

14 Pin DIP Precision OCXO / VCOCXO BOC1 Series



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Description:

Connor-Winfield's high stability BOC1 series are exceptionally precise frequency standards, excellent devices for use in cellular base stations, test equipment, Synchronous Ethernet and VSAT applications.

This 14 Pin DIP OCXO / VCOCXO provides temperature stabilities in the range of ± 50 ppb or ± 100 ppb, over the commercial, extended commercial or the industrial temperature range.

The BOC1 series is available with a CMOS output along with optional Voltage Controlled option (VCOCXO). These oscillators provide outstanding phase noise characteristics that will meet the most stringent requirements.

Features:

OCXO / VCOCXO

Frequencies Available:

10, 12.8, 19.44, 20, 25 or 38.88 MHz

3.3 or 5.0 Vdc Operation

Package: 14 Pin DIP

Frequency Stabilities Available:

± 50 ppb or ± 100 ppb

Temperature Ranges Available:

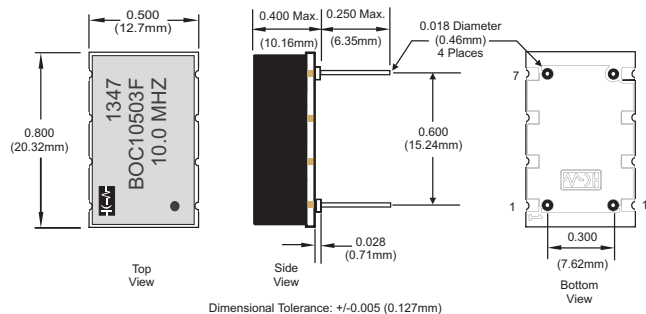
0 to 70°C, -20 to 75°C or -40 to 85°C

CMOS Output / Low Phase Noise

Voltage Controlled Option

RoHS Compliant / Lead Free

BOC1 Package Outline



Pin Connections

- 1: N/C or Vc (option)
- 7: Ground:
- 8: Output
- 14: Supply Voltage (Vcc)

Ordering Information

BOC	1	05	0	3	F	-010.0M
Oscillator Type OCXO VCOCXO	Package Type 1 = 14 Pin DIP	Frequency Stability 05 = ± 50 ppb 10 = ± 100 ppb	Temperature Range 0 = 0 to 70°C 1 = -20 to 75°C 2 = -40 to 85°C	Supply Voltage 3 = 3.3 Vdc 5 = 5.0 Vdc	Voltage Control Option F = OCXO (Fixed Freq.) V = VCOCXO (Voltage Controlled)	Output Frequency Frequency Format -xxx.xM Min.* -xxx.xxxxxM Max*

*Amount of numbers after the decimal point.
M = MHz

Part Number Examples:

BOC10503F-010.0M = 14 Pin DIP package, ± 50 ppb, 0 to 70°C, 3.3 Vdc, LVCMOS Output, OCXO, Output Frequency 10.0 MHz

BOC11025V-020.0M = 14 Pin DIP package, ± 100 ppb, -40 to 85°C, 5.0 Vdc, HCMOS Output, VCOCXO, 20.0 MHz



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Specifications subject to change without notification. See Connor-Winfield's website for latest revision. Not intended for life support applications.
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Absolute Maximum Ratings

Parameter		Minimum	Nominal	Maximum	Units	Notes
Storage Temperature		-55	-	125	°C	
Supply Voltage:	3.3 Vdc (Vcc)	-0.5	-	4.5	Vdc	
	5.0 Vdc (Vcc)	-0.5	-	6.0	Vdc	
Control Voltage (Vc)		-0.5	-	Vcc+0.5	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
Center Frequency: (Fo)		10, 12.8, 19.44, 20, 25 or 38.88			MHz	
Frequency Stability vs. Change in Temperature: (See Ordering Information)						
	Stability Code 05	-50.0	-	50.0	ppb	1
	Stability Code 10	-100.0	-	100.0	ppb	1
Operating Temperature Range: (See Ordering Information)						
	Temperature Code 0	0	-	70	°C	
	Temperature Code 1	-20	-	75	°C	
	Temperature Code 2	-40	-	85	°C	
Frequency Calibration:		-1.0	-	1.0	ppm	2
Frequency Stability vs. Load		-20	-	20	ppb	±5%
Frequency Stability vs. Voltage		-20	-	20	ppb	±5%
Aging: Daily:		-10	-	10	ppb/day	3
Aging: First Year:		-300	-	300	ppb	3
Total Frequency Tolerance		-4.6	-	4.6	ppm	4
Supply Voltage: (Vcc) (See Ordering Information)						
	Supply Voltage Code 3	3.13	3.30	3.47	Vdc	±5%
	Supply Voltage Code 5	4.75	5.00	5.25	Vdc	±5%
Power Consumption: Vcc = Nominal Voltage						
	Turn On	-	-	3.0	W	
	Steady State @ 25°C	-	-	1.3	W	
Phase Jitter: (BW: 12 KHz to Fo/2)		-	0.5	1.0	ps RMS	
Short Term Stability		-	-	1.0E-9/s		
Start-Up Time:		-	-	10	ms	
Warm Up Time (Within Specification @ 25°C)		-	-	60	s	
Warm Up Time (Within Specification @ -40°C)		-	-	90	s	

VCOCXO Input Characteristics (Optional)

Parameter		Minimum	Nominal	Maximum	Units	Notes
Control Voltage Range:						
	Vcc = 3.3 Vdc	0.30	1.65	3.00	V	5
	Vcc = 5.0 Vdc	0.5	2.5	4.5	V	5
Frequency Pullability:		±10.0	-	-	ppm	6
Input Impedance		100K	-	-	Ohms	
Linearity		±5	-	-	%	



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CMOS Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	15	-	pF	
Output Voltage:					
Vcc = 3.3 Vdc High (Voh)	2.70	-	-	V	
Low (Vol)	-	-	0.30	V	
Vcc = 5.0 Vdc High (Voh)	4.00	-	-	V	
Low (Vol)	-	-	0.50	V	
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time: 10% to 90%	-	-	6.5	ns	

Phase Noise Characteristics

Typical Phase Noise for BOC10503F - 010.0M

Parameter	Minimum	Nominal	Maximum	Units	Notes
@ 1 Hz offset	-	-67	-	dBc/Hz	
@ 10 Hz offset	-	-100	-	dBc/Hz	
@ 100 Hz offset	-	-130	-	dBc/Hz	
@ 1 KHz offset	-	-148	-	dBc/Hz	
@ 10 KHz offset	-	-154	-	dBc/Hz	
@ 100 KHz offset	-	-155	-	dBc/Hz	

Package Characteristics

BOC1 Series Package	Package consisting of a FR4 substrate and a Ryton-R4 cover.
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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 Recommendations: RoHS compliant, lead free. See solder profile on page 6.

In-line reflow: Refer to recommended reflow pre-heat and reflow temperatures on page 6. Package material consist of Ryton R-4 high temperature cover with FR4 substrate. Component solder is Pb free high temperature eutectic alloy with a melting point of 221°C.

In-line oven profile: We recommend using KIC profiler or similar device placing one of the thermocouples on the device to insure that the internal package temperature does not exceed 221°C.

Removal of device: If for any reason the device needs to be removed from the board, use a temperature controlled repair station with profile monitoring capabilities. Following a monitored profile will insure the device is properly pre-heated prior to reflow. Refer to IPC 610E for inspection guidelines.

Recommended Cleaning Process: (If required)

Device is non-hermetic, water resistance with four weep holes, one in each corner to allow moisture to be removed during the drying cycle. We recommend in-line warm water wash with air knife and drying capabilities. If cleaner does not have drying capability, then use hot air circulated oven. Boards should be placed in the oven vertically for good water runoff

Device must be dried properly prior to use!

Note: If saponifier is used make sure the device is rinsed properly to insure all residues are removed. PH of saponifier should not exceed 10.

Drying Temperature: Between 85 to 100°C.

Drying Time: Time will vary depending on the board size.

Caution: Do not submerge the device!



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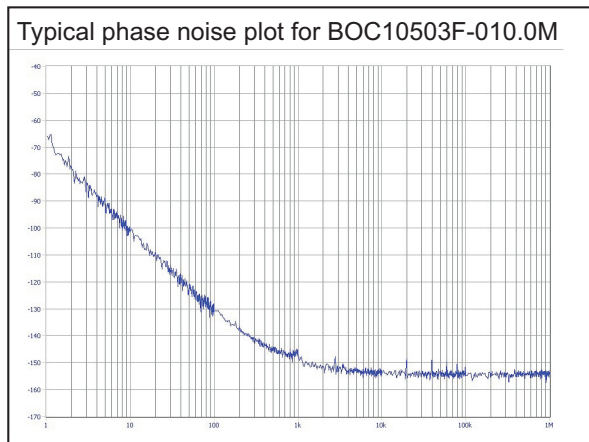
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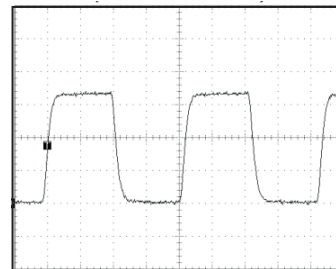
Notes:

- 1 Frequency stability vs. change in temperature. $[\pm(F_{\max} - F_{\min})/(2 \cdot F_0)]$.
- 2 Initial calibration @ 25°C. For VCOCXO control voltage must be fixed.
- 3 After 30 days of operation
4. Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage ($\pm 5\%$), load change ($\pm 5\%$), shock and vibration and 20 years aging
- 5 Positive slope. (Frequency increases as Vc voltage increases.)
- 6 Referenced to F₀.

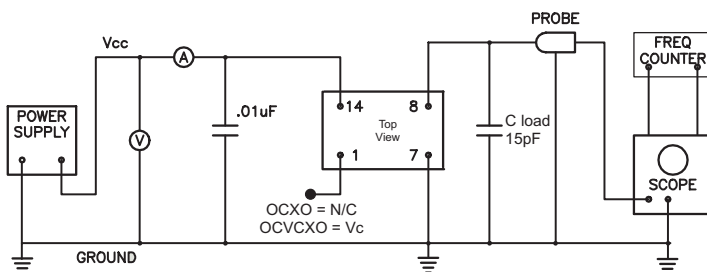
Phase Noise Plot



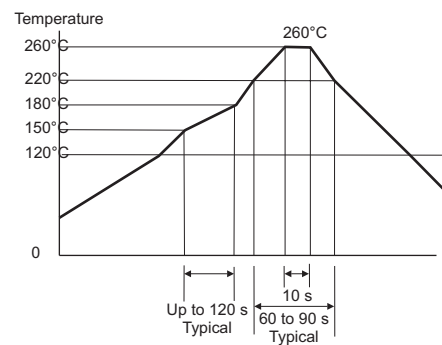
CMOS Output Waveform



BOC1 Series Test Circuit



RoHS Solder Profile



Meets IPC/JEDEC J-STD-020C

Revision History

Revision A00	Advanced information data sheet released 05/19/11
Revision P01	Added page 4 information and released data sheet 07/11/11
Revision P02	Removed "-" from part number 02/27/12
Revision P03	Updated pin dimensions. 05/01/12
Revision P04	Updated start-up time. 05/17/12
Revision 05,	Removed the BOC2 series, 11/22/13.



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