

- The Pletronics' SM13T Series is a miniature surface mount crystal.
- The package is ideal for automated surface mount assembly and reflow practices.
- Tape and Reel packaging
- 6 MHz to 70 MHz Fundamental
- 40 MHz to 100 MHz 3rd Overtone
- 5 x 7 mm 4 pad
- AT Cut Crystals
- Ideal for use in hand held consumer products.
- High endurance version available

Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2011/65/EC) and WEEE (2002/96/EC) directives.

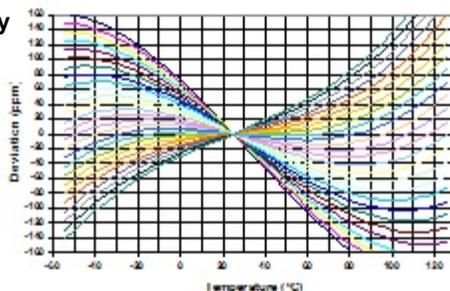
Pletronics Inc. guarantees the device does not contain the following:
 Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
 Weight of the Device: 0.16 grams
 Moisture Sensitivity Level: 1 As defined in J-STD-020C
 Second Level Interconnect code: e4



Electrical Specification:

| Item | Min | Max | Unit | Condition | |
|------------------------------------|-----|------|---------|---|--------------------------|
| Frequency Range | 6 | 70 | MHz | Fundamental | |
| | 40 | 100 | MHz | 3 rd overtone | |
| Calibration Frequency Tolerance | 10 | 50 | ppm | at +25°C ± 3°C, see part number for options | |
| Frequency Stability over OTR | 10 | 150 | ppm | see part number for available options | |
| Equivalent Series Resistance (ESR) | - | 100 | Ohms | 6 MHz to 7.4 MHz | Fundamental |
| | - | 60 | Ohms | 7.4 MHz to 9.8 MHz | |
| | - | 50 | Ohms | 9.8 MHz to 20 MHz | |
| | - | 40 | Ohms | 20 MHz to 70 MHz | |
| | - | 80 | Ohms | 40 MHz to 100 MHz | 3 rd Overtone |
| Drive Level | - | 100 | µW | use 10 µW for testing | |
| Shunt Capacitance (C0) | - | 7 | pF | Pad to Pad capacitance | |
| Aging | -5 | +5 | ppm /Yr | for the first year at +25°C ± 3°C | |
| | -2 | +2 | ppm /Yr | after the first year at +25°C ± 3°C | |
| 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:

SM13T -18 -12.0M -50 H 1 E G -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 = 3rd Overtone |
| Frequency Stability See chart below |
| Calibration Frequency Tolerance (Typ. Values shown) 10 = ± 10 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 Load Resonance from 06 to 32 pF (18 pF Std) -or- SR = Series Resonance |
| Series Model SM13T = Standard Version SM13TS = High Endurance Version |

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 | | • | • | • | • | • | • | • | • | • |
| -10 to +50°C | EC | | • | • | • | • | • | • | • | • | • |
| -10 to +60°C | EE | | • | • | • | • | • | • | • | • | • |
| -10 to +75°C | EH | | | • | • | • | • | • | • | • | • |
| -20 to +70°C | GG | | | • | • | • | • | • | STD | • | • |
| -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):

| | | | | | | |
|--|---|---|-----|-----------|-----|--|
| SM13T | 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) | | | | | | |
| Series Model SM13T = Standard Version SM13TS = High Endurance Version | | | | | | |

Reliability: Environmental Compliance

| Parameter | Condition for SM13T | SM13TS |
|------------------|--------------------------------------|-------------|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition B | Condition D |
| Vibration | MIL-STD-883 Method 2007, Condition A | Condition B |
| Solderability | MIL-STD-883 Method 2003 | same |
| Thermal Shock | MIL-STD-883 Method 1011, Condition A | same |

Package Labeling

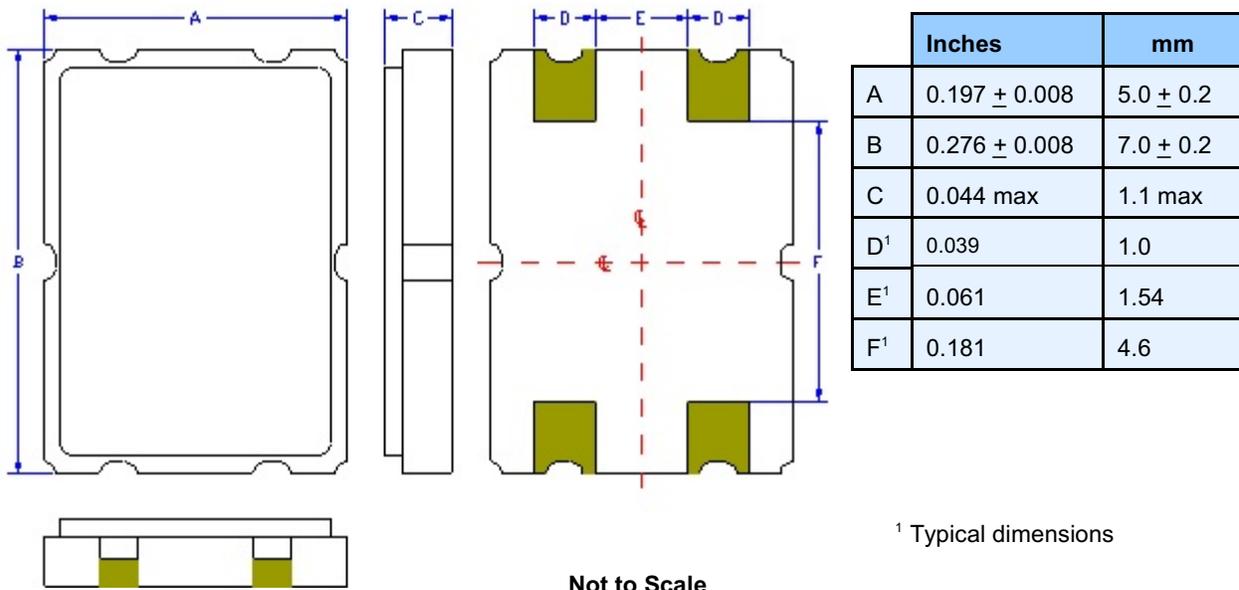
Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII

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

| | |
|---------------|---|
| P/N: |  |
| | SM13T-18-14.31818M-20E1LK |
| Customer P/N: |  |
| | 12345678 |
| Qty: |  |
| | 1000 |
| D/C |  |
| | 504 |

| |
|-----------------------------------|
| RoHS Compliant |
| 2nd LvL Interconnect |
| Category=e4 |
| Max Safe Temp=260C for 10s 2X Max |

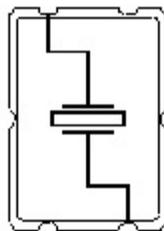
Mechanical:



Contacts :

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

Connection (top view):



The pads shown not connected to the crystal are common and connected to the metal cover.

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.

Part Marking:

SM13Tx or **SM13TSx** or **SM13T-zz**
FFF.FFF M **FFF.FFF M** **FFF.FFF M**
PLEymdz **PLEymdz** **PLEyywvz**

Legend:

PLE = Pletronics
 x = Capacitance load code from below
 FFF.FFM = Frequency in MHz
 YMD = Date of Manufacture (year, month and day)
 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 |

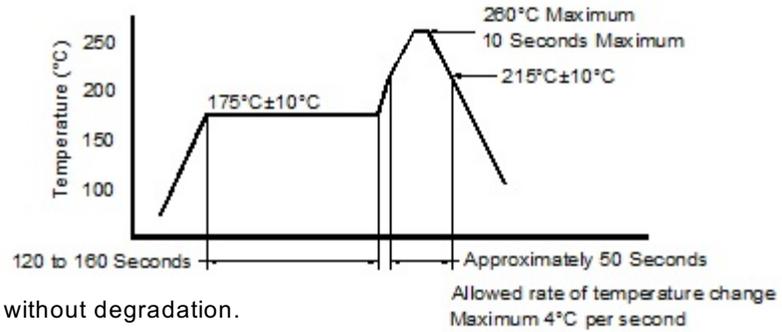
Codes for Date Code YMD

| Code | 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)



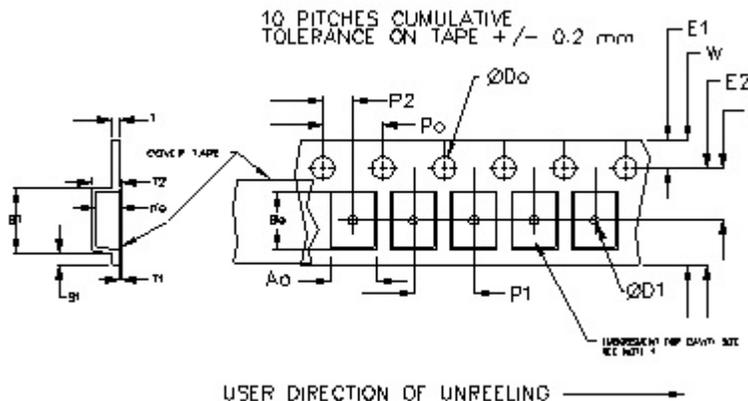
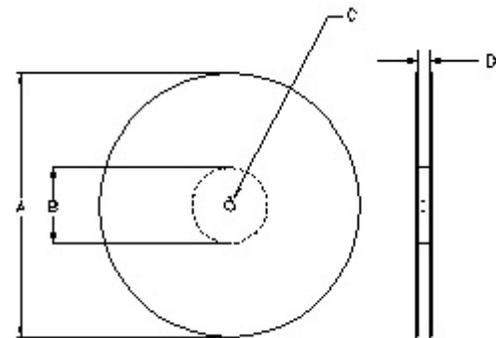
The part may be reflowed 2 times without degradation.

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 | A0, B0 & K0 |
| 16 mm | 8.1 | 14.25 | 7.5 ± 0.1 | 12.0 ± 0.1 | 1.8 | 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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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

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