TPA3251D2 150-W Stereo/300-W MONO PurePath™ HD Analog-Input Power Stage

1 Features

- Differential Analog Inputs
- Total Output Power at 10%THD+N
  - 150-W Stereo into 4 Ω in BTL Configuration
  - 200-W Stereo into 3 Ω in BTL Configuration
  - 300-W Mono into 2 Ω in PBTL Configuration
- Total Output Power at 1%THD+N
  - 125-W Stereo into 4 Ω in BTL Configuration
  - 160-W Stereo into 3 Ω in BTL Configuration
  - 250-W Mono into 2 Ω in PBTL Configuration
- Active Enabled Integrated Feedback Provides: (PurePath™ HD)
  - Signal Bandwidth up to 100 kHz for High Frequency Content From HD Sources
  - Ultra Low 0.005% THD+N at 1W into 4 Ω and <0.01% THD+N to Clipping
  - 80 dB PSRR (BTL, No Input Signal)
  - <65 µV (A-Weighted) Output Noise
  - >112 dB (A Weighted) SNR
  - Click and Pop Free Startup and Stop
- Multiple Configurations Possible on the Same PCB:
  - Mono Parallel Bridge Tied Load (PBTL)
  - Stereo Bridge Tied Load (BTL)
  - 2.1 Single Ended (SE) Stereo Pair and Bridge Tied Load Subwoofer
  - Quadruple Single Ended (SE) Outputs
- AD-Mode Modulation with no Output Common Mode Signal
- 90% Efficient Class-D Operation (4 Ω) With 60-mΩ Output MOSFETs
- Wide 12-V to 36-V Supply Voltage Operation
- Self-Protection Design (Including Undervoltage, Overtemperature, Clipping, and Short Circuit Protection) With Error Reporting
- EMI Compliant When Used With Recommended System Design

2 Applications

- Blu-ray Disk™ / DVD Receivers
- High End HTiB Systems
- AV Receivers
- High End Soundbar
- Mini Combo Systems
- Active Speakers and Subwoofers

3 Description

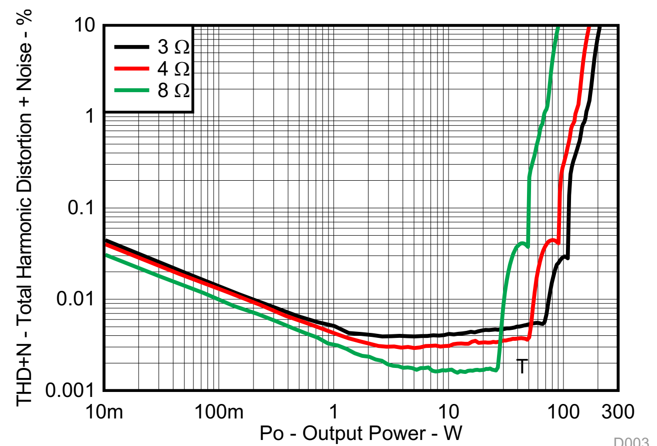
The TPA3251D2 is a high performance class-D power amplifier with integrated closed loop feedback technology (PurePath™ HD) and 2 VRMS analog input interface. It has the ability to drive up to 150 W [(1)] stereo into 4 Ω at high audio performance with low output THD and noise. Unlike traditional Class-D amplifiers, the distortion curve only increases once the output levels move into clipping. The TPA3251D2 uses large 60 mΩ MOSFETs for improved power efficiency and a novel gate drive scheme for reduced idle losses at low output power to reduce heatsink size.

Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPA3251D2	HTSSOP (44)	6.10mm x 14.00mm

(1) For all available packages, see the orderable addendum at the end of the datasheet.

Total Harmonic Distortion



(1) Achievable output power levels are dependent on the thermal configuration of the target application. A high performance thermal interface material between the package exposed heatslug and the heat sink should be used to achieve high output power levels

PRODUCT PREVIEW

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCT PREVIEW Information. Product in design phase of development. Subject to change or discontinuance without notice.

4 Revision History

DATE	REVISION	NOTES
May 2015	*	Initial release.

PRODUCT PREVIEW

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5 Device and Documentation Support

5.1 Trademarks

Blu-ray Disk is a trademark of Blu-ray Disc Association.
All other trademarks are the property of their respective owners.

5.2 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

5.3 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PRODUCT PREVIEW

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPA3251D2DDV	PREVIEW	HTSSOP	DDV	44	35	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR	0 to 70	TPA3251D2	
TPA3251D2DDVR	PREVIEW	HTSSOP	DDV	44	2000	Green (RoHS & no Sb/Br)	Call TI	Level-3-260C-168 HR	0 to 70	TPA3251D2	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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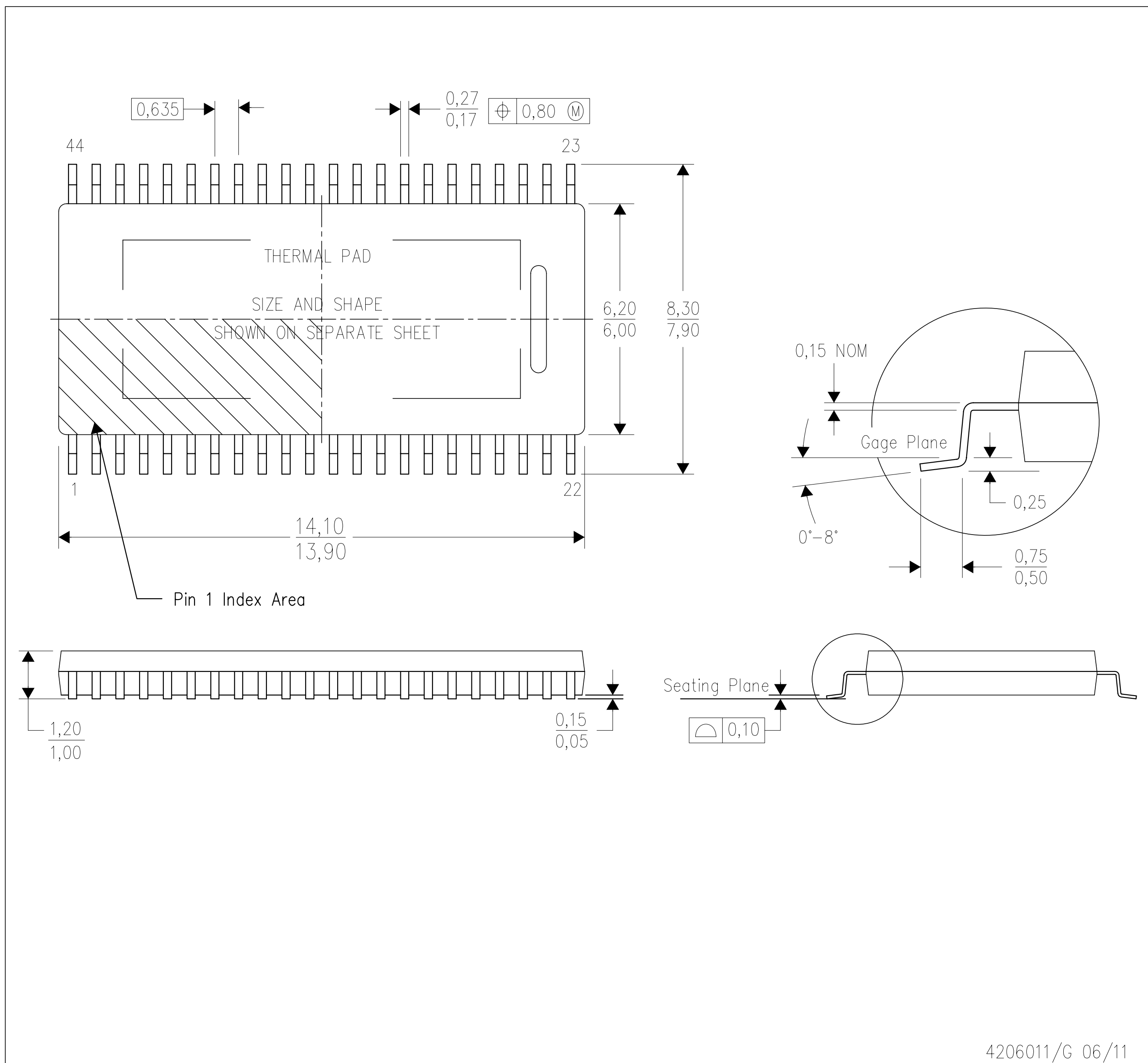
DDV (R-PDSO-G44) PowerPAD™ PLASTIC SMALL OUTLINE PACKAGE (DIE DOWN)



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. This package is designed to be attached directly to an external heatsink. Refer to Technical Brief, PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 for information regarding recommended board layout. This document is available at www.ti.com <http: //www.ti.com>. See the product data sheet for details regarding the exposed thermal pad dimensions.

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