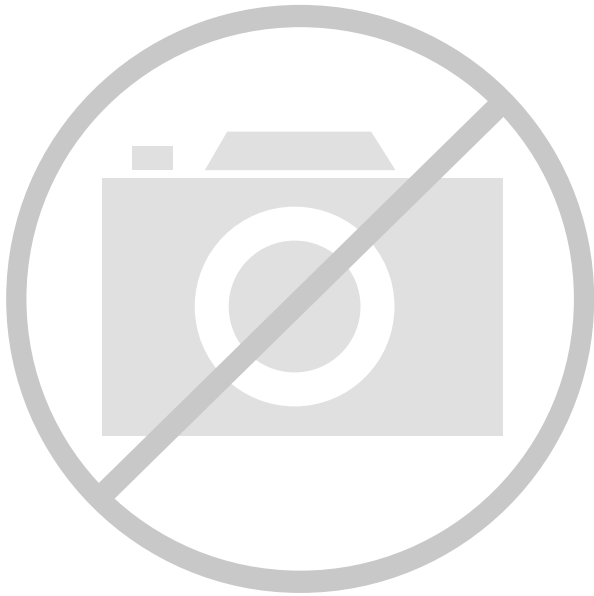




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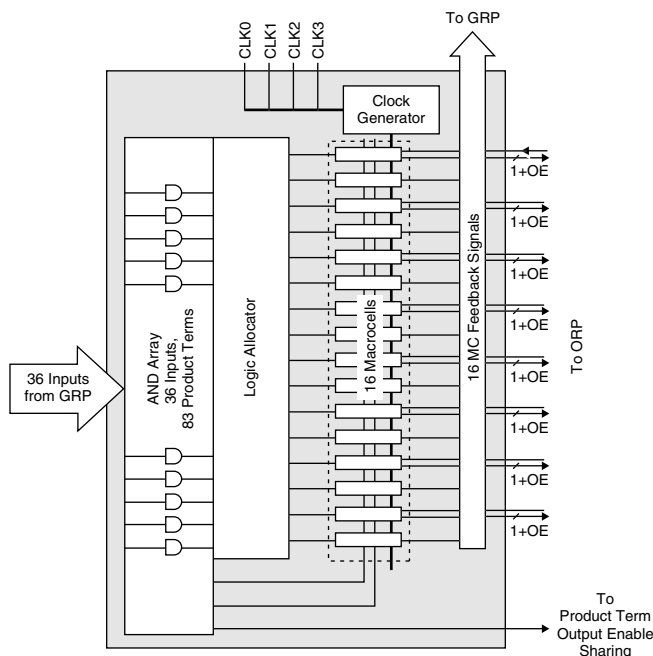
Understanding [Embedded - CPLDs \(Complex Programmable Logic Devices\)](#)

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	Obsolete
Programmable Type	In System Programmable
Delay Time tpd(1) Max	7.5 ns
Voltage Supply - Internal	2.3V ~ 2.7V
Number of Logic Elements/Blocks	16
Number of Macrocells	256
Number of Gates	-
Number of I/O	160
Operating Temperature	-40°C ~ 105°C (TJ)
Mounting Type	Surface Mount
Package / Case	256-LBGA
Supplier Device Package	256-FTBGA (17x17)
Purchase URL	https://www.e-xfl.com/product-detail/lattice-semiconductor/lc4256b-75ftn256bi

Figure 2. Generic Logic Block

AND Array

The programmable AND Array consists of 36 inputs and 83 output product terms. The 36 inputs from the GRP are used to form 72 lines in the AND Array (true and complement of the inputs). Each line in the array can be connected to any of the 83 output product terms via a wired-AND. Each of the 80 logic product terms feed the logic allocator with the remaining three control product terms feeding the Shared PT Clock, Shared PT Initialization and Shared PT OE. The Shared PT Clock and Shared PT Initialization signals can optionally be inverted before being fed to the macrocells.

Every set of five product terms from the 80 logic product terms forms a product term cluster starting with PT0. There is one product term cluster for every macrocell in the GLB. Figure 3 is a graphical representation of the AND Array.

IEEE 1532-Compliant In-System Programming

Programming devices in-system provides a number of significant benefits including: rapid prototyping, lower inventory levels, higher quality and the ability to make in-field modifications. All ispMACH 4000 devices provide In-System Programming (ISP™) capability through the Boundary Scan Test Access Port. This capability has been implemented in a manner that ensures that the port remains compliant to the IEEE 1149.1 standard. By using IEEE 1149.1 as the communication interface through which ISP is achieved, users get the benefit of a standard, well-defined interface. All ispMACH 4000 devices are also compliant with the IEEE 1532 standard.

The ispMACH 4000 devices can be programmed across the commercial temperature and voltage range. The PC-based Lattice software facilitates in-system programming of ispMACH 4000 devices. The software takes the JEDEC file output produced by the design implementation software, along with information about the scan chain, and creates a set of vectors used to drive the scan chain. The software can use these vectors to drive a scan chain via the parallel port of a PC. Alternatively, the software can output files in formats understood by common automated test equipment. This equipment can then be used to program ispMACH 4000 devices during the testing of a circuit board.

User Electronic Signature

The User Electronic Signature (UES) allows the designer to include identification bits or serial numbers inside the device, stored in E²CMOS memory. The ispMACH 4000 device contains 32 UES bits that can be configured by the user to store unique data such as ID codes, revision numbers or inventory control codes.

Security Bit

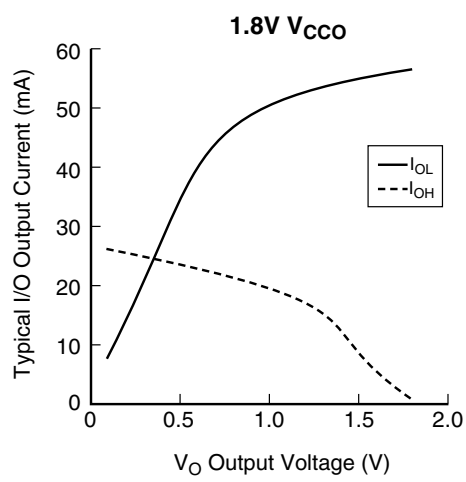
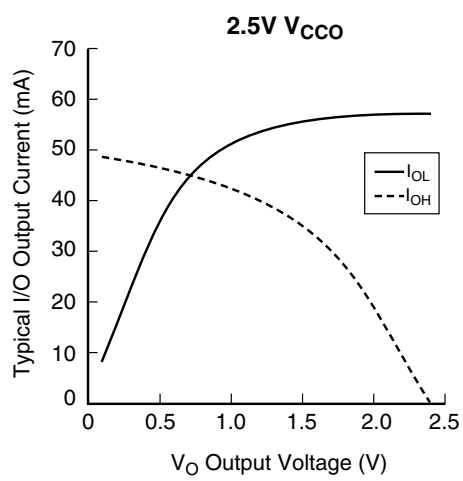
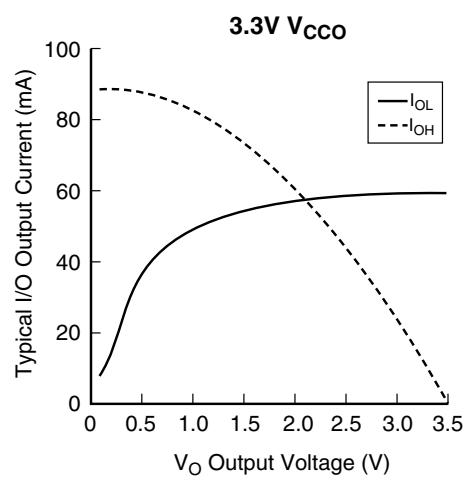
A programmable security bit is provided on the ispMACH 4000 devices as a deterrent to unauthorized copying of the array configuration patterns. Once programmed, this bit defeats readback of the programmed pattern by a device programmer, securing proprietary designs from competitors. Programming and verification are also defeated by the security bit. The bit can only be reset by erasing the entire device.

Hot Socketing

The ispMACH 4000 devices are well-suited for applications that require hot socketing capability. Hot socketing a device requires that the device, during power-up and down, can tolerate active signals on the I/Os and inputs without being damaged. Additionally, it requires that the effects of I/O pin loading be minimal on active signals. The ispMACH 4000 devices provide this capability for input voltages in the range 0V to 3.0V.

Density Migration

The ispMACH 4000 family has been designed to ensure that different density devices in the same package have the same pin-out. Furthermore, the architecture ensures a high success rate when performing design migration from lower density parts to higher density parts. In many cases, it is possible to shift a lower utilization design targeted for a high density device to a lower density device. However, the exact details of the final resource utilization will impact the likely success in each case.



ispMACH 4000Z External Switching Characteristics

Over Recommended Operating Conditions

Parameter	Description ^{1, 2, 3}	-35		-37		-42		Units
		Min.	Max.	Min.	Max.	Min.	Max.	
t _{PD}	5-PT bypass combinatorial propagation delay	—	3.5	—	3.7	—	4.2	ns
t _{PD_MC}	20-PT combinatorial propagation delay through macrocell	—	4.4	—	4.7	—	5.7	ns
t _S	GLB register setup time before clock	2.2	—	2.5	—	2.7	—	ns
t _{ST}	GLB register setup time before clock with T-type register	2.4	—	2.7	—	2.9	—	ns
t _{SIR}	GLB register setup time before clock, input register path	1.0	—	1.1	—	1.3	—	ns
t _{SIRZ}	GLB register setup time before clock with zero hold	2.0	—	2.1	—	2.6	—	ns
t _H	GLB register hold time after clock	0.0	—	0.0	—	0.0	—	ns
t _{HT}	GLB register hold time after clock with T-type register	0.0	—	0.0	—	0.0	—	ns
t _{HIR}	GLB register hold time after clock, input register path	1.0	—	1.0	—	1.3	—	ns
t _{HIRZ}	GLB register hold time after clock, input register path with zero hold	0.0	—	0.0	—	0.0	—	ns
t _{CO}	GLB register clock-to-output delay	—	3.0	—	3.2	—	3.5	ns
t _R	External reset pin to output delay	—	5.0	—	6.0	—	7.3	ns
t _{RW}	External reset pulse duration	1.5	—	1.7	—	2.0	—	ns
t _{PTOE/DIS}	Input to output local product term output enable/disable	—	7.0	—	8.0	—	8.0	ns
t _{GPTOE/DIS}	Input to output global product term output enable/disable	—	6.5	—	7.0	—	8.0	ns
t _{GOE/DIS}	Global OE input to output enable/disable	—	4.5	—	4.5	—	4.8	ns
t _{CW}	Global clock width, high or low	1.0	—	1.5	—	1.8	—	ns
t _{GW}	Global gate width low (for low transparent) or high (for high transparent)	1.0	—	1.5	—	1.8	—	ns
t _{WIR}	Input register clock width, high or low	1.0	—	1.5	—	1.8	—	ns
f _{MAX} ⁴	Clock frequency with internal feedback	—	267	—	250	—	220	MHz
f _{MAX} (Ext.)	clock frequency with external feedback, [1 / (t _S + t _{CO})]	—	192	—	175	—	161	MHz

1. Timing numbers are based on default LVCMOS 1.8 I/O buffers. Use timing adjusters provided to calculate other standards.

Timing v.2.2

2. Measured using standard switching GRP loading of 1 and 1 output switching.

3. Pulse widths and clock widths less than minimum will cause unknown behavior.

4. Standard 16-bit counter using GRP feedback.

ispMACH 4000V/B/C/Z Power Supply and NC Connections¹

Signal	44-pin TQFP ²	48-pin TQFP ²	56-ball csBGA ³	100-pin TQFP ²	128-pin TQFP ²
VCC	11, 33	12, 36	K2, A9	25, 40, 75, 90	32, 51, 96, 115
VCCO0 VCCO (Bank 0)	6	6	F3	13, 33, 95	3, 17, 30, 41, 122
VCCO1 VCCO (Bank 1)	28	30	E8	45, 63, 83	58, 67, 81, 94, 105
GND	12, 34	13, 37	H3, C8	1, 26, 51, 76	1, 33, 65, 97
GND (Bank 0)	5	5	D3	7, 18, 32, 96	10, 24, 40, 113, 123
GND (Bank 1)	27	29	G8	46, 57, 68, 82	49, 59, 74, 88, 104
NC	—	—	4032Z: A8, B10, E1, E3, F8, F10, J1, K3	—	—

1. All grounds must be electrically connected at the board level. However, for the purposes of I/O current loading, grounds are associated with the bank shown.
2. Pin orientation follows the conventional order from pin 1 marking of the top side view and counter-clockwise.
3. Pin orientation A1 starts from the upper left corner of the top side view with alphabetical order ascending vertically and numerical order ascending horizontally.

**ispMACH 4032V/B/C/Z and 4064V/B/C/Z Logic Signal Connections:
48-Pin TQFP (Cont.)**

Pin Number	Bank Number	ispMACH 4032V/B/C/Z		ispMACH 4064V/B/C		ispMACH 4064Z	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
33	1	B10	B [^] 10	D4	D [^] 2	D10	D [^] 5
34	1	B11	B [^] 11	D6	D [^] 3	D8	D [^] 4
35	-	TDO	-	TDO	-	TDO	-
36	-	VCC	-	VCC	-	VCC	-
37	-	GND	-	GND	-	GND	-
38	1	B12	B [^] 12	D8	D [^] 4	D6	D [^] 3
39	1	B13	B [^] 13	D10	D [^] 5	D4	D [^] 2
40	1	B14	B [^] 14	D12	D [^] 6	D2	D [^] 1
41	1	B15/GOE1	B [^] 15	D14/GOE1	D [^] 7	D0/GOE1	D [^] 0
42	1	CLK3/I	-	CLK3/I	-	CLK3/I	-
43	0	CLK0/I	-	CLK0/I	-	CLK0/I	-
44	0	A0/GOE0	A [^] 0	A0/GOE0	A [^] 0	A0/GOE0	A [^] 0
45	0	A1	A [^] 1	A2	A [^] 1	A1	A [^] 1
46	0	A2	A [^] 2	A4	A [^] 2	A2	A [^] 2
47	0	A3	A [^] 3	A6	A [^] 3	A4	A [^] 3
48	0	A4	A [^] 4	A8	A [^] 4	A6	A [^] 4

ispMACH 4032Z and 4064Z Logic Signal Connections: 56-Ball csBGA

Ball Number	Bank Number	ispMACH 4032Z		ispMACH 4064Z	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
B1	-	TDI	-	TDI	-
C3	0	A5	A [^] 5	A8	A [^] 5
C1	0	A6	A [^] 6	A10	A [^] 6
D1	0	A7	A [^] 7	A11	A [^] 7
D3	0	GND (Bank 0)	-	GND (Bank 0)	-
E3	0	NC ¹	-	I ¹	-
E1	0	NC ¹	-	I ¹	-
F3	0	VCCO (Bank 0)	-	VCCO (Bank 0)	-
F1	0	A8	A [^] 8	B15	B [^] 7
G3	0	A9	A [^] 9	B12	B [^] 6
G1	0	A10	A [^] 10	B10	B [^] 5
H1	0	A11	A [^] 11	B8	B [^] 4
J1	0	NC	-	I	-
K1	-	TCK	-	TCK	-
K2	-	VCC	-	VCC	-
H3	-	GND	-	GND	-
K3	-	NC ¹	-	I ¹	-
K4	0	A12	A [^] 12	B6	B [^] 3
H4	0	A13	A [^] 13	B4	B [^] 2
H5	0	A14	A [^] 14	B2	B [^] 1

**ispMACH 4064V/B/C/Z, 4128V/B/C/Z, 4256V/B/C/Z Logic Signal Connections:
100-Pin TQFP**

Pin Number	Bank Number	ispMACH 4064V/B/C/Z		ispMACH 4128V/B/C/Z		ispMACH 4256V/B/C/Z	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
1	-	GND	-	GND	-	GND	-
2	-	TDI	-	TDI	-	TDI	-
3	0	A8	A ⁸	B0	B ⁰	C12	C ³
4	0	A9	A ⁹	B2	B ¹	C10	C ²
5	0	A10	A ¹⁰	B4	B ²	C6	C ¹
6	0	A11	A ¹¹	B6	B ³	C2	C ⁰
7	0	GND (Bank 0)	-	GND (Bank 0)	-	GND (Bank 0)	-
8	0	A12	A ¹²	B8	B ⁴	D12	D ³
9	0	A13	A ¹³	B10	B ⁵	D10	D ²
10	0	A14	A ¹⁴	B12	B ⁶	D6	D ¹
11	0	A15	A ¹⁵	B13	B ⁷	D4	D ⁰
12*	0	I	-	I	-	I	-
13	0	VCCO (Bank 0)	-	VCCO (Bank 0)	-	VCCO (Bank 0)	-
14	0	B15	B ¹⁵	C14	C ⁷	E4	E ⁰
15	0	B14	B ¹⁴	C12	C ⁶	E6	E ¹
16	0	B13	B ¹³	C10	C ⁵	E10	E ²
17	0	B12	B ¹²	C8	C ⁴	E12	E ³
18	0	GND (Bank 0)	-	GND (Bank 0)	-	GND (Bank 0)	-
19	0	B11	B ¹¹	C6	C ³	F2	F ⁰
20	0	B10	B ¹⁰	C5	C ²	F6	F ¹
21	0	B9	B ⁹	C4	C ¹	F10	F ²
22	0	B8	B ⁸	C2	C ⁰	F12	F ³
23*	0	I	-	I	-	I	-
24	-	TCK	-	TCK	-	TCK	-
25	-	VCC	-	VCC	-	VCC	-
26	-	GND	-	GND	-	GND	-
27*	0	I	-	I	-	I	-
28	0	B7	B ⁷	D13	D ⁷	G12	G ³
29	0	B6	B ⁶	D12	D ⁶	G10	G ²
30	0	B5	B ⁵	D10	D ⁵	G6	G ¹
31	0	B4	B ⁴	D8	D ⁴	G2	G ⁰
32	0	GND (Bank 0)	-	GND (Bank 0)	-	GND (Bank 0)	-
33	0	VCCO (Bank 0)	-	VCCO (Bank 0)	-	VCCO (Bank 0)	-
34	0	B3	B ³	D6	D ³	H12	H ³
35	0	B2	B ²	D4	D ²	H10	H ²
36	0	B1	B ¹	D2	D ¹	H6	H ¹
37	0	B0	B ⁰	D0	D ⁰	H2	H ⁰
38	0	CLK1/I	-	CLK1/I	-	CLK1/I	-
39	1	CLK2/I	-	CLK2/I	-	CLK2/I	-
40	-	VCC	-	VCC	-	VCC	-
41	1	C0	C ⁰	E0	E ⁰	I2	I ⁰

ispMACH 4128V/B/C Logic Signal Connections: 128-Pin TQFP (Cont.)

Pin Number	Bank Number	ispMACH 4128V/B/C	
		GLB/MC/Pad	ORP
19	0	C13	C ¹⁰
20	0	C12	C ⁹
21	0	C10	C ⁸
22	0	C9	C ⁷
23	0	C8	C ⁶
24	0	GND (Bank 0)	-
25	0	C6	C ⁵
26	0	C5	C ⁴
27	0	C4	C ³
28	0	C2	C ²
29	0	C0	C ⁰
30	0	VCCO (Bank 0)	-
31	0	TCK	-
32	0	VCC	-
33	0	GND	-
34	0	D14	D ¹¹
35	0	D13	D ¹⁰
36	0	D12	D ⁹
37	0	D10	D ⁸
38	0	D9	D ⁷
39	0	D8	D ⁶
40	0	GND (Bank 0)	-
41	0	VCCO (Bank 0)	-
42	0	D6	D ⁵
43	0	D5	D ⁴
44	0	D4	D ³
45	0	D2	D ²
46	0	D1	D ¹
47	0	D0	D ⁰
48	0	CLK1/I	-
49	1	GND (Bank 1)	-
50	1	CLK2/I	-
51	1	VCC	-
52	1	E0	E ⁰
53	1	E1	E ¹
54	1	E2	E ²
55	1	E4	E ³
56	1	E5	E ⁴
57	1	E6	E ⁵
58	1	VCCO (Bank 1)	-
59	1	GND (Bank 1)	-
60	1	E8	E ⁶
61	1	E9	E ⁷

ispMACH 4128V/B/C Logic Signal Connections: 128-Pin TQFP (Cont.)

Pin Number	Bank Number	ispMACH 4128V/B/C	
		GLB/MC/Pad	ORP
105	1	VCCO (Bank 1)	-
106	1	H6	H ⁵
107	1	H5	H ⁴
108	1	H4	H ³
109	1	H2	H ²
110	1	H1	H ¹
111	1	H0/GOE1	H ⁰
112	1	CLK3/I	-
113	0	GND (Bank 0)	-
114	0	CLK0/I	-
115	0	VCC	-
116	0	A0/GOE0	A ⁰
117	0	A1	A ¹
118	0	A2	A ²
119	0	A4	A ³
120	0	A5	A ⁴
121	0	A6	A ⁵
122	0	VCCO (Bank 0)	-
123	0	GND (Bank 0)	-
124	0	A8	A ⁶
125	0	A9	A ⁷
126	0	A10	A ⁸
127	0	A12	A ⁹
128	0	A14	A ¹¹

**ispMACH 4064Z, 4128Z and 4256Z Logic Signal Connections:
132-Ball csBGA**

Ball Number	Bank Number	ispMACH 4064Z		ispMACH 4128Z		ispMACH 4256Z	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
B1	-	GND	-	GND	-	GND	-
B2	-	TDI	-	TDI	-	TDI	-
C1	0	NC	-	VCCO (Bank 0)	-	VCCO (Bank 0)	-
C3	0	NC	-	B0	B ⁰	C12	C ⁶
C2	0	A8	A ⁸	B1	B ¹	C10	C ⁵
D1	0	A9	A ⁹	B2	B ²	C8	C ⁴
D3	0	A10	A ¹⁰	B4	B ³	C6	C ³
D2	0	A11	A ¹¹	B5	B ⁴	C4	C ²
E1	0	NC	-	B6	B ⁵	C2	C ¹
E2	0	GND (Bank 0)	-	GND (Bank 0)	-	GND (Bank 0)	-

ispMACH 4128V and 4256V Logic Signal Connections: 144-Pin TQFP (Cont.)

Pin Number	Bank Number	ispMACH 4128V		ispMACH 4256V	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
43	0	D9	D [^] 7	G4	G [^] 2
44	0	D8	D [^] 6	G2	G [^] 1
45	0	NC ²	-	I ²	-
46	0	GND (Bank 0)	-	GND (Bank 0)	-
47	0	VCCO (Bank 0)	-	VCCO (Bank 0)	-
48	0	D6	D [^] 5	H12	H [^] 6
49	0	D5	D [^] 4	H10	H [^] 5
50	0	D4	D [^] 3	H8	H [^] 4
51	0	D2	D [^] 2	H6	H [^] 3
52	0	D1	D [^] 1	H4	H [^] 2
53	0	D0	D [^] 0	H2	H [^] 1
54	0	CLK1/I	-	CLK1/I	-
55	1	GND (Bank 1)	-	GND (Bank 1)	-
56	1	CLK2/I	-	CLK2/I	-
57	-	VCC	-	VCC	-
58	1	E0	E [^] 0	I2	I [^] 1
59	1	E1	E [^] 1	I4	I [^] 2
60	1	E2	E [^] 2	I6	I [^] 3
61	1	E4	E [^] 3	I8	I [^] 4
62	1	E5	E [^] 4	I10	I [^] 5
63	1	E6	E [^] 5	I12	I [^] 6
64	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-
65	1	GND (Bank 1)	-	GND (Bank 1)	-
66	1	E8	E [^] 6	J2	J [^] 1
67	1	E9	E [^] 7	J4	J [^] 2
68	1	E10	E [^] 8	J6	J [^] 3
69	1	E12	E [^] 9	J8	J [^] 4
70	1	E13	E [^] 10	J10	J [^] 5
71	1	E14	E [^] 11	J12	J [^] 6
72	1	NC ²	-	I ²	-
73	-	GND	-	GND	-
74	-	TMS	-	TMS	-
75	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-
76	1	F0	F [^] 0	K12	K [^] 6
77	1	F1	F [^] 1	K10	K [^] 5
78	1	F2	F [^] 2	K8	K [^] 4
79	1	F4	F [^] 3	K6	K [^] 3
80	1	F5	F [^] 4	K4	K [^] 2
81	1	F6	F [^] 5	K2	K [^] 1
82	1	GND (Bank 1)	-	GND (Bank 1)	-
83	1	F8	F [^] 6	L14	L [^] 7
84	1	F9	F [^] 7	L12	L [^] 6
85	1	F10	F [^] 8	L10	L [^] 5

ispMACH 4128V and 4256V Logic Signal Connections: 144-Pin TQFP (Cont.)

Pin Number	Bank Number	ispMACH 4128V		ispMACH 4256V	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
86	1	F12	F ⁹	L8	L ⁴
87	1	F13	F ¹⁰	L6	L ³
88	1	F14	F ¹¹	L4	L ²
89	1	NC ²	-	I ²	-
90	1	GND (Bank 1) ¹	-	NC ¹	-
91	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-
92	1	NC ²	-	I ²	-
93	1	G14	G ¹¹	M2	M ¹
94	1	G13	G ¹⁰	M4	M ²
95	1	G12	G ⁹	M6	M ³
96	1	G10	G ⁸	M8	M ⁴
97	1	G9	G ⁷	M10	M ⁵
98	1	G8	G ⁶	M12	M ⁶
99	1	GND (Bank 1)	-	GND (Bank 1)	-
100	1	G6	G ⁵	N2	N ¹
101	1	G5	G ⁴	N4	N ²
102	1	G4	G ³	N6	N ³
103	1	G2	G ²	N8	N ⁴
104	1	G1	G ¹	N10	N ⁵
105	1	G0	G ⁰	N12	N ⁶
106	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-
107	-	TDO	-	TDO	-
108	-	VCC	-	VCC	-
109	-	GND	-	GND	-
110	1	NC ²	-	I ²	-
111	1	H14	H ¹¹	O12	O ⁶
112	1	H13	H ¹⁰	O10	O ⁵
113	1	H12	H ⁹	O8	O ⁴
114	1	H10	H ⁸	O6	O ³
115	1	H9	H ⁷	O4	O ²
116	1	H8	H ⁶	O2	O ¹
117	1	NC ²	-	I ²	-
118	1	GND (Bank 1)	-	GND (Bank 1)	-
119	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-
120	1	H6	H ⁵	P12	P ⁶
121	1	H5	H ⁴	P10	P ⁵
122	1	H4	H ³	P8	P ⁴
123	1	H2	H ²	P6	P ³
124	1	H1	H ¹	P4	P ²
125	1	H0/GOE1	H ⁰	P2/GOE1	P ¹
126	1	CLK3/I	-	CLK3/I	-
127	0	GND (Bank 0)	-	GND (Bank 0)	-
128	0	CLK0/I	-	CLK0/I	-

**ispMACH 4256V/B/C, 4384V/B/C, 4512V/B/C Logic Signal Connections:
256-Ball ftBGA/fpBGA (Cont.)**

Ball Number	I/O Bank	ispMACH 4256V/B/C 128-I/O		ispMACH 4256V/B/C 160-I/O		ispMACH 4384V/B/C		ispMACH 4512V/B/C	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
R5	0	NC	-	NC	-	NC	-	L4	L [^] 1
T5	0	NC	-	NC	-	I2	I [^] 1	L8	L [^] 2
R6	0	NC	-	NC	-	I0	I [^] 0	L12	L [^] 3
T6	0	NC	-	H14	H [^] 9	G12	G [^] 6	M8	M [^] 2
N7	0	NC	-	H12	H [^] 8	G14	G [^] 7	M12	M [^] 3
P7	0	H14	H [^] 7	H10	H [^] 7	L14	L [^] 7	P14	P [^] 7
R7	0	H12	H [^] 6	H9	H [^] 6	L12	L [^] 6	P12	P [^] 6
L8	0	H10	H [^] 5	H8	H [^] 5	L10	L [^] 5	P10	P [^] 5
T7	0	H8	H [^] 4	H6	H [^] 4	L8	L [^] 4	P8	P [^] 4
M8	0	H6	H [^] 3	H4	H [^] 3	L6	L [^] 3	P6	P [^] 3
N8	0	H4	H [^] 2	H2	H [^] 2	L4	L [^] 2	P4	P [^] 2
R8	0	H2	H [^] 1	H1	H [^] 1	L2	L [^] 1	P2	P [^] 1
P8	0	H0	H [^] 0	H0	H [^] 0	L0	L [^] 0	P0	P [^] 0
-	-	GND	-	GND	-	GND	-	GND	-
T8	0	CLK1/I	-	CLK1/I	-	CLK1/I	-	CLK1/I	-
-	1	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-
N9	1	CLK2/I	-	CLK2/I	-	CLK2/I	-	CLK2/I	-
-	-	VCC	-	VCC	-	VCC	-	VCC	-
P9	1	I0	I [^] 0	I0	I [^] 0	M0	M [^] 0	AX0	AX [^] 0
R9	1	I2	I [^] 1	I1	I [^] 1	M2	M [^] 1	AX2	AX [^] 1
T9	1	I4	I [^] 2	I2	I [^] 2	M4	M [^] 2	AX4	AX [^] 2
T10	1	I6	I [^] 3	I4	I [^] 3	M6	M [^] 3	AX6	AX [^] 3
R10	1	I8	I [^] 4	I6	I [^] 4	M8	M [^] 4	AX8	AX [^] 4
M9	1	I10	I [^] 5	I8	I [^] 5	M10	M [^] 5	AX10	AX [^] 5
P10	1	I12	I [^] 6	I9	I [^] 6	M12	M [^] 6	AX12	AX [^] 6
L9	1	I14	I [^] 7	I10	I [^] 7	M14	M [^] 7	AX14	AX [^] 7
N10	1	NC	-	I12	I [^] 8	BX14	BX [^] 7	DX0	DX [^] 0
T11	1	NC	-	I14	I [^] 9	BX12	BX [^] 6	DX4	DX [^] 1
R11	1	NC	-	NC	-	P0	P [^] 0	EX0	EX [^] 0
T12	1	NC	-	NC	-	P2	P [^] 1	EX4	EX [^] 1
N12	1	NC	-	NC	-	NC	-	EX8	EX [^] 2
-	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-
-	1	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-
R12	1	NC	-	NC	-	NC	-	EX12	EX [^] 3
T13	1	NC	-	J0	J [^] 0	BX10	BX [^] 5	DX8	DX [^] 2
P12	1	NC	-	J1	J [^] 1	BX8	BX [^] 4	DX12	DX [^] 3
M10	1	J0	J [^] 0	J2	J [^] 2	N0	N [^] 0	BX0	BX [^] 0
R13	1	J2	J [^] 1	J4	J [^] 3	N2	N [^] 1	BX2	BX [^] 1
L10	1	J4	J [^] 2	J6	J [^] 4	N4	N [^] 2	BX4	BX [^] 2
T14	1	J6	J [^] 3	J8	J [^] 5	N6	N [^] 3	BX6	BX [^] 3
M11	1	J8	J [^] 4	J9	J [^] 6	N8	N [^] 4	BX8	BX [^] 4

**ispMACH 4256V/B/C, 4384V/B/C, 4512V/B/C Logic Signal Connections:
256-Ball ftBGA/fpBGA (Cont.)**

Ball Number	I/O Bank	ispMACH 4256V/B/C 128-I/O		ispMACH 4256V/B/C 160-I/O		ispMACH 4384V/B/C		ispMACH 4512V/B/C	
		GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP	GLB/MC/Pad	ORP
R14	1	J10	J ⁵	J10	J ⁷	N10	N ⁵	BX10	BX ⁵
P13	1	J12	J ⁶	J12	J ⁸	N12	N ⁶	BX12	BX ⁶
N13	1	J14	J ⁷	J14	J ⁹	N14	N ⁷	BX14	BX ⁷
M12	1	NC	-	NC	-	P4	P ²	FX0	FX ⁰
T15	1	NC	-	NC	-	P6	P ³	FX2	FX ¹
-	-	VCC	-	VCC	-	VCC	-	VCC	-
-	-	GND	-	GND	-	GND	-	GND	-
-	1	-	-	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-
P14	-	TMS	-	TMS	-	TMS	-	TMS	-
-	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-
L12	1	NC	-	NC	-	NC	-	FX4	FX ²
R16	1	NC	-	NC	-	P8	P ⁴	FX6	FX ³
N14	1	NC	-	NC	-	P10	P ⁵	FX8	FX ⁴
P15	1	K14	K ⁷	K14	K ⁹	O14	O ⁷	CX14	CX ⁷
L11	1	K12	K ⁶	K12	K ⁸	O12	O ⁶	CX12	CX ⁶
P16	1	K10	K ⁵	K10	K ⁷	O10	O ⁵	CX10	CX ⁵
K11	1	K8	K ⁴	K9	K ⁶	O8	O ⁴	CX8	CX ⁴
M14	1	K6	K ³	K8	K ⁵	O6	O ³	CX6	CX ³
K12	1	K4	K ²	K6	K ⁴	O4	O ²	CX4	CX ²
N15	1	K2	K ¹	K4	K ³	O2	O ¹	CX2	CX ¹
N16	1	K0	K ⁰	K2	K ²	O0	O ⁰	CX0	CX ⁰
M15	1	NC	-	K1	K ¹	BX6	BX ³	HX0	HX ⁰
M13	1	NC	-	K0	K ⁰	BX4	BX ²	HX4	HX ¹
-	1	-	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-
-	1	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-
M16	1	NC	-	NC	-	NC	-	FX10	FX ⁵
L15	1	NC	-	NC	-	P12	P ⁶	FX12	FX ⁶
L16	1	NC	-	NC	-	P14	P ⁷	FX14	FX ⁷
J11	1	NC	-	L14	L ⁹	BX2	BX ¹	HX8	HX ²
K15	1	NC	-	L12	L ⁸	BX0	BX ⁰	HX12	HX ³
J12	1	L14	L ⁷	L10	L ⁷	AX14	AX ⁷	GX14	GX ⁷
K13	1	L12	L ⁶	L9	L ⁶	AX12	AX ⁶	GX12	GX ⁶
K14	1	L10	L ⁵	L8	L ⁵	AX10	AX ⁵	GX10	GX ⁵
K16	1	L8	L ⁴	L6	L ⁴	AX8	AX ⁴	GX8	GX ⁴
J16	1	L6	L ³	L4	L ³	AX6	AX ³	GX6	GX ³
J15	1	L4	L ²	L2	L ²	AX4	AX ²	GX4	GX ²
H16	1	L2	L ¹	L1	L ¹	AX2	AX ¹	GX2	GX ¹
J13	1	L0	L ⁰	L0	L ⁰	AX0	AX ⁰	GX0	GX ⁰
-	1	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-	VCCO (Bank 1)	-
-	1	-	-	GND (Bank 1)	-	GND (Bank 1)	-	GND (Bank 1)	-
J14	1	M0	M ⁰	M0	M ⁰	DX0	DX ⁰	JX0	JX ⁰

ispMACH 4000B (2.5V) Industrial Devices

Family	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032B	LC4032B-5T48I	32	2.5	5	TQFP	48	32	I
	LC4032B-75T48I	32	2.5	7.5	TQFP	48	32	I
	LC4032B-10T48I	32	2.5	10	TQFP	48	32	I
	LC4032B-5T44I	32	2.5	5	TQFP	44	30	I
	LC4032B-75T44I	32	2.5	7.5	TQFP	44	30	I
	LC4032B-10T44I	32	2.5	10	TQFP	44	30	I
LC4064B	LC4064B-5T100I	64	2.5	5	TQFP	100	64	I
	LC4064B-75T100I	64	2.5	7.5	TQFP	100	64	I
	LC4064B-10T100I	64	2.5	10	TQFP	100	64	I
	LC4064B-5T48I	64	2.5	5	TQFP	48	32	I
	LC4064B-75T48I	64	2.5	7.5	TQFP	48	32	I
	LC4064B-10T48I	64	2.5	10	TQFP	48	32	I
	LC4064B-5T44I	64	2.5	5	TQFP	44	30	I
	LC4064B-75T44I	64	2.5	7.5	TQFP	44	30	I
	LC4064B-10T44I	64	2.5	10	TQFP	44	30	I
LC4128B	LC4128B-5T128I	128	2.5	5	TQFP	128	92	I
	LC4128B-75T128I	128	2.5	7.5	TQFP	128	92	I
	LC4128B-10T128I	128	2.5	10	TQFP	128	92	I
	LC4128B-5T100I	128	2.5	5	TQFP	100	64	I
	LC4128B-75T100I	128	2.5	7.5	TQFP	100	64	I
	LC4128B-10T100I	128	2.5	10	TQFP	100	64	I
LC4256B	LC4256B-5FT256AI	256	2.5	5	ftBGA	256	128	I
	LC4256B-75FT256AI	256	2.5	7.5	ftBGA	256	128	I
	LC4256B-10FT256AI	256	2.5	10	ftBGA	256	128	I
	LC4256B-5FT256BI	256	2.5	5	ftBGA	256	160	I
	LC4256B-75FT256BI	256	2.5	7.5	ftBGA	256	160	I
	LC4256B-10FT256BI	256	2.5	10	ftBGA	256	160	I
	LC4256B-5F256AI ¹	256	2.5	5	fpBGA	256	128	I
	LC4256B-75F256AI ¹	256	2.5	7.5	fpBGA	256	128	I
	LC4256B-10F256AI ¹	256	2.5	10	fpBGA	256	128	I
	LC4256B-5F256BI ¹	256	2.5	5	fpBGA	256	160	I
	LC4256B-75F256BI ¹	256	2.5	7.5	fpBGA	256	160	I
	LC4256B-10F256BI ¹	256	2.5	10	fpBGA	256	160	I
	LC4256B-5T176I	256	2.5	5	TQFP	176	128	I
	LC4256B-75T176I	256	2.5	7.5	TQFP	176	128	I
	LC4256B-10T176I	256	2.5	10	TQFP	176	128	I
	LC4256B-5T100I	256	2.5	5	TQFP	100	64	I
	LC4256B-75T100I	256	2.5	7.5	TQFP	100	64	I
	LC4256B-10T100I	256	2.5	10	TQFP	100	64	I

ispMACH 4000V (3.3V) Industrial Devices (Cont.)

Family	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4256V	LC4256V-5FT256AI	256	3.3	5	ftBGA	256	128	I
	LC4256V-75FT256AI	256	3.3	7.5	ftBGA	256	128	I
	LC4256V-10FT256AI	256	3.3	10	ftBGA	256	128	I
	LC4256V-5FT256BI	256	3.3	5	ftBGA	256	160	I
	LC4256V-75FT256BI	256	3.3	7.5	ftBGA	256	160	I
	LC4256V-10FT256BI	256	3.3	10	ftBGA	256	160	I
	LC4256V-5F256AI ¹	256	3.3	5	fpBGA	256	128	I
	LC4256V-75F256AI ¹	256	3.3	7.5	fpBGA	256	128	I
	LC4256V-10F256AI ¹	256	3.3	10	fpBGA	256	128	I
	LC4256V-5F256BI ¹	256	3.3	5	fpBGA	256	160	I
	LC4256V-75F256BI ¹	256	3.3	7.5	fpBGA	256	160	I
	LC4256V-10F256BI ¹	256	3.3	10	fpBGA	256	160	I
	LC4256V-5T176I	256	3.3	5	TQFP	176	128	I
	LC4256V-75T176I	256	3.3	7.5	TQFP	176	128	I
	LC4256V-10T176I	256	3.3	10	TQFP	176	128	I
	LC4256V-5T144I	256	3.3	5	TQFP	144	96	I
	LC4256V-75T144I	256	3.3	7.5	TQFP	144	96	I
	LC4256V-10T144I	256	3.3	10	TQFP	144	96	I
	LC4256V-5T100I	256	3.3	5	TQFP	100	64	I
	LC4256V-75T100I	256	3.3	7.5	TQFP	100	64	I
	LC4256V-10T100I	256	3.3	10	TQFP	100	64	I
LC4384V	LC4384V-5FT256I	384	3.3	5	ftBGA	256	192	I
	LC4384V-75FT256I	384	3.3	7.5	ftBGA	256	192	I
	LC4384V-10FT256I	384	3.3	10	ftBGA	256	192	I
	LC4384V-5F256I ¹	384	3.3	5	fpBGA	256	192	I
	LC4384V-75F256I ¹	384	3.3	7.5	fpBGA	256	192	I
	LC4384V-10F256I ¹	384	3.3	10	fpBGA	256	192	I
	LC4384V-5T176I	384	3.3	5	TQFP	176	128	I
	LC4384V-75T176I	384	3.3	7.5	TQFP	176	128	I
	LC4384V-10T176I	384	3.3	10	TQFP	176	128	I
LC4512V	LC4512V-5FT256I	512	3.3	5	ftBGA	256	208	I
	LC4512V-75FT256I	512	3.3	7.5	ftBGA	256	208	I
	LC4512V-10FT256I	512	3.3	10	ftBGA	256	208	I
	LC4512V-5F256I ¹	512	3.3	5	fpBGA	256	208	I
	LC4512V-75F256I ¹	512	3.3	7.5	fpBGA	256	208	I
	LC4512V-10F256I ¹	512	3.3	10	fpBGA	256	208	I
	LC4512V-5T176I	512	3.3	5	TQFP	176	128	I
	LC4512V-75T176I	512	3.3	7.5	TQFP	176	128	I
	LC4512V-10T176I	512	3.3	10	TQFP	176	128	I

1. Use ftBGA package. fpBGA package devices have been discontinued via PCN#14A-07.

Lead-Free Packaging**ispMACH 4000Z (Zero Power, 1.8V) Lead-Free Commercial Devices**

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032ZC	LC4032ZC-35MN56C	32	1.8	3.5	Lead-free csBGA	56	32	C
	LC4032ZC-5MN56C	32	1.8	5	Lead-free csBGA	56	32	C
	LC4032ZC-75MN56C	32	1.8	7.5	Lead-free csBGA	56	32	C
	LC4032ZC-35TN48C	32	1.8	3.5	Lead-free TQFP	48	32	C
	LC4032ZC-5TN48C	32	1.8	5	Lead-free TQFP	48	32	C
	LC4032ZC-75TN48C	32	1.8	7.5	Lead-free TQFP	48	32	C
LC4064ZC	LC4064ZC-37MN132C	64	1.8	3.7	Lead-free csBGA	132	64	C
	LC4064ZC-5MN132C	64	1.8	5	Lead-free csBGA	132	64	C
	LC4064ZC-75MN132C	64	1.8	7.5	Lead-free csBGA	132	64	C
	LC4064ZC-37TN100C	64	1.8	3.7	Lead-free TQFP	100	64	C
	LC4064ZC-5TN100C	64	1.8	5	Lead-free TQFP	100	64	C
	LC4064ZC-75TN100C	64	1.8	7.5	Lead-free TQFP	100	64	C
	LC4064ZC-37MN56C	64	1.8	3.7	Lead-free csBGA	56	32	C
	LC4064ZC-5MN56C	64	1.8	5	Lead-free csBGA	56	32	C
	LC4064ZC-75MN56C	64	1.8	7.5	Lead-free csBGA	56	32	C
	LC4064ZC-37TN48C	64	1.8	3.7	Lead-free TQFP	48	32	C
	LC4064ZC-5TN48C	64	1.8	5	Lead-free TQFP	48	32	C
	LC4064ZC-75TN48C	64	1.8	7.5	Lead-free TQFP	48	32	C
LC4128ZC	LC4128ZC-42MN132C	128	1.8	4.2	Lead-free csBGA	132	96	C
	LC4128ZC-75MN132C	128	1.8	7.5	Lead-free csBGA	132	96	C
	LC4128ZC-42TN100C	128	1.8	4.2	Lead-free TQFP	100	64	C
	LC4128ZC-75TN100C	128	1.8	7.5	Lead-free TQFP	100	64	C
LC4256ZC	LC4256ZC-45TN176C	256	1.8	4.5	Lead-free TQFP	176	128	C
	LC4256ZC-75TN176C	256	1.8	7.5	Lead-free TQFP	176	128	C
	LC4256ZC-45MN132C	256	1.8	4.5	Lead-free csBGA	132	96	C
	LC4256ZC-75MN132C	256	1.8	7.5	Lead-free csBGA	132	96	C
	LC4256ZC-45TN100C	256	1.8	4.5	Lead-free TQFP	100	64	C
	LC4256ZC-75TN100C	256	1.8	7.5	Lead-free TQFP	100	64	C

ispMACH 4000Z (Zero Power, 1.8V) Lead-Free Industrial Devices

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032ZC	LC4032ZC-5MN56I	32	1.8	5	Lead-free csBGA	56	32	I
	LC4032ZC-75MN56I	32	1.8	7.5	Lead-free csBGA	56	32	I
	LC4032ZC-5TN48I	32	1.8	5	Lead-free TQFP	48	32	I
	LC4032ZC-75TN48I	32	1.8	7.5	Lead-free TQFP	48	32	I

ispMACH 4000C (1.8V) Lead-Free Commercial Devices (Cont.)

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4512C	LC4512C-35FTN256C	512	1.8	3.5	Lead-free ftBGA	256	208	C
	LC4512C-5FTN256C	512	1.8	5	Lead-free ftBGA	256	208	C
	LC4512C-75FTN256C	512	1.8	7.5	Lead-free ftBGA	256	208	C
	LC4512C-35FN256C ¹	512	1.8	3.5	Lead-free fpBGA	256	208	C
	LC4512C-5FN256C ¹	512	1.8	5	Lead-free fpBGA	256	208	C
	LC4512C-75FN256C ¹	512	1.8	7.5	Lead-free fpBGA	256	208	C
	LC4512C-35TN176C	512	1.8	3.5	Lead-free TQFP	176	128	C
	LC4512C-5TN176C	512	1.8	5	Lead-free TQFP	176	128	C
	LC4512C-75TN176C	512	1.8	7.5	Lead-free TQFP	176	128	C

1. Use ftBGA package. fpBGA package devices have been discontinued via PCN#14A-07.

ispMACH 4000C (1.8V) Lead-Free Industrial Devices

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032C	LC4032C-5TN48I	32	1.8	5	Lead-free TQFP	48	32	I
	LC4032C-75TN48I	32	1.8	7.5	Lead-free TQFP	48	32	I
	LC4032C-10TN48I	32	1.8	10	Lead-free TQFP	48	32	I
	LC4032C-5TN44I	32	1.8	5	Lead-free TQFP	44	30	I
	LC4032C-75TN44I	32	1.8	7.5	Lead-free TQFP	44	30	I
	LC4032C-10TN44I	32	1.8	10	Lead-free TQFP	44	30	I
LC4064C	LC4064C-5TN100I	64	1.8	5	Lead-free TQFP	100	64	I
	LC4064C-75TN100I	64	1.8	7.5	Lead-free TQFP	100	64	I
	LC4064C-10TN100I	64	1.8	10	Lead-free TQFP	100	64	I
	LC4064C-5TN48I	64	1.8	5	Lead-free TQFP	48	32	I
	LC4064C-75TN48I	64	1.8	7.5	Lead-free TQFP	48	32	I
	LC4064C-10TN48I	64	1.8	10	Lead-free TQFP	48	32	I
	LC4064C-5TN44I	64	1.8	5	Lead-free TQFP	44	30	I
	LC4064C-75TN44I	64	1.8	5	Lead-free TQFP	44	30	I
	LC4064C-10TN44I	64	1.8	10	Lead-free TQFP	44	30	I
LC4128C	LC4128C-5TN128I	128	1.8	5	Lead-free TQFP	128	92	I
	LC4128C-75TN128I	128	1.8	7.5	Lead-free TQFP	128	92	I
	LC4128C-10TN128I	128	1.8	10	Lead-free TQFP	128	92	I
	LC4128C-5TN100I	128	1.8	5	Lead-free TQFP	100	64	I
	LC4128C-75TN100I	128	1.8	7.5	Lead-free TQFP	100	64	I
	LC4128C-10TN100I	128	1.8	10	Lead-free TQFP	100	64	I

ispMACH 4000B (2.5V) Lead-Free Commercial Devices

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032B	LC4032B-25TN48C	32	2.5	2.5	Lead-Free TQFP	48	32	C
	LC4032B-5TN48C	32	2.5	5	Lead-Free TQFP	48	32	C
	LC4032B-75TN48C	32	2.5	7.5	Lead-Free TQFP	48	32	C
	LC4032B-25TN44C	32	2.5	2.5	Lead-Free TQFP	44	30	C
	LC4032B-5TN44C	32	2.5	5	Lead-Free TQFP	44	30	C
	LC4032B-75TN44C	32	2.5	7.5	Lead-Free TQFP	44	30	C
LC4064B	LC4064B-25TN100C	64	2.5	2.5	Lead-Free TQFP	100	64	C
	LC4064B-5TN100C	64	2.5	5	Lead-Free TQFP	100	64	C
	LC4064B-75TN100C	64	2.5	7.5	Lead-Free TQFP	100	64	C
	LC4064B-25TN48C	64	2.5	2.5	Lead-Free TQFP	48	32	C
	LC4064B-5TN48C	64	2.5	5	Lead-Free TQFP	48	32	C
	LC4064B-75TN48C	64	2.5	7.5	Lead-Free TQFP	48	32	C
	LC4064B-25TN44C	64	2.5	2.5	Lead-Free TQFP	44	30	C
	LC4064B-5TN44C	64	2.5	5	Lead-Free TQFP	44	30	C
	LC4064B-75TN44C	64	2.5	7.5	Lead-Free TQFP	44	30	C
LC4128B	LC4128B-27TN128C	128	2.5	2.7	Lead-Free TQFP	128	92	C
	LC4128B-5TN128C	128	2.5	5	Lead-Free TQFP	128	92	C
	LC4128B-75TN128C	128	2.5	7.5	Lead-Free TQFP	128	92	C
	LC4128B-27TN100C	128	2.5	2.7	Lead-Free TQFP	100	92	C
	LC4128B-5TN100C	128	2.5	5	Lead-Free TQFP	100	92	C
	LC4128B-75TN100C	128	2.5	7.5	Lead-Free TQFP	100	92	C
LC4256B	LC4256B-3FTN256AC	256	2.5	3	Lead-Free ftBGA	256	128	C
	LC4256B-5FTN256AC	256	2.5	5	Lead-Free ftBGA	256	128	C
	LC4256B-75FTN256AC	256	2.5	7.5	Lead-Free ftBGA	256	128	C
	LC4256B-3FTN256BC	256	2.5	3	Lead-Free ftBGA	256	160	C
	LC4256B-5FTN256BC	256	2.5	5	Lead-Free ftBGA	256	160	C
	LC4256B-75FTN256BC	256	2.5	7.5	Lead-Free ftBGA	256	160	C
	LC4256B-3FN256AC ¹	256	2.5	3	Lead-Free fpBGA	256	128	C
	LC4256B-5FN256AC ¹	256	2.5	5	Lead-Free fpBGA	256	128	C
	LC4256B-75FN256AC ¹	256	2.5	7.5	Lead-Free fpBGA	256	128	C
	LC4256B-3FN256BC ¹	256	2.5	3	Lead-Free fpBGA	256	160	C
	LC4256B-5FN256BC ¹	256	2.5	5	Lead-Free fpBGA	256	160	C
	LC4256B-75FN256BC ¹	256	2.5	7.5	Lead-Free fpBGA	256	160	C
	LC4256B-3TN176C	256	2.5	3	Lead-Free TQFP	176	128	C
	LC4256B-5TN176C	256	2.5	5	Lead-Free TQFP	176	128	C
	LC4256B-75TN176C	256	2.5	7.5	Lead-Free TQFP	176	128	C
	LC4256B-3TN100C	256	2.5	3	Lead-Free TQFP	100	64	C
	LC4256B-5TN100C	256	2.5	5	Lead-Free TQFP	100	64	C
	LC4256B-75TN100C	256	2.5	7.5	Lead-Free TQFP	100	64	C

ispMACH 4000V (3.3V) Lead-Free Commercial Devices

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4032V	LC4032V-25TN48C	32	3.3	2.5	Lead-free TQFP	48	32	C
	LC4032V-5TN48C	32	3.3	5	Lead-free TQFP	48	32	C
	LC4032V-75TN48C	32	3.3	7.5	Lead-free TQFP	48	32	C
	LC4032V-25TN44C	32	3.3	2.5	Lead-free TQFP	44	30	C
	LC4032V-5TN44C	32	3.3	5	Lead-free TQFP	44	30	C
	LC4032V-75TN44C	32	3.3	7.5	Lead-free TQFP	44	30	C
LC4064V	LC4064V-25TN100C	64	3.3	2.5	Lead-free TQFP	100	64	C
	LC4064V-5TN100C	64	3.3	5	Lead-free TQFP	100	64	C
	LC4064V-75TN100C	64	3.3	7.5	Lead-free TQFP	100	64	C
	LC4064V-25TN48C	64	3.3	2.5	Lead-free TQFP	48	32	C
	LC4064V-5TN48C	64	3.3	5	Lead-free TQFP	48	32	C
	LC4064V-75TN48C	64	3.3	7.5	Lead-free TQFP	48	32	C
	LC4064V-25TN44C	64	3.3	2.5	Lead-free TQFP	44	30	C
	LC4064V-5TN44C	64	3.3	5	Lead-free TQFP	44	30	C
	LC4064V-75TN44C	64	3.3	7.5	Lead-free TQFP	44	30	C
LC4128V	LC4128V-27TN144C	128	3.3	2.7	Lead-free TQFP	144	96	C
	LC4128V-5TN144C	128	3.3	5	Lead-free TQFP	144	96	C
	LC4128V-75TN144C	128	3.3	7.5	Lead-free TQFP	144	96	C
	LC4128V-27TN128C	128	3.3	2.7	Lead-free TQFP	128	92	C
	LC4128V-5TN128C	128	3.3	5	Lead-free TQFP	128	92	C
	LC4128V-75TN128C	128	3.3	7.5	Lead-free TQFP	128	92	C
	LC4128V-27TN100C	128	3.3	2.7	Lead-free TQFP	100	64	C
	LC4128V-5TN100C	128	3.3	5	Lead-free TQFP	100	64	C
	LC4128V-75TN100C	128	3.3	7.5	Lead-free TQFP	100	64	C

ispMACH 4000V (3.3V) Lead-Free Industrial Devices (Cont.)

Device	Part Number	Macrocells	Voltage	t _{PD}	Package	Pin/Ball Count	I/O	Grade
LC4256V	LC4256V-5FTN256AI	256	3.3	5	Lead-free ftBGA	256	128	I
	LC4256V-75FTN256AI	256	3.3	7.5	Lead-free ftBGA	256	128	I
	LC4256V-10FTN256AI	256	3.3	10	Lead-free ftBGA	256	128	I
	LC4256V-5FTN256BI	256	3.3	5	Lead-free ftBGA	256	160	I
	LC4256V-75FTN256BI	256	3.3	7.5	Lead-free ftBGA	256	160	I
	LC4256V-10FTN256BI	256	3.3	10	Lead-free ftBGA	256	160	I
	LC4256V-5FN256AI ¹	256	3.3	5	Lead-free fpBGA	256	128	I
	LC4256V-75FN256AI ¹	256	3.3	7.5	Lead-free fpBGA	256	128	I
	LC4256V-10FN256AI ¹	256	3.3	10	Lead-free fpBGA	256	128	I
	LC4256V-5FN256BI ¹	256	3.3	5	Lead-free fpBGA	256	160	I
	LC4256V-75FN256BI ¹	256	3.3	7.5	Lead-free fpBGA	256	160	I
	LC4256V-10FN256BI ¹	256	3.3	10	Lead-free fpBGA	256	160	I
	LC4256V-5TN176I	256	3.3	5	Lead-free TQFP	176	128	I
	LC4256V-75TN176I	256	3.3	7.5	Lead-free TQFP	176	128	I
	LC4256V-10TN176I	256	3.3	10	Lead-free TQFP	176	128	I
	LC4256V-5TN144I	256	3.3	5	Lead-free TQFP	144	96	I
	LC4256V-75TN144I	256	3.3	7.5	Lead-free TQFP	144	96	I
	LC4256V-10TN144I	256	3.3	10	Lead-free TQFP	144	96	I
	LC4256V-5TN100I	256	3.3	5	Lead-free TQFP	100	64	I
	LC4256V-75TN100I	256	3.3	7.5	Lead-free TQFP	100	64	I
	LC4256V-10TN100I	256	3.3	10	Lead-free TQFP	100	64	I
LC4384V	LC4384V-5FTN256I	384	3.3	5	Lead-free ftBGA	256	192	I
	LC4384V-75FTN256I	384	3.3	7.5	Lead-free ftBGA	256	192	I
	LC4384V-10FTN256I	384	3.3	10	Lead-free ftBGA	256	192	I
	LC4384V-5FN256I ¹	384	3.3	5	Lead-free fpBGA	256	192	I
	LC4384V-75FN256I ¹	384	3.3	7.5	Lead-free fpBGA	256	192	I
	LC4384V-10FN256I ¹	384	3.3	10	Lead-free fpBGA	256	192	I
	LC4384V-5TN176I	384	3.3	5	Lead-free TQFP	176	128	I
	LC4384V-75TN176I	384	3.3	7.5	Lead-free TQFP	176	128	I
	LC4384V-10TN176I	384	3.3	10	Lead-free TQFP	176	128	I
LC4512V	LC4512V-5FTN256I	512	3.3	5	Lead-free ftBGA	256	208	I
	LC4512V-75FTN256I	512	3.3	7.5	Lead-free ftBGA	256	208	I
	LC4512V-10FTN256I	512	3.3	10	Lead-free ftBGA	256	208	I
	LC4512V-5FN256I ¹	512	3.3	5	Lead-free fpBGA	256	208	I
	LC4512V-75FN256I ¹	512	3.3	7.5	Lead-free fpBGA	256	208	I
	LC4512V-10FN256I ¹	512	3.3	10	Lead-free fpBGA	256	208	I
	LC4512V-5TN176I	512	3.3	5	Lead-free TQFP	176	128	I
	LC4512V-75TN176I	512	3.3	7.5	Lead-free TQFP	176	128	I
	LC4512V-10TN176I	512	3.3	10	Lead-free TQFP	176	128	I

1. Use ftBGA package. fpBGA package devices have been discontinued via PCN#14A-07.