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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.

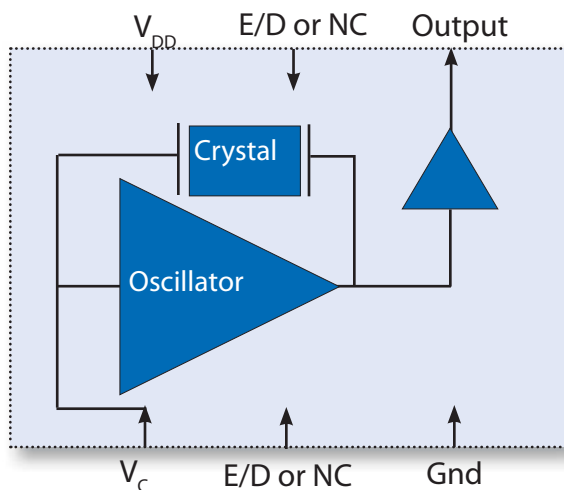
Features

- 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



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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 Stabilities⁵					
vs. operating temp. (Ordering Option)			±50		ppm
vs. initial accuracy @ $V_C = 1.65V$			±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 ^{2,4}	t_R			5	ns
Fall Time ^{2,4}	t_F			5	ns
Symmetry ²	SYM	45	50	55	%
Integrated Jitter ^{5,7} , RMS (12 kHz - 20 MHz)	ϕ_J			1.0	ps
Phase Noise ⁷ 10Hz 100Hz 1kHz 10kHz 100kHz 1MHz 10MHz			-55 -84 -113 -139 -151 -151 -151		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

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 $V_C = 0.3V$ 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.

Test Circuit

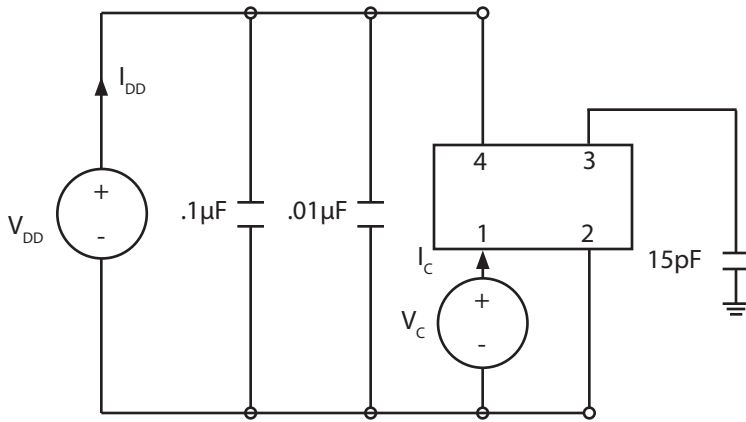


Fig 1: Test Circuit

Waveform

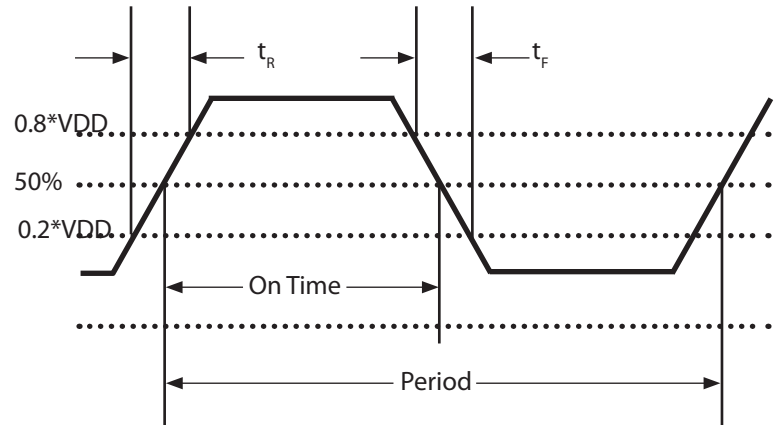


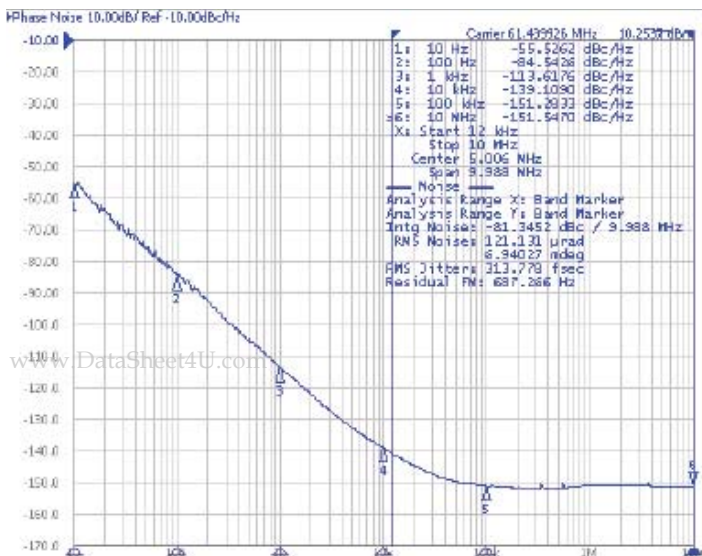
Fig 2: Waveform

Table 2. Absolute Maximum Ratings

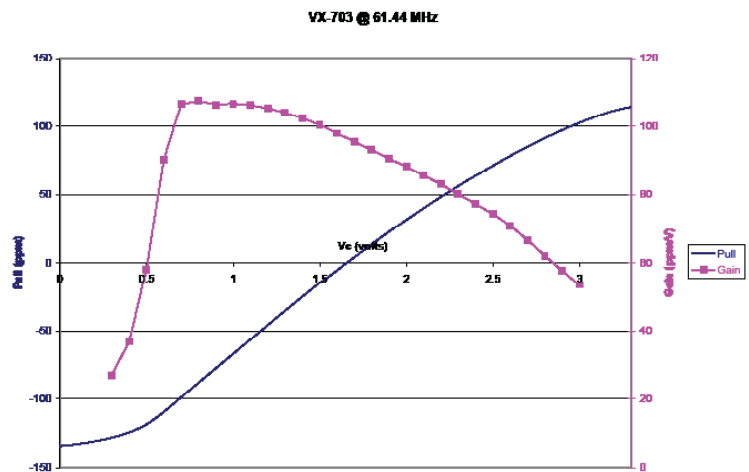
Parameter	Symbol	Ratings	Unit
Power Supply	V_{DD}	0 to 6	V
Voltage Control Range	V_C	0 to V_{DD}	V
Storage Temperature	TS	-55 to 125	°C
Soldering Temp/Time	T_{LS}	260 / 20	°C / sec

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 datasheet. 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.

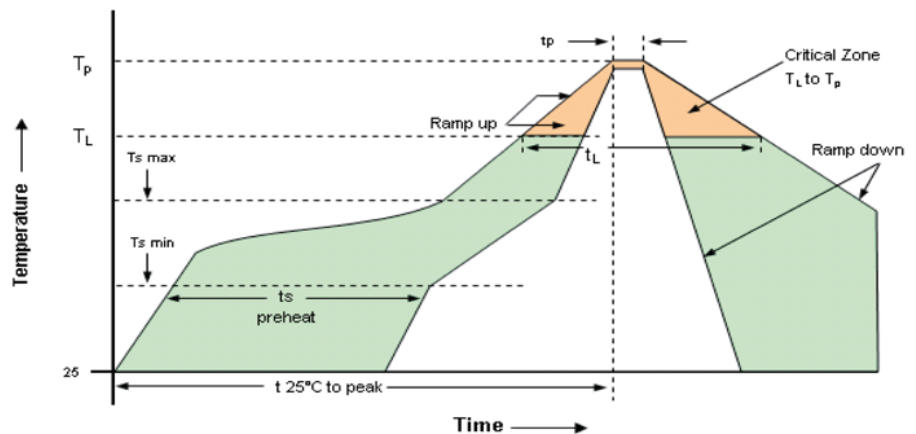
Table 4. ESD Ratings

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

Solderprofile:



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

Outline Drawing - Package "VX-7030"

Outline Drawing - Package "VX-7031"

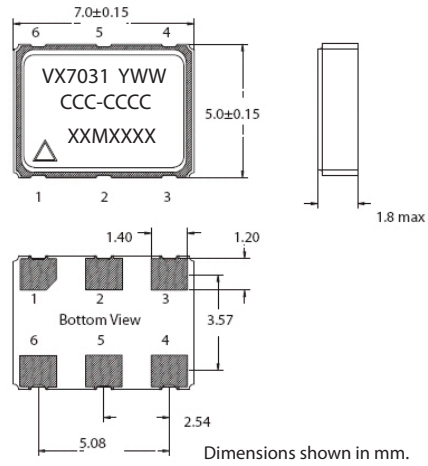
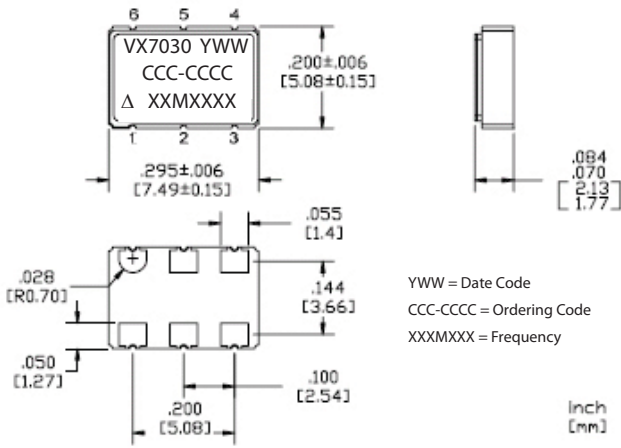
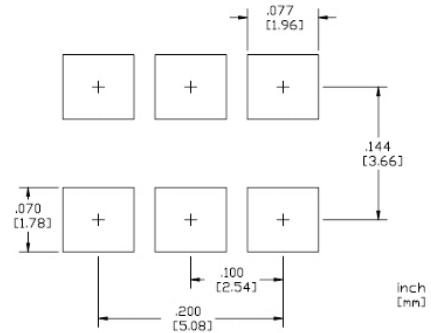


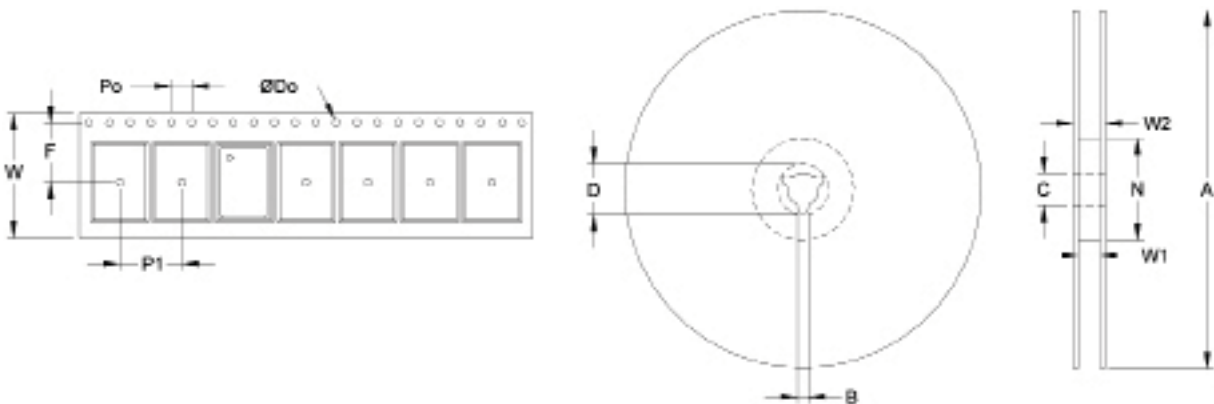
Table 6. Pin Out

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)



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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

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1.54400	2.04800	4.09600	6.17600	8.19200	10.00000	12.00000	12.28800
12.35200	13.00000	14.31800	15.44000	16.00000	16.38400	18.00000	18.43200
19.20000	19.44000	20.00000	20.48000	24.57600	24.70400	25.00000	27.00000
30.00000	32.00000	32.76800	34.36800	35.32800	38.88000	40.00000	40.96000
42.66000	44.73600	48.89600	50.00000	50.68800	51.84000	52.00000	54.00000
57.1429	62.20800	65.53600	77.76				

Ordering Information

VX-703 0- E A T - K E A A - 39M3216000

Product
VCXO

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

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

Output
A: CMOS

Temp Range
T: 0/70°C
U: 0/85°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
P: ±80ppm APR
S: ±100ppm APR¹

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

Example: VX-7030-EAE-KEFB-51M8400000

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