



**FEATURES**

- **Standard 2.0mm x 1.6mm Seam Weld Package**
- **Fundamental Crystal Design**
- Frequency Range 16 – 60 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/Green Compliant [6/6]**



**APPLICATIONS**

Model 402 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 code "W, A & C".

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

**PACKAGING INFORMATION [Reference]**

Device quantity is 1k pieces minimum and 3k pieces maximum per 180mm reel.



**ELECTRICAL CHARACTERISTICS**

PARAMETER		VALUE		
<b>ELECTRICAL PARAMETERS</b>	Frequency Range	16 MHz to 60 MHz		
	Operating Mode	Fundamental		
	Crystal Cut	AT-Cut		
	Frequency Tolerance @ +25°C	±20 ppm, Standard		
	Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading)	±30 ppm, Standard		
	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]	16 MHz - < 20 MHz	300 Ohms	
		20 MHz - < 30 MHz	200 Ohms	
		30 MHz - < 40 MHz	100 Ohms	
		40 MHz - 60 MHz	60 Ohms	
	Load Capacitance	See Ordering Information		
	Shunt Capacitance (C <sub>0</sub> )	3.0 pF Typical, 7.0 pF Maximum		
	Drive Level	10 μW Typ., 100 μW Max.		
Aging @ +25°C	±3 ppm/yr Typical			
Insulation Resistance	500M Ohms @ DC 100V			
Storage Temperature Range	-40°C to +85°C			

**MECHANICAL SPECIFICATIONS**

**PACKAGE DRAWING**



**MARKING INFORMATION**

1. M402 - CTS Model Series.
2. D – Date code. See Table I for codes.
3. XXX – Frequency code. Reference CTS document 016-1454-01.

**NOTES**

1. Complete CTS part number, frequency value, date code and manufacturing site code information must appear on reel and carton labels.
2. Terminations #2, #4 and the metal lid are connected internally. End user may connect these pins to circuit ground.
3. Termination pads (e4); barrier plating is nickel [Ni] with gold [Au] flash plate.
4. Reflow conditions per JEDEC J-STD-020; 260°C maximum, 10 seconds.
5. MSL = 1.

**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												
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	