TPA2037D1 Audio Power Amplifier Evaluation Module

The TPA2037D1 is a 6-dB fixed-gain audio power amplifier evaluation module is a complete, low-power, Class-D, mono audio power amplifier capable of delivering 1.46 W into 8 Ω and 2.57 W into 4 Ω at 1% THD+N (YFF package). All components and the evaluation module are Pb-free. The TPA2037D1 evaluation module (EVM) consists of a TPA2037D1 device and all necessary components to evaluate it.

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1 Introduction

This section provides an overview of the Texas Instruments (TI) TPA2037D1 NanoFree™ WCSP audio amplifier evaluation module (TPA2037D1EVM). It includes a brief description of the module and a list of EVM specifications.

1.1 TPA2037D1EVM Specifications

Supply voltage range, V_{DD}	2.5 V to 5.5 V
Power supply current rating required	2.5 A
Continuous output power, P_O: 4-Ω BTL, V_{DD} = 5 V, THD+N = 10%	3.24 W
Audio input voltage, V_I	0 V to V_{DD}
Minimum load impedance, Z_L	4 Ω

2 Operation

This section describes how to operate the TPA2037D1EVM.

2.1 Quick Start for Stand-Alone Operation

Use the following steps when operating the TPA2037D1EVM stand-alone or when connecting the EVM into existing circuits or equipment.

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2.1.1 Power and Ground

1. Ensure that the external power sources are set to OFF.
2. Set the power supply voltage between 2.5 V and 5.5 V. When connecting the power supply to the EVM, attach the ground connection to the GND header pin first, and then connect the positive supply to the VDD header pin. Verify that the connections are made to the correct header pins.

2.1.2 Inputs and Outputs

2.1.2.1 Audio

1. Ensure that the audio source is set to the minimum level.
2. Connect the audio source to the RCA input socket, IN. In case of differential audio input ensure that the jumper JP IN is not inserted. In case of a single-ended audio input ensure that the jumper JP IN is inserted, thereby grounding IN- through the input capacitor C2.
3. Connect a speaker (4 Ω-32 Ω) between the output banana jacks OUT+ and OUT-.

2.1.2.2 Enable Control

The TPA2037D1 has an active-high enable pin EN. A logic high on this pin places the device in the operating mode, and a logic low on this pin places the device in the shutdown mode. Press and hold pushbutton S1 on the EVM to place the TPA2037D1 in shutdown mode. Release pushbutton S1 to restart normal operation.

2.1.2.3 Output filter

The TPA2037D1 EVM provides two test outputs TPOUT+ and TPOUT- between which a filtered version of the BTL output of the TPA2037D1 can be obtained by populating the filter components R4, R5, C9 and C10 (see Table 1 for typical components). The filtered output is useful in evaluating performance parameters of the TPA2037D1 using measurement equipment such as the Audio Precision.

2.2 Power Up

1. Verify the correct connections as described in Sections 2.1.1 and 2.1.2.
2. Verify the voltage setting of the power supply is between 2.5 V and 5.5 V, and turn on the power supply. Proper operation of the EVM begins.
3. Adjust the audio signal source as needed.

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3 Reference

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

3.1 TPA2037D1EVM PCB Layers

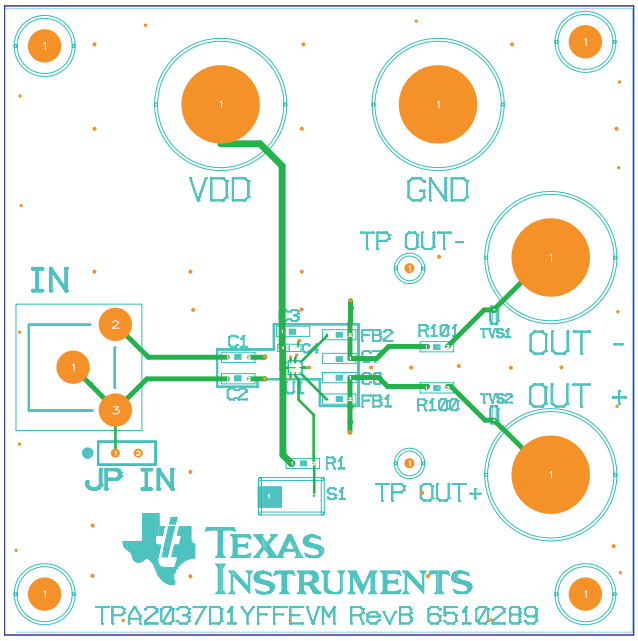


Figure 1. Top Layer

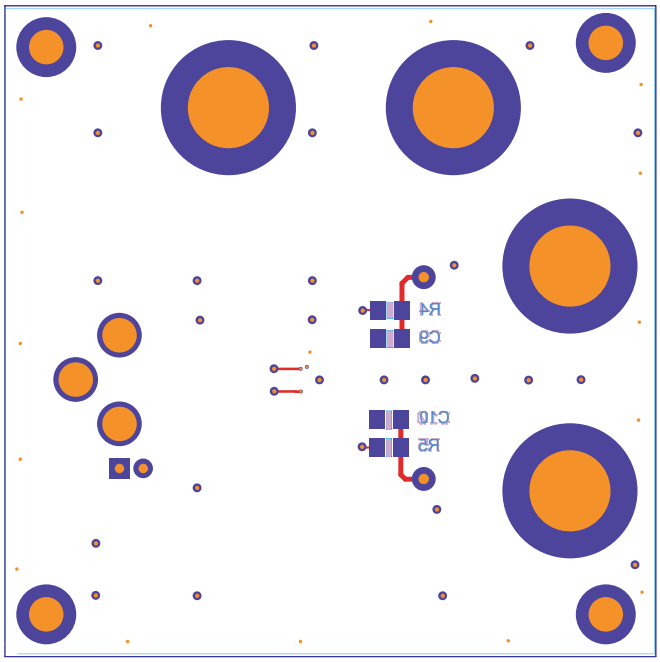


Figure 2. Bottom Layer

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3.2 TPA2037D1EVM Schematic Diagram

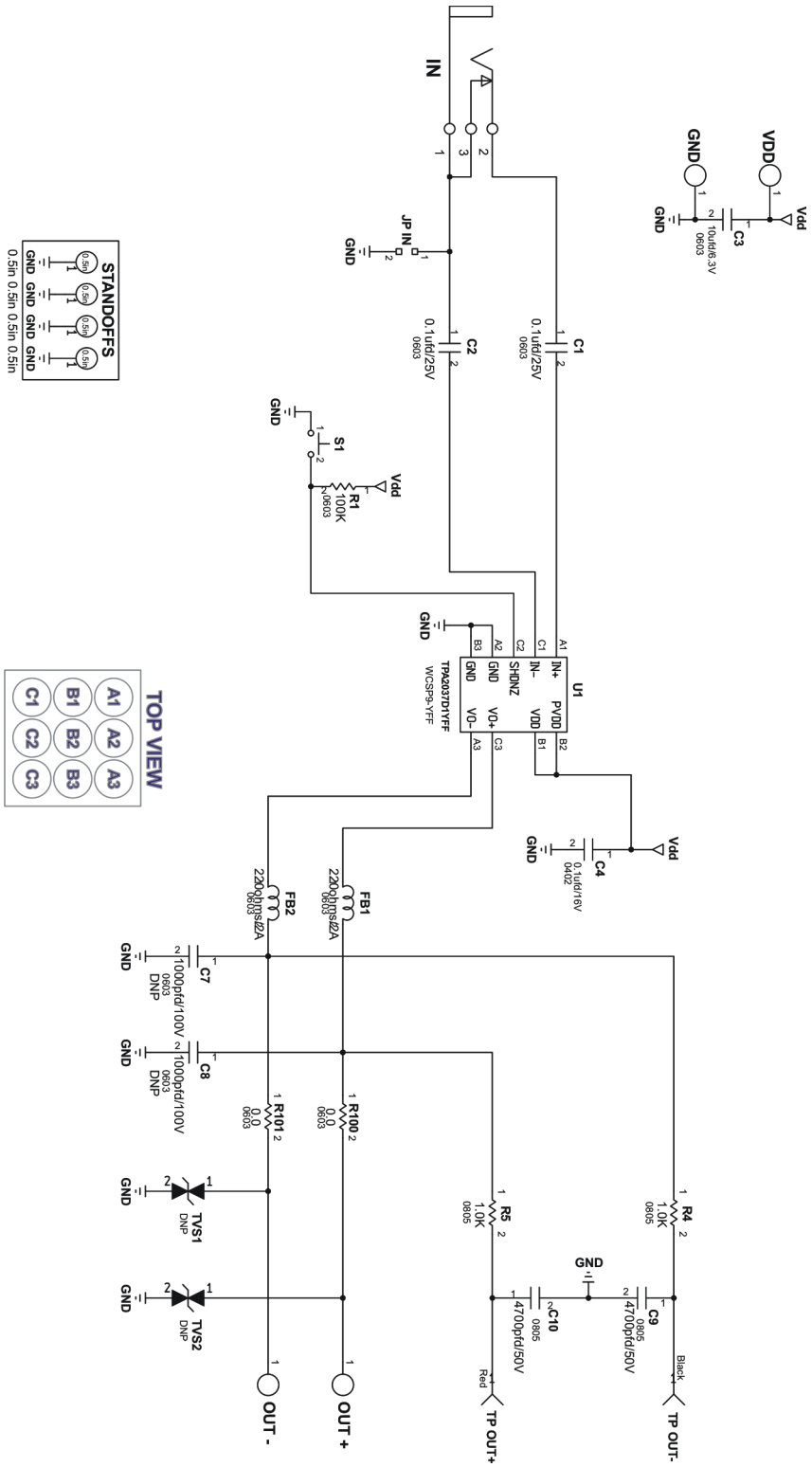


Figure 3. TPA2037D1EVM Schematic Diagram

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3.3 TPA2037D1 Audio Power Amplifier Evaluation Module Parts List

Table 1. TPA2037D1EVM Parts List

Part No.	Description	Size	Qty.	Vendor Part Number
U1	2.75W STEREO CLASS D AMP WCSP9-YFF ROHS		1	Texas Instruments , TPA2037D1YFF
TVS1, TVS2	TRANSIENT VOLTAGE SUPPRESSION BIDIR 6.1V 9A SOD-882 ROHS		2	ST Microelectronics, ESDALC6V1-1BT2
C7, C8	CAP SMD0603 CERM 1000PFD 100V 10% X7R ROHS	0603	2	Panasonic, PCC1952CT
C1, C2	CAP SMD0603 CERM 0.1UFD 25V 10% X5R ROHS	0603	2	AVX, 478-1244-1
C9, C10	CAP SMD0805 CERM 4700PFD 50V 5% X7R ROHS	0805	2	AVX, 478-3770-1
C3	CAP SMD0603 CERM 10UFD 6.3V 20% X5R ROHS	0603	1	Panasonic, PCC2395CT
C4	CAP SMD0402 CERM 0.1UFD 16V 10% X7R ROHS	0402	1	Taiyo Yuden, 490-3261-1
R1	RES 100K OHM 1/16W 1% SMD 0603 ROHS	0603	1	Panasonic, P100KHCT
R4,R5	RES SMT0805 1.0K 5% 1/8W ROHS	0805	2	Panasonic, P1.0KACT
R100, R101	RES 0.0 OHM 1/16W 5% SMD 0603 ROHS	0603	2	Panasonic, P0.0GCT
FB1,FB2	FERRITE CHIP, 220 OHMS 2A 100MHZ SMD 0603 ROHS	0603	2	TDK, 445-1565-1
JP1	HEADER 2 PIN MALE, PCB STRAIGHT GOLD ROHS		1	Sullins, S1011E-02 2
IN	JACK, RCA 3-PIN PCB-RA BLACK ROHS		1	Switchcraft, 65K7770
TP OUT+	PC TESTPOINT, RED, ROHS		1	Keystone Electronics, 5000K
TP OUT-	PC TESTPOINT, BLACK, ROHS		1	Keystone Electronics, 5001K
S1	SWITCH, MOM, 160G SMT 4X3MM ROHS		1	E-Switch, EG4344CT
JP1	SHUNT, BLACK AU FLASH 2mmLS		1	Norcomp Inc., SP2-001E
GND,VDD, OUT +,OUT -	BINDING-POST,NONINS,THRU,ROHS		4	Emerson NPCS, J587
HW1,HW2, HW3,HW4	STANDOF ,4-40 0.5IN 3/16IN DIA ALUM RND F-F		4	Keystone, 2027K
HW1,HW2, HW3,HW4	4-40 SCREW, STEEL 0.250 IN		4	Building Fasteners, H34

4 Related Documentation From Texas Instruments

- TPA2037D1 Datasheet: 3.2 W Mono Class-D Audio Power Amplifier with 6-dB Gain and Auto Short-Circuit Recovery.

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 2.5 V to 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 60°C. The EVM is designed to operate properly with certain components above 60°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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