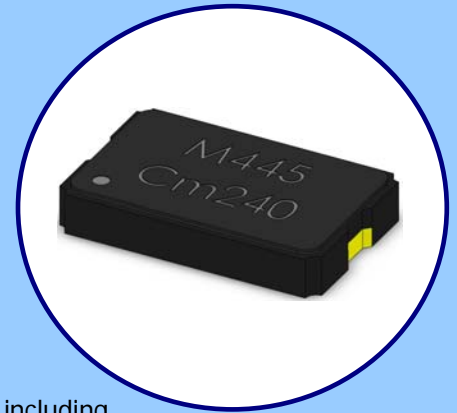


### FEATURES

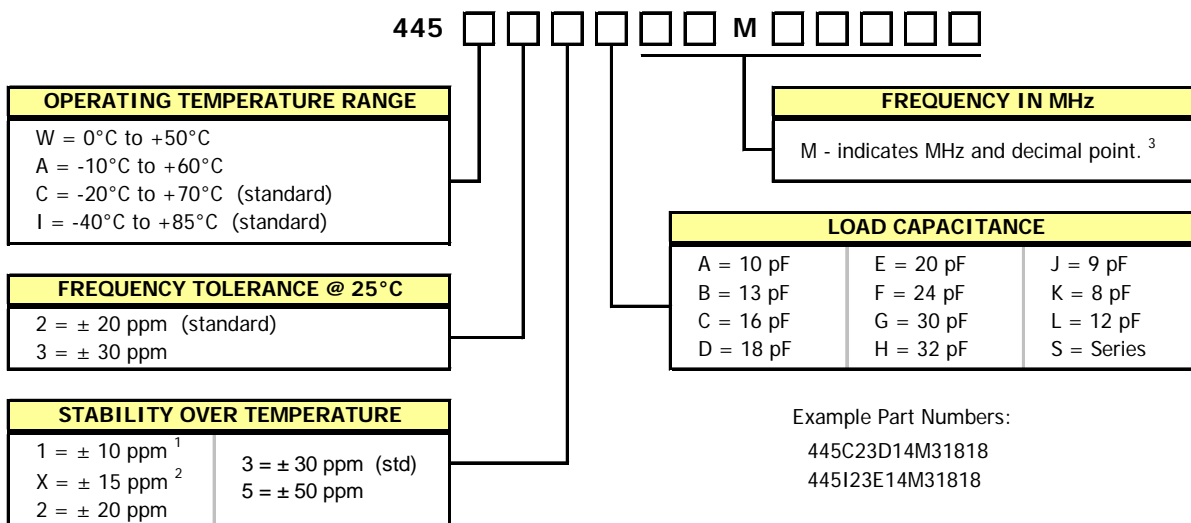
- **Standard 5.0mm x 3.2mm Glass Seal Package**
- **Fundamental Crystal Design**
- Frequency Range 10 – 50 MHz
- Frequency Tolerance,  $\pm 20$  ppm Standard [other tolerances available]
- Frequency Stability,  $\pm 30$  ppm Standard [other stabilities available]
- Operating Temperature to  $-40^{\circ}\text{C}$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



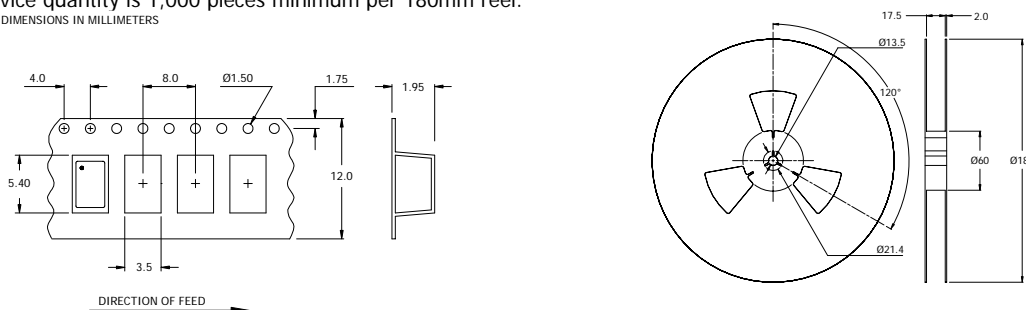
- 1) Only available with temperature range codes "W" and "A".
- 2) Only available with temperature range codes "W", "A" and "C".
- 3) Frequency is recorded with two leading digits before the 'M' and 5 significant digits after the 'M' (including zeros).

**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

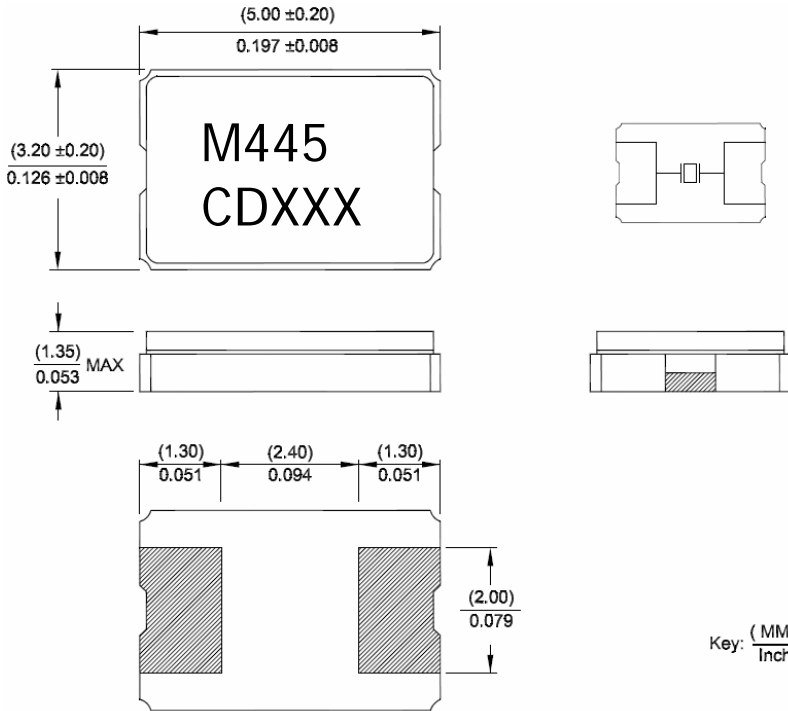


**ELECTRICAL CHARACTERISTICS**

PARAMETER		VALUE	
<b>ELECTRICAL PARAMETERS</b>	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)	±10 ppm, ±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**

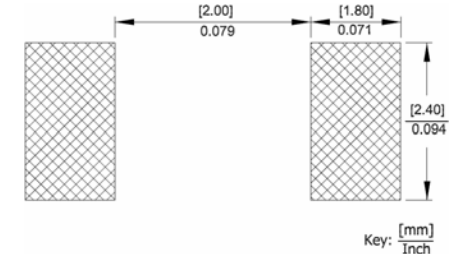
1. M445 - CTS Model Series.
2. C - CTS.
3. D - Date code. See Table I for codes.
4. XXX - Frequency code.

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												
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	