

## 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.

## ELECTRICAL SPECIFICATIONS

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

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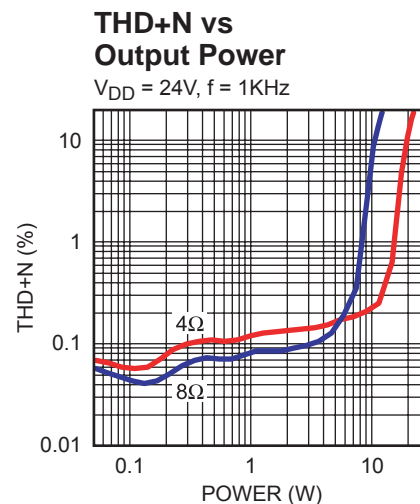
AAM (Analog Adaptive Modulation) is a Trademark of Monolithic Power Systems, Inc.

## EV7720DS-00A EVALUATION BOARD

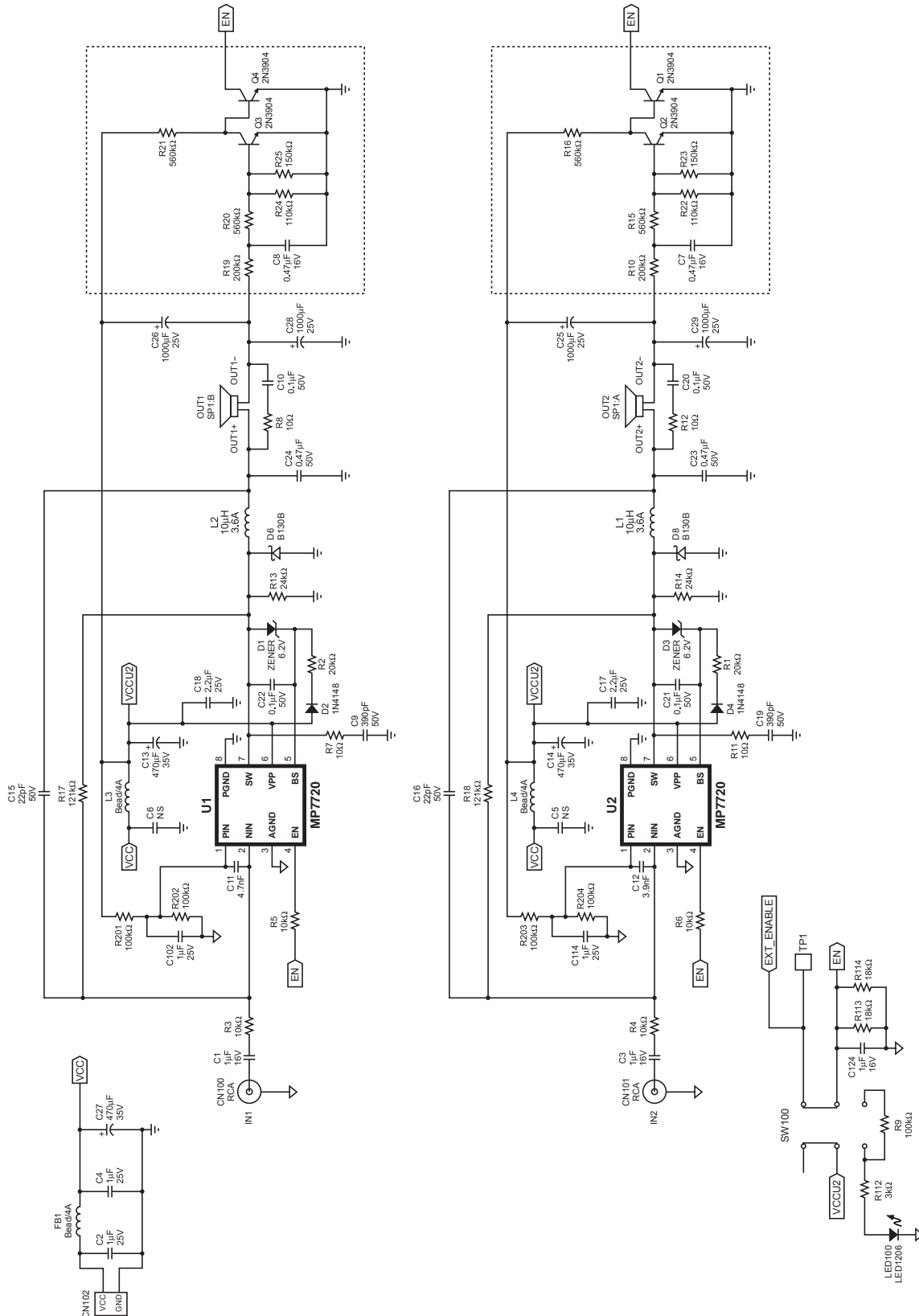


Dimensions (2.4"X x 3.5"Y x 1.2"Z)

Board Number	MPS IC Number
EV7720DS-00A	MP7720DS



# EVALUATION BOARD SCHEMATIC



**EV7720DS-00A BILL OF MATERIALS**

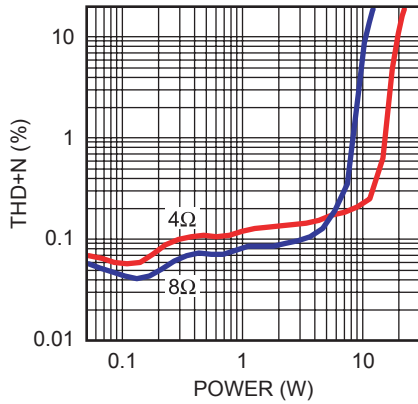
Qty	Ref	Value	Description	Package	Manufacturer P/N
3	C1, C3, C124	1 $\mu$ F	Ceramic Capacitor, 16V, X7R	0805	Murata: GRM21BR71C105KA99
2	C2, C4	1 $\mu$ F	Ceramic Capacitor, 25V, X7R	0805	Murata: GRM21BR71E105KA99
2	C5, C6	NS	Not Stuffed		
2	C7, C8	0.47 $\mu$ F	Ceramic Capacitor, 16V, X7R	0603	Murata: GRM188R71C474KA88D
2	C9, C19	390pF	Ceramic Capacitor, 50V, C0G	0603	Murata: GRM1885C1H3901JA01
4	C10, C20, C21, C22	0.1 $\mu$ F	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	470 $\mu$ F	Electrolytic Capacitor, 35V, YXF	Radial	Rubycon: 35YXF470M
2	C15, C16	22pF	Ceramic Capacitor, 50V, C0G	0603	Murata: GRM1885C1H220JA01
2	C17, C18	2.2 $\mu$ F	Ceramic Capacitor, 25V, X7R	1206	Murata: GRM31MR71E225KA93
2	C102, C114,	1 $\mu$ F	Ceramic Capacitor, 25V, X7R	1206	Murata: GRM31CR71E105KA88
2	C23, C24	0.47 $\mu$ F	Capacitor, 50V, X7R	Radial	Any
4	C25, C26, C28, C29	1000 $\mu$ F	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	10 $\mu$ H	Inductor	Radial	Toko: 13RHBP-A7502BY-100M
1	LED100		LED	1206	Any
4	Q1, Q2, Q3, Q4		NPN, 2N3904	SOT23	On Semi: MMBT3904

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

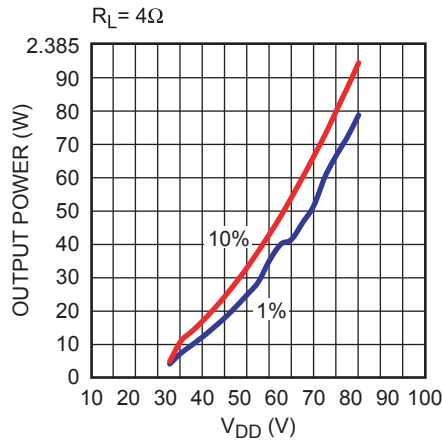
Qty	Ref	Value	Description	Package	Manufacturer P/N
2	R1, R2	20kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0720KL
2	R3, R4	10kΩ	Resistor, 1%	0603	Yageo: RC0603FR-0710KL
2	R5, R6	10kΩ	Resistor, 5%	0603	Yageo: RC0603JR-0710KL
2	R7, R11	10Ω	Resistor, 5%	0603	Yageo: RC0603JR-0710RL
2	R8, R12	10Ω	Resistor, 5%	1206	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

### TYPICAL PERFORMANCE CHARACTERISTICS

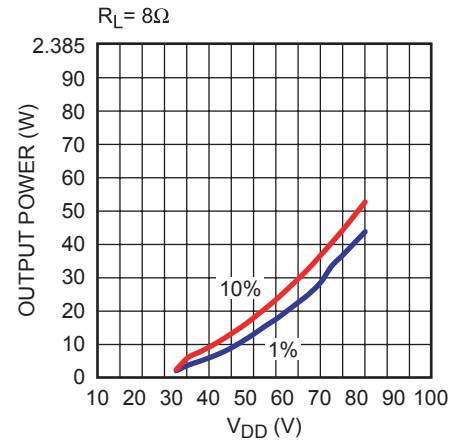
**THD+N vs Output Power**  
f = 1KHz



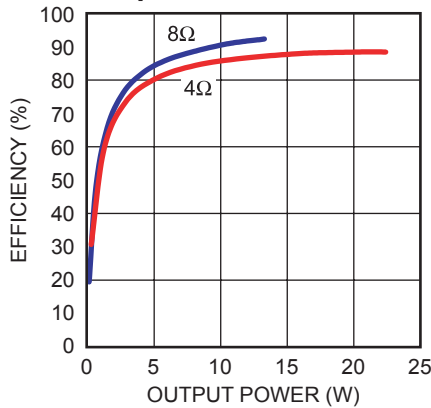
**Output Power vs VDD**



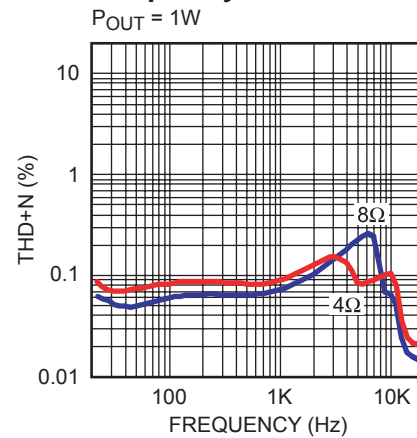
**Output Power vs VDD**



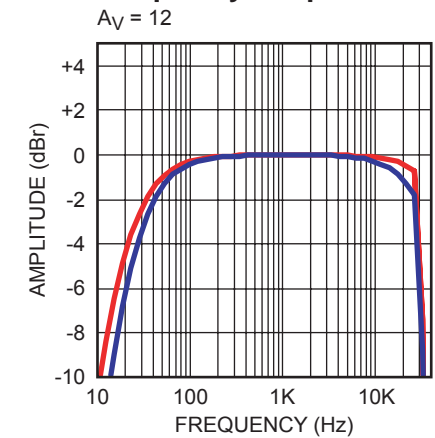
**Efficiency vs Output Power**



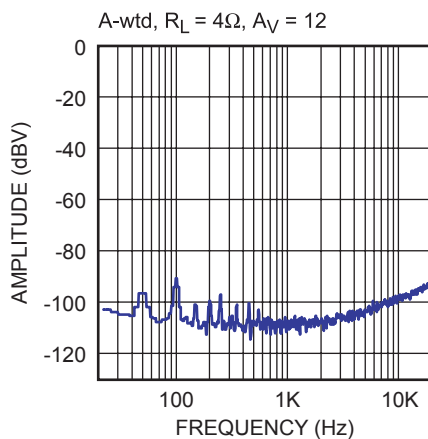
**THD+N vs Frequency**



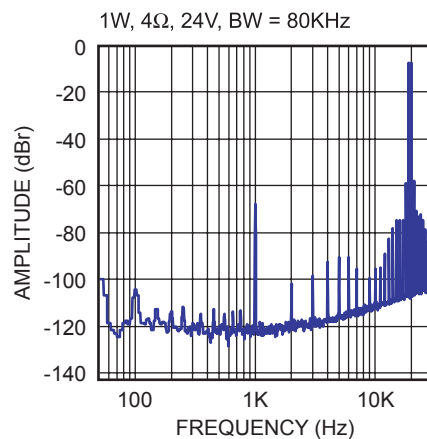
**Frequency Response**



**FFT Noise Floor**



**IHF-IMD Test**



### PRINTED CIRCUIT BOARD LAYOUT

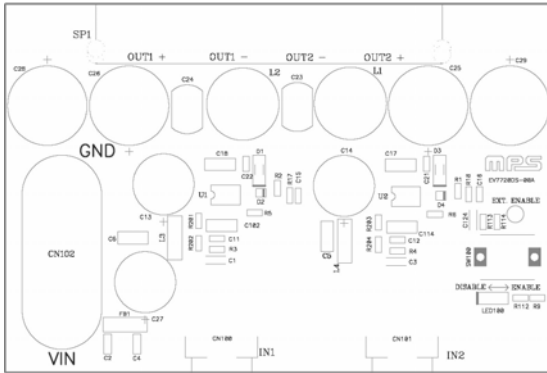


Figure 1—Top Silk Layer

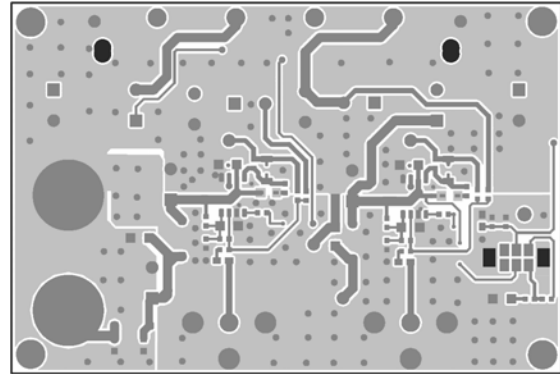


Figure 2—Top Layer

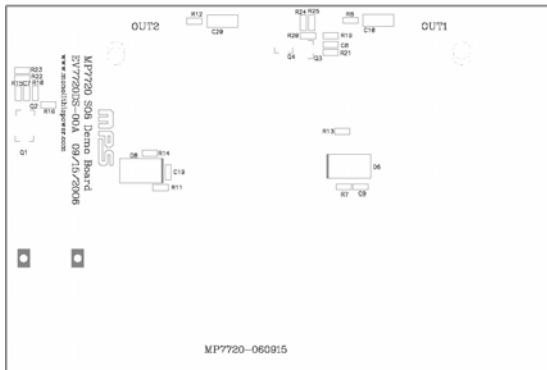


Figure 3—Bottom Silk Layer

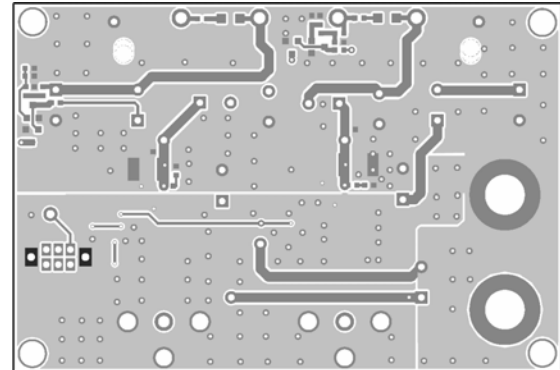


Figure 4—Bottom Layer

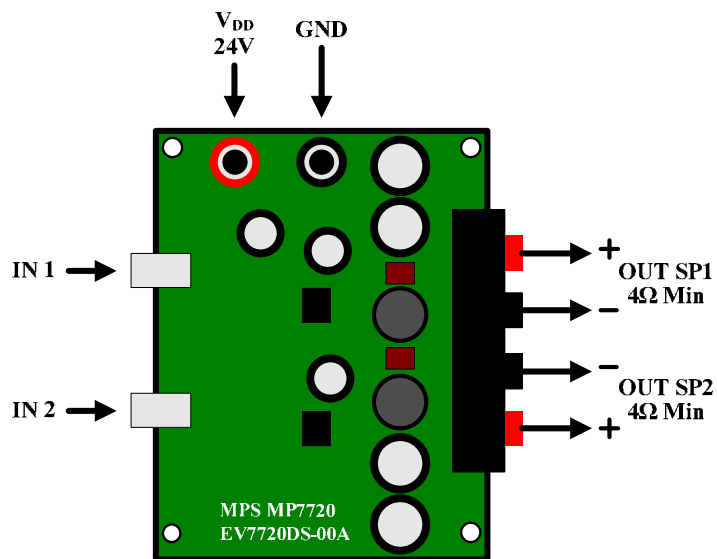


Figure 5—EV7720DS-00A Connection Diagram

## 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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