User's Guide
SLAU287A–December 2009–Revised May 2010

TAS5630PHD2EVM

This user's guide describes the operation of the evaluation module for the TAS5630 300W Stereo Feedback Analog-Input Digital Amplifier from Texas Instruments. The user's guide also provides measurement data and design information including the schematic, BOM, and PCB layout.

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1 Overview

The TAS5630PHD2EVM PurePath™ Premier Pro customer evaluation module demonstrates the integrated circuit TAS5630PHD from Texas Instruments (TI).

The TAS5630PHD is a high-performance, integrated Stereo Feedback Analog-Input Digital Amplifier Power Stage designed to drive 4Ω speakers at up to 300W per channel. This amplifier requires only a simple passive demodulation filter to deliver high-quality, high-efficiency audio amplification.

This EVM is configured with 2 BTL channels and the possibility to apply either a single ended or a differential analog input signal. It is also possible to configure the two BTL channels into one parallel BTL (PBTL) channel.

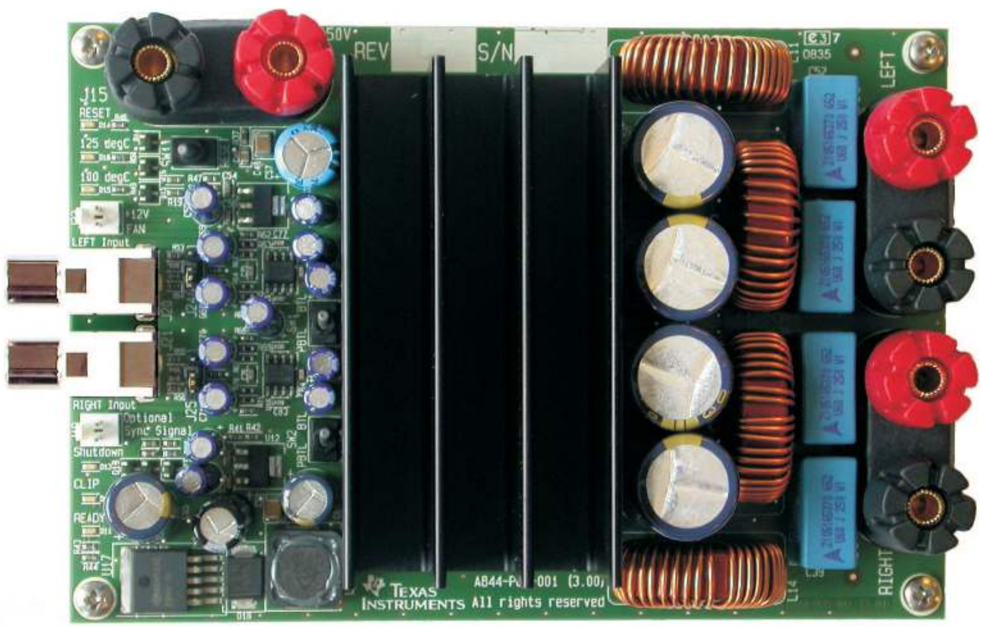
The OPA1632 is a High Performance Fully Differential Audio Op Amp designed to allow operation with single ended or differential input signals to the EVM.

This EVM is a complete stereo analog input 2 × 300 W power amplifier ready for evaluation and great music.

Table 1. TAS5630PHD2EVM Specification

Key Parameters	
Output stage supply voltage	25 V – 50 V
Number of channels	2 × BTL, 1 x PBTL
Load impedance BTL	4–8 Ω
Load impedance PBTL	2–3 Ω
Output power BTL	318 W / 4 Ω 10% THD or 180 W / 8 Ω / 10% THD
Output power PBTL	607 W / 2 Ω / 10% THD
DNR	>100 dB(A)
PWM processor	OPA1632
Output stage	TAS5630PHD
Other features	+15 V on-board switcher from PVDD supply

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



1.1 TAS5630PHD2EVM Features

- Stereo PurePath™ Premier Pro evaluation module.
- Self-contained protection system (short circuit and thermal).
- Standard 1VRMS single ended line input or differential input.
- Double-sided, plated-through PCB layout.

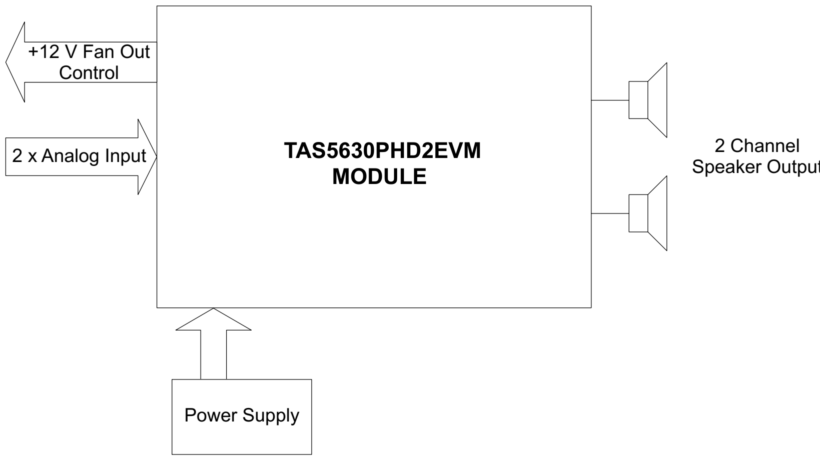


Figure 1. Integrated PurePath™ Premier Pro Amplifier System

1.2 PCB Key Map

Physical structure for the TAS5630PHD2EVM is illustrated in Figure 2.

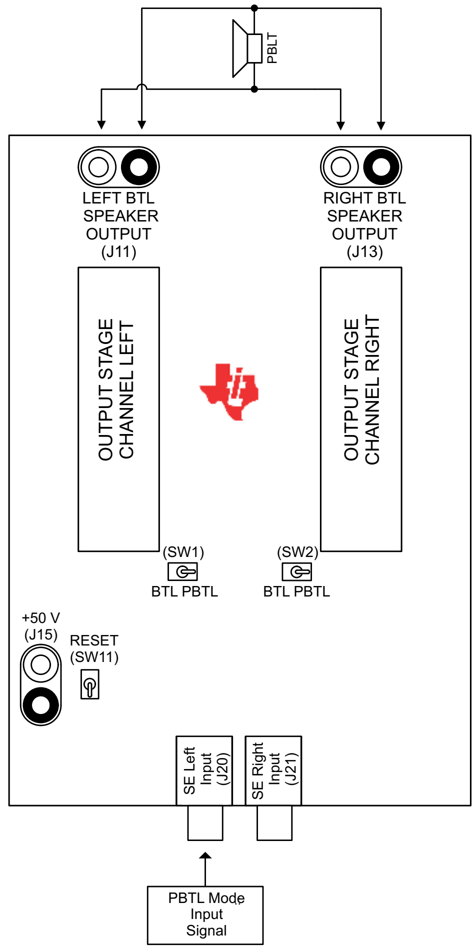


Figure 2. Physical Structure for the TAS53630PHDEVM (Approximate Layout)

2 Quick Setup Guide

This chapter describes the TAS5630PHD2EVM board in regards to power supply and system interfaces. The chapter 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 TAS5630PHD2EVM for device evaluation

2.1 Electrostatic Discharge Warning

Many of the components on the TAS5630PHD2EVM 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 TAS5630PHD2EVM package, ensure that the following items are included:

- 1 pc. TAS5630PHD2EVM board using one TAS5630PHD.
- 1 pc. PurePath CD-ROM.

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

2.3 Power Supply Setup

To power up the EVM, one power supply are needed. An onboard switched voltage regulator is supplying system power, logic and gate-drive. Power supply is connected to the EVM using connector J15.

NOTE: While powering up set switch SW11 to the RESET position.

Table 2. Recommended Supply Voltages

Description	Voltage Limitations	Current Requirement	Cable
Output stage power supply	25 – 50 V	16 A	J15 (marked +50V)

CAUTION

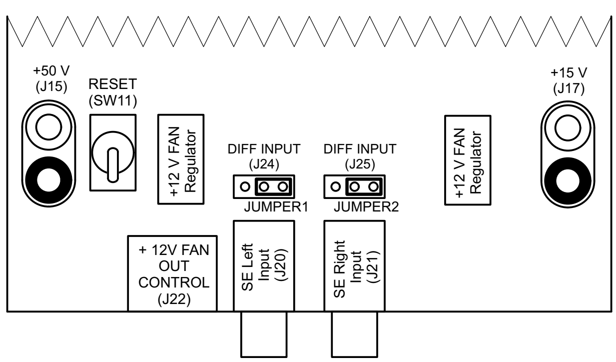
Applying voltages above the limitations given in Table 2 may cause permanent damage to your hardware

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

2.4 Applying Input Signal

It is possible to apply either a single ended input signal to J20 and J21 or a differential input signal to J24 and J25.

NOTE: If a single ended input signal is applied please insert jumpers in the header J24 and J25.



2.5 Speaker Connection

CAUTION

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

2.6 Output configuration BTL and PBTL

When changing mode e.g. from BTL to PBTL make sure that RESET switch (SW11) is activated before changing the state of mode switches SW1 and SW2. Switch SW1 and SW2 has to be synchronized in state BTL or PBTL.

Input signal to RCA connector J20 when operating PBTL mode. J21 is disabled.

In PBTL mode, the load has to be connected according to :

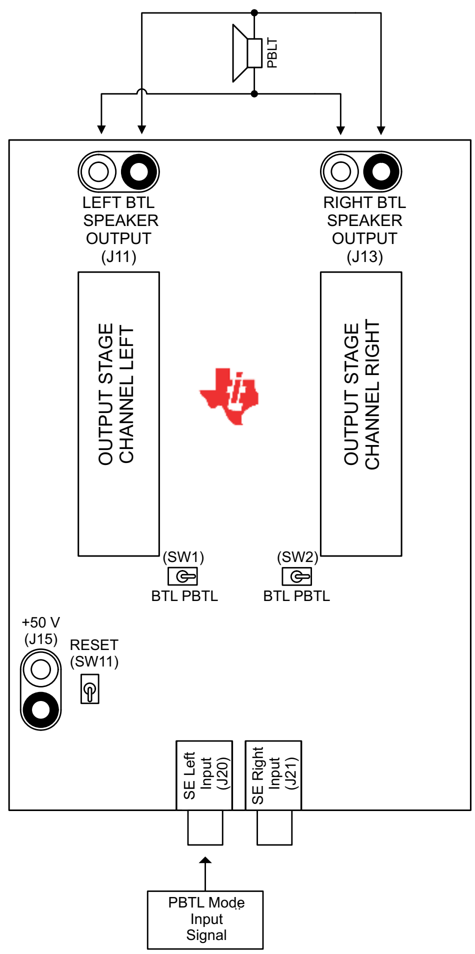


Figure 3. Figure 3. PBTL Mode Configuration

3 Protection

This section describes the short-circuit protection and fault-reporting circuitry of the TAS5630 device.

3.1 Short-Circuit Protection and Fault-Reporting Circuitry

The TAS5630 is a self-protecting device that provides fault reporting (including high-temperature protection and short-circuit protection). The TAS5630 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 (SLES220) for further explanation. This mean that the device restart itself after an error occasion and report through the $\overline{SD}$ error signal.

3.2 Fault Reporting

The $\overline{OTW}$ and $\overline{SD}$ outputs from TAS5630 indicate fault conditions. See the TAS5630 data manual for a description of these pins.

Table 3. TAS5630 Warning/Error Signal Decoding

$\overline{SD}$	$\overline{OTW1}$	$\overline{OTW2}$	Device Condition
0	0	0	High-temperature error and/or high-current error
0	0	1	Undervoltage lockout or high current error. 100°C temperature warning.
0	1	1	Undervoltage lockout or high-current error
1	0	0	125°C temperature warning
1	0	1	100°C temperature warning
1	1	1	Normal operation, no errors/warnings

The shutdown signals together with the temperature warning signal give chip-state information as described in the Table 3. device fault-reporting outputs are open-drain outputs.

4 TAS5630PHD2EVM Performance

Table 4. General Test Conditions

General Test Conditions		Notes
Output stage supply voltage:	50 V	Laboratory power supply (EA-PS 7065-10A)
Load impedance BTL:	4 and 8 Ω	
Load impedance PBTL:	2 Ω	
Input signal	1 kHz sine	
Input configuration	Unbalanced and Grounded	
Measurement filter	AES17 and AUX0025	
Note: These test conditions are used for all tests, unless otherwise specified.		

Table 5. Electrical Data

Electrical Data		Notes/Conditions
Output power, BTL, 4 Ω:	260 W	1 kHz, 1% THD+N, T_A = 25°C
Output power, BTL, 4 Ω:	315 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, BTL, 8 Ω:	145 W	1 kHz, 1% THD+N, T_A = 25°C
Output power, BTL, 8 Ω:	180 W	1 kHz, 10% THD+N, T_A = 25°C
Output power, PBTL, 2 Ω:	500 W	1 kHz, 1% THD+N, T_A = 25°C
Output power, PBTL, 2 Ω:	600 W	1 kHz, 10% THD+N, T_A = 25°C
Maximum peak current, BTL:	>16.5 A	1-kHz burst, 1 Ω, R_{OC} = 22 kΩ
Maximum peak current, PBTL:	>33.5 A	1-kHz burst, 1 Ω, R_{OC} = 22 kΩ
Output stage efficiency:	>87%	2 x channels, 4 Ω
Damping factor BTL:	42	1 kHz, -3dBFS input, relative to 4 Ω load
Damping factor PBTL:	40	1 kHz, -3dBFS input, relative to 2 Ω load
Supply current:	65 mA	1 kHz, input grounded
Idle power consumption:	<3.5 W	Supply, input grounded

Table 6. Audio Performance

Audio Performance			Notes/Conditions
THD+N, BTL, 4 Ω:	1 W	<0.05 %	1 kHz
THD+N, BTL, 4 Ω:	10 W	<0.09 %	1 kHz
THD+N, BTL, 4 Ω:	50 W	<0.05 %	1 kHz
THD+N, BTL, 4 Ω:	100 W	<0.4 %	1 kHz
THD+N, BTL, 4 Ω:	200 W	<0.05 %	1 kHz
THD+N, BTL, 8 Ω:	1 W	<0.09 %	1 kHz
THD+N, BTL, 8 Ω:	10 W	<0.05 %	1 kHz
THD+N, BTL, 8 Ω:	50 W	<0.05 %	1 kHz
THD+N, BTL, 8 Ω:	100 W	<0.05 %	1 kHz
THD+N, PBTL, 2 Ω:	1 W	<0.09 %	1 kHz
THD+N, PBTL, 2 Ω:	10 W	<0.05 %	1 kHz
THD+N, PBTL, 2 Ω:	100 W	<0.05 %	1 kHz
THD+N, PBTL, 2 Ω:	200 W	<0.09 %	1 kHz
THD+N, PBTL, 2 Ω:	300 W	<0.09 %	1 kHz
THD+N, PBTL, 2 Ω:	400 W	<0.04 %	1 kHz
Dynamic Range:		>102 dB	Ref: rated power, A-weighted, AES17 filter, 2 ch avg
Noise Voltage:		280 μVrms	A-weighted, AES17 filter
Channel Separation:		>84 dB	1 kHz,
Frequency Response:		+0.5 / –0.6 dB	90 W / 4 Ω, unclipped (1% THD+N)

Table 7. Thermal Specification

Thermal Specification**	$T_{HEATSINK}$*	Notes/Conditions
Idle, all channels switching	30°C	1 kHz, 15 min, input grounded, T_A = 25°C
2 x 37.5 W, 4 Ω (1/8 power)	40°C	1 kHz, 1 hour, T_A = 25°C
2 x 300 W, 4 Ω	85°C	1 kHz, 5 min, T_A = 25°C

*Measured on surface of heatsink

** During the thermal test the heat sink has been ventilated with a fan (NMB-MAT Type: 2410ML-04W-B50) connected to J22.

Table 8. Physical Specifications

Physical Specifications		Notes/Conditions
PCB dimensions:	90 × 140 × 55	Width × Length × Height (mm)
Total weight:	400 gr	Components + PCB + Heatsink + Mechanics

Note: All electrical and audio specifications are typical values.

4.1 THD+N vs Power (BTL –4 Ω)

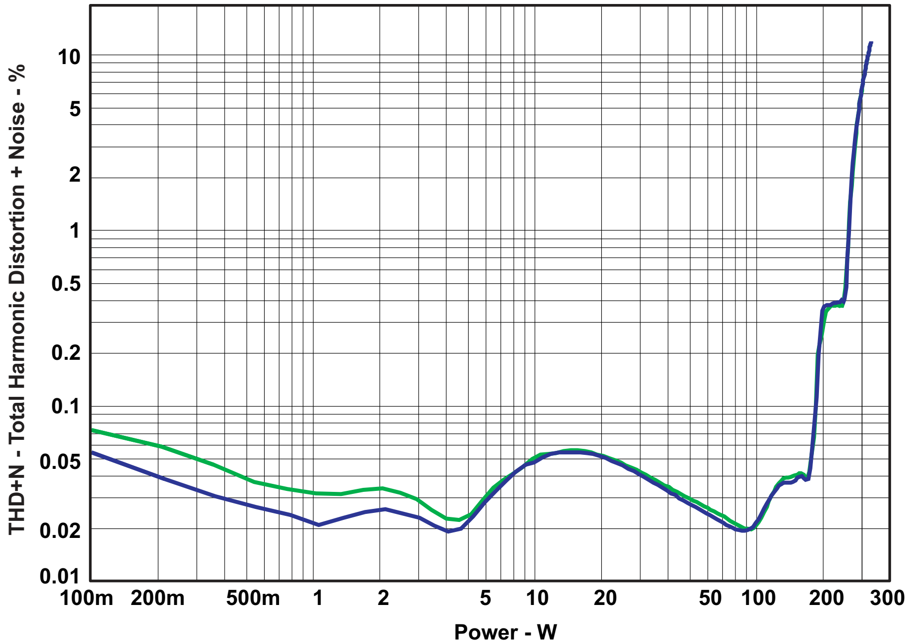


Figure 4. THD+N vs Power (BTL – 4 Ω)

4.2 THD+N vs Power (BTL –8 Ω)

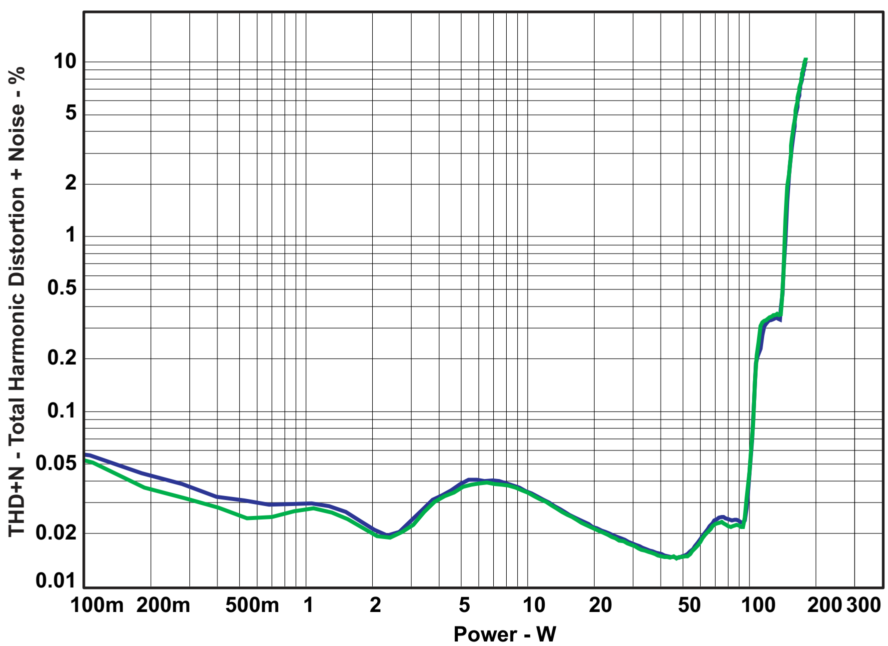


Figure 5. THD+N vs Power (BTL –8 Ω)

4.3 THD+N vs Power (PBTL –2 Ω)

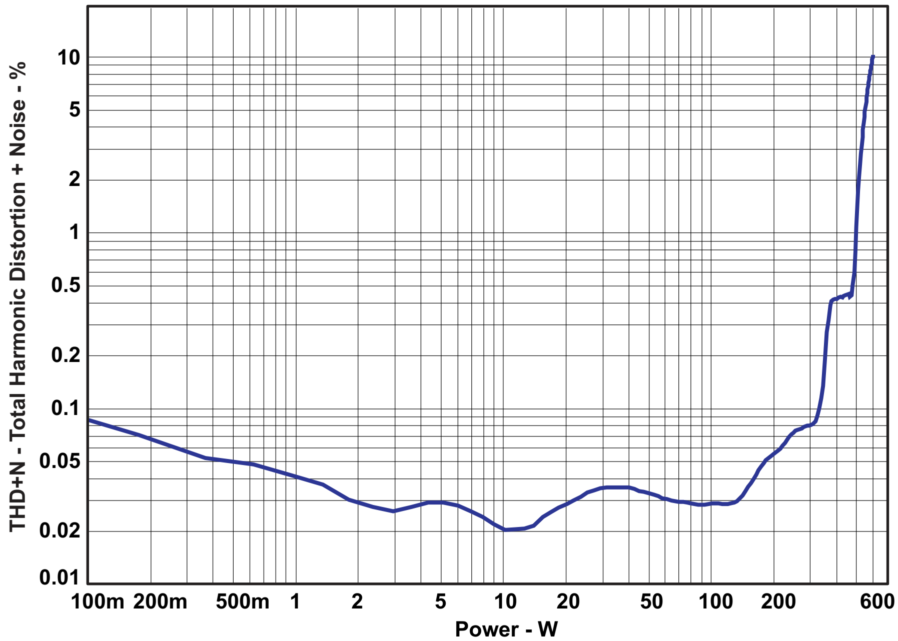


Figure 6. THD+N vs Power (PBTL –2 Ω)

4.4 THD+N vs Frequency (BTL –4 Ω)

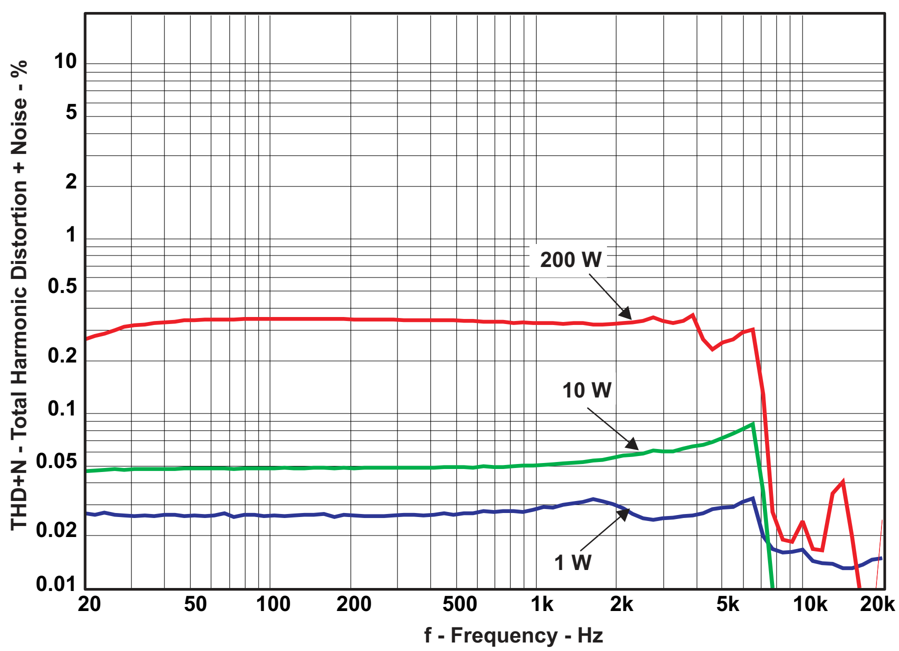


Figure 7. THD+N vs Frequency (BTL –4 Ω)

4.5 THD+N vs Frequency (BTL –8 Ω)

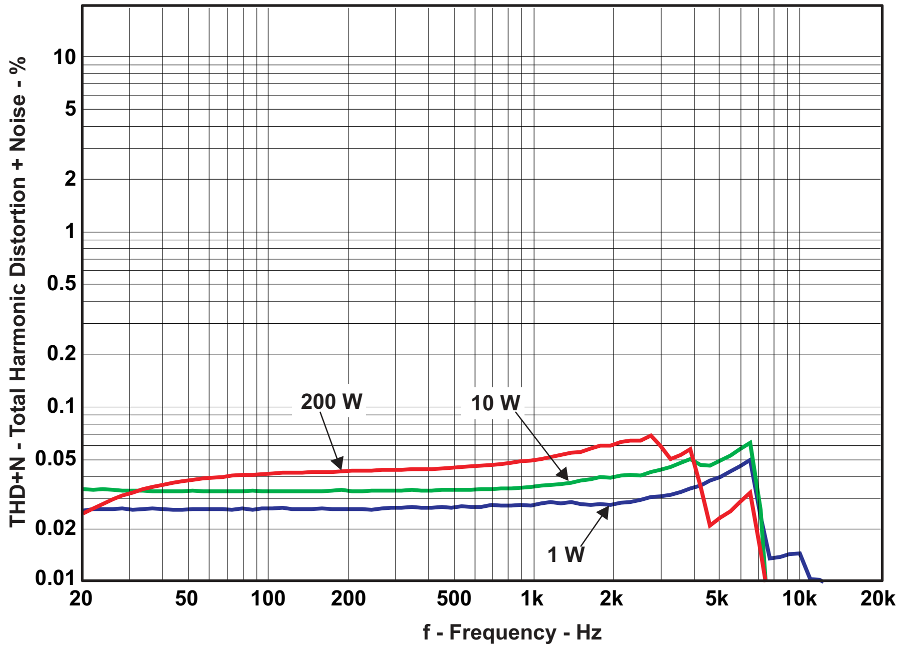


Figure 8. THD+N vs Frequency (BTL –8 Ω)

4.6 THD+N vs Frequency (PBTL –2 Ω)

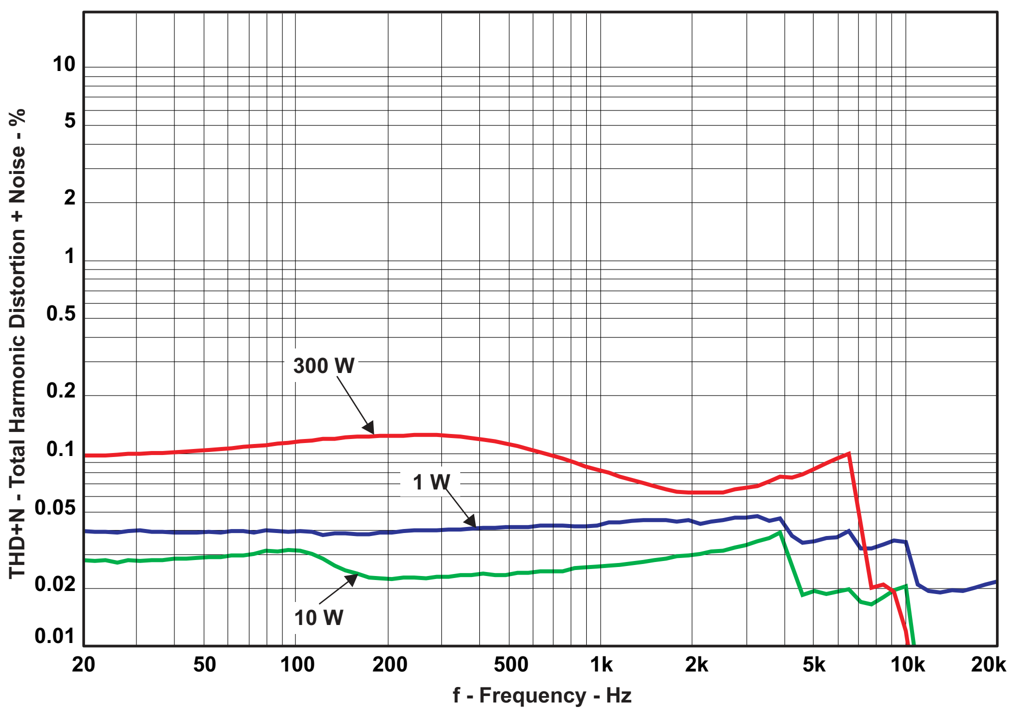


Figure 9. THD+N vs Frequency (PBTL –2 Ω)

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

Reference voltage is 28.3 V. FFT size 16k.

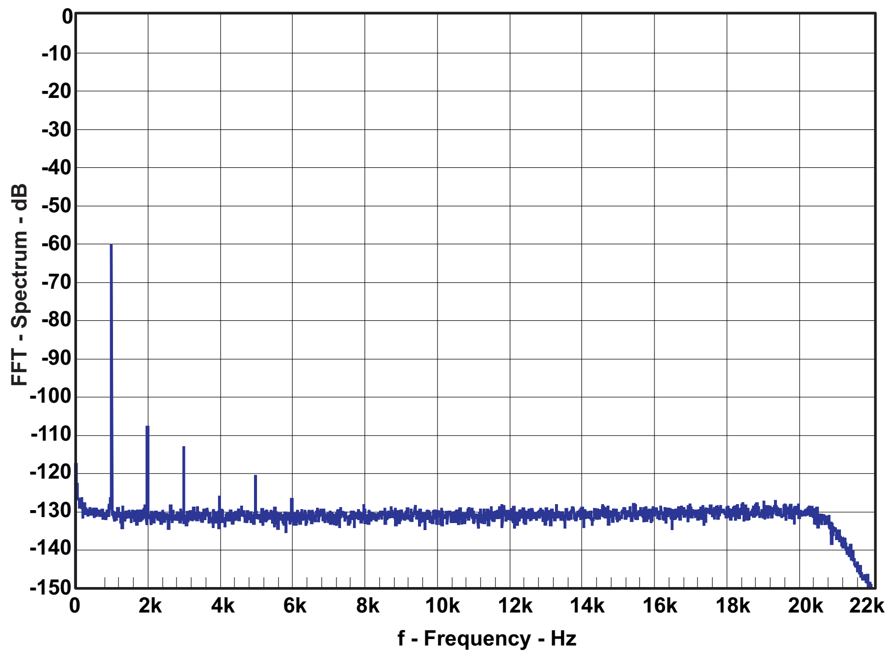


Figure 10. FFT Spectrum with –60-dBFS Tone (BTL)

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

Reference voltage is 28.3 V. FFT size 16k.

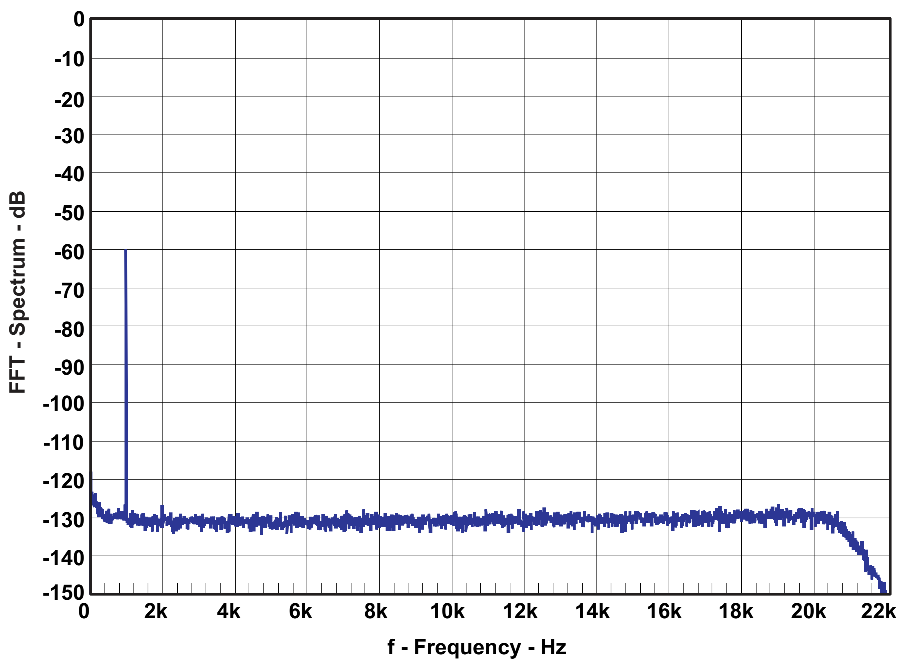
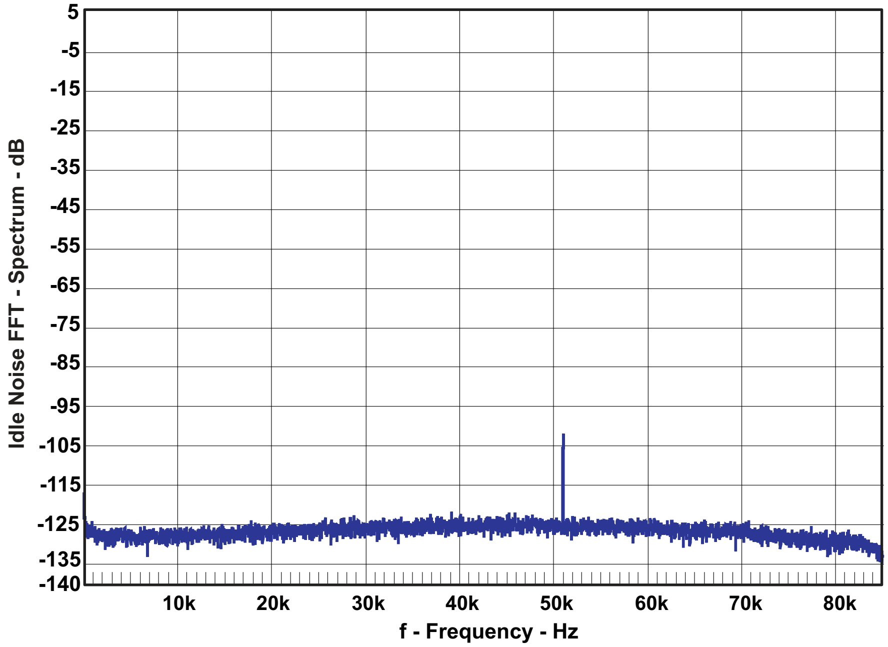


Figure 11. FFT Spectrum with –60-dBFS Tone (PBTL)

4.9 Idle Noise FFT Spectrum (BTL)

Input grounded – Reference voltage is 28.3 V. FFT size 16k.

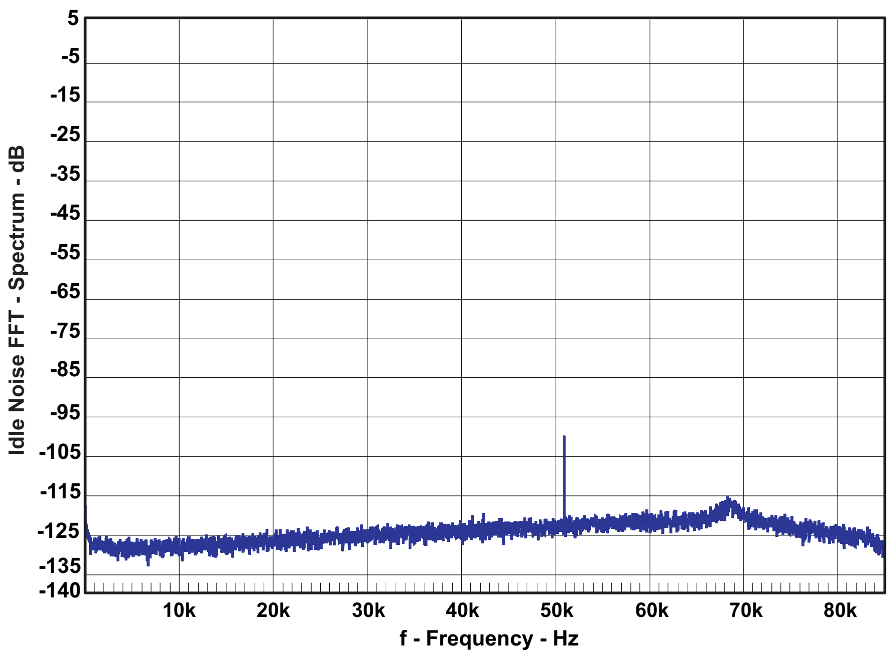


Spurious tone at 52 kHz has it's origin from the TL2575 switching voltage regulator.

Figure 12. Idle Noise FFT Spectrum (BTL)

4.10 Idle Noise FFT Spectrum (PBTL)

Input grounded – Reference voltage is 28.3 V. FFT size 16k.



Spurious tone at 52 kHz has it's origin from the TL2575 switching voltage regulator.

Figure 13. Idle Noise FFT Spectrum (PBTL)

4.11 Channel Separation

Left channel input signal is set corresponding to max unclipped output power (1% THD+N) Right channel input is grounded. Reference voltage 28.3 Vrms.

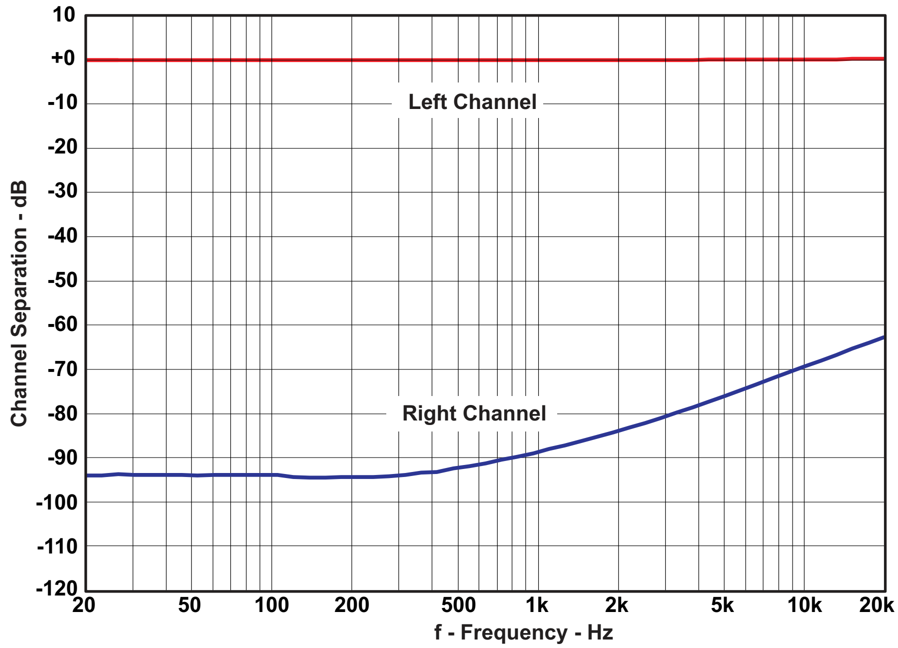


Figure 14. Channel Separation

4.12 Frequency Response (BTL)

Measurement bandwidth filter 80 kHz.

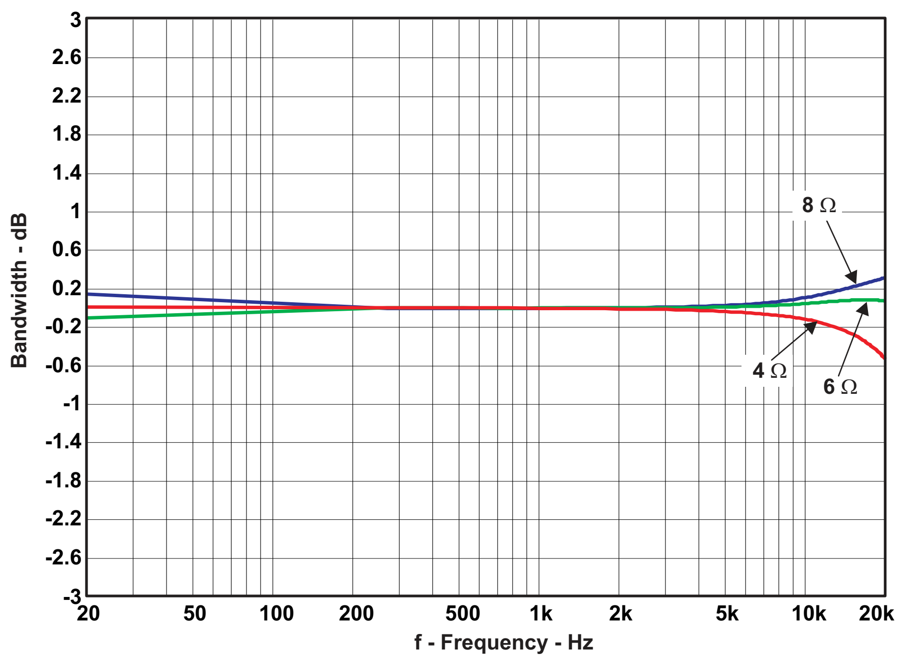


Figure 15. Frequency Response (BTL)

4.13 Frequency Response (PBTL)

Measurement bandwidth filter 80 kHz.

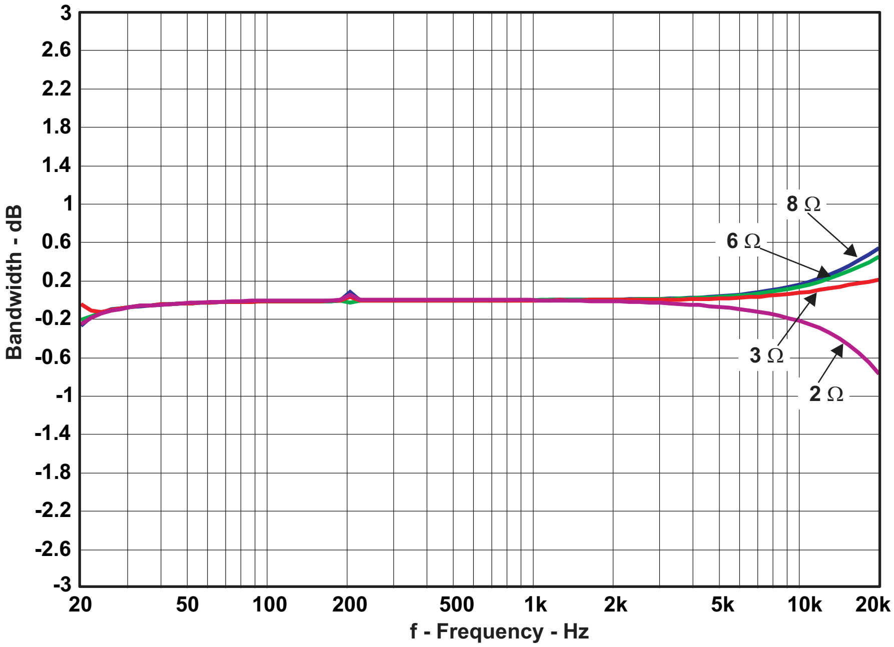


Figure 16. Frequency Response (PBTL)

4.14 High-Current Protection (BTL)

Input 1-kHz bursted signal, load 1 Ω.

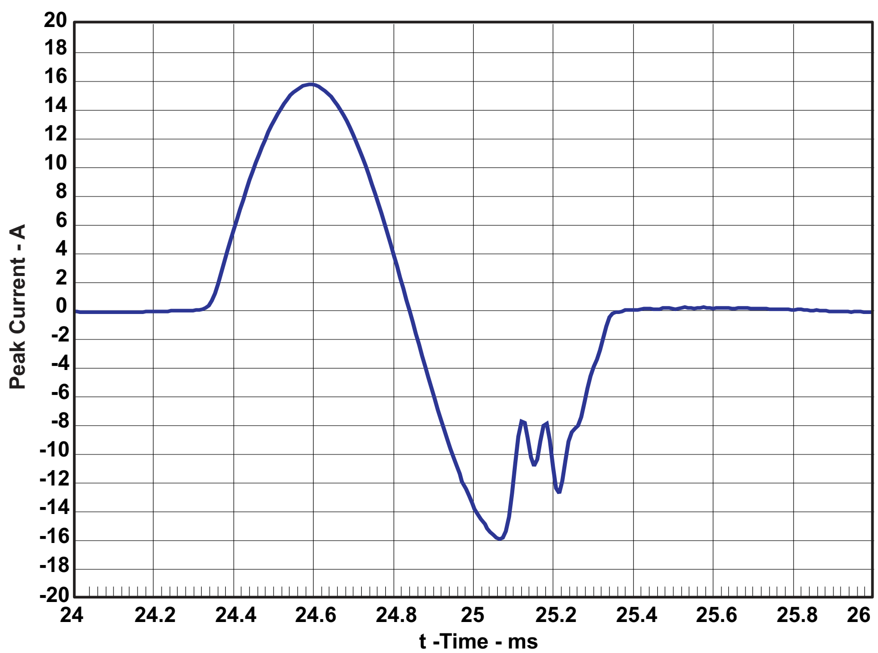


Figure 17. High-Current Protection (BTL)

4.15 High-Current Protection (PBTL)

Input 1-kHz bursted signal, load 1 Ω.

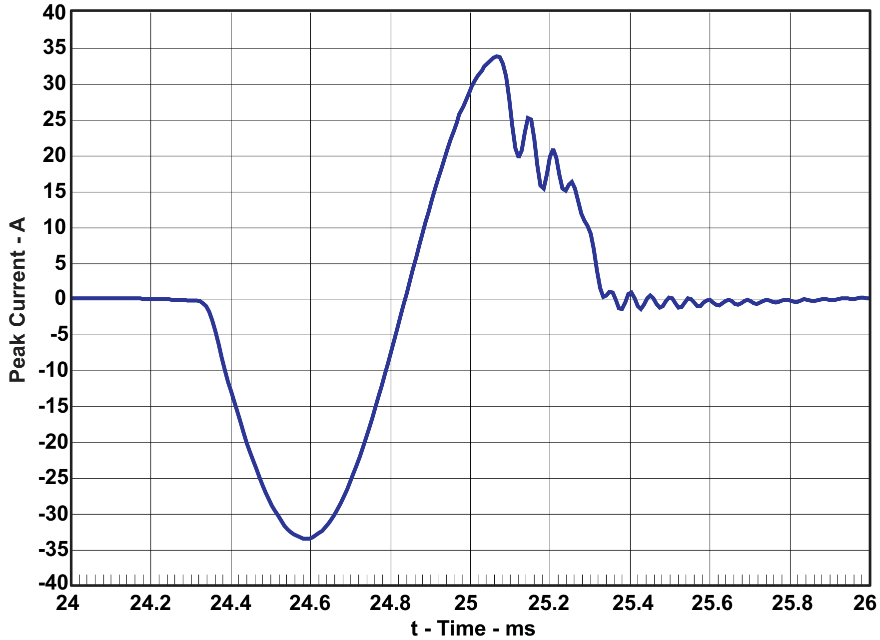


Figure 18. High-Current Protection (PBTL)

4.16 Pop/Click (BTL)

Input grounded. The measurement results are presented in frequency domain.

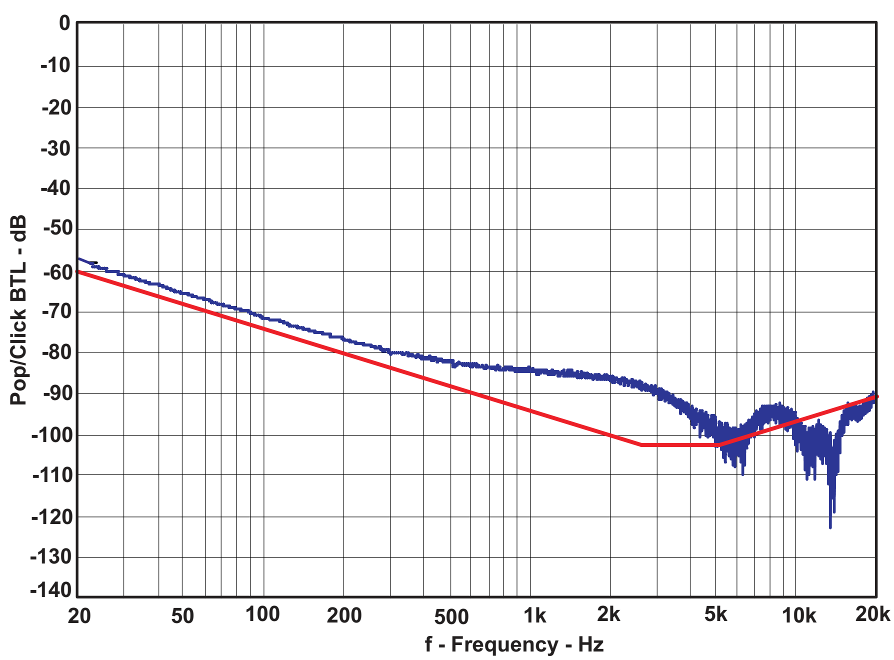


Figure 19. Pop/Click (BTL)

4.17 Pop/Click (PBTL)

Input grounded. The measurement results are presented in frequency domain.

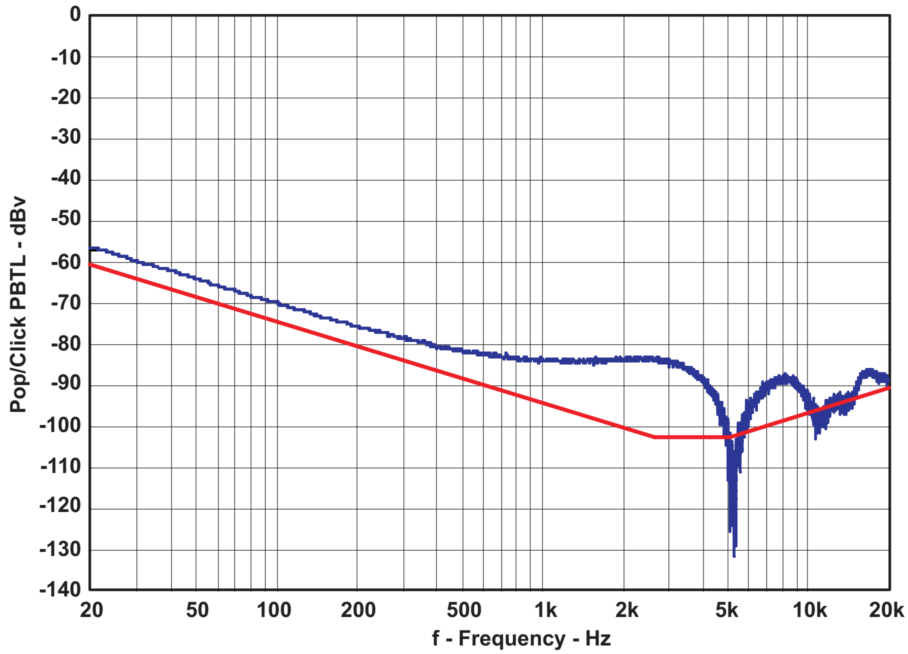


Figure 20. Pop/Click (PBTL)

4.18 Output Stage Efficiency

Efficiency is tested with 2 BTL channels.

The heat sink has been ventilated with a fan during the test.

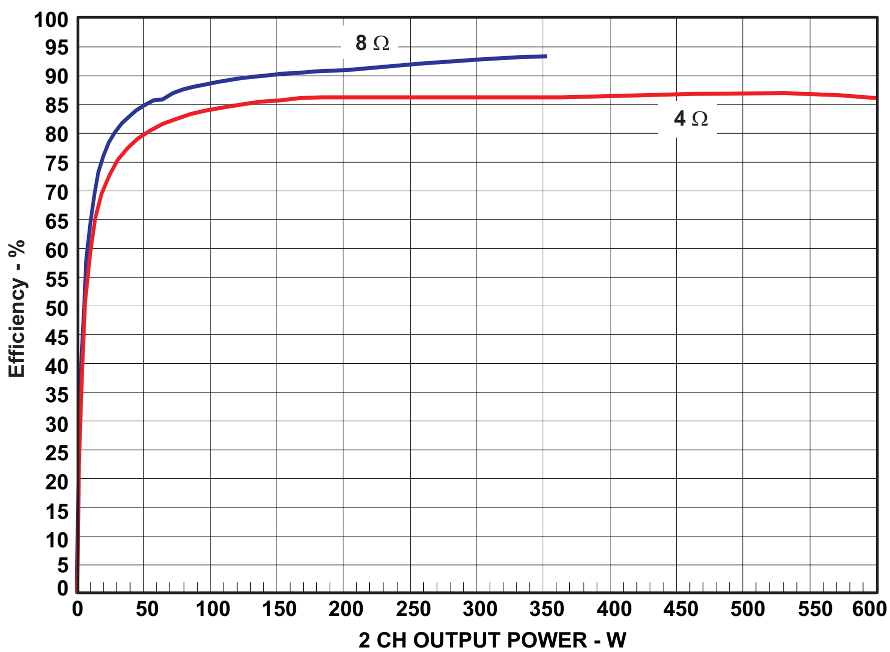


Figure 21. Output Stage Efficiency

5 Related Documentation from Texas Instruments

Table 9 contains a list of data manuals that have detailed descriptions of the integrated circuits used in the design of the TAS5630PHD2EVM. The data manuals can be obtained at the URL http://www.ti.com.

Table 9. Related Documentation from Texas Instruments

Part Number	Literature Number
TAS5630	SLES220
OPA1632D	SBOS286
LM317M	SLVS297
TL2575HV-15I	SLVS638

5.1 Additional Documentation

1. *System Design Considerations for True Digital Audio Power Amplifiers* application report (SLAA117)
2. *Digital Audio Measurements* application report (SLAA114)
3. *PSRR for PurePath Digital™ Audio Amplifiers* application report (SLEA049)
4. *Power Rating in Audio Amplifiers* application report (SLEA047)
5. *PurePath Digital™ AM Interference Avoidance* application report (SLEA040)
6. *Click and Pop Measurements Technique* application report (SLEA044)
7. *Power Supply Recommendations for DVD-Receivers* application report (SLEA027)
8. *Implementation of Power Supply Volume Control* application report (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 (4 pages)
- Parts List (1 pages)
- PCB Specification (1 page)
- PCB Layers (6 pages)
- Heat-Sink Drawing (1 page)

Design Name: **TAS5630PHD2EVM**
Type: Mass Market EVM
File Name: A844-SCH-001.DSN
Version: 5.00
Date: 5.May 2009
Design Engineer: Kim N Madsen (knm@ti.com), Jonas Holm (jlh@ti.com)

Audio Configuration: PurePath Premire Pro Digital Amplifier Design
1 x TAS5630PHD

Interfaces: J20-J21: Single Ended Analog Audio Input
J11, J13: Banana Bindingposts For Speakers
J15: Banana Bindingpost For H-Bridge Supply

Setup: 4 Ohm (BTL) Speaker Loads
+50 V H-Bridge Supply Voltage

Performance: 2 x 300 W / 4 Ohm (BTL) 10% THD+N
> 102 dB Dynamic Range

Page
1/4: Front Page and Schematic Disclaimer
2/4: TAS5630 Amplifier
3/4: Input Stage
4/4: Mechanics

NOTE1

SCHEMATIC DISCLAIMER

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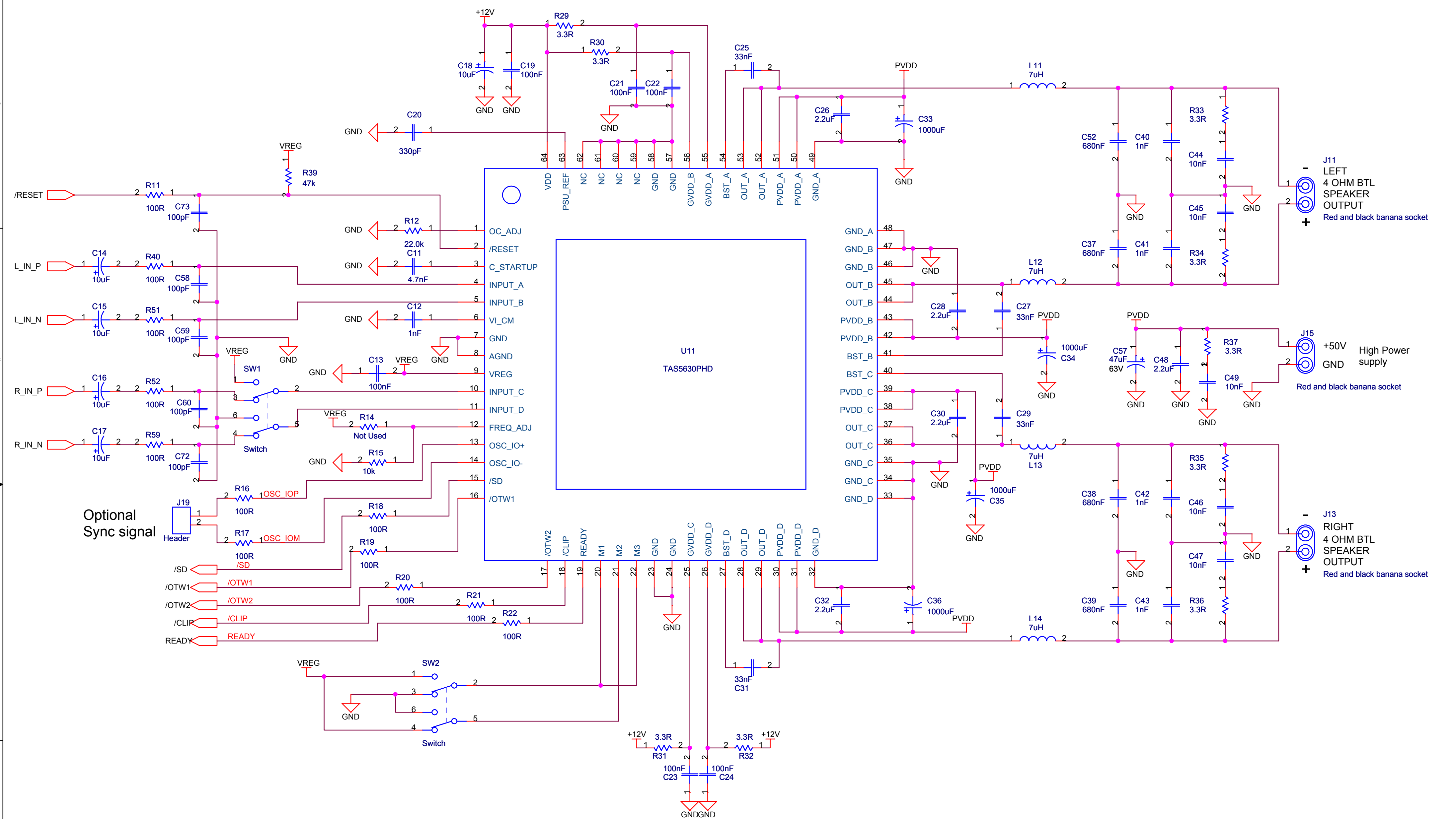
Schematic Disclaimer Preliminary

TAS5630 Parts list 5.00

AUDIO/IMAGING GROUP
Home Audio Amplifiers

Project: TAS5630PHD2EVM	Rev: 5.00
Page Title: Disclaimer	Size: A3
File Name: A844-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Wednesday, May 06, 2009	Page: 1 of 4

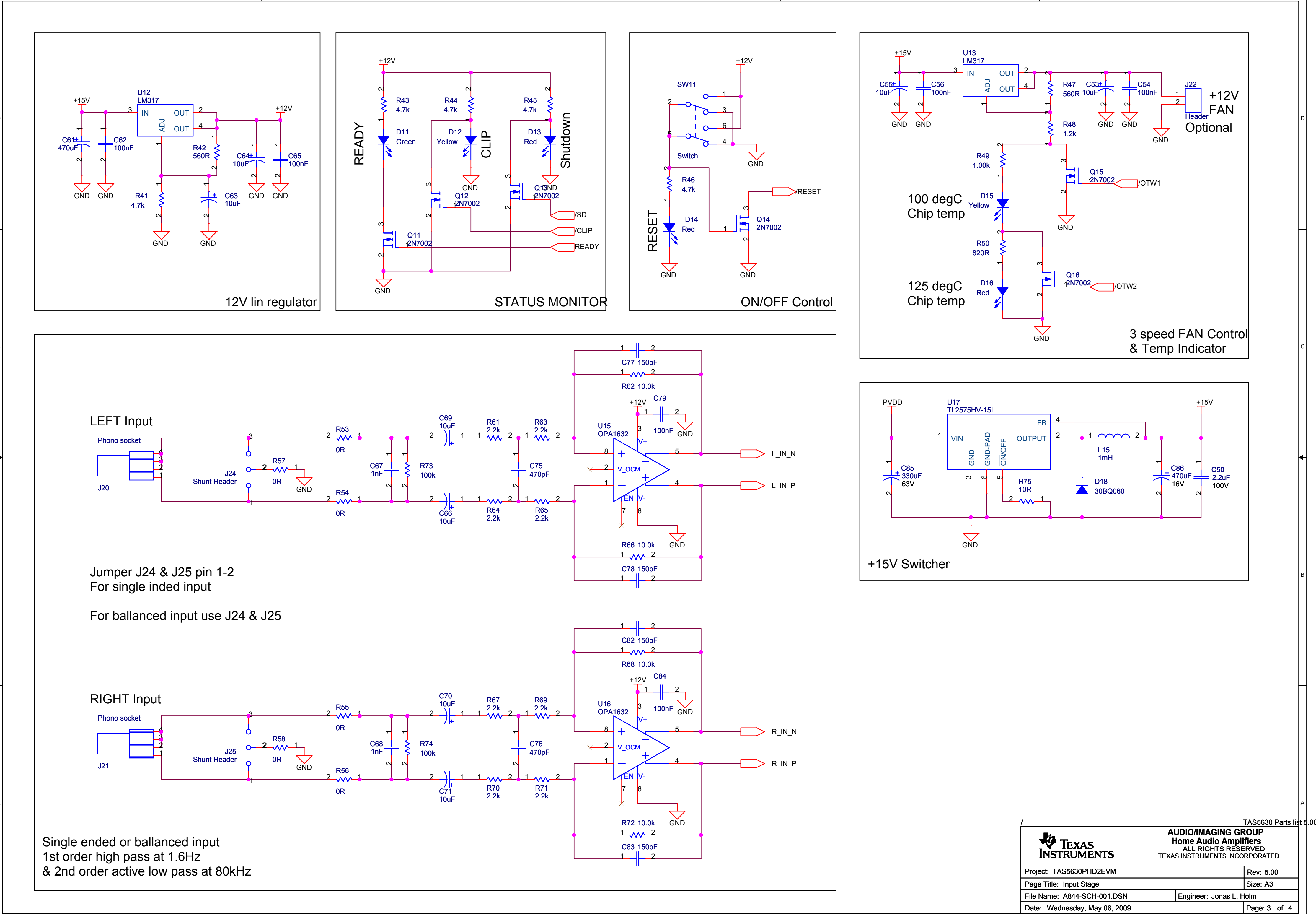


TAS5630 Parts list 5.00

TEXAS INSTRUMENTS

AUDIO/IMAGING GROUP
Home Audio Amplifiers

Project: TAS5630PHD2EVM	Rev: 5.00
Page Title: Main Schematic	Size: A3
File Name: A844-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Monday, May 25, 2009	Page: 2 of 4



12V lin regulator
U12 LM317
IN OUT ADJ OUT
+15V
+12V
C61 470uF
C62 100nF
R42 560R
C64 10uF
C65 100nF
R41 4.7k
C63 10uF
GND
STATUS MONITOR
READY
CLIP
Shutdown
R43 4.7k
R44 4.7k
R45 4.7k
D11 Green
D12 Yellow
D13 Red
Q11 2N7002
Q12 2N7002
Q13 2N7002
/SD
/CLIP
READY
ON/OFF Control
SW11
Switch
RESET
R46 4.7k
D14 Red
Q14 2N7002
/RESET
3 speed FAN Control
& Temp Indicator
U13 LM317
C55 10uF
C56 100nF
R47 560R
C53 10uF
C54 100nF
J22 Header
+12V FAN Optional
R48 1.2k
R49 1.00k
D15 Yellow
Q15 2N7002
/OTW1
100 degC Chip temp
R50 820R
D16 Red
Q16 2N7002
/OTW2
125 degC Chip temp
+15V Switcher
PVDD
U17 TL2575HV-15I
VIN OUTPUT FB GND GND-PAD ON/OFF
C85 330uF 63V
R75 10R
L15 1mH
D18 30BQ060
C86 470uF 16V
C50 2.2uF 100V
LEFT Input
Phono socket
J20
J24 Shunt Header
R57 0R
R53 0R
R54 0R
C67 1nF
R73 100k
C69 10uF
C66 10uF
R61 2.2k
R63 2.2k
R64 2.2k
R65 2.2k
C75 470pF
C77 150pF
R62 10.0k
C79 100nF
U15 OPA1632
V_OCM EN V+ V-
R66 10.0k
C78 150pF
L_IN_N
L_IN_P
Jumper J24 & J25 pin 1-2
For single inded input
For ballanced input use J24 & J25
RIGHT Input
Phono socket
J21
J25 Shunt Header
R58 0R
R55 0R
R56 0R
C68 1nF
R74 100k
C70 10uF
C71 10uF
R67 2.2k
R69 2.2k
R70 2.2k
R71 2.2k
C76 470pF
C82 150pF
R68 10.0k
C84 100nF
U16 OPA1632
R72 10.0k
C83 150pF
R_IN_N
R_IN_P
Single ended or ballanced input
1st order high pass at 1.6Hz
& 2nd order active low pass at 80kHz
TAS5630 Parts list 5.00
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AUDIO/IMAGING GROUP
Home Audio Amplifiers
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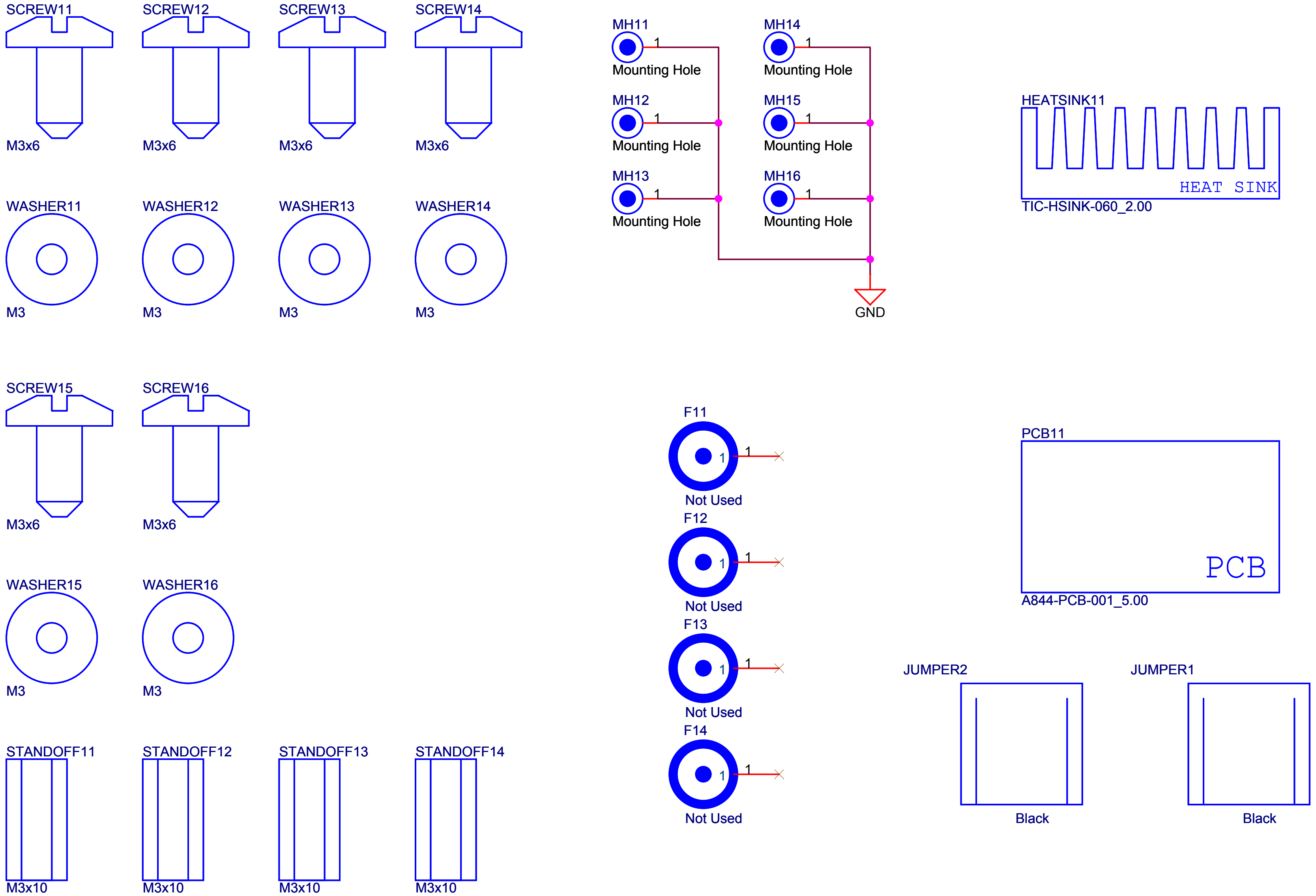
TEXAS INSTRUMENTS INCORPORATED
Project: TAS5630PHD2EVM
Rev: 5.00
Page Title: Input Stage
Size: A3
File Name: A844-SCH-001.DSN
Engineer: Jonas L. Holm
Date: Wednesday, May 06, 2009
Page: 3 of 4

MECHANICS



TAS5630 Parts list 5

TEXAS INSTRUMENTS

AUDIO/IMAGING GROUP
Home Audio Amplifiers

Project: TAS5630PHD2EVM	Rev: 5.00
Page Title: Mechanics	Size: A4
File Name: A844-SCH-001.DSN	Engineer: Jonas L. Holm
Date: Wednesday, May 06, 2009	Page: 4 of 4

TAS5630PHD2EVM Parts List (5.00).xls

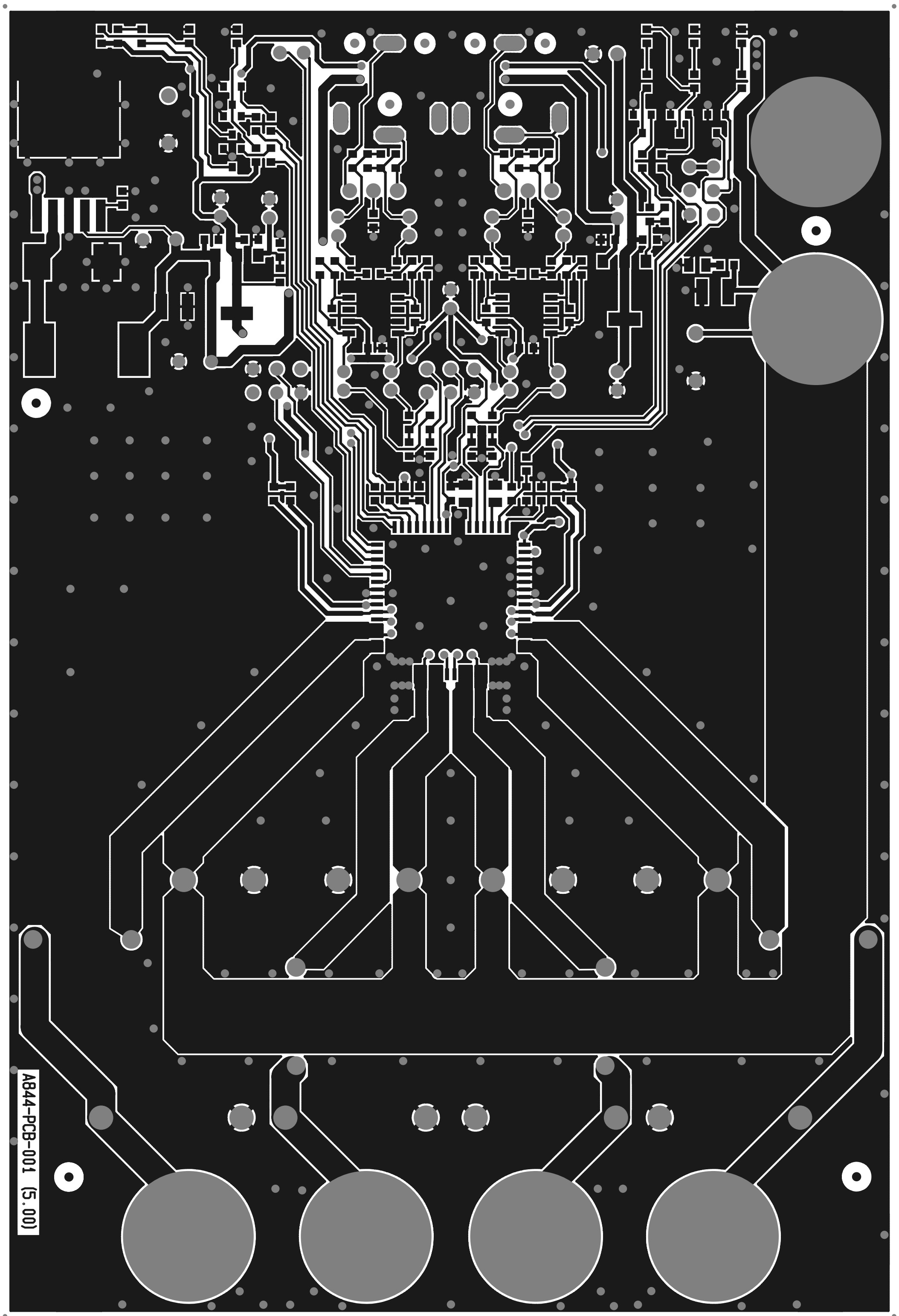
Qty	Part Reference	Description	Manufacture	First Mfr P/N
6	R53 R54 R55 R56 R57 R58	0R / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-070RL
12	R11 R16 R17 R18 R19 R20 R21 R22 R40 R51 R52 R59	100R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07100RL
1	R49	1.00k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-071KL
1	R15	10k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710KL
4	R62 R66 R68 R72	10.0k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-0710KL
2	R73 R74	100k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07100KL
1	R75	10R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710RL
1	R48	1.2k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071K2L
8	R61 R63 R64 R65 R67 R69 R70 R71	2.2k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-072K2L
1	R12	22.0k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-0722KL
9	R29 R30 R31 R32 R33 R34 R35 R36 R37	3.3R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-073R3L
5	R41 R43 R44 R45 R46	4.7k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-074K7L
1	R39	47k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0747KL
2	R42 R47	560R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07560RL
1	R50	820R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07820RL
5	C44 C45 C46 C47 C49	Ceramic 10nF / 100V / 20% X7R 0805 Capacitor	BC Components	0805B103M101NT
1	C11	Ceramic 4.7nF / 50V / 10% X7R 0805 Capacitor	BC Components	0805B472K500NT
4	C40 C41 C42 C43	Ceramic 1nF / 100V / 10% NP0 1206 Capacitor	BC Components	1206N102K101NT
6	C26 C28 C30 C32 C48 C50	Ceramic 2.2uF / 100V / 20% X7R 1210 Capacitor	Murata	GRM32ER72A225KA35L
1	C12	Ceramic 1nF / 50V / 10% NP0 0805 Capacitor	BC Components	0805N102K500NT
12	C13 C19 C21 C22 C23 C24 C54 C56 C62 C65 C79 C84	Ceramic 100nF / 16V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXJ
4	C25 C27 C29 C31	Ceramic 33nF / 25V / 20% X7R 0603 Capacitor	BC Components	0603B333M250NT
5	C58 C59 C60 C72 C73	Ceramic 100pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N101K500NT
2	C67 C68	Ceramic 1nF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N102K500NT
4	C77 C78 C82 C83	Ceramic 150pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N151K500NT
1	C20	Ceramic 330pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N331K500NT
2	C75 C76	Ceramic 470pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N471K500NT
4	C37 C38 C39 C52	Metal Film 680nF / 250V / 20% Polypropylene 15mm (W:8mm L:18mm) Capacitor	Wima	MKP 4 0.68uF/20%/250Vdc PCM15
13	C14 C15 C16 C17 C18 C53 C55 C63 C64 C66 C69 C70 C71	Electrolytic 10uF / 16V / 20% Aluminium 2mm ø5mm M Series - General Purpose Capacitor	Panasonic	ECA1CM100
4	C33 C34 C35 C36	Electrolytic 1000uF / 63V / 20% Aluminium 7.5mm ø16mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1J102
1	C85	Electrolytic 330uF / 63V / 20% Aluminium 5mm ø10mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1J331L
1	C57	Electrolytic 47uF / 63V / 20% Aluminium 5mm ø10mm Capacitor	BC Components	2222 136 68479
1	C86	Electrolytic 470uF / 16V / 20% Aluminium 3.5mm ø8mm Low ESR Capacito	Rubycon	16ZL470M8x16
1	C61	Electrolytic 470uF / 25V / 20% Aluminium 3.5mm ø8mm FC Series - Low Impedance Capacitor	Panasonic	EEUFC1E471L
1	L15	1mH / 0.55A 20% (1.68R) Ferrite Inductor (12.8x12.8x8.0)	Epcos	B82477G4105M000
4	L11 L12 L13 L14	7uH / 5A (30mR) Low THD+N Ferrite Inductor	Fe-Tronic	TIC-INDC-026 (1.00)
1	D18	3A / 60V Schottky 30BQ060 Diode (SMC)	Int. Rectifier	30BQ060PBF
3	D13 D14 D16	Light Emitting Red Red LED (0603)	Toshiba	TLSU1008
1	D11	Light Emitting Green Green LED (0603)	Toshiba	TLGU1008
2	D12 D15	Light Emitting Yellow Yellow LED (0603	Toshiba	TLYU1008
6	Q11 Q12 Q13 Q14 Q15 Q16	0.115A / 60V N-ch Power 2N7002 Mosfet (SOT-23)	Fairchild	2N7002
1	U11	TAS5630PHD / Stereo Analog Audio PWM Power Output Stage (PHD64)	Texas Instruments	TAS5630PHD
2	U15 U16	OPA1632 / High-Performance, Fully-Differential Audio Opamp (SO8)	Texas Instruments	OPA1632D
2	U12 U13	LM317 / 0.5A Positive Adjustable Regulator (DCY)	Texas Instruments	LM317MDCY
1	U17	TL2575HV-15I / 15V/1-A SIMPLE STEP-DOWN SWITCHING VOLTAGE REGULATORS (KTT5)	Texas Instruments	TL2575HV-15IKTTR
6	SCREW11 SCREW12 SCREW13 SCREW14 SCREW15 SCREW16	M3x6 Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x6
6	WASHER11 WASHER12 WASHER13 WASHER14 WASHER15 WASHER16	M3 Stainless Steel Spring Washer	Bossard	BN 760 M3
4	STANDOFF11 STANDOFF12 STANDOFF13 STANDOFF14	M3x10 Aluminium Stand-off	Ettinger	05.03.108
2	J19 J22	2 pins / 1 row / 2.54mm Pitch Vertical Male Friction lock Pin header Heade	Molex	22-27-2021
2	JUMPER1 JUMPER2	2 pins / 1 row / 2.54mm Pitch Horizontal Female Black Shunt Black	Molex	15-29-1024
2	J20 J21	Horizontal Female w. Switch Coax Phono socket	Chunfeng	RJ843-4W
3	J11 J13 J15	2 pins / Vertical Female Banana Red and black banana socket	Cliff	TPP-3CT
2	J24 J25	3 pins / 1 row / 2.54mm Pitch Vertical Male Shunt Header Shunt Heade	Samtec	TSW-107-07-T-T
3	SW1 SW2 SW11	Switch DPDT PCB Mount Switch	NKK-Nikkai	G-22-AP
1	NOTE1	Schematic Disclaimer Preliminary Note Note	n/a	n/a
1	PCB11	A844-PCB-001_5.00 / TAS5630PHD2EVM Printed Circuit Board (ver. 5.00)	Printline	A844-PCB-001(5.00)
1	HEATSINK11	TIC-HSINK-060_2.00 / Heatsink for 1 PHD package, length 78 mm	Phonotech	TIC-HSINK-060(2.00)

Jonas Holm

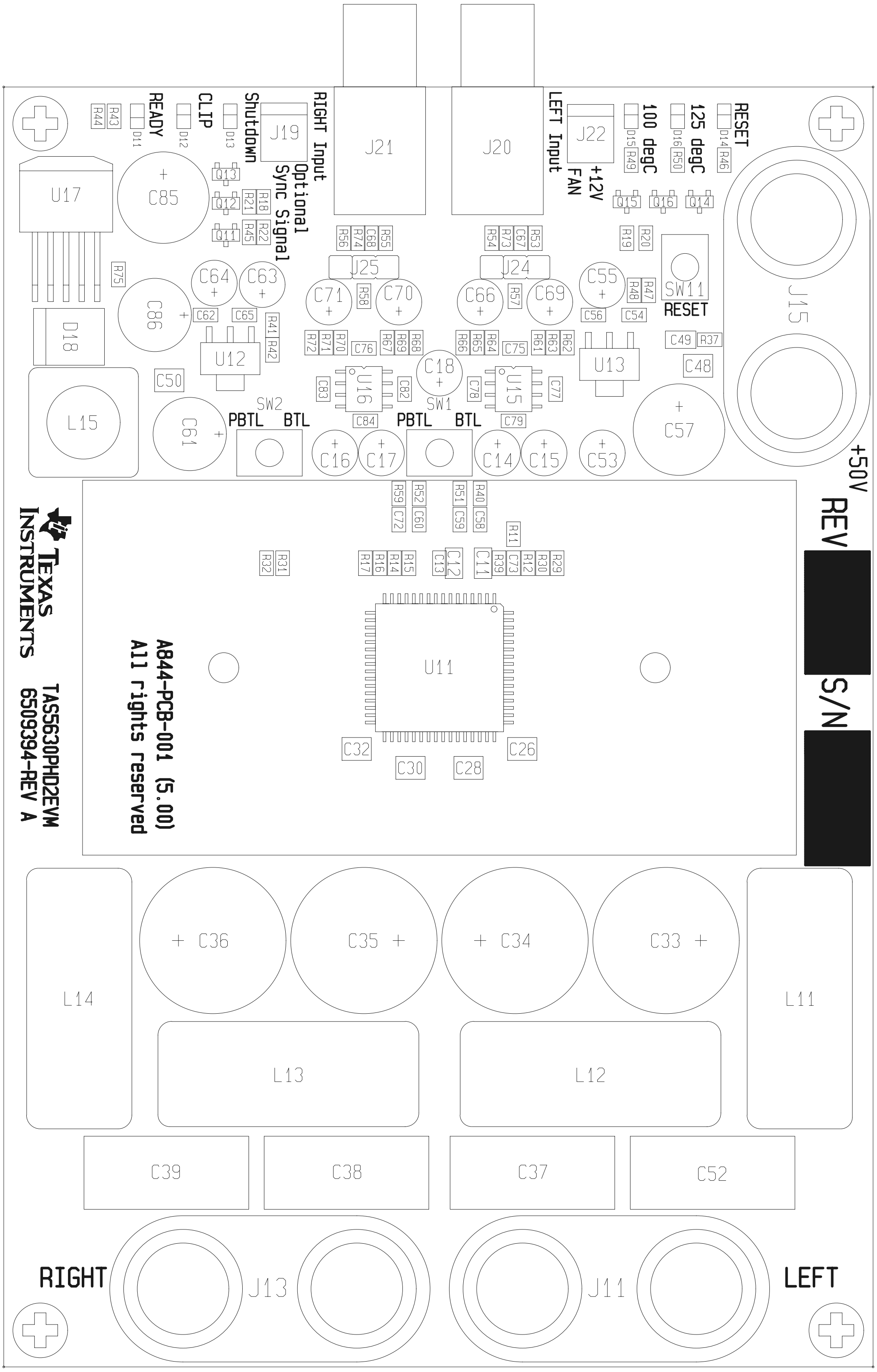
TAS5630PHD2EVM
PCB SPECIFICATION
Version 5.00

BOARD IDENTIFICATION:	A844-PCB-001(5.00)
BOARD TYPE:	DOUBLE-SIDED PLATED-THROUGH BOARD
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6mm
TOP LAYER COPPER THICKNESS:	70µm (INCL. PLATING EXTERIOR LAYER)
BOTTOM LAYER COPPER THICKNESS:	70µm (INCL. PLATING EXTERIOR LAYER)
COPPER PLATING OF HOLES:	>25µm
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:	95 x 140 mm
Aprox. Number of holes	880
COMMENTS:	SEE DRILL INFORMATION FILE (A844-PCB-001(5.00).pdf)

COMPONENT SIDE	DpS 5312 090520
TI Denmark A844-PCB-001 (5.00)	



COMP. LAYOUT COMP	DpS 5312 090520
TI Denmark A844-PCB-001 (5.00)	



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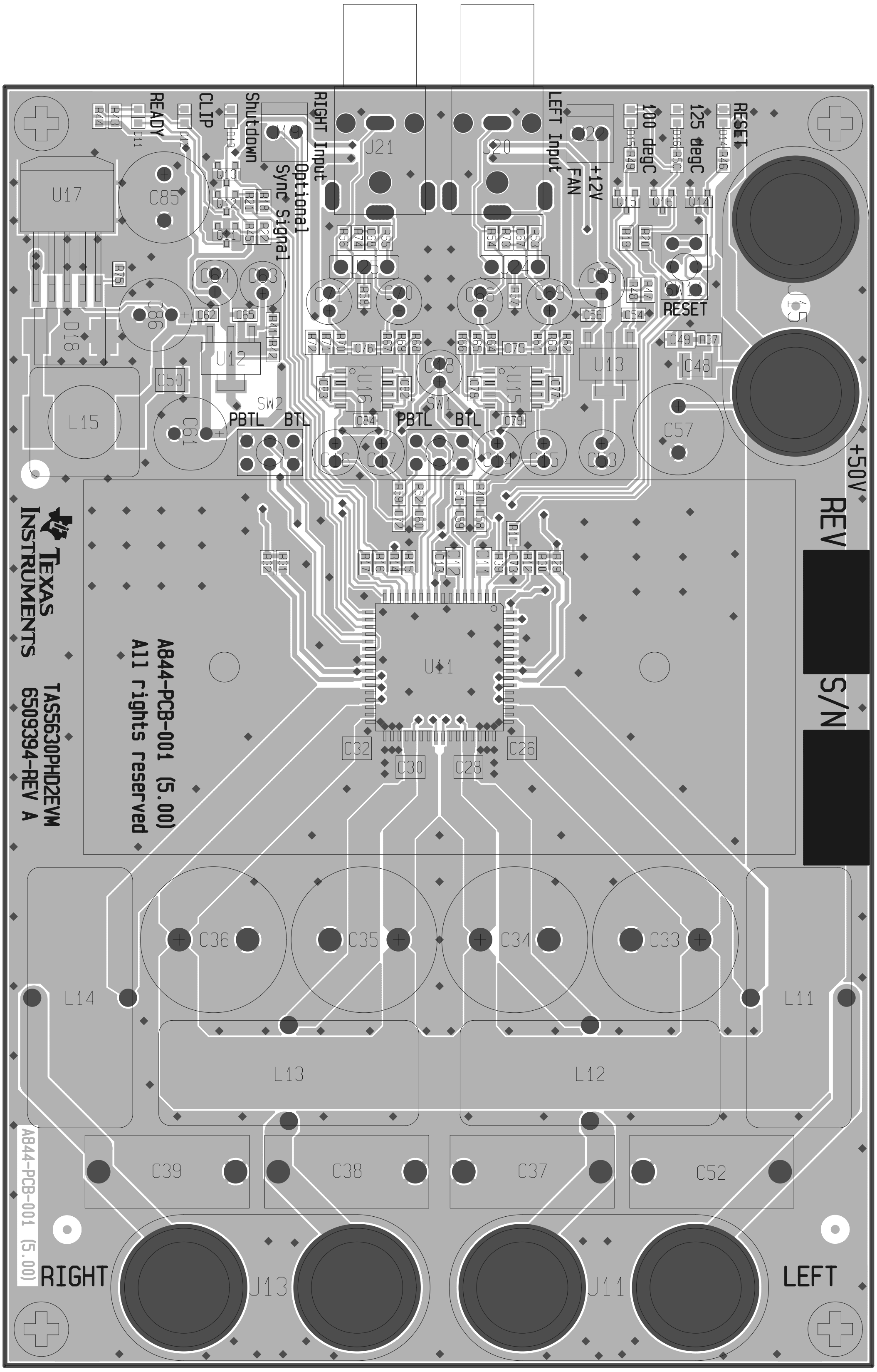
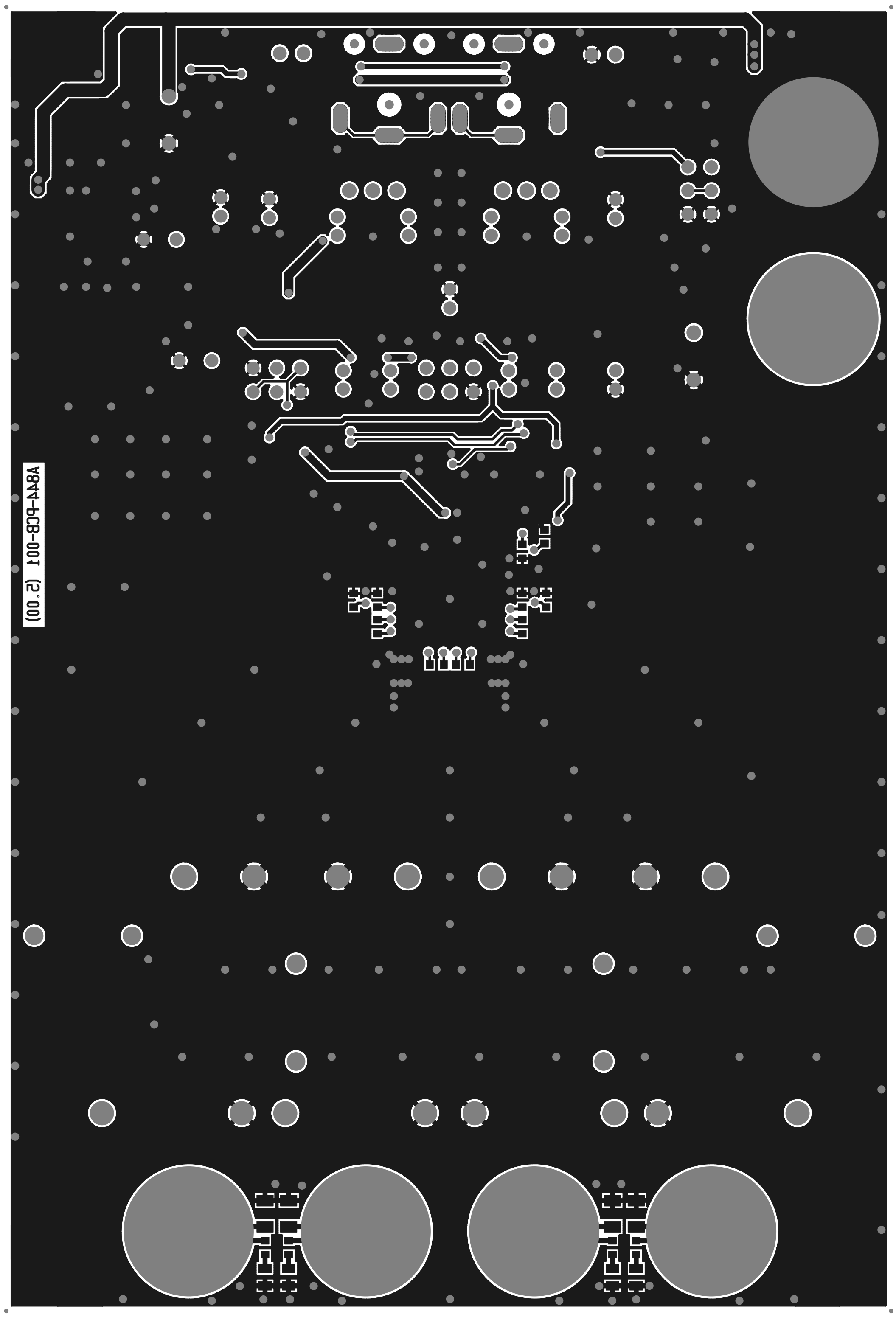


SOLDER SIDE		dps 5312 090520
TI Denmark A844-PCB-001 (5.00)		



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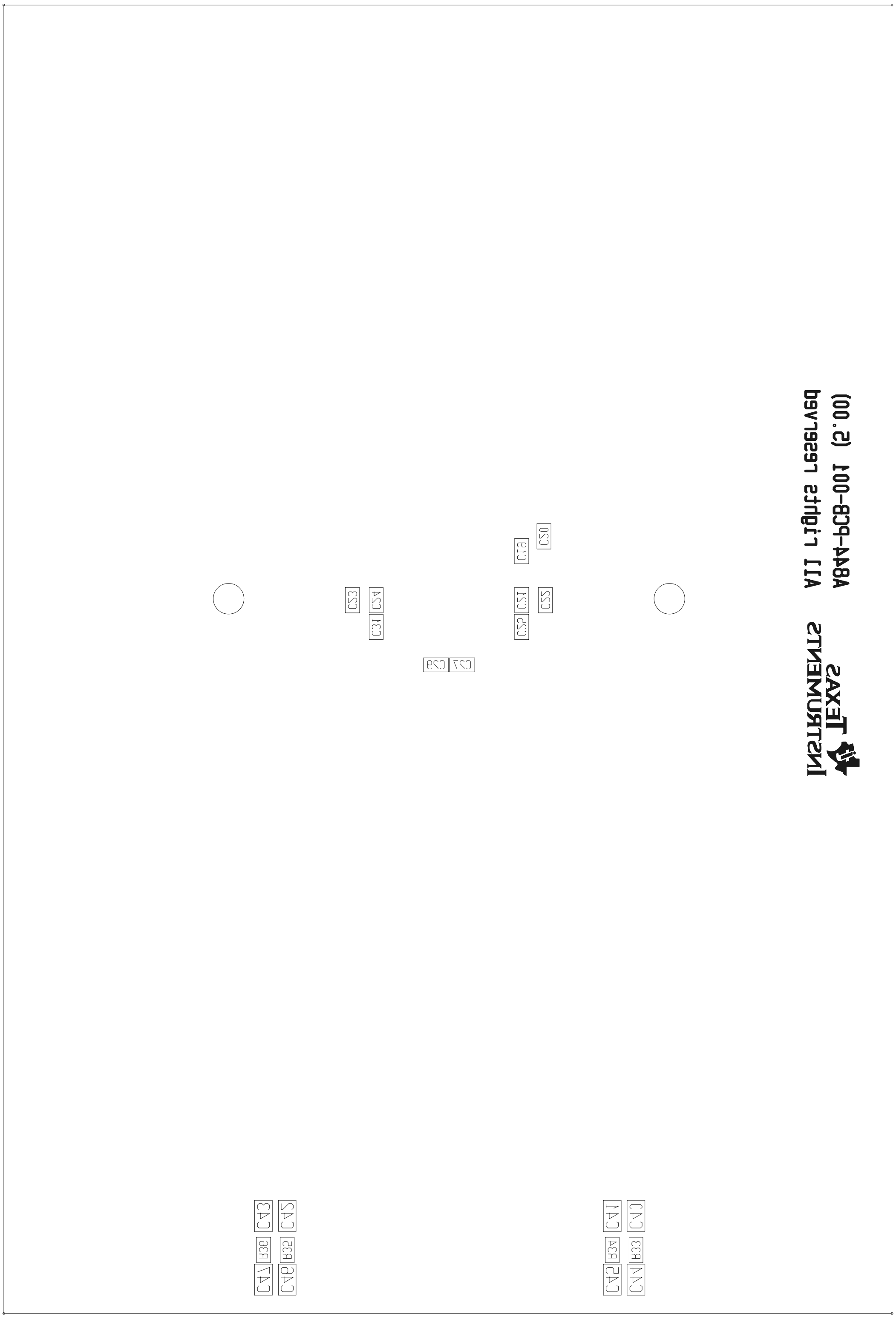

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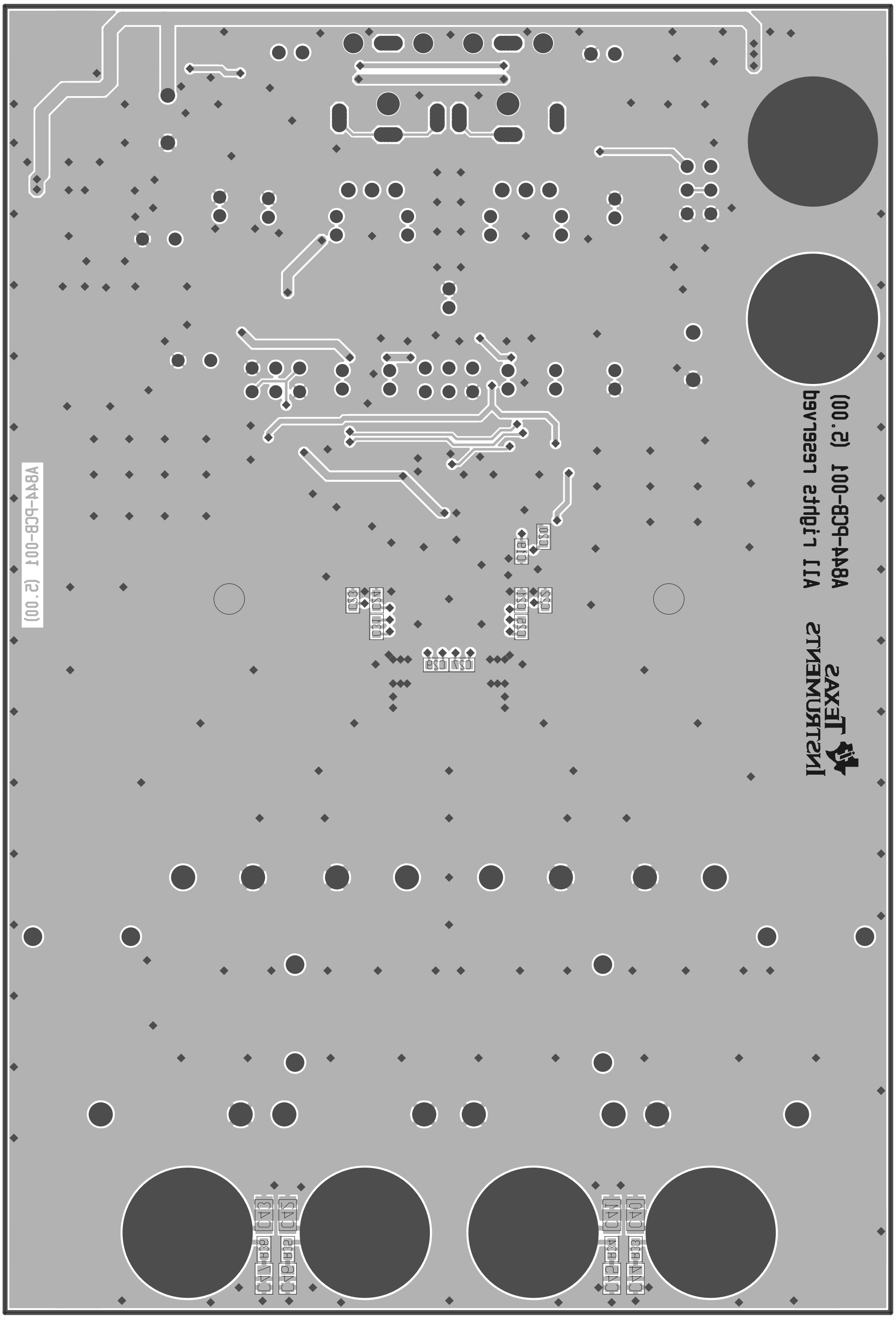


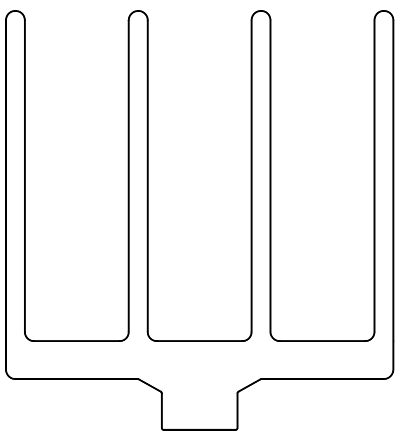
TEXAS INSTRUMENTS

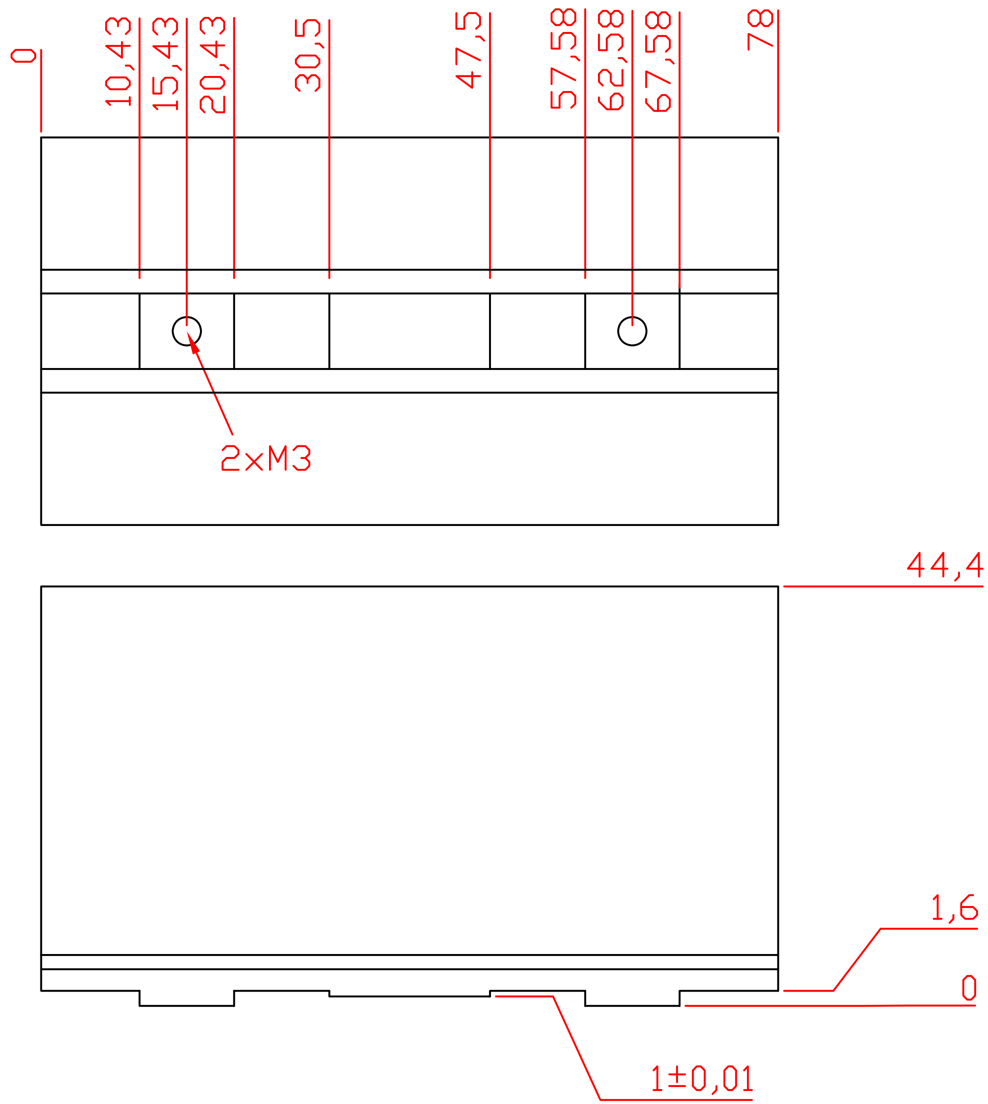
TIC-HSINK-060 (2.00)

Heat sink for 1 PHD package

3. april 2008
TIC-HSINK-060 (2.00).dwg

Kim N Madsen





APPROX. SCALE: 1.25:1
DIMENSIONS: mm
MATERIAL: Profile TIC-HSINK-050(1.00), ALUMINUM
SURFACE: FREE OF SHARP EDGES
SURFACE TREATMENT: BLACK ANODIZED
TOLERANCES: +/- 0.1 mm

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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 90°C. The EVM is designed to operate properly with certain components above 125°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.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265