

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

CALIFORNIA INSTITUTE OF TECHNOLOGY

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Test Procedure	T1400031-v1.0	
PCal Photodiode Board Test Procedure		
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This is an internal working note of the LIGO Laboratory

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Date:

LIGO T1400031-v1

1. Overview

This is the board that goes in the PCal Photodiode Housing, [D1300103](#), and can be configured in three different manners.

2. Test Equipment

- 2.1 Power Supply capable of +/- 15V
- 2.2 Stanford Research SR785 Network Analyzer, or the like
- 2.3 Digital Multimeter (DMM)
- 2.4 PCal PD Satellite Box (D1300368)

3. Preliminaries

- 3.1 Perform visual inspection on board to check for missing components or solder deficiencies
- 3.2 Use a Digital multimeter to measure the resistors listed in “Table 1” below, make sure that the values match the values in “Figure 1” for the given photodiode configuration.
- 3.3 Remove front plate from the PD enclosure and insert jumper into the board to enable the test input.
- 3.4 Before connecting the power, set power supplies to +/- 15 Volts, then turn them off. Connect the power supplies to the 3-pin power connector on the “PCal PD Satellite Box”, paying attention to the value and polarity on the panel. Using a 9-pin serial cable, connect the connector on the back of the Photodiode board to the outlet labeled “Photodiode” on the satellite box.
- 3.5 Before turning on the power supply, make sure that the “Power Select” Switch on the satellite box is in the “Remote” position and the switch labeled “PD Power” is in the off position

Configuration	Rt (Ohm)	Rg (Ohm)

Table 1: Record component values, and compare with Figure1 to determine configuration

Photodiode	Transimpedance Resistor, Rt	Transimpedance Cap., Ct	Gain Resistor, Rg
OFS (10)	422 Ohms	30pF	2K
Rx, GS (15)	8.45K	6.8pF	2K
Tx (10)	11K	5.6pF	20K

Figure 1: Component value specifications for differentiating between configurations.

4. DC Tests

- 4.1 Turn on the power supplies to the system under test and record the total current.

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Measure	Current Draw	LED Lit? Y/N
-15V Supply	40mA +/- 5mA	
+15V Supply	40mA +/- 5mA	

Table 2: Power supply function verification

5. Dynamic Tests

5.1 Set an SR785 dynamic signal analyzer for a 50mV source, and do a swept sign measurement from 100Hz to 100KHz. Set the display of the analyzer to have a dual output that reads out magnitude in dB on the upper display and phase in deg. on the lower display. The nominal response should match the values for the specific configuration listed in the table below.

Response should show a high pass filter with a zero at DC and a pole at 7KHz. Gain values given in the table below. See Figure 2 below for an example curve for each configuration.

Configuration	Gain @ 100KHz	Phase @ 100KHz
O.F.S.	-43dB +/- 1dB	2.5deg +/- 1deg
Rx	-17dB +/- 1dB	1deg +/- 1deg
Tx	4.5dB +/- 1dB	-5.5deg +/- 1deg

Table 3: Nominal values for TF gain and phase that can be expected from each configuration

Source	Ch2	Function Correct? (Initial)
TP4 / GND And Ch1	PD MON (Satellite Box BNC)	

Table 4: Initial in the blank if transfer function meets the above specifications.

5.2 Save an image and data file of the transfer function recorded on the SR785. And upload these files to the DCC.

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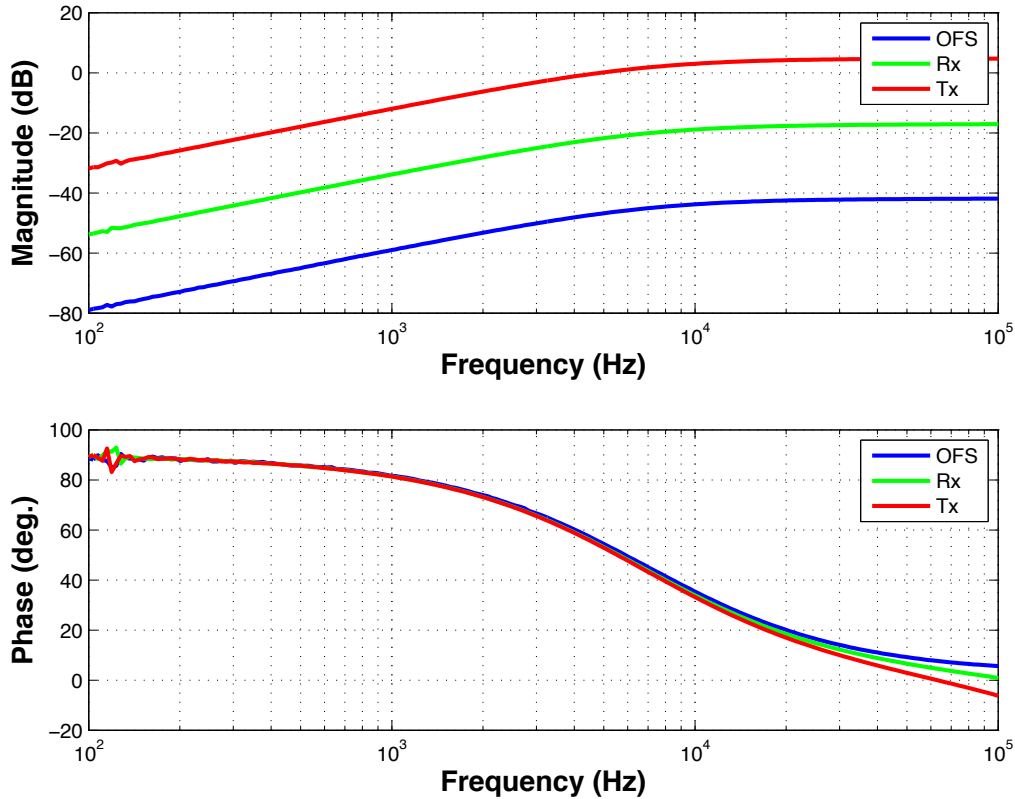


Figure 2: Plot of PD transfer functions for each of the three circuit Configurations. TF generated by injecting a swept sign into TP4 with test jumpers present, and reading out (TP4 / PDMon)

6. Documentation

6.1 After the device in question has been tested, and deemed to be in proper working order according to the information provided in this document, it is time to document these findings.

Attached is a reference sheet to be used to record the information generated by this test procedure. Print out a hardcopy of the reference sheet only and fill out by hand. After the device is tested, scan a copy of the reference sheet and upload it to the DCC as a .PDF where the file name is the serial number

(e.g. sXXXXXXXX.pdf)

Also upload the image and data files that were saved under section 5.2

Any image file that is viewable on a standard computer will suffice (e.g. .tif, .gif, .jpeg, .eps. etc.)

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PCal PD Test Procedure Reference Sheet

s/n _____

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File Names: