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Description

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

Features

- Ultra Low Jitter, Fundamental Crystal Design
- CMOS Output Crystal Oscillator
- 114.285 MHz Output Frequency
- 3.3 V Operation
- Output Disable Feature
- ± 25 ppm stability, $-40/85^{\circ}\text{C}$
- Small Industry Standard Package, 5x7mm
- Product is compliant to RoHS directive  and fully compatible with lead free assembly

Applications

Block Diagram

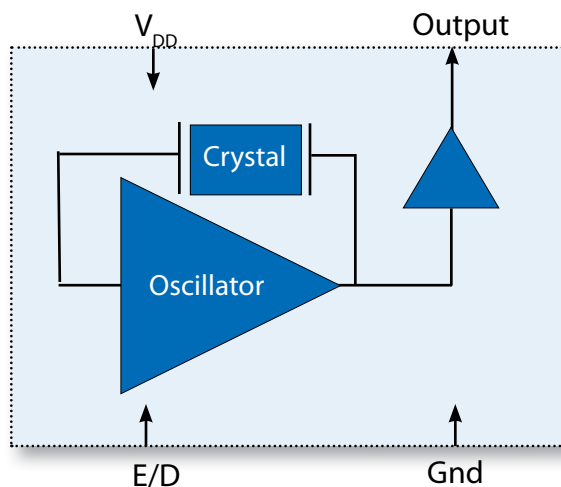


Table 1. Electrical Performance

Parameter	Symbol	Min	Typical	Maximum	Units
Supply					
Voltage ¹	V_{DD}	2.97	3.3	3.63	V
Maximum Voltage		-0.5		5.0	V
Current ²	I_{DD}			50	mA
Current, Output Disabled				30	uA
Frequency					
Frequency ³	f_N		114.285		MHz
Stability ³				±25	ppm
Outputs					
Output Logic Levels ²					
Output Logic High	V_{OH}	0.9* V_{DD}			V
Output Logic Low	V_{OL}			0.1* V_{DD}	V
Output Logic High Drive	I_{OH}	8			mA
Output Logic Low Drive	I_{OL}	8			mA
Load	I_{OUT}			15	pF
Output Rise /Fall Time ²	t_R/t_F			2	ns
Output Leakage, Output Disabled	I_Z			±10	uA
Duty Cycle ^{2,4}		45	50	55	%
RMS Jitter, 12 kHz - 5 MHz BW ⁵				100	fs
Enable/Disable					
Output Enable/Disable ⁶					
Output Enable	V_{IH}	2.0			V
Output Disable	V_{IL}			0.5	V
Disable time	t_D			100	ns
Enable Internal Pull-Up Resistor			100		Kohm
Start-Up Time	t_{SU}			10	ms
Operating Temperature	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 0.01 uF
- 2] Parameters are tested with production test circuit below, Figure 1.
- 3] Includes initial accuracy, operating temperature, supply voltage, shock and vibration (not under operation) and 15 years aging.
- 4] Duty Cycle is measured as On Time/Period (Fig 2).
- 5] Measured using an Agilent E5052, AC coupled (passive connection).
- 6] Outputs will be Enabled if Enable/Disable is left open.

Test Diagram and Waveform

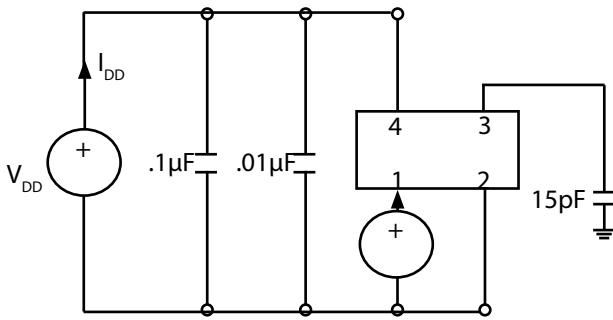


Fig 1: Test Circuit

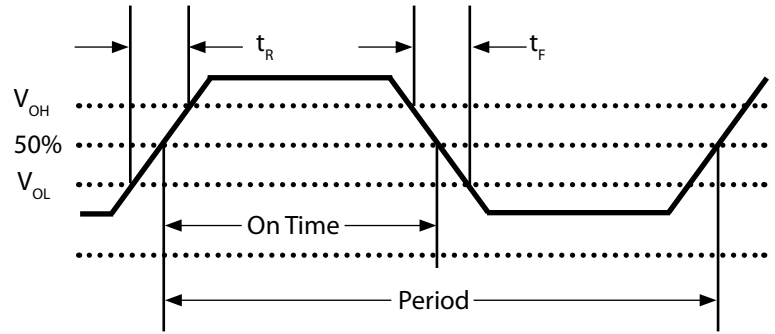
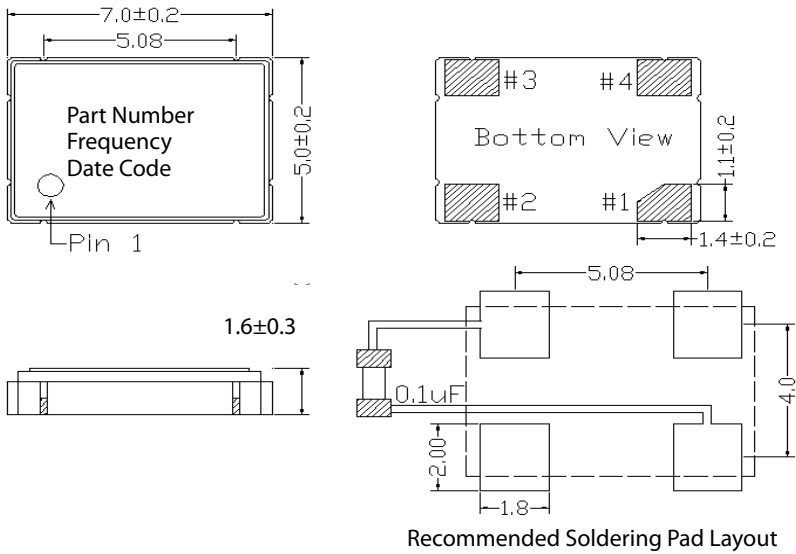


Fig 2: Waveform

Outline Drawing & Pad Layout



Recommended Soldering Pad Layout

Dimensions in mm

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	T_S	-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.

Solderprofile:

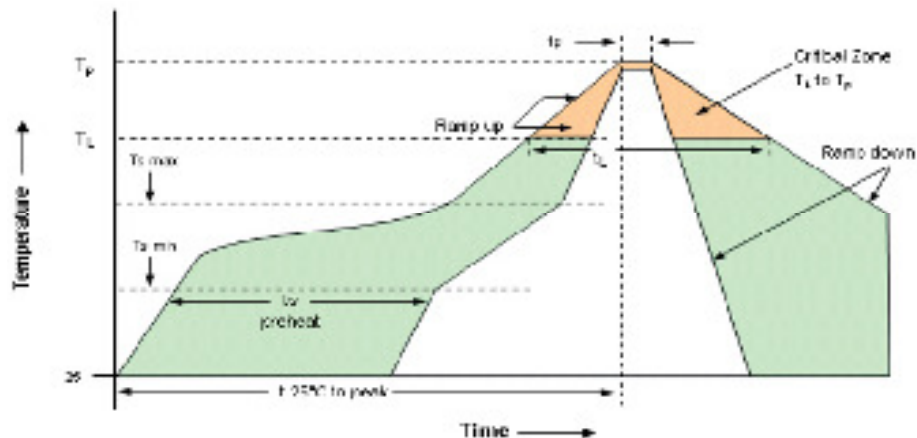


Table 6. Reflow Profile

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

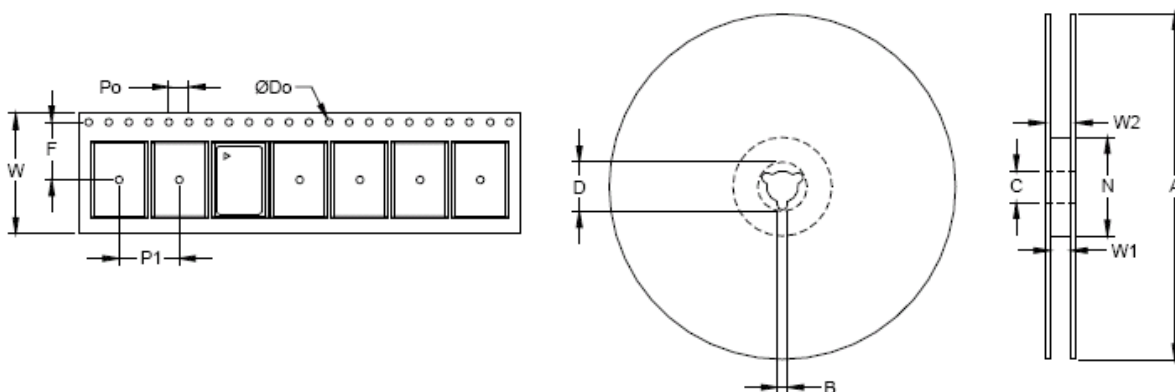


Table 7. Tape and Reel Information

Tape Dimensions (mm)						Reel Dimensions (mm)							# Per Reel
Dimension	W	F	Do	Po	P1	A	B	C	D	N	W1	W2	
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- 1537- 114M285000

Product
5x7 Crystal Oscillator

Source
Control Drawing

Frequency in MHz

For Additional Information, Please Contact

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