



SM77H Series 3.3V CMOS Clock Oscillators

January 2016



- Pletronics' SM77H Series is a quartz crystal controlled precision square wave generator with a CMOS output.
- The package is designed for high density surface mount designs.
- This is a low cost mass produced oscillator.
- Tape and Reel or cut tape packaging is available.
- 0.8 to 70 MHz
- 5 x 7 mm LCC Ceramic Package
- Enable/Disable or Standby Function
- Disable function includes low standby power mode
- Low Jitter

Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2011/65/EC) and WEEE (2002/96/EC) directives.

Pletronics Inc. guarantees the device does not contain the following:

Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 0.17 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020C

Second Level Interconnect code: e4

Absolute Maximum Ratings:

Parameter	Unit
V_{CC} Supply Voltage	-0.5V to +7.0V
V_i Input Voltage	-0.5V to $V_{CC} + 0.5V$
V_o Output Voltage	-0.5V to $V_{CC} + 0.5V$
I_o Output Current	+25 mA to -25 mA

Thermal Characteristics

The maximum die or junction temperature is 155°C

The thermal resistance junction to board is 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Part Number:

SM77	45	H	E	V	- 25.0M	-XX	
Packaging code or blank							
T250 = 250 per Tape and Reel							
T500 = 500 per Tape and Reel							
T1K = 1,000 per Tape and Reel							
Frequency in MHz							
Supply Voltage V_{CC}							
V = 3.3V \pm 10%							
Optional Enhanced OTR							
Blank = Temp. range -10 to +70°C							
C = Temp. range -20 to +70°C							
E = Temp. range -40 to +85°C							
Series Model							
Frequency Stability							
45 = \pm 50 ppm							
44 = \pm 25 ppm							
20 = \pm 20 ppm							
Series Model							

Part Marking and Marking Legend:
PLE SM77
FF.FFF M
• YMDxx
PLE SM77
FF.FFF M
• YYWWxx
7xYWWxx
FF.FFF M
• PLE xxx

PLE = Pletronics
FF.FFF M = Frequency in MHz
YYWW or **YWW** or **YMD** = Date of Manufacture (year and week, or year-month-day)
All other marking is internal factory codes

Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from the marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YMD

Code	4	5	6	7	8	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2014	2015	2016	2017	2018	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	

Electrical Specification for 3.30V ±10% over the specified temperature range

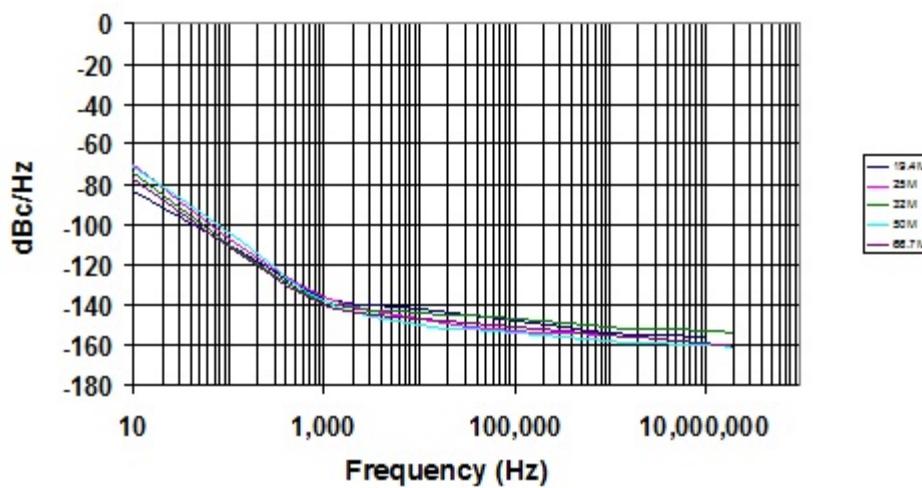
Item	Min	Max	Unit	Condition
Frequency Range	0.8	69.9	MHz	
Frequency Accuracy "45"	-50	+50	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
"44"	-25	+25		
"20"	-20	+20		
Output Waveform	CMOS			
Output High Level	90	-	%	of V_{cc} (See load circuit)
Output Low Level	-	10	%	
Output Symmetry	45	55	%	
Jitter	-	0.6	pS RMS	12 KHz to 20 MHz from the output frequency
	-	2.5	pS RMS	10 Hz to 1 MHz from the output frequency
Enable/Disable Internal Pull-up	50	-	Kohm	to V_{cc} of V_{cc} applied to pin 1
V disable	-	30	%	
V enable	70	-	%	
Output leakage $V_{out} = V_{cc}$	-10	+10	uA	Pin 1 low, device disabled
$V_{out} = 0V$	-10	+10	uA	
Standby Current I_{cc}	-	3	uA	
Enable time	-	2.0	μs	Time for output to reach a logic state
Disable time	-	100	ns	Time for output to reach a high Z state
Start up time	-	3	μs	Time for output to reach specified frequency
Operating Temperature Range	-10	+70	°C	Standard Temperature Range
	-20	+70	°C	Extended Temperature Range "C" Option
	-40	+85	°C	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	°C	

Electrical Specification for 3.30V $\pm 10\%$ over the specified temperature range

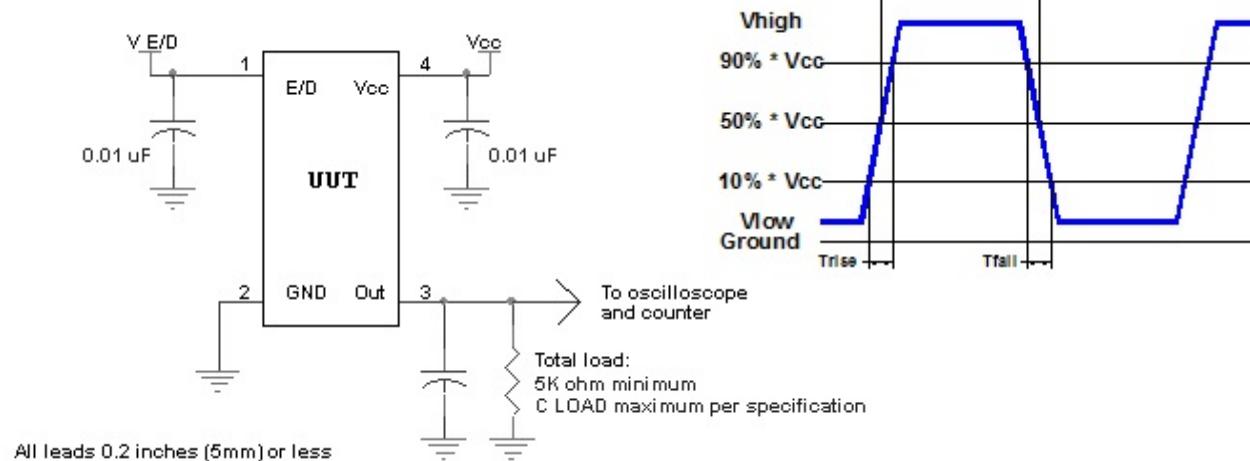
Item	Typ	Max	Unit	Condition	
Output T_{RISE} and T_{FALL}	-	5	nS	< 35 MHz	$C_{LOAD} = 15$ pF 10% to 90% of V_{cc} See Load Circuit
	-	3	nS	≥ 35 MHz	
	-	8	nS	< 35 MHz	$C_{LOAD} = 30$ pF 10% to 90% of V_{cc} See Load Circuit
	-	5	nS	≥ 35 MHz	
V_{cc} Supply Current (I_{cc})	-	9	mA	< 8 MHz	$C_{LOAD} = 15$ pF
	-	11	mA	≥ 8 MHz and < 16 MHz	
	-	17	mA	≥ 16 MHz and < 35 MHz	
	-	26	mA	≥ 35 MHz	
	-	12	mA	< 8 MHz	$C_{LOAD} = 30$ pF
	-	16	mA	≥ 8 MHz and < 16 MHz	
	-	22	mA	≥ 16 MHz and < 35 MHz	
	-	35	mA	≥ 35 MHz	

Specifications with Pad 1 E/D open circuit

Typical phase noise plot for 5 oscillators at different output frequencies.



Load Circuit and Test Waveform



Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition B
Vibration	MIL-STD-883 Method 2007, Condition A
Solderability	MIL-STD-883 Method 2003
Thermal Shock	MIL-STD-883 Method 1011, Condition A

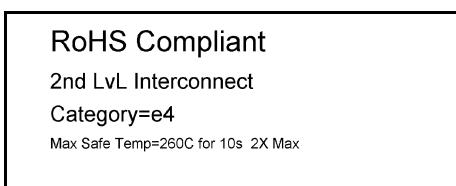
ESD Rating

Model	Minimum Voltage	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

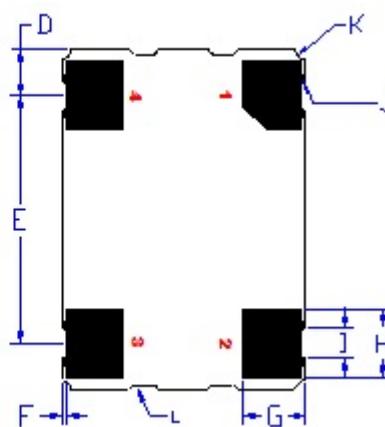
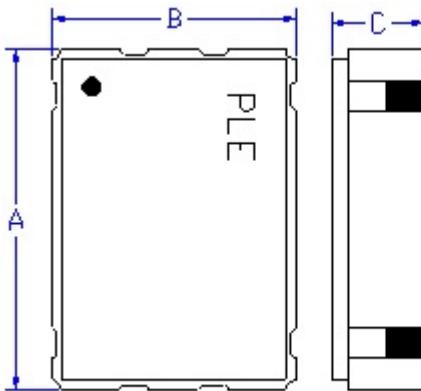
Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)
 Font is Courier New
 Bar code is 39-Full ASCII

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



Mechanical:



	Inches	mm
A	0.276 \pm 0.006	7.00 \pm 0.15
B	0.197 \pm 0.006	5.00 \pm 0.15
C	0.068 \pm 0.018	1.73 \pm 0.44
D ¹	0.038	0.96
E ¹	0.200	5.08
F ¹	0.004	0.10
G ¹	0.050	1.27
H ¹	0.055	1.40
I ¹	0.024	0.60
J ¹	0.004	0.10R
K ¹	0.008	0.020R

The detents "L", 4 each, on the package ends are optional

Not to Scale

¹ Typical dimensions

Contacts (pads) :

Gold 11.8 to 39.4 μ inches (0.3 to 1.0 μ m) over Nickel 50 to 350 μ inches (1.27 to 8.89 μ m)

Pad	Function	Note
1	Output Enable/Disable	When this pin is not connected the oscillator shall operate. When this pin is logic low the output will be inhibited (high impedance state.) Recommend connecting this pin to V_{cc} if the oscillator is to be always on.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V_{cc})	Recommend connecting appropriate power supply bypass capacitors as close as possible.

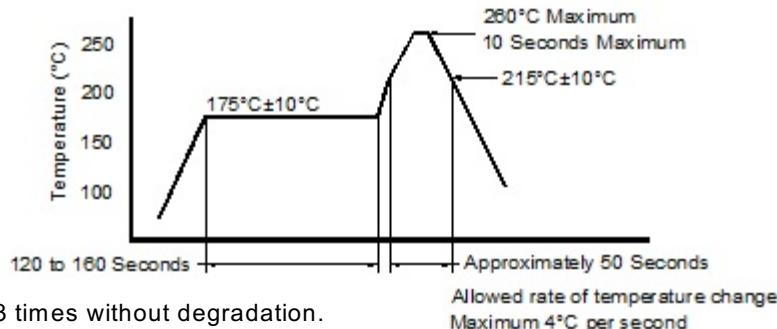


Layout and application information

For Optimum Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.

Reflow Cycle (typical for lead free processing)



The part may be reflowed 3 times without degradation.

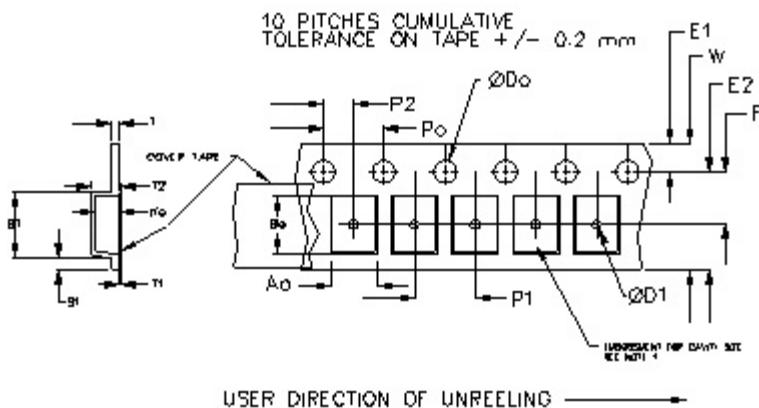
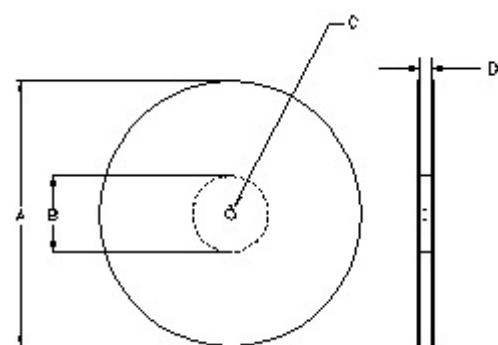
Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	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	0.6	0.6	0.1
12mm		1.5			2.0 ±0.1			
16mm		1.5			2.0 ±0.1			
24mm		1.5			2.0 ±0.1			

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
16 mm	12.1	14.25	7.5 ±0.1	8.0 ±0.1	8.0	16.3	Note 1

Note 1: Embossed cavity to conform to EIA-481-B

Not to scale



REEL DIMENSIONS				
A	inches	7.0	10.0	13.0
	mm	177.8	254.0	330.2
B	inches	2.50	4.00	3.75
	mm	63.5	101.6	95.3
C	mm	13.0 +0.5 / -0.2		
D	mm	16.4 +2.0 / -0.0	16.4 +2.0 / -0.0	16.4 +2.0 / -0.0
		Tape Width		
		16.0		

Reel dimensions may vary from the above

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