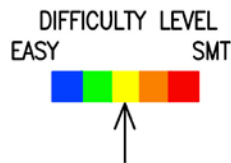
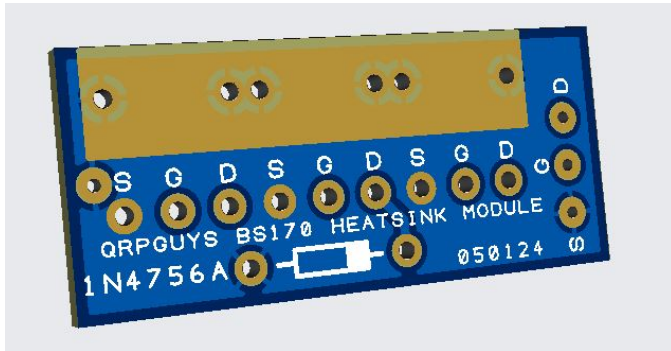




QRPBuilder BS170 Socketed Heatsink



First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us and we will send one. To request a part, please use qrpbuilder@gmail.com. Please read all the instructions carefully, and do not proceed if you are unsure.

Parts List

- 1 – QRPBuilder BS170 socketed heat sink module pcb
- 6 – Mouser matched set Fairchild BS170, TO-92, MOSFET, enough for an extra set
- 1 – 1N4756A Zener diode, glass w/ black band on one end
- 1 – 2.54mm c/c round pin 4 position header
- 4 – 1/4W resistors for wire leads
- 1 – packet of silicone heat sink grease

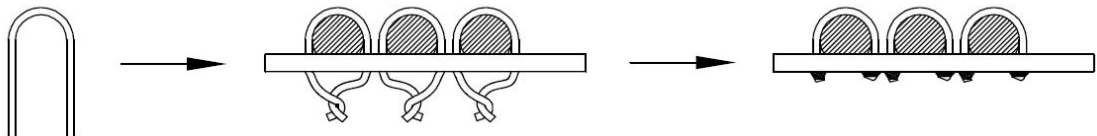
To build the module you will need a small soldering iron, rosin core solder, small wire cutters, and a toothpick.

For removing and reworking the (tr)uSDX RF board we recommend the addition of some 138°C solder paste, a solder sucker, or solderwick braid to make removal and cleaning the final transistor holes easier.

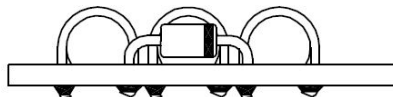
The scope of this kit involves mounting a new set of BS170 FET's on a small pcb utilizing the flats on the transistors to transfer any heat to the module pcb. You will be installing three pin sockets at Q3, on the RF board, for the module pcb to attach to the board. Read the instructions carefully and don't proceed if you are not confident in removing the finals, cleaning the RF board and installing the pin sockets. When completed the new heat sink module board will have the same height as the surrounding toroids, so there are no changes needed for the case.



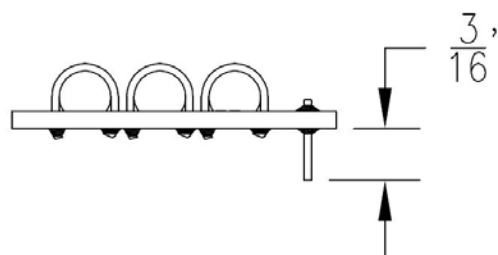
- [] Solder the three BS170 FET's with the flats down on the pcb. Center the TO-92 case between the retaining wire holes. The top end of the transistor body should be flush with the edge of the board.
- [] The resistors are provided only for the necessary wire to mechanically hold the transistors against the pcb. Gently lift up the transistors and distribute a small amount of the silicone heat sink grease with a toothpick between each of the three transistor flats and the pcb. It doesn't take much, as it is squeezed flat when the retaining wires are drawn tight.
- [] Using three of the trimmed resistor leads, bend in the middle to the shape of the transistor body, and insert into holes either side of each transistor through to the bottom of the board and twist, retaining the transistors flat against the board. Solder the leads to the bottom of the board and trim flush.



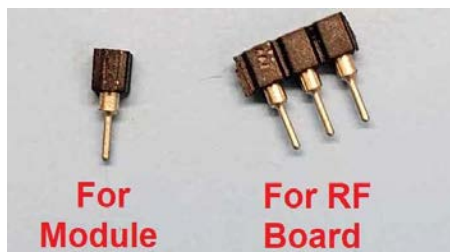
- [] Install the 1N4756A Zener diode, oriented with the black band as shown on the silkscreen, and Trim flush.



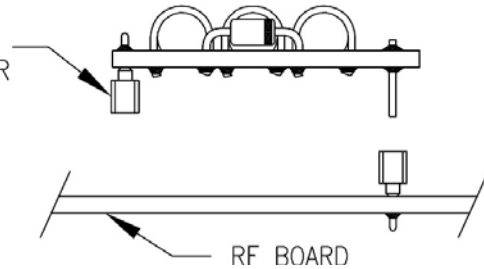
- [] Insert three of the trimmed resistor leads into holes marked S, G, and D, on the right side of the board, as shown in the graphic below. Solder, then trim flat to the top of the board, and to the dimension shown on the bottom.



- [] Solder the single round pin header socket to the bottom of the pcb as shown in the graphic below. It is a spacer to support that side of the pcb when installed.



ONE ROUND PIN
SOCKET AS SPACER

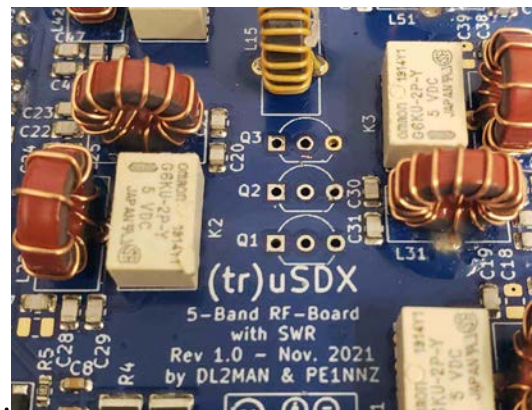


This completes the module.

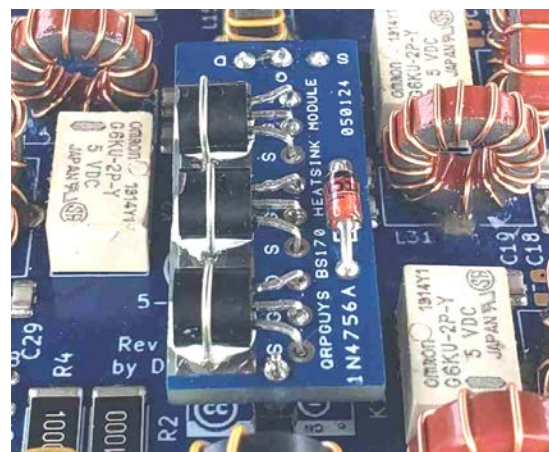
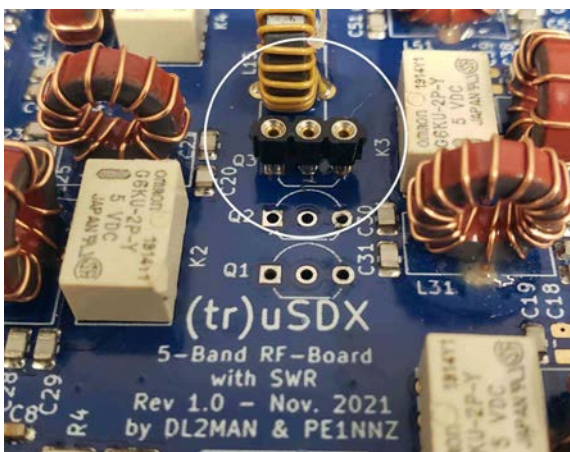
Replacing the BS170 Finals

The original mounting design works very well in practice, but accidents can happen. Unfortunately I had to replace my BS170 finals after a coax mix-up caused me to damage mine.

Because of the component to hole clearance on compact pcb's, rework can be difficult, and a pcb can be damaged lifting pads, traces, or affecting nearby components using excessive heat. In this case, I used the technique of clipping off the tops of the transistors, and applying 138C/218F solder paste to form a low temperature amalgam around the legs to make it easy to remove the pieces of leads and clean up the holes with my simple Soldapullt for vacuum, resulting in clean thru holes with low heat. See results below.

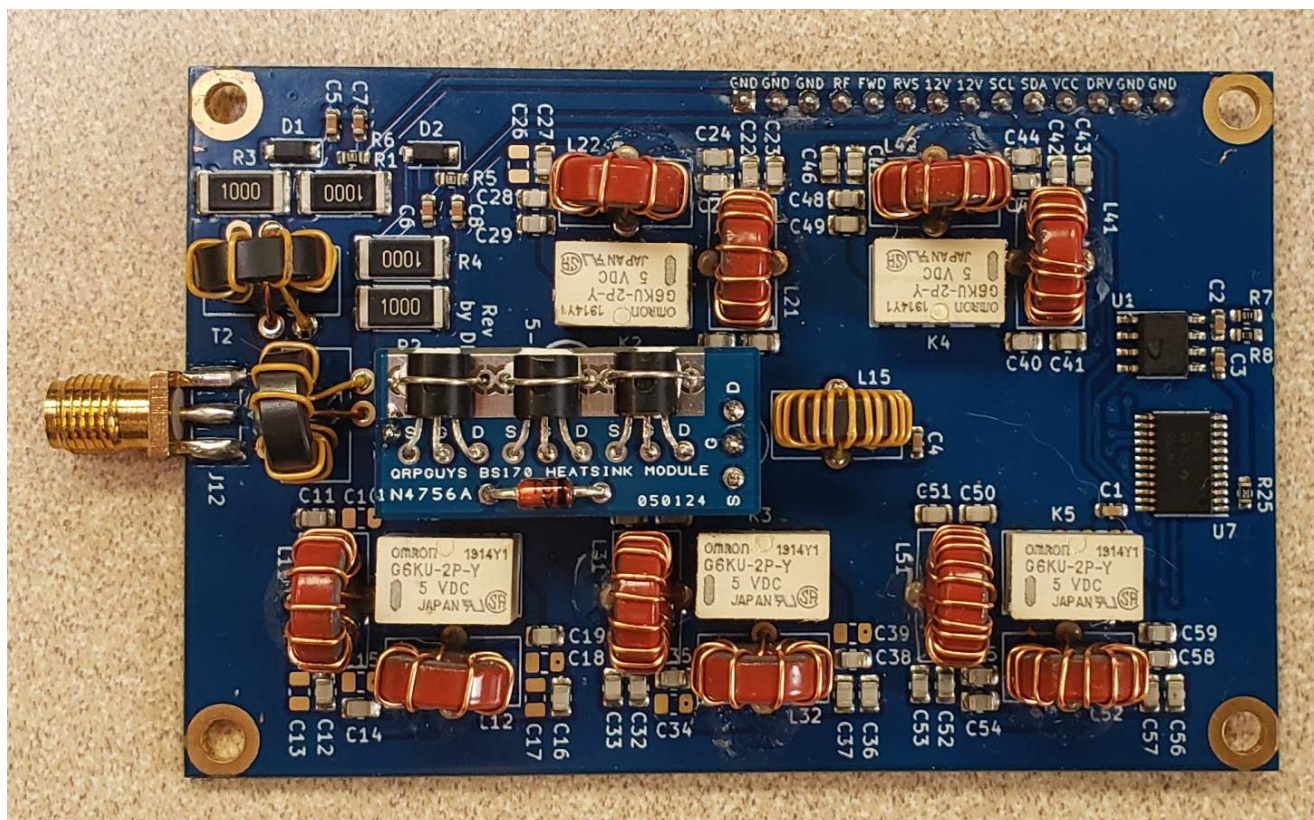


When you have completed the old transistor removal and clean-up, solder the three piece pin header socket strip into the cleaned holes where Q3 resided. This is the only RF board modification.



The module can now be plugged into the RF board

The module pcb we laid out is 1.12"x.50" and is a good fit to the rf board. The Q3 transistor holes on the rf board closest to the toroid are used for the pin sockets. We have used this heatsink technique very successfully in the past with multiple BS170's. The FR4 material, though not as good as aluminum for heatsinking, is a vast improvement over static air transfer. Three connections are all that's required, as all three FET's are all in parallel. One additional pin socket is used on the bottom side of the module board on the far end to act as a spacer and can be tacked to the rf board with some hot melt glue if desired. The zener diode offers some protection for open, shorted antenna connections, tuner switching transients, and nearby lightning spike protection.



Addendum:

This board can also be used replacing the finals on QRPGuys AFP-FSK Digital Transceiver III with the same benefits. The BS170 mosfets and zener are assembled the same way on the pcb as described above. The difference is that the pins for Source, Gate, Drain, and spacer are installed so the connecting pins are on the same side of the board as the mosfets as in the graphic below. In this configuration the S, G, and D will match the transceiver finals pads. The original BS170 Q2,3,4 finals must be removed from the transceiver using the same procedure described for the (tr)uSDX and the three pin sockets installed at Q2.

