

## **TAS3108EVM2 Application Report**

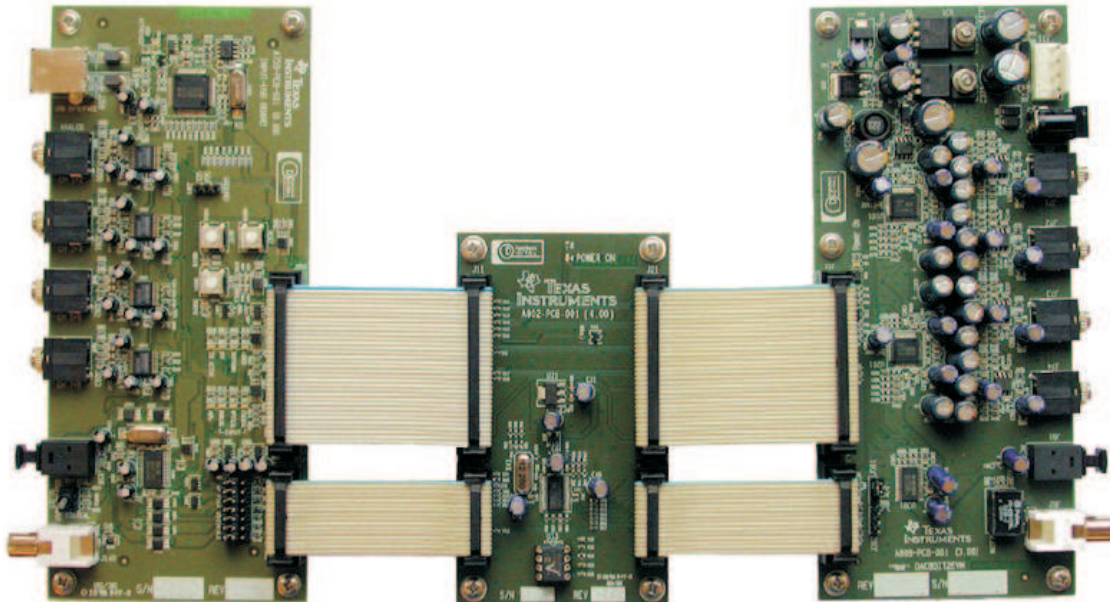
Jonas L. Holm

*Digital Audio and Video Products*

### **ABSTRACT**

The TAS3108EVM2 is an 8-channel, fully programmable digital audio processor, and in combination with the TI Input USB Board and the Graphical Development Environment (GDE) software, the device is easily programmed via USB interface to a wide variety of filter combinations.

It is possible to attach a DAC output board and have access to analog outputs and SPDIF output (electrical or optical). Additionally, it is possible to use a PurePath digital amplifier EVM, which allows testing of the TAS3108 with a speaker directly connected.



For EVM setup and use, please see *TAS3108EVM2 User's Guide*.

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

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## 1 TAS3108EVM2 Board Specifications

**Table 1. General Test Conditions**

General Test Conditions		Notes
System Supply Voltage	5 V	Supplied from LAB supply

**Table 2. System and Sample Rate Clocks**

Audio Performance		Notes/Conditions <sup>(1)</sup>
Audio DSP Clock	135 MHz	$11 \times \text{MCLK}/2$ , MCLK = 24.576 MHz
MCLK max	25 MHz	
SCLK	$64 \times \text{FS}$	
LRCLK max	96 kHz <sup>(2)</sup>	
Sample Rate ratio (MCLK/LRCLK)	256 <sup>(2)</sup>	This relationship can be changed.

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

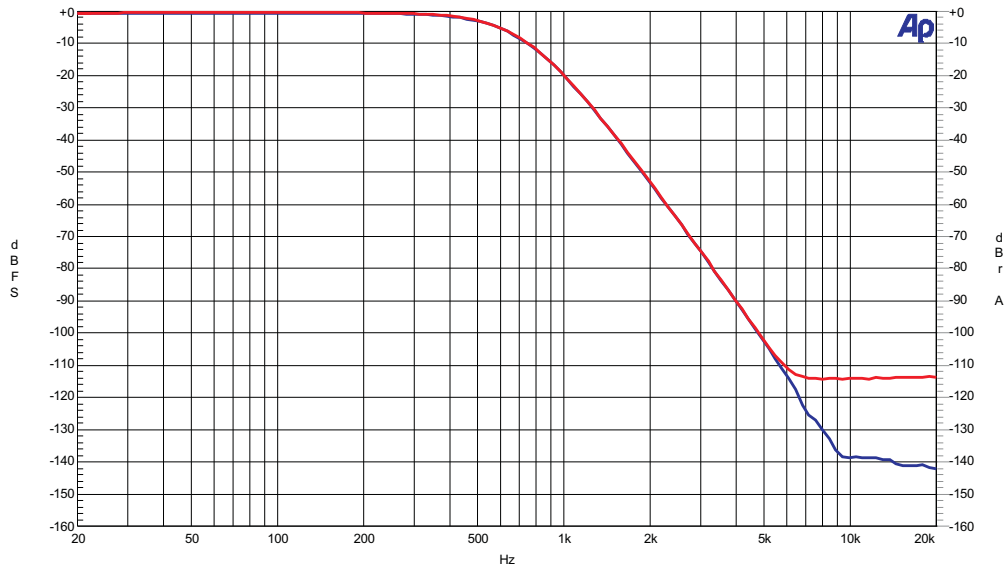
<sup>(2)</sup> TAS3108EVM2 is capable of handling sample rates up to 192 kHz using MCLK =  $128 \times \text{FS}$ . However, TI Input-USB Board and TI Output DAC Board are limited to 96-kHz MCLK =  $256 \times \text{FS}$

**Table 3. Physical Specifications**

Physical Specifications		Notes/Conditions <sup>(1)</sup>
PCB Dimensions	$60 \times 104 \times 30$	Width $\times$ Length $\times$ Height (mm)
Total weight	0.04 kg	Components + PCB + Mechanics

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

### 1.1 500-Hz Low Pass Filter Example

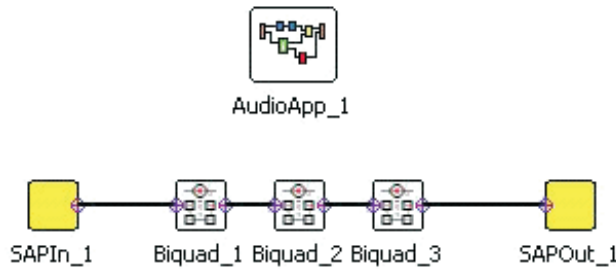


Comments: Input signal: -0.5 dB FS at 44.1 kHz  
 Mode: Slave  
 TAS3108 implemented filter: 3 cascaded BiQuads

(RED) Measured on Analog DAC output  
 Filter: 20 kHz (AES 17)

(BLUE) Measured on SPDIF output  
 Filter: Fs/2  
 FS = 44.1 kHz

**Figure 1. 500-Hz Low-Pass Filter Example**



**Figure 2. Screenshot of the 500-Hz Low-Pass Filter GDE Implementation**

## 2 References


1. *System Design Considerations for True Digital Audio Power Amplifiers* (SLAA117)
2. *Digital Audio Measurements* (SLAA114)
3. *PSRR for PurePath Digital Audio Amplifiers* (SLEA049)
4. *Power Rating in Audio Amplifier* (SLEA047)
5. *PurePath Digital AM Interference Avoidance* (SLEA040)
6. *Click & Pop Measurements Technique* (SLEA044)
7. *Power Supply Recommendations for DVD-Receivers* (SLEA027)
8. *Implementation of Power Supply Volume Control* (SLEA038)


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## Appendix A Design Documents

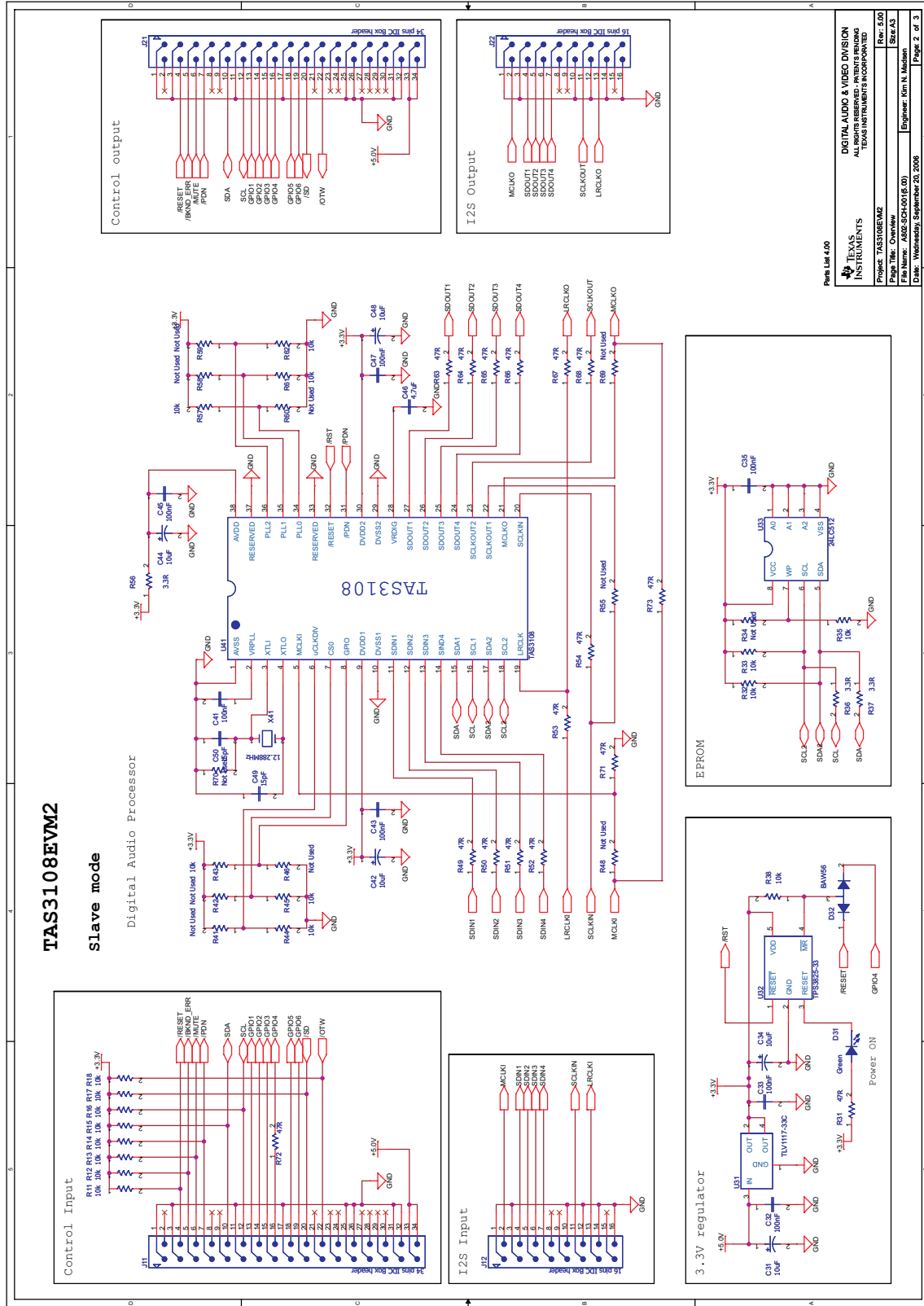
<b>A.1 TAS3108EVM2 Schematic</b>	Version 5.00	3 pages
<b>A.2 TAS3108EVM2 Parts List</b>	Version 4.00	1 page
<b>A.3 TAS3108EVM2 PCB Specification</b>	Version 4.00	1 page
<b>A.4 TAS3108EVM2 PCB Layers</b>	Version 4.00	5 pages

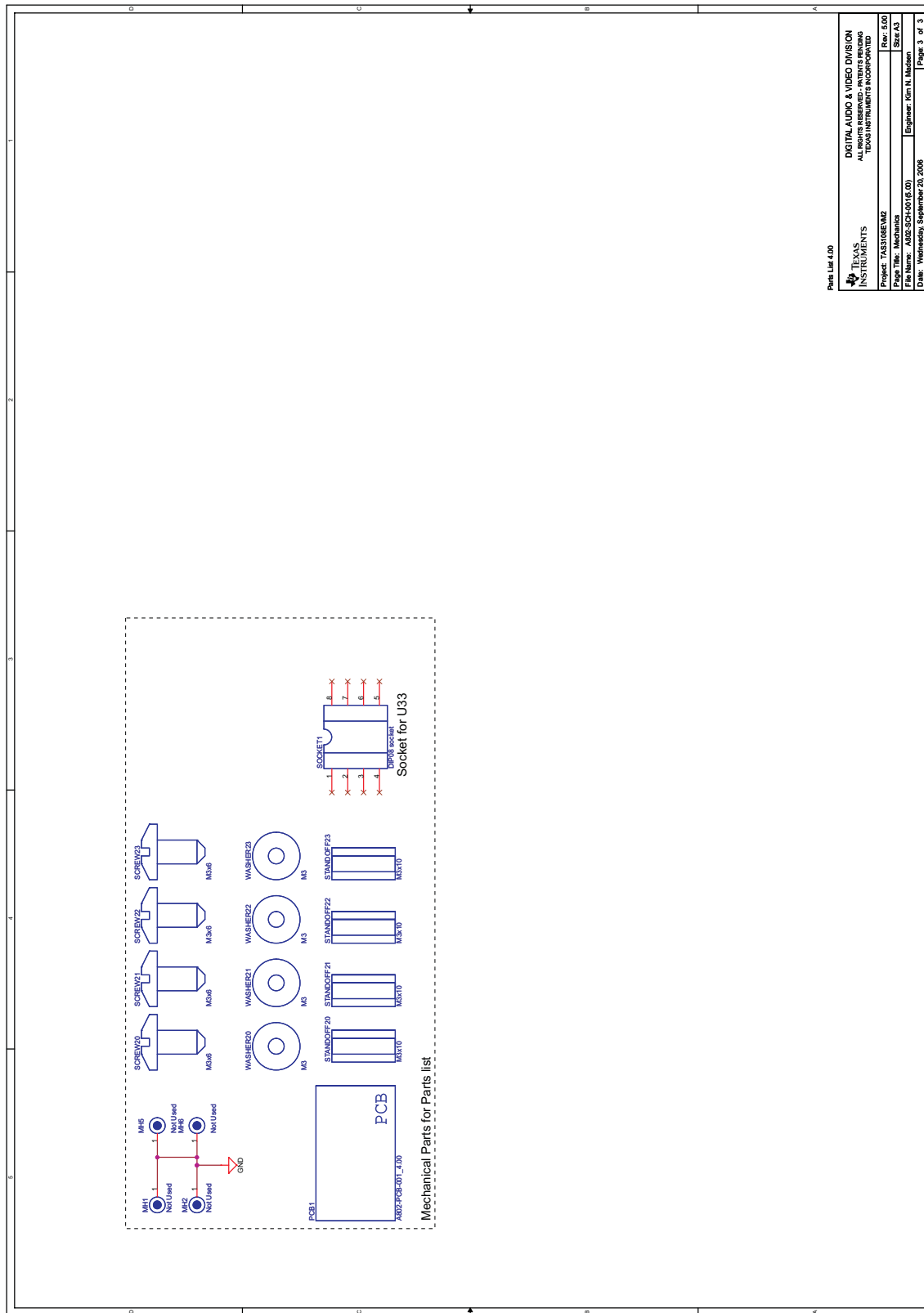
## **A.1 TAS3108EVM2 Schematic**

 <p><b>DESIGN NAME:</b> TAS3108EVM2  <b>TYPE:</b> Mass Market Evaluation Module  <b>FILE NAME:</b> A802-SCH-001(5,00).DSN  <b>VERSION:</b> 5.00  <b>DATE:</b> 20-09-2006  <b>DESIGN ENGINEER:</b> Kim N. Madsen, Jonas Holm</p> <p><b>AUDIO CONFIGURATION:</b> 8 Channel Full programmable Digital Audio Processor</p> <p>1 x TAS3108</p> <p><b>INTERFACES:</b>          J11: 34 pin IDC Header for Control Input, I2C and +5V          J12: 16 pin IDC Header for I2S Audio Input          J22: 16 pin IDC Header for I2S Audio Output</p> <p><b>PAGE</b>          1/3: Front Page and Schematic Disclaimer          2/3: Connectors and Digital Audio Processor          3/3 Mechanics</p> <p>Copyright 2006 Texas Instruments, Inc. - All rights reserved -          The TI and PurePath Digital logos are trademarks of Texas Instruments.</p>	<p style="text-align: center;"><b>SCHEMATIC DISCLAIMER</b></p> <p>The schematic information and materials ("Materials") provided here are provided by Texas Instruments Incorporated ("TI") as a service to its customers and/or suppliers, and may be used for informational purposes only, and only subject to the following terms. 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Project: TAS3108EVM2	Rev: 5.00
Page Title: Schematic Disclaimer	Size: A3
File Name: A802-SCH-001(5,00)	Engineer: Kim N. Madsen
Date: Wednesday, September 20, 2006	Page: 1 of 3







Part List 4.00

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Date: Wednesday, September 20, 2006	Rev: 5.00
Engineer: Ken N. Mullen	Sheet: A3
	Page: 3 of 3

## A.2 TAS3108EVM2 Parts List

TAS3108EVM2 Parts List (4.00)



Qty	Part Reference	Description	Manufacture	First Mfr P/N
18	R11 R12 R13 R14 R15 R16 R17 R18 R32 R33 R35 R38 R43 R44 R45 R57 R61 R62	10k/100mW 5% 0603 Metal Film Resistor	BC Components	DCT 0603 5% 10k0
3	R36 R37 R56	3.3R/100mW 5% 0603 Metal Film Resistor	BC Components	DCT 0603 5% 3R30
16	R31 R49 R50 R51 R52 R53 R54 R63 R64 R65 R66 R67 R68 R71 R72 R73	47R/100mW 5% 0603 Metal Film Resistor	BC Components	DCT 0603 5% 47R0
7	C32 C33 C35 C41 C43 C45 C47	Ceramic 100nF/16V 20% X7R 0603 Capacitor	BC Components	0603B104M160NT
1	C46	Ceramic 4.7uF/6.3V 20% X5R 0603 Capacitor	Panasonic	ECJ-1V50J475M
2	C49 C50	Ceramic 15pF/50V 10% NP0 0603 Capacitor	BC Components	0603N150K500NT
5	C31 C34 C42 C44 C48	Electrolytic 10uF/16V 20% Aluminium 2mm ø5mm M Series - General Purpose Capacitor	Panasonic	ECA1CM100
1	D32	250mA/70V 350mW Small Signal Dual (C-A-C) Diode (SOT-23)	Fairchild	BAW56
1	D31	Light Emitting Green LED (0603)	Toshiba	TLGU1008
1	U41	Audio DSP for industrial temperature range (HTSSOP38)	Texas Instruments	TAS3108DCP
1	U33	512K I2C serial EEPROM, TIC-EPROM-003(1.00), CSUM = 4B9F (DIP8)	Microchip	24LC512-I/P
1	U32	3.3V Supply Voltage Supervisor (SOT23-5)	Texas Instruments	TPS3825-33DBVT
1	U31	3.3V/800mA Positive Voltage Regulator (SOT223)	Texas Instruments	TLV1117-33CDCY R
4	SCREW20 SCREW21 SCREW22 SCREW23	M3x6, Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x6
4	WASHER20 WASHER21 WASHER22 WASHER23	M3 Stainless Steel Washer	Bossard	BN 670 M3
4	STANDOFF20 STANDOFF21 STANDOFF22 STANDOFF23	M3x10 Aluminium Stand-off	Ettinger	05.03.108
1	SOCKET1	8-pin DIP socket Socket	Tyco	808-AG11D
2	J12 J22	16 pins/2 rows/2.54mm Pitch Vertical Male IDC	Molex	87256-1611
2	J11 J21	34 pins/2 rows/2.54mm Pitch Vertical Male IDC	Molex	87256-3411
1	X41	12.288MHz Leaded Crystal (HC49)	C-MAC	12.288MHz HC49
1	PCB1	TAS3108EVM2 Printed Circuit Board (ver. 4.00) - Allegro	Printline	A802-PCB-001(4.00)



### **A.3 TAS3108EVM2 PCB Specification**

# TAS3108EVM2 PCB SPECIFICATION

## Version 4.00

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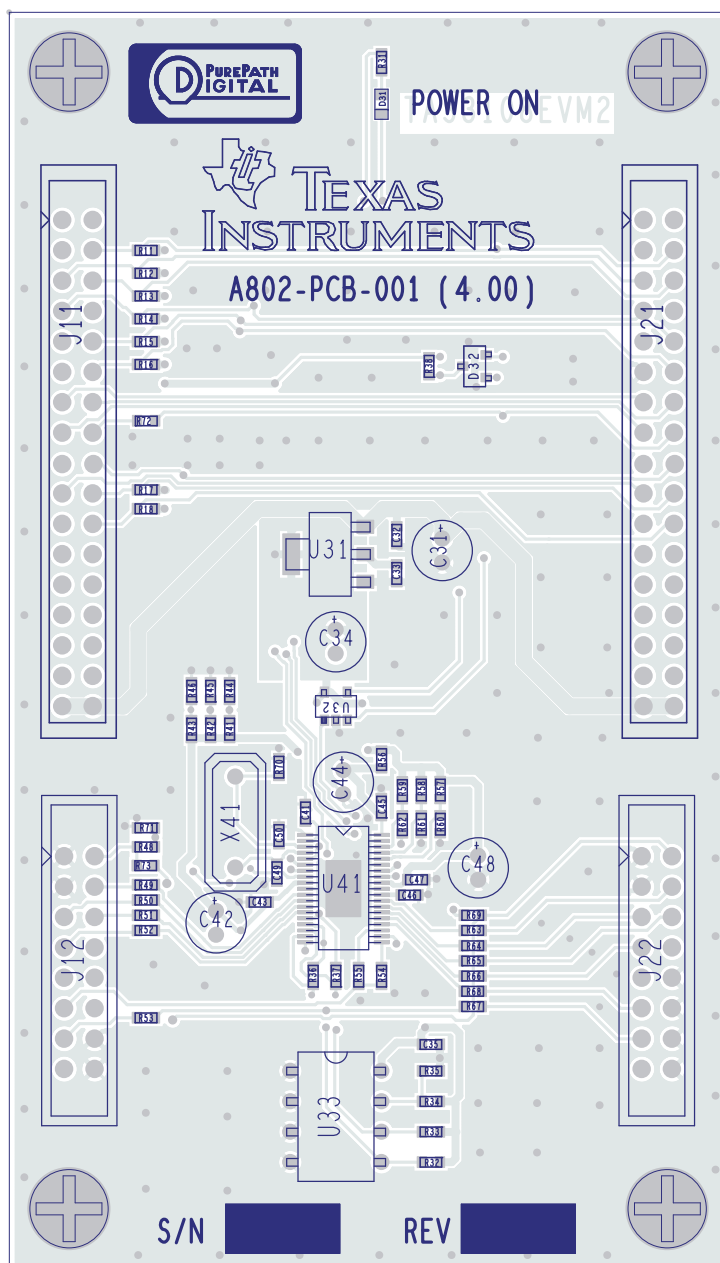
BOARD IDENTIFICATION:	A802-PCB-001(4.00)
BOARD TYPE:	DOUBLE-SIDED PLATED-THROUGH BOARD
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6mm
COPPER THICKNESS:	35 $\mu$ m (INCL. PLATING EXTERIOR LAYER)
COPPER PLATING OF HOLES:	>25 $\mu$ m
MINIMUM HOLE DIAMETER	0.3 mm
SILKSCREEN COMPONENT SIDE:	WHITE - REMOVE SILKSCREEN 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:	60 x 105 mm
Aprox. Number of holes	300
COMMENTS:	SEE DRILL INFORMATION FILE (5166pcb.PDF).

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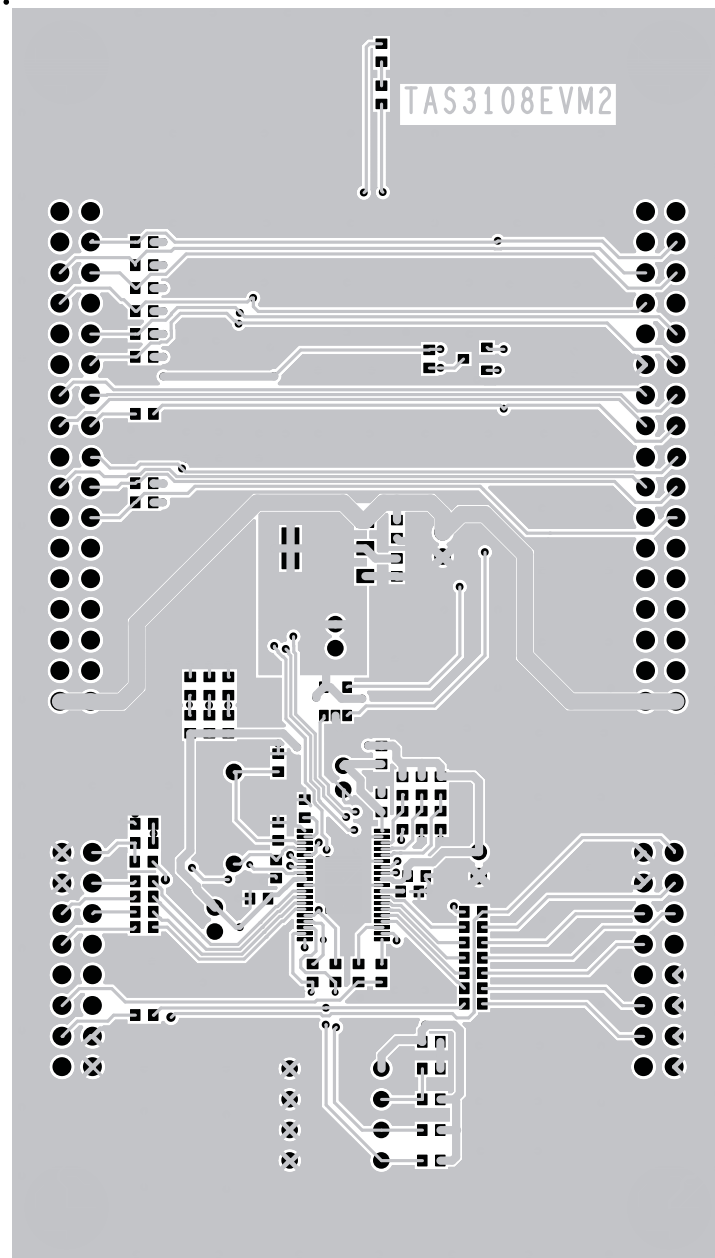
## **A.4 TAS3108EVM2 PCB Layers**



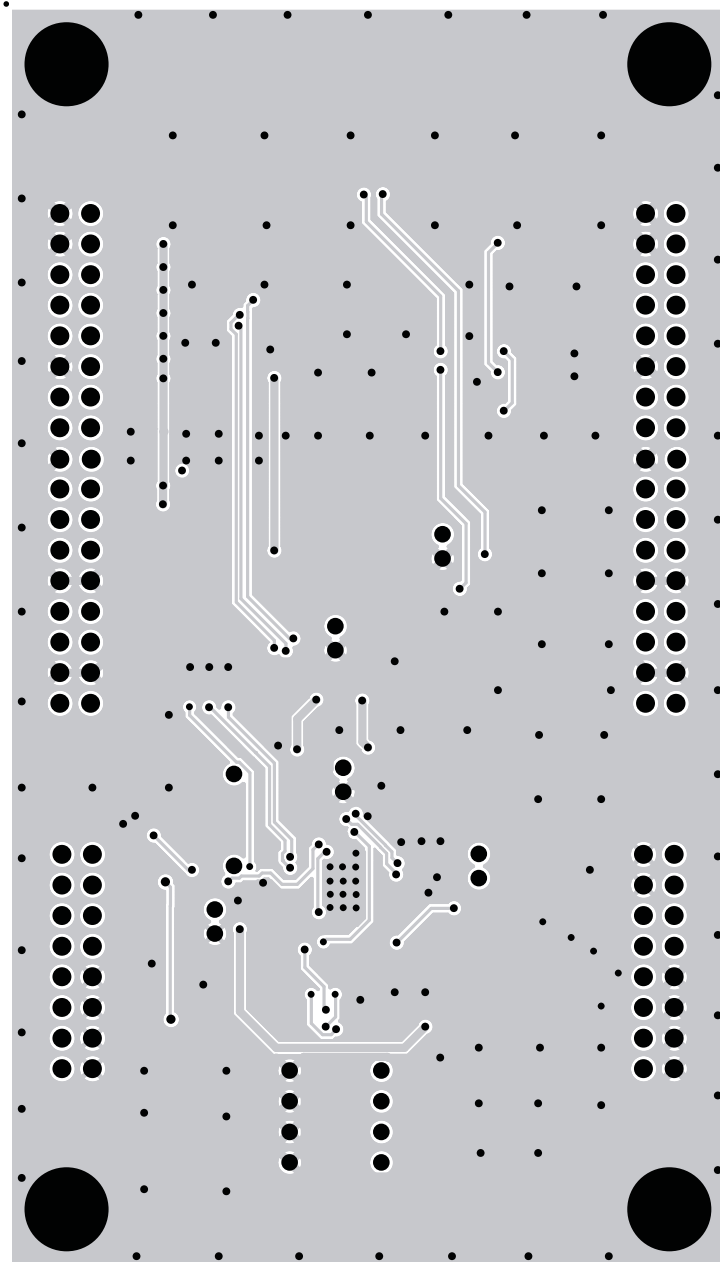
COMP LAYOUT ICOMP	DpS 5166 060817
TI Denmark	A802-PCB-001 (4.00)



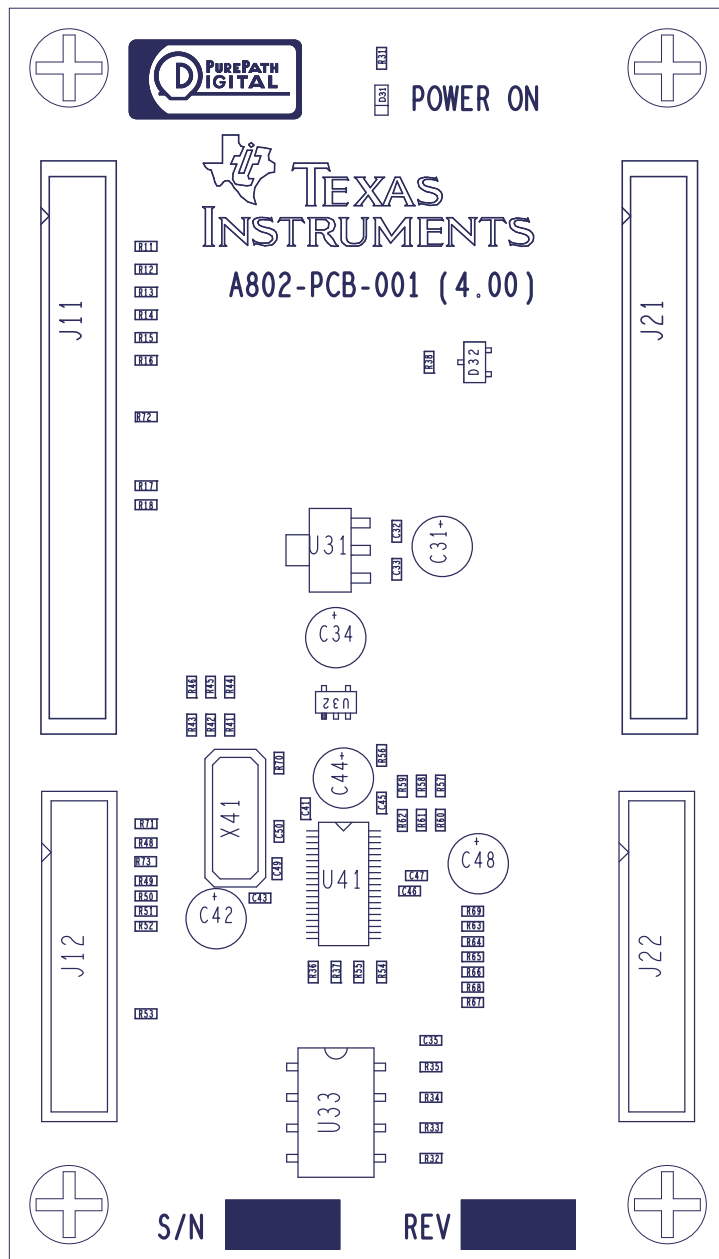
COMPONENT SIDE	DpS 5166	060817
TI Denmark	A802-PCB-001 (4.00)	



718000 0012 2qD	SOLDER SIDE
( 00 )	TI Denmark A805-PCB-001 ( 4.00 )



COMP LAYOUT COMP	DpS 5166	060817
TI Denmark	A802-PCB-001 (4.00)	





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Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Low Power Wireless	<a href="http://www.ti.com/lpw">www.ti.com/lpw</a>	Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
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