

DIY Kit 106. 50W Hi-Fi Audio Amplifier Module

INTRODUCTION

The heart of this amplifier module is a monolithic integrated circuit from SGS-Thomson, TDA7294. It is intended for use as an audio class AB amplifier in hi-fi applications. It has a wide voltage range and output current capability, enabling it to supply the highest power into both 4Ω and 8Ω loads.

With the addition of a handful of parts and a suitable power supply, this module will deliver 50W RMS into 8Ω @ 0.1% THD. The heatsink is supported on the PCB. A similar circuit was published in **Elektor**, 11/96.

The kit is constructed on single-sided printed circuit board. Protel Autotrax & Schematic were used in the design.

SPECIFICATIONS (± 30V supply)

Input sensitivity:	1.3V (50W into 8Ω)
Input impedance:	10kΩ
Frequency response:	16Hz - 100kHz
Slew rate:	10V/uS
Output power:	50W into 8Ω (0.1% THD) 82W into 4Ω (0.1% THD)
Signal-to-Noise ratio:	105dBa (1W / 8Ω)
THD (40W into 8Ω):	0.002% (1kHz) < 0.04% (20Hz - 20kHz)

CONSTRUCTION

Start with the lowest height components first, resistors and capacitors. Keep one of the longer lead offcuts to use as the link. Be careful to get the electrolytic capacitors in the correct way around. The positive lead is marked on the overlay. The negative lead is marked on the body of each capacitor. Leave the IC and the big electrolytic capacitors to last. Make sure that the IC is at right-angles to the PCB before soldering.

Important: you the user must supply a heavy duty heatsink rated at 1.4 °C/W. This item is too heavy to supply with the kit. It **must** be obtained separately then drilled in the right place. An insulation bush, 3x12mm screw & nut, 3mm washer & TO-3 silicon-impregnated insulating washer are provided in the kit.

Solder the power and audio cables directly to the pads provided on the PCB.

CIRCUIT DESCRIPTION

The input signal is applied to pin 3 via capacitor C1 and low-pass filter R1-C2. The filter improves the pulse response and flattens out the frequency response. The lower -3dB point is determined by R2-C1 and R4-C5. This is 16Hz for the values used. The upper -3dB point is about 100kHz.

Pin 10 is the MUTE input and pin 9 provides a STANDBY mode. Muting should always take place before standby mode is selected. Connecting these pins permanently to the supply rail (insert links) ensures that

the amplifier comes on immediately on power up. Any switch-on clicks may be eliminated by increasing the time constants R5-C4 and R6-C5.

The IC has internal thermal protection that causes the mute to cut in at 145°C and switches the amplifier into standby at 150°C.

POWER SUPPLY

The maximum supply voltage of the IC is ± 40V. However the maximum dissipation of the IC would be exceeded when using a 4Ω load at that voltage. Therefore the supply voltage used should be kept down to a safe ± 30V. This can be constructed using a 44V centre-tapped transformer, a diode bridge rated at 10A (min.) and a pair of 10,000uF electrolytic capacitors. A lower secondary voltage transformer could also be used but the reduced DC output would result in less power output.

The mains transformer used to power the module should be rated at a minimum of 80VA. If you want to run two modules in a stereo amplifier you can use a common power supply. In this case the transformer should be rated at 150VA.

TESTING

Before applying power, check that all parts are inserted in the correct locations. Make sure that the electrolytic capacitors are the right way round. Connect the power supply leads with a multimeter (set to read amps) in series with the positive rail. Connect a speaker and short out the audio input. Make sure there are links inserted for MUTE and STANDBY.

Switch on the power and check that the current settles down to between 20 and 60mA. There will be a brief surge as the main filter capacitor (C6) charges.

Note: You must have the heatsink fitted, otherwise the thermal overload protection circuit will cut in and switch the device off.

OPERATION

Do not operate the module without a heatsink.

The heatsink tab on the TDA7294 IC is internally connected to the negative supply rail. This is not a problem if the heatsink is mounted on the PCB and isolated from any metal enclosure. **If the module is mounted inside an earthed metal enclosure then the IC must be insulated from the heatsink.** If not, the negative supply rail will be shorted to ground.

A silicon impregnated rubber washer and bush is provided for this purpose. The rubber washer should **always** be used as it increases the thermal conductivity between the IC and the heatsink. To minimize noise and distortion, keep the input signal leads away from the power supply and output leads.

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IF IT DOES NOT WORK

Poor soldering ("dry joints") is the most common reason that the circuit does not work. Check all soldered joints carefully under a good light. Re-solder any that look suspicious. Check that all components are in their correct position on the PCB.

Are the electrolytic capacitors the right way round?

Have you inserted the links for MUTE and STANDBY?

If the module is mounted inside a metal enclosure, check that the negative supply rail is not shorted to the metal case. Remember that the metal tab on the IC is internally connected to the negative supply rail.

The data sheet on the TDA7294 IC is available from the ST Electronics (formerly SGS-Thomson) website at

<http://www.st.com>

PARTS LIST - KIT 106

Resistors (0.25W carbon)

150 brown green brown	R1	1
680 blue grey brown	R4	1
10K brown black orange.....	R2,3,5	3
22K red red orange	R6	1

Capacitors

2.7nF MKT polyester	C2	1
100nF MKT polyester	C8,10	2
1.5uF MKT polyester	C1	1
10uF 63V electrolytic	C4,5	2
22uF 63V electrolytic	C3,6	2
2200uF 50V electrolytic	C7,9	2

Semiconductors

TDA7294.....	IC1	1
50W Audio Power Amplifier IC		

Miscellaneous

Header, 2 pin	2
Jumper	2
Silicon impregnated insulating washer	1
Insulating bush.....	1
Screw, 3 x 12mm	1
Nut, 3mm	1
Washer, 3mm.....	1
PCB, K106.....	1

