VSS4 series

3.3 Volt Spread Spectrum CMOS Oscillator



The VSS4 Spread Spectrum Crystal Oscillator

Features

- CMOS output
- Output frequencies to 168 MHz
- Tri-state output for board test and debug
- -10/70 or –40/85 °C operating temperature
- Gold over nickel contact pads
- Hermetically sealed ceramic SMD package
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- Printers, Copiers, Scanners
- Cable Modems, Set Top Box
- DVD, Blue Ray Disc players
- Computer Peripherals, CPU, Graphic Cards
- LCD Displays
- GPS
- Video Surveillance
- Games

Description

Vectron's VSS4 Crystal Oscillator (XO) is quartz stabilized square wave generator with a CMOS output incorporating spread spectrum technology, operating off a 3.3 volt supply.

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Performance Characteristics

Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_O	12		168	MHz
Operating Supply Voltage [1]	V_{DD}	3.135	3.3	3.465	V
Absolute Maximum Operating Voltage		-0.5		4.0	V
Supply Current, Output Enabled 12.00 to 27.999 MHz 28 to 79.999 MHz 80 to 168 MHz	I_{DD}			 13 15 30	mA
Supply Current, Output disabled	I_{DD}			50	uA
Output Logic Levels Output Logic High [2] Output Logic Low [2] Output Logic High Drive Output Logic Low Drive	 V_{OH} V_{OL} I_{OH} I_{OL}	 0.9*V_{DD} 8 8		 0.1*V_{DD}	 V V mA mA
Output Rise/Fall Time [2]	t_R/t_F			5	ns
Duty Cycle [3]	SYM	40		60	%
Operating Temperature (*ordering option*)		-10/70 or –40/85			°C
Storage Temperature		-40		85	°C
Stability [4] (*ordering option)*		±50, ±100			ppm
Spread, Center or Down (*ordering option*)		±0.5,±1,±2,±4			%
Cycle-Cycle Jitter, F_{OUT} <=19.999MHz F_{OUT}>20MHz				200 100	ps
Output Enable/Disable [5] Output Enabled Output Disabled		 2.64		 0.66	V
Internal Enable Pull-Up resistor [5]			25		Kohm
Start-up time				10	ms

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. Figure 4 illustrates the operating conditions under which these parameters are tested and specified. For Fo>90MHz, rise and fall time is measured 20 to 80%.
3. Symmetry is measured defined as On Time/Period.
4. Includes calibration tolerance, operating temperature, supply voltage variations, aging and shock and vibration (not under operation).
5. Output will be enabled if enable/disable is left open.

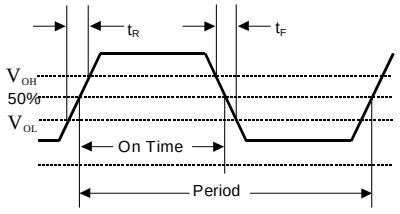


Figure 2. Output Waveform

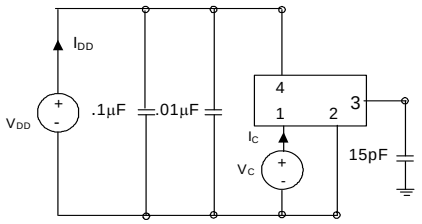


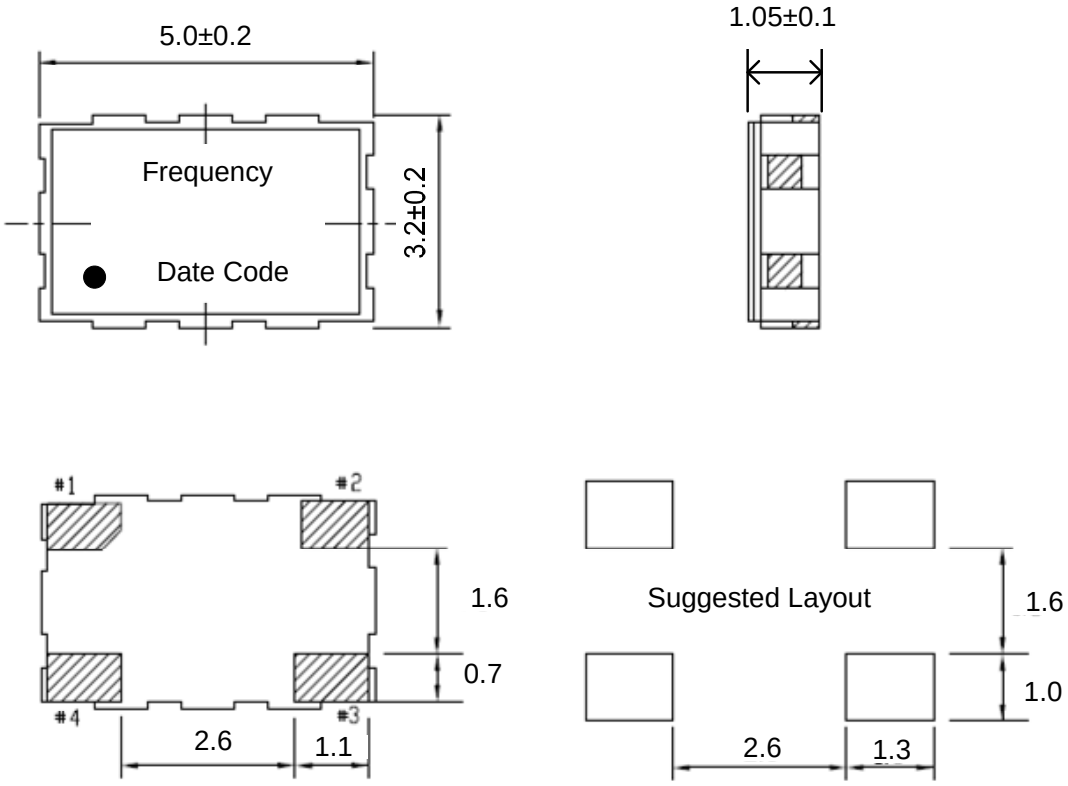
Figure 3. Typical Output Test Conditions (25±5°C)

Enable/Disable Functional Description

Under normal operation the Enable/Disable is left open or set to a logic high state. When the E/D is set to a logic low, the oscillator stops and the output is in a high impedance state. This helps reduce power consumption as well as facilitating board testing and troubleshooting.

Table 2. Outline Diagrams, Pad Layout and Pin Out

Pin #	Symbol	Function
1	E/D	Enable/Disable
2	GND	Electrical and Case Ground
3	f_O	Output Frequency
4	V_{DD}	Supply Voltage



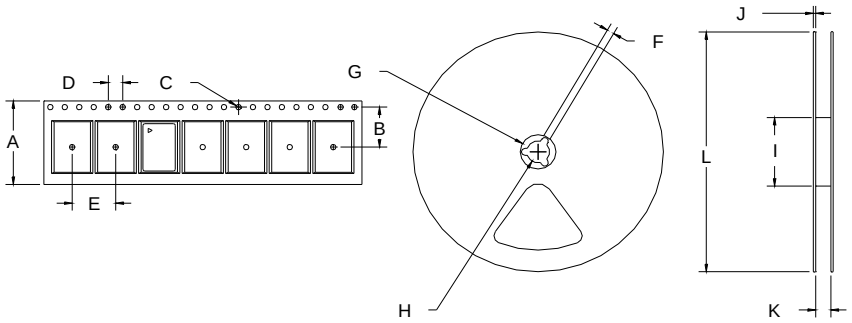
Devices will be marked with pin 1, frequency and date code

Contact Pads are gold over nickel

Figure 3, Package drawing

Tape and Reel

Table 3: Tape and Reel Dimensions (mm)													
Tape Dimensions						Reel Dimensions							# Per
Product	A	B	C	D	E	F	G	H	I	J	K	L	Reel
VSS4	12	5.5	1.55	4	8	2.2	20	13	62	2.2	12.4	180	1000



Reliability

The VSS4 qualification testing will include:

Table 4. Environnemental Compliance	
Parameter	Conditions
Mechanical Shock	MIL-STD-883 Method 2002
Mechanical Vibration	MIL-STD-883 Method 2007
Temperature Cycle	MIL-STD-883 Method 1010
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	MSL1

Handling Precautions

Although ESD protection circuitry has been designed into the the VSS4, proper precautions should be taken when handling and mounting. VI 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 5. ESD Ratings		
Model	Minimum	Conditions
Human Body Model	1000	MIL-STD-883 Method 3115
Charged Device Model	500	JESD 22-C101

Suggested IR profile

Devices are built using lead free epoxy and can be subjected to standard lead free IR reflow conditions, Table 6 shows max temperatures and lower temperatures can also be used e.g. peak temperature of 220C.

Table 6. Reflow Profile (IPC/JEDEC J-STD-020CurrentRev)

Parameter	Symbol	Value
Time At 260 °C (max)	$T1/t_1$	10 sec Max
Time At 225 °C (max)	$T2/t_2$	60 sec Max
Ramp Down	R_{DN}	6 °C/sec Max

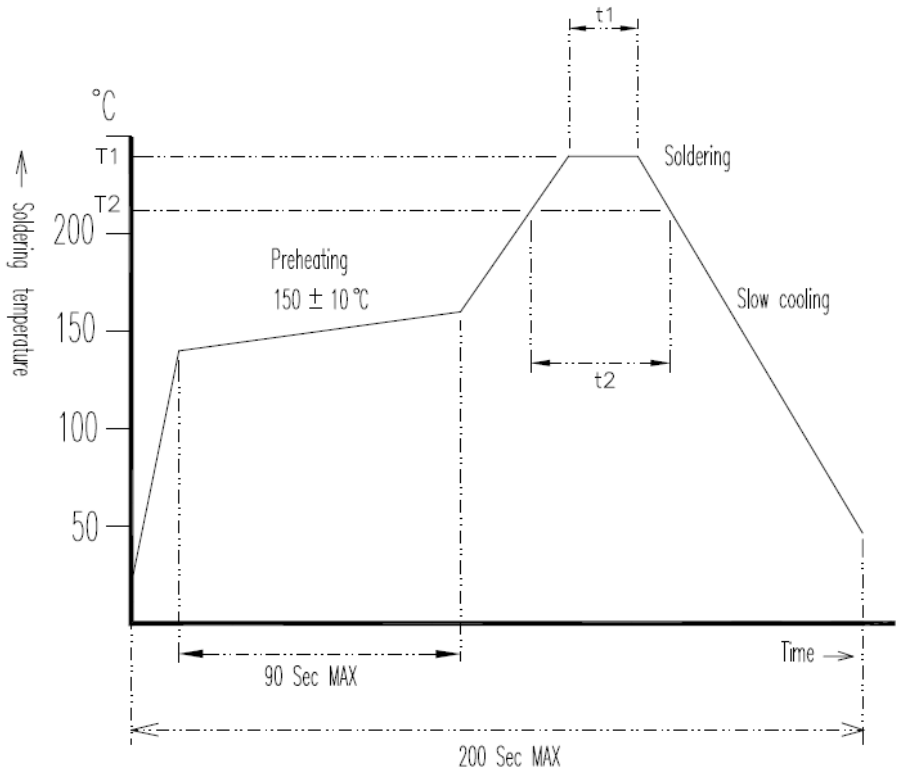


Table 7. Standard Frequencies (MHz)

25.000	29.412	33.000	50.000						

Other frequencies may be available upon request. Standard frequencies are frequencies which the crystal has been designed and does not imply a stock position.

Ordering Information

VSS4 - B 1 C - 25M00

Product Family

Spread Spectrum XO, 5x3.2

Voltage Options

B: +3.3 Vdc ±5%

Spread Range

1: ±0.5% Center Spread
2: ±1% Center Spread
3: ±2% Center Spread
4: -1% Down Spread
5: -2% Down Spread
6: -4% Down Spread

Output Frequency in MHz

Temperature Options

A: ±100ppm over -10 to 70°C
B: ±50ppm over -10 to 70°C
C: ±100ppm over -40 to 85°C
D: ±50ppm over -40 to 85°C

Note: Not all combinations are available

For Additional Information, Please Contact:

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Revision History

Date	Description
5/13/2008	Release