SiT8003

Low Power Programmable Oscillator

1 - 110 MHz

SiTime™ It's About Time

Features, Benefits and Applications

- The world's lowest power programmable oscillator with 3.2 mA typical active current
- 1-110 MHz frequency range
- High frequency stability of ±25 PPM, ±30 PPM, ±50 PPM, ±100 PPM
- Extremely fast resume time of 3.5 ms
- Programmable standby or output enable modes
- Available in 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 portable applications :portable media players, digital cameras, digital camcorders, portable navigation device, handheld gaming, cell phone and other handheld applications.
- Ideal for high-speed serial protocols such as: USB 1.1, USB 2.0, SATA, SAS, Fiber Channel, Firewire, Ethernet, PCI Express, etc

Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	1	–	110	MHz	
Frequency Stability	F_stab	-25	–	+25	PPM	Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration. **Contact SiTime for ±25 PPM and ±30 PPM support for Industrial temperature.**
		-30	–	+30	PPM	
		-50	–	+50	PPM	
		-100	–	+100	PPM	
Aging	Ag	–1.0	–	1.0	PPM	1st year at 25°C
Storage Temperature Range		-65	–	+150	°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	–	3.2	3.5	mA	No load condition, f = 20 MHz, Vdd = 1.8 V
		–	3.7	4.1	mA	No load condition, f = 20 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V
Standby Current	I_std	–	0.4	0.8	µA	$\overline{ST}$ = GND, Vdd = 1.8 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
		–	2.4	4.3	µA	$\overline{ST}$ = GND, Vdd = 3.3 V, Output is Weakly Pulled Down
Duty Cycle	DC	45	50	55	%	All Vdds. f <= 75 MHz
		40	50	60	%	All Vdds. f > 75 MHz
Rise/Fall Time	Tr, Tf	–	1	2	ns	20% - 80% Vdd=2.5V, 2.8V or 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	–	–	3.5	ms	Measured from the time ST pin crosses 50% threshold
RMS Period Jitter	T_jitt	–	–	5.5	ps	f = 75 MHz, Vdd = 1.8 V
		–	–	4.0	ps	f = 75 MHz, Vdd = 2.5 V, 2.8 V or 3.3 V
RMS Phase Jitter (random)	T_phj	–	0.6	–	ps	f = 75 MHz, Integration bandwidth = 900 kHz to 7.5 MHz, VDD = 2.5V, 2.8V, or 3.3V
		–	0.8	–	ps	f = 75 MHz, Integration bandwidth = 900 kHz to 7.5 MHz, VDD = 1.8V

Specifications (cont.)

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

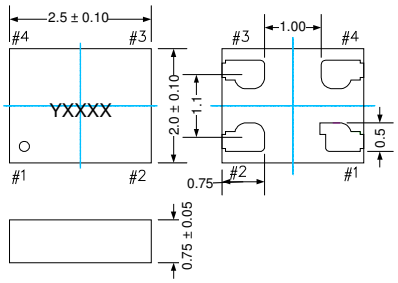
Parameter	Min.	Max.	Unit
Storage Temperature	-65	150	℃
VDD	-0.5	+3.65	V
Electrostatic Discharge	–	6000	V
Theta JA (with copper plane on VDD and GND)	–	75	℃/W
Theta JC (with PCB traces of 0.010 inch to all pins)	–	24	℃/W
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	℃
Number of Program Writes	–	1	NA
Program Retention over -40 to 125 ℃, Process, VDD (0 to 3.65V)	–	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 Sensibility Level	MSL1 @ 260℃

Dimensions, Pin Description and Land Pattern

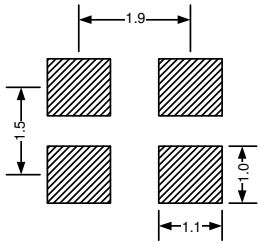
Dimensions (Unit: mm)[1]
2.5 x 2.0 x 0.75 mm



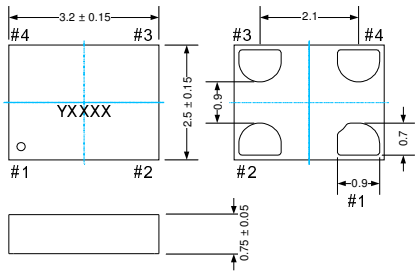
Pin #1 Functionality
OE
H or Open[3]; specified frequency output
L: output is high impedance
$\overline{ST}$
H or Open; specified frequency output
L: output is low level (weak pull down)

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

Recommended Land Pattern (Unit: mm)[2]



Dimensions (Unit: mm)[1]
3.2 x 2.5 x 0.75 mm



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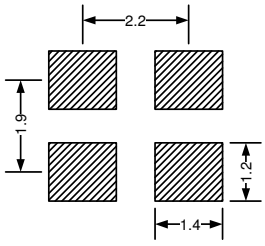
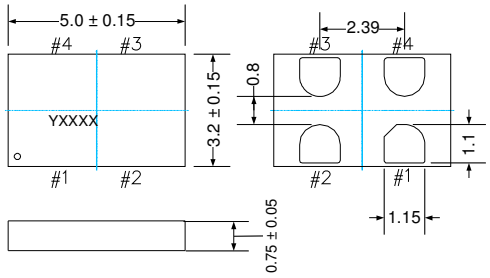


Dimensions (Unit: mm)[1]
5.0 x 3.2 x 0.75 mm



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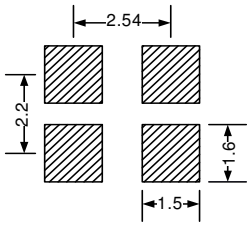
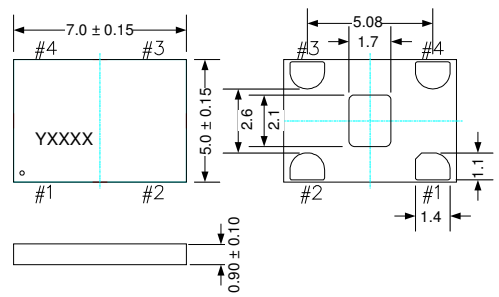


Dimensions (Unit: mm)[1]
7.0 x 5.0 x 0.90 mm



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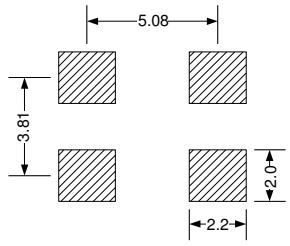
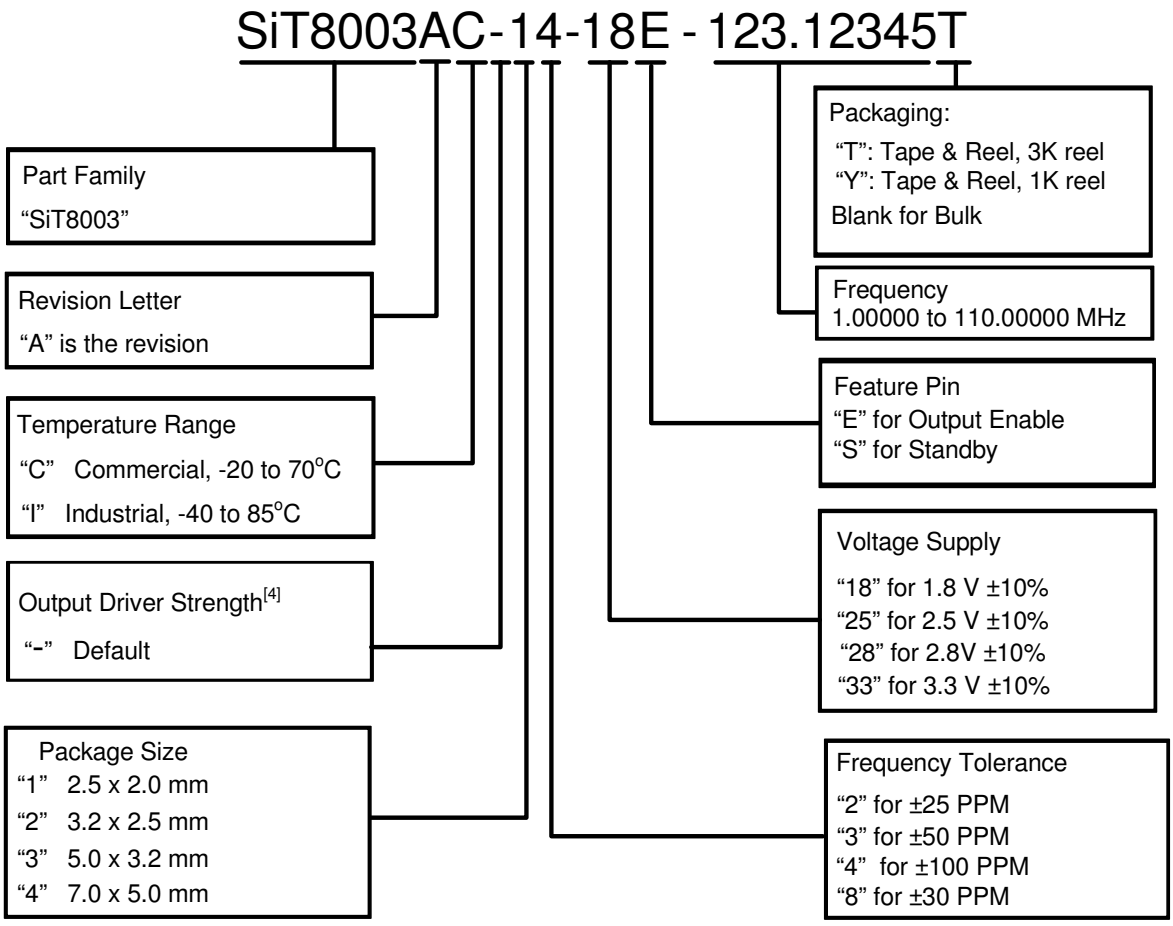


Notes:
1. Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
2. A capacitor of value 0.1µF between Vdd and GND is recommended.
3. In 1.8V mode, a resistor of <100 kΩ between OE pin and VDD is recommended.

Part No. Guide- How to Order



Note:

4. Contact SiTime for different drive strength options for driving higher loads or reducing EMI.