

# 5x7mm Surface Mount LVDS Clock Oscillator

# CONNOR WINFIELD



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## Description:

The Connor-Winfield LMxxx - Series are 5x7mm Surface Mount, LVDS, Fixed Frequency Crystal Controlled Oscillator (XO). The LMxxx - Series are designed for applications requiring tight frequency stability, wide temperature range, and low jitter. Operating at 2.5 or 3.3 Vdc supply voltage, the LMxxx - Series provides LVDS Differential Outputs with an enable / disable function. The design utilizes PLL multiplication to produce a high frequency output from a low frequency fundamental crystal.



## Features:

### Model LMxxx - Series

5 x7mm Surface Mount Package  
2.5 or 3.3 Vdc Operation  
LVDS Differential Outputs  
Frequency Stabilities Available:  
+/-20 ppm, +/-25 ppm, +/-50 ppm or +/-100 ppm  
Temperature Ranges Available:  
0 to 70°C, -40 to 85°C, 0 to 85°C or -20 to 70°C  
Low Jitter <1ps RMS  
Tri-State Enable/Disable on Pad 1  
Tape and Reel Packaging  
RoHS Compliant / Lead Free

## Absolute Maximum Ratings

| Parameter            | Minimum | Nominal | Maximum   | Units | Notes |
|----------------------|---------|---------|-----------|-------|-------|
| Storage Temperature  | -55     | -       | 125       | °C    |       |
| Supply Voltage (Vcc) | -0.5    | -       | 4.6       | Vdc   |       |
| Input Voltage        | -0.5    | -       | Vcc + 0.5 | Vdc   |       |

## Operating Specifications

| Parameter                         | Minimum                                                         | Nominal | Maximum | Units  | Notes |
|-----------------------------------|-----------------------------------------------------------------|---------|---------|--------|-------|
| Output Frequency (Fo)             | 98                                                              | -       | 670     | MHz    | 1     |
| Total Frequency Tolerance         | (See Ordering Information or Model Matrix for full part number) |         |         |        |       |
| Model LMx4x                       | -20                                                             | -       | 20      | ppm    | 2     |
| Model LMx1x                       | -25                                                             | -       | 25      | ppm    | 2     |
| Model LMx2x                       | -50                                                             | -       | 50      | ppm    | 2     |
| Model LMx3x                       | -100                                                            | -       | 100     | ppm    | 2     |
| Operating Temperature Range       | (See Ordering Information or Model Matrix for full part number) |         |         |        |       |
| Model LM1xx                       | 0                                                               | -       | 70      | °C     |       |
| Model LM2xx                       | -40                                                             | -       | 85      | °C     |       |
| Model LM3xx                       | 0                                                               | -       | 85      | °C     |       |
| Model LM4xx                       | -20                                                             | -       | 70      | °C     |       |
| Supply Voltage (Vcc)              | (See Ordering Information or Model Matrix for full part number) |         |         |        |       |
| Model LMxx2                       | 2.375                                                           | 2.5     | 2.625   | Vdc    |       |
| Model LMxx3                       | 3.135                                                           | 3.3     | 3.465   | Vdc    |       |
| Supply Current (Icc)              | -                                                               | 70      | 75      | mA     |       |
| Jitter:                           |                                                                 |         |         |        |       |
| Period Jitter                     | -                                                               | 3.0     | 5.0     | ps RMS |       |
| Integrated Phase Jitter           | -                                                               | 0.6     | 1.0     | ps RMS |       |
| SSB Phase Noise (Fo = 155.52 MHz) |                                                                 |         |         |        |       |
| @ 10 Hz offset                    | -                                                               | -40     | -       | dBc/Hz |       |
| @ 100 Hz offset                   | -                                                               | -75     | -       | dBc/Hz |       |
| @ 1 KHz offset                    | -                                                               | -95     | -       | dBc/Hz |       |
| @ 10 KHz offset                   | -                                                               | -110    | -       | dBc/Hz |       |
| @ 100 KHz offset                  | -                                                               | -115    | -       | dBc/Hz |       |
| Sub-Harmonics                     | -                                                               | -60     | -50     | dBc    |       |
| Start-Up Time                     | -                                                               | -       | 2       | ms     |       |

## Enable / Disable Input Characteristics

| Parameter                             | Minimum | Nominal | Maximum | Units | Notes |
|---------------------------------------|---------|---------|---------|-------|-------|
| Enable Input Voltage - (High) - (Vih) | 70%Vcc  | -       | -       | Vdc   | 3     |
| Disable Input Voltage - (Low) - (Vil) | -       | -       | 30%Vcc  | Vdc   | 3     |

## LVDS Output Characteristics

| Parameter                         | Minimum | Nominal | Maximum | Units | Notes |
|-----------------------------------|---------|---------|---------|-------|-------|
| Load                              | -       | 100     | -       | Ohm   |       |
| Output Differential Voltage (Vod) | 250     | -       | 450     | mV    | 4     |
| Duty Cycle at 50% Level           | 45      | 50      | 55      | %     | 5     |
| Rise / Fall Time: 20% to 80%      | -       | 0.3     | 0.7     | ns    |       |

## Package Characteristics

|         |                                                     |
|---------|-----------------------------------------------------|
| Package | Hermetically sealed ceramic package and metal cover |
|---------|-----------------------------------------------------|

## Environmental Characteristics

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| Vibration:         | Vibration per Mil Std 883E Method 2007.3 Test Condition A.        |
| Shock:             | Mechanical Shock per Mil Std 883E Method 2002.4 Test Condition B. |
| Soldering Process: | RoHS compliant lead free. See soldering profile on page 2.        |

## Notes:

1. All output frequencies may not be available, please contact the factory with your output frequency requirements.
2. Includes calibration @ 25°C, frequency stability vs. change in temperature, supply voltage and load variations, shock and vibration and 20 years aging.
3. When the oscillator is disabled the outputs are at high impedance. Outputs are enabled with no connection on E/D pad 1.
4. Vod measured with a 100 ohm resistor between the true output and the complementary output.
5. Duty cycle measured at 50% of output voltage swing.

Specifications subject to change without notice. All dimensions in inches. © Copyright 2010 The Connor-Winfield Corporation



Bulletin **DS030**  
Page **1 of 2**  
Revision **00**  
Date **05 Oct 2010**

## Ordering Information

| LM                                     | 1                                                                                            | 2                                                                                   | 3                                              | - 155.52M                                                                                                                           |
|----------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Type<br>LVDS<br>Clock Series<br>5x7 mm | Temperature<br>Range<br>1 = 0 to 70°C<br>2 = -40 to 85°C<br>3 = 0 to 85°C<br>4 = -20 to 70°C | Frequency<br>Tolerance<br>4 = ±20 ppm<br>1 = ±25 ppm<br>2 = ±50 ppm<br>3 = ±100 ppm | Supply Voltage<br>2 = 2.5 Vdc,<br>3 = 3.3 Vdc, | Output Frequency<br>Frequency Format<br>-xxx.xM Min<br>-xxx.xxxxxM Max<br>*Amount of numbers<br>after the decimal<br>point. M = MHz |

### Example Part Number:

LM123-155.52M = LVDS Output, 0 to 70°C, +/-50ppm, 3.3Vdc, E/D Pad 1, Output Frequency 155.52 MHz

Note: Not all temperature and frequency tolerance combinations are available.  
See Model Matrix below for available models

## Model Matrix

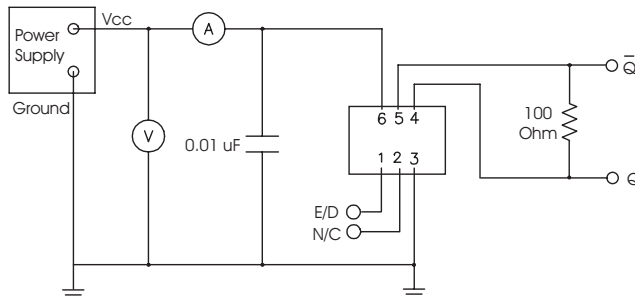
| Frequency<br>Tolerance<br>±20 ppm | Frequency<br>Tolerance<br>±25 ppm | Frequency<br>Tolerance<br>±50 ppm | Frequency<br>Tolerance<br>±100 ppm | Supply<br>Voltage | Temperature<br>Range |
|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|-------------------|----------------------|
| LM142                             | LM112                             | LM122                             | LM132                              | 2.5 Vdc           | 0 to 70°C            |
| LM442                             | LM412                             | LM422                             | LM432                              | 2.5 Vdc           | -20 to 70°C          |
| LM342                             | LM312                             | LM322                             | LM332                              | 2.5 Vdc           | 0 to 85°C            |
| X                                 | X                                 | LM222                             | LM232                              | 2.5 Vdc           | -40 to 85°C          |
| LM143                             | LM113                             | LM123                             | LM133                              | 3.3 Vdc           | 0 to 70°C            |
| LM443                             | LM413                             | LM423                             | LM433                              | 3.3 Vdc           | -20 to 70°C          |
| LM343                             | LM313                             | LM323                             | LM333                              | 3.3 Vdc           | 0 to 85°C            |
| X                                 | X                                 | LM223                             | LM233                              | 3.3 Vdc           | -40 to 85°C          |

X = Models not available

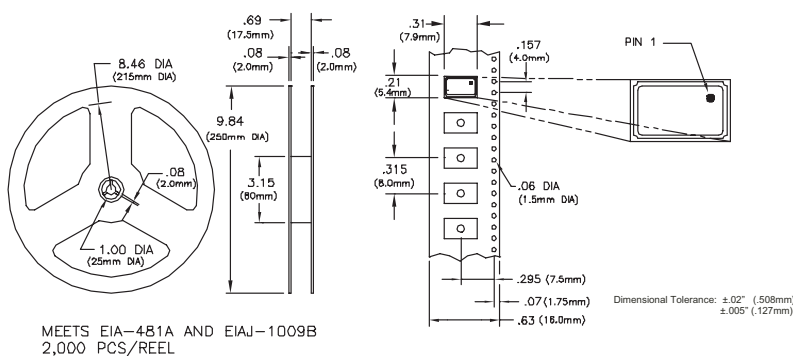
## Enable / Disable Function

Pad 1 Input: \_\_\_\_\_ Output State: \_\_\_\_\_  
Low: \_\_\_\_\_ Disabled (High Impedance) \_\_\_\_\_  
High or Open: \_\_\_\_\_ Enabled \_\_\_\_\_

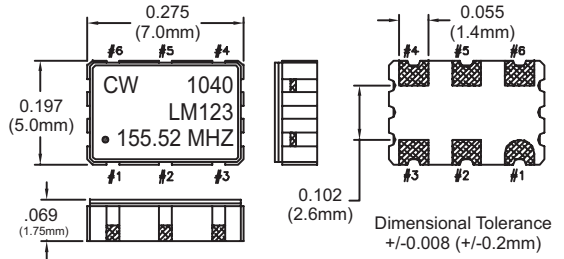
## Test Circuit



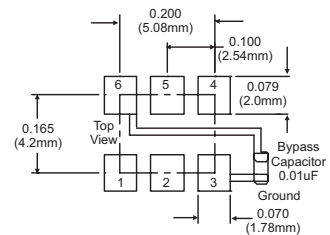
## Tape and Reel Dimensions



## Package Outline



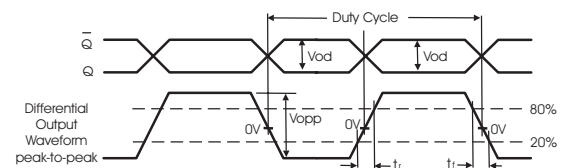
## Suggested Pad Layout



## Pad Connections

- 1: Enable / Disable
- 2: N/C
- 3: Ground
- 4: Output Q
- 5: Complementary Output  $\bar{Q}$
- 6: Supply Voltage (Vcc)

## Output Waveform



## Solder Profile

