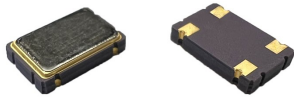




# PLETRONICS SM77H Series 2.5V CMOS Clock Oscillator



SM77HW  
7.0 x 5.0 x 1.3 mm  
LCC Ceramic Package

## Features

- Pletronics' SM77H 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
- 0.80 - 69.999 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> (F <sub>O</sub> )	0.80	-	69.999	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% 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	-	-	3	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	-	-	2	ms	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> , 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
Standby Current	-	-	10	μA	Pad 1 low, device disabled
Phase Jitter	-	-	0.6	ps RMS	12kHz to 20MHz from specified frequency; Fo ≥40MHz
	-	-	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

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

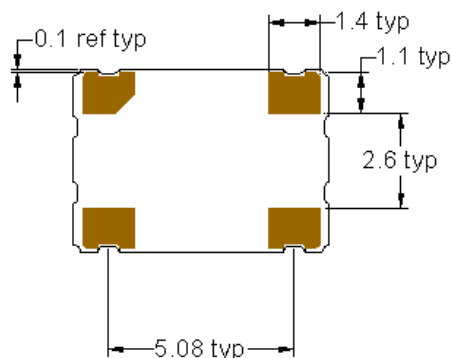
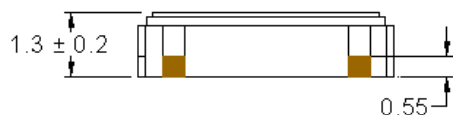
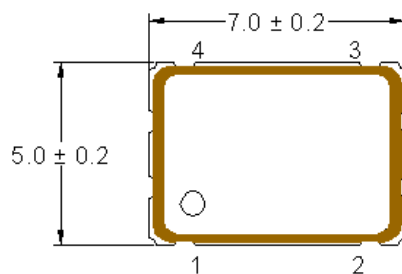


# PLETRONICS SM77H Series 2.5V CMOS Clock Oscillator

## Electrical Characteristics (Specifications with Pad 1 E/D circuit open)

Parameter	Typ	Max	Unit	Condition	
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	7.0	nS	All	C <sub>LOAD</sub> = 15 pF
	-	9.0		≥35 MHz	C <sub>LOAD</sub> = 30 pF
	-	12.0		<35 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 10% to 90% of V <sub>CC</sub> See Load Circuit
	-	8		≥8 MHz and <16 MHz	
	-	11		≥16 MHz and <35 MHz	
	-	29		≥35 MHz	
	-	7		<8 MHz	C <sub>LOAD</sub> = 30 pF 10% to 90% of V <sub>CC</sub> See Load Circuit
	-	8		≥8 MHz and <16 MHz	
	-	10		≥16 MHz and <35 MHz	
	-	41		≥35 MHz	

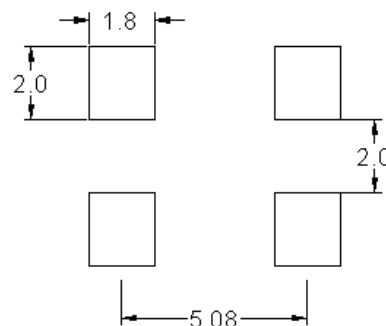
## Mechanical Dimensions



## Pad Connections

Pad	Function
1	Enable/Disable
2	Ground
3	Output
4	$V_{CC}$

ENABLE/DISABLE	
Pad 1	Output
$V_{IH}$ / Open	Active
$V_{IL}$ / Gnd	Disabled / Tristate



Dimensions in mm

## Pad Layout

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

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



# PLETRONICS SM77H Series 2.5V CMOS Clock Oscillator

## Part Number

Series Model	Frequency Stability		Operating Temperature Range	Supply Voltage V <sub>CC</sub>	Frequency in MHz	Optional T&R Packaging code
SM77	45	H	E	W	- 50.0M	-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%	0.80 - 69.999	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>PLE SM77</b> <b>FFF.FF M</b> • YMDxx	<b>PLE SM77</b> <b>FFF.FF M</b> • YYWWxx	<b>7xYWWxx</b> <b>FFF.FF M</b> • PLExxx
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PLE = Pletronics  
FFF.FF = 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>
<b>PLE Part Number</b>
<b>Customer P/N:</b>
<b>12345678</b>
<b>Qty:</b>
<b>1000</b>
<b>D/C:</b>
<b>2A1</b>
<b>MSL: 1</b>

RoHS Compliant

2nd Lvl Interconnect

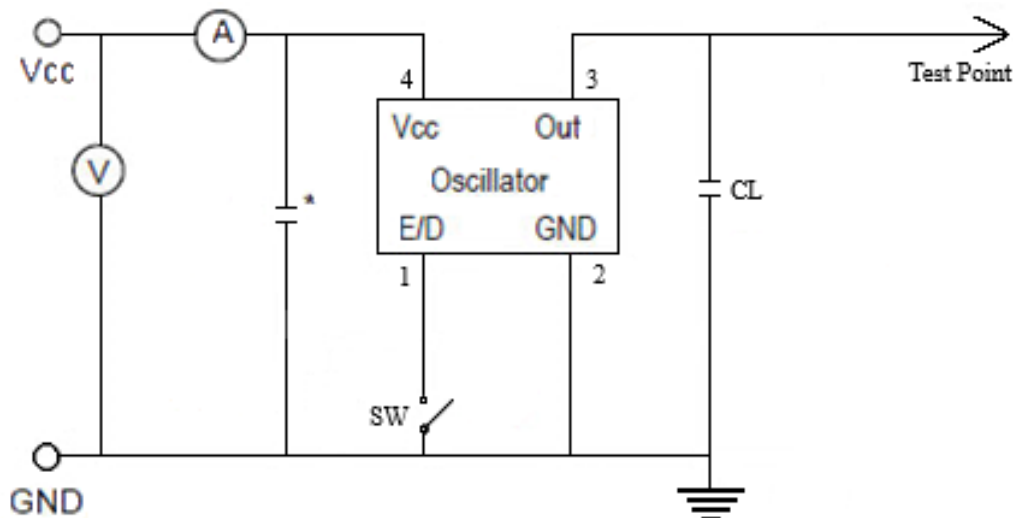
Category=e4

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

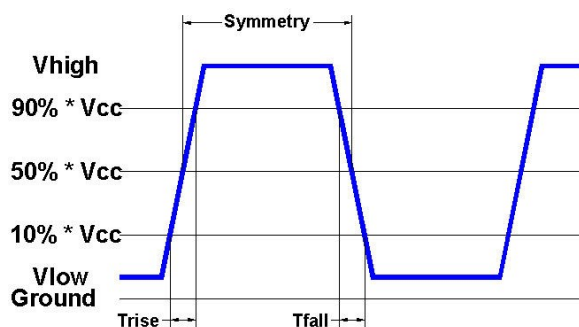
## Electrical Test / Load Circuit



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	JESD22-A114
Machine Model	200V	JESD22-A115

### Thermal Characteristics:

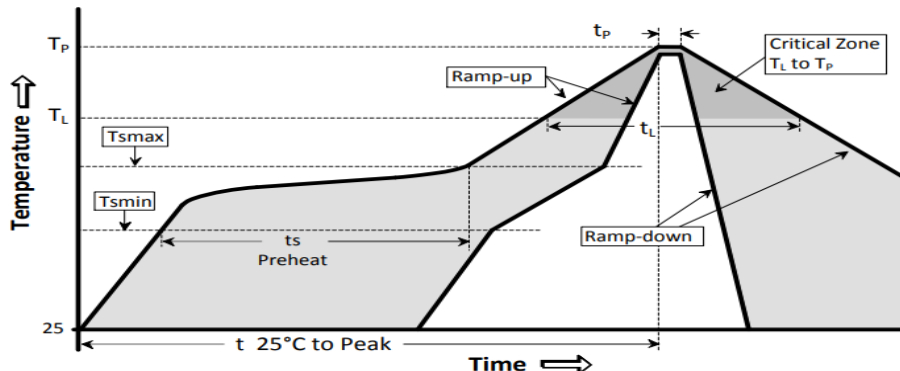
The maximum die or junction temperature is 150°C

### 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

## Reflow Cycle

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

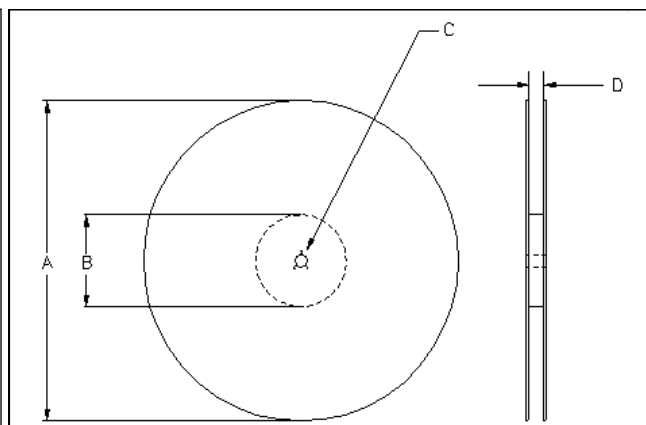
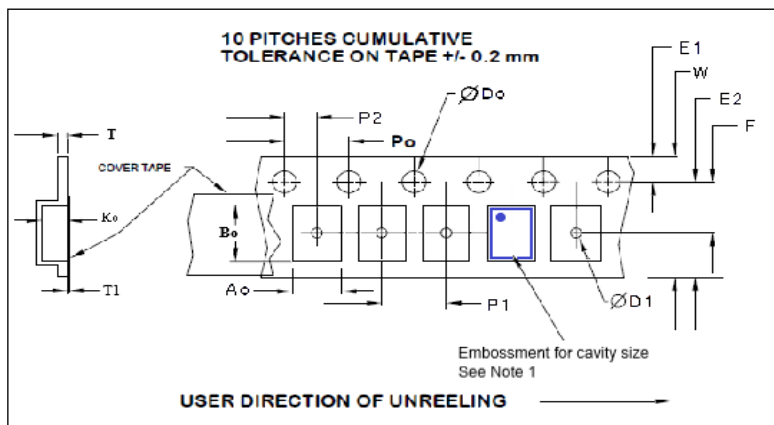


The part may be reflowed 2 times without degradation (typical for lead free processing).

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. 16mm tape, 8mm pitch.



Tape Variable Dimensions Table 2

Tape Size	E2 typ	F	P1	W max	A0	B0	K0
16mm	14.25	7.5 ±0.05	8.0 ±0.1	16.3	5.56±0.1	7.85±0.1	2.0±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 typ	E1	Po	P2	T max	T1 max
16mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	0.3	0.1

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
13	13.0	330	3.75	100		+2.0 -0.0



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