



Helping Customers Innovate, Improve & Grow



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

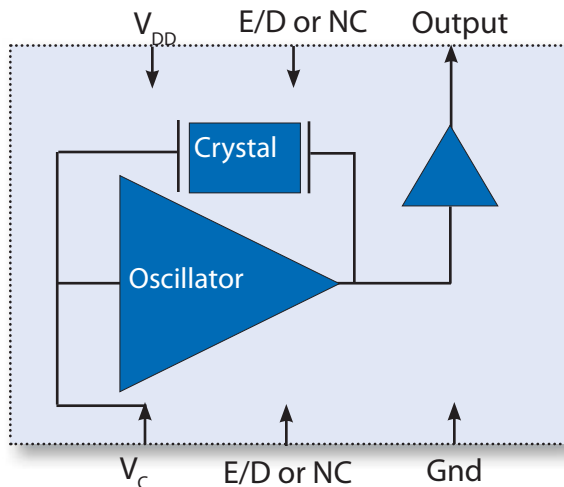
- CMOS output VCXO
- Output Frequencies from 1.544 MHz to 77.760 MHz
- 5.0 or 3.3 V Operation
- Fundamental Crystal Design with Low Jitter Performance
- Output Disable Feature
- Excellent ± 20 ppm Temperature Stability,
- 0/70°C or -40/85°C Operating Temperature
- Small Industry Standard Package, 5.0x7.0x1.8mm
- 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} , <i>ordering option</i> | APR | | ±50, ±80, ±100 | | ppm |
| Linearity ² | Lin | | 5 | 10 | % |
| Gain Transfer ² | K_V | | Positive, +65 | | ppm/V |
| Frequency Stabilities⁵ | | | | | |
| vs. operating temp. <i>ordering option</i> | | | ±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, 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) | ϕ_J | | 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 | M Ω uA |
| Control Voltage Modulation BW | BW | 10 | | | kHz |
| Operating Temp, <i>ordering option</i> | | | 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 $V_C = 0.3V$ 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.

9] Typical phase noise for the VX-7031package option which is recommended for best phase noise performance.

Test Circuit

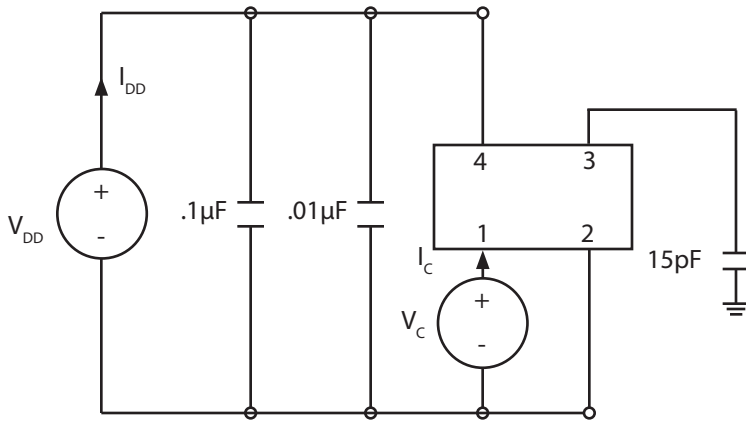


Fig 1: Test Circuit

Waveform

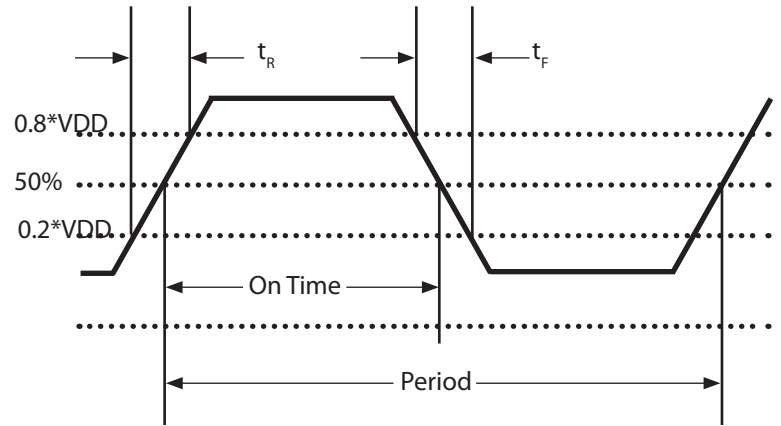


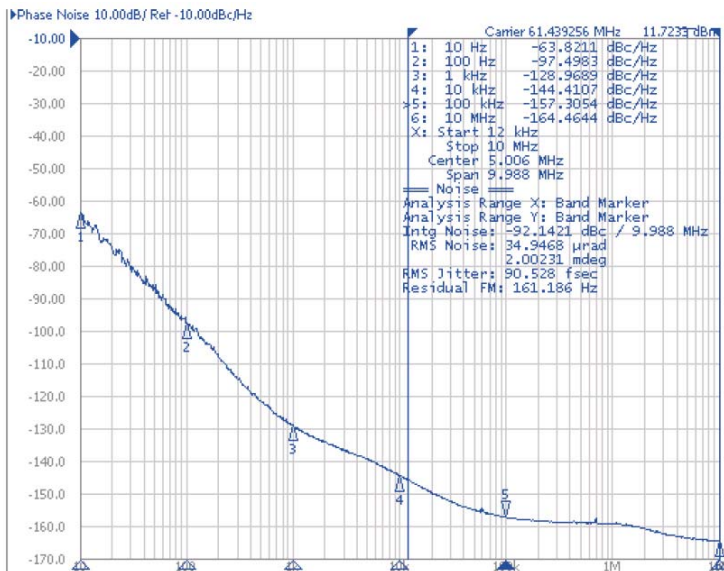
Fig 2: Waveform

Table 2. Absolute Maximum Ratings

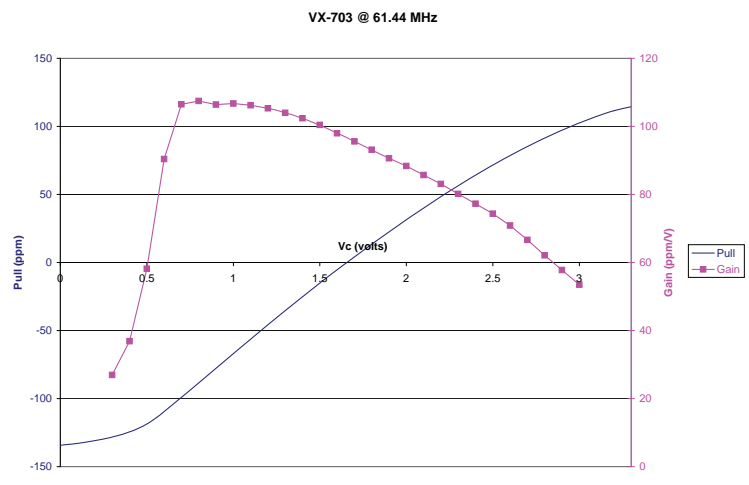
| Parameter | Symbol | Ratings | Unit |
|-----------------------|----------|---------------|----------|
| Power Supply | V_{DD} | 0 to 6 | V |
| Voltage Control Range | V_C | 0 to V_{DD} | V |
| Storage Temperature | TS | -55 to 125 | °C |
| Soldering Temp/Time | T_{LS} | 260 / 20 | °C / sec |

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 |

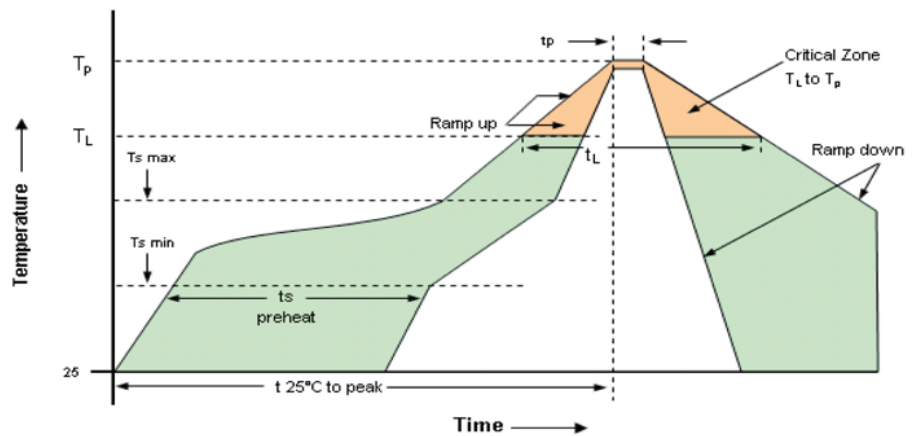
Table 5. Reflow Profile

| 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 |

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"

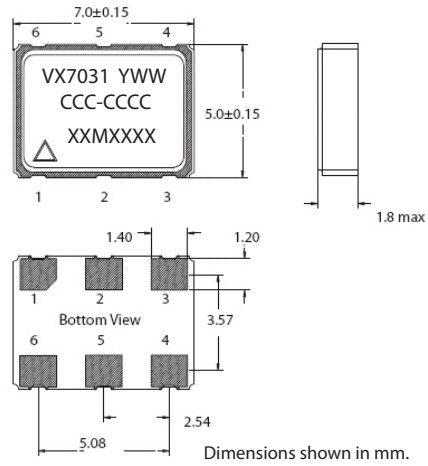
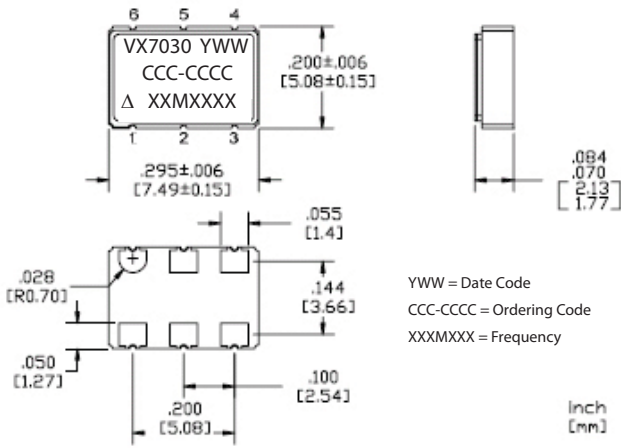
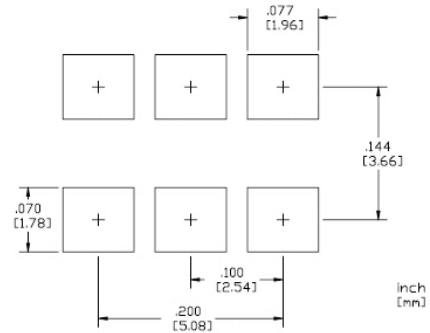


Table 6. Pin Out

| 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)

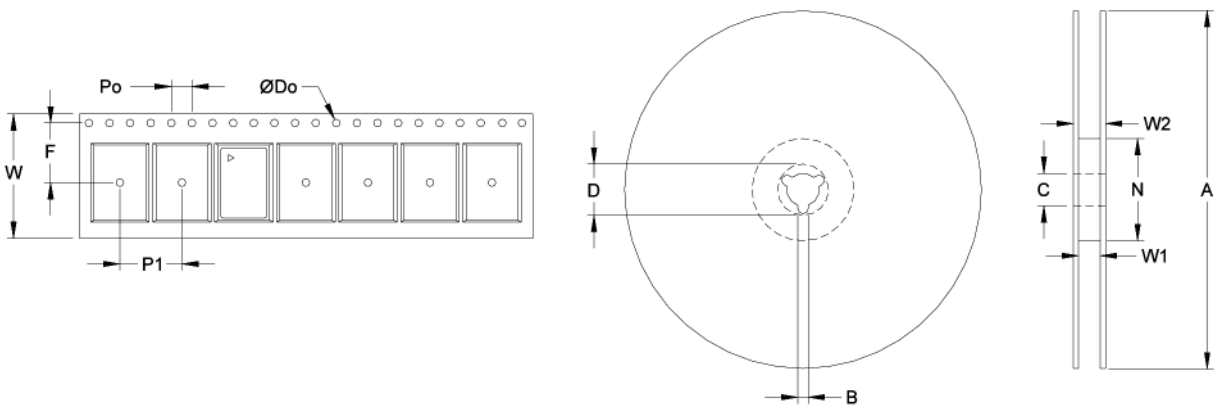


Table 7. Tape and Reel Information

| 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 | 10.00000000 | 12.00000000 | 12.28800000 |
| 12.35200000 | 13.00000000 | 14.31800000 | 15.44000000 | 16.00000000 | 16.38400000 | 18.00000000 | 18.43200000 |
| 19.20000000 | 19.44000000 | 19.51594000 | 20.00000000 | 20.48000000 | 24.57600000 | 24.70400000 | 25.00000000 |
| 27.00000000 | 30.00000000 | 32.00000000 | 32.76800000 | 33.33300000 | 33.55440000 | 34.36800000 | 35.32800000 |
| 38.88000000 | 39.32160000 | 40.00000000 | 40.96000000 | 42.66000000 | 44.73600000 | 48.89600000 | 50.00000000 |
| 50.68800000 | 51.84000000 | 52.00000000 | 54.00000000 | 57.14290000 | 61.44000000 | 62.20800000 | 65.53600000 |
| 77.76000000 | | | | | | | |

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 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-7031-EAE-KEFB-51M8400000

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