TPA3125D2 EVM

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1 Introduction

1.1 Description

The TPA3125D2 evaluation module (EVM) consists of a single 10-W, class-D, stereo audio power amplifier, complete with a small number of external components mounted on a printed-circuit board. The EVM can be used to directly drive speakers with an external analog audio source as the input. Figure 1 and Figure 2 display the top and bottom views of the EVM, respectively. For additional information, consult the TPA3125D2 data sheet (SLOS611).

Figure 1. TPA3125D2 Audio Power Amplifier EVM - Top View

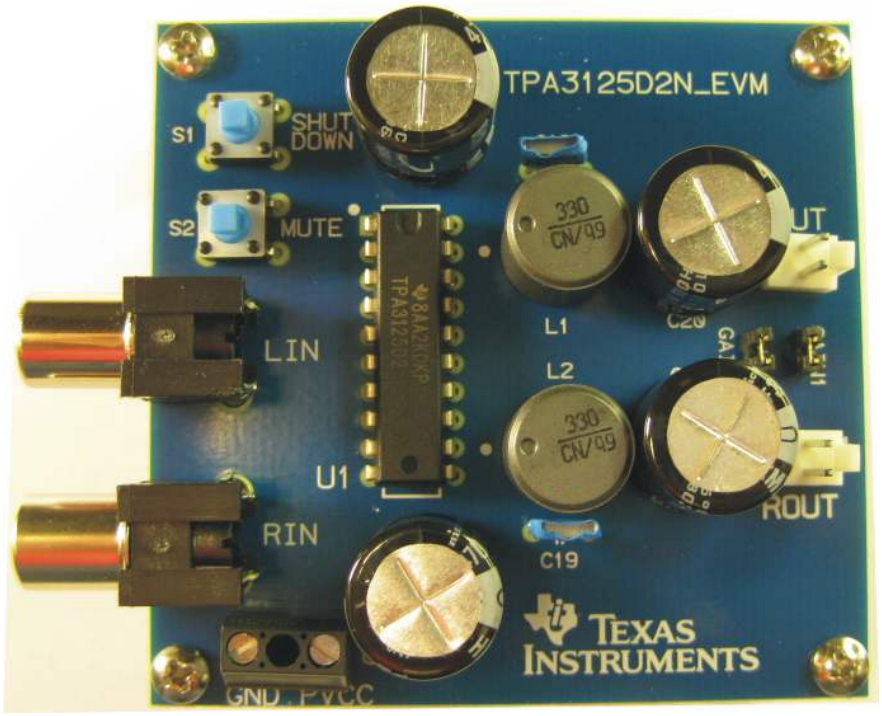
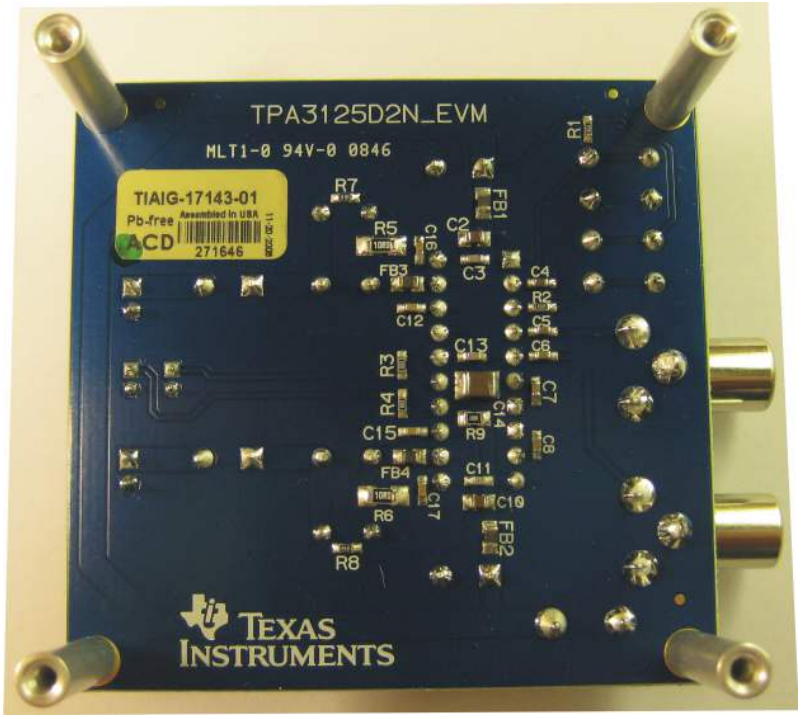


Figure 2. TPA3125D2 Audio Power Amplifier EVM - Bottom View



1.2 EVM Specifications

Table 1. TPA3125D2 EVM Specifications

		Value	Units
VCC	Supply voltage range	10 to 26	V
ICC	Supply current	3	A
P_O	Continuous output power per channel 8 Ω, VCC = 24V, THD+N=10%	10	W
R_L	Minimum load impedance	4	Ω

2 Quick Start for Stand-alone Operation

Use these procedures to operate the TPA3125D2 EVM in a stand-alone configuration, or when connecting it into existing circuits or equipment. Connections to the EVM module can be made by inserting stripped wire for the power supplies. Two pin male headers are provided for the speaker connections and the inputs accept standard RCA plugs.

2.1 Power Supply

1. Ensure that all external power sources are set to OFF.
2. Connect an external regulated power supply adjusted from 10 V to 26 V to the module VCC and GND terminal block (**J1**), taking care to observe marked polarity.

2.2 Evaluation Module Preparations

2.2.1 Inputs and Outputs

1. Connect the left and right speakers across LOUT and ROUT respectively.
2. Install both gain jumpers GAIN0 and GAIN1. This sets the amplifier gain to the lowest level, 20 dB.

2.2.2 Control Inputs

- **$\overline{\text{SHUTDOWN}}$ (S1)** —terminal is active LOW. A LOW on the device terminal (less than 0.8 V) shuts down the amplifier; a HIGH (greater than 2 V) on the device terminal places the amplifier in the active state. Pressing and holding the switch **S1** places the amplifier in the SHUTDOWN state. Releasing the **S1** switch returns the amplifier to the active state. This terminal is VCC compliant.
- **MUTE (S2)**—terminal is active HIGH. A HIGH (greater than 2 V) on this terminal immediately terminates audio playback through the speakers; a LOW (less than 0.8 V) enables the device. The outputs remain switching with a 50% duty cycle. The EVM **S2** switch controls the state of the MUTE terminal. Pressing and holding the **S2** switch places the amplifier in the MUTE state. Releasing the **S2** switch returns the amplifier to the active state. This terminal is VCC compliant.
- **GAIN0**/**GAIN1**—Together, these terminals determine the gain of the amplifier (see Table 2). Installing a jumper in **GAIN0** or **GAIN1** sets the respective terminal to GND. Removing the jumper sets the respective terminals to VCC. Removing jumpers ***increases*** the gain while installing jumpers ***decreases*** the gain. Logic levels are TTL compatible. These terminals are VCC compliant.

Table 2. Gain Jumper Settings [(1)]

GAIN1	GAIN0	Amplifier Gain (dB)
ON	ON	20
ON	OFF	26
OFF	ON	32
OFF	OFF	36

(1) OFF denotes jumper is REMOVED; ON denotes jumper INSTALLED.

2.2.3 Applying Power to the EVM

1. Verify correct voltage and input polarity for the external power supplies. Turn ON. The EVM starts operation.
2. Adjust the input signal.
3. Adjust the control inputs to the desired settings as described in the Control Inputs section.
4. Adjust the amplifier gain by installing or removing the gain jumpers, **GAIN0** and **GAIN1** to yield the gain values described in Table 2.

3 Schematic and PCB Layers

Figure 3. TPA3125D2 EVM Schematic

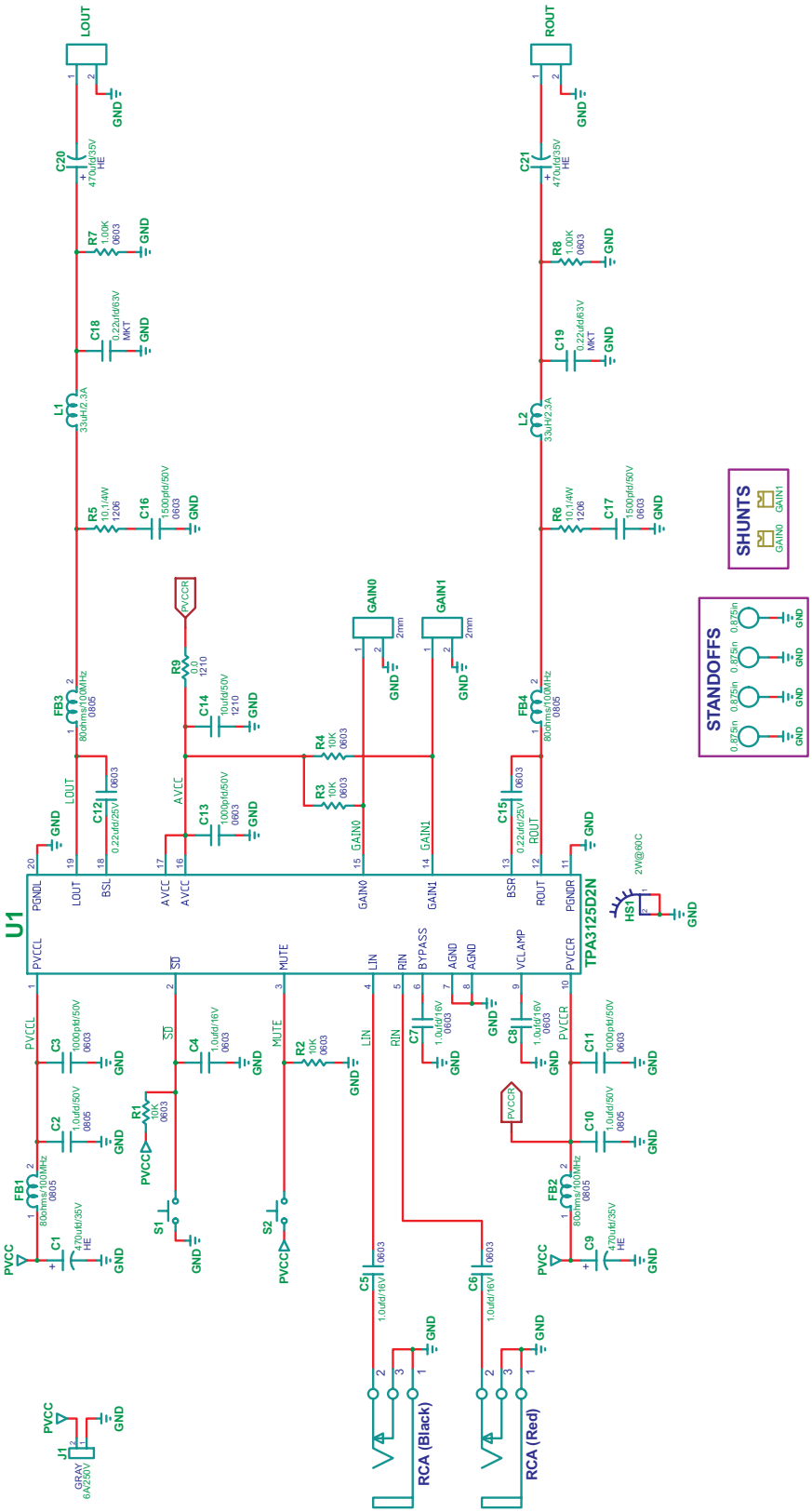


Figure 4. TPA3125D2 EVM – Top Side Layout

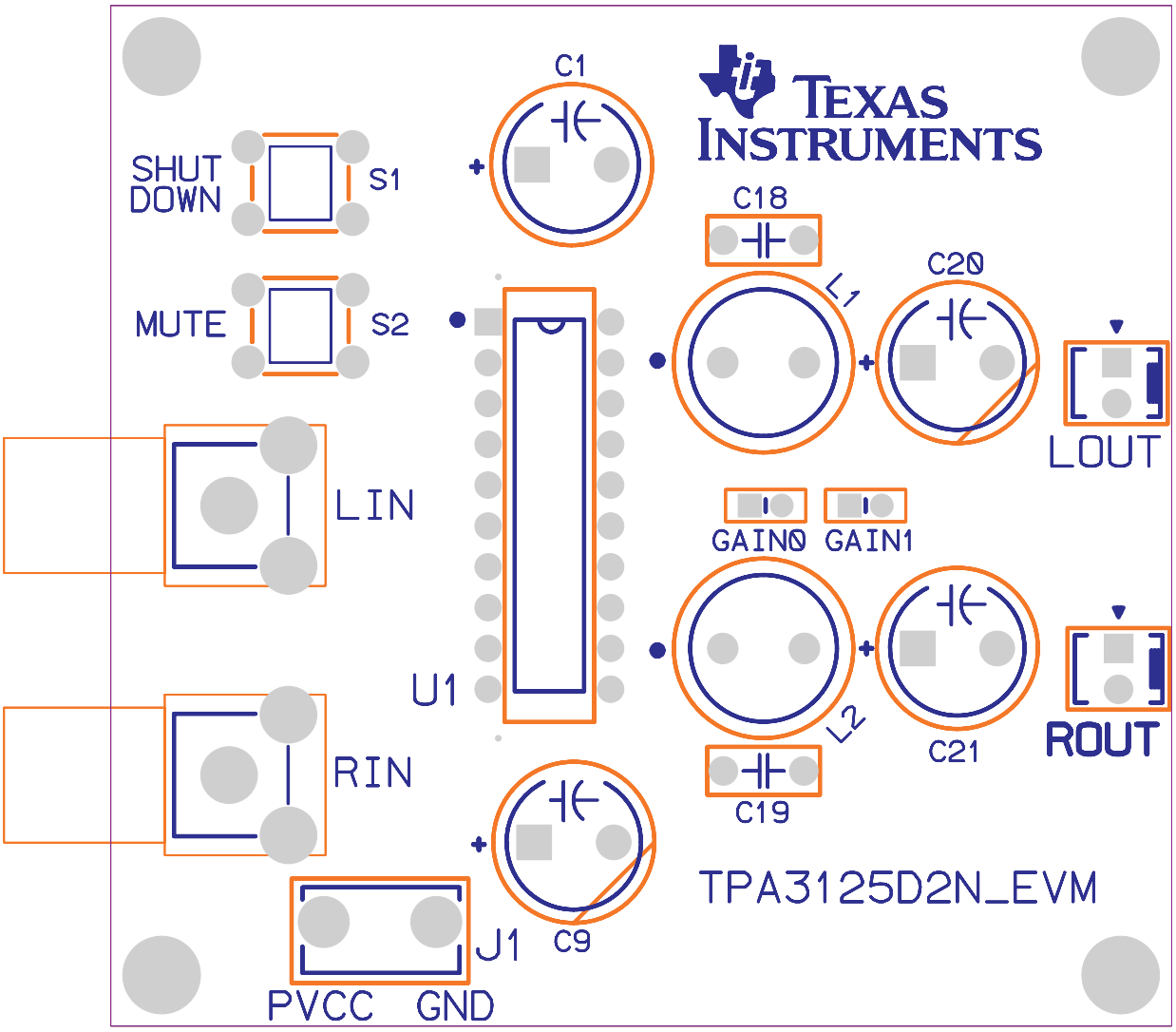
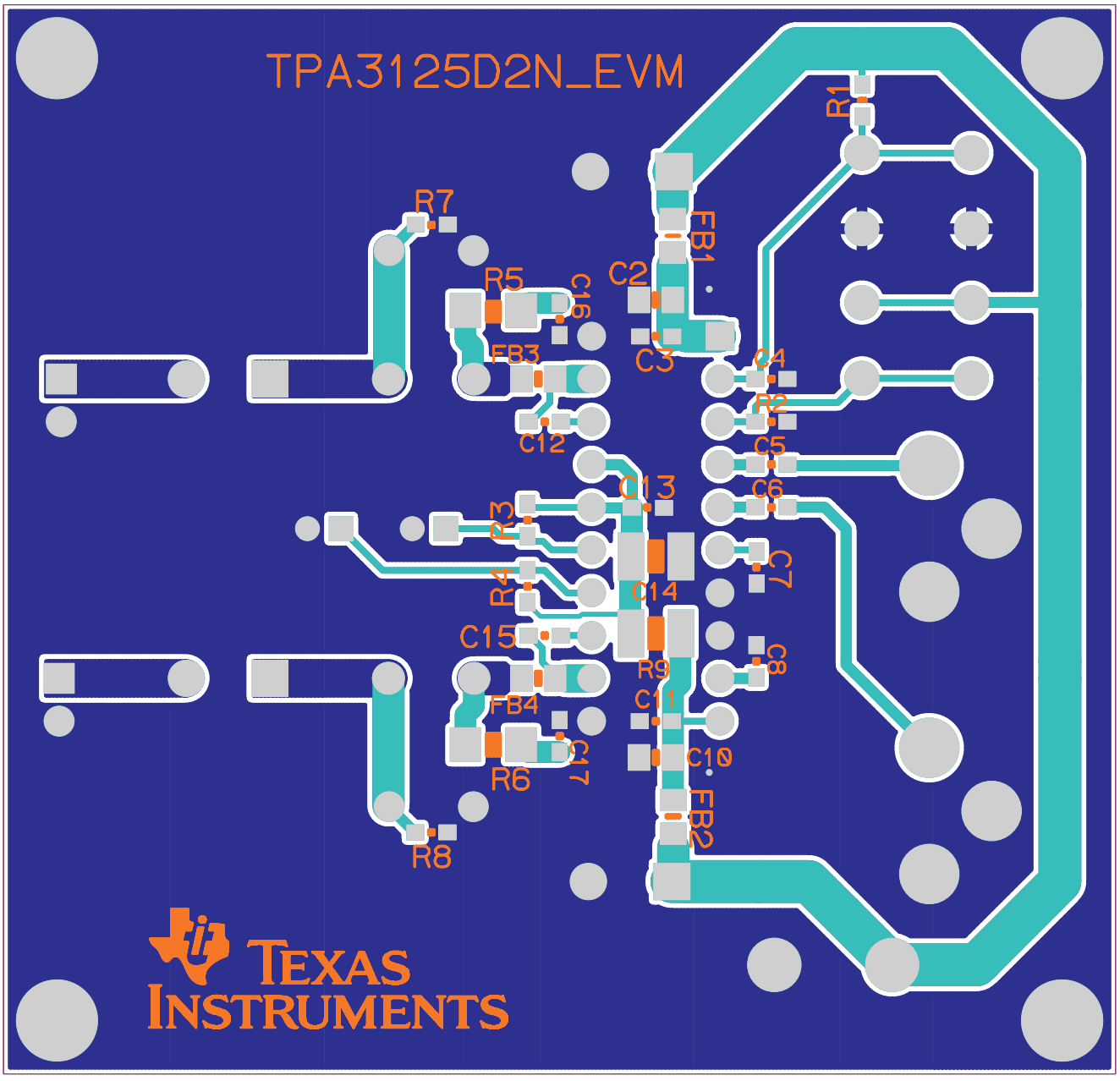


Figure 5. TPA3125D2 EVM – Bottom Side Layout



4 Bill of Materials

All components should be lead-free.

Table 3. TPA3125D2 EVM Bill of Materials

RefDes	Description	Qty	Mfr Part No.	Mfr	Vendor Part No.	Vendor
U1	10W STEREO CLASS-D AUDIO POWER AMP N20-DIP ROHS	1	TPA3125D2N	Texas Instruments	TPA3125D2N	Texas Instruments
C3, C11, C13	CAP 1000PFD 50V 5% CERM 0603 COG ROHS	3	C1608C0G1H102J	TDK Corp.	445-1293-1	Digi-Key
C16, C17	CAP SMD0603 CERM 1500pfd 50V 10% X7R ROHS	2	C0603C152K5RACTU	Kemet	399-1084-1	Digi-Key
C12, C15	CAP SMT0603 CERM 0.22µF, 25V 10% X5R ROHS	2	06033D224KAT2A	AVX	478-1245-1	Digi-Key
C18, C19	METAL POLY CAP THU MKT 0.22µF, 63V 10% ROHS	2	B32559C224K000	EPCOS	495-2814	Digi-Key
C4–C8	CAP SMT0603 CERM 1.0µF, 16V 10% X5R ROHS	5	ECJ-1VB1C105K	Panasonic	PCC2224CT	Digi-Key
C2, C10	CAP SMT0805 CERM 1.0µF, 50V 10% X7R ROHS	2	GRM21BR71H105KA12L	Murata	490-4736-1	Digi-Key
C14	CAP SMD1210 CERM 10µF, 50V Y5V ROHS	1	ECJ-4YF1H106Z	Panasonic	PCC2308CT	Digi-Key
C1, C9, C20, C21	CAP 470UFD 35V RAD ALUM ELEC HE ROHS	4	UHE1V471MHD6	Nichicon	493-1583	Digi-Key
R7, R8	RES 1.00K OHM 1/10W 1% SMD 0603 ROHS	2	RC0603FR-071KL	Yageo	311-1.00KHRCT	Digi-Key
R9	RESISTOR SMD1210 0.0 Ω 1/3W ROHS	1	CRCW12100000Z0EA	Vishay	541-0.0VCT	Digi-Key
R1–R4	RES SMT0603 10K 5% 1/10W ROHS	4	ERJ-3GEYJ103V	Panasonic	P10KGCT	Digi-Key
R5, R6	RESISTOR SMT1206 10.0Ω 1% 1/4W ROHS	2	ERJ-8ENF10R0	Panasonic	P10.0FCT	Digi-Key
L1, L2	INDUCTOR SERIES 11RHBP/A7503AY 33µH/2.3A ROHS	2	A7503AY-330M	TOKO	A7503AY-330M	TOKO
FB1–FB4	FERRITE BEAD SMD0805 80 Ω at 100MHz 5A ROHS	4	HI0805R800R-10	Steward	240-2395-1	Digi-Key
GAIN0, GAIN1	HEADER 2 PIN, PCB 2.0MM ROHS	2	26630201RP2	Norcomp	2663S-02	Digi-Key
LOUT, ROUT	HEADER MALE 2PIN 100LS W/ FRICTION LOCK ROHS	2	22-23-2021	Molex	WM4200	Digi-Key
RIN	JACK, RCA 3-PIN PCB-RA RED ROHS	1	PJRAN1X1U03X	Switchcraft	89K7617	Newark
LIN	JACK, RCA 3-PIN PCB-RA BLACK ROHS	1	PJRAN1X1U01X	Switchcraft	65K7770	Newark
J1	TERMINAL BLOCK 2PIN 6A/250V GRAY 7mm PITCH 16-28AWG ROHS	1	ED655/2DS	On Shore Technology	ED1534	Digi-Key
S1, S2	SWITCH MOM TACT 100GF TH 4PIN 6×6MM ROHS	2	FSMCDH	Tyco-Alcoswitch	450-1654	Digi-Key
GAIN0, GAIN1	SHUNT, BLACK AU FLASH 2mmLS	2	810-002-SP2L001	Norcomp Inc.	SP2-001E	Digi-Key
HS1	HEATSINK DIP20 BLACK 2W ROHS	1	580400B00000G	AAVID Thermalloy	580400B00000G	AAVID Thermalloy
SO1–S04	4-40 SCREW, STEEL 0.250 IN	4	PMS 440 0025 PH	Building Fasteners	H342	Digi-Key
SO1–S04	STANDOFF, 4-40, 0.875IN×3/16IN, ALUM RND F-F	4	2030	Keystone Electronics	2030K	Digi-Key

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EVM WARNINGS AND RESTRICTIONS

It is important to operate this EVM within the input voltage range of 10 V to 30 V and the output voltage range of 0 V to 30 V.

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 85°C. The EVM is designed to operate properly with certain components above 85°C 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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