**PURE SPECTRUM**

# TCXO - VCTCXO Specification: TX14- Sinewave Series

# CONNOR WINFIELD

## Description:

The Connor-Winfield's TX14 Sinewave Series of Temperature Compensated Crystal Oscillators and Voltage Controlled Temperature Compensated Crystal Oscillators are designed for use in S3 Telecom Applications. Through the use of Analog Temperature Compensation, this device is capable of holding sub 1-ppm stabilities over the commercial or the industrial temperature ranges. All models will meet ±4.6 ppm accuracies for twenty years. STRATUM 3 compliant models are available.
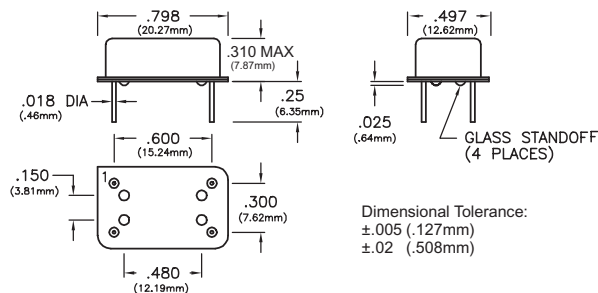
The TX14 series provides temperature stabilities in the range of ±0.28 ppm to ±2.50 ppm, over the commercial, extended commercial or the industrial temperature range.

The TX14 series is available with Sinewave output along optional Electronic Frequency Tuning (VCTCXO). These oscillators provide outstanding phase noise characteristics that will meet the most stringent requirements.
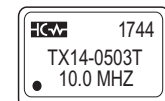
## Features:

- TCXO / VCTCXO
- Frequency Range: 6.4 to 100 MHz
- 3.3 Vdc Operation
- Sinewave Output
- Frequency Stabilities Available:
    ±0.28ppm, ✓ STRATUM 3
    ±0.5ppm,±1.0ppm or ±2.5ppm
- Temperature Ranges Available:
    0 to 70°C. -20 to 70°C or -40 to 85°C
- Frequency Tolerance:
    ±4.60 ppm for 20 years.
- Low Jitter <1ps RMS
- Voltage Control on Pin 1
- Hermetically Sealed 14 Pin DIP Package
- Through-hole or gull wing SMT
- RoHS Compliant / Lead Free ✓ RoHS
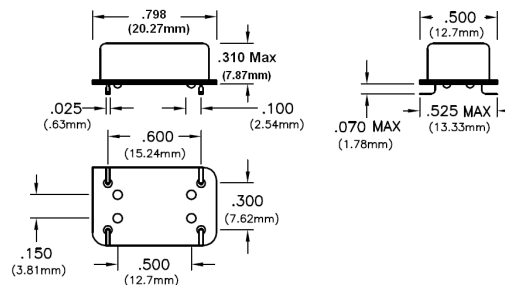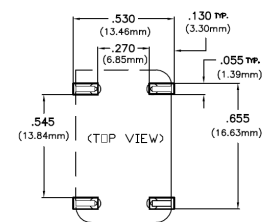- Recommended for New Designs

## TX14 Package Outline



.798 (20.27mm)
.310 MAX (7.87mm)
.497 (12.62mm)
.018 DIA (.46mm)
.25 (6.35mm)
.025 (.64mm)
GLASS STANDOFF (4 PLACES)
.600 (15.24mm)
.150 (3.81mm)
.300 (7.62mm)
.480 (12.19mm)

Dimensional Tolerance:
±.005 (.127mm)
±.02 (.508mm)

## Marking Diagram

HCW 1744
TX14-0503T
10.0 MHZ

## Pin Connections

| Pin | Connection |
|---|---|
| 1: | NC or Voltage Control (Vc) |
| 7: | Ground |
| 8: | Output |
| 14: | Supply Voltage (Vcc) |

## JTX14 Package Outline

.798 (20.27mm)
.310 Max (7.87mm)
.500 (12.7mm)
.025 (.63mm)
.100 (2.54mm)
.070 MAX (1.78mm)
.525 MAX (13.33mm)
.600 (15.24mm)
.150 (3.81mm)
.300 (7.62mm)
.500 (12.7mm)

## JTX14 Suggested Pad Layout

.530 (13.46mm)
.130 TYP. (3.30mm)
.270 (6.85mm)
.055 TYP. (1.39mm)
.545 (13.84mm)
(TOP VIEW)
.655 (16.63mm)

## Ordering Information

| TX14- | 28 | 0 | 7 | T | -020.0M |
|---|---|---|---|---|---|
| Oscillator Type | Frequency Stability | Temperature Range | Supply Voltage Output Type | TCXO Type | Output Frequency |
| TX14 = 14-Pin DIP Through-hole | 28 = ±0.28 ppm | 0 = 0 to 70°C | 7 = 3.3 Vdc, Sinewave | T = TCXO (Fixed Freq.) | Frequency Format |
| JTX14 = 14-Pin DIP Gull-wing SMT | 05 = ±0.50 ppm | 1 = -20 to 70°C | | V = VCTCXO (Voltage Controlled) | -xxx.xM Min.* |
| | 10 = ±1.00 ppm | 2 = -40 to 85°C | | | -xxx.xxxxxxM Max* |
| | 25 = ±2.50 ppm | | | | |

Example Part Numbers:
TX14-2807T-020.0M = 14 Pin DIP package, ±0.28 ppm, 0 to 70°C, 3.3 Vdc, Sinewave Output, TCXO, Output Frequency 20.0 MHz
TX14-0527V-38.88M = 14 Pin DIP package, ±0.50 ppm, -40 to 85°C, 3.3 Vdc, Sinewave Output, VCTCXO, 38.88 MHz

*Min 1, Max 6 digits after the decimal point.
M = MHz

**RoHS COMPLIANT**

# CONNOR WINFIELD

## Absolute Maximum Ratings

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Storage Temperature | -55 | - | 125 | °C | |
| Supply Voltage  3.3 Vdc (Vcc) | -0.6 | - | 4.6 | Vdc | |
| Control Voltage (Vc) | -0.5 | - | Vcc+0.5 | Vdc | |

*Absolute Ratings: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only. The functional operation of the device at those or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to conditions outside the "recommended operating conditions" for any extended period of time may adversely impact device reliability and result in failures not covered by warranty.*

## Operating Specifications for (J)TX14-28xxx Series

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Frequency Range (Fo) | 6.4 | - | 40 | MHz | |
| Frequency Calibration | -1.0 | - | 1.0 | ppm | 1 |
| Frequency Stability vs. Change in Temperature: (See Ordering Information) ✔STRATUM 3 | | | | | |
|    Stability Code 28 | -0.28 | - | 0.28 | ppm | 2 |
| Holdover Stability | -0.32 | - | 0.32 | ppm | 3 |
| Frequency Stability vs. Load | -50 | - | 50 | ppb | ±5% |
| Frequency Stability vs. Voltage | -50 | - | 50 | ppb | ±5% |
| Aging / Life (20 Years) | -3.0 | - | 3.0 | ppm | |
| Aging / Day (@25 °C) | -40 | - | 40 | ppb/day | |
| Aging / Second | -4.63E-13 | - | 4.63E-13 | | |
| Total Frequency Tolerance (20 Years) | -4.60 | - | 4.60 | ppm | 4 |

## Operating Specifications for (J)TX14-05xxx Series

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Frequency Range (Fo) | 6.4 | - | 60 | MHz | |
| Frequency Calibration | -1.0 | - | 1.0 | ppm | 1 |
| Frequency Stability vs. Change in Temperature: (See Ordering Information) | | | | | |
|    Stability Code 05 | -0.50 | - | 0.50 | ppm | 2 |
| Frequency Stability vs. Load | -50 | - | 50 | ppb | ±5% |
| Frequency Stability vs. Voltage | -50 | - | 50 | ppb | ±5% |
| Aging / Life (20 Years) | -3.0 | - | 3.0 | ppm | |
| Total Frequency Tolerance (20 Years) | -4.60 | - | 4.60 | ppm | 4 |

## Operating Specifications for (J)TX14-10xxx Series

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Frequency Range (Fo) | 6.4 | - | 100 | MHz | |
| Frequency Calibration | -1.0 | - | 1.0 | ppm | 1 |
| Frequency Stability vs. Change in Temperature: (See Ordering Information) | | | | | |
|    Stability Code 10 | -1.00 | - | 1.00 | ppm | 2 |
| Frequency Stability vs. Load | -50 | - | 50 | ppb | ±5% |
| Frequency Stability vs. Voltage | -50 | - | 50 | ppb | ±5% |
| Aging / Life (20 Years) | -3.0 | - | 3.0 | ppm | |
| Total Frequency Tolerance (20 Years) | -4.60 | - | 4.60 | ppm | 4 |

## Operating Specifications for (J)TX14-25xxx Series

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Frequency Range (Fo) | 6.4 | - | 100 | MHz | |
| Frequency Calibration | -1.0 | - | 1.0 | ppm | 1 |
| Frequency Stability vs. Change in Temperature: (See Ordering Information) | | | | | |
|    Stability Code 25 | -2.50 | - | 2.50 | ppm | 2 |
| Frequency Stability vs. Load | -50 | - | 50 | ppb | ±5% |
| Frequency Stability vs. Voltage | -50 | - | 50 | ppb | ±5% |
| Aging / Life (20 Years) | -3.0 | - | 3.0 | ppm | |
| Total Frequency Tolerance (20 Years) | -4.60 | - | 4.60 | ppm | 4 |

## Notes:

1. *Initial calibration @ 25°C. Specifications at time of shipment after 48 hours of operation.* **For VCTCXO control voltage must be fixed.**
2. *Frequency stability vs. change in temperature. [±(Fmax - Fmin)/(2*Fo)].*
3. *Inclusive of frequency stability, supply voltage change (±1%), aging, for 24 hours.*
4. *Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage (±5%), load change (±5%), shock and vibration and 20 years aging.*

## Operating Temperature Ranges

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Operating Temperature Range: (See Ordering Information) | | | | | |
| Temperature Code 0 | 0 | - | 70 | °C | |
| Temperature Code 1 | -20 | - | 70 | °C | |
| Temperature Code 2 | -40 | - | 85 | °C | |

## Operating Specifications

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Supply Voltage: (Vcc) (See Ordering Information) | | | | | |
| Supply Voltage Code 7 | 3.13 | 3.30 | 3.47 | Vdc | ±5% |
| Supply Current Vcc = Nominal Voltage | - | 6 | 10 | mA | |
| Static Temperature Hysteresis | -0.4 | - | 0.4 | ppm | 5 |
| Jitter: | | | | | |
| Period Jitter | - | 3 | 5 | ps RMS | |
| Phase Jitter (BW: 12 KHz to Fo/2) | - | 0.5 | 1.0 | ps RMS | |
| Typical SSB Phase Noise: (Fo = 20 MHz) | | | | | |
| @ 10 Hz offset | - | -90 | -85 | dBC/Hz | |
| @ 100 Hz offset | - | -120 | -115 | dBC/Hz | |
| @ 1 KHz offset | - | -140 | -135 | dBC/Hz | |
| @ 10 KHz offset | - | -150 | -145 | dBC/Hz | |
| @ >100 KHz offset | - | -152 | -150 | dBC/Hz | |
| Start-Up Time | - | - | 1 | ms | |

## Sinewave Output Characteristics

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Load | - | 50 | - | Ohm | AC Coupled |
| Output Voltage | 3.0 | 6.0 | - | dBm | |
| Harmonics | - | - | -30 | dBc | |
| Spuious | - | - | -80 | dBc | |

## Voltage Control Input Characteristics (Pin 1) Optional

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|---|---|---|---|---|
| Control Voltage Range: (Vc) Voltage Control Code V (See Ordering Information) | | | | | |
| Vcc = 3.3 Vdc | 0.30 | 1.65 | 3.00 | V | |
| Frequency Pullability | ±10.0 | - | - | ppm | 6 |
| Input Impedance | 100K | - | - | Ohms | |
| Linearity | ±5 | - | - | % | |
| Slope | Positive Transfer Function | | | | |

## Package Characteristics

| | |
|---|---|
| Package | 14 Pin DIP Hermetically Sealed Metal Package |

## Environmental Characteristics

| | |
|---|---|
| Shock | 500 G's 1ms, Halfsine, 3 shocks per direction, per MIL-STD 202G, Method 213B Test Condition D. |
| Sinusoidal Vibration | 0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD-202G, Method 204D, Test Condition A. |
| Random Vibration | 5.35 G's rms. 20 to 2000 Hz per MIL-STD-202G, Method 214,Test Condition 1A, 15 minutes each axis. |
| Moisture | 10 cycles, 95% RH, Per MIL-STD-202G, Method 112. |
| Marking Permanency | Per MIL-STD-202G, Method 215J. |
| Solder Process | RoHS compliant, lead free. See solder profile on page 4. |

**Notes:**

5. *Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25℃.*
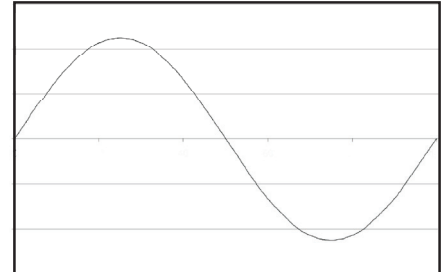6. *Referenced to Fo.*

| | |
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| Date | **15 Nov 2023** |

## Sinewave Test Circuit
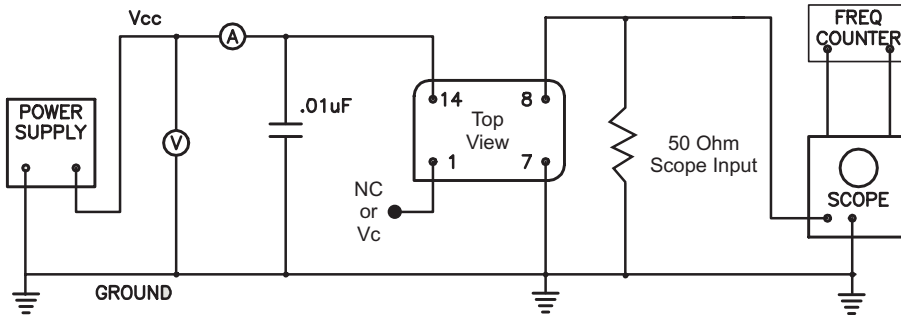


## Sinewave Output Waveform

Sinewave Output, 3 dBm minimum into 50 Ohms



## Phase Noise Plot



Model TX14-2807T-020.0M
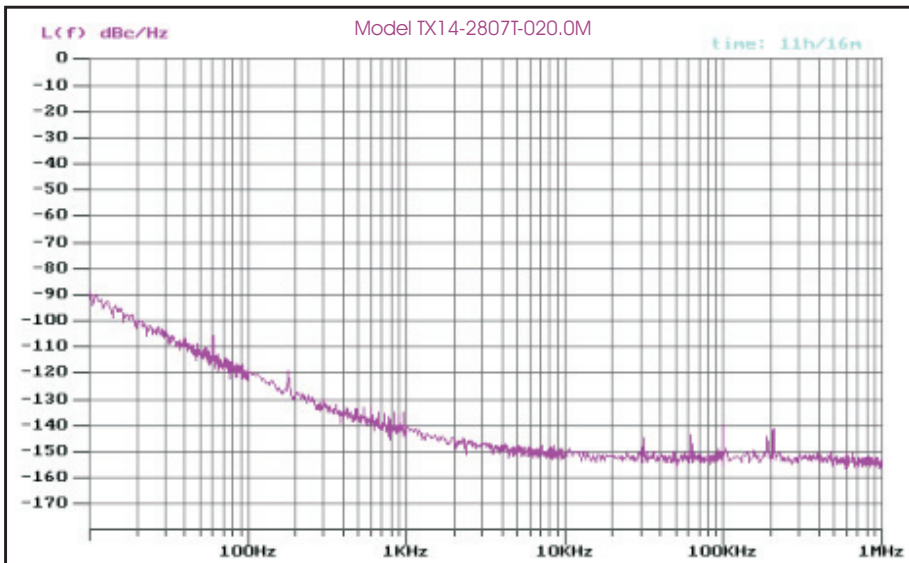
## RoHS Solder Profile ✓RoHS
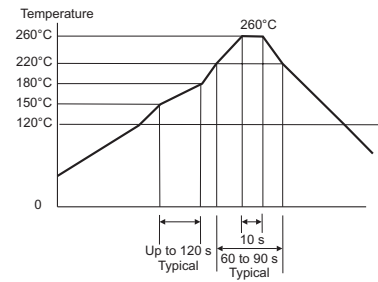


Meets IPC/JEDEC J-STD-020C

## Revision History

| Revision | Date | Note |
|---|---|---|
| 04 | 11/15/23 | Updated Voltage Operation |

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