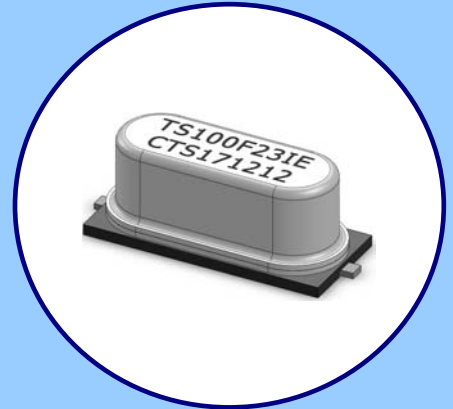


### FEATURES

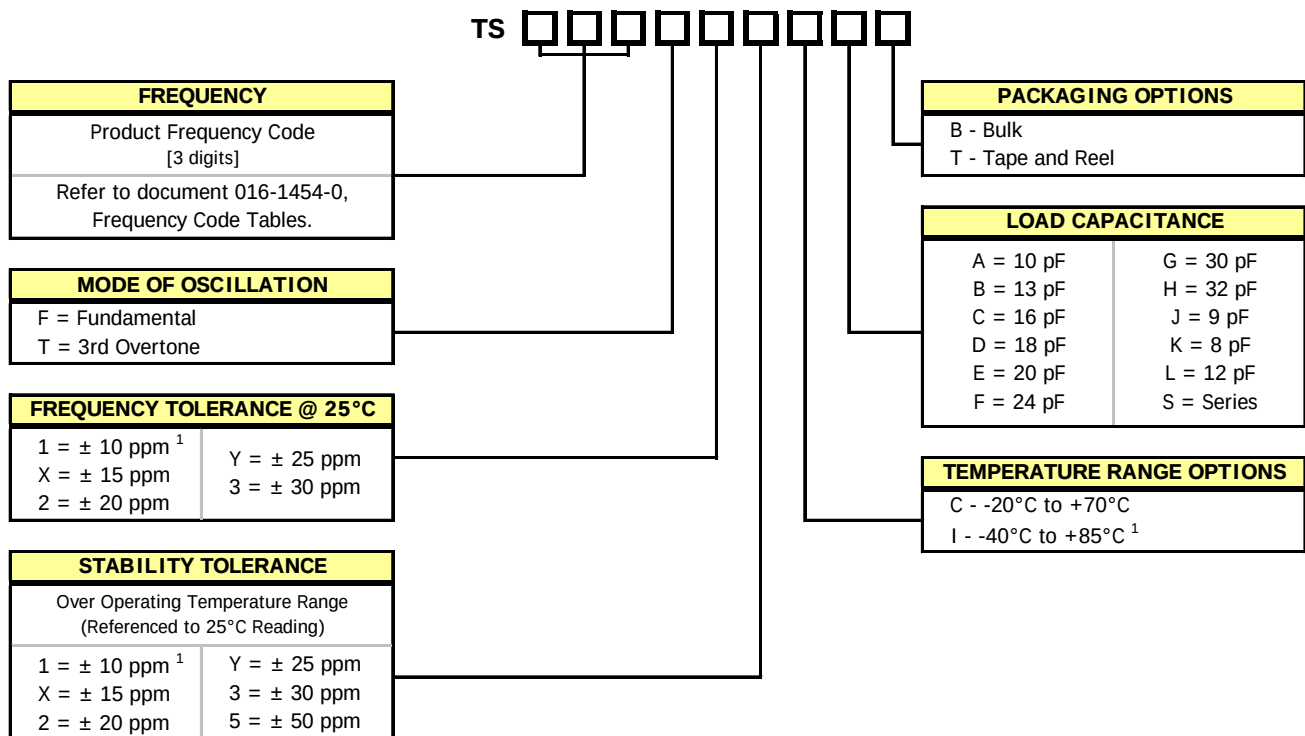
- **Standard HC-49/US-SM (surface mount) Package**
- **Fundamental and 3<sup>rd</sup> Overtone Crystals**
- Stable Frequency Over Temperature and Drive Level
- Frequency Range 3.2 – 64 MHz
- Frequency Tolerance, Options from  $\pm 10$  ppm to  $\pm 30$  ppm
- Frequency Stability, Options from  $\pm 10$  ppm to  $\pm 50$  ppm
- Operating Temperature,  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  &  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  Standard
- Tape & Reel Packaging Standard
- **RoHS/Green Compliant (6/6)**



### APPLICATIONS

The ATSSMTS [Tight Stability] crystal series offers excellent long-term stability and reliability in a proven resistance-weld metal package. The excellent shock performance makes it suitable for microprocessor, telecommunication, industrial, consumer electronics and networking applications.

### ORDERING INFORMATION



1] Check factory availability for "111" Tolerance/Stability/Temperature combination.

**Not all performance combinations and frequencies may be available.**  
**Contact your local CTS Representative or CTS Inside Sales Representative for availability.**

## ELECTRICAL CHARACTERISTICS

| ELECTRICAL PARAMETERS | PARAMETER                                                                                          | VALUE                                |
|-----------------------|----------------------------------------------------------------------------------------------------|--------------------------------------|
|                       | Frequency Range                                                                                    | 3.2 MHz to 64.0 MHz                  |
|                       | Operating Mode                                                                                     | Fundamental or 3rd Overtone          |
|                       | Crystal Cut                                                                                        | AT-Cut                               |
|                       | Frequency Tolerance @ +25°C *                                                                      | ±10, ±15, ±20, ±25, ±30 ppm          |
|                       | Frequency Stability Tolerance *<br>(Over Operating Temperature Range, Referenced to +25°C Reading) | ±10, ±15, ±20, ±25, ±30, ± 50 ppm    |
|                       | Operating Temperature Range *                                                                      | -20°C to +70°C and -40°C to +85°C    |
|                       | Equivalent Series Resistance                                                                       | See ESR Table                        |
|                       | Load Capacitance                                                                                   | See Ordering Information             |
|                       | Shunt Capacitance (C <sub>0</sub> )                                                                | 7.0 pF Maximum                       |
|                       | Drive Level                                                                                        | 100 µW Typical, 1,000 µW Maximum     |
|                       | Aging @ +25°C                                                                                      | ±3 ppm/yr Typical, ±5 ppm/yr Maximum |
|                       | Storage Temperature Range                                                                          | -40°C to +85°C                       |

\* See Ordering Information

## EQUIVALENT SERIES RESISTANCE TABLE

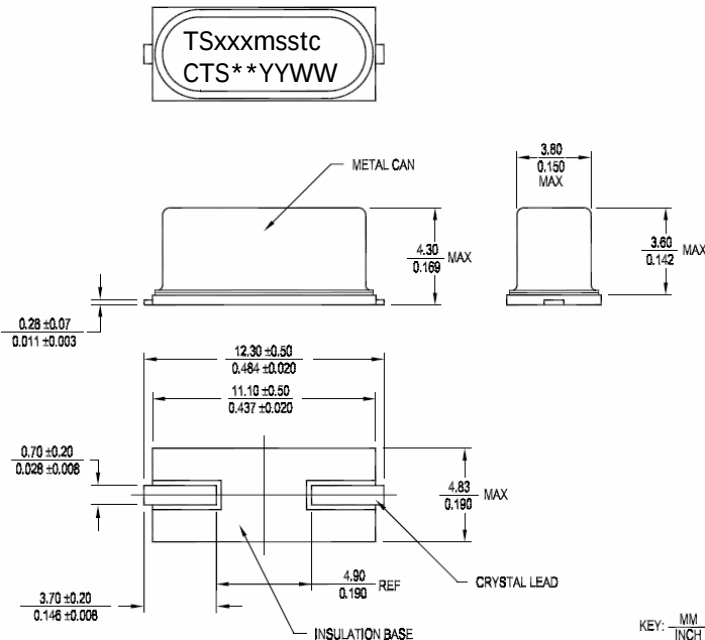
| FREQUENCY RANGE         | OSCILLATION MODE | ESR MAXIMUM |
|-------------------------|------------------|-------------|
| 3.20 MHz - < 4.00 MHz   | Fundamental      | 150 Ohms    |
| 4.00 MHz - < 5.00 MHz   | Fundamental      | 120 Ohms    |
| 5.00 MHz - < 8.00 MHz   | Fundamental      | 80 Ohms     |
| 8.00 MHz - < 12.00 MHz  | Fundamental      | 60 Ohms     |
| 12.00 MHz - < 20.00 MHz | Fundamental      | 40 Ohms     |
| 20.00 MHz - < 30.00 MHz | Fundamental      | 30 Ohms     |
| 27.00 MHz - 64.00 MHz   | 3rd Overtone     | 80 Ohms     |

### SCHEMATIC



## MECHANICAL SPECIFICATIONS

### PACKAGE DRAWING



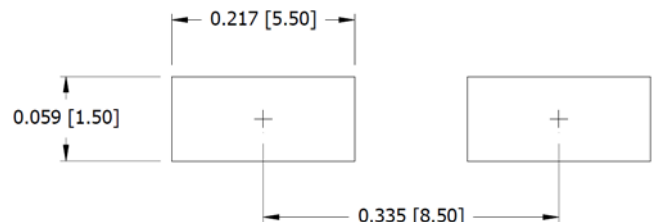
### MARKING INFORMATION

- TSxxxmsstc – Truncated CTS Part Number.  
[Packaging code is not required in the marking.]  
a) TS – ATSSMTS platform.  
b) xxx – 3-digit Frequency Code. [Reference document 016-1454-01]  
c) msstc – Tolerance, Stability, Temperature and Load Capacitance codes. Reference Ordering Information.
- \*\* - Manufacturing Site Code.
- YYWW – Date Code, YY – year, WW – week.
- Complete CTS part number, frequency value and date code information must appear on bag and box labels.

### NOTES

- Lead finish (e1), SnAgCu.
- Reflow conditions per JEDEC J-STD-020; 260°C maximum, 10 sec.
- MSL = 1.

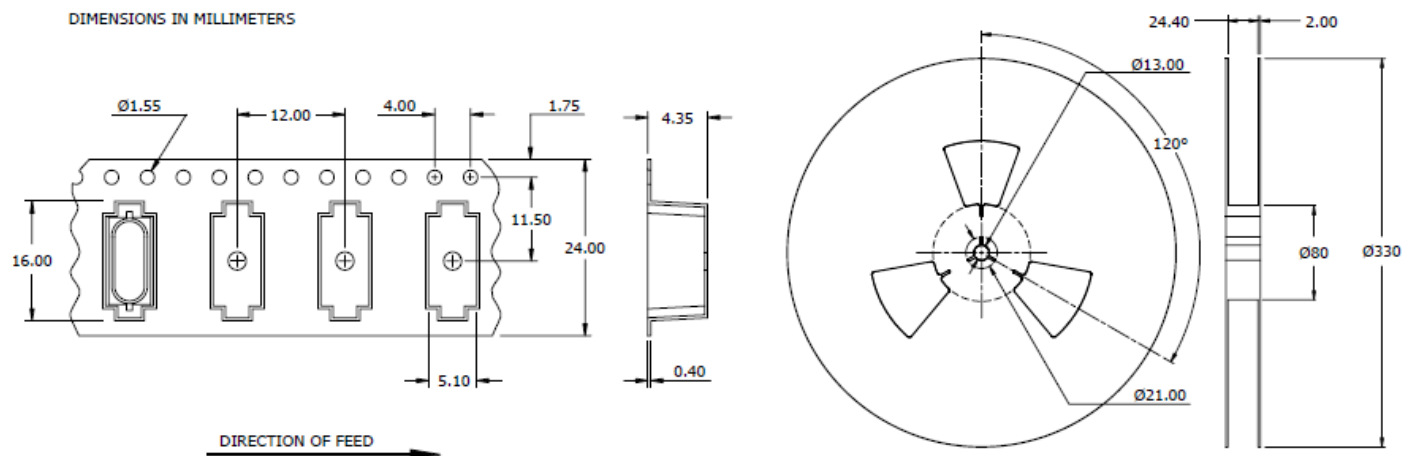
### SUGGESTED SOLDER PAD GEOMETRY



## PACKAGING INFORMATION

### ATS-SM Tape and Reel [For Reference]

DIMENSIONS IN MILLIMETERS



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[TS286F11CDT](#) [TS320T33CDT](#) [TS320T33CET](#) [TS353T33CDT](#) [TS036F33IET](#) [TS13CF33IDT](#) [TS143F33CET](#)  
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