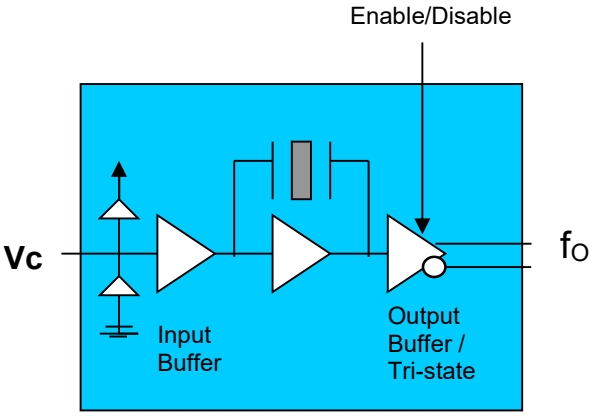
VX-716

Voltage Controlled Crystal Oscillator

The VX-716 Voltage Controlled Crystal Oscillator



Features

- Low jitter 51fs typ, 12kHz-20MHz
- 3.3V operation
- Linearity ≤ 10%
- Tri-State Output
- LVPECL Output
- 0/70 to -40/105 °C temp ranges
- Hermetically sealed ceramic SMD package

Product is compliant to RoHS directive and fully compatible with lead free assembly (Excluding solder dipped, _SNPB, option)

Applications

- 5G
- 1588, Synchronous Ethernet
- Frequency Translation
- Clock Clean-Up

Description

Vectron's VX-716 Voltage Controlled Crystal Oscillator (VCXO) is a quartz stabilized square wave generator with frequency adjustment for use in a PLL for clock clean-up and frequency applications.

Performance Specifications

Table 1. Electrical Performance, LVPECL Output

Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_O	100		250	MHz
Supply Voltage [1]	V_{DD}	2.97	3.3	3.63	V
Maximum Supply Voltage Non Operating		-0.3		4.5	
Supply Current	I_{DD}			81	mA
Output Logic Levels Output Logic High[2] Output Logic Low[2]	 V_{OH} V_{OL}	 2.2		 1.8	 V V
Transition Times Rise Time[2] Fall Time[2]	 t_R t_F			 400 400	 ps ps
Load			50		Ohms
Tristate Output Enabled Output Disabled	 V_{IN} V_{IL}	 0.7*V_{DD}		 0.3*V_{DD}	 V V
Duty Cycle[3]	SYM	45	50	55	%
Test Conditions for APR	V_C	0.3		3.0	V
Maximum Control Voltage		-0.3		V_{DD}+0.3	
Absolute Pull Range, Ordering Option	APR	±30, ±50, ±100			ppm
Gain Transfer		Positive			ppm/V
Input Impedance		10			MOhm
Control Voltage Bandwidth (-3dB)	BW	25			kHz
Phase Noise[4] 122.880MHz 10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz 10 MHz 20 MHz			 -69 -97 -127 -151 -161 -162 -164 -165		dBc/Hz
Phase Jitter, 12kHz-20MHz			51		fs
Start-Up Time	T_{SU}			5	ms
Operating Temperature, Ordering Option		0/70, -10/70, -40/85, -40/105			°C
Package Size		7.0x5.0			mm

1. A 0.01uF and a 0.1uF capacitor should be located as close to the supply as possible (to ground) is recommended.
2. Figure 3 defines these parameters, tested under a Figure 2 conditions.
3. Duty Cycle is defined as on time divided by period, as defined in Figure 3.
4. Measured using an E5502B or equivalent at room temperature.

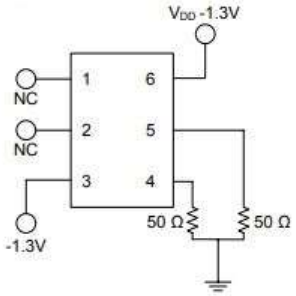


Figure 1

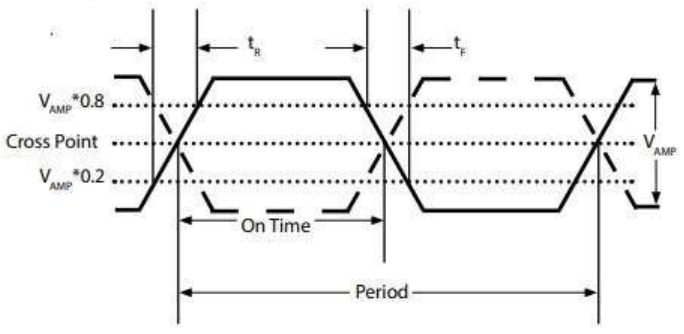
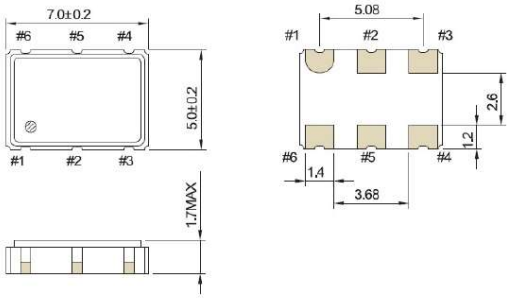


Figure 2

Outline Diagram, Pad Layout and Pin Out



Marking

VX-716-XXX
XXXMXX
Δ YYWW M

where
VX-716-XXX = Part Number
XXXMXX = Frequency, eg 122M88 = 122.88 MHz
YY = Year
WW = Week
M = Manufacturing Location
Δ = Pin 1

Dimensions in mm

Table 2. LVPECL Pinout

Pin #	Symbol	Function
1	V_C	VCXO Control Voltage
2	E/D	Logic low disables output Logic high or no connection enables output waveform
3	GND	Ground
4	f_O	Output Frequency
5	fo	Complementary Output
6	V_{DD}	Supply Voltage

Table 3. Enable/Disable Function

E/D	Output
High	Clock Output(s)
Open	Clock Output(s)
Low	High Impedance

Tape and Reel

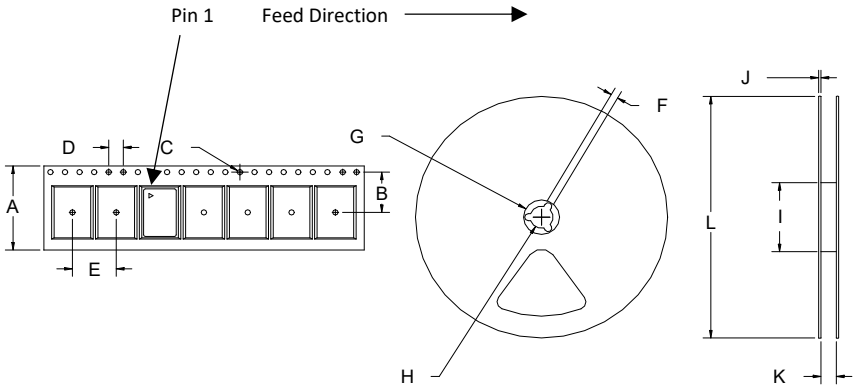


Table 4. Tape and Reel
Tape and Reel Dimensions (mm)

Tape Dimensions						Reel Dimensions							# Per
Product	A	B	C	D	E	F	G	H	I	J	K	L	Reel
VX-716	16	7.5	1.5	8	8	2		21	60	1.2	17	180	1000

Absolute Maximum Ratings

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.

Table 5. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Storage Temperature	Tstorage	-55/125	°C
Maximum Junction Température		150	°C

Reliability

The VX-716 is capable of meeting the following qualification tests.

Table 6. 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 2016
Moisture Sensitivity Level	MSL1
Contact Pads	Gold (0.3um to 1.0um) over nickel, ENIG
Contact Pads _SNPB option	Tinned using SN63PB37 solder alloy in accordance with J-STD-006

Handling Precautions

Although ESD protection circuitry has been designed into the the VX-716, proper precautions should be taken when handling and mounting. Microchip employs a Human Body Model and a Charged-Device Model (CDM) for ESD susceptibility testing and design protection evaluation. ESD thresholds are dependent on the circuit parameters used to define the model. Although no industry wide standard has been adopted for the CDM, a standard HBM of resistance = 1.5kohms and capacitance = 100pF is widely used and therefore can be used for comparison purposes.

Table 7. ESD Ratings

Model	Minimum	Conditions
Human Body Model		MIL-STD-883 Method 3115
Charged Device Model		JESD 22-C101

The VX-716 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 and parameters are listed in the table below. The contact pads are gold over nickel so lower IR reflow temperatures such as 220°C can be used (device is backwards compatible with a lead solder assembly). The VX-716 is hermetically sealed so an aqueous wash is not an issue.

NOTE: Devices which have been solder dipped, _SNPB, will not be Pb-free.

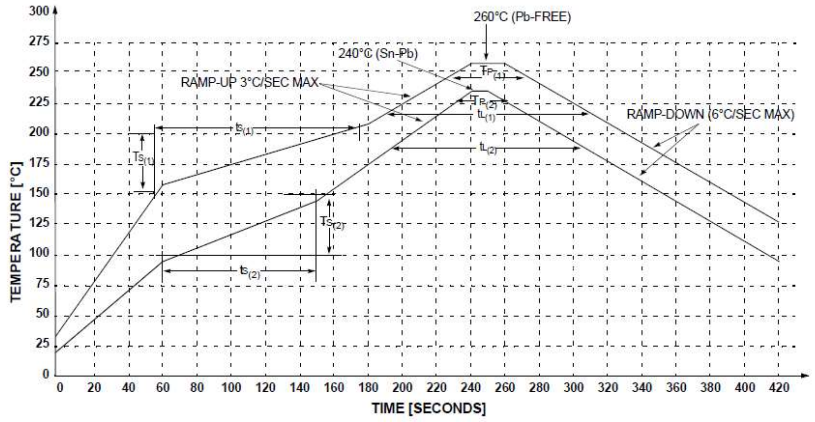


Table 11. Reflow Profile (IPC/JEDEC J-STD-020)

Symbol	Min – Max, C	Conditions
$Ts_{(1)}$	150 ~ 200	Pb-free Option
$Ts_{(2)}$	100 ~ 150	_SNPB Option
$ts_{(1)}$	60 ~ 180	Pb-free Option
$ts_{(2)}$	60 ~ 120	_SNPB Option
$tl_{(1)}$	60 ~ 150	Pb-free Option
$tl_{(2)}$	60 ~ 150	_SNPB Option
$Tp_{(1)}$	245 ~ 260	Pb-free Option
$Tp_{(2)}$	225 ~ 240	_SNPB Option

Ordering Information

VX-716-ECE-KEAN-125M000000xx

Product
VCXO, 7.0x5.0mm Ceramic

Voltage
E = +3.3V

Output
C = LVPECL

Temperature Range
T = 0/70°C
W = -10/70°C
E = -40/85°C
F = -40/105°C

Absolute Pull Range
G = ±30 ppm APR
K = ±50 ppm APR
S = ±100 ppm APR

Packaging
TR = Tape and Reel
Blank = Cut Tape / non TR Quantities
_SNPB = Tin Lead Solder Dipped

Frequency in MHz

Other (Future Use)
N = Standard

Enable Disable Logic
A = Output Enabled Logic High or Open

Temperature Stability
X = Standard
E = ±20 ppm

Revision History		
Date	Approved	DescriptioOCtn
Oct 18, 2023		Review

Preliminary