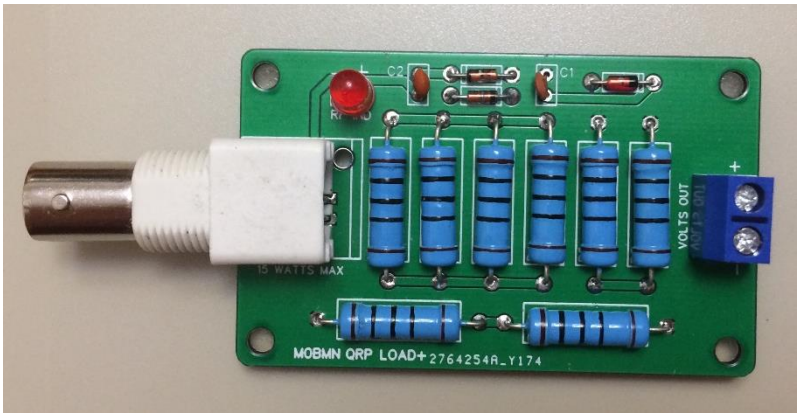
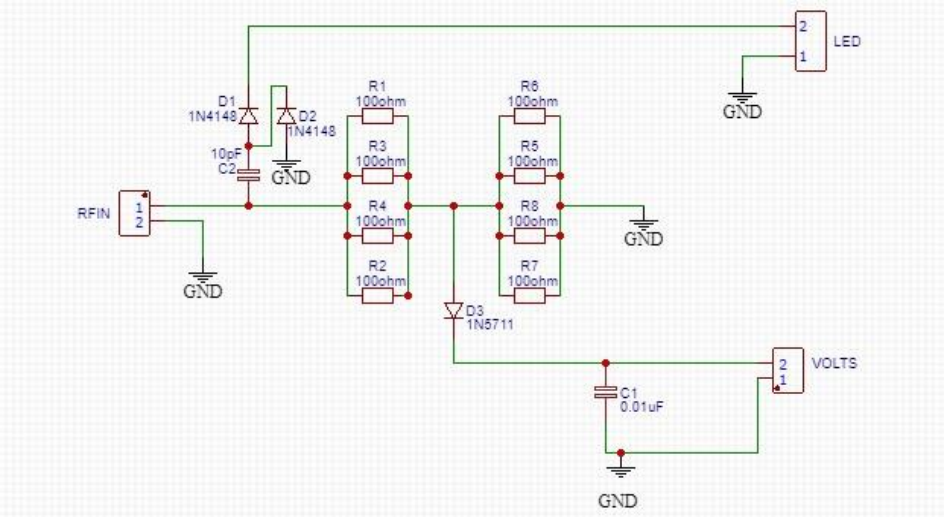
QRPLoad+



The QRPload+ is a QRP+ dummy load with a RF detector circuit that allows a standard Voltmeter to be used to measure RF power out, ideal for anyone adjusting homebrew QRP Transmitters. It also as an LED indicator to show when RF is present. Power as low as 50mW (or even lower) will cause the LED to light.
This type of device is not new, in fact the idea is many years old but unlike many designs the voltage tap off point is not directly taped across the 50 ohm load. In this design, the tap point is moved to a position that will protect your radio even if the voltage out terminals are short-circuited.

The QRPLoad+ uses a bank of resistors to provide a good 50-Ohm match and each resistor is rated at 2 watts, this gives a working wattage of 16 watts
max. In practice it has been found that higher power levels can be tested if the transmission time is kept brief but do keep in mind the rating of the resistors.



The circuit for the load is here.

Parts List

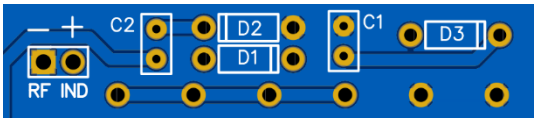
QRPLoad+ PCB
R1 to R8 100 ohms 2watt Resistors
D1,D2 1N4148 Diodes
D3 1N5711 Low Volt drop Diode
C2 10pF Ceramic Disk
C1 10nF Ceramic Disk
1 x Red RF LED
BNC PCB Connector
2 way Terminal block

Building the QRPLoad

The build is very simple, First fit the 8 power resistors (R1 to R8) . When fitting these try to leave a small gap between the bottom of the resistor and the Circuit Board. This will help to keep the resistors cool. I insert a thin metal ruler under them before I solder in place so that I can keep a constant gap on all of them.

Next fit the two ceramic disk capacitors, the fist C1 is 10nF (Marked 103). C2 is next and this the 10pF disk (marked 10). This capcitor is physically a little larger than the other.

Next, we need to fit the diodes, Read the next section here BEFORE you fit any, make sure you put the right ones in the right places. There are three diodes in the kit, two IN4148's and one 1N5711. We will fit the two 1N4148's first. These are the two brown diodes and they are fitted in positions D1 and D2, they MUST be fitted the correct way.



The diodes have a black band on one end. The black end of the first diode D1 must point towards the capcitor C1. The black band on D2 must be near to C2.

The diode D3 is blue, again it as a black band on one end. If you look at the silkscreen printing on the PCB (for all the diodes) you will see a line on the layout symbol. This is the end the black band needs to be.

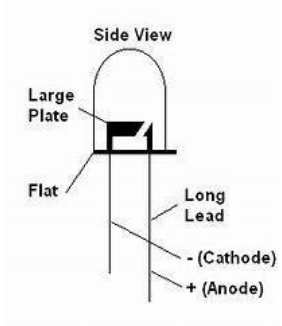
Now fit the BNC socket and two way terminal block

Time to do a basic check, we don't want to damage our radio.

Place a test meter across the BNC input on the left hand edge of the board, the RF input. You should measure 50 ohm (plus or minus less than 1 ohm).

If that looks right we can proceed with the rest of the wiring.

The RF indicator diode can if you wish, be mounted directly on to the PCB, if you do be careful with the polarity of the LED, The long leg is the +Ve of the LED.



If you prefer fit the LED remote from the board.

Fit the QRPLoad in to a suitable enclosure and I would suggest fitting a couple of 4mm dc sockets to the DC output from the board. If you do decided to case the module (you don't need to) then the case does not have to be metal, a plastic case will be fine, it is only to give some protection to the unit. If you just use the module as it is then you may want to stick the four rubber feet to the board, one in each corner

Now it's ready for use.
Connect your RF source to the load and transmit, the Red RF indicator led will light (acts as a quick all working indicator). If your radio has a SWR indicator check its reading, it should be 1:1 or very close to that. Put a voltmeter on the DC terminals and measure the voltage.

Below I have given a chart to convert the Voltage to Power, you can also use this voltage in a formula to be more accurate. For most people and applications, the charts will be fine

In case you like maths, heres the formula.

Now

Power=((V+Dv)^2/25)

*Dv = voltage drop across the diode mine was 0.14v so I have used that)

For example, if we find we have **13.5** volts on the terminals

So Power = ((13.5+0.14)/25)

Power = 186/25 =7.44 Watts

Each diode may have a slight difference in voltage drop but this will make only a slight difference to the calculations

Here is the chart

Volts	0	0.25	0.5	0.75
0	0.00	0.01	0.02	0.03
1	0.05	0.08	0.11	0.14
2	0.18	0.23	0.28	0.33
3	0.44	0.46	0.53	0.61
4	0.69	0.77	0.86	0.96
5	1.06	1.16	1.27	1.39
6	1.51	1.63	1.76	1.90
7	2.04	2.18	2.33	2.49
8	2.65	2.82	2.99	3.16
9	3.34	3.53	3.72	3.91
10	4.11	4.32	4.53	4.74

Volts	0	0.25	0.5	0.75
10	4.11	4.32	4.53	4.74
11	4.96	5.19	5.42	5.65
12	5.89	6.14	6.39	6.65
13	6.91	7.17	7.44	7.72
14	8.00	8.28	8.57	8.87
15	9.17	9.47	9.78	10.10
16	10.42	10.74	11.07	11.41
17	11.75	12.09	12.45	12.80
18	13.16	13.53	13.90	14.27
19	14.65	15.04	15.43	15.82
20	16.22	16.63	17.04	17.45

Print these out and keep them.

If you want a bigger version email me at info@phoenixkitsonline.co.uk and I will email you a pdf version.

I Hope you find the QRPLoad+ useful and enjoyed building (and Using) it

73 Paul M0BMN