PLETRONICS SM33T Series 1.8V CMOS Clock Oscillator

SM33TX
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
- 1.8V 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 [2]	1.25	-	50	MHz	Consult factory for other options
Frequency Stability [2] ± 20 = **20***, ± 25 = **44**, ± 50 = **45**	±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 [2]	-10 -20 -40	- - -	+70 +70 +85	°C	Standard range Extended range **C** option Extended range **E** option
Supply Voltage [1, 2] (V_{CC})	1.62	1.8	1.98	V	1.8V ± 10%
Supply Current					See table on page 2
Output Waveform		CMOS			
Duty Cycle	45	-	55	%	At 50%Vcc
Output V_{HIGH} (VOH)	0.9Vcc	-	-	V	
Output V_{LOW} (VOL)	-	-	0.1Vcc	V	See Load Circuit
Output T_{RISE} and T_{FALL}				ns	See table on page 2; See Load Circuit
Startup Time	-	-	10	ms	Time for output to reach specified frequency
$V_{DISABLE}$ (VIL)	-	-	30	%	Of V_{CC} applied to Pad 1
V_{ENABLE} (VIH)	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_{CC}, Pin 1 open or ≥0.7Vcc
Output Leakage $V_{OUT} = V_{CC}$ $V_{OUT} = 0V$	- -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
[1] Place an appropriate power supply bypass capacitor next to device for correct operation
[2] Specified by part number

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition	
Supply Current I_{CC}		1 1.5 2 12	2 2.5 3 18	mA	1.25 MHz ≤ Freq <8 MHz 8 MHz ≤ Freq < 16 MHz 16 MHz ≤ Freq < 35 MHz 35 MHz ≤ Freq ≤ 50 MHz	Cload = 15pF

Parameter	Min	Typ	Max	Unit	Condition	
Rise/Fall Time T_R/T_F		2 1	5 3.5	ns	1.25 MHz ≤ Freq <35 MHz 35 MHz ≤ Freq ≤ 50 MHz	Cload = 15pF, 0.1~0.9Vcc levels

Specifications with Pad 1 E/D circuit open

Part Number

Series Model	Frequency Stability		Operating Temperature Range	Supply Voltage V_{CC}	Frequency in MHz	Optional T&R Packaging code
SM33	**45**	**T**	**E**	**X**	**- 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	**X** = 1.8V ± 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

P*FF.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.

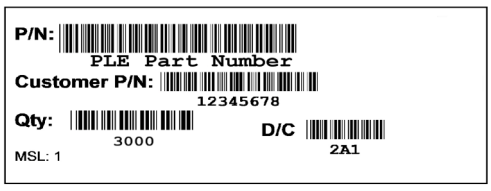
Codes for Date Code YMD (Year Month Day)

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

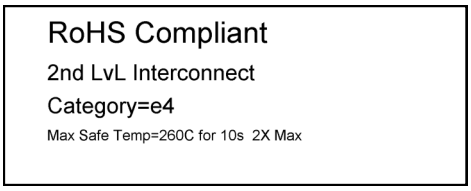
Code	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Code	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

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



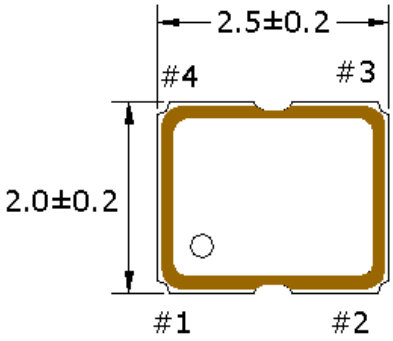
RoHs Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

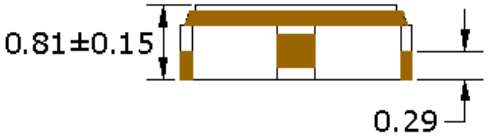


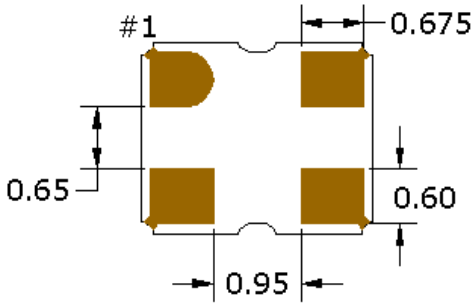
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

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







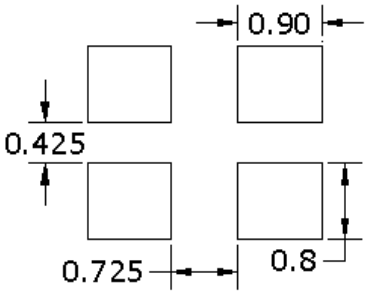
Shape of pad 1 may differ

Dimensions in mm

Pad Connections

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

ENABLE/DISABLE	
Pad 1	Output
VIH/Open	Active
VIL/Gnd	Disabled/Tristate



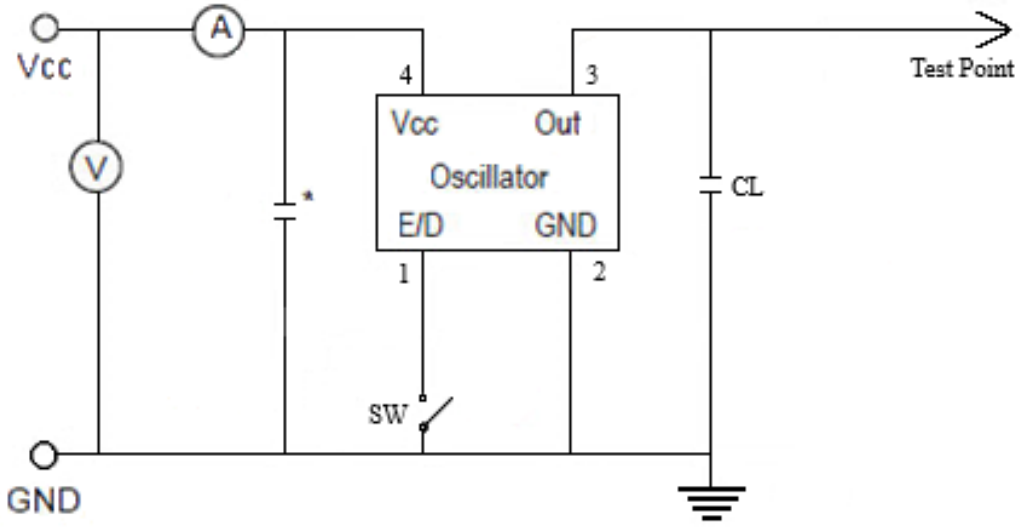
Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

Contacts (pads): Gold (0.3 to 1.0 µm) over Nickel (1.27 to 8.89 µm)

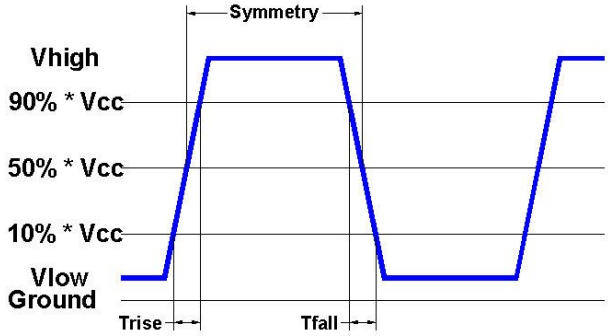
For Optimum Jitter Performance, Pletronics recommends:

- 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

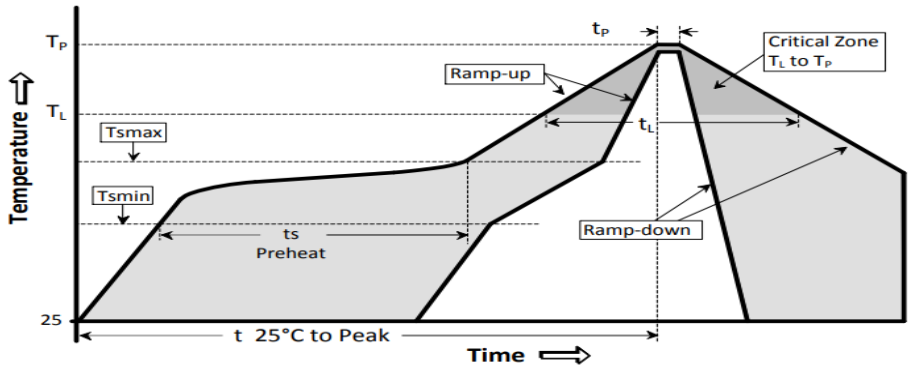
Thermal Characteristics:
The maximum die or junction temperature is 150°C

Absolute Maximum Ratings

Parameter	Unit
V_{CC} Supply Voltage	-0.5V to +4.0V
Vi Input Voltage	-0.5V to V_{CC} + 0.5V
Vo Output Voltage	-0.5V to V_{CC} + 0.5V

Reflow Cycle

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

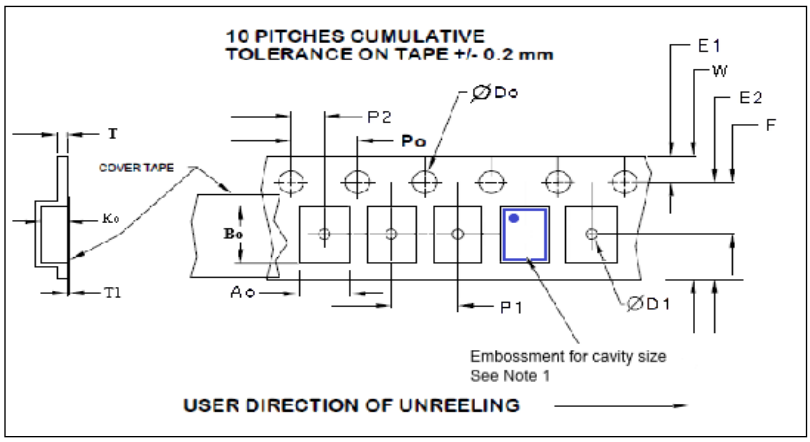


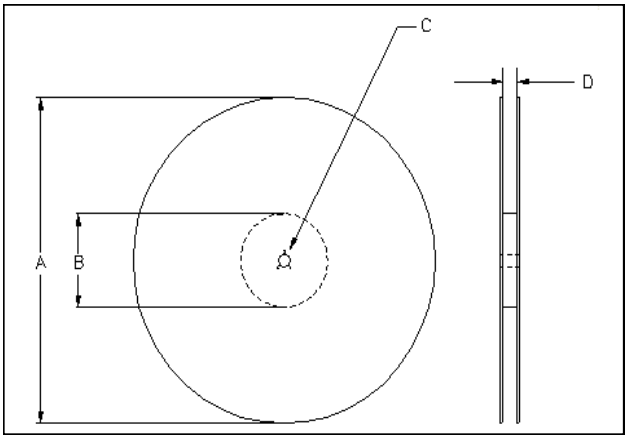
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time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

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 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

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	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

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

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