EV7770-F-01A

2 x 45W Stereo Single-Ended Class-D Audio Amplifier Evaluation Board

DESCRIPTION

The EV7770-F-01A is a single-ended configuration evaluation board designed to demonstrate the capabilities of the MP7770, an analog Class-D audio amplifier that can deliver 45W per channel to a 4Ω speaker under a 36V input voltage (V_{DD}). It is part of MPS's family of fully integrated audio amplifiers that dramatically reduce solution size by integrating 100mΩ power MOSFETs, start-up/shutdown pop elimination, and short-circuit protection (SCP) circuits.

MPS's Class-D audio amplifiers demonstrate the high fidelity of a Class-A or Class-B amplifier at higher efficiencies. The circuit is based on MPS's proprietary variable-frequency topology, which delivers excellent linearity, fast response time, and operates from a single power supply.

The MP7770 is available in a TSSOP-28EP package.

PERFORMANCE SUMMARY (1)

Specifications are at T_A = 25°C, unless otherwise noted.

Parameters	Conditions	Value
Input voltage (V_{DD}) range		9.5V to 36V

EV7770-F-01A EVALUATION BOARD

LxWxH (9cmx6.1cmx4cm)

Board Number	MPS IC Number
EV7770-F-01A	MP7770GF

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QUICK START GUIDE

The EV7770-F-01A evaluation board is configured at the factory for 24V single-ended operation. To use the EV7770-F-01A with a 36V or 12V power supply, adjust the components according to step 5 or step 6, respectively. Refer to the MP7770 datasheet for more details. For proper measurement equipment set-up, refer to Figure 1 and follow the steps below:

1. Set the power supply between 9.5V to 36V.
2. Set the audio signal source between $0V_{RMS}$ and $2V_{RMS}$ (max)
3. Set the speaker between 3Ω and 8Ω (typically).
4. For 24V operation, follow the steps below:
    a. Adjust the power supply to 24V, then keep the power supply turned off.
    b. Connect the outputs to the external speakers.
    c. Connect the power supply to the VDD terminals.
    d. Disable the enable switch.
    e. Connect the audio input signal source to the amplifier input (CN1).
    f. After making the connections, turn on the power supply.
5. For 36V operation with a 3Ω minimum resistance load, follow the steps below:
    a. Refer to Table 2 in the MP7770 datasheet to optimize the frequency.
    b. Adjust R16 to 64.3kΩ to set the 30V input voltage (V_{DD}) shutdown voltage.
    c. Adjust the power supply to 36V, then keep the power supply turned off.
    d. Follow steps 4b to 4f.
6. For 12V operation, follow the steps below:
    a. Refer to Table 2 in the MP7770 datasheet to optimize the frequency.
    b. Adjust R16 to 16.9kΩ to set the 9.5V V_{DD} shutdown voltage.
    c. Adjust R15 to 27kΩ to ensure sufficient EN voltage (V_{EN}) at 12V V_{DD}.
    d. Adjust the power supply to 12V, then keep the power supply turned off.
    e. Follow steps 4b to 4f.
7. For the music turn-on sequence, enable the enable switch.
8. For the music turn-off sequence, disable the enable switch, then turn off the power supply.

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9. Table 1 shows the OTW and FAULT pin settings for error reporting.

Table 1: OTW or FAULT Indication

Pin Setting		Error Reporting Description		
FAULT	**OTW**	**Over-Temperature (OT) Warning**	**Over-Temperature Protection (OTP)**	**Over-Current Protection (OCP)**
0	0	0	0	0
0	1	1	0	0
1	0	0	0	1
1	1	0	1	0

10. Figure 1 shows the measurement equipment set-up.

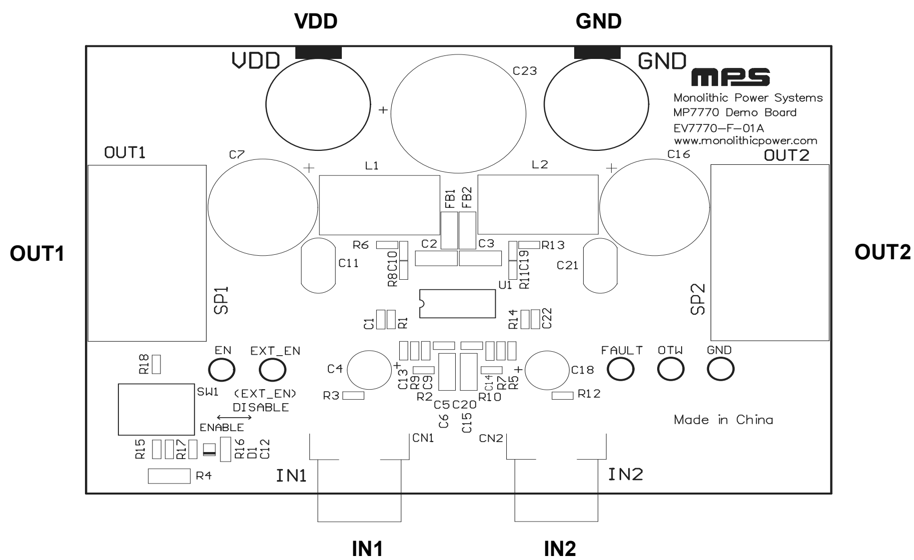

Figure 1: Measurement Equipment Set-Up

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EVALUATION BOARD SCHEMATIC

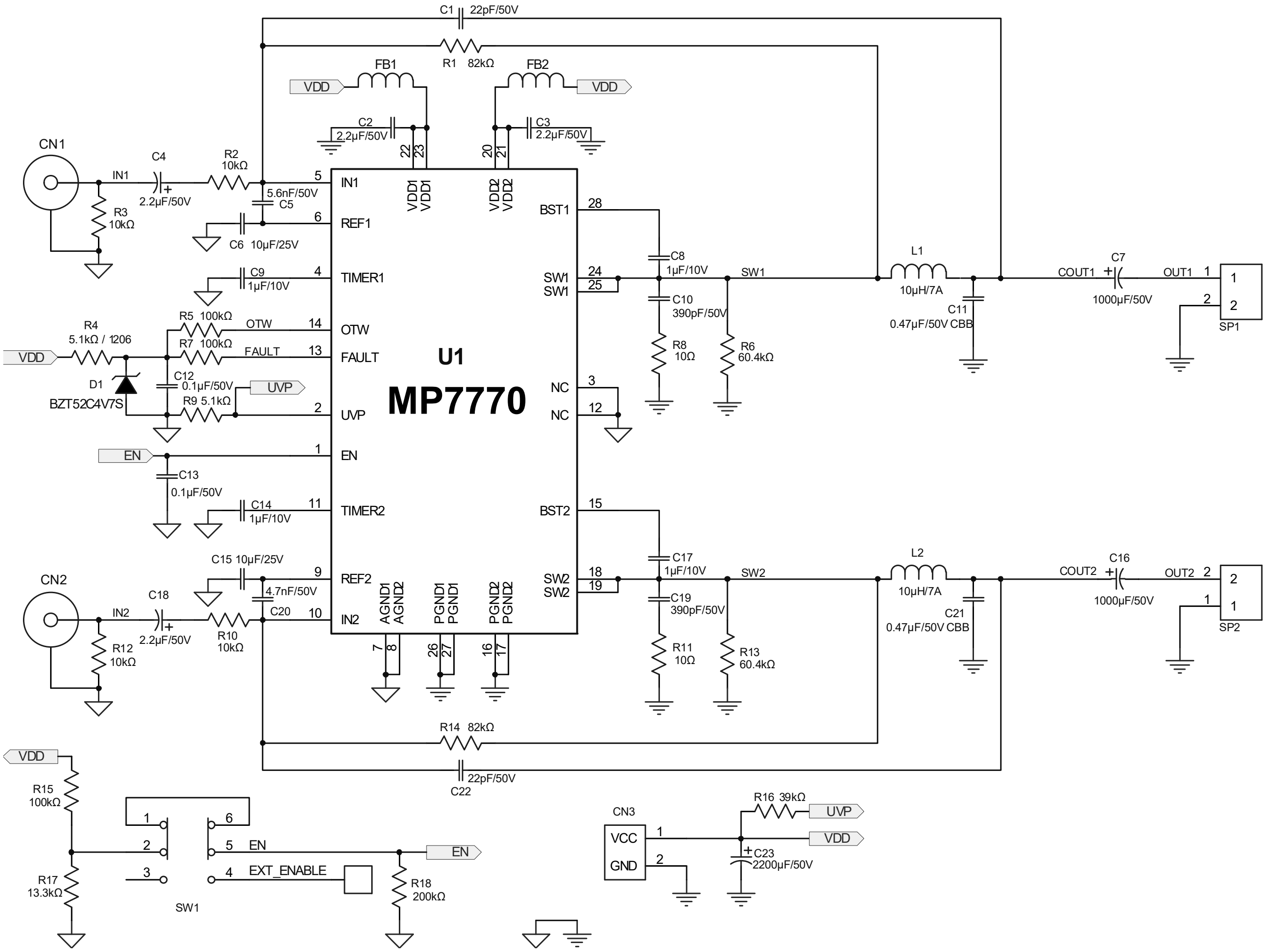

Figure 2: Evaluation Board Schematic

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EV7770-F-01A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
2	C1, C22	22pF	Ceramic capacitor, 50V, C0G	0603	TDK	C1608C0G1H220J
2	C2, C3	2.2µF	Ceramic capacitor, 50V, X7R	1206	Murata	GRM31CR71H225KA88L
2	C4, C18	2.2µF	Electrolytic capacitor, 50V	DIP	Rubycon	50YXF2R2MEFC5X11
1	C5	5.6nF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H562KA01
2	C6, C15	10µF	Ceramic capacitor, 25V, X5R	1206	Murata	GRM31CR61E106KA12L
2	C7, C16	1000µF	Electrolytic capacitor, 50V	DIP	Rubycon	SK050YXA102MEFC
4	C8, C9, C14, C17	1µF	Ceramic capacitor, 10V, X7R	0603	Murata	GRM188R71A105KA61D
2	C10, C19	390pF	Ceramic capacitor, 50V, C0G	0603	TDK	C1608C0G1H391J
2	C11, C21	0.47µF	Ceramic capacitor, 50V, CBB	DIP	Panasonic	ECQV1H474JL
2	C12, C13	0.1µF	Ceramic capacitor, 50V, X7R	0603	Murata	GRM188R71H104KA93D
1	C20	4.7nF	Ceramic capacitor, 50V, X7R	0603	TDK	C1608X7R1H472K
1	C23	2200µF	Electrolytic capacitor, 50V	DIP	Rubycon	SK050YXA222MEFC
2	R1, R14	82kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0782KL
4	R2, R3, R10, R12	10kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	R4	5.1kΩ	Film resistor, 1%, 1/4W	1206	Yageo	RC1206FR-075K1L
3	R5, R7, R15	100kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
2	R6, R13	60.4kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0760K4L
2	R8, R11	10Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0710RL
1	R9	5.1kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-075K1L
1	R16	39kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0739KL
1	R17	13.3kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-0713K3L
1	R18	200kΩ	Film resistor, 1%	0603	Yageo	RC0603FR-07200KL
2	FB1, FB2	6A	Magnetic bead, 6A	1206	Murata	BLM31PG330SN1
2	L1, L2	10µH	Digital audio inductor, 8.5A, 9mΩ	DIP	Wurth	7444011480100
1	D1	5mA	Zener diode, 4.7V	SOD-323	Diodes, Inc.	BZT52C4V7S-7-F
2	CN1, CN2	12mm	RCA connector	DIP	Any	
1	VDD	11mm	Female banana connector, red	DIP	Any	
1	GND	11mm	Female banana connector, black	DIP	Any	
1	SP1	24mm	Speaker connector	DIP	Any	
1	SP2	24mm	Speaker connector	DIP	Any	
1	SW1	9mm	DPDT switch	DIP	Any	
1	U1	MP7770	2 x 45W stereo SE Class-D audio amplifier	TSSOP-28EP	MPS	MP7770GF

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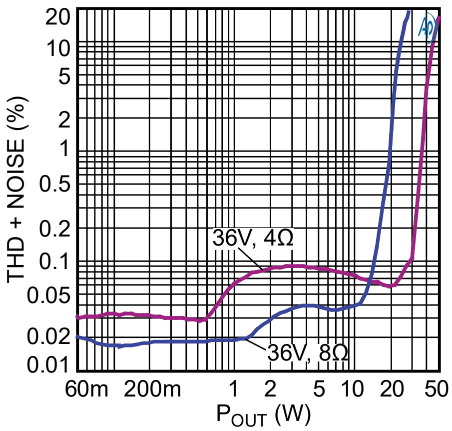
EVB TEST RESULTS

THD + Noise vs. Output Power
Signal frequency = 1kHz



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PCB LAYOUT

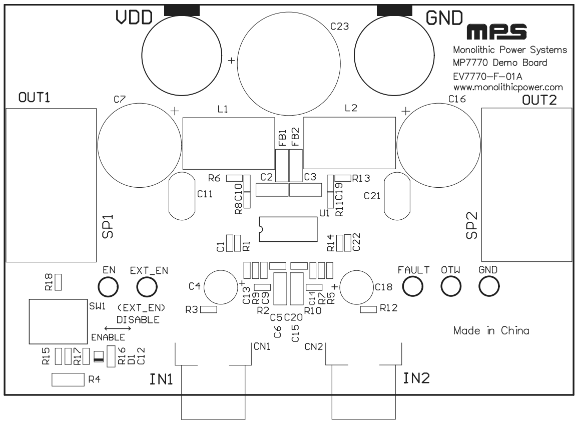

Figure 3: Top Silk

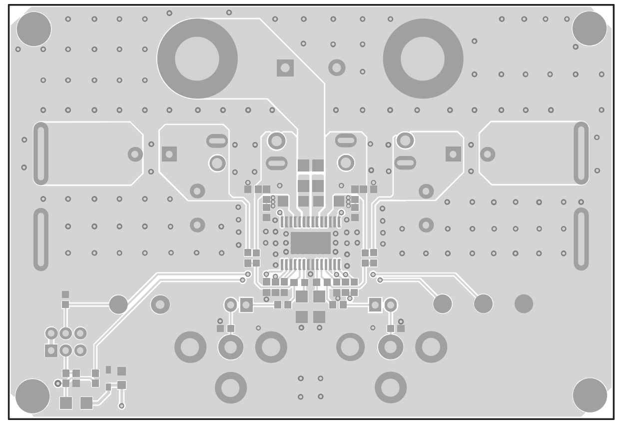

Figure 4: Top Layer

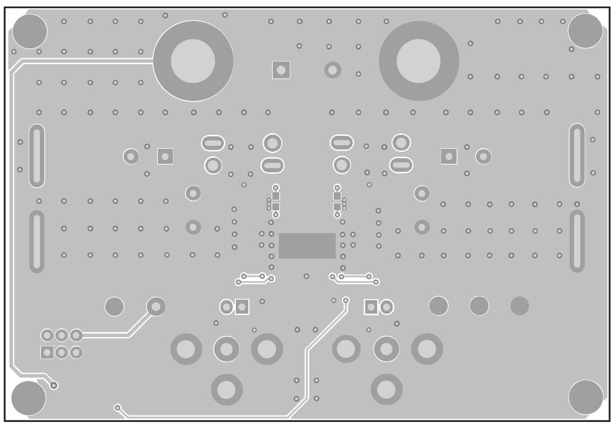

Figure 5: Bottom Layer

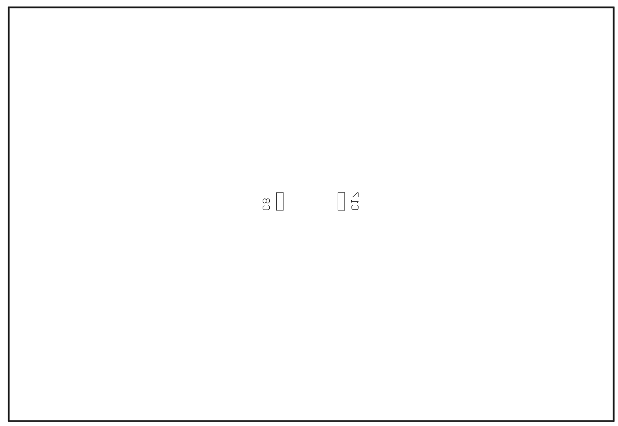

Figure 6: Bottom Silk

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REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	4/3/2024	Initial Release	-

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