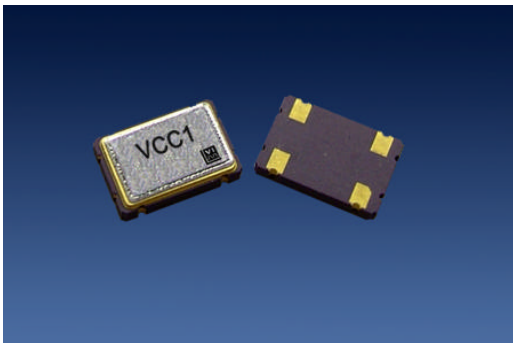


# C-TYPE


## 3.3, 5.0 volt CMOS Oscillator

**Not recommended for new designs**



The C-TYPE Crystal Oscillator

### Features

- CMOS output
- Output frequencies to 190 MHz
- Low jitter, Fundamental or 3<sup>rd</sup> OT Crystal
- Tri-state output for board test and debug
- Gold over nickel contact pads
- Hermetically sealed ceramic SMD package
- Product is compliant to RoHS directive  and fully compatible with lead free assembly

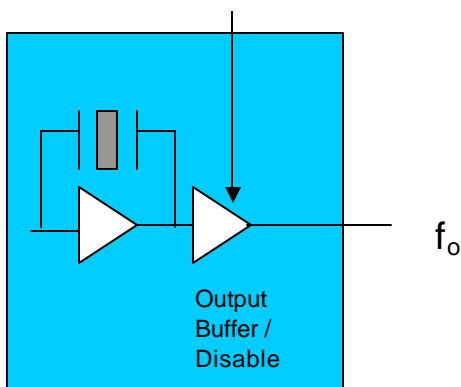
### Applications

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

### Description

Vectron's C-TYPE Crystal Oscillator (XO) is quartz stabilized square wave generator with a CMOS output, operating off a 1.8, 2.5, 3.3, or 5.0 volt supply.

The C-TYPE uses fundamental or 3<sup>rd</sup> overtone crystals resulting in low jitter performance, typically 0.5ps rms in the 12 kHz to 20MHz band. Also a monolithic IC, which improves reliability and reduces cost, is hermitically sealed.



# C-TYPE Data Sheet

## Performance Characteristics

Table 1. Electrical Performance, 5V option					
Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	$f_O$	0.012		125.000	MHz
Operating Supply Voltage <sup>1</sup>	$V_{DD}$	4.5	5.0	5.5	V
Absolute Maximum Supply Voltage		-0.7		7.0	V
Supply Current, Output Enabled	$I_{DD}$				mA
<1.5 MHz				7	
1.5 to 20 MHz				10	
20.01 to 50 MHz				30	
50.01 to 85 MHz				50	
85.01 to 125 MHz				60	
Supply Current, Out disabled	$I_{DD}$			30	uA
Output Logic Levels					
Output Logic High <sup>2</sup>	$V_{OH}$	$0.9 \cdot V_{DD}$			V
Output Logic Low <sup>2</sup>	$V_{OL}$			$0.1 \cdot V_{DD}$	V
Output Logic High Drive	$I_{OH}$	16			mA
Output Logic Low Drive	$I_{OL}$	16			mA
Output Rise/Fall Time <sup>2</sup>	$t_R/t_F$				ns
< 1.00 MHz				200	
1.0 to 20.00 MHz				8	
20.01 to 50.00 MHz				5	
50.01 to 125.00 MHz				2	
Duty Cycle <sup>3</sup> (ordering option)	SYM		45/55		%
Operating Temperature (ordering option)			-10/70 or -40/85		°C
Storage Temperature		-55		125	°C
Stability <sup>4</sup> (ordering option)			$\pm 20, \pm 25, \pm 32, \pm 50, \pm 100$		ppm
RMS Jitter, 12kHz to 20 MHz			0.5	1	ps
Period Jitter, RMS			2.5		ps
Output Enable/Disable <sup>5</sup>					V
Output Enabled		4.0			
Output Disabled				0.8	
Internal Enable Pull-Up resistor <sup>5</sup>			100		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 1 defines these parameters. Figure 2 illustrates the operating conditions under which these parameters are tested and specified.
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.

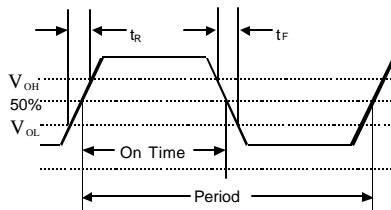


Figure 1. Output Waveform

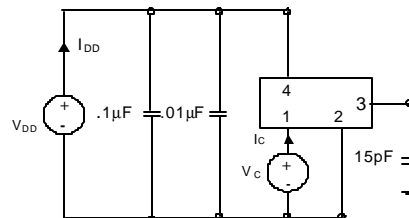


Figure 2. Typical Output Test Conditions (25±5°C)

## C-TYPE Data Sheet

Table 2. Electrical Performance, 3.3V option					
Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	$f_o$	0.012		190.000	MHz
Operating Supply Voltage <sup>1</sup>	$V_{DD}$	2.97	3.3	3.63	V
Absolute Maximum Operating Voltage		-0.5		5.0	V
Supply Current, Output Enabled	$I_{DD}$				mA
< 1.500 MHz				5	
1.5 to 20 MHz				7	
20.01 to 50 MHz				20	
50.01 to 85 MHz				30	
85.01 to 190 MHz				50	
Supply Current, Output disabled	$I_{DD}$			30	uA
Output Logic Levels					
Output Logic High <sup>2</sup>	$V_{OH}$	$0.9 \cdot V_{DD}$			V
Output Logic Low <sup>2</sup>	$V_{OL}$			$0.1 \cdot V_{DD}$	V
Output Logic High Drive	$I_{OH}$	8			mA
Output Logic Low Drive	$I_{OL}$	8			mA
Output Rise/Fall Time <sup>2</sup>	$t_R/t_F$				ns
< 1.00 MHz				200	
1.00 to 20.00 MHz				6	
20.01 to 50.00 MHz				4	
50.01 to 90.00 MHz				3	
90.01 to 190.00 MHz				2	
Duty Cycle <sup>3</sup> (ordering option)	SYM	45/55			%
Operating Temperature (ordering option)		-10/70 or -40/85			°C
Storage Temperature		-55		125	°C
Stability <sup>4</sup> (ordering option)		$\pm 20, \pm 25, \pm 32, \pm 50, \pm 100$			ppm
RMS Jitter, 12kHz to 20 MHz			0.5	1	ps
RMS Jitter			2.5		ps
Output Enable/Disable <sup>5</sup>					V
Output Enabled		2.0			
Output Disabled				0.5	
Internal Enable Pull-Up resistor <sup>5</sup>			100		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  $f_o > 90\text{MHz}$ , 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.

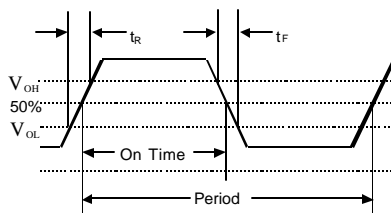


Figure 3. Output Waveform

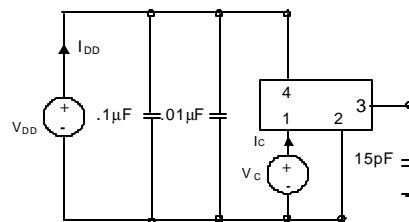


Figure 4. Typical Output Test Conditions (25±5°C)

## C-TYPE Data Sheet

### Enable/Disable Functional Description

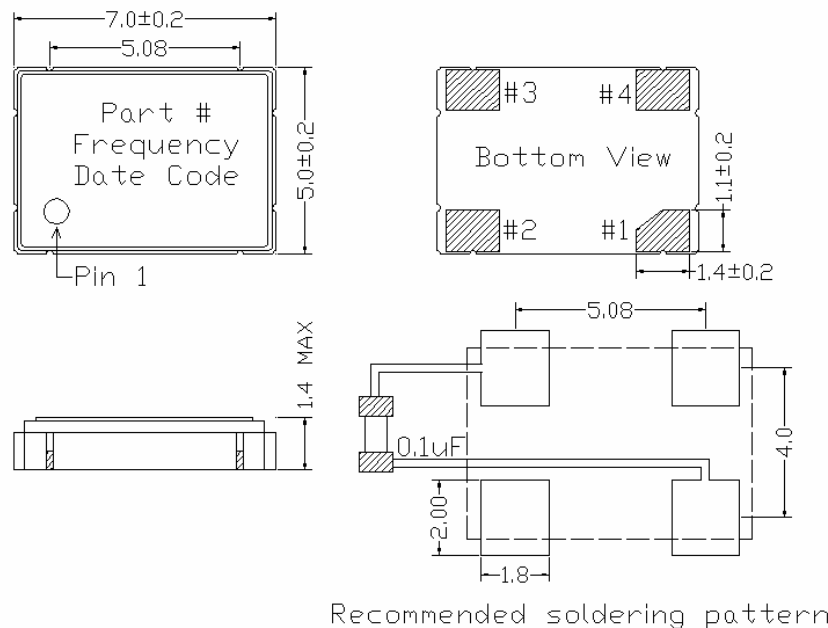
Under normal operation the Enable/Disable is left open or set to a logic high state. When the E/D is set to a logic low, the oscillator stops and the output is in a high impedance state. This helps reduce power consumption as well as facilitating board testing and troubleshooting.

### Tri-state Functional Description

Under normal operation the tri-state is left open or set to a logic high state. When the tri-state is set to a logic low, the oscillator remains active but the output buffer is in a high impedance state. This helps facilitate board testing and troubleshooting.

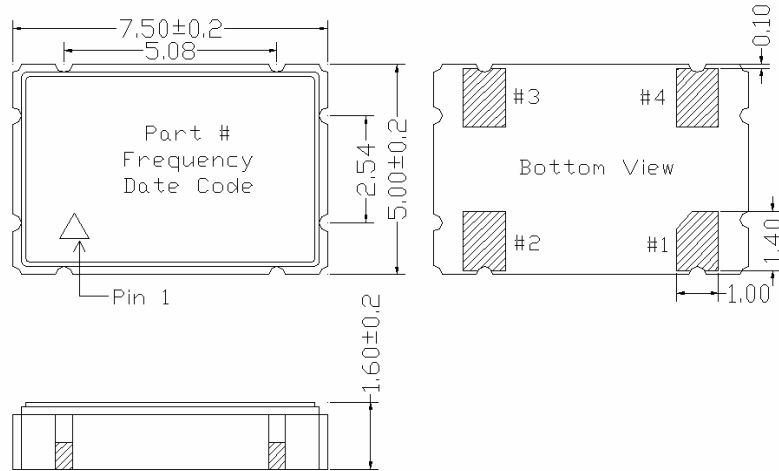
**Table 3. Outline Diagrams, Pad Layout and Pin Out**

Pin #	Symbol	Function
1	E/D or NC	Tri-state, Enable/Disable or NC
2	GND	Electrical and Case Ground
3	$f_o$	Output Frequency
4	$V_{DD}$	Supply Voltage



Contact Pads are gold over nickel  
**Figure 9, Package drawing**

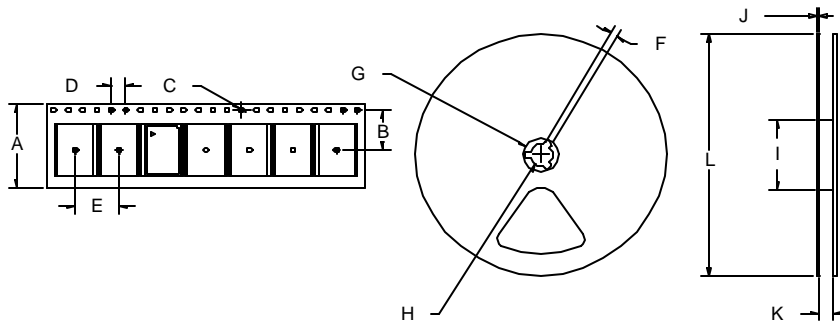
## C-TYPE Data Sheet



Contact Pads are gold over nickel  
**Figure 10, Alternate Package drawing**

### 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
C-TYPE	16	7.5	1.5	4	8	2	21	13	60	2	17	180	1000

## C-TYPE Data Sheet

### Reliability

The C-TYPE qualification tests have included:

**Table 5. Environmental Compliance**

Parameter	Conditions
Mechanical Shock	MIL-STD-883 Method 2022
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	1
Contact Pads	Gold over Nickel

### Handling Precautions

Although ESD protection circuitry has been designed into the the C-TYPE, 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 6. ESD Ratings**

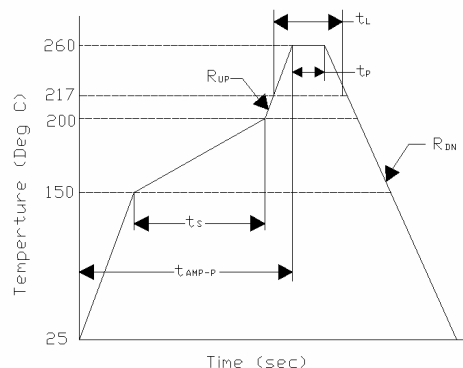
Model	Minimum	Conditions
Human Body Model	1000	MIL-STD-883 Method 3115
Charged Device Model	1500	JESD 22-C101

### Suggested IR profile

Devices are built using lead free epoxy and can also be subjected to standard lead free IR reflow conditions, Table 9 shows max temperatures and lower temperatures can also be used e.g. peak temperature of 220C.

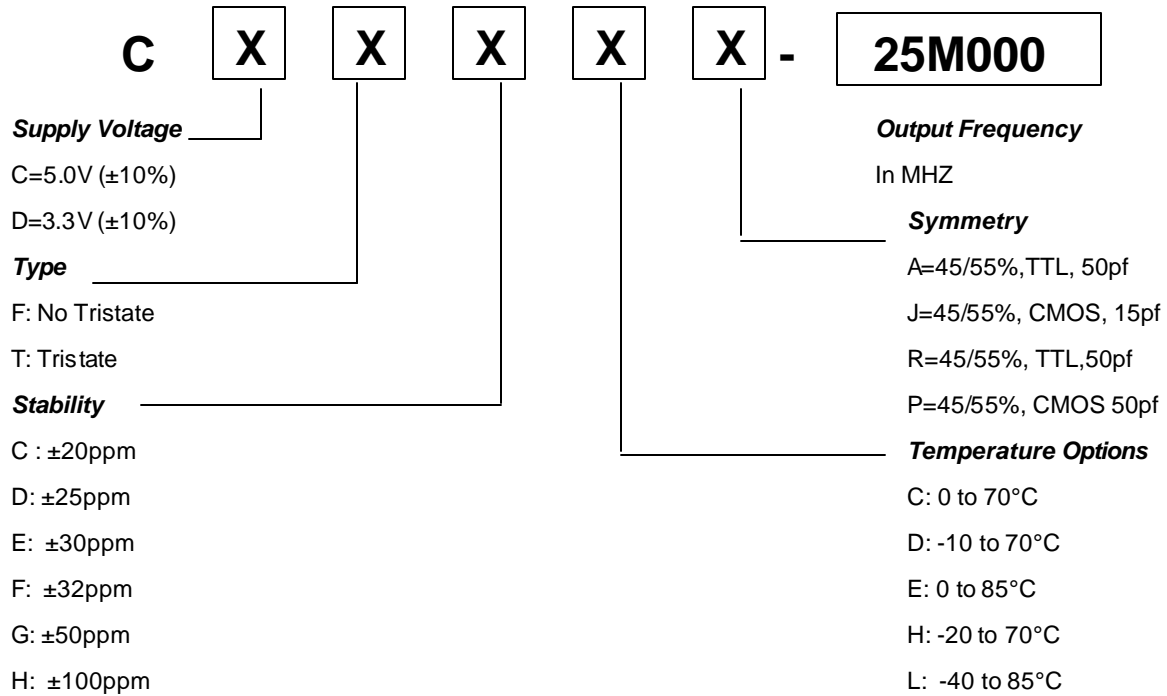
**Table 7. Reflow Profile**

Parameter	Symbol	Value
Preheat Time	$t_s$	150 sec Min, 200 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
Time At 240 °C (max)	$t_{p2}$	60 sec Max
Ramp Down	$R_{DN}$	6 °C/sec Max



# C-TYPE Data Sheet

## Ordering Information



**Note: Not all combinations are available.**

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