

Helping Customers Innovate, Improve & Grow



VV-701

Description

Vectron's VV-701 Voltage Controlled Crystal Oscillator (VCXO) is a quartz stabilized square wave generator with a CMOS output. The VV-701 uses fundamental crystals resulting in low jitter performance and a monolithic IC which improves reliability and reduces cost.

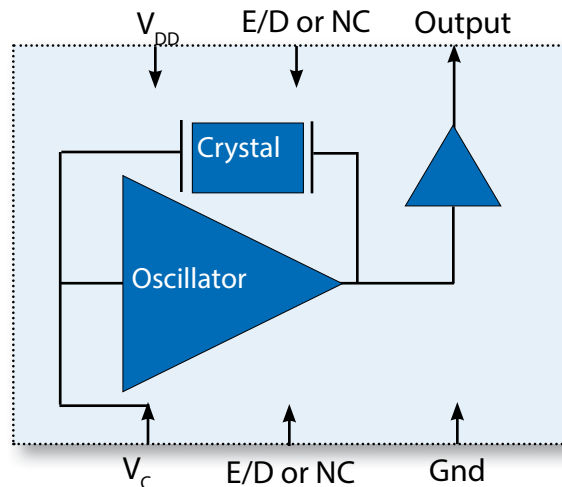
Features

- CMOS output VCXO
- Output Frequencies from 1.544 MHz to 77.760 MHz
- 5.0 or 3.3 V Operation
- High Impedance Control Voltage Option
- Fundamental Crystal Design with Low Jitter Performance
- Output Disable Feature
- Excellent 20ppm Temperature Stability,
- 0/70°C or -40/85°C Operating Temperature
- Small Industry Standard Package, 7.0x5.0x1.8mm
- Product is free of lead and compliant to EC RoHS Directive

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, 1.544-30MHz 30.001-50.000 50.001-77.760MHz 3.3V option, 1.544-30MHz 30.001-50.000 50.001-77.760MHz | I_{DD} | | | 10 12 18 5 9 14 | mA |
| Frequency | | | | | |
| Nominal Frequency ³ | f_N | 1.544 | | 77.760 | MHz |
| Pull Range ^{2,6} , <i>ordering option</i> | APR TPR | | $\pm 50, \pm 80, \pm 100$ $\pm 50, \pm 100, \pm 150$ | | ppm |
| Linearity ² | Lin | | 5 | | % |
| Gain Transfer ² | K_V | | Positive, +65 | | ppm/V |
| Temperature Stability | f_{STAB} | | ± 20 | | 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 | % |
| Period Jitter ^{5,7} , RMS (61.44 MHz) Peak-Peak (61.440MHz) | ϕ_J | | 3.0 23 | | ps |
| Jitter ⁸ , 12kHz-20MHz (61.44 MHz) | ϕ_J | | 90 | | fs |
| Phase Noise ⁸ 10Hz 100Hz 1kHz 10kHz 100kHz 1MHz 10MHz | | | -63 -97 -129 -144 -157 -159 -164 | | dBc/Hz |
| Control Voltage | | | | | |
| Control Voltage Range for Pull Range | V_C | 0.5 0.3 | | 4.5 3.0 | V |
| Control Voltage Input Impedance "E" Ordering option | Z_{IN} | 2 | 100 | | K Ω M Ω |
| Control Voltage Modulation BW | BW | 10 | | | kHz |
| Output Enable/Disable ⁹ Output Enabled Output Disabled | | $0.9 * V_{DD}$ | | $0.1 * V_{DD}$ | V |
| Start-Up Time | | | | 10 | ms |
| Operating Temp, <i>ordering option</i> | T_{OP} | 0/70 or -40/85 | | | $^{\circ}C$ |
| Package Size | | 7.0 x 5.0 x 1.8 | | | mm |

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 (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, guaranteed by design, verified at qualification.

6] Tested with $V_C = 0.3V$ to $3.0V$ unless otherwise stated in part description

7] Broadband Period Jitter measured using Wavcrest SIA3300C, 90K samples, see Application Note for Typical Phase Noise and Jitter Performance

8] Phase Noise is measured with an Agilent E5052A, see Application Note for Typical Phase Noise and Jitter Performance

9] The Output is Enabled if the Enable/Disable is left open.

Test Circuit

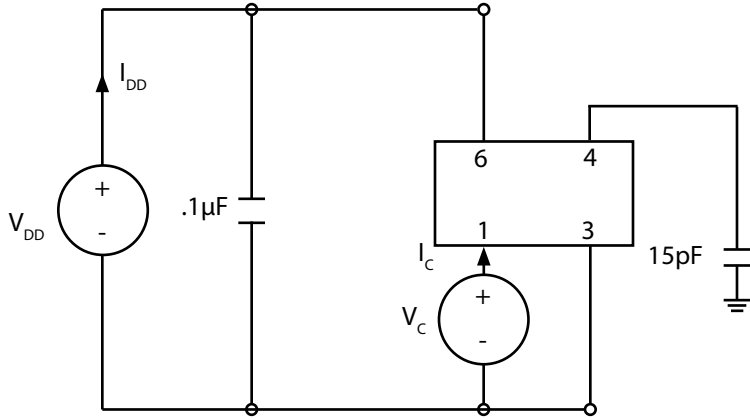


Fig 1: Test Circuit

Waveform

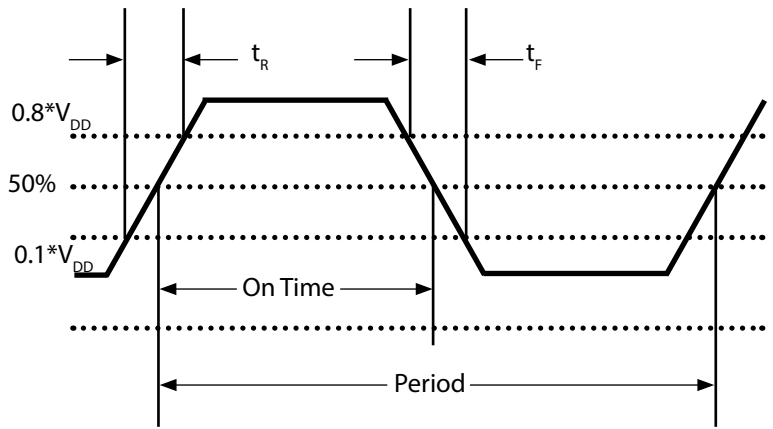


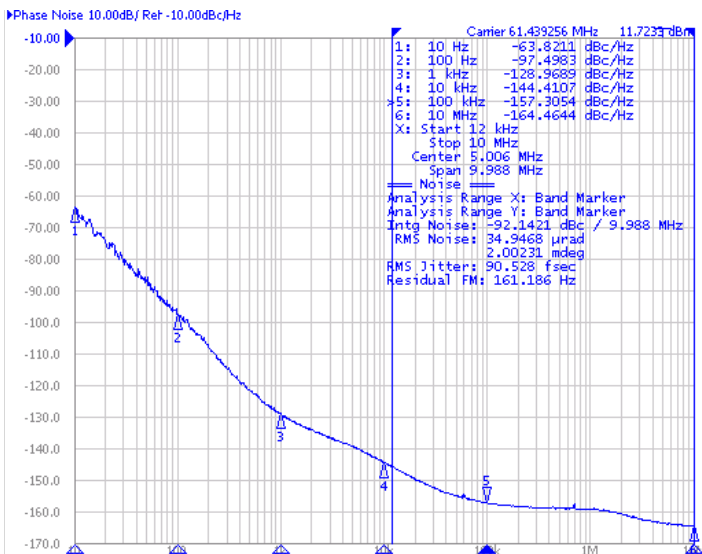
Fig 2: Output Waveform

Table 2. Absolute Maximum Ratings

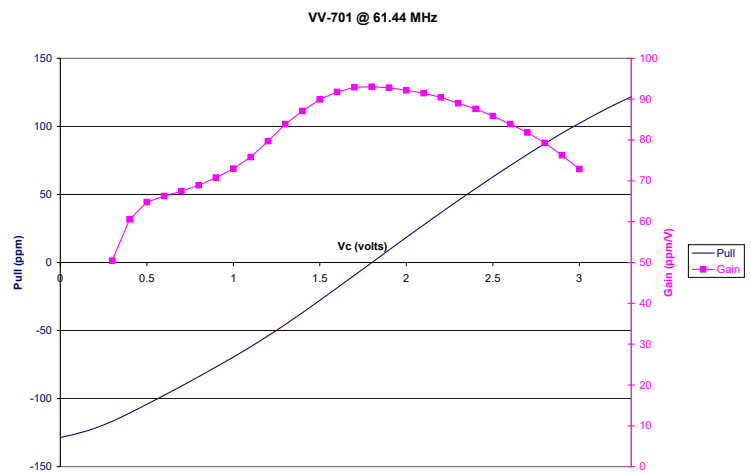
| Parameter | Symbol | Ratings | Unit |
|-----------------------|----------|---------------|----------|
| Power Supply | V_{CC} | 0 to 6 | V |
| Voltage Control Range | V_C | 0 to V_{CC} | V |
| Storage Temperature | TS | -55 to 125 | °C |
| Soldering Temp/Time | T_{LS} | 260 / 20 | °C / sec |

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

Vectron qualification includes aging at various extreme temperatures, shock and vibration, temperature cycling, and IR reflow simulation. The VV-701 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 VV-701 proper precautions should be taken when handling and mounting. Vectron 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 |

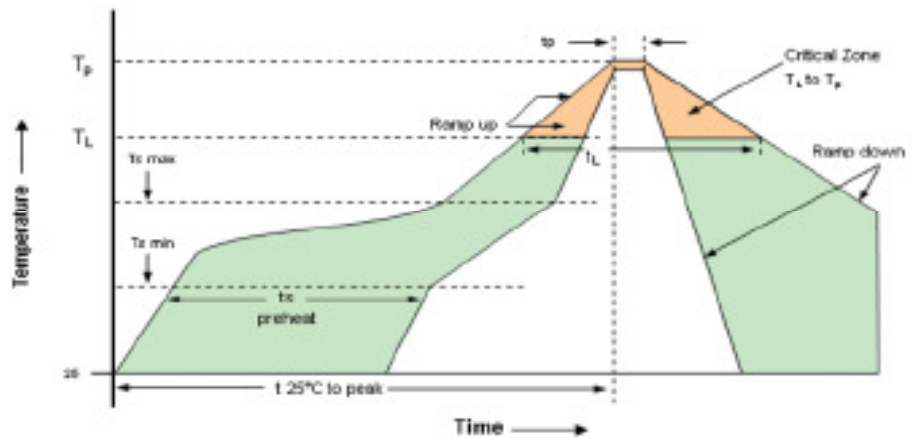
Table 5. Reflow Profile

| Parameter | Symbol | Value |
|----------------------------------|---------------------|---|
| PreHeat Time Ts-min Ts-max | t_s | 60 sec Min, 260 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 | 30 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 VV-701 device is hermetically sealed so an aqueous wash is not an issue.

Termination Plating:
Electrolytic Gold Plate over Electrolytic Nickel Plate



Outline Drawing & Pad Layout

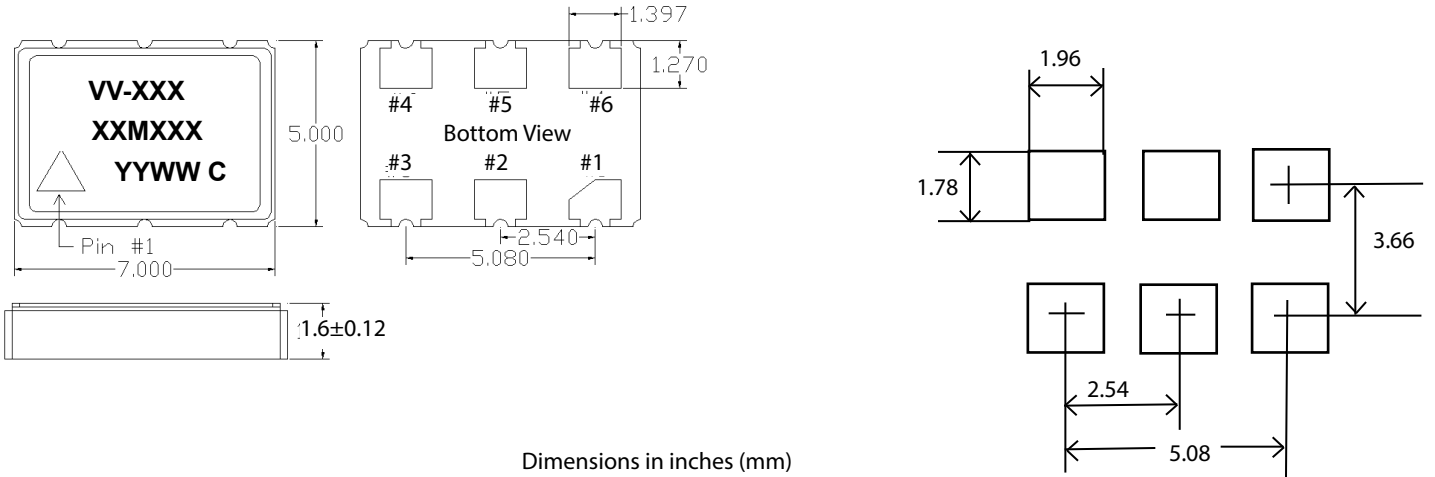


Table 6. Pin Out

| 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 |

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

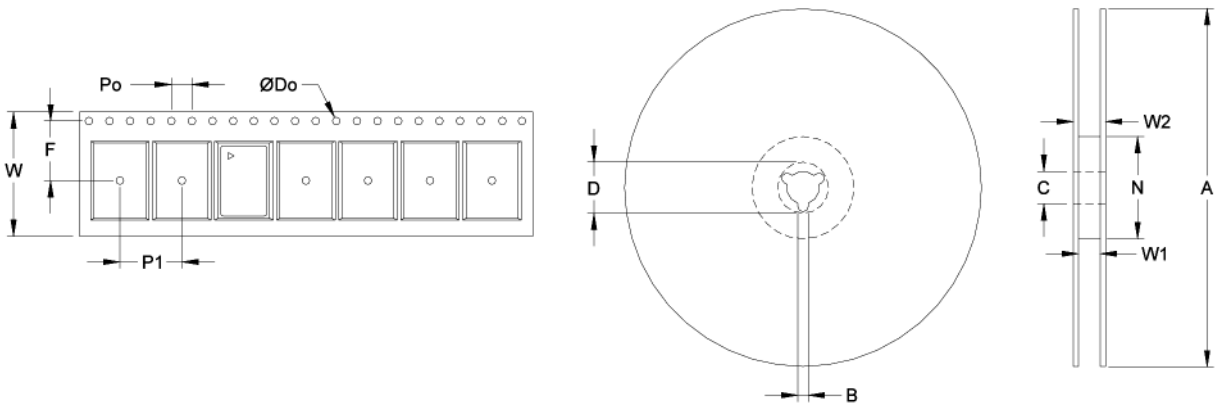


Table 7. Tape and Reel Information

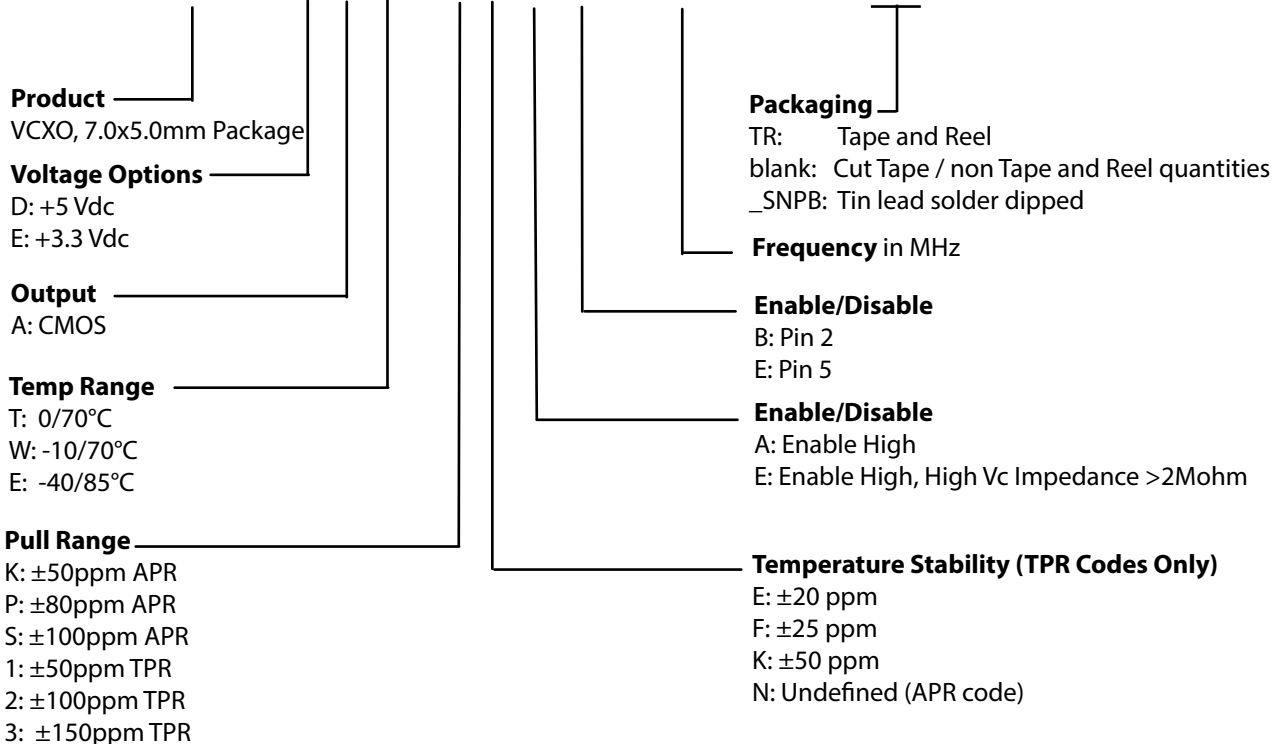
| Tape Dimensions (mm) | | | | | | Reel Dimensions (mm) | | | | | | | |
|----------------------|-----|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|-----|-----|------------|
| Dimension | W | F | Do | Po | P1 | A | B | C | D | N | W1 | W2 | # Per Reel |
| Tolerance | Typ | Typ | Typ | Typ | Typ | Typ | Min | Typ | Min | Min | Typ | Max | |
| VV-701 | 16 | 7.5 | 1.5 | 4 | 8 | 180 | 2 | 13 | 21 | 60 | 17 | 21 | 1000 |

Table 8. Standard Output Frequencies (MHz)

| | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 | | | | | |

Ordering Information

VV-701- D A T - K N A B- 39M3216000xx



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

Example:

VV-701-DAT-KNAB-39M3216000TR

VV-701-DAT-KNAB-39M3216000

VV-701-DAT-KNAB-39M3216000_SNPB

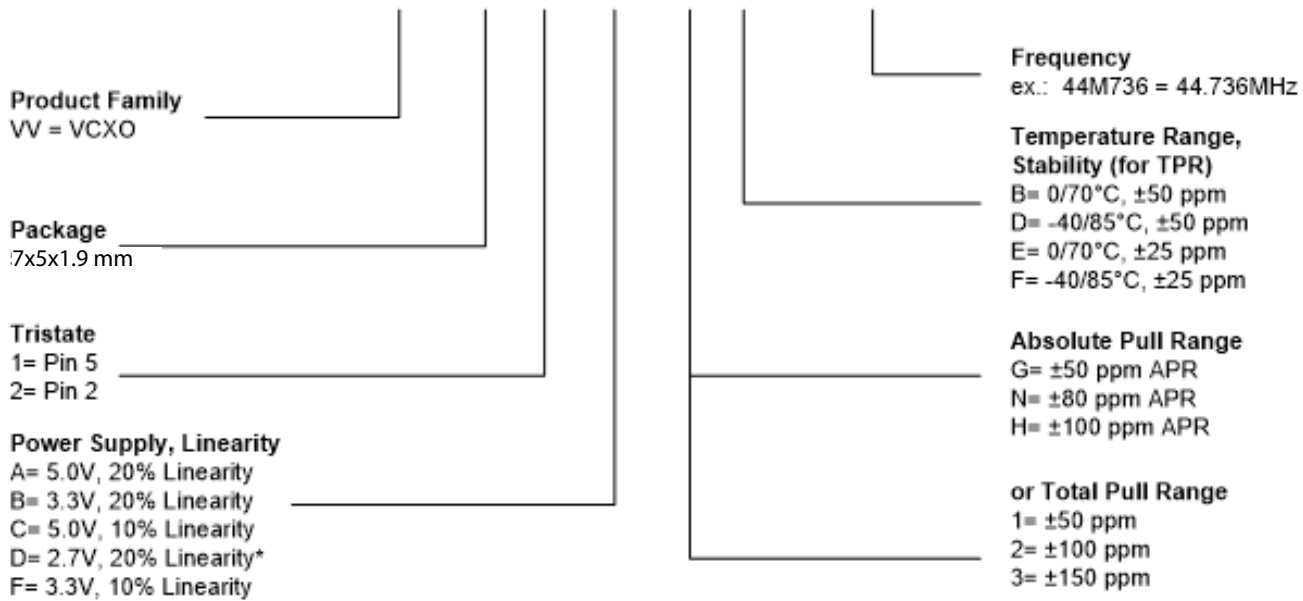
Tape and Reel

Cut Tape

Tin lead solder dipped

**Previous Ordering Information for Reference Only
Do Not Use to Build a New Part Number**

VVC1-BGE - xxMxxx



The ordering codes for the VVC1 were changed in 2016. If you had ordered a specific code based off this ordering method, it is still available for purchase under the old code however no new part numbers will be created using this system.

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