



# PLETRONICS SM44T Series 1.8V CMOS Clock Oscillator



SM44TX  
3.2 x 2.5 x 1.05 mm  
LCC Ceramic Package

## Features

- Pletronics' SM44T 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
- 1.8V nominal Supply Voltage
- 0.80-100 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>	0.80	-	100	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> )	1.62	1.80	1.98	V	
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	at 50% of V <sub>CC</sub>
Output V <sub>HIGH</sub> (V <sub>OH</sub> )	0.9V <sub>CC</sub>	-	-	V	See Load Circuit
Output V <sub>LOW</sub> (V <sub>OL</sub> )	-	-	0.1V <sub>CC</sub>	V	
Startup Time	-	-	10	ms	Time for output to reach specified frequency
V <sub>DISABLE</sub> (V <sub>IL</sub> )	-	-	0.3V <sub>CC</sub>	V	
V <sub>ENABLE</sub> (V <sub>IH</sub> )	0.7V <sub>CC</sub>	-	-		
Output Enable Time	-	-	250	ns	Time for output to reach a logic state
Output Disable Time	-	-	250	ns	Time for output to reach a high Z state
Enable/Disable Internal Pull-up	30	70	150	KΩ	To V <sub>CC</sub> , Pin 1 open or ≥0.7V <sub>CC</sub>
Output Leakage V <sub>OUT</sub> = V <sub>CC</sub> V <sub>OUT</sub> = 0V	- -10	-	+10 -	μA	Pad 1 low, device disabled
Standby Current	-	-	10	μA	
Phase Jitter 1 to 15MHz ≥15 to 35MHz ≥35 to 50MHz > 50MHz	-	-	6.0 5.0 4.0 3.0	ps RMS	10 Hz to 1 MHz from the output frequency
Phase Jitter	-	-	0.7	ps RMS	12 kHz to 20 MHz from the output frequency; Out freq ≥40MHz
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 $T_{RISE}$ and $T_{FALL}$	2	5	nS	< 35 MHz	$C_{LOAD} = 15$ pF 10% to 90% of $V_{CC}$ See Load Circuit
	1	3.5		$\geq 35$ MHz and < 70 MHz	
	1.5	2.5		$\geq 70$ MHz	
Supply Current ( $I_{CC}$ )	1	2	mA	< 8 MHz	$C_{LOAD} = 15$ pF
	1.5	2.5		$\geq 8$ MHz and < 16 MHz	
	2	3		$\geq 16$ MHz and < 35 MHz	
	12	18		$\geq 35$ MHz and < 70 MHz	
	17	27		$\geq 70$ MHz and < 100 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
SM44	45	T	E	X	- 100.0M	-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	X = 1.8V ±10%	0.80 - 100 MHz	T250 = 250 per Reel T500 = 500 per Reel T3K = 3000 per Reel (Std)

## Device Marking

<b>PFF.FF M</b> • YMDxx
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<b>PFF.FF M</b> • YMxxx
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P = Pletronics  
FF.FF = Frequency in MHz  
YMD or YM = 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>
<b>PLE Part Number</b>
<b>Customer P/N:</b>
<b>12345678</b>
<b>Qty:</b>
<b>3000</b>
<b>D/C</b>
<b>2A1</b>
<b>MSL: 1</b>

### RoHS Compliant

2nd LvL Interconnect

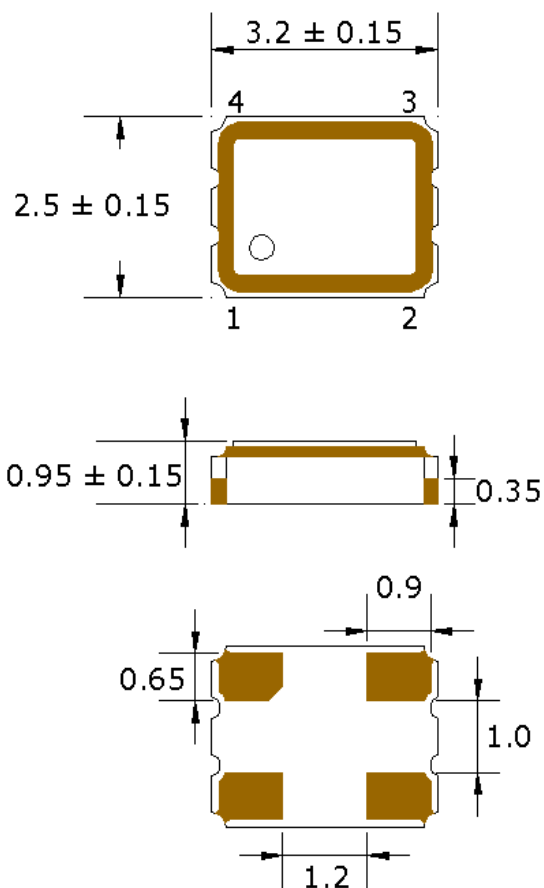
Category=e4

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: 0.024 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020D  
Second Level Interconnect code: e4

## Mechanical Dimensions

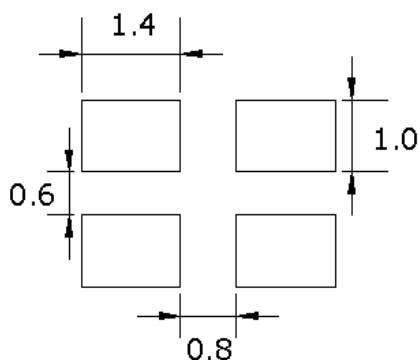


## Pad Connections

Pad	Function
1	Enable/Disable
2	Ground
3	Output
4	Vcc

## ENABLE/DISABLE

Pad 1	Output
V <sub>IH</sub> /Open	Active
V <sub>IL</sub> /Gnd	Disabled/Tristate



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

## Dimensions in mm

**Contacts (pads): Gold (0.3 to 1.0  $\mu$ m) over Nickel (1.27 to 8.89  $\mu$ m)**

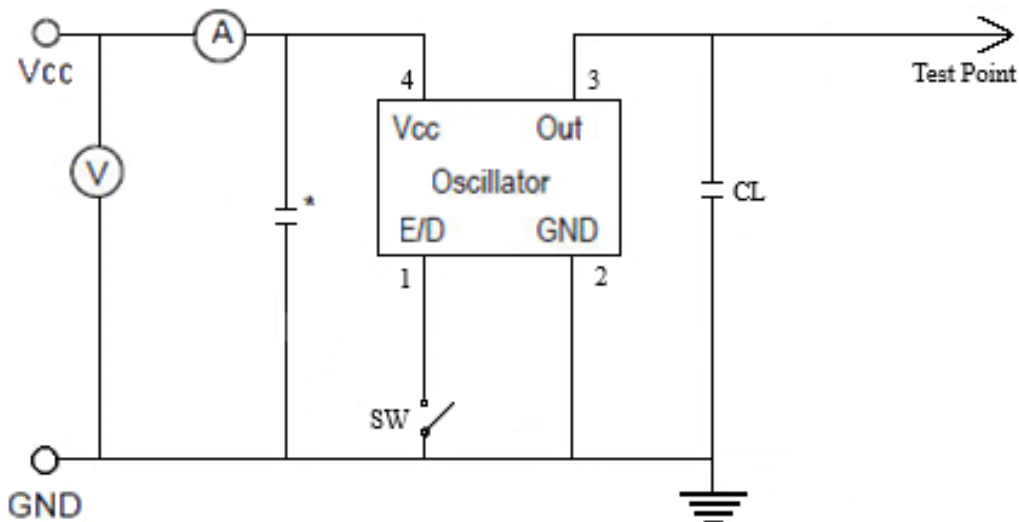
For Optimum Jitter Performance, Pletronics recommends:

- 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



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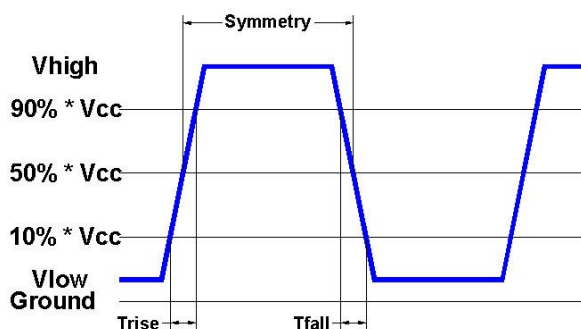
## Electrical Test / Load Circuit



Notes:

CL: Includes the input capacitance of oscilloscope

\* 0.01 $\mu$ F external by-pass filter is recommended



## Environmental / ESD Ratings

### Reliability: Environmental

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

### ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	MIL-STD-883 3015.7
Machine Model	200V	EIAJ ED-4701/304

### Thermal Characteristics:

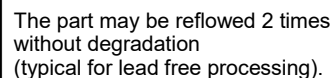
The maximum die or junction temperature is 150°C

### 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

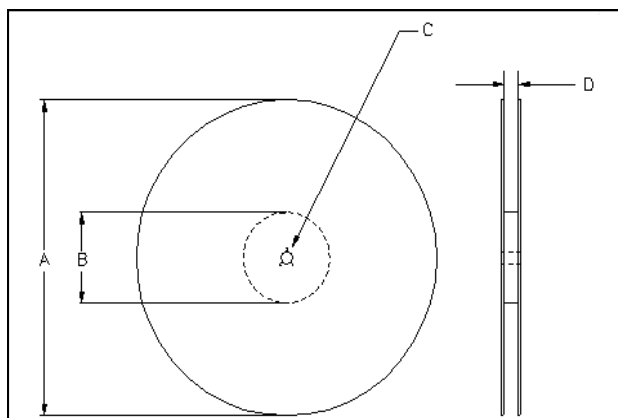


**Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"**



Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	( $T_{S_{max}}$ to $T_P$ )	3°C / second max	°C / s
Ramp down Rate	$T_{cool}$	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to-peak}$	8 minutes max	min
<b>Preheat</b>			
Temperature min	$T_{S_{min}}$	150	°C
Temperature max	$T_{S_{max}}$	200	°C
Time $T_{S_{min}}$ to $T_{S_{max}}$	$t_s$	60 – 180	sec
<b>Soldering above liquidus</b>			
Temperature liquidus	$T_L$	217	°C
Time above liquidus	$t_L$	60 – 150	sec
<b>Peak temperature</b>			
Peak Temperature	$T_p$	260	°C
Time within 5°C of peak temperature	$t_p$	20 – 40	sec

Tape and Reel available for quantities of 250 to 3000 per reel, cut tape for < 250. 8mm tape, 4mm pitch.



Reel Dimensions (may vary) Table 3

	A		B		C	D
Reel Size	Inch-es	mm	Inches	mm	mm	mm
7	7.0	180	2.50	60	13.0 +0.5 -0.2	Tape size +0.4  +2.0 -0.0

Dimensions in mm    Drawing Not to scale  
Note 1: Embossed cavity to conform to EIA-481-B

Type Size	Do	D1 typ	E1	Po	P2	T <sub>max</sub>	T1 <sub>max</sub>
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.3	0.1



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