

# ***TPA6204A1***

## ***Audio Power Amplifier Evaluation Module***

# *User's Guide*

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

| <b>Products</b>  |  | <b>Applications</b> |  |
|------------------|--|---------------------|--|
| Amplifiers       | <a href="http://amplifier.ti.com">amplifier.ti.com</a>             | Audio               | <a href="http://www.ti.com/audio">www.ti.com/audio</a>                   |
| Data Converters  | <a href="http://dataconverter.ti.com">dataconverter.ti.com</a>     | Automotive          | <a href="http://www.ti.com/automotive">www.ti.com/automotive</a>         |
| DSP              | <a href="http://dsp.ti.com">dsp.ti.com</a>                         | Broadband           | <a href="http://www.ti.com/broadband">www.ti.com/broadband</a>           |
| Interface        | <a href="http://interface.ti.com">interface.ti.com</a>             | Digital Control     | <a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a> |
| Logic            | <a href="http://logic.ti.com">logic.ti.com</a>                     | Military            | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Power Mgmt       | <a href="http://power.ti.com">power.ti.com</a>                     | Optical Networking  | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
| Microcontrollers | <a href="http://microcontroller.ti.com">microcontroller.ti.com</a> | Security            | <a href="http://www.ti.com/security">www.ti.com/security</a>             |
|                  |  | Telephony           | <a href="http://www.ti.com/telephony">www.ti.com/telephony</a>           |
|                  |  | Video & Imaging     | <a href="http://www.ti.com/video">www.ti.com/video</a>                   |
|                  |  | Wireless            | <a href="http://www.ti.com/wireless">www.ti.com/wireless</a>             |

Mailing Address: Texas Instruments  
Post Office Box 655303 Dallas, Texas 75265

## EVM IMPORTANT NOTICE

Texas Instruments (TI) provides the enclosed product(s) under the following conditions:

This evaluation kit being sold by TI is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not considered by TI to be fit for commercial use. As such, the goods being provided may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety measures typically found in the end product incorporating the goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may not meet the technical requirements of the directive.

Should this evaluation kit not meet the specifications indicated in the EVM User's Guide, the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods. Please be aware that the products received may not be regulatory compliant or agency certified (FCC, UL, CE, etc.). Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge.

**EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

TI currently deals with a variety of customers for products, and therefore our arrangement with the user **is not exclusive**.

TI assumes **no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein**.

Please read the EVM User's Guide and, specifically, the EVM Warnings and Restrictions notice in the EVM User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact the TI application engineer.

Persons handling the product must have electronics training and observe good laboratory practice standards.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used.

Mailing Address:

Texas Instruments  
Post Office Box 655303  
Dallas, Texas 75265

## **EVM WARNINGS AND RESTRICTIONS**

It is important to operate this EVM within the input voltage range of 2.5 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 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.

### **Mailing Address:**

Texas Instruments  
Post Office Box 655303  
Dallas, Texas 75265

# Read This First

---

---

---

### *Information About Cautions and Warnings*

This book may contain cautions and warnings.

**This is an example of a caution statement.**

**A caution statement describes a situation that could potentially damage your software or equipment.**

**This is an example of a warning statement.**

**A warning statement describes a situation that could potentially cause harm to you.**

The information in a caution or a warning is provided for your protection. Please read each caution and warning carefully.

### *Related Documentation From Texas Instruments*

- **TI Plug-N-Play Audio Amplifier Evaluation Platform** (literature number SLOU011) provides detailed information on the evaluation platform and its use with TI audio evaluation modules.
- **TPA6204A1 1.7-W Mono Fully Differential Audio Power Amplifier** (literature number SLOS429) This is the data sheet for the TPA6204A1 audio amplifier integrated circuit.

***FCC Warning***

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

# Contents

---

---

---

|          |  |            |
|----------|--|------------|
| <b>1</b> | <b>Introduction</b> .....  | <b>1-1</b> |
| 1.1      | Description .....  | 1-2        |
| 1.2      | TPA6204A1 EVM Specifications .....                                 | 1-2        |
| <b>2</b> | <b>Operation</b> .....   | <b>2-1</b> |
| 2.1      | Quick Start List for Stand-Alone .....                             | 2-2        |
| 2.1.1    | Power Supply .....   | 2-2        |
| 2.1.2    | Inputs and Outputs .....   | 2-2        |
| 2.1.3    | Control Input .....  | 2-2        |
| 2.1.4    | Power Up .....   | 2-2        |
| <b>3</b> | <b>Schematic, Parts List, and PCB Layers</b> .....                 | <b>3-1</b> |
| 3.1      | TPA6204A1 EVM Schematic Diagram .....                              | 3-2        |
| 3.2      | TPA6204A1 Audio Power Amplifier Evaluation Module Parts List ..... | 3-2        |
| 3.3      | TPA6204A1 EVM PCB Layers .....                                     | 3-3        |

# Figures

---

---

---

|     |  |     |
|-----|--|-----|
| 1-1 | TI TPA6204A1 Audio Amplifier Evaluation Module ..... | 1-2 |
| 3-1 | TPA6204A1 EVM Schematic Diagram .....                | 3-2 |
| 3-2 | TPA6204A1 EVM Top Layer .....                        | 3-3 |
| 3-3 | TPA6204A1 EVM Bottom Layer .....                     | 3-3 |

# Tables

---

---

---

|     |                                |     |
|-----|--------------------------------|-----|
| 3-1 | TPA6204A1 EVM Parts List ..... | 3-2 |
|-----|--------------------------------|-----|





# Introduction

---

---

---

---

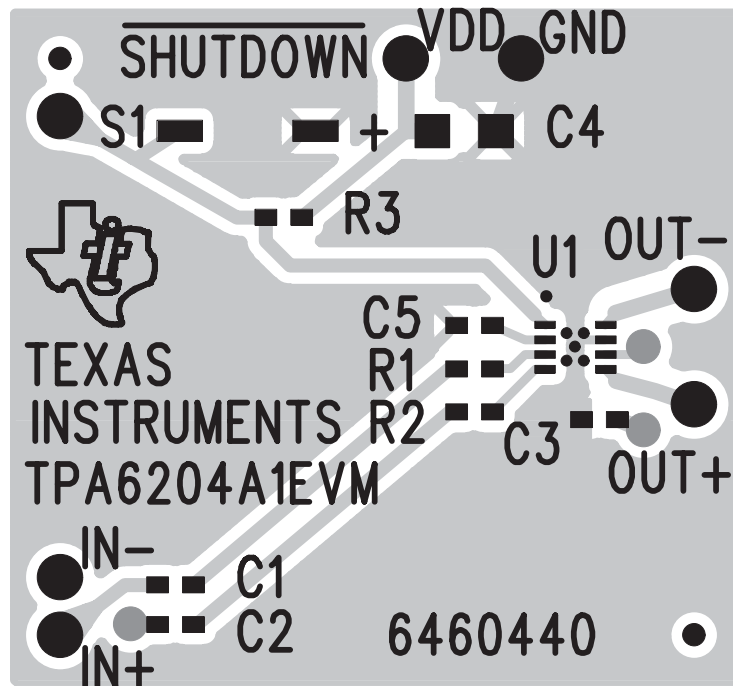
This chapter provides an overview of the Texas Instruments (TI) TPA6204A1 audio amplifier evaluation module (TPA6204A1EVM). It includes a list of EVM features, a brief illustrated description of the module, and a list of EVM specifications.

| <b>Topic</b>                          | <b>Page</b> |
|---------------------------------------|-------------|
| 1.1 Description .....                 | 1-2         |
| 1.2 TPA6204A1EVM Specifications ..... | 1-3         |

## 1.1 Description

The TPA6204A1 audio power amplifier evaluation module is a complete, low-power single-channel audio power amplifier. It consists of the TI TPA6204A1 1.7-W low-voltage audio power amplifier IC along with a small number of other parts mounted on a circuit board that is approximately one and a quarter inches square (see Figure 1–1).

Figure 1–1. TI TPA6204A1 Audio Amplifier Evaluation Module



## 1.2 TPA6204A1 EVM Specifications

|  |                       |
|--|-----------------------|
| Supply voltage range, $V_{DD}$ .....                                   | 2.5 V to 5.5 V        |
| Power supply current rating required .....                             | 2 A                   |
| Continuous output power, $P_O$ : 8- $\Omega$ BTL, $V_{DD} = 5$ V ..... | 1.7 W                 |
| Audio input voltage, $V_I$ .....                                       | 0 V to $V_{DD}$ , max |
| Minimum load impedance, $Z_L$ .....                                    | 8 $\Omega$            |

# Operation

---

---

---

---

The following section describes the steps to use the TPA6204A1EVM stand-alone or with existing circuits. Connections can be made directly to the module pins or it can be wired directly into existing circuits or equipment.

| <b>Topic</b>                                      | <b>Page</b> |
|---|-------------|
| <b>2.1 Quick Start List for Stand-Alone .....</b> | <b>2-2</b>  |

## 2.1 Quick Start List for Stand-Alone

### 2.1.1 Power Supply

- 1) Ensure that all external power sources are set to OFF.
- 2) Connect an external regulated power supply, between 2.5 V and 5.5 V to the module  $V_{DD}$  and GND pins, taking care to observe marked polarity.

### 2.1.2 Inputs and Outputs

- 1) Ensure that the audio source level is set to minimum.
- 2) Connect the positive lead from the audio source to the module IN+ pin and the negative lead to the IN- pin.

### 2.1.3 Control Inputs

- 1) SHUTDOWN: This pin is active low. A low on this pin shuts down the amplifier; a high on this pin places the amplifier in the active state. Leaving this pin floating also allows normal amplifier operation. Holding down switch (S1) places the amplifier to the active state. The absolute maximum voltage on this terminal is  $VCC + 0.3 V$ .

### 2.1.4 Power Up

- 1) Verify correct voltage and input polarity and set the external power supply to on.

The EVM should begin to operate.

- 2) Adjust the audio source level as needed.

# **Schematic, Parts List, and PCB Layers**

---

---

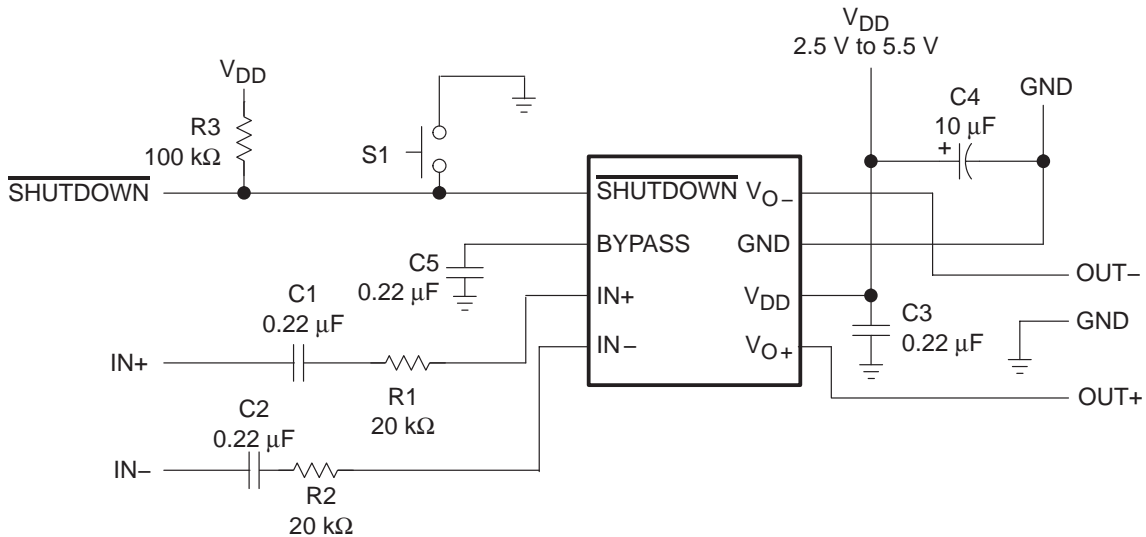
---

This chapter contains the schematic, parts list and the EVM PCB layers.

| <b>Topic</b>  | <b>Page</b> |
|---|-------------|
| <b>3.1 TPA6204A1 EVM Schematic Diagram .....</b>                          | <b>3-2</b>  |
| <b>3.2 TPA6204A1 Audio Power Amplifier Evaluation Module Parts List .</b> | <b>3-2</b>  |
| <b>3.3 TPA6204A1 EVM PCB Layers .....</b>                                 | <b>3-3</b>  |

### 3.1 TPA6204A1 EVM Schematic Diagram

Figure 3–1. TPA6204A1 EVM Schematic Diagram



### 3.2 TPA6204A1 Audio Power Amplifier Evaluation Module Parts List

Table 3–1. TPA6204A1 EVM Parts List

| Reference         | Description  | Size      | Qty. | Manufacturer/<br>Part Number | Vendor/<br>Part Number    |
|-------------------|--|-----------|------|------------------------------|---------------------------|
| C4                | Capacitor, 10 $\mu$ F, 6.3 V                       | A         | 1    | Panasonic<br>ECS-TOJY106R    | Digi-Key<br>PCS1106CT-ND  |
| C1, C2,<br>C3, C5 | Capacitor, 0.22 $\mu$ F,<br>80%/–20%, nonpolarized | 0603      | 4    | Panasonic<br>ECJ-1VF1C224Z   | Digi-Key<br>PCC1790TR-ND  |
| R1, R2            | Resistor, 20 k $\Omega$ , 1/16 W, 1%               | 0603      | 2    | Panasonic<br>ERJ-3EKF2002V   | Digi-Key<br>P200KHCT-ND   |
| R3                | Resistor, 100 k $\Omega$ , 1/16 W, 1%              | 0603      | 1    | Panasonic<br>ERJ-3EKF1003V   | Digi-Key<br>PCS100KHCT-ND |
| S1                | Switch, momentary                                  |           | 1    | Panasonic<br>P8048SCT-ND     | Digi-Key<br>P8048SCT-ND   |
|                   | Terminal post headers                              |           | 7    | Sullins<br>PTC36SABN         | Digi-Key<br>S1022-36-ND   |
| U1                | IC, TPA6204A1, audio<br>amplifier, 1.7 W, mono     | 8-pin QFN | 1    | TI<br>TPA6204A1              |                           |
| PCB1              | PCB, TPA6204A1 EVM                                 |           | 1    |                              |                           |

**Note:** All items are SMD except terminal posts.

### 3.3 TPA6204A1EVM PCB Layers

The following illustrations depict the TPA6204A1EVM PCB layers and silkscreen. These drawings are not to scale. Gerber plots can be obtained from the product folder on [www.ti.com](http://www.ti.com) under *Related Products – Development Tools*.

Figure 3–2. TPA6204A1 EVM Top Layer

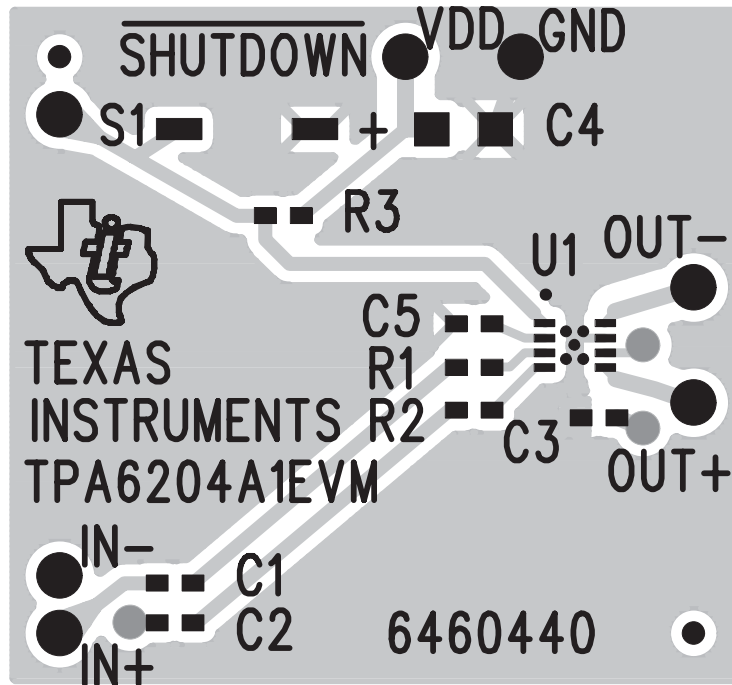
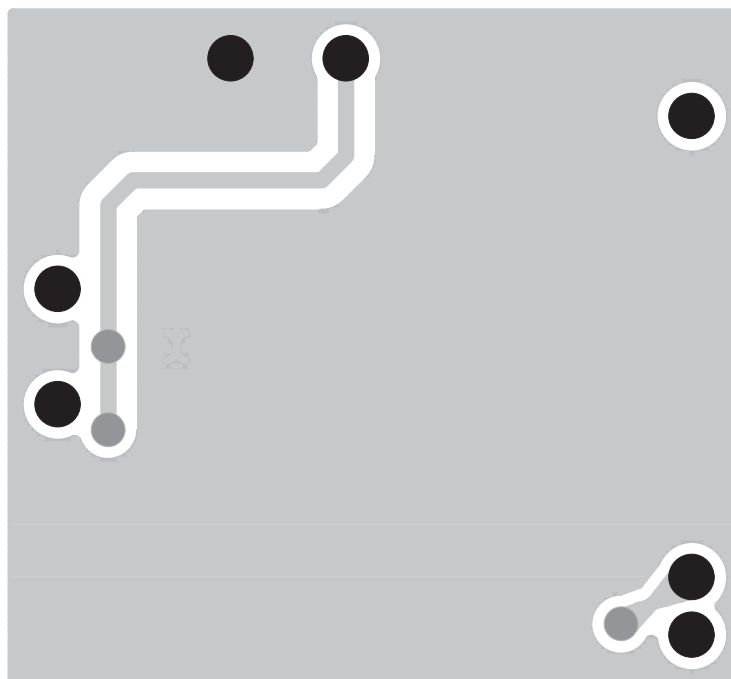


Figure 3–3. TPA6204A1 EVM Bottom Layer









**Стандарт  
Электрон  
Связь**

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331