

THF-51S MuFo Fokin Building Tips

1. This is not a project for first timers. We are dealing with 60+ Volts and up to 3 Amperes of current, so only experienced builders should attempt it. These are not step by step instructions, just some tips to help the build along.

2. Amplifier building is not a speed sport. Take your time and enjoy the build. Identify and double check each component before installing and soldering. Check against the schematic. Make sure it is the right piece, the right value. Many builders have struggled with trouble shooting at first power-up because of incorrect component values. After completing each solder joint, examine it closely. Touch up if it doesn't look good.

Time spent checking during construction is time saved at the end.

3. Many of the solder pads are small. Small sized solder is recommended. I use 0.8mm diameter 60/40 with flux. I use an older analog basic Hakko solder station with its standard tip that is about 2mm wide. I would say that is the largest tip size that would work comfortably.

4. IMPORTANT! The 0.1R 3W resistors (R7-R11) heat up when the amplifier is operating. Install these resistors elevated at least 15mm above the board for air flow and heat dissipation. For best air flow and heat dissipation, the amplifier boards should be mounted vertically with the resistors at the top. This will also allow the heat to dissipate away from the other components. The 3A of current flowing through the board will also heat the board. Mount the board on the heatsink with 15mm or longer

standoffs to allow air flow on both sides of the board. If the boards are mounted in an enclosed chassis, provide ventilation holes in the bottom and top plates at the pcb location for air flow.

5. This amplifier dissipates a lot of heat, nearly 200W per channel. So adequate heatsinks, whether they are natural convection or forced air, need to be provided, along with free space around, under, and above the amplifier. The interior of the amplifier case will also heat up as the power transformer, the mosfet and SIT, and the 3A flowing through the 3W resistors and circuit board, all dissipate heat directly into the interior. Again, the case will need vents in the bottom and top plates, and free space is needed under the case for the air to get to the vents.

Another point to consider, especially if your heatsinking is marginal, is to run the amplifier at a lower current. It will still sound great at 2.5A instead of 3A.

6. There are test points (T.P.) at R4, R5, and D1. Install these components elevated above the board so that clip leads may be attached to the component leads at the test points.

7. The trimmer resistors (RV1, R4) should be set to maximum resistance. Rotate the adjustment screw counter-clockwise to its end point. Mount the trimmers with the adjustment screw on the left side on the Left Channel board and on the right side on the Right Channel board. See pictures in [post #419](#).

8. For best performance, wires in circuits should be tightly twisted. This will minimize electromagnetic emission and pick-up by the wires, resulting

in lower noise. All wires form a circuit as electrons will flow only if there is a closed circuit.

Wires to twist tightly together:

- AC from AC input to power transformer, including transformer primary winding leads
- AC power transformer secondary winding leads to rectifiers
- DC positive and negative from rectifiers to power supply board
- DC negative and ground (for this amplifier) from power supply board to amplifier board
- speaker out and ground from amplifier board to speaker out connectors
- signal in and ground from RCA jack to amplifier board

If the speakers are of low sensitivity, electrical noise may not be audible. But if a FFT analysis is done, any noise would be obvious. Another benefit of twisted wires is if trouble shooting is required, the circuit is easier to track visually.

I have also seen posts on diyAudio where the posters have said, ignore the messy wiring, it will be cleaned up. To me, it doesn't make sense to do a bad job of wiring to get an amplifier running, and then take it all apart and re-do it. Take the time to do it right the first time.

Here is a demonstration of the effect of twisting wires: <https://audiouniversityonline.com/twisted-pairs/>

Power-up

1. As I mentioned at the beginning, this project is for experienced builders so you should be experienced in safely powering up projects. I recommend power-up in stages, power supply first, and then the amplifier section, starting with a Dim Bulb Tester (DBT-60W to 100W). Others have used a variac to slowly power up to check for shorts.
2. First power up the power supply by itself with the DBT. Check that the voltage V_- relative to Ground is negative voltage and correct value. If no shorts, continue to connecting the amplifier board.
3. I recommend that the amplifier section be powered up in stages. The first stage is with the board complete and connected to the power supply and to the Mosfet, but with the SIT not connected. Check the polarity of the power supply wires to the amplifier board. Make sure the V_- wire is connected to the V_- power input on the board. Check and double check. Attach a voltmeter across one of the 0.1R 3W resistors to monitor current, and also monitor the power supply voltage with another meter. Initial power-up with DBT. With no SIT attached, the power supply capacitors will charge up but no current will flow through the 0.1R resistor. The DBT will glow bright and then dim as the capacitors become full charged. If the DBT remains bright, that is a problem. Trouble shooting is required.
4. If successful, next connect an 8 Ohm test load (100W) to the SIT drain and source connection points on the board. Attach voltmeters to monitor current through one of the 0.1R 3W resistors, to monitor power supply voltage, and to monitor voltage across the test load. Power up with DBT (I used 250W). Current should flow through the 0.1R resistor but will be

limited by the DBT. I measured around 2A or a bit more and the light bulb was on but not at full brightness. The voltage drop across the test load should be (Current)x(Test load resistance), that is, $2A \times 8R = 16V$ (depends on your measured current and test load resistance). If current is in that ball park and steady, then power down and remove the DBT and power up with full AC voltage. The current was then measured at around 2.5A, which is about what it should be. Your measured current may not be exactly 2.5A, but should be in that neighbourhood.

For those that do not know Ohm's Law, you should learn it: $V=IR$, $I=V/R$, $R=V/I$. Use it to calculate current through the 0.1R resistor. i.e. if voltage across 0.1R resistor is 0.2V, then $I = 0.2V/0.1R = 2.0V$

5. With the current source confirmed to be operating correctly, connect the THF-51S. Again, I used a 250W bulb in my DBT for this first powerup. Hook a voltmeter across one of the 0.1R resistors to monitor I_q and also a voltmeter at the THF-51S drain and source to measure V_{ds} . The drain is at ground so connect one meter probe to any available ground. I used the ground on the input RCA jack. Power up and after the PS capacitors is charged, the 250W bulb should be at a reduced brightness. Next power up without the DBT. The V_{ds} was 51.7V and I_q was 2.2A. Your numbers may be a bit different as each THF-51S is a bit different. The first adjustment is to the SIT bias pot. Turn the screw clockwise to drop V_{ds} to 33V. This may take quite a few turns. Then adjust the CCS pot clockwise until the current is about 2.7A (or to 2.2A if your goal is 2.5A), again it may take quite a few turns. Put the cover on and let the amp heat and stabilize.

Once the amp has heated up, adjust the current up by 0.1A or so, and also adjust V_{ds} to 33V as needed. Allow more time for the temperature to

stabilize and make further adjustments. I set my amp up at V_{ds} 33V and 3.0A. (That was the operating point that I initially chose, but I have subsequently reduced the current to 2.5A to try it out as an alternative operating point for those that do not have the heatsinking for 3A. See [post #371](#)). You may prefer something else, and this is DIY. Just make sure that your heat sinks stay at 55C or lower. Lower is better as the devices will be less stressed. Also extremely hot heat sinks heat up the interior of the amplifier and its contents. Electrolytic capacitors do not appreciate the heat.

6. I have two THF-51S amplifiers, this MuFo Fokin and the Redneck DEF, and both have been stable over long periods of operation. There have been no issues with increasing gate leakage current as the SIT heated up. Hopefully that will be case for all of you building this amp. You can check your amplifier by monitoring the THF-51S V_{ds} . If the V_{ds} does not stabilize at 33V, but continues to drop after it reaches operating temperature, then you have an issue. Try changing R5 from 10k to 6k. If the gate leakage is only mildly excessive, that may solve the problem. If that doesn't work, other fixes are more drastic. If you have a spare THF-51S, do a swap.

7. You can use a Variac instead of a DBT for initial power-ups. Monitor the current as you slowly increase the Variac voltage. As the voltage increases, the current should increase with it. At no point should the current increase dramatically or run away. Immediately power down if that happens.