VT-702

Temperature Compensated Crystal Oscillator

a Microchip company

Description

Vectron's VT-702 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave or CMOS output, amalog temperature compensated oscillator, operating off either 5.0 or 3.3 volt supply, hermetically sealed 10 pad 7.0 x 5.0 mm ceramic package.

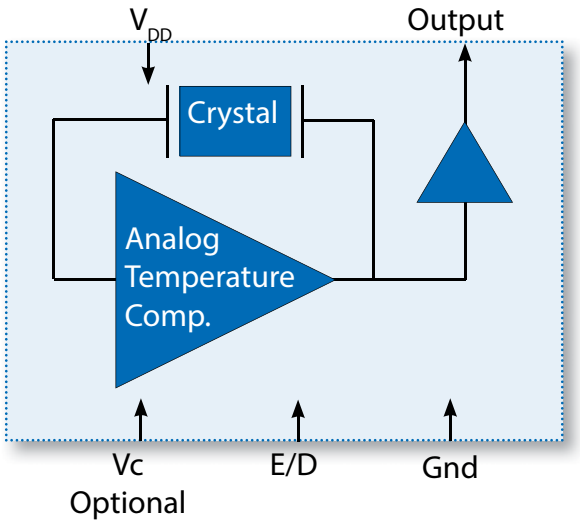
Features

- 5.000 - 52.000MHz Output Frequency
- ±0.280 ppm Temperature Stability
- Optional Frequency Tuning
- Fundamental Crystal Design
- Stratum 3 version available as a custom part number
- Hermetically Sealed Ceramic SMD package
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- Femto Cells
- Base Stations
- IP Networking
- Global Posiitoning Systems
- Point to Point Radio
- Test and Measurement

Block Diagram



Specifications

Table 1. Electrical Performance, Clipped Sine Wave Option					
Parameter	Symbol	Min	Typ	Max	Units
Output Frequency[1] , *Ordering Option*	f_O	5		52	MHz
Supply Voltage[2] , *Ordering Option*	V_{DD}	+2.8, +3.0, +3.3, +5.0			V
Supply Current	I_{DD}			3.5	mA
Operating Temperature, *Ordering Option*	T_{OP}	0/55, -10/70, -20/70, -30/85, -40/85			°C
Frequency Stability					
Stability Over T_{OP}[4] *Ordering Option*	F_{STAB}	±0.05, ±0.10, ±0.20, ±0.28, ±0.50			ppm
Frequency Tolerance[5]	F_{TOL}			±2.0	ppm
Power Supply Stability, ±5% change	F_{SUP}			±0.2	ppm
Load Stability, ±10% change	F_{LOAD}			±0.2	ppm
Aging / 1st year	F_{AGE}			±1.0	ppm
Frequency Tuning (EFC), *Ordering Option*					
Tuning Range[6]	PR	±5.0, ±8.0, ±10.0, ±12.0			ppm
Tuning Slope		Positive			
Control Voltage to reach Pull Range	Vc	0.5	1.5	2.5	V
Control Voltage Impedance		100			Kohm
RF Output (Clipped Sine Wave) *Ordering Option*					
Output Level	V_O p-p	0.8			V
Output Load	C_L		10K ll 10pF		
Start Up Time	t_{SU}			2	ms
Output Enable[7] Output Disable	V_{IH} V_{IL}	0.7*V_{DD}		 0.3*V_{DD}	V V
Phase Noise[8]					
Phase Noise[8], 10MHz 10Hz 100Hz 1kHz 10kHz 100kHz			 -99 -123 -143 -152 -155		dBc/Hz

1. Refer to Table 8 for Standard Frequencies. Other Frequencies may be avilable upon request. Check with factory
2. Output DC-cut capacitor is optional.
3. The VT-702 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
4. Referenced to the midpoint between minimum and maximum frequency value over the operating temperature range.
5. Frequency measured at 25 °C, 1 hour after 2 IR reflows.
6. Referenced to Mid Control Voltage
7. Output is Enabled if Enable / Disable pad is left Open or No Connect.
8. Measured using Agilent E5052 Signal Source Analyzer at 25 °C

Table 2. Electrical Performance, CMOS Option					
Parameter	Symbol	Min	Typ	Max	Units
Output Frequency[1] , *Ordering Option*	f_O	5		52	MHz
Supply Voltage[2] , *Ordering Option*	V_{DD}	+2.8, +3.0, +3.3, +5.0			V
Supply Current	I_{DD}			6.0	mA
Operating Temperature, *Ordering Option*	T_{OP}	0/55, -10/70, -20/70, -30/85, -40/85			°C
Frequency Stability					
Stability Over T_{OP}[4] *Ordering Option*	F_{STAB}	±0.05, ±0.10, ±0.20, ±0.28, ±0.50			ppm
Frequency Tolerance[5]	F_{TOL}			±2.0	ppm
Power Supply Stability, ±5% change	F_{SUP}			±0.2	ppm
Load Stability, ±10% change	F_{LOAD}			±0.2	ppm
Aging / 1st year	F_{AGE}			±1.0	ppm
Frequency Tuning (EFC), *Ordering Option*					
Tuning Range[6]	PR	±5.0, ±8.0, ±10.0, ±12.0			ppm
Tuning Slope		Positive			
Control Voltage to reach Pull Range	Vc	0.5	1.5	2.5	V
Control Voltage Impedance		100			Kohm
RF Output (CMOS), *Ordering Option*					
Output Level High Output Level Low	V_{OH} V_{OL}	0.9*V_{DD}		 0.1*V_{DD}	V V
Output Load	C_L			15	pF
Duty Cycle		45		55	%
Start Up Time	T_{SUP}			2	ms
Rise / Fall Times	t_R / t_F			4	ns
Output Enable[7] Output Disable	V_{IH} V_{IL}	0.7*V_{DD}		 0.3*V_{DD}	V V
Phase Noise[8]					
Phase Noise[8], 10MHz 10Hz 100Hz 1kHz 10kHz 100kHz			 -101 -124 -144 -154 -156		dBc/Hz

1. Refer to Table 8 for Standard Frequencies. Other Frequencies may be avilable upon request. Check with factory
2. Output DC-cut capacitor is optional.
3. The VT-702 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
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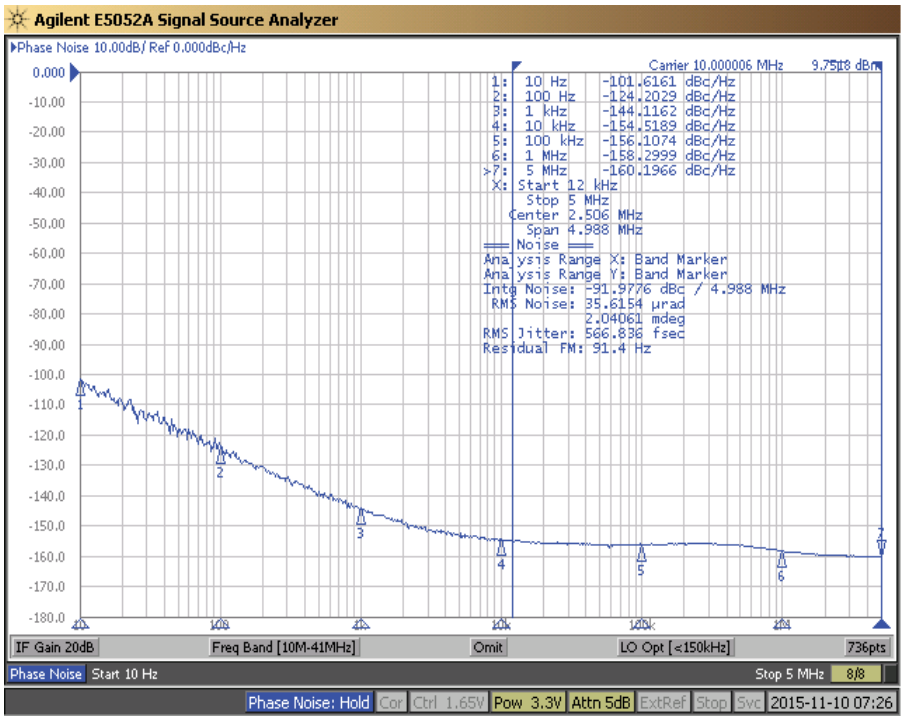
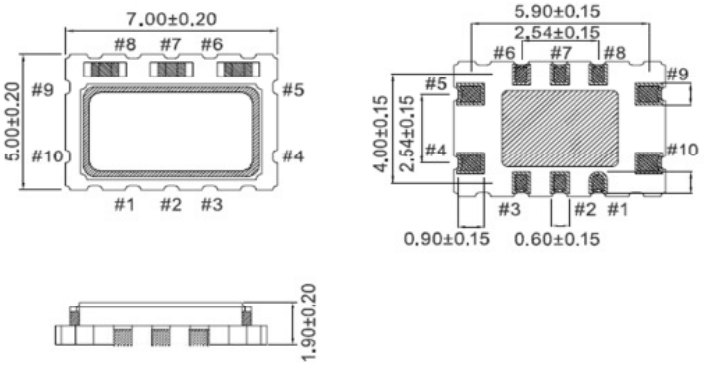
Phase Noise, CMOS



Package Drawing



Dimensions in mm

Recommended Land Pattern

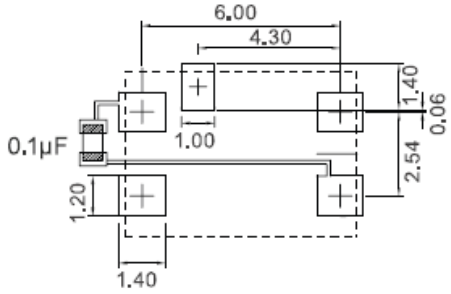


Table 3. Pinout

Pin #	Symbol	Function
1	NC	No Connect
2	NC	No Connect
3	NC	No Connect
4	GND	Ground
5	OUT	RF Output
6	NC	No Connects
7	NC	No Connect
8	E/D	Enable / Disable
9	V_{DD}	Supply Voltage
10	NC	No Connect

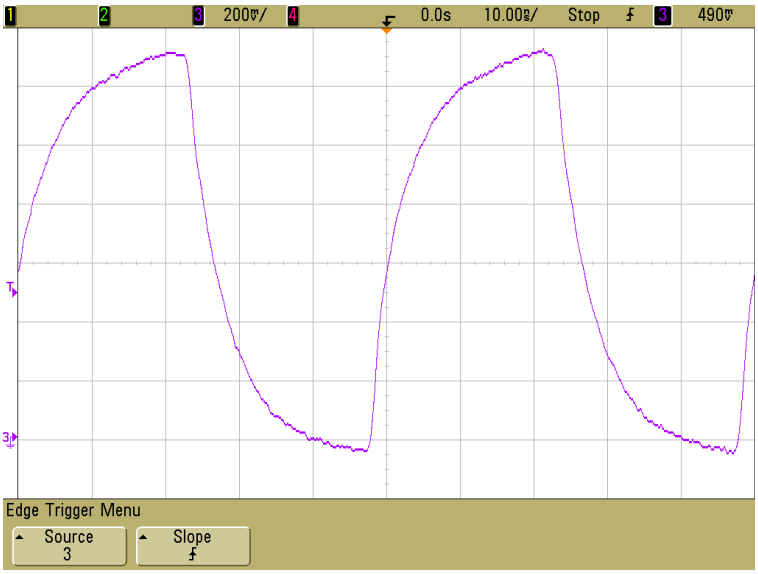
XXMXXX
• YYWW T

Marking Information
XXMXXX - Frequency (10M000)
YY - Year of Manufacture
WW - Week of the Year
T - Manufacturing Location
● - Pin 1 Indicator

Enable/Disable Function

Enable/Disable Feature: The VT-702 has an enable/disable feature to which shuts down the oscillator and puts the output in to a high impdeance mode. If the Enable/Disable is left open or floating, the output is active**l.**

Clipped Sine Wave Output



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-702, 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 4. Maximum Ratings

Parameter	Symbol	Rating	Unit
Storage Temperature	T_{STORE}	-55/125	°C
Supply Voltage	V_{DD}	-0.6/6.0	V
Control Voltage	Vc	-0.6/ V_{DD}+0.6	V
Enable/Disable Voltage	E/D	-0.6/ V_{DD}+0.6	V
ESD, Human Body Model		1500	V
ESD, Charged Device Model		1000	V

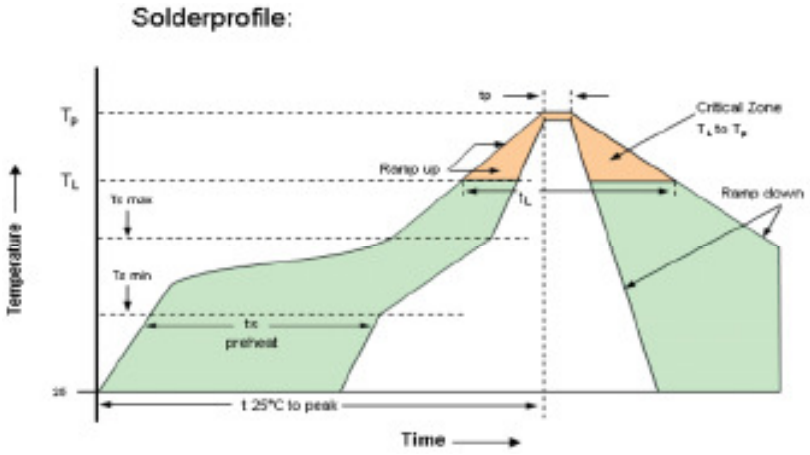
Table 5. Environmental Compliance	
Parameter	Condition
Mechanical Shock	MIL-STD-883 Method 2002
Mechanical Vibration	MIL-STD-883 Method 2007
Temperature Cycle	MIL-STD-883 Method 1010
Solderability	MIL-STD-883 Method 2003
Fine and Gross Leak	MIL-STD-883 Method 1014
Resistance to Solvents	MIL-STD-883 Method 2015
Moisture Sensitivity Level	MSL1
Contact Pads	Gold over Nickel

IR Reflow

Suggested IR Profile

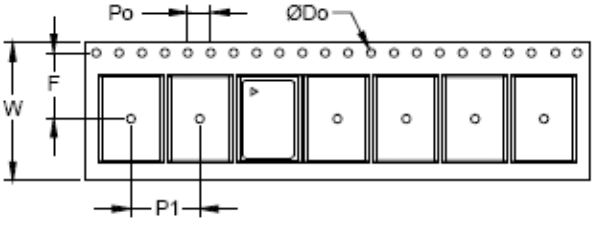
Devices are built using lead free epoxy and can be subjected to standard lead free IR reflow conditions shown in Table 5. Contact pads are gold over nickel and lower maximum temperatures can also be used, such as 220C.

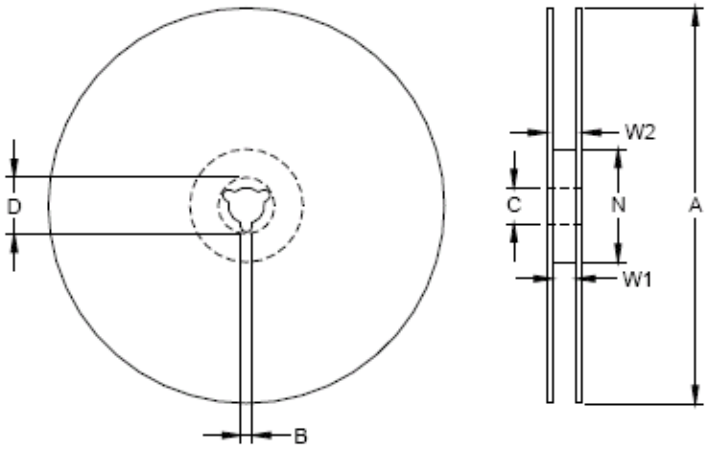
Table 6. Reflow Profile		
Parameter	Symbol	Value
PreHeat Time Ts-min Ts-max	t_s	200 sec Max 150°C 200°C
Ramp Up	R_{UP}	3°C/sec Max
Time above 217C	t_L	150 sec Max
Time to Peak Temperature	$t_{25C\ to\ peak}$	480 sec Max
Time at 260C	t_P	30 sec Max
Time at 240C	t_{P2}	60 sec Max
Ramp down	R_{DN}	6°C/sec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



Tape & Reel

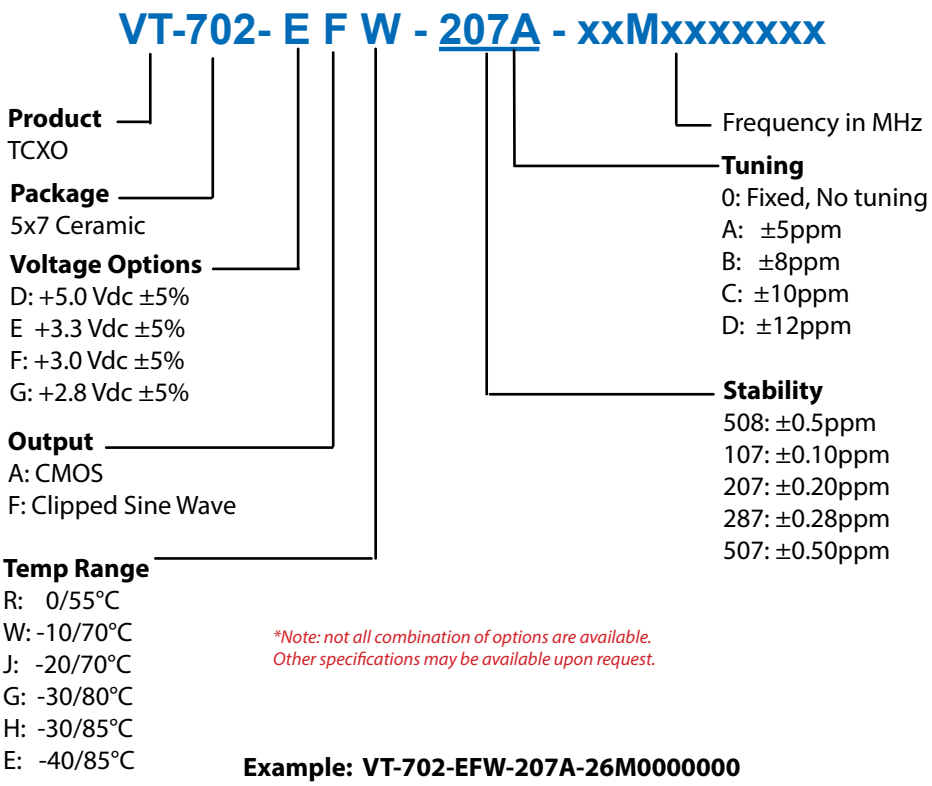
Table 7. Tape and Reel Information												
Tape Dimensions (mm)					Reel Dimensions (mm)							
W	F	Do	Po	P1	A	B	C	D	N	W1	W2	#/Reel
16	7.5	1.5	4	8	180	1.5	13	20.2	60	16.4	20.4	1000





Ordering Information

Table 8. Standard Frequencies (MHz)									
10.000	12.800	16.384	19.200	20.000	25.000	26.000	40.000		



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

Example: VT-702-EFW-207A-26M0000000

* Add **_SNPBDIP** for tin lead solder dip

Example: VT-702-EFW-207A-26M0000000_SNPBDIP

Revision History

Revision Date	Approved	Description
August 10, 2018	FB	Rev 0.4: Updated logo and contact information, added "SNPBDIP" ordering option
October 29, 2018	FB	Correct package drawing and specifications from rev Nov30 2015 version

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