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LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

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AdL AA/AI Filter (65536 Sample Rate) Board Test Plan		
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1 Introduction

The tests described below are required to verify the correct operation of the AdL AA/AI Filter Board (D070081, Rev 00 and 01). The transfer function of this board is a 3rd order, 10KHz Butterworth low pass filter with a single notch at 65536Hz. The boards can be tested in by themselves or assembled into a single 32 channel chassis (AA configuration). This test plan assumes that the boards are to be tested individually

The board should be powered using a standard bench supply.

2 Test Equipment

Dynamic Signal Analyzer
Oscilloscope
Power supplies

3 Tests

3.1 Input Power

Record the input voltage and current in the table below. Values should be +/-20mA of the nominal values.

Supply	Nominal Current	Actual	4 LEDs ON?	Pass/Fail
+15 V	0.125 A	0.13A	yes	
-15 V	0.125 A	0.13A	yes	

3.2 Filter Response

The nominal response of each channel is a 3rd order, 30KHz Butterworth low pass filter with a single notch at 65536 Hz. Note that due to the board connections, the nominal response is inverting. The tolerance on the gain and phase measurements is +/- 1 dB and 5 degrees, respectively.

Chan	Input (Front Panel of Chassis)	Output (ADC Interface Board)	Gain/ Phase at 1KHz Nominal= 0 dB/ 165 deg	Gain/ Phase at 10KHz Nominal= -4.8 dB/ 25 deg	Gain at 65536Hz <-75dB?	Pass/ Fail
1	P2- 1,6	J1- 1,6	0 164	-4.4 26.6	-85	
2	P2- 2,7	J1- 2,7	0 164	-4.4 25.4	-83	
3	P2- 3,8	J1- 3,8	0 164	-4.5 24.6	-84	
4	P2- 4,9	J1- 4,9	0 164	-4.4 26.8	-83	
5	P3- 1,6	J2- 1,6	0 164	-4.5 24.8	-87	
6	P3- 2,7	J2- 2,7	0 164	-4.4 26.9	-84	
7	P3- 3,8	J2- 3,8	0 164	-4.4 26.4	-83	
8	P3- 4,9	J2- 4,9	0 164	-4.4 25.1	-85	

Plots of the nominal transfer function are shown in the figure below.

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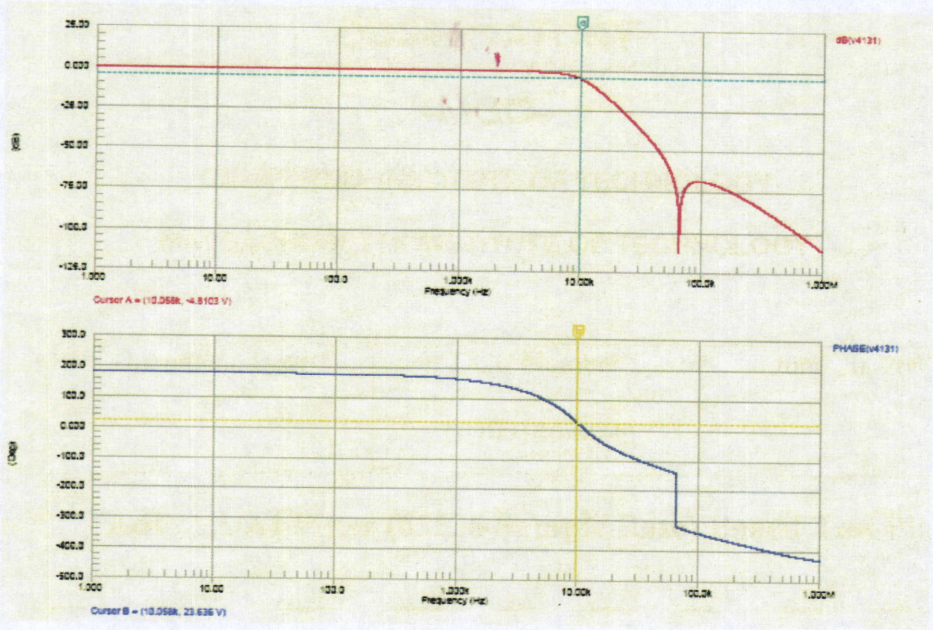

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3.3 Noise Tests

The input to each channel should be terminated with 50 ohms and the output noise measured using the dynamic signal analyzer. The output noise for all channels should be below 50nV/√Hz for all frequencies from 10 Hz to 50KHz. Using the table below, record the highest noise measured and the approximate frequency of the noise peak for frequencies from 10Hz to 50KHz. Note 60Hz harmonic peaks should be ignored

Chan	Input (Front Panel of Chassis)	Output (ADC Interface Board)	Highest Output Noise Measured 10Hz to 50KHz	Frequency of Noise Peak
1	P2- 1,6	J1- 1,6	27	1.8K
2	P2- 2,7	J1- 2,7	22	2.8K
3	P2- 3,8	J1- 3,8	28	1.8K
4	P2- 4,9	J1- 4,9	25	1.8K
5	P3- 1,6	J2- 1,6	32	2.6K
6	P3- 2,7	J2- 2,7	22	5.0K
7	P3- 3,8	J2- 3,8	44	2.8K
8	P3- 4,9	J2- 4,9	32	2.6K