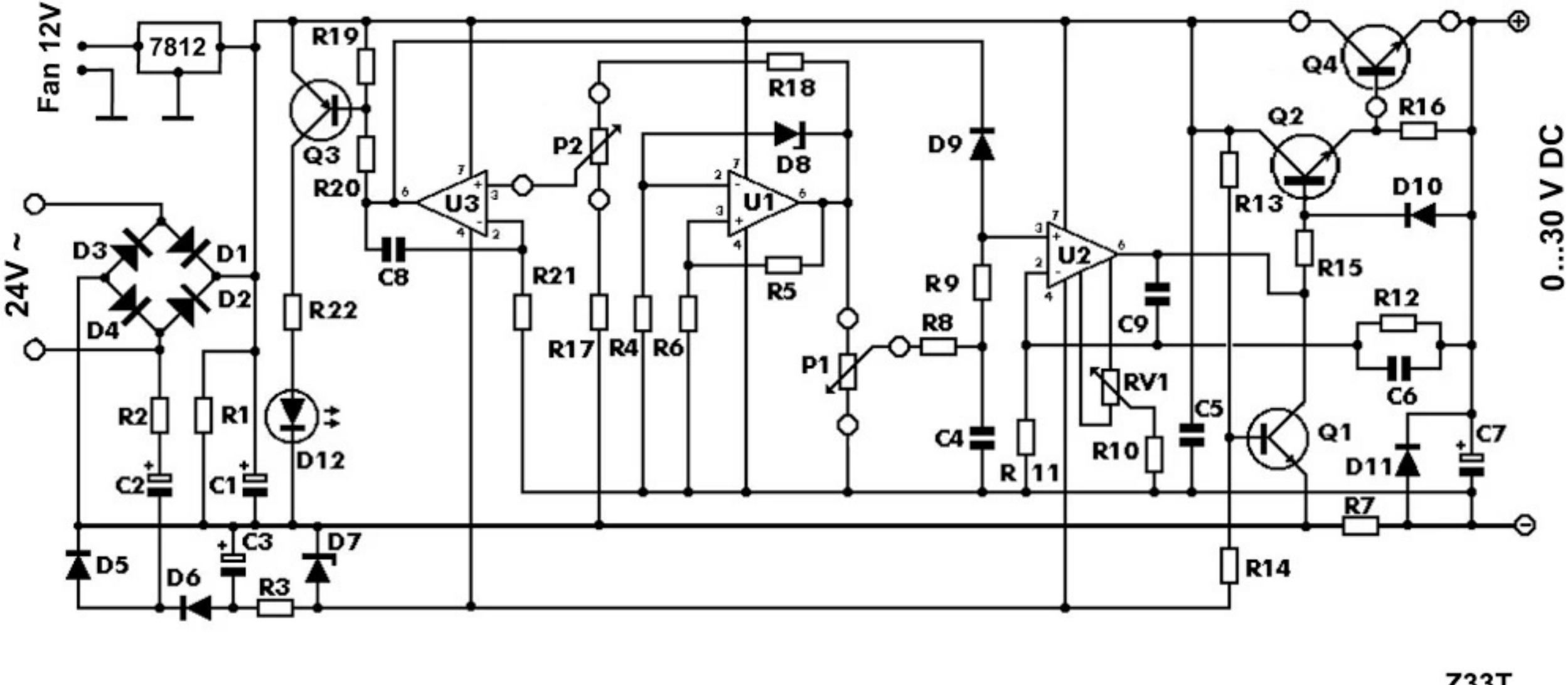
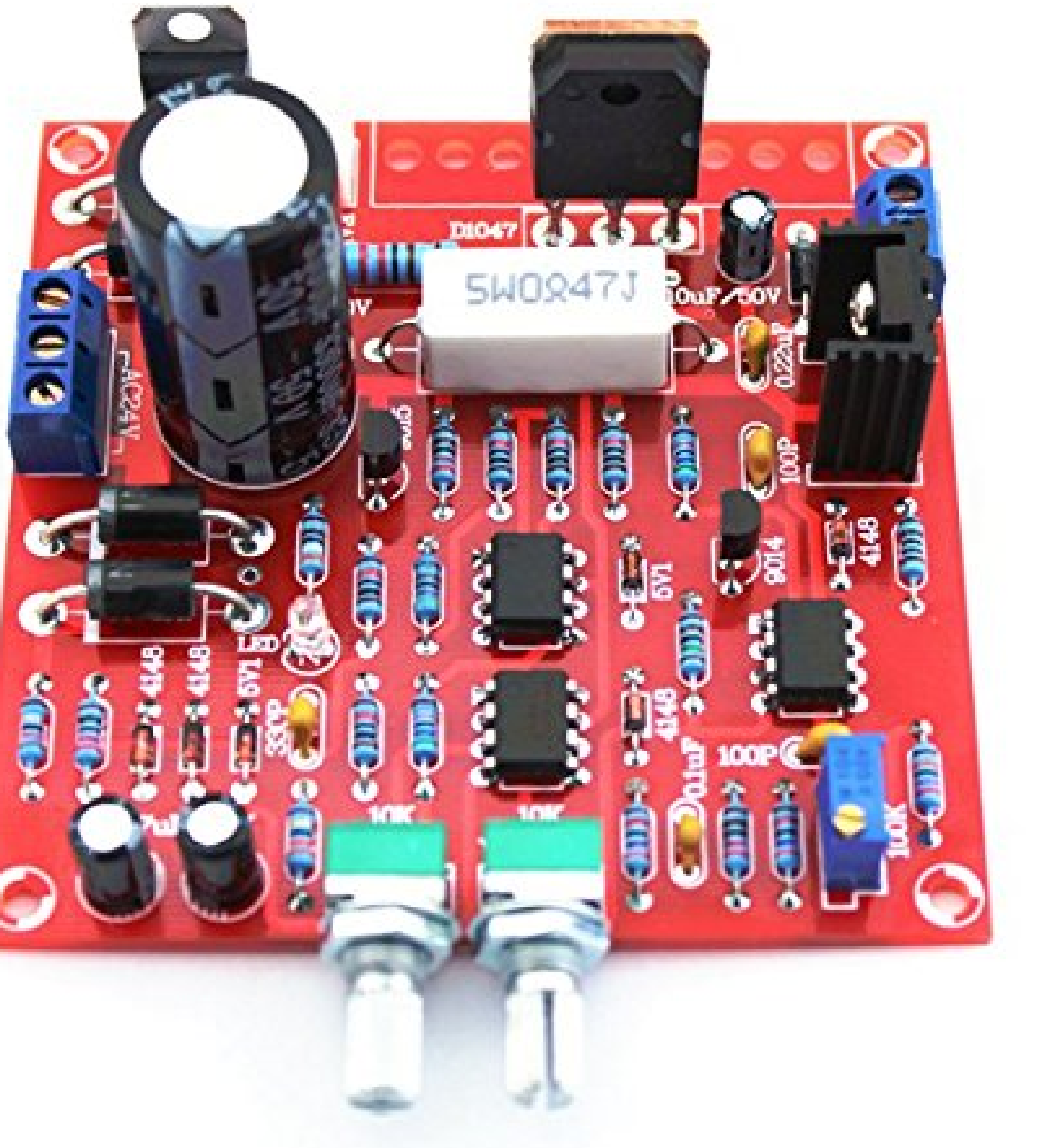

Fan 12V
7812
24V ~
D3
D1
D2
D4
R2
R1
C2
C1
C3
D5
D6
R3
D7
R19
Q3
R20
U3
C8
R21
R22
D12
P2
R18
D8
U1
R5
R17
R4
R6
P1
D9
R9
R8
C4
U2
R11
C9
RV1
R10
C5
R13
Q4
R16
Q2
D10
R15
R12
C6
Q1
D11
C7
R7
R14
0...30 V DC
Z33T

D1, D2, D3, D4 = 1N5408 (could be replaced with similar diode for current ≥ 3A)
D5, D6, D9, D10 = 1N4148 diode
D7, D8 = 5,1V zener diode
D11 = 1N4001 (could be replaced with 1N4002..1N4007 or similar 1A diode)
D12 = LED
Q1 = 9014 (could be replaced with BC547, BC548 or other similar NPN transistor)
Q2 = 2SD882 (can be 2N2219, BC141, BC286, or BD137 or BD139 are even better)
Q3 = 9015 (can be BC557, BC558, BC327 or other similar PNP transistor)
Q4 = 2SD1047 have to be mounted on heat sink (instead original transistor could be used TIP3055, 2N3055 or other similar NPN transistor )
U1, U2, U3 = TL081 operational amplifier
R1 = 2k2 (original is 1W, but it is better to be replaced by 2W resistor)
R2 = 82 Ohm (original is 0.25W, but it is better to be replaced by 0.5W resistor)
R3 = 220 Ohm (original is 0.25W, but it is better to be replaced by 0.5W resistor)
R4 = 4k7 – 0.25 W
R5, R6, R13, R20, R21 = 10k – 0.25 W
R7 = 0.47 Ohm - 5W (it is good to be soldered 3-4mm above PCB)
R8, R11 = 27k – 0.25 W
R9, R19 = 2k2 – 0.25 W
R10 = 270k – 0.25 W
R12, R18 = 56k – 0.25 W
R14 = 1k5 – 0.25 W
R15, R16 = 1k – 0.25 W
R17 = 33 Ohm – 0.25 W
R22 = 3k9 – 0.25 W
RV1 = 100k (linear trimmer potentiometer)
P1, P2 = 10k (linear potentiometer)
C1 = 3300 µF / 50V (electrolytic capacitor)
C2, C3 = 47 µF / 50V (electrolytic capacitor)
C4 = 100nF (polyester capacitor)
C5 = 220nF (polyester capacitor)
C6, C9 = 100pF (ceramic capacitor)
C7 = 10 µF / 50V (electrolytic capacitor)
C8 = 330pF (ceramic capacitor)
LM7812 – fixed voltage regulator 12V (have to be mounted on heat sink)



5W0Ω47J
D1047
10uF/50V
100P
10K
10K