


## Helping Customers Innovate, Improve & Grow



### Description

Vectron's VV-800 Voltage Controlled Crystal Oscillator (VCXO) is a quartz stabilized square wave generator with a CMOS output. The VV-800 uses fundamental crystals resulting in low jitter performance and a monolithic IC which improves reliability and reduces cost.

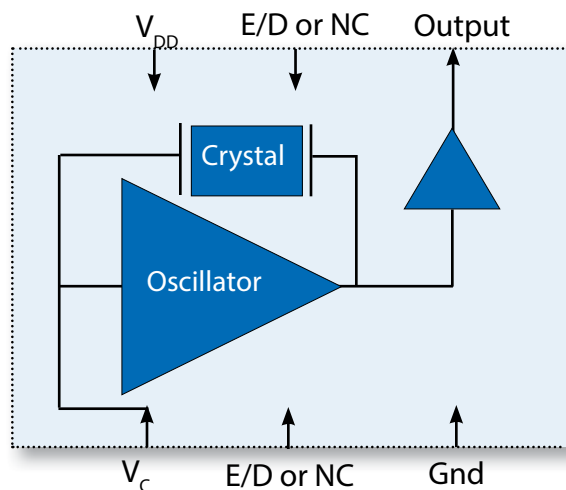
### Features

- 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 20ppm Temperature Stability
- -10/70°C or -40/85°C Operating Temperature
- Small Industry Standard Package, 3.2x5x1.2mm
- Hermetically Sealed
- 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
<b>Supply</b>					
Voltage <sup>1</sup> , 5V option 3.3V option	$V_{DD}$	4.750 3.135	5.0 3.3	5.250 3.465	V
Current <sup>2</sup> , 5V option 3.3V option	$I_{DD}$			25 15	mA
<b>Frequency</b>					
Nominal Frequency <sup>3</sup>	$f_N$	1.544		77.760	MHz
Pull Range <sup>2,6</sup> , <i>ordering option</i>	APR	±50, ±80, ±100			ppm
Linearity <sup>2</sup>	Lin		5		%
Gain Transfer <sup>2</sup> , 61.440MHz 30.720MHz	$K_V$		+80 +120		ppm/V
Temperature Stability	$f_{STAB}$		±20		ppm
<b>Outputs</b>					
Output Logic Levels <sup>2</sup> Output Logic High Output Logic Low	$V_{OH}$ $V_{OL}$	0.9* $V_{DD}$		0.1* $V_{DD}$	V
Load	$I_{OUT}$			15	pF
Rise Time <sup>2,4</sup>	$t_R$			5	ns
Fall Time <sup>2,4</sup>	$t_F$			5	ns
Symmetry <sup>2</sup>	SYM	45	50	55	%
Period Jitter <sup>5,7</sup> , RMS (61.44 MHz)	$\phi_J$		3.0		ps
Period Jitter <sup>5,7</sup> , Peak - Peak (61.44MHz)	$\phi_J$		23		ps
Phase Noise <sup>8</sup> 10Hz 100Hz 1kHz 10kHz 100kHz 1MHz 10MHz			-63 -97 -129 -144 -157 -159 -164		dBc/Hz
<b>Control Voltage</b>					
Control Voltage Range for Pull Range	$V_C$	0.5 0.3		4.5 3.0	V
Control Voltage Input Impedance "E" Ordering Option, +3.3V only	$Z_{IN}$	2	100		K $\Omega$ M $\Omega$
Control Voltage Modulation BW	BW	10			kHz
Output Enable/Disable <sup>9</sup> Output Enabled Output Disabled	$V_{IH}$ $V_{IL}$	0.9* $V_{DD}$		0.1* $V_{DD}$	V
Start-Up Time	$T_{SU}$			10	ms
Operating Temp, Ordering Option	$T_{OP}$	0/70 or -40/85			°C
Package Size		5.0 x 3.2 x 1.2			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 in Figure 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 Wavecrest SIA3300C, 90K samples.
- 8] Phase Noise is measured with an Agilent E5052A.
- 9] The Output is Enabled if the Enable/Disable is left open.

## Test Circuit

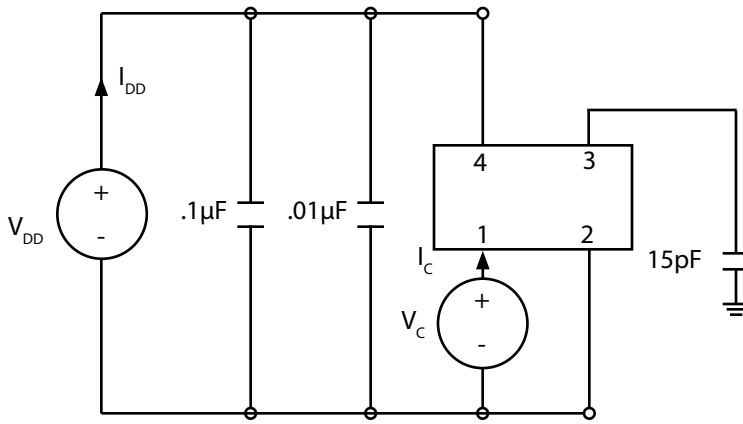


Fig 1: Test Circuit

## Waveform

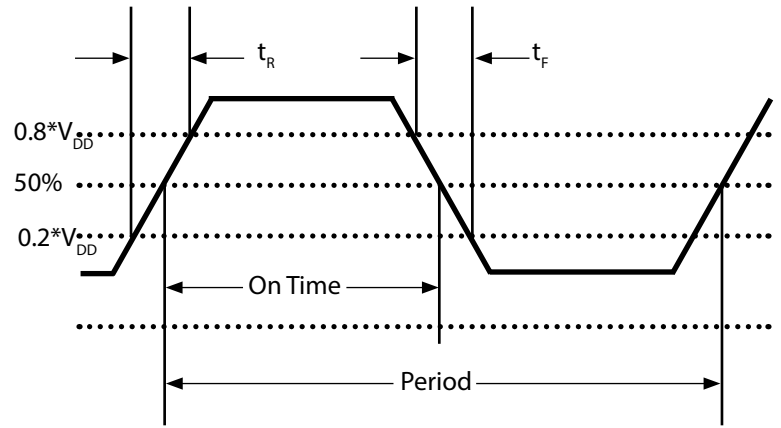


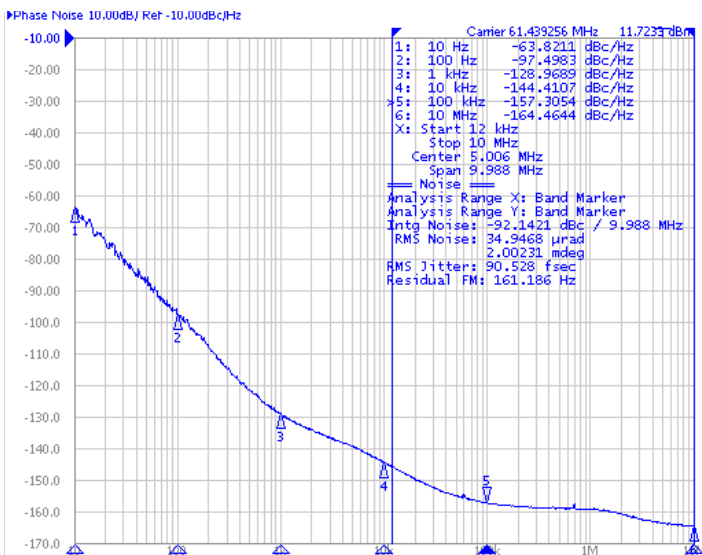
Fig 2: Waveform

Table 2. Absolute Maximum Ratings

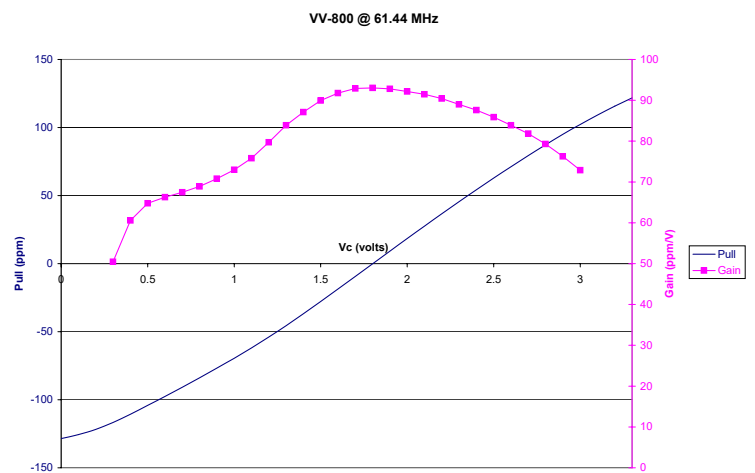
Parameter	Symbol	Ratings	Unit
Power Supply	$V_{DD}$	0 to 6	V
Voltage Control Range	$V_C$	0 to $V_{CC}$	V
Storage Temperature	TS	-55 to 125	°C
Soldering Temp/Time	$T_{LS}$	260 / 20	°C / sec

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

VI qualification includes aging at various extreme temperatures, shock and vibration, temperature cycling, and IR reflow simulation. The VV-800 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-800 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

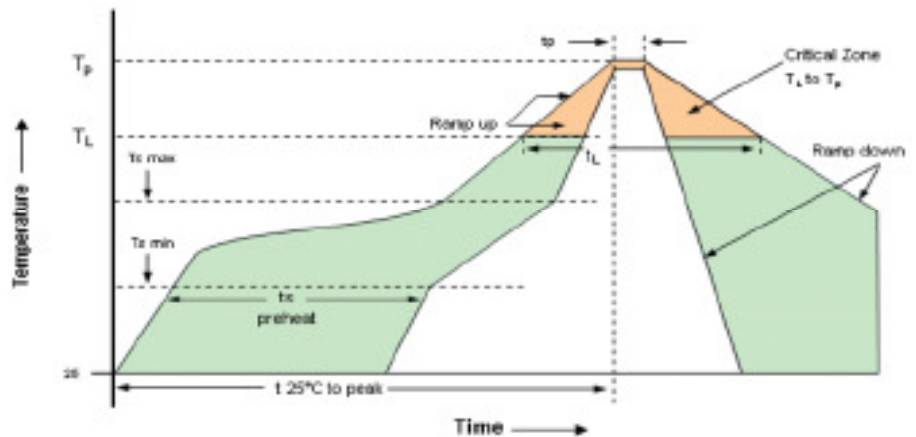
**Table 5. Reflow Profile**

Parameter	Symbol	Value
PreHeat Time	$t_s$	60 sec Min, 260 sec Max
Ramp Up	$R_{UP}$	3 °C/sec Max
Time Above 217 °C	$t_L$	60 sec Min, 150 sec Max
Time To Peak Temperature	$T_{AMB-P}$	480 sec Max
Time at 260 °C	$t_p$	30 sec Max
Ramp Down	$R_{DN}$	6 °C/sec Max

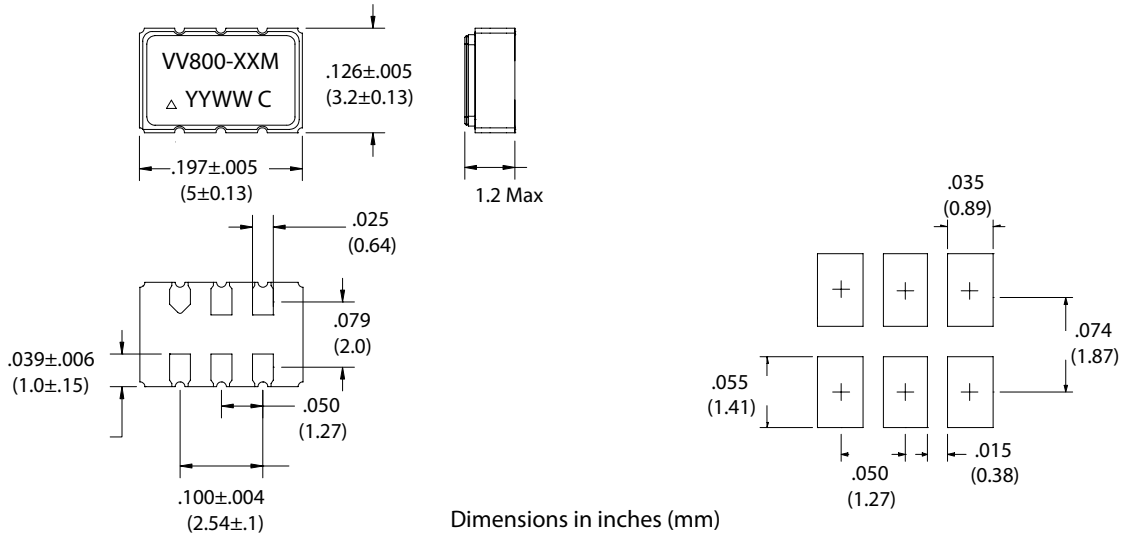
The device is qualified to meet the JEDEC standard for Pb-Free assembly. The temperatures and time intervals listed are based on the Pb-Free small body requirements. The VV-800 device is hermetically sealed so an aqueous wash is not an issue.

Termination Plating:  
Electroless Gold Plate over Nickel Plate

**Solderprofile:**



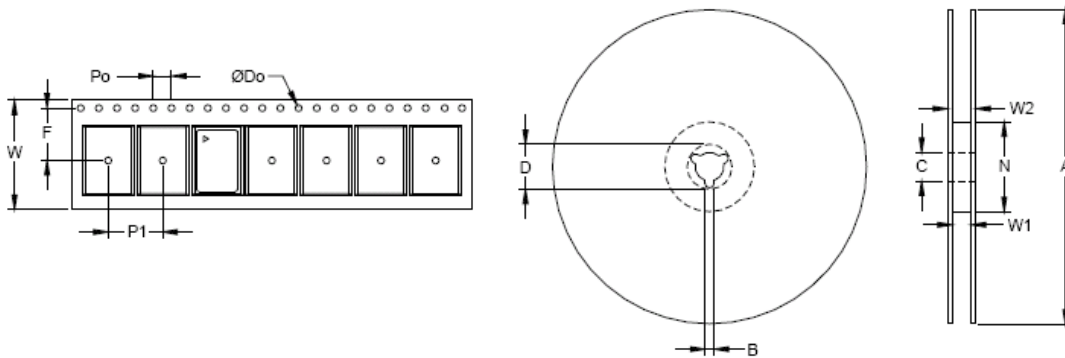
## Outline Drawing & Pad Layout



**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**

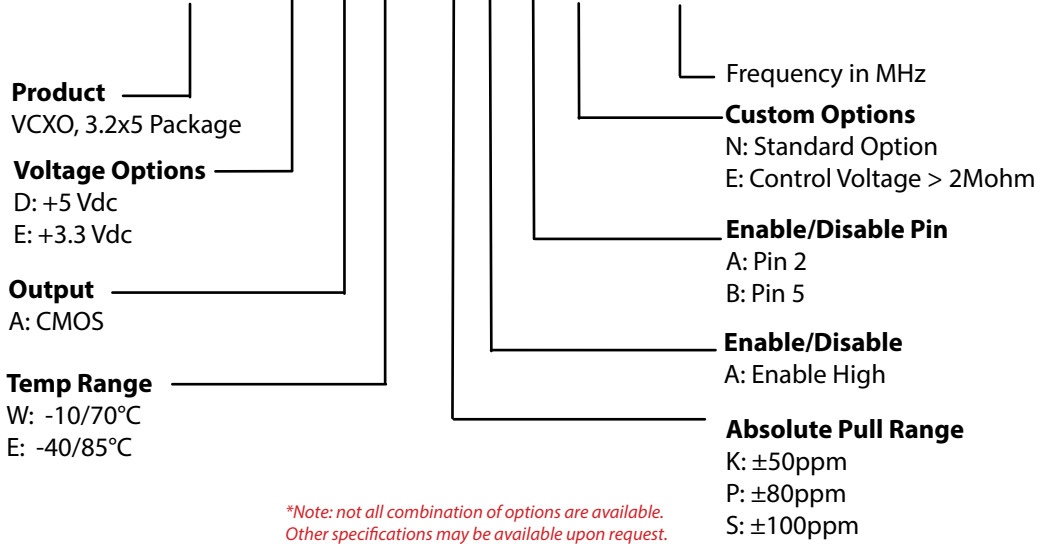
Tape Dimensions (mm)						Reel Dimensions (mm)							
Dimension	W	F	Do	Po	P1	A	B	C	D	N	W1	W2	# Per Reel
Tolerance	Typ	Typ	Typ	Typ	Typ	Typ	Min	Typ	Min	Min	Typ	Max	
VV-800	12	5.5	1.5	4	8	178	1.78	13	20.6	55	12.4	22.4	500

**Table 8. Standard Output Frequencies (MHz)**

3.600000	4.096000	8.192000	10.000000	12.960000	13.500000	14.318180	15.360000
16.000000	16.384000	19.200000	19.440000	20.000000	25.000000	26.000000	27.000000
28.37500	30.720000	32.768000	34.560000	38.400000	38.785000	39.321600	40.000000
44.736000	45.000000	50.000000	51.840000	62.208000	65.468000	70.000000	74.175800
74.528000	77.760000						

**Ordering Information**

**VV-800- D A W - K A A N- 39M3216000**



**Example: VV-800-EAE-KAAN-51M8400000**

\* Add **\_SNPBDIP** for tin lead solder dip  
Example: VV-800-EAE-KAAN-51M8400000\_**\_SNPBDIP**

**Revision History**

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



**Microsemi Headquarters**

One Enterprise, Aliso Viejo, CA 92656 USA  
Within the USA: +1 (800) 713-4113  
Outside the USA: +1 (949) 380-6100  
Sales: +1 (949) 380-6136  
Fax: +1 (949) 215-4996  
email: [salos.support@microsemi.com](mailto:salos.support@microsemi.com)  
[www.microsemi.com](http://www.microsemi.com)

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