



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

*LIGO Laboratory / LIGO Scientific Collaboration*

LIGO-E1500050-v1

*LIGO*

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*ISC Fast Shutters: Acceptance Documentation*

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LIGO Scientific Collaboration

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## 1 Requirements documentation

See section 2 of the design document for the requirements: [LIGO-T1400335](#). For the electronics requirements, see [LIGO-T1300906](#).

## 2 Design overview and detailed design documentation

Design documentation is in the aLIGO DCC tree, starting at:

[LIGO-E1400177](#): aLIGO, ISC, Fast Shutter

a) *Final Design Document (FDD)*: [LIGO-T1400335](#)

b) *Review reports*:

The fast shutter was not formally reviewed. The design of both the mechanical and electronic parts were presented at several ISC meetings as the design progressed, and several suggestions from that were incorporated in the design.

c) *Supporting design documents: models, analyses, specifications, etc.*

All in the DCC tree, under E1400177.

d) *Drawings: cite the top level assembly drawing for each major assembly or subsystem.*

[LIGO-D1003318](#)

e) *Bill(s) of Materials (BOM): cite any collected BOMs. If the BOMs are only to be found on the Assembly and Sub-Assembly drawing sheets, then state so.*

BOMs are found in the assembly drawings.

f) *Interface control: cite any documents (such as RODAs) with interface definition/control and/or cite the relevant sections of the DRD and FDD.*

None.

g) *Software: cite any software design description documentation.*

Documentation and code for the Programmable System On a Chip: [LIGO-E1400389](#)

h) *Design source data:*

- *Confirm that all mechanical design CAD models are in the SolidWorks/PDMWorks vault, or explain what is not and why.*

- *Confirm that all electronics design CAD models (schematics and PWB layouts) are backed up and available on LIGO Lab archives, or explain what is not and why.*

Confirmed.

## 3 Materials and fabrication specification

*Any special materials, or treatment of materials including preparation for in-vacuum use; this may be integrated into the Design documentation.*

Coil winding fabrication specification is in [LIGO-C1301986](#).

## 4 Parts and in-process spares inventoried

All Fast Shutter assemblies are in ICS as assembly records: ASSY-D1003318-Snn. There are 6 assembled units. Each interferometer requires 1 unit. Nine coil assemblies were made, anticipating that these might get damaged in use.

## 5 Assembly procedures

Assembly procedure: [LIGO-T1400220](#).

## 6 Installation procedures

Alignment procedure for HAM6 installation is given in [LIGO-T1400588](#). Installation and test procedure for the driver is in [LIGO-E1500046](#).

## 7 Test documents

[LIGO-D1400208](#) is a tester board that can control the driver in manual mode.

## 8 User interface software

User interface is a medm screen to control and monitor the shutter.

## 9 Operation Manual

The driver installation guide contains some information on operations: [LIGO-E1500046](#). The state diagram, [LIGO-T1400267](#), is also useful in this regard.

## 10 Safety

*Safety documentation must be in the DCC for all phases of the subsystem development, including any needed for normal use or foreseen maintenance/repair scenarios.*

The driver test procedure ([LIGO-E1400451](#)) and installation guide ([LIGO-E1500046](#)) both contain statements about requirements for working on energized equipment.