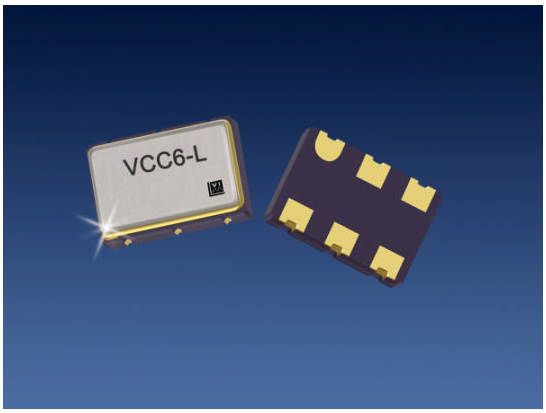
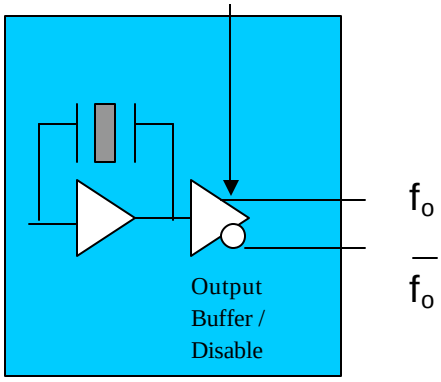
VCC6-L/V

2.5 or 3.3 volt LVDS Oscillator



The VCC6 Crystal Oscillator



Features

- 2.5 or 3.3 V LVDS
- 3rd Overtone Crystal for best jitter performance
- Output frequencies to 270 MHz
- Low Jitter < 1 pS rms, 12kHz to 20MHz
- Enable/Disable output for test and board debug
- -10/70 or –40/85 °C operating temperature
- Hermetically sealed ceramic SMD package
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- SONET/SDH/DWDM
- Ethernet, Gigabit Ethernet
- Storage Area Network
- Digital Video
- Broadband Access

Description

Vectron's VCC6 Crystal Oscillator (XO) is quartz stabilized square wave generator with a LVDS output, operating off a 2.5 or 3.3 volt supply.

The VCC6 uses a 3rd overtone crystals for output frequencies < 200MHz resulting in low jitter performance, typically 0.3pS rms in the 12 kHz to 20MHz band.

Performance Characteristics

Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_O	10		270	MHz
Supply Voltage [1] **L option**	V_{DD}	3.15	3.3	3.45	
Supply Voltage [1] **V option**	V_{DD}	2.375	2.5	2.625	V
Supply Current, Output Enabled	I_{DD}			60	mA
Supply Current, Output Disabled	I_{DD}			30	uA
Output Logic Levels					
Output Logic High[2]	V_{OH}		1.43	1.6	V
Output Logic Low[2]	V_{OL}	0.9	1.10		V
Differential Output	V_{OD}	247	330	454	mV
Differential Output Error				50	mV
Offset Voltage	VOS	1.125	1.25	1.375	V
Offset Error	VOS			50	mV
Output Leakage Current				10	uA
Transition Times					
Rise Time[2]	t_R			600	ps
Fall Time[2]	t_F			600	ps
Symmetry or Duty Cycle[3]	SYM	45	50	55	%
Operating temperature (*ordering option*)		-10/70 or –40/85			°C
Stability (*ordering option)*[4]		±25, ±50 or ±100			ppm
RMS Jitter, 12kHz to 20 MHz			0.3	0.7	pS
RMS Jitter			2.5		pS
Output Enabled[5]		0.7*VDD			V
Output Disabled[5]				0.3*VDD	V
Output Enable/Disable time				400	nS
Package Size		5.0 x 7.0 x 1.5			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 1 defines these parameters.
3. Symmetry is measured defined as On Time/Period.
4. Includes calibration tolerance, operating temperature, supply voltage variations, aging (40 degreesC/10 years) and shock and vibration (not under operation).
5. Output will be enabled if enable/disable is left open.

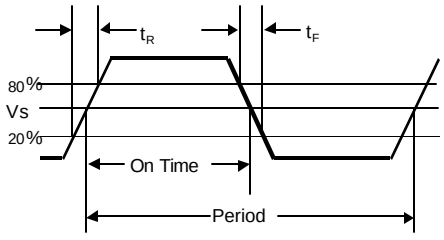
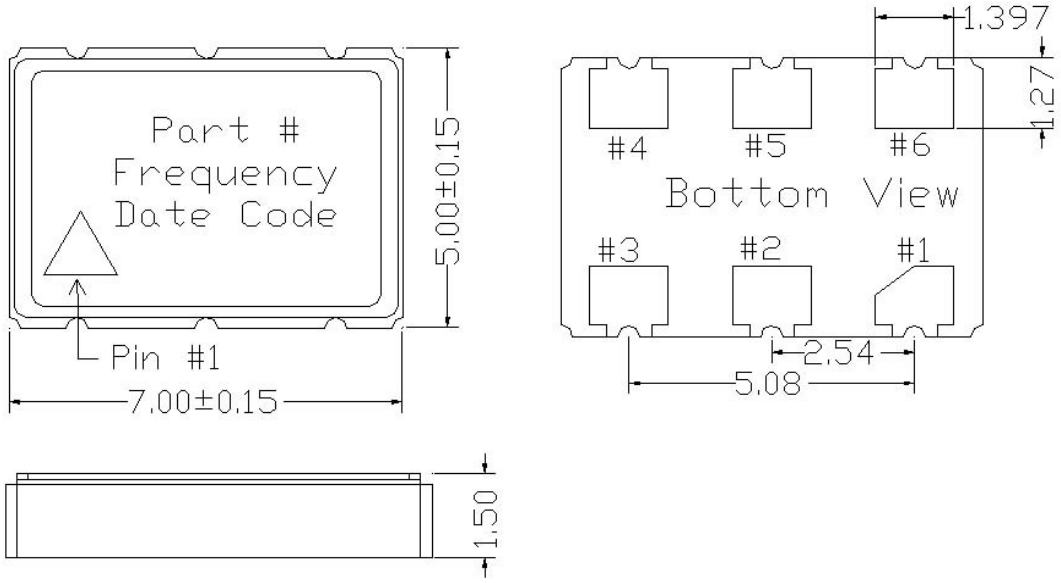


Figure 1. Output Waveform

Outline Diagram, Pad Layout and Pin Out



Contact Pad Plating: gold over nickel

Table 2. VCC6-LCx and VCC6-VCx Pinout

Pin #	Symbol	Function
1	E/D	Tristate Function
2	NC	This pin has no internal connection and is floating.
3	GND	Ground
4	f_O	Output Frequency
5	Cf_o	Complementary Output Frequency
6	V_{DD}	Supply Voltage

Table 3. VCC6-LAx and VCC6-VAx Pinout

Pin #	Symbol	Function
1	NC	This pin has no internal connection and is floating.
2	ED	Tristate Function
3	GND	Ground
4	f_O	Output Frequency
5	Cf_o	Complementary Output Frequency
6	V_{DD}	Supply Voltage

Tape and Reel

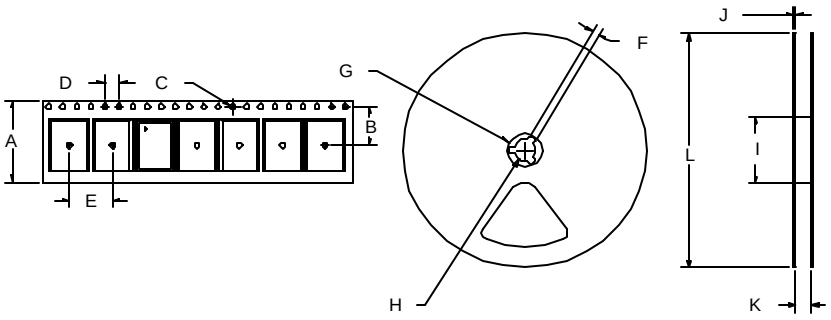


Table 4. Tape and Reel Dimensions (mm)

Tape Dimensions						Reel Dimensions							# Per
Product	A	B	C	D	E	F	G	H	I	J	K	L	Reel
VCC6	16	7.5	1.5	4	8	2	21	13	60	2	17	180	250

Enable/Disable Functional Description

Under normal operation the Enable/Disable is left open, or set to a logic high state, the VCC6 is an oscillation mode and outputs are active. When the E/D is set to a logic low, the oscillator stops and the both the output and complementary outputs are in a high impedance state. This helps facilitate board testing and troubleshooting.

Power Saving Pull-Up Resistor

The E/D pull-up resistor changes in response to the input logic level; the pull-up resistor is a large value when E/D is set to a logic low, which reduces the current consumed. When E/D is open, or set to a logic high, the pull-up resistance becomes a smaller value which helps decrease the effects of external noise.

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
Power Supply	V_{DD}	-0.5 to +7.0	Vdc
Enable/Disable	V_{IN}	-0.5 to V_{DD}+0.5	Vdc
Storage Temperature	Tstorage	-55/125	°C

Reliability

The VCC6 qualification tests include the following:

Table 6. Environnemental 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

Handling Precautions

Although ESD protection circuitry has been designed into the the VCC6, 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 7. ESD Ratings

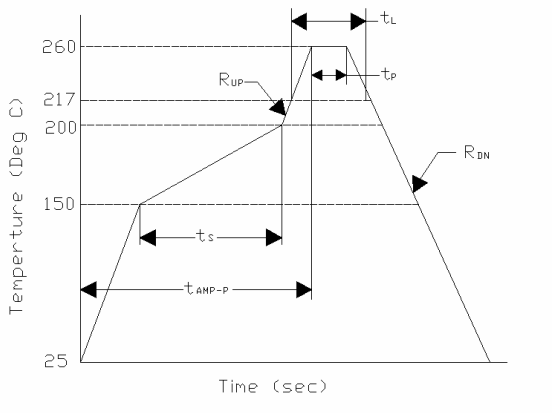
Model	Minimum	Conditions
Human Body Model	1000	MIL-STD-883 Method 3115
Charged Device Model	1000	JESD 22-C101

Suggested IR profile

The VCC6 has been 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 Table 7. The VCC6 is hermetically sealed so an aqueous wash is not an issue.

Table 8. Reflow Profile

Parameter	Symbol	Value
PreHeat Time	t_S	60 sec Min, 180 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 (max)	t_P	10 sec Max
Ramp Down	R_{DN}	6 °C/sec Max



Frequencies (MHz)

50.000	74.1758	74.250	77.760	80.000
100.000	106.250	125.000	133.000	136.000
153.850	155.520	156.250	161.1328	162.325
164.3555	166.6667	173.3708	173.438	175.000
180.000	187.500	200.00	212.500	

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

VCC6-LCB – 125M000

Product Family

Crystal Oscillator

Output

L: LVDS 3.3 Volts

V: LVDS 2.5 Volts

Enable/Disable

A: E/D is on Pin 2, Pin 1 is NC

C: E/D is on Pin 1, Pin 2 is NC

Frequency

example: 125M000= 125.000 MHz

Stability Options/Temperature

A: ±100ppm	-10 to 70°C
B: ±50ppm	-10 to 70°C
C: ±100ppm	-40 to 85°C
D: ±50ppm	-40 to 85°C
E: ±25ppm	-10 to 70°C
F: ±25ppm	-40 to 85°C

NOTE: Not all combinations of options are available.

A ±20ppm over -10 to 70°C, +3.3V, E/D on pin 1, VCC6-109-frequency is available.

A ±20ppm over -10 to 70°C, +2.5V, E/D on pin 1, VCC6-111-frequency is available.

For Additional Information, Please Contact:

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VCC6-L (REVISION DATE: September 6 2005)