

# High Precision TCXO / VCTCXO



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

## Description:

The Connor-Winfield 9x14 mm Temperature Compensated Crystal Controlled Oscillators (TCXO series) and Voltage Controlled Temperature Compensated Crystal Controlled Oscillators (VCTCXO series) are designed for use in Telecom applications requiring tight frequency stability. 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.

## Features:

TCXO or VCTCXO

3.3 Vdc or 5.0 Vdc Operation

LVC MOS or HCMOS Output Logic

9x14 mm Surface Mount Package

Frequency Stabilities Available:

$\pm 0.25$  ppm,  $\pm 0.28$  ppm  $\pm 0.5$  ppm,  $\pm 1.0$  ppm

Temperature Ranges Available:

0 to 70°C or -40 to 85°C

Low Jitter <1 ps RMS

Tri-State Enable/Disable Function

Tape and Reel Packaging

RoHS Compliant / Lead Free

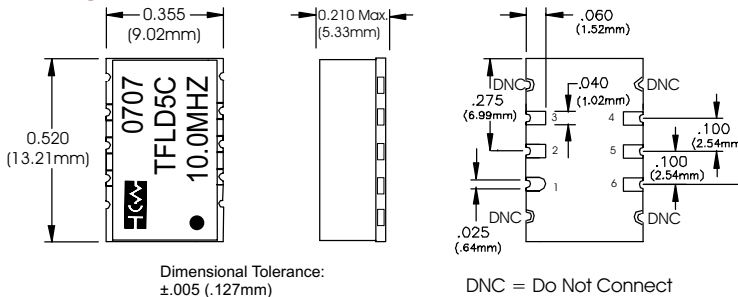
## Operating Specifications

Parameter	Minimum	Nominal	Maximum	Units	Notes
Frequency Range: (Fo)					
Stability Code C	6.4	-	32	MHz	
Stability Code D	6.4	-	40	MHz	
Stability Code E and F	6.4	-	52	MHz	
Frequency Stability:					
Stability Code C	-0.25	-	0.25	ppm	
Stability Code D	-0.28	-	0.28	ppm	
Holdover Code D	-0.32	-	0.32	ppm	1
Stability Code E	-0.50	-	0.50	ppm	
Stability Code F	-1.00	-	1.00	ppm	
Frequency Calibration (@25 °C)	-1.0	-	1.0	ppm	2
Frequency Stability vs. Voltage	-0.20	-	0.20	ppm	$\pm 5\%$
Frequency Stability vs. Load	-0.20	-	0.20	ppm	$\pm 5\%$
Static Temperature Hysteresis	-0.40	-	0.40	ppm	3
Aging: First Year	-1.0	-	1.0	ppm	
Total Frequency Tolerance	-4.6	-	4.6	ppm	4
Operating Temperature Range:					
Temperature Code 5	0	-	70	°C	
Temperature Code 6	-40	-	85	°C	
Supply Voltage: (Vcc)					
Voltage Code L	3.135	3.30	3.465	Vdc	$\pm 5\%$
Voltage Code H	4.75	5.00	5.25	Vdc	$\pm 5\%$
Supply Current	-	6	15	mA	
Start-up Time	-	-	10	ms	

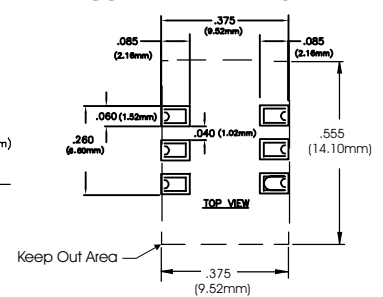
## Notes:

- Inclusive of frequency stability, supply voltage change ( $\pm 5\%$ ), aging for 24 hours.
- TCXO: Initial calibration @ 25°C. Specification at time of shipment after 48 hours of operation.
- Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C.
- Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage ( $\pm 5\%$ ), load change ( $\pm 5\%$ ), reflow soldering process and 10 years aging

## Package Outline



## Suggested Pad Layout



## Ordering Information

<b>TF</b> Type TF = TCXO TV = VCTCXO CMOS Output	<b>L</b> Supply Voltage L = 3.3 Vdc H = 5.0 Vdc	<b>D</b> Package Size D = 9 x 14 mm Surface Mount Package	<b>5</b> Temperature Range 5 = 0 to 70°C 6 = -40 to 85°C	<b>C</b> Frequency Stability C = $\pm 0.25$ ppm D = $\pm 0.28$ ppm E = $\pm 0.50$ ppm F = $\pm 1.00$ ppm	<b>- 010.0M</b> Output Frequency Frequency Format -xxx.xM Min. -xxx.xxxxxxM Max. *Amount of numbers after the decimal point. M = MHz
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## Example Part Number:

TFLD5C-010.0M = TCXO, 3.3 Vdc, 9x14mm package, 0 to 70°C temperature range,  $\pm 0.25$ ppm frequency stability, output frequency 10.0 MHz.  
To order a TFLD5C with an output frequency of: 6.4 MHz = TFLD5C-006.4M, 16.384 MHz = TFLD5C-016.384M.



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Revision **06**  
Date **14 May 2009**



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## Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	85	°C	
Supply Voltage (Vcc)	-0.5	-	6.0	Vdc	
Input Voltage	-0.5	-	Vcc+0.6	Vdc	

## Input Characteristics for Enable / Disable Function

Parameter	Minimum	Nominal	Maximum	Units	Notes
Enable Voltage (High) (Vih)	70%Vcc	-	-	V	5
Enable Voltage (High) (Vih)	-	-	30%Vcc	V	5

## VCTCXO Input Characteristics for Voltage Control Function

Parameter	Minimum	Nominal	Maximum	Units	Notes
Control Voltage (Vcc = 3.3 Vdc)	0.3	1.65	3.0	Vdc	
Control Voltage (Vcc = 5.0 Vdc)	0.5	2.5	4.5	Vdc	
Frequency Tuning measured @ 25°	±10	-	-	ppm	Positive
Input Impedance	±100K	-	-	Ohm	Slope
Linearity	±5	-	-	%	

## CMOS Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	15	-	pF	
Voltage (High) Voh	90%Vcc	-	-	V	
(Low) Vol	-	-	10%Vcc	V	
Duty Cycle at 50% Vcc	45	50	55	%	
Rise / Fall Time 10% to 90%	-	5	8	ns	
Phase Jitter (BW=12KHz to Fo/2)	-	-	1	ps RMS	
Period Jitter	-	-	3	ps RMS	
SSB Phase Noise at 10Hz offset	-	-80	-	dBc/Hz	
SSB Phase Noise at 100Hz offset	-	-110	-	dBc/Hz	
SSB Phase Noise at 1KHz offset	-	-135	-	dBc/Hz	
SSB Phase Noise at 10KHz offset	-	-145	-	dBc/Hz	
SSB Phase Noise at 100KHz offset	-	-150	-	dBc/Hz	

## Package Characteristics

Package FR4 substrate, surface mount package

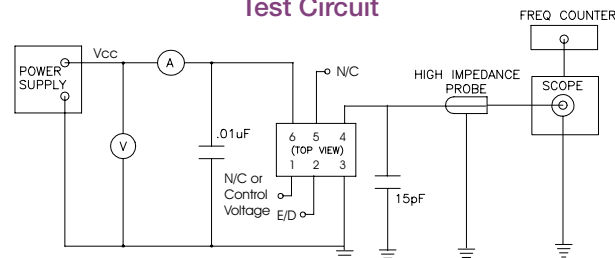
## Environmental Characteristics

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 2.  
Solderability; Solderability per Mil Std 883E Method 2003

### Notes:

5. Oscillator output is enabled with no connection on pin 2. Output is at high impedance when disabled.

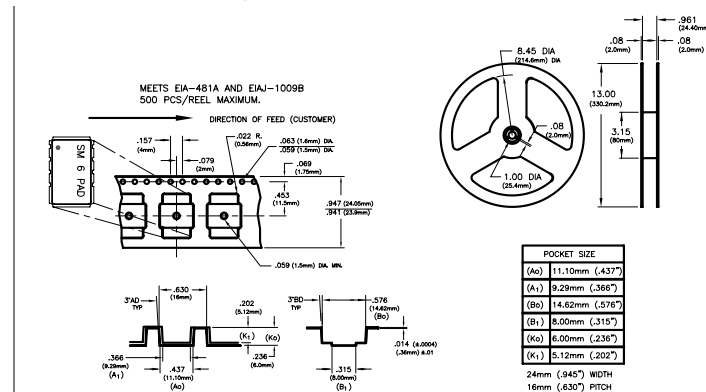
## Test Circuit



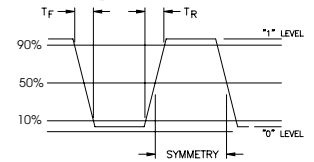
## Pad Connections

- Pad Connection
- 1: N/C or Control Voltage
  - 2: Enable / Disable
  - 3: Ground (Case)
  - 4: Output
  - 5: N/C
  - 6: Supply Voltage (Vcc)

## Tape and Reel Information



## Output Waveform



## Solder Profile

