TPA6020A2 Audio Power Amplifier Evaluation Module

This user's guide provides an overview of the Texas Instruments TPA6020A2 audio amplifier evaluation module (TPA6020A2EVM). It includes a list of EVM features, a brief, illustrated description of the module, and a list of EVM specifications.

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1 Introduction

1.1 Feature Highlights

The Texas Instruments (TI) TPA6020A2 audio amplifier evaluation module includes the following features:

- TPA6020A2 Stereo, Low-Voltage, Audio Power Amplifier Evaluation Module
  - Stereo
  - Fully differential amplifier
  - Dual-channel, bridge-tied load (BTL)
  - 2.5-V to 5.5-V operation
  - 2.8-W per channel output power into 3 Ω at 5 V, BTL
  - Internal depop and quick start-up circuitry
  - Internal thermal and short-circuit protection
  - Module gain is set at 2 V/V

1.2 Description

The TPA6020A2 audio power amplifier evaluation module is a complete, stereo, low-power, dual-channel, audio power amplifier. It consists of the TI TPA6020A2 2.8-W, low-voltage, audio power amplifier IC along with a small number of other parts mounted on a circuit board that is approximately 2-in. long by 1.5-in. wide (see Figure 1).

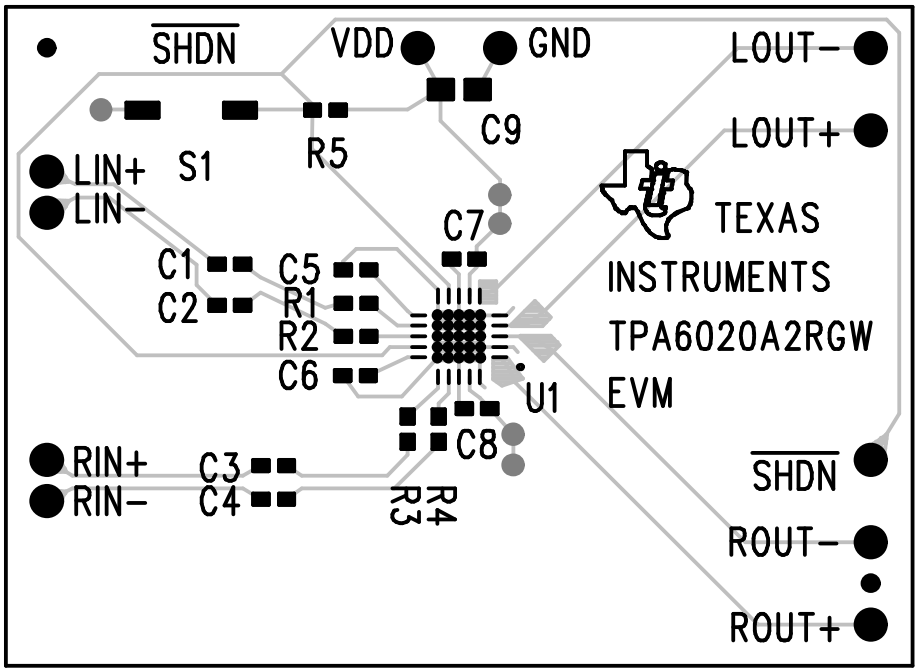


Figure 1. TI TPA6020A2 Audio Amplifier Evaluation Module

Single in-line header pins are mounted to the underside of the module circuit board. These pins allow the EVM to be wired directly into existing circuits and equipment.

1.3 TPA6020A2 EVM Specifications

		UNIT
V_{DD}	Supply voltage range	2.5 V to 5.5 V
	Power supply current rating required	2.5 A
	Continuous output power, Stereo, BTL, V_{DD} = 5 V, R_L = 3 Ω	2.8 W
V_I	Audio input voltage	0 V to V_{DD}, max
Z_L	Minimum load impedance	3 Ω

2 Operation

2.1 Quick Start List for Stand-Alone

Follow these steps to use the TPA6020A2 EVM stand-alone or when connecting it into existing circuits or equipment. Connections to the TPA6020A2 module header pins can be made via individual sockets, wire-wrapping, or soldering to the pins on either the top or the bottom of the module circuit board. Numbered callouts for selected steps are shown in Figure 2.

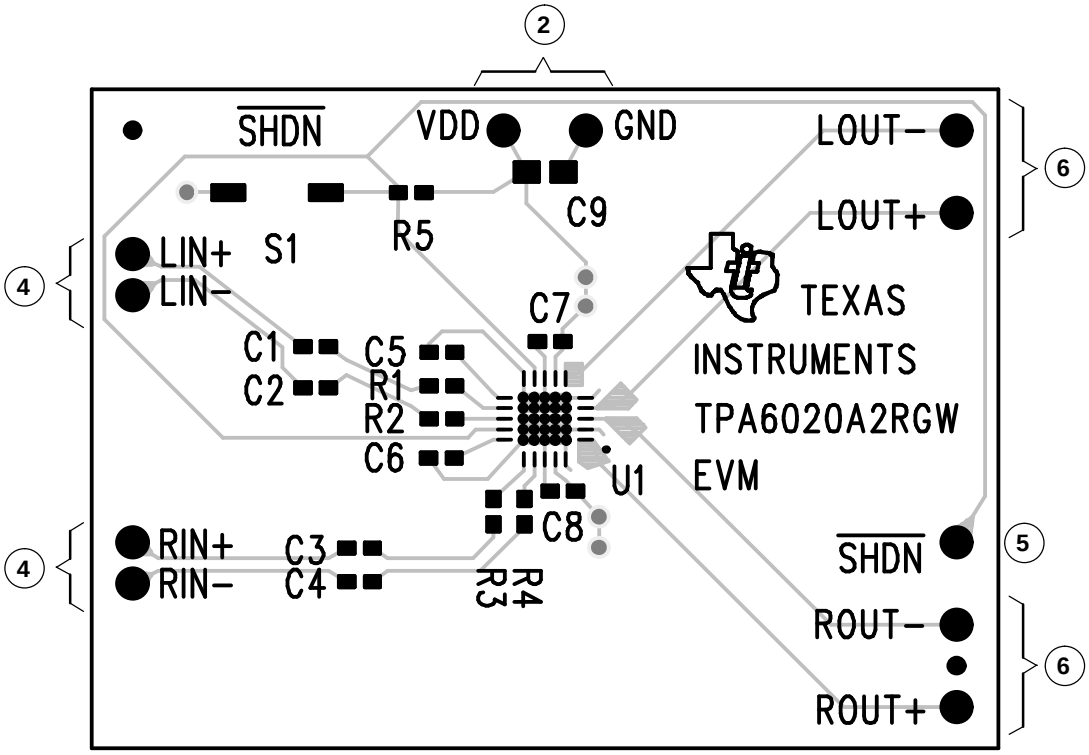


Figure 2. Quick Start Module Map

- Power Supply
  1) Select and connect the power supply:
  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
  3) Ensure that signal source level is set to minimum.

4) Connect the right (left) positive lead from the audio source to the module RIN+ (LIN+) pin and the negative lead to the RIN- (LIN-) pin.
5) Connect the $\overline{\text{SHDN}}$ pin to a voltage source for external control. Otherwise, $\overline{\text{SHDN}}$ will be controlled by the normally open switch, S1, on the EVM.
6) Connect a 3-Ω to 32-Ω speaker to the module LOUT+ and LOUT- pins, and an identical speaker to the module ROUT+ and ROUT- pins.

- Power Up

7) Verify that voltage and input polarity are correct, and set the external power supply to on.

   The EVM begins operation.

8) Adjust the signal source level as needed.

2.2 References

2.2.1 TPA6020A2 EVM Connected for Stereo BTL Output

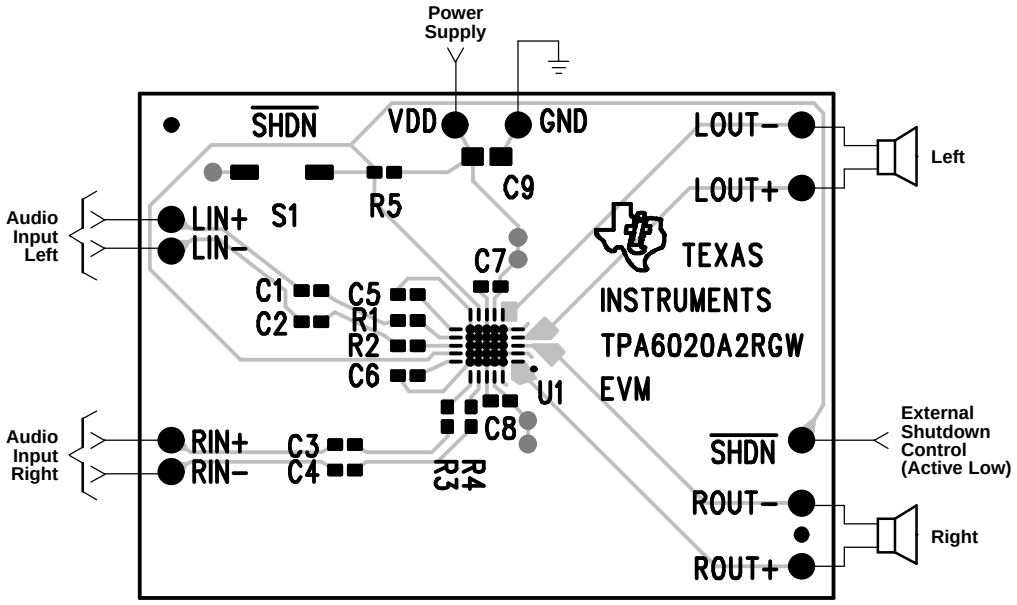


Figure 3. TPA6020A2 EVM Connected for Stereo BTL Output

2.2.2 TPA6020A2 EVM Schematic Diagram

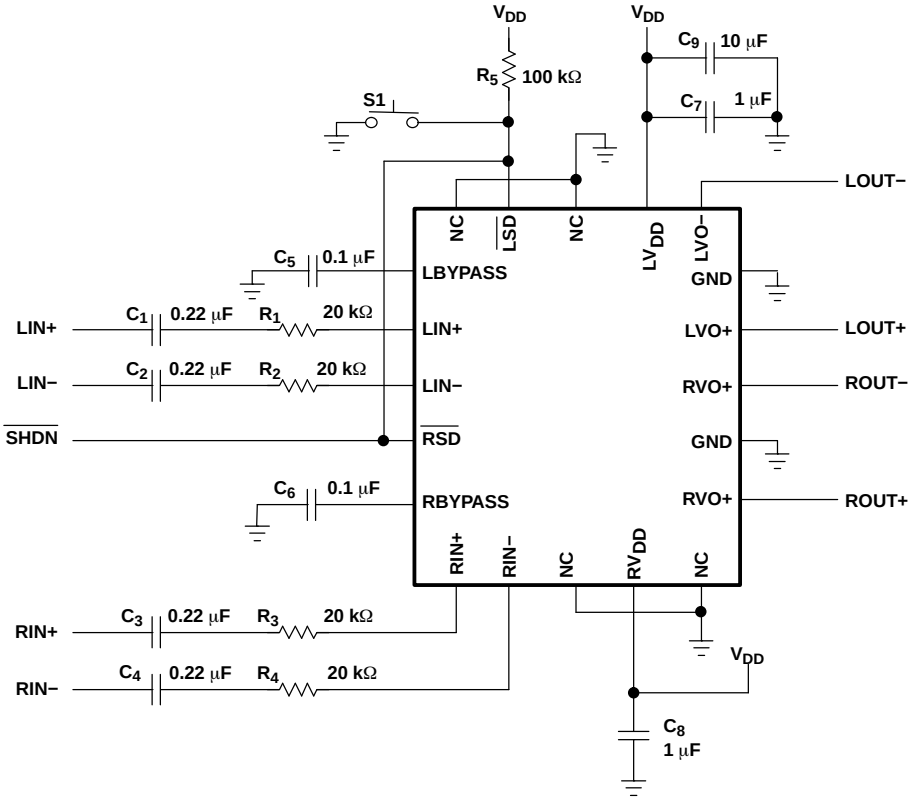


Figure 4. TPA6020A2 EVM Schematic Diagram

2.2.3 TPA6020A2 Audio Power Amplifier Evaluation Module Parts List

Table 1. TPA6020A2 EVM Parts List

Reference	Description	Size	Qty.	Manufacturer/ Part Number	Vendor/ Part Number
R1, R2, R3, R4	Resistor, 20kΩ, 1/16 W, 1%	0603	4	Panasonic ERJ-3EKF2002V	Digi-Key P20.0KHCT-ND
R5	Resistor, 100kΩ, 1/16 W, 1%	0603	1	Panasonic ERJ-3EKF1003V	Digi-Key PCS100KHCT-ND
C1, C2, C3, C4	Capacitor, 0.22µF, 10V, X5R, 10%	0603	4	Panasonic ECJ-1VB1A224K	Digi-Key PCC1749CT-ND
C5, C6	Capacitor, 0.1µF, 16V, X7R, 10%	0603	2	Panasonic ECJ-1VB1C104K	Digi-Key PCC1762CT-ND
C7, C8	Capacitor, 1.0µF, 10V, Y5V, +80/-20%	0603	2	Panasonic ECJ-1VF1A105Z	Digi-Key PCC1787CT-ND
C9	Capacitor, 10µF, 6.3V, Tantalum, 20%	A	1	Panasonic ECS-TOJY106R	Digi-Key PCS1106CT-ND
U1	IC, TPA6020A2, audio amplifier, 2.8W, stereo	20-pin QFN	1	TI TPA6020A2RGW	
S1	Switch, normally open, low-force, mom		1	Panasonic EVQ-PPBA25	Digi-Key P8086SCT-ND
	Terminal Post Headers		11	Sullins PTC36SABN	Digi-Key S1022-36-ND
PCB1	PCB, TPA6020A2 EVM		1		

2.2.4 TPA6020A2 Evaluation Module PCB Layers

The following illustrations depict the TPA6020A2 EVM, PCB layers and silkscreen. These drawings are not to scale. Gerber plots can be obtained from the TI Web site at www.ti.com.

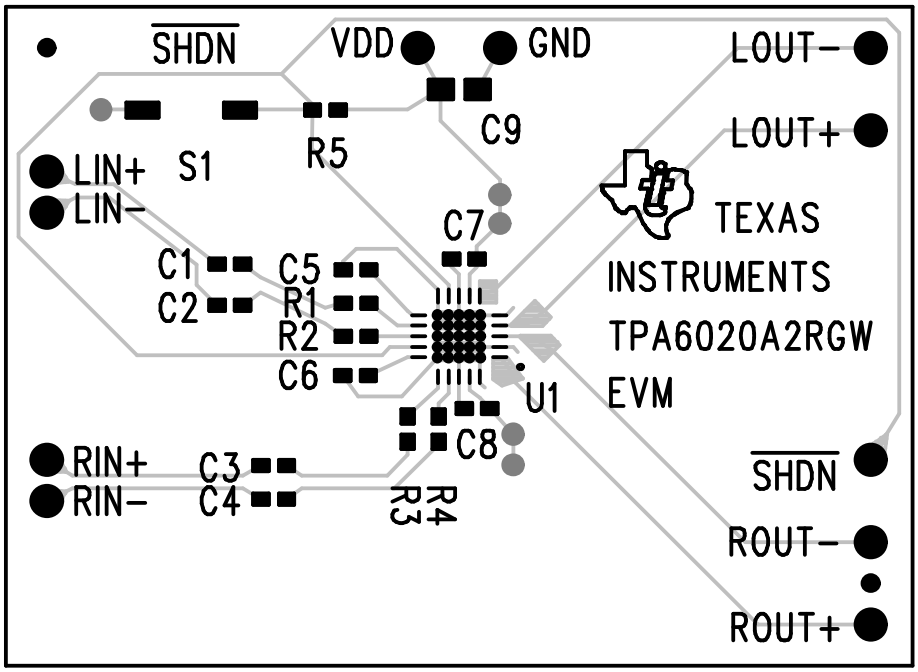


Figure 5. TPA6020A2 Evaluation Module Top Layer

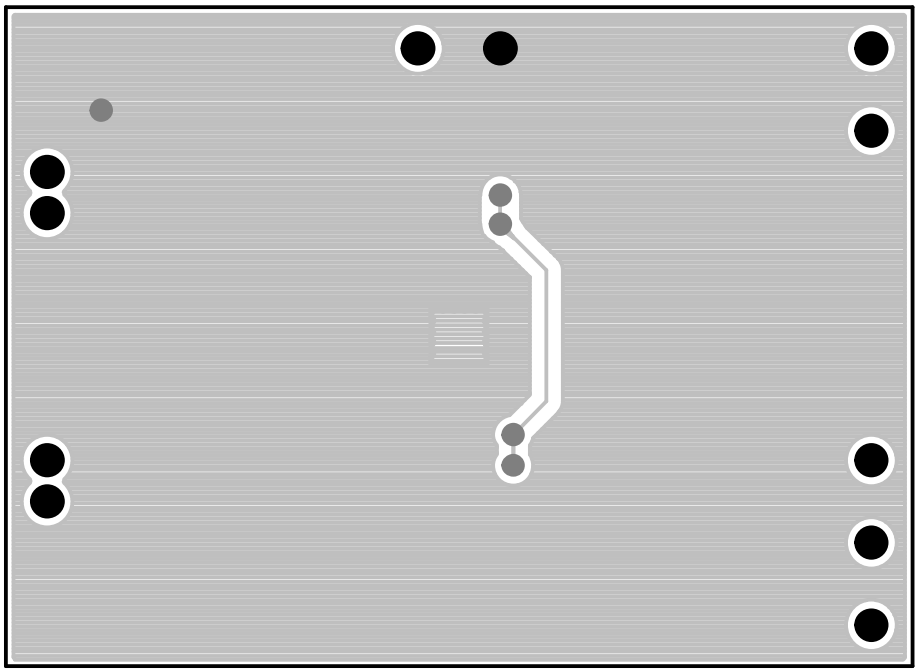


Figure 6. TPA6020A2 Evaluation Module Bottom Layer

3 Related Documentation From Texas Instruments

- *TPA6020A2, 2.8-W Stereo Fully Differential Audio Power Amplifier* (SLOS458). This is the data sheet for the TPA6020A2 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 2.5 V to 5.5 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 85° C. The EVM is designed to operate properly with certain components above 85° 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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