

# TPA311xD2-Q1 30-W, 50-W Filter-Free Class-D Stereo Automotive Amplifier Family With AM Avoidance

## 1 Features

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
  - Device Temperature Grade 1:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  Ambient Operating Temperature Range
  - Device HBM ESD Classification Level H2
  - Device CDM ESD Classification Level C4B
- Supports Multiple Output Configurations
  - 2 x 50 W Into a 4- $\Omega$  BTL Load at 21 V (TPA3116D2-Q1)
  - 2 x 30 W Into an 8- $\Omega$  BTL Load at 24 V (TPA3118D2-Q1)
- Wide Voltage Range: 4.5 V to 26 V
- Efficient Class-D Operation
  - >90% Power Efficiency Combined With Low Idle Loss Greatly Reduces Heat Sink Size
  - Advanced Modulation Schemes
- Multiple Switching Frequencies
  - AM Avoidance
  - Master and Slave Synchronization
  - Up to 1.2-MHz Switching Frequency
- Feedback Power-Stage Architecture With High PSRR Reduces PSU Requirements
- Programmable Power Limit
- Differential and Single-Ended Inputs
- Stereo and Mono Mode With Single-Filter Mono Configuration
- Single Power Supply Reduces Component Count
- Integrated Self-Protection Circuits Including Overvoltage, Undervoltage, Overtemperature, DC-Detect, and Short Circuit With Error Reporting
- Thermally Enhanced Packages
  - DAD (32-pin HTSSOP Pad Up)
  - DAP (32-pin HTSSOP Pad Down)
  - $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  Ambient Temperature Range

## 2 Applications

- Automotive
- Mini-Micro Component, Speaker Bar, Docks
- CRT TV
- Consumer Audio Applications

## 3 Description

The TPA311xD2-Q1 devices are automotive stereo, efficient, digital-amplifier power stages for driving speakers up to 30 W into 2  $\Omega$  in mono. The TPA3118D2-Q1 can even run 2 x 30 W into 8  $\Omega$  without a heat sink on a dual-layer PCB. If even higher power is needed, the TPA3116D2-Q1 does 2 x 50 W into 4  $\Omega$  with a small heat sink attached to its top side thermal pad. All three devices share the same footprint, enabling a single PCB to be used across different power levels.

The TPA311xD2-Q1 advanced oscillator and PLL circuit employ a multiple-switching-frequency option to avoid AM interference; this is achieved together with an option of either master or slave selection, making it possible to synchronize multiple devices.

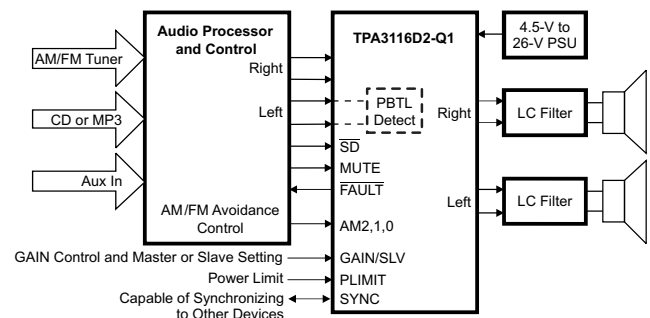
The TPA311xD2-Q1 devices are fully protected against faults with short-circuit protection and thermal protection as well as overvoltage, undervoltage and dc protection. Faults are reported back to the processor to prevent devices from being damaged during overload conditions.

### Device Information(1)

DEVICE	PACKAGE	BODY SIZE (NOM)
TPA3116D2-Q1	HTSSOP (32)	11.00 mm x 6.20 mm
TPA3118D2-Q1		

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

### Simplified Application Circuit



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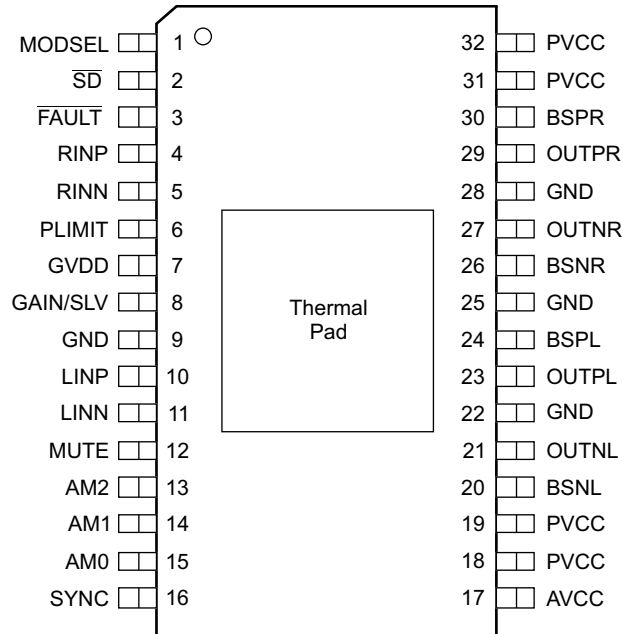
### 4 Revision History

DATE	REVISION	NOTES
July 2015	*	Original release

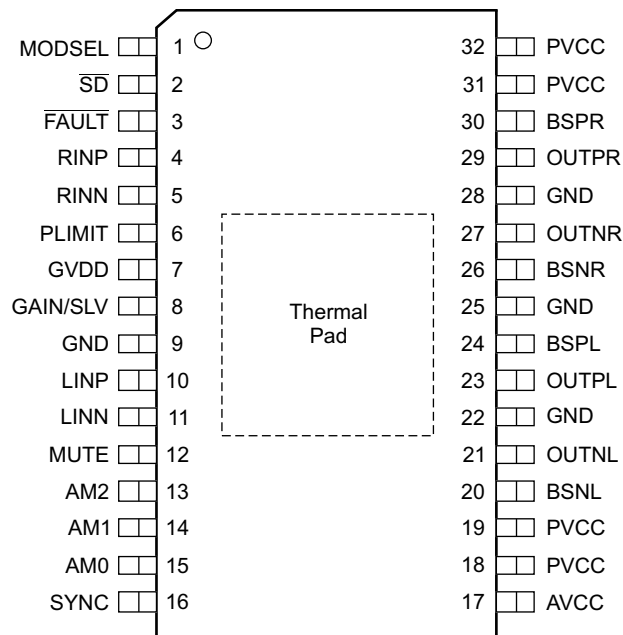
**PRODUCT PREVIEW**

## 5 Pin Configuration and Functions

**DAD Package**  
32-Pin HTSSOP With Exposed Thermal Pad Up  
TPA3116D2-Q1 Top View



**DAP Package**  
32-Pin HTSSOP With Exposed Thermal Pad Down  
TPA3118D2-Q1 Top View



PRODUCT PREVIEW

**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
TPA3116D2QDADRQ1	PREVIEW	HTSSOP	DAD	32	2000	TBD	Call TI	Call TI	-40 to 125		
TPA3118D2QDAPRQ1	PREVIEW	HTSSOP	DAP	32	2000	TBD	Call TI	Call TI	-40 to 125		

(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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**OTHER QUALIFIED VERSIONS OF TPA3116D2-Q1 :**

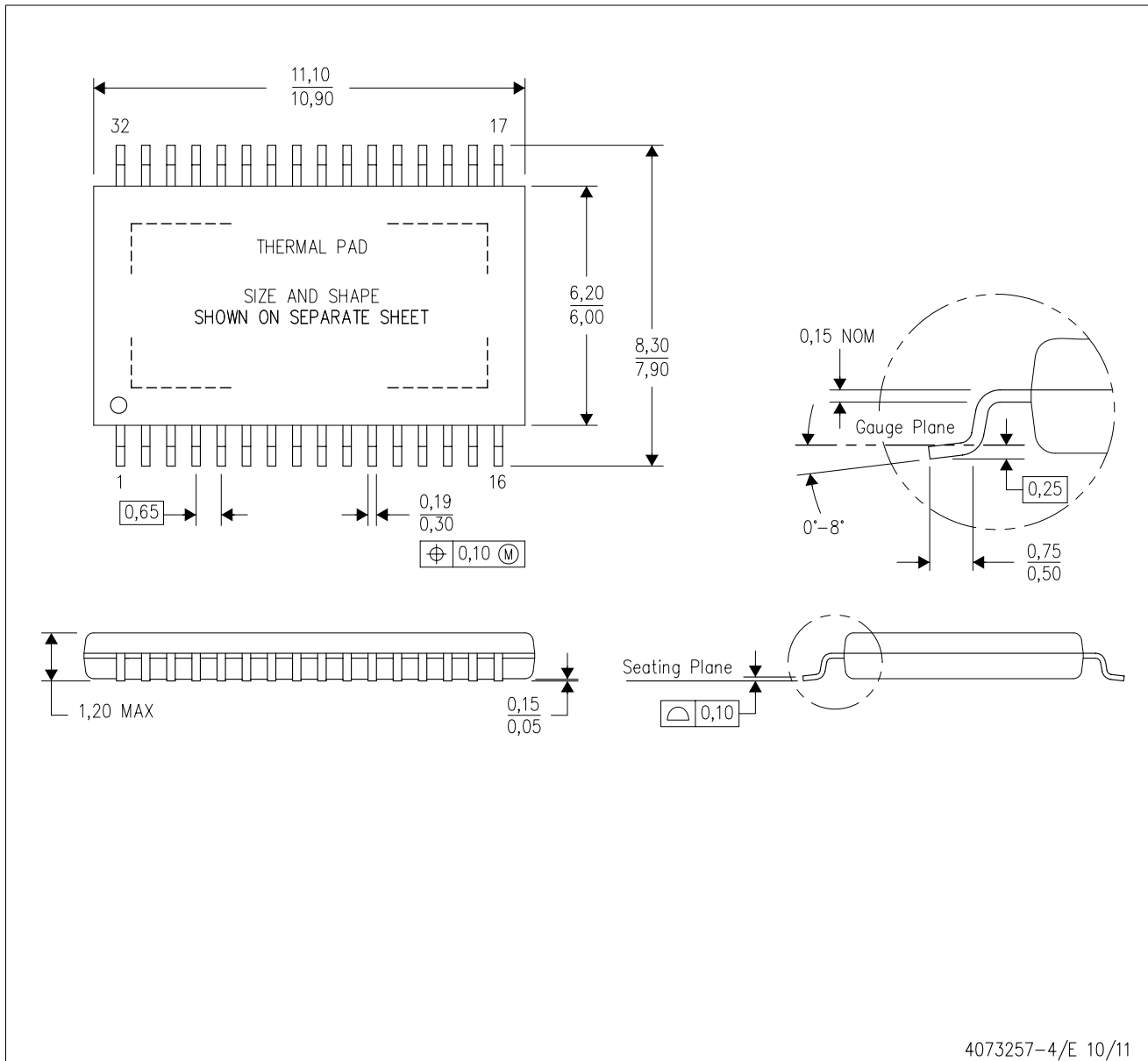
- Catalog: [TPA3116D2](#)

## NOTE: Qualified Version Definitions:


- Catalog - TI's standard catalog product

# MECHANICAL DATA

DAP (R-PDSO-G32) PowerPAD™ PLASTIC SMALL-OUTLINE PACKAGE



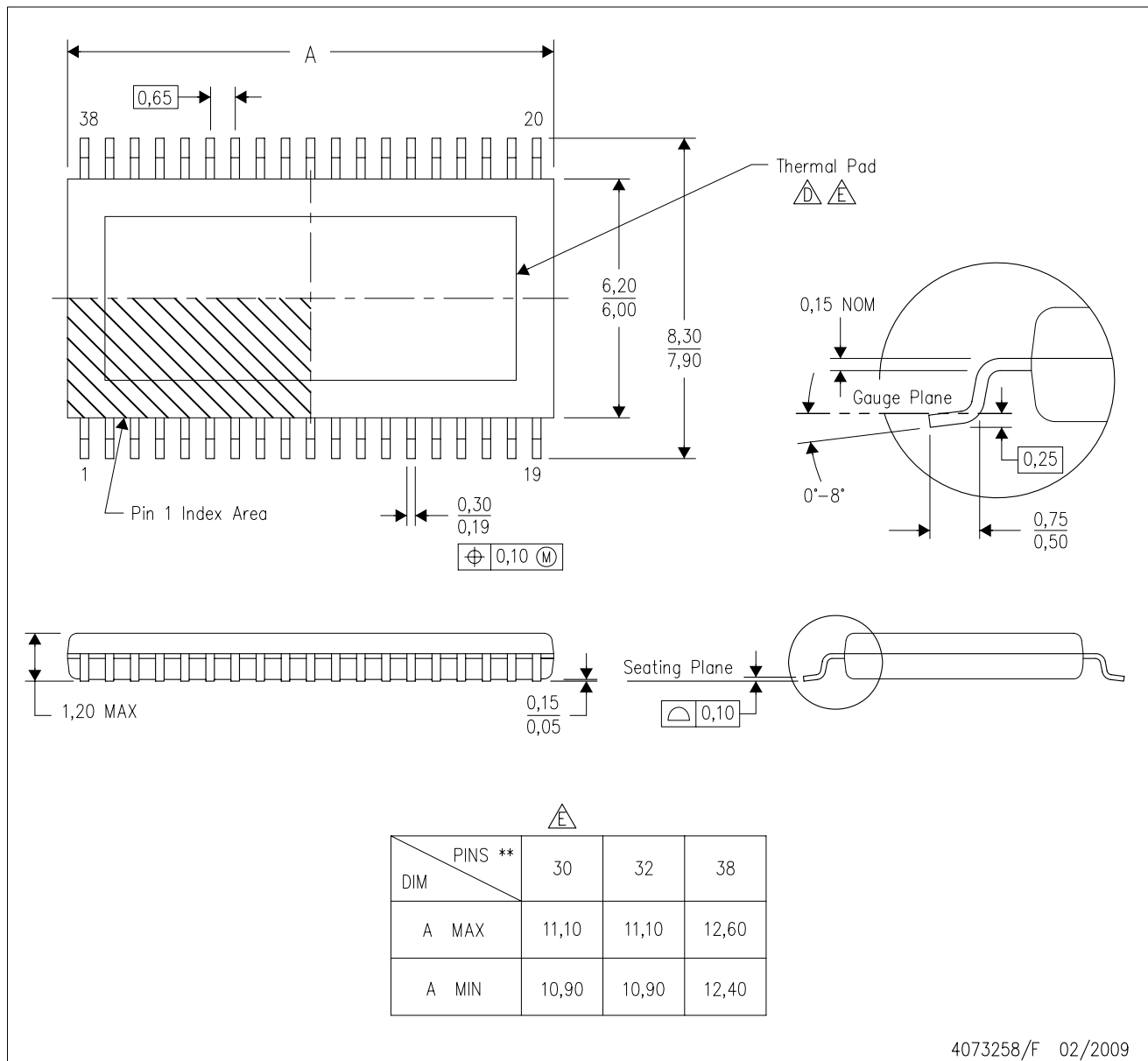
4073257-4/E 10/11

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - D. This package is designed to be soldered to a thermal pad on the board. 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) <<http://www.ti.com>>.
-  Falls within JEDEC MO-153 Variation DCT.

PowerPAD is a trademark of Texas Instruments.

# MECHANICAL DATA

DAD (R-PDSO-G\*\*) PowerPAD™ PLASTIC SMALL-OUTLINE (DIE DOWN)  
38 PIN SHOWN



- 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. Mold flash and protrusion shall not exceed 0.15 per side.
  - ⚠ 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) <<http://www.ti.com>>.
  - See the product data sheet for details regarding the exposed thermal pad dimensions.
  - ⚠ Falls within JEDEC MO-153, except 30 pin body length and JEDEC variations for top side thermal pad.

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Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
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Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
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RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
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