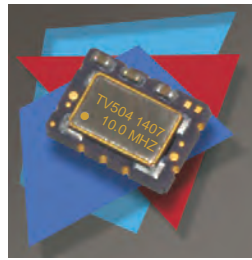


Description:

Connor-Winfield's Txxx and TVxxx series are 5x7mm TCXO and VCTCXO products with exceptional frequency stability and low phase noise. Through the use of analog temperature compensation, these products are capable of holding Stratum 3 level temperature stabilities of ± 0.28 ppm over the commercial and industrial temperature ranges. Available in 4-pad or 10-pad surface mount footprints.

These products are designed for such applications as IEEE 1588 PTP and Synchronous Ethernet.

All models will meet ± 4.6 ppm accuracies for twenty years



Features:

- Frequency Stabilities Available:
 - +/-0.28 ppm (6.4 to 50 MHz)
 - +/-0.50 ppm (6.4 to 50 MHz)
 - +/-1.00 ppm or +/-2.00 ppm (6.4 to 54 MHz)
- Temperature Ranges Available:
 - 0 to 85°C, 0 to 70°C, -40 to 85°C or -20 to 70°C
- Packages Available:
 - T - Series: 5 x 7mm - 10 Pad
 - TV - Series: 5 x 7mm - 4 Pad
- 3.3 Vdc Operation
- Output Logic: LVCMOS or Clipped Sinewave
- Fixed Frequency - TCXO
- Voltage Controlled - VCTCXO
- Low Jitter <0.50 ps RMS
- Low Phase Noise
- Tri-State Enable/Disable: (T Model Series Only)
- Tape and Reel Packaging
- RoHS Compliant / Lead Free

Applications:

- IEEE 1588 Applications
- Synchronous Ethernet slave clocks, ITU-T G.8262 EEC options 1 & 2
- Compliant to Stratum 3, GR-1244-CORE & GR-253-CORE
- Wireless Communications
- Small Cells
- Test and Measurement
- GPS

Standard Frequencies Available *

* 6.4, 9.72, 10, 10.24, 12.5, 12.8, 13.5, 19.2, 19.44, 20, 20.48, 25, 27, 38.88, 40 MHz
Available frequencies from the factory for small quantity orders or quick delivery.
Additional frequencies are available.

** Not all Models available at Digi-Key

Ordering Information

| TV | 5 | 0 | 4 | - 010.0M |
|---|---|--|--|---|
| Type / Package TCXO / VCTCXO Series T = 5.0x7.0 mm 10 Pads TV = 5.0x7.0 mm 4 Pads | Temperature Range 3 = 0 to 85 °C 5 = 0 to 70°C 6 = -40 to 85°C 7 = -20 to 70°C | Frequency Stability 0 = ± 0.28 ppm 1 = ± 0.50 ppm 2 = ± 1.00 ppm 3 = ± 2.00 ppm | Features 2 = TCXO, LVCMOS, 3.3 Vdc 3 = TCXO, Clipped Sinewave, 3.3 Vdc 4 = VCTCXO, LVCMOS, 3.3 Vdc 5 = VCTCXO, Clipped Sinewave, 3.3 Vdc | Output Frequency Frequency Format -xxx.xM Min -xxx.xxxxxM Max *Amount of numbers after the decimal point. M = MHz |

Example: Part Number

TV504-010.0M = 5x7mm 4 pad package, ± 0.28 ppm, 0 to 70°C, 3.3 Vdc, LVCMOS Output, VCTCXO
T715-012.8M = 5x7mm 10 pad package, ± 0.50 ppm, -20 to 70°C, 3.3 Vdc, Clipped Sinewave Output, VCTCXO
T522-050.0M = 5x7mm 10 pad package, ± 1.0 ppm, 0 to 70°C, 3.3 Vdc, LVCMOS Output, TCXO
TV602-010.0M = 5x7mm 4 pad package, ± 0.28 ppm, -40 to 85°C, 3.3 Vdc, LVCMOS Output, TCXO



Absolute Maximum Ratings

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|----------------------|---------|---------|-----------|-------|-------|
| Storage Temperature | -55 | - | 95 | °C | |
| Supply Voltage (Vcc) | -0.5 | - | 6.0 | Vdc | |
| Input Voltage | -0.5 | - | Vcc + 0.5 | Vdc | |

Operating Specifications

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|----------|----------|--------|--------------|
| Output Frequency (Fo) | | | | | |
| Models Tx0x, TVx0x | 6.4 | - | 50 | MHz | |
| Models Tx1x, TVx1x | 6.4 | - | 50 | MHz | |
| Models Tx2x, TVx2x | 6.4 | - | 54 | MHz | |
| Models Tx3x, TVx3x | 6.4 | - | 54 | MHz | |
| Operating Temperature Range | (See Ordering Information for full part number) | | | | |
| Models T3xx, TV3xx | 0 | - | 85 | °C | |
| Models T5xx, TV5xx | 0 | - | 70 | °C | |
| Models T6xx, TV6xx | -40 | - | 85 | °C | |
| Models T7xx, TV7xx | -20 | - | 70 | °C | |
| Frequency Calibration @ 25 °C | -1.0 | - | 1.0 | ppm | 1 |
| Frequency Stability (See Ordering Information for full part number) Per STRATUM 3 GR-1244-CORE | | | | | |
| Frequency Stability ±0.28 ppm is only available in the frequency range of 6.4 to 50 MHz. | | | | | |
| Models Tx0x, TVx0x | -0.28 | - | 0.28 | ppm | 2 |
| Holdover Stability | -0.32 | - | 0.32 | ppm | 3 |
| Constant Temperature Stability | -40 | - | 40 | ppb | Over 24 Hrs. |
| Frequency Stability (See Ordering Information for full part number) | | | | | |
| Models Tx1x, TVx1x | -0.50 | - | 0.50 | ppm | 2 |
| Models Tx2x, TVx2x | -1.00 | - | 1.00 | ppm | 2 |
| Models Tx3x, TVx3x | -2.00 | - | 2.00 | ppm | 2 |
| Frequency vs. Load Stability | -0.05 | - | 0.05 | ppm | ±5% |
| Frequency vs. Voltage Stability | -0.05 | - | 0.05 | ppm | ±5% |
| Static Temperature Hysteresis | - | - | 0.40 | ppm | 4 |
| Freq. shift after reflow soldering | -1.0 | - | 1.0 | ppm | 5 |
| Long Term Stability | -1.0 | - | 1.0 | ppm | 6 |
| Aging | | | | | |
| per Life (20 Years) | -3.0 | - | 3.0 | ppm | |
| per Day | -40 | - | 40 | ppb | |
| Total Frequency Tolerance | -4.6 | - | 4.6 | ppm | 7 |
| Supply Voltage (Vcc) | 3.135 | 3.30 | 3.465 | Vdc | |
| Supply Current (Icc) LVCMOS | - | 2.1 | 6.0 | mA | |
| Clipped Sinewave | - | 1.3 | 2.9 | mA | |
| Jitter: | | | | | |
| Period Jitter | - | 3.0 | 5.0 | ps RMS | |
| Integrated Phase Jitter (12K to Fo/2) | - | 0.3 | 1.0 | ps RMS | 8 |
| Allan Deviation (1s) | - | 1.0E-10 | - | | |
| Typical SSB Phase Noise | | | | | |
| For Fo | 10.0 MHz | 25.0 MHz | 50.0 MHz | | |
| @ 10 Hz offset | -98 | -90 | -73 | dBc/Hz | |
| @ 100 Hz offset | -125 | -120 | -103 | dBc/Hz | |
| @ 1 KHz offset | -143 | -140 | -134 | dBc/Hz | |
| @ 10 KHz offset | -151 | -151 | -151 | dBc/Hz | |
| @ 100 KHz offset | -152 | -152 | -152 | dBc/Hz | |
| @ 1 MHz offset | -155 | -154 | -154 | dBc/Hz | |
| Start-Up Time | - | - | 10 | ms | |



Control Voltage Input Characteristics

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|----------------------------|----------------|---------|---------|-------|-------|
| Control Voltage | 0.3 | 1.65 | 3.0 | V | |
| Frequency Pullability | ±10 | ±12 | - | ppm | |
| Pull Slope (Vc=1.65V) | - | 8.00 | - | ppm/V | |
| Control Voltage Slope | Positive Slope | | | | |
| Monotonic Linearity | - | - | 5 | % | |
| Input Impedance | 100K | - | - | Ohm | |
| Modulation Bandwidth (3dB) | 10 | - | - | | KHz |

OE Enable /Disable Input Characteristics (Pad 8) T Series only

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|-------------------------------|---------|---------|---------|-------|-------|
| Enable Input Voltage -(Vih) | 70%Vcc | - | - | Vdc | 9 |
| Disable Input Voltage - (Vil) | - | - | 30%Vcc | Vdc | 9 |

| Function | Output |
|---------------|---------------------------|
| Low: | Disabled (High Impedance) |
| High or Open: | Enabled |

LVC MOS Output Characteristics

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|-----------------------------|---------|---------|---------|-------|-------|
| Load (CL) | - | 15 | - | pF | 10 |
| Voltage (High) (Voh) | 90%Vcc | - | - | Vdc | |
| (Low) (Vol) | - | - | 10%Vcc | Vdc | |
| Current (High) (Ioh) | -4 | - | - | mA | |
| (Low) (Iol) | - | - | 4 | mA | |
| Duty Cycle at 50% of Vcc | 45 | 50 | 55 | % | |
| Rise / Fall Time 10% to 90% | - | 4 | 8 | ns | |

Clipped Sinewave Output Characteristics

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---------------------------|---------|---------|---------|-------|-------|
| Load (RC) | | | | | 11 |
| Output Load Resistance | - | 10K | - | Ohm | 12 |
| Output Load Capacitance | - | 10 | - | pF | |
| Output Voltage (< 40 MHz) | 1.0 | 1.2 | - | V | pk-pk |
| Output Voltage (=>40 MHz) | 0.8 | 1.0 | - | V | pk-pk |
| Output Impedance | - | 200 | - | Ohms | |

Package Characteristics

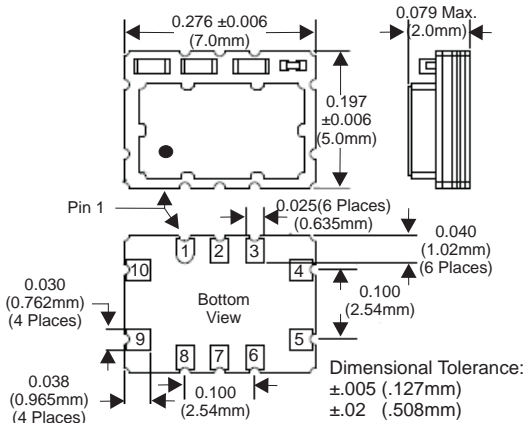
| | |
|---------|---|
| Package | Hermetically sealed ceramic package with grounded metal cover |
|---------|---|

Environmental Characteristics

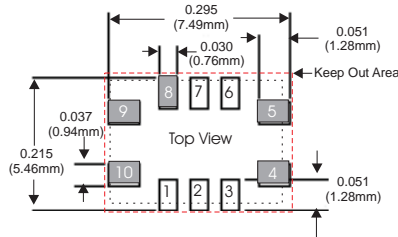
| | |
|--------------------|---|
| Vibration: | Vibration per Mil Std 883E Method 2007.3 Test Condition A. |
| Shock: | Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B. |
| Soldering Process: | RoHS compliant lead free. See soldering profile on page 6. |



T Series Package Outline



T Series Suggested Pad Layout

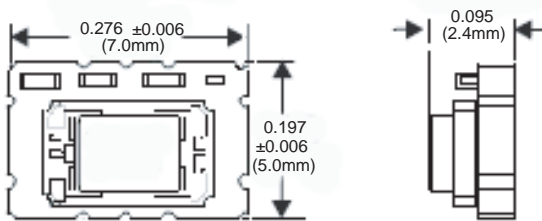


* Do not route any traces in the keep out area. It is recommended the next layer under the keep out area is to be ground plane.

T Series Pad Connections

- 1: Do Not Connect
- 2: Do Not Connect
- 3: Do Not Connect
- 4: Ground
- 5: Output
- 6: Do Not Connect
- 7: Do Not Connect
- 8: Enable / Disable (OE)
- 9: Supply Voltage (Vcc)
- 10: VCTCXO: Control Voltage (Vc)
TCXO: N/C

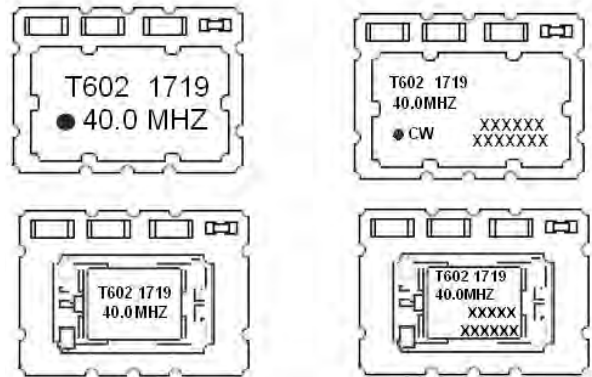
T Series Alternate Package Outline



Alternate package applies to some frequencies where a smaller crystal size is used. The differences are the top view crystal size, and the overall height. Bottom view, suggested pad layout, and pad connections all remain the same as above.

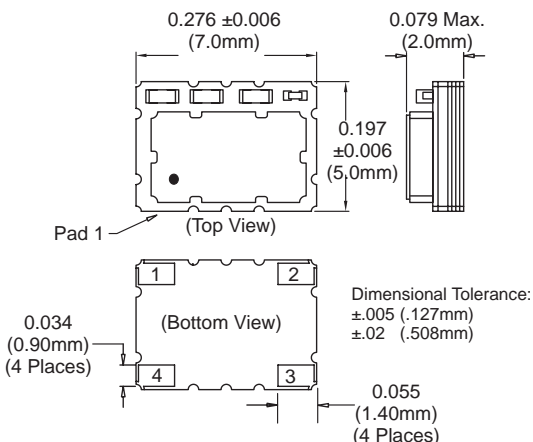
Marking Information

The following are examples of possible marking configurations

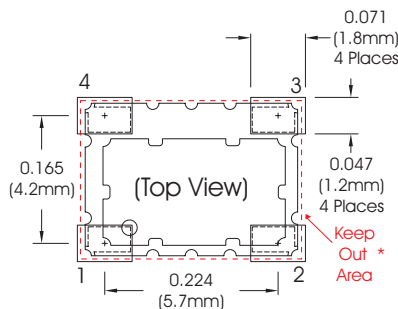


Note: The XXXXX represents crystal lot code information.

TV Series Package Outline



TV Series Suggested Pad Layout



* Do not route any traces in the keep out area. It is recommended the next layer under the keep out area is to be ground plane.

TV Series Pad Connections

- 1: VCTCXO: Voltage Control (Vc)
TCXO: N/C
- 2: Ground
- 3: Output
- 4: Supply (Vcc)