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### Description

Vectron's VT-490 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, analog temperature compensated oscillator, operating off either 3.0 or 5.0 volt supply built on a 9.9x11.8 FR4 board with a cover.

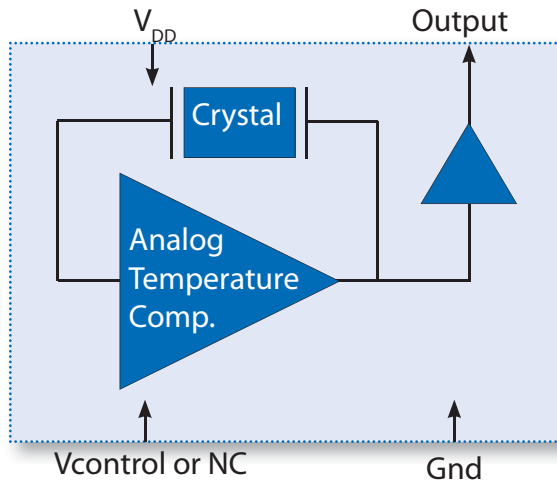
### Features

- Clipped Sine Wave Output
- Output Frequencies to 40 MHz
- Fundamental Crystal Design
- Optional VCXO Function available
- Gold over nickel contact pads
- 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

### Block Diagram



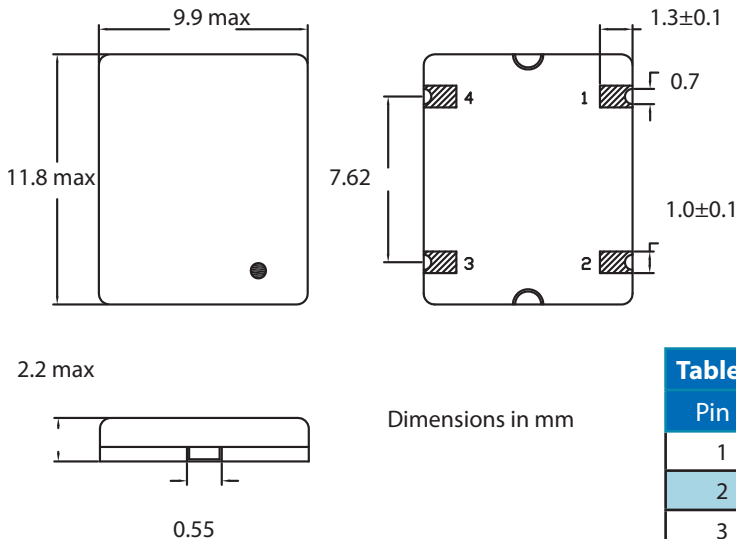
# Performance Specifications

**Table 1. Electrical Performance**

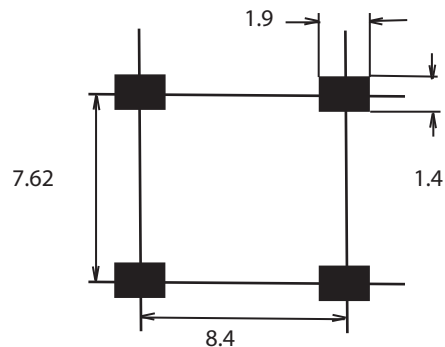
Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency	$f_o$	10		40	MHz
Supply Voltage <sup>1</sup>	$V_{DD}$	+3.0 or +5.0			V
Supply Current, 8-16.800MHz 16.801-25.9999MHz 26.000-40.000MHz	$I_{DD}$			2.0 3.0 4.0	mA
Operating Temperature, (Ordering Option)	$T_{OP}$	-20/70, -30/80, -40/85			°C
Stability Over $T_{OP}$ (Ordering Option)		±1.5, ±2.0, ±2.5, ±5.0			ppm
Initial Accuracy, "No Adjust" Option				±1.0	ppm
Power Supply Stability, 10-16.800MHz 16.801-25.9999MHz 26.000-40.000MHz				±0.3 ±0.5 ±1.0	ppm
Load Stability				±0.5	ppm
Aging				±1	ppm/yr
Pull Range, <sup>3</sup> Mechanical Trim Only Electrical and Mechanical Trim Electrical Trim only	TPR	±8 ±5 ±8			ppm
Control Voltage to reach Pull Range, 5V 3.0V option		0.5 0.5		4.5 2.5	V
Control Voltage Impedance		100			Kohm
Output Level <sup>2</sup> , 5V option 3.0V option	$V_o$ p/p	1.0 0.7			V
Output Load				10K II 10pF	
Phase Noise, 10.000MHz 10Hz 100Hz 1kHz 10kHz 100kHz			-100 -123 -133 -143 -151		dBc/Hz
Start Up Time				10	ms

1. The OSC power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
2. The Output is AC coupled
3. A special trim tool, KMTZ04, should be used to adjust the frequency

## Outline Drawing



## Recommended Pad Layout



**Table 2. Pinout**

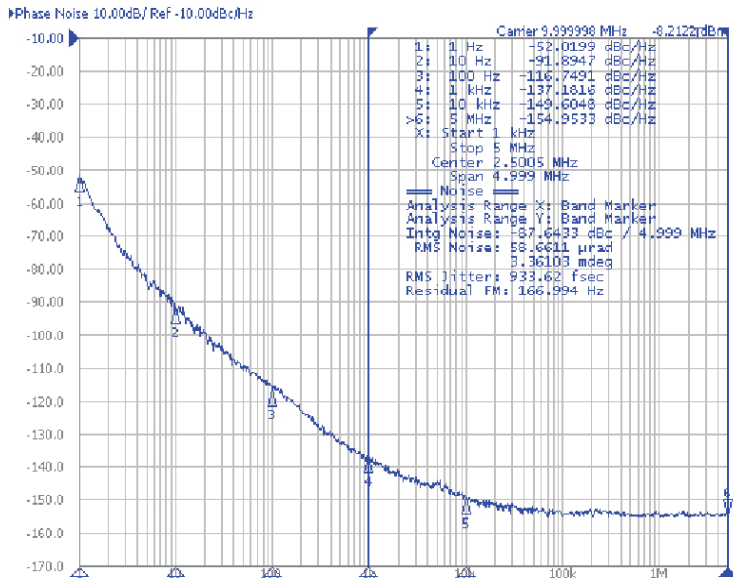
Pin #	Symbol	Function
1	$V_c$	TCXO Control Voltage or Ground
2	GND	Electrical and Lid Ground
3	$f_o$	Output Frequency
4	$V_{DD}$	Supply Voltage

## VCXO Function

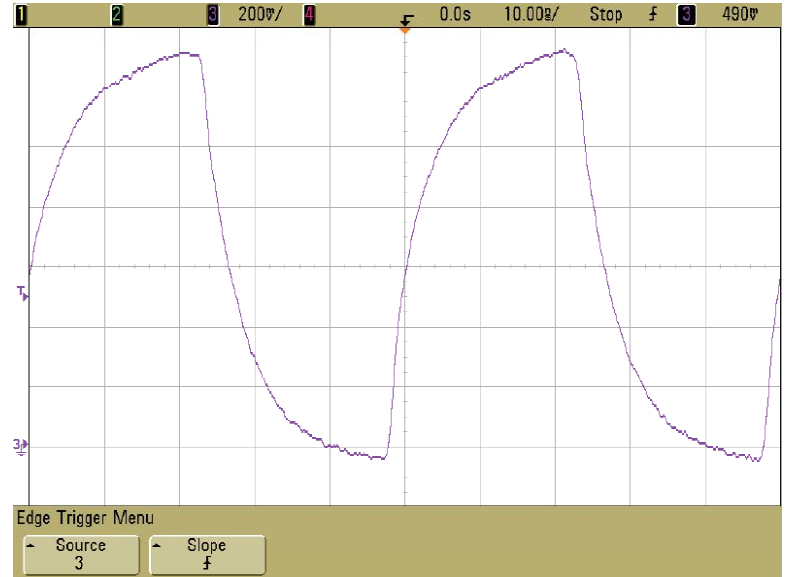
**VCXO Feature:** The VT-490 can be ordered with a VCXO function for applications where it will be used in a PLL, or the output frequency needs fine tune or calibration adjustments. This is a high impedance input, 1Mohm, and can be driven with an op-amp or terminated with adjustable resistors etc. **Pin 1 should not be left floating on the VCXO optional device.**

**“No Adjust” Option:** In applications where the VT-490 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-490-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).

## Phase Noise



## Output Waveform



## 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-490, 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.

Parameter	Symbol	Rating	Unit
Storage Temperature	$T_{STORE}$	-55/125	$^{\circ}$ C
Supply Voltage	$V_{DD}$	6	V
Control Voltage	$V_C$	0/ $V_{DD}$	V
ESD, Human Body Model		1500	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

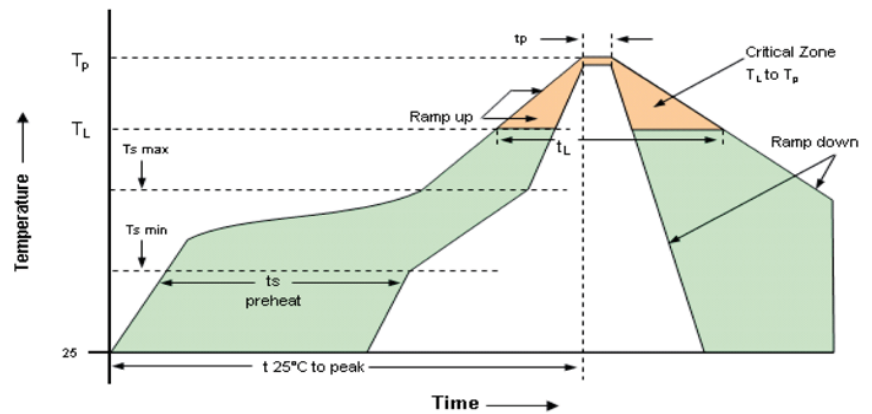
## IR Reflow

### 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
Ts-min		150°C
Ts-max		200°C
Ramp Up	$R_{UP}$	3°C/sec Max
Time above 217C	$t_L$	150 sec Max
Time to Peak Temperature	$t_{25C\ to\ peak}$	480 sec Max
Time at 260C	$t_p$	10 sec Max
Time at 240C	$t_{p2}$	60 sec Max
Ramp down	$R_{DN}$	6°C/sec Max

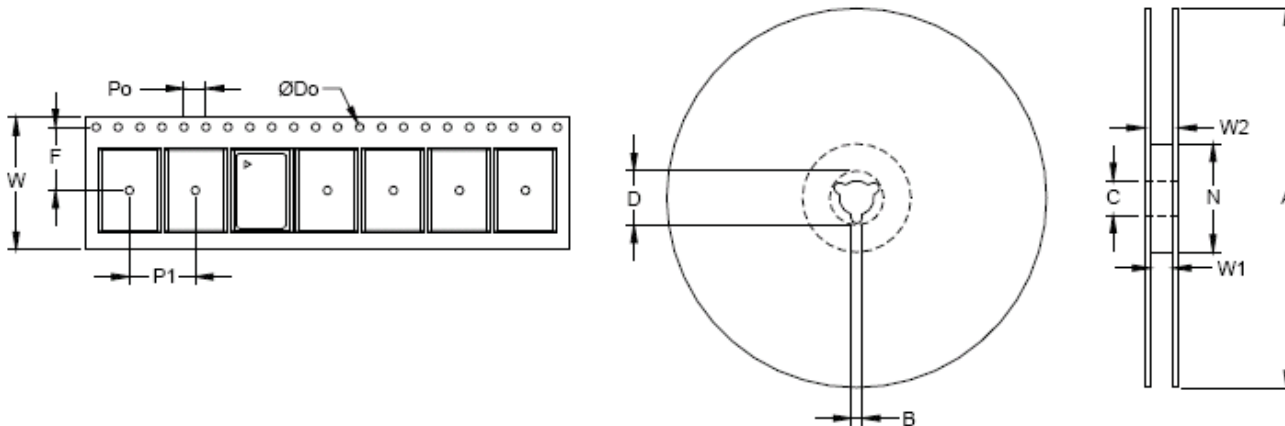
### Solderprofile:



## Tape and Reel Information

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
16	7.5	1.5	4	8	180	1.5	13	20.2	60	16.4	20.4	1000

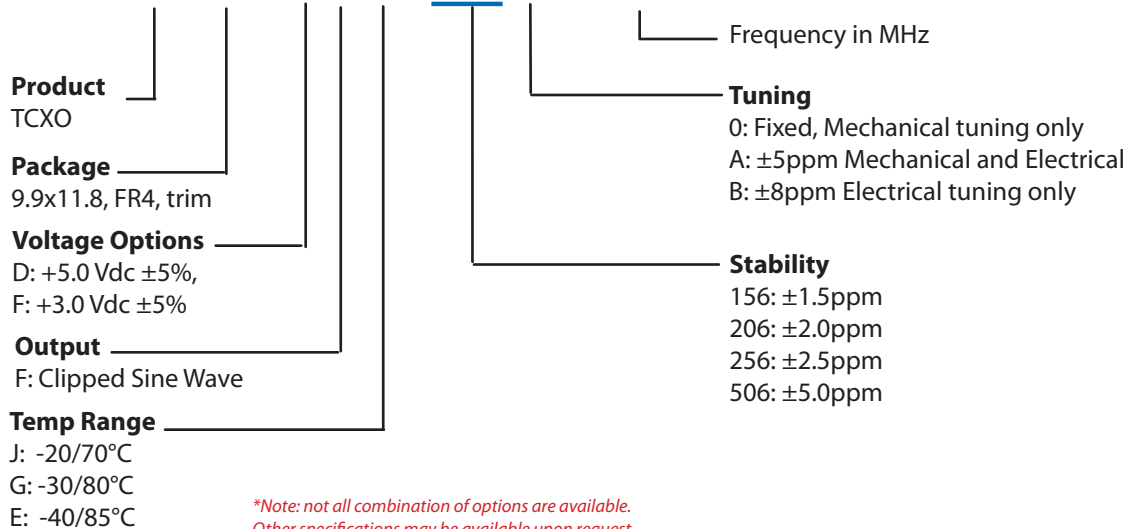


**Table 7. Standard Frequencies (MHz)**

10.000	10.245	12.504	12.800	13.000	13.568	14.000	14.31818	14.4844	14.7456
15.000	16.000	16.325291	16.36625	16.367667	16.3683	16.396	16.800	17.500	18.414
19.200	19.440	19.6608	19.680	19.800	20.000	20.910	21.250	23.104	24.000
24.5454	24.5535	24.576	25.000	25.600	26.000	27.000	27.456	28.800	32.768
40.000									

## Ordering Information

### VT- 490- F F J - 206 A- xxMxxxxxxxxx



**Example: VT-490-FFJ-206A-19M2000000**

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