PLETRONICS SM12T Series
Miniature SMD Crystal

SM12T
6.0 x 3.5 x 1.0 mm
Ceramic Package

Features

- Miniature low profile surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- AT Cut Crystal
- 10 MHz to 150 MHz

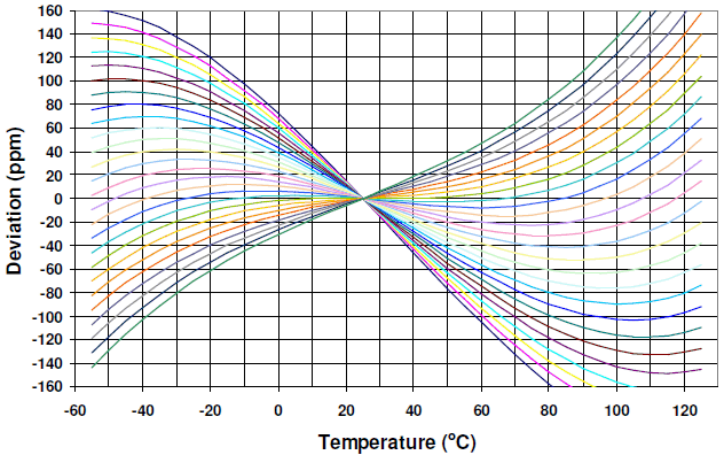
Applications

Bluetooth
WLAN
IoT

Electrical Characteristics

Parameter	**Min**	**Typ**	**Max**	**Unit**	**Condition** (Consult factory for other options)
Frequency Range	10.0	-	150.0	MHz	
Calibration Frequency Tolerance	±10	-	±50	ppm	at +25°C ± 3°C, see part number guide below for available options
Frequency Stability	±5	-	±100	ppm	see part number guide below for available options
Operating Temperature Range	-40	-	+125	°C	see part number guide below for available options
Storage Temperature Range	-55	-	+125	°C	
Equivalent Series Resistance (ESR)	-	-	60 50 100	Ω	10 MHz ≤ Freq < 16 MHz 16 MHz ≤ Freq ≤ 50 MHz 40 MHz ≤ Freq < 150 MHz (3rd Overtone)
Drive Level	-	-	100	µW	Use 10µW for testing
Shunt Capacitance (C0)	-	-	5.0	pF	Pad to Pad Capacitance
Aging at 25°C ± 3°C	-	-	±3	ppm	for the first year
	-	-	±2	ppm	after the first year

AT Cut Crystal Frequency versus Temperature Typical Performance:



Part Numbering

Series Model	Load Capacitance (CLoad) in pF	Frequency in MHz	Frequency Calibration Tolerance	Frequency Stability	AT Cut Crystal	Operating Temperature Range		Internal Code Or Blank
						Lowest	Highest	
SM12T	-8	-25.0M	-20	H	1	G	G	-xx
	Parallel Resonance from 06 to 32 pF SR = Series Resonance		(Typical Values Shown) 10 = ± 10 ppm 15 = ± 15 ppm 20 = ± 20 ppm (Standard) 25 = ± 25 ppm 50 = ± 50 ppm	See Table Below	1 = Fundamental 3 = 3rd OT	C = 0°C D = -5°C E = -10°C G = -20°C J = -30°C K = -35°C L = -40°C	C = +50°C E = +60°C G = +70°C H = +75°C J = +80°C K = +85°C P = +105°C U = +125°C	

Available Frequency Stability versus Temperature in ppm

Operating Temperature Range		B	C	D	E	F	G	H	J
	CODE	±5	±8	±10	±15	±20	±30	±50	±100
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 +70°C	EH		•	•	•	•	•	•	•
-20 to +70°C	GG		•	•	•	•	•	•	•
-20 to +75°C	GH		•	•	•	•	•	•	•
-30 to +75°C	JH			•	•	•	•	•	•
-30 to +85°C	JK			•	•	•	•	•	•
-35 to +80°C	KJ				△	•	•	•	•
-40 to +85°C	LK				△	•	•	•	•
-40 to +105°C	LP					•	•	•	•
-40 to +125°C	LU						△	•	•

• = Available △ = Check with Pletronics

Device Marking

fff.fff *PywwC*	*OR*	fff.fffM *PymdC*

fff.fff = Crystal Frequency in MHz
x = Internal factory codes
P = Pletronics
YMD or *YWW* = Date code (Year-WeekWeek or Year-Month-Day; see chart below)
C = Capacitance load

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

Codes for Date Code YMD (Year Month Day)

Code	4	5	6	7	8	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2024	2025	2026	2027	2028	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	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

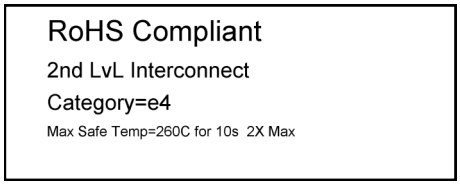
Codes for Load Capacitance

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

Package Labeling

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

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



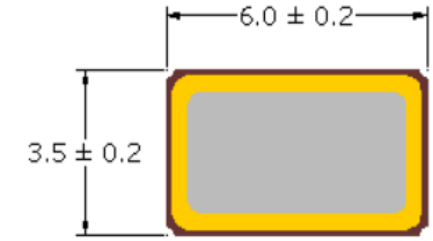
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

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-020D
Second Level Interconnect code: e4

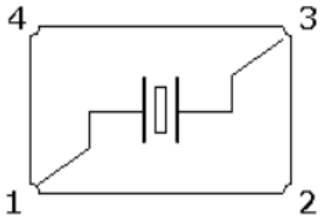
Reliability

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

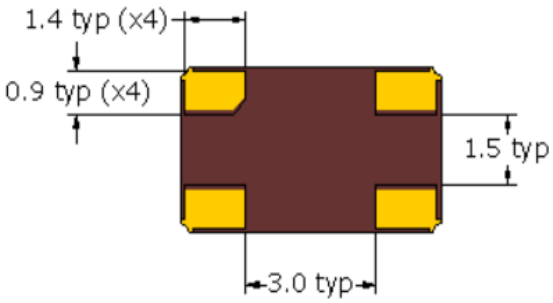
Mechanical Dimensions

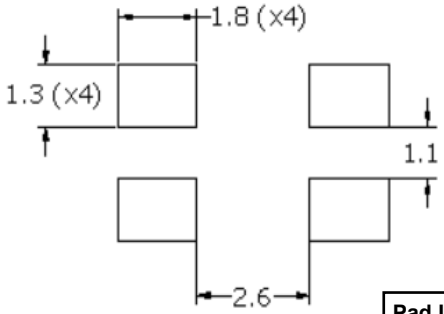


Package Connections
(Top View)



Pads 2 and 4 connected to lid
(attach either to ground)





Dimensions in mm

Pad Layout
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

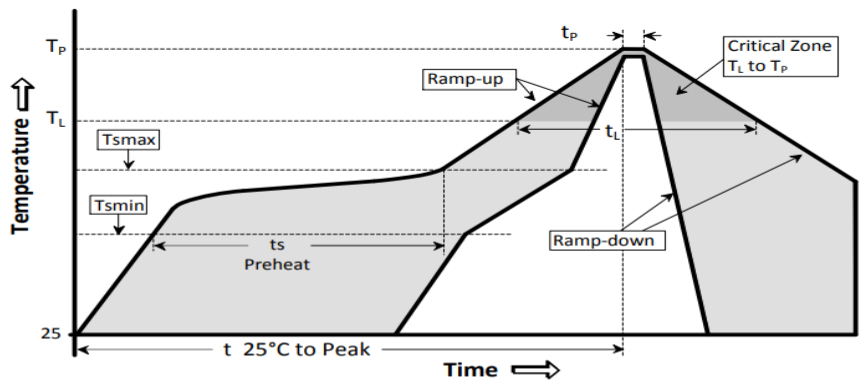
Contacts (pads): Gold (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)
The chamfered pad may or may not be present and may be on any pad.
The crystal is symmetrical, there is no Pad 1 preference. The part can be rotated 180° when being assembled on the PCB and will still perform correctly.

For Optimum Jitter Performance, Pletronics recommends:

- 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 or 4 connected to ground.
- These very small crystals have high ESR, the oscillator start-up and operation should take this into consideration.
- These small crystals should have their maximum drive level limited to 100 µW.

Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

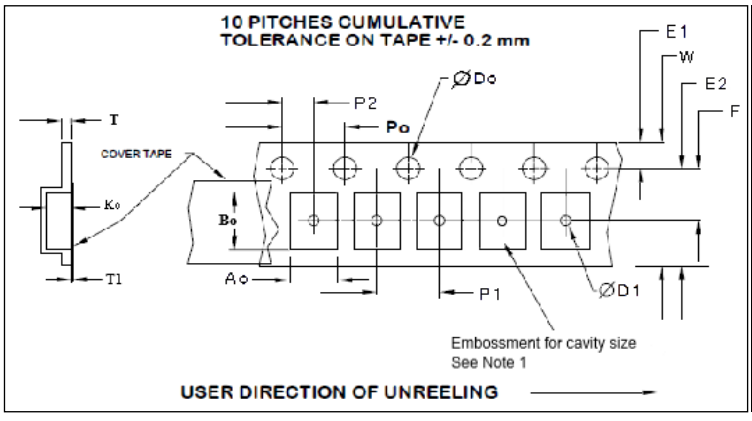


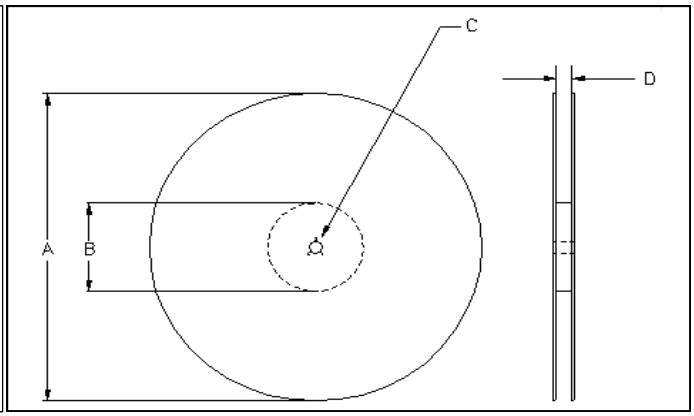
Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(Ts_{max} to T_P)	3°C / second max	°C / s
Ramp down Rate	T_{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to\text{-}peak}$	8 minutes max	min
Preheat			
Temperature min	Ts_{min}	150	°C
Temperature max	Ts_{max}	200	°C
Time Ts_{min} to Ts_{max}	ts	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T_L	217	°C
Time above liquidus	t_L	60 – 150	sec
Peak temperature			
Peak Temperature	Tp	260	°C
Time within 5°C of peak temperature	tp	20 – 40	sec

The part may be reflowed 2 times without degradation (typical for lead free processing).

Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 1000. 16mm tape, 8mm pitch.





Tape Variable Dimensions Table 2							
Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
16mm	14.25	7.5 ±0.05	8.0 ± 0.1	16.3	3.95±0.1	6.5±0.1	1.35±0.1

Dimensions in mm Drawing Not to scale
Note 1: Embossed cavity to conform to EIA– 481-B

Tape Constant Dimensions Table 1							
Tape Size	Do	D1 min	E1	Po	P2	T max	T1 max
16mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	0.3	0.1

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inch-es	mm	Inches	mm	mm	mm
7	7.0	180	2.50	60	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

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