



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

*LIGO Laboratory / LIGO Scientific Collaboration*

LIGO-T1600605-v9

Advanced LIGO

September 6, 2022

---

## Monitor Photodiodes for SQZ

---

Rich Abbott, Lisa Barsotti, Daniel Sigg

Distribution of this document:  
LIGO Scientific Collaboration

This is an internal working note  
of the LIGO Laboratory.

**California Institute of Technology**  
**LIGO Project – MS 18-34**  
**1200 E. California Blvd.**  
**Pasadena, CA 91125**  
Phone (626) 395-2129  
Fax (626) 304-9834  
E-mail: [info@ligo.caltech.edu](mailto:info@ligo.caltech.edu)

**Massachusetts Institute of Technology**  
**LIGO Project – NW22-295**  
**185 Albany St**  
**Cambridge, MA 02139**  
Phone (617) 253-4824  
Fax (617) 253-7014  
E-mail: [info@ligo.mit.edu](mailto:info@ligo.mit.edu)

**LIGO Hanford Observatory**  
**P.O. Box 159**  
**Richland WA 99352**  
Phone 509-372-8106  
Fax 509-372-8137

**LIGO Livingston Observatory**  
**P.O. Box 940**  
**Livingston, LA 70754**  
Phone 225-686-3100  
Fax 225-686-7189

<http://www.ligo.caltech.edu/>

## List of RF Photodiodes

Name	Location	Type	RF Chain	Comment
Newport 1611FS-AC:		<a href="#">Commercial</a>		
FIBR_MIXER	SQZT0/FSS1	1611	TTFSS	Laser/fiber locking PD
Broadband Photodetectors:		<a href="#">E1200428</a>		
SHG_TRANS_RF35	SQZT0/SHG	BBPD	2ch demod	SHG locking (IR)
OPO_REFL_RF80	SQZT7/OPO	BBPD	2ch demod	OPO locking (GR)
LSC RF Photodetectors:		<a href="#">E1400099</a>		
CLF_REFL_RF6	SQZT7/CLF	ALIGO	2ch demod	CLF phase. locking
FC_REFL_RF40	SQZT7/FC	ALIGO	2ch demod	FC locking
Existing OMC DCPD:		<a href="#">E1300521</a>		
OMC_TRANS_RF3	In-vac	ALIGO	2ch demod	Squeeze angle locking
Thorlabs PDA100A:		<a href="#">Commercial</a>		
FC_BEAT_RF1	SQZT7/FC	PDA100A	Fast ADC	FC beat note
Homodyne Photodetector:		<a href="#">E1700135</a>		
HD_DIFF_RF3	SQZT7/HD	ALIGO	2ch demod	LO locking/diagnostics

## List of Quad Detectors

Name	Location	Type	Chain	Comment
New 105 kHz Quads:		<a href="#">E2000502</a>		
RLF_REFL_A	In-vac	ALIGO	RLF	FC locking/alignment
RLF_REFL_B	In-vac	ALIGO	RLF	FC locking/alignment
Green Quad:		TBD		
FC_TRANS_A	SQZT8/green	ALIGO	QPD	FC alignment
FC_TRANS_B	SQZT8/green	ALIGO	QPD	FC alignment

## List of DC monitor photodiodes

Name	Location	Type	S	F	W	Comment
<b>4-chn Generic PD interface (SQZT0):</b>						
FIBR_PD_DC/LF	SQZT0/FSS1	1611	×	×	×	DC of laser/fiber locking PD
SHG_TRANS_DC/LF	SQZT0/SHG	BBPD	×	×	×	DC of SHG locking (IR)
LASER_IR_DC/LF	SQZT0/PD1	PDA100A	×	×	×	Power of SQZ laser
SHG_GR_DC/LF	SQZT0/PD2	PDA100A	×	×	×	SHG green power (GR)
<b>4-chn Generic PD interface (SQZT7):</b>						
CLF_TRIG_DC	SQZT7/PD3	PDA100A	×	×		Trigger PD CLF path
OPO_IR_PD_LF	SQZT7/IR	PDA100A	×	×		DC of OPO transmitted (IR)
CLF_REFL_DC	SQZT7/CLF	ALIGO	×			DC of CLF refl. locking
OPO_REFL_DC	SQZT7/OPO	BBPD	×			DC of OPO refl. locking (GR)
<b>4-chn Generic PD interface (SQZT8):</b>						
FC_TRANS_C	SQZT8/GR	PDA100A	×	×		FC green transmitted light
FC_TRANS_D	SQZT8/IR	<a href="#">Femto</a>	×	×		FC red transmitted light
<b>DC Outputs of LSC RF PD interface:</b>						
CLF_REFL_LF	SQZT7/CLF	ALIGO		×	+	DC of CLF refl. locking
OPO_REFL_LF	SQZT7/OPO	BBPD		×	+	DC of OPO refl. locking (GR)
FC_REFL_LF	SQZT7/FC	ALIGO		×	+	DC of FC refl. locking (GR)
FC_BEAT_LF	SQZT7/FC	PDA100A		×	+	DC of FC/OPO beat note (GR)
<b>Homodyne interface:</b>						
HD_B_DC	SQZT7/HD	ALIGO		×	+	PD B of homodyne
HD_DIFF_DC	SQZT7/HD	ALIGO		×	+	Difference of homodyne PDs
HD_A_DC	SQZT7/HD	ALIGO		×	+	PD A of homodyne
<b>Unamplified DC Monitors:</b>						
SHG_FIBR_REJECTED_DC	In-vac	PD	×			Rejected pump power
CLF_FIBR_REJECTED_DC	In-vac	PD	×			Rejected CLF power
FC_FIBR_REJECTED_DC	In-vac	PD	×			Rejected green FC power
OFI_A_REJECTED_DC	In-vac	PD	×			OFI monitor HAM7

OFI_B_REJECTED_DC	In-vac	PD	×			OFI monitor HAM5
FIBR_TRANS_DC/LF	SQZT0/DC1	<a href="#">SM1PD1A</a>	×	×	×	Transmitted by laser fiber
FIBR_REJECTED_DC	SQZT0/DC2	SM1PD1A	×			Rejected after laser fiber
CLF_LAUNCH_DC	SQZT0/DC4	SM1PD1A	×			Injected into CLF fiber
CLF_REJECTED_DC	SQZT0/DC3	SM1PD1A	×			Rejected before injection
SHG_LAUNCH_DC	SQZT0/DC7	SM1PD1A	×			Injected into pump fiber
SHG_REJECTED_DC	SQZT0/DC6	SM1PD1A	×			Rejected before injection
SEED_LAUNCH_DC	SQZT0/DC5	SM1PD1A	×			Seed beam injection
LO_LAUNCH_DC	SQZT0/DC8	SM1PD1A	×			LO beam injection
FC_FIBR_LAUNCH_DC	SQZT0/DC11	SM1PD1A	×			Injected into FC green fiber
OPO_REFL_REJECTED_DC	SQZT7/DC9	SM1PD1A	×	×	×	Rejected OPO refl. power
OPO_TRANS_DC/LF	SQZT7/DC10	PDA100A	×	×	×	Trans. green OPO power (GR)
FC_REFL_REJECTED_DC	SQZT7/DC12	SM1PD1A	×	×	×	Reject. FC REFL power (GR)
FC_BEAT_REJECTED_DC	SQZT7/DC13	SM1PD1A	×			Reject. FC BEAT power (GR)
SPARE_A_DC	TBD	TBD	×			Spare (SQZT0)
SPARE_B_DC	TBD	TBD	×			Spare (SQZT7)
SPARE_C_DC	TBD	TBD	×			Spare (SQZT8)
SPARE_D_DC	TBD	TBD	×			Spare (SQZT8)
<b>Trigger PD:</b>						
SYS-MOTION_C_SHUTTER_H_TRIGGER	SQZT7/PD3	PDA100A	×			Trigger PD CLF path

S: Slow controls readback; F: Fast DAQ readback; W: Whitened readback (×: standard whitening, +: custom whitening)