓	✓[1]	✓[1]			✓		
	DDR3 SDRAM Controller	✓	✓							

1) Contact Lattice for version support information.

Continued on next page

IP Cores and Reference Designs

	IP Core	ECP5/ ECP5-5G	Lattice ECP3	Lattice ECP2M	Lattice ECP2	Mach XO2	Mach XO	Lattice XP2	Suite (One Year Subscription)	Annual License Renewal (After First Year)
Connectivity IP Suite	DDR3 SDRAM Controller	✓	✓						Order #: DS-CONN-ST-U	Order #: DS-CONN-ST-UR
	LPDDR3 SDRAM Controller	✓								
	PCI Express x1 Endpoint	✓	✓	✓[1]						
	PCI Express x2 Endpoint	✓								
	PCI Express x4 Endpoint	✓	✓	✓[1]						
	PCIe Root Complex Lite x1	✓	✓							
	PCIe Root Complex Lite x4	✓	✓							
	10 Gigabit Ethernet MAC	✓	✓	✓[1]	✓[1]					
	SGMII and Gigabit Ethernet PCS	✓	✓	✓[1]						
	Triple Speed 10/100/1G Ethernet MAC	✓	✓	✓[1]	✓[1]			✓		
	XAUI	✓	✓	✓[1]						
	Scatter Gather DMA	✓	✓	✓[1]	✓[1]			✓		
	CPRI	✓	✓	✓						
	JESD204B	✓	✓							
	DDR3 PHY	✓	✓							

1) Contact Lattice for version support information.

IP Cores and Reference Designs

Name	Reference Design No.	ECP5/ ECP5-5G	Lattice ECP3	Mach XO3	Mach XO2	Mach XO	Lattice XP2	iCE40 LP/HX/LM	iCE40 Ultra	iCE40 UltraPlus	Format: Verilog	Format: VHDL
RAM-Type Interface for Embedded User Flash Memory - WISHBONE Compatible	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				✓	✓	✓				✓	✓
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 - WISHBONE Compatible	RD1125			✓	✓						✓	✓
SPI Slave Port Expander	RD1168							✓				✓
SPI to I²C Bridge	RD1173							✓			✓	
SPI to MIPI-DSI Bridge										✓		
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							✓			✓	

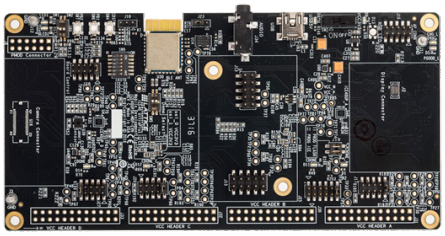
ispMACH 4000 Reference Designs

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 UltraPlus Mobile Development Platform

Enables designers to evaluate key connectivity features of the iCE40 UltraPlus FPGA as well as processing features utilizing multiple DSPs, integrated RAM, and FPGA fabric.



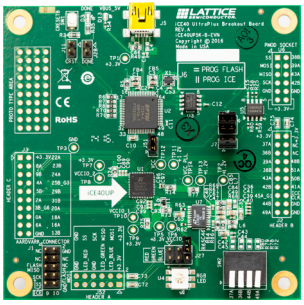
Features

- x1 MIPI DSI interface up to 108 Mbps
- 4x Microphone bridging (2x I2S mics and 2x PDM mics)
- Compass sensor (LSM303), pressure sensor (BMP180), gyro sensor (LSM330), and accelerometer (LIS2D12)
- 640 x 480 Image sensor (OVM7692)
- BLE module to transfer any captured data from iCE40 UltraPlus wirelessly
- iCE40 UltraPlus can be programmed via on-board SPI Flash or via USB port

Ordering Part Number
iCE40UP5K-MDP-EVN

iCE40 UltraPlus Breakout Board

Enables designers to evaluate key connectivity features of the iCE40 UltraPlus FPGA. The breakout board brings out all I/Os and allows the FPGA to be programmed over a USB connector.



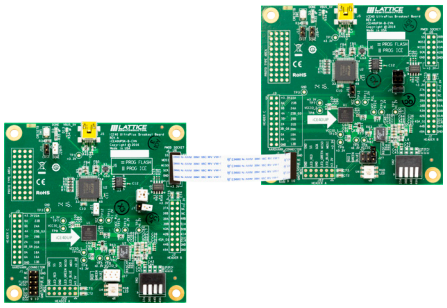
Features

- iCE40 UltraPlus (iCE40UP5K) device in a 48-pin QFN package
- High-current LED output
- iCE40UP5K application based current measurements
- Standard USB cable for device programming
- RoHS-compliant packaging and process
- Pre-loaded RGB LED Demo
- Software run GUI
- USB Connector Cable

Ordering Part Number
iCE40UP5K-B-EVN

iCE40 UltraPlus I3C Evaluation Kit

Enables designers to evaluate I3C host interface along with I3C device interface embedded with iCE40 UltraPlus.



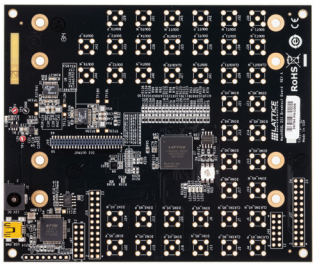
Features

- Reuse iCE40 UltraPlus Breakout Boards
- Signal Generator with I3C host on one FPGA
- I3C device on second FPGA along with additional I^2C host interfaces

Ordering Part Number
ICE40UP5K-VGPIO-I3C-EVN

MachXO3L Breakout Board

Focusing on evaluating high-speed source synchronous interfaces with the Lattice MachXO3L-2100 and MachXO3L-6900 products in both 49-ball WLCSP and 256-ball caBGA packages respectively.



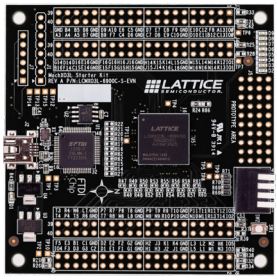
Features

- 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 I/O 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 Type-A to Type-B (mini) cable for FPGA power and programming via PC
- DC jack for supplemental power input

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

MachXO3L Starter Kit

The MachXO3L Starter Kit is a basic breakout board to allow simple evaluation and development of MachXO3L based designs. It includes the LCMXO3L-6900C-5BG256C device.



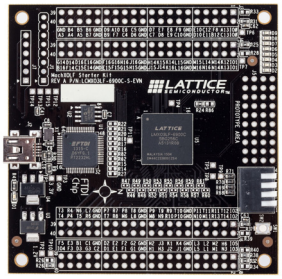
Features

- MachXO3 FPGA – LCMXO3L-6900C-5BG256C
- USB Type-B (mini) connector (program/power)
- Pre-programmed example design (available on latticesemi.com)
- Eight LEDs
- 4-position DIP switch
- 40-hole prototyping area
- Four 2x20 expansion header landings for general I/O, JTAG and external power
- 1x8 expansion header landing for JTAG
- 1x6 expansion header landing for SPI/ I^2C
- SPI Flash for external boot or dual boot
- 3.3V and 1.2V supply rails

Ordering Part Number
LCMXO3L-6900C-S-EVN

MachXO3LF Starter Kit

The MachXO3LF Starter Kit is a basic breakout board to allow simple evaluation and development of MachXO3LF based designs. It includes the LCMXO3LF-6900C-5BG256C device.



Features

- MachXO3 FPGA – LCMXO3LF-6900C-5BG256C
- USB Type-B (mini) connector (program/power)
- Pre-programmed example design (available on latticesemi.com)
- Eight LEDs
- 4-position DIP switch
- 40-hole prototyping area
- Four 2x20 expansion header landings for general I/O, JTAG and external power
- 1x8 expansion header landing for JTAG
- 1x6 expansion header landing for SPI/ I^2C
- SPI Flash for external boot or dual boot
- 3.3V and 1.2V supply rails

Ordering Part Number
LCMXO3LF-6900C-S-EVN

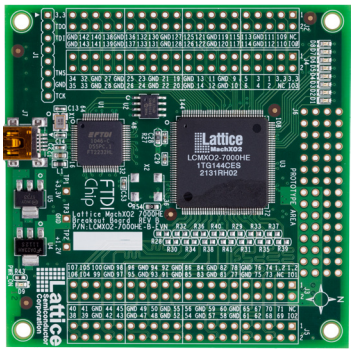
Development Kits

MachXO

MachXO2 Boards and Kits

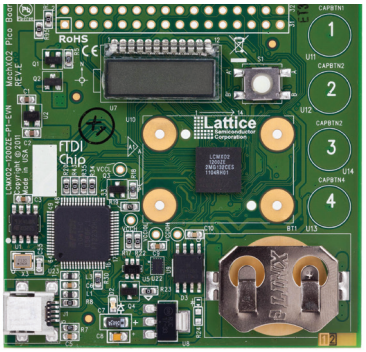
MachXO2 Breakout Board Features

- MachXO2 LCMXO2-7000HE
- Access to all device I/O via four 2x20 expansion header landings for I/O, JTAG and external power
- 60-hole prototype area
- USB Type-B (mini) connector for power and programming (cable included)
- Eight general purpose LEDs
- 3.3V and 1.2V supply rails



MachXO2 Pico Development Kit Features

- MachXO2 LCMXO2-1200ZE
- 4-character, 16-segment LCD display
- 4 capacitive touch sense buttons
- 1Mbit SPI Flash
- I2C temperature sensor
- Current and voltage sensor circuits
- Expansion header for JTAG, I2C
- Standard USB cable for device programming and I2C communication
- RS-232/USB & JTAG/USB interface
- RoHS-compliant packaging and process
- Watch battery



MachXO2 Control Development Kit Features

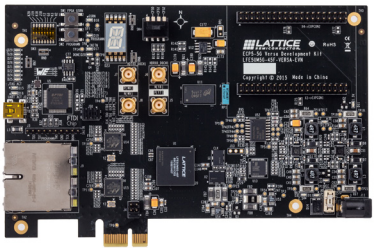
- MachXO2 LCMXO2-4000HC
- Power Manager II ispPAC-POWR1014A
- 128Mbit LPDDR memory, 4Mbit SPI Flash
- Current and voltage sensor circuits
- SD memory card socket
- Microphone
- Audio amplifier and Delta-Sigma ADC
- Up to two DVI sources and one DVI output.
- Up to two Display inputs (7:1 LVDS) and one Display output (7:1 LVDS)
- Audio output channel
- Expansion header for JTAG, SPI, I2C 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)

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

ECP

ECP5 and ECP5-5G Versa Development Kits

For evaluation and development with the ECP5 and ECP5-5G FPGAs, including PCI Express, Gigabit Ethernet, DDR3 and generic SERDES performance.



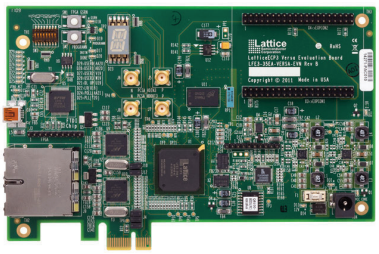
Features

- Half-length PCI Express form factor: allows demonstration of PCI Express x1interconnection
- Electrical testing of one full-duplex SERDES channel via SMA connections
- USB Type-B connection for UART and device programming
- Two RJ45 interfaces to 10/100/1000 Ethernet to RGMII
- On-board boot Flash:128Mbit Serial SPI Flash
- DDR3-1866 memory components (64Mbit/x16)
- Expansion mezzanine interconnection for prototyping
- 14-segment alphanumeric display
- Switches, LEDs and displays for demo purposes
- Diamond® programming support
- On-board reference clock sources

Ordering Part Number
LFE5UM-45F-VERSA-EVN
LFE5UM5G-45F-VERSA-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 1.1x1 Edge connector interface
  - Two Gigabit Ethernet ports (RJ45)
  - 4 SMA connectors for SERDES access
  - USB Type-B (mini) for FPGA programming
  - LatticeECP3 FPGA: LFE3-35EA-FF484
  - 64Mbit Serial Flash memory
  - 1GB DDR3 Memory
  - 14 segment alphanumeric 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 Type-A to Type-B (mini) cable for FPGA programming via PC
- 12V AC power adapter and international plug adapters

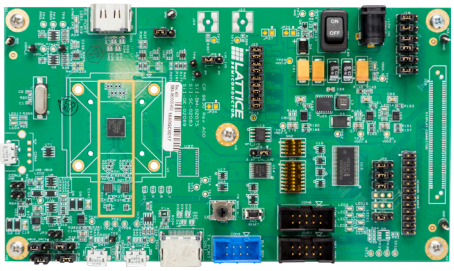
Ordering Part Number
LFE3-35EA-VERSA-EVN

Development Kits

ASSP Video

Sil9630 evaluation kit

This is an evaluation kit for Sil9630, HDMI/MHL transceiver solution. Input can be eTMDS or HDMI while output can be MHL or HDMI. The evaluation kit allows HDCP decryption and encryption to be evaluated, DSC compression to be evaluated, and MHL/HDMI transmission up to 4K60 444 video resolution.



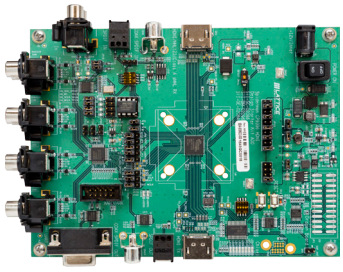
Features

- Dual-Mode MHL or HDMI Transmitter
- Input: HDMI or eTMDS (Up to 4K60 444)
- Output: MHL (Up to 4K60 444) or HDMI (Up to 4K60 444)
- Header pins available to measure power consumption
- DSC encoder support
- RGB/YCbCr/xvYCC support

Ordering Part Number
CP9630

Sil9396 evaluation kit

This is an evaluation kit for Sil9396, which is a DSC decompression IC supporting HDMI and MHL up to 4K60 444.



Features

- Dual inputs (MHL or HDMI)
  - HDMI can support up to 4K60 444
  - MHL1/2 can support up to 1080p60
  - MHL3 can support up to 4K30 422pp
- Ouptut support for HDMI2.0 up to 4K60 444
- DSC decompression supported
- CSC & chroma down/up-sampling support, RGB/YCbCr/xvYCC support
- Two LED supported
  - LED1: Green, ON – source connected
  - LED2: Red, ON – Power error

Ordering Part Number
CP9396

More

Additional Boards and Kits

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

For additional information, explore our full catalog at www.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 program a Lattice device. Programming Cables can also be used to help debug your hardware designs via Lattice software tools.

- **USB Programming Cable (HW-USBN-2B – pictured).** The latest-generation Programming Cable adds I^2C programming and various other features.
- **Parallel Cable (HW-DLN-3C).** This connects to a PC parallel port and is best for basic JTAG programming.

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

Smart Sockets

Lattice Smart Sockets are an all-in-one solution for prototype programming of the latest Lattice products.

These complete solutions include all the functionality of a Desktop Programmer + Socket Adapter combination in a single board. All that's needed is a simple connection to your PC via USB (cable included).

More information about Lattice Smart Sockets is on the Lattice website at **www.latticesmi.com/sockets**.

Desktop Programmers

Lattice offers two desktop programmers for prototype programming of Lattice products.

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.

The Lattice Model 300 Desktop Programmer (pictured) supports most Lattice FPGA and CPLD products.

The iCEprog Desktop Programmer supports all Lattice iCE products.

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.

Socket adapters are generally designed to support a device family/package combination.

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 at **www.latticesmi.com/sockets**.

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	ECP5UM5G	✓				
	ECP5U	✓	✓			
	ECP5UM	✓				
	LatticeECP3	✓				
	LatticeECP2M/S	✓				
	LatticeECP2S	✓				
	MachXO2	✓	✓			
	MachXO3	✓	✓			
	MachXO	✓	✓			
	LatticeXP2	✓	✓			
	LatticeXP	✓	✓			
	LatticeECP2	✓	✓			
	iCE40				✓	
	ispMACH 4000B/C/V/ZE			✓		
	Platform Manager 2	✓	✓			
	L-ASC10	✓	✓			
	Power Manager II					✓
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)	MachXO/XO2/XO3 Lattice ECP2/ECP3/ECP5/ ECP5-5G/ECP2M/XP2	MachXO/XO2/XO3 LatticeECP2/ECP5U/ XP2	ispMACH 4000 only	✓	
	IP and Module Configuration	✓	✓	Module Only	Module Only	
	Power Estimation & Calculation	✓	✓		✓	
	Timing 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	Windows Only	
Operating Systems	Windows 7/8 (32 bit and 64 bit)	✓	✓	Windows 7/XP	✓	
	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	✓			✓	

Connectivity ASSPs

TV Port Processors	Sil9777	Sil9687A	Sil9589-3	Sil9587-3	Sil9489A	Sil9381A
HDMI® Input	4	4	5	4	5	4
superMHL Input						
MHL® Input	2	1	1	1	1	1
HDMI Output	3	1	1	1	2	1
superMHL™ Output						
InstaPort™		InstaPort™ S	InstaPort™ S	InstaPort™ S	InstaPort™ S	InstaPort™ S
Hardware HDCP Repeater	HDCP 2.2				HDCP 1.4	
HDCP Upstream Authentication Support	HDCP 2.2		HDCP 1.4	HDCP 1.4	HDCP 1.4	
HDMI Bandwidth	18 Gbps	9 Gbps	9 Gbps	9 Gbps	6 Gbps	6 Gbps
Audio Return Channel	✓	✓	✓	✓	✓	✓
Maximum HDMI Resolution	4K60 4:4:4	4K60 4:2:0	4K60 4:2:0	4K60 4:2:0	1080p60 36-bit	1080p60 36-bit
Maximum MHL Resolution	4K30	1080p60	1080p30	1080p30	1080p30	1080p30
HDCP 1.4 support	✓	✓	✓	✓	✓	✓
HDCP 2.2 support	✓					
Pre-programmed HDCP keys	✓	✓	✓	✓	✓	✓
CEC Processor			✓	✓	✓ (2)	✓
Integrated NVRAM EDID		✓	✓	✓	✓	✓
Package	208-pin QFP	76-pin QFN	100-pin QFP	88-pin QFN	128-pin QFP	88-pin QFN
Package Size	28 x 28 mm	9 x 9 mm	14 x 14 mm	10 x 10 mm	14 x 14 mm	10 x 10 mm
Starter Kit	CP9777	CP9687A	CP9589-3	CP9587-3	CP9489A	CP9381A

HDMI Receiver	Sil1127A	Sil9127A	Sil9233A	Sil9679	Sil5293
HDMI® Input Type	HDMI1.3	HDMI1.3	HDMI1.4	HDMI2.0, 300MHz	HDMI 1.4b
Number of HDMI Inputs	2	2	4	1	1
MHL® Input				MHL3.0	MHL2
RGB/YCbCr Output	Up to 36-bit	Up to 36-bit	Up to 36-bit		Up to 24-bit
HDMI Output				HDMI2.0	
Max Video Resolution	1080p60 36-bit	1080p60 36-bit	1080p60 36-bit	4K60 4:2:0	1080p30 HDMI 1080p60 MHL 1080p30 SALT
HDCP support		HDCP 1.1	HDCP 1.4	HDCP 1.4/ HDCP 2.2	HDCP 1.4
Pre-programmed HDCP keys		✓	✓	✓	✓
Audio Extraction (I2S) 192kHz	2-ch	2-ch	8-ch		✓
S/PDIF	✓	✓	✓	✓	✓
High Bit Rate Audio (Dolby TrueHD, DTS-HD)	✓	✓	✓	✓	
I²C Interface	✓	✓	✓	✓	✓
Integrated NVRAM EDID	✓	✓	✓	SRAM EDID	
HDCP Repeater support			✓		
Package	128-pin TQFP	128-pin TQFP	144-pin TQFP	76-pin QFN	72-pin QFN
Package Size	14 x 14 mm	14 x 14 mm	20 x 20 mm	9 x 9 mm	10 x 10 mm
Starter Kit	CP1127HDMI	CP9127HDMI	CP9233HDMI	Yes	Yes

Connectivity ASSPs

HDMI Transmitter	Sil9022A	Sil9024A	Sil1136	Sil9136-3	Sil9334	Sil9678	Sil7172	Sil164
HDMI® Output Type	HDMI1.3	HDMI1.3	HDMI1.4	HDMI1.4	HDMI1.4	HDMI2.0	iTMDS	DVI
Number of HDMI Outputs	1	1	1	1	1	1		
RGB/YCbCr Input	24-bit / 16-bit	24-bit / 16-bit	Up to 48-bit	Up to 48-bit	Up to 36-bit		Dual 36-bit	Up to 24-bit
HDMI Input						HDMI2.0		
Max Video Resolution	1080p60 4:4:4	1080p60 4:4:4	4K30 4:4:4	4K30 4:4:4	1080p60 (225MHz)	4K60 4:2:0	1080p60	1080p60
HDMI Bandwidth	4.9 Gbps	4.9 Gbps	9 Gbps	9 Gbps	6.75 Gbps	9 Gbps	6.75 Gbps	4.95 Gbps
HDCP support		HDCP 1.3		HDCP 1.2	HDCP 1.4	HDCP 1.4/ HDCP 2.2	HDCP 1.1	
Pre-programmed HDCP keys		✓		✓	✓	✓	✓	✓
Audio Insertion (I2S x 4) 192kHz	✓	✓	✓	✓	✓			
S/PDIF	✓	✓	✓	✓	✓	✓		
High Bit Rate Audio (Dolby TrueHD, DTS-HD)			✓	✓	✓	✓		
I²C Interface	✓	✓	✓	✓	✓	✓	✓	✓
Package	81-ball VFBGA 72-pin QFN 49-ball VFBGA	81-ball VFBGA 72-pin QFN 49-ball VFBGA	100-pin TQFP	100-pin TQFP	100-pin TQFP	76-pin QFN	129-Pin LQFP	64-Pin TQFP
Package Size	4 x 4 mm (VFBGA) 10 x 10 mm (QFN)	4 x 4 mm (VFBGA) 10 x 10 mm (QFN)	14 x 14 mm	14 x 14 mm	14 x 14 mm	9 x 9 mm	14 x 20 mm	12 x 12 mm
Starter Kit			CP1136HDMI	CP9136HDMI-3	CP9334	CP9678		

MHL Transmitters	Sil8334	Sil8620	Sil8240	Sil8346	Sil8348	Sil8630	Sil9630	Sil8558
HDMI input		✓				✓	✓	✓
eTMDS input	✓	✓	✓			✓	✓	✓
MIPI DSI input								
Parallel Digital Video Input				✓	✓			
MHL output	MHL1	MHL3	MHL2	MHL2	MHL2	superMHL	superMHL	MHL2
Integrated Analog Switch	USB ID & Data		USB ID			MHL Demux for Type-C	MHL Demux for Type-C	USB, UART, audio
MAX video resolution	1080p30	4K30	1080p60	1080p60	1080p60	4K60	4K60	1080p60
720p adaptive Scaler								
HDCP decryption on input	Pass through	HDCP1.4				HDCP1.4	HDCP1.4	HDCP1.4
HDCP encryption on output	Pass through	HDCP1.4/ HDCP2.2	HDCP1.4	HDCP1.4		HDCP1.4/ HDCP2.2	HDCP1.4/ HDCP2.2	HDCP1.4
Dolby Digital	✓	✓	✓	✓	✓	✓	✓	
DTS digital Audio	✓	✓	✓	✓	✓	✓	✓	
Object Audio - Dolby Atmos, DTS:X						✓	✓	
8-ch I2S interface @ 192KHz								
Package	49ball VFBGA	64ball VFBGA	49ball VFBGA	64ball VFBGA	64ball VFBGA	64ball VFBGA	64ball BGA	64ball VFBGA
Package size	4 x 4 mm	4 x 4 mm	3.5 x 3.5 mm	4.5 x 4.5 mm	4.5 x 4.5 mm	4 x 4 mm	6.5 x 6.5 mm	4 x 4 mm
Starter Kit	CP8334	CP8620	CP8240	CP8346	CP8348	CP8630	CP9630	CP8558

Connectivity ASSPs

MHL Bridges	Sil9292	Sil9293A	Sil9296	Sil9394	Sil9396	Sil1296	Sil1292A	Sil9617
MHL input	MHL1	MHL2	MHL2	MHL3	superMHL	MHL2.0	MHL1	MHL2
HDMI input		HDMI1.4			HDMI2.0	HDMI1.4	HDMI1.4	2x HDMI1.4
eTMDS input					✓			
HDMI output	HDMI1.4		HDMI1.4	HDMI1.4	HDMI2.0		HDMI1.4	HDMI1.4
Other Video Output		Parallel 24-bit			superMHL	VGA		
MAX video resolution	1080p30	1080p60	1080p60	4K30	4K60	1080p60	1080p30 MHL 1080p60 HDMI 12-bit DC	1080p60 MHL 4K30 HDMI
HDCP decryption on input	Pass through	HDCP 1.4	HDCP 1.4	HDCP 1.4/ HDCP 2.2	HDCP 1.4/ HDCP 2.2		Pass through	HDCP 1.3
HDCP encryption on output	Pass through		HDCP 1.4	HDCP 1.4/ HDCP 2.2	HDCP 1.4/ HDCP 2.2		Pass through	HDCP 1.3
Dolby Digital		✓		✓	✓	✓		
DTS digital Audio		✓		✓	✓	✓		
Object Audio - Dolby Atmos, DTS:X		✓			✓			
8-ch I2S interface @ 192KHz		✓		✓	✓			
8ch TDM		✓				✓		
Package	40-pin QFN	72-pin QFN	49-pin QFN	76-pin QFN	76-pin QFN	72-pin QFN	40-pin QFN	76-pin MQFN
Package size	6 x 6 mm	10 x 10 mm	7 x 7 mm	9 x 9 mm	9 x 9 mm	10 x 10 mm	6 x 6 mm	9 x 9 mm
Starter Kit	CP9292	CP9293	CP9296	CP9394	CP9396	CP1296	CP1292	CP9617

USB Switches/ Type-C Port Controllers	Sil6031	Sil7024	Sil7033	Sil7014	LIF-UC110	LIF-UC140
Type-C		✓	✓	✓	✓	✓
Main function	USB2.0/MHL/ UART switch	CC/PD PHY + MHL/debug	CC/PD PHY + MHL/debug/ USB3.1 switch	CC/PD PHY + HPD generator + AUX switch	CC/PD port controller for charger	Full CC/PD port controller
SuperSpeed switch		Gen 1	Gen 1			
HPD generator			✓	✓	✓	✓
High speed video switch	MHL1/2/3/ superMHL	MHL1/2/3/ superMHL/ x 2DP	MHL1/2/3/ superMHL x 2DP	DP AUX		
Billboard support		✓	✓	✓		✓
BMC		✓	✓	✓	✓	✓
VDM		✓	✓	✓	✓	✓
Package	24 -pin QFN	32 -pin QFN	36ball BGA	24 -pin QFN	48 -pin QFN	81ball BGA
Package size	3 x 3 mm	4 x 4 mm	3 x 3 mm	3 x 3 mm	7 x 7 mm	4 x 4 mm
Starter kit	CP7033	CP7033	CP7033	CP7033	iCE5LP4K-USBC-EVN	iCE40LP8K-USBC-EVN

pASSP™ Solutions

		CrossLink™				
Device		**LIF-MD6000-36**	**LIF-MD6000-64**	**LIF-MD6000-81**	**LIF-MD6000-80**	**LIA-MD6000-80[1]**
LUTs		5936	5936	5936	5936	5936
Embedded Memory	kbits	180	180	180	180	180
Distrib. RAM	kbits	47	47	47	47	47
GPLL		1	1	1	1	1
D-PHY PLL		1	2	2	2	2
Embedded I^2C Blocks		2	2	2	2	2
Embedded RX/TX MIPI D-PHY		1 (4 Data + 1 Clock)	2 (8 Data + 2 Clock)	2 (8 Data + 2 Clock)	2 (8 Data + 2 Clock)	2 (8 Data + 2 Clock)
48MHz Oscillator		1	1	1	1	1
10kHz Oscillator		1	1	1	1	1
NVCM		Yes	Yes	Yes	Yes	Yes
Dual Boot		Yes	Yes	Yes	Yes	Yes
Power Management Unit		Yes	Yes	Yes	Yes	Yes
Low Power Sleep Mode		Yes	Yes	Yes	Yes	Yes
Typical Operational Power		5mW – 135mW	5mW – 135mW	5mW – 135mW	5mW – 135mW	5mW – 135mW
Footprint		2.5 mm x 2.5 mm	3.5 mm x 3.5 mm	4.5 mm x 4.5 mm	6.5 mm x 6.5 mm	6.5 mm x 6.5 mm
Package Pitch		0.4 mm	0.4 mm	0.5 mm	0.65 mm	0.65 mm
GPIO		7	8	9	8	8
I/O		17	29	37	36	36

1) Automotive grade.

SiBEAM WirelessHD® Modules

WirelessHD transmitter and receiver modules are completely self-contained, autonomous WirelessHD subsystems that connect to a host board and provide wireless video connectivity between an HDMI® source and a display. The modules eliminate the complexity associated with radio performance, regulatory requirements, and compliance to standards in wireless system design. The module-to-system interface carries video, audio, power, and control signals.
SiBEAM offers three programming cables to suit your needs.

Features

- WirelessHD V 1.1 compliant device
- 60 GHz interference free link for up to 4 Gbps video data rate
- Small form factor module
- Wide support for video resolutions
  - VGA through SXGA+
  - 480i/576i to 1080p/60 Hz
  - 3D video support 720p/1080p
- Subframe latency video for real time control of interactive content, such as video games
- Support for surround sound audio
- Support for CEC or AVC commands
- HDCP content protection
- Automated advanced power control, for energy saving operation

Ordering Part Number	
Wireless Transmitter	MOD6320-T
Wireless Transmitter with Cable	MOD6320-T-C
Wireless Receiver	MOD6321-R
Wireless Receiver with Cable	MOD6321-R-C
Wireless Receiver (Dual Polarization Antenna)	MOD6321-R-12
Wireless Receiver (Dual Polarization Antenna) with Cable	MOD6321-R-12-C

Software Licensing
Email: lic_admn@latticesemi.com
Web: latticesemi.com/licensing

Technical Support
latticesemi.com/support

March 2017 • Order #: I0211 Rev. 8