PLETRONICS
Innovations in
Frequency Control

SM12T Series
Miniature SMD Crystal

February 2015

- 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 3rd 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.

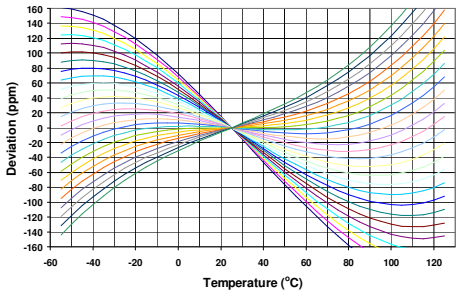
Pletronics Inc. guarantees the device does not contain the following:
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.06 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020C
Second Level Interconnect code: e4

Lead Free

Electrical Specification:

Item	Min	Max	Unit	Condition	
Frequency Range	10	80	MHz	Fundamental Mode	
	40	150	MHz	3rd 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	3rd 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

Highest Specified Operating Temperature

A = 40ºC	**G** = 70ºC	**N** = 100ºC
B = 45ºC	**H** = 75ºC	**P** = 105ºC
C = 50ºC	**J** = 80ºC	**R** = 110ºC
D = 55ºC	**K** = 85ºC	**S** = 115ºC
E = 60ºC	**L** = 90ºC	**T** = 120ºC
F = 65ºC	**M** = 95ºC	**U** = 125ºC

Lowest Specified Operating Temperature

A = +10ºC	**F** = -15ºC	**L** = -40ºC
B = +5ºC	**G** = -20ºC	**M** = -45ºC
C = 0ºC	**H** = -25ºC	**N** = -50ºC
D = -5ºC	**J** = -30ºC	**P** = -55ºC
E = -10ºC	**K** = -35ºC	

Mode: **1** = Fundamental **3** = 3rd Overtone

Frequency Stability See chart below

Calibration Frequency Tolerance

10 = ± 10 ppm at 25ºC ± 3ºC
15 = ± 15 ppm at 25ºC ± 3ºC
20 = ± 20 ppm at 25ºC ± 3ºC
50 = ± 50 ppm at 25ºC ± 3ºC (Standard)

Frequency in MHz

Cload in pF
Parallel Resonance from **06** to **32** pF or
SR = Series Resonance

Series Model

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

Legacy Part Number (not for new designs):

SM12T	B	E	-18	-11.0592M	-XX

Internal code or blank
Frequency in MHz
Cload in pF Parallel Resonance from **6** to **32** pF or **SR** = Series Resonance
Operating Temperature Range Blank = 0 to + 70ºC **E** = -40 to +85ºC
Calibration Tolerance / **Frequency Stability** Blank = 50/50 (Standard) **A** = 30/50 **B** = 30/30 **C** = 15/30 **D** = 10/20 (not all frequencies)
Model Number

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

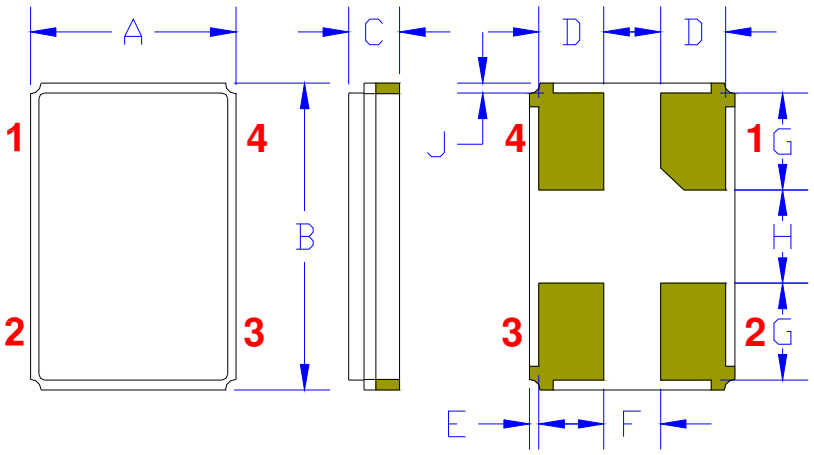
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

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

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

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

Mechanical:



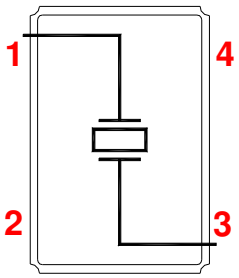
	Inches	mm
A	0.138 ± 0.008	3.5 ± 0.2
B	0.236 ± 0.008	6.0 ± 0.2
C	0.047 max	1.2 max
D[1]	0.035	0.9
E[1]	0.004	0.1
F[1]	0.059	1.5
G[1]	0.055	1.4
H[1]	0.118	3.0
J[1]	0.004	0.1

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

Not to Scale

[1] 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.

Lead Free

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**
P*ymdC*

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

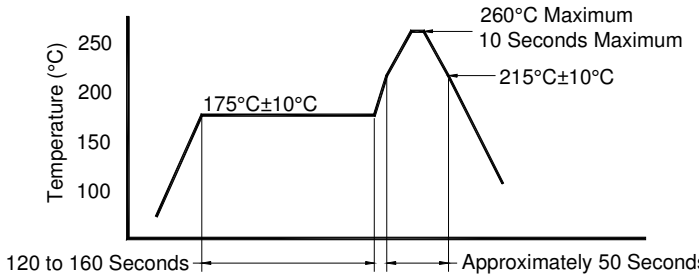
Codes for Date Code YMD

Code	2	3	4	5	6	7	8
Year	2012	2013	2014	2015	2016	2017	2018

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.

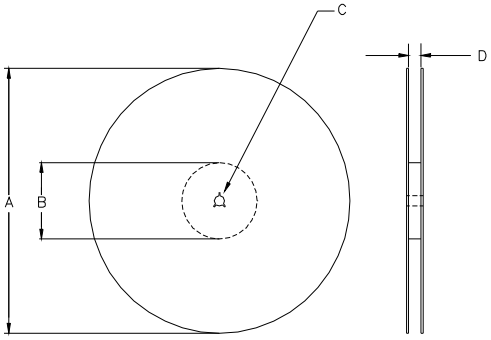
Allowed rate of temperature change
Maximum 4°C per second

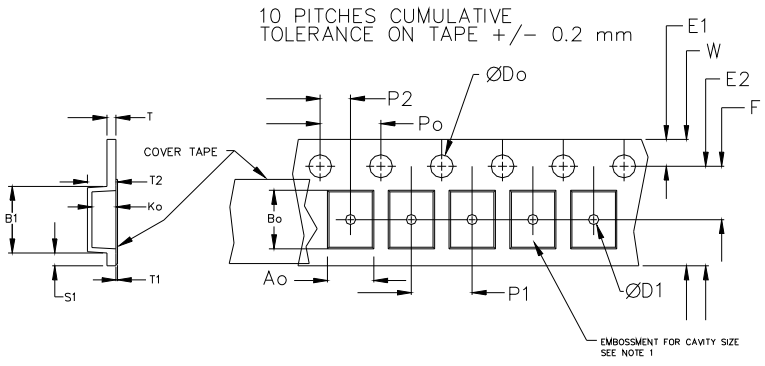
Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5 +0.1 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.6	0.25	0.1
12mm		1.5			2.0 ±0.1			
16mm		1.5						
24mm		1.5						

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





USER DIRECTION OF UNREELING

		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	Tape Width
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	16.0

Reel dimensions may vary from the above

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