VT-501

Temperature Compensated Crystal Oscillator
Previous Vectron Model VTD3

Description

Vectron's VT-501 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, CMOS output, analog temperature compensated oscillator, operating off either a 3.3 or 5.0 volt supply in a 9.9 x 11.8mm FR4 board with nickel cover.

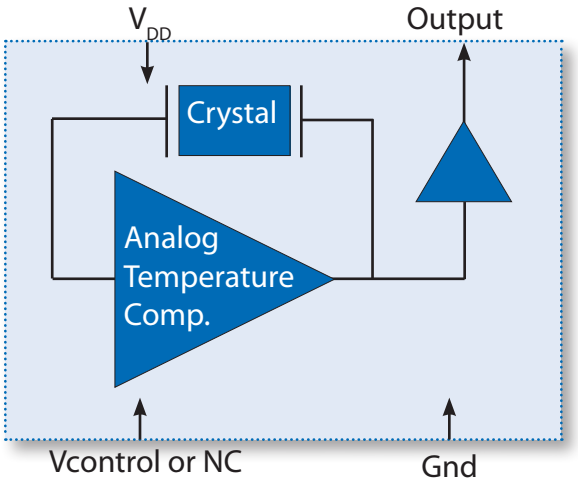
Features

- CMOS Output
- Output Frequencies to 61.440 MHz
- Fundamental Crystal Design
- Optional VCXO Function available
- Gold over nickel contact pads
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- Wireless Communications
- Base Stations
- Point to point radios
- Broadband Access
- Test Equipment

Block Diagram

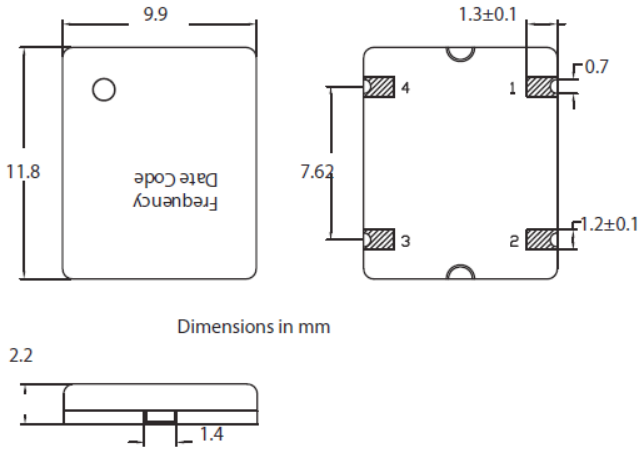


Specifications

Table 1. Electrical Performance					
Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency	f_O	8		61.440	MHz
Supply Voltage[1]	V_{DD}		+3.3 or +5.0		V
Supply Current, 8-22MHz >22MHz	I_{DD}			15 24	mA
Operating Temperature, *ordering option*	T_{OP}		0/55, -10/60, -20/70, -30/80, -40/85		°C
Stability Over T_{OP}, *ordering option*			±1.0, ±1.5, ±2.0, ±2.5, ±3.0, ±4.0, ±5.0		ppm
Initial Accuracy, "No Adjust" Option				±2.0	ppm
Power Supply Stability				±1.0	ppm
Load Stability				±0.3	ppm
Aging				±1.0	ppm/yr
Pull Range	TPR		±5, ±8, ±10, ±12, ±15		ppm
Control Voltage to reach Pull Range, 5V 3.3V option		0.5 0.3		4.5 3.0	V
Control Voltage Impedance		100			kohm
Output Level[2] Output High Output Low Output High Drive Output Low Drive	 V_{OH} V_{OL} I_{OH} I_{OL}	 0.9*V_{DD} 4		 0.1*V_{DD} -4	 V V mA mA
Output Load			15		pF
Duty Cycle				40/60	%
Phase Noise, 10.000MHz 10Hz 100Hz 1kHz 10kHz 100kHz			 -107 -138 -148 -152 -154		dBc/Hz
Start Up Time				10	ms

1. The VT-501 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
2. The Output is DC coupled
3. Duty Cycle is On Time/Period, see Figure 2. Test Circuit is shown in Figure 1.

Outline Drawing



Recommended Pad Layout

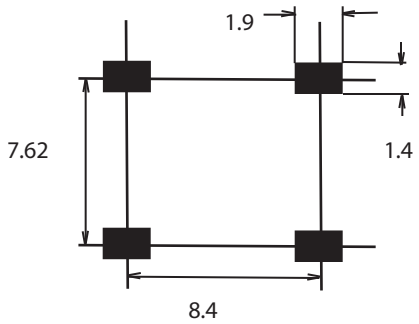


Table 2. Pinout		
Pin #	Symbol	Function
1	V_C	TCXO Control Voltage or Ground
2	GND	Electrical and Lid Ground
3	f_o	Output Frequency
4	V_{DD}	Supply Voltage

Test Circuit

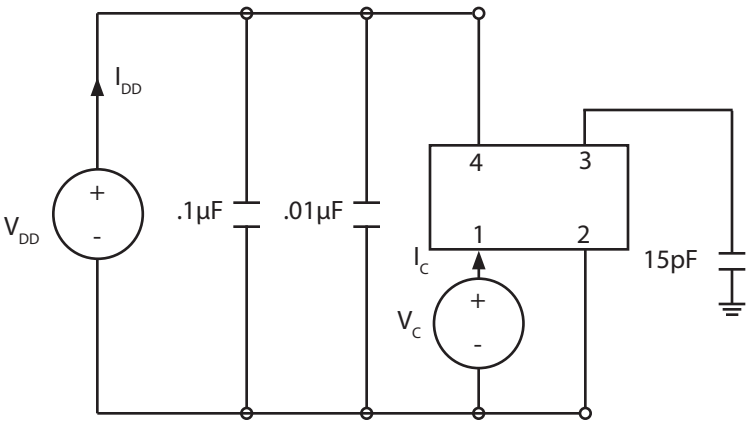


Figure 1 Test Circuit

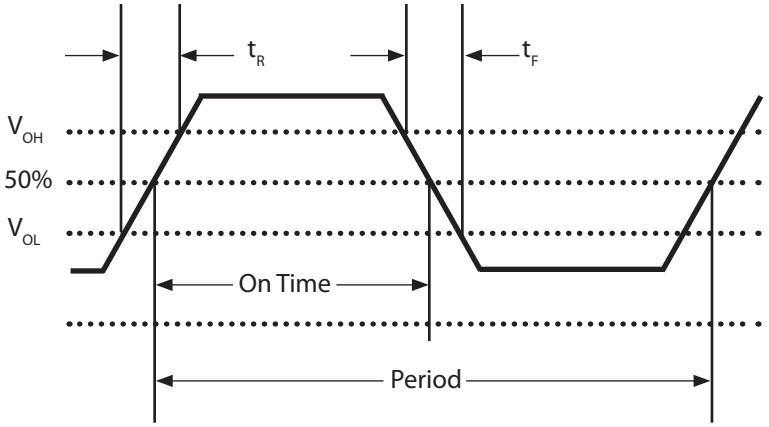


Figure 2 Duty Cycle, On Time/Period

Phase Noise and Alan Deviation Plot

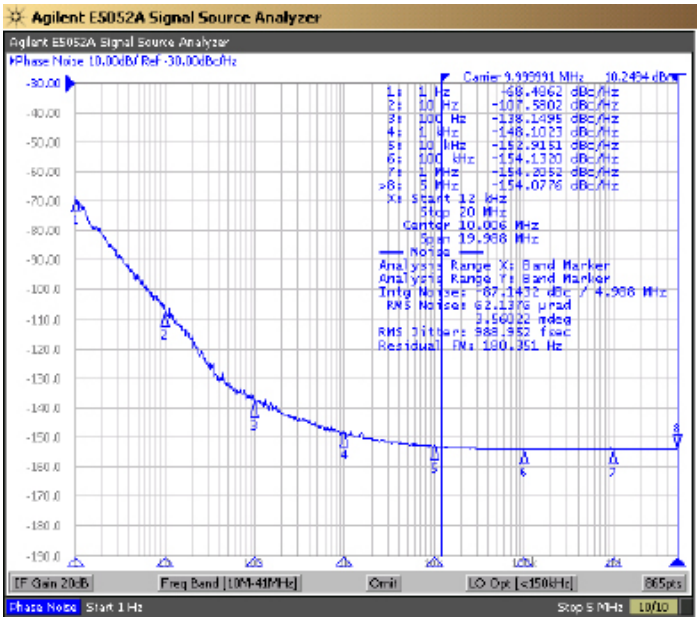


Figure 3 Phase Noise Plot for a 10.000MHz output

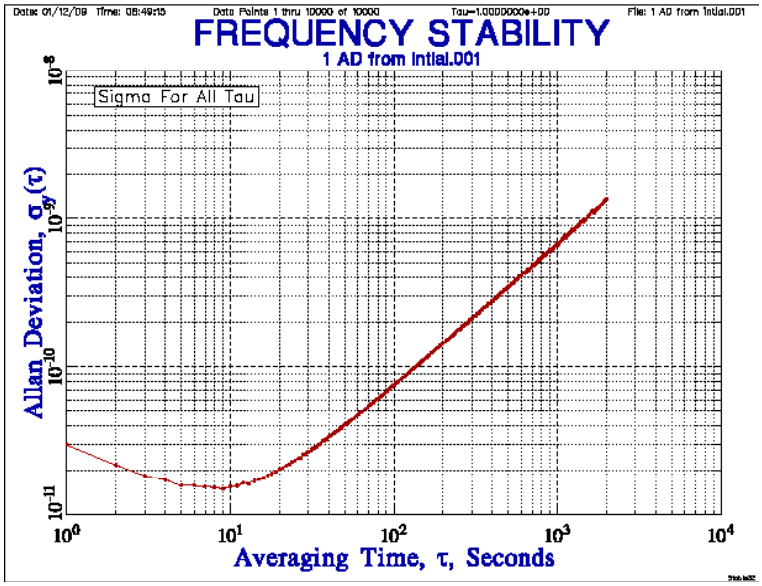


Figure 4 Alan Deviation Plot for a 10.000MHz output

VCXO Function

VCXO Feature: The VT-501 can be ordered with a VCXO function for applications were it will be used in a PLL, or the output frequency needs fine tune or calibration adjustments. This is a high impedance input , 1Mohm, and can be driven with an op-amp or terminated with adjustable resistors etc. **Pin 1 should not be left floating on the VCXO optional device.**

"No Adjust" Option: In applications were the VT-501 will not be used in a PLL , or the output frequency does not need fine tune adjustments, the best device to use would be a VT-501-xxx-xxx0. By using the "no adjust" option, the circuit is simplified as Vc does not need to be adjusted or set to a predetermined voltage and pin 1 should be grounded (pin 1 can be left open but should not be set to a voltage such as an RF signal or power supply voltage.

Maximum Ratings

Absolute Maximum Ratings and Handling Precautions

Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied or any other excess of conditions represented in the operational sections of this data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

Although ESD protection circuitry has been designed into the VT-501, proper precautions should be taken when handling and mounting, VI employs a Human Body Model and Charged Device Model for ESD susceptibility testing and design evaluation. ESD thresholds are dependent on the circuit parameters used to define the model. Although no industry standard has been adopted for the CDM a standard resistance of 1.5kOhms and capacitance of 100pF is widely used and therefor can be used for comparison purposes.

Table 3. Maximum Ratings

Parameter	Symbol	Rating	Unit
Storage Temperature	T_{STORE}	-40/85	ºC
Supply Voltage	V_{DD}	7	V
Control Voltage	V_C	0/V_{DD}	V
ESD, Human Body Model		1000	V
ESD, Charged Device Model		500	V

Table 4. Environmental Compliance

Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002
Mechanical Vibration	MIL-STD-883 Method 2007
Temperature Cycle	MIL-STD-883 Method 1010
Solderability	MIL-STD-883 Method 2003
Fine and Gross Leak	MIL-STD-883 Method 1014
Resistance to Solvents	MIL-STD-883 Method 2015
Moisture Sensitivity Level	MSL1
Contact Pads	Gold over Nickel

Suggested IR Profile

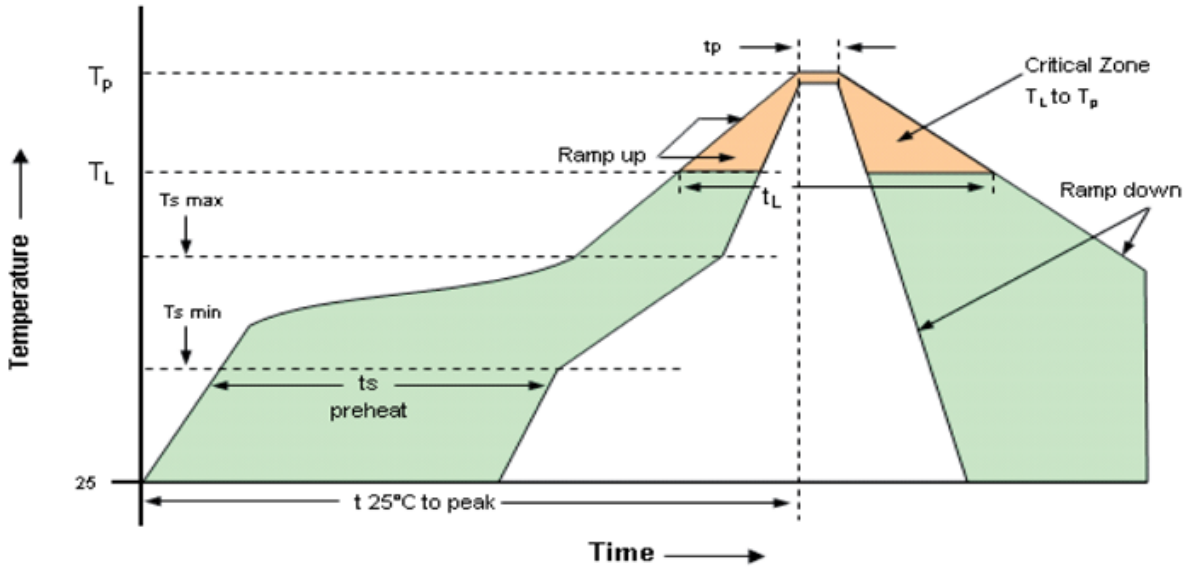
Devices are built using lead free epoxy and can be subjected to standard lead free IR reflow conditions shown in Table 5. Contact pads are gold over nickel and lower maximum temperatures can also be used, such as 220C.

Table 5. Reflow Profile

Parameter	Symbol	Value
PreHeat Time	t_s Ts-min Ts-max	200 sec Max 150°C 200°C
Ramp Up	R_{UP}	3ºC/sec Max
Time above 217C	t_L	150 sec Max
Time to Peak Temperature	$t_{25\text{-}PEAK}$	480 sec Max
Time at 260C	t_P	10 sec Max
Time at 240C	t_{P2}	60 sec Max
Ramp down	R_{DN}	6ºC/sec Max

IR Reflow

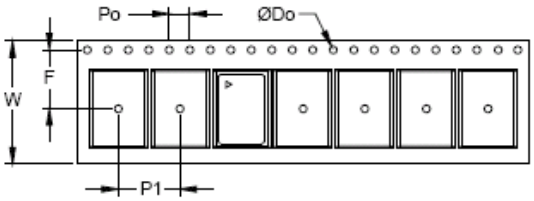
Solderprofile:

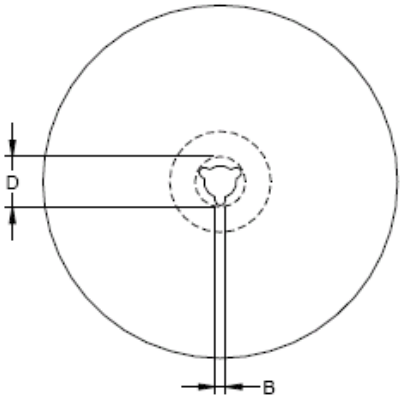


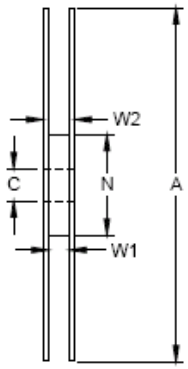
Tape & Reel

Table 6. Tape and Reel Information

Tape Dimensions (mm)					Reel Dimensions (mm)							
W	F	Do	Po	P1	A	B	C	D	N	W1	W2	#/Reel
24	11.5	1.5	4	16	330	2	13	21	80	24.4	28.4	1000 or 2000







Ordering Information

Table 7. Standard Frequencies (MHz)									
8.750	9.83040	10.000	10.230	11.000	12.28880	12.3520	12.500	12.800	13.000
14.318180	14.400	15.360	16.3840	16.800	18.4140	19.200	19.440	19.6608	19.680
20.000	21.400	24.9770	25.1658240	25.600	26.880	27.000	30.080	30.720	32.000
32.7680	37.800	38.400	44.000	44.7360	46.000	46.080	48.000	50.000	56.000
61.440									

VT-501- E A G - 206 A - xxMxxxxxx

Product
TCXO

Package
9.9x11.8 FR4

Voltage Options
D: +5.0 Vdc ±5%
E: +3.3 Vdc ±5%

Output
A: CMOS

Temp Range
R: 0 /55°C
K: -10/60°C
J: -20/70°C
G: -30/80°C
E: -40/85°C

**Note: not all combination of options are available. Other specifications may be available upon request.*

Frequency in MHz

Tuning
0: Fixed, No tuning
A: ±5ppm
B: ±8ppm
C: ±10ppm
D: ±12ppm
E ±15ppm

Stability
106: ±1ppm
156: ±1.5ppm
206: ±2.0ppm
256: ±2.5ppm
306: ±3.0ppm
356: ±3.5ppm
406: ±4.0ppm
506: ±5.0ppm

Example: VT-501-EAG-206A-19M2000000

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