41Hz Audio

Assembly instructions AMP9

Thank you for choosing an audio product from 41hz.com!

Check delivery

On delivery, check that all components have been included. We do double-check the component count but mistakes can happen. A bill of material (BOM) is found as APPENDIX 1 in this document.

NOTE: components packaged in a shielded, aluminized bag should be considered ESD sensitive and should be handled with ESD care.

Tools needed

Assembly of the kits requires the usual set of electronics working tools; soldering iron, wire cutter etc. The boards are double sided, double weight copper so a high-power solder iron is recommended, especially for components connected to the ground plane. Solder irons without temperature control should not be used. A magnifying glass/loupe of the type that you wear like a pair of glasses or like a cap is recommended, as it increases the precision and quality of your work.

IMPORTANT

The Tripath chips use MOSFEt outputs which by nature are sensitive to ESD (Electro Static Discharge). Use ESD precautions. Preferably work on a conductive, grounded "ESD mat", and avoid touching the chip leads with your fingers. Discharge yourself before working with the components. Especially the Tripath chip and the TO-92 casing FET transistors should be treated with some care.

Additional components

The following will at some stage be needed to complete the amplifier, but is not included in the kit:

- Heat sink. Screws and heat conductive paste to mount the heat sink. The main sources of heat on the board is the Tripath chip. In most cases, if you mount the board and chip to an aluminum amplifier casing, it is sufficient to cool the chip. However, for high power applications the heat dissipated increases and you must ensure this has adequate cooling. The Tripath chip does not need to be insulated, as the back of the chip is internally connected to ground.
- Hookup wire. I recommend soldering connection wires to the board. Optionally you can fit screw/solder terminals with 2.5 mm spacing for the inputs and 5 mm spacing for power and outputs.
- Mute/un-mute switch or jumper. Preferably wire this to a switch on your panel. Optionally use a 2.54 mm jumper (50 mil) on the board. Muting the amp before power on minimizes the turn on thump and is recommended.

- Transformer, power switch and fuse.
- The boards for AMP9 are double weight, double sided copper. Even if the PCB and components are small, quite a powerful soldering iron is helpful. Especially components and pads connected to the ground plane require significant heating. A temperature controlled 50W soldering iron is recommended. At the same time, applying excessive heat may damage the board, causing the copper leads to come off. Preheating the board to around 100ºC will make work easier and allows using a lower solder iron temperature which decreases the damage risk. Some information on how to solder both SMT and hole-mounted components is available in the forum on http://www.41hz.com

Considerations

1. You can use screw terminals or solder hookup wire to the PCB. Soldering is generally the best connection from an electrical / signal point of view but may be unpractical. Note that you should avoid soldering on/off the cables, especially the power and speaker cables. As these cables are usually quite thick, they will require substantial heating. So repeatedly soldering these may cause the copper tracks to come off, lift, because the FRP below them is beginning to deteriorate. It is then better to unsolder/cut the “other” end of the cable or use a board connector.

2. Power supply. For testing, any 12V supply should work and a slow fuse of 1A is adequate for low-medium power testing. For final use, the transformer / power supply would normally determine the fuse rating. The fuse should not be higher rated than recommended for the transformer. Fuses on the primary side may need to be quite large and slow blow type, to allow the transformer startup current.

Schematic of AMP9

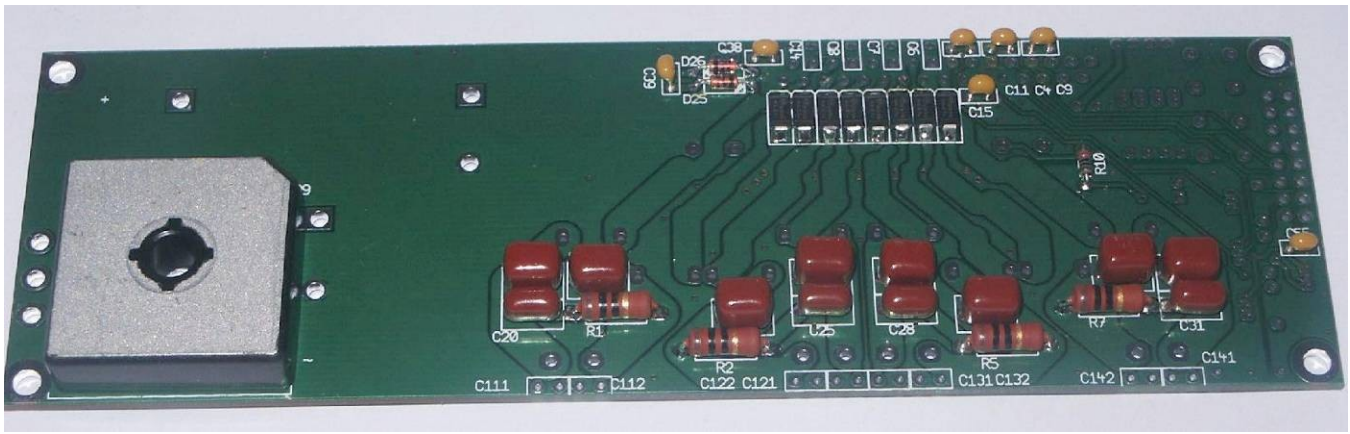
The schematics used for AMP9 is similar schematics in the Tripath data sheet for the TAA4100A chip but not identical. A schematic is attached.

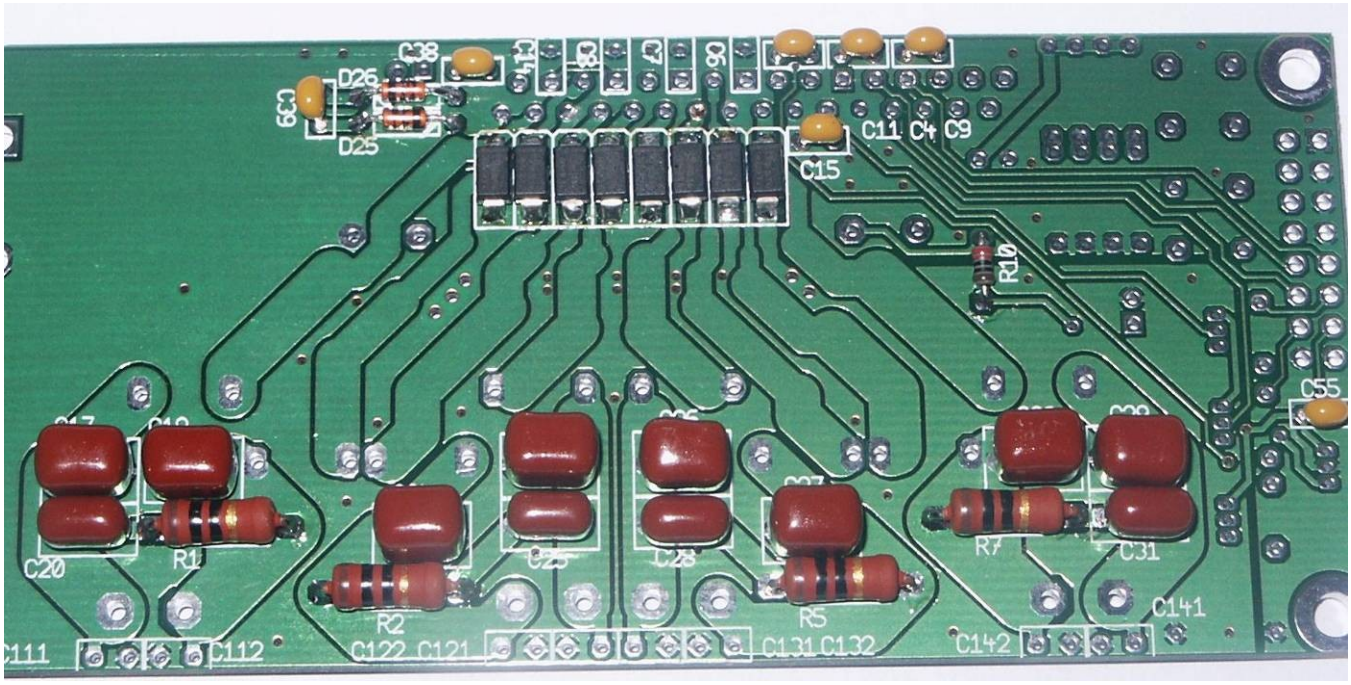
Mounting the components

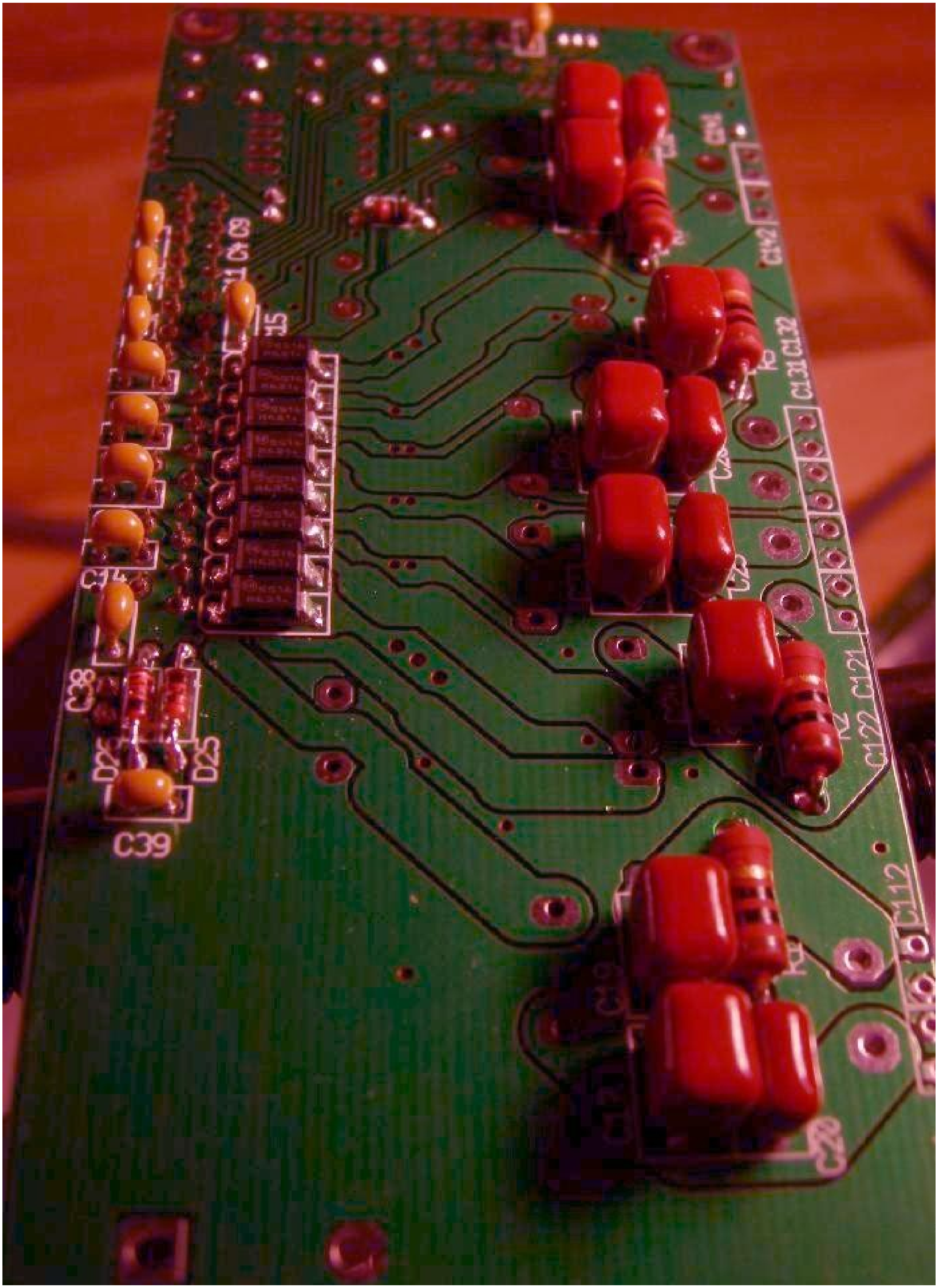
NOTE There are four 0.1 uF capacitors, C6, and C7, C8 and C14 which should be mounted and soldered into the holes of the TAA4100A chip. These are critical to the function of the amplifier. The locations of these are printed on the bottom side of the PCB. *Do not solder these capacitors until when you fit the Tripath chip*. So put aside four 0.1 uF, 2.5 mm lead spacing capacitors for this.

1. First, solder the small capacitors on the bottom side of the board, but NOT the ones that are mounted with the TAA4100A chip. A picture of how the components are placed is included in APPENDIX 2. Solder C5 (charge pump) in place

2. Continue with the rest of the components on the bottom side: these are the components for the output filter, the main rectifier, and the eight overshoot clamping diodes. Note: the diodes must be in the correct direction.






C38
D25
C39
C131 C132
C122 C121
C112

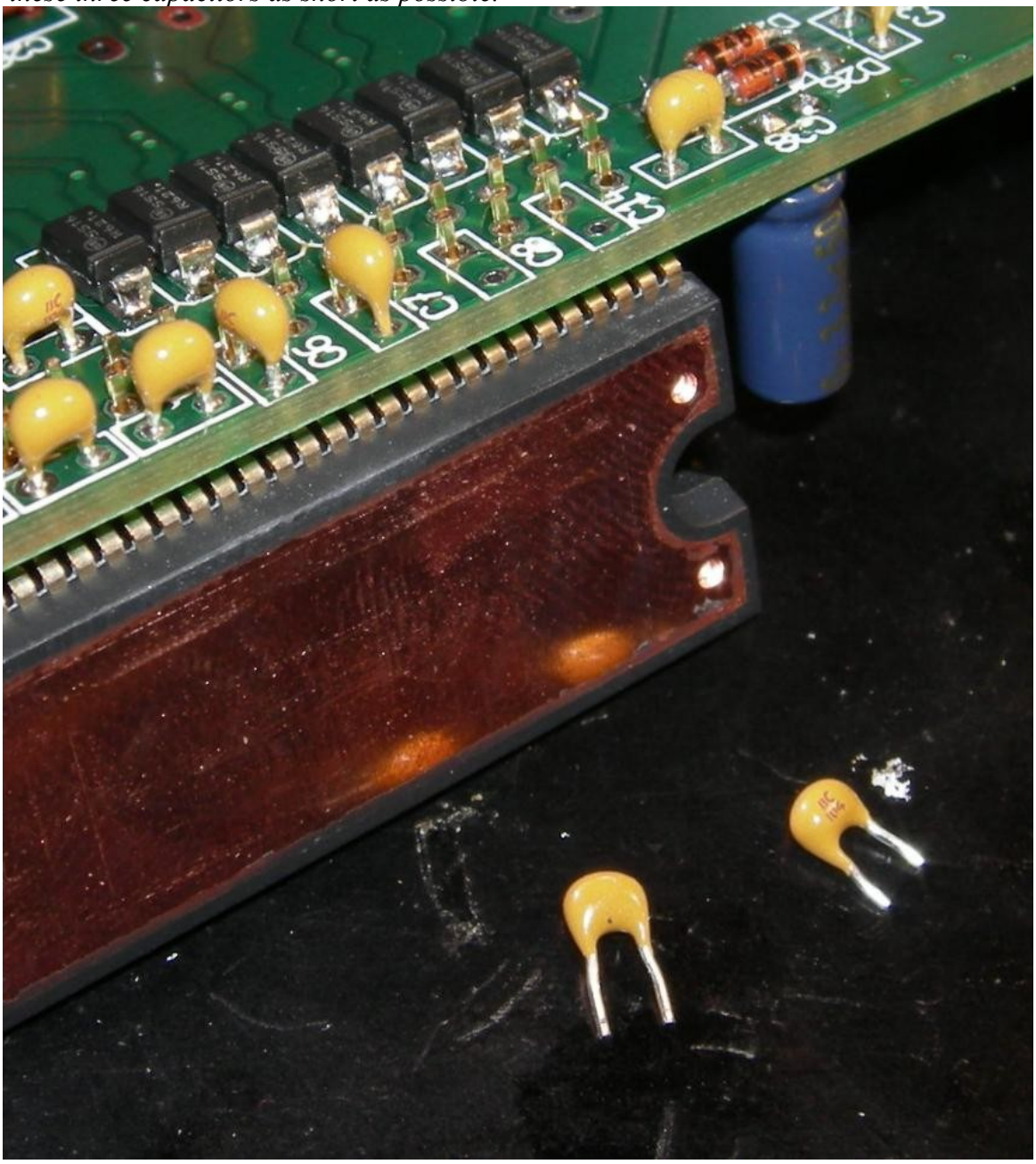
3. Turn the board over and continue by mounting 8 small diodes on the top side.

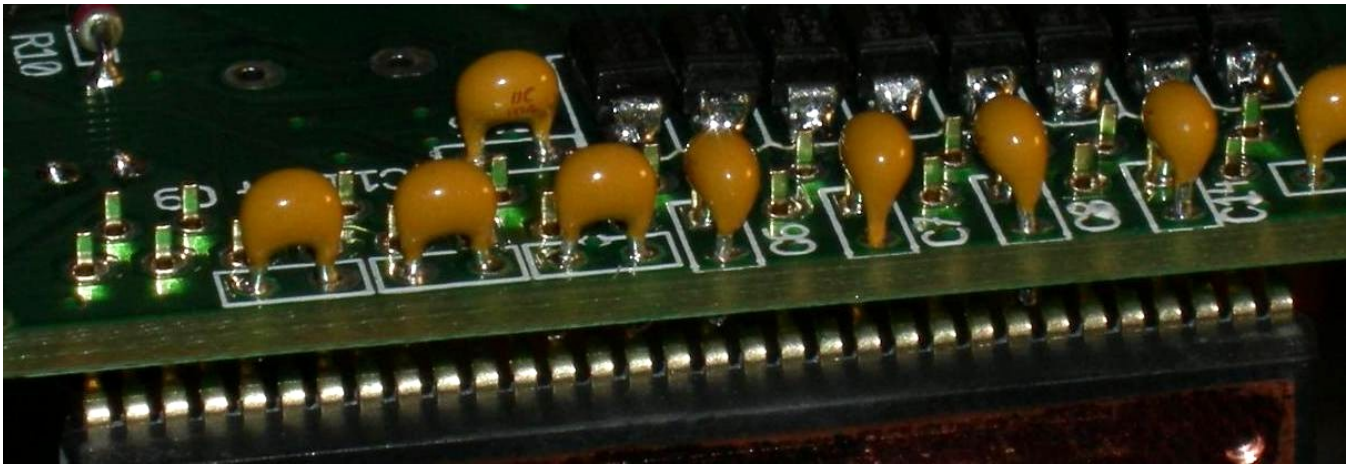
4. Mount the small electrolytic caps C5, C10 and C52. As with all electrolytic capacitor the polarity must be respected. The positive pad is usually rectangular and marked with a "+" on the PCB, while the negative is usually round. On the capacitor, the negative side is usually printed and the positive lead is longer than the negative. Mount the four input capacitors C16, C18, C21, C22.

5. Mount L9 which connects the ground plane with the power section ground plane.

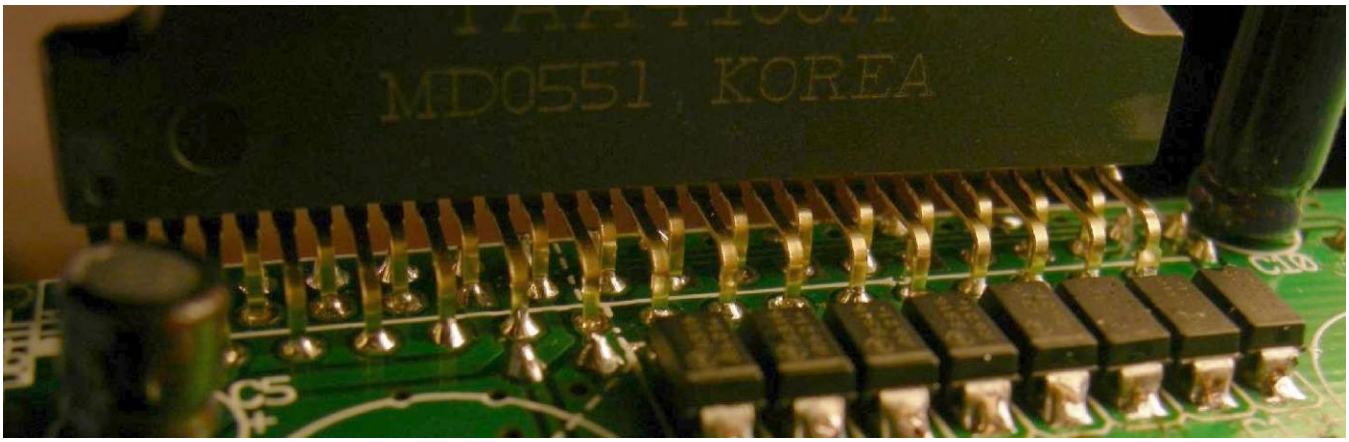
6. Solder U2 in place. It is a 5V regulator for the turn-on logic.

7. Now mount the Tripath chip in place and before soldering, add the four capacitors C6, C7, C8 and C14. Gentle pressure may be needed to get them in place. *It is essential to keep the leads of these three capacitors as short as possible.*





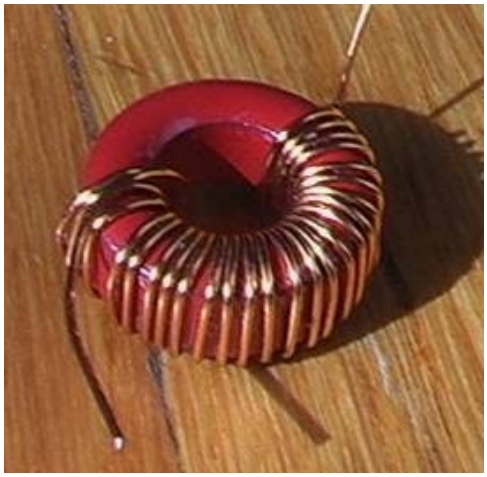
Solder the chip in place, making sure it is well aligned, horizontally and vertically.



8. Continue with the two close-up bulk capacitors, C12 and C13. Again, note the polarity.

9. The eight zener diodes near the input capacitors may be added to protect inputs from very high signals. U4, U5, R14, R15 can be added to drive external status LEDs.

10. Wind the toroid inductors. You should use 42 turns of 0.7 mm wire (changed from 52 turns of 0.6 mm wire). Wind tightly, holding the core in one hand, the wire in the other hand. Do not use vices or other tools as you then risk cracking the toroid core. Pull the wire snug every quarter turn. The picture shows a toroid with half of the turns done. The first turns are difficult do well, and will have to be redone when the rest of the windings have been finished. Tight winding minimizes stray signal leakage from the inductors. You should be able to do the 52 turns on wire before coming back to the starting point, without overlapping. Leave the wire ends un-cut so you can pull the toroids snugly to the PCB when soldering them. If you have an inductance



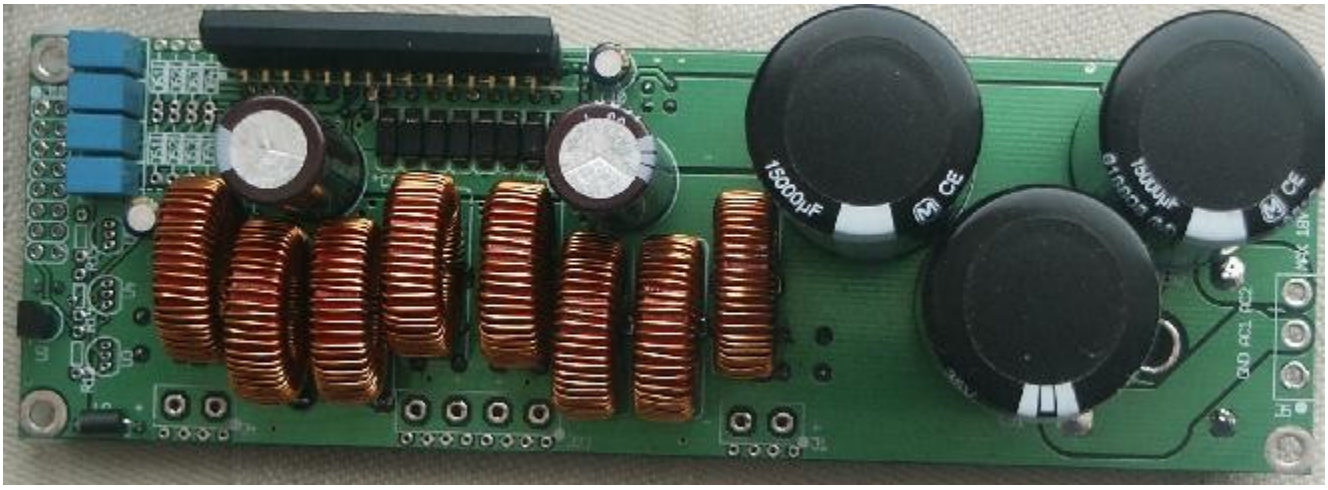
meter, measure the inductance. It should be 10 uH. If you do not have an inductance meter, count the turns.

11. Scrape or torch the enamel off the wires where they will be soldered. Tin the leads before soldering them to the PCB, by heating the wire ends with the solder iron temperature set to maximum. Adding flux also helps. Now mount the toroids to the PCB. Pull them snugly to the board with a tool when soldering so they are vertically aligned and can not move. You can also glue the toroids to the board to prevent them from working loose. In case the board is subject to vibrations, the copper wire could break due to fatigue if not fixed properly. This is especially important for in-speaker mounted amplifiers and mobile (car) amplifiers. Temperature resistant glue should be used, as the toroids may get hot at high power.

The finished toroid. Tight winding minimizes signal leakage

12. The above components are enough to test the amplifier.

13. Last connect signal and power connectors and you are ready for testing. For testing at low power no heat sink is required. For low to medium power applications the amplifier housing may be sufficient as a heat sink. For high power use, into 4 ohm speakers, the amplifier can dissipate 20W of heat *per channel* at full power. Then, a 2ºC/W heat sink is reasonable. Medium or low power applications will not dissipate a lot of heat. The heat slug of the TAA4100A chip is connected to ground and does not require electrically insulated mounting. Silica heat transfer compound or similar should be used to improve cooling.



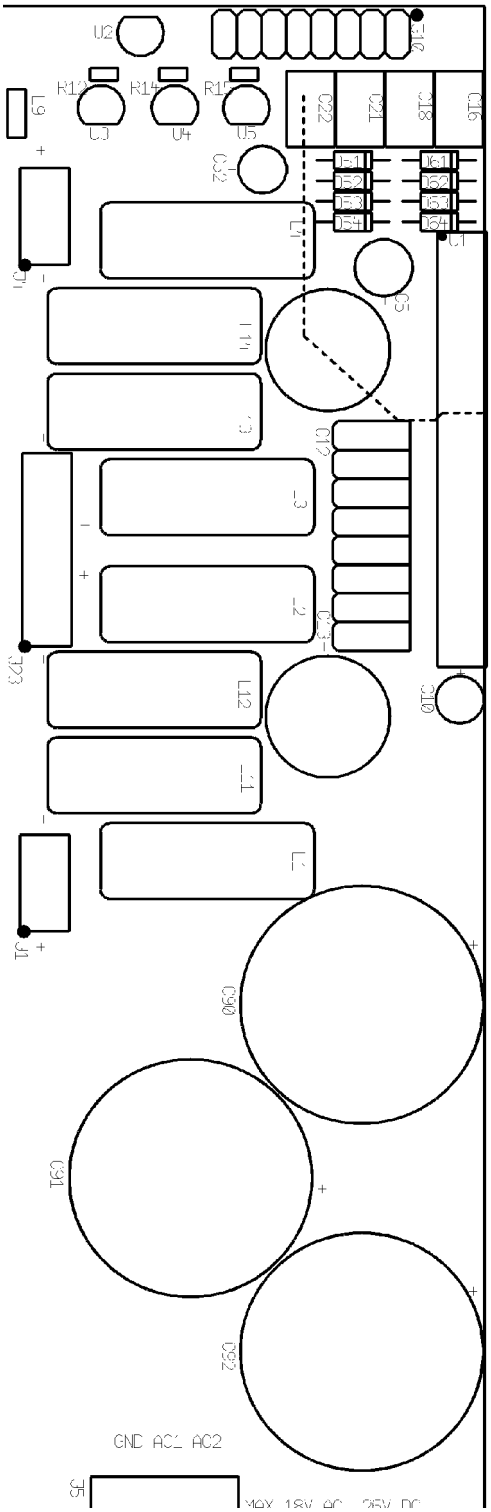
The two mounting holes on the power side of the PCB are connected to the ground plane, the two holes on the signal end of the board are not.

If you have any questions, comments or feedback, please write in the forum on the web site http://www.41hz.com. You can of course also contact us at jan@41hz.com

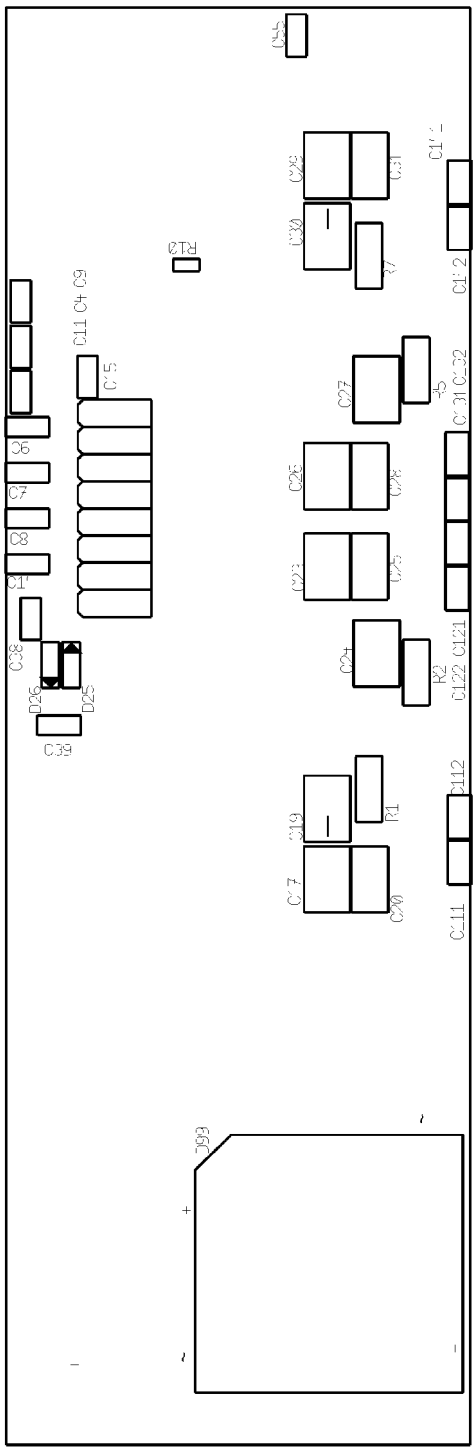
APPENDIX 1 BOM (see separate doc)

APPENDIX 2

Top View



Bottom view



Pin connections

J1

1	**Chan 1 speaker positive**
2	**Chan 1 speaker negative**

J23

1	**Chan 2 speaker negative**
2	**Chan 2 speaker positive**
3	**Chan 3 speaker positive**
4	**Chan 3 speaker negative**

J4

1	**Chan 4 speaker negative**
2	**Chan 4 speaker positive**

J5 With AC / transformer

1	**Power ground (to chassis / earth)**
2	**AC2 (to AC source)**
3	**AC1 (to AC source)**

J5 With DC / battery

1	**Power ground (to chassis / earth and minus)**
2	**Not used**
3	**Positive**

J10

1	**AGND**	**Analogue ground (for input 1)**
2	**In1**	**Signal input 1**
3	**AGND**	**Analogue ground (for input 2)**
4	**In2**	**Signal input 2**
5	**AGND**	**Analogue ground (for input 3)**
6	**In3**	**Signal input 3**
7	**AGND**	**Analogue ground (for input 4)**
8	**In4**	**Signal input 4**
9	**“AM mode” (AGND)**	**Setting AMP into A/B class mode (normally not used)**
10	**SLEEP**	**Input. 0v=>sleep +5V=>awake**
11	**HMUTE LED**	**Output. On when amp is on**
12	**MUTE**	**Input. 0v=>muted +5V=>un-muted**
13	**+5V**	**+5v for mute & sleep**
14	**OVRLDB_LED**	**Output. Normally on. Off when input is overloaded.**
15	**FAULT_LED (not used)**	**Output. Not used**
16	**AGND**	