PLETRONICS
www.pletronics.com 425-776-1880

SM10T Series
Miniature SMD Crystal

October 2005

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
- 16 MHz to 60 MHz
- 2.5 x 3.2 mm 4 pad
- AT Cut Fundamental Crystal
- Ideal for use in hand held consumer products

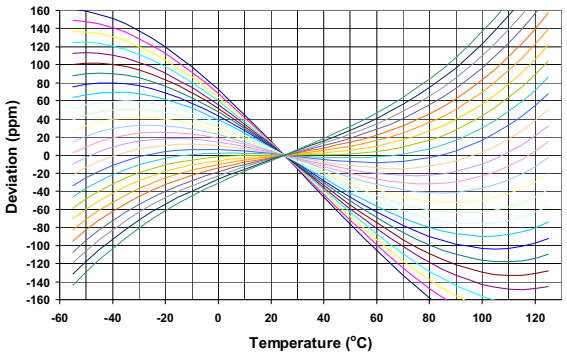
Pletronics Inc. certifies this device is in accordance with the RoHS (2002/95/EC) and WEEE (2002/96/EC) directives.

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	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)	-	100	Ohms	to 30 MHz
	-	50	Ohms	above 30 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:



SM10T Series
Miniature SMD Crystal

October 2005

Part Number:

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

See chart below for available options

-XX	Internal code or blank
K	**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
L	**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
1	Fundamental mode AT cut crystal
E	**Frequency Stability** See chart below
-20	**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
-16.384M	**Frequency in MHz**
-18	**Cload in pF** Parallel Resonance from **06** to **32** pF or **SR** = Series Resonance
SM10T	**Model Number**

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 +45ºC	CB	!	!	!	!	!	!	!	!	!	!
0 to +50ºC	CC	!	!	!	!	!	!	!	!	!	!
0 to +60ºC	CE		!	!	!	!	!	!	!	!	!
0 to +70ºC	CG		!	!	!	!	!	!	!	!	!
-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):

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 **E** = -40 to +85°C
Calibration Tolerance / Frequency Stability Blank = 30/50 **B** = 30/30
Series Model

Reliability: Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002, Condition A
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

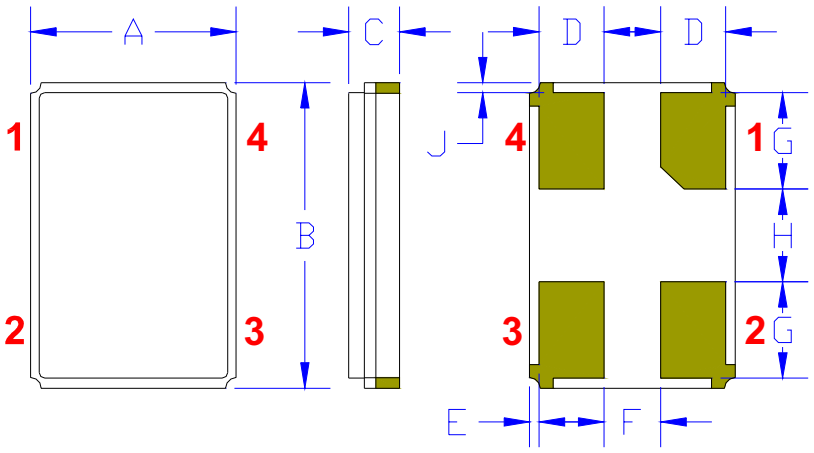
P/N: SM10T-16-23.45M-10F1CG
Customer P/N: 12345678
Qty: 1000 D/C 0526

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

Pb Free

2nd LvL Interconnect
Catagory=e4
Max Safe Temp=260C for 10s

Mechanical:



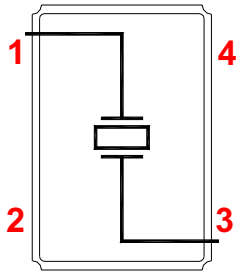
	Inches	mm
A	0.098 ± 0.004	2.5 ± 0.1
B	0.126 ± 0.004	3.2 ± 0.1
C	0.028 max	0.7 max
D[1]	0.028	0.7
E[1]	0.004	0.1
F[1]	0.035	0.9
G[1]	0.035	0.9
H[1]	0.047	1.2
J[1]	0.004	0.1

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

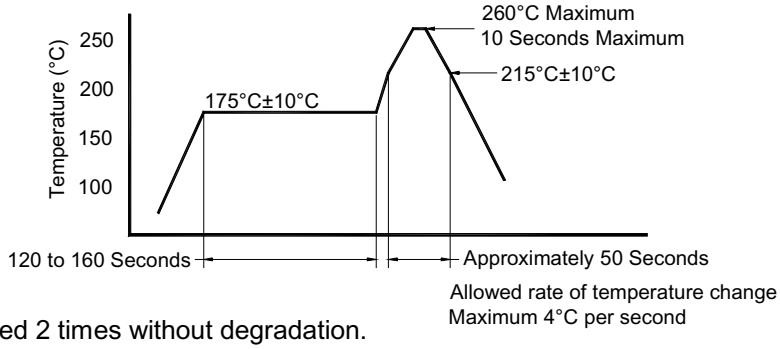
Layout and application information

- 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.

Marking

- Marking consists of the frequency (may be truncated due to package size)
- Orientation of marking may be mixed on the tape
- Traceability of part is lost once removed from reel

Reflow Cycle (typical for lead free processing)



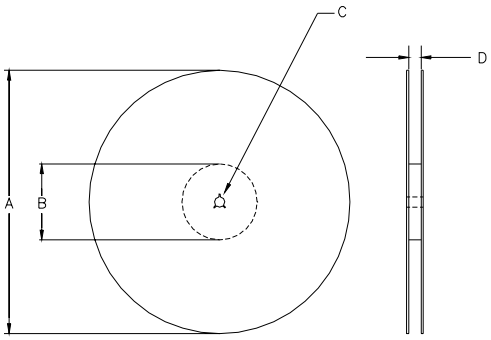
The part may be reflowed 2 times without degradation.

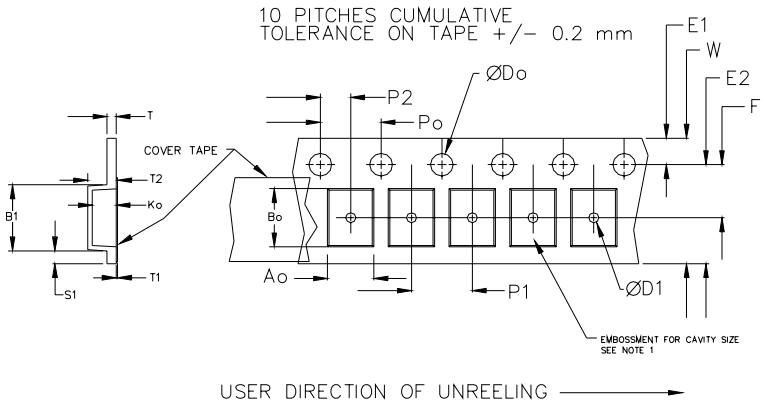
Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5 +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	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.0
	mm	---	---	24.4 +2.0 -0.0	24.0
	mm	---	---	32.4 +2.0 -0.0	32.0

Reel dimensions may vary from the above

IMPORTANT NOTICE

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's standard warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

Contacting Pletronics Inc.

Pletronics Inc.
19013 36th Ave. W, Suite H
Lynnwood, Washington 98036-5761 USA
Tel: 425-776-1880
Fax: 425-776-2760
E-mail: ple-sales@pletronics.com
URL: www.pletronics.com