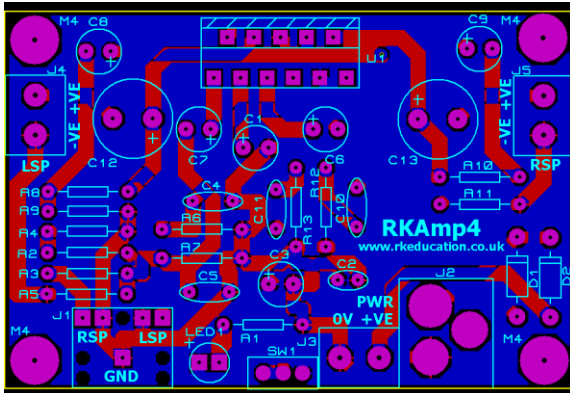


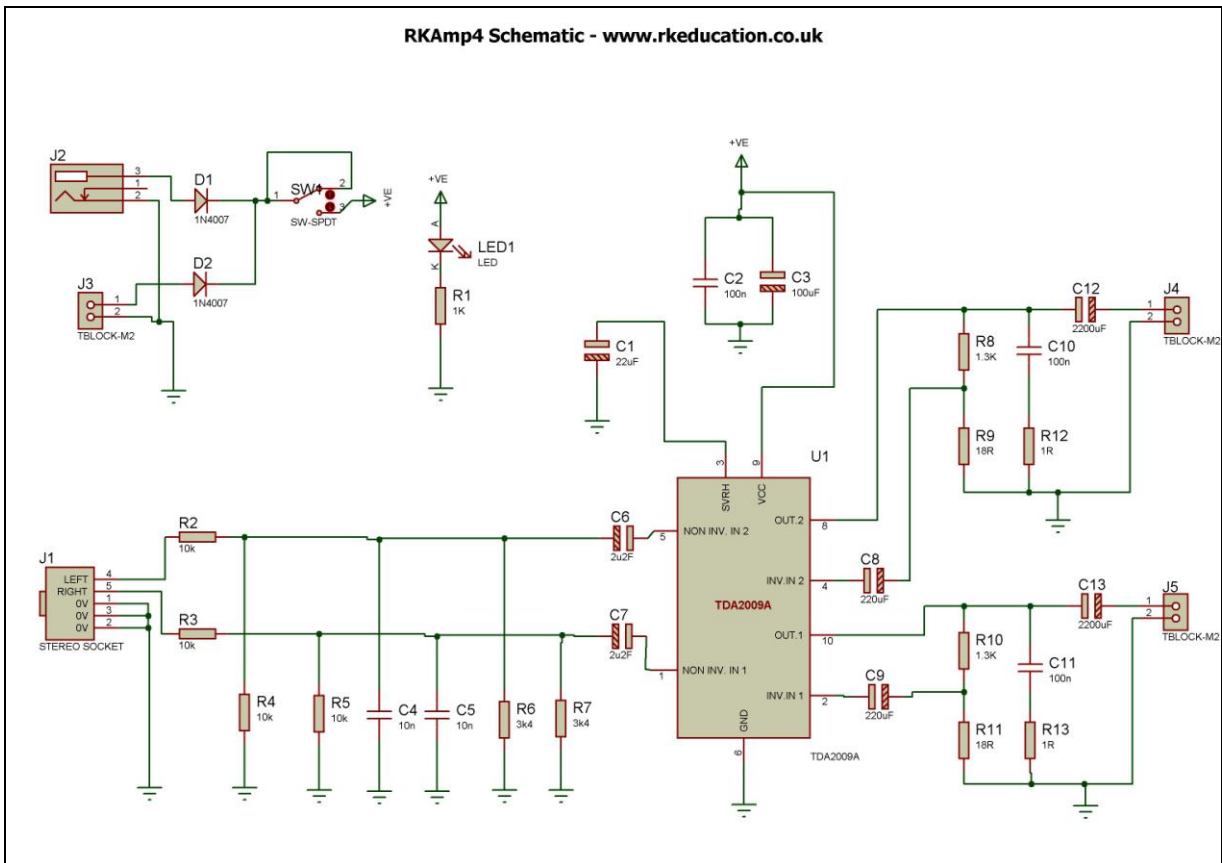
RKAmp4 Component List and Instructions



PCB layout



Constructed PCB



Schematic



Description

The RKamp4 stereo amplifier PCB has been designed around the 2 x 10watt stereo amplifier I.C. TDA2009a

- The sound signal is inputted into the circuit via a 3.5mm stereo socket
- The amplifier has 2 channels of up to 10watts per channel
- Produces a very high quality sound output
- The PCB includes a power switch
- The PCB includes a power LED
- The PCB uses terminal blocks
- Battery powered between 4.5V and 24V
- Power is inputted to the PCB via a terminal block
- Compact design
- Low cost
- The PCB is a high quality double sided black PCB
- A large ground plane is used to aid with dissipating heat

Component List

C1 – 22uF 25VDC electrolytic radial capacitor
C2 – 100nF capacitor
C3 – 100uF 25VDC electrolytic radial capacitor
C4, C5– 10nF capacitor
C6, C7 – 2.2uF electrolytic capacitor
C8, C9 - 220uF 25VDC electrolytic radial capacitor
C10, C11 – 100nF capacitor
C12, C13 - 2200uF 25VDC electrolytic radial capacitor
D1, D2 – 1N4007
IC1 – TDA2009a stereo amplifier I.C.
LED1 – 3mm LED
J1 – PCB mount 3.5mm stereo connector
J2 – 2.1mm DC socket
J3 ~ J5 (PWR, LEFT & RIGHT)– 2 way 5mm terminal blocks
R1 – 1k brown black red
R2, R3 – 10k brown black orange*
R4, R5 – 10k brown black orange*
R6, R7 – 3k4 orange yellow red
R8, R10 - 12K brown, red, orange
R9, R11 – 18R brown, grey
R12, R13 - 1R
SW1 – ultra miniature slide switch

*can be varied

Instructions

For a datasheet on the TDA2009a amplifier I.C. please visit the manufacturer's website.

Connecting Power

The power is connected using the terminal block marked J3 and the DC socket, the 0V input, usually black is put in the left hand terminal and the +VE, usually red, is put in the right hand terminal. The PCB has 2 1N4007 diodes to prevent damage from reverse polarity. The unit can be battery powered or DC PSU powered. When using batteries it is recommended that high capacity batteries are used with an appropriate battery pack with leads or battery pack with a battery clip, high current capacity batteries at 12VDC are recommended but the circuit will run from 4x AA batteries and produce a quality sound but at a lower volume. When using a DC PSU 6VDC to 24VDC is recommended but when using higher voltages a heat sink will be needed to dissipate heat, excessive heat will damage the I.C. A power switch has been added to the PCB and is marked PWR, if a switch is not needed short the appropriate PCB pads. When the PCB is powered the 3mm LED will light up and turn off when power is removed. The PCB can be powered from 4.5VDC to 24VDC. When powered at a lower voltage the output power will be reduced and the sound may become distorted. If a high power is not needed then it is recommended that 6VDC is used. At higher voltages and output powers more current is needed so the

batteries will use power faster and the amplifier I.C. will also generate more heat which will need to be dissipated.

In order to get a high quality sound with longer battery life and without generating heat it is recommended that the PCB be powered at 6VDC at a lower volume.

To achieve high power outputs 24VDC at 2Amps with 4Ω speakers will be necessary.

If your amplifier I.C. is getting hot a heat sink will need to be used

Speakers

The PCB has been designed to power **2 full range speakers**. Speaker choice is very important and this can be complicated by the large number of speakers available.

When selecting speakers it is recommended that 4 to 8Ω impedance speakers are used, higher impedances will reduce the output power. When choosing a speaker the power rating is also important, this PCB outputs up to 10 watts so speakers above 10 watts are needed, speakers that have a larger cone will produce a better sound. It is advisable to select speakers that can be mounted to a panel. For a range of speakers visit,

www.rapidonline.com

The speakers used in the picture above are Visaton FRS10. They are not the cheapest speaker and they produce an excellent quality sound, they are rated at 20watts and are available from Rapid.

It is recommended that 160mm 100watt speakers should be used, these are available from Rapid and produce an excellent sound. They are also available in 200 and 300mm diameters.

If you need help selecting speakers please contact us, we have speakers available.

Connecting Speaker Outputs

Connecting the speakers to the PCB is a straightforward process, the main thing to be careful with is the polarity of the speaker cables. As with speakers there is a wide range of speaker cable available. It is possible to use wire but it is recommended that at the least a basic speaker cable should be used. For a better quality sound use a better quality cable.

First cut the speaker cable to the desired length and carefully separate the ends of the cable. Strip around 0.5cm of the insulation from the cable and twist the exposed copper wire together. Then apply some solder to the end of the cable to stop the ends fraying or short circuiting. One end of the cable will need soldering to the speaker and the other end will need screwing into the speaker terminal blocks marked **RIGHT** and **LEFT**. It is important that the polarities of the speakers are observed and the cables are attached to the PCB correctly. The polarity of the speaker terminal blocks on the PCB are clearly labelled and speakers normally have a

+ and - where the cable is attached, speaker cables always have something that identifies the 2 different wires.

Connecting the PCB to a Music Device

This PCB has been designed for use with music players such as MP3 players, mobile phones with music players and ipods. The unit is connected to a music player via a 3.5mm stereo lead with one end inserted into the music player and the other end inserted into the PCBs 3.5mm stereo socket at the bottom left hand corner of the PCB. Some music players do not come with a 3.5mm stereo socket, if this is the case then an adapter will need to be used, these are available from outlets such as Rapid and Maplin.

Testing the Amplifier

When the PCB has been constructed, the speakers have been attached, a music player has been connected and power has been applied the unit is ready to be tested.

PLEASE ONLY TEST THE UNIT WHEN YOU ARE SURE THE PCB IS FULLY FUNCTIONAL. CAREFULLY CHECK IT HAS BEEN CONSTRUCTED CORRECTLY. WE WILL NOT ACCEPT ANY RESPONSIBILITY FOR ANY DAMAGE TO YOUR EQUIPMENT.

Ensure the LED power indicator is lit and turn the volume of your music player to its lowest level and press play, gradually increase the volume until it can be heard. The volume is not controlled by the PCB, the volume level will be controlled by the music player itself.

Building a Suitable Case

In order to finish this project and to achieve a high quality sound it will be necessary to case the PCB and speakers. There are many different ways this can be achieved and how this is done will depend on many things. The picture above is a suitable design and is a simple method of producing a high quality and effective speaker.

It was constructed using a laser cut panel to hold the speakers, these are available from us. The main body of the speaker was constructed using pieces of pine which were then varnished. There are more steps to this and to help there is a more detailed data sheet on how to produce this speaker on our website. If you have pictures of your own speakers please send them to us so we can add them to our website.

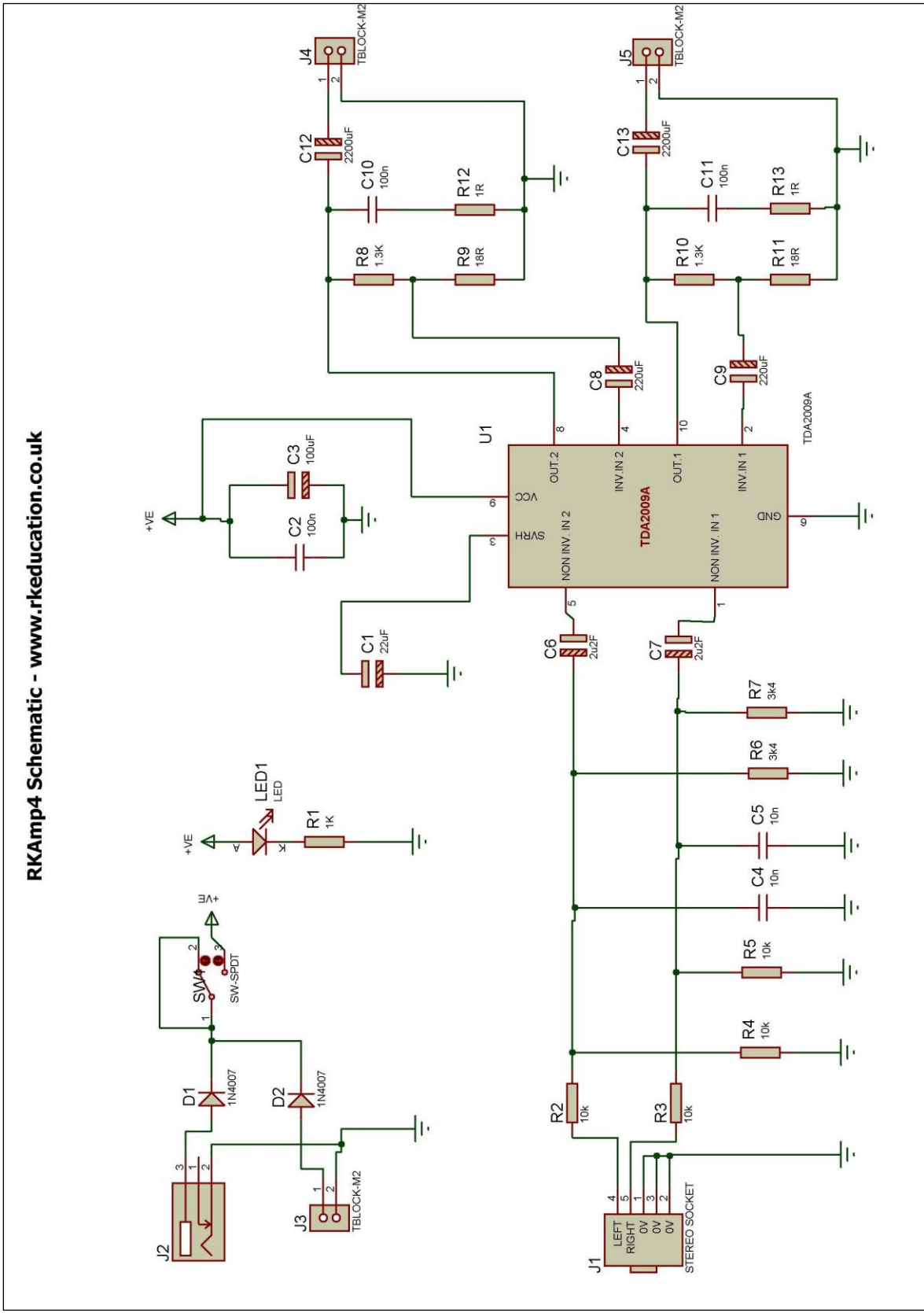
Budget Version

It is also possible to build a budget PCB by not using terminal blocks and the stereo socket. This is aimed at schools wishing to reduce costs and involves soldering the speaker wires and stereo lead directly to the PCB, please contact if you need more guidance with this.

Please visit our website
www.rkeducation.co.uk

If you have any comments or queries please email us at
technical@rkeducation.co.uk





RKamp4 Schematic - www.rkeducation.co.uk

