



SM55T Series 1.8 V CMOS Clock Oscillators

April 2010

Lead Free 

- Pletronics' SM55 Series is a quartz crystal controlled precision square wave generator with a CMOS output.
- The package is designed for high density surface mount designs.
- This is a low cost mass produced oscillator.
- Tape and Reel or cut tape packaging is available.
- 0.8 to 165 MHz
- 3.2 x 5 mm LCC Ceramic Package
- Enable/Disable Function
- Disable function includes low standby power mode
- Low Jitter

**Pletronics Inc. certifies this device is in accordance with the
RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:

Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 0.064 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020C

Second Level Interconnect code: e4

Absolute Maximum Ratings:

Parameter	Unit
V _{CC} Supply Voltage	-0.5V to +7.0V
V _i Input Voltage	-0.5V to V _{CC} + 0.5V
V _o Output Voltage	-0.5V to V _{CC} + 0.5V
I _o Output Current	+25 mA to -25 mA

Thermal Characteristics

The maximum die or junction temperature is 155°C

The thermal resistance junction to board is 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.



Part Marking:

Electrical Specification for 1.80V $\pm 10\%$ over the specified temperature range

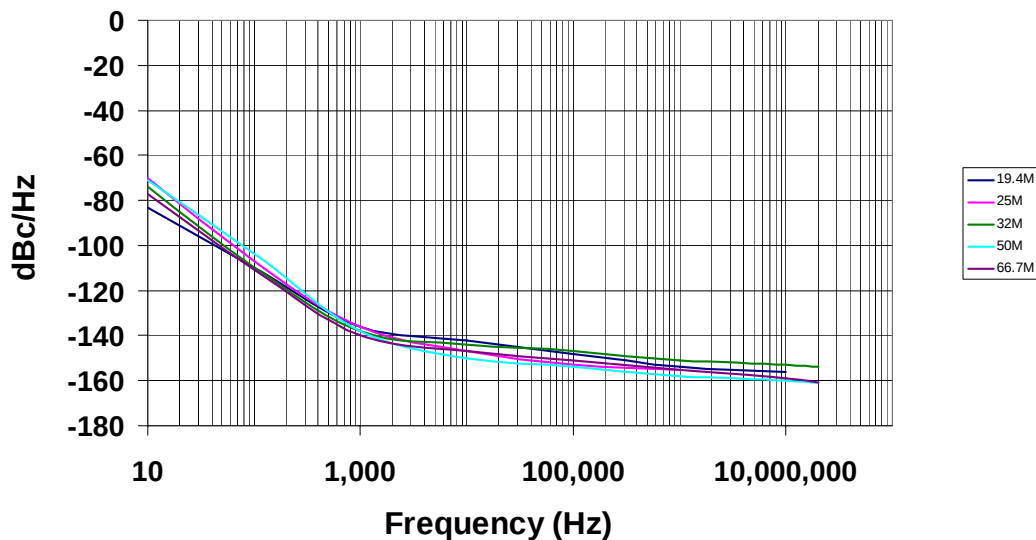
Item	Min	Max	Unit	Condition
Frequency Range	0.8	165	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	CMOS			
Output High Level	90	-	%	of V_{CC} for $I_{OH} = +2$ mA <35 MHz
	70	-		of V_{CC} for $I_{OH} = +8$ mA ≥ 35 MHz
Output Low Level	-	10	%	of V_{CC} for $I_{OL} = -2$ mA <35 MHz
	-	30		of V_{CC} for $I_{OL} = -8$ mA ≥ 35 MHz
Output Symmetry	45	55	%	at 50% point of V_{CC} (See load circuit)
Jitter Output: 1 to 15MHz	-	6.0	pS RMS	10 Hz to 1 MHz from the output frequency
Output: 15 to 35MHz	-	5.0	pS RMS	
Output: 35 to 50MHz	-	4.0	pS RMS	
Output: 50 to 70MHz	-	3.0	pS RMS	
Output: > 70 MHz	-	2.5	pS RMS	
Output: 25 to 70MHz	-	0.7	pS RMS	12 KHz to 20 MHz from the output frequency
Output: > 70 MHz	-	0.6	pS RMS	
E/D Internal Pull-up	50	500	Kohm	to V_{CC}
V disable	-	30	%	of V_{CC} applied to pin 1
V enable	70	-	%	
Output leakage $V_{OUT} = V_{CC}$	-10	+10	uA	Pin 1 low, device disabled
$V_{OUT} = 0V$	-10	+10	uA	
Standby Current I_{CC}	-	4	uA	<35 MHz
	-	100	uA	≥ 35 MHz
Enable time	-	250	nS	Time for output to reach a logic state
Disable time	-	250	nS	Time for output to reach a high Z state
Start up time	-	10	mS	Time for output to reach specified frequency
Operating Temperature Range	-10	+70	°C	Standard Temperature Range
	-40	+85	°C	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	°C	

Electrical Specification for 1.80V $\pm 10\%$ over the specified temperature range

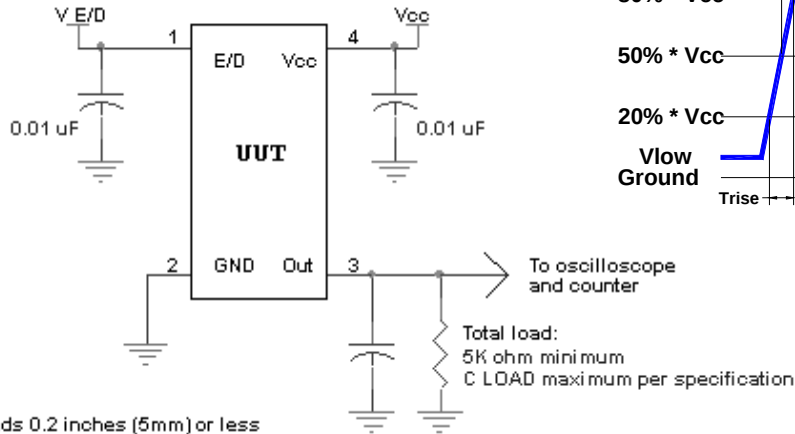
Item	Typ	Max	Unit	Condition	
Output T_{RISE} and T_{FALL}	2.0	5.0	nS	< 35 MHz	$C_{\text{LOAD}} = 15 \text{ pF}$ 20% to 80% of V_{CC} See Load Circuit
	1.7	3.5	nS	$\geq 35 \text{ MHz}$ and $> 70 \text{ MHz}$	
	-	2.5	nS	$\geq 70 \text{ MHz}$	
	4.0	10.0	nS	< 35 MHz	$C_{\text{LOAD}} = 30 \text{ pF}$ 20% to 80% of V_{CC} See Load Circuit
	2.0	7.0	nS	$\geq 35 \text{ MHz}$ and $< 70 \text{ MHz}$	
V_{CC} Supply Current (I_{CC})	-	4	mA	< 8 MHz	$C_{\text{LOAD}} = 15 \text{ pF}$
	-	5	mA	$\geq 8 \text{ MHz}$ and $< 16 \text{ MHz}$	
	-	8	mA	$\geq 16 \text{ MHz}$ and $< 35 \text{ MHz}$	
	-	18	mA	$\geq 35 \text{ MHz}$ and $< 70 \text{ MHz}$	
	-	27	mA	$\geq 70 \text{ MHz}$ and $< 120 \text{ MHz}$	
	-	37	mA	$\geq 120 \text{ MHz}$	

Specifications with Pad 1 E/D open circuit

Typical phase noise plot for 5 oscillators at different output frequencies.



Load Circuit and Test Waveform



Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition B
Vibration	MIL-STD-883 Method 2007, Condition A
Solderability	MIL-STD-883 Method 2003
Thermal Shock	MIL-STD-883 Method 1011, Condition A

ESD Rating

Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

Package Labeling

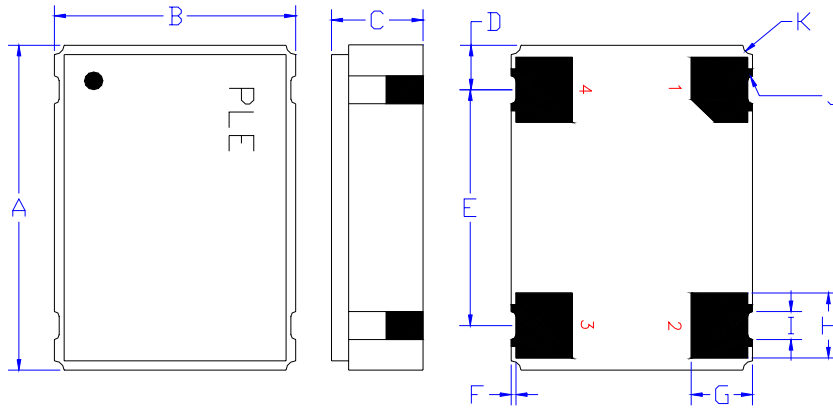
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

P/N:		
	SM5545TX-100.0M	
Customer P/N:		
	12345678	
Qty:		D/C
	1000	
		0632-MMO

RoHS Compliant
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

Mechanical:



Not to Scale

¹ Typical dimensions

	Inches	mm
A	0.197 $\pm$ 0.006	5.00 $\pm$ 0.15
B	0.126 $\pm$ 0.006	3.20 $\pm$ 0.15
C	0.045 $\pm$ 0.004	1.15 $\pm$ 0.10
D ¹	0.048	1.23
E ¹	0.100	2.54
F ¹	0.004	0.10
G ¹	0.050	1.27
H ¹	0.055	1.40
I ¹	0.024	0.60
J ¹	0.004	0.10R
K ¹	0.008	0.020R

Contacts :

Gold 11.8 to 39.4 μ mches (0.3 to 1.0 μ m) over Nickel 50 to 350 μ mches (1.27 to 8.89 μ m)

Pad	Function	Note
1	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is logic low the output will be inhibited (high impedance state.) Recommend connecting this pad to V _{CC} if the oscillator is to be always on.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V _{CC})	Recommend connecting appropriate power supply bypass capacitors as close as possible.

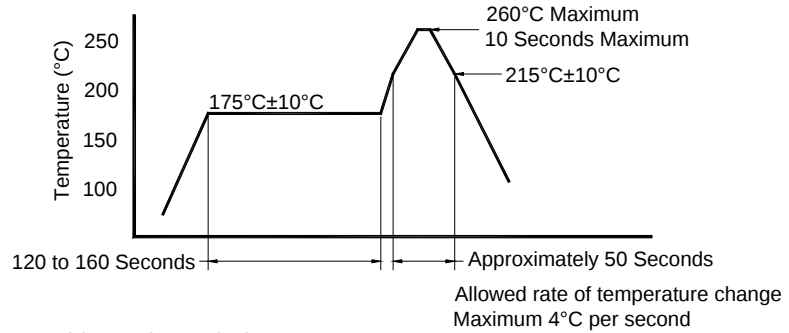
Layout and application information



For Optimum Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.

Reflow Cycle (typical for lead free processing)



The part may be reflowed 3 times without degradation.

Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

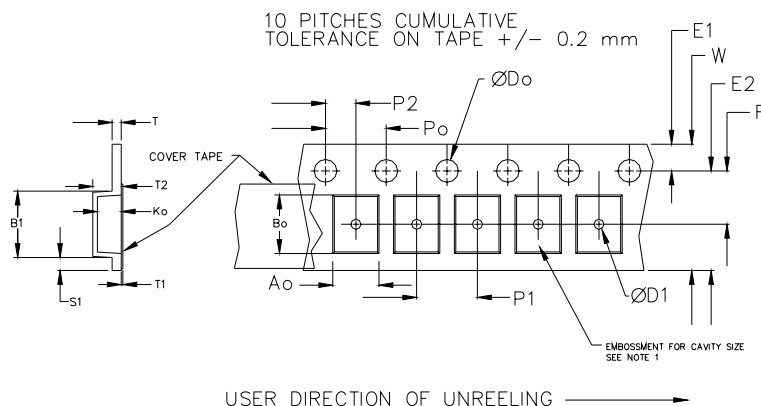
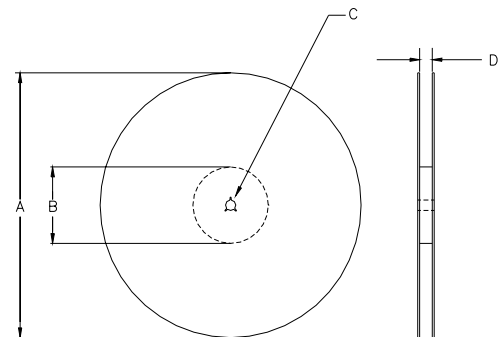
Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.6	0.1
12mm		1.5			2.0 ±0.1			
16mm		1.5						
24mm		1.5						

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
16 mm	12.1	14.25	7.5 ± 0.1	8.0 ± 0.1	8.0	16.3	Note 1

Note 1: Embossed cavity to conform to EIA-481-B

Dimensions in mm

Not to scale



REEL DIMENSIONS				
A	inches	7.0	10.0	13.0
	mm	177.8	254.0	330.2
B	inches	2.50	4.00	3.75
	mm	63.5	101.6	95.3
C	mm	13.0 +0.5 / -0.2		
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0
		16.0		

Reel dimensions may vary from the above

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