

### Features

- High frequency stability
  - $\pm 10$  PPM,  $\pm 15$  PPM,  $\pm 20$  PPM
  - $\pm 25$  PPM,  $\pm 50$  PPM,  $\pm 100$  PPM
- Extremely low RMS phase jitter (random)
  - 0.5 ps (typical)
- Wide frequency range
  - 1 to 200 MHz
- Operating voltage
  - 1.8, 2.5, 2.8V or 3.3 V
  - Other voltages up to 3.63 V (contact SiTime)
- Operating temperature range
  - Industrial,  $-40$  to  $85$  °C
  - Extended Commercial,  $-20$  to  $70$  °C
  - Commercial,  $0$  to  $70$  °C
- Small footprint
  - $2.5 \times 2.0 \times 0.75$  mm
  - $3.2 \times 2.5 \times 0.75$  mm
  - $5.0 \times 3.2 \times 0.75$  mm
  - $7.0 \times 5.0 \times 0.90$  mm
- All packages are Pb-free and ROHs compliant
- High drive option: 30pF load (contact factory)

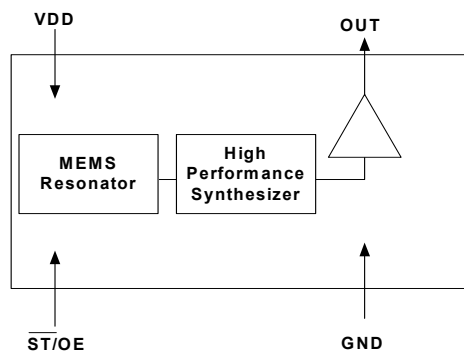
### Benefits

- No crystal or load capacitors required
- Eliminates crystal qualification time
- Ultra-reliable start up and greater immunity from interference
- Replaces expensive single-ended SAW oscillators
- More cost effective than quartz oscillators, quartz crystals and clock ICs.
- Completely quartz-free

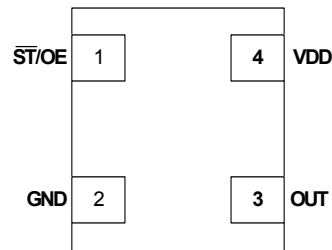
### Applications

- Communications and Networking Applications
- Consumer Electronics Applications
- Automotive Applications
- Industrial Applications
- Gigabit Ethernet
- 10 Gigabit Ethernet
- Fiber Channel
- Ethernet
- SATA/SAS
- USB 2.0
- PCI-Express

### Block Diagram



### Pinout



### Pin Description

| Pin No. | Name  | Pin Description                      |
|---------|-------|--------------------------------------|
| 1       | ST/OE | Standby/ Output Enable               |
| 2       | GND   | Connect to Ground                    |
| 3       | OUT   | 1 to 200 MHz Programmed Clock output |
| 4       | VDD   | Connect to 1.8V / 2.5V / 2.8V / 3.3V |

### Pin1

| Pin #1 Functionality                                      |
|---|
| <b>OE</b>   |
| H or Open; specified frequency output                     |
| L: output is high impedance                               |
| <b>ST</b>   |
| H or Open; specified frequency output                     |
| L: output is low level (weak pull down) oscillation stops |

## Description

The SiT8102 is the next generation of the SiT8002 programmable oscillator with lower phase noise, lower jitter, and a wider frequency range. SiTime oscillators are the smallest, high-performance programmable oscillator available and are suitable for use in high speed serial communications, consumer, portable, industrial, automotive and computation.

This oscillator is packaged in standard low-cost plastic and chip-scale IC packages.

System reliability is also increased with the SiT8102 by eliminating the quartz crystal and improved immunity to the environmental effects of vibration, shock, strain, and humidity.

To order samples, go to [www.sitime.com](http://www.sitime.com) and click on Request Sample" link.

## Absolute Maximum Ratings

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.

### Absolute Maximum Table

| Parameter  | Min. | Max.   | Unit  |
|--|------|--------|-------|
| Storage Temperature  | -65  | 150    | °C    |
| VDD  | -0.5 | +3.66  | 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 3.65V)      | –    | 1,000+ | years |

## Operating Conditions

| Parameter                                 | Min. | Typ. | Max. | Unit |
|---|------|------|------|------|
| Supply Voltages, VDD <sup>[1]</sup>       | 2.97 | 3.3  | 3.63 | V    |
|   | 2.52 | 2.8  | 3.08 | V    |
|   | 2.25 | 2.5  | 2.75 | V    |
|   | 1.7  | 1.8  | 1.9  | V    |
| Commercial Operating Temperature          | 0    | –    | 70   | °C   |
| Extended Commercial Operating Temperature | -20  | –    | 70   | °C   |
| Industrial Operating Temperature          | -40  | –    | 85   | °C   |
| Maximum Load Capacitance <sup>[2]</sup>   | –    | –    | 15   | pF   |

## 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              |

### Notes:

1. The 3.3V device can operate from 2.25V to 3.63V with higher output drive strength, however, the data sheet specifications cannot be guaranteed. Please contact factory for this option.
2. The output driver strength can be programmed to drive up to 50pF load. Please contact factory for this option.

## DC Electrical Specifications

VDD = 3.3V ±10%, -40 to 85°C

| Parameter           | Condition   | Min. | Typ. | Max. | Unit |
|---------------------|---|------|------|------|------|
| Output Voltage High | IOH = -9 mA   | 90   | –    | –    | %Vdd |
| Output Voltage Low  | IOL = 9 mA  | –    | –    | 10   | %Vdd |
| Input Voltage High  | Pin 1   | 70   | –    | –    | %Vdd |
| Input Voltage Low   | Pin 1   | –    | –    | 30   | %Vdd |
| Operating Current   | Output frequency = 30 MHz, 15 pF load   | –    | –    | 26   | mA   |
|                     | Output frequency = 125 MHz, 15 pF load  | –    | –    | 34   | mA   |
| Standby Current     | Output is weakly pulled down, ST = GND  | –    | 30   | 50   | µA   |
| Power Up Time       | Time from minimum power supply voltage to the first cycle (Guaranteed no runt pulses) | –    | –    | 10   | ms   |

VDD = 2.5V ±10% or VDD = 2.8V ±10%, -40 to 85°C

| Parameter           | Condition   | Min. | Typ. | Max. | Unit |
|---------------------|---|------|------|------|------|
| Output Voltage High | IOH = -7 mA   | 90   | –    | –    | %Vdd |
| Output Voltage Low  | IOL = 7mA   | -    | –    | 10   | %Vdd |
| Input Voltage High  | Pin 1   | 70   | –    | –    | %Vdd |
| Input Voltage Low   | Pin 1   | –    | –    | 30   | %Vdd |
| Operating Current   | Output frequency = 30 MHz, 15 pF load   | –    | –    | 26   | mA   |
|                     | Output frequency = 125 MHz, 15 pF load  | –    | –    | 31   | mA   |
| Standby Current     | Output is weakly pulled down, ST = GND  | –    | 30   | 50   | µA   |
| Power Up Time       | Time from minimum power supply voltage to the first cycle (Guaranteed no runt pulses) | –    | –    | 10   | ms   |

VDD = 1.8V ±5%, -40 to 85°C

| Parameter           | Condition   | Min. | Typ. | Max. | Unit |
|---------------------|---|------|------|------|------|
| Output Voltage High | IOH = -5 mA   | 90   | –    | –    | %Vdd |
| Output Voltage Low  | IOL = 5 mA  | -    | –    | 10   | %Vdd |
| Input Voltage High  | Pin 1   | 70   | –    | –    | %Vdd |
| Input Voltage Low   | Pin 1   | –    | –    | 30   | %Vdd |
| Operating Current   | Output frequency = 30 MHz, 15 pF load   | –    | –    | 26   | mA   |
|                     | Output frequency = 125 MHz, 15 pF load  | –    | –    | 31   | mA   |
| Standby Current     | Output is weakly pulled down, ST = GND  | –    | 30   | 50   | µA   |
| Power Up Time       | Time from minimum power supply voltage to the first cycle (Guaranteed no runt pulses) | –    | –    | 10   | ms   |

## AC Electrical Specifications

VDD = 3.3V ±10%, -40 to 85°C

| Parameter                 | Condition   | Min.                       | Typ. | Max. | Unit |     |
|---------------------------|---|----------------------------|------|------|------|-----|
| Clock Output Frequency    |   | 1                          | –    | 200  | MHz  |     |
| Frequency Stability       | Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change | 0 to 70°C                  | -10  | –    | +10  | PPM |
|                           |   | -20 to 70°C<br>-40 to 85°C | -15  | –    | +15  | PPM |
|                           |   |                            | -20  | –    | +20  | PPM |
|                           |   |                            | -25  |      | +25  | PPM |
|                           |   |                            | -50  |      | +50  | PPM |
| -100                      |   | +100                       | PPM  |      |      |     |
| Aging                     | First year @ 25 °C  | –                          | –    | 1    | PPM  |     |
| Clock Output Duty Cycle   | Output frequency= 1 to 125 MHz  | 45                         | –    | 55   | %    |     |
|                           | Output frequency= 125 to 200 MHz  | 40                         | –    | 60   | %    |     |
| Clock Output Rise Time    | 15 pF Load, 20% to 80% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| Clock Output Fall Time    | 15 pF Load, 80% to 20% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| RMS Period Jitter         | Output frequency = 75 MHz   | –                          | 2.6  | 4    | ps   |     |
|                           | Output frequency = 125 MHz  | –                          | 2.4  | 3.6  | ps   |     |
| RMS Phase Jitter (Random) | Output frequency = 75 MHz (900 kHz to 7.5 MHz)  | –                          | 0.81 | –    | ps   |     |
|                           | Output frequency = 106.25 MHz (637kHz to 10 MHz)  | –                          | 1.64 | –    | ps   |     |
|                           | Output frequency = 125 MHz (1.875 to 20 MHz)  | –                          | 0.38 | –    | ps   |     |

VDD = 2.5V ±10% or VDD = 2.8V ±10%, -40 to 85°C

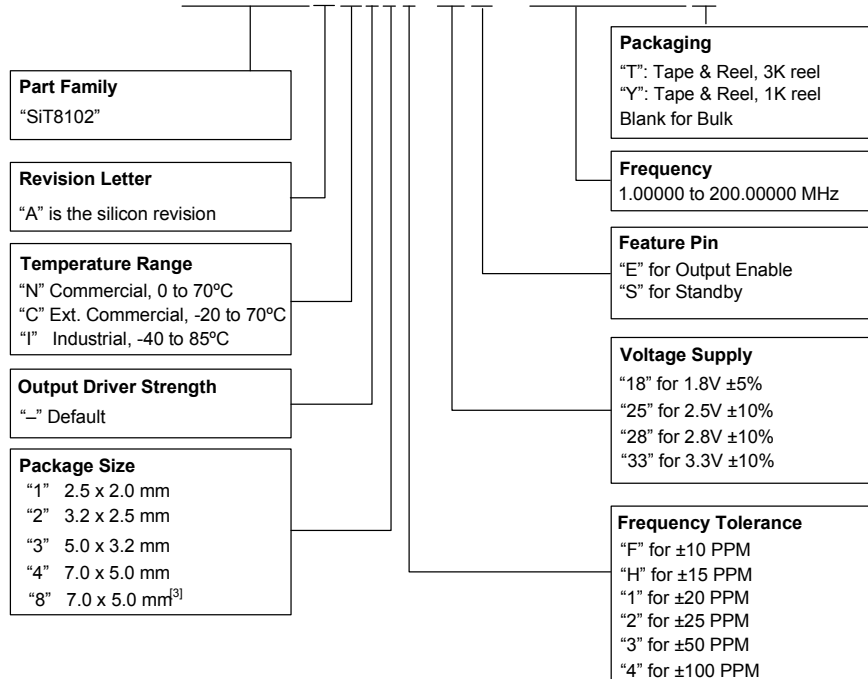
| Parameter                 | Condition   | Min.                       | Typ. | Max. | Unit |     |
|---------------------------|---|----------------------------|------|------|------|-----|
| Clock Output Frequency    |   | 1                          | –    | 200  | MHz  |     |
| Frequency Stability       | Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change | 0 to 70°C                  | -10  | –    | +10  | PPM |
|                           |   | -20 to 70°C<br>-40 to 85°C | -15  | –    | +15  | PPM |
|                           |   |                            | -20  | –    | +20  | PPM |
|                           |   |                            | -25  |      | +25  | PPM |
|                           |   |                            | -50  |      | +50  | PPM |
| -100                      |   | +100                       | PPM  |      |      |     |
| Aging                     | First year @ 25 °C  | –                          | –    | 1    | PPM  |     |
| Clock Output Duty Cycle   | Output frequency= 1MHz to 125MHz  | 45                         | –    | 55   | %    |     |
|                           | Output frequency= 125MHz to 200MHz  | 40                         | –    | 60   | %    |     |
| Clock Output Rise Time    | 15 pF Load, 20% to 80% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| Clock Output Fall Time    | 15 pF Load, 80% to 20% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| RMS Period Jitter         | Output frequency = 75 MHz   | –                          | 3    | 6    | ps   |     |
|                           | Output frequency = 125 MHz  | –                          | 2.8  | 5    | ps   |     |
| RMS Phase Jitter (Random) | Output frequency = 75 MHz (900 kHz to 7.5 MHz)  | –                          | 0.87 | –    | ps   |     |
|                           | Output frequency = 106.25 MHz (637kHz to 10 MHz)  | –                          | 1.7  | –    | ps   |     |
|                           | Output frequency = 125 MHz (1.875 to 20 MHz)  | –                          | 0.41 | –    | ps   |     |

VDD = 1.8V ±5%, -40 to 85°C

| Parameter                 | Condition   | Min.                       | Typ. | Max. | Unit |     |
|---------------------------|---|----------------------------|------|------|------|-----|
| Clock Output Frequency    |   | 1                          | –    | 200  | MHz  |     |
| Frequency Stability       | Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change | 0 to 70°C                  | -15  | –    | +15  | PPM |
|                           |   | -20 to 70°C<br>-40 to 85°C | -20  | –    | +20  | PPM |
|                           |   |                            | -25  |      | +25  | PPM |
|                           |   |                            | -50  |      | +50  | PPM |
|                           |   |                            | -100 |      | +100 | PPM |
| Aging                     | First year @ 25 °C  | –                          | –    | 1    | PPM  |     |
| Clock Output Duty Cycle   | Output frequency= 1 MHz to 75 MHz   | 45                         | –    | 55   | %    |     |
|                           | Output frequency= 75 MHz to 200 MHz   | 40                         | –    | 60   | %    |     |
| Clock Output Rise Time    | 15 pF Load, 20% to 80% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| Clock Output Fall Time    | 15 pF Load, 80% to 20% VDD  | –                          | 1.0  | 1.5  | ns   |     |
| RMS Period Jitter         | Output frequency = 75 MHz   | –                          | 7.3  | 14   | ps   |     |
|                           | Output frequency = 125 MHz  | –                          | 7.1  | 14   | ps   |     |
| RMS Phase Jitter (Random) | Output frequency = 75 MHz (900 kHz to 7.5 MHz)  | –                          | 0.85 | –    | ps   |     |
|                           | Output frequency = 106.25 MHz (637kHz to 10 MHz)  | –                          | 1.72 | –    | ps   |     |
|                           | Output frequency = 125 MHz (1.875 to 20 MHz)  | –                          | 1.06 | –    | ps   |     |

### Ordering Information

#### SiT8102AC-13-25E - 105.12345T



**Notes:**

3. Without Center Pad.

### Frequency Stability vs. Temperature Range Options

| Frequency Stability (PPM) | Temperature Range | Supply Voltage |       |       |
|---------------------------|-------------------|----------------|-------|-------|
|                           |                   | 1.8 V          | 2.5 V | 3.3 V |
| ±10                       | N (0 to +70°C)    | -              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | -              | -     | -     |
|                           | I (-40 to +85°C)  | -              | -     | -     |
| ±15                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | -              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | -              | ✓     | ✓     |
| ±20                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |
| ±25                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |
| ±50                       | N (0 to +70°C)    | ✓              | ✓     | ✓     |
|                           | C (-20 to +70°C)  | ✓              | ✓     | ✓     |
|                           | I (-40 to +85°C)  | ✓              | ✓     | ✓     |

### Package Information [4,5]

Dimension (mm)

Land Pattern (recommended) (mm)<sup>[6]</sup>

#### 2.5 x 2.0 x 0.75mm



#### 3.2 x 2.5 x 0.75 mm



#### 5.0 x 3.2 x 0.75 mm



### Package Information (continued)<sup>[4,5]</sup>

Dimension (mm)



Land Pattern (recommended) (mm)<sup>[6]</sup>



**Notes:**

4. Y top marking denotes manufacturing origin. The value of "Y" will depend on the assembly location of the device.
5. XXXX top marking denotes manufacturing lot number.
6. A capacitor of value 0.1µF between VDD and GND is recommended.
7. The 7050 package with part number designation "-8" has NO center pad.

© SiTime Corporation 2010. The information contained herein is subject to change at any time without notice. SiTime assumes no responsibility or liability for any loss, damage or defect of a Product which is caused in whole or in part by (i) use of any circuitry other than circuitry embodied in a SiTime product, (ii) misuse or abuse including static discharge, neglect or accident, (iii) unauthorized modification or repairs which have been soldered or altered during assembly and are not capable of being tested by SiTime under its normal test conditions, or (iv) improper installation, storage, handling, warehousing or transportation, or (v) being subjected to unusual physical, thermal, or electrical stress.

**Disclaimer:** SiTime makes no warranty of any kind, express or implied, with regard to this material, and specifically disclaims any and all express or implied warranties, either in fact or by operation of law, statutory or otherwise, including the implied warranties of merchantability and fitness for use or a particular purpose, and any implied warranty arising from course of dealing or usage of trade, as well as any common-law duties relating to accuracy or lack of negligence, with respect to this material, any sitime product and any product documentation. products sold by sitime are not suitable or intended to be used in a life support application or component, to operate nuclear facilities, or in other mission critical applications where human life may be involved or at stake. all sales are made conditioned upon compliance with the critical uses policy set forth below.

**CRITICAL USE EXCLUSION POLICY**

BUYER AGREES NOT TO USE SITIME'S PRODUCTS FOR ANY APPLICATION OR IN ANY COMPONENTS USED IN LIFE SUPPORT DEVICES OR TO OPERATE NUCLEAR FACILITIES OR FOR USE IN OTHER MISSION-CRITICAL APPLICATIONS OR COMPONENTS WHERE HUMAN LIFE OR PROPERTY MAY BE AT STAKE.

SiTime owns all rights, title and interest to the intellectual property related to SiTime's products, including any software, firmware, copyright, patent, or trademark. The sale of SiTime products does not convey or imply any license under patent or other rights. SiTime retains the copyright and trademark rights in all documents, catalogs and plans supplied pursuant to or ancillary to the sale of products or services by SiTime. Unless otherwise agreed to in writing by SiTime, any reproduction, modification, translation, compilation, or representation of this material shall be strictly prohibited.





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.