Microsemi

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VT-701

Description

Vectron's VT-701 Temperature Compensated Crystal Oscillator (TCXO) is a quartz stabilized, clipped sine wave output, analog temperature compensated oscillator, operating off either a 3.3 or 5.0 volt supply in a hermetically sealed 5x7 ceramic package.

Features

- CMOS Output
- Output Frequencies to 27 MHz
- Fundamental Crystal Design
- Optional VCXO Function available
- Gold over nickel contact pads
- Hermetically Sealed Ceramic SMD package

- Product is compliant to RoHS directive (Pb) and fully compatible with lead free assembly

Applications

- FPGA's
- A/D's, D/A's
- Broadband Access Head End
- Wireless Communications
- Base Stations
- Point to point radios
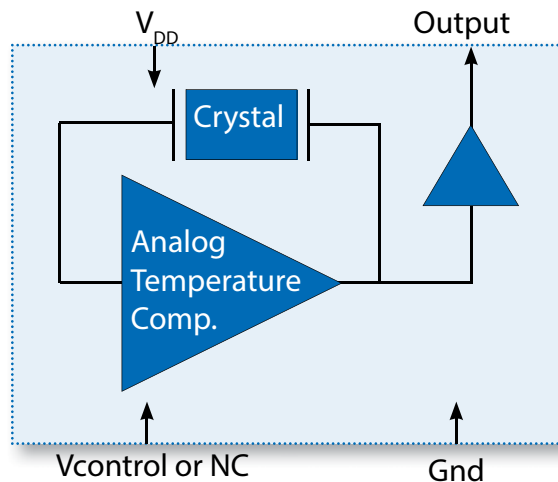- Broadband Access
- Test Equipment

Block Diagram

Table 1. Electrical Performance

Parameter	Symbol	Min.	Typ	Max	Units
Output Frequency	f_O	5		27	MHz
Supply Voltage[1], *Ordering Option*	V_{DD}	+3.3 or +5.0			Vdc
Supply Current	I_{DD}			10	mA
Operating Temperature, *Ordering Option*	T_{OP}	0/55, -10/60, -20/70, -30/80, -40/85			°C
Stability Over T_{OP}, *Ordering Option*		±0.5, ±1.0, ±.5, ±2.0, ±2.5, ±3.0, ±4.0, ±5.0			ppm
Initial Accuracy, "No Adjust" Option				±1.0	ppm
Power Supply Stability				±0.3	ppm
Load Stability				±0.2	ppm
Aging				±1.0	ppm/yr
Pull Range, *ordering option*	TPR	±5, ±8, ±10, ±12			ppm
Control Voltage to reach Pull Range		0.5		2.5	V
Control Voltage Impedance		1			Mohm
Output Level[2] Output Logic High Output Logic Low Output Logic High Drive Output Logic Low Drive	V_{OH} V_{OL} I_{OH} I_{OL}	0.8*V_{DD} 4		0.1*V_{DD} -4	V V mA mA
Output Load				15	pF
Phase Noise, 10.000MHz 10Hz 100Hz 1kHz 10kHz 100kHz			-92 -116 -137 -149 -154		dBc/Hz
Enable Disable[3] , Output Enbaled Output Disabled	V_{IH} V_{IL}	0.3*$_{VDD}$		0.7*V_{DD}	
Start Up Time				2	ms

1. The V-701 power supply pin should be filtered, eg, a 0.1 and 0.01uf capacitor
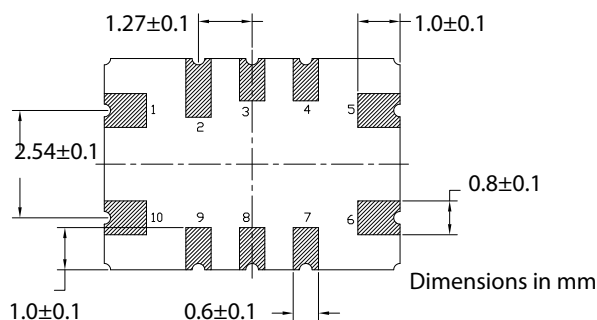2. The Output is DC coupled
3. Output is Enabled if E/D is left open

Outline Drawing
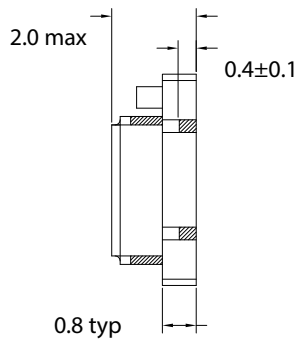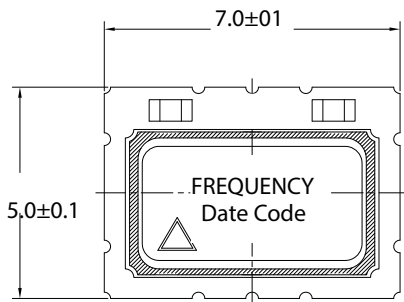
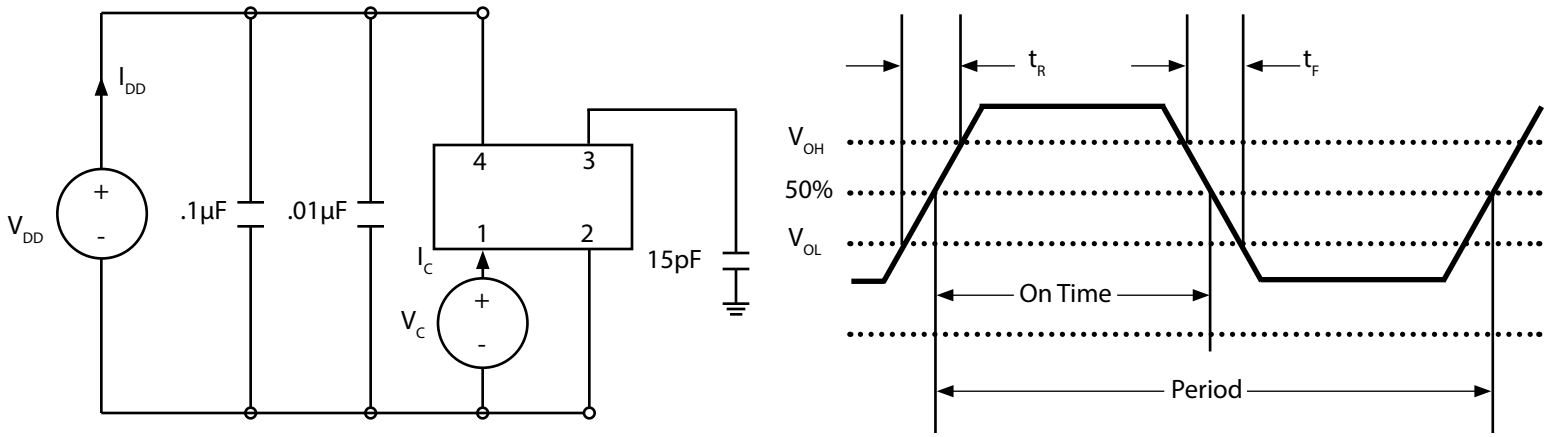## Recommended Pad Layout
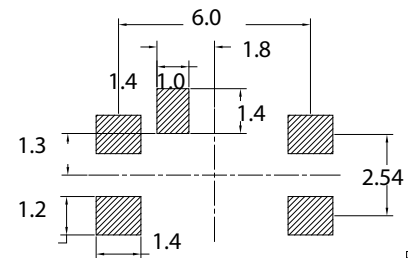
Pad Layout mm

Dimensions in mm

Table 2. Pinout

Pin #	Symbol	Function
1	V_C	TCXO Control Voltage or Ground
2,3,4	NC	Make No Connection
5	GND	Electrical and Lid Ground
6	f_O	Output Frequency
7,8	NC	Make No Connection
9	E/D	Enable Disable
10	V_{DD}	Supply Voltage

Test Circuit

VCXO Function

VCXO Feature: The VT-701 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 , 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 were the VT-701 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-701-xxx-xxx0. By using the "no adjust" option, the circuit is simplified as Vc 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.

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-701, 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.

Table 3. Maximum Ratings			
Parameter	Symbol	Rating	Unit
Storage Temperature	T_{STORE}	-55/125	ºC
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 Compliance

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	200 sec Max
Ramp Up	R_{UP}	3°C/sec Max
Time above 217°C	tL	150 sec Max
Time to Peak Temperature	tAMB-P	480 sec Max
Time at 260°C	tP	30 sec Max
Time at 240°C	tP2	60 sec Max
Ramp down	R_{DN}	6°C/sec Max

Solderprofile:
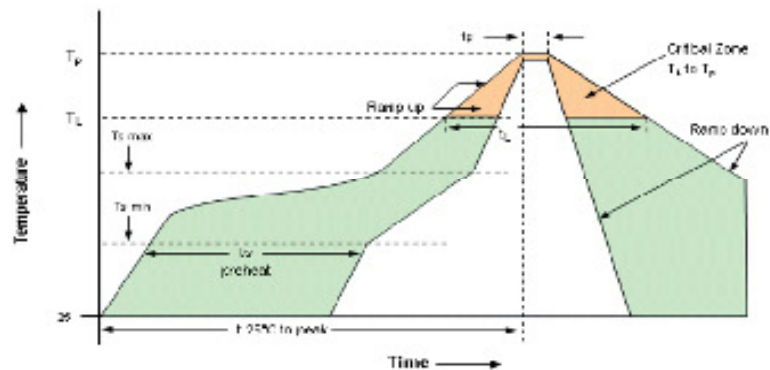
Tape & Reel

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
16	7.5	1.5	4	8	180	1.5	13	20.2	60	16.4	20.4	1000
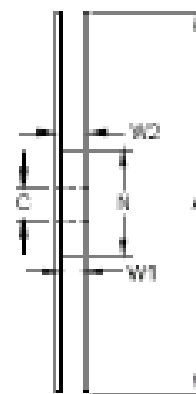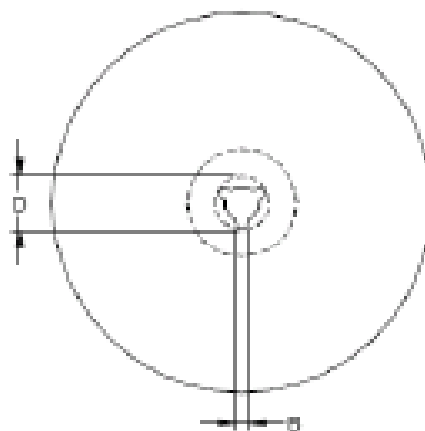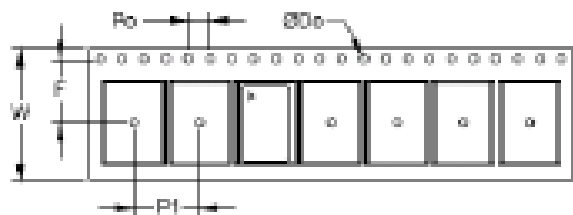
Table 7. Standard Frequencies (MHz)		Standard Frequencies							
5.000*	6.400*	8.192	10.000	12.500*	12.800	13.000*	16.384	19.200	20.000
19.440	19.800	20.000	24.000	25.000	26.000	27.000			

Ordering Information

VT-701- E A G - X X X A- xxMxxxxxxx

└─ Frequency in MHz

Product ──
TCXO

Package ──
5x7

Voltage Options ──
D: +5.0 Vdc ±5%,
E: +3.3 Vdc ±5%,

Output ──
A: CMOS

Temp Range ──
R: 0 /55°C
K: -10/60°C
J: -20/70°C
G: -30/80°C
E: -40/85°C

*Note: Not all combination of options are available and * notes limited temperature stability.*

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

Stability
507: ±0.5ppm
106: ±1ppm
156: ±1.5ppm
206: ±2.0ppm
256: ±2.5ppm
306: ±3.0ppm
356: ±3.5ppm
406: ±4.0ppm
506: ±5.0ppm
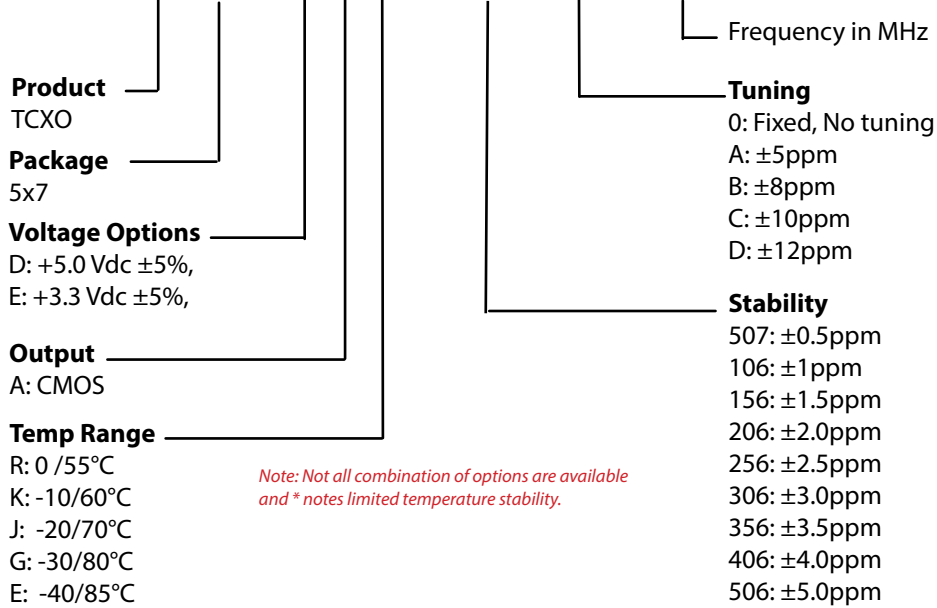
Example: VT-701-EAG-206A-19M2000000

* Add _SNPBDIP for tin lead solder dip
Example: VT-701-EAG-206A-19M2000000_SNPBDIP

Revision History

Revision Date	Approved	Description
August 10, 2018	FB	Rev 0.4: Updated logo and contact information, added "SNPBDIP" ordering option

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