TPA4411 Audio Power Amplifier Evaluation Module

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1 Introduction

This section provides an overview of the Texas Instruments (TI) TPA4411 DirectPath™ stereo headphone amplifier evaluation module. It includes a brief description of the module and a list of EVM specifications.

1.1 Description

The TPA4411 is a DirectPath™ stereo headphone amplifier capable of delivering 80 mW/Ch without the added output dc blocking capacitors. The TPA4411 EVM includes connections for input, power, ground, pushbuttons, and a headphone jack for the outputs.

1.2 EVM Specifications

Supply voltage range, V_{DD}	1.8 V to 4.5 V
Supply current, I_{DD}	0.5 A, maximum
Continuous output power, P_O, V_{DD} = 4.5 V, 16 Ω	80 mW

DirectPath is a trademark of Texas Instruments.

2 Operation

This section describes how to operate the TPA4411EVM.

2.1 Quick-Start List for Stand-Alone Operation

Use the following steps when operating the TPA4411EVM stand alone or when connecting the EVM into an existing circuit.

2.1.1 Power and Ground

1. Ensure that the external power sources are set to OFF.
2. Connect the power supply with a voltage between 1.8 V and 4.5 V to the EVM. Make sure to connect the ground connection first, and then connect the positive supply. Verify that the connections are made to the correct pins.

2.1.2 Inputs and Outputs

2.1.2.1 Audio

1. Ensure that the audio source is set to the minimum level.
2. Connect the audio source to the inputs, INL and INR.
3. Connect a headset or other load to the headphone jack. Output pins, OUTL and OUTR, also are provided for connections to external circuits.

2.1.2.2 Shutdown Controls

1. The TPA4411 provides independent shutdown controls so that each channel can be controlled separately. The shutdown pins, $\overline{\text{SDL}}$ and $\overline{\text{SDR}}$, are active low. This means that a low voltage (ground) on this pin will place the appropriate channel in shutdown mode. Using the pushbuttons provided on the EVM, the TPA4411 can be placed in shutdown by pressing and holding the button(s) down. Both buttons must be depressed in order for both channels of the TPA4411 to turn off. When the buttons are released, the appropriate channel on the device will restart.

2.1.3 Power Up

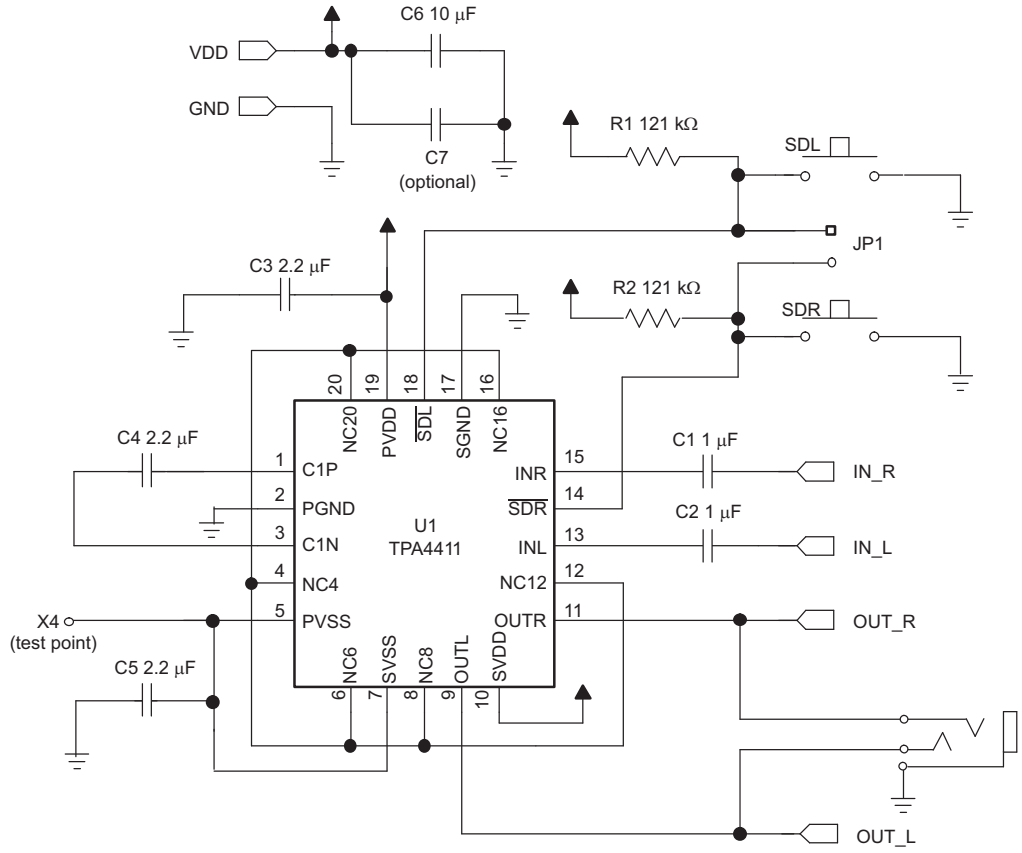
1. Verify the correct connections as described in Sections 2.1.1 and 2.1.2.
2. Verify the correct voltage setting of the power supply and turn ON the power supply. Proper operation of the EVM should begin.
3. Adjust the audio signal source as needed.

3 Reference

This section includes the EVM schematic, parts list, and board layout reference.

3.1 TPA4411EVM Schematic

Figure 1. TPA4411EVM Schematic



3.2 TPA4411EVM Bill of Materials

Table 1. TPA4411EVM Bill of Materials

Qty.	Reference	Description	SND Size	Manufacturer/ Part Number
2	C1, C2	Capacitor, ceramic, 1 µF, 10 V, X7R, ±10%	0603	TDK C1608X7R1C105K
2	C3, C4, C5	Capacitor, ceramic, 2.2 µF, 6.3 V, X5R, ±20%	0603	TDK C1608X5R0J225M
1	C6	Capacitor, ceramic, 10 µF, 6.3 V, X5R, ±20%	0805	TDK C2012X5R0J106
0	C7	Not installed	0603	
2	R1, R2	Resistor, 121 kΩ, 1/16 W, 1%	0603	Panasonic ERJ-3EKF1213J
2	SDL, SDR	Momentary switch		Panasonic P8048SCT-ND
1	U1	TPA4411 audio amplifier IC 4 × 4 thin QFN package		Texas Instruments TPA4411RTJ
1	J1	Headphone jack		Kycon, Inc., P/N ST-3000
0	JP1	2 Position, 2 mm header (not installed)		
7	PNP Headers	Terminal post headers		Sullins, PTC36SABN SAMTEC TSW-19-8-G-S
1	PCB	TPA4411EVM printed-circuit board		

3.3 TPA4411EVM PCB Layers

Figure 2. Top Layer

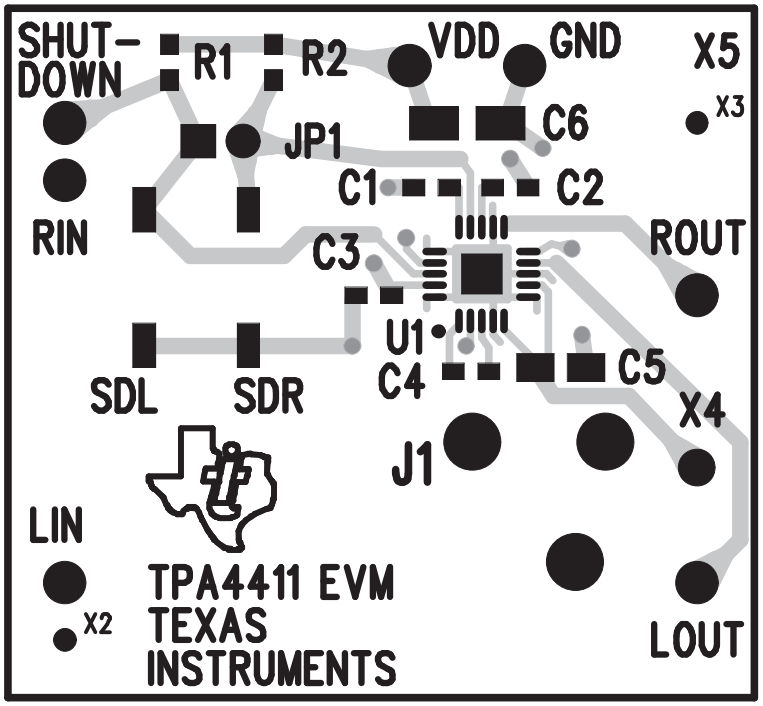
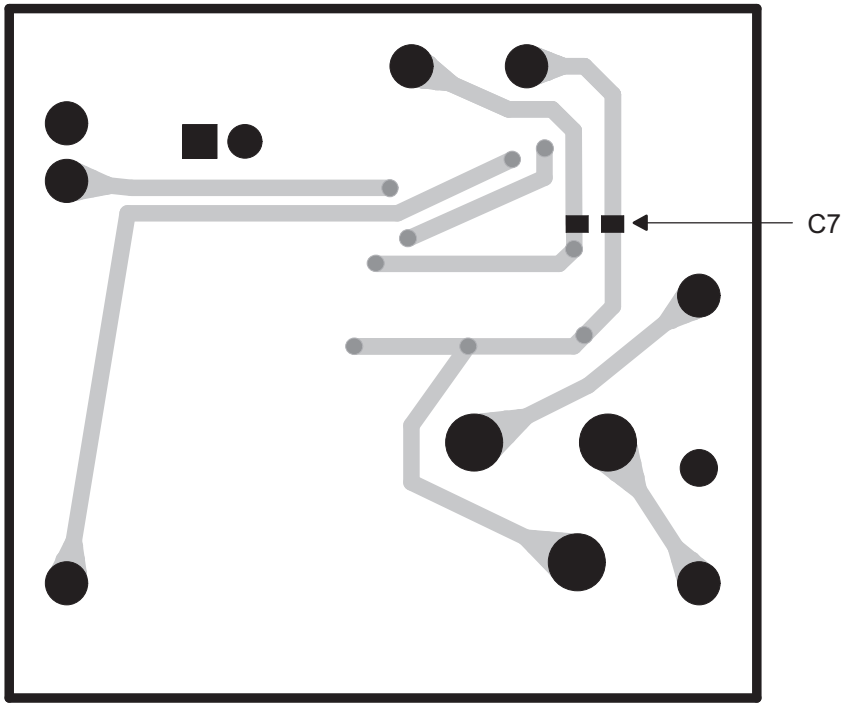


Figure 3. Bottom Layer



4 Related Documentation From Texas Instruments

- **TI Plug-N-Play Audio Amplifier Evaluation Platform** (literature number SLOU011) provides detailed information on the evaluation platform and its use with TI audio evaluation modules.
- **TPA4411 80-mW DirectPath™ Stereo Headphone Driver** (literature number SLOS430) This is the data sheet for the TPA4411 audio amplifier integrated circuit.

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 1.8 V to 4.5 V and the output voltage range of -4.5 V to 4.5 V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than 65°C. The EVM is designed to operate properly with certain components above 65°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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