



# Stratum 3E High Stability Oven Stabilized Oscillator OH200-Series

## OCXO / VCOCXO

# CONNOR WINFIELD



2111 Comprehensive Drive

Aurora, Illinois 60505

Phone: 630-851-4722

Fax: 630-851-5040

www.conwin.com

## Description

Connor-Winfield's high stability OH200- series are exceptionally precise frequency standards, excellent for use in cellular base stations, test equipment, Synchronous Ethernet, VSAT and Stratum 3E applications



These unique OCXO / VCOCXO oscillator products provide temperature stabilities in the range of  $\pm 3$  ppb to  $\pm 25$  ppb, over the commercial, extended commercial or the industrial temperature range. Power requirements are 3W over the commercial temperature range and 4.5W over the industrial temperature range. Additionally, excellent aging is achieved through the use of overtone SC cut crystals.

The OH200 series is available with CMOS logic or Sinewave output along with Voltage Controlled option. These oscillators provide outstanding phase noise that varies depending on frequency. Frequencies are available from 5.0 to 40.0 MHz. Allan Variance specifications are rated for primary reference standards. Warm up times are on the order of 5 minutes to 0.10 ppm of final frequency.

## Features

- Frequency Range: 5.0 to 40.0 MHz
- OCXO - Fixed Frequency
- VCOCXO - Voltage Controlled Option
- 3.3 Vdc, 5.0 Vdc or 12.0 Vdc Operation
- Available Frequency Stabilities:  $\pm 3$  ppb,  $\pm 5$  ppb,  $\pm 10$  ppb or  $\pm 25$  ppb
- Available Temperature Ranges: 0 to 70°C, -20 to 70°C, -40 to 70°C or -40 to 85°C
- Low Phase Noise / Phase Jitter
- Available Outputs: CMOS or Sinewave
- Package: 1.1" x 1.4" x 0.5" (CO-8)
- RoHS Compliant / Lead Free

## Ordering Information

OH200-	6	10	03	C	F	-012.8M
Package OH200- = 1.1x1.4 CO8	Temperature Range 5 = 0 to 70°C 6 = -40 to 85°C 7 = -20 to 70°C 8 = -40 to 70°C	Frequency Stability 06 = $\pm 3$ ppb * 10 = $\pm 5$ ppb * 20 = $\pm 10$ ppb 50 = $\pm 25$ ppb  ( $\pm(F_{max}-F_{min})/(2^*F_o)$ )	Supply Voltage 03 = 3.3 Vdc 05 = 5.0 Vdc 12 = 12.0 Vdc	Output Type C = CMOS S = Sinewave	OCXO Type F = Fixed Freq. V = Voltage Controlled Option	Output Frequency Frequency Format -xxx.xM Min -xxx.xxxxxM Max *Min 1 and Max 6 digits after the decimal point. M = MHz

\* Frequency stability option 06 is only available for temperature ranges 0 to 70°C and -20 to 70°C.

\* Frequency stability options 06 and 10 are only available at frequencies less than or equal to 25MHz.

### Example Part Number:

OH200-61003CF-012.8M = 1.1" x 1.4" x 0.5" CO-8 package, -40 to 85°C temperature range,  $\pm 5.0$  ppb frequency stability, 3.3 Vdc supply voltage, CMOS square wave output, fixed frequency OCXO, 12.8 MHz output frequency.

To order a OH200-61003CF with an output frequency of: 6.4 MHz = OH200-61003CF-006.4M  
To order a OH200-61003CF with an output frequency of 16.384 MHz = OH200-61003CF-016.384M.

OH200-72005SV-040.0M = 1.1" x 1.4" x 0.5" CO-8 package, -20 to 70°C temperature range,  $\pm 10.0$  ppb frequency stability, 5.0 Vdc supply voltage, Sinewave output, voltage controlled output frequency VCOCXO, 40 MHz output frequency.



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## Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	125	°C	
Supply Voltage (Vcc)	-0.5	-	13.5	Vdc	
Control Voltage (Vc)	-0.5	-	7.0	Vdc	
Operating Supply Voltage 3.3 Vdc (Vcc)	3.13	3.30	3.47	Vdc	
Operating Supply Voltage 5.0 Vdc (Vcc)	4.75	5.00	5.25	Vdc	
Operating Supply Voltage 12 Vdc (Vcc)	11.40	12.00	12.60	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)	5.0	-	40.0	MHz	
Operating Temperature Range:					
Temperature Code 5	0	-	70	°C	
Temperature Code 6	-40	-	85	°C	
Temperature Code 7	-20	-	70	°C	
Temperature Code 8	-40	-	70	°C	
Frequency Calibration:	-0.1	-	0.1	ppm	@ 25°C
Frequency Stability vs. Change in Temperature:					
Stability Code 06	-3.0	-	3.0	ppb	1
Stability Code 10	-5.0	-	5.0	ppb	1
Stability Code 20	-10.0	-	10.0	ppb	1
Stability Code 50	-25.0	-	25.0	ppb	1
Frequency Stability vs. Load	-5.0	-	5.0	ppb	±5%
Frequency Stability vs. Voltage	-5.0	-	5.0	ppb	±5%
Aging: Daily:					
5 MHz to 20 MHz	-1.0	-	1.0	ppb/day	2
>20 MHz to 40 MHz	-2.0	-	2.0	ppb/day	2
Aging: First Year:					
5 MHz to 20 MHz	-50	-	50	ppb	
>20 MHz to 40 MHz	-100	-	100	ppb	
Lifetime Tolerance: (20 Years)					
5 MHz to 20 MHz-	-300	-	300	ppb	3
>20 MHz to 40 MHz	-500	-	500	ppb	3
Supply Voltage: (Vcc)					
Voltage Code 03	3.13	3.30	3.47	Vdc	4
Voltage Code 05	4.75	5.00	5.25	Vdc	4
Voltage Code 12	11.40	12.00	12.60	Vdc	4
Power Consumption: Turn-On					
0 to 70°C Models	-	-	3.00	W	5
-20 to 70°C Models	-	-	3.20	W	5
-20 to 75°C Models	-	-	3.30	W	5
-40 to 85°C Models	-	-	3.80	W	5
Power Consumption: Steady State @ 25°C					
0 to 70°C Models	-	-	1.10	W	5
-20 to 70°C Models	-	-	1.10	W	5
-20 to 75°C Models	-	-	1.20	W	5
-40 to 85°C Models	-	-	1.50	W	5
Phase Jitter: (BW: 10 Hz to Fo/2)					
Models with Fo: 5 MHz to 20 MHz	-	-	1.0	ps rms	
Models with Fo: >20 MHz to 40 MHz	-	-	2.0	ps rms	
Short Term Allan Deviation (1s)	-	1.0E-11	-	rms	
Start-Up Time:	-	-	500	ms	
Warm Up Time @ 25°C:	-	-	5	minutes	6

### Notes:

1. Frequency stability vs. change in temperature  $[\pm(F_{max}-F_{min})/(2*F_o)]$ . Stability option 06 is not available for temperature ranges -40/70°C and -40/85°C. Stability options 06 and 10 are not available for frequencies >25MHz.
2. At time of shipment after 48 hours of operation.
3. Inclusive of calibration, operating temperature, supply voltage change, load change and 20 years aging.
4. Supply voltage must reach Vcc levels monotonically within a ramp-up time of <12 ms.
5. Measured with Vcc = Nominal, in calm air.
6. After 5 minutes of operation, the frequency at 25°C will be within ±100ppb of the final frequency observed 1 hour after turn on.
7. To ensure proper operation of VCOCXO, the control voltage input must be biased the nominal control voltage. Failure to bias the Vc input will cause an unstable output condition.

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## Phase Noise Characteristics

### Typical Phase Noise for OH200-series with CMOS Output

Parameter					Units	Notes
SSB Phase Noise	5 - 12 MHz	>12- 20 MHz	>20 - 30 MHz	>30 - 40 MHz		
@1Hz offset	-85	-80	-70	-65	dBc/Hz	
@ 10Hz offset	-115	-110	-100	-95	dBc/Hz	
@ 100Hz offset	-140	-135	-125	-120	dBc/Hz	
@ 1KHz offset	-145	-140	-140	-140	dBc/Hz	
@ 10KHz offset	-150	-150	-150	-150	dBc/Hz	
@ 100KHz offset	-150	-150	-150	-150	dBc/Hz	

## Input Characteristics - Voltage Controlled Option (OCXO Type Code V)

Parameter	Minimum	Nominal	Maximum	Units	Notes
Control Voltage Range:					
3.3 Vdc Models	0.30	1.65	3.00	V	Vcc = 3.3 Vdc
5.0 Vdc Models	0.50	2.50	4.50	V	Vcc = 5.0 Vdc
12.0 Vdc Models	0.50	2.50	4.50	V	Vcc = 12.0 Vdc
Frequency Pullability:					
Models with Fo 5 to 20 MHz	±0.4	-	-	ppm	7
Models with Fo >20 to 40 MHz	±0.6	-	-	ppm	7
Input Impedance	100K	-	-	Ohms	

## CMOS Output Characteristics (Output Code C)

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	15	-	pF	
Output Voltage:					
3.3 Vdc Models	High (Voh)	3.0	-	V	
	Low (Vol)	-	0.4		
5.0 Vdc Models	High (Voh)	4.7	-	V	
	Low (Vol)	-	0.4		
12.0 Vdc Models	High (Voh)	4.7	-	V	
	Low (Vol)	-	0.4		
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time: 10% to 90%	-	-	6	ns	
Spurious Output	-	-	-80	dBc	

## Sinewave Output Characteristics (Output Code S)

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	50	-	Ohms	
Output Power	5.0	-	-	dBm:	
Harmonics	-	-	-30	dBc	
Spurious	-	-	-80	dBc	

## Package Characteristics

OH200 Package Hermetically sealed, resistive welded package with grounded case.

## 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.
Attachment Method PCB	Through-hole mounted, see Note 8 below.
Resistance to Solder Heat	Per MIL-STD-202G, Method 210, Condition E.

Note 8. To preserve the high precision characteristics of this device, assembly methods with low ambient temperature are recommended, e.g. manual assembly, selective solder, or wave solder.



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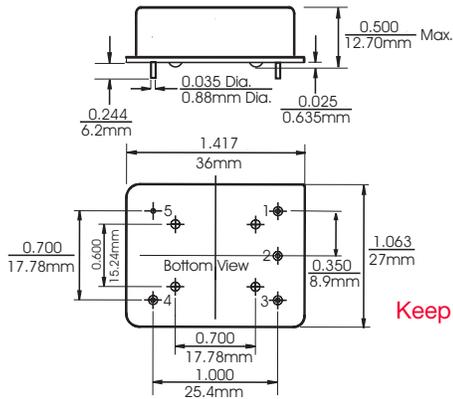


## Re stabilization Time

Off Time	Re stabilization Time
<1 Hour	<2 Hours *
<6 Hour	<12 Hours *
<24 Hour	<48 Hours *
1 to 16 Days	48 Hours + 1/4 Off Time *
>16 Days	<6 Days *

\* For a given off time, the time required to meet daily aging, short term stability and TEV requirements.

## Package Outline



## Package Marking



Date Code (YYWW)  
Model Number  
Output Frequency  
Serial # Barcode  
Serial Number

Pin 1

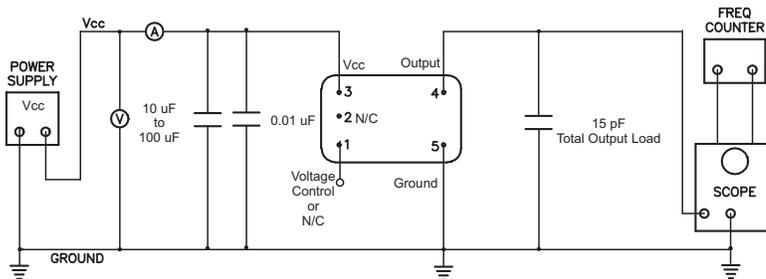
## Pin Connections

### Pin Connection

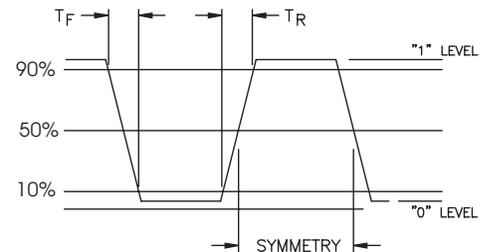
- 1: Voltage Control or N/C
- 2: N/C
- 3: Supply Voltage (Vcc)
- 4: Output
- 5: Ground (Case)

Keep Out Area: Under the OCXO is a keep out area, do not place any parts in this area.

## Test Circuit



## CMOS Output Waveform



## Revision History

Revision	Date	Changes
00	10/16/09	New release
01	02/09/10	Added -20 to 75C and 50ppb stability.
02	03/29/10	Changed 75C to 70C
03	04/05/10	Added 8 = -40 to 70C temperature code.
04	05/19/11	Corrected temperature on page 2, from -20 to 80c to -40 to 70C
05	07/27/11	Updated power consumption
06	09/08/11	Added sinewave models to the data sheet
07	01/23/12	Changed package height from 0.530" to 0.500"
08	03/21/12	Changed frequency stability from "Absolute" to "+/-" with note 1 added as reference
09	08/22/12	Changed marking to Label marking.
10	12/07/12	Added application note information.
11	05/13/13	Changed note 4 and removed note from power supply line. and added absolute note.
12	11/15/13	Added Voltage Controlled Option.
13	10/11/16	Miscellaneous Text Corrections
14	04/24/18	Added exception notes to frequency stability options 06 and 10.
15	05/30/23	Added Note 8 regarding assembly method recommendations.



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