

Application Note

DA7202 Board Testing Guide

AN-UA-020

Abstract

The DA7202 Evaluation Board (189-01) has been designed to allow measurement and evaluation of the DA7202 device.

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1 References

- [1] DA7202 Schematic (189-01-A_Schematic), Renesas Electronics.
- [2] DA7202 Evaluation Board User Guide, Renesas Electronics.
- [3] DA7202 Datasheet, Renesas Electronics.

Note 1 References are for the latest published version, unless otherwise indicated.

2 Introduction

DA7202 is a powerful, high efficiency, low EMI Class-D speaker driver that can drive 7 W into 8 Ω loads directly from a 2S lithium-ion battery pack. The DA7202 evaluation board has been produced to allow measurement and evaluation of the DA7202 device.



Figure 1. DA7202 evaluation board

3 External Connections and Operation

The following connections are needed to operate the DA7202 evaluation board:

- Ensure SP1 and SP2 link are soldered, which connect the output of DA7202 to J5 (see [Figure 2](#)).
- Power supply VPWR = 8.4 V either from a battery or a bench supply to J2. Sense wires should be connected to J2 from the power supply.
- Power supply PDN_N = 5.0 V from a battery or bench supply to J6.
- Analogue differential input from a signal source to J3.
- Resistive Load of 4/8 Ω with 33 μ H Inductor to J5, (44-179-179-02 Speaker Load Board) (see [Figure 3](#)).

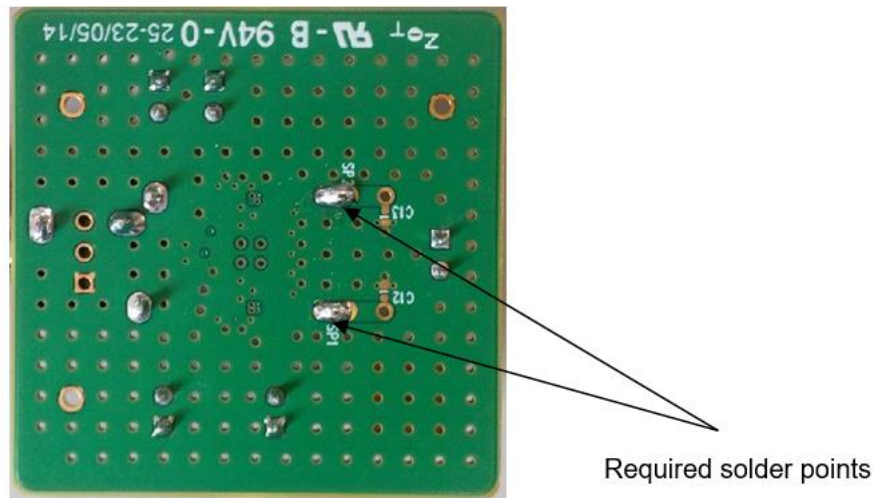


Figure 2. 189-01-A (bottom layer of board)

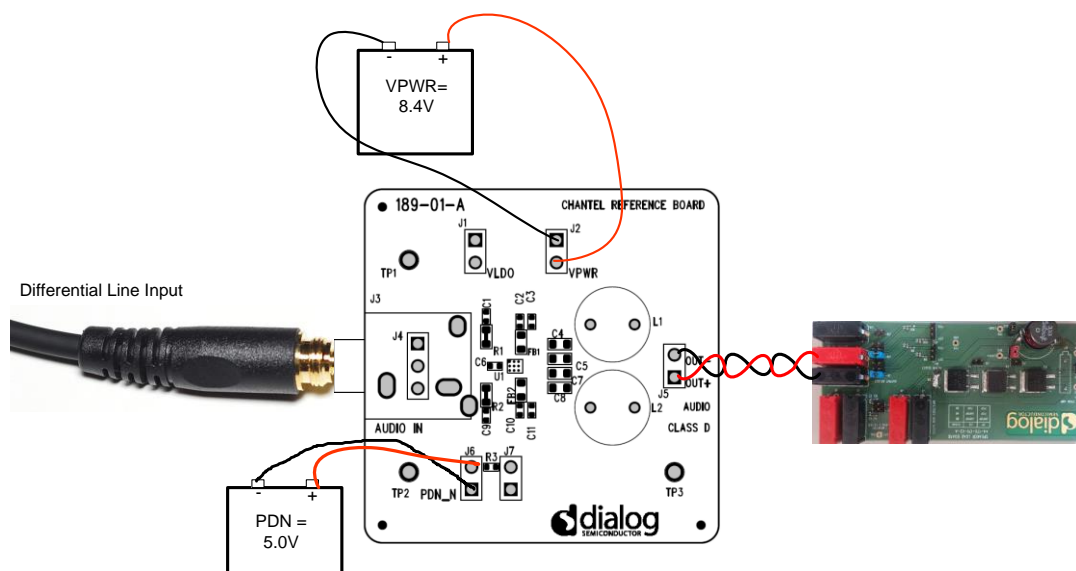


Figure 3. DA7202 EVB external connections

3.1 Test procedure

1. With the APX or AP, apply sine wave signal 1 kHz to J3 at 10 dBV "Generator Off".
2. Power supply VPWR switched on.
3. Power supply PDN_N switched on.
4. Quiescent Current on VPWR supply should be 12 mA.
5. With APX or AP "Generator On".
6. The quiescent current on VPWR supply should be 123 mA.
7. Measure output power that should be 774 mW.

If the board provides the correct quiescent current and output power, it can be prepared for shipping.

3.2 Test methods

3.2.1 Continuous power

Continuous power is the ability to provide a constant output over time. For these test signals the input signal is 1 kHz sine wave.

Due to the package size and power capability of the device, consideration must be given to the maximum power dissipation. The maximum power dissipation allowable for a continuous input signal can be seen in Figure 4.

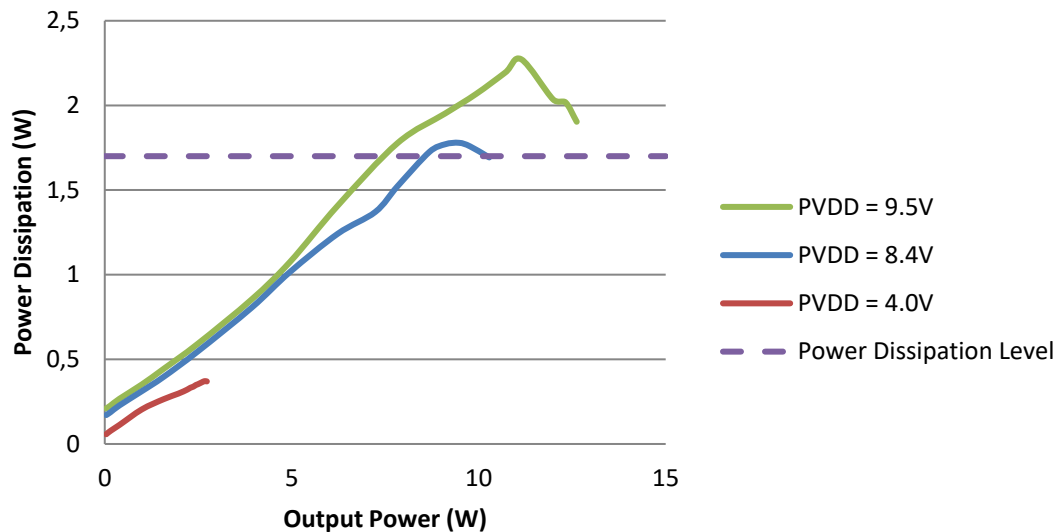


Figure 4. Power dissipation vs output power at 25 °C, 4 Ω load

NOTE

Measurements above the dashed power dissipation level are burst measurements.

With a thermal rating of 72 °C/W (junction to ambient in 1 ft³ enclosure) and maximum junction temperature of 150 °C before thermal shutdown, the device could dissipate 1.7 W, if the EVB is at 25 °C ambient. This would limit it to around 8-9 W continuous output.

If the device were in a smaller enclosure or at a higher ambient temperature, this output power would be further reduced. For example, 125 °C junction temperature and 85 °C ambient temperature would limit the part to 0.6 W continuous dissipation, limiting it to around 3 W continuous output.

3.2.2 Burst power

In practice, an audio signal is always changing and has many short peaks, so the input signal into the amplifier results in bursts of large output power which are not continuous. This means that the limited thermal capability of the package does not restrict performance for typical use. They use burst power for testing "dynamic power".

In Figure 4, the measured power dissipation level starts to reduce at a certain level, with the burst measurements dissipating less power since the device package does not have to time to heat up.

DA7202 was tested against the CTA-2006 specifications, where the measurement uses a sine wave burst stimulus signal that is adjusted to the level that produces the target distortion in the Class D output. This method is often employed to perform measurements at an amplifier's maximum output level under tone burst conditions.

A burst signal is a 1 kHz sine wave that is switched between two levels (that is, modulated by a square wave), with the higher level typically 100% of the generator level setting, and the lower level typically 10% (-20 dB). The duty cycle of the burst is less than 50% (that is, the on time is less than the off time).

Signal was created within the AP2700 Software, Analog Generator using the function Waveform: Sine and Normal Burst with the following parameters. The signal is a repetition of a burst of 20 cycles of a 1 kHz sine wave at 100%, followed by 480 cycles of 1 kHz at 10% (-20 dB). The first 9 cycles are ignored, and the last 11 cycles are analysed to calculate the maximum output at a set input signal. An example of the expected input signal into DA7202 is shown in [Figure 5](#).

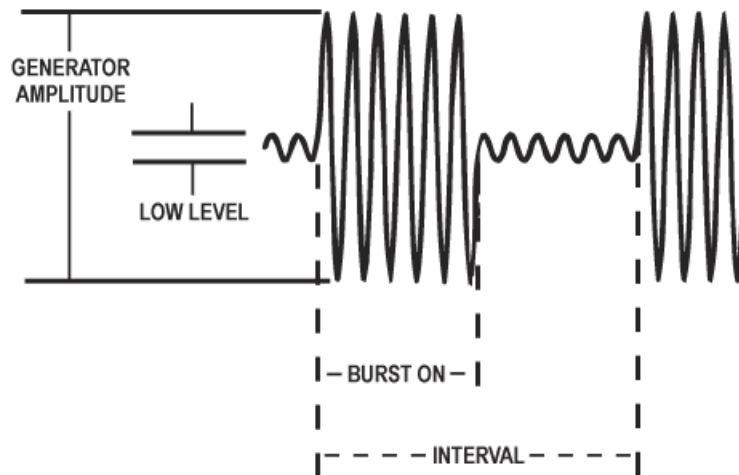


Figure 5. Tone burst diagram

With this method of testing, higher outputs can be achieved without the device's thermal shutdown function being enabled.

3.3 Test equipment

The following setup and equipment were used to carry out performance measurements.

PCB System Set-up: DA7202, 189-01-A Evaluation board + 44-179-179-02 Speaker Load Board.

Supply Set-up: PDN_N = 5 V supplied by HM8143, PVDD = As Required by HM8143 with sense wires connected.

Test Set-up: AP2700 Differential Analogue generator to IN_P/IN_N, OUT_P/OUT_N to AUX-0025 Class D filter, output of filter to AP2700 Analogue Analyser (THD+N meter), 4 Ω or 8 Ω as required by test with 33 μ H load at SPK output. All wires to be short as possible to DUT from AP2700, AUX-0025 and Speaker Load Board. The impedance of the load should be measured at J5 and then referenced in the AP software,

Test File: AP2700 files created to test "specifications" as defined in the DA7202 Datasheet. Both Continuous and Burst Power methods were used.

Appendix A EVB Hardware Details

A.1 Schematics

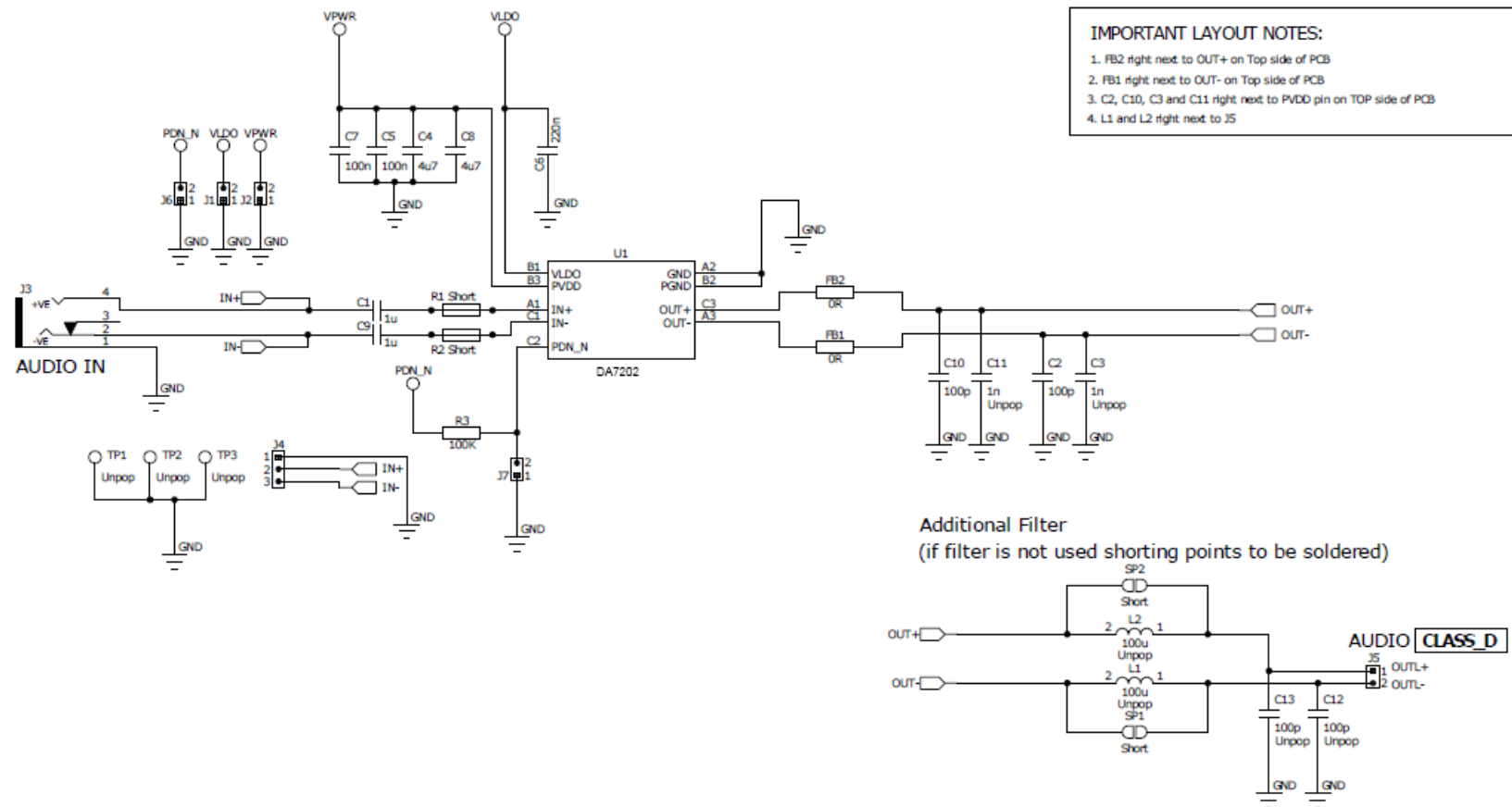


Figure 6. DA7202 evaluation board schematic

Revision History

Revision	Date	Description
1.2	Jan 30, 2024	Updated to include continuous and burst power methods.
1.1	Jan 12, 2024	Rebranded to Renesas.
1.0	June 12, 2013	Initial version.

Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

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