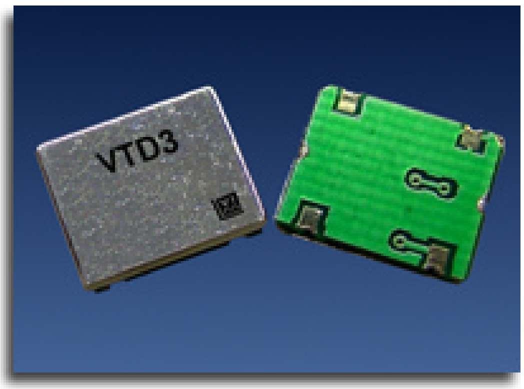
VTD3 series

Voltage Controlled Temperature Compensated Crystal Oscillator



The VTD3, VCTCXO

Features

- CMOS Output
- Output Frequencies to 60 MHz
- Fundamental Crystal Design
- Optional VCXO function available
- Product is compliant to RoHS directive

Applications

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

Description

Vectron's VTD3 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, CMOS squarewave, temperature compensated oscillator, operating off either 3.3 or 5.0 volt supply.

Performance Characteristics

Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_O	10.000		60.000	MHz
Supply Voltage		3.3V±5%, 5V±5%			
Maximum Supply Voltage				7	V_{DC}
Supply Current, Output Frequency<22MHz Output Frequency=>22MHz	I_{DD}			 15 24	 mA
Output Level [2] Logic High Logic Low Drive High Drive Low	 V_{OH} V_{OL} I_{OH} I_{OL}	 0.9*V_{DD} 4		 0.1*V_{DD} -4 	 V V mA mA
Output Load			15pf		
Duty Cycle, @ 50%				40/60	%
Control Voltage Impedance	Z_{Vc}	100			Kohm
Control Voltage to reach pull, 5V option 3.3 V option		0.5 0.3		4.5 3.0	V
Pull Range *Ordering option, see last page*	TPR	±5, ±8, ±10, ±15			ppm
Temperature Stability *Ordering option, see last page.*		±1.0 to ±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/year
Operating temperature *Ordering option, see last page*		0/55, -10/60, -20/70, -30/75, -40/85			°C
Phase Noise, 12.800MHz 10 Hz offset 100 Hz offset 1 kHz offset 10 kHz offset 100 kHz offset			 -93 -123 -147 -155 -158		dBc/Hz
Start-up time				10	ms

1. A 0.01uF and a 0.1uF capacitor should be located as close to the supply as possible (to ground) is recommended.
2. Output is DC coupled.

VCXO Functional Description

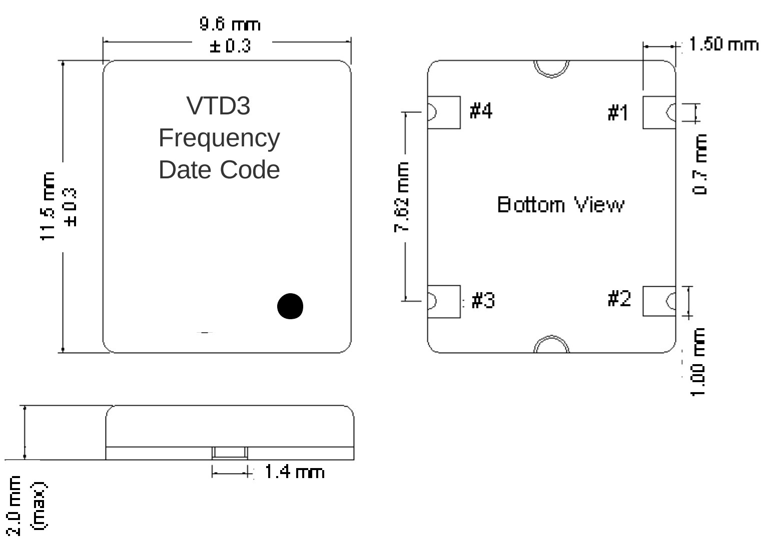
VCXO Feature: The VTD3 can be ordered with a VCXO function for applications where it will be used in a PLL, or the output frequency needs fine tune adjustments. This is high impedance input, 100 kohm, and can be driven with an op-amp or terminated with adjustable resistors etc. **Pin 1 should not be left floating** on the VCXO optional devices.

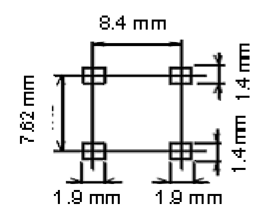
“No Adjust” Feature: In applications where the VTD3 will not be used in a PLL, or the output frequency does not need fine tune adjustments, the fixed TCXO/VTD3-x0xx is the best option. By using the “no adjust” option, the circuit is simplified as Vc does not need to adjusted or set to a predetermined voltage. Pin 1 can be grounded to reduce the risk of adding noise into the circuit.

Outline Diagrams, Pad Layout and Pin Out

Table 2. Pinout

Pin #	Symbol	Function
1	N/C *or* V_C	No Connect (VTD3-x0xx) or VCXO Control Voltage
2	GND	Electrical and Case Ground
3	f_O	Output Frequency
4	V_{DD}	Supply Voltage

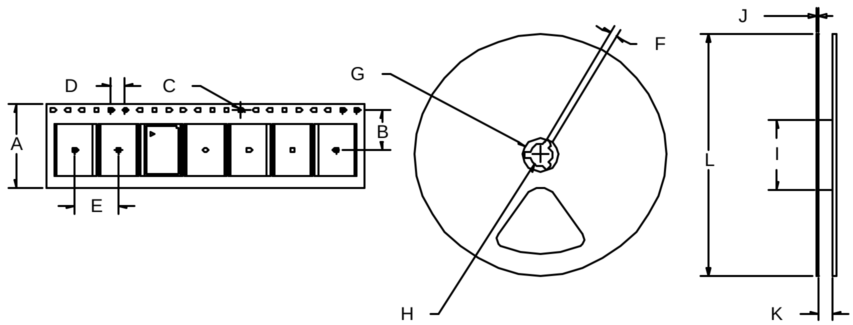




Suggested Pad Layout

Tape and Reel

Table 3. Tape and Reel Dimensions (mm)													
Tape Dimensions						Reel Dimensions							# Per
Product	A	B	C	D	E	F	G	H	I	J	K	L	Reel
VTD3	24	11.5	1.5	4	12	2	21	13	80	2	25.5	255	1K



Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied at these or any other conditions in 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.

Table 4. Absolute Maximum Ratings			
Parameter	Symbol	Ratings	Unit
Storage Temperature	Tstorage	-40/85	°C

Reliability

The VTD3 qualification tests have included:

Table 5. Environnemental Compliance	
Parameter	Conditions
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
Gross and Fine Leak	MIL-STD-883 Method 1014
Resistance to Solvents	MIL-STD-883 Method 2015

Handling Precautions

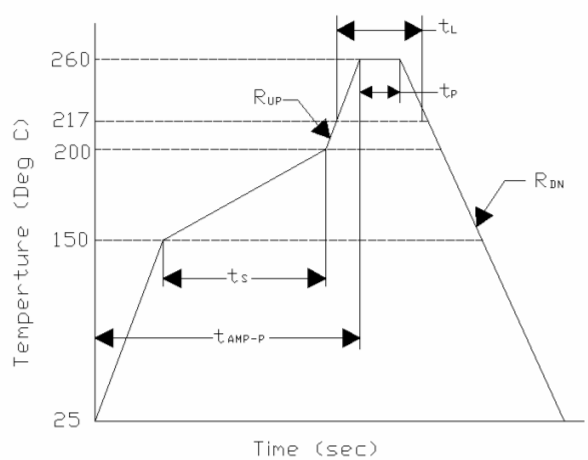
Although ESD protection circuitry has been designed into the VTD3, proper precautions should be taken when handling and mounting. VI employs a Human Body Model and a Charged-Device Model (CDM) for ESD susceptibility testing and design protection evaluation. ESD thresholds are dependent on the circuit parameters used to define the model. Although no industry wide standard has been adopted for the CDM, a standard HBM of resistance = 1.5Kohms and capacitance = 100pF is widely used and therefore can be used for comparison purposes.

Table 6. ESD Ratings		
Model	**Minimum**	**Conditions**
Human Body Model	1000	MIL-STD-883 Method 3015
Charged Device Model	500	JESD 22-C101

Suggested IR profile

Table 7 shows max temperatures and lower peak temperatures can also be used e.g. peak temperature of 230-240°C. The VTD3 should not be subjected to a wash process that will immerse it in solvents – a no clean process is recommended.

Table 7. Reflow Profile		
Parameter	**Symbol**	**Value**
PreHeat Time	t_S	60 sec Min, 180 sec Max
Ramp Up	R_{UP}	3 °C/sec Max
Time Above 217 °C	t_L	60 sec Min, 150 sec Max
Time To Peak Temperature	t_{AMB-P}	480 sec Max
Time At 260 °C (max)	t_P	6 sec Max
Time At 240 °C (max)	t_{p2}	60 sec Max
Ramp Down	R_{DN}	6 °C/sec Max



Ordering Information

Table 8. Standard Frequency List							
10.00	11.00	12.288	12.352	12.50	12.80	13.00	14.31818
14.40	15.36	16.384	16.80	19.20	19.44	19.6608	19.68
20.00	26.88	27.00	32.00	32.768	44.00	44.736	50.000

VTD3 - J 0 2 C - 10M00

Product Family

TCXO, 9.6 x 11.5

Voltage Options

H: +5.0 Vdc ±5%

J: +3.3 Vdc ±5%

Pulling Range

0: Fixed TCXO, no adjust

1: ±5ppm

2: ±8ppm

3: ±10ppm

4: ±15ppm

Output Frequency

In MHz

Temperature Options

A: 0 to 55°C

B: -10 to 60°C

C: -20 to 70°C

D: -30 to 75°C

E: -40 to 85°C

Stability Options

1: ±1.0ppm

B: ±1.5ppm

2: ±2.0ppm

C: ±2.5ppm

3: ±3.0 ppm

4: ±4.0ppm

5: ±5.0ppm

Note: Not all combinations are available

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Revision	Date	PLM Approval	Eng req'd	Engineering Approval	Date	Description
1.6	08/13/07	FB				Increase output frequency from 50MHz to 60MHz, update package marking and reel dimensions