

TPA3131D2EVM Audio Amplifier Evaluation Module

This evaluation module allows users to evaluate TI's TPA3131D2 audio amplifier. This user's guide contains an operations description, schematic, printed-circuit board (PCB) layout, and the bill of materials (BOM).

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1 Introduction

The TPA3131D2EVM (EVM) customer evaluation module, [Figure 1](#) and [Figure 2](#), demonstrates the TPA3131D2 integrated circuit (IC) from Texas Instruments.

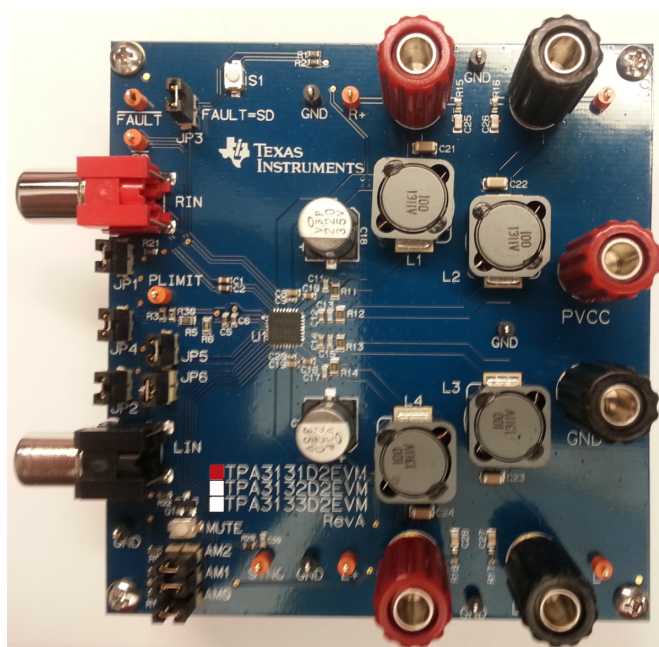


Figure 1. TPA3131D2EVM Audio Power Amplifier – Top View

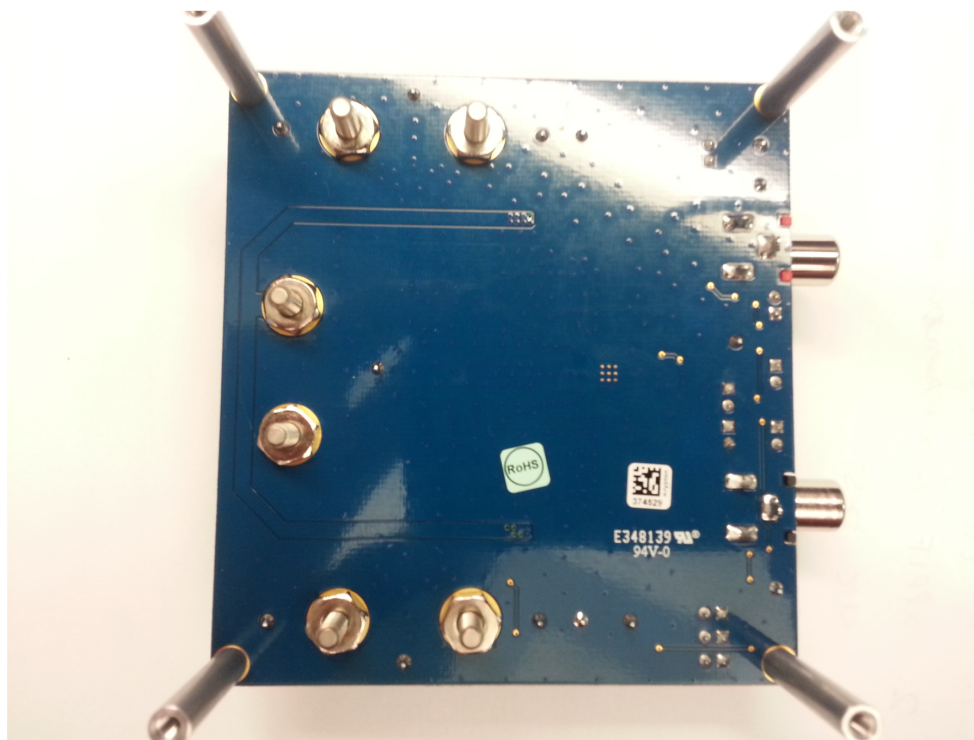


Figure 2. TPA3131D2EVM Audio Power Amplifier – Bottom View

2 Operation

2.1 Quick-Start List for Stand-Alone Operation

Section 2.1.1 and Section 2.1.2 provide instructions for using the TPA3131D2EVM in stand-alone operation or when connecting it into existing circuits or equipment. Connections to the EVM power supply and output connectors can be made by inserting stripped wire or using banana jacks. The input connectors are RCA phono jacks.

2.1.1 Power Supply

A single power supply is required to power the EVM. Because most of the pins are PVCC compliant, the PVCC supply can also be used to power the analog supply (AVcc) and to pull up the logic pins for shutdown (SD) control, and gain (GAIN). PLIMIT can be powered by an external supply connected to the PLIMIT pin. Do not power the PLIMIT pin through the PLIMIT network when the PVCC supply is turned off. This can damage the IC.

Table 1. Power Supply Requirements

Description	Voltage Range	Current Requirements	Wire Size
PVCC	4.5 V to 26 V	3 A	24 AWG

1. Ensure that the external regulated power supply is turned OFF.
2. Connect the external regulated power supply, adjusted from 4.5 V to 26 V, to the PVCC and GND banana jacks on the EVM taking care to observe marked polarity.

2.1.2 EVM Preparations

Inputs and Outputs

1. For a BTL configuration, remove jumpers from JP5 and JP6 and connect loads across the outputs (LEFT+ and LEFT-) and (RIGHT+ and RIGHT-). For PBTL configuration, insert jumpers on JP5 and JP6 and connect a single load from one of the left speaker jacks to one of the right speaker jacks.
2. Connect audio inputs, either differential or single-ended, to the LIN and RIN RCA phono plugs for BTL operation. For PBTL operation, connect a single input, differential or single-ended, to the RIN RCA phono plug.

Table 2. TPA3131D2EVM Jumpers

Jumper	Function	Options	Notes
JP1	RCA Gnd to Board GND		
JP2	RCA Gnd to Board GND		
JP3	Fault to SD short	Auto SD = insert, No SD= open	When inserted, fault pulls down SD
JP4	Gvdd to Plimit short	Insert to defeat, remove to enable	See datasheet (SLOS841)
JP5	BTL or PBTL	Insert for PBTL, remove for BTL	JP5 and JP6 should match
JP6	BTL or PBTL	Insert for PBTL, remove for BTL	JP5 and JP6 should match
AM0 AM1 AM2	Oscillator frequency	AM2=0, AM1=0, AM0=0 AM2=0, AM1=0, AM0=1 AM2=0, AM1=1, AM0=0 AM2=0, AM1=1, AM0=1 AM2=1, AM1=0, AM0=0 AM2=1, AM1=0, AM0=1 AM2=1, AM1=1, AM0=0 AM2=1, AM1=1, AM0=1	400 kHz 500 kHz 600 kHz 1000 kHz 1200 kHz Reserved Reserved Reserved

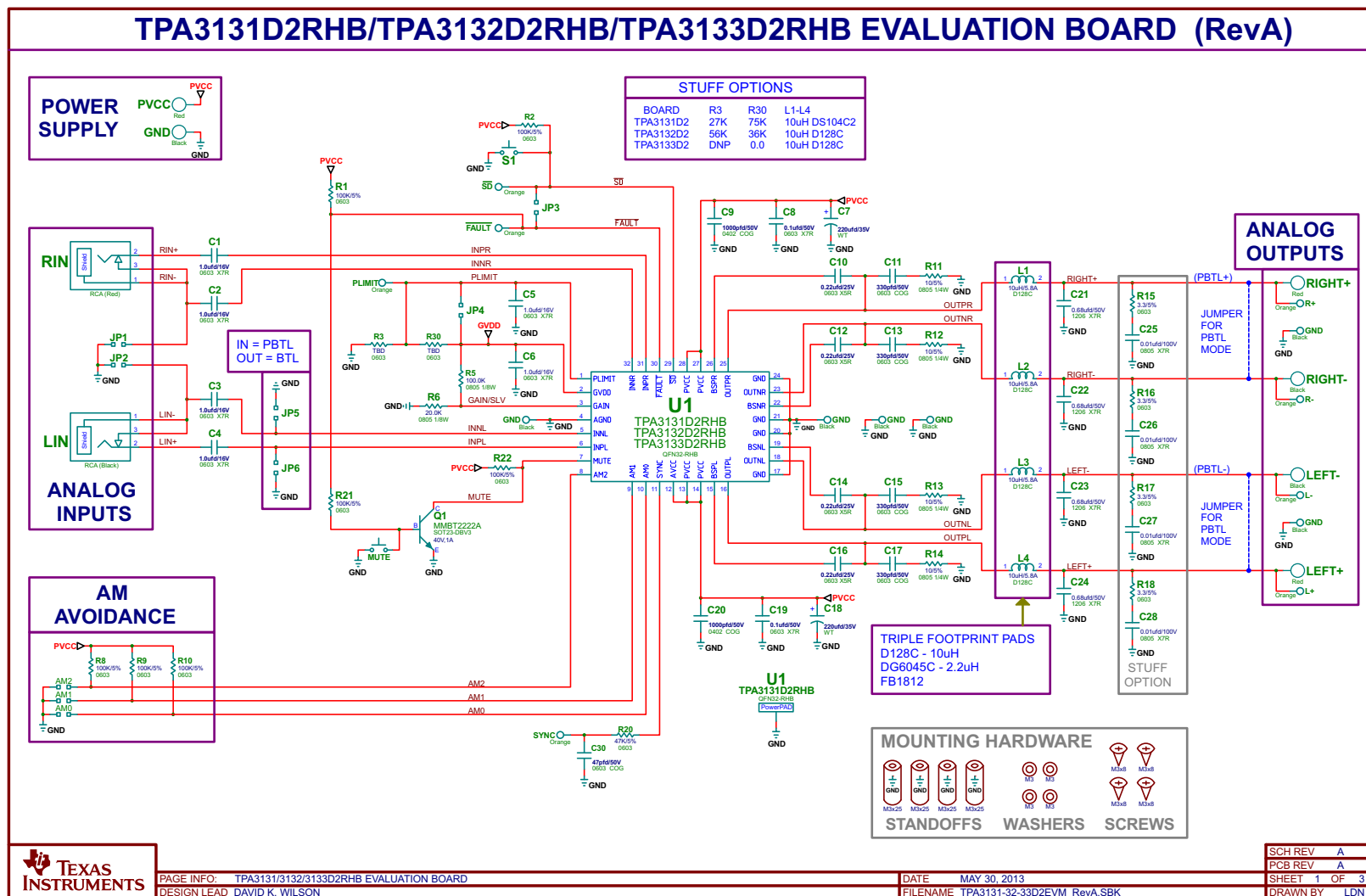
Power Up

1. Verify correct power supply voltage and polarity, and turn the external power supply ON. The EVM begins to operate.
2. Adjust the audio source for the correct volume.

3 Schematic, Layout, and Bill of Materials

3.1 TPA3131D2EVM Schematic

Figure 3 illustrates the schematic for this EVM.



3.2 TPA3131D2EVM Printed-Circuit Board Layers

Figure 4 and Figure 5 illustrate the top- and bottom-side PCB layouts for the EVM.

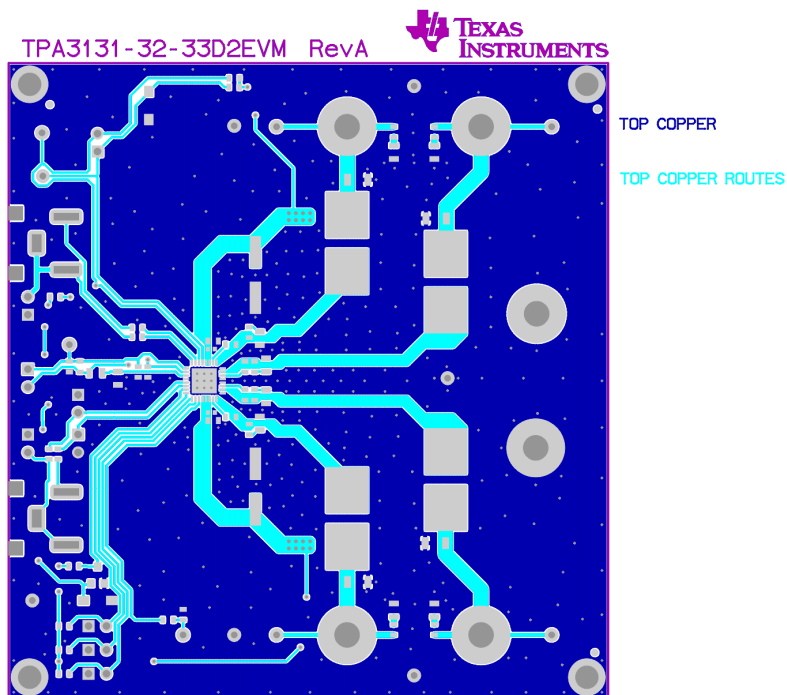


Figure 4. TPA3131D2EVM – Top-Side Layout

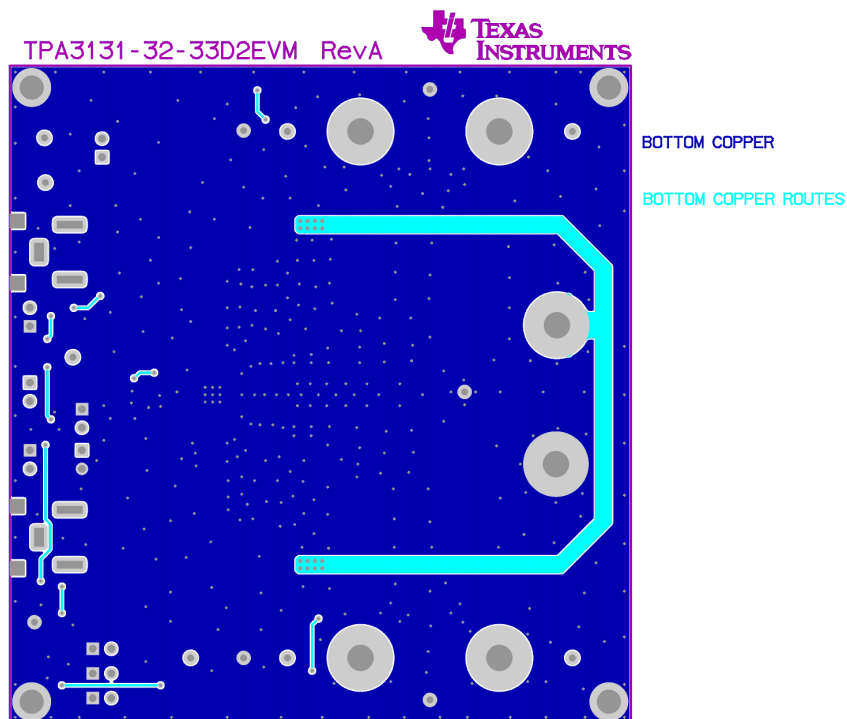


Figure 5. TPA3131D2EVM – Bottom-Side Layout

3.3 TPA3131D2EVM Bill of Materials

Table 3 is the TPA3131D2EVM BOM.

Table 3. TPA3131D2EVM Bill of Materials

Item	MANU PART NUM	MANU	Qty	REF Designators	Description
1	TPA3131D2RHB	TEXAS INSTRUMENTS	1	U1	100 W FILTER-FREE CLASS D STEREO AMP AM AVOIDANCE QFN32-RHB ROHS
2	MMBT2222A-7-F	DIODES INC.	1	Q1	TRANSISTOR NPN GENERAL PURPOSE 40V 1A SOT23 DBV3 ROHS
3	C1608X7R1C105K	TDK	6	C1, C2, C3, C4, C5, C6	CAP SMD0603 CERM 1.0UFD 16V 10% X7R ROHS
4	UWT1V221MNL1GS	NICHICON	2	C7, C18	CAP SMD ELECT 220ufd 35V 20% WT ROHS
5	GRM188R71H104KA93D	MURATA	2	C8, C19	CAP SMD0603 CERM 0.1UFD 50V 10% X7R ROHS
6	GRM1555C1H102JA01D	MURATA	2	C9, C20	CAP SMD0402 CERM 1000pfd 5% 50V COG ROHS
7	06033D224KAT2A	AVX	4	C10, C12, C14, C16	CAP SMD0603 CERM 0.22UFD 25V 10% X5R ROHS
8	GRM1885C1H331JA01D	MURATA	4	C11, C13, C15, C17	CAP SMD0603 CERM 330PFD 50V 5% COG ROHS
9	C1206C684K5RACTU	KEMET	4	C21, C22, C23, C24	CAP SMD1206 CERM 0.68UFD 50V 10% X7R ROHS
10	GRM21BR72A103KA01L	MURATA	4	C25, C26, C27, C28	CAP SMD0805 CERM 0.01UFD 100V 10% X7R ROHS
11	GRM1885C1H470JA01D	MURATA	1	C30	CAP SMD0603 CERM 47PFD 50V 5% COG ROHS
12	RMCF0603JT100K	STACKPOLE ELECTRONICS	7	R1, R2, R8, R9, R10, R21, R22	RESISTOR SMD0603 100K OHMS 5% 1/10W ROHS
13	ERJ-3EKF2702V	PANASONIC	1	R3	RESISTOR SMD0603 27.0K 1% THICK FILM 1/10W ROHS
14	MCR10EZHF1003	ROHM	1	R5	RESISTOR SMD0805 100.0 KOHMS 1% 1/8W ROHS
15	MCR10EZHF2002	ROHM	1	R6	RESISTOR SMD0805 20.0 KOHMS 1% 1/8W ROHS
16	ESR10EZPJ100	ROHM	4	R11, R12, R13, R14	RESISTOR SMD0805 10 OHM 5% 1/4W ROHS
17	ERJ-3GEYJ3R3V	PANASONIC	4	R15, R16, R17, R18	RESISTOR SMD0603 3.3 OHMS 5% 1/10W ROHS
18	ERJ-3GEYJ473V	PANASONIC	1	R20	RESISTOR SMD0603 47K OHMS 5% 1/10W ROHS
19	RMCF0603FT75K0	STACKPOLE ELECTRONICS	1	R30	RESISTOR SMD0603 75.0K OHMS 1% 1/10W ROHS
20	B952AS-100M	TOKO	4	L1, L2, L3, L4	INDUCTOR SMT 10uH 3.6A 44 mOHMS 20% DS104C2 ROHS
21	PBC02SAAN	SULLINS	9	AM0, AM1, AM2, JP1, JP2, JP3, JP4, JP5, JP6	HEADER THRU MALE 2 PIN 100LS GOLD ROHS
22	PJРАН1X1U013	SWITCHCRAFT	1	RIN	JACK, RCA 3-PIN PCB-RA RED ROHS
23	PJРАН1X1U01X	SWITCHCRAFT	1	LIN	JACK, RCA 3-PIN PCB-RA BLACK ROHS
24	5001	KEYSTONE ELECTRONICS	6	G1, G2, G3, G4, G5, G6	PC TESTPOINT, BLACK, ROHS
25	5003	KEYSTONE ELECTRONICS	8	L+, L-, R+, R-, SD, SYNC, FAULT, PLIMIT	PC TESTPOINT, ORANGE, ROHS
26	TL1015AF160QG	E-SWITCH	2	S1, MUTE	SWITCH, MOM, 160G SMT 4X3MM ROHS
27	7006	KEYSTONE ELECTRONICS	3	PVCC, LEFT+, RIGHT+	BINDING POST, RED, 15A ECONO ROHS
28	7007	KEYSTONE ELECTRONICS	3	GND, LEFT-, RIGHT-	BINDING POST, BLACK, 15A ECONO ROHS

Table 3. TPA3131D2EVM Bill of Materials (continued)

Item	MANU PART NUM	MANU	Qty	REF Designators	Description
29	95947A018	MCMaster-CARR	4	STANDOFFS	STANDOFF M3x25mm 4.5mm DIA HEX ALUM F-F ROHS
30	92148A150	MCMaster-CARR	4	STANDOFF WASHERS	WASHER SPLIT-LOCK M3 6.2mm OD 0.7mm THICK STAINLESS STEEL ROHS
31	92000A118	MCMaster-CARR	4	STANDOFF SCREWS	SCREW M3x8 PHILIPS PANHEAD STAINLESS STEEL ROHS
32	969102-0000-DA	3M	9	AM0, AM1, AM2, JP1, JP2, JP3, JP4, JP5, JP6	SHUNT BLACK AU FLASH 0.100LS OPEN TOP ROHS
		TOTAL	109		
SPECIAL NOTES TO THIS BILL OF MATERIALS					
SN1	These assemblies are ESD sensitive, ESD precautions shall be observed.				
SN2	These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.				
SN3	These assemblies must comply with workmanship standards IPC-A-610 Class 2.				
SN4	Ref designators marked with an asterisk (**) cannot be substituted. All other components can be substituted with equivalent MFG's components.				

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