Evaluating the ADM3050E 5.7 kV rms, Signal Isolated, Basic CAN FD Transceiver

FEATURES
ADM3050E 12 Mbps isolated CAN FD transceiver
2-layer PCB with low radiated emissions, passes EN 55022 Class B
On-board LDOs for 6 V to 9 V supply, providing 5 V to the ADM3050E VDD1 and VDD2 pins
Screw terminal connectors for the following:
  6 V to 9 V LDO, 5 V power supply to the VDD1 pin
  1.8 V to 5.0 V direct power supply to VDD1 pin
  6 V to 9 V LDO, 5 V power supply to the VDD2 pin
  5 V direct power supply to VDD2 pin
  TXD pin, RXD pin, CANH pin, CANL pin signals
Divided PCB return planes for GND1 and GND2
SMA connectors for TXD pin and RXD pin signals

GENERAL DESCRIPTION
The EVAL-ADM3050EEBZ allows the user to evaluate the ADM3050E isolated signal and power transceiver for controller area network (CAN) or CAN with flexible data rate (CAN FD) networks. The EVAL-ADM3050EEBZ allows all of the input and output functions to work without the need for external components.

Based on the Analog Devices, Inc., iCoupler® technology, the ADM3050E integrates logic side on-off keying (OOK) signal isolation channels and an Analog Devices isoPower® dc-to-dc converter to provide regulated, isolated power that is well below EN 55022 Class B limits when transmitting on a 2-layer printed circuit board (PCB) with ferrites.

The EVAL-ADM3050EEBZ comes populated with the ADM3050E.

Full specifications of the ADM3050E can be found in the ADM3050E data sheet, available from Analog Devices and must be consulted in conjunction with this user guide when using the EVAL-ADM3050EEBZ.

EVALUATION KIT CONTENTS
EVAL-ADM3050EEBZ evaluation board
ADM3050EBRIZ
ADP7104
LTC6900

DOCUMENTS NEEDED
ADM3050E data sheet

PHOTOGRAPH OF EVAL-ADM3050EEBZ

Figure 1.
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## REVISION HISTORY

10/2018—Revision 0: Initial Version
EVALUATION BOARD HARDWARE

USING THE EVALUATION BOARD

Figure 1 shows the EVAL-ADM3050EEBZ. The $V_{DD1}$ and $V_{DD2}$ supply pins of the ADM3050E device must be supplied with input power. The $V_{DD1}$ pin and the $V_{DD2}$ pin can be powered directly or through the fixed output 5 V on-board low dropout (LDO) regulators. The VDD1 side LDO input supply requires a power supply voltage of 6 V to 9 V and connects to Pin 1 of Screw Terminal P3 (marked VIN_LDO1 on the silkscreen) and Pin 2 of Screw Terminal P3 (marked RTN_LDO1 on the silkscreen). The VDD2 side LDO input supply also requires a power supply voltage of 6 V to 9 V but connects to Pin 1 of Screw Terminal P6 (marked VIN_LDO2 on the silkscreen) and Pin 2 of Screw Terminal P6 (marked RTN_LDO2 on the silkscreen).

Using the LDO, the complete board can be powered by a 9 V battery (when testing for electromagnetic compatibility (EMC), for example). The ADP7104 LDO and LT3012 LDO both feature reverse current protection and can be left unpowered but connected to the EVAL-ADM3050EEBZ evaluation board when supplying power directly to the ADM3050E $V_{DD1}$ and $V_{DD2}$ pins. Additionally, the LT3012 is protected against reverse voltages to the input power pin. This LT3012 feature can be used in conjunction with the ADM3050E device bus fault tolerance to protect against miswire damage in applications where the supply power and CAN bus pins are manually wired.

PCB LAYOUT RECOMMENDATIONS

Place a 0.1 µF capacitor as close as possible to VDD1 and GND1 and another 0.1 µF capacitor as close as possible to VDD2 and GND2 as shown in the layout example for the EVAL-ADM3050EEBZ (see Figure 2).

EN 55022 RADIATED EMISSIONS TEST RESULTS

The EVAL-ADM3050EEBZ passes the EN 55022 Class B standard.

The EVAL-ADM3050EEBZ is configured and tested with a 5 V power supplied to the $V_{DD1}$ pin from the ADP7104 regulator output and the $V_{DD2}$ pin from the LT3012 regulator output. The on-board LTC6900 generates the clock signal input to the TXD pin and is set to a given frequency with the on-board potentiometer. Battery packs with short leads are used for emissions testing to supply the ADP7104 regulator and the LT3012 regulator inputs.

Figure 3 shows the measurements carried out according to the EN 55032 Class B standard in a semianechoic chamber at 10 m from 30 MHz to 1 GHz. Figure 3 shows the results of the peak horizontal scan (the worst case). These results demonstrate that the ADM3050E has a greater than 6.0 dB margin below EN 55032 Class B limits on a 2-layer PCB.
Figure 4. EVAL-ADM3050EEBZ Schematic
Figure 5. EVAL-ADM3050EEBZ Primary Silkscreen

Figure 6. EVAL-ADM3050EEBZ Top Layer
Figure 7. EVAL-ADM3050EEBZ Bottom Layer

Figure 8. EVAL-ADM3050EEBZ Bottom Silkscreen
## ORDERING INFORMATION

### BILL OF MATERIALS

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<th>Part No.</th>
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<td>U1</td>
<td>5.7 kV rms, signal isolated, basic CAN FD transceiver</td>
<td>Analog Devices</td>
<td>ADM3050EBRWZ</td>
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<td>U2</td>
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<td>Analog Devices</td>
<td>LTC6900CS5#PBF</td>
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<td>U3</td>
<td>Low noise, CMOS, LDO, 5.0 V_{OUT}</td>
<td>Analog Devices</td>
<td>ADP7104ARDZ-5.0-R7</td>
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<td>U4</td>
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### RELATED LINKS

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<td>5.7 kV rms, signal isolated, basic CAN FD transceiver</td>
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<td>AN-1123</td>
<td>Controller area network (CAN) implementation guide</td>
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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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