

Input-USB Board 2

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Audio Products

ABSTRACT

This user's guide describes the operation of the Input-USB Board 2, which is to be used together with Purepath evaluation modules from Texas Instruments. The user's guide also provides measurement data and design information like schematic, BOM and PCB layout.

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Preliminary

1 Overview

The board has 8 channels analog to digital converter, SPDIF receiver (coax and optical) and a USB connection for PC to I2C control.

This board, together with a PurePath amplifier EVM, can be a complete 8 channel digital audio amplifier system which includes digital input (S/PDIF), analog inputs, interface to PC. There are reporting of shutdowns and over temperature warning from the EVM.

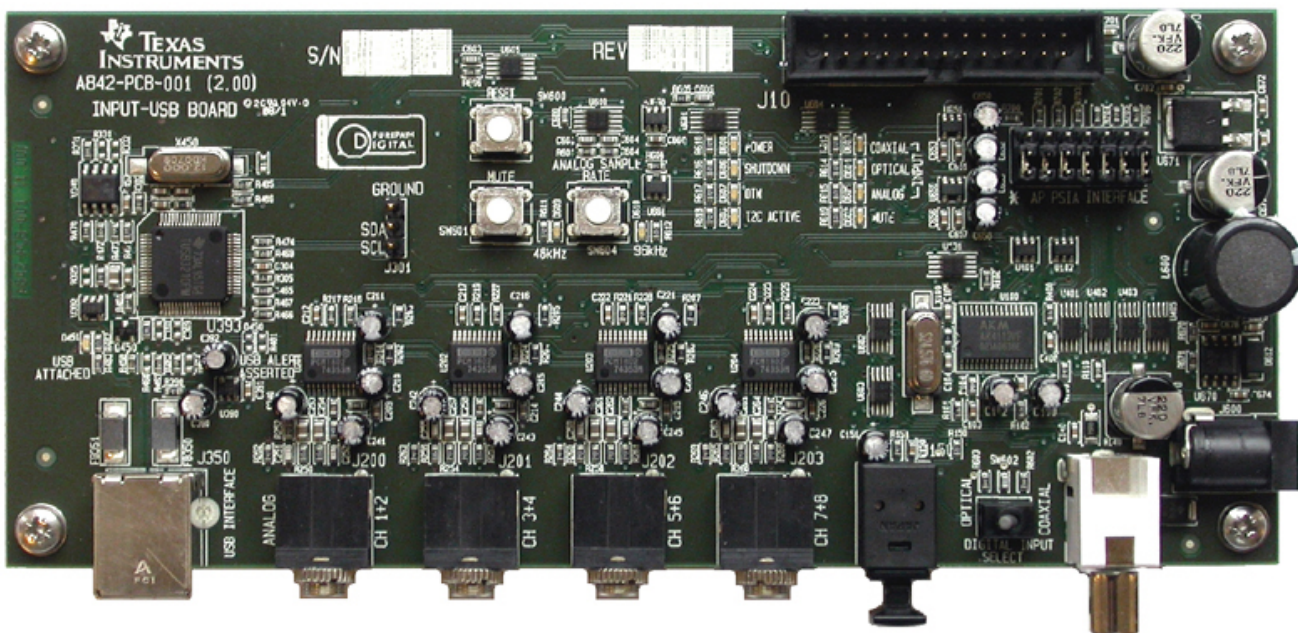
The board can also be connected to PurePath digital audio processor EVM.

Table 1. Input-USB Board 2 Specifications

Key Parameters	
Supply Voltage:	15 V
Number of Channels	8 x Analog Inputs, 1 x Digital Electrical Input, 1 x Digital Optical Input
Input Impedance:	8.5 kOhm
Full Scale Input Voltage 48 kHz SR:	2.1 VRMS
Full Scale Input Voltage 96 kHz SR:	2.1 VRMS
DNR	>110 dB
AD Converter	PCM1802
Digital Audio Interface	AK4113
USB Interface	TUSB3210

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

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



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

1.1 Features

- 8 channel Analog inputs
- Coax / optical stereo channel SPDIF input.
- USB interface for PC GUI's
- Status reporting for PurePath EVM's.
- Standard I²S and I²C / Control connector for PurePath EVM's
- Double-sided plated-through PCB layout.

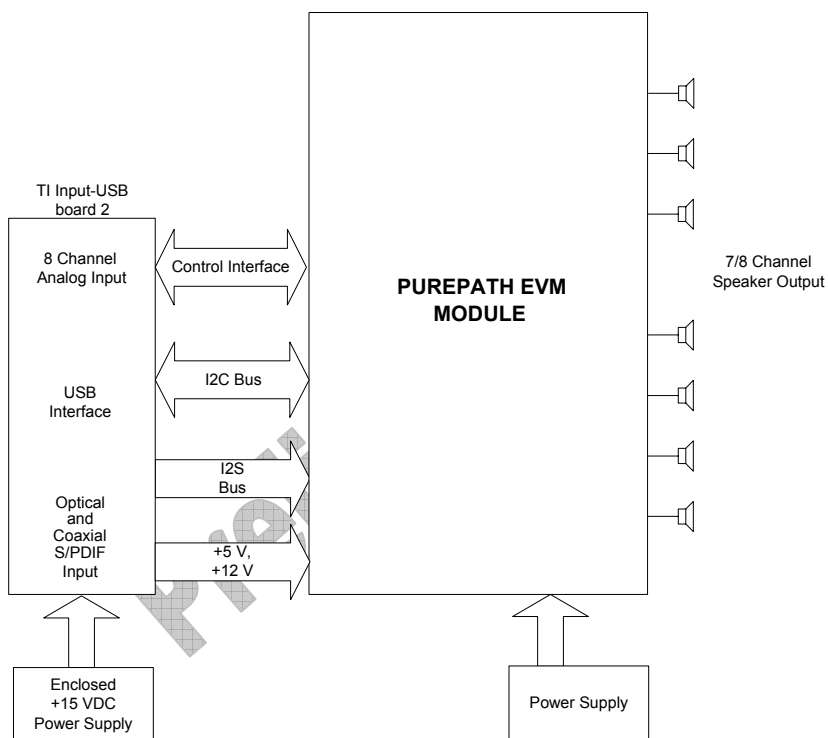


Figure 1. Integrated PurePath Digital™ Amplifier System

2.3 Power Supply Setup

The Input-USB Board 2 is intended to be powered from the enclosed +15 VDC Power Supply via J600. The Input-USB Board 2 is delivering +5 VDC and +12 VDC to the connected TI EVM.

Table 2. Recommended supply voltages

Description	Voltage limitations	Current requirement
System power supply	+20 V	1 A

Caution: Applying voltages above the limitations given in table above may cause permanent damage to your hardware

CAUTION

2.4 Audio Source Connection and Default start up

After each reset, either auto-generated during power up sequence or manual pressing RESET button, the Input-USB board will always in following configuration:

- Mute enabled
- Analog input set to 48kHz sample rate

To start up a PurePath EVM use following procedure:

- 1) Turn on all power supplies before connecting USB interface
- 2) Connect USB interface and press RESET button
- 3) Start GUI software and press RESET in GUI window. Make sure that "USB attached" LED is on and status indicator changes to "ok"
- 4) Load EVM configuration file. Make sure to select the correct file according to the EVM in use.
- 5) Press MUTE to unmute EVM
- 6) EVM is ready to use

2.5 GUI Software Interface

The Input-USB board supports the following GUI's

- TAS5508 GUI 4.0 or later
- TAS5518 GUI 4.0 or later
- TAS5504 GUI 4.0 or later
- TAS5086 GUI 4.0 or later
- Command Tool 6.01 or later
- Other GUI's programmed for TUSB3210

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3 Advanced Use

This chapter describes more advanced used of the Input-USB board.

3.1 Analog Sample Rate

The Input-USB board has 8 analog inputs. Default these inputs are converted to digital at a sample rate of 48kHz. By pressing SW604 "Analog Sample Rate" this can be changed to 96kHz. LED's will show which sample rate is selected.

Note that after each power up and reset sample rate will always return to default 48kHz.

3.2 I2C Connection

Connector J301 has pin outs for I2C. This connector is intended for external I2C monitoring.

By removing R469 and R474 this connector can also be used for control of I2C. Removing the resistors will disconnect USB device from I2C bus.

Caution: I2C bus will always be pulled up to onboard 3.3V rail via >5kΩ resistors

CAUTION

3.3 AP PSIA Interface

The Input-USB board provides the possibility to use I2S directly into the PurePath EVM. I2S source could e.g. be an Audio Precision with a Programmable Serial Interface Adaptor, PSIA.

Default jumper setting is shown in Figure 4. In this setting data out will be: Analog 1+2 routed to Data1, Analog 3+4 to Data2 etc. when analog inputs are selected. When digital input is selected either Coax or Toslink channel A+B is copied into all data outputs.

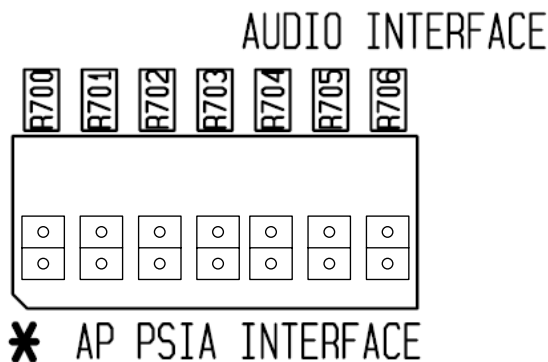


Figure 3. AP PSIA default setting

When using Input-USB board with external I2S source connection and jumper settings below should be used. By placing the jumper as shown will copy I2S data into all data outputs.

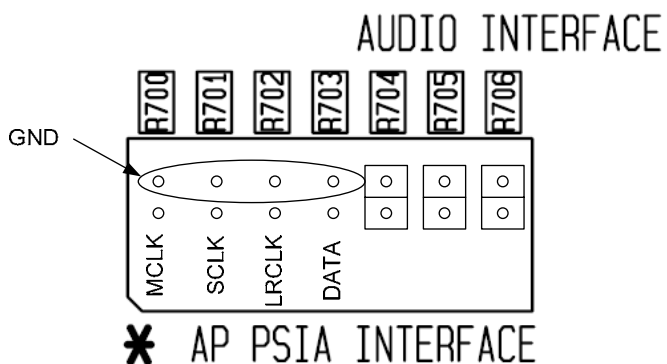


Figure 4. AP PSIA settings using external I2S source

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4 Input-USB Board 2 Performance

Table 3. General Test Conditions

General Test Conditions	Notes
System Supply Voltage:	+15 V Supplied from enclosed power supply.
Sampling frequency:	48 kHz and 96 kHz
Note: These test conditions are used for all tests, unless otherwise specified.	

Table 4. Analog Sample Rate Clocks

Audio Performance	Notes/Conditions
FS 48 MCLK	12.28MHz 256x FS
FS 48 SCLK	3.072MHz 64x FS
FS 48 LRCLK	48.0kHz FS
FS 96 MCLK	24.6MHz 256x FS
FS 96 SCLK	6.144MHz 64x FS
FS 96 LRCLK	96.0kHz FS

Table 5. SPDIF Coax Input

Audio Performance	Notes/Conditions
MCLK at FS=48kHz	256x FS
SCLK at FS=48kHz	64x FS
MCLK at FS=96kHz	256x FS
SCLK at FS=96kHz	64x FS
S/N ratio FS=48 kHz:	144dB A-weighted, 20 kHz LP
S/N ratio FS=96 kHz:	147dB A-weighted, 20 kHz LP
Minimum Detection Level FS=48kHz	220mV
Minimum Detection Level FS=96kHz	250mV

Table 6. Audio Performance, Analog-Digital Converter

Audio Performance	Notes/Conditions
S/N ratio FS=48 kHz:	-102 dBFS A-weighted, 20 kHz LP
S/N ratio FS=96 kHz:	-103 dBFS A-weighted, 20 kHz LP
S/N ratio FS=96 kHz:	-96 dBFS Filter: FS/2
Channel Separation:	>92 dB 1 kHz, Vin = -0.5 dBFS
Frequency Response:	+1 / -0.6 dB
Input Voltage Max @ THD+N = 1%	2.1 VRMS FS=48 kHz
Input Voltage Max @ THD+N = 1%	2.1 VRMS FS=96 kHz
Input impedance:	8.5 kΩ

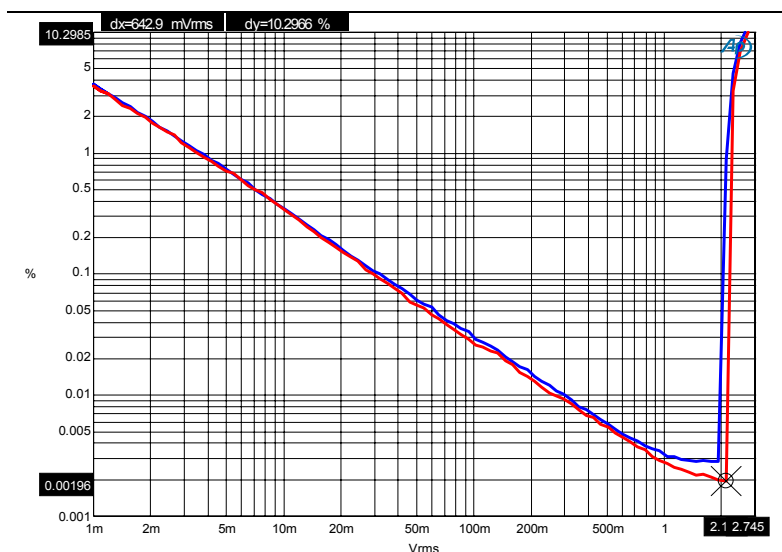
Note: All electrical and audio specifications are typical values.

Table 7. Physical Specifications

Physical Specifications	Notes/Conditions
PCB Dimensions:	73 x 167 x 32 Width x Length x Height (mm)
Total Weight:	100 gr. Components + PCB + Mechanics

Note: All electrical and audio specifications are typical values.

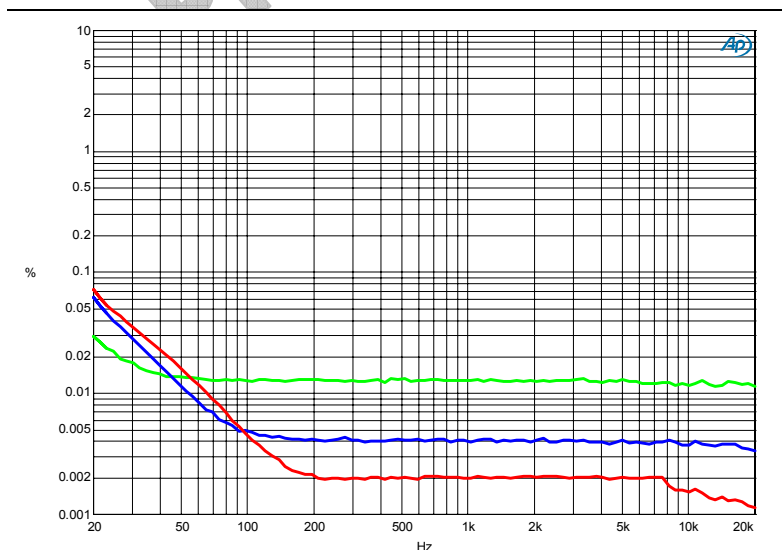
4.1 THD+N vs. Input Amplitude (AD Converter)



Comments: Input signal: 1kHz AP Filter: FS/2 Sample freq: 48kHz Sample freq: 96kHz

Figure 5. THD+N vs. Input Amplitude (AD Converter)

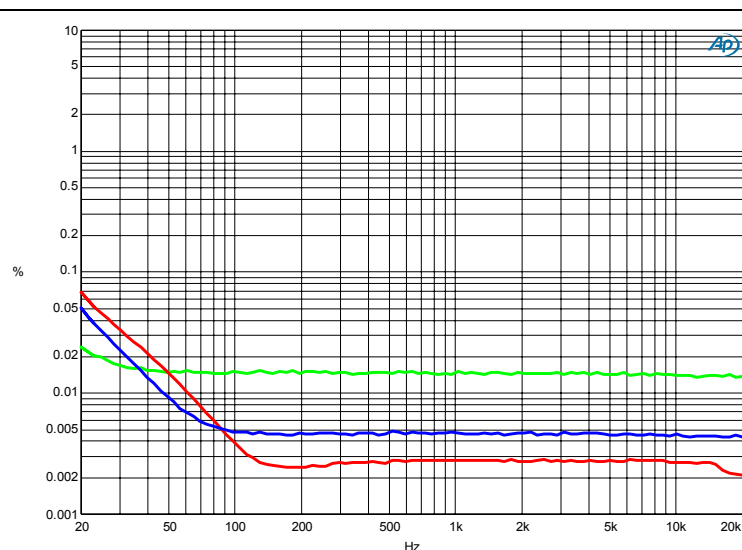
4.2 THD+N vs. Frequency (AD Converter - 48 kHz SR)



Comments: Input signal: -20 dBFS Input signal: -10 dBFS Input signal: -0.5 dBFS Filter: 20 kHz LP Sample freq: 48 kHz Reference: 2.1 VRMS (0 dBFS)

Figure 6. THD+N vs. Frequency (AD Converter - 48 kHz SR)

4.3 THD+N vs. Frequency (AD Converter - 96 kHz SR)



Comments: Input signal: -20 dBFS Filter: 20 kHz LP
 Input signal: -10 dBFS Sample freq: 96 kHz
 Input signal: -0.5 dBFS Reference: 2.1 VRMS (0 dBFS)

Figure 7. THD+N vs. Frequency (AD Converter - 96 kHz SR)

4.4 FFT Spectrum with -60 dBFS Tone (AD Converter - 48 kHz SR)

Reference voltage is 2.1 VRMS (0 dBFS). FFT size 16k.

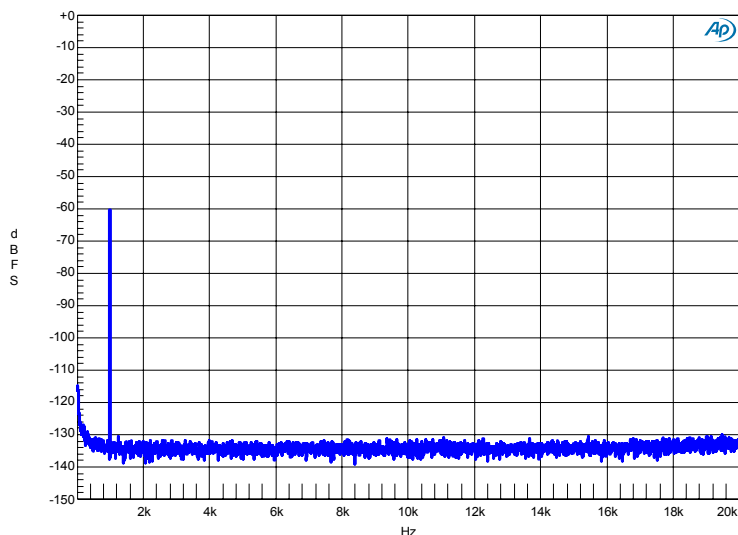


Figure 8. FFT Spectrum with -60 dBFS Tone (AD Converter - 48 kHz SR)

4.5 FFT Spectrum with -60 dBFS Tone (AD Converter - 96 kHz SR)

Reference voltage is 2.1 VRMS (0 dBFS). FFT size 16k.

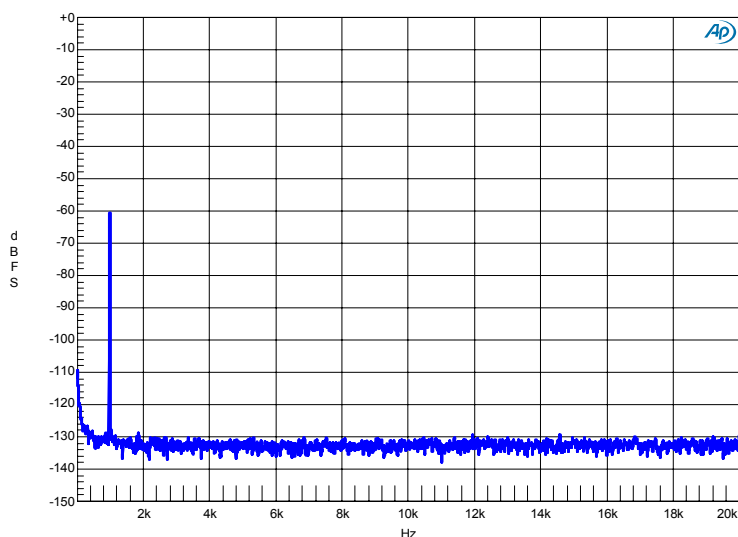
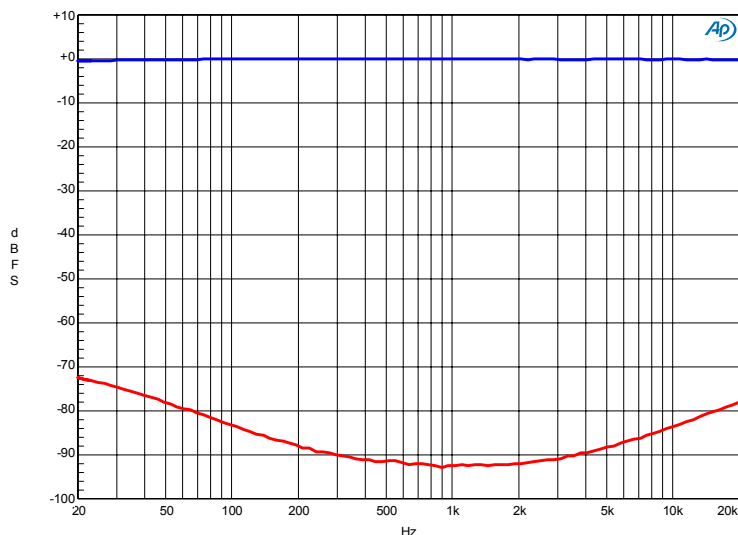


Figure 9. FFT Spectrum with -60 dBFS Tone (AD Converter - 96 kHz SR)

4.6 Channel Separation (AD Converter - 48 kHz SR)

Channel separation is tested for two channels in the same AD converter, channel 1 and channel 2. Channel 1 input signal is -0.5 dBFS, channel 2-8 Grounded. Reference voltage 2.1 VRMS

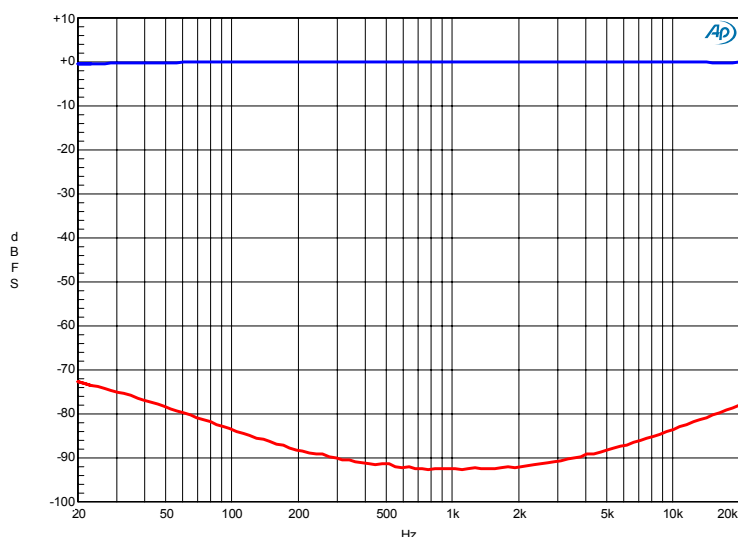


Comments: Blue: Channel 1 Red: Channel 2

Figure 10. Channel Separation (AD Converter - 48 kHz SR)

4.7 Channel Separation (AD Converter - 96 kHz SR)

Channel separation is tested for two channels in the same AD converter, channel 1 and channel 2. Channel 1 input signal is -0.5 dBFS, channel 2-8 Grounded. Reference voltage 2.1 VRMS



Comments: Blue: Channel 1 Red: Channel 2

Figure 11. Channel Separation (AD Converter - 96 kHz SR)

4.8 Frequency Response (AD Converter)

Measurement bandwidth filter 80kHz. Reference 2.1 VRMS.

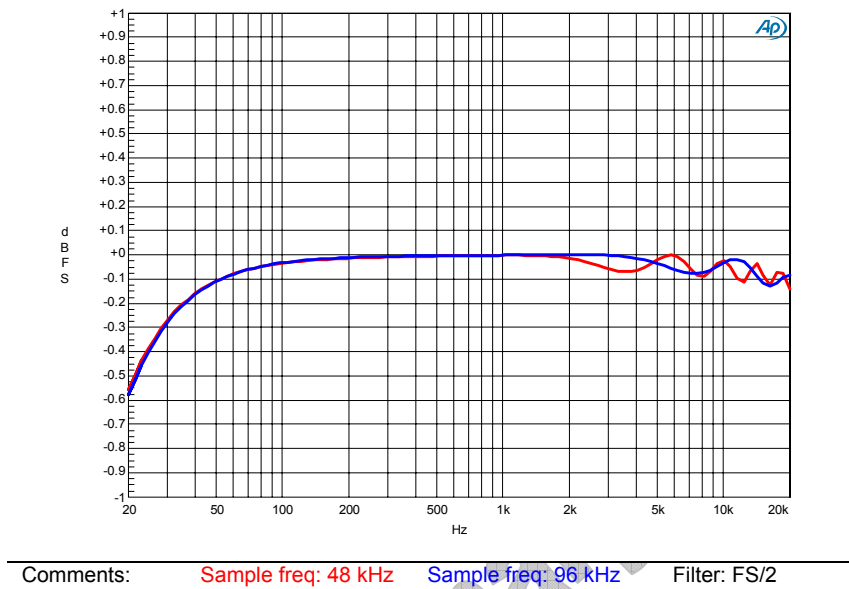


Figure 12. Frequency Response (AD Converter)

5 Related Documentation from Texas Instruments

The following table contains a list of data manuals that have detailed descriptions of the integrated circuits used in the design.

The data manuals can be obtained at the URL <http://www.ti.com>.

Table 8. Related Documentation from Texas Instruments

Part Number	Literature Number
PCM1802	SLES023C
TUSB3210	SLLS466F
TPS76433	SLVS180B
TPS5430	SLVS632C
TPS3825-33	SLVS165

Preliminary

5.1 Design Documents

A.1	Input-USB Board 2 Schematic	Version 2.00	6 pages
A.2	Input-USB Board 2 Partslist	Version 2.00	2 pages
A.3	Input-USB Board 2 PCB Specification	Version 2.00	1 page
A.4	Input-USB Board 2 PCB Layers	Version 2.00	5 pages

Preliminary



Board Name: **Input-USB Board 2**
Type: Mass Market EVM Support Board
File Name: A842-SCH-001(2.00).DSN
Version: 1.00
Date: 7.Feb.2008
Engineer: Jonas Holm (jlh@ti.com)
Audio Configuration: Digital and Analogs inputs + USB Interface
1 x AK4113, 4 x PCM1802, 1 x TUSB3210

Interfaces: J140: RCA Phono connector for coaxial S/PDIF input
J150: Toslink receiver for optical S/PDIF input
J200-J203: Mini-Jack connectors for 6-ch analog input
J350: USB connector for PC interface
J800: 34 pin IDC Header for Control, I2C and +5V
J850: 16 pin IDC Header for I2S Audio

Page

1/6: Front Page and Schematic Disclaimer
2/6: Overview and in/out connectors
3/6: Digital Inputs
4/6: Analog Inputs
5/6: USB Interface
6/6: Logic, PSU and Mechanics

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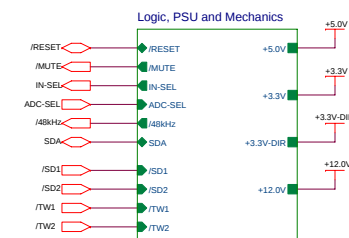
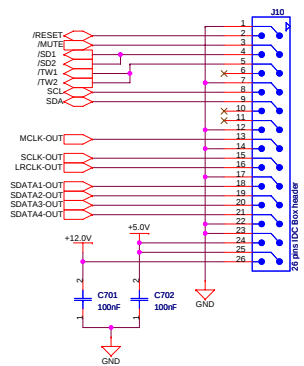
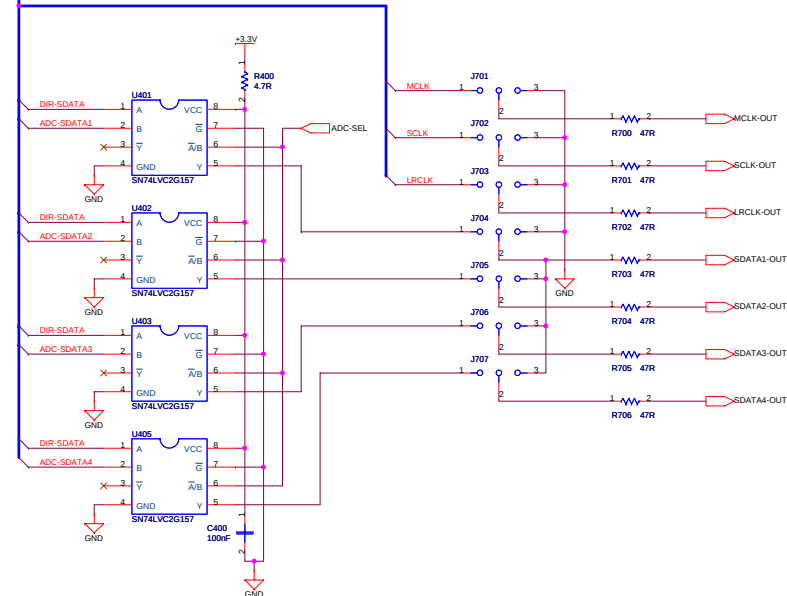
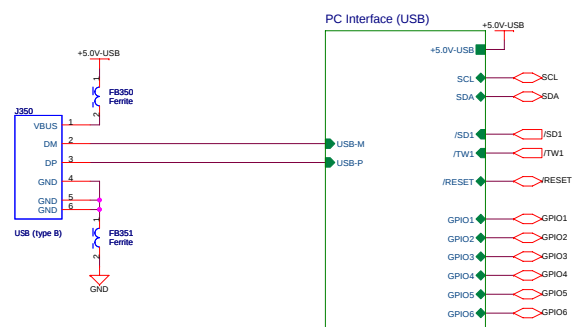
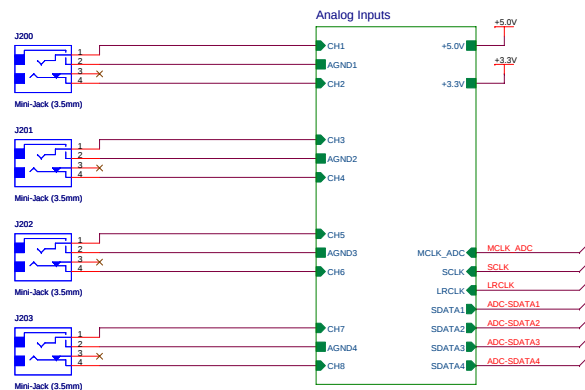
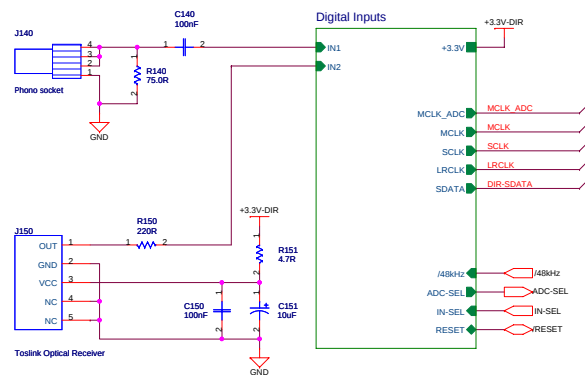
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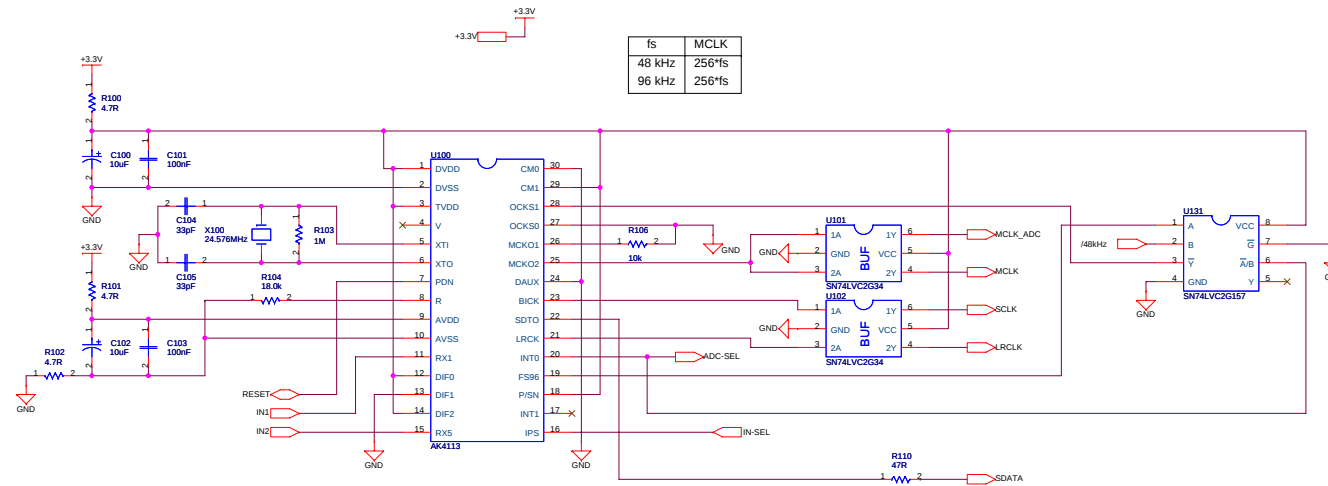
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Part List 2.00

TEXAS INSTRUMENTS		DIGITAL AUDIO & VIDEO DIVISION ALL RIGHTS RESERVED - PATENTS PENDING TEXAS INSTRUMENTS INCORPORATED	
Project: Input-USB Board 2		Rev: 2.00	
Page Title: Schematic Disclaimer		Size: A2	
File Name: A842-SCH-001(2.00)		Engineer: Jonas Holm	
Date: Thursday, February 07, 2008		Page: 1 of 6	





DIF0-2
HLH I2S - 24bit

ADC-SEL
L SPDIF
H ANALOG

IN-SEL
L COAX
H OPTICAL

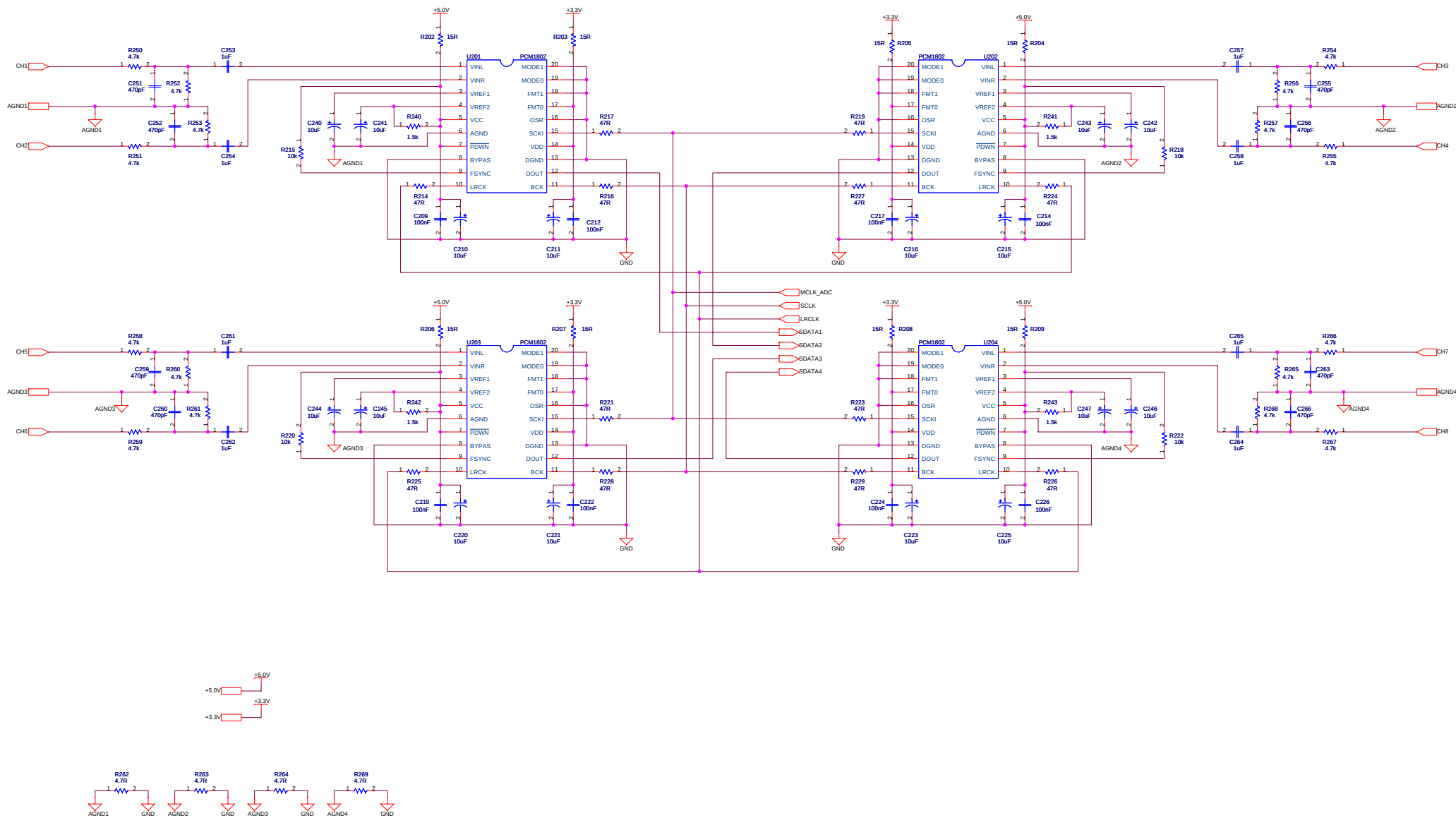
FS96
L <54kHz SR
H >64kHz SR

Part list 2.00



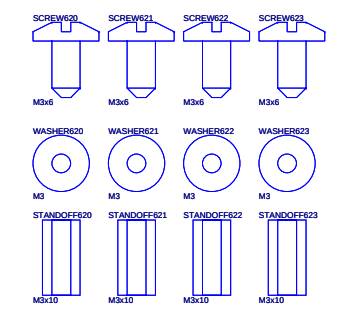
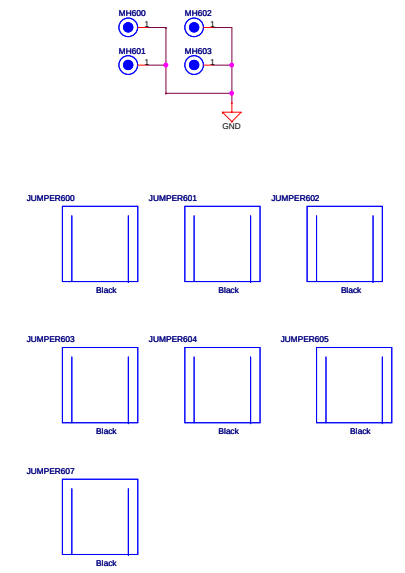
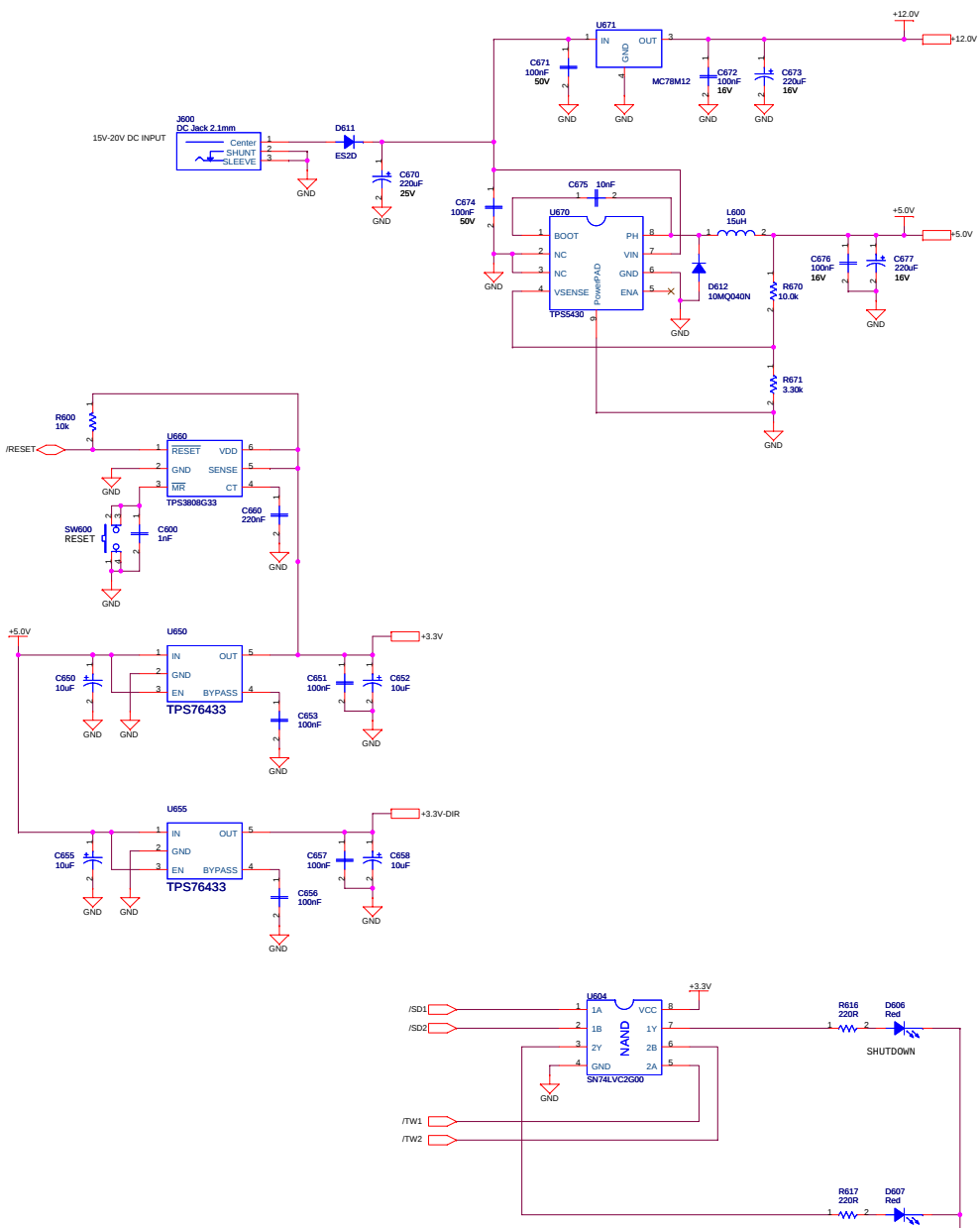
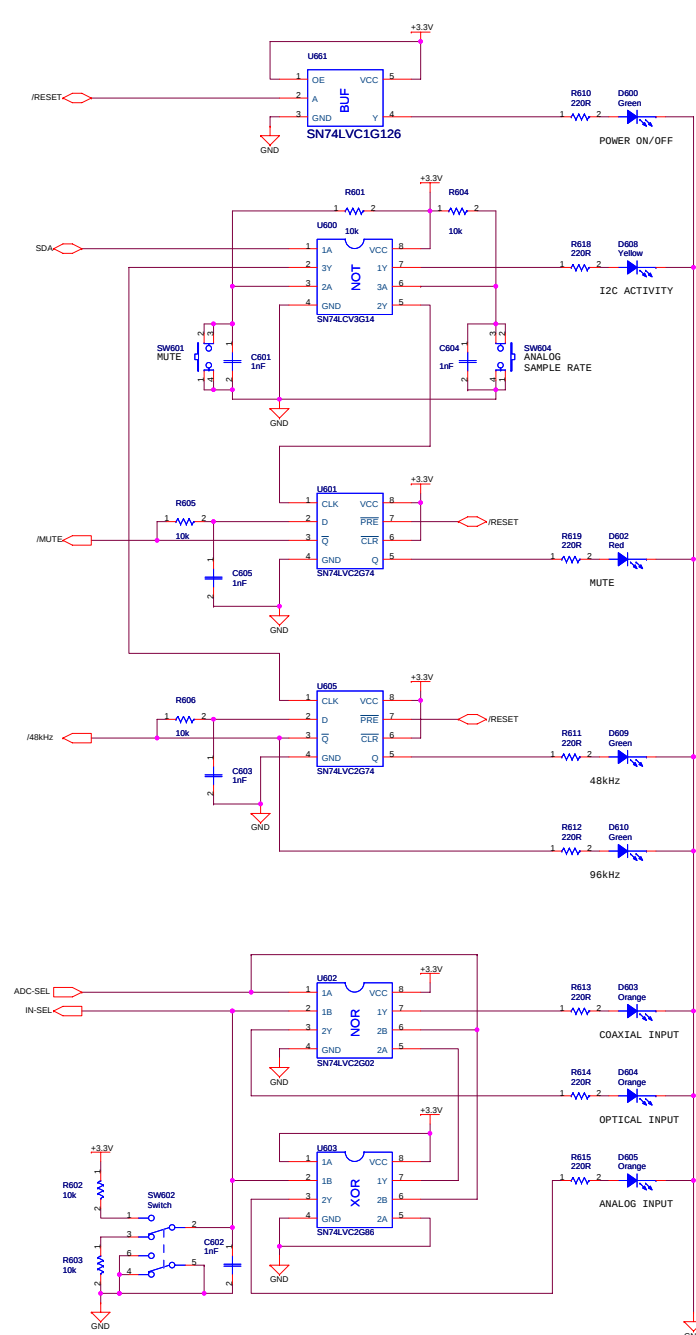
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Project: Input-USB Board 2		Rev: 2.00
Page Title: Digital Inputs		Size: A2
File Name: A842-SCH-001(2.00)	Engineer: Jonas Holm	
Date: Tuesday, December 18, 2007	Page: 3 of 6	



Part List 2.00

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Project: Input-USB Board 2		Rev: 2.00	
Page Title: Analog Inputs		Size: A2	
File Name: A842-SCH-001(2.00)		Engineer: Jonas Helm	
Date: Tuesday, December 18, 2007		Page: 4 of 6	



Qty	Part Reference	Description	Manufacture	First Mfr P/N
1	R140	75.0R / 250mW / 1% / 1206 Thick Film Resistor	Yageo	RC1206FR-0775RL
16	R106 R215 R218 R220 R222 R331 R470 R471 R483 R600 R601 R602 R603 R604 R605 R606	10k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0710KL
1	R670	10.0k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-0710KL
4	R461 R465 R466 R467	100k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07100KL
2	R103 R450	1M / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071ML
5	R240 R241 R242 R243 R458	1.5k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-071K5L
1	R459	15k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0715KL
8	R202 R203 R204 R205 R206 R207 R208 R209	15R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0715RL
1	R104	18.0k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-0718KL
12	R150 R482 R610 R611 R612 R613 R614 R615 R616 R617 R618 R619	220R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-07220RL
6	R462 R463 R469 R474 R485 R486	22R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0722RL
1	R671	3.30k / 100mW / 1% / 0603 Thick Film Resistor	Yageo	RC0603FR-073K3L
16	R250 R251 R252 R253 R254 R255 R256 R257 R258 R259 R260 R261 R265 R266 R267 R268	4.7k / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-074K7L
13	R100 R101 R102 R151 R262 R263 R264 R269 R302 R303 R305 R390 R400	4.7R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-074R7L
22	R110 R214 R216 R217 R219 R221 R223 R224 R225 R226 R227 R228 R229 R472 R473 R700 R701 R702 R703 R704 R705 R706	47R / 100mW / 5% / 0603 Thick Film Resistor	Yageo	RC0603JR-0747RL
9	C253 C254 C257 C258 C261 C262 C264 C265 C307	Ceramic 1uF / 16V / 20% X7R 0805 Capacitor	BC Components	0805B105M160NT
2	C673 C677	Electrolytic 220uF / 16V / 20% Aluminium 8x9mm SMD Ultra Low ESR Capacitor	Panasonic	EEEFK1C221P
1	C670	Electrolytic 220uF / 25V / 20% Aluminium 8x10mm SMD Ultra Low ESR Capacitor	Panasonic	EEEFK1E221P
1	C675	Ceramic 10nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y103MXA
26	C101 C103 C140 C150 C209 C212 C214 C217 C219 C222 C224 C226 C304 C308 C391 C400 C457 C461 C651 C653 C656 C657 C672 C676 C701 C702	Ceramic 100nF / 16V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXJ
2	C671 C674	Ceramic 100nF / 50V / 20% X7R 0603 Capacitor	Vishay	VJ0603Y104MXA
1	C660	Ceramic 220nF / 16V / 20% X7R 0603 Capacitor	BC Components	VJ0603Y224MXJ
6	C600 C601 C602 C603 C604 C605	Ceramic 1nF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N102K500NT
4	C104 C105 C450 C451	Ceramic 33pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N330K500NT
8	C251 C252 C255 C256 C259 C260 C263 C266	Ceramic 470pF / 50V / 10% NP0 0603 Capacitor	BC Components	0603N471K500NT
25	C100 C102 C151 C210 C211 C215 C216 C220 C221 C223 C225 C240 C241 C242 C243 C244 C245 C246 C247 C390 C392 C650 C652 C655 C658	Electrolytic 10uF / 16V / 20% Aluminium 1.5mm ø4mm Ultra-Mini Series Capacitor	Sang Jing Electronics	UMR16V106M4X5
2	FB350 FB351	Ferrite / 5A SMD Ferrite Bead Ferrite Bead Inductor	Easy Magnet Corp.	NB 423226
1	L600	15uH / Ferrite Inductor	Kwang Sung	8020P-06-150L
1	D611	2A / 200V Small Signal 20nS Epitaxial ES2D Diode (SMB)	Fairchild	ES2D
1	D612	1A / 40V Schottky 10MQ040N Diode (SMA)	Int. Rectifier	10MQ040N
3	D602 D606 D607	Light Emitting Red Red LED (0603)	Toshiba	TLSU1008
3	D600 D609 D610	Light Emitting Green Green LED (0603)	Toshiba	TLGU1008
2	D451 D608	Light Emitting Yellow Yellow LED (0603)	Toshiba	TLYU1008
3	D603 D604 D605	Light Emitting Orange Orange LED (0603)	Toshiba	TLOU1008
1	Q450	600mA / 40V NPN Small signal PMBT2222 Transistor (SOT-23)	Philips	PMBT2222
4	U201 U202 U203 U204	PCM1802 / 24-Bit Delta Sigma Audio ADC (SSOP20) AK4113 / 24-Bit, 192kHz, 6:1/2:1 select, SPDIF receiver (VSOP30)	Texas Instruments	PCM1802DB
1	U100		AKM	AK4113VFP
1	U604	SN74LVC2G00 / Dual 2-Input Positive-NAND Gate (SSOP8)	Texas Instruments	SN74LVC2G00DCTR
1	U602	SN74LVC2G02 / Dual 2-Input Positive-NOR Gate (SSOP8)	Texas Instruments	SN74LVC2G02DCTR
1	U600	SN74LVC3G14 / Triple Schmitt-Trigger Inverter (SSOP8)	Texas Instruments	SN74LVC3G14DCTR
2	U101 U102	SN74LVC2G34 / Dual Buffer Gate, LVC (SOT23-6) SN74LVC2G74 / Positive-Edge-Triggered D-Type Flip-Flop With Clear And Preset (SSOP8)	Texas Instruments	SN74LVC2G34DBVR
2	U601 U605		Texas Instruments	SN74LVC2G74DCT
1	U603	SN74LVC2G86 / Dual 2-Input Exclusive-OR Gate (SSOP8)	Texas Instruments	SN74LVC2G86DCTR
1	U661	SN74LVC1G126 / Single Bus Buffer, LVC (SOP5-DBV)	Texas Instruments	SN74LVC1G126DBVR
5	U131 U401 U402 U403 U405	SN74LVC2G157 / Single 2-Line to 1-Line Data Selector/Multiplexer (SSOP8-DCT)	Texas Instruments	SN74LVC2G157DCTR
1	U393	TUSB3210 / Universal Serial Bus General Purpose Device Controller (LQFP64-PM)	Texas Instruments	TUSB3210PM

1	U340	24LC64 / 64K I2C serial EEPROM, TIC-EPROM-004(1.00), CSUM = 822A (SO8)	Microchip	24LC64SN
1	U660	TPS3808G33 / 3.3V Programmable-Delay Supply Voltage Supervisor (SOT23)	Texas Instruments	TPS3808G33DBVR
1	U392	TPS3825-33 / 3.3V Supply Voltage Supervisor (SOP5-DBV)	Texas Instruments	TPS3825-33DBVT
1	U671	MC78M12 / 12V/500mA Positive Voltage Regulator (PFM3-KVU)	ON/Motorola	MC78M12CDTG
3	U390 U650 U655	TPS76433 / 3.3V/150mA Low Drop Linear Regulator (SOP5-DBV)	Texas Instruments	TPS76433DBVR
1	U670	TPS5430 / 5V/3A Buck Converter (HSOP8-DDA)	Texas Instruments	TPS5430DDA
1	J150	Toslink Optical Receiver Toslink Receiver, 3.3V Special func.	Toshiba	TORX141P
4	SCREW620 SCREW621 SCREW622 SCREW623	M3x6 Pan Head, Pozidriv, A2 Screw	Bossard	BN 81882 M3x6
4	WASHER620 WASHER621 WASHER622 WASHER623	M3 Stainless Steel Washer	Bossard	BN 670 M3
4	STANDOFF620 STANDOFF621 STANDOFF622 STANDOFF623	M3x10 Aluminium Stand-off	Ettinger	05.03.108
1	J301	3 pins / 1 row / 2.54mm Pitch Vertical Male Pin header Header	Molex	90120-0123
7	JUMPER600 JUMPER601 JUMPER602 JUMPER603 JUMPER604 JUMPER605 JUMPER607	Black Black (Low profile) Shunt	Molex	90059-0007
1	J140	Horizontal Female w. Switch Coax Phono socke	Chunfeng	RJ843-4W
4	J200 J201 J202 J203	Horizontal Female 3.5mm stereo with switch Jack Mini-Jack (3.5mm)	Schurter	4832 2320
1	J10	26 pins / 2 rows / 2.54mm Pitch Vertical Male Low profile IDC 26 pins IDC Box header	Molex	87834-2611
1	J600	2 pins / Horizontal Male DC DC Jack 2.1mm	Lumberg	NEB 21 R
1	J350	Horizontal Female USB USB (type B)	FCI	61729-0010B
7	J701 J702 J703 J704 J705 J706 J707	3 pins / 1 row / 2.54mm Pitch Vertical Male Shunt Header Shunt Header	Samtec	TSW-107-07-T-T
1	X450	12MHz 12MHz SMD Crystal (HCM49)	Citizen	HCM49-12MABJT
1	X100	24.576MHz 24.576MHz SMD Crystal (HCM49)	Citizen	HCM49-24.576MABJT
1	SW602	Switch DPDT PCB Mount Switch	NKK-Nikkai	G-22-AP
3	SW600 SW601 SW604	Switch 6mm Square Key Switch (single pole / single throw) Switch	Omron	B3W-1000
1	NOTE1	Schematic Disclaimer Note Note	n/a	n/a
1	PCB610	Input-USB 2 Printed Circuit Board (2.00)	Printline	A842-PCB-001(2.00)

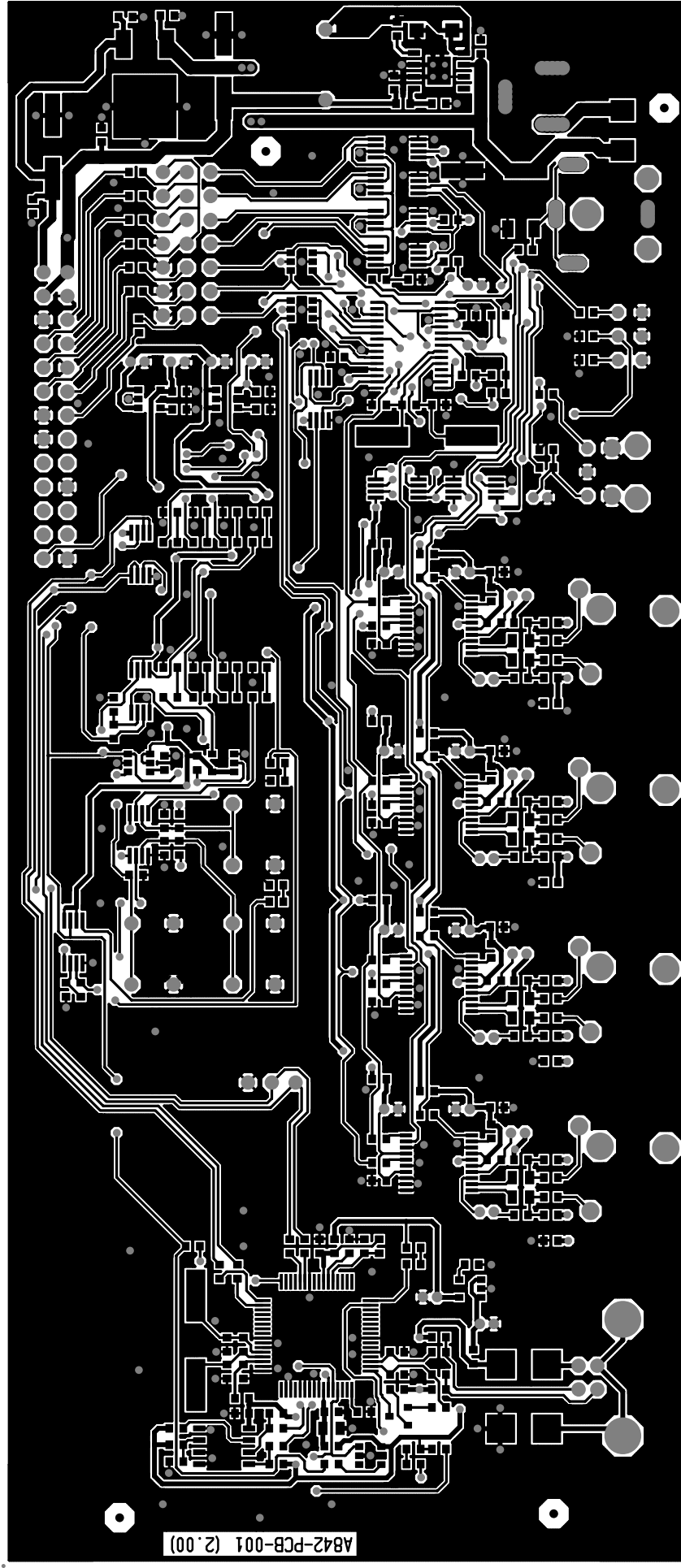
INPUT-USB BOARD (A842)

PCB SPECIFICATION

Version 2.00

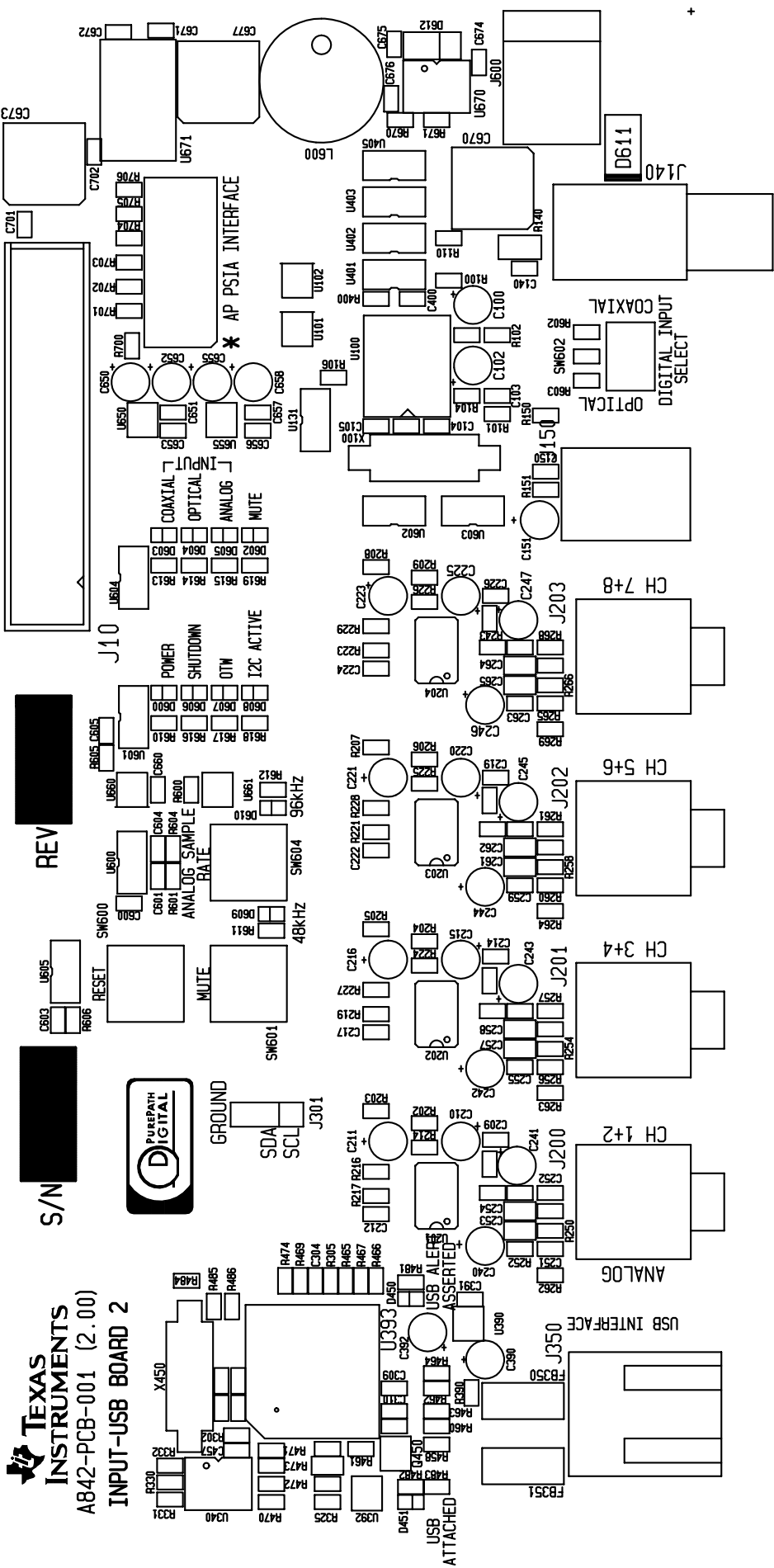
BOARD IDENTIFICATION:	A842-PCB-001(2.00)
BOARD TYPE:	DOUBLE-SIDED PLATED-THROUGH BOARD
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6mm
COPPER THICKNESS:	35µm (INCL. PLATING EXTERIOR LAYER)
COPPER PLATING OF HOLES:	>25µm
MINIMUM HOLE DIAMETER	0.3 mm
SILKSCREEN COMPONENT SIDE:	WHITE – REMOVE SILKSCREEN FROM 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:	167 x 73 mm
COMMENTS:	SEE DRILL INFORMATION FILE (5294pcb.PDF).

COMPONENT SIDE	Dps 5294 080207
TI Denmark	A842-PCB-001 (2.00)



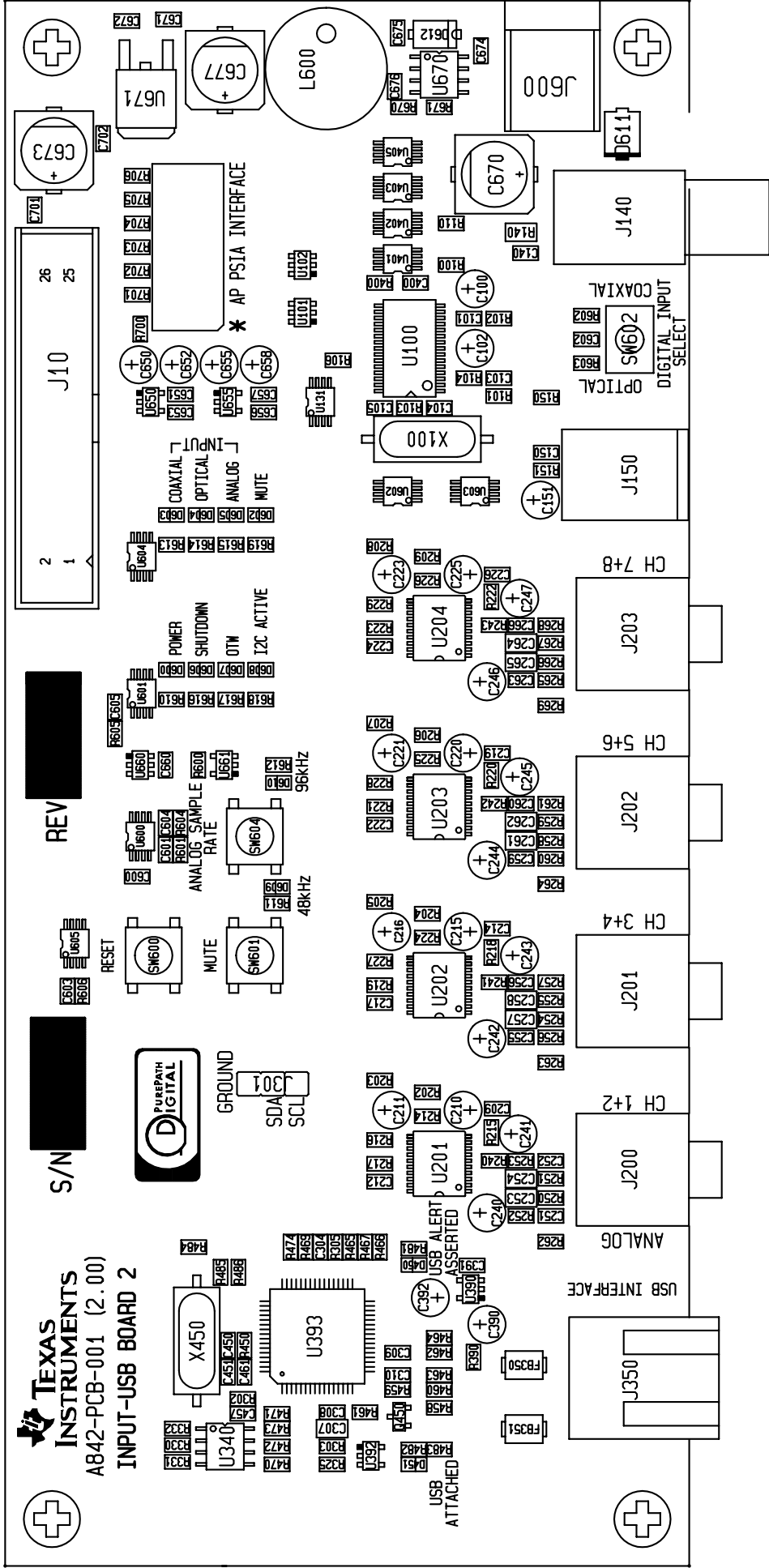
SILKSCREEN COMP Dps 5294 080207

TI Denmark A842-PCB-001 (2.00)



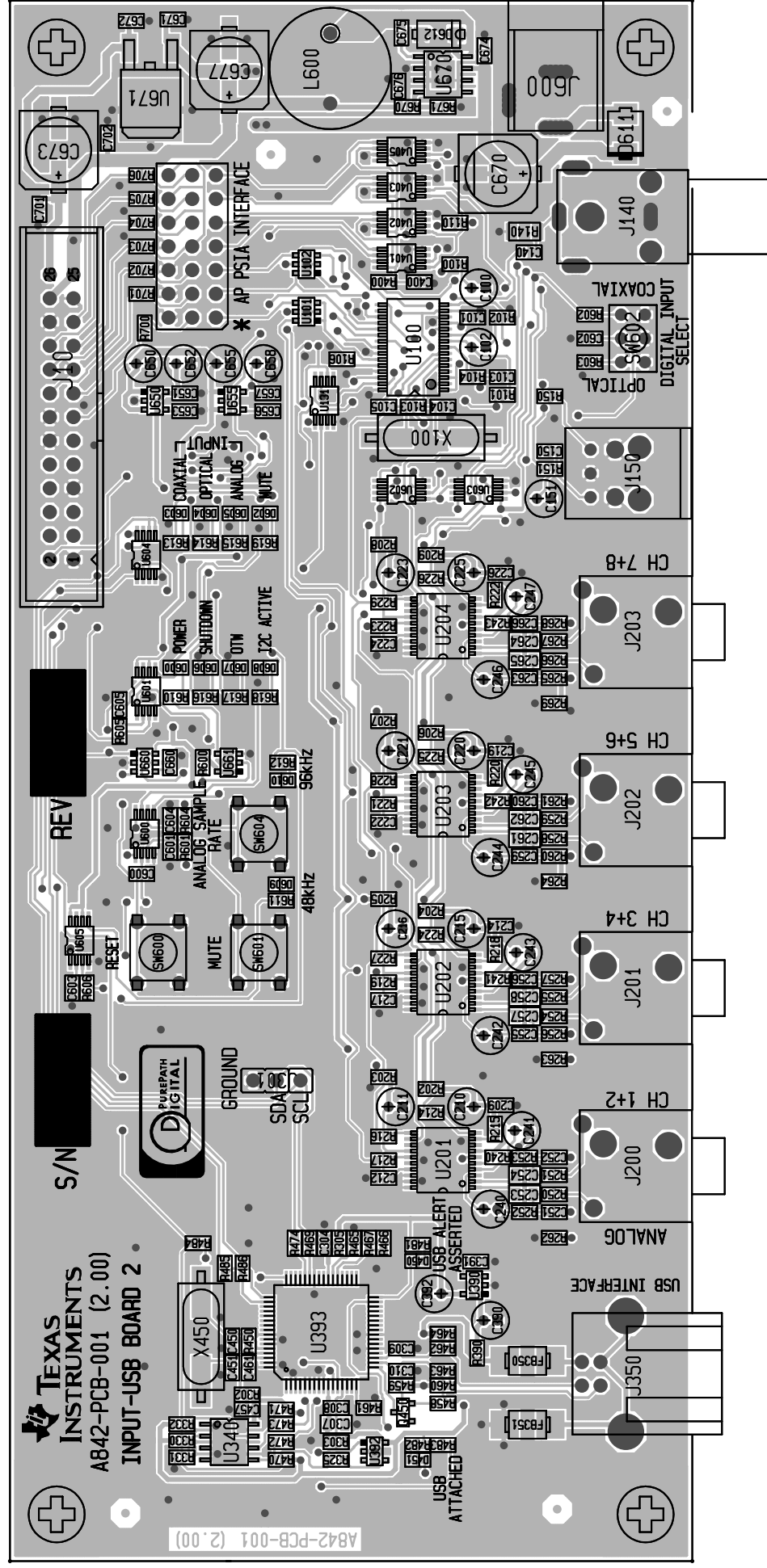
COMP. LAYOUT COMP	DpS 5294 080207
TI Denmark A842-PCB-001 (2.00)	

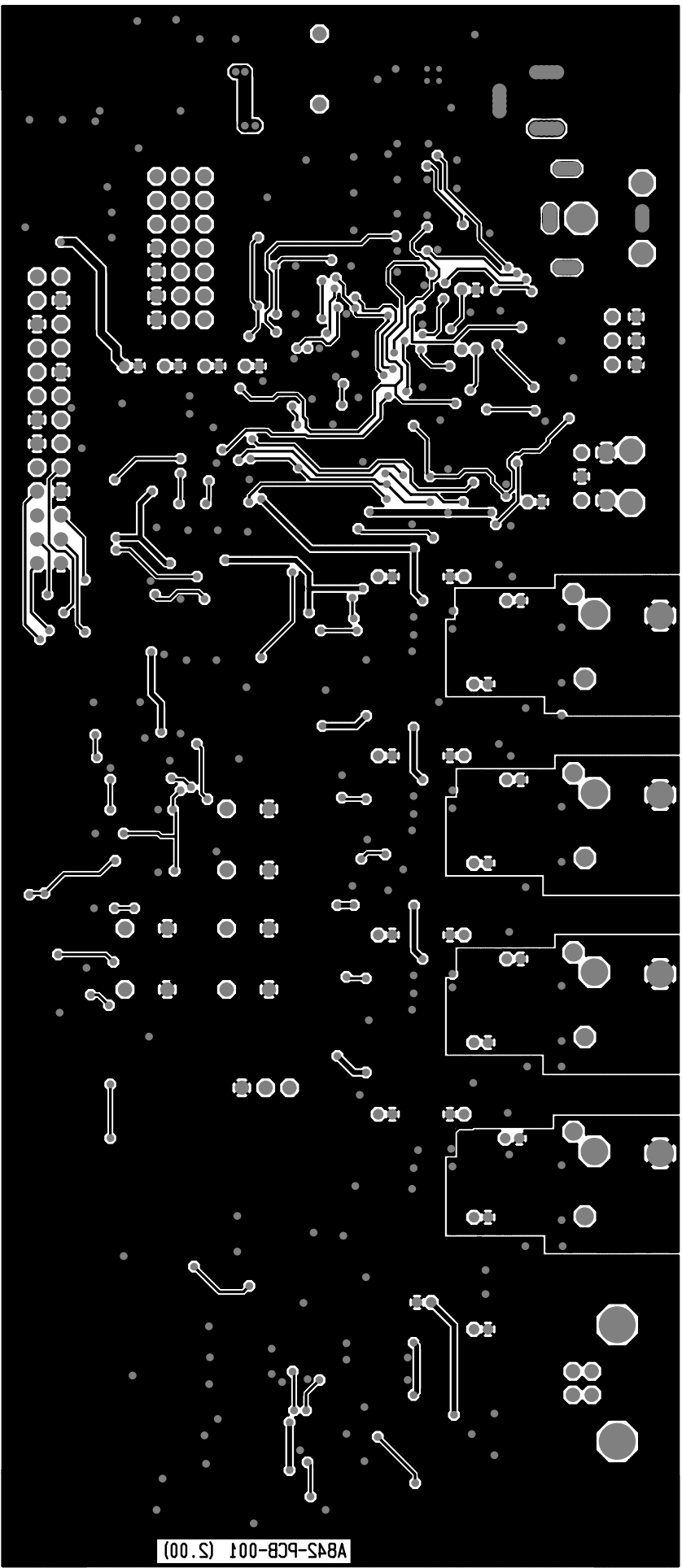
COMP. LAYOUT COMP	DpS 5294 080207
TI Denmark A842-PCB-001 (2.00)	



COMP/PLAYOUTS/COMP	DP5 5294 080207
TI Denmark A842-PCB-001 (2.00)	

COMP/PLAYOUTS/COMP	DP5 5294 080207
TI Denmark A842-PCB-001 (2.00)	





LI DeuW9LK V845-bCB-001 (S.00)		
20TDER 2IDE		Db2 25a4 080501