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VT-841

## Description

Vectron's VT-841 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, analog temperature compensated oscillator, operating off a 1.8, 2.5, 2.8, 3.0, 3.3 volt supply in a hermetically sealed 2.5x2.0mm 4-pad ceramic package.

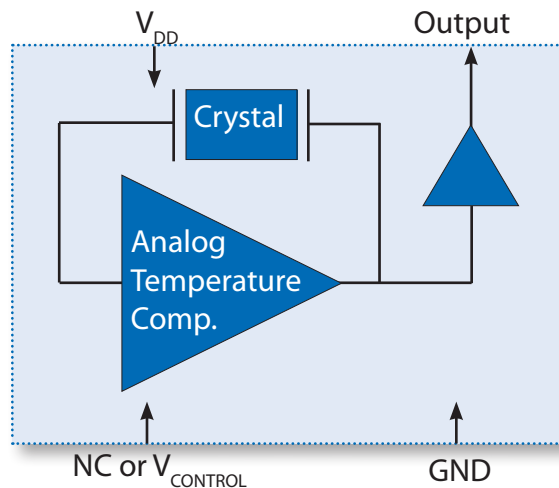
## Features

- Output Frequencies to 52MHz
- $\pm 0.5$ ppm Temperature Stability
- 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
- Global Positioning Systems
- Base Stations
- Point to Point Radio
- Broadband Access
- Test Equipments

## Block Diagram

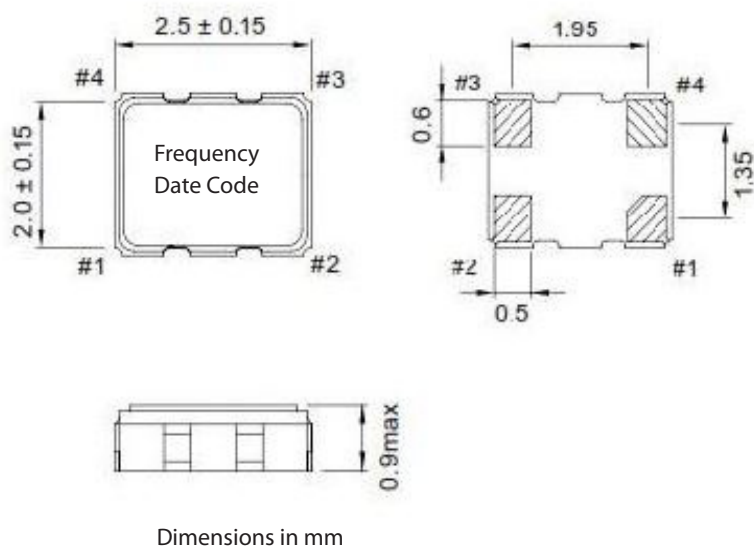


## Specifications

Table 1. Electrical Performance					
Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency <sup>1</sup> , <i>Ordering Option</i>	$f_o$	10.000		52.000	MHz
Supply Voltage <sup>2</sup> , <i>Ordering Option</i>	$V_{DD}$	1.8, 2.5, 2.8, 3.0, 3.3			V
Supply Current 10.000MHz to 26.000MHz 26.001MHz to 52.000MHz	$I_{DD}$			2.0 2.5	mA
Operating Temperature, <i>Ordering Option</i>	$T_{OP}$	0/55, -20/70, -30/85, -40/85			°C
Frequency Stability					
Stability Over $T_{OP}$ <sup>3</sup> , <i>Ordering Option</i>	$F_{STAB}$	$\pm 0.5, \pm 1.0, \pm 1.5, \pm 2.0, \pm 2.5$			ppm
Initial Accuracy <sup>4</sup>				$\pm 1.0$	ppm
Power Supply Stability, $\pm 5\%$ change				$\pm 0.2$	ppm
Load Stability				$\pm 0.2$	ppm
Aging				$\pm 1.0$	ppm/yr
Frequency Tuning (EFC), <i>Ordering Option</i>					
Tuning Range <sup>5</sup>	PR	$\pm 5.0, \pm 8.0, \pm 10.0, \pm 12.0$			ppm
Tuning Slope		Positive			
Control Voltage to reach Pull Range 1.8V Supply Voltage Option 2.5V, 2.8V, 3.0V, 3.3V Supply Voltage Option	$V_C$	0.3 0.5	0.9 1.5	1.5 2.5	V
Control Voltage Impedance		500			KOhm
RF Output (Clipped Sine Wave), <i>Ordering Option</i>					
Output Level <sup>6</sup>	$V_o$ p/p	0.8			V
Output Load				10K    10pF	
Start Up Time				2	ms
Phase Noise <sup>7</sup>					
Phase Noise, 19.2MHz 10Hz 100Hz 1kHz 10kHz			-91 -115 -135 -148		dBc/Hz

1. Refer to Table for Standard Frequencies. Other frequencies are available on request. Check with factory.
2. The VT-841 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
3. Referenced to the mid point between minimum and maximum frequency value over  $T_{OP}$
4. Initial Accuracy is before IR reflow. Allow an additional 1ppm shift through 2 reflows and 24 hours.
5. Referenced to Mid Control Voltage.
6. Output DC-cut capacitor is optional.
7. Measured at ambient temperature using Agilent E5052B Signal Source Analyzer.

## Outline Drawing



## Recommended Pad Layout

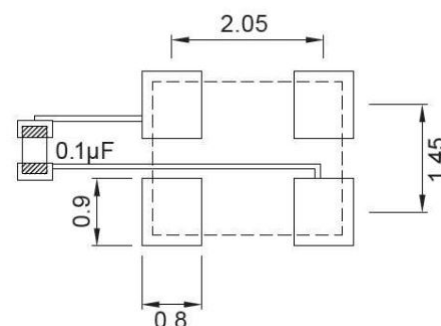


Table 2. Pinout

Pin #	Function
1	TCXO Control Voltage or No Connect
2	Electrical and case ground
3	Output Frequency
4	Supply Voltage

## VCXO Function

**VCXO Feature:** The VT-841 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.**

In Applications where the VT-841 output frequency do not need fine tune adjustments, Pin 1 can be grounded or left open as a "No Connect". It 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-841, 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	$T_{STORE}$	-55/125	°C
Supply Voltage	$V_{DD}$	-0.6 to 6.0	V
Control Voltage	$V_C$	0/ $V_{DD}$	V
ESD, Human Body Model	HBM	1500	V
ESD, Charged Device Model	CDM	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

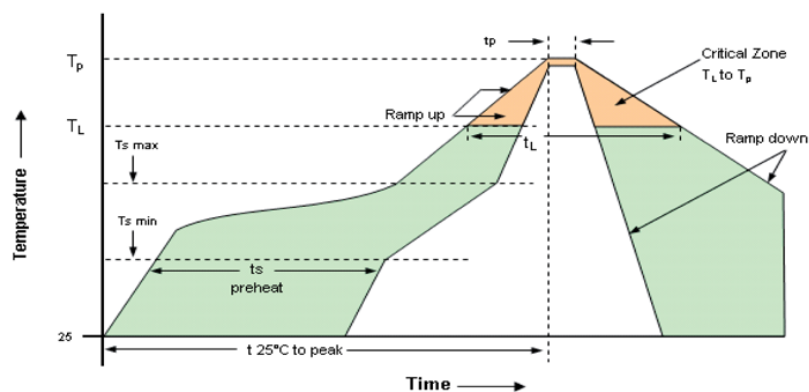
## IR Reflow

### 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	$t_p$	30 sec Max
Time at 240C	$t_{p2}$	60 sec Max
Ramp down	$R_{DN}$	6°C/sec Max

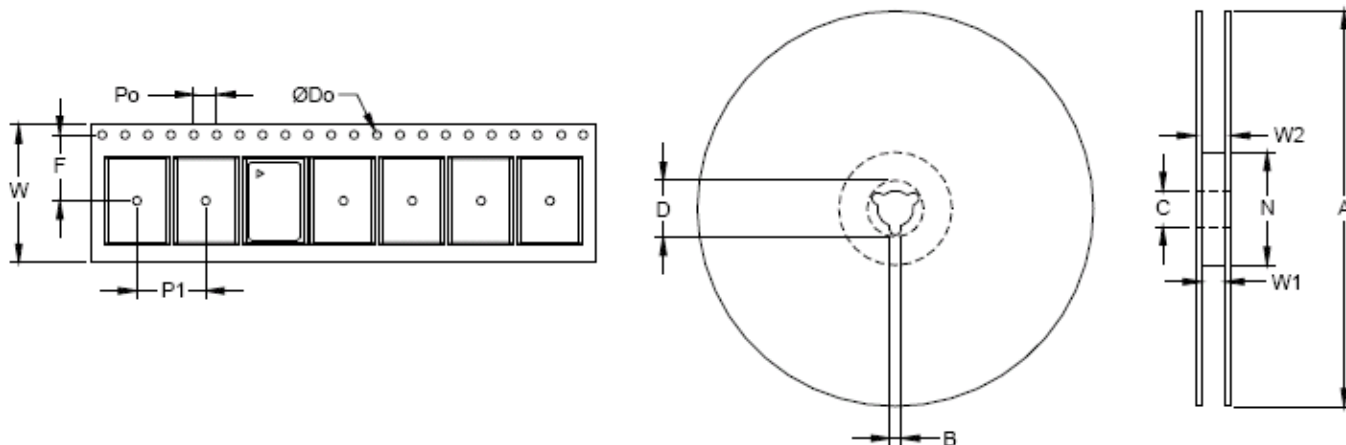
Solderprofile:



## 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
8.0	3.5	1.5	4.0	4.0	180	2.0	13.0	21.0	60.0	9.0	11.4	1000



## Ordering Information

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

10.000	12.8000	16.368	16.369	16.384	19.200	20.000	24.000	25.000	26.000
30.000	32.000	38.400	40.000	45.000	50.000	52.000			

Note: Other Frequencies are available on request.

VT-841- E F J - 5070- xxMxxxxxxxx

**Product** — TCXO

**Package** — 2.0x2.5 Ceramic 4-pads

**Voltage Options** —  
 E: +3.3 Vdc ±10%  
 F: +3.0 Vdc ±10%  
 G: +2.8 Vdc ±10%  
 H: +2.5 Vdc ±10%  
 J: +1.8 Vdc ±10%

**Output** —  
 F: Clipped Sine Wave

**Temp Range** —  
 R: 0/55°C  
 J: -20/70°C  
 H: -30/85°C  
 E: -40/85°C

Frequency in MHz

**Tuning**  
 0: Fixed, No tuning  
 A: ±5ppm  
 B: ±8ppm  
 C: ±10ppm  
 D: ±12ppm

**Stability**  
 507: ±0.5ppm  
 106: ±1.0ppm  
 156: ±1.5ppm  
 206: ±2.0ppm  
 256: ±2.5ppm

\*Note: not all combination of options are available.  
 Other specifications may be available upon request.

Example: VT-841-EFJ-5070-26M0000000

Table 8. Capability Chart					
	±0.5ppm	±1.0ppm	±1.5ppm	±2.0ppm	±2.5ppm
0/55°C	●	●	●	●	●
-20/70°C	●	●	●	●	●
-30/85°C	●	●	●	●	●
-40/85°C	●	●	●	●	●

- = Can be provided.
- = Under development. Please consult with factory.

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## Revision History

Revision Date	Approved	Description
Aug 13, 2014	VN	VT-841 Product Initial Release
Jan 17, 2017	VN	Updated Reflow Profile (Table 5) to show 30s maximum for time at 260C