

14 Pin DIP Package

HTFLxx Series HTVLxx Series

HTFHxx Series HTVHxx Series

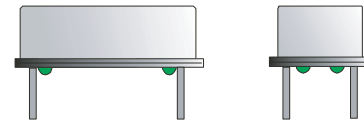
CONNOR WINFIELD



TCXO / VCTCXO

Description

The Connor Winfield 14 Pin DIP Temperature Compensated Crystal Controlled Oscillators (TCXO series) and Voltage Controlled Temperature Compensated Crystal Controlled Oscillators (VCTCXO series) are designed for use in applications where high frequency stability performance is required. 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. Many features are available to meet your design requirements.



Features:

- Available RoHS Options:
 - RoHS Compliant / Lead Free
 - RoHS Compliant / Terminations Contain Lead
- Fixed Frequency with Tri-State E/D (TCXO) or Voltage Controlled (VCTCXO)
- Available Supply Voltages: 3.3v or 5.0v
- Low Jitter >1ps Rms
- Available Frequency Stabilities:
 - 6.4 Mhz to 50 Mhz, 0.28 Ppm pk-pk, ±0.20 ppm,
 - ±0.25 ppm, ±0.28 ppm, ±0.50 ppm,
 - ±1.00 ppm, ±2.50 ppm, ±4.60 ppm
- Available Frequency Stabilities:
 - >50 Mhz to 156.25 Mhz, ±0.50 ppm
 - ±1.00 ppm, ±2.50 ppm, ±4.60 ppm
- Available Temperature Ranges:
 - 0 to 70°C or -40 To 85°C
- Tri-State Enable / Disable Function or Voltage Control Pin 1
- Hermetically Sealed 14 Pin Dip Package

Absolute Maximum Ratings

Table 1.0

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|----------------------|---------|---------|---------|-------|-------|
| Storage Temperature | -55 | - | 125 | °C | |
| Supply Voltage (Vcc) | -0.5 | - | 6.0 | Vdc | |
| Input Voltage (Vcc) | -0.5 | - | Vcc+0.6 | Vdc | |

Ordering Information

HTFL6D - 12.800 MHz

TCXO
SERIES

CENTER
FREQUENCY

2111 Comprehensive Drive
Aurora, Illinois 60505
Phone: 630-851-4722
Fax: 630-851-5040
www.conwin.com
US Headquarters:
630-851-4722
European Headquarters:
+353-61-472221



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Revision **05**
Date **08 January 2008**



Operating Specifications

Table 2.0

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|--|---------|---------|------------|--------|-------|
| Center Freq (See Table 8) (Fo) | 6.40 | - | 156.25 | MHz | |
| Frequency Calibration – All Models | -1.0 | | 1.0 | ppm | 1 |
| Frequency Stability vs. Temperature $\pm[(F_{max}-F_{min})/2]$ (See Table 8) | | | | | 2 |
| Freq. Stability vs. Voltage - All Models | - | - | ± 0.20 | ppm | 3 |
| Total Frequency Tolerance – HTxxxA through HTxxxF | - | - | ± 4.6 | ppm | 4 |
| Total Frequency Tolerance – HTxxxG | - | - | ± 6.1 | ppm | 4 |
| Total Frequency Tolerance – HTxxxH | - | - | ± 20.0 | ppm | 4 |
| Aging (20 years) – All Models | - | - | ± 3.0 | ppm | |
| Operating Temperature Range (See Table 8) | | | | | |
| Model: HTxx5x- Series | 0 | - | 70 | °C | |
| Model: HTxx6x- Series | -40 | - | 85 | °C | |
| Supply Voltage (See Table 7) | | | | | |
| Model: HTFLxx or HTVLxx - Series (Vcc) | 3.135 | 3.300 | 3.465 | Vdc | |
| Model: HTFHxx or HTVHxx - Series (Vcc) | 4.75 | 5.00 | 5.25 | Vdc | |
| Supply Current (6.4 to 50 MHz) (Icc) | - | 6 | 10 | mA | |
| Supply Current (>50 to 156.25MHz) (Icc) | - | 9 | 25 | mA | |
| Phase Jitter (BW = 12KHz to Fo/2) | - | - | 1 | pS RMS | |
| Phase Jitter (BW = 10Hz to Fo/2) | - | - | 3 | pS RMS | |
| Period Jitter | - | - | 3 | pS RMS | |
| SSB Phase Noise at 1Hz offset | - | -50 | - | dBc/Hz | |
| SSB Phase Noise at 10 Hz offset | - | -80 | - | dBc/Hz | |
| SSB Phase Noise at 100 Hz offset | - | -110 | - | dBc/Hz | |
| SSB Phase Noise at 1 KHz offset | - | -135 | - | dBc/Hz | |
| SSB Phase Noise at 10K Hz offset | - | -150 | - | dBc/Hz | |
| SSB Phase Noise at 100 KHz offset | - | -150 | - | dBc/Hz | |
| Start-Up Time: Oscillator | - | - | 10 | mS | |
| TDEV @ 1 second | - | - | 1.0 | nS | |
| TDEV @ 4 seconds | - | - | 2.0 | nS | |

Notes:

- 1) Initial calibration @ 25°C. Specifications at time of shipment after 48 hours of operation.
- 2) Frequency stability vs. change in temperature. $\pm[(F_{max}-F_{min})/2]$, where the Fmax and Fmin values are in ppm.
- 3) Frequency stability for a +/- 5% supply voltage change.
- 4) Inclusive of calibration, operating temperature range, supply voltage change, shock and vibration and aging (20 years).
- 5) Oscillator output is enabled with no connection on pin 1. Output is at high impedance when disabled.

Input Characteristics for VCTCXO Models

Table 3.0

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|----------|---------|---------|-------|-------|
| Control Voltage Range (Vcc = 3.3V) (Vc) | 0.3 | 1.65 | 3.0 | Vdc | |
| Control Voltage Range (Vcc = 5.0V) (Vc) | 0.5 | 2.5 | 4.5 | Vdc | |
| Frequency Tuning | ± 10 | - | - | ppm | |
| Linearity | ± 1 | - | - | % | |
| Slope | Positive | | | | |
| Input Resistance | >100K | - | - | Ohm | |

Input Characteristics for TCXO Models

Table 4.0

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|-----------------------------|--------------------|---------|--------------------|-------|-------|
| Enable Voltage (High) (Vih) | $\geq 70\% V_{dd}$ | - | - | Vdc | 5 |
| Disable Voltage (Low) (Vil) | - | - | $\leq 30\% V_{dd}$ | Vdc | 5 |

| | |
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HCMOS Output Characteristics

Table 5.0

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|---|-------------|---------|-------------|----------|-------|
| LOAD | - | - | 15 | pF | |
| Output Voltage 6.4 to 52 MHz Voltage: (High) (Voh) (Low) (Vol) | 90%Vcc - | - - | - 10%Vcc | V V | |
| Drive Current for 6.4 to 52 MHz (High) (Ioh) (Low) (Iol) | -4 - | - - | - 4 | mA mA | |
| Output Voltage >52 MHz Vcc=3.3Vdc Voltage: (High) (Voh) (Low) (Vol) | 2.0 - | - - | - 0.4 | V V | |
| Output Voltage >52 MHz Vcc=5.0Vdc Voltage: (High) (Voh) (Low) (Vol) | 2.4 - | - - | - 0.4 | V V | |
| Drive Current >52 MHz (High) (Ioh) (Low) (Iol) | -8 - | - - | - 8 | mA mA | |
| Duty Cycle at 50% of Vcc | 45 | 50 | 55 | % | |
| Rise / Fall Time 10% to 90% | - | - | 8 | nS | |

Package Characteristics

Table 6.0

| | |
|---------|---|
| Package | Hermetically sealed, 14 Pin DIP metal package |
|---------|---|

Process Recommendation

Solder Reflow Products suitable for convection reflow soldering. Peak temperature 260°C.
Maximum time above 220°C, 20 seconds

Model Number Select Table

Table 7.0

| Fixed Frequency Models | Voltage Controlled Models | Supply Voltage | Output Logic Typ |
|------------------------|---------------------------|----------------|------------------|
| HTFLxx | HTVLxx | 3.3 Vdc | HCMOS |
| HTFHxx | HTVHxx | 5.0 Vdc | HCMOS |

xx — Add the frequency vs. temperature range to the end of the model number.

Frequency vs. Temperature Range

Table 8.0

Select Table Frequency Range: 6.4 to 50 MHz

| Operating Temperature Ranges | ±0.28 ppm pk-pk* | ±0.20 ppm*** | ±0.25 ppm*** | ±0.28 ppm*** | ±0.50 ppm*** | ±1.00 ppm*** | ±2.50 ppm*** | ±4.60 ppm*** |
|------------------------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 0 to 70°C | 5A | 5B | 5C | 5D | 5E | 5F | 5G | 5H |
| -40 to 85°C | ** | ** | ** | 6D | 6E | 6F | 6G | 6H |

Select Table Frequency Range: >50 to 155.52 MHz

| Operating Temperature Ranges | +0.50 ppm*** | ±1.00 ppm*** | ±2.50 ppm*** | ±4.60 ppm*** |
|------------------------------|--------------|--------------|--------------|--------------|
| 0 to 70°C | 5E | 5F | 5G | 5H |
| -40 to 85°C | ** | 6F | 6G | 6H |

* — Frequency vs. temperature, absolute.
** — Frequency stabilities not available at -40 to 85°C
*** — ±[(Fmax-Fmin)/2], where the Fmax and Fmin values are in ppm.



Package Dimensions

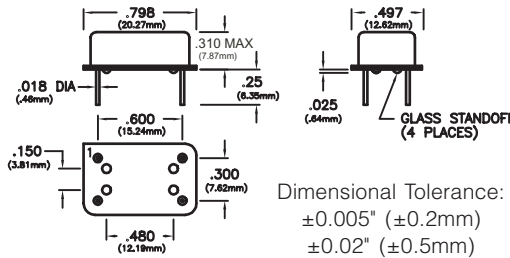
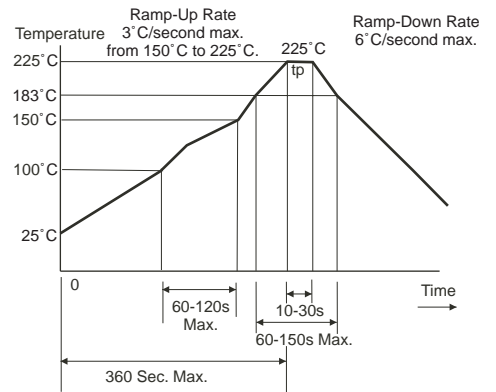


Table 9.0

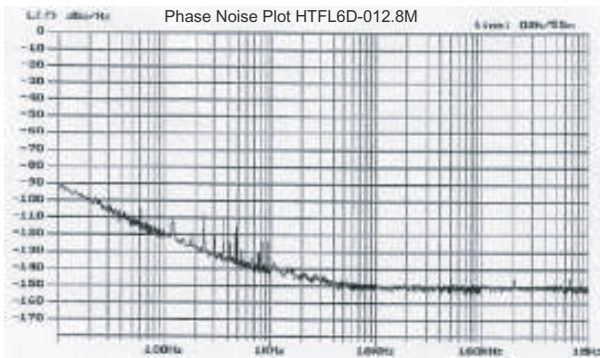
Pin Function

- 1 E / D or Voltage Control
- 7 Ground
- 8 Output
- 14 Vcc

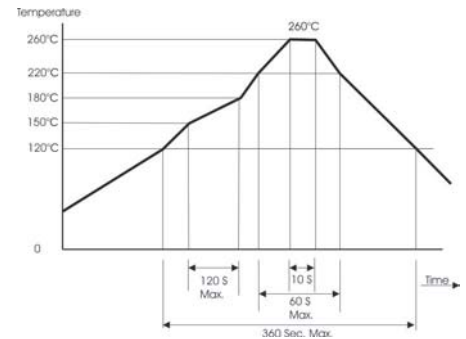
RoHS 5/6 Solder Profile



Phase Noise Plot



RoHS Solder Profile



Order Information Specifications

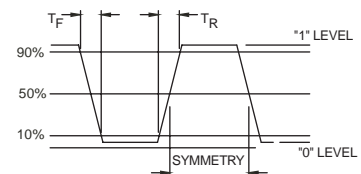
HTVH 5D G5 - 020.0M

- Model Number, Fixed or Voltage Controlled Output, Supply Voltage - Code
- Frequency Stability vs. Temperature Range - Code
- G5 = RoHS 5/6 Compliant / Terminations Contain Lead
- Blank = RoHS Compliant / Lead Free
- Output Frequency

HTVH5DG5-020.0M = 20 MHz, Voltage Controlled VCTCXO, 5.0V, HCMOS, $\pm 0.28\text{ppm}$, 0 to 70°C, RoHS 5/6 Compliant / Terminations contain lead.

HTFL6D-012.8M = 12.8 MHz, Fixed Frequency TCXO, 3.3V, HCMOS, $\pm 0.28\text{ppm}$, -40 to 85°C, RoHS Compliant / Lead Free

Output Waveform



Test Circuit

