



# STRATUM 3E High Stability Oven Stabilized Oscillator OH100 Series

## OCXO / VCOCXO

# CONNOR WINFIELD



2111 Comprehensive Drive

Aurora, Illinois 60505

Phone: 630-851-4722

Fax: 630-851-5040

www.conwin.com

US Headquarters:

630-851-4722

European Headquarters:

+353-61-472221

## Description

Connor-Winfield's high stability OH100 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 oscillators provide temperature stabilities in the range of  $\pm 5$  ppb to  $\pm 50$  ppb, over the commercial, extended commercial or the industrial temperature range. Power requirements are 1.1W over the commercial temperature range and 1.5W over the industrial temperature range after warm-up. Additionally, excellent aging is achieved through the use of overtone SC cut crystals.

The OH100 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. 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 to 40 MHz
- OCXO - Fixed Frequency
- VCOCXO - Voltage Controlled Option
- 3.3 Vdc or 5.0 Vdc Operation
- Available Frequency Stabilities:
  - $\pm 5.0$  ppb,  $\pm 10.0$  ppb,  $\pm 20$  ppb or  $\pm 50$  ppb
- Available Temperature Ranges:
  - 0 to 70°C, -20 to 70°C, -20 to 75°C, -40 to 70°C or -40 to 85°C
- Low Phase Noise / Phase Jitter
- Output: CMOS Logic or Sinewave
- Package: 1.0" x 1.0" x 0.500"
- RoHS Compliant / Lead Free

\*\* Not all  
available at  
Digi-Key

## Ordering Information

| OH100-   | 6   | 10   | 03   | C                                       | F  | - 010.0M   |
|--|---|--|--|---|--|--|
| Package<br>OH100- =<br>1.0"x1.0"x0.5"<br>OCXO<br>Through Hole<br>Package | Temperature<br>Range<br>5 = 0 to 70°C<br>6 = -40 to 85°C<br>7 = -20 to 70°C<br>8 = -40 to 70°C<br>9 = -20 to 75°C | Frequency<br>Stability<br>05 = $\pm 5.0$ ppb*<br>10 = $\pm 10.0$ ppb<br>20 = $\pm 20.0$ ppb<br>50 = $\pm 50.0$ ppb | Supply Voltage<br>03 = 3.3 Vdc<br>05 = 5.0 Vdc | Output Type<br>C = CMOS<br>S = Sinewave | OCXO Type<br>F = Fixed<br>Freq.<br>V = Voltage<br>Controlled<br>Option | Output Frequency<br>Frequency Format<br>-xxx.xM Min<br>-xxx.xxxxxM Max<br>*Amount of<br>numbers after the<br>decimal point.<br>M = MHz |

\*  $\pm 5.0$  ppb stability models are  
only available from 0 to 70°C.

### Example Part Number:

OH100-61003CF-010.0M = 1.0" x 1.0" x 0.445" package, -40 to 85°C temperature range,  $\pm 10.0$  ppb frequency stability, 3.3 Vdc supply voltage, CMOS square wave output, fixed output frequency OCXO, 10.0 MHz output frequency.

OH100-52005CV-010.0M = 1.0" x 1.0" x 0.445" package, 0 to 70°C temperature range,  $\pm 20.0$  ppb frequency stability, 5.0 Vdc supply voltage, CMOS square wave output, voltage controlled option, VCOCXO, 10.0 MHz output frequency.

OH100-71005SV-010.0M = 1.0" x 1.0" x 0.445" package, -20 to 70°C temperature range,  $\pm 10.0$  ppb frequency stability, 5.0 Vdc supply voltage, Sinewave output, voltage controlled option, VCOCXO 10.0 MHz output frequency.



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@ [www.conwin.com/technologies.html](http://www.conwin.com/technologies.html)



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## Absolute Maximum Ratings

| Parameter                              | Minimum | Nominal | Maximum | Units | Notes |
|--|---------|---------|---------|-------|-------|
| Storage Temperature                    | -55     | -       | 125     | °C    |       |
| Supply Voltage                         | -0.5    | -       | 7.0     | 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   |       |

*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       | -       | 40      | 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      |        |
| Temperature Code 9                             | -20     | -       | 75      | °C      |        |
| Frequency Calibration:                         | -0.1    | -       | 0.1     | ppm     | @ 25°C |
| Frequency Stability vs. Change in Temperature: |         |         |         |         |        |
| Stability Code 05                              | -5.0    | -       | 5.0     | ppb     | 1, 2   |
| Stability Code 10                              | -10.0   | -       | 10.0    | ppb     | 2      |
| Stability Code 20                              | -20.0   | -       | 20.0    | ppb     | 2      |
| Stability Code 50                              | -50.0   | -       | 50.0    | ppb     | 2      |
| Frequency Stability vs. Load                   | -2.0    | -       | 2.0     | ppb     | ±5%    |
| Frequency Stability vs. Voltage                | -2.0    | -       | 2.0     | ppb     | ±5%    |
| Aging: Daily:                                  |         |         |         |         |        |
| 5 MHz to 20 MHz                                | -1.0    | -       | 1.0     | ppb/day | 3      |
| >20 MHz to 40 MHz                              | -2.0    | -       | 2.0     | ppb/day | 3      |
| 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     | 4      |
| >20 MHz to 40 MHz                              | -500    | -       | 500     | ppb     | 4      |
| Supply Voltage: (Vcc)                          |         |         |         |         |        |
| Voltage Code 03                                | 3.13    | 3.30    | 3.47    | Vdc     | 5      |
| Voltage Code 05                                | 4.75    | 5.00    | 5.25    | Vdc     | 5      |
| Power Consumption: Turn-On                     |         |         |         |         |        |
| 0 to 70°C Models                               | -       | -       | 3.00    | W       | 6      |
| -20 to 70°C Models                             | -       | -       | 3.20    | W       | 6      |
| -20 to 75°C Models                             | -       | -       | 3.30    | W       | 6      |
| -40 to 85°C Models                             | -       | -       | 3.80    | W       | 6      |
| Power Consumption: Steady State @ 25°C         |         |         |         |         |        |
| 0 to 70°C Models                               | -       | -       | 1.10    | W       | 6      |
| -20 to 70°C Models                             | -       | -       | 1.15    | W       | 6      |
| -20 to 75°C Models                             | -       | -       | 1.20    | W       | 6      |
| -40 to 85°C Models                             | -       | -       | 1.50    | W       | 6      |
| Phase Jitter: (BW: 10 Hz to Fo/2)              |         |         |         |         |        |
| Models Fo: 5 MHz to 20 MHz                     | -       | -       | 1.0     | ps rms  |        |
| Models 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 | 7      |

### Notes:

- ±5.0 ppb stability models are only available from 0 to 70°C.
- Referenced to the frequency measured @ 25°C.
- At time of shipment after 48 hours of operation.
- Inclusive of calibration, operating temperature, supply voltage change, load change and 20 years aging.
- Supply voltage must reach Vcc levels monotonically within a ramp-up time of <12 ms.
- Measured with Vcc = Nominal, in calm air.
- Measured @ 25°C, within ±100 ppb, referenced one hour after turn-on
- To ensure proper operation of VCOCXO's 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 OH100-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     | V <sub>cc</sub> = 3.3 Vdc |
| 5.0 Vdc Models         | 0.50    | 2.50    | 4.50    | V     | V <sub>cc</sub> = 5.0 Vdc |
| Frequency Pullability: | ±0.4    | -       | -       | ppm   | 8                         |
| 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     |       |       |
| Duty Cycle at 50% of V <sub>cc</sub> | 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    | -       | +10     | dBm:  |       |
| Harmonics    | -       | -       | -30     | dBc   |       |
| Spurious     | -       | -       | -80     | dBc   |       |

## Package Characteristics

OH100 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   |
| Resistance to Solder Heat | Per MIL-STD-202G, Method 210, Condition E.   |
| Solder Process            | RoHS compliant, lead free. See solder profile.   |

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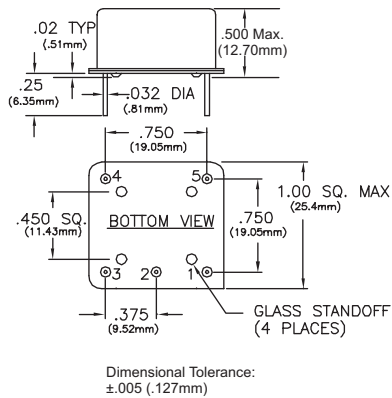


## Re-Stabilization Time

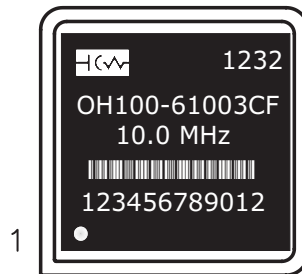
| Off Time     | Re stabilization Time     |
|--------------|---------------------------|
| <1 Hour      | <2 Hours *                |
| <6 Hour      | <12 Hours *               |
| <24 Hour     | <48 Hours *               |
| 1 to 16 Days | 48 Hours + 1/4 Off Time * |
| >16 Days     | <6 Days *    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

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

## Package Outline



## Package Marking



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

## Pin Connections

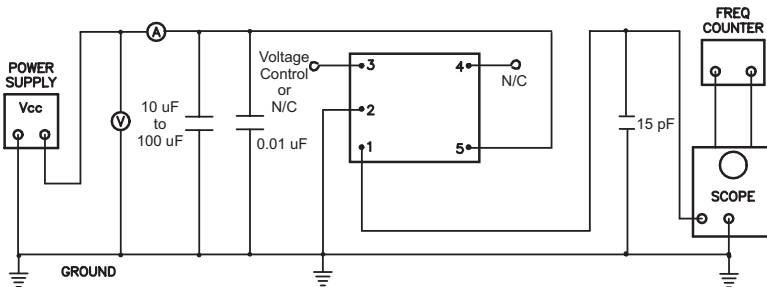
| Pin Connection            |  |
|---------------------------|--|
| 1: Output                 |  |
| 2: Ground (Case)          |  |
| 3: Voltage Control or N/C |  |
| 4: N/C                    |  |
| 5: Supply Voltage (Vcc)   |  |

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

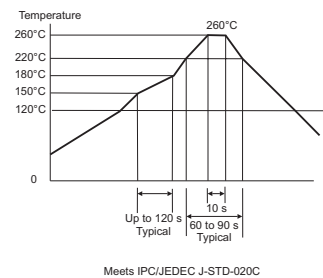


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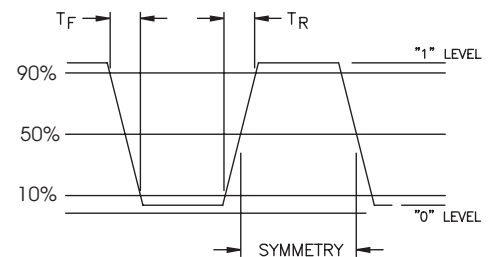
## Test Circuit



## Solder Profile



## CMOS Output Waveform



## Revision History

| Revision | Date     | Changes   |
|----------|----------|---|
| 00       | 03/01/11 | New issue   |
| 01       | 07/27/11 | Updated power consumption   |
| 02       | 03/22/12 | Added sinewave models   |
| 03       | 08/22/12 | Updated marking information   |
| 04       | 09/18/12 | Added +10 dB Max to sinewave output characteristics                         |
| 05       | 12/07/12 | Added application note AN2093 information                                   |
| 06       | 04/03/13 | Added ±5ppb models  |
| 07       | 05/13/13 | Changed note 5 and removed note from power supply line, added absolute note |
| 08       | 11/19/13 | Added Voltage Controlled Option   |

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