

## SM11T Series Miniature SMD Crystal

August 2007

- The Pletronics' SM11T 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 150 MHz Fundamental
- 70 MHz to 300 MHz 3<sup>rd</sup> Overtone
- 120 MHz to 250 MHz 5<sup>th</sup> Overtone
- 3.2 x 5 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 (2002/95/EC) and WEEE (2002/96/EC) directives.**

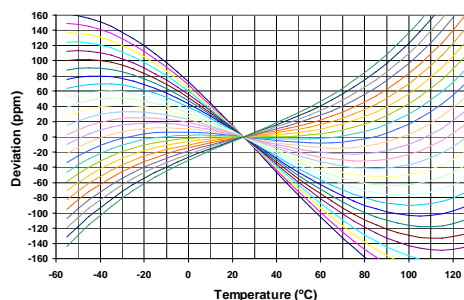
Pletronics Inc. guarantees the device does not contain the following:  
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.06 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020C  
Second Level Interconnect code: e4



### Electrical Specification:

Item	Min	Max	Unit	Condition	
Frequency Range	12	300	MHz	Fundamental, 3 <sup>rd</sup> and 5 <sup>th</sup> Overtone Modes	
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)	-	80	Ohms	12 MHz to 16 MHz	Fundamental Mode
	-	60	Ohms	16 MHz to 20 MHz	
	-	50	Ohms	above 20 MHz	
	-	100	Ohms	70 MHz to 300 MHz	3 <sup>rd</sup> Overtone Mode
	-	160	Ohms	120 MHz to 250 MHz	5 <sup>th</sup> overtone Mode
Drive Level	-	100	µW	use 10 µW for testing	
Shunt Capacitance (C0)	-	5	pF	Pad to Pad capacitance	
Aging at 25°C ± 3°C	-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:

SM11T -18 -14.31818M- 20 E 1 L K -XX

See chart below for available options

Internal code or blank	
<b>Highest Specified Operating Temperature</b>	
A = 40°C	G = 70°C
B = 45°C	H = 75°C
C = 50°C	J = 80°C
D = 55°C	K = 85°C
E = 60°C	L = 90°C
F = 65°C	M = 95°C
N = 100°C	P = 105°C
R = 110°C	S = 115°C
T = 120°C	U = 125°C
<b>Lowest Specified Operating Temperature</b>	
A = +10°C	F = -15°C
B = +5°C	G = -20°C
C = 0°C	H = -25°C
D = -5°C	J = -30°C
E = -10°C	K = -35°C
L = -40°C	M = -45°C
N = -50°C	P = -55°C
<b>Mode: 1=Fundamental 3= 3<sup>rd</sup> OT 5 = 5<sup>th</sup> OT</b>	
<b>Frequency Stability</b>	See chart below
<b>Calibration Frequency Tolerance (Typ. Values shown)</b>	
10 = ± 10 ppm at 25°C ± 3°C	
15 = ± 15 ppm at 25°C ± 3°C	
20 = ± 20 ppm at 25°C ± 3°C	
50 = ± 50 ppm at 25°C ± 3°C (Standard)	
<b>Frequency in MHz</b>	
<b>Load in pF</b>	
Parallel Resonance from 06 to 32 pF or	
SR = Series Resonance	
<b>Model Number</b>	

		Available Frequency Stability versus Temperature in ppm									
Operating Temperature Range	CODE	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		•	•	•	•	•	•	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):





SM11T	B	E	-18	-14.31818M	-XX	
<b>Internal code or blank</b>						
<b>Frequency in MHz</b>						
<b>Load in pF</b> Parallel Resonance from 6 to 32 pF or <b>SR</b> = Series Resonance						
<b>Operating Temperature Range</b> Blank = 0 to +70°C (STD) <b>E</b> = -40 to +85°C						
<b>Calibration Tolerance / Frequency Stability</b> Blank = 50/50 (STD) <b>B</b> = 30/30 <b>C</b> = 15/30 <b>D</b> = 10/20 (not all frequencies)						
<b>Model Number</b>						

## 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

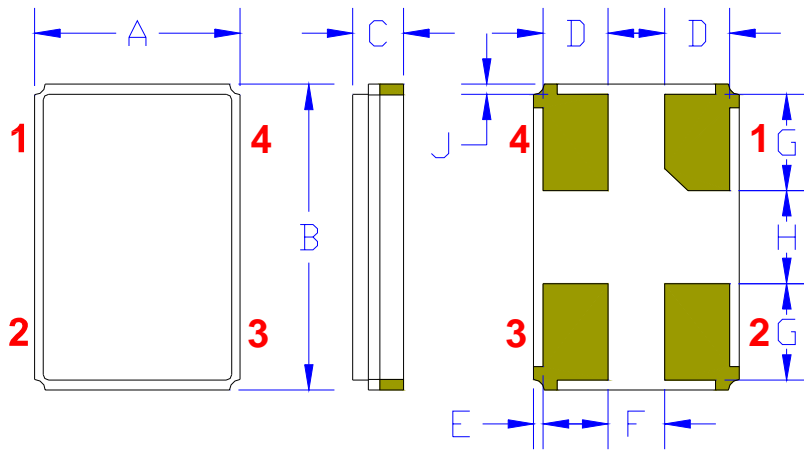
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

P/N:	
	SM11T-18-24.0M-1SD1EH
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:



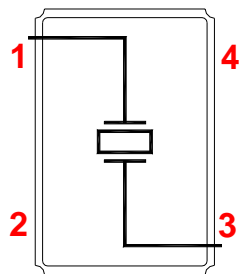
	Inches	mm
A	0.126 ± 0.004	3.2 ± 0.2
B	0.197 ± 0.004	5.0 ± 0.2
C	0.039 max	0.85 max
D <sup>1</sup>	0.031	0.8
E <sup>1</sup>	0.004	0.1
F <sup>1</sup>	0.055	1.4
G <sup>1</sup>	0.043	1.1
H <sup>1</sup>	0.102	2.6
J <sup>1</sup>	0.004	0.1

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

**Not to Scale**

<sup>1</sup> 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.



## 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.

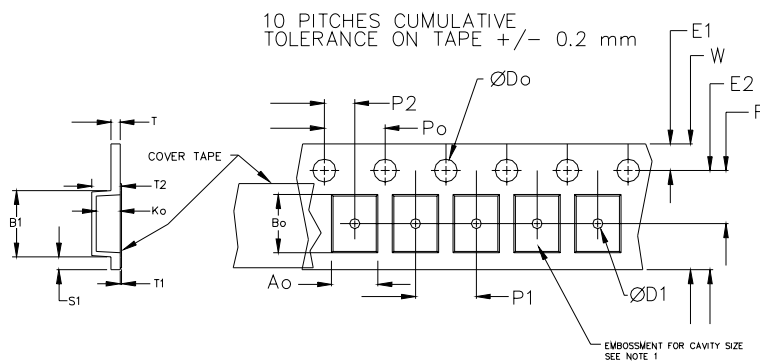
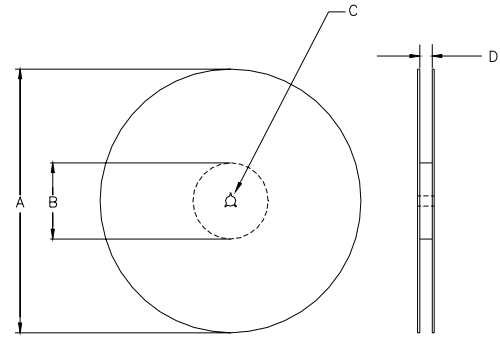


**Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)**

Constant Dimensions Table 1								
Tape Size	D0	D1 Min	E1	P0	P2	S1 Min	T Max	T1 Max
8mm	1.5	1.0	1.75	4.0	2.0 ±0.05	0.6	0.25	0.1
12mm		1.5			2.0 ±0.1			
16mm		+0.1 -0.0			1.5			
24mm		1.5			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	Tape Width
	mm	177.8	254.0	330.2	
B	inches	2.50	4.00	3.75	
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			
D	mm	16.4	16.4	16.4	
		+2.0 -0.0	+2.0 -0.0	+2.0 -0.0	

Reel dimensions may vary from the above

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