TAS5612L-TAS5614LDDVEVM

This user's guide provides specifications for the evaluation module (EVM) for TAS5612L and TAS5614L Digital Input Class-D Power Stages with the TAS5558 Digital Audio Processor with PWM output from Texas Instruments. The user's guide also describes operation of the EVM and provides design information including schematic, bill of materials, and PCB layout.

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1 Introduction

The TAS5612L-TAS5614LDDVEVM PurePath™ EVM demonstrates the current version of TAS5612LDDV or TAS5614LDDV integrated circuit power stage with TAS5558 from Texas Instruments (TI).

The TAS5612L and TAS5614L are high-performance, integrated Stereo Feedback Digital Amplifier Power Stages designed to drive 4-Ω speakers at up to 150 W per channel for TAS5614LDDV and 125 W per channel for TAS5612LDDV. They require only a passive demodulation filter to deliver efficient high quality audio amplification.

The TAS5558 is a high-performance 32-bit (24-bit input) multi channel PurePath Digital Pulse Width Modulator (PWM) with 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.

This EVM can be configured as 2 BTL channels for stereo evaluation or 1 PBTL (parallel BTL) channel for subwoofer evaluation. Together with a TI Input-USB Board 3, it provides a complete stereo digital audio amplifier system which includes digital input (S/PDIF), analog inputs, interface to PC and DAP features like digital volume control, input and output mixers, automute, tone controls, loudness, EQ filters and dynamic range compression (DRC). There are configuration options for power stage failure protection.

NOTE: TAS5612L-TAS5614LDDVEVM is shipped with the current version of the TAS5614L installed. Evaluate the current version of TAS5612L by visiting the product folder at www.ti.com and requesting a free sample. Replace the TAS5614L with the TAS5612L.

Table 1. TAS5612L-TAS5614LDDVEVM Specification

Key Parameters	Values
TAS5614L Power Supply Voltage	12–38 Vdc
TAS5612L Power Supply Voltage	12–34 Vdc
Number of Channels	2 × BTL or 1 × PBTL
Load Impedance BTL	4–8 Ohm
Load Impedance PBTL	2–4 Ohm
TAS5614L Output power BTL	150 W / 4 Ohm / 10% THD+N
TAS5614L Output power PBTL	300 W / 2 Ohm / 10% THD+N
TAS5612L Output power BTL	125 W / 4 Ohm / 10% THD+N
TAS5612L Output power PBTL	250 W / 2 Ohm / 10% THD+N
Dynamic Range (DNR)	> 105 dB
PWM Processor	TAS5558
Output Stage	TAS5614LDDV or TAS5612LDDV

NOTE: The heatsink in TAS5612L-TAS5614LDDVEVM is designed to comply with time requirements of the “Amplifier Rule”, US Federal Trade Commission 16 CFR 432, when the EVM is operated at power levels specified above. If continuous operation at specified output power is required it is necessary to provide forced air flow through the heatsink.

(The FTC regulation specifies operation in 25°C ambient temperature for one hour at 1/8 specified output power (18.75W per channel for TAS5614LDDVEVM, 15.63W per channel for TAS5612LDDVEVM) and then for 5 minutes at specified output power (150W per channel for TAS5614LDDVEVM, 125W per channel for TAS5612LDDVEVM). Then distortion vs. output power can be measured. TAS5612L-TAS5614LDDVEVM provides specified output power for several minutes or more without thermal shutdown. THD is not specified for this test but is typically near 10%.)

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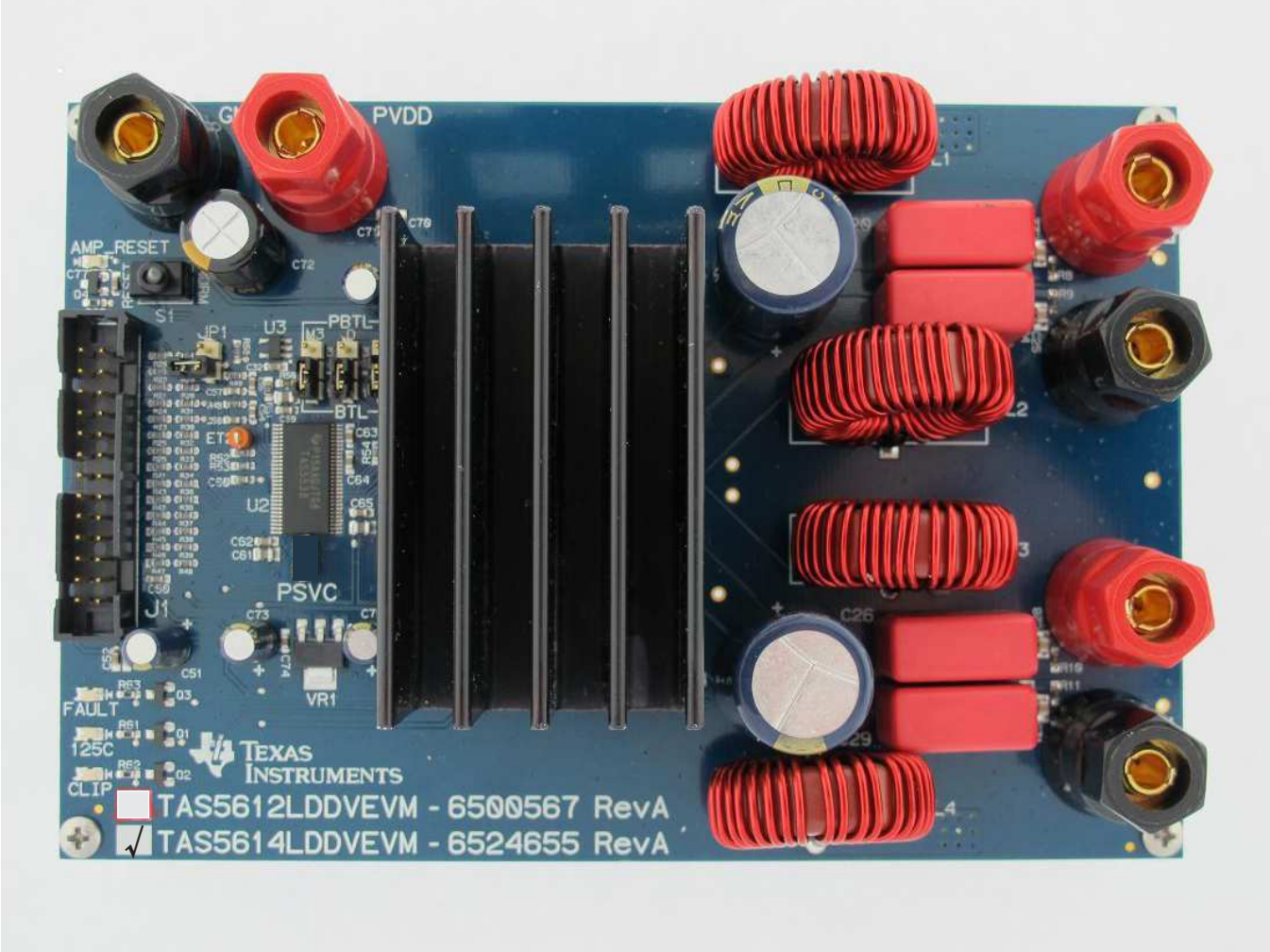


Figure 1. TAS5612L-TAS5614LDDVEVM

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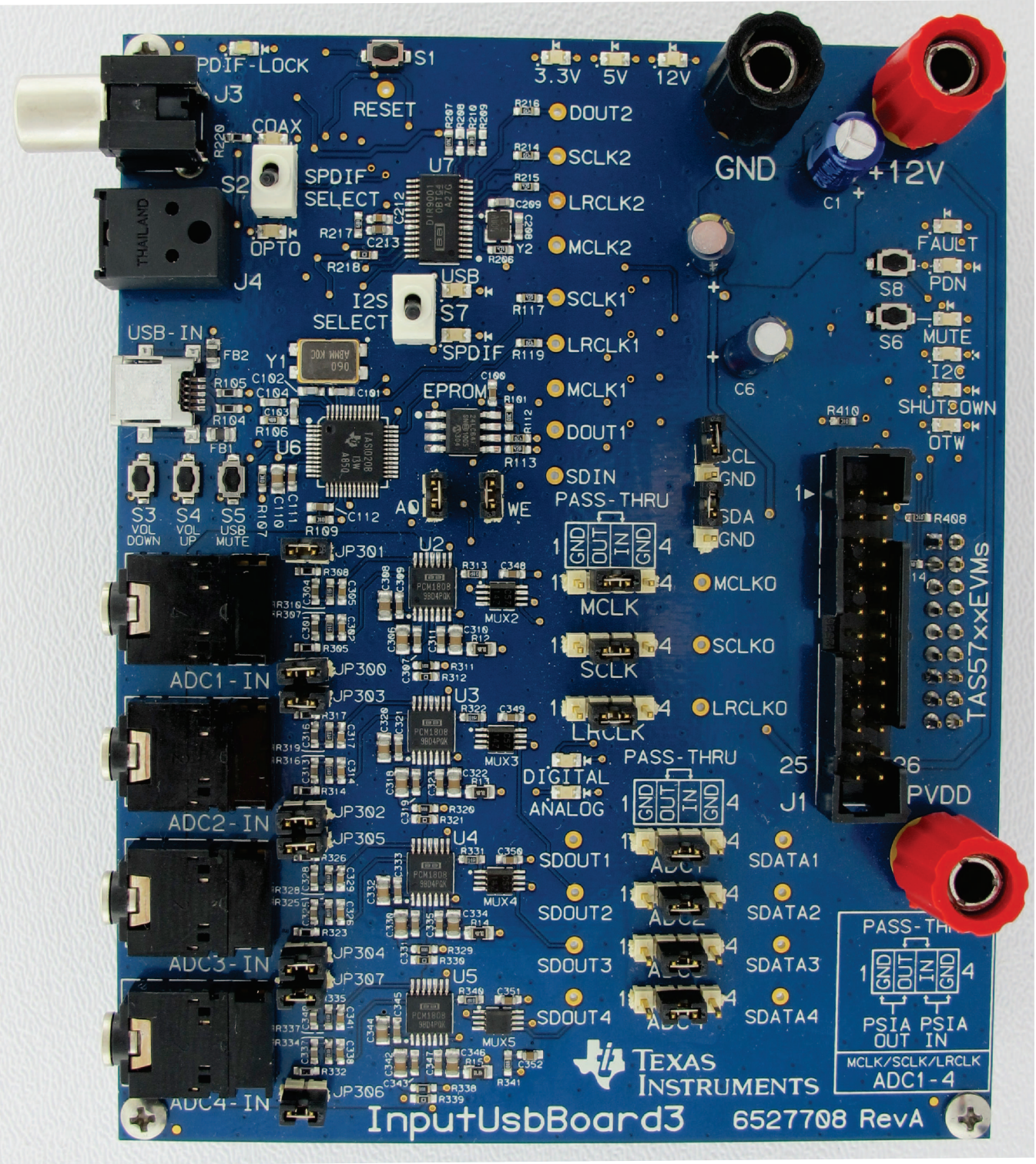


Figure 2. Input-USB Board3

Gerber (layout) files are available at: http://www.ti.com.

The EVM is delivered with a TI Input-USB Board 3 to connect to an input source and to a PC for control. Refer to Unpacking the EVM.

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TAS5612L-TAS5614LDDVEVM Features

- Stereo PurePath Digital evaluation module.
- Self-contained protection system (overcurrent, overtemperature, undervoltage and missing PWM input).
- Standard I^2S and I^2C / Control connector for TI input board
- Double-sided plated-through PCB layout.

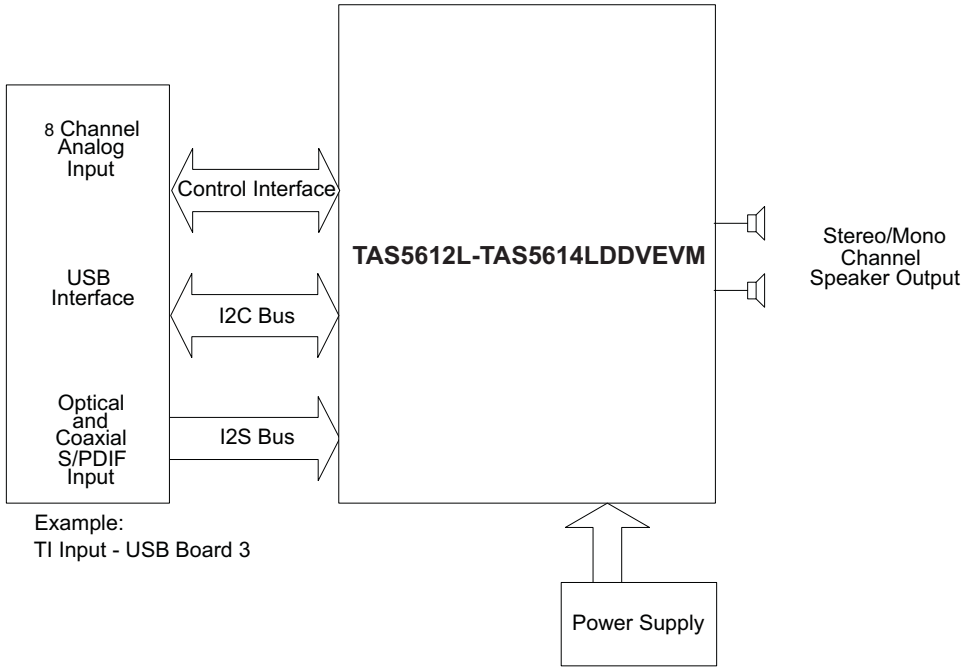


Figure 3. Integrated PurePath Digital Amplifier System

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EVM Physical Structure

Physical structure of the TAS5612L-TAS5614LDDVEVM is illustrated in Figure 4.

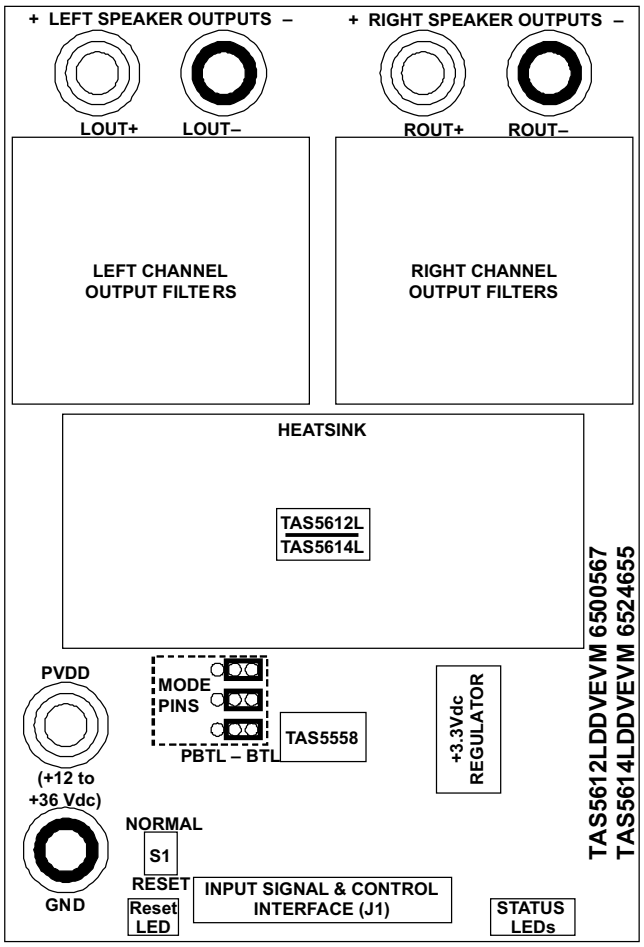


Figure 4. Physical Structure of the TAS5612L-TAS5614LDDVEVM (Approximate Layout)

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2 Quick Setup Guide

This section describes the TAS5612L-TAS5614LDDVEVM power supplies and system interfaces. It provides information regarding handling and unpacking, absolute operating conditions, and switch and jumper positions. It also provides a step-by-step guide to setting up the TAS5612L-TAS5614LDDVEVM for device evaluation.

2.1 Electrostatic Discharge Warning

Many of the components of the TAS5612L-TAS5614LDDVEVM 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 can result in damage to EVM components.

2.2 Unpacking the EVM

Upon opening the TAS5612L-TAS5614LDDVEVM package, check to make sure that the following items are included:

- 1 pc. TAS5612L-TAS5614LDDVEVM using 1 TAS5558 and 1 TAS5612LDDV or TAS5614LDDV.
- 1 pc. TI Input-USB Board 3 for interfacing TAS5612L-TAS5614LDDVEVM to SPDIF/analog sources and PC for control.
- 1 pc. Signal and Control Interface IDC cable for connection to an I^2S front-end like the Input-USB Board 3.
- If any of these items are missing, contact the nearest Texas Instruments Product Information Center to inquire about a replacement.

Connect the Input-USB Board 3 to the TAS5612L/14LDDVEVM using the delivered IDC cable.

Power Supply Setup

Two power supplies are needed to power the TAS5612L-TAS5614LDDVEVM. Voltage and current requirements for the PVDD power supply are shown in the table below. Connect this power supply to the EVM using banana cables or wires secured to the power supply binding posts PVDD and GND. A second power supply, 12Vdc at 500mA, is required to power Input-USB Board 3. Connect the 12V power supply to the Input-USB Board 3 using banana cables or wires secured to the power supply binding posts +12V and GND.

Table 2. Recommended PVDD Power Supply Voltages

Description	Voltage Range	Current Requirements	Binding Post
TAS5614L Power Supply Voltage	12–38 Vdc	16 A	PVDD
TAS5612L Power Supply Voltage	12–34 Vdc	14 A	PVDD

CAUTION

NOTE: Applying voltages above specifications in Table 2 can cause permanent damage to the hardware. Verify polarity of power supply connections before powering the EVM.

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

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2.3 Speaker Connection

CAUTION

Both positive and negative speaker outputs are floating and cannot be connected to ground (that is, through an oscilloscope). To measure a BTL output connect an oscilloscope probe to each side of the output, connect both ground clips to EVM ground and use the oscilloscope math functions to show the difference between the 2 probe signals.

2.4 Output Configuration BTL and PBTL

When changing mode from BTL to PBTL, make sure that the AMP_RESET switch is set to RESET before changing shunts on Mode headers M3, D and C.

- For BTL mode place a shunt on pins 1 and 2 of each header, at the positions marked BTL.
- For PBTL mode place a shunt on pins 3 and 2 of each header, at the positions marked PBTL.

In PBTL mode the load must be connected according to Figure 5:

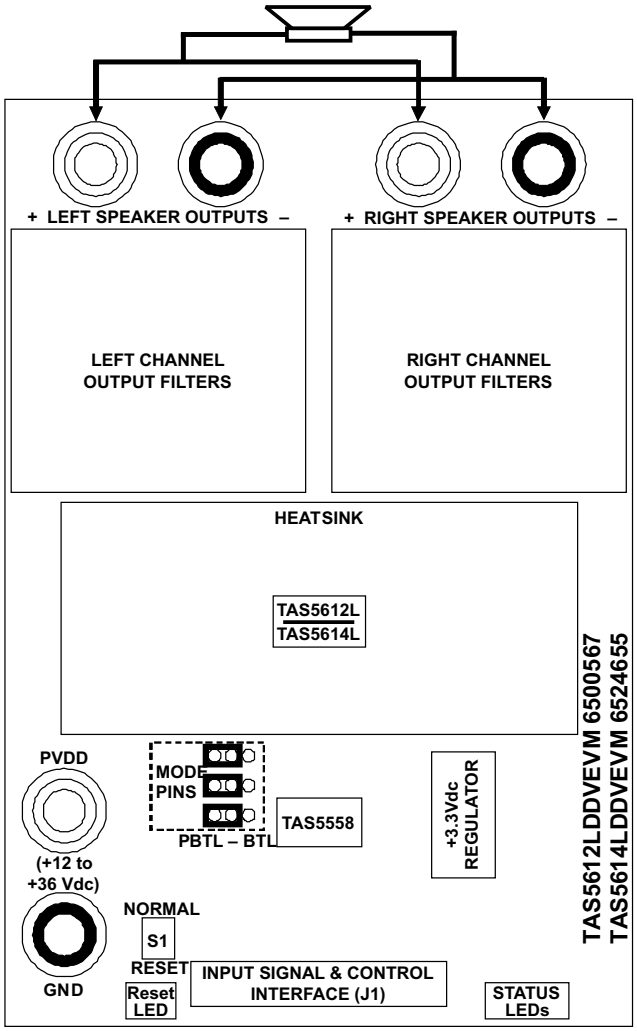


Figure 5. PBTL Mode Configuration

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3 GUI Software Installation and Startup

The TAS5612L-TAS5614LDDVEVM is controlled by the Input-USB Board 3 the PurePath Console GUI and TAS5612 plug-in. The TAS5612 GUI provides control of all registers in the TAS5558. Connect the USB cable (not supplied) between the host PC and jack USB-IN on the Input-USB Board 3. Then turn on the 12-V power supply and the PVDD power supply in that order.

3.1 Software Installation

Download the PurePath Console GUI from the TI Web site (http://cc.ext.ti.com). The TI Web site always has the latest release and any updates to versions of the GUI. A request must be submitted to download the software.

Execute the GUI install program, setup_PurePathConsole_Main_vxx_revxx.exe. Once the program is installed, the program group and shortcut icon is created in Start → Program → Texas Instruments Inc → PurePathConsole → Choose Target. When the GUI comes up, select TAS5612.

3.2 Software Quick-Start Guide

The EVM is initialized upon PurePath Console GUI startup. Audio is streaming to the headphones if Window Media (or similar program) is playing and mini-USB EVM is selected in the sound playback properties. The following indicators show both PurePath Console GUI and EVM are operating correctly:

- On the EVM, the VALID LED (green) is on
- On the PurePath Console GUI, both green LEDs on the bottom left corner are on

3.3 Using the EVM Software

3.3.1 Main Tab

Figure 6 illustrates the main tab when the GUI starts up. Clicking the TAS5612 icon directs you to the device block diagram.

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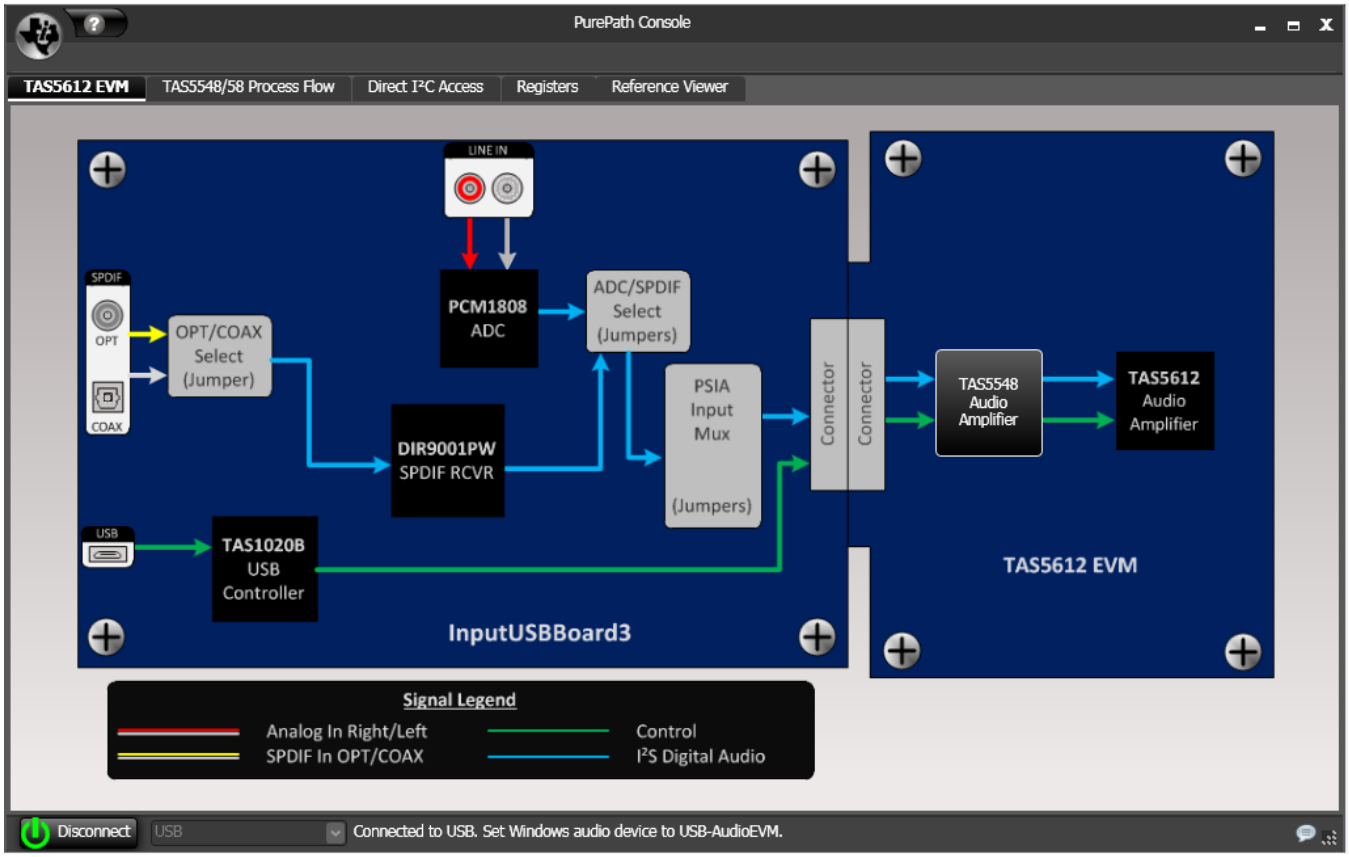


Figure 6. Main Tab

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3.3.2 Block Diagram Tab

This tab shows major blocks of the device. To control the device, click on the digital audio processor (DAP) bringing up the TAS5558 process flow tab.

3.3.3 Process Flow Tab

The process flow tab, Figure 7,controls the TAS5558 main functions: EQ, DRC, input and output mixing, tone, and volume.

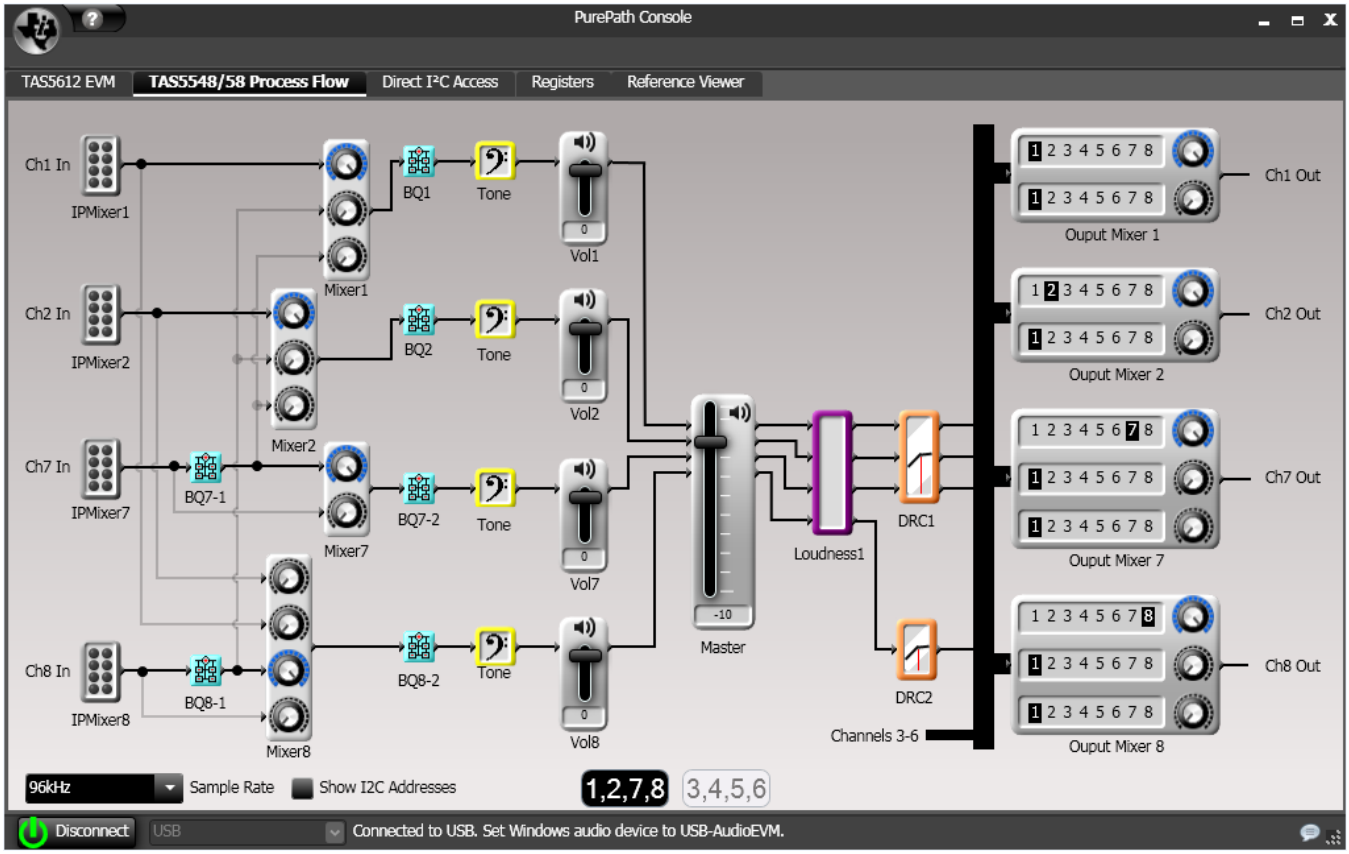


Figure 7. Process Flow Tab

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3.3.4 Direct I²C Access Tab

Reading and writing I²C registers is performed on the tab illustrated in Figure 8.

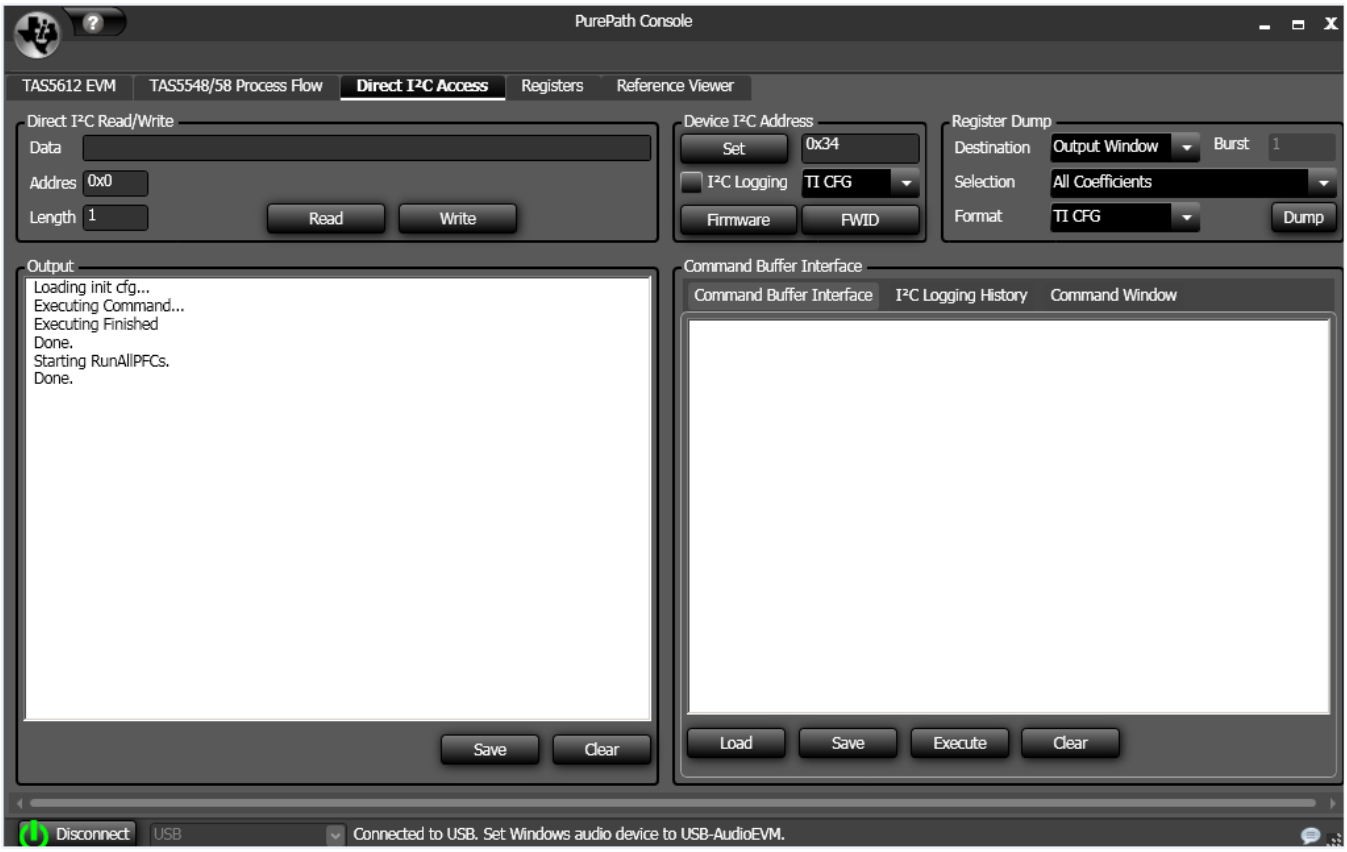
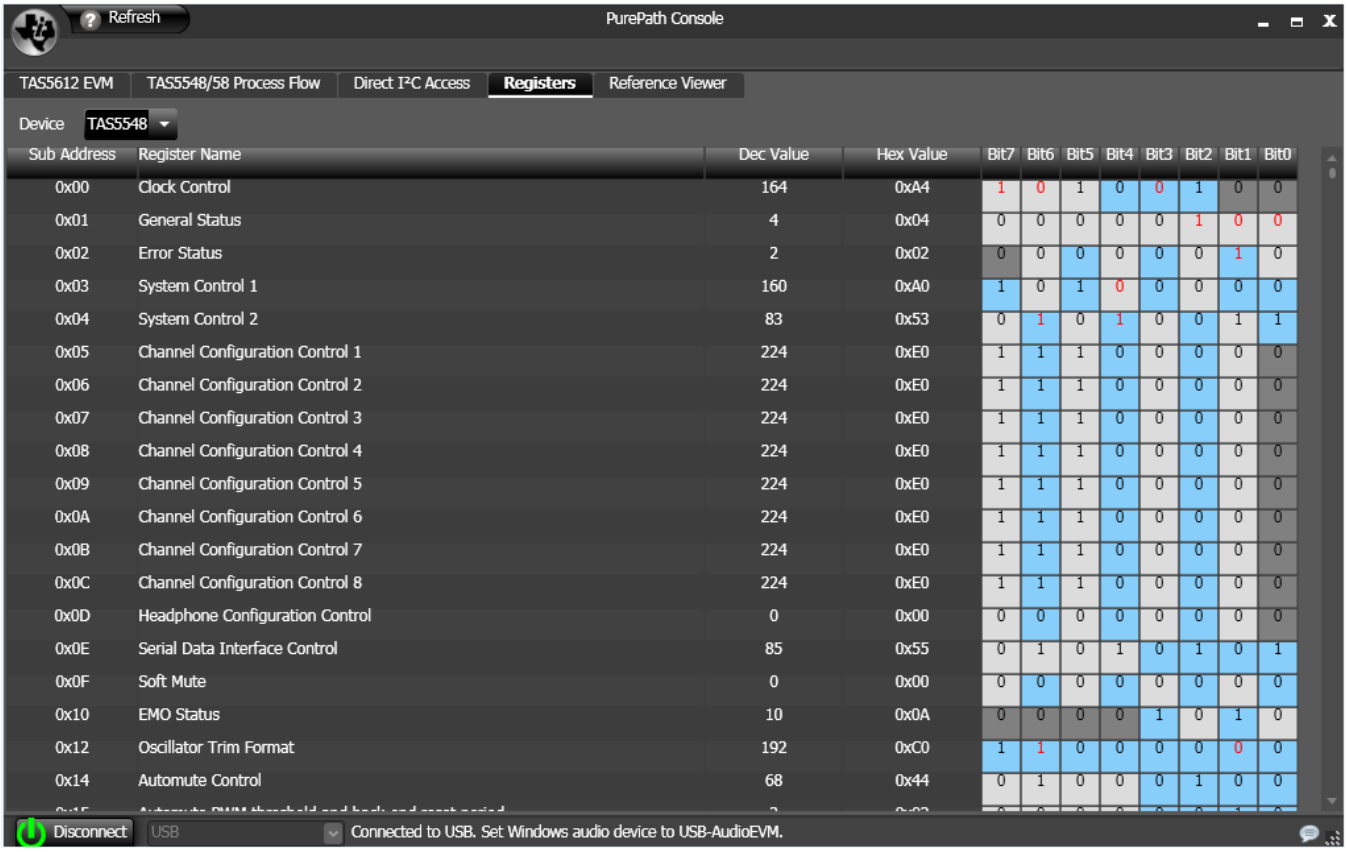


Figure 8. Direct I²C Access

3.3.5 TAS5558 Registers Tab

The TAS5558 registers tab, illustrated in Figure 9, shows the current I²C register values (hexadecimal and decimal).

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Sub Address	Register Name	Dec Value	Hex Value	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0x00	Clock Control	164	0xA4	1	0	1	0	0	1	0	0
0x01	General Status	4	0x04	0	0	0	0	0	1	0	0
0x02	Error Status	2	0x02	0	0	0	0	0	0	1	0
0x03	System Control 1	160	0xA0	1	0	1	0	0	0	0	0
0x04	System Control 2	83	0x53	0	1	0	1	0	0	1	1
0x05	Channel Configuration Control 1	224	0xE0	1	1	1	0	0	0	0	0
0x06	Channel Configuration Control 2	224	0xE0	1	1	1	0	0	0	0	0
0x07	Channel Configuration Control 3	224	0xE0	1	1	1	0	0	0	0	0
0x08	Channel Configuration Control 4	224	0xE0	1	1	1	0	0	0	0	0
0x09	Channel Configuration Control 5	224	0xE0	1	1	1	0	0	0	0	0
0x0A	Channel Configuration Control 6	224	0xE0	1	1	1	0	0	0	0	0
0x0B	Channel Configuration Control 7	224	0xE0	1	1	1	0	0	0	0	0
0x0C	Channel Configuration Control 8	224	0xE0	1	1	1	0	0	0	0	0
0x0D	Headphone Configuration Control	0	0x00	0	0	0	0	0	0	0	0
0x0E	Serial Data Interface Control	85	0x55	0	1	0	1	0	1	0	1
0x0F	Soft Mute	0	0x00	0	0	0	0	0	0	0	0
0x10	EMO Status	10	0x0A	0	0	0	0	1	0	1	0
0x12	Oscillator Trim Format	192	0xC0	1	1	0	0	0	0	0	0
0x14	Automute Control	68	0x44	0	1	0	0	0	1	0	0

Figure 9. Registers Tab (Selecting Biquad GUI)

3.4 Self-Protection and Fault Reporting

The TAS5612L and TAS5614L are self-protecting devices that provide overtemperature, overcurrent, undervoltage and missing-PWM-input protection, with extensive fault reporting. For full descriptions of these functions consult data sheet SLAS847 for TAS5612LA and data sheet SLAS846 for TAS5614LA.

4 Related Documentation from Texas Instruments

The following table lists data sheets that provide detailed descriptions of integrated circuits from TI that are used in the TAS5612L-TAS5614LDDVEVM. These data sheets can be obtained at http://www.ti.com.

Related Documentation from Texas Instruments

Part Number	Literature Number
TAS5558	SLES273
TAS5612LA	SLAS847
TAS5614LA	SLAS846
TPS3825-33	SLVS165
TLV1117-33C	SLVS561

4.1 Additional Documentation

1. *System Design Considerations for True Digital Audio Power Amplifiers* (SLAA117)
2. *Digital Audio Measurements* (SLAA114)
3. *PSRR for PurePath Digital Audio Amplifiers* (SLEA049)

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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)

5 Design Information

This appendix includes design information for the TAS5612L-TAS5614LDDVEVM. This information is presented in the following order.

- Table 3 Bill of Materials for TAS5614LDDVEVM
- Section 5.1 EVM Custom Component Vendors
- Section 5.2 TAS5612L-TAS5614LDDVEVM PCB SPECIFICATION
- Section 5.3 EVM PCB Layers
- Section 5.4 EVM and Input-USB Board 3 Schematics

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Table 3. Bill of Materials for TAS5614LDDVEVM

Manu Part No.	Qty.	Ref Des	Vendor Part No.	Description	Vendor	Manu.
TI-SEMICONDUCTORS						
TAS5614LDDV	1	U1	TAS5614LDDV	150W-STEREO/300W-MONO PUREPATH DIGITAL AMP HTSSOP44-DDV ROHS	Texas Instruments	Texas Instruments
TAS5558	1	U2	TAS5558	8 CHANNEL HD COMPATIBLE AUDIO PROCESSOR TAS5558-DGG ROHS	Texas Instruments	Texas Instruments
TPS3825-33DBVT	1	U3	296-2636-1	PROCESSOR SUPERVISORY CIRCUITS 2.93V 200ms SOT23-DBV5 ROHS	Digi-Key	Texas Instruments
TLV1117-33CDCYR	1	VR1	296-21112-1-ND	VOLT REG LDO 3.3V 800mA SOT223-DCY ROHS	Digi-Key	Texas Instruments
SEMICONDUCTORS						
2N7002	4	Q1, Q2, Q3, Q4	2N7002NCT	N-FET 60V 115mA 200mW 7.5 OHM@10V SOT23-DBV3 ROHS	Digi-Key	Fairchild
SML-LXT0805SRW-TR	3	125C, FAULT, AMP_RESET	67-1555-1	LED, RED 2.0V SMD0805 ROHS	Digi-Key	Lumex Opto
SML-LXT0805YW-TR	1	CLIP	67-1554-1	LED, YELLOW 2.0V SMD0805 ROHS	Digi-Key	Lumex Opto
CAPACITORS						
C1206C102K1RACTU	4	C21, C24, C27, C30	399-1222-1	CAP SMD1206 CERM 1000PFD 100V 1% C0G ROHS	Digi-Key	Kemet
GRM188R71H472KA01D	2	C54, C55	490-1506-1	CAP SMD0603 CERM 4700PFD 50V 10% X7R ROHS	Digi-Key	Murata
GRM21BR72A103KA01L	5	C22, C25, C28, C31, C70	490-1652-1	CAP SMD0805 CERM 0.01UFD 100V 10% X7R ROHS	Digi-Key	Murata
GRM188R71H333KA61D	4	C16, C17, C18, C19	490-3286-1-ND	CAP SMD0603 CERM 0.033UFD 50V 10% X7R ROHS	Digi-Key	Murata
GRM188R71C473KA01D	2	C56, C57	490-1529-1	CAP SMD0603 CERM 0.047UFD 16V 10% ROHS	Digi-Key	Murata
GRM188R71C104KA01D	17	C2, C3, C4, C7, C32, C50, C52, C53, C59, C60, C62, C63, C64, C65, C74, C76, C77	490-1532-1-ND	CAP SMD0603 CERM 0.1UFD 16V 10% X7R ROHS	Digi-Key	Murata
MKP4 -.68/250/20	4	C20, C23, C26, C29	MKP4 -0.68/250/20	CAP POLYPRO FILM MKP4 0.68UFD 250V 20% ROHS	WIMA	WIMA
C1608X7R1C105K	2	C5, C6	445-1604-1	CAP SMD0603 CERM 1.0UFD 16V 10% X7R ROHS	Digi-Key	TDK
GRM21BR71H105KA12L	5	C8, C9, C10, C11, C71	490-4736-1-ND	CAP SMD0805 CERM 1.0UFD 50V 10% X7R ROHS	Digi-Key	Murata
GRM21BR61C106KE15L	3	C58, C61, C66	490-3886-1	CAP SMD0805 CERM 10UFD 16V 10% X5R ROHS	Digi-Key	Murata
CAPACITORS						
EEU-FC1C470	4	C1, C51, C73, C75	P11196	CAP 47UFD 16V RAD ALUM ELEC FC ROHS	Digi-Key	Panasonic
UKZ1H470MPM	1	C72	493-3194	CAP ALUM ELEC KZ RADIAL 47UFD 50V 20% ROHS	Digi-Key	Nichicon
EEU-FC1H102	2	C12, C14	P10333-ND	CAP ALUM ELEC FC RADIAL 1000UFD 50V 20% ROHS	Digi-Key	Panasonic
RESISTORS						
RMCF0402ZT0R00	2	R12, R13	RMCF0402ZT0R00CT	ZERO OHM JUMPER SMT 0402 0 OHM 1/16W,5% ROHS	Digi-Key	Stackpole Electronics
ERJ-3GEY0R00V	1	R51	P0.0GCT	RESISTOR SMD0603 0.0 OHM 5% THICK FILM 1/10W ROHS	Digi-Key	Panasonic
ERJ-3GEYJ1R0V	1	R50	P1.0GCT	RESISTOR SMD0603 1.0 OHMS 1% THICK FILM 1/10W ROHS	Digi-Key	Panasonic
ERJ-3GEYJ3R3V	8	R1, R7, R8, R9, R10, R11, R14, R60	P3.3GCT	RESISTOR SMD0603 3.3 OHMS 5% 1/10W ROHS	Digi-Key	Panasonic
ERJ-3GEYJ470V	19	R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R54, R55, R56, R57, R58	P47GCT	RESISTOR SMD0603 47 OHMS 5% 1/10W ROHS	Digi-Key	Panasonic
CRCW0603100RFKEA	3	R4, R5, R6	541-100HCT	RESISTOR SMD0603 100 OHM 1/10W 1% ROHS	Digi-Key	Vishay
ERJ-3GEYJ471V	2	R48, R49	P470GCT	RESISTOR SMD0603 470 OHMS 5% 1/10W ROHS	Digi-Key	Panasonic
ERJ-3GEYJ472V	4	R61, R62, R63, R65	P4.7KGCT	RESISTOR SMD0603 4.7K OHMS 5% 1/10W ROHS	Digi-Key	Panasonic

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Table 3. Bill of Materials for TAS5614LDDVEVM (continued)

Manu Part No.	Qty.	Ref Des	Vendor Part No.	Description	Vendor	Manu.
ERJ-3EKF1002V	14	R20, R21, R22, R23, R24, R25, R26, R41, R42, R43, R44, R45, R46, R47	P10.0KHCT	RESISTOR SMD0603 10.0K 1% THICK FILM 1/10W ROHS	Digi-Key	Panasonic
RMCF0603FT15K0	1	R52	RMCF0603FT15K0CT	RESISTOR SMD0603 15.0K OHMS 1% 1/10W ROHS	Digi-Key	Stackpole Electronics
RC0603FR-0718KL	1	R53	311-18.0KHRCT	RESISTOR SMD0603 THICK FILM 18.0K OHMS 1% 1/10W ROHS	Digi-Key	Yageo
RC0603FR-0730KL	1	R2	311-30.0KHRCT	RESISTOR SMD0603 THICK FILM 30.0K 1% 1/10W ROHS	Digi-Key	Yageo
ERJ-3GEYJ473V	1	R3	P47KGCT	RESISTOR SMD0603 47K OHMS 5% 1/10W ROHS	Digi-Key	Panasonic
INDUCTORS						
MA5172-AE	4	L1, L2, L3, L4	MA5172-AE	SHIELDED POWER INDUCTOR 10uH 10A ROHS	Coil Craft	Coil Craft
HEADERS						
N2526-6002-RB	1	J1	MHC26K-ND	HEADER SHROUDED 100LS MALE GOLD 2X13 PINS ROHS	Digi-Key	3M
PBC02SAAN	1	JP1	S1011E-02-ND	HEADER THRU MALE 2 PIN 100LS GOLD ROHS	Digi-Key	Sullins
PBC03SAAN	3	C, D, M3	S1011E-03-ND	HEADER THRU MALE 3 PIN 100LS GOLD ROHS	Digi-Key	Sullins
TESTPOINTS AND SWITCHES						
5003	1	ET2	5003K	PC TESTPOINT, ORANGE, ROHS	Digi-Key	Keystone Electronics
G12AP-RO	1	S1	360-1758	SWITCH THRU SPDT STRAIGHT ULTRA MINIATURE ROHS	Digi-Key	NKK
BINDING POSTS						
5018-0	3	GND, LOUT-, ROUT-	565-5018-0	BINDING POST, BLACK 60V 30A GOLD ROHS	Mouser	Pomona
5018-2	3	PVDD, LOUT+, ROUT+	565-5018-2	BINDING POST, RED 60V 30A GOLD ROHS	Mouser	Pomona
SHUNTS						
SPC02SYAN	4	JP1, C(1-2), D(1-2), M3(1-2)	S9001	SHUNT, BLACK AU FLASH 0.100LS	Digi-Key	Sullins
HEAT SINKS AND HARDWARE						
ATSTI1OP-563-C1-R0	1	HS1	ATSTI1OP-563-C1-R0	HEATSINK ALUMINUM ATS 36x54mm 36.8mm PITCH ROHS	ATS	ATS
92000A118	2	HS1	92000A118	PHILIPS PANHEAD SCREW M3x8mm STAINLESS STEEL ROHS	McMaster- Carr	McMaster- Carr
92148A150	2	HS1	92148A150	SPLIT WASHER M3 STAINLESS STEEL ROHS	McMaster- Carr	McMaster- Carr
STANDOFFS AND HARDWARE						
94868A178	4	NA	94868A178	STANDOFF M3x25mm 4.5mm DIA HEX STAINLESS STEEL F-F ROHS	McMaster- Carr	McMaster- Carr
92000A118	4	NA	92000A118	PHILIPS PANHEAD SCREW M3x8mm STAINLESS STEEL ROHS	McMaster- Carr	McMaster- Carr
92148A150	4	NA	92148A150	SPLIT WASHER M3 STAINLESS STEEL ROHS	McMaster- Carr	McMaster- Carr
Component Count:	163					
COMPONENTS NOT ASSEMBLED						
CR1, CR2, CR3, CR4, L+, L-, OA, OB, OC, OD, R+, R-, PVDD_AB, PVDD_CD, M1, M2, GNDx2, PSVC						

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5.1 EVM Custom Component Vendors

TAS5612LDDVEVM and TAS5614LDDVEVM include inductors and heatsinks from 2 custom component vendors designed specifically for the EVMs. These vendors carry stock for small orders on their shelves.

Advanced Thermal Solutions (ATS), in Norwood, MA, USA, provide a heatsink optimized for these EVMs, ATS-TI1OP-563-C1. Information on this heatsink can be obtained from Leonard Alter at lalter@qats.com. ATS design and manufacture a large line of off-the-shelf and patented high performance heatsinks. They also design and manufacture research quality thermal test and measurement equipment and offer thermal evaluation and design services. Information about their products and services is available at www.qats.com.

Coilcraft, in Cary, IL, USA, provide a 10µH inductor optimized for these EVMs, MA5172-AE. Information on this component can be found in the data sheet for the MA5172 inductor family at www.coilcraft.com. Coilcraft make a variety of other inductors for Class D amplifiers, most of which are *AEC-Q200* Grade 1 certified for automotive applications. Free evaluation samples and on-line ordering are available at www.coilcraft.com.

5.2 TAS5612L-TAS5614LDDVEVM PCB SPECIFICATION

PCB IDENTIFICATION:	TAS5612L-TAS5614LDDVEVM_RevA
PCB TYPE:	DOUBLE-SIDED PLATED-THROUGH
PCB SIZE:	142 x 96 mm
LAMINATE TYPE:	FR4
LAMINATE THICKNESS:	1.6mm
COPPER THICKNESS:	70 µm (2 ounce) (INCLUDING PLATING EXTERIOR LAYER)
COPPER PLATING IN HOLES:	70 µm (2 ounce)
MINIMUM HOLE DIAMETER:	0.3 mm (12 mils)
SILKSCREEN:	WHITE - REMOVE SILKSCREEN FROM SOLDER & PRE-TINNED AREAS
SOLDER MASK:	BLUE
APPROX. HOLE COUNT:	570
PROTECTIVE COATING:	ENIG (ELECTROLESS NICKEL / IMMERSION GOLD)
ELECTRICAL TEST:	PCB MUST BE ELECTRICAL TESTED
COMMENTS:	FAB NOTES ARE IN THE DRILL DRAWING FILE

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5.3 EVM PCB Layers

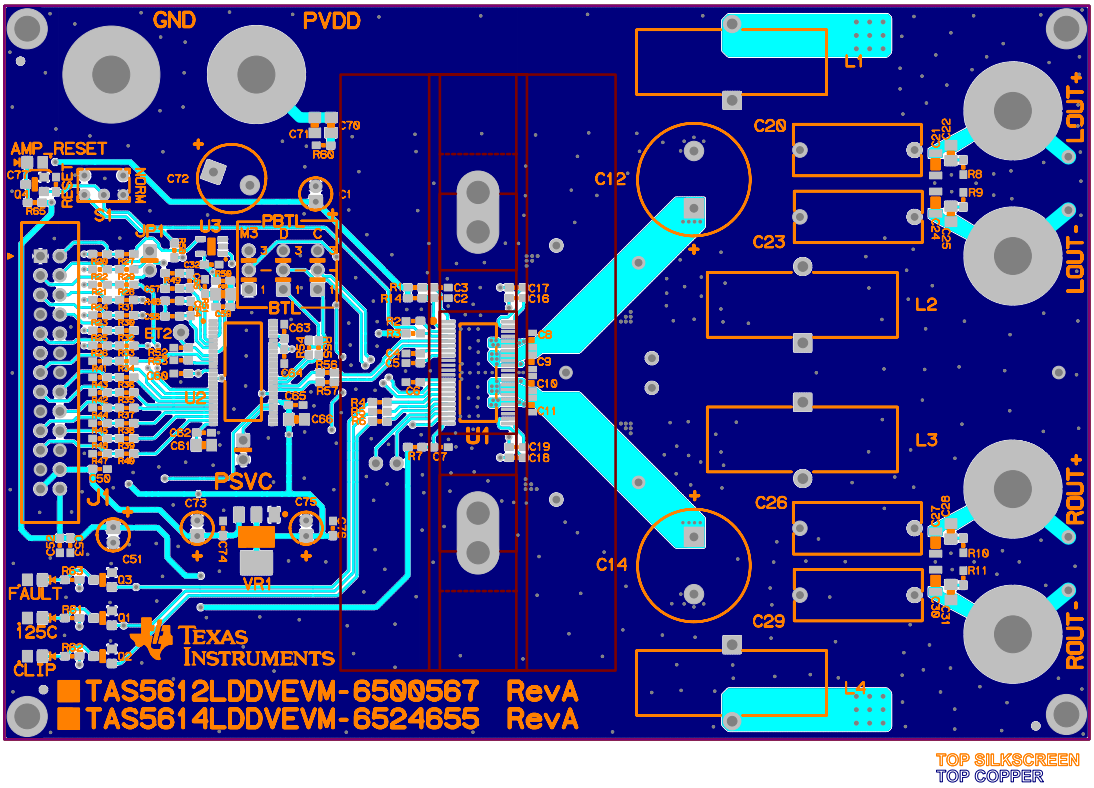


Figure 10. Top Composite PCB Layer

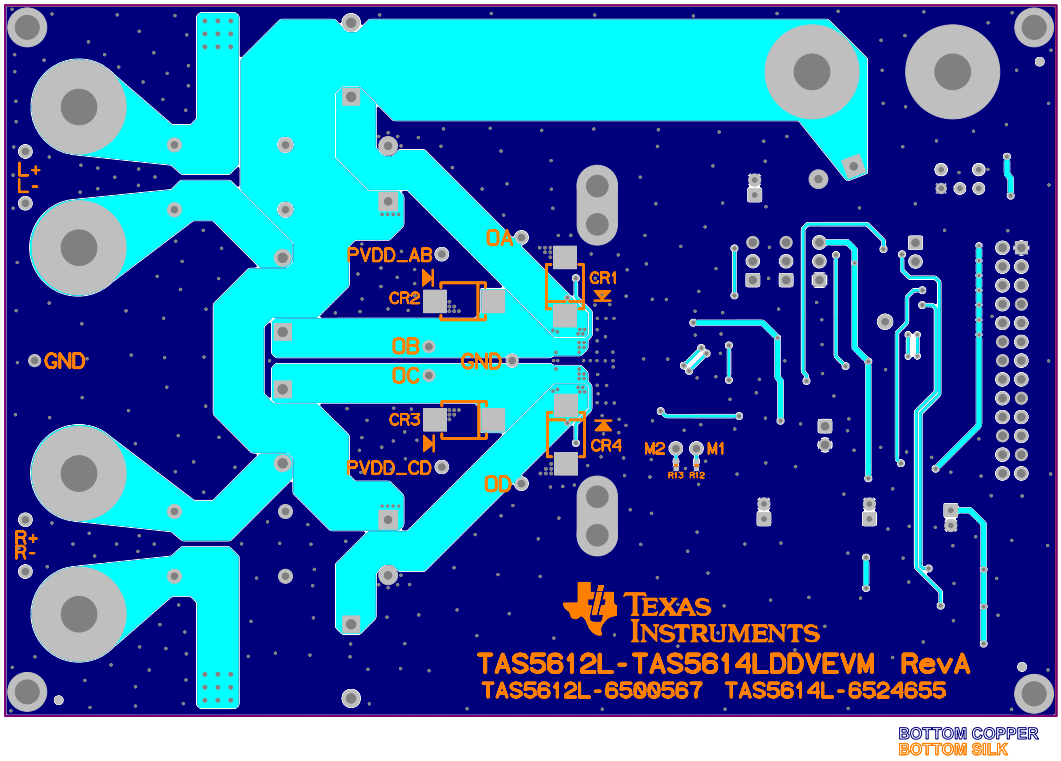


Figure 11. Bottom Composite PCB Layer

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5.4 EVM and Input-USB Board 3 Schematics

The EVM and Input-USB Board 3 schematics are illustrated in Figure 12 through Figure 22.

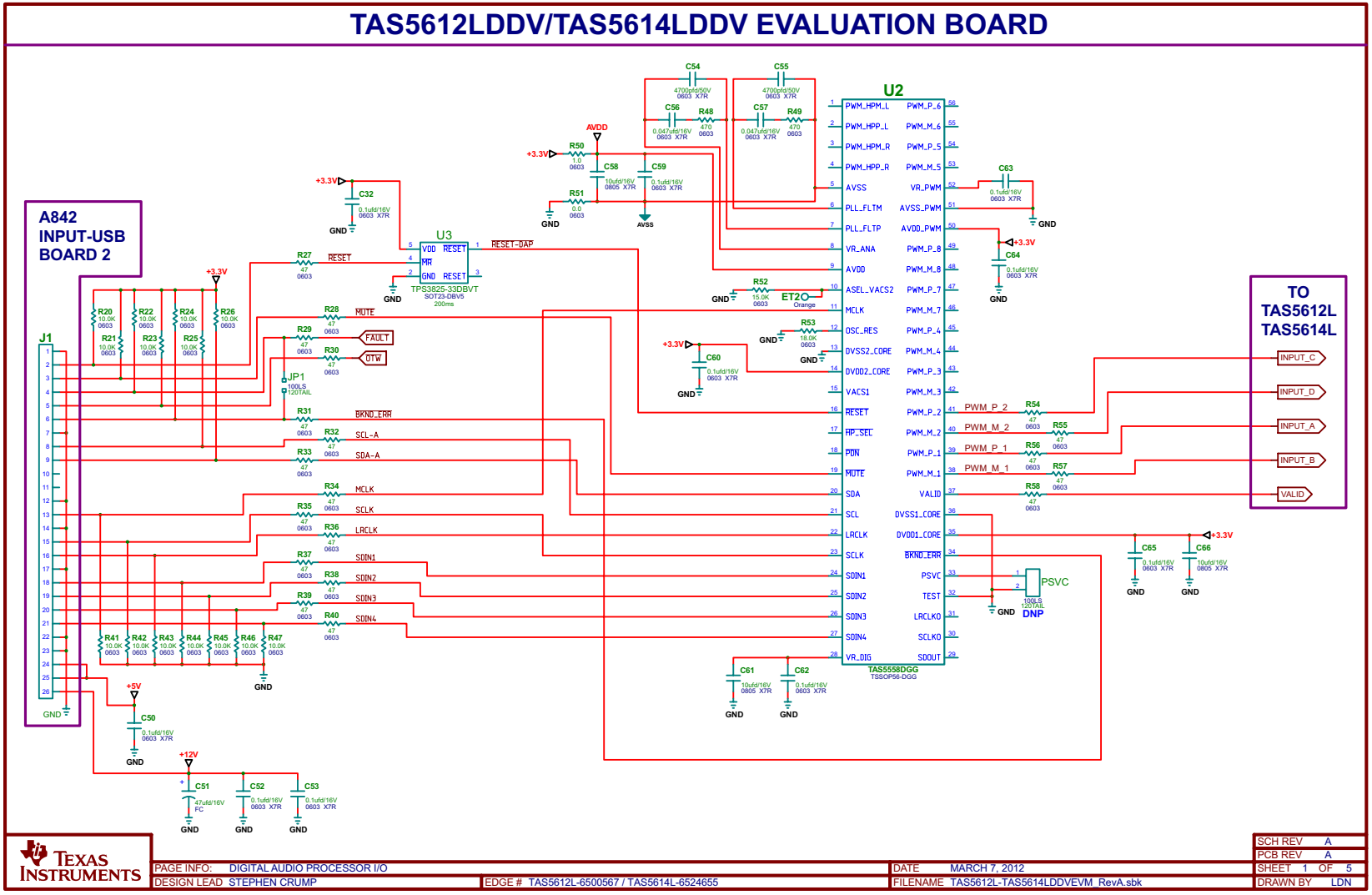


Figure 12. TAS5612L-TAS5614LDDV Evaluation Board Digital Audio Processor I/O

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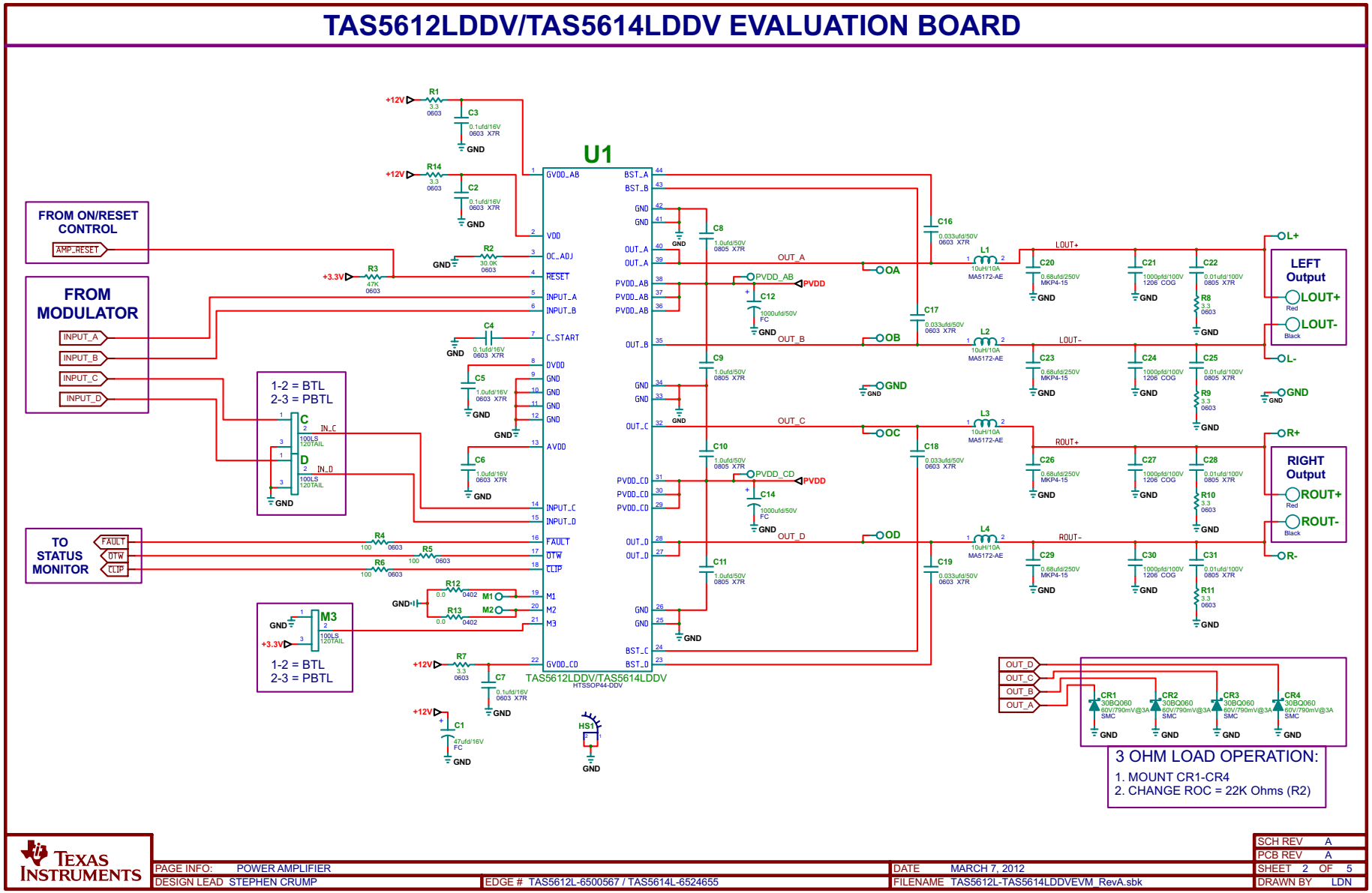


Figure 13. TAS5612L-TAS5614LDDV Evaluation Board Power Amplifier

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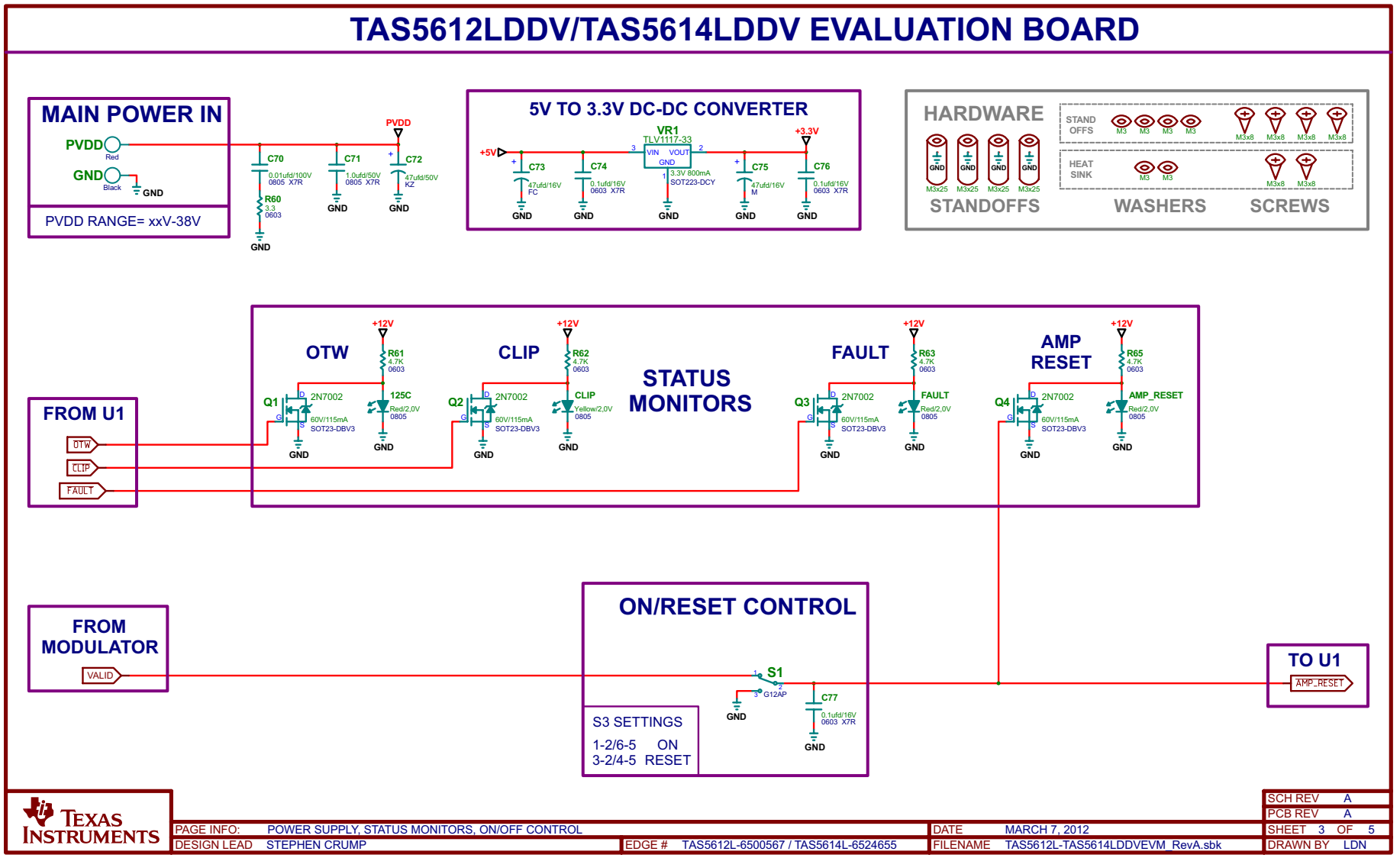


Figure 14. TAS5612L-TAS5614LDDV Evaluation Board Power Supply, Status Monitors, On and Off Control

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TAS5612LDDV/TAS5614LDDV EVALUATION BOARD

REVISION HISTORY

REVISION	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE	MARCH 7, 2012	SC

			SCH REV A
			PCB REV A
PAGE INFO: REVISION HISTORY		DATE MARCH 7, 2012	SHEET 4 OF 5
DESIGN LEAD STEPHEN CRUMP	EDGE # TAS5612L-6500567 / TAS5614L-6524655	FILENAME TAS5612L-TAS5614LDDVEVM_RevA.sbk	DRAWN BY LDN

Figure 15. TAS5612L-TAS5614LDDV Evaluation Board Revision History

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Figure 16. TAS5612L-TAS5614LDDV Evaluation Board Disclaimer

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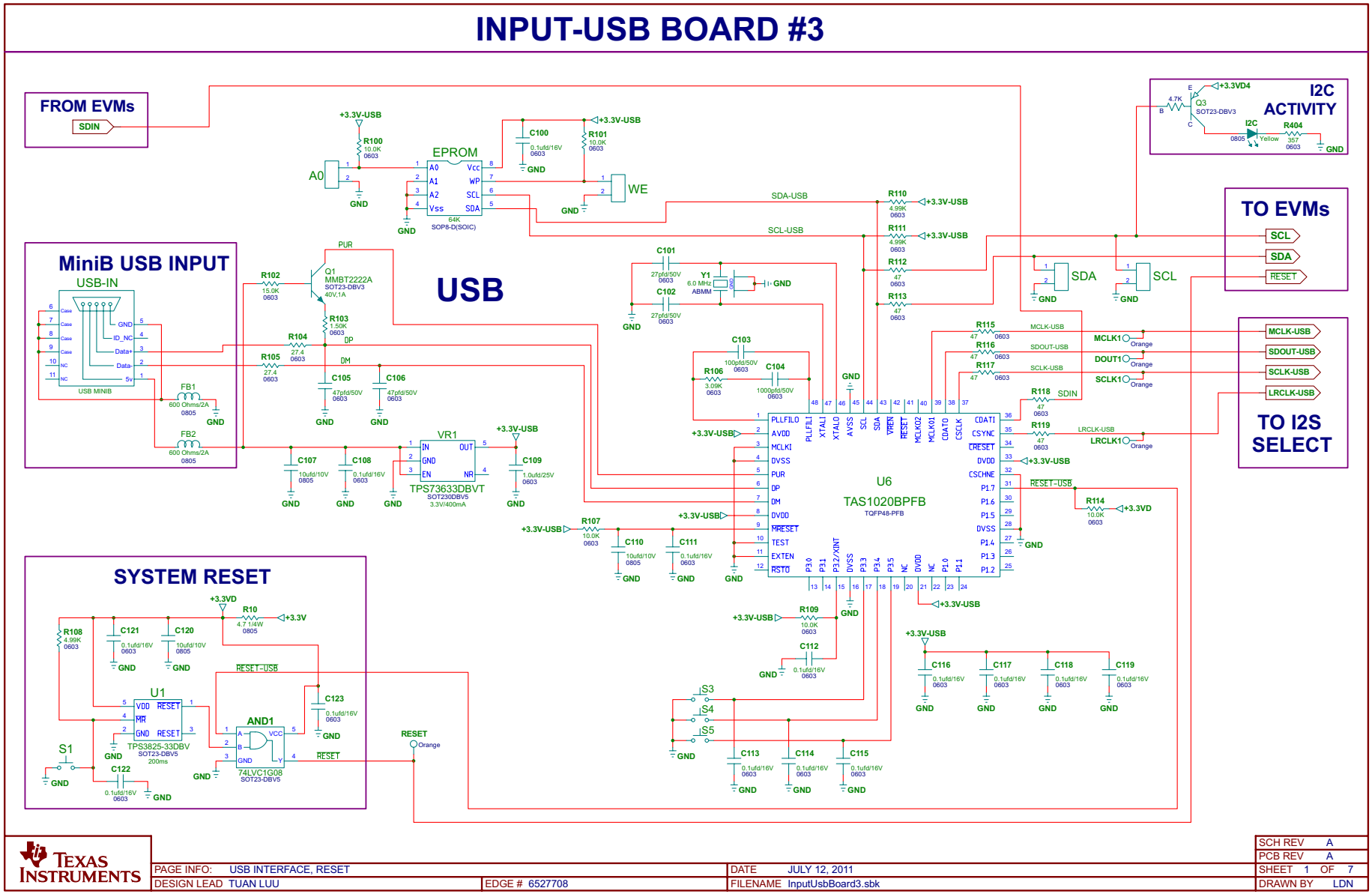


Figure 17. Input - USB Board Schematic, USB Interface Reset

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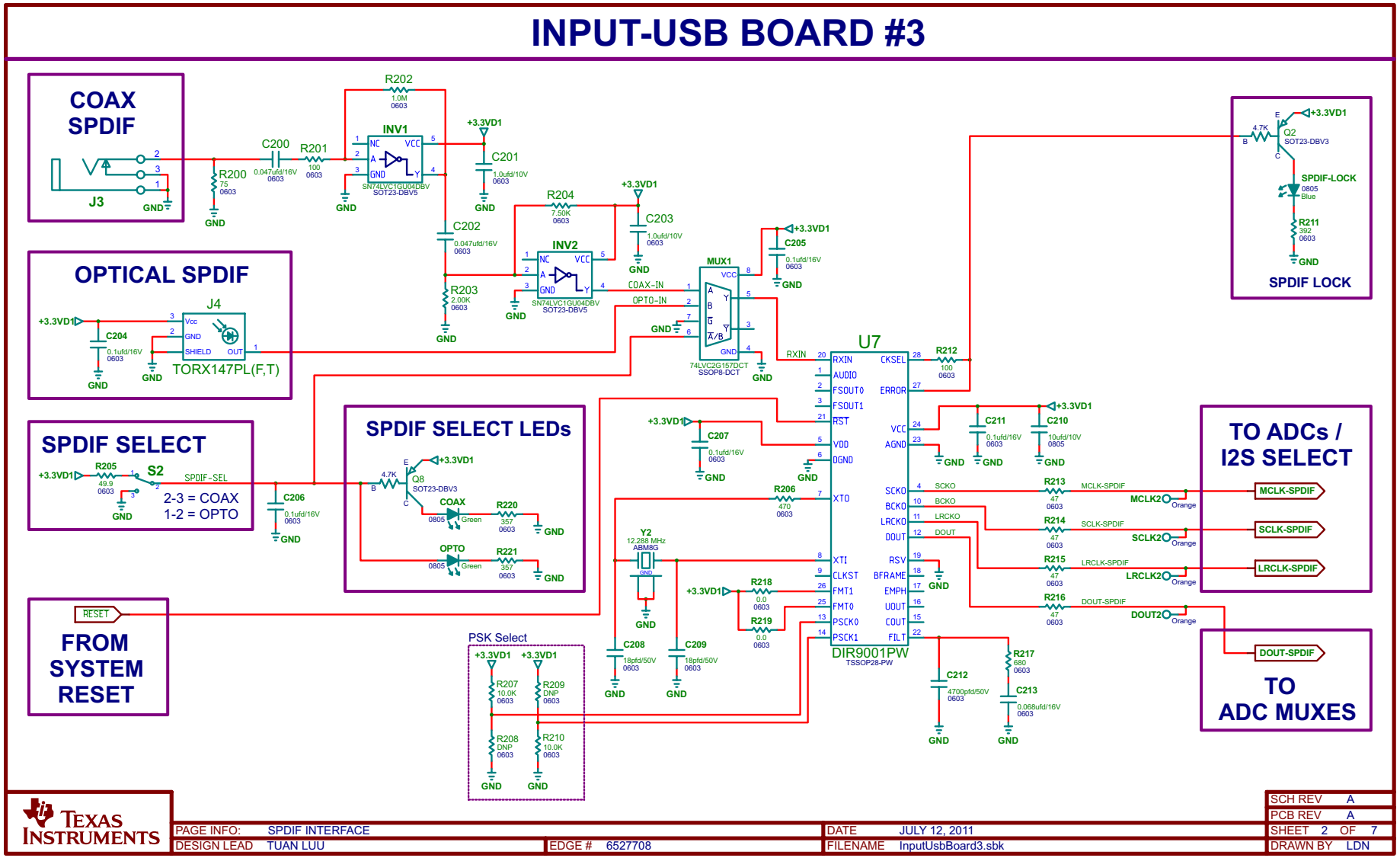


Figure 18. Input - USB Board Schematic, SPDIF Interface

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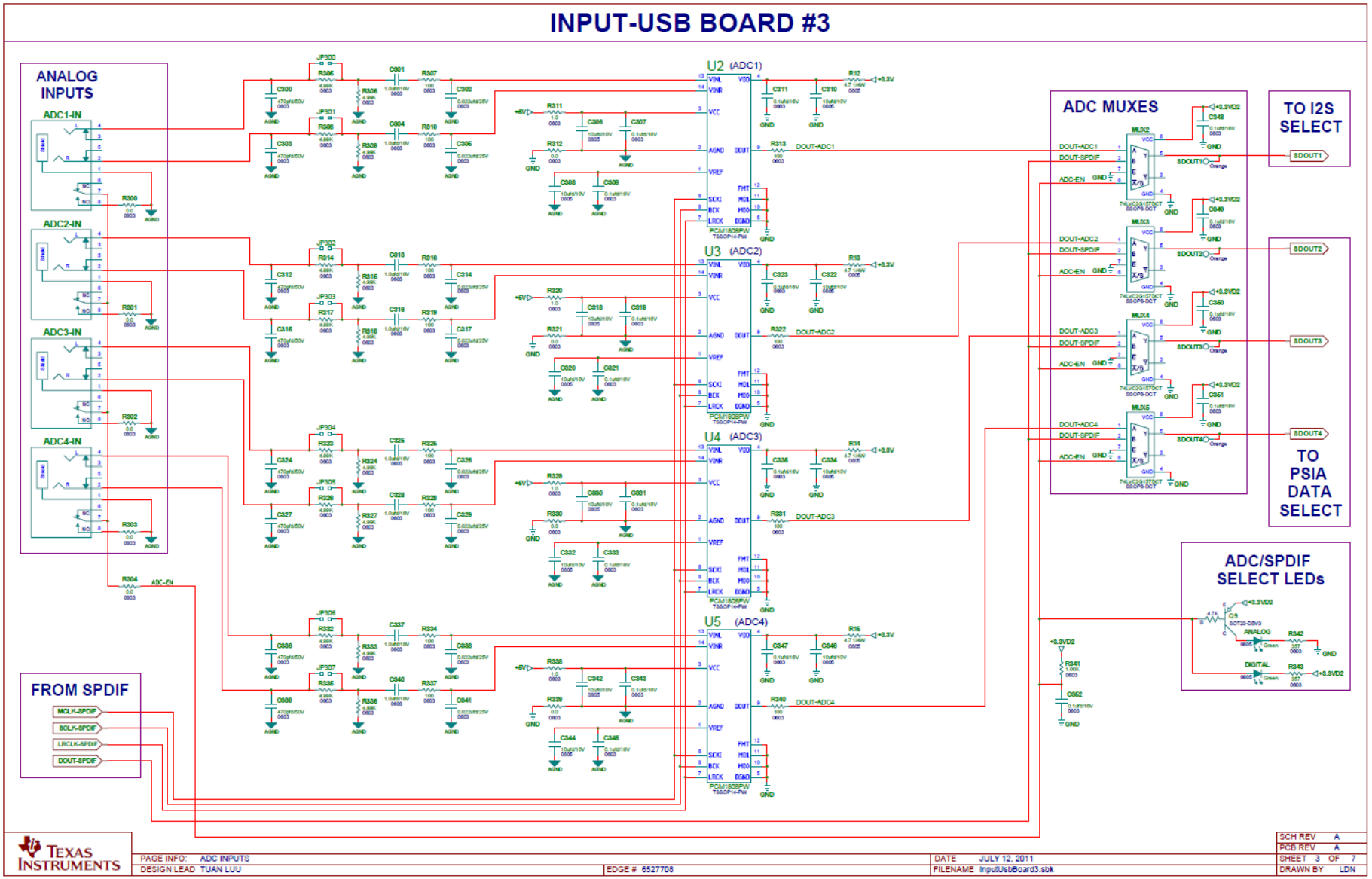


Figure 19. Input - USB Board Schematic, PSIA Inputs, Data Select, and EVM Connector

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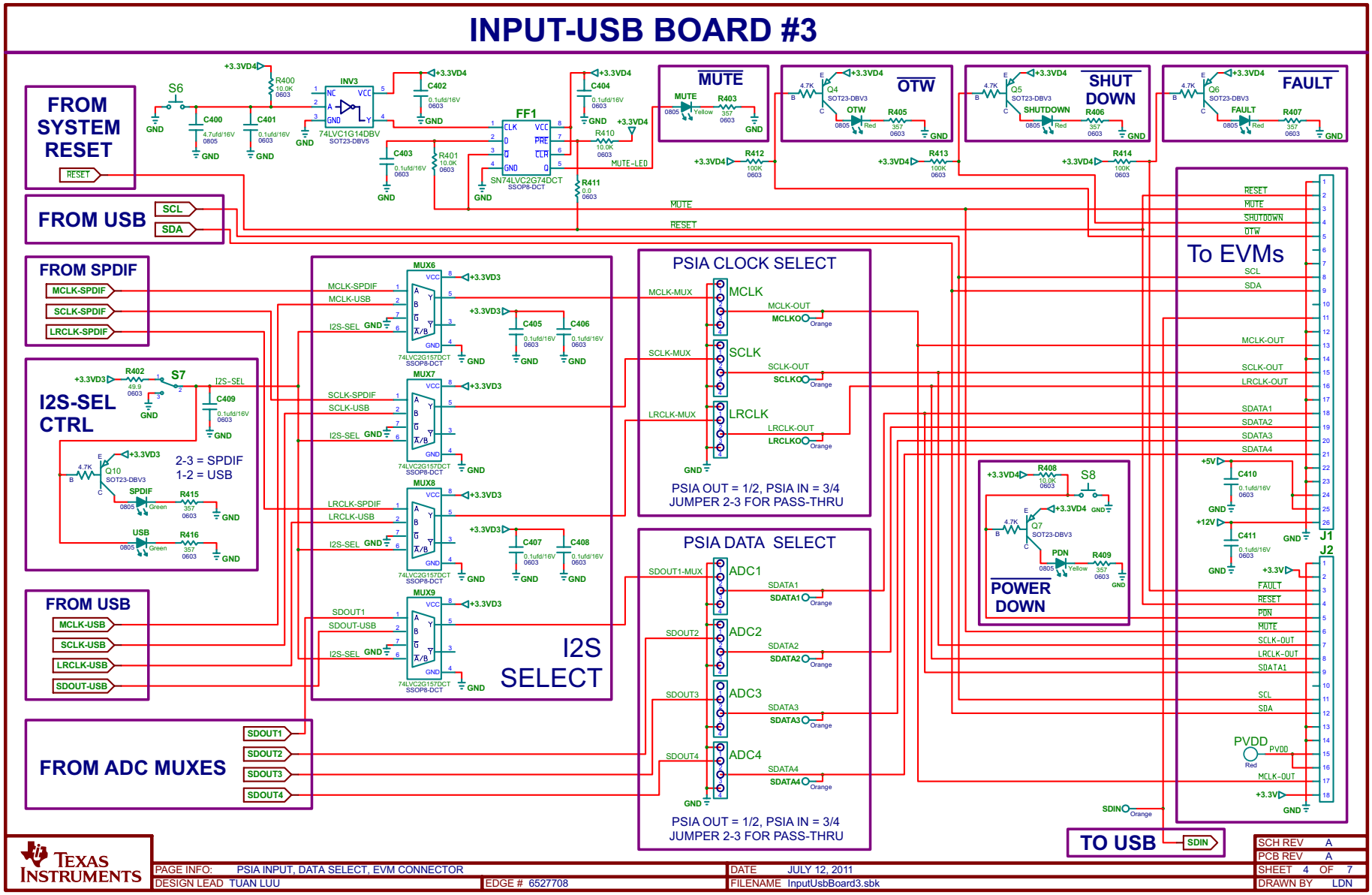


Figure 20. Input - USB Board Schematic, Power Inputs and Supplies

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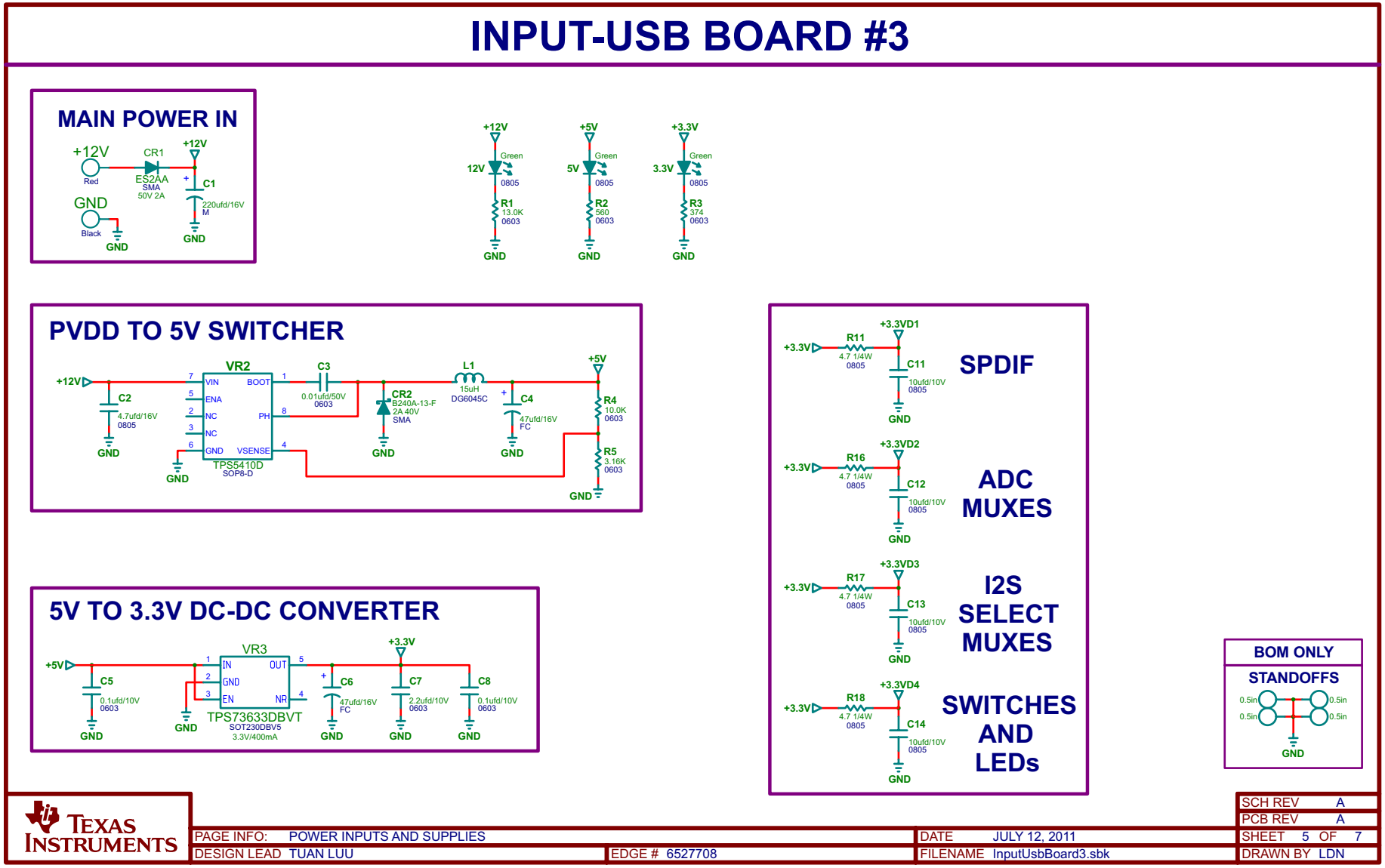


Figure 21. Input - USB Board Schematic, Revision History

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INPUT-USB BOARD #3

REVISION HISTORY

REVISION	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE	JULY 12, 2011	TL

			SCH REV A
			PCB REV A
PAGE INFO: REVISION HISTORY		DATE JULY 12, 2011	SHEET 6 OF 7
DESIGN LEAD TUAN LUU	EDGE # 6527708	FILENAME InputUsbBoard3.sbk	DRAWN BY LDN

Figure 22. Input - USB Board Revision History

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Figure 23. USB Board Schematic Disclaimer

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Revision History

Changes from A Revision (September 2013) to B Revision	Page
• Changed paragraph immediately before the section titled *TAS5612L-TAS5614LDDVEVM Features*.	5
• Deleted one bullet from the *Unpacking the EVM* section.	8
• Added *(not supplied)* to the first paragraph in Section 3, *GUI Software Installation and Startup*.	10

Revision History

Changes from B Revision (May 2014) to C Revision	Page
• Changed page 3 of the schematic, Figure 19	27

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3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

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4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

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4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

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