

## Reverse Voltage Protection 20A Kit - Assembly Manual

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### INTRODUCTION

The reverse voltage protection (RVP) circuit is designed to prevent damage to an electronic device when connected to DC power in the opposite polarity for which the electronic device was designed to operate normally. The RVP incorporates a MOSFET switch and some associated circuitry that only allows the switch to conduct in one polarity direction (that being the direction the electronic device was designed for). Visual indications in the form of LEDs are provided to indicate normal (forward) connection and improper (reverse) connection. Screw terminals are for source and load wire connections have a current capability of 20 amps continuous.



### SPECIFICATIONS

Input voltage:	10.6-18.0 VDC
Operating Current:	20A continuous, 25A intermittent.
Mounting:	Two M4 floating mounting holes
Indications:	RED LED on = Indication of reverse power connection, GREEN LED on = Indication of proper power connection.
Size:	1.00" x 1.58"

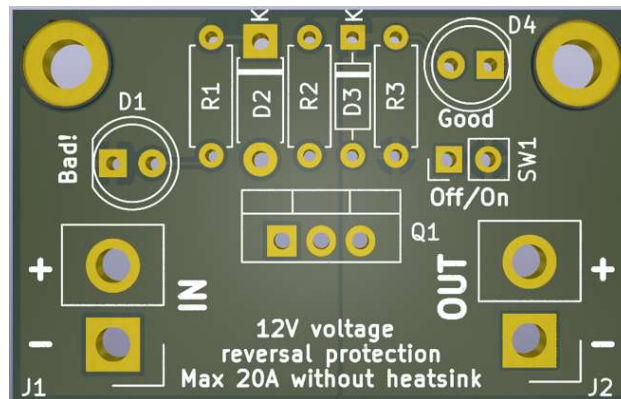
## INVENTORY AND PREWORK

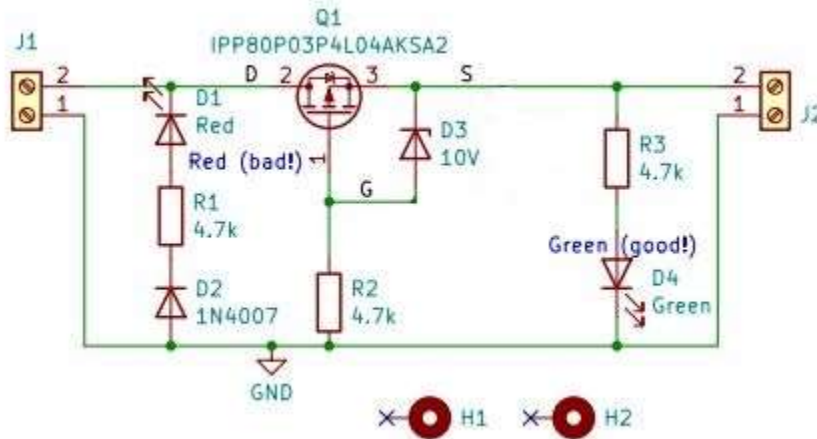
Before you begin, inventory your parts against BOM to make sure you have everything you need to complete the RVP board. The BOM is shown below:

Qty	Ref	Description
1	D1	Red LED 5.0mm
1	D2	1N4007 1000V 1A Leaded Diode
1	D3	10V 0.5W Leaded Zener Diode
1	D4	Green LED 5.0mm
1	J1, J2	SCREW TERMINAL BLOCK 2 POSITIONS 5MM 250V 16A
1	SW1	1x2 IDC Male Pins - 2.53mm pitch
1	SWS-S	1x2 IDC Shorting Jumper - 2.53mm pitch
1	Q1	IPP80P03P4L04AKSA2 30V 80A MOSFET
3	R1,R2,R3	4.7k 1/4W 5% Leaded Carbon Film Resistor
1	Board	Custom Circuit Board

## BOARD AND CIRCUIT

Refer to the unpopulated circuit board and the schematic for building the RVP kit:





## BUILDING THE BOARD

1. Find a place where you can spread out your work, including a printouts of the schematic and BOM. Your workstation should be such that you can leave it overnight without having to "clean up". The workspace should also be kid- and cat-proof. If you get tired, stop. Come back to it tomorrow. Rushing the assembly rarely works out saving time.
2. Start by cleaning the RVP board with IPA (Iso-propyl or "rubbing" alcohol) to make sure it's clean.
3. Next, bend the leads and solder the three 4.7K ohm resistors at positions R1, R2, and R3 on the board. Clip the leads on the bottom side of the board:



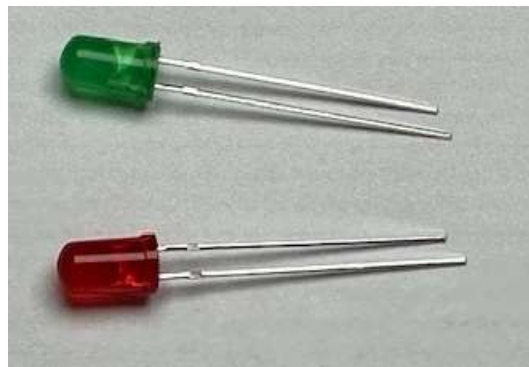
4. Solder D2, the "all black" looking 1N4007 diode with the white stripe on one end. Make sure the end with the white stripe aligns with the white stripe on the board at the D2 position (square pad on the circuit board):



5. Solder D3, the “glass” 1N4740 Zener diode with the black stripe in its place on the board. Make sure the end with the black band is oriented to align with the white stripe at the D3 position (square pad on the circuit board):



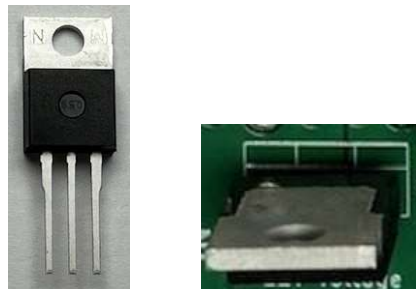
6. Solder the two LEDs D1 (RED or “BAD”), and D2 (GREEN or “GOOD”) onto the board. Note the orientation is such that the SHORT LEAD of the LEDs goes through the hole in the SQUARE PAD on the circuit board.



7. Next, solder the two screw terminals to circuit board. Orient the terminal connectors such that the WIRE HOLES point outward from the board:



8. Finally solder the MOSFET into its position at Q1. Note that the metal tab is oriented to correspond as shown below:



9. Solder the two IDC pins with the shorting at the SW1 position.
10. The board is now complete. Use IPA again to clean the flux off the board. If done right, It should look like this:



## USING THE BOARD

Connect incoming power to the RVP board at J1. Mind the connection polarity. Apply power to test the RVP. The GREEN LED should light. Remove power and connect the load (radio or other piece of electronic gear) to J2 minding the connection polarity to the load. Now apply power to the PRV and the load should be active. Note that this board is small enough to fit inside most projects and will protect the project from voltage reversals. A quick check of the LEDs will tell you if there is a connection problem.

You can remove the jumper at SW1 and replace it with a small/ remote SPST (NO=OFF) switch to make the EVP board a solid state power switch capable of switching more than 20A at 12VDC.

NOTE: No heatsink is normally required on Q1. The on state of the device results in less than a 4 milliohms resistance in series with the load, and therefore it dissipates about 1.6 watts at the rated 20A load. The device is capable of dissipating greater than 100W with a heat sink.