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LIGO

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

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Test Procedure for Drop in Replacement for Wenzel OCXO

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Distribution of this document:
LIGO Scientific Collaboration

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1 Introduction

The following Test Procedure describes the test of proper operation of the Drop in Replacement for Wenzel OCXO.

S/N 523000 55 Nominal Frequency: 203.125MHz / 200.105MHz / 203.125

Tester D.S. Date 3/15/23

2 Test Equipment

- Voltmeter
- Oscilloscope
- RF Power Meter Agilent E4418A
- RF Frequency counter Agilent 53131A
- Board Schematics, LIGO D2200294.

3 Tests

Use clip doodles to apply +15V to the unit (J2/J3)

1) **Verify the proper current draw.** Using a bench DC supply apply +15Volts to J2/J3. Measure the current draw of the board.

   +15 Volt current 150mA 0.03 A Nom. (30mA)

2) **On the board check.**

   VCC (+3.3V) 3.3V ✓

3) **Measure RF powers and RF frequencies as function of the tuning voltage.** Use Frequency Counter to measure frequency, and power meter to measure power on J4 (SMA) while applying voltage to the TUNE input. Use voltage calibrator to apply voltage to the TUNE input J1.

Port	Tune	Power dBm)	Freq. (MHz)	Nominal depending on OCXO
J4	0V	17.4	203.084943	>13 dBm
J4	+5V	17.3	203.124725	>13 dBm
J4	+10V	17.2	203.149425	>13 dBm

4) **Measure the Phase noise of the Low Noise VCXO Output (Out)** using the Wenzel single channel phase noise measurement technique (3.5.3), Figure 3.5.2-1, which can be found at

http://www.wenzel.com/wp-content/uploads/BP_1000_v1-05.pdf.

A reasonable FFT analyzer is the SR785, which can be set to measure power units if you start in Display Setup. A Reference Source should be provided from the 203.125 MHz output of the D1100663 Multiple Frequency Oscillator (MFO), properly powered and connected to the Wenzel phase noise measurement system. The output of the Low Noise VCO will need to be attenuated by about 3 dB to provide the amplitude needed by the Wenzel phase noise measurement system (about 10 dBm).

For reference purposes, the oscillator being used inside is the Wenzel 500-30558, information for which can be found here and here. For the purposes of this test, the REF oscillator phase noise ($\mathscr{L}(f)^{REF}$) is considered unmeasured but calculated to be [$\mathscr{L}(f)^{COMB}$ – 3 dB]; using these values, $\mathscr{L}(f)^{DUT}$ can be calculated in section 3.5.3.4.

Offset Frequency (Hz)	PSD Value ($dBV_{rms}/\sqrt{Hz}$)	Mixer Slope (V/rad)	Amplifier Gain (dB)	VCXO noise ($\mathscr{L}(f)^{DUT}$)
10 Hz				
100 Hz				
1 kHz				

Mixer Slope _____ mV / 0.02pi radians = _____