Super-Shunt Regulator Ver-I

Part List

Resistor

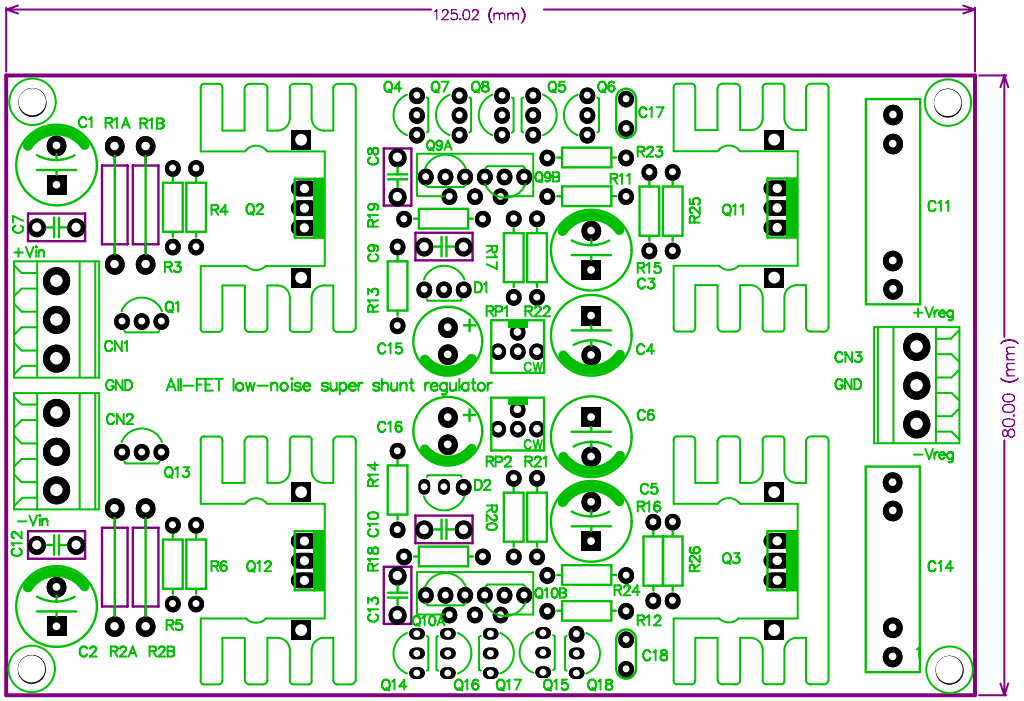
r01	R1A,R2A	Rset
r02	R1B,R2B	Rset
r03	R3,R4,R5,R6,R23,R24	221R
r04	R11,R12	4K75
r05	R13,R14,R25,R26	10K
r06	R17,R18	2K21
r07	R19,R20	1K82
r08	R21,R22	1K5
r09	R15,R16	1K

Trimpot

t01	RP1,RP2	5K

Semiconductor

s01	Q1	MPSA56
s02	Q2,Q3	2SJ313
s03	Q4,Q5,Q14,Q15	2SK30ATM-Y
s04	Q7,Q8	2SK246BL
s05	Q9A, Q9B	2SK170 (Matched)
s06	Q6	2SJ148
s07	Q13	MPSA06
s08	Q11,Q12	2SK2013
s09	Q16,Q17	2SJ103BL
s10	Q10A,Q10B	2SJ74 (Matched)
s11	Q18	2SK982
s12	D1,D2	LM329CZ



Capacitor

c01	C1,C2,C3,C4,C5,C6	330uF/35V	Panasonic FM
c02	C15,C16	150uF/25V	Panasonic FM
c03	C7,C8,C9,C10,C12,C13	0.1uF/250V	Wima MKP-4, PP film
c04	C17,C18	220pF/100V	Wima FKP-2, film and foil
c05	C11,C14	0.1uF	PP Film&Foil

Miscellaneous

m01	Heat sink	SK76-50

Selection of Rset

For load current of 200mA, use Rset = 2.2 Ohm. With this Rset, Icss is set to 280 mA and Ish is 80mA.

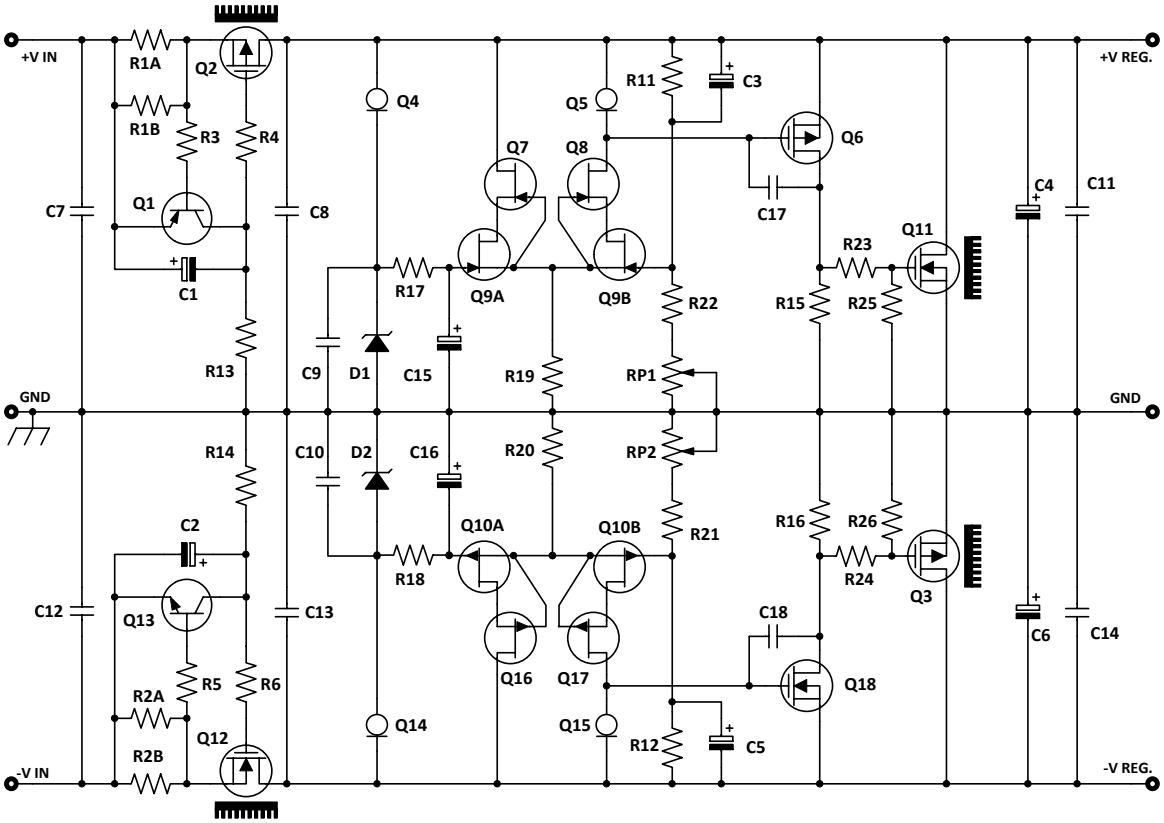
For load current of 100mA, use Rset = 4.3 Ohm by installing R1A,R2A with 4.3R/2W resistors and leave out R1B,R2B (or vice versa). With this Rset, Icss is set to 140mA and Ish is 40mA.

Setup

1. Start the assembly from components with lowest profile (resistors, small film caps, and trimpots). Then assembly the TO-92 semiconductors devices, electrolytic caps. Finally assembly the TO-220 MOSFETs with the heat sinks. Make sure the MOSFETs is tightened properly to the heat sinks (use silicone pads to interface between the devices and heat sinks).
2. Select an appropriate load resistor to test the regulators at min 50% of the actual load current(eg. use 250 Ohm/3W to test 24V Vreg with Iload =100mA). It is recommended to test the + and - sides of the regulators separately.
3. Connect the load resistor to the output. Apply appropriate DC to the input thru an Ammeter. Current input should be according to the Rset. Connect a Voltmeter across the load resistor. Adjust the Vreg with trimpot (RP1 or RP2) to the desired voltage.

Note

- Min. Diff Vin/Vreg is 4V but 6V-8V is recommended.
- Shunt regulators work by shunting excess current to regulate the output voltage. The regulators can dissipate a lot of heat. Consequently the heat sinks will run hot. Adequate ventilation is therefore absolutely mandatory.
- Shunt regulators are true Class-A devices. In the event of short circuit, the regulators will continues to supply current until the transformer is melt down. This can be catastrophic and very dangerous. Appropriate line fuse or somewhere along the power supply chain is absolutely mandatory.



BP-255:Super Shunt Regulator