EV7720DS-00A

20W Stereo Class D Single Ended Audio Amplifier Evaluation Board

The Future of Analog IC Technology

DESCRIPTION

The EV7720DS-00A is the evaluation board for the MP7720, a mono 20W 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

Startup / Shutdown pop elimination

Short circuit protection circuits

Mute / Standby

The MP7720 utilizes a single ended output structure with capacitor divider configuration capable of delivering 20W into 4Ω speakers. MPS Class D Audio Amplifiers exhibit the high fidelity of a Class A/B amplifier at efficiencies greater than 90%. The circuit is based on the MPS' AAM™ proprietary variable frequency topology that delivers excellent PSRR, fast response time and operates on a single power supply.

FEATURES

- 20W Output at V_{DD} = 24V into a 4Ω load
- No Supply Pumping
- THD+N = 0.08% at 1W, 8Ω
- 90% Efficiency at 20W
- Switching Frequency Up to 1MHz
- 9.5V to 24V Operation from a Single Supply
- Integrated Startup and Shutdown Pop Elimination Circuit
- Thermal Protection
- Mute/Standby Modes (Sleep)

APPLICATIONS

- Surround Sound DVD Systems
- Televisions
- Flat Panel Monitors
- Multimedia Computers
- Home Stereo Systems

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

ELECTRICAL SPECIFICATIONS

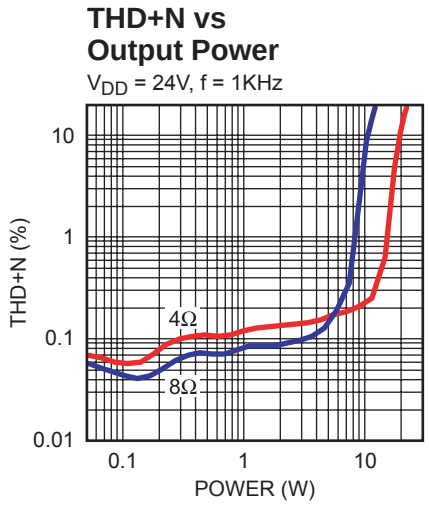
Parameter	Symbol	Value	Units
Supply Voltage	V_{DD}	24	V

EV7720DS-00A EVALUATION BOARD



Dimensions (2.4"X x 3.5"Y x 1.2"Z)

Board Number	MPS IC Number
EV7720DS-00A	MP7720DS



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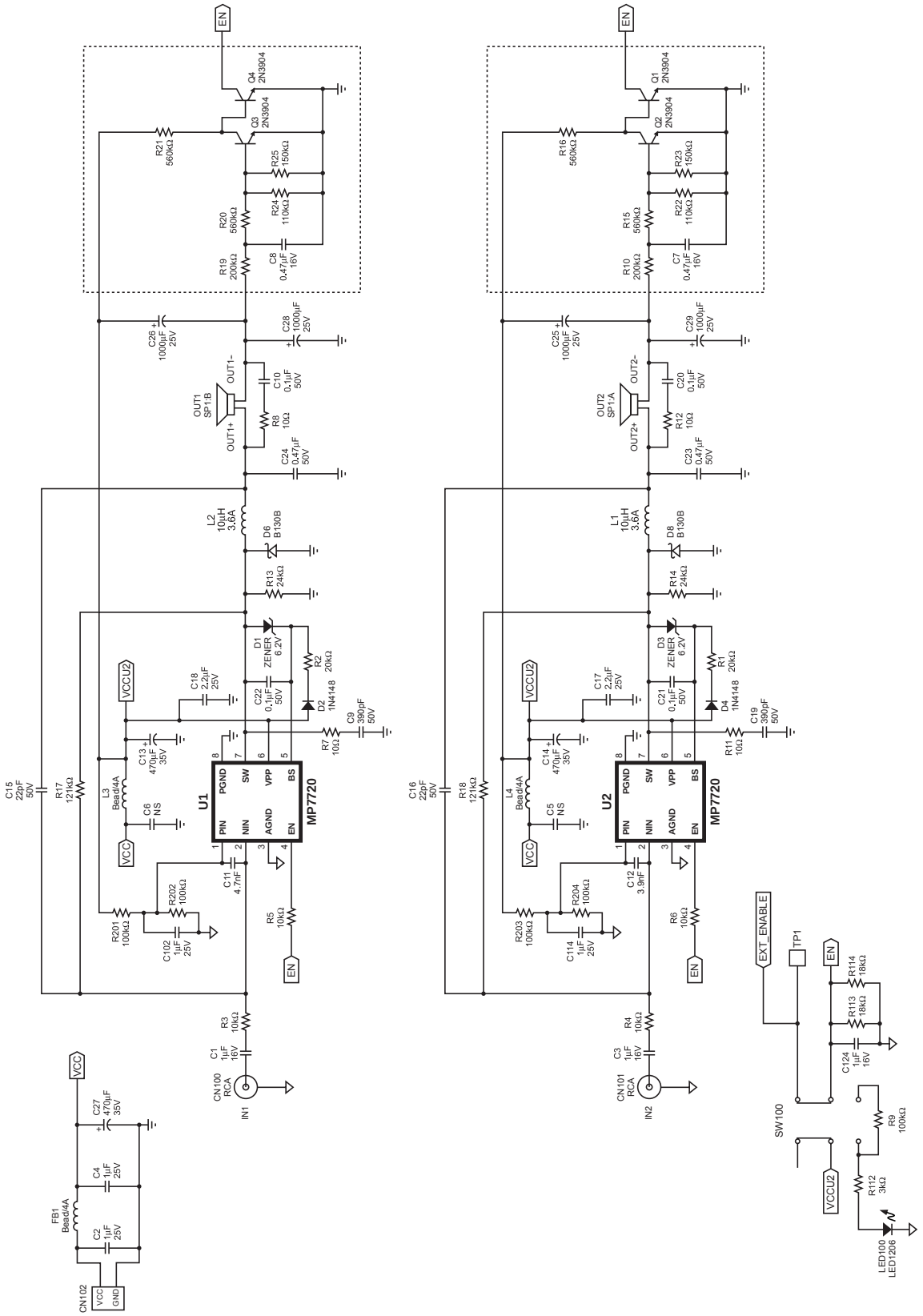
EVALUATION BOARD SCHEMATIC



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EV7720DS-00A BILL OF MATERIALS

Qty	Ref	Value	Description	Package	Manufacturer P/N
3	C1, C3, C124	1µF	Ceramic Capacitor, 16V, X7R	0805	Murata: GRM21BR71C105KA99
2	C2, C4	1µF	Ceramic Capacitor, 25V, X7R	0805	Murata: GRM21BR71E105KA99
2	C5, C6	NS	Not Stuffed		
2	C7,C8	0.47µF	Ceramic Capacitor, 16V, X7R	0603	Murata: GRM188R71C474KA88D
2	C9, C19	390pF	Ceramic Capacitor, 50V, C0G	0603	Murata: GRM1885C1H3901JA01
4	C10, C20, C21, C22	0.1µF	Ceramic Capacitor, 50V, X7R	0603	Murata: GRM188R71H104KA993D
2	C11	4.7nF	Ceramic Capacitor, 50V, X7R	0603	Murata: GRM188R71H472KA01
1	C12	3.9nF	Ceramic Capacitor, 50V, X7R	0603	Murata: GRM188R71H392KA01
3	C13, C14, C27	470µF	Electrolytic Capacitor, 35V, YXF	Radial	Rubycon: 35YXF470M
2	C15,C16	22pF	Ceramic Capacitor, 50V, C0G	0603	Murata: GRM1885C1H220JA01
2	C17, C18	2.2µF	Ceramic Capacitor, 25V, X7R	1206	Murata: GRM31MR71E225KA93
2	C102, C114,	1µF	Ceramic Capacitor, 25V, X7R	1206	Murata: GRM31CR71E105KA88
2	C23, C24	0.47µF	Capacitor, 50V, X7R	Radial	Any
4	C25, C26, C28, C29	1000µF	Electrolytic Capacitor, 25V, YXF	Radial	Rubycon: 25VYXF1000M
2	CN100, CN101		Phone Jack, Female	RCA	Any
1	CN102		Banana Jack Connector		Any
2	D1, D3		Zener Diode 6.2V/250mW	SOD323	Diodes Inc.: BZT52C6V2S
2	D2, D4		Diode Switch, 75V, 100mA	SOD323	Diodes Inc.: 1N4148
2	D6, D8		Schottky Diode, 1A/30V	SMB	Diodes Inc.: B130B-13-F
3	FB1, L3, L4		Ferrite Bead	BS43	Toko: BS43
2	L1, L2	10µH	Inductor	Radial	Toko: 13RHBP-A7502BY-100M
1	LED100		LED	1206	Any
4	Q1,Q2,Q3,Q4		NPN, 2N3904	SOT23	On Semi: MMBT3904

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EV7720DS-00A BILL OF MATERIALS *(continued)*

Qty	Ref	Value	Description	Package	Manufacturer P/N
2	R1, R2	20kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0720KL
2	R3, R4	10kΩ	Resistor, 1%	0603	Yageo: RC0603FR-0710KL
2	R5, R6	10kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0710KL
2	R7, R11	10Ω	Resistor, 5%	0603	Yageo: RC0603JR-0710RL
2	R8, R12	10Ω	Resistor, 5%	1206	Yageo: RC1206JR-0710RL
4	R9, R201, R202, R203, R204,	100kΩ	Resistor, 1%	0603	Yageo: RC0603FR-07100KL
2	R10, R19	200kΩ	Resistor, 5%	0603	Yageo: RC0603JR-07200KL
2	R13, R14	24kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0725RL
4	R15, R16, R20, R21	560kΩ	Resistor, 5%	0603	Yageo: RC0603JR-07560KL
2	R17, R18	121kΩ	Resistor, 1%	0603	Yageo: RC0603FR-07120KL
2	R22, R24	110kΩ	Resistor, 5%	0603	Any
2	R23, R25	150kΩ	Resistor, 5%	0603	Any
1	R112	3kΩ	Resistor,5%	0603	Yageo: RC0603JR-073KL
2	R113,R114	18kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0718KL
1	SP1		Speaker Connector, Red and Black		Any
1	SW100		Switch slide, 12V, 0.1A		Any
1	TP1		Test Point		Any
2	U1, U2			SO8	MPS: MP7720

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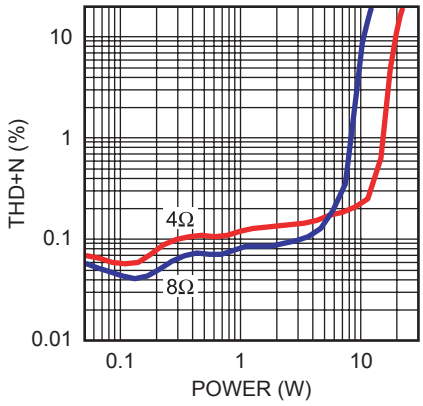
TYPICAL PERFORMANCE CHARACTERISTICS

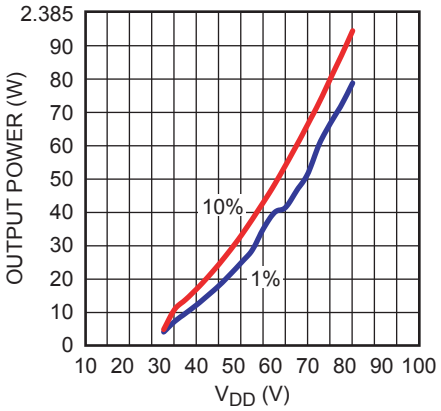
THD+N vs Output Power

f = 1KHz



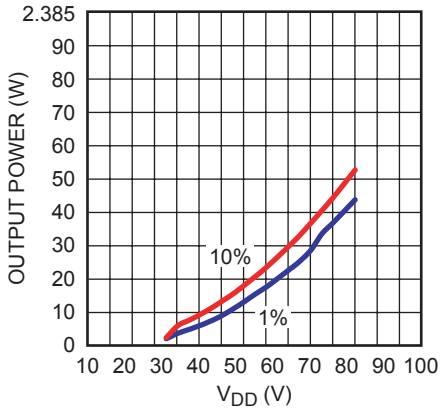
Output Power vs VDD

R_L= 4Ω

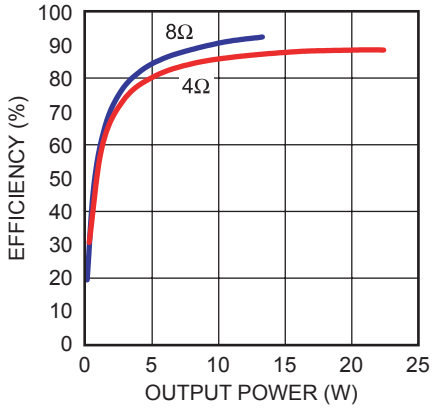


Output Power vs VDD

R_L= 8Ω

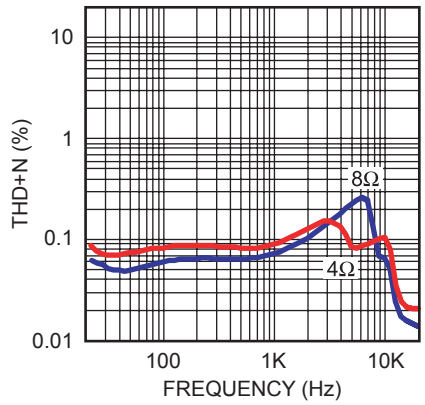


Efficiency vs Output Power



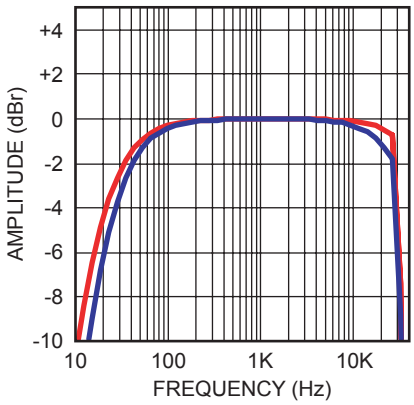
THD+N vs Frequency

P_{OUT} = 1W



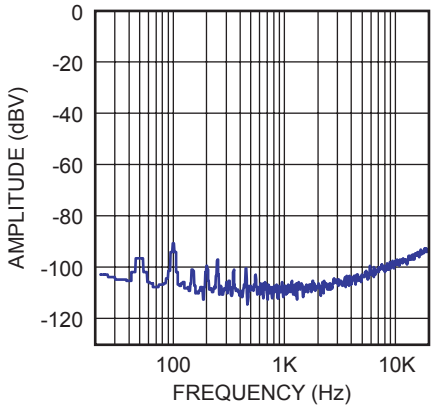
Frequency Response

A_V = 12



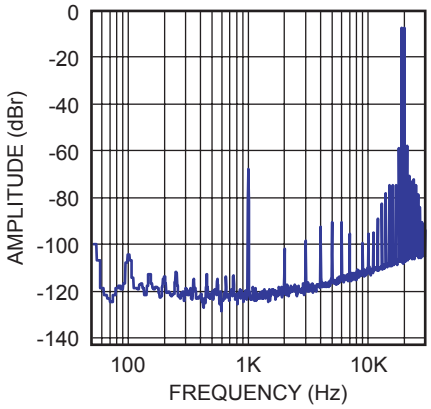
FFT Noise Floor

A-wtd, R_L = 4Ω, A_V = 12



IHF-IMD Test

1W, 4Ω, 24V, BW = 80KHz



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PRINTED CIRCUIT BOARD LAYOUT

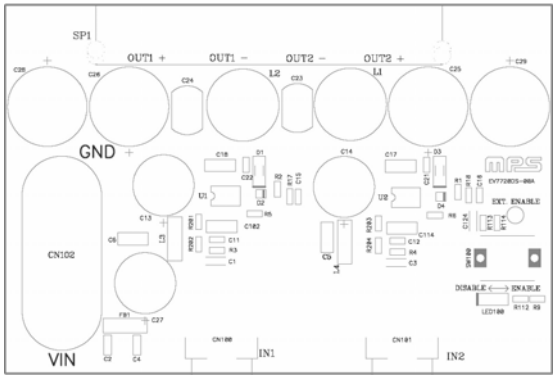

Figure 1—Top Silk Layer

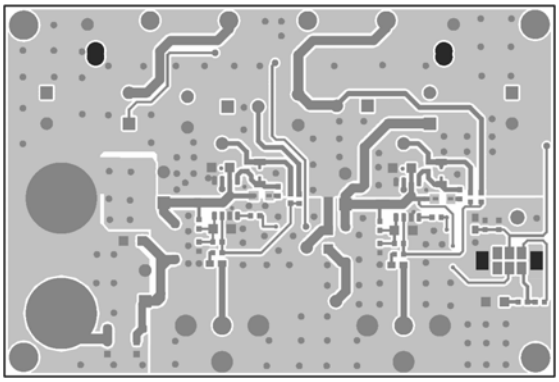

Figure 2—Top Layer

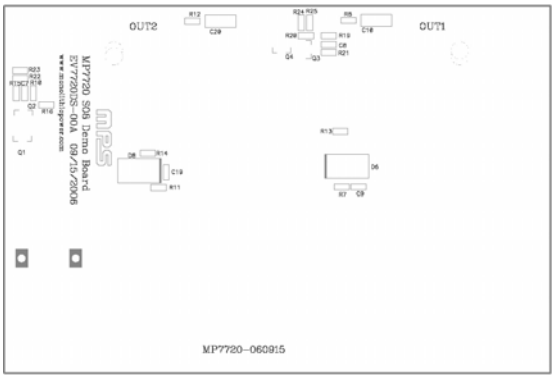

Figure 3—Bottom Silk Layer

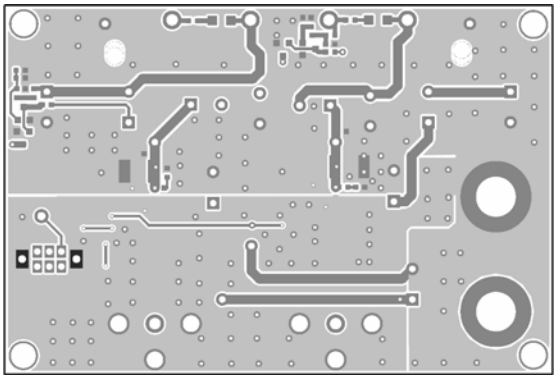

Figure 4—Bottom Layer

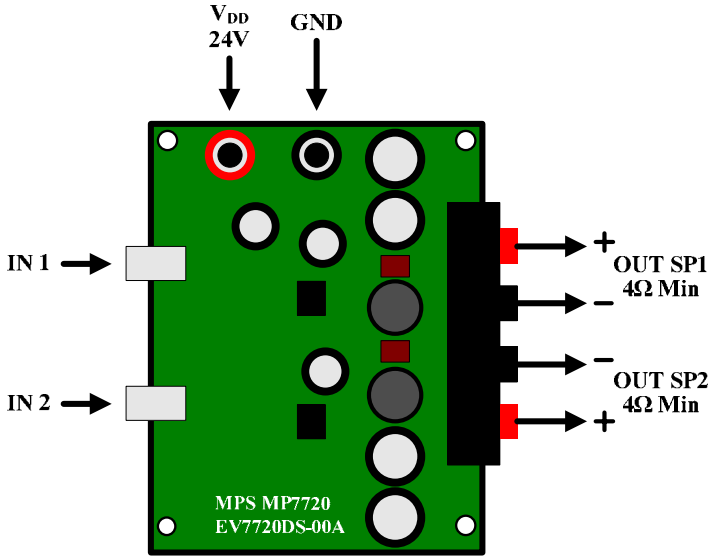

Figure 5—EV7720DS-00A Connection Diagram

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QUICK START GUIDE

This board is set up from the factory for 24V operation. To use a 12V power supply, adjust the components as specified in Section 3 below. For more information, consult the MP7720 datasheet.

1. Power Requirements
    a. Power Supply: 24V, 6A maximum
    b. 0V to 1VRMS (max) audio signal source
    c. Speaker: 4Ω or 8Ω
2. Setup Conditions for 24V Operation
    a. Connect the outputs to the external speakers
    b. Adjust the power supply to 24V before connecting to the evaluation board
    c. Turn off the power supply
    d. Connect the power supply to the VDD terminals
    e. Set the enable switch to the DISABLE position
    f. Connect the audio input signal source to the amplifier inputs (IN1, IN2)
    g. Turn on the power supply to apply power to the board
3. 12V Operation Modifications
    a. Change C11 to 2.2nF and C12 to 1.8nF
    b. Remove R22, R24 and R113. Change R1 and R2 from 20kΩ to 10kΩ
    c. Adjust the power supply to 12V (do not turn on)
    d. Use same procedure for turn on as specified in Section 2
4. Music Turn-On Sequence
    a. Set the enable switch to the ENABLE position
    b. Audio should be heard from the speaker(s)
5. Music Turn-Off Sequence
    a. Set the enable switch to the DISABLE position

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