

## Evaluating the **ADM3058E** 5.7 kV rms, Signal Isolated, Basic CAN FD Transceiver

### FEATURES

- ADM3058E** 12 Mbps isolated CAN FD transceiver
- 2-layer PCB with low radiated emissions, passes EN 55022 Class B
- On-board LDO regulators for 6 V to 9 V supply, providing 5 V to the **ADM3058E** V<sub>DD1</sub> pin and V<sub>DD2</sub> pin
- Screw terminal connectors for the following
  - 6 V to 9 V LDO regulator, 5 V power supply to V<sub>DD1</sub> pin
  - 1.7 V to 5.5 V direct power supply to V<sub>DD1</sub> pin
  - 6 V to 9 V LDO regulator, 5 V power supply to V<sub>DD2</sub> pin
  - 4.5 V to 5.5 V direct power supply to V<sub>DD2</sub> pin
- TXD pin, RXD pin, CANH pin, CANL pin signals
- Divided PCB return planes for GND<sub>1</sub> and GND<sub>2</sub>
- SMA connectors for TXD pin and RXD pin signals

### EVALUATION KIT CONTENTS

- EVAL-ADM3058EEBZ evaluation board
- ADM3058EBRIZ**
- ADP7104**
- LTC6900**

### DOCUMENTS NEEDED

- ADM3058E** data sheet

### GENERAL DESCRIPTION

The EVAL-ADM3058EEBZ allows the user to evaluate the **ADM3058E** isolated signal and power transceiver for controller area network (CAN) or CAN with flexible data rate (CAN FD) networks. The EVAL-ADM3058EEBZ 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 **ADM3058E** integrates logic side on/off keying (OOK) signal isolation channels and a low loop delay, high data rate, CAN FD transceiver.

The EVAL-ADM3058EEBZ is populated with the 8-lead standard small outline package, with increased creepage (SOIC\_IC) and >8 mm creepage.

Full specifications of the **ADM3058E** can be found in the **ADM3058E** data sheet, available from Analog Devices, which must be consulted in conjunction with this user guide when using the EVAL-ADM3058EEBZ.

### EVAL-ADM3058EEBZ PHOTOGRAPH



Figure 1.

23486-001

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## REVISION HISTORY

7/2020—Revision 0: Initial Version

## EVALUATION BOARD HARDWARE USING THE EVALUATION BOARD

The EVAL-ADM3058EEBZ board can evaluate the full range of the isolated CAN FD transceiver functionality. The bus and logic side of the transceiver can be powered by independent, isolated power supplies. The board is intended for evaluation of the *iCoupler* isolation technology, but has not been safety certified for high voltage operation. If voltages greater than 60 V are applied to either the bus or logic side of the evaluation board, external safety measures appropriate for user protection must be in place.

Figure 1 shows the EVAL-ADM3058EEBZ. The  $V_{DD1}$  and  $V_{DD2}$  supply pins of the ADM3058E 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  $V_{DD1}$  side LDO regulator 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  $V_{DD2}$  side LDO regulator 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).

The ADP7104 and LT3012 LDO regulators both feature reverse current protection on the output of the device. Reverse current protection allows the user to apply power directly to the ADM3058E  $V_{DD1}$  and  $V_{DD2}$  pins without modification to the circuit. This feature can also be useful in an application where alternate power sources may be available. Additionally, the LT3012 is protected against reverse voltages to the input power pin. This LT3012 feature can be used in conjunction with the ADM3058E device bus fault tolerance to protect the circuit against miswire damage in applications where the supply power and CAN bus connections are manually wired.

### PRINTED CIRCUIT BOARD (PCB) LAYOUT RECOMMENDATIONS

Place a 0.1  $\mu$ F capacitor as close as possible to  $V_{DD1}$  and GND<sub>1</sub> and another 0.1  $\mu$ F capacitor as close as possible to  $V_{DD2}$  and GND<sub>2</sub> to minimize impedance, as shown in the layout example for the EVAL-ADM3058EEBZ (see Figure 2).

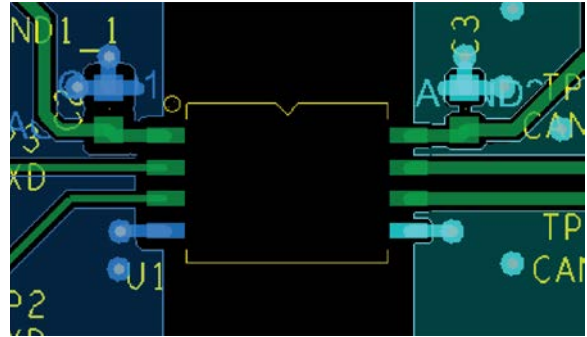


Figure 2. Layout Example for the EVAL-ADM3058EEBZ

### EN 55022 RADIATED EMISSIONS TEST RESULTS

The EVAL-ADM3058EEBZ passes the EN 55022 Class B standard.

The EVAL-ADM3058EEBZ 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 ADM3058E has a greater than 6.0 dB margin below EN 55032 Class B limits on a 2-layer PCB.

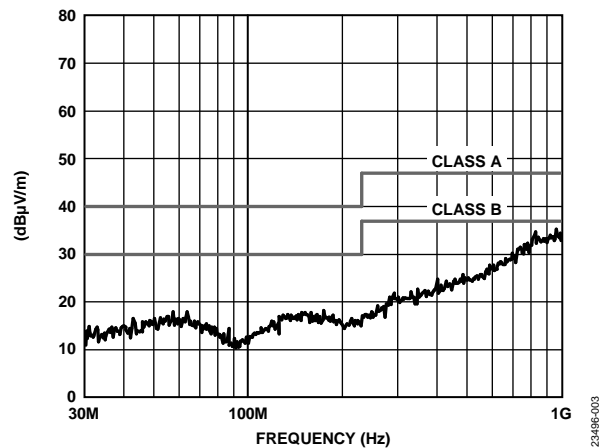


Figure 3. Horizontal Scan from 30 MHz to 1 GHz with 12 Mbps Signal to TXD with 60  $\Omega$  Termination

EVALUATION BOARD SCHEMATIC AND ARTWORK

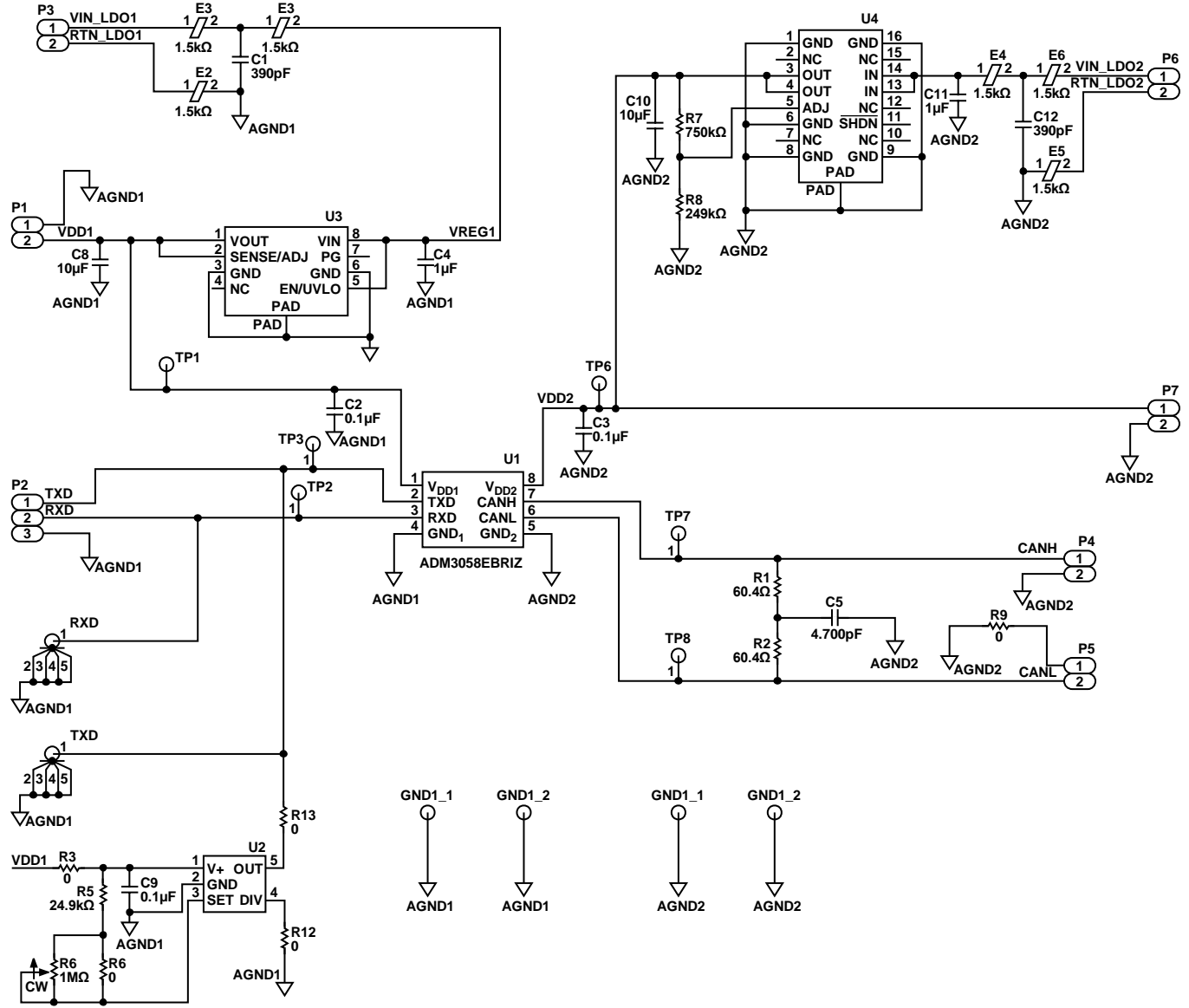


Figure 4. EVAL-ADM3058EEBZ Schematic

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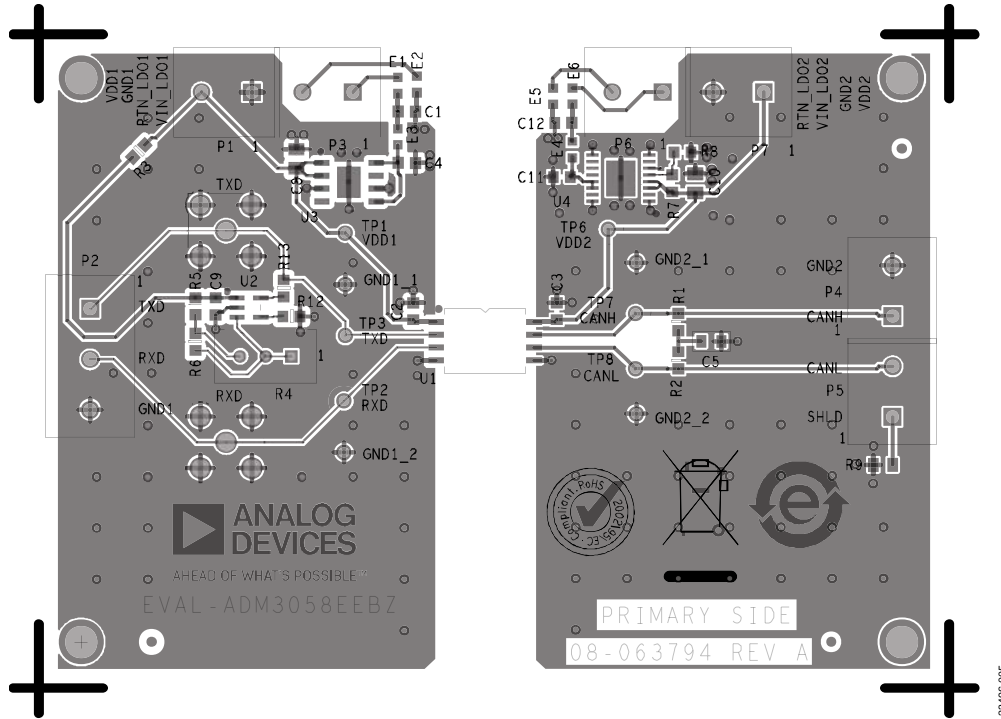


Figure 5. EVAL-ADM3058EEBZ Top Layer and Silkscreen

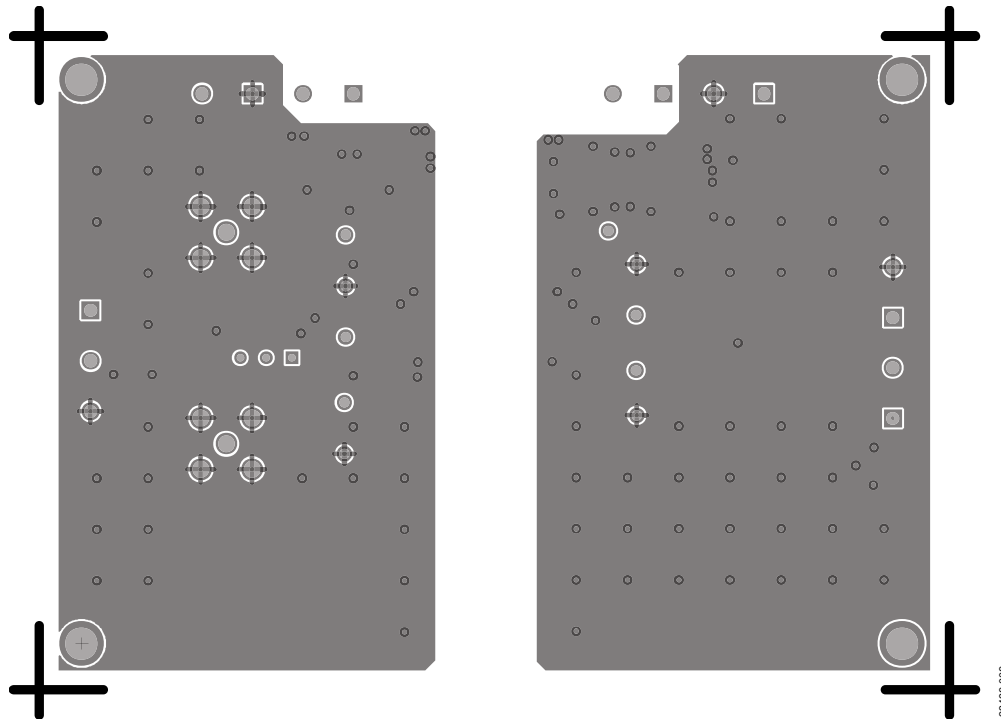


Figure 6. EVAL-ADM3058EEBZ Bottom Layer

## ORDERING INFORMATION

### BILL OF MATERIALS

Table 1.

Component	Description	Supplier	Part No.
U1	5.7 kV rms, signal isolated, basic CAN FD transceiver	Analog Devices	<a href="#">ADM3058EBRIZ</a>
U2	Low power, resistor set oscillator, 1 kHz to 20 MHz	Analog Devices	<a href="#">LTC6900CS5#PBF</a>
U3	Low noise, CMOS, LDO regulator, 5.0 V output voltage	Analog Devices	<a href="#">ADP7104ARDZ-5.0-R7</a>
U4	Low dropout, micropower linear regulator	Analog Devices	<a href="#">LT3012EFE#PBF</a>
C12	Capacitors, 390 pF, X7R, 0603	AVX	0603YC391KAT2A
C8, C10	Capacitors, 10 µF, X7R, 0805	Würth Electronik	885012207026
C4, C11	Capacitors, 1 µF, X7R, 0603	Würth Electronik	885012206076
C2, C3, C9	Capacitors, 0.1 µF, X7R, 0603	Würth Electronik	885012206046
C5	Capacitor, 4700 pF, X7R, 0805	Würth Electronik	885012207090
E1, E2, E3, E4, E5, E6	Ferrite beads, 1500 Ω, 0603	Murata	BLM18HE152SN1D
TXD, RXD	Connector, subminiature Version A (SMA)	TE Connectivity	5-1814832-1
P1, P3, P4, P5, P6, P7	Connectors, 2-position screw terminal block	Würth Electronik	691 213 710 002
P2	Connector, 3-position screw terminal block	Würth Electronik	691213710003
R1, R2	Resistors, 60.4 Ω, 1/10 W, 0603	Panasonic	ERJ-3EKF60R4V
R12	Resistor, 0 Ω, 1/10 W, 0603	Panasonic	ERJ-3GEY0R00V
R7	Resistor, 750 kΩ, 1/10 W, 0603	Panasonic	ERJ-3EKF7503V
R8	Resistor, 249 kΩ, 1/10 W, 0603	Panasonic	ERJ-3EKF2493V
TP1, TP2, TP3, TP6, TP7, TP8	Orange test points	Keystone	5003
GND1_1, GND1_2, GND2_1, GND2_2	Black test points	Vero	20-2137
R3, R6, R13	Resistors, 0 Ω, 1/10 W, 0603 (do not install, DNI)	Panasonic	ERJ-3GEY0R00V
R4	Potentiometer, 1 MΩ (DNI)	Bourns	3296W-1-105LF
R5	Resistor, 24.9 kΩ, 1/10 W, 0603 (DNI)	Panasonic	ERA-3AEB2492V
R9	Resistor, 0 Ω, 1/10 W, 0805 (DNI)	Panasonic	ERJ-6GEY0R00V

### RELATED LINKS

Resource	Description
<a href="#">ADM3058E</a>	5.7 kV rms, signal isolated, basic CAN FD transceiver
<a href="#">AN-1123</a>	Controller area network (CAN) implementation guide

## 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.

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