



SM12T Series Miniature SMD Crystal

November 2018

- Pletronics' SM12T Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 10 MHz to 80 MHz Fundamental Mode
- 40 MHz to 150 MHz 3rd Overtone
- 3.5 x 6 mm 4 pad
- AT Cut Crystal
- 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: 0.06 grams

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

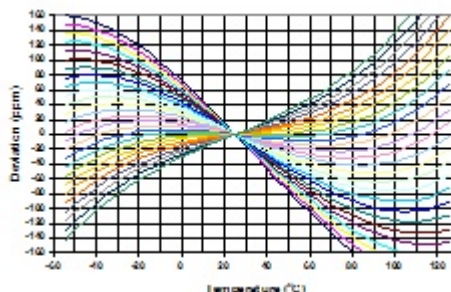
Second Level Interconnect code: e4



Electrical Specification:

| Item | Min | Max | Unit | Condition | |
|------------------------------------|-----|------|---------|---|--------------------------|
| Frequency Range | 10 | 80 | MHz | Fundamental Mode | |
| | 40 | 150 | MHz | 3 rd Overtone | |
| Calibration Frequency Tolerance | 10 | 50 | ppm | at +25°C ± 3°C, see part number for options | |
| Frequency Stability over OTR | 3 | 150 | ppm | see part number for available options | |
| Equivalent Series Resistance (ESR) | - | 60 | Ohms | 10 MHz to 16 MHz | Fundamental |
| | - | 50 | Ohms | 16 MHz to 50 MHz | |
| | - | 100 | Ohms | 40 MHz to 150 MHz | 3 rd Overtone |
| Drive Level | - | 100 | µW | use 10 µW for testing | |
| Shunt Capacitance (C0) | - | 5 | pF | Pad to Pad capacitance | |
| Aging | -3 | +3 | 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:



Part Number:

SM12T -18 -14.31818M- 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 |
| Mode: 1 = Fundamental 3 = 3 rd Overtone |
| Frequency Stability See chart below |
| Calibration Frequency Tolerance 10 = ± 10 ppm at 25°C $\pm 3^\circ\text{C}$ 15 = ± 15 ppm at 25°C $\pm 3^\circ\text{C}$ 20 = ± 20 ppm at 25°C $\pm 3^\circ\text{C}$ 50 = ± 50 ppm at 25°C $\pm 3^\circ\text{C}$ (Standard) |
| Frequency in MHz |
| Load in pF Parallel Resonance from 06 to 32 pF or SR = Series Resonance |
| Series Model |

| | | Available Frequency Stability versus Temperature in ppm | | | | | | | | | |
|-----------------------------|------|---|-----------|-----------|----------|----------|----------|----------|----------|-----------|-----------|
| Operating Temperature Range | CODE | 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):





| | | | | | | |
|-------|---|---|-----|-----------|-----|--|
| SM12T | B | E | -18 | -11.0592M | -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 E = -40 to +85°C |
| | | | | | | Calibration Tolerance / Frequency Stability Blank = 50/50 (Standard) A = 30/50 B = 30/30 C = 15/30 D = 10/20 (not all frequencies) |
| | | | | | | Model Number |

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

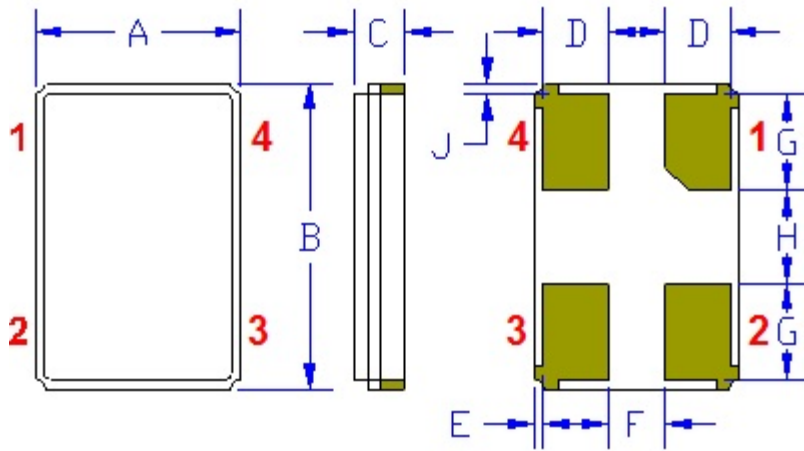
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

| | |
|----------------------|--|
| P/N: |  |
| | SM12T-SR-23.45M-10F1CG |
| Customer P/N: |  |
| | 12345678 |
| Qty: |  D/C  |
| | 1000 0526 |

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 |

Mechanical:



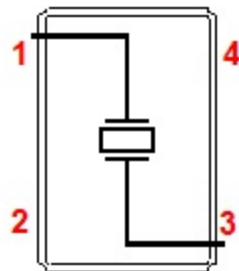
| | Inches | mm |
|----------------|---------------|-----------|
| A | 0.138 ± 0.008 | 3.5 ± 0.2 |
| B | 0.236 ± 0.008 | 6.0 ± 0.2 |
| C | 0.047 max | 1.2 max |
| D ¹ | 0.035 | 0.9 |
| E ¹ | 0.004 | 0.1 |
| F ¹ | 0.059 | 1.5 |
| G ¹ | 0.055 | 1.4 |
| H ¹ | 0.118 | 3.0 |
| J ¹ | 0.004 | 0.1 |

Contacts :
Gold 11.8 μinches 0.3 μm minimum over
Nickel 50 to 350 μinches 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.



Layout and application information

- 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 and/or pad 4 connected to ground.

Part Marking:

fff.fff M
PymdC

Where **fff.fff** = frequency in MHz
Pymd = Pletronics and Date code
C = Capacitance load code (see table below)

- Orientation of marking may be mixed on the tape
- Traceability of part is lost once removed from reel

| 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 |

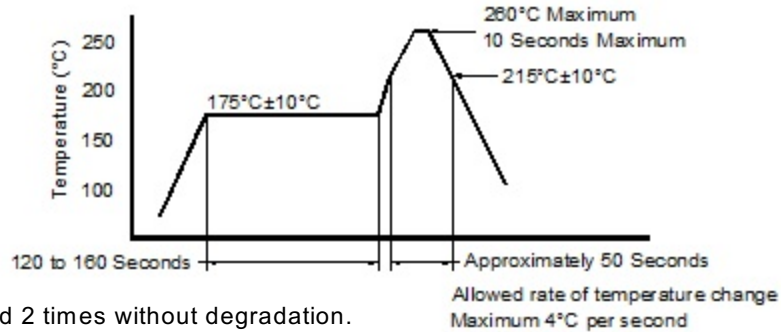
Codes for Date Code YMD

| | | | | | | | |
|------|------|------|------|------|------|------|------|
| Code | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |

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

Reflow Cycle (typical for lead free processing)



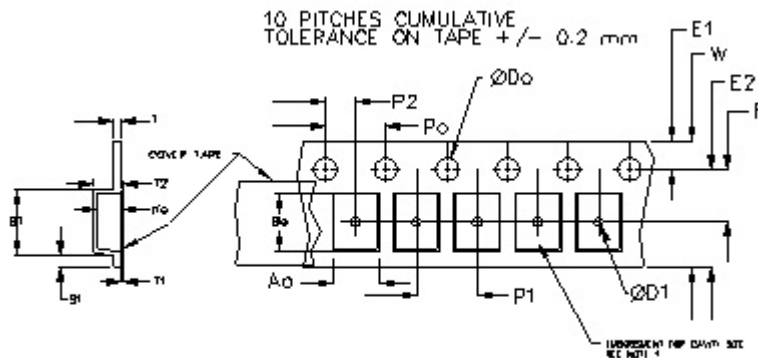
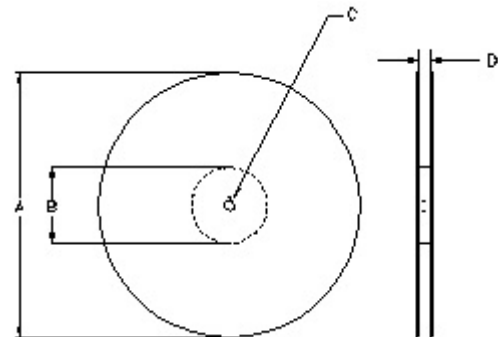
The part may be reflowed 2 times without degradation.

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 |
| 16 mm | 12.1 | 14.25 | 7.5 ± 0.1 | 8.0 ± 0.1 | 8.0 | 16.3 | 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 | Tape Width |
| | mm | 63.5 | 101.6 | 95.3 | |
| C | mm | 13.0 +0.5 / -0.2 | | | Tape Width |
| D | mm | 16.4 +2.0 -0.0 | 16.4 +2.0 -0.0 | 16.4 +2.0 -0.0 | |

Reel dimensions may vary from the above

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