

Advanced LIGO Engineering Change Request (ECR)

ECR Title: Component Changes to RFPDs

DCC No: E1300103-v2

Date: 1 February, 2013

Requester: Richard Abbott

Impacted Subsystem(s):
PSL/IO/ISC

Description of Proposed Change(s): IC chips used within the ASC and LSC RFPDs will be changed for chips that don't fail upon loss of a single polarity of DC power. Clamping diodes will be added to the regulated voltages inside the RFPD head such that the regulators can never be caused to reverse polarity (within a silicon diode drop from ground). The specific chip changes in a WAS/IS format are: D1200066 (U2 AD8597/LT1128, U1 AD8599/AD8672, C14 removed), D1101614 (U2 AD8597/LT1128, C28 removed), D1101124 (U2 AD8597/LT1128, U8 & U10 AD8675/OP27, C31 removed).

Reason for Change(s): aLIGO RFPDs have a tendency to self-destruct if one polarity of DC power is lost. This change renders them insensitive to that failure mechanism. The principle of the fix is the same for all designs of RFPD

Estimated Cost: Hardware cost is insignificant (100s of \$). Manpower to retrofit each unit is more significant as there are ~70 units to retrofit at 2-3 hours per unit (disassembly, retrofit, reassembly, and retest). Can be a man month. Not all units have been tested yet, and we can send some out for bulk retrofit which will save money.

Schedule Impact Estimate: minimal once the initial units for the IMC are complete.

Nature of Change (check all that apply):

- Safety
- Correct Hardware
- Correct Documentation

- Improve Hardware
- Improve/Clarify Documentation
- Change Interface
- Change Requirement

Importance:

- Desirable for ease of use, maintenance, safety
- Desirable for improved performance, reliability
- Essential for performance, reliability
- Essential for function
- Essential for safety

Urgency:

- No urgency
- Desirable by date/event: _____
- Essential by date/event: _____
- Immediately (ASAP)

Impacted Hardware (select all that apply):

- Repair/Modify. List part & SNs: ALL _____
- Scrap & Replace. List part & SNs: _____
- Installed units? List IFO, part & SNs: _____
- Future units to be built

Impacted Documentation (list all dwgs, design reports, test reports, specifications, etc.):D1200066, D1101614, D1101124

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Disposition of the proposed change(s):

The disposition of this proposed engineering change request is to be completed by Systems Engineering and indicated in the “Notes and Changes” metadata field in the DCC entry for this ECR. The typical dispositions are as follows:

- **Additional Information Required:** in which case the additional information requested is defined. The ECR requester then re-submits the ECR with the new information using the same DCC number for the ECR but with the next version number.
- **Rejected:** in which case the reason(s) for the rejection are to be given
- **Approved**
- **Approved with Caveat(s):** in which case the caveat(s) are listed
- **TRB:** the ECR is referred to an ad-hoc Technical Review Board for further evaluation and recommendation. It is the System Engineer’s (or designee’s) responsibility to organize the TRB. The System Engineer (or designee) then makes a technical decision based on the TRB’s recommendation. Links to the TRB’s documentation (charge, memos, final report, etc.) are to be added to the “Related Documents” field for this ECR.
- **CCB:** a change request for approval of additional funds or schedule impact is to be submitted to the Configuration Control Board. Links to the CCB’s documentation (CR, etc.) are to be added to the “Related Documents” field for this ECR.

Concurrence by Project Management:

Acknowledgement/acceptance/approval of the disposition is to be indicated by the electronic “signature” feature in the DCC entry for this ECR, by one the following personnel:

- Systems Scientist
- Systems Engineer
- Deputy Systems Engineer