Modular expandable power amplifier with TDA7293 / TDA7294
Schematics and BOM for modular TDA7293 amplifier

This project made for very simple and popular homemade amplifier instrument amplification. The gainclone called TDA7293 and 7294 is very good solution for guitar or microphone amplifiers. The poweramp can be connected to bridge, parallel, and bridge+parallel mode. This project contains 3 different PCBs for this integrated MOSFET amplifier, and one PCB for speaker protection. Very easy to build, the output power is from 75W to 300W with one channel, but with this project possible to build stereo application. Popular guitar amplifier makers like Marshall and Carlsbro using TDA729x ICs for combos and guitar heads.

Schematics and Bill of materials for TDA amplifier
Schematic and BOM of first (main) module

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Conn1: Power supply, ±47V for 7293, ±40V for 7294
Conn5: Left and Right audio level inputs
Conn7: Clipping LED connector
Conn6: Simple [GND and Out+] and bridge [Out+ and Out] mode speaker outputs.

Notes
This is the first and the most important module of this project. This module can be used alone for 1x75W or 2x75W amplification. The commercial amplifiers say 100W for this circuit what is not true. The output power is 70–75W with 4 Ohm speakers, and about 40–50W with 8 Ohm speakers. The maximum power supply is ±50V, but ±47V recommended.

English blog and PCB order: http://custompcb.blogspot.com/
Hungarian blog and PCB order: http://diyguitarpa.blogspot.com/
The Youtube Channel  •  Picasa gallery  •  Email: gitarfogas@gmail.com
Schematics and Bill of materials for TDA amplifier
Schematic and BOM of second (bridge) module

<table>
<thead>
<tr>
<th>Comment</th>
<th>Footprint</th>
<th>Value</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>GND2</td>
<td></td>
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<td>2</td>
<td></td>
</tr>
<tr>
<td>+V</td>
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</tr>
<tr>
<td>-V</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
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<td>1</td>
<td>TDA7293</td>
</tr>
<tr>
<td>R1</td>
<td></td>
<td>22k</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td></td>
<td>22u</td>
<td>2</td>
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</table>

Notes
This is the bridge module of this project. This module can be connected to the right side of the main circuit. This module duplicates the output power with 4 ohm speakers. 4 Ohm speakers cannot be used with bridge amplifiers.

Schematics and Bill of materials for TDA amplifier
Schematic and BOM of third (parallel) module

This module can be connected to the first (main) module, to the second (bridge) module, and if you need more power, can be connected to the first parallel module on the system to increase the output current.

Notes
This is the parallel module of this amplifier project. This module can be connected to the right side of the main module to use with 4 ohm speakers, or it can be connected to the second (bridge) module to use bridged amp with 4 ohm too. For parallel amplification use only TDA7293 only.
Schematics and Bill of materials for TDA amplifier
Schematic and BOM of speaker protection module

Modular poweramp with TDA7293 and TDA7294

Bill of Materials

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Required</th>
<th>Board</th>
<th>Description</th>
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<td>A4</td>
<td>3 input connector</td>
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<tr>
<td>Resistor</td>
<td>300mil</td>
<td>1</td>
<td>A4</td>
<td>2 input connector</td>
</tr>
<tr>
<td>Panel Connector</td>
<td></td>
<td>3 input Small</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel Connector</td>
<td></td>
<td>2 input Small</td>
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<td>Cap</td>
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<td>1</td>
<td>A4</td>
<td></td>
</tr>
<tr>
<td>Cap</td>
<td>Elco 12 mm, 2 mil pins</td>
<td>1</td>
<td>A4</td>
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<tr>
<td>Diode</td>
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</table>

Notes
This is very simple and optional module for all configuration of this amplifier project. This module possible to use for all one channel mono and all two channels stereo configurations. This module (if used) must be connected between left and right channels. Connect the left side connector of speaker protection to the last module of left channel, connect right side connector to the first module of the main module of right channel. The Conn3 is used for 24V DC power, and for 24V AC input of UPC1237. Conn1 is the LED connector for protection checking. Conn2 is for the high current relays, connect or disconnect the speakers from speaker outputs.

Warning
Make sure to use the schematic from the datasheet from 2003. Slave mode is activated by pulling INH, INI, and SGND to Vb, the negative supply! In older versions from 1999 of the schematic slave mode is NOT activated properly, which may lead according to reports on the internet to the destruction of the chip.

http://custompcb.blogspot.com/  
http://idiguitarpaa.blogspot.com/

For 7293:

For 7294:

Parallel with 7293:

Bridge with 7293 and 7294:

Simple 7293 or 7294:

Three modes of TDA7293 from the official datasheet
Schematics and Bill of materials for TDA amplifier
Simplified schematic of bridged and paralleled modes
Schematics and Bill of materials for TDA amplifier
Connections between single, bridge and parallel modes

Notes
Blue lines: connections between main module and bridge module, one connection required between parallel module and bridged module.
Green lines: connection between main module and parallel module, and between bridge module and parallel module.
Yellow lines: Connection between all modules and speaker protection.
Red lines: Input for all channels, the dotted line is for second channel if the full configuration is stereo.

Input connectors for another modules:
- Conn4 on Main module
- Conn5 on Bridge module
- Conn2 on parallel module

[Diagram of Schematics and Bill of materials for TDA amplifier]
Schematics and Bill of materials for TDA amplifier
Variations between main, bridge, and parallel modules

One channel (mono) applications:

- About 75-80W:
  1. Main module only
  2. Main module and speaker protection

- About 150-200W on 8 Ohm:
  1. Main module and Bridge module
  2. Main module, Bridge module and speaker protection

- About 120W on 4 Ohm:
  1. Main module, parallel module
  2. Main module, parallel module and speaker protection

- About 180W on 4 Ohm:
  1. Main module, and 2 parallel module
  2. Main module, 2 parallel module, and speaker protection

- About 220W on 8 Ohm:
  1. Main module, 1 parallel module, bridge module and 1 parallel module
  2. Main module, 1 parallel module, bridge module, 1 parallel module and speaker protection

- About 300W on 4 Ohm:
  1. Main module, 2 parallel module, bridge module and 2 parallel module
  2. Main module, 2 parallel module, bridge module, 2 parallel module and speaker protection

Two channel (stereo) applications:

- About 2x75-80W:
  1. Main module, speaker protection, main module

- About 2x150-200W on 8 Ohm:
  1. Main module and Bridge module, speaker protection, main module, bridge module

- About 2x120W on 4 Ohm:
  1. Main module, parallel module, speaker protection, main module, parallel module

- About 2x180W on 4 Ohm:
  1. Main module, and 2 parallel module, speaker protection, main module, 2 parallel module

- About 2x220W on 8 Ohm:
  1. Main module, 1 parallel module, bridge module and 1 parallel module, speaker protection, main module, 1 parallel module, bridge module and 1 parallel module

- About 2x300W on 4 Ohm:
  1. Main module, 2 parallel module, bridge module and 2 parallel module, speaker protection, main module, 2 parallel module, bridge module and 2 parallel module

Bridge application:
1) - 1 TDA729x IC paralleled / bridge
2) - 2 TDA729x IC paralleled / bridge

<table>
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<tr>
<th>8 Ohm</th>
<th>4 Ohm</th>
<th>W</th>
<th>W</th>
<th>V</th>
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<td></td>
<td>120(1)</td>
<td>± 20</td>
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<tr>
<td>125</td>
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<tr>
<td>150</td>
<td></td>
<td>210(1)</td>
<td>± 29</td>
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<tr>
<td>180(1)</td>
<td></td>
<td>250(2)</td>
<td>± 33</td>
<td></td>
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<tr>
<td>220(1)</td>
<td></td>
<td>300(2)</td>
<td>± 40</td>
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</tbody>
</table>

Single application:
1) - 1 TDA729x IC paralleled
2) - 2 TDA729x IC paralleled

<table>
<thead>
<tr>
<th>8 Ohm</th>
<th>4 Ohm</th>
<th>W</th>
<th>W</th>
<th>V</th>
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</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td>50</td>
<td>± 23</td>
<td></td>
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<tr>
<td>40</td>
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<tr>
<td>85</td>
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<td>125(1)</td>
<td>± 40</td>
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</tr>
<tr>
<td>100(1)</td>
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<td>150(2)</td>
<td>± 44</td>
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</tr>
<tr>
<td>120(1)</td>
<td></td>
<td>180(2)</td>
<td>± 47</td>
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</tbody>
</table>

PCB for modular expandable TDA amplifier project
Notes
This module can be used alone for mono - or with speaker protection - for stereo amplifiers. This is the first module for all possible configurations. Conn4 can be connected to the right side of speaker protection only, Conn2 is the input of bridge, parallel or speaker protection modules.

Notes
This is the bridge module of this project. This module can be connected to the right side of first (main) module only. This module duplicate the output power with 8 ohm speakers. 4 Ohm speakers cannot be used with bridge amplifier if parallel modules not used.
PCB for TDA729x amplifier project

Notes

This is very simple, cheap and optional module for all configuration of this amplifier project with UPC1237. This module possible to use for all one channel mono and all two channels stereo configurations. This module (if used) must be connected between the last module of left channel and the first (main) module of right channel. Otherwise, the left side connector (Conn3) of speaker protection must be connected to the last module (main, bridge or parallel) of left channel, and the right side connector (Conn4) must be connected to the (first) main module of right channel.
Examples how to connect modules and build instrument amplifiers

Examples for modular amplifiers
Mono bridge, single and parallel, – stereo bridge and single amp

Mono bridge
- Main module
- Bridge module

Mono parallel
- Main module
- Parallel module

Stereo bridge
- Main module
- Bridge module
- Speaker protection

Mono single
- Main module

Stereo single
- Main module
- Speaker protection
- Main module
Examples for modular amplifiers
Stereo bridge + parallel, – mono bridge + doubled parallel amp with speaker protection
More power with parallel modules up to 800W

Notes

As previous application examples, I offered two parallel module after all main and bridge module on the whole system. With this system by the official datasheet the possible output power is 300W.

For one 300W system these modules required:
- 1 Main module
- 2 Parallel module
- 1 Bridge module
- 2 Parallel module
- Speaker protection with FAN controller

This system contains 6 TDA7293 chips, for stereo application required 12 chips.

But try to increase the maximum number of parallel modules more than 2. If modify the number of 2 parallel modules to 3, the possible output power is around 800W:
- 1 Main module
- 3 Parallel module
- 1 Bridge module
- 3 Parallel module
- Speaker protection with FAN controller

This system contains 8 TDA7293 chips, for stereo application required 16 chips + speaker protection. The 800W output power maybe true if one chip really gives 100W. But this system required more powerful power supply, and better heating system with fan controller.

<table>
<thead>
<tr>
<th>Bridge application:</th>
<th>Single application:</th>
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<tbody>
<tr>
<td>1) - 1 TDA729x IC paralleled / bridge</td>
<td>1) - 1 TDA729x IC paralleled</td>
</tr>
<tr>
<td>2) - 2 TDA729x IC paralleled / bridge</td>
<td>2) - 2 TDA729x IC paralleled</td>
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<table>
<thead>
<tr>
<th>8 Ohm</th>
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<td>W</td>
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<td>85</td>
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<td>175³</td>
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<td>180³</td>
<td>250³</td>
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<tr>
<td>220³</td>
<td>300³</td>
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<table>
<thead>
<tr>
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<td>W</td>
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<td>150³</td>
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<tr>
<td>120³</td>
<td>180³</td>
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</table>
More power with parallel modules
Speaker protection schematic with PWM fan controller V:1

Notes
This new schematic made for this modular amplifier project is PWM fan controller needed. If you build amplifier system with parallel modules, better heating needed. This schematic contains simple speaker protection circuit with UPC1237, but FAN controllers included for 3 12V cooler. These coolers have to be assembled to the heatsink or the case of the amplifier. This new circuit can be used and connected between the left and right channels, or after the last module of one channel of mono application. The 10kOhm RT1 thermal resistor must be fixed to the heatsink.
More power with parallel modules
Speaker protection PCB with PWM fan controller V:1

More power with parallel modules
Speaker protection schematic with PWM fan controller V:2

Notes
This is the second version of speaker protection with new PWM fan controller. The main part of new fan controller is the MIC502 fan controller chip. With this solution the PCB of this circuit can be much smaller. The schematic contains speaker protection with UPC1237. With P1 potentiometer set the "sleep mode", the minimum value of the temperature when the coolers starts. I offer 3 or more 12V coolers for heatsink and for the case, depending on the power of full amplifier system.
More power with parallel modules
Speaker protection PCB with PWM fan controller V:2

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