



PLETRONICS SM5S Series Miniature SMD Crystal



SM5S
1.2 x 1.0 x 0.5 mm
Ceramic Package

Features

- Miniature low profile surface mount watch crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- 32.768 kHz

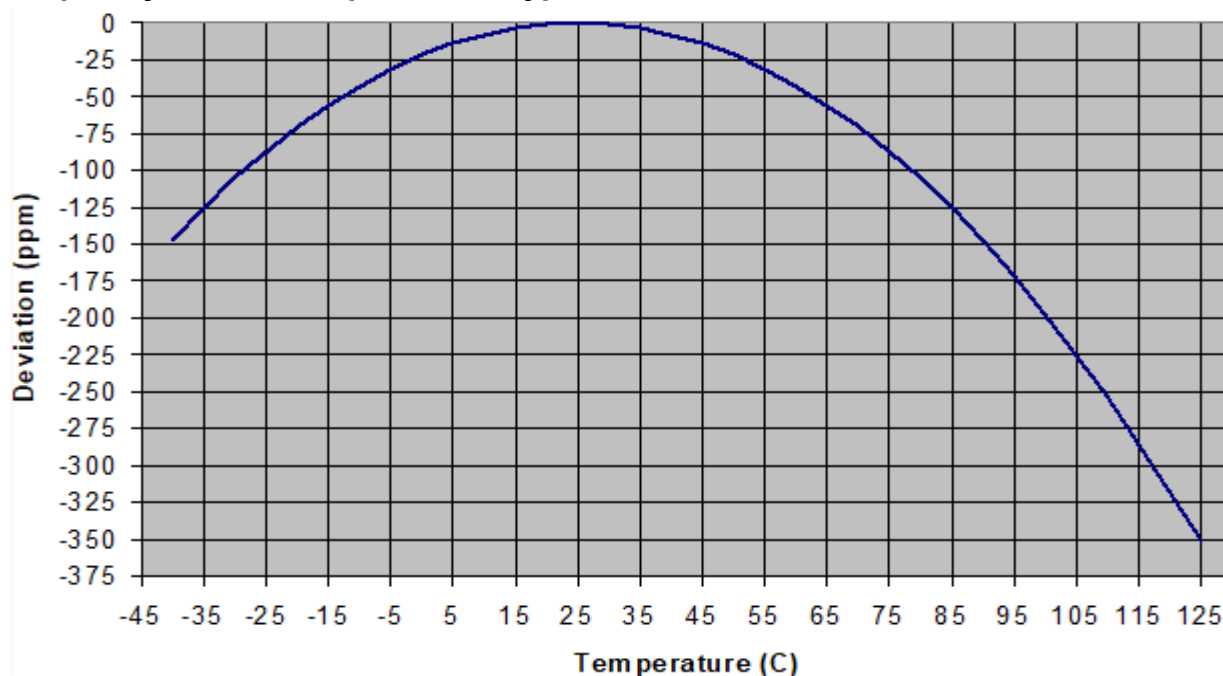
Applications

RTC

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range	-	32.768	-	kHz	
Calibration Frequency Tolerance	-	-	±20	ppm	Standard at 25°C ± 3°C. See page 2 for all options
Frequency Stability	-0.032	-0.036	-0.04	ppm/Δ°C ²	
Load Capacitance (CL)	6.0	-	12.5	pF	Available: 6pF, 7pF, 9pF, 12.5pF
Turnover Temperature	+20	+25	+30	°C	
Operating Temperature Range	-40	-	+85	°C	
Storage Temperature Range	-55	-	+125	°C	
Equivalent Series Resistance (ESR)	-	-	90	kΩ	At 25°C
Drive Level	-	0.1	0.3	μW	
Shunt Capacitance (C0)	-	1.4	-	pF	Pad to Pad Capacitance
Insulation Resistance	500	-	-	MΩ	@100VDC
Aging at 25°C	-	-	±5	ppm	for the first year

Frequency versus Temperature - Typical Performance





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Part Numbering

Series Model	Load Capacitance (CLoad) in pF	Frequency in kHz	Frequency Calibration Tolerance
SM5S	-9	-32.768K	-20
	Blank = 12.5pF 9 = 9pF 7 = 7pF 6 = 6pF		10 = ±10 ppm 20 = ±20 ppm

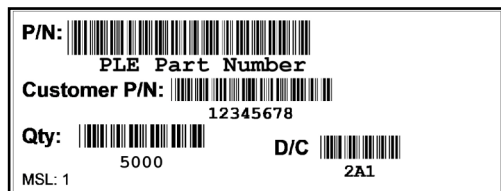
Device Marking

1. Marking: xYWW x=internal code, YWW = date code
2. Orientation of marking may be mixed on the tape

Package Labeling

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

RoHS 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

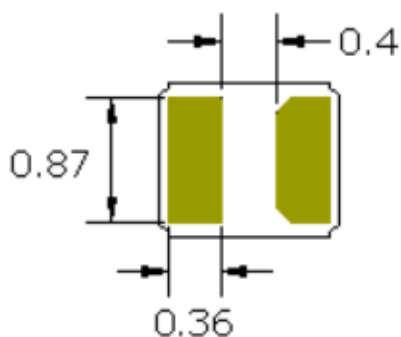
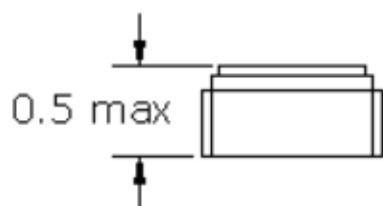
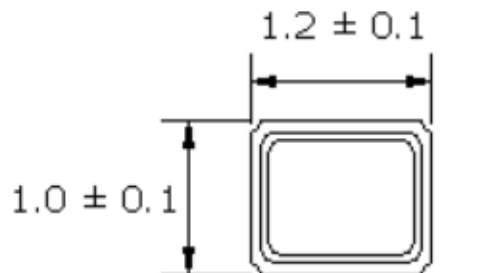
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.002 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

Reliability

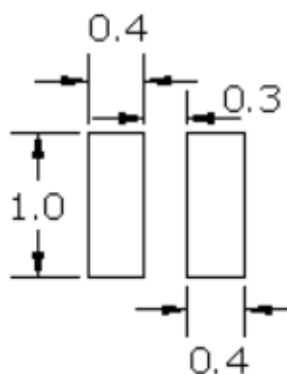
Parameter	Condition
Mechanical Shock	JESD22-B104
Vibration	JESD22-B103
Solderability	IPC J-STD-002
Thermal Shock	MIL-STD-883 Method 1011, Condition A

Mechanical Dimensions/Solder Pad Layout



Dimensions in mm

Solder Pad Layout



Pad Layout

Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

Contacts (pads): Gold (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)

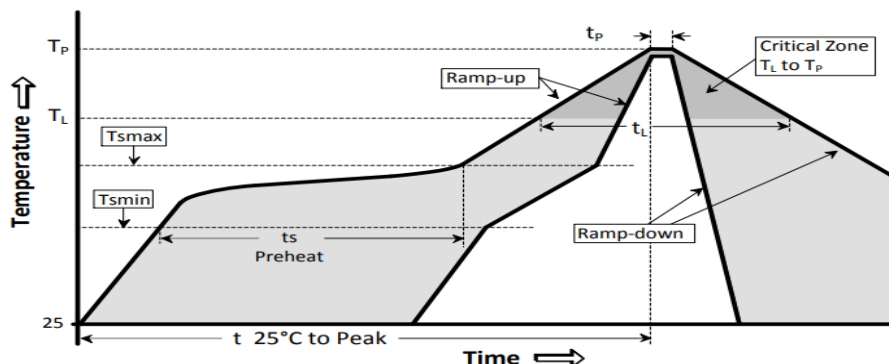
Please ensure no circuit pattern under the crystal.

For Optimum Jitter Performance, Pletronics recommends:

- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.
- These very small crystals have high ESR, the oscillator start-up and operation should take this into consideration.

Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

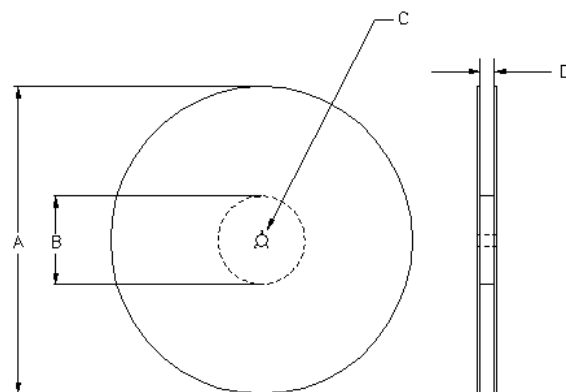
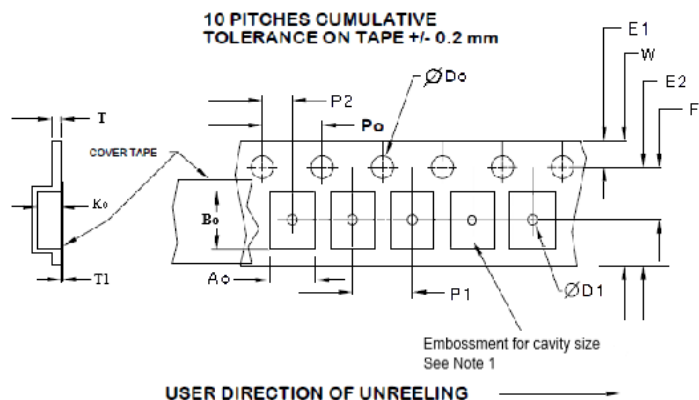


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	(T _{smax} to T _P)	3°C / second max	°C / s
Ramp down Rate	T _{cool}	6°C / second max	°C / s
Time 25°C to Peak Temperature	T _{to-peak}	8 minutes max	min
Preheat			
Temperature min	T _{smin}	150	°C
Temperature max	T _{smax}	200	°C
Time T _{smin} to T _{smax}	t _s	60 – 180	sec
Soldering above liquidus			
Temperature liquidus	T _L	217	°C
Time above liquidus	t _L	60 – 150	sec
Peak temperature			
Peak Temperature	T _P	260	°C
Time within 5°C of peak temperature	t _P	20 – 40	sec

Tape and Reel

Tape and Reel standard quantity = 5000 per reel. 8mm tape, 4mm pitch.



Tape Dimensions Table 1							
Tape Size	E2 typ	F	P1	W	Ao	Bo	Ko
8mm	6.25	3.5 ±0.05	4.0 ±0.1	8.2	1.38 ± 0.05	1.18 ± 0.05	0.63 ± 0.05

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

Reel Dimensions (may vary) Table 3						
	A		B		C	D
Reel Size	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.30	60	13.0 +0.5 -0.2	Tape size +2.0 -0.0

Tape Dimensions Table 2							
Tape Size	Do	D1	E1	Po	P2	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	0.3	0.1



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