

Wideband Amplifier and bias tee – Assembly notes

This kit contains the components required to build a G4BAO wideband amplifier and bias tee as described in the March 2010 Issue of RadCom, and includes any updates since publication. This document is correct for the v3 PCB.

Antistatic precautions

Note that the 5 volt regulator and Avago Modamp device fitted to the amplifier PCB are susceptible to static damage until the board has been assembled. Do not remove the devices from their packaging without wearing an antistatic wrist strap or at minimum before having first touched something grounded.

Amplifier circuit and layout

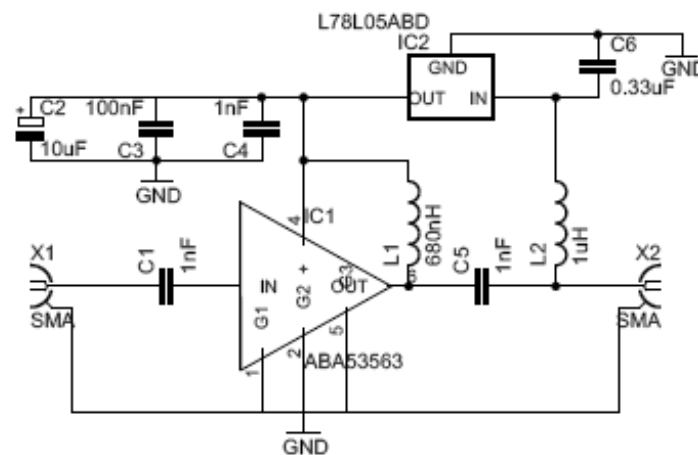


Figure 1 - Amplifier Schematic

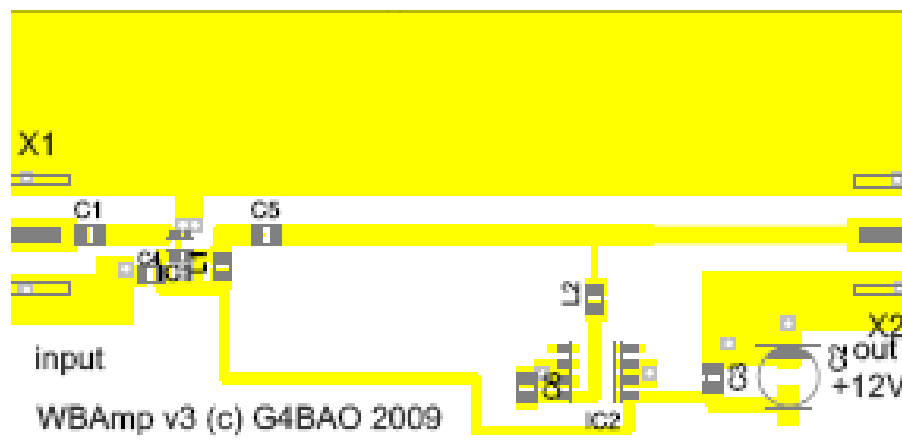


Figure 2 - Amplifier layout

Bias tee circuit and layout

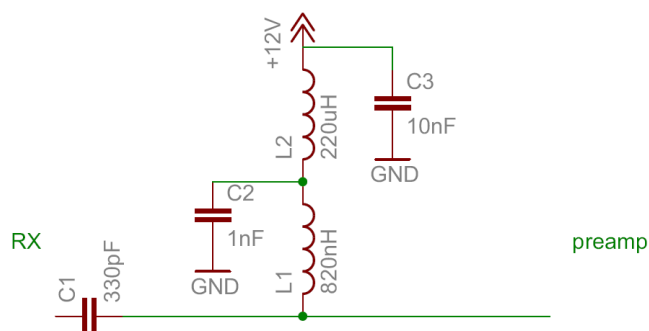


Figure 3 – Bias tee schematic

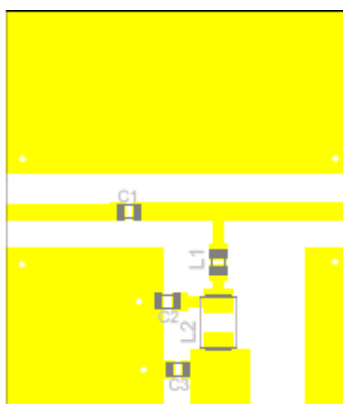


Figure 4 – Bias tee layout

Component lists

Component	Value	Type	Identifier
C1, C4, C5	1nF	SMD 0805 npo ceramic	Orange
C2	10uF	SMD Alum. electrolytic	Silver can. Black bar -ve
C3	100nF	SMD 0805 X7R ceramic	No marking
C6	330nF	SMD 0805 X7R ceramic	Yellow
L1	680nH	SMD 0805 inductor	Blue/clear
L2	1uH	SMD 0805 inductor	Black/clear
IC1	ABA52563	Avago Modamp	Manufacturer's mark
IC2	UA78L05	SMD SO8 5V regulator	Manufacturer's mark

Table 1 Amplifier component list

Component	Value	Type	Identifier
C1	330pF	SMD 0805 npo ceramic	Purple/green
C2	1nF	SMD 0805 npo ceramic	Orange
C3	10nF	SMD 0805 X7R ceramic	Black /purple
L1	820nH	SMD 0805 inductor	No colour/ clear
L2	220uH	Bourne CM453232-221KL	221K

Table 2 Bias Tee component list

Tools

- Use a small temperature controlled, earthed soldering iron, and thin (28swg) solder.
- A pair of small sharp side cutters
- Small SMD tweezers

Assembly

Check that all the components are present in the kit, and email john@g4bao.com immediately if there is anything missing.

These kits work best when fitted in to a Schubert h Tinplate box. When using this box, first file notches on opposite corner of the PCB to allow it to fit in the box such that no gaps are left between the PCB and the box sides.

Remember throughout assembly to observe antistatic precautions. Do not to bend the PCB once the components are fitted as this can crack the components

Bias tee

As the bias tee only has five components, they can be fitted in any order.

Amplifier

1. **First fit the modamp marked 2Hx.** (where “x” depends on the source of the device)

This is a very small 6 pin package and requires great care in attachment. Either use a very fine (0.6mm) soldering iron bit, or a hotplate.

Double check that you have the modamp in the correct orientation with the “2” to the right and “upside down” (Figure 5) as will only have one chance to solder it down!

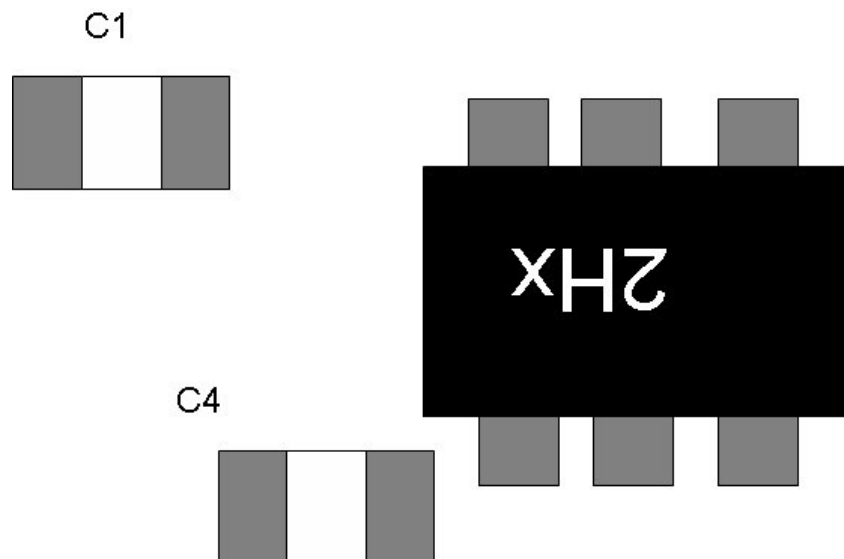


Figure 5 Orientation of modamp

If using a soldering iron, using just the existing solder tinning on the PCB, “tack” it in to position before soldering down the other 5 legs and re-soldering the first.

Use the smallest amount of solder, and if possible, examine the 6 joints under a microscope for shorts before proceeding.

2. Fit the five 0805 ceramic capacitors C1, C3, C4, C5, C6.
3. Fit C2, L1, L2.
4. Fit the 5V regulator IC2.

Alignment

Check for shorts to ground on the output microstripline +12 supply. Apply +12Volts to the output connector (marked X2) and check for +5V ± 0.1 at the junction of C5 and L1. The current drawn by the Amplifier should be 40mA ± 2 mA

If you are not planning to power the amplifier via the bias tee, remove L2 and supply +12V via a feethrough capacitor to the input of the voltage regulator, to the L2 pad furthest away from the output connector line.

No alignment is required of this amplifier, but performance measurements can be made with a suitable network analyser and noise figure meter. This is beyond the scope of this document. Typical results can be found in the RadCom article or on www.g4bao.com.

Assembly in a Schubert tinplate box

If using the recommended the Schubert boxes, from Eisch/G3NYK the PCB should be fitted as shown in Figure 6.

The two SMA connector centres should be mounted in the centre, 14mm up the box sides. The SMA centre spills should be soldered directly to the PCB. Solder the edges of the PCB ground plane and the topside and bottom side ground plane as completely as possible, completely round the ground plane side.

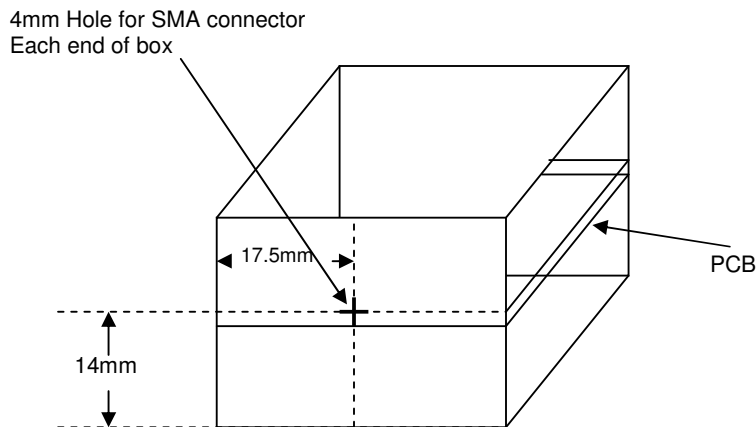


Figure 6 Box assembly

Fault finding

There are only few components on the board, so there is little to go wrong if the units are built correctly and fault finding is relatively easy. Carefully inspect all your solder joints, and check that you have not cracked or damaged any of the surface mount components. If you can get access to a microscope to do this, all the better!