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VT-820

## Description

Vectron's VT-820 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, analog temperature compensated oscillator, operating off either 1.8, 2.8, 3.0 or 3.3 volt supply in a hermetically sealed 3.2x2.5mm ceramic package.

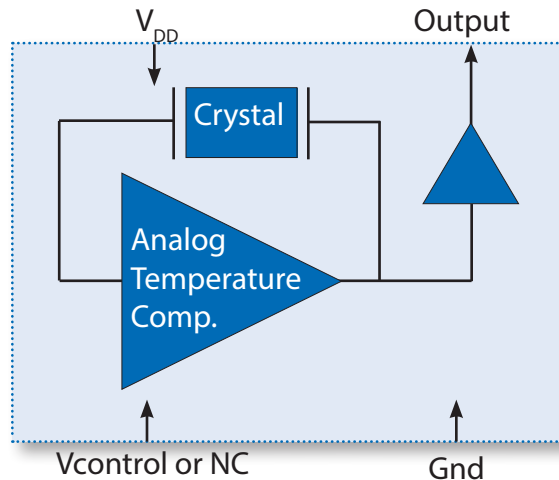
## Features

- **±0.5ppm Temperature Stability**
- Clipped Sine Wave Output
- Output Frequencies to 45 MHz
- Fundamental Crystal Design
- Optional VCXO Function available
- Hermetically Sealed Ceramic SMD package
- Product is compliant to RoHS directive  and fully compatible with lead free assembly

## Applications

- GPS
- WiMAX, Wi-Fi, Wi-LAN
- Seismic Exploration
- Wireless Communications
- Base Stations
- Point to point radios
- Broadband Access
- Test Equipment
- Handsets

## Block Diagram



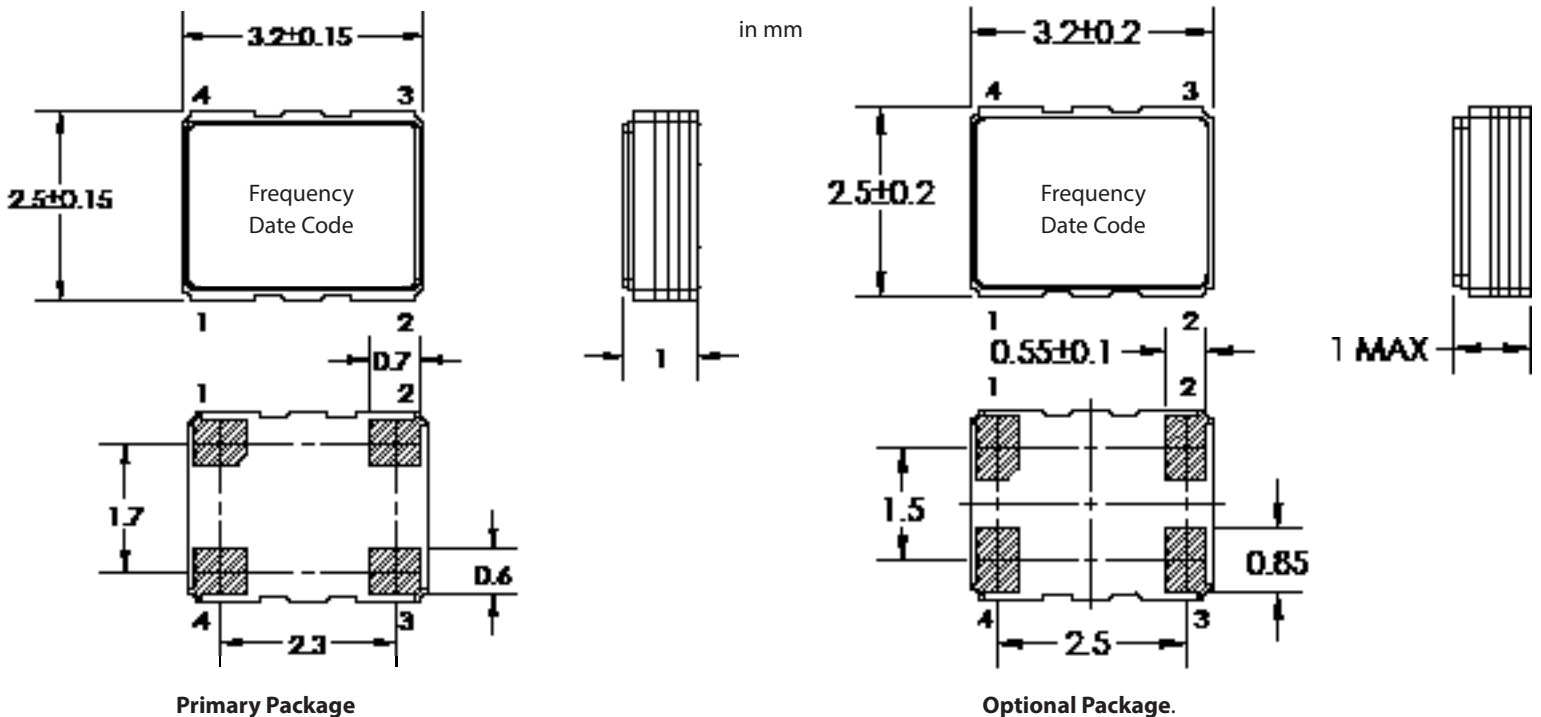
# Specifications

**Table 1. Electrical Performance**

Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency	$f_o$	8		45	MHz
Supply Voltage, <sup>1</sup> (Ordering Option)	$V_{DD}$	+1.8, 2.8, +3.0 or +3.3			V
Supply Current, 8 to 19.999MHz 20.000 to 31.9999MHz 32.000 to 45.000MHz	$I_{DD}$			1.5 2.0 2.5	mA
Operating Temperature, (Ordering Option)	$T_{OP}$	0/55, -10/60, -20/70, -30/80, -30/85, -40/85			°C
Stability Over $T_{OP}$ , (Ordering Option)		$\pm 0.5, \pm 1.0, \pm 1.5, \pm 2.0, \pm 2.5, \pm 3.0, \pm 3.5 \pm 4.0, \pm 5.0$			ppm
Initial Accuracy <sup>2</sup> , "No Adjust" Option				$\pm 1.0$	ppm
Power Supply Stability, $\pm 5\%$ change				$\pm 0.2$	ppm
Load Stability				$\pm 0.2$	ppm
Aging				$\pm 1.0$	ppm/yr
Pull Range, (Ordering Option)	TPR	$\pm 5, \pm 8, \pm 10, \pm 12, \pm 15$			ppm
Control Voltage to reach Pull Range 1.8V option		0.5 0.3		2.5 1.5	V V
Control Voltage Impedance		500			Kohm
Output Level <sup>3</sup>	$V_o$ p/p	0.8			V
Output Load				10K    10pF	
Phase Noise, 10.000MHz 10Hz 100Hz 1kHz 10kHz 100kHz			-91 -116 -137 -149 -150		dBc/Hz
Start Up Time				2	ms

1. The VT-820 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor.
2. Initial Accuracy is before IR reflow. Allow another 1ppm shift through 2 reflows and 24 hours.
3. The Output is DC coupled.

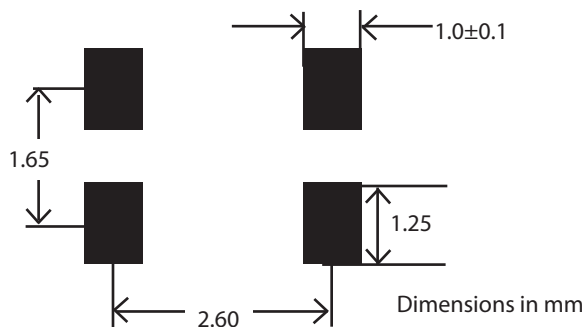
## Outline Drawing



## Pinout and 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



## VCXO Function

**VCXO Feature:** The VT-820 can be ordered with a VCXO function for applications where it will be used in a PLL, or the output frequency needs fine tune or calibration adjustments. This is a high impedance input, 500KOhm, 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 where the VT-820 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-820-xxx-xxx0. By using the “no adjust” option, the circuit is simplified as  $V_C$  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-820, 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 therefore can be used for comparison purposes.

**Table 3. Maximum Ratings**

Parameter	Symbol	Rating	Unit
Storage Temperature	$T_{STORE}$	-40/85	°C
Supply Voltage	$V_{DD}$	6	V
Control Voltage	$V_C$	0/ $V_{DD}$	V
ESD, Human Body Model		1000	V
ESD, Charged Device Model		1000	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

# IR Compliance

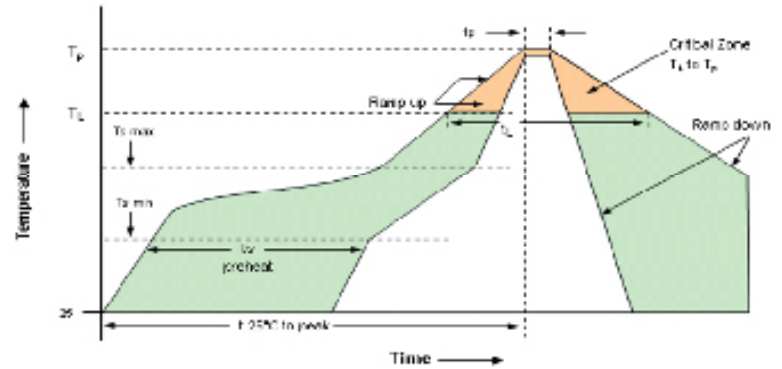
## Suggested IR Profile

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	$t_s$	200 sec Max
Ramp Up	$R_{UP}$	3°C/sec Max
Time above 217°C	$t_L$	150 sec Max
Time to Peak Temperature	$t_{AMB-P}$	480 sec Max
Time at 260°C	$t_P$	30 sec Max
Time at 240°C	$t_{P2}$	60 sec Max
Ramp down	$R_{DN}$	6°C/sec Max

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
18	1.75	1.55	4	4	178	2.5	13	22	60	11.5	15	1000

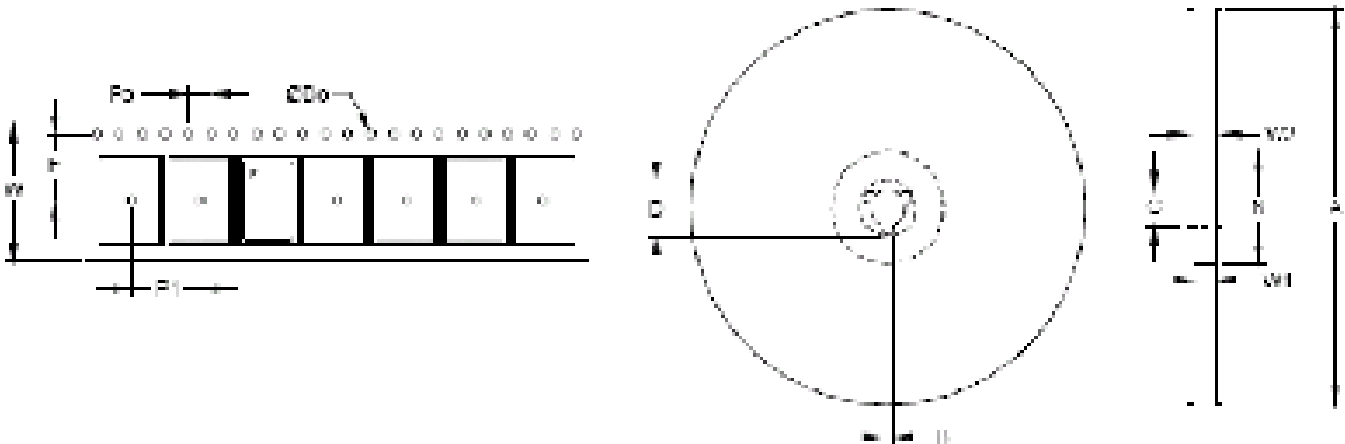
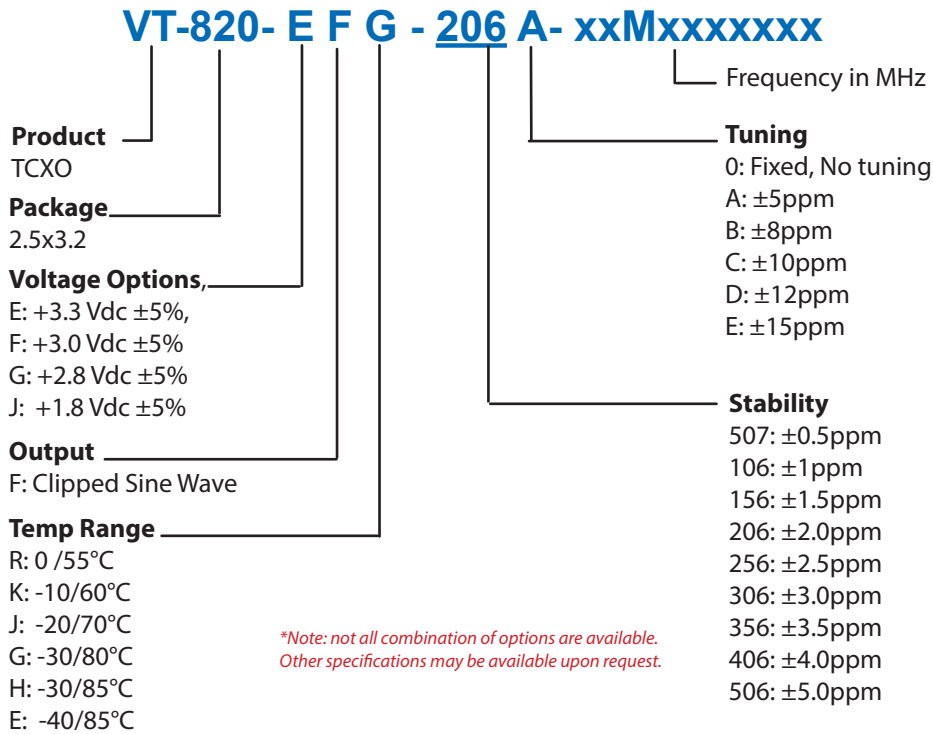


Table 7. Standard Frequencies (MHz)

8.1920	10.000	10.250	12.000	12.800	13.000	13.568	14.000	14.7456	15.360
15.000	16.000	16.3670	16.366667	16.367667	16.367673	16.368	16.369	16.736	16.800
19.200	19.392658	19.440	19.6608	19.680	20.000	20.7360	22.000	23.104	24.5535
25.000	26.000	27.000	27.4560	30.150	30.400	30.720	31.7967590	37.800	38.400
39.000	40.000	41.4720	45.000						

## Ordering Information



**Example: VT-820-EFG-206A-19M200000**

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Rev: 01/17/17

Revision Date	Description
10/21/2009	Add J=1.8V option, Vc=0.3 1.6V for 1.5Voption in table 1
8/08/2013	Removed 6pd package version (non-standard). Added two 4-pd package versions.
10/29/2013	Updated VI Asia Contact Information
02/11/2014	Updated new Vectron Logo and Hudson Address
01/17/2017	Updated IR Reflow Profile