



# PLETRONICS SM33T Series 2.5V CMOS Clock Oscillator



SM33TW  
2.5 x 2.0 x 0.81 mm  
LCC Ceramic Package

## Features

- Pletronics' SM33T 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
- 1.25 - 50 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>	1.25	-	50	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	2.5	2.75	V	2.5V ± 10%
Supply Current					See table on page 2
Output Waveform	CMOS				
Duty Cycle	45	-	55	%	At 50%V <sub>CC</sub>
Output V <sub>HIGH</sub>	0.9V <sub>CC</sub>	-	-	V	
Output V <sub>LOW</sub>	-	-	0.1V <sub>CC</sub>	V	
Output T <sub>RISE</sub> and T <sub>FALL</sub>				ns	See Load Circuit
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	-	-	10	ms	Time for output to reach specified frequency
Disable Time	-	-	100	ns	Time for output to reach a high Z state
Enable/Disable Internal Pull-up	30	70	150	Kohm	To V <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 Noise 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz 5 MHz	-	-113 -129 -140 -149 -154 -159	-	dBc/Hz	25°C ± 2°C at 25 MHz
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	Min	Typ	Max	Unit	Condition	
Supply Current $I_{CC}$		1.5	2.5	mA	1.25 MHz $\leq$ Freq < 8 MHz	Cload = 15pF
		1.8	3		8 MHz $\leq$ Freq < 16 MHz	
		2.4	4		16 MHz $\leq$ Freq < 35 MHz	
		7	9		35 MHz $\leq$ Freq $\leq$ 50 MHz	

Parameter	Min	Typ	Max	Unit	Condition	
Rise/Fall Time $T_R/T_F$		2.8	5.5	ns	1.25 MHz $\leq$ Freq < 35 MHz	Cload = 15pF, 0.1~0.9Vcc levels
		3	6		35 MHz $\leq$ Freq $\leq$ 50 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
SM33	45	T	E	W	- 25.0M	-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%	1.25 - 50 MHz	T250 = 250 per Reel T500 = 500 per Reel T3K = 3000 per Reel (Std)

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

## Device Marking

PFF.FF

- YMDxxx

P = Pletronics  
FF.FF = Frequency in MHz  
YMD = Date Code, All other marking is internal code

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)

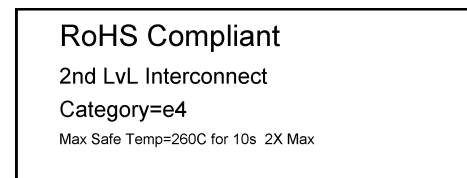
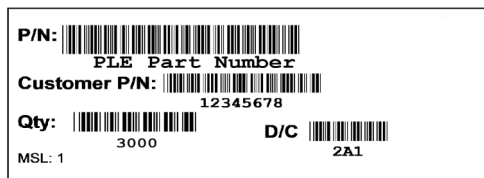
Code	2	3	4	5	6	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2022	2023	2024	2025	2026	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

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

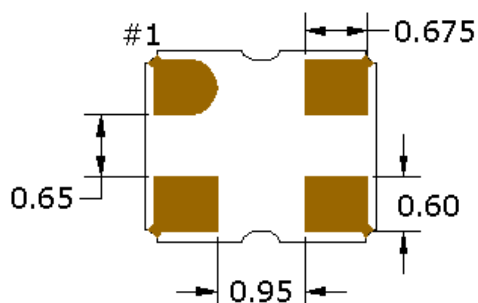
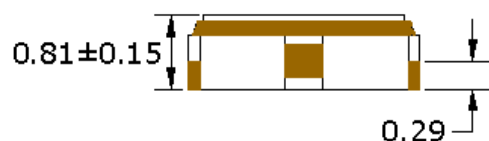
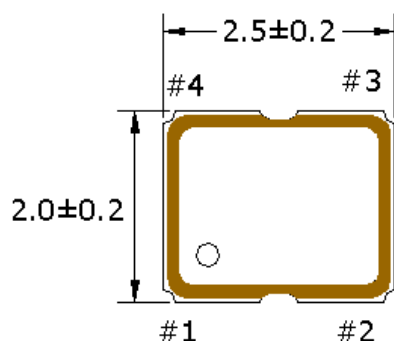
RoHS Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Arial



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

## Mechanical Dimensions

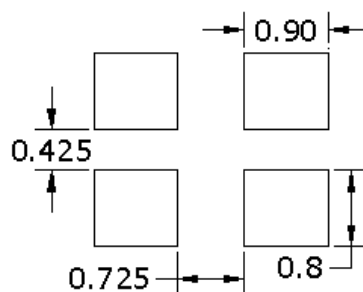


## Pad Connections

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.

Shape of pad 1 may differ

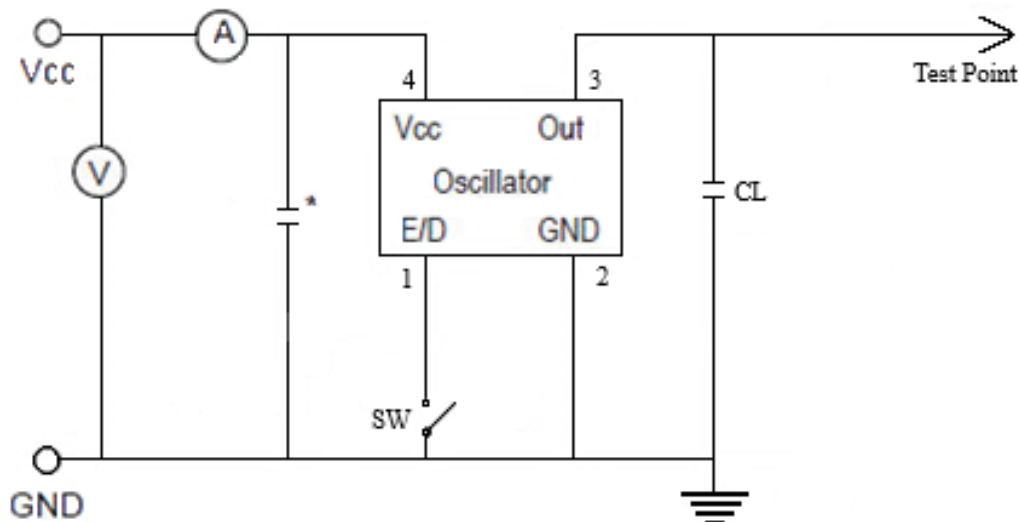
Dimensions in mm

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

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

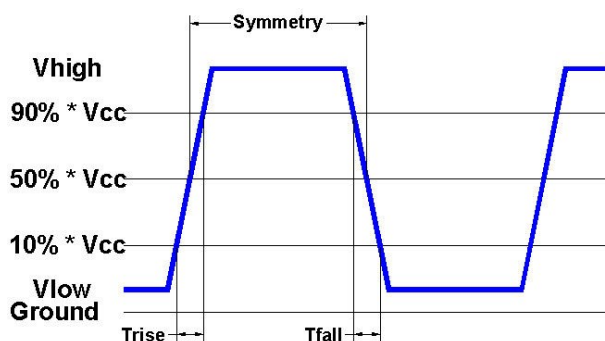
## Electrical Test / Load Circuit



Notes:

CL: Includes the input capacitance of oscilloscope

\* 0.01μF 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

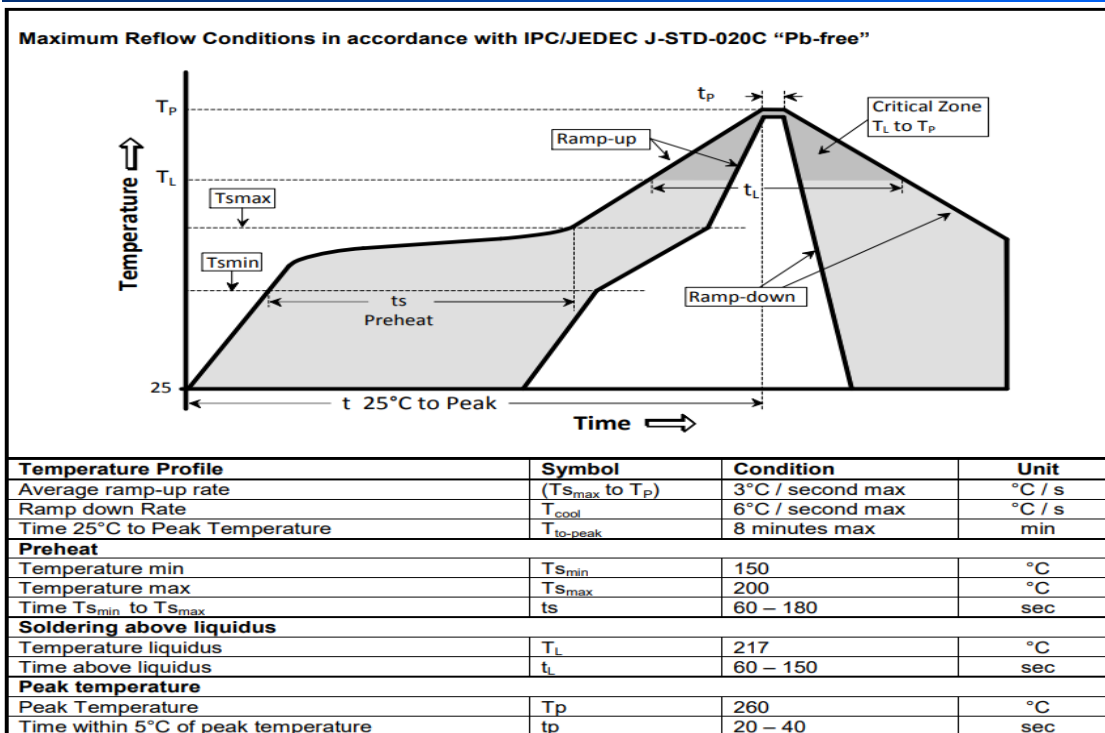
### Thermal Characteristics:

The maximum die or junction temperature is 150°C

### Absolute Maximum Ratings

Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +4.0V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V

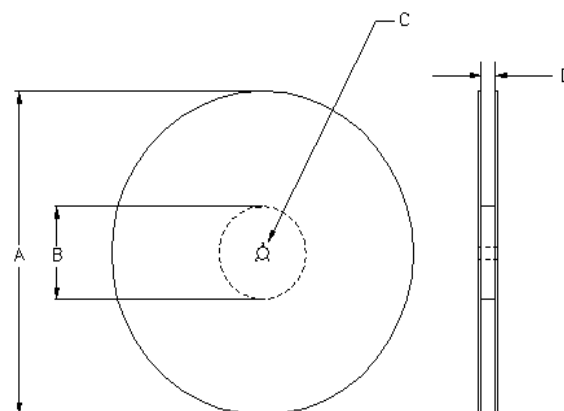
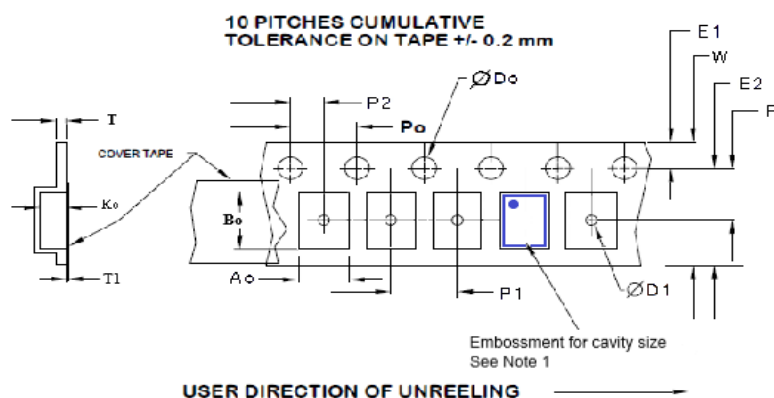
## Reflow Cycle



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

## Tape and Reel

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



Tape Variable Dimensions Table 2

Tape Variable Dimensions Table 2							
Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.2	2.25±0.1	2.75±0.1	1.15±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 Constant Dimensions Table 1							
Tape Size	Do	D1 min	E1	Po	P2	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	0.3	0.1

Reel Dimensions (may vary) Table 3

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.50	63.5	13.0 +0.5 -0.2	Tape size +0.4  +2.0 -0.0



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