

OPA818DRGEVM Evaluation Module

The OPA818DRGEVM is an evaluation module (EVM) for the single [OPA818](#) in the DRG (8-pin WSON) package. The OPA818DRGEVM is designed to quickly demonstrate the functionality and versatility of the amplifier.

The EVM is ready to connect to power, signal sources, and test instruments by using onboard connectors. The default amplifier configuration is a noninverting gain of 7 in a split-supply design. The EVM can be easily configured for other gains and single-supply operation. Throughout this document the term *EVM* is synonymous with the *OPA818DRGEVM*.

1 Features

- Configured for split-supply operation and modified for single-supply.
- Default noninverting gain of 7 configuration is reconfigurable for other gains.
- Designed for connection to standard 50-Ω impedance test equipment.
- Inputs and outputs include subminiature version A (SMA) connectors.

2 EVM Specifications

This section provides a general description of the OPA818DRGEVM. [Table 1](#) lists the parameters of this user's guide.

Table 1. EVM Input and Output Limits

| PARAMETER | MIN | TYP | MAX | UNIT |
|--|------------|-----|-----------|------|
| Single-supply voltage range (VEE = ground) | 6 | | 13 | V |
| Split-supply voltage range (VCC,VEE) | ±3 | | ±6.5 | V |
| Supply current, I_S | | 28 | | mA |
| Input voltage, V_I | VEE + 0.25 | | VCC – 3.6 | V |
| Output drive, I_O (with a ±6-V or 12-V supply) | | 55 | | mA |

2.1 Power Connections

The OPA818DRGEVM is equipped with banana jacks for easy power connection. The positive supply input is labeled VCC, the negative supply input is labeled VEE, and ground is labeled GND.

2.1.1 Split-Supply Operation

To operate in a split-supply configuration, apply the positive supply voltage to VCC, the negative supply voltage to VEE, and the ground reference from supply to GND.

2.1.2 Single-Supply Operation

To operate in a single-supply configuration, apply jumper VEE to GND and the positive supply voltage to VCC. The inputs and outputs must be biased per the data sheet specifications for proper operation.

2.2 Input and Output Connections

The OPA818DRGEVM is equipped with SMA connectors to connect the EVM to signal generators and analysis equipment. As shipped, the EVM is configured for a noninverting gain of 7 configuration and split-supply operation with terminals for connecting to 50-Ω test equipment. For best results, route all signals to and from the EVM with cables that have a characteristic impedance of 50 Ω. See the [OPA818 data sheet](#), schematics, and layouts for details on how to reconfigure for other gain configurations.

3 EVM Schematic, Board Layout, and Bill of Materials (BOM)

This section provides a complete schematic diagram, board layouts, and a bill of materials for the OPA818DRGEVM.

3.1 EVM Schematic

Figure 1 shows a schematic diagram for the OPA818DRGEVM.

Refer to U1 Datasheet/EVM User's Guide for recommended operating conditions

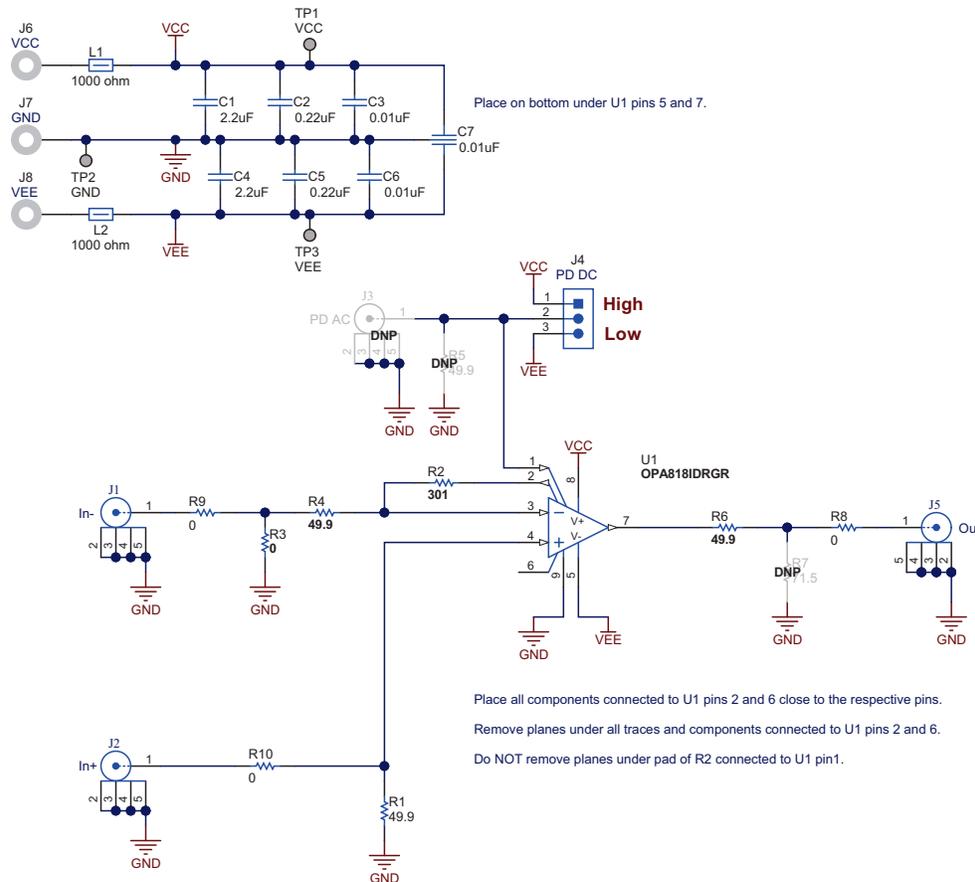


Figure 1. OPA818DRGEVM Schematic

3.2 EVM Layers

Figure 2 to Figure 9 illustrate the various board layers for the OPA818DRGEVM.

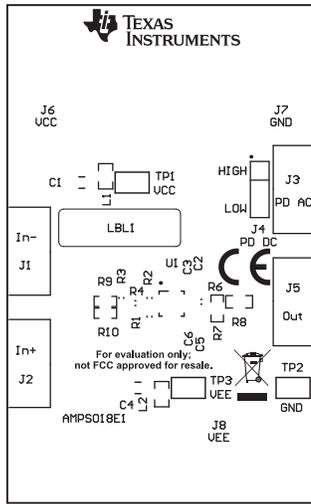


Figure 2. Top Overlay

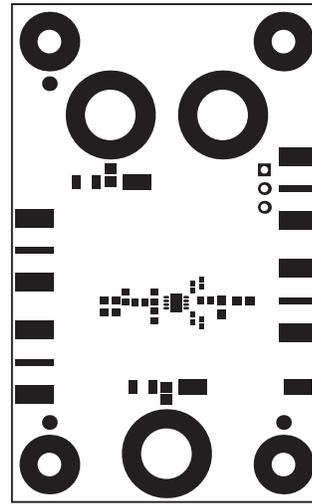


Figure 3. Top Solder

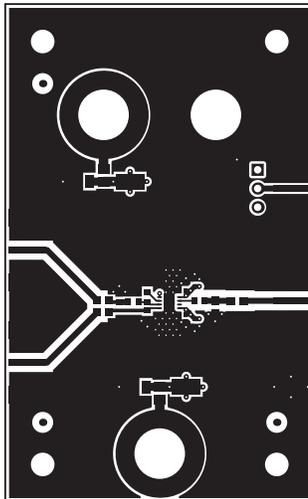


Figure 4. Top Layer

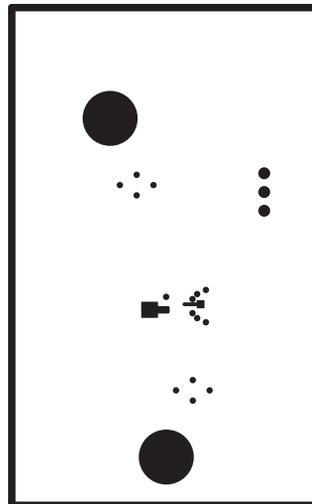


Figure 5. Ground Plane

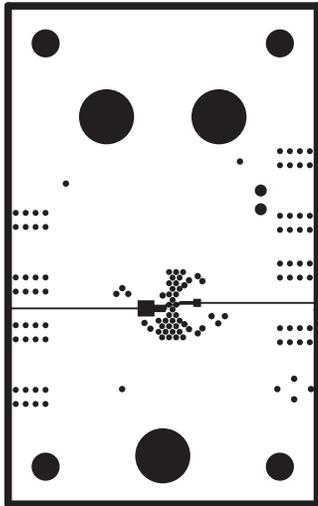


Figure 6. Power Plane

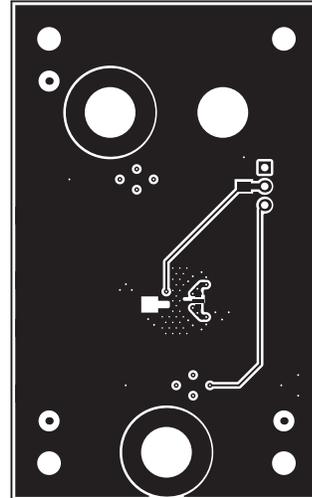


Figure 7. Bottom Layer

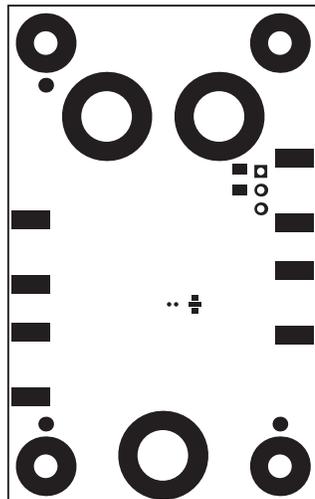


Figure 8. Bottom Solder

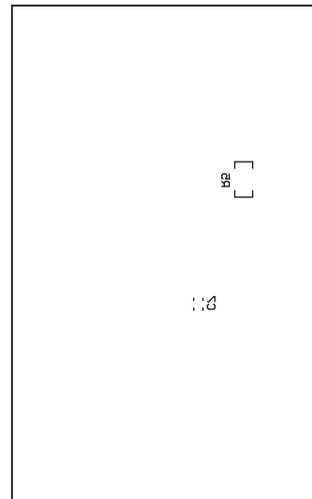


Figure 9. Bottom Overlay

3.3 Bill of Materials

Table 2 lists the bill of materials (BOM) for the OPA818DRGEVM.

Table 2. OPA818DRGEVM BOM

| Designator | Qty | Value | Description | Package Reference | Part Number | Manufacturer |
|-----------------|-----|--------|--|------------------------------|--------------------|---------------------|
| C1, C4 | 2 | 2.2µF | CAP, CERM, 2.2 µF, 25 V, ± 10%, X7R, 1206 | 1206 | 12063D225KAT2A | AVX |
| C2, C5 | 2 | 0.22µF | CAP, CERM, 0.22 µF, 25 V, ± 20%, X5R, 0402 | 0402 | CL05A224KA5NNNC | Samsung |
| C3, C6 | 2 | 0.01µF | CAP, CERM, 0.01 µF, 25 V, ± 10%, X7R, 0402 | 0402 | C0402C103J5RACTU | Kemet |
| C7 | 1 | 0.01µF | CAP, CERM, 0.01 µF, 50 V, ± 20%, X7R, 0603 | 0603 | 500X14W103MV4T | Johanson Technology |
| H1, H2, H3, H4 | 4 | | Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead | Screw | NY PMS 440 0025 PH | B&F Fastener Supply |
| H5, H6, H7, H8 | 4 | | Standoff, Hex, 0.5"L #4-40 Nylon | Standoff | 1902C | Keystone |
| J1, J2, J5 | 3 | | Connector, End launch SMA, 50 Ω, SMT | SMA End Launch | 142-0701-851 | Cinch Connectivity |
| J4 | 1 | | Header, 100 mil, 3x1, Gold, TH | Header, 100 mil, 3x1, TH | HTSW-103-07-G-S | Samtec |
| J6, J7, J8 | 3 | | Standard Banana Jack, Uninsulated | Keystone_6095 | 6095 | Keystone |
| L1, L2 | 2 | 1000 Ω | Ferrite Bead, 1000 Ω @ 100 MHz, 0.5 A, 0805 | 0805 | BLM21AG102SN1D | MuRata |
| LBL1 | 1 | | Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll | PCB Label 0.650 x 0.200 inch | THT-14-423-10 | Brady |
| R1 | 1 | 49.9 | RES, 49.9, 1%, 0.1 W, 0603 | 0603 | RC0603FR-0749R9L | Yageo |
| R2 | 1 | 301 | RES, 301, 1%, 0.1 W, AEC-Q200 Grade 0, 0603 | 0603 | CRCW0603301RFKEA | Vishay-Dale |
| R3, R8, R9, R10 | 4 | 0 | RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603 | 0603 | CRCW06030000Z0EA | Vishay-Dale |
| R4, R6 | 2 | 49.9 | RES, 49.9, 1%, 0.1 W, AEC-Q200 Grade 0, 0603 | 0603 | CRCW060349R9FKEA | Vishay-Dale |
| SH-J1 | 1 | 1x2 | Shunt, 100 mil, Gold plated, Black | Shunt | SNT-100-BK-G | Samtec |
| TP1, TP2, TP3 | 3 | | Test Point, Miniature, SMT | Test Point, Miniature, SMT | 5019 | Keystone |
| U1 | 1 | | Wideband, FET-Input Operational Amplifier, DRG0008B (WSO-8) | DRG0008B | OPA818DRGR | Texas Instruments |
| J3 | 0 | | Connector, End launch SMA, 50 Ω, SMT | SMA End Launch | 142-0701-851 | Cinch Connectivity |
| R5 | 0 | 49.9 | RES, 49.9, 1%, 0.25 W, AEC-Q200 Grade 0, 1206 | 1206 | CRCW120649R9FKEA | Vishay-Dale |
| R7 | 0 | 71.5 | RES, 71.5, 1%, 0.1 W, AEC-Q200 Grade 0, 0603 | 0603 | CRCW060371R5FKEA | Vishay-Dale |

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NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGRADATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 Regulatory Notices:

3.1 United States

3.1.1 Notice applicable to EVMs not FCC-Approved:

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

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.

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.

3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

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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-
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