RGBAmp construction and operation instructuons

Caution:

Electronic components can be sensitive to electrostatic discharge (ESD). When handling electronic components, a grounding wristband should be worn!

The RGBAmp is designed exclusively for use with Aqua Computer Aquaero5. Use of any other signal source is at the user's own risk:

The RGBAmp Mk I does not have internal current control. Therefore any LED device connected to the output of a RGBAmp Mk I must contain its own current controll and be certified for 12VDC.

The RGBAmp-design has ben carefully planned and tested by me. This is a gratituous service and entirely complimentary. Therefore I do not accept any product liability in the sense of the law exceeding liability for gross negilgence on my part. The user alone is responsible for correctly constructing and operating the RGBAmp.

The RGBAmp has not been certified according to CE and has not passed a formal EMC test. The user is therefore solely responsible for operating the equipment.

The rear surfaces of the FETs on RGBAmp-A may under no circumstances be electrically connected!

Variants:

The RGBAmp Mk.I is available in two variants: RGBAmp-A and RGBAmp-C. A stands for Common Anode and C stands Common Cathode. Which variant is needed depends on the LED bands used. Separate LED bands for the three colors can be used with both variants equally, only the connection scheme changes. If RGB-LED-bands are used, the RGBAmp must be chosen according to the design of the LED band. Connecting a RGB-LED band to the wrong variant with a high probability will lead to the destruction of the LED band and possibly the RGBAmp.

Most RGB-LED bands are Common-Anode design, i.e. they have only one 12VDC connector and three ground connectors for the three colors. This type is controlled by RGBAmp-A.

More rarely Common-Cathode based RGB-LED bands may be encountered which have a VCC connector for each color and a common ground. Logically these need the RGBAmp-C. This principle has also been used in the Aqua Computer RGB LED.
WARNING: The RGB-LED sold by Aqua computer does not contain any internal resistors and therefore isn't suitable for connection to the RGBAmp-Mk.I without further measures!

Really rarely, constructions with three VCC lines AND three ground lines may be encountered. These can be connected to both variants equally.

Aufbau

NOTE: Please read the entire description FIRST, start soldering THEN!

Tools Needed:

- Soldering iron of appx. 30-60W power

Note: Due to the operating principle, „Cold Heat“solderers should not be used for electronic components!!

- Solder
- Side cutter (flat to be preferred)

For soldering the SMD-LED(optional) additionally:

- Fine vice or third hand
- Head-mounted or stand-mounted magnifiing glass
- fine tweezers

Useful if not strictly necessary:

- Cold spray
- Desoldering pump oder copper braid
- Soldering needle to work the SMD-LED.
- 0.5mm SMD-Solder
- Adhesive tape, glue or hot glue

Needed components:

1x Pinheader 4-lead, R2.54mm
1x Screw-type terminal 4-lead, R 5.08mm
1x AMP-connector for Print-mount, vertical (Disk Drive connector)
3x IRLZ34N NE-MOSFET TO220AB
3x 150kOhm resistor, type 207
3x 1kOhm resistor, type 207
some wire or copper braid for wire bridges

Note: If you know what you are doing, you can use different resistor values. Important is to select resistance values big enough to keep the current and thus the strain on the Aquaero down and to select larger values for the pulldown resistors than for the inline resistors.

Optional:

1x Osram MultiLed®, PLCC6
2x resistor 220Ohm, type 207
1x resistor 150Ohm, type 207

3x heat sink TO220
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1x heat sink yod 3 TO220
3x insulating pad for TO220
3x plastic screw size M4
3x plastic nut size M4

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Assembly:

1. SMD-LED(Optional)
SMD-Bauteile normally are soldered automatically. Manual soldering of SMD components is somewhat tricky. The circuit board must be aligned with the copper side straight up. For simpler soldering, the component may be fixed to the board with a little flow enhancer or a tiny drop of super glue.

The LED is heat-sensitive. It must be soldered rather quickly to not unnecessarily expose it to the heat. First, a tiny drop of solder is applied to one of the terminals on the board. Then, the LED is correctly centered on the pads (Mind the orientation!). Then the LED is gently held down using the tweezers, meanwhile the solder is carefully heated with the soldering iron until it melts. The solder then flows around the pin of the component and fixes it to the board. No additional solder should be added! The LED must be held down until the solder has handened again. This process can be quickened by a short gush of cold spray. Now the other pads are soldered. Here, a tiny amount of solder must be applied once more. First, the pad is warmed with the tip of the soldering iron. Then a drop of solder is applied. After the solder flows entirely around the terminal of the component, the soldering iron is immediately removed. In between soldering the individual pads, a break of at least 10 seconds should be observer, alternatively the LED shoud be cooled with a small jet of cold spray.

2. Resistors

First, bend al resistors and position them. Bend the leads slightly outward below the board, so the board can be turned over without the resistors falling out

The 150k resistors are soldered into the positions marked PD(Pulldown). These can be identified by having one pin connected to the ground surface.
The 1k resistors are used for the Inline positions (marked R) verwendet. These lie between the input terminals and the gates of the FET.

Resistors aren't temperature-sensitive, so the resistors can be soldered in your own time.

After soldering, cut the leads short with the pliers.

3. MOSFET
The MOSFET transistors are mounted in a TO-220 case. TO-220 cases are made specially for enhanced heat dissipation. This can raise the soldering times slightly with a weak soldering iron.
With MOSFET, correct orientation absolutely must be observed. The metallic heat sinks face the screw terminals. A wrongly oriented transistor may cause great damage to the computer!

The transistors can be inserted only so deeply that they have an ideal distance from the board. After inserting the transistor, turn the board over and slightly bend the pins in opposite directions to avoid the component falling out. After that, the transistor is soldered normally and the leads cut short.

4. connectors
The connectors are soldered last. Since the connectors are made from thermoplastics, their heat

durability is limited. Soldering should be done without unneccessary delay.

For the orientation of the components, please refer to the board layout. To solder them, the connectors have to be affixed to the board. Since the pins can't be bent, fixation must be done with some adhesive tape or some glue. Alternatively the components can be held down with a hand. In the interest of your own healt, I suggest wearing a heat-blocking glove for this!

Some leads were left without solder-resist coating. Some solder can be applied here to enhance the thermal durability of the RGBAmp. This is **not strictly necessary** and only has an effect if the RGBAmp is run to the upper limit of it's current durability.

Advanced users: Enhancing the current durability of the RGBAmp

The maximum current tolerable by the RGBAmp isn't limited by its component but by the thermal durability of the circuit paths. Without further solder they can tolerate about 5A per channel, with a maximum of 10A total.

Alternatively to or additional to extra solder, heat spreaders can be applied to the cirtuit paths.

Eg: A piece of copper sheet can be soldered vertically onto the circuit path, e.g. from an old graphics card cooler.

Short pieces of tinned wire can be bent into a v-shape and soldered to the circuit paths. The discarded ends of resistor leads can be used for this.

A piece of copper braid is satuarted in solder and soldered vertically onto the circuit path.

A piece of tinned wire is bent into a crinkly shape and soldered to the circuit lead.

Naturally, great care must be taken not to create short circuits. With good airflow, these measures can about double the current tolerance of the RGBAmp. The exact current tolerance must be determined by measuring the temperature. Individual circuit paths should not get hotter than 100-110°C.