

SM11T Series Miniature SMD Crystal

April 2015

- The Pletronics' SM11T Series is a miniature surface mount crystal.
- Package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 8 MHz to 150 MHz Fundamental
- 70 MHz to 300 MHz 3rd Overtone
- 120 MHz to 250 MHz 5th Overtone
- 3.2 x 5 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-020D.1

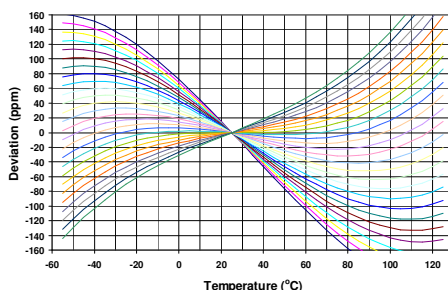
Second Level Interconnect code: e4



Electrical Specification:

| Item | Min | Max | Unit | Condition | |
|------------------------------------|-----|------|---------|---|-------------------------------|
| Frequency Range | 8 | 300 | MHz | Fundamental, 3 rd and 5 th Overtone Modes | |
| 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) | - | 100 | Ohms | 8MHz to 10MHz | Fundamental Mode |
| | - | 80 | Ohms | 10 MHz to 16 MHz | |
| | - | 60 | Ohms | 16 MHz to 20 MHz | |
| | - | 50 | Ohms | above 20 MHz | |
| | - | 100 | Ohms | 70 MHz to 300 MHz | 3 rd Overtone Mode |
| | - | 160 | Ohms | 120 MHz to 250 MHz | 5 th overtone Mode |
| Drive Level | - | 100 | μW | use 10 μW for testing | |
| Shunt Capacitance (C0) | - | 5 | pF | Pad to Pad capacitance | |
| Aging at 25°C ± 3°C | -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:

SM11T -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 OT 5 = 5 th OT | |
| Frequency Stability See chart below | |
| Calibration Frequency Tolerance (Typ. 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 30 = ± 30 ppm at 25°C ± 3°C 50 = ± 50 ppm at 25°C ± 3°C (Standard) | |
| Frequency in MHz | |
| Clload in pF Parallel Resonance from 06 to 32 pF or SR = Series Resonance | |
| Model Number | |

| Operating Temperature Range | | Available Frequency Stability versus Temperature in ppm | | | | | | | | | |
|-----------------------------|-------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | A | B | C | D | E | F | G | H | J | K |
| | CODE | ± 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):





| | | | | | | |
|-------|---|---|-----|------------|-----|---|
| SM11T | B | E | -18 | -14.31818M | -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 = 50/50 (STD) 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

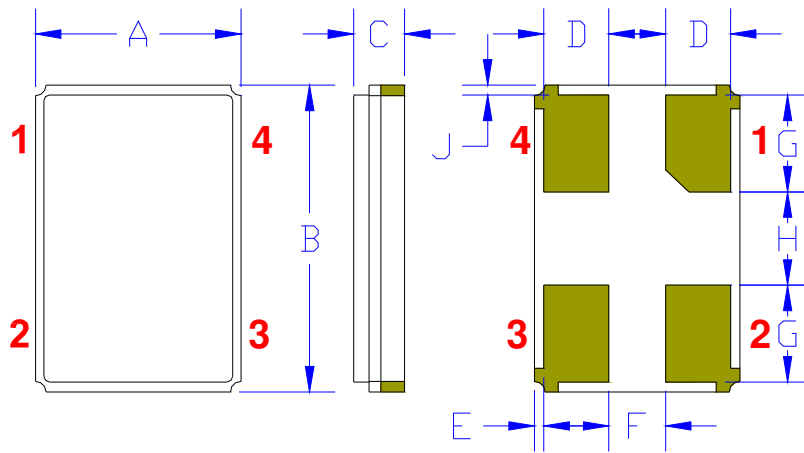
Label is 1" x 2.6" (25.4mm x 66.7mm)
 Font is Courier New
 Bar code is 39-Full ASCII

| | |
|---|---|
| P/N:  | |
| SM11T-18-24.0M-1SD1EH | |
| 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 | 0.126 ± 0.004 | 3.2 ± 0.2 |
| B | 0.197 ± 0.004 | 5.0 ± 0.2 |
| C | 0.033 max | 0.85 max |
| D ¹ | 0.031 | 0.8 |
| E ¹ | 0.004 | 0.1 |
| F ¹ | 0.055 | 1.4 |
| G ¹ | 0.043 | 1.1 |
| H ¹ | 0.102 | 2.6 |
| J ¹ | 0.004 | 0.1 |

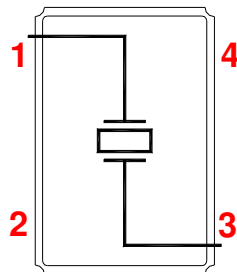
Contacts (pads):

Gold 11.8 to 39.3 μ inches (0.3 to 1.0 μ m)
over
Nickel 50 to 350 μ inches (1.27 to 8.89 μ m)

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

All other marking is internal factory codes

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

- 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 |

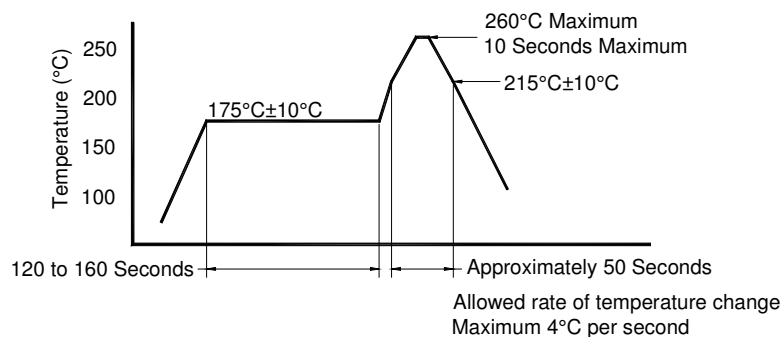
Codes for Date Code YMD

| Code | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------|------|------|------|------|------|------|------|
| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |

| 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)



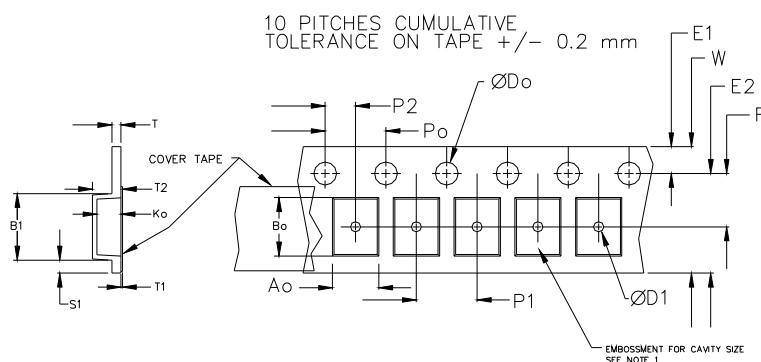
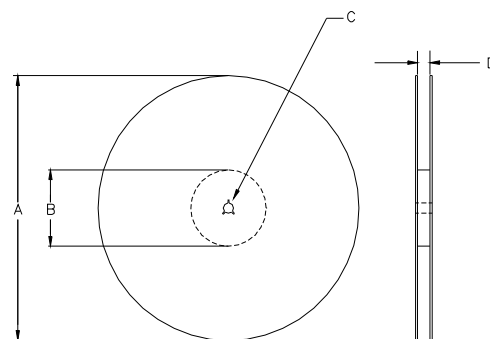
The part may be reflowed 2 times without degradation.

Tape and Reel: available for quantities of 250 to 3000 per reel

| Constant Dimensions Table 1 | | | | | | | | |
|-----------------------------|-------------------------|--------|------|-----|--------------|--------|-------|--------|
| Tape Size | D0 | D1 Min | E1 | P0 | P2 | S1 Min | T Max | T1 Max |
| 8mm | 1.5 +0.1 -0.0 | 1.0 | 1.75 | 4.0 | 2.0 ±0.05 | 0.6 | 0.25 | 0.1 |
| 12mm | | 1.5 | | | 2.0 ±0.1 | | | |
| 16mm | | 1.5 | | | | | | |
| 24mm | | 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 | | | | | 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 $+0.5 / -0.2$ | | | 16.0 |
| 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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