



PLETRONICS SM12T Series Miniature SMD Crystal



SM12T
6.0 x 3.5 x 1.0 mm
Ceramic Package

Features

- Miniature low profile surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel Packaging.
- AT Cut Crystal
- 10 MHz to 150 MHz

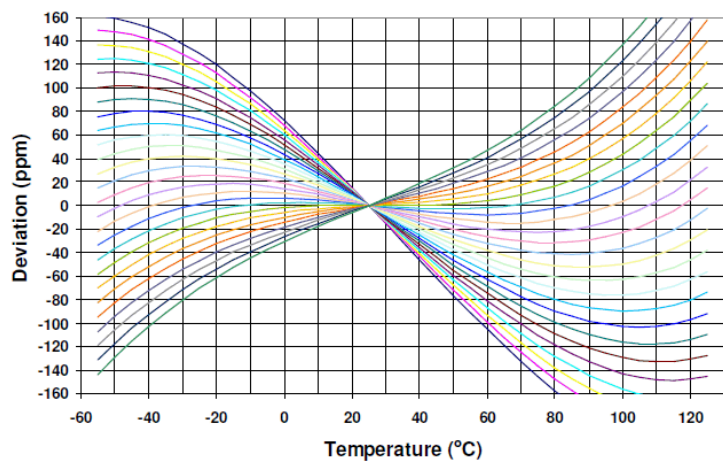
Applications

Bluetooth
WLAN
IoT

Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition (Consult factory for other options)
Frequency Range	10.0	-	150.0	MHz	
Calibration Frequency Tolerance	±10	-	±50	ppm	at +25°C ± 3°C, see part number guide below for available options
Frequency Stability	±5	-	±100	ppm	see part number guide below for available options
Operating Temperature Range	-40	-	+125	°C	see part number guide below for available options
Storage Temperature Range	-55	-	+125	°C	
Equivalent Series Resistance (ESR)	-	-	60 50 100	Ω	10 MHz ≤ Freq < 16 MHz 16 MHz ≤ Freq ≤ 50 MHz 40 MHz ≤ Freq < 150 MHz (3rd Overtone)
Drive Level	-	-	100	μW	Use 10μW for testing
Shunt Capacitance (C0)	-	-	5.0	pF	Pad to Pad Capacitance
Aging at 25°C ± 3°C	-	-	±3	ppm	for the first year
	-	-	±2	ppm	after the first year

AT Cut Crystal Frequency versus Temperature Typical Performance:





PLETRONICS SM12T Series Miniature SMD Crystal

Part Numbering

Series Model	Load Capacitance (CLoad) in pF	Frequency in MHz	Frequency Calibration Tolerance	Frequency Stability	AT Cut Crystal	Operating Temperature Range		Internal Code Or Blank
						Lowest	Highest	
SM12T	-8	-25.0M	-20	H	1	G	G	-xx
	Parallel Resonance from 06 to 32 pF SR = Series Resonance		(Typical Values Shown) 10 = ±10 ppm at 25°C ± 3°C 15 = ±15 ppm at 25°C ± 3°C 20 = ±20 ppm at 25°C ± 3°C (Standard) 25 = ±25 ppm at 25°C ± 3°C 50 = ±50 ppm at 25°C ± 3°C	See Table Below	1 = Fundamental 3 = 3rd OT	C = 0°C D = -5°C E = -10°C G = -20°C J = -30°C K = -35°C L = -40°C	C = +50°C E = +60°C G = +70°C H = +75°C J = +80°C K = +85°C P = +105°C U = +125°C	

Available Frequency Stability versus Temperature in ppm

Operating Temperature Range		B	C	D	E	F	G	H	J
	CODE	±5	±8	±10	±15	±20	±30	±50	±100
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 +70°C	EH		•	•	•	•	•	•	•
-20 to +70°C	GG		•	•	•	•	•	•	•
-20 to +75°C	GH		•	•	•	•	•	•	•
-30 to +75°C	JH			•	•	•	•	•	•
-30 to +85°C	JK			•	•	•	•	•	•
-35 to +80°C	KJ				△	•	•	•	•
-40 to +85°C	LK				△	•	•	•	•
-40 to +105°C	LP					•	•	•	•
-40 to +125°C	LU						△	•	•

• = Available △ = Check with Pletronics



PLETRONICS SM12T Series Miniature SMD Crystal

Device Marking

**fff.fff
PywwC**

OR

**fff.fffM
PymdC**

fff.fff = Crystal Frequency in MHz
 x = Internal factory codes
 P = Pletronics
 YMD or YWW = Date code (Year-WeekWeek or Year-Month-Day; see chart below)
 C = Capacitance load

Specifications such as part number, frequency stability, supply voltage and operating temperature range, etc. are not identified from marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

Codes for Date Code YMD (Year Month Day)

Code	2	3	4	5	6	Code	A	B	C	D	E	F	G	H	J	K	L	M
Year	2022	2023	2024	2025	2026	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	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	X	Y	Z
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Codes for Load Capacitance

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

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

P/N: 
 SM12T-SR-23.45M-10F1CG

Customer P/N: 
 12345678

Qty:  1000 D/C  0526

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: 0.064 grams
 Moisture Sensitivity Level: 1 As defined in J-STD-020D
 Second Level Interconnect code: e4

Reliability

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

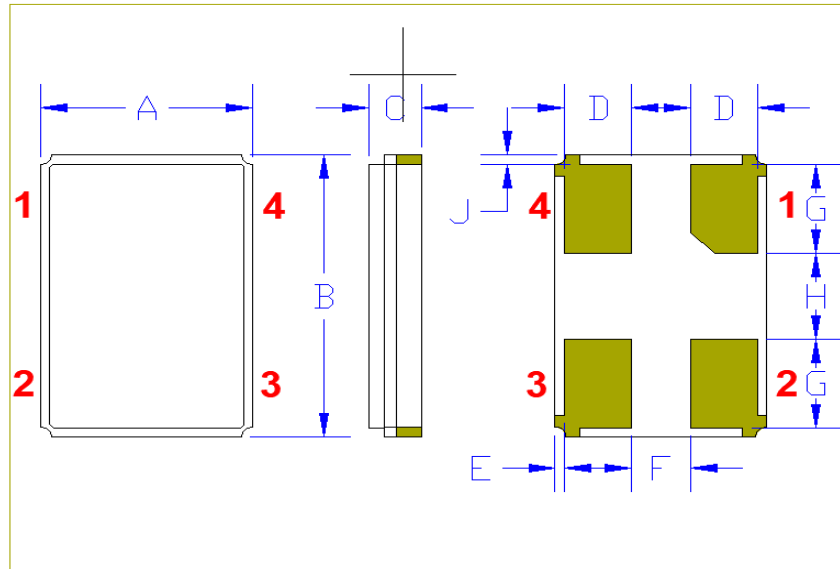


PLETRONICS SM12T Series Miniature SMD Crystal

Mechanical Dimensions

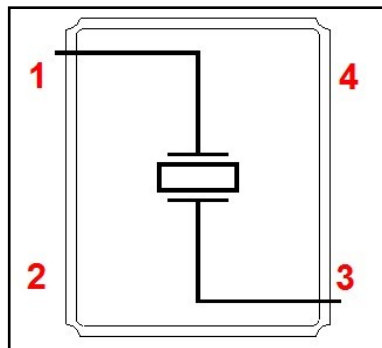
	Inches	mm
A	0.138 ± 0.008	3.5 ± 0.2
B	0.236 ± 0.008	6.0 ± 0.2
C	0.043 max	1.1 max
D	0.031	0.8
E ¹	0.004	0.1
F ¹	0.059	1.5
G ¹	0.055	1.4
H ¹	0.118	3.0
J ¹	0.004	0.1

¹ Typical dimensions

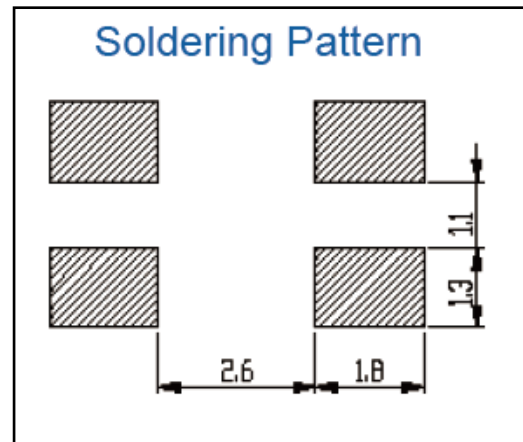


Contacts (pads): Gold (0.3 to 1µm) over Nickel (1.27 to 8.89 µm)
The chamfered pad may or may not be present and may be on any pad.
 The crystal is symmetrical, there is no Pad 1 preference. The part can be rotated 180° when being assembled on the PCB and will still perform correctly.

Pad layout - Solder Pattern



Pad	Note
2 + 4	Connected to the metal cover



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

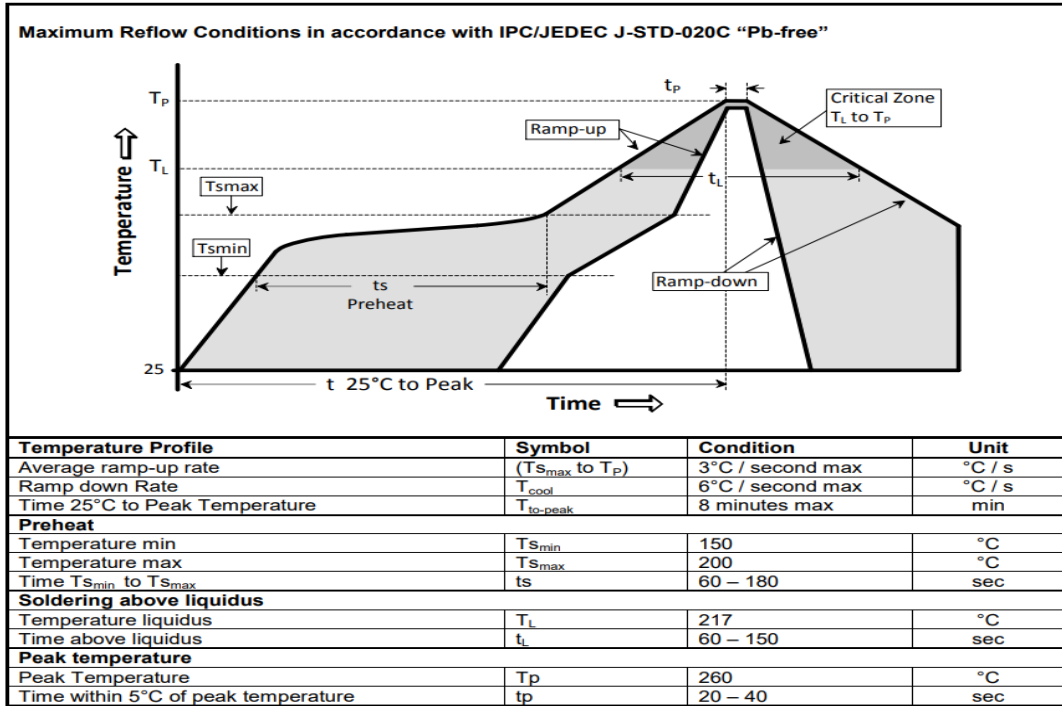
For Optimum Jitter Performance, Pletronics recommends:

- Trace lengths to the crystal should be kept as short as possible.
- The crystal connections are sensitive to noise.
- The package should be grounded for optimum performance, pad 2 or 4 connected to ground.
- These very small crystals have high ESR, the oscillator start-up and operation should take this into consideration.
- These small crystals should have their maximum drive level limited to 100 µW.



PLETRONICS SM12T Series Miniature SMD Crystal

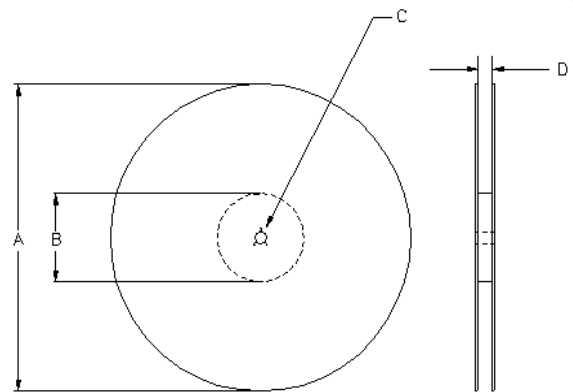
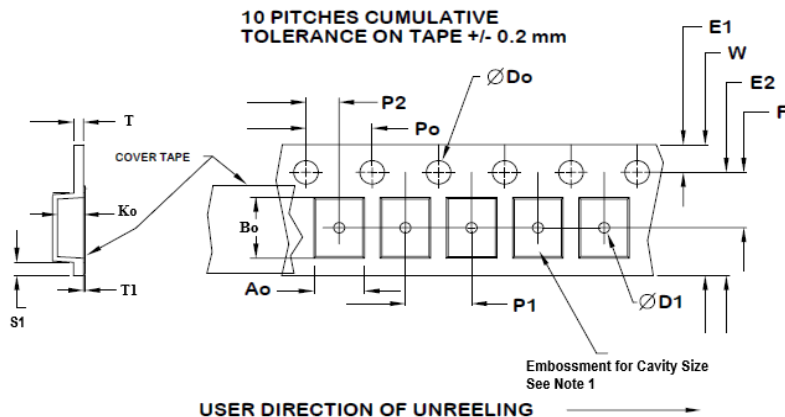
Reflow Cycle



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

Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 1000. 16mm tape, 8mm pitch.



Tape Size	E2 typ	F	P1	W max	Ao	Bo	Ko
16mm	14.25	7.5 ±0.05	8.0 ±0.1	16.3	3.95±0.1	6.5±0.1	1.35±0.1

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

Tape Size	Do	D1 min	E1	Po	P2	S1 min	T max	T1 max
16mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	0.6	0.3	0.1

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
7	7.0	177.8	2.50	63.5	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0



PLETRONICS SM12T Series Miniature SMD Crystal

Important Notice

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

PLE warrants performance of this product to the specifications applicable at the time of sale in accordance with PLE's limited warranty. Testing and other quality control techniques are used to the extent PLE deems necessary to support this warranty. Except where mandated by specific contractual documents, testing of all parameters of each product is not necessarily performed.

PLE assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using PLE components. To minimize the risks associated with the customer products and applications, customers should provide adequate design and operating safeguards.

PLE products are not designed, intended, authorized or warranted to be suitable for use in life support applications, weapons, weapon systems and space applications, devices or systems or other critical applications that may involve potential risks of death, personal injury or severe property or environmental damage. Inclusion of PLE products in such applications is understood to be fully at the risk of the customer. Use of PLE products in such applications requires the written approval of an appropriate PLE officer. Questions concerning potential risk applications should be directed to PLE.

PLE does not warrant or represent that any license, either express or implied, is granted under any PLE patent right, copyright, artwork or other intellectual property right relating to any combination, machine or process which PLE product or services are used. Information published by PLE regarding third-party products or services does not constitute a license from PLE to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from PLE under the patents or other intellectual property of PLE.

Reproduction of information in PLE data sheets or web site is permissible only if the reproduction is without alteration and is accompanied by associated warranties, conditions, limitations and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. PLE is not responsible or liable for such altered documents.

Resale of PLE products or services with statements different from or beyond the parameters stated by PLE for that product or service voids all express and implied warranties for the associated PLE product or service and is an unfair or deceptive business practice. PLE is not responsible for any such statements.

Contacting Pletronics Inc.

Pletronics, Inc.
19013 36th Ave. West
Lynnwood, WA 98036-5761
U.S.A.

Tel: 425.776.1880
Fax: 425.776.2760
email: ple-sales@pletronics.com

URL: www.pletronics.com