

Helping Customers Innovate, Improve & Grow




VT-841A

## Description

Vectron's VT-841A Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, analog temperature compensated oscillator, operating off a 1.8, 2.8, 3.0 or 3.3 volt supply in a hermetically sealed 2.0 x 1.6 mm ceramic package.

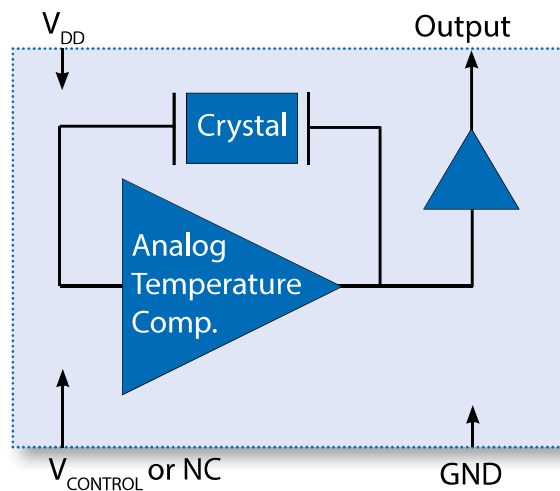
## Features

- 13.000 - 52.000 MHz Output Frequency
- $\pm 2.5$  ppm Temperature Stability over  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Frequency Tuning Option
- Fundamental Crystal Design
- Gold over nickel contact pads
- Hermetically Sealed 2.5 x 2.0 mm Ceramic SMD package
- Product is compliant to RoHS directive  and fully compatible with lead free assembly

## Applications

- GPS
- WiLAN, WiMAX
- IoT
- Point to Point Radio
- Manpack Radio

## Block Diagram

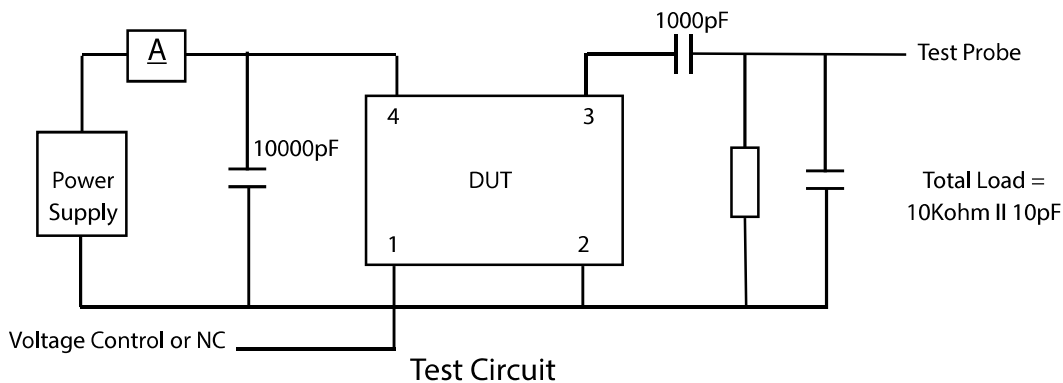


# Specifications

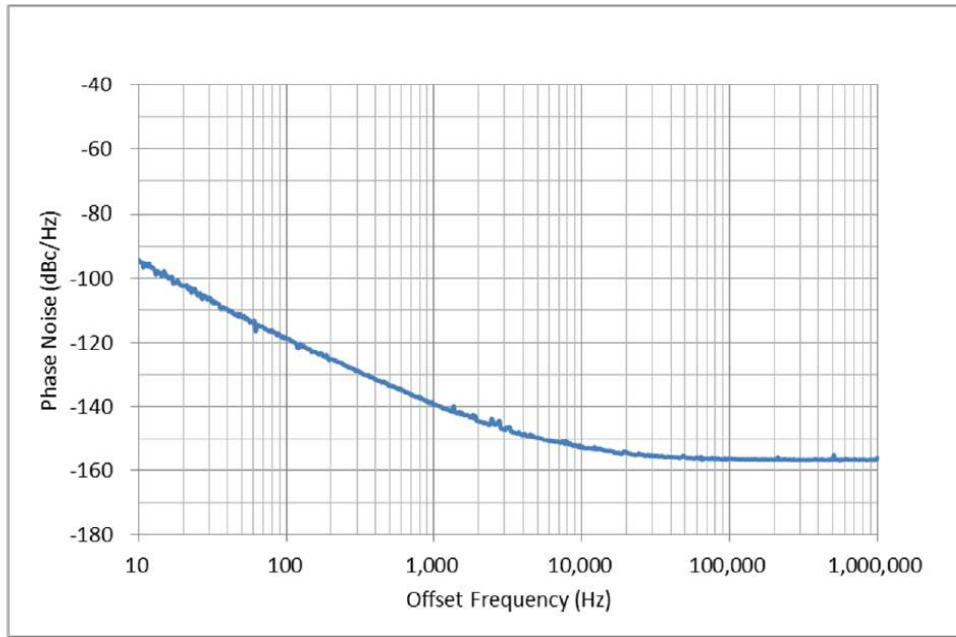
**Table 1. Electrical Performance**

Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency <sup>1</sup> , <i>Ordering Option</i>	$f_o$	13		52	MHz
Supply Voltage <sup>2</sup> , <i>Ordering Option</i>	$V_{DD}$	+1.8, +2.8, +3.0, +3.3			V
Supply Current <sup>3</sup> , $f_o \leq 26\text{MHz}$ $f_o > 26\text{MHz}$	$I_{DD}$			2.0 2.5	mA
Operating Temperature, <i>Ordering Option</i>	$T_{OP}$	-30/85, -40/85			°C
<b>Frequency Stability</b>					
Stability Over $T_{OP}$ <sup>4</sup> , <i>Ordering Option</i>	$F_{STAB}$	±0.5, ±1.0, ±2.5			ppm
Frequency Tolerance <sup>5</sup>	$F_{TOL}$			±1.5	ppm
Power Supply Stability, ±5%	$F_{PWR}$			±0.2	ppm
Load Stability, ±10%	$F_{LOAD}$			±0.2	ppm
Aging / 1st year @ 25°C	$F_{AGE}$			±1.0	ppm
<b>Frequency Tuning (EFC), <i>Ordering Option</i></b>					
Tuning Pull Range <sup>6</sup> , <i>Ordering Option</i>	TPR	±5, ±10			ppm
Tuning Slope		Positive			
Control Voltage to reach Pull Range 1.8V Supply Voltage Option 2.5V, 2.8V, 3.0V and 3.3V Supply Voltage Option	$V_C$	0.3 0.5	0.9 1.5	1.5 2.5	V V
Linearity	Lin			10	%
Control Voltage Impedance		500			Kohm
<b>RF Output , Clipped Sine Wave</b>					
Output Level	$V_o$ p/p	0.8			V
Output Load, typical ±10%			10k    10pF		
Duty Cycle	SYM	40		60	%
Start Up Time	$t_{SU}$			2	ms
<b>Phase Noise</b>					
Phase Noise <sup>7</sup> , 26.00MHz 10Hz 100Hz 1kHz 10kHz 100kHz	$\theta_N$		-95 -118 -140 -152 -158		dBc/Hz
Integrated Phase Jitter, 26.00MHz (12k-5MHz) <sup>6</sup>	$\theta_j$		0.3		ps

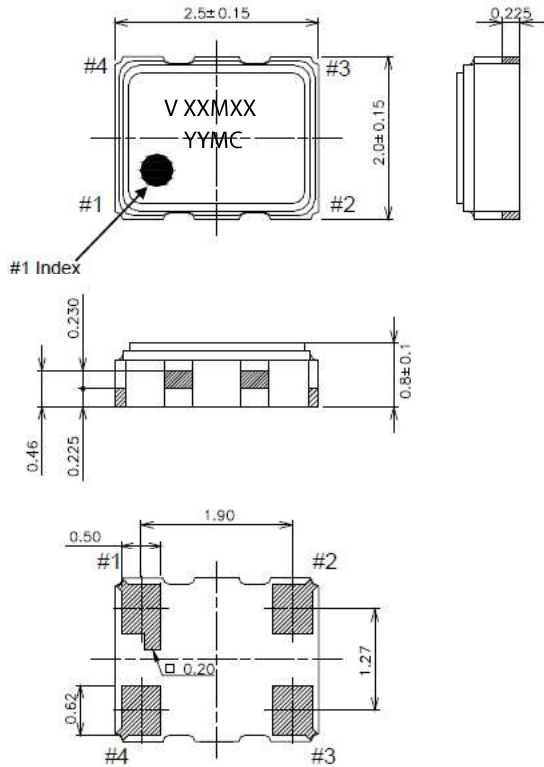
1. Refer to Table 7 for Standard Frequencies. Output is DC coupled.
2. The VT-841A power supply pin (Pin 4) should be filtered using a by-pass capacitor such as 0.01 uF for optimal performance.
3. No Load.
4. Referenced to the midpoint between minimum and maximum frequency value over Operating Temperature Range.
5. Frequency measured at 25 °C, 2 hours after 2 IR reflows.
6. Referenced to Mid Control Voltage and is over the operating temperature.
7. Measured at room ambient temperature using Agilent E5052B Signal Source Analyzer or equivalent.



## Typical Phase Noise Performance (26MHz)



## Package Outline Drawing & Pad Layout



**Table 2. Pinout**

Pin #	Symbol	Function
1	V <sub>C</sub> or NC	Voltage Controlled Frequency Tuning or No Connection
2	GND	Ground
3	OUT	RF Output
4	V <sub>DD</sub>	Supply Voltage

Note:

0.01uF capacitor is a by-pass power supply filter capacitor placed between Pin4 (V<sub>DC</sub>) and Ground for optimal performance.

### Marking Information

- V = Vectron
- XXMXX = Frequency (Example: 26M000)
- YY = Year of Manufacture
- M = Month of the Year ( M = A-Jan, B-Feb.....K-Nov, L-Dec)
- C = Manufacturing Location
- = Pin 1 Indicator

## 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-841A, 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	$T_{STORE}$	-40/85	°C
Supply Voltage	$V_{DD}$	-0.3/4.6	V
Max Vc Voltage <sup>1</sup>		-0.3/ $V_{DD}+0.3$	V
ESD, Human Body Model		1500	V
ESD, Charged Device Model		750	V

1. The maximum rating is ( $V_{DD}+0.3$ ) up to 4.6V.

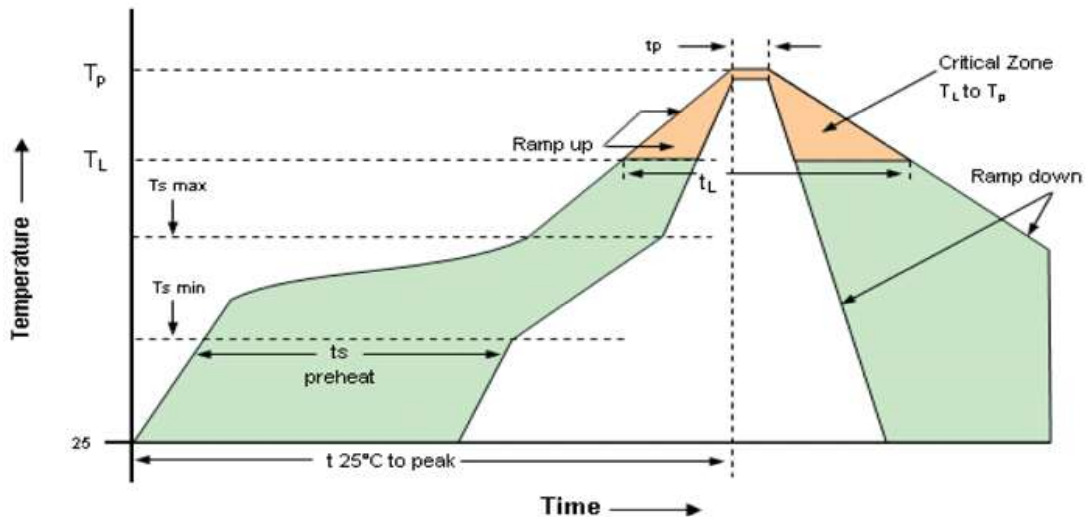
## Reliability

Table 4. Environmental Compliance	
Parameter	Condition
Mechanical Shock	IEC 60068-2-6
Mechanical Vibration	IEC 60068-2-27
Drop Test	EUAJ-ED-4702C, Method 5
Thermal Shock	IEC 60068-2-14
Solderability	IEC 60068-2-58
High Temperature Storage	IEC 60068-2-2 Bb
Low Temperature Storage	IEC 60068-2-1 Ab
Humidity	IEC 60068-2-78
Moisture Sensitivity Level	MSL1
Contact Pads	Gold (0.3 um min -1.0 um max)over Nickel
Weight	20 mg

# IR Reflow

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	$t_P$	10 sec Max
Time at 220°C	$t_{P2}$	60 sec Max
Ramp down	$R_{DN}$	6°C/sec Max

## Solderprofile:



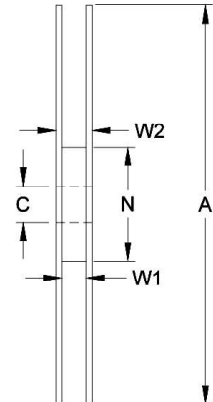
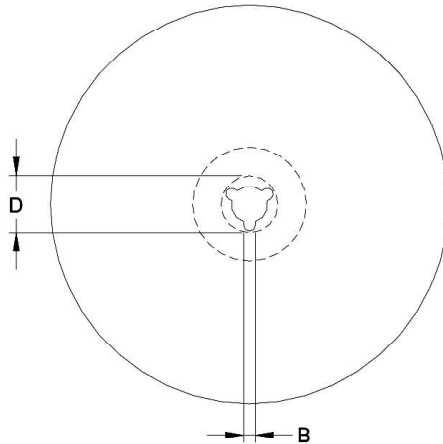
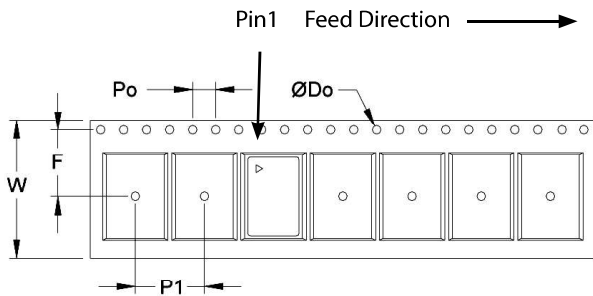
### Suggested IR Profile

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

# 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	3.5	1.55	4	4	180	2.0	13	20.2	60	9.0	11.4	3000



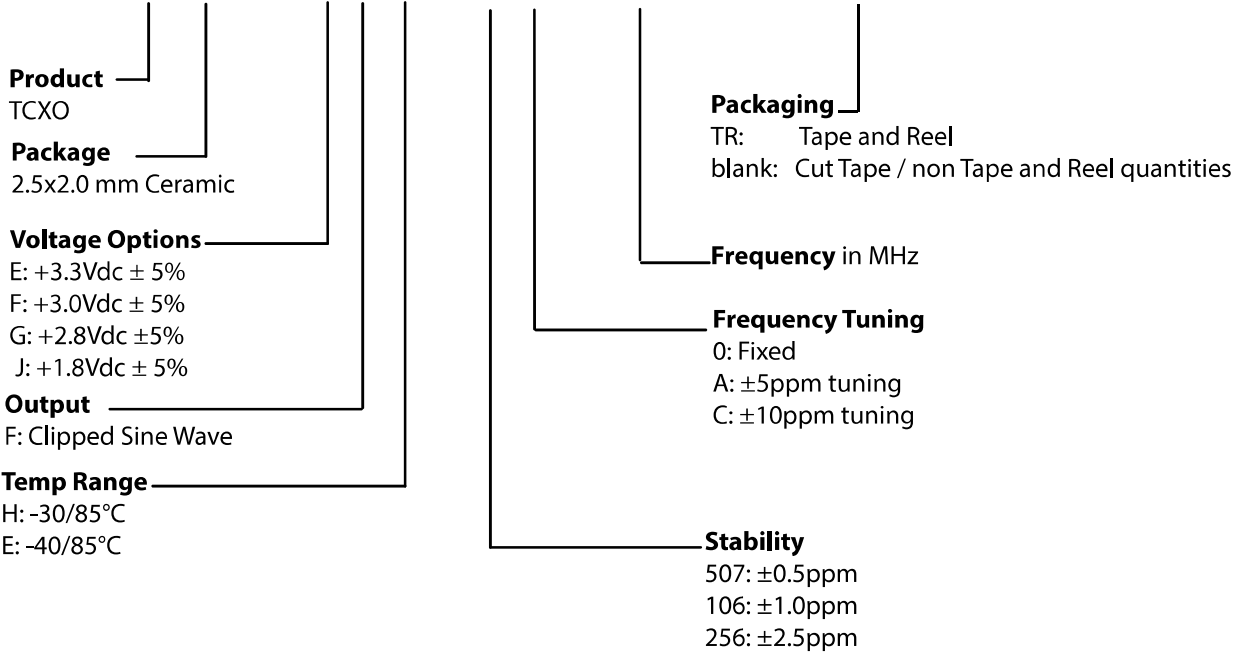
# Standard Frequencies

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

16.384	16.368	16.389	19.200	20.000	24.000	26.000	32.000	33.600	37.400
38.400	40.000	48.000	52.000						

## Ordering Information

### VT-841A- E F E - 1060- xxMxxxxxxxxXX



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

**Example:**

**VT-841A-EFE-1060-26M000000TR**  
**VT-841A-EFE-1060-26M0000000**

**Tape and Reel**  
**Cut Tape**

## Revision History

Revision Date	Approved	Description
Dec 08, 2021	FB	Preliminary

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