

Evaluation Board for the **ADuM7223** *i*Coupler, 4 A, Isolated Precision Half Bridge Driver

FEATURES

- 4 A peak output current**
- High frequency operation: 1 MHz maximum**
- CMOS input logic levels**
- 4.5 V to 18 V output drive**
- Supports TO-252 IGBT/MOSFETs**
- Bootstrap option**

SUPPORTED *i*Coupler MODELS

- [ADuM7223A](#)
- [ADuM7223B](#)
- [ADuM7223C](#)

GENERAL DESCRIPTION

The **EVAL-ADuM7223EBZ** supports the **ADuM7223** 4 A, isolated precision half bridge driver. Because the evaluation boards have footprints for insulated gate bipolar transistors (IGBTs) and metal oxide semiconductor field effect transistors (MOSFETs) in TO-252 packages, the **ADuM7223** can be evaluated with many different power devices. The evaluation boards also allow the high-side supply to be bootstrapped to the low-side supply.

The **ADuM7223A** model represents a superset of the **ADuM7223** models because it has the lowest minimum output voltage (4.5 V). The evaluation board comes populated with the lowest undervoltage lockout (UVLO) value (Grade A).

Complete information about the **ADuM7223** is available in the **ADuM7223** data sheet, which should be consulted in conjunction with this user guide when using the evaluation board.

EVALUATION BOARD DIAGRAM



Figure 1. **ADuM7223** Evaluation Board

TABLE OF CONTENTS

Features	1	Power Connections	3
Supported iCoupler Models	1	Input/Output Connections	3
General Description	1	Bootstrapping VDDB to VDDA	3
Evaluation Board Diagram	1	Evaluation Board Schematic	4
Revision History	2	Evaluation Board Layout	5
Setting Up the Evaluation Board	3	Ordering Information	6
Pad Layout for the Device Under Test (DUT)	3	Bill of Materials	6

REVISION HISTORY

3/14—Revision 0: Initial Version

SETTING UP THE EVALUATION BOARD

PAD LAYOUT FOR THE DEVICE UNDER TEST (DUT)

Figure 5 shows the top layer artwork for the dual gate driver circuit.

- U1 is the footprint for the [ADuM7223](#).
- C1, C2, and C4 are 0.1 μ F bypass capacitors; C3 and C5 are 10 μ F bypass capacitors.
- Q1 and Q2 can be populated with TO-252 MOSFETs or IGBTs with the pinout shown in Figure 2.
- C6 and C7 are 2.2 nF loads for the gate driver outputs. Remove C6 and C7 if MOSFETs or IGBTs are added to Q1 and Q2.
- R6 and R7 are gate resistors that control the edges of the outputs. By default, 0 Ω resistors are installed; however, these resistors may need to be replaced with low value 0603 resistors if the outputs have loads lighter than 2.2 nF.

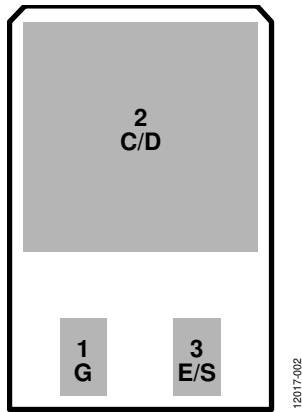


Figure 2. IGBT/MOSFET Footprint

POWER CONNECTIONS

To connect the evaluation board to the power supply, follow these steps:

1. Connect the 5 V or 3.3 V input supply to JP2 with the positive terminal on VDD1 and the ground on GND1.
2. Connect the [ADuM7223](#) V_{DDB} supply voltage (4.5 V to 18 V) to the VDDB pin and its return to the GNDB pin.
3. Connect the VDDA supply voltage (4.5 V to 18 V) to the pin marked VDDA and its return to GNDA.

GNDA and GNDB are functionally isolated. The emitter/source of Q1 is tied to GNDA, and the emitter/source of Q2 is tied to GNDB. GNDB also has a wire pad directly below the emitter/source pad of Q2. Connect the bridge supply to the +HV wire pin, which is connected to the collector/drain of Q1 if Q1 and Q2 are populated.

INPUT/OUTPUT CONNECTIONS

Connect Logic Input A (V_{IA}) to VIA or to Pin 1 of J1; connect Logic Input B (V_{IB}) to VIB or to Pin 2 of J1. Both inputs have 50 Ω terminations. Resistor R5 enables the outputs of the [ADuM7223](#) by pulling the DISABLE pin low. The disable function can also be externally controlled from J1 or set by J2 using a 2-pin jumper.

The half bridge output is the Q1 emitter/source and Q2 collector/drain node. VOUT is the output of the half bridge, and it is also connected to GNDA.

BOOTSTRAPPING VDDB TO VDDA

To bootstrap VDDB to VDDA, D1 can be populated with a diode from VDDB to VDDA, as shown in Figure 3. Additionally, populate R8 with a value between 0 Ω and 10 Ω to control the charge rate of the C2 and C3 bootstrap capacitors. In this way, both outputs of the [ADuM7223](#) can be powered by the VDDB supply when a half bridge is configured with Q1 and Q2. Additional overvoltage protection can be added by populating D2 with a zener diode if desired.

When the switch node (GNDA) is low, C2 and C3 are charged through the forward-biased bootstrapping diode. When the switch node rises to the bridge voltage, the diode becomes reverse biased, and VDDA = GNDA + VDDB – GNDB because of the charge on C2 and C3. For bootstrapping to work, Q1 and Q2 must be populated instead of the load capacitors, C6 and C7. The switching frequency and duty cycle must be sufficiently high to supply C2 and C3 with the charge required to drive the Q1 gate.

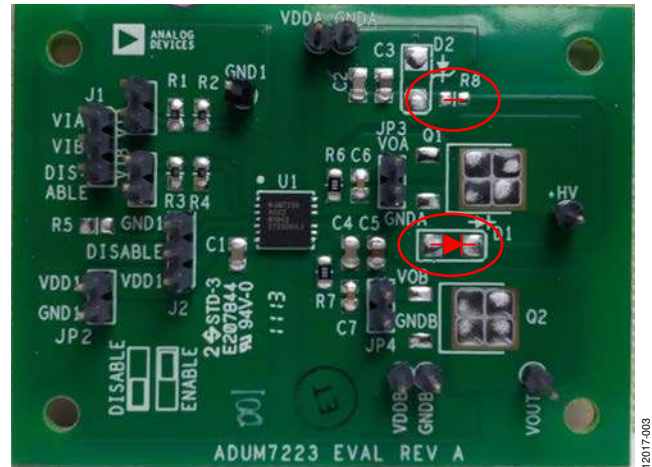


Figure 3. Bootstrapping VDDB to VDDA

EVALUATION BOARD LAYOUT

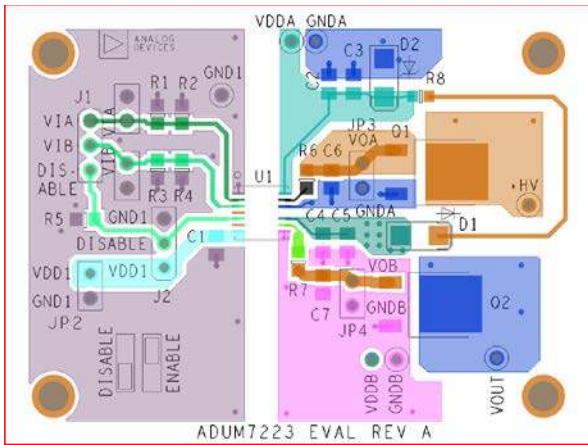


Figure 5. ADuM7223 Evaluation Board Top Layer

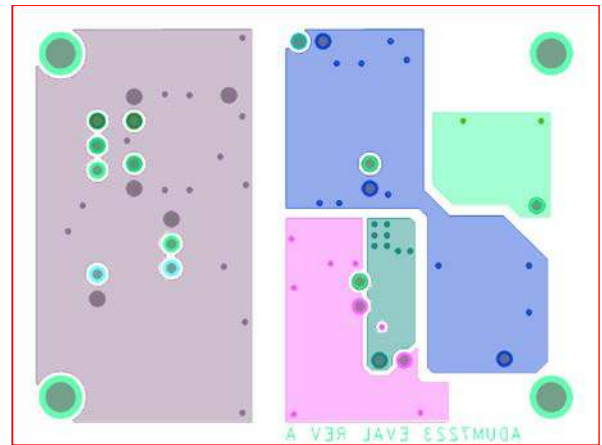


Figure 6. ADuM7223 Evaluation Board Bottom Layer

ORDERING INFORMATION**BILL OF MATERIALS**

Table 1.

Quantity	Reference Designator	Description
1	U1	ADuM7223ACCZ IC
3	C1, C2, C4	Capacitor, 0.1 μ F, 25 V, 10%, 0603
2	C3, C5	Capacitor, 10 μ F, 25 V, 10%, 1206
2	C6, C7	Capacitor, 2200 pF, 50 V, 5%, 0603
3	J3, J5, J7	Test point, TP-104 series, red
3	J4, J6, J8	Test point, TP-104 series, black
4	R1, R2, R3, R4	Resistor, 100 Ω , 1/4 W, 1%, 0805
1	R5	Resistor, 10 k Ω , 1/4 W, 1%, 0805
2	R6, R7	Resistor, 0 Ω , 1/10 W, 0603
4	TP1, TP2, TP3, TP4	Test point, TP-104 series, white
4	J1, J2, Q1, Q2	Not installed

NOTES

NOTES

**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 One Technology Way, Norwood, MA 02062, USA. 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.