



# PLETRONICS SM55T Series 2.5V CMOS Clock Oscillator



SM55TW  
5.0 x 3.2 x 1.2 mm  
LCC Ceramic Package

## Features

- Pletronics' SM55T Series is a quartz crystal controlled precision square wave oscillator
- CMOS Output (will interface with TTL devices)
- Enable/Disable Function includes low standby power
- Low Jitter
- 2.5V nominal Supply Voltage
- 1.0 -165 MHz Frequency Range

## Applications

Driving A/Ds, D/As, FPGAs  
Digital Video  
Ethernet, GbE  
Medical  
Storage Area Networking  
COTS  
Broad Band Access  
SONET/ SDH/ DWDM  
Base Stations/ Picocell  
Test & Measurement

## Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Frequency Range <sup>2</sup>	1.0	-	165	MHz	Consult factory for other options
Frequency Stability <sup>2</sup> ± 20 = <b>20*</b> , ± 25 = <b>44</b> , ± 50 = <b>45</b>	±20	-	±50	ppm	Includes supply voltage change, load change, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. *limited frequencies, see page 3
Operating Temperature Range <sup>2</sup>	-10 -20 -40	- - -	+70 +70 +85	°C	Standard range Extended range <b>C</b> option Extended range <b>E</b> option
Supply Voltage <sup>1,2</sup> V <sub>CC</sub>	2.25	2.50	2.75	V	2.5V ± 10%
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	At 50% point of V <sub>CC</sub>
Output V <sub>HIGH</sub>	90	-	-	%	of V <sub>CC</sub>
Output V <sub>LOW</sub>	-	-	10	%	of V <sub>CC</sub>
Startup Time	-	-	10	ms	Time for output to reach specified frequency
V <sub>DISABLE</sub>	-	-	30	%	Of V <sub>CC</sub> applied to Pad 1
V <sub>ENABLE</sub>	70	-	-		
Enable Time	-	-	100	ns	Time for output to reach a logic state
Disable Time	-	-	100	ns	Time for output to reach a high Z state
Enable/Disable Internal Pull-up	30	70	150	KΩ	To V <sub>CC</sub>
Output Leakage V <sub>OUT</sub> = V <sub>CC</sub> V <sub>OUT</sub> = 0V	-10 -10	-	+10 +10	μA	Pad 1 low, device disabled
Standby Current	-	-	10	μA	
Jitter	-	-	0.6	ps RMS	12kHz to 20MHz from specified frequency
	-	-	2.5	ps RMS	10Hz to 1MHz from specified frequency
Storage Temperature Range	-55	-	+125	°C	

Notes: Specifications with Pad 1 E/D open circuit

<sup>1</sup> Place an appropriate power supply bypass capacitor next to device for correct operation

<sup>2</sup> Specified by part number



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## Electrical Characteristics

Parameter	Typ	Max	Unit	Condition	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	7	nS	< 35 MHz	C <sub>LOAD</sub> = 15 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
		4		≥ 35 MHz and < 70 MHz	
	-	3		≥ 70 MHz	

Parameter	Typ	Max	Unit	Condition	
V <sub>CC</sub> Supply Current (I <sub>CC</sub> )	-	6	mA	< 8 MHz	C <sub>LOAD</sub> = 15 pF
	-	8		≥ 8 MHz and < 16 MHz	
	-	11		≥ 16 MHz and < 35 MHz	
	-	29		≥ 35 MHz and < 70 MHz	
	-	50		≥ 70 MHz and < 120 MHz	
	-	70		≥ 120 MHz	

Specifications with Pad 1 E/D circuit open



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## Part Number

Series Model	Frequency Stability		Operating Temperature Range	Supply Voltage V <sub>CC</sub>	Frequency in MHz	Optional T&R Packaging code
SM55	45	T	E	W	- 125.0M	-XX
	45 = ± 50 ppm (STD) 44 = ± 25 ppm 20* = ± 20 ppm		Blank = -10 to +70°C (STD) C = -20 to +70°C E = -40 to +85°C	W = 2.5V ± 10%	1.0 - 165 MHz	T250 = 250 per Reel T500 = 500 per Reel T1K = 1000 per Reel (Std for 1K pcs)

\* Contact PLE sales for limited frequencies. Full frequency range available which excludes aging.

## Device Marking

<b>Pff.fff M</b> • YMDxx	<b>P ff.fff M</b> • YYWWxx	<b>P5xYWWx</b> • ff.fff M	<b>PLE SM55</b> <b>ff.fff M</b> • YMDxx	<b>5xYWWxx</b> <b>ff.fff M</b> • PLExx
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P or PLE = Pletronics  
ff.fff = Frequency in MHz  
YMD or YWW or YYWW = Date Code, All other marking is internal codes

Note: Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YMD (Year Month Day)

Code	2	3	4	5	6	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2022	2023	2024	2025	2026	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

## Package Labeling

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

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

<b>P/N:</b>	
	SM5545TW-125.0M
<b>Customer P/N:</b>	
	12345678
<b>Qty:</b>	
	1000
<b>D/C</b>	
	1LM

<b>RoHS Compliant</b>
2nd Lvl Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

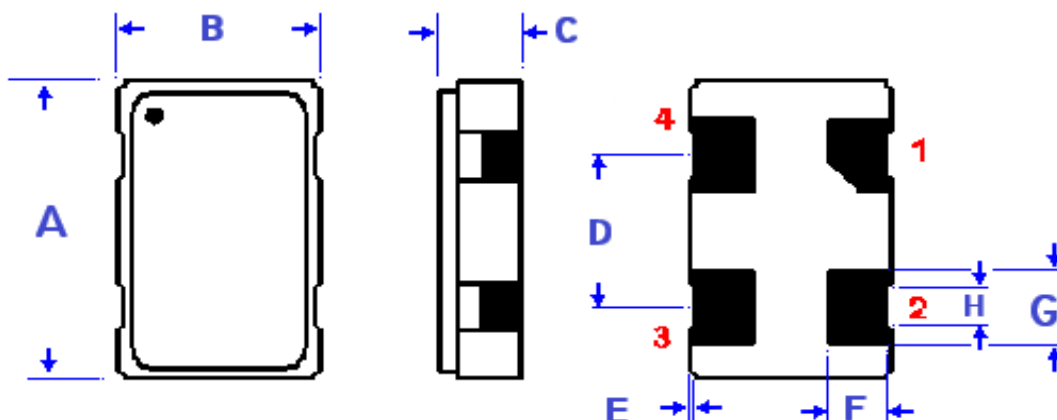
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.06 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020D  
Second Level Interconnect code: e4

## Mechanical Dimensions

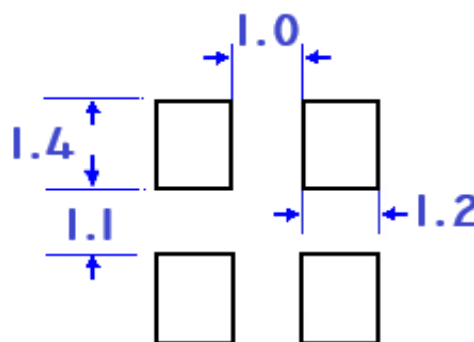
	Inches	mm
A	0.197 ± 0.006	5.00 ± 0.15
B	0.126 ± 0.006	3.20 ± 0.15
C	0.052 Max	1.3 Max
D <sup>1</sup>	0.100	2.54
E <sup>1</sup>	0.004	0.10
F <sup>1</sup>	0.050	0.9
G <sup>1</sup>	0.055	1.20
H <sup>1</sup>	0.024	0.80

<sup>1</sup> Typical dimensions



**Pad Layout** mm shown

Disclaimer: Recommended layout shown.  
Adjust layout as needed for individual  
process requirements.



**Contacts (pads):** Gold 11.8 to 39.4 μmches (0.3 to 1.0 μm) over Nickel 50 to 350 μmches (1.27 to 8.89 μm)

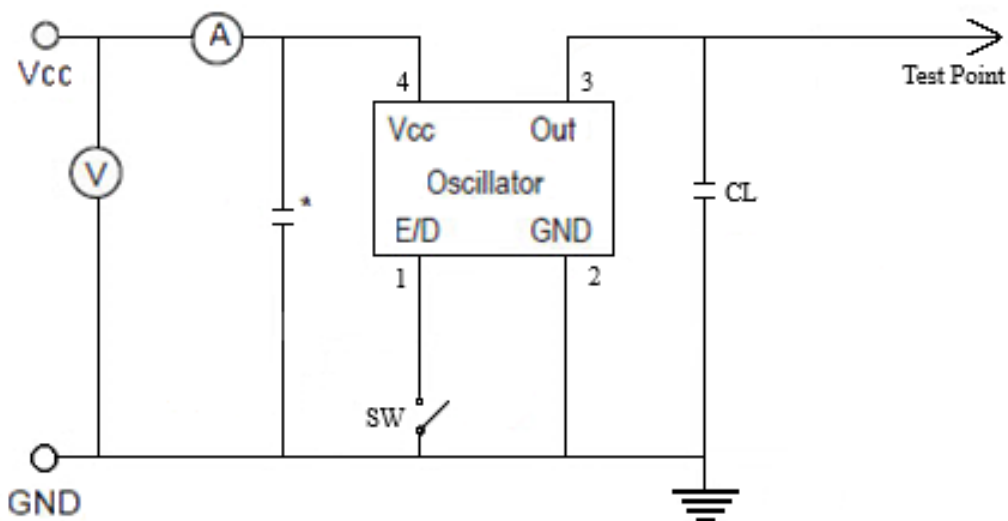
## Layout

Pad	Function	Note
1	Output Enable/Disable	The oscillator shall operate when this pad is not connected. The output will be inhibited (high impedance state) when this pad is logic low. Recommend connecting this pad to V <sub>CC</sub> if the oscillator is to be always on.
2	Ground (GND)	
3	Output	CMOS
4	V <sub>CC</sub> Supply Voltage	Connect an appropriate power supply bypass capacitor as close as possible

For Optimum Jitter Performance, Pletronics recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

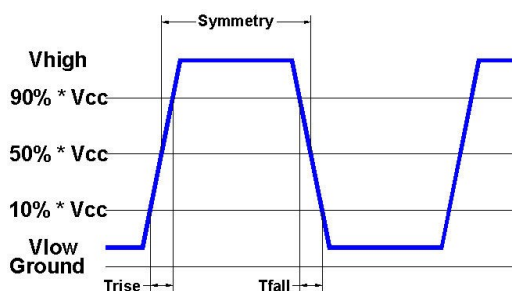
## Electrical Test / Load Circuit



Notes:

CL: 15pF Includes the input capacitance of oscilloscope

\* 0.01~0.1μF external by-pass filter is recommended



## Environmental / ESD Ratings

Reliability: Environmental

ESD Rating

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

Model	Min. Voltage	Condition
Human Body Model	2000V	JESD22-A114
Machine Model	200V	JESD22-A115

Absolute Maximum Ratings

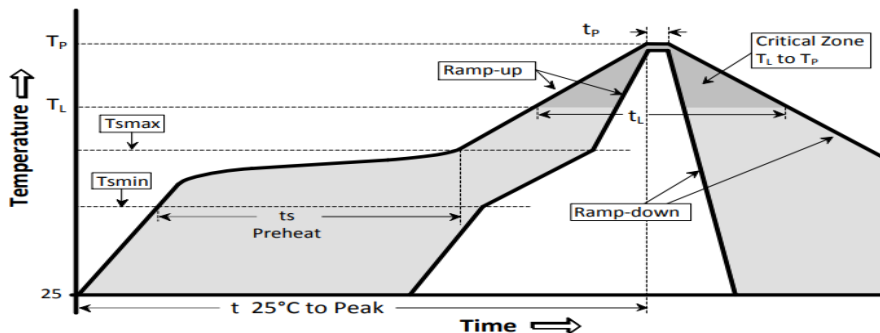
Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.3V to +4.0V
V <sub>i</sub> Input Voltage	-0.3V to V <sub>CC</sub> + 0.3V
V <sub>o</sub> Output Voltage	-0.3V to V <sub>CC</sub> + 0.3V

### Thermal Characteristics:

The maximum die or junction temperature is 150°C

## Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

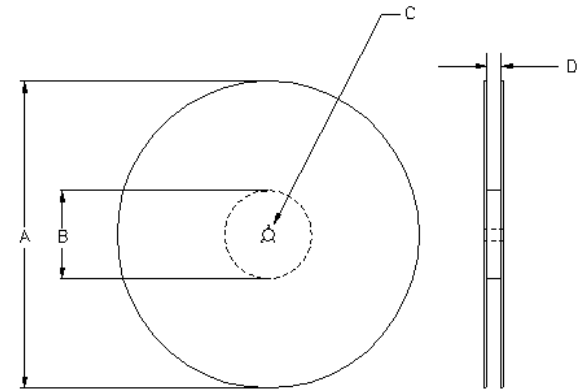
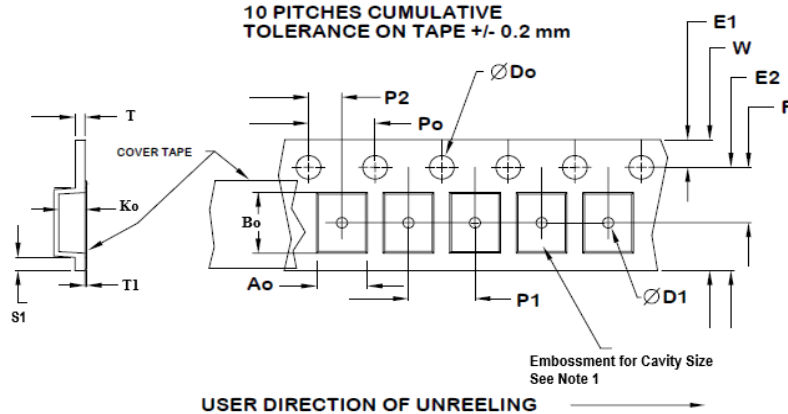


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(T <sub>smax</sub> to T <sub>P</sub> )	3°C / second max	°C / s
Ramp down Rate	T <sub>cool</sub>	6°C / second max	°C / s
Time 25°C to Peak Temperature	T <sub>to-peak</sub>	8 minutes max	min
<b>Preheat</b>			
Temperature min	T <sub>smin</sub>	150	°C
Temperature max	T <sub>smax</sub>	200	°C
Time T <sub>smin</sub> to T <sub>smax</sub>	t <sub>s</sub>	60 – 180	sec
<b>Soldering above liquidus</b>			
Temperature liquidus	T <sub>L</sub>	217	°C
Time above liquidus	t <sub>L</sub>	60 – 150	sec
<b>Peak temperature</b>			
Peak Temperature	T <sub>P</sub>	260	°C
Time within 5°C of peak temperature	t <sub>P</sub>	20 – 40	sec

## Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 12mm (or 16mm) tape, 8mm pitch.



USER DIRECTION OF UNREELING

Tape Variable Dimensions Table 2

Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
12mm	10.25	5.5 ±0.05	8.0 ±0.1	12.2	3.6±0.1	5.4±0.1	1.4±0.1
16mm	14.25	7.5 ±0.05	8.0 ±0.1	16.3	3.6±0.1	5.4±0.1	1.4±0.1

Dimensions in mm Drawing Not to scale

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

Tape Constant Dimensions Table 1

Tape Size	Do	D1 min	E1	Po	P2	S1 min	T max	T1 max
12mm	1.5	1.5	1.75	4.0	2.0 ±0.05	0.6	0.3	0.1
16mm	+0.1 -0.0	1.5	±0.1	±0.1	2.0 ±0.1			

Reel Dimensions (may vary) Table 3

Reel Size	A Inches	A mm	B Inches	B mm	C mm	D mm
7	7.0	177.8	2.50	63.5	13.0	Tape size +0.4
10	10.0	254.0	4.00	101.6	+0.5 -0.2	+2.0 -0.0
13	13.0	330.2	3.75	95.3		



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