



# Low Phase Noise Clock Oscillator Series XB Series



2111 Comprehensive Drive

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### Description:

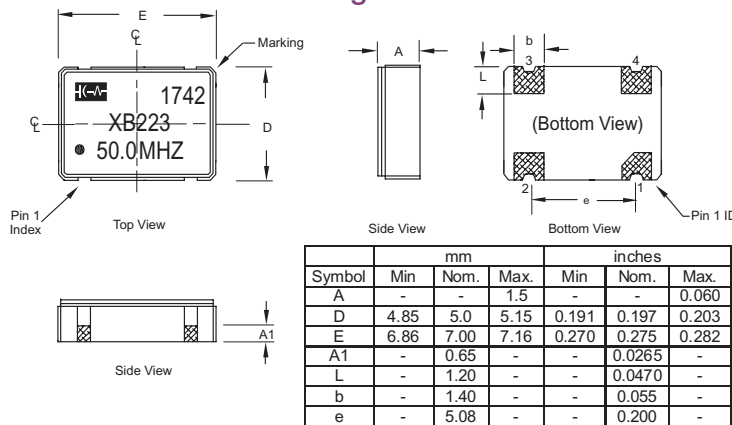
The Connor-Winfield XB-series is a 5x7mm surface mount LVC MOS oscillator with ultra-low phase noise. This XB-series operates at either 1.8, 2.5, or 3.3V supply voltages with temperature stabilities as low as  $\pm 20$ ppm.



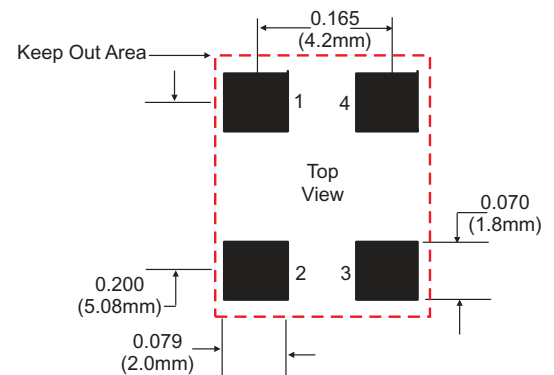
### Features:

- 5.0 x 7.0mm Surface Mount Package
- 1.8V, 2.5V, or 3.3V Operation
- LVC MOS Output Logic
- Frequency Stabilities Available:  $\pm 20$ ppm;  $\pm 25$ ppm;  $\pm 50$ ppm;  $\pm 100$ ppm
- Temperature Ranges Available:
  - XB1xx Series: 0 to 70°C; XB2xx Series: -40 to 85°C
  - XB3xx Series: 0 to 85°C; XB4xx Series: -20 to 70°C
- Low Jitter: <0.1ps RMS
- Low Phase Noise
- Tri-State Enable/Disable
- Tape and Reel Packaging
- RoHS Compliant / Lead (Pb) Free

### Package Outline



### Suggested Pad Layout



### Pad Connections

- 1: Enable / Disable (OE)
- 2: Ground
- 3: Output
- 4: Supply Voltage (Vdd)

\* Digi-Key Stock available for XB223-050.0M and XB223-064.0M only.

### Ordering Information

XB	1	2	3	-050.0M
Type LVC MOS Clock Series 5x7 mm	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 = $\pm 20$ ppm 1 = $\pm 25$ ppm 2 = $\pm 50$ ppm 3 = $\pm 100$ ppm	Supply Voltage 1 = 1.8 Vdc 2 = 2.5 Vdc 3 = 3.3 Vdc	Output Frequency Frequency Format -xxx.xM Min* -xxx.xxxxxM Max* * Min 1 and Max 6 decimal places allowed for frequency. M=MHz.

### Example Part Numbers:

XB123-050.0M = LVC MOS Output, 0 to 70°C,  $\pm 50$  ppm, 3.3 Vdc, E/D Pad 1, Output Frequency 50.0 MHz  
 XB223-064.0M = LVC MOS Output, -40 to 85°C,  $\pm 50$  ppm, 3.3Vdc, E/D Pad 1, Output Frequency 64.0 MHz





## Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	125	°C	
Supply Voltage (Vdd)	-0.6	-	6.0	Vdc	
Input Voltage (OE)	-0.6	-	Vdd+0.6	Vdc	

Absolute Ratings: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only. The functional operation of the device at those or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to conditions outside the "recommended operating conditions" for any extended period of time may adversely impact device reliability and result in failures not covered by warranty.

## Operating Specifications

Parameter	Minimum	Nominal	Maximum	Units	Notes
Output Frequency (Fo)	20	-	64	MHz	
Total Frequency Tolerance					
Model XBx4x	-20	-	20	ppm	1
Model XBx1x	-25	-	25	ppm	1
Model XBx2x	-50	-	50	ppm	1
Model XBx3x	-100	-	100	ppm	1
Operating Temperature Range					
Model XB1xx	0	-	70	°C	
Model XB2xx	-40	-	85	°C	
Model XB3xx	0	-	85	°C	
Model XB4xx	-20	-	70	°C	
Supply Voltage (Vdd)					
Model XBxx1	1.71	1.8	1.89	Vdc	
Model XBxx2,	2.375	2.5	2.625	Vdc	
Model XBxx3	3.135	3.3	3.465	Vdc	
Supply Current (Idd)					
20 to 49.999 MHz	-	-	15	mA	
50 to 64 MHz	-	-	26	mA	
Jitter Fo=50.0 MHz:					
Period Jitter	-	3.0	5.0	ps RMS	
Integrated Phase Jitter (BW = 12 KHz to 20 MHz)	-	60	100	fs RMS	
SSB Phase Noise (Fo = 50 MHz)					
@ 10 Hz offset	-	-70	-	dBc/Hz	
@ 100 Hz offset	-	-110	-	dBc/Hz	
@ 1 KHz offset	-	-140	-	dBc/Hz	
@ 10 KHz offset	-	-160	-	dBc/Hz	
@ 100 KHz offset	-	-162	-	dBc/Hz	
@ 1 MHz offset	-	-163	-	dBc/Hz	
@ 10 MHz offset	-	-170	-	dBc/Hz	
Start-Up Time	-	-	2	ms	

## OE Input Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Enable Voltage (High) (Vih)	70%Vdd	-	-	Vdc	2
Disable Voltage (Low) (Vil)	-	-	30%Vdd	Vdc	2
Enable Time	-	-	2	ms	
Disable Time	-	-	200	ns	
Output Disable Current (Standby Current) (Idd)	-	-	10	uA	

## CMOS Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	15	-	pF	
Output Voltage: High (Voh)	Vdd-0.4	-	-	V	
Low (Vol)	-	-	0.4	V	
Output Current: High (Ioh)	-8	-	-	mA	
Low (Iol)	-	-	8	mA	
Duty Cycle at 50% of Vdd	45	50	55	%	
Rise / Fall Time: 10% to 90%	-	1	2	ns	

### Notes:

- 1) Inclusive of calibration @ 25°C, frequency vs. temperature stability, supply voltage change, load change, shock and vibration, 10 years aging.
- 2) When the oscillator is disabled, the output is high impedance. Output is enabled with no connection on pad 1.

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## Package Characteristics

Package	Ceramic Surface Mount Package
Moisture Sensitivity Level	MSL-1
Termination Finish	0.7um Gold (Au) over 2.5um Nickel (Ni)

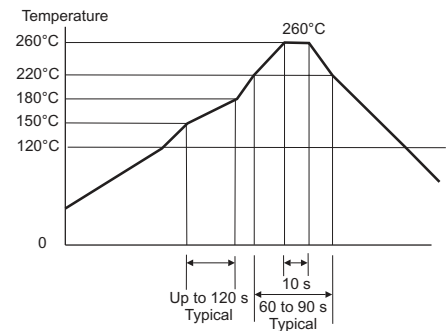
## Environmental Characteristics

Shock	500 G's 1ms, Halfsine, 3 shocks per direction, per MIL-STD 202G, Method 213B Test Condition D.
Sinusoidal Vibration	0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD-202G, Method 204D, Test Condition A.
Random Vibration	5.35 G's rms. 20 to 2000 Hz per MIL-STD-202G, Method 214, Test Condition 1A, 15 minutes each axis.
Moisture	10 cycles, 95% RH, Per MIL-STD-202G, Method 112.
Marking Permanency	Per MIL-STD-202G, Method 215J.
Solder Process	RoHS compliant, lead free. See solder profile below.

## Enable / Disable Function (OE)

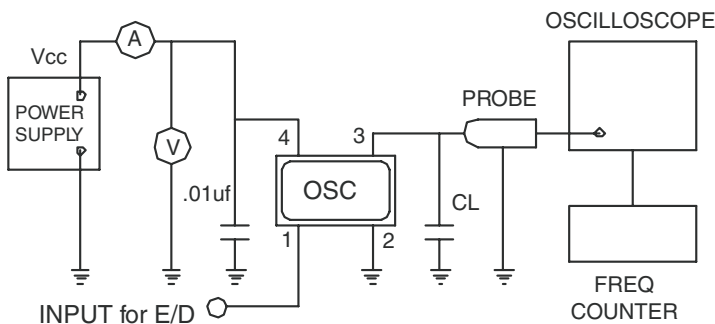
Function (Pad 1)	Output
High (Vih) or Open	Enabled
Low (Vil)	Disabled (High Impedance)

## Solder Profile

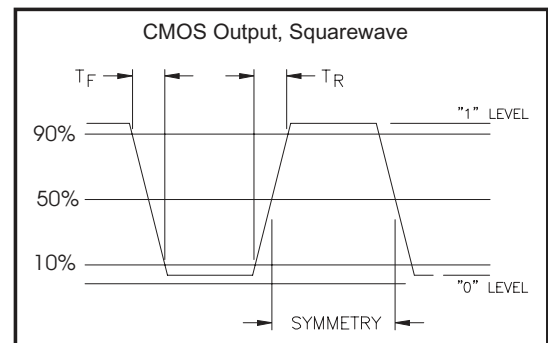


Meets IPC/JEDEC J-STD-020C

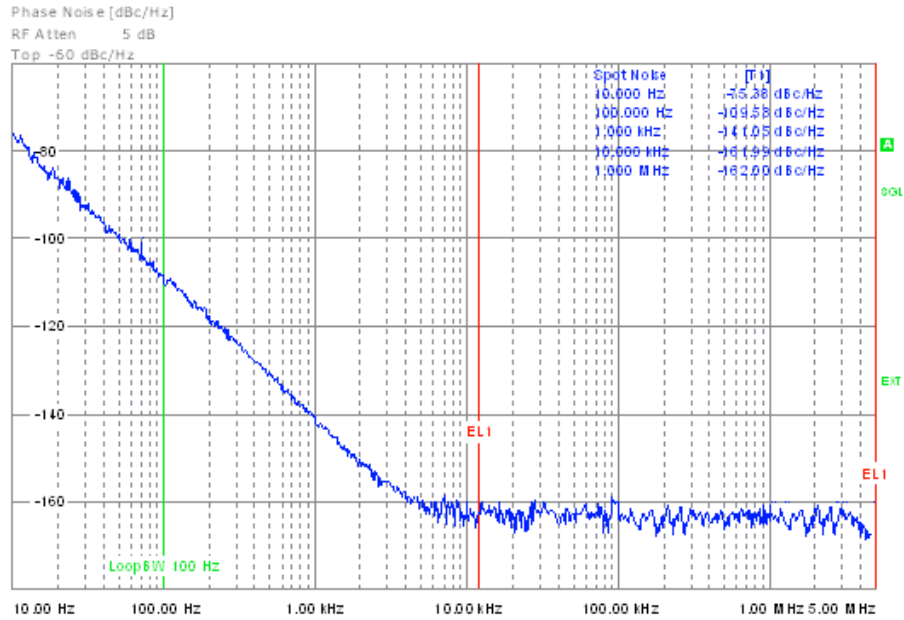
## Test Circuit



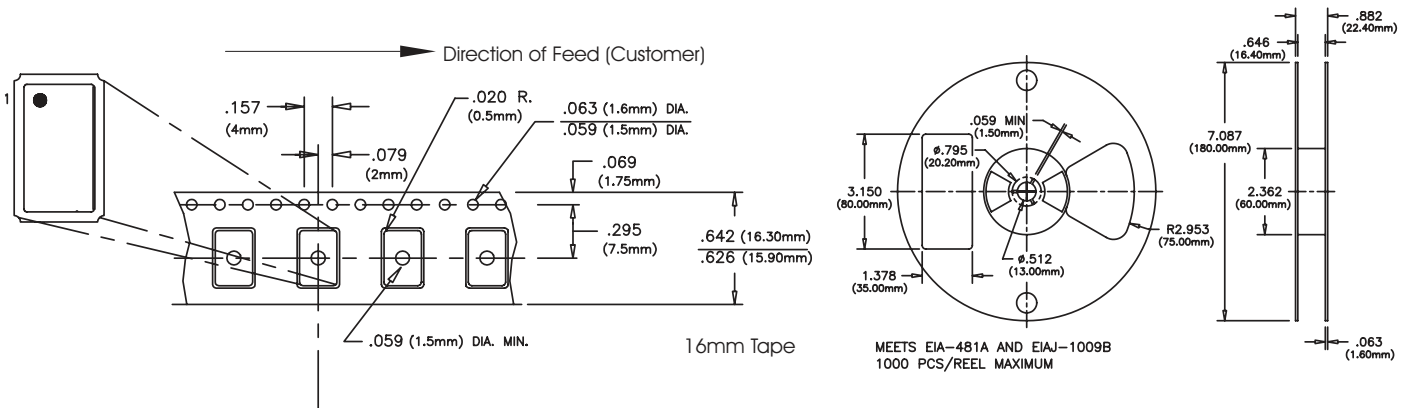
## CMOS Output Waveform



## Typical Phase Noise at Fo=50MHz



## Tape and Reel Dimensions



## Revision History

Revision	Date	Changes
00	09/21/16	Data sheet released
01	01/26/17	Frequency range update
02	03/14/17	Updated phase noise numbers.
03	01/03/18	Updated Frequency Range
04	01/04/18	Update frequency range under supply current

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