VT-841

Temperature Compensated Crystal Oscillator

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.

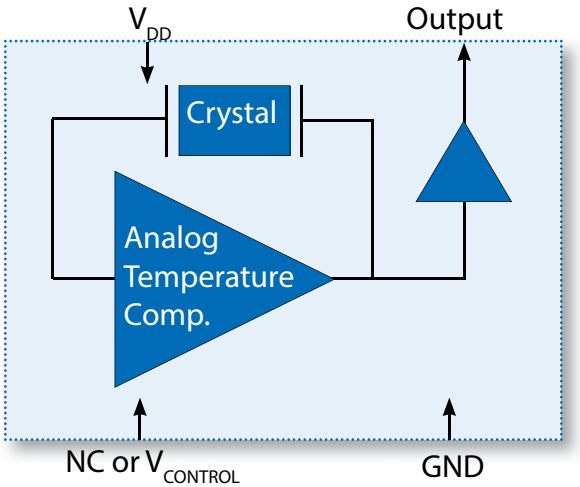
Features

- Output Frequencies to 52MHz
- ±0.5ppm 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



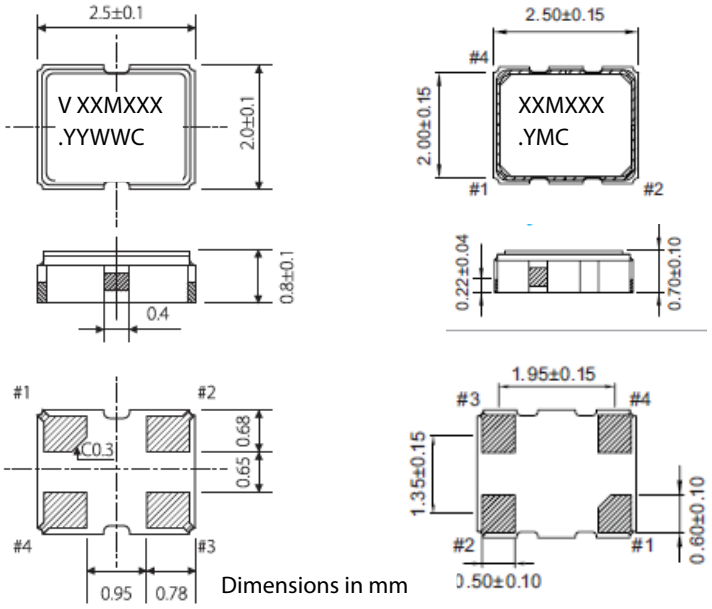
Specifications

Table 1. Electrical Performance

Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency[1], *Ordering Option*	f_O	10.000		52.000	MHz
Supply Voltage[2], *Ordering Option*	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, *Ordering Option*	T_{OP}	-20/70, -40/85			°C
Frequency Stability					
Stability Over T_{OP}[3], *Ordering Option*	F_{STAB}	±0.5, ±1.0, ±1.5, ±2.0, ±2.5			ppm
Initial Accuracy[4]				±1.0	ppm
Power Supply Stability, ±5% change				±0.2	ppm
Load Stability				±0.2	ppm
Aging				±1.0	ppm/yr
Frequency Tuning (EFC), *Ordering Option*					
Tuning Range[5]	PR	±5.0, ±10.0			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), *Ordering Option*					
Output Level	V_O p/p	0.8			V
Output Load				10K II 10pF	
Start Up Time				2	ms
Phase Noise					
Phase Noise[6], 19.2MHz 10Hz 100Hz 1kHz 10kHz 100kHz			 -91 -115 -135 -148 -152		dBc/Hz

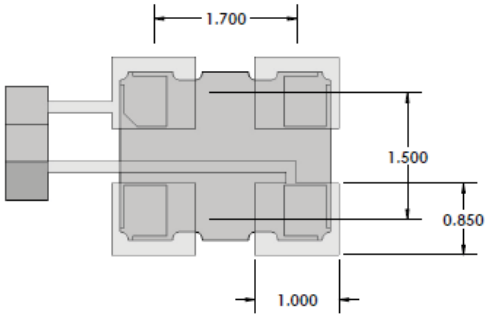
1. Refer to Table for Standard Frequencies. Other frequencies are available on request. Check with factory.
2. The VT-841 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
3. Referenced to the mid point between minimum and maximum frequency value over T_{OP}
4. Initial Accuracy is before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

Outline Drawing



Dimensions in mm

Recommended Pad Layout



Marking
V XXMXXX
V = Vectron
XXMXXX = Frequency
.YYWWC
YY = Year
WW = Week
C= Manufacturing Location

Marking
XXMXXX
XXMXXX = Frequency
.YMC
Y = Year
M = Month
C= Manufacturing Location

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 were 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, Vectron 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.

Table 3. Maximum Ratings

Parameter	Symbol	Rating	Unit
Storage Temperature	T_{STORE}	-55/125	ºC
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

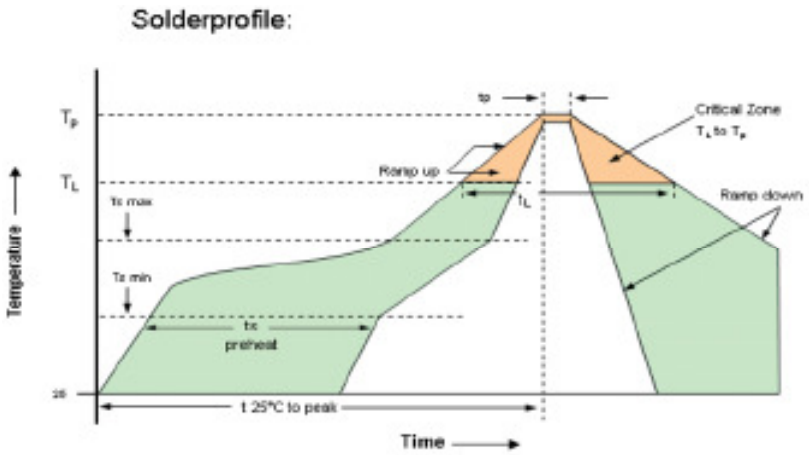
Table 4. Environmental Compliance	
Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002
Mechanical Vibration	MIL-STD-883 Method 2007
Temperature Cycle	MIL-STD-883 Method 1010
Solderability	MIL-STD-883 Method 2003
Fine and Gross Leak	MIL-STD-883 Method 1014
Resistance to Solvents	MIL-STD-883 Method 2015
Moisture Sensitivity Level	MSL1
Contact Pads	Gold over Nickel
Weight	15 mg

IR Reflow

Suggested IR Profile

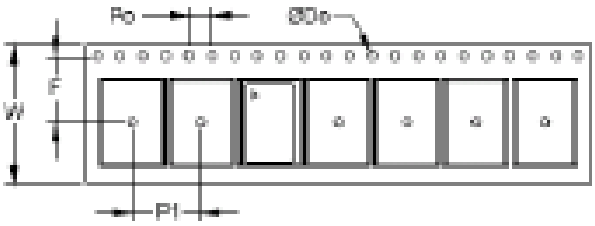
Devices are built using lead free epoxy and can be subjected to standard lead free IR reflow conditions shown in Table 5. Contact pads are gold over nickel and lower maximum temperatures can also be used, such as 220C.

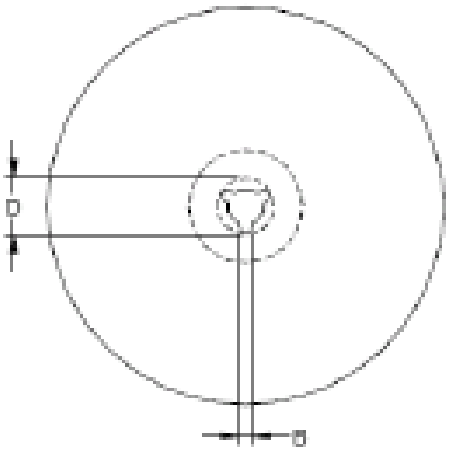
Table 5. Reflow Profile		
Parameter	Symbol	Value
PreHeat Time Ts-min Ts-max	t_s	200 sec Max 150°C 200°C
Ramp Up	R_{UP}	3°C/sec Max
Time above 217C	t_L	150 sec Max
Time to Peak Temperature	$t_{25C\ to\ peak}$	480 sec Max
Time at 260C	t_P	30 sec Max
Time at 240C	t_{P2}	60 sec Max
Ramp down	R_{DN}	6°C/sec Max

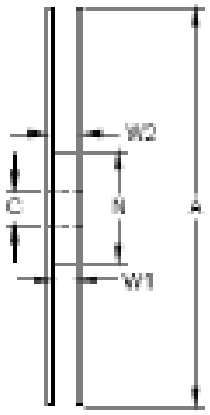


Tape & Reel

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



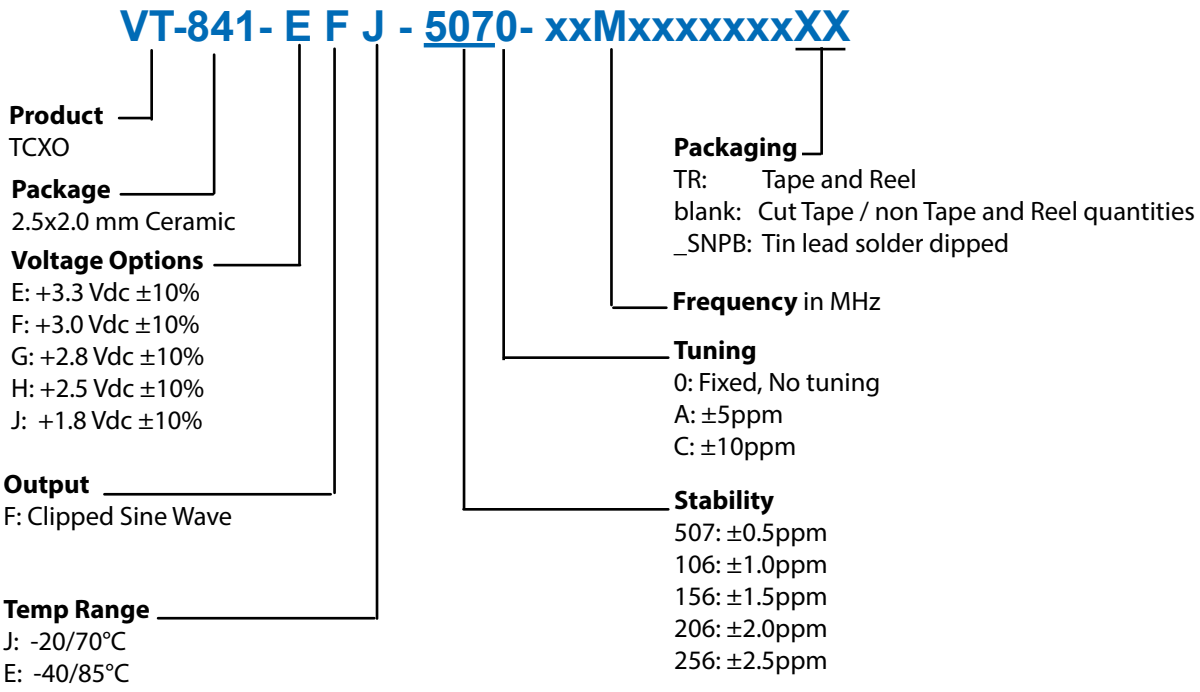




Ordering Information

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.



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

Example:

VT-841-EFE-5070-24M5760000TR	**Tape and Reel**
VT-841-EFE-5070-24M5760000	**Cut Tape**
VT-841-EFE-5070-24M5760000_SNPB	**Tin lead solder dipped**

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
Aug 10, 2018	FB	Update logo, contact information, layout, add "SNPBDIP" ordering option, delete AC output coupling ordering option note 6
May 24, 2019	FB	Update logo, contact information and ordering options, change "SNPBDIP" to "SNPB"
April , 2020	FB	Add tape and reel ordering option

Contact Information

USA:
100 Watts Street
Mt Holly Springs, PA 17065
Tel: 1.717.486.3411
Fax: 1.717.486.5920

Europe:
Landstrasse
74924 Neckarbischofsheim
Germany
Tel: +49 (0) 7268.801.0
Fax: +49 (0) 7268.801.281