

**SiT5301****Stratum 3 MEMS VCTCXO**  
Advanced Information

### ■ Features, Benefits and Applications

- Any frequency between 1 and 60 MHz
- $\pm 4.6$  PPM total frequency stability over 20 years
- $< \pm 0.37$  PPM (370 PPB) 24-hour hold-over stability
- $\pm 0.1$  PPM (100 PPB) over-temperature stability (0 - 70°C).
- Excellent phase jitter: 0.5 ps (12 kHz to 20 MHz)
- Voltage control with  $\pm 12.5$  PPM pull range
- LVCMOS/HCMOS compatible output
- Three 4-pin packages: 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 (mmxmm)
- Contact SiTime for the following options:
  - SoftEdge™ Configurable rise/fall time control
  - Extended commercial and industrial temperature range options
  - Fixed frequency TCXO option
  - 2.5 x 2.0 footprint compatible package support
- Outstanding silicon reliability of 2 FIT (10x improvement over quartz-based devices)
- Ideal for telecom, networking, smart meter, and IP timing applications

### ■ Specifications

#### Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	1	–	60	MHz	
Frequency Stability						
Overall stability	F_stab	-4.6	–	+4.6	PPM	Inclusive of temperature, 20 year aging, supply voltage and output load
Stability over temperature	F_temp	-0.10	–	+0.10	PPM	0 to 70 °C (Ordering code: Q)
		-0.20	–	+0.20	PPM	0 to 70 °C (Ordering code: P)
Supply Voltage	F_vdd	-0.025	–	+0.025	PPM	$\pm 5\%$ Vdd
Output Load	F_load	-0.005	–	+0.005	PPM	$\pm 10\%$ of 15 pF load
24 hour hold-over stability	F_hold	-0.37	–	+0.37	PPM	Inclusive of temperature, 24 hour aging, supply voltage and output load
Initial Tolerance	F_init	-1	–	1	PPM	at 25°C
Operating Temperature Range	T_use	0	–	+70	°C	Commercial. Contact SiTime for extended commercial (-20 to 70 °C) or industrial temperature (-20 to 45°C) range support
Supply Voltage	Vdd	2.25	2.5	2.75	V	Any supply voltage between 2.5V and 3.3V is supported to 1 decimal of accuracy
		2.97	3.3	3.63	V	
Pull Range	PR	$\pm 12.5$			PPM	
Control Voltage	VC	10	–	90	%VDD	
Linearity	Lin	–	–	1	%	
Frequency Change Polarity	–	Positive slope			–	
Control Voltage -3dB Bandwidth	V_BW	–	–	8	kHz	
Current Consumption	Idd	–	31	33	mA	No load condition, f = 20 MHz, Vdd = 2.5 V or 3.3 V
Duty Cycle	DC	45	–	55	%	All Vdds.
Rise/Fall Time	Tr, Tf	–	1.5	2	ns	15 pF load, 10% - 90% Vdd
Output Voltage High	VOH	90%	–	–	Vdd	IOH = 7mA, Vdd = 3.3V IOH = 4.5mA, Vdd = 2.5V
Output Voltage Low	VOL	–	–	10%	Vdd	IOL = 7mA, Vdd = 3.3V IOL = 4.5mA, Vdd = 2.5V
Output Load	Load	–	–	15	pF	At maximum frequency and supply voltage. Contact SiTime for higher output load options
Startup Time	T_start	–	–	10	ms	Measured from the time Vdd reaches its rated minimum value
RMS Period Jitter	T_jitt	–	1.7	2.5	ps	f = 10 MHz, all Vdds
RMS Phase Jitter (random)	T_phj	–	0.5	–	ps	f = 10 MHz, Integration bandwidth = 12 kHz to 20MHz, All Vdds

**SiT5301****Stratum 3 MEMS VCTCXO**  
Advanced Information**SiTime™****Specifications (Cont.)****Pin Description Tables**

Pin #1 Functionality
VIN
0 - Vdd: produces voltage dependent frequency change

Pin Map	
Pin	Connection
1	VC
2	GND
3	CLK
4	VDD

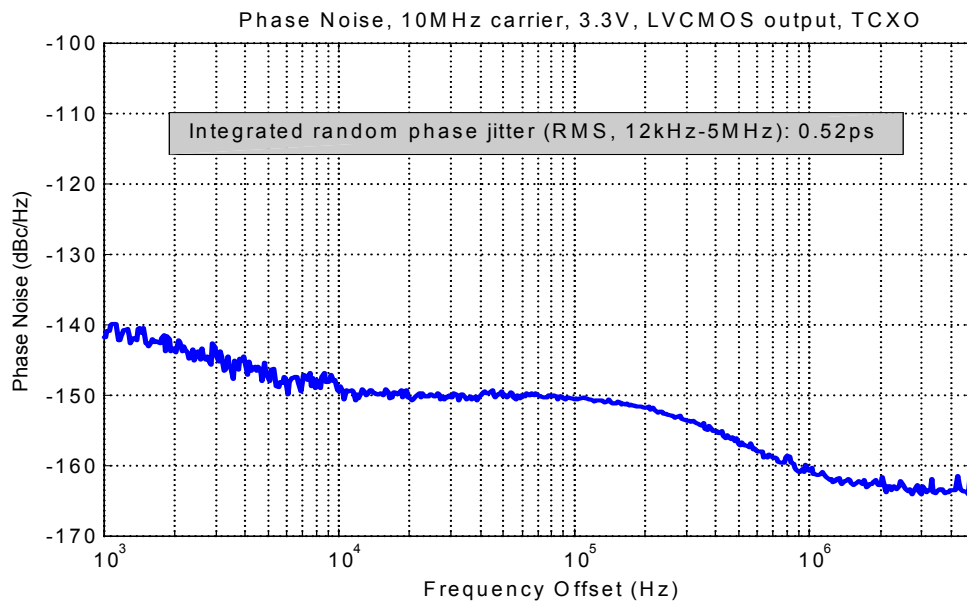
**Absolute Maximum Ratings**

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 (Human Body Model)	-	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 (MSL)	MSL1 @ 260°C

**Phase Noise Plot<sup>[1]</sup>****Note:**

1. The maximum offset frequency is half of the clock (or carrier) frequency for a digital clock.

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### ■ Dimensions and Land Patterns

Package Size – Dimensions (Unit: mm) <sup>[2]</sup>	Recommended Land Pattern (Unit: mm) <sup>[3]</sup>
<p><b>3.2 x 2.5 x 0.75 mm</b></p> <p>Top view dimensions: 3.2 ± 0.15 mm (width), 2.5 ± 0.15 mm (height). Pin locations: #1, #2, #3, #4. Marking: YXXXX.</p> <p>Side view dimensions: 0.75 ± 0.05 mm (thickness).</p> <p>Detail view dimensions: 2.1 mm (width between pads), 0.9 mm (pad width), 0.7 mm (pad height).</p>	<p>Land pattern dimensions: 2.2 mm (width between pads), 1.9 mm (height between pads), 1.4 mm (pad width), 1.2 mm (pad height).</p>
<p><b>5.0 x 3.2 x 0.75 mm</b></p> <p>Top view dimensions: 5.0 ± 0.15 mm (width), 3.2 ± 0.15 mm (height). Pin locations: #1, #2, #3, #4. Marking: YXXXX.</p> <p>Side view dimensions: 0.75 ± 0.05 mm (thickness).</p> <p>Detail view dimensions: 2.39 mm (width between pads), 1.1 mm (pad height), 1.15 mm (pad width).</p>	<p>Land pattern dimensions: 2.54 mm (width between pads), 2.2 mm (height between pads), 1.5 mm (pad width), 1.6 mm (pad height).</p>
<p><b>7.0 x 5.0 x 0.90 mm</b></p> <p>Top view dimensions: 7.0 ± 0.15 mm (width), 5.0 ± 0.15 mm (height). Pin locations: #1, #2, #3, #4. Marking: YXXXX.</p> <p>Side view dimensions: 0.90 ± 0.10 mm (thickness).</p> <p>Detail view dimensions: 5.08 mm (width between pads), 1.1 mm (pad height), 1.4 mm (pad width).</p>	<p>Land pattern dimensions: 5.08 mm (width between pads), 3.81 mm (height between pads), 2.2 mm (pad width), 2.0 mm (pad height).</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
- Refer to application note AN10002 for recommended RLL to power supply bypass for better supply noise immunity.

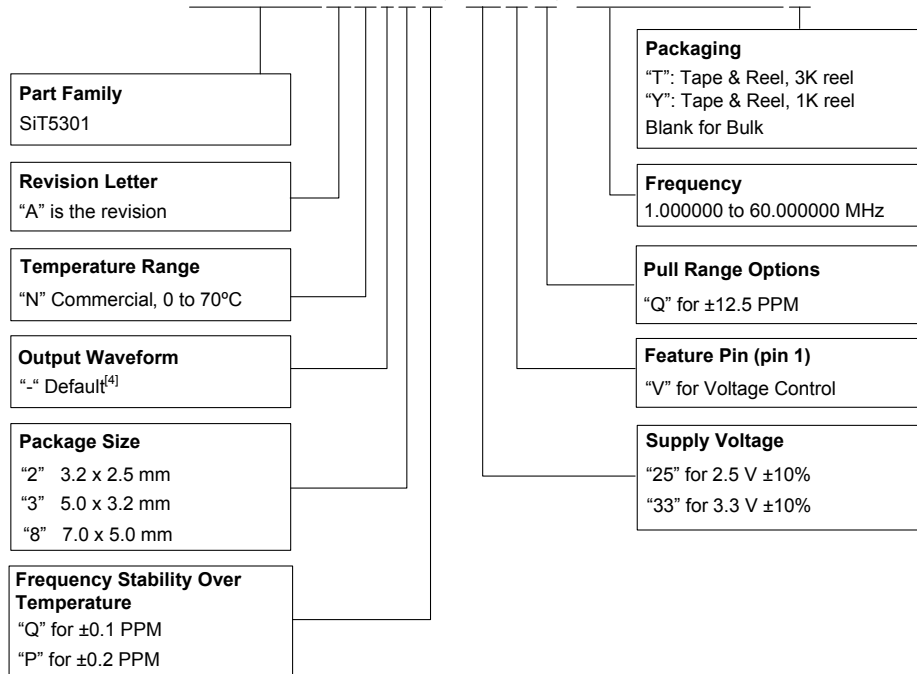
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■ Part No. Guide - How to Order

**SiT5301AC-2Q-33VQ-10.123456T**



**Notes:**

4. Contact SiTime for SoftEdge™ output waveform that reduces EMI and is similar to clipped sinewave in functionality.

**Frequency Stability vs. Temperature Range Options<sup>[5]</sup>**

Frequency Stability Over-temperature (PPM)	Temperature Range (°C)	Supply Voltage	
		2.5 V	3.3 V
±0.1	0 to +70	✓	✓
	-20 to +70	Contact SiTime	
±0.2	0 to +70	✓	✓
	-20 to +70	Contact SiTime	

5. Contact SiTime for wider operating temperature range support.

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