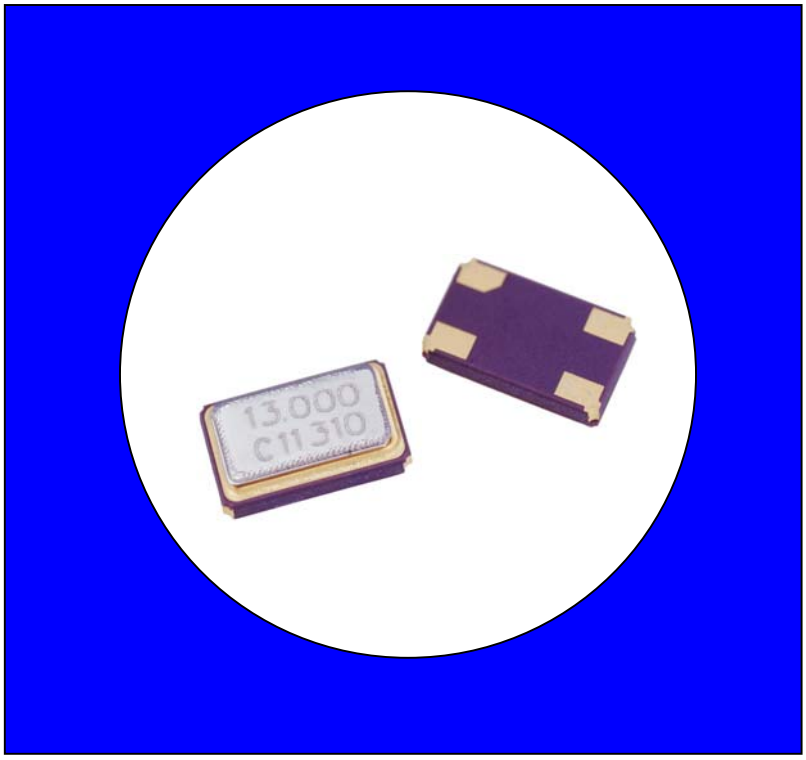
Model 405

Surface Mount Quartz Crystal

FEATURES

- Standard 5.0x3.2mm Surface Mount Footprint
- Stable Frequency Over Temperature and Drive Level
- Frequency Range 12 – 50 MHz
- Frequency Tolerance, ±30 ppm Standard (±10 ppm and ±20 ppm available)
- Frequency Stability, ±50 ppm Standard (±10,±20,±30 and ±40 ppm available)
- Operating Temperature to –40°C to +85°C
- Tape & Reel Packaging, EIA-481-2 Compliant
- **RoHS/Green Compliant**



DESCRIPTION

The Model 405 is a ceramic packaged Crystal offering reduced size, ideal for high-density circuit board applications. The Model 405 offers reliable precision and excellent shock performance in wireless telecommunication devices.

ORDERING INFORMATION

405 ☐ ☐ ☐ ☐ ☐ ☐ M ☐ ☐ ☐ ☐ ☐

OPERATING TEMPERATURE RANGE

C = -20°C to +70°C (standard)
I = -40°C to +85°C

FREQUENCY TOLERANCE @ 25°C

1 = ± 10 ppm
2 = ± 20 ppm
3 = ± 30 ppm (standard)

STABILITY TOLERANCE

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

1 = ± 10 ppm **
2 = ± 20 ppm
3 = ± 30 ppm
4 = ± 40 ppm
5 = ± 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	G = 30 pF
B = 13 pF	H = 32 pF
C = 16 pF	J = 9 pF
D = 18 pF	K = 8 pF
E = 20 pF	L = 12 pF
F = 24 pF	S = Series

Example Part Numbers:
405C35A14M31818
405I35A32M00000

Custom performance characteristics are available upon request. Use form C052 to detail non-standard parameters.
Contact your local CTS Representative or CTS Customer Service for assistance.

• • • CTS Electronic Components, Inc. • 171 Covington Drive • Bloomingdale, IL 60108 • • •
• • • www.ctscorp.com • • •

ELECTRICAL CHARACTERISTICS

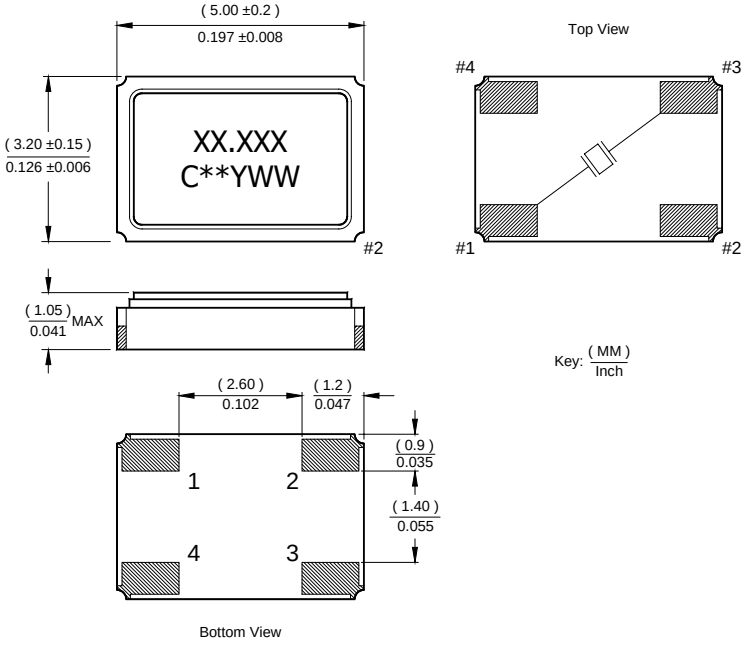
	PARAMETER	VALUE
Electrical Parameters	Operating Mode	Fundamental
	Crystal Cut	AT-Cut
	Frequency Range	12.0 MHz to 50.0 MHz
	Frequency Tolerance @ 25°C	± 30 ppm Standard (± 10 ppm and ± 20 ppm Available)
	Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading)	± 50 ppm 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_0)	7.0 pF Maximum (3.0 pF Typical)
	Drive Level	25 µW Typical, 100 µW Maximum
	Reflow Condition, per JEDEC J-STD-020	+255°C ± 5°C, 10 Seconds Maximum

EQUIVALENT SERIES RESISTANCE TABLE

FREQUENCY RANGE	MODE of OSCILLATION	ESR Maximum
12.00 MHz - 50.00 MHz	Fundamental	50 Ohms

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING

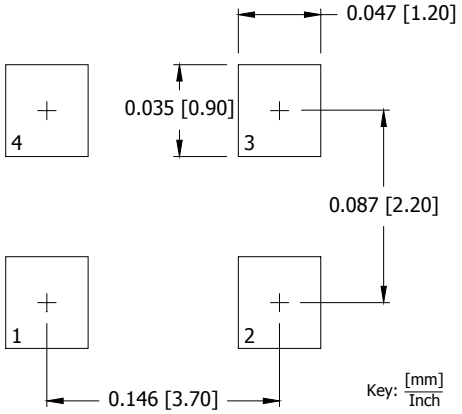


Notes:
1. Termination pads (e4), barrier-plating is nickel (Ni) with gold (Au) flash plate.
2. Terminations #2, #4 and the metal lid are connected internally.
   End user may connect these pins to circuit ground.

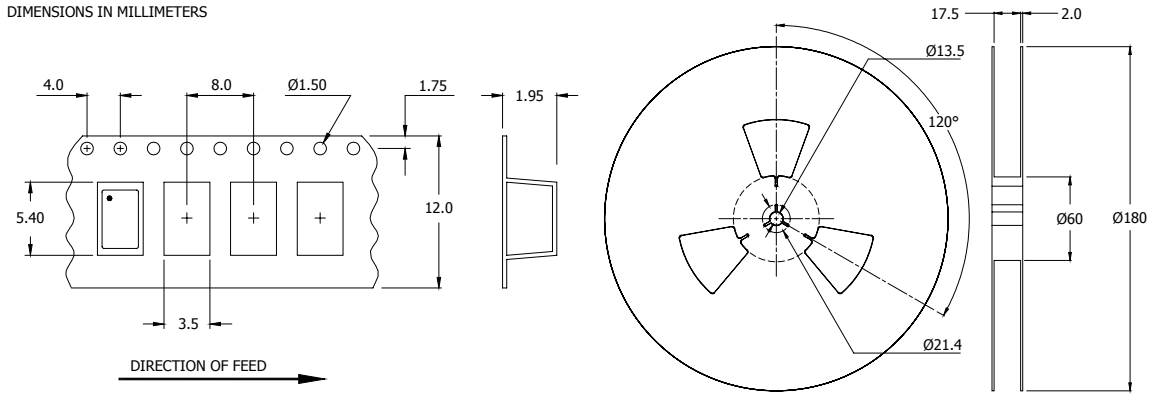
MARKING INFORMATION

1. XX.XXX – Frequency marked with 3 significant digits after the decimal.
2. C – CTS and Pin 1 identifier.
3. ** - Manufacturing Site Code.
4. YWW – Date Code, Y – Last Digit of Year, WW – Week.
5. Complete CTS part number, frequency value and date code information must appear on reel and box labels.

SUGGESTED SOLDER PAD GEOMETRY



TAPE AND REEL INFORMATION



Device quantity is 1,000 pieces per 180mm 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 $2x10^{-8}$ 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.
Insulation Resistance:	500M Ohms @ $100V_{DC}$ $\pm 15V_{DC}$.
Moisture Sensitivity Level:	Level 1 per JEDEC J-STD-020.

QUALITY AND RELIABILITY

Quality systems meet or exceed the requirements of ISO 9000:2000 standards.