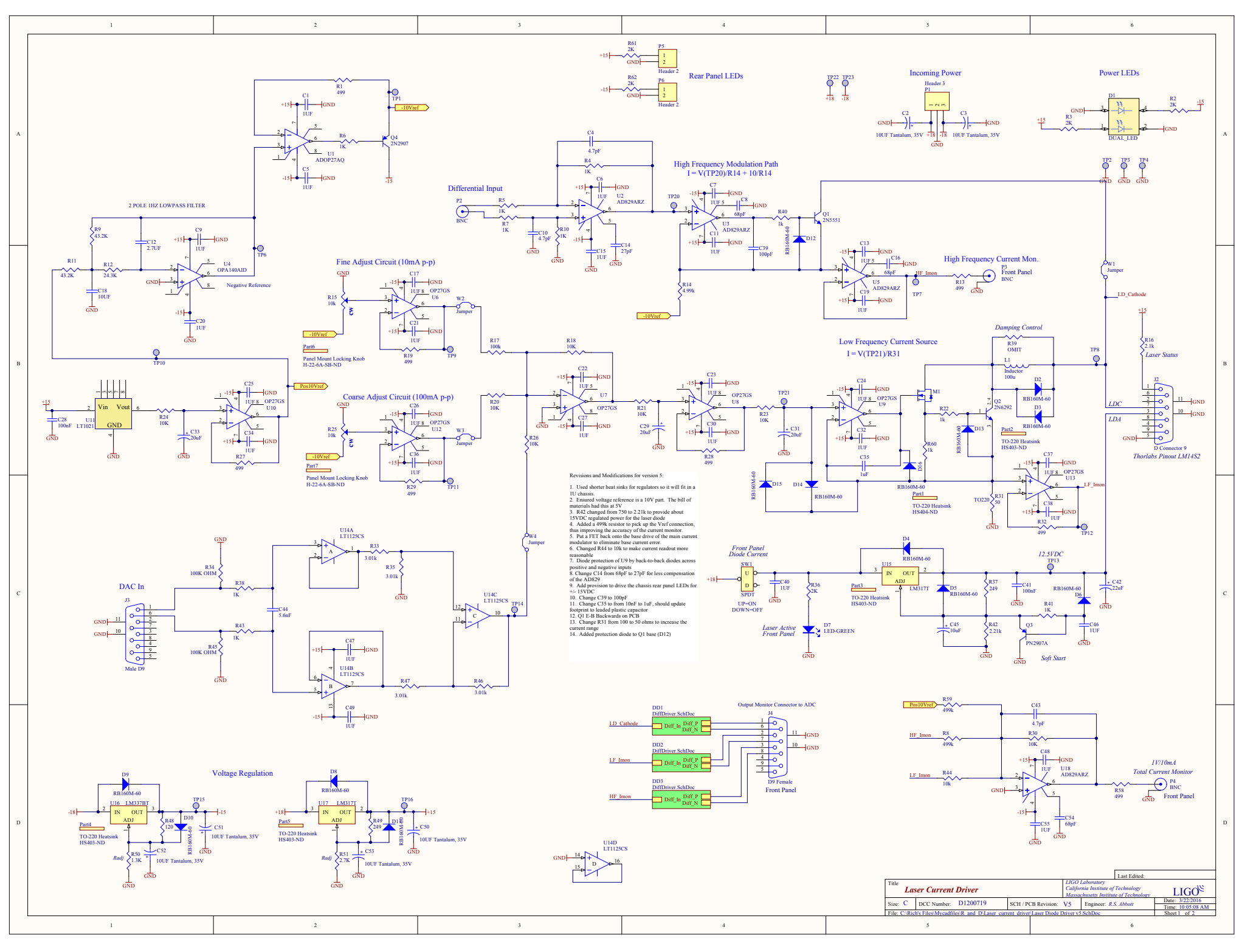
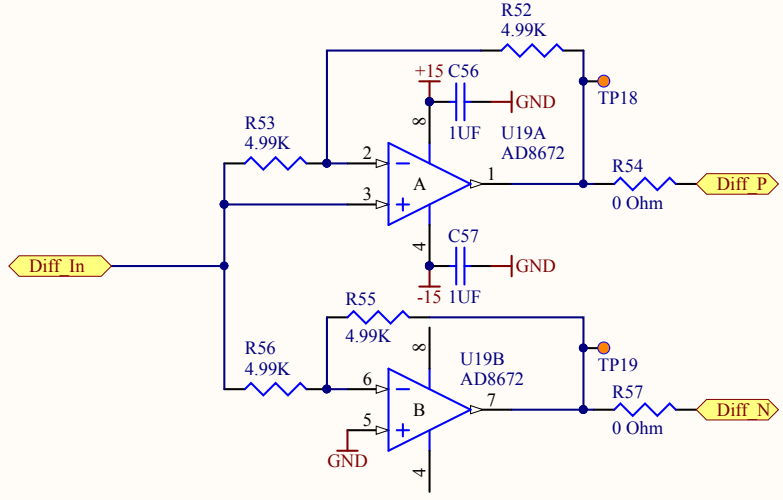
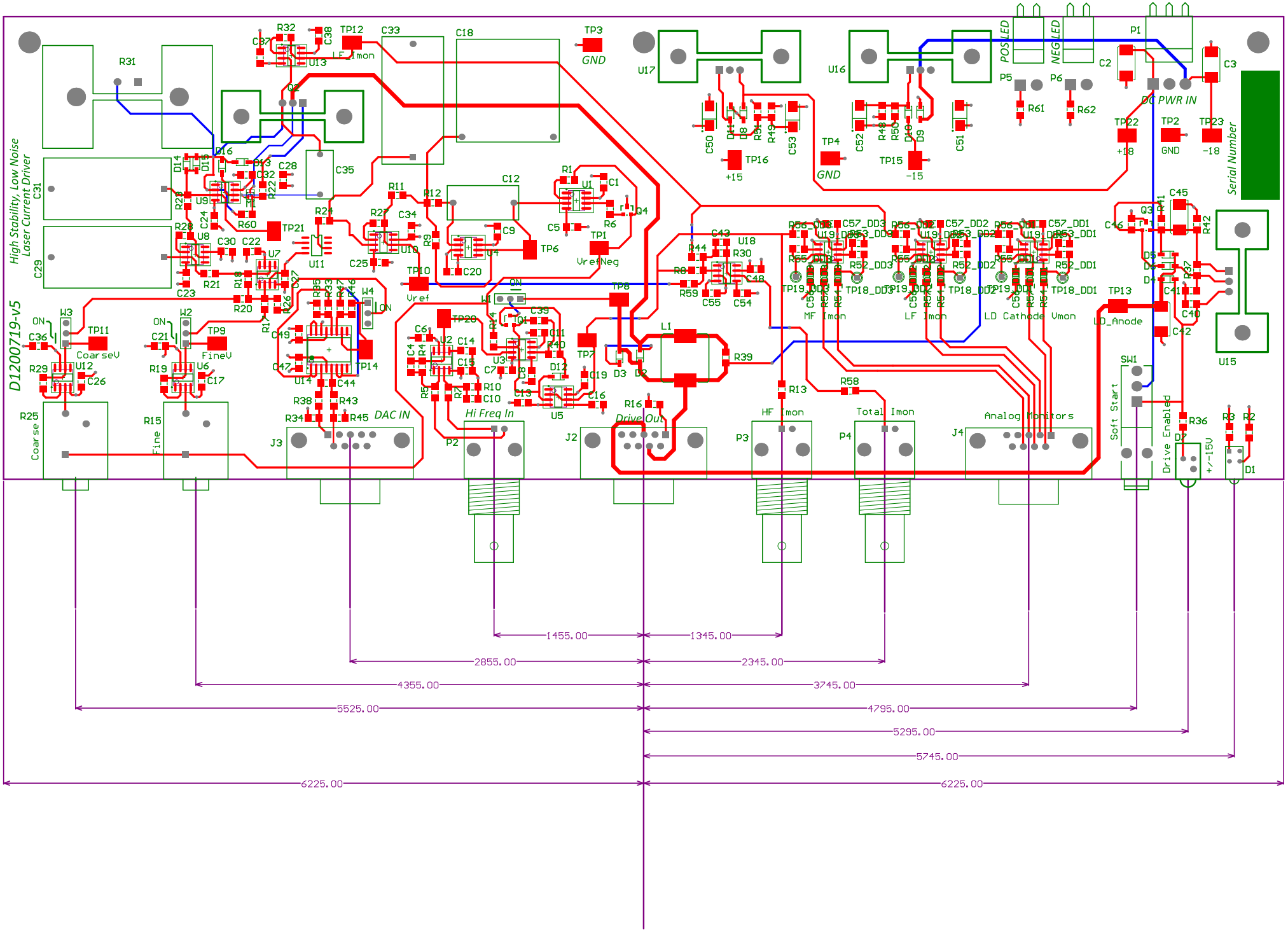

Rear Panel LEDs
Incoming Power
Power LEDs
Header 3
DUAL_LED
Differential Input
High Frequency Modulation Path
I = V(TP20)/R14 + 10/R14
2 POLE 1HZ LOWPASS FILTER
Negative Reference
Fine Adjust Circuit (10mA p-p)
Coarse Adjust Circuit (100mA p-p)
Panel Mount Locking Knob
H-22-6A-SB-ND
High Frequency Current Mon.
Front Panel
BNC
Low Frequency Current Source
I = V(TP21)/R31
Damping Control
Inductor
100u
Laser Status
LDC
LDA
D Connector 9
Thorlabs Pinout LM14S2
TO-220 Heatsink
HS403-ND
HS404-ND
Front Panel
Diode Current
UP=ON
DOWN=OFF
Laser Active
Front Panel
LED-GREEN
Soft Start
12.5VDC
DAC In
Male D9
Voltage Regulation
Output Monitor Connector to ADC
D9 Female
Front Panel
1V/10mA
Total Current Monitor
Revisions and Modifications for version 5:
1. Used shorter heat sinks for regulators so it will fit in a 1U chassis.
2. Ensured voltage reference is a 10V part. The bill of materials had this at 5V
3. R42 changed from 750 to 2.21k to provide about 15VDC regulated power for the laser diode
4. Added a 499k resistor to pick up the Vref connection, thus improving the accuracy of the current monitor.
5. Put a FET back onto the base drive of the main current modulator to eliminate base current error.
6. Changed R44 to 10k to make current readout more reasonable
7. Diode protection of U9 by back-to-back diodes across positive and negative inputs
8. Change C14 from 68pF to 27pF for less compensation of the AD829
9. Add provision to drive the chassis rear panel LEDs for +/- 15VDC
10. Change C39 to 100pF
11. Change C35 to from 10nF to 1uF, should update footprint to leaded plastic capacitor
12. Q1 E-B Backwards on PCB
13. Change R31 from 100 to 50 ohms to increase the current range
14. Added protection diode to Q1 base (D12)
Title
Laser Current Driver
LIGO Laboratory
California Institute of Technology
Massachusetts Institute of Technology
Size: C
DCC Number: D1200719
SCH / PCB Revision: V5
Engineer: R.S. Abbott
Last Edited:
Date: 3/22/2016
Time: 10:05:08 AM
Sheet 1 of 2
File: C:\Rich's Files\Mycadfiles\R and D\Laser current driver\Laser Diode Driver v5.SchDoc



Typical LIGO differential driver circuit for the monitor signals.

Title: ***Differential Driver***			*LIGO Laboratory* *California Institute of Technology* *Massachusetts Institute of Technology*	LIGO
Size: A	DCC Number: *	Revision: V5	Engineer: *R.S. Abbott*	Last Edited: 2/18/2016 Date: 3/22/2016 Time: 10:05:09 AM Sheet 2 of 2

File: C:\Rich's Files\Mycadfiles\R_and_D\Laser_current_driver\DiffDriver.SchDoc


D1200719-v5
High Stability, Low Noise
Laser Current Driver
Serial Number
DC PWR IN
POS LED
NEG LED
GND
+15
-15
+18
-18
Coarse V
Fine V
DAC IN
Hi Freq In
Drive Out
LF Imon
MF Imon
HF Imon
Total Imon
LD Cathode Vmon
LD_Anode
Analog Monitors
Soft Start
Drive Enabled
+/-15V
Vref
VrefNeg
1455.00
1345.00
2855.00
2345.00
4355.00
3745.00
5525.00
4795.00
5295.00
5745.00
6225.00
6225.00

LIGO Bill of Materials

Source Data From: Laser Diode Driver v5.PrjPcb
Board Designed By: R.S. Abbott
Board D-number D1200719
Board Revision V5
Variant: None

Creation Date:	3/22/2016	10:05:14 AM
Print Date:	22-Mar-16	10:05:18 AM

Designator	Comment	Description	Digikey Part Number	Manufacturers Part Number	Quantity
C1, C5, C9, C20	1UF		PCC2234CT-ND		4
C2, C3	10UF Tantalum, 35V	Polarized Cap	478-1701-1-ND	TAJC106K035RNJ	2
C4, C10, C43	4.7pF	Capacitor	478-1464-1-ND		3
C6, C7, C11, C13, C15, C17, C19, C21, C22, C23, C24, C25, C26, C27, C30, C32, C34, C36, C37, C38, C40, C46, C47, C48, C49, C55, C56_DD1, C56_DD2, C56_DD3, C57_DD1, C57_DD2, C57_DD3	1UF	CAP 1.0UF 50V CERAMIC F 1206, Capacitor	478-1580-1-ND		32
C8, C16, C54	68pF	Capacitor	478-1478-1-ND		3
C12	2.7UF		EF1275-ND		1
C14	27pF	Capacitor	399-9341-1-ND		1
C18	10UF		EF1106-ND		1
C28, C41	100nF	Capacitor	478-1556-1-ND		2
C29, C31, C33	20uF	Polarized Cap	478-2592-ND		3
C35	1uF	Capacitor	EF1105-ND	ECQ-E1105KF	1
C39	100pF	Capacitor	311-1161-1-ND		1
C42	22uF	Polarized Cap	478-1712-1-ND		1
C44	5.6nF	CAP 1.0UF 50V CERAMIC F 1206	PCF1305CT-ND		1
C45, C50, C51, C52, C53	10uF, 10UF Tantalum, 35V	Polarized Cap	478-4973-1-ND	TAJC106M035RNJ	5
D1	DUAL_LED	Dual Led indicator	67-1321-ND		1
D2, D3, D4, D5, D6, D8, D9, D10, D11, D12, D13, D14, D15, D16	RB160M-60	1 Amp General Purpose Rectifier, High Conductance Fast Diode	RB160M-60CT-ND		14
D7	LED-GREEN	LED GREEN T1-3/4 RT ANG PCB	L20015-ND		1
J2	D Connector 9	Receptacle Assembly, 9 Position, Right Angle	6E17C-009S-AJ-120-ND		1
J3	Male D9	Receptacle Assembly, 9 Position, Right Angle	6E17C-009P-AJ-121-ND		1
J4	D9 Female	Receptacle Assembly, 9 Position, Right Angle	A32117-ND		1
L1	Inductor	Inductor	308-1331-1-ND		1
M1	NMOS	ROHM N-Channel MOSFET	2SK3019TLCT-ND		1
P1	Header 3	Header, 3-Pin	WM5236-ND		1
P2, P3, P4	BNC		A32244-ND		3
P5, P6	Header 2	Header, 2-Pin	A31688-ND		2
Part1	TO-220 Heatsink	For BOM Only	HS404-ND		1
Part2, Part3, Part4, Part5	TO-220 Heatsink	For BOM Only	HS403-ND		4
Part6, Part7	Panel Mount Locking Knob	For BOM Only	H-22-6A-SB-ND		2
Q1	2N5551	NPN General Purpose Amplifier	MMBT5551LT1GOSCT-ND		1
Q2	2N6292	SOT223 NPN Silicon Planar High-Performance Transistor	2N6292GOS-ND		1
Q3, Q4	2N2907, PN2907A	PNP General Purpose Amplifier	MMBT2907AFSCT-ND		2
R1, R13, R19, R27, R28, R29, R32, R58	499	Resistor	RNCP1206FTD499RCT-ND		8
R2, R3, R36, R61, R62	2K	Resistor	P2.0KECT-ND		5
R4, R5, R6, R7, R10, R22, R38, R40, R41, R43, R60	1K	Resistor	PAT1.00KCCT-ND	WSL120600000ZEA9	11
R8, R59	499k	Resistor	RG32P499KBCT-ND		2
R9, R11	43.2K	Resistor	P43.2KFCT-ND		2
R12	24.3K	Resistor	P24.3KFCT-ND		1
R14, R52_DD1, R52_DD2, R52_DD3, R53_DD1, R53_DD2, R53_DD3, R55_DD1, R55_DD2, R55_DD3, R56_DD1, R56_DD2, R56_DD3	4.99k	Resistor	RNCP1206FTD4K99CT-ND		13
R15, R25	10k	Potentiometer	83A1A-B24-J15L-ND		2
R16	2.1k	Resistor	RNCF1206DTE2K10CT-ND		1
R17, R34, R45	100k, 100K OHM	Resistor	CRT1206-BY-1003ELFCT-ND		3
R18, R20, R21, R23, R24, R26, R30, R44	10K	Resistor	CRT1206-BY-1002ELFCT-ND		8
R31	Res3	Resistor	696-1352-ND		1
R33, R35, R46, R47	3.01k	Resistor	P3.01KBCCT-ND		4
R37, R49	249	Resistor	TNP249ACCT-ND		2
R39	OMIT	Resistor	OMIT		1
R42	2.21k	Resistor	RNCP1206FTD2K21CT-ND		1
R48	120		RG32P120BCT-ND		1
R50	1.3K		RG32P1.3KBCT-ND		1
R51	2.7K		RG32P2.7KBCT-ND		1
R54_DD1, R54_DD2, R54_DD3, R57_DD1, R57_DD2, R57_DD3	0 Ohm	Resistor	P0.0ECT-ND		6
SW1	SPDT	Rocker SPDT	450-1518-ND		1
TP1, TP2, TP3, TP4, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP20, TP21, TP22, TP23	TESTPT	PCB Testpoint	5016KCT-ND		19
U1, U6, U7, U8, U9, U10, U12, U13	ADOP27AQ, OP27GS	Low-Noise, Precision Operational Amplifier, Ultra-Low Noise, Precision Operational Amplifier	OP27GSZ-ND		8
U2, U3, U5, U18	AD829	Video Operational Amplifier	AD829ARZ-ND	AD829ARZ	4
U4	OPA140AID	FET Input Operational Amplifier	296-28019-5-ND		1
U11	LT1021	Precision Voltage Reference	LT1021DCS8-10#PBF-ND		1
U14	LT1125CS	Quad Low Noise, High-Speed Precision Operational Amplifier	LT1125CSW#PBF-ND	LT1125CSW#PBF	1
U15, U17	LM317T	Three-Terminal Adjustable Output Positive Voltage Regulator	497-1575-5-ND		2
U16	LM337BT	3-Terminal Adjustable Negative Voltage Regulator	LM337TFS-ND		1
U19_DD1, U19_DD2, U19_DD3	AD8672	High-Speed, Low-Power Dual Operational Amplifier	AD8672ARZ-ND		3
W1, W2, W3, W4	Jumper	Jumper Wire	644884-3-ND		4
					218