THS4552PWEVM

The THS4552PWEVM is an evaluation module for the dual THS4552 amplifier in the PW (16-lead TSSOP) 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 or differential 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. Both the channels can be easily configured for other functions, gains, and single- or split-supply operation.

The THS4552PWEVM has an onboard load for the amplifier of 1 kΩ on both channels. The output transformer and resistor network converts this to a 50-Ω single-ended output.

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Trademarks

1 Features

This EVM supports the following 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 and output impedance test equipment
- Inputs and outputs include SMA connectors

2 EVM Specifications

Table 1 lists the EVM specifications:

Table 1. EVM Specifications

		Value
	Single-supply voltage range (V– = ground)	2.7 to 5.4 V
V±	Split-supply voltage range	±1.35 to ±2.7 V
I_S±	Supply current (no load)	2.7 mA
	Input voltage	V_S±, Max
I_{OUT}	Output drive	±80 mA

3 Power Connections

The THS4552PWEVM is equipped with test point connectors for easy connection of power. The positive supply input is red and is labeled V+. The negative supply input is yellow and is labeled V–. The Ground is black and is labeled GND.

3.1 Split-Supply Operation

To operate as split supply, apply the positive supply voltage to V+, negative supply voltage to V– , and the ground reference from supply to GND.

3.2 Single-Supply Operation

To operate as single supply, connect both the V– connector and the GND connector to ground, and apply the positive supply voltage to V+. Inputs and outputs must be biased per datasheet specifications for proper operation. The THS4552 outputs common-mode voltage defaults to mid supply if the Vcm1 and Vcm2 connector is left floating.

4 Input and Output Connections

The THS4552PWEVM 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 or differential input and single-ended output with 50-Ω termination on both the channels. For best results, signals must be routed to and from the EVM with cables having 50-Ω characteristic impedance. Either IN1+ (J1) or IN1– (J2) can be used for single-ended input on one channel and IN2+ (J3) or IN2– (J4) can be used for single-ended input on the other channel. The unused connector should be terminated with a 50-Ω resistive SMA load. If no SMA load is available, the spaces marked C1, C2, C17, or C18 can be loaded with a 0-Ω resistor to terminate the unused input. Use both IN1+ (J1) and IN1– (J2) for differential input on one channel and both IN2+ (J3) and IN2– (J4) for differential input on the other channel. OUT1+ (J12) is the output connector for single-ended output signal for one channel and OUT2+ (J14) is the output connector for single-ended output signal for the other channel. The amplifier converts the single-ended or differential input to a differential signal at its output pins. A resistor network and transformer on the output of the amplifier convert the differential output signal to single-ended, and provides a 1-kΩ load to the amplifier when terminated in 50 Ω. A 50-Ω line-impedance match at OUT1+ and OUT2+ should be preserved. This results in an output measurement loss, and the overall gain is approximately –30 dB. See the THS4552 datasheet applications section (SBOS831), schematics, and layouts for more detail and how to reconfigure the EVM.

4.1 VOCM Input Connections

The Vcm1 (J7) and Vcm2 (J6) inputs are optional and the SMA connectors are not loaded in default configuration. These inputs set the common mode of the output pins of both the channels independently. The THS4552 will automatically self-bias the output common-mode voltages to the mid-supply voltage if the VOCM1 or VOCM2 pins are not connected. This is the optimal voltage for maximum output swing and best linearity.

The valid range of the VOCM1 and VOCM2 is 0.55 V above the negative supply to 1.5 V below the positive supply. For example, on a ±2.5-V split supply, the VOCM1 and VOCM2 pin can be set anywhere from –1.95 V to 1.0 V. With a single 5-V supply the valid range would be 0.55 V to 3.5 V. Remember, the outputs of the THS4552 can swing from rail to rail; however, the maximum output swing available is reduced when the output common mode is set to a voltage other than mid supply.

If providing 50-Ω termination for the Vcm1 or Vcm2 input signal source is desired, C6 or C20 can be replaced with a 0-Ω resistor, respectively. The board is shipped with C6 and C20 populated with 0.22 µF and output common mode voltages of both channels are set to mid-supply voltage with C6 and C20 populated.

4.2 $\overline{PD}$ Input Connections

The PD1 (J5) and PD2 (J10) jumpers allow both THS4552 channels to be disabled independently. SMA connectors can also be loaded at J8 and J9 and a signal for the power down function can be applied for high-speed testing. Normally the J5 and J10 jumpers are used to enable or disable (power down) the corresponding channels of the dual-channel amplifier. When the jumpers are open, the amplifier is **not** powered down, so it is enabled. When the shorting block is connected and J5 or J10 is closed, the amplifier channel corresponding to the jumper is powered down.

For high-speed testing, the C4 and C19 can be replaced with 0 Ω to terminate the PD1 and PD2 SMA inputs, respectively. The shorting block should be removed from J5 and J10 during high-speed testing. Because 0 Ω at C4 or C19 terminates to the ground and not to the supplies, the state of the amplifier will be undefined when the signal source is disconnected. For this reason, 0 Ω at C4 or C19 should only be used when driving the SMA connector with a high-speed, controlled-impedance source.

5 THS4552PWEVM Schematic, Layout, and Bill of Materials

5.1 Schematics

Figure 1 and Figure 2 illustrate the EVM schematics.

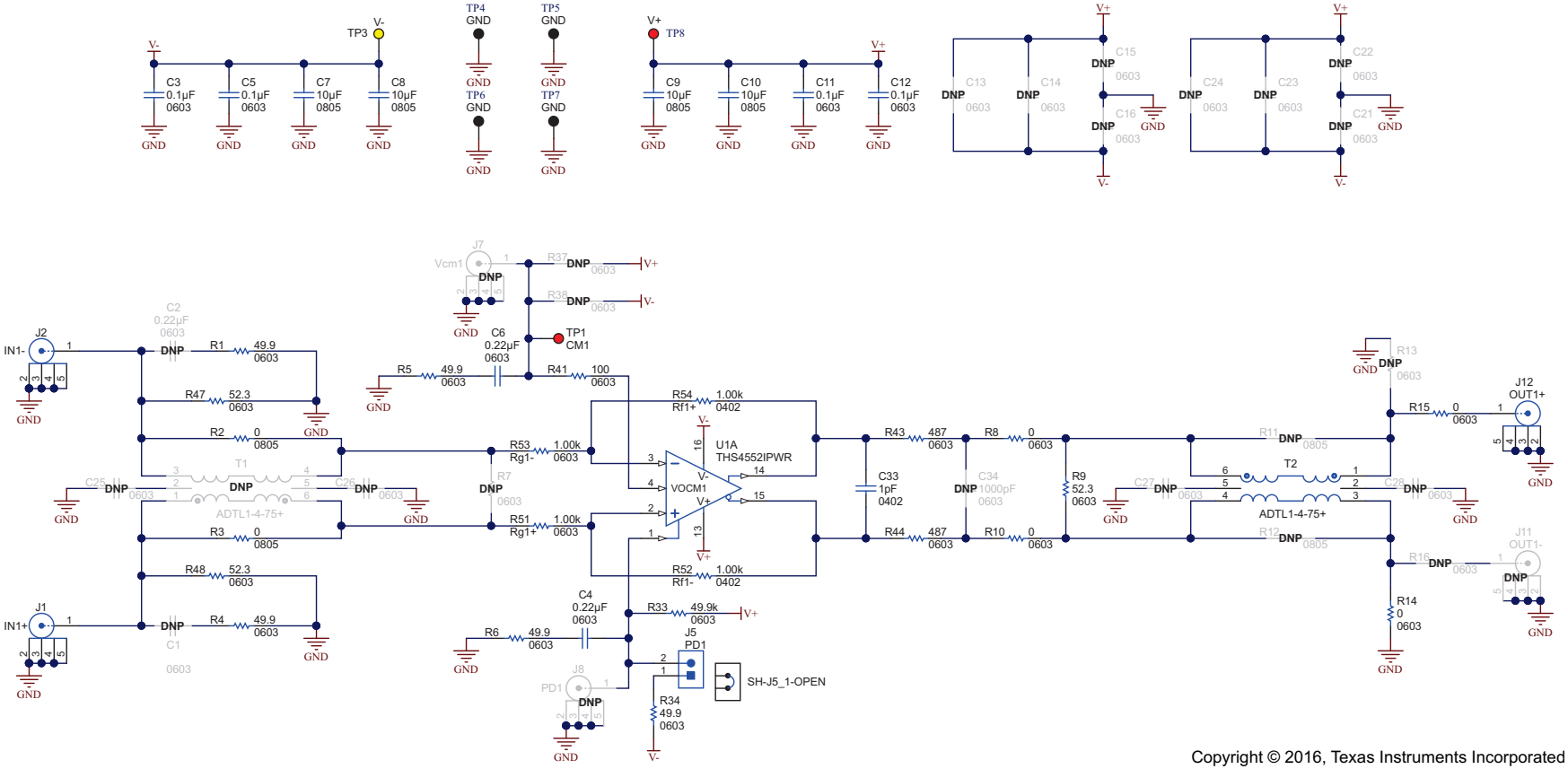

Figure 1. THS4552PWEVM Schematic

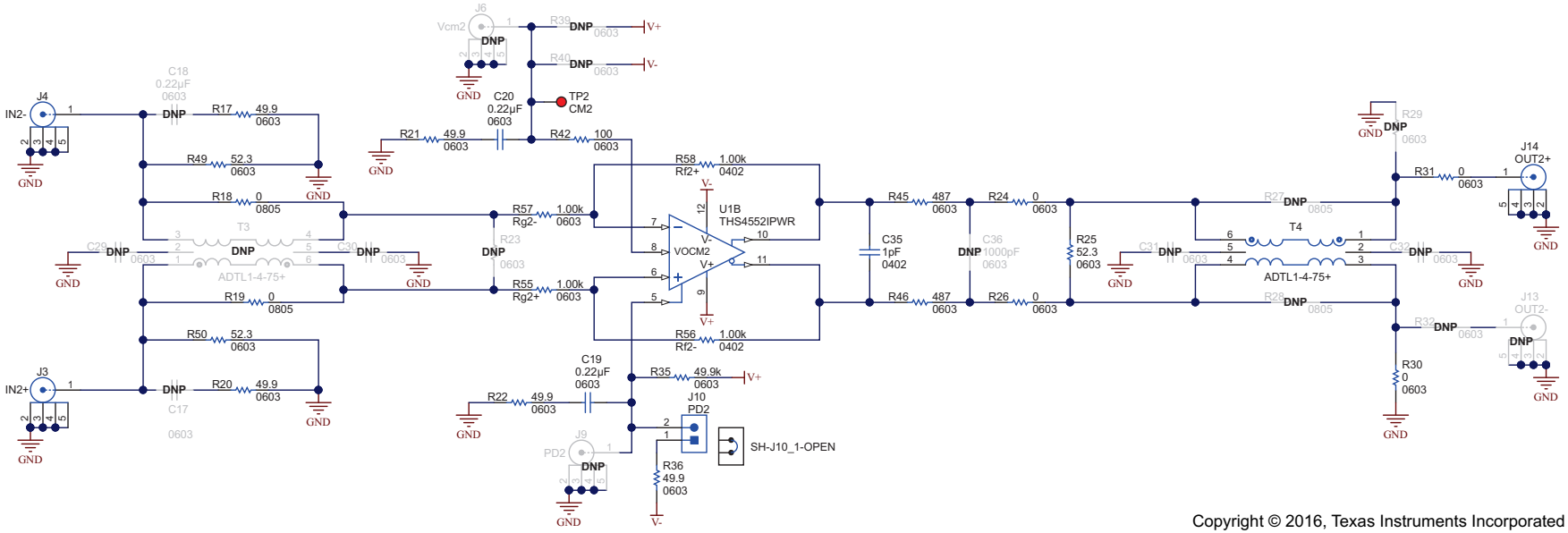

Figure 2. THS4552PWEVM Schematic

5.2 THS4552PWEVM Layers

Figure 3 through Figure 6 show the THS4552PWEVM layers.

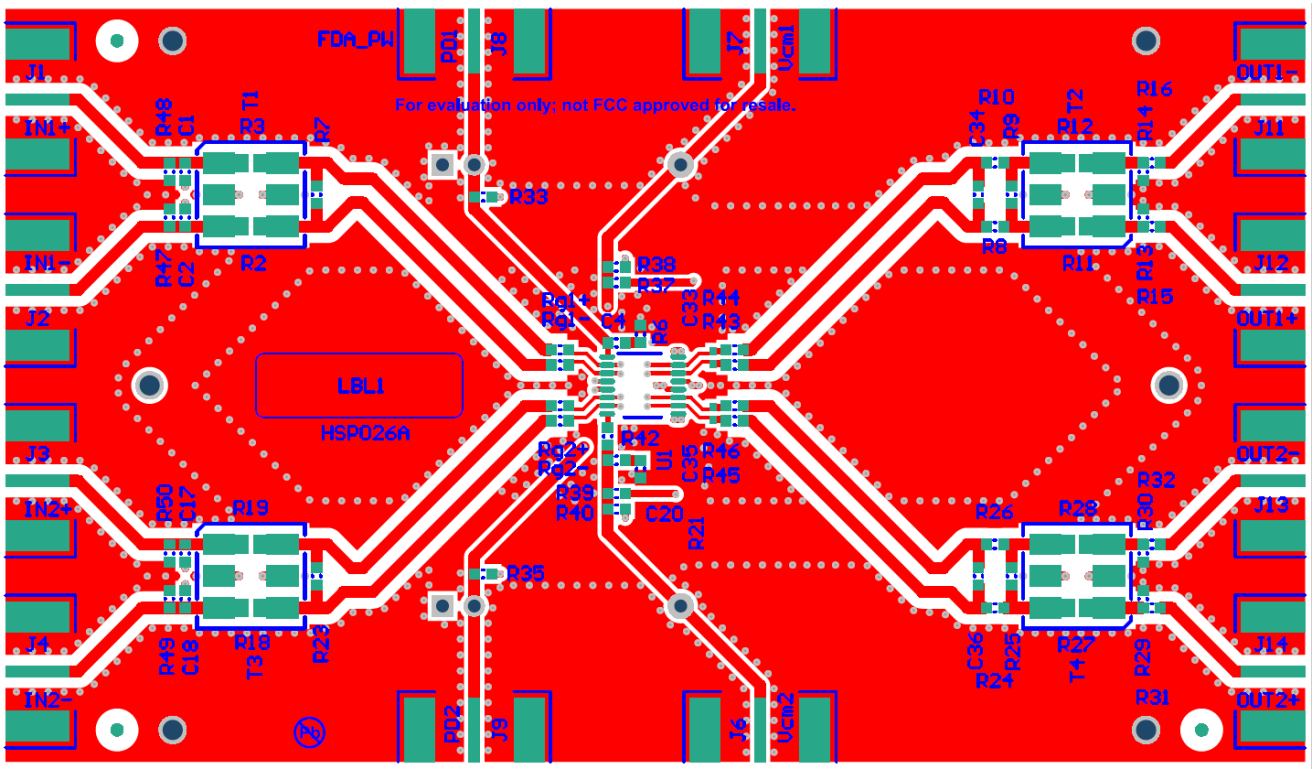

Figure 3. THS4552PWEVM Top Layer, Signal

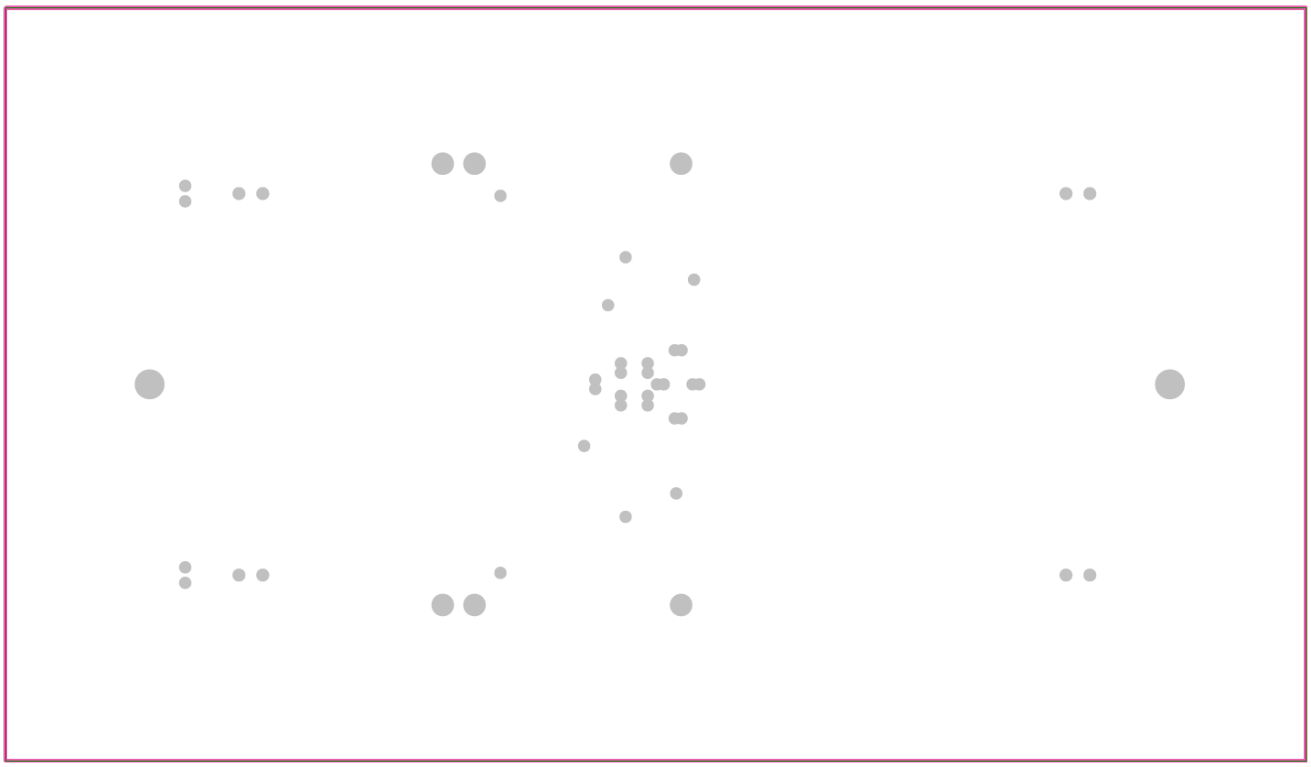

Figure 4. THS4552PWEVM Layer 2

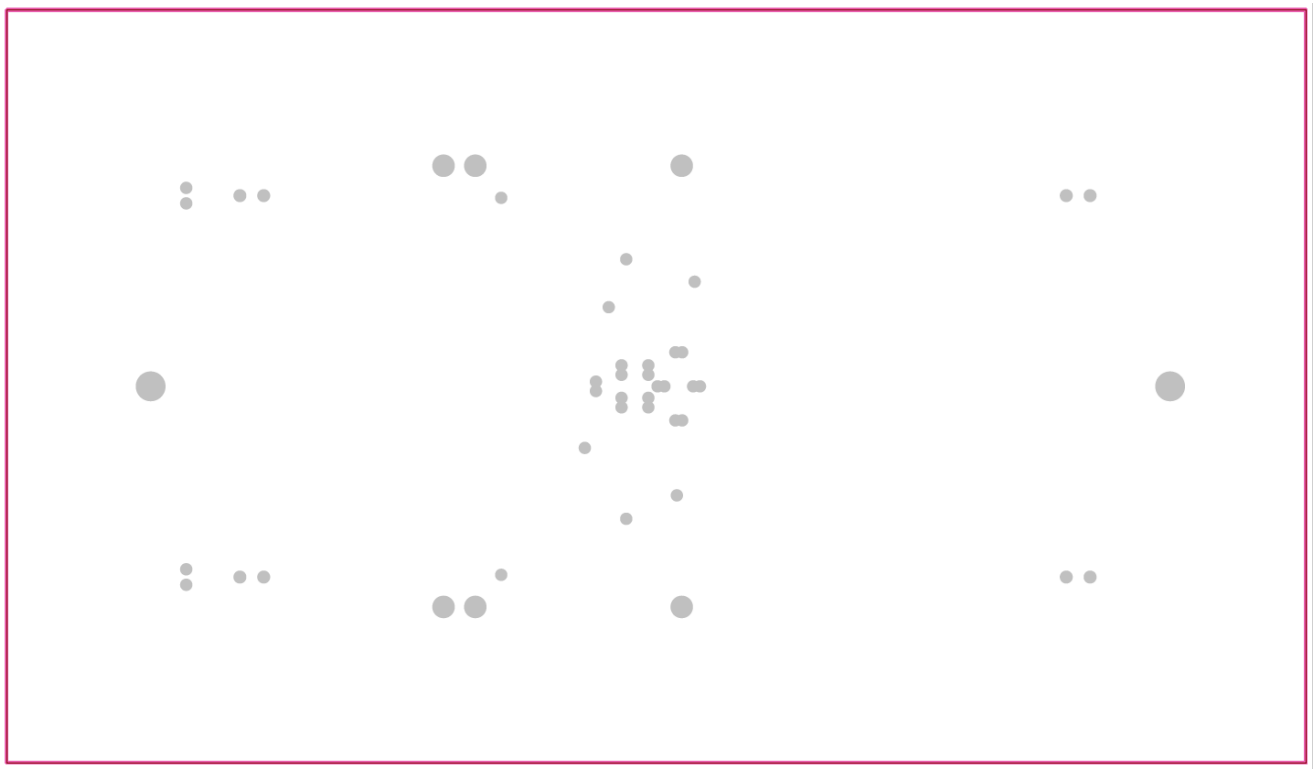

Figure 5. THS4552PWEVM Layer 3

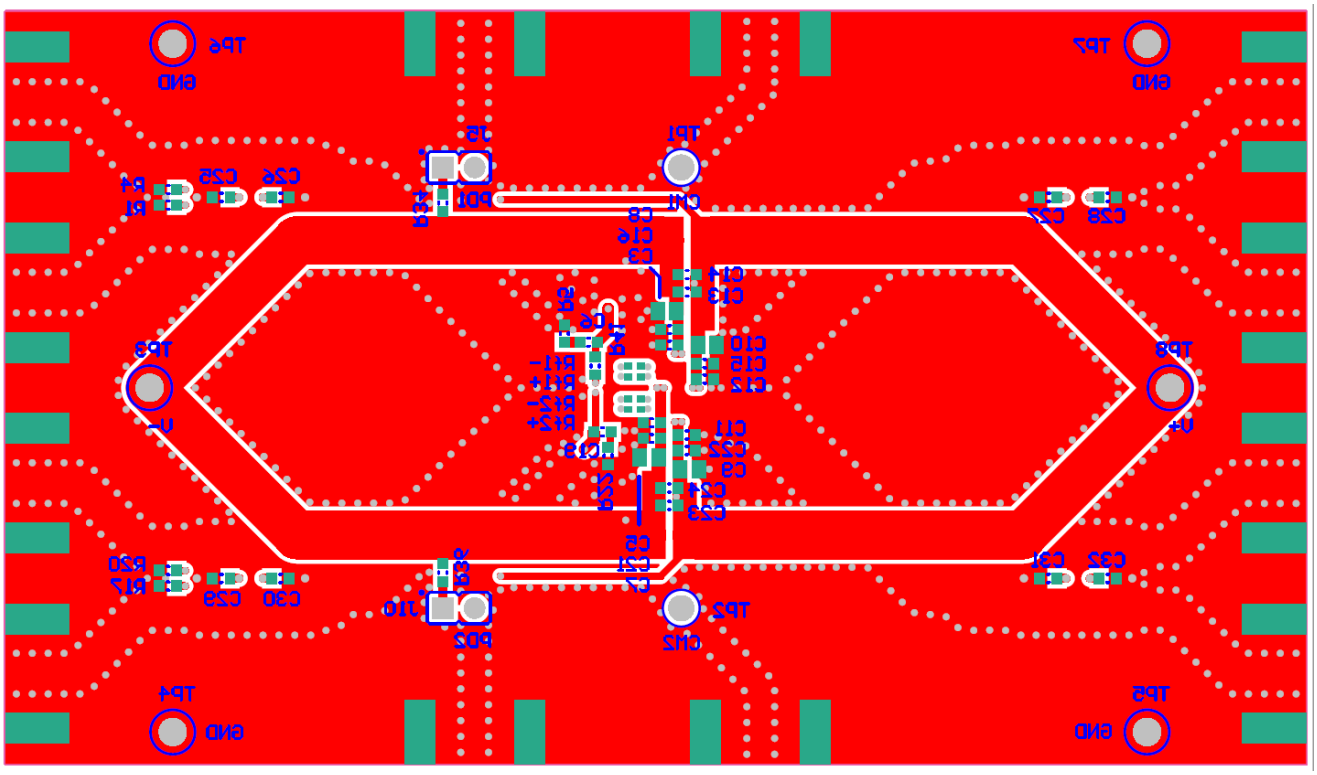

Figure 6. THS4552PWEVM Bottom Layer

5.3 Bill of Materials

Table 2 lists the EVM bill of materials.

Table 2. THS4552PWEVM Bill of Materials

Item	Part Reference	Quantity	Part Number	Manufacturer	Description	Note
1	C4, C6, C19, C20	4	GRM188R61A224KA01D	Murata	CAP, CERM, 0.22 µF, 10 V, +/- 10%, X5R, 0603	
2	C3, C5, C11, C12	4	0603YC104JAT2A	AVX	CAP, CERM, 0.1 µF, 16 V, +/- 5%, X7R, 0603	
3	C33, C35	2	GRM1555C1H1R0CA01D	Murata	CAP, CERM, 1 pF, 50 V, +/- 5%, C0G/NP0, 0402	
4	C7, C8, C9, C10	4	GRM21BR61C106KE15L	Murata	CAP, CERM, 10 µF, 16 V, +/- 10%, X5R, 0805	
5	J1, J2, J3, J4, J12, J14	6	142-0701-806	Emerson Network Power	Connector, End launch SMA, 50 ohm, SMT	
6	J5, J10	2	PBC02SAAN	Sullins Connector Solutions	Header, 100mil, 2x1, Gold, TH	
7	R1, R4, R5, R6, R17, R20, R21, R22, R34, R36	10	CRCW060349R9FKEA	Vishay-Dale	RES, 49.9, 1%, 0.1 W, 0603	
8	R2, R3, R18, R19	4	MCR10EZPJ000	Rohm	RES, 0, 5%, 0.125 W, 0805	
9	R43, R44, R45, R46	4	CRCW0603487RFKEA	Vishay-Dale	RES, 487, 1%, 0.1 W, 0603	
10	R9, R25, R47, R48, R49, R50	6	CRCW060352R3FKEA	Vishay-Dale	RES, 52.3, 1%, 0.1 W, 0603	
11	R8, R10, R14, R15, R24, R26, R30, R31	8	CRCW06030000Z0EA	Vishay-Dale	RES, 0, 5%, 0.1 W, 0603	
12	R33, R35	2	RC0603FR-0749K9L	Yageo America	RES, 49.9 k, 1%, 0.1 W, 0603	
13	R51, R53, R55, R57	4	CRCW06031K00FKEA	Vishay-Dale	RES, 1.00 k, 1%, 0.1 W, 0603	
14	R52, R54, R56, R58	4	CRCW04021K00FKED	Vishay-Dale	RES, 1.00 k, 1%, 0.063 W, 0402	
15	R41, R42	2	CRCW0603100RFKEA	Vishay-Dale	RES, 100, 1%, 0.1 W, 0603	
16	SH-J5_1-OPEN, SH-J10_1-OPEN	2	382811-6	AMP	Shunt, 100mil, Gold plated, Black	
17	T2, T4	2	ADTL1-4-75+	Minicircuits	RF Transformer, 75 ohm, 0.5 to 1000 MHz, SMT	
18	TP1, TP2	2	5000	Keystone	Test Point, Miniature, Red, TH	
19	TP3	1	5014	Keystone	Test Point, Multipurpose, Yellow, TH	
20	TP4, TP5, TP6, TP7	4	5011	Keystone Electronics	Test Point, TH, Multipurpose, Black	
21	TP8	1	5010	Keystone Electronics	Test Point, TH, Multipurpose, Red	
22	U1	1	THS4552IPWR	Texas Instruments	Low Power, Precision, 150MHz, Fully Differential Amplifier	

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      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

      NOTE: 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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NOTE: 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.*

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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 EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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