

SM10T Series Miniature SMD Crystal

November 2018



- Pletronics' SM10T Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 12 MHz to 67.5 MHz
- 2.5 x 3.2 mm 4 pad
- AT Cut Fundamental and 3rd Overtone Crystals
- Ideal for use in hand held consumer products

Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (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: 0.03 grams

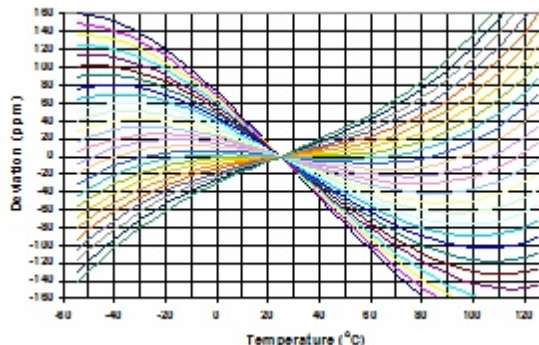
Moisture Sensitivity Level: 1 As defined in J-STD-020D.1

Second Level Interconnect code: e4

Electrical Specification:

| Item | Min | Max | Unit | Condition |
|------------------------------------|-----|------|---------|---|
| Frequency Range | 12 | 60 | MHz | |
| Calibration Frequency Tolerance | 10 | 50 | ppm | at +25°C ± 3°C, see part number for options |
| Frequency Stability | 3 | 150 | ppm | see part number for available options |
| Equivalent Series Resistance (ESR) | - | 200 | Ohms | 12 MHz to 14.318 MHz |
| | - | 150 | Ohms | 14.318 MHz to 16 MHz |
| | - | 60 | Ohms | 16 MHz to 22 MHz |
| | - | 50 | Ohms | 22 MHz to 50 MHz |
| Drive Level | - | 100 | µW | use 10 µW for testing |
| Shunt Capacitance (C0) | - | 5 | pF | Pad to Pad capacitance |
| Aging at 25°C ± 3°C | -5 | +5 | ppm /Yr | for the first year |
| | -2 | +2 | ppm /Yr | after the first year |
| Operating Temperature Range | -40 | +125 | °C | see part number for available options |
| Storage Temperature Range | -55 | +125 | °C | |

AT Cut Crystal Frequency versus Temperature Typical Performance:



Product information is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. Production processing does not necessarily include testing of all parameters.

Copyright © 2018, Pletronics Inc.

Part Number:

SM10T -18 -16.384M -20 E 1 L K -XX

See chart below for available options

| |
|--|
| Internal code or blank |
| Highest Specified Operating Temperature A = 40°C G = 70°C N = 100°C B = 45°C H = 75°C P = 105°C C = 50°C J = 80°C R = 110°C D = 55°C K = 85°C S = 115°C E = 60°C L = 90°C T = 120°C F = 65°C M = 95°C U = 125°C |
| Lowest Specified Operating Temperature A = +10°C F = -15°C L = -40°C B = +5°C G = -20°C M = -45°C C = 0°C H = -25°C N = -50°C D = -5°C J = -30°C P = -55°C E = -10°C K = -35°C |
| Fundamental mode AT cut crystal 1 = Fundamental AT cut crystal 3 = 3rd Overtone AT cut crystal |
| Frequency Stability See chart below |
| Calibration Frequency Tolerance (Typ. Values shown) 10 = ± 10 ppm at 25°C ± 3°C 20 = ± 20 ppm at 25°C ± 3°C 30 = ± 30 ppm at 25°C ± 3°C (Standard) 50 = ± 50 ppm at 25°C ± 3°C |
| Frequency in MHZ |
| Load in pF Parallel Resonance from 06 to 32 pF or SR = Series Resonance |
| Model Number |

| Operating Temperature Range | CODE | Available Frequency Stability versus Temperature in ppm | | | | | | | | | |
|-----------------------------|------|---|-------|-------|------|------|------|------|------|-------|-------|
| | | A | B | C | D | E | F | G | H | J | K |
| | | ± 3.0 | ± 5.0 | ± 8.0 | ± 10 | ± 15 | ± 20 | ± 30 | ± 50 | ± 100 | ± 150 |
| 0 to +45°C | CB | • | • | • | • | • | • | • | • | • | • |
| 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 +75°C | EH | | | • | • | • | • | • | • | • | • |
| -20 to +70°C | GG | | | • | • | • | • | • | • | • | • |
| -20 to +75°C | GH | | | | • | • | • | • | • | • | • |
| -30 to +75°C | JH | | | | • | • | • | • | • | • | • |
| -30 to +80°C | JJ | | | | • | • | • | • | • | • | • |
| -30 to +85°C | JK | | | | | • | • | • | • | • | • |
| -35 to +80°C | KJ | | | | | • | • | • | • | • | • |
| -40 to +85°C | LK | | | | | • | • | • | • | • | • |
| -40 to +90°C | LL | | | | | • | • | • | • | • | • |
| -40 to +105°C | LP | | | | | | • | • | • | • | • |
| -40 to +125°C | LU | | | | | | | | • | • | • |

Legacy Part Number (not for new designs):

| | | | | | | |
|-------|---|---|-----|---------|-----|---|
| SM10T | B | E | -18 | -23.45M | -XX | |
| | | | | | | Internal code or blank |
| | | | | | | Frequency in MHz |
| | | | | | | Load in pF Parallel Resonance from 6 to 32 pF or SR = Series Resonance |
| | | | | | | Operating Temperature Range Blank = 0 to +70°C (STD) E = -40 to +85°C |
| | | | | | | Calibration Tolerance / Frequency Stability Blank = 30/50 (STD) B = 30/30 |
| | | | | | | Series Model |





Reliability: Environmental Compliance

| Parameter | Condition |
|------------------|--------------------------------------|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition B |
| Vibration | MIL-STD-883 Method 2007, Condition A |
| Solderability | MIL-STD-883 Method 2003 |
| Thermal Shock | MIL-STD-883 Method 1011, Condition A |

Package Labeling

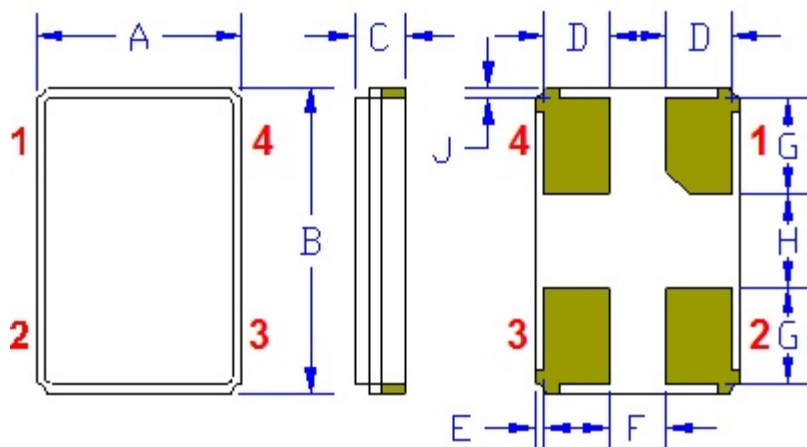
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

| | |
|---------------|---|
| P/N: |  |
| | SM10T-16-23.45M-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 |

Mechanical:



| | Inches | mm |
|----------------|-------------------|------------|
| A | 0.098 ± 0.004 | 2.5 ± 0.15 |
| B | 0.126 ± 0.004 | 3.2 ± 0.15 |
| C | 0.028 max | 0.7 max |
| D ¹ | 0.028 to 0.031 | 0.7 to 0.8 |
| E ¹ | 0.004 | 0.1 |
| F ¹ | A - (2 * (D + E)) | |
| G ¹ | 0.035 | 0.9 |
| H ¹ | 0.047 | 1.2 |
| J ¹ | 0.004 | 0.1 |

The chamfered pad may or may not be present and may be on any pad

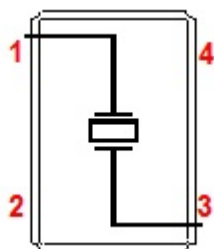
Contacts :

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

Not to Scale

¹ Typical dimensions

Connection (top view):

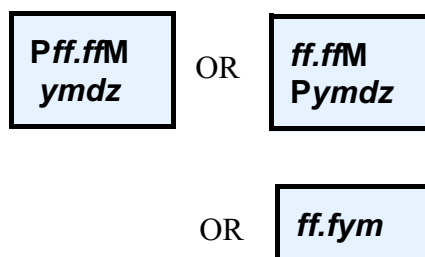


Pad 2 and Pad 4 are common and connected to the metal cover. They are not connected to the crystal. Connected to ground is recommended

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.

Marking:

- P = Pletronics
- ff.ffM or ff.f = Frequency
- ymd or ym = Year Month Day or Year Month, see code below
- z = Internal information
- Orientation of marking may be mixed on the tape
- Traceability of part is lost once removed from reel

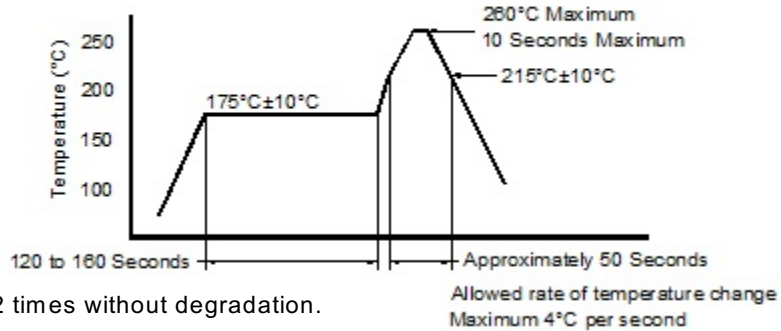


Codes for Date Code YMD

| Code | 6 | 7 | 8 | 9 | 0 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|------|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year | 2016 | 2017 | 2018 | 2019 | 2020 | 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 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H | J | K | L | M | N | P | R | T | U | V | W | X | Y | Z | |
| Day | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |

Reflow Cycle (typical for lead free processing)



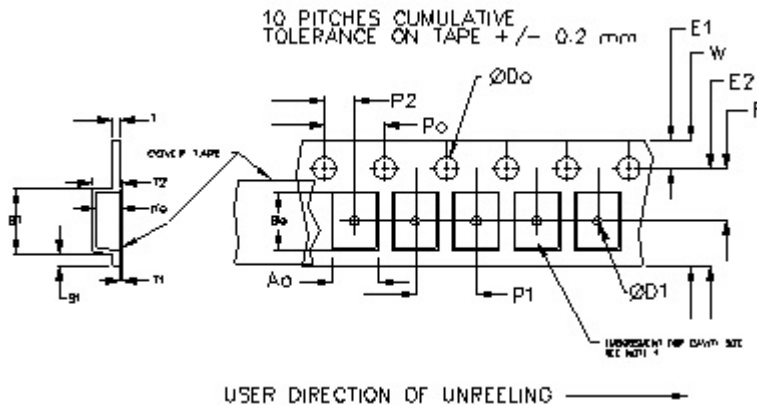
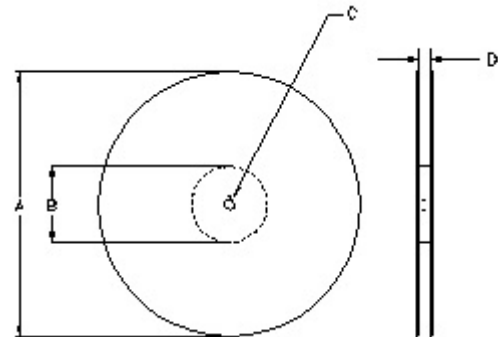
The part may be reflowed 2 times without degradation.

Tape and Reel: available for quantities of 250 to 3000 per reel (<1000 will be cut tape)

| 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 |
| 8 mm | 3.5 | 6.4 | 1.7 ± 0.1 | 4.0 ± 0.1 | 1.0 | 8.9 | Note 1 |

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



| | | REEL DIMENSIONS | | | Tape Width |
|---|--------|---------------------|---------------------|---------------------|------------|
| A | inches | 7.0 | 10.0 | 13.0 | |
| | 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 | 8.4 +2.0 -0.0 | 8.4 +2.0 -0.0 | 8.4 +2.0 -0.0 | 8.0 |

Reel dimensions may vary from the above

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, weapons systems or 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 USA

Tel: 425-776-1880
Fax: 425-776-2760
E-mail: ple-sales@pletronics.com
URL: www.pletronics.com

Copyright © 2018 Pletronics Inc.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Pletronics:

[SM10T-07-16.0M-10E1JJ](#) [SM10T-08-16.0M-10F1GG](#) [SM10T-10-12.0M](#) [SM10T-18-12.0M-30G1LK](#) [SM10T-18-13.50M-30G1EK](#) [SM10T-18-16.0M-50H1LK](#) [SM10T-18-18.432M-50H1LK](#) [SM10T-18-24.0M-50H1CG](#) [SM10T-18-25.0M-50H1LK](#) [SM10T-18-40.0M-20F1GG](#) [SM10T-9-26.0M](#) [SM10T-SR-25.0M-30F1CG](#) [SM10T-SR-40.0M-10D1JK](#)
[SM10T-16-25.0M-30G1GK](#) [SM10T-18-25.0M-20F1LK](#)