

**LASER INTERFEROMETER GRAVITATIONAL WAVE
OBSERVATORY**

-LIGO-

CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Test Procedure	T010138-A-C	November 5, 2001
EG&G Photodiode Testing and Handling Procedure		
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Distribution of this draft: NSF reviewers, LIGO scientists
This is an internal working note of the LIGO Laboratory

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1. Introduction

- 1.1. The following procedure details the safe handling process for the EG&G photo-detectors used in the RF photodiodes at LIGO. This process protects the photo-detector from physical as well as static electric damage and is the result of direct experience in both of these damage scenarios. A static wrist strap must be used for all handling operations. All work must be done above a soft surface such as a cotton cloth to prevent damage to the internal element in the event the diode is dropped. The procedure assumes some familiarity with the RFPD.

2. Upon receipt of diodes from manufacturer

- 2.1. **Visual inspection** - While wearing a grounded anti-static wristband, open the shipping box and visibly inspect the diodes. Look for poorly attached diode elements, broken bond wires, or broken leads to the device.

Visual test OK_____

- 2.2. **Heat-shrinking** - While wearing a grounded anti-static wristband place 0.2" length heat-shrinkable tubing over each lead of the diode snug up against the can. Heat shrink in place.

Check heat-shrink in place_____

- 2.3. **Dark current check** (While wearing a grounded anti-static wristband)

- 2.3.1. Using the leakage current test jig, apply power in accordance with the labels on the jig and hook the jig up to the Fluke 45 multi-meter on the auto-ranging volts function.
- 2.3.2. Insert the diode under test into the socket on the jig and put the cover over the diode to block ambient light.
- 2.3.3. Push the button on the jig and record the leakage current in nano-amperes using the conversion printed on the jig. The current must be less than 100 nA.

Diode dark current_____ nA (must be less than 100 nA)

- 2.4. **Cutting the glass cover off the can** (Only necessary if the diode is to be used in an LSC application, PSL diodes can be left with the glass on).

- 2.4.1. Visually inspect the Thorlabs can cutting tool to ensure the rollers are firmly attached, the cutting blade is sharp and properly aligned with respect to the tool, and no obvious damage exists

Visual check OK_____

- 2.4.2. Place the diode into the cutting tool with the leads protruding away from the cutter. The cut should be made half way up the can of the diode.

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- 2.4.3. Adjust the black depth-stop screw until the cutter blade can barely touch the can of the diode. Increments to this screw should be made in no more than 1/8 of a revolution steps.
- 2.4.4. Apply **gentle** pressure to the cutter and rotate the knob to score the diode. Once the cutting has ceased, increment the depth stop by 1/8 of a revolution. It may take 100 or more turns and many depth-stop increments to fully cut the diode. At all times, be prepared for the diode to fall. A soft landing place is a must. Take your time this is a critical step.
- 2.4.5. Once the tool cuts through the diode, gently remove the glass window if it is still attached. Be extremely careful of the exposed diode element. Visually inspect the diode element for damage.

Diode element visual inspection OK _____

- 2.4.6. Carefully insert the diode into the metal photo-diode mounting block and secure it in place with mounting washer and four screws.
- 2.4.7. Visually inspect the diode for damage.
- 2.4.8. Apply Kapton tape over the metal mounting block to protect the photo-diode from dirt or damage. The tape must not touch the active portion of the photo-diode element.

Diode element visual inspection OK _____

- 2.4.9. Store the mounting block and photo-diode assembly in a sealed static-proof container until ready to mount on PCB.

3. **Installation on circuit board** (Anti-static wrist strap must be worn during installation)

- 3.1. Heat-sinking compound must be installed in the recess of the metal mounting block corresponding to the temperature sensor. Use a minimal amount as the compound migrates.
- 3.2. Attach the metal mounting block to the PCB with the four dedicated mounting screws taking care to insert the photo-diode leads through the holes in the PCB.
- 3.3. Solder the leads of the photo-diode to the pads on the PCB.
- 3.4. Trim the photo-diode leads to length.
- 3.5. If the protective Kapton tape is removed for any testing purpose, it must be replaced after testing to ensure the cleanliness and protection of the photo-diode.