

FEATURES

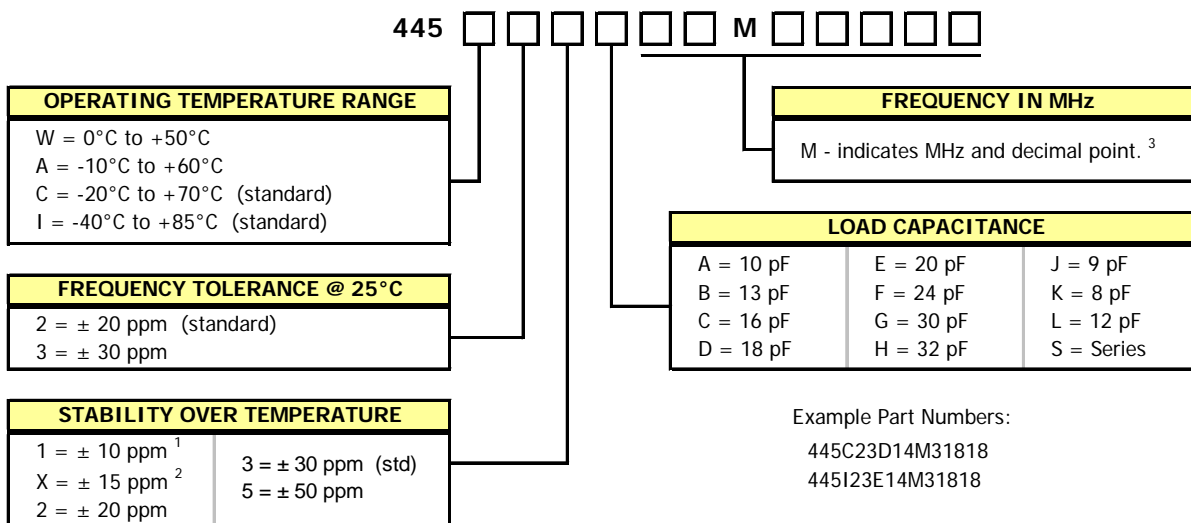
- Standard 5.0mm x 3.2mm Glass Seal Package
- Fundamental Crystal Design
- Frequency Range 10 – 50 MHz
- Frequency Tolerance, ± 20 ppm Standard [other tolerances available]
- Frequency Stability, ± 30 ppm Standard [other stabilities available]
- Operating Temperature to -40°C to $+85^{\circ}\text{C}$
- Tape & Reel Packaging Standard, EIA-481
- **RoHS Compliant in Accordance with EU Directive 2005/95/EC**
 - Lead-Free Termination Finish
 - Exemption 5 for Pb in glass material used for cover attach



APPLICATIONS

Model 445 is a low cost device used in a wide range of commercial applications including notebooks, computer peripherals, audio visual, Bluetooth and USB interfaces, PDAs, and automotive electronics.

ORDERING INFORMATION



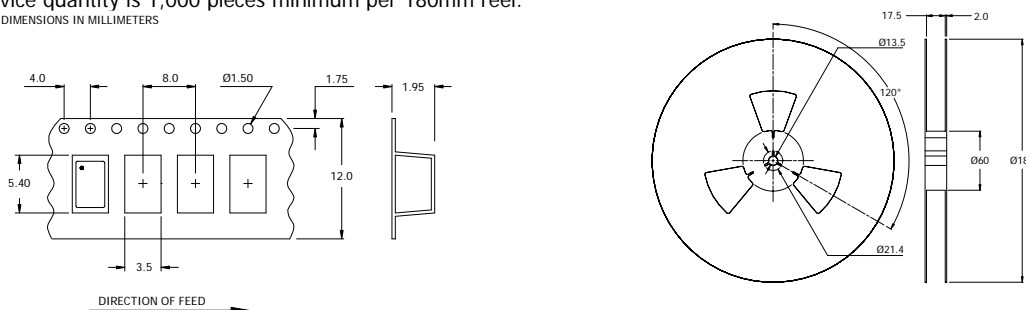
- 1) Only available with temperature range codes "W" and "A".
- 2) Only available with temperature range codes "W", "A" and "C".
- 3) Frequency is recorded with two leading digits before the 'M' and 5 significant digits after the 'M' (including zeros).

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

PACKAGING INFORMATION

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

DIMENSIONS IN MILLIMETERS

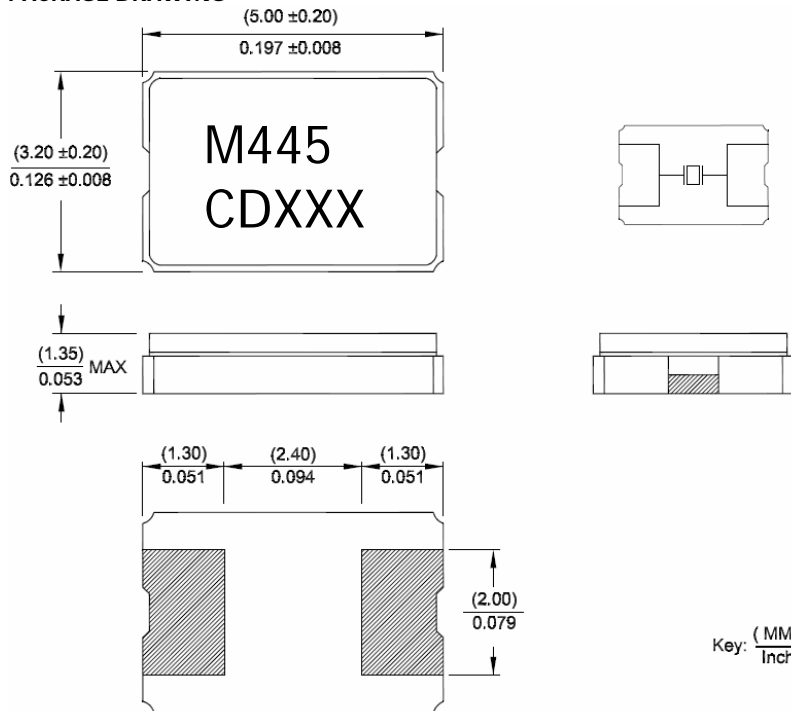


ELECTRICAL CHARACTERISTICS

| PARAMETER | | VALUE | |
|------------------------------|--|------------------------------------|----------------|
| ELECTRICAL PARAMETERS | Frequency Range | 10 MHz to 50 MHz | |
| | Operating Mode | Fundamental | |
| | Crystal Cut | AT-Cut | |
| | Frequency Tolerance @ +25°C | ±20 ppm, ±30 ppm | |
| | Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading) | ±15 ppm, ±20 ppm, ±30 ppm, ±50 ppm | |
| | Operating Temperature Ranges | 0°C to +50°C | -10°C to +60°C |
| | | -20°C to +70°C | -40°C to +85°C |
| | Equivalent Series Resistance [Maximum] | 10 MHz - < 12 MHz | 100 Ohms |
| | | 12 MHz - < 16 MHz | 50 Ohms |
| | | 16 MHz - < 30 MHz | 40 Ohms |
| | | 30 MHz - < 50 MHz | 30 Ohms |
| | Load Capacitance or Resonance Mode | See Ordering Information | |
| | Shunt Capacitance (C ₀) | 5.0 pF Typical, 7.0 pF Maximum | |
| Drive Level | 10 µW Min., 100 µW Typ., 300 µW Max. | | |
| Aging @ +25°C | ±3 ppm/yr Typical | | |
| Storage Temperature Range | -40°C to +85°C | | |

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



MARKING INFORMATION

1. M445 - CTS Model Series.
2. C - CTS.
3. D - Date code. See Table I for codes.
4. XXX - Frequency code.

| Frequency Code | | | | |
|----------------|----------------|-------------|---------------|-------------|
| 120 = 12.00 | 143 = 14.31818 | 200 = 20.00 | 245 = 24.5760 | 270 = 27.00 |
| 130 = 13.00 | 160 = 16.0000 | 240 = 24.00 | 250 = 25.0000 | 300 = 30.00 |

NOTES

1. Complete CTS part number, frequency value, date code and manufacturing site code information must appear on reel and carton labels.
2. Termination pads (e4); barrier plating is nickel [Ni] with gold [Au] flash plate.
3. Reflow conditions per JEDEC J-STD-020; 260°C maximum, 10 seconds.

SUGGESTED SOLDER PAD GEOMETRY

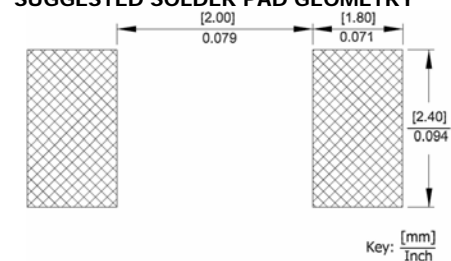


TABLE I - DATE CODE

| YEAR | | MONTH | | | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|------|-------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 2001 | 2005 | 2009 | 2013 | 2017 | | | | | | | | | | | | |
| 2001 | 2005 | 2009 | 2013 | 2017 | A | B | C | D | E | F | G | H | J | K | L | M | | |
| 2002 | 2006 | 2010 | 2014 | 2018 | N | P | Q | R | S | T | U | V | W | X | Y | Z | | |
| 2003 | 2007 | 2011 | 2015 | 2019 | a | b | c | d | e | f | g | h | j | k | l | m | | |
| 2004 | 2008 | 2012 | 2016 | 2020 | n | p | q | r | s | t | u | v | w | x | y | z | | |