

## 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

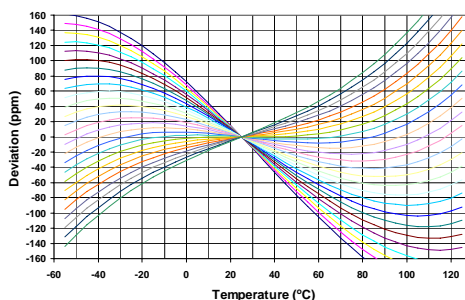
Second Level Interconnect code: e4



### 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 $\pm$ 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	$\mu$ W	use 10 $\mu$ W for testing	
Shunt Capacitance (C0)	-	5	pF	Pad to Pad capacitance	
Aging at 25°C $\pm$ 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> <b>A</b> = 40°C <b>G</b> = 70°C <b>N</b> = 100°C <b>B</b> = 45°C <b>H</b> = 75°C <b>P</b> = 105°C <b>C</b> = 50°C <b>J</b> = 80°C <b>R</b> = 110°C <b>D</b> = 55°C <b>K</b> = 85°C <b>S</b> = 115°C <b>E</b> = 60°C <b>L</b> = 90°C <b>T</b> = 120°C <b>F</b> = 65°C <b>M</b> = 95°C <b>U</b> = 125°C										
<b>Lowest Specified Operating Temperature</b> <b>A</b> = +10°C <b>F</b> = -15°C <b>L</b> = -40°C <b>B</b> = +5°C <b>G</b> = -20°C <b>M</b> = -45°C <b>C</b> = 0°C <b>H</b> = -25°C <b>N</b> = -50°C <b>D</b> = -5°C <b>J</b> = -30°C <b>P</b> = -55°C <b>E</b> = -10°C <b>K</b> = -35°C										
<b>Mode:</b> 1=Fundamental      3= 3 <sup>rd</sup> OT      5= 5 <sup>th</sup> OT										
<b>Frequency Stability</b> See chart below										
<b>Calibration Frequency Tolerance</b> (Typ. Values shown) <b>10</b> = ± 10 ppm at 25°C ± 3°C <b>15</b> = ± 15 ppm at 25°C ± 3°C <b>20</b> = ± 20 ppm at 25°C ± 3°C <b>50</b> = ± 50 ppm at 25°C ± 3°C (Standard)										
<b>Frequency in MHz</b>										
<b>Load in pF</b> Parallel Resonance from <b>06</b> to <b>32</b> pF or <b>SR</b> = 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	
						Internal code or blank
						Frequency in MHz
						Cload in pF Parallel Resonance from 6 to 32 pF or <b>SR</b> = Series Resonance
						Operating Temperature Range Blank = 0 to +70°C (STD) <b>E</b> = -40 to +85°C
						Calibration Tolerance / Frequency Stability Blank = 50/50 (STD) <b>B</b> = 30/30 <b>C</b> = 15/30 <b>D</b> = 10/20 (not all frequencies)
						Model Number

### 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

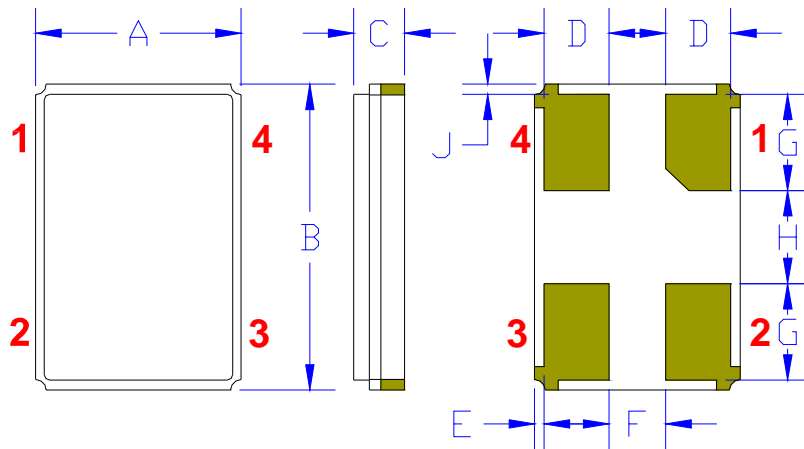
Label is 1" x 2.6" (25.4mm x 66.7mm)  
 Font is Courier New  
 Bar code is 39-Full ASCII

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:**



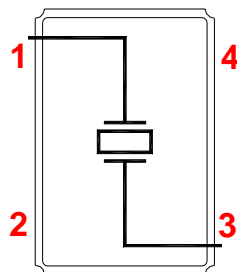
Contacts :  
Gold 11.8  $\mu$ mches 0.3  $\mu$ m minimum over  
Nickel 50 to 350  $\mu$ mches 1.27 to 8.89  $\mu$ m

**Not to Scale**

<sup>1</sup> Typical dimensions

	Inches	mm
A	0.126 $\pm$ 0.004	3.2 $\pm$ 0.2
B	0.197 $\pm$ 0.004	5.0 $\pm$ 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

**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.

### Part Marking:

**fff.fff M** or **fff.fff M** Where **fff.fff** = frequency in MHz  
**PywwC** **PymdCz** **Pyww** or **Pymd** = Pletronics and Date code  
**C** = Capacitance load code (see table below)

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

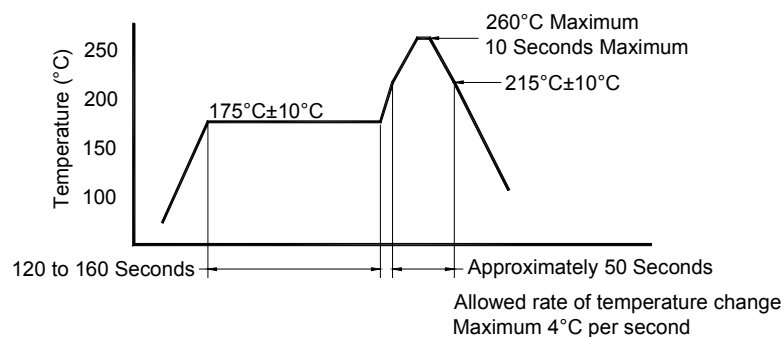
### Codes for Date Code YMD

Code	6	7	8	9	0	1	2
Year	2006	2007	2008	2009	2010	2011	2012

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)



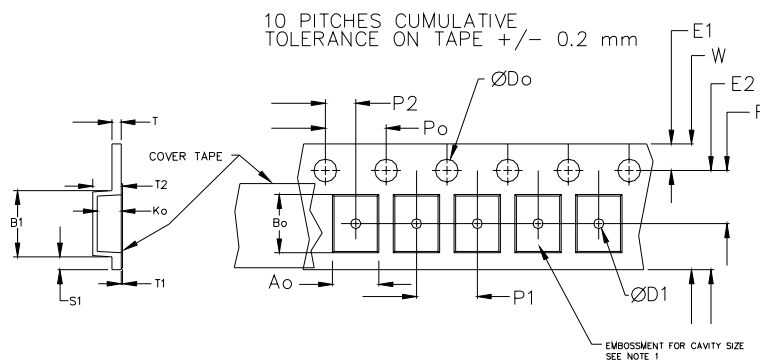
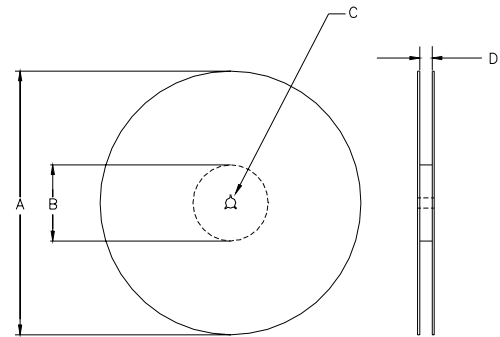
The part may be reflowed 2 times without degradation.

**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	1.5  +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			2.0 ±0.1			
16mm		1.5						
24mm		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 $\pm 0.1$	8.0 $\pm 0.1$	8.0	16.3	Note 1

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



REEL DIMENSIONS					Tape Width
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	
C	mm	13.0 +0.5 / -0.2			16.0
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	

Reel dimensions may vary from the above

### IMPORTANT NOTICE

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