*LIGO Laboratory / LIGO Scientific Collaboration*

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*ISC Custom Photodetectors:* Acceptance Documentation

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This is an internal working note

of the LIGO Laboratory.

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# Requirements documentation

The custom photodetectors included in this package are:

* LSC RF photodetectors
* Broadband photodetectors (BBPD)
* ASC RF photodetectors (WFS)
* In-Vacuum QPDs (quadrant photodetectors)
* Unamplified DC photodetectors

Documentation for all of the above is found in the DCC tree, under:

aLIGO Document Tree > aLIGO, ISC > aLIGO, ISC, Photodetectors and Sensors:

[LIGO-E1200199](https://dcc.ligo.org/LIGO-E1200199)

The requirements are found in the documentation as follows:

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| LSC RF PD | [LIGO-T1100402](https://dcc.ligo.org/LIGO-T1100402), sections 2 and 2.1 |
| ASC RF PD (WFS) | [LIGO-T1100402](https://dcc.ligo.org/LIGO-T1100402), sections 2 and 2.2 |
| In-vac QPD | [LIGO-T0900423](https://dcc.ligo.org/LIGO-T0900423), sections 1 and 2 |
| BBPD | [LIGO-T1100467](https://dcc.ligo.org/LIGO-T1100467), section1 |

# Design overview and detailed design documentation

1. *Final Design Document (FDD):*

The technical notes listed above are the final design documents for the detectors.

*b) Review reports:*

* Review report for BBPD: [LIGO-L1100099](https://dcc.ligo.org/LIGO-L1100099)
* Review report for In-vac QPD: [LIGO-L1000094](https://dcc.ligo.org/LIGO-L1000094); response is found in the same file card—all comments were incorporated into the final design
* RF PDs were not formally reviewed (internal review only within ISC group)

*c) Supporting design documents:* Everything is in the DCC tree. The entry [LIGO-E1400110](https://dcc.ligo.org/LIGO-E1400110) collects documents relevant to both the LSC and ASC RF PDs.

*d) Drawings:* Schematics and assembly drawings are all linked in the DCC tree.

*e) Bill(s) of Materials (BOM):*

* RF PDs: BOM found in the ‘Schematic’ file card
* BBPD: [LIGO-E1100819](https://dcc.ligo.org/LIGO-E1100819)
* In-vac QPD: [LIGO-E1101004](https://dcc.ligo.org/LIGO-E1101004)

*f) Interface control:* none

*g) Software:* none

*h) Design source data:*

* RF PDs: Design files (Altium) are found in the ‘Schematic’ file card
* BBPD: Design files (Altium) included in [LIGO-D1002969](https://dcc.ligo.org/LIGO-D1002969)
* In-vac QPD: Design files are in the SolidWorks vault

# Materials and fabrication specification

The in-vacuum RF PD enclosures are processed by SRI Hermetics. This fabrication process is defined in [LIGO-C1204586](https://dcc.ligo.org/LIGO-C1204586). The in-house cleaning procedure is in [LIGO-E1300449](https://dcc.ligo.org/LIGO-E1300449).

# Parts and in-process spares inventoried

Status of all RF PDs is tracked in [LIGO-T1200506](https://dcc.ligo.org/LIGO-T1200506). All units are in ICS under the enclosure body D-number (e.g., D1101174 for the LSC In-air RF PD).

The in-vac QPDs status is tracked in [LIGO-E1101174](https://dcc.ligo.org/LIGO-E1101174). The dual QPD assemblies are in ICS under their cable D-numbers.

BBPDs are in ICS, under D1002969.

# Assembly procedures

None.

# Installation procedures

None.

# Test documents

LSC RF PD:

* Test procedure: [LIGO-T1200335](https://dcc.ligo.org/LIGO-T1200335)
* Datasheet template: [LIGO-T1200334](https://dcc.ligo.org/LIGO-T1200334)
* Test results: filed in the S-number entry for each unit

ASC RF PD (WFS):

* Test procedure: [LIGO-T1200347](https://dcc.ligo.org/LIGO-T1200347)
* Datasheet template: [LIGO-T1200381](https://dcc.ligo.org/LIGO-T1200381)
* Test results: filed in the S-number entry for each unit

BBPD: No written test procedure. All units were tested for proper DC and RF response, but results were not recorded.

In-vac QPD: Diode element test results are found in [LIGO-T1200065](https://dcc.ligo.org/LIGO-T1200065) and [LIGO-T1200063](https://dcc.ligo.org/LIGO-T1200063). Dual QPD assemblies were re-tested, though results were not recorded. The status document E1101174 includes QPD serial numbers that can be cross-referenced to the test results.

# User interface software

None.

# Operation Manual

Under [LIGO-E1200199](https://dcc.ligo.org/LIGO-E1200199), see:

* [LIGO-T1300488](https://dcc.ligo.org/LIGO-T1300488): Guide to Troubleshooting aLIGO RFPDs
* [LIGO-T1300315](https://dcc.ligo.org/LIGO-T1300315): Notes on RFPD Signal Chain Measurements
* [LIGO-T1300506](https://dcc.ligo.org/LIGO-T1300506): aLigo RFPD Spot Check Procedure

# Safety

All ISC electronics is in conformance with the LIGO EEIP (Electrical Equipment Inspection Program). This program was implemented to protect personnel from electrical hazards.