



PLETRONICS SM7S-AEC Automotive RTC Crystal



SM7S-AEC
2.05 x 1.2 x 0.6 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

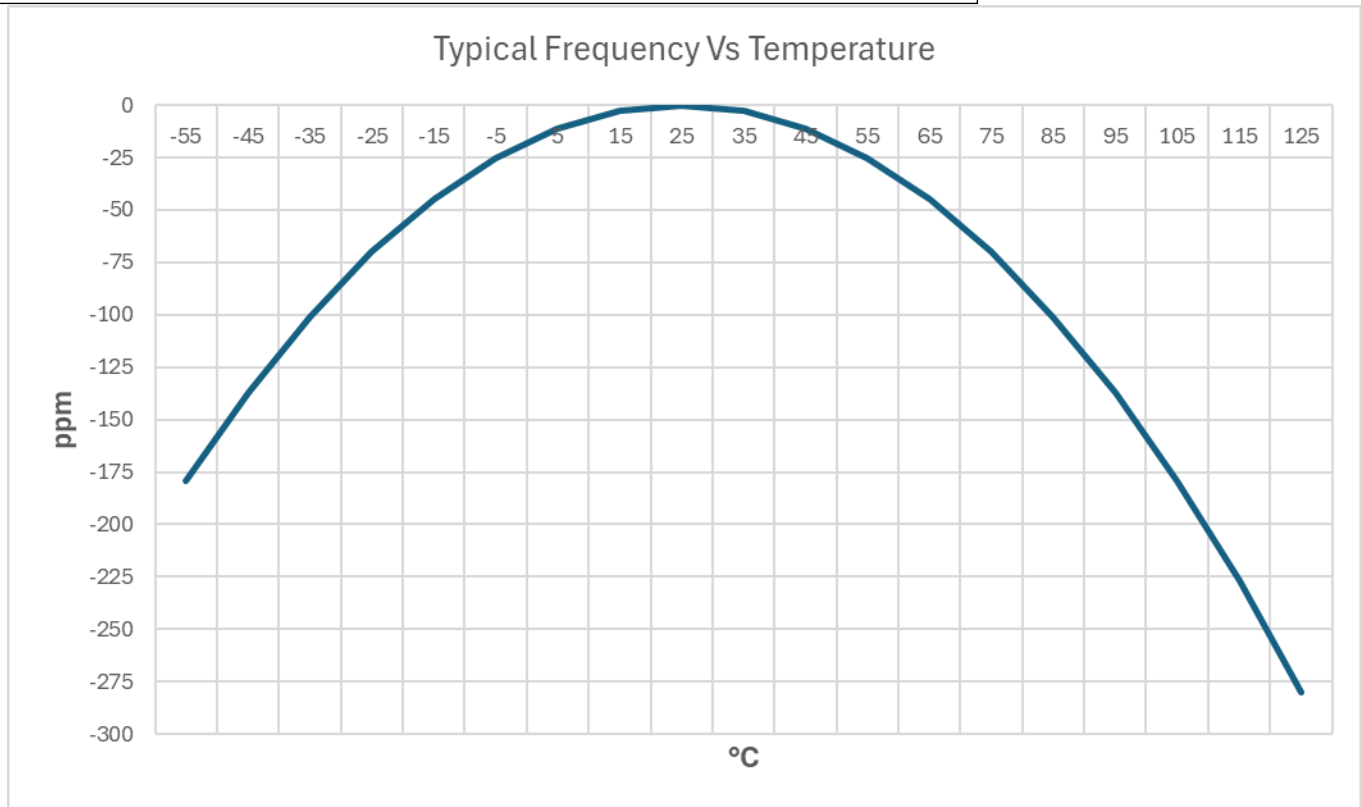
Applications

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.
Frequency Stability	-0.022	-0.028	-0.034	ppm/Δ°C ²	
Turnover Temperature	20	25	30	°C	
Operating Temperature Range	-55	-	+125	°C	
Storage Temperature Range	-55	-	+125	°C	
Equivalent Series Resistance (ESR)	-	-	90	kΩ	At 25°C
Drive Level	-	0.1	1	μW	
Shunt Capacitance (C0)	-	1.3	-	pF	Pad to Pad Capacitance
Insulation Resistance	500	-	-	MΩ	@100VDC
Aging at 25°C ± 3°C	-	-	±3	ppm	for the first year

Frequency versus Temperature - Typical Performance





Part Numbering

Series Model	Load Capacitance (CL) in pF	Frequency in kHz	Frequency Calibration Tolerance	Automotive Grade
SM7S	-9	-32.768K	-20	-AEC
	Blank = 12.5 pF 9 = 9 pF 7 = 7 pF 6 = 6 pF		20 = ± 20 ppm Contact PLE for other options	

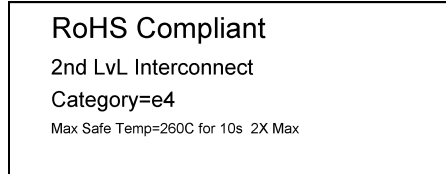
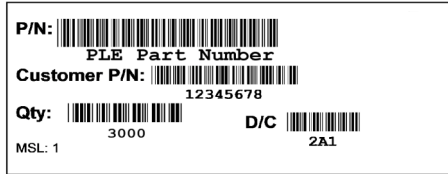
Device Marking

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

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



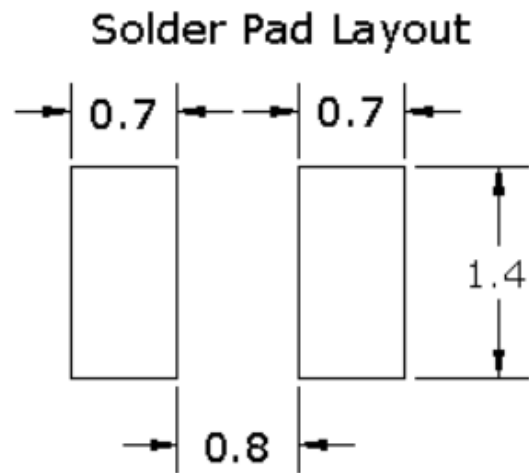
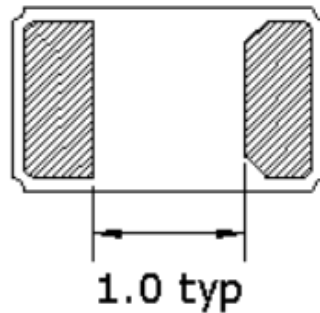
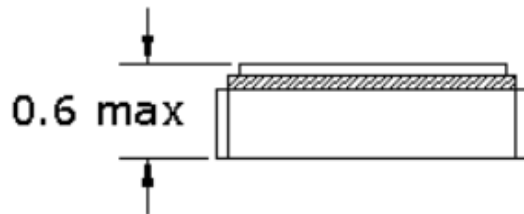
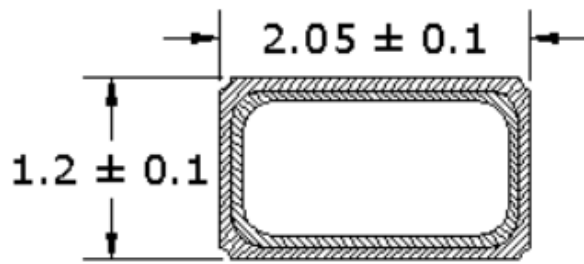
Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.004 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

Pad Layout
Disclaimer: Suggested layout shown. Adjust layout as needed for individual process requirements.

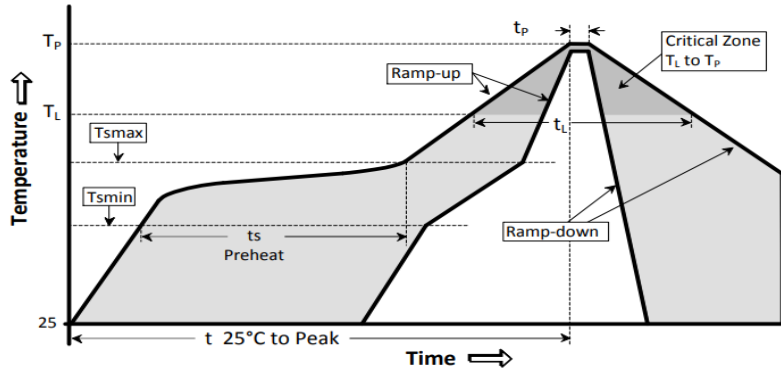
Contacts (pads): Gold (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)

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"

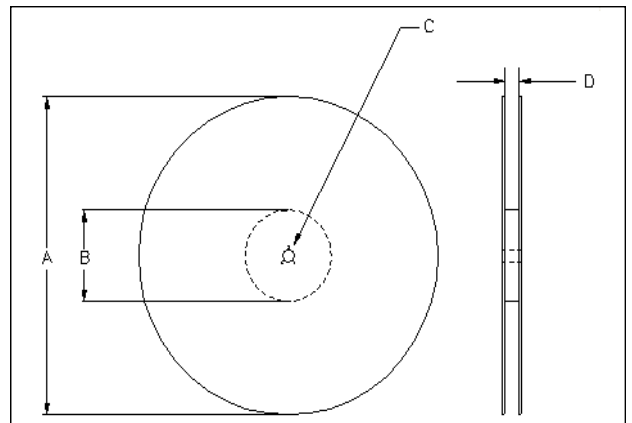
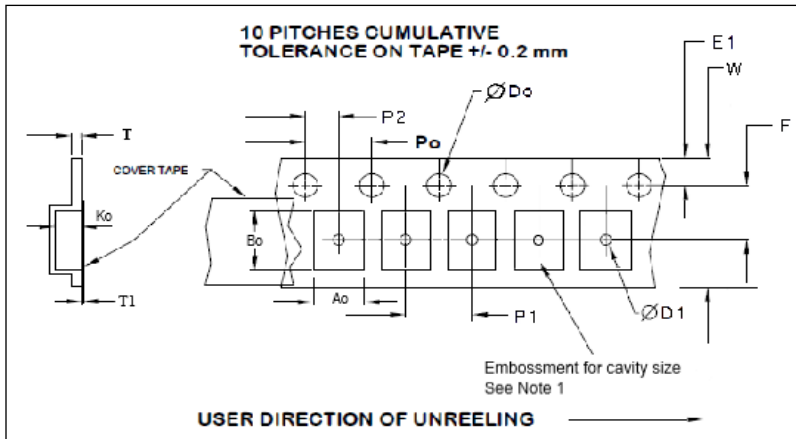


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	($T_{S_{max}}$ 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	$T_{S_{min}}$	150	°C
Temperature max	$T_{S_{max}}$	200	°C
Time $T_{S_{min}}$ to $T_{S_{max}}$	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 = 3000 per reel. 8mm tape, 4mm pitch.



Tape Size	F	P1	W max	Ao	Bo	Ko	Do	D1	E1	Po	P2	T	T1
12mm	3.5 ±0.1	4.0 ±0.1	8.2	1.45	2.25	0.75	1.5 +1.0 -0.0	1.0	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	0.25	0.1

Dimensions in mm

Reel Size	A	B	C	D
7	180	60	13.0 +0.5 -0.2	Tape size +2.0 -0.0



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