VCC1-1544-50M0000000

CMOS Crystal Oscillator

Description

Vectron's VCC1 Crystal Oscillator (XO) is a quartz stabilized square wave generator with a CMOS output. The VCC1 uses a fundamental or 3rd overtone crystal resulting in very low jitter performance, and a monolithic IC which improves reliability and reduces cost.

Features

- Ultra Low Jitter, Fundamental or 3rd OT Crystal Design
- CMOS Output Crystal Oscillator
- Output Frequency 50 MHz
- 3.3V Operation
- Output Disable Feature
- Excellent 50ppm overall stability
- -40/85°C operating temperature
- Small Industry Standard Package, 5x7mm
- Product is compliant to RoHS directive and fully compatible with lead free assembly

Applications

- SONET/SDH/DWDM
- Ethernet, GE, SynchE
- Storage Area Networking
- Fiber Channel
- Digital Video
- Broadband Access
- Base Stations, Picocells
- Driving A/D's, D/A's, FPGA's
- Test and Measurement
- COTS

Block Diagram

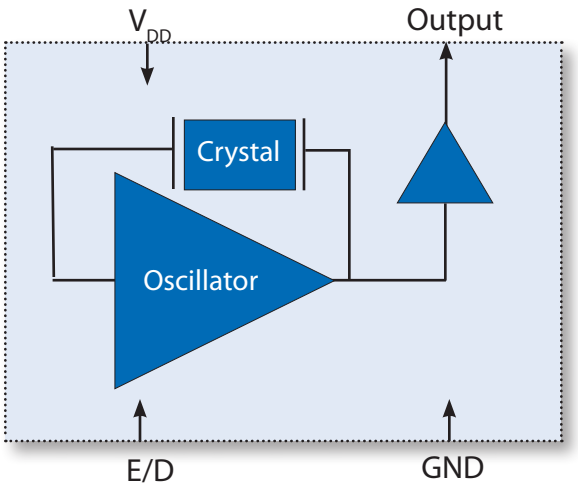


Table 1. Electrical Performance					
Parameter	Symbol	Mininum	Typical	Maximum	Units
Supply					
Voltage[1]	V_{DD}	2.97	3.3	3.63	V
Maximum Voltage		-0.5		5	V
Current[2]	I_{DD}			20	mA
Current, Output Disabled				30	uA
Frequency					
Nominal Frequency	f_N		50		MHz
Stability[4],			±50,		ppm
Outputs					
Output Logic Levels[2] Output Logic High Output Logic Low 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
Load	I_{OUT}			15	pF
Output Rise /Fall Time[2]	t_R/t_F			4	ns
Output Leakage, Output Disabled[2,5]	I_Z			±10	uA
Duty Cycle[2,5]		45	50	55	%
RMS Jitter, 12k-20M	ϕJ			100	fs
Enable/Disable					
Output Enable/Disable[7] Output Enable Output Disable	 V_{IH} V_{IL}	 2.0		 0.5	 V V
Disable time	t_D			100	ns
Enable Internal Pull-Up Resistor			100		Kohm
Start-Up Time	t_{SU}			10	ms
Operating Temp, (Ordering Option)	T_{OP}		-40/85		°C

1] The power supply should have by-pass capacitors as close to the supply and to ground as possible, for example 0.1 and 0.01uF
2] Parameters are tested with the test circuit shown in Figure 1.
3] See Ordering Information tables for more specific information
4] Includes initial accuracy, operating temperature, supply voltage, shock and vibration (not under operation) and 10 years aging.
5] Duty Cycle is measured as On Time/Period, see Fig 2.
6] Broadband Period Jitter measured using a LeCroy Wavemaster 8600A, 90K samples, see Application Note for Typical Phase Noise and Jitter Performance
7] The Output is Enabled if the Enable/Disable is left open.

Test Diagram and Waveform

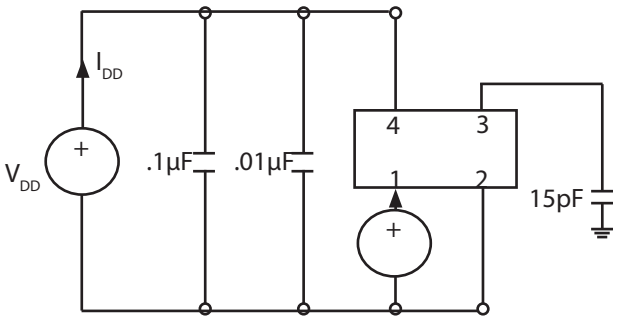


Fig 1: Test Circuit

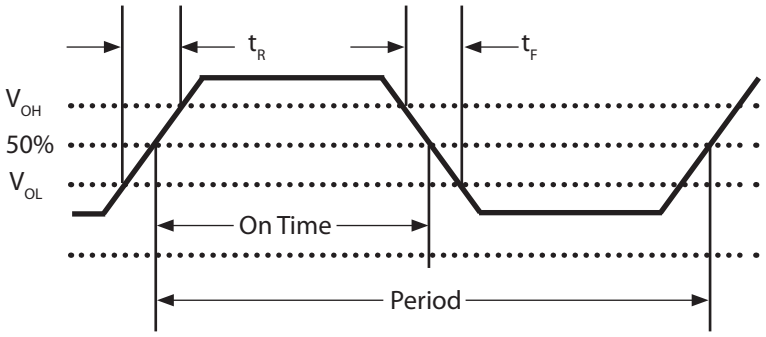
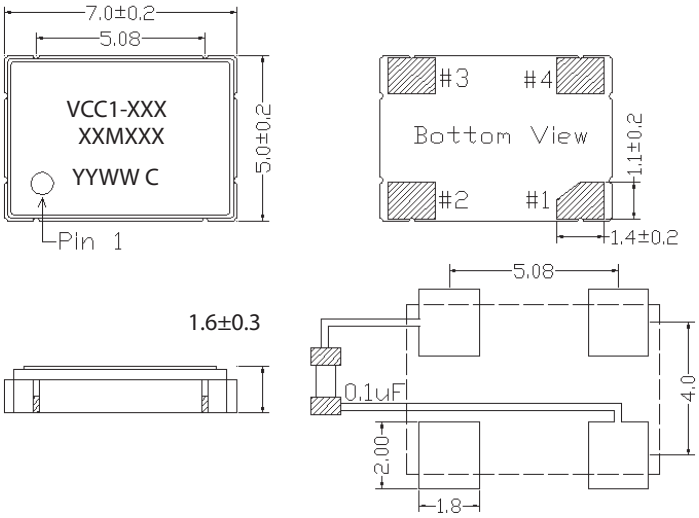


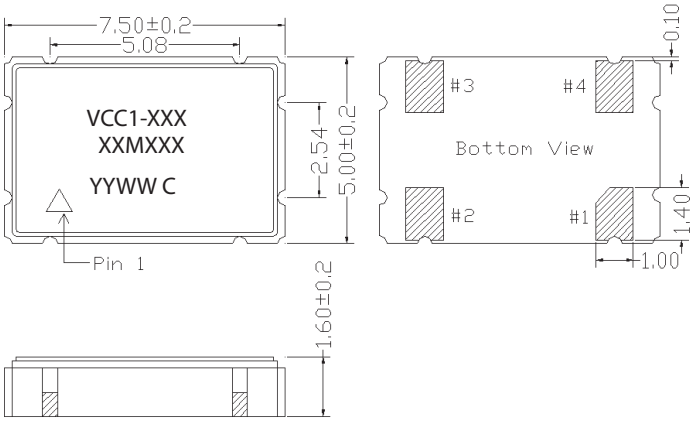
Fig 2: Waveform

Outline Drawing & Pad Layout



Recommended Soldering Pad Layout

Dimensions in mm



Alternate Package Design

Table 2. Pin Out

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

Reliability

VI qualification includes aging at various extreme temperatures, shock and vibration, temperature cycling, and IR reflow simulation. The VCC1 family is capable of meeting the following qualification tests:

Table 3. Environmental 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	MSL 1
Contact Pads	Gold over Nickel

Although ESD protection circuitry has been designed into the VCC1 proper precautions should be taken when handling and mounting. VI employs a human body model (HBM) and a charged device model (CDM) for ESD susceptibility testing and design protection evaluation.

Table 4. ESD Ratings

Model	Minimum	Conditions
Human Body Model	1500V	MIL-STD-883, Method 3015
Charged Device Model	1000V	JESD22-C101

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 datasheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability. Permanent damage is also possible if E/D is applied before V_{DD}.

Table 5. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Storage Temperature	TS	-55 to 125	°C
Soldering Temp/Time	T_{LS}	260 / 30	°C / sec

IR Reflow

The VCC1 is 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. The VCC1 device is hermetically sealed so an aqueous wash is not an issue.

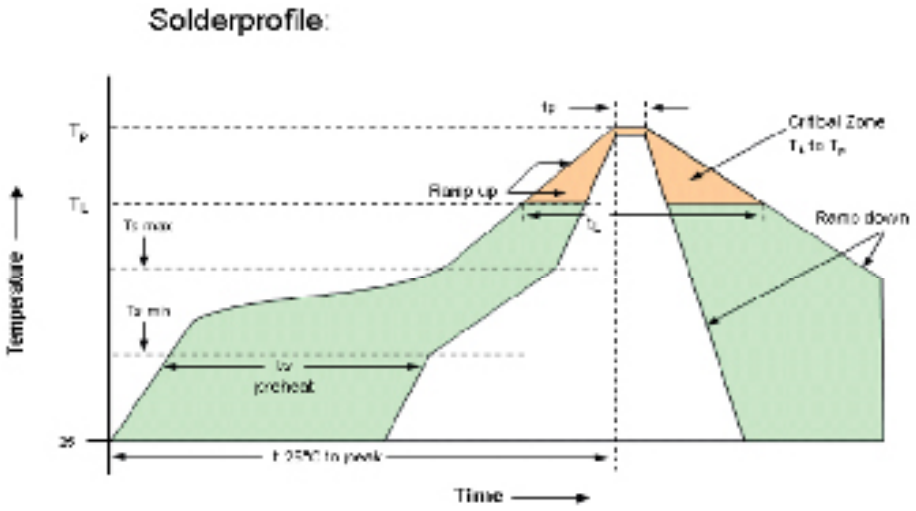


Table 6. Reflow Profile

Parameter	Symbol	Value
PreHeat Time Ts-min Ts-max	t_S	60 sec Min, 260 sec Max 150°C 200°C
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	t_P	30 sec Max
Ramp Down	R_{DN}	6 °C/sec Max

Tape and Reel

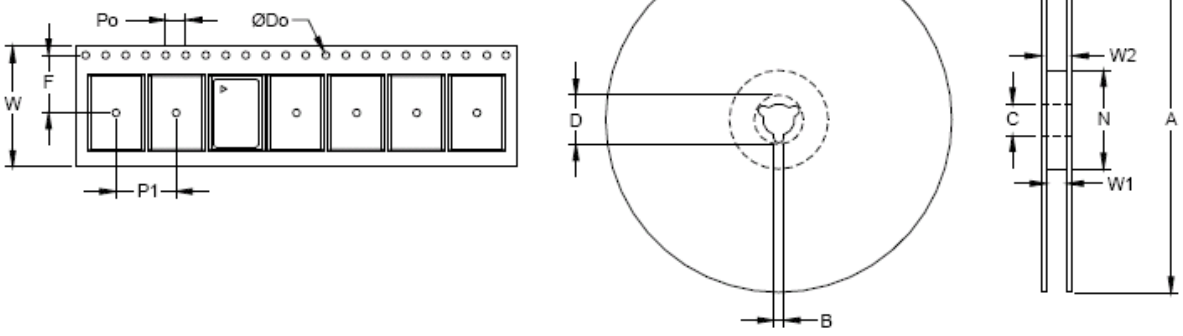


Table 7. Tape and Reel Information

Tape Dimensions (mm)						Reel Dimensions (mm)							
Dimension	W	F	Do	Po	P1	A	B	C	D	N	W1	W2	# Per Reel
Tolerance	Typ	Typ	Typ	Typ	Typ	Typ	Min	Typ	Min	Min	Typ	Max	
VCC1	16	7.5	1.5	4	8	180	2	13	21	60	17	21	1000

Ordering Information

VCC1- 1544 - 50M0000000

Parameter	Value
Output Type	CMOS
Frequency	50MHz
Supply	3.3V
Stability	±50ppm
Operating Temperature Range	-40 to +85ºC

For Additional Information, Please Contact

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