Surface Mount
Quartz Crystal Oscillator
PC and LC series

CONNOR WINFIELD

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Description:

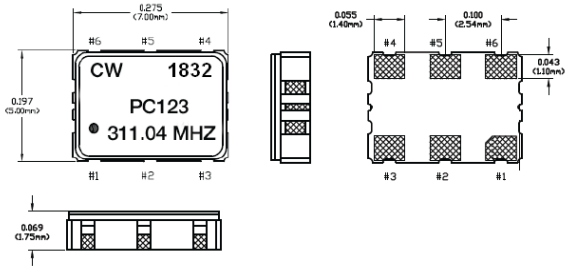
Connor-Winfield's PCxxx and LCxxx series are 5x7mm surface mount, fixed frequency crystal controlled oscillators (XO) designed for applications requiring tight frequency stability, wide temperature range, and low jitter. Operating at 2.5 or 3.3Vdc supply voltage, the PCxxx series provides LVPECL differential outputs, while the LCxxx provides LVDS differential outputs.

Both series incorporate PLL multiplication to achieve the final output frequency from a lower frequency crystal reference.

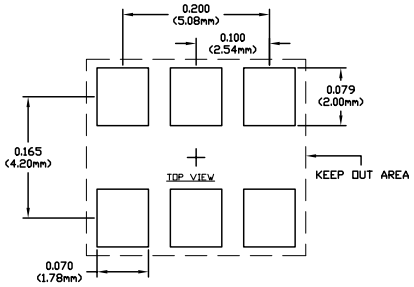
Features:

- Frequency Range 15 MHz to 2.0 GHz
- 3.3 or 2.5 Vdc Operation
- 5x7 mm SMT Package
- Frequency Stabilities Available:
  ±20 ppm, ±25 ppm, ±50 ppm or ±100 ppm
- Temperature Ranges Available:
  0 to 70°C, -40 to 85°C, 0 to 85°C or -20 to 70°C
- Low Jitter: 0.15ps RMS Typical
- Differential LVPECL or LVDS outputs
- Tri-State Enable/Disable on Pad 2
- Tape and Reel Packaging
- RoHS Compliant / Lead Free

Package Outline



Suggested Pad Layout



Keep Out Area: Do not route any traces in the keep out area. It is recommended the next layer under the keep out area is to be ground plane.

Pad Connections

1: N/C
2: Enable / Disable (OE)
3 Ground
4: Output Q
5: Complementary Output $\overline{Q}$
6: Supply Voltage (Vdd)

Ordering Information

PC	1	2	3	-311.04M
Oscillator Type 5x7mm Series PC=LVPECL LC=LVDS	Temperature Range 1 = 0 to 70°C 2 = -40 to 85°C 3 = 0 to 85°C 4 = -20 to 70°C	Frequency Tolerance 4 = ±20 ppm 1 = ±25 ppm 2 = ±50 ppm 3 = ±100 ppm	Supply Voltage E/D Function 2 = 2.5 Vdc, E/D Pad 2 3 = 3.3 Vdc, E/D Pad 2	Output Frequency Frequency Format -xxx.xM Min.* -xxx.xxxxxxM Max*

*Min 1 and Max 6 digits after the decimal point.

Example Part Numbers:

PC123-311.04M = 5x7 mm package, ±50 ppm, 0 to 70°C, 3.3 Vdc, LVPECL Output, E/D Pad 2, Output Frequency 311.04 MHz

LC222-622.08M = 5x7 mm package, +/-50ppm, -40 to 85C, 2.5 Vdc, LVDS Output, E/D Pad 2, Output Frequency 622.08 MHz

RoHS COMPLIANT

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Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	125	°C	
Supply Voltage (Vdd)	-0.5	-	3.8	Vdc	
Input Voltage	-0.5	-	3.8	Vdc	

Operating Specifications

Parameter	Minimum	Nominal	Maximum	Units	Notes
Center Frequency: (Fo)	15	-	2000	MHz	
Operating Temperature Range: (See Ordering Information)					
Temperature Code 1	0	-	70	°C	
Temperature Code 2	-40	-	85	°C	
Temperature Code 3	0	-	85	°C	
Temperature Code 4	-20	-	70	°C	
Total Frequency Tolerance: (See Ordering Information)					
Tolerance Code 4	-20	-	20	ppm	1
Tolerance Code 1	-25	-	25	ppm	1
Tolerance Code 2	-50	-	50	ppm	1
Tolerance Code 3	-100	-	100	ppm	1
Supply Voltage: (Vdd)					
Supply Voltage Code 2	2.375	2.5	2.625	Vdc	±5%
Supply Voltage Code 3	3.135	3.3	3.465	Vdc	±5%
Supply Current					
LVPECL Output	-	80	95	mA	
LVDS Output	-	70	80	mA	
Start-Up Time	-	-	10	ms	

Jitter / Phase Noise Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Jitter					
Period Jitter	-	6	8	ps RMS	
Integrated Phase Jitter	-	0.15	0.25	ps RMS	
SSB Phase Noise for Fo = 245.76 MHz					
@ 100 Hz offset	-	-65	-	dBC/Hz	
@ 1 KHz offset	-	-92	-	dBC/Hz	
@ 10 KHz offset	-	-115	-	dBC/Hz	
@ 100 KHz offset	-	-135	-	dBC/Hz	
@ 1 MHz offset	-	-145	-	dBC/Hz	
@ 10 MHz offset	-	-155	-	dBC/Hz	

Enable/Disable Function Input Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Enable Voltage (V_{IH})	70% Vdd	-	-	Vdc	
Disable Voltage (V_{IL})	-	-	30% Vdd	Vdc	2
Enable Time	-	-	200	ns	
Disable Time	-	-	50	ns	

Enable / Disable Function

Function: (Pad 2)	Output
Low	Disabled (High Impedance)
High or Open	Enabled

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LVPECL Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	50	-	Ohms	3
Output Voltage: Vdd = 2.5					
High (V_{OH})	1.475	-	-	V	
Low (V_{OL})	-	-	0.880	V	
Output Voltage: Vdd = 3.3					
High (V_{OH})	2.275	-	-	V	
Low (V_{OL})	-	-	1.680	V	
Duty Cycle at 50% of output voltage swing	45	50	55	%	
Rise / Fall Time: 20% to 80%	-	350	500	ps	

LVDS Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	100	-	Ohms	
Output Differential Voltage (Vod)	250	-	450	mV	4
Output Swing (Differential Output Pk to Pk)	500	700	900	mV	
Duty Cycle at 50% of output voltage swing	45	50	55	%	
Differential Rise / Fall Time: 20% to 80%	150	350	ps		

Package Characteristics

Package	Hermetically sealed ceramic package and metal cover

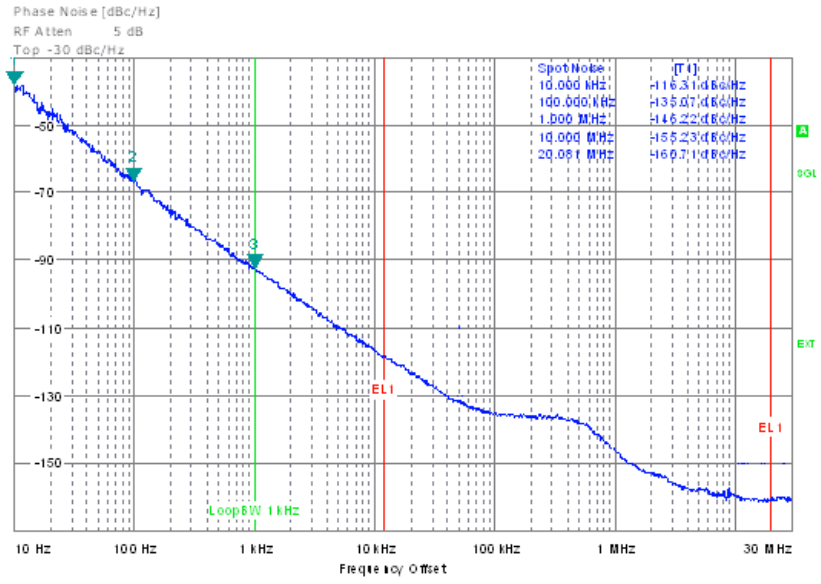
Environmental Characteristics

Vibration:	Vibration per Mil Std 883E Method 2007.3 Test Condition A.
Shock:	Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B.
Soldering Process:	RoHS compliant lead free. See soldering profile on page 4.

Notes:

1. *Includes calibration @ 25°C, frequency stability vs. change in temperature, supply voltage and load variations, shock and vibration and 20 years aging.*
2. *When the oscillator is disabled the outputs go to tri-state level (high impedance) which floats to V_{OL}. Outputs are enabled with no connection on E/D pad.*
3. *LVPECL outputs must be terminated into 50 ohms to Vdd – 2V or Thevenin equivalent.*
4. *Vod is measured with a 100 ohm resistor between the true and the complementary outputs.*

Phase Noise Plot Fo = 245.76M



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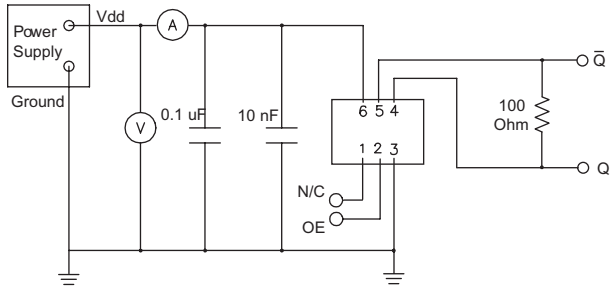
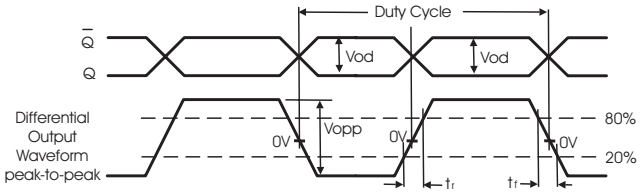
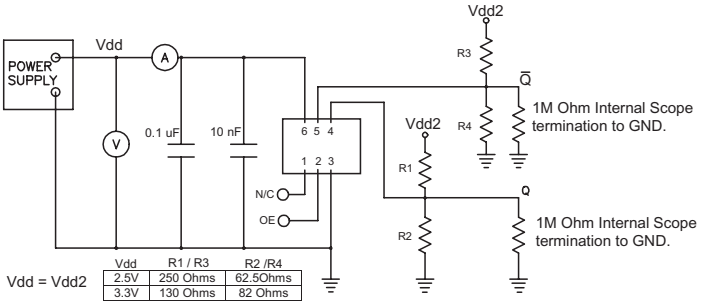
LVDS Test Circuit



LVDS Output Waveform



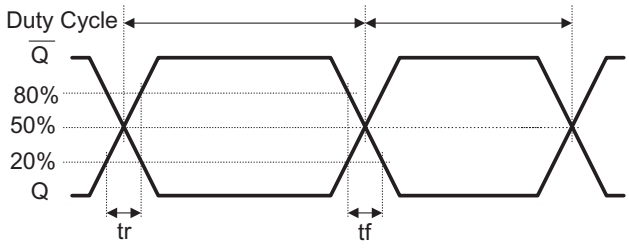
LVPECL Test Circuit



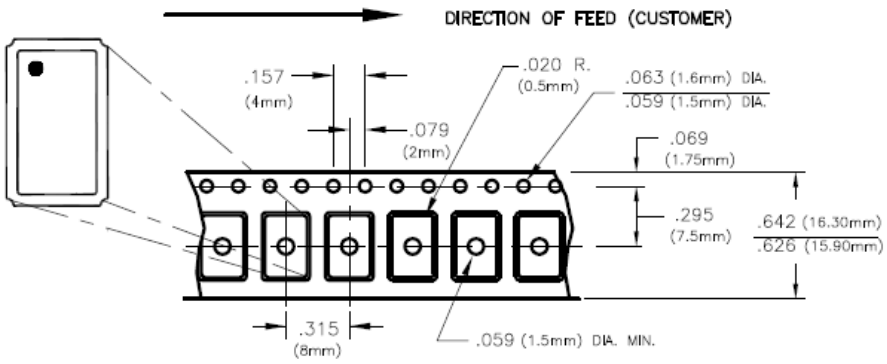
Vdd = Vdd2

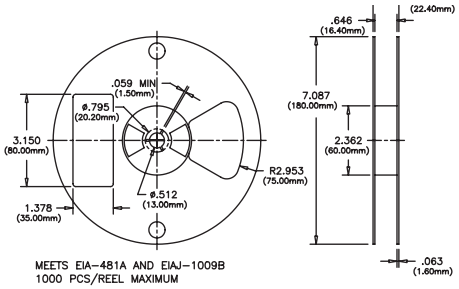
Vdd	R1 / R3	R2 /R4
2.5V	250 Ohms	62.5Ohms
3.3V	130 Ohms	82 Ohms

LVPECL Output Waveform



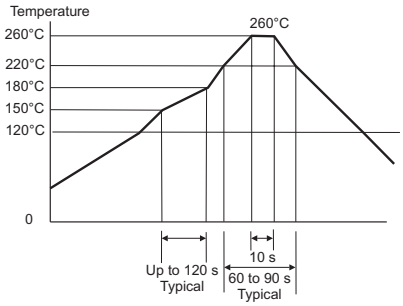
Tape and Reel Dimensions





MEETS EIA-481A AND EIAJ-1009B
1000 PCS/REEL MAXIMUM

RoHS Solder Profile



Meets IPC/JEDEC J-STD-020C

Revision	Revision Date	Note
00	03/31/17	Data Sheet Release
01	04/04/17	Frequency Range and Supply Current update
02	08/03/17	Change OE from Pin 1 to Pin 2
03	08/07/18	Updated package and tape and reel drawings