

SM44T Series 2.5 V CMOS Clock Oscillators

November 2018

Lead Free 

- Pletronics' SM44 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 180 MHz
- 2.5 x 3.2 mm LCC Ceramic Package
- Enable/Disable 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: 0.041 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 40 to 60°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Part Number:

SM44	45	T	E	W	- 75.0M	-XX	
							Packaging code or blank T250 = 250 per Tape and Reel T500 = 500 per Tape and Reel T1K = 1000 per Tape and Reel
							Frequency in MHZ
							Supply Voltage V_{CC} W = 2.5V ± 10%
							Temperature Range Blank = Temp. range -10 to +70°C C = Temp. range -10 to +70°C E = Temp. range -40 to +85°C
							Series Model
							Frequency Stability 45 = ± 50 ppm 44 = ± 25 ppm 20 = ± 20 ppm
							Series Model

Part Marking:

PFF.FFM •YMDxx	or	PFF.FFM •YMxxx
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Marking legend:

P	= Pletronics
FF.FFF	= Frequency in MHz
YMD or YM	= Date of Manufacture (year and month, or year-month-day)

All other markings are 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	6	7	8	9	0	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2016	2017	2018	2019	2020	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 2.50V $\pm 10\%$ over the specified temperature range

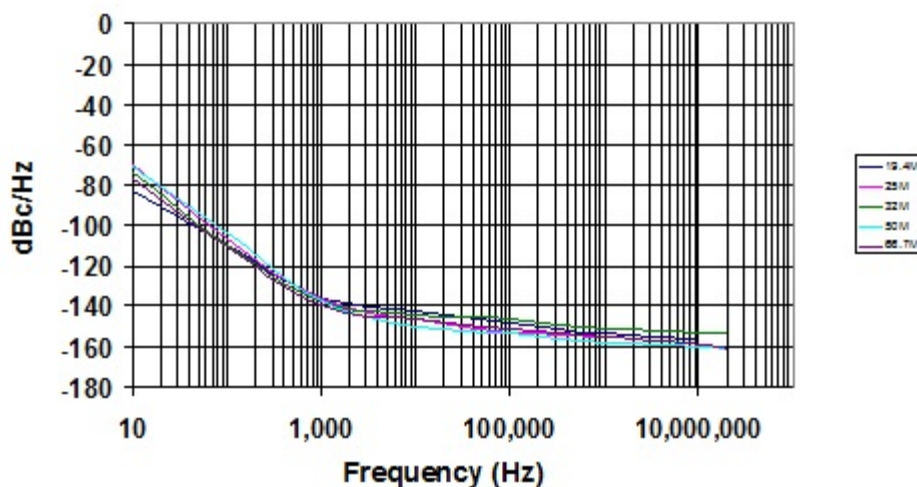
Item	Min	Max	Unit	Condition
Frequency Range	0.8	180	MHZ	
Frequency Accuracy "45" "44" "20"	-50 -25 -20	+50 +25 +20	ppm	For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures
Output Waveform	CMOS			
Output High Level	90	-	%	of V_{CC} (See load circuit)
Output Low Level	-	10	%	
Output Symmetry	45	55	%	at 50% point of V_{CC}
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}
V disable	-	30	%	of V_{CC} applied to pad 1
V enable	70	-	%	
Output leakage $V_{OUT} = V_{CC}$	-10	+10	uA	Pad 1 low, device disabled
$V_{OUT} = 0V$	-10	+10	uA	
Standby Current I_{CC}	-	3	uA	
Enable time	-	100	nS	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	mS	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 2.50V $\pm 10\%$ over the specified temperature range

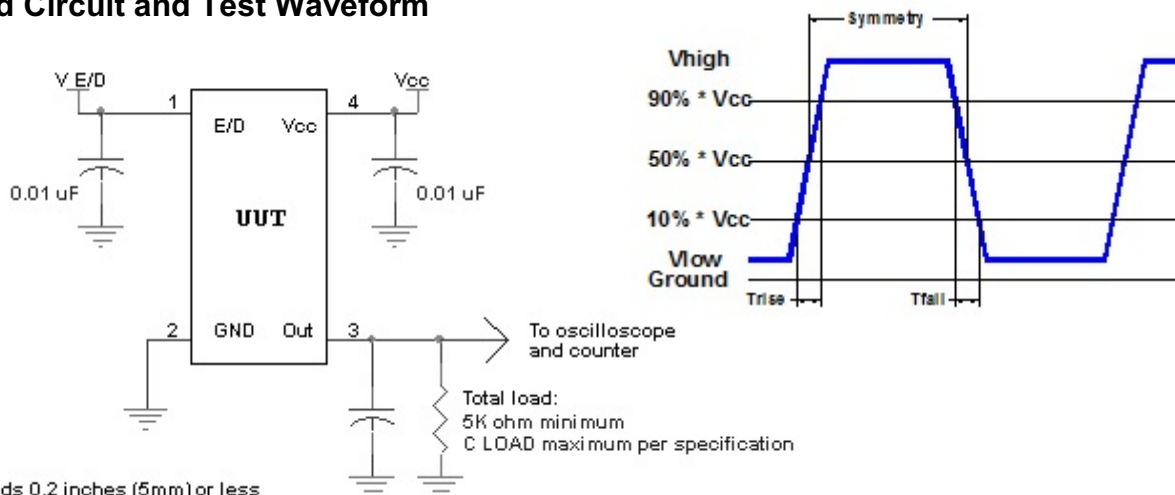
Item	Typ	Max	Unit	Condition
Output T_{RISE} and T_{FALL}	2.8	5.5	nS	< 35 MHZ
	3	6	nS	≥ 35 MHZ and < 70 MHZ
	1	2	nS	≥ 70 MHZ
	4.5	9	nS	< 35 MHZ
	6	12	nS	≥ 35 MHZ and < 70 MHZ
	2	3	nS	≥ 70 MHZ and < 120 MHZ
V_{CC} Supply Current (I_{CC})	1.5	2.5	mA	< 8 MHZ
	1.8	3	mA	≥ 8 MHZ and < 16 MHZ
	2.4	4	mA	≥ 16 MHZ and < 35 MHZ
	7	9	mA	≥ 35 MHZ and < 70 MHZ
		36	mA	≥ 70 MHZ and < 120 MHZ
		55	mA	≥ 120 MHZ
	2	3	mA	< 8 MHZ
	2.2	3.5	mA	≥ 8 MHZ and < 16 MHZ
	2.5	4.5	mA	≥ 16 MHZ and < 35 MHZ
	10	13	mA	≥ 35 MHZ and < 70 MHZ
	27	42	ma	≥ 70 MHZ and < 120 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



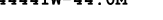


ESD Rating

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

P/N:			
	SM4444TW-44.0M		
Customer P/N:			
	12345678		
Qty:		D/C	
	500		7FW-MMO

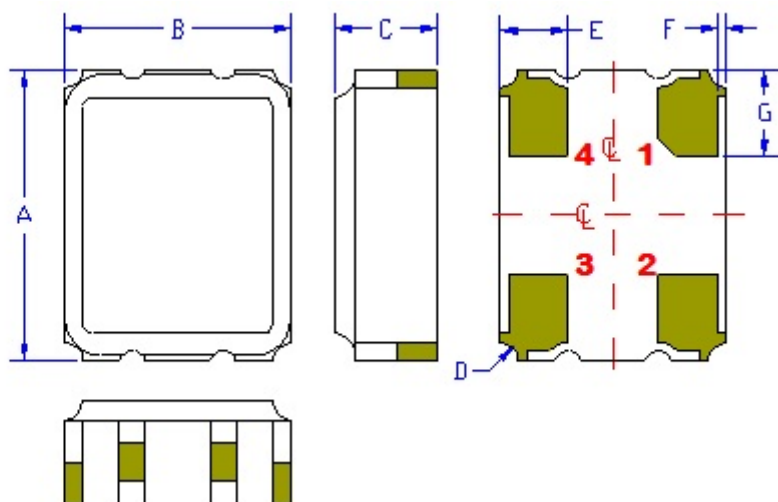
RoHS Compliant

2nd LVL Interconnect

Category=e4

Max Safe Temp=260C for 10s 2X Max

Mechanical:



	Inches	mm
A	0.125 \pm 0.006	3.20 \pm 0.15
B	0.098 \pm 0.006	2.50 \pm 0.15
C	0.046 max	1.15 max
D ¹	0.008	0.20R
E ¹	0.030	0.75
F ¹	0.004	0.10
G ¹	0.037	0.95

Not to Scale

¹ Typical dimensions

Contacts :

Gold 11.8 to 29.4 μ m (0.3 to 1.0 μ m) over Nickel 50 to 350 μ m (1.27 to 8.89 μ m)

Pad	Function	Note
1	Output Enable/Disable	When this pad is not connected the oscillator shall operate. When this pad is logic low the output will be inhibited (high impedance state.) Recommend connecting this pad 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.

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