User's Guide
SLOU367–June 2013

TAS5721xx, TAS5723xx, and TAS5729xx Evaluation Module

This user's guide contains support documentation for the TAS5721xx, TAS5723xx, and TAS5729xx evaluation modules, hereafter referred to as EVM or TAS572xxx EVM in this document. Also included are the bill of materials (BOM), schematics, and the printed-circuit board (PCB) layout for the EVM.

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PurePath is a trademark of Texas Instruments.
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1 Hardware and Software Requirements

The following hardware and software is required to evaluate the TAS572xxx EVM.

1.1 Hardware

1. TAS572xxx EVM
   - The EVM is populated with the TAS5729MD device, by default. Other devices supported by the EVM can be evaluated by replacing the TAS5729MD device with free samples from www.ti.com.
2. PurePath™ Console Mother Board
   - The PurePath Console Mother Board is not included with the EVM but is available for order on https://estore.ti.com.
3. Micro-USB cable
4. DC power-supply
5. Speaker or resistor load (2x)
6. Cables
   - Banana cable (2x) to connect from DC power-supply to EVM board
   - JST to speaker or load cable (2x) to connect the device output to speaker or resistor load
7. PC running Windows® XP OR Windows 7 operating system
8. Audio input source
   - Digital audio options supported - USB, SPDIF (optical & coax), I2S (via 2-pin headers)
   - Analog audio input options supported: 3.5 mm HP-jack and 2-pin header

1.2 Software

1. PurePath Console GUI
   - Prior approval is required to download the GUI. Please request access at http://www.ti.com/tool/controlconsole.

1.3 Other Documentation

Additional reference literature:

1. PurePath Console Mother Board user's guide (SLOU366)
2. TAS5729MD Datasheet (SLOS836)

2 Setting up the EVM

1. Refer to PurePath Console Mother Board user's guide to install the GUI software and the target device plug-in
2. Connect the EVM board to the Pure Path Console Mother Board
   - Note the controller board is not included with the EVM and can be ordered at https://estore.ti.com
3. Connect the external speaker or resistor load to the EVM's output connector
   - JST connectors on top are for BTL mode and connectors on bottom are for SE mode (TAS5721xx only)
   - Refer to the device data-sheet for minimum load requirements
4. Connect DC power supply to EVM power connector and turn the supply ON
   (a) Refer to the device datasheet for the supported voltage range
   (b) This DC supply powers both the controller board and the device EVM. The controller board draws ~0.3 A.
   (c) The 5-V, 3.3-V green LEDs and the orange ET LED on the controller board should now be illuminated
5. Connect the controller board to a PC (running Windows XP or Windows 7) via a micro-USB cable
   - The USB blue LED on the controller board should now be illuminated

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Figure 1 illustrates the TAS572xxx EVM.

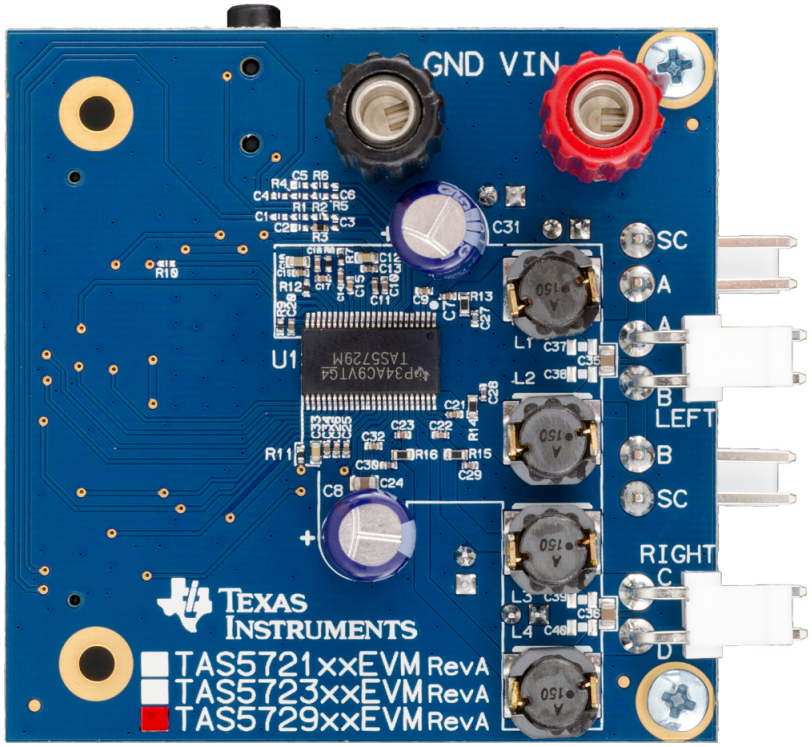

Figure 1. TAS572xxx EVM

3 Using the GUI

Refer to the PurePath Console Mother Board user's guide to launch and configure the PurePath Console GUI.

The process flow tab, shown in Figure 2, can be used to configure the device signal flow.

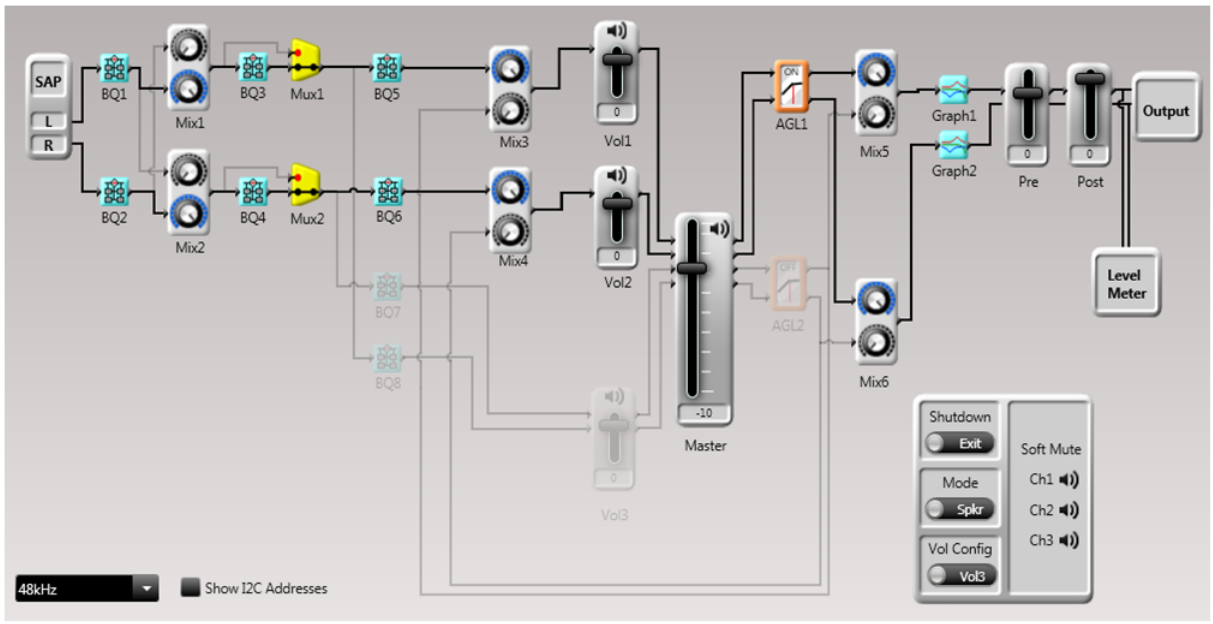

Figure 2. TAS5729xx Process Flow Tab

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4 Board Files (BOM, Schematics, and PCB Layout)

4.1 Bill of Materials

Table 1 is the BOM for this EVM.

Table 1. TAS572xxx EVM Bill of Materials

ITEM	MANU PART NUM	MANU	QTY	REF DESIGNATORS	DESCRIPTION
1	TAS5721/23/29xx	TEXAS INSTRUMENTS	1	U1	I2S Input Digital Amplifier
2	24LC256-I/MS	MICROCHIP	1	U2	SERIAL EEPROM I2C 256K 400kHz MSOP8-MS ROHS
3	C1005X5R1A155K	TDK CORP	0	C1, C4	CAP SMD0402 CERM 1.5UFD 10V 10% X5R ROHS
4	GRM1555C1H102JA01D	MURATA	0	C2, C5	CAP SMD0402 CERM 1000pfd 5% 50V COG ROHS
5	GRM1555C1H221JA01D	MURATA	0	C3, C6	CAP SMD0402 CERM 220PFD 5% 50V COG ROHS
6	C1005X7R1H333K	TDK CORP	4	C7, C21, C22, C23	CAP SMD0402 CERM 0.033ufd 50V 10% X7R ROHS
7	ECA-1VM221BJ	PANASONIC	2	C8, C31	CAP ALUM ELEC M RADIAL 220UFD 35V 20% ROHS
8	C1005X7R1H104K	TDK CORP	2	C9, C32	CAP SMD0402 CERM 0.1ufd 50V 10% X7R ROHS
9	C1005X5R1A105K	TDK CORP	5	C10, C11, C13, C50, C51	CAP SMD0402 CERM 1.0UFD 10V 10% X5R ROHS
10	GRM188R60J106ME47D	MURATA	3	C12, C18, C33	CAP SMD0603 CERM 10UFD 6.3V 20% X5R ROHS
11	EMK105B7473KV-F	TAIYO YUDEN	2	C14, C16	CAP SMD0402 CERM 0.047UFD 16V 10% X7R ROHS
12	CC0402KRX7R8BB472	YAGEO	2	C15, C17	CAP SMD0402 CERM 4700pfd 25V 10% X7R ROHS
13	GRM155R71C104KA88D	MURATA	3	C19, C26, C34	CAP SMD0402 CERM 0.1UFD 16V X7R 10% ROHS
14	GRM155R60J475ME87D	MURATA	1	C20	CAP SMD0402 CERM 4.7UFD 6.3V X5R 10% ROHS
15	GRM21BR71H105KA12L	MURATA	1	C24	CAP SMD0805 CERM 1.0UFD 50V 10% X7R ROHS
16	C1005X7R1H222K	TDK CORP.	1	C25	CAP SMD0402 CERM 2200PFD 50V 10% X7R ROHS
17	GRM1555C1H331JA01D	MURATA	4	C27, C28, C29, C30	CAP SMD0402 CERM 330pfd 5% 50V COG ROHS
18	GRM219R71H334KA88D	MURATA	2	C35, C36	CAP SMD0805 CERM 0.33UFD 50V 10% X7R ROHS
	GRM219R71H334KA88D	MURATA	0	C37, C38, C39, C40	CAP SMD0805 CERM 0.33UFD 50V 10% X7R ROHS
19	UVY1E221MED	NICHICON	4	C41, C42, C43, C44	CAP ALUM ELEC VY RADIAL 220UFD 25V 20% 6.3x2.5x11 ROHS
20	CRCW040210K0FKED	VISHAY	6	R30, R31, R32, R33, R34, R35	RESISTOR SMD0402 10.0K OHMS 1% 1/16W ROHS
	CRCW040210K0FKED	VISHAY	0	R1, R2, R4, R5	RESISTOR SMD0402 10.0K OHMS 1% 1/16W ROHS
21	RMCF0402ZT0R00	STACKPOLE ELECTRONICS	1	R3	ZERO OHM JUMPER SMT 0402 0 OHM 1/16W,5% ROHS
	RMCF0402ZT0R00	STACKPOLE ELECTRONICS	0	R6, R10	ZERO OHM JUMPER SMT 0402 0 OHM 1/16W,5% ROHS
22	ERJ-2RKF4700X	PANASONIC	2	R7, R8	RESISTOR SMD0402 THICK FILM 470 OHMS 1/10W 1% ROHS
23	ERJ-2RKF1822X	PANASONIC	1	R9	RESISTOR SMD0402 THICK FILM 18.2K OHMS 1/10W 1% ROHS
24	RC0402FR-0715KL	YAGEO	6	R11, R12, R17, R18, R19, R20	RESISTOR SMD0402 THICK FILM 15.0K OHM 1% 1/16W ROHS
25	ERJ-3GEYJ180V	PANASONIC	4	R13, R14, R15, R16	RESISTOR SMD0603 18 OHMS 5% 1/10W ROHS
26	B1135AS-150M	TOKO JAPAN	4	L1, L2, L3, L4	INDUCTOR SMT 15uH 2.2A 77 mOHMS 20% DS85LC ROHS
27	B2PS-VH(LF)(SN)	JST	4	LEFT, SE-A, SE-B, RIGHT	JACK JST-VH RA 2-PIN 3.96mmLS ROHS
28	QTS-050-01-F-D-A	SAMTEC	1	J1	CONNECTOR SMT/THU 100 POS+GND MATE HEIGHT 5mm ROHS
29	35RASMT4BHNTRX	SWITCHCRAFT	1	DR-OUT	JACK MINI STEREO 3.5mm SMT W/SHUNTS ROHS
30	95947A060	MCMASTER-CARR	2	STANDOFFS	STANDOFF M3x30mm 6mm DIA HEX ALUM F-F ROHS
31	92000A118	MCMASTER-CARR	2	STANDOFF SCREWS	SCREW M3x8 PHILIPS PANHEAD STAINLESS STEEL ROHS

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Table 1. TAS572xxx EVM Bill of Materials (continued)

ITEM	MANU PART NUM	MANU	QTY	REF DESIGNATORS	DESCRIPTION
32	92148A150	MCMASTER-CARR	2	STANDOFF WASHERS	WASHER SPLIT-LOCK M3 6.2mm OD 0.7mm THICK STAINLESS STEEL ROHS
33	7007	KEYSTONE ELECTRONICS	1	GND	BINDING POST, BLACK, 15A ECONO ROHS
34	7006	KEYSTONE ELECTRONICS	1	VIN	BINDING POST, RED, 15A ECONO ROHS
		TOTAL	75		
X1	DO NOT POPULATE		17	C1, C2, C3, C4, C5, C6, C37, C38, C39, C40, R1, R2, R3, R4, R5, R6, R10	
SPECIAL NOTES TO THIS BILL OF MATERIALS					
SN1	These assemblies are ESD sensitive, ESD precautions shall be observed.				
SN2	These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.				
SN3	These assemblies must comply with workmanship standards IPC-A-610 Class 2.				

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4.2 TAS572xxx Schematics

Figure 3 and Figure 4 illustrate the schematics for this EVM.

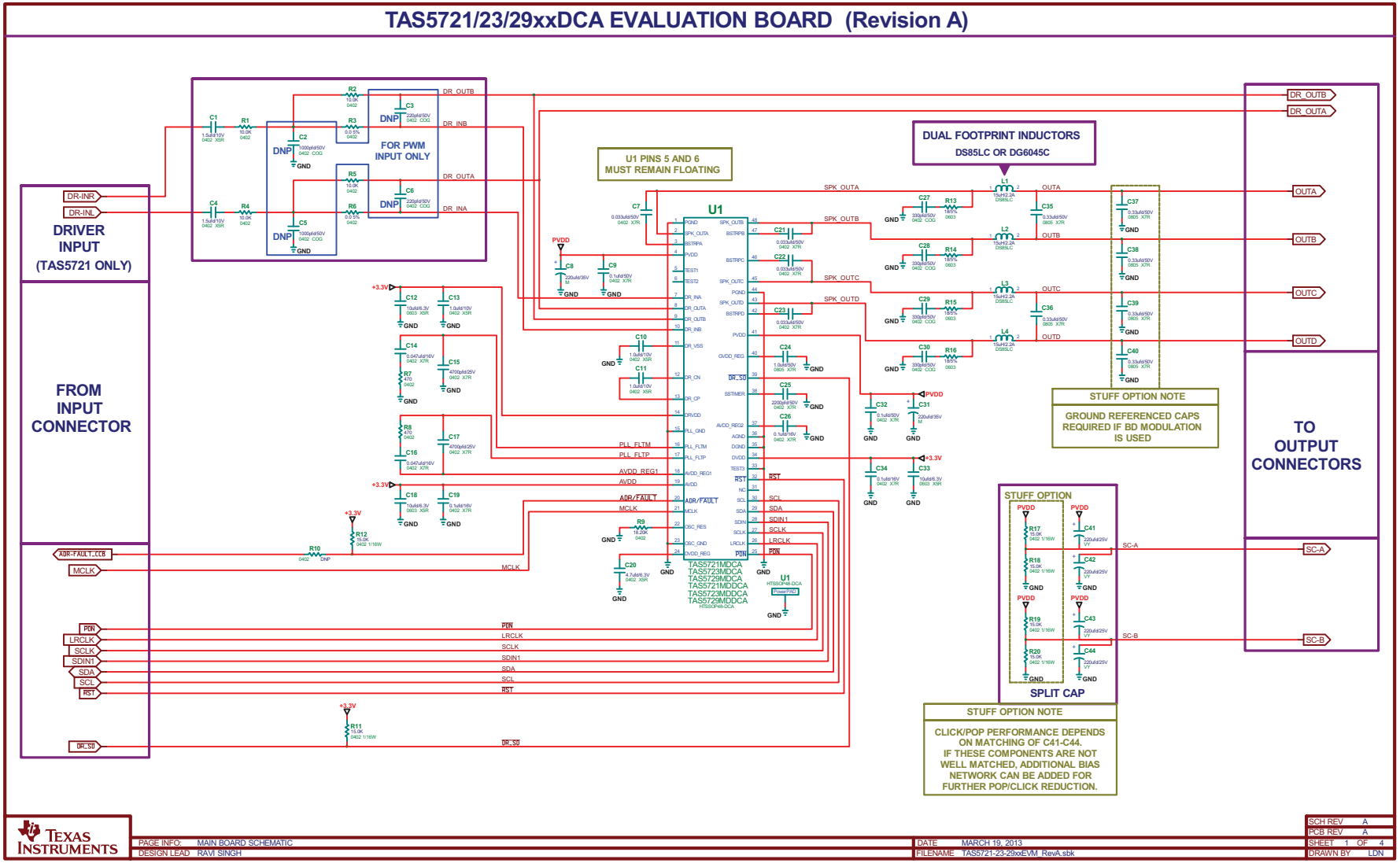

Figure 3. TAS572xxx Main Board Schematic

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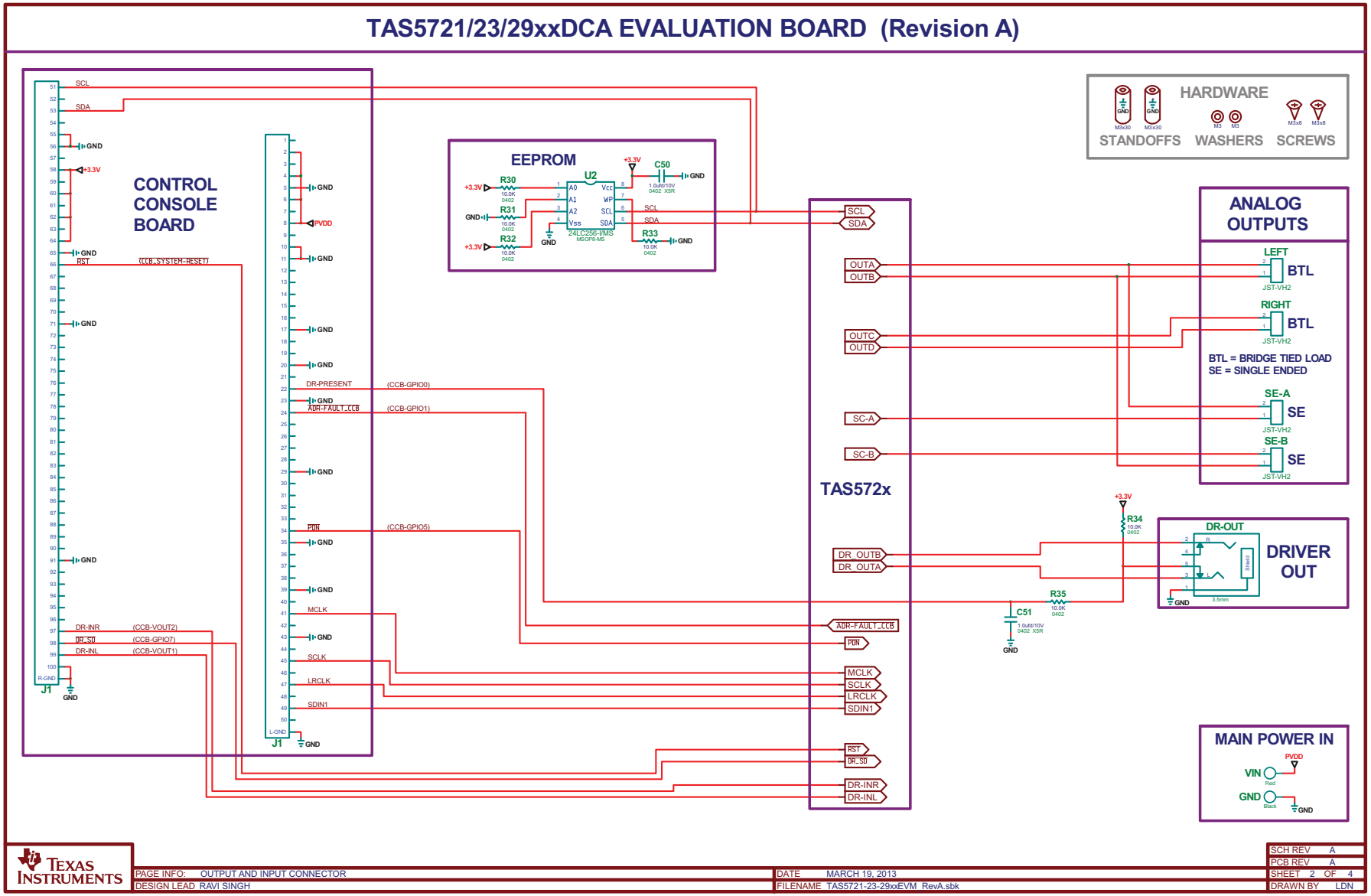

Figure 4. TAS572xxx Output and Input Connector Schematic

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4.3 PCB Layout

Figure 5 through Figure 8 are the PCB layouts for this EVM.

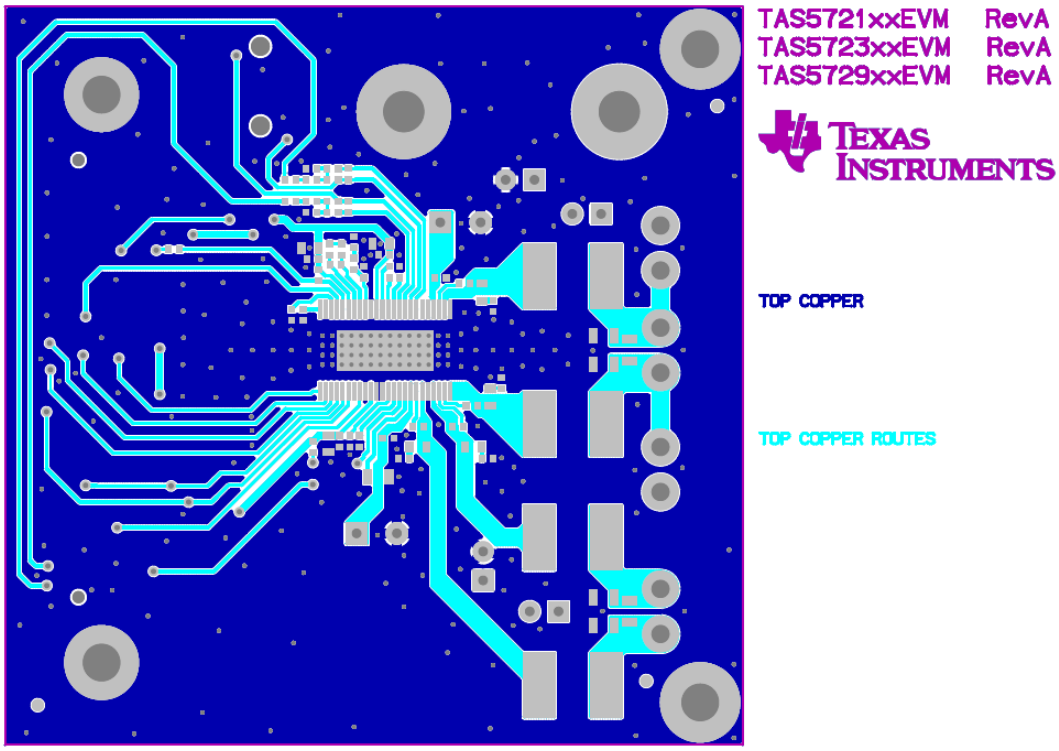

Figure 5. Top Copper Layout

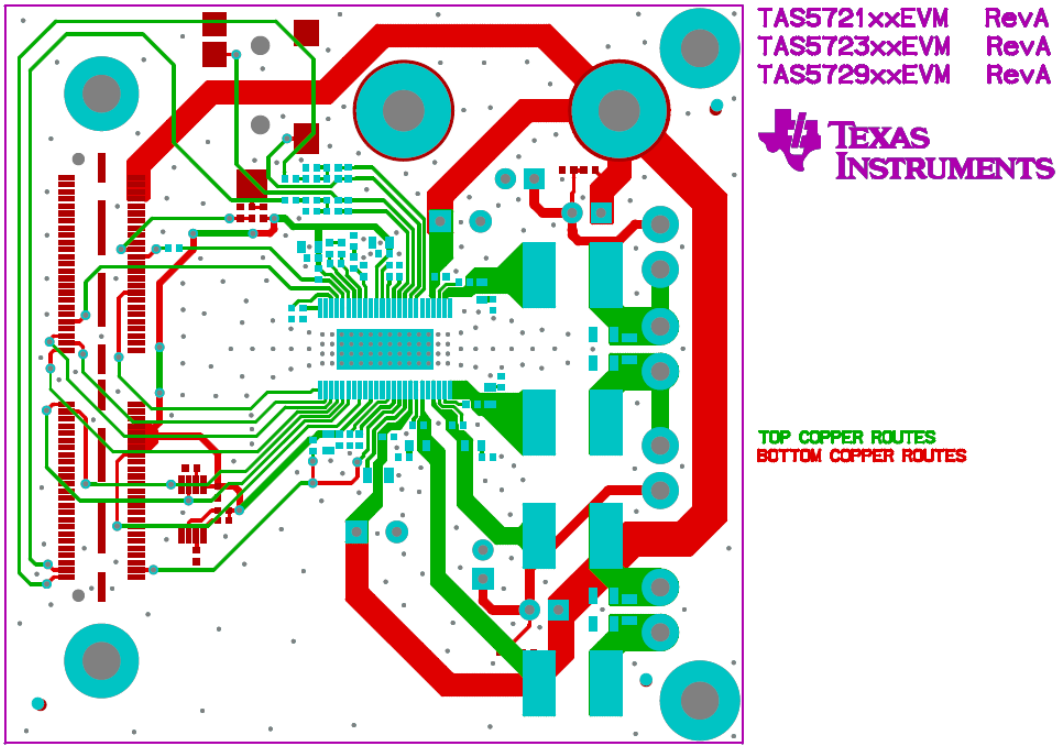

Figure 6. Top X-Ray View

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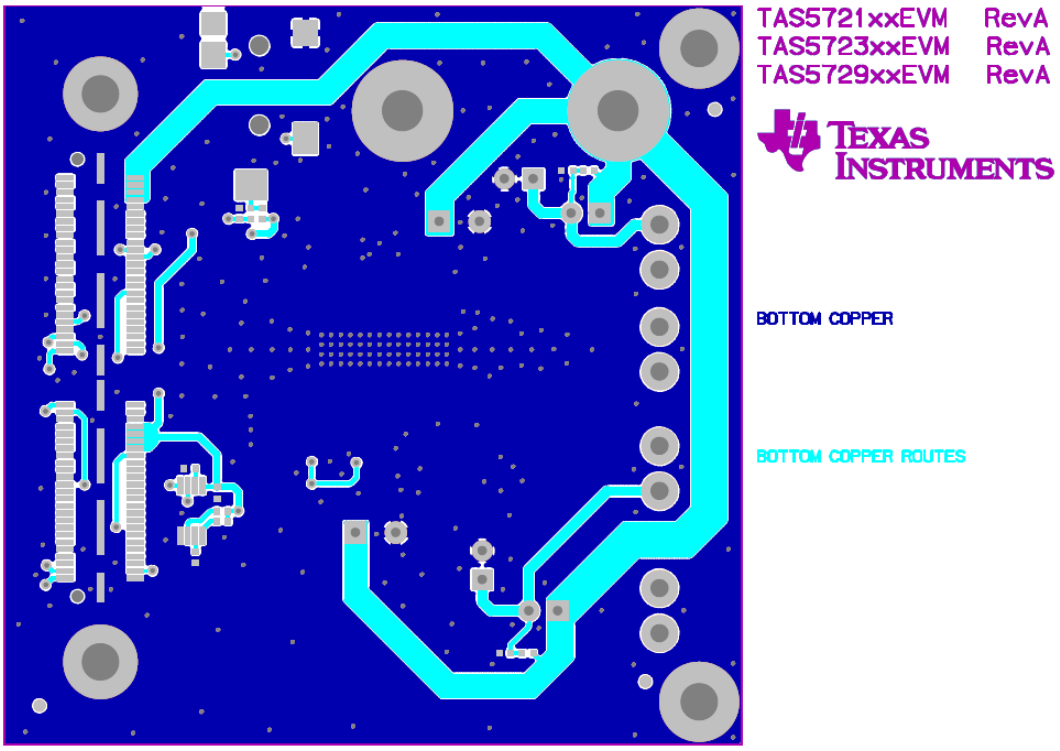

Figure 7. Bottom Copper Layout

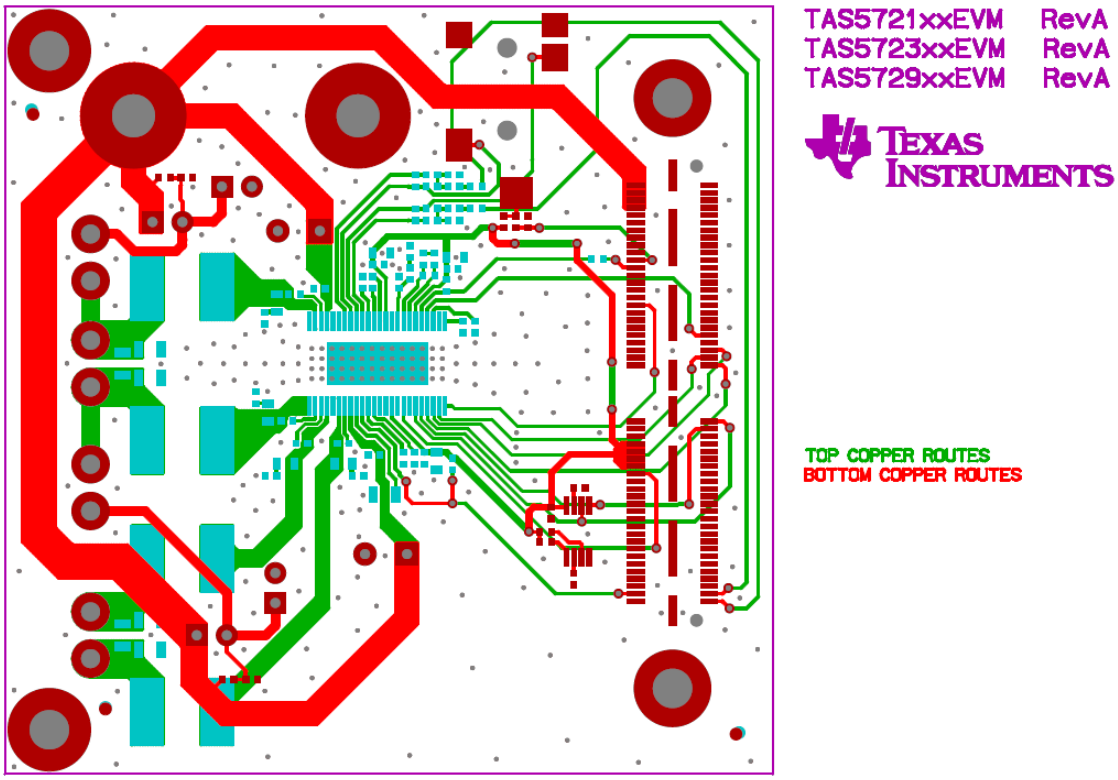

Figure 8. Bottom X-Ray View

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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.

【Important Notice for Users of this Product in Japan】

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.

Texas Instruments Japan Limited
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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.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

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