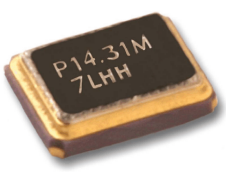
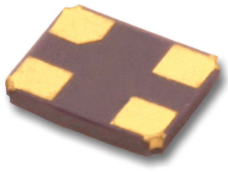
PLETRONICS
Innovations in
Frequency Control





SM10T Series
Miniature SMD Crystal

March 2015

Lead Free

- Pletronics' SM10T Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 12 MHz to 67.5 MHz
- 2.5 x 3.2 mm 4 pad
- AT Cut Fundamental and 3rd Overtone Crystals
- Ideal for use in hand held consumer products

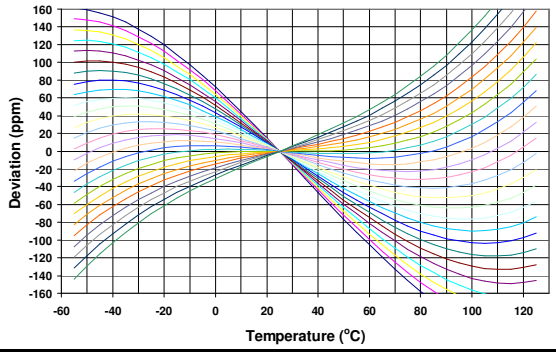
Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2011/65/EC) and WEEE (2002/96/EC) directives.

Pletronics Inc. guarantees the device does not contain the following:
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.03 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D.1
Second Level Interconnect code: e4

Electrical Specification:

Item	Min	Max	Unit	Condition
Frequency Range	12	60	MHz	
Calibration Frequency Tolerance	10	50	ppm	at +25°C ± 3°C, see part number for options
Frequency Stability	3	150	ppm	see part number for available options
Equivalent Series Resistance (ESR)	-	120	Ohms	12 MHz to 14.318 MHz
	-	100	Ohms	14.318 MHz to 16 MHz
	-	80	Ohms	16 MHz to 20 MHz
	-	70	Ohms	20 MHz to 30 MHz
	-	50	Ohms	30 MHz to 50 MHz
	-	80	Ohms	above 50 MHz
Drive Level	-	100	µW	use 10 µW for testing
Shunt Capacitance (C0)	-	5	pF	Pad to Pad capacitance
Aging at 25°C ± 3°C	-5	+5	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:



Product information is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. Production processsing does not necessarily include testing of all parameters.

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March 2015

Part Number:

SM10T	-18	-16.384M	-20	E	1	L	K	-XX

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	

Fundamental mode AT cut crystal
1 = Fundamental AT cut crystal
3 = 3rd Overtone AT cut crystal

Frequency Stability See chart below

Calibration Frequency Tolerance (Typ. Values shown)
10 = ± 10 ppm at 25°C ± 3°C
20 = ± 20 ppm at 25°C ± 3°C
30 = ± 30 ppm at 25°C ± 3°C (Standard)
50 = ± 50 ppm at 25°C ± 3°C

Frequency in MHZ

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

Model Number

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 +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):

SM10T	B	E	-18	-23.45M	-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 (STD E = -40 to +85°C
						Calibration Tolerance / Frequency Stability Blank = 30/50 (STD) B = 30/30
						Series Model

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: SM10T-16-23.45M-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

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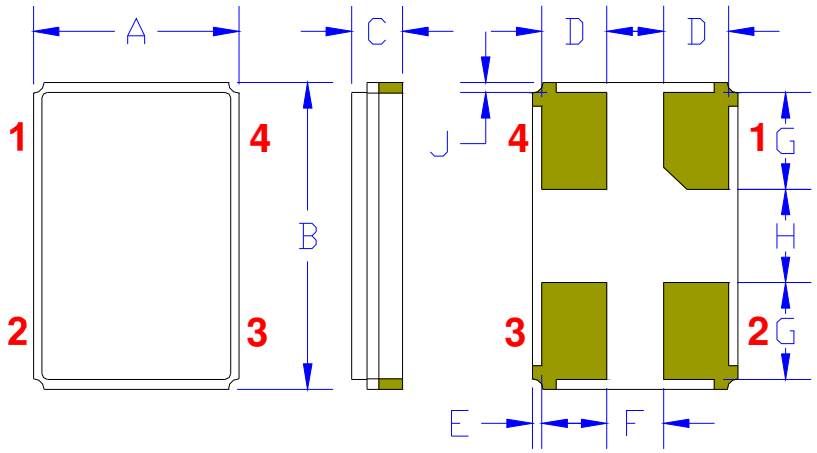
Mechanical:



	Inches	mm
A	0.098 ± 0.004	2.5 ± 0.15
B	0.126 ± 0.004	3.2 ± 0.15
C	0.028 max	0.7 max
D[1]	0.028 to 0.031	0.7 to 0.8
E[1]	0.004	0.1
F[1]	A - (2 * (D + E))	
G[1]	0.035	0.9
H[1]	0.047	1.2
J[1]	0.004	0.1

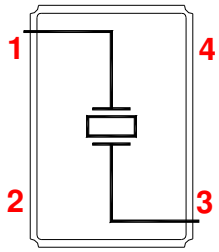
The chamfered pad may or may not be present and may be on any pad

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. Connected to ground is recommended

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.

Marking:

- P = Pletronics
- *ff.ff*M *or ff.f* = Frequency
- *ymd or ym* = Year Month Day or Year Month, see code below
- *z* = Internal information
- Orientation of marking may be mixed on the tape
- Traceability of part is lost once removed from reel

P*ff.ff*M
ymdz

OR

***ff.ff*M**
P*ymdz*

OR

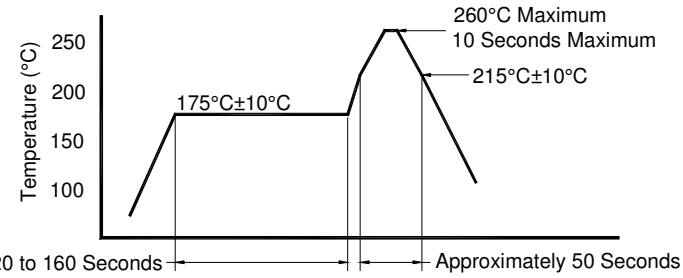
ff.fym

Codes for Date Code YMD

Code	3	4	5	6	7	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2013	2014	2015	2016	2017	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	

Reflow Cycle (typical for lead free processing)



The part may be reflowed 2 times without degradation.

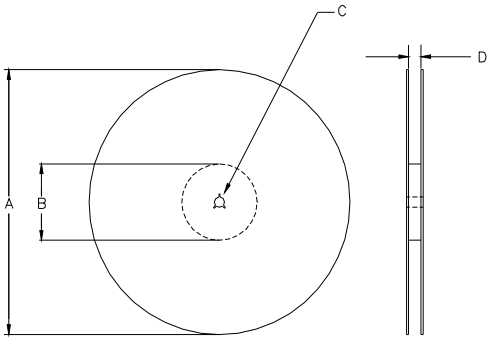
Allowed rate of temperature change
Maximum 4°C per second

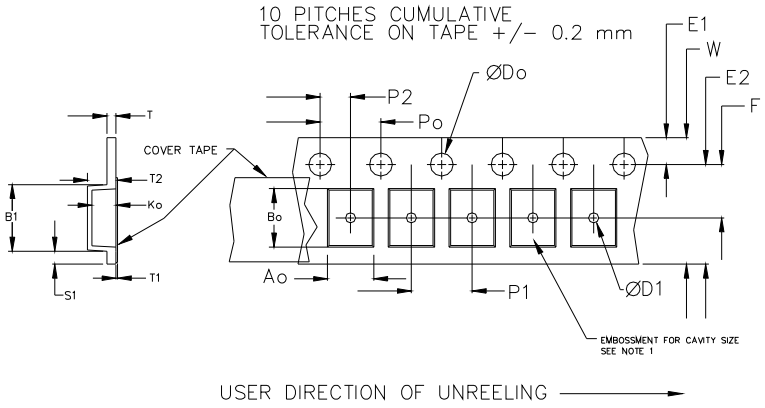
Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)

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						
16mm		1.5			2.0 ±0.1			
24mm		1.5						

Variable Dimensions Table 2							
Tape Size	B1 Max	E2 Min	F	P1	T2 Max	W Max	Ao, Bo & Ko
8 mm	3.5	6.4	1.7 ±0.1	4.0 ±0.1	1.0	8.9	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	
	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	8.4 +2.0 -0.0	8.4 +2.0 -0.0	8.4 +2.0 -0.0	8.0

Reel dimensions may vary from the above

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
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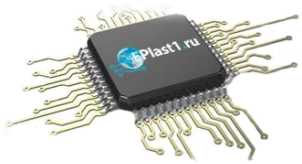

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