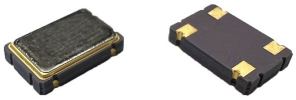
PLETRONICS SM77H Series 1.8V CMOS Clock Oscillator



SM77HX
7.0 x 5.0 x 1.7 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
- 1.8V 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 [2]	0.80	-	69.999	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	1.80	1.98	V	1.8V ± 10%
Output Waveform		CMOS			
Duty Cycle	45	-	55	%	at 50% of V_{CC} — See Load Circuit
Output V_{HIGH}	90	-	-	%	Of Vcc — See Load Circuit
Output V_{LOW}	-	-	10	%	Of Vcc — See Load Circuit
Startup Time	-	-	10	ms	Time for output to reach specified frequency
$V_{DISABLE}$	-	-	30	%	Of V_{CC} applied to Pad 1
V_{ENABLE}	70	-	-	%	Of V_{CC} applied to Pad 1
Enable Time	-	-	2	ms	Time for output to reach a logic state
Disable Time	-	-	250	ns	Time for output to reach a high Z state
Enable/Disable Internal Pull-up	30	70	150	Kohm	To V_{CC}
Output Leakage $V_{OUT} = V_{CC}$ $V_{OUT} = 0V$	-10 -10	-	+10 +10	µA	
Standby Current	-	-	10	µA	Pad 1 low, device disabled
Jitter Output 1 to 15MHz Output 15 to 35MHz Output 35 to 50MHz Output 50 to 69.999MHz	-	-	6.0 5.0 4.0 3.0	pS RMS	10 Hz to 1 MHz from the output frequency
Jitter Output 25 to 69.999MHz	-	-	0.7	pS RMS	12 kHz to 20 MHz from the output frequency
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	Typ	Max	Unit	Condition	
Output T_{RISE} and T_{FALL}	2.0	5.0	nS	<35 MHz	C_{LOAD} = 15 pF 10% to 90% of V_{CC} See Load Circuit
	1.7	3.5		≥35 MHz	

Parameter	Typ	Max	Unit	Condition	
V_{CC} Supply Current (I_{CC})	-	4	mA	<8 MHz	C_{LOAD} = 15 pF
	-	5		≥8 MHz and <16 MHz	
	-	7		≥16 MHz and <35 MHz	
	-	18		≥35 MHz	

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
SM77	**45**	**H**	**E**	**X**	**- 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	**X** = 1.8V ± 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

PLE SM77 *FFF.FF* M • *YMDxx*	PLE SM77 *FFF.FF* M • *YYWWxx*	7*xYWWxx* *FFF.FF* M • PLE*xxx*

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)

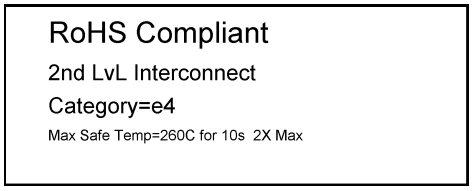
Code	2	3	4	5	6	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2022	2023	2024	2025	2026	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

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



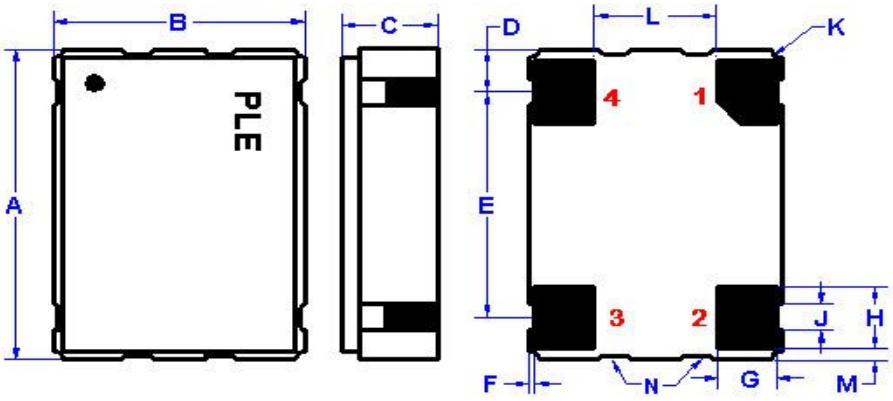
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.174grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

Mechanical Dimensions

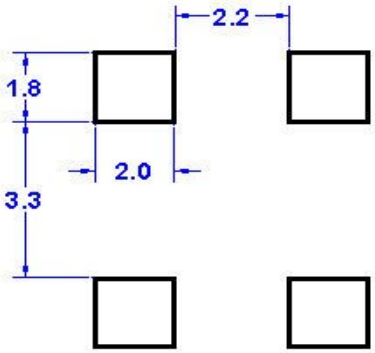
	Inches	mm
A	0.276 ± 0.006	7.00 ± 0.15
B	0.197 ± 0.006	5.00 ± 0.15
C	0.067 Max	1.70 Max
D[1]	0.038	0.96
E[1]	0.200	5.08
F[1]	0.004	0.10
G[1]	0.043	1.10
H[1]	0.055	1.40
J[1]	0.024	0.60
K[1]	0.008R	0.20R
L[1]	0.102	2.60
M[1]	0.010	0.26
N	End Detents optional	

[1] 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 µinches (0.3 to 1.0 µm) over Nickel 50 to 350 µinches (1.27 to 8.89 µm)

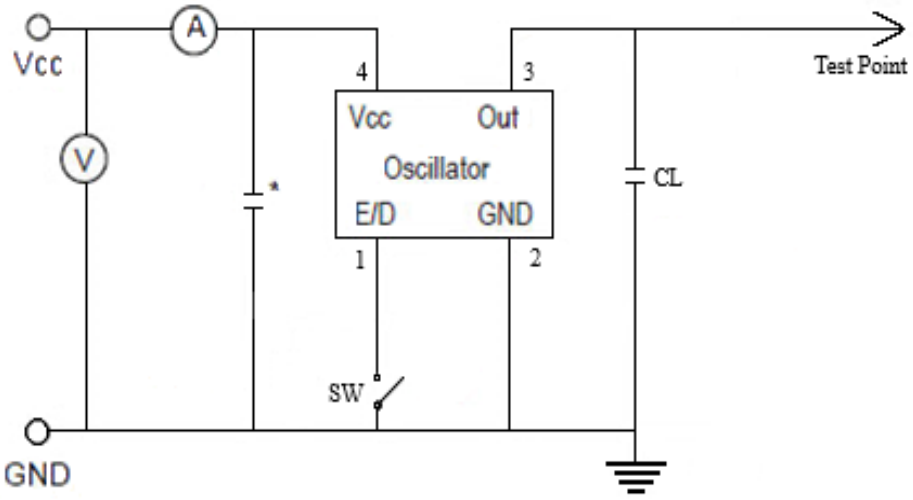
Layout

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_{CC} if the oscillator is to be always on.
2	Ground (GND)	
3	Output	CMOS
4	V_{CC} Supply Voltage	Connect an appropriate power supply bypass capacitor as close as possible

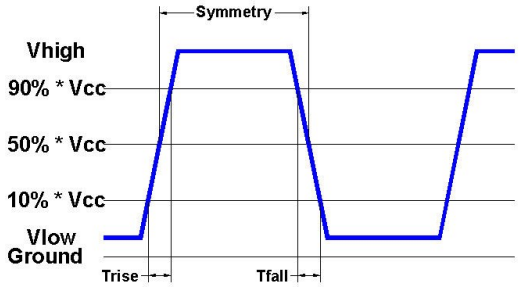
For Optimum Jitter Performance, Pletronics recommends:

- 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: 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	JESD22-A114
Machine Model	200V	JESD22-A115

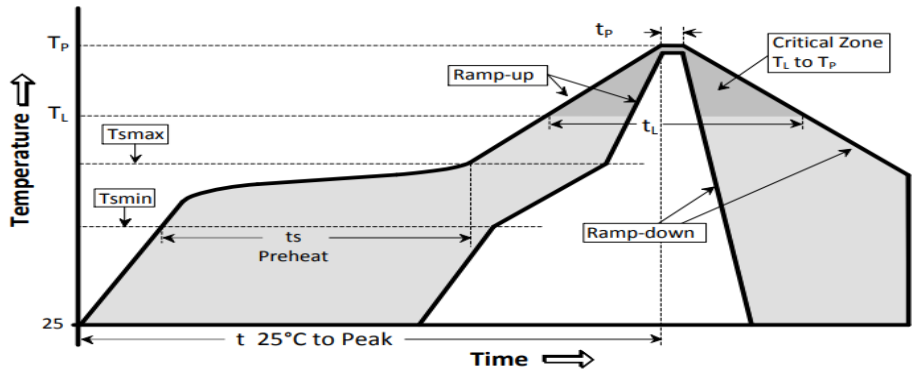
Thermal Characteristics:
The maximum die or junction temperature is 150°C

Absolute Maximum Ratings

Parameter	Unit
V_{CC} Supply Voltage	-0.3V to +4.0V
Vi Input Voltage	-0.3V to V_{CC} + 0.3V
Vo Output Voltage	-0.3V to V_{CC} + 0.3V

Reflow Cycle

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

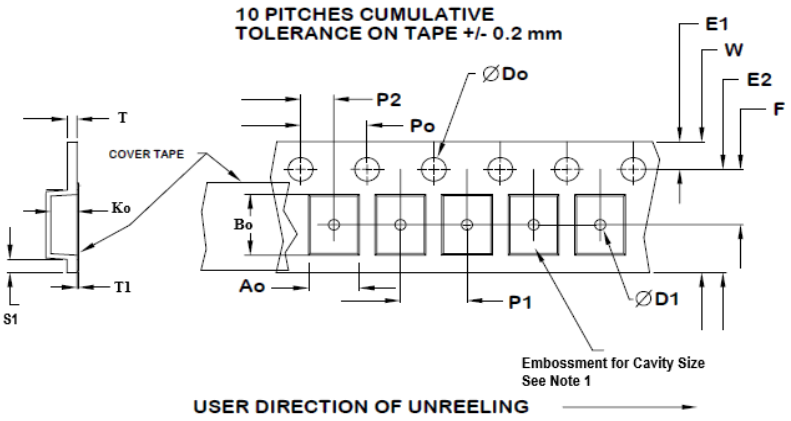


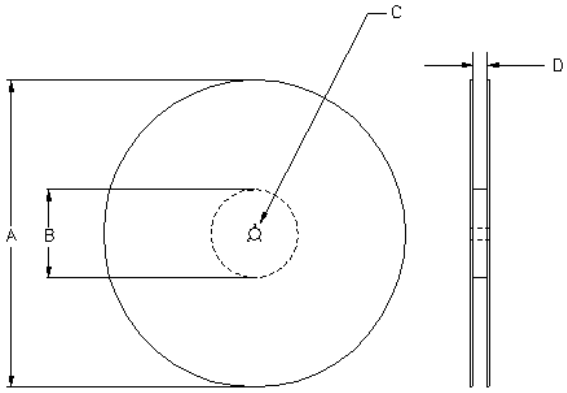
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time 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 1000 per reel, cut tape for < 250. 16mm tape, 8mm pitch.





Tape Variable Dimensions Table 2							
Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
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	S1 min	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	0.6	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	177.8	2.50	63.5	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0
10	10.0	254.0	4.00	101.6		
13	13.0	330.2	3.75	95.3		

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