

## **THS4531DGKEVM Evaluation Module**

The THS4531DGKEVM is an evaluation module for the single THS4531 amplifier in the DGK [8-lead VSSOP (MSOP)] package. This evaluation module is designed to quickly and easily demonstrate the functionality and versatility of the amplifier. The EVM is ready to connect to power, signal source, and test instruments through the use of onboard connectors. The EVM comes configured for easy connection with common 50-Ω laboratory equipment on its inputs and outputs. The amplifier is configured for single-ended input with gain of 1 V/V to differential output at the device pins, which is converted to single-ended via a transformer to the output. It can be easily configured for other functions, gains, and single- or split-supply operation.

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## 1 Features

- Configured for split-supply operation and easily modified for single supply
- Default gain of 1 configuration can easily be reconfigured for other gains
- Designed for easy connection to standard 50-Ω input/output impedance test equipment
- Inputs and outputs include SMA connectors

## 2 EVM Specifications

	Single-supply voltage range ( $V_{S-} = \text{ground}$ )	2.5 V to 5.5 V
$V_{S\pm}$	Split-supply voltage range	$\pm 1.25 \text{ V to } \pm 2.75 \text{ V}$
$I_{S\pm}$	Supply current	250 $\mu\text{A}$
	Input voltage	$V_{S\pm}, \text{ Max}$
$I_{\text{OUT}}$	Output drive	$\pm 25 \text{ mA}$

### 3 Power Connections

The THS4531DGKEVM is equipped with banana jacks for easy connection of power. The positive supply input is labeled  $V_{S+}$ . The negative supply input is labeled  $V_{S-}$ . Ground is labeled GND.

#### 3.1 Split-Supply Operation

To operate as split supply, apply the positive supply voltage to  $V_{S+}$ , negative supply voltage to  $V_{S-}$ , and the ground reference from supply to GND.

#### 3.2 Single-Supply Operation

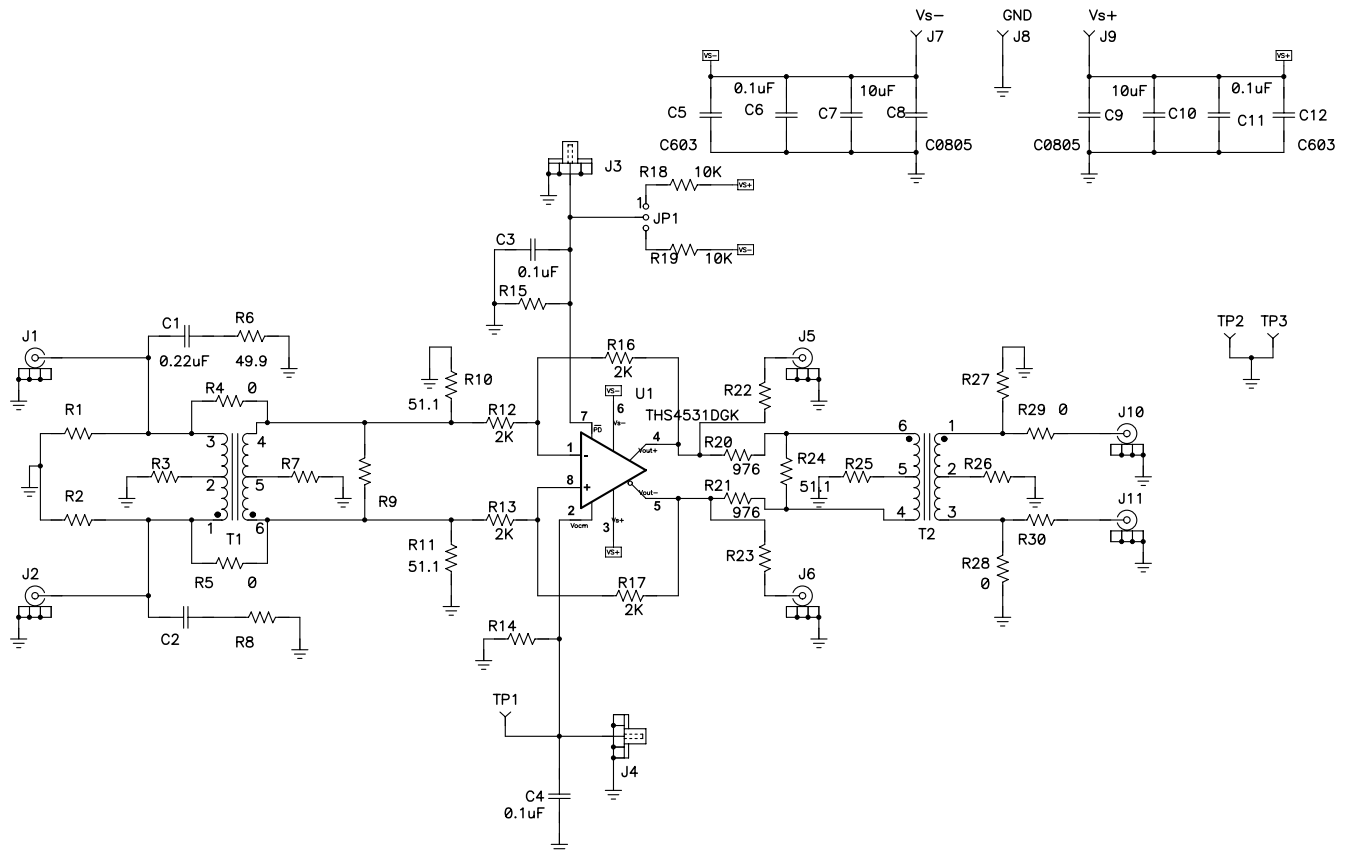
To operate as single supply, connect jumper  $V_{S-}$  to GND, and apply the positive supply voltage to  $V_{S+}$ . Inputs and outputs must be biased per data-sheet specifications for proper operation.

### 4 Input and Output Connections

The THS4531DGKEVM is equipped with SMA connectors for easy connection of signal generators and analysis equipment. As shipped, the EVM is configured for a gain of 1, split supply, single-ended input and output with 50- $\Omega$  termination. For best results, signals must be routed to and from the EVM with cables having 50- $\Omega$  characteristic impedance.  $V_{IN+}$  (J2) is the input connector for single-ended input signals.  $V_{OUT+}$  (J10) is the output connector for single-ended output signals.  $V_{IN-}$  (J1) is not intended for use with single-ended input signals and has C1 and R6 added to approximate the impedance of an ac-coupled 50- $\Omega$  source and to balance the amplifier when  $V_{IN+}$  is driven from an ac-coupled, 50- $\Omega$  source. The amplifier converts the single-ended input to a differential signal at its output pins. A resistor network (R20, R21, R24) and transformer on the amplifier's output convert the differential signal to single-ended, provides 2-k $\Omega$  load to the amplifier when terminated in 50  $\Omega$ , and 50- $\Omega$  line impedance match at  $V_{OUT+}$ . This results in loss, and the overall gain is approximately -38 dB. See the following THS4531 data-sheet applications section, schematics, and layouts for more detail and how to reconfigure the EVM.

## 5 THS4531DGKEVM Schematic, Layout, and Bill of Materials

### 5.1 Schematic



**Figure 1. THS4531DGKEVM Schematic**

5.2 THS4531DGKEVM Layers

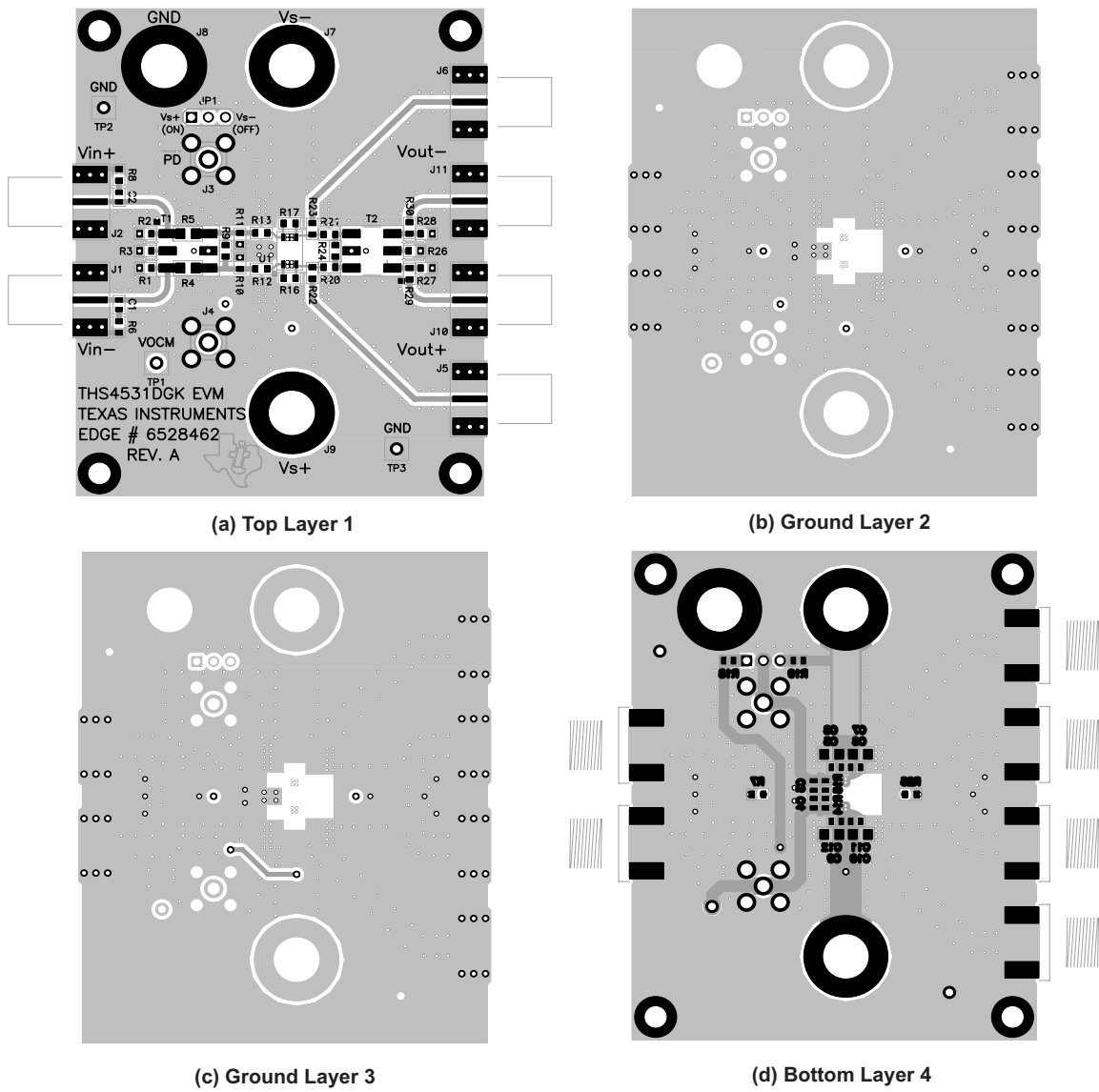


Figure 2. THS4531DGKEVM Layers 1 Through 4

### 5.3 Bill of Materials

**Table 1. THS4531DGKEVM Bill of Materials**

Item	Description	SMD Size	Reference Designator	PCB Qty.	Manufacturer's Part No.
1	CAP, 10.0uF, CERAMIC, X5R, 16V	0805	C7, C10	2	(AVX) 0805YD106KAT2A
2	CAP, 0.1uF, CERAMIC, X7R, 16V	0603	C3, C4, C6, C11	4	(AVX) 0603YC104KAT2A
3	CAP, 0.22uF, CERAMIC, X7R, 10V	0603	C1	1	(AVX) 0603ZC224KAT2A
4	OPEN	0603	C2, C5, C12	3	
5	OPEN	0805	C8, C9	2	
6	OPEN	0603	R1, R2, R3, R7, R8, R9, R14, R15, R22, R23, R25, R26, R27, R30	13	
7	RESISTOR, 0 OHM	0603	R28, R29	2	(ROHM) MCR03EZPJ000
8	RESISTOR, 49.9 OHM, 1/10W, 1%	0603	R6	1	(ROHM) MCR03EZPFX49R9
9	RESISTOR, 51.1 OHM, 1/10W, 1%	0603	R10, R11, R24	3	(ROHM) MCR03EZPFX51R1
10	RESISTOR, 976 OHM, 1/10W, 1%	0603	R20, R21	2	(ROHM) MCR03EZPFX9760
11	RESISTOR, 2K OHM, 1/10W, 1%	0603	R12, R13, R16, R17	4	(ROHM) MCR03EZPFX2001
12	RESISTOR, 10K OHM, 1/10W, 1%	0603	R18, R19	2	(ROHM) MCR03EZPFX1002
13	RESISTOR, 0 OHM	0805	R4, R5	2	(ROHM) MCR10EZPJ000
14	OPEN		T1	1	
15	TRANSFORMER, RF		T2	1	(MINI-CIRCUITS) ADT1-1WT+
16	JACK, BANANA RECEPTANCE, 0.25" DIA. HOLE		J7, J8, J9	3	(SPC) 15459
17	OPEN		J1, J3, J4, J5, J6, J11	6	
18	CONNECTOR, EDGE, SMA PCB JACK		J2, J10	2	(JOHNSON) 142-0701-801
19	HEADER, 0.1" CTRS, 0.025" SQ. PINS	3 POS.	JP1	1	(SULLINS) PBC36SAAN
20	SHUNTS		JP1	1	(SULLINS) SSC02SYAN
21	TEST POINT, RED		TP1	1	(KEYSTONE) 5000
22	TEST POINT, BLACK		TP2, TP3	2	(KEYSTONE) 5001
23	IC, THS4531		U1	1	(TI) THS4531IDGK
24	STANDOFF, 4-40 HEX, 0.625" LENGTH			4	(KEYSTONE) 1808
25	SCREW, PHILLIPS, 4-40, 0.250"			4	PMSSS 440 0025 PH
26	BOARD, PRINTED CIRCUIT			1	(TI) EDGE# 6528462 REV.A

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## EVM Warnings and Restrictions

It is important to operate this EVM within the input voltage range of 2.5 V to 5.5 V and the output voltage range of 2.5 V to 5.5 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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