

### ■ Features, Benefits and Applications

- The world's lowest power spread spectrum oscillator with 3.2 mA typical active current
- 1-110 MHz frequency range
- LVCMOS/LVTTL compatible output
- Standby current as low as 0.5  $\mu$ A
- Fast resume time of 3.0 ms
- <30 ps cycle-cycle jitter
- Spread options (contact SiTime for other spread options)
  - Center spread:  $\pm 0.50\%$ ,  $\pm 0.25\%$
  - Down spread: -1%, -0.5%
- Up to 12 dB EMI reduction
- Standby, output enable, or spread off mode
- 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
- Outstanding mechanical robustness for portable applications
- All-silicon device with outstanding reliability of 2 FIT (10x improvement over quartz-based devices), enhancing system mean-time-to-failure (MTBF)
- Ultra short lead time
- Ideal for printers, flat panel drivers, PCI, USB, and microprocessors

### ■ Specifications

#### Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	1	–	110	MHz	
Frequency Tolerance	F <sub>tol</sub>	-50	–	+50	PPM	Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration Spread Off
		-100	–	+100	PPM	
Aging	Ag	-1	–	1	PPM	1st year at 25°C
Operating Temperature Range	T <sub>use</sub>	-20	–	+70	°C	Extended Commercial
		-40	–	+85	°C	Industrial
Supply Voltage	V <sub>dd</sub>	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	I <sub>dd</sub>	–	3.7	4.1	mA	No load condition, f = 20 MHz, V <sub>dd</sub> = 2.5 V, 2.8 V or 3.3 V
		–	3.2	3.5	mA	No load condition, f = 20 MHz, V <sub>dd</sub> = 1.8 V
Standby Current	I <sub>std</sub>	–	2.4	4.3	$\mu$ A	$\overline{ST}$ = GND, V <sub>dd</sub> = 3.3 V, Output is Weakly Pulled Down
		–	1.2	2.2	$\mu$ A	$\overline{ST}$ = GND, V <sub>dd</sub> = 2.5 or 2.8 V, Output is Weakly Pulled Down
		–	0.4	0.8	$\mu$ A	$\overline{ST}$ = GND, V <sub>dd</sub> = 1.8 V, Output is Weakly Pulled Down
Duty Cycle	DC	45	–	55	%	All V <sub>dds</sub> . f $\leq$ 70 MHz
		40	–	60	%	All V <sub>dds</sub> . f > 70 MHz
Rise/Fall Time	Tr, Tf	–	1	2	ns	20% - 80% V <sub>dd</sub> =2.5 V, 2.8 V or 3.3 V, 15 pf load
		–	1.3	2.5	ns	20% - 80% V <sub>dd</sub> =1.8 V, 15 pf load
Output Voltage High	VOH	90%	–	–	V <sub>dd</sub>	IOH = -4 mA (V <sub>dd</sub> = 3.3 V) IOH = -3 mA (V <sub>dd</sub> = 2.8 V and V <sub>dd</sub> = 2.5 V) IOH = -2 mA (V <sub>dd</sub> = 1.8 V)
Output Voltage Low	VOL	–	–	10%	V <sub>dd</sub>	IOL = 4 mA (V <sub>dd</sub> = 3.3 V) IOL = 3 mA (V <sub>dd</sub> = 2.8 V and V <sub>dd</sub> = 2.5 V) IOL = 2 mA (V <sub>dd</sub> = 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%	–	–	V <sub>dd</sub>	Pin 1, OE or $\overline{ST}$ or SD
Input Voltage Low	VIL	–	–	30%	V <sub>dd</sub>	Pin 1, OE or $\overline{ST}$ or SD
Startup Time	T <sub>osc</sub>	–	–	10	ms	Measured from the time V <sub>dd</sub> reaches its rated minimum value
Resume Time	T <sub>resume</sub>	–	3.0	3.8	ms	Measured from the time ST pin crosses 50% threshold
Cycle-cycle Jitter	T <sub>cyc</sub>	–	–	26	ps	f = 50 MHz, Spread = ON
		–	–	26	ps	f = 50 MHz, Spread = OFF

## Specifications (Cont.)

### Spread Spectrum Modes

Code	Center Spread		Down Spread	
	B	D	O	Q
Percentage	±0.25%	±0.5% <sup>[1]</sup>	-0.5%	-1.0% <sup>[1]</sup>

In both center spread and down spread modes, triangle modulation is employed with a frequency of ~32 kHz.

### Pin Description Tables

Pin #1 Functionality
<b>OE</b>
H or Open <sup>[2]</sup> : specified frequency output
L: output is high impedance
<b><math>\overline{\text{ST}}</math></b>
H or Open: specified frequency output
L: output is low level (weak pull down)
<b>SD</b>
H or Open: Spread Spectrum = ON
L: Spread Spectrum = OFF

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

### Absolute Maximum Ratings

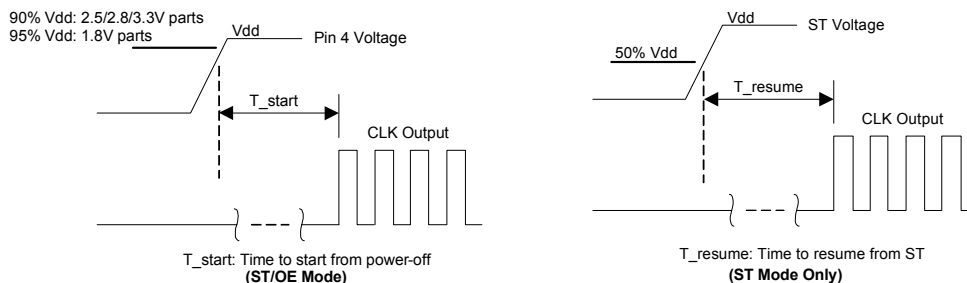
Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

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



#### Notes:

- ±0.5% and -1.0% are available ONLY for <75 MHz in extended commercial temperature range.
- 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) <sup>[3]</sup>	Recommended Land Pattern (Unit: mm) <sup>[4]</sup>
<p><b>2.5 x 2.0 x 0.75 mm</b></p>	
<p><b>3.2 x 2.5 x 0.75 mm</b></p>	
<p><b>5.0 x 3.2 x 0.75 mm</b></p>	
<p><b>7.0 x 5.0 x 0.90 mm</b></p>	

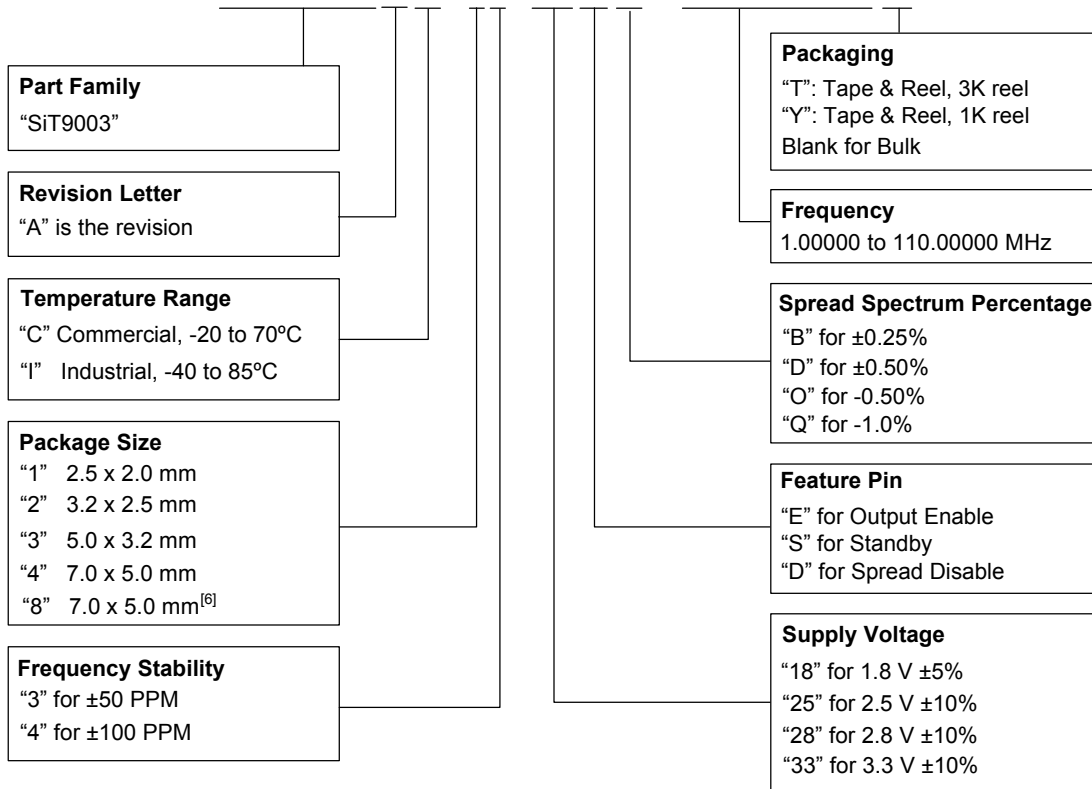
**Notes:**

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  $\mu$ F between Vdd and GND is recommended.
5. The 7050 package with part number designation "-8" has NO center pad.

■ 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](#).

### SiT9003AC-14-18EB - 105.12345T



**Notes:**

6. Without Center Pad.

**Available Spread Options vs. Temperature and Frequency**

Spread Percentage	Temperature Range	
	C = -20 to 70°C	I = -40 to 85°C
B = ±0.25%	1-110 MHz	
D = ±0.50%	1-75 MHz	-
O = -0.50%	1-110 MHz	
Q = -1.0%	1-75 MHz	-

© 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.