VX-703 Data Sheet

Voltage Controlled Crystal Oscillator
Previous Vectron Model V-Type

Description

Vectron's VX-703 Voltage Controlled Crystal Oscillator (VCXO) is a quartz stabilized square wave generator with a CMOS output. The VX-703 uses fundamental crystals resulting in low jitter performance and a monolithic IC which improves reliability and reduces cost.

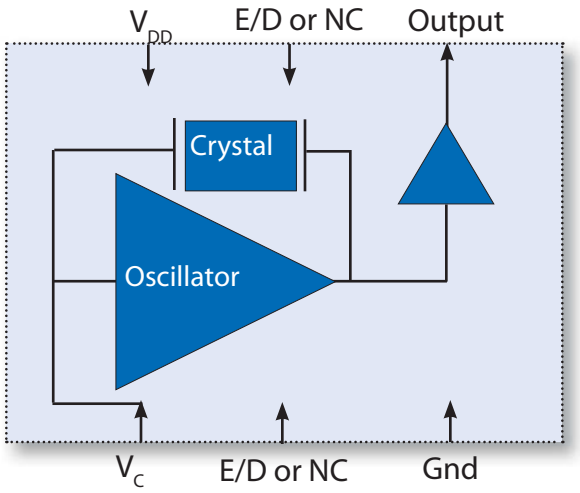
Features

- CMOS output VCXO
- Output Frequencies from 1.544 MHz to 77.760 MHz
- 5.0 or 3.3 V Operation
- Fundamental Crystal Design with Low Jitter Performance
- Output Disable Feature
- Excellent ±20 ppm Temperature Stability,
- 0/70°C or -40/85°C Operating Temperature
- Small Industry Standard Package, 5.0x7.0x1.8mm
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- SONET/SDH/DWDM
- Ethernet, SynchE
- xDSL, PCMIA
- Digital Video
- Broadband Access
- Base Stations, Picocells

Block Diagram



Performance Specifications

Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Supply					
Voltage[1], 5V option 3.3V option	V_{DD}	4.750 3.135	5.0 3.3	5.250 3.465	V
Current[2], 5V option 3.3V option	I_{DD}			55 40	mA
Frequency					
Nominal Frequency[3]	f_N	1.544		77.760	MHz
Pull Range[2,6], *ordering option*	APR		±50, ±80, ±100		ppm
Linearity[2]	Lin		5	10	%
Gain Transfer[2]	K_V		Positive, +65		ppm/V
Frequency Stabilities[5]					
vs. operating temp. *ordering option*			±50		ppm
vs. initial accuracy @ Vc = 1.65V			±50		ppm
vs. supply voltage			±3		ppm
vs. load change			±1		ppm
vs. aging / 1 Year			±2		ppm
vs. aging / (following years)			±1		ppm
Outputs					
Output Logic Levels[2] Output Logic High Output Logic Low		0.9*V_{DD}		 0.1*V_{DD}	V
Load	I_{OUT}			15	pF
Rise Time, Fall Time[2,4]	t_R, t_F			5	ns
Symmetry[2]	SYM	45	50	55	%
Integrated Jitter[5,7], 12kHz-20MHz (61.44 MHz)	ϕJ		90		fs
Phase Noise[7,9] (61.44 MHz) 10Hz 100Hz 1kHz 10kHz 100kHz 1MHz 10MHz			 -63 -97 -129 -144 -157 -159 -164		dBc/Hz
Enable/Disable					
Output Enabled (EN = H)	V_{IH}	0.7*V_{DD}			V
Output Disabled	V_{IL}			0.3*V_{DD}	V
Control Voltage					
Control Voltage Range for Pull Range	V_C	0.5 0.3		4.5 3.0	V
Control Voltage Input Impedance Control Voltage Leakage	Z_{IN}		5	 ±1	MΩ uA
Control Voltage Modulation BW	BW	10			kHz
Operating Temp, *ordering option*			0/70 or -40/85		°C

1] The power supply should have by-pass capacitors as close to the supply and to ground as possible, for examples 0.1 and 0.01uF.
2] Parameters are tested with production test circuit below (Fig 1).
3] See Standard Frequencies and Ordering Information tables for more specific information.
4] Measured from 20% to 80% of a full output swing (Fig 2).
5] Not tested in production unless otherwise stated in part description. Guaranteed by design and verified at qualification.
6] Tested with Vc = 0.3V to 3.0V unless otherwise stated in part description.
7] Measured using Agilent E5052.
8] The Output is Enabled if the Enable/Disable is left open.
9] Typical phase noise for the VX-7031package option which is recommended for best phase noise performance.

Test Circuit

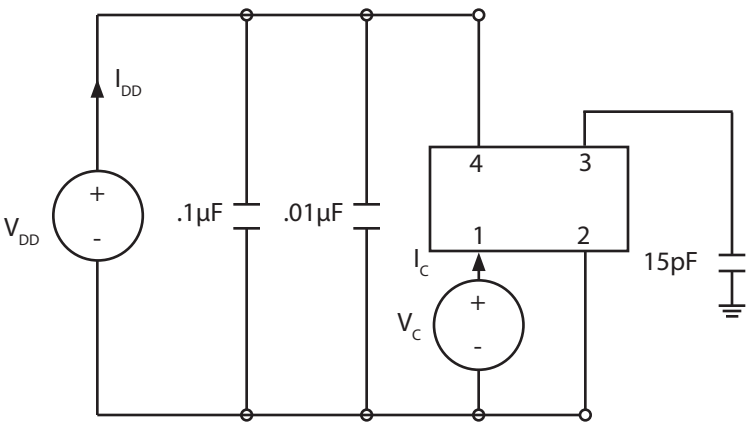


Fig 1: Test Circuit

Waveform

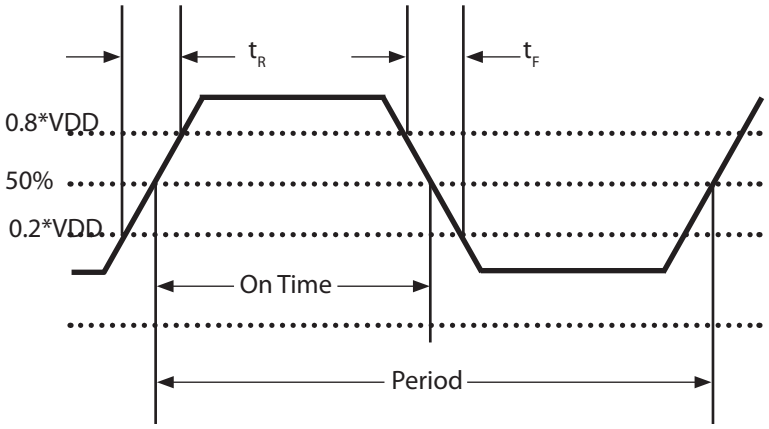


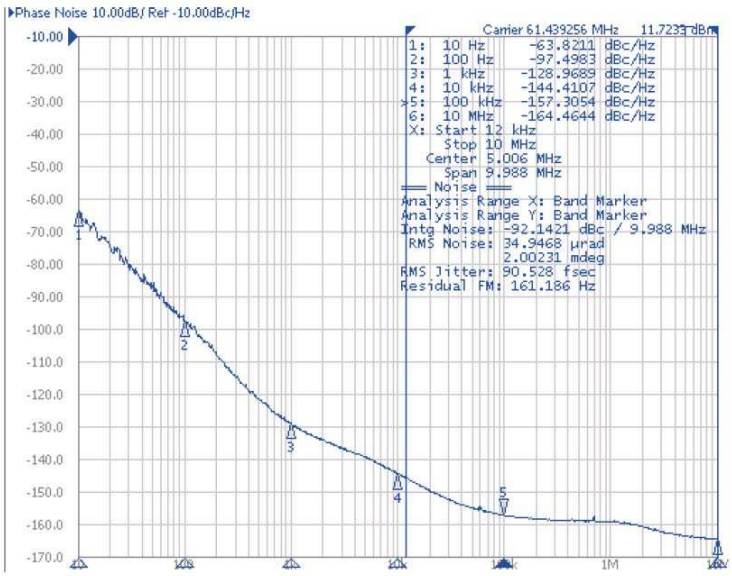
Fig 2: Waveform

Table 2. Absolute Maximum Ratings

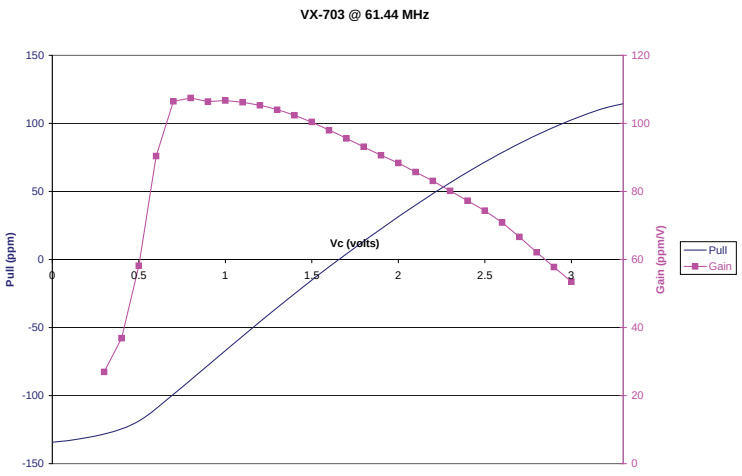
Parameter	Symbol	Ratings	Unit
Power Supply	V_{DD}	0 to 6	V
Voltage Control Range	V_C	0 to V_{DD}	V
Storage Temperature	TS	-55 to 125	°C
Soldering Temp/Time	T_{LS}	260 / 20	°C / sec

Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied at these or any other conditions in 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. Permanent damage is also possible if OD or Vc is applied before Vcc.

Typical Phase Noise



Typical Gain



Reliability

VI qualification includes aging at various extreme temperatures, shock and vibration, temperature cycling, and IR reflow simulation. The VX-703 family is capable of meeting the following qualification tests:

Table 3. Environmental Compliance

Parameter	Conditions
Mechanical Shock	MIL-STD-883, Method 2002
Mechanical Vibration	MIL-STD-883, Method 2007
Solderability	MIL-STD-883, Method 2003
Gross and Fine Leak	MIL-STD-883, Method 1014
Resistance to Solvents	MIL-STD-883, Method 2015
Moisture Sensitivity Level	MSL 1
Contact Pads	Gold over Nickel

Handling Precautions

Although ESD protection circuitry has been designed into the VX-703 proper precautions should be taken when handling and mounting. VI employs a human body model (HBM) and a charged device model (CDM) for ESD susceptibility testing and design protection evaluation.

Table 4. ESD Ratings

Model	Minimum	Conditions
Human Body Model	500V	MIL-STD-883, Method 3015
Charged Device Model	500V	JESD22-C101

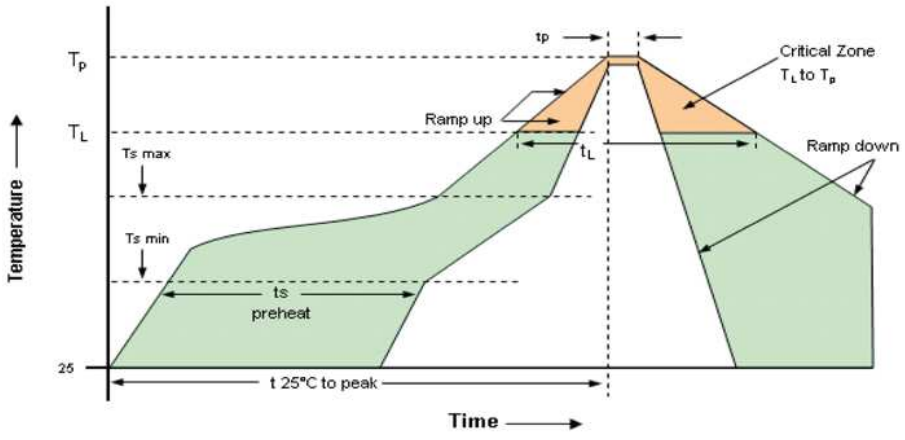
Table 5. Reflow Profile

Parameter	Symbol	Value
PreHeat Time Ts-min Ts-max	t_S	60 sec Min, 180 sec Max 150°C 200°C
Ramp Up	R_{UP}	3 °C/sec Max
Time Above 217 °C	t_L	60 sec Min, 150 sec Max
Time To Peak Temperature	$T_{25C\ to\ peak}$	480 sec Max
Time at 260 °C	t_P	20 sec Min, 40 sec Max
Ramp Down	R_{DN}	6 °C/sec Max

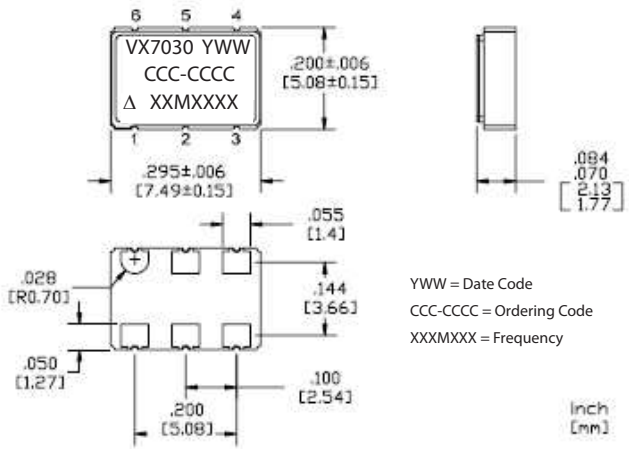
The device is qualified to meet the JEDEC standard for Pb-Free assembly. The temperatures and time intervals listed are based on the Pb-Free small body requirements. The VX-703 device is hermetically sealed so an aqueous wash is not an issue.

Termination Plating:
Electroless Gold Plate over Nickel Plate

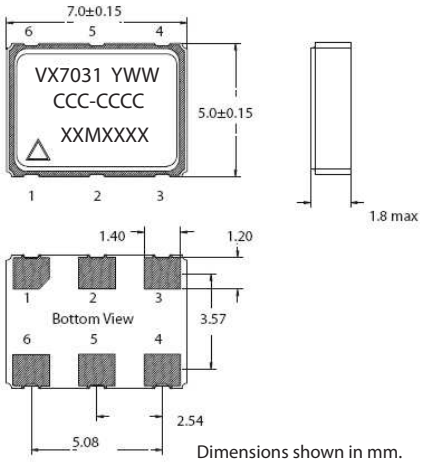
Solderprofile:



Outline Drawing - Package "VX-7030"



Outline Drawing - Package "VX-7031"

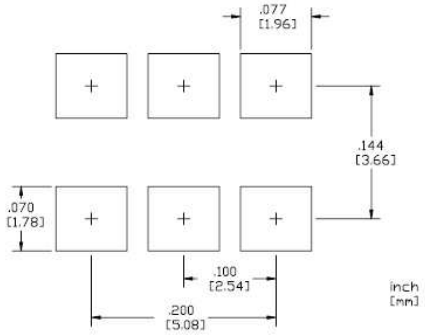


Dimensions shown in mm.

Table 6. Pin Out

Pin	Symbol	Function
1	V_C	VCXO Control Voltage
2	E/D	Enable Disable or NC
3	GND	Case and Electrical Ground
4	Output	Output
5	E/D	Enable Disable or NC
6	V_{DD}	Power Supply Voltage

Pad Layout



Tape & Reel (EIA-481-2-A)

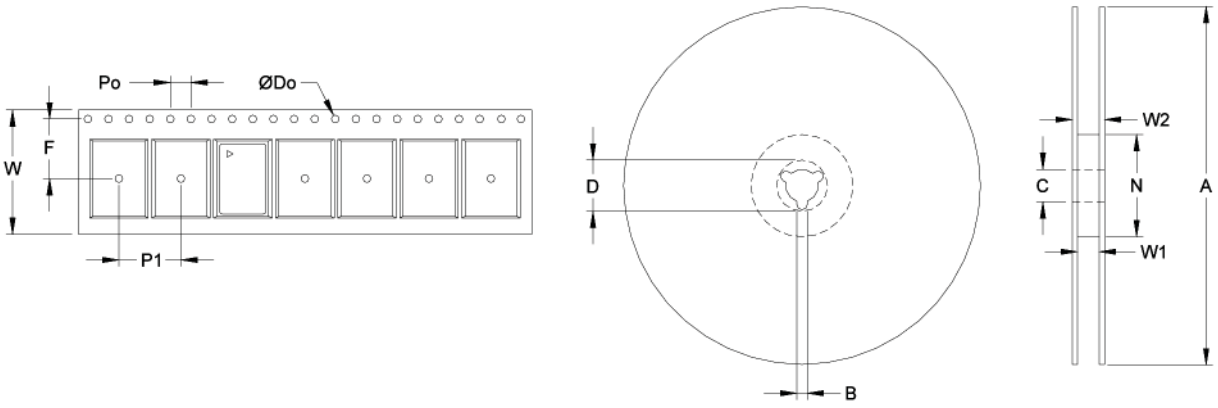


Table 7. Tape and Reel Information

Tape Dimensions (mm)						Reel Dimensions (mm)							
Dimension	W	F	Do	Po	P1	A	B	C	D	N	W1	W2	# Per Reel
Tolerance	Typ	Typ	Typ	Typ	Typ	Typ	Min	Typ	Min	Min	Typ	Max	
VX-703	16	7.5	1.55	4	8	178	1.78	13	20.6	55	12.4	22.4	500

Table 8. Standard Output Frequencies (MHz)							
1.54400000	2.04800000	4.09600000	6.17600000	8.19200000	10.0000000	12.0000000	12.2880000
12.3520000	13.0000000	14.3180000	15.4400000	16.0000000	16.3840000	18.0000000	18.4320000
19.2000000	19.4400000	19.5159400	20.0000000	20.4800000	24.5760000	24.7040000	25.0000000
27.0000000	30.0000000	32.0000000	32.7680000	33.3330000	33.5544000	34.3680000	35.3280000
38.8800000	39.3216000	40.0000000	40.9600000	42.6600000	44.7360000	48.8960000	50.0000000
50.6880000	51.8400000	52.0000000	54.0000000	57.1429000	61.4400000	62.2080000	65.5360000
77.7600000							

Ordering Information

VX-703 1- E A T - K E A A - 39M3216000

Product
VCXO

Package
0: 5.0x7.5x2.0mm
1: 5.0x7.0x1.8mm (standard)

Voltage Options
D: +5 Vdc
E: +3.3 Vdc

Output
A: CMOS

Temp Range
T: 0/+70°C
U: 0/+85°C
I: -20/+85°C
E: -40/+85°C

Frequency in MHz

Enable/Disable Pin and Logic
A: Pin 2, EN=H (standard)
B: Pin 5 , EN=H
X: Pins 2/5 no connect

Initial Accuracy*
K: ±50 ppm (standard)
F: ±25 ppm
E: ±20 ppm

Temperature Stability*
K: ±50 ppm (standard)
F: ±25 ppm
E: ±20 ppm

Pull Range
K: ±50ppm APR (standard)
P: ±80ppm APR
S: ±100ppm APR[1]

**Note: not all combination of options are available. Other specifications may be available upon request. 1. For ±100ppm APR, "7031" package required.*

Example: VX-7031-EAE-KEFB-51M8400000

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