

## **TAS5622-TAS5624DDVEVM**

This user's guide provides specifications for the evaluation module (EVM) for TAS5622 and TAS5624 Digital Input Class-D Power Stages with the TAS5538 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 TAS5622-TAS5624DDVEVM PurePath™ EVM demonstrates the current version of TAS5622DDV or TAS5624DDV integrated circuit power stage with TAS5538DGG from Texas Instruments (TI).

The TAS5622 and TAS5624 are high-performance, integrated Stereo Feedback Digital Amplifier Power Stages designed to drive 3Ω speakers at up to 200W per channel for TAS5624DDV and 165W per channel for TAS5622DDV. They require only a passive demodulation filter to deliver efficient high quality audio amplification.

TAS5538DGG 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.

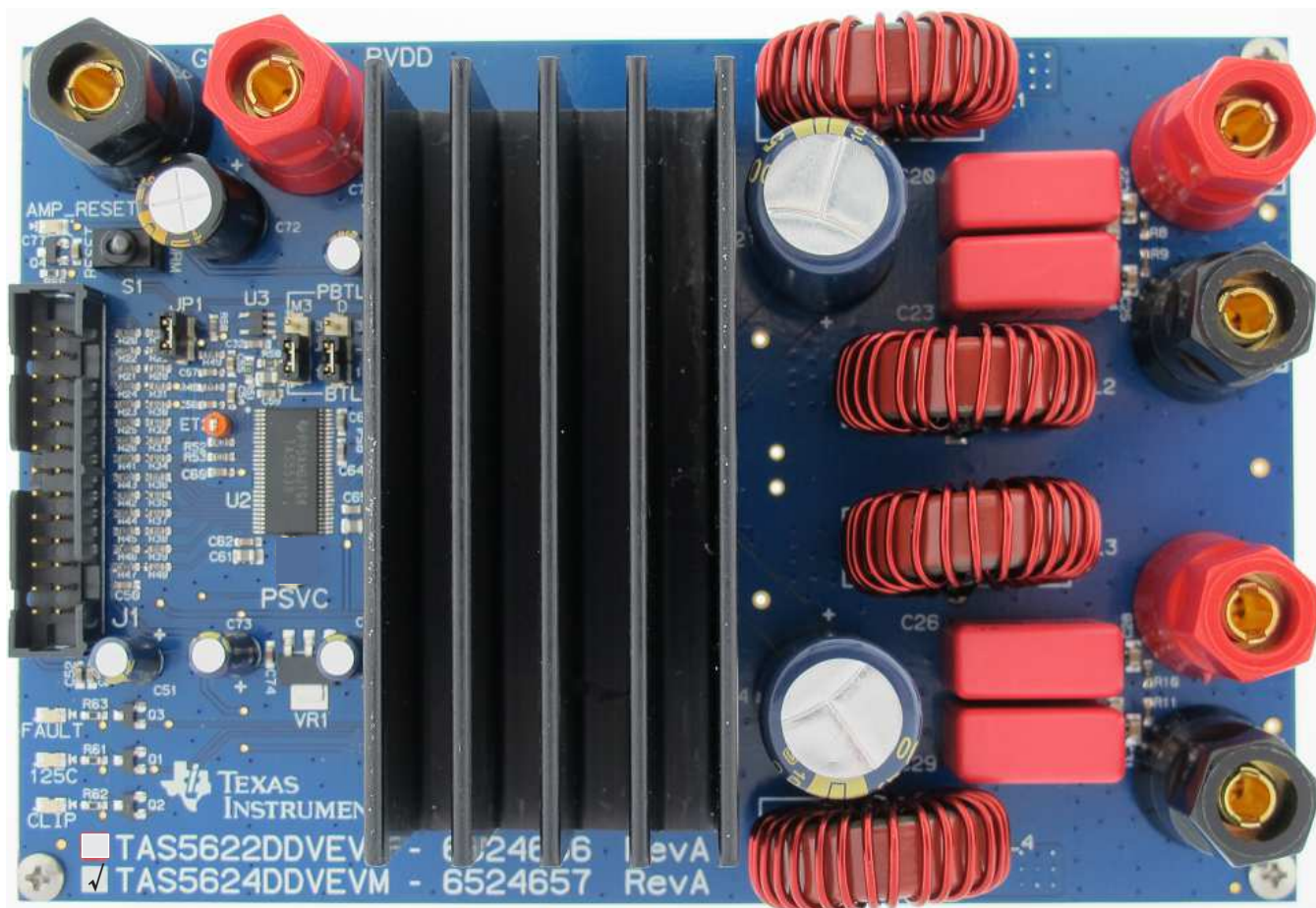
**NOTE:** TAS5622-TAS5624DDVEVM IS SHIPPED WITH THE CURRENT VERSION OF TAS5624 INSTALLED. TO EVALUATE THE CURRENT VERSION OF TAS5622 PLEASE VISIT THE PRODUCT FOLDER AT [www.ti.com](http://www.ti.com) AND REQUEST A FREE SAMPLE, AND REPLACE TAS5624 WITH TAS5622.

**Table 1. TAS5622-TAS5624DDVEVM Specification**

| Key Parameters               | Values                   |
|------------------------------|--------------------------|
| TAS5624 Power Supply Voltage | 12 - 38 Vdc              |
| TAS5622 Power Supply Voltage | 12 - 34 Vdc              |
| Number of Channels           | 2 x BTL or 1 x PBTL      |
| Load Impedance BTL           | 3-8 Ohm                  |
| Load Impedance PBTL          | 1.5-4 Ohm                |
| TAS5624 Output power BTL     | 200W / 3Ohm / 10%THD+N   |
| TAS5624 Output power PBTL    | 400W / 1.5Ohm / 10%THD+N |
| TAS5622 Output power BTL     | 165W / 3Ohm / 10%THD+N   |
| TAS5622 Output power PBTL    | 325W / 1.5Ohm / 10%THD+N |
| Dynamic Range (DNR)          | >105 dB                  |
| PWM Processor                | TAS5538DGG               |
| Output Stage                 | TAS5624DDV or TAS5622DDV |

**NOTE:** The heatsink in TAS5622-TAS5624DDVEVM 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 (25.0W per channel for TAS5624DDVEVM, 20.63W per channel for TAS5622DDVEVM) and then for 5 minutes at specified output power (200W per channel for TAS5624DDVEVM, 165W per channel for TAS5622DDVEVM). Then distortion vs. output power can be measured. TAS5622-TAS5624DDVEVM provides specified output power for several minutes or more without thermal shutdown. THD is not specified for this test but is typically near 10%.)



**Figure 1. TAS5622-TAS5624DDVEVM**

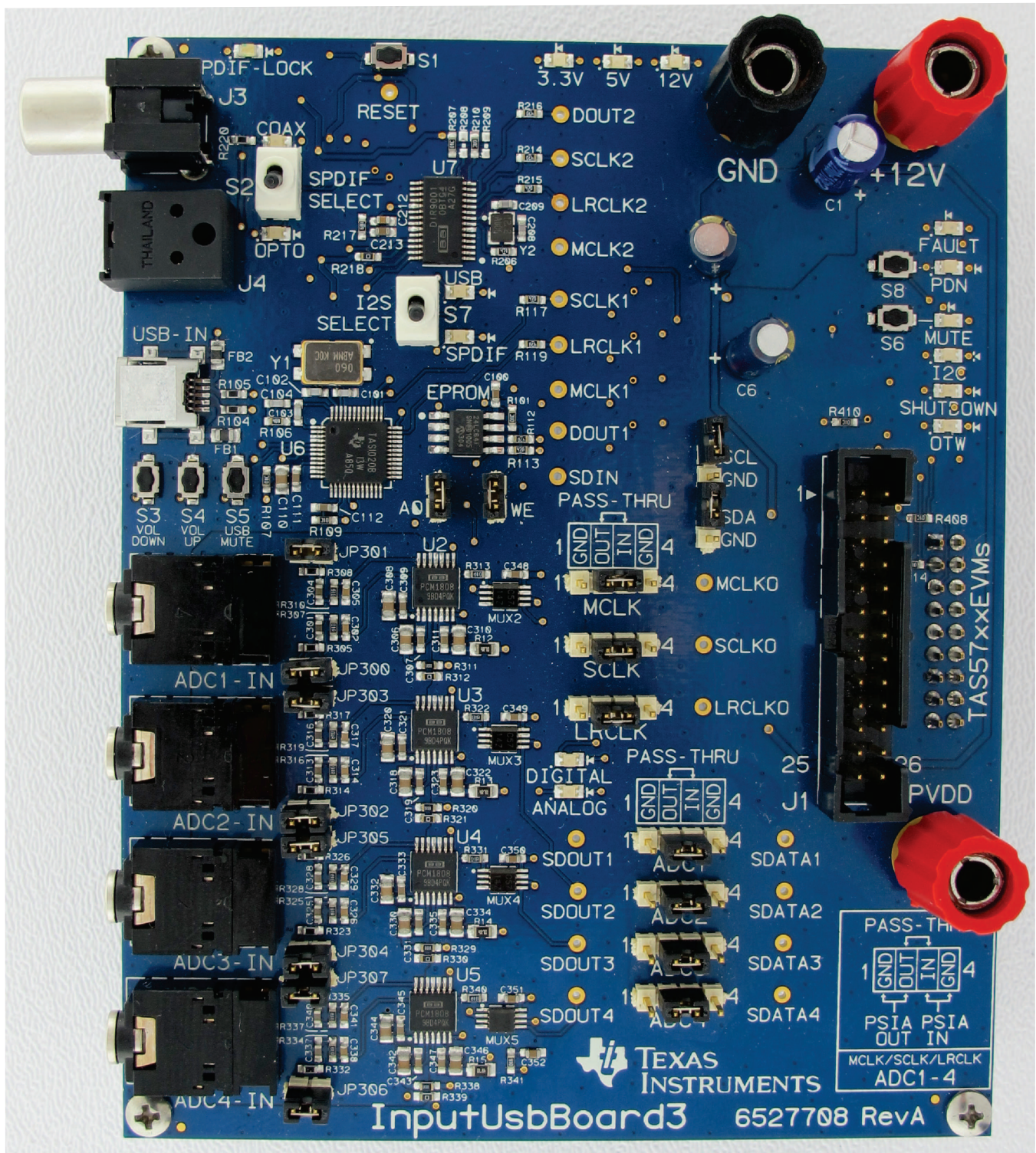


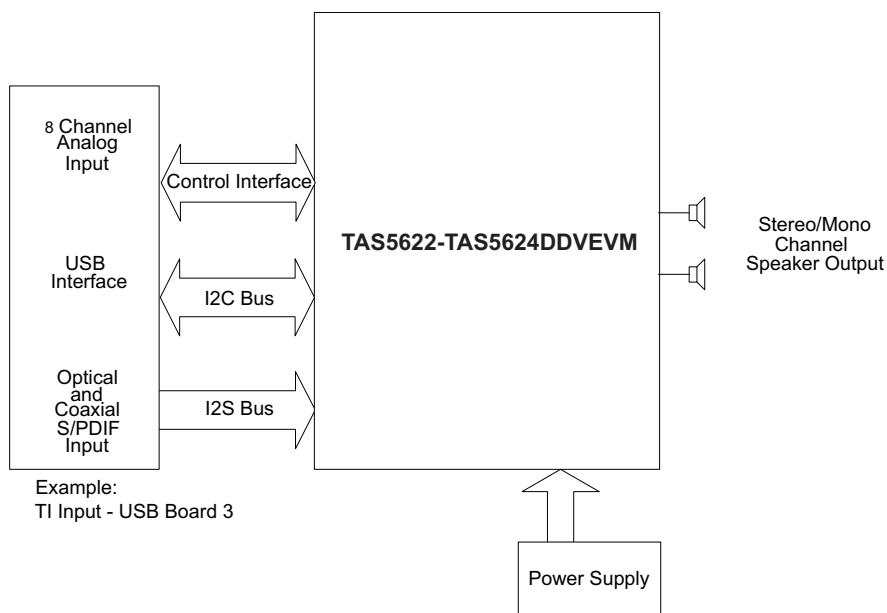
Figure 2. Input-USB Board3

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

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

## 1.1 TAS5622-TAS5624DDVEVM Features

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



**Figure 3. Integrated PurePath Digital™ Amplifier System**

## 1.2 EVM Physical Structure

Physical structure of the TAS5622-TAS5624DDVEVM is illustrated in [Figure 4](#).

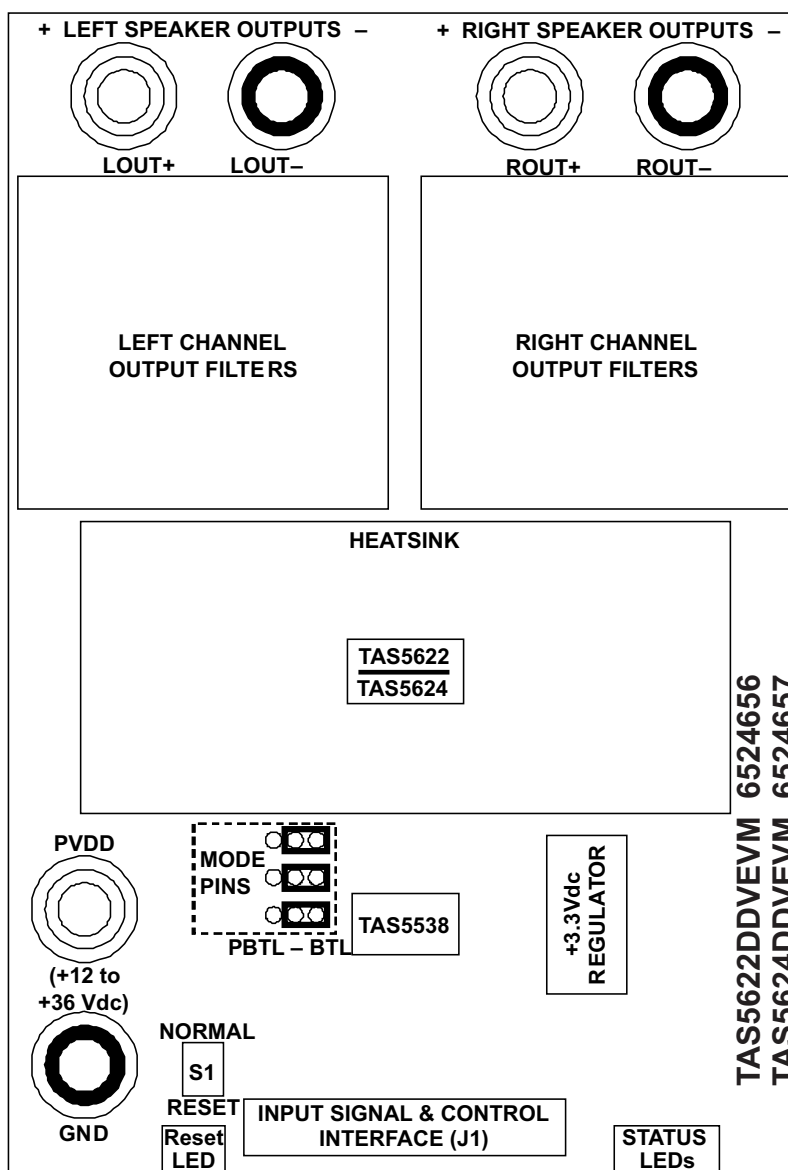


Figure 4. Physical Structure of the TAS5622-TAS5624DDVEVM (Approximate Layout)

## 2 Quick Setup Guide

This section describes the TAS5622-TAS5624DDVEVM 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 TAS5622-TAS5624DDVEVM for device evaluation.

### 2.1 Electrostatic Discharge Warning

Many of the components of the TAS5622-TAS5624DDVEVM 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 TAS5622-TAS5624DDVEVM package, check to make sure that the following items are included:

- 1 pc. TAS5622-TAS5624DDVEVM using 1 TAS5538DGG and 1 TAS5622DDV or TAS5624DDV.
- 1 pc. TI Input-USB Board 3 for interfacing TAS5622-TAS5624DDVEVM to SPDIF/analog sources and PC for control.
- 1 pc. Signal and Control Interface IDC cable for connection to an I<sup>2</sup>S front-end like the Input-USB Board 3.
- 1 pc. Cable for connecting Input-USB Board 3 to a USB port on a PC for TAS5538 control by software.
- 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 TAS5622/14LDDVEVM using the delivered IDC cable.

## 2.3 Power Supply Setup

2 power supplies are needed to power the TAS5622-TAS5624DDVEVM. 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 |
|------------------------------|---------------|----------------------|--------------|
| TAS5624 Power Supply Voltage | 12 - 38 Vdc   | 20 A                 | PVDD         |
| TAS5622 Power Supply Voltage | 12 - 34 Vdc   | 18 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.

## 2.4 Speaker Connection

### CAUTION

Both positive and negative speaker outputs are floating and cannot be connected to ground (e.g. 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.

## 2.5 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](#):

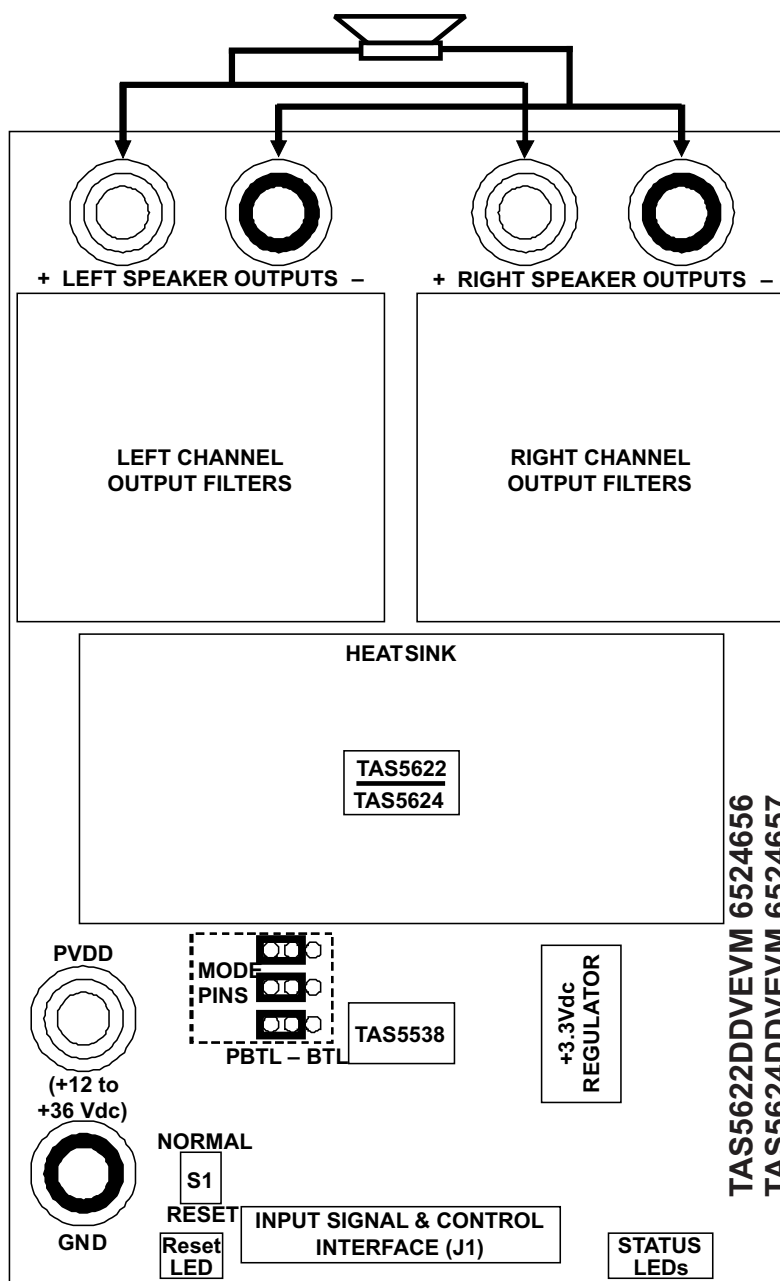


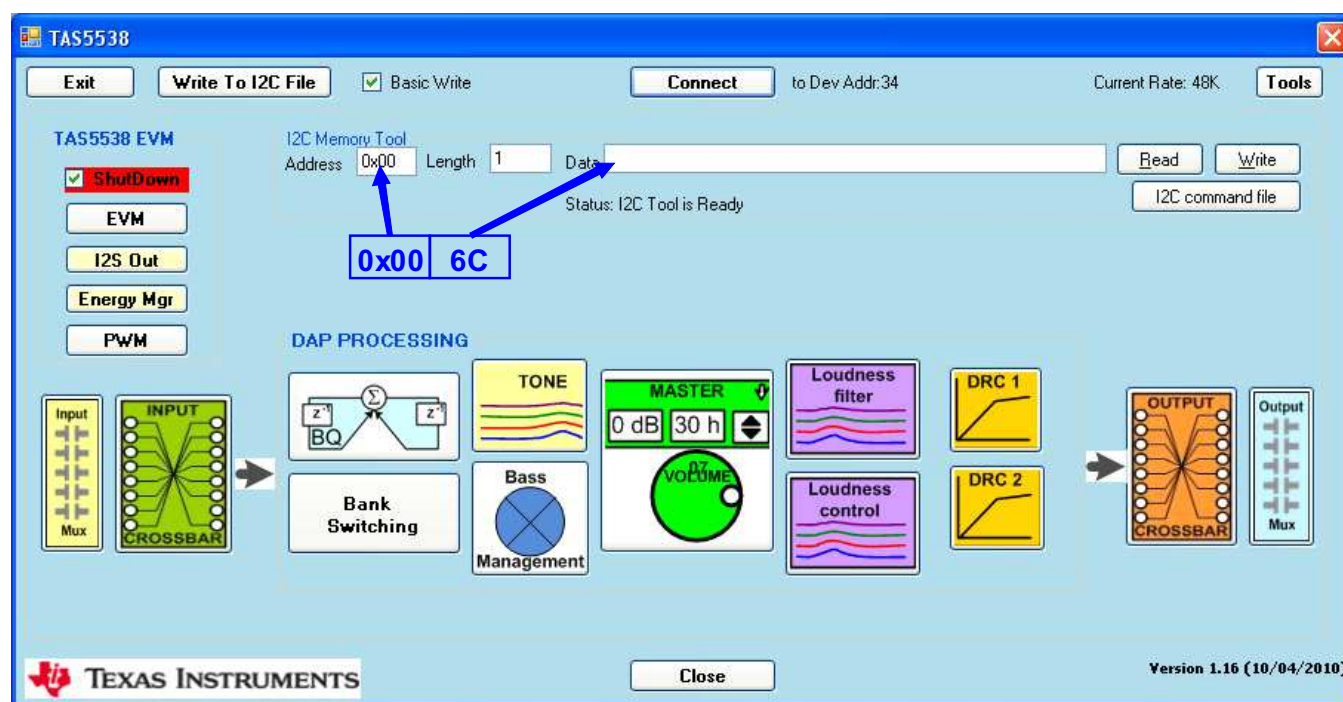
Figure 5. PBTL Mode Configuration

## 2.6 GUI Software Installation and EVM Startup

The TAS5622-TAS5624DDVEVM is controlled by the Input-USB Board 3 with the TAS5538 GUI. The TAS5538 GUI provides control of all registers in TAS5538. Download the current version of the GUI zip file "TAS5538\_xxxx.zip" from the TAS5622DDVEVM folder or the TAS5624DDVEVM folder on <http://www.ti.com> to a convenient location on the host PC. Create a new folder at a convenient location and extract the files from the zip file to the new folder. Be sure to check the box labeled "Use folder names" during extraction. Then connect the USB cable between the host PC and jack USB-IN on the Input-USB Board 3. Then turn on the 12V power supply and the PVDD power supply in that order.

Start the GUI by opening "TAS55XX\_GUI.exe" in the new folder. Startup will take a few seconds and the following window will open.

Click CONNECT and then READ, to verify that the data in register **0x00** read **6C**.

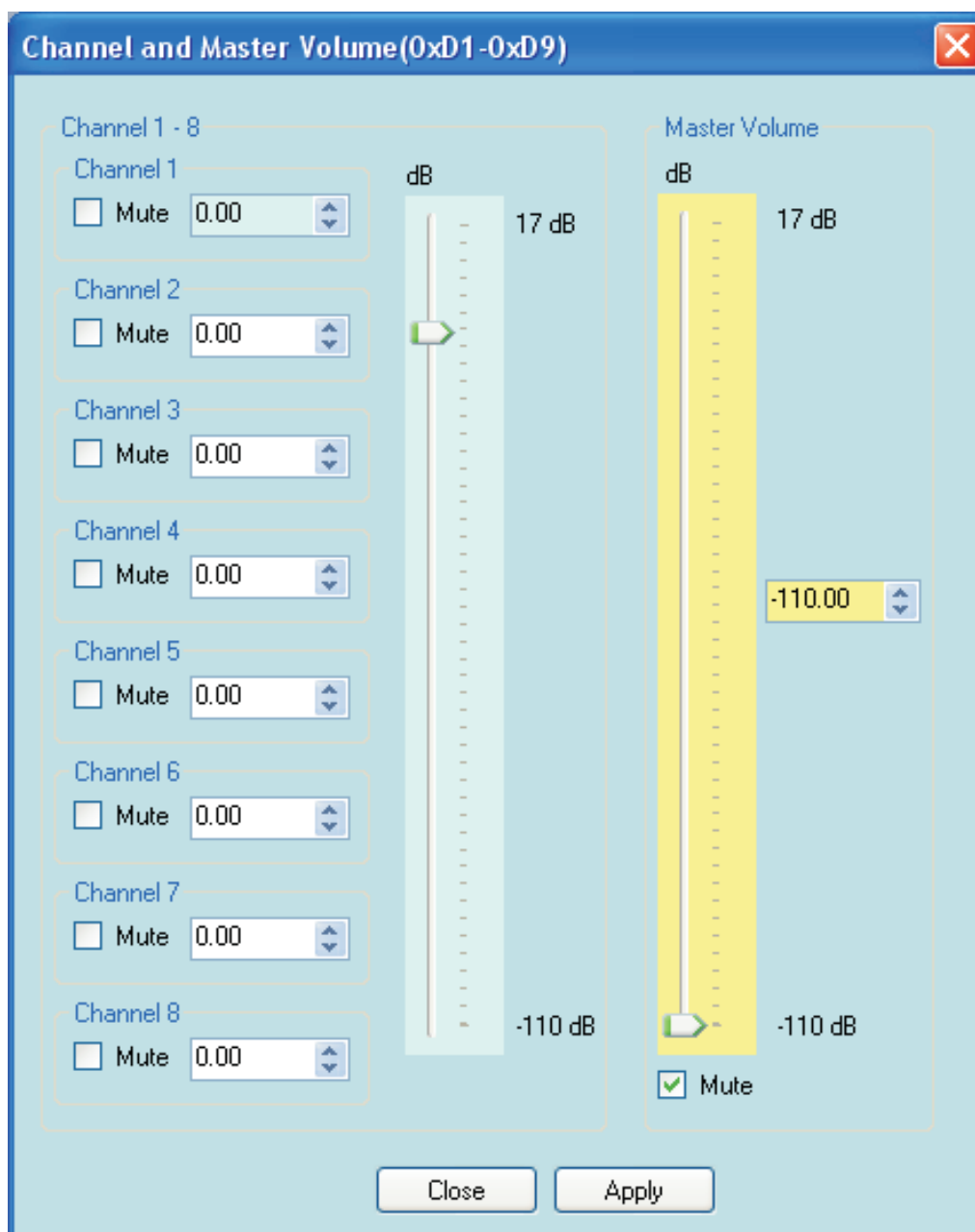


**Figure 6. TAS5538 GUI Window**

**NOTE:** If the address that is read is not **6C**, make sure the USB is connected to the PC and check for HID enumeration.

- Open the PC device manager. Right-click My Computer on desktop and open Properties, then Hardware, then Device Manager.
- Expand "Human Interface Devices".
- Plug and unplug the USB cable from Input-USB Board 3 and confirm that an HID icon appears.

Uncheck "ShutDown" and click the "Master Volume" icon to open the following window.



**Figure 7. Channel and Master Volume GUI**

Uncheck mute and increase volume to the desired level, and close the window. Then press the MUTE switch on Input-USB Board 3 to extinguish the MUTE LED. The EVM should now operate.

**NOTE:** In some cases when power is cycled on the DUT or Input-USB Board 3 but the GUI is not closed, it will be necessary to take an action like checking and unchecking mute to force I2C communication to refresh TAS5538. In some cases the startup process must be repeated.

An SPDIF input may be provided to Input-USB Board 3 by coax to jack COAX or by optical connection to jack OPTO. Alternatively an analog input may be connected to jack ADC1\_IN. An analog input will override an SPDIF input.

## 2.7 Self-Protection and Fault Reporting

The TAS5622 and TAS5624 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 SLAS845 for TAS5622A and data sheet SLAS844 for TAS5624A.

## 3 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 TAS5622-TAS5624DDVEVM. These data sheets can be obtained at <http://www.ti.com>.

**Table 3. Related Documentation from Texas Instruments**

| Part Number | Literature Number       |
|-------------|-------------------------|
| TAS5538     | <a href="#">SLES255</a> |
| TAS5622A    | <a href="#">SLAS845</a> |
| TAS5624A    | <a href="#">SLAS844</a> |
| TPS3825-33  | <a href="#">SLVS165</a> |
| TLV1117-33C | <a href="#">SLVS561</a> |

### 3.1 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](#))
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](#))

## Appendix A Design Information

This appendix includes design information for the TAS5622-TAS5624DDVEVM. This information is presented in the following order.

- [Table 4](#) EVM Bill of Materials
- [Section A.1](#) EVM Custom Component Vendors
- [Section A.2](#) TAS5622-TAS5624LDDVEVM PCB Specification
- [Section A.3](#) EVM PCB Layers
- [Section A.4](#) EVM and Input-USB Board 3 Schematics

**Table 4. Bill of Materials for TAS5624DDVEVM**

| Manu Part No.            | Qty | Ref Des                                                                         | Vendor Part No.  | Description                                                  | Vendor            | Manu              |
|--------------------------|-----|---------------------------------------------------------------------------------|------------------|--------------------------------------------------------------|-------------------|-------------------|
| <b>TI-SEMICONDUCTORS</b> |     |                                                                                 |                  |                                                              |                   |                   |
| TAS5624DDV               | 1   | U1                                                                              | TAS5624DDV       | 150W-STEREO/300W-MONO PUREPATH DIGITAL AMP HTSSOP44-DDV ROHS | Texas Instruments | Texas Instruments |
| TAS5538DGG               | 1   | U2                                                                              | TAS5538DGG       | 8 CHANNEL HD COMPATIBLE AUDIO PROCESSOR TSSOP56-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 |
| <b>SEMICONDUCTORS</b>    |     |                                                                                 |                  |                                                              |                   |                   |
| 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        |
| <b>CAPACITORS</b>        |     |                                                                                 |                  |                                                              |                   |                   |
| 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 -.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            |
| <b>CAPACITORS</b>        |     |                                                                                 |                  |                                                              |                   |                   |
| EEU-FC1C470              | 4   | C1, C51, C73, C75                                                               | P11196           | CAP 47UFD 16V RAD ALUM ELEC FC ROHS                          | Digi-Key          | Panasonic         |

**Table 4. Bill of Materials for TAS5624DDVEVM (continued)**

| Manu Part No.                  | Qty | Ref Des                                                                                       | Vendor Part No.  | Description                                          | Vendor     | Manu                  |
|--------------------------------|-----|-----------------------------------------------------------------------------------------------|------------------|------------------------------------------------------|------------|-----------------------|
| UKZ1H470MPM                    | 1   | C72                                                                                           | 493-3194         | CAP ALUM ELEC KZ RADIAL 47UF 50V 20% ROHS            | Digi-Key   | Nichicon              |
| EEU-FC1H102                    | 2   | C12, C14                                                                                      | P10333-ND        | CAP ALUM ELEC FC RADIAL 1000UF 50V 20% ROHS          | Digi-Key   | Panasonic             |
| <b>RESISTORS</b>               |     |                                                                                               |                  |                                                      |            |                       |
| 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             |
| 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             |
| <b>INDUCTORS</b>               |     |                                                                                               |                  |                                                      |            |                       |
| MA5173-AE                      | 4   | L1, L2, L3, L4                                                                                | MA5173-AE        | SHIELDED POWER INDUCTOR 7uH 12A ROHS                 | Coil Craft | Coil Craft            |
| <b>HEADERS</b>                 |     |                                                                                               |                  |                                                      |            |                       |
| 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               |
| <b>TESTPOINTS AND SWITCHES</b> |     |                                                                                               |                  |                                                      |            |                       |
| 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                   |
| <b>BINDING POSTS</b>           |     |                                                                                               |                  |                                                      |            |                       |
| 5018-0                         | 3   | GND, LOUT-, ROUT-                                                                             | 565-5018-0       | BINDING POST, BLACK 60V 30A GOLD ROHS                | Mouser     | Pomona                |

**Table 4. Bill of Materials for TAS5624DDVEVM (continued)**

| Manu Part No.                                                                             | Qty | Ref Des                            | Vendor Part No.    | Description                                                | Vendor        | Manu          |
|-------------------------------------------------------------------------------------------|-----|------------------------------------|--------------------|------------------------------------------------------------|---------------|---------------|
| 5018-2                                                                                    | 3   | PVDD,<br>LOUT+,<br>ROUT+           | 565-5018-2         | BINDING POST, RED 60V 30A GOLD ROHS                        | Mouser        | Pomona        |
| <b>SHUNTS</b>                                                                             |     |                                    |                    |                                                            |               |               |
| SPC02SYAN                                                                                 | 4   | JP1, C(1-2),<br>D(1-2),<br>M3(1-2) | S9001              | SHUNT, BLACK AU FLASH 0.100LS                              | Digi-Key      | Sullins       |
| <b>HEAT SINKS AND HARDWARE</b>                                                            |     |                                    |                    |                                                            |               |               |
| ATSTI1OP-519-C1-R3                                                                        | 1   | HS1                                | ATSTI1OP-519-C1-R3 | HEATSINK ALUMINUM ATS 36x78mm<br>36.8mm PITCH ROHS         | ATS           | ATS           |
| 92000A118                                                                                 | 2   | HS1                                | 92000A118          | PHILIPS PANHEAD SCREW M3x8mm<br>STAINLESS STEEL ROHS       | McMaster-Carr | McMaster-Carr |
| 92148A150                                                                                 | 2   | HS1                                | 92148A150          | SPLIT WASHER M3 STAINLESS STEEL<br>ROHS                    | McMaster-Carr | McMaster-Carr |
| 94868A178                                                                                 | 4   | NA                                 | 94868A178          | STANDOFF M3x25mm 4.5mm DIA HEX<br>STAINLESS STEEL F-F ROHS | McMaster-Carr | McMaster-Carr |
| 92000A118                                                                                 | 4   | NA                                 | 92000A118          | PHILIPS PANHEAD SCREW M3x8mm<br>STAINLESS STEEL ROHS       | McMaster-Carr | McMaster-Carr |
| 92148A150                                                                                 | 4   | NA                                 | 92148A150          | SPLIT WASHER M3 STAINLESS STEEL<br>ROHS                    | McMaster-Carr | McMaster-Carr |
| Component Count:                                                                          | 163 |                                    |                    |                                                            |               |               |
| <b>COMPONENTS NOT ASSEMBLED</b>                                                           |     |                                    |                    |                                                            |               |               |
| CR1, CR2, CR3, CR4, L+, L-, OA, OB, OC, OD, R+, R-, PVDD_AB, PVDD_CD, M1, M2, GNDx2, PSVC |     |                                    |                    |                                                            |               |               |

## A.1 EVM Custom Component Vendors

TAS5622DDVEVM and TAS5624DDVEVM 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-519-C1. Information on this heatsink can be obtained from Leonard Alter at [lalter@qats.com](mailto: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](http://www.qats.com).

Coilcraft, in Cary, IL, USA, provide a 7μH inductor optimized for these EVMs, MA5173-AE. Information on this component can be found in the data sheet for the MA5172 inductor family at [www.coilcraft.com](http://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](http://www.coilcraft.com).

## A.2 TAS5622-TAS5624LDDVEVM PCB Specification

|                          |                                                          |
|--------------------------|----------------------------------------------------------|
| PCB IDENTIFICATION:      | TAS5622-TAS5624DDVEVM_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                  |

## A.3 EVM PCB Layers

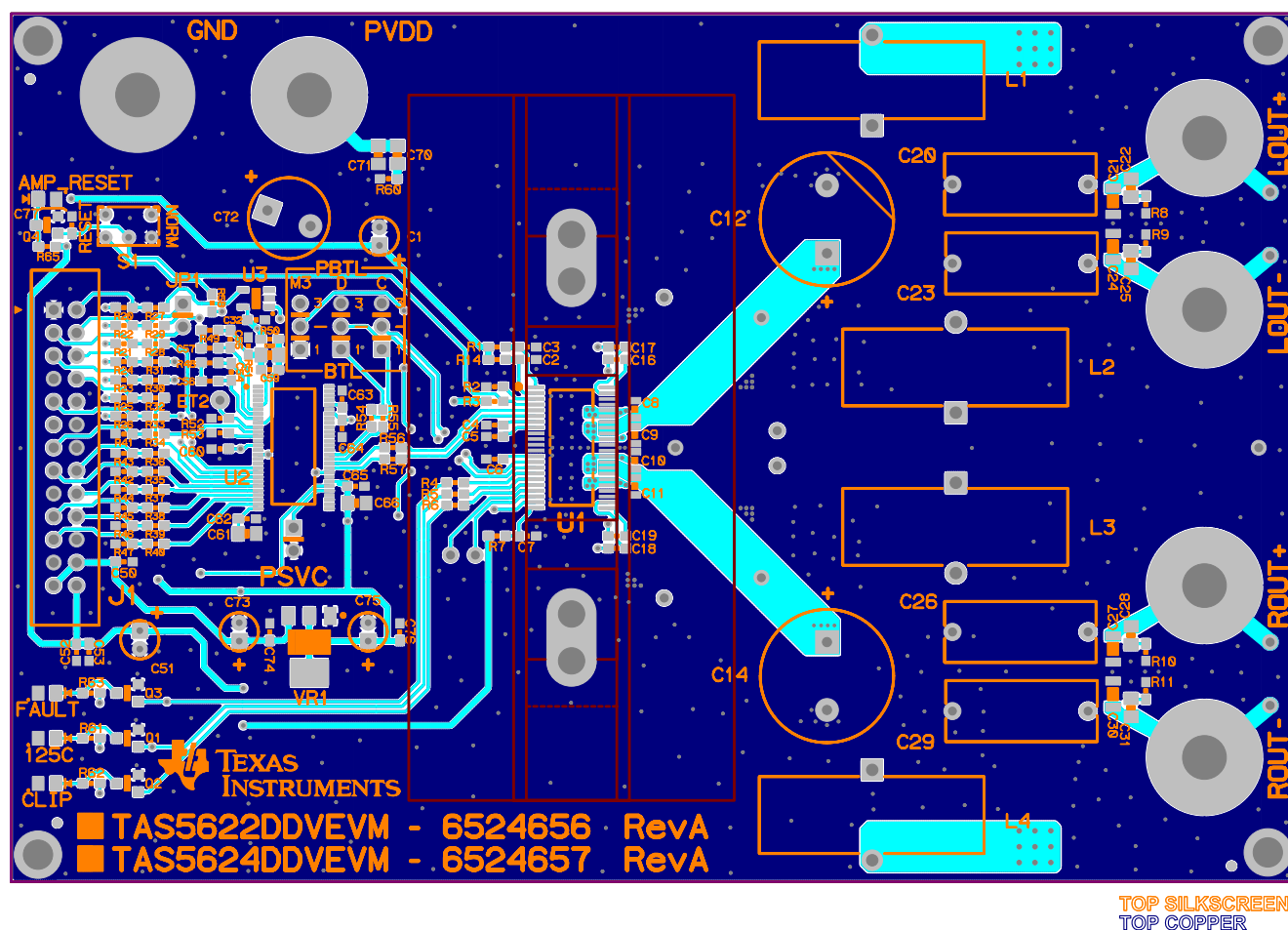


Figure 8. Top Composite PCB Layer

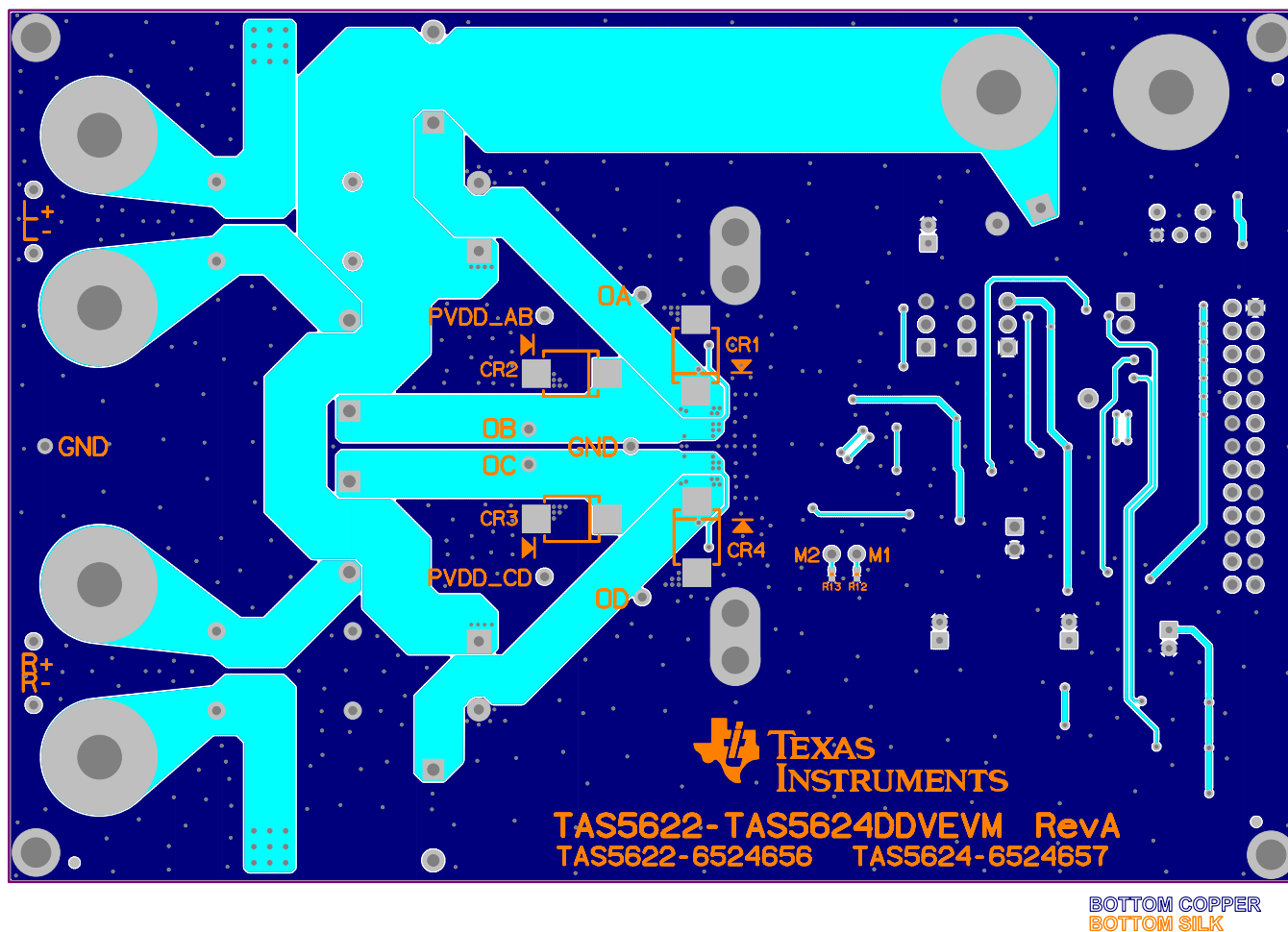
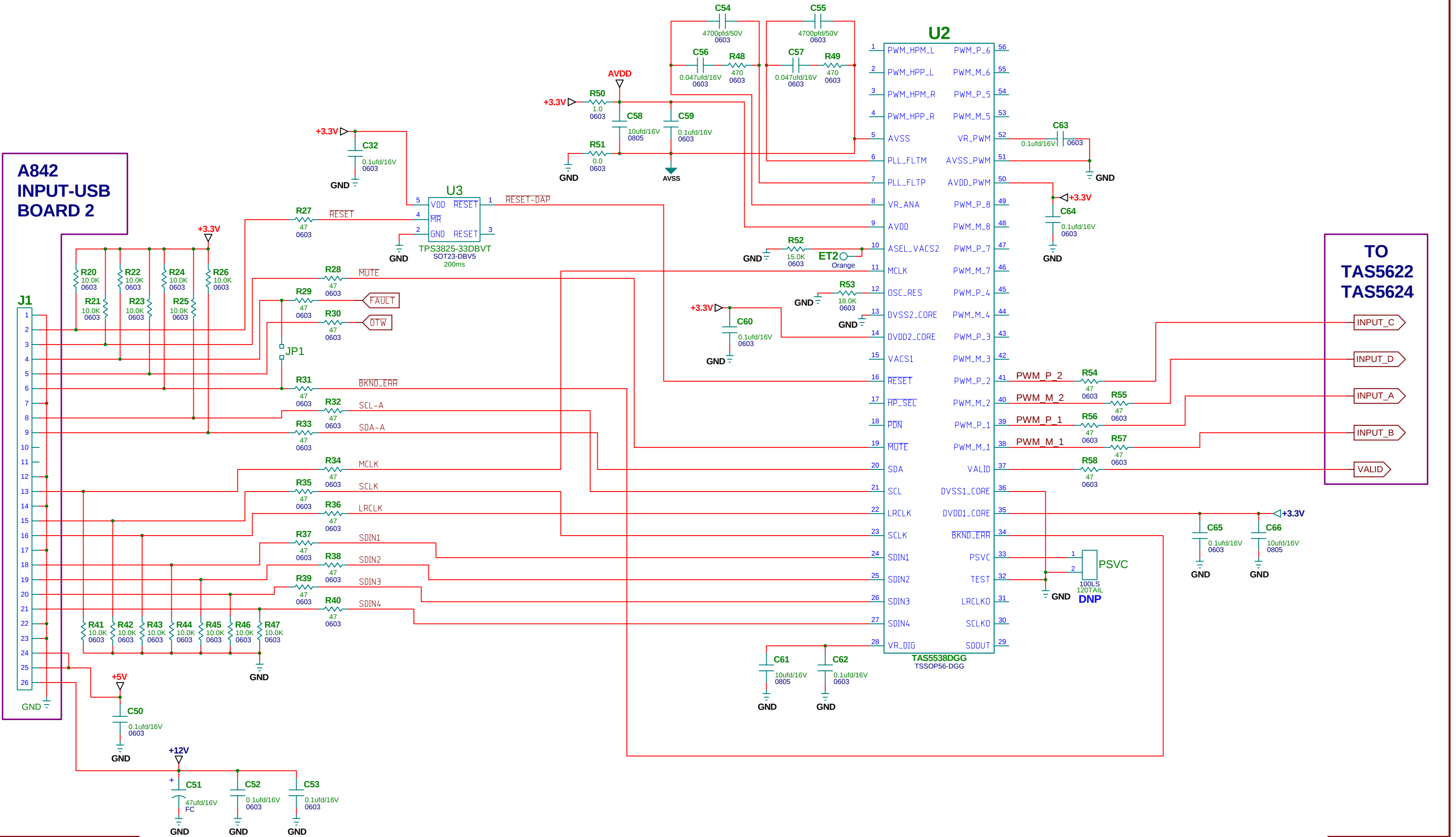


Figure 9. Bottom Composite PCB Layer

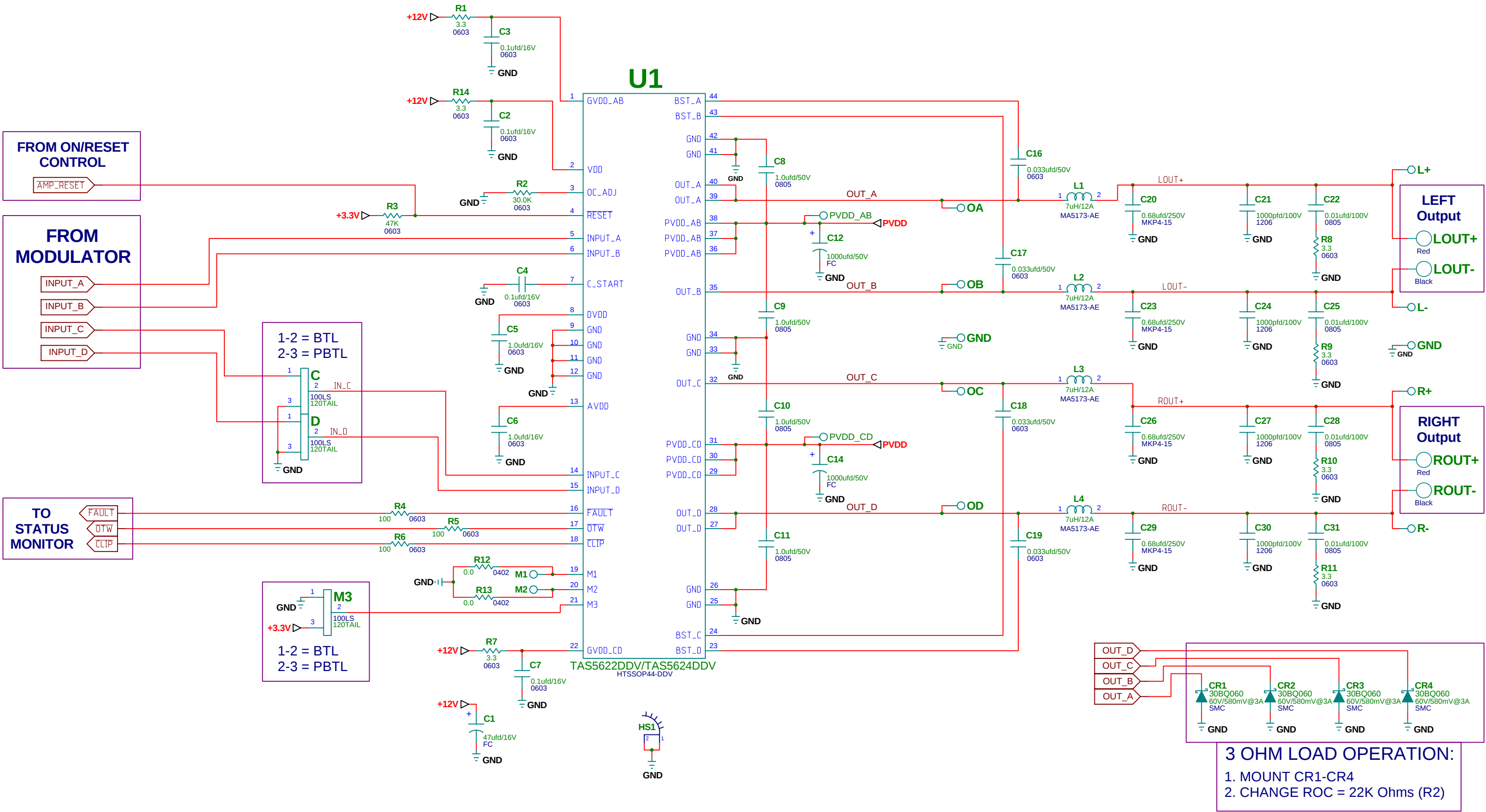
#### A.4 EVM and Input-USB Board 3 Schematics

The EVM and Input-USB Board 3 Schematics are appended to this User's Guide PDF.

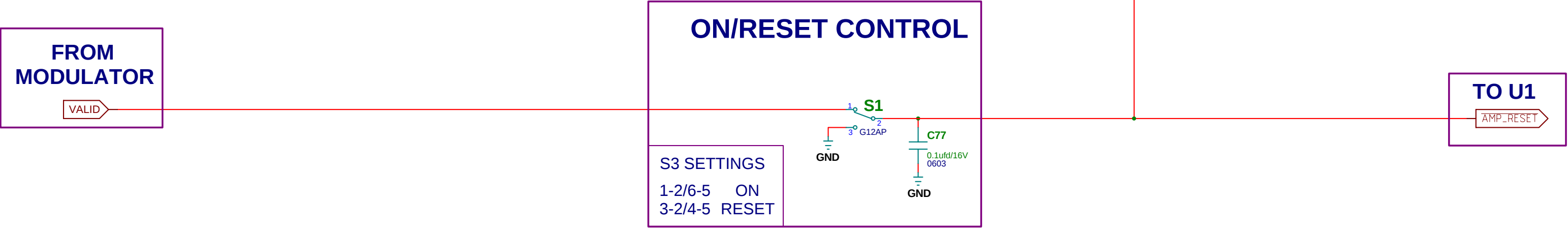
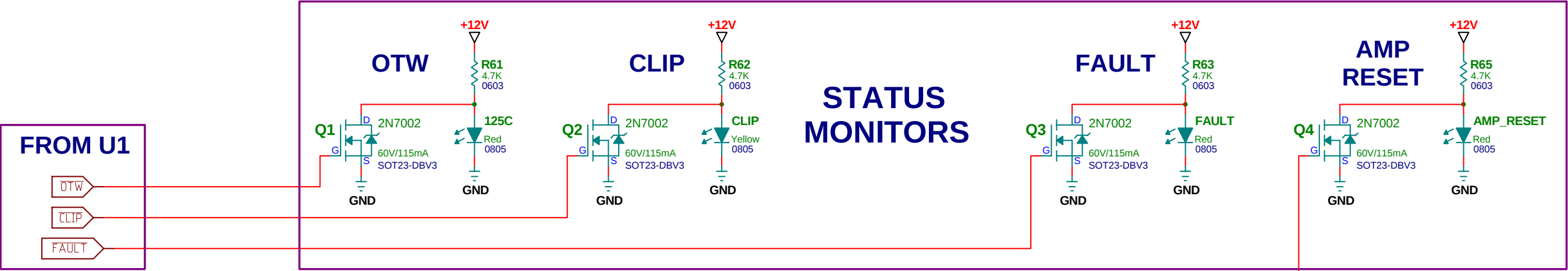
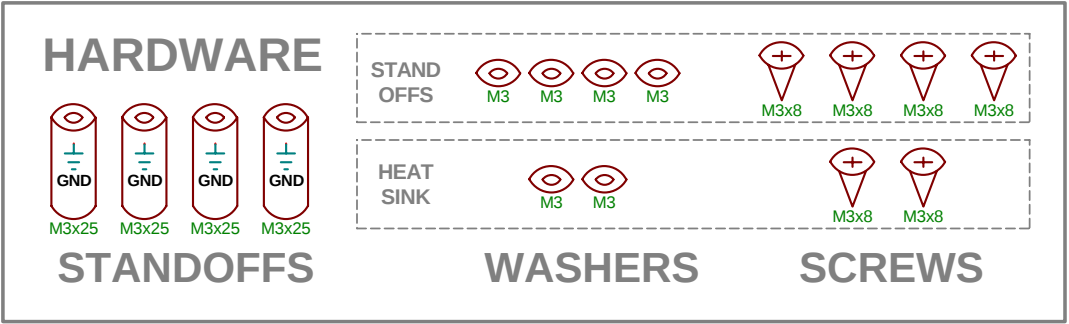
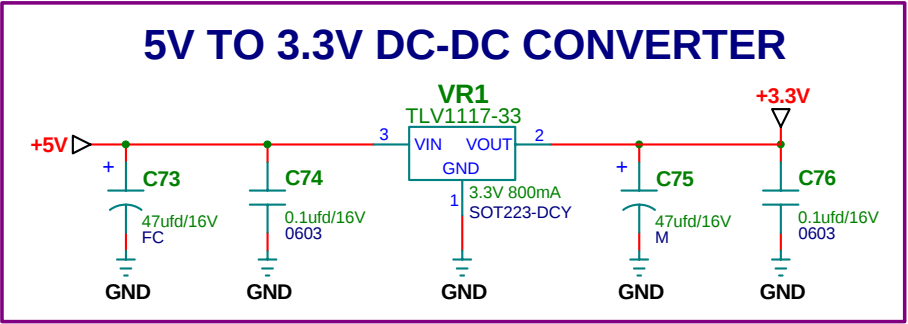
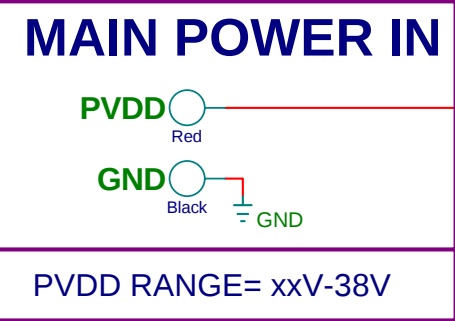
# TAS5622DDV/TAS5624DDV EVALUATION BOARD



# TAS5622DDV/TAS5624DDV EVALUATION BOARD



# TAS5622DDV/TAS5624DDV EVALUATION BOARD



# TAS5622DDV/TAS5624DDV EVALUATION BOARD

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

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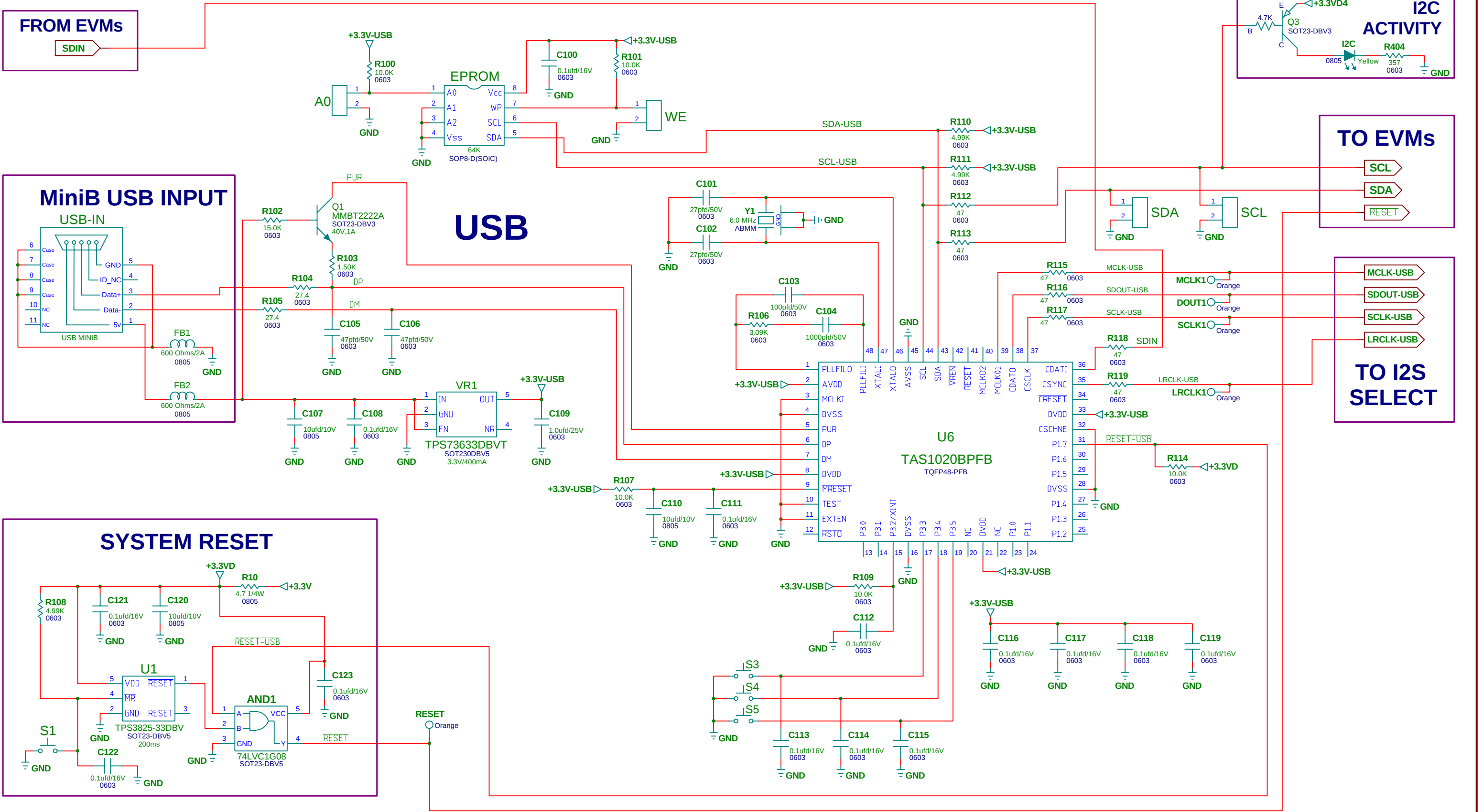
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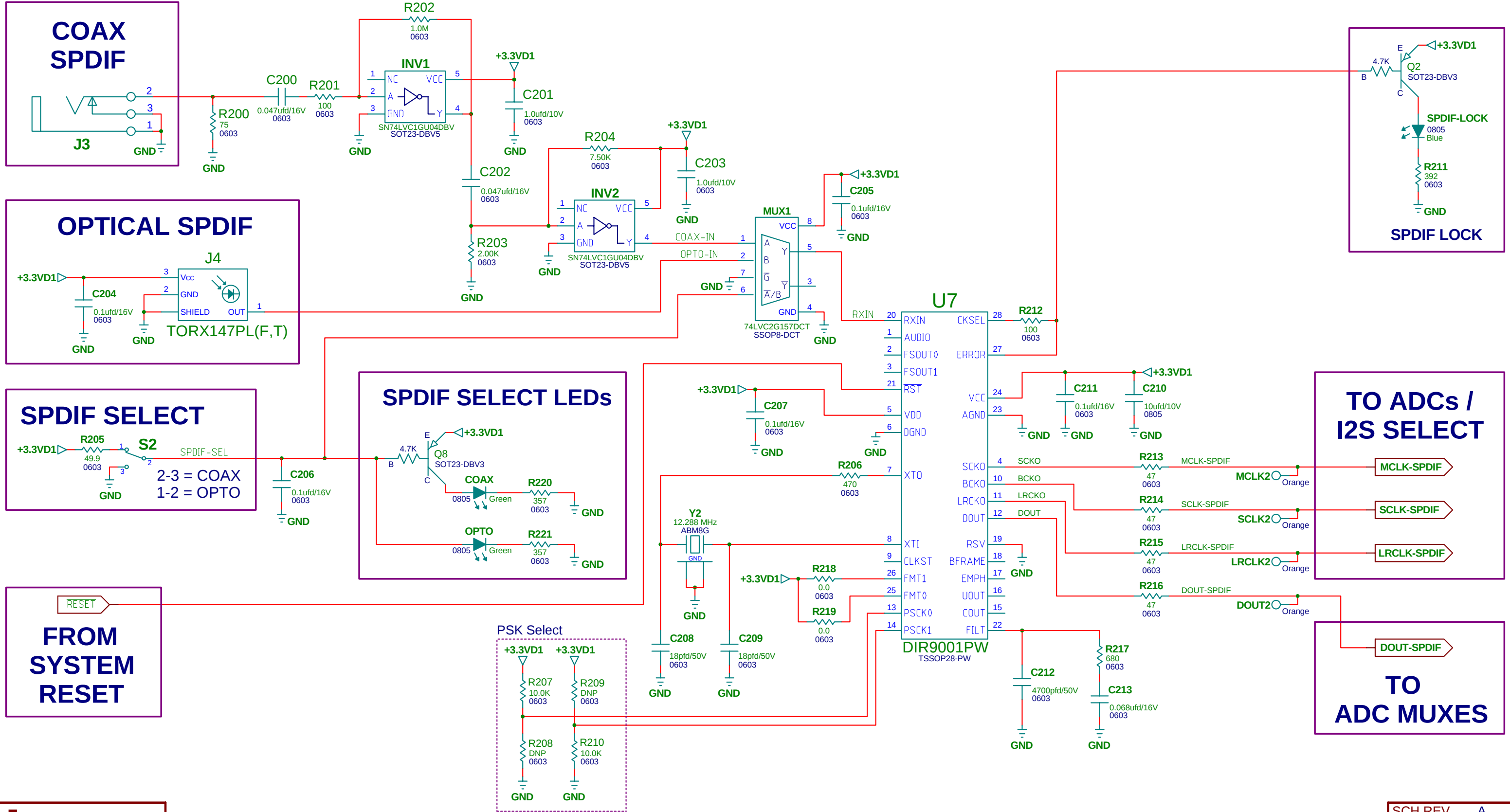
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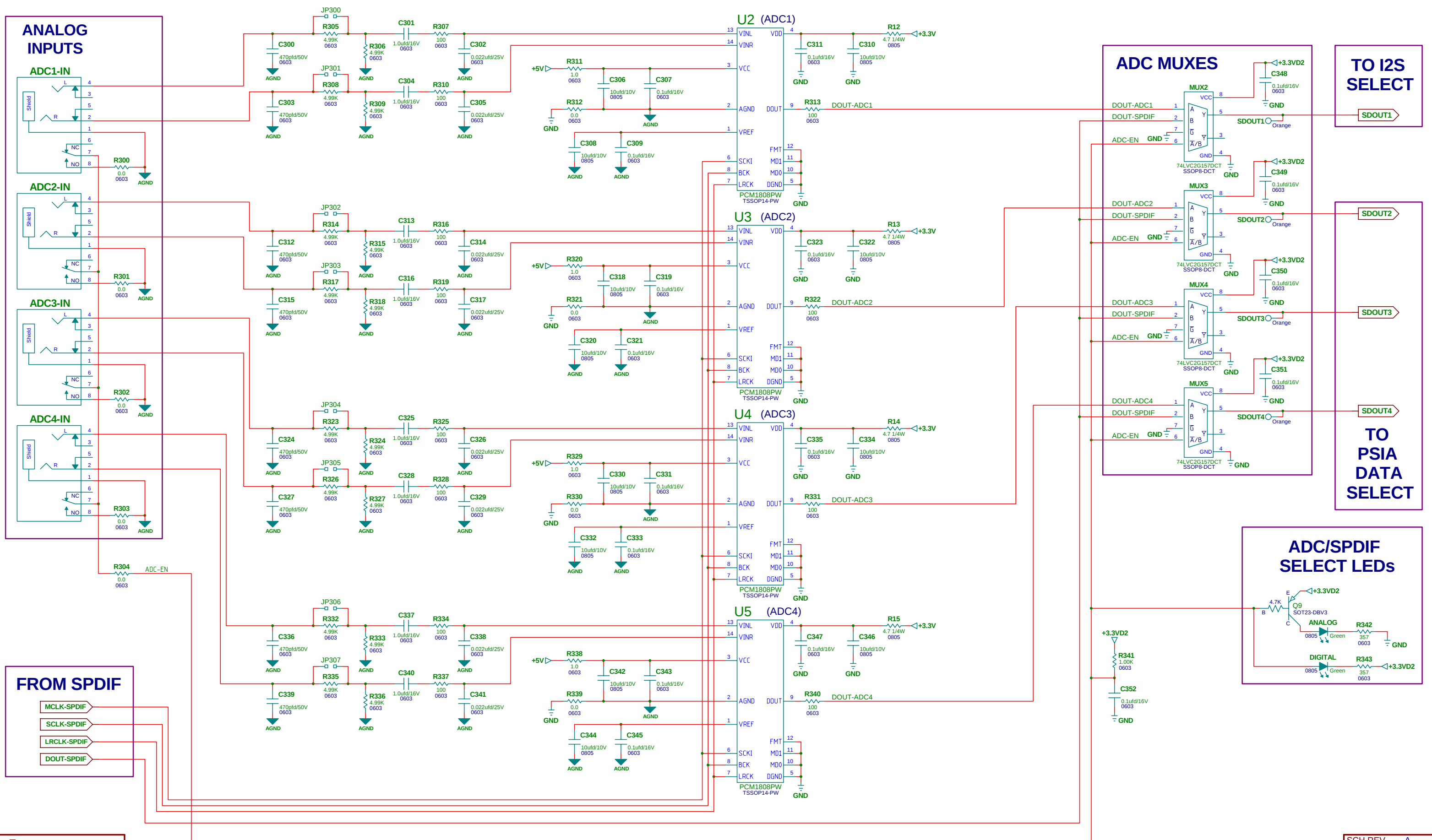
# INPUT-USB BOARD #3



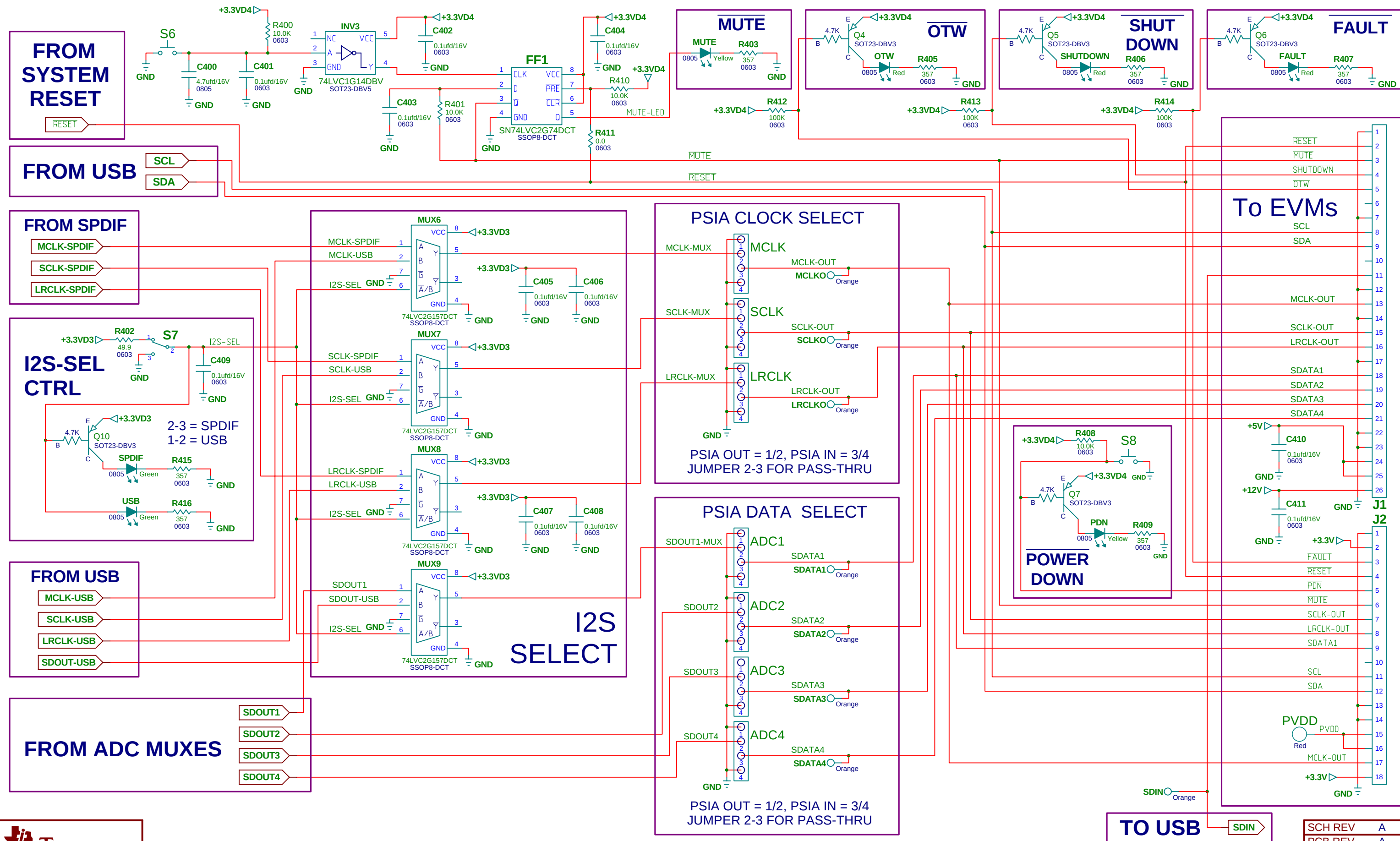
# INPUT-USB BOARD #3



# INPUT-USB BOARD #3

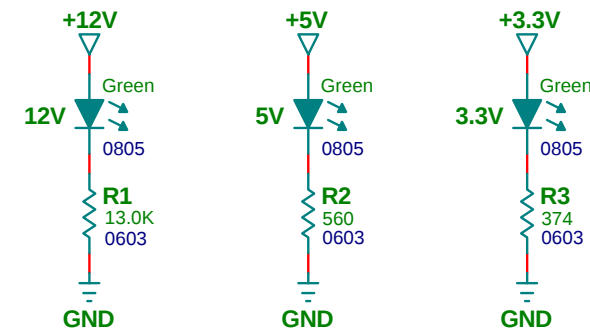
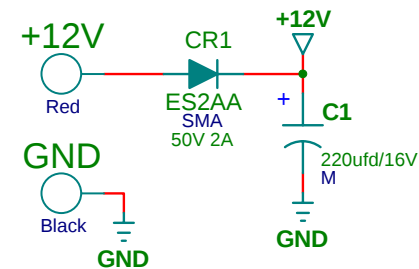


# INPUT-USB BOARD #3

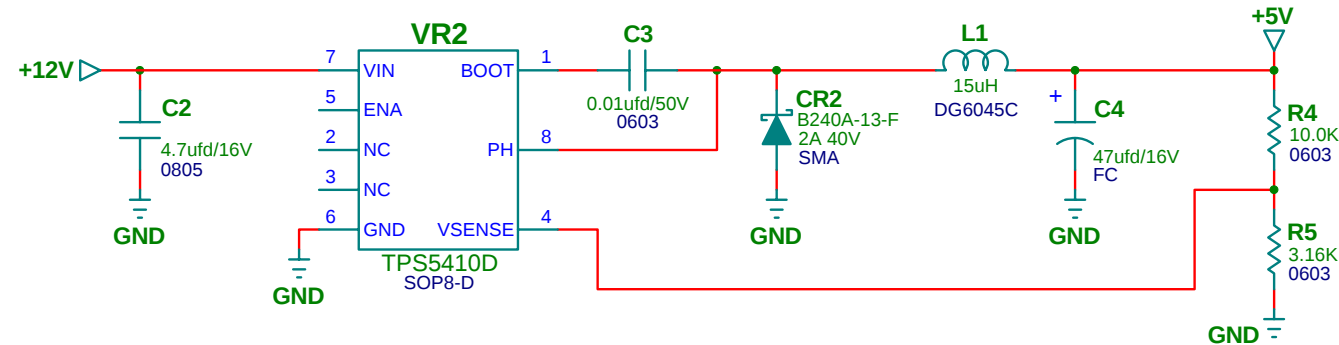


# INPUT-USB BOARD #3

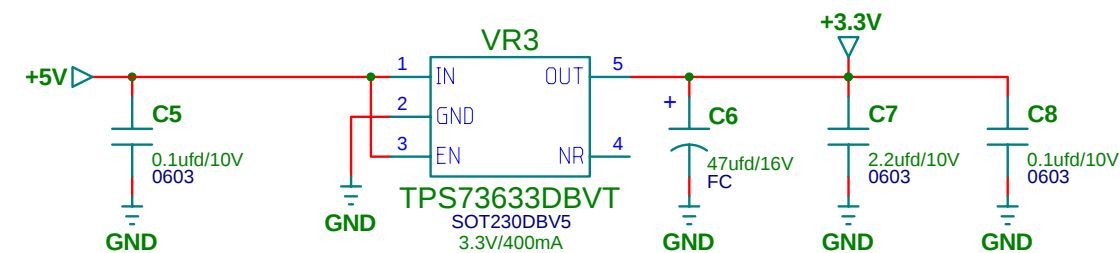
## MAIN POWER IN



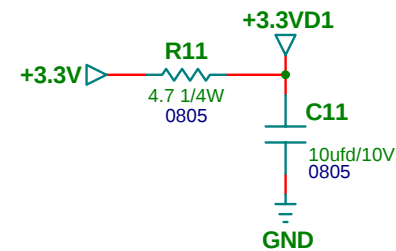
## PVDD TO 5V SWITCHER



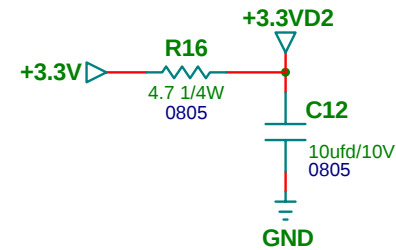
## 5V TO 3.3V DC-DC CONVERTER



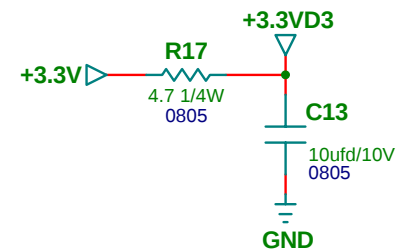
## SPDIF



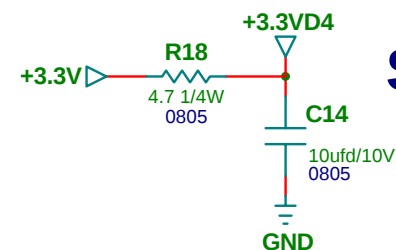
## ADC MUXES



## I2S SELECT MUXES

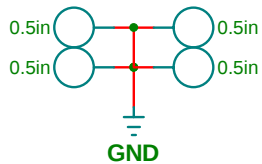


## SWITCHES AND LEDs



## BOM ONLY

### STANDOFFS



# INPUT-USB BOARD #3

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

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

### General Statement for EVMs including a radio

*User Power/Frequency Use Obligations:* This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

### 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

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**

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.

### **For EVMs annotated as IC – INDUSTRY CANADA Compliant**

This Class A or B digital apparatus complies with Canadian ICES-003.

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

### **Concerning EVMs including radio transmitters**

This device complies with Industry Canada licence-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.

### **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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

### **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.

### **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.

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**This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan**

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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## EVALUATION BOARD/KIT/MODULE (EVM) WARNINGS, RESTRICTIONS AND DISCLAIMERS

**For Feasibility Evaluation Only, in Laboratory/Development Environments.** Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure 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.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

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