TPA3122D2 EVM

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1 Introduction

1.1 Description

The TPA3122D2 evaluation module (EVM) consists of a single 15 W, class-D, stereo audio power amplifier, complete with a small number of external components mounted on a circuit board. The EVM can be used to directly drive speakers with an external analog audio source as the input. Figure 1 and Figure 2 display the top and bottom views of the EVM, respectively. For additional information, consult the TPA3122D2 data sheet (SLOS527).

Figure 1. TPA3122D2 Audio Power Amplifier EVM - Top View

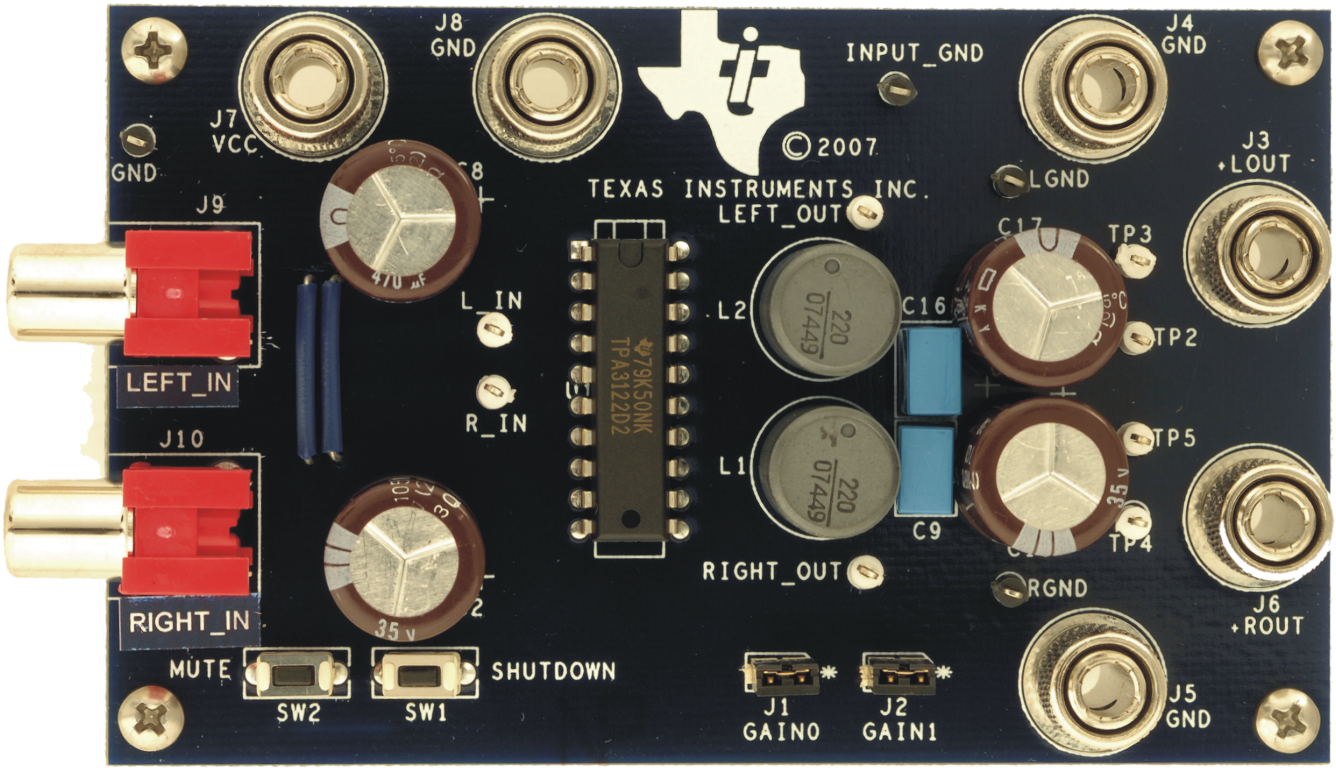

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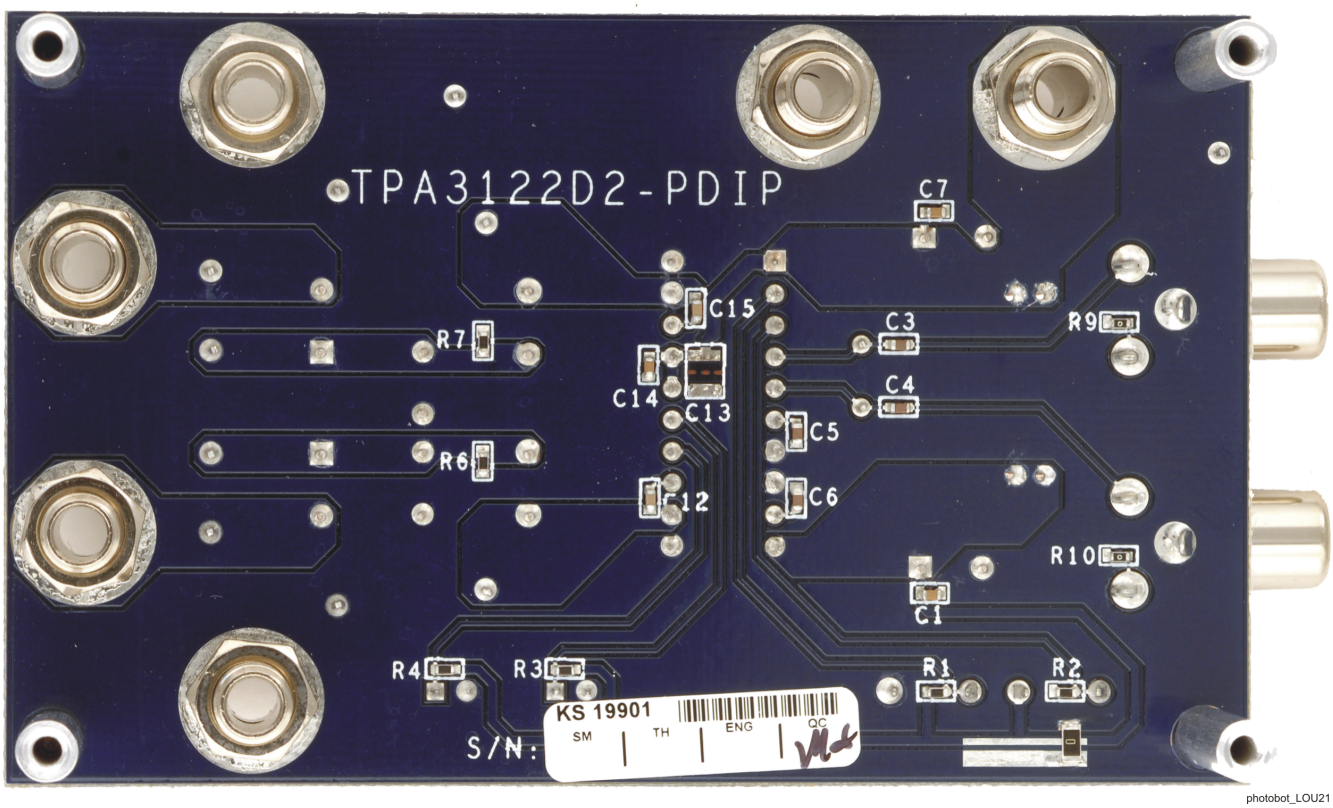
Figure 2. TPA3122D2 Audio Power Amplifier EVM - Bottom View



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1.2 EVM Specifications

Table 1. TPA3122D2 EVM Specifications

		Value	Units
VCC	Supply voltage range	10 to 30	V
ICC	Supply current	3 (maximum)	A
P_O	Continuous output power per channel 8 Ω, VCC = 27V, THD+N=10%	15	W
R_L	Minimum load impedance	4	Ω

2 Quick Start for Stand-alone Operation

Use these procedures to operate the TPA3122D2 EVM in a stand-alone configuration, or when connecting it into existing circuits or equipment. Connections to the EVM module 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 Power Supply

1. Ensure that all external power sources are set to OFF.
2. Connect an external regulated power supply adjusted from 10-30 V to the module VCC (**J7**) and GND (**J8**) banana jacks; taking care to observe marked polarity.

2.2 Evaluation Module Preparations

2.2.1 Inputs and Outputs

1. Connect a speaker across GND (**J5**) and +ROUT (**J6**). Connect another speaker across LOUT (**J3**) and GND (**J4**).
2. Install both gain jumpers GAIN0 (**J1**) and GAIN1 (**J2**). This sets the amplifier gain to the lowest level, 20 dB.

2.2.2 Control Inputs

- **$\overline{\text{SHUTDOWN}}$**—terminal is active LOW. A LOW on the device terminal (less than 0.8 V) shuts down the amplifier; a HIGH (greater than 2 V) on the device terminal places the amplifier in the active state. Pressing and holding the switch SW1 places the amplifier in the SHUTDOWN state. Releasing the SW1 switch returns the amplifier to the active state. This terminal is VCC compliant.
- **MUTE**—terminal is active HIGH. A HIGH (greater than 2 V) on this terminal, immediately terminates audio playback through the speakers; a LOW (less than 0.8 V) enables the device. The outputs remain switching with fifty percent duty cycle. The EVM **SW2** switch controls the state of the MUTE terminal. Pressing and holding the **SW2** switch places the amplifier in the MUTE state. Releasing the **SW2** switch returns the amplifier to the active state. This terminal is VCC compliant.
- **GAIN0 / GAIN1**—Together, these terminals determine the gain of the amplifier (see Table 2). Installing a jumper in **J1** or **J2** sets the respective terminal to GND. Removing the jumper sets the respective terminals to VCC. Removing jumpers ***increases*** the gain while installing jumpers ***decreases*** the gain. Logic levels are TTL compatible. These terminals are VCC compliant.

Table 2. Gain Jumper Settings (1)

GAIN1 (J2)	GAIN0 (J1)	Amplifier Gain (dB)
ON	ON	20
ON	OFF	26
OFF	ON	32
OFF	OFF	36

(1) OFF denotes jumper is REMOVED; ON denotes jumper INSTALLED.

2.2.3 Applying Power to the EVM

1. Verify correct voltage and input polarity for the external power supplies. Turn ON. The EVM starts operation.
2. Adjust the input signal.
3. Adjust the control inputs to the desired settings as described in the Control Inputs section.
4. Adjust the amplifier gain by installing or removing the gain jumpers, **J1** and **J2** to yield the gain values described in Table 2.

3 Schematic and PCB Layers

Figure 3. TPA3122D2 EVM Schematic

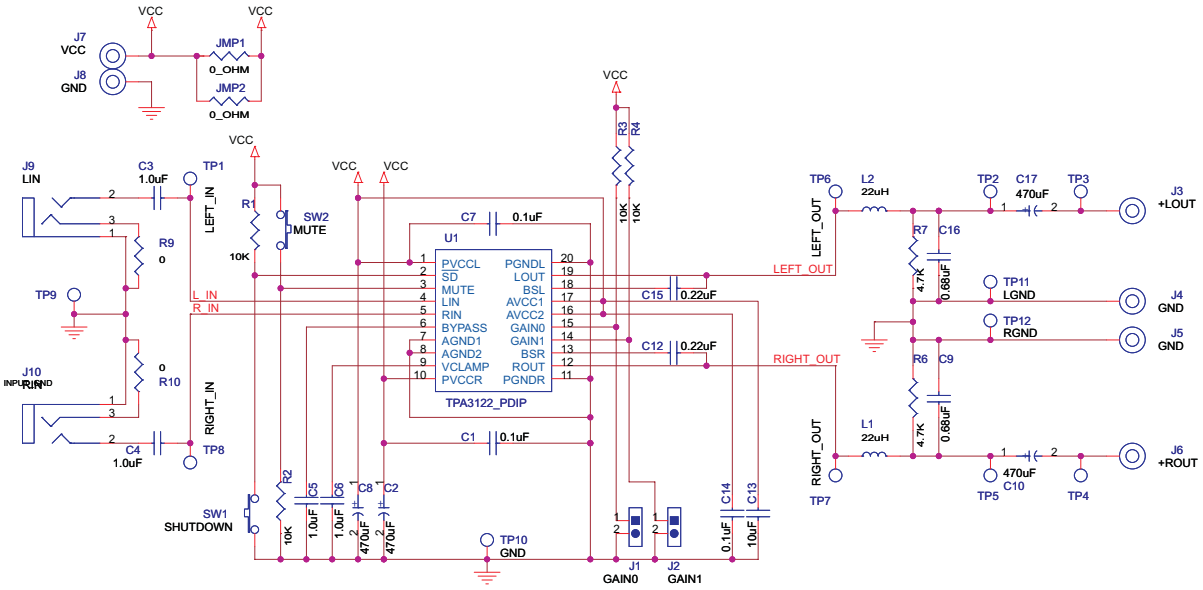


Figure 4. TPA3122D2 EVM – Top Side Layout

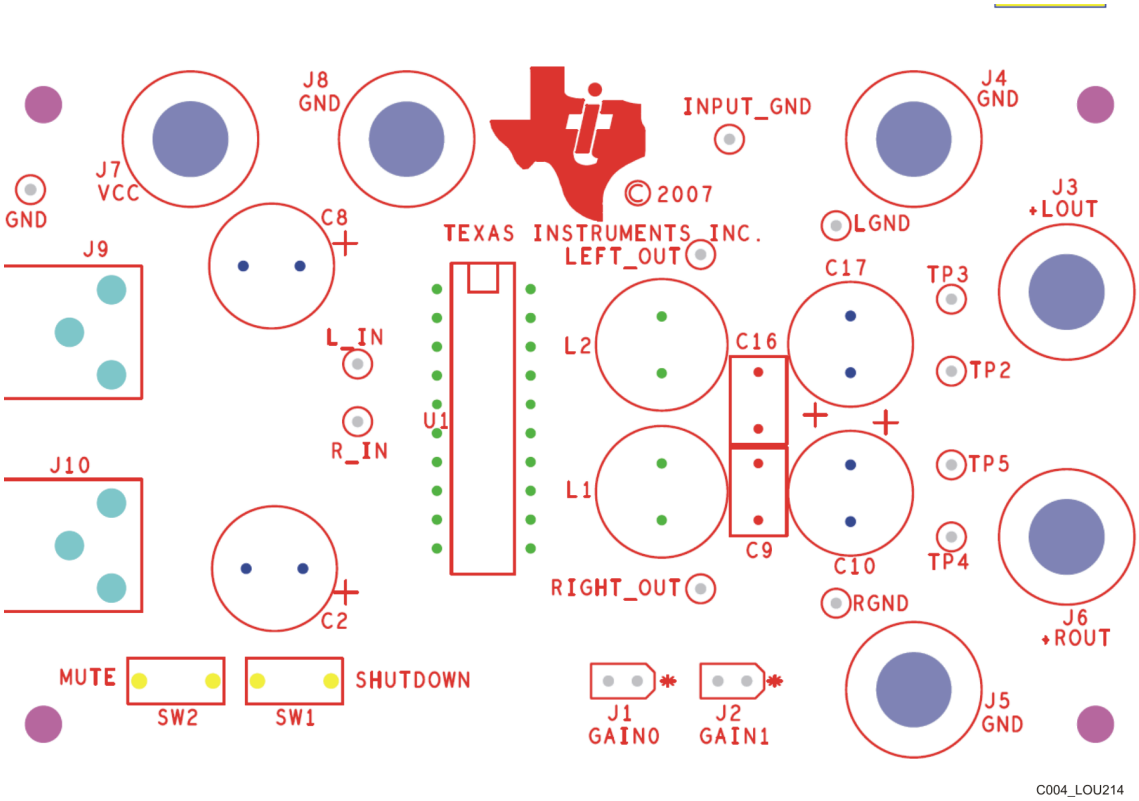
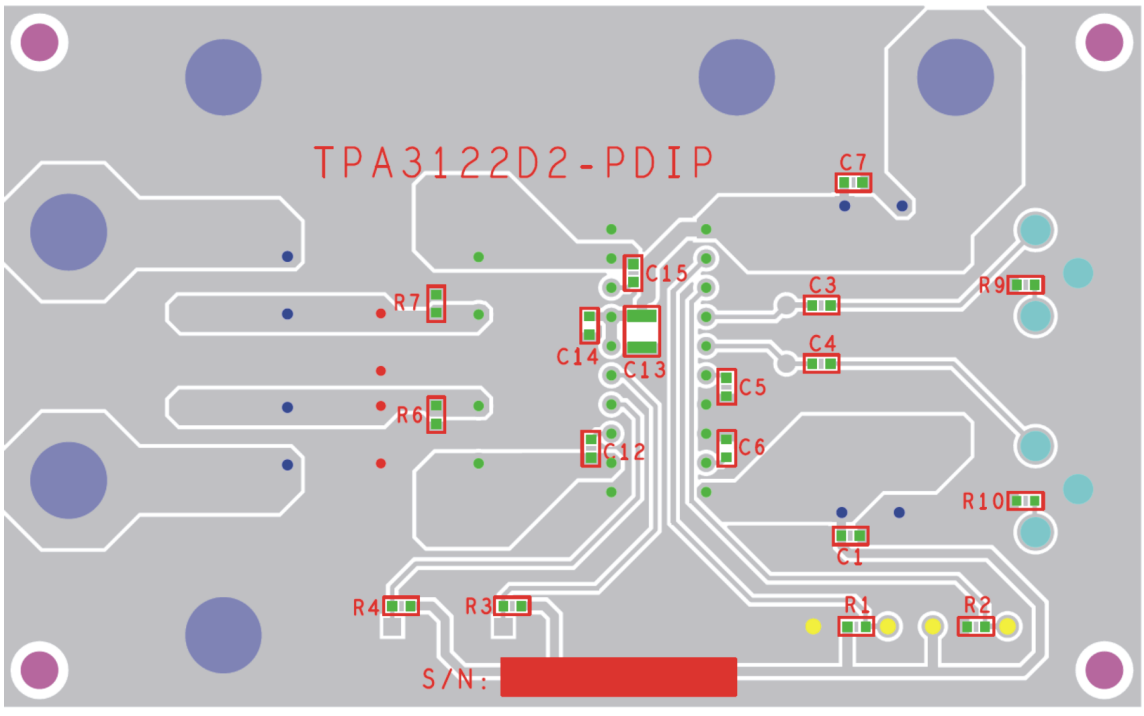


Figure 5. TPA3122D2 EVM – Bottom Side Layout



4 Bill of Materials

All components should be lead-free.

Table 3. TPA3122D2 EVM Bill of Materials

Reference	Description	Install	Size	Qty	Mfg.	Part #
C1, C7, C14	Capacitor, ceramic, 0.1µF, ±10%, X7R, 50V	yes	0603	3	TDK	C1608X7R1H104KT
C2, C8, C10, C17	Capacitor, electrolytic, 470µF, 35V, 105°C, Low impedance	yes	Radial	4	Nichicon	UHE1V471MH06
C3, C4, C5, C6,	Capacitor, ceramic, 1.0µF, ±10%, X7R, 16V	yes	0603	4	TDK	C1608X7R1C105K
C9, C16	Capacitor, metal poly, 0.68µF, 63V	yes	Radial	2	Epcos, Inc.	B32529C684J
C12, C15	Capacitor, ceramic, 0.22µF, ±10%, X7R, 16V	yes	0603	2	TDK	C1608X7R1C224KT
C13	Capacitor, ceramic, 10µF, +80%/–20%, Y5V, 50V	no	1210	1	Murata	GRM32DF51H106ZA01L
L1-L2	Inductor, 22µH, radial lead, ferrite material, shielded	yes	Radial	2	Toko	A7503AY-220M
R1-R4	Resistor, chip, 10 kΩ, 1/16 W, 5%	yes	0603	4	Panasonic	ERA-V15J103V
R6, R7	Resistor, chip, 4.7 kΩ, 1/10 W, 5%	yes	0603	2	Panasonic	ERJ-3GEYJ472V
R9, R10	Resistor, chip, zero Ω, 1/10 W, 5%	yes	0603	2	Panasonic	ERJ-3GEY0R00V
J1-J2	Header, 2 position, Male	yes	2 mm	2	Norcomp	2163-36-01-P2
JP1-JP2 (shunts)	SHUNT, 2 mm	yes	2 mm	2	Specialty	2JM-G
J3-J8	Banana Jack w/knurled Thumbnut (nickel plate)	yes		6	Johnson	111-2223-001
J9-J10	Phono Jack, PC mount, switched	yes		2	Switchcraft	PJRAN1X1U03
SW1, SW2	SWITCH PB SPST 20mA	yes	6mm x 3.3mm	2	TYCO	FSMC
	Standoffs, 5/8" length, 4-40 thread	yes		4	Keystone	1808
	Screws, 4-40, .375	yes		4		
U1	TPA3122D2N	yes	20 pin PDIP	1	TI	TPA3122D2N

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 10 V to 30 V and the output voltage range of 0 V to 30 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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