



# SM13S Series Low Frequency Crystal

November 2018



- The Pletronics' SM13S Series is a miniature surface mount crystal.
- The package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 32.768 KHz only
- 1.5 x 7mm 4 pad
- XY Cut Crystal

**Pletronics Inc. certifies this device is in accordance with the RoHS (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: 0.118 grams  
 Moisture Sensitivity Level: 1 As defined in J-STD-020C  
 Second Level Interconnect code: e3

### Part Number:

SM13S	- 6	- 32.768K	-XX	
				Internal code or blank
				<b>Nominal Frequency in KHz</b>
				<b>Load Capacitance</b> Blank = 12.5pF <b>6</b> = 6pF <b>9</b> = 9pF
				<b>Model Number</b>

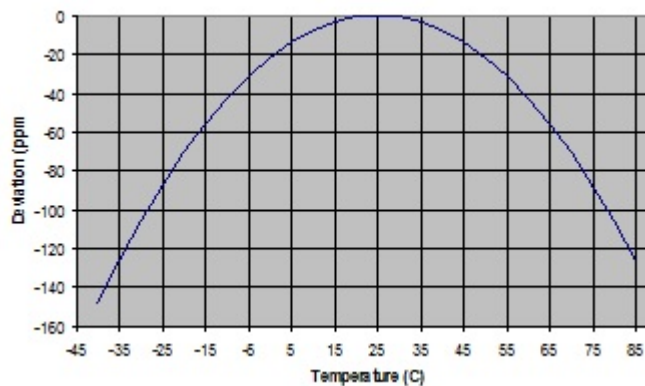
### Reliability: Environmental Compliance

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

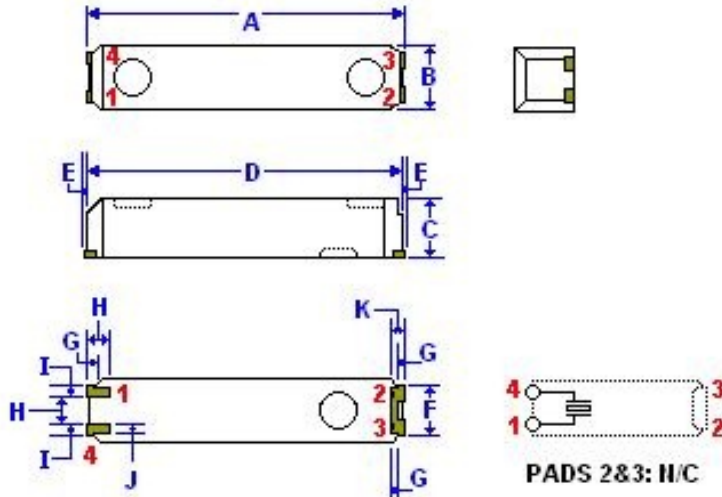
### Electrical Specification:

Item	Min	Max	Unit	Condition
Frequency	32.768		kHz	
Calibration Frequency Tolerance	-20	+20	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	-0.035		ppm/°C <sup>2</sup>	typical
Q Factor	30000	--	Q	
Shunt Capacitance	1.7		pF	Pin to Pin Capacitance, typical
Motional Capacitance	2.9		fF	typical
Aging (for first year)	-3	+3	ppm/Yr	at 25°C ± 3°C
Insulation Resistance	500M	--	Ohms	at 100V DC ± 15V
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	0.276 max	7.0 max
B	0.059 max	1.5 max
C	0.055 max	1.4 max
D <sup>1</sup>	0.264	6.7
E <sup>1</sup>	0.004	0.1
F <sup>1</sup>	0.047	1.2
G <sup>1</sup>	0.008	0.2
H <sup>1</sup>	0.022	0.55
I <sup>1</sup>	0.012	0.3
J <sup>1</sup>	0.010	0.25
K <sup>1</sup>	0.024	0.6

Not to Scale

<sup>1</sup> Typical dimensions

Note: The part of the cylinder inside the resin mold may be sometimes be exposed, however this does not affect performance or characteristics of the device.

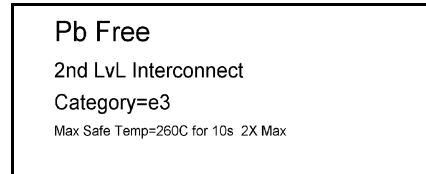
### Contacts :

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

## 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



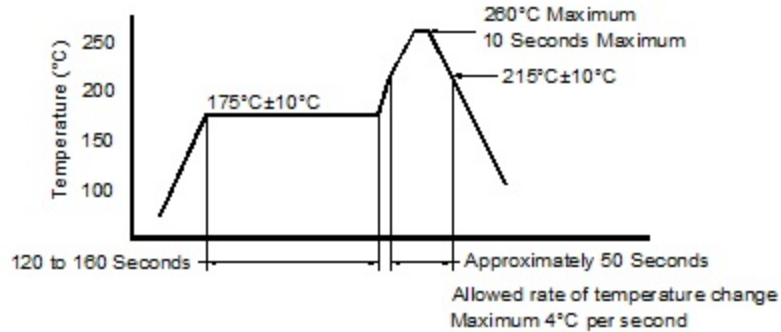
## Part Marking:

- Marking consists of an internal 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)**



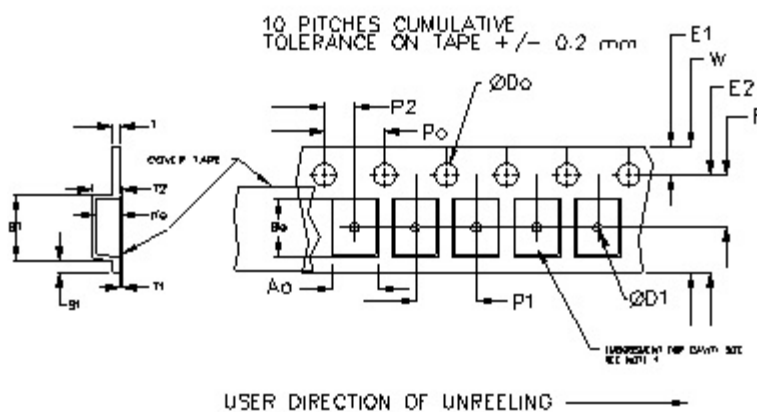
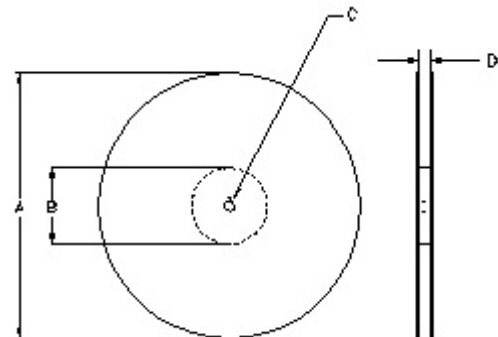
The part may be reflowed 2 times without degradation.

**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
16 mm	12.1	14.25	5.5 ± 0.1	8.0 or 4.0 ± 0.1	1.2	12.3	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	
	mm	63.5	101.6	95.3	
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	
	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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