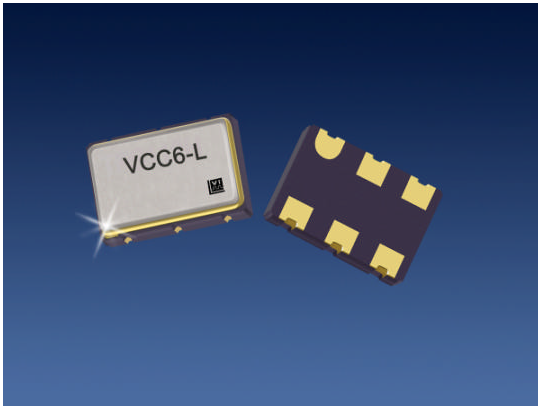
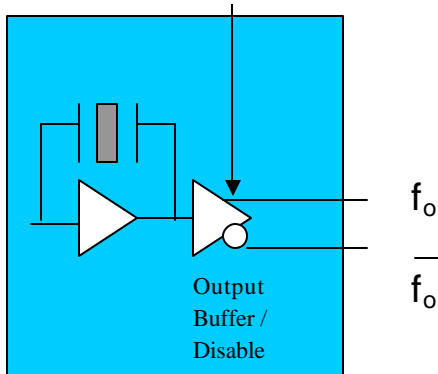


VCC6-L/V


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.

VCC6-L/V Series, 2.5 and 3.3V LVDS Crystal Oscillator

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 (<i>ordering option</i>) | | -10/70 or -40/85 | | | °C |
| Stability (<i>ordering option</i>) 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.

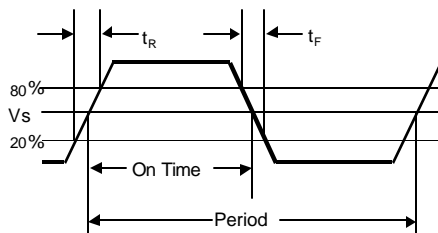
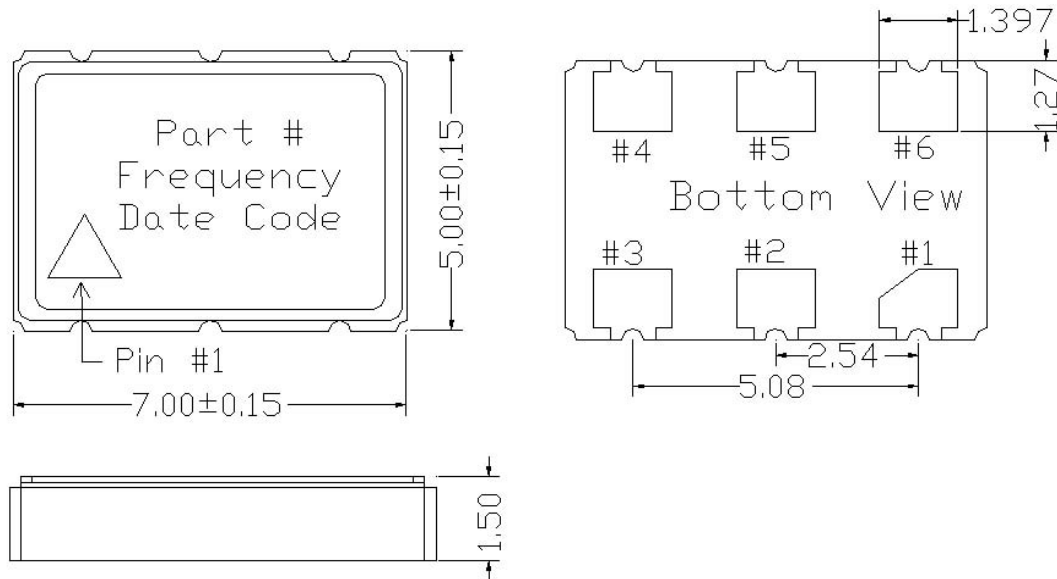


Figure 1. Output Waveform

VCC6-L/V Series, 2.5 and 3.3V LVDS Crystal Oscillator

Outline Diagram, Pad Layout and Pin Out



Contact Pad Plating: gold over nickel

| Pin # | Symbol | Function |
|-------|----------|--|
| 1 | ED | 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 |

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VCC6-L/V Series, 2.5 and 3.3V LVDS Crystal Oscillator

Tape and Reel

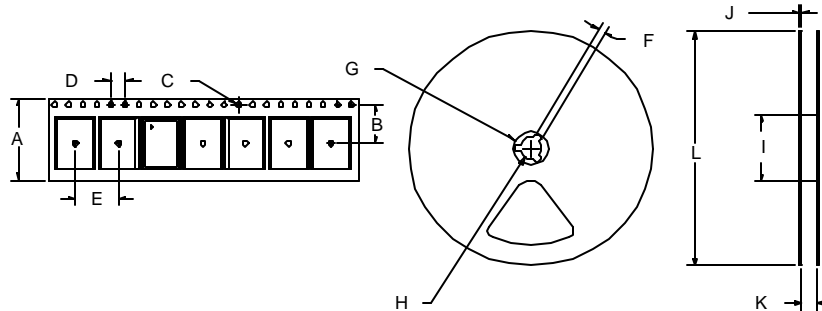


Table 4. Tape and Reel Dimensions (mm)

| Tape Dimensions | | | | | | Reel Dimensions | | | | | | # Per Reel | |
|-----------------|----|-----|-----|---|---|-----------------|----|----|----|---|----|------------|------|
| 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 | $T_{storage}$ | -55/125 | °C |

VCC6-L/V series, 2.5 and 3.3V LVDS Crystal Oscillator

Reliability

The VCC6 qualification tests include the following:

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 |

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

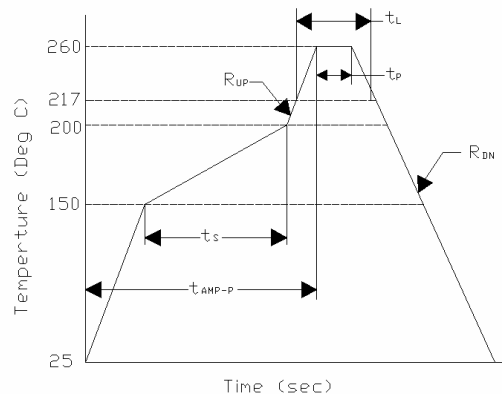
| Model | Minimum | Conditions |
|----------------------|---------|-------------------------|
| Human Body Model | 1000 | MIL-STD-883 Method 3115 |
| Charged Device Model | 1000 | JESD 22-C101 |

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 |



VCC6-L/V series, 2.5 and 3.3V LVDS Crystal Oscillator

| 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:



USA: Vectron International • 267 Lowell Road, Hudson, NH 03051

• Tel: 1-88-VECTRON-1 • Fax: 1-888-FAX-VECTRON

EUROPE: Landstrasse, D-74924, Neckarbischofsheim, Germany •

Tel: 49 (0) 7268 8010 • Fax: 49 (0) 7268 801281

ASIA: Vectron Asia Pacific Sales 1F-2F, No.8 Workshop No.308 Fenju Rd., WaiGaoQiao Free Trade Zone, Pudong New Area Shanghai, China 200131

•Tel: 8621 50480777 • Fax: 8621 50481881

www.vectron.com

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VCC6-L (REVISION DATE: September 6 2005)