



## SM12T Series Miniature SMD Crystal

November 2018

- Pletronics' SM12T Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 10 MHz to 80 MHz Fundamental Mode
- 40 MHz to 150 MHz 3<sup>rd</sup> Overtone
- 3.5 x 6 mm 4 pad
- AT Cut Crystal
- Ideal for use in hand held consumer products.

### 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: 0.06 grams

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

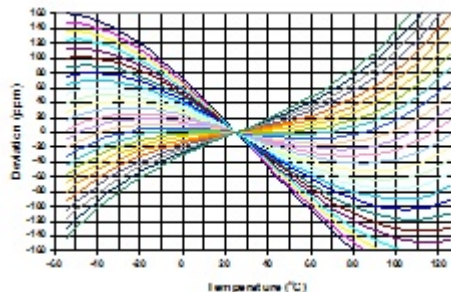
Second Level Interconnect code: e4



### Electrical Specification:

Item	Min	Max	Unit	Condition	
Frequency Range	10	80	MHz	Fundamental Mode	
	40	150	MHz	3 <sup>rd</sup> Overtone	
Calibration Frequency Tolerance	10	50	ppm	at +25°C ± 3°C, see part number for options	
Frequency Stability over OTR	3	150	ppm	see part number for available options	
Equivalent Series Resistance (ESR)	-	60	Ohms	10 MHz to 16 MHz	Fundamental
	-	50	Ohms	16 MHz to 50 MHz	
	-	100	Ohms	40 MHz to 150 MHz	3 <sup>rd</sup> Overtone
Drive Level	-	100	µW	use 10 µW for testing	
Shunt Capacitance (C0)	-	5	pF	Pad to Pad capacitance	
Aging	-3	+3	ppm /Yr	for the first year	
	-2	+2	ppm /Yr	after the first year	
Operating Temperature Range	-40	+125	°C	see part number for available options	
Storage Temperature Range	-55	+125	°C		

### AT Cut Crystal Frequency versus Temperature Typical Performance:



### Part Number:

SM12T -18 -14.31818M- 20 E 1 L K -XX

See chart below for available options

Internal code or blank
<b>Highest Specified Operating Temperature</b> <b>A</b> = 40°C <b>G</b> = 70°C <b>N</b> = 100°C <b>B</b> = 45°C <b>H</b> = 75°C <b>P</b> = 105°C <b>C</b> = 50°C <b>J</b> = 80°C <b>R</b> = 110°C <b>D</b> = 55°C <b>K</b> = 85°C <b>S</b> = 115°C <b>E</b> = 60°C <b>L</b> = 90°C <b>T</b> = 120°C <b>F</b> = 65°C <b>M</b> = 95°C <b>U</b> = 125°C
<b>Lowest Specified Operating Temperature</b> <b>A</b> = +10°C <b>F</b> = -15°C <b>L</b> = -40°C <b>B</b> = +5°C <b>G</b> = -20°C <b>M</b> = -45°C <b>C</b> = 0°C <b>H</b> = -25°C <b>N</b> = -50°C <b>D</b> = -5°C <b>J</b> = -30°C <b>P</b> = -55°C <b>E</b> = -10°C <b>K</b> = -35°C
<b>Mode:</b> 1 = Fundamental    3 = 3 <sup>rd</sup> Overtone
<b>Frequency Stability</b> See chart below
<b>Calibration Frequency Tolerance</b> <b>10</b> = $\pm 10$ ppm at 25°C $\pm 3^\circ\text{C}$ <b>15</b> = $\pm 15$ ppm at 25°C $\pm 3^\circ\text{C}$ <b>20</b> = $\pm 20$ ppm at 25°C $\pm 3^\circ\text{C}$ <b>50</b> = $\pm 50$ ppm at 25°C $\pm 3^\circ\text{C}$ (Standard)
<b>Frequency in MHz</b>
<b>Load in pF</b> Parallel Resonance from <b>06</b> to <b>32</b> pF or <b>SR</b> = Series Resonance
<b>Series Model</b>

		Available Frequency Stability versus Temperature in ppm									
Operating Temperature Range	CODE	A	B	C	D	E	F	G	H	J	K
		$\pm 3.0$	$\pm 5.0$	$\pm 8.0$	$\pm 10$	$\pm 15$	$\pm 20$	$\pm 30$	$\pm 50$	$\pm 100$	$\pm 150$
0 to +45°C	CB	•	•	•	•	•	•	•	•	•	•
0 to +50°C	CC	•	•	•	•	•	•	•	•	•	•
0 to +60°C	CE	•	•	•	•	•	•	•	•	•	•
0 to +70°C	CG		•	•	•	•	•	•	STD	•	•
-10 to +50°C	EC		•	•	•	•	•	•	•	•	•
-10 to +60°C	EE		•	•	•	•	•	•	•	•	•
-10 to +75°C	EH			•	•	•	•	•	•	•	•
-20 to +70°C	GG			•	•	•	•	•	•	•	•
-20 to +75°C	GH				•	•	•	•	•	•	•
-30 to +75°C	JH				•	•	•	•	•	•	•
-30 to +80°C	JJ				•	•	•	•	•	•	•
-30 to +85°C	JK				•	•	•	•	•	•	•
-35 to +80°C	KJ					•	•	•	•	•	•
-40 to +85°C	LK					•	•	•	•	•	•
-40 to +90°C	LL					•	•	•	•	•	•
-40 to +105°C	LP					•	•	•	•	•	•
-40 to +125°C	LU						•	•	•	•	•

### Legacy Part Number (not for new designs):





SM12T	B	E	-18	-11.0592M	-XX	
<b>Internal code or blank</b>						
<b>Frequency in MHz</b>						
<b>Load in pF</b> Parallel Resonance from <b>6</b> to <b>32</b> pF or <b>SR</b> = Series Resonance						
<b>Operating Temperature Range</b> Blank = 0 to + 70°C <b>E</b> = -40 to +85°C						
<b>Calibration Tolerance / Frequency Stability</b> Blank = 50/50 (Standard) <b>A</b> = 30/50 <b>B</b> = 30/30 <b>C</b> = 15/30 <b>D</b> = 10/20 (not all frequencies)						
<b>Model Number</b>						

### 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

### Package Labeling

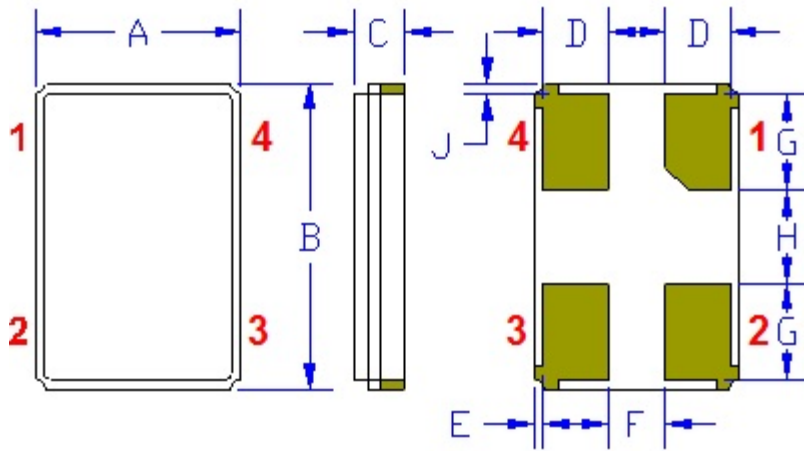
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

<b>P/N:</b>	
	SM12T-SR-23.45M-10F1CG
<b>Customer P/N:</b>	
	12345678
<b>Qty:</b>	 <b>D/C</b> 
	1000 0526

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

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

**Mechanical:**



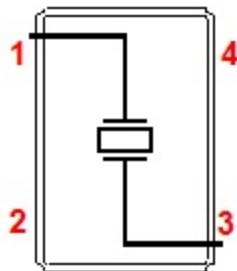
	Inches	mm
A	0.138 ± 0.008	3.5 ± 0.2
B	0.236 ± 0.008	6.0 ± 0.2
C	0.047 max	1.2 max
D <sup>1</sup>	0.035	0.9
E <sup>1</sup>	0.004	0.1
F <sup>1</sup>	0.059	1.5
G <sup>1</sup>	0.055	1.4
H <sup>1</sup>	0.118	3.0
J <sup>1</sup>	0.004	0.1

Contacts :  
Gold 11.8 μinches 0.3 μm minimum over  
Nickel 50 to 350 μinches 1.27 to 8.89 μm

**Not to Scale**

<sup>1</sup> Typical dimensions

**Connection (top view):**



Pad 2 and Pad 4 are common and connected to the metal cover. They are not connected to the crystal.



**Layout and application information**

- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.
- The package should be grounded for optimum performance, pad 2 and/or pad 4 connected to ground.

### Part Marking:

**fff.fff M**  
**PymdC**

Where **fff.fff** = frequency in MHz  
**Pymd** = Pletronics and Date code  
**C** = Capacitance load code (see table below)

- Orientation of marking may be mixed on the tape
- Traceability of part is lost once removed from reel

Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
pF	10	12	13	8	15	18	20	22	24	26	28	30	32	34	36	27	series	33	50	19	16	17	14

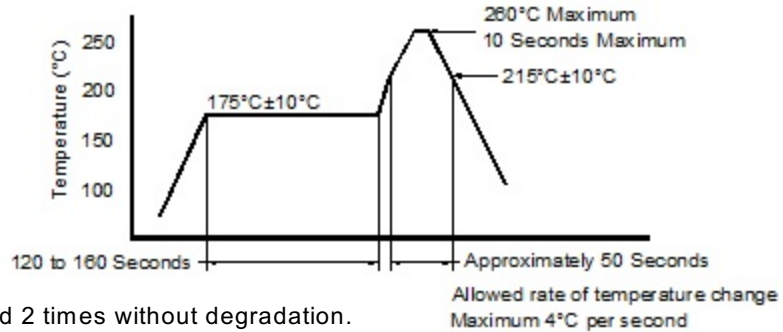
### Codes for Date Code YMD

Code	4	5	6	7	8	9	0
Year	2014	2015	2016	2017	2018	2019	2020

Code	A	B	C	D	E	F	G	H	J	K	L	M
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
Day	1	2	3	4	5	6	7	8	9	10	11	12
Code	D	E	F	G	H	J	K	L	M	N	P	R
Day	13	14	15	16	17	18	19	20	21	22	23	24
Code	T	U	V	W	X	Y	Z					
Day	25	26	27	28	29	30	31					

### Reflow Cycle (typical for lead free processing)



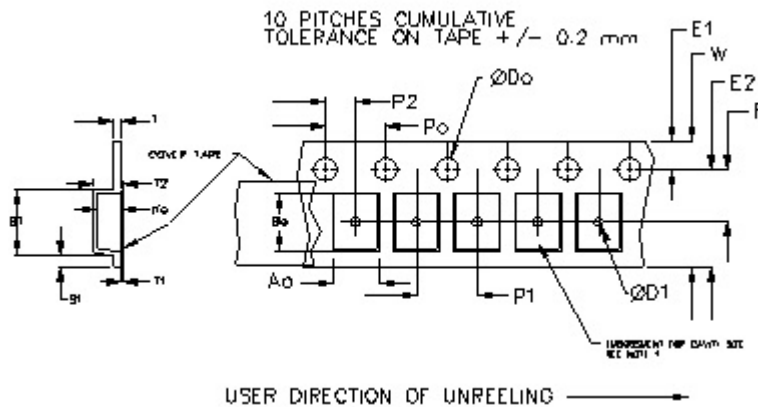
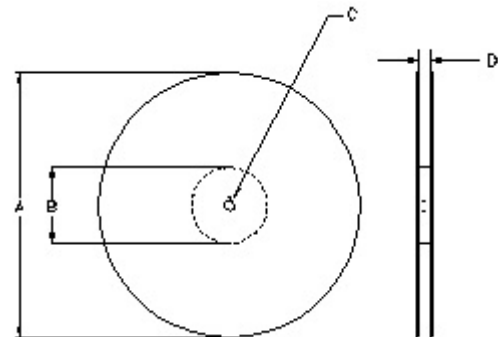
The part may be reflowed 2 times without degradation.

### Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5	1.0	1.75	4.0	2.0 ± 0.05	0.6	0.25	0.1
12mm		1.5			2.0 ± 0.1			
16mm		+0.1 -0.0			± 0.1			
24mm		1.5			± 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 Dimensions in mm Not to scale



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

Reel dimensions may vary from the above

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