



Monolithic Power Systems

EV0045 (MP7731)

Compact 25W Class D
Stereo Bridged Audio Amplifier

EVALUATION BOARD – PRELIMINARY INFORMATION

GENERAL DESCRIPTION

The EV0045 is a stereo evaluation board featuring MPS' MP7731 Class D Full Bridge Audio Amplifier. The EV0045 can deliver 25W into a 4Ω load with a 14.5V input supply.

The MP7731 is a mono 30W Class D Audio Amplifier. It is one of MPS' second generation of fully integrated audio amplifiers which dramatically reduces solution size by integrating the following:

- 180mΩ power MOSFETs
- Start up / shut down pop elimination
- Short circuit protection circuits
- Mute / Standby Mode

The MP7731 utilizes a full bridge output structure capable of delivering 30W into 4Ω speakers. As in all other MPS Class D Audio Amplifiers, this device exhibits the high fidelity of a Class A/B amplifier at efficiencies greater than 90%.

FEATURES

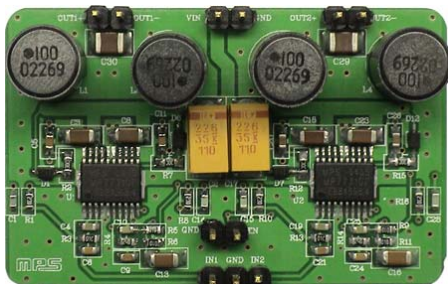
- 25W into 4Ω with 14.5V Input
- 90% Efficiency at 5W
- 9.5V to 14.5V Supply Voltage Operation
- Full Bridge Output Drive
- Integrated 180mΩ Switches
- Turn On / Turn Off Click and Pop Suppression
- Integrated Short Circuit Protection
- Integrated Thermal shutdown
- Mute / Standby Mode

APPLICATIONS

- Notebook and Multimedia Computers
- Television and Home Theatre Systems
- DVD and VCR Players

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EVALUATION BOARD



Dimensions (1.9"X x 1.2"Y)

| Board Number | MPS IC Number |
|--------------|---------------|
| EV0045 | MP7731DF |

ABSOLUTE MAXIMUM RATINGS

Supply Voltage V_{IN} 26V
 BS Voltage..... $V_{SW}-0.3V$ to $V_{SW}+6.5V$
 Enable Voltage V_{EN} -0.3V to 6V
 V_{SW} , V_{PIN} , V_{NIN} -1V to $V_{DD}+1V$
 AGND to PGND -0.3V to 0.3V

Recommended Operating Conditions

Input Voltage V_{DD} 9.5V to 14.5V
 Signal Input Voltage $\pm 1V$ rms
 Signal Input Frequency 20Hz to 20kHz
 Signal Source Impedance less than 600Ω
 External Enable Input 0V to 5V
 Speaker Resistance 4Ω to 8Ω

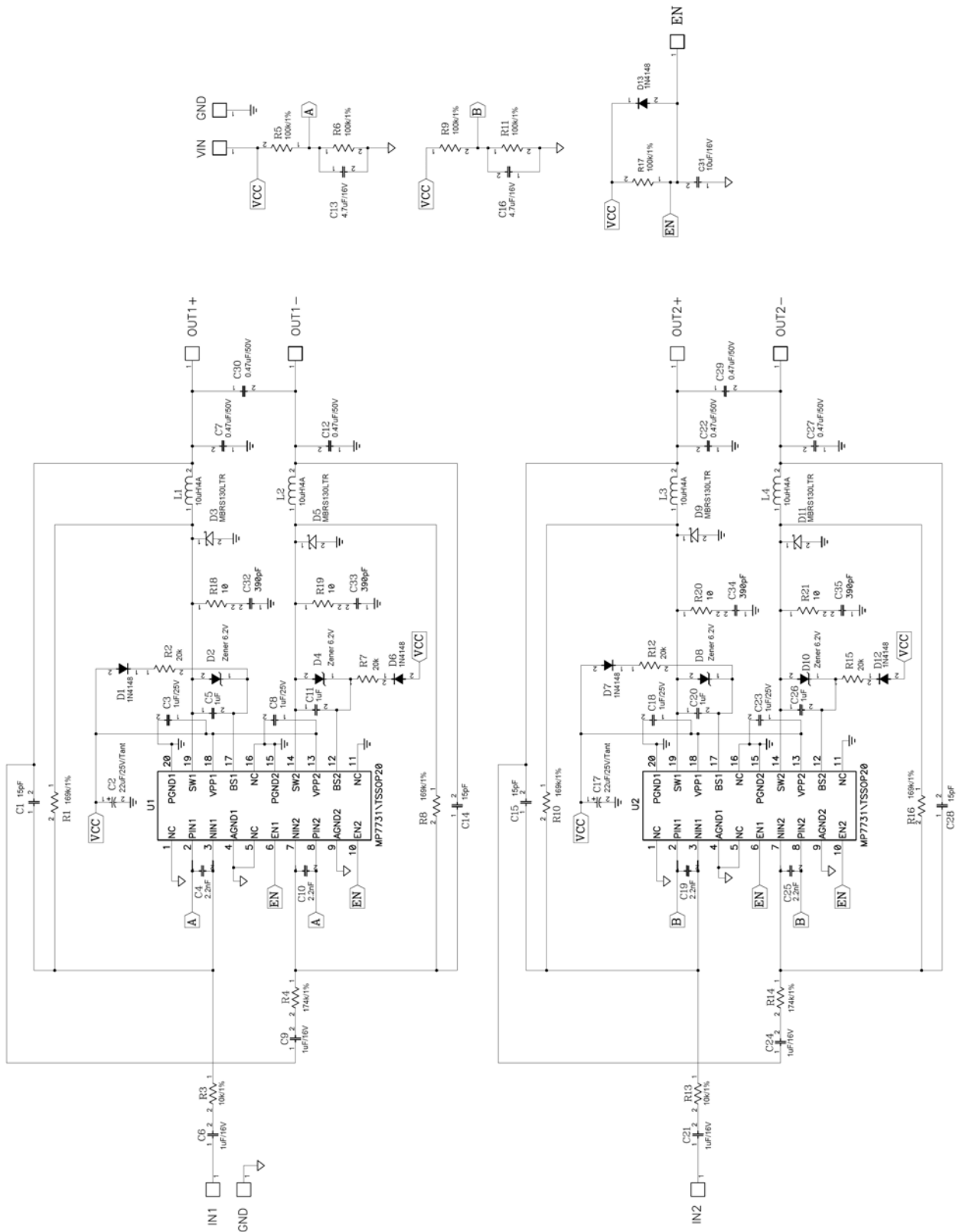


Figure 1: EV0045 Stereo Full Bridge Schematic

Table 1: EV0045 Stereo Full Bridge Bill of Materials

| Item | Qty | Ref Des | Value | Description | Package | Manufacturer | Manufacturer Part Number | Distributor Part Number |
|------|-----|---------|--------|-----------------------------|---------|--------------|--------------------------|-------------------------|
| 1 | 4 | D3 | | Schottky Diode, 30V, 1A | SMB | IRF | MBR5130LTR | MBR5130LCT-ND |
| | | D5 | | | | | | |
| | | D9 | | | | | | |
| | | D11 | | | | | | |
| 2 | 5 | D1 | | Rectifier Diode | SOD-323 | Diodes Inc | 1N4148WS-7 | 1N4148WSCT-ND |
| | | D6 | | | | | | |
| | | D7 | | | | | | |
| | | D12 | | | | | | |
| | | D13 | | | | | | |
| 3 | 4 | D2 | | Zener Diode, 6.2V | SOD-323 | Diodes Inc | BZT52C6V2S-7 | BZT52C6V2SDICT-ND |
| | | D4 | | | | | | |
| | | D8 | | | | | | |
| | | D10 | | | | | | |
| 4 | 2 | C2 | 22uF | Tantalum Cap., 25V | SMD | Panasonic | ECS-T1E0226R | PCC5226CT-ND |
| | | C17 | | | | | | |
| 5 | 4 | C6 | 1uF | Ceramic Capacitor, 16V, X5R | SM0603 | Panasonic | ECJ-1VB1C105K | PCC2224CT-ND |
| | | C9 | | | | | | |
| | | C21 | | | | | | |
| | | C24 | | | | | | |
| 6 | 4 | C4 | 2200pF | Ceramic Capacitor, 50V, X7R | SM0603 | Panasonic | ECU-V1H222KBV | PCC222BVCT-ND |
| | | C10 | | | | | | |
| | | C19 | | | | | | |
| | | C25 | | | | | | |
| 7 | 2 | C13 | 4.7uF | Ceramic Capacitor, 16V, X5R | SM1206 | Panasonic | ECJ-3YB1C475M | PCC2226CT-ND |
| | | C16 | | | | | | |
| 8 | 4 | C1 | 15pF | Ceramic Capacitor, 50V, NPO | SM0603 | Panasonic | ECJ-1VC1H150J | PCC150ACVCT-ND |
| | | C14 | | | | | | |
| | | C15 | | | | | | |
| | | C28 | | | | | | |
| 9 | 4 | C5 | 1uF | Ceramic Capacitor, 16V, X5R | SM0805 | Panasonic | ECJ-2FB1C105K | PCC2249CT-ND |
| | | C11 | | | | | | |
| | | C20 | | | | | | |
| | | C26 | | | | | | |
| 10 | 4 | C3 | 1uF | Ceramic Capacitor, 25V, X7R | SM1206 | Panasonic | ECJ-3YB1E105K | PCC1893CT-ND |
| | | C8 | | | | | | |
| | | C18 | | | | | | |
| | | C23 | | | | | | |

Distributor: Digikey



Table 1: EV0045 Stereo Full Bridge Bill of Materials (continued)

| Item | Qty | Ref Des | Value | Description | Package | Manufacturer | Manufacturer Part Number | Distributor Part Number |
|------|-----|---------|----------|------------------------------|----------|--------------|--------------------------|-------------------------|
| 11 | 6 | C7 | 0.47uF | Ceramic Capacitor, 100V, X7R | SM1210 | Panasonic | ECJ-4YB2A474K | PCC2240CT-ND |
| | | C12 | | | | | | |
| | | C22 | | | | | | |
| | | C27 | | | | | | |
| | | C29 | | | | | | |
| | | C30 | | | | | | |
| 12 | 1 | C31 | 10uF | Ceramic Capacitor, 16V, X5R | SM1206 | Panasonic | ECJ-3YB1C106M | PCC2227CT-ND |
| 13 | 4 | C32 | 390pF | Ceramic Capacitor, 50V, X7R | SM0603 | Panasonic | ECU-V1H391KBV | PCC391BVCT-ND |
| | | C33 | | | | | | |
| | | C34 | | | | | | |
| | | C35 | | | | | | |
| 14 | 2 | U1 | | Class D Amplifier | TSSOP-20 | MPS | MP7731 | |
| | | U2 | | | | | | |
| 15 | 4 | L1 | 10uH | Inductor/2.6A/0.035 Ohm/8RDY | Radial | Toko | A7040HN-100M | |
| | | L2 | | | | | | |
| | | L3 | | | | | | |
| | | L4 | | | | | | |
| 16 | 4 | R2 | 20k Ohm | Film Resistor, 5% | SM0805 | Panasonic | ERJ-6GEYJ203V | P20KACT-ND |
| | | R7 | | | | | | |
| | | R12 | | | | | | |
| | | R15 | | | | | | |
| 17 | 2 | R3 | 10k Ohm | Film Resistor, 1% | SM0603 | Panasonic | ERJ-3EKF1002V | P10.0KHCT-ND |
| | | R13 | | | | | | |
| 18 | 4 | R18 | 10 Ohm | | | | | |
| | | R19 | | Film Resistor, 5% | SM0603 | Panasonic | ERJ-3GEYJ100V | P10GCT-ND |
| | | R20 | | | | | | |
| | | R21 | | | | | | |
| 19 | 5 | R5 | 100k Ohm | Film Resistor, 1% | SM0603 | Panasonic | ERJ-3EKF1003V | P100KHCT-ND |
| | | R6 | | | | | | |
| | | R9 | | | | | | |
| | | R11 | | | | | | |
| | | R17 | | | | | | |
| 20 | 4 | R1 | 169k Ohm | Film Resistor, 1% | SM0603 | Panasonic | ERJ-3EKF1693V | P169KHCT-ND |
| | | R8 | | | | | | |
| | | R10 | | | | | | |
| | | R16 | | | | | | |

Distributor: Digikey

Table 1: EV0045 Stereo Full Bridge Bill of Materials (continued)

| Item | Qty | Ref Des | Value | Description | Package | Manufacturer | Manufacturer Part Number | Distributor Part Number |
|------|-----|----------|----------|--------------------------|---------|--------------|--------------------------|-------------------------|
| 21 | 2 | R4 | 174k Ohm | Film Resistor, 1% | SM0603 | Panasonic | ERJ-3EKF1743V | P174KHCT-ND |
| | | R14 | | | | | | |
| 22 | 10 | TP1-TP10 | | Test Point Square Header | | Sullins | PTC36SAAN | S1012-36-ND |

Distributor: Digikey

EVALUATION BOARD OPERATION

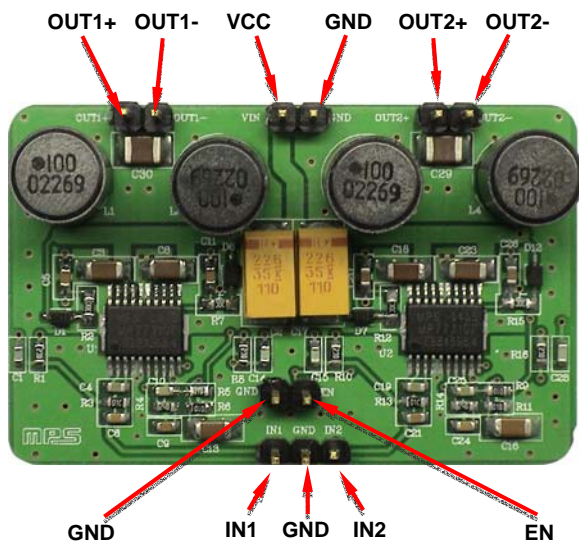


Figure 2: Board Connections

Power Requirements

1. Power supply: 12V
2. 0 -1V_{RMS} (max) audio signal source.
3. Speaker: 4Ω or 8Ω:

Setup Condition for 12V Operation

1. Connect speaker outputs to OUT1+, OUT-, OUT2+, OUT2- respectively.
2. Connect the audio inputs to IN1, GND, IN2 respectively.
3. Adjust the power supply to 12V, (do not turn on)
4. Connect the power supply to the VCC, GND terminals
5. Apply power to the board
6. Audio should be heard from the speaker(s)

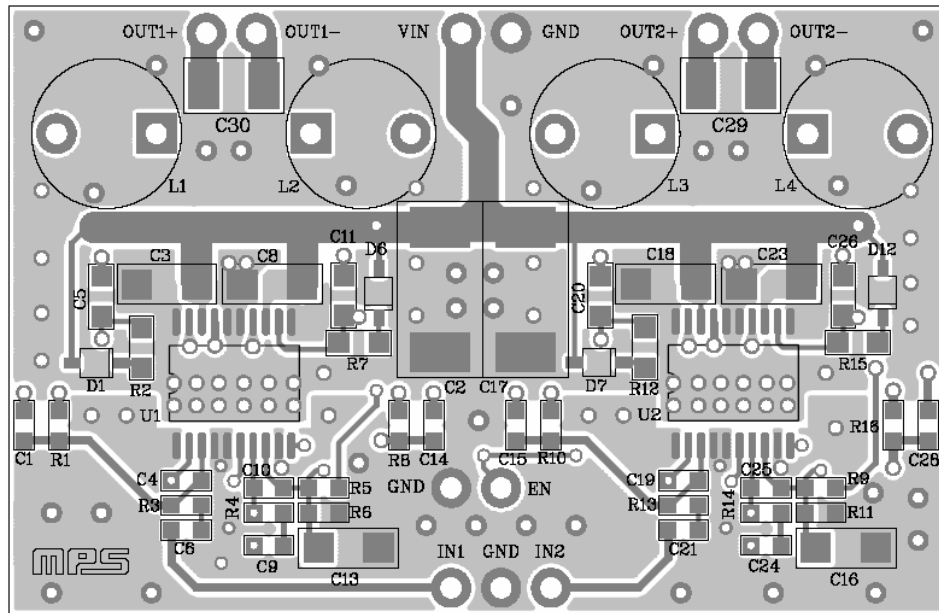


Figure 3: Top Layer with Silkscreen Overlay

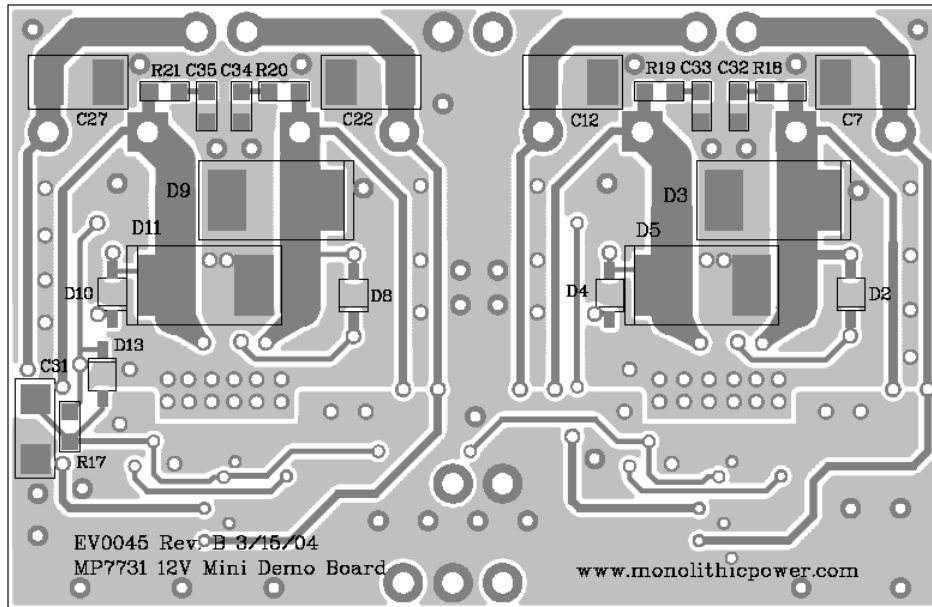


Figure 4: Bottom Layer with Silkscreen Overlay

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