

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.

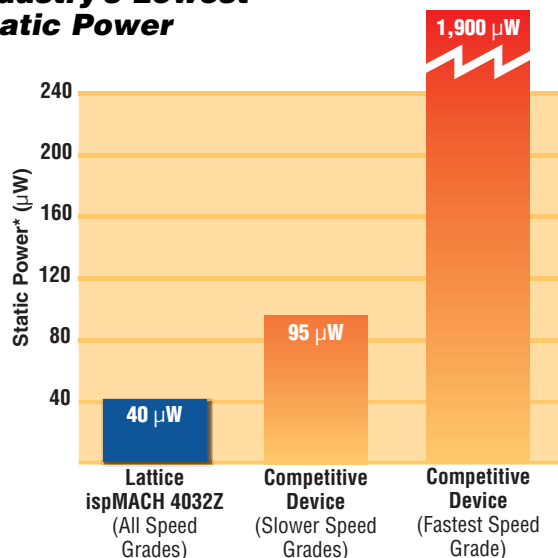
Versions of the ispMACH 4000Z family support commercial, industrial, and automotive temperature ranges.

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 80µW 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



*Worst case, over full operating range, based on published specifications.



- **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 LVCMOS 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



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 (≈A) | 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 | 4 | 3.3 | 2.8 | 250 | 1.8 | 25 | 48-pin TQFP 56-ball csBGA 100-pin TQFP 132-ball csBGA |
| ispMACH 4128ZC | 128 | 64+10 96+4 | 4.5 | 3.9 | 2.9 | 220 | 1.8 | 30 | 100-pin TQFP 132-ball csBGA |
| ispMACH 4256ZC | 256 | 64+10 96+6 128+4 | 5.0 | 3.9 | 3.0 | 200 | 1.8 | 40 | 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+4 128+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 fpBGA* |
| 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 fpBGA |
| 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 fpBGA |

*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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