

TPA6043A4 Audio Power Amplifier Evaluation Module

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1 Introduction

1.1 Description

The TPA6043A4 evaluation module (EVM) consists of a single 2-W stereo speaker amplifier and 85-mW DirectPath™ headphone amplifier complete with a small number of external components mounted on a circuit board that can be used to drive speakers and headphones directly with external analog audio sources as inputs. The TPA6043A4 also contains an LDO capable of outputting 3.3 V with a maximum load of 120 mA.

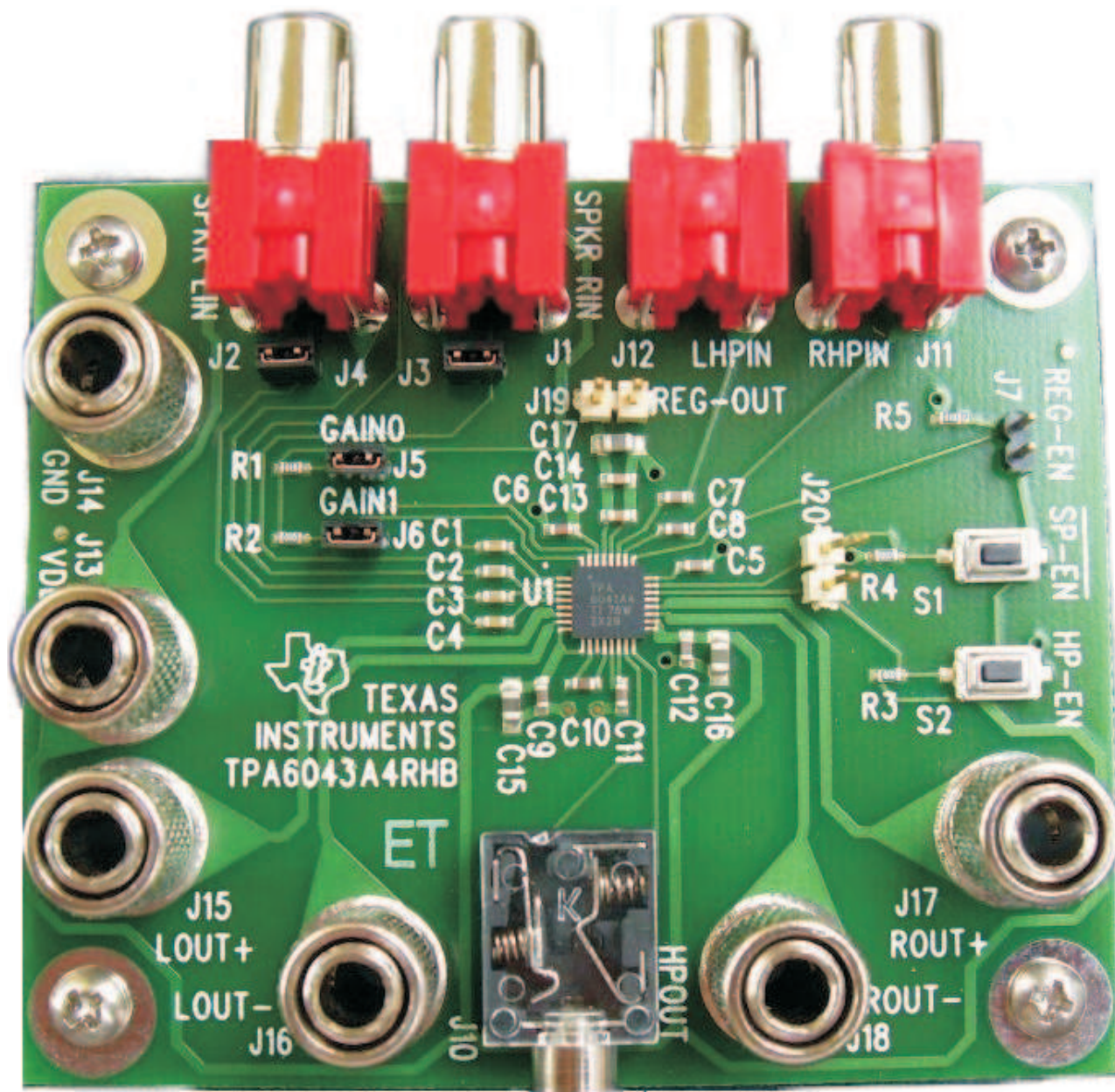


Figure 1. TI TPA6043A4 Audio Power Amplifier EVM – Top View

1.2 TPA6043A4 EVM Specifications

Supply voltage range, VDD	4.5 V to 5.5 V
Supply current, IDD	1 A, maximum
Speaker amplifier output power per channel, P_O : 4 Ω , VDD = 5 V, THD+N=10%	2 W
Headphone output power per channel, P_O : 32 Ω , VDD = 5 V, THD+N=10%	85 mW

2 Operation

2.1 Quick-Start List for Stand-Alone Operation

2.1.1 Speaker Amplifier

Follow these steps to use the TPA6043A4 EVM stand-alone or when connecting it into existing circuits or equipment. Connections to the EVM can be made by inserting stripped wire or using banana plugs for the power supply and output connections. The inputs accept standard RCA plugs.

2.1.2 Power Supply

1. Ensure that all external power sources are set to OFF.
2. Connect an external regulated power supply adjusted to 5 V to the module VDD (J13) and GND (J14) banana jacks, taking care to observe marked polarity.

2.1.3 Evaluation Module Preparations

Inputs and Outputs

1. If connecting to a fully differential input or a grounded input (the shield of the RCA is GND), remove jumpers J3 and J4 from the EVM. If connecting to a floating source like a portable CD, install jumpers J3 and J4. After setting the J3 and J4 jumpers appropriately, connect the input source to either the speaker inputs (J1 and J2) or the headphone inputs (J11 and J12) or both.
2. Connect a speaker across +LOUT (J15) and –LOUT (J16). Connect another speaker across +ROUT (J17) and –ROUT (J18).
3. Install both gain jumpers GAIN0 (J5) and GAIN1 (J6). This sets the gain of the amplifier to the lowest level, 6 dB.
4. Connect a set of headphones to the headphone output jack (J10).

Control Inputs

1. **Speaker Enable:** This terminal is active-low. A LOW on the device terminal (<0.8 V) enables the amplifier; a HIGH (>2 V) on the device terminal places the amplifier in the SHUTDOWN state. Holding down switch S1 places the amplifier in the SHUTDOWN state. Releasing **S1** returns the amplifier to the active state.
2. **Headphone Enable:** This terminal is active-high. A LOW on the device terminal (<0.8 V) shuts down the headphone amplifier; a HIGH (>2 V) on the device terminal places the headphone amplifier in the active state. Holding down switch S2 places the headphone amplifier in the SHUTDOWN state. Releasing **S2** returns the headphone amplifier to the active state.
3. **GAIN0/GAIN1:** Together, these terminals determine the gain of the amplifier. See [Table 1](#). Installing a jumper in **J5** or **J6** sets the respective terminal to GND. Removing the jumper sets the respective terminals to VDD. Removing jumpers increases the gain whereas installing jumpers decreases the gain. Logic levels are TTL compatible.
4. **Regulator Enable:** Shunt J7 and remove jumper for J19 to enable the regulator output. Remove jumper for J7 and shunt J19 to disable the regulator output. **Never shunt J19 if J7 is shunt.**

Table 1. Gain Settings

GAIN0 (J5)⁽¹⁾	GAIN1 (J6)⁽¹⁾	Amplifier Gain (dB)
ON	ON	6
ON	OFF	10
OFF	ON	15.6
OFF	OFF	21.6

⁽¹⁾ OFF = Jumper removed; ON = Jumper installed

2.1.4 Power Up

1. Verify correct voltage and input polarity, and turn on the external power supplies. The EVM should begin operation.
2. Adjust the input signal.
3. Adjust the control inputs to the desired settings.
4. Adjust the amplifier gain by installing/removing the gain jumpers, J5 and J6.

3 Schematic and Bill of Materials

3.1 TPA6043A4 EVM Schematic

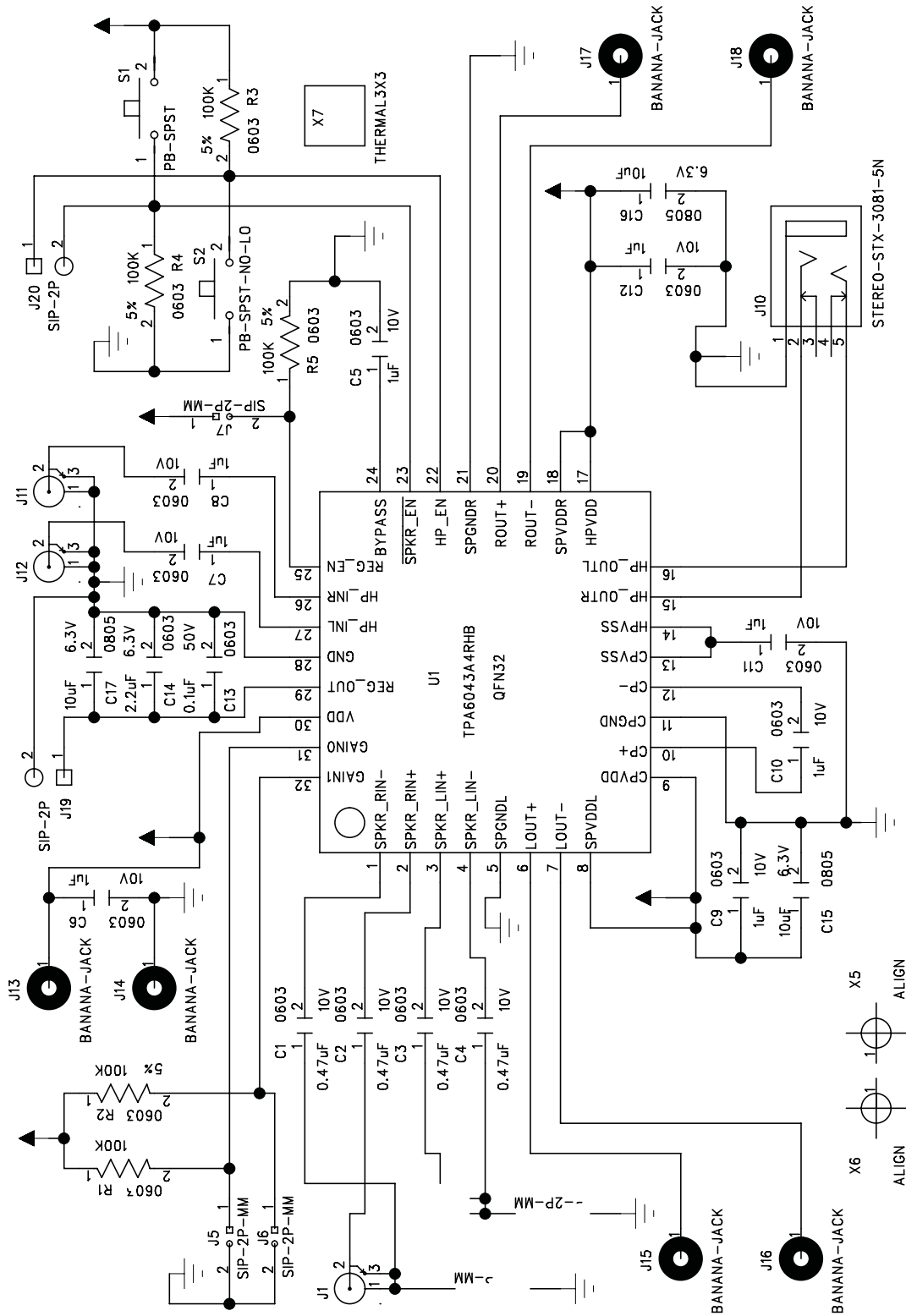


Figure 2. TPA6043A4 EVM Schematic

3.2 TPA6043A4 EVM PCB Layers

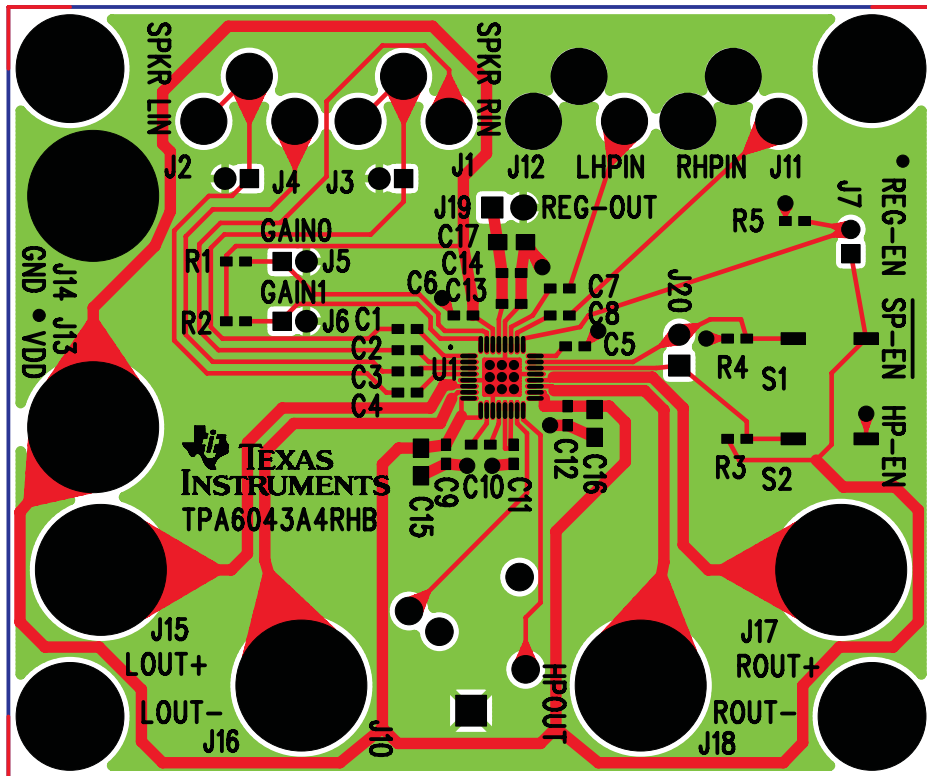
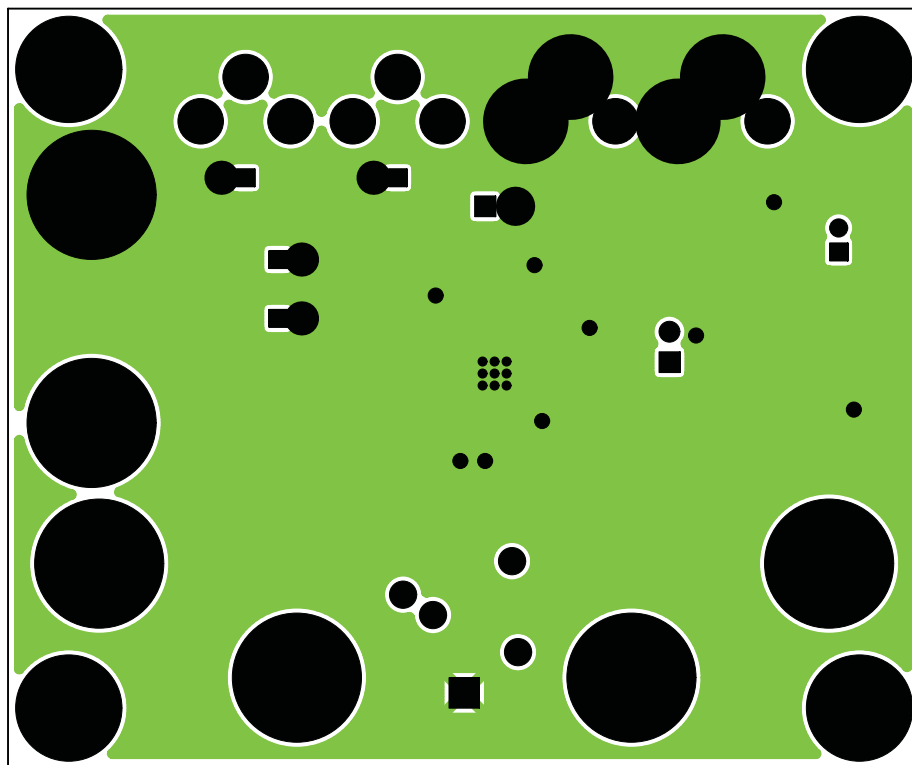


Figure 3. Top Side Layout



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Figure 4. Bottom Side Layout

3.3 TPA6043A4 EVM Bill of Materials

REF.	DESCRIPTION	SIZE	QTY	MFG	PART NO.	VENDOR NO.
C1–C4	Capacitor, ceramic, 0.47- μ F, \pm 10%, X5R, 10-V	0603	4	TDK	C1608X5R1A474K	Digi-Key/445-1320-2-ND
C5–C12	Capacitor, ceramic, 1- μ F, \pm 10%, X5R, 10-V	0603	8	TDK	C1608X5R1A105KT	Digi-Key/445-1321-2
C13	Capacitor, ceramic, 0.1- μ F, \pm 10%, X7R, 50-V	0603	1	TDK	C1608X7R1H104KT	Digi-Key/445-1314-2
C14	Capacitor, ceramic, 2.2- μ F, 6.3 V, X5R, 20%	0603	1	TDK	C1608X5R0J225M	Digi-Key/445-1323-1-ND
C15–C17	Capacitor, ceramic, 10- μ F, 6.3 V, Y5R, 20%	0805	3	TDK	C2012X5R0J106	Digi-Key/445-1363-1-ND
R1–R5	Resistor, chip, 100 k Ω , 1/10W, 5%	0603	5	Panasonic	ERJ-3GEYJ104V	Digi-Key/P100KG
J1, J2, J11, J12	Phono jack, PC mount, switched		4	Switchcraft	PJLAN1X1U03	Newark/16C1860
J3–J7	Header, 2 position, male	2 mm	5	Norcomp	2163-36-01-P2	Digi-Key/2163S-36
J10	Headphone jack		3	Kycon, Inc.	STX-3081-5N	Mouser/806-STX-3081-5t
J15–J18	Banana jack w/knurled thumbnut (nickel plate)		6	Johnson	111-2223-001	Digi-Key/J587
J19, J20	2 pin 0.1 in. breakaway header	0.1 in.	2	Sullins	PBX26SAAN	Digi-Key/PBC36SAAN
S1, S2	Switch, momentary, SMD, low profile		2	Panasonic	EVQ-PPBA25	Digi-Key/P8086S
U1	TPA6043A4 2-W stereo audio power amplifier	RTV (S-PQFP-N32)	1	TI	TPA6043A4	

32-pin QFN 5-mm sq. and 0,5-mm spacing and exposed thermal pad

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 4.5 V to 5.5 V and the output voltage range of 0 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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