

# Precision Surface Mount OCXO OHSM4 Series



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## Description:

The Connor-Winfield OHSM4 is a surface mount precision OCXO in a 20.3mm x 12.7mm package size. The OHSM4 is designed for compliance to ITU-T G.8262 Options 1 and 2, and ITU-T G.8263.



## Features:

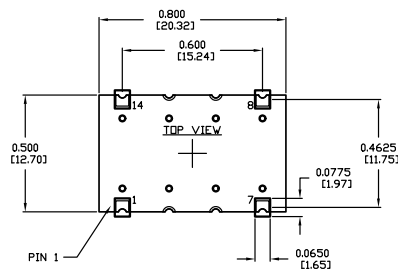
- OCXO - Fixed Frequency
- OCVCXO - Voltage Controlled
- Frequencies Range: 6.4 MHz to 40 MHz  
Higher Frequencies available upon request
- 3.3V or 5.0V Operation
- LVCMOS, HCMOS or Sinewave Output
- Frequency Stabilities Available:  
\*05:  $\pm 5$ ppb; 10:  $\pm 10$ ppb;  
20:  $\pm 20$ ppb; 50:  $\pm 50$ ppb
- Temperature Ranges Available:  
0 to 70°C, -20 to 70°C, -20 to 75°C,  
-40 to 70°C, or -40 to 85°C
- Low Phase Noise
- Surface Mount Package
- RoHS Compliant / Lead Free

## Pin Connections

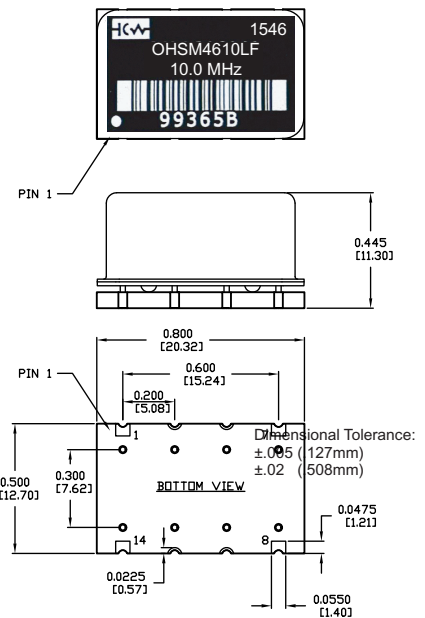
### Pin Function

|                         |
|-------------------------|
| 1: OCXO - N/C           |
| VCOXO - Voltage Control |
| 7 Ground (Case)         |
| 8: Output               |
| 14: Vcc                 |

## Suggested Pad Layout



## Surface Mount Package



## Ordering Information

|  |                               |   |  |   |   |                    |
|--|-------------------------------|---|--|---|---|--------------------|
| OHSM4                                  |                               | 6   | 10   | L   | F   | -010.0M            |
| Oscillator Type                        | Package Type                  | Temperature Range   | Frequency Stability  | Supply Voltage / Output   | Output  | Output Frequency   |
| Precision Frequency Std OCXO or OCVCXO | OHSM4 = Surface Mount Package | 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 | *05 = $\pm 5$ ppb<br>10 = $\pm 10$ ppb<br>20 = $\pm 20$ ppb<br>50 = $\pm 50$ ppb | L = 3.3Vdc / LVCMOS<br>H = 5.0Vdc / HCMOS<br>S = 5.0Vdc / Sinewave<br>R = 3.3Vdc / Sinewave | F = OCXO (Fixed Freq.)<br>V = OCVCXO (Voltage Controlled) | M = MHz<br>xxx.xxM |

Example: OHSM4610LF-010.0M

\*  $\pm 5$ ppb stability only available for 0 - 70°C or -20 to 70°C



Bulletin **Cx272**

Page **1 of 4**

Revision **00**

Date **13 Nov 2015**



## Absolute Maximum Ratings

| Parameter              | Minimum | Nominal | Maximum | Units | Notes |
|------------------------|---------|---------|---------|-------|-------|
| Storage Temperature    | -55     | -       | 125     | °C    |       |
| Supply Voltage (Vcc)   |         |         |         |       |       |
| 3.3V LVC MOS           | -0.5    | -       | 4.5     | Vdc   |       |
| 5.0V HCM OS / Sinewave | -0.5    | -       | 7.0     | Vdc   |       |
| Control Voltage (Vc)   |         |         |         |       |       |
| 3.3V LVC MOS           | -0.5    | -       | 4.5     | Vdc   |       |
| 5.0V HCM OS / Sinewave | -0.5    | -       | 7.0     | Vdc   |       |

## Operating Specifications

| Parameter                             | Minimum                            | Nominal | Maximum | Units   | Notes    |
|---------------------------------------|------------------------------------|---------|---------|---------|----------|
| Frequency Calibration                 | -0.1                               | -       | 0.1     | ppm     | 1, 4, 9, |
| Frequency Stability                   | *05: ±5; 10: ±10; 20: ±20; 50: ±50 |         |         | ppb     | 2        |
| Frequency vs Change in Supply Voltage | -10                                | -       | 10      | ppb     | 3        |
| Aging Daily                           | -5                                 | -       | 5       | ppb     | 4        |
| Aging 1st Year                        | -0.3                               | -       | 0.3     | ppm     |          |
| Total Frequency Tolerance (20 years)  | -1.5                               | -       | 1.5     | ppm     | 5, 10    |
| Supply Voltage (Vcc)                  |                                    |         |         |         |          |
| 3.3V LVC MOS                          | 3.13                               | 3.3     | 3.47    | Vdc     |          |
| 5.0V HCM OS / Sinewave                | 4.75                               | 5.0     | 5.25    | Vdc     |          |
| Supply Power (0 to 70°C)              | -                                  | -       | 1.4     | Watts   |          |
| Supply Power (-40 to 85°C)            | -                                  | -       | 2.2     | Watts   |          |
| Phase Jitter (BW = 10KHz to Fo/2)     | -                                  | -       | 1       | ps RMS  |          |
| Period Jitter                         | -                                  | -       | 1       | ps RMS  |          |
| Allan Variance (1 second)             | -                                  | 5.0E-11 | -       |         |          |
| SSB Phase Noise at 10Hz offset        | -                                  | -100    | -       | dbc/Hz  | 6        |
| SSB Phase Noise at 100Hz offset       | -                                  | -120    | -       | dbc/Hz  | 6        |
| SSB Phase Noise at 1kHz offset        | -                                  | -140    | -       | dbc/Hz  | 6        |
| SSB Phase Noise at 10kHz offset       | -                                  | -150    | -       | dbc/Hz  | 6        |
| Start-Up Time Oscillator              | -                                  | -       | 35      | ms      |          |
| Warm-Up Time                          | -                                  | -       | 3       | Minutes | 7        |

## OCVCXO Characteristics

| Parameter                          | Minimum | Nominal | Maximum | Units | Notes |
|------------------------------------|---------|---------|---------|-------|-------|
| Control Voltage Range:(Vc)         |         |         |         |       |       |
| 3.3V LVC MOS                       | 0.30    | 1.65    | 3.0     | Vdc   |       |
| 5.0V HCM OS / Sinewave             | 0.50    | 2.50    | 4.50    | Vdc   |       |
| Frequency                          |         |         |         |       |       |
| 3.3V LVC MOS at Vc=0.3 Vdc         | -       | -7      | -5      | ppm   | 8     |
| 3.3V LVC MOS at Vc=3.0 Vdc         | 5       | 7       | -       | ppm   | 8     |
| 5.0V HCM OS /Sinewave at Vc=0.5Vdc | -       | -7      | -5      | ppm   | 8     |
| 5.0V HCM OS /Sinewave at Vc=4.5Vdc | 5       | 7       | -       | ppm   | 8     |
| Slope of Frequency Adjust          |         |         |         |       |       |
| 3.3V LVC MOS                       | 3.7     | -       | -       | ppm/V |       |
| 5.0V HCM OS /Sinewave              | 2.5     | -       | -       | ppm/V |       |
| Input Impedance                    | 100K    | -       | -       | Ohms  |       |

- Initial calibration @ 25C. OCVCXO model Vc = Nominal.
- Frequency stability vs. Change in temperature, referenced to 25C.
- Frequency stability per 5% change in supply voltage.
- At the time of shipment after 48 hours of operation.
- Inclusive of calibration, operating temperature range, supply voltage change, shock and vibration 20 years aging, OCVCXO models Vc = Nominal.
- Typical phase noise, results will vary depending on center frequency. The phase noise shown are typical for 20 MHz.
- Measured @ 25C, within 3 minutes, the unit will be within +/-0.1ppm of its reference frequency, measured after 30 minutes of continuous operation at a stable 25C.
- OCVCXO models pullability referenced to Fo @ 25°C, Positive Transfer Characteristics
- Initial calibration @ 25C. OCVCXO model Vc = Nominal.
- Inclusive of calibration, operating temperature range, supply voltage change, shock and vibration 20 years aging, OCVCXO models Vc = Nominal.

|          |                    |
|----------|--------------------|
| Bulletin | <b>Cx272</b>       |
| Page     | <b>2 of 4</b>      |
| Revision | <b>00</b>          |
| Date     | <b>13 Nov 2015</b> |



## LVC MOS Output Characteristics

| Parameter                    | Minimum | Nominal | Maximum | Units | Notes |
|------------------------------|---------|---------|---------|-------|-------|
| Load                         | -       | 15      | -       | pF    |       |
| Voltage: 3.3V LVC MOS        |         |         |         |       |       |
| High (Voh)                   | 2.60    | -       | -       | Vdc   |       |
| Low (Vol)                    | -       | -       | 0.40    | Vdc   |       |
| Voltage: 5.0V HCMOS          |         |         |         |       |       |
| High (Voh)                   | Vcc-0.5 | -       | -       | Vdc   |       |
| Low (Vol)                    | -       | -       | 0.40    | Vdc   |       |
| Current                      |         |         |         |       |       |
| High (Ioh)                   | -4      | -       | -       | mA    |       |
| Low (Iol)                    | -       | -       | 4       | mA    |       |
| Duty Cycle at 50% of Vcc     | 45      | 50      | 55      | %     |       |
| Rise / Fall Time: 10% to 90% | -       | -       | 6.5     | ns    |       |

## Sinewave Output Characteristics

| Parameter    | Minimum | Nominal | Maximum | Units | Notes |
|--------------|---------|---------|---------|-------|-------|
| Load         | -       | 50      | -       | Ohms  |       |
| Output Power |         |         |         |       |       |
| (Vcc=3.3V)   | 3       | -       | -       | dBm   |       |
| (Vcc=5.0V)   | 6       | -       | -       | dBm   |       |
| Harmonics    | -       | -       | -30     | dBc   |       |
| Spurious     | -       | -       | -80     | dBc   |       |

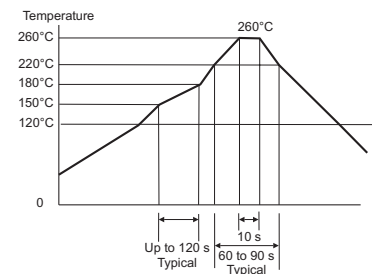
## Package Characteristics

OHSM4-Series                      Hermetically sealed welded package on FR4 substrate

## Environmental Characteristics

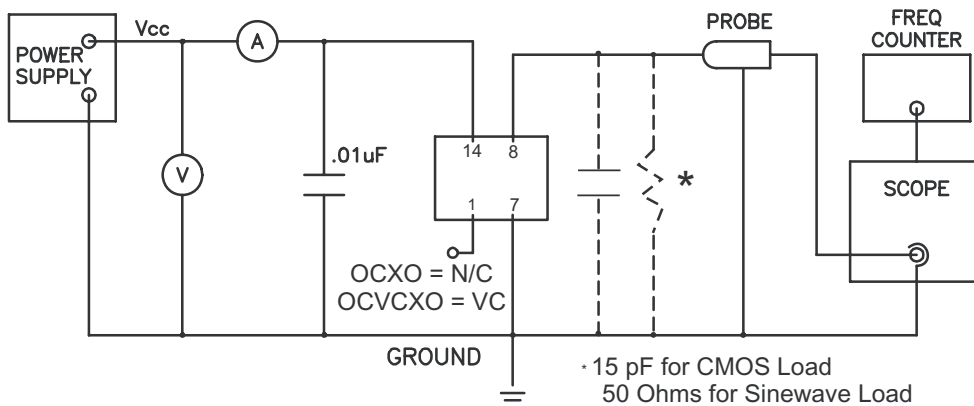
|                           |  |
|---------------------------|--|
| Shock                     | 100 G's 3ms, Half sine, 3 shocks per direction, per MIL-STD 202F, Method 213B Test Condition D.    |
| Sinusoidal Vibration      | 0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD 202F, Method 204D, Test 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. |
| Altitude                  | 70,000 ft max  |
| 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   |
| Resistance to Solder Heat | Per MIL-STD-202F, Method 210, Condition E.   |
| Solder Process            | RoHS compliant, lead free. See solder profile.   |

## Solder Profile

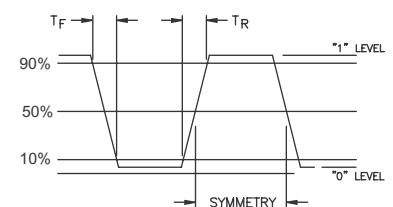


Meets IPC/JEDEC J-STD-020C

## Test Circuit

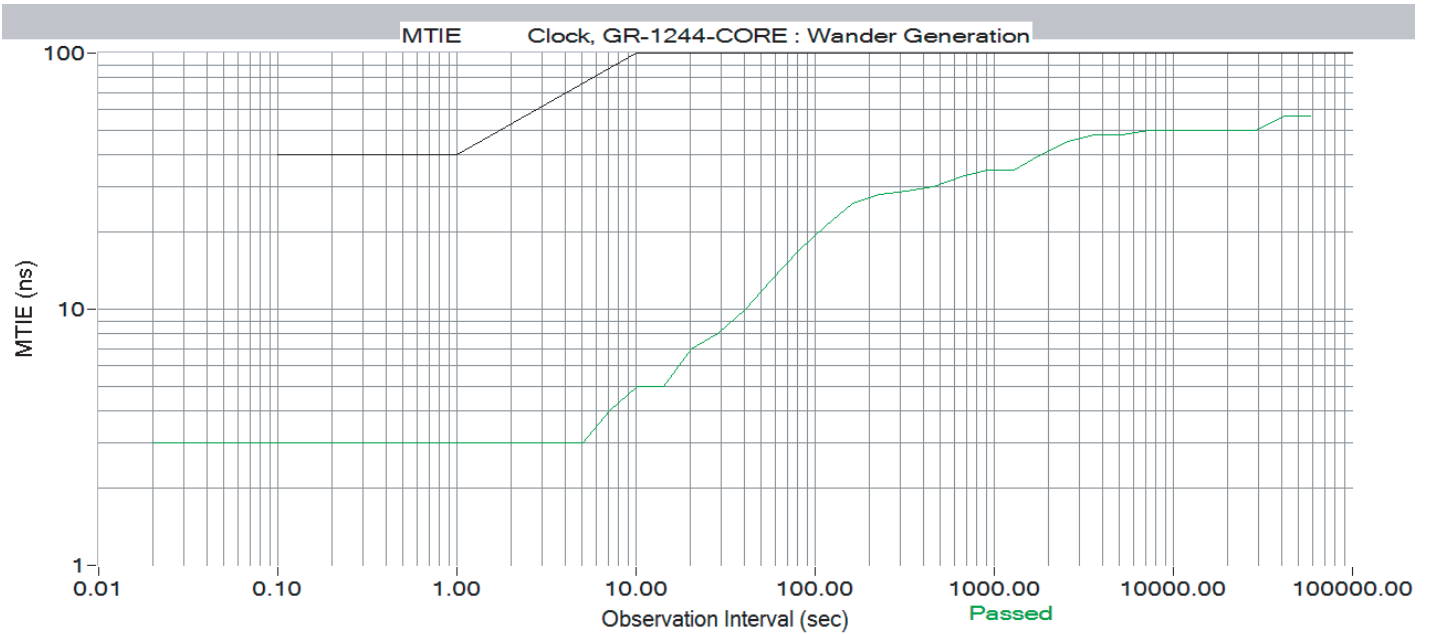


## CMOS Output Waveform



Bulletin                      **Cx272**  
Page                            **3 of 4**  
Revision                      **00**  
Date                            **13 Nov 2015**

**OHSM4610LF-020.0M MTIE per Stratum 3E (OCXO is covered)**  
**Loop Bandwidth = 0.0016 Hz**



**OHSM4610LF-020.0M TDEV per Stratum 3E (OCXO is covered)**  
**Loop Bandwidth = 0.0016 Hz**

