UM2376
User manual

Evaluation boards for TDA7803A and TDA7808 power amplifiers

Introduction

This note provides preliminary information about how to operate the boards offered to evaluate two components: TDA7803A and TDA7808. These parts can be selected in two package options, and consequently two different boards are available: the EVAL-TDA7803AFW, usable with the devices in FW27 package, and the EVAL-TDA7803APSO, for the PSO36 option.

This document describes how to use the evaluation board in order to check devices' performance; for any other information and deeper details please refer to the TDA7803A and TDA7808 datasheets (see *Appendix A*)

Figure 1. EVAL-TDA7803AFW

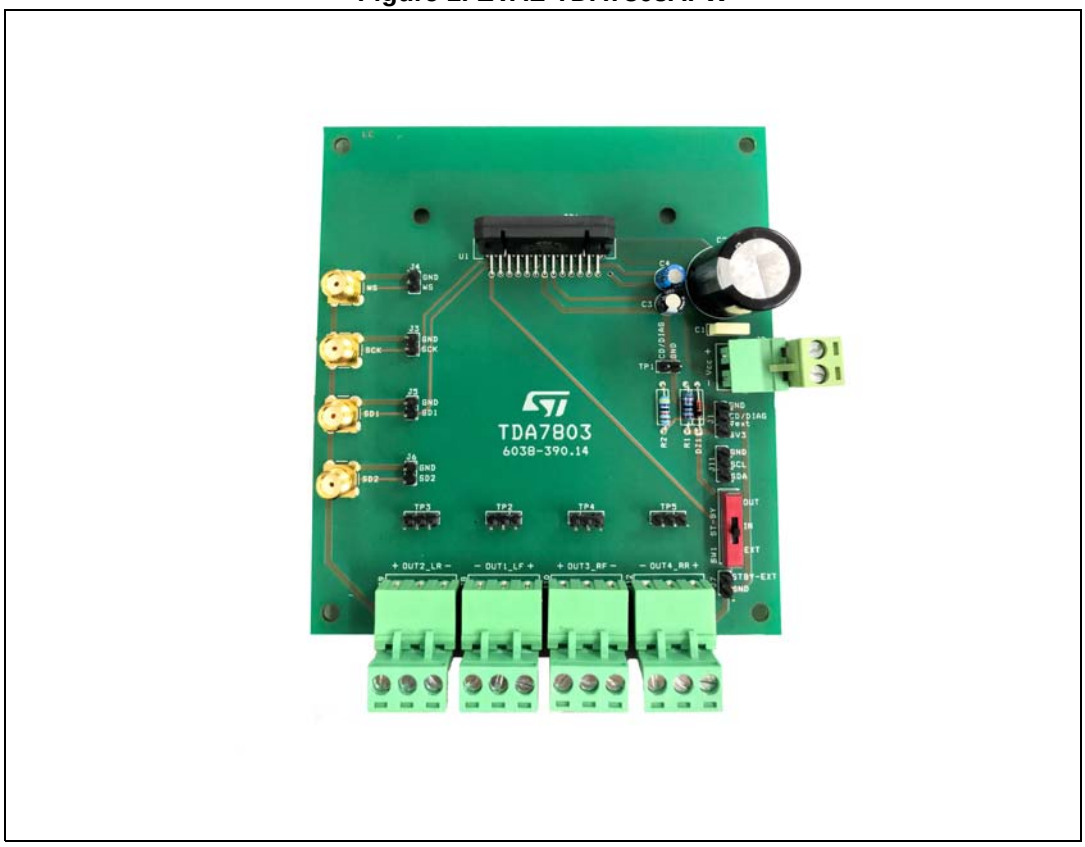
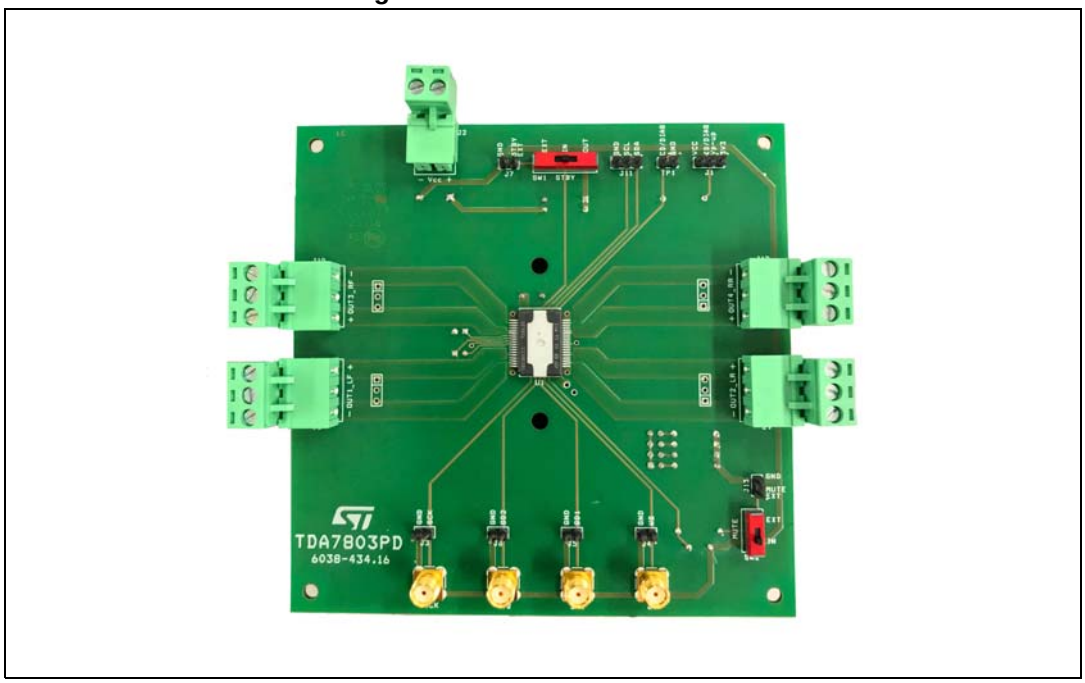


Figure 2. EVAL-TDA7803APSO



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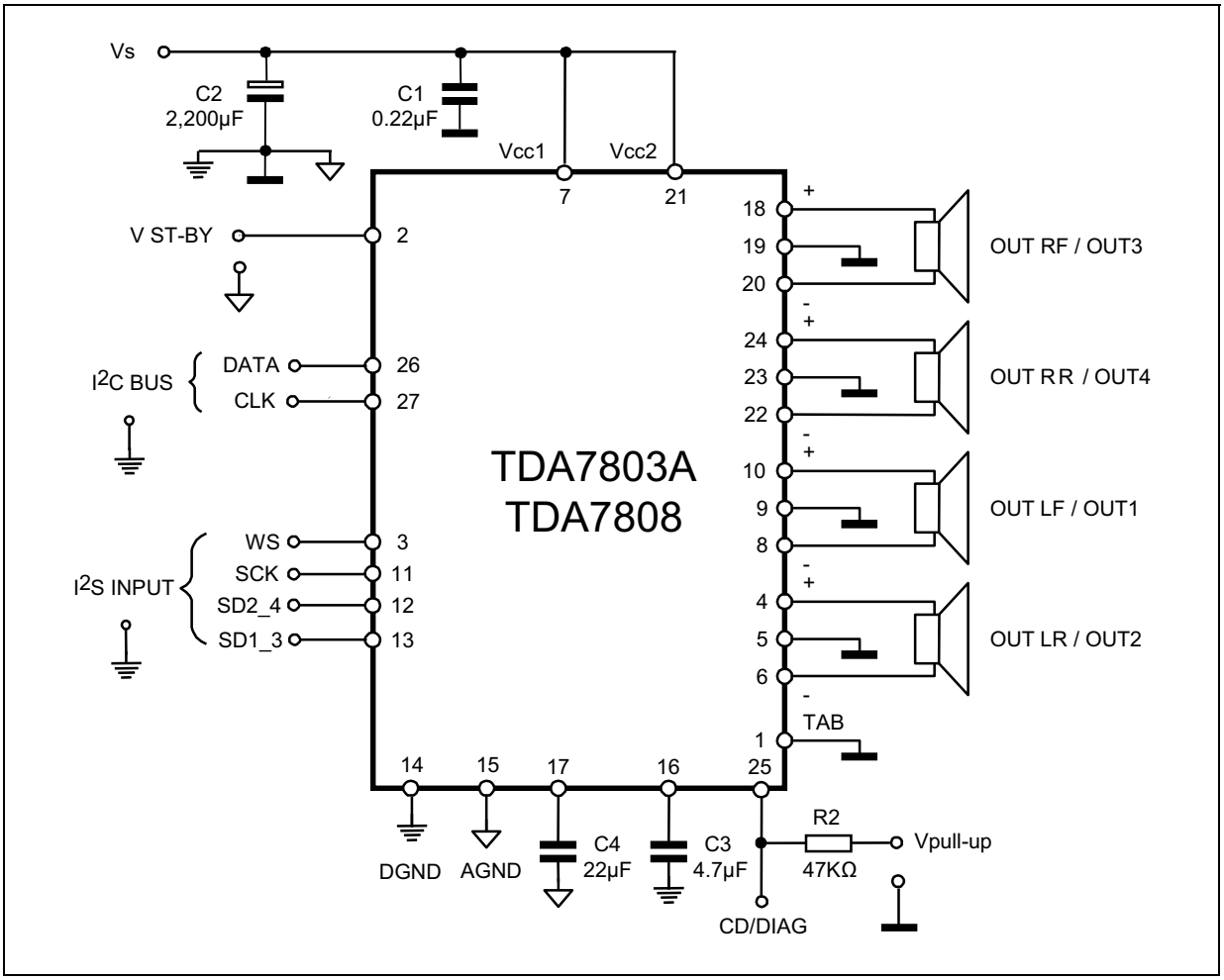
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1 Board description

1.1 EVAL-TDA7803AFW - FW package

The basic application diagram is shown – for the two packages - in *Figure 3: EVAL-TDA7803AFW application circuit* and *Figure 4: EVAL-TDA7803APSO application circuit*. A key components description and a suggestion about how to choose the right components, are respectively shown in*Table 1 and Table 2*.

Figure 3. EVAL-TDA7803AFW application circuit



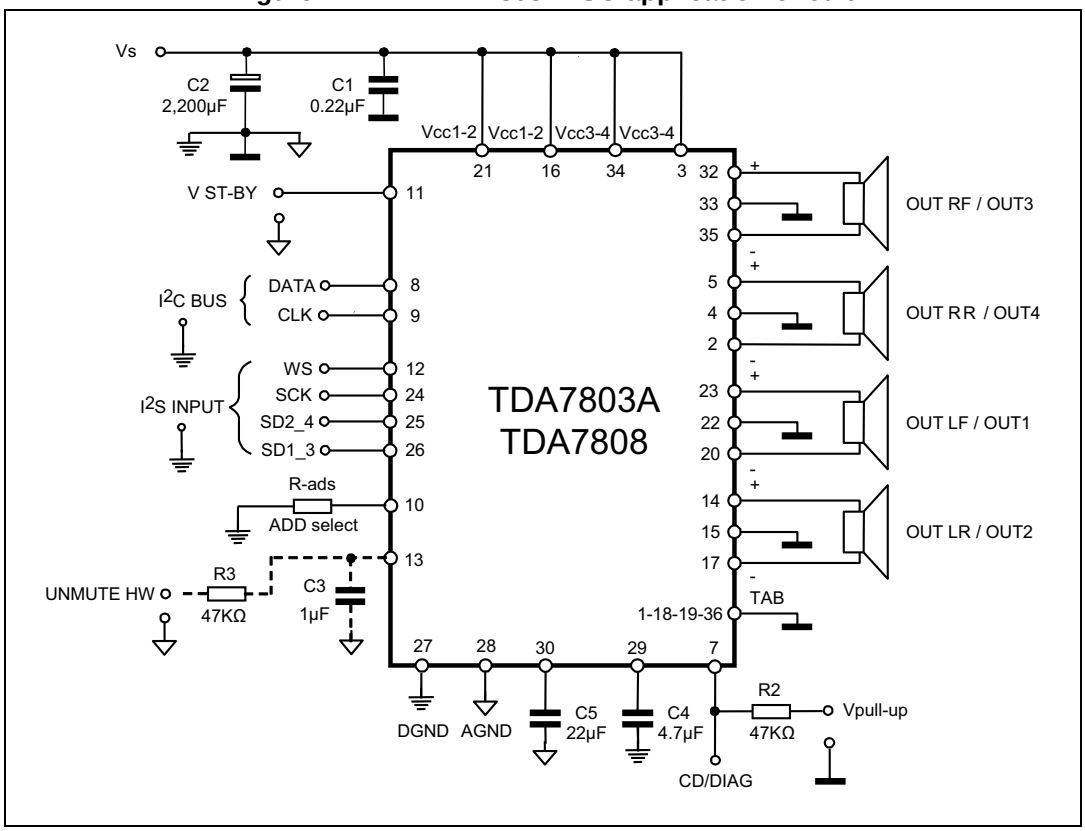
– C3 and C4 capacitors must be SMD ceramic types.
– GND separations unnecessary if a dedicated ground layer is available at PC-Board level.

Table 1. EVAL-TDA7803AFW components description

Component name	Recomm.value	Min/Max value	Purpose	Lower than recomm	Heigher than recomm	Notes
C1	0.1 µF	0.1 µF/ 0.47 µF ± 20 %	Vbatt HF filter	Danger of high frequency instabilities	Lower HF suppression	low-ESR type (e.g. X7R) Placed very close to the IC
C2	2.200 µF	1.000 µF min	Vbatt LF filter	Higher ripple	Audio performance improvement	Standard Electrolytic/25 V Reasonably close to the IC
C3	4.7 µF	2.2 µF /10 µF ± 20 %	Supply filter of the IC's digital section	instability	dysfunction	low ESR type (e.g X7R)
C4	22 µF	10 µF /47 µF	Supply filter of the IC's analog section	instability	dysfunction	low ESR type (e.g X7R)
R2	47 KΩ	10 KΩ/ 75 KΩ	CD/DIAG pull-up	dysfunction	dysfunction	

1.2 EVAL-TDA7803APSO - PSO package

Figure 4. EVAL-TDA7803APSO application circuit



– C4 and C5 capacitors must be SMD ceramic types.

– GND separations unnecessary if a dedicated ground layer is available at PC-Board level.

Table 2. EVAL-TDA7803APSO components description

Component name	Recomm.value	Min/Max value	Purpose	Lower than recomm	Heigher than recomm	Notes
C1	0.1 µF	0.1 µF/ 0.47 µF ± 20 %	Vbatt HF filter	Danger of high frequency instabilities	Lower HF suppression	low-ESR type (e.g. X7R) Placed very close to the IC
C2	2.200 µF	1.000 µF min	Vbatt LF filter	Higher ripple	Audio performance improvement	Standard Electrolytic/25 V Reasonably close to the IC
C3	1 µF	0.22 µF /47 µF	Muting time constant	Shorter muting delay time	Longer multing delay time	-

Table 2. EVAL-TDA7803APSO components description (continued)

Component name	Recomm.value	Min/Max value	Purpose	Lower than recomm	Heigher than recomm	Notes
C4	4.7 µF	2.2 µF /10 µF ± 20 %	Supply filter of the IC's digital section	instability	dysfunction	low ESR type (e.g X7R)
C5	22 µF	10 µF /47 µF	Supply filter of the IC's analog section	instability	dysfunction	low ESR type (e.g X7R)
Rads	See d.s	-	I2C address selection	-	-	-
R2	47 KΩ	10 KΩ/ 100 KΩ	Muting time constan	Shorter muting delay time	Longer multing delay time	-
R3	47 KΩ	10 KΩ/ 75 KΩ	CD/DIAG pull-up	dysfunction	dysfunction	

2 Board operation

Before any operation, please insert the power amplifier in the socket provided with the board.

A heat-sink (not provided) has to be used. Please refer to *Section 3: Power dissipation/Heat-sink* to choose the right heat-sink.

A supply voltage (battery voltage or equivalent) on VS-GND connectors, between 6 V and 18 V, is needed to operate the board.

Please refer to datasheet to understand load impedance compatibility of power amplifiers, then connect resistive loads (or speakers) to OUT1, OUT2, OUT3, OUT3 connectors.

I^2S format (SDA, CLK, WS lines) has to be used for input audio signals.

I^2C bus format (SDA, CLK lines) is necessary for sending any operation instructions to the IC.

HW Mute and Standby should be disabled (both are active low).

The TDA7803A power amplifier can only operate with I2C bus active.

The IC can work in high efficiency mode too (please, refer to datasheet). This operating mode can be selected through the I^2C bus.

3 Power dissipation/Heat-sink

The heat-sink size / characteristics largely depend on the operating conditions and consequently power dissipation levels are implied. Dissipation can be higher if sine test tones are used instead of music or audio-simulation signals (e.g. Pink Noise).

Considering the standard car-radio conditions (Vs= 14 V, RL= 4 Ω, 4-CH operation), the Pdiss levels implied are as follows (STD mode / HI-EFF mode @ Tamb= 70 ^{o}C , Tj-max= 150 ^{o}C):

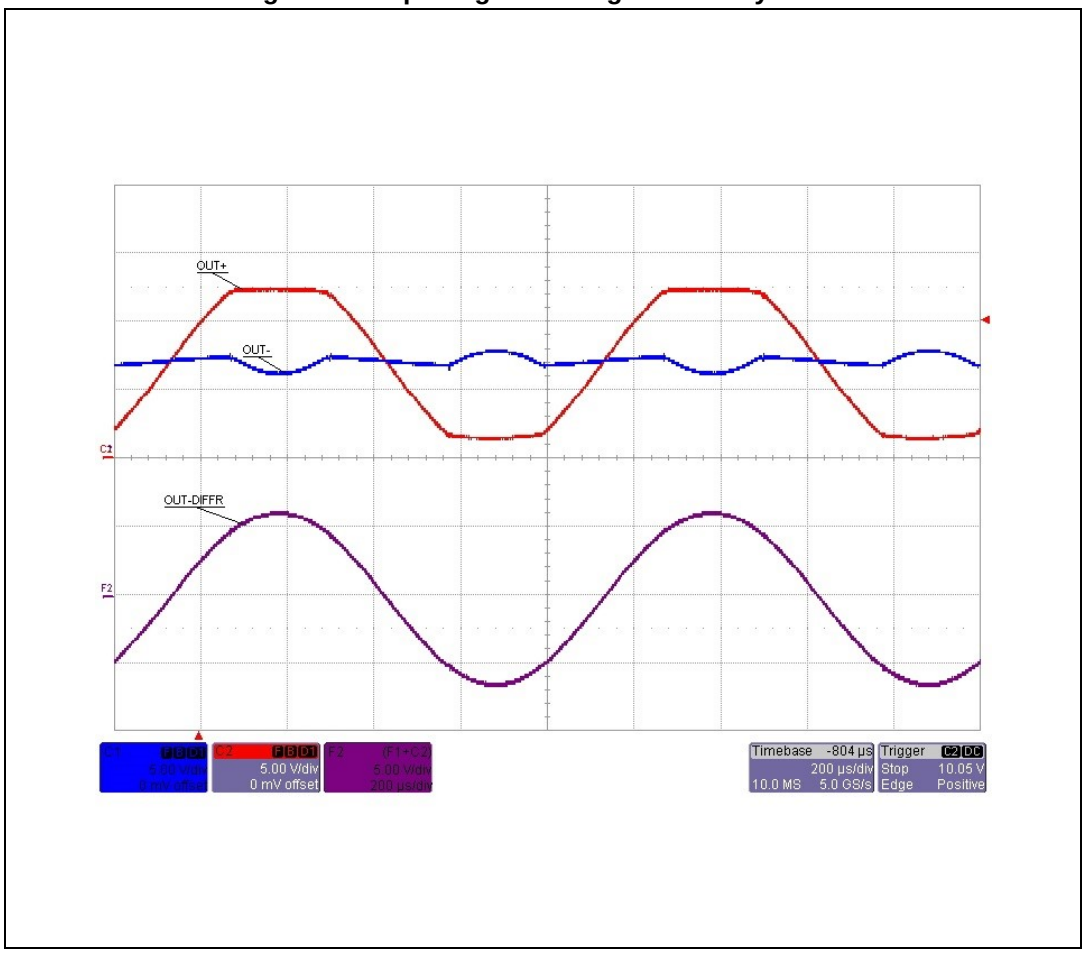
- SINE WAVE: Pdiss= 42 W / 38 Rth htsk = 1.9 ^{o}C/W / 2.1 ^{o}C/W
- PINK NOISE: Pdiss= 30 W / 18 Rth htsk = 12.7 ^{o}C/W / 4.4 ^{o}C/W

If sine-wave trials (especially with 4-CH operation / RL= 2 Ω) are to be run, then the heatsink has to be replaced by a larger / lower-Rth one.

4 High frequency output waveforms

In HI-EFF mode the speaker signal (OUT-OUT) is the sum of the signals at OUT+ and OUT- pins, which are not sinusoidal (in STD mode they are). Here below it is reported an oscilloscope snapshot, which shows the output waveforms in HI-EFF mode (@ Po > 2.5 W / 4 Ω).

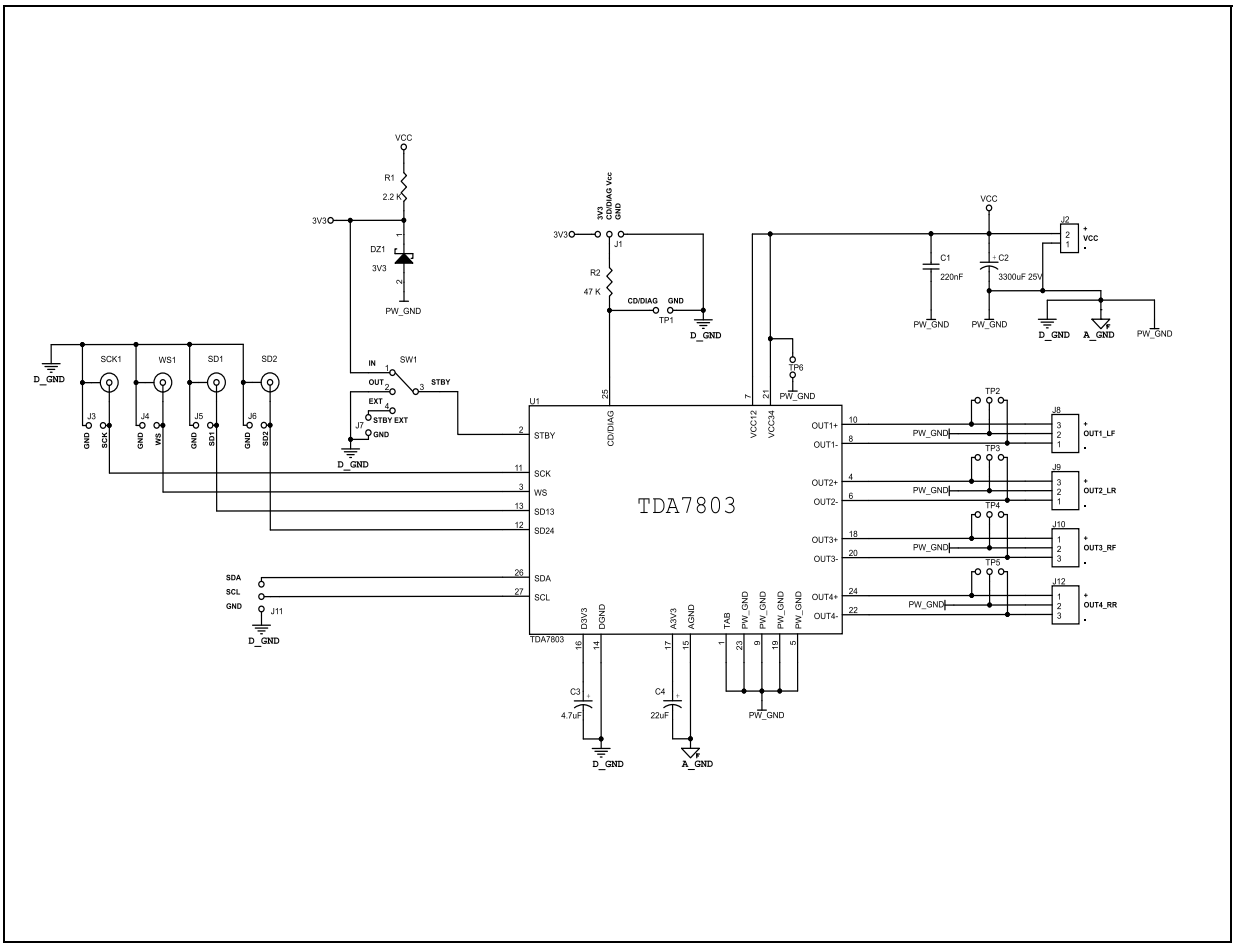
Figure 5. Output signals in high efficiency mode



5 Demo board schematic and BOM

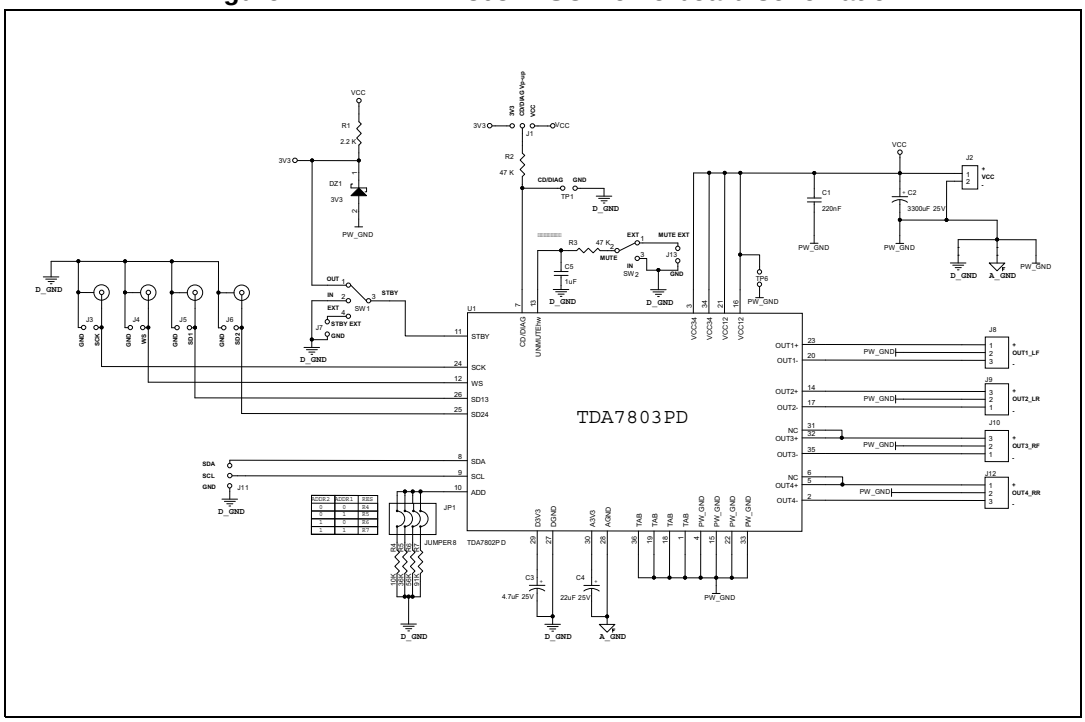
5.1 EVAL-TDA7803AFW

Figure 6. EVAL-TDA7803AFW Demo board schematic



5.2 EVAL-TDA7803APSO

Figure 7. EVAL-TDA7803APSO Demo board schematic



6 Information on board use

This evaluation board/kit is intended to be used for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and it is not considered by ST Microelectronics (ST) to be a finished end product fit for general consumer use. People handling the product(s) must have electronics training and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design-, marketing- and/or manufacturing-related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards. This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and therefore they may not meet the technical requirements of these directives or other related directives.

Appendix A Reference

- TDA7803A, High efficiency digital input automotive quad power amplifier with built-in diagnostics features, 'start stop' compatible (Datasheet DocID030745)
- TDA7808, High efficiency digital input automotive quad power amplifier, 'start stop' compatible (Datasheet DocID030826).

Revision history

Table 3. Document revision history

Date	Revision	Changes
05-Apr-2018	1	Initial release.

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