User's Manual

ISL32704EVAL2Z

User's Manual: Evaluation Board

Industrial Precision

Rev 0.00 Apr 2017

1. Overview

The ISL32704EVAL2Z board enables the evaluation of the ISL32704EIBZ isolated, half-duplex RS-485 transceiver in a typical bus node application, used in isolated industrial networks.

1.1 Specifications

This board has been configured and optimized for the following operating conditions:

- Up to 4Mbps data rate
- V_{CC} = 3.3V

1.2 Ordering Information

Part Number	Description
ISL32704EVAL2Z	ISL32704EIBZ evaluation board

1.3 Key Features

- Drive capability of up to 32 x 1 UL transceivers
- Isolated 3.3V to 5V DC/DC converter with regulated output

1.4 Related Literature

- For a full list of related documents, visit our website
  - ISL32704E product page

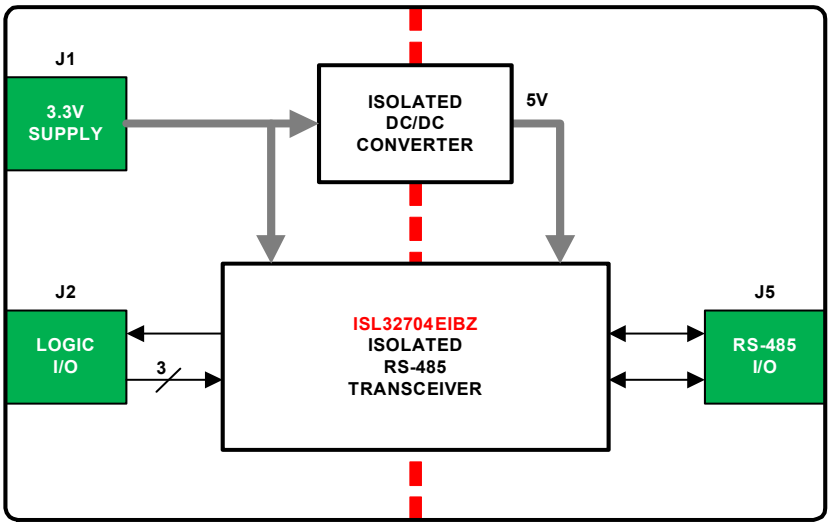

Figure 1.1 Block Diagram

2. Functional Description

The ISL32704EIBZ is an isolated, 4Mbps, half-duplex RS-485 transceiver. The device incorporates a patented refresh circuit to maintain the correct output state with respect to data input. At power-up, the bus outputs follow the truth tables shown in Tables 2.1 and 2.2.

The DE input should be held low during power-up to prevent false drive data pulses on the bus. This is accomplished by connecting the DE using a 10kΩ pull-down resistor to GND1.

This transceiver uses a differential input receiver for maximum noise immunity and common-mode rejection. Input sensitivity is ±200mV, as required by the RS-485 specification.

The receiver input resistance meets the RS-485 “Unit Load” (UL) requirement of 12kΩ minimum. The receiver includes a “fail-safe if open” function that ensures a high-level receiver output if the receiver inputs are unconnected (floating). The receiver output is tri-statable through the active low $\overline{RE}$ input.

The RS-485 driver is a differential output device that delivers at least 1.5V across a 54Ω purely differential load. The driver features low propagation delay skew to maximize bit width and to minimize EMI.

The driver in the ISL32704E is tri-statable through the active high DE input. The outputs of the ISL32704E driver are not slew rate limited, so faster output transition times allow data rates of at least 4Mbps.

Important Notice:

For convenience, an isolated DC/DC converter is used to provide the power supply across the isolation barrier. Its isolation ratings however, are lower than those of the transceiver. Therefore, it must be ensured that the ground potential difference between the left side (GND1, GND2) and the right side (GND3, GND4) of the board remain below 50VAC (see Figure 3.1).

Table 2.1 Truth Table - Receiving

Receiving			
Inputs			Output
RE	DE	A-B	R
0	0	≥0.2V	1
0	0	≤ -0.2V	0
0	0	Inputs Open/Shorted	1
1	1	X	High-Z
1	0	X	High-Z

Table 2.2 Truth Table - Transmitting

Transmitting					
Inputs			Outputs		
RE	DE	D	ISODE	B	A
X	1	1	1	0	1
X	1	0	1	1	0
0	0	X	0	High-Z	High-Z
1	0	X	0	High-Z	High-Z

3. PCB Layout Guidelines

Both supplies, V_{DD1} and V_{DD2}, must be bypassed with 100nF ceramic capacitors. These should be placed as close as possible to the supply pins for proper operation.

3.1 ISL32704EVAL2Z Evaluation Board

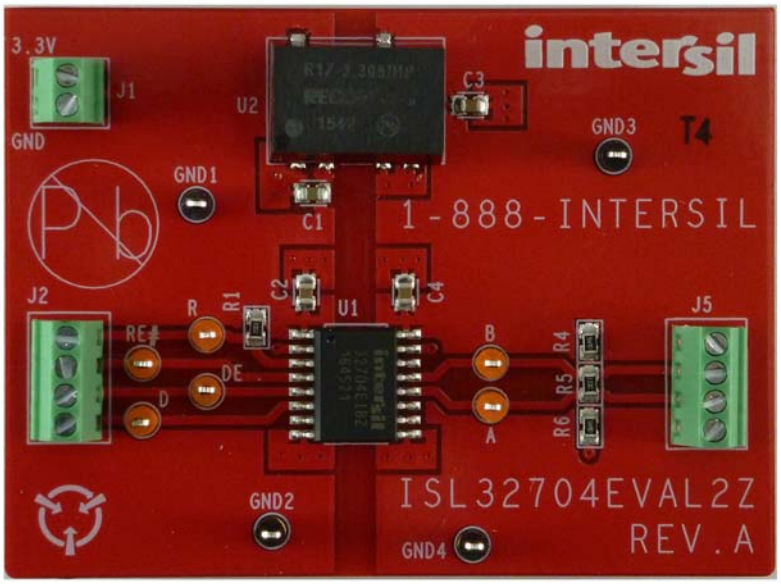

Figure 3.1 Top Side

Figure 3.2 Bottom Side

3.2 ISL32704EVAL2Z Circuit Schematic

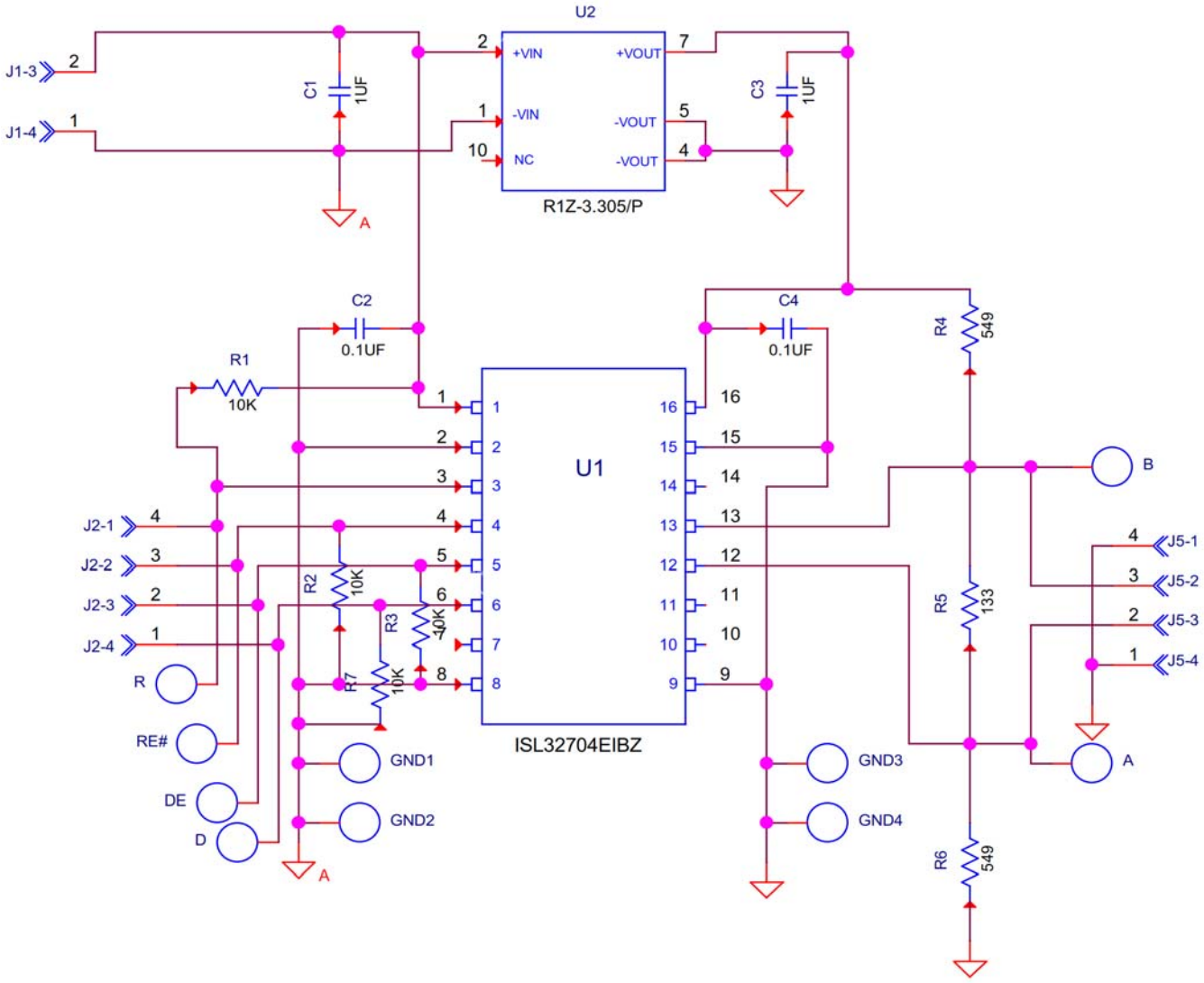

Figure 3.3 ISL32704EVAL2Z Schematic

3.3 Bill of Materials

Manufacturer Part	Qty	Reference Designator	Description	Manufacturer
ISL32704EVAL2ZREVAPCB	1		PWB-PCB, ISL32704EVAL2Z, REVA, ROHS	IMAGINEERING INC
ISL32704EIBZ	1	U1	ISOLATED, 4Mbps, HALF-DUPLEX RS-485 TRANSCEIVER, ROHS	Intersil
R1Z-3.305/P	1	U2	ISOLATED 3.3V-TO-5V DC/DC CONVERTER WITH REGULATED OUTPUT, ROHS	RECOM-POWER
CR0805-8W-1002FT (Pb-Free)	4	R1 - R3, R7	RES, SMD, 0805, 10k, 1/8W, 1%, TF, ROHS	VENKEL
RK73H2AT1330F	1	R5	RES, SMD, 0805, 133Ω, 1/8W, 1%, TF, ROHS	KOA
RC0805FR-07549RL	2	R4, R6	RES, SMD, 0805, 549Ω, 1/8W, 1%, TF, ROHS	YAGEO
C0805X5R160-106KNE	2	C1, C3	CAP, SMD, 0805, 10µF, 16V, 10%, X5R, ROHS	VENKEL
ECJ-2VB1E104K	2	C2, C4	CAP, SMD, 0805, 0.1µF, 25V, 10%, X7R, ROHS	PANASONIC
1725656	1	J1	CONN-TERMINAL BLK, TH, 2P, 6A, 125V, 20-30AWG, 2.54mm, ROHS	PHOENIX CONTACT
1725672	2	J2, J5	CONN-TERMINAL BLOCK, 4POS, 0.1, 26-20AWG, 63V, 6A, ROHS	PHOENIX CONTACT
5001	4	GND1 - GND4	CONN-MINI TEST PT, VERTICAL, BLK, ROHS	KEYSTONE
5003	6	A, B, D, R, DE, RE#	CONN-MINI TEST POINT, VERTICAL, ORG, ROHS	KEYSTONE
S-2261	1	Place assy in bag	BAG, STATIC, 4x6, ZIPLOC, ROHS	ULINE
LABEL-DATE CODE	1	AFFIX TO BACK OF PCB	LABEL-DATE CODE_LINE 1: YRWK/REV#, LINE 2: BOM NAME	INTERSIL

3.4 Board Layout

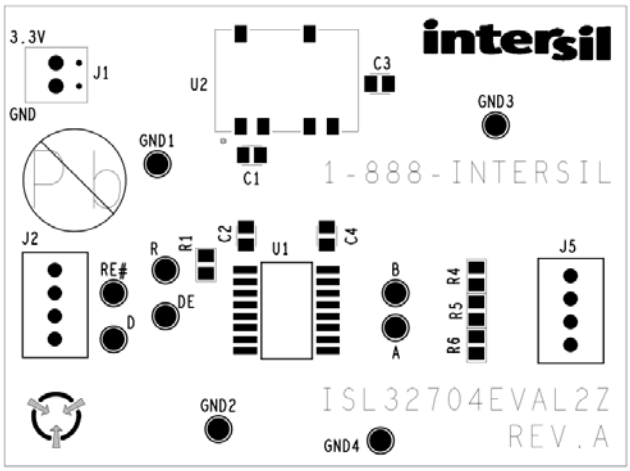

Figure 3.4 Silkscreen Top

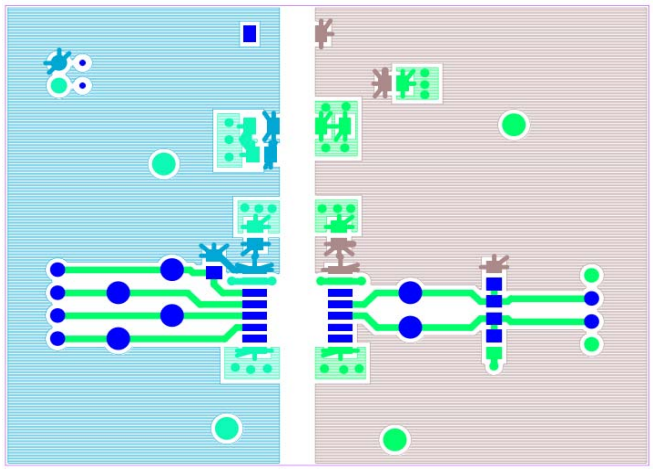

Figure 3.5 Top Layer

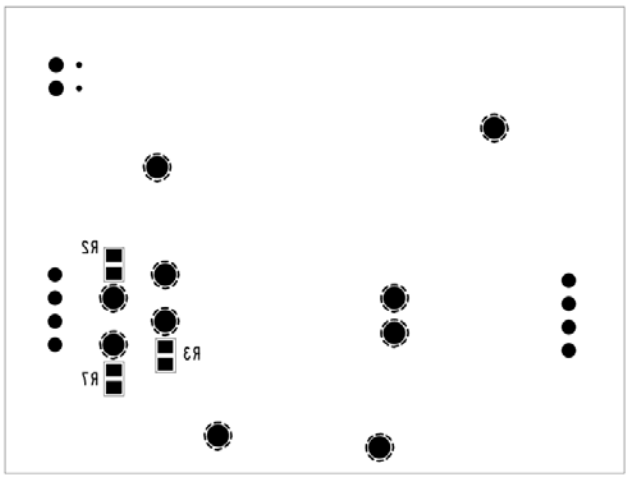

Figure 3.6 Silkscreen Bottom

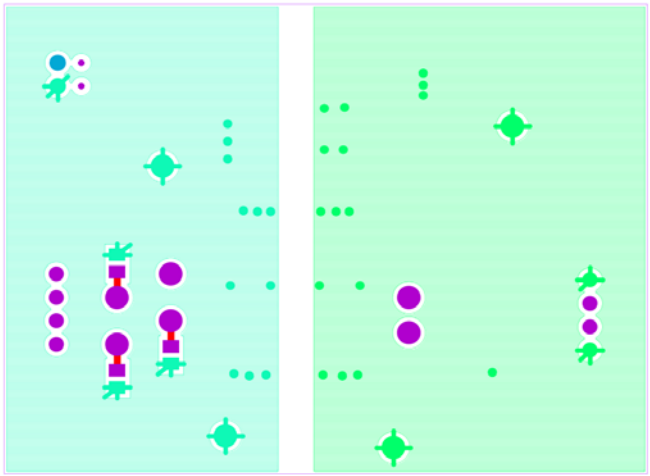

Figure 3.7 Bottom Layer

4. Typical Performance Curves

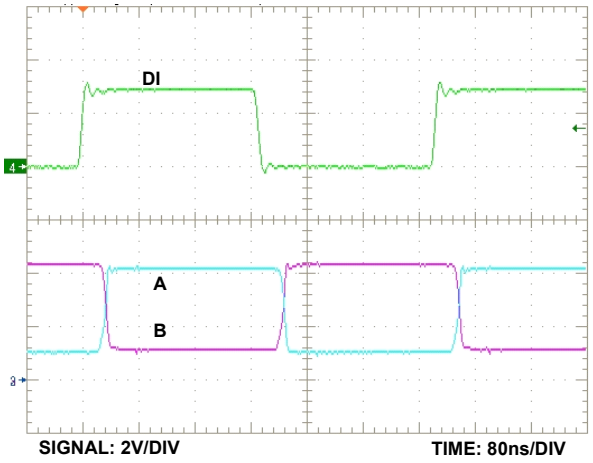

Figure 4.1 Transmit Mode

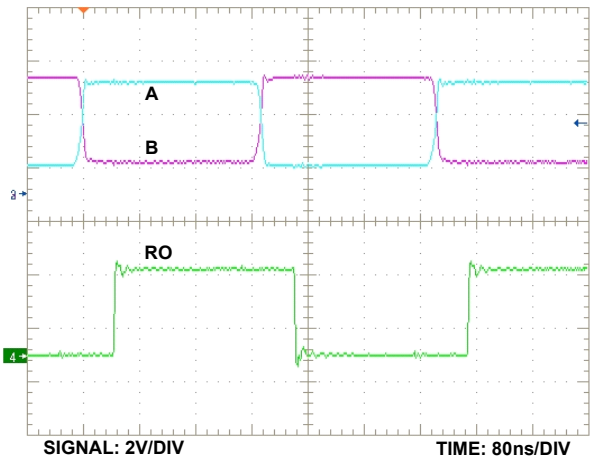

Figure 4.2 Receive Mode

5. Revision History

Rev.	Date	Description	
		Page	Summary
0.00	Apr 3, 2017	—	Initial release

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