



OD100LP-Series Low Phase Noise VCOXCO

CONNOR WINFIELD



2111 Comprehensive Drive

Aurora, Illinois 60505

Phone: 630-851-4722

Fax: 630-851-5040

www.conwin.com

Description:

The Connor-Winfield OD100LP-series is a low phase noise VCOXCO in a 1x1 inch metal package. The OD100LP-series is designed for those applications that demand extremely low noise frequency sources.



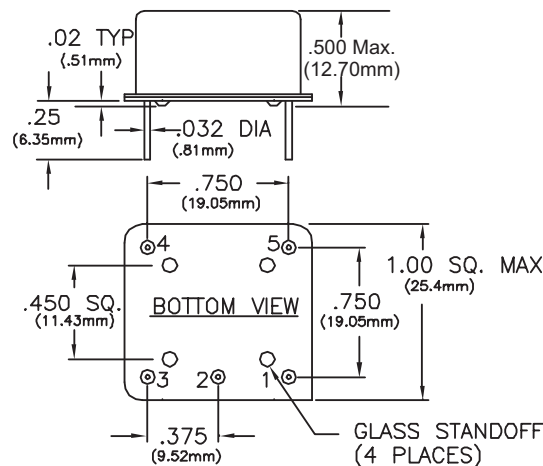
Features:

- VCOXCO
- 5Vdc or 12Vdc operation
- 1x1" Metal Package
- Frequency Stability Options: ± 200 , ± 100 , ± 50 , ± 20 and ± 10 ppb
- Temperature Range Options: 0 to 70°C, -40 to 85°C, -20 to 70°C
- Sinewave or CMOS Output
- Reference Voltage Output Pin 4
- RoHS Compliant / Lead Free ✓RoHS

Pin Connections

- | | |
|----|----------------------|
| 1: | Output |
| 2: | Ground (Case) |
| 3: | Voltage Control |
| 4: | Reference Voltage |
| 5: | Supply Voltage (Vdd) |

Package Outline



Dimensional Tolerance:
 $\pm .005$ (.127mm)

Marking Configuration



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

** Not all options available at Digi-Key

Ordering Information

| OD100LP- | 5 | 12 | 12 | S | V | - 010.0M |
|---|--|---|--|--|---|--|
| Package OD100LP- = 1.0"x1.0"x0.5" OXCO Through Hole Package | Temperature Range 5 = 0 to 70°C 6 = -40 to 85°C 7 = -20 to 70°C 8 = -40 to 75°C | Frequency Stability 10 = ± 10 ppb 20 = ± 20 ppb 50 = ± 50 ppb 12 = ± 100 ppb 22 = ± 200 ppb | Supply Voltage 05 = 5.0 Vdc 12 = 12.0 Vdc | Output Type S = Sinewave C = CMOS | OCXO Type V = Voltage Controlled V1 = Voltage Control* | Output Frequency Frequency Format -xxx.xM Min -xxx.xxxxxM Max *Max 6 digits after the decimal point. M = MHz |

Note: See page 2 for frequencies available at each stability level. Not all combinations of supply voltage and temperature ranges are available.

* V1 specifies 0 to +5V CV range on +12V 100MHz model

Example Part Number:

OD100LP-51212SV-010.0M = 1.0" x 1.0" x 0.445" package, 0 to 70°C temperature range, ± 100 ppb frequency stability, 12V Vdc supply voltage, Sinewave output, VCOXCO, 10.0 MHz output frequency.



Attention: System Designers please review Application Note AN2093: System Design Information and Printed Circuit Board Layout Guidelines for OCXO Oscillators. @ <https://www.conwin.com/pdfs/AN2093.pdf>



Absolute Maximum Ratings

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|----------------------------|---------|---------|---------|-------|-------|
| Storage Temperature | -55 | - | 125 | °C | |
| Supply Voltage (5V Models) | -0.5 | - | 7.0 | Vdc | |
| (12V Models) | -0.5 | - | 12.6 | Vdc | |
| Control Voltage (Vc) | -0.5 | - | 9.0 | Vdc | |

Operating Specifications

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|------------------------------------|---------|------------|---------|---------|----------------|
| Center Frequency: (Fo) | - | 10 and 100 | - | MHz | |
| Frequency Calibration | | | | | |
| Fo=10 MHz | -200 | - | 200 | ppb | 1 |
| Fo=100 MHz | -800 | - | 800 | ppb | 1 |
| Frequency Stability vs Temperature | | | | | 2 |
| Stability Code 10: | -10 | - | 10 | ppb | 10MHz only |
| Stability Code 20: | -20 | - | 20 | ppb | 10MHz only |
| Stability Code 50: | -50 | - | 50 | ppb | 10MHz only |
| Stability Code 12: | -100 | - | 100 | ppb | 10MHz & 100MHz |
| Stability Code 22: | -200 | - | 200 | ppb | 10MHz & 100MHz |
| vs. Supply Voltage Change | | | | | |
| Fo = 10MHz: | -0.3 | - | 0.3 | ppb | Vcc ±5% |
| Fo = 100MHz | -10 | - | 10 | ppb | Vcc ±5% |
| vs. Load Change | | | | | |
| Fo = 10MHz: | -0.3 | - | 0.3 | ppb | Load ±5% |
| Fo = 100MHz | -10 | - | 10 | ppb | Load ±5% |
| vs. Aging per day | | | | | |
| Fo = 10MHz | -0.5 | - | 0.5 | ppb | 3 |
| Fo = 100MHz | -10 | - | 10 | ppb | 3 |
| vs. Aging 1st Year | | | | | |
| Fo = 10MHz | -50 | - | 50 | ppb | |
| Fo = 100MHz | -500 | - | 500 | ppb | |
| Operating Temperature Range: | | | | | |
| Temperature Code 5: | 0 | - | 70 | °C | |
| Temperature Code 6: | -40 | - | 85 | °C | 4 |
| Temperature Code 7: | -20 | - | 70 | °C | |
| Temperature Code 8: | -40 | - | 75 | °C | |
| Warm-up Time at 25°C | - | - | 2 | Minutes | 5 |
| Short Term Stability (ADEV at 1s) | | | | | |
| Fo = 10MHz | - | 1.0E-11 | - | | 6 |
| Fo = 100MHz | - | 2.0E-11 | - | | 6 |

Typical Phase Noise

| Parameter | Fo=10MHz | | Units | Notes |
|-----------------|-------------|-----------------|--------|-------|
| | CMOS Output | Sinewave Output | | |
| @1Hz offset | -95 | -65 | dBc/Hz | |
| @ 10Hz offset | -125 | -95 | dBc/Hz | |
| @ 100Hz offset | -145 | -125 | dBc/Hz | |
| @ 1KHz offset | -160 | -155 | dBc/Hz | |
| @ 10KHz offset | -165 | -165 | dBc/Hz | |
| @ 100KHz offset | -165 | -170 | dBc/Hz | |



| Parameter | Supply Voltage (Vdd) | | | Units | Notes |
|-------------------------------|----------------------|---------|---------|-------|-------|
| | Minimum | Nominal | Maximum | | |
| Supply Voltage: | | | | | |
| Option 05: | 4.75 | 5.00 | 5.25 | Vdc | |
| Option 12: | 11.4 | 12.0 | 12.6 | Vdc | |
| Supply Current (Idd) | | | | | |
| Turn On (Vdd=5V) | - | 700 | - | mA | |
| Turn On (Vdd=12V) | - | 300 | - | mA | |
| Steady State at 25C (Vdd=5V) | - | 220 | - | mA | |
| Steady State at 25C (Vdd=12V) | - | 100 | - | mA | |

| Parameter | Reference Voltage | | | Units | Notes |
|--|-------------------|---------|---------|-------|-------|
| | Minimum | Nominal | Maximum | | |
| Reference Voltage (Vdd=5V) | 3.8 | 4.0 | 4.2 | Vdc | |
| Reference Voltage (Vdd=12V, Fo=10.0MHz) | 3.8 | 4.0 | 4.2 | Vdc | |
| Reference Voltage (Vdd=12V, Fo=100.0MHz) | 8.5 | 9.0 | 9.5 | Vdc | |

| Parameter | Input Characteristics - Voltage Control (Vc) | | | Units | Notes |
|---------------------------------|--|----------|---------|-------|-------|
| | Minimum | Nominal | Maximum | | |
| Tuning Range (Fo=10MHz) | ±0.5 | - | ±1.5 | ppm | |
| Tuning Range (Fo=100MHz) | ±1.5 | ±3.0 | ±4.5 | ppm | |
| Linearity | - | - | 20 | % | |
| Control Voltage Range | | | | | |
| Vdd=5V (Fo=10.0M and 100.0M): | 0.0 | 2.0 | 4.0 | Vdc | |
| Vdd=12V (Fo=10.0M) | 0.0 | 2.0 | 4.0 | Vdc | |
| Vdd=12V, (Fo=100.0M): Standard | 0.5 | 4.5 | 8.5 | Vdc | |
| Vdd=12V, (Fo=100.0M): Option V1 | 0.0 | 2.5 | 5.0 | Vdc | |
| Tuning Slope | | Positive | | | |
| Input Impedance | 100K | - | - | Ohms | |

| Parameter | CMOS Output Characteristics (Output Code C) | | | Units | Notes |
|------------------------------|---|---------|---------|-------|-------|
| | Minimum | Nominal | Maximum | | |
| Load | - | 15 | - | pF | |
| Output Voltage: | | | | | |
| High (Voh) | 3.3 | - | - | V | |
| Low (Vol) | - | - | 0.4 | | |
| Duty Cycle at 50% of Vcc | 45 | 50 | 55 | % | |
| Rise / Fall Time: 10% to 90% | - | - | 6 | ns | |

| Parameter | Sinewave Output Characteristics (Output Code S) | | | Units | Notes |
|--------------|---|---------|---------|-------|-------|
| | Minimum | Nominal | Maximum | | |
| Load | - | 50 | - | Ohms | |
| Output Power | 7 | 9 | 11 | dBm | |
| Harmonics | - | - | -30 | dBc | |
| Spurious | - | - | -80 | dBc | |

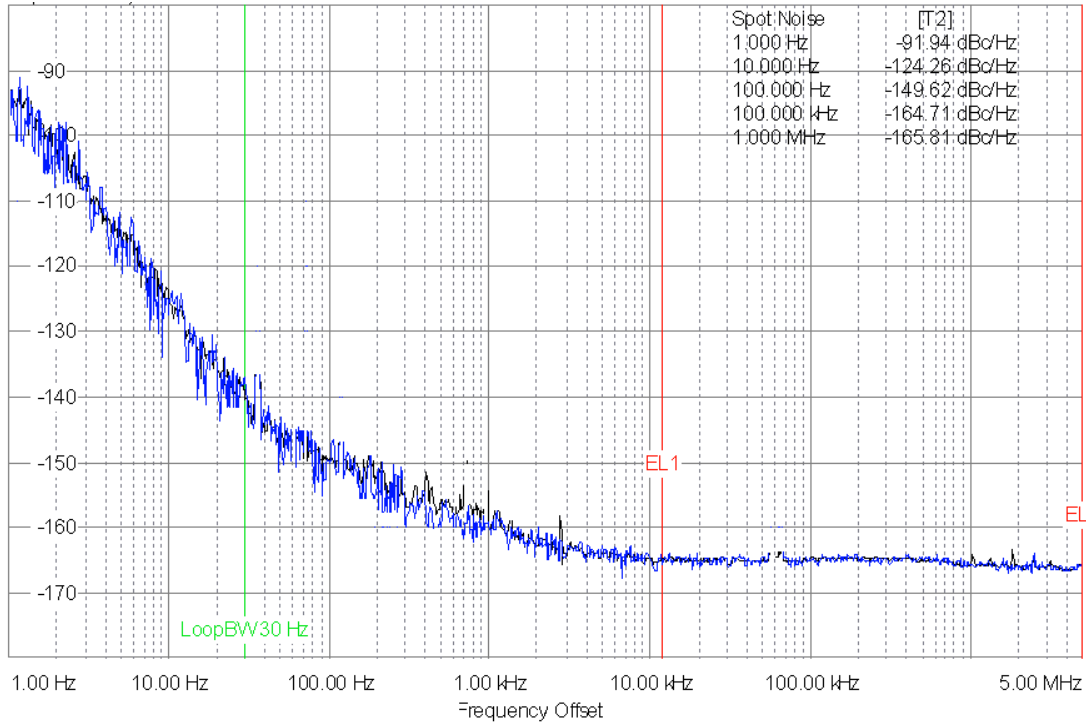
| Package Characteristics | |
|----------------------------|---|
| OD100LP-Series Package | Hermetically sealed, resistive welded package with grounded case. |
| Moisture Sensitivity Level | MSL-1. |
| ESD Level | HBM 2kV |

| Environmental Characteristics | |
|-------------------------------|--|
| Shock | 500 G's 1ms, Halfsine, 3 shocks per direction, per MIL-STD 202F, Method 213B Test Condition D. |
| Sinusoidal Vibration | 0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD-202F, Method 204D, Test Condition A. |
| Random Vibration | 5.35 G's rms. 20 to 2000 Hz per MIL-STD-202F, Method 214, Test Condition 1A, 15 minutes each axis. |
| Moisture | 10 cycles, 95% RH, Per MIL-STD-202F, Method 112. |
| Marking Permanency | Per MIL-STD-202F, Method 215J. |
| Attachment Method PCB | Through hole mounted, see Note 7. |
| Resistance to Solder Heat | Per MIL-STD-202F, Method 210, Condition E. |

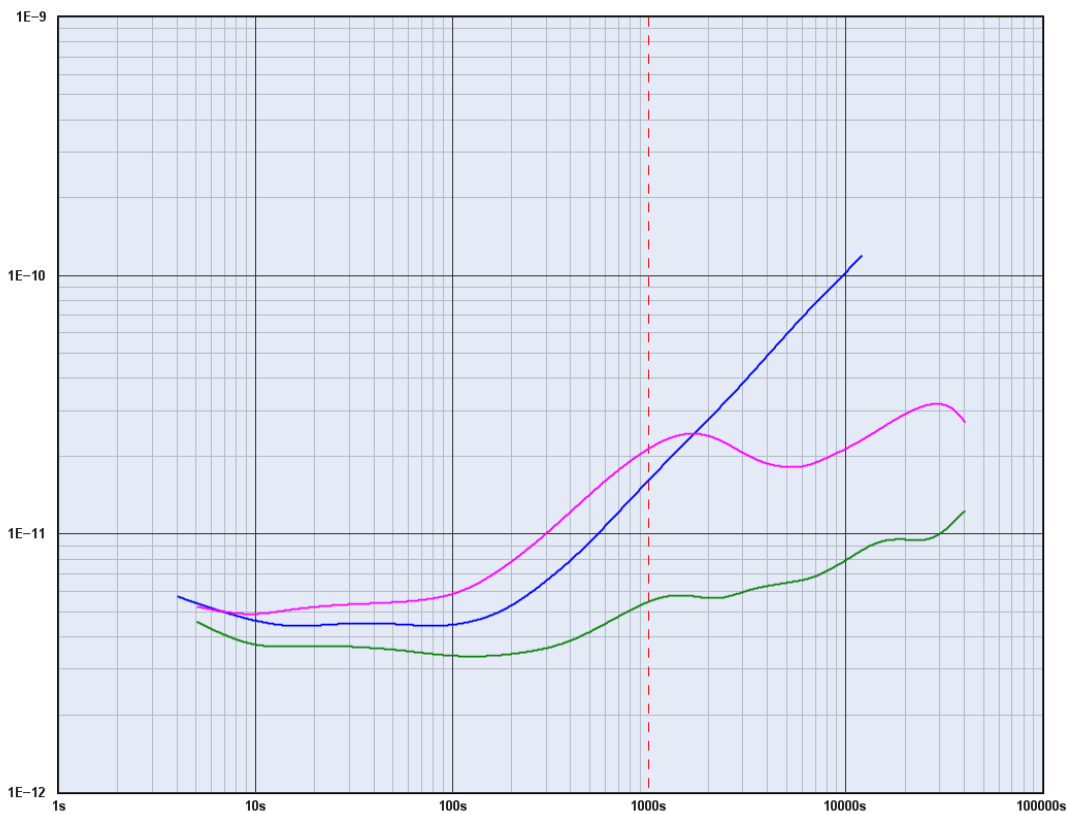
| Notes: | |
|---|--|
| 1. At time of shipment after 60 minutes of operation, @25°C. | |
| 2. Frequency stability vs. change in temperature $[\pm(F_{max}-F_{min})/(2 \cdot F_0)]$. | |
| 3. At time of shipment after 48 hours of operation. | |
| 4. The 100MHz frequency at 12V supply voltage is not available with temperature range -40 to 85C | |
| 5. Measured at 25°C, after 2 minutes will be within ±200ppb of the reference frequency measured 1 hour after turn-on. | |
| 6. The part is shielded from airflow during this measurement. | |
| 7. Because of the high precision characteristics of this device, low ambient temperature assembly methods such as manual soldering, selective soldering, or wave soldering are recommended. | |

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Typical Phase Noise Fo=10MHz CMOS Output

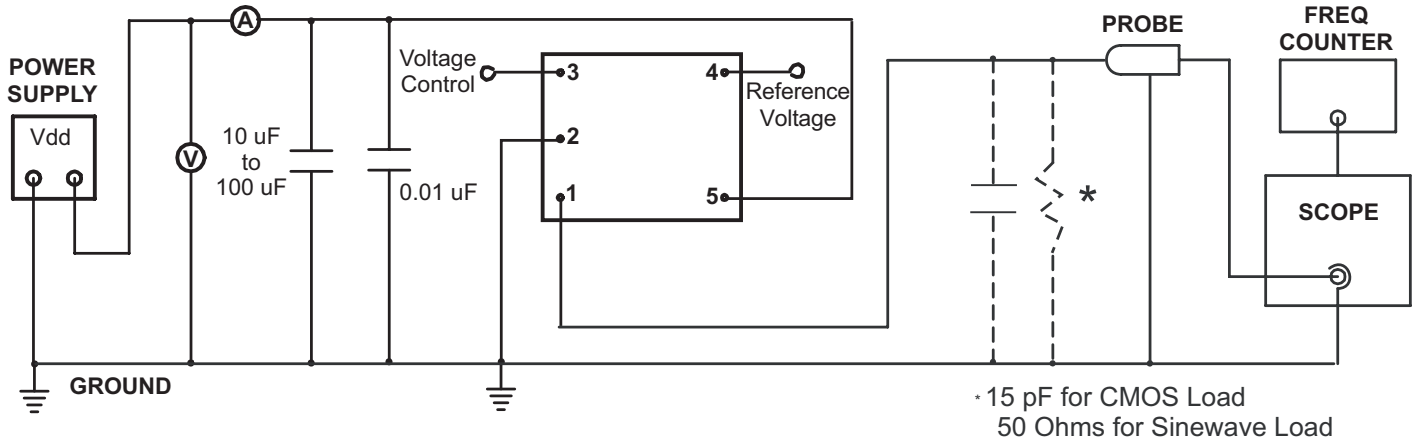


Short Term Stability (ADEV) Fo = 10MHz





Test Circuit



Revision History

| Revision | Date | Description |
|----------|----------|--|
| 00 | 08/30/17 | New issue |
| 01 | 09/13/17 | Added 10MHz phase noise and ADEV data. |
| 02 | 09/14/17 | Updated Operating Specifications |
| 03 | 07/03/18 | Expanded frequency stability table and updated supply current. |
| 04 | 12/18/18 | Updated calibration specifications, reference voltages, and control voltage ranges. |
| 05 | 02/06/19 | Updated Tuning Ranges |
| 06 | 04/30/20 | Added Input Impedance specification |
| 07 | 01/21/21 | Updated Voltage Control - adding V1 option |
| 08 | 07/21/21 | Updated Voltage Control adding "Standard" and Changed Vref on 12V 10MHz part from 5V to 4Vdc |
| 09 | 10/12/23 | Update control voltage range on 12V 10MHz part to 2.0V center, 0-4V range |
| 10 | 04/17/24 | Added Digi-Key availability notes |
| 11 | 07/18/24 | Changed CMOS output voltage level high from 4.7V min to 3.3V min |
| 12 | 01/29/26 | Update PCB attachment methods, add MSL and ESD levels. |

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