TPA2035D1 Audio Power Amplifier Evaluation Module

The TPA2035D1 audio power amplifier evaluation module is a complete, low-power, Class-D, stereo audio power amplifier capable of delivering 2.75 W (YZF package). All components and the evaluation module are Pb-free. The evaluation module consists of a TPA2035D1 on the main circuit of the board. An additional TPA2035D1 Mini EVM is included.

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1 Introduction

This section provides an overview of the Texas Instruments (TI) TPA2035D1 NanoFree™ WCSP audio amplifier evaluation module (TPA2035D1EVM). It includes a brief description of the module and a list of EVM specifications.

1.1 TPA2035D1EVM 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	2.75 W
Audio input voltage, V_I	0 V to V_{DD}
Minimum load impedance, Z_L	4 Ω

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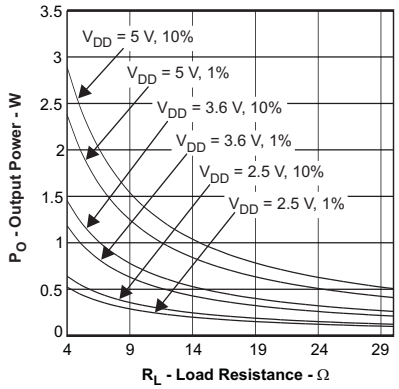


Figure 1. TPA2035D1 Output Power

2 Operation

This section describes how to operate the TPA2035D1EVM.

2.1 Quick Start for Stand-Alone Operation

Use the following steps when operating the TPA2035D1EVM stand-alone or when connecting the EVM into existing circuits or equipment.

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 inputs, IN+/-.
   - For a differential audio source, connect the audio source directly to the appropriate input header pins.
   - For a single-ended audio source, connect the audio source to the negative input header pin and ground the positive audio input header pin.
3. Connect speakers (4 Ω-32 Ω) to the output pins, OUT+/-.

2.1.2.2 Shutdown Control

The TPA2035D1 provides a shutdown control so that the device can be placed into a shutdown mode. The shutdown pin, $\overline{SD}$, is an active low pin. This means that a low voltage (ground) on this pin places the device into a shutdown mode. Using the pushbutton provided on the EVM, the user can place the TPA2035D1 in shutdown mode by pressing and holding the button down. When the button is released, the device restarts.

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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.

3 Reference

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

3.1 TPA2035D1EVM PCB Layers

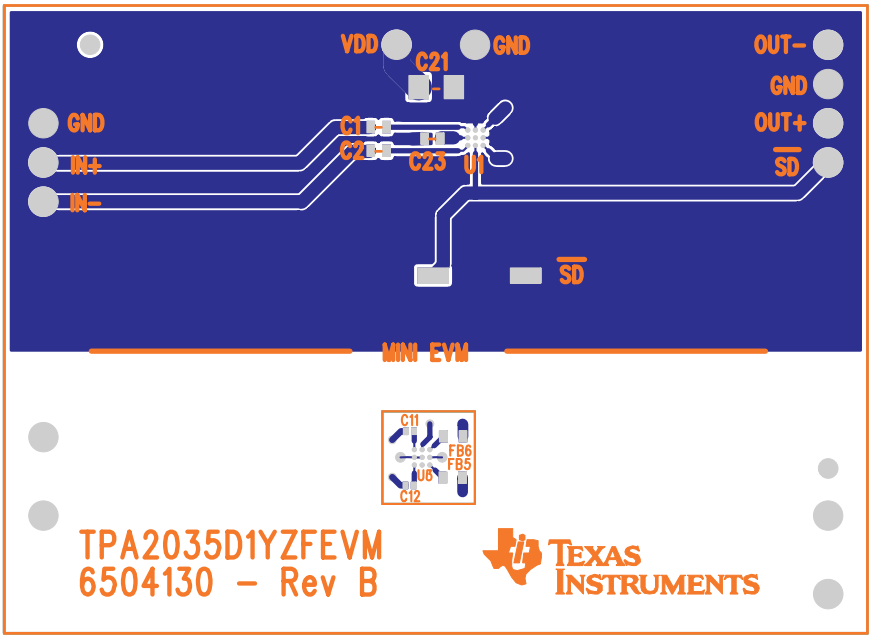


Figure 2. Top Layer

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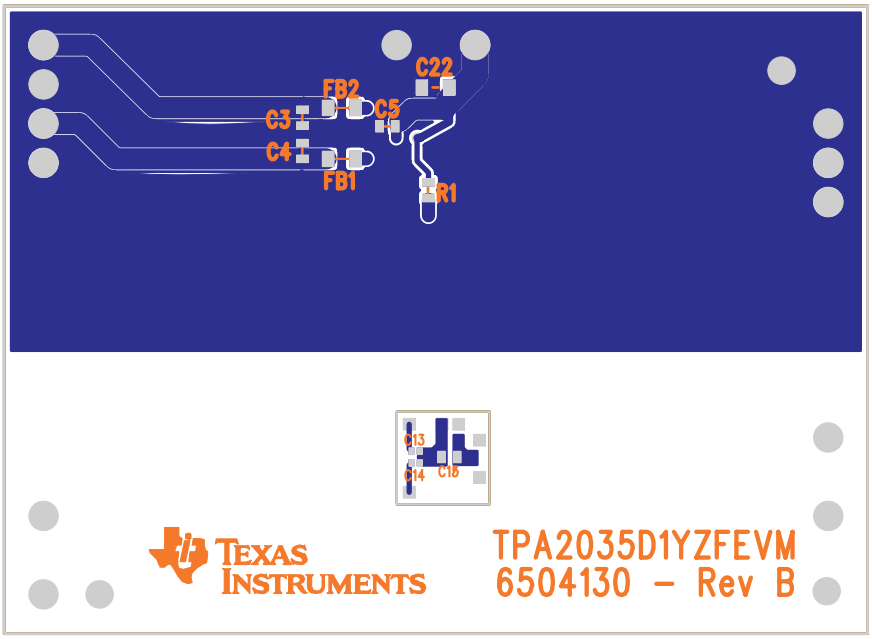
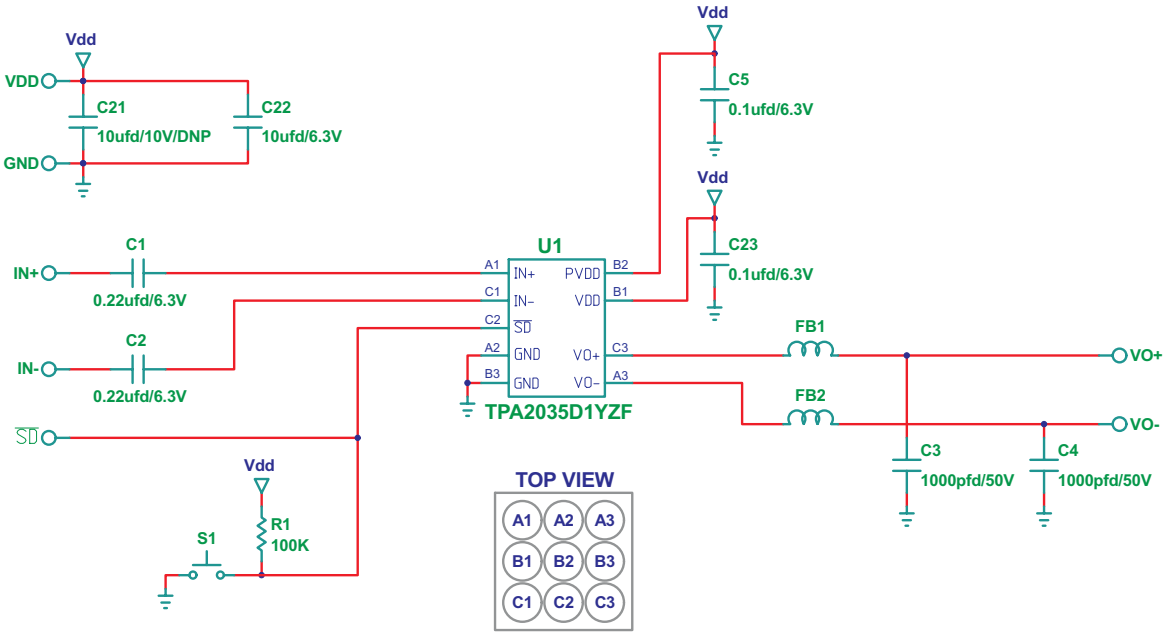


Figure 3. Bottom Layer

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3.2 TPA2035D1EVM Schematic Diagram

TPA2035D1YZF EVALUATION MODULE (UPPER CIRCUIT)



MINI EVM (LOWER CIRCUIT)

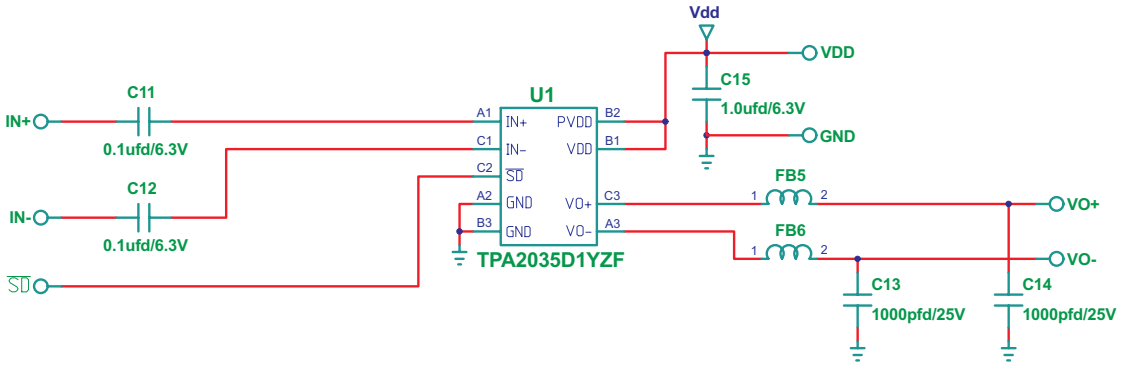


Figure 4. TPA2035D1EVM Schematic Diagram

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3.3 TPA2035D1 Audio Power Amplifier Evaluation Module Parts List

Table 1. TPA2035D1EVM Parts List

Part No.	Description	Size	Qty.	Vendor Part Number
TPA2035D1 Main Circuit				
C1-2	Capacitor, Ceramic, 0.22uF, 6.3V, X5R	0402	2	TDK C1005X5R0J224
C5	Capacitor, Ceramic, 0.1uF, 6.3V, X5R	0402	1	TDK C1005X5R0J104
C3-4	Capacitor, Ceramic, 1nF, 50V, X7R	0402	2	TDK C1005X7R1H102
C22	Capacitor, Ceramic, 10uF, 6.3V, X5R	0603	1	TDK C1608X5R0J106
C21	Capacitor, Ceramic, 10uF, 10V	0805	1	Not Assembled
C23	Capacitor, Ceramic, 0.1uF, 6.3V, X5R	0402	1	TDK C1005X5R0J104
R1	Resistor, Chip, 100K, 1/16W, 1%	0402	1	Panasonic, ERJ-2RKF1003X
U1	TPA2035D1 audio amplifier IC 1.5 X 1.5 mm WCSP		1	Texas Instruments, TPA2035D1YZF
FB1-2	Ferrite Bead	0603	4	TDK MPZ1608S221A
	Terminal post headers		12	Sullins, PTC36SABN, SAMTEC TSW-19-8-G-S"
S1	Switch, momentary	SMT	1	Panasonic, EVQ-PPBA25
PCB	TPA2035D1EVM printed circuit board		1	
TPA2035D1 Mini Circuit				
C11-12	Capacitor, Ceramic, 0.1uF, 6.3V, X5R	0201	2	TDK C0603X5R0J104
C13-14	Capacitor, Ceramic, 1nF, 25V, X5R	0201	2	TDK C0603X5R1E102
C15	Capacitor, Ceramic, 1uF, 6.3V, X5R	0402	1	TDK C1005X5R0J105
U3	TPA2035D1 audio amplifier IC 1.5 X 1.5 mm WCSP		1	Texas Instruments, TPA2035D1YZF
FB5-6	Ferrite Bead	0402	2	TDK MPZ1005S121C

4 Related Documentation From Texas Instruments

- *TPA2035D1 2.75-W Fixed Gain Mono Filter-Free Class-D Audio Power Amplifier* (SLOS562) This is the data sheet for the TPA2035D1 audio amplifier integrated circuit.

5 EVM Board Revision History

This is a list of modification made to the TPA2035D1EVM board Rev. A and appearing on Rev. B. The modifications do not affect the performance of the board.

Modification	Date	Description
EVM Label	12/2009	Changed from TPA2035D1 to TPA2035D1YZF (added package label)
GND	12/2009	Added ground label to right side of standard EVM silkscreen
Revision	12/2009	Updated EVM revision letter on silkscreen
TI Logo	12/2009	Moved TI logo on silkscreen.

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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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