



## SM55G Series 1.8 V CMOS Clock Oscillators

January 2016

**Lead Free** 

- Pletronics' SM55 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 165 MHz
- 3.2 x 5 mm LCC Ceramic Package
- Enable/Disable Function
- Disable function includes low standby power mode
- Low Jitter
- Optimized for fastest Trise & Tfall

**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: 0.064 grams

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

Second Level Interconnect code: e4

### Absolute Maximum Ratings:

Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +7.0V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V
I <sub>o</sub> 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:**

SM55	45	G	E	X	- 75.0M	-XX	
							<b>Packaging code or blank</b> T250 = 250 per Tape and Reel T500 = 500 per Tape and Reel T1K = 1000 per Tape and Reel
							<b>Frequency in MHz</b>
							<b>Supply Voltage V<sub>CC</sub></b> <b>X</b> = 1.8V ± 10%
							<b>Optional Enhanced OTR</b> <b>Blank</b> = Temp. range -10 to +70°C <b>C</b> = Temp. range -20 to +70°C <b>E</b> = Temp. range -40 to +85°C
							<b>Series Model</b>
							<b>Frequency Stability</b> <b>45</b> = ± 50 ppm <b>44</b> = ± 25 ppm <b>20</b> = ± 20 ppm
							<b>Series Model</b>

**Part Marking and Legend:**

<b>P ff.fff M</b> • YMDxx	<b>P ff.fff M</b> • YYWWxx	<b>PLE SM55</b> <b>ff.fff M</b> • YMDxx	<b>P5xYWWx</b> • ff.fff M	<b>5xYWWxx</b> <b>ff.fff M</b> • PLExx
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PLE = Pletronics  
 ff.fff M or ff.ff 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 1.80V $\pm 10\%$ over the specified temperature range

Item	Min	Max	Unit	Condition
Frequency Range	0.8	165	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 $V_{CC}$ for $I_{OH} = +2$ mA <35 MHz
	70	-		of $V_{CC}$ for $I_{OH} = +8$ mA $\geq$ 35 MHz
Output Low Level	-	10	%	of $V_{CC}$ for $I_{OL} = -2$ mA <35 MHz
	-	30		of $V_{CC}$ for $I_{OL} = -8$ mA $\geq$ 35 MHz
Output Symmetry	45	55	%	at 50% point of $V_{CC}$ (See load circuit)
Jitter Output: 1 to 15 MHz	-	6.0	pS RMS	10 Hz to 1 MHz from the output frequency
Output: 15 to 35 MHz	-	5.0	pS RMS	
Output: 35 to 50 MHz	-	4.0	pS RMS	
Output: 50 to 70 MHz	-	3.0	pS RMS	
Output: > 70 MHz	-	2.5	PS RMS	
Output: 25 to 70 MHz	-	0.7	pS RMS	12 KHz to 20 MHz from the output frequency
Output: > 70 MHz	-	0.6	pS RMS	
E/D Internal Pull-up	50	500	Kohm	to $V_{CC}$
V disable	-	30	%	of $V_{CC}$ applied to pin 1
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 $I_{CC}$	-	4	uA	< 35 MHz
	-	100	uA	$\geq$ 35 MHz
Enable time	-	250	nS	Time for output to reach a logic state
Disable time	-	250	nS	Time for output to reach a high Z state
Start up time	-	10	mS	Time for output to reach specified frequency
Operating Temperature Range	-10	+70	$^{\circ}C$	Standard Temperature Range
	-20	+70	$^{\circ}C$	Extended Temperature Range "C" Option
	-40	+85	$^{\circ}C$	Extended Temperature Range "E" Option
Storage Temperature Range	-55	+125	$^{\circ}C$	

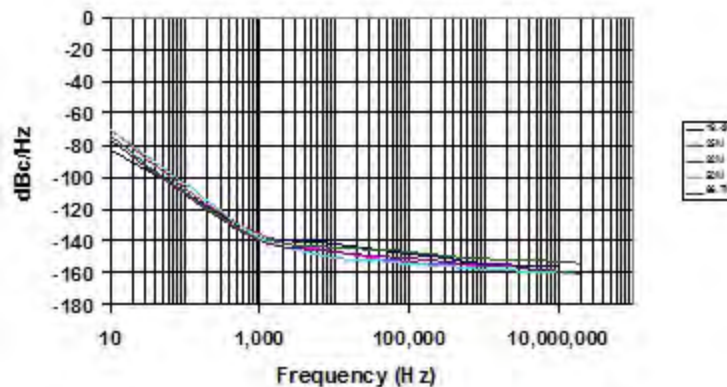
## Electrical Specification for 1.80V $\pm 10\%$ over the specified temperature range

Item	Typ	Max	Unit	Condition	
Output $T_{RISE}$ and $T_{FALL}$	1.5	3	nS	< 35 MHz	$C_{LOAD} = 15$ pF 20% to 80% of $V_{CC}$ See Load Circuit
	1.7	3.5	nS	$\geq 35$ MHz and < 70 MHz	
	1.5	2.5	nS	$\geq 70$ MHz	
	4	7	nS	< 35 MHz	$C_{LOAD} = 30$ pF 20% to 80% of $V_{CC}$ See Load Circuit
	2	7	nS	$\geq 35$ MHz < 70 MHz	
	6	12	nS	< 35 MHz	$C_{LOAD} = 50$ pF 20% to 80% of $V_{CC}$ See Load Circuit
6	11	nS	$\geq 35$ MHz and < 45 MHz		
$V_{CC}$ Supply Current ( $I_{CC}$ )	2	4	mA	< 8 MHz	$C_{LOAD} = 15$ pF
	2.5	5	mA	$\geq 8$ MHz and < 16 MHz	
	5	8	mA	$\geq 16$ MHz and < 35 MHz	
	-	18	mA	$\geq 35$ MHz and < 70 MHz	
	17	27	mA	$\geq 70$ MHz and < 120 MHz	
	23	37	mA	$\geq 120$ MHz	
	2.5	4.5	mA	< 8 MHz	$C_{LOAD} = 30$ pF
	3	5	mA	$\geq 8$ MHz and < 16 MHz	
	4	8	mA	$\geq 16$ MHz and < 35 MHz	
	10	20	mA	$\geq 35$ MHz and < 70 MHz	
	2.5	4	mA	< 8 MHz	$C_{LOAD} = 50$ pF
	4	6	mA	$\geq 8$ MHz and < 16 MHz	
	5	9	mA	$\geq 16$ MHz and < 35 MHz	
	13	23	mA	$\geq 35$ MHz and < 45 MHz	

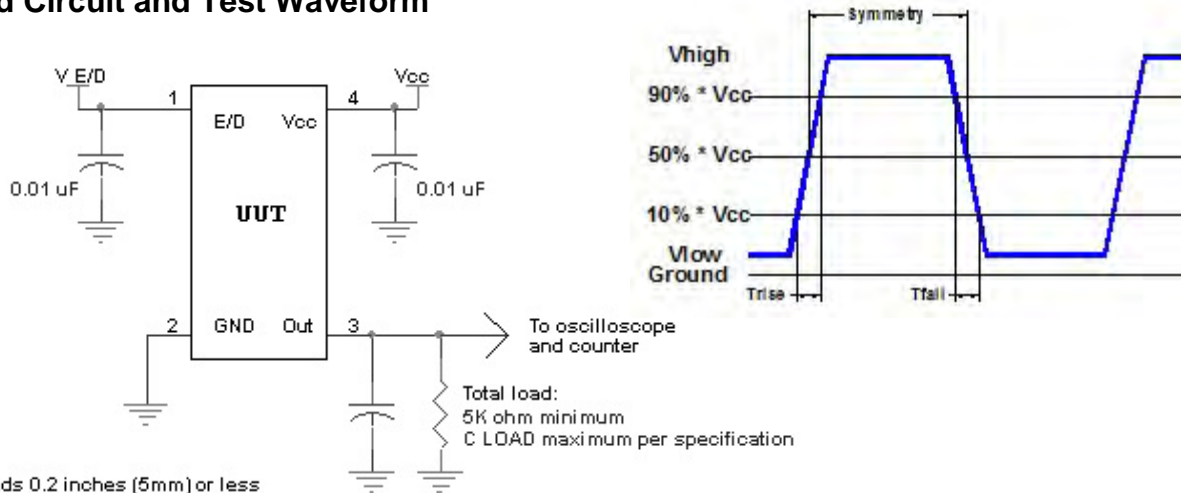
Specifications with Pad 1 E/D open circuit

NOTE: Not specified for 50 pF loads above 45 MHz, or 30 pF loads above 70 MHz

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



## Load Circuit and Test Waveform



All leads 0.2 inches (5mm) or less

## 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

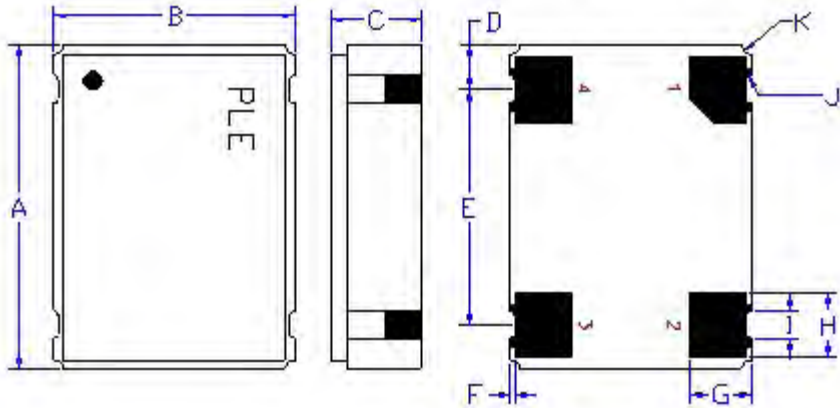
Label is 1" x 2.6" (25.4mm x 66.7mm)

Font is Arial

P/N:		
	SM5545GX-40.0M	
Customer P/N:		
Qty:		D/C
	1000	0632-MMO

RoHS Compliant
2nd Lvl Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

## Mechanical:



	Inches	mm
A	0.197 ±0.006	5.00 ±0.15
B	0.126 ±0.006	3.20 ±0.15
C	0.045 ±0.004	1.15 ±0.10
D <sup>1</sup>	0.048	1.23
E <sup>1</sup>	0.100	2.54
F <sup>1</sup>	0.004	0.10
G <sup>1</sup>	0.050	1.27
H <sup>1</sup>	0.055	1.40
I <sup>1</sup>	0.024	0.60
J <sup>1</sup>	0.004	0.10R
K <sup>1</sup>	0.008	0.020R

Not to Scale

<sup>1</sup> Typical dimensions

Contacts :

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)

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 <sub>CC</sub> if the oscillator is to be always on.
2	Ground (GND)	
3	Output	
4	Supply Voltage (V <sub>CC</sub> )	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.

