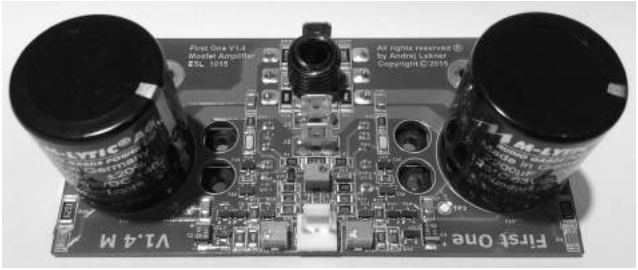
First One M power amplifier module V 1.4

Installation and user manual



Absolute maximum ratings

Operation beyond these limits may result in irreversible damage. Table 1:

Item	Symbol	Rating	Unit
Supply Voltage	+VDC, –VDC	65	Vdc
Output Current	I out	16	Adc
Air Temperature	T amb	50	°C
Heat-sink Temperature	T sink	75	°C

Recommended operating conditions

Proper module operation within these limits is guaranteed. Table 2:

Item	Symbol	Rating	Unit
Supply Voltage	+VDC, –VDC	40 – 63	Vdc
Load Impedance	Z load	2 – 16	Ω
Air Temperature	T amb	20 – 30	°C
Heat-sink Temperature	T sink	40 – 60	°C

Description

First One M power amplifier is a compact medium size ready made single channel Class AB power amplifier module, carefully designed for DIY or OEM implementations of the most demanding audio applications, such as stereo power amplifiers, monoblock power amplifiers or active multi-way powered speakers.

First One M power amplifier module is fully assembled, pre-calibrated and tested in our production. Measurements and calibrations of all vital electrical parameters were already performed in our laboratory, so all that's left to be done is to mount it to a proper heatsink, install it into a suitable metal chassis and connect to a proper DC power supply. Our recommendation goes to either a switch mode power supply or classic linear power supply with minimum of 10 A peak output current per rail. Properly made wiring connections of the First One M power amplifier module followed with short form operating instructions are well explained in this installation and user manual.

First One M module in stereo connection

In most cases First One M modules will be used as a part of stereo power amplifier for which connection diagram is proposed below (Fig.1), where two First One modules operates together in a single metal chassis.

Each of the RCA input connectors has to be electrically isolated from the metal chassis. Cable connecting RCA terminals to PCB pads has to be as short as possible, double shielded coaxial cable of 50 to 75 Ohm impedance is recommended. Although a twisted pair of a solid core wires can also be used if an internal input connection length is shorter than few cm.

Speaker output connector terminals have to be mechanically heavy duty variant, capable of conducting high currents. Normally each of them has to be electrically isolated from the metal chassis. Internal wiring from power supply to all amplifier power connections has to be made by isolated properly coloured wires of minimal 1,5 mm² cross-section area.

Special attention has to be dedicated to earth reference point of a metal chassis (Fig.1). Properly done with electrically well conducted bolt connected to the metal chassis in a one point, therefore all the parts of a chassis (all metal plates, heatsinks) are connected to the earth potential. GND power supply terminal J2 from each First One module is connected to GND terminal of its power supply only (Fig.1). GND potential of both channels are isolated between each other and earth potential, in this way modules are prevented from unwanted ground loops interference currents to flow between channel's GND potentials.

Powering stereo amplifier can be realized by single power supply for both channels or by two power supplies, each for separate channel in a so called dual-mono configuration. Later is preferred and recommended as more reliable and higher performance solution (Fig.1). As already mentioned the best sonic result is achieved by using unregulated switch mode power supply of at least 600 W or more output power per one First One module's channel.

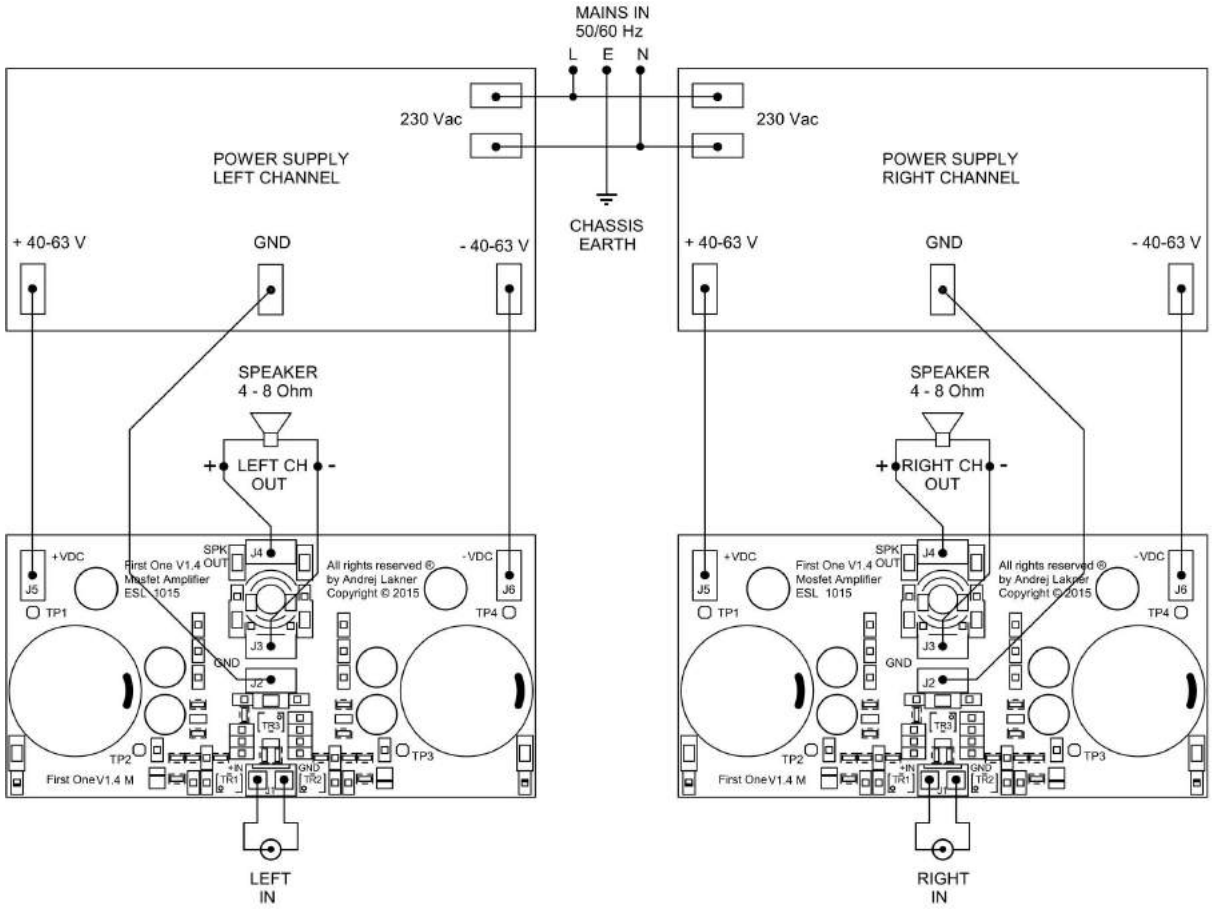


Fig.1 Schematic diagram for stereo connection

Thermal considerations

To ensure proper operating conditions to the First One amplifier module, temperature of the main heatsink should never exceed the limit value of 75°C (Table 1). This is even more important since module has only two output transistors, so it is of utmost importance to keep them at low temperature range at all times to get best out of their performance. Therefore heatsink's power dissipation efficiency must be high, resulting in thermal resistance of Rth=0,5 K/W or less. Module (four drivers and two output transistors) is fixed to the heatsink surface with four M3x12 mm and two M3x16 mm bolts (obligatory use M3 washers) tightened to M3x10 mm threaded holes in the heatsink. Output transistors must be isolated from the heatsink by mica insulator washer, driver transistors are already isolated. All six transitor's bottom surfaces needs to be coated evenly with silicon thermal grease before fixing the module to the heatsink.

Optional calibrations

Although First One M module is pre-calibrated in the production, it is highly recommended to check and recalibrate it prior initial or any new installation into the chassis. Thus the module's vital parameters are set to optimal working conditions in accordance with power supply selected. Three electrical parameters should be checked and adjusted if necessary:

- VAS idle bias current (18 mA)
- output DC offset voltage (0 mV)
- supply idle bias current (280 mA)

Calibration adjustments will be correct only if performed 20-30 min after powering on, when optimal operating temperature of the module's heatsink settled around 42-45°C, measured close to the output power transistors.

Schematic diagram of calibration adjustment procedure is shown below (Fig.2), using three digital multimeters (DMM) will ease the measuring job substantially. Please be careful to set all DMM to proper measuring range and connect them as shown in the schematic.

Trimmers TR1, TR2 serves to adjust VAS idle bias current to 18 mA (180 mV measured between TP1-TP2, same between TP3-TP4) and at the same manner to adjust the output DC offset voltage to 0 mV.

Description of TR1, TR2 trimmers rotating adjustments explained as follows:

- to increase VAS idle bias current rotate TR1 or TR2 clockwise
- to decrease VAS idle bias current rotate TR1 or TR2 counter-clockwise
- to increase output DC offset voltage rotate TR1 clockwise or TR2 counter-clockwise
- to decrease output DC offset voltage rotate TR1 counter-clockwise or TR2 clockwise

Observing the display values of DMM1 and DMM2 simultaneously will clearly show the resulting effect of rotating TR1, TR2, so both preferred target values could be set easily.

Trimmer TR3 serves to calibrate output bias current, correct value is achieved when complete idle current consumption of the module shows 280 mA (DMM3).

If TR3 adjustment changes setting of VAS bias current or output DC offset, readjust TR1, TR2, so the correct target values are gained back.

Technical specifications

Voltage gain:	+27,5 dB
Input impedance:	10 kΩ ll 100 pF
Output impedance:	10 mΩ (DC to 20 kHz)
S/N ratio:	> 110 dB (input shorted)
Output DC offset:	+/- 10 mV max.
Power bandwidth:	DC to 100 kHz (-3 dB)
Output Power:	160 Wrms/8 Ohm max. 240 Wrms/4 Ohm max.
Overall height:	40 mm (rest of dimensions – Fig.3)

Connectors to use with module

J1 – Molex 08-55-0110, contact, crimp
Molex 22-01-2035, case housing
J2 – Fast On 6,3 mm, contact, crimp
J3 – Fast On 6,3 mm, contact, crimp
J4 – Fast On 6,3 mm, contact, crimp
J5 – Fast On 6,3 mm, contact, crimp
J6 – Fast On 6,3 mm, contact, crimp

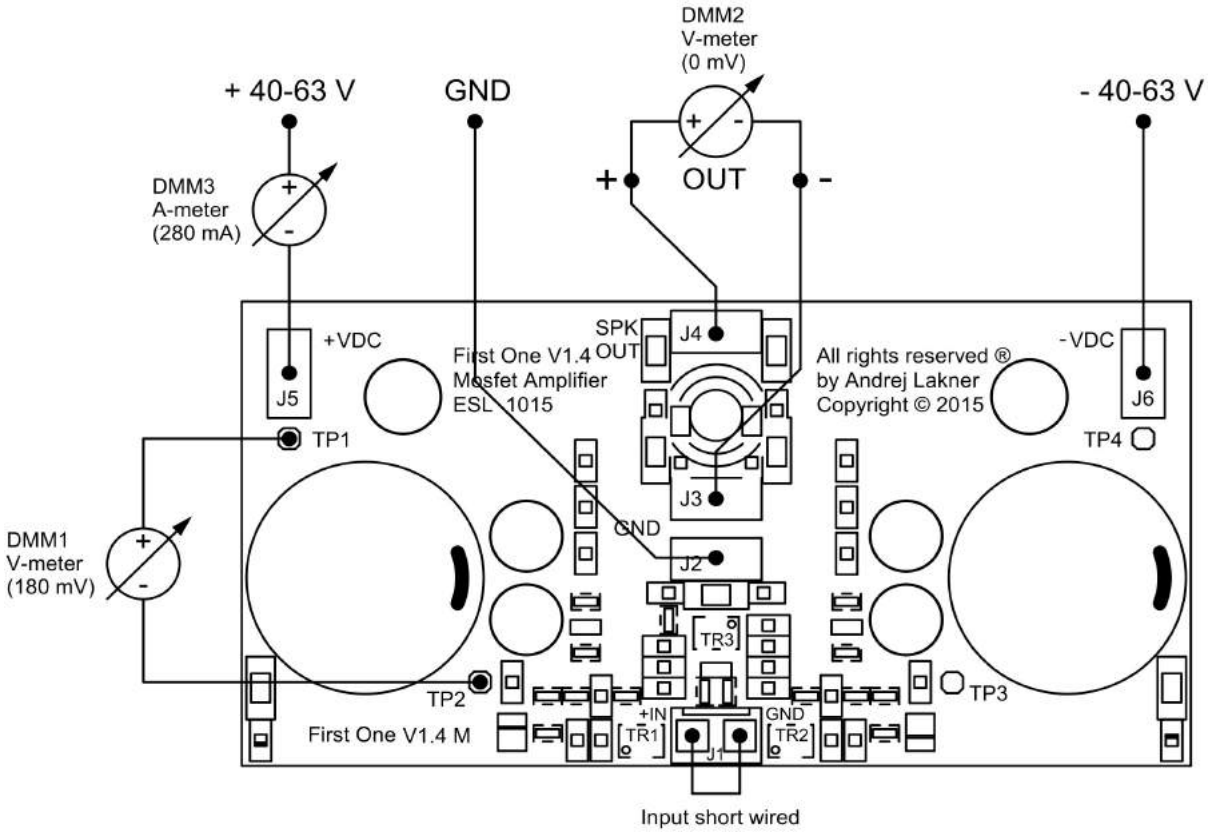


Fig.2 Schematic diagram for calibration adjustments

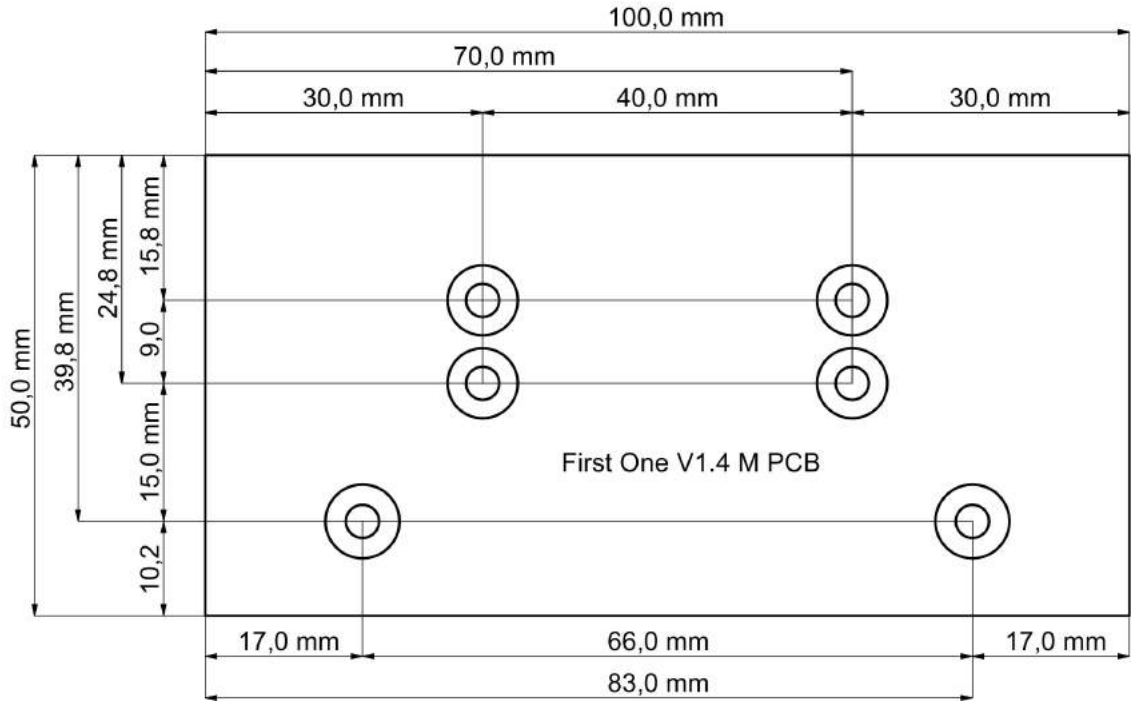


Fig.3 First One module - dimensions