

TPA6139A2 EVM

This section provides an overview of the Texas Instruments (TI) TPA6139A2 DirectPath™ stereo headphone amplifier evaluation module (EVM). It includes a brief description of the module and a list of EVM specifications.

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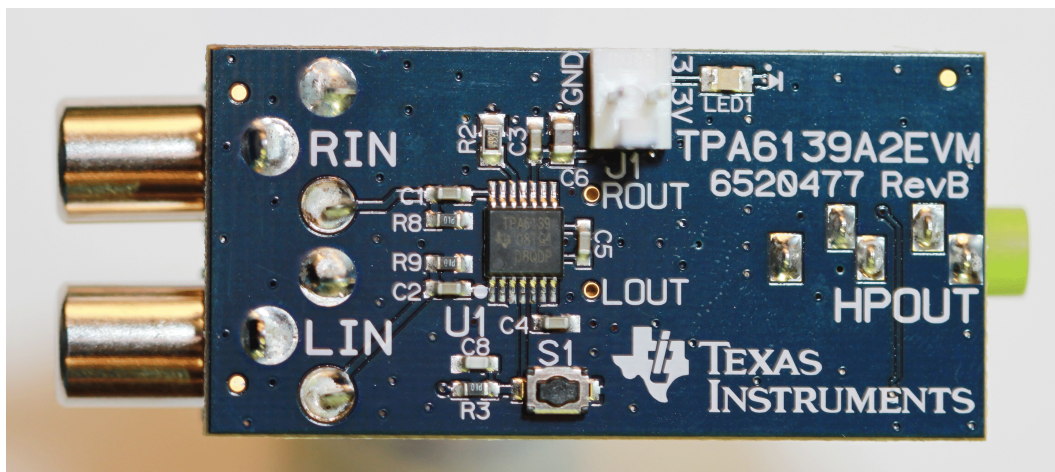


Figure 1. TPA6139A2 EVM Top View

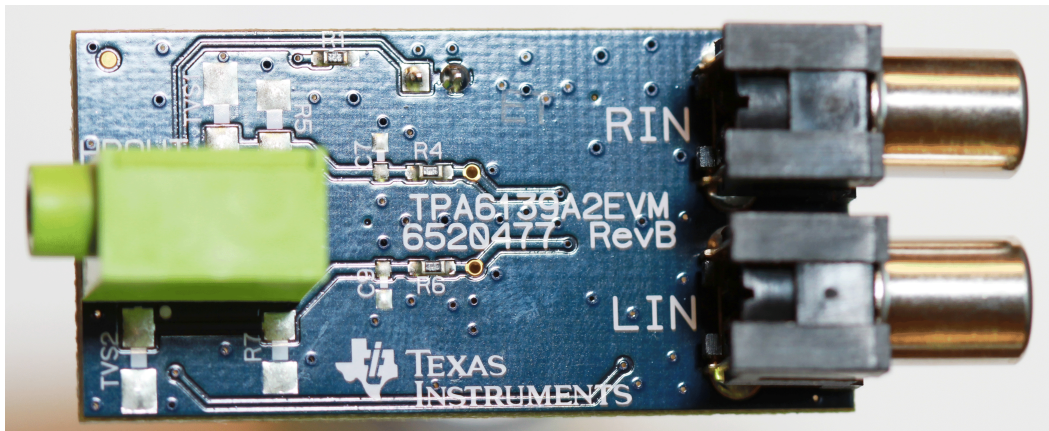


Figure 2. TPA6139A2 EVM Bottom View

1 Description

The TPA6139A2 is a DirectPath™ stereo headphone amplifier capable of driving 2 Vrms into a 600Ω load and deliver up to 25 mW/Ch into 32 Ω with a 3.3V supply. The TPA6139A2 is designed using TI's patented DirectPath™ technology and requires no output DC blocking capacitors.

The TPA6139A2 EVM is a complete, stand-alone audio board. It contains the TPA6139A2 TSSOP (PW) DirectPath™ stereo headphone amplifier. All components are Pb-free.

2 EVM Specifications

Table 1. EVM Specifications

Supply voltage range, V_{DD}	3.0 V to 3.6 V
Supply current, I_{DD}	130 m A, Typical
Continuous output power, P_O , $V_{DD} = 3.3$ V, 32 Ω, THD+N < 0.03%	25 m W

3 Operation

This section describes how to operate the TPA6139A2EVM.

3.1 Quick-Start List for Stand-Alone Operation

Use the following steps when operating the TPA6139A2EVM stand alone or when connecting the EVM into an existing circuit.

3.1.1 Power and Ground

1. Verify that the external power sources are set to OFF.
2. Connect the power supply to the EVM (J1) and set the power supply voltage between 3.0 V and 3.6 V

3.1.2 Inputs and Outputs

3.1.2.1 Audio

1. Verify that the audio source is set to the minimum level.
2. Connect the audio source to the inputs, LIN and RIN.
3. Connect a headset or other load to the headphone jack HPOUT.

3.1.2.2 Shutdown Controls

1. Shutdown is controlled by pushbutton S1. Press and hold S1 to place the TPA6139A2 in shutdown. Release S1 to reactivate the TPA6139A2.

3.1.3 Gain Setting

The gain setting is programmed with the GAIN pin and is latched when the $\overline{\text{MUTE}}$ pin is set high. The default gain of the TPA6139A2EVM is set to 3.5dB using a 49.9 k Ω resistor (R2). The gain resistor can be adjusted to achieve a gain range from 0 dB to 20 dB. Refer to the datasheet for more details on gain settings.

3.1.4 Power Up

1. Verify the correct connections as described in [Section 3.1.1](#) and [Section 3.1.2](#). Verify the correct voltage setting of the power supply and turn ON the power supply. Proper operation of the EVM should begin.
2. Adjust the audio signal source as needed.

4 Reference

This section includes the EVM schematic and board layout reference.

4.1 TPA6139A2EVM Schematic

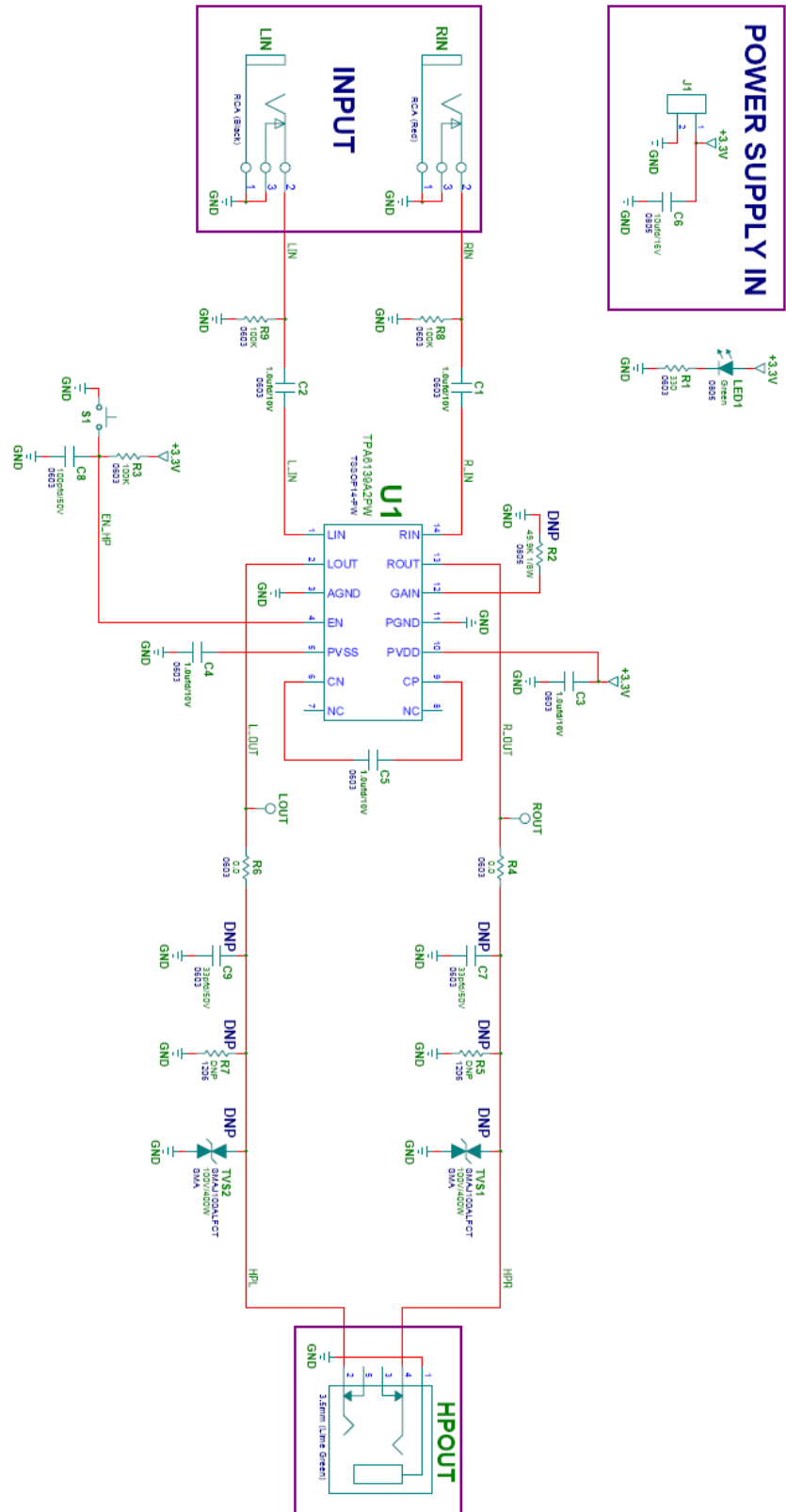


Figure 3. TPA6139A2EVM Schematic

4.2 TPA6139A2EVM PCB Layers

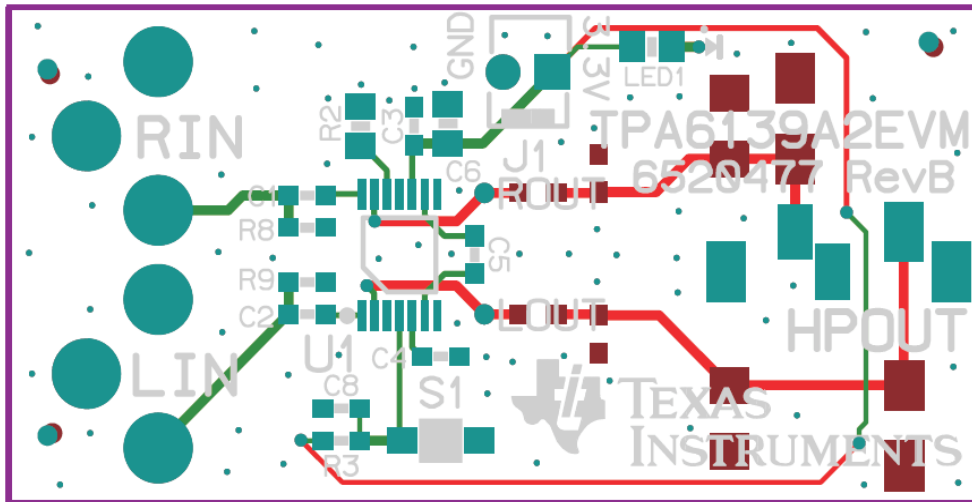


Figure 4. Top Silkscreen

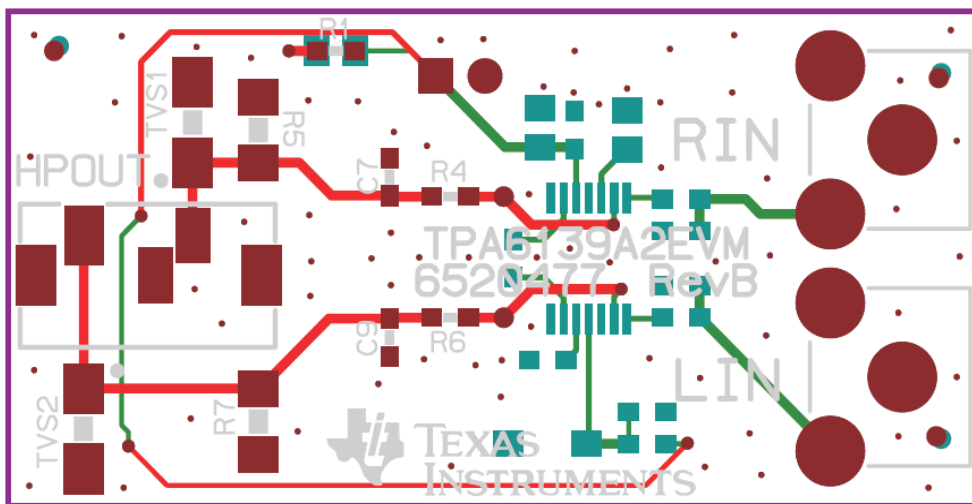


Figure 5. Bottom Silkscreen

5 TPA6139A2EVM Bill of Materials

Table 2. TPA6139A2EVM Bill of Materials

Qty.	Reference	Description	SMD Size	Manufacturer	Part Number
1	U1	Headphone AMP with 2 Vrms output TSSOP14-PW ROHS	0603	TPA6139A2PW	
1	LED1	LED, GREEN 2.0V SMD0805 ROHS	0805	LUMEX OPTO	SML-LXT0805GW-TR
2	TVS1, TVS2	TRANSIENT VOLTAGE SUPPRESSION SMA 100V 400W ROHS	0603	LITTLEFUSE	SMAJ100A
2	C7, C9	CAP SMD0603 CERM 33PFD 50V 5% NPO ROHS	0603	MURATA	GRM1885C1H330JA01D
1	C8	CAP SMD0603 CERM 100PFD 50V 5% NPO ROHS	0603	MURATA	GRM1885C1H101JA01D
5	C1–C5	CAP SMD0603 CERM 1.0UFD 10V 10% X5R ROHS	0603	MURATA	GRM185R61A105KE36D
1	C6	CAP SMD0805 CERM 10UFD 16V 10% X5R ROHS	0603	MURATA	GRM21BR61C106KE15L
2	R4, R6	RESISTOR SMD0603 ZERO OHMS 1/10W ROHS	0603	STACKPOLE ELECTRONICS	RMCF0603ZT0R00
1	R1	RESISTOR SMD0603 330 OHMS 5% 1/10W ROHS	0603	PANASONIC	ERJ-3GEYJ331V
1	R2	RESISTOR SMD0805 49.9K OHMS 1% 1/8W THICK FILM ROHS	0805	VISHAY	CRCW080549K9FKEA
3	R3, R8, R9	RESISTOR SMD0603 100K OHM 1% THICK FILM 1/10W ROHS	0603	PANASONIC	ERJ-3EKF1003
1	J1	HEADER MALE 2PIN 100LS W/ FRICTION LOCK ROHS		MOLEX	22-23-2021
1	LIN	JACK, RCA 3-PIN PCB-RA BLACK ROHS		SWITCHCRAFT	PJРАН1X1U01X
1	RIN	JACK, RCA 3-PIN PCB-RA RED ROHS		SWITCHCRAFT	PJРАН1X1U03X
1	HPOUT	JACK MINI STEREO 3.5mm LIME GREEN W/SHUNTS ROHS		KYCON	STX-3150-5N-577C
1	S1	SWITCH, MOM, 160G SMT 4X3MM ROHS		E-SWITCH	TL1015AF160QG

Components not assembled: C7, C9, R2, R5, R7, TVS1, and TVS2.

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 3.0 V to 3.6 V and the output voltage range of 3.0 V to 3.6 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 60°C. The EVM is designed to operate properly with certain components above 40°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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