OPA1S238xEVM

This user's guide describes the characteristics, operation, and use of the evaluation module (EVM) for the OPA1S2384 and OPA1S2385 referred to as the OPA1S238xEVM. This EVM is designed to evaluate the performance of the device in both single- and dual-supply configurations. This document also includes the schematic, printed circuit board (PCB) layout, and a bill of materials (BOM). Throughout this document the terms *evaluation board*, *evaluation module*, and *EVM* are synonymous with the OPA1S238xEVM.

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1 Introduction

1.1 OPA1S2384 and OPA1S2385

The OPA1S2384 and OPA1S2385 combine high bandwidth, FET-input operational amplifiers with a fast SPST CMOS switch. They are well suited for applications that require the tracking and capturing of fast signals, such as wideband photodiode amplification. These devices are available in a DFN-10 package.

1.2 OPA1S238xEVM

The OPA1S238xEVM is intended to provide basic functional evaluation of the OPA1S2385. It provides the following features:

- Configured for split-supply or single-supply operation.
- Easy access to pertinent nodes with test points, SMA connectors, and banana plugs.
- Default noninverting gain of 1 configuration for basic sample-and-hold mode evaluation.
- Component footprints allow for multiple gain, feedback, and filtering configurations.
- Designed for connection to standard 50-Ω test equipment.

A picture of the OPA1S238xEVM is shown in Figure 1.

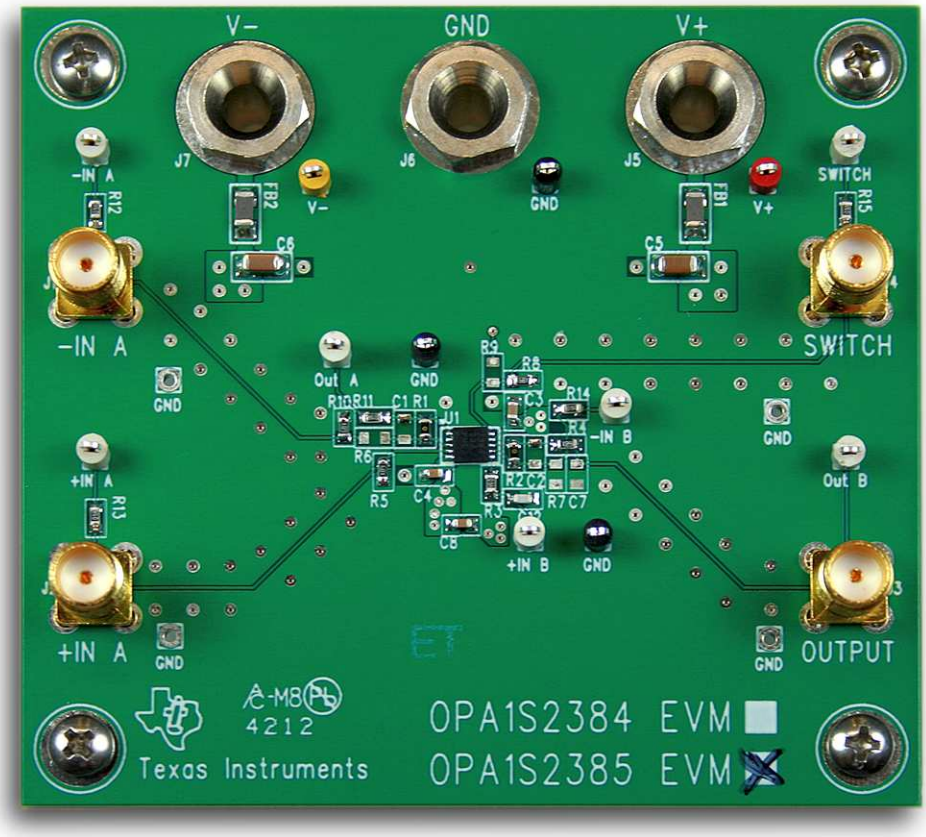

Figure 1. OPA1S238xEVM (OPA1S2385 Shown)

2 OPA1S238xEVM Hardware

This section discusses the OPA1S238xEVM hardware schematics and PCB layout.

2.1 Schematic

The schematic of the OPA1S238xEVM is shown in Figure 2.

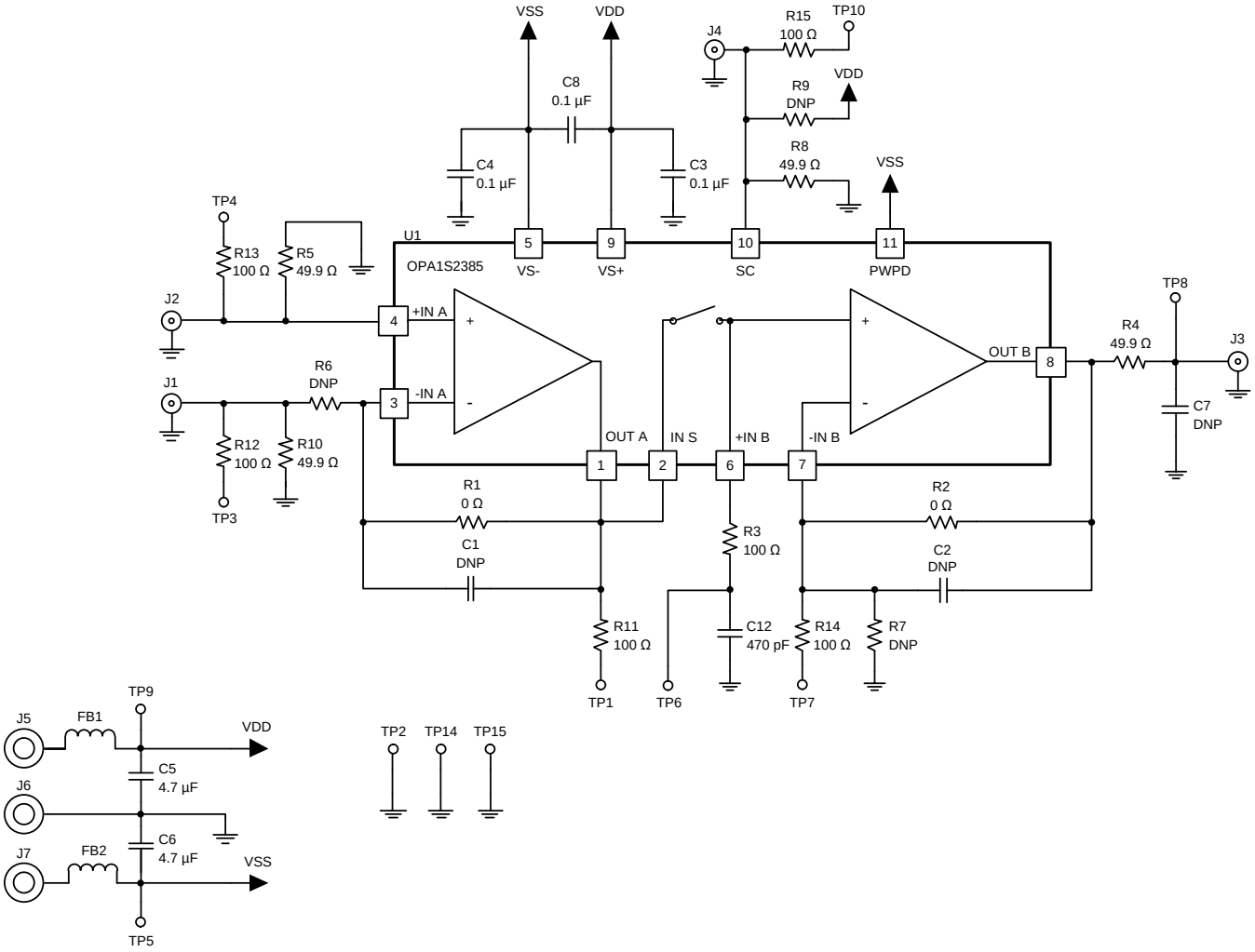

Figure 2. OPA1S238xEVM Schematic

2.1.1 Amplifier A

In the default configuration, amplifier A is set to a noninverting gain of 1. The noninverting input signal is applied through SMA connector J2. If the amplifier is placed in an inverting configuration, the input signal is applied through SMA connector J1. The output of amplifier A can be measured at test point TP1. Both input traces include 50-Ω termination resistors to properly interface with standard test equipment.

The gain and feedback configuration of amplifier A can be changed by modifying components R1, C1, R5, R6, and R10.

2.1.2 Amplifier B

In the default configuration, amplifier B is set to a noninverting gain of 1. The output of amplifier A is passed to the noninverting input of amplifier B through an internal switch. Alternatively, an external signal can be applied to either input of amplifier B using test points TP6 and TP7. The output of amplifier B can be measured at SMA connector J3 or test point TP8. The output trace includes a 50-Ω termination resistor to properly interface with standard test equipment.

The gain, feedback, and filtering configuration of amplifier B can be changed by modifying components R2, C2, R4, R7, and C7.

2.1.3 Switch Control

The control signal to the switch is applied through SMA connector J4. The input trace to the switch control pin includes a 50-Ω termination resistor to properly interface with standard test equipment. The logic table that describes the behavior of the switch is shown in Table 1.

Table 1. Switch Control

SC VOLTAGE	SWITCH BEHAVIOR	
	OPA1S2384	OPA1S2385
High (V+)	Closed	Open
Low (V–)	Open	Closed

2.1.4 Power

Power is applied through the banana connectors J5, J6, and J7. The minimum and maximum supply voltage ranges are given below in Table 2.The default configuration utilizes a split supply of ±2.5 V. If single-supply operation is desired, short J6 to J7 and connect them to GND, then apply the positive supply voltage to J5.

Table 2. Supply Voltage Range

CONFIGURATION	V_{SUPPLY} (MAX)	V_{SUPPLY} (MIN)
Split supply	±2.75 V	±1.35 V
Single supply	+5.5 V	+2.7 V

2.2 OPA1S238xEVM PCB Layout

Figure 3, Figure 4, Figure 5, and Figure 6 depict the four layers of the OPA1S238xEVM PCB layout.

NOTE: Board layouts are not to scale. These figures are intended to show how the board is laid out; they are not intended to be used for manufacturing OPA1S238xEVM PCBs.

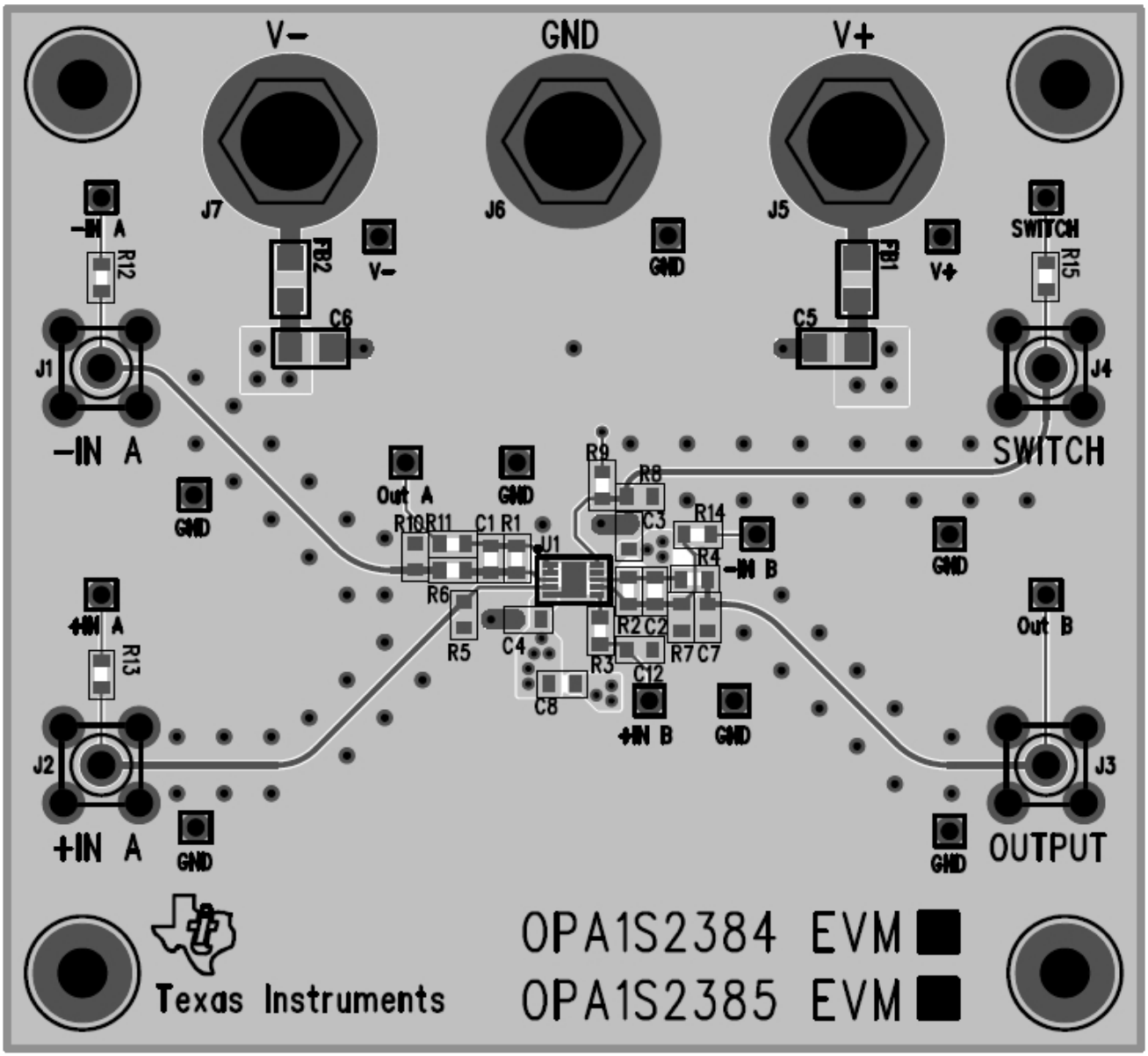

Figure 3. Top Layer (Signal and Ground)

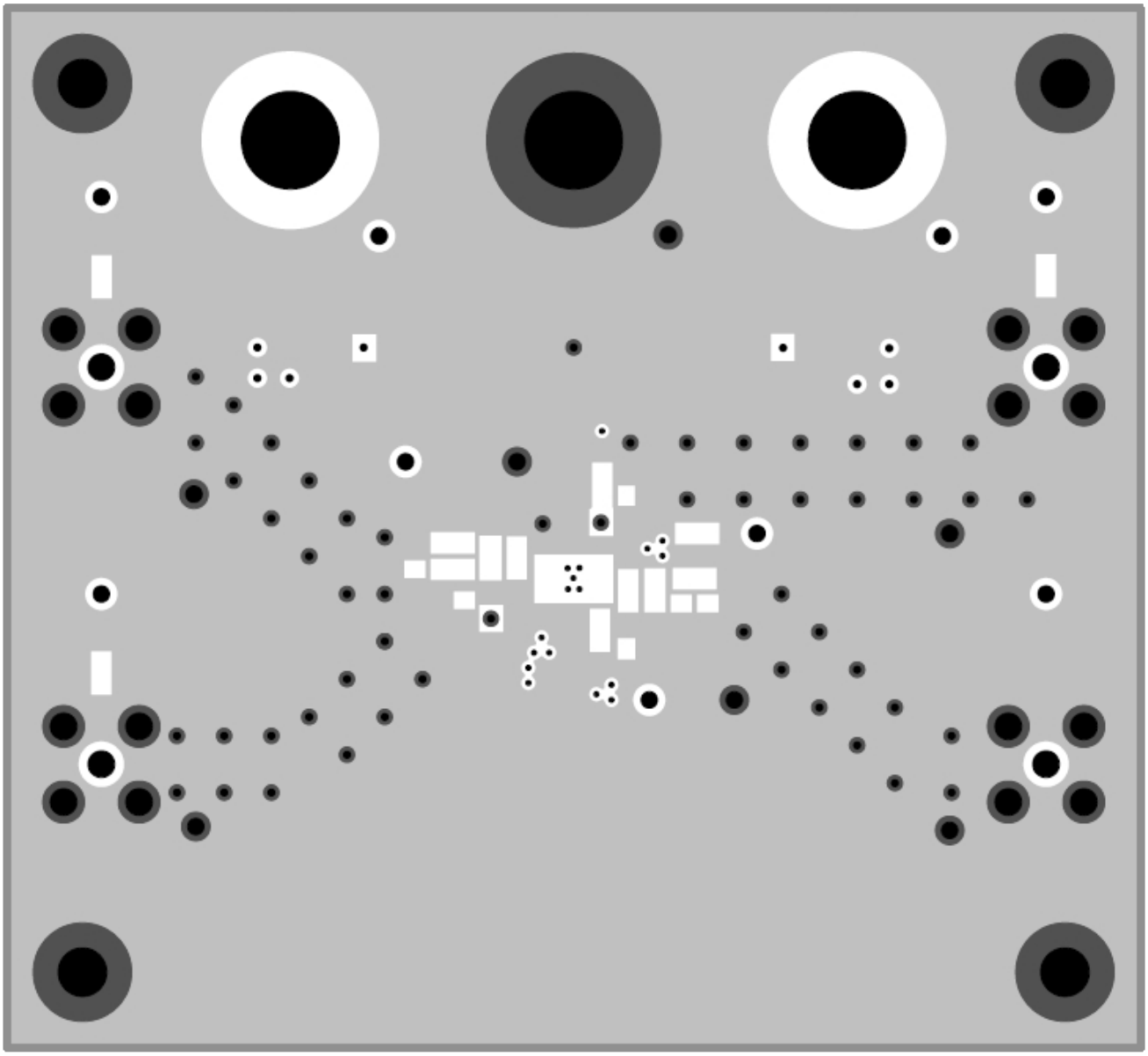

Figure 4. Layer 2 (Ground)

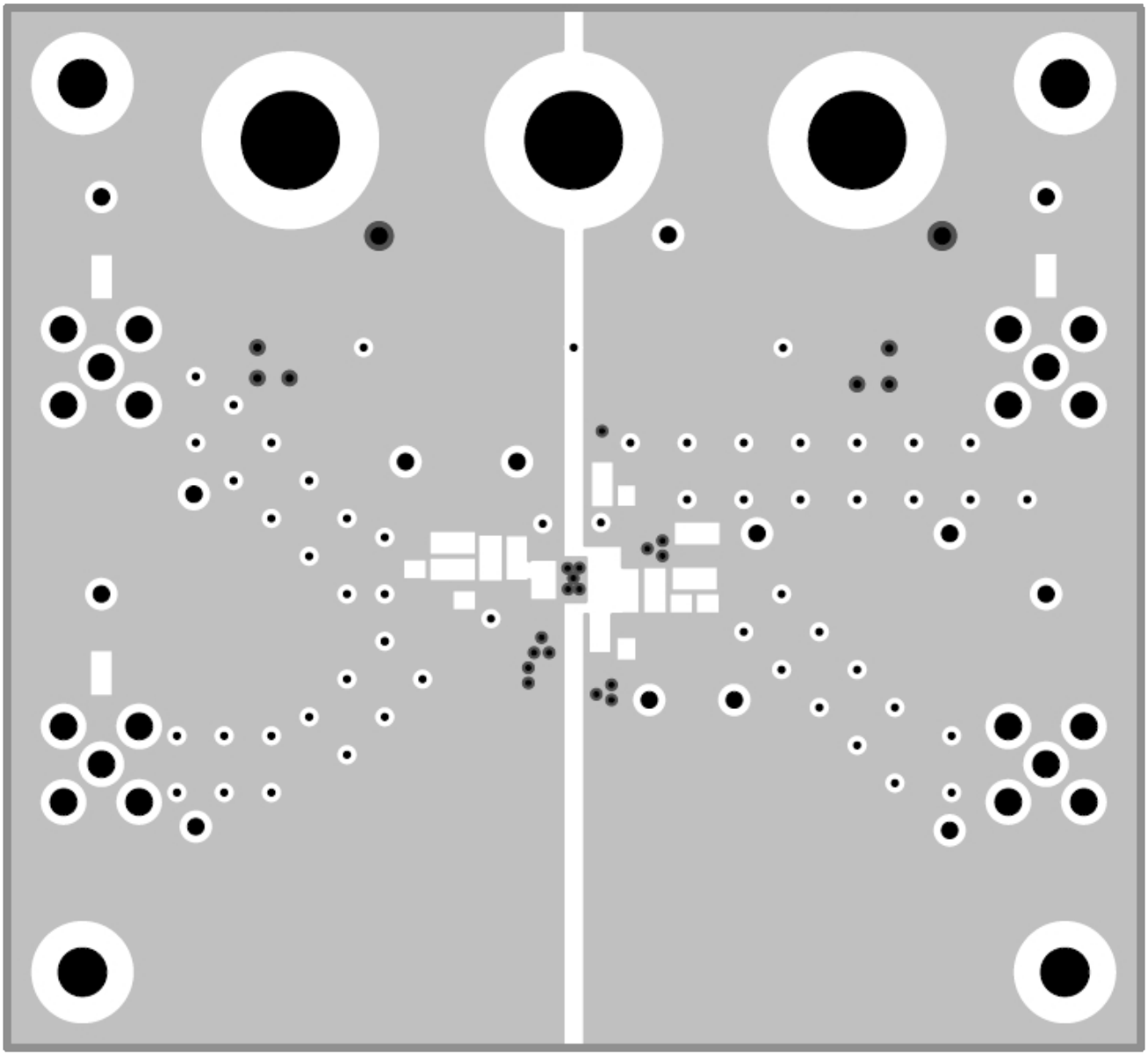

Figure 5. Layer 3 (Power)

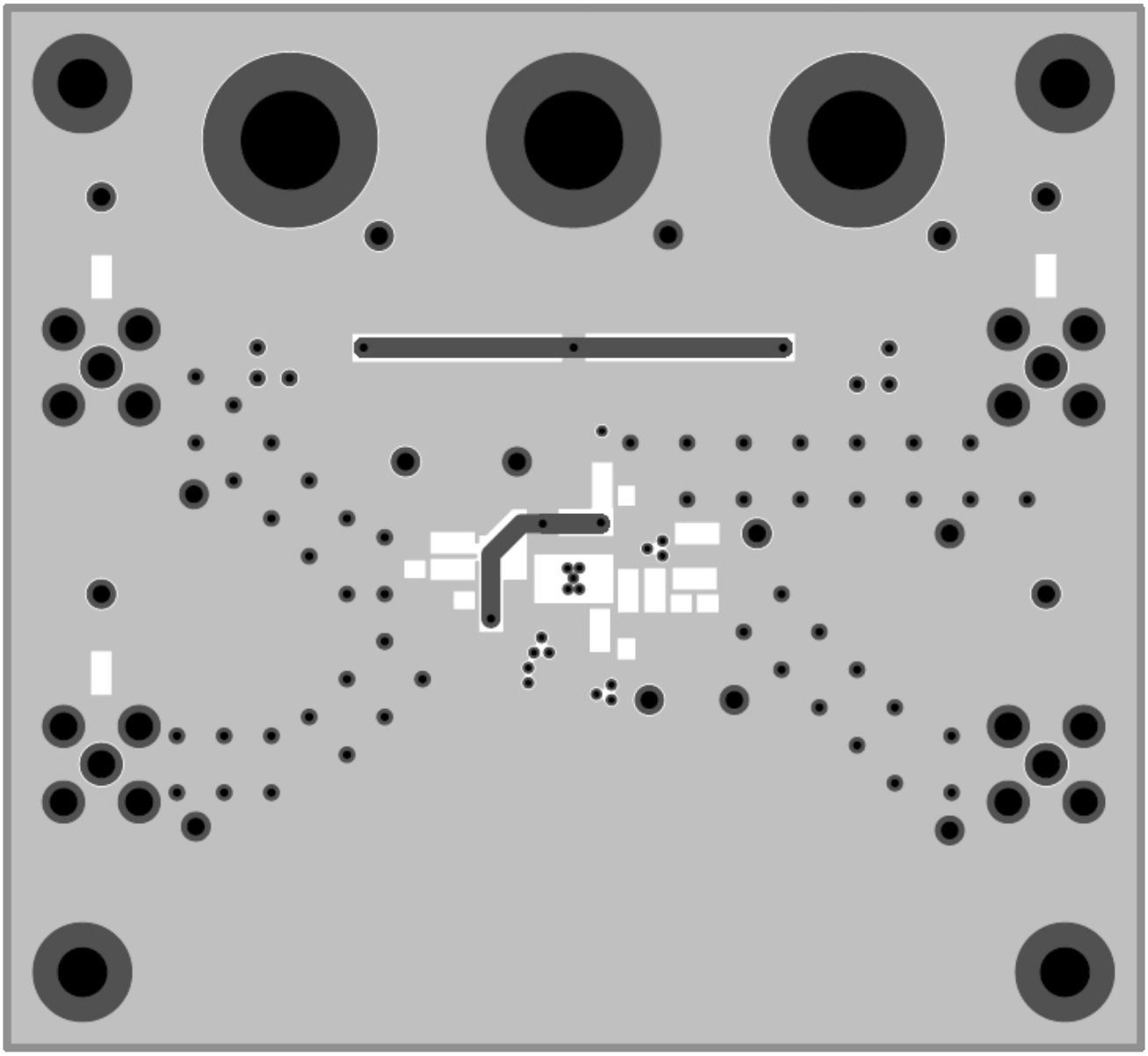

Figure 6. Bottom Layer (Ground)

3 Bill of Materials

Table 3 gives the bill of materials (BOM) used for the OPA1S238xEVM. It also lists examples of optional components.

Table 3. OPA1S238xEVM Bill of Materials

Count	RefDes	Value	Description	Part Number	Manufacturer
1	U1	N/A	OPA1S2384 (DFN-10) or OPA1S2385 (DFN-10)	OPA1S2384 or OPA1S2385	Texas Instruments
3	C3, C4, C8	0.1 µF	Capacitor, .010µF, 16V, X7R, 0603	C1608X7R1C104K	TDK Corporation
2	C5, C6	4.7 µF	Capacitor, 4.7µF, 16V, X7R, 1206	C3216X7R1C475K/1.60	TDK Corporation
1	C12	470 pF	Capacitor, 470pF, 50V, NP0, 0603	GRM1885C1H471JA01D	Murata Electronics
2	FB1, FB2	N/A	Ferrite Bead, 3A, 80 ohms, 1206	HI1206N800R-10	Laird-Signal Integrity Products
2	R1, R2	0 Ω	Resistor, 0Ohm, 0603	ERJ-3GEY0R00V	Panasonic Electronic Components
6	R3, R11-R15	100 Ω	Resistor, 100Ohm, 0603	ERJ-3EKF1000V	Panasonic Electronic Components
4	R4, R5, R8, R10	49.9 Ω	Resistor, 49.9Ohm, 0603	ERJ-3EKF49R9V	Panasonic Electronic Components
7	TP1, TP3, TP4, TP6, TP7, TP8, TP10	N/A	Test Point, PC Mini, 0.040", White	5002	Keystone Electronics
1	TP5	N/A	Test Point, PC Mini, 0.040", Yellow	5004	Keystone Electronics
1	TP9	N/A	Test Point, PC Mini, 0.040", Red	5000	Keystone Electronics
3	TP2, TP14, TP15	N/A	Test Point, PC Mini, 0.040", Black	5001	Keystone Electronics
4	J1-J4	N/A	Connector Socket, SMA, Die-cast, PCB Mount	5-1814832-1	TE Connectivity
3	J5-J7	N/A	Connector Jack, Banana, Panel Mount	108-0740-001	Emerson Network Power Connectivity
4	Screws	N/A	Screw, Phillips, 4-40x3/8	PMS 440 0038 PH	B&F Fastener Supply
4	Standoffs	N/A	Standoff, Hex, 4-40THR, Aluminum, 0.500"	2203	Keystone Electronics
Not Installed	C1, C2, C7	N/A	Capacitor, 0603		
Not Installed	R6, R7, R9	N/A	Resistor, 0603		
Not Installed	TP11-TP13, TP16	N/A	Test Point, PC Mini, 0.040"		

4 Related Documentation from Texas Instruments

The following documents provide information regarding Texas Instruments' integrated circuits and support tools for the OPA1S238xEVM. This user's guide is available from the TI web site under literature number ***SBOU127***. Any letter appended to the literature number corresponds to the document revision that is current at the time of the writing of this document. Newer revisions may be available from the TI web site, or call the Texas Instruments' Literature Response Center at (800) 477-8924 or the Product Information Center at (972) 644-5580. When ordering, identify the document by both title and literature number.

Related Documentation

Document	Literature Number
OPA1S2384 product data sheet	SBOS645
OPA1S2385 product data sheet	

Revision History

Changes from Original (December 2012) to A Revision	Page
• Added OPA1S2384 and OPA1S2384EVM devices to user's guide	1

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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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.

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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.

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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.

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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
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