

■ Features, Benefits and Applications

- 200 - 1000 kHz frequency range (contact SiTime for <200 kHz)
- Frequency stability as low as ± 20 PPM
- LVCMOS/LVTTL compatible output
- Typical current consumption of 5.7 mA in active mode
- 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
- All-silicon device with outstanding reliability of 2 FIT, 10x improvement over quartz-based devices, enhancing system MTBF
- Outstanding mechanical robustness for portable applications
- Ultra short lead time
- Ideal for consumer electronics, audio applications

■ Specifications

Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|-----------------------------|----------|------|------|------|---------|---|
| Output Frequency Range | f | 200 | – | 1000 | kHz | Contact SiTime for <200 kHz |
| Frequency Stability | F_stab | -20 | – | +20 | PPM | Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration. ± 20 PPM available in extended commercial temperature only |
| | | -25 | – | +25 | PPM | |
| | | -30 | – | +30 | 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 | 1.71 | 1.8 | 1.89 | V | |
| | | 2.25 | 2.5 | 2.75 | V | |
| | | 2.52 | 2.8 | 3.08 | V | |
| | | 2.97 | 3.3 | 3.63 | V | |
| Current Consumption | Idd | – | 5.9 | 6.9 | mA | No load condition, f = 400 KHz, Vdd = 2.5 V, 2.8 V or 3.3 V |
| | | – | 5.7 | 6.6 | mA | No load condition, f = 400 KHz, Vdd = 1.8 V |
| Standby Current | I_std | – | 2.4 | 4.3 | μ A | \overline{ST} = GND, Vdd = 3.3 V, Output is weakly pulled down |
| | | – | 1.2 | 2.2 | μ A | \overline{ST} = GND, Vdd = 2.5 or 2.8 V, Output is weakly pulled down |
| | | – | 0.4 | 0.8 | μ A | \overline{ST} = GND, Vdd = 1.8 V, Output is weakly pulled down |
| Duty Cycle | DC | 45 | 50 | 55 | % | All Vdds |
| Rise/Fall Time | Tr, Tf | – | 1.0 | 2.0 | ns | 20% - 80% Vdd=2.5V or 2.8V, 3.3V, 15pF load |
| | | – | 1.3 | 2.5 | ns | 20% - 80% Vdd=1.8V, 15pF 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) IOH = -2 mA (Vdd = 1.8 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) IOL = 2 mA (Vdd = 1.8 V) |
| Output Load | Ld | – | – | 15 | pF | At maximum frequency and 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_osc | – | – | 10 | ms | Measured from the time Vdd reaches its rated minimum value |
| Resume Time | T_resume | – | 3 | 4 | ms | Measured from the time ST pin crosses 50% threshold |
| RMS Period Jitter | T_jitt | – | 11 | 17 | ps | f = 400 KHz, Vdd = 2.5 V, 2.8 V or 3.3 V |
| | | – | 12 | 17 | ps | f = 400 KHz, Vdd = 1.8 V |

Specifications (Cont.)

Pin Description Tables

| Pin #1 Functionality |
|--|
| OE |
| H or Open ^[1] : specified frequency output |
| L: output is high impedance |
| $\overline{\text{ST}}$ |
| 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

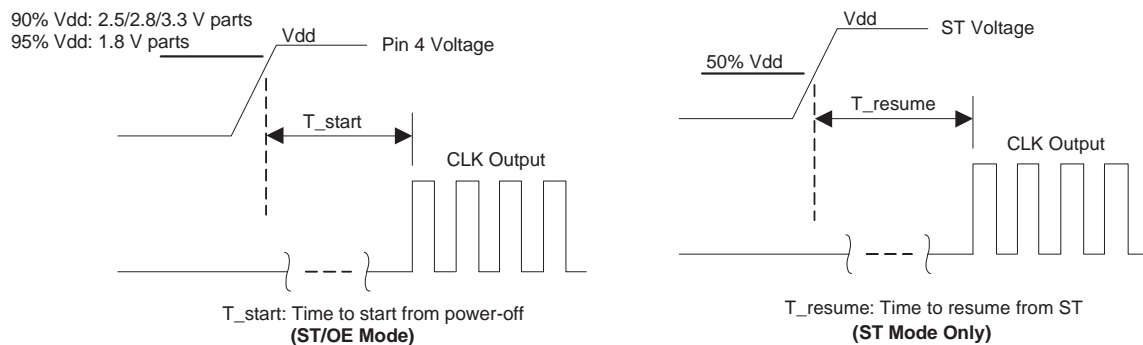
Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

| Parameter | Min. | Max. | Unit |
|--|--------|------|-------|
| Storage Temperature | -65 | 150 | °C |
| Vdd | -0.5 | 4 | V |
| Electrostatic Discharge | – | 6000 | 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



Note:

- In 1.8 V mode, a resistor of <100 kΩ between OE pin and VDD is recommended.

■ 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> | |

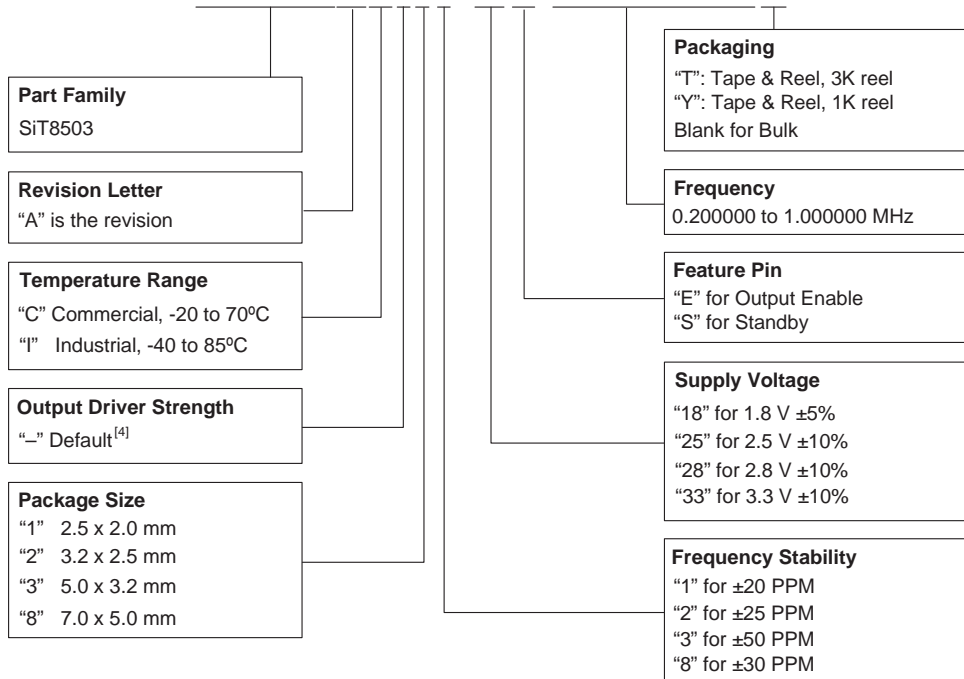
Notes:

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

■ Part No. Guide - How to Order

The Part No. Guide is for reference only. For real-time customization and exact part number, use the SiTime [Part Number Generator](#).

SiT8503AC-23-33E-000.751234T



Notes:

4. 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 | | | |
|---------------------------|-------------------|----------------|-------|-------|-------|
| | | 1.8 V | 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) | - | - | - | - |
| ±30 | 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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