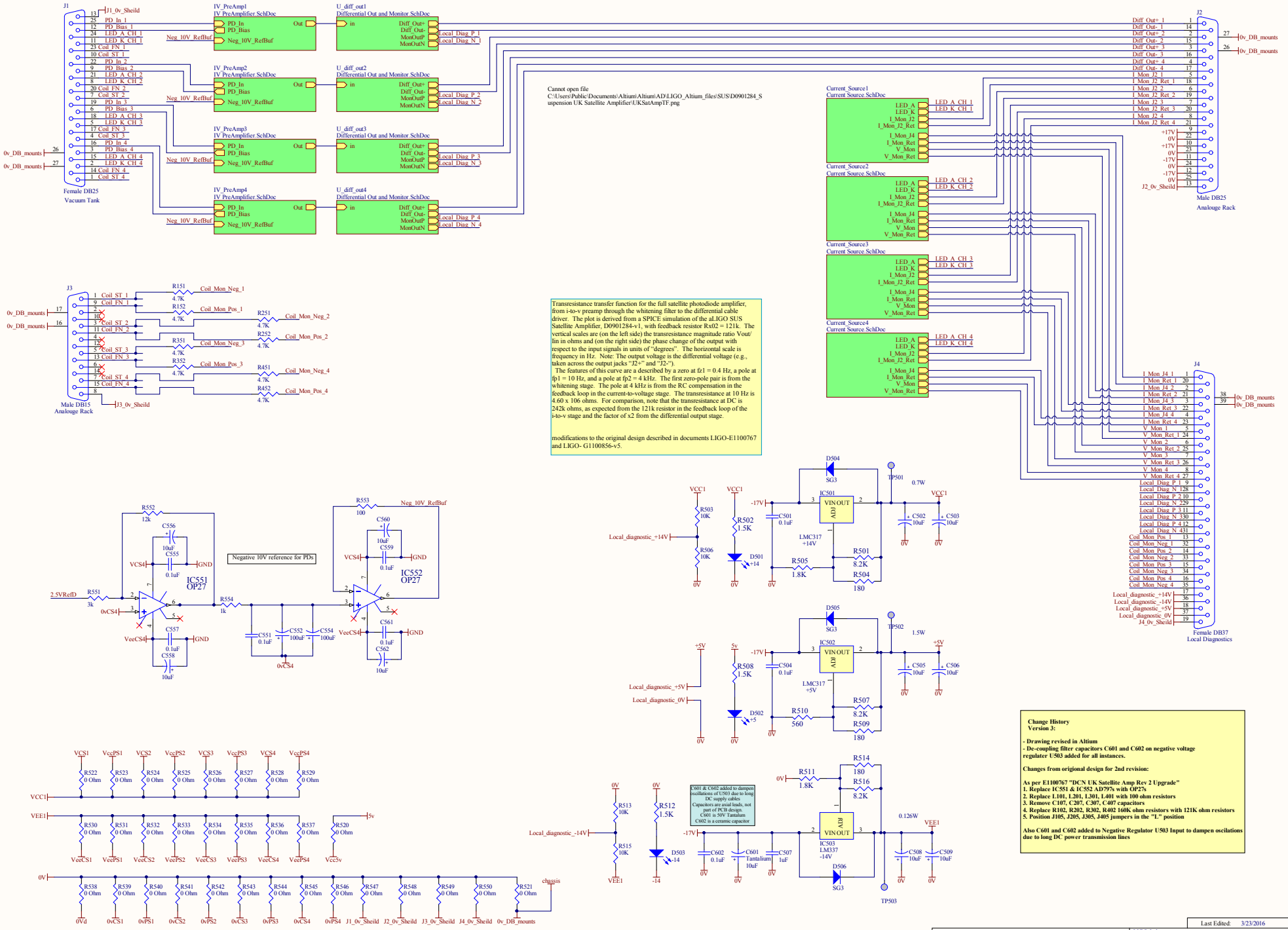
J1
J1_0v_Sheild
PD_In_1
PD_Bias_1
LED_A_CH_1
LED_K_CH_1
Coil_FN_1
Coil_ST_1
PD_In_2
PD_Bias_2
LED_A_CH_2
LED_K_CH_2
Coil_FN_2
Coil_ST_2
PD_In_3
PD_Bias_3
LED_A_CH_3
LED_K_CH_3
Coil_FN_3
Coil_ST_3
PD_In_4
PD_Bias_4
LED_A_CH_4
LED_K_CH_4
Coil_FN_4
Coil_ST_4
0v_DB_mounts
Female DB25
Vacuum Tank
IV_PreAmp1
IV_PreAmp2
IV_PreAmp3
IV_PreAmp4
IV PreAmplifier.SchDoc
PD_In
PD_Bias
Neg_10V_RefBuf
Out
U_diff_out1
U_diff_out2
U_diff_out3
U_diff_out4
Differential Out and Monitor.SchDoc
in
Diff_Out+
Diff_Out-
MonOutP
MonOutN
Local_Diag_P_1
Local_Diag_N_1
Local_Diag_P_2
Local_Diag_N_2
Local_Diag_P_3
Local_Diag_N_3
Local_Diag_P_4
Local_Diag_N_4
Cannot open file
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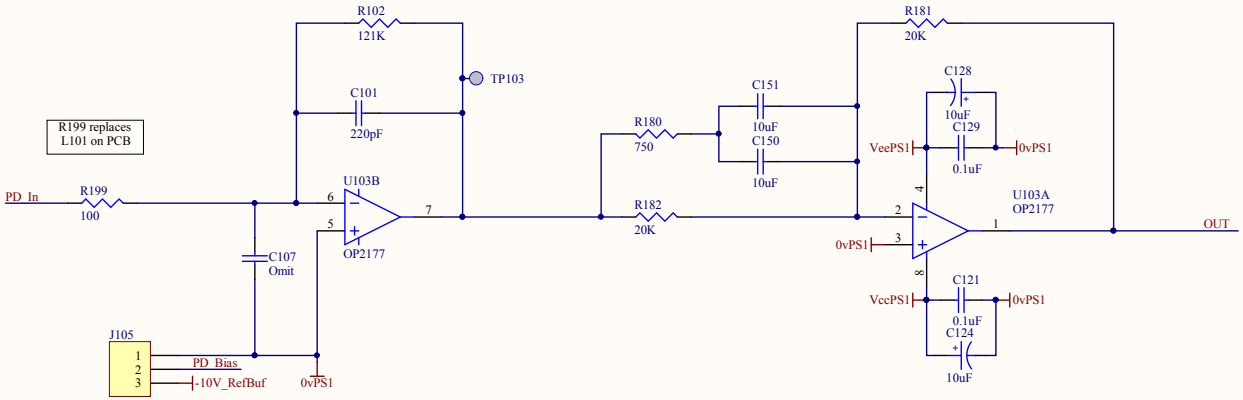
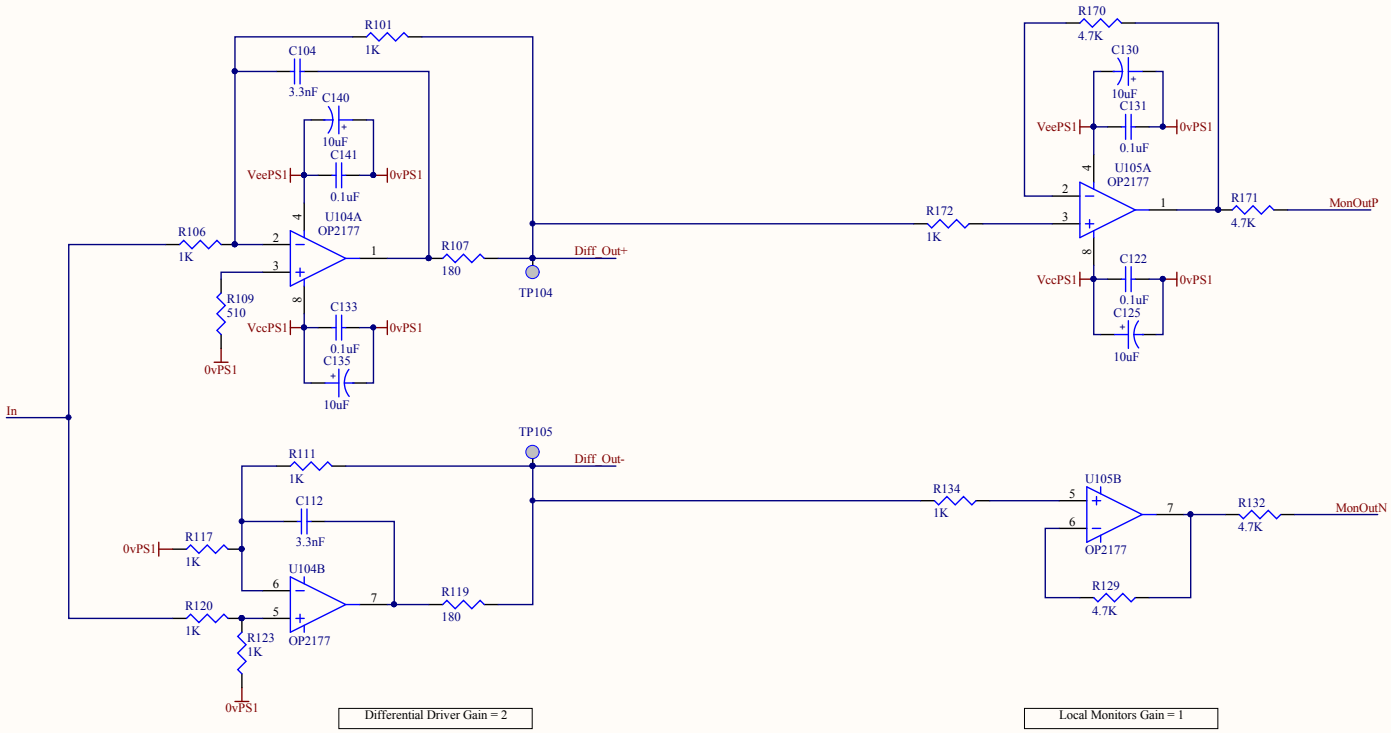
Current_Source1
Current_Source2
Current_Source3
Current_Source4
Current Source.SchDoc
LED_A
LED_K
I_Mon_J2
I_Mon_J2_Ret
I_Mon_J4
I_Mon_Ret
V_Mon
V_Mon_Ret
LED_A_CH_1
LED_K_CH_1
LED_A_CH_2
LED_K_CH_2
LED_A_CH_3
LED_K_CH_3
LED_A_CH_4
LED_K_CH_4
J2
Male DB25
Analouge Rack
Diff_Out+_1
Diff_Out-_1
Diff_Out+_2
Diff_Out-_2
Diff_Out+_3
Diff_Out-_3
Diff_Out+_4
Diff_Out-_4
I_Mon_J2_1
I_Mon_J2_Ret_1
I_Mon_J2_2
I_Mon_J2_Ret_2
I_Mon_J2_3
I_Mon_J2_Ret_3
I_Mon_J2_4
I_Mon_J2_Ret_4
+17V
0V
-17V
J2_0v_Sheild
0v_DB_mounts
J3
Male DB15
Analouge Rack
Coil_ST_1
Coil_FN_1
Coil_ST_2
Coil_FN_2
Coil_ST_3
Coil_FN_3
Coil_ST_4
Coil_FN_4
R151
R152
R351
R352
R251
R252
R451
R452
4.7K
Coil_Mon_Neg_1
Coil_Mon_Pos_1
Coil_Mon_Neg_2
Coil_Mon_Pos_2
Coil_Mon_Neg_3
Coil_Mon_Pos_3
Coil_Mon_Neg_4
Coil_Mon_Pos_4
J3_0v_Sheild
J4
Female DB37
Local Diagnostics
I_Mon_J4_1
I_Mon_Ret_1
I_Mon_J4_2
I_Mon_Ret_2
I_Mon_J4_3
I_Mon_Ret_3
I_Mon_J4_4
I_Mon_Ret_4
V_Mon_1
V_Mon_Ret_1
V_Mon_2
V_Mon_Ret_2
V_Mon_3
V_Mon_Ret_3
V_Mon_4
V_Mon_Ret_4
Local_Diag_P_1
Local_Diag_N_1
Local_Diag_P_2
Local_Diag_N_2
Local_Diag_P_3
Local_Diag_N_3
Local_Diag_P_4
Local_Diag_N_4
Coil_Mon_Pos_1
Coil_Mon_Neg_1
Coil_Mon_Pos_2
Coil_Mon_Neg_2
Coil_Mon_Pos_3
Coil_Mon_Neg_3
Coil_Mon_Pos_4
Coil_Mon_Neg_4
Local_diagnostic_+14V
Local_diagnostic_-14V
Local_diagnostic_+5V
Local_diagnostic_0V
J4_0v_Sheild
Transresistance transfer function for the full satellite photodiode amplifier, from i-to-v preamp through the whitening filter to the differential cable driver. The plot is derived from a SPICE simulation of the aLIGO SUS Satellite Amplifier, D0901284-v1, with feedback resistor Rx02 = 121k. The vertical scales are (on the left side) the transresistance magnitude ratio Vout/Iin in ohms and (on the right side) the phase change of the output with respect to the input signals in units of "degrees". The horizontal scale is frequency in Hz. Note: The output voltage is the differential voltage (e.g., taken across the output jacks "J2+" and "J2-").
The features of this curve are a described by a zero at fz1 = 0.4 Hz, a pole at fp1 = 10 Hz, and a pole at fp2 = 4 kHz. The first zero-pole pair is from the whitening stage. The pole at 4 kHz is from the RC compensation in the feedback loop in the current-to-voltage stage. The transresistance at 10 Hz is 4.60 x 106 ohms. For comparison, note that the transresistance at DC is 242k ohms, as expected from the 121k resistor in the feedback loop of the i-to-v stage and the factor of x2 from the differential output stage.
modifications to the original design described in documents LIGO-E1100767 and LIGO- G1100856-v5.
Negative 10V reference for PDs
2.5VRefD
R551
3k
R552
12k
R553
100
R554
1k
C556
C555
C557
C558
C559
C560
C561
C562
C551
C552
C554
10uF
0.1uF
100uF
VCS4
VeeCS4
0vCS4
GND
IC551
OP27
IC552
OP27
VCC1
VEE1
VCS1
VeePS1
VCS2
VeePS2
VCS3
VeePS3
VCS4
VeePS4
Vcc5v
VeeCS1
VeeCS2
VeeCS3
R522
R523
R524
R525
R526
R527
R528
R529
R520
R530
R531
R532
R533
R534
R535
R536
R537
0 Ohm
5v
0Vd
0vCS1
0vPS1
0vCS2
0vPS2
0vCS3
0vPS3
0vCS4
0vPS4
J1_0v_Sheild
J2_0v_Sheild
J3_0v_Sheild
J4_0v_Sheild
0v_DB_mounts
chassis
R538
R539
R540
R541
R542
R543
R544
R545
R546
R547
R548
R549
R550
R521
D504
D505
D501
D502
D503
D506
SG3
-14
+14
+5
TP501
TP502
TP503
0.7W
1.5W
0.126W
IC501
IC502
IC503
VIN OUT
ADJ
LMC317
+14V
+5V
LM337
-14V
R501
R502
R503
R504
R505
R506
R507
R508
R509
R510
R511
R512
R513
R514
R515
R516
1.5K
10K
8.2K
1.8K
180
560
C501
C502
C503
C504
C505
C506
C507
C508
C509
C601
C602
0.1uF
1uF
Tantalium
C601 & C602 added to dampen oscillations of U503 due to long DC supply cables
Capacitors are axial leads, not part of PCB design.
C601 is 50V Tantalum
C602 is a ceramic capacitor
Change History
Version 3:
- Drawing revised in Altium
- De-coupling filter capacitors C601 and C602 on negative voltage regulater U503 added for all instances.
Changes from origional design for 2nd revision:
As per E1100767 "DCN UK Satellite Amp Rev 2 Upgrade"
1. Replace 1C551 & 1C552 AD797s with OP27s
2. Replace L101, L201, L301, L401 with 100 ohm resistors
3. Remove C107, C207, C307, C407 capacitors
4. Replace R102, R202, R302, R402 160K ohm resistors with 121K ohm resistors
5. Position J105, J205, J305, J405 jumpers in the "L" position
Also C601 and C602 added to Negative Regulator U503 Input to dampen oscillations due to long DC power transmission lines
Last Edited: 3/23/2016
Title
Suspension UK Satellite Amplifier
LIGO Laboratory
California Institute of Technology
Massachusetts Institute of Technology
LIGO
Size: C
DCC Number: D0901284
SCH / PCB Revision: v3
Engineer: Carl Adams
Date: 3/23/2016
Time: 9:17:49 AM
Sheet 1 of 4
File: C:\Users\Public\Documents\Altium\Altium\CarlAdams\AD\LIGO_Altium_files_Carl_Adams\SUS\D0901284_Suspension UK Satellite Amplifier\Sheet1.SchDoc
UK_Satellite_Amplifie



Last Edited: *11/19/2015*				
Title: ***IV PreAmplifier***	*LIGO Laboratory* *California Institute of Technology* *Massachusetts Institute of Technology*			LIGO
Size: B	DCC Number: D0901284	Revision: v3	Engineer: *Carl Adams*	Date: 3/23/2016 Time: 9:17:49 AM
File: C:\Users\Public\Documents\Altium\Altium\CarlAdams\AD\LIGO_Altium_files_Carl_Adams\SUS\D0901284_Suspension UK Satellite Amplifier\IV PreAmplifier.SchDoc				Sheet 1 of 1



Title: ***Differential Out and Monitor***				*LIGO Laboratory* *California Institute of Technology* *Massachusetts Institute of Technology*
Size: B	DCC Number: D0901284	Revision: v3	Engineer: *Carl Adams*	Last Edited: *11/19/2015* Date: 3/23/2016 Time: 9:17:49 AM

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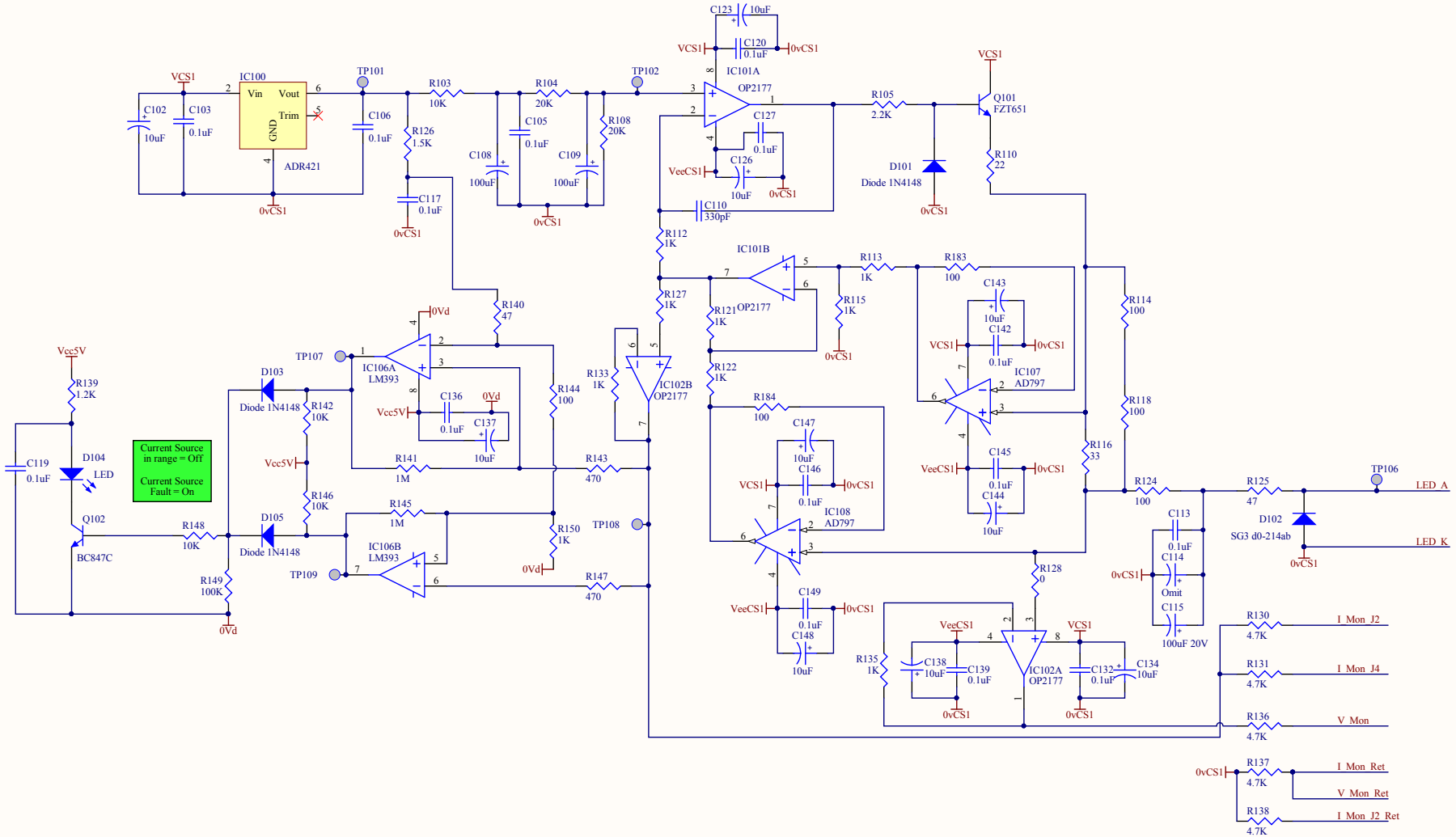
Sheet 1 of 1



Title: *Current Source*			*LIGO Laboratory* *California Institute of Technology* *Massachusetts Institute of Technology*	LIGO
Size: B	DCC Number: D0901284	Revision: v3	Engineer: *Carl Adams*	Last Edited: *11/19/2015* Date: 3/23/2016 Time: 9:17:49 AM

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Sheet 3 of 3