



FEATURES

- **Clipped Sine Wave Output**
- **Optional Voltage Control for Frequency Tuning [VCTCXO]**
- 2.5mmx2.0mm Surface Mount Package
- Frequency Range 10 – 52 MHz [Standard Frequencies List Shown Below]
- Fundamental Crystal Design
- Frequency Stability, several options to choose from $\pm 0.5\text{ppm} \sim \pm 2.5\text{ppm}$
- Operating Voltage, +1.8Vdc \sim +2.5Vdc
- Operating Temperature to -40°C to +85°C
- Tape & Reel Packaging Available
- **RoHS/Green Compliant (6/6)**



APPLICATIONS

The Model 520 Temperature Compensated Crystal Oscillator (TCXO) is a quartz based, clipped sine wave output, with optional frequency tuning, in a hermetically sealed ceramic package. M520 is suitable for wireless communications, broadband access, WLAN/WiMax/WIFI, portable equipment, test and measurement and mobile applications.

ORDERING INFORMATION



* Frequency vs. Temperature Only

- 1] Only available with temperature range codes "H" and "C".
- 2] Only available with temperature range codes "H", "C" and "D".
- 3] Frequency is recorded with two leading digits before the 'M' and 4 significant digits after the 'M' (including zeros).
[Ex. XXMXXXX (10M0000), XXMXXXX (16M3840)]
- 4] See Electrical Characteristics for Control Voltage range per Supply Voltage selected.

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

| M520 Standard Frequencies | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 13.000000 | 16.368000 | 19.200000 | 26.000000 | 40.000000 |
| 16.367667 | 16.369000 | 20.000000 | 38.400000 | |

ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---|----------------------------------|--|--------------------------------------|---------------------------------|---|--------|
| Maximum Supply Voltage | V _{CC} | - | -0.5 | - | 6.0 | V |
| Maximum Control Voltage | V _C | - | -0.5 | - | V _{CC} | V |
| Storage Temperature | T _{STG} | - | -40 | - | 85 | °C |
| Frequency Range | f ₀ | Std frequencies listed in Ordering Information | 10 | - | 52 | MHz |
| Frequency Stability | Δf/f ₀ | Frequency vs. Temperature Only | 0.5, 1.0, 1.5 2.0, 2.5 | | | ± ppm |
| Frequency Stability vs. Initial Calibration vs. Supply Voltage vs. Load vs. Reflow Shift vs. Aging | - | @25°C ±5% change ±10% change After 2 reflows 1st year 10 year | - | - | 2.0 0.2 0.2 2.0 1.0 10.0 | ± ppm |
| Operating Temperature Order Code 'W' Order Code 'H' Order Code 'C' Order Code 'D' Order Code 'I' | T _A | - | 0 -10 -20 -30 -40 | 25 | 55 60 70 85 85 | °C |
| Supply Voltage Order Code 'M' Order Code 'N' Order Code 'T' Order Code 'R' Order Code 'L' | V _{CC} | ±5% | 1.77 2.38 2.66 2.85 3.14 | 1.8 2.5 2.8 3.0 3.3 | 1.83 2.63 2.94 3.15 3.47 | V |
| Supply Current | I _{CC} | 10.00 MHz - 25.99 MHz 26.00 MHz - 52.00 MHz | - | - | 2 2.5 | mA |
| Control Voltage | V _C | 2.5V, 2.8V, 3.0V, 3.3V 1.8V | 0.4 0.3 | 1.5 0.9 | 2.4 1.5 | V |
| Frequency Tuning [VCTCXO Only] | - | Specified V _C Range | 5.0 | - | - | ± ppm |
| V _C Input Impedance | ZV _C | - | 500 | - | - | kOhm |
| Output Waveform | | AC coupled Clipped Sinewave | | | | |
| Output Voltage Levels | V _O | | 0.8 | - | - | Vp-p |
| Output Load | R _L // C _L | - | 10 kOhm // 10 pF | | | |
| Start Up Time | T _S | - | - | - | 2 | ms |
| Phase Noise | - | Varies based on output frequency. See example plot @ 19.2 MHz below. | | | | dBc/Hz |

ELECTRICAL PARAMETERS



ELECTRICAL CHARACTERISTICS

D.U.T. PIN ASSIGNMENTS

| PIN | SYMBOL | DESCRIPTION |
|-----|-----------------|---|
| 1 | V _C | GND – TCXO [Note 1] Control Voltage – VCTCXO |
| 2 | GND | Circuit & Package Ground |
| 3 | Output | Clipped Sine Wave Output [Note 2] |
| 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.

TEST CIRCUIT – RL//CL LOAD



* DC-Cut Capacitor

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING



MARKING INFORMATION

1. M520 - CTS Model Series.
2. ● – Pin 1 identifier.
3. D – Date code. See Table I for codes.
4. XXX – Frequency code. Reference CTS document 016-1454-01.

Complete CTS part number, frequency value and date code information must appear on reel and carton labels.

NOTES

1. DO NOT make connections to non-labeled pins and 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.

SUGGESTED SOLDER PAD GEOMETRY



C_{BYPASS} should be ≥ 0.01 uF.

TABLE I – DATE CODE

| YEAR \ MONTH | | | | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|--------------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 pieces minimum and 3k maximum per 180mm reel.



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Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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