



The Future of Analog IC Technology®

# EV7782DF-02

## 40W Class D Stereo Bridged Audio Amplifier Evaluation Board

### DESCRIPTION

The EV7782DF-02 is a stereo evaluation board for MPS' MP7782 Class D Bridged Audio Amplifier. It is a second generation, fully integrated audio amplifier which dramatically reduces solution size by integrating four 180mΩ Power MOSFETs in a space saving TSSOP20 Package. It utilizes a full bridge output structure capable of delivering 40W into 8Ω speakers. As in all other MPS Class D Audio Amplifiers, this device exhibits the high fidelity of a Class AB amplifier with an efficiency of 90%. The circuit is based on the MPS' proprietary variable frequency modulation topology (patents pending) that delivers excellent PSRR, fast response time and operates on a single power supply.

### ELECTRICAL SPECIFICATIONS

| Parameter      | Symbol          | Value     | Units |
|----------------|-----------------|-----------|-------|
| Supply Voltage | V <sub>DD</sub> | 9.5 to 24 | V     |

### FEATURES

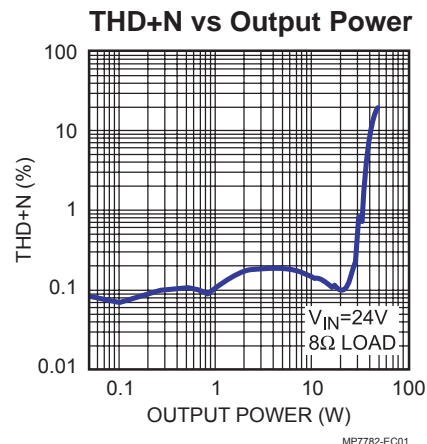
- 2 x 40W Peak, 2 x 30W Continuous into 8Ω with V<sub>DD</sub> = 24V
- 90% Efficiency
- THD+N = 0.1%
- 9.5V to 24V Supply Voltage Operation
- Full Bridge Output Drive
- 4 Integrated 180mΩ Switches
- Turn-On / Turn-Off Click and Pop Suppression
- Integrated Short Circuit Protection
- Integrated Thermal Shutdown
- Mute / Standby Mode
- Thermally Enhanced TSSOP20F Package with Exposed Pad

### APPLICATIONS

- Flat Panel LCD and PDP Displays
- Notebook and Multimedia Computers
- Televisions
- Home Stereos
- DVD and VCD Players
- Game Devices and Systems
- Subwoofer

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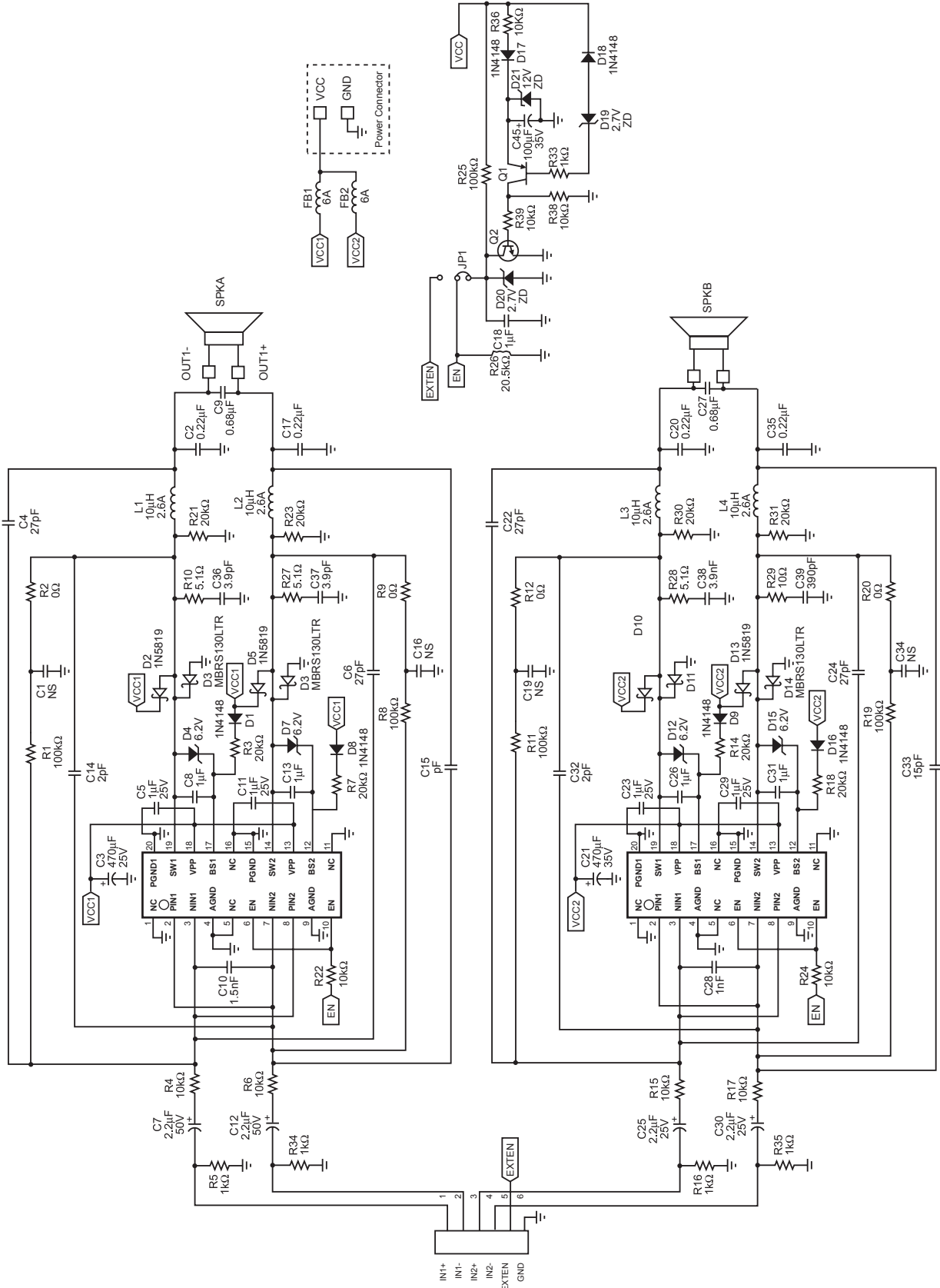
## EV7782DF-01A EVALUATION BOARD



Dimensions (L x W x H) 4.0" x 3.5" x 1.0" (10cm x 9cm x 2.5cm)

| Board Number | MPS IC Number |
|--------------|---------------|
| EV7782DF-02A | 2 x MP7782DF  |

EVALUATION BOARD SCHEMATIC



EV7782\_S01

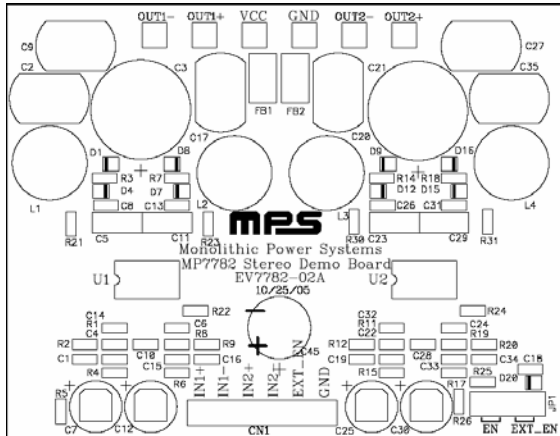
**EV7782DF-02A BILL OF MATERIALS**

| Qty | Ref                       | Value  | Description                      | Package | Manufacturer P/N            | Distributor P/N              |
|-----|---------------------------|--------|----------------------------------|---------|-----------------------------|------------------------------|
| 2   | C10, C28                  | 1nF    | Ceramic Capacitor, 50V, X7R      | 0603    | TDK<br>C1608X7R1H102K       | Digikey<br>445-1308-1-ND     |
| 5   | C8, C13, C18, C26, C31    | 1µF    | Ceramic Capacitor, 16V, X5R      | 0603    | TDK<br>C1608X5R1C105K       | Digikey<br>445-1416-1-ND     |
| 4   | C6, C14, C24, C32         | 2pF    | Ceramic Capacitor, 50V, NPO      | 0603    | Panasonic<br>ECJ-1VC1H020C  | Digikey<br>PCC020CVCT-ND     |
| 4   | C36, C37, C38, C39        | 3.9nF  | Ceramic Capacitor, 50V, X7R      | 0603    | Panasonic<br>ECJ-1VB1H392K  | Digikey<br>PCC1779CT-ND      |
| 4   | C4, C15, C22, C33         | 15pF   | Ceramic Capacitor, 50V, NPO      | 0603    | TDK<br>C1608C0G1H150J       | Digikey<br>445-1271-1-ND     |
| 4   | C1, C16, C19, C34         |        | Do Not Stuff                     | 0603    |                             |                              |
| 4   | C5, C11, C23, C29         | 1µF    | Ceramic Capacitor, 25V, X7R      | 1206    | TDK<br>C3216X7R1E105K       | Digikey<br>445-1381-1-ND     |
| 4   | C7, C12, C25, C30         | 2.2µF  | Electrolytic Capacitor, 50V, NHG | Radial  | Panasonic<br>ECA-1HHG2R2    | Digikey<br>P5564-ND          |
| 4   | C2, C17, C20, C35         | 0.22µF | Film Capacitor, 50V, V-Series    | Radial  | Panasonic<br>ECQ-V1H224JL   | Digikey<br>P4667-ND          |
| 2   | C9, C27                   | 0.68µF | Film Capacitor, 50V, V-Series    | Radial  | Panasonic<br>ECQ-V1H684JL   | Digikey<br>P4673-ND          |
| 2   | C3, C21                   | 470µF  | Electrolytic Capacitor, 25V, NHG | Radial  | Panasonic<br>ECA-1EHG471    | Digikey<br>P5543-ND          |
| 1   | C45                       | 100µF  | Electrolytic Capacitor, 35V, NHG | Radial  | Panasonic<br>ECA-1VHG101    | Digikey<br>P5551-ND          |
| 1   | CN1                       |        | 6-Pin Header, 0.1"               |         |                             |                              |
| 6   | D1, D8, D9, D16, D17, D18 |        | Diode Switch, 75V, 200mW         | SOD323  | Diodes Inc.<br>1N4148WS-7   | Digikey<br>1N4148WSDICT-ND   |
| 4   | D2, D5, D10, D13          |        | Diode Schottky, 40V, 1A          | SOD123  | Diodes Inc.<br>1N5819HW-7   | Digikey<br>1N5819HWDICT-ND   |
| 4   | D4, D7, D12, D15          |        | Diode Zener, 6.2V, 200mW         | SOD323  | Diodes Inc.<br>BZT52C6V2S-7 | Digikey<br>BZT52C6V2SDICT-ND |
| 4   | D3, D6, D11, D14          |        | Diode Schottky, 30V, 1A          | SMB     | IR<br>MBRS130LTR            | Digikey<br>MBRS130LCT-ND     |
| 1   | D21                       |        | Diode Zener, 12V, 200mW          | SOD323  | Diodes Inc.<br>BZT52C12S-7  | Digikey<br>BZT52C12SDICT-ND  |
| 1   | D19                       |        | Diode Zener, 2.7V, 200mW         | SOD323  | Diodes Inc.<br>BZT52C2V7S-7 | Digikey<br>BZT52C2V7SDICT-ND |
| 1   | D20                       |        | Diode Zener, 2.7V, 200mW         | SOD323  | Diodes Inc.<br>BZT52C2V7S-7 | Digikey<br>BZT52C2V7SDICT-ND |
| 2   | FB1, FB2                  |        | Ferrite Bead, 6A                 | 1206    | Steward<br>HI1206T500R-00   | Digikey<br>240-1009-1-ND     |
| 1   | JP1                       |        | 3-Pin Header, 0.1"               |         |                             |                              |

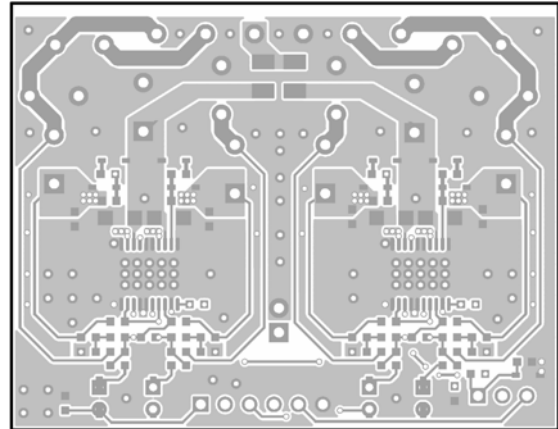
**EV7782DF-02A BILL OF MATERIALS** (continued)

| Qty | Ref                                       | Value  | Description             | Package | Manufacturer P/N           | Distributor P/N            |
|-----|---|--------|-------------------------|---------|----------------------------|----------------------------|
| 4   | L1, L2, L3, L4                            | 10μH   | Inductor, 2.6A, 8RDY    | Radial  | Toko<br>A7040HN-100M       |                            |
| 1   | Q1  |        | Transistor, PNP, 40V    | SOT-23  | Fairchild<br>MMBT3906      | Digikey<br>MMBT3906FSCT-ND |
| 1   | Q2  |        | Transistor, NPN, 40V    | SOT-23  | Fairchild<br>MMBT3904      | Digikey<br>MMBT3904FSCT-ND |
| 4   | R2, R9, R12, R20                          | 0Ω     | Film Resistor, 5%       | 0603    | Panasonic<br>ERJ-3GEY0R00V | Digikey<br>P0.0GCT-ND      |
| 5   | R5, R16, R34, R33, R35                    | 1kΩ    | Film Resistor, 5%       | 0603    | Panasonic<br>ERJ-3GEYJ102V | Digikey<br>P1.0KGCT-ND     |
| 9   | R4, R6, R15, R17, R22, R24, R36, R38, R39 | 10kΩ   | Film Resistor, 5%       | 0603    | Panasonic<br>ERJ-3GEYJ103V | Digikey<br>P10KGCT-ND      |
| 8   | R3, R7, R14, R18, R21, R23, R30, R31      | 20kΩ   | Film Resistor, 5%       | 0603    | Panasonic<br>ERJ-3GEYJ203V | Digikey<br>P20KGCT-ND      |
| 1   | R26                                       | 20.5kΩ | Film Resistor, 1%       | 0603    | Panasonic<br>ERJ-3EKF2052V | Digikey<br>P20.5KHCT-ND    |
| 5   | R1, R8, R11, R19, R25                     | 100kΩ  | Film Resistor, 1%       | 0603    | Panasonic<br>ERJ-3EKF1003V | Digikey<br>P100KHCT-ND     |
| 4   | R10, R27, R28, R29                        | 5.1Ω   | Film Resistor, 5%       | 1206    | Panasonic<br>ERJ-8GEYJ5R1V | Digikey<br>P5.1ECT-ND      |
| 2   | U1, U2                                    |        | Class D Audio Amplifier | TSSOP20 | MPS<br>MP7782DF            |                            |

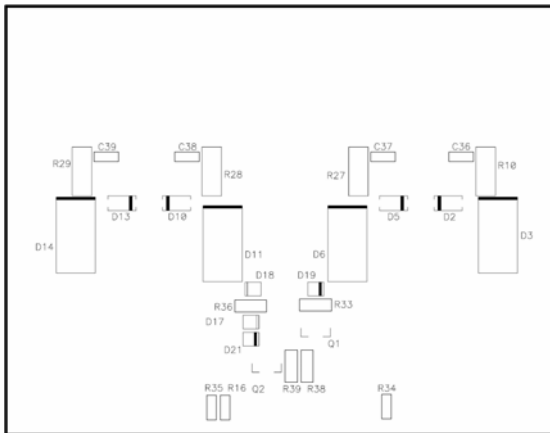
**PRINTED CIRCUIT BOARD LAYOUT**



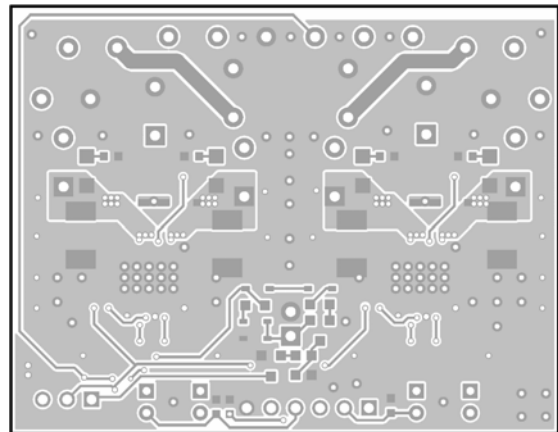
**Figure 1—Top Silk Layer**



**Figure 2—Top Layer**



**Figure 3—Bottom Silk Layer**



**Figure 4—Bottom Layer**

## QUICK START GUIDE

This board is factory set for 24V operation.

1. Power Requirements
  - a. Power supply: 24V.
  - b. 0V to 1V<sub>RMS</sub> (max) audio signal source.
  - c. Speaker: 8Ω or greater load resistance.
2. Setup Conditions
  - a. Connect the outputs to the external speakers.
  - b. Adjust the power supply to 24V, (do not turn on).
  - c. Connect the power supply to the V<sub>DD</sub> terminals.
  - d. Disable the amplifier by removing the enable jumper JP1.
  - e. Connect the audio input signal source to the amplifier inputs (IN1, IN2).
  - f. Turn on the power supply to apply power to the board.
3. Music Turn-On Sequence
  - a. Enable the amplifier by placing jumper JP1.
  - b. Audio should be heard from the speaker(s)
4. Music Turn-Off Sequence
  - a. Set the enable switch to the DISABLE position, again by removing jumper JP1.

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