

## TAS5162DDV6EVM

This user's guide describes the operation of the evaluation module for the TAS5162 Digital Amplifier Power Output Stage using the TAS5086 Digital Audio PWM Processor from Texas Instruments. The user's guide also provides measurement data and design information such as the schematic, bill of materials, and printed-circuit board layout

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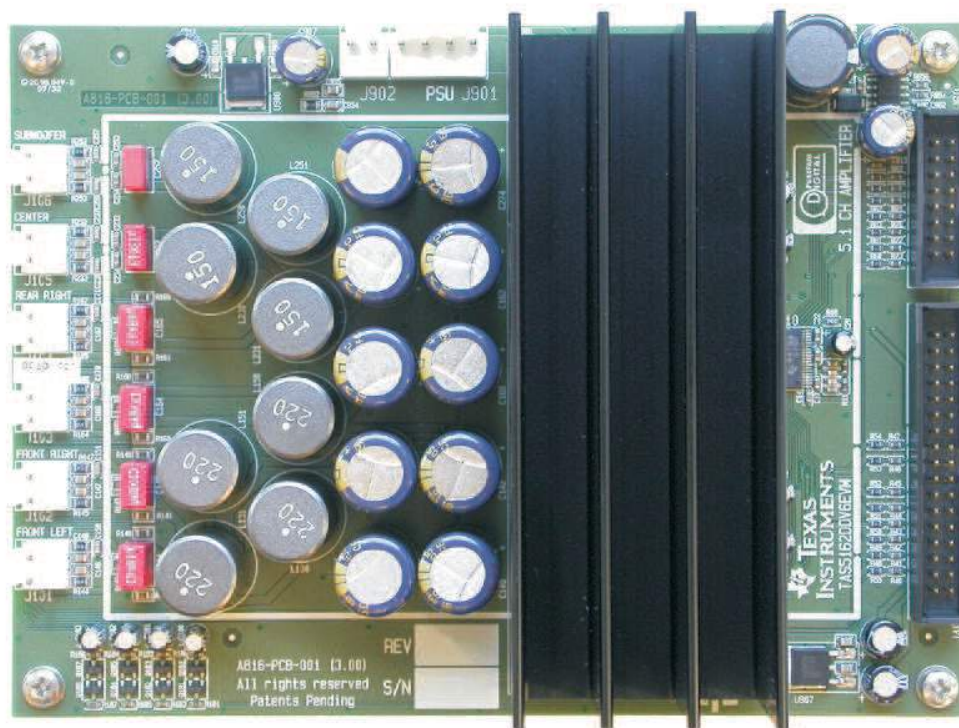
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## 1 Overview

The TAS5162DDV6EVM PurePath Digital™ customer evaluation module (Figure 1) demonstrates the integrated circuits TAS5162DDV and TAS5086DBT from Texas Instruments (TI).



**Figure 1. TAS5162DDV6EVM Board**

The TAS5162DDV is a high-performance, integrated stereo digital amplifier power stage designed to drive 6-Ω speakers at up to 210 W per channel. The device incorporates PurePath Digital™ technology and is designed to be used with PurePath Digital™ modulators (Figure 2). This system requires only a simple, passive demodulation filter to deliver high-quality, high-efficiency audio amplification.

TAS5086DBT is a high-performance, 32-bit (24-bit input), multichannel PurePath Digital™ pulse width modulator (PWM) based on Equibit™ technology with fully symmetrical analog-to-digital modulation scheme.

This EVM is configured with four single-ended (SE) channels and two bridge-tied load (BTL) channels.

This EVM, together with a TI input-USB board, is a complete 5.1 channels, digital audio amplifier system which includes digital input (S/PDIF), analog inputs, interface to PC and DAP features like digital volume control, input and output mixers, automute, tone controls, loudness, EQ filters, and dynamic range compression (DRC). Table 1 lists the key parameters of the EVM. There are configuration option for power stage failure protection and a mini-jack connector for headphone.

**Table 1. TAS5162DDV6EVM Specification**

Key Parameters	
Output Stage Supply Voltage:	0 V–50 V
System Supply Voltage:	15 V–20 V
Number of Channels	4 x SE, 2 x BTL
Load Impedance SE:	4–8 Ω
Load Impedance BTL:	6–8 Ω
Output power SE	80 W / 4 Ω 10% THD
Output power BTL	160 W / 8 Ω / 10% THD or 210 W / 6 Ω / 10% THD

**Table 1. TAS5162DDV6EVM Specification (continued)**

DNR	>109 dB
PWM Processor	TAS5086DBT
Output Stage	TAS5162DDV

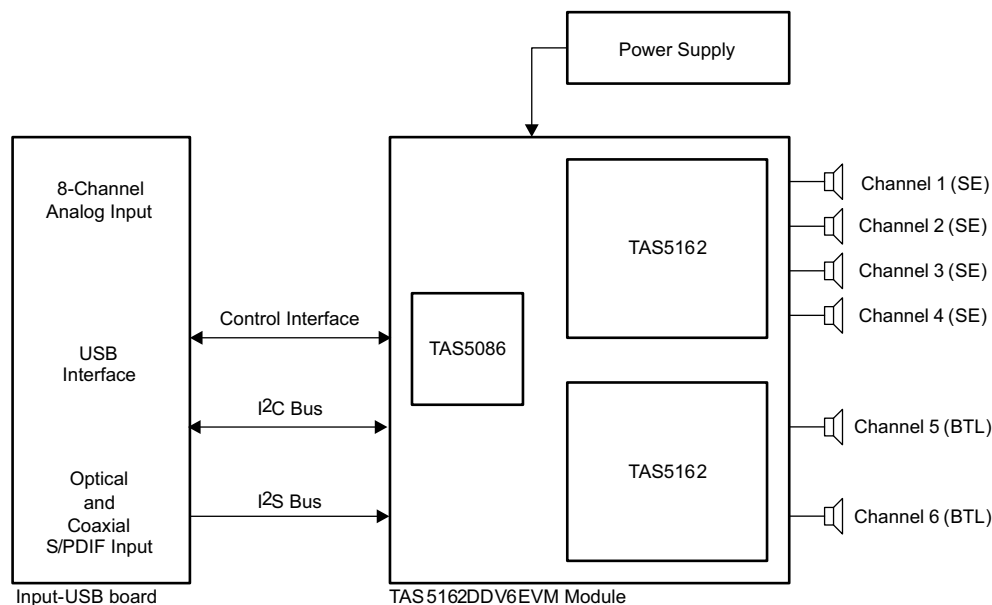
This 6.1 system is designed for home theater applications such as A/V receivers, DVD receivers, DVD mini-component systems, or home theater in a box (HTIB).

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

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

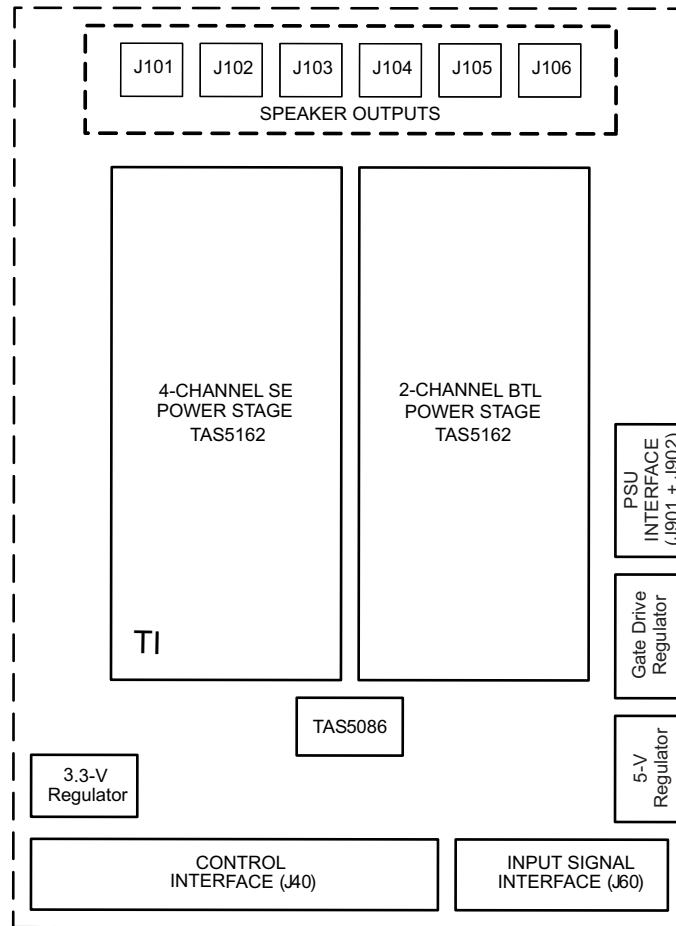
### 1.1 TAS5162DDV6EVM Features

- 7/8-channel PurePath Digital™ evaluation module (double-sided, plated-through PCB layout).
- Self-contained protection system (short-circuit and thermal).
- Standard I<sup>2</sup>S and I<sup>2</sup>C™ / Control connector for TI input board
- Double-sided, plated-through PCB layout.


**Figure 2. Integrated PurePath Digital™ Amplifier System**

## 1.2 PCB Key Map

Physical structure for the TAS5162DDV6EVM is illustrated in [Figure 3](#).



**Figure 3. Physical structure for the TAS5162DDV6EVM (Approximate Layout)**

## 2 Quick-Setup Guide

This section describes the TAS5162DDV6EVM board in regards to power supplies and system interfaces. The section provides information regarding handling and unpacking, absolute operating conditions, and a description of the factory default switch and jumper configuration.

This section provides a step-by-step guide to configuring the TAS5162DDV6EVM for device evaluation.

### 2.1 Electrostatic Discharge Warning

Many of the components on the TAS5162DDV6EVM 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.

## 2.2 Unpacking the EVM

On opening the TAS5162DDV6EVM package, check to ensure that the following items are included:

- 1 pc. TAS5162DDV6EVM board using one TAS5086DBT and two TAS5162DDV.
- 1 pc. TI Input-USB board for interfacing TAS5162DDV6EVM with SPDIF/analog sources and PC for control.
- 1 pc. Signal Interface IDC cable for connection to an I<sup>2</sup>S front-end like the attached TI Input-USB board.
- 1 pc. Control Interface IDC cable for connection to an I<sup>2</sup>C™ front-end like the attached TI Input-USB board.
- 1 pc Cable for connecting Input-USB board to a USB port on a PC for TAS5086 control by software.
- 1 pc. Power supply cable for two regulated power supplies (H-bridge and system supply).
- 1 pc. PurePath Digital™ CD-ROM

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

Connect the Input-USB board to TAS5162DDV6EVM using the two delivered IDC cables.

## 2.3 Power Supply Setup

Two power supplies are required to power up the EVM: one for system power, logic, and gate-drive, and one for output stage supply. Power supplies are connected to the EVM using the delivered power cable Red/Black, White/Black.

**Table 2. Recommended Supply Voltages**

Description	Voltage Limitations	Current Requirement	Cable
System power supply	15–20 V	0.3 A	Red/Black
Output stage power supply	0–50 V	10 A	White/Black

**CAUTION**

Applying voltages above the limitations given in [Table 2](#) may cause permanent damage to the hardware.

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

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## 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).

## 2.5 GUI Software Installation

The TAS5086 GUI provides easy control of all registers in the TAS5086. To install the GUI, run setup file from the PurePath™ CD-ROM.

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

Start GUI program from the Windows™ menu. Start up of GUI will take few seconds.



Figure 4. TAS5518 GUI Window

From the files menu, load the configuration file:

TAS5162DDV6EVM Configuration (3.00).cfg

The file is located on the PurePath™ CD-ROM. This file contains all settings for a default setup of the EVM.

For easy access of the file, it is recommended to copy the files into a directory where the GUI is installed. Default is C:\Program Files\Texas Instruments Inc\TAS5086\.

For more advanced use of the GUI, see the GUI user's guide and data sheet for the TAS5086.

### 3 Protection

This section describes the short-circuit protection and fault-reporting circuitry of the TAS5162 device.

#### 3.1 Short-Circuit Protection and Fault-Reporting Circuitry

The TAS5162 is a self-protecting device that provides fault reporting (including high-temperature protection and short-circuit protection). TAS5162 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 for further explanation. This means that the device restarts itself after an error occasion and reports shortly thereafter through the SD error signal.

### 3.2 Fault Reporting

The  $\overline{OTW}$  and  $\overline{SD}$  outputs from TAS5162 indicate fault conditions. See the TAS5162 data sheet for a description of these pins.

**Table 3. TAS5162 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 TAS5162DDV6EVM board are wired-OR to one temperature warning signal ( $\overline{OTW}$  – pin 22 in control interface connector). Shutdown signals are wired-OR into one shutdown signal ( $\overline{SD}$  – pin 20 in control interface connector).

The shutdown signals together with the temperature warning signal give chip-state information as described in [Table 3](#). Device fault-reporting outputs are open-drain outputs.



**4 TAS5162DDV6EVM Performance**
**Table 4. General Test Conditions**

General Test Conditions <sup>(1)</sup>		Notes
Output Stage Supply Voltage:	50 V	Laboratory Power Supply (EA-PS 7065-10A)
System Supply Voltage:	15 V	
Load Impedance SE:	4 $\Omega$	
Load Impedance BTL:	8 $\Omega$	
Input Signal	1 kHz Sine	
Sampling Frequency	48 kHz	
Gain Setting in TAS5086	0 dB	
Measurement Filter	AES17 and AUX0025	
TI Input-USB Board	Input-USB	Rev 10
EVM Configuration File	Ver 3.00	TAS5162DDV6EVM Configuration (3.00).cfg

<sup>(1)</sup> These test conditions are used for all tests, unless otherwise specified.

**Table 5. TAS5086 Register Settings**

Register <sup>(1)</sup>		Value	Notes
Oscillator Trim Register	0x1B	0x00	Initiate Factory Trim
Master Volume Register	0x07	0x30	Master Volume 0 dB
Split Cap Register	0x1A	0x00	No Split Capacitor Charge Period.
Modulation Index Limit Register	0x10	0x04	Set Modulation Index to 96.1%
PWM Start Register	0x18	0xF0	Mid-Z Sequence Enabled For All Channels.
Input Multiplexer Register	0x20	00 01 23 45	
Output Multiplexer Register	0x25	00 01 23 45	
System Control Register	0x05	20	PWM Start

<sup>(1)</sup> These register settings are used for all tests, unless otherwise specified.

**Table 6. Electrical Data**

Electrical Data		Notes/Conditions
Output Power, SE, 4 $\Omega$ :	60 W	1 kHz, Unclipped (0 dBFS), $T_A = 25^\circ\text{C}$
Output Power, SE, 4 $\Omega$ :	80 W	1 kHz, 10% THD+N, $T_A = 25^\circ\text{C}$
Output Power, BTL, 6 $\Omega$ :	161 W	1 kHz, Unclipped (0 dBFS), $T_A = 25^\circ\text{C}$
Output Power, BTL, 6 $\Omega$ :	210 W	1 kHz, 10% THD+N, $T_A = 25^\circ\text{C}$
Output Power, BTL, 8 $\Omega$ :	122 W	1 kHz, Unclipped (0 dBFS), $T_A = 25^\circ\text{C}$
Output Power, BTL, 8 $\Omega$ :	160 W	1 kHz, 10% THD+N, $T_A = 25^\circ\text{C}$
Maximum Peak Current, SE:	>9.9 A	1 kHz Burst, 1 $\Omega$ , $R_{OC} = 22\text{ k}$
Maximum Peak Current, BTL:	>9.9 A	1 kHz Burst, 1 $\Omega$ , $R_{OC} = 22\text{ k}$
Output Stage Efficiency:	>90%	1 x SE Channels, 4 $\Omega$ + 1 x BTL Channel, 8 $\Omega$
Damping Factor SE:	14	1 kHz, Relative to 4- $\Omega$ load
Damping Factor BTL:	15	1 kHz, relative to 8- $\Omega$ Load
System Supply Current:	<195 mA	1 kHz, -60-dBFS Signal, With TI Input Board
H-Bridge Supply Current:	<190 mA	1 kHz, -60-dBFS Signal
Total Board Idle Power Consumption:	12.5 W	H-Bridge Supply + System Supply, -60-dBFS Signal

**Table 7. Audio Performance**

Audio Performance			Notes/Conditions
THD+N, SE, 4 $\Omega$ :	1 W	<0.09%	1 kHz
THD+N, SE, 4 $\Omega$ :	10 W	<0.09%	1 kHz
THD+N, SE, 4 $\Omega$ :	50 W	<0.08%	1 kHz
THD+N, BTL, 6 $\Omega$ :	1 W	<0.009%	1 kHz
THD+N, BTL, 6 $\Omega$ :	10 W	<0.05%	1 kHz
THD+N, BTL, 6 $\Omega$ :	50 W	<0.03%	1 kHz
THD+N, BTL, 6 $\Omega$ :	100 W	<0.12%	1 kHz
THD+N, BTL, 6 $\Omega$ :	150 W	<0.14%	1 kHz
THD+N, BTL, 8 $\Omega$ :	1 W	<0.007%	1 kHz
THD+N, BTL, 8 $\Omega$ :	10 W	<0.04%	1 kHz
THD+N, BTL, 8 $\Omega$ :	50 W	<0.03%	1 kHz
THD+N, BTL, 8 $\Omega$ :	100 W	<0.08%	1 kHz
Dynamic Range:		>109 dB	Ref: Rated Power, A-Weighted, AES17 Filter, 4 Ch Avg
Noise Voltage SE:		<50 $\mu$ Vrms	A-weighted, AES17 Filter
Noise Voltage BTL:		<100 $\mu$ Vrms	A-weighted, AES17 Filter
Channel Separation:		>68 dB	1 kHz
Frequency Response SE (100 Hz–20 kHz):		$\pm 0.5$ / $-1.0$ dB	62.5 W / 4 $\Omega$ , Unclipped (0 dBFS)
Frequency Response BTL (20 Hz–20 kHz):		$\pm 0.3$	125 W / 8 $\Omega$ , Unclipped (0 dBFS)

**Table 8. Thermal Specifications**

Thermal Specifications	T <sub>HEATSINK</sub> <sup>(1)</sup>	Notes/Conditions
Idle, All Channels Switching	46°C	1 kHz, 15 min, $-60$ -dBFS signal, T <sub>A</sub> = 25°C
4 x 7.5 W, 4 $\Omega$ + 2 x 16 W, 8 $\Omega$ (1/8 power)	66°C	1 kHz, 1 hour, T <sub>A</sub> = 25°C
2 x 60 W, 4 $\Omega$	73°C	1 kHz, 5 min, T <sub>A</sub> = 25°C

<sup>(1)</sup> Measured on surface of heatsink.

**Table 9. Physical Specifications<sup>(1)</sup>**

Physical Specification		Notes/Conditions
PCB Dimensions:	112 x 154 x 54	Width x Length x Height (mm)
Total Weight:	350 g	Components + PCB + Heat-Sink + Mechanics

<sup>(1)</sup> All electrical and audio specifications are typical values.

#### 4.1 THD+N vs Power (SE –4 Ω)

Gain: 2.5 dB set in TAS5086

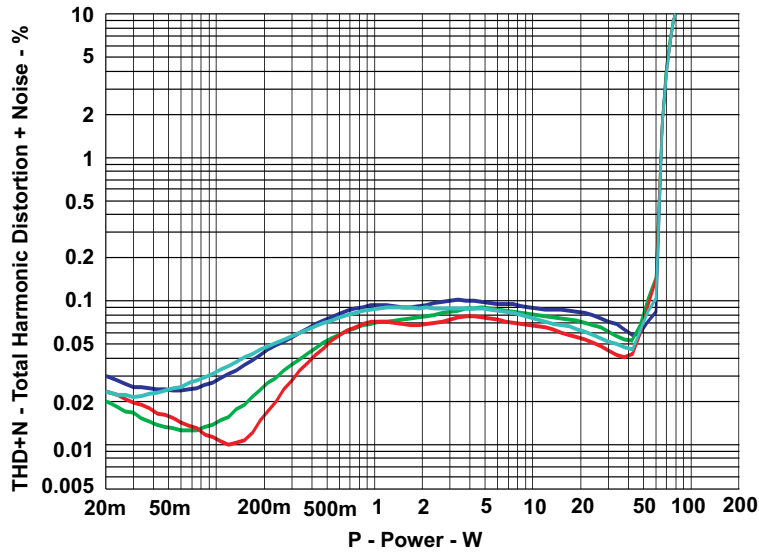


Figure 5. THD+N vs Power (SE –4 Ω)

#### 4.2 THD+N vs Power (SE – 3 Ω)

Gain: 2.5 dB set in TAS5086

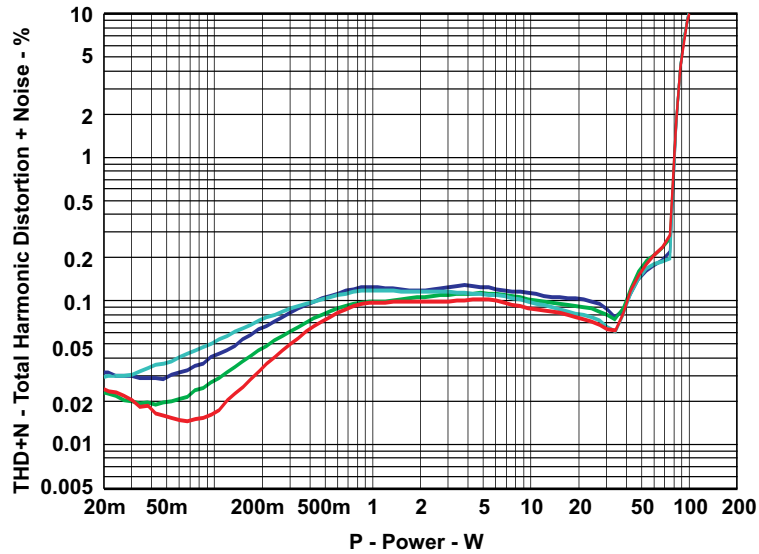


Figure 6. THD+N vs Power (SE – 3 Ω)

### 4.3 THD+N vs Power (BTL – 8 Ω)

Gain: 2.5 dB set in TAS5086

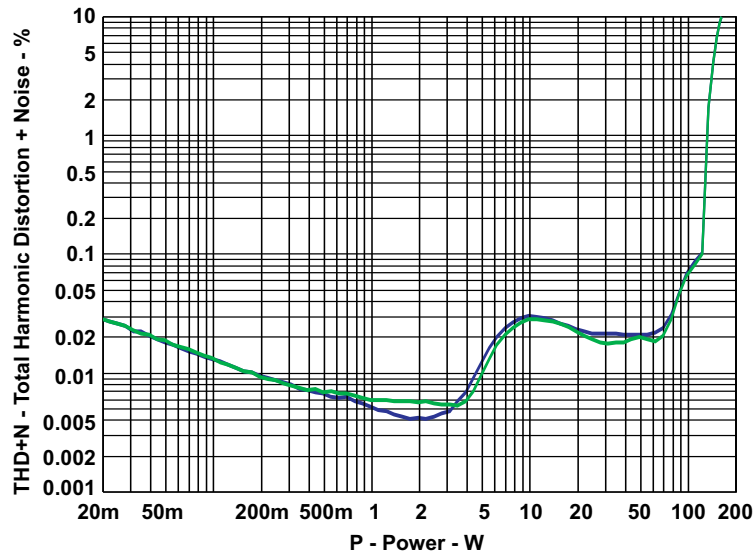


Figure 7. THD+N vs Power (BTL – 8 Ω)

### 4.4 THD+N vs Power (BTL – 6 Ω)

Gain: 2.5 dB set in TAS5086

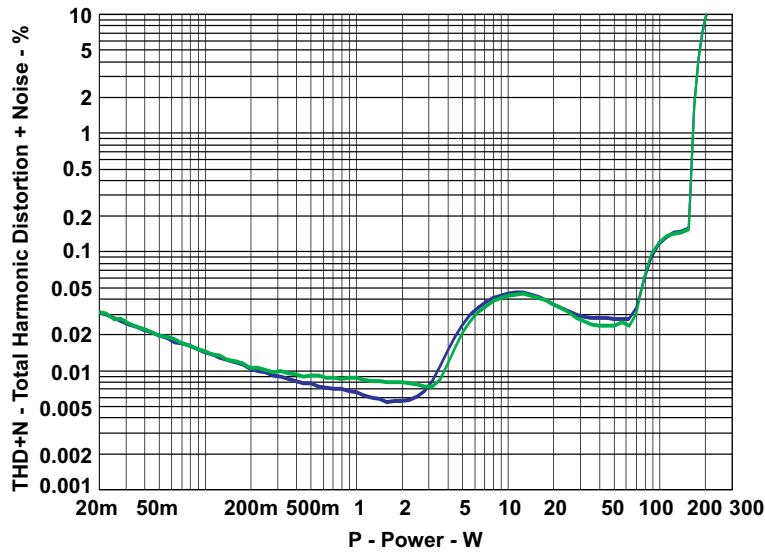


Figure 8. THD+N vs Power (BTL – 6 Ω)

#### 4.5 THD+N vs Frequency (SE – 4 Ω)

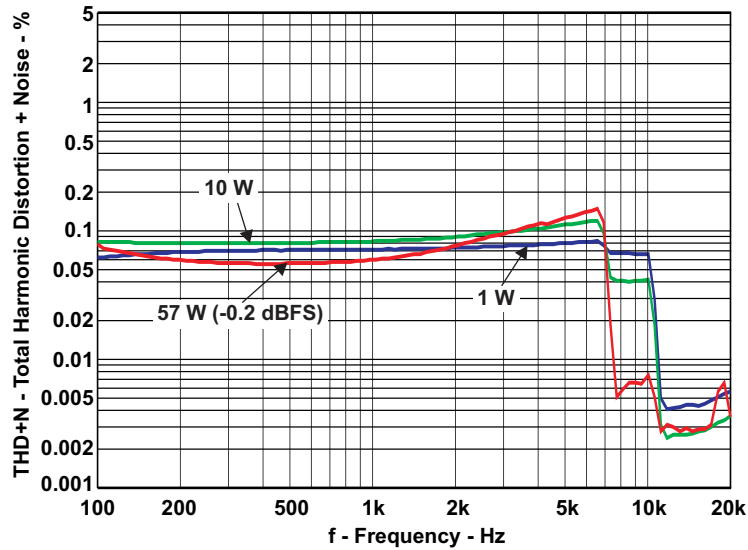


Figure 9. THD+N vs Frequency (SE – 4 Ω)

#### 4.6 THD+N vs Frequency (SE – 3 Ω)

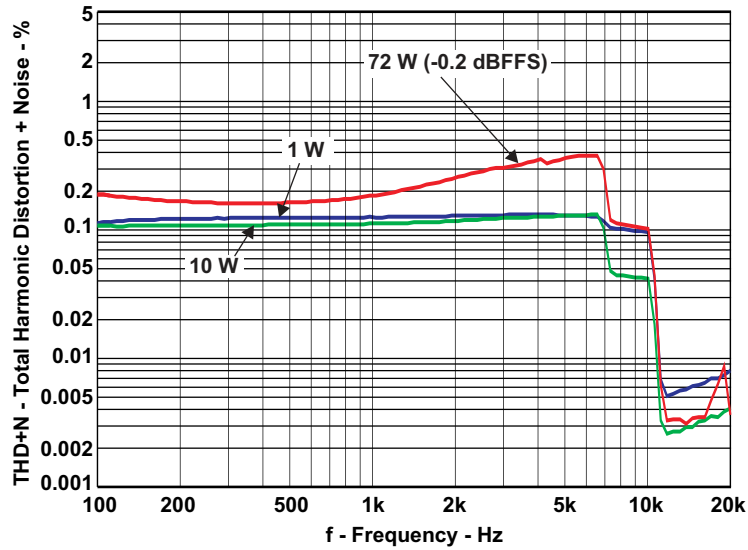


Figure 10. THD+N vs Frequency (SE – 3 Ω)

#### 4.7 THD+N vs Frequency (BTL – 8 Ω)

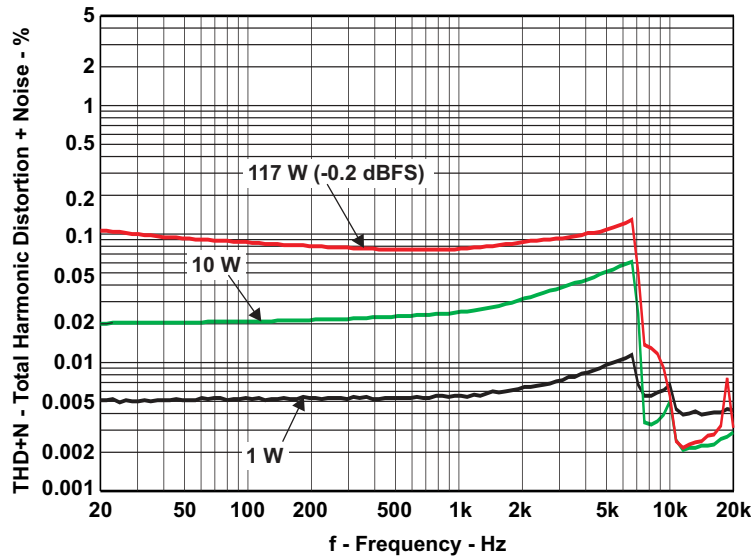


Figure 11. THD+N vs Frequency (BTL – 8 Ω)

#### 4.8 THD+N vs Frequency (BTL – 6 Ω)

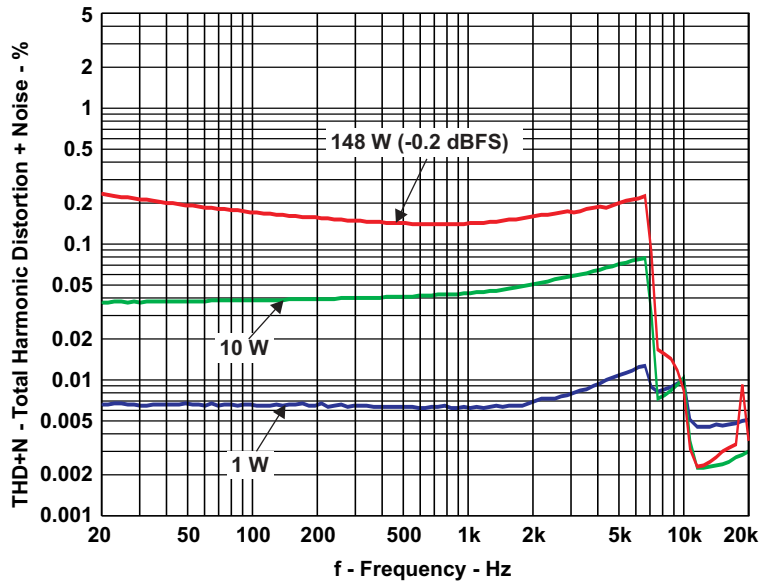


Figure 12. THD+N vs Frequency (BTL – 6 Ω)

#### 4.9 FFT Spectrum With -60-dBFS Tone (SE)

Reference voltage is 15.5 V. FFT size 16 k.

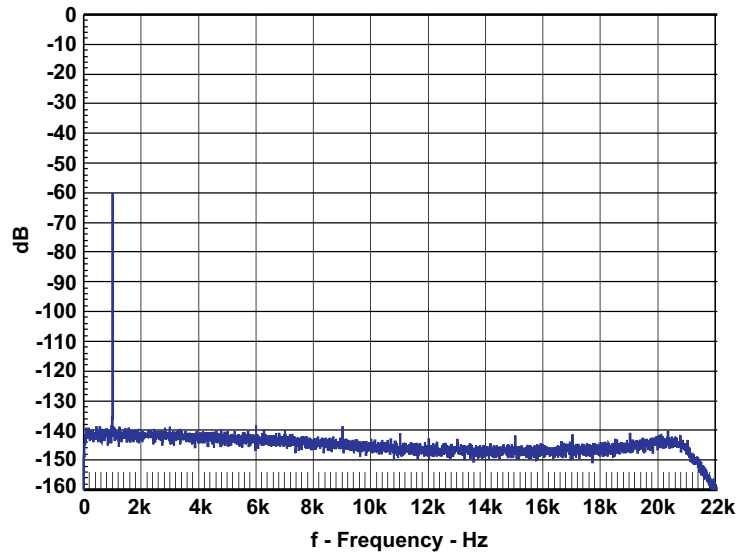


Figure 13. FFT Spectrum With -60 dBFS Tone (SE)

#### 4.10 FFT Spectrum With -60-dBFS Tone (BTL)

Reference voltage is 31.2 V. FFT size 16 k.

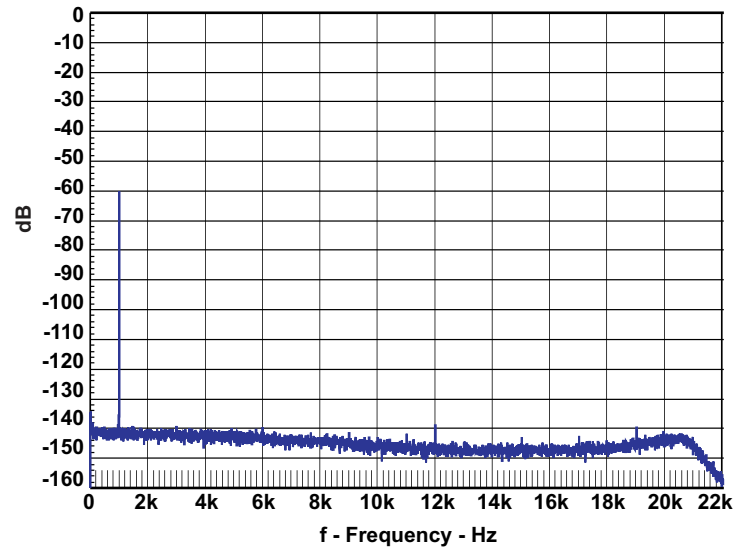


Figure 14. FFT Spectrum With -60-dBFS Tone (BTL)

#### 4.11 Idle Noise FFT Spectrum (SE)

Reference voltage is 15.5 V. FFT size 16 k.

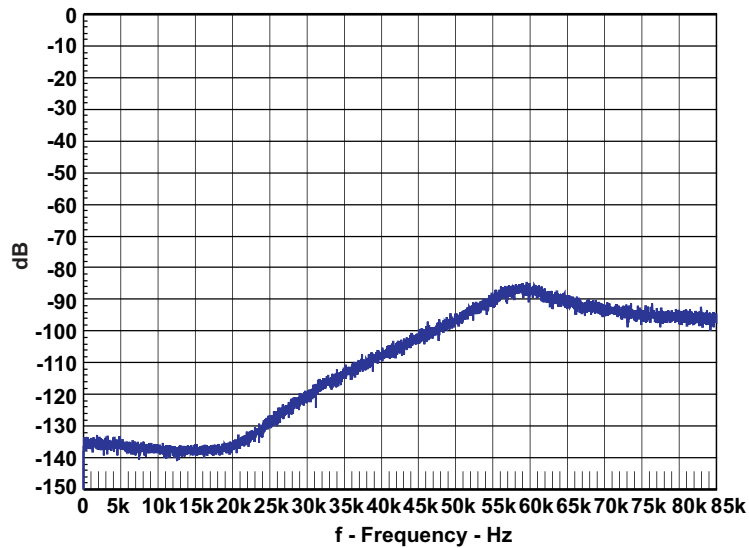


Figure 15. Idle Noise FFT Spectrum (SE)

#### 4.12 Idle Noise FFT Spectrum (BTL)

Reference voltage is 31.2 V. FFT size 16 k.

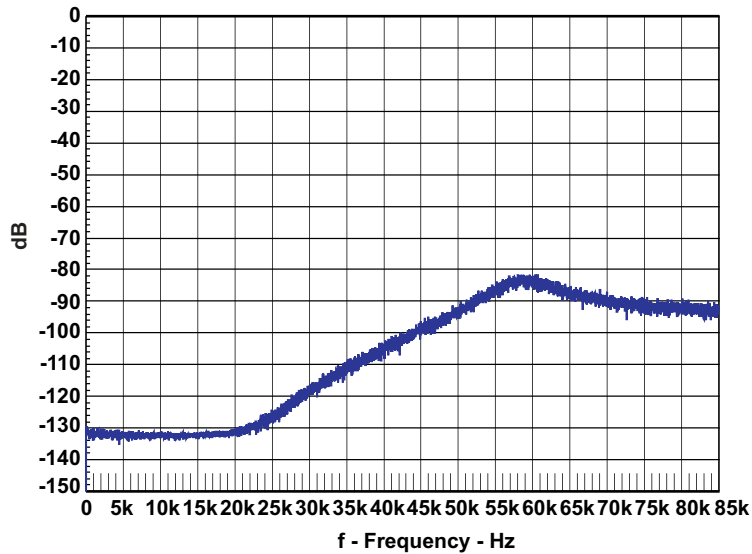


Figure 16. Idle Noise FFT Spectrum (BTL)



### 4.13 Channel Separation

Channel separation is tested for two channels, channel 1 and channel 2. Both channels use 4-Ω loads. Channel-1 input signal is 0 dBFS, channel 2 is muted. Reference voltage is 15.5 Vrms.

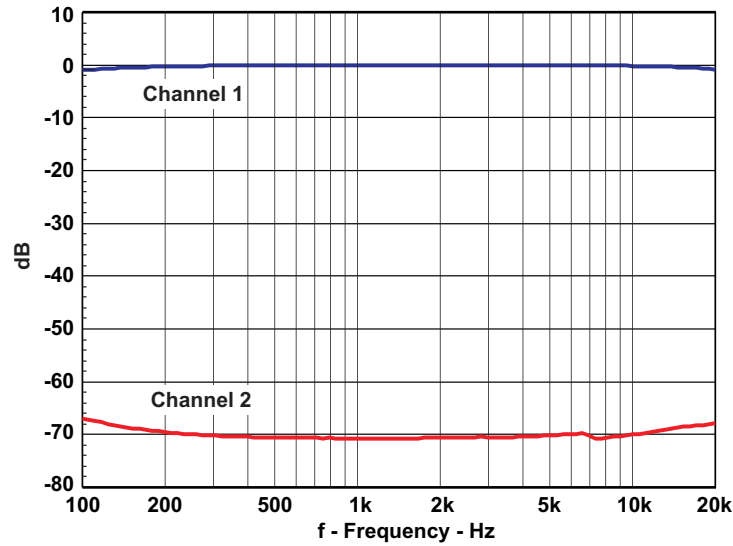


Figure 17. Channel Separation

### 4.14 Frequency Response (SE)

Measurement bandwidth filter is 80 kHz.

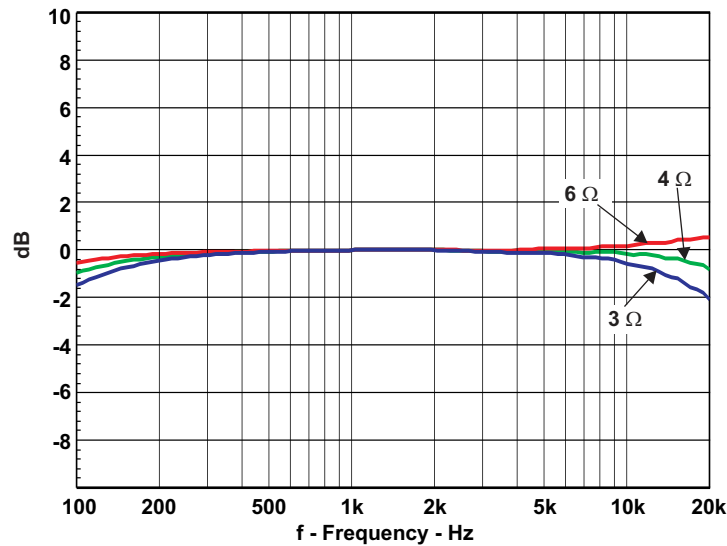


Figure 18. Frequency Response (BTL)

### 4.15 Frequency Response (BTL)

Measurement bandwidth filter is 80 kHz.

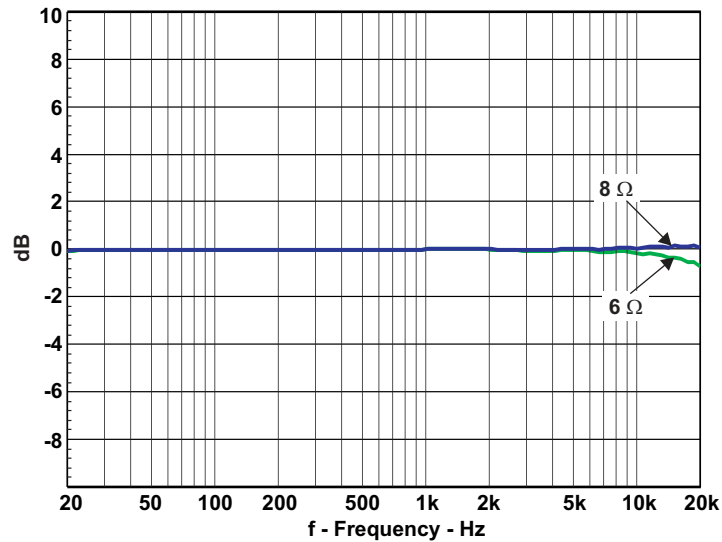


Figure 19. Frequency Response (BTL)

### 4.16 High-Current Protection (SE)

Input 1-kHz bursted signal, Load 1 Ω.

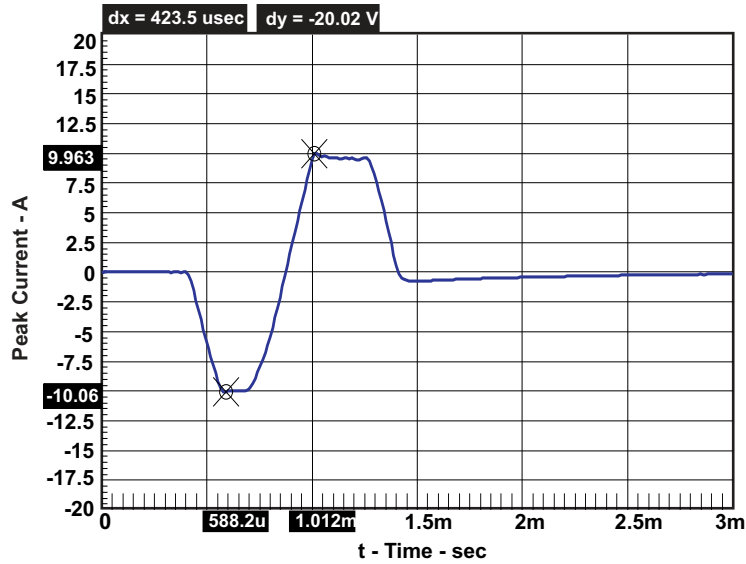


Figure 20. High Current Protection (SE)

### 4.17 High-Current Protection (BTL)

Input 1-kHz bursted signal, Load 1  $\Omega$ .

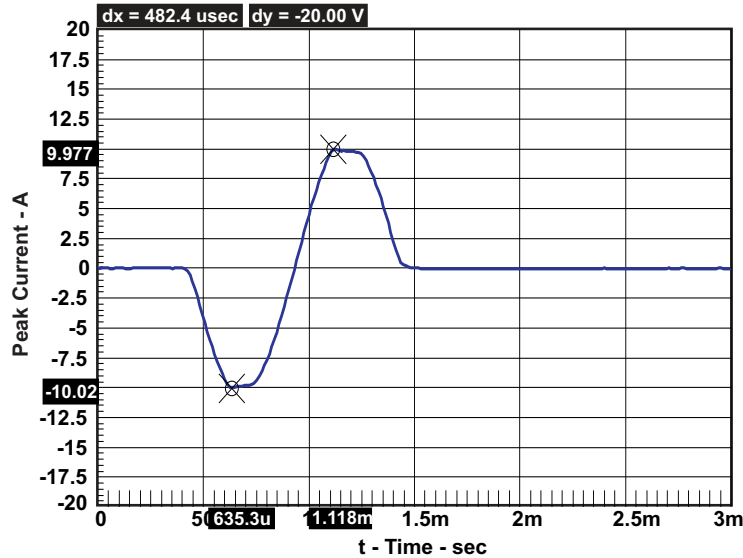


Figure 21. High Current Protection (PBTL)

### 4.18 Pop/Click (BTL)

No input signal applied, Load 8  $\Omega$ . FFT Analyzer Setup: Size = 32768, Window = Blackman Harris, Sample Rate = 48 kHz, DC Coupled.

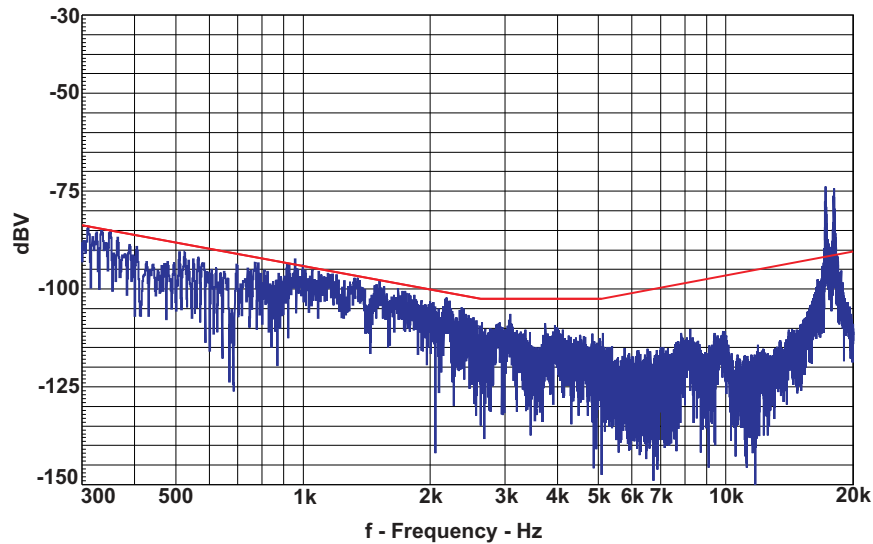


Figure 22. Pop/Click (BTL)

#### 4.19 Pop/Click (SE)

No input signal applied, Load 4  $\Omega$ . FFT Analyzer Setup: Size = 32768, Window = Blackman Harris, Sample Rate = 48 kHz, DC Coupled.

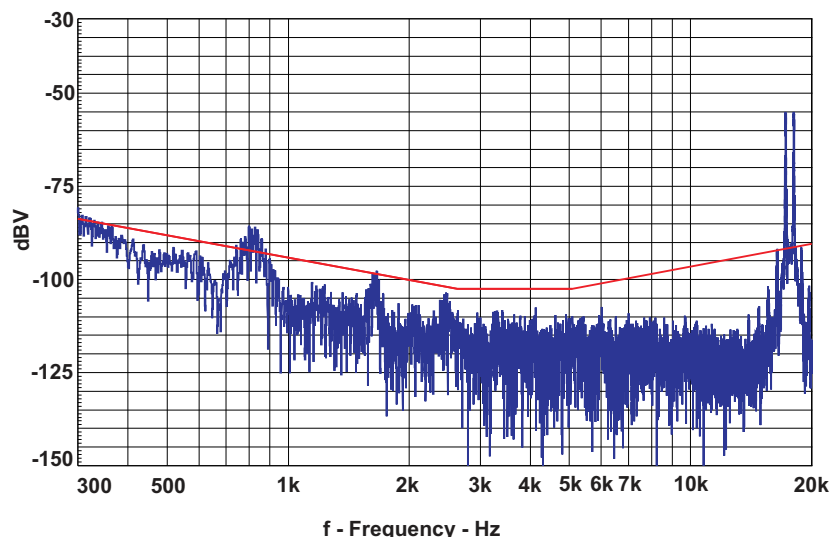


Figure 23. Pop/Click (SE)

#### 4.20 Output Stage Efficiency

Efficiency is tested with one SE channel loaded 4  $\Omega$  and one BTL channel loaded with 8  $\Omega$ . The board has been preheated for 1 hour at 1/8 output power.

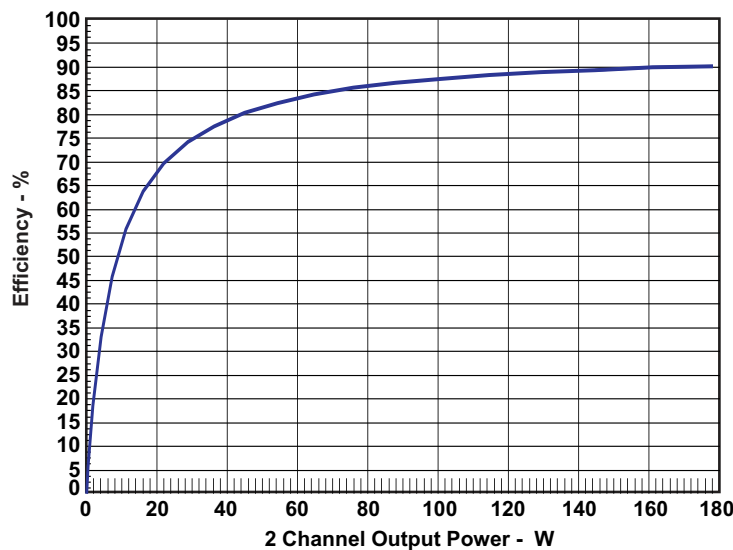


Figure 24. Output Stage Efficiency

### 5 Related Documentation from Texas Instruments

Table 10 contains a list of data sheets that have detailed descriptions of the integrated circuits used in the design of the TAS5162DDV6EVM. The data sheets can be obtained at <http://www.ti.com>.

**Table 10. Related Documentation from Texas Instruments**

Part Number	Literature Number
TAS5086	<a href="#">SLES131</a>
TAS5162	<a href="#">SLES194</a>
TLV272	<a href="#">SLOS351</a>
TPS5430	<a href="#">SLVS632</a>
TPS3801K33	<a href="#">SLVS219</a>
TLV2217-33	<a href="#">SLVS067</a>
UA78M12	<a href="#">SLVS059</a>

### 5.1 Additional Documentation

1. *PC Configuration Tool for TAS5086* (TAS5086 GUI ver. 4.0 or later)
2. *System Design Considerations for True Digital Audio Power Amplifiers* ([SLAA117](#))
3. *Digital Audio Measurements* ([SLAA114](#))
4. *PSRR for PurePath Digital™ Audio Amplifiers* ([SLEA049](#))
5. *Power Rating in Audio Amplifier* ([SLEA047](#))
6. *PurePath Digital™ AM Interference Avoidance* ([SLEA040](#))
7. *Click and Pop Measurement Technique* ([SLEA044](#))
8. *Power Supply Recommendations for DVD Receivers* ([SLEA027](#))
9. *Implementation of Power Supply Volume Control* ([SLEA038](#))

## **Appendix A Design Documents**

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

- Schematic (6 pages)
- Parts List (2 pages)
- PCB Specification (1 page)
- PCB Layers (4 pages)
- Heat-Sink Drawing (1 page)



Design Name: **TAS5162DDV6EVM**  
 Type: Mass Market Evaluation Module  
 File Name: A816-SCH-001(4.00).DSN  
 Version: 4.00  
 Date: 7.September 2007  
 Design Engineer: Jonas L. Holm (jlh@ti.com)  
 Audio Configuration: 5.1 PurePath Digital Amplifier Design  
 1 x TAS5086, 2 x TAS5162DDV

Interfaces: J40: 34 pin IDC Header for Control, I2C and +5V  
 J60: 16 pin IDC Header for I2S Audio  
 J101-J106: 2 pin 3.96mm Headers for Speakers  
 J901: 4 pin 3.96mm Header for H-Bridge and System Power Supply

Setup: 4 x 4 Ohm and 2 x 8 Ohm Speaker Loads  
 +50V H-Bridge and +15V System Power Supplies

Performance: 4 x 62.5 W/4 Ohm (SE) + 2 x 125 W/8 Ohm (BTL) - all unclipped.  
 105 dB Dynamic Range

Page

- 1/6: Front Page and Schematic Disclaimer
- 2/6: Overview - Modulator and Input/Output
- 3/6: 4 Channel SE Power Stage (FL, FR, SL, and SR)
- 4/6: 2 Channel BTL Power Stage (C and LFE SW)
- 5/6: Power Supplies
- 6/6: Mechanics

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NOTE1

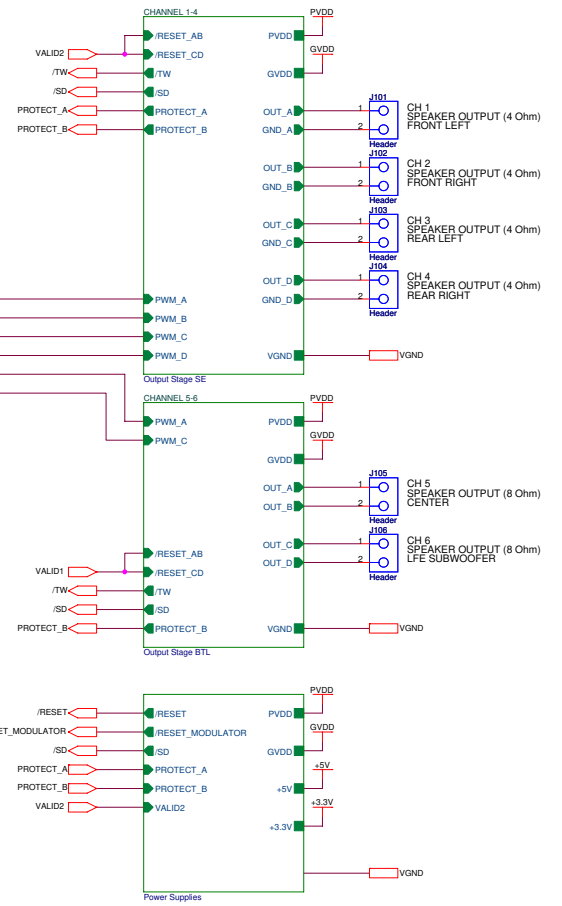
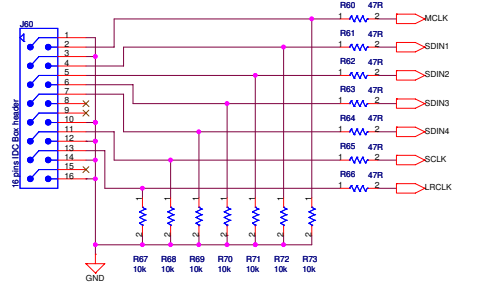
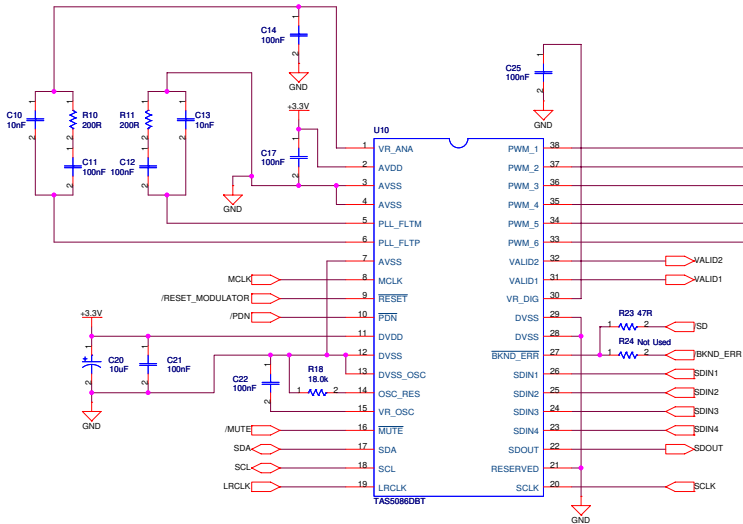
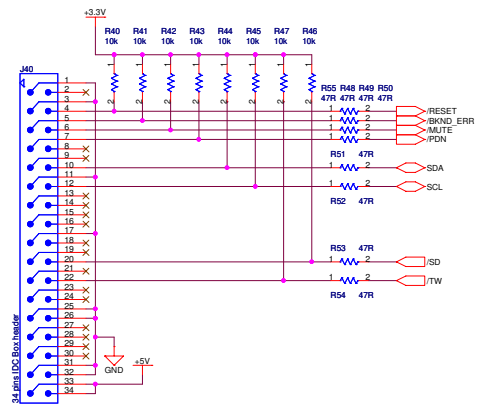
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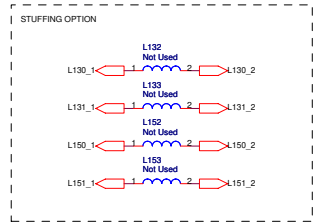
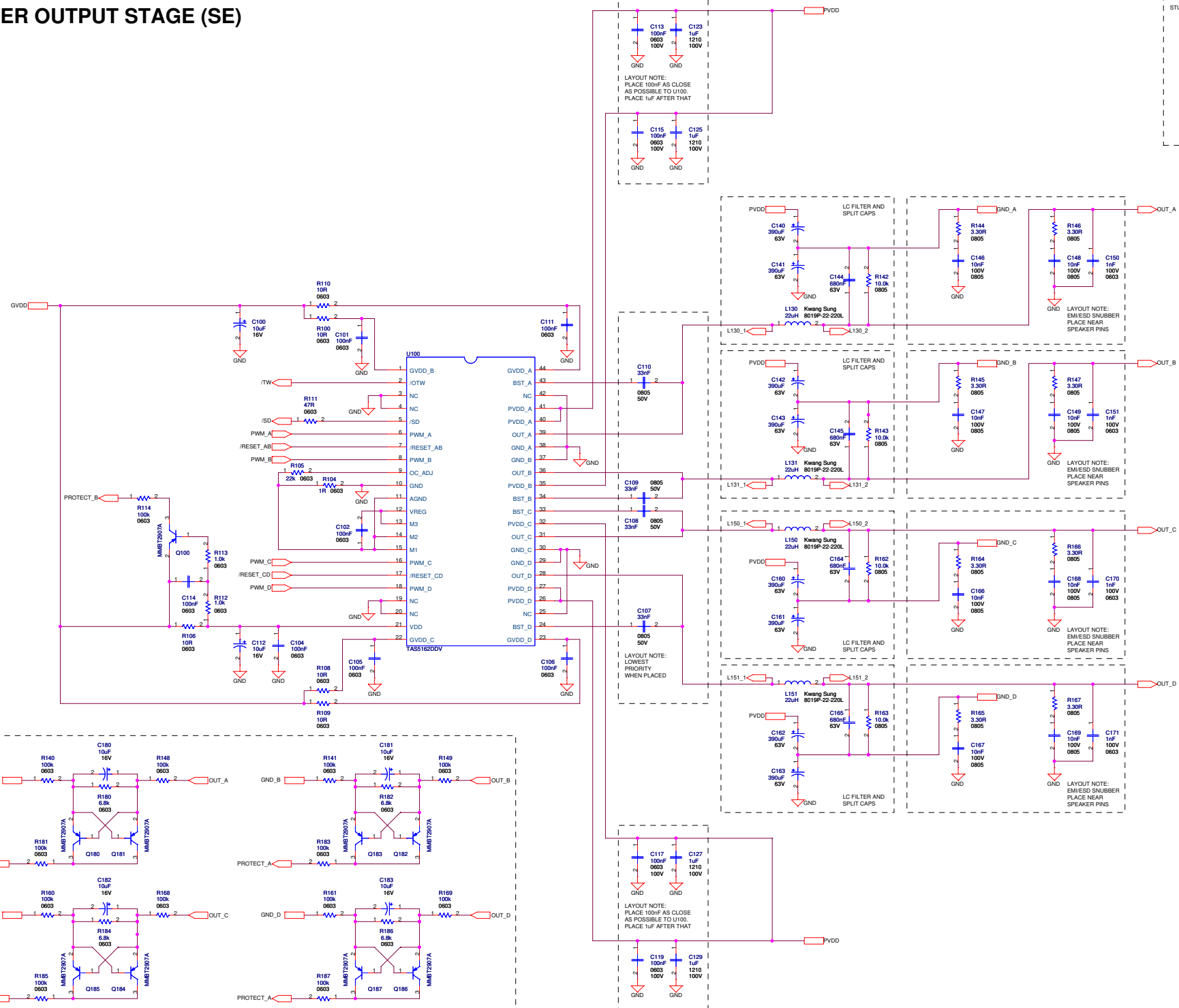
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# TAS5162DDV6EVM





# POWER OUTPUT STAGE (SE)

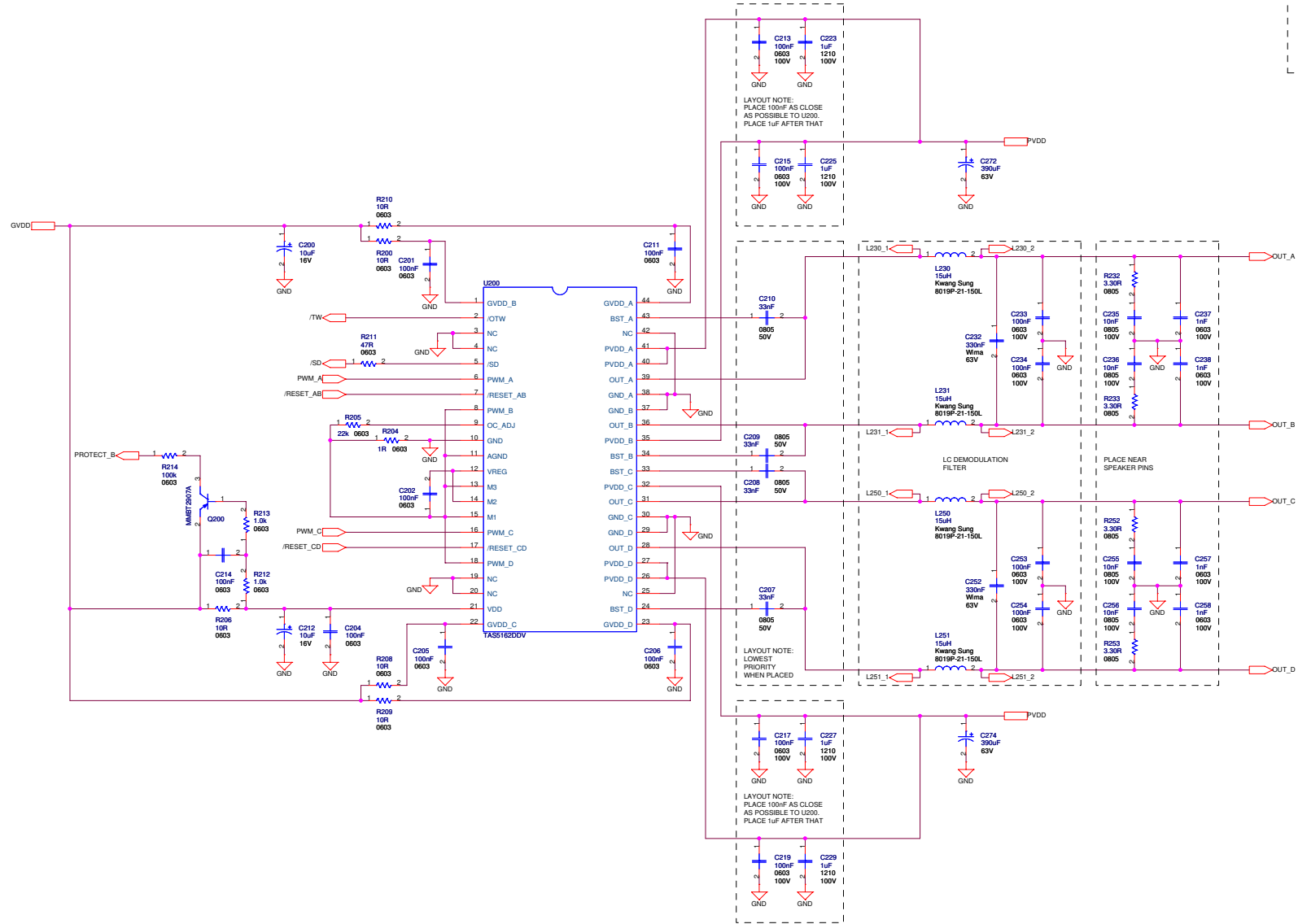
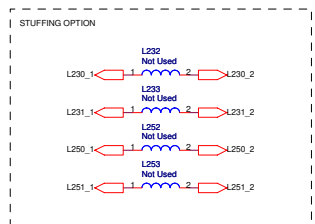


DESIGN NOTE:  
IF PVDD < 35 V, THEN R180 - R182 - R184 - R186 - 30k Ohm

Patents pending in circuitry design and layout (WO99/59241 & WO99/59242). This circuitry may only be used together with the integrated circuit TASS162DDV from Texas Instruments Incorporated.

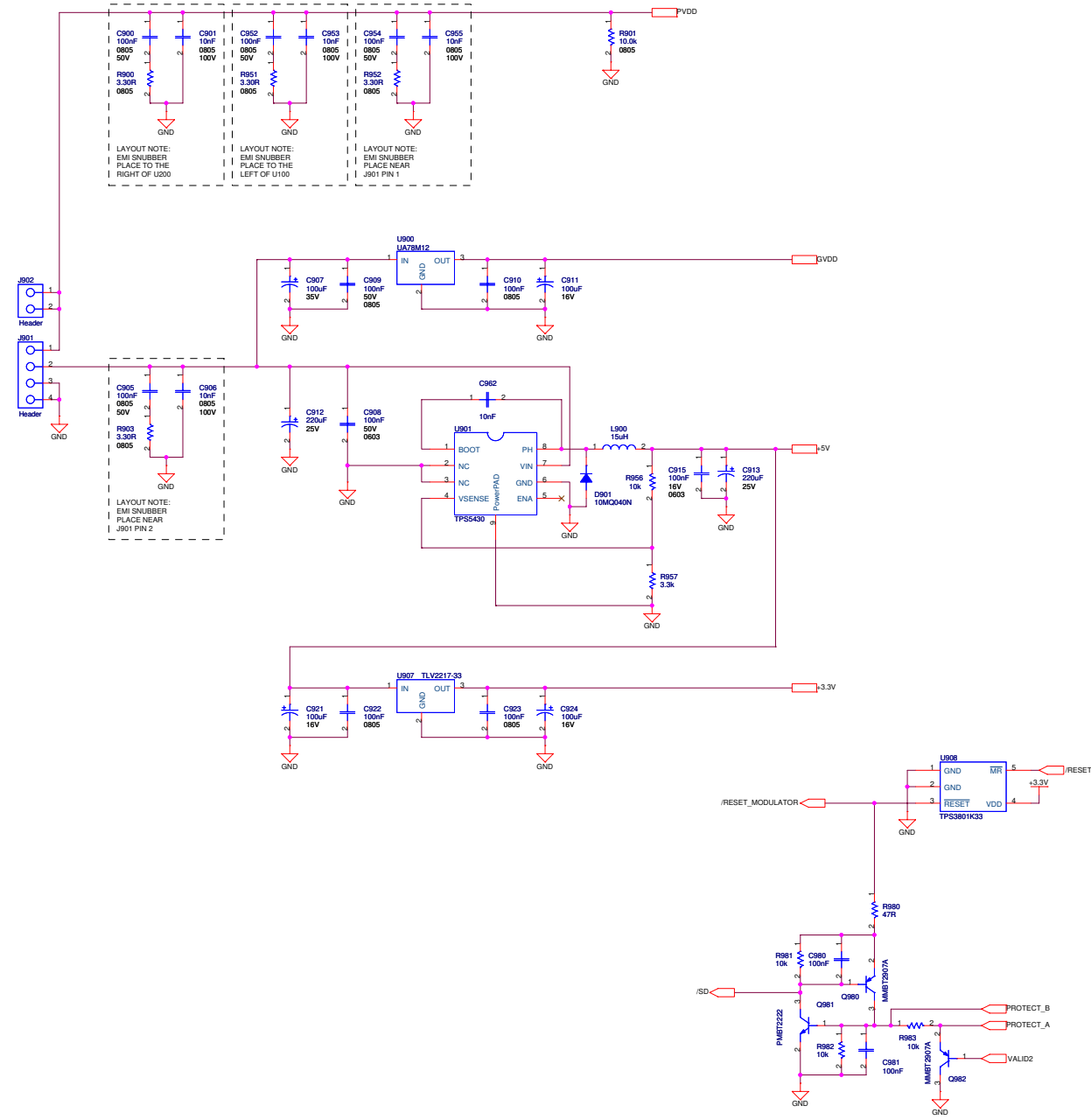
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		Project: TASS162DDV6EVM Page Title: SE Power Stage File Name: A816-SC4-001.DSN Date: Thursday, July 12, 2007	Rev: 4.00 Size: A2 Engineer: Jonas L. Hoem Page 3 of 6

# POWER OUTPUT STAGE (BTL)

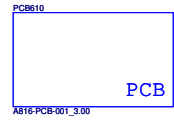
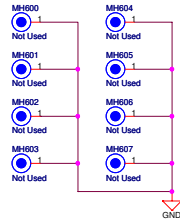
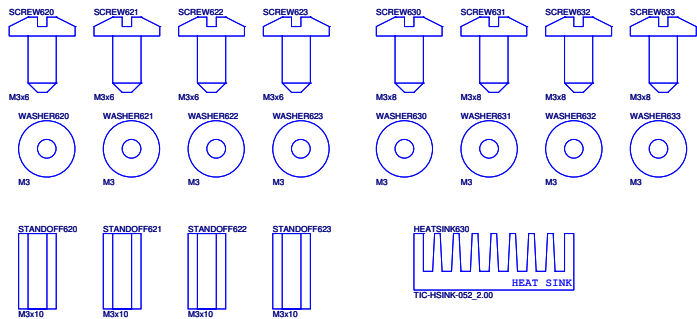


CHANNEL 6-6		Parts List 4.00	
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		Project: TAS5162DDV6EVM	Rev: 4.00
Page Title: BTL Power Stages		Size: A2	
File Name: AB16-SC4-001.DSN		Engineer: Jonas L. Holm	
Date: Thursday, July 12, 2007		Page: 4 of 6	

# POWER SUPPLIES



# MECHANICS



# TAS5162DDV6EVM Parts List (4.00)



Qty	Part Reference	Description	Manufacture	First Mfr P/N
5	R142 R143 R162 R163 R901	10.0k / 125mW / 1% / 0805 Thick Film Resistor	Yageo	RC0805FR-0710KL
16	R144 R145 R146 R147 R164 R165 R166 R167 R232 R233 R252 R253 R900 R903 R951 R952	3.30R / 125mW / 1% / 0805 Thick Film Resistor	Yageo	RC0805FR-073R3L
4	R112 R113 R212 R213	1.0k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071KL
19	R40 R41 R42 R43 R44 R45 R46 R47 R67 R68 R69 R70 R71 R72 R73 R956 R981 R982 R983	10k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710KL
14	R114 R140 R141 R148 R149 R160 R161 R168 R169 R181 R183 R185 R187 R214	100k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07100KL
2	R104 R204	1R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071RL
10	R100 R106 R108 R109 R110 R200 R206 R208 R209 R210	10R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710RL
1	R18	18.0k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-0718KL
2	R10 R11	200R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07200RL
2	R105 R205	22k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0722KL
1	R957	3.3k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-073K3L
19	R23 R48 R49 R50 R51 R52 R53 R54 R55 R60 R61 R62 R63 R64 R65 R66 R111 R211 R980	47R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0747RL
4	R180 R182 R184 R186	6.8k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-076K8L
16	C146 C147 C148 C149 C166 C167 C168 C169 C235 C236 C255 C256 C901 C906 C953 C955	Ceramic 10nF / 100V / 20% X7R 0805 Capacitor	BC Components	0805B103M101NT
8	C900 C905 C909 C910 C922 C923 C952 C954	Ceramic 100nF / 50V / 20% X7R 0805 Capacitor	BC Components	0805B104M500NT
8	C107 C108 C109 C110 C207 C208 C209 C210	Ceramic 33nF / 50V / 20% X7R 0805 Capacitor	BC Components	0805B333M500NT
8	C123 C125 C127 C129 C223 C225 C227 C229	Ceramic 1uF / 100V / 10% X7R 1210 Capacitor	Murata	GRM32ER72A105KA01L
8	C150 C151 C170 C171 C237 C238 C257 C258	Ceramic 1nF / 100V / 10% X7R 0603 Capacitor	Murata	GRM188R72A102KA01
3	C10 C13 C962	Ceramic 10nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y103MXA
24	C11 C12 C14 C17 C21 C22 C25 C101 C102 C104 C105 C106 C111 C114 C201 C202 C204 C205 C206 C211 C214 C915 C980 C981	Ceramic 100nF / 16V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXJ
1	C908	Ceramic 100nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXA
12	C113 C115 C117 C119 C213 C215 C217 C219 C233 C234 C253 C254	Ceramic 100nF / 100V / 10% X7R 0603 Capacitor	Murata	GRM188R72A104KA35D
9	C20 C100 C112 C180 C181 C182 C183 C200 C212	Electrolytic 10uF / 16V / 20% Aluminium 1.5mm ø4mm Ultra-Mini Series Capacitor	Sang Jing Electronics	UMR16V106M4X5
1	C907	Electrolytic 100uF / 35V / 20% Aluminium 3.5mm ø8mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1V101
3	C911 C921 C924	Electrolytic 100uF / 16V / 20% Aluminium 2.5mm ø6.3mm Ultra-Mini Series Capacitor	Sang Jing Electronics	UMR16V107M6.3X5
2	C912 C913	Electrolytic 220uF / 25V / 20% Aluminium 3.5mm ø8mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1E221
10	C140 C141 C142 C143 C160 C161 C162 C163 C272 C274	Electrolytic 390uF / 63V / 20% Aluminium 5mm ø12.5mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1J391
2	C232 C252	Metal Film 330nF / 63V / 10% Polyester 5mm (W:4.5mm L:7.2mm) Capacitor	Wima	MKS 2 0.33uF/10%/63Vdc PCM5
4	C144 C145 C164 C165	Metal Film 680nF / 63V / 10% Polyester 5mm (W:4.5mm L:7.2mm) Capacitor	Wima	MKS 2 0.68uF/10%/63Vdc PCM5
4	L230 L231 L250 L251	15uH / Ferrite Inductor	Kwang Sung	8019P-21-150L
1	L900	15uH / Ferrite Inductor	Kwang Sung	8020P-06-150L
4	L130 L131 L150 L151	22uH / Ferrite Inductor	Kwang Sung	8019P-22-220L
1	D901	1A / 40V Schottky 10MQ040N Diode (SMA)	Int. Rectifier	10MQ040N
1	Q981	600mA / 40V NPN Small signal PMBT2222 Transistor (SOT-23)	Philips	PMBT2222
12	Q100 Q180 Q181 Q182 Q183 Q184 Q185 Q186 Q187 Q200 Q980 Q982	800mA / 40V PNP Small signal MMBT2907A Transistor (SOT-23)	Fairchild	MMBT2907A
1	U10	TAS5086DBT / 6 ch PWM processor (SE, VOL, 192kHz, I2S out) (TSSOP38)	Texas Instruments	TAS5086DBT
2	U100 U200	TAS5162DDV / 4ch/2ch/1ch Digital Audio PWM Power Output Stage (DDV44)	Texas Instruments	TAS5162DDV
1	U908	TPS3801K33 / 3.3V Supply Voltage Supervisor (SOT323-5)	Texas Instruments	TPS3801K33DCK
1	U900	UA78M12 / 12V/500mA Positive Voltage Regulator (PFM2-KTP)	Texas Instruments	UA78M12CKTPR

# TAS5162DDV6EVM Parts List (4.00)



1	U907	TLV2217-33 / 3.3V Low Dropout Voltage Regulator (PFM2-KTP)	Texas Instruments	TLV2217-33KTPR
1	U901	TPS5430 / 5V/3A Buck Converter (HSOP8-DDA)	Texas Instruments	TPS5430DDA
4	SCREW620 SCREW621 SCREW622 SCREW623	M3x6 Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x6
4	SCREW630 SCREW631 SCREW632 SCREW633	M3x8 Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x8
4	WASHER620 WASHER621 WASHER622 WASHER623	M3 Stainless Steel Washer	Bossard	BN 670 M3
4	WASHER630 WASHER631 WASHER632 WASHER633	M3 Stainless Steel Spring Washer	Bossard	BN 760 M3
4	STANDOFF620 STANDOFF621 STANDOFF622 STANDOFF623	M3x10 Aluminium Stand-off	Ettinger	05.03.108
7	J101 J102 J103 J104 J105 J106 J902	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	J60	16 pins / 2 rows / 2.54mm Pitch Vertical Male IDC 16 pins IDC Box header	Molex	87256-1611
1	J40	34 pins / 2 rows / 2.54mm Pitch Vertical Male IDC 34 pins IDC Box header	Molex	87256-3411
1	PCB610	A816-PCB-001_4.00 / TAS5162DDV6EVM Printed Circuit Board (ver. 4.00)	Printline	A816-PCB-001(4.00)
1	HEATSINK630	TIC-HSINK-052_2.00 / Heatsink for 2 DDV packages length 106 mm	THF-Teknik	TIC-HSINK-052(2.00)

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# TAS5162DDV6EVM

## PCB SPECIFICATION

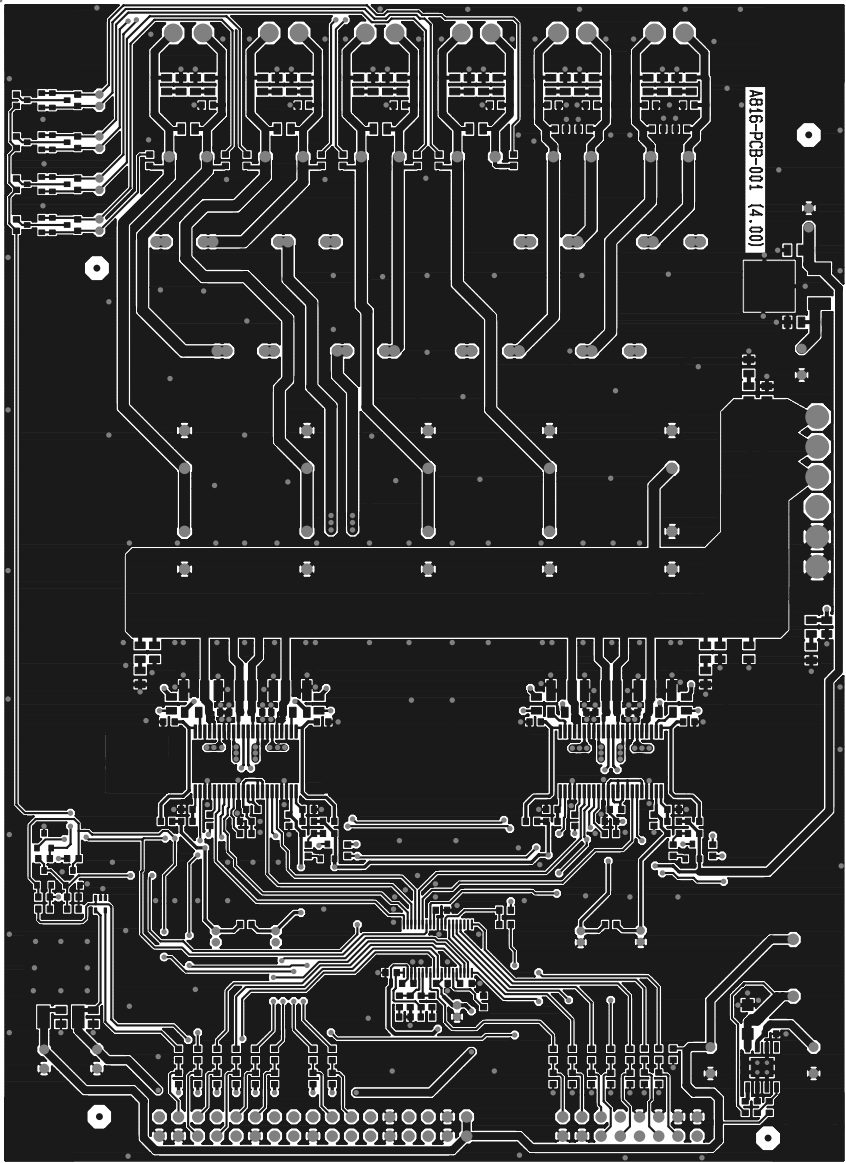
Version 4.00

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BOARD IDENTIFICATION:	A816-PCB-001(4.00)
BOARD TYPE:	DOUBLE-SIDED PLATED-THROUGH BOARD
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6mm
COPPER THICKNESS:	70 $\mu\text{m}$ (INCL. PLATING EXTERIOR LAYER)
COPPER PLATING OF HOLES:	>25 $\mu\text{m}$
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 ( <a href="http://www.perfag.dk">www.perfag.dk</a> )
APERTURE TABLE:	PERFAG 10A ( <a href="http://www.perfag.dk">www.perfag.dk</a> )
BOARD SIZE:	112 x 154 mm
Aprox. Number of holes	600
COMMENTS:	SEE DRILL INFORMATION FILE (5201pcb.PDF).

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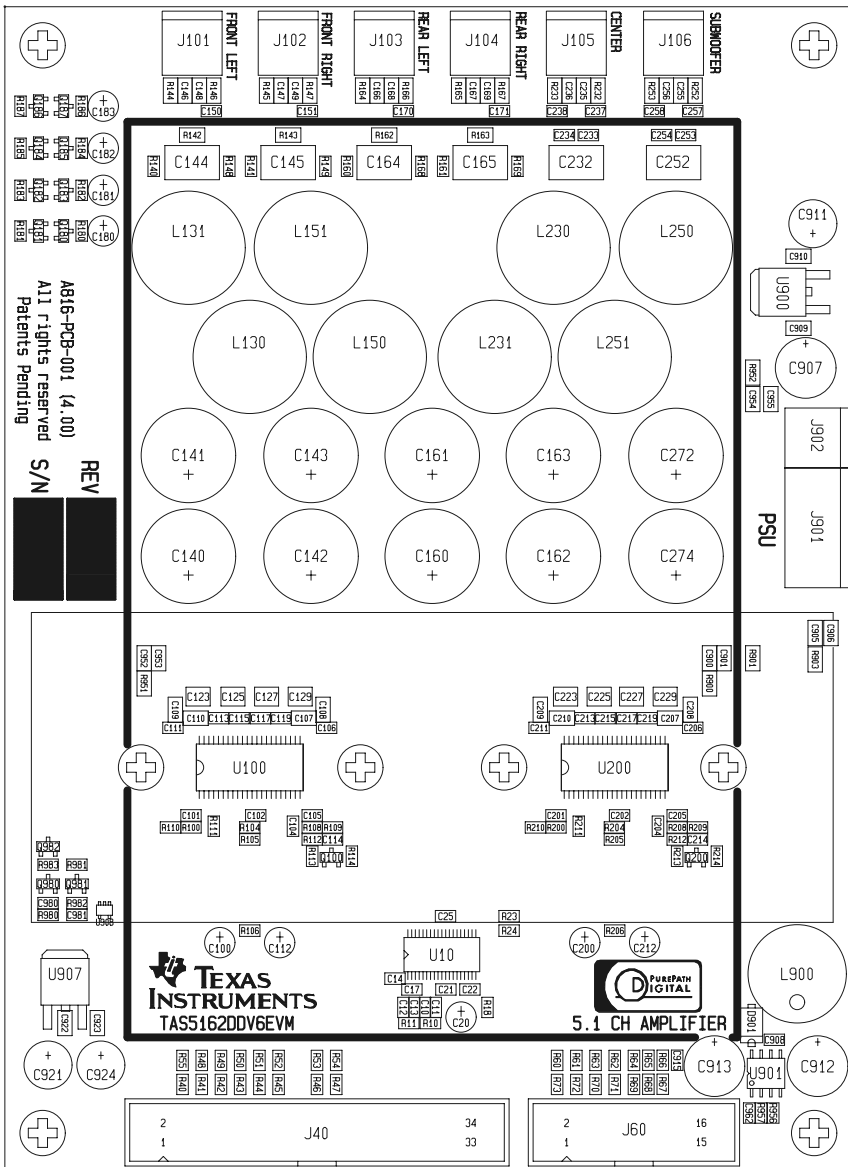
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TI Denmark A816-PCB-001 (4.00)	





COMP. LAYOUT COMP | DpS 5201 070821

TI Denmark A816-PCB-001 (4.00)



A816-PCB-001 (4.00)  
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 Patents Pending

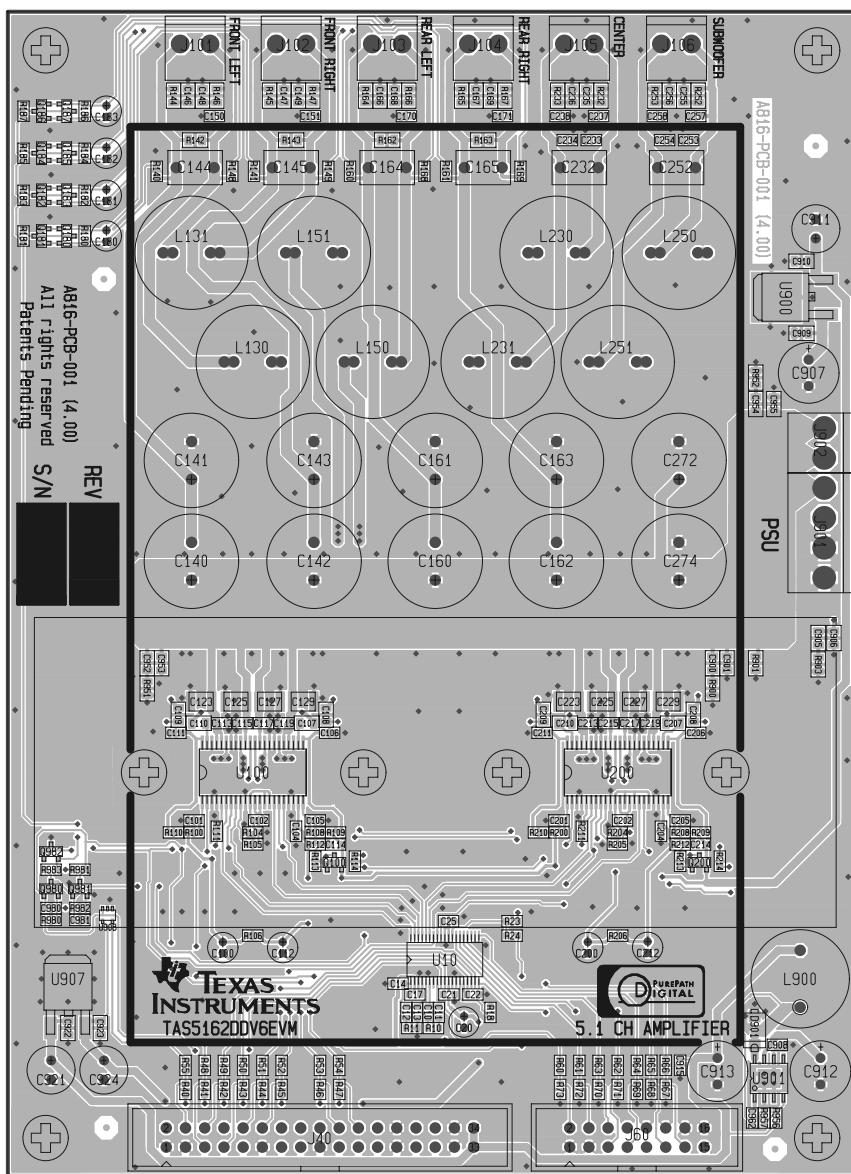
REV  
 S/N

2	J40	34
1		33

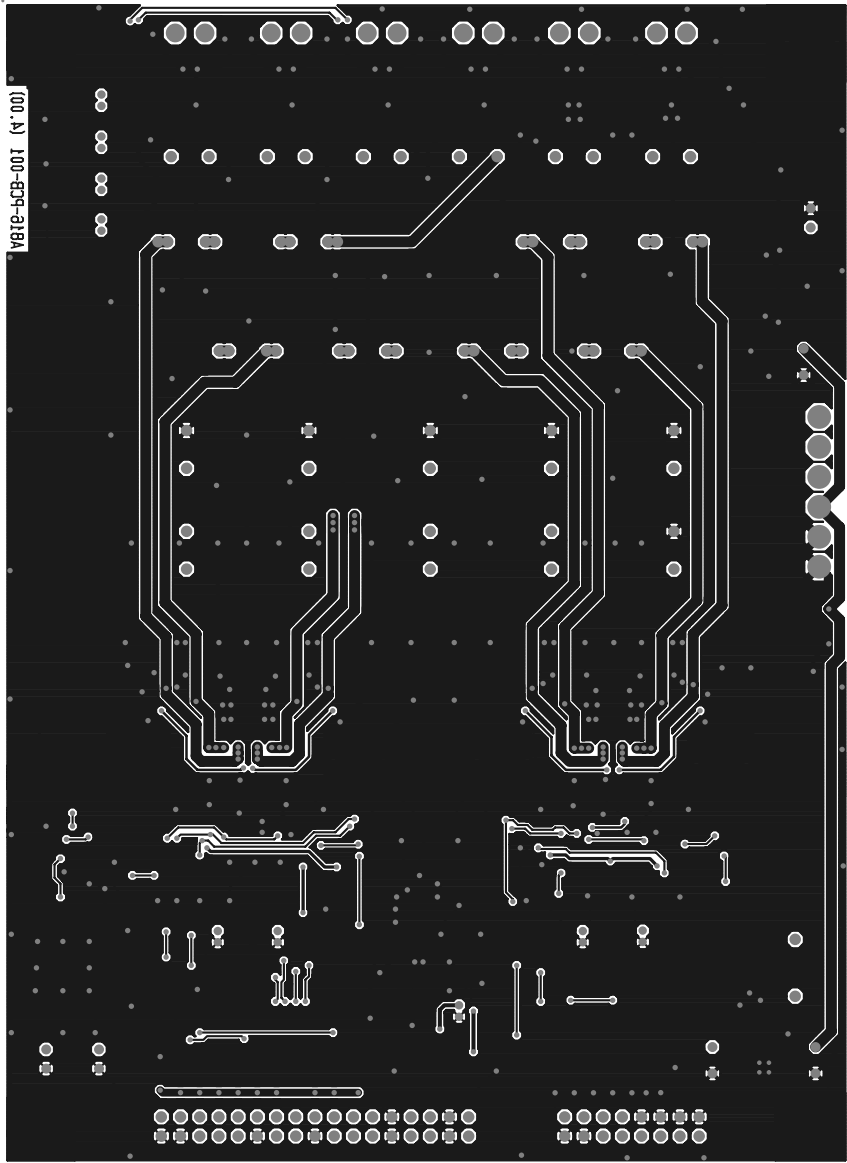
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1		15

COMP/PCB LAYOUTS/COMP | Dps 5201 070821

TI Denmark A816-PCB-001 (4.00)

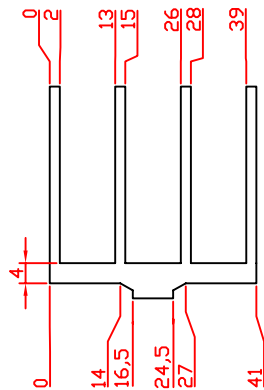
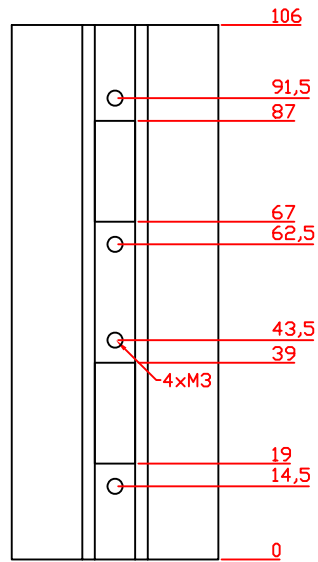


TI Denmark A819-PCB-001 (V.00)	SOLDER SIDE	0ps 2501 070821
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# TIC-HSINK-052(2.00)

Heatsink for 2 DDV packages length 106 mm



SCALE: 1:1.5  
 PROFILE: TIC-HSINK-050(1.00)  
 DIMENSIONS: mm  
 MATERIAL: ALUMINUM  
 INTERNAL SCREW THREADS: M3  
 SURFACE: FREE OF SHARP EDGES  
 SURFACE TREATMENT: BLACK ANODIZED  
 TOLERANCES: +/- 0.1 mm

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It is important to operate this EVM within the input voltage range of 3.3 V to 5 V and the output voltage range of 0 V to 5 V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 30°C. The EVM is designed to operate properly with certain components above 85°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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