

SM13T Series Miniature SMD Crystal

November 2018

- The Pletronics' SM13T Series is a miniature surface mount crystal.
- The package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging

- 6 MHz to 70 MHz Fundamental
- 40 MHz to 100 MHz 3rd Overtone
- 5 x 7 mm 4 pad
- AT Cut Crystals
- Ideal for use in hand held consumer products.
- High endurance version available

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: 0.16 grams

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

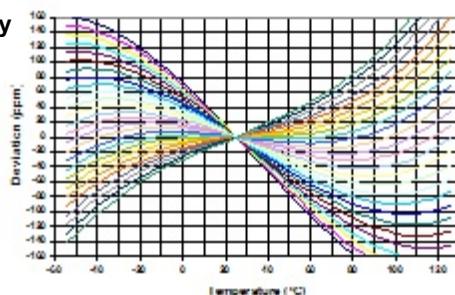
Second Level Interconnect code: e4



Electrical Specification:

Item	Min	Max	Unit	Condition
Frequency Range	6	70	MHz	Fundamental
	40	100	MHz	3 rd overtone
Calibration Frequency Tolerance	10	50	ppm	at +25°C ± 3°C, see part number for options
Frequency Stability over OTR	10	150	ppm	see part number for available options
Equivalent Series Resistance (ESR)	-	100	Ohms	6 MHz to 7.4 MHz
	-	60	Ohms	7.4 MHz to 9.8 MHz
	-	50	Ohms	9.8 MHz to 20 MHz
	-	40	Ohms	20 MHz to 70 MHz
	-	80	Ohms	40 MHz to 100 MHz
Drive Level	-	100	µW	use 10 µW for testing
Shunt Capacitance (C0)	-	7	pF	Pad to Pad capacitance
Aging	-5	+5	ppm /Yr	for the first year at +25°C ± 3°C
	-2	+2	ppm /Yr	after the first year at +25°C ± 3°C
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:

SM13T	-18	-12.0M	-50	H	1	E	G	-XX	
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See chart below for available options

Internal code or blank									
Highest Specified Operating Temperature									
A = 40°C	G = 70°C	N = 100°C							
B = 45°C	H = 75°C	P = 105°C							
C = 50°C	J = 80°C	R = 110°C							
D = 55°C	K = 85°C	S = 115°C							
E = 60°C	L = 90°C	T = 120°C							
F = 65°C	M = 95°C	U = 125°C							
Lowest Specified Operating Temperature									
A = +10°C	F = -15°C	L = -40°C							
B = +5°C	G = -20°C	M = -45°C							
C = 0°C	H = -25°C	N = -50°C							
D = -5°C	J = -30°C	P = -55°C							
E = -10°C	K = -35°C								
Mode: 1 = Fundamental 3 = 3rd Overtone									
Frequency Stability See chart below									
Calibration Frequency Tolerance (Typ. Values shown)									
10 = ± 10 ppm at 25°C $\pm 3^\circ\text{C}$									
20 = ± 20 ppm at 25°C $\pm 3^\circ\text{C}$									
50 = ± 50 ppm at 25°C $\pm 3^\circ\text{C}$ (Standard)									
Frequency in MHz									
Cload in pF Load Resonance from 06 to 32 pF (18 pF Std) -or- SR = Series Resonance									
Series Model SM13T = Standard Version SM13TS = High Endurance Version									

Operating Temperature Range	CODE	Available Frequency Stability versus Temperature in ppm									
		A	B	C	D	E	F	G	H	J	K
		± 3.0	± 5.0	± 8.0	± 10	± 15	± 20	± 30	± 50	± 100	± 150
0 to +45°C	CB	•	•	•	•	•	•	•	•	•	•
0 to +50°C	CC	•	•	•	•	•	•	•	•	•	•
0 to +60°C	CE	•	•	•	•	•	•	•	•	•	•
0 to +70°C	CG		•	•	•	•	•	•	•	•	•
-10 to +50°C	EC		•	•	•	•	•	•	•	•	•
-10 to +60°C	EE		•	•	•	•	•	•	•	•	•
-10 to +75°C	EH			•	•	•	•	•	•	•	•
-20 to +70°C	GG			•	•	•	•	•	STD	•	•
-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):

SM13T	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 + 70°C E = -40 to +85°C						
Calibration Tolerance / Frequency Stability Blank = 50/50 (Standard) A = 30/50 B = 30/30 C = 15/30 D = 10/20 (not all frequencies)						
Series Model SM13T = Standard Version SM13TS = High Endurance Version						

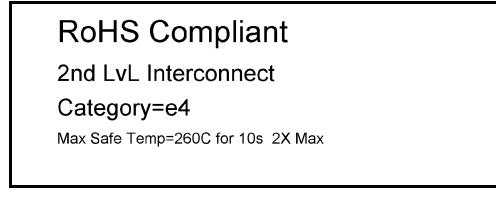
Reliability: Environmental Compliance

Parameter	Condition for SM13T	SM13TS
Mechanical Shock	MIL-STD-883 Method 2002, Condition B	Condition D
Vibration	MIL-STD-883 Method 2007, Condition A	Condition B
Solderability	MIL-STD-883 Method 2003	same
Thermal Shock	MIL-STD-883 Method 1011, Condition A	same

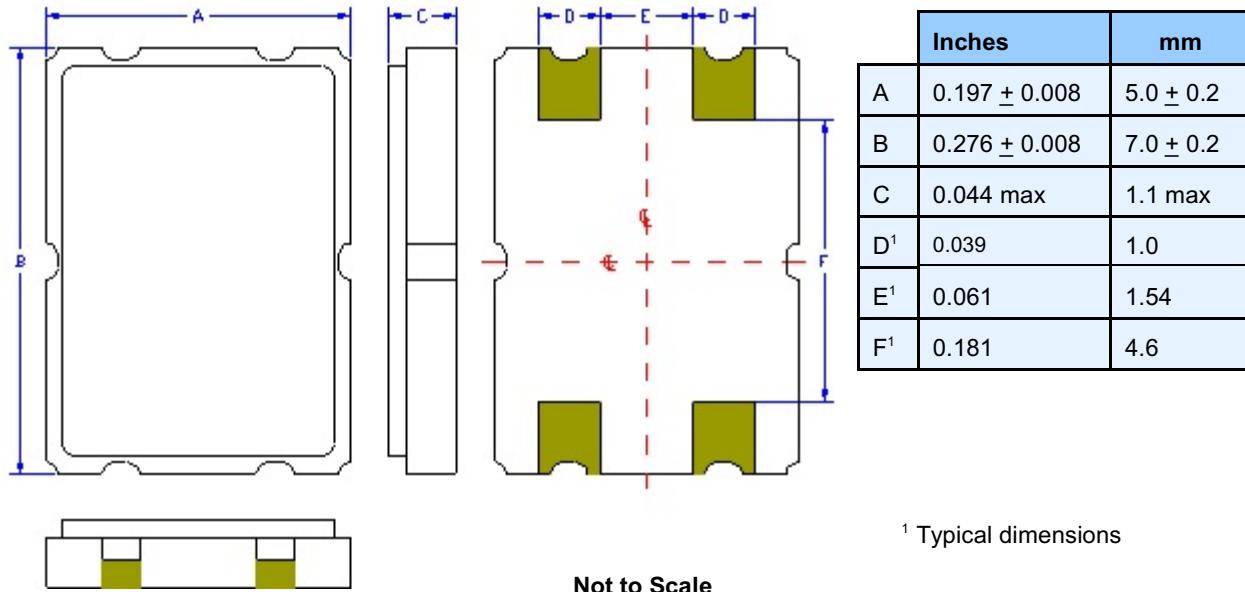
Package Labeling

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



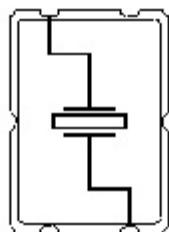
Mechanical:



Contacts :

Gold 11.8 μ inches 0.3 μ m minimum over Nickel 50 to 350 μ inches 1.27 to 8.89 μ m

Connection (top view):



The pads shown not connected to the crystal are common and connected to the metal cover.

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.

Part Marking:

SM13Tx or **SM13TSx** or **SM13T-zz**
FFF.FFF M **FFF.FFF M** **FFF.FFF M**
PLEymdz **PLEymdz** **PLEyywwz**

Legend:

PLE = Pletronics
 x = Capacitance load code from below
 FFF.FFM = Frequency in MHz
 YMD = Date of Manufacture (year, month and day)
 All other marking is internal factory codes

Specifications such as frequency tolerance 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.

- 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

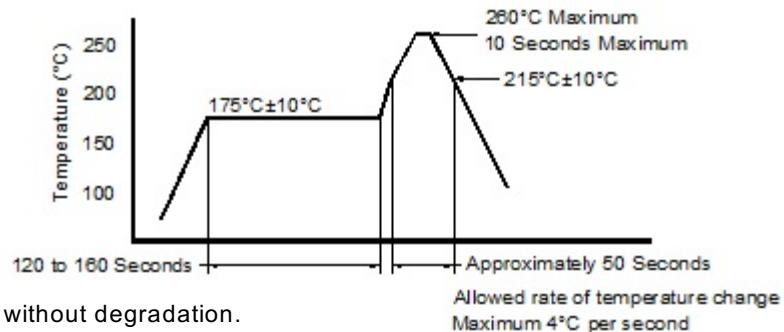
Codes for Date Code YMD

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)



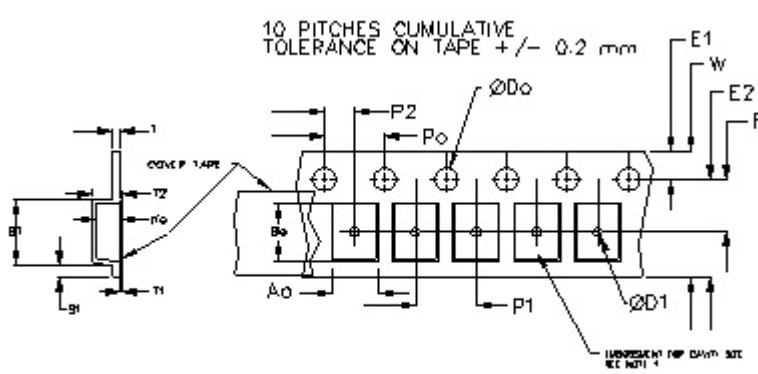
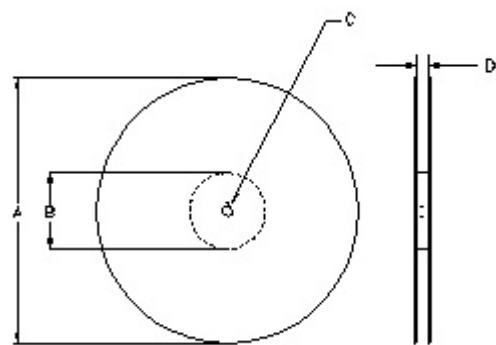
The part may be reflowed 2 times without degradation.

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		1.0						
12mm	1.5	1.5						
16mm	+0.1 -0.0	1.5	1.75	4.0	2.0 ±0.05	0.6	0.25	0.1
24mm		1.5	±0.1	±0.1	2.0 ±0.1			

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
16 mm	8.1	14.25	7.5 ±0.1	12.0 ±0.1	1.8	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
B	mm	177.8	254.0	330.2
C	inches	2.50	4.00	3.75
C	mm	63.5	101.6	95.3
D	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
		Tape Width		
		16.0		

Reel dimensions may vary from the above

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