



The Future of Analog IC Technology®

# EV7747DQ-00A

## 2x20W Stereo Single Ended Class D Audio Amplifier Evaluation Board

### DESCRIPTION

The EV7747DQ-00A is the evaluation board for the MP7747, a 20W mono Class D Audio Amplifier. It is one of MPS' products of fully integrated audio amplifiers which dramatically reduce solution size by integrating the following:

- 250mΩ power MOSFETs
- Startup / Shutdown pop elimination
- Short circuit protection circuits

The MP7747 utilizes a single ended output structure capable of delivering 20W into 4Ω speakers. MPS Class D Audio Amplifiers exhibit the high fidelity of a Class A/B amplifier at high efficiency. The circuit is based on the MPS' AAM™ proprietary variable frequency topology that delivers excellent linearity, fast response time and operates on a single power supply.

### ELECTRICAL SPECIFICATIONS

| Parameter      | Symbol   | Value  | Units |
|----------------|----------|--------|-------|
| Supply Voltage | $V_{DD}$ | 9.5~36 | V     |

### FEATURES

- 2 x 20W Output at  $V_{DD} = 24V$  into a 4Ω load
- THD+N = 0.02% at 1W, 8Ω, 1kHz
- 91% Efficiency at 20W and  $V_{DD}=24V$  with 4Ω load
- Low Noise (103μV Typical)
- 9.5V to 36V Operation from a Single Supply

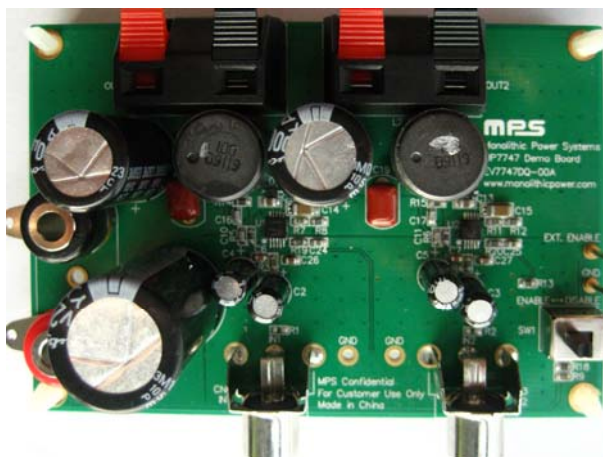
### APPLICATIONS

- Flat Panel TV
- Portable Docking Stations
- Surround Sound DVD Systems
- Televisions
- Multimedia Computers
- Home Stereo Systems

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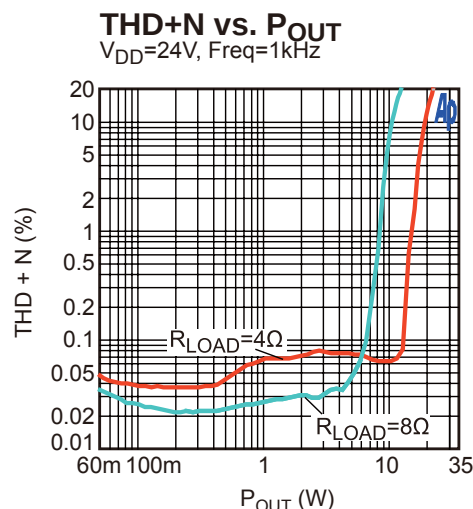
AAM (Analog Adaptive Modulation) is a Trademark of Monolithic Power Systems, Inc.

### EV7747DQ-00A EVALUATION BOARD

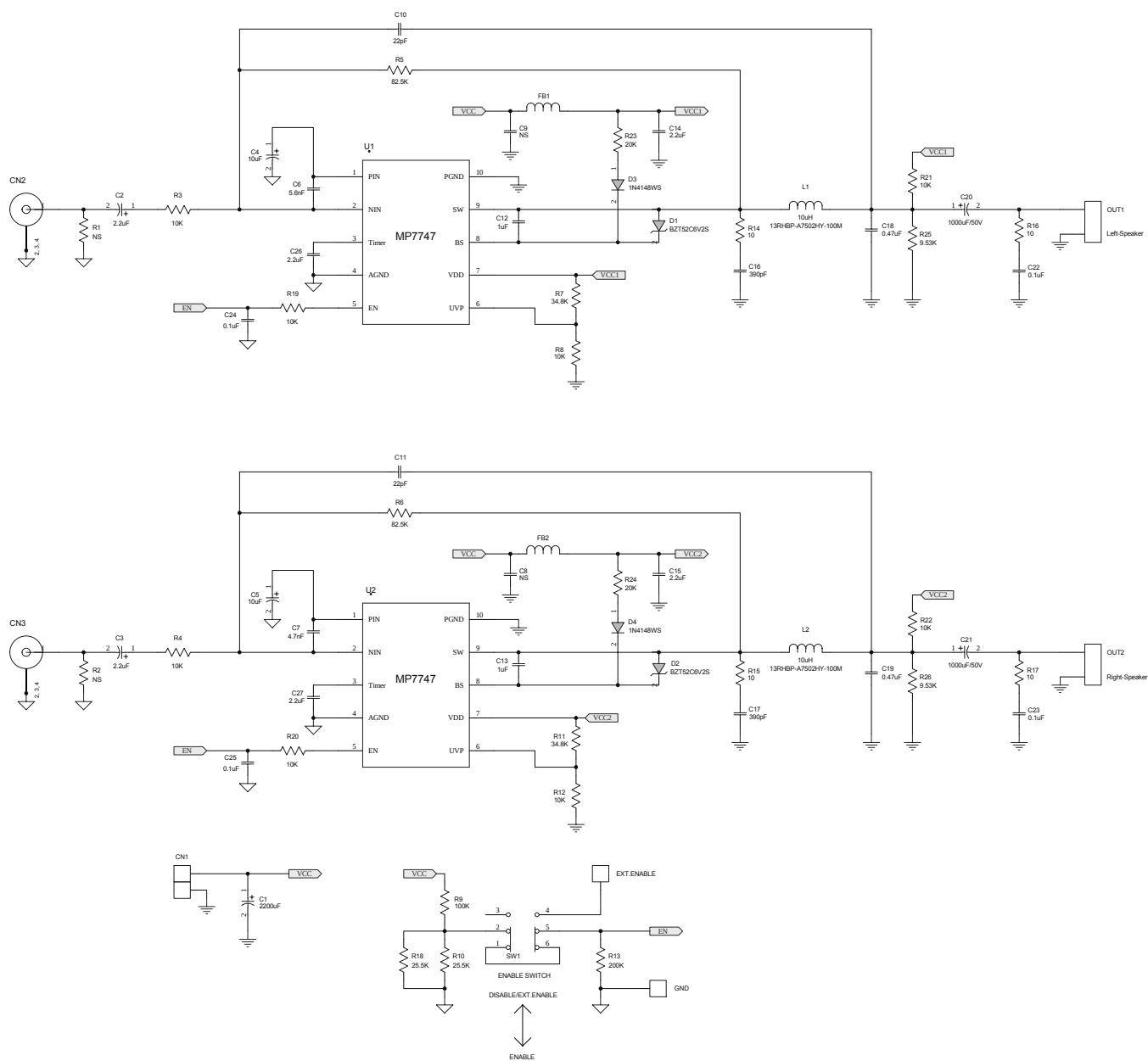


(L x W x H) 3.5" x 2.5" x 1.2"  
9.0cm x 6.3cm x 3.0cm

| Board Number | MPS IC Number |
|--------------|---------------|
| EV7747DQ-00A | MP7747DQ      |



## EVALUATION BOARD SCHEMATIC



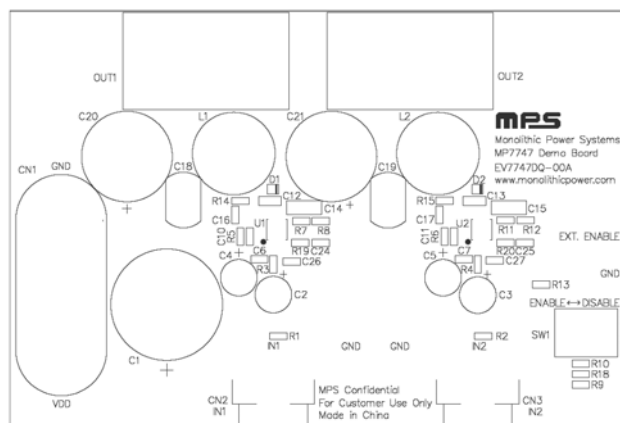
## EV7747DQ-00A BILL OF MATERIALS

| Qty | Ref                                 | Value       | Description                       | Package | Manufacturer | Manufacturer P/N    |
|-----|-------------------------------------|-------------|-----------------------------------|---------|--------------|---------------------|
| 1   | C1                                  | 2200µF      | Electrolytic Capacitor; 50V       | DIP     | Rubycon      |                     |
| 2   | C2, C3                              | 2.2µF       | Electrolytic Capacitor; 50V       | DIP     | Rubycon      |                     |
| 2   | C4, C5                              | 10µF        | Electrolytic Capacitor; 50V       | DIP     | Rubycon      |                     |
| 1   | C6                                  | 5.6nF       | Ceramic Capacitor; 50V; X7R; 0603 | 0603    | muRata       | GRM188R71H562KA01   |
| 1   | C7                                  | 4.7nF       | Ceramic Capacitor; 50V; X7R; 0603 | 0603    | muRata       | GRM188R71H472KA01D  |
| 2   | C8, C9                              | NS          |                                   | 0603    |              |                     |
| 2   | C10, C11                            | 22pF        | Ceramic Capacitor; 50V; C0G; 0603 | 0603    | TDK          | C1608C0G1H220J      |
| 2   | C12, C13                            | 1µF         | Ceramic Capacitor; 16V; X7R; 0805 | 0805    | muRata       | GRM21BR71C105KA01   |
| 2   | C14, C15                            | 2.2µF       | Ceramic Capacitor; 50V; X7R; 1206 | 1206    | muRata       | GRM31CR71H225KA88L  |
| 2   | C16, C17                            | 390pF       | Ceramic Capacitor; 50V; C0G; 0603 | 0603    | muRata       | GRM1885C1H391JA01D  |
| 2   | C18, C19                            | 0.47µF      | CBB Capacitor; 50V                | DIP     | Panasonic    |                     |
| 2   | C20, C21                            | 1000µF      | Electrolytic Capacitor; 50V       | DIP     | Rubycon      |                     |
| 2   | C22, C23                            | 0.1µF       | Ceramic Capacitor; 50V; X7R; 0603 | 0603    | muRata       | GRM188R71H104KA93D  |
| 2   | C24, C25                            | 0.1µF       | Ceramic Capacitor; 16V; X7R; 0603 | 0603    | muRata       | GRM188R71C104KA01D  |
| 2   | C26, C27                            | 2.2µF       | Ceramic Capacitor; 10V; X7R; 0603 | 0603    | muRata       | GRM188R71A225KE15   |
| 2   | D1, D2                              | BZT52 C6V2S | Zener Diode; 6.2V; 5mA/200mW      | SOD-323 | Diodes       | BZT52C6V2S-7-F      |
| 2   | D3, D4                              | 1N414 8WS   | Diode; 75V; 0.15A                 | SOD-323 | Diodes       | 1N4148WS-7-F        |
| 2   | FB1, FB2                            |             | Magnetic Bead                     | 1206    | LION         | PB321611-320        |
| 2   | L1, L2                              | 10µH        | Inductor; 10µH; 18mΩ; 3.61A       | DIP     | TOKO         | 13RHBP-A7502HY-100M |
| 2   | R1, R2                              | NS          |                                   | 0603    |              |                     |
| 8   | R3, R4, R8, R12, R19, R20, R21, R22 | 10kΩ        | Film Resistor; 1%                 | 0603    | Royalohm     | 0603F1002T5E        |
| 2   | R5, R6                              | 82.5kΩ      | Film Resistor; 1%                 | 0603    | Yageo        | RC0603FR-0782K5L    |
| 2   | R7, R11                             | 34.8kΩ      | Film Resistor; 1%                 | 0603    | Yageo        | RC0603FR-0734K8L    |
| 1   | R9                                  | 100kΩ       | Film Resistor; 1%                 | 0603    | Royalohm     | 0603F1003T5E        |
| 2   | R10, R18                            | 25.5kΩ      | Film Resistor; 1%                 | 0603    | Yageo        | RC0603FR-0725K5L    |
| 1   | R13                                 | 200kΩ       | Film Resistor; 5%                 | 0603    | Yageo        | RC0603JR-07200KL    |
| 2   | R14, R15                            | 10Ω         | Film Resistor; 1%                 | 0603    | Yageo        | RC0603FR-0710RL     |
| 2   | R16, R17                            | 10Ω         | Film Resistor; 1%                 | 1206    | Yageo        | RC1206FR-0710RL     |

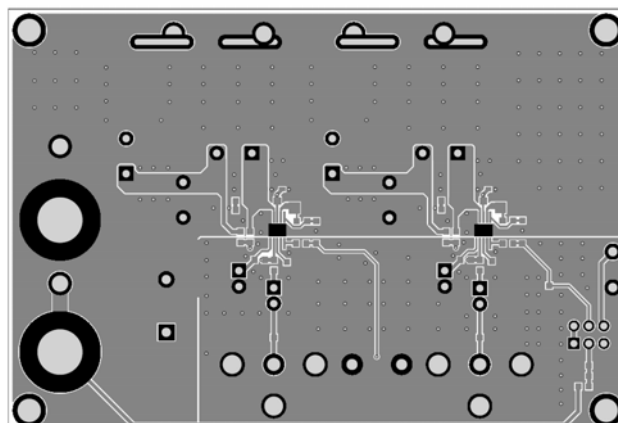
**EV7747DQ-00A BILL OF MATERIALS (Continued)**

| Qty | Ref        | Value  | Description              | Package | Manufacturer | Manufacturer P/N |
|-----|------------|--------|--------------------------|---------|--------------|------------------|
| 2   | R23, R24   | 20kΩ   | Film Resistor; 1%        | 0603    | Yageo        | RC0603FR-0720KL  |
| 2   | R25, R26   | 9.53kΩ | Film Resistor; 1%        | 0603    | Yageo        | RC0603FR-079K53L |
| 1   | SW1        |        | DPDT Slide Switch        | DIP     | Any          |                  |
| 1   | CN1        |        | Connector; Red and Black |         | Any          |                  |
| 2   | CN2, CN3   |        | RCA Connector            | DIP     | Any          |                  |
| 2   | OUT1, OUT2 |        | Connector                | DIP     | Any          |                  |
| 2   | U1, U2     |        | Class D Audio Amplifier  | QFN10   | MPS          | MP7747DQ         |

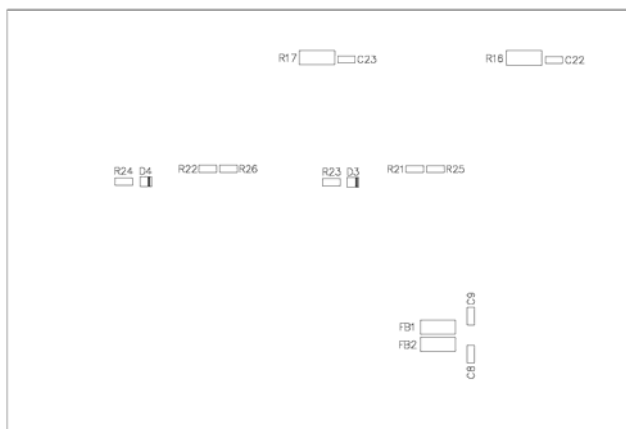
## PRINTED CIRCUIT BOARD LAYOUT



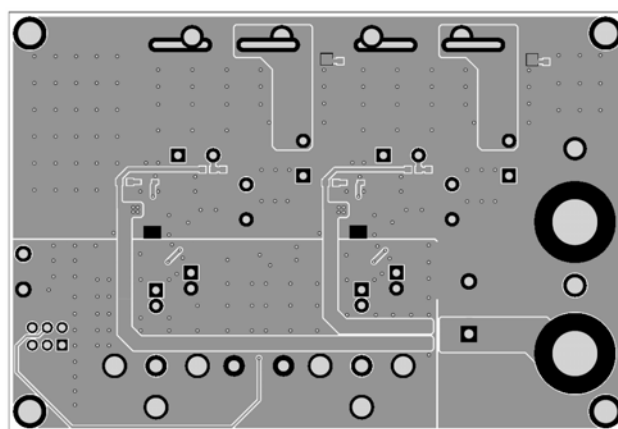
**Figure 1—Top Silk Layer**



**Figure 2—Top Layer**



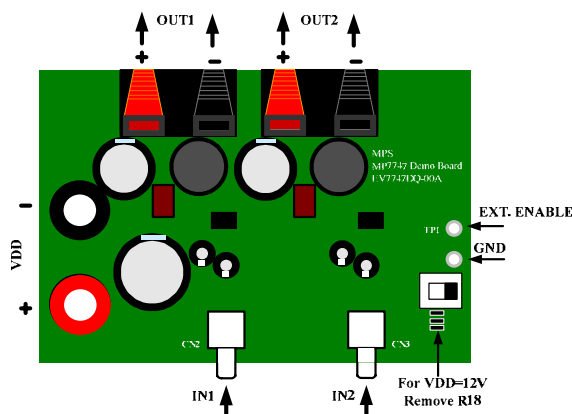
**Figure 3—Bottom Silk Layer (Mirror)**



**Figure 4—Bottom Layer (Mirror)**

## QUICK START GUIDE

This board is set up from the factory for 24V operation. To use with 36V (12V) power supply, adjust the components as specified in the 36V (12V) Operation Modifications section below. For more information, consult the MP7747 datasheet.



**Figure 5—EV7747DQ-00A Connection Diagram**

1. Power Requirements
  - a. Power supply: 9.5V to 36V, 4.5A maximum.
  - b. 0V to 1.5VRMS (max) audio signal source.
  - c. Speaker: typically 4Ω to 8Ω;
2. Setup Condition for 24V Operation
  - a. Adjust the power supply to 24V (do not turn on).
  - b. Connect the outputs to the external speakers.
  - c. Connect the power supply to the VDD terminals.
  - d. Set the enable switch to the DISABLE position.
  - e. Connect the audio input signal source to the amplifier inputs (CN2, CN3).
  - f. Turn on the power supply.
3. 36V Operation Modifications
  - a. Change C6 to 8.2nF and C7 to 6.8nF.
  - b. Change R7 & R11 to 64.9k Ω to set 30V VDD shutdown voltage.
  - c. Adjust the power supply to 36V (do not turn on).
  - d. Do as step b~f specified in Section 2.
4. 12V Operation Modifications
  - a. Change C6 to 3.3nF and C7 to 2.2nF.
  - b. Change R7 & R11 to 15kΩ to set 10V VDD shutdown voltage.
  - c. Remove R18 to make sure EN signal is high enough @ 12V VDD.
  - d. Adjust the power supply to 12V (do not turn on).
  - e. Do as step b~f specified in Section 2.
5. Music Turn-On Sequence
 

Set the enable switch to the ENABLE position.
6. Music Turn-Off Sequence
  - a. Set the enable switch to the DISABLE position.
  - b. Turn off the power supply.

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