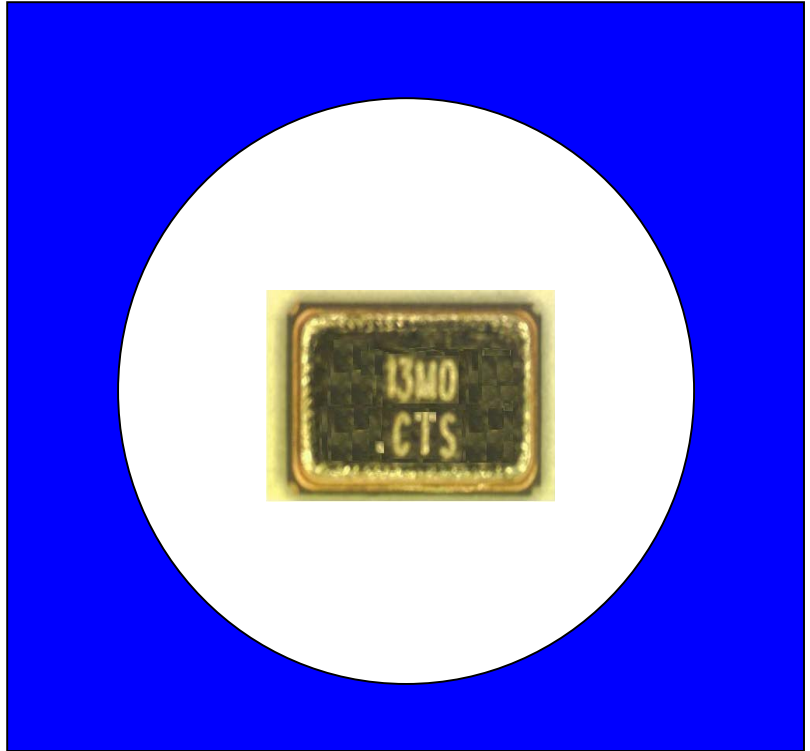


### FEATURES

- Standard 3.2x2.5mm Surface Mount Footprint
- Stable Frequency Over Temperature and Drive Level
- Frequency Range 13 – 50 MHz
- Frequency Tolerance,  $\pm 30$  ppm Standard ( $\pm 10$  ppm and  $\pm 20$  ppm available)
- Frequency Stability,  $\pm 50$  ppm Standard ( $\pm 10, \pm 20, \pm 30$  and  $\pm 40$  ppm available)
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Tape & Reel Packaging, EIA-481-2 Compliant
- **RoHS Compliant**

### DESCRIPTION

The Model 403 is a ceramic packaged Crystal offering reduced size, ideal for high-density circuit board applications. The Model 403 offers reliable precision and excellent shock performance in wireless telecommunication devices.



### ORDERING INFORMATION

403 □ □ □ □ □ □ M □ □ □ □ □

**OPERATING TEMPERATURE RANGE**  
 C =  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  (standard)  
 I =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

**FREQUENCY TOLERANCE @ 25°C**  
 1 =  $\pm 10$  ppm  
 2 =  $\pm 20$  ppm  
 3 =  $\pm 30$  ppm (standard)

**STABILITY TOLERANCE**  
 Over Operating Temperature Range  
 (Referenced to 25°C Reading)

1 =  $\pm 10$  ppm \*\*  
 2 =  $\pm 20$  ppm  
 3 =  $\pm 30$  ppm  
 4 =  $\pm 40$  ppm  
 5 =  $\pm 50$  ppm (standard)

\*\* Limited to Standard Operating Temperature Range Only, Code C.

**FREQUENCY IN MHz**  
 M - indicates MHz and decimal point.  
 Frequency is recorded with minimum 5 significant digits to the right of the "M".

**LOAD CAPACITANCE**  
 A = 10 pF  
 B = 13 pF  
 C = 16 pF  
 D = 18 pF  
 E = 20 pF  
 F = 24 pF  
 G = 30 pF  
 H = 32 pF  
 J = 9 pF  
 S = Series

Example Part Numbers:  
 403C35A14M31818  
 403I35A32M00000

## ELECTRICAL CHARACTERISTICS

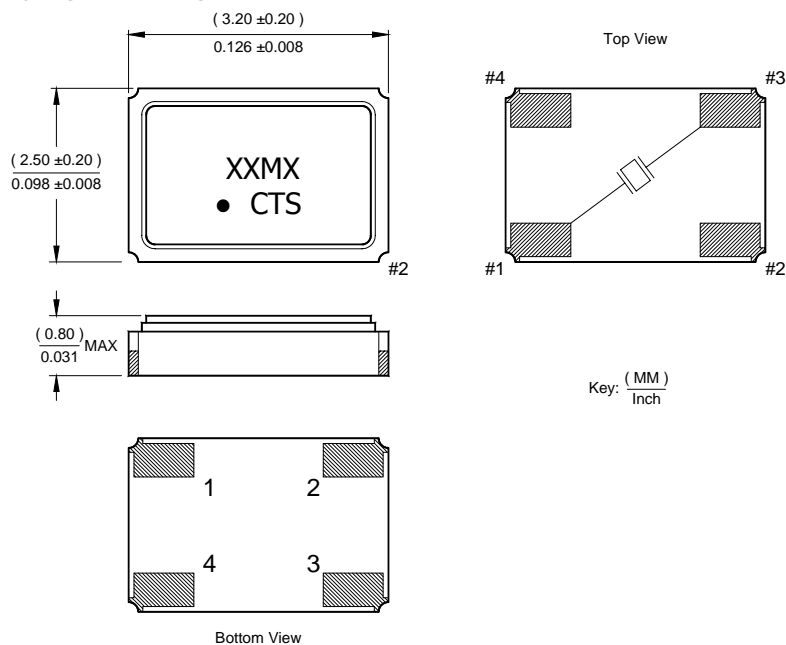
	PARAMETER	VALUE
Electrical Parameters	Operating Mode	Fundamental
	Crystal Cut	AT-Cut
	Frequency Range	13.0 MHz to 50.0 MHz
	Frequency Tolerance @ 25°C	± 30 ppm Standard (± 10 ppm and ± 20 ppm Available)
	Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading)	± 50 ppm Standard (± 10 ppm, ± 20 ppm, ± 30 ppm and ± 40 ppm Available)
	Operating Temperature Range	-20°C to +70°C Standard (-40°C to +85°C Available)
	Storage Temperature Range	-55°C to +125°C
	Equivalent Series Resistance	See ESR Table
	Load Capacitance or Resonance Mode	See Ordering Information
	Shunt Capacitance (C <sub>0</sub> )	5.0 pF Maximum (3.0 pF Typical)
	Drive Level	10 µW Typical, 100 µW Maximum
	Surface Mount Temperature Reflow Condition	+255°C ± 5°C, 10 Seconds Maximum

## EQUIVALENT SERIES RESISTANCE TABLE

FREQUENCY RANGE	MODE of OSCILLATION	ESR Maximum
13.00 MHz - 20.00 MHz	Fundamental	90 Ohms
20.01 MHz - 30.00 MHz	Fundamental	60 Ohms
30.01 MHz - 50.00 MHz	Fundamental	50 Ohms

## MECHANICAL SPECIFICATIONS

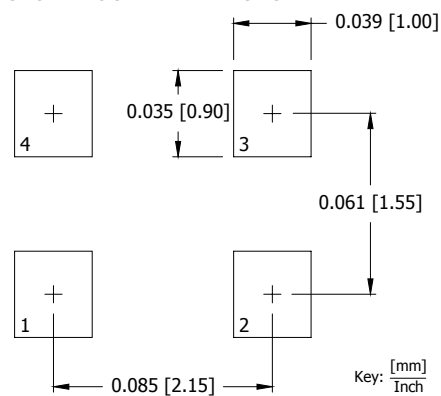
### PACKAGE DRAWING



### MARKING INFORMATION

- Frequency Formats:  
 XMXX – Ex. 6M00 (6.00000 MHz)  
 XXMX – EX. 20M0 (20.00000 MHz)
- Complete CTS part number, frequency value and date code information must appear on reel and box labels.

### SUGGESTED SOLDER PAD GEOMETRY

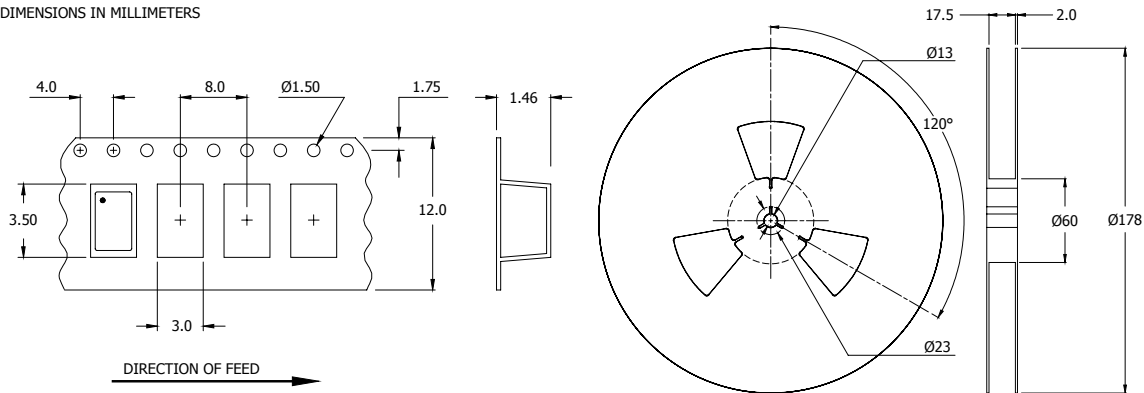


### Notes:

- Termination pads plated with gold (Au).
- Terminations #2, #4 and the metal lid are connected internally. End user may connect these pins to circuit ground.

**TAPE AND REEL INFORMATION**

DIMENSIONS IN MILLIMETERS



Device quantity is 1,000 pieces per 178mm reel.

**ENVIRONMENTAL SPECIFICATIONS**

Temperature Cycle:	400 cycles from -55°C to +125°C, 10 minute dwell at each temperature, 1 minute transfer time between temperatures.
Mechanical Shock:	1,500g's, 0.5mS duration, ½ sinewave, 3 shocks each direction along 3 mutually perpendicular planes (18 total shocks).
Sinusoidal Vibration:	0.06 inches double amplitude, 10 to 55 Hz and 20g's, 55 to 2,000 Hz, 3 cycles each in 3 mutually perpendicular planes (9 times total).
Gross Leak:	No leak shall appear while immersed in an FC40 or equivalent liquid at +125°C for 20 seconds.
Fine Leak:	Mass spectrometer leak rates less than 2x10 <sup>-8</sup> ATM cc/sec air equivalent.
Resistance to Solder Heat:	Product must survive 3 reflows of +260°C peak, 10 seconds maximum.
High Temperature Operating Bias:	2,000 hours at +125°C, disregarding frequency shift.
Frequency Aging:	1,000 hours at +85°C, maximum ±5 ppm shift.

**QUALITY AND RELIABILITY**

Quality systems meet or exceed the requirements of ISO 9000:2000 standards. Reliability audits are performed on this or similar products with results available upon request.