

## SM12T Series Miniature SMD Crystal

February 2015

- 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 3<sup>rd</sup> 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.**

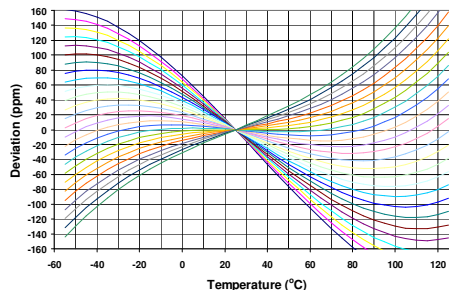
Pletronics Inc. guarantees the device does not contain the following:  
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.06 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020C  
Second Level Interconnect code: e4



### Electrical Specification:

| Item                               | Min | Max  | Unit    | Condition                                   |
|------------------------------------|-----|------|---------|---|
| Frequency Range                    | 10  | 80   | MHz     | Fundamental Mode                            |
|                                    | 40  | 150  | MHz     | 3 <sup>rd</sup> 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                            |
|                                    | -   | 50   | Ohms    | 16 MHz to 50 MHz                            |
|                                    | -   | 100  | Ohms    | 40 MHz to 150 MHz                           |
|                                    |     |      |         | Fundamental                                 |
|                                    |     |      |         | 3 <sup>rd</sup> 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   |
| <b>Highest Specified Operating Temperature</b>   |
| <b>A</b> = 40°C <b>G</b> = 70°C <b>N</b> = 100°C<br><b>B</b> = 45°C <b>H</b> = 75°C <b>P</b> = 105°C<br><b>C</b> = 50°C <b>J</b> = 80°C <b>R</b> = 110°C<br><b>D</b> = 55°C <b>K</b> = 85°C <b>S</b> = 115°C<br><b>E</b> = 60°C <b>L</b> = 90°C <b>T</b> = 120°C<br><b>F</b> = 65°C <b>M</b> = 95°C <b>U</b> = 125°C |
| <b>Lowest Specified Operating Temperature</b>  |
| <b>A</b> = +10°C <b>F</b> = -15°C <b>L</b> = -40°C<br><b>B</b> = +5°C <b>G</b> = -20°C <b>M</b> = -45°C<br><b>C</b> = 0°C <b>H</b> = -25°C <b>N</b> = -50°C<br><b>D</b> = -5°C <b>J</b> = -30°C <b>P</b> = -55°C<br><b>E</b> = -10°C <b>K</b> = -35°C  |
| <b>Mode: 1</b> = Fundamental <b>3</b> = 3 <sup>rd</sup> Overtone   |
| <b>Frequency Stability</b> See chart below   |
| <b>Calibration Frequency Tolerance</b>   |
| <b>10</b> = ± 10 ppm at 25°C ± 3°C<br><b>15</b> = ± 15 ppm at 25°C ± 3°C<br><b>20</b> = ± 20 ppm at 25°C ± 3°C<br><b>50</b> = ± 50 ppm at 25°C ± 3°C (Standard)  |
| <b>Frequency in MHz</b>  |
| <b>Load in pF</b>  |
| Parallel Resonance from <b>06</b> to <b>32</b> pF or<br><b>SR</b> = Series Resonance   |
| <b>Series Model</b>  |

|                             |      | 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 |  |
| <b>Internal code or blank</b>  |   |   |     |           |     |  |
| <b>Frequency in MHz</b>  |   |   |     |           |     |  |
| <b>Load in pF</b><br>Parallel Resonance from <b>6</b> to <b>32</b> pF or<br><b>SR</b> = Series Resonance   |   |   |     |           |     |  |
| <b>Operating Temperature Range</b><br>Blank = 0 to + 70°C<br><b>E</b> = -40 to +85°C   |   |   |     |           |     |  |
| <b>Calibration Tolerance / Frequency Stability</b><br>Blank = 50/50 (Standard)<br><b>A</b> = 30/50<br><b>B</b> = 30/30<br><b>C</b> = 15/30<br><b>D</b> = 10/20 (not all frequencies) |   |   |     |           |     |  |
| <b>Model Number</b>  |   |   |     |           |     |  |

### 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

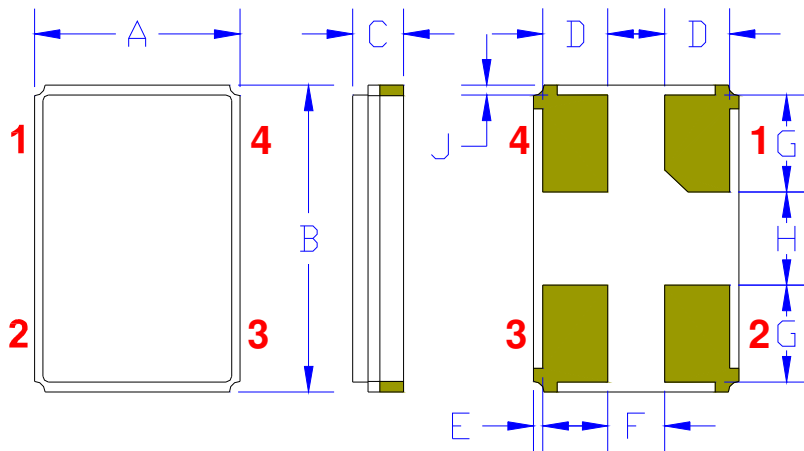
Label is 1" x 2.6" (25.4mm x 66.7mm)  
Font is Courier New  
Bar code is 39-Full ASCII

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



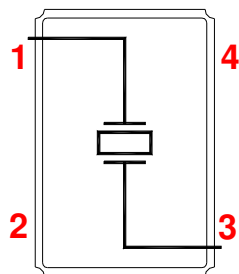
|                | Inches        | mm        |
|----------------|---------------|-----------|
| A              | 0.138 ± 0.008 | 3.5 ± 0.2 |
| B              | 0.236 ± 0.008 | 6.0 ± 0.2 |
| C              | 0.047 max     | 1.2 max   |
| D <sup>1</sup> | 0.035         | 0.9       |
| E <sup>1</sup> |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

<sup>1</sup> 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 |

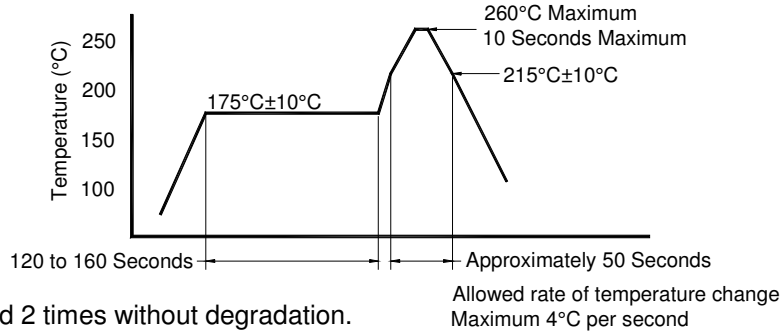
## Codes for Date Code YMD

| Code | 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)



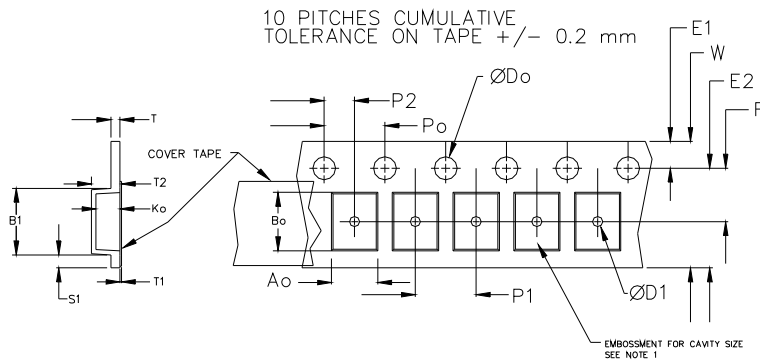
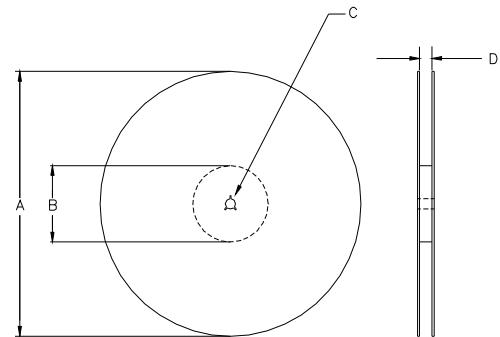
The part may be reflowed 2 times without degradation.

## Tape and Reel: available for quantities of 250 to 3000 per reel (<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<br>-0.0 |      |     | ± 0.1      |        |       |        |
| 24mm                        |     | 1.5          |      |     | ± 0.1      |        |       |        |

| 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



USER DIRECTION OF UNREELING →

| 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<br>+2.0<br>-0.0 | 16.4<br>+2.0<br>-0.0 | 16.4<br>+2.0<br>-0.0 |            |

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, 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 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

Copyright © 2008, Pletronics Inc.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А