

SiT8004 for Networking

Low Power Oscillator for GPON, EPON and Gigabit Ethernet



■ Features, Benefits and Applications

- Lowest power, high frequency oscillator with 6.2 mA typical active current
- Custom frequency such as 125.00375 MHz improves or eliminates bit errors
- 125 MHz, 125.00375 MHz output frequencies
- LVCMOS/LVTTL compatible output
- Excellent frequency stability over temperature, ± 20 PPM
- Ultra low standby current, 1.2 μ A
- Standby or output enable modes
- Four industry-standard packages: 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm
- Drop-in replacement of quartz
- Ultra short lead time
- All-silicon device with outstanding reliability of 2 FIT (10x improvement over quartz-based devices), enhancing system mean-time-to-failure (MTBF)

■ Specifications

Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-----------------------------|----------|------|-----------|------|---------|--|
| Output Frequency Range | f | – | 125 | – | MHz | |
| | | – | 125.00375 | – | MHz | |
| Frequency Stability | F_stab | -20 | – | +20 | PPM | Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration |
| | | -25 | – | +25 | PPM | |
| | | -50 | – | +50 | PPM | |
| Aging | Ag | -1.0 | – | 1.0 | PPM | 1st year at 25°C |
| Operating Temperature Range | T_use | -20 | – | +70 | °C | Extended Commercial |
| | | -40 | – | +85 | °C | Industrial |
| Supply Voltage | Vdd | 2.25 | 2.5 | 2.75 | V | |
| | | 2.52 | 2.8 | 3.08 | V | |
| | | 2.97 | 3.3 | 3.63 | V | |
| Current Consumption | Idd | – | 6.7 | 8 | mA | No load condition, f = 125 MHz, Vdd = 3.3 V |
| | | – | 6.2 | 7 | mA | No load condition, f = 125 MHz, Vdd = 2.5 V or 2.8 V |
| Standby Current | I_std | – | 2.4 | 4.3 | μ A | $\overline{ST} = \text{GND}$, Vdd = 3.3 V, Output is Weakly Pulled Down |
| | | – | 1.2 | 2.2 | μ A | $\overline{ST} = \text{GND}$, Vdd = 2.5 or 2.8 V, Output is Weakly Pulled Down |
| Duty Cycle | DC | 40 | 50 | 60 | % | All Vdds |
| Rise/Fall Time | Tr, Tf | – | 1 | 2 | ns | 20% - 80% Vdd=2.5 V, 2.8 V or 3.3 V, 15 pf load |
| Output Voltage High | VOH | 90% | – | – | Vdd | IOH = -4 mA (Vdd = 3.3 V) IOH = -3 mA (Vdd = 2.8 V and Vdd = 2.5 V) |
| Output Voltage Low | VOL | – | – | 10% | Vdd | IOL = 4 mA (Vdd = 3.3 V) IOL = 3 mA (Vdd = 2.8 V and Vdd = 2.5 V) |
| Output Load | Ld | – | – | 15 | pF | At 125MHz and max supply voltage. Contact SiTime for higher output load option |
| Input Voltage High | VIH | 70% | – | – | Vdd | Pin 1, OE or \overline{ST} |
| Input Voltage Low | VIL | – | – | 30% | Vdd | Pin 1, OE or \overline{ST} |
| Startup Time | T_start | – | – | 10 | ms | Measured from the time Vdd reaches its rated minimum value |
| Resume Time | T_resume | – | 3.0 | 3.8 | ms | Measured from the time \overline{ST} pin crosses 50% threshold |
| RMS Period Jitter | T_jitt | – | – | 4.5 | ps | f = 125 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V |
| RMS Phase Jitter (random) | T_phj | – | 0.5 | – | ps | f = 125 MHz, Integration bandwidth = 900 kHz to 7.5 MHz, VDD = 2.5 V, 2.8 V, or 3.3 V |

Specifications (Cont.)

Pin Description Tables

| Pin #1 Functionality |
|--|
| OE |
| H or Open: specified frequency output |
| L: output is high impedance |
| ST |
| H or Open: specified frequency output |
| L: output is low level (weak pull down). Oscillation stops |

| Pin Map | |
|---------|----------------------------|
| Pin | Connection |
| 1 | OE/ $\overline{\text{ST}}$ |
| 2 | GND |
| 3 | CLK |
| 4 | VDD |

Absolute Maximum Table

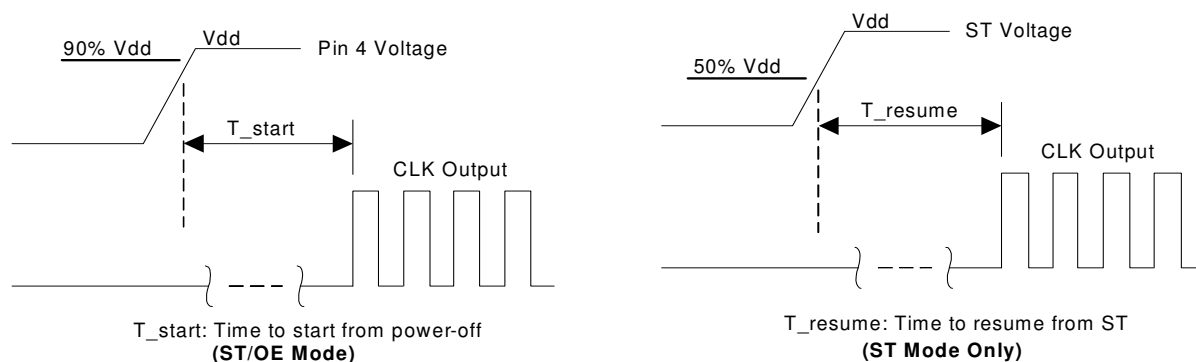
Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

| Parameter | Min. | Max. | Unit |
|--|--------|------|-------|
| Storage Temperature | -65 | 150 | °C |
| VDD | -0.5 | 4 | V |
| Electrostatic Discharge | – | 2000 | V |
| Theta JA (with copper plane on VDD and GND) | – | 75 | °C/W |
| Theta JC (with PCB traces of 0.010 inch to all pins) | – | 24 | °C/W |
| Soldering Temperature (follow standard Pb free soldering guidelines) | – | 260 | °C |
| Number of Program Writes | – | 1 | NA |
| Program Retention over -40 to 125 °C, Process, VDD (0 to 3.65 V) | 1,000+ | – | years |

Environmental Compliance

| Parameter | Condition/Test Method |
|----------------------------|---------------------------|
| Mechanical Shock | MIL-STD-883F, Method 2002 |
| Mechanical Vibration | MIL-STD-883F, Method 2007 |
| Temperature Cycle | JESD22, Method A104 |
| Solderability | MIL-STD-883F, Method 2003 |
| Moisture Sensitivity Level | MSL1 @ 260 °C |

Startup and Resume Timing Diagram



■ Dimensions and Land Patterns

| Package Size – Dimensions (Unit: mm) ^[2] | Recommended Land Pattern (Unit: mm) ^[3] |
|---|--|
| <p>2.5 x 2.0 x 0.75 mm</p> | |
| <p>3.2 x 2.5 x 0.75 mm</p> | |
| <p>5.0 x 3.2 x 0.75 mm</p> | |
| <p>7.0 x 5.0 x 0.90 mm</p> | |

Notes:

1. Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
2. A capacitor of value 0.1 μ F between Vdd and GND is recommended.

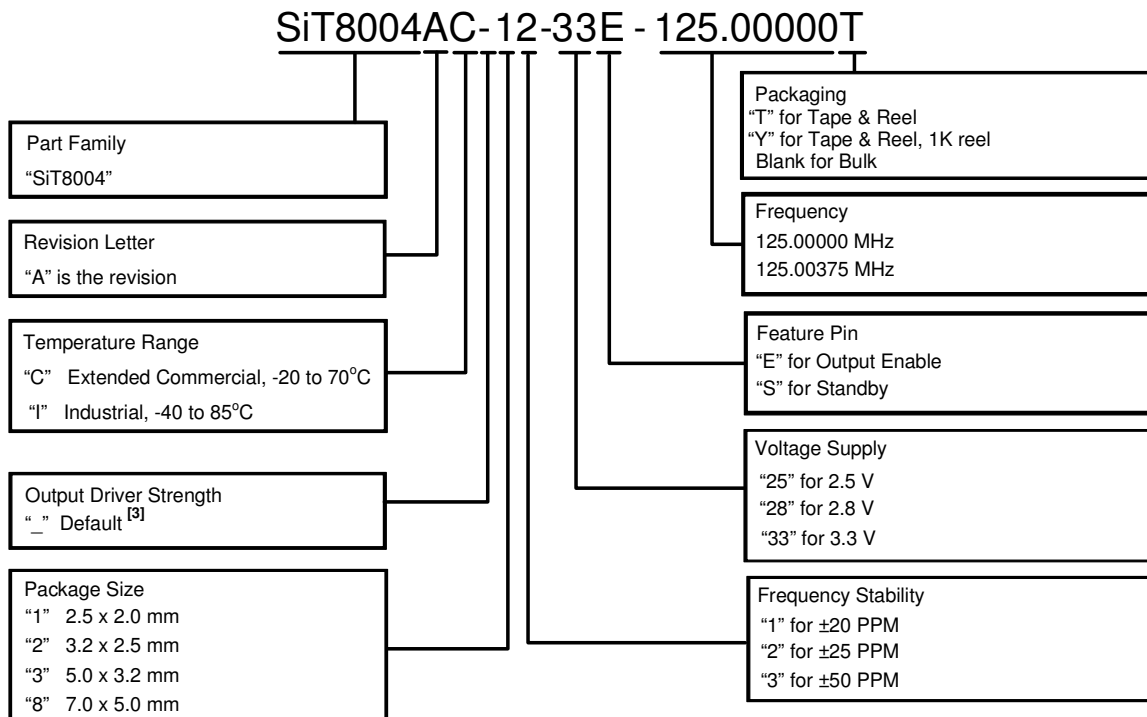
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Advanced Information



■ Part No. Guide - How to Order



Note:

3. Contact SiTime for different drive strength options for driving higher loads or reducing EMI.

Frequency Stability vs. Temperature Range Options

| Frequency Stability (PPM) | Temperature Range | Supply Voltage | | |
|---------------------------|-------------------|----------------|-------|-------|
| | | 2.5 V | 2.8 V | 3.3 V |
| ±20 | C (-20 to +70°C) | ✓ | ✓ | ✓ |
| | I (-40 to +85°C) | - | - | - |
| ±25 | C (-20 to +70°C) | ✓ | ✓ | ✓ |
| | I (-40 to +85°C) | - | - | - |
| ±50 | C (-20 to +70°C) | ✓ | ✓ | ✓ |
| | I (-40 to +85°C) | - | - | - |

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