

## **OPA838DCK Evaluation Module**

The OPA838DCKEVM is an evaluation module for the single OPA838 amplifier in the DCK (SC70-5) 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 non-inverting signal gain of 6 V/V at the device output. The OPA838DCKEVM has a total onboard load of 2 kΩ to the amplifier. The output resistor network converts the output to a 50-Ω impedance source. The evaluation module can be easily configured for other functions, gains, and single- or split-supply operation.

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### **Trademarks**

All trademarks are the property of their respective owners.

## 1 Features

This EVM supports the following features:

- Configured for split-supply operation and easily modified for single supply
- Default gain of 6 V / V configuration can be easily 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**

Parameter		Value
	Single-supply voltage range ( $V_- = \text{ground}$ )	2.7 to 5.4 V
$V_{\pm}$	Split-supply voltage range	$\pm 1.35$ to $\pm 2.7$ V
$I_{S\pm}$	Supply current (no load)	1 mA
	Input voltage	$V_{S\pm}, \text{Max}$
$I_{\text{OUT}}$	Output drive	$\pm 40$ mA

## 3 Power Connections

The OPA838DCKEVM 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 data-sheet specifications for proper operation.

## 4 Input and Output Connections

The OPA838DCKEVM is equipped with SMA connectors for easy connection of signal generators and analysis equipment. As shipped, the EVM is configured for a non-inverting gain of 6 V/V, split supply operation, 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. IN+ (J2) should be used for single-ended input with 50- $\Omega$  source. OUT (J5) is the output connector. A resistor network (R7, R8 and R9) at the output of the amplifier convert the output signal to 50- $\Omega$  single-ended source, and provides a 2-k $\Omega$  load to the amplifier when terminated with 50- $\Omega$  load at J5. A 50- $\Omega$  line-impedance match at OUT (J5) should be preserved. This results in an output measurement loss, and the overall attenuation is approximately 38 dB. See the OPA838 data sheet ([SBOS867](#)) applications section, schematics, and layouts for more detail and how to reconfigure the EVM.

## 5 OPA838DCKEVM Schematic, Layout, and Bill of Materials

### 5.1 Schematic

Figure 1 illustrates the EVM schematic.

For recommended operating voltage refer to OPA Datasheet/EVM User's Guide

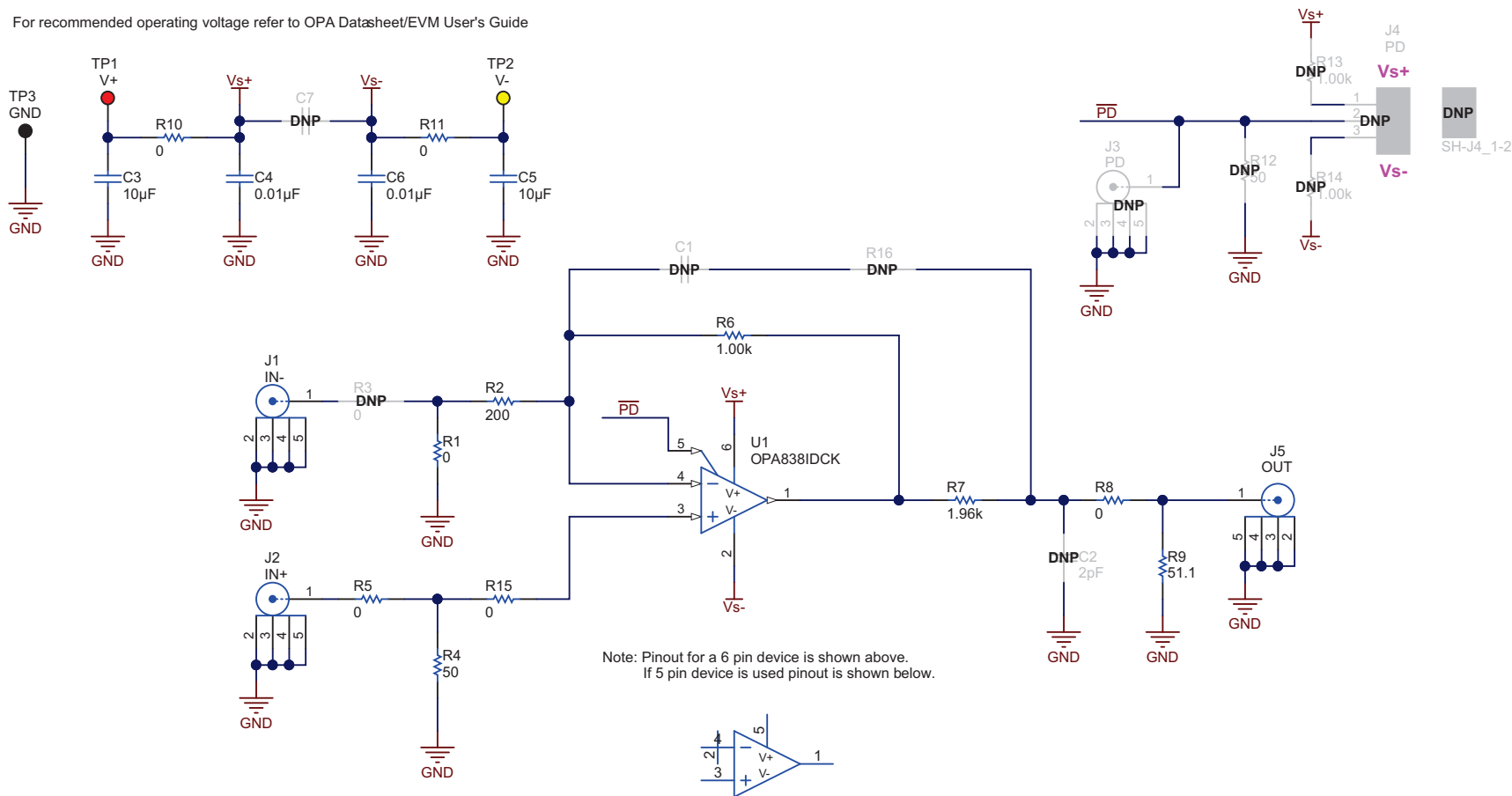


Figure 1. OPA838DCKEVM Schematic

## 5.2 OPA838DCKEVM Layers

Figure 2 through Figure 5 show the OPA838DCKEVM layers.

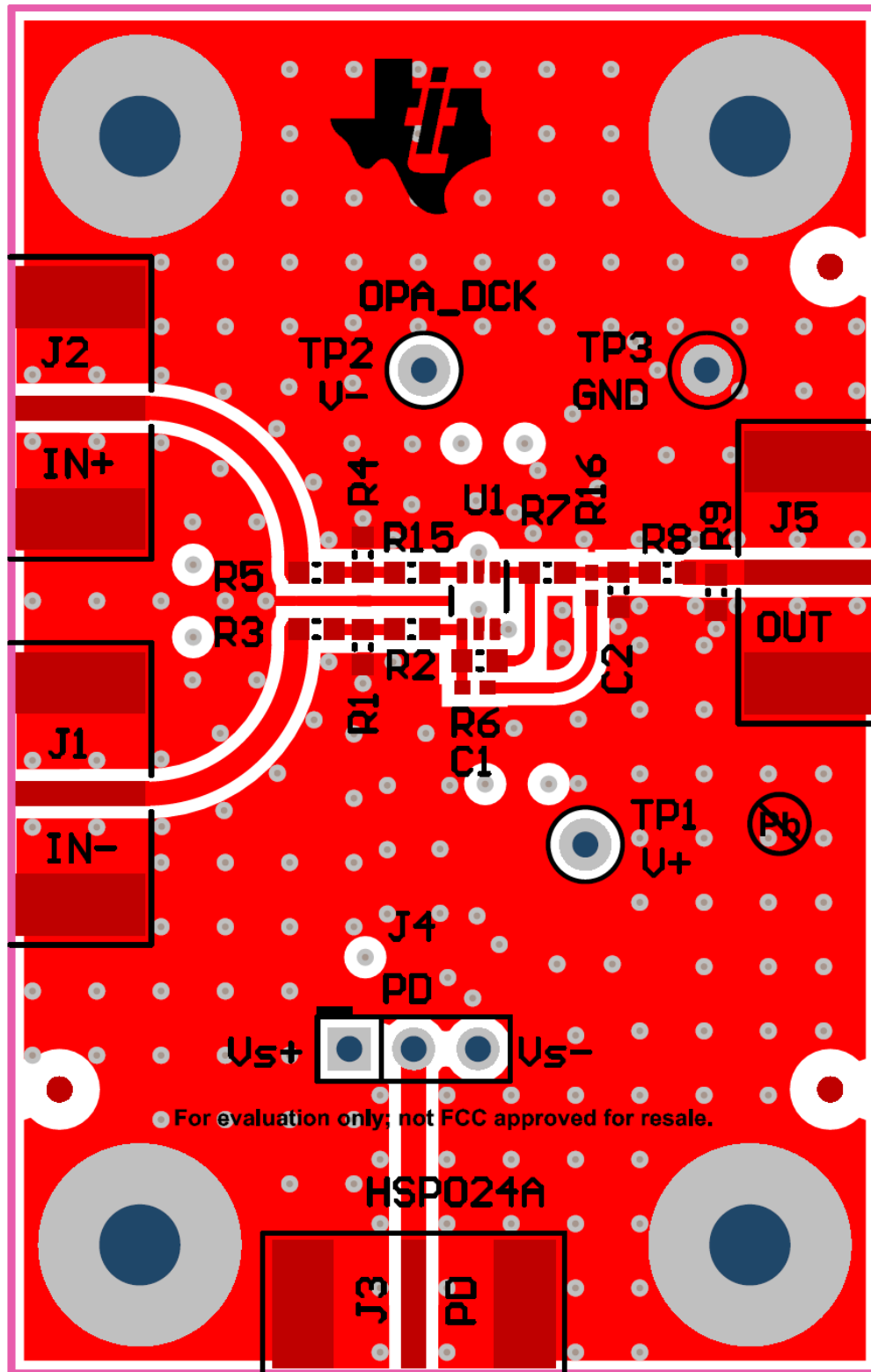


Figure 2. OPA838DCKEVM Top Layer, Signal

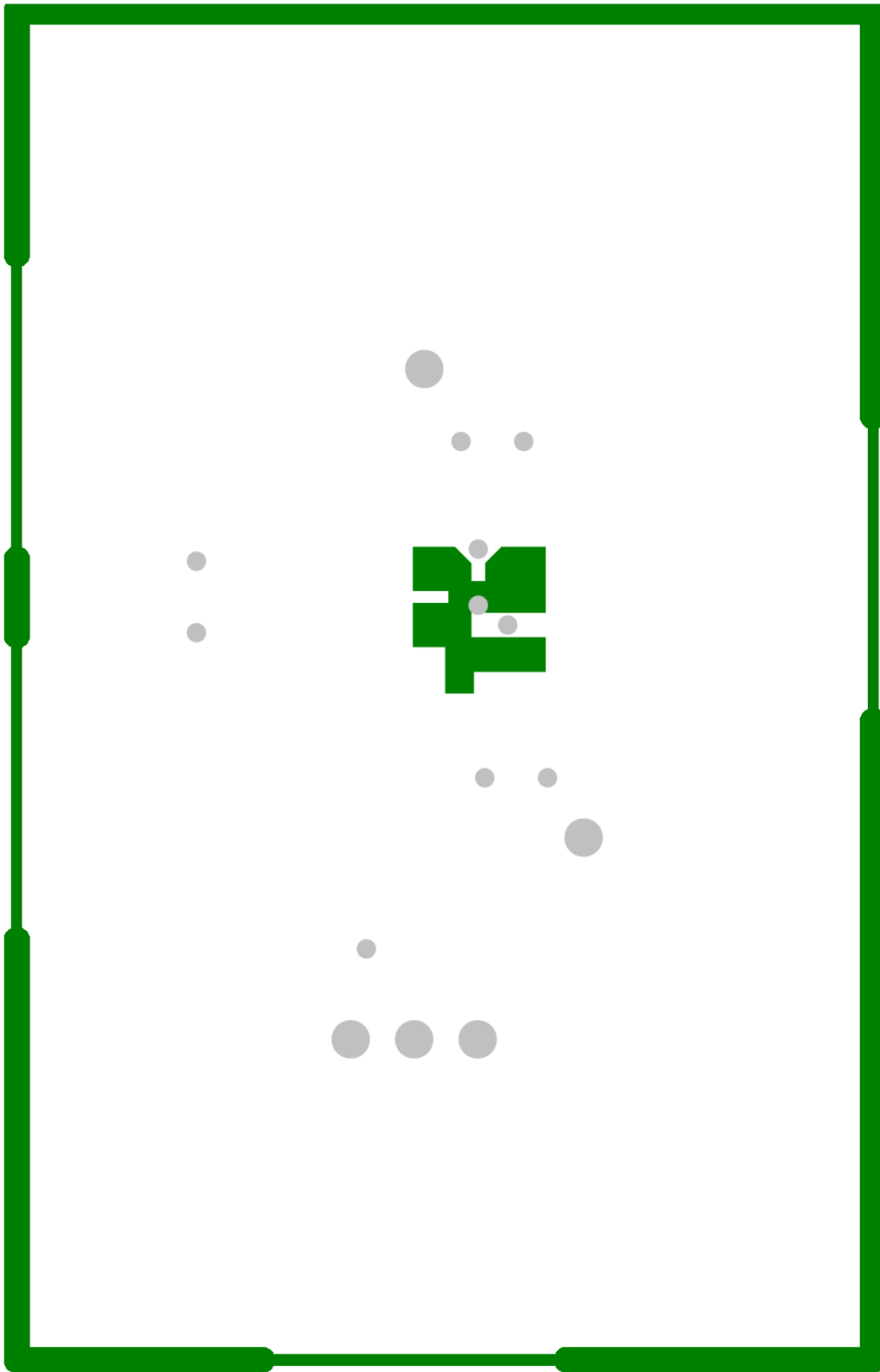


Figure 3. OPA838DCKEVM Layer 2

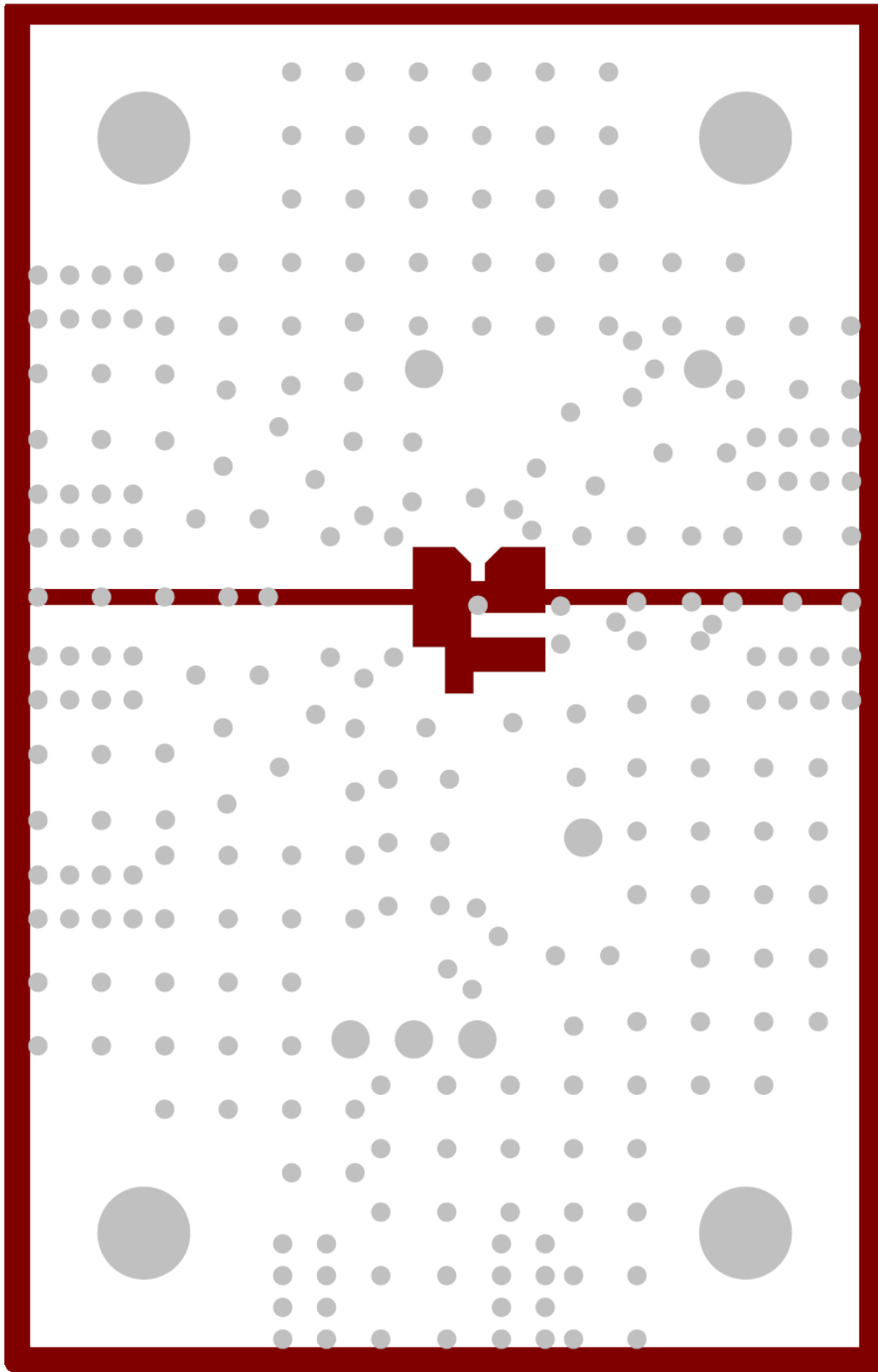


Figure 4. OPA838DCKEVM Layer 3

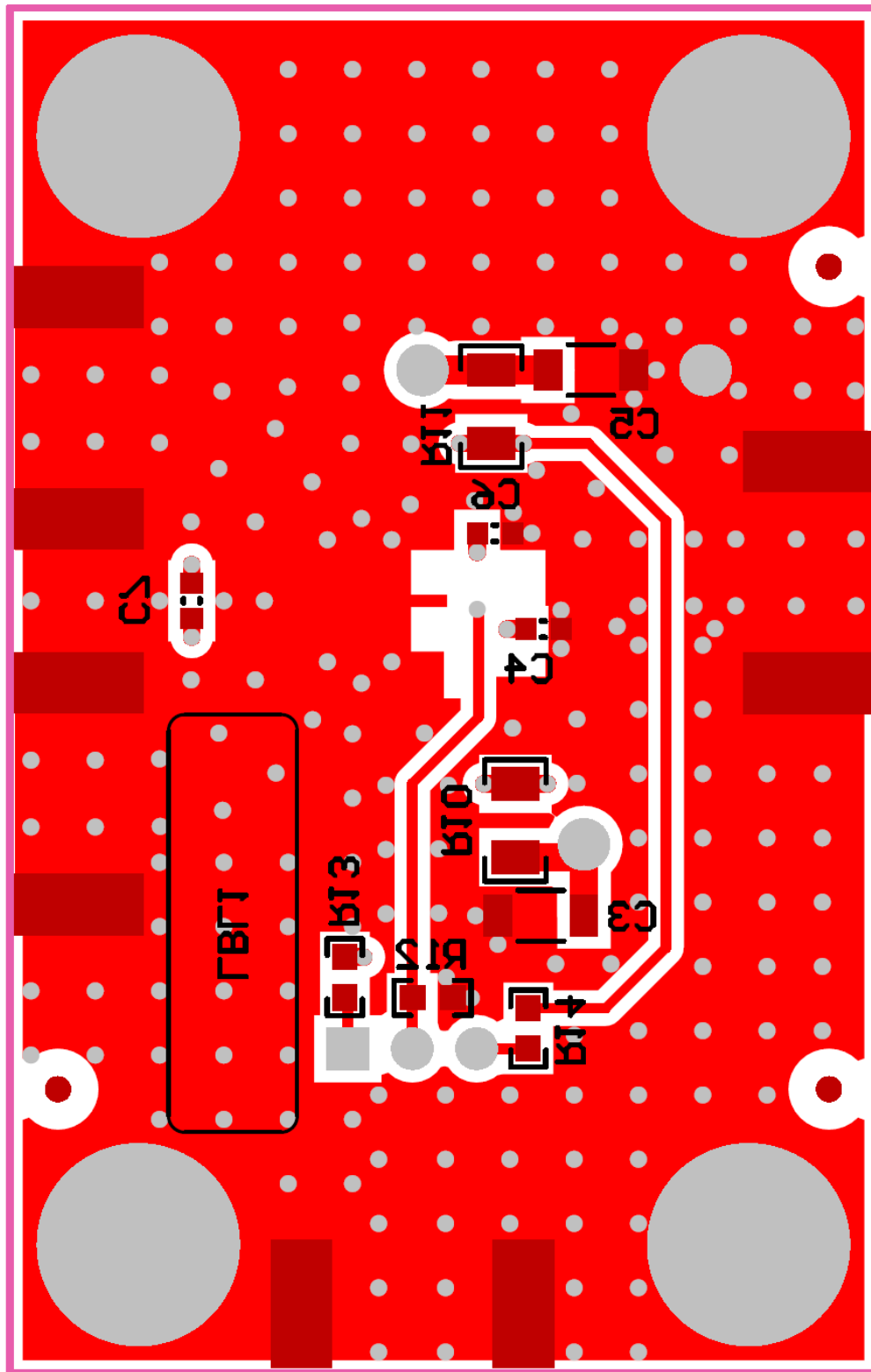


Figure 5. OPA838DCKEVM Bottom Layer



### 5.3 Bill of Materials

Table 2 lists the EVM bill of materials.

**Table 2. OPA838DCKEVM Bill of Materials**

Item	Part Reference	Quantity	Part Number	Manufacturer	Description	Note
1	C3, C5	2	C3216X6S1V106K160AC	TDK	CAP, CERM, 10 $\mu$ F, 35 V, +/- 10%, X6S, 1206	
2	C4, C6	2	06031C103JAT2A	AVX	CAP, CERM, 0.01 $\mu$ F, 100 V, +/- 5%, X7R, 0603	
3	J1, J2, J5	3	142-0701-851	Emerson Network Power	Connector, End launch SMA, 50 ohm, SMT	
4	R1,R5, R8, R15	4	CRCW06030000Z0EA	Vishay-Dale	RES, 0, 5%, 0.1 W, 0603	
5	R4	1	CRCW060350R0FKEA	Vishay-Dale	RES, 50, 1%, 0.1 W, 0603	
6	R7	1	CRCW06031K96FKEA	Vishay-Dale	RES, 1.96 k, 1%, 0.1 W, 0603	
7	R9	1	CRCW060351R1FKEA	Vishay-Dale	RES, 51.1, 1%, 0.1 W, 0603	
8	R10, R11	2	RC1206JR-070RL	Yageo America	RES, 0, 5%, 0.25 W, 1206	
9	TP1	1	5000	Keystone	Test Point, Miniature, Red, TH	
10	TP2	1	5004	Keystone	Test Point, Miniature, Yellow, TH	
11	TP3	1	5001	Keystone	Test Point, Miniature, Black, TH	
12	U1	1	OPA838IDCKR	Texas Instruments	Low Power, Precision, 120MHz, Voltage Feedback Op Amp	
13	R13, R14		CRCW06031K00FKEA	Vishay-Dale	RES, 1.00 k, 1%, 0.1 W, 0603	

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**FCC NOTICE:** This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.
    - 3.1.2 *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

*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.*

## **FCC Interference Statement for Class B EVM devices**

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- 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.

### **3.2 Canada**

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247

#### **Concerning EVMs Including Radio Transmitters:**

This device complies with Industry Canada license-exempt RSSs. 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.

#### **Concernant les EVMs avec appareils radio:**

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.

#### **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.

#### **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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[http://www.tij.co.jp/lstds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page)

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
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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