



The Future of Analog IC Technology™

# EV7720DS-7782-00D

150W Class D

5.1 Channel Audio Board

EVALUATION BOARD

## GENERAL DESCRIPTION

The EV7720DS-7782-00D is an evaluation board for using MPS' Class D Audio Amplifiers in 5.1 Surround Sound systems. The board has 150W total output power coming from 5 x 20W from the satellites (MP7720DS) and 50W from the subwoofer (MP7782). The system offers high dynamic range and low distortion for high quality sound reproduction.

## FEATURES

- 150W Total Output Power
- High Fidelity
- High Efficiency
- 9.5V to 24V Supply Voltage Range
- Mute/Standby Modes
- Thermal Protection
- Over-Current Protection

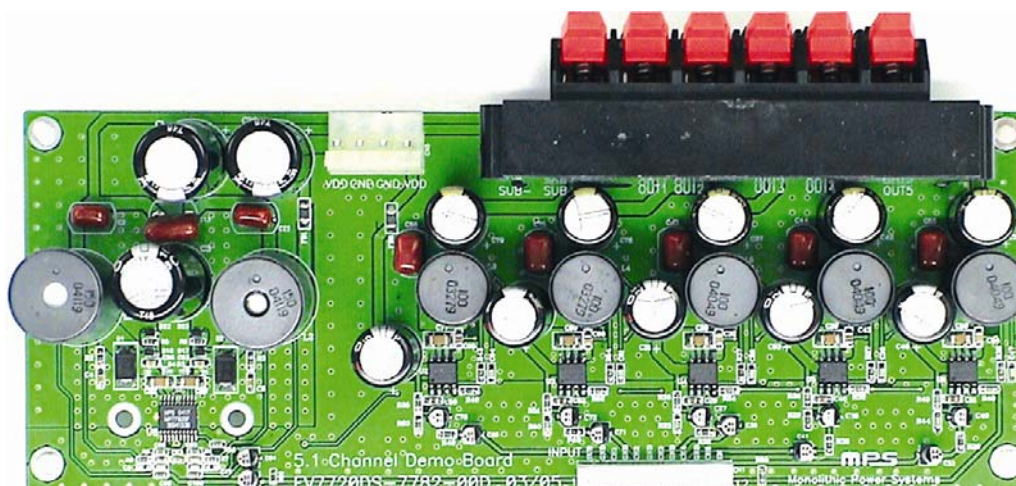
## APPLICATIONS

- 5.1 Audio Setups
- Home Theatre Systems

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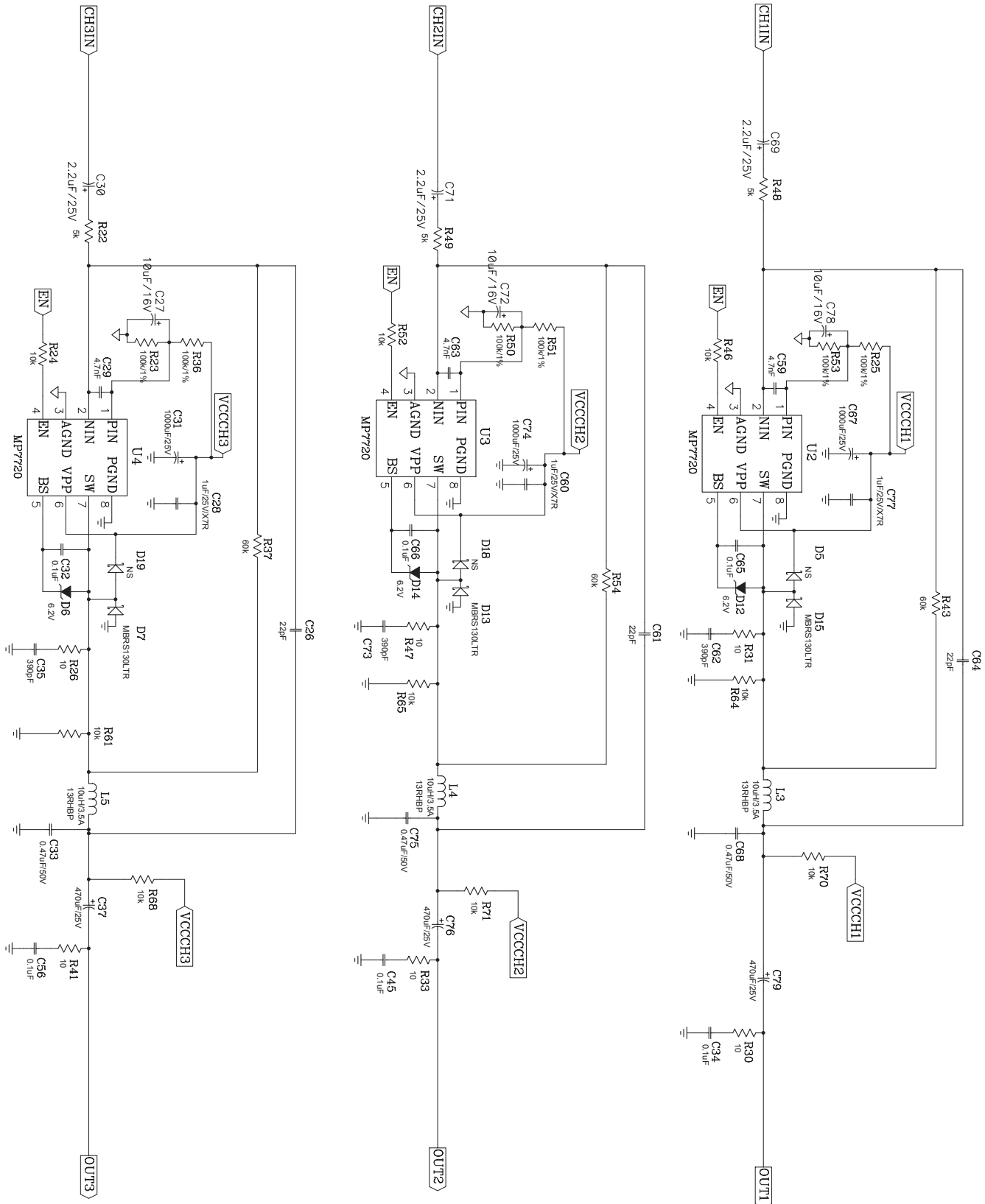
## EV7720DS-7782-00D EVALUATION BOARD



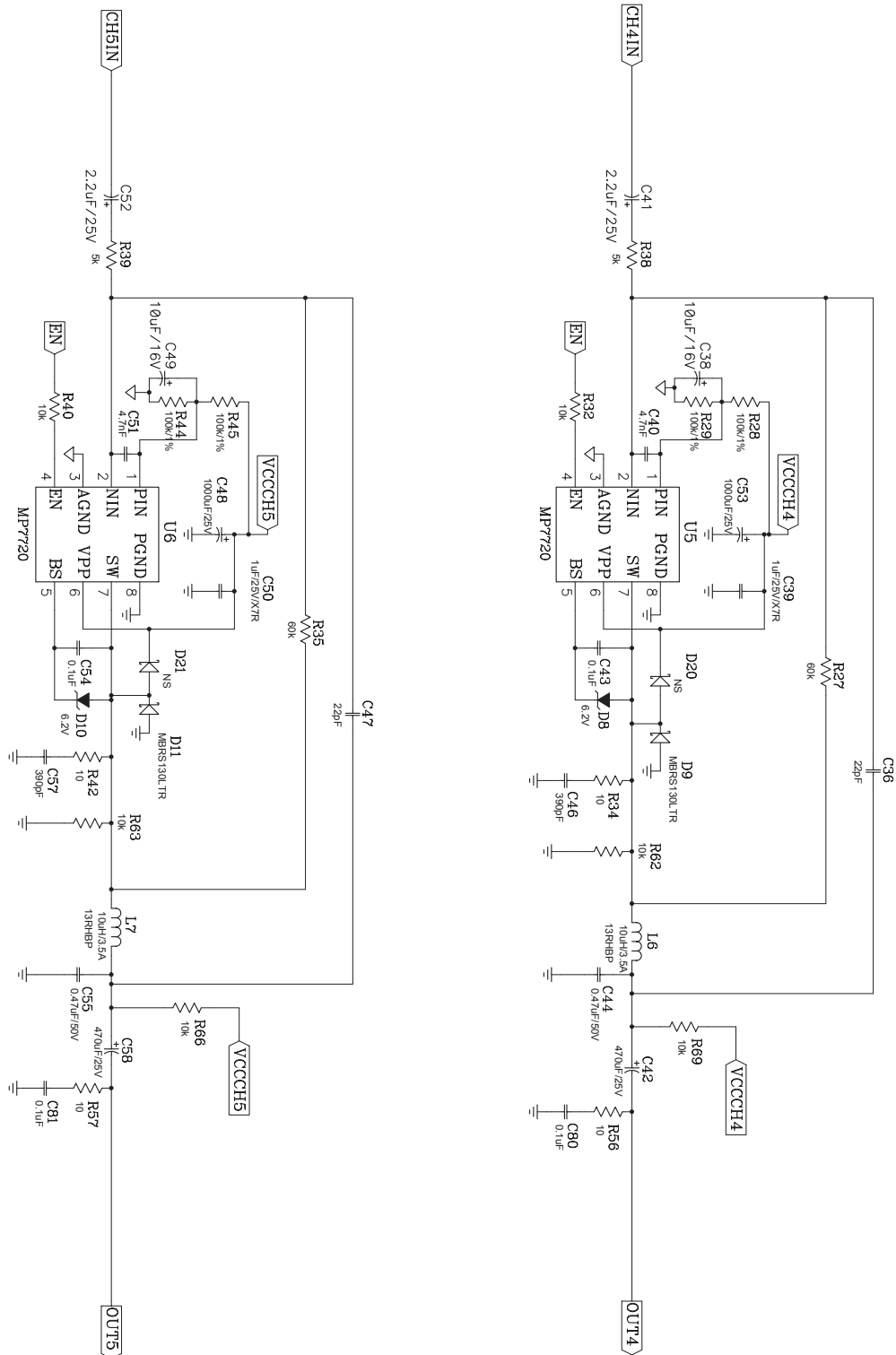
Dimensions (6.7"X x 2.5"Y)

| Board Number      | MPS IC Number              |
|-------------------|----------------------------|
| MP7720DS-7782-00D | 5 x MP7720DS<br>1 x MP7782 |

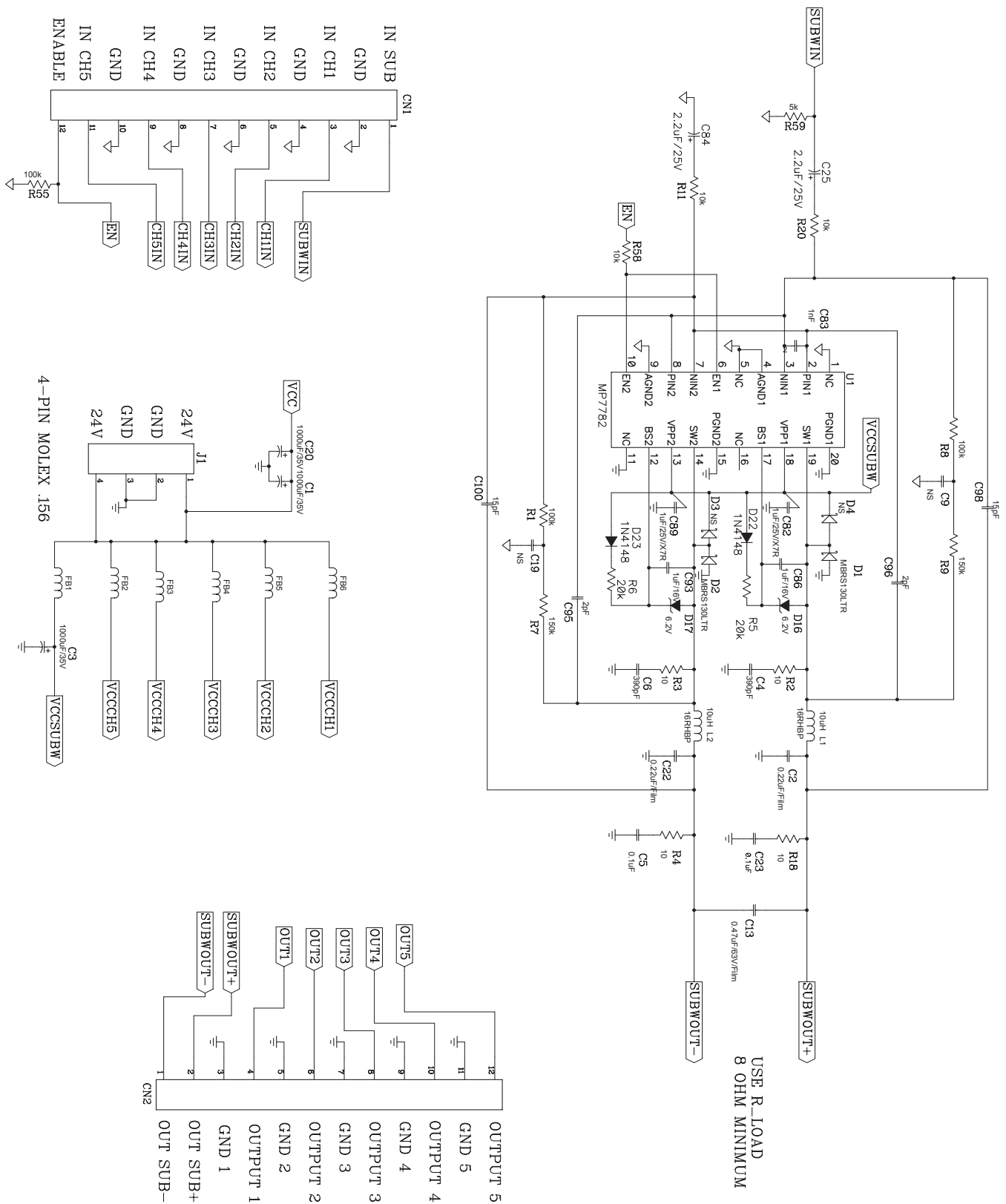
# EVALUATION BOARD SCHEMATIC



## EVALUATION BOARD SCHEMATIC (continued)



## EVALUATION BOARD SCHEMATIC *(continued)*



## EV7720DS-7782-00D BILL OF MATERIALS

| Qty | Ref                                        | Value  | Description                   | Package | Manufacturer:<br>Manufacturer P/N | Distributor:<br>Distributor P/N |
|-----|--------------------------------------------|--------|-------------------------------|---------|-----------------------------------|---------------------------------|
| 3   | C1, C3,<br>C20                             | 1000µF | Electrolytic Cap, 35V,<br>NHG | Radial  | Panasonic:<br>ECA-1VHG102         | Digikey:<br>P5555-ND            |
| 2   | C2, C22                                    | 0.22µF | Film Cap, 50V                 | Radial  | Panasonic:<br>ECQ-V1H224JL        | Digikey:<br>P4667-ND            |
| 7   | C4, C6,<br>C35, C46,<br>C57, C62,<br>C73   | 390pF  | Ceramic Cap, 50V,<br>X7R      | SM0805  | Panasonic:<br>ECU-V1H391KBN       | Digikey:<br>PCC391BNCT-ND       |
| 7   | C5, C23,<br>C34, C45,<br>C56, C80,<br>C81  | 0.1µF  | Ceramic Cap, 50V,<br>X7R      | SM1206  | Panasonic:<br>ECJ-3VB1H104K       | Digikey:<br>PCC104BCT-ND        |
| 2   | C9, C19                                    |        | Not Stuffed                   | SM0603  |                                   |                                 |
| 1   | C13                                        | 0.47µF | Film Cap, 63V                 | Radial  | Panasonic:<br>ECQ-V1J474JM        | Digikey:<br>P4544-ND            |
| 7   | C25, C84,<br>C69, C71,<br>C30, C41,<br>C52 | 2.2µF  | Electrolytic Cap, 35V         | SMD     | Panasonic:<br>ECE-V1VS2R2SR       | Digikey:<br>PCE3070CT-ND        |
| 5   | C26, C36,<br>C47, C61,<br>C64              | 22pF   | Ceramic Cap, 50V,<br>NPO      | SM0805  | Panasonic:<br>ECJ-2VC1H220J       | Digikey:<br>PCC220CNCT-ND       |
| 5   | C27, C38,<br>C49, C72,<br>C78              | 10µF   | Electrolytic Cap, 16V         | SMD     | Panasonic:<br>ECE-V1CS100SR       | Digikey:<br>PCE3061CT-ND        |
| 7   | C28, C39,<br>C50, C60,<br>C77, C82,<br>C89 | 1µF    | Ceramic Cap, 25V,<br>X7R      | SM1206  | Panasonic:<br>ECJ-3YB1E105K       | Digikey:<br>PCC1893CT-ND        |
| 5   | C29, C40,<br>C51, C59,<br>C63              | 4.7nF  | Ceramic Cap, 50V,<br>X7R      | SM0805  | Panasonic:<br>ECJ-2VB1H472K       | Digikey:<br>PCC472BNCT-ND       |
| 5   | C31, C48,<br>C53, C67,<br>C74              | 1000µF | Electrolytic Cap, 25V,<br>NHG | Radial  | Panasonic:<br>ECA-1EHG102         | Digikey:<br>P5544-ND            |
| 5   | C32, C43,<br>C54, C65,<br>C66              | 0.1µF  | Ceramic Cap, 50V,<br>X7R      | SM0805  | Panasonic:<br>ECJ-2YB1H104K       | Digikey:<br>PCC1840CT-ND        |
| 5   | C33, C44,<br>C55, C68,<br>C75              | 0.47µF | Film Cap, 50V                 | Radial  | Panasonic:<br>ECQ-V1H474JL        | Digikey:<br>P4671-ND            |
| 5   | C37, C42,<br>C58, C76,<br>C79              | 470µF  | Electrolytic Cap, 25V,<br>NHG | Radial  | Panasonic:<br>ECA-1EHG471         | Digikey:<br>P5543-ND            |
| 1   | C83                                        | 1nF    | Ceramic Cap, 50V,<br>X7R      | SM0603  | Panasonic:<br>ECJ-1VB1H102K       | Digikey:<br>PCC1772CT-ND        |
| 2   | C86, C93                                   | 1µF    | Ceramic Cap, 16V,<br>X5R      | SM0805  | Panasonic:<br>ECJ-2FB1C105K       | Digikey:<br>PCC2249CT-ND        |

**EV7720DS-7782-00D BILL OF MATERIALS (continued)**

| Qty | Ref                                       | Value | Description                      | Package | Manufacturer:<br>Manufacturer P/N      | Distributor:<br>Distributor P/N |
|-----|-------------------------------------------|-------|----------------------------------|---------|----------------------------------------|---------------------------------|
| 2   | C95, C96                                  | 2pF   | Ceramic Cap, 50V,<br>NPO         | SM0603  | Panasonic:<br>ECJ-1VC1H020C            | Digikey:<br>PCC020CVCT-ND       |
| 2   | C98,<br>C100                              | 15pF  | Ceramic Cap, 50V,<br>NPO         | SM0603  | Panasonic:<br>ECJ-1VC1H150J            | Digikey:<br>PCC150ACVCT-ND      |
| 1   | CN1                                       |       | Connector, 12-Pin<br>Header, 2mm |         | Hirose Electronic:<br>DF3-12P-2DSA(01) | Digikey:<br>H3931-ND            |
| 1   | CN2                                       |       | Speaker Terminal, 6-<br>Channel  |         |                                        |                                 |
| 7   | D1, D2,<br>D15, D13,<br>D7, D9,<br>D11    |       | Schottky Diode, 30V,<br>1A       | SMB     | IRF:<br>MBRS130LTR                     | Digikey:<br>MBRS130LCT-ND       |
| 7   | D3, D4,<br>D5, D18,<br>D19, D20,<br>D21   |       | Not Stuffed                      |         |                                        |                                 |
| 5   | D6, D8,<br>D10, D12,<br>D14               |       | Zener Diode, 6.2V,<br>500mW      | SOD-123 | Diodes Inc:<br>BZT52C6V2-7             | Digikey:<br>BZT52C6V2-7DICT-ND  |
| 2   | D16, D17                                  |       | Zener Diode, 6.2V,<br>200mW      | SOD-323 | Diodes Inc:<br>BZT52C6V2S-7            | Digikey:<br>BZT52C6V2SDICT-ND   |
| 2   | D22, D23                                  |       | Switch Diode, 75V,<br>200mW      | SOD323  | Diodes Inc:<br>1N4148WS-7              | Digikey:<br>1N4148WSDICT-ND     |
| 6   | FB1, FB2,<br>FB3, FB4,<br>FB5, FB6        |       | Ferrite Bead, 6A,<br>100MHz      | SM1206  | Steward:<br>HI1206T500R-00             | Digikey:<br>240-1009-1-ND       |
| 1   | J1                                        |       | Connector, 4-Pin                 |         | Molex:<br>26-48-1045                   | Digikey:<br>WM4602-ND           |
| 2   | L1, L2                                    | 10μH  | Inductor, 3.61A,<br>13RHBP       | Radial  | Toko:<br>A7502HY-100M                  |                                 |
| 5   | L3, L4, L5,<br>L6, L7                     | 10μH  | Inductor, 3.5A,<br>10RYTL        | Radial  | Toko:<br>7023LYF-100K                  |                                 |
| 2   | R1, R8                                    | 100kΩ | Resistor, 1%                     | SM0603  | Panasonic:<br>ERJ-3EKF1003V            | Digikey:<br>P100KHCT-ND         |
| 7   | R2, R3,<br>R26, R31,<br>R34, R42,<br>R47  | 10Ω   | Resistor, 5%                     | SM0805  | Panasonic:<br>ERJ-6GEYJ100V            | Digikey:<br>P10ACT-ND           |
| 7   | R4, R18,<br>R30, R33,<br>R41, R56,<br>R57 | 10Ω   | Resistor, 5%                     | SM1206  | Panasonic:<br>ERJ-8GEYJ100V            | Digikey:<br>P10ECT-ND           |
| 2   | R5, R6                                    | 20kΩ  | Resistor, 5%                     | SM0603  | Panasonic:<br>ERJ-3GEYJ203V            | Digikey:<br>P20KGCT-ND          |
| 2   | R7, R9                                    | 150kΩ | Resistor, 1%                     | SM0603  | Panasonic:<br>ERJ-3EKF1503V            | Digikey:<br>P150KHCT-ND         |

**EV7720DS-7782-00D BILL OF MATERIALS (continued)**

| Qty | Ref                                                                  | Value  | Description               | Package | Manufacturer:<br>Manufacturer P/N | Distributor:<br>Distributor P/N |
|-----|----------------------------------------------------------------------|--------|---------------------------|---------|-----------------------------------|---------------------------------|
| 2   | R20, R11                                                             | 10kΩ   | Resistor, 1%              | SM0603  | Panasonic:<br>ERJ-3EKF1002V       | Digikey:<br>P10.0KHCT-ND        |
| 11  | R23, R25,<br>R28, R29,<br>R36, R44,<br>R45, R50,<br>R51, R53,<br>R55 | 100kΩ  | Resistor, 1%              | SM0805  | Panasonic:<br>ERJ-6ENF1003V       | Digikey:<br>P100KCCT-ND         |
| 5   | R27, R35,<br>R37, R43,<br>R54                                        | 60.4kΩ | Resistor, 1%              | SM0805  | Panasonic:<br>ERJ-6ENF6042V       | Digikey:<br>P60.4KCCT-ND        |
| 5   | R48, R49,<br>R22, R38,<br>R39                                        | 5.1kΩ  | Resistor, 5%              | SM0805  | Panasonic:<br>ERJ-6GEYJ512V       | Digikey:<br>P5.1KACT-ND         |
| 6   | R58, R46,<br>R52, R24,<br>R32, R40                                   | 10kΩ   | Resistor, 5%              | SM0805  | Panasonic:<br>ERJ-6GEYJ103V       | Digikey:<br>P10KACT-ND          |
| 1   | R59                                                                  |        | Not Stuffed               | SM0603  |                                   |                                 |
| 1   | R59                                                                  | 5.1kΩ  | Resistor, 5%              | SM0603  | Panasonic:<br>ERJ-3GEYJ512V       | Digikey:<br>P5.1KGCT-ND         |
| 10  | R61, R62,<br>R63, R64,<br>R65, R66,<br>R68, R69,<br>R70, R71         | 10kΩ   | Resistor, 5%              | SM1206  | Panasonic:<br>ERJ-8GEYJ103V       | Digikey:<br>P10KECT-ND          |
| 1   | U1                                                                   |        | Class D Amplifier,<br>40W | TSSOP20 | MPS:<br>MP7782DF                  |                                 |
| 5   | U2, U3,<br>U4, U5,<br>U6                                             |        | Class D Amplifier,<br>20W | SO8     | MPS:<br>MP7720DS                  |                                 |

## PRINTED CIRCUIT BOARD LAYOUT

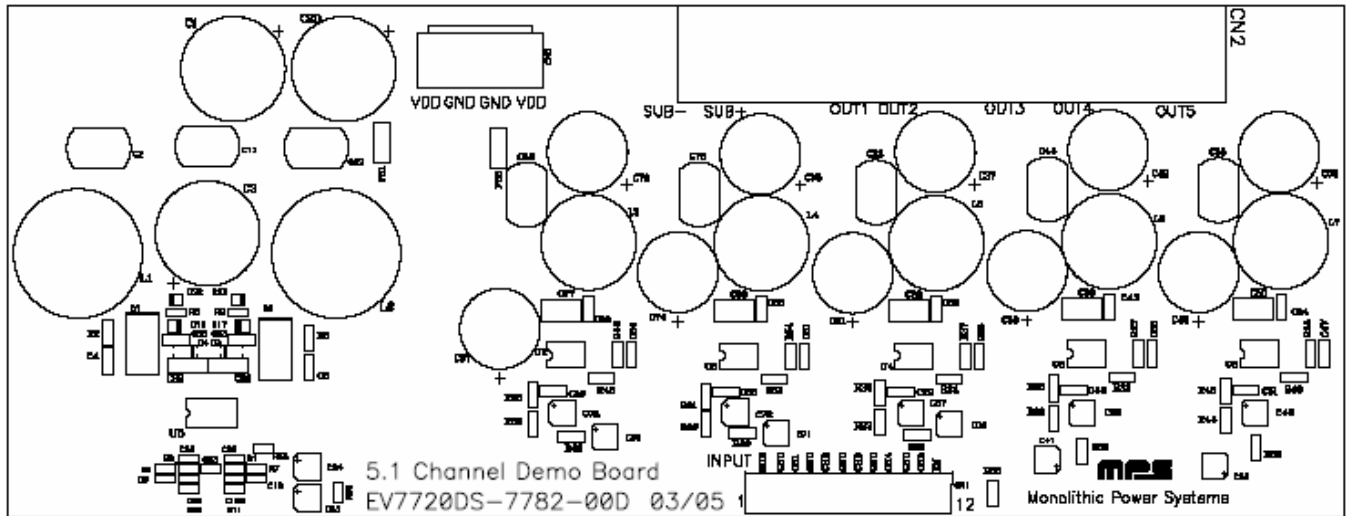


Figure 1—Top Silk Layer

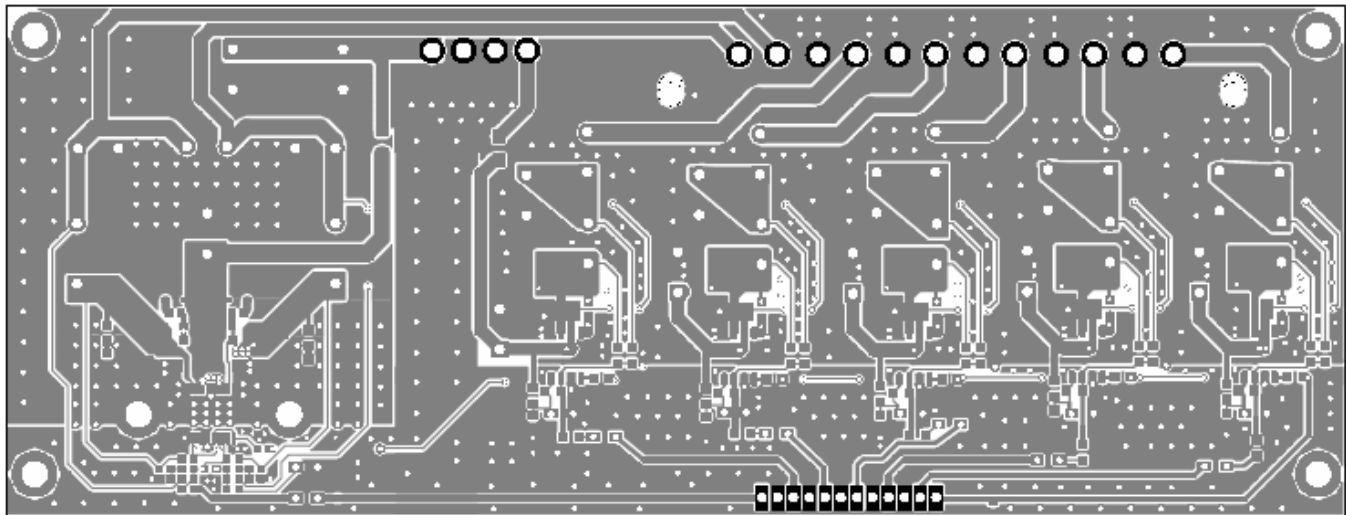


Figure 2—Top Layer

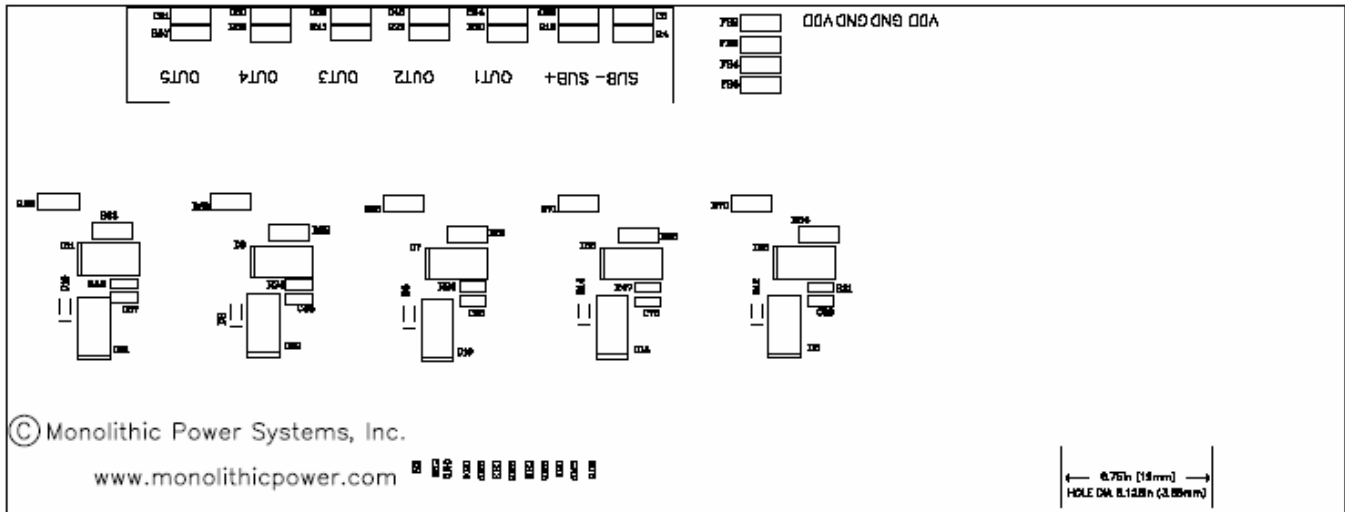


Figure 3—Bottom Silk Layer

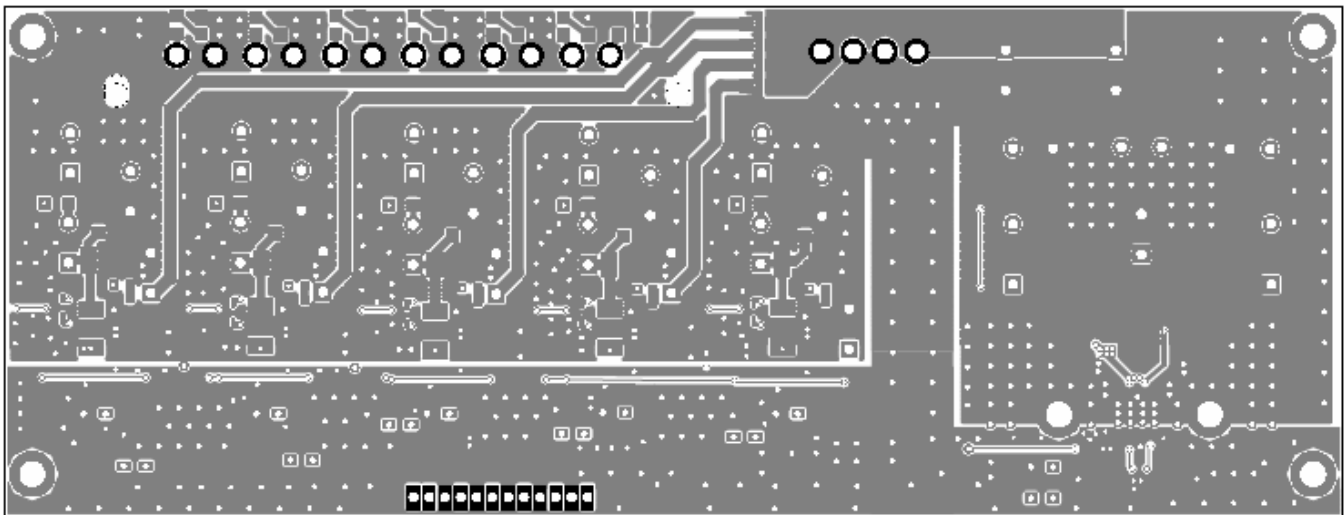
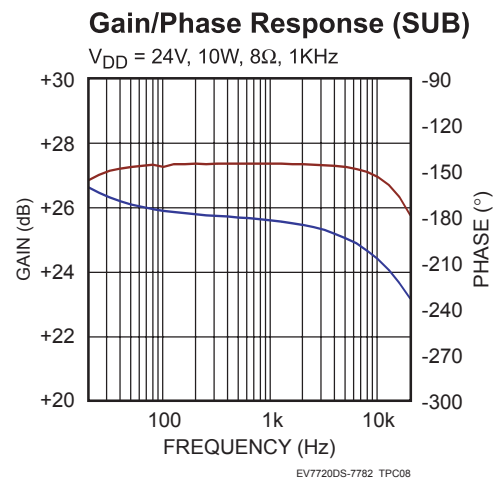
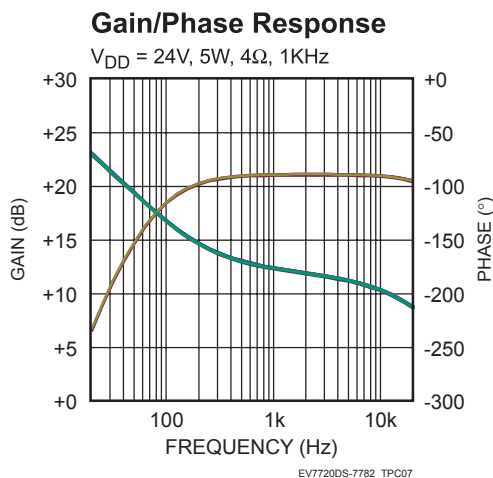
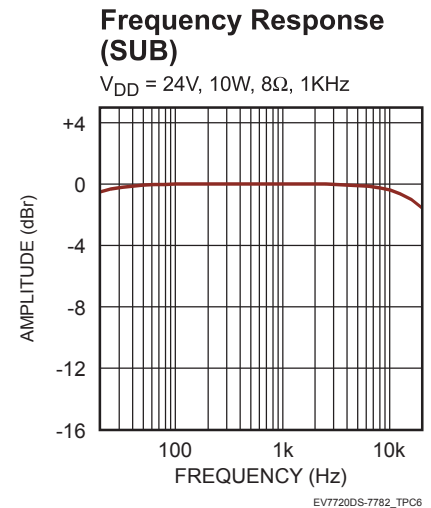
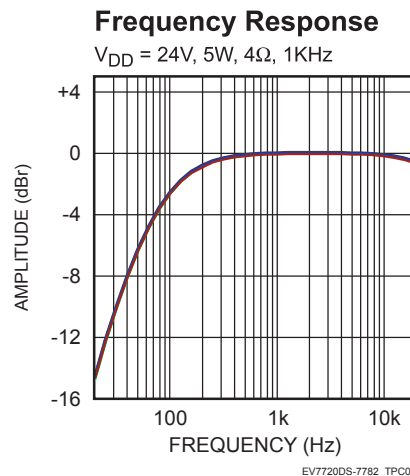
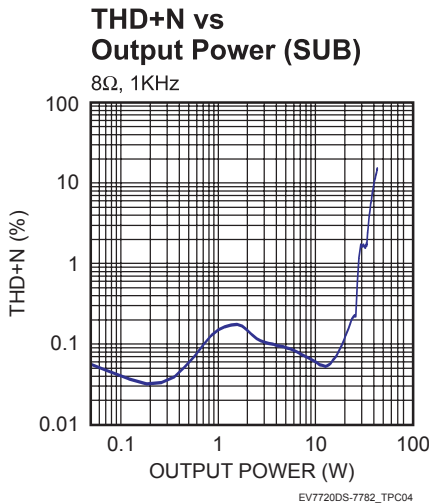
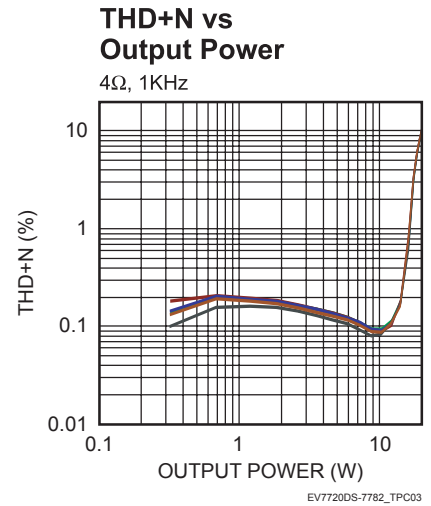
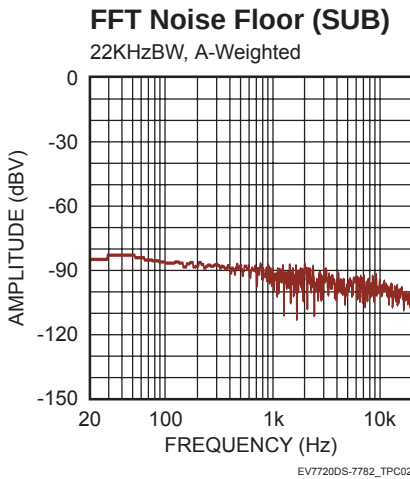
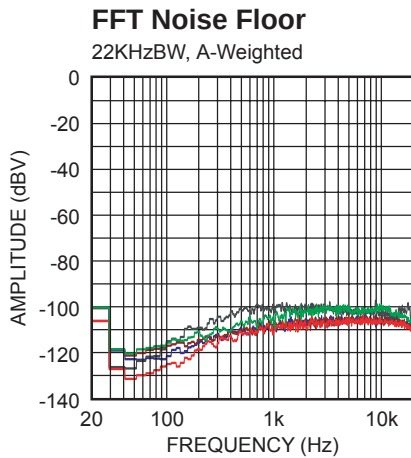


Figure 4—Bottom Layer

# TYPICAL PERFORMANCE CHARACTERISTICS



## QUICK START GUIDE

### 1. Input / Output Requirements

- Power supply: 9.5V to 24V, 6A
- Enable: 3.3V to 5V
- 0V to 1V<sub>RMS</sub> (max) audio signal source,  $\leq 600\Omega$ .
- Main/Satellite Speakers: 4 $\Omega$  MINIMUM
- Subwoofer: 6 $\Omega$  MINIMUM

### 2. Setup Condition for 24V Operation

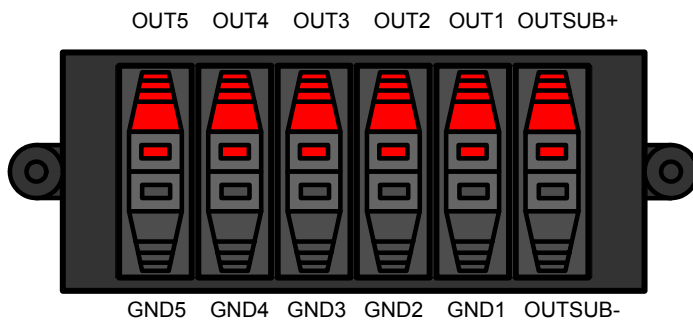
- Connect the satellite speakers (4 $\Omega$  MINIMUM) to the output terminals OUT1 through OUT5 to - normally Left Front, Right Front, Left Rear, Right Rear, and Center.
- Connect the subwoofer speaker (6 $\Omega$  MINIMUM) to the SUB+ / SUB- output terminals.
- Adjust the power supply to  $9.5 \leq V_{DD} \leq 24V$  (do not turn on).
- Set the enable signal to LOW by applying 0V to the enable input.
- With the power supply off, connect the power supply to the V<sub>DD</sub> terminals.
- Connect the audio input signal sources to the amplifier inputs corresponding to output channels.
- Turn on the power supply to apply power to the board.

### 3. Music Turn-On Sequence

- UNMUTE the amplifiers by applying 3.3V or 5V to the enable input.
- Audio should be heard from the speaker(s).

### 4. Music Turn-Off Sequence

- Set enable LOW by applying 0V to the enable input.



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