

ispMACH 4000Z

Industry's Lowest Power CPLD Family

Cooler Power, Cooler Price!

Based on Lattice's popular SuperFAST™ ispMACH® 4000 family architecture, the ispMACH 4000Z family offers an industry-leading combination of low power consumption and high performance. Lattice's ispMACH 4000Z CPLDs provide the most cost-effective logic implementation for today's portable and hand-held applications.

Utilizing a low power version of Lattice's advanced E²CMOS® process technology, the ispMACH 4000Z delivers very low static power and high speed. Devices operate from a 1.8V power supply resulting in low dynamic power consumption. This family interfaces with standard 1.8V/2.5V/3.3V devices and all inputs and I/Os are 5V tolerant.

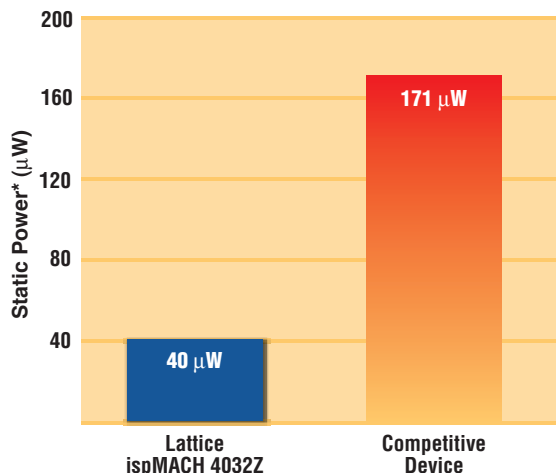
Versions of the ispMACH 4000Z family support commercial, industrial, and automotive temperature ranges.

The new ispMACH 4000Z family is fully supported by Lattice's easy-to-use and powerful ispLEVER® design software and a wide range of popular third-party tools.

Key Features and Benefits

- **Lowest Static Power Consumption**
 - 40 to 105µW static power (maximum, T_j = 70°C)
 - 18µW static power (typical)
 - 1.8V core for low dynamic power
- **Zero Power for Free!**
 - No price premium versus standard power CPLDs

Industry's Lowest Static Power



* Based on published specifications over full operating range.



- **SuperFAST Architecture**
 - 3.5ns t_{PD} pin-to-pin delay
 - 267MHz system performance
- **Multiple Temperature Range Options**
 - Commercial: 0 to 70°C T_A (ambient)
 - Industrial: -40 to 85°C T_A (ambient)
 - Automotive: -40 to 125°C T_A (ambient)
- **Ease of Design**
 - 32, 64, 128 and 256 macrocell density options
 - Four global clocks
 - 36 inputs per logic block
 - Up to 80 Product Terms (PTs) per output
 - ORP for pin locking
 - Density migration
 - Flexible control, clocking and OE
- **Easy System Integration**
 - Pin- and function-compatible with ispMACH 4000V/B/C devices
 - Interface with standard 1.8V/2.5V/3.3V I/O
 - 5V tolerant inputs and I/O
 - Extended power supply operating range 1.6V to 1.9V
 - Extended LVC MOS 3.3 operation 2.7V to 3.6V
 - Programmable open drain outputs
 - Programmable bus maintenance
 - Programmable output slew rate
 - Hot socketing capability
 - 3.3V PCI compatible
 - IEEE 1532 compliant ISP™
 - IEEE 1149.1 boundary scan test
 - Lead-free package options

ispMACH 4000Z Family Attributes

Family Member	Macrocells	I/O + Inputs	t _{PD} (ns)	t _{CO} (ns)	t _S (ns)	f _{MAX} (MHz)	V _{CC} (Volts)	Max. Standby Current (μA)	Package
ispMACH 4032ZC	32	32+4 32+4	3.5	3.0	2.2	267	1.8	20	48-pin TQFP 56-ball csBGA
ispMACH 4064ZC	64	32+4 32+12 64+10 64+10	3.7	3.2	2.5	250	1.8	25	48-pin TQFP 56-ball csBGA 100-pin TQFP 132-ball csBGA
ispMACH 4128ZC	128	64+10 96+4	4.2	3.5	2.7	220	1.8	35	100-pin TQFP 132-ball csBGA
ispMACH 4256ZC	256	64+10 96+6 128+4	4.5	3.8	2.9	200	1.8	55	100-pin TQFP 132-ball csBGA 176-pin TQFP

ispMACH 4000V/B/C Family Attributes

V = 3.3V, B = 2.5V, C = 1.8V core supply

Family Member	Macrocells	User I/O + Inputs	t _{PD} (ns)	t _{CO} (ns)	t _S (ns)	f _{MAX} (MHz)	V _{CC} (Volts)	Standby Current at 1.8V (mA)	Package
ispMACH 4032V/B/C	32	30+2 32+4	2.5	2.2	1.8	400	3.3/2.5/1.8	1.3	44-pin TQFP 48-pin TQFP
ispMACH 4064V/B/C	64	30+2 32+4 64+10	2.5	2.2	1.8	400	3.3/2.5/1.8	1.5	44-pin TQFP 48-pin TQFP 100-pin TQFP
ispMACH 4128V/B/C	128	64+10 92+4 96+4	2.7	2.7	1.8	333	3.3/2.5/1.8	1.5	100-pin TQFP 128-pin TQFP 144-pin TQFP**
ispMACH 4256V/B/C	256	64+10 96+14 128+4 128+4/160+4	3.0	2.7	2.0	322	3.3/2.5/1.8	2.0	100-pin TQFP 144-pin TQFP** 176-pin TQFP 256-ball ftBGA*
ispMACH 4384V/B/C	384	128+4 192+4	3.5	2.7	2.0	322	3.3/2.5/1.8	2.5	176-pin TQFP 256-ball ftBGA
ispMACH 4512V/B/C	512	128+4 208+4	3.5	2.7	2.0	322	3.3/2.5/1.8	3.0	176-pin TQFP 256-ball ftBGA

**128 and 160 I/O options **3.3V only

ispMACH 4000Z Advanced Packaging



Packages are shown actual size. Dimensions refer to package body size.

ispMACH 4000Z Application Areas

- Telematics
- Cell phones
- Paging devices
- Handheld debit and credit card readers
- GPS positioning equipment
- PDAs
- Calculators
- Two-way radio
- Industrial instrumentation
- Digital cameras
- Digital video recorders
- Personal audio equipment
- Portable medical equipment
- Automotive applications
- Portable barcode scanners
- Any CPLD application!

Applications Support

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