

## 2N5109/2N3866 Low-noise Broadband HF Pre-amplifier



Thank you for choosing my KIT for building a very nice HF amplifier.

This amplifier is broadband from about 0.5 to more than 30 MHz with 14 dB of stable gain and very good linearity. It can produce +23dBm of output power, while still in linear operation. It is usable up to 110 MHz where the gain drops to around 10 dB. If you change the ferrite material (for example to BN-73-202) you can extend the low frequency end down to less than 100 KHz.

Although an experienced ham may not need any additional advice other than the schematic, here are some instructions for helping the less-experienced or a novice one.

Happy soldering!

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Start by soldering all capacitors and resistors.

C1	100 nF
C2	100 nF
C3	100nF
C4	10nF
C5	100 nF
C6	100 nF
C7	10 $\mu$ F / 25V Electrolytic. Watch the polarity, the line on the capacitor body indicates the minus (negative) terminal.
R1	2700R (2.7 K $\Omega$ ) – Red Violet Red
R2	560R (560 $\Omega$ ) – Blue Green Brown
R3	390R (390 $\Omega$ ) – Orange White Brown
R4	5R6 (5.6 $\Omega$ ) – Blue Green Gold
R5	18R (18 $\Omega$ ) – Brown Gray Black

R6                    150R (150  $\Omega$ ) – Brown Green Brown

R7                    39R (39  $\Omega$ ) – Orange White Black

R8                    150R (150  $\Omega$ ) – Brown Green Brown

Then install and solder the Diode (D1) and the two axial inductors (L1 and L2).

D1                    1N4002 (the line indicated is the cathode and should go to the positive supply line).

L1                    1  $\mu$ H (Brown Black Gold)

L2                    100  $\mu$ H (Brown Black Brown)

You can now solder the power transistor. The emitter pin is marked on the transistor body and on the PCB.

Q1                    2N5109 (or 2N3866)

A T0-39 heat-sink is provided for this transistor. Place it on Q1.

Now it is time to prepare the 4:1 transformer T1.

**T1 Preparation:**

Take the FT50-43 Ferrite Toroidal Core and wind 6 turns. One turn is considered when the wire passes from the center of the core one time. Hold the wire tight, while observing not to scratch the wire insulation off by scrubbing it hard on the core material.

Cut the excess wire off, leaving 1-2 cm of wire for soldering later on the PCB and tin or scrub 5 mm of the wire insulation off with a blade-knife or sandpaper to allow for a good soldered joint. The copper should reveal clear and shiny under the insulating enamel or varnish.

The secondary has 3 turns, wind them over the primary winding leaving about 1-2 cm and cut. Separate the primary and secondary winding ends, clear off the insulation and solder in place.

For use in a mobile or portable environment, consider placing a double-sided sticky tape between the ferrite core and the PCB in order for the core to stay firmed onto the PCB and any vibrations will not risk cutting-off those thin wires which otherwise actually supporting the whole transformer on to the PCB.

Solder T1.

T1	FT50-43 ferrite toroidal core, 6 turns for the primary winding and 3 turns for the secondary winding. Watch the orientation of the primary winding while soldering T1 on the PCB.
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Solder the RF-input and RF-output SMA connectors.

J1	SMA female for PCB vertical mounting
J2	SMA female for PCB vertical mounting

Solder the 2-pin DC Power input connector

J3	MTA 3.96mm 2-pin male header for PCB vertical mount
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This completes the assembly of the pre-amplifier. Watch the polarity of the applied DC power (+12VDC) and check that it draws around 55 mA. Enjoy a low-noise stable and clean pre-amp or post-mixer amplifier.

Good DX and kind 73s de Makis, SV1AFN

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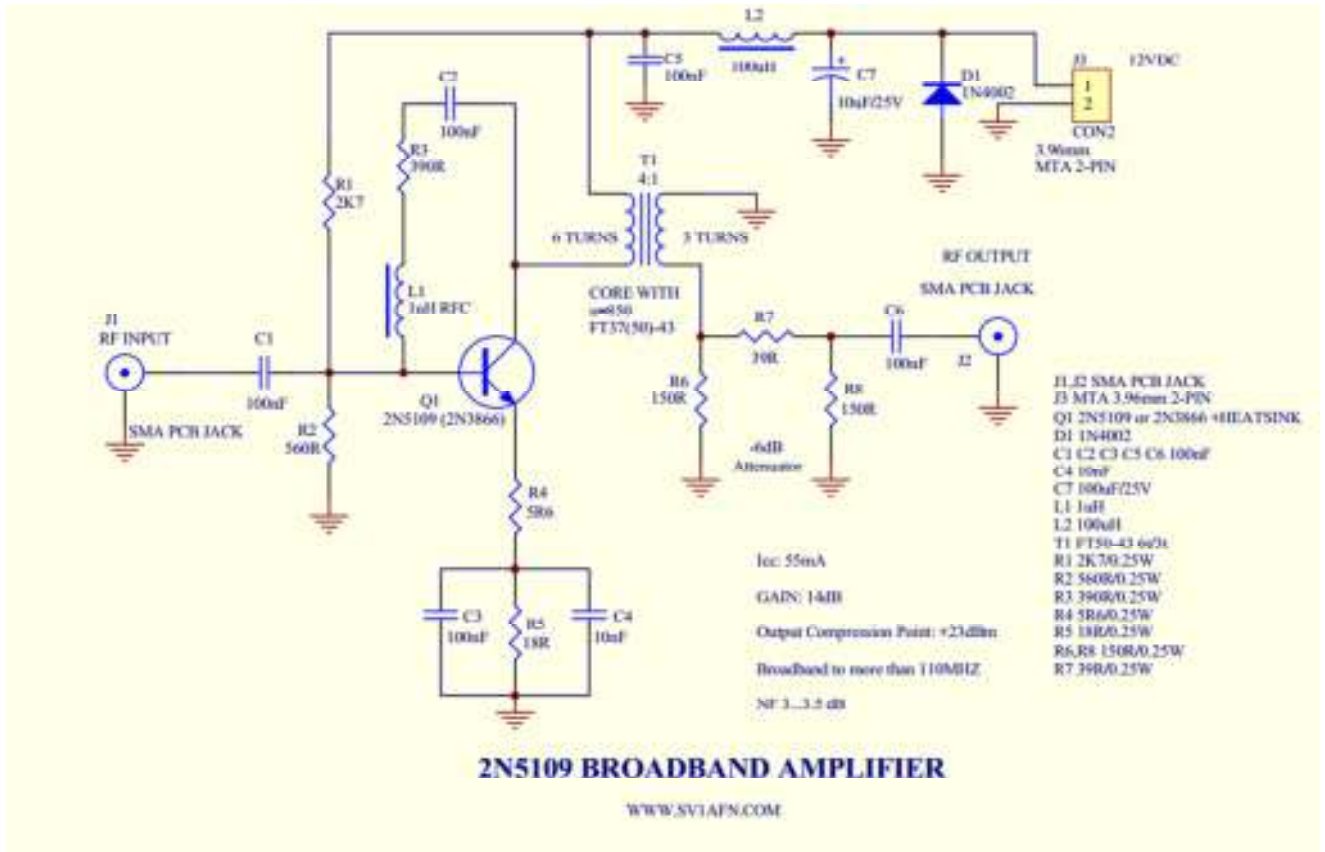


Fig. 1 The amplifier Schematic Diagram