TAS5342DDV6EVM

This user's guide describes the operation of the evaluation module for the TAS5342 Digital Amplifier Power Output Stage using the TAS5508B Digital Audio PWM Processor from Texas Instruments. The user's guide also provides measurement data and design information like schematic, bill of materials, and PCB layout.

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1 Overview

The TAS5342DDV6EVM PurePath Digital™ customer evaluation module demonstrates the integrated circuits TAS5342DDV and TAS5508BPAG from Texas Instruments (TI).

The TAS5342DDV is a high-performance, integrated stereo Digital Amplifier Power Stage designed to drive 4-Ω speakers at up to 100 W per channel. The device incorporates TI Equibit™ technology and is designed to be used with TI Equibit™ modulators. This system requires only a simple passive demodulation filter to deliver high-quality, high-efficiency audio amplification.

The TAS5508BPAG is a high-performance, 32-bit (24-bit input) multichannel PurePath Digital™ pulse width modulator (PWM) based on Equibit™ technology with fully symmetrical AD modulation scheme. The device also has digital audio processing (DAP) that provides 48-bit signal processing, advanced performance, and a high level of system integration. The device has interfaces for headphone output and power supply volume control (PSVC).

This EVM is configured with four BTL channels, one PBTL (parallel BTL) channel for the center channel, and a subwoofer lineout using the DRV600 line driver.

The DRV600RTJ is a stereo line driver designed to allow the removal of the DC-blocking capacitors for reduced component count and cost. The DRV600RTJ is ideal for single-supply electronics where size and cost are critical design parameters. The DRV600RTJ is capable of driving two VRMS into a 600-Ω load with a 3.3-V supply. The DRV600RTJ has a fixed gain of –1.5 V/V. Independent shutdown control for the left and right audio channels is implemented.

This EVM, together with a TI input-USB board, is a complete 5-channel + subwoofer line-output digital audio amplifier system which includes digital input (S/PDIF), analog inputs, interface to a personal computer (PC), and DAP features like digital volume control, input and output mixers, automute, tone controls, loudness, EQ filters, and dynamic range compression (DRC). Configuration options are available for power stage failure protection.

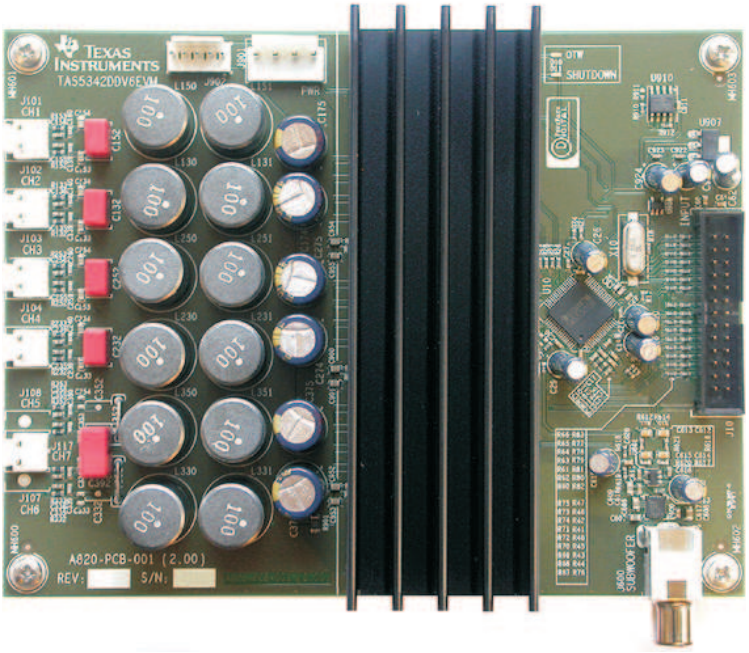
Table 1. TAS5342DDV6EVM Specification

Key Parameters	
Output stage supply voltage	0 V – 31.5 V
Number of channels	4 × BTL, 1 x PBTL
Load impedance BTL	4–8 Ω
Load impedance PBTL	2–8 Ω
Output power BTL	120 W / 4 Ω 10% THD or 87 W / 6 Ω / 10% THD
Output power PBTL	225 W / 2 Ω / 10% THD
DNR	>102 dB
PWM processor	TAS5508BPAG
Output stage	TAS5342DDV
Other features	Subwoofer line output

This 5-channel system plus subwoofer line output is designed for home theater applications such as A/V receivers, DVD receivers, DVD mini-component systems, or home theater in a box (HTIB).

This document covers EVM specifications, audio performance and power efficiency measurements graphs, and design documentation that includes schematics, parts list, layout, and mechanical design.

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Gerber (layout) files are available at www.ti.com.

The EVM is delivered with cables and an Input-USB board to connect to an input source and be controlled from a PC.

An external power adapter is required for supplying the voltage to the Input USB-2 Control Board. Refer to the Power Supply Setup section for more information.

1.1 TAS5342DDV6EVM Features

- 5/6-channel PurePath Digital™ evaluation module
- Subwoofer line output (LFE Output).
- Self-contained protection system (short circuit and thermal).
- Standard I^2S and I^2C/control connector for TI input board
- Double-sided, plated-through PCB layout.

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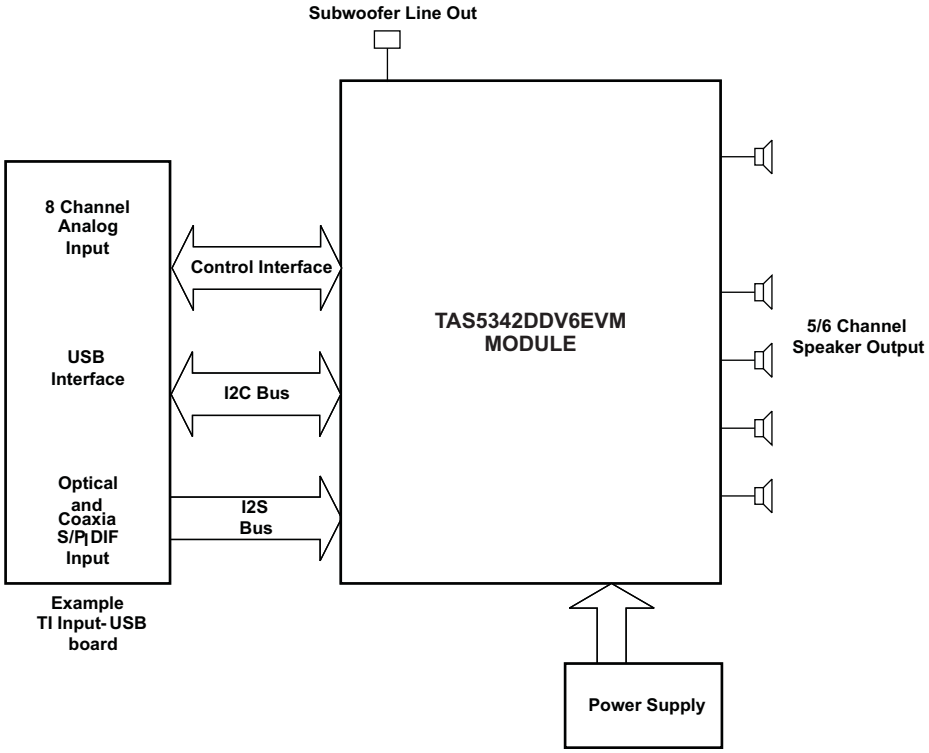


Figure 1. Integrated PurePath Digital™ Amplifier System

1.2 PCB Key Map

Physical structure for the TAS5342DDV6EVM is illustrated in Figure 2.

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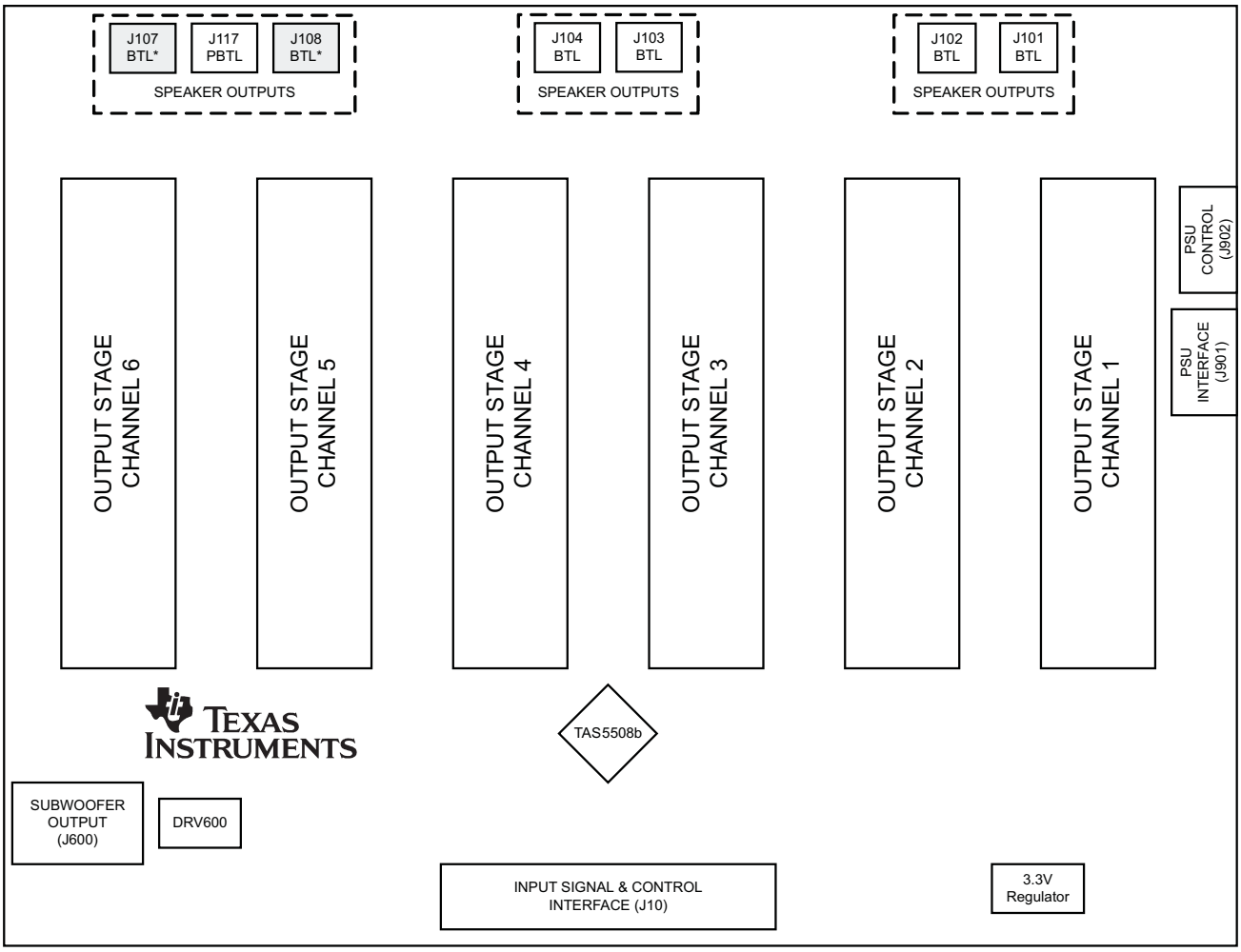


Figure 2. Physical Structure for the TAS5342DDV6EVM (Approximate Layout)

2 Quick Setup Guide

This section describes the TAS5342DDV6EVM board in regards to power supplies and system interfaces. Included is information regarding handling and unpacking, absolute operating conditions, and a description of the factory default switch and jumper configuration. A step-by-step guide explains how to configure the TAS5342DDV6EVM for device evaluation.

2.1 Electrostatic Discharge Warning

Many of the components on the TAS5342DDV6EVM are susceptible to damage by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

CAUTION

Failure to observe ESD handling procedures may result in damage to EVM components.

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2.2 Unpacking the EVM

On opening the TAS5342DDV6EVM package, ensure that the following items are included:

- 1 pc. TAS5342DDV6EVM board using one TAS5508BPAG and three TAS5342DDV.
- 1 pc. TI Input USB Board 2 for interfacing TAS5342DDV6EVM with S/PDIF/analog sources and PC for control.
- 1 pc. Signal and Control Interface IDC cable for connection to a TI Input USB Board 2.
- 1 pc. Cable for connecting Input-USB board to a USB port on a PC for TAS5508B control by software.
- 1 pc. Power supply cable for a regulated power supply (H-bridge supply).

If any of the items are missing, contact the Texas Instruments Product Information Center nearest you to inquire about a replacement.

Connect Input-USB board to TAS5342DDV6EVM using the delivered IDC cable.

2.3 Power Supply Setup

To power up the EVM, two power supplies are needed. One for system power, logic, and gate-drive, and one for output stage supply. The H-bridge power supply is connected to the EVM using the delivered power cable White/Black, White/Black. The system, logic and gate drive power supply must be supplied from an external 15-V, 1-A adapter. The characteristics of this adapter can be found in Table 3.

Table 2. Recommended Supply Voltages for Power Stage

Description	Voltage Limitations	Current Requirement	Cable
Output stage power supply	0 – 31.5 V	10 A	White/Black

Table 3. Supply Adapter for System Power, Logic and Gate Driver Characteristics

Description	Requirement
DC Output Voltage	15 V
Output Current	1 A
Max Power Rating	15 W
DC Output Connector	5.5 mm x 2.1 mm x 10 mm center positive barrel plug

CAUTION

Applying voltages above the limitations given in Table 2 may cause permanent damage to your hardware.

NOTE: The length of the power supply cable must be minimized. Increasing the length of the PSU cable is equal to increasing the distortion for the amplifier at high output levels and low frequencies.

2.4 Speaker Connection

CAUTION

Both positive and negative speaker outputs are floating and may not be connected to ground (e.g., through an oscilloscope).

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2.5 GUI Software Installation

The TAS5508 GUI provides easy control of all registers in TAS5508B. The latest TAS5508 GUI can be downloaded from the TAS5342DDV6EVM product folder on www.ti.com.

To install the software, run the setup file of the GUI.

After installation, turn on power supplies and connect USB cable to Input-USB board.

Start the GUI program from Microsoft® Windows® menu. Start up of the GUI takes a few seconds.



Figure 3. TAS5508 GUI Window

For more advanced use of the GUI, see the GUI User's Guide and data manual for TAS5508B (SLES162).

3 Protection

This section describes the short-circuit protection and fault-reporting circuitry of the TAS5342 device.

3.1 Short-Circuit Protection and Fault-Reporting Circuitry

The TAS5342 is a self-protecting device that provides fault reporting (including high-temperature protection and short-circuit protection). The TAS5342 is configured in back-end auto-recovery mode and therefore resets automatically after all errors (M1, M2, and M3 is set low); see the data sheet (SLAS557) for further explanation. This mean that the device restart itself after an error occasion and reports shortly thereafter through the $\overline{SD}$ error signal.

3.2 Fault Reporting

The $\overline{OTW}$ and $\overline{SD}$ outputs from TAS5342 indicate fault conditions. See the TAS5342 data manual for a description of these pins.

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Table 4. TAS5342 Warning/Error Signal Decoding

$\overline{OTW}$	$\overline{SD}$	Device Condition
0	0	High-temperature error and/or high-current error
0	1	High-temperature warning
1	0	Undervoltage lockout or high-current error
1	1	Normal operation, no errors/warnings

The temperature warning signals at the TAS5342DDV6EVM board are wired-OR to one temperature warning signal ($\overline{OTW}$ – pin 22 in the control interface connector). Shutdown signals are wired-OR into one shutdown signal ($\overline{SD}$ – pin 20 in the control interface connector).

The shutdown signals together with the temperature warning signal give chip-state information as described in the Table 4. device fault-reporting outputs are open-drain outputs.

4 TAS5342DDV6EVM Performance

Table 5. General Test Conditions

General Test Conditions		Notes
Output stage supply voltage:	31.5 V	Laboratory power supply (EA-PS 7065-10A)
Load impedance BTL:	4–8 Ω	
Load impedance PBTL:	2–4 Ω	
Input signal	1 kHz sine	
Sampling frequency	48 kHz	
Gain setting in TAS5508B	0 dB	
Measurement filter	AES17 and AUX0025	
TI input board	Input-USB2	Rev 1
EVM configuration file	Ver 1.00	TAS5342DDV6EVM Configuration (1.00).cfg
Note: These test conditions are used for all tests, unless otherwise specified.		

Table 6. TAS5508B Register Settings

Register	Register	Value	Notes
Modulation Index Limit	0x16	0x02	Set modulation index to 97.7%
Master Volume	0xD9	00 00 00 48	Master volume set to 0 dB
Note: These register settings are used for all test, unless otherwise specified.			

Table 7. Electrical Data

Electrical Data		Notes/Conditions
Output power, BTL, 4 Ω:	90 W	1 kHz, unclipped (0 dBFS), T_A = 25°C
Output power, BTL, 4 Ω:	120 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, BTL, 6 Ω:	66 W	1 kHz, unclipped (0 dBFS), T_A = 25°C
Output power, BTL, 6 Ω:	87 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, BTL, 8 Ω:	51 W	1 kHz, unclipped (0 dBFS), T_A = 25°C
Output power, BTL, 8 Ω:	68 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, PBTL, 2 Ω:	170 W	1 kHz, unclipped (0 dBFS), T_A = 25°C
Output power, PBTL, 2 Ω:	225 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, PBTL, 3 Ω:	130 W	1 kHz, unclipped (0 dBFS), T_A = 25°C
Output power, PBTL, 3 Ω:	170 W	1 kHz, 10% THD+N, T_A = 25°C
Maximum peak current, BTL:	>10 A	1-kHz burst, 1 Ω, R_{OC} = 27 kΩ
Maximum peak current, PBTL:	>20 A	1-kHz burst, 1 Ω, R_{OC} = 27 kΩ
Output stage efficiency:	90%	2 x channels, 8 Ω
Damping factor BTL:	8.5	1 kHz, relative to 4-Ω load

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Table 7. Electrical Data (continued)

Electrical Data		Notes/Conditions
Damping factor PBTL:	9.4	1 kHz, relative to 2-Ω load
H-bridge supply current:	<190 mA	1 kHz, -60-dBFS signal
Idle power consumption:	5.99 W	H-bridge supply, –60-dBFS input signal

Table 8. Audio Performance

Audio Performance			Notes/Conditions
THD+N, BTL, 4 Ω:	1 W	<0.06 %	1 kHz
THD+N, BTL, 4 Ω:	10 W	<0.15 %	1 kHz
THD+N, BTL, 4 Ω:	50 W	<0.095 %	1 kHz
THD+N, BTL, 6 Ω:	1 W	<0.08 %	1 kHz
THD+N, BTL, 6 Ω:	10 W	<0.097 %	1 kHz
THD+N, BTL, 6 Ω:	50 W	<0.08 %	1 kHz
THD+N, BTL, 8 Ω:	1 W	<0.073 %	1 kHz
THD+N, BTL, 8 Ω:	10 W	<0.085 %	1 kHz
THD+N, BTL, 8 Ω:	50 W	<0.068 %	1 kHz
THD+N, PBTL, 2 Ω:	1 W	<0.089 %	1 kHz
THD+N, PBTL, 2 Ω:	10 W	<0.15 %	1 kHz
THD+N, PBTL, 2 Ω:	50 W	<0.13 %	1 kHz
THD+N, PBTL, 2 Ω:	100 W	<0.097 %	1 kHz
THD+N, PBTL, 2 Ω:	150 W	<0.21 %	1 kHz
THD+N, PBTL, 3 Ω:	1 W	<0.093 %	1 kHz
THD+N, PBTL, 3 Ω:	10 W	<0.05 %	1 kHz
THD+N, PBTL, 3 Ω:	50 W	<0.08 %	1 kHz
THD+N, PBTL, 3 Ω:	100 W	<0.062 %	1 kHz
Dynamic Range:		>102 dB	Ref: rated power, A-weighted, AES17 filter, 4 ch avg
Noise Voltage:		<160 µVrms	A-weighted, AES17 filter
Click/Pop, DC step BTL:		14 mV	Mute/unmute, no signal, 6 Ω
Click/Pop, DC step PBTL:		27 mV	Mute/unmute, no signal, 4 Ω
Channel Separation:		>61 dB	1 kHz,
Frequency Response:		0.0 / –0.8 dB	90 W / 4 Ω, unclipped (0 dBFS)

Table 9. Audio Performance Subwoofer Line Output

Audio Performance			Notes/Conditions
Full-scale output voltage swing, 0 dBFS:		2 VRMS	100 Hz, 10-kΩ load
Full-scale output voltage swing, 10% THD+N:		2.32 VRMS	100 Hz, 10-kΩ load
THD+N, 10 kΩ:	1 V	<0.017%	100 Hz
THD+N, 10 kΩ:	100 mV	<0.013%	100 Hz
Frequency response:		+1, –3 dB	20 Hz–1.7 kHz
Dynamic range:		>105.5 dB	20 Hz–1.7 kHz
Noise voltage:		<11 µV	20 Hz–1.7 kHz

Table 10. Thermal Specification

Thermal Specification**	$T_{HEATSINK}$*	Notes/Conditions
Idle, all channels switching	32°C	1 kHz, 15 min, –60 dBFS signal, T_A = 25°C
4x12.5 W, 4 Ω + 1x25 W , 2 Ω (1/8 power)	58°C	1 kHz, 1 hour, T_A = 25°C
2x100 W, 4 Ω	78°C	1 kHz, 5 min, T_A = 25°C

*Measured on surface of heatsink

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Table 11. Physical Specifications

Physical Specifications		Notes/Conditions
PCB dimensions:	124 × 150 × 54	Width × Length × Height (mm)
Total weight:	370 gr	Components + PCB + Heatsink + Mechanics

Note: All electrical and audio specifications are typical values.

4.1 THD+N vs Power (BTL –4 Ω)

Gain: +2.5 dB set in TAS5508B

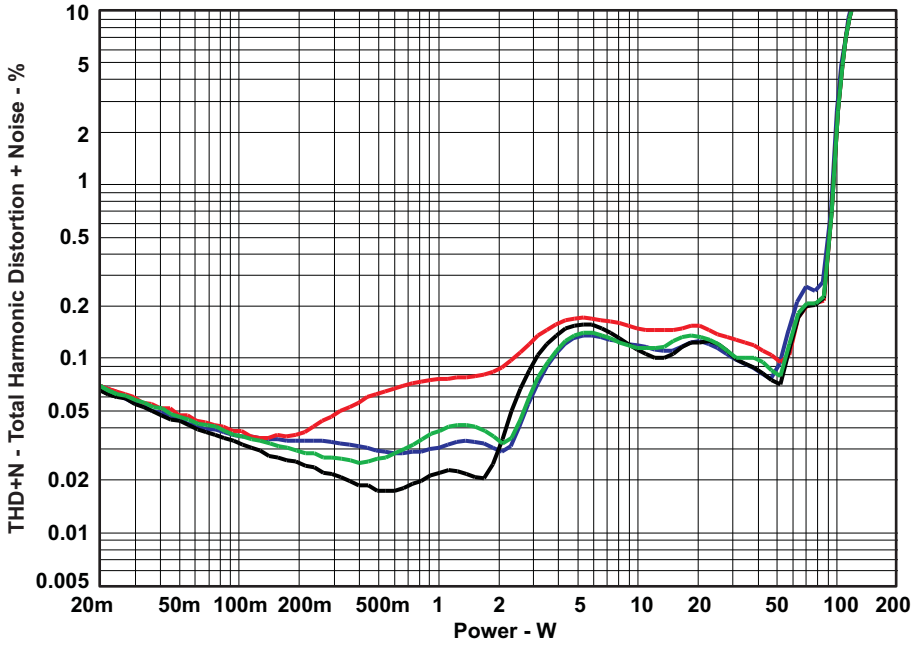


Figure 4. THD+N vs Power (BTL – 4 Ω)

4.2 THD+N vs Power (BTL –6 Ω)

Gain: +2.5 dB set in TAS5508B

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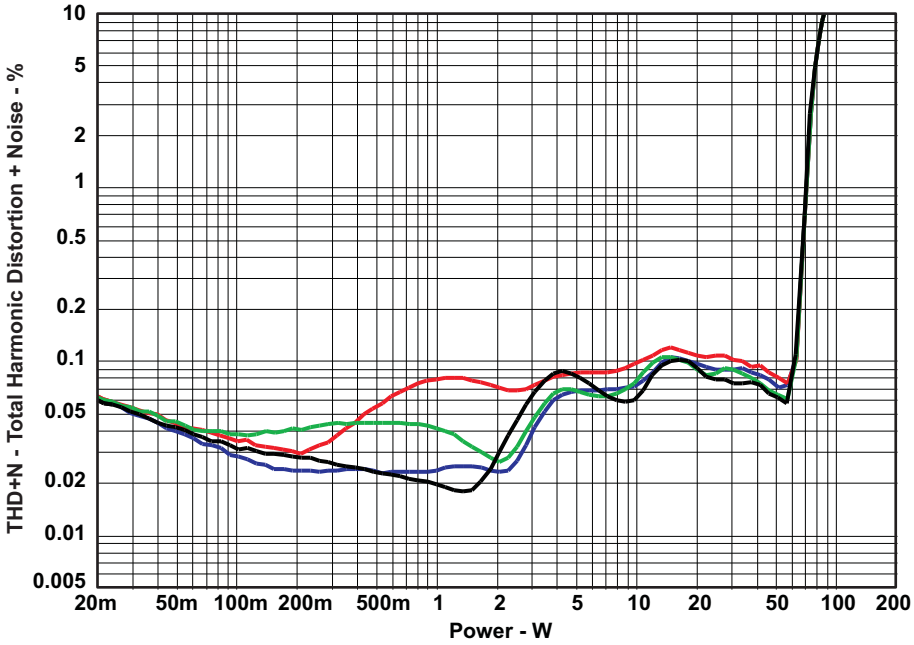


Figure 5. THD+N vs Power (BTL –6 Ω)

4.3 THD+N vs Power (BTL –8 Ω)

Gain: +2.5 dB set in TAS5508B

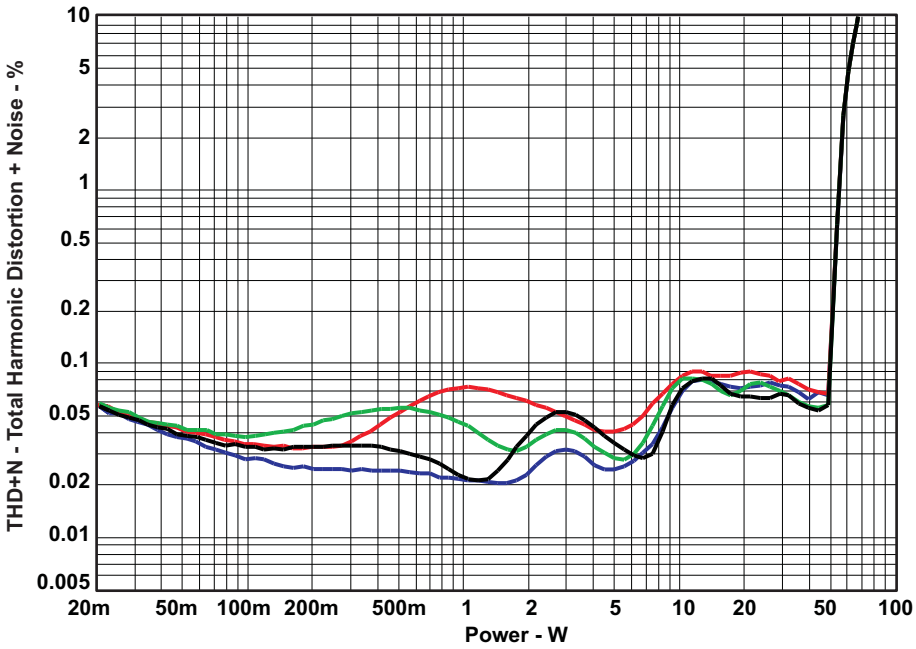


Figure 6. THD+N vs Power (BTL –8 Ω)

4.4 THD+N vs Power (PBTL –2 Ω)

Gain: +2.5 dB set in TAS5508B

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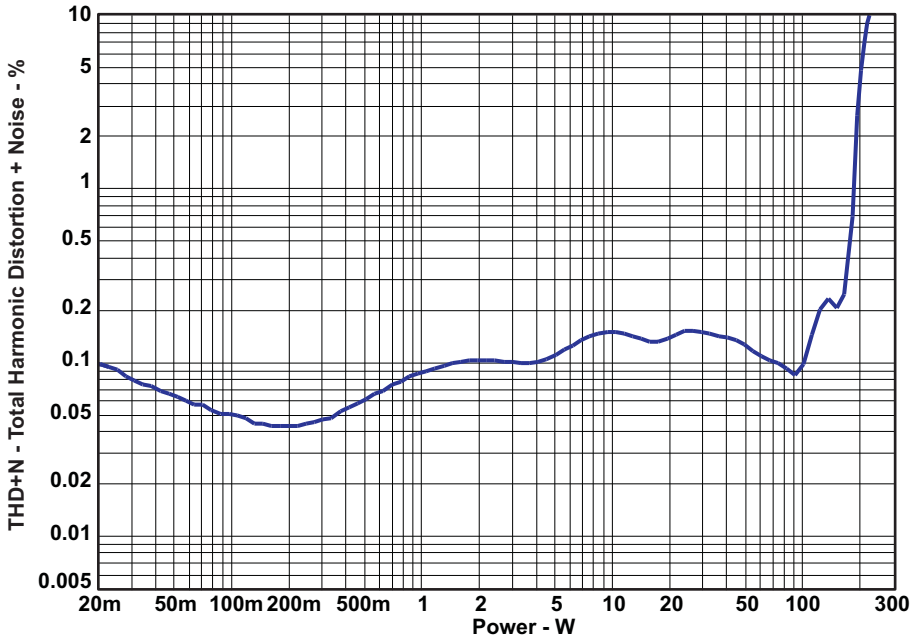


Figure 7. THD+N vs Power (PBTL –2 Ω)

4.5 THD+N vs Power (PBTL –3 Ω)

Gain: +2.5 dB set in TAS5508B

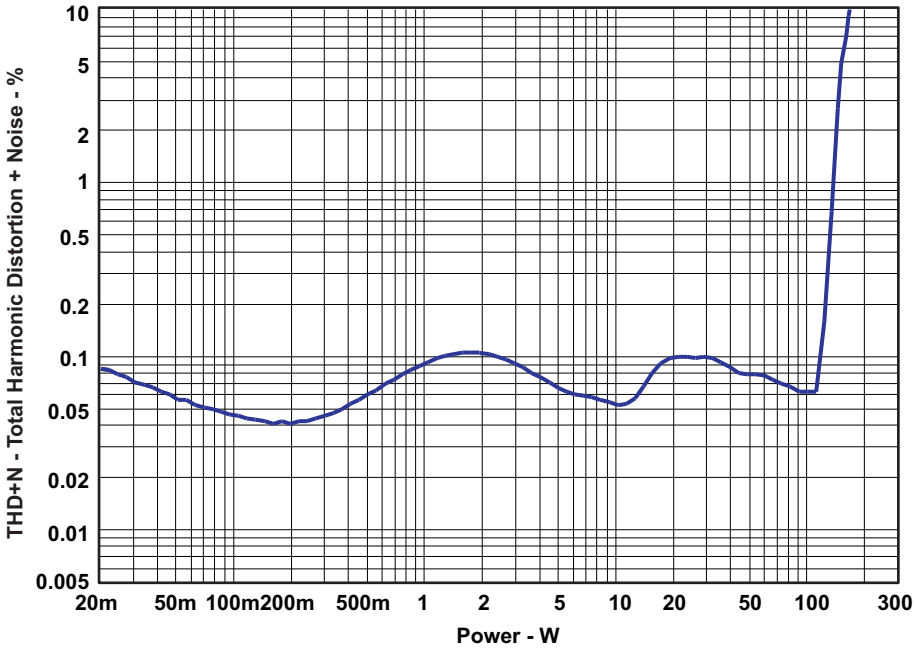


Figure 8. THD+N vs Power (PBTL –3 Ω)

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4.6 THD+N vs Frequency (BTL –4 Ω)

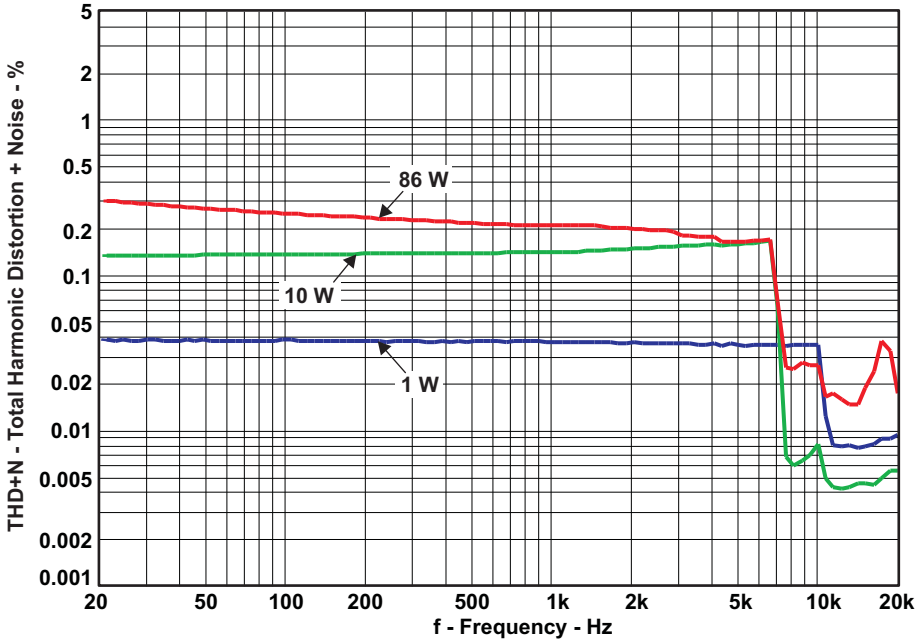


Figure 9. THD+N vs Frequency (BTL –4 Ω)

4.7 THD+N vs Frequency (BTL – 6 Ω)

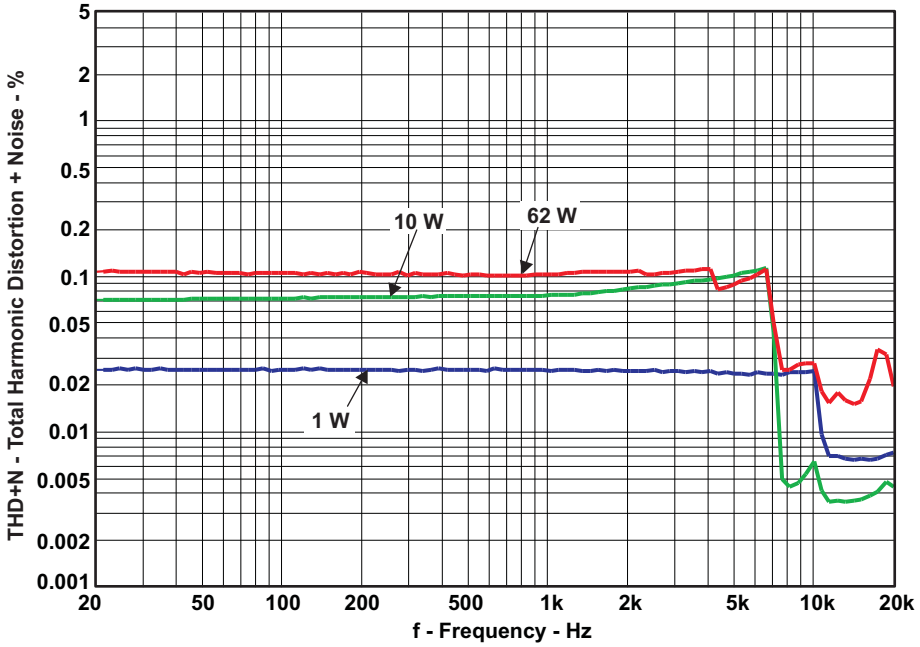


Figure 10. THD+N vs Frequency (BTL – 6 Ω)

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4.8 THD+N vs Frequency (BTL –8 Ω)

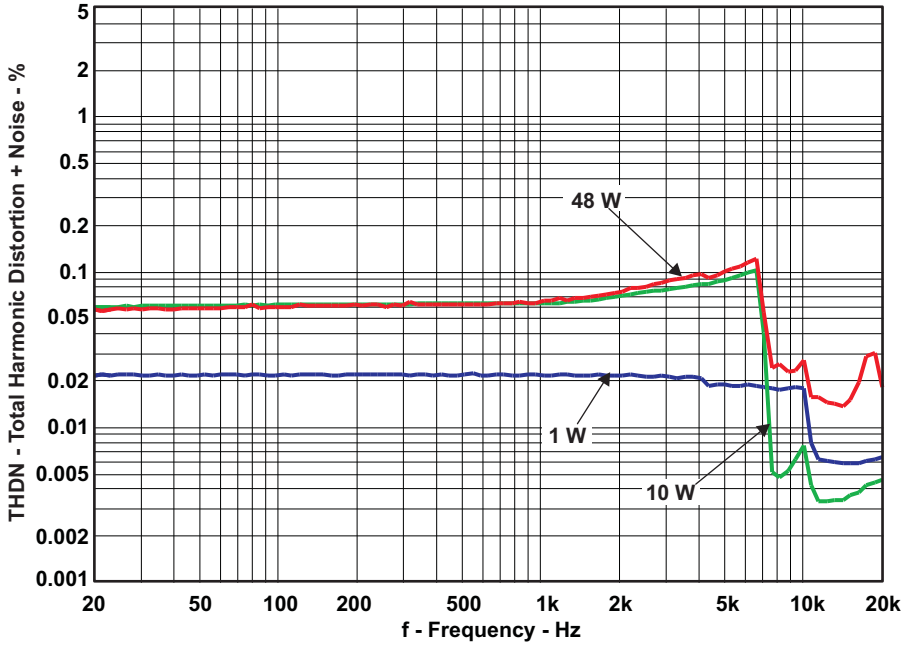


Figure 11. THD+N vs Frequency (BTL –8 Ω)

4.9 THD+N vs Frequency (PBTL –2 Ω)

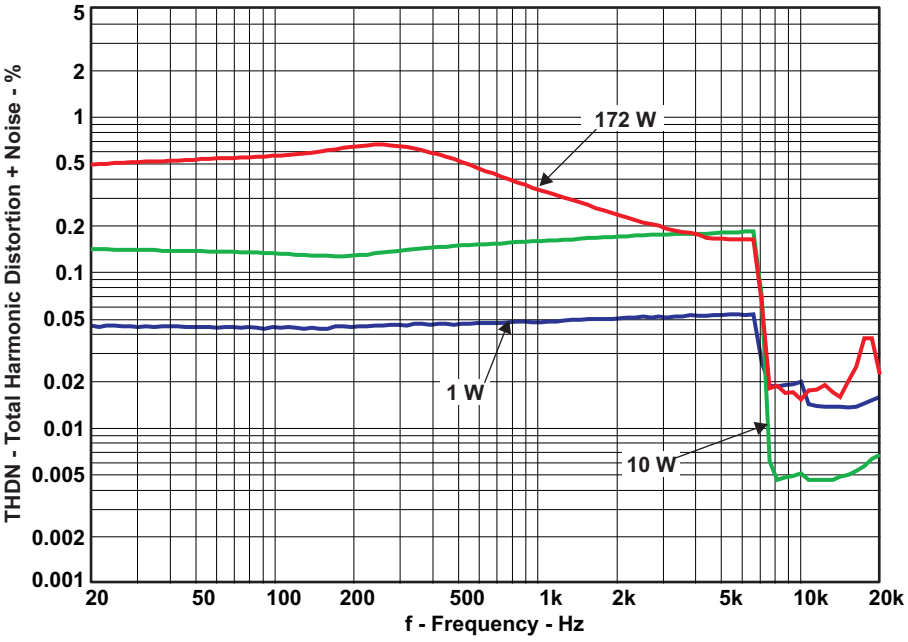


Figure 12. THD+N vs Frequency (PBTL –2 Ω)

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4.10 THD+N vs Frequency (PBTL –3 Ω)

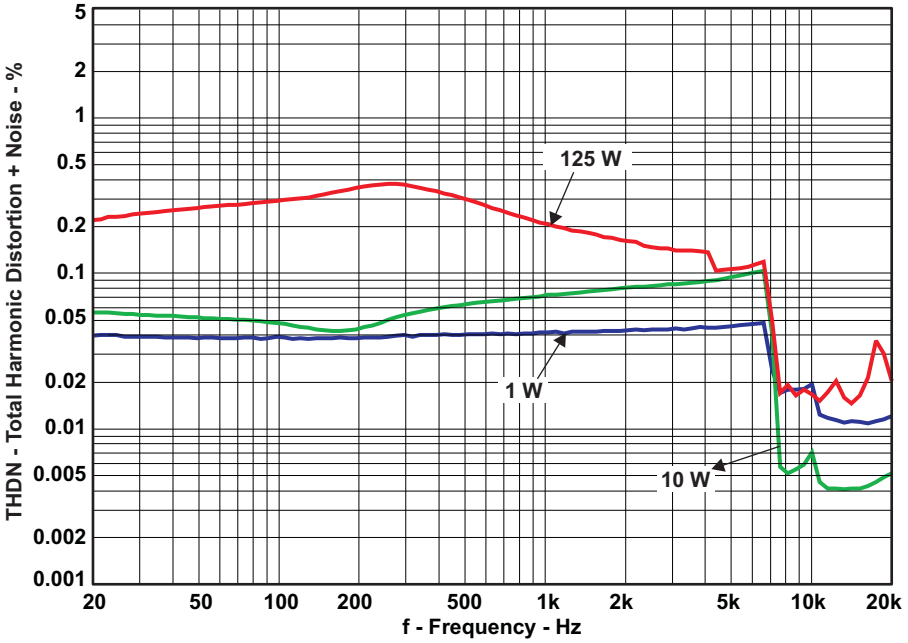


Figure 13. THD+N vs Frequency (PBTL –3 Ω)

4.11 FFT Spectrum with –60-dBFS Tone (BTL)

Reference voltage is 19.09 V. FFT size 16k.

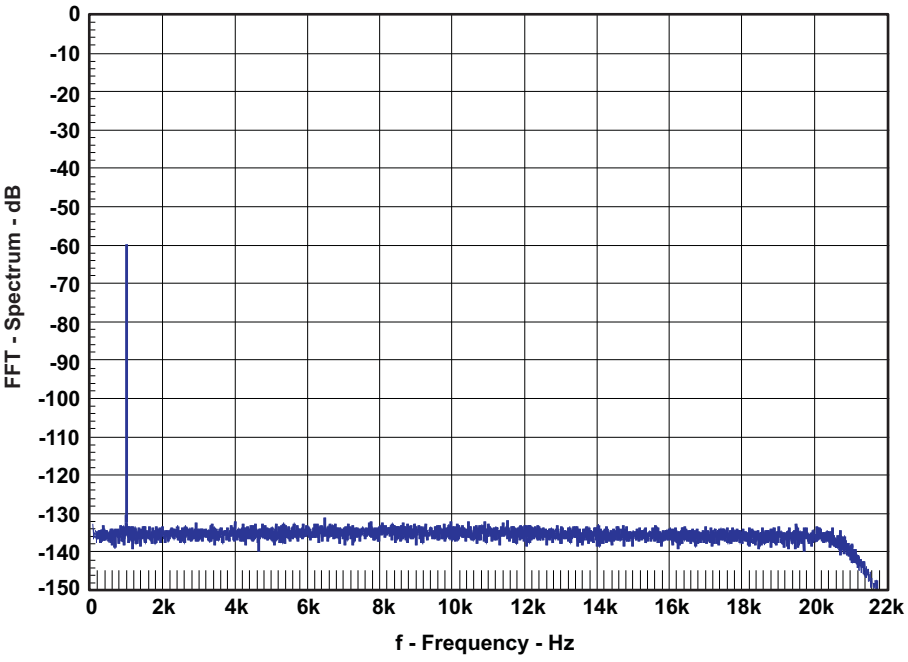


Figure 14. FFT Spectrum with –60-dBFS Tone (BTL)

4.12 FFT Spectrum With –60-dBFS Tone (PBTL)

Reference voltage is 18.7 V. FFT size 16k.

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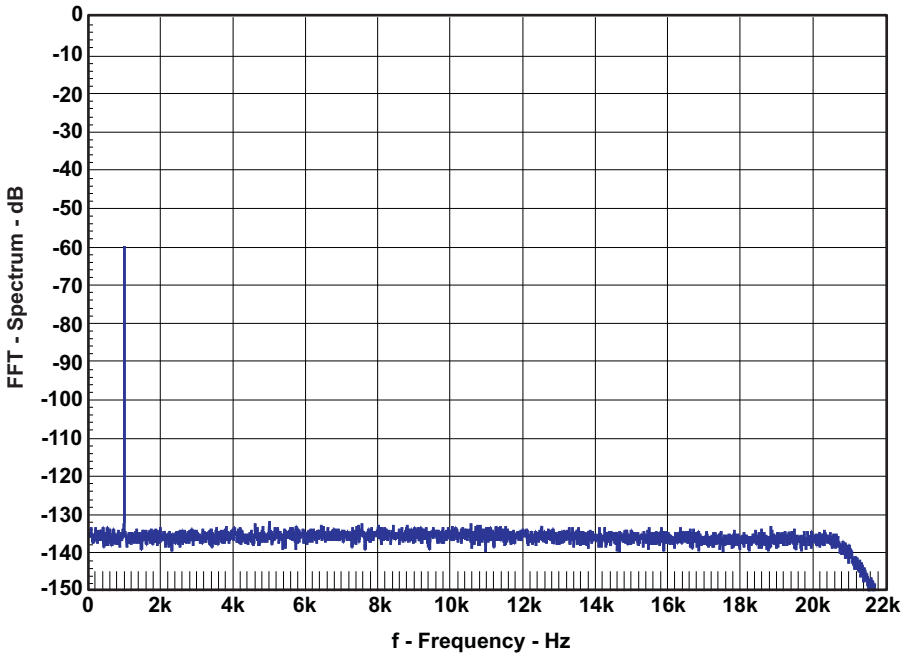


Figure 15. FFT Spectrum with –60-dBFS Tone (PBTL)

4.13 Idle Noise FFT Spectrum (BTL)

Automute disabled – Register x04h set to x60h. Reference voltage is 19.02 V. FFT size 16k.

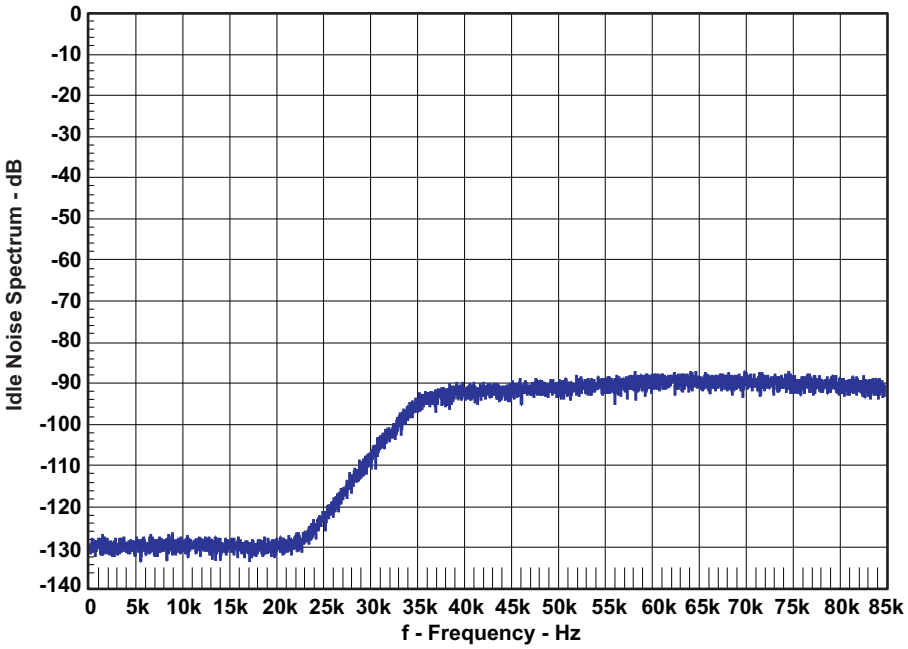


Figure 16. Idle Noise FFT Spectrum (BTL)

4.14 Idle Noise FFT Spectrum (PBTL)

Automute disabled – Register x04h set to x60h. Reference voltage is 18.75 V. FFT size 16k.

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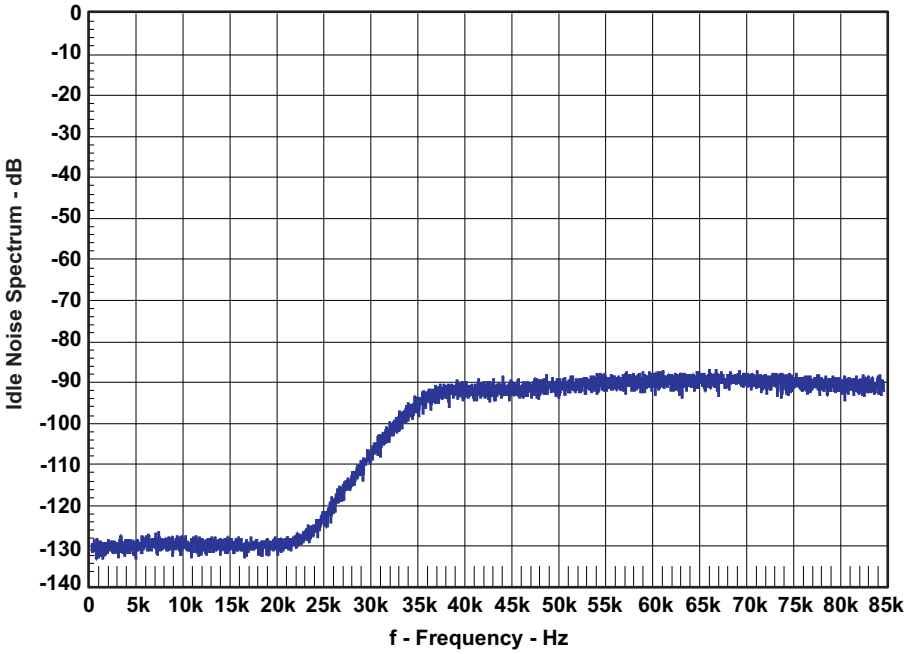


Figure 17. Idle Noise FFT Spectrum (PBTL)

4.15 Channel Separation

Channel separation is tested for two channels in different package, channel 1 and channel 2. 4-Ω loads are used for both channels. Channel 1 input signal is 0 dBFS, channel 2 muted. Reference voltage 19 Vrms

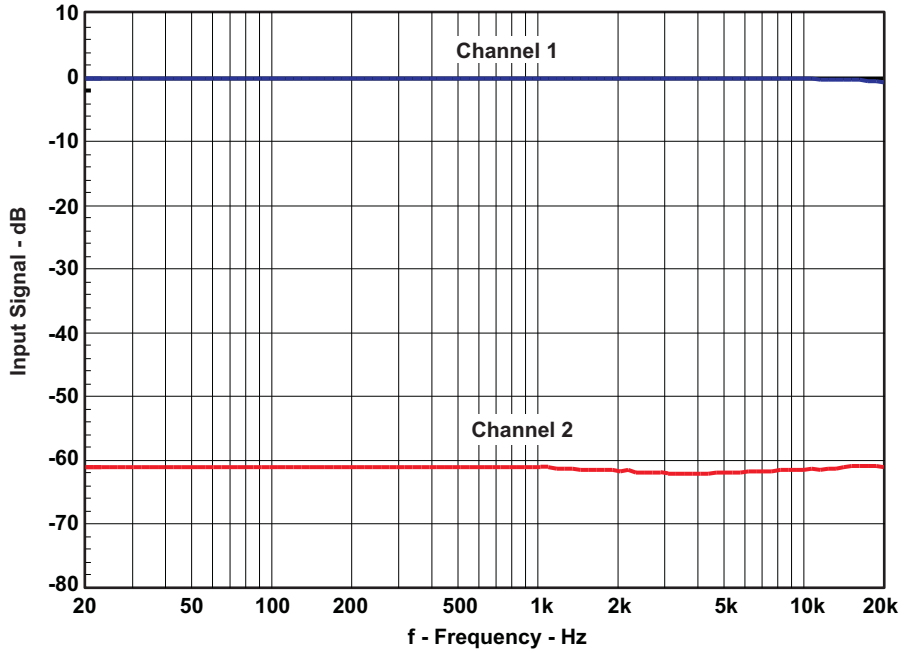


Figure 18. Channel Separation

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4.16 Frequency Response (BTL)

Measurement bandwidth filter 80 kHz.

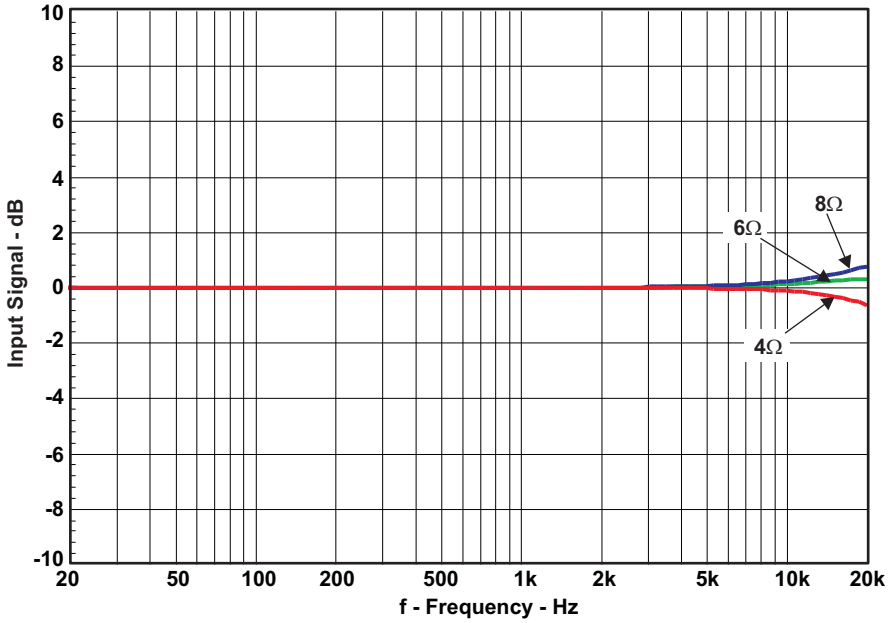


Figure 19. Frequency Response (BTL)

4.17 Frequency Response (PBTL)

Measurement bandwidth filter 80 kHz.

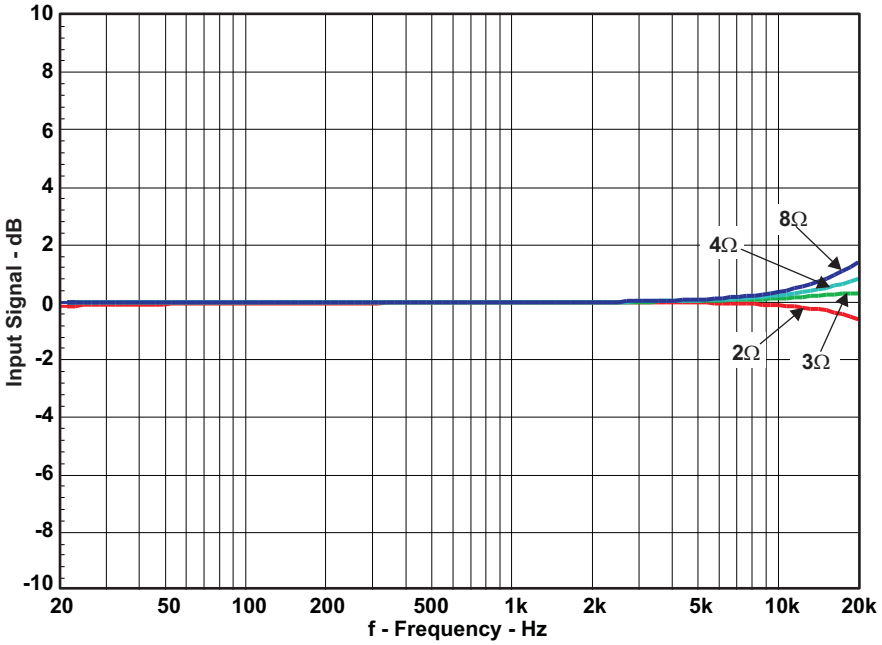


Figure 20. Frequency Response (PBTL)

4.18 High-Current Protection (BTL)

Input 1-kHz bursted signal, load 1 Ω

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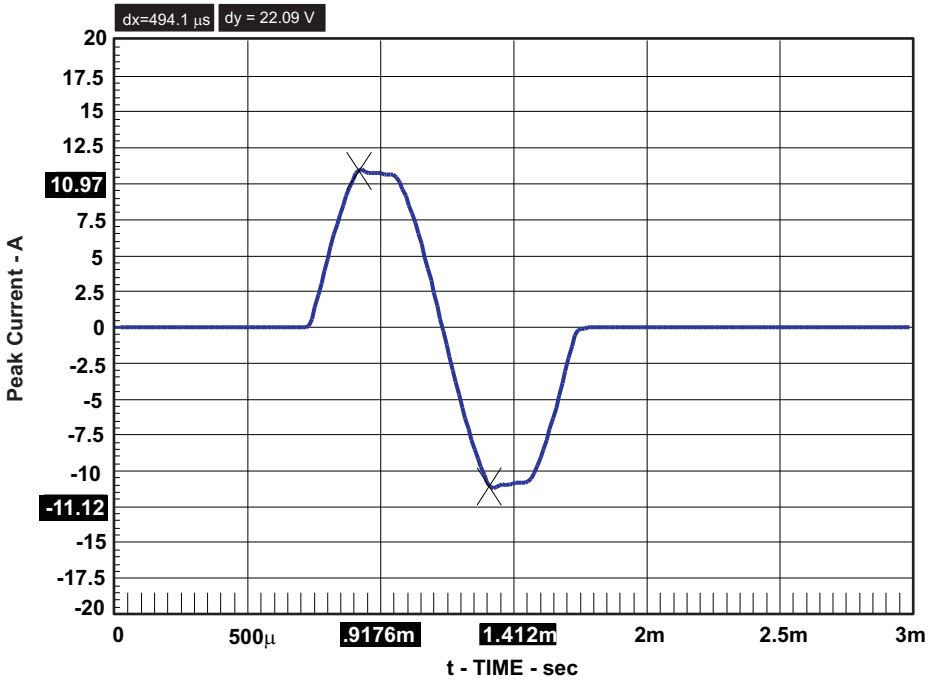


Figure 21. High-Current Protection (BTL)

4.19 High-Current Protection (PBTL)

Input 1-kHz bursted signal, load 1 Ω.

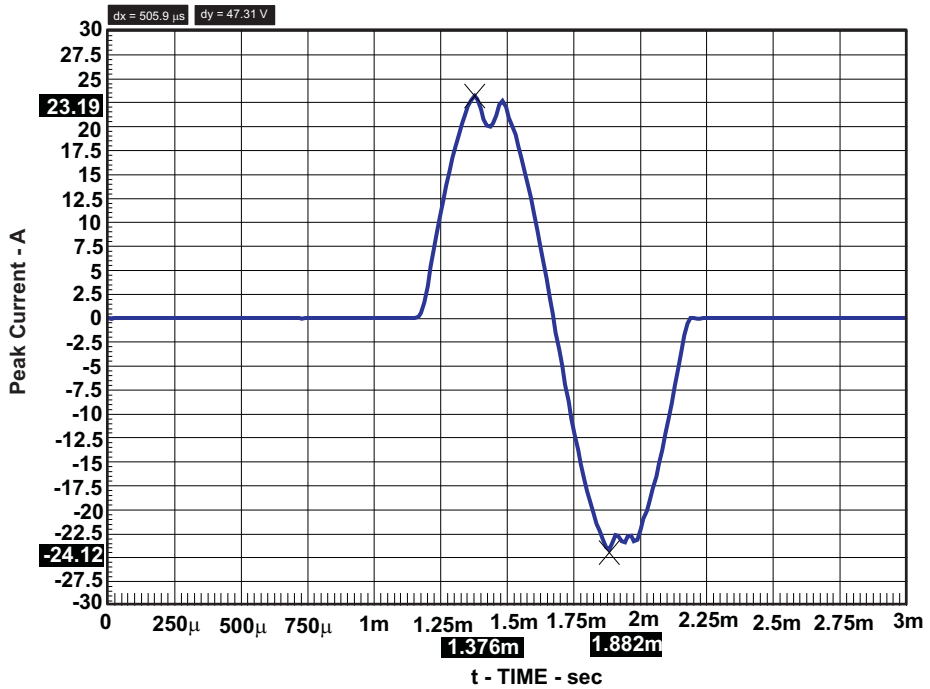


Figure 22. High-Current Protection (PBTL)

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4.20 Pop/Click (BTL)

No input signal applied. The measurement results are presented in time domain.

Test with automute disabled – Register x04h set to x60h. No input signal applied. Load 4 Ω.

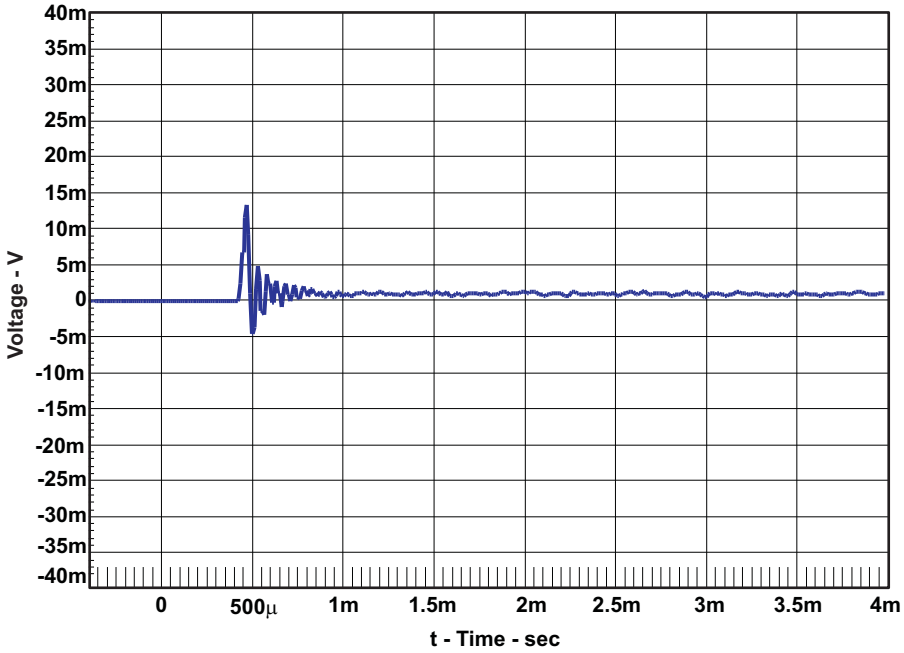


Figure 23. Pop/Click (BTL)

4.21 Pop/Click (PBTL)

No input signal applied. The measurement results are presented in time domain.

Test with automute disabled – Register x04h set to x60h. No input signal applied. Load 2 Ω.

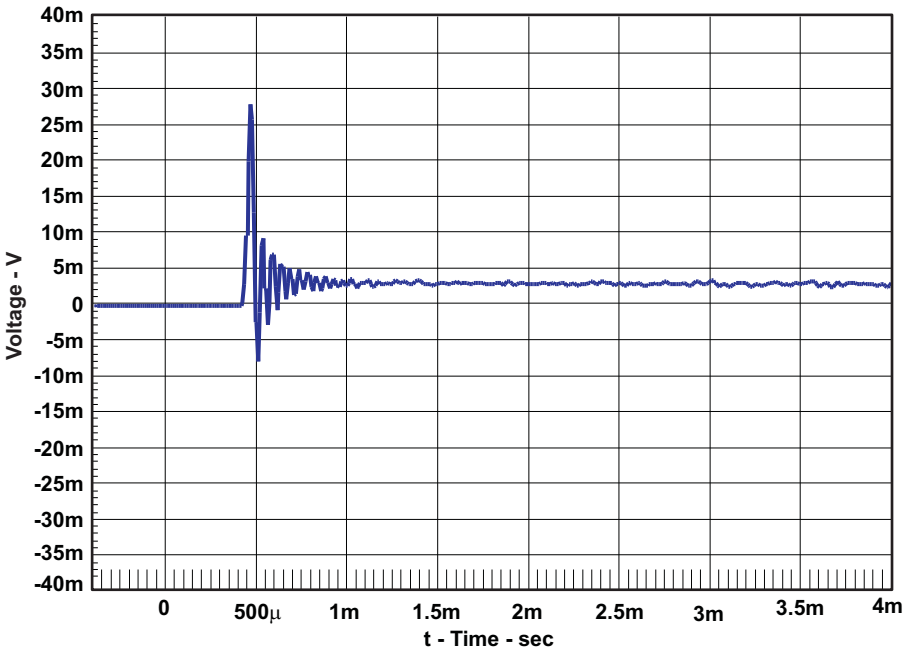


Figure 24. Pop/Click (PBTL)

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4.22 Output Stage Efficiency

Efficiency is tested with two channels carrying an 8-Ω load. The board has been preheated for 1 hour at 1/8 output power.

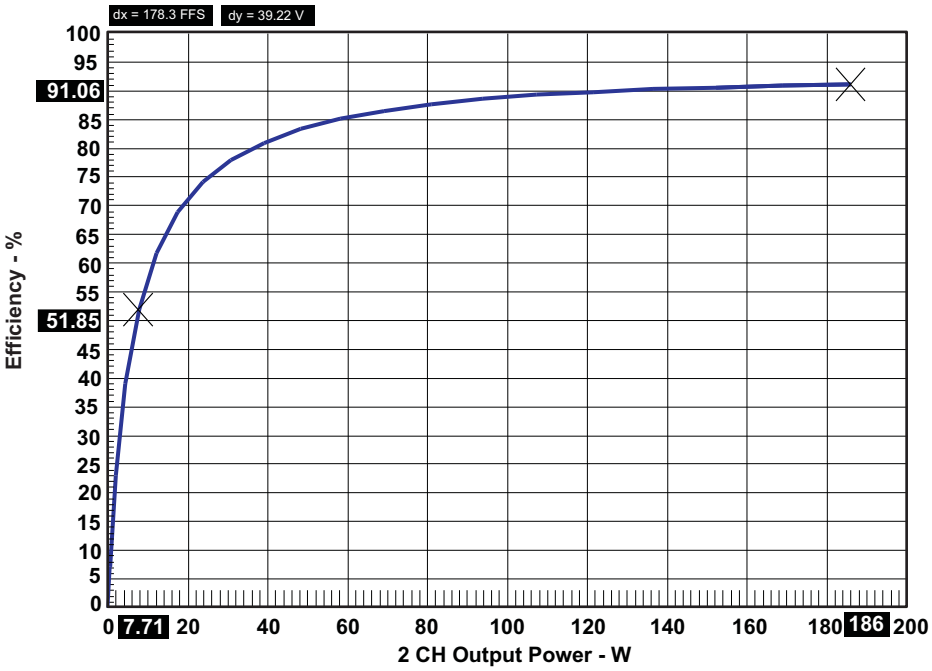


Figure 25. Output Stage Efficiency

4.23 Subwoofer Lineout THD vs Output Voltage

Gain: +2.5 dB set in TAS5508B. 100-Hz input

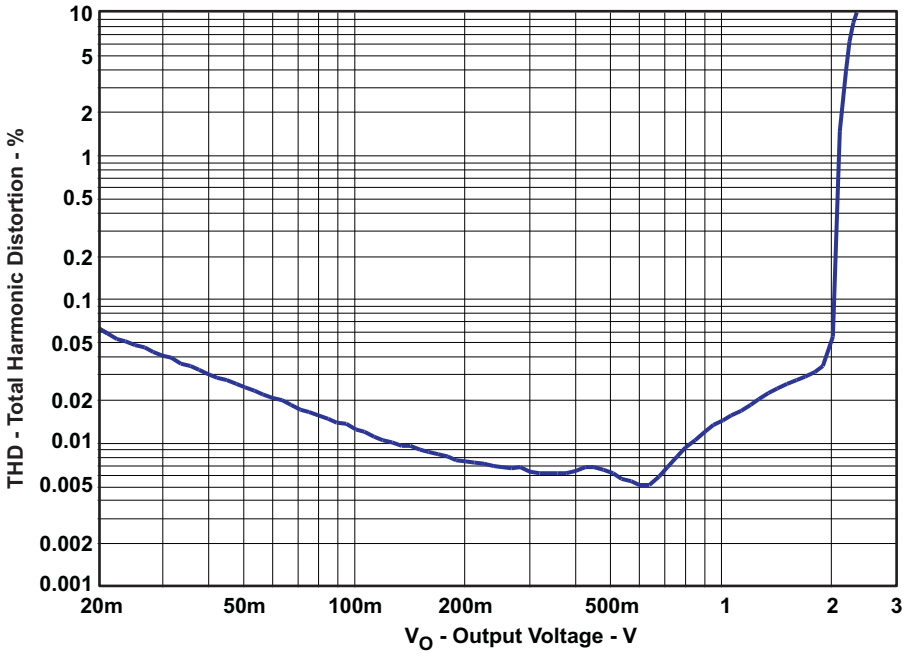


Figure 26. Subwoofer Lineout THD vs Output Voltage

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4.24 Subwoofer Lineout THD vs Frequency

Load 10 kΩ

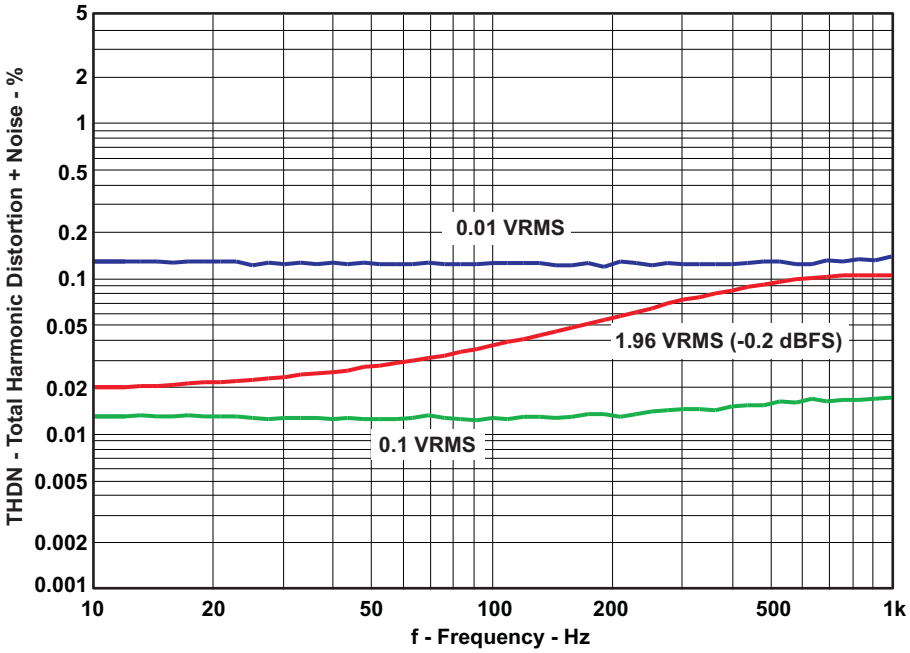


Figure 27. Subwoofer Lineout THD vs Frequency

4.25 Subwoofer Lineout Frequency Response

Measurement bandwidth filter 80 kHz. Load 10 kΩ.

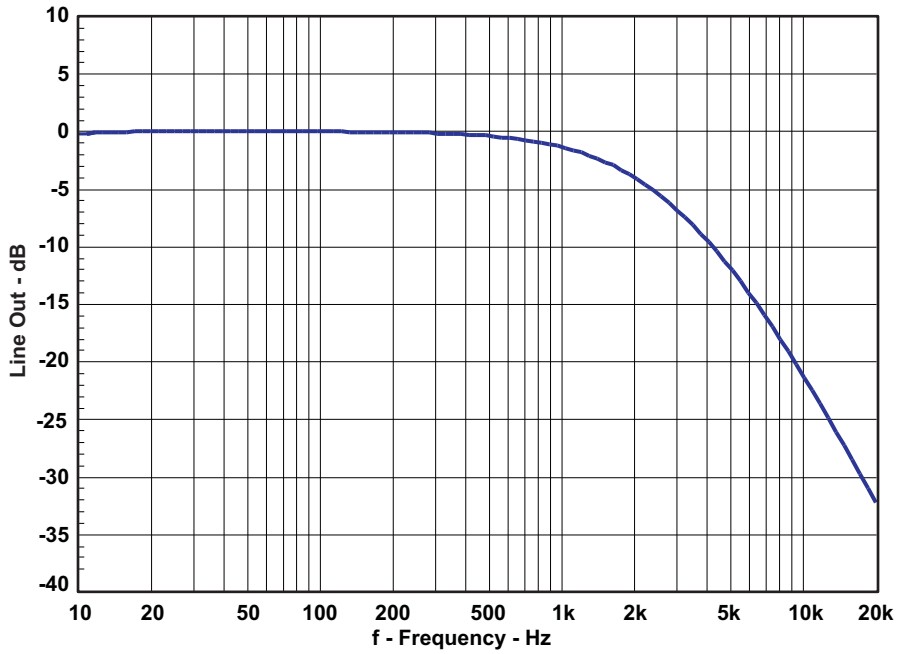


Figure 28. Subwoofer Lineout Frequency Response

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5 Related Documentation from Texas Instruments

Table 12 contains a list of data manuals that have detailed descriptions of the integrated circuits used in the design of the TAS5342DDV6EVM. The data manuals can be obtained at the URL http://www.ti.com.

Table 12. Related Documentation from Texas Instruments

Part Number	Literature Number
TAS5508B	SLES162
TAS5342	SLAS557
DRV600	SLOS536
TLV271	SLOS351
TPS3825-33	SLVS165
TLV1117-33C	SLVS561

5.1 Additional Documentation

1. *PC Configuration Tool for TAS5508* (TAS5508 GUI ver. 4.0 or later)
2. *System Design Considerations for True Digital Audio Power Amplifiers* application report (SLAA117)
3. *Digital Audio Measurements* application report (SLAA114)
4. *PSRR for PurePath Digital™ Audio Amplifiers* application report (SLEA049)
5. *Power Rating in Audio Amplifiers* application report (SLEA047)
6. *PurePath Digital™ AM Interference Avoidance* application report (SLEA040)
7. *Click and Pop Measurements Technique* application report (SLEA044)
8. *Power Supply Recommendations for DVD-Receivers* application report (SLEA027)
9. *Implementation of Power Supply Volume Control* application report (SLEA038)

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Design Documents

This appendix comprises design documents pertaining to the TAS5162DDV6EVM evaluation module. The documents are presented in the following order.

- Schematic (8 pages)
- Parts List (2 pages)
- PCB Specification (1 page)
- PCB Layers (4 pages)
- Heat-Sink Drawing (1 page)

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Design Name:	**TAS5342DDV6EVM**
Type:	Mass Market Evaluation Module
File Name:	A820-SCH-001.DSN
Version:	2.00
Date:	5.Nov 2007
Design Engineer:	Jonas Holm (jlh@ti.com)
Audio Configuration:	5.1 PurePath Digital Amplifier Design 1 x TAS5508b, 3 x TAS5342DDV
Interfaces:	J10: 26 pin IDC Header for Control, I2C, +5V, +12V and for I2S Audio J101-J104, J107, J108, J117: 2 pin 3.96mm Headers for Speakers J600: RCA Jack for Subwoofer Line Out J901: 4 pin 3.96mm Header for H-Bridge Supply J902: 5 pin 2.54 mm Header for PSVC Interface
Setup:	4 Ohm (BTL) and 2 Ohm (PBTL) Speaker Loads +31.5 V H-Bridge Supply Voltage
Performance:	80 W / 4 Ohm (BTL) unclipped, or 100 W / 4 Ohm (BTL) 10% THD+N 102 dB Dynamic Range

Page

1/8: Front Page and Schematic Disclaimer
2/8: Overview - Modulator, Input/Output and Line Output Connectors
3/8: 2 Channel BTL Power Stage
4/8: 2 Channel BTL Power Stage
5/8: 1 Channel PBTL Power Stage
6/8: Subwoofer Line Out
7/8: Power Supplies & EEPROM
8/8: Mechanics

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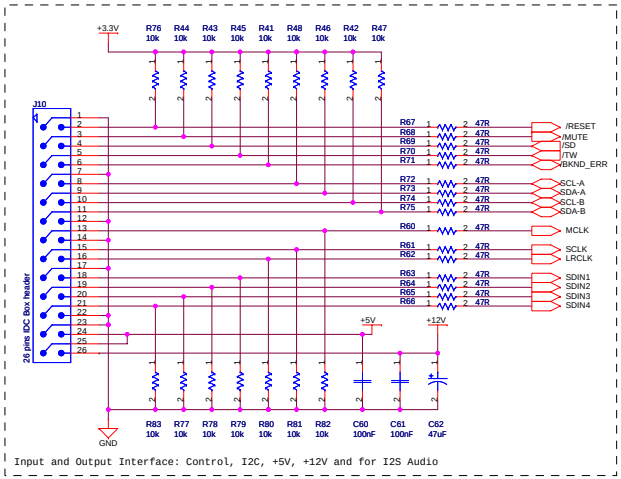
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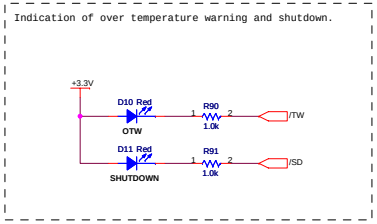
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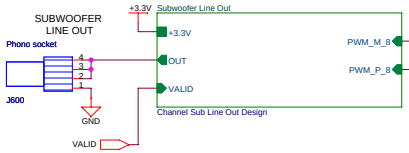
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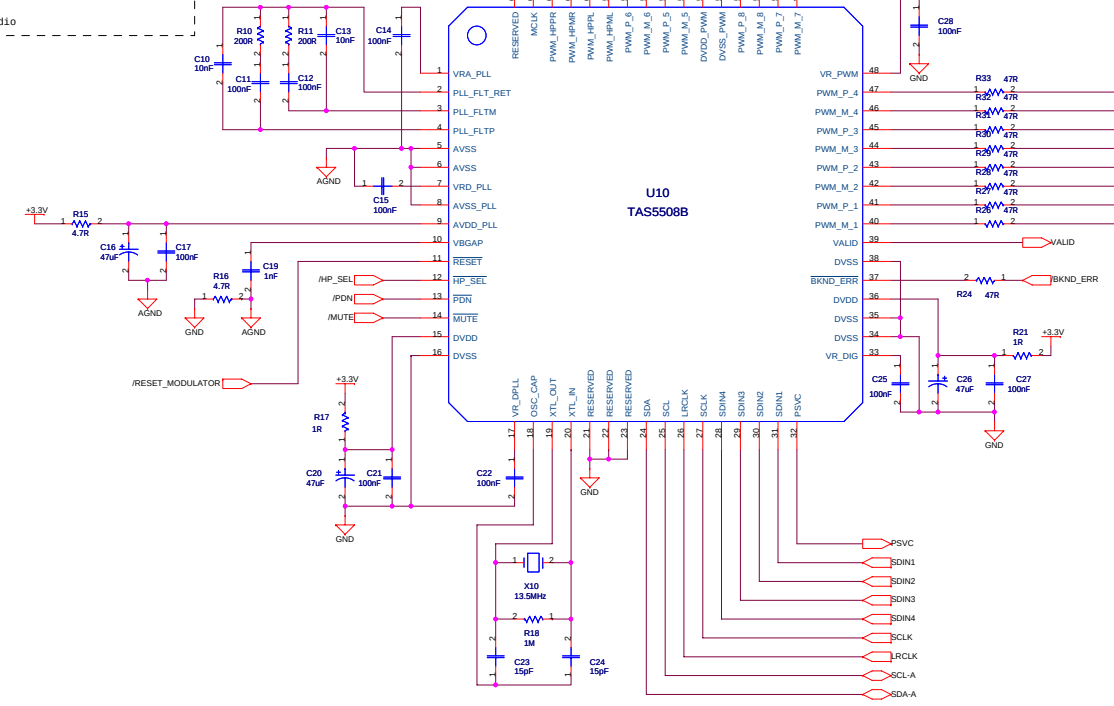
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Page Title: TAS5342DDV6EVM - 5.1 Digital Amplifier Design	Size: A2
File Name: A820-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Friday, November 09, 2007	Page: 1 of 8

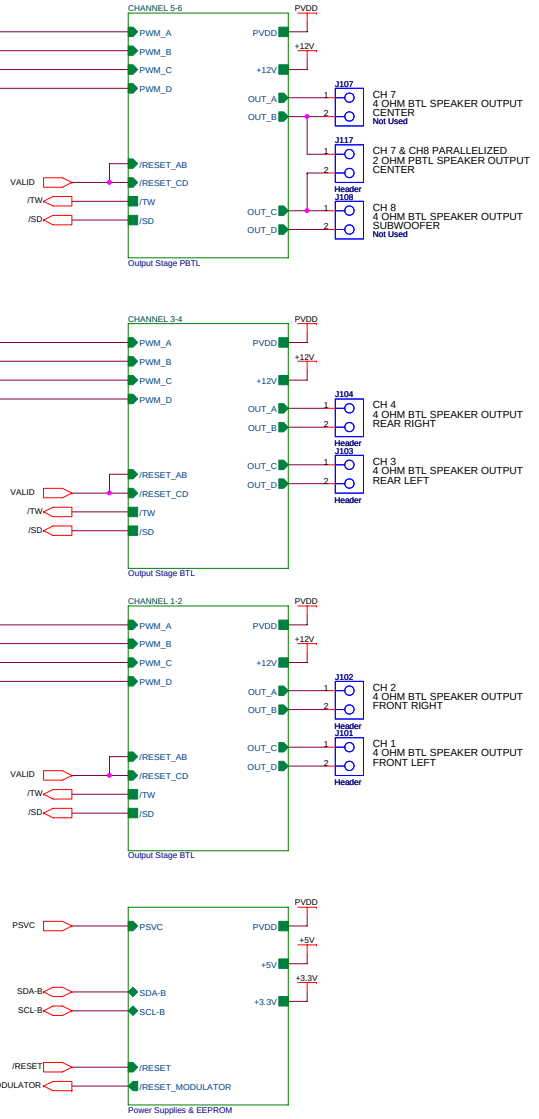
TAS5342DDV6EVM











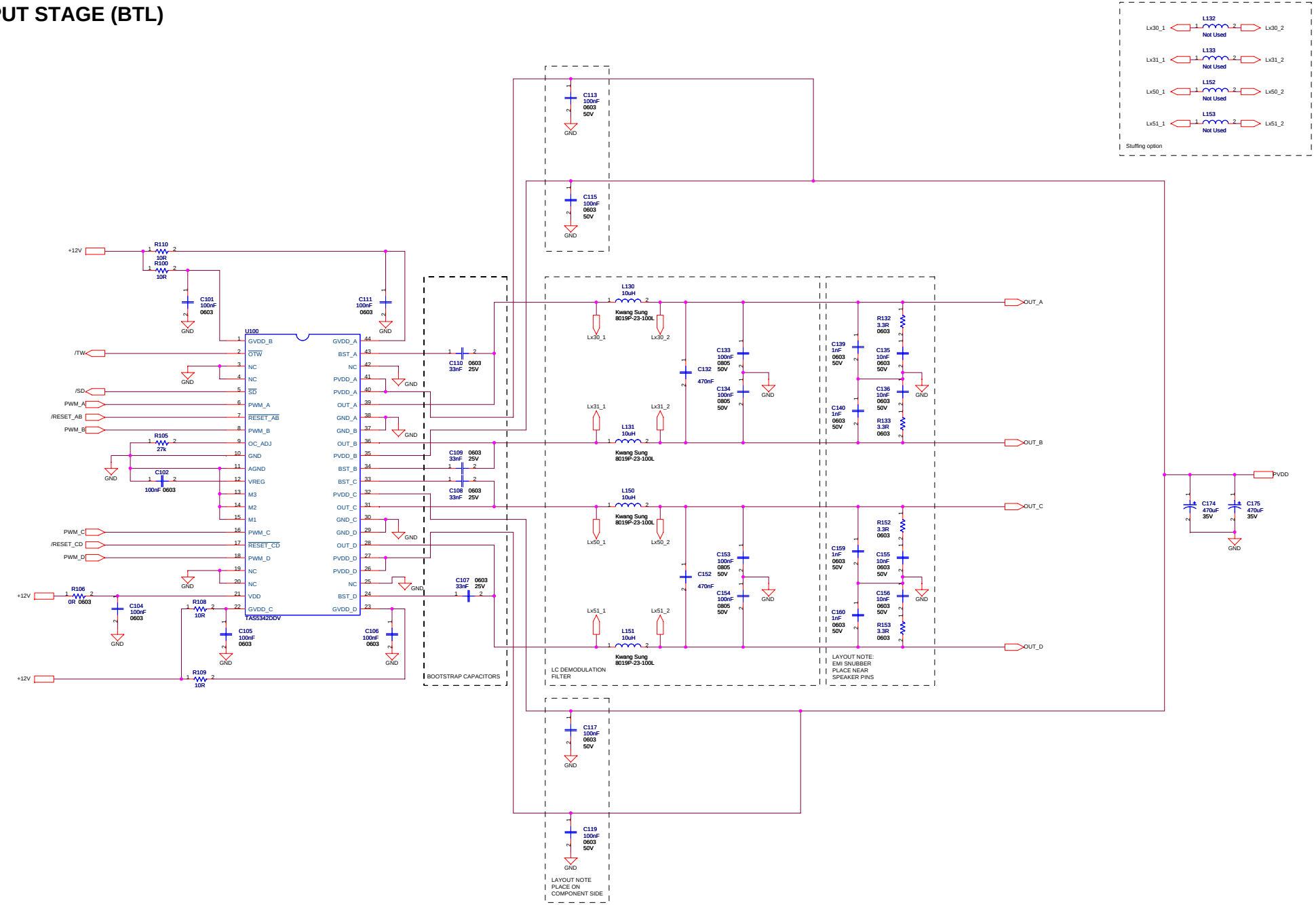
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Page Title: OVERVIEW	Size: A2
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Date: Friday, November 09, 2007	Page: 2 of 8

POWER OUTPUT STAGE (BTL)



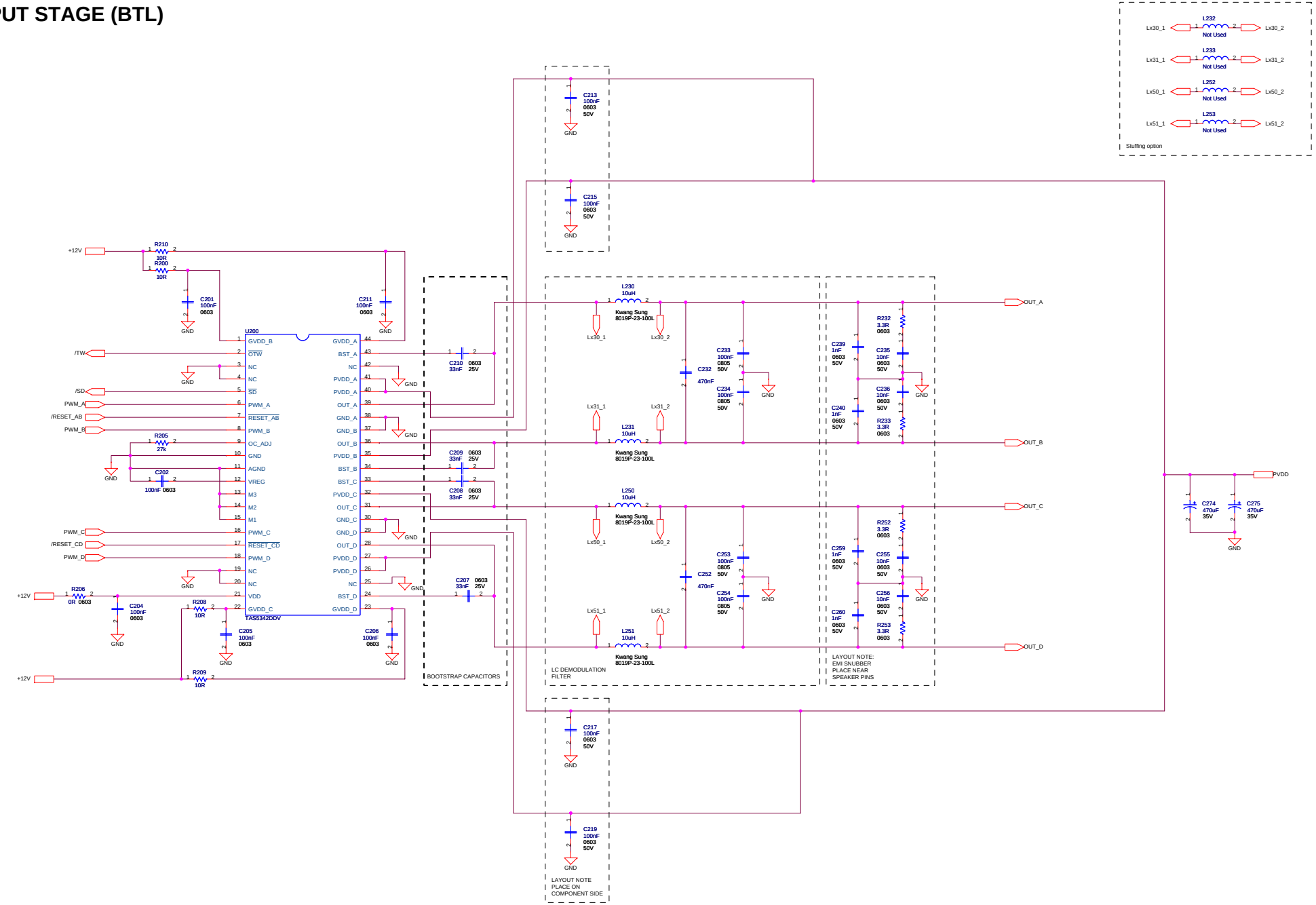
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Page Title: Output Stage 1	Size: A2
File Name: A820-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Wednesday, November 14, 2007	Page: 3 of 8

POWER OUTPUT STAGE (BTL)



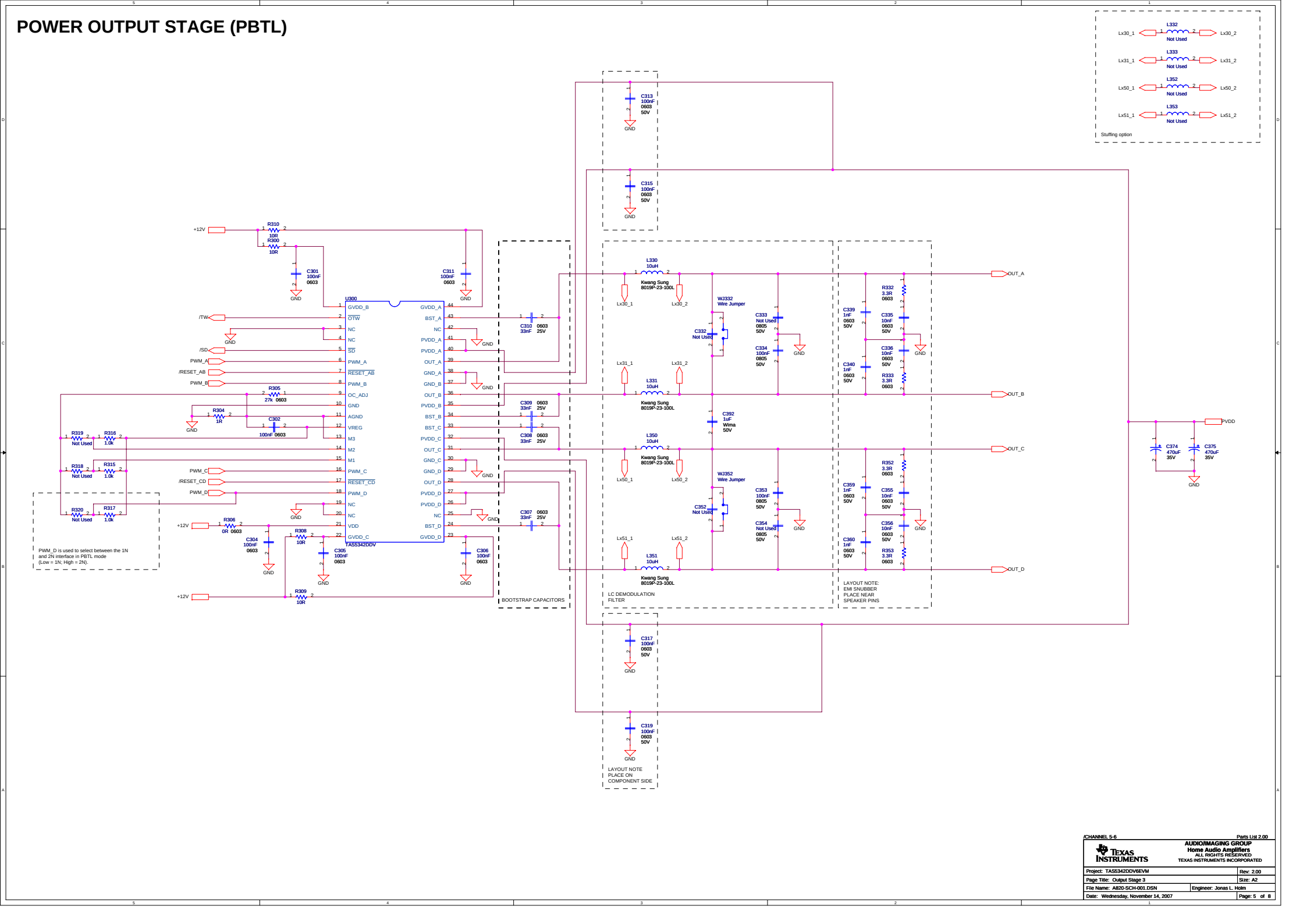
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Date: Wednesday, November 14, 2007	Page: 4 of 8

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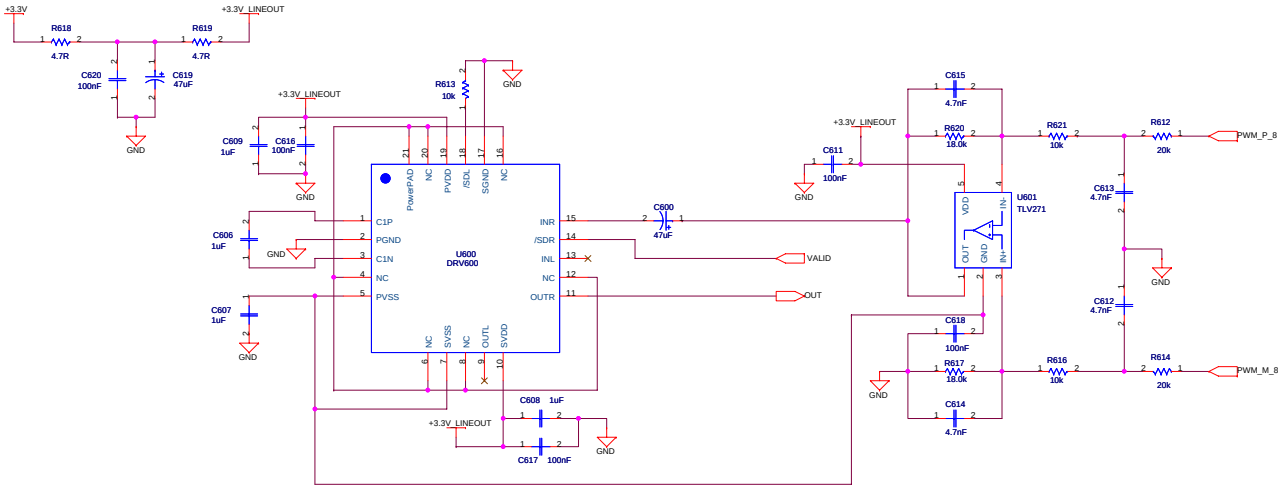


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SUBWOOFER LINE OUT



/Subwoofer Line Out

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File Name: A820-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Tuesday, November 06, 2007	Page: 6 of 8

POWER SUPPLIES AND EEPROM



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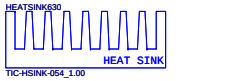
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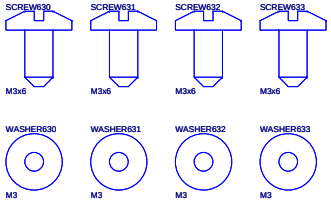
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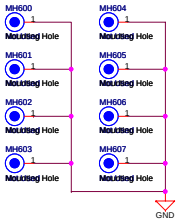
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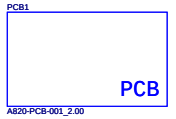
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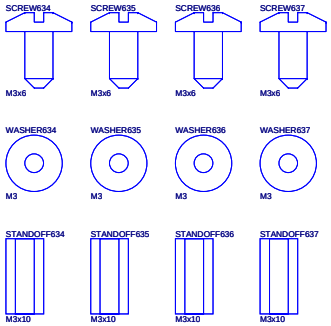
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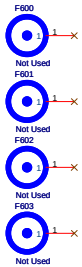












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File Name: A820-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Tuesday, November 06, 2007	Page: 8 of 8

TAS5342DDV6EVM Partslist (3.00)

Qty	Part Reference	Description	Manufacture	First Mfr P/N
1	R901	10.0k / 250mW / 1% / 1206 Thick Film Resistor	Yageo	RC1206FR-0710KL
3	R900 R951 R952	3.30R / 125mW / 1% / 0805 Thick Film Resistor	Yageo	RC0805FR-073R3L
3	R106 R206 R306	0R / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-070RL
5	R90 R91 R315 R316 R317	1.0k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071KL
21	R41 R42 R43 R44 R45 R46 R47 R48 R76 R77 R78 R79 R80 R81 R82 R83 R613 R616 R621	10k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710KL
1	R18	1M / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071ML
3	R17 R21 R304	1R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071RL
12	R100 R108 R109 R110 R200 R208 R209 R210 R300 R308 R309 R310	10R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710RL
2	R617 R620	18.0k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0718KL
2	R10 R11	200R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07200RL
2	R612 R614	20k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0720KL
3	R105 R205 R305	27k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0727KL
12	R132 R133 R152 R153 R232 R233 R252 R253 R332 R333 R352 R353	3.3R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-073R3L
5	R15 R16 R22 R618 R619	4.7R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-074R7L
29	R24 R26 R27 R28 R29 R30 R31 R32 R33 R35 R36 R37 R38 R60 R61 R62 R63 R64 R65 R66 R67 R68 R69 R70 R71 R72 R73 R74 R75	47R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0747RL
3	C901 C953 C955	Ceramic 10nF / 50V / 20% X7R 0805 Capacitor	BC Components	0805B103M500NT
13	C133 C134 C153 C154 C233 C234 C253 C254 C334 C353 C900 C952 C954	Ceramic 100nF / 50V / 20% X7R 0805 Capacitor	BC Components	0805B104M500NT
4	C606 C607 C608 C609	Ceramic 1uF / 16V / 20% X7R 0805 Capacitor	BC Components	0805B105M160NT
4	C612 C613 C614 C615	Ceramic 4.7nF / 50V / 10% X7R 0805 Capacitor	BC Components	0805B472K500NT
14	C10 C13 C135 C136 C155 C156 C235 C236 C255 C256 C335 C336 C355 C356	Ceramic 10nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y103MXA
39	C11 C12 C14 C15 C17 C21 C22 C25 C27 C28 C30 C60 C61 C101 C102 C104 C105 C106 C111 C201 C202 C204 C205 C206 C211 C301 C302 C304 C305 C306 C311 C611 C616 C617 C618 C620 C922 C923	Ceramic 100nF / 16V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXJ
12	C113 C115 C117 C119 C213 C215 C217 C219 C313 C315 C317 C319	Ceramic 100nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXA
12	C107 C108 C109 C110 C207 C208 C209 C210 C307 C308 C309 C310	Ceramic 33nF / 25V / 20% X7R 0603 Capacitor	BC Components	0603B333M250NT
13	C19 C139 C140 C159 C160 C239 C240 C259 C260 C339 C340 C359 C360	Ceramic 1nF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N102K500NT
2	C23 C24	Ceramic 15pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N150K500NT
9	C16 C20 C26 C29 C62 C600 C619 C924 C925	Electrolytic 47uF / 16V / 20% Aluminium 2mm ø5mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1C470
6	C174 C175 C274 C275 C374 C375	Electrolytic 470uF / 35V / 20% Aluminium 5mm ø10mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1V471
1	C392	Metal Film 1uF / 50V / 10% Polyester 7.5mm (W:4.5mm L:10mm) Capacitor	Wima	MKS 4 1uF/10%/50Vdc PCM7.5
4	C132 C152 C232 C252	Metal Film 470nF / 63V / 10% Polyester 5mm (W:4.5mm L:7.2mm) Capacitor	Wima	MKS 2 0.47uF/10%/63Vdc PCM5
12	L130 L131 L150 L151 L230 L231 L250 L251 L330 L331 L350 L351	10uH / Ferrite Inductor	Kwang Sung	8019P-23-100L
2	WJ332 WJ352	Wire Jumper / Wire ø0.9mm (SWG20), Pitch 7.5mm, Copper Tinned Wire Jumper Inductor	n/a	n/a
2	D10 D11	Light Emitting Red Red LED (0603)	Toshiba	TLSU1008
3	U100 U200 U300	TAS5342DDV / STEREO DIGITAL AMPLIFIER POWER STAGE (DDV44)	Texas Instruments	TAS5342DDV
1	U10	TAS5508B / 8 ch PWM processor (AD, DAP, 192kHz, PWM-VOL) (TQFP64)	Texas Instruments	TAS5508BPAG
1	U601	TLV271 / RtR Output Opamp (SOT23-5)	Texas Instruments	TLV271CDBVT
1	U600	DRV600 / DirectPath(TM) Audio Line Driver (QFN-20)	Texas Instruments	DRV600RTJT
1	U908	TPS3825-33 / 3.3V Supply Voltage Supervisor (SOP5-DBV)	Texas Instruments	TPS3825-33DBVT
1	U907	TLV1117-33C / 3.3V/800mA Positive Voltage Regulator (SOT4-DCY)	Texas Instruments	TLV1117-33CDCYR
8	SCREW630 SCREW631 SCREW632 SCREW633 SCREW634 SCREW635 SCREW636 SCREW637	M3x6 Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x6
8	WASHER630 WASHER631 WASHER632 WASHER633 WASHER634 WASHER635 WASHER636 WASHER637	M3 Stainless Steel Spring Washer	Bossard	BN 760 M3
4	STANDOFF634 STANDOFF635 STANDOFF636 STANDOFF637	M3x10 Aluminium Stand-off	Ettinger	05.03.108
1	J902	5 pins / 1 row / 2.54mm Pitch Vertical Male Friction lock Pin header Header	Molex	22-27-2051

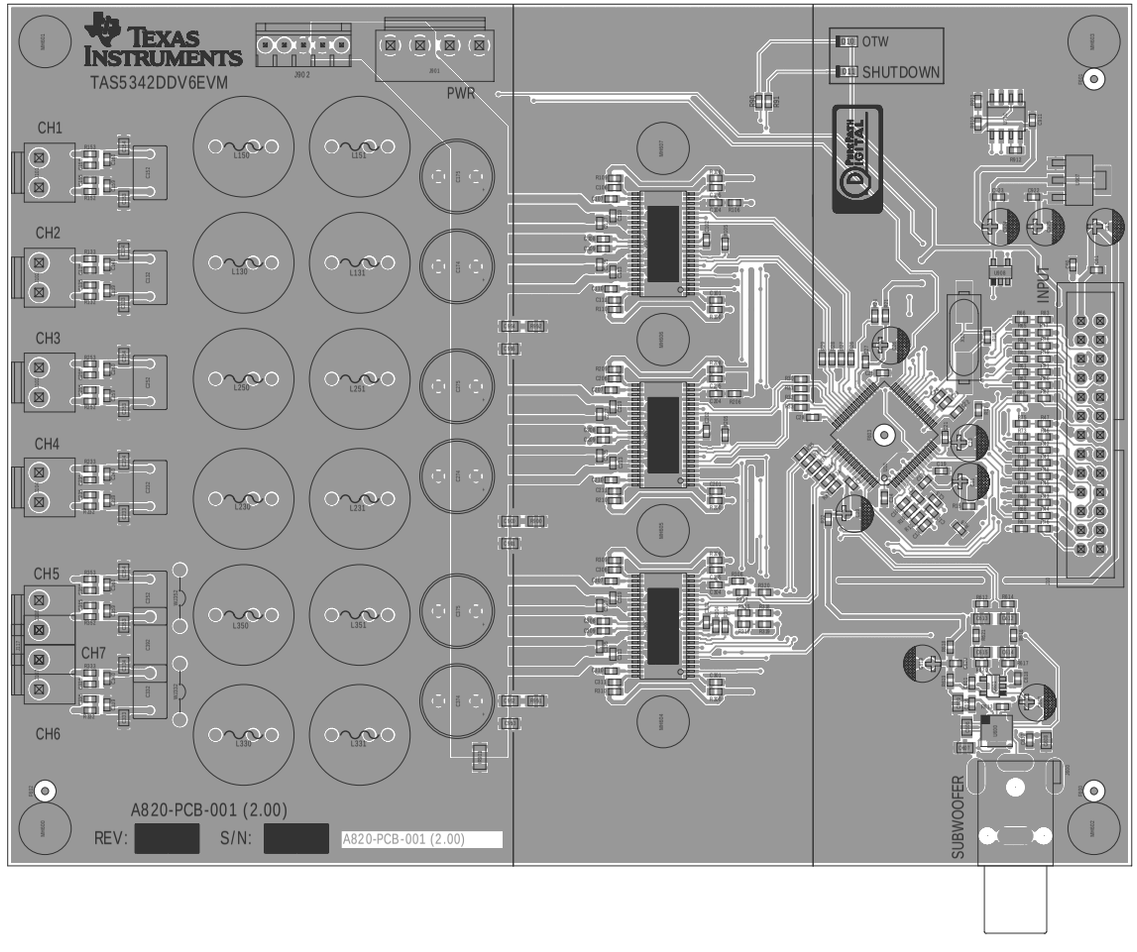
TAS5342DDV6EVM Partslist (3.00)

5	J101 J102 J103 J104 J117	2 pins / 1 row / 3.96mm Pitch Vertical Male Pin header Header	JST	B2P-VH
1	J901	4 pins / 1 row / 3.96mm Pitch Vertical Male Pin header Header	JST	B4P-VH
1	J600	Horizontal Female w. Switch Coax Phono socket	Chunfeng	RJ843-4W
1	J10	26 pins / 2 rows / 2.54mm Pitch Vertical Male Low profile IDC 26 pins IDC Box header	Molex	87834-2611
1	X10	13.5MHz 13.5MHz SMD Crystal (HCM49)	Citizen	HCM49-13.500MABJT
1	NOTE1	Schematic Disclaimer Preliminary Note Note	n/a	n/a
1	PCB1	A820-PCB-001_2.00 / TAS5342DDV6EVM Printed Circuit Board (ver. 2.00)	Printline	A820-PCB-001(2.00)
1	HEATSINK630	TIC-HSINK-054_1.00 / Heatsink for 3 DDV packages length 114 mm	Phonotech	TIC-HSINK-054(1.00)

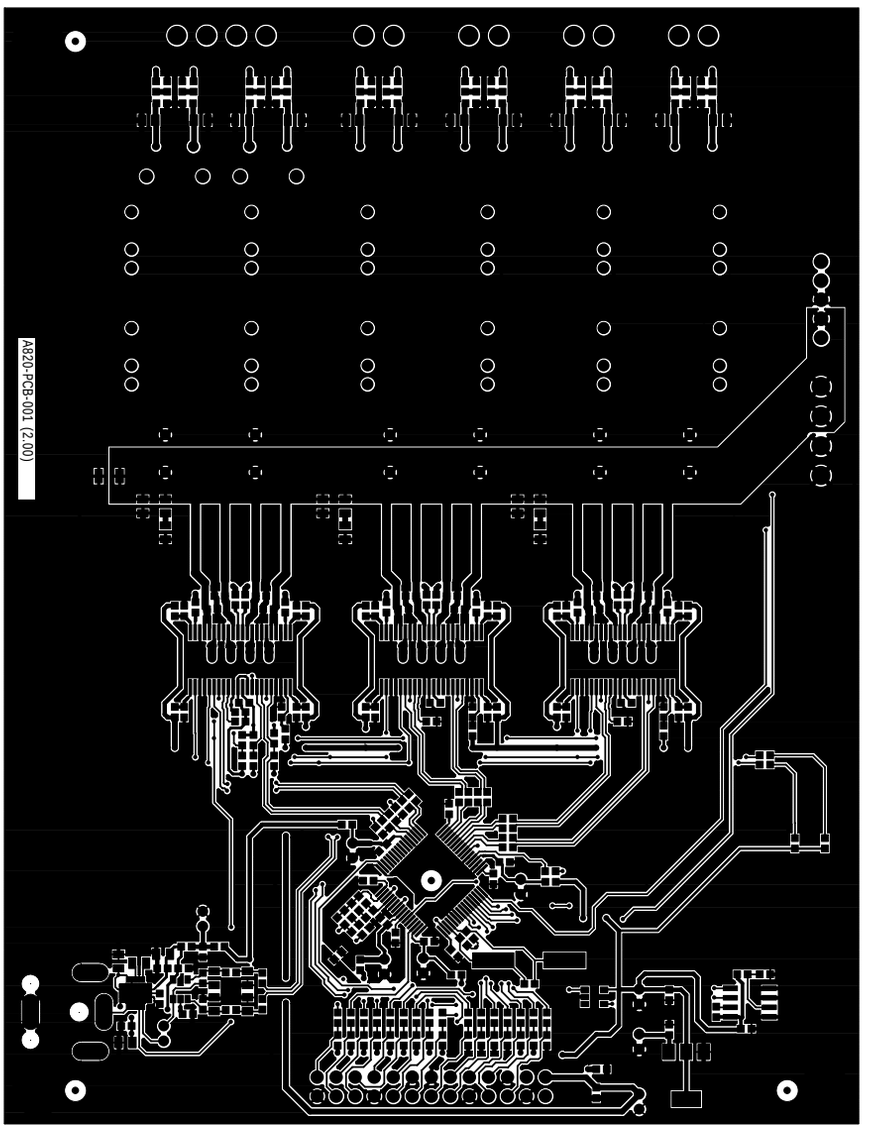
Jonas Holm

TAS5342DDV6EVM (A820)
PCB SPECIFICATION
Version 2.00

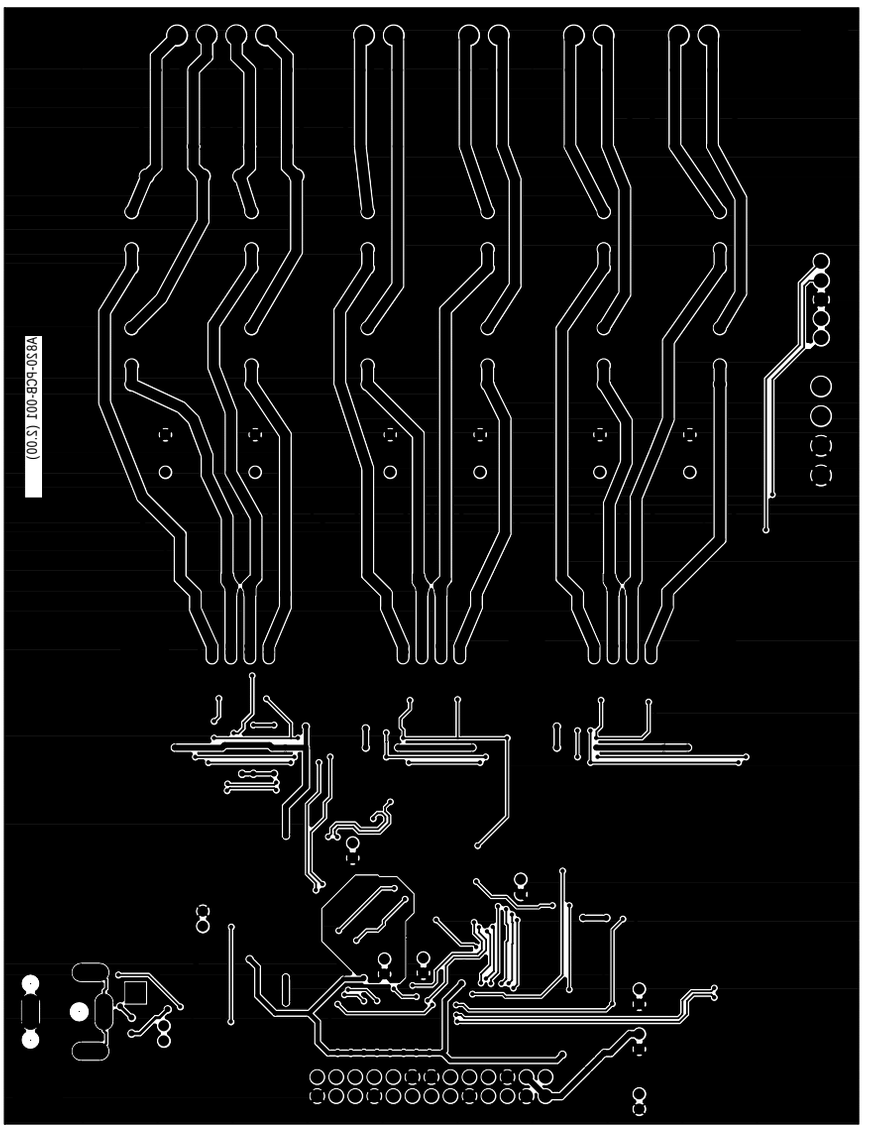
BOARD IDENTIFICATION:	A820-PCB-001(2.00)
BOARD TYPE:	DOUBLE-SIDED PLATED-THROUGH BOARD
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6 mm
COPPER THICKNESS:	70 µm (INCL. PLATING EXTERIOR LAYER)
COPPER PLATING OF HOLES:	>25 µm
MINIMUM HOLE DIAMETER	0.3 mm
SILKSCREEN COMPONENT SIDE:	WHITE - REMOVE SILKSCREEN FROM SOLDER AREA & PRE-TINNED AREAS
SILKSCREEN SOLDER SIDE:	None
SOLDER MASK COMPONENT SIDE:	GREEN
SOLDER MASK SOLDER SIDE:	GREEN
PROTECTIVE COATING:	SOLDER COATING AND CHEMICAL SILVER ON FREE COPPER
ELECTRICAL TEST:	PCB MUST BE ELECTRICAL TESTED
MANUFACTURED TO:	PERFAG 2E (www.perfag.dk)
APERTURE TABLE:	PERFAG 10A (www.perfag.dk)
BOARD SIZE:	114 x 149 mm
COMMENTS:	SEE DRILL INFORMATION FILE (PCBDOC.ZIP).


TEXAS INSTRUMENTS
TAS5342DDV6EVM
PWR
OTW
SHUTDOWN
CH1
CH2
CH3
CH4
CH5
CH7
CH6
INPUT
SUBWOOFER
A820-PCB-001 (2.00)
REV:
S/N:
A820-PCB-001 (2.00)

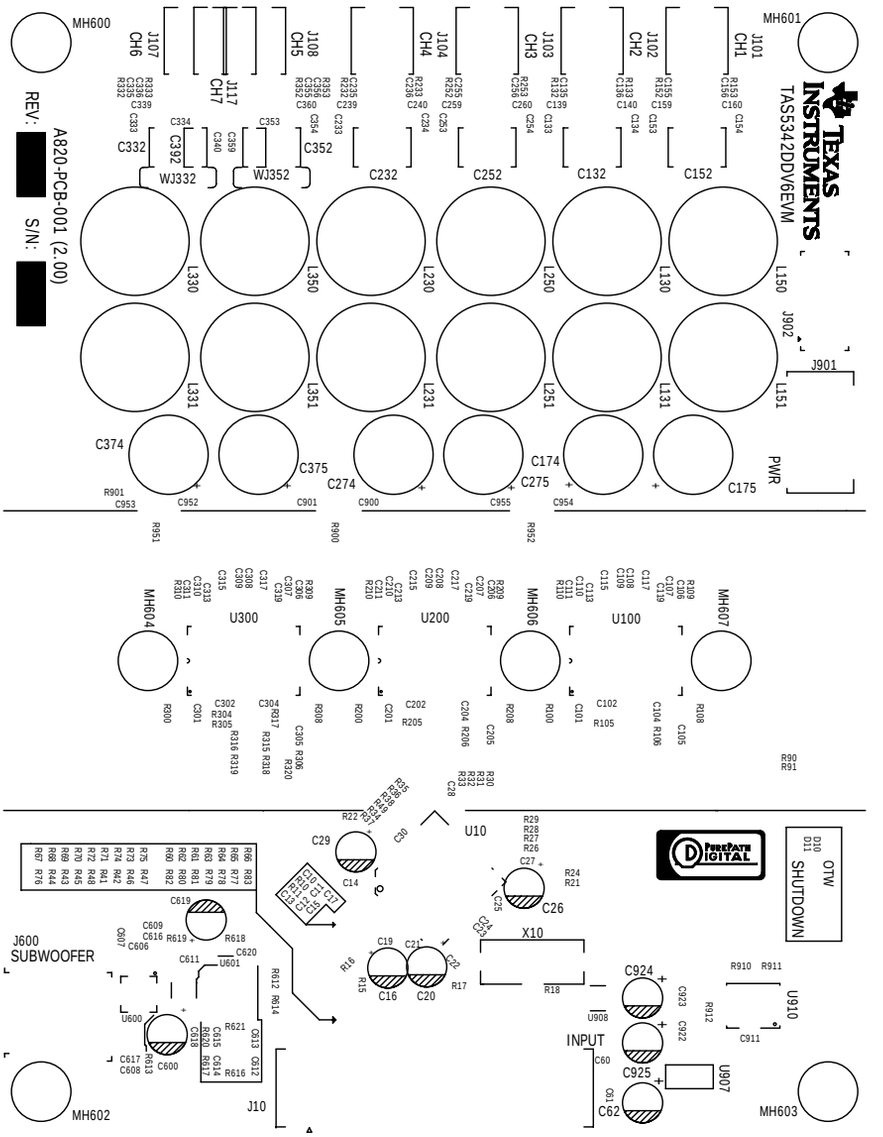
POS	Texas Instruments Lyngby Hovedgade 4, DK-2800 Lyngby		
	Title TAS5342DDV6EVM	Date 2007/NOV/14	
	P/N A820-PCB-001	REV 2	Designer KR/CMS
	LAYER 01 - SHEET 01 OF 06		Engineer Jonas L. Holm



POS	Texas Instruments Lyngby Hovedgade 4, DK-2800 Lyngby		
	Title TAS5342DDV6EVM	Date 2007/NOV/14	
	P/N A820-PCB-001	REV 2	Designer KR/CMS
	LAYER 02 - SHEET 02 OF 06		Engineer Jonas L. Holm



POS	Texas Instruments Lyngby Hovedgade 4, DK-2800 Lyngby		
	Title TAS5342DDV6EVM	Date 2007/NOV/14	
	P/N A820-PCB-001	REV 2	Designer KR/CMS
	Sht TSLK - SHEET 05 OF 06		Engineer Jonas L. Holm

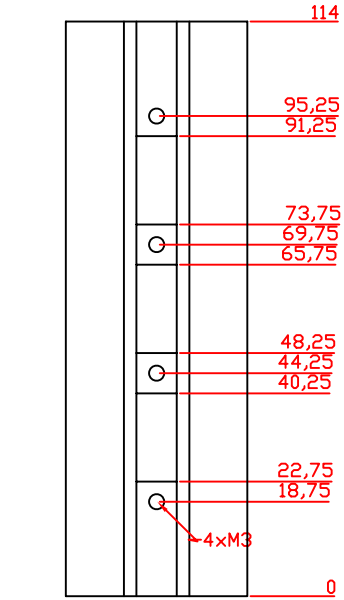


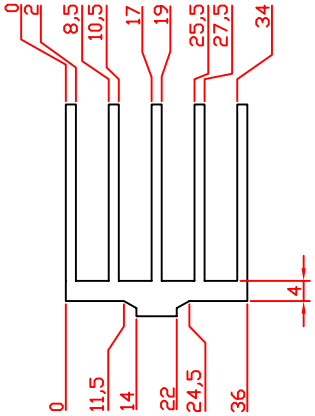
TIC-HSINK-054(1.00)

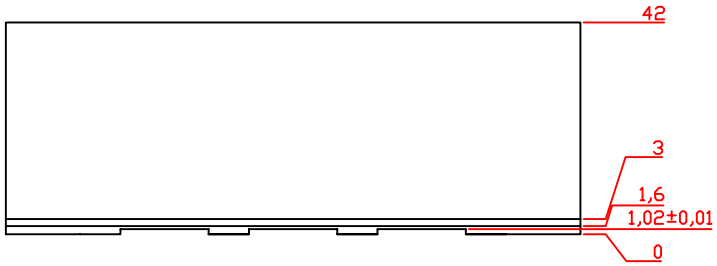
Heatsink for 3 DDV packages

10.July 2007
TIC-HSINK-054(1.00).dwg

Jonas L. Holm







SCALE: 1:1.5
PROFILE: TIC-HSINK-043(1.00)
DIMENSIONS: mm
MATERIAL: ALUMINUM
INTERNAL SCREW THREADS: M3
SURFACE: FREE OF SHARP EDGES
SURFACE TREATMENT: BLACK ANODIZED
TOLERANCES: +/- 0.1 mm

Revision History

Changes from Original (February 2008) to A Revision **Page**

- Added external power adapter requirement statement to *Overview* section. 4
- Deleted three bullets from *Unpacking the EVM* section. 7
- Changed last sentence in first paragraph of the *Power Supply Setup* section. 7
- Added *Supply Adapter for System Power, Logic and Gate Driver Characteristics* table. 7
- Changed and updated GUI links in the *GUI Software Installation* section. 8
- Deleted configuration file information following the *TAS5508 GUI Window* window. 8

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

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STANDARD TERMS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

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東京都新宿区西新宿６丁目２４番１号

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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

   6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

   6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

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