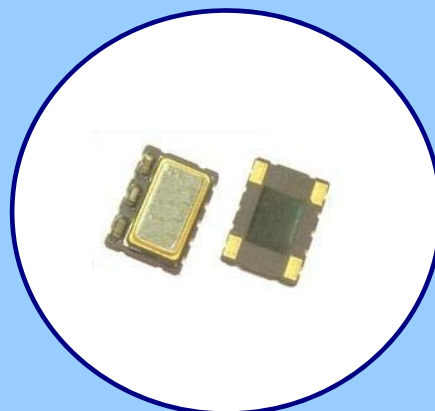


FEATURES

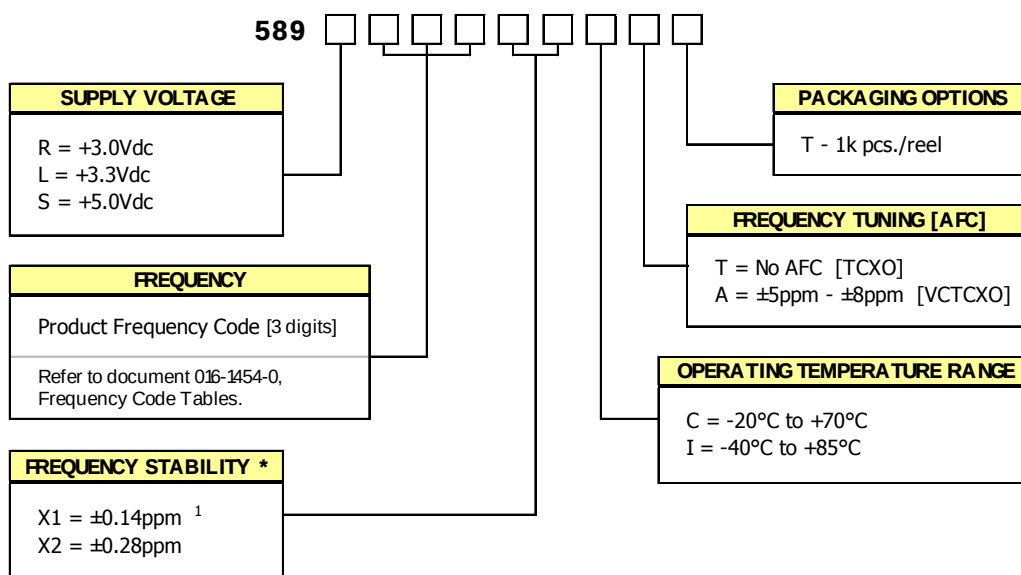
- HCMOS Output
- Optional Voltage Control for Frequency Tuning [VCTCXO]
- 7.0mm x 5.0mm Surface Mount Package
- Frequency Range 5 – 52 MHz
- Fundamental Crystal Design
- Operating Voltage, +3.0Vdc, +3.3Vdc or +5.0Vdc
- Overall Frequency Stability ± 4.6 ppm
- Operating Temperature to -40°C to $+85^{\circ}\text{C}$
- Tape & Reel Packaging Standard, EIA-418
- **RoHS/Green Compliant [6/6]**



APPLICATIONS

The Model 589, a quartz based analog TCXO with HCMOS output and optional frequency tuning, is suitable for applications requiring Stratum 3 performance such as base stations, Microcells, Femtocells, 1588 and Synchronous Ethernet timing, wireless communications, test and measurement.

ORDERING INFORMATION



* Frequency vs. Temperature Only

¹ Only available with temperature range code "C".

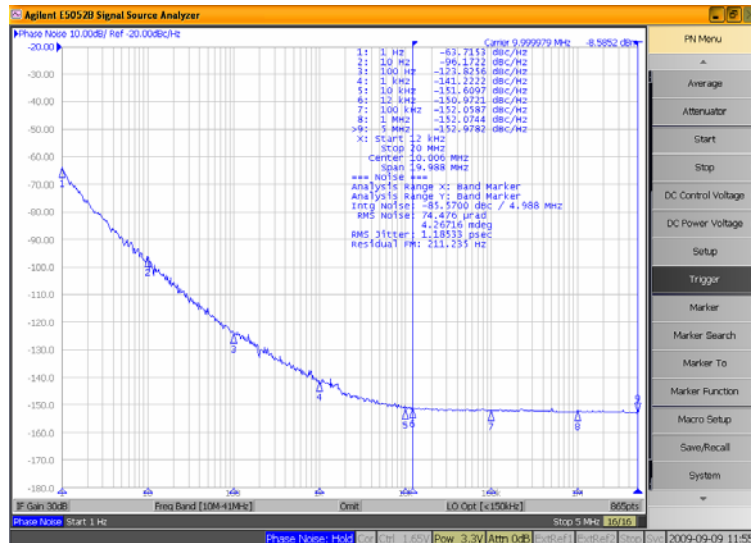
**Not all performance combinations and frequencies may be available.
Contact your local CTS Representative or CTS Customer Service for availability.**

ELECTRICAL CHARACTERISTICS

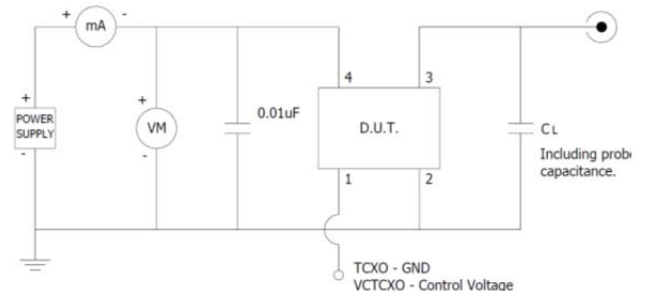
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Supply Voltage	V_{CC}	-	-0.6	-	6.0	V
Maximum Control Voltage	V_C	-	-0.5	-	V_{CC}	V
Storage Temperature	T_{STG}	-	-40	-	+100	°C
Operating Temperature	T_A	-	-20	+25	+70	°C
Order Code 'C'			-40		+85	
Order Code 'I'						
Frequency Range	f_0	-	5	-	52	MHz
Supply Voltage	V_{CC}	$\pm 5\%$	2.85	3.0	3.15	V
Order Code 'R'			3.14	3.3	3.47	
Order Code 'L'			4.75	5.0	5.25	
Order Code 'S'						
Supply Current	I_{CC}	-	-	-	6.0	mA
Frequency Stability	$\Delta f/f_0$	Reference to f_0 , Including 20 years aging	-	-	4.60	$\pm$ ppm
Overall Frequency Stability		@ +25°C, at time of shipment	-	-	1.00	
vs. Initial Calibration		[Fmax. - Fmin.]/2, over -40°C to +85°C	-	-	0.28	
vs. Operating Temperature		[Fmax. - Fmin.]/2, over -20°C to +70°C	-	-	0.14	
vs. Supply Voltage		$\pm 5\%$ change @ +25°C	-	-	0.40	
vs. Load		$\pm 5\%$ change	-	-	0.10	
vs. Aging	$\Delta f/f_{25}$	20 years @ +40°C	-	-	2.80	
Holdover		[Fmax. - Fmin.]/2, over 24 hours	-	-	0.32	
Control Voltage	V_C	-	0.5	1.5	2.5	V
Frequency Tuning [VCTCXO Only]	-	$V_C = 1.5V \pm 1.0V$, monotonic positive	5 - 8			$\pm$ ppm
V_C Input Impedance	Z_{V_C}	-	100	-	-	kOhm
Output Waveform		HCMOS				
Output Voltage Levels						
Logic '1' Level	V_{OH}	HCMOS Load	$0.9 \cdot V_{CC}$	-	-	V
Logic '0' Level	V_{OL}	HCMOS Load	-	-	$0.1 \cdot V_{CC}$	
Output Load	C_L	-	-	-	15	pF
Rise and Fall Time	T_R, T_F	@ 20% - 80% Levels	-	3.0	6.0	ns
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Start Up Time	T_S	-	-	-	2	ms
Enable Function						
Enable Input Voltage	V_{IH}	Pin 8 Logic '1', Output Enabled	$0.7 \cdot V_{CC}$	-	-	V
Disable Input Voltage	V_{IL}	Pin 8 Logic '0', Output Disabled [High Imp]	-	-	$0.3 \cdot V_{CC}$	
Phase Noise ¹	-	-				dBc/Hz

Notes:

1. Phase Noise performance may vary based on output frequency. See example plot at 10 MHz below.

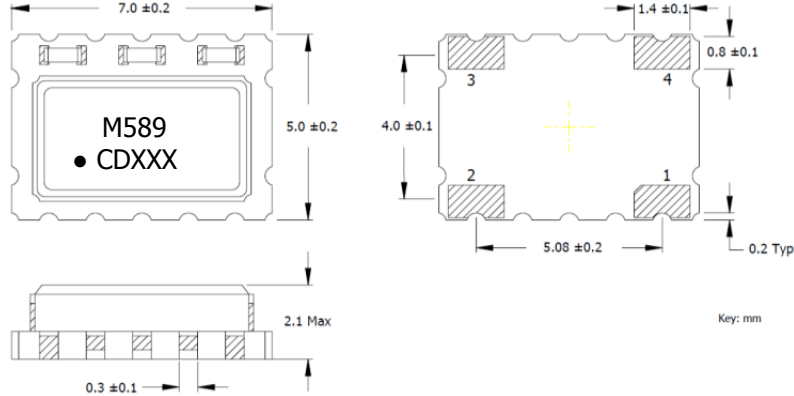


TEST CIRCUIT - HCMOS LOAD



MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



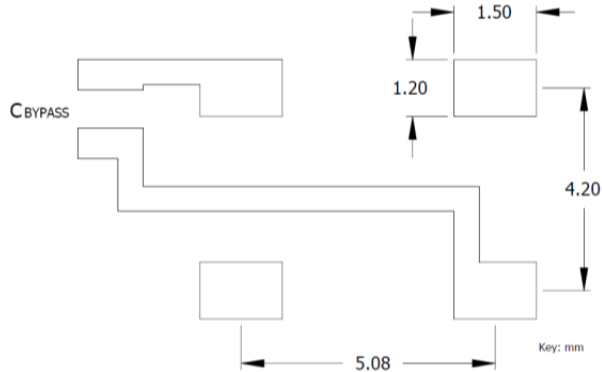
MARKING INFORMATION

1. M589 – CTS Model Series.
 2. • – Pin 1 identifier.
 3. C – CTS identifier.
 4. D – Date code. See Table II for codes.
 5. xxx – Frequency Code.
- Refer to document 016-1454-0, Frequency Code Tables.

NOTES

1. DO NOT make connections to non-labeled pins or castellations as they may have internal connections used in the manufacturing process.
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.
4. MSL = 1.

SUGGESTED SOLDER PAD GEOMETRY



D.U.T. PIN ASSIGNMENTS

PIN	SYMBOL	DESCRIPTION
1	V _C	Control Voltage – VCTCXO [Note 1]
2	GND	Circuit & Package Ground
3	Output	HCMOS Output
4	V _{CC}	Supply Voltage

NOTES

1. Connect to ground for TCXO [no AFC] option.

TABLE II – DATE CODE

MONTH					YEAR											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC					
A	B	C	D	E	F	G	H	J	K	L	M					
N	P	Q	R	S	T	U	V	W	X	Y	Z					
a	b	c	d	e	f	g	h	j	k	l	m					
n	p	q	r	s	t	u	v	w	x	y	z					

PACKAGING INFORMATION [reference]

Device quantity is 1k pcs. maximum per 180mm reel.

