

**Evaluating the ADA4098-2 50 V, 1 MHz, 165  $\mu$ A per Channel, Robust, Over-The-Top Precision Op Amp**
**FEATURES**

- ▶ Fully featured evaluation board for the [ADA4098-2](#)
- ▶ Enables efficient prototyping
- ▶ User defined circuit configuration
- ▶ Simplified connection to test equipment and other circuits

**EVALUATION KIT CONTENTS**

- ▶ EVAL-ADA4098-2EBZ

**EQUIPMENT NEEDED**

- ▶ Dual-output dc power supply
- ▶ Dual-channel signal generator
- ▶ Oscilloscope
- ▶ Banana jack to grabber cables
- ▶ BNC to SMA cables

**DOCUMENTS NEEDED**

- ▶ ADA4098-2 data sheet

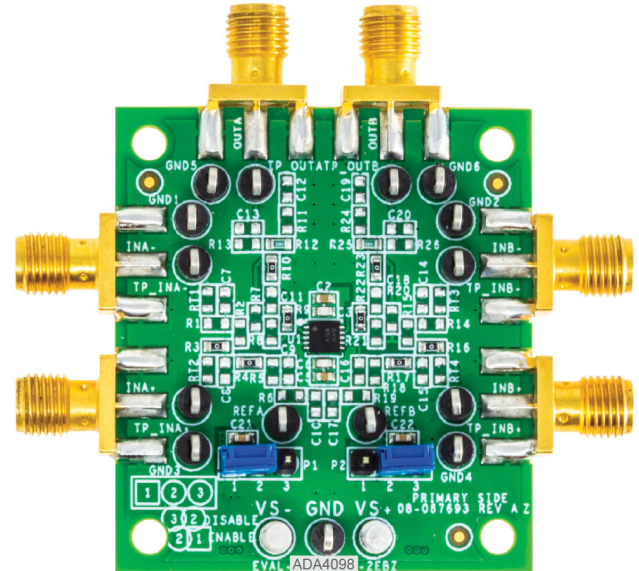
**GENERAL DESCRIPTION**

The EVAL-ADA4098-2EBZ evaluates the ADA4098-2 10-lead, lead frame chip scale package (LFCSP), robust Over-The-Top™ precision operational amplifier (op amp). The EVAL-ADA4098-2EBZ is a prepopulated board using a gain of 1 configuration.

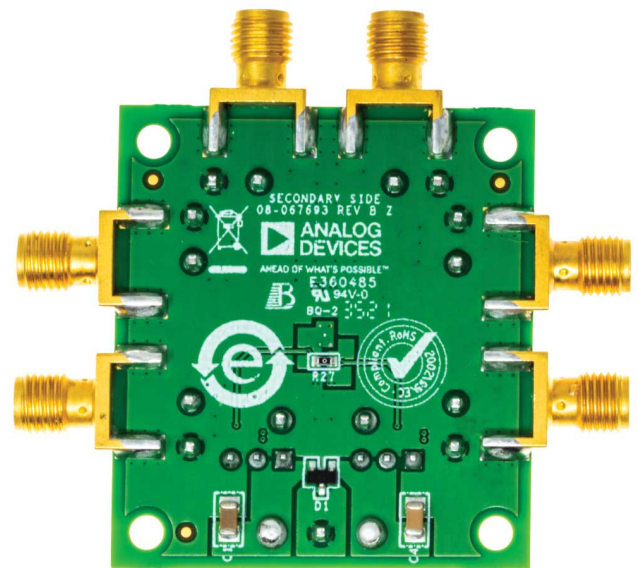
The EVAL-ADA4098-2EBZ design allows simplified and efficient use. The EVAL-ADA4098-2EBZ has edge mounted Subminiature Version A (SMA) connectors on the inputs and outputs to allow efficient connection to test equipment or other circuits. Bulk test points are also incorporated as an alternative option to be used for the inputs and outputs. The optimized EVAL-ADA4098-2EBZ ground plane, component placement, and power supply allow maximum circuit flexibility and performance. The EVAL-ADA4098-2EBZ uses a combination of surface-mount technology (SMT) with the majority of components in the 0603 case size, except for the 10  $\mu$ F bypass capacitors (C1 and C4). The EVAL-ADA4098-2EBZ also has unpopulated resistor and capacitor pads that provide the user with options and flexibility to implement different application circuits and configurations.

[Figure 1](#) shows the primary side of the EVAL-ADA4098-2EBZ, and [Figure 2](#) shows the secondary side of the EVAL-ADA4098-2EBZ.

Refer to the ADA4098-2 data sheet for full specifications, details on device operation, and application circuit configurations. Consult the data sheet in conjunction with this user guide when using the EVAL-ADA4098-2EBZ.

**EVALUATION BOARD PHOTOGRAPHS**


*Figure 1. EVAL-ADA4098-2EBZ, Primary Side*



*Figure 2. EVAL-ADA4098-2EBZ, Secondary Side*

**TABLE OF CONTENTS**

Features.....	1	Power Supply Consideration.....	3
Evaluation Kit Contents.....	1	Initial Board Configuration.....	3
Equipment Needed.....	1	Using the Evaluation Board for Testing.....	3
Documents Needed.....	1	Evaluation Board Schematics and Artwork.....	4
General Description.....	1	Ordering Information.....	6
Evaluation Board Photographs.....	1	Bill of Materials.....	6
Evaluation Board Quick Start Procedures.....	3		

**REVISION HISTORY****3/2022—Revision 0: Initial Version**

## EVALUATION BOARD QUICK START PROCEDURES

The [Power Supply Consideration](#) section, the [Initial Board Configuration](#) section, and the [Using the Evaluation Board for Testing](#) section outline the basic, prepopulated EVAL-ADA4098-2EBZ configuration required to test the basic functionality of the device.

### POWER SUPPLY CONSIDERATION

Use the turret pins (VS+, VS-, and GND) to power up the EVAL-ADA4098-2EBZ. Ensure that the correct polarity and voltage level is used to avoid reverse polarity and overvoltage, which can permanently damage the EVAL-ADA4098-2EBZ. The operating supply voltage range is 3 V to 50 V. Higher voltages can damage the amplifier. Decoupling capacitors of 10  $\mu$ F, 0.1  $\mu$ F, and 100 pF are preinstalled on the EVAL-ADA4098-2EBZ for ready operation.

### INITIAL BOARD CONFIGURATION

To set up the initial EVAL-ADA4098-2EBZ configuration, perform the following steps:

1. Ensure that all equipment is powered down, including the power supply and the signal generator. Use the banana jack to grabber cables to connect the positive supply, ground, and negative supply to the VS+, VS-, and GND turret pins, respectively.
2. Verify that the P1 jumper for SHDN1 is in Position 1 (labeled ENABLE) to tie SHDN1 to VS-, or leave Position 1 open without the jumper connection to enable the device at Channel A. Also, verify that the P2 jumper for SHDN2 is in Position 3 (labeled DISABLE) to tie SHDN2 to VS+ and disable Channel B or shutdown mode. The unused or inactive channel (Channel B), non-inverting input INB+, and output OUTB must all be tied to GND.
3. Connect the signal generator at the INA+ SMA pad using a Bayonet Neill-Concelman (BNC) to SMA cable or at the INA+ bulk test point and adjacent GND bulk test point using a BNC to grabber cable.
4. Connect OUTA on the EVAL-ADA4098-2EBZ to the oscilloscope using a BNC to SMA cable, or connect an oscilloscope probe with a 10 $\times$  attenuation factor to the OUTA bulk test point. Clip the ground of the oscilloscope probe with a 10 $\times$  attenuation factor to the adjacent GND bulk test point.
5. To use Channel B instead of Channel A, repeat Step 1 to Step 4 and move the P2 jumper on the EVAL-ADA4098-2EBZ from Position 3 to Position 1 to tie SHDN2 to VS-, or leave Position 1 open without the jumper connection. Verify that the P1 jumper is moved from Position 1 to Position 3 to tie SHDN1 to VS+ and disable Channel A. The unused or inactive channel (Channel A), non-inverting input INB+, and output OUTB must all be tied to GND. Finally, apply an input signal at INB+ and monitor the output at OUTB.

### USING THE EVALUATION BOARD FOR TESTING

When the procedure in the [Initial Board Configuration](#) section is complete, implement the following settings and verify the expected output:

1. Set the power supply to +15 V for the positive supply and -15 V for the negative supply, and then turn on the power supply.
2. Configure the signal generator to output a 1 kHz sine wave with 0 V offset and 1 V p-p, and enable the generator.
3. Set the oscilloscope scaling to 200 mV/2 ms per division. If using a 10 $\times$  probe instead of a BNC to SMA cable to monitor OUTA, set the oscilloscope input impedance to 1 M $\Omega$ , and the oscilloscope probe setting attenuation factor to 10 $\times$ . Ensure that a 1 kHz, 1 V p-p sine wave centered at 0 V appears on the oscilloscope.
4. To evaluate the shutdown performance of Channel A, move the P1 jumper into Position 3 (labeled DISABLE) to tie SHDN1 to VS+. There will be no output at the OUTA SMA pad or bulk test point. To re-enable Channel A, move the P1 jumper back into Position 1 (labeled ENABLE).
5. Repeat Step 1 to Step 4 with the P2 jumper of the EVAL-ADA4098-2EBZ to enable or disable Channel B via SHDN2. Apply an input signal at INB+ and monitor the output at OUTB.

EVALUATION BOARD SCHEMATICS AND ARTWORK

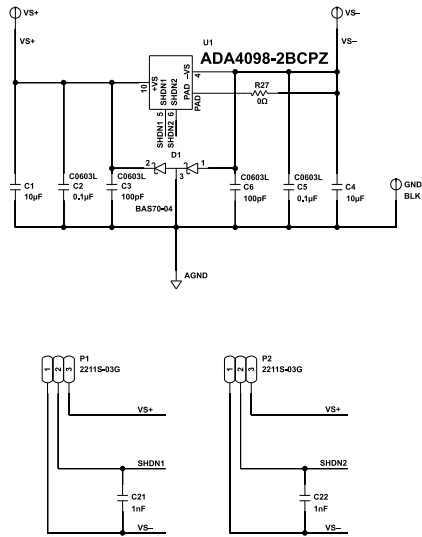


Figure 3. EVAL-ADA4098-2EBZ Schematic for Power Supplies and SHDNx

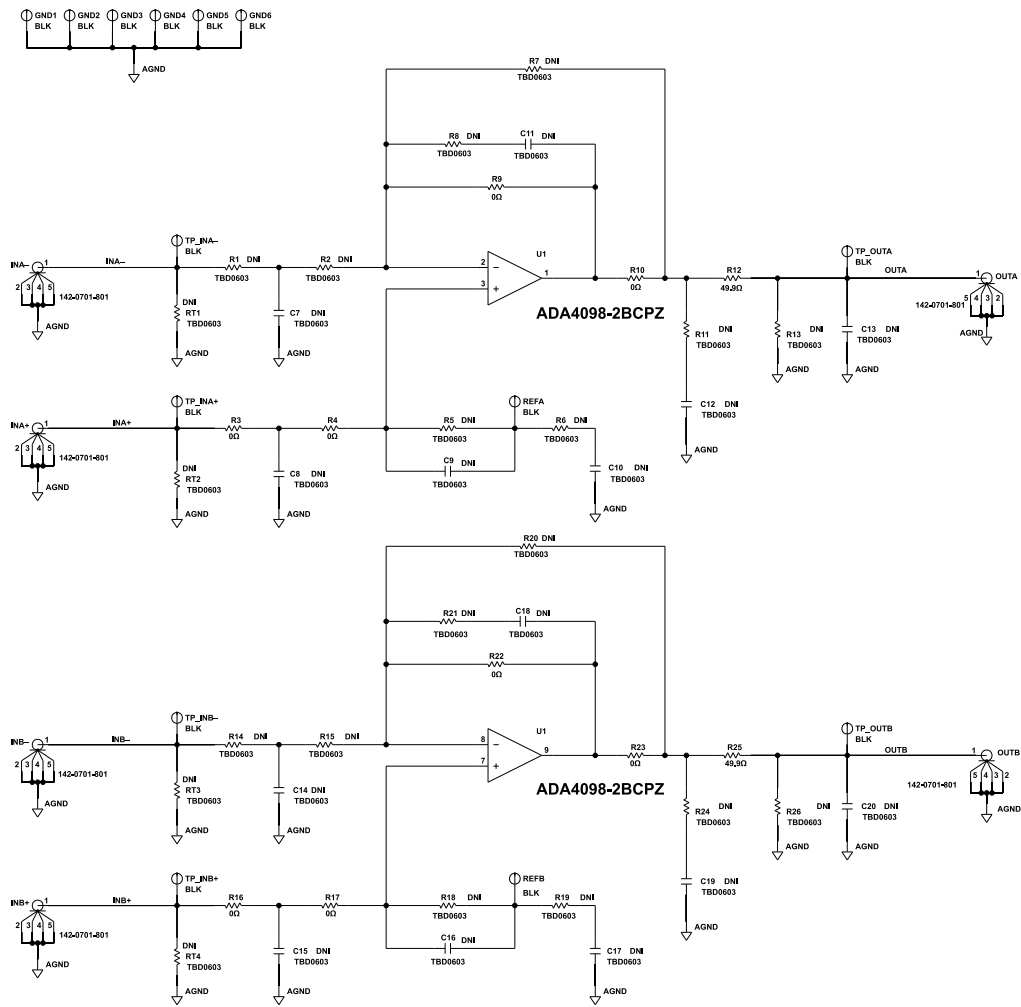


Figure 4. EVAL-ADA4098-2EBZ Schematic per Channel

EVALUATION BOARD SCHEMATICS AND ARTWORK

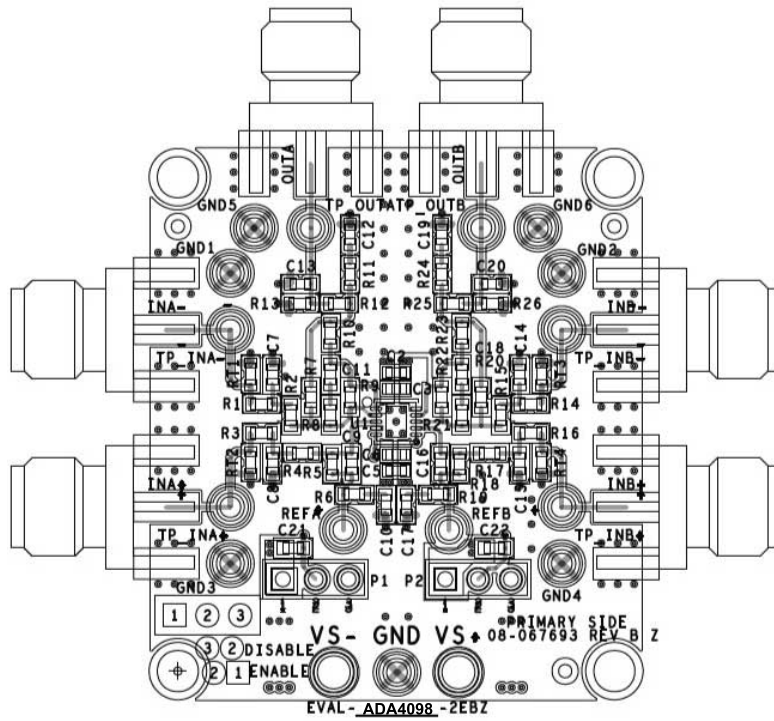


Figure 5. EVAL-ADA4098-2EBZ Layout Pattern, Primary Side

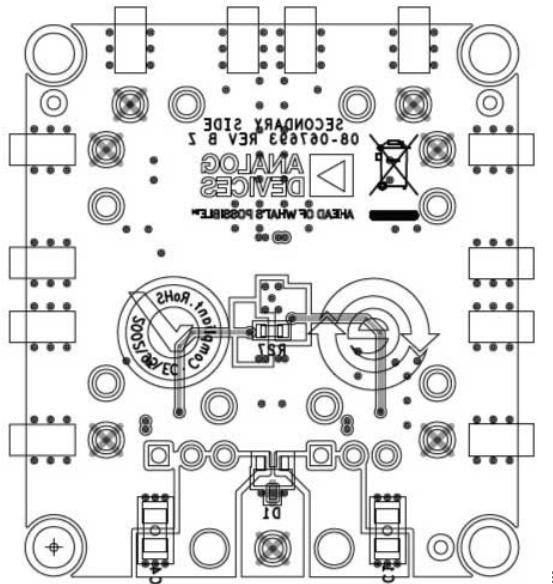


Figure 6. EVAL-ADA4098-2EBZ Layout Pattern, Secondary Side

## ORDERING INFORMATION

## BILL OF MATERIALS

Table 1.

Qty	Reference Designator	Description	Supplier	Part Number
1	U1	50 V, 1 MHz, 165 $\mu$ A per channel, robust, Over-The-Top, precision op amp	Analog Devices, Inc.	ADA4098-2BCPZ
2	C1, C4	Ceramic capacitors, X5R, 1206, 10 $\mu$ F	TDK	C3216X5R1H106K160AB
2	C2, C5	Ceramic capacitors, X7R, 0603, 0.1 $\mu$ F	Yageo	CC0603KRX7R9BB104
2	C21, C22	Ceramic capacitors, X7R, 0603, 1 nF	AVX Corporation	06031C102KAT2A
2	C3, C6	Ceramic capacitors, X7R, 0603, 100 pF	Kemet	C0603C101K5RAC
14	C7 to C20	Capacitors, 0603, do not install (DNI), user defined	Not applicable	Not applicable
1	D1	Diode Schottky barrier	Nexperia USA	BAS70-04,215
3	GND, VS+, VS-	Printed circuit board (PCB) connectors, terminal turrets	Mill-Max	2501-2-00-80-00-00-07-0
14	TP_INA+, TP_INA-, REFA, TP_OUTA, TP_INB+, TP_INB-, REFB, TP_OUTB, GND1 to GND6	PCB connectors, bulk test points	Components	TP-104-01-00
6	INA+, INA-, OUTA, INB+, INB-, OUTB	Coax SMA end launch	Cinch	142-0701-801
2	P1, P2	PCB connectors, 3-position, male header	Multicomp (SPC)	2211S-03G
2	R12, R25	Resistors, 49.9 $\Omega$	Vishay	TNPW060349R9BEEA
20	R1, R2, R5 to R8, R11, R13 to R15, R18 to R21, R24, R26, RT1 to RT4	Resistors, 0603, DNI, user defined	Not applicable	Not applicable
8	R3, R4, R9, R10, R16, R17, R22, R23	Resistors, 0 $\Omega$	Panasonic	ERJ-3GEY0R00V

**ESD Caution**

**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

**Legal Terms and Conditions**

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

