

## Evaluation Board for the **ADuM4120** and **ADuM4120-1** Isolated Precision Gate Drivers with 2 A Output

### FEATURES

- 2 A peak drive output capability
- Output power device resistance:  $<2\ \Omega$
- Low propagation delay:  $<51\ \text{ns}$
- Operating temperature range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Output voltage range to 35 V
- Output and input undervoltage lockout (UVLO)
- Pad placement for multiple switch types
- Screw terminals for easy connectivity

### EVALUATION KIT CONTENTS

**EVAL-ADuM4120EBZ** evaluation board or the **EVAL-ADuM4120-1EBZ** evaluation board

### EQUIPMENT NEEDED

#### Suggested test equipment

- Primary side power supply: 0 V to 6 V at 100 mA
- Secondary side supply: 0 V to 35 V at 250 mA
- Square wave generator: 0 V to 5 V

### GENERAL DESCRIPTION

The evaluation boards **EVAL-ADuM4120EBZ** and **EVAL-ADuM4120-1EBZ** support the **ADuM4120/ADuM4120-1** single-channel gate drivers with an integrated miller clamp. Analog Devices, Inc., *iCoupler*® technology provides isolation between the input signal and the output gate driver. The **EVAL-ADuM4120-1EBZ** option is populated with the **ADuM4120-1** that does not contain an internal input glitch filter, resulting in lower propagation delays.

The instructions and components in this user guide apply to both the **EVAL-ADuM4120EBZ** and **EVAL-ADuM4120-1EBZ**.

The **ADuM4120/ADuM4120-1** provides operation with voltages of up to 35 V. The high common-mode transient immunity (CMTI) and robust drive strength makes the **ADuM4120/ADuM4120-1** an excellent fit for fast switching technologies.

The **EVAL-ADuM4120EBZ** evaluation board facilitates testing of the propagation delay, drive strength, and input logic of the device.

For complete information about the **ADuM4120/ADuM4120-1**, refer to the **ADuM4120/ADuM4120-1** data sheet that should be consulted in conjunction with this user guide when using the evaluation board.

### EVAL-ADuM4120EBZ EVALUATION BOARD

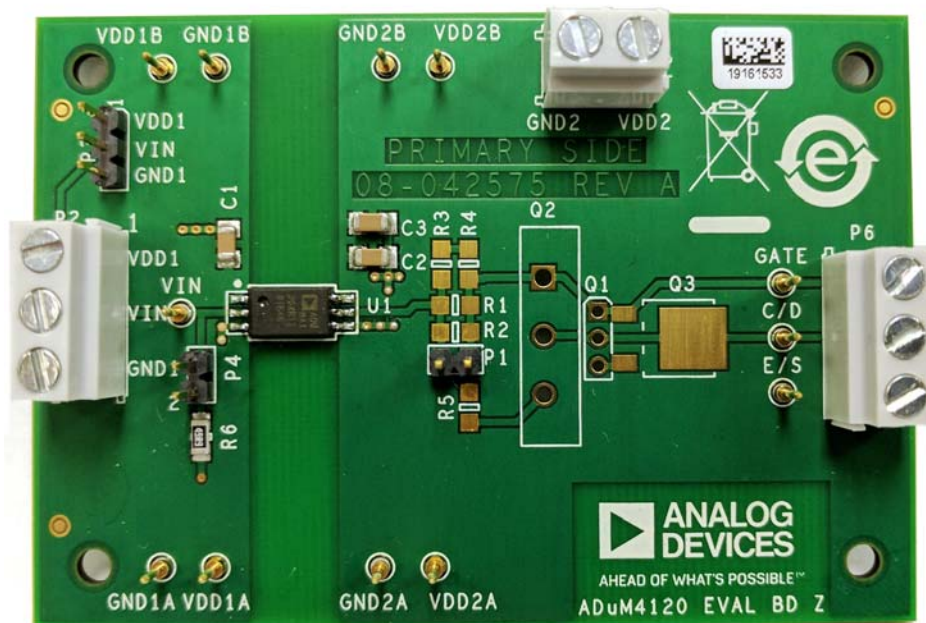


Figure 1.

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REVISION HISTORY

4/2017—Revision 0: Initial Version

## SETTING UP THE EVAL-ADUM4120EBZ AND EVAL-ADUM4120-1EBZ INITIAL CONFIGURATION

Before initial use, certain steps must be completed to prepare the [EVAL-ADuM4120EBZ](#) or [EVAL-ADuM4120-1EBZ](#) evaluation board for operation. In the stock configuration (see Figure 1), the R1 to R4 resistors are not placed. These are the locations of the series external resistors for the charging and discharging paths of the device being driven. It is recommended to use 1206 surface-mount resistors with values between approximately 1  $\Omega$  and 10  $\Omega$ , depending on the load being driven. R1 and R2 provide parallel placements, whereas R3 and R4 are in series. An actual insulated gate bipolar transistor (IGBT) or metal-oxide semiconductor field effect transistor (MOSFET) can be placed in the provided Q1, Q2, or Q3 landing patterns. Jumper P1 allows shorting across the series external resistors to observe overshoot and/or allow the user to probe voltage to quantify peak currents.

Resistor R6 is provided if the user must terminate the  $V_{IN}$  input with a 50  $\Omega$  load. Placing a jumper in P4 connects the stock 50  $\Omega$  load to the  $V_{IN}$  pin. R6 is not required, and, if the P4 jumper is not placed, the evaluation board accepts high impedance signal generator signals.

Pins accompany the screw terminals. The user decides which connection mechanism to use. The screw terminals aid in connecting wires for longer term measurements, but are not recommended for placement of the devices being driven. The distance to the screw terminals for Jumper P6 is far from the gate driver and introduces parasitic inductances to the measurement.

Jumper P3 allows the user to tie the  $V_{IN}$  pin to VDD1 or GND1 quickly. If a jumper is installed in P3, do not attempt to drive the  $V_{IN}$  pin by an external signal generator because this causes a short condition. Only actively drive  $V_{IN}$  when no jumper is placed in P3.

### PAD LAYOUT FOR THE DEVICE UNDER TEST (DUT)

Figure 2 shows the top layer artwork for the dual-gate driver circuit. Evaluation board components include the following:

- U1 is the footprint for the [ADuM4120](#) or [ADuM4120-1](#).
- C1 and C2 are 0.1  $\mu$ F bypass capacitors; C3 is a 10  $\mu$ F bypass capacitor.
- Q1, Q2, and Q3 can be populated with TO-246, TO-252, or TO-220 MOSFETs or IGBTs (see Figure 2).
- R1 to R4 are gate resistors that control the edges of the outputs. By default, no resistors are installed; these resistors must be populated with low value 1206 resistors, generally in the 1  $\Omega$  to 10  $\Omega$  range.

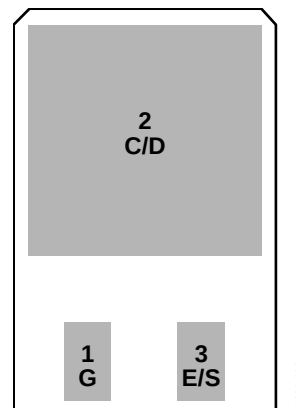


Figure 2. IGBT/MOSFET Footprint

### POWER CONNECTIONS

Follow these steps to connect the [ADuM4120](#) or [ADuM4120-1](#) evaluation board to a power supply:

1. Connect the input supply (2.5 V to 5.5 V) with the positive terminal on VDD1 and the ground on GND1.
2. Connect the [ADuM4120](#) or [ADuM4120-1](#) VDD2 supply voltage (4.5 V to 35 V) to the VDD2 pin and return to the GND2 pin.

GND1 and GND2 are isolated from each other. The emitter/source of the IGBT or MOSFET is tied to GND2.

### INPUT/OUTPUT CONNECTIONS

The  $V_{IN}$  pin is a complementary metal-oxide semiconductor (CMOS) input. To drive the gate driver with positive logic, connect the input signal to the  $V_{IN}$  pin.

The [EVAL-ADuM4120EBZ](#) evaluation board has screw terminals for both the input and output connections. These terminals facilitate connection options but are not the best option for high performance transient testing. The best measurements performed on the load, whether it is an IGBT, MOSFET, or load capacitor, come from small loop measurements performed at the load. Using the screw terminals as either the sensing node or for the connection of the load often results in observing extra overshoot during measurement.

## EVALUATION BOARD SCHEMATICS AND ARTWORK

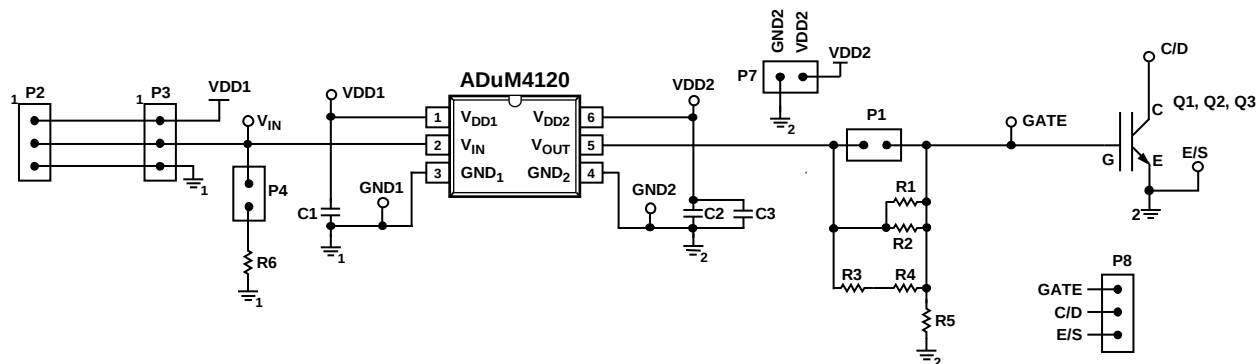


Figure 3. Schematic of the EVAL-ADuM4120EBZ

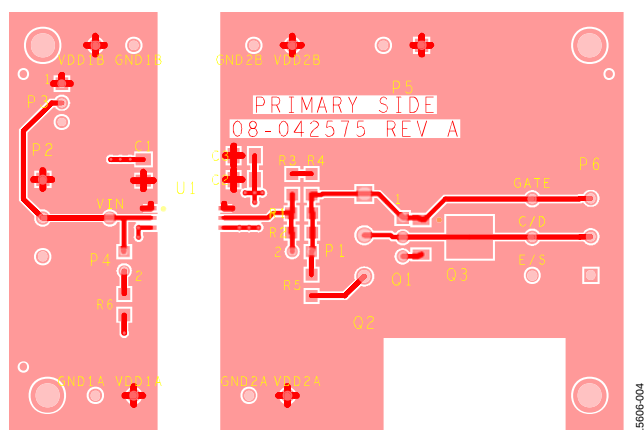


Figure 4. EVAL-ADuM4120EBZ Evaluation Board Top Layer

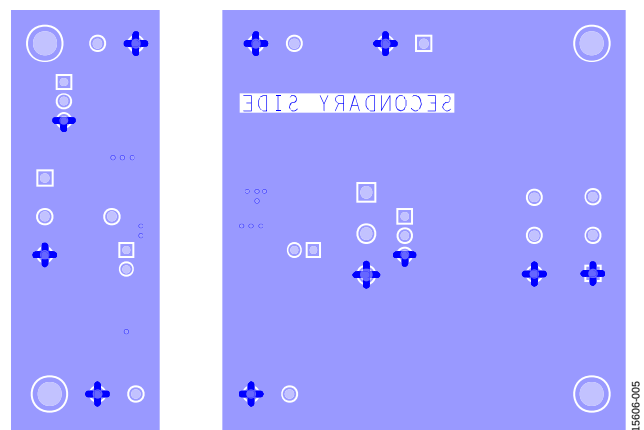


Figure 5. EVAL-ADuM4120EBZ Evaluation Board Bottom Layer

## ORDERING INFORMATION

### BILL OF MATERIALS

Table 1.

| Reference Designator | Description                             |
|----------------------|-----------------------------------------|
| U1                   | ADuM4120ARIZ or ADuM4120-1ARIZ          |
| R6                   | Resistor, 50 $\Omega$ , 1/8 W, 1206     |
| C1, C2               | Capacitor, 0.1 $\mu$ F, 25 V, 10%, 1206 |
| C3                   | Capacitor, 10 $\mu$ F, 50 V, 10%, 1206  |
| R1 to R5, Q1 to Q3   | Not installed                           |



#### 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.

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