



**FEATURES**

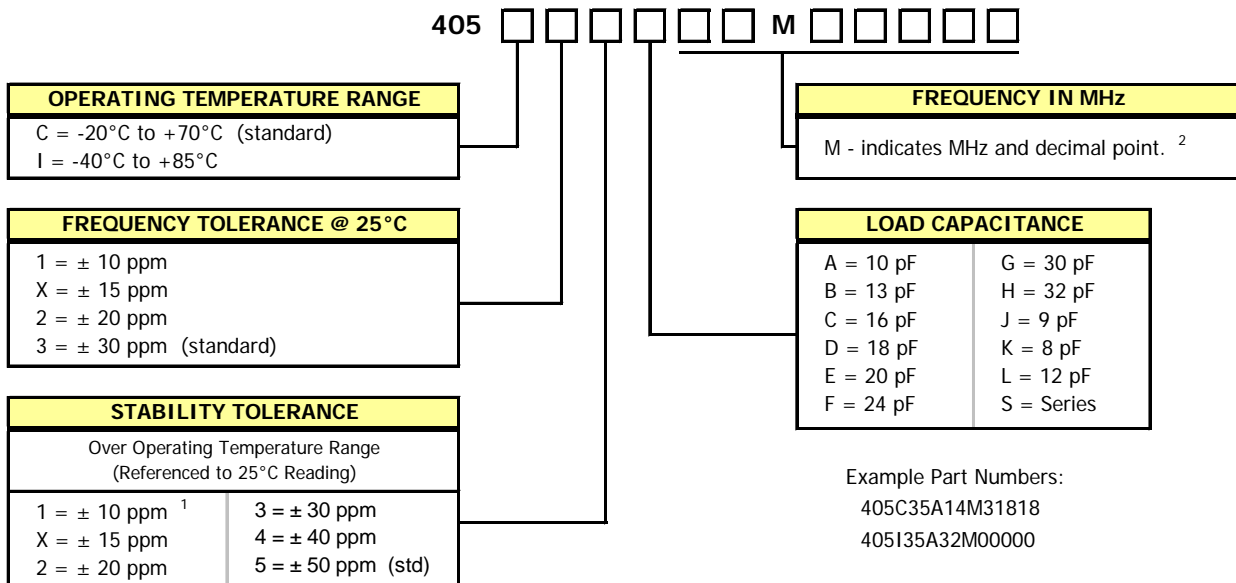
- **Standard 5.0mm x 3.2mm Ceramic Surface Mount Package**
- **Fundamental Crystal Design**
- Frequency Range 6.76438 – 50 MHz
- Frequency Tolerance,  $\pm 30$  ppm Standard  
[other tolerances available]
- Frequency Stability,  $\pm 50$  ppm Standard  
[other stabilities available]
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 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**



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
<b>ELECTRICAL PARAMETERS</b>	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 <sub>0</sub> )	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**

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

**NOTES**

- Complete CTS part number, frequency value and date code information must appear on reel and carton labels.
- Termination pads (e4); barrier plating is nickel (Ni) with gold (Au) flash plate.
- Terminations #2, #4 and metal lid are connected internally and may be connected to ground for EMI suppression.
- 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 whilk
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 +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 <sub>DC</sub> ±15V <sub>DC</sub> .
Moisture Sensitivity Level:	Level 1 per JEDEC J-STD-020.

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