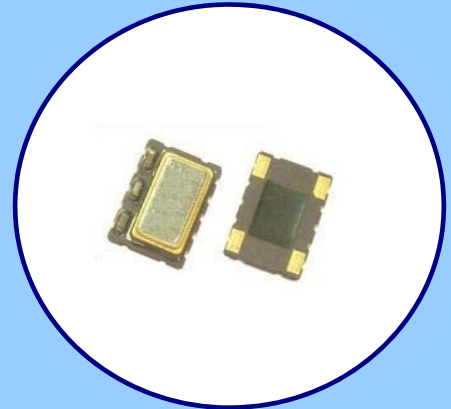


**FEATURES**

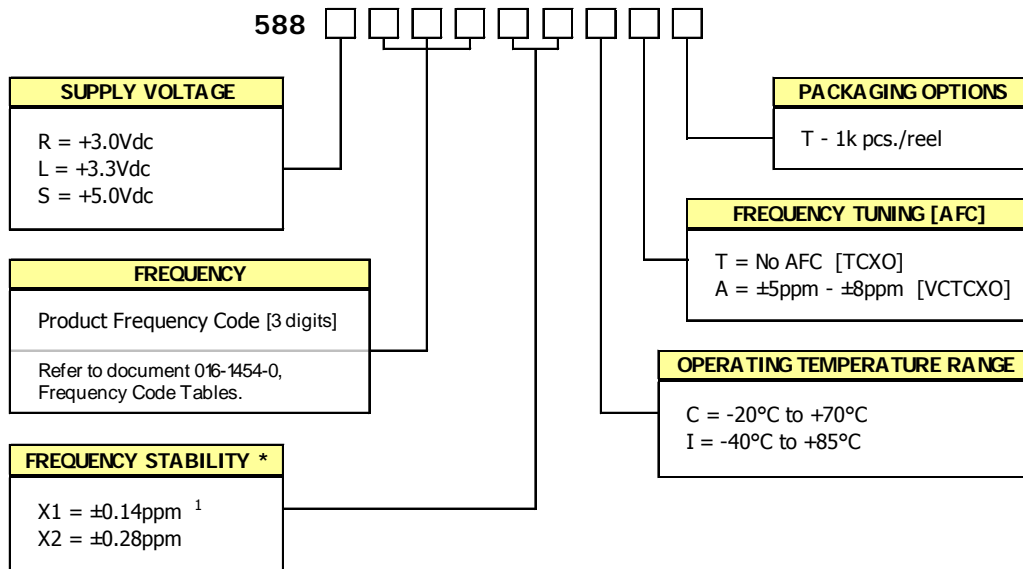
- **Clipped Sine Wave Output**
- **Optional Voltage Control for Frequency Tuning [VCTCXO]**
- 7.0mm x 5.0mm Surface Mount Package
- Frequency Range 5 – 52 MHz
- Fundamental Crystal Design
- Operating Voltage, +3.0Vdc, +3.3Vdc or +5.0Vdc
- Overall Frequency Stability  $\pm 4.6$ ppm
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 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".

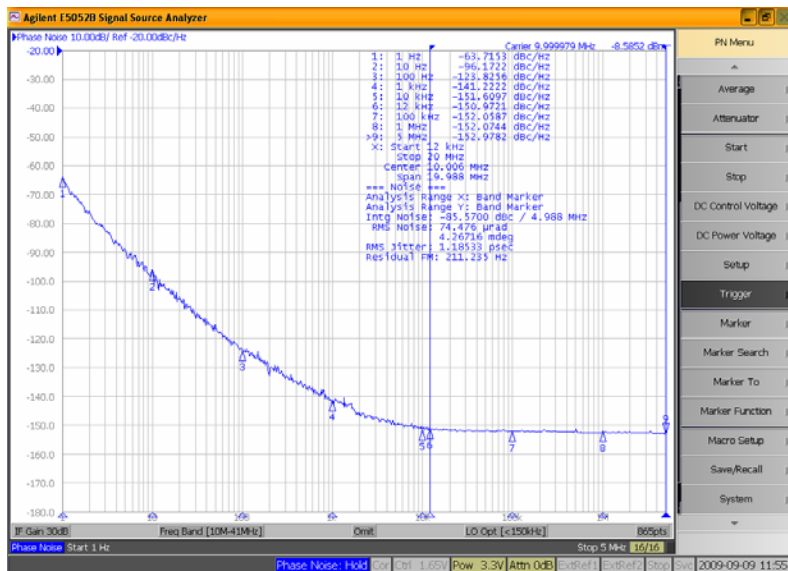
**Not all performance combinations and frequencies may be available.  
Contact your local CTS Representative or CTS Customer Service for availability.**

**ELECTRICAL CHARACTERISTICS**

| PARAMETER   | SYMBOL                           | CONDITIONS   | MIN                 | TYP   | MAX                 | UNIT             |
|---|----------------------------------|--|---------------------|-------|---------------------|------------------|
| Maximum Supply Voltage                              | V <sub>CC</sub>                  | -  | -0.6                | -     | 6.0                 | V                |
| Maximum Control Voltage                             | V <sub>C</sub>                   | -  | -0.5                | -     | V <sub>CC</sub>     | V                |
| Storage Temperature                                 | T <sub>STG</sub>                 | -  | -40                 | -     | +100                | °C               |
| Operating Temperature                               | T <sub>A</sub>                   | -  | -20                 | +25   | +70                 | °C               |
| Order Code 'C'                                      |                                  |  | -40                 |       | +85                 |                  |
| Order Code 'I'                                      |                                  |  |                     |       |                     |                  |
| Frequency Range                                     | f <sub>0</sub>                   | -  | 5                   | -     | 52                  | MHz              |
| Supply Voltage                                      | V <sub>CC</sub>                  | ±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 <sub>CC</sub>                  | -  | -                   | -     | 3.5                 | mA               |
| Frequency Stability                                 | Δf/f <sub>0</sub>                | Reference to f <sub>0</sub> , Including 20 years aging<br>@ +25°C, at time of shipment | -                   | -     | 4.60                | ± ppm            |
| Overall Frequency Stability vs. Initial Calibration |                                  |  | -                   | -     | 1.00                |                  |
| vs. Operating Temperature                           |                                  | [Fmax. - Fmin.]/2, over -40°C to +85°C   | -                   | -     | 0.28                |                  |
| vs. Supply Voltage                                  |                                  | [Fmax. - Fmin.]/2, over -20°C to +70°C   | -                   | -     | 0.14                |                  |
| vs. Load  |                                  | ±5% change @ +25°C   | -                   | -     | 0.40                |                  |
| vs. Aging   |                                  | ±5% change<br>20 years @ +40°C   | -                   | -     | 2.80                |                  |
| Holdover  | Δf/f <sub>0</sub>                | [Fmax. - Fmin.]/2, over 24 hours   | -                   | -     | 0.32                |                  |
| Control Voltage                                     | V <sub>C</sub>                   | -  | 0.5                 | 1.5   | 2.5                 | V                |
| Frequency Tuning [VCTCXO Only]                      | -                                | V <sub>C</sub> = 1.5V ±1.0V, monotonic positive  |                     | 5 - 8 |                     | ± ppm            |
| V <sub>C</sub> Input Impedance                      | Z <sub>V<sub>C</sub></sub>       | -  | 100                 | -     | -                   | kOhm             |
| Output Waveform                                     |                                  | AC coupled Clipped Sinewave  |                     |       |                     |                  |
| Output Voltage Levels                               |                                  |  | 0.8                 | -     | -                   | V <sub>p-p</sub> |
| Output Load   | R <sub>L</sub> // C <sub>L</sub> | -  | 10kOhm // 10pF      |       |                     |                  |
| Output Duty Cycle                                   | SYM                              | @ 50% Level  | 45                  | -     | 55                  | %                |
| Start Up Time                                       | T <sub>S</sub>                   | -  | -                   | -     | 2                   | ms               |
| Enable Function                                     |                                  |  |                     |       |                     |                  |
| Enable Input Voltage                                | V <sub>IH</sub>                  | Pin 8 Logic '1', Output Enabled  | 0.7*V <sub>CC</sub> | -     | -                   | V                |
| Disable Input Voltage                               | V <sub>IL</sub>                  | Pin 8 Logic '0', Output Disabled [High Imp]  | -                   | -     | 0.3*V <sub>CC</sub> |                  |
| Phase Noise <sup>1</sup>                            | -                                | -  |                     |       |                     | dBc/Hz           |

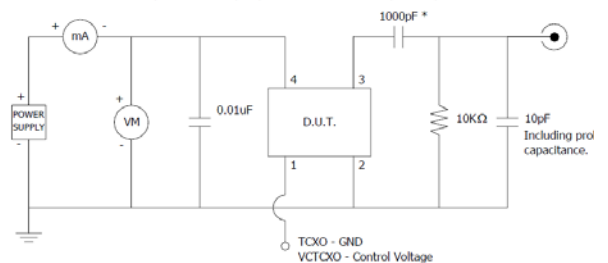
Notes:

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



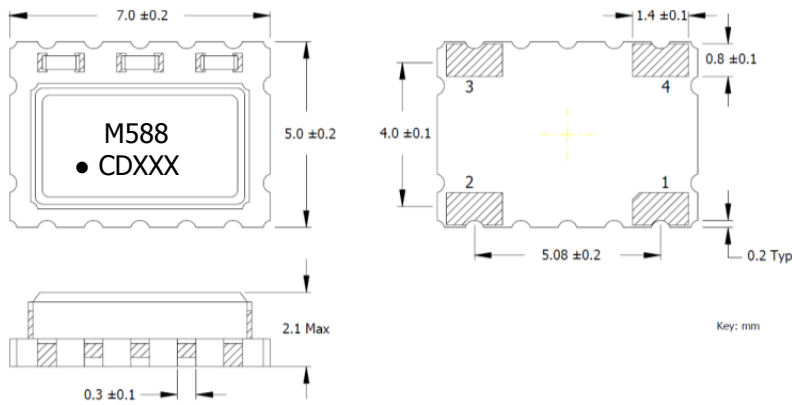
**TEST CIRCUIT – Clipped Sine Load**

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



**MECHANICAL SPECIFICATIONS**

**PACKAGE DRAWING**



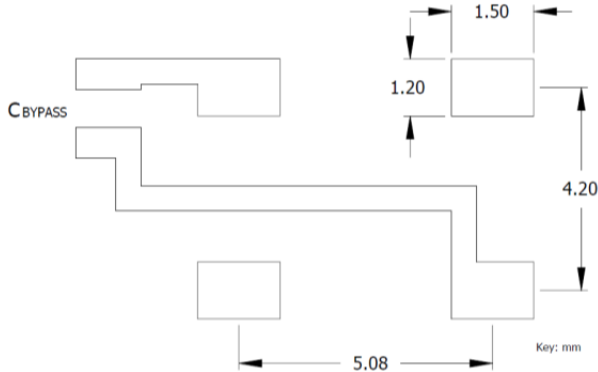
**MARKING INFORMATION**

1. M588 – CTS Model Series.
2. ● – Pin 1 identifier.
3. C – CTS identifier.
4. D – Date code. See Table II for codes.
5. xxx – Frequency Code.
6. 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 <sub>C</sub>  | Control Voltage – VCTCXO [Note 1]<br>GND - TCXO |
| 2   | GND             | Circuit & Package Ground                        |
| 3   | Output          | Clipped Sine Wave Output                        |
| 4   | V <sub>CC</sub> | Supply Voltage                                  |

**NOTES**

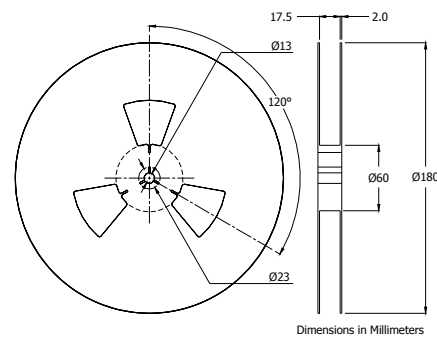
1. Connect to ground for TCXO [no AFC] option.
2. DC-Cut Capacitor Required.  
Add 1000pF capacitor between TCXO output and input of load.

**TABLE II – DATE CODE**

| 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   |     |     |

**PACKAGING INFORMATION [reference]**

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





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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