

TAS5805M Evaluation Module

This user's guide describes the operation of the TAS5805M Evaluation Modules (EVM). The TAS5805MEVM is a stand-alone EVM. Use the PurePath™ Control Console 3 GUI (PPC3) to initialize and operate this EVM. The main contents of this document are:

1. Hardware descriptions and implementation
2. TAS5805MEVM operations

Required equipment and accessories:

1. TAS5805MEVM
2. A USB micro type-B cable
3. Power Supply Unit (PSU)
4. Speakers and cables
5. Desktop or laptop running Windows 7, Windows 8 or Windows 8.1
6. Audio source: This can be a DVD player with a coaxial cable or Playback Media from Windows 7, Windows 8 or Windows 8.1.

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Trademarks

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1 Hardware Overview

The TAS5805MEVM showcases the latest TI digital input Class-D closed loop amplifier. The TAS5805M is a digital input stereo Class-D audio amplifier with enhanced processing and low idle power dissipation. The TAS5805MEVM is a stand-alone EVM, which has a single power supply input, USB control via PurePath Control Console 3 (PPC3) and flexible audio input options.

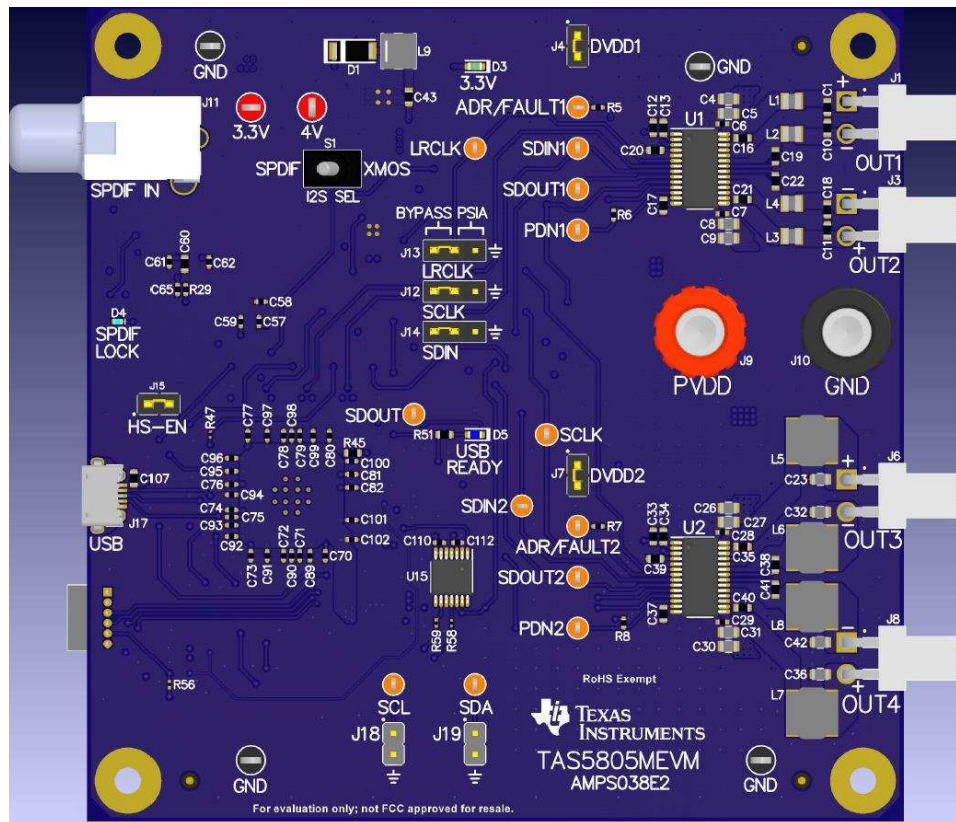


Figure 1. TAS5805MEVM

1.1 Features

- 96-kHz Input Sample Rate Support
- 2.0, Mono and 2.1 Capable
- Operates in BTL or PBTL
- Provides flexible input signal routing (USB, Coax and external I2S)
- Demonstration, Evaluation and Development environment via the PurePath Console 3 software (GUI)

1.2 Functions

The digital audio data input to the TAS5805MEVM is selectable from USB audio, coaxial SPDIF and PSIA (external I2S).

1.3 Detailed Operations

The TAS5805MEVM only requires a single supply to operate. Three different audio sources can be selected:

1. If XMOS is selected manually by toggling the S1 switch, the Windows Media Player can be used to stream audio.
2. If SPDIF is selected manually by toggling the S1 switch, a DVD player with a coaxial cable can be used to provide audio stream.
3. If external digital audio source such as Programmable Serial Interface Adapter (PSIA) from Audio Precision, jumpers can be used to insert external I2S signals.

The USB connection is also used to provide I²C communications with the two TAS5805M devices on the EVM. The Pure Path Console 3 (PPC3) is the software tool which can initialize and operate this EVM.

2 Hardware Setup

1. Connect speakers to TAS5805MEVM.
2. Connect a PSU to the TAS5805MEVM and turn on the power. The 3.3-V LED (Green) is illuminated.
3. Plug in a USB cable from the PC to the TAS5805MEVM. The USB READY LED (Blue) is also illuminated.
4. If a coaxial SPDIF source is used, the blue SPDIF LOCK LED is illuminated.

2.1 I²C Device Addresses

The default 7-bit I2C addresses on the EVM are set to 0x2c for the top device (U1) and 0x2d for the bottom one (U2).

3 Schematics, Board Layouts, and Bill of Materials

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

3.1 Schematics

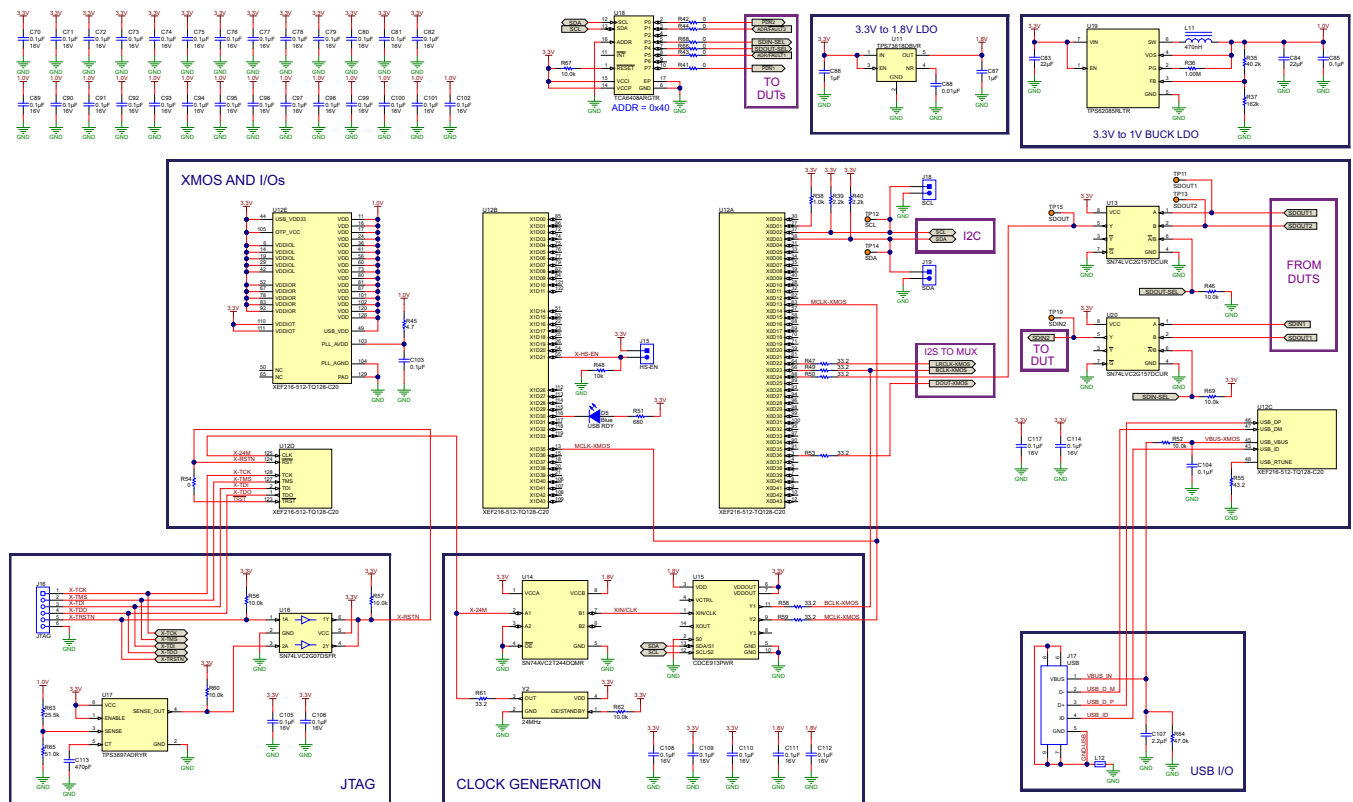


Figure 2. TAS5805MEVM Schematic (1 of 5)

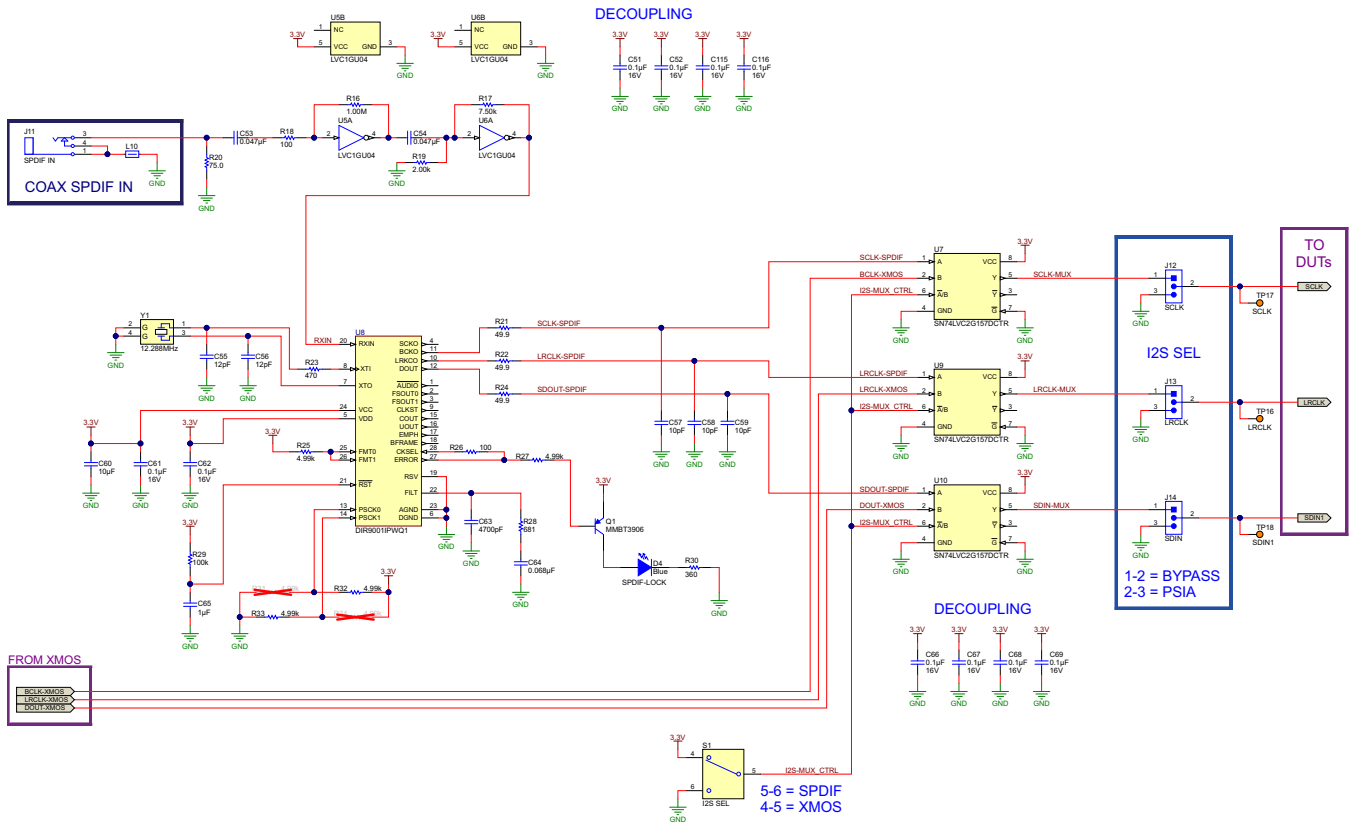


Figure 3. TAS5805MEVM Schematic (2 of 5)

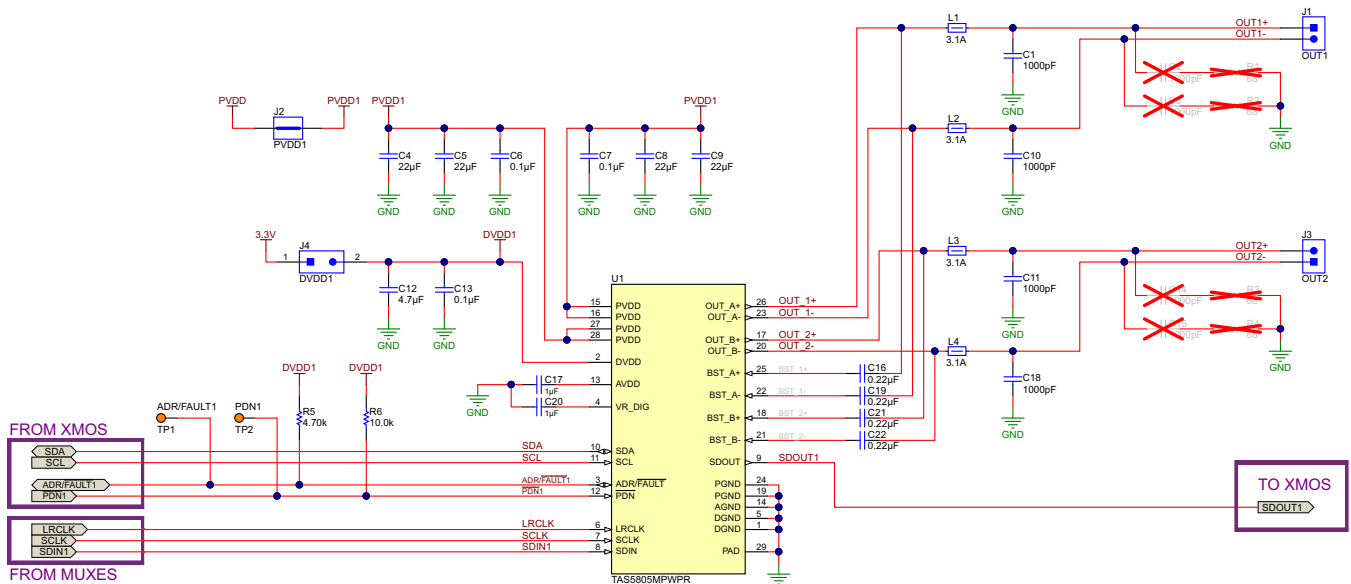


Figure 4. TAS5805MEVM Schematic (3 of 5)

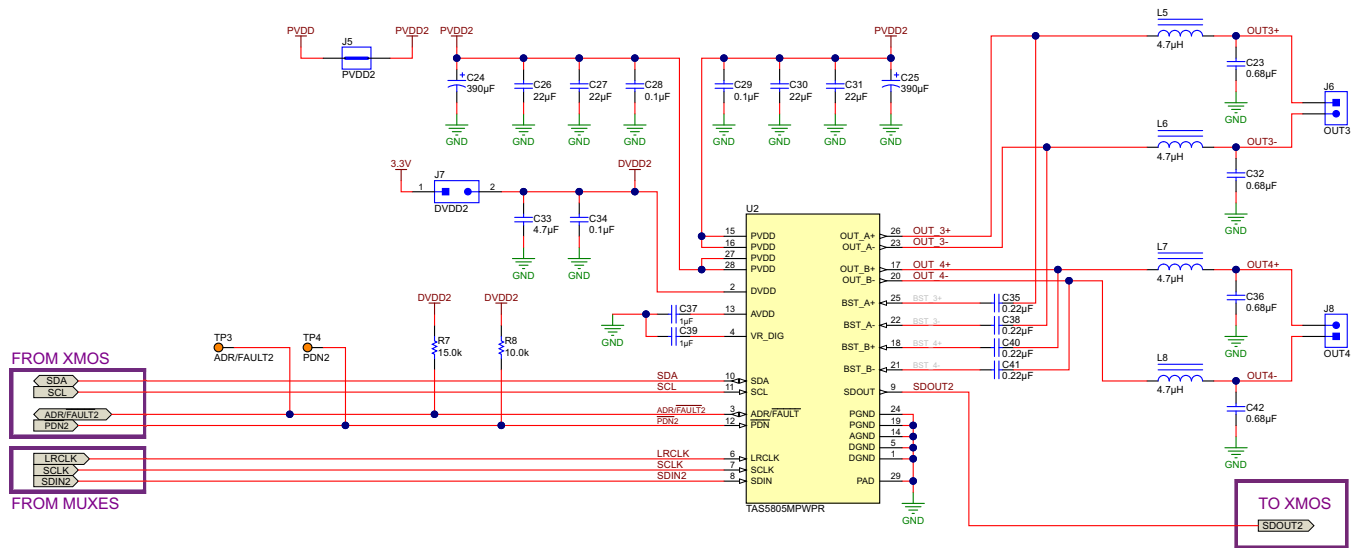


Figure 5. TAS5805MEVM Schematic (4 of 5)

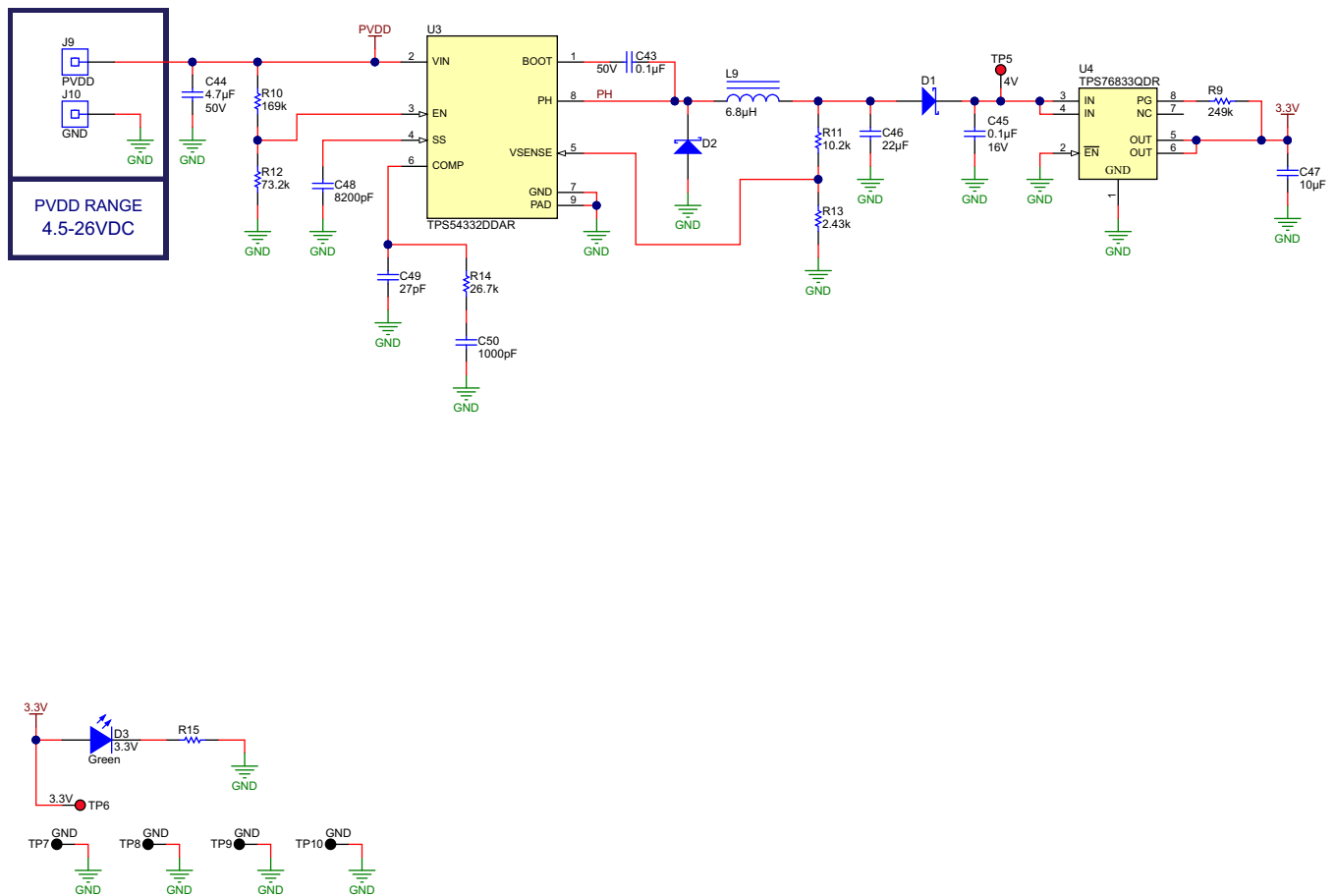


Figure 6. TAS5805MEVM Schematic (5 of 5)

3.2 Board Layouts

Figure 7 and Figure 8 illustrate the board layouts for the EVM.

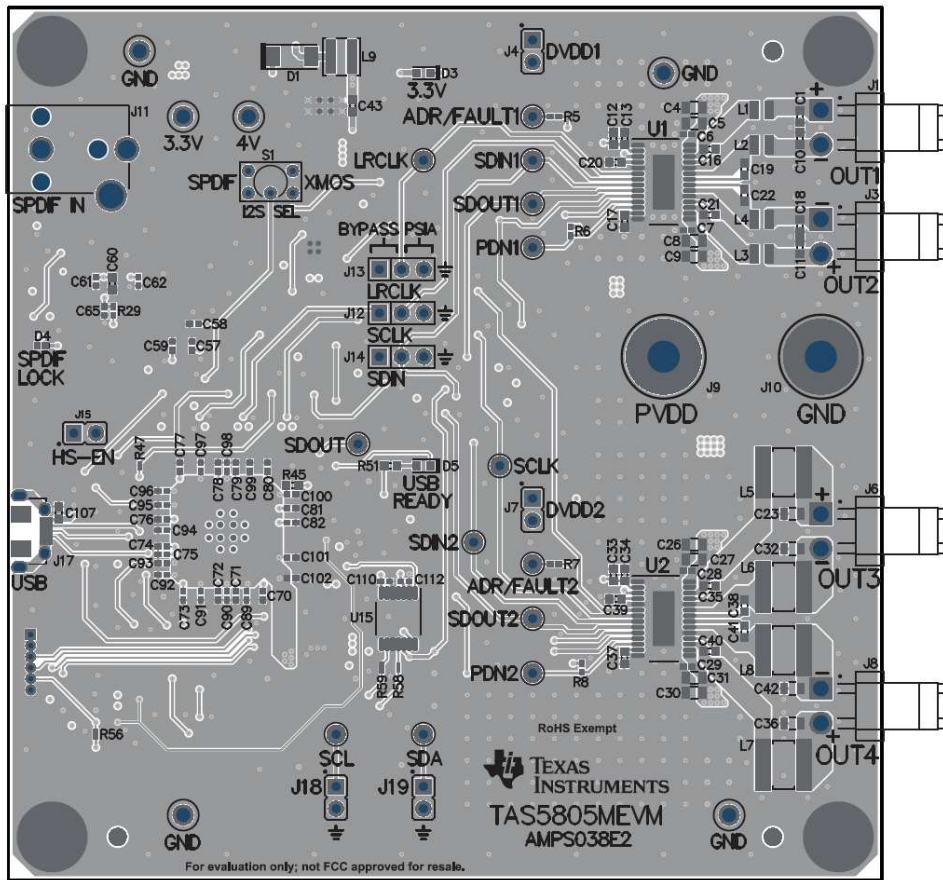


Figure 7. TAS5805MEVM Top Overlay

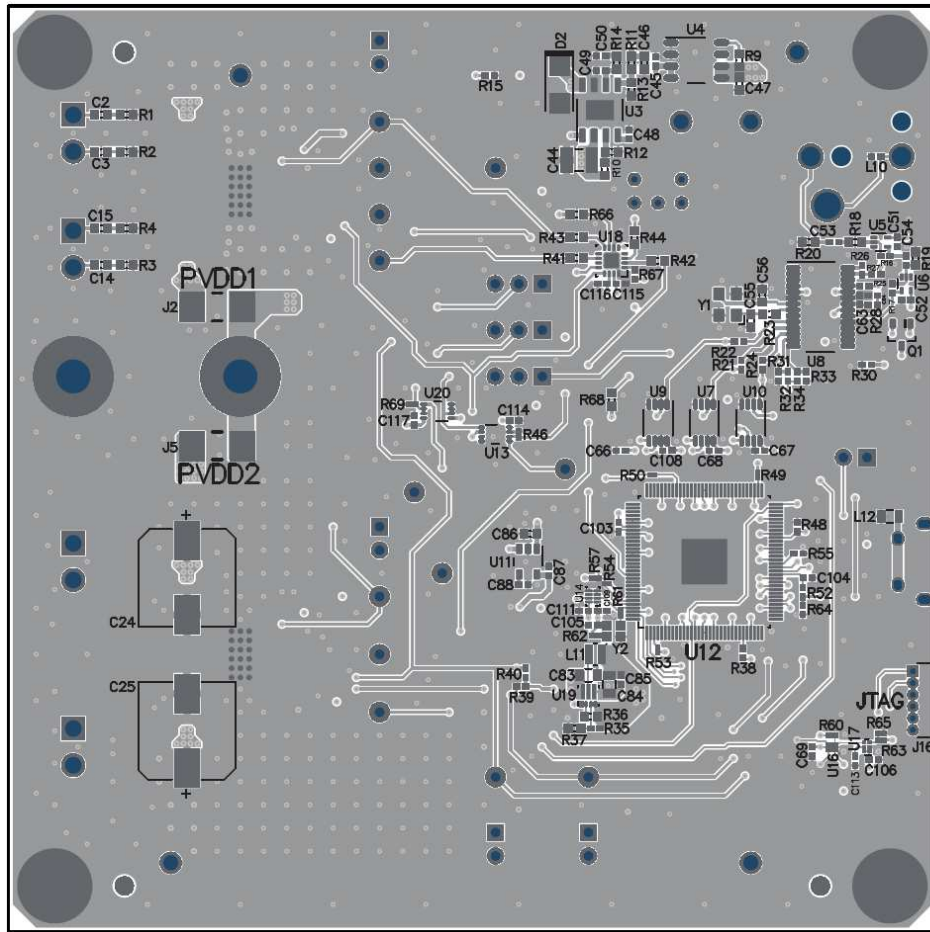


Figure 8. TAS5805MEVM Bottom Overlay

3.3 Bill of Materials

Designator	Quantity	Value	Description	PackageReference	PartNumber	Manufacturer
C1, C10, C11, C18	4	1000pF	CAP, CERM, 1000 pF, 100 V, +/- 10%, X7R, 0603	0603	GRM188R72A102KA01D	MuRata
C4, C5, C8, C9, C26, C27, C30, C31	8	22uF	CAP, CERM, 22 μF, 35 V, +/- 20%, JB, 0805	0805	C2012JB1V226M125AC	TDK
C6, C7, C28, C29	4	0.1uF	CAP, CERM, 0.1 μF, 50 V, +/- 10%, X7R, 0402	0402	C1005X7R1H104K050BB	TDK
C12, C33	2	4.7uF	CAP, CERM, 4.7 μF, 10 V, +/- 10%, X5R, 0603	0603	C0603C475K8PACTU	Kemet
C13, C34	2	0.1uF	CAP, CERM, 0.1 μF, 16 V, +/- 10%, X7R, 0603	0603	C0603C104K4RACTU	Kemet
C16, C19, C21, C22, C35, C38, C40, C41	8	0.22uF	CAP, CERM, 0.22 μF, 50 V, +/- 10%, X7R, 0603	0603	C1608X7R1H224K080AB	TDK

C17, C20, C37, C39	4	1uF	CAP, CERM, 1 μ F, 16 V, +/- 10%, X5R, 0603	0603	C0603C105K4P ACTU	Kemet
C23, C32, C36, C42	4	0.68uF	CAP, CERM, 0.68 μ F, 50 V, +/- 10%, X7R, 0805	0805	C0805C684K5R ACTU	Kemet
C24, C25	2	390uF	CAP, AL, 390 μ F, 35 V, +/- 20%, 0.08 Ω , SMD	10x10	UCL1V391MNL1 GS	Nichicon
C43	1	0.1uF	CAP, CERM, 0.1 μ F, 50 V, +/- 10%, X7R, 0603	0603	GCM188R71H10 4KA57D	MuRata
C44	1	4.7uF	CAP, CERM, 4.7 μ F, 50 V, +/- 10%, X7R, 1210	1210	GRM32ER71H4 75KA88L	MuRata
C45, C61, C62, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100, C101, C102, C105, C106, C108, C109, C110, C111, C112, C114, C117	39	0.1uF	CAP, CERM, 0.1uF, 16V, +/- 10%, X7R, 0402	0402	GRM155R71C10 4KA88D	MuRata
C46	1	22uF	CAP, CERM, 22 μ F, 6.3 V, +/- 20%, X5R, 0603	0603	GRM188R60J22 6MEA0J	MuRata
C47, C60	2	10uF	CAP, CERM, 10 μ F, 10 V, +/- 20%, X5R, 0603	0603	C1608X5R1A10 6M080AC	TDK
C48	1	8200pF	CAP, CERM, 8200 pF, 50 V, +/- 10%, X7R, 0402	0402	GRM155R71H82 2KA88D	MuRata
C49	1	27pF	CAP, CERM, 27 pF, 50 V, +/- 5%, C0G/NP0, 0402	0402	GRM1555C1H27 0JA01D	MuRata
C50	1	1000pF	CAP, CERM, 1000 pF, 50 V, +/- 10%, X7R, 0402	0402	GRM155R71H10 2KA01D	MuRata
C51, C52, C66, C67, C68, C69, C85, C103, C104, C115, C116	11	0.1uF	CAP, CERM, 0.1 μ F, 16 V, +/- 10%, X7R, 0402	0402	GRM155R71C10 4KA88D	MuRata
C53, C54	2	0.047uF	CAP, CERM, 0.047 μ F, 16 V, +/- 10%, X7R, 0402	0402	GRM155R71C47 3KA01D	MuRata
C55, C56	2	12pF	CAP, CERM, 12 pF, 50 V, +/- 5%, C0G/NP0, 0603	0603	GRM1885C1H12 0JA01D	MuRata
C57, C58, C59	3	10pF	CAP, CERM, 10 pF, 50 V, +/- 5%, C0G/NP0, 0402	0402	GRM1555C1H10 0JA01D	MuRata

C63	1	4700pF	CAP, CERM, 4700 pF, 25 V, +/- 10%, X7R, 0402	0402	GRM155R71E47 2KA01D	MuRata
C64	1	0.068uF	CAP, CERM, 0.068 µF, 50 V, +/- 10%, X7R, 0402	0402	C1005X7R1H68 3K050BB	TDK
C65	1	1uF	CAP, CERM, 1 µF, 6.3 V, +/- 20%, X5R, 0402	0402	C1005X5R0J105 M050BB	TDK
C83, C84	2	22uF	CAP, CERM, 22 µF, 10 V, +/- 20%, X7R, 0805	0805	GRM21BZ71A22 6ME15L	MuRata
C86	1	1uF	CAP, CERM, 1 µF, 25 V, +/- 10%, X7R, 0603	0603	GRM188R71E10 5KA12D	MuRata
C87	1	1uF	CAP, CERM, 1 µF, 6.3 V, +/- 20%, X7R, 0402	0402	GRM155R70J10 5MA12D	MuRata
C88	1	0.01uF	CAP, CERM, 0.01 µF, 6.3 V, +/- 10%, X7R, 0402	0402	GRM155R70J10 3KA01D	MuRata
C107	1	2.2uF	CAP, CERM, 2.2 µF, 10 V, +/- 10%, X7R, 0603	0603	GRM188R71A22 5KE15D	MuRata
C113	1	470pF	CAP, CERM, 470 pF, 25 V, +/- 5%, C0G/NP0, 0402	0402	GRM1555C1E47 1JA01D	MuRata
D1	1	30V	Diode, Schottky, 30 V, 3 A, M-FLAT	M-FLAT	CMS01(TE12L,Q ,M)	Toshiba
D2	1	60V	Diode, Schottky, 60 V, 3 A, SMA	SMA	B360A-13-F	Diodes Inc.
D3	1	Green	LED, Green, SMD	LED_0603	150060GS75000	Würth Elektronik
D4	1	Blue	LED, Blue, SMD	Blue LED	SMLP12BC7TT8 6	Rohm
D5	1	Blue	LED, Blue, SMD	LED_0603	150060BS75000	Würth Elektronik
H1, H2, H3, H4	4		MACHINE SCREW PAN PHILLIPS 4-40		PMS 440 0038 PH	B&F Fastener Supply
H5, H6, H7, H8	4		ROUND STANDOFF 4-40 ALUM 1/2"	ROUND STANDOFF 4-40 ALUM 1/2 inch	2027	Keystone
J1, J3, J6, J8	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		JUMPER TIN SMD	6.85x0.97x2.51 mm	S1911-46R	Harwin
J4, J7, J15, J18, J19	5		Header, 100mil, 2x1, Gold, TH	Sullins 100mil, 1x2, 230 mil above insulator	PBC02SAAN	Sullins Connector Solutions
J9	1		Binding Post, RED, TH	11.4x27.2mm	7006	Keystone
J10	1		Binding Post, BLACK, TH	11.4x27.2mm	7007	Keystone
J11	1		RCA Jack, White, R/A, TH	PC Mount Phono Jack-White, TH	970	Keystone

J12, J13, J14	3		Header, 100mil, 3x1, Gold, TH	PBC03SAAN	PBC03SAAN	Sullins Connector Solutions
J16	1		Receptacle, 50mil, 6x1, Gold, R/A, TH	6x1 Receptacle	LPPB061NGCN-RC	Sullins Connector Solutions
J17	1		Connector, Receptacle, Micro-USB Type AB, R/A, Bottom Mount SMT	Connector, USB Micro AB	DX4R205JJAR1 800	JAE Electronics
L1, L2, L3, L4	4	300 Ω	Ferrite Bead, 300 Ω @ 100 MHz, 3.1 A, 0806	0806	NFZ2MSM301S N10L	MuRata
L5, L6, L7, L8	4	4.7uH	Inductor, Shielded, 4.7 μ H, 4 A, 0.023 Ω , SMD	6.3x4.5x6.3mm	1255AY-4R7M=P3	MuRata Toko
L9	1	6.8uH	Inductor, Shielded, Composite, 6.8 μ H, 3.6 A, 0.0674 Ω , SMD	4.0x3.1x4.0mm	XAL4030-682MEB	Coilcraft
L10	1	120 Ω	Ferrite Bead, 120 Ω @ 100 MHz, 0.4 A, 0402	0402	MMZ1005Y121C	TDK
L11	1	470nH	Inductor, Shielded Drum Core, Ferrite, 470 nH, 2 A, 0.059 Ω , SMD	Inductor, 2x1.2x2mm	VLS2012ET-R47N	TDK
L12	1	600 Ω	Ferrite Bead, 600 Ω @ 100MHz, 2A, 0805	0805	MPZ2012S601A	TDK
Q1	1	40 V	Transistor, PNP, 40 V, 0.2 A, SOT-23	SOT-23	MMBT3906	Fairchild Semiconductor
R5	1	4.70k	RES, 4.70 k, 1%, 0.0625 W, 0402	0402	RC0402FR-074K7L	Yageo America
R6, R8, R67	3	10.0k	RES, 10.0 k, 1%, 0.063 W, 0402	0402	CRCW040210K0 FKED	Vishay-Dale
R7	1	15.0k	RES, 15.0 k, 0.1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	ERA-2AEB153X	Panasonic
R9	1	249k	RES, 249 k, 1%, 0.1 W, 0603	0603	RC0603FR-07249KL	Yageo America
R10	1	169k	RES, 169 k, 1%, 0.1 W, 0603	0603	RC0603FR-07169KL	Yageo America
R11	1	10.2k	RES, 10.2 k, 1%, 0.1 W, 0603	0603	RC0603FR-0710K2L	Yageo America
R12	1	73.2k	RES, 73.2 k, 1%, 0.1 W, 0603	0603	RC0603FR-0773K2L	Yageo America
R13	1	2.43k	RES, 2.43 k, 1%, 0.1 W, 0603	0603	RC0603FR-072K43L	Yageo America
R14	1	26.7k	RES, 26.7 k, 1%, 0.1 W, 0603	0603	RC0603FR-0726K7L	Yageo America
R15, R30	2	360	RES, 360 Ω , 5%, 0.063W, 0402	0402	CRCW0402360 RJNED	Vishay-Dale
R16	1	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0402	0402	ERJ-2RKF1004X	Panasonic

R17	1	7.50k	RES, 7.50 k, 1%, 0.063 W, 0402	0402	CRCW04027K50 FKED	Vishay-Dale
R18	1	100	RES, 100, 1%, 0.1 W, 0603	0603	CRCW0603100 RFKEA	Vishay-Dale
R19	1	2.00k	RES, 2.00 k, 1%, 0.1 W, 0603	0603	CRCW06032K00 FKEA	Vishay-Dale
R20	1	75.0	RES, 75.0, 1%, 0.1 W, 0603	0603	CRCW060375R 0FKEA	Vishay-Dale
R21, R22, R24	3	49.9	RES, 49.9 Ω , 1%, 0.063W, 0402	0402	CRCW040249R 9FKED	Vishay-Dale
R23	1	470	RES, 470, 1%, 0.1 W, 0603	0603	RC0603FR- 07470RL	Yageo America
R25, R27, R32, R33	4	4.99k	RES, 4.99k Ω , 1%, 0.063W, 0402	0402	CRCW04024K99 FKED	Vishay-Dale
R26	1	100	RES, 100, 1%, 0.1 W, 0402	0402	ERJ-2RKF1000X	Panasonic
R28	1	681	RES, 681, 1%, 0.063 W, 0402	0402	CRCW0402681 RFKED	Vishay-Dale
R29	1	100k	RES, 100k Ω , 1%, 0.063W, 0402	0402	CRCW0402100K FKED	Vishay-Dale
R35	1	40.2k	RES, 40.2 k, 1%, 0.1 W, AEC- Q200 Grade 0, 0402	0402	ERJ-2RKF4022X	Panasonic
R36	1	1.00Meg	RES, 1.00 M, 1%, 0.1 W, 0603	0603	RC0603FR- 071ML	Yageo America
R37	1	162k	RES, 162 k, 1%, 0.1 W, 0603	0603	RC0603FR- 07162KL	Yageo America
R38	1	1.0k	RES, 1.0 k, 5%, 0.063 W, 0402	0402	CRCW04021K00 JNED	Vishay-Dale
R39, R40	2	2.2k	RES, 2.2 k, 5%, 0.063 W, 0402	0402	CRCW04022K20 JNED	Vishay-Dale
R41, R42, R43, R44, R66, R68	6	0	RES, 0, 5%, 0.1 W, 0603	0603	RC0603JR- 070RL	Yageo America
R45	1	4.7	RES, 4.7, 5%, 0.1 W, 0603	0603	CRCW06034R7 0JNEA	Vishay-Dale
R46, R56, R57, R60, R62, R69	6	10.0k	RES, 10.0 k, 1%, 0.05 W, 0201	0201	CRCW020110K0 FKED	Vishay-Dale
R47, R49, R50, R53, R58, R59, R61	7	33.2	RES, 33.2, 1%, 0.05 W, 0201	0201	RC0201FR- 0733R2L	Yageo America
R48	1	10k	RES, 10 k, 5%, 0.063 W, 0402	0402	CRCW040210K0 JNED	Vishay-Dale
R51	1	680	RES, 680, 1%, 0.1 W, 0603	0603	RC0603FR- 07680RL	Yageo America
R52	1	10.0k	RES, 10.0 k, 1%, 0.1 W, 0402	0402	ERJ-2RKF1002X	Panasonic
R54	1	0	RES, 0, 5%, 0.05 W, 0201	0201	ERJ-1GE0R00C	Panasonic
R55	1	43.2	RES, 43.2, 1%, 0.063 W, 0402	0402	CRCW040243R 2FKED	Vishay-Dale
R63	1	25.5k	RES, 25.5 k, 1%, 0.05 W, 0201	0201	RC0201FR- 0725K5L	Yageo America
R64	1	47.0k	RES, 47.0 k, 1%, 0.0625 W, 0402	0402	RC0402FR- 0747KL	Yageo America
R65	1	51.0k	RES, 51.0 k, 1%, 0.05 W, 0201	0201	RC0201FR- 0751KL	Yageo America

S1	1		Switch, Toggle, SPDT 1Pos, TH	7 X 11 X4.5 mm	G12AP	NKK Switches
SH1, SH2, SH3, SH4, SH5, SH6	6	1x2	Shunt, 100mil, Gold plated, Black	Shunt	SNT-100-BK-G	Samtec
TP1, TP2, TP3, TP4, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19	13		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone
TP5, TP6	2	Red	Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone
TP7, TP8, TP9, TP10	4	Black	Test Point, Compact, Black, TH	Black Compact Testpoint	5006	Keystone
U1, U2	2		20W Inductor-Less, Digital Input, Stereo, Closed-Loop Class-D Audio Amplifier with Enhanced Processing and Low Idle Power Dissipation, PWP0028E (TSSOP-28)	PWP0028E	TAS5805MPWPR	Texas Instruments
U3	1		3.5V to 28V Input, 3.5A, 1MHz Step-Down Converter with Eco-mode, DDA0008H (SOIC-8)	DDA0008H	TPS54332DDAR	Texas Instruments
U4	1		Single Output Fast Transient Response LDO, 1 A, Fixed 3.3 V Output, 2.7 to 10 V Input, with Low IQ, 8-pin SOIC (D), -40 to 125 degC, Green (RoHS & no Sb/Br)	D0008A	TPS76833QDR	Texas Instruments
U5, U6	2		Single Inverter Gate, DRL0005A, LARGE T&R	DRL0005A	SN74LVC1GU04 DRLR	Texas Instruments
U7, U9, U10	3		Single 2-Line to 1-Line Data Selector Multiplexer, DCT0008A (SSOP-8)	DCT0008A	SN74LVC2G157 DCTR	Texas Instruments
U8	1		Automotive Catalog 96-kHz 24-Bit Digital Audio Interface Receiver, 50 ps Jitter, 3.3V, -40 to 85 degC, 28-Pin TSSOP (PW), Green (RoHS & no Sb/Br)	PW0028A	DIR9001IPWQ1	Texas Instruments

U11	1		Single Output Low Noise LDO, 400 mA, Fixed 1.8 V Output, 1.7 to 5.5 V Input, with Reverse Current Protection, 5-pin SOT-23 (DBV), -40 to 85 degC, Green (RoHS & no Sb/Br)	DBV0005A	TPS73618DBVR	Texas Instruments
U12	1		IC MCU 32BIT, TQFP-128	TQFP-128	XEF216-512-TQ128-C20	XMOS semiconductor
U13, U20	2		Single 2-Line to 1-Line Data Selector/Multiplexer, DCU0008A (VSSOP-8)	DCU0008A	SN74LVC2G157DCUR	Texas Instruments
U14	1		2-BIT UNIDIRECTIONAL VOLTAGE-LEVEL TRANSLATOR, DQM0008A (X2SON-8)	DQM0008A	SN74AVC2T244DQMR	Texas Instruments
U15	1		Programmable 1-PLL VCXO Clock Synthesizer With 1.8-V, 2.5-V, and 3.3-V Outputs, PW0014A (TSSOP-14)	PW0014A	CDCE913PWR	Texas Instruments
U16	1		DUAL BUFFER/DRIVER WITH OPEN DRAIN OUTPUTS, DSF0006A	DSF0006A	SN74LVC2G07DSFR	Texas Instruments
U17	1		Single-Channel, Adjustable Supervisory Circuit in Ultra-Small Package, DRY0006A (USON-6)	DRY0006A	TPS3897ADRYR	Texas Instruments
U18	1		Low-Voltage 8-Bit I2C and SMBus I/O Expander, 1.65 to 5.5 V, -40 to 85 degC, 16-pin QFN (RGT), Green (RoHS & no Sb/Br)	RGT0016A	TCA6408ARGTR	Texas Instruments
U19	1		3-A Step-Down Converter with Hiccup Short Circuit Protection in 2x2 QFN Package, RLT0007A	RLT0007A	TPS62085RLTR	Texas Instruments
Y1	1		Crystal, 12.288 MHz, 12 pF, SMD	3.2x2.5mm	ABM8AIG-12.288MHZ-12-2Z-T3	Abracon Corporation

Y2	1		OSC, 24 MHz, 2.25 - 3.63 V, SMD	2x1.6mm	ASTMLPA- 24.000MHZ-EJ- E-T	Abracon Corporation
C2, C3, C14, C15	0	1000pF	CAP, CERM, 1000 pF, 50 V, +/- 10%, C0G/NP0, 0603	0603	06035A102KAT2 A	AVX
FID1, FID2, FID3, FID4, FID5, FID6	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
R1, R2, R3, R4	0	68	RES, 68, 5%, 0.1 W, 0603	0603	CRCW060368R 0JNEA	Vishay-Dale
R31, R34	0	4.99k	RES, 4.99k Ω , 1%, 0.063W, 0402	0402	CRCW04024K99 FKED	Vishay-Dale

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