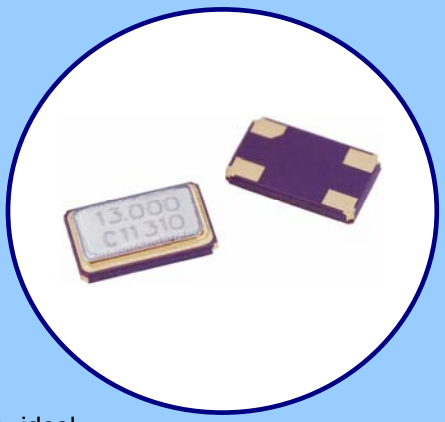
Model 405

Surface Mount Quartz Crystal

FEATURES

- **Standard 5.0mm x 3.2mm Ceramic Surface Mount Package**
- **Fundamental Crystal Design**
- Frequency Range 6.76438 – 50 MHz
- Frequency Tolerance, ±30 ppm Standard
  [other tolerances available]
- Frequency Stability, ±50 ppm Standard
  [other stabilities available]
- Operating Temperature to -40°C to +85°C
- Stable Frequency Over Temperature and Drive Level
- Tape & Reel Packaging Standard, EIA-481-2
- **RoHS/Green Compliant (6/6)**



APPLICATIONS

The Model 405 is a seam sealed ceramic packaged crystal offering reduced size, ideal for high-density circuit board applications. M405 offers reliable precision and excellent shock performance suitable for wireless communications, broadband access, WLAN/WiMax/WIFI, portable equipment, test and measurement, PCMCIA, computers and modems.

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
X = ± 15 ppm
2 = ± 20 ppm
3 = ± 30 ppm (standard)

STABILITY TOLERANCE

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

1 = ± 10 ppm [1]	3 = ± 30 ppm
X = ± 15 ppm	4 = ± 40 ppm
2 = ± 20 ppm	5 = ± 50 ppm (std)

FREQUENCY IN MHz

M - indicates MHz and decimal point. [2]

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

Use form C052 to detail non-standard parameters.

1] Only available with temperature range code "C".

2] Frequency is recorded with two leading digits before the 'M' and 5 significant digits after the 'M' (including zeros).
[Ex. XXMXXXXX (16M38400), XXMXXXXX (14M31818)]

Not all performance combinations and frequencies may be available.
Contact your local CTS Representative or CTS Customer Service for availability.

ELECTRICAL CHARACTERISTICS

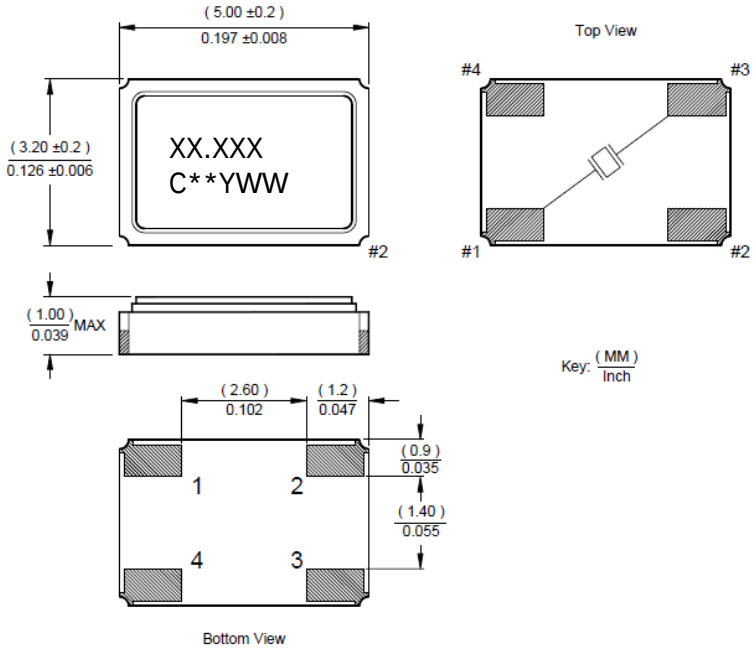
	PARAMETER	VALUE
ELECTRICAL PARAMETERS	Frequency Range	6.76438 MHz to 50.0 MHz
	Operating Mode	Fundamental
	Crystal Cut	AT-Cut
	Frequency Tolerance @ 25°C	± 30 ppm standard [± 10 ppm, ± 15 ppm and ± 20 ppm Available]
	Frequency Stability Tolerance [Operating Temperature Range, Referenced to 25°C Reading]	-20°C to +70°C standard [± 10 ppm, ± 15 ppm, ± 20 ppm, ± 30 ppm and ± 40 ppm Available]
	Operating Temperature Range	-20°C to +70°C -40°C to +85°C
	Equivalent Series Resistance	See ESR Table
	Load Capacitance or Resonance Mode	See Ordering Information
	Shunt Capacitance (C_0)	3.0 pF typical 7.0 pF maximum
	Drive Level	10 µW typical 100 µW maximum
	Aging @ +25°C	±3 ppm/yr typical ±5 ppm/yr maximum
	Storage Temperature Range	-55°C to +125°C
	Reflow Condition, per JEDEC J-STD-020	+260°C maximum, 10 Seconds maximum

EQUIVALENT SERIES RESISTANCE TABLE

FREQUENCY RANGE	MODE of OSCILLATION	ESR Maximum
6.76438 MHz - 10.999 MHz	Fundamental	80 Ohms
11.00 MHz - 20.00 MHz	Fundamental	60 Ohms
20.001 MHz - 50.00 MHz	Fundamental	50 Ohms

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



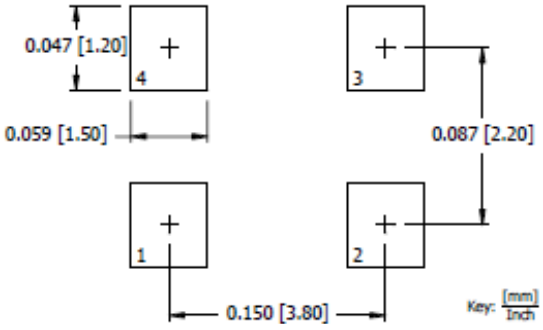
MARKING INFORMATION

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.

NOTES

1. Complete CTS part number, frequency value and date code information must appear on reel and carton labels.
2. Termination pads (e4); barrier plating is nickel (Ni) with gold (Au) flash plate.
3. Terminations #2, #4 and metal lid are connected internally and may be connected to ground for EMI suppression.
4. Reflow conditions per JEDEC J-STD-020, 260°C maximum.

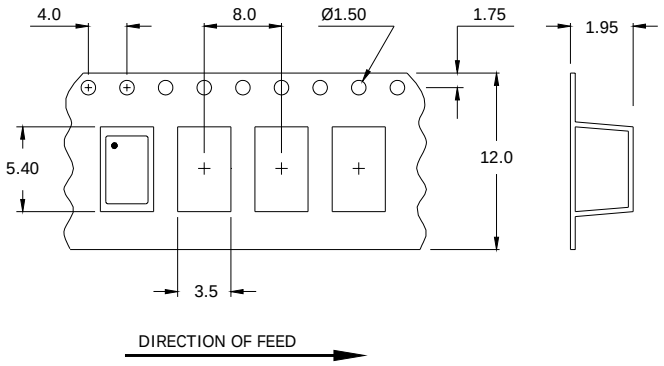
SUGGESTED SOLDER PAD GEOMETRY

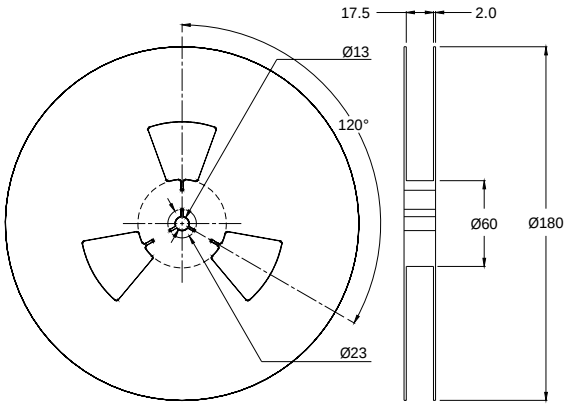


PACKAGING INFORMATION

Device quantity is 1,000 pieces per 180mm reel.

DIMENSIONS IN MILLIMETERS





ENVIRONMENTAL SPECIFICATIONS

Temperature Cycle:	400 cycles from –55°C to between temperatures.
Mechanical Shock:	1,500g's, 0.5mS duration planes (18 total shocks).
Sinusoidal Vibration:	0.06 inches double amplit perpendicular planes (9 ti
Gross Leak:	No leak shall appear while
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 +250°C maximum, 10 seconds maximum.
High Temperature Operating Bias:	2,000 hours at +125°C, disregarding frequency shift.
Frequency Aging:	1,000 hours at +85°C.
Insulation Resistance:	500M Ohms @ $100V_{DC}$ $\pm 15V_{DC}$.
Moisture Sensitivity Level:	Level 1 per JEDEC J-STD-020.

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