

## **TAS5504-5142V4EVM Application Report**

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DAV Digital Audio/Speaker

### **ABSTRACT**

The TAS5504-5142V4EVM PurePath Digital™ customer evaluation module demonstrates the integrated circuits, TAS5504APAG and TAS5142DDV, from Texas Instruments (TI).

The TAS5504APAG is a high-performance 32-bit (24-bit input) multichannel PurePath Digital pulse width modulator (PWM) based on Equibit™ technology, with a 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).

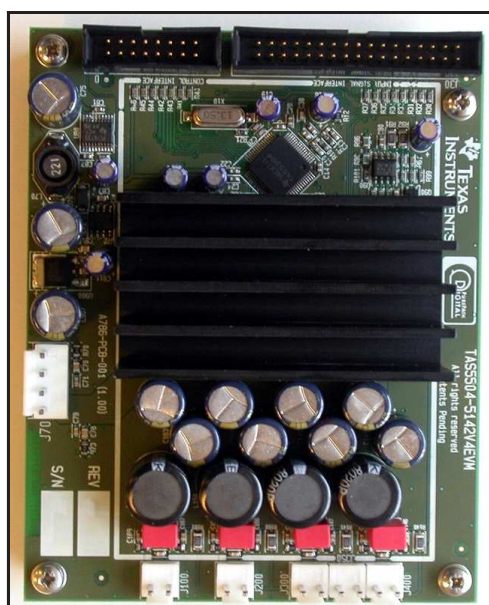
The TAS5142DDV is a third-generation, high-performance, integrated stereo digital amplifier power stage designed to drive two 4-Ω loudspeakers up to 100 W (10% THD+N) in bridge-tied load (BTL) configuration, or four 4-Ω loudspeakers up to 30 W (10% THD+N) in single ended (SE) configuration. It contains integrated gate drivers, eight matched and electrically isolated enhancement-mode N-channel power DMOS transistors, and protection/fault-reporting circuitry.

This EVM is configured with four SE channels – but can be connected as a two SE plus one BTL. This becomes a 2.1-channel system.

This EVM, together with a TI input-USB board, is a complete 4-channel digital audio amplifier system that includes digital input (S/PDIF), analog inputs, interface to PC, and DAP features, such as digital volume control, input and output mixers, auto mute, tone controls, loudness, EQ filters, and dynamic range compression (DRC). There are configuration options for power-stage failure protection.

This 4-channel system is designed for home-theater applications, such as DVD receivers, DVD mini-component systems, home theater in a box (HTIB), or flat panel TVs.

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



For EVM setup and use, see the *TAS5504-5142V4EVM User's Guide (SLEU075)*.

For gerber (layout) and parts list (MS Excel format), see the PurePath Digital™ CD-ROM.

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# 1 TAS5504-5142V4EVM Specification

**Table 1. General Test Conditions**

| General Test Conditions      |             | Notes                                      |
|------------------------------|-------------|--|
| Output Stage Supply Voltage: | 32 V        | Laboratory Power Supply (EA-PS 7065-10A)   |
| System Supply Voltage:       | 15 V        |  |
| Load Impedance:              | 4 ohm       |  |
| Sampling Frequency:          | 48 kHz      |  |
| PWM Processor:               | TAS5504APAG |  |
| Output Stage:                | TAS5142DDV  |  |
| TI Input Board:              | Input-USB   | Rev 5                                      |
| EVM configuration file:      | ver 1.00    | TAS5504-5142V4EVM configuration (1.00).cfg |

**Table 2. TAS5504A Register Settings**

| Register                            | I2C Address | Value                      | Notes                                |
|-------------------------------------|-------------|----------------------------|--------------------------------------|
| Modulation Index Limit Register     | 0x16        | 0x04                       | Set Modulation Index to 96.1%        |
| Output Mixer Register PWM channel 1 | 0xAA        | 00 80 00 00<br>00 00 00 00 | Mix DAP Channel 1 into PWM channel 1 |
| Output Mixer Register PWM channel 2 | 0xAB        | 10 80 00 00<br>00 00 00 00 | Mix DAP Channel 2 into PWM channel 2 |
| Output Mixer Register PWM channel 7 | 0xB0        | 40 80 00 00<br>00 00 00 00 | Mix DAP Channel 5 into PWM channel 7 |
| Output Mixer Register PWM channel 8 | 0xB1        | 50 80 00 00<br>00 00 00 00 | Mix DAP Channel 6 into PWM channel 8 |
| Master Volume Register              | 0xD9        | 00 00 00 48                | Master Volume set to 0dB             |

**Table 3. Electrical Data**

| Electrical Data                       | Notes/Conditions |  |
|---------------------------------------|------------------|--|
| Output Power, SE, 4 ohm:              | 20 W             | 1 kHz, unclipped (0 dBFS), T <sub>A</sub> = 25°C |
| Output Power, SE, 4 ohm: (10% THD+N)  | 30 W             | 1 kHz, T <sub>A</sub> = 25°C                     |
| Output Power, BTL, 8 ohm:             | 45 W             | 1 kHz, unclipped (0 dBFS), T <sub>A</sub> = 25°C |
| Output Power, BTL, 8 ohm: (10% THD+N) | 75 W             | 1 kHz, T <sub>A</sub> = 25°C                     |
| Rated Load Impedance:                 | 4-8 ohm          |  |
| Maximum Peak Current:                 | >7 A             | 1 kHz, burst, 1 ohm, R <sub>∞</sub> = 22 k       |
| Output Stage Efficiency:              | >90 %            | 1 kHz, 4 × 20 W, 4 ohm                           |
| System Supply Current:                | <100 mA          | 1 kHz, -60 dBFS signal                           |
| H-Bridge Supply Current:              | 4 W              | 1 kHz, -60 dBFS signal                           |
| Total Board Idle Power Consumption:   |                  | H-Bridge supply + System supply, -60 dBFS signal |

**Table 4. Audio Performance<sup>(1)</sup>**

| Audio Performance                |                                 | Notes/Conditions                           |
|----------------------------------|---------------------------------|--|
| THD+N, 1 W, SE, 4 ohm:           | <0.2 %                          | 1 kHz                                      |
| THD+N, 10 W, SE, 4 ohm:          | <0.2 %                          | 1 kHz                                      |
| THD+N, 0Dbfs, SE, 4 ohm:         | <0.2 %                          | 1 kHz                                      |
| THD+N, 1 W, SE, 8 ohm:           | <0.09 %                         | 1 kHz                                      |
| THD+N, 10 W, SE, 8 ohm:          | <0.2 %                          | 1 kHz                                      |
| THD+N, 0Dbfs, SE, 8 ohm:         | <0.2 %                          | 1 kHz                                      |
| Dynamic Range:                   | >100 dB                         | Ref: rated power, A-weighted, AES17 filter |
| Noise Voltage:                   | <100 $\mu\text{V}_{\text{rms}}$ | A-weighted, AES17 filter                   |
| Click/Pop:                       | <20 mV                          | Mute/Unmute, No signal, 4 ohm              |
| Channel Separation:              | >75 dB                          | 1 kHz, $P_{\text{OUT}} = 20 \text{ W}$     |
| Frequency Response 200 – 20 kHz: | +1 dB                           | 20 W/4 ohm, unclipped (0 dBFS)             |

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

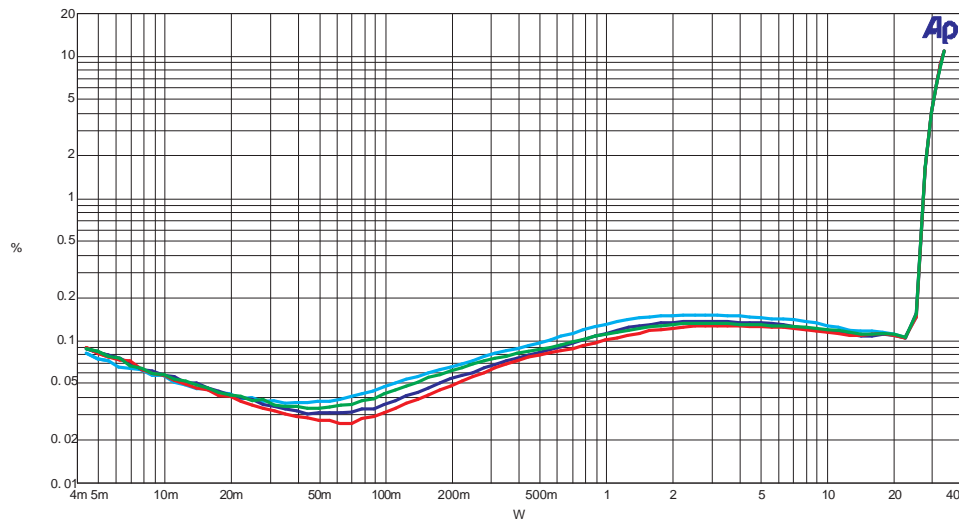
**Table 5. Physical Specifications<sup>(1)</sup>**

| Physical Specifications |                | Notes/Conditions             |
|-------------------------|----------------|------------------------------|
| PCB Dimensions:         | 95 mm × 120 mm | Width × Length               |
| Total Weight:           | <200 g         | Components + PCB + Mechanics |

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

### 1.1 THD+N vs Power (Ch 1-4)

Channels 1 to 4, one trace for each channel, one channel running, rest muted


**Comments:**

Power supply: 32 Vdc

Load: 4 ohm

Filter: AES17

Input signal: 1kHz

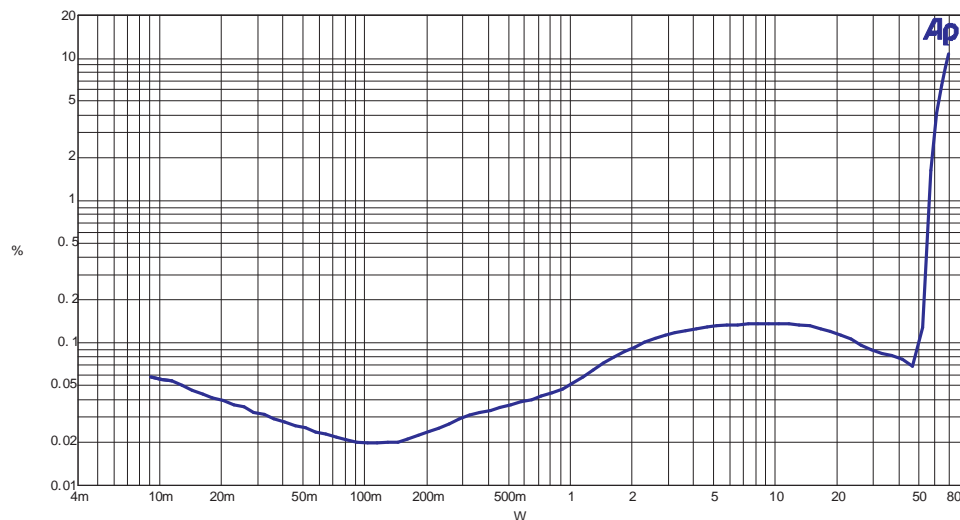
+2.5 dB gain in TAS5504A

Sample frequency: 48kHz

**Figure 1. THD+N vs Power (Ch 1-4)**

### 1.2 THD+N vs Power (BTL)

Channel BTL, 1 BTL Channel running, rest muted


**Comments:**

Power supply: 32 Vdc

Load: 8 ohm

Filter: AES17

Input signal: 1kHz

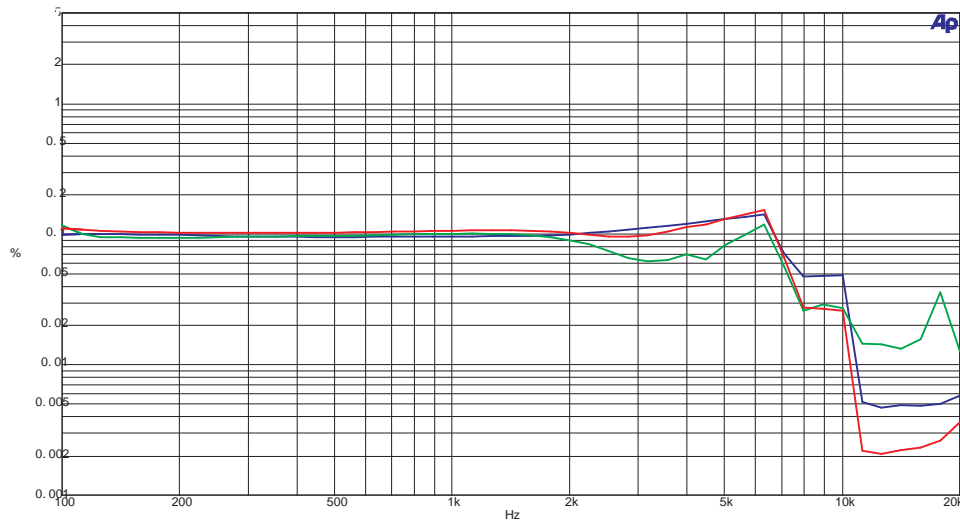
+2.5 dB gain in TAS5504A

Sample frequency: 48kHz

**Figure 2. THD+N vs Power (BTL)**

### 1.3 THD+N vs Frequency (Ch 1)

#### Channel 1



**Comments:**

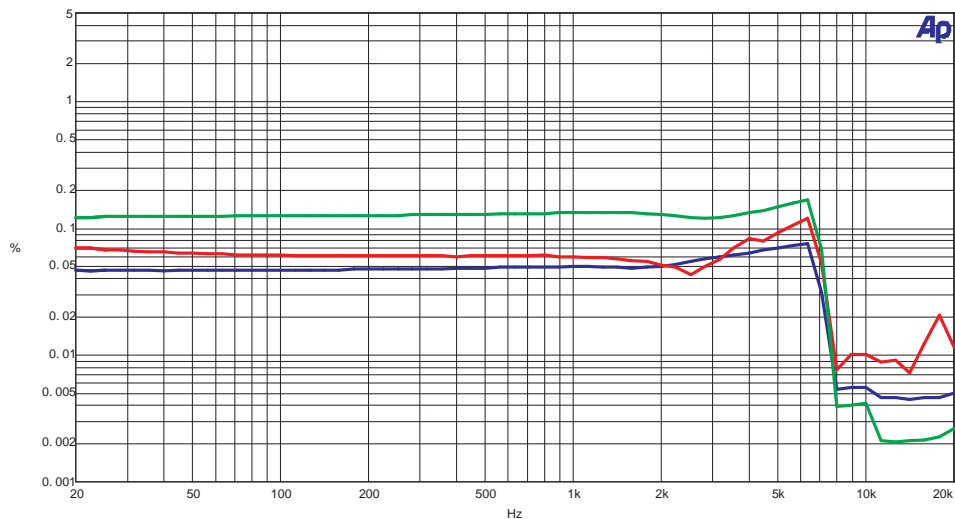
|                      |                        |                      |                         |
|----------------------|------------------------|----------------------|-------------------------|
| <b>Blue: 1 watt</b>  | <b>Green: 10 watts</b> | <b>Red: 20 watts</b> | Sample frequency: 48kHz |
| Power supply: 32 Vdc | Load: 4 ohm            | Filter: AES17        |                         |

A THD+N at high frequencies depend on the output-filter coil material.

**Figure 3. THD+N vs Frequency (Ch 1)**

### 1.4 THD+N vs Frequency (BTL)

#### Channel BTL



**Comments:**

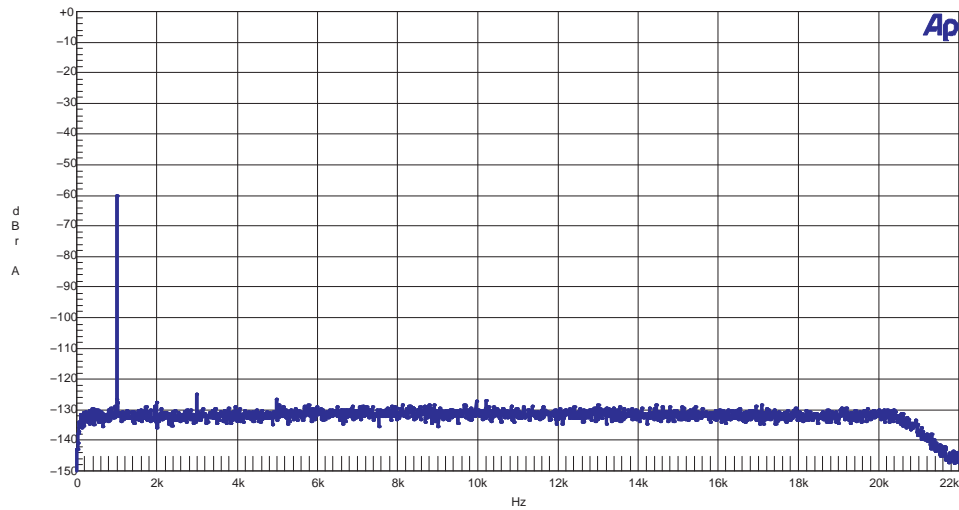
|                      |                        |                      |                         |
|----------------------|------------------------|----------------------|-------------------------|
| <b>Blue: 1 watt</b>  | <b>Green: 10 watts</b> | <b>Red: 20 watts</b> | Sample frequency: 48kHz |
| Power supply: 32 Vdc | Load: 8 ohm            | Filter: AES17        |                         |

A THD+N at high frequencies depend on the output-filter coil material.

**Figure 4. THD+N vs Frequency (BTL)**

## 1.5 FFT Spectrum With Dithered -60-dB FS Tone (Ch 1)

### Channel 1

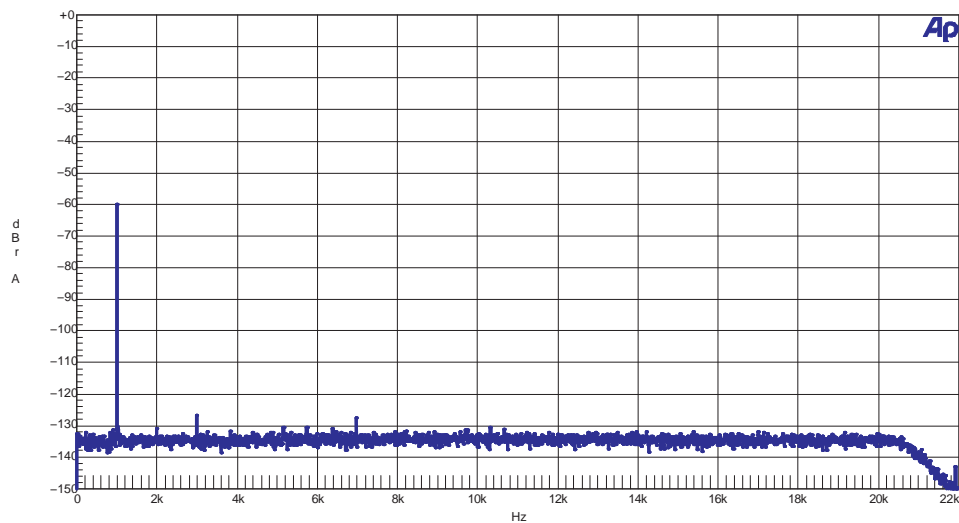

**Comments:**

|                                    |                         |                |
|------------------------------------|-------------------------|----------------|
| Power supply: 32 Vdc               | Load: 4 ohm             | Filter: AES17  |
| Input signal: 1 kHz                | Sample frequency: 48kHz | FFT size: 16 k |
| Reference: 10.02 volt = full scale |                         |                |

**Figure 5. FFT Spectrum With Dithered -60-dB FS Tone (Ch 1)**

## 1.6 FFT Spectrum With Dithered -60-dB FS Tone (BTL)

### Channel BTL


**Comments:**

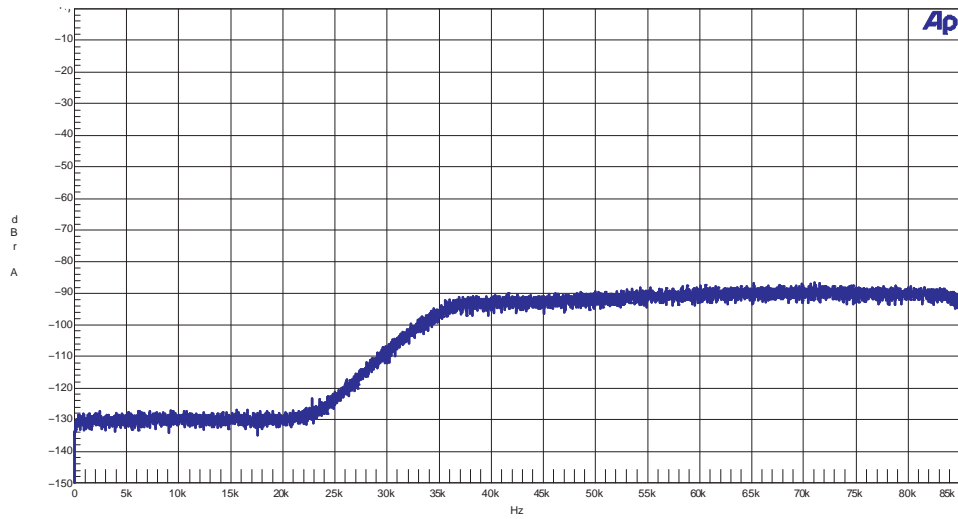
|                                    |                         |                |
|------------------------------------|-------------------------|----------------|
| Power supply: 32 Vdc               | Load: 8 ohm             | Filter: AES17  |
| Input signal: 1 kHz                | Sample frequency: 48kHz | FFT size: 16 k |
| Reference: 20.36 volt = full scale |                         |                |

**Figure 6. FFT Spectrum With Dithered -60-dB FS Tone (BTL)**



### 1.7 Idle Channel Noise FFT Spectrum (Ch 1)

#### Channel 1



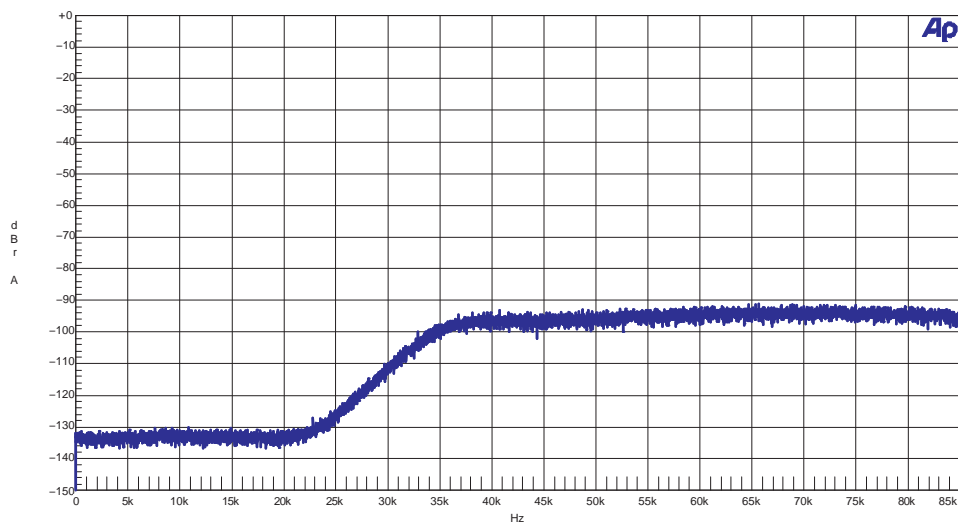
**Comments:**

|                      |                         |   |                                    |
|----------------------|-------------------------|---|------------------------------------|
| Power supply: 32 Vdc | Load: 4 ohm             | FFT size: 16 k                                | Reference: 10.45 volt = full scale |
| Input signal: 0 Fs   | Sample frequency: 48kHz | Automute disable – Register: x04h Value: x60h |                                    |

**Figure 7. Idle Channel Noise FFT Spectrum (Ch 1)**

### 1.8 Idle Channel Noise FFT Spectrum (BTL)

#### Channel BTL



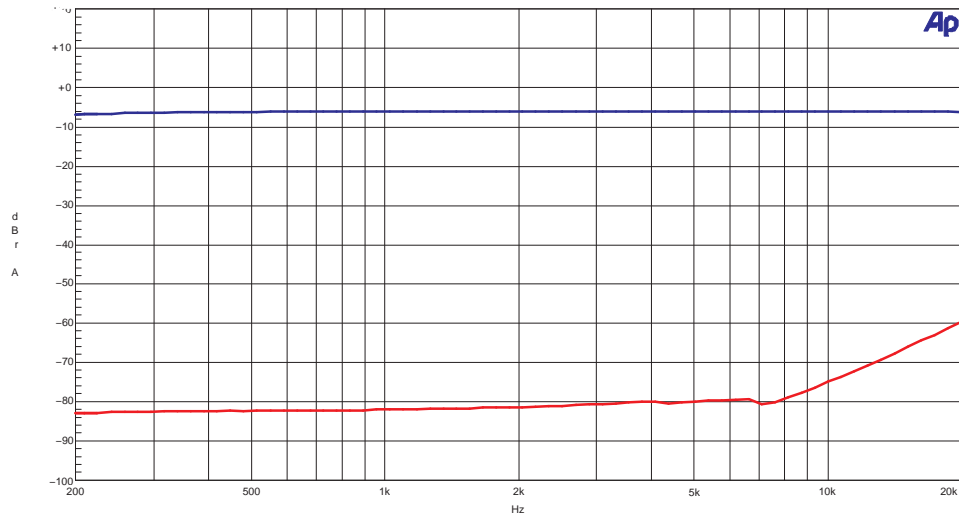
**Comments:**

|                      |                         |   |                                    |
|----------------------|-------------------------|---|------------------------------------|
| Power supply: 32 Vdc | Load: 8 ohm             | FFT size: 16 k                                | Reference: 20.30 volt = full scale |
| Input signal: 0 Fs   | Sample frequency: 48kHz | Automute disable – Register: x04h Value: x60h |                                    |

**Figure 8. Idle Channel Noise FFT Spectrum (BTL)**

## 1.9 Channel Separation (Ch 1)

### Channel 1 and 2


**Comments:**
**Blue: Channel 1**

Input channel 1: 1 Fs

Input channel 2: 0 Fs

**Red: Channel 2**

Load: 4 ohm

Filter: AES17

Sample frequency: 48 kHz

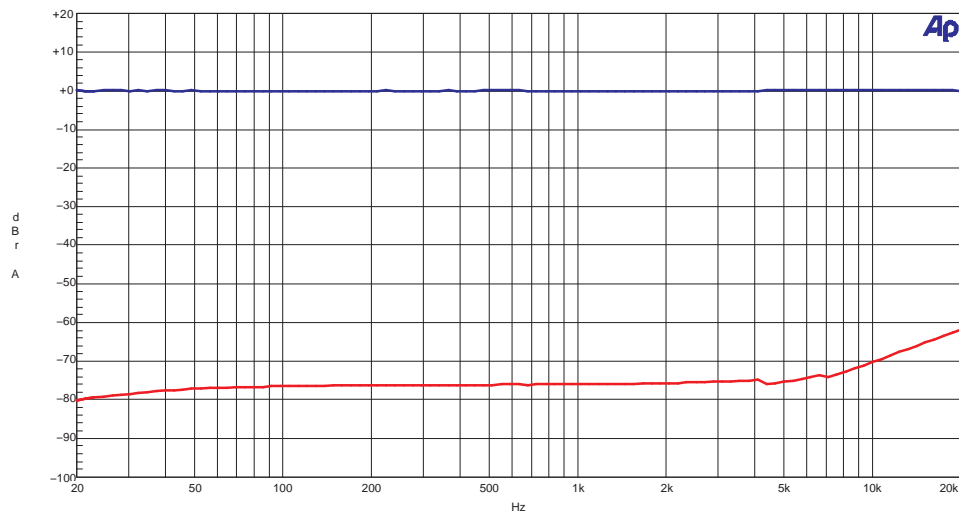
Power supply: 32 Vds

Reference: 10.04 volt

**Figure 9. Channel Separation (Ch 1)**

## 1.10 Channel Separation (BTL)

### Channel BTL and 2


**Comments:**
**Blue: Channel 1**

Input channel 1: 1 Fs

Input channel 2: 0 Fs

**Red: Channel 2**

Load: (8/4) ohm

Filter: AES17

Sample frequency: 48 kHz

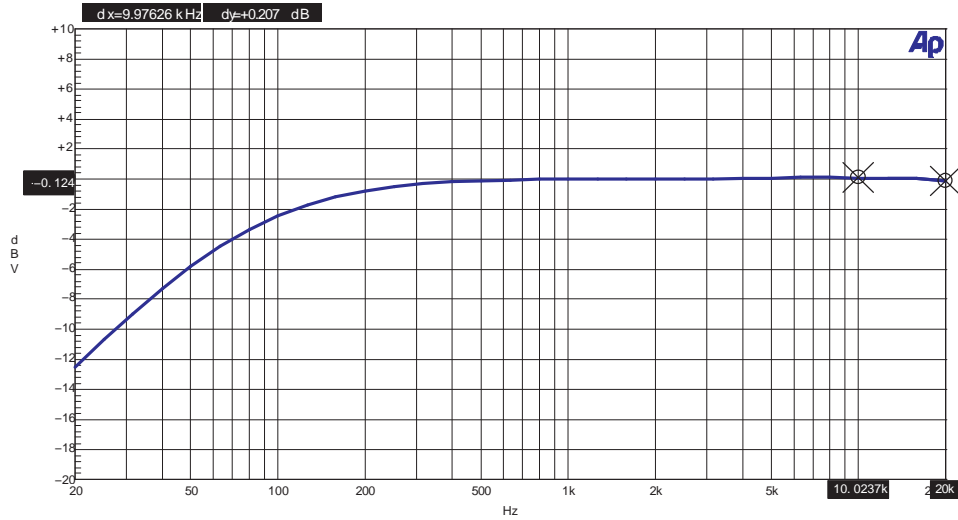
Power supply: 32 Vds

Reference: 20.16 volt

**Figure 10. Channel Separation (BTL)**

### 1.11 Frequency Response (Ch 1)

Channel 1



**Comments:**

**Blue: 4 ohm**

Power supply: 32 Vdc

Input channel 1: 1 kHz

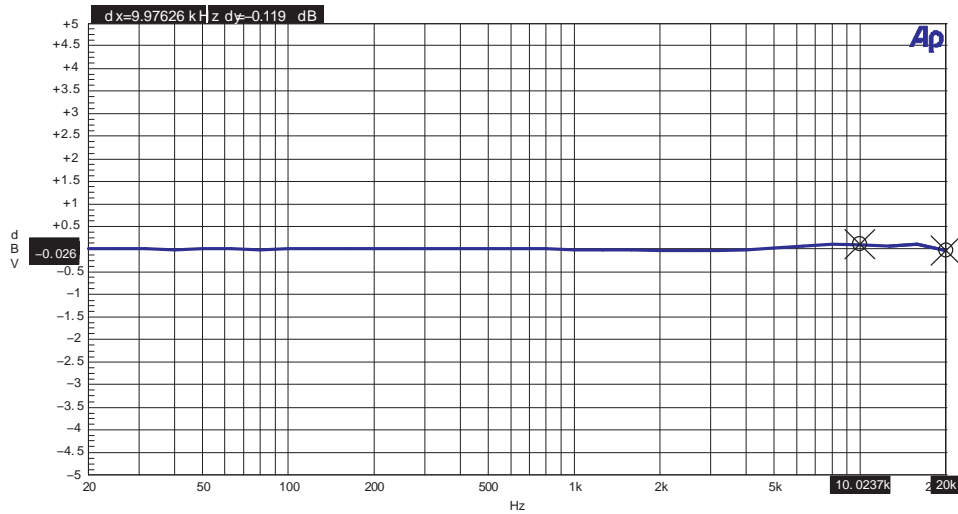
Sample frequency: 48 kHz

Filter: AES17

**Figure 11. Frequency Response (Ch 1)**

### 1.12 Frequency Response (BTL)

Channel BTL



**Comments:**

**Blue: 8 ohm**

Power supply: 32 Vdc

Input channel 1: 1 kHz

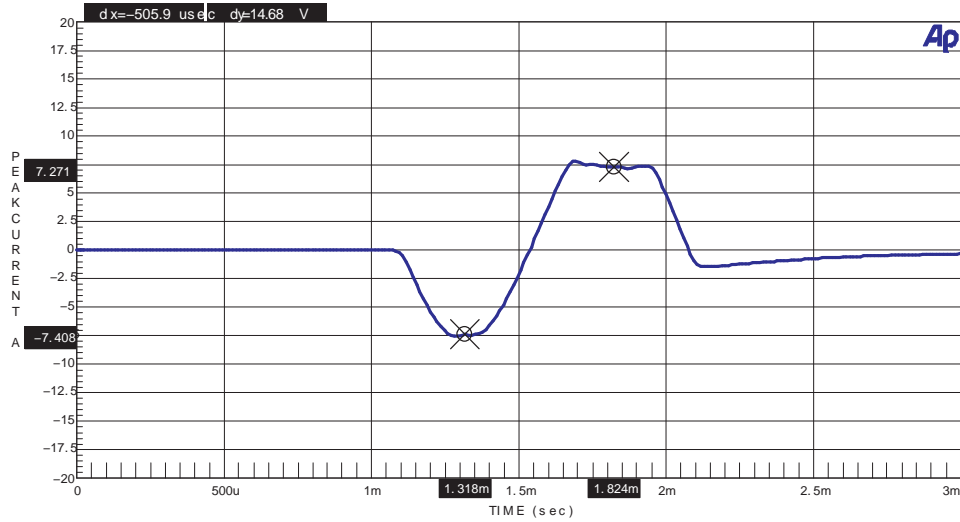
Sample frequency: 48 kHz

Filter: AES17

**Figure 12. Frequency Response (BTL)**

### 1.13 High Current Protection (CH 1)

Channel 1



Comments:

Blue: 1 ohm

Input channel 1: 1 kHz

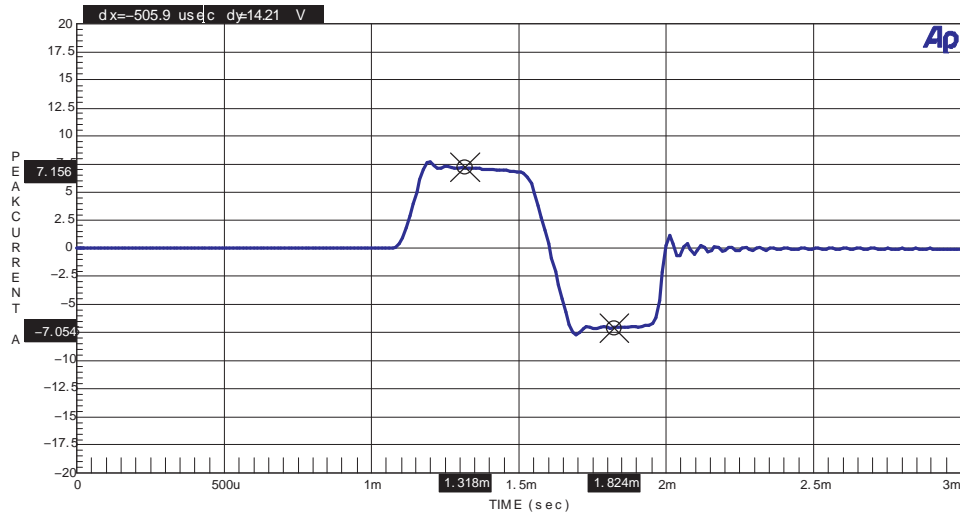
Sample frequency: 48 kHz

Power supply: 32 Vdc

Figure 13. High Current Protection (Ch 1)

### 1.14 High Current Protection (BTL)

Channel BTL



Comments:

Blue: 1 ohm

Input channel 1: 1 kHz

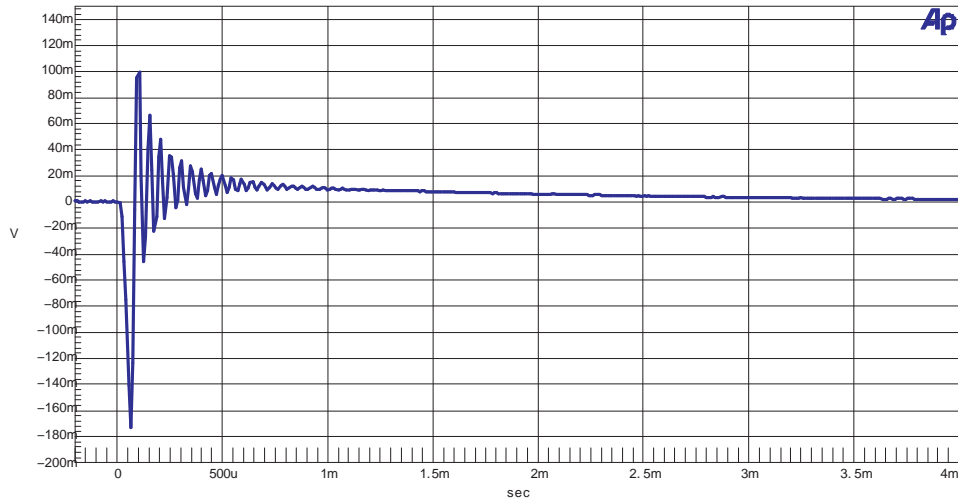
Sample frequency: 48 kHz

Power supply: 32 Vdc

Figure 14. High Current Protection (BTL)

### 1.15 Pop/Click (Ch 1)

Channel 1



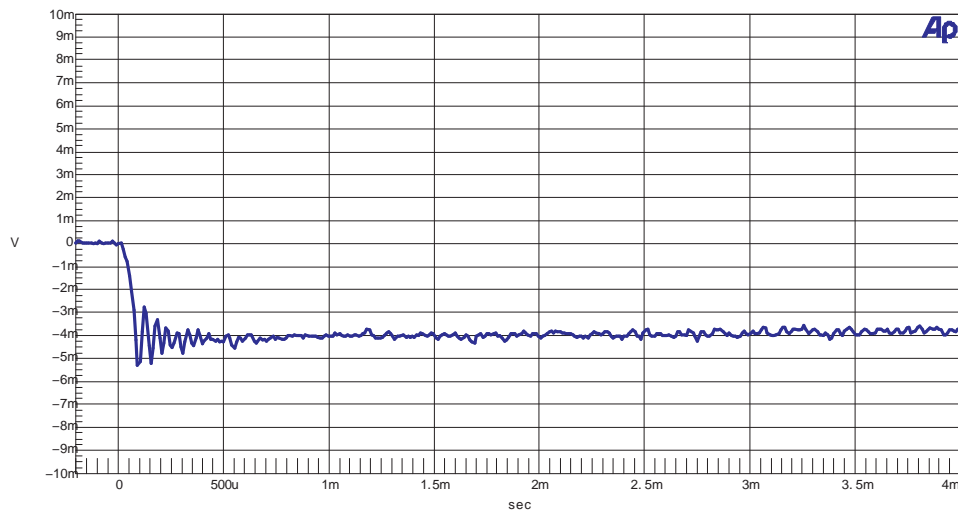
**Comments:**

|                        |                          |                      |
|------------------------|--------------------------|----------------------|
| Load: 4 ohm            | Filter: AES17            |                      |
| Input channel 1: 1 kHz | Sample frequency: 48 kHz | Power supply: 32 Vdc |

**Figure 15. Pop/Click (Ch 1)**

### 1.16 Pop/Click (BTL)

Channel BTL



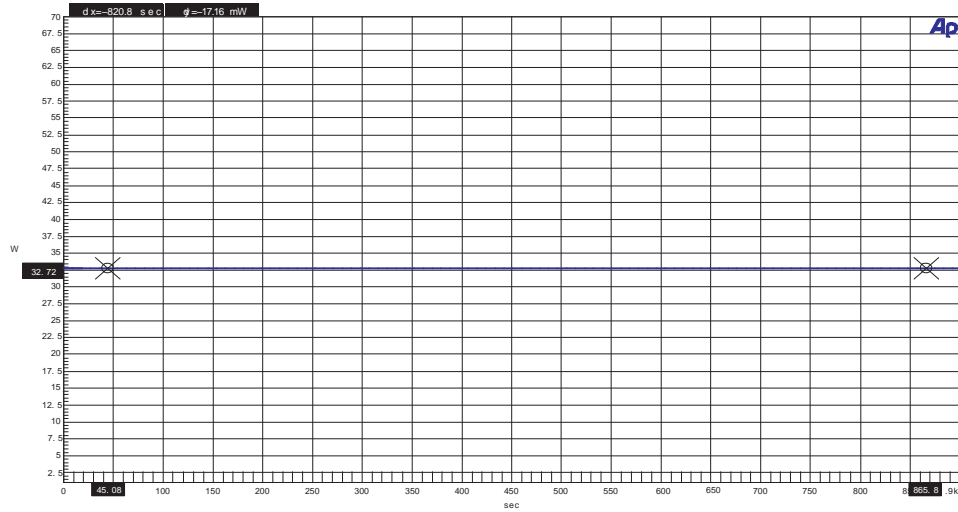
**Comments:**

|                        |                          |                      |
|------------------------|--------------------------|----------------------|
| Load: 8 ohm            | Filter: AES17            |                      |
| Input channel 1: 1 kHz | Sample frequency: 48 kHz | Power supply: 32 Vdc |

**Figure 16. Pop/Click (BTL)**

### 1.17 Output Power vs Time (15 min) (Ch 1)

Channel 1



**Comments:**

Ch 1 Output Power: 32 W  
Ch 1 Load: 4 ohm

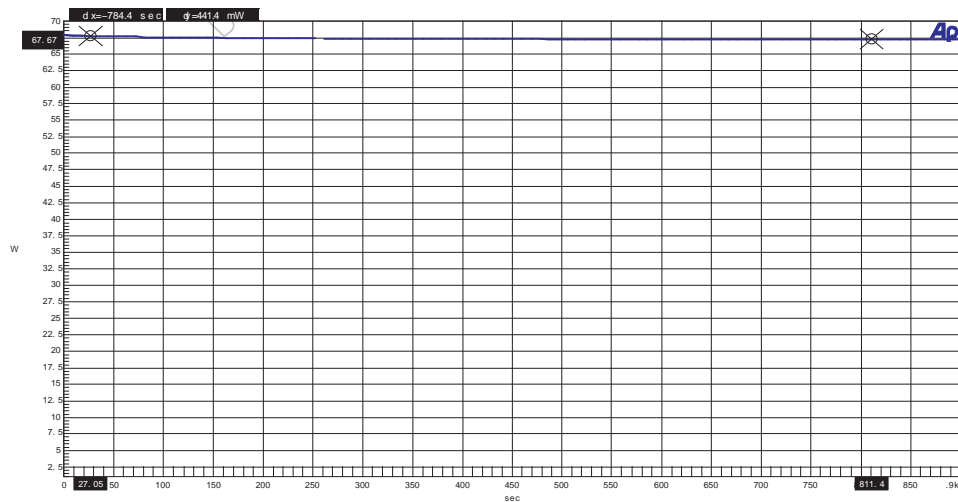
Power supply: 32 Vdc  
Input signal: 1 kHz  
Sample frequency: 48 kHz

A All channels preheated 1 hour at 1/8 output power.

**Figure 17. Output Power vs Time (15 min) (Ch 1)**

### 1.18 Output Power vs Time (15 min) (BTL)

Channel BTL



**Comments:**

Ch BTL Output Power: 67 W  
Ch BTL Load: 8 ohm

Power supply: 32 Vdc  
Input signal: 1 kHz  
Sample frequency: 48 kHz

A All channels preheated 1 hour at 1/8 output power.

**Figure 18. Output Power vs Time (15 min) (BTL)**

### 1.19 Output Stage Efficiency

All Channels (Ch1, Ch2, and BTL)



**Comments:**

Blue: All ch output power

Power supply: 32 Vdc

Loads: 4 and 8 ohm

Ch BTL Load: 8 ohm

Sample frequency: 48 kHz

**Figure 19. Output Stage Efficiency**

## 2 References

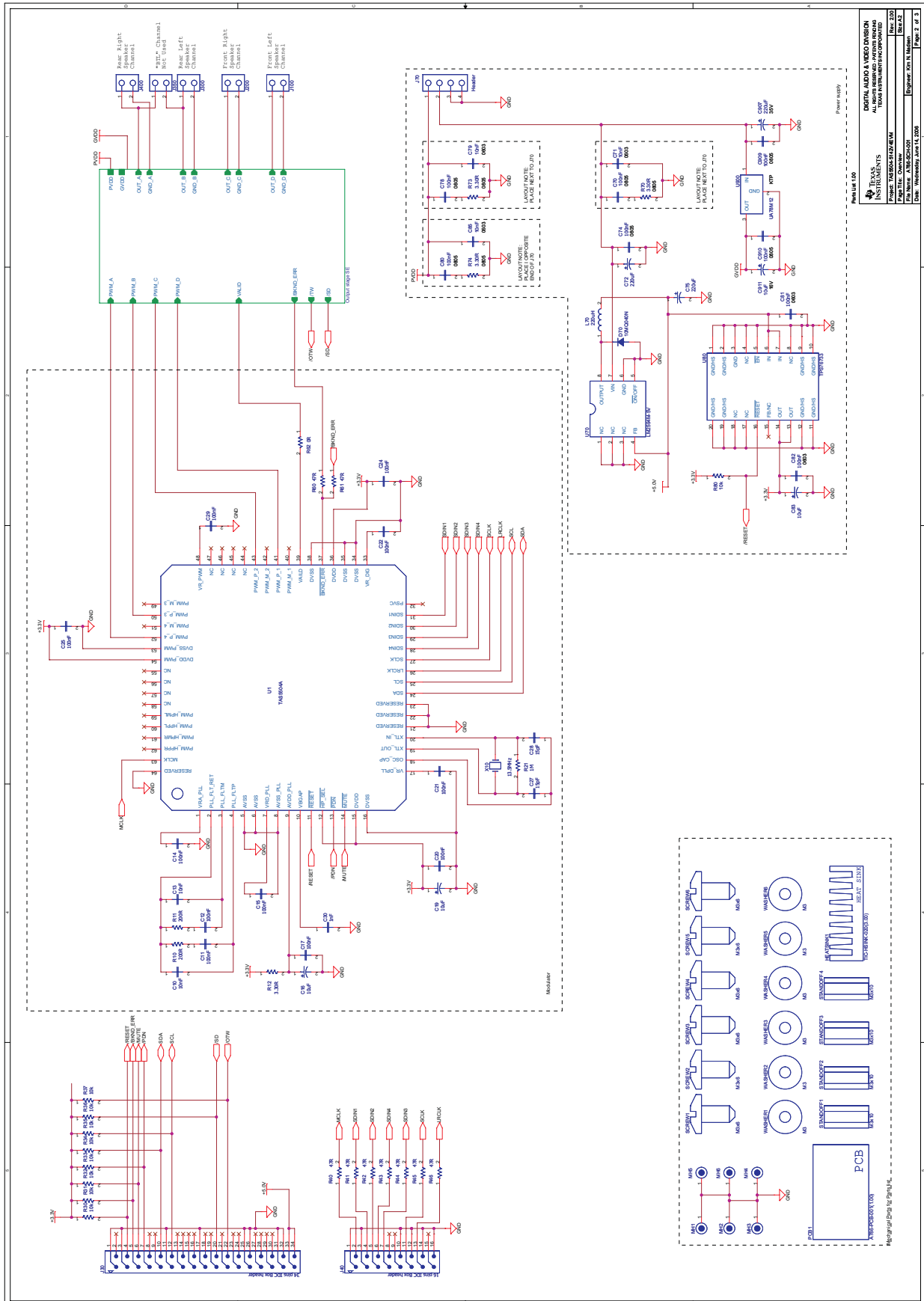
1. *System Design Considerations for True Digital Audio Power Amplifiers* (SLAA117)
2. *Digital Audio Measurements* (SLAA114)
3. *TAS5518: 8-Channel Digital Audio PWM Processor* (SLES162)
4. *TAS5152: Stereo Digital Amplifier Power Stage* (SLES127A)
5. *PSRR for PurePath Digital™ Audio Amplifiers* (SLEA049)
6. *Power Rating in Audio Amplifiers* (SLEA047)
7. *PurePath Digital™ AM Interference Avoidance* (SLEA040)
8. *Click & Pop Measurements Technique* (SLEA044)
9. *Power-Supply Recommendations for DVD Receivers* (SLEA027)
10. *Implementation of Power-Supply Volume Control* (SLEA038)



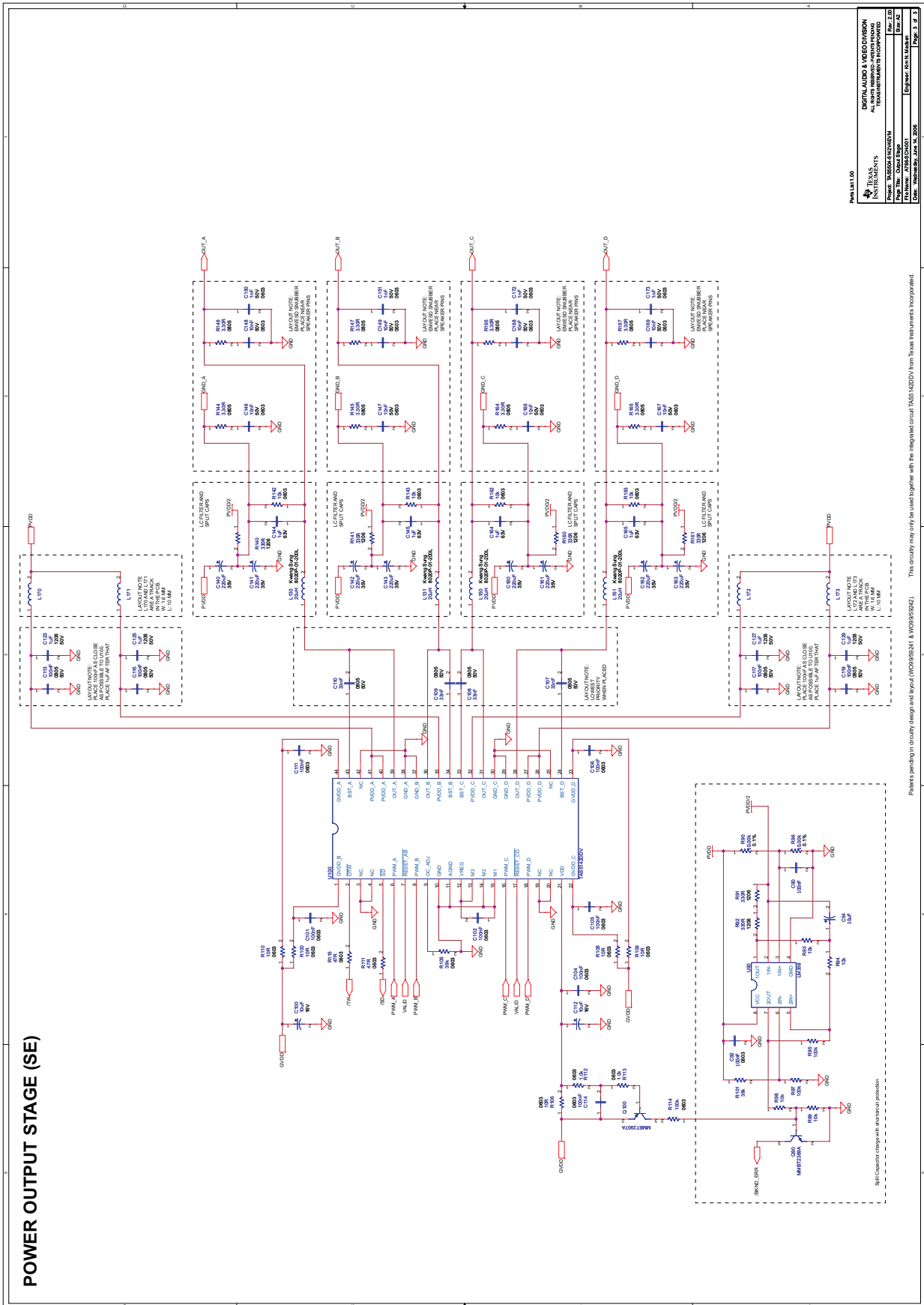
**Appendix A Design Documents**

|            |                                     |              |         |
|------------|-------------------------------------|--------------|---------|
| <b>A.1</b> | TAS5504-5142V4EVM Schematics        | Version 3.00 | 3 pages |
| <b>A.2</b> | TAS5504-5142V4EVM Parts List        | Version 2.00 | 2 pages |
| <b>A.3</b> | TAS5504-5142V4EVM PCB Specification | Version 1.00 | 1 page  |
| <b>A.4</b> | TAS5504-5142V4EVM PCB Layers        | Version 1.00 | 6 pages |
| <b>A.5</b> | TAS5504-5142V4EVM Heatsink Drawing  | Version 3.00 | 1 page  |
| <b>A.6</b> | TAS5504-5142V4EVM ECO-003           | Version 1.00 | 1 page  |





|   |   |
|---|---|
| <p> <br/> <b>INSTRUMENTS</b> </p>                     | <p> <b>DIGITAL AUDIO &amp; VIDEO DIVISION</b> </p>        |
| <p> <b>TI</b> </p>                                    | <p> <b>TI</b> </p>  |
| <p>           PACKAGE: TAS5504-5142V4EVM         </p> | <p>           PART NUMBER: TAS5504-5142V4EVM         </p> |
| <p>           DATE: 08/08/08         </p>             | <p>           REVISION: 1.0         </p>                  |
| <p>           AUTHOR: [Name]         </p>             | <p>           ENGINEER: [Name]         </p>               |
| <p>           DATE: [Date]         </p>               | <p>           PAGE: 2 OF 3         </p>                   |



## A.2 TAS5504-5142V4EVM Parts List (2.00)

**Table A-1. TAS5504-5142V4EVM Parts List (2.00)**

| Qty | Part Reference   | Description   | Manufacture   | First Mfr P/N            |
|-----|--|---|---------------|--------------------------|
| 6   | R91 R92 R140 R141 R160 R161  | 330R/250mW 1% 1206 Metal Film Resistor  | BC Components | DCA 1206 1% 330R         |
| 12  | R12 R70 R73 R74 R144 R145 R146 R147 R164 R165 R166 R167  | 3.30R/125mW 1% 0805 Metal Film Resistor   | BC Components | DCU 0805 1% 3R30         |
| 1   | R62  | 0R 0603 Metal Film Resistor   | BC Components | DCT 0603 JUMPER          |
| 2   | R112 R113  | 1.0k/100mW 5% 0603 Metal Film Resistor  | BC Components | DCT 0603 5% 1k00         |
| 17  | R30 R31 R32 R33 R34 R35 R36 R37 R80 R93 R94 R98 R99 R142 R143 R162 R163                        | 10k/100mW 5% 0603 Metal Film Resistor   | BC Components | DCT 0603 5% 10k0         |
| 3   | R95 R97 R114   | 100k/100mW 5% 0603 Metal Film Resistor  | BC Components | DCT 0603 5% 100k         |
| 1   | R21  | 1M/100mW 5% 0603 Metal Film Resistor  | BC Components | DCT 0603 5% 1M00         |
| 5   | R100 R106 R108 R109 R110   | 10R/100mW 5% 0603 Metal Film Resistor   | BC Components | DCT 0603 5% 10R0         |
| 2   | R10 R11  | 200R/100mW 5% 0603 Metal Film Resistor  | BC Components | DCT 0603 5% 200R         |
| 2   | R101 R105  | 39k/100mW 5% 0603 Metal Film Resistor   | BC Components | DCT 0603 5% 39k0         |
| 11  | R40 R41 R42 R43 R44 R45 R46 R60 R61 R111 R115  | 47R/100mW 5% 0603 Metal Film Resistor   | BC Components | DCT 0603 5% 47R0         |
| 2   | R90 R96  | 10.00k/100mW 0.1% 0805 Metal Film Precision Resistor                                | Meggitt       | RN73C2A10K0BTG           |
| 10  | C70 C74 C78 C80 C113 C115 C117 C119 C909 C910  | Ceramic 100nF/50V 20% X7R 0805 Capacitor  | BC Components | 0805B104M500NT           |
| 4   | C107 C108 C109 C110  | Ceramic 33nF/50V 20% X7R 0805 Capacitor   | BC Components | 0805B333M500NT           |
| 4   | C123 C125 C127 C129  | Ceramic 1uF/50V 10% X7R 1206 Capacitor  | TDK           | C3216X7R1H105K           |
| 13  | C10 C13 C71 C79 C85 C146 C147 C148 C149 C166 C167 C168 C169                                    | Ceramic 10nF/50V 20% X7R 0603 Capacitor   | BC Components | 0603B103M500NT           |
| 22  | C11 C12 C14 C15 C17 C20 C21 C22 C24 C25 C29 C81 C82 C90 C92 C101 C102 C104 C105 C106 C111 C114 | Ceramic 100nF/16V 20% X7R 0603 Capacitor  | BC Components | 0603B104M160NT           |
| 5   | C30 C150 C151 C172 C173  | Ceramic 1nF/50V 10% NP0 0603 Capacitor  | BC Components | 0603N102K500NT           |
| 2   | C27 C28  | Ceramic 15pF/50V 10% NP0 0603 Capacitor   | BC Components | 0603N150K500NT           |
| 7   | C16 C19 C54 C83 C100 C112 C911   | Electrolytic 10uF/16V 20% Aluminium 2mm x 5mm M Series - General Purpose Capacitor  | Panasonic     | ECA1CM100                |
| 11  | C72 C75 C140 C141 C142 C143 C160 C161 C162 C163 C907   | Electrolytic 220uF/35V 20% Aluminium 5mm x 10mm FC Series - Low Impedance Capacitor | Panasonic     | EEUFC1V221               |
| 4   | C144 C145 C164 C165  | Metal Film 1uF/63V 10% Polyester 5mm (W:5.0mm L:7.2mm) Capacitor                    | Wima          | MKS 2 1uF/10%/63Vdc PCM5 |
| 1   | L70  | 220uH/0.5A 20% (390mR) Magnetically shielded Ferrite Inductor                       | CoilCraft     | DT3316P-224              |

**Table A-1. TAS5504-5142V4EVM Parts List (2.00) (continued)**

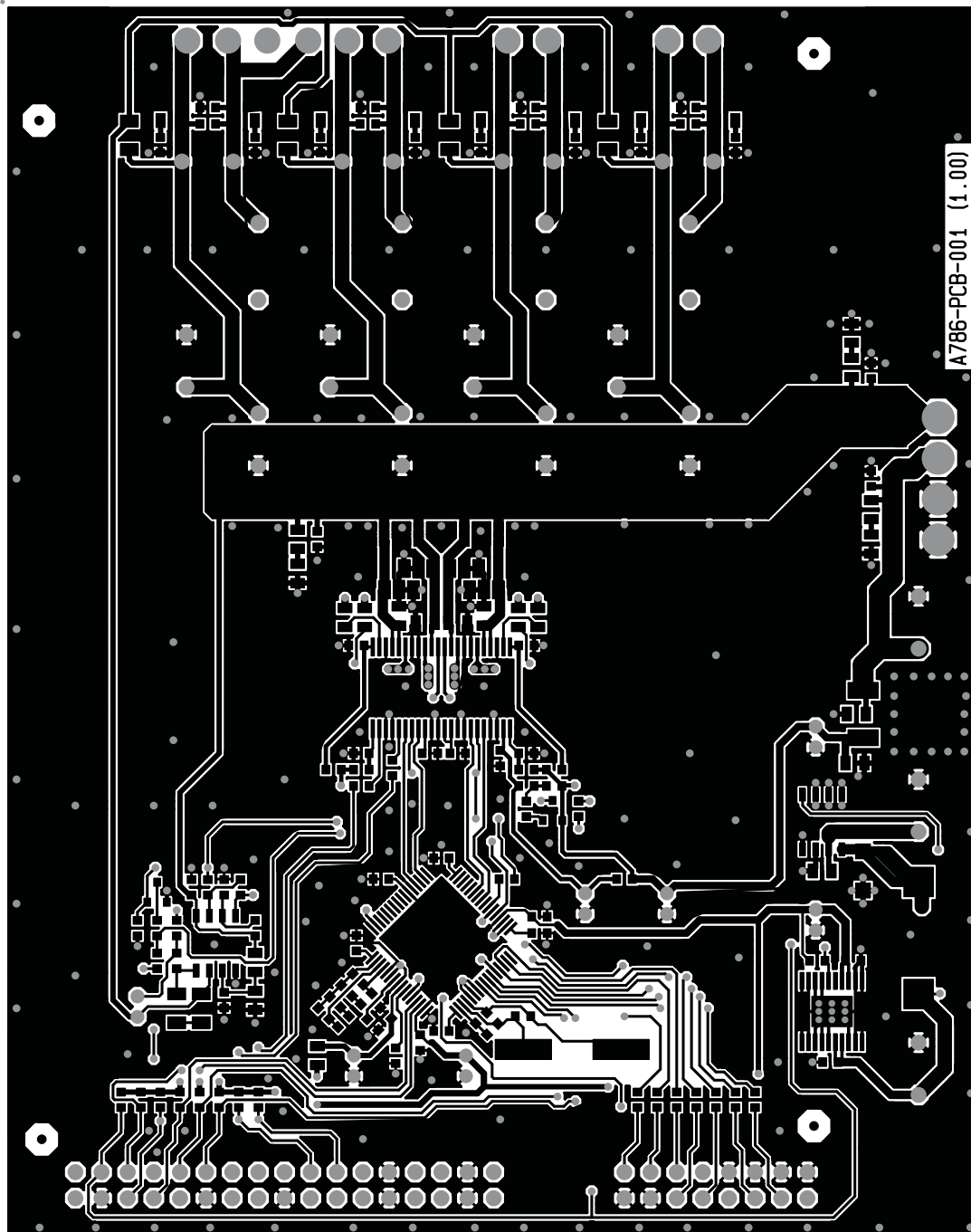
| Qty | Part Reference  | Description  | Manufacture       | First Mfr P/N       |
|-----|---|--|-------------------|---------------------|
| 4   | L130 L131 L150 L151                                   | 22uH/Ferrite Inductor                                    | Kwang Sung        | 8020P-01-200L       |
| 1   | D70   | 1A/40V Schottky Diode (SMA)                              | Int. Rectifier    | 10MQ040N            |
| 1   | Q90   | 200mA/15V 225mW NPN Switch Transistor (SOT-23)           | Fairchild         | MMBT2369A           |
| 1   | Q100  | 800mA/40V PNP Small signal Transistor (SOT-23)           | Fairchild         | MMBT2907A           |
| 1   | U100  | 4ch/2ch/1ch Digital Audio PWM Power Output Stage (DDV44) | Texas Instruments | TAS5142DDV          |
| 1   | U1  | 4 ch PWM processor (AD, DAP, 192kHz, PWM-VOL) (TQFP64)   | Texas Instruments | TAS5504APAG         |
| 1   | U90   | Dual Precision Opamp (SO8)                               | Texas Instruments | LM358D              |
| 1   | U900  | 12V/500mA Positive Voltage Regulator (KTP)               | Texas Instruments | UA78M12CKTPR        |
| 1   | U70   | 5V/0.5A Buck Converter (SO8)                             | National Semi.    | LM2594M-5.0V        |
| 1   | U80   | 3.3V/1A Low Drop Voltage Regulator (HTSSOP20)            | Texas Instruments | TPS76733QPWP        |
| 6   | SCREW1 SCREW2 SCREW3<br>SCREW4 SCREW5 SCREW6          | M3x6, Pan Head, Pozidriv, A2 Screw                       | Bossard           | BN 81882 M3x6       |
| 6   | WASHER1 WASHER2<br>WASHER3 WASHER4<br>WASHER5 WASHER6 | M3 Stainless Steel Washer                                | Bossard           | BN 670 M3           |
| 4   | STANDOFF1 STANDOFF2<br>STANDOFF3 STANDOFF4            | M3x10 Aluminium Stand-off                                | Ettinger          | 05.03.108           |
| 4   | J100 J200 J300 J400                                   | 2 pins/1 row/3.96mm Pitch Vertical Male Pin header       | JST               | B2P-VH              |
| 1   | J70   | 4 pins/1 row/3.96mm Pitch Vertical Male Pin header       | JST               | B4P-VH              |
| 1   | J40   | 16 pins/2 rows/2.54mm Pitch Vertical Male IDC            | Molex             | 87256-1611          |
| 1   | J30   | 34 pins/2 rows/2.54mm Pitch Vertical Male IDC            | Molex             | 87256-3411          |
| 1   | X10   | 13.5MHz SMD Crystal (HCM49)                              | Citizen           | HCM49-13.500MABJT   |
| 1   | PCB1  | TAS5504-TAS5142V4EVM Printed Circuit Board (ver. 1.00)   | Printline         | A786-PCB-001(1.00)  |
| 1   | HEATSINK1   | Heatsink for 1 DDV device                                | A.K.S.            | TIC-HSINK-020(3.00) |

**A.3 TAS5504-5142V4EVM (A786) PCB Specification**
**Table A-2. TAS5504-5142V4EVM (A786) PCB Specification  
Version 1.00**

|                             |   |
|-----------------------------|---|
| Board Identification:       | A786-PCB-001(1.00)  |
| Board Type:                 | Double-sided plated-through board                               |
| Laminate Type:              | FR4   |
| Laminate Thickness:         | 1.6 mm  |
| 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 and 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:                 | 95 $\times$ 120 mm  |
| Comments:                   | See drill information file (5101pcb.PDF)                        |

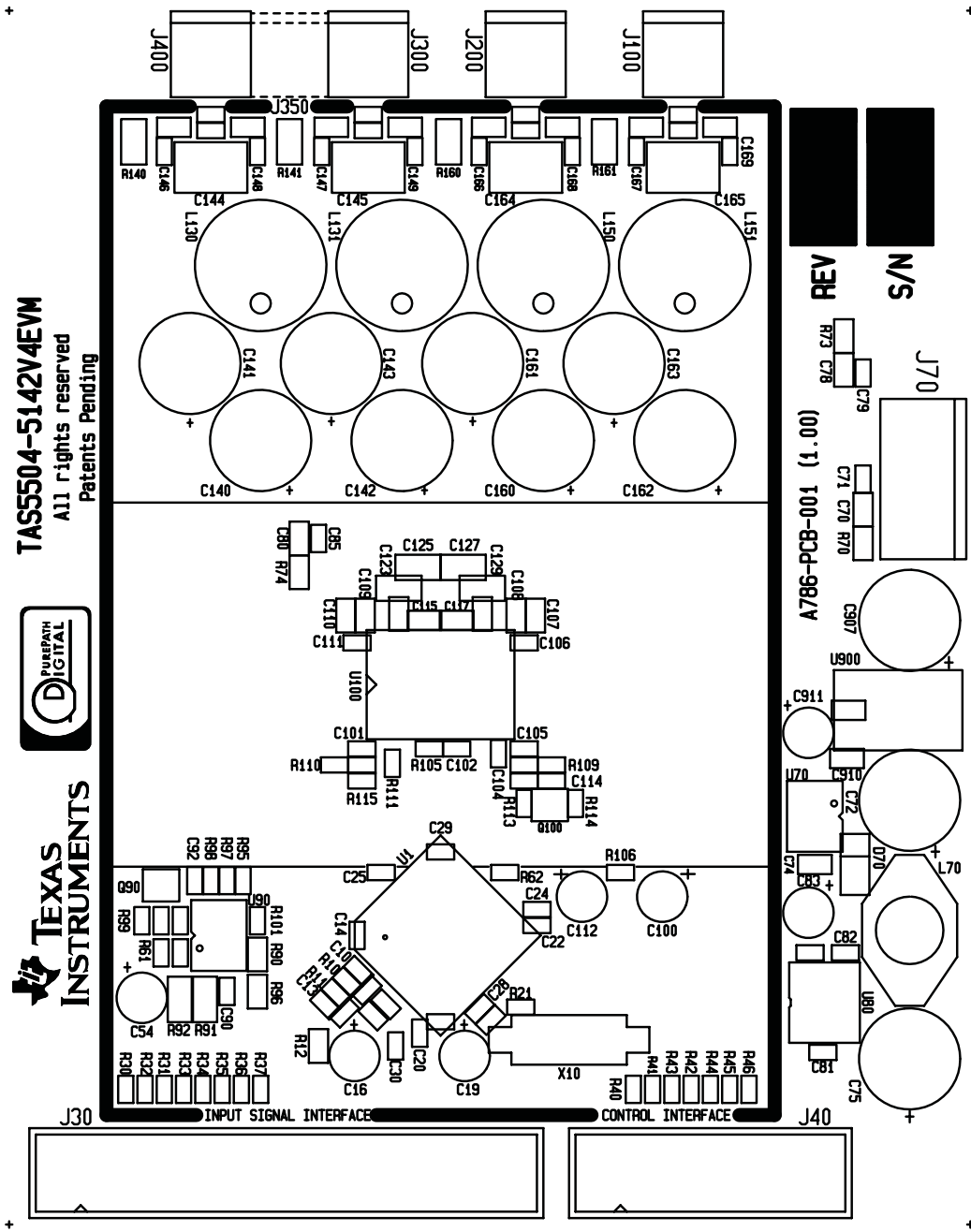
**A.4 TAS5504-5142V4EVM PCB Layers**

|                                |                 |
|--------------------------------|-----------------|
| COMPONENT SIDE                 | DpS 5101 050928 |
| TI Denmark A786-PCB-001 (1.00) |                 |





|                                |                 |
|--------------------------------|-----------------|
| SILKSCREEN COMP                | Dps 5101 050928 |
| TI Denmark A786-PCB-001 (1.00) |                 |



TAS5504-5142V4EVM  
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Patents Pending



REV

S/N

J70

A786-PCB-001 (1.00)

U900

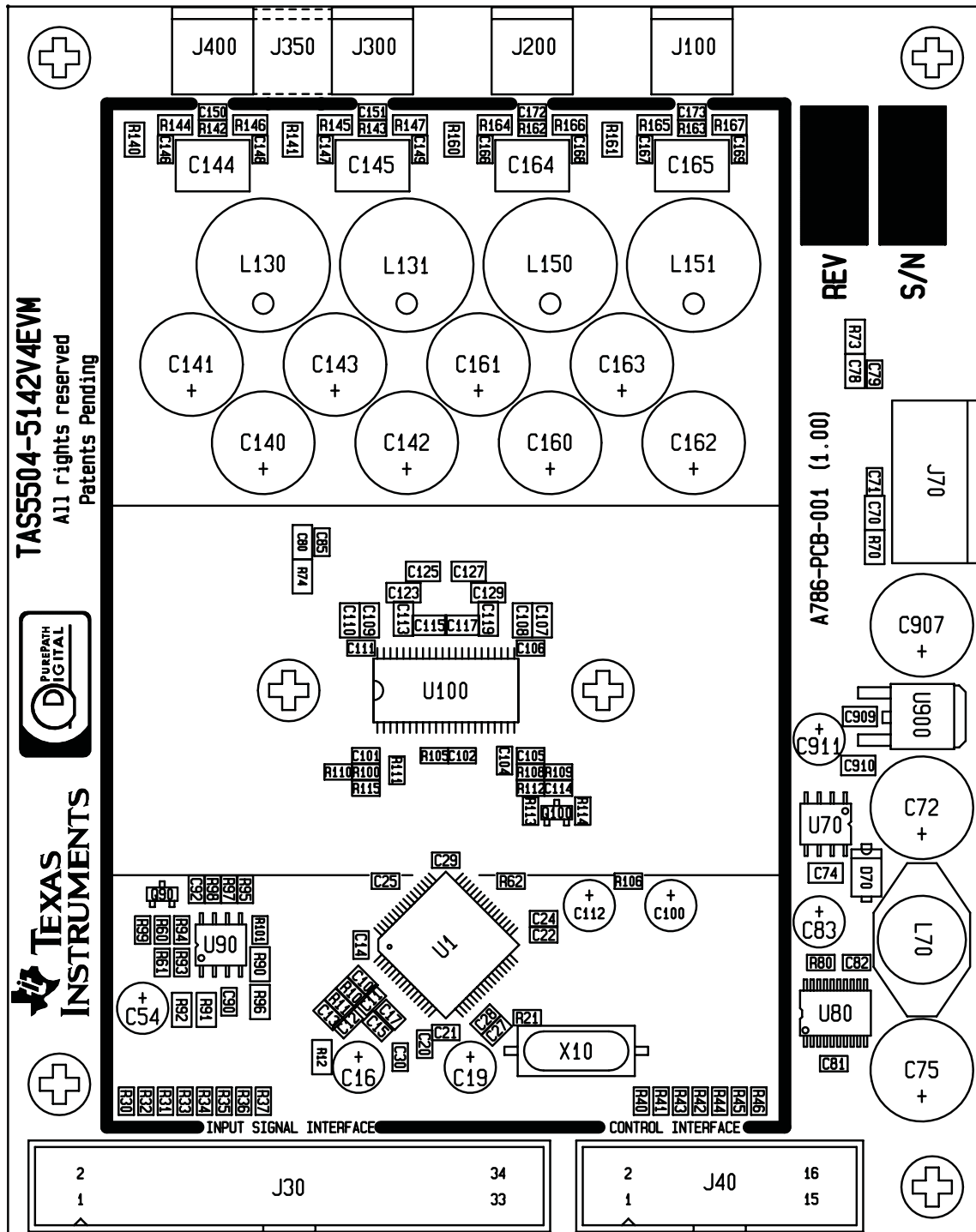
U70

U80

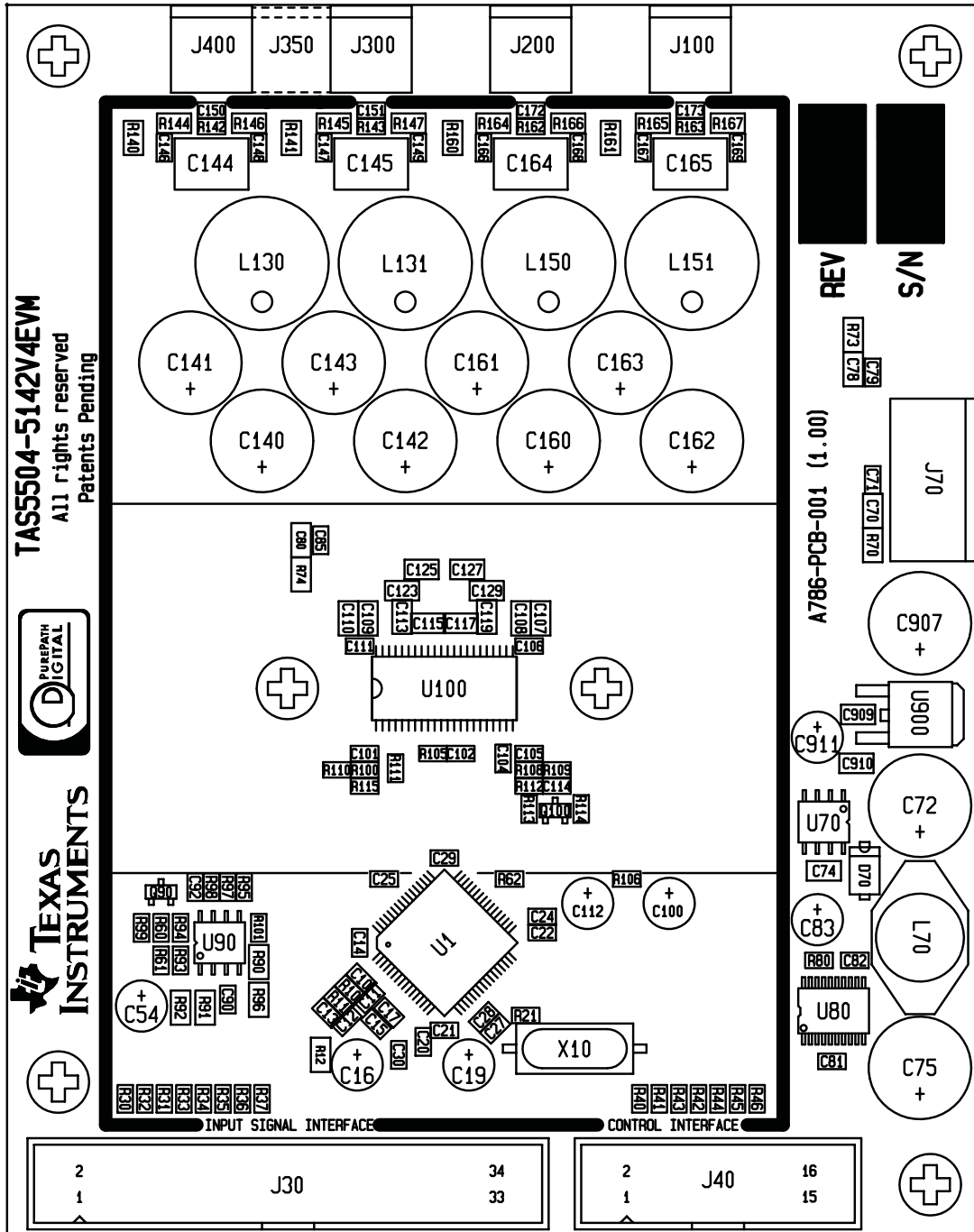
J30 INPUT SIGNAL INTERFACE

J40 CONTROL INTERFACE

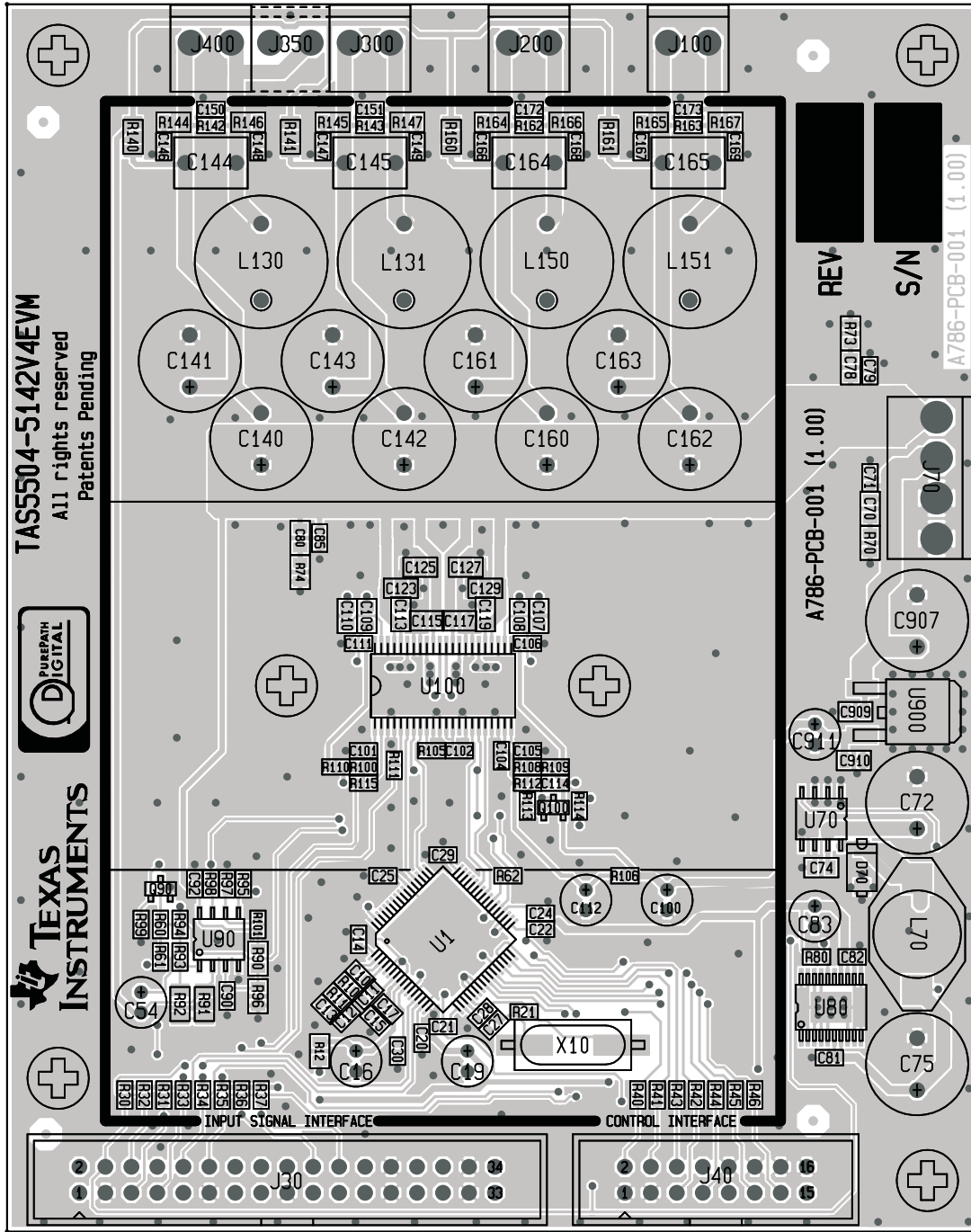
COMP. LAYOUT COMP | DpS 5101 050928  
 TI Denmark A786-PCB-001 (1.00)



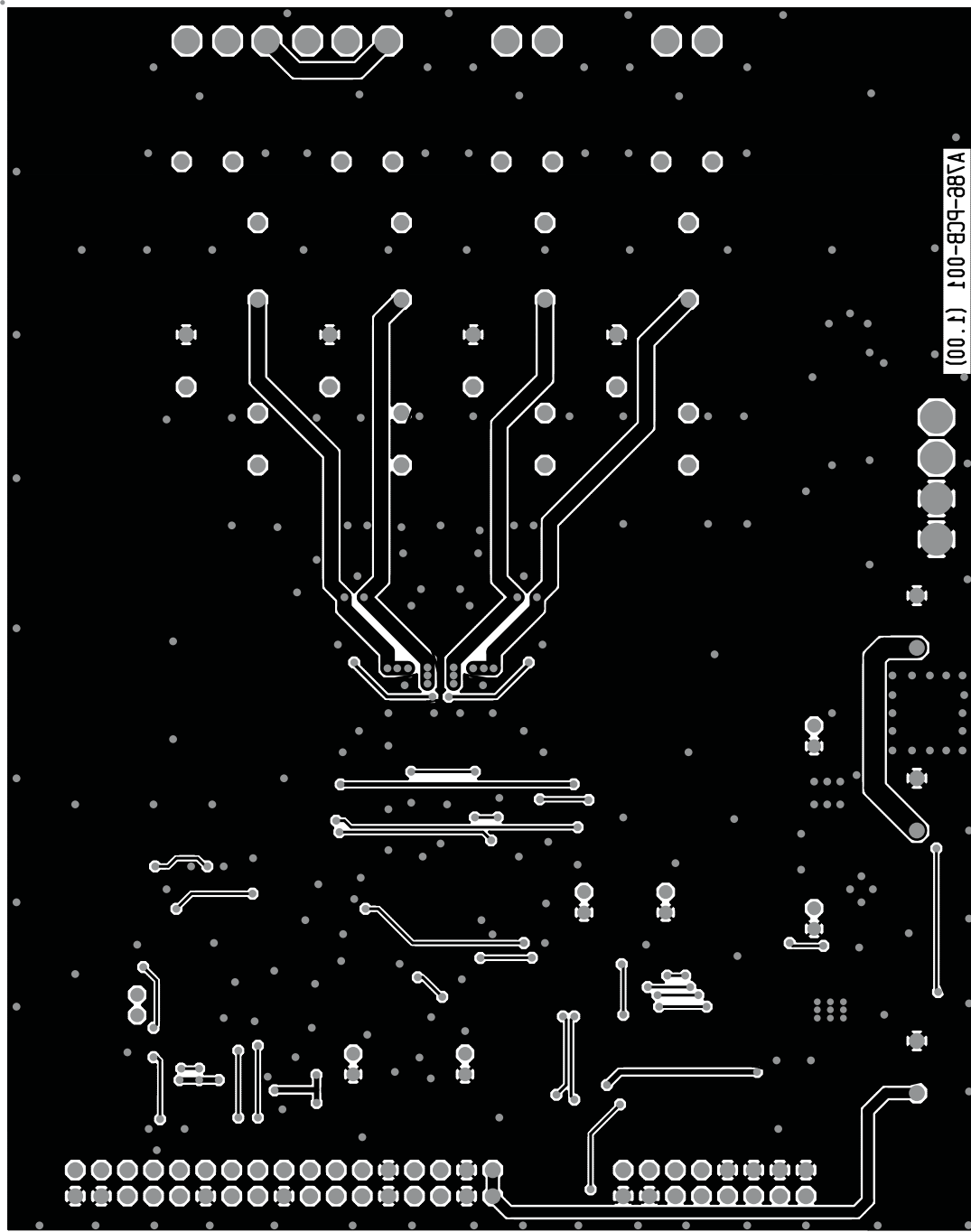
COMP. LAYOUT COMP DpS 5101 050928  
 TI Denmark A786-PCB-001 (1.00)



|                                |                 |
|--------------------------------|-----------------|
| COMP. LAYOUT COMP              | DpS 5101 050928 |
| TI Denmark A786-PCB-001 (1.00) |                 |



|                                |                 |
|--------------------------------|-----------------|
| SOLDER SIDE                    | DpS 5101 050928 |
| TI Denmark A786-PCB-001 (1.00) |                 |

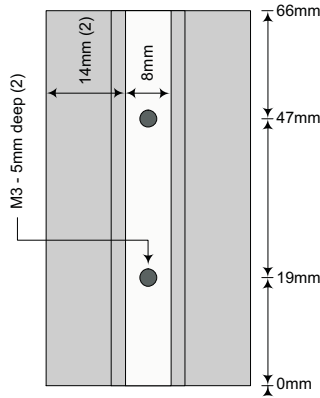
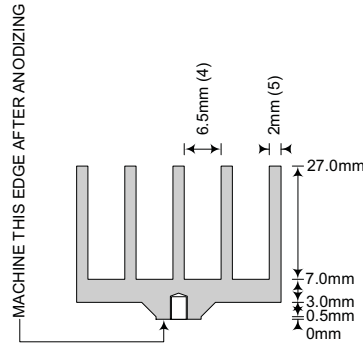


**A.5 TAS5504-5142V4EVM Heatsink Drawing**

**TIC-HSINK-020 (3.00)  
Heatsink for 1 DDV device**



Jonas Svendsen



**MATERIAL:** ALUMINIUM  
**INTERNAL SCREW THREADS:** M3  
**SURFACE:** GLASS BLOWED, FREE OF SHARP EDGES  
**SURFACE TREATMENT:** BLACK ANODIZED  
**TOLERANCES:** +/- 0.1mm.

10. February 2005  
 TIC-HSINK-020(3.00).vsd

**A.6 TAS5504-5142V4EVM ECO-003**

## TAS5504-5142V4EVM Engineering Change Order

**Affected Documents**
**Board Revision:** REV 2

| Title                 | Document Number | Issue |
|-----------------------|-----------------|-------|
| Schematic             | A786-SCH-001    | 3.00  |
| Printed Circuit Board | A786-PCB-001    | 1.00  |
| Bill Of Material      | A786-LST-001    | 2.00  |

**Part list changes from version**

| Type    | Value | Part Reference | Old P/N                           | New P/N                    |
|---------|-------|----------------|-----------------------------------|----------------------------|
| Changed | -     | U900           | Texas Instruments<br>UA78M12CKTPR | ON/Motorola<br>MC78M12CDTG |

**Please update board revision to "3".**

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| Medical            | <a href="http://www.ti.com/medical">www.ti.com/medical</a>               |
| Military           | <a href="http://www.ti.com/military">www.ti.com/military</a>             |
| Optical Networking | <a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a> |
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