Evaluating the ADuM3250, Isolated, Half-Bridge Gate Driver with Adjustable Dead Time, 10A Output

FEATURES

- Isolated dual-channel gate driver
  - 10A peak current
  - 4.5V UVLO on VDDA/VDDB sides (Grade A)
- Output voltage: 4.5V to 28V
- Input signals accessible by header pins or SMA connectors
- Multiple test points for all critical signals
- Test points compatible with ground spring probes

EVALUATION KIT CONTENTS

- EVAL-ADuM3250EBZ evaluation board

EQUIPMENT NEEDED

- Primary side power supply: 0V to 5.5V
- 2x secondary side supplies: 0V to 28V
- Square wave generator: 0V to 5V
- Oscilloscope

DOCUMENTS NEEDED

- ADuM3250 data sheet

GENERAL DESCRIPTION

The EVAL-ADuM3250EBZ evaluation board demonstrates the performance and capabilities of the ADuM3250 isolated half-bridge gate driver, which utilizes Analog Devices' proprietary *i*Coupler® technology. By default, the EVAL-ADuM3250EBZ evaluation board includes the ADuM3250A model, which delivers a peak output current of 10A and features a 4.5V undervoltage lockout (UVLO) threshold on both V_{DDA} and V_{DDB} rails. Grade B (7.6V) model offers additional UVLO option that accommodate different switch requirements and ensure safe operation under varying supply conditions.

The ADuM3250 VDD1 supports input voltages from 2.5V to 5.5V, which makes it compatible with a wide range of logic families. Input signals VIA and VIB respectively control the output states of VOA and VOB, while the DISABLE input shuts off the device regardless of the channel inputs. In addition to providing basic overlap protection, the dead-time (DT) pin on the primary side allows an adjustable dead time between the VOA and VOB output transitions.

The ADuM3250 secondary side can sustain supply voltages up to 28V. This evaluation board simplifies the characterization of propagation delay, drive strength, and device logic, which makes it ideal for characterizing the ADuM3250 isolated gate driver family.

Full specifications on the ADuM3250 are available in the ADuM3250 data sheet available from Analog Devices, Inc., and must be consulted with this user guide when using the EVAL-ADuM3250EBZ evaluation board.

PLEASE SEE THE LAST PAGE FOR AN IMPORTANT
WARNING AND LEGAL TERMS AND CONDITIONS.

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REVISION HISTORY

9/2026—Revision 0: Initial Version

EVALUATION BOARD PHOTOGRAPH

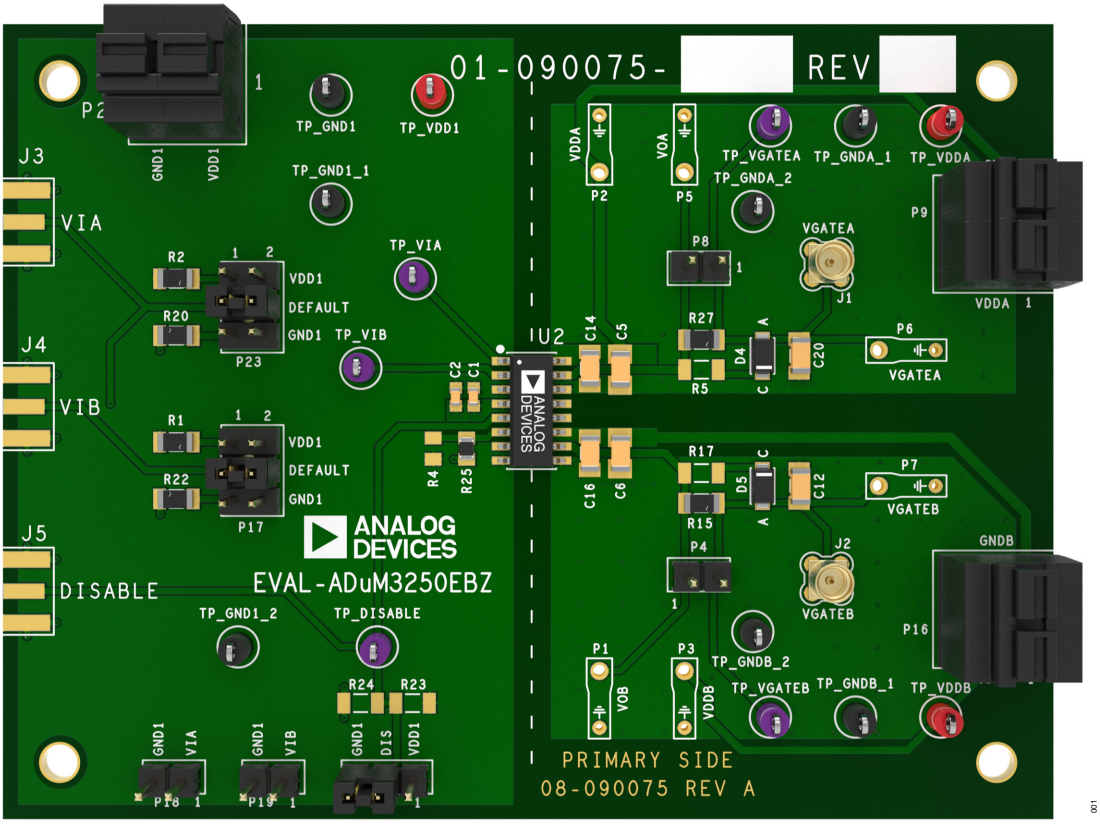


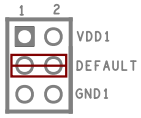
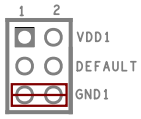
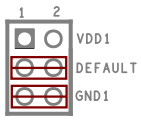
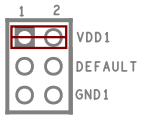
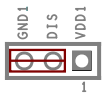
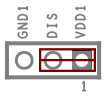
Figure 1. EVAL-ADuM3250EBZ Evaluation Board Photograph

EVALUATION BOARD HARDWARE

INPUT SIGNALS

The EVAL-ADuM3250EBZ evaluation board provides VIA, VIB, and DISABLE input signals through header pins, SMA connectors, or test points. Jumpers can force these signals to GND1 or VDD1, which enables different test conditions. The possible jumper configuration are listed in Table 1.

Table 1. Input Signals Jumper Configurations

Jumper	Configuration	Description
P23, P17		**DEFAULT Connection** P23: VIA connected to J3 and P18.1. P17: VIB connected to J4 and P19.1.
		**GND1 Connection** P23: VIA connected to GND1 through 50Ω resistor. P17: VIB connected to GND1 through 50Ω resistor.
		**50Ω Termination** P23: VIA connected to J3 and P18.1, 50Ω terminated. P17: VIB connected to J4 and P19.1, 50Ω terminated.
		**VDD1 Connection** P23: VIA connected to VDD1 through 100kΩ resistor. P17: VIB connected to VDD1 through 100kΩ resistor.
P25 (DISABLE)		DISABLE controlled by J5 or P25.2. NOTE: An internal pull-down resistor connects DISABLE to GND1.
		**DEFAULT** DISABLE connected to GND1.
		DISABLE connected to VDD1.

EVALUATION BOARD HARDWARE

TEST POINTS

All ADuM3250 signals are accessible through dedicated test points. For a complete list of signals and their corresponding test points, see Table 2.

Table 2. Test Points List

Signal	Test Point	Description
VDD1	TP_VDD1	Ring test point.
GND1	TP_GND1	Ring test point.
	TP_GND1_1	Ring test point.
	TP_GND1_2	Ring test point.
VIA	TP_VIA	Ring test point.
VIB	TP_VIB	Ring test point.
DISABLE	TP_DISABLE	Ring test point.
VDDA	TP_VDDA	Ring test point.
GNDA	TP_GNDA_1	Ring test point.
	TP_GNDA_2	Ring test point.
VGATEA	TP_VGATEA	Ring test point, voltage on load, output A.
VDDB	TP_VDDB	Ring test point.
GNDB	TP_GNDB_1	Ring test point.
	TP_GNDB_2	Ring test point.
VGATEB	TP_VGATEB	Ring test point, voltage on load, output B.
VOB-GNDB	P1	Spring ground probe test point.
VDDA-GNDA	P2	Spring ground probe test point.
VDDB-GNDB	P3	Spring ground probe test point.
VOA-GNDA	P5	Spring ground probe test point.
VGATEA-GNDA	P6	Spring ground probe test point, voltage on load, output A. GNDA referred.
	J1	MMCX connector, voltage on load, output A. GNDA referred.
VGATEB-GNDB	P7	Spring ground probe test point, voltage on load, output A.
	J2	MMCX connector, voltage on load, output B. GNDB referred.

GETTING STARTED

DEFAULT CONFIGURATION

ADI ships the EVAL-ADuM3250EBZ in a default configuration that supports basic gate-driver functionality characterization under no-load conditions. Apply power through either the screw terminals or the test point pins. Provide input signals through test points, header pins, or SMA connectors. Note that SMA connectors are not pre-soldered and are not included with the board.

On the input side, the resistors R24 and R23 are not populated. Resistor R25 configures the dead time and overlap protection, and the board populates it with a 10kΩ 0805 resistor by default to achieve a 2µs dead time.

On the driver side, the resistors R5 and R17 are not populated by default. The initial load configuration includes R27 = R15 = 5.1Ω and C20 = C12 = 2.2nF. Before initial use, verify the jumper settings and ensure proper power and signal connections.

SETTING UP THE EVAL-ADUM3250EBZ

On the input side of the board, jumpers P23, P17, and P25 configure the VIA, VIB, and DISABLE signal paths, respectively. These jumpers allow to pull the signals up to VDD1, pull them down to GND1, or connect them directly to the input headers. For a detailed settings, see Table 1.

The board populates R25 with a 10kΩ resistor by default to implement a 2µs dead time and overlap protection. Changing the value of R25 adjusts the dead time. For more details, see the Dead Time and Overlap Protection Configuration section.

Populate R5 and R17 with 1206 SMD resistors ranging from 1Ω to 10Ω to provide separate current paths for turn-on and turn-off transitions. Default capacitive load is 2.2nF.

INPUT/OUTPUT CONNECTIONS

The VIA, VIB, and DISABLE input pins support both 3.3V and 5V logic levels. To drive VIA and VIB with a waveform generator or microcontroller, configure jumpers P23 and P17 to connect Pin 3 and Pin 4 (default setting). To enable the optional 50Ω termination, bridge Pin 5 and Pin 6 along with Pin 3 and Pin 4. For a complete list of valid jumper configurations, see Table 1.

By default, the DISABLE pin is shorted to GND1 through P25 header, keeping the device enabled. To externally control this function, remove the jumper and drive the signal through the P25.2 header pin or the SMA connector.

In the default configuration, resistor R25 connects the DT pin to GND1 through a 10kΩ resistor, which enables the overlap protection and setting a 2µs dead time. For more details, see the Dead Time and Overlap Protection Configuration section.

DEAD TIME AND OVERLAP PROTECTION CONFIGURATION

The ADuM3250 includes a dead-time (DT) pin that enables the overlap protection between outputs VOA and VOB, which prevents both outputs from being high simultaneously, even when both inputs are high. This avoids shoot-through in half-bridge configurations by introducing a delay between the falling edge of one output and the rising edge of the other.

The dead time is set by resistor R25, as defined by Equation 1 and shown in Figure 2.

$$DT(ns) \approx 5 \times R_{DT}(k\Omega) \quad (1)$$

To disable the dead time feature and allow simultaneous output activation, remove R25 and install a 0Ω resistor at R4 to short DT to VDD1.

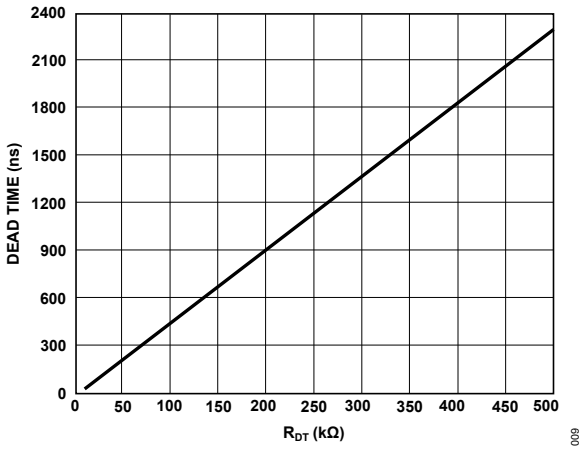


Figure 2. R_{DT} and Dead-Time Relation

POWER CONNECTIONS

To power the EVAL-ADuM3250EBZ evaluation board, do the following steps:

1. Connect the input VDD1 supply (2.5V to 5.5V) to the VDD1 pin and connect the ground to the GND1 pin.
2. Connect the VDDA supply (4.5V to 28V) to the VDDA pin and connect the ground to the GNDA pin.
3. Connect the VDDB supply (4.5V to 28V) to the VDDB pin and connect the ground to the GNDB pin.

Note that the minimum VDDA and VDDB is related to ADuM3250 UVLO grade. By default, the board mounts Grade A model having a VDDA and VDDB UVLO of 4.5V. This value may vary depending on the UVLO grade of the specific component mounted on the board. Grade B model supports higher minimum voltages of 7.6V. For a detailed specifications and configuration options, refer to the ADuM3250 data sheet.

Note that GND1, GNDA, and GNDB are galvanically isolated from each other, which allows independent ground domains on the primary and secondary sides.

GETTING STARTED

PROBING THE SIGNALS

All the important signals are accessible through dedicated test points. For a complete list, see Table 2.

The gate-driver supplies VDDA and VDDB, outputs VOA and VOB, and load voltages VGATEA and VGATEB are all referenced to their respective isolated grounds, GNDA and GNDB. In addition to ring test point, these signals are accessible by isolated probe through MMCX connector and spring ground probe.

Measure the voltage across the gate resistors using the P8 and P4 header connectors.

EVALUATION BOARD SCHEMATICS AND ARTWORK

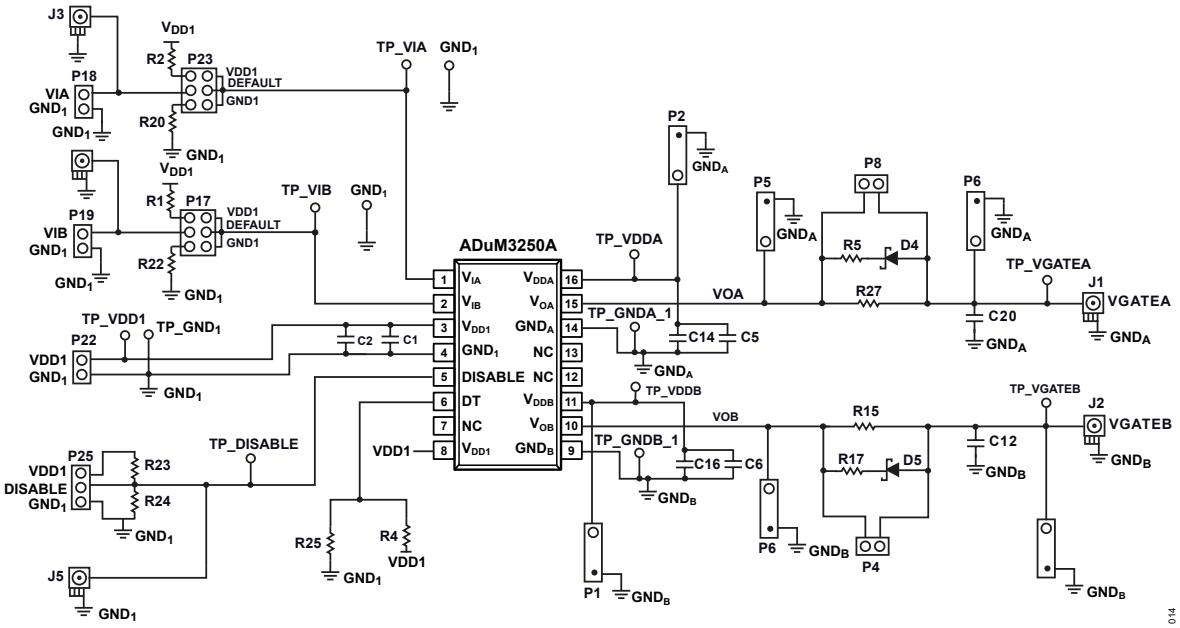
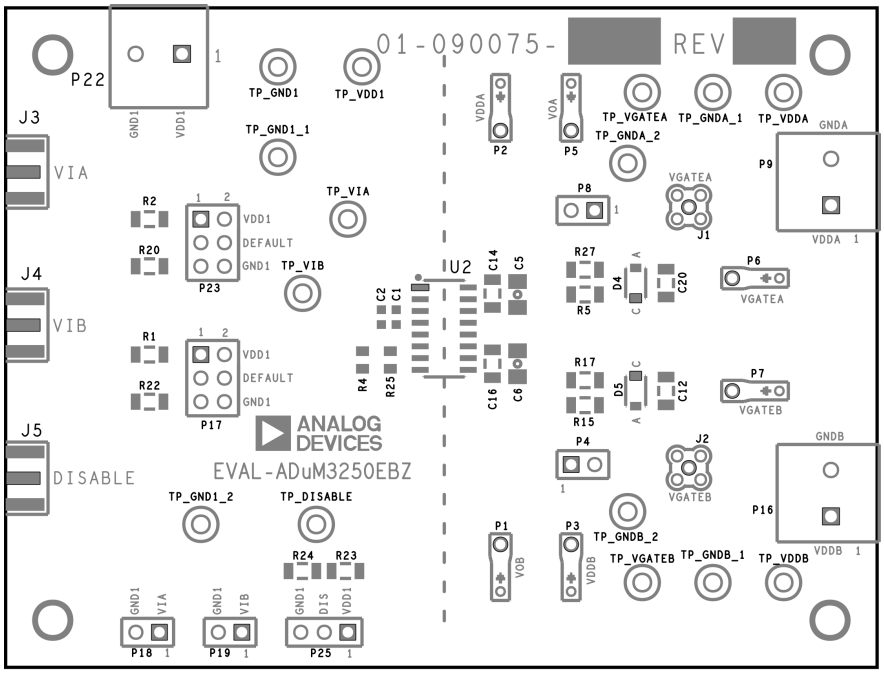


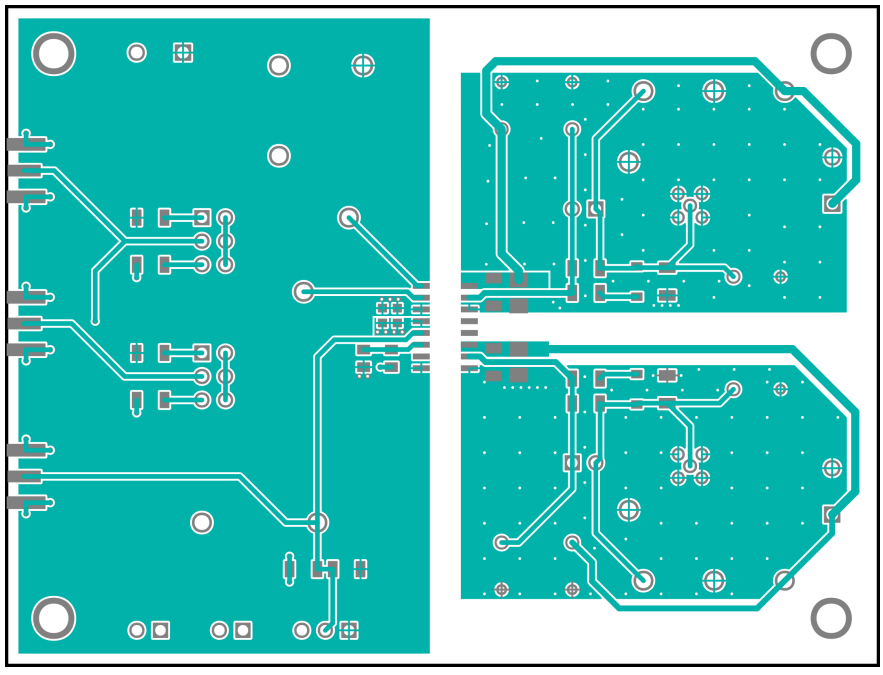
Figure 3. EVAL-ADuM3250EBZ Evaluation Board Schematic

EVALUATION BOARD SCHEMATICS AND ARTWORK



010

Figure 4. EVAL-ADuM3250EBZ, Top Silkscreen



011

Figure 5. EVAL-ADuM3250EBZ, Top Copper

EVALUATION BOARD SCHEMATICS AND ARTWORK

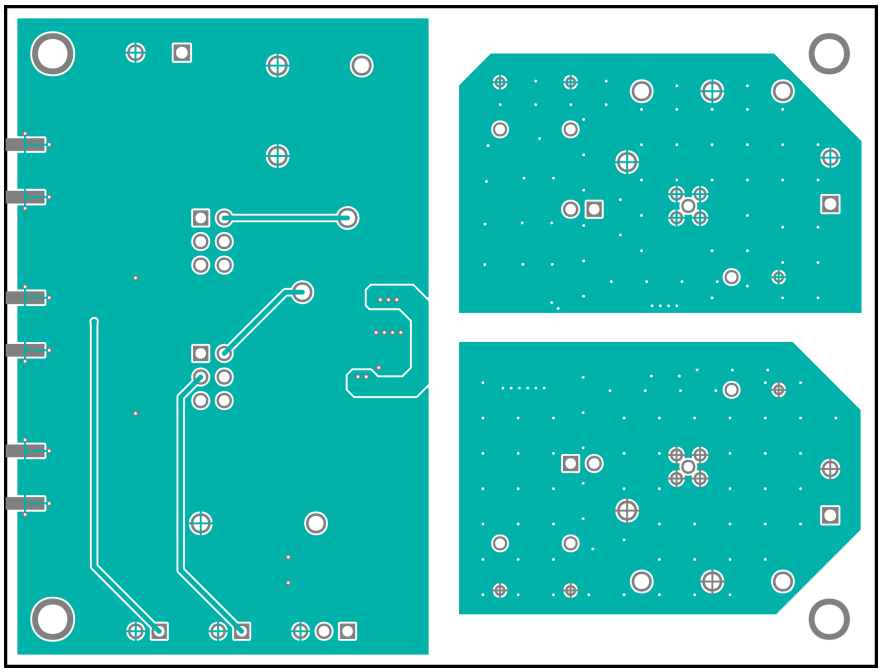


Figure 6. EVAL-ADuM3250EBZ, Bottom Copper

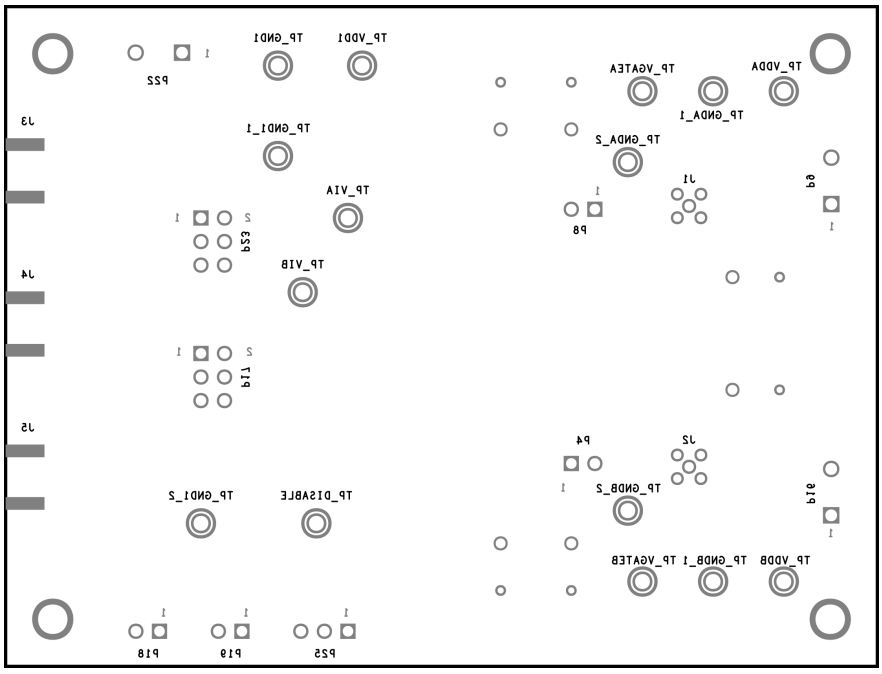


Figure 7. EVAL-ADuM3250EBZ, Bottom Silkscreen

ORDERING INFORMATION

BILL OF MATERIALS

Table 3. Bill of Materials for EVAL-ADuM3250EBZ

Quantity	Reference Designator	Description	Manufacturer	Part Number
1	C1	Ceramic capacitor, 0.1µF, 25V, 10%, X8R, 0603	TDK	C1608X8R1E104K080AA
2	C12, C20	Ceramic capacitors, 2200pF, 630V, 5%, U2J, 1206	Murata	GRM31A7U2J222JW31D
2	C14, C16	Ceramic capacitors, 0.1µF, 50V, 10%, X7R, 1206	AVX	12065C104KAT2A
1	C2	Ceramic capacitor, low ESR, 10µF, 16V, 20%, X5R, 0603	TDK	C1608X5R1C106M080AB
2	C5, C6	Ceramic capacitors, 10µF, 50V, 10%, X7R, 1206	Samsung	CL31B106KBHNNNE
2	D4, D5	Schottky diodes, power rectifiers	On Semiconductor	MBR140SFT1G
2	J1, J2	PCB connectors, MMCX straight PC mount jack receptacles, female socket, impedance 50Ω	Cinch Connectivity Solutions	135-3701-211
3	J3, J4, J5 (NI[1])	PCB connectors, SMA series, straight, edge mount, jack, female socket, impedance 50Ω	Samtec	SMA-J-P-H-ST-EM1
3	P9, P16, P22	PCB connectors, terminal blocks, pitch 5mm, 2-positions	Phoenix Contact	1792863
2	P17, P23	PCB connectors, male pin, headers, unshrouded, through hole, pitch - mating 2.54mm, contact length - mating 5.84mm, solder trail 2.54mm, 2-rows, 6-positions	Samtec	TSW-103-07-G-D
4	P4, P8, P18, P19	PCB connectors, male pin, headers, unshrouded, through hole, pitch - mating 2.54mm, contact length - mating 5.84mm, solder trail 2.54mm, 1-row, 2-positions	Samtec	TSW-102-07-G-S
1	P25	PCB connector, male pin, header, unshrouded, through hole, pitch - mating 2.54mm, contact length - mating 5.84mm, solder trail 2.54mm, 1-row, 3-positions	Samtec	HTSW-103-07-G-S
2	R1, R2	Resistors, SMD, 10kΩ, 0.01%, 1/4W, 1206, AEC-Q200	Stackpole Electronics, Inc.	RNCF1206TKY10K0
2	R15, R27	Resistors, SMD, 5.6Ω, 1%, 1/2W, 1206, AEC-Q200	Panasonic	ERJ-8BQF5R6V
4	R5, R17, R23, R24	NI[1]	1206	1206
2	R20, R22	Resistors, SMD, 50Ω, 0.1%, 400mW, 1206, AEC-Q200	Vishay	TNPW120650R0BEEN07
1	R25	Resistor, SMD, 10kΩ, 1%, 1/8W, 0805, AEC-Q200	Panasonic	ERJ-6ENF1002V
1	R4	NI[1]	0805	0805
5	TP_DISABLE, TP_VGATEA, TP_VGATEB, TP_VIA, TP_VIB	Connectors, PCB test points purple	Keystone Electronics	5129
7	TP_GND1, TP_GND1_1, TP_GND1_2, TP_GNDA_1, TP_GNDA_2, TP_GNDB_1, TP_GNDB_2	Connectors, PCB test points black	Keystone Electronics	5011
3	TP_VDD1, TP_VDDA, TP_VDDB	Connectors, PCB test points red	Keystone Electronics	5010
1	U2	IC - isolated, half-bridge gate driver with adjustable dead time, 10A output	Analog Devices, Inc.	ADuM3250ARZ

[1] NI means not installed.

ORDERING INFORMATION

EVALUATION BOARDS

Table 4. Evaluation Boards

Model[1]	Description
EVAL-ADuM3250EBZ	Evaluation Board

[1] Z = RoHS Compliant Part.



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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