

FEATURES

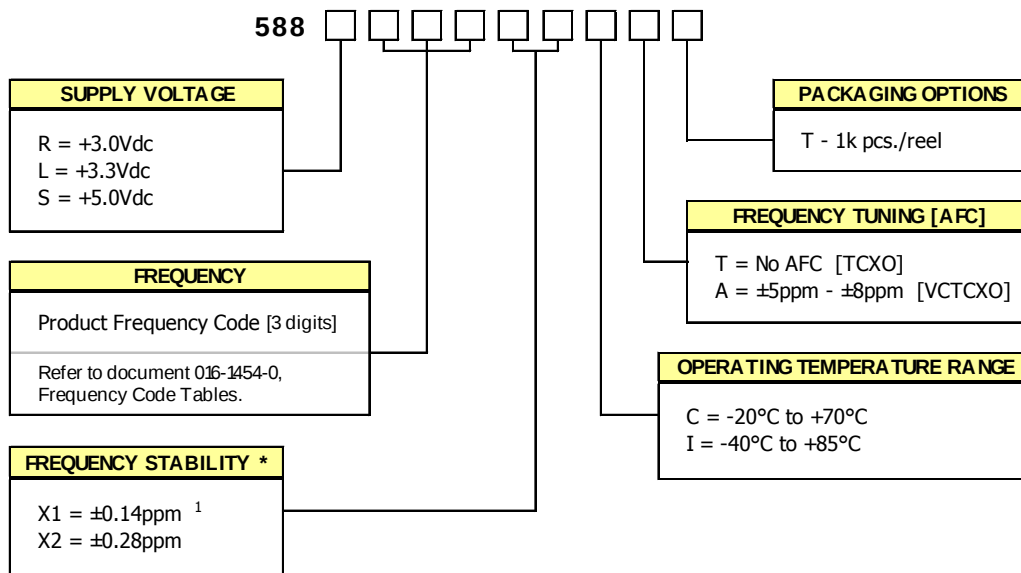
- **Clipped Sine Wave Output**
- **Optional Voltage Control for Frequency Tuning [VCTCXO]**
- 7.0mm x 5.0mm Surface Mount Package
- Frequency Range 5 – 52 MHz
- Fundamental Crystal Design
- Operating Voltage, +3.0Vdc, +3.3Vdc or +5.0Vdc
- Overall Frequency Stability ± 4.6 ppm
- Operating Temperature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



APPLICATIONS

The Model 588, a quartz based analog TCXO with Clipped Sine 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".

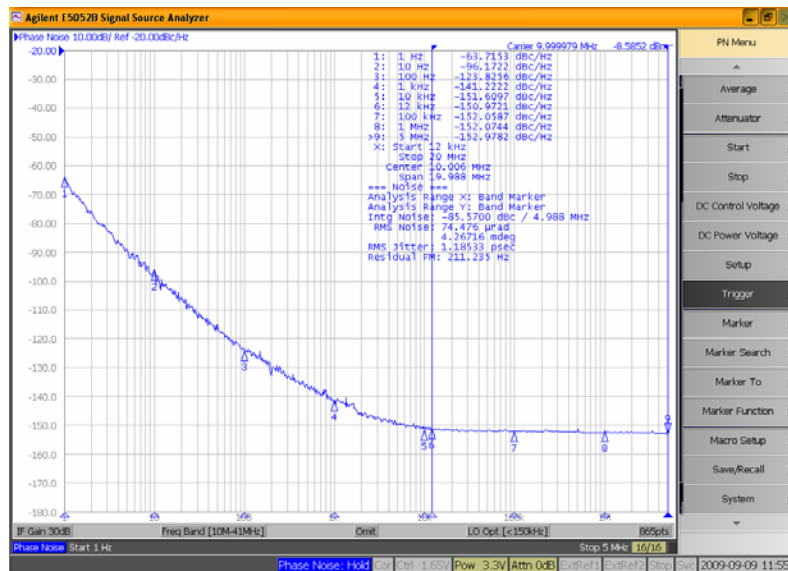
Not all performance combinations and frequencies may be available.
Contact your local CTS Representative or CTS Customer Service for availability.

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}	±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}	-	-	-	3.5	mA
Frequency Stability	$\Delta f/f_0$	Reference to f_0 , Including 20 years aging	-	-	4.60	± ppm
Overall Frequency Stability		@ +25°C, at time of shipment	-	-	1.00	
vs. Initial Calibration	$\Delta f/f_{25}$	[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		±5% change @ +25°C	-	-	0.40	
vs. Load	$\Delta f/f_0$	±5% change	-	-	0.10	
vs. Aging		20 years @ +40°C	-	-	2.80	
Holdover	$\Delta f/f_0$	[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			± ppm
V_C Input Impedance	Z_{V_C}	-	100	-	-	kOhm
Output Waveform		AC coupled Clipped Sinewave				
Output Voltage Levels			0.8	-	-	Vp-p
Output Load	$R_L // C_L$	-	10kOhm // 10pF			
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

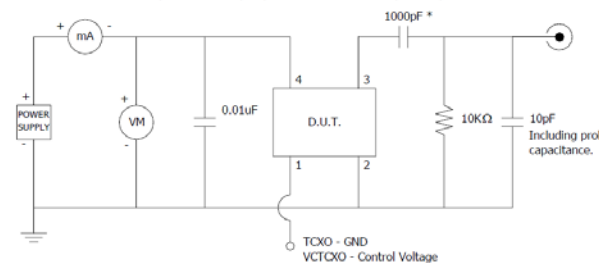
Notes:

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



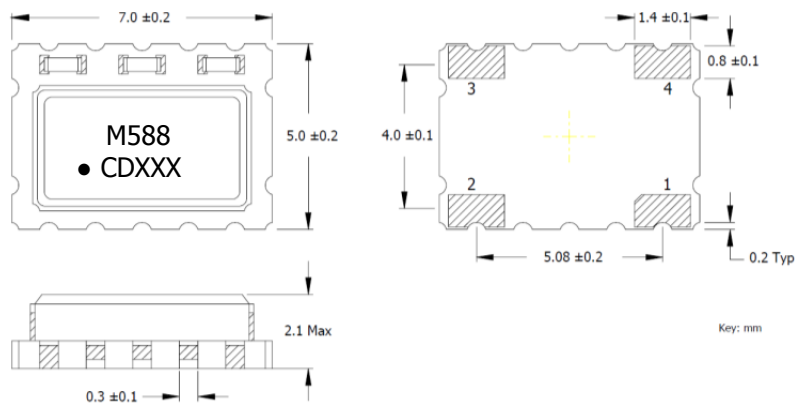
TEST CIRCUIT – Clipped Sine Load

* DC-Cut Capacitor: Add 1000pF capacitor between the TCXO output and input of load.

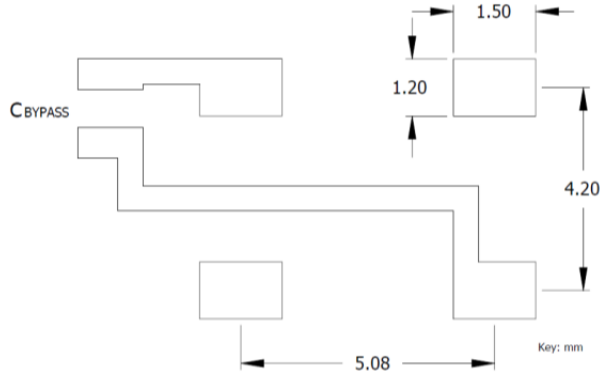


MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



SUGGESTED SOLDER PAD GEOMETRY



MARKING INFORMATION

1. M588 – CTS Model Series.
 2. • – Pin 1 identifier.
 3. C – CTS identifier.
 4. D – Date code. See Table II for codes.
 6. 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.

D.U.T. PIN ASSIGNMENTS

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

NOTES

1. Connect to ground for TCXO [no AFC] option.
2. DC-Cut Capacitor Required.
Add 1000pF capacitor between TCXO output and input of load.

TABLE II – DATE CODE

MONTH					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR																
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

PACKAGING INFORMATION [reference]

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

