TEXAS INSTRUMENTS

TPA6017A2

Audio Power Amplifier Evaluation Module

User's Guide

December 2001

High Performance Linear Products

SLOU119

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the maximum supply voltage of 6 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 85°C. The EVM is designed to operate properly with certain components above 25°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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Chapter 1

Introduction

The TPA6017A2 is a class AB 2-watts per channel stereo audio power evaluation module.

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1.1 Description

The TPA6017A2 audio power amplifier evaluation module is a 2-watt per channel class-AB stereo audio power amplifier complete with a small number of external components mounted on a circuit board that measures approximately 2-1/4 inches by 1-1/2 inches (Figure 1–1 and Figure 1–2).

Figure 1–1. The TI TPA6017A2 Audio Power Amplifier EVM—Top View

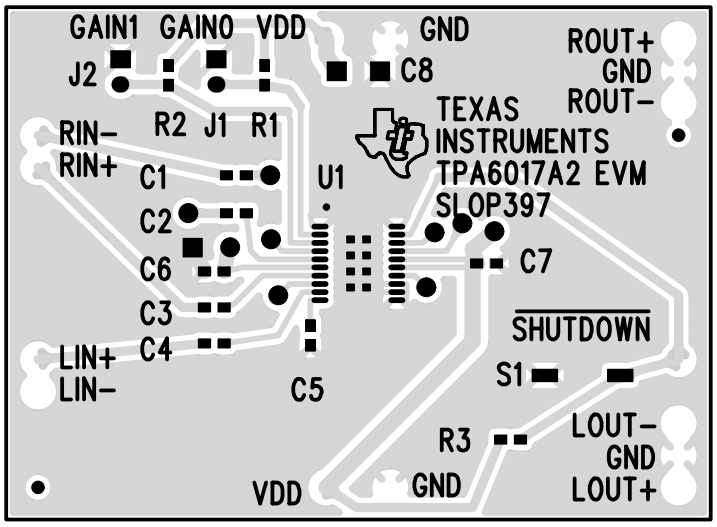
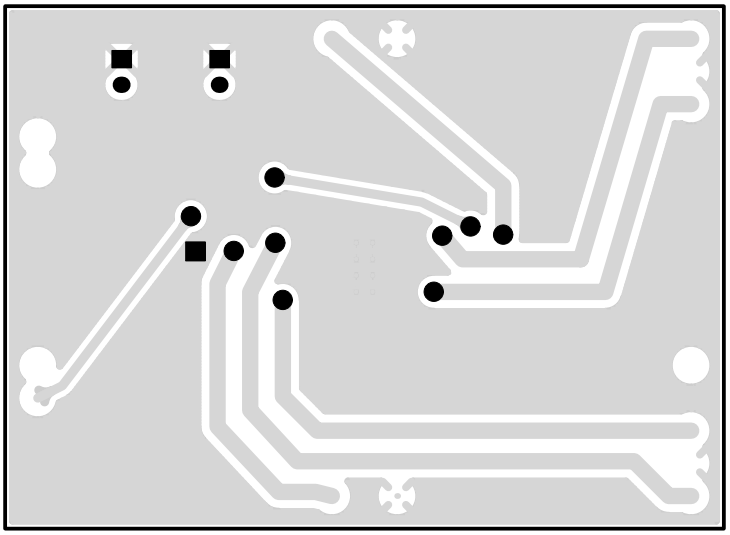


Figure 1–2. The TI TPA6017A2 Audio Power Amplifier EVM—Bottom View



Single in-line header pins extend from the underside of the module to allow the EVM to be plugged into the TI plug-n-play audio amplifier platform (see literature number SLOU011), or to be directly wired into existing circuits and equipment when used stand-alone.

The plug-n-play platform has room for a single TPA6017A2 evaluation module and is convenient for evaluating the TPA6017A2 device. The EVMs simply plug into the platform, which provides power to the modules and connects them to a versatile array of standard audio input and output jacks and connectors.

There is nothing to build, nothing to solder, and nothing but the speakers included with the platform to hook up.

1.2 TPA6017A2 EVM Specifications

Supply voltage range, V_{DD} . . . . . 4.5 V to 5.5 V
Supply current, I_{DD} . . . . . 2 A max
Continuous output power per channel, P_O: 3 Ω, V_{DD} = 5 V . . . . . 2 W
Minimum load impedance, R_L . . . . . 3 Ω

1.3 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.
- *TPA6017A2 2-W Stereo Audio Power Amplifier With Four Selectable Gain Settings* (literature number SLOS386) is the data sheet for the TPA6017A2 audio amplifier integrated circuit.

Chapter 2

Operation

This chapter describes the steps for use with plug-n-play platform and stand-alone operation.

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2.1 Quick Start List for Plug-n-Play Platform

Follow these steps when using the TPA6017A2 EVM with the TI plug-n-play audio amplifier evaluation platform (see the platform user's guide, literature number SLOU011, for additional details). Numbered callouts for selected steps are shown in Figure 2–1.

❑ Platform Preparations

1) Ensure that all external power sources are set to OFF and that the platform power switch S1 is set to OFF.
2) Install a TPA6017A2 module in platform socket U2, taking care to align the module pins correctly.
3) Use switch S2 to select or bypass the signal conditioning EVM installed in U1. If no EVM is installed in U1, set this switch to OFF.
4) Set control signal polarity jumper JP8 to Lo.
5) Set jumper JP6 to select the Mute control input (this causes the TPA6017A2 to shut down if a plug is inserted into platform headphone jack J10).
6) If a headphone amplifier will be installed in U5, set headphone source switch S3 to U5.

Table 2–1. Platform Jumper and Switch Settings for the TPA6017A2

EVM	JP4	JP5	JP6	JP7	JP8	S2	S3
PNP Platform	X	ON	Mute	X	Lo	Note 2	U5

Notes: 1) ON = Jumper installed, OFF = Jumper NOT installed, X = Don't care
2) Set S2 to ON when signal conditioning board is installed in U1; set S2 to OFF when no signal conditioning board is installed.

❑ Power Supply

1) Select and connect the power supply (ensure power supply switch S1 is set to OFF)
   a) Connect an external regulated power supply set to 5 V to platform V_{DD} power input connector J6. Observed marked polarity.

      OR

   b) Install a voltage regulator EVM (SLVP097 or equiv.) in platform socket U6. Connect a 7-V–12-V power source to a platform V_{CC} power input J1 or J2 and jumper the appropriate power input (see platform user's guide). If using J1, J2, or B1, set S1 to ON to supply power to the EVM.

❑ Inputs and Outputs

1) Ensure that the audio signal source level is set to a minimum.
2) Connect the audio source to the left and right RCA phono jacks J3 and J5 or stereo miniature phone jack J4.

3) Connect speakers to left and right RCA jacks J7 and J9 or to stripped wire speaker connectors J8.

❑ Evaluation Module Settings

1) Use jumpers J1 and J2 to set the gain of the TPA6017A2 amplifier (see Table 2–2 callout). Refer to Table 2–2 for gain settings.

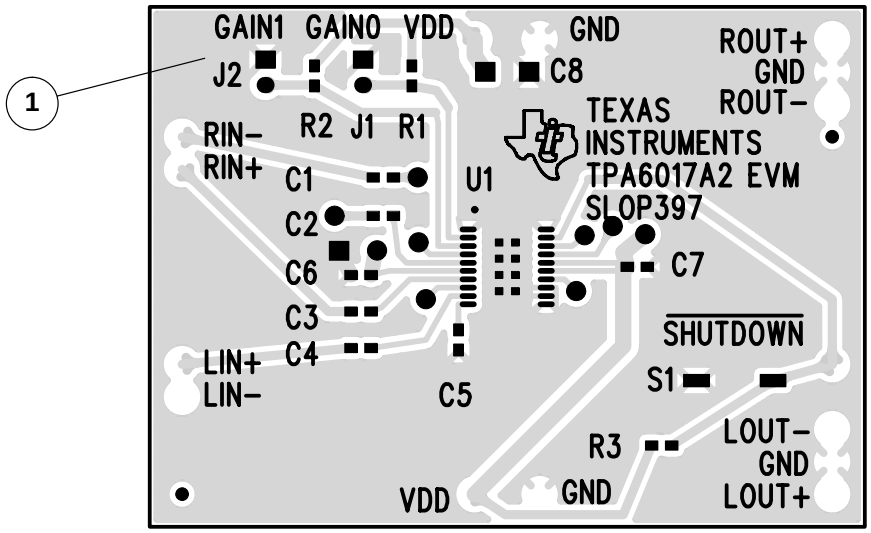
Table 2–2. Gain Settings

GAIN0 (J1 jumper)	GAIN1 (J2 jumper)	Gain
ON	ON	6 dB
ON	OFF	10 dB
OFF	ON	15.6 dB
OFF	OFF	21.6 dB

Note: ON = jumper installed; OFF = jumper NOT installed

2) Switch S1 is used to shut down the device. Push and hold S1 to put the device into shutdown mode. Releasing S1 returns the device to the active state.

Figure 2–1. Module Preparation



❑ Power Up

1) Verify correct voltage and input polarity and set the external power supply to ON. If V_{CC} and an onboard regulator EVM are used to provide V_{DD}, set the platform power switch S1 to ON.

Platform LED2 should light indicating the presence of V_{DD}, and the evaluation modules installed on the platform should begin operation.

2) Adjust the signal source level and gain setting jumpers, J1 and J2, as needed.

2.2 Quick Start List for Stand-Alone Operation

Follow these steps to use the TPA6017A2 EVM stand-alone or when connecting it into existing circuits or equipment. Connections to the EVM module header pins can be made via individual sockets, wire-wrapping, or soldering to the pins, either on the top or the bottom of the module circuit board.

❑ Power Supply

1) Ensure that all external power sources are set to OFF.

2) Connect an external regulated power supply set to 5 V to the module V_{DD} and GND pins taking care to observe marked polarity.

❑ Inputs and Outputs

1) Ensure that the audio signal source level adjustments are set to minimum.

2) Connect the right and left positive audio source to the module RIN+ and LIN+ pins, respectively. Connect the right and left negative audio source to the module RIN– and LIN– pins, respectively.

3) If using single ended inputs, ground the LIN+ and RIN+ pins and connect the signal source to RIN– and LIN–.

❑ Evaluation Module Preparations

1) Use jumpers J1 and J2 to set the gain of the TPA6017A2 amplifier. Refer to Table 2–2 for gain settings.

❑ Control Inputs

1) $\overline{\text{SHUTDOWN}}$: This pin is active LOW. A LOW on this pin (< 0.8 V) shuts down the amplifier; a HIGH (> 2 V) on this pin places the amplifier in the active state. Leaving this pin floating allows normal amplifier operation in the active state.

❑ Power Up

1) Verify correct voltage and input polarity and set the external power supply to ON.

The EVM should begin operation.

2) Adjust the signal source level and gain setting jumpers, J1 and J2, as needed.

Chapter 3

Schematic, PCB Layers, and Parts List

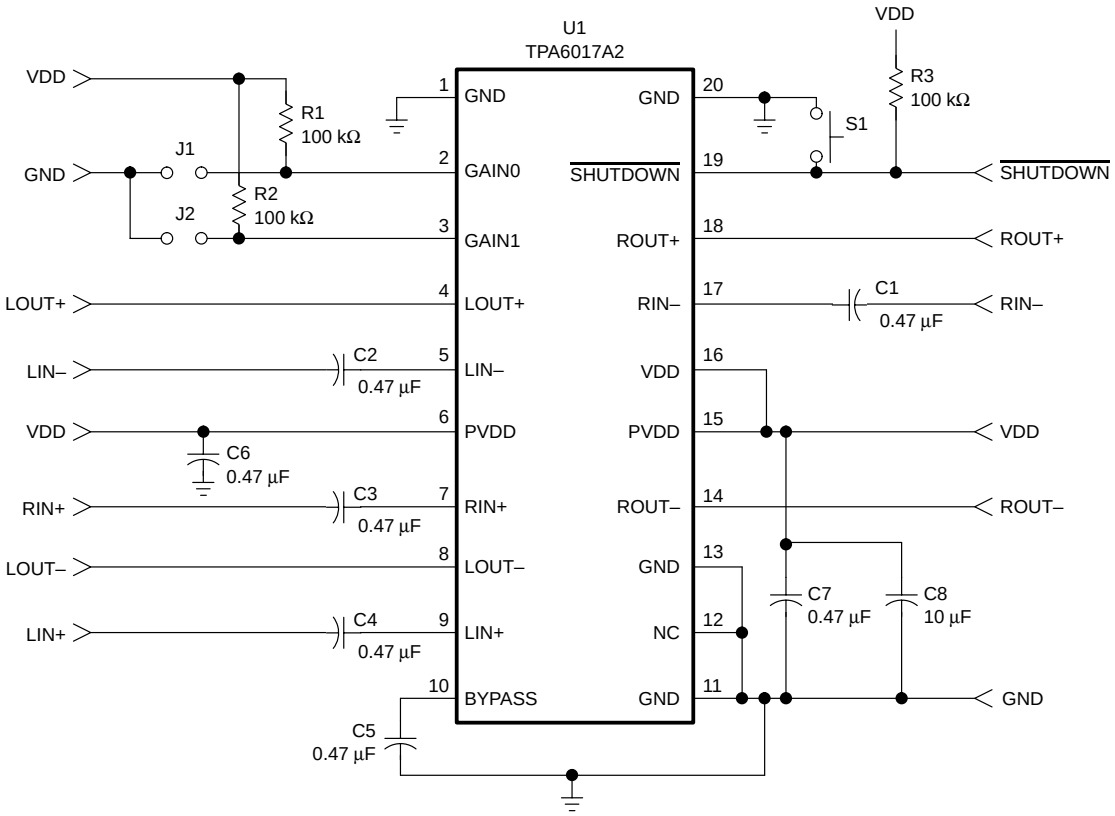
This chapter describes PCB layers, part list, and schematics.

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3.1 TPS6017A2 EVM Schematic

Figure 3–1. TPA6017A2 EVM Schematic



3.2 TPA6017A2 EVM PCB Layers

Figure 3–2. TPA6017A2 EVM—Top Layer

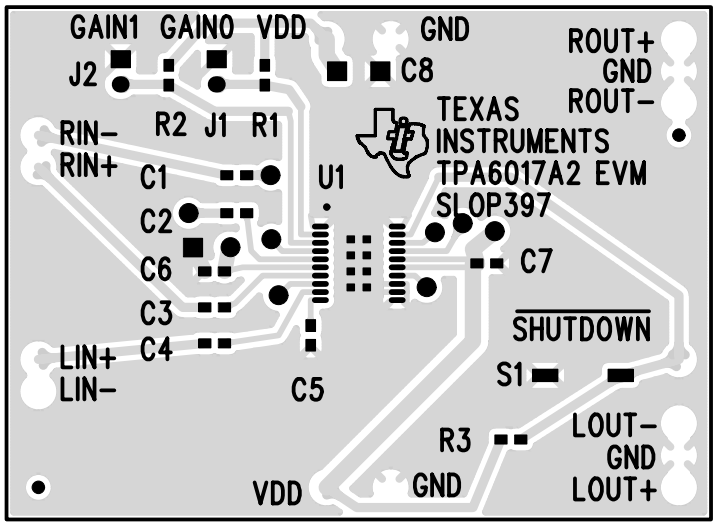
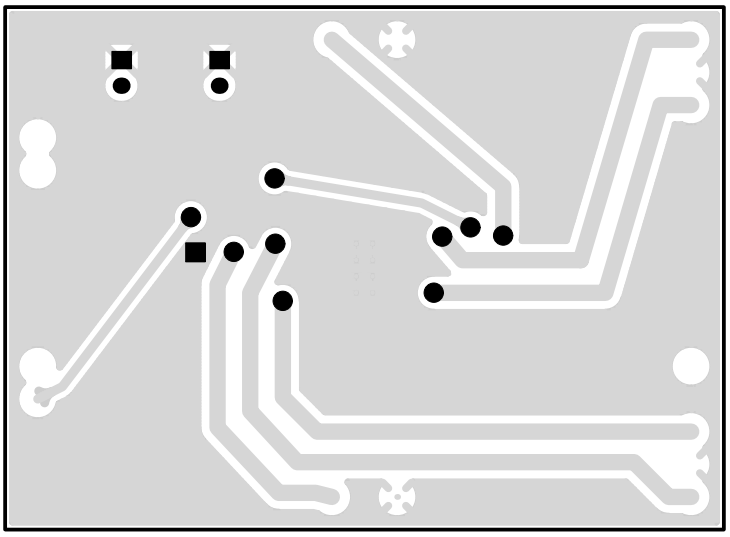


Figure 3–3. TPA6017A2 EVM—Bottom Layer



3.3 TPA6017A2 EVM Parts List

Table 3–1. TPA6017A2 EVM Parts List

Reference	Description	Size	EVM QTY.	Manufacturer/ Part Number
C1, C2, C3, C4, C5, C6, C7	Capacitor, 0.47 μF, 80%/–20%, 16 V	0603	7	Panasonic/ ECJ–1VF1C474Z
C8	Capacitor, 10 μF, 6.3 V	A	1	Panasonic/ ECS–TOJY106R
R1, R2, R3	Resistor, 100 kΩ, 1/16 W, 5%	0603	3	Panasonic/ ERJ–3GEYJ104V
S1	Switch, momentary pushbutton, 12 V, 50 mA	SMD	1	Panasonic/ EVQ–PPBA25
J1, J2	Header, 2 position	2 mm	2	Norcomp/ 2163–2–01–P2
P1, P2	Shunts	2 mm	2	3M / 953170–30
	Headers, 0.100 in centers, 1/2 in length		15	Samtec/ TSW–19–8–G–S
U1	IC, TPA6017A2, 2W, Stereo audio power amplifier	20-pin TSSOP	1	TI/ TPA6017A2PWP
PCB	PCB, 2 layer, fits U2 on PnP	2.25” × 1.5”	1	TI