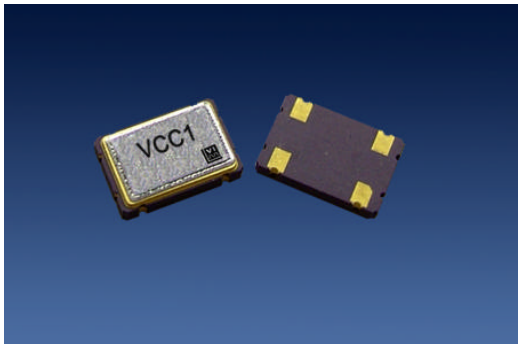
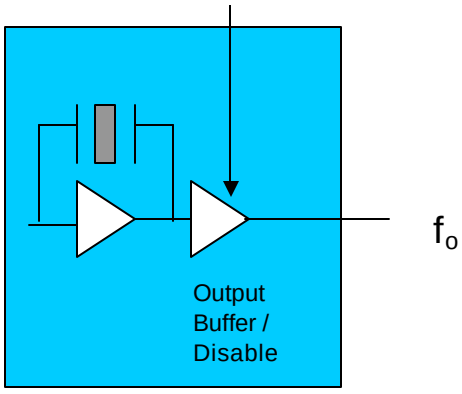
C-TYPE

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 3rd 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 3rd 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.

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 [1]	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[2]	V_{OH}	0.9*V_{DD}			V
Output Logic Low[2]	V_{OL}			0.1*V_{DD}	V
Output Logic High Drive	I_{OH}	16			mA
Output Logic Low Drive	I_{OL}	16			mA
Output Rise/Fall Time[2]	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[3] *(ordering option)*	SYM	45/55			%
Operating Temperature (*ordering option*)		-10/70 or -40/85			°C
Storage Temperature		-55		125	°C
Stability[4] (*ordering option)*		±20, ±25, ±32, ±50, ±100			ppm
RMS Jitter, 12kHz to 20 MHz			0.5	1	ps
Period Jitter, RMS			2.5		ps
Output Enable/Disable[5]					V
Output Enabled		4.0			
Output Disabled				0.8	
Internal Enable Pull-Up resistor[5]			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.

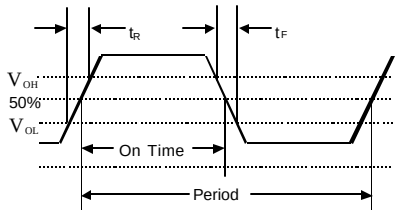


Figure 1. Output Waveform

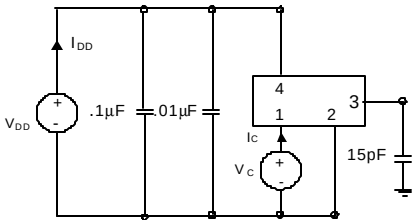


Figure 2. Typical Output Test Conditions (25±5°C)

Table 2. Electrical Performance, 3.3V option					
Parameter	**Symbol**	**Min**	**Typical**	**Maximum**	**Units**
Frequency	f_O	0.012		190.000	MHz
Operating Supply Voltage [1]	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[2]	V_{OH}	0.9*V_{DD}			V
Output Logic Low[2]	V_{OL}			0.1*V_{DD}	V
Output Logic High Drive	I_{OH}	8			mA
Output Logic Low Drive	I_{OL}	8			mA
Output Rise/Fall Time[2]	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[3] *(ordering option)*	SYM	45/55			%
Operating Temperature (*ordering option*)		-10/70 or –40/85			°C
Storage Temperature		-55		125	°C
Stability[4] (*ordering option)*		±20, ±25, ±32, ±50, ±100			ppm
RMS Jitter, 12kHz to 20 MHz			0.5	1	ps
RMS Jitter			2.5		ps
Output Enable/Disable[5]					V
Output Enabled		2.0			
Output Disabled				0.5	
Internal Enable Pull-Up resistor[5]			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 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.

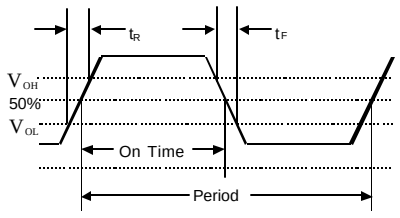


Figure 3. Output Waveform

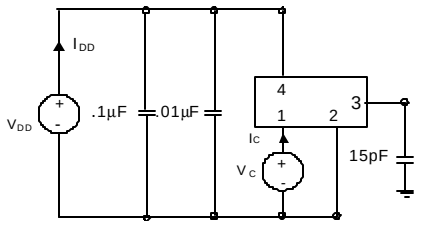


Figure 4. Typical Output Test Conditions (25±5°C)

Enable/Disable Functional Description

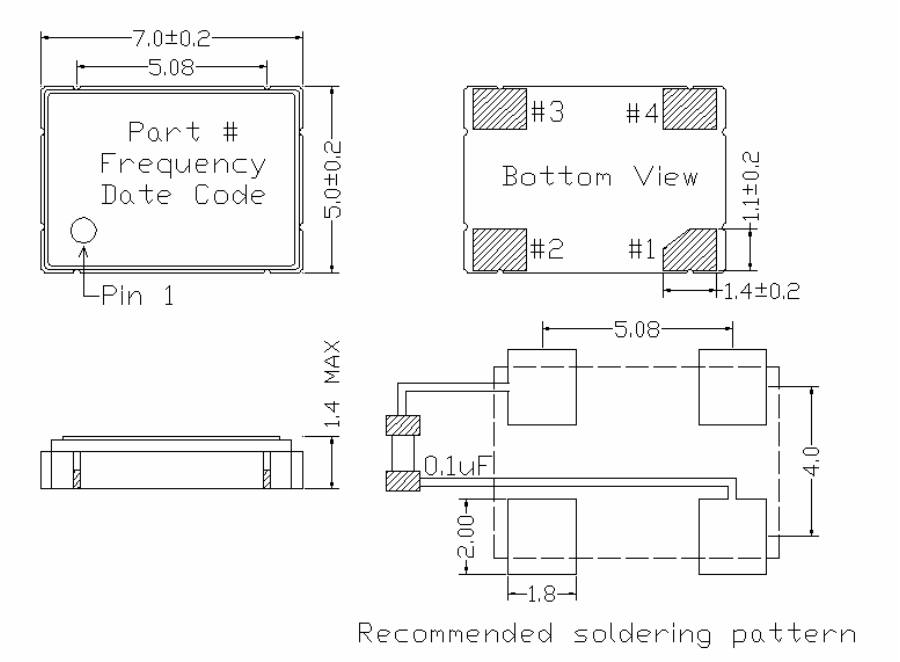
Under normal operation the Enable/Disable is left open or set to a logic high state. When the E/D is set to a logic low, the oscillator stops and the output is in a high impedance state. This helps reduce power consumption as well as facilitating board testing and troubleshooting.

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.

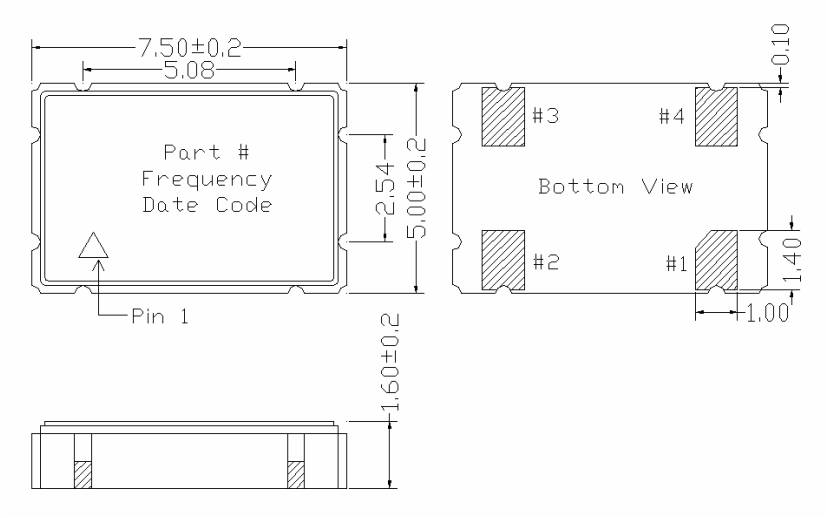
Table 3. Outline Diagrams, Pad Layout and Pin Out

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

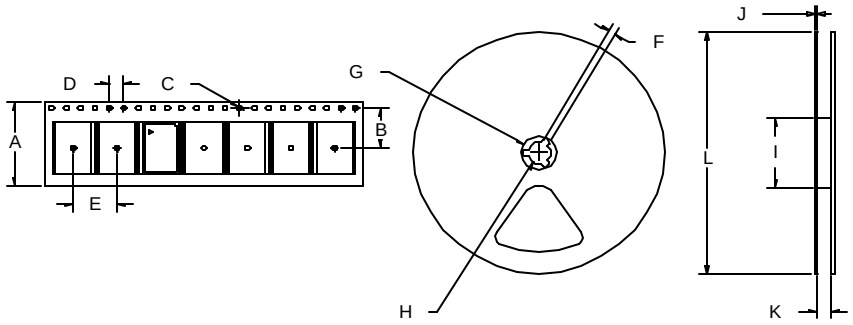


Contact Pads are gold over nickel

Figure 10, Alternate Package drawing

Tape and Reel

Table 4: Tape and Reel Dimensions (mm)



Tape Dimensions						Reel Dimensions							# Per
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

Reliability

The C-TYPE qualification tests have included:

Table 5. Environnemental 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

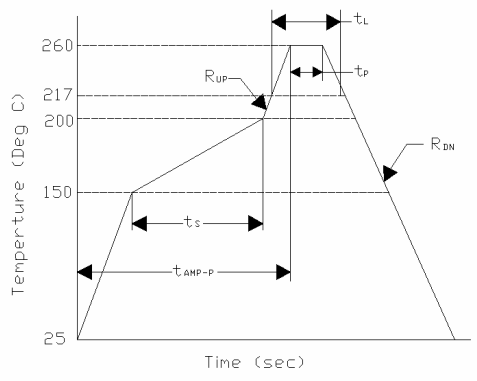
Model	Minimum	Conditions
Human Body Model	1000	MIL-STD-883 Method 3115
Charged Device Model	1500	JESD 22-C101

Suggested IR profile

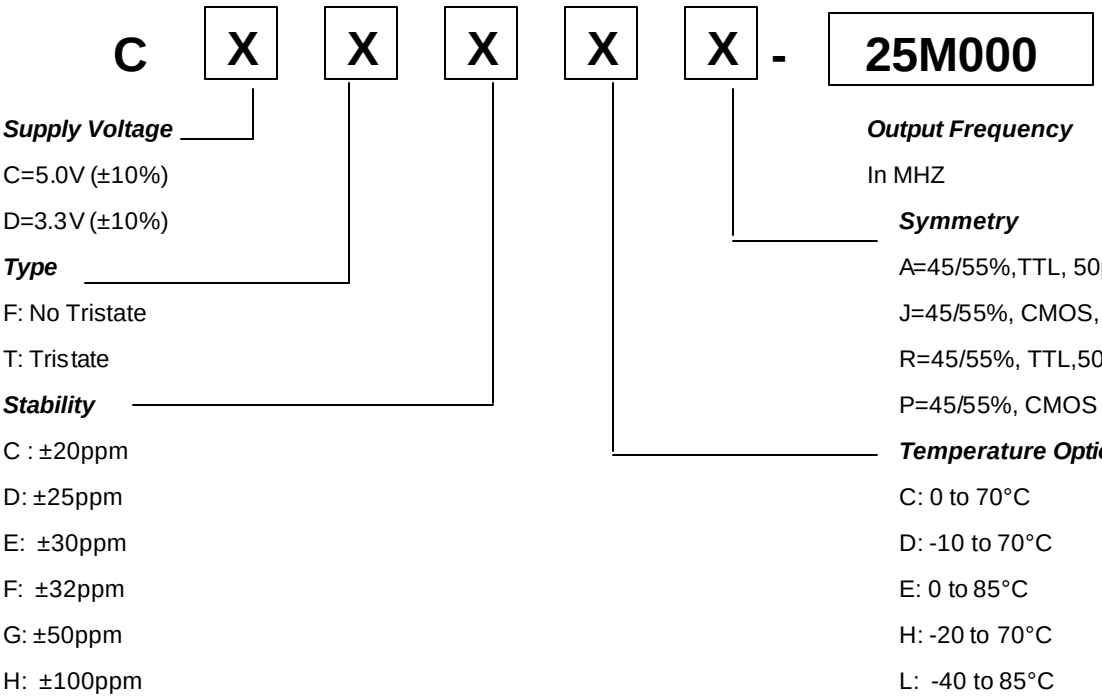
Devices are built using lead free epoxy and can also be subjected to standard lead free IR reflow conditions, Table 9 shows max temperatures and lower temperatures can also be used e.g. peak temperature of 220C.

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



Ordering Information



Note: Not all combinations are available.

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