# SiT8208

## Ultra Performance Oscillator

**Preliminary**

## Features, Benefits and Applications

- Any frequency between 1 and 80 MHz with 6 decimal places of accuracy
- 100% pin-to-pin drop-in replacement to quartz-based TCXO
- Ultra low phase jitter: 0.5 ps (12 kHz to 20 MHz)
- Frequency stability as low as ±10 PPM
- LVCMOS/LVTTL compatible output
- Standby or output enable modes
- Three industry-standard 4-pin packages: 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm
- Contact SiTime for the following options:
  - SoftEdge™ configurable rise/fall time for EMI reduction or driving higher loads
  - 2.5 x 2.0 footprint compatbile package
- Outstanding silicon reliability of 2 FIT (10x improvement over quartz-based devices)
- Ultra short lead time
- Ideal for high-speed serial protocols such as: SATA, SAS, Ethernet, PCI Express, etc.

## Specifications

### Electrical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Output Frequency Range | f | 1 | – | 80 | MHz | |
| Frequency Stability | F_stab | -10 | – | +10 | PPM | Inclusive of Initial tolerance at 25 °C, operating temperature, rated supply voltage variation and load variation (15% pF ±10%) |
| | | -20 | – | +20 | PPM | |
| | | -25 | – | +25 | PPM | |
| | | -50 | – | +50 | PPM | |
| Operating Temperature Range | T_use | -20 | – | +70 | °C | Extended Commercial |
| | | -40 | – | +85 | °C | Industrial |
| Supply Voltage | Vdd | 1.71 | 1.8 | 1.89 | V | Any supply voltage between 2.5 V and 3.3V is supported in increment of 0.1 V. Contact SiTime for guaranteed performance specs for supply voltages not specified in this talbe. |
| | | 2.25 | 2.5 | 2.75 | V | |
| | | 2.52 | 2.8 | 3.08 | V | |
| | | 2.97 | 3.3 | 3.63 | V | |
| Current Consumption | Idd | – | 31 | 33 | mA | No load condition, f = 20 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V |
| | | – | 29 | 31 | mA | No load condition, f = 20 MHz, Vdd = 1.8 V |
| Standby Current | I_std | – | – | 70 | µA | Vdd = 2.5 V, 2.8V or 3.3V, $\overline{ST}$ = GND, output is Weakly Pulled Down |
| | | – | – | 10 | µA | Vdd = 1.8 V. $\overline{ST}$ = GND, output is Weakly Pulled Down |
| Duty Cycle | DC | 45 | – | 55 | % | All Vdds. |
| Rise/Fall Time | Tr, Tf | – | 1.5 | 2 | ns | 15 pF load, 10% - 90% Vdd, all Vdds |
| | | – | 3.6 | – | ns | 30 pF load, 10% - 90% Vdd, all Vdds |
| | | | 4.6 | | ns | 45 pF load, 10% - 90% Vdd, all Vdds |
| Output Voltage High | VOH | 90% | – | – | Vdd | IOH = -7 mA, IOL = 7 mA, (Vdd = 3.3 V)<br>IOH = -4 mA, IOL = 4 mA, (Vdd = 2.8 V and Vdd = 2.5 V)<br>IOH = -2 mA, IOL = 2 mA, (Vdd = 1.8 V) |
| Output Voltage Low | VOL | – | – | 10% | Vdd | |
| Input Voltage High | VIH | 70% | – | – | Vdd | Pin 1, OE or $\overline{ST}$ |
| Input Voltage Low | VIL | – | – | 30% | Vdd | Pin 1, OE or $\overline{ST}$ |
| Input Pull-up Impedance | Z_in | – | 100 | 250 | kΩ | |
| Startup Time | T_start | – | 6 | 10 | ms | Measured from the time Vdd reaches its rated minimum value |
| OE Enable/Disable Time | T_oe | – | – | 150 | ns | f=80 MHz, all Vdds. For other frequencies, T_oe = 100 ns + 3 cycles |
| Resume Time | T_resume | – | 6 | 10 | ms | Measured from the time ST pin crosses 50% threshold |
| RMS Period Jitter | T_jitt | – | 1.5 | 2 | ps | f = 75 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V |
| | | – | 2 | 3 | ps | f = 75 MHz, Vdd = 1.8 V |
| RMS Phase Jitter (random) | T_phj | – | 0.5 | 1 | ps | f = 75 MHz, Integration bandwidth = 12 kHz to 20MHz, All Vdds |
| Aging | F_aging | – | ±1 | – | PPM | 1st year, 25°C |

**Note:**

1. All electrical specifications in the above table are measured with 15pF output load, unless stated otherwise in the Condition.

## ■ Specifications (Cont.)

### Pin Description Tables

| Pin #1 Functionality |
|---|
| **OE** |
| H or Open[2]: specified frequency output |
| L: output is high impedance. Only output driver is disabled. |
| **$\overline{ST}$** |
| H or Open: specified frequency output |
| L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I_std |

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

### Absolute Maximum Table

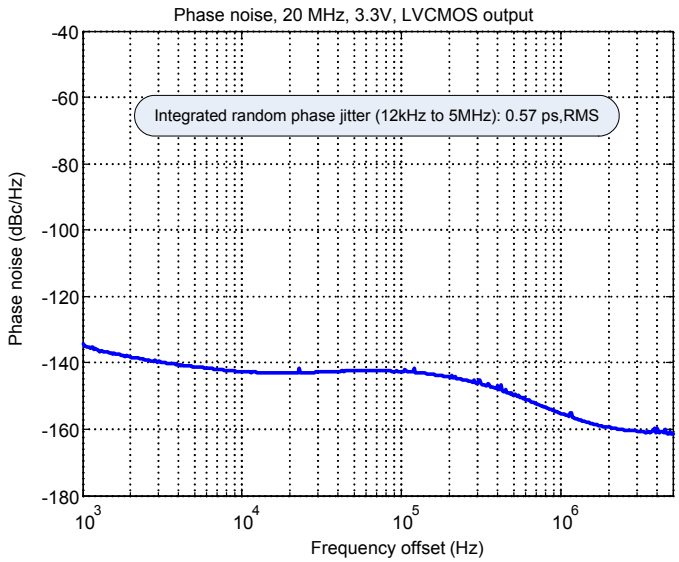
Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

| Parameter | Min. | Max. | Unit |
|---|---|---|---|
| Storage Temperature | -65 | 150 | °C |
| VDD | -0.5 | 4 | V |
| Electrostatic Discharge | – | 2000 | V |
| 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

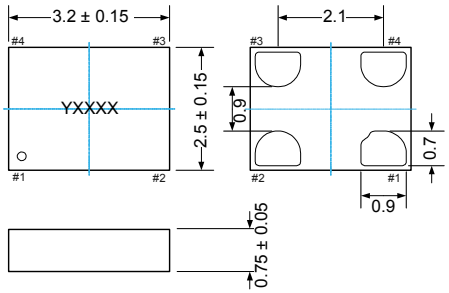
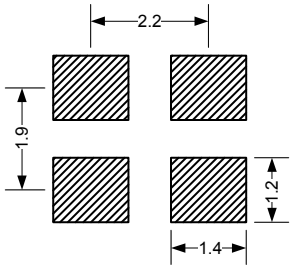
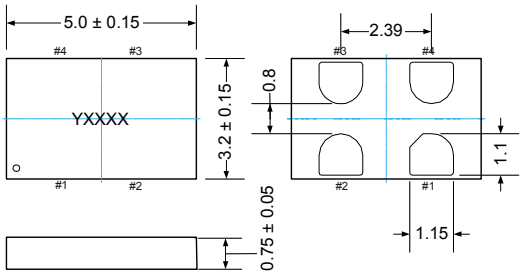
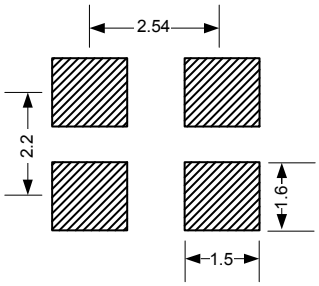
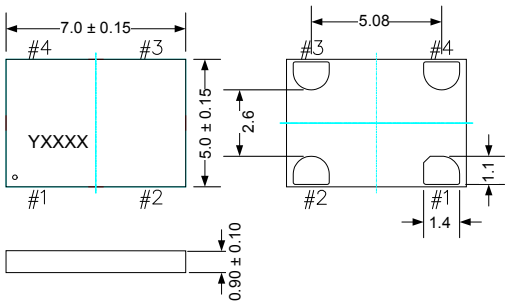
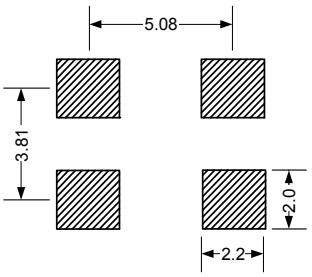
| Parameter | Condition/Test Method |
|---|---|
| Mechanical Shock | MIL-STD-883F, Method 2002 |
| Mechanical Vibration | MIL-STD-883F, Method 2007 |
| Temperature Cycle | JESD22, Method A104 |
| Solderability | MIL-STD-883F, Method 2003 |
| Moisture Sensitivity Level | MSL1 @ 260°C |

### Phase Noise Plot




**Note:**
2. A resistor of <100 kΩ between OE/$\overline{ST}$ pin and VDD is recommended for all voltages.

## Dimensions and Land Patterns

| Package Size – Dimensions (Unit: mm)[3] | Recommended Land Pattern (Unit: mm)[4] |
|---|---|
| **3.2 x 2.5 x 0.75 mm**<br>  |  |
| **5.0 x 3.2 x 0.75 mm**<br>  |  |
| **7.0 x 5.0 x 0.90 mm**<br>  |  |

**Notes:**
3. Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
4. A capacitor of value 0.1 µF between Vdd and GND is recommended.

## Part No. Guide - How to Order

SiT8208AC-23-25E-75.123456T

**Part Family**
"SiT8208"

**Revision Letter**
"A" is the silicon revision

**Temperature Range**
"C" Ext. Commercial, -20 to 70ºC
"I" Industrial, -40 to 85ºC

**Output Driver Strength**[5]
"–" Default

**Package Size**
"2" 3.2 x 2.5 mm
"3" 5.0 x 3.2 mm
"8" 7.0 x 5.0 mm

**Packaging**
"T": Tape & Reel, 3K reel
"Y": Tape & Reel, 1K reel
Blank for Bulk

**Frequency**
1.000000 to 80.000000 MHz

**Feature Pin**
"E" for Output Enable
"S" for Standby

**Voltage Supply**
"18" for 1.8V ±5%
"25" for 2.5V ±10%
"28" for 2.8V ±10%
"33" for 3.3V ±10%

**Frequency Tolerance**
"F" for ±10 PPM
"1" for ±20 PPM
"2" for ±25 PPM
"3" for ±50 PPM

**Note:**
5. Contact SiTime for different drive strength options for driving higher loads or reducing EMI.