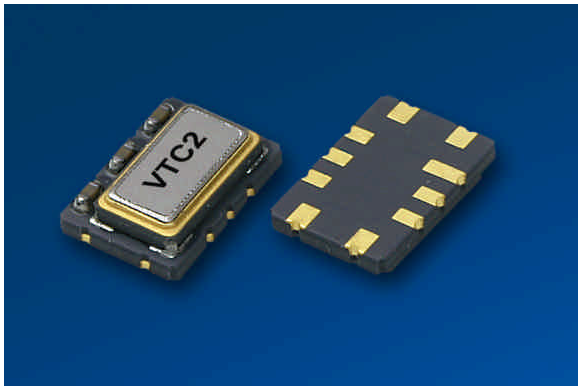
VTC2 series

Voltage Controlled Temperature Compensated Crystal Oscillator



The VTC2, VCTXCO

Features

- CMOS Square Wave Output
- Enable Disable Feature
- Output Frequencies to 30 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

- FPGA's
- A/D's
- DSL Head End
- Wireless Communications
- Base Stations
- Point to point radios
- Broadband Access
- Test Equipment

Description

Vectron's VTC2 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, CMOS squarewave, temperature compensated oscillator, operating off either 2.8, 3.0, 3.3 or 5.0 volt supply.

Performance Characteristics

Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_O	10.000		30.000	MHz
Supply Voltage		3.3V±10% or +5V ±5%			V_{DC}
Maximum Supply Voltage				6	V_{DC}
Supply Current, +3.3V	I_{DD}			10.0	mA
Output Level [2]					
Logic High	V_{OH}	0.9*V_{DD}			V
Logic Low	V_{OL}			0.1*V_{DD}	V
Drive High	I_{OH}			-4	mA
Drive Low	I_{OL}	4			mA
Output Load			15pf		
Duty Cycle, @ 50%				45/55	%
Control Voltage Impedance	Z_{Vc}	100			Kohm
Control Voltage to reach pull		0.5		2.5	V
Pull Range *Ordering option, see last page*	TPR	±5, ±8			ppm
Temperature Stability *Ordering option, see last page.*		±0.5 to ±5.0			ppm
Initial Accuracy, "No Adjust" option				±1.0	ppm
Power Supply Stability				±0.3	ppm
Load Stability				±0.2	ppm
Aging				±1.0	ppm/year
Enable/Disable[3]					V
Output Active		0.8*V_{DD}			
Output Disabled				0.2*V_{DD}	
Operating temperature *Ordering option, see last page*		0/55, -10/60, -20/70, -30/80, -40/85			°C
Phase Noise, 12.800MHz					dBc/Hz
10 Hz offset			-93		
100 Hz offset			-123		
1 kHz offset			-147		
10 kHz offset			-155		
100 kHz offset			-158		
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.
2. Output is DC coupled.
3. Output is active if E/D is open.

VCXO Functional Description

VCXO Feature: The VTC2 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 high impedance, 1 Mohm, input 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.

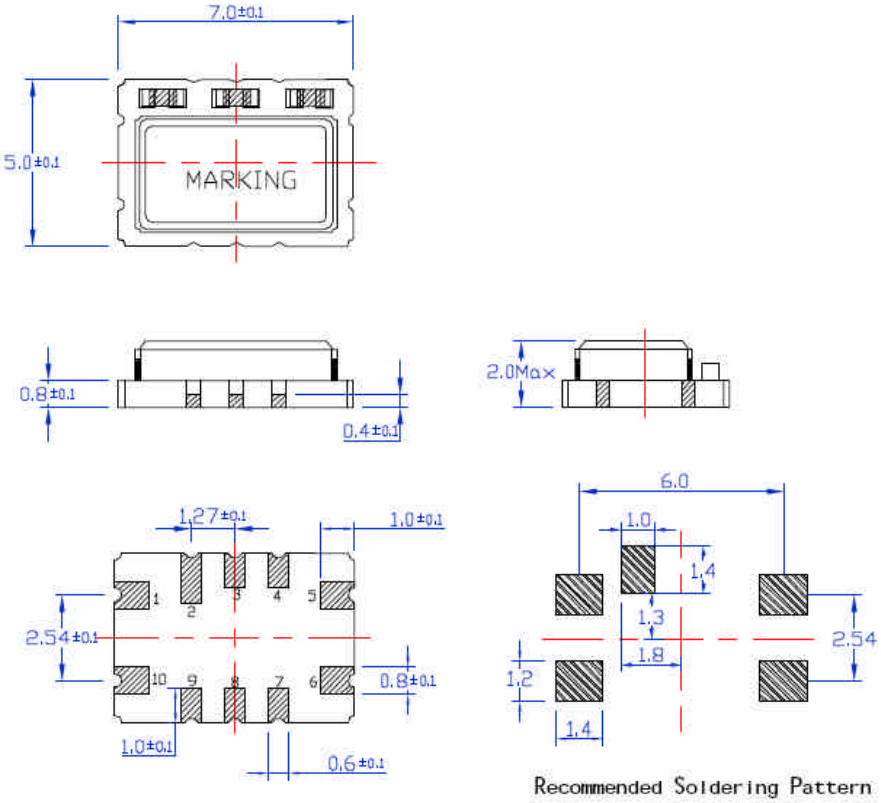
"No Adjust" Feature: In applications were the VTC2 will be not be used in a PLL, or the output frequency does not fine tune adjustments, the best device to use would be a VTC2-x0xxx. By using the "no adjust" option, the circuit is simplified as Vc does not need to adjusted or set to a predetermined voltage and **pin 1 should be grounded or left open** (but not set to a voltage such as the supply).

Outline Diagrams, Pad Layout and Pin Out

Table 2. Pinout

Pin #	Function	Pin #	Function
1	No Connect (VTC2-x0xx) or VCXO Control Voltage	10	Supply Voltage
2	Make No Connection	9	Enable/Disable
3	Make No Connection	8	Make No Connection
4	Make No Connection	7	Make No Connection
5	Electrical Ground	6	Output Frequency

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.

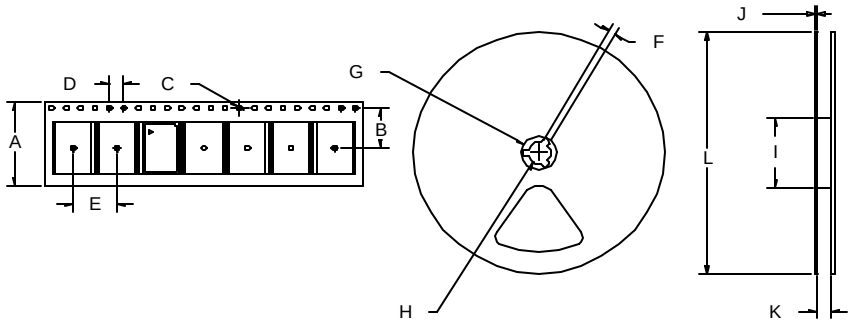


Contact Pads are gold over nickel

Figure 2, 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
VTC2	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 VTC2 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
Moisture Sensitivity Level	1
Contact Pads	Gold over Nickel

Handling Precautions

Although ESD protection circuitry has been designed into the the VTC2, 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

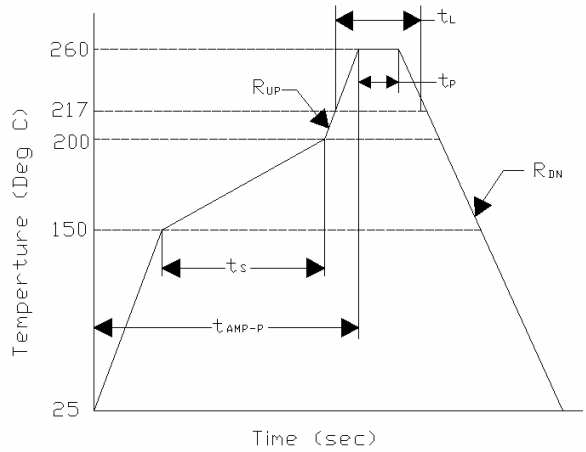
Model	Minimum	Conditions
Human Body Model	1500	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

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	12.800	16.000	18.000	19.200	20.000	24.000	25.000
26.000	27.000						

VTC2 - [J] [0] [2] [C] - [10M000]

Product Family

TCXO, 5x7

Voltage Options

H: +5.0 Vdc ±5%, CMOS Output

J: +3.3 Vdc ±10%, CMOS Output

Pulling Range

0: Fixed TCXO, no adjust

1: ±5ppm

2: ±8ppm

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 to 55 °C only

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

VECTRON INTERNATIONAL A DOVER COMPANY

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

March 26, 2007