TAS5782M Evaluation Module

This user's guide describes the operation of the TAS5782M Evaluation Module (EVM). The EVM is connected to the PurePath™ Console Motherboard (PPCMB). The main contents of this document include:

- Hardware descriptions and implementation

Related documents:

- TAS5782M data sheet (SLASEG8)
- PurePath Console Motherboard User's Guide (SLOU366)
- PPC3 User Manual [1]
- PurePath Graphic Development Suite (PurePath Console)
- TAS5782M Process Flows (SLAA737)

Required equipment and accessories:

1. TAS5782MEVM
2. PurePath console motherboard
3. A USB micro type-B cable
4. Power supply unit (PSU) 9.5 – 26.4 VDC [2]
5. Speakers and cables
6. Desktop or laptop running Microsoft® Windows® 7, Windows 8, or Windows 8.1
7. Audio source: This can be a DVD player with appropriate SPDIF cable or playback media from Windows 7, Windows 8, or Windows 8.1

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[1] The PPC3 User Manual is only available after requesting the PPC3 software.

[2] Power supply minimum voltage can be lower than stated depending on the version of PPCMB used. PPCMB rev. E and earlier requires greater than 9.02 V. PPCMB rev. F and later requires greater than 4.5 V.

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1 Hardware Overview

The TAS5782MEVM showcases the latest TI digital input class-D closed loop amplifier. The TAS5782M is an I²S or TDM input class-D amplifier with up to 96-kHz processing. The EVM is used in conjunction with the PPCMB. The PVDD supply is provided via the TAS5782MEVM and is regulated to 5 VDC and 3.3 VDC on the PPCMB. The PPCMB provides the I²S, I²C, and 3.3 VDC to the TAS5782MEVM.

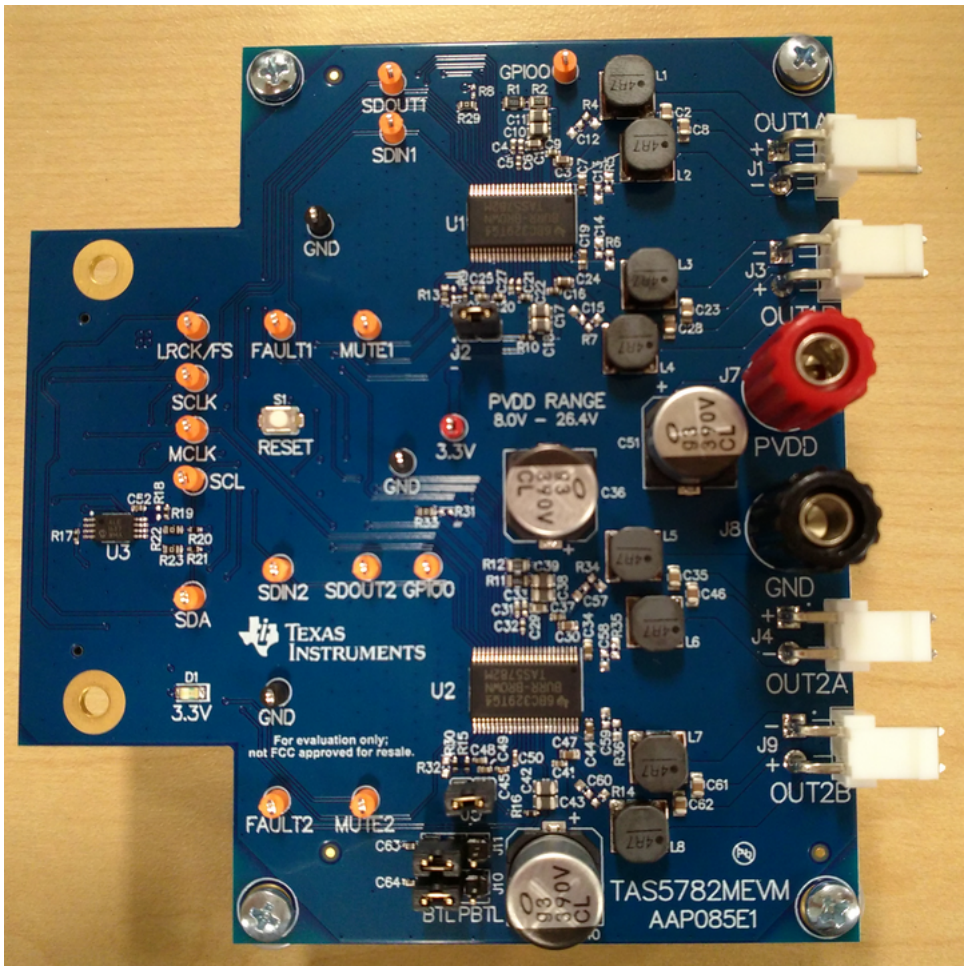


Figure 1. TAS5782MEVM

1.1 Features

- GUI control via USB port
- Stereo and mono channels with I²S input
- Processed and non-processed mono channel I²S input
- Operates in BTL or PBTL

1.2 Functions

The TAS5782MEVM is controlled by the PPCMB. The digital audio data input to the TAS5782MEVM is sent from PPCMB and is selectable from USB audio, optical SPDIF, coaxial SPDIF, PSIA (external I²S), and analog ADC sources.

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1.3 Detailed Operations

Upon power-on, the PPCMB uses USB audio input (default). The I^2S signals LRCLK, SCLK, SDIN and MCLK come from the TAS1020B. foobar2000 or similar non-processing media source can be used to stream audio. The TAS1020B enumerates as the following device on a Microsoft Windows operating system (OS): USB audio (USB-AudioEVM), Human Interface Devices, and USB Composite Device, see Figure 2.

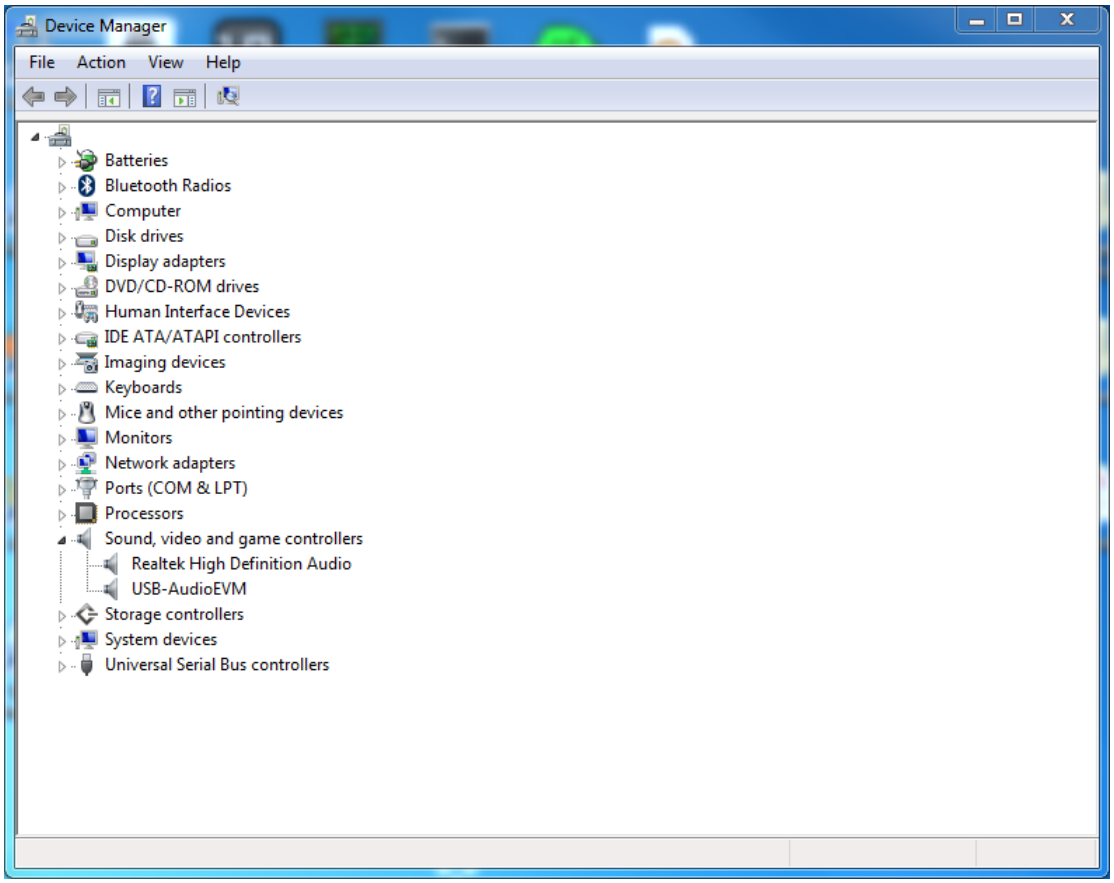


Figure 2. Device Manager

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USB audio output quality can be configured as shown in Figure 3. The user must select "2 channel, 16 bit, 48000 Hz (DVD Quality)".

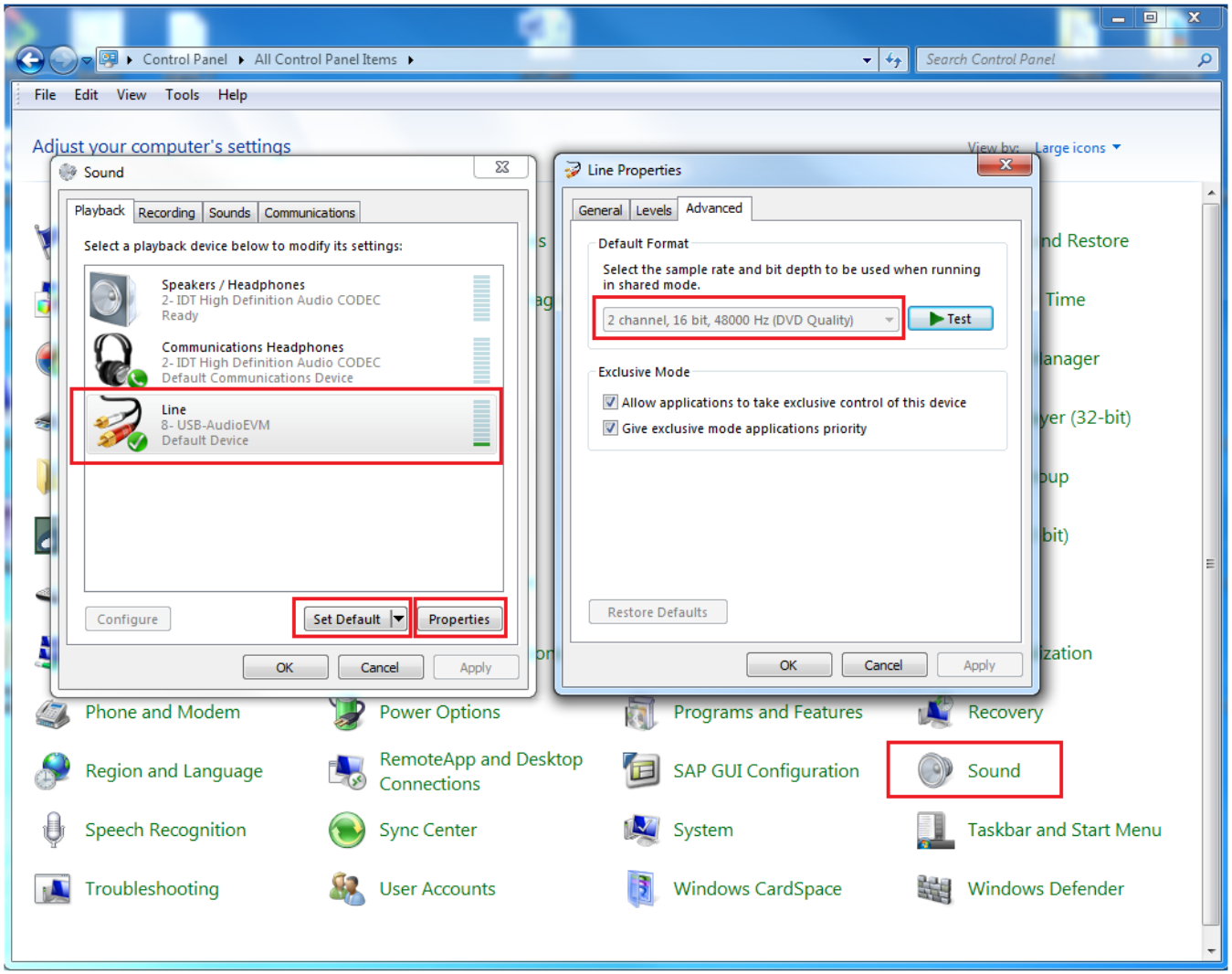


Figure 3. Default Format

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2 Hardware Setup

Step 1. Connect the PPCMB to the TAS5782MEVM.

Step 2. Connect speakers to the TAS5782MEVM.

Step 3. Connect a PSU to the TAS5782MEVM and turn on the power. 5-V and 3.3-V LEDs (Yellow) are illuminated. The USB Lock LED (Blue) is also illuminated. The PSU voltage range is 9.5 to 26.4 VDC.

Step 4. Plug in a USB cable from the PC to the PPCMB.

Step 5. If an optical SPDIF source is used, the blue SPDIF clock-locked LED is illuminated.

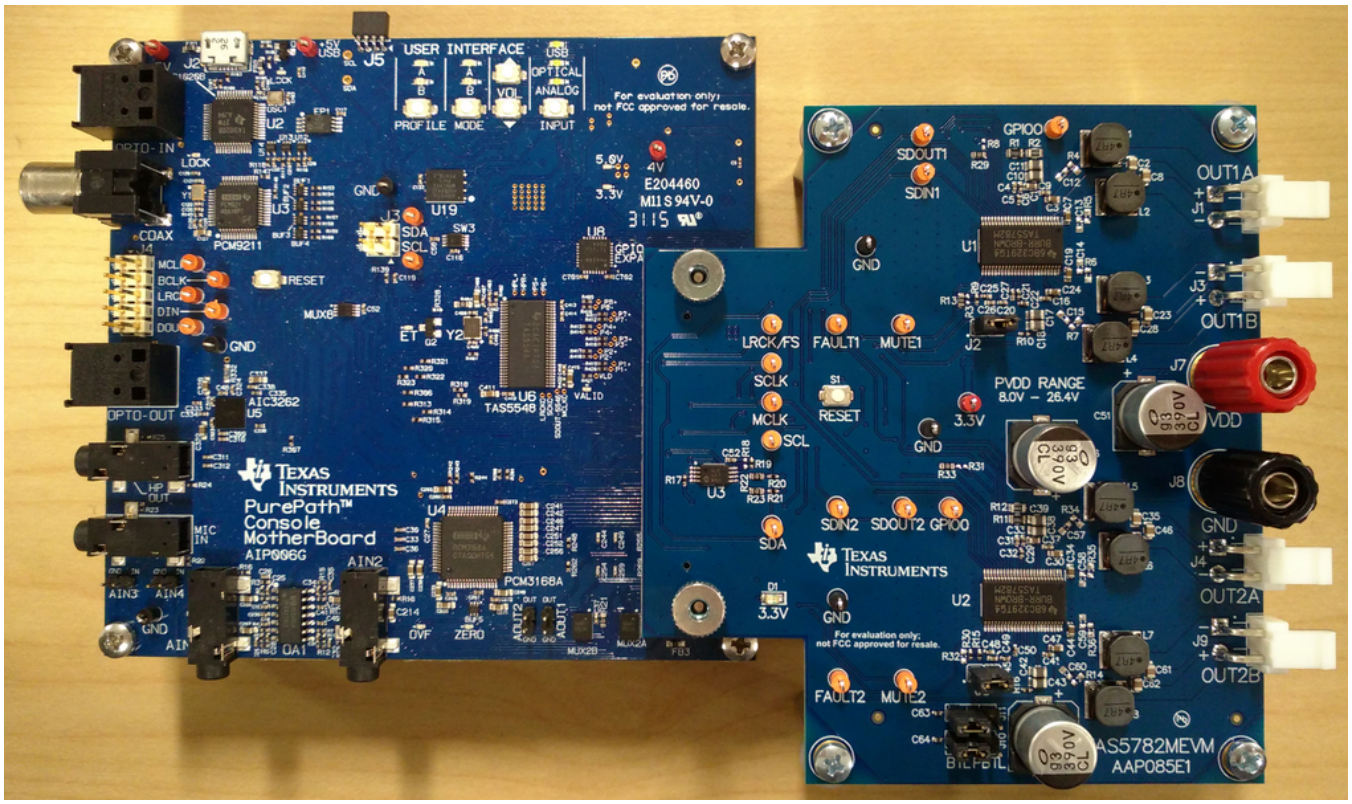


Figure 4. PPCMB and TAS5782MEVM Connection

2.1 PBTL Hardware Setup

1. The EVM and PPCMB need to be disconnected from the power supply.
2. Set J10 and J11 on the EVM to PBTL mode (right position)
3. Connect speaker terminals (J4 and J9) to the speaker in PBTL mode (See Figure 7).
4. Power up the EVM and it will now operate in PBTL mode.

NOTE: The EVM has two devices (U1 and U2), only the bottom one (U2) can operate in PBTL mode.

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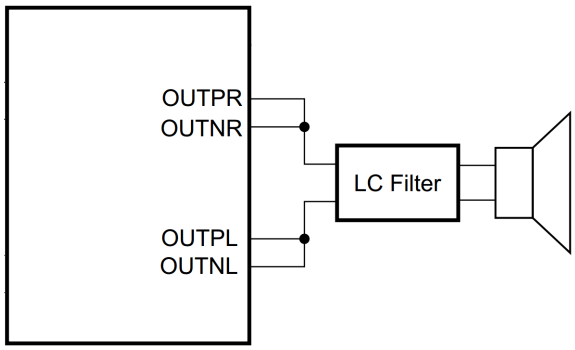


Figure 5. PBTL Configuration

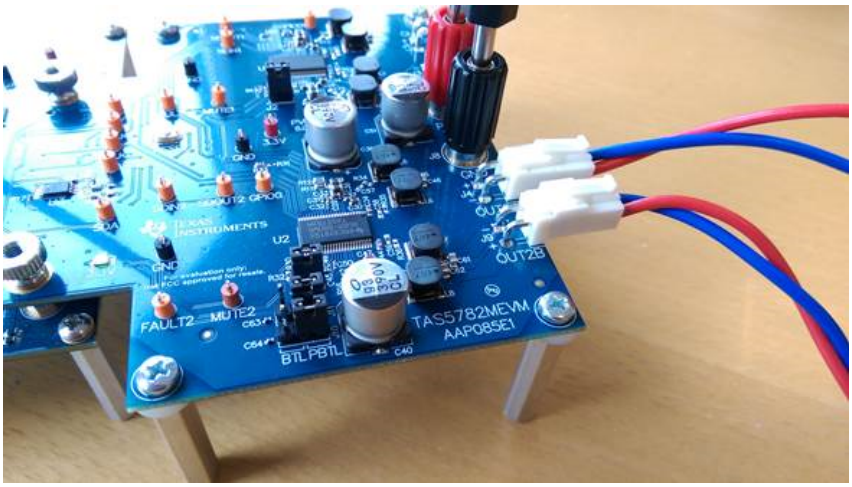


Figure 6. PBTL Connection at EVM

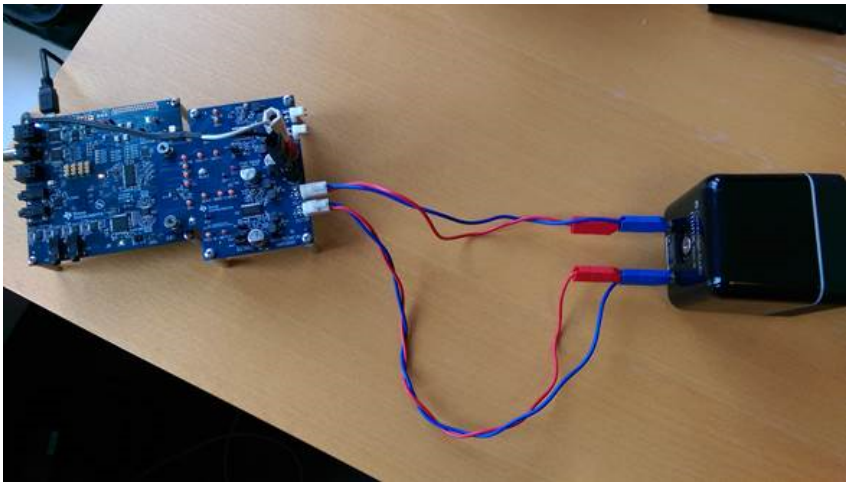


Figure 7. PBTL Connection to Speaker

2.2 I²C Device Addresses

The default I²C addresses on the EVM are set to 0x90 for the top device (U1) and 0x92 for the bottom one (U2).

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3 Software Overview

3.1 PurePath Console 3 (PPC3)

PurePath™ Console 3 (PPC3) is a software platform for Texas Instruments' audio devices. Many of these audio devices can be configured, tuned, and validated. This platform has the ability to support a number of TI audio devices with features that make the audio tuning experience more intuitive and exciting. Request access on *http://www.ti.com/tool/PUREPATHCONSOLE*.

Once approval is given, go to *www.ti.com/mysecuresoftware* to download the software. After login, users will see this webpage with a similar list of software products available for download.

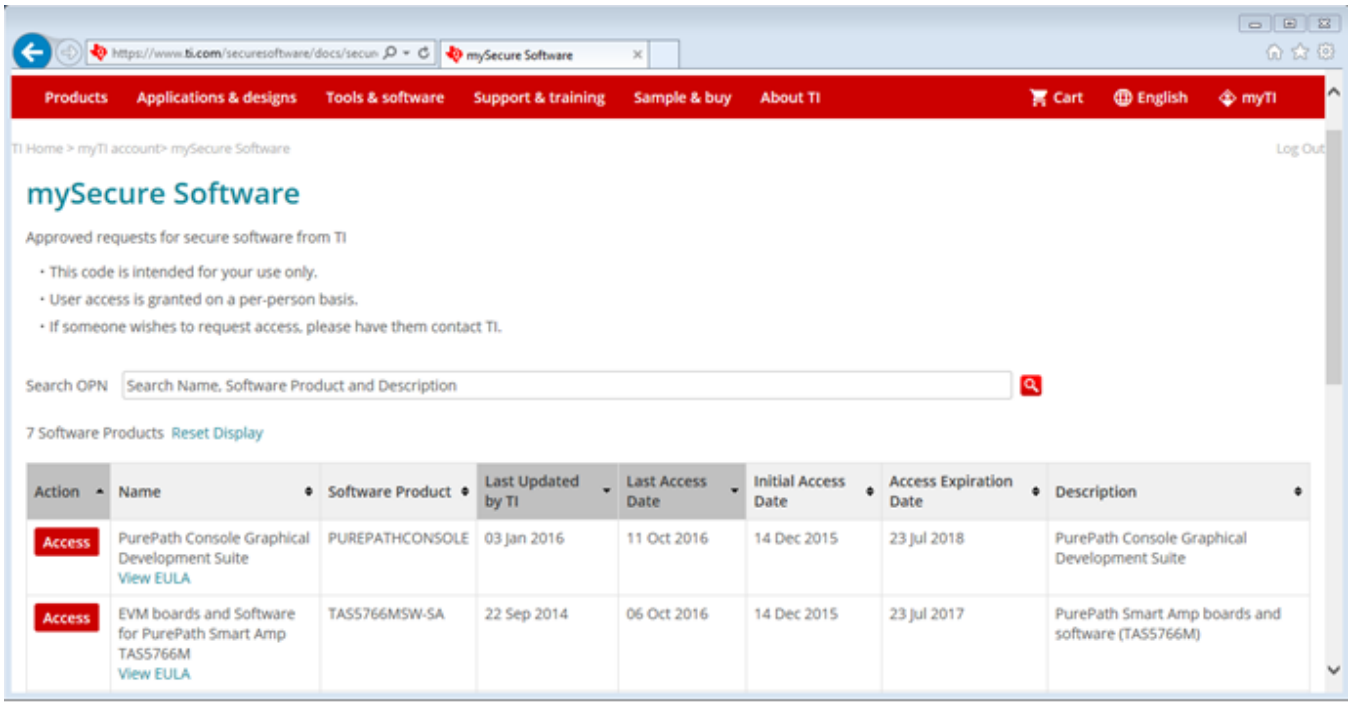


Figure 8. PPC3 Download Window

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Run the installation program. Also, download the PPC3 User Manual (after requesting the PPC3 software) for further instructions. The following window is displayed when PPC3 is launched for the first time.

When the window in Figure 9 is displayed, click on “sign in” to see TAS5782 EVM application. Click on TAS5782M box to download TAS5782M EVM App. Installation window will pop up, then click “Install”.



Figure 9. PPC3 Window

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After installation, TAS5782 EVM box will appear in “Installed EVM Apps” section, see Figure 10. Click on TAS5782 box to launch TAS5782 App.

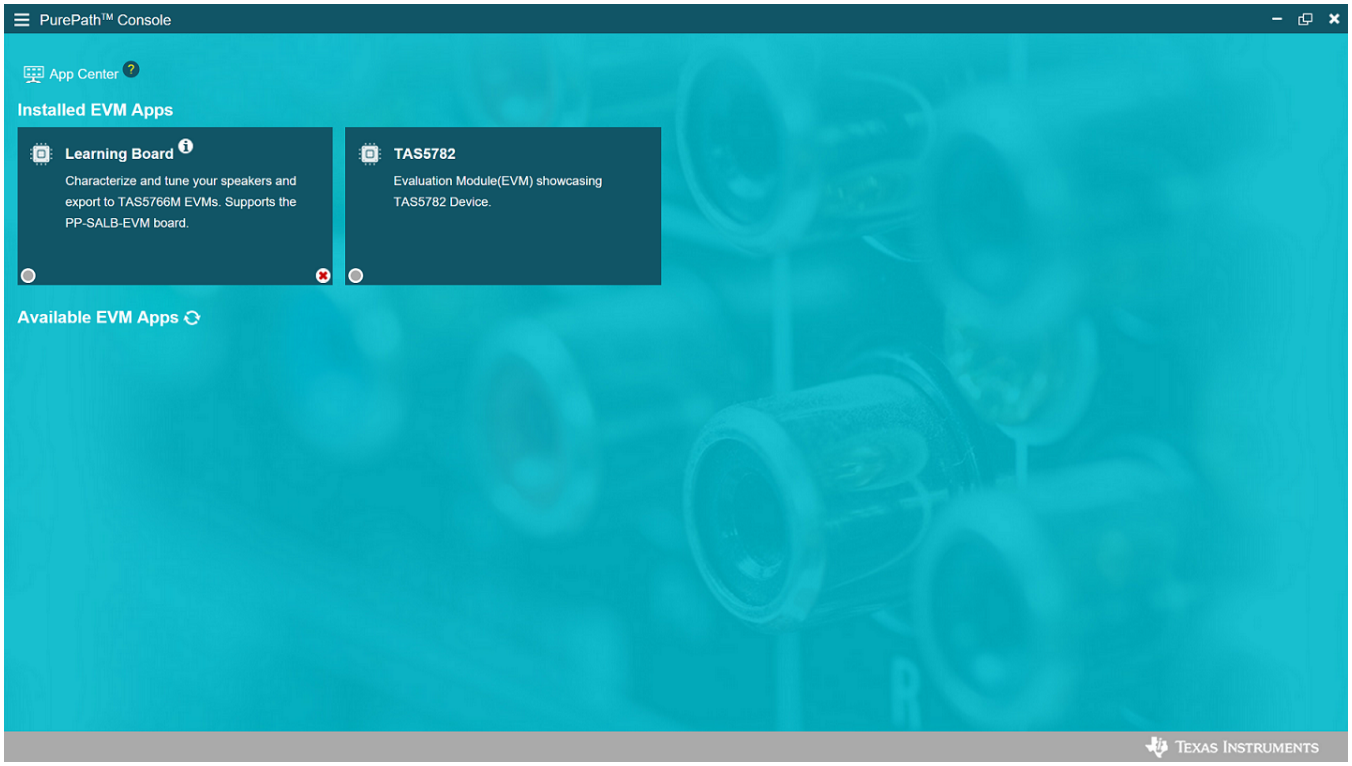


Figure 10. Installed EVM Apps

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3.2 TAS5782M Home Page

When the TAS5782M EVM App is launched, the TAS5782M Home Page is shown, see Figure 11. It displays features that are available for that EVM. When a feature is selected, then the respective page is loaded.

If the EVM is powered on and the USB is connected to the PC, the Home Page will display “Connect” button in the bottom left corner. If the USB is not connected, only “TAS5782M – offline” is shown.

There are six pages available in the TAS5782 EVM App: System Checks, Direct I^{2}C, Audio I/O, Register Map, End System Integration and Tuning and Audio Processing.

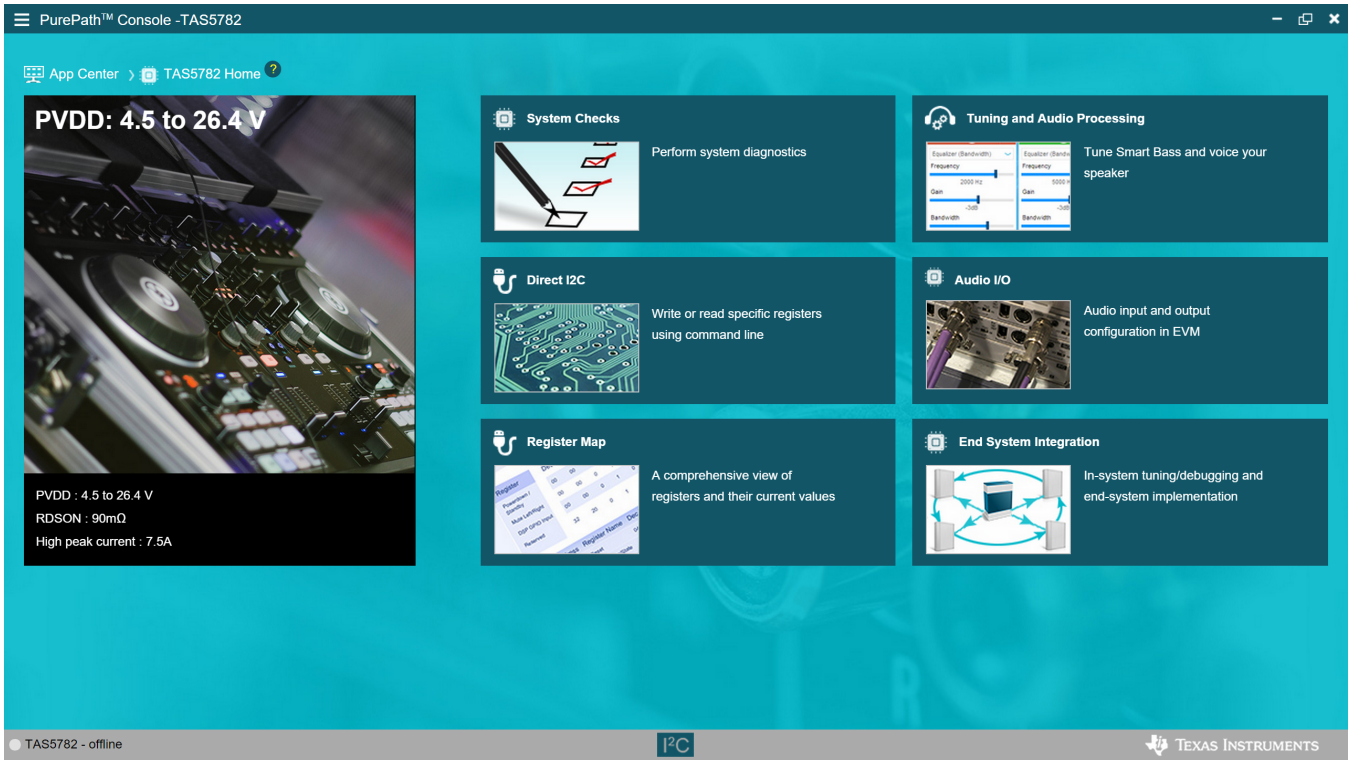


Figure 11. TAS5782M Home Page

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3.3 System Checks

The System Checks Page (See Figure 12) is used to determine whether the EVM can be configured correctly and receive audio stream from PC via USB. These checks will complete in a few minutes if no problem is detected. It is recommended to run the system checks before proceeding to the Tuning and Audio Processing Page.

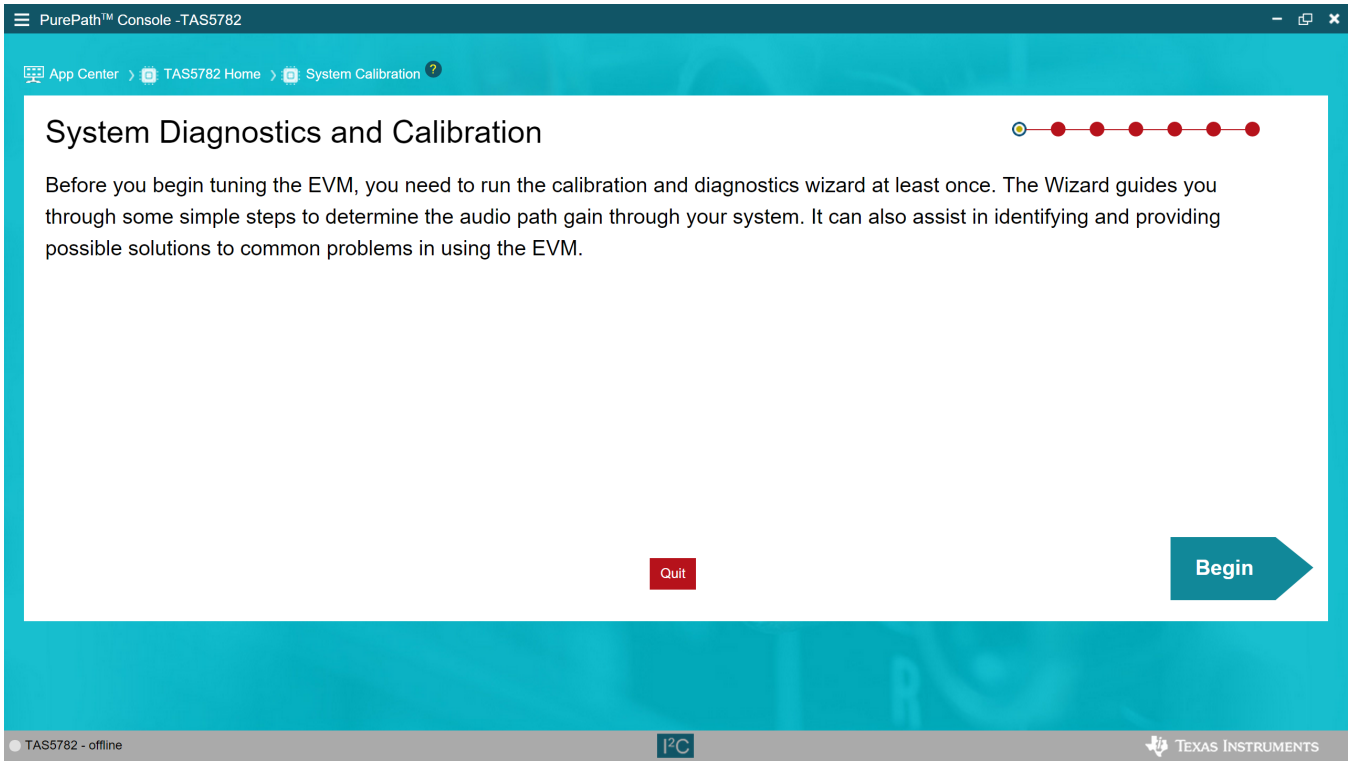


Figure 12. System Checks Page

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3.4 Direct I²C

The I/O tab in the Direct I²C has two sub sections. The Input section has the provision to enter the read or write commands scripts. Clicking the Execute button will execute the commands written in the Input section. The status of the execution is displayed in the Output section as shown in Figure 13.

The Checksum button on the right is used to compute the checksum value of a cfg file. Load a cfg file by clicking the Checksum button and then the computed XOR and CRC checksum will show on the Output section.

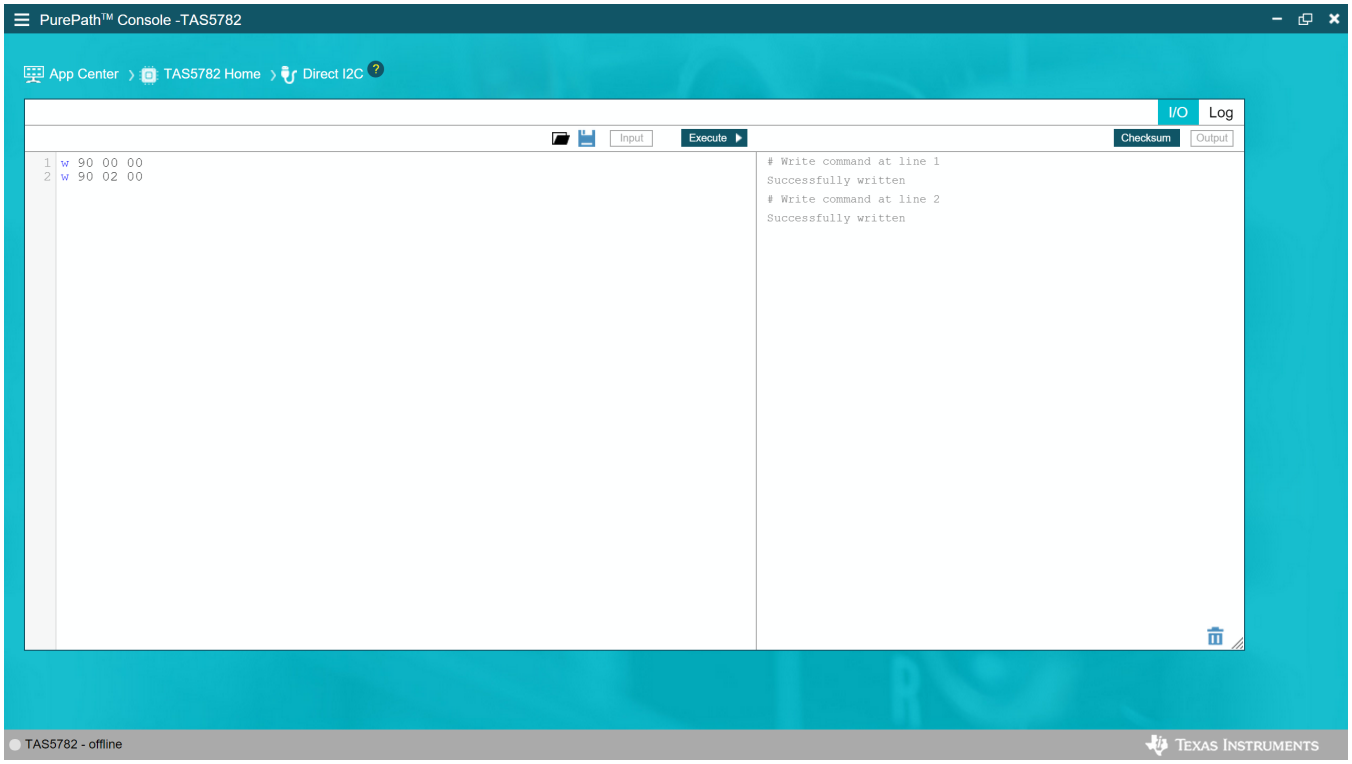


Figure 13. Direct I²C Page, I/O Tab

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The Log tab in the Direct I²C displays the I²C command history, if the record option is enabled. The log tab has a search option to search for a particular command. The search key is found at the top left of the window with the search icon. ‘Save to a file’ is used to save the log as a .cfg file. ‘Delete Output’ clears the log history. ‘Copy to a Clipboard’ copies the log text to the clipboard. Clicking the ‘Start Recording’ button starts recording the I²C transactions and displays them in the log window. ‘Stop Recording’ stops recording I²C transactions.

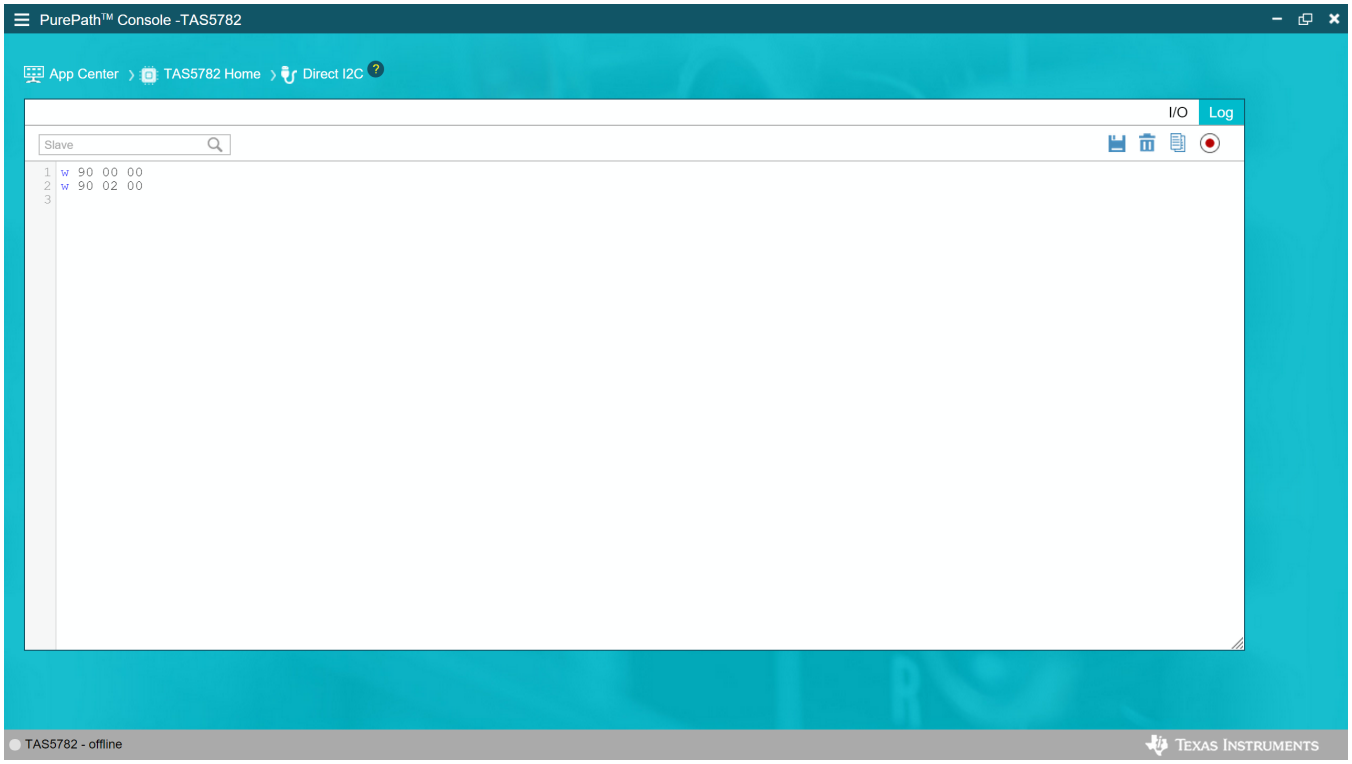


Figure 14. Direct I²C Page, Log Tab

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3.5 Audio I/O

This tool selects the desired audio input to the EVM. USB, coax, analog, optical, and PSIA (external I^2S) inputs are supported by the motherboard. USB audio source is selected as default.

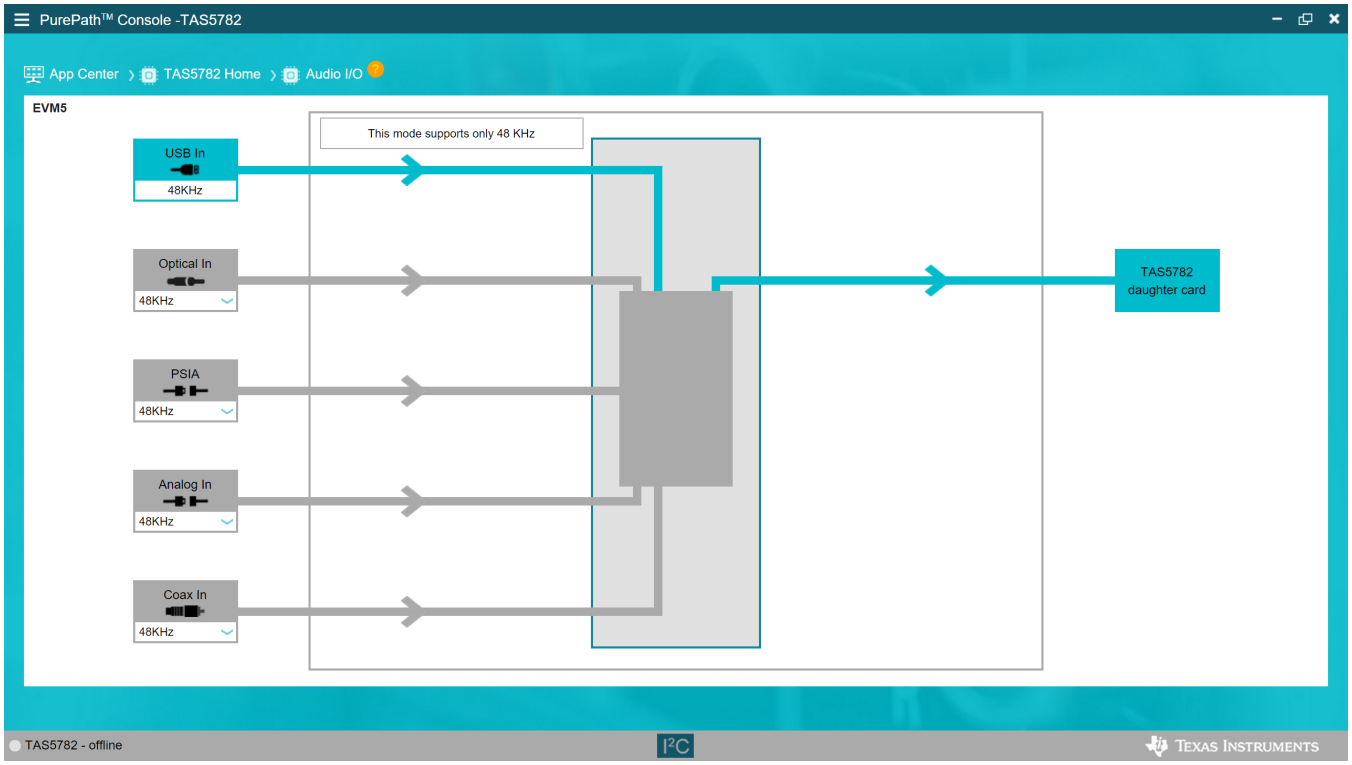


Figure 15. Audio I/O Page

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3.6 Register Map

The Register Map Page shows the current I²C register values (hexadecimal) in the TAS5782M and it can also be used to change the register values. Manually changing register values is accomplished by double-clicking in the desired bit to change. Clicking on Read All Registers allows monitoring of the register status of the amplifier. The Fields section shows the register name and a brief description of each bit that affects the selected register.

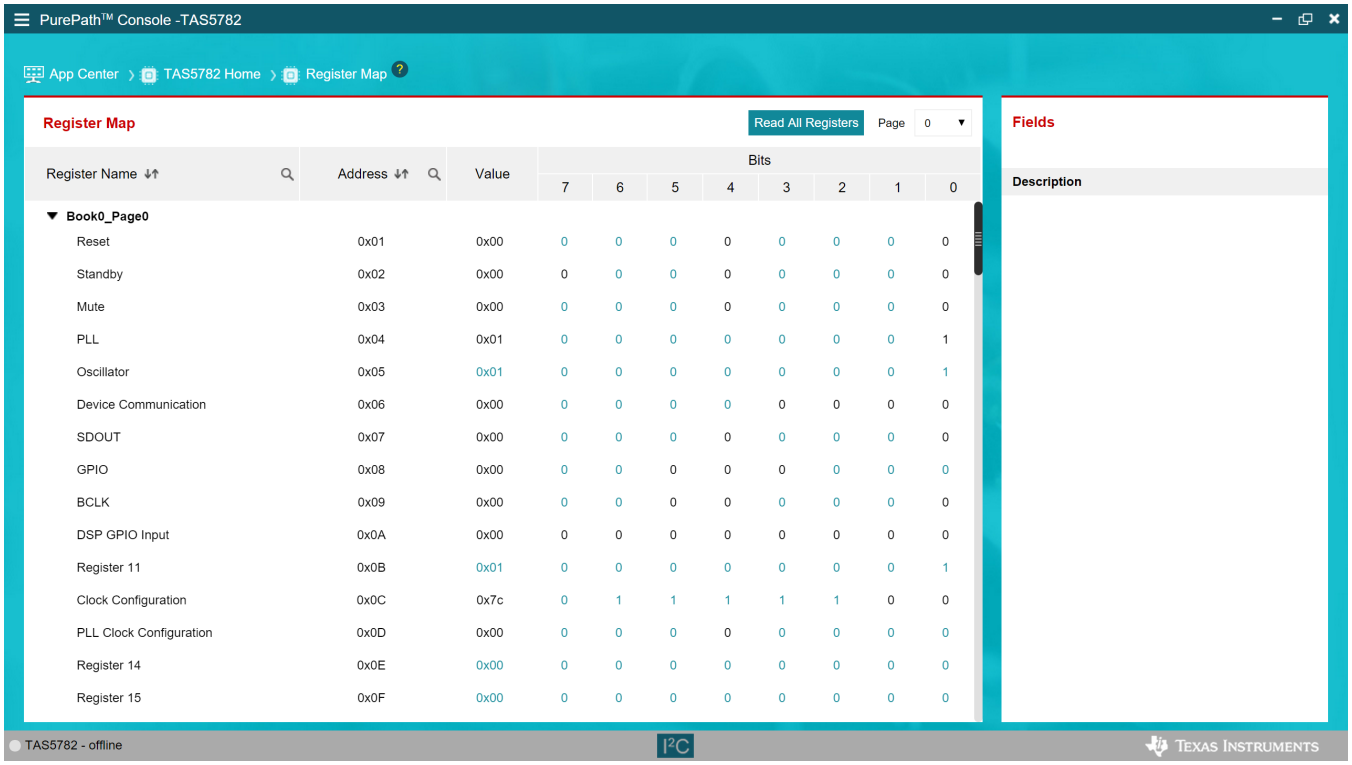


Figure 16. Register Map Page

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3.7 End System Integration

The End System Integration Page offers a powerful tool to generate a configuration file to use with processors and a method to debug the device in the end system. Three options are available:

1. Dump Current State into a Header file
2. In-System Debugging
3. In-System Tuning

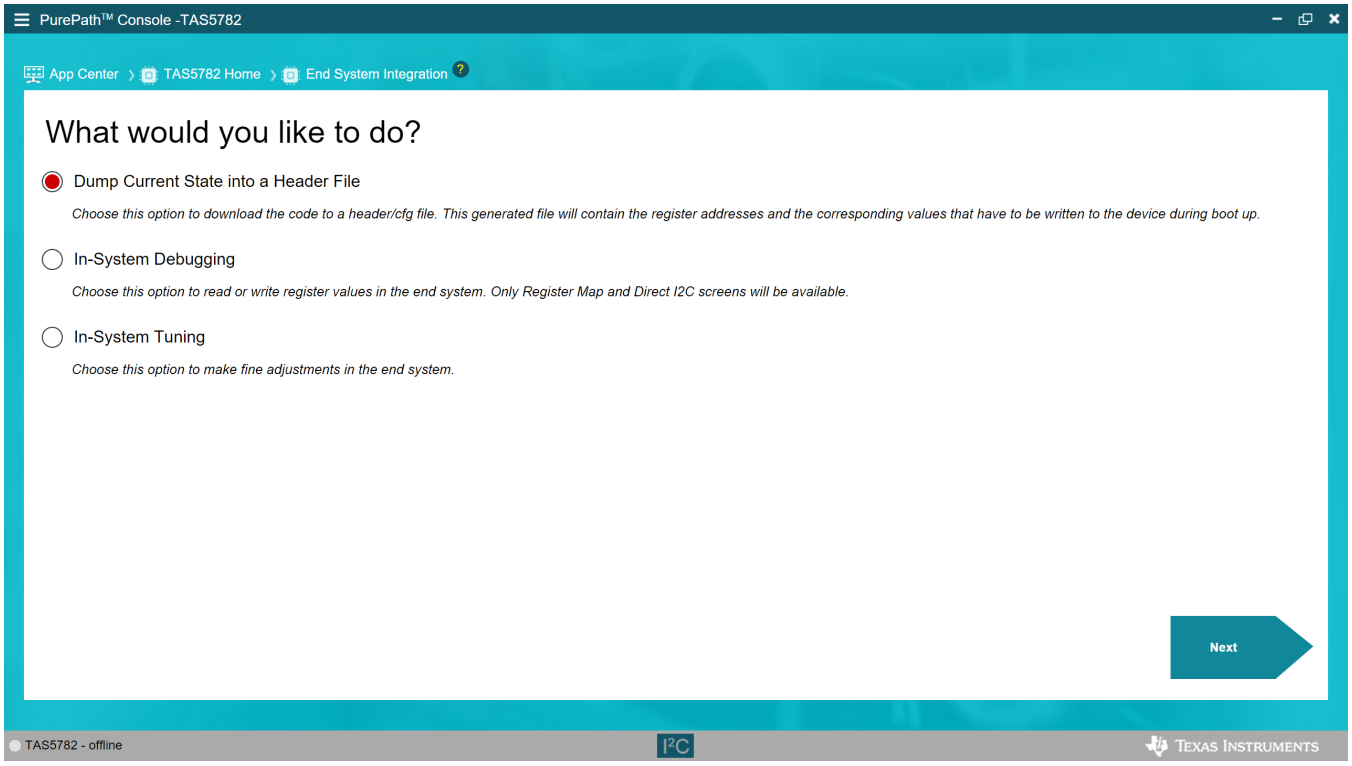


Figure 17. End System Integration Page

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3.7.1 Dump Current State into a Header File

This tool is used to generate a header or configuration file for the evaluated device according to the features evaluated and configured with PPC3. A few settings are available for file generation, including the format, end system I²C address, burst length and so forth. The generated file can be saved in the PC or shown in the output window on the right.

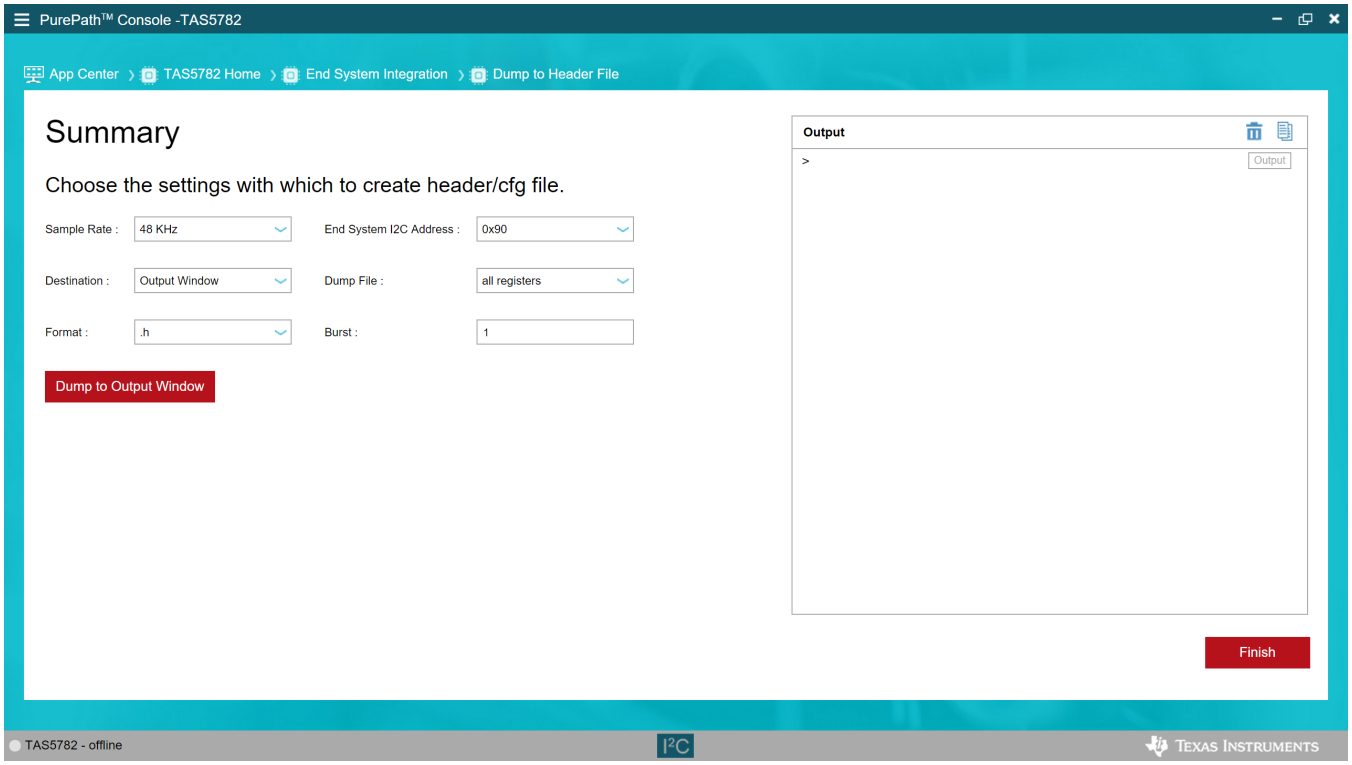


Figure 18. Header File Generation

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3.7.2 In-System Debugging

This tool helps debug the device which is already integrated in the end-system. This is possible by connecting the I^2C signals of the end-system device to the SCL, SDA, and GND test points of PPCMB. Only Register Map and Direct I^2C will be available in this mode. Leave the In-System Debugging Mode by clicking on the Disconnect button on the bottom left corner of the window.

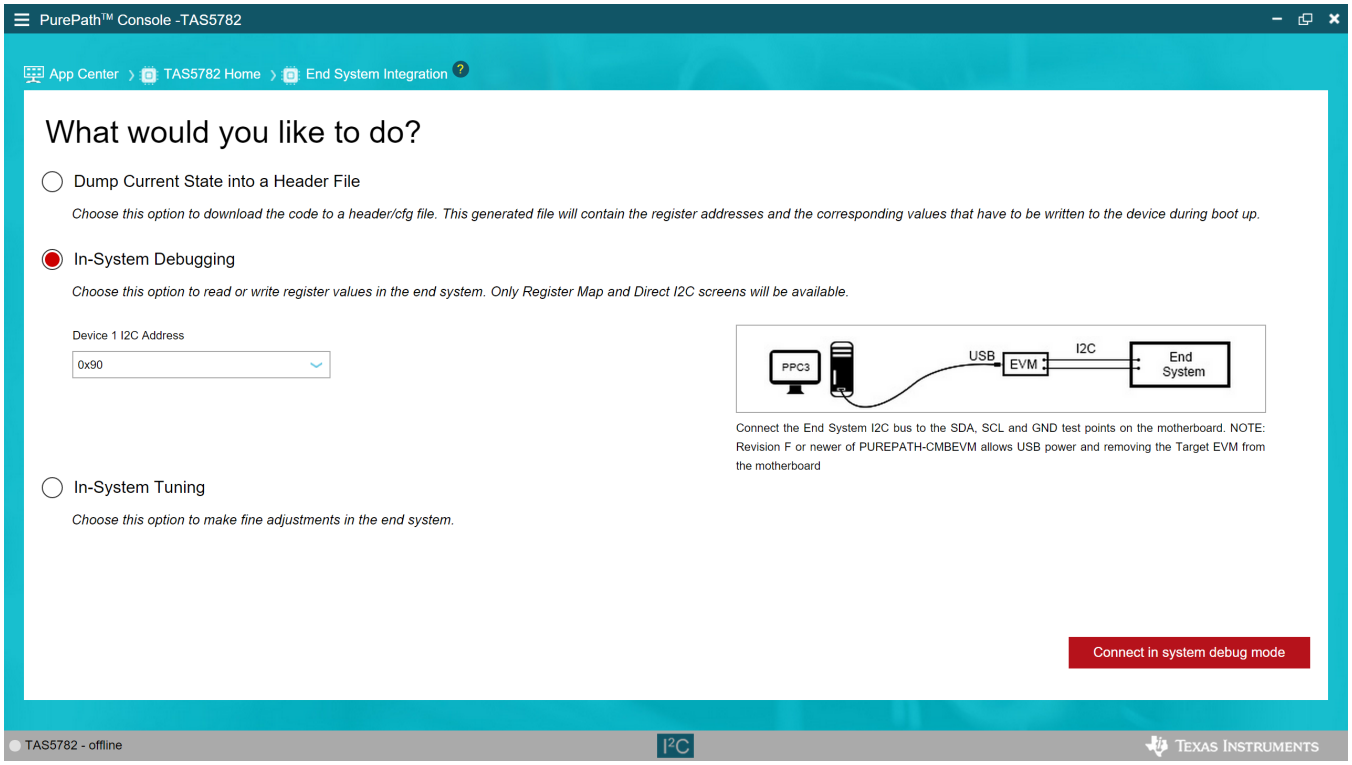


Figure 19. In-System Debugging

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3.7.3 In-System Tuning

Even if the device is integrated in the end application, it is still possible to make fine adjustments with the help of In-System Tuning. Like the In-System Debugging above, this is done by connecting I²C signals from PPCMB to the TAS5782M device in the end-system.

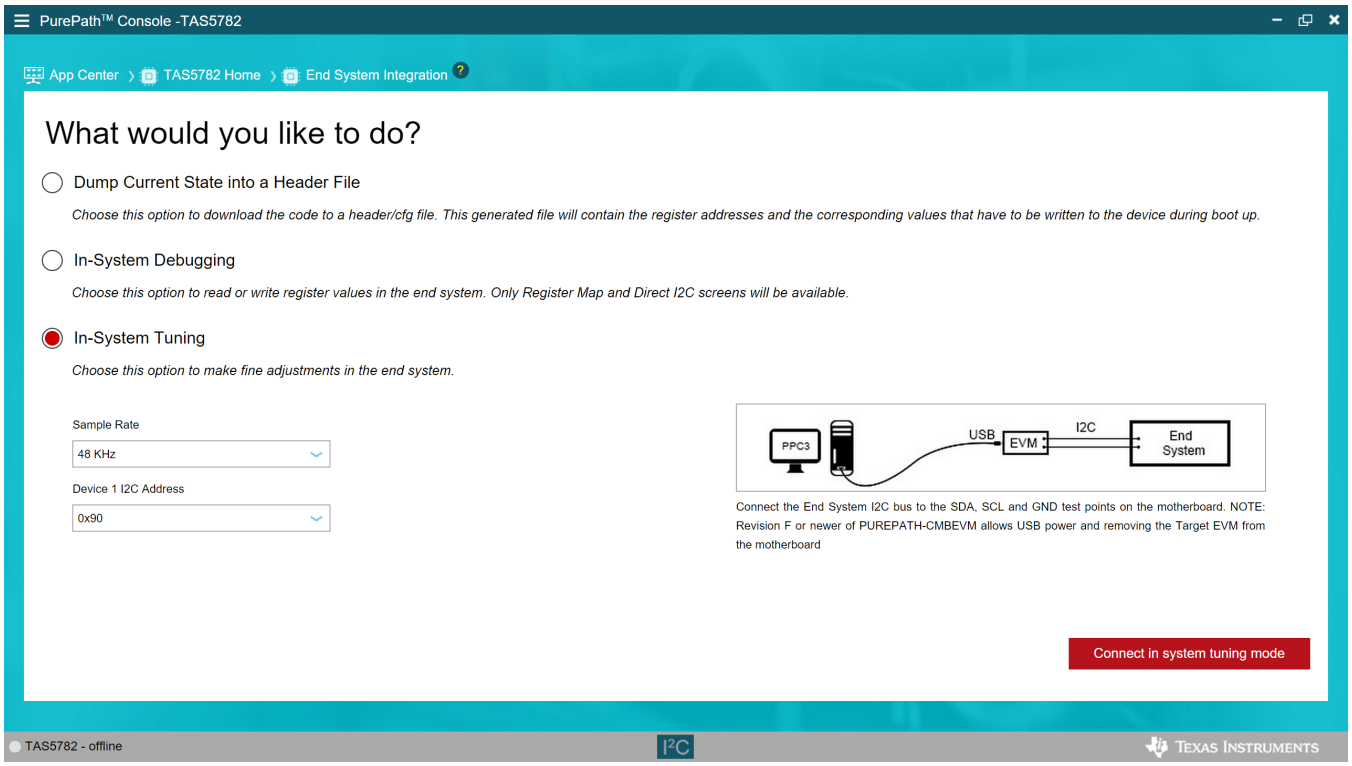


Figure 20. In-System Tuning

4 Troubleshooting

4.1 Power Cycle

To perform a power cycle disconnect both the USB cable and the power supply from the board.

4.2 Changing PPCMB Sample Rate

Older PPCMB devices may require a firmware update to support 48-kHz audio over USB. Instructions for updating the PPCMB firmware is found *here*. Please note this update applies only to audio over USB. 96-kHz audio over USB is not supported, for now.

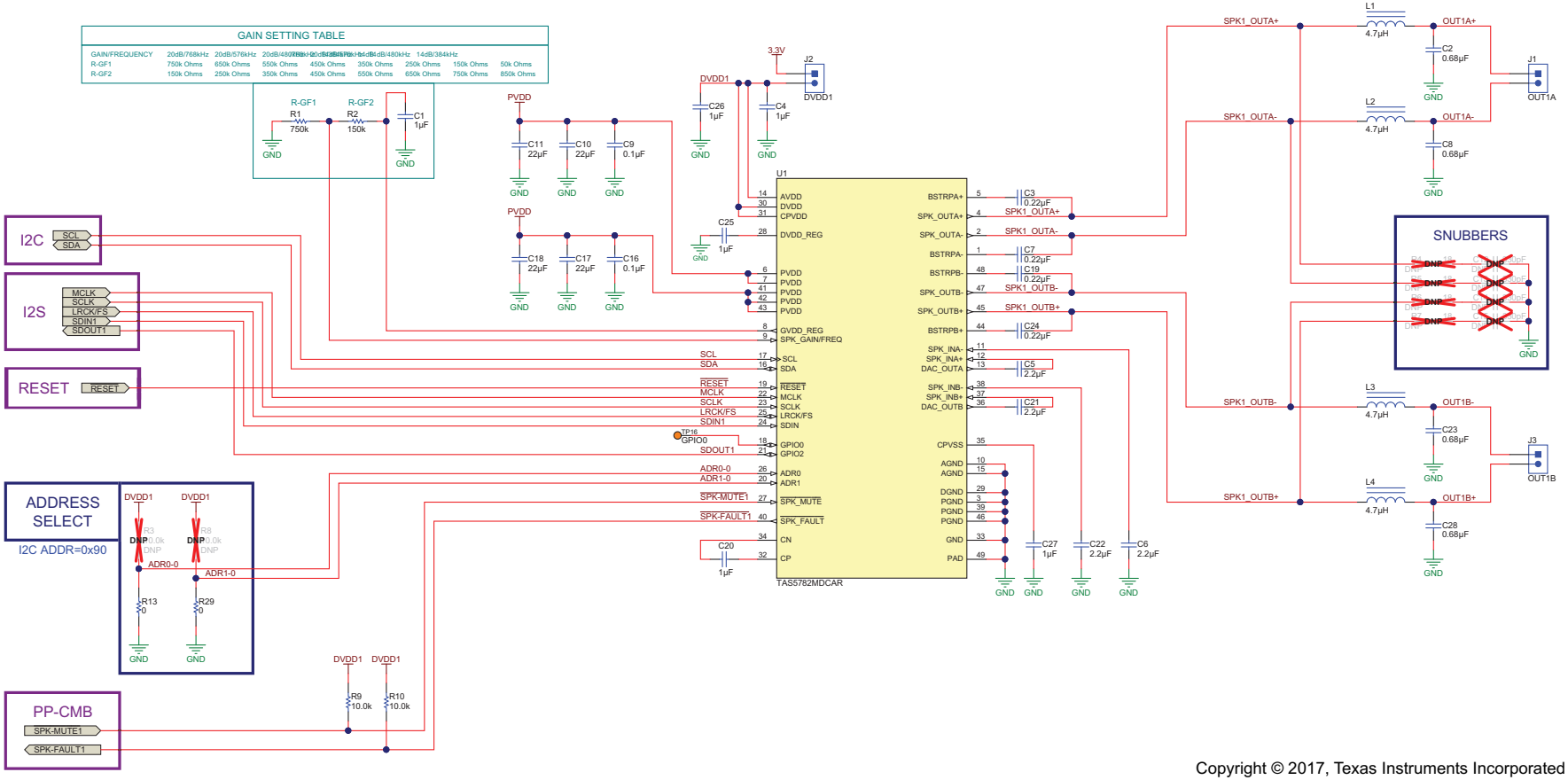
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5 Board Layouts, Bill of Materials, and Schematic

This section includes the EVM schematics, board layouts and bill of materials.

5.1 Schematics

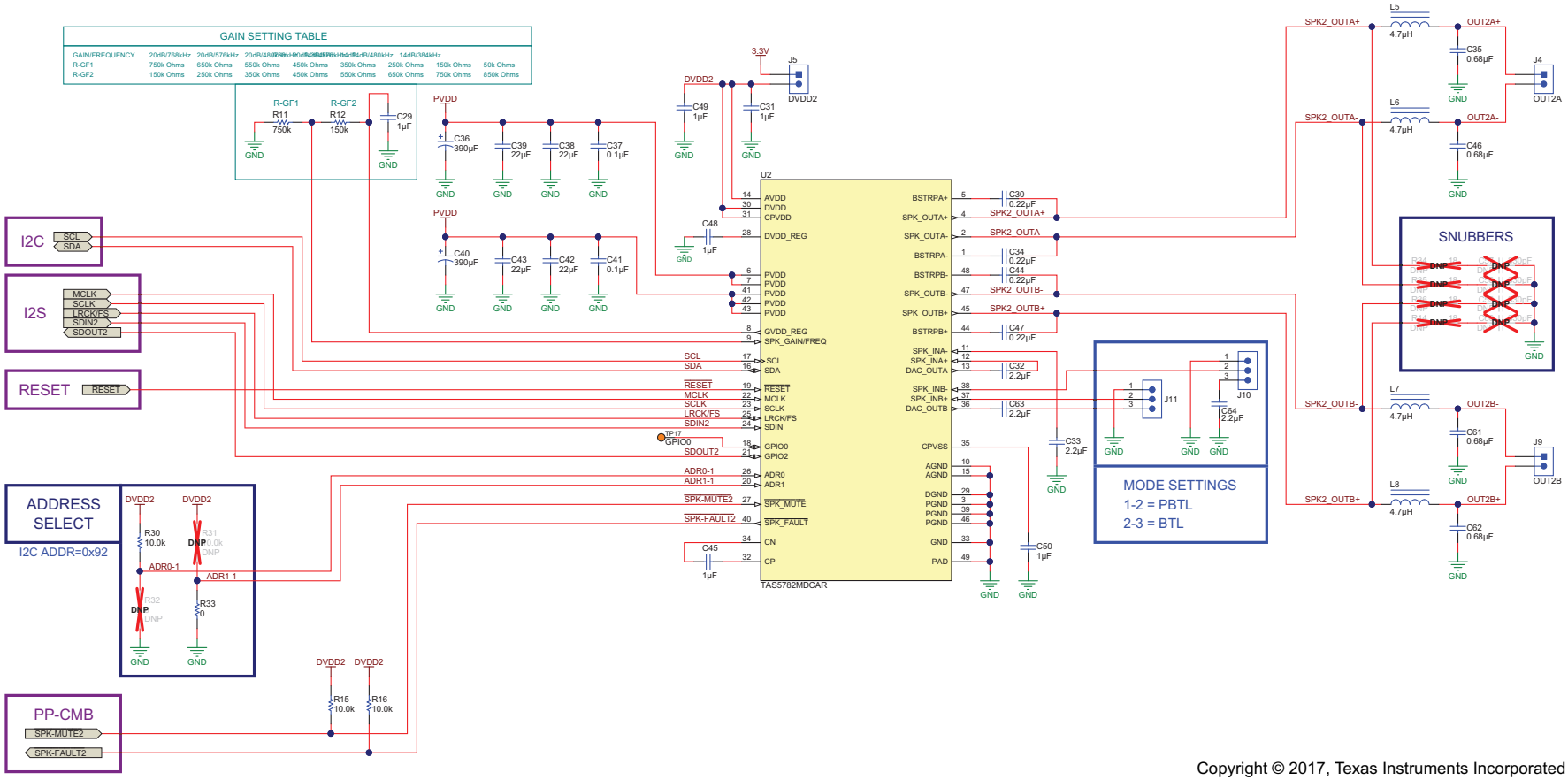
Figure 21 through Figure 23 illustrate the schematics for this EVM.



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Figure 21. TAS5782MEVM Schematic (1 of 3)

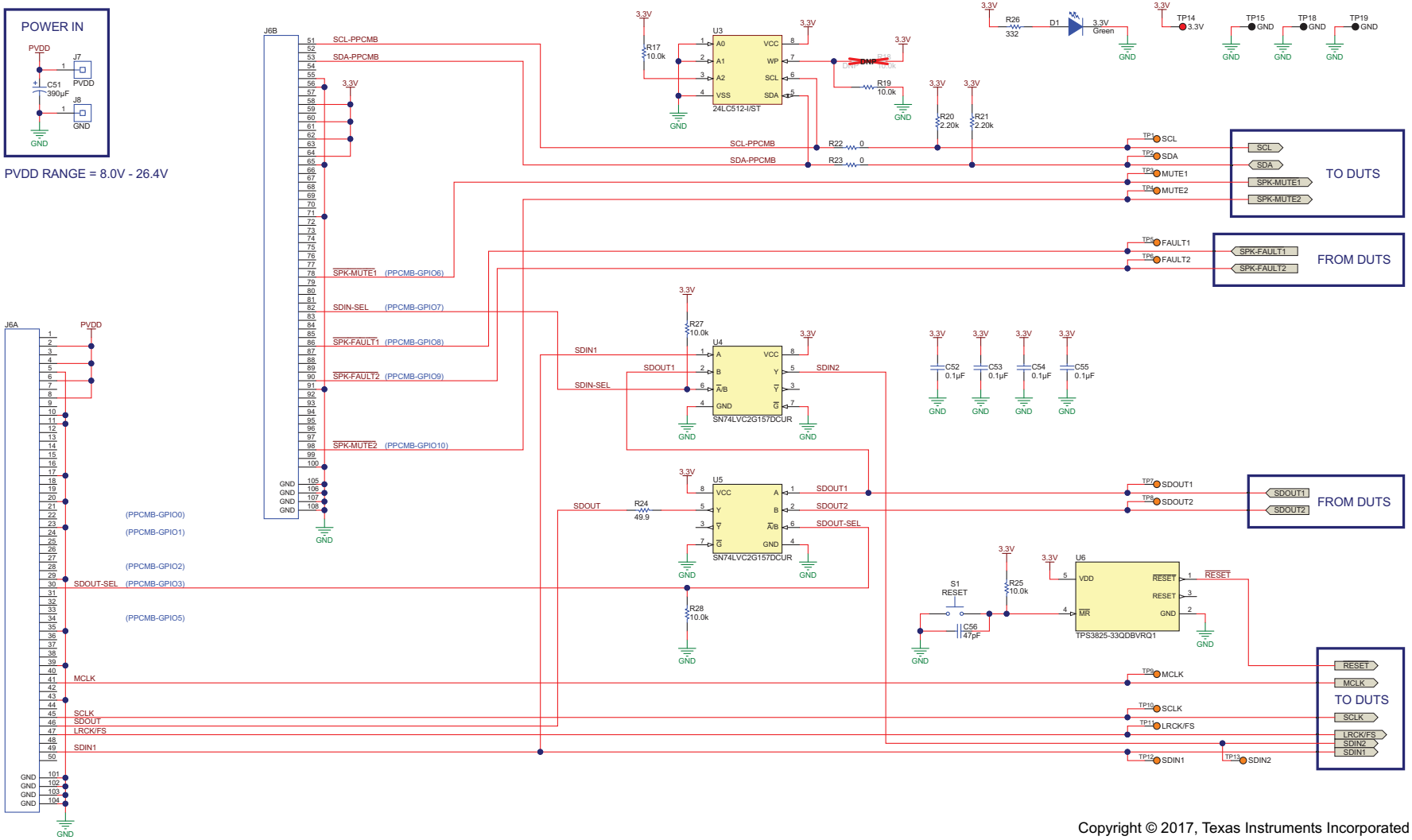
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Figure 22. TAS5782MEVM Schematic (2 of 3)

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Figure 23. TAS5782MEVM Schematic (3 of 3)

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5.2 Board Layouts

Figure 24 and Figure 25 illustrate the board layouts for the EVM.

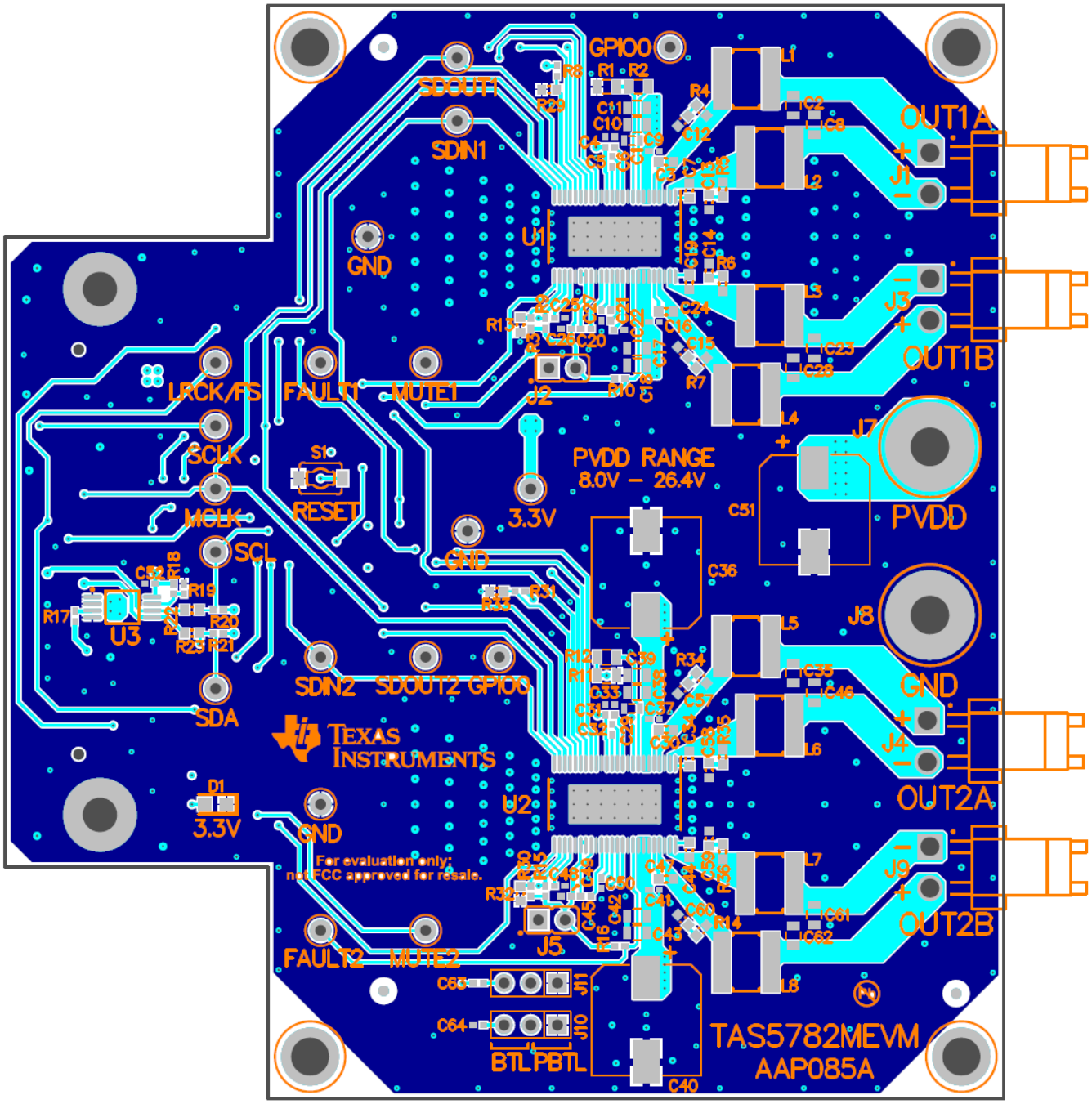


Figure 24. TAS5782MEVM Top Composite Assembly

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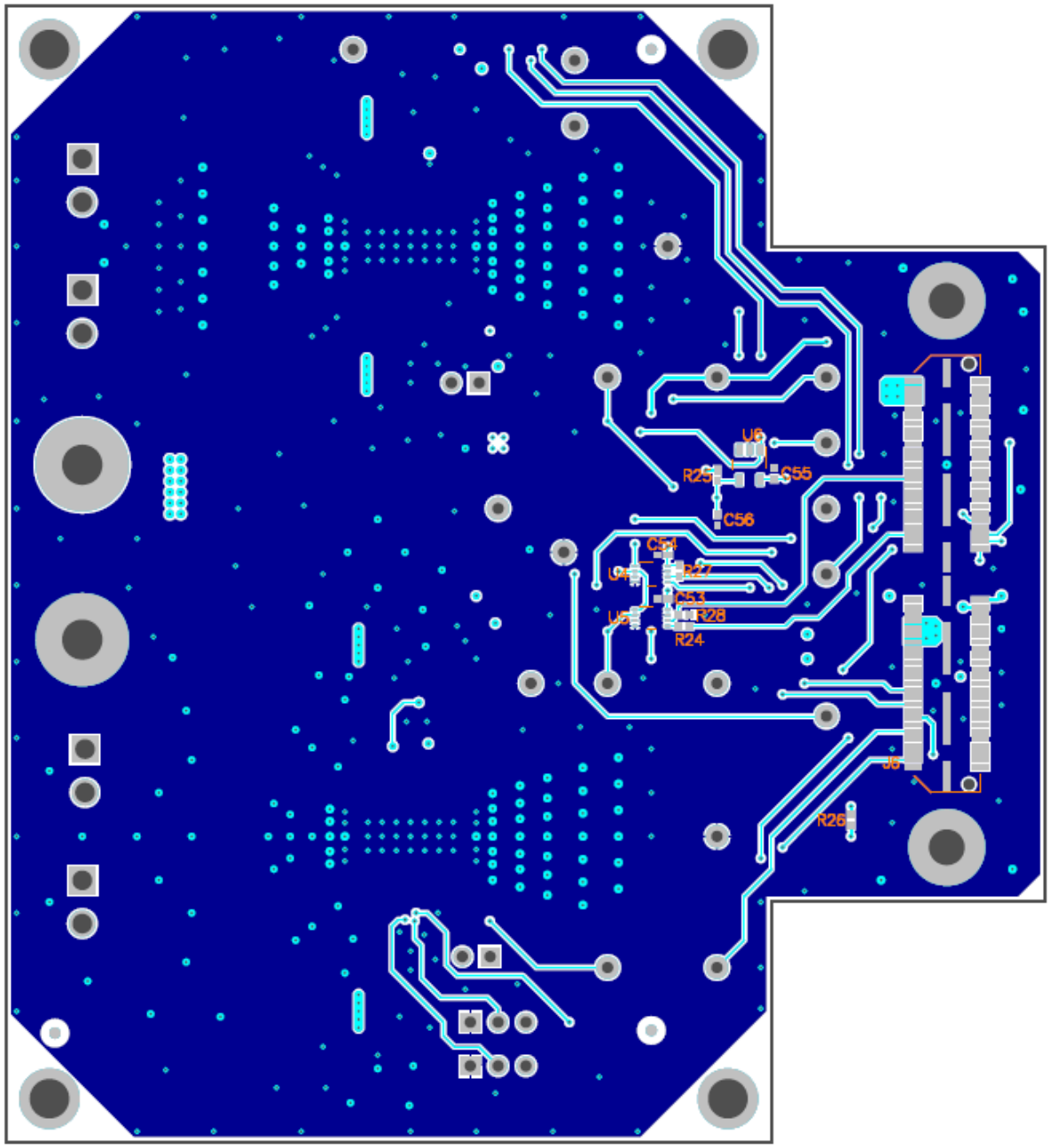


Figure 25. TAS5782MEVM Bottom Composite Assembly

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5.3 Bill of Materials

Table 1 lists the TAS5782MEVM bill of materials.

Table 1. TAS5782MEVM Bill of Materials[1]

Designator	Qty	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
C1, C29	2	1uF	CAP, CERM, 1 µF, 16 V, +/- 10%, X5R, 0603	0603	GRM185R61C105KE44D	Murata		
C2, C8, C23, C28, C35, C46, C61, C62	8	0.68uF	CAP, CERM, 0.68 µF, 50 V, +/- 20%, X7R, 0805	0805	C2012X7R1H684M125AB	TDK		
C3, C7, C19, C24, C30, C34, C44, C47	8	0.22uF	CAP, CERM, 0.22 µF, 50 V, +/- 10%, X7R, 0603	0603	C1608X7R1H224K080AB	TDK		
C4, C20, C25, C26, C27, C31, C45, C48, C49, C50	10	1uF	CAP, CERM, 1 µF, 25 V, +/- 10%, X5R, 0402	0402	C1005X5R1E105K050BC	TDK		
C5, C6, C21, C22, C32, C33, C63, C64	8	2.2uF	CAP, CERM, 2.2 µF, 16 V, +/- 10%, X5R, 0402	0402	C1005X5R1C225K050BC	TDK		
C9, C16, C37, C41, C52, C53, C54, C55	8	0.1uF	CAP, CERM, 0.1 µF, 50 V, +/- 10%, X7R, 0402	0402	C1005X7R1H104K050BB	TDK		
C10, C11, C17, C18, C38, C39, C42, C43	8	22uF	CAP, CERM, 22 µF, 35 V, +/- 20%, JB, 0805	0805	C2012JB1V226M125AC	TDK		
C36, C40, C51	3	390uF	CAP, AL, 390 µF, 35 V, +/- 20%, 0.08 ohm, SMD	10x10	UCL1V391MNL1GS	Nichicon		
C56	1	47pF	CAP, CERM, 47pF, 25V, +/-5%, C0G/NP0, 0402	0402	GRM1555C1E470JA01D	Murata		
D1	1	Green	LED, Green, SMD	LED_0805	LTST-C170KGKT	Lite-On		
H1, H2, H3, H4	4		MACHINE SCREW PAN PHILLIPS M3	M3 Screw	RM3X8MM 2701	APM HEXSEAL		
H5, H6, H7, H8	4		Washer, Flat, #4 Nylon		3200	Keystone		
H9, H10, H11, H12	4		Standoff, HexBrass M3, 30 mm	Spacer M3, 30mm	R30-1003002	Harwin		
J1, J3, J4, J9	4		Header (friction lock), 3.96mm, 2x1, Tin, R/A, TH	Header, 2x1, 3.96mm, R/A	B2PS-VH(LF)(SN)	JST Manufacturing		
J2, J5	2		Header, 100mil, 2x1, Gold, TH	Sullins 100mil, 1x2, 230 mil above insulator	PBC02SAAN	Sullins Connector Solutions		
J6	1		Connector, 100 Pos. 0.635mm, SMT	Connector, 1575x235x280 mil	QTS-050-01-F-D-A	Samtec		
J7	1		Binding Post, RED, TH	11.4x27.2mm	7006	Keystone		
J8	1		Binding Post, BLACK, TH	11.4x27.2mm	7007	Keystone		
J10, J11	2		Header, 100mil, 3x1, Gold, TH	PBC03SAAN	PBC03SAAN	Sullins Connector Solutions		
L1, L2, L3, L4, L5, L6, L7, L8	8	4.7uH	Inductor, Shielded, 4.7 µH, 4 A, 0.023 ohm, SMD	6.3x4.5x6.3mm	1255AY-4R7M=P3	Murata Toko		
R1, R11	2	750k	RES, 750 k, 1%, 0.125 W, 0805	0805	ERJ-6ENF7503V	Panasonic		
R2, R12	2	150k	RES, 150 k, 1%, 0.125 W, 0805	0805	ERJ-6ENF1503V	Panasonic		
R9, R10, R15, R16, R17, R19	6	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R13, R22, R23, R29, R33	5	0	RES, 0, 5%, 0.1 W, 0603	0603	CRCW06030000Z0EA	Vishay-Dale		
R20, R21	2	2.20k	RES, 2.20 k, 1%, 0.063 W, 0402	0402	CRCW04022K20FKED	Vishay-Dale		
R24	1	49.9	RES, 49.9, 1%, 0.063 W, 0402	0402	CRCW040249R9FKED	Vishay-Dale		
R25, R27, R28, R30	4	10.0k	RES, 10.0k ohm, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R26	1	332	RES, 332, 1%, 0.063 W, 0402	0402	CRCW0402332RFKED	Vishay-Dale		
S1	1		Switch, Tactile, SPST-NO, 0.05A, 12V, SMT	Switch, 4.4x2x2.9 mm	TL1015AF160QG	E-Switch		

(1) Unless otherwise noted in the Alternate Part Number or Alternate Manufacturer columns, all parts may be substituted with equivalents.

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Table 1. TAS5782MEVM Bill of Materials[(1)] (continued)

Designator	Qty	Value	Description	Package Reference	Part Number	Manufacturer	Alternate Part Number	Alternate Manufacturer
SH1, SH2, SH3, SH4	4	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M	SNT-100-BK-G	Samtec
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP16, TP17	15		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone		
TP14	1		Test Point, Miniature, Red, TH	Red Miniature Testpoint	5000	Keystone		
TP15, TP18, TP19	3		Test Point, Miniature, Black, TH	Black Miniature Testpoint	5001	Keystone		
U1, U2	2		Digital Input, Closed-Loop Class-D Amplifier with 96-kHz Processing, DCA0048G (TSSOP-48)	DCA0048G	TAS5782MDCAR	Texas Instruments	TAS5782MDCA	Texas Instruments
U3	1		EEPROM, 512KBIT, 400KHZ, 8TSSOP	TSSOP-8	24LC512-I/ST	Microchip		
U4, U5	2		Single 2-Line to 1-Line Data Selector Multiplexer, DCU0008A	DCU0008A	SN74LVC2G157DCUR	Texas Instruments	SN74LVC2G157DCUT	Texas Instruments
U6	1		Processor Supervisory Circuit, DBV0005A	DBV0005A	TPS3825-33QDBVRQ1	Texas Instruments		Texas Instruments
C12, C13, C14, C15, C57, C58, C59, C60	0	330pF	CAP, CERM, 330 pF, 50 V, +/- 5%, C0G/NP0, 0603	0603	GRM1885C1H331JA01D	Murata		
FID1, FID2, FID3, FID4, FID5, FID6	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A		
R3, R8, R31	0	10.0k	RES, 10.0k ohm, 1%, 0.063W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R4, R5, R6, R7, R14, R34, R35, R36	0	18	RES, 18, 5%, 0.1 W, 0603	0603	CRCW060318R0JNEA	Vishay-Dale		
R18	0	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	CRCW040210K0FKED	Vishay-Dale		
R32	0	0	RES, 0, 5%, 0.1 W, 0603	0603	CRCW06030000Z0EA	Vishay-Dale		

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   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

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

      FCC NOTICE: 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 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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 to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

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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3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

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.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

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9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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