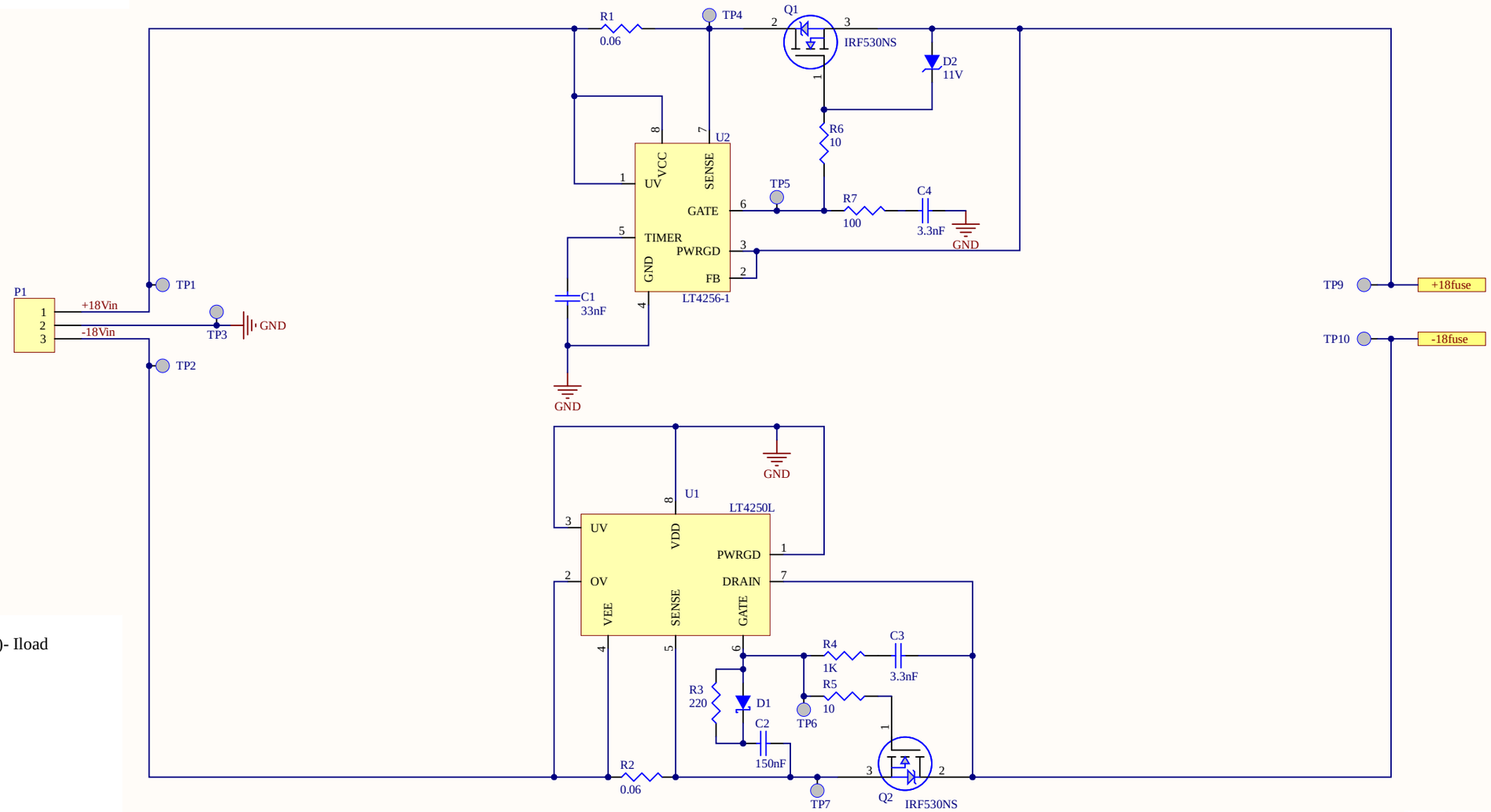
Ilim = 0.055/0.06=0.91A



In_Rush I=(0.8*(0.04/R9))- Iload

@-18v and R9=0.06Ohms

Iload(A)	Rload(ohms)
0.32757	55
0.27649	65
0.23838	75
0.21081	85
0.18892	95

@-24v

0.4355	55
0.36874	65
0.31955	75
0.28207	85
0.25162	95

Ilim=0.05/0.060=0.833A.

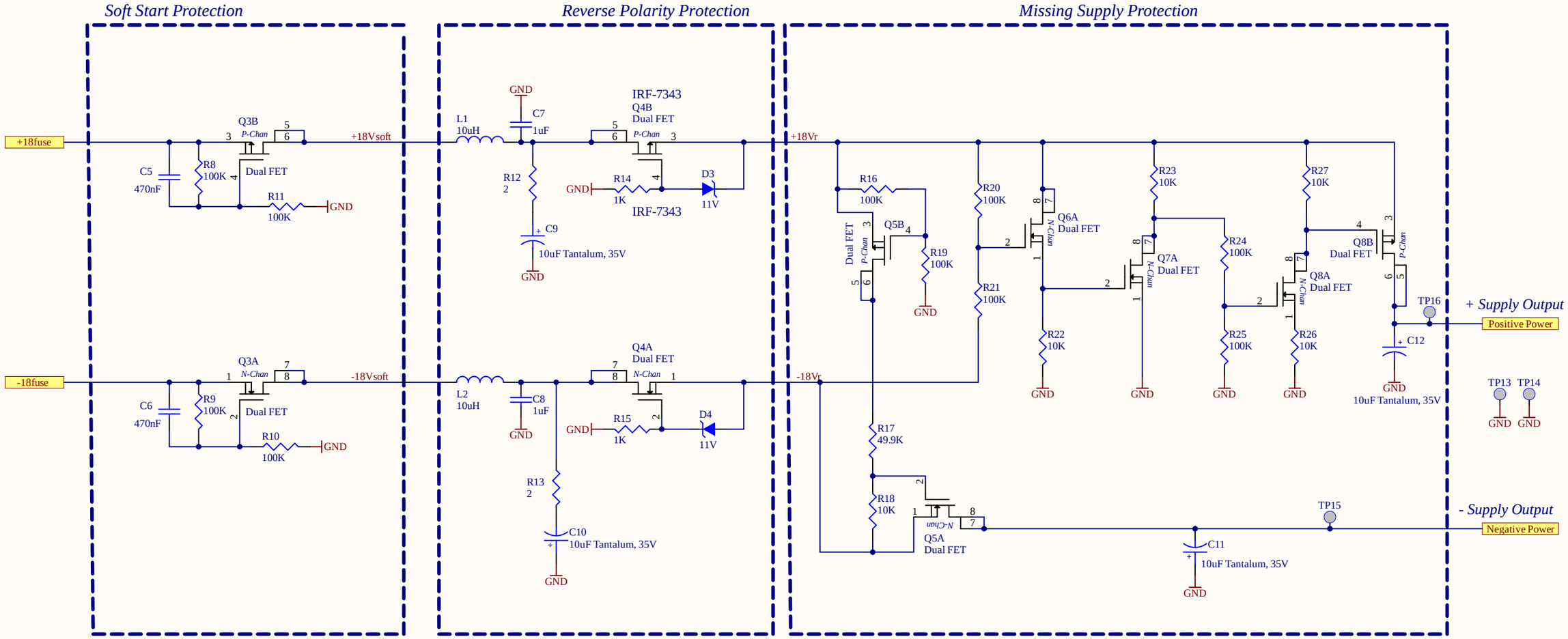
R4 and R6 prevent high frequency oscillations in Q1 and Q2.
R1 and R2 provide current detection and limit.
C3 and C4 control the GATE slew rate.
R7 and R4 compensate the current control loop.
C2 controls the starting time.

Version History:

v0 - Two PCBs created, for testing.

v1 - New PCB release. Changes are:
1. Added BAT85 diode and 220Ω resistor for keeping Q2 "ON" at negative rail section. To prevent that intial overshoot trigger and shut down output, turning "OFF" Q2.

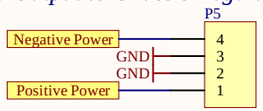
Last Edited: 7/3/2025				
Title: **Electronic Fuse**			*LIGO Laboratory* *California Institute of Technology* *Massachusetts Institute of Technology*	LIGO
Size: B	DCC Number: D2500223	Revision: 1	Engineer: *L.Sánchez*	Date: 7/3/2025 Time: 10:40:06 AM
File: C:\Users\daniel.sigg\Documents\Protel\Analog\Heater\FusedPowerProtection\ElectronicFuse.SchDoc				Sheet 1 of 2



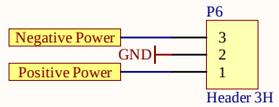
Measured Performance with 20 Ohm Load

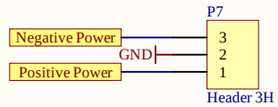
Input Voltage (volts)	Output Voltage (volts)	Voltage Drop (volts)	Calculated Current (amps)	Power Disspation in Protection Board (watts)
-9	-8.81	0.19	0.44	0.08
-10	-9.8	0.2	0.49	0.10
-12	-11.83	0.17	0.59	0.10
-16	-15.79	0.21	0.79	0.17
-18	-17.71	0.29	0.89	0.26
-24	-23.71	0.29	1.19	0.34
-26	-25.74	0.26	1.29	0.33
9	8.65	0.35	0.43	0.15
10	9.7	0.3	0.49	0.15
12	11.73	0.27	0.59	0.16
16	15.67	0.33	0.78	0.26
18	17.58	0.42	0.88	0.37
24	23.54	0.46	1.18	0.54
26	25.55	0.45	1.28	0.57

DC Output to Chassis Regulator Board



DC Outputs to Other Chassis Circuitry





Specifications:

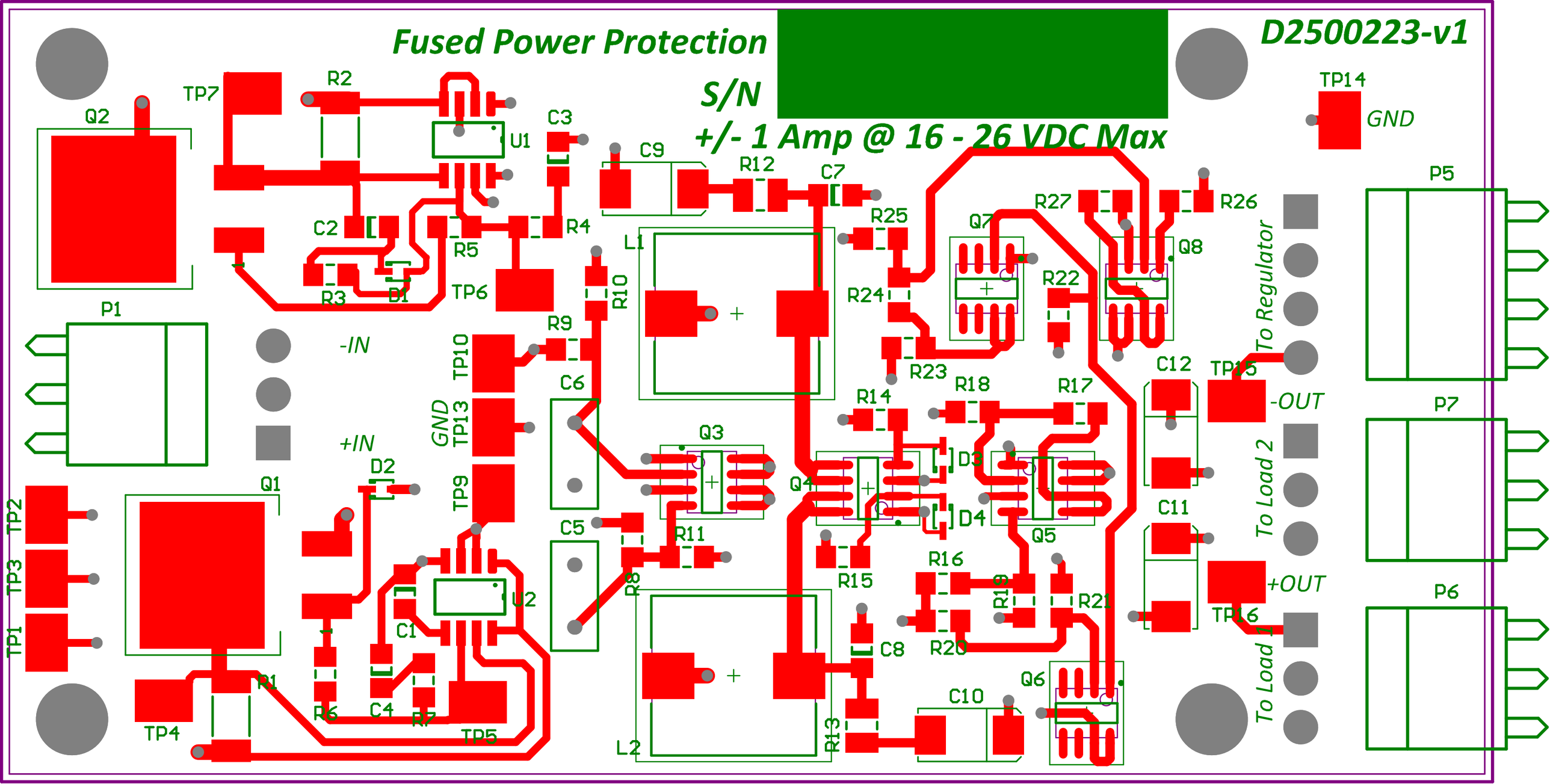
1. Max Input DC Voltage - +/- 26 VDC
2. Max Average Current - +/- 1A DC Continuous
3. Maximum Voltage Drop (input to output) - 0.6 VDC

Revision History:

1. Version 1 - Initial release
2. Version 2 - Changed the order of stages for better operation. Reduced the maximum current allowed from 2 amperes to 1 ampere
3. Version 3 - Noticed C8 is actually in backwards on the version 2 schematic and circuit board. Version 3 correctly depicts the capacitor as it should be, but the board is still wrong. The board should be fixed prior to making more of these. Consider addition of e-fuse circuitry for a complete solution.

Last Edited: 2 Jul 2025

Title: **Power Supply Protection Circuit**	LIGO Laboratory, California Institute of Technology, Massachusetts Institute of Technology		
Size: B	DCC Number: D2500223	Revision: 1	Engineer: R. Abbott
File: C:\Users\daniel.sigg\Documents\Protel\Analog\Heater\FusedPowerProtection\PowerProtection.SchDoc			Date: 7/3/2025 Time: 10:40:06 AM Sheet 2 of 2


Fused Power Protection
S/N
+/- 1 Amp @ 16 - 26 VDC Max
D2500223-v1
TP14
GND
P5
P7
P6
P1
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
U1
U2
L1
L2
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
D1
D2
D3
D4
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP9
TP10
TP13
TP15
TP16
-IN
+IN
GND
-OUT
+OUT
To Regulator
To Load 2
To Load 1