TPA6012A4 Audio Power Amplifier EVM

This user's guide describes the operation of TPA6012A4 evaluation module and presents the schematic, board layout, and bill of materials of the printed-circuit board.

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1 Introduction

This section provides an overview of the Texas Instruments (TI) TPA6012A4 evaluation module (EVM). The EVM user guide includes a brief description of the module and a list of EVM specifications.

1.1 Description

The TPA6012A4 is a stereo amplifier with 32-steps DC volume control. TPA6012A4 supports both speaker and headphone output.

The TPA6012A4 EVM is a complete, stand-alone audio board. It contains the TPA6012A4 TSSOP (PWP) stereo amplifier. All components are Pb-free.

1.2 EVM Specifications

Supply voltage range, V_{DD}	4 V to 5.5 V
Supply current, I_{DD}	1.2 A, maximum
Speaker continuous output power, P_O, V_{DD} = 5.5 V, 3 Ω, THD+N = 10%	3 W
Headphone continuous output power, P_O, V_{DD} = 5 V, 16 Ω, THD+N = 1%	180 mW

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2 Operation

This section describes how to operate the TPA6012A4EVM.

2.1 Quick-Start List for Stand-Alone Operation

Use the following steps when operating the TPA6012A4EVM stand-alone board 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. Set the power supply voltage between 4 V and 5.5 V. When connecting the power supply to the EVM, first connect the ground connection to GND at the POWER terminal block, and then connect the positive supply to V_{DD} at the POWER terminal block. Verify that the connections are made to the correct terminals.

2.1.2 Inputs and Outputs

2.1.2.1 Audio Input

1. Connect audio source at the RCA jacks RIN and LIN. Shunt jumper RIN and LIN is for single-ended input.

2.1.2.2 Audio Output

1. Connect speakers at terminal blocks ROUT and LOUT.
2. TPA6012A4 supports both speaker and headphone output. To select speaker output, remove headphone in the headphone jack. To select headphone output, insert headphone into the headphone jack; speaker amplifiers will be turned off automatically.

2.1.2.3 Other Controls

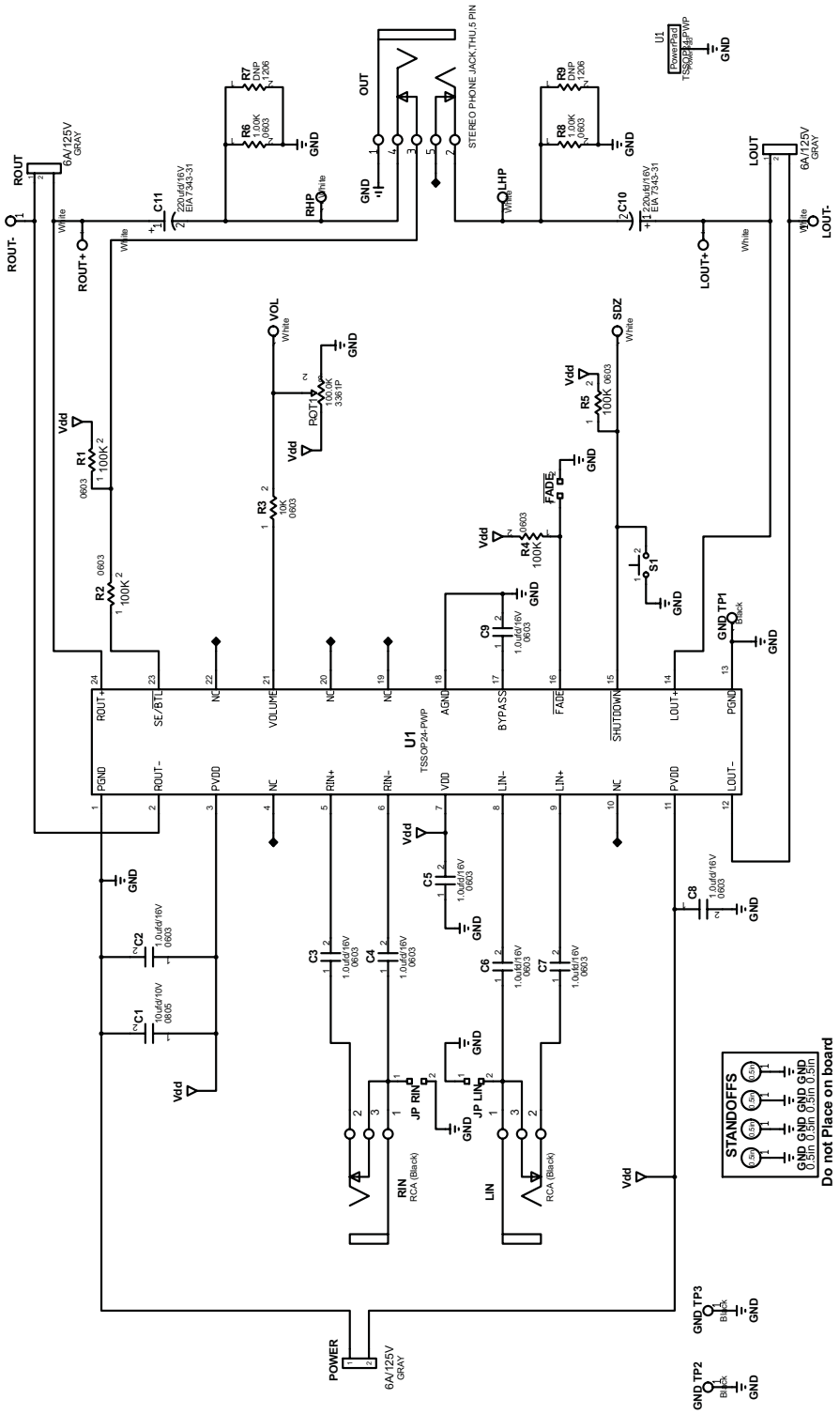
1. Shutdown is controlled by pushbutton S1. Press and hold S1 to place the TPA6012A4 in shutdown mode. Release S1 to reactivate the TPA6012A4.
2. Volume is controlled by potentiometer.
3. Shunt FADE to enable fade function. Remove shunt to disable fade function.

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3 Reference

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

3.1 TPA6012A4EVM Schematic



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3.2 TPA6012A4EVM PCB Layers

Figure 1. Top Layer

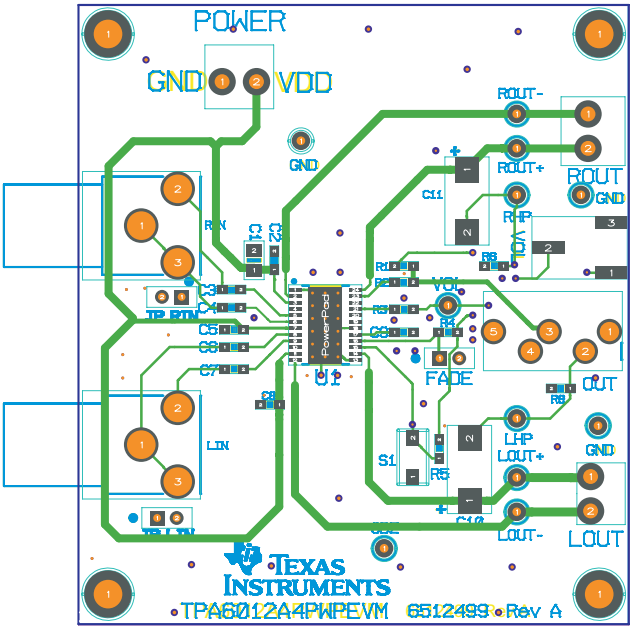
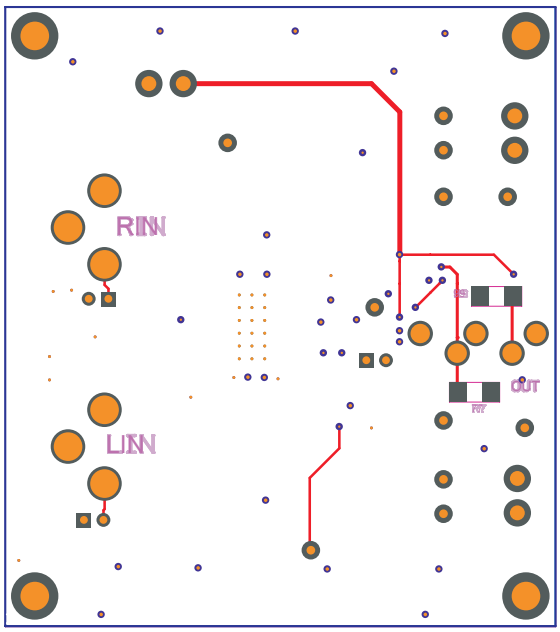


Figure 2. Bottom Layer



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4 TPA6012A4EVM Bill of Materials

Table 1. Bill of Materials for TPA6012A4PWPEVM

Item	Manufacturer/ Part Number	QTY	RefDes	Vendor/ Part Number	Description	Vendor	MFR
1	TPA6012A4PWP	1	U1	TPA6012A4PWP	3-W STEREO AUDIO POWER AMP W/DC VOLUME TSSOP24-PWP ROHS	Texas Instruments	Texas Instruments
CAPACITORS							
3	EMK107B7105KA-T	8	C1, C2, C3, C4, C5, C6, C7, C8, C9	587-1241-1	CAP SMD0603 CERM 1.0µF 16V 10% X7R ROHS	Digi-Key	Taiyo Yuden
4	GRM21BR71A106KE51L	1	C1	490-3905-1	CAP SMD0805 CERM 10µF 10V 10% X7R ROHS	Digi-Key	Murata
5	B45197A3227K509	2	C10, C11	495-1552-1	CAP TANT EIA7343-31 220µF 16V 10% LOW ESR ROHS	Digi-Key	EPCOS
RESISTORS							
6	ERJ-3GEYJ104V	4	R1, R2, R4, R5	P100KGCT	RESISTOR SMD0603 100KΩ 5% THICK FILM 1/10W ROHS	Digi-Key	Panasonic
7	RC0603FR-071KL	2	R6, R8	311-1.00KHRCT	RESISTOR SMD0603 THICK FILM 1.00KΩ 1% 1/10W ROHS	Digi-Key	Yageo
8	ERJ-3GEYJ103V	1	R3	P10KGCT	RESISTOR SMD0603 10KΩ 5% 1/10W ROHS	Digi-Key	Panasonic
9	3361P-1-104GLF	1	POT1	3361P-104GLFCT	POT, SMD CERMET 100.0K, 10% SINGLE-TURN, TOP ADJUST 1/2W ROHS	Digi-Key	Bourns
HEADERS, JACKS AND SHUNTS							
10	26630201RP2	3	FADE, JP RIN, JP LIN	2663S-02	HEADER 2-PIN, PCB 2.0MM ROHS	Digi-Key	Norcomp
12	PJRAN1X1U01X	2	LIN, RIN	65K7770	JACK, RCA 3-PIN PCB-RA BLACK ROHS	Newark	Switchcraft
1	35RAPC4BV4	1	OUT	35RAPC4BV4-ND	STEREO PHONE JACK, THU, 5-PIN, 3.5mm	Digi-Key	Switchcraft
13	ED555/2DS	3	LOUT, ROUT, POWER	ED1514	PITCH 16-28AWG ROHS	Digi-Key	On-Shore Technology
TESTPOINTS AND SWITCHES							
14	5002	8	LHP, RHP, SDZ, VOL, LOUT+, LOUT-, ROUT+, ROUT-, GND TP1,GND	5002K	PC TESTPOINT, WHITE, ROHS	Digi-Key	Keystone Electronics
15	5001	3	TP2, GND TP3	5001K	PC TESTPOINT, BLACK, ROHS	Digi-Key	Keystone Electronics
16	TL1015AF160QG	1	S1	EG4344CT	SWITCH, MOM, 160G SMT 4x3MM ROHS	Digi-Key	E-Switch
STANDOFFS AND HARDWARE							
17	2027	4	HW1, HW2, HW3, HW4	2027K	STANDOFF,4-40,0.5INx3/16IN,ALUM RNDF-F	Digi-Key	Keystone Electronics
	Component Count	41					
COMPONENTS NOT ASSEMBLED							
	HW1, HW2, HW3, HW4, R7, R9						

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of HPVSS - 0.3 V to HPVDD + 0.3 V and the output voltage range of HPVSS to HPVDD.

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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