

## SM12S Series Low Frequency Crystal

October 2005



- Pletronics' SM12S Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 32.0 KHz or 32.768 KHz
- 1.82 x 4.95 mm 2 pad
- XY Cut Crystal

### 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: 0.02 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020C  
Second Level Interconnect code: e4

#### Part Number:

SM12S	-9	-32.768K	-XX	
				Internal code or blank
				<b>Nominal Frequency in KHz</b> Available frequencies are <b>30.0K</b> and <b>32.768K</b>
				<b>Load Capacitance</b> Blank = 12.5pF <b>9</b> = 9pF <b>7</b> = 7pF (other values are special order)
				<b>Model Number</b>

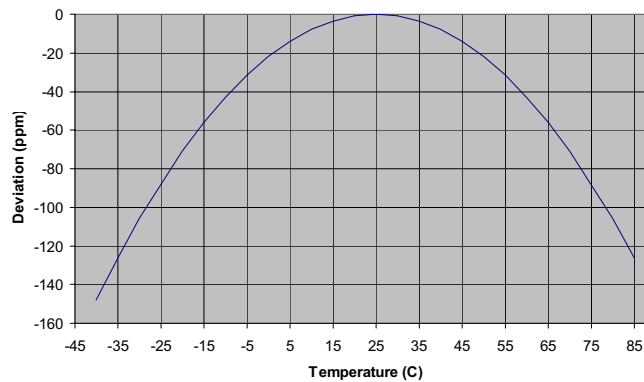
#### Reliability: Environmental Compliance

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

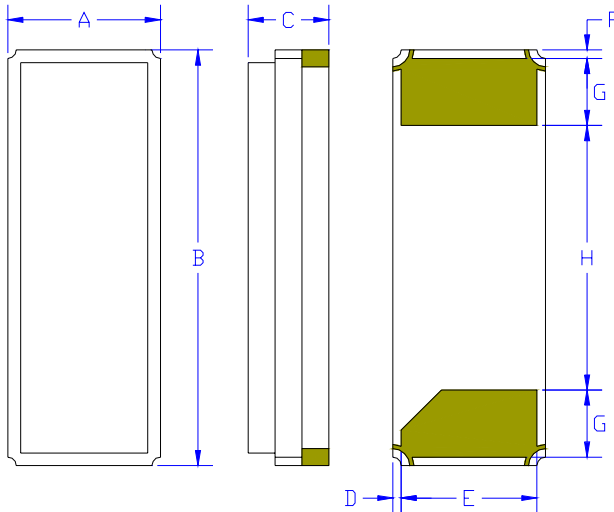
## Electrical Specification:

Item	Min	Max	Unit	Condition
Frequency	32.0	32.768	kHz	
Calibration Frequency Tolerance	-30	+30	ppm	at +25°C
Equivalent Series Resistance	--	65K	Ohms	
Drive Level	--	1.0	uW	
Turn Over Temperature	20	30	°C	Nominal is 25°C
Temperature Coefficient	-0.034		ppm/°C <sup>2</sup>	typical
Q Factor	50000	--	Q	
Shunt Capacitance	1.0		pF	Pin to Pin Capacitance, typical
Motional Capacitance	2.5		fF	typical
Aging (for first year)	-5	+5	ppm/Yr	at 25°C +/-3°C
Insulation Resistance	500M	--	Ohms	at 100V DC
Crystal Cut				XY Cut
Operating Temperature Range	-40	+85	°C	
Storage Temperature Range	-55	+125	°C	
Shock Resistance	-5	+5	ppm	
Vibration Resistance	-5	+5	ppm	
Reflow Resistance	-10	+10	ppm	

## XY Crystal Frequency versus Temperature Typical Performance:



## Mechanical:



	Inches	mm
A	0.072 ± 0.008	1.82 ± 0.2
B	0.195 ± 0.008	4.95 ± 0.2
C	0.037 max	0.95 max
D <sup>1</sup>	0.004	0.1
E <sup>1</sup>	0.063	1.6
F <sup>1</sup>	0.004	0.1
G <sup>1</sup>	0.031	0.8
H <sup>1</sup>	0.124	3.15

### Contacts :

Gold 11.8 pinches 0.3 µm minimum over  
Nickel 50 to 350 pinches 1.27 to 8.89 µm

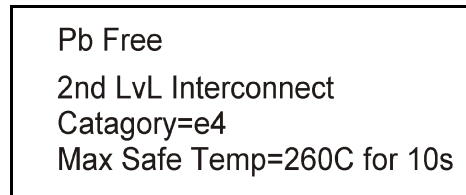
**Not to Scale**

<sup>1</sup> Typical dimensions

## 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



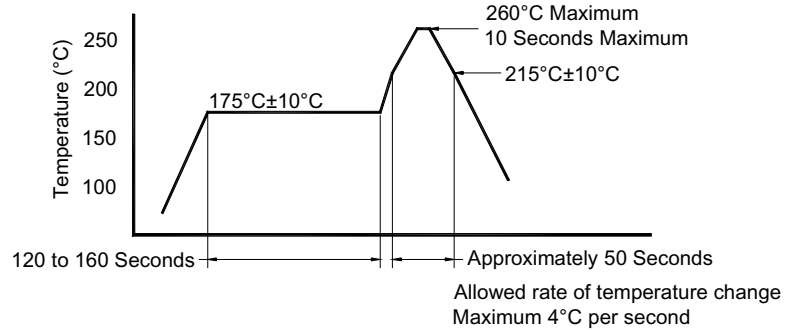
## Part Marking:

- Marking consists of a manufacturing date code
- Orientation of marking may be mixed on the tape
- Traceability of part's specification is lost once removed from reel

## Layout and application information

- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.

## Reflow Cycle (typical for lead free processing)



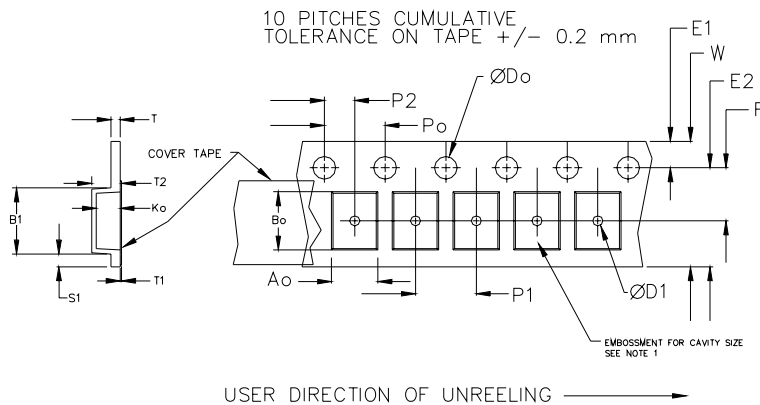
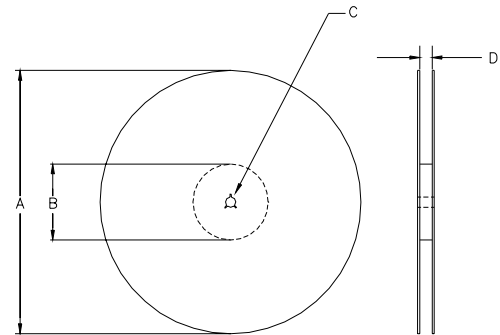
The part may be reflowed 2 times without degradation.

## Tape and Reel: available for quantities of 250 to 1000 per reel

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
12 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



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	Tape Width
	mm	63.5	101.6	95.3	
C	mm	13.0 +0.5 / -0.2			Tape Width
D	mm	16.4 +2.0 -0.0	16.4 +2.0 -0.0	16.4 +2.0 -0.0	
	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

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