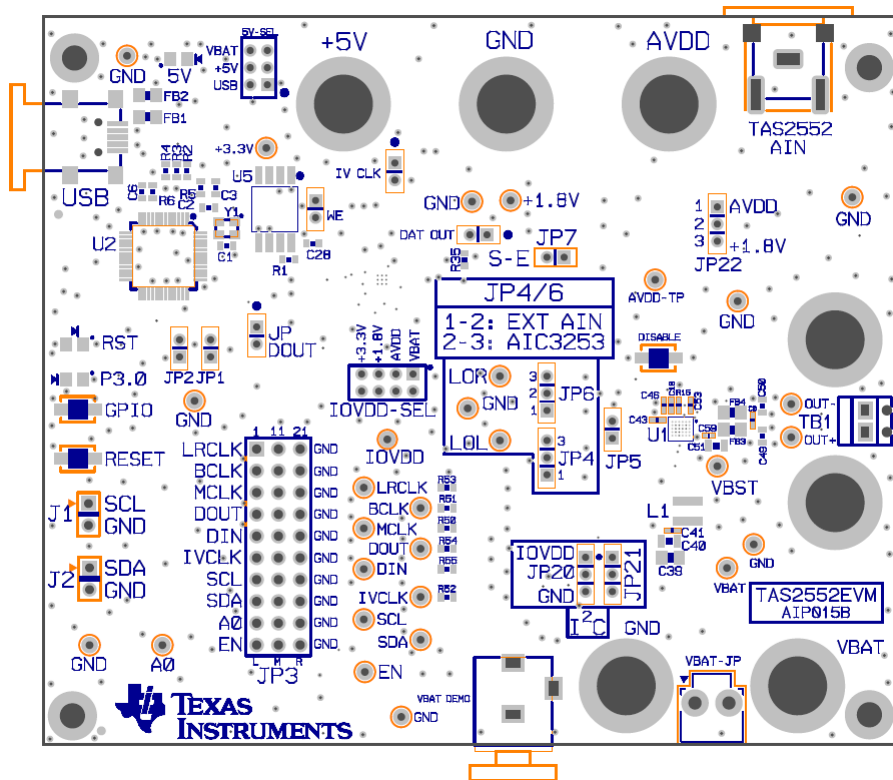


TAS2552 EVM

This user's guide contains support documentation for the TAS2552 evaluation module (EVM). Also included are the performance specifications, operating instructions, schematics, printed-circuit board (PCB) layouts and the bill of materials (BOM) for the TAS2552 EVM.



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1 Introduction

This section provides an overview of the Texas Instruments (TI) TAS2552 Class-D mono speaker amplifier evaluation module (EVM). It includes a brief description of the module and a list of EVM specifications.

1.1 Description

The TAS2552 is a high efficiency Class-D audio power amplifier with advanced battery current measurement and an integrated boost converter. It drives up to 3.5 W into an 8-Ω speaker. The built-in boost converter generates the Class-D amplifier supply rail. This boosted supply rail provides louder audio than a stand-alone amplifier directly connected to the battery.

The AGC function automatically adjusts Class-D gain to reduce battery current at end-of-charge voltages, and prevents output clipping and distortion.

The Class-D output switching is adjustable by the I²C interface, providing a method to slow the Class-D switching edge rate to improve EMI. For more information about the TAS2552, refer to the datasheet ([SLAS898](#)).

1.2 EVM Specifications

Table 1. EVM Specifications

Boost input supply voltage	2.7 V to 5.5 V
Analog supply voltage	1.6 V to 2.0 V
Digital I/O supply voltage	1.5 V to 3.3 V
Continuous output power, P _O , V _{DD} = 3.6 V, 8 Ω, THD+N 1%	3.5 W
USB Connection	Mini-USB

1.3 GUI Installation

Copy the supplied GUI into a directory and unzip it. Place the supplied scripts in the same directory

There is no set-up or other install necessary, simply run the GUI as described in [Section 2.1.3](#) of this document.

2 Operation

This section describes how to operate the TAS2552EVM.

2.1 Quick-Start List for Stand-Alone Operation

Use the following steps when operating the TAS2552EVM stand alone or when connecting the EVM into an existing circuit.

2.1.1 Power and Ground

Use the following steps to operate the EVM:

1. Verify that the external power sources are set to OFF.
2. Connect a 3.6-V supply to the VBAT terminal in the lower right corner of the EVM and the GND terminal located to the left of the VBAT terminal.
3. Make sure the 5V-SEL jumper in the upper left corner is in the "USB" Position (the red box in Figure 1). Connect the USB cable to the EVM. This will supply power to required blocks of the EVM.

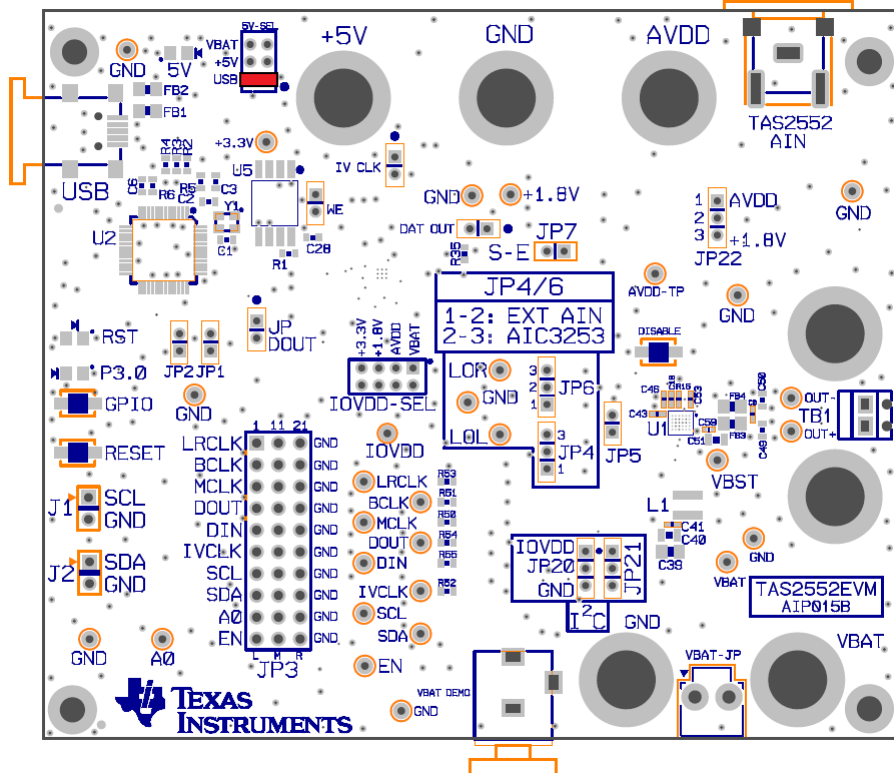
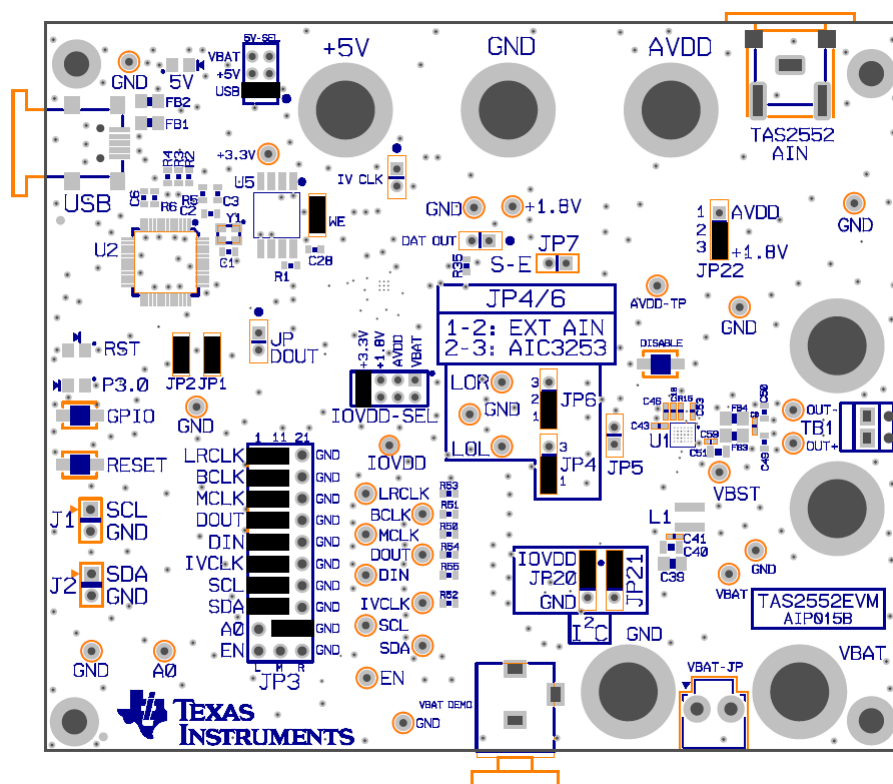


Figure 1. Power Connections

- Ensure the jumpers are set according to [Table 2](#) and [Figure 2](#):

Table 2. TAS2552EVM Default Jumper Settings for Analog Input Operation

Jumper Name	Position	Comments
5V-SEL	USB	Uses USB +5 V
IOVDD-SEL	+3.3V	Supplies +3.3 V to IOVDD from on-board LDO
SPI	ALL OUT	SPI interface is currently not being used
WE	OUT	Write protect for TAS1020 EEPROM
J1, J2	OUT	For external I ² C connectivity only
JP1, JP2 (SDA, SCL)	IN	Connect I ² C bus from TAS1020 to TAS2552 and AIC3253
JP3 – LRCLK	LEFT SIDE	Connects LRCLK to TAS2552
JP3 – BCLK	LEFT SIDE	Connects BCLK to TAS2552
JP3 – MCLK	LEFT SIDE	Connects MCLK to TAS2552
JP3 – DOUT	LEFT SIDE	Data out of the TAS2552
JP3 – DIN	LEFT SIDE	Data coming into the TAS2552
JP3 – IVCLK	LEFT SIDE	Connects IVCLK to TAS2552
JP3 – SCL	LEFT SIDE	Connects SCL to TAS2552
JP3 – SDA	LEFT SIDE	Connects SDA to TAS2552
JP3 – A0	RIGHT SIDE	Address pin of the TAS2552
JP3 – EN	OUT	Leave this pin floating. ENABLE pin pulled high
JP4, JP6	1 – 2	External RCA analog input connector to TAS2552
JP5	OUT	n/a
JP7 – SE	OUT	Default input mode set to differential
JP11 – JP17	ALL OUT	These jumpers are hard pull-ups tied to IOVDD
JP20, JP21	IOVDD	I ² C pull-up resistors for SDA and SCL
JP22	+1.8V	Supplies +1.8 V to AVDD from on-board LDO


Figure 2. TAS2552EVM Default Jumper Settings

If this is the first time you connect the EVM to a PC, Windows® will install it as a USB HID device.

2.1.1.1 Jumpering Notes

The EVM can run in several input modes:

1. Analog input – Remove all of the jumpers in the JP3 block except for SDA, SCL, and A0. Be sure that JP4/6 are in the 1 to 2 position. *Run the TAS255x_Analog_Input_Init_Script.cfg script.*
2. Digital input from digital interface when attached to a device like an AP PSIA – Remove all of the jumpers in the JP3 block except for SDA, SCL, and A0. Be sure that jumpers IV CLK, JP DOUT, and DAT OUT are not installed. *Run the TAS255x_I2S_Input_Init_Script.cfg script.*
3. Digital input from a PC media player to the digital input of the TAS2552 – Install all of the jumpers in the JP3 jumper block except for the EN jumper. Be sure that the jumpers IV CLK, JP DOUT, and DAT OUT are not installed. *Run the TAS255x_I2S_Input_Init_Script.cfg script.*

2.1.2 Inputs and Outputs

The inputs and outputs for this EVM are described in this section.

2.1.2.1 Audio

1. Verify that the audio source is set to the minimum level.
2. Connect the audio source to the TAS2552-AIN RCA jack located in the top right corner of the EVM (highlighted in red in [Figure 3](#)).
3. Connect an 8-Ω load to the OUT– and OUT+ terminals.

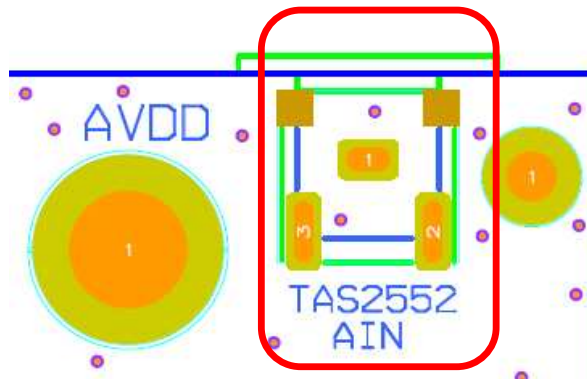


Figure 3. TAS2552EVM Analog Input Connections

2.1.2.2 Shutdown Controls

Shutdown is controlled with the pushbutton labeled “DISABLE”, see Figure 4. Press and hold DISABLE to place the TAS2552 in shutdown. The device can be activated via the I²C interface.

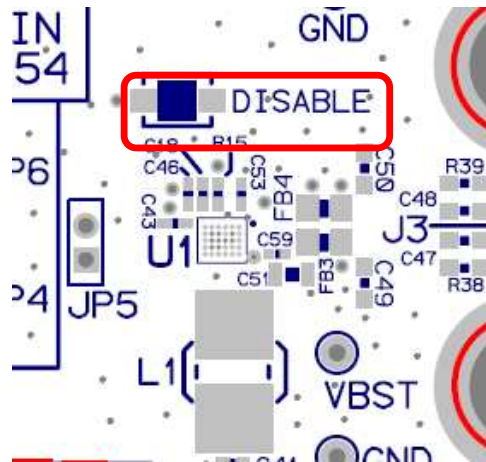


Figure 4. DISABLE Pushbutton

2.1.3 Power Up

1. Verify the correct connections as described in Section 2.1.1 and Section 2.1.2.
2. Verify the correct voltage setting of the power supply and turn ON the power supply.
3. Run CodeControl.exe and select TAS2552EVM. The GUI starts and shows the main TAS2552 block diagram with corresponding controls. The correct EVM name should appear at the top of the screen. If the program fails to detect the EVM properly, try unplugging the USB cable and plug it into the EVM again.

Note: This EVM uses the TAS255x GUI as illustrated in Figure 5.

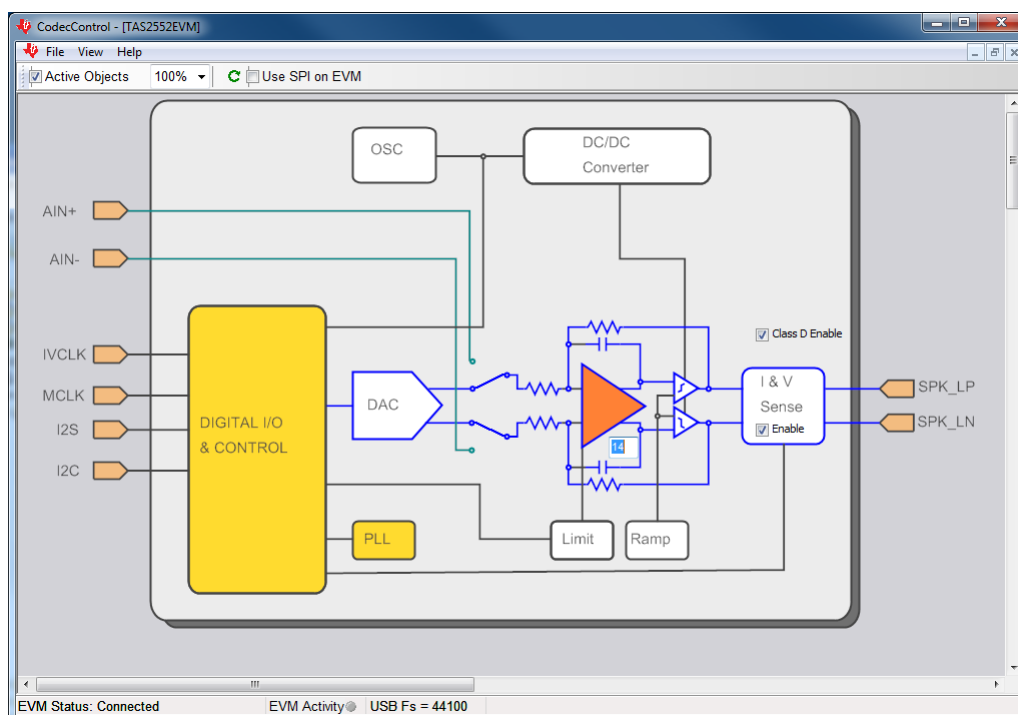


Figure 5. CodeControl GUI

2.1.4 Gain Setting and Input configuration

The gain and input mode settings are programmed via the I²C interface. The default gain of the TAS2552 is set to -21.5 dB. The gain can be adjusted by clicking on the orange amplifier block and moving the slider up/down as illustrated in Figure 6. The input can be switched from digital to analog and vice versa by clicking on the input MUX mode switch.

When clicking on the “Class-D Enable” checkbox, the output of the amplifier will be enabled and the Class-D will start switching. Set the Volume Control to 0 dB. Refer to the datasheet [SLAS898](#) for more details on gain settings.

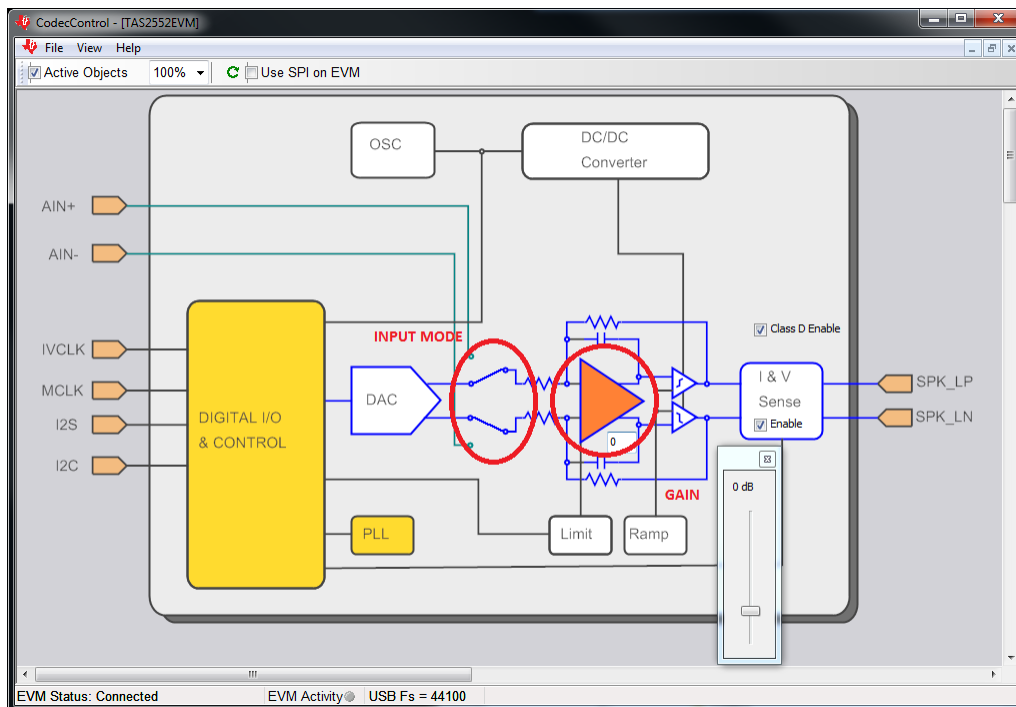


Figure 6. TAS2552 GUI Gain and Input Settings

2.1.5 Analog Input Configuration

In order to operate the TAS2552 in Analog input mode, go to **View** → **Command**, and open the **TAS255x_Analog_Input_Init_Script.cfg** setup script from the **Scripts** folder. Click **Run** to execute the script.

After running this script, you should be able to input a signal and measure the output.

2.1.6 Digital Input Configuration

In order to operate the TAS2552 in digital input mode (I2S from TAS1020), set the jumpers as shown in [Table 3](#):

Table 3. Jumper Settings for Digital Input Mode

Jumper Name	Position	Comments
JP3 (LRCLK)	L-M	Connects LRCLK line to TAS2552
JP3 (BCLK)	L-M	Connects BCLK line to TAS2552
JP3 (MCLK)	L-M	Connects MCLK line to TAS2552
JP3 (DIN)	L-M	Connects Data In line to TAS2552
JP3 (SCL, SDA)	L-M	Connects I ² C lines to TAS2552
JP3 (FAULT)	L-M	Connects FAULT line from TAS2552 to TAS1020

Go to **View** → **Command** and open the **TAS255x_I2S_Input_Init_Script.cfg** setup script located in the **Scripts** sub-directory. Click **Run** to execute the script.

If using an external I2S interface or PSIA, the clock and data lines can be connected straight to JP3. The rightmost column of headers is GND for each pair. The same I2S script can also be used for direct digital.

Note: The sample rate for this script is 44.1 kHz. The format is I2S.

3 Reference

This section includes the EVM schematics, board layout views, and the BOM.

3.1 TAS2552EVM Schematic

Figure 7 through Figure 9 illustrate the schematics for this EVM.

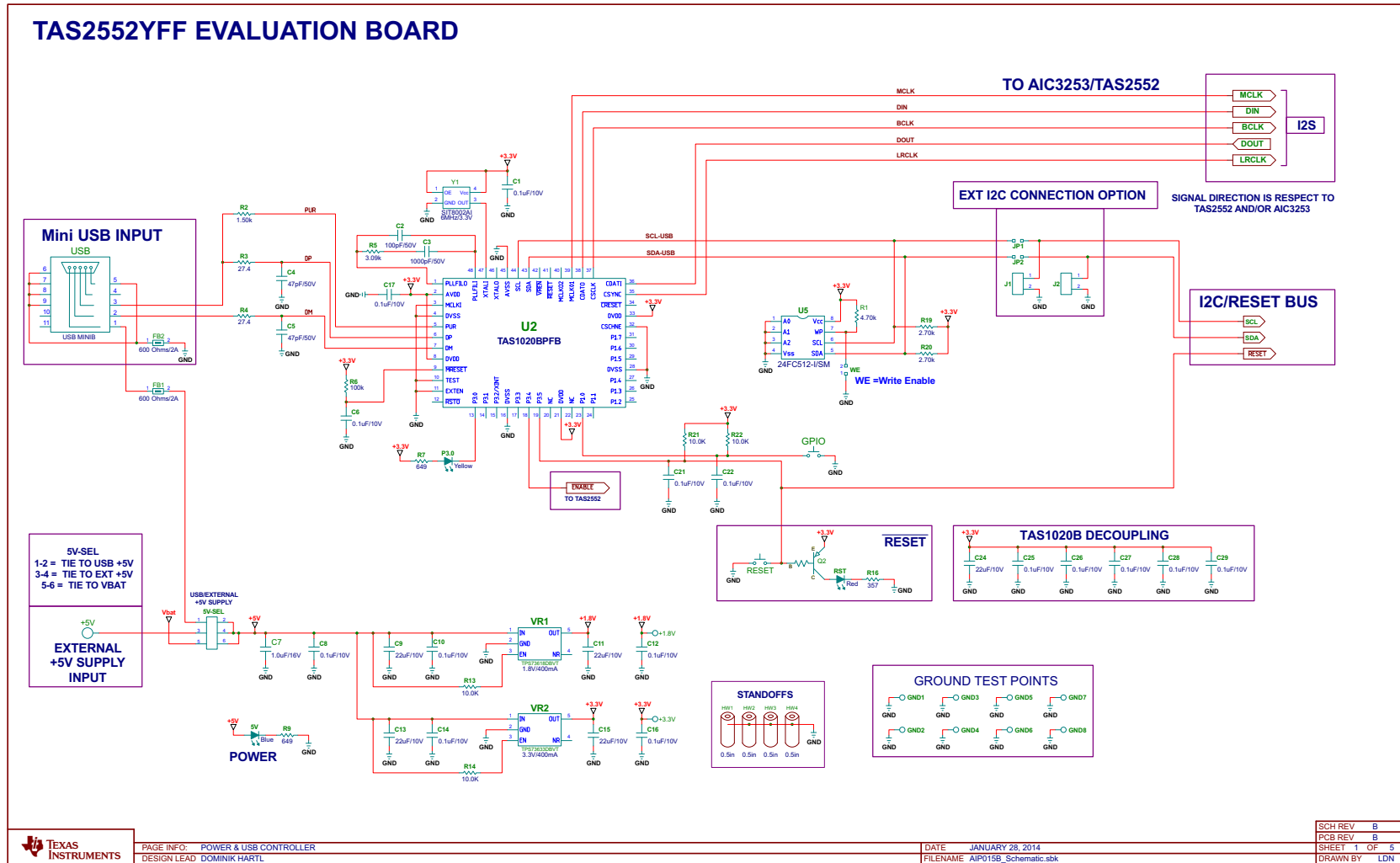


Figure 7. TAS2552 EVM Power and USB Controller Schematic

TAS2552YFF EVALUATION BOARD

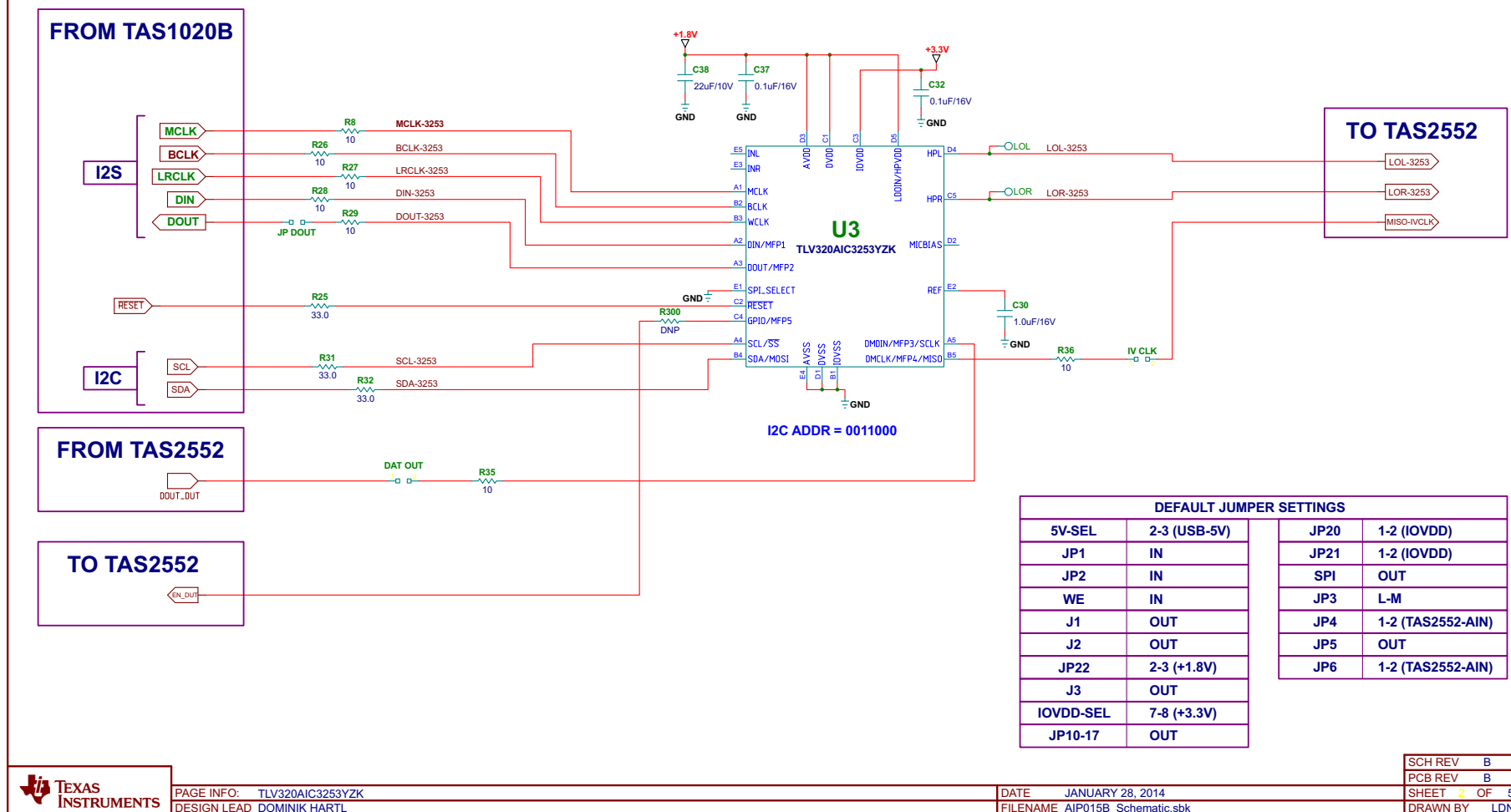


Figure 8. TAS2552 EVM Schematic (2 of 3)

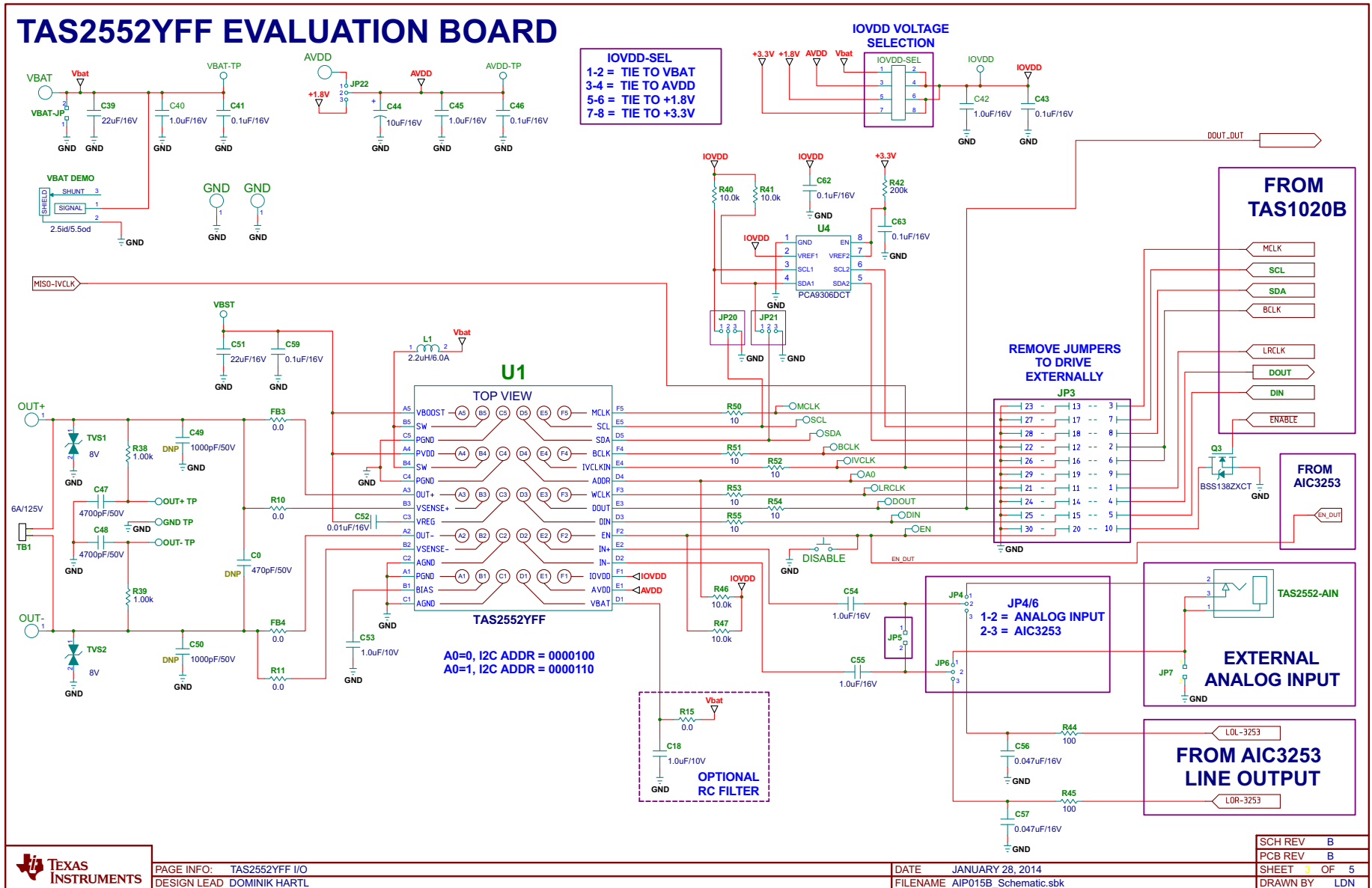


Figure 9. TAS2552 EVM Schematic (3 of 3)

3.2 TAS2552EVM PCB Layers

Figure 10 and Figure 11 illustrate the PCB layouts for this EVM.

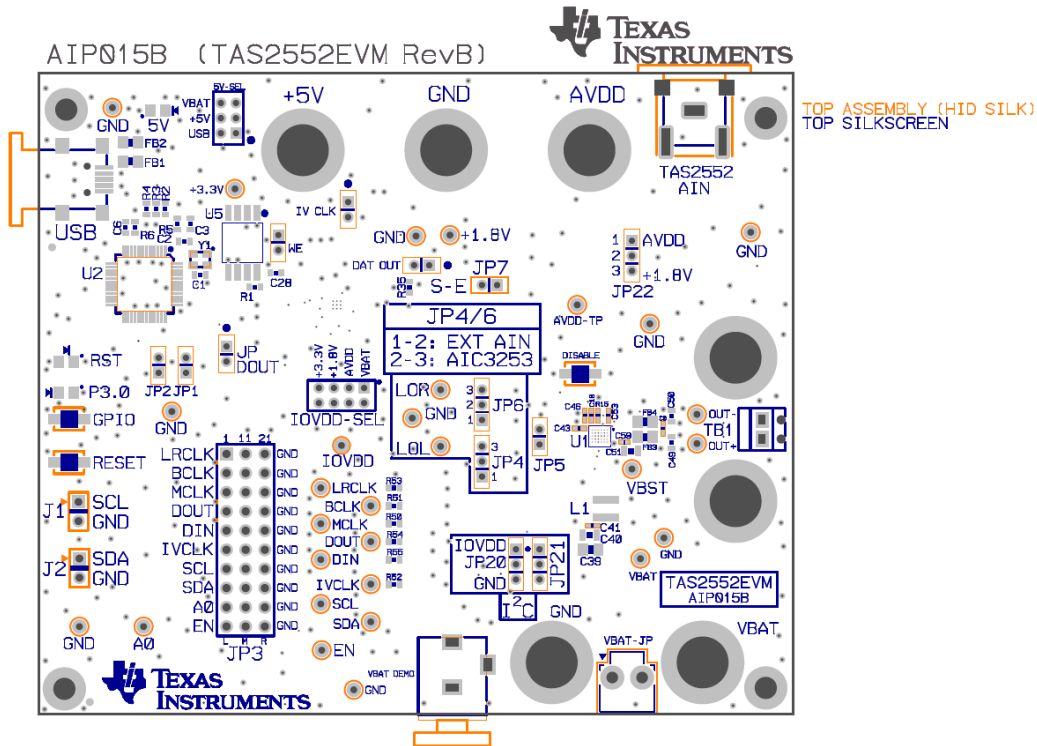


Figure 10. TAS2552 EVM Top X-Ray View

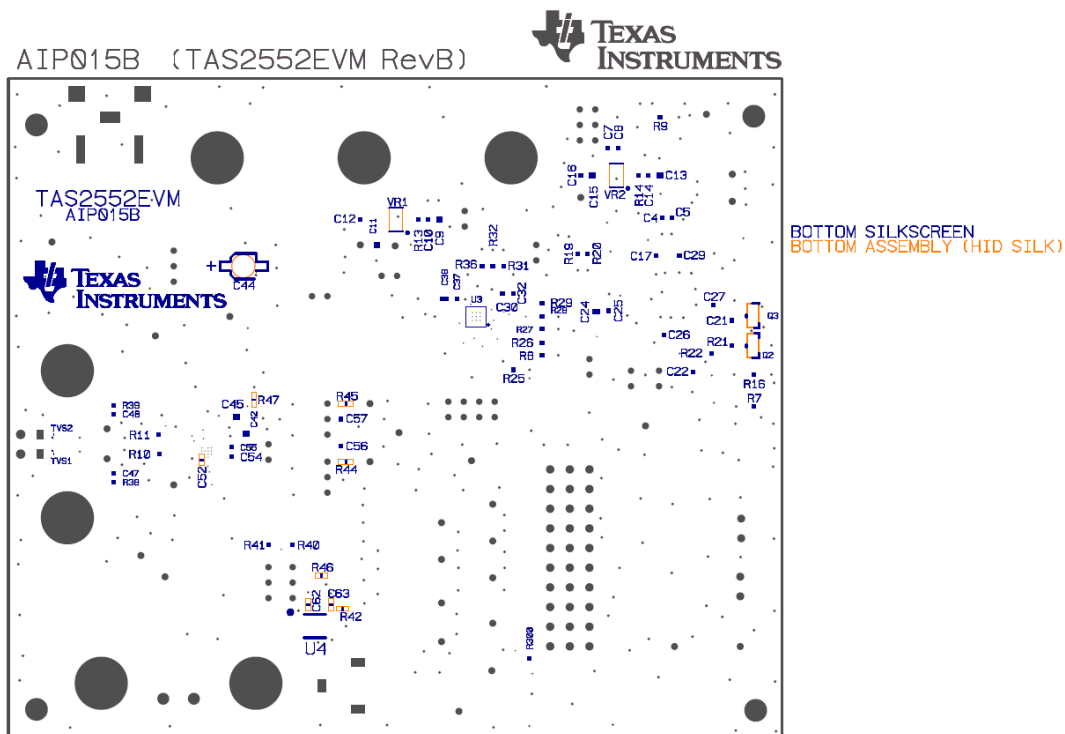


Figure 11. TAS2552 EVM Bottom X-Ray View

3.3 TAS2552 EVM Bill of Materials

Table 4 contains the BOM for this EVM.

Table 4. Bill of Materials for TAS2552EMV

Item	MFG Part NUM	MFG	Qty	Ref Designators	Description
1	TAS2552YFF	TEXAS INSTRUMENTS	1	U1	DIG IN 3.5W CLASS-D AUDIO AMP ADAPTIVE BOOST SPKR SENSE WCSP30-YFF ROHS
2	TAS1020BPFB	TEXAS INSTRUMENTS	1	U2	USB STREAMING CONTROLLER TQFP48-PFB ROHS
3	TLV320AIC3253IYZKR	TEXAS INSTRUMENTS	1	U3	ULTRA LOW POWER STEREO AUDIO CODEC WITH miniDSP WCSP25-YZK ROHS
4	PCA9306DCTR	TEXAS INSTRUMENTS	1	U4	DUAL BIDIR I2C BUS AND SMBUS VOLT LEVEL TRANS SSOP8-DCT ROHS
5	24FC512-I/SM	MICROCHIP	1	U5	512K (64Kx8) I2C SERIAL EEPROM SOIC8-SM ROHS
6	TPS73618DBVT	TEXAS INSTRUMENTS	1	VR1	VOLT REG 1.8V 400MA LDO CAP FREE NMOS SOT23-DBV5 ROHS
7	TPS73633DBVT	TEXAS INSTRUMENTS	1	VR2	VOLT REG 3.3V 400MA LDO CAP FREE NMOS SOT23-DBV5 ROHS
8	DDTA143TCA-7-F	DIODES INC.	1	Q2	TRANSISTOR-PNP PREBIASED 4.7K SOT23-DBV3 ROHS
9	BSS138TA	ZETEX	1	Q3	N-CH ENHANCEMENT MODE VERT DMOS FET SOT23-DBV3 ROHS
10	ESD8V0R1B-02LSE6327	INFINEON	2	TVS1,TVS2	TVS BIDIR ILINE 8V TSSLP-2-1 ROHS
11	SML-LXT0805YW-TR	LUMEX OPTO	1	P3.0	LED, YELLOW 2.0V SMD0805 ROHS
12	SML-LXT0805SRW-TR	LUMEX OPTO	1	RST	LED, RED 2.0V SMD0805 ROHS
13	LTST-C170TBKT	LITE-ON INC.	1	5V	LED, BLUE 3.3V SMD0805 ROHS
14	SIT8002AI-13-33E-6.00000T	SITIME	1	Y1	OSCILLATOR SMT 6MHz 3.3V OUT-ENABLE ROHS
15	C0402C471K5RACTU	KEMET	0	C0	CAP SMD0402 CERM 470PFD 50V 10% X7R ROHS
16	C0603C104K8RACTU	KEMET	15	C1, C6, C8, C10, C12, C14, C16, C17, C21, C22, C25, C26, C27, C28, C29	CAP SMD0603 CERM 0.1UFD 10V 5% X7R ROHS
17	GRM1885C1H101JA01D	MURATA	1	C2	CAP SMD0603 CERM 100PFD 50V 5% COG ROHS
18	C1608C0G1H102J	TDK CORP.	1	C3	CAP SMD0603 CERM 1000PFD 50V 5% COG ROHS
19	GRM1885C1H470JA01D	MURATA	2	C4, C5	CAP SMD0603 CERM 47PFD 50V 5% COG ROHS
20	C1608X7R1C105K	TDK	4	C7, C30, C54, C55	CAP SMD0603 CERM 1.0UFD 16V 10% X7R ROHS
21	LMK212BJ226MG-T	TAIYO YUDEN	6	C9, C11, C13, C15, C24, C38	CAP SMD0805 CERM 22UFD 10V 20% X5R ROHS
22	C1005X5R1A105K	TDK CORP	2	C18, C53	CAP SMD0402 CERM 1.0UFD 10V 10% X5R ROHS
23	GRM188R71C104KA01D	MURATA	2	C32, C37	CAP SMD0603 CERM 0.1UFD 16V 10% X7R ROHS
24	C2012X5R1C226K	TDK	2	C39, C51	CAP SMD0805 CERM 22UFD 16V 10% X5R ROHS
25	C2012X7R1C105K	TDK	3	C40, C42, C45	CAP SMD0805 CERM 1.0UFD 16V 10% X7R ROHS
26	GRM155R71C104KA88D	MURATA	6	C41, C43, C46, C59, C62, C63	CAP SMD0402 CERM 0.1UFD 16V X7R 10% ROHS
27	EEE-1CS100SR	PANASONIC	1	C44	CAP ALUM-ELECT SMD-VSA 10UFD 16V 20% ROHS
28	GRM188R71H472KA01D	MURATA	2	C47, C48	CAP SMD0603 CERM 4700PFD 50V 10% X7R ROHS
29	C1608C0G1H102J	TDK CORP.	0	C49, C50	CAP SMD0603 CERM 1000PFD 50V 5% COG ROHS
30	0402YC103KAT2A	AVX	1	C52	CAP SMD0402 CERM 0.01ufd 16V 10% X7R ROHS
31	GRM188R71C473KA01D	MURATA	2	C56, C57	CAP SMD0603 CERM 0.047UFD 16V X7R 10% ROHS
32	CRCW06034K70FKEA	VISHAY	1	R1	RESISTOR SMD0603 4.70K OHMS 1% 1/10W 4.70K ROHS
33	ERJ-3EKF1501V	PANASONIC	1	R2	RESISTOR SMD0603 1.50K OHM 1% THICK FILM 1/10W ROHS
34	CRCW060327R4FKEA	VISHAY	2	R3, R4	RESISTOR SMD0603 27.4 OHM 1/10W 1% ROHS
35	ERJ-3EKF3091V	PANASONIC	1	R5	RESISTOR SMD0603 3.09K OHM 1% THICK FILM 1/10W ROHS

Table 4. Bill of Materials for TAS2552EMV (continued)

Item	MFG Part NUM	MFG	Qty	Ref Designators	Description
36	RMCF0603JT100K	STACKPOLE ELECTRONICS	1	R6	RESISTOR SMD0603 100K OHMS 5% 1/10W ROHS
37	RC0603FR-07649RL	YAGEO	2	R7, R9	RESISTOR SMD0603 THICK FILM 649 OHMS 1% 1/10W ROHS
38	RC0603JR-0710RL	YAGEO	13	R8, R26, R27, R28, R29, R35, R36, R50, R51, R52, R53, R54, R55	RESISTOR SMD0603 THICK FILM 10 OHM 5% 1/10W ROHS
39	ERJ-3GEY0R00V	PANASONIC	2	R10, R11	RESISTOR SMD0603 0.0 OHM 5% THICK FILM 1/10W ROHS
40	ERJ-3EKF1002V	PANASONIC	6	R13, R14, R21, R22, R40, R41	RESISTOR SMD0603 10.0K 1% THICK FILM 1/10W ROHS
41	RMCF0402ZT0R00	STACKPOLE ELECTRONICS	1	R15	ZERO OHM JUMPER SMT 0402 0 OHM 1/16W,5% ROHS
42	ERJ-3EKF3570V	PANASONIC	1	R16	RESISTOR SMD0603 357 OHM 1% THICK FILM 1/10W ROHS
43	ERJ-3EKF2701V	PANASONIC	2	R19, R20	RESISTOR SMD0603 2.70K OHMS 1% 1/10W ROHS
44	ERJ-3EKF33R0V	PANASONIC	3	R25, R31, R32	RESISTOR SMD0603 33.0 OHMS 1% 1/10W ROHS
45	RC0603FR-071KL	YAGEO	2	R38, R39	RESISTOR SMD0603 THICK FILM 1.00K OHM 1% 1/10W ROHS
46	RC0402FR-07200KL	YAGEO	1	R42	RESISTOR SMD0402 THICK FILM 200K OHMS 1% 1/16W ROHS
47	RMCF0402FT100R	STACKPOLE ELECTRONICS	2	R44, R45	RESISTOR SMD0402 100 OHMS 1% 1/16W ROHS
48	CRCW040210K0FKED	VISHAY	2	R46, R47	RESISTOR SMD0402 10.0K OHMS 1% 1/16W ROHS
49	ERJ-3GEY0R00V	PANASONIC	0	R300	RESISTOR SMD0603 0.0 OHM 5% THICK FILM 1/10W ROHS
50	MPZ2012S601A	TDK	2	FB1, FB2	FERRITE BEAD SMD0805 600 Ohms 2A ROHS
51	ERJ-6GEY0R00V	PANASONIC	2	FB3, FB4	RESISTOR SMD0805 ZERO OHM 5% 1/8W ROHS
52	XFL4020-222MEB	COIL CRAFT	1	L1	SHIELDED POWER INDUCTOR 2.2uH 6.0A ROHS
53	PBC02SAAN	SULLINS	2	J1, J2	HEADER THRU MALE 2 PIN 100LS 120 TAIL GOLD ROHS
54	TSW-110-08-T-T	SAMTEC	1	JP3	HEADER,THU,30P,3X10,MALE,TRIPLE ROW,100LS,200TL
55	26630301RP2	NORCOMP	5	JP4, JP6, JP20, JP21, JP22	HEADER 3 PIN, PCB 2.0MM ROHS
56	26630201RP2	NORCOMP	8	DAT OUT, IV CLK, JP1, JP2, JP5, JP7, JP DOUT, WE	HEADER 2 PIN, PCB 2.0MM ROHS
57	26640801RP2	NORCOMP	1	IOVDD-SEL	HEADER 8 PIN 2x4 PCB 2.0MM ROHS
58	26640601RP2	NORCOMP	1	5V-SEL	HEADER 6 PIN 2x3 PCB 2.0MM ROHS
59	B2P-VH(LF)(SN)	JST	1	VBAT-JP	JACK JST-VH 2-PIN 3.96mmLS ROHS
60	UX60-MB-5ST	HIROSE	1	USB	JACK USB MINIB SMT-RA 5PIN ROHS
61	PJ-RAN1X1U01X	SWITCHCRAFT	1	TAS2552-AIN	JACK, RCA 3-PIN PCB-RA BLACK ROHS
62	PJ-102B	CUI INC.	1	VBAT DEMO	JACK MINI-PWR THRU-RA 2,5ID/5.5OD 16VDC 5A ROHS
63	1725656	PHOENIX CONTACT	1	TB1	TERMINAL BLOCK MPT COMBICON 2PIN 6A/125V GREEN 100LS ROHS
64	5001	KEYSTONE ELECTRONICS	9	GNDx9	PC TESTPOINT, BLACK, ROHS
65	5002	KEYSTONE ELECTRONICS	20	A0, EN, DIN, LOL, LOR, SCL, SDA, BCLK, DOUT, MCLK, VBST, +1.8V, +3.3V, IOVDD, IVCLK, LRCLK, AVDD-TP, OUT+ TP, OUT- TP, VBAT-TP	PC TESTPOINT, WHITE, ROHS
66	TL1015AF160QG	E-SWITCH	3	GPIO, RESET, DISABLE	SWITCH, MOM, 160G SMT 4X3MM ROHS
67	111-2223-001	EMERSON NPCS	7	+5V, GND, AVDD, OUT+, OUT-, VBAT, GND22	BINDING-POST,NONINS,THRU,ROHS
68	2029	KEYSTONE ELECTRONICS	4	STANDOFFS	STANDOFF 4-40 0.5IN 3/16IN DIA ALUM RND F-F ROHS
69	PMSSS 440 0025 PH	B&F FASTENER SUPPLY	4	STANDOFF SCREWS	4-40 SCREW STEEL 0.250 IN ROHS
70	969102-0000-DA	3M	8	JP3-LRCLK(L), JP3-BCLK(L), JP3-MCLK(L), JP3-DOUT(L), JP3-DIN(L), JP3-SCL(L), JP3-SDA(L), JP3-A0(R)	SHUNT BLACK AU FLASH 0.100LS OPEN TOP ROHS
71	810-002-SP2L001	NORCOMP INC.	10	JP1, JP2, JP4(1-2), JP5, JP6(1-2), JP20(1-2), JP21(1-2), JP22(2-3), 5V-SEL (Shunt VBAT), IOVDD-SEL(+3.3V)	SHUNT BLACK AU FLASH 2mmLS OPEN TOP ROHS
		TOTAL	201		

Table 4. Bill of Materials for TAS2552EMV (continued)

Item	MFG Part NUM	MFG	Qty	Ref Designators	Description
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.				
SN4	Ref designators marked with an asterisk (***) cannot be substituted. All other components can be substituted with equivalent MFG's components.				

EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

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REGULATORY COMPLIANCE INFORMATION

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 EVMs for RF Products 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.

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

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

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

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.
3. Since the EVM is not a completed product, it may not meet all applicable regulatory and safety compliance standards (such as UL, CSA, VDE, CE, RoHS and WEEE) which may normally be associated with similar items. You assume full responsibility to determine and/or assure compliance with any such standards and related certifications as may be applicable. 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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No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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