

TAS6684A-Q1 45V, 13A Digital Input 4-Channel Automotive Class-D Audio Amplifier with Current Sense and Real-time Load Diagnostics

1 Features

- AEC-Q100 qualified for automotive applications
 - Temperature grade 1: –40°C to +125°C, T_A
- General operation
 - 4.5V to 45V supply voltage, 50V load dump
 - Support for 1.8V and 3.3V I/O
 - I²C control with 8 address options
 - <2-W idle power loss at 14.4V, <8uA max VBAT+PVDD shutdown loss
- Integrated DSP processing
 - Class-H supply voltage control
 - Thermal monitoring and foldback
 - Clip detection, PVDD monitoring and foldback
- Output current sensing by channel via I²S/TDM
 - No need for external circuitry
- Real-time load diagnostics
 - Monitor output conditions while playing audio
 - Real-time temperature monitor for each channel
 - Open load, Shorted load detection
- DC and AC Standby load diagnostics
- Audio inputs
 - 2-4 channel I²S or 4-16 channel TDM input
 - Input sample rates: 44.1, 48, 96, 192kHz
 - Low latency < 100us at 96k sample rate
- Audio outputs
 - 4-channel bridge-tied load (BTL), configurable 2-channel parallel BTL (PBTL)
 - 384kHz to 2MHz configurable output switching frequency
 - Up to 13A channel output current
 - 400VA peak BTL output power
 - 118W (45V, 8Ω, 1% THD, BTL)
 - 218W (45V, 4Ω, 1% THD, BTL)
- Audio Performance
 - THD+N 0.03% (8Ω, 1W, 1kHz)
 - 111dB SNR
 - 37μV (14.4V), 80μV (45V) output noise
- Protection
 - Output short protection
 - DC offset, undervoltage and overvoltage
 - Configurable overtemperature warning and individual channel shutdown
 - I²C temperature and supply voltage readout
- Easily meet CISPR25-L5 EMC specification
 - Advanced spread-spectrum

2 Applications

- [Automotive external amplifier](#)
- [Automotive head unit](#)

3 Description

The TAS6684A-Q1 is a four-channel, digital-input, high-voltage, Class-D audio amplifier that supports up to 45V supply voltage. Combined with up to 13A output current, this device delivers maximum output power and high fidelity audio in high and low impedance loads. The device provides four channels at 118W (45V, 8Ω, 1% THD, BTL) and 218W (45V, 4Ω, 1% THD, BTL).

The TAS6684A-Q1 integrates DC and AC load diagnostics to determine the status of the connected loads before enabling the output stage. During audio playback, the status can be monitored through the output current sense and temperature of each channel which is available for each channel, and reports the measurement to a host processor through TDM with minimal delay. The device monitors the output load condition while playing audio using real-time load diagnostics which operate independently from the host and audio input.

To optimize system efficiency, the integrated DSP of the TAS6684A-Q1 enables Class-H envelope tracking control, eliminating the need for the development of complex tracking software and making local boost voltage control possible without the need for an external microcontroller.

The TAS6684A-Q1 device features an additional low-latency signal path for each channel, providing up to 70% faster signal processing at 48kHz and support an audio signal path latency of < 100us at 96kHz sample rate, which enables time-sensitive Active Noise Cancellation (ANC), Road Noise Cancellation (RNC) applications.

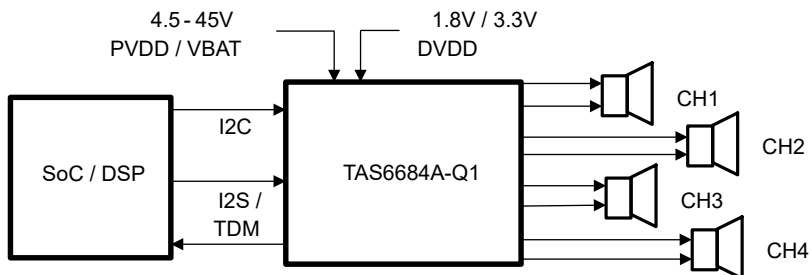
The TAS6684A-Q1 is offered in a 64-pin QFP package with the exposed thermal pad up, TAS6684A-Q1 is pin-to-pin compatible with TAS6684-Q1.



Package Information

PART NUMBER	PACKAGE ⁽¹⁾	PACKAGE SIZE (NOM) ⁽²⁾
TAS6684A-Q1	HTQFP (64)	14mm x 14mm

- (1) For all available packages, see the orderable addendum at the end of the data sheet.
 (2) The package size (length × width) is a nominal value and includes pins, where applicable.



Simplified Diagram

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4 Device Options

Table 4-1. TAS6x8x-Q1 device options

Part number	Channel Count	Maximum PVDD Operation Voltage	OTSD register report function	Schottky diode quantity PBTL	2Ω PBTL 1% THD+N BD mode max Pout
TAS6684-Q1	4	45V	Scenario dependent	16	200W at 25V
TAS6684A-Q1	4	45V	Valid	16	200W at 25V
TAS6682-Q1	2	45V	Valid	8	200W at 25V
TAS6884-Q1	4	48V BTL, 45V PBTL	Valid	0	400W at 45V

5 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

5.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

5.2 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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5.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
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5.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

5.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
August 2026	*	Initial Release

7 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.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TAS6684AQP HDRQ1	Active	Production	null (null)	1000 LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	TAS6684A

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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