

## ■ Features, Benefits and Applications

- MEMS oscillator with LVCMOS/LVTTL compatible output
- 1-110 MHz frequency range
- Frequency stability as low as  $\pm 20$  PPM
- Typical current consumption of 6.1 mA in active mode
- Standby or output enable modes
- 1.8V, 2.5V - 3.3V supply voltage
- SoftEdge™ configurable rise/fall time for driving higher loads or EMI reduction.
- 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
- Ultra short lead time
- Ideal for consumer electronics: video, set top boxes, HDTV, DVR, scanners, printers, IP camera, etc.
- Ideal for high-speed serial protocols: Ethernet, USB, SATA, SAS, Fibre Channel, Firewire, PCI Express

## ■ Specifications

Electrical Characteristics<sup>[1]</sup>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	1	—	110	MHz	
Frequency Stability	F_stab	-20	—	+20	PPM	Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration.  <b><math>\pm 20</math> PPM available in extended commercial temperature only</b>
		-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	Any voltage between 2.5V and 3.3V is supported with 1 decimal point resolution.
		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	7.5	mA	No load condition, f = 20 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V
		—	6.1	6.7	mA	No load condition, f = 20 MHz, Vdd = 1.8 V
Standby Current	I_std	—	2.4	4.3	μA	$\overline{ST}$ = GND, Vdd = 3.3 V, Output is Weakly Pulled Down
		—	1.2	2.2	μA	$\overline{ST}$ = GND, Vdd = 2.5 or 2.8 V, Output is Weakly Pulled Down
		—	0.4	0.8	μA	$\overline{ST}$ = GND, Vdd = 1.8 V, Output is Weakly Pulled Down
Duty Cycle	DC	45	50	55	%	All Vdds. f $\leq$ 75 MHz
		40	50	60	%	All Vdds. f > 75 MHz
Rise/Fall Time	Tr, Tf	—	1	2	ns	15pF load, 20% - 80% Vdd=2.5V, 2.8V or 3.3V
		—	1.3	2.5	ns	15pF load, 20% - 80% Vdd=1.8V
		—	1.9	2.6	ns	30pF load, 20% - 80% Vdd=2.5V, 2.8V or 3.3V
		—	2.3	3.3	ns	30pF load, 20% - 80% Vdd=1.8V
		—	2.9	3.9	ns	45pF load, 20% - 80% Vdd=2.5V, 2.8V or 3.3V
		—	3.4	4.6	ns	45pF load, 20% - 80% Vdd=1.8V
Output Voltage High	VOH	90%	—	—	Vdd	IOH = -4 mA (Vdd = 3.3 V)
Output Voltage Low	VOL	—	—	10%	Vdd	IOH = -3 mA (Vdd = 2.8 V and Vdd = 2.5 V) IOH = -2 mA (Vdd = 1.8 V)
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	4	ms	Measured from the time $\overline{ST}$ pin crosses 50% threshold
RMS Period Jitter	T_jitt	—	—	4.0	ps	f = 75 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V
		—	—	6.5	ps	f = 75 MHz, Vdd = 1.8 V
RMS Phase Jitter (random)	T_phj	—	0.6	—	ps	f = 75 MHz @ BW: 900 kHz to 7.5 MHz, VDD = 2.5 V to 3.3 V
		—	0.8	—	ps	f = 75 MHz @ BW: 900 kHz to 7.5 MHz, VDD = 1.8 V

## Note:

1. All electrical specifications in the above table are measured with 15pF output load, unless stated otherwise in the Condition. For more information about SoftEdge™ rise/fall time for driving higher output load or reducing EMI, download <http://www.sitime.com/support2/documents/AN10022-rise-and-fall-time-rev1.1.pdf>.

## 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). 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.

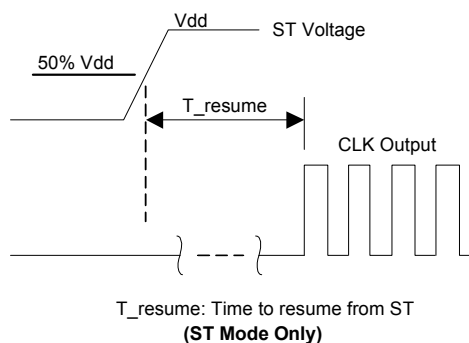
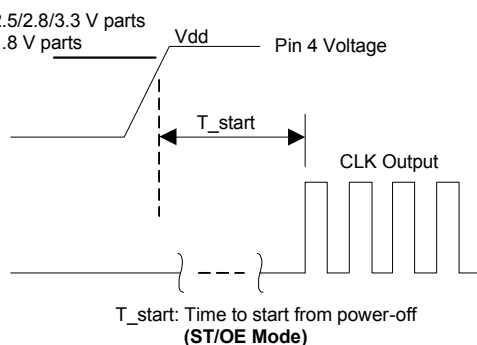
Parameter	Min.	Max.	Unit
Storage Temperature	-65	150	°C
VDD	-0.5	4	V
Electrostatic Discharge	–	6000	V
Theta JA (with copper plane on VDD and GND)	–	75	°C/W
Theta JC (with PCB traces of 0.010 inch to all pins)	–	24	°C/W
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C
Number 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

90% Vdd: 2.5/2.8/3.3 V parts  
95% Vdd: 1.8 V parts



## Note:

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

## ■ Dimensions and Land Patterns

Package Size – Dimensions (Unit: mm) <sup>1</sup>	Recommended Land Pattern (Unit: mm) <sup>[5]</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>	

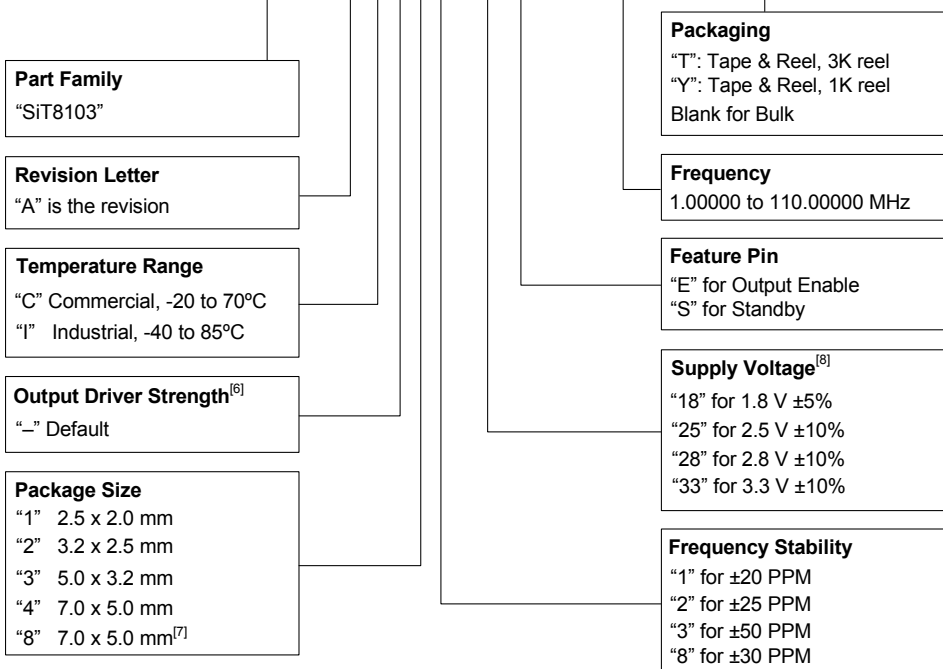
### Notes:

- Top marking: 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  $\mu$ F between Vdd and GND is recommended.
- 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](#).

## SiT8103AC-13-18E-105.12345T

**Notes:**

6. Contact SiTime for different drive strength options for driving loads with faster rise/fall time spec than those shown in the electrical table, or reducing EMI.  
 7. Without Center Pad.  
 8. Supply voltage can be configured to any voltage up to 1 decimal place between 2.5V and 3.3V.

**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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