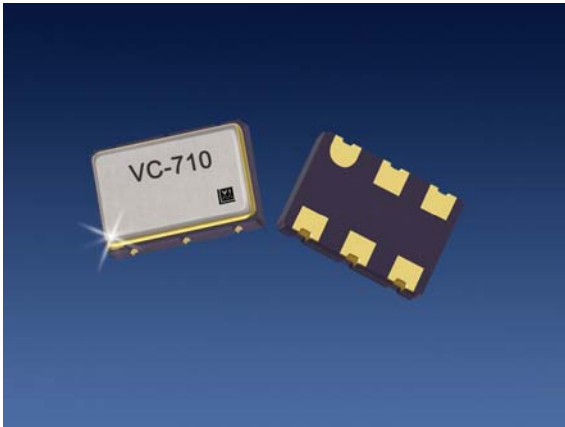



VC-710

Voltage Controlled Crystal Oscillator



Features

- Small Industry Standard Package, 5.0 x 7.5 x 1.8 mm
- Output Frequencies from 80 MHz to 200 MHz
- 3.3 V Operation
- HFF crystal for ultra low jitter
- Complementary LVPECL Outputs
- 0/70° C or -40/85° C operating temperature
- Enable /Disable
- Product is compliant to RoHS directive  and fully compatible with lead free assembly

Applications

PLL circuits for Clock Smoothing and Frequency Translation

- Fiber Channel
- SONET
- SDH, ITU-T G.709
- SONET, GR-253-CORE Issue3

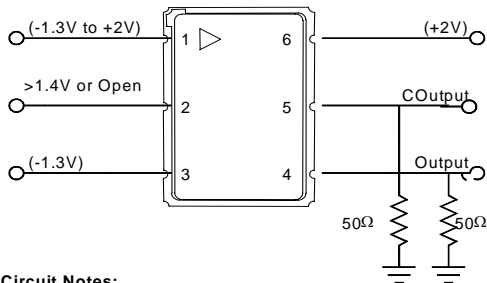
Description

The VC-710 is a voltage controlled crystal oscillator that operates at the fundamental frequency of the internal HFF crystal. The HFF crystal is a high-Q quartz device that enables the circuit to achieve low phase jitter performance over a wide operating temperature range. The oscillator is housed in an industry standard hermetically sealed leadless surface mount package and is available on tape and reel.

VC-710 Voltage Controlled Crystal Oscillator

Electrical Performance					
Parameter	Symbol	Min	Typical	Maximum	Units
Frequency	f_o	80	155.52	200	MHz
Supply Voltage (+3.3 V)	V_{DD}	3.135	3.3	3.465	V
Supply Current	I_{DD}		50	90	mA
Output Logic Levels					
Output Logic High +25 °C	V_{OH}	$V_{CC} - 1.025$	$V_{CC} - 0.950$	$V_{CC} - 0.880$	V
Output Logic Low +25 °C	V_{OL}	$V_{CC} - 1.810$	$V_{CC} - 1.700$	$V_{CC} - 1.620$	V
Transition Times					
Rise Time	t_R		0.5	1	ns
Fall Time	t_F		0.5	1	ns
Symmetry or Duty Cycle	SYM	45	50	55	%
Operating temperature (ordering option)		0/70 or -40/85			°C
Jitter (12 kHz – 20 MHz BW), 155.52 MHz			0.3		ps (rms)
Jitter (50 kHz – 80 MHz BW), 155.52 MHz			0.5		ps (rms)
Phase Noise, $f_o = 155.52$ MHz					
10 Hz offset			-64		dBc/Hz
100 Hz offset			-95		dBc/Hz
1 kHz offset			-123		dBc/Hz
10 kHz offset			-143		dBc/Hz
100 kHz offset			-146		dBc/Hz
1 MHz offset			-146		dBc/Hz
10 MHz offset			-146		dBc/Hz
Test Conditions for APR (+3.3V)	V_C	0.3		3.0	V
Absolute Pull Range (APR)	APR	± 50			ppm
Gain Transfer		Positive, 65			ppm/V
Control Voltage Bandwidth (-3dB)	BW	20	100		kHz
Enable/Disable ¹					
Output Enabled, F option		$V_{DD} * 0.7$			V
Output Disabled, F option				$V_{DD} * 0.3$	V
Output Enabled, B option				$V_{DD} * 0.2$	V
Output Disabled, B option		$V_{DD} * 0.7$			V
Package Size		5.08 x 7.5 x 1.8			mm

1. Output is enabled if the E/D, pin 2, is left open on F option. E/D must be terminated on B option.



Test Circuit Notes:

- 1) To Permit 50Ω Measurement of Outputs, all DC Inputs are Biased Down 1.3V.
- 2) All Voltage Sources Contain Bypass Capacitors to Minimize Supply Noise.
- 3) 50Ω Terminations are Within Test Equipment.

Figure 1. Test Circuit (3.3 V)

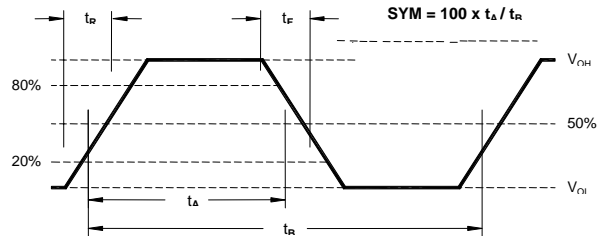


Figure 2. PECL Waveform

VC-710 Voltage Controlled Crystal Oscillator

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Supply	V_{DD}	0 to 6	V
Voltage Control Range	V_C	0 to V_{DD}	V
Storage Temperature	TS	-55 to 125	°C

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.

Reliability

The VC-710 family is capable of meeting the following qualification tests:

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	MSL1

Handling Precautions

Although ESD protection circuitry has been designed into the VC-710 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 Ratings

Model	Minimum	Conditions
Human Body Model	500	MIL-STD 883, Method 3015
Charged Device Model	500	JESD 22-C101

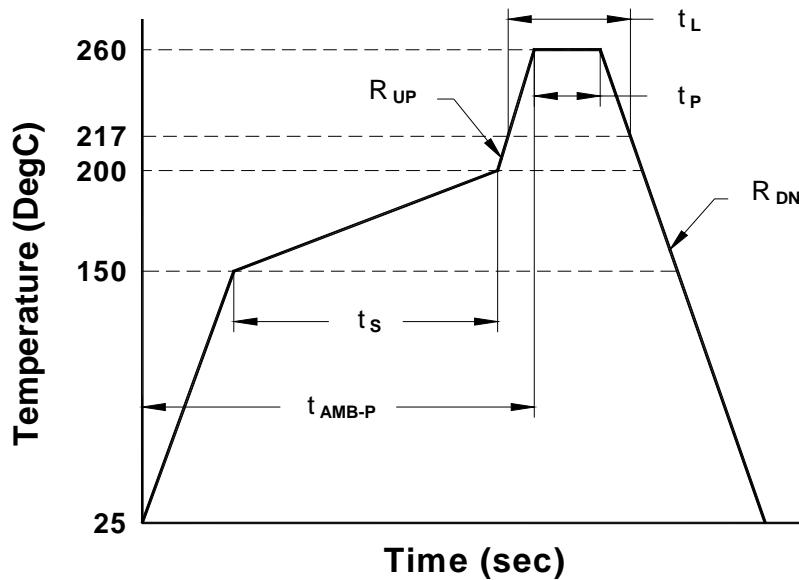
VC-710 Voltage Controlled Crystal Oscillator

Suggested IR profile

The VC-710 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 and parameters are listed in the table below. The contact pads are gold over nickel so lower IR reflow temperatures such as 220°C can be used (device is backwards compatible with a lead solder assembly).

The VC-710 is hermetically sealed so an aqueous wash is not an issue.

Reflow Profile (IPC/JEDEC J-STD-020C)		
Parameter	Symbol	Value
PreHeat Time	t_s	60 sec Min, 180 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	t_P	20 sec Min, 40 sec Max
Ramp Down	R_{DN}	6 °C/sec Max



VC-710 Voltage Controlled Crystal Oscillator

Standard Frequencies (MHz)

80.000	88.4736	89.600	91.080	93.312	96.000	100.000	101.992
110.000	112.640	120.000	122.880	124.416	125.000	128.000	133.330
139.264	144.000	155.520	156.250	157.500	161.1328	166.627	166.6286
167.3316	175.000	184.000	184.320	187.500	192.000	192.456	200.000

Other frequencies available upon request

Ordering Information

VC - 710 - D F F - G F A - xxx.xxx

Product Family

VC: VCXO

Package

710: 5.0 x 7.5 x 1.8 mm

Input

D: 3.3 Vdc ± 5%

Output

F: Complementary LVPECL

Frequency

80 - 200 MHz

Linearity, Temp. Stability

A: N/A

L: ± 10 % linearity

M: ± 20 ppm temp. stability

Enable - Disable)

F: Pin 2, Output is enabled high

B: Pin 2, Output is enabled low

Absolute Pull Range

G: ± 50 ppm

Operating Temperature

C: 0 to 70 °C

F: -40 to 85 °C

1. Not all combinations are possible.
2. ± 10% linearity available at certain frequencies. Consult factory.

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