

### FEATURES

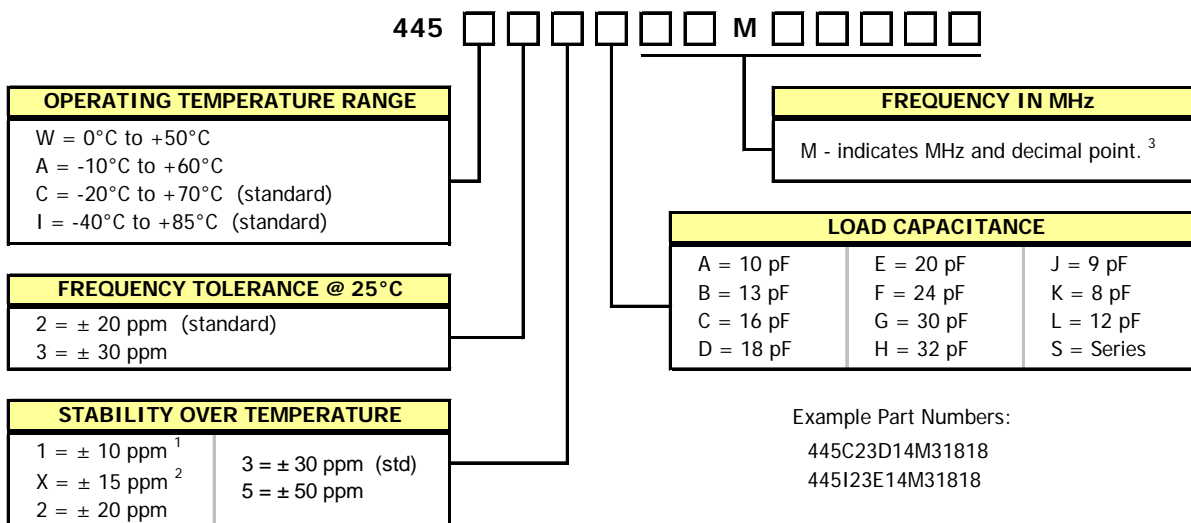
- **Standard 5.0mm x 3.2mm Glass Seal Package**
- **Fundamental Crystal Design**
- Frequency Range 10 – 50 MHz
- Frequency Tolerance,  $\pm 20$  ppm Standard [other tolerances available]
- Frequency Stability,  $\pm 30$  ppm Standard [other stabilities available]
- Operating Temperature to  $-40^{\circ}\text{C}$  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".

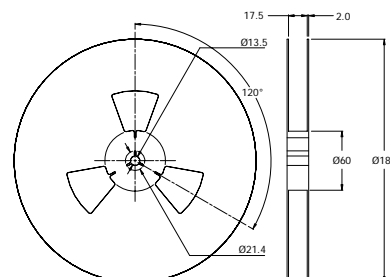
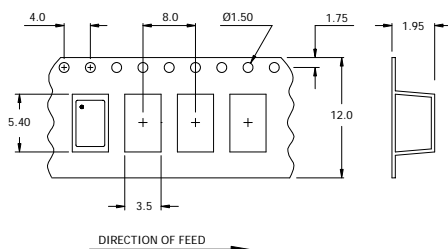
3) Frequency is recorded with two leading digits before the 'M' and 5 significant digits after the 'M' (including zeros).

**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

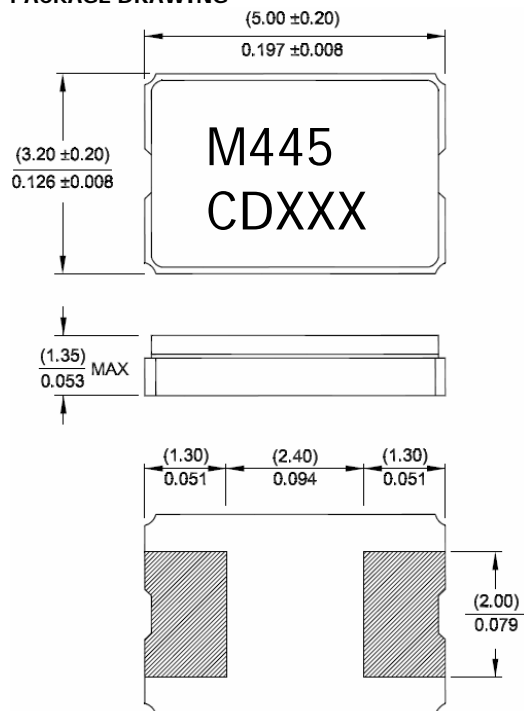


## ELECTRICAL CHARACTERISTICS

ELECTRICAL PARAMETERS	PARAMETER	VALUE
	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 <sub>0</sub> )	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

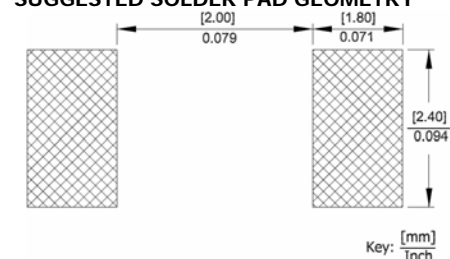


TABLE I - DATE CODE

YEAR \ MONTH					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	2005	2009	2013	2017	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