EVM User's Guide: TAS2118EVM

TAS2118 Evaluation Module

Description

The TAS2118EVM has been designed to demonstrate the performance of TAS2118 in a mono configuration. The EVM utilizes the AC-MB to provide a USB to Audio interface to the EVM. Up to four devices can share a common bus through I²S/TDM and I²C interfaces. The TAS2118EVM also supports a dual-mono configuration by combining two TAS2118EVMs.

Get Started

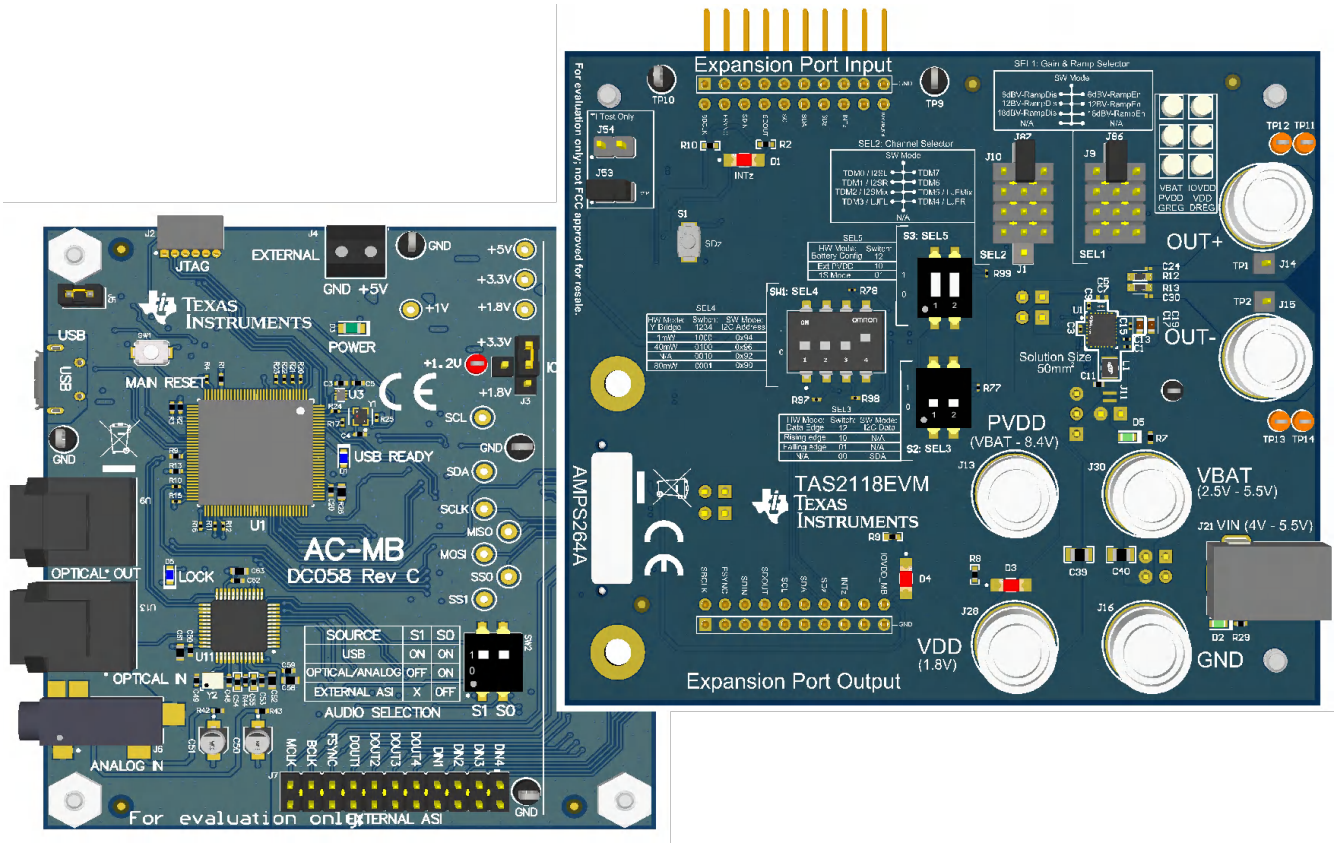
1. Order the TAS2118EVM and access supplemental resources in the TAS2118 product folder.
2. Read the TAS2118 data sheet.
3. Request and download Pure Path Console 3.
4. Request access to the TAS2118-SW page.
5. Visit E2E forum for any questions.

Features

- Mono speaker evaluation
- Plug-n-play hardware mode
- Advanced software mode interface using PurePath™ Console 3 Windows® software
- EVM interconnection for stereo testing
- USB input
- External I²C and I²S/TDM host controller connection available

Applications

- Mobile phone, tablets and wearables
- Smart speakers with voice assistance
- Bluetooth and wireless speakers



TAS2118 Mono Evaluation Module

1 Evaluation Module Overview

1.1 Introduction

This user's guide describes the function and use of the TAS2118EVM. This document includes the hardware configuration instructions, a quick-start guide, jumper and connector descriptions, software description, schematics, and printed circuit board (PCB) layout that demonstrate TI's recommended practices for these devices. In addition, this document includes a Troubleshooting section that can help with common usage errors and problems occuring during TAS2118EVM evaluation.

This section provides details on what is included inside the evaluation module box, what are TAS2118 capabilities and operation ranges, as well as what is the additional test equipment that can be required for a full audio evaluation.

1.2 Kit Contents

The evaluation kit consists of the following items:

- TAS2118EVM
- AC-MB controller board

A speaker is not included in the kit, however any speaker or dummy load rated for the expected output power can be connected to the output connectors using the banana jacks.

Similarly, a power supply is not part of the kit, but the barrel jack connector can be connected to any power supply in a range of 4V to 5.5V. A micro-USB cable is also needed if software mode is used.

1.3 Specification

The TAS2118 is a digital input Class-D audio amplifier optimized for delivering best battery life for music playback and voice calls.

The integrated boost allows TAS2118 to be implemented in 1S or 3S battery applications. TAS2118EVM showcases the 1S battery broadly used in mobile and industrial applications but can also be used to evalute the 3S configuration. Two EVMs can be interconnected for a stereo demonstration, as shown in Section 3.9.

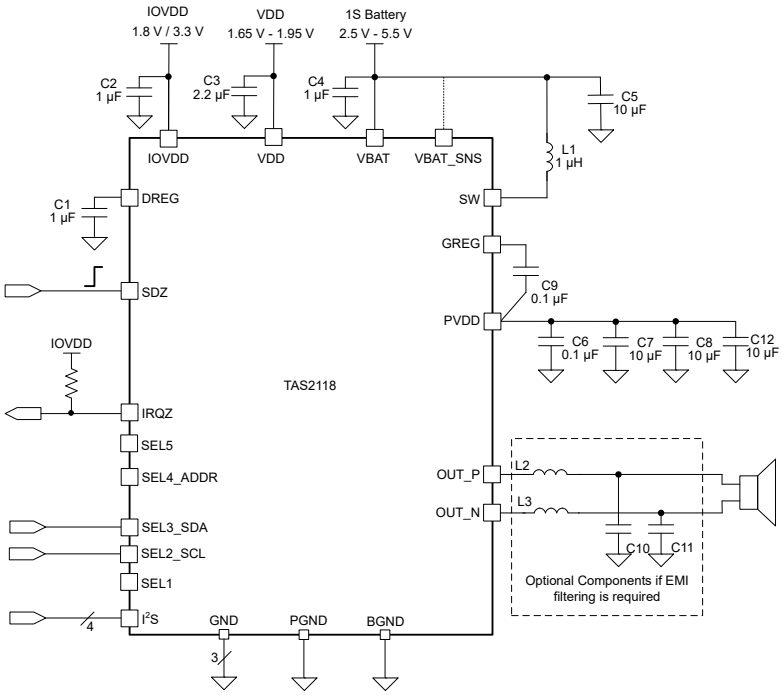


Figure 1-1. Application Diagram for 1S Battery System

In a 3S battery application, the integrated boost can be bypassed, and an external power rail can supply PVDD directly. The boost inductor is not required in this case and SW pin is left open. VBAT pin must still be supplied by a voltage from 2.5V to 5.5V.

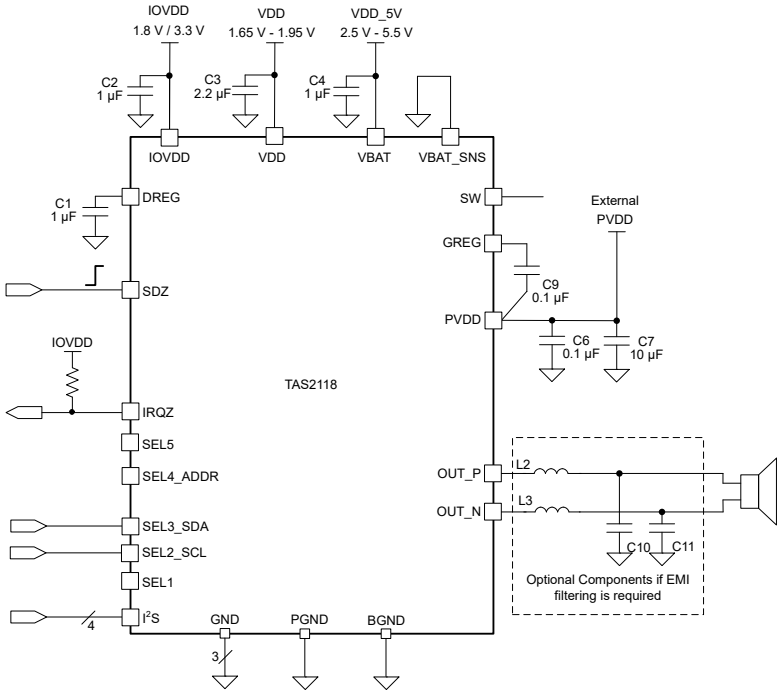


Figure 1-2. Application Diagram for External PVDD System

1.4 Device Information

TAS2118 is a mono, digital-input, Class-D audio amplifier optimized for efficiently driving high peak power into small loudspeaker applications. The Class-D amplifier is capable of delivering 5W into a 4Ω load at a battery voltage of 3.6V. Up to four devices can share a common bus via I^2S/TDM and I^2C interfaces. TAS2118 also supports a simple hardware-controlled mode in which the I^2C is disabled and replaced with basic option selection re-purposing some of the digital control pins.

2 Quick Start Guide

2.1 TAS2118EVM Setup for Software Mode

Follow the information presented in this section to properly set the EVM for Software Mode. Place the jumpers as instructed in Table 2-1. The EVM comes in this Software Mode configuration by default.

Table 2-1. Software Mode Jumper Settings

Location	Jumper	Setting	Description
Front	SEL1 (J9/J86)	SW Mode	Short from the middle row to the top pin to select SW mode.
	SEL2 (J10/J87/J1)	SW Mode	Short from the middle row to the top pin. This pin is re-purposed as SCL.
	SEL3 (S2)	00	This pin is re-purposed as SDA.
	SEL4 (SW1)	0001	Select the I^2C address option as 0x90.
	SEL5 (S3)	XX	This pin is not used in SW mode.
	EEPROM address (J53)	Short	TI Test jumper.
	EEPROM (J54)	Open	TI Test jumper.
Back	VIN to VBAT (J22)	Short	VIN (J21) = VBAT for TAS2118.
	VBAT (J5)	Short	Connect VBAT to TAS2118.
	VBAT_SNS (J4)	VBAT	VBAT_SNS connected to VBAT.
	VDD (J7)	Short	Connect LDO to TAS2118 VDD.
	IOVDD (J3)	Short	Connect AC-MB IOVDD to TAS2118 IOVDD.
	SCL (J18)	Short	Connect SCL from AC-MB.
	SDA (J19)	Short	Connect SDA from AC-MB.

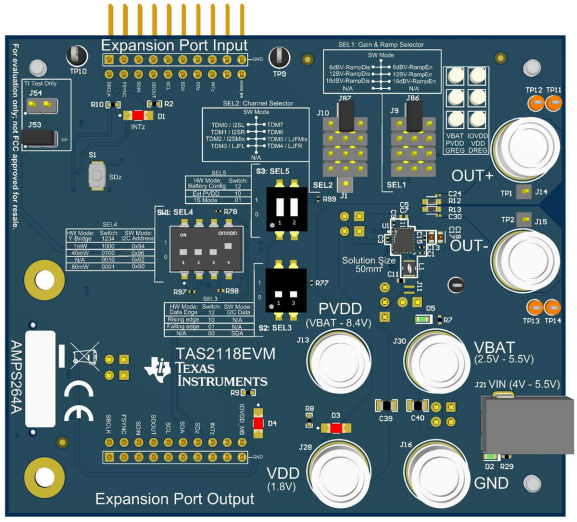


Figure 2-1. Software Mode Jumper Settings (Front Side)

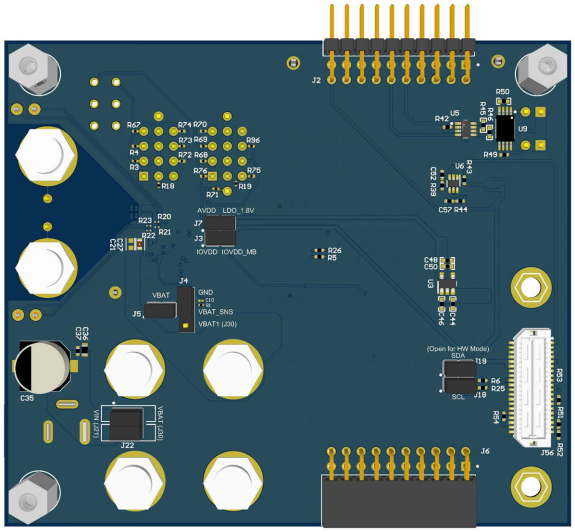


Figure 2-2. Software Mode Jumper Settings (Back Side)

Once all the jumpers on the EVM are properly configured, follow the steps below:

- Connect AC-MB to EVM by placing the EVM on top of the edge of the AC-MB.
- Set the IOVDD jumper on AC-MB to either 3.3V or 1.8V.
- Connect USB cable from PC to AC-MB.

- Connect 5V power adapter to barrel jack J21 on TAS2118EVM.
- Configure TAS2118 registers with PurePath Console (PPC3).

At this moment, the device is powered up and running, ready to play audio. The evaluation kit works as any other sound card, select the EVM as system playback device and use any software like web browser, media player, and so forth.

2.1.1 PurePath Console Software Setup

PurePath Console 3 is a highly integrated and easy-to-use audio development suite designed to simplify the evaluation and configuration associated with the development of Texas Instruments audio products. The PPC3 software can be requested here. Once access has been granted the software can be downloaded from the same link. Specific device apps can be similarly requested which populates in the PPC3 software upon approval. The TAS2118 app can be requested here. For a high level overview of PPC3, refer to this training video.

Open and sign in to PPC3 to view and install the various device apps you have access to. Once installed the TAS2118 app appear as shown in Figure 2-3.

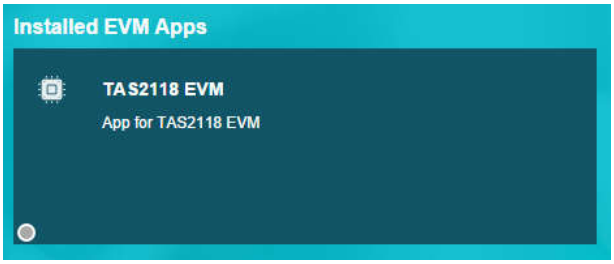


Figure 2-3. TAS2118 PPC3 App

When the device app is opened a high level home page appears. Within this page there are various tabs that offer different controls and features. The Device Control tab is the main section used for evaluation and configuration. When Device Control is opened an initialization script is run and then the user has full access to TAS2118 feature settings, levels, and thresholds as shown in Figure 2-5. Other tabs include Register Map, Direct I2C, System Checks, and End System Integration.

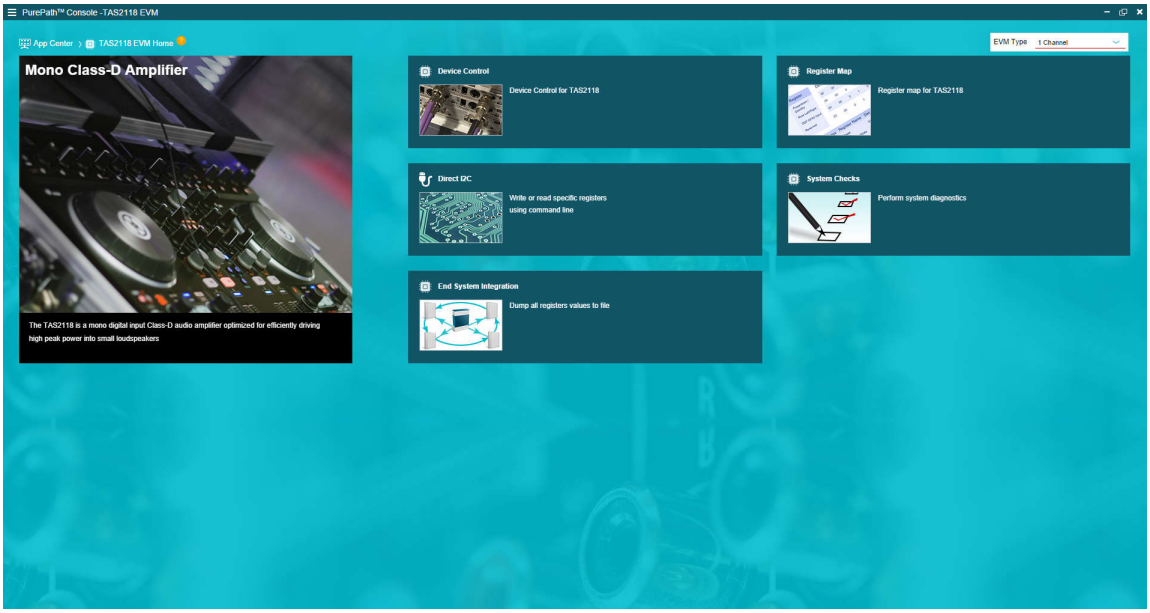


Figure 2-4. TAS2118 PPC3 App - High Level

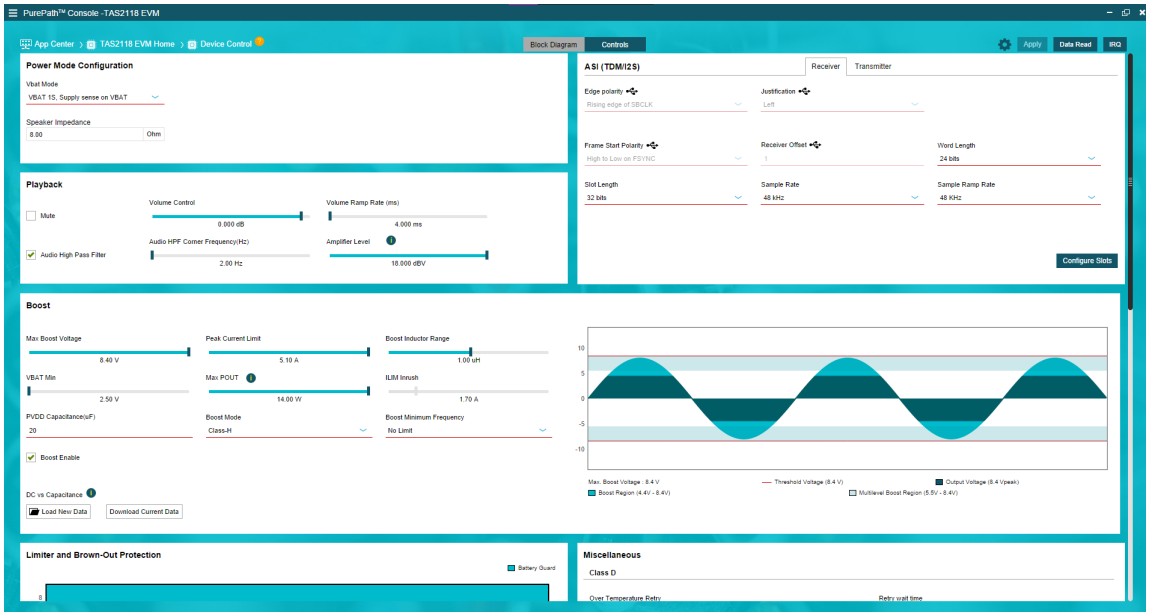


Figure 2-5. TAS2118 PPC3 App - Device Control Overview

2.2 TAS2118EVM Setup for Hardware Pin-Control Mode

Follow the information presented in this section to properly set the EVM for Hardware Pin-Control Mode. Place the jumpers as instructed in Table 2-2.

Table 2-2. Hardware Pin-Control Mode Jumper Settings

Location	Jumper	Setting	Description
Front	SEL1 (J9/J86)	18dBV-RampEn	Short 2nd to bottom-right corner to select 18dBV gain and volume ramp enabled.
	SEL2 (J10/J87/J1)	TDM0 / I2SL	Short top left corner for TDM0 channel selection.
	SEL3 (S2)	10	Select BCLK Rising Edge.
	SEL4 (SW1)	0001	Select the Y-Bridge threshold as 80mW.
	SEL5 (S3)	01	Select 1S Mode.
	EEPROM address (J53)	Short	TI Test jumper.
	EEPROM (J54)	Open	TI Test jumper.
Back	VIN to VBAT (J22)	Short	VIN (J21) = VBAT for TAS2118.
	VBAT (J5)	Short	Connect VBAT to TAS2118.
	VBAT_SNS (J4)	VBAT	VBAT_SNS connected to VBAT.
	VDD (J7)	Short	Connect LDO to TAS2118 VDD.
	IOVDD (J3)	Short	Connect AC-MB IOVDD to TAS2118 IOVDD.
	SCL (J18)	Open	Disconnect SCL from AC-MB.
	SDA (J19)	Open	Disconnect SDA from AC-MB.

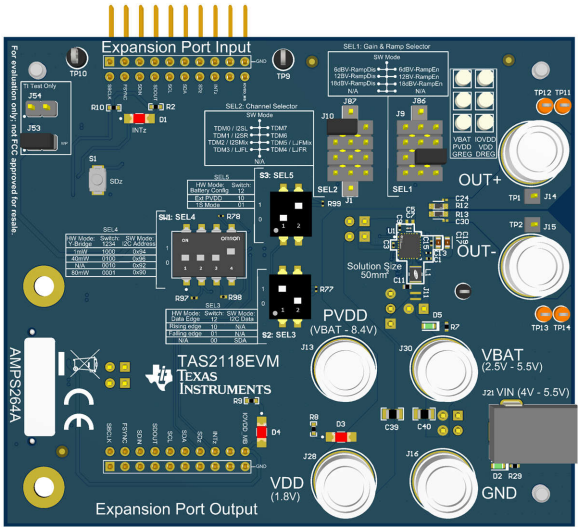


Figure 2-6. Hardware Pin-Control Mode Jumper Settings (Front Side)

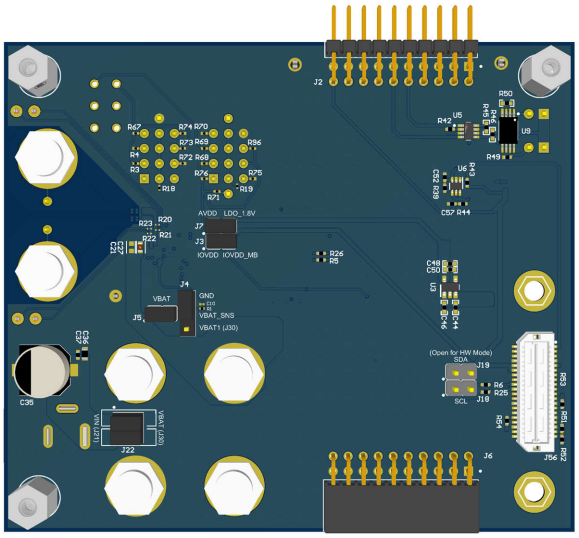


Figure 2-7. Hardware Pin-Control Mode Jumper Settings (Back Side)

Once all the jumpers on the EVM are properly configured, follow the steps below:

- Connect AC-MB to EVM by placing the EVM on top of the edge of the AC-MB.
- Set the IOVDD jumper on AC-MB to either 3.3V or 1.8V.
- Connect 5V power adapter to barrel jack J21 on TAS2118EVM
- Connect USB cable from PC to AC-MB.

At this moment, the device is powered up and running, ready to play audio. The evaluation kit works as any other sound card, select the EVM as system playback device and use any software like web browser, media player, and so forth.

3 Hardware

3.1 I²C Target Address Selection

TAS2118 supports 4 different I²C selectable addresses. When SEL1 is set to Software Mode by shorting the middle row to the top pin (J86), the device checks the configuration of SEL4 to select the device address. Use SEL4 switch (SW1) to select the required I²C address.

CAUTION

By default, the amplifier is configured to play the audio slot according to the I²C address, that is, in a TDM system, device with address 0x90 plays slot 0, address 0x92 plays slot 1, and so on.

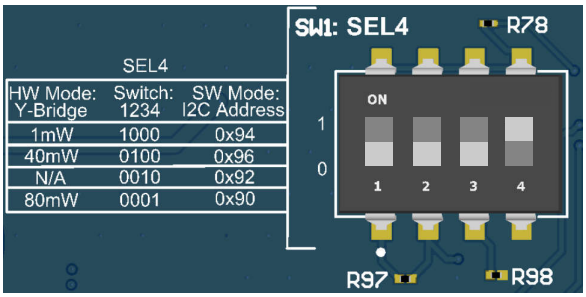


Figure 3-1. SEL4 (SW1) Address Selection

3.2 VBAT Power Supply Options

VBAT pin on U1 is directly connected to J5 which can be used to measure current consumption on TAS2118. J5 connects VBAT pin to J30. Banana jack J30 can be connected to barrel-jack J21 by shorting the 2 jumpers on J22. This allows flexible supply options for VBAT to use either banana or barrel-jack supply.

VBAT side of L1 inductor is always connected to J30.

3.2.1 External PVDD EVM Hardware Configuration

This section shows how to set the EVM jumpers to evaluate TAS2118EVM in a External PVDD application for VBAT as depicted in Figure 1-3.

VBAT pin must still be connected to a power supply range from 3V up to 5V. The internal boost is not used, so the SW pin is left floating and the inductor can be removed from the circuit.

The 3S battery supply range is from VBAT pin level up to 8.4V and is directly connected to the PVDD node. The decoupling capacitors and GREG capacitor are still required.

- VBAT pin 5V connection can be powered from J30.
- VBAT_SNS pin connection (J4):
  - HW Mode: must be left as default with J4 shorted across pins 1-2 (VBAT)
  - SW Mode: can be shorted to VBAT or GND
- 3S voltage range supply must be connected to J13 (PVDD).

3.3 VDD Power Supply Options

VDD supply to TAS2118 is powered by an on-board 1.8V LDO. This LDO is powered from 5V connected to barrel jack J21.

J7 on the bottom side of the EVM can be used to open this power supply connection for current measurement purposes. If J7 is open, an external VDD must be connected to the J28 banana jack.

3.4 IOVDD Power Supply Options

IOVDD supply to TAS2118 is powered by AC-MB. For simplicity, the same IOVDD voltage selected on AC-MB is used for TAS2118.

J3 on the bottom side of the EVM can be used to open this power supply connection for current measurement purposes. If J3 is open, then an external IOVDD must be connected to the IOVDD test point close to TAS2118 - U1.

3.5 Speaker Outputs

OUT+ (J14) and OUT- (J15) are the outputs from the amplifier. Banana cables can be connected directly to these jacks. Alternatively the banana jack can be unscrewed to use bare wires, similar to a screw terminal.

3.6 AC-MB Settings

3.6.1 Audio Serial Interface Settings

The AC-MB provides the digital audio signals to the evaluation module from the USB, optical connector, stereo jack, and external audio serial interface (ASI) header. A block diagram of the ASI routing on the AC-MB is shown in Figure 3-1.

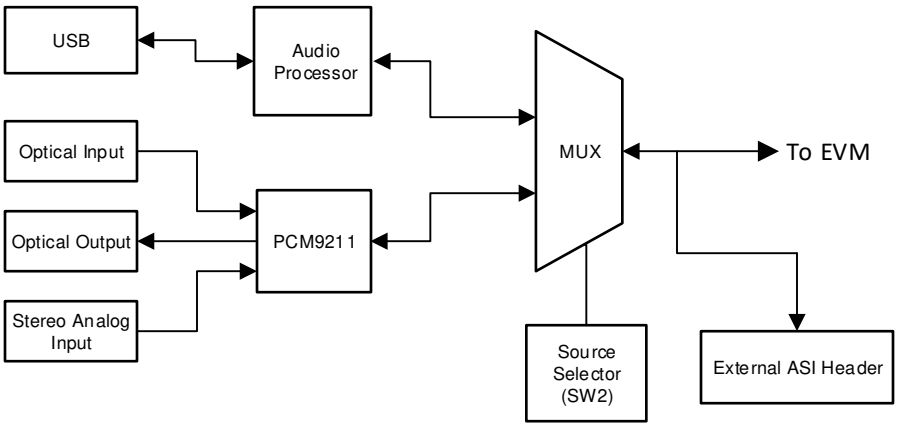


Figure 3-2. AC-MB Audio Serial Interface Routing

Switch SW2 on the AC-MB selects the audio serial bus that interfaces with the TAS2118EVM daughter card. Next to switch SW2, the AC-MB has a quick reference table to identify the audio serial interface source options and switch settings. The AC-MB acts as the controller for the audio serial interface, with three different modes of operation: USB, optical or analog, or external ASI.

3.6.2 USB Audio AC-MB Settings

The serial interface clocks and data are provided from the USB interface. The sampling rate and format are determined by the USB audio class driver on the operating system.

The default settings for the USB audio interface are 32-bit frame size, 48kHz sampling rate, BCLK and FSYNC ratio is 256, and the format is time division multiplexing (TDM).

The AC-MB is detected by the OS as an audio device with the name TI USB Audio UAC2.0. The AC-MB audio setting for the USB mode of operation is shown in Figure 3-3.

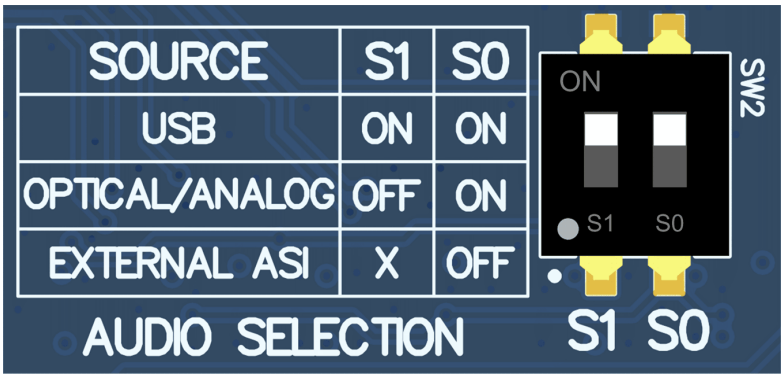


Figure 3-3. AC-MB USB Audio Setting

3.6.3 External Audio AC-MB Settings

In this mode, the audio serial interface clocks for the evaluation board are provided through connector J7 from an external source. This architecture allows the use of an external system to communicate with the evaluation board, such as a different host processor or test equipment (for instance, Audio Precision PSIA). The clocks

generated from the USB interface and PCM9211 are isolated with this setting. The AC-MB audio setting for the external mode of operation is shown in Figure 3-4.

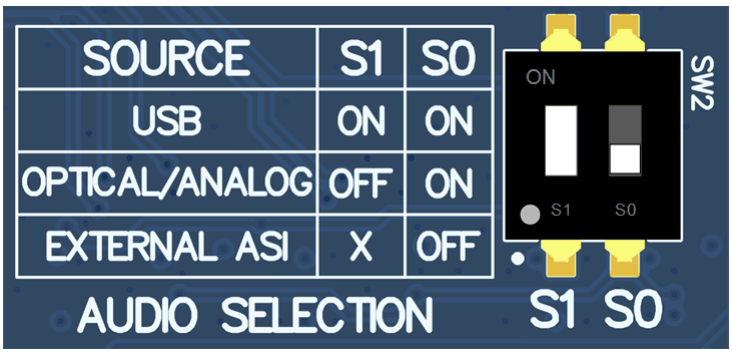


Figure 3-4. AC-MB External Audio Setting

How to connect the external audio interface with the bottom row for the ground and the top row for signals is shown in Figure 3-5.

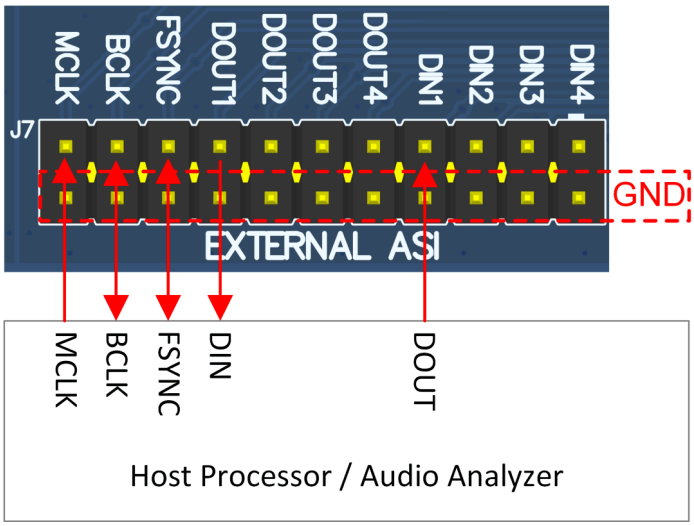


Figure 3-5. AC-MB Connection with External Audio Serial Interface

3.7 AC-MB Power Supply

The AC-MB motherboard is powered from a single 5V power supply. However, the motherboard has different low-dropout regulators (LDOs) integrated that provide the required power supplies to the different blocks of the board. The block diagram depicting the power structure of the AC-MB is shown in Figure 3-6. The AC-MB can be powered from the host computer by using the USB 5V power supply (VBUS) by shorting header J5, USB POWER. Additionally, the AC-MB can be powered from an external power supply connected to terminal J4, EXTERNAL POWER. Header J5 must be open for external supply operation. The IOVDD voltage for the digital signals that is provided to the evaluation module is generated on the motherboard from the main power supply (USB or external). The voltage levels available are 1.2V, 1.8V and 3.3V, and can be selected via the J3 header IOVDD. Default setting for TAS2118EVM operation is 3.3V; **1.2V operation cannot be used for TAS2118EVM**. When the motherboard is fully powered and the power supplies from the onboard LDOs are correct, the green POWER LED (D3) turns ON. The USB READY LED indicates that a successful USB communication is established between the AC-MB and the host computer.

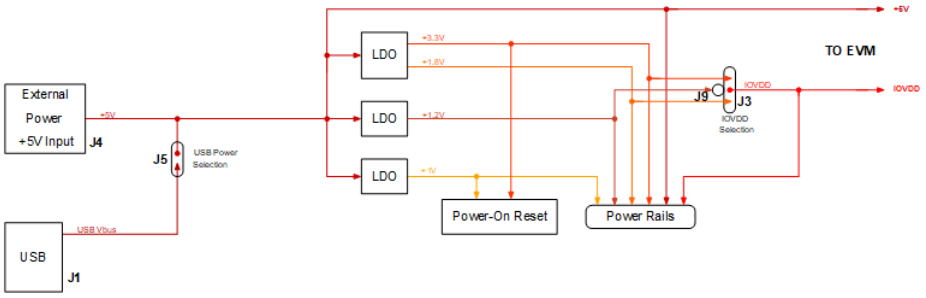


Figure 3-6. Power -Supply Distribution of the AC-MB

3.8 4-Wire Measurement of Load

TAS2118EVM has been designed such that the dummy load or speaker load connected to the device can be measured very accurately directly from the device pin including board parasitic and connector contact resistance using 4-wire method in digital multimeter. Pin headers have been provided to connect a digital multimeter in 4-wire mode as shown below Figure 3-8.

Connect HI of DMM to TP11 and HI_SNS of DMM to TP12.

Connect LO of DMM to TP14 and LO_SNS of DMM to TP13.

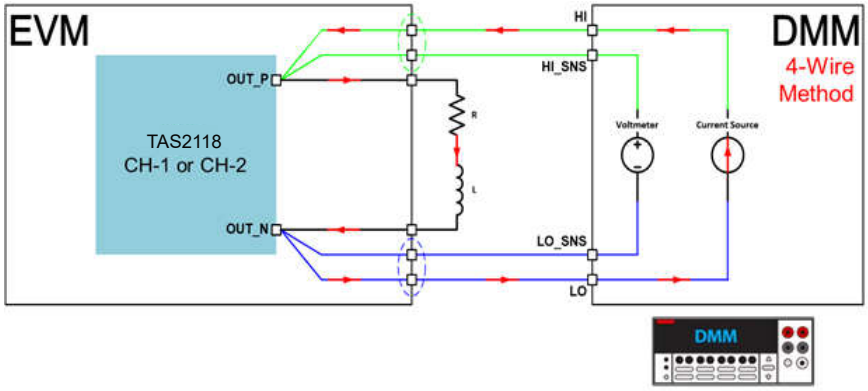


Figure 3-7. Load DC Resistance Measurement in 4-Wire Mode using Digital Multimeter

3.9 2-Channel Configuration

Two mono EVMs can be interconnected using J2 and J6 headers as shown in Figure 3-8. Place the EVMs side by side and connect J6 from the first EVM to J2 on the second EVM.

CAUTION

When 2 EVMs are interconnected, both EVMs must be set to the same mode, that is, either both EVMs are in Hardware mode or both EVMs are in Software mode. Mixed configuration is not supported. Use the same jumper settings for both EVMs.

CAUTION

Make sure to short J54 jumper on the secondary EVM, ie. the EVM that is not connected to the AC-MB controller board.

CAUTION

The power supplies used on the main EVM can be connected to the secondary EVM using the banana connectors.

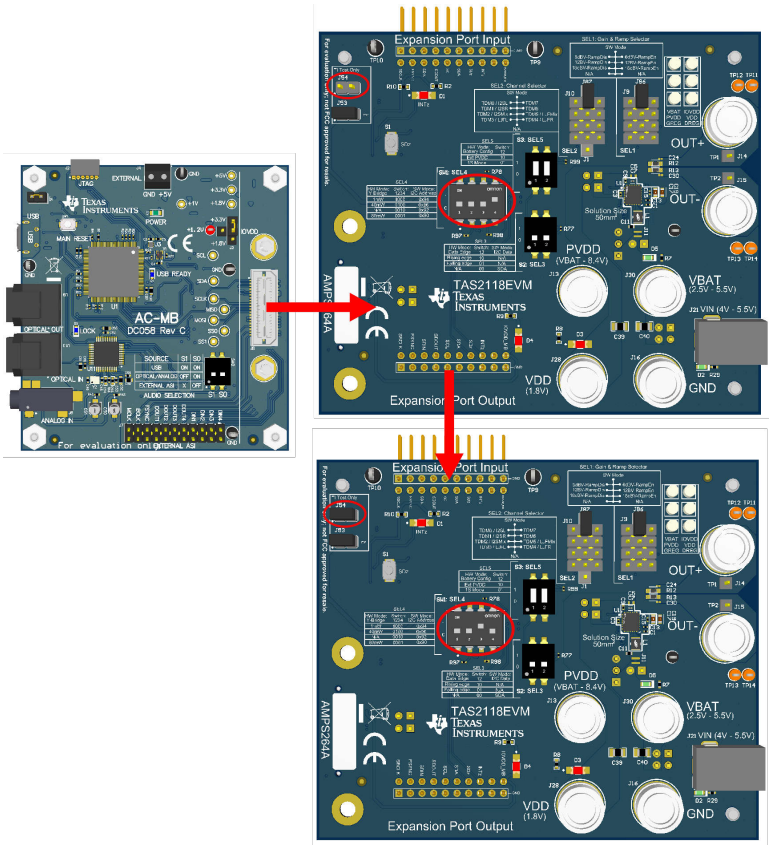


Figure 3-8. 2-Channel EVM Interconnection

4 Troubleshooting

This section provides a series of responses for possible errors that can present during the evaluation of TAS2118EVM.

- EVM connects to PPC3 but shows invalid hardware error:
  - Make sure J3-IOVDD on the companion AC-MB board is set to either 3.3V or 1.8V. Please note 1.2V is not supported by TAS2118 and is not be used.
  - Make sure J54 on TAS2118EVM is open. This is an optional jumper that is only used in special cases when connecting 2 EVMs together as described in Section 3.9.
  - Make sure J18 and J19 at the bottom side of TAS2118EVM are shorted. These are I2C SDA and SCL related jumpers and is open only when evaluating TAS2118 in Hardware mode.
  - Make sure EEPROM is properly programmed to work correctly for TAS2118EVM. Use I2C Master tool within PPC3 to run these couple of commands:
    - w a0 00 00
    - r a0 00 1a

    Compare the resulting values with the ones below:

    54 41 53 32 31 31 38 2d 45 56 4d 00 52 45 56 2d 41 00 53 2f 4e 2d 30 30 30 30

    If the values are not the same, run this command:

    w a0 00 00 54 41 53 32 31 31 38 2d 45 56 4d 00 52 45 56 2d 42 00 53 2f 4e 2d 30 30 30 30

Figure 4-1. EEPROM Programming Script

- EVM connects and configures correctly but there is no audio output:
  - TAS2118EVM operates as a sound-card. Make sure the volume is properly set and that the device is not muted.
  - Make sure the EVM is selected as the playback device.

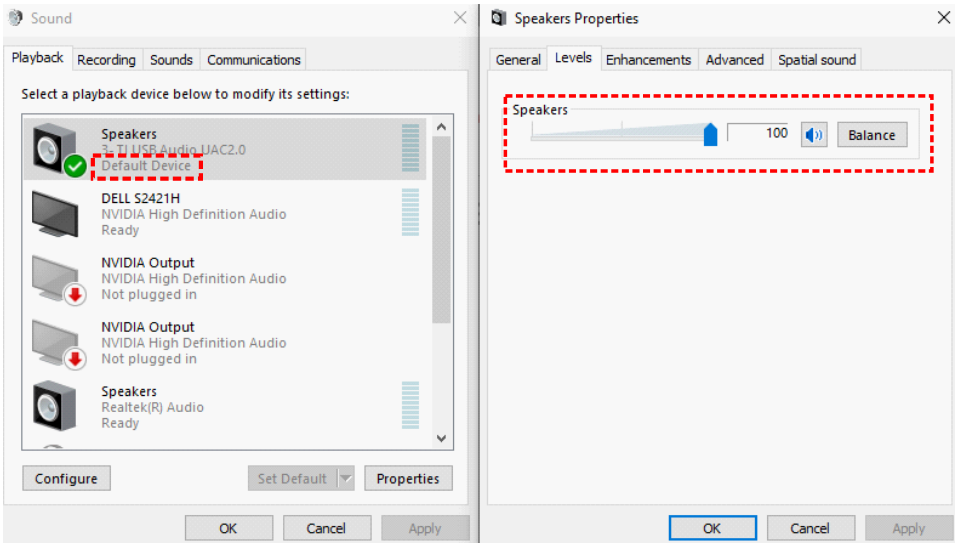


Figure 4-2. Device Selection and Volume Settings

5 Hardware Design Files

5.1 Schematics

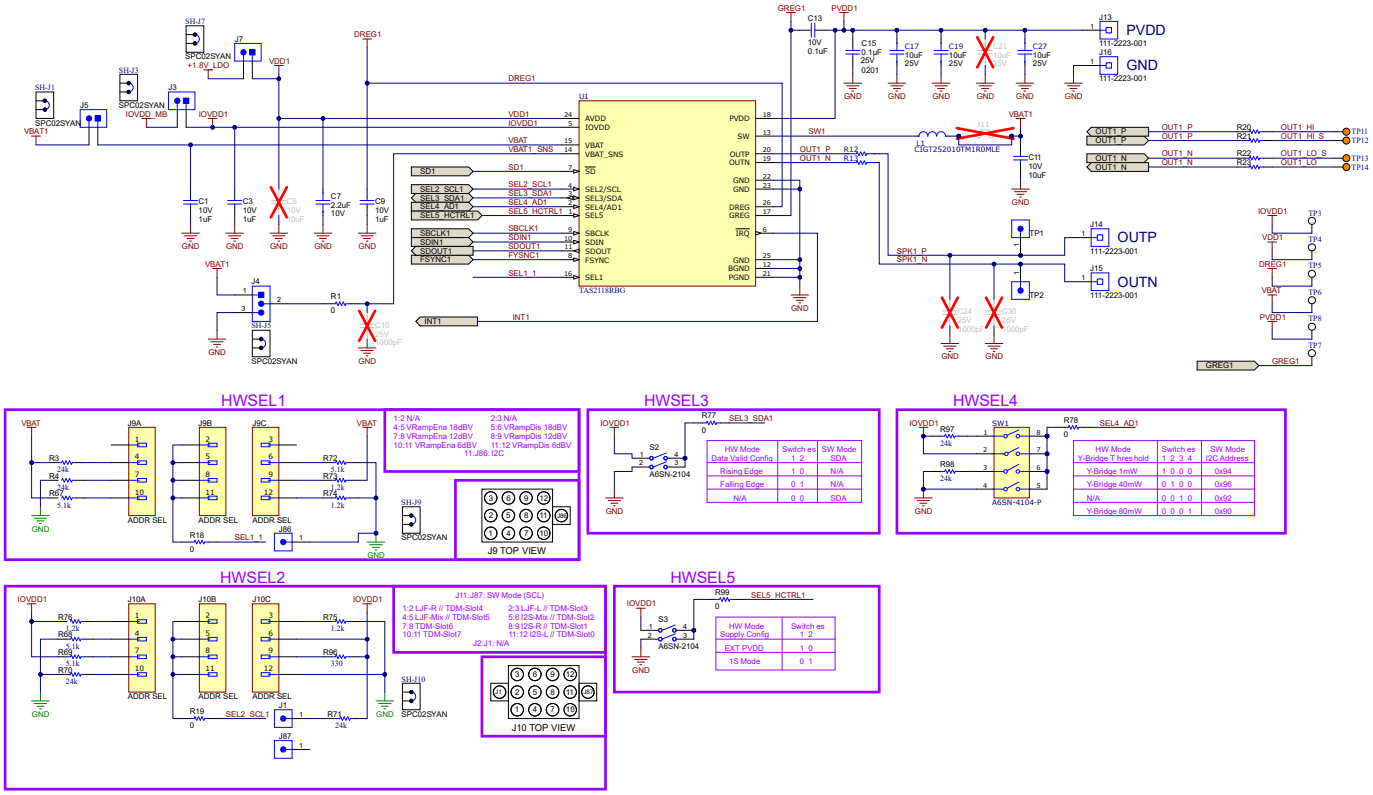


Figure 5-1. TAS2118EVM Schematic (Sheet 1 of 4)

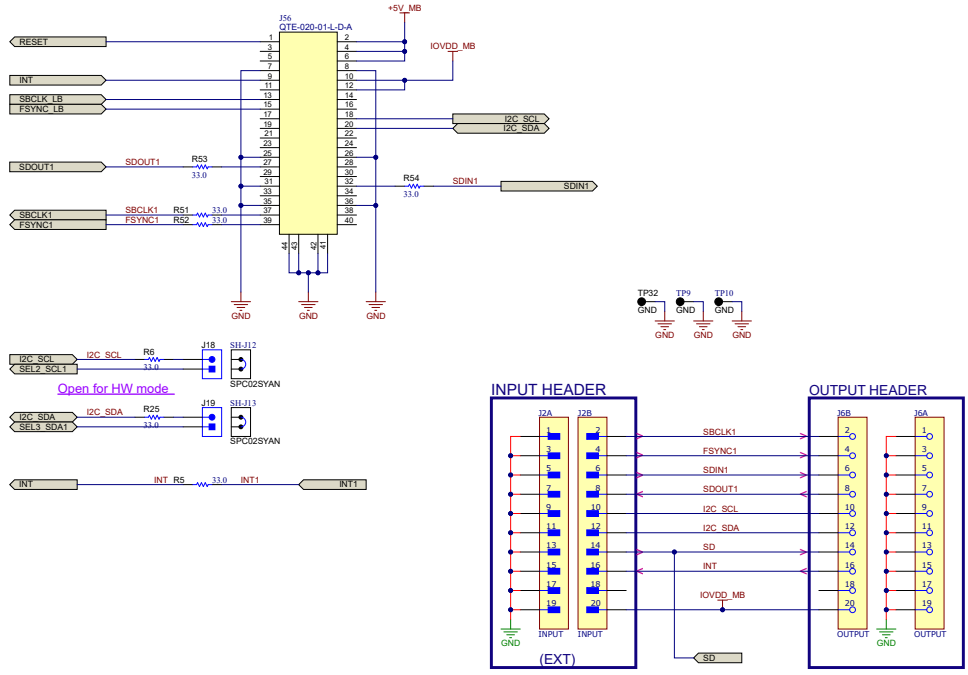


Figure 5-2. TAS2118EVM Schematic (Sheet 2 of 4)

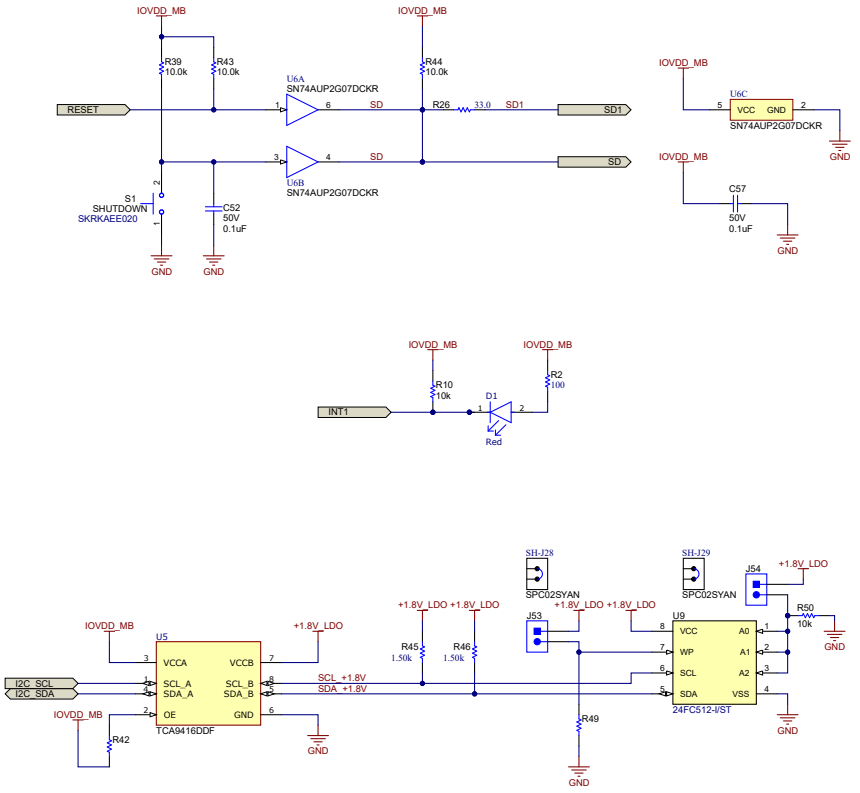


Figure 5-3. TAS2118EVM Schematic (Sheet 3 of 4)

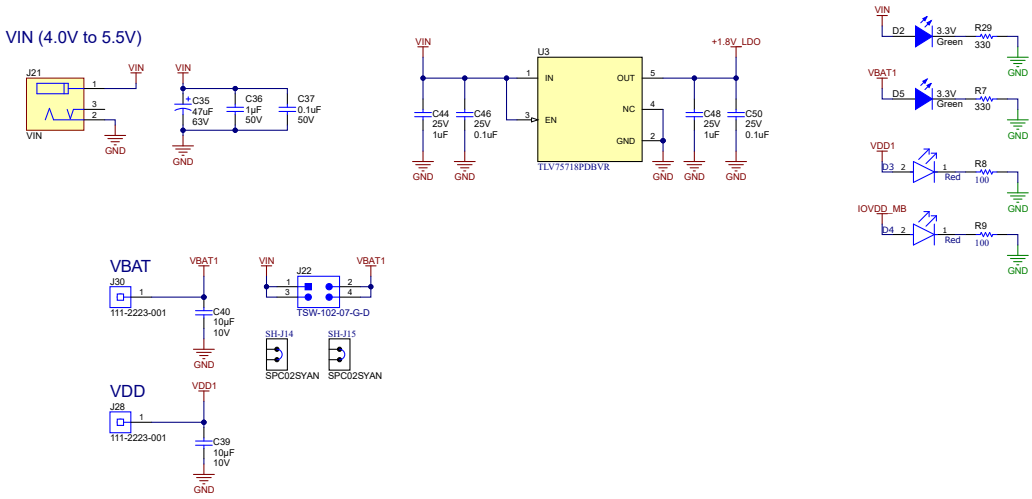


Figure 5-4. TAS2118EVM Schematic (Sheet 4 of 4)

5.2 PCB Layouts

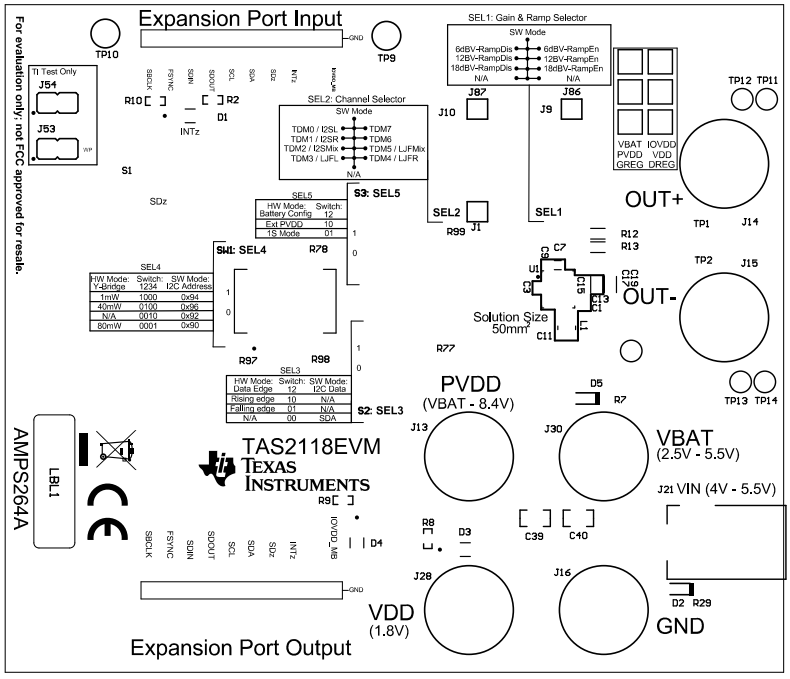


Figure 5-5. TAS2118EVM Top Overlay

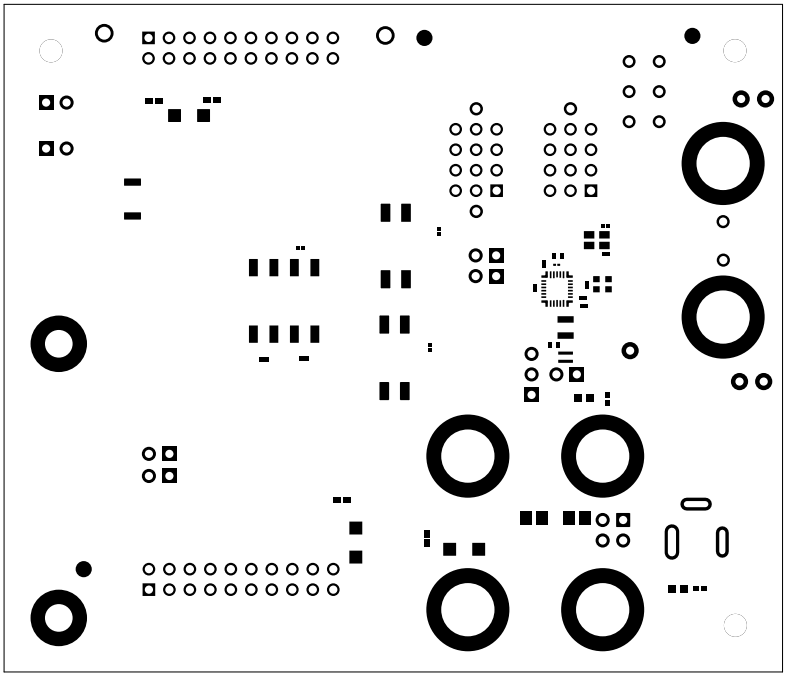


Figure 5-6. TAS2118EVM Top Solder Mask

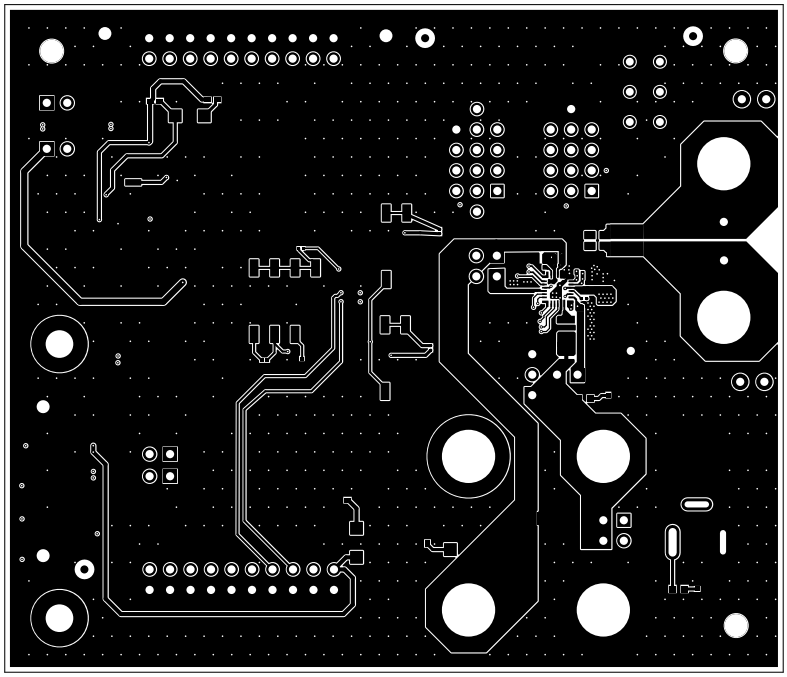


Figure 5-7. TAS2118EVM Top Layer

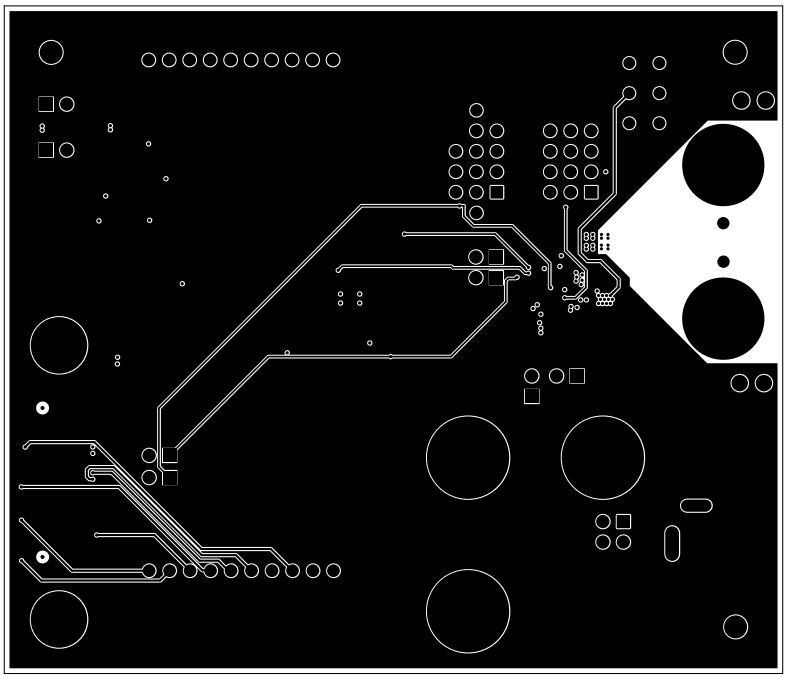


Figure 5-8. TAS2118EVM Layer 2

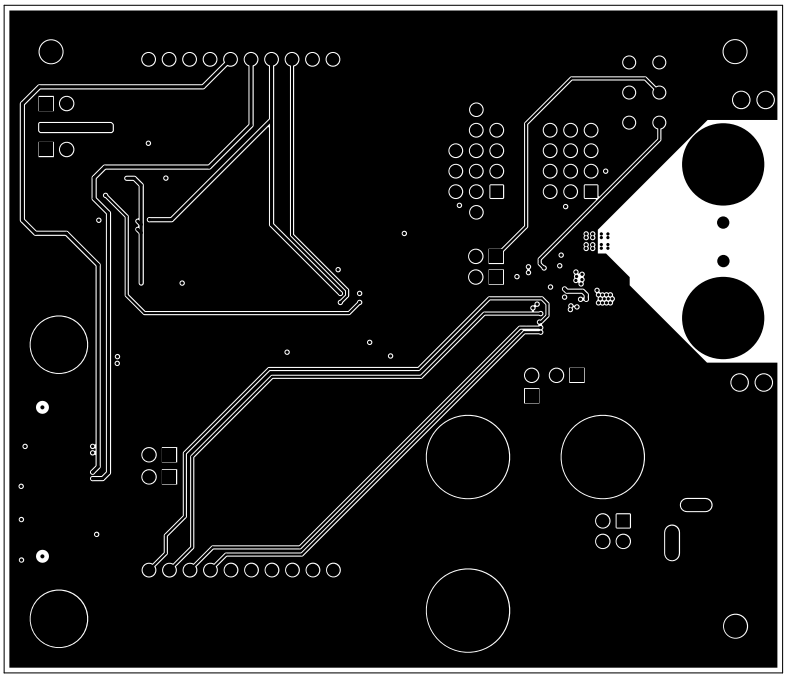


Figure 5-9. TAS2118EVM Layer 3

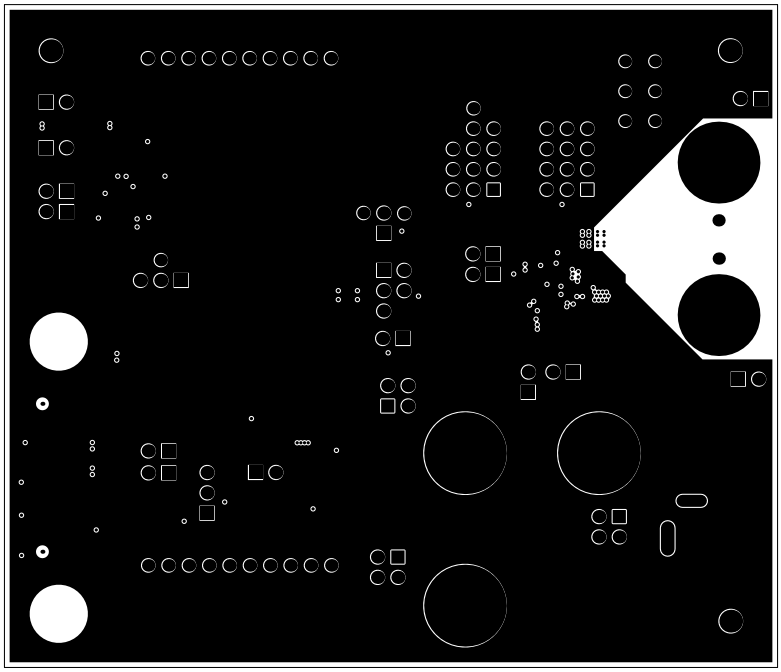


Figure 5-10. TAS2118EVM Layer 4

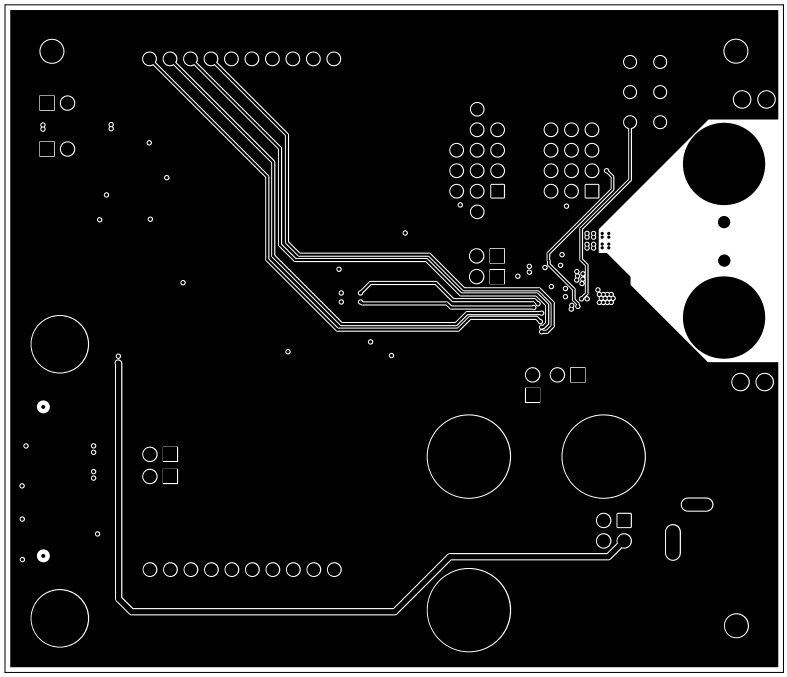


Figure 5-11. TAS2118EVM Layer 5

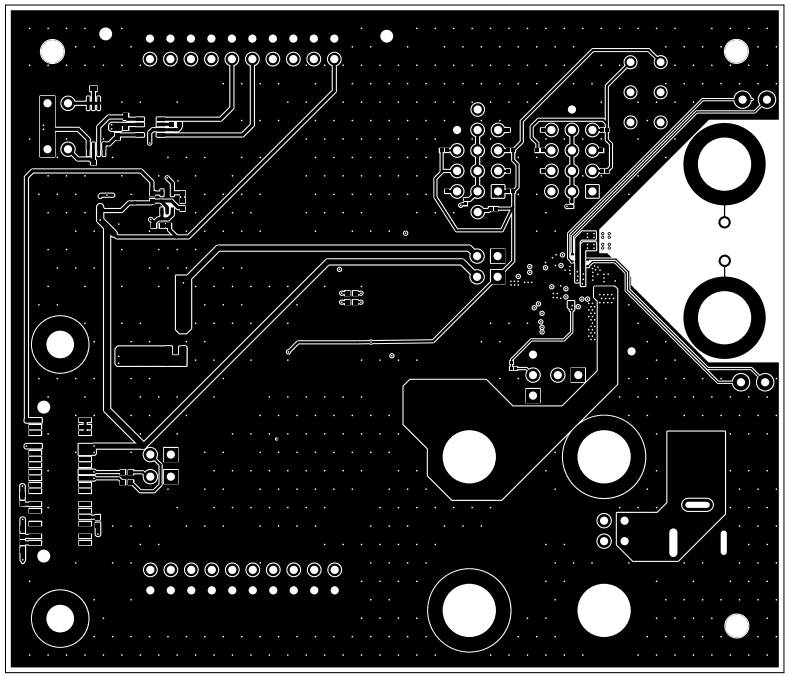


Figure 5-12. TAS2118EVM Bottom Layer

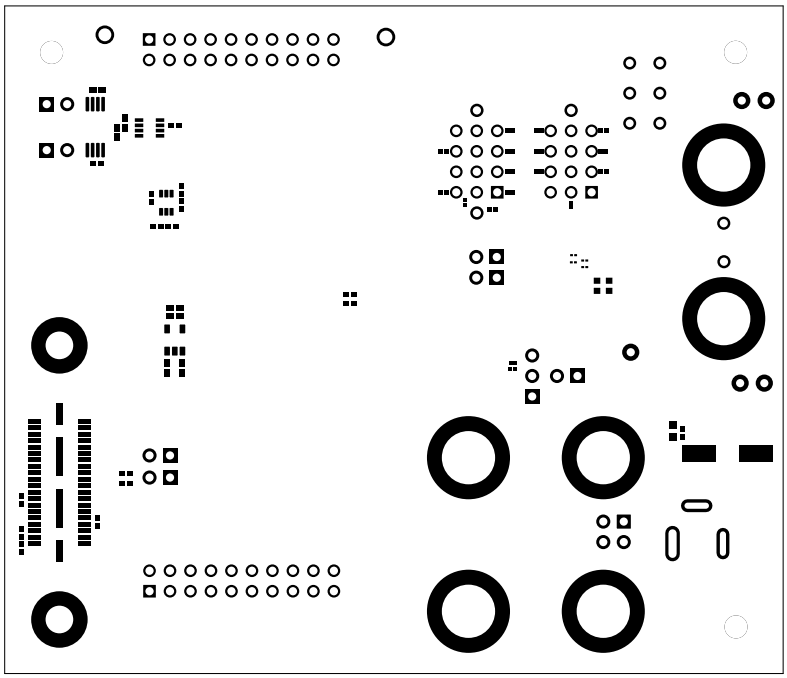


Figure 5-13. TAS2118EVM Bottom Solder Mask

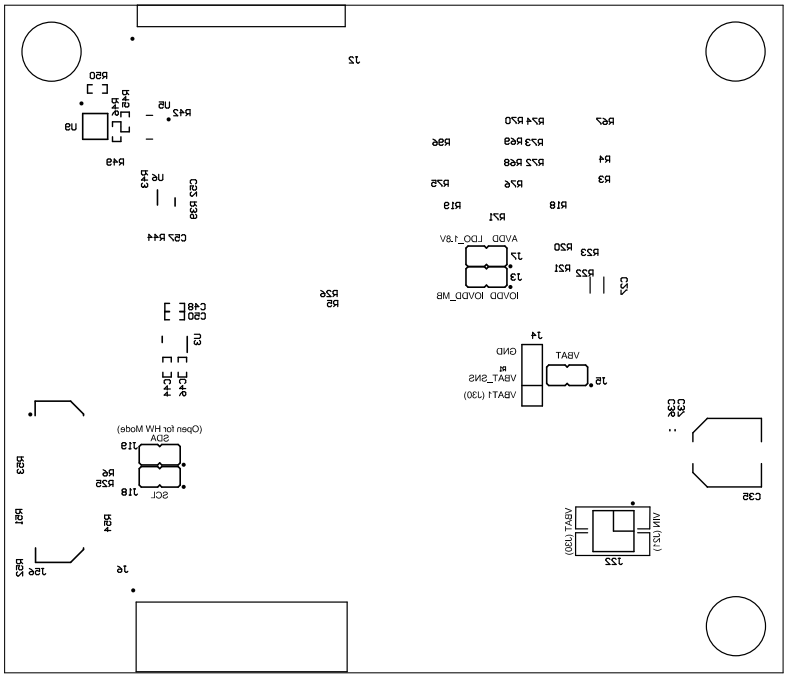


Figure 5-14. TAS2118EVM Bottom Overlay

5.3 Bill of Materials

The bill of materials for the EVM is listed in Table 5-1.

Table 5-1. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
C1, C3, C9	3	1uF	CAP, CERM, 1uF, 10V, +/- 20%, X5R, 0201	0201	CL03A105MP3NSNC	Samsung Electro-Mechanics		
C7	1	2.2µF	Cap Ceramic 2.2uF 10V X5R ±20% Pad SMD 0201 +85°C T/R	0201	CL03A225MP3CRNC	Samsung		
C11	1	10uF	CAP, CERM, 10uF, 10V, +/- 20%, X5R, 0402	0402	CL05A106MP5NUNC	Samsung Electro-Mechanics		
C13	1	0.1uF	CAP, CERM, 0.1uF, 10V, +/- 10%, X5R, 0201	0201	CL03A104KP3NNNC	Samsung Electro-Mechanics		
C15	1	0.1uF	CAP, CERM, 0.1µF, 10V,+/- 10%, X5R, 0201	0201		SAMSUNG ELECTRO-MECHANICS		
C17, C19, C27	3	10µF	Cap Ceramic 10uF 25V X5R ±20% Pad SMD 0603 +85°C T/R	0603	CL10A106MA8NRNC	Samsung		
C35	1	47uF	CAP, AL, 47uF, 63V, +/- 20%, 0.65 ohm, AEC-Q200 Grade 2, SMD	SMT Radial F	EEE-FK1J470P	Panasonic		
C36	1	1uF	CAP, CERM, 1µF, 50V,+/- 20%, X5R, AEC-Q200 Grade 3, 0603	0603	CGA3E3X5R1H105M080AB	TDK		
C37, C52, C57	3	0.1uF	CAP, CERM, 0.1uF, 50V, +/- 10%, X7R, 0402	0402	C1005X7R1H104K050BB	TDK		
C39, C40	2	10uF	CAP, CERM, 10µF, 10V,+/- 10%, X7R, AEC-Q200 Grade 1, 0805	0805	GCJ21BR71A106KE01L	MuRata		
C44, C48	2	1uF	CAP, CERM, 1uF, 25V, +/- 10%, X5R, 0402	0402	C1005X5R1E105K050BC	TDK		
C46, C50	2	0.1uF	CAP, CERM, 0.1uF, 25V, +/- 10%, X5R, 0402	0402	GRM155R61E104KA87D	MuRata		
D1, D3, D4	3		Red 630nm LED Indication - Discrete 1.5V 1206 (3216 Metric)	1206	CTL1206FRD1T-CT	Venkel		
D2, D5	2	Green	LED, Green, SMD	LED_0603	LTST-C191KGKT	Lite-On		
H1, H3, H7	3				HNSS440	B&F Fastener Supply		

Table 5-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
H2, H4, H8	3		Standoff; 1/4 Hex Male/female; 4-40 Thread; Stainless Steel; .750LENGTH	HEX_STANDOFF	4538-440-SS	RAF Electronic Hardware		
J1, J86, J87	3		Header, 2.54mm, 1x1, Gold, TH	Header, 2.54mm, 1x1, TH	HTSW-101-07-G-S	Samtec		
J2	1			HDR20	TSW-110-08-G-D-RA	Samtec		
J3, J5, J7, J18, J19, J53, J54	7		Header, 100mil, 2x1, Gold, TH	Sullins 100mil, 1x2, 230 mil above insulator	PBC02SAAN	Sullins Connector Solutions		
J4	1		Header, 100mil, 3x1, Gold, TH	PBC03SAAN	PBC03SAAN	Sullins Connector Solutions		
J6	1		20 Position Receptacle Connector Through Hole, Right Angle	HDR20	SSQ-110-02-G-D-RA	SAMTEC		
J9, J10	2			HDR12	TSW-104-07-G-T	Samtec		
J13, J14, J15, J16, J28, J30	6		Binding Post, Nickel, TH	Receptacle, 1x1 Position, Dia 9.8mm, TH	111-2223-001	Cinch Connectivity		
J21	1		Power Jack, mini, 2.5mm OD, R/A, TH	Jack, 14.5x11x9mm	RAPC712X	Switchcraft		
J22	1		Header, 100mil, 2x2, Gold, TH	2x2 Header	TSW-102-07-G-D	Samtec		
J56	1		Connector, Header, High Speed, 20 pairs, SMT	QTE-020-01-X-D-A	QTE-020-01-L-D-A	Samtec		
L1	1	1uH	POWER INDUCTOR 1uH, ±20%, Isat 5.3A, Itemp 5A, DCR Max 0.023Ω, 1008 (2520)	2520	CIGT252010TM1R0MLE	Samsung		
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650 x 0.200 inch	THT-14-423-10	Brady		
R1, R18, R19, R77, R78, R99	6	0	RES, 0, 5%, 0.05 W, 0201	0201	CRCW02010000Z0ED	Vishay-Dale		
R2, R8, R9	3	100	RES, 100, 1%, 0.1 W, 0402	0402	ERJ-2RKF1000X	Panasonic		
R3, R4, R70, R71, R97, R98	6	24k	RES, 24 k, 5%, 0.05 W, 0201	0201	RC0201JR-0724KL	Yageo America		

Table 5-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
R5, R6, R25, R26, R51, R52, R53, R54	8	33	RES, 33.0, 1%, 0.1 W, 0402	0402	ERJ-2RKF33R0X	Panasonic		
R7, R29	2	330	RES, 330, 1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2RKF3300X	Panasonic		
R10, R50	2	10k	RES, 10 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0402	0402	ERJ-2GEJ103X	Panasonic		
R12, R13	2	0	RES 0 OHM JUMPER 1/4W 0603	0603	HCJ0603ZT0R00	Stackpole Electronics		
R20, R21, R22, R23	4		RES SMD 0 OHM JUMPER 1/20W 0201	0201 (0603 Metric)	RC0201JR-070RL	Yageo		
R39, R42, R43, R44, R49	5	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	RC0402FR-0710KL	Yageo America		
R45, R46	2	1.50k	RES, 1.50 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	RMCF0402FT1K50	Stackpole Electronics Inc		
R67, R68, R69, R72	4	5.1k	RES, 5.1 k, 5%, 0.05 W, 0201	0201	RC0201JR-075K1L	Yageo America		
R73, R74, R75, R76	4	1.2k	RES, 1.2 k, 5%, 0.05 W, 0201	0201	RC0201JR-071K2L	Yageo America		
R96	1	330	RES, 330, 5%, 0.05 W, 0201	0201	RC0201JR-7D330RL	Yageo America		
S1	1		Switch, SPST-NO, 0.05A, 12VDC, SMT	3.9x2.9mm	SKRKAEE020	Alps		
S2, S3	2		Switch, Slide, 2 SPST, Off-On, 0.025A, 24VDC, SMT	7x7.5mm	A6SN-2104	Omron Electronic Components		
SH-J1, SH-J3, SH-J5, SH-J7, SH-J9, SH-J10, SH-J12, SH-J13, SH-J14, SH-J15, SH-J28, SH-J29	12	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions		
SW1	1		Dip Switch SPST 4 Position Surface Mount Slide (Standard) Actuator 25mA 24VDC	SW	A6SN-4104-P	Omron Electronics Inc-EMC Div		

Table 5-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
TP1, TP2	2		Header, 2.54mm, 1x1, Gold, TH	Header, 2.54mm, 1x1, TH	TSW-101-08-G-S	Samtec		
TP3, TP4, TP5, TP6, TP7, TP8	6		Test Point, Miniature, White, TH	Test-Point, Dia 100mil, TH	TP105-01-09	Components Corporation		
TP9, TP10	2		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone Electronics		
TP11, TP12, TP13, TP14	4		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone Electronics		
TP32	1		Test Point, Miniature, Black, TH	Black Miniature Testpoint	5001	Keystone		
U1	1		TAS2118RBG	VQFN-HR26	TAS2118RBG	Texas Instruments		
U3	1		1A low-Iq small-size low-dropout (LDO) regulator, DBV0005A (SOT-23-5)	DBV0005A	TLV75718PDBVR	Texas Instruments	TLV75718PDBVT	Texas Instruments
U5	1		TCA9416DDF	SOT23-8	TCA9416DDF	Texas Instruments		
U6	1		Low-Power Dual Buffer/Driver With Open-Drain Outputs, DCK0006A (SOT-SC70-6)	DCK0006A	SN74AUP2G07DCKR	Texas Instruments		
U9	1		512K I2C Serial EEPROM, TSSOP	TSSOP-8	24FC512-I/ST	Microchip		
C5	0	10uF	CAP, CERM, 10uF, 10V, +/- 20%, X5R, 0402	0402	CL05A106MP5NUNC	Samsung Electro-Mechanics		
C10, C24, C30	0	1000pF	CAP, CERM, 1000pF, 25V, +/- 10%, X5R, 0201	0201	C0603X5R1E102K030BA	TDK		
C21	0	10µF	Cap Ceramic 10uF 25V X5R ±20% Pad SMD 0603 +85°C T/R	0603	CL10A106MA8NRNC	Samsung		
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A		
H9, H11	0		8MM RD X 6MM X M3	10x10mm	M3561-SS	RAF Electronic Hardware		
H10, H12	0		Standoff, Male/Male Thread, 5.15mm, M3 x 0.5	Standoff	SO-0515-02-02-01	Samtec		

Table 5-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
J11	0		Jumper-0.015x0.072-0.04p	JUMPER-0.015x0.072-0.04p	Jumper-0.015x0.072-0.04p	Jumper		

6 Additional Information

6.1 Trademarks

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7 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
May 2025	*	Initial Release

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