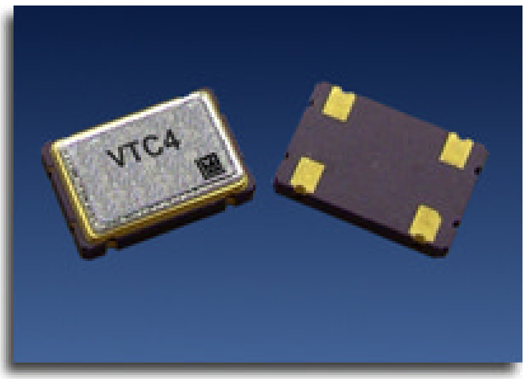
VTC4 series

Voltage Controlled Temperature Compensated Crystal Oscillator



The VTC4, VCTXCO

Features

- Clipped Sine Wave Output
- Output Frequencies to 27 MHz
- Fundamental Crystal Design
- Optional VCXO Function available
- Gold over nickel contact pads
- Hermetically Sealed Ceramic SMD package
- 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
- Handsets

Description

Vectron's VTC4 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, temperature compensated oscillator, operating off either 2.8, 3.0, 3.3 or 5.0 volt supply.

Performance Characteristics

Table 1. Electrical Performance for the Clipped Sine Wave Output Option					
Parameter	**Symbol**	**Min**	**Typical**	**Maximum**	**Units**
Frequency	f_O	10.000		27.000	MHz
Typical Supply Voltage *Ordering option, see last page*		2.8V, 3.0V, 3.3V or 5.0V			
Supply Current 10.000 MHz to < 15.000 MHz 15.000 MHz to 27.00 MHz	I_{DD}			 1.5 2.0	mA
Output Level	Vp/p	0.8			V
Output Load			10K II 10pf		
Control Voltage Impedance	Z_{Vc}	1			Mohm
Control Voltage to reach pull *All options (5.0, 3.3,3.0 and 2.8V)*		 0.5		 2.5	V
Pull Range *Ordering option, see last page*	TPR	±5, ±8, ±10, ±15 or ±20			ppm
Temperature Stability *Ordering option, see last page.*		±0.5 to ±5.0			ppm
Initial Accuracy, “No Adjust” option				±0.5	ppm
Power Supply Stability				±0.2	ppm
Load Stability				±0.2	ppm
Aging				±1.0	ppm/year
Operating temperature *Ordering option, see last page*		0/55, -10/60, -20/70, -30/80, -40/85			°C
Phase Noise, 12.800MHz 10 Hz offset 100 Hz offset 1 kHz offset 10 kHz offset 100 kHz offset 5MHz offset			 -89 -113 -137 -150 -155 -156		dBc/Hz
Start-up time				2	ms

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

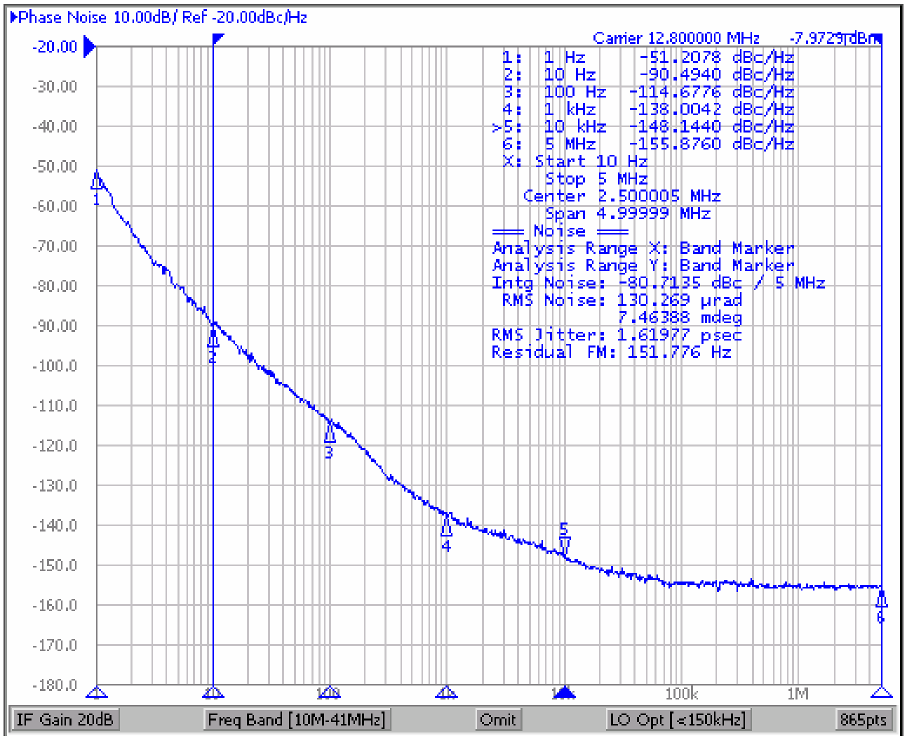


Figure 1. Typical Phase Noise Plot

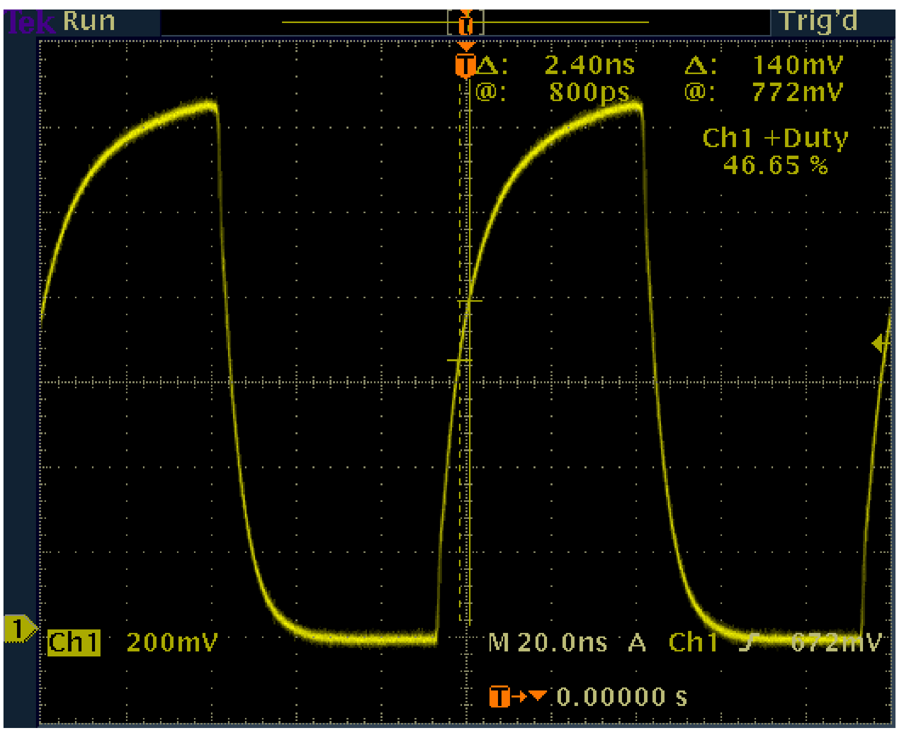


Figure 2. Clipped Sine Wave Output

VCXO Functional Description

VCXO Feature: The VTC4 can be ordered with a VCXO function for applications were it will be used in a PLL, or the output frequency needs fine tune adjustments. This is a high impedance input, 1 Mohm, 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.

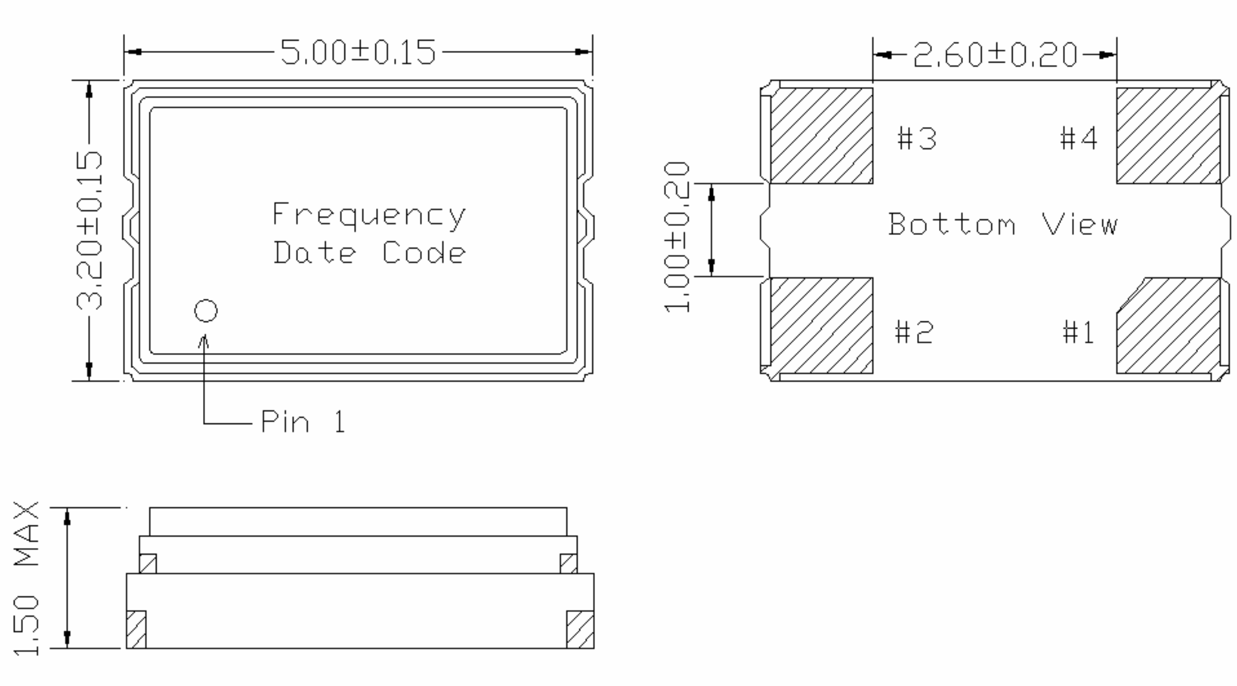
"No Adjust" Feature: In applications were the VTC4 will be not be used in a PLL, or the output frequency does not fine tune adjustments, the best device to use would be a VTC4-x0xxx. By using the "no adjust" option, the circuit is simplified as Vc does not need to adjusted or set to a predetermined voltage and **pin 1 should be grounded** (pin 1 can be left open but should not be set to a voltage such as the supply).

Outline Diagrams, Pad Layout and Pin Out

Table 2. Pinout

Pin #	Symbol	Function
1	N/C *or* V_C	No Connect (VTC4-x0xx) or VCXO Control Voltage
2	GND	Electrical and Case Ground
3	f_O	Output Frequency
4	V_{DD}	Supply Voltage

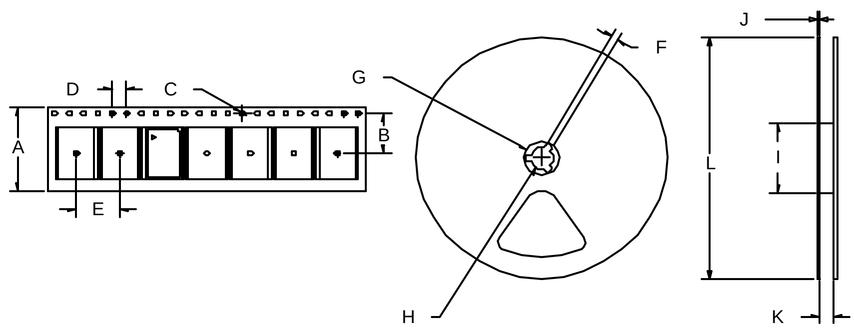
NOTE: Additional pads are used to program and adjust the TCXO during manufacturing and should be left open; do not terminate these to the supply voltage. Some designs do not include these additional pads.



Contact Pads are gold over nickel
Figure 3, Package drawing

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
VTC4	16	7.5	1.5	4	8	1.5	20.2	13	60	2	16.4	180	1000

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	-55/125	°C

Reliability

The VTC4 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 the VTC4, 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

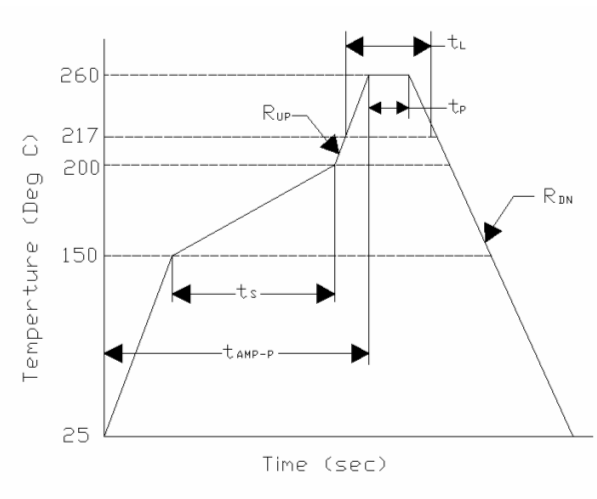
Model	Minimum	Conditions
Human Body Model	1000	MIL-STD-883 Method 3115
Charged Device Model	1500	JESD 22-C101

Suggested IR profile

Devices are built using lead free epoxy and can also be subjected to standard lead free IR reflow conditions, Table 7 shows max temperatures and lower temperatures can also be used e.g. peak temperature of 220C.

Table 7. Reflow Profile (IPC/JEDEC J-STD-020B)

Parameter	Symbol	Value
PreHeat Time	t_S	150 sec Min, 200 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	10 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							
10.000	12.504	12.800	13.000	13.568	14.000	14.31818	14.4844
14.7456	15.000	16.000	16.325291	16.367667	16.396	16.800	17.500
18.414	19.200	19.440	19.680	19.800	20.000	21.250	23.104
24.000	24.5535	25.000	25.600	27.456			

VTC4 - B 0 2 C - 12M800

Product Family

TCXO, 5x3.2

Voltage Options

A: +5.0 Vdc ±5%, Clipped Sine Output

B: +3.3 Vdc ±5%, Clipped Sine Output

C: +3.0 Vdc ±5%, Clipped Sine Output

D: +2.8 Vdc ±5%, Clipped Sine Output

Pulling Range

0: Fixed TCXO, no adjust

1: ±5ppm

2: ±8ppm

3: ±10ppm

4: ±15ppm

5: ±20ppm

Output Frequency

In MHz

Temperature Options

A: 0 to 55°C

B: -10 to 60°C

C: -20 to 70°C

D: -30 to 80°C

E: -40 to 85°C

Stability Options

A: ±0.5ppm

1: ±1.0ppm

B: ±1.5ppm

2: ±2.0ppm

C: ±2.5ppm

3: ±3.0 ppm

D: ±3.5ppm

4: ±4.0ppm

5: ±5.0ppm

Note: Not all combinations are available:

±0.5 ppm is available over 0/ 55 °C, and on a case by case basis for -10/60C.

±1.0 ppm to ±5.0 ppm is available on all temperature ranges

www.vectron.com

USA: Vectron International • 267 Lowell Road, Hudson, NH 03051
• Tel: 1-88-VECTRON-1 • Fax: 1-888-FAX-VECTRON
EUROPE: Landstrasse, D-74924, Neckarbischofsheim, Germany •
Tel: 49 (0) 7268 8010 • Fax: 49 (0) 7268 801281
ASIA: Vectron Asia Pacific Sales 1F~2F. No.8 Workshop No.308 Fenju Rd., WaiGaoQiao Free Trade Zone, Pudong New Area Shanghai, China 200131
•Tel: 8621 50480777 • Fax: 8621 50481881

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