VPC1

CMOS Crystal Oscillator

Description

Vectron's VPC1 Crystal Oscillator (XO) is a quartz stabilized square wave generator with a CMOS output. The VPC1 utilized a high performance, low frequency quartz resonator followed by a custom ASIC to synthesize the output frequency.

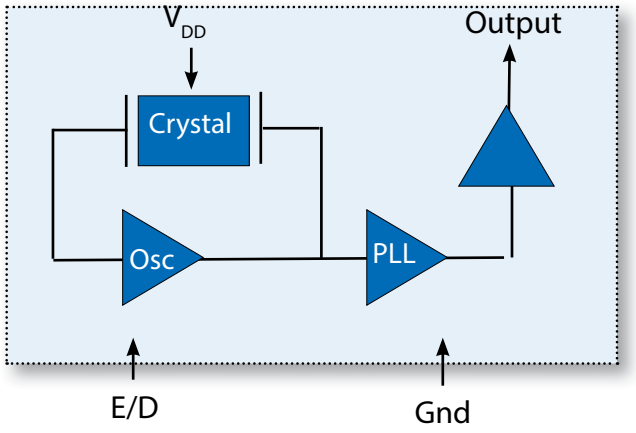
Features

- Quick Delivery
- Wide output Frequency range up to 160 MHz
- Stabilities of ±50, ±100 PPM
- 5.0, 3.3 V Operation
- HCMOS/TTL Compatible
- Product is free of lead and compliant to EC RoHS Directive

Applications

- Proto-type delivery

Block Diagram



Performance Specifications

Table 1. Electrical Performance, 5V Option

Parameter	Symbol	Min	Typical	Maximum	Units
Supply					
Voltage[1]	V_{CC}	4.5	5.0	5.5	V
Current[2]	I_{CC}			45	mA
Frequency					
Nominal Frequency	f_N	1.544		160.000	MHz
Stability[4], (Ordering Option)		±25, ±50, ±100			ppm
Outputs					
Output Logic Levels[2] Output Logic High Output Logic Low	 V_{OH} V_{OL}	 0.9*V_{DD}		 0.1*V_{DD}	 V V
Load	I_{OUT}			15	pF
Output Rise /Fall Time[2,4] <20.000MHz 20.001 to 160.000MHz	t_R/t_F			 8 4	ns
Duty Cycle[2,5]		45	50	55	%
Enable/Disable					
Output Enable/Disable Output Enable Output Disable	 V_E V_D	 4.0		 0.8	 V V
Start-Up Time	t_{SU}			10	ms
Operating Temp, (Ordering Option)	T_{OP}	-10/70 or -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 production test circuit below , Figure 1.
3] See Standard Frequencies and Ordering Information tables for more specific information
4] Includes initial accuracy, operating temperature, supply voltage, shock and vibration (not under operation) and aging for 50 and 100ppm options.
5] Duty Cycle is measured as On Time/Period (Fig 2).
6] The Output is Enabled if the Enable/Disable is left open.

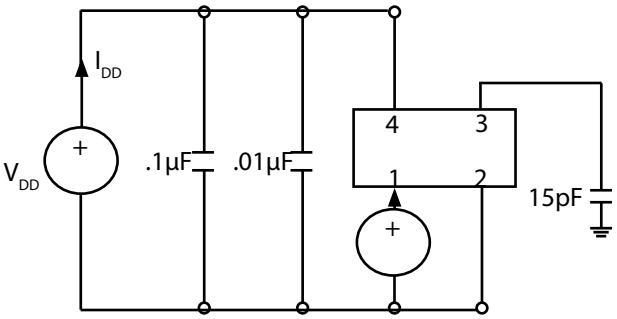


Fig 1: Test Circuit

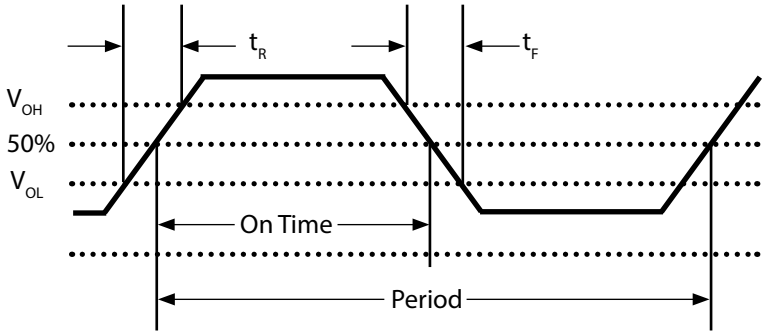


Fig 2: Waveform

Performance Specifications

Table 2. Electrical Performance, 3.3V Option

Parameter	Symbol	Min	Typical	Maximum	Units
Supply					
Voltage[1]	V_{CC}	2.97	3.3	3.63	V
Current[2]	I_{CC}			28	mA
Frequency					
Nominal Frequency	f_N	1.544		125.000	MHz
Stability[2], (Ordering Option)			±25, ±50, ±100		ppm
Outputs					
Output Logic Levels[2] Output Logic High Output Logic Low	 V_{OH} V_{OL}	 0.9*V_{DD}		 0.1*V_{DD}	 V V
Load	I_{OUT}			15	pF
Output Rise /Fall Time[2] <20.000MHz 20.000 to 125.000MHz	t_R/t_F			 10 6	ns
Duty Cycle		45	50	55	%
Enable/Disable					
Output Enable/Disable[7] Output Enable Output Disable	 V_E V_D	 2.0		 0.5	 V V
Start-Up Time	t_{SU}			10	ms
Operating Temp, (Ordering Option)	T_{OP}		-10/70 or -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 production test circuit below , Figure 1.
3] See Standard Frequencies and Ordering Information tables for more specific information
4] Includes initial accuracy, operating temperature, supply voltage, shock and vibration (not under operation) and aging for 50 and 100ppm options.
5] Duty Cycle is measured as On Time/Period (Fig 2).
6] The Output is Enabled if the Enable/Disable is left open.

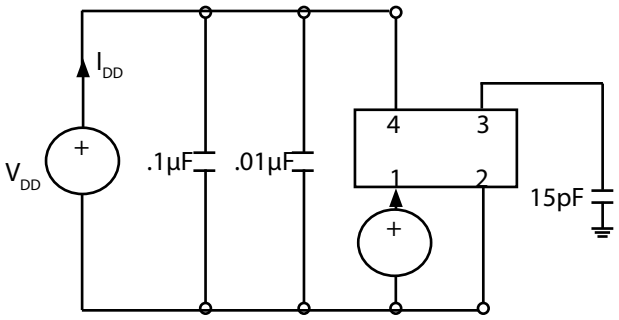


Fig 1: Test Circuit

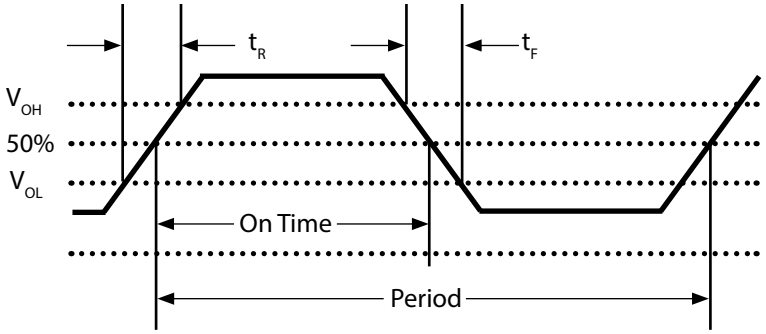


Fig 2: Waveform

Outline Drawing & Pad Layout

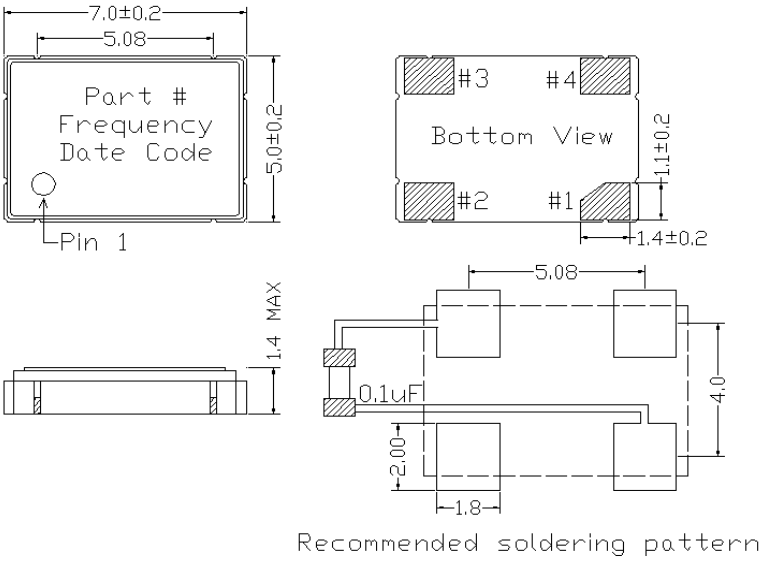


Table 3. Pin Out

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 VPC1 family is capable of meeting the following qualification tests:

Table 4. 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 2015
Moisture Sensitivity Level	MSL 1
Contact Pads	Gold over Nickel

Although ESD protection circuitry has been designed into the VPC1 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 5. 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 data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability. Permanent damage is also possible if E/D is applied before Vcc.

Table 6. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Storage Temperature	TS	-55 to 125	°C
Soldering Temp/Time	T_{LS}	260 / 10	°C / sec

IR Reflow

The VPC1 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 VPC1 device is hermetically sealed so an aqueous wash is not an issue.

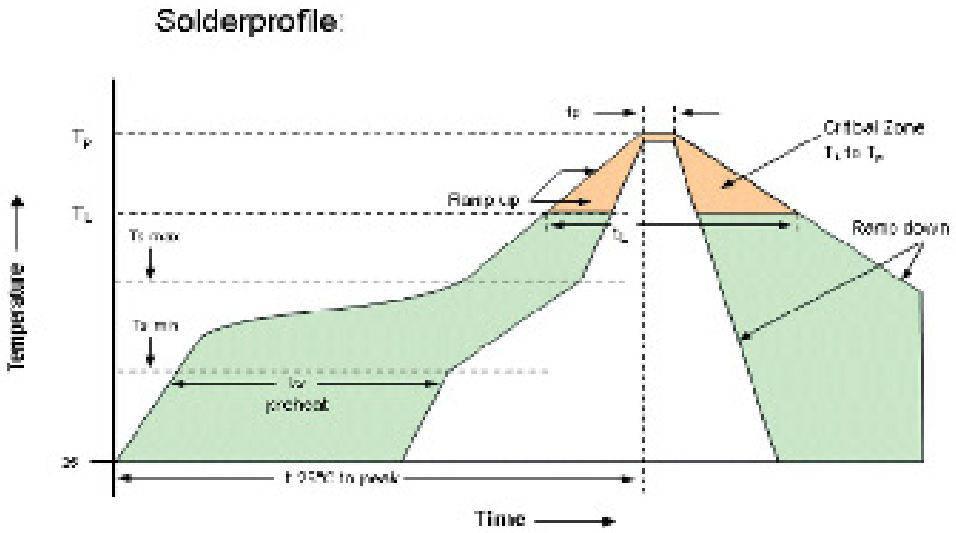
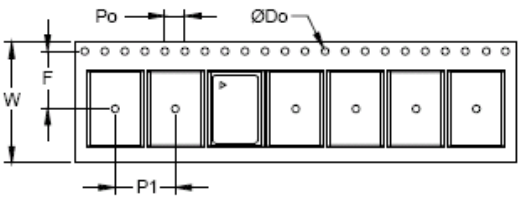
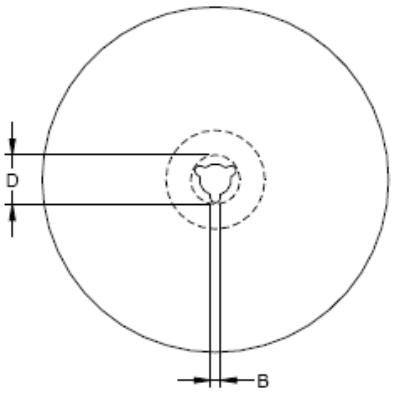


Table 7. Reflow Profile

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	10 sec Max
Ramp Down	R_{DN}	6 °C/sec Max

Tape and Reel





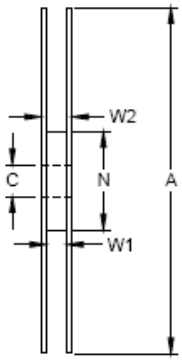


Table 8. Tape and Reel Information

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**	
VPC1	16	7.5	1.5	4	8	180	2	13	21	60	17	21	1000

Ordering Information

VPC1- X X X- xxMxxxxxxx

Frequency in MHz

Product
Crystal Oscillator

Package
7x5 Ceramic

Power Supply
A: +5.0Vdc, 15pF
B: +3.3Vdc, 15pF
E: +5.0Vdc, 50pf (<66MHz)
F: +3.3Vdc, 50pF (<66MHz)

Output
1: 60/40% Symmetry
3: 45/55% Symmetry

Stability - Temp Range
A: ±100ppm, 0/70°C
B: ±50ppm, 0/70°C
C: ±50ppm, -40/85°C
D: ±50ppm, -40/85°C
E: ±25ppm, 0/70°C
F: ±25ppm, -40/85°C

**Note: not all combination of options are available.*
Other specifications may be available upon request.

Example: VPC1-B3B-125M000000

* Add **_SNPBDIP** for tin lead solder dip

Example: VPC1-B3B-125M000000_SNPBDIP

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