

TAS5514B Evaluation Module (EVM)

User's Guide



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TAS5514B Evaluation Module (EVM) User's Guide

The TAS5514B evaluation module (EVM) is intended to be used to demonstrate the capabilities of the device. All the device features can be accessed through the hardware supplied. This user's guide contains a description of the EVM. Included are the EVM schematics, bill of materials, and the board layout.

1 Quick-Start Guide

This section provides a guide to set up and power up the EVM without the details of its operation. For a more-detailed description, read the complete user's guide.

1.1 Overview

The EVM consists of a single printed circuit board (PCB) mounted inside a metal chassis for EMC testing and a power/speaker cable connector assembly. The EVM is different than the TAS5414B EVM as it does not need an I²C controller board to function.

1.2 Connections

The connections are for an analog signal for the input, speaker loads, and power. The audio inputs are made through the four RCA connectors. The power connections and speaker connections are made using the 10-pin connector.

The basic connections are: PVDD or power is connected to the EVM through the supplied 10-pin connector with the twisted red and black wires. The speakers or loads are also connected through the same 10-pin connector with the twisted red and white wires. See [Figure 1](#) for EVM input details.

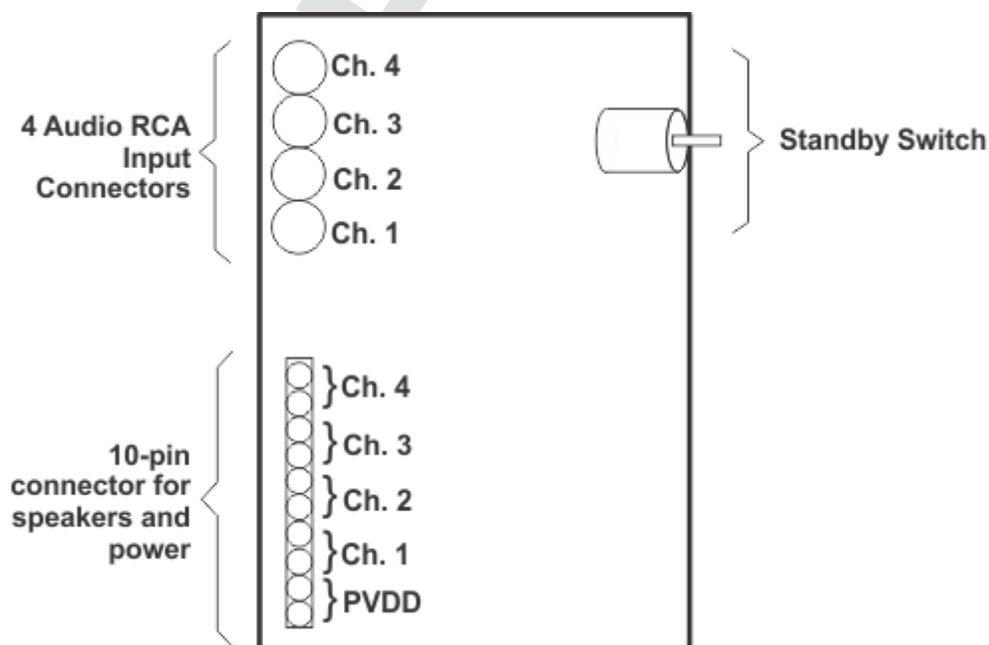


Figure 1. Connections for Input, Speaker Loads, and Power

1.3 Initial Power Up

Before applying power, check to make sure the standby control switch is in the Standby OFF position, as shown in [Figure 2](#).

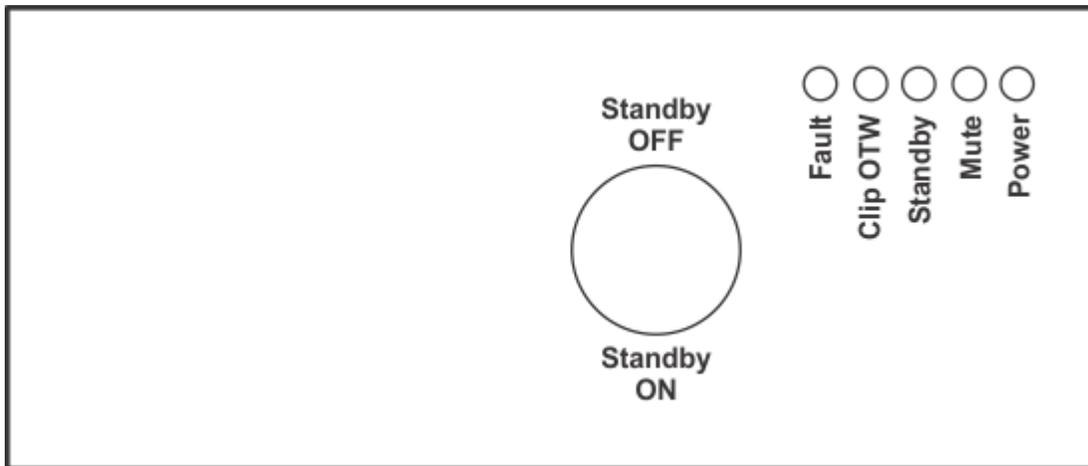


Figure 2. Front Panel Labels

Apply power: the Standby, Mute, and Power LEDs should be on. This indicates that the unit is powered, and the TAS5514B is in Standby Mode. The TAS5514B is placed into play mode by simply moving the toggle switch to the Standby OFF position. The Fault LED may flash once and then go off. This is the device automatically clearing the faults at startup.

2 EVM Description

2.1 Description of Inputs

2.1.1 Analog Inputs

The TAS5424B EVM provides balanced input and the TAS5514B EVM provides unbalanced (single-ended) inputs. The four RCA jacks on either EVM are provided for the audio input. The unbalanced inputs have the shield of the RCA connected to ground. The balanced inputs have the plus (+) input on the center pin of the RCA and the minus (-) input on the shield. The balanced ground can be connected to the chassis or Power- (GND).

2.1.2 Power

The EVM requires one dc power connection. The connection is made through a 10-pin supplied connector. The black wire is ground and the red wire is connected to PVDD, which can range from 6 to 24 Vdc.

2.2 Description of Outputs

2.2.1 Speaker and Power Connections

The 10-pin connector on the EVM and the wiring harness provide the power connections and the speaker connections. The power connection consists of a pair of red and black twisted wires, which correspond to the plus (+) input and minus (-) input, respectively. This pair of wires must be attached to a power supply.

The speaker connections consist of the remaining four pairs of red and white twisted wire. Each pair of red and white wires corresponds with a channel. The red wire corresponds to the plus (+) output, and the white wire corresponds to the minus (-) output. These wires must be terminated to a speaker load or resistive load.

See [Figure 1](#) for more details on the 10-pin connector on the EVM, [Figure 3](#) for more details about the speaker cables, and [Figure 4](#) for the power and speaker-cables connections to the EVM.

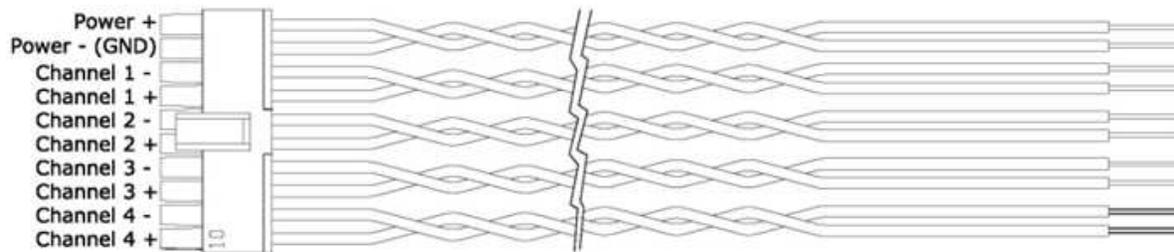


Figure 3. Wiring Harness for Power and Speaker Connections

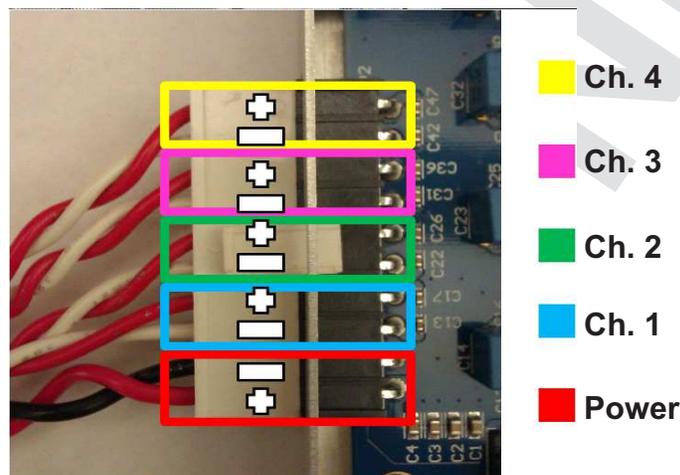


Figure 4. Power and Speaker Connections to the EVM

NOTE: Do not connect any of the speaker outputs to ground. The TAS5514B has full bridged outputs; connecting to ground triggers a fault.

The outputs can be paralleled by connecting the plus (+) of one channel to the plus (+) of the other channel. The minus (-) connection of one channel and the minus (-) connection of the other channel must be connected also. See the data sheet for more details on parallel outputs (PBTl).

2.3 Controls

2.3.1 Standby

The standby switch is located on the front panel. Having the toggle in the Standby ON position forces the TAS5514B into the standby mode. This is the same as a power-on reset (POR). POR shuts down the device.

Setting the switch to the Standby OFF position puts the device in the EVM into the power up mode. The amplifier will perform load diagnostics and then will place the amplifier outputs into play mode. Please note, that any channel that has a shorted load, short to ground, or a short to power will not be placed into play mode.

2.4 Indicator Description

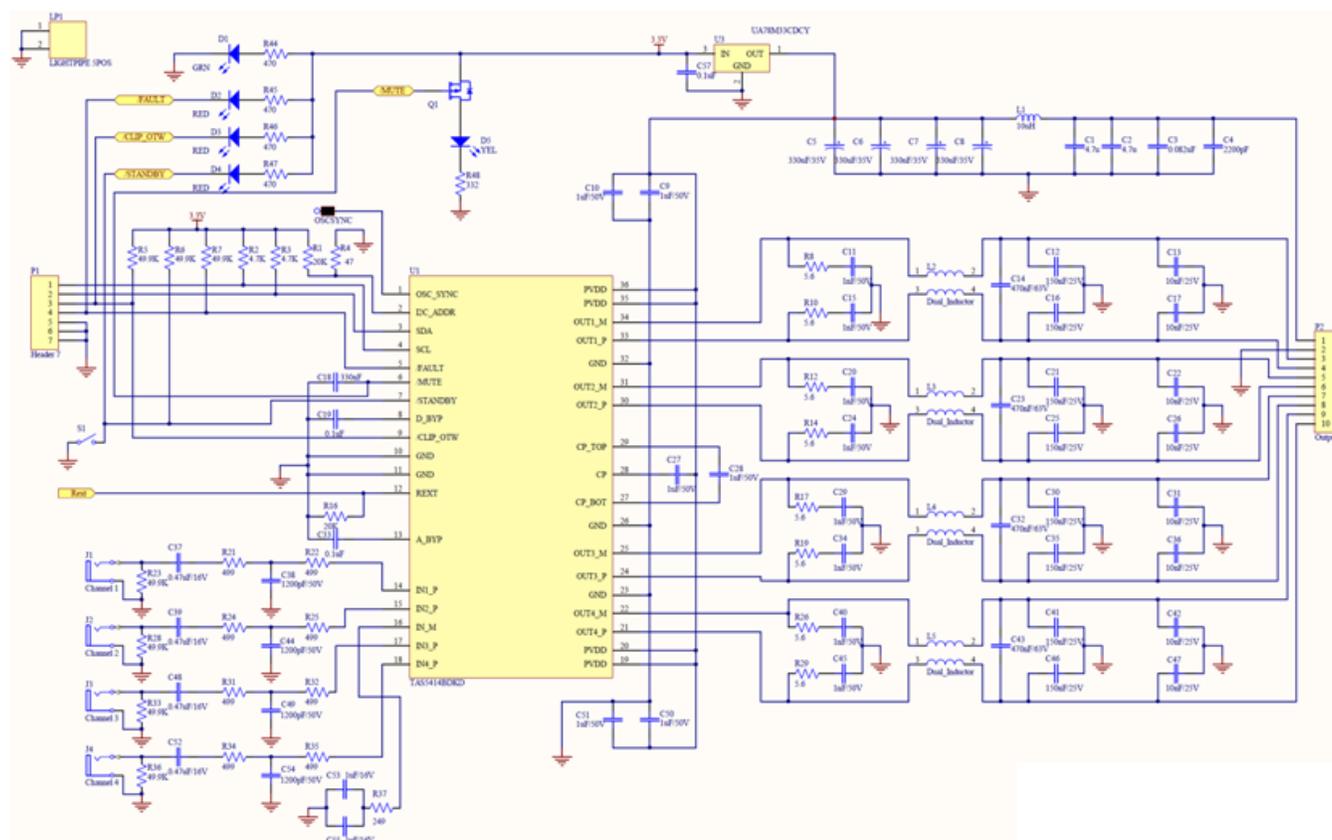
There are five LED indicators on the chassis next to the standby switch. The LED farthest away from the standby switch is for the 3.3 Vdc supply. The 3.3 V supply is needed for the LEDs and the standby circuit. The other four LEDs output pins: FAULT, CLIP_OTW, STANDBY, and MUTE. In normal play mode, these four LEDs should not light.

3 TAS5514B EVM Schematic

The schematic for the TAS5514BDKD EVM is shown on the following pages.

DRAFT ONLY

TAS5514BKDK EVM Schematic



4 Board Layouts

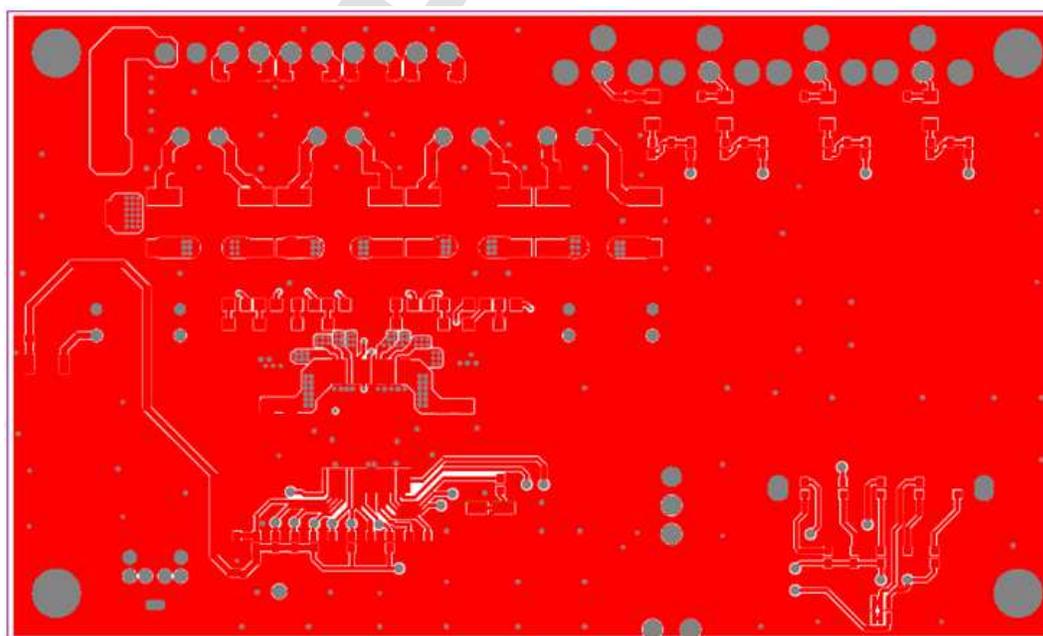


Figure 5. TAS5514BKDK Top Layer

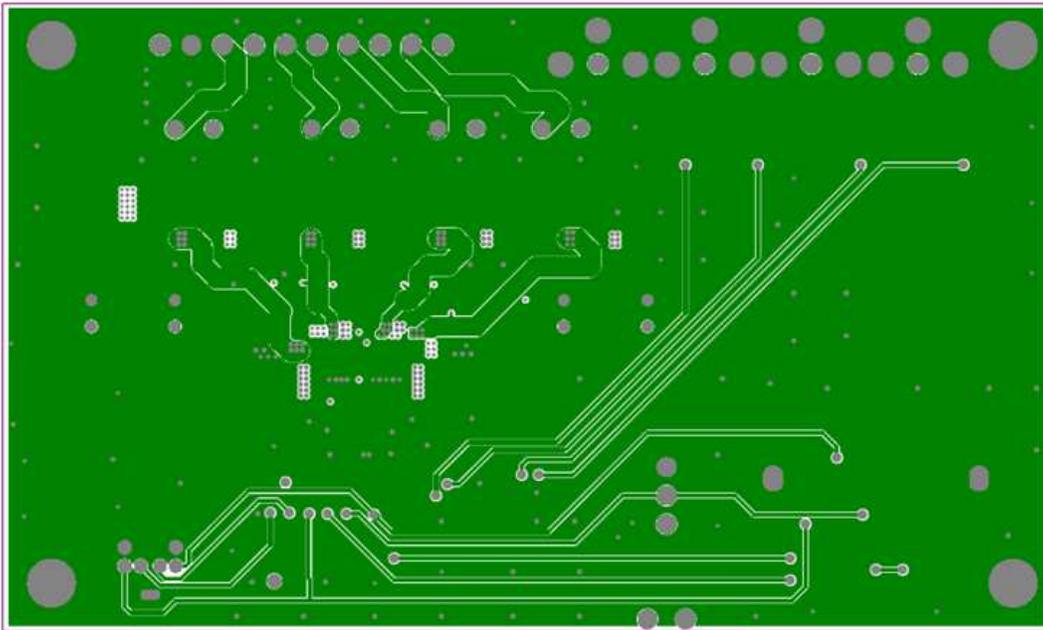


Figure 6. TAS5514BDKD Mid Layer Level 1

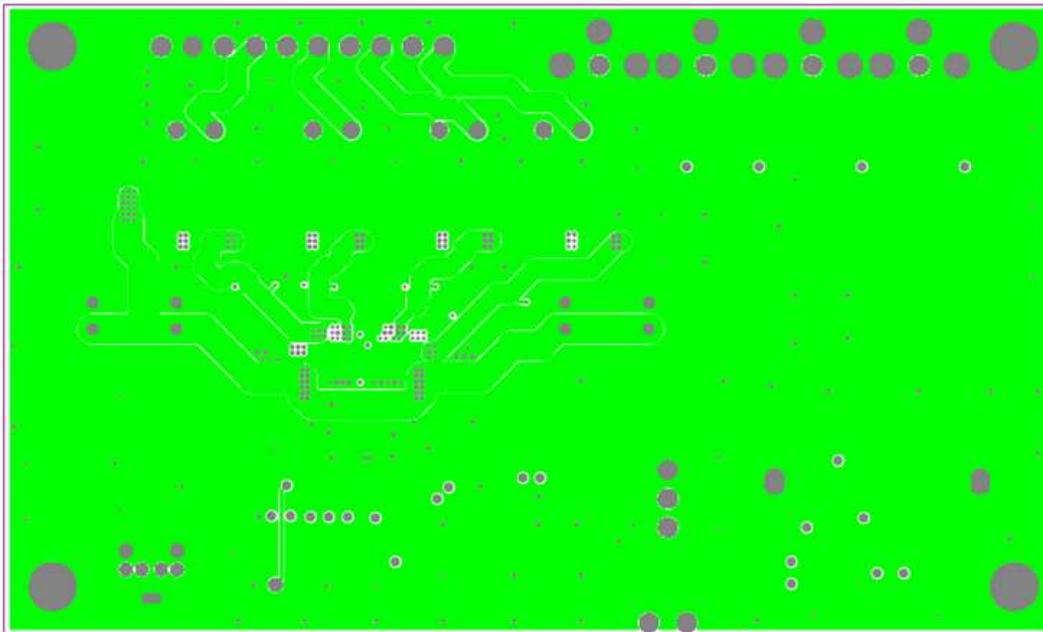


Figure 7. TAS5514BDKD Mid Layer Level 2

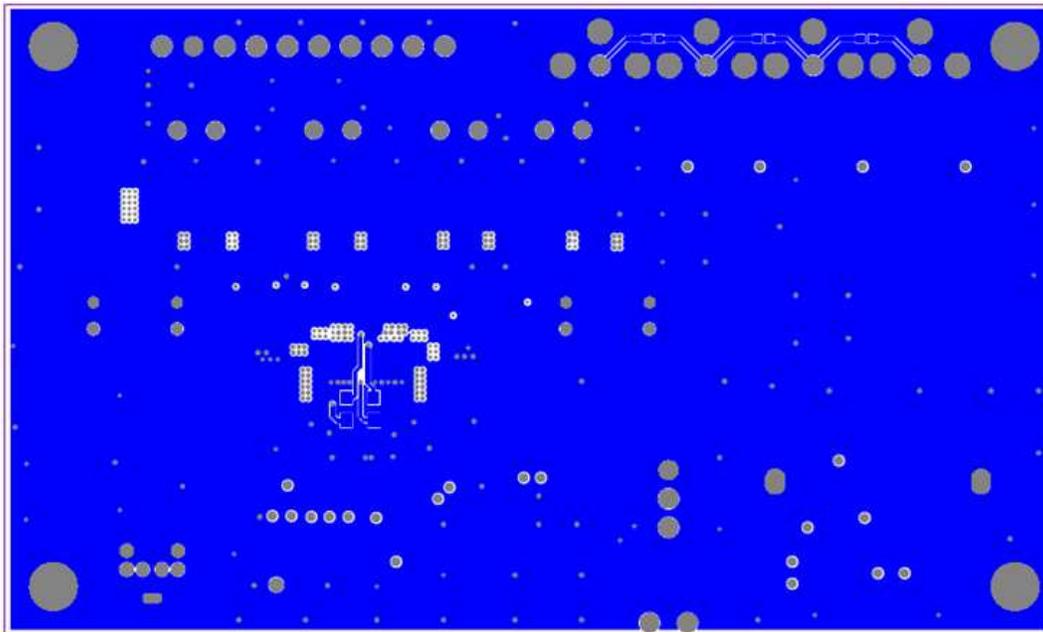


Figure 8. TAS5514BDKD Bottom Layer

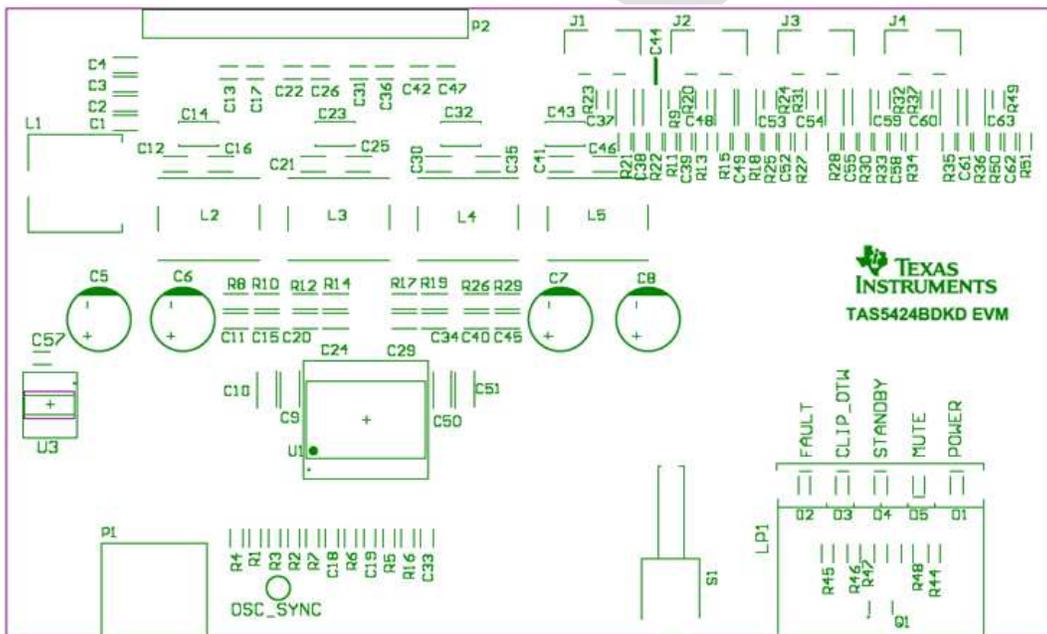


Figure 9. TAS5514BDKD Top Silkscreen Overlay



Figure 10. TAS5514BDKD Bottom Silkscreen Overlay

5 Bill of Materials

Table 1. Bill of Materials for TAS5514BDKD

VALUE	DESCRIPTION	DESIGNATOR	P/N	P/N (DIGIKEY)	QUANTITY
4.7 μ F	Capacitor, ceramic	C1, C2	C2012X5R1E475K	445-4116-1-ND	2
0.082 μ F	Capacitor, ceramic	C3	ECJ-2YB1H823K	PCC1839CT	1
2200 pF	Capacitor, ceramic	C4	ECJ-2VB1H222K	PCC222BNCT-ND	1
330 μ F/35 V	Capacitor, electrolytic	C5, C6, C7, C8	UVR1V331MPD	493-1083-ND	4
1 μ F/50 V	Capacitor, ceramic	C9, C10, C27, C28, C50, C51	C3216X7R1H105K	445-1423-1-ND	6
1 nF/50 V	Capacitor, ceramic	C11, C15, C20, C24, C29, C34, C40, C45	ECJ-2VB1H102K	PCC102BNCT-ND	8
150 nF/25 V	Capacitor, ceramic	C12, C16, C21, C25, C30, C35, C41, C46	C2012X7R1E474K	445-1353-1-ND	8
10 nF/25 V	Capacitor, ceramic	C13, C17, C22, C26, C31, C36, C42, C47	ECJ-1VB1E103K	PCC1763CT-ND	8
470 nF/63 V	Capacitor, ceramic	C14, C23, C32, C43	B32529C474J	495-1110-ND	4
220 nF	Capacitor, ceramic	C18	C0603C334K4RACTU	399-4916-1-ND	1
0.1 μ F	Capacitor, ceramic	C19, C33, C57	ECJ-1VB1C104K	PCC1762CT-ND	3
0.47 μ F/16 V	Capacitor, film	C37, C39, C48, C52	ECP-U1C474MA5	PCF1130CT-ND	4
1200 pF/50 V	Capacitor, ceramic	C38, C44, C49, C54	ECJ-1VB1H122K	PCC1773CT-ND	4
1 μ F/16 V	Capacitor, film	C53, C55	ECP-U1C105MA5	PCF1132CT-ND	2
GRN	Typical GREEN GaAs LED	D1	SML-LX0603GW-TR	67-1549-1-ND	1
RED	Typical RED GaAs LED	D2, D3, D4	SML-LX0603SRW-TR	67-1551-1-ND	3
YEL	Typical YELLOW GaAs LED	D5	SML-LX0603YW-TR	67-1550-1-ND	1
Channel 1, 2, 3, 4 input	RCA phono jack, right angle, thru-hole, snap-in	J1	RCJ-011	CP-1400-ND	4
10 μ H	10- μ H Inductor, SMT	L1	Coilcraft SER1360H-103L		1
Dual_inductor	Dual inductor	L2, L3, L4, L5	Toko HEAW		4
LIGHTPIPE 5POS		LP1	LPF-C051303S		1
Header 7	Header, 7-pin	P1	MD-60S	CP-2460	1
Output	Header, 10-pin, right	P2	Samtech IPBT-110-H1-T-S-RA		1
N MOS	FET - P W/DIODE	Q1	IRLMS5703TRPBF	IRLMS5703PBFCT-ND	1
20 k Ω	Resistor, SMT	R1, R16	ERJ-3EKF2002V	P20.0KHCT-ND	2

Table 1. Bill of Materials for TAS5514BDKD (continued)

VALUE	DESCRIPTION	DESIGNATOR	P/N	P/N (DIGIKEY)	QUANTITY
4.7 kO	Resistor, SMT	R2, R3	ERJ-3EKF4701V	P4.70KHCT-ND	2
47 O	Resistor, SMT	R4	ERJ-3EKF47R0V	P47.0HCT-ND	1
49.9 kO	Resistor, SMT	R5, R6, R7, R23,R28, R33, R36	ERJ-3EKF4992V	P49.9KHCT-ND	7
5.6 O	Resistor, SMT	R8, R10, R12, R14,R17, R19, R26, R29	RL1220S-5R6-F	RL12S5.6FCT-ND	8
499 O	Resistor, SMT	R21, R22, R24, R25,R31, R32, R34, R35	ERJ-3EKF4990V	P499HCT-ND	8
249 O	Resistor, SMT	R37	ERJ-3EKF2490V	P249HCT-ND	1
470 O	Resistor, SMT	R44, R45, R46, R47	ERJ-3GEYJ471V	P470GCT-ND	4
332 O	Resistor, SMT	R48	ERJ-3EKF3320V	P332HCT-ND	1
S1	E-switch, SPDT, right-angle	S1	100SP1T2B4M7RE	EG2364-ND	1
TAS5514BDKD	4-channel class-D amplifier	U1	TAS5514BTDKDRQ1	TAS5514BTDKDRQ1-ND	1
UA78M33CDCY	Positive-voltage regulator	U3	UA78M33CDCYR	296-13424-1-ND	1

6 Related Documentation from Texas Instruments

The TAS5514B, TAS5424B, Four-Channel Automotive Digital Amplifiers data sheet can be found online at www.ti.com.

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EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of and the output voltage range of .

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. 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 . The EVM is designed to operate properly with certain components above as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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