Telecom Performance
TCXO / VCTCXO

CONNOR WINFIELD

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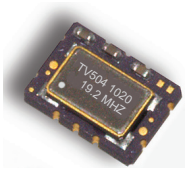
Description:



The Connor-Winfield 5x7mm Temperature Compensated Crystal Controlled Oscillators and Voltage Controlled Temperature Compensated Crystal Controlled 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. Three STRATUM 3 compliant model series are available.

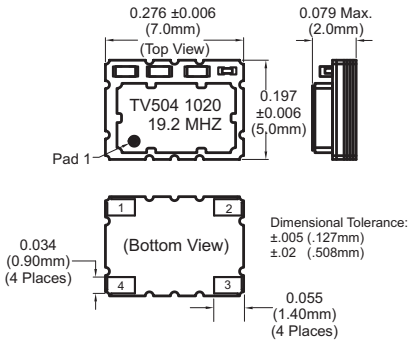
Features

- Miniature 5 x 7mm Surface Mount Package
- 3.3V Operation
- LVCMOS or Clipped Sinewave Output Logic
- Frequency Stabilities Available:
  - TV50x / TV60x / TV70x: ±-0.28ppm ✓STRATUM 3
  - TV51x / TV61x / TV71x: ±0.50ppm
  - TV52x / TV62x / TV72x: ±1.00ppm
- Temperature Ranges Available:
  - TV5xx Series: 0 to 70°C
  - TV6xx Series: -40 to 85°C
  - TV7xx Series: -20 to 70°C
- Frequency Tolerance: ±4.60 ppm for 20 yrs.
- Aging: <4.63E-13 / second
- Low Jitter <1ps RMS
- Tape and Reel Packaging
- RoHS Compliant / Lead Free ✓RoHS
- Recommended for New Designs

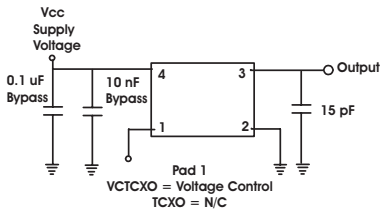
Applications:

- 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

Package Layout



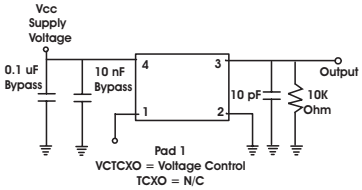
LVCMOS Test Circuit



Pin Connections

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

Clipped Sinewave Test Circuit



Standard Frequencies Available *

6.4 MHz, 9.72 MHz, 10.0 MHz, 10.24 MHz, 12.5 MHz, 12.8 MHz, 13.5 MHz, 19.2 MHz, 19.44 MHz, 20.0 MHz, 20.48 MHz, 25.0 MHz, 27.0 MHz, 38.88 MHz

* Available frequencies from the factory for small quantity orders or quick delivery. Additional frequencies are available.

Ordering Information

TV	5	0	4	019.2M
Type: Precision TCXO VCTCXO 4 Pad 5x7mm	Temperature Range 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	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 Format -xxx.xM Min. * -xxx.xxxxxxM Max.* * Amount of numbers after the decimal point. M = MHz

Example:
TV504-019.2M = 5x7mm, VCTCXO, LVCMOS, 3.3Vdc, 0 to 70°C, ±28ppm, Output Frequency 19.44MHz
To order a TV504 with an output frequency of: 6.4 MHz = TV504-006.4M
20 MHz = TV504-020.0M
38.88 MHz = TV504-038.88M

RoHS COMPLIANT

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Absolute Maximum Ratings

Table 1.0

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

Model Specifications

Table 2.0

Model Number	TV502	TV503	TV504	TV505 ✓STRATUM 3	
Temperature Range		0 to 70°C			
Model Number	**TV602**	**TV603**	**TV604**	**TV605 ✓STRATUM 3**	
Temperature Range		-40 to 85°C			
Model Number	**TV702**	**TV703**	**TV704**	**TV705 ✓STRATUM 3**	
Temperature Range		-20 to 70°C			
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range		6.4 to 40 MHz			
Frequency Stability		±0.28ppm			1
Supply Voltage		3.3Vdc			
Holdover Stability		±0.32ppm			2
Aging / Life		±3.0ppm			3
Aging / Day		±40ppb			
Aging / Second		4.63E-13			

Model Specifications

Table 3.0

Model Number	TV512	TV513	TV514	TV515	
Temperature Range		0 to 70°C			
Model Number	**TV612**	**TV613**	**TV614**	**TV615**	
Temperature Range		-40 to 85°C			
Model Number	**TV712**	**TV713**	**TV714**	**TV715**	
Temperature Range		-20 to 70°C			
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range		6.4 to 40 MHz			
Frequency Stability		±0.50ppm			1
Supply Voltage		3.3Vdc			
Frequency Aging		±3.0ppm			3

Model Specifications

Table 4.0

Model Number	TV522	TV523	TV524	TV525	
Temperature Range		0 to 70°C			
Model Number	**TV622**	**TV623**	**TV624**	**TV625**	
Temperature Range		-40 to 85°C			
Model Number	**TV722**	**TV723**	**TV724**	**TV725**	
Temperature Range		-20 to 70°C			
Output Type	LVCMOS	Clipped Sinewave	LVCMOS	Clipped Sinewave	
TCXO / VCTCXO	TCXO	TCXO	VCTCXO	VCTCXO	
Frequency Range		6.4 to 52 MHz			
Frequency Stability		±1.00ppm			1
Supply Voltage		3.3Vdc			
Frequency Aging		±3.0ppm			3

Notes:
1) Frequency stability vs. change in temperature. [±(Fmax – Fmin)/2.Fo].
2) Inclusive of frequency stability, supply voltage change (±1%), aging, for 24 hours.
3) Over twenty years.

Operating Specifications

Table 5.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
TCXO Frequency Calibration @ 25°C		-1.00	-	1.00	ppm	1
Supply Voltage Variation. (Vcc±5%)		-0.05	-	0.05	ppm	
Load Coefficient, ±5%		-0.05	-	0.05	ppm	
Static Temperature Hysteresis		-0.4	-	0.4	ppm	2
Total Frequency Tolerance		-4.60	-	4.60	ppm	3
Supply Voltage (±5%)	(Vcc)	3.135	3.3	3.465	Vdc	4
Supply Current	(Icc)	-	6	10	mA	
Period Jitter		-	3	5	ps rms	
Integrated Phase Jitter (BW=12kHz to 20MHz)		-	0.3	1.0	ps rms	
SSB Phase Noise at 10Hz offset		-	-90	-85	dBc/Hz	5
SSB Phase Noise at 100Hz offset		-	-120	-115	dBc/Hz	5
SSB Phase Noise at 1KHz offset		-	-140	-135	dBc/Hz	5
SSB Phase Noise at >10KHz offset		-	-150	-145	dBc/Hz	5
SSB Phase Noise at >100KHz offset		-	-152	-157	dBc/Hz	5
Start Up Time		-	-	1	ms	6

Input Characteristics For Voltage Control Models(Pad1)

Table 6.0

Parameter		Minimum	Nominal	Maximum	Units	Notes
Control Voltage Range (Vcc = 3.3V)	(Vc)	0.3	1.65	3.0	Vdc	
Frequency Tuning		±10	-	-	ppm	7
Linearity		±5	-	-	%	
Input Impedance		100K	-	-	Ohm	
Slope		Positive				

LVCMOS Output Characteristics

Table 7.0

Parameter			Minimum	Nominal	Maximum	Units	Notes
LOAD			-	15	-	pF	8
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%			-	-	8	ns	

Clipped Sinewave Output Characteristics

Table 8.0

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load					9
Output Load Resistance	-	10K	-	Ohms	
Output Load Capacitance	-	10	-	pF	8
Output Voltage (< 40 MHz)	1.00	-	-	V pk-pk	
Output Voltage (> 40 MHz)	0.80	-	-	V pk-pk	

Note

1) *TCXO: Initial calibration @ 25°C. Specifications at time of shipment after 48 hours of operation.*
2) *Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C.*
3) *Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage (±5%), load change (±5%), reflow soldering process and 20 years aging.*
4) *For best in application performance, careful selection of an external power source is critical. Select an external regulator that meets or exceeds to following specifications regarding voltage regulation tolerance, initial accuracy, temperature coefficient, voltage noise, and low voltage noise density* ***Factory Test Conditions****: Initial Accuracy ±2mv, Noise (0.1Hz to 10 KHz) 15uV p-p, Voltage Noise Density = 50nV/srt Hz, Temperature Coefficient < 5ppmºC.*
5) *Phase noise measurements Fo = 20 MHz, other frequencies may vary by 20log F/20MHz.*
6) *Typical start up time for the frequency range of 12.8 MHz to 25 MHz ≤330 us.*
7) *Additional pull ranges are available; please contact the factory for additional information.*
8) *Attention: To achieve optimal frequency stability, and in some cases to meet the specification stated on this data sheet, it is required that the circuit connected to this TCXO output must have the equivalent input capacitance that is specified by the nominal load capacitance. Deviations from the nominal load capacitance will have a graduated effect on the stability of approximately 20 ppb per pF load difference.*
9) *Output is AC coupled.*

Package Characteristics

Table 9.0

Package	Hermetically sealed surface mount package with metal cover.

Environmental Characteristics

Table 10.0

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:	SMD product suitable for Convection Reflow soldering. Peak temperature 260°C. Maximum time above 220°C, 60 seconds.
Solderability;	Solderability per Mil Std 883E Method 2003

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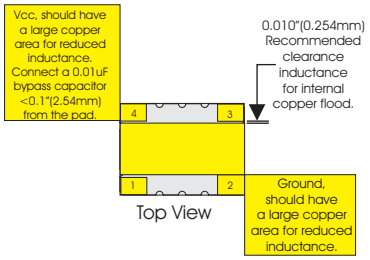
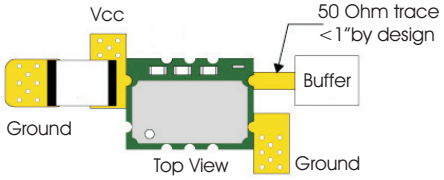
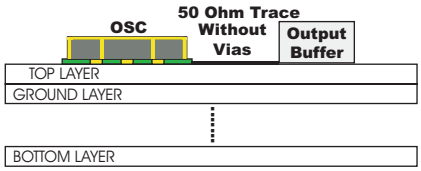
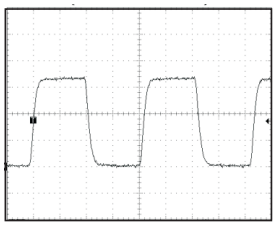
Design Recommendations



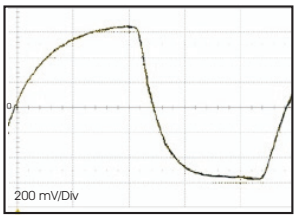




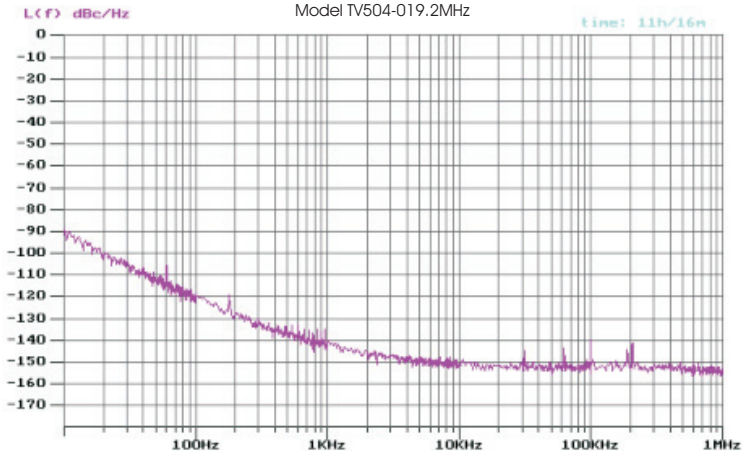
LVCMOS Output Waveform



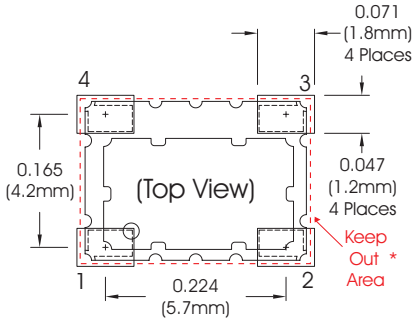
Clipped Sinewave Output Waveform



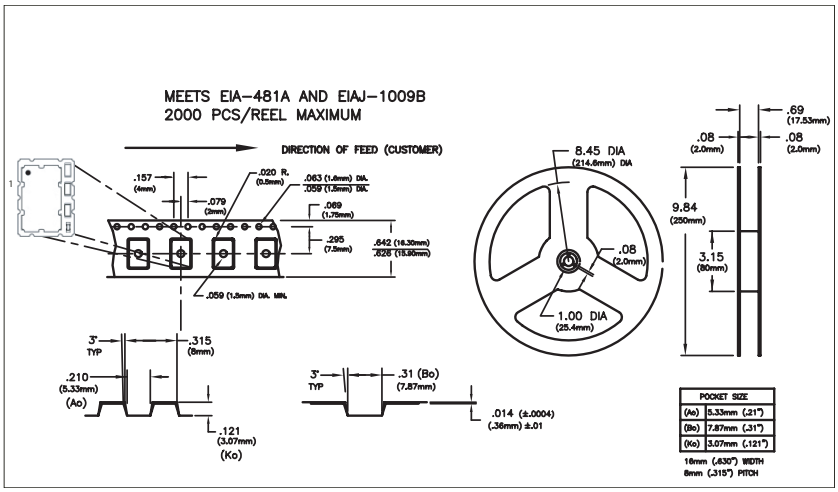
Typical Phase Noise



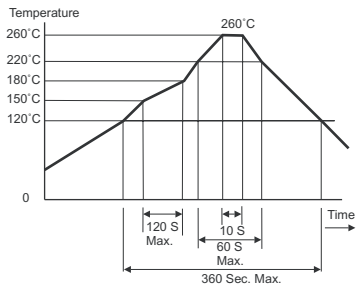
Suggested Pad Layout



Tape and Reel Specifications



Solder Profile



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