

## Features

- Frequency: 48MHz
- Stability: 50 PPM
- Supply voltage: 3.3V
- Operating temperature range: I-temp (-40°C to 85°C)
- LVC MOS/HCMOS compatible output
- Packages: SOT23, 2.5x2.0mmxmm, 5.0x3.2mmxmm, 7.0x5.0mmxmm
- 100% pin-to-pin drop-in replacement to quartz-based XO
- Pb-free, RoHS and REACH compliant

## Applications

- Oscillator for Intel Bay Trail Super IO IC

EXPRESS  
SAMPLESGREEN  
SOLUTIONSQUARTZ  
FREE

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

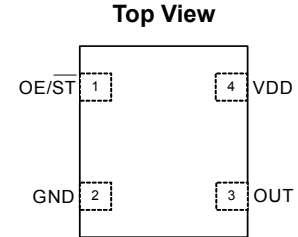
Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
<b>Frequency Range</b>						
Output Frequency Range	f		48		MHz	
<b>Frequency Stability and Aging</b>						
Frequency Stability	F_stab	-50	-	+50	PPM	Inclusive of Initial tolerance at 25°C, 1st year aging at 25°C, and variations over operating temperature, rated power supply
<b>Operating Temperature Range</b>						
Operating Temperature Range	T_use	-40	-	+85	°C	Extended Commercial
<b>Supply Voltage and Current Consumption</b>						
Supply Voltage	Vdd	2.97	3.3	3.63	V	
Current Consumption	Idd	-	4.3	5.0	mA	No load condition
OE Disable Current	I_OD	-	-	4	mA	OE = GND, output is Weakly Pulled Down
Standby Current	I_std	-	2.6	4.3	µA	ST = GND, Output is Weakly Pulled Down
<b>LVC MOS Output Characteristics</b>						
Duty Cycle	DC	45	-	55	%	
Rise/Fall Time	Tr, Tf	-	-	2	ns	20% - 80%
Output High Voltage	VOH	90%	-	-	Vdd	IOH = -4 mA
Output Low Voltage	VOL	-	-	10%	Vdd	IOL = 4 mA
<b>Input Characteristics</b>						
Input High Voltage	VIH	70%	-	-	Vdd	Pin 1, OE or ST
Input Low Voltage	VIL	-	-	30%	Vdd	Pin 1, OE or ST
Input Pull-up Impedance	Z_in	-	87	100	kΩ	Pin 1, OE logic high or logic low, or ST logic high
		2	-	-	MΩ	Pin 1, ST logic low
<b>Startup and Resume Timing</b>						
Startup Time	T_start	-	-	5	ms	Measured from the time Vdd reaches its rated minimum value
Enable/Disable Time	T_oe	-	-	130	ns	
Resume Time	T_resume	-	-	5	ms	Measured from the time ST pin crosses 50% threshold
<b>Jitter</b>						
RMS Period Jitter	T_jitt	-	1.76	3	ps	
RMS Phase Jitter (random)	T_phj	-	0.5	0.9	ps	Integration bandwidth = 900 kHz to 7.5 MHz

### Note:

1. All electrical specifications in the above table are specified with 15 pF output load, 3.3V VDD and 48MHz output frequency unless otherwise stated.

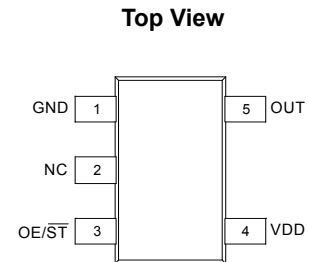
### Pin Description (4-Pin Devices)

Pin	Symbol		Functionality
1	OE/ $\overline{ST}$	Output Enable	H or Open <sup>[2]</sup> : specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H or Open <sup>[2]</sup> : specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I <sub>std</sub> .
2	GND	Power	Electrical ground <sup>[3]</sup>
3	OUT	Output	Oscillator output
4	VDD	Power	Power supply voltage <sup>[3]</sup>



### Pin Description (5-Pin SOT23 Device)

Pin	Symbol		Functionality
1	GND	Power	Electrical ground <sup>[3]</sup>
2	NC	No Connect	No connect
3	OE/ $\overline{ST}$	Output Enable	H or Open <sup>[2]</sup> : specified frequency output L: output is high impedance. Only output driver is disabled.
		Standby	H or Open <sup>[2]</sup> : specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I <sub>std</sub> .
4	VDD	Power	Power supply voltage <sup>[3]</sup>
5	OUT	Output	Oscillator output



**Notes:**

- 2. A pull-up resistor of <10 kΩ between OE/  $\overline{ST}$  pin and Vdd is recommended in high noise environment.
- 3. A capacitor value of 0.1 μF between Vdd and GND is recommended.

### Absolute Maximum

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
Soldering Temperature (follow standard Pb free soldering guidelines)	-	260	°C
Junction Temperature	-	150	°C

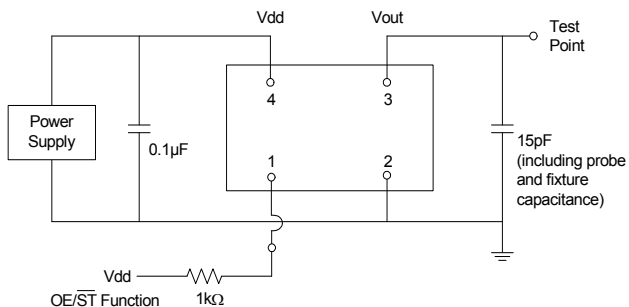
### Thermal Consideration

Package	θJA, 4 Layer Board (°C/W)	θJC, Bottom (°C/W)
SOT23	420	174
2520	117	26
3225	109	27
5032	97	24
7050	191	30

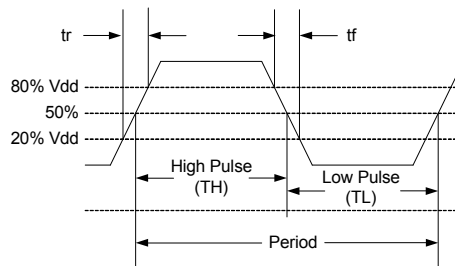
### Environmental Compliance

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

### Test Circuit and Waveform<sup>[4]</sup>



**Figure 1. Test Circuit**

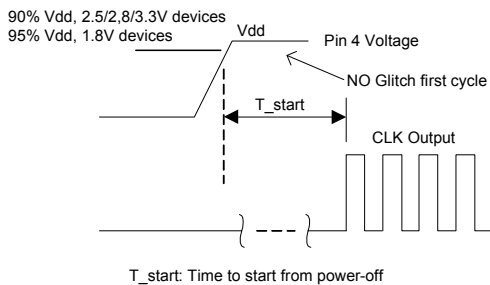


**Figure 2. Waveform**

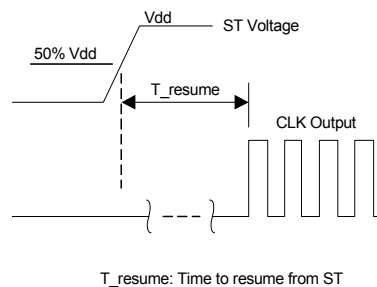
**Note:**

4. Duty Cycle is computed as  $Duty\ Cycle = TH/Period$ .

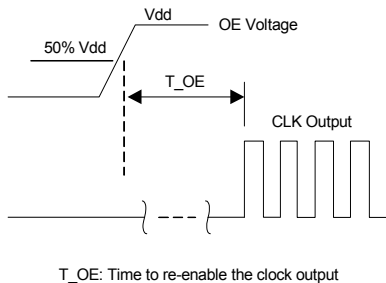
### Timing Diagram



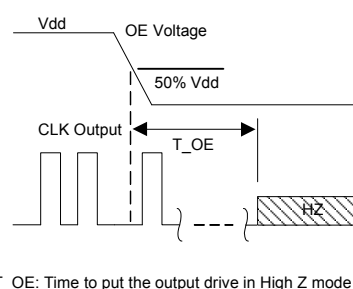
**Figure 3. Startup Timing (OE/ST Mode)**



**Figure 4. Standby Resume Timing (ST Mode Only)**



**Figure 5. OE Enable Timing (OE Mode Only)**



**Figure 5. OE Disable Timing (OE Mode Only)**

**Notes:**

- 5. SiT1602 supports no runt pulses and no glitches during startup or resume.
- 6. SiT1602 supports gated output which is accurate within rated frequency stability from the first cycle.

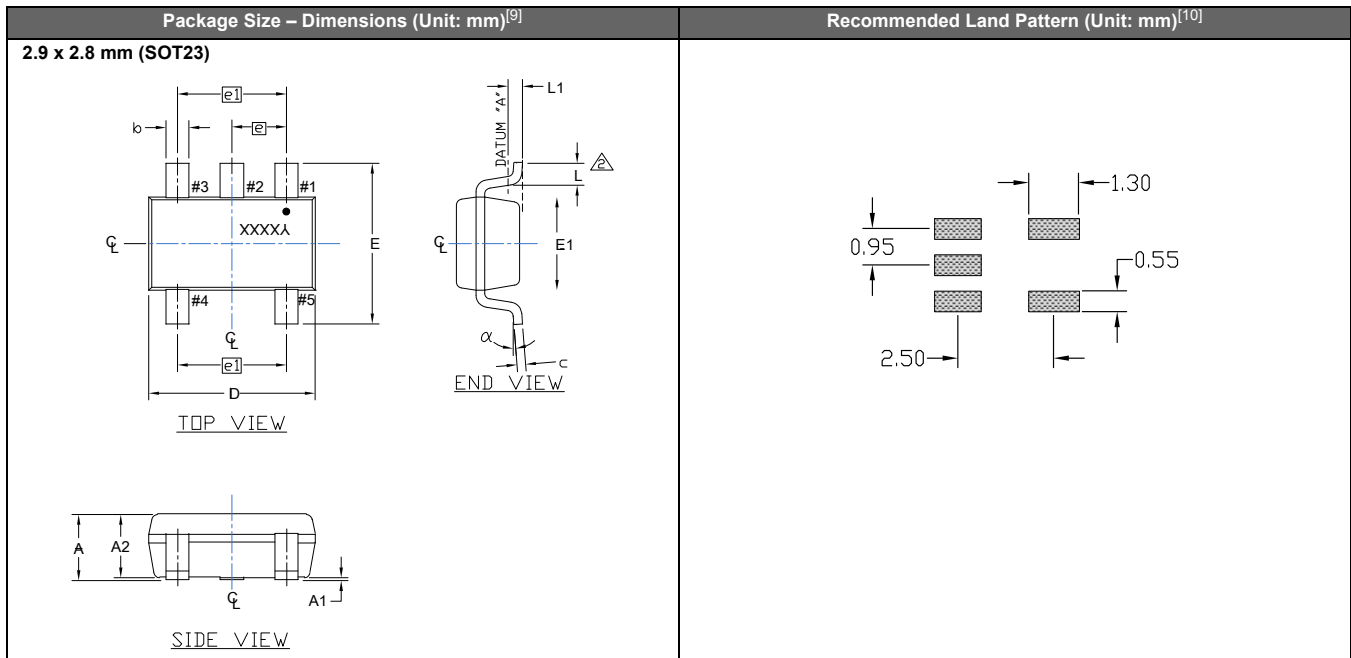
### Dimensions and Patterns

Package Size – Dimensions (Unit: mm) <sup>[7]</sup>	Recommended Land Pattern (Unit: mm) <sup>[8]</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:**

7. 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.
8. A capacitor of value 0.1  $\mu$ F between Vdd and GND is recommended.

### Dimensions and Patterns



**Notes:**

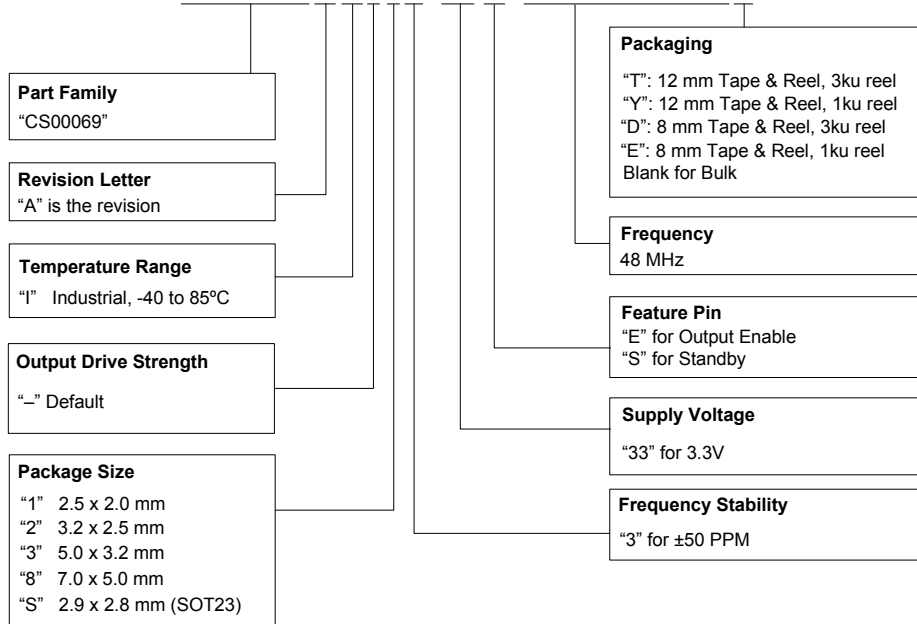
- 9. Top marking: Y denotes manufacturing origin and XXXX denotes manufacturing lot number. The value of "Y" will depend on the assembly location of the device.
- 10. A capacitor of value 0.1  $\mu$ F between Vdd and GND is recommended.

### Dimension Table (SOT23)

Symbol	Min.	Nom.	Max.
A	0.90	1.27	1.45
A1	0.00	0.07	0.15
A2	0.90	1.2	1.30
b	0.30	0.35	0.50
c	0.14	0.153	0.20
D	2.90		
E	2.80		
E1	1.60		
e	0.95		
e1	1.90		
L	0.30	0.38	0.55
L1	0.25		
a	0°	–	8°

Ordering Information

CS00069AI-33-33E -48.000000T



Ordering Codes for Supported Tape & Reel Packing Method<sup>[11]</sup>

Device Size	8 mm T&R (3ku)	8 mm T&R (1ku)	12 mm T&R (3ku)	12 mm T&R (1ku)
2.5 x 2.0 mm	D	E	-	-
3.2 x 2.5 mm	D	E	-	-
5.0 x 3.2 mm	-	-	T	Y
7.0 x 5.0 mm	-	-	-	-
2.9 x 2.8 mm	D	E	-	-

Note:

11. For "-", contact SiTime for availability.

Additional Information

Document	Description	Download Link
Time Machine II	MEMS oscillator programmer	<a href="http://www.sitime.com/support/time-machine-oscillator-programmer">http://www.sitime.com/support/time-machine-oscillator-programmer</a>
Field Programmable Oscillators	Devices that can be programmable in the field by Time Machine II	<a href="http://www.sitime.com/products/field-programmable-oscillators">http://www.sitime.com/products/field-programmable-oscillators</a>
Manufacturing Notes	Tape & Reel dimension, reflow profile and other manufacturing related info	<a href="http://www.sitime.com/component/docman/doc_download/85-manufacturing-notes-for-sitime-oscillators">http://www.sitime.com/component/docman/doc_download/85-manufacturing-notes-for-sitime-oscillators</a>
Qualification Reports	RoHS report, reliability reports, composition reports	<a href="http://www.sitime.com/support/quality-and-reliability">http://www.sitime.com/support/quality-and-reliability</a>
Performance Reports	Additional performance data such as phase noise, current consumption and jitter for selected frequencies	<a href="http://www.sitime.com/support/performance-measurement-report">http://www.sitime.com/support/performance-measurement-report</a>
Termination Techniques	Termination design recommendations	<a href="http://www.sitime.com/support/application-notes">http://www.sitime.com/support/application-notes</a>
Layout Techniques	Layout recommendations	<a href="http://www.sitime.com/support/application-notes">http://www.sitime.com/support/application-notes</a>

# SiT1602

## Low Power, Standard Frequency Oscillator



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