SiT1618

Preliminary

Automotive Grade, Standard Frequency Oscillator

SiTime™

The Smart Timing Choice™

Features

- 33 standard frequencies between 7.3728 MHz and 75 MHz
- Operating temperature up to 125 °C (Contact SiTime for ACEQ100 compliance)
- 100% pin-to-pin drop-in replacement to quartz-based XO
- Excellent total frequency stability as low as ±25 PPM
- Superior G-sensitivity of 0.1 PPB/
- Low power consumption of 3.6 mA typical
- Standby mode for longer battery life
- Fast startup time of 5 ms
- LVCMOS/HCMOS compatible output
- Industry-standard packages: 2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0 mm

Applications

- High reliability automotive, medical and industrial electronics
- Industrial sensors, control boards, infortainment systems

EXPRESS SAMPLES   GREEN SOLUTIONS   QUARTZ FREE

Electrical Characteristics

| Parameter and Conditions	Symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	(*Refer to the frequency list page 5*)			MHz	33 standard frequencies between 1MHz and75MHz
Frequency Stability	F_stab	-25	–	+25	PPM	Inclusive of: Initial stability, operating temperature, rated power, supply voltage change, load change, shock and vibration
		-50	–	+50	PPM	
Operating Temperature Range	T_use	-40	–	-105	°C	Extended Commercial
		-40	–	+125	°C	Industrial
Supply Voltage	Vdd	1.62	1.8	1.98	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	
		2.7	3.0	3.3	V	
		2.97	3.3	3.63	V	
Current Consumption	Idd	–	3.9	5	mA	No load condition, f = 20 MHz, Vdd = 2.5V, 2.8V or 3.3V
		–	3.6	4.5	mA	No load condition, f = 20 MHz, Vdd = 1.8V
Standby Current	I_std	–	2	10	µA	$\overline{ST}$ = GND, Vdd = 3.3V, Output is Weakly Pulled Down.
		–	2	10	µA	$\overline{ST}$ = GND, Vdd = 2.5V or 2.8V, Output is Weakly Pulled Down
		–	1	5	µA	$\overline{ST}$ = GND, Vdd = 1.8V, Output is Weakly Pulled Down
Duty Cycle	DC	45	50	55	%	All Vdds
Rise/Fall Time	Tr, Tf	–	1.2	2	ns	20% - 80% Vdd = 2.5V, 2.8V or 3.3V
		–	1.5	2.5	ns	20% - 80% Vdd =1.8V
Output High Voltage	VOH	90%	–	–	Vdd	IOH = -4 mA (Vdd = 3.3V) IOH = -3 mA (Vdd = 2.8V and Vdd = 2.5V) IOH = -2 mA (Vdd = 1.8V)
Output Low Voltage	VOL	–	–	10%	Vdd	IOL = 4 mA (Vdd = 3.3V) IOL = 3 mA (Vdd = 2.8V and Vdd = 2.5V) IOL = 2 mA (Vdd = 1.8V)
Input High Voltage	VIH	70%	–	–	Vdd	Pin 1, OE or $\overline{ST}$
Input Low Voltage	VIL	–	–	30%	Vdd	Pin 1, OE or $\overline{ST}$
Input Pull-up Impedance	Z_in	–	100	250	kΩ	
Startup Time	T_start	–	–	5	ms	Measured from the time Vdd reaches its rated minimum value
Resume Time	T_resume	–	–	5	ms	Measured from the time ST pin crosses 50% threshold
RMS Period Jitter	T_jitt	–	2	4	ps	f = 20 MHz, Vdd = 2.5V, 2.8V or 3.3V
		–	2	4.5	ps	f = 20 MHz, Vdd = 1.8V
Pk-Pk Period Jitter	T_djitt	–	15	30	ps	Measured over 10000 hits
RMS Phase Jitter (random)	T_phj	–	0.7	1	ps	f = 20 MHz, Integration bandwidth = 900 kHz to 7.5 MHz, Vdd =1.8V, 2.5V, 2.8V, or 3.3V
		–	1.5	3	ps	f = 20 MHz, Integration bandwidth = 12 kHz to 7.5 MHz, Vdd = 1.8V, 2.5V, 2.8V, or 3.3V
Aging	Ag	−1.5	–	1.5	PPM	1st year at 25°C

Note:
1. All electrical specifications in the above table are specified with 15 pF ±10% output load and for all Vdd(s) unless otherwise stated.

Pin Description

Pin	Map		Functionality
1	OE	Input	H or Open[2]: specified frequency output L: output is high impedance
	$\overline{ST}$	Input	H or Open[2]: specified frequency output L: output is low level (weak pull down). Oscillation stops
2	GND	NA	VDD Power Supply Ground
3	CLK	Power	Output Oscillator
4	VDD	Output	Power Supply Voltage

Top View
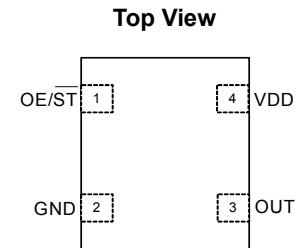
Note:
2. A pull-up resistor of <10 kΩ between OE/ $\overline{ST}$ pin and Vdd is recommended in high noise environment

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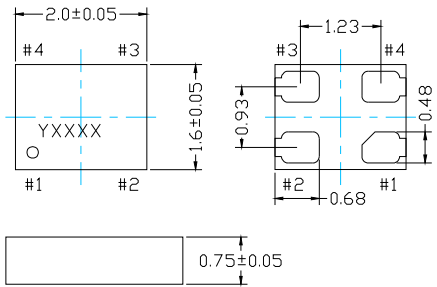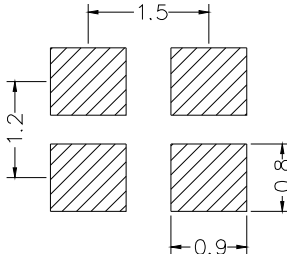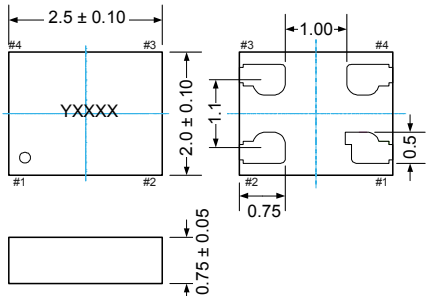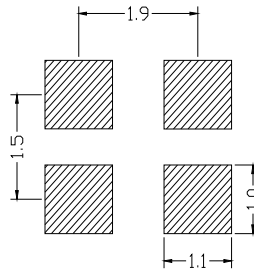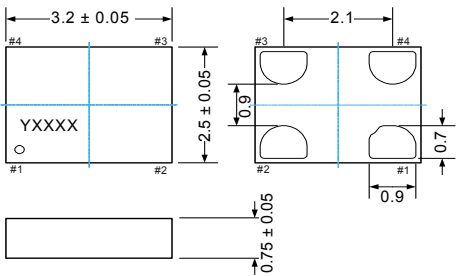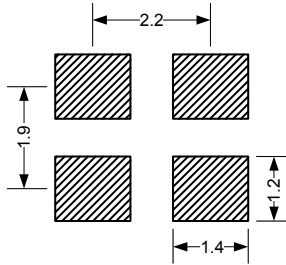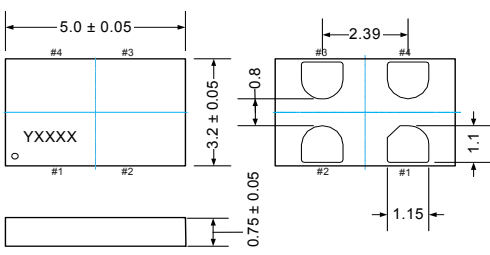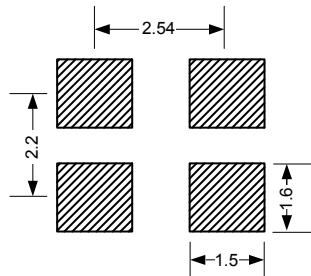
Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Parameter	Min.	Max.	Unit
Storage Temperature	-65	150	°C
VDD	-0.5	4	V
Electrostatic Discharge (HBM)	–	2000	V
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C

Environmental Compliance

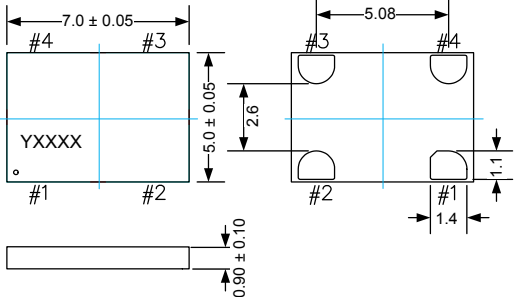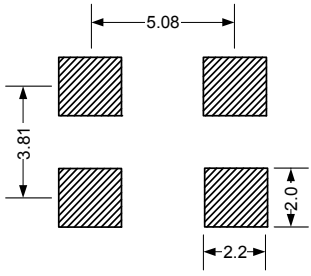| Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002
Mechanical Vibration	MIL-STD-883F, Method 2007
Temperature Cycle	JESD22, Method A104
Solderability	MIL-STD-883F, Method 2003
Moisture Sensitivity Level	MSL1 @ 260°C

Dimensions and Patterns

Package Size – Dimensions (Unit: mm)[3]	Recommended Land Pattern (Unit: mm)[4]
2.0 x 1.6 mm	
2.5 x 2.0 x 0.75 mm	
3.2 x 2.5 x 0.75 mm	
5.0 x 3.2 x 0.75 mm	

Notes:

3. 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.
4. A capacitor of value 0.1 µF between Vdd and GND is recommended.
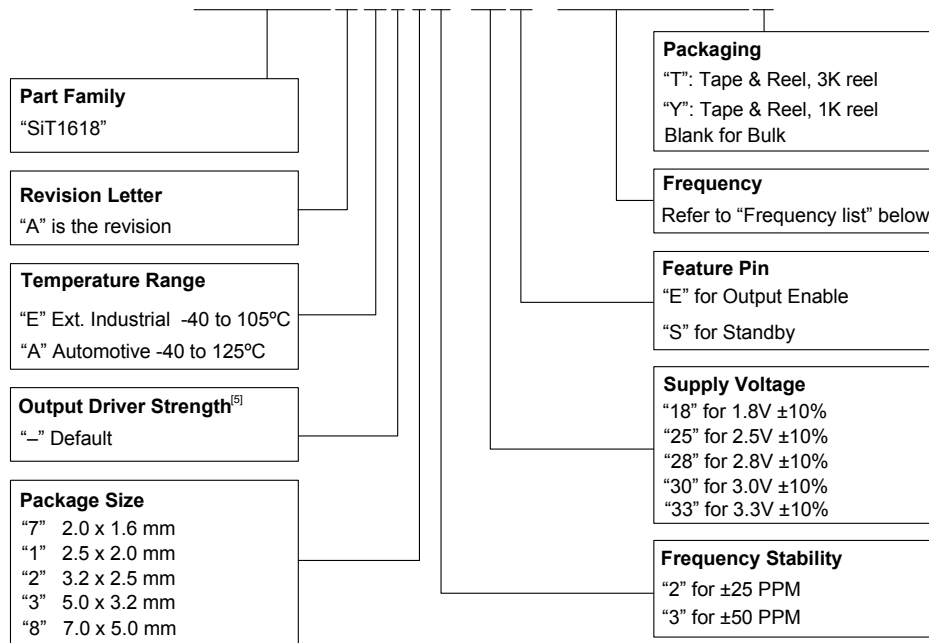
Dimensions and Patterns

Package Size – Dimensions (Unit: mm)[5]	Recommended Land Pattern (Unit: mm)[6]
7.0 x 5.0 x 0.90 mm	

Notes:
5. 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.
6. A capacitor of value 0.1 µF between Vdd and GND is recommended.

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Ordering Information

SiT1618AA-12-18E -25.000000T

Part Family
"SiT1618"

Revision Letter
"A" is the revision

Temperature Range
"E" Ext. Industrial -40 to 105ºC
"A" Automotive -40 to 125ºC

Output Driver Strength[5]
"–" Default

Package Size
"7"   2.0 x 1.6 mm
"1"   2.5 x 2.0 mm
"2"   3.2 x 2.5 mm
"3"   5.0 x 3.2 mm
"8"   7.0 x 5.0 mm

Packaging
"T": Tape & Reel, 3K reel
"Y": Tape & Reel, 1K reel
Blank for Bulk

Frequency
Refer to "Frequency list" below

Feature Pin
"E" for Output Enable
"S" for Standby

Supply Voltage
"18" for 1.8V ±10%
"25" for 2.5V ±10%
"28" for 2.8V ±10%
"30" for 3.0V ±10%
"33" for 3.3V ±10%

Frequency Stability
"2" for ±25 PPM
"3" for ±50 PPM

Note:
  7. Contact SiTime for the SoftEdge™ option that can be used to either drive higher (or multiple) loads or reduce EMI.

Supported Frequencies

7.3728 MHz	8 MHz	8.192 MHz	9.8304 MHz	9.84375 MHz	11.0592 MHz	12 MHz	12.288 MHz	13 MHz
13.225625 MHz	13.52127 MHz	24.56 MHz	14.31818 MHz	14.7456 MHz	15 MHz	16 MHz	16.384 MHz	18.432 MHz
19.6608 MHz	20 MHz	22.1184 MHz	24 MHz	24.576 MHz	25 MHz	26 MHz	27 MHz	29.4912 MHz
30 MHz	32 MHz	33 MHz	36 MHz	40 MHz	48 MHz			

Note:
  8. Contact SiTime for frequencies that are not listed in the above table