User's Manual

ISL32741EVAL1Z

User's Manual: Evaluation Board

Industrial Precision

Rev.1.00 Aug 2017

1. Overview

The ISL32741EVAL1Z board enables the evaluation of the ISL32741EIBZ reinforced isolated, half-duplex RS-485 transceiver in a typical bus node application, used in isolated industrial networks.

1.1 Key Features

- Drive capability of up to 160 x 1/5UL-transceivers
- Isolated 3.3V to 5V DC/DC converter with regulated output

1.2 Specifications

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

- Up to 40Mbps data rate
- V_{CC} = 3.3V

1.3 Ordering Information

Part Number	Description
ISL32741EVAL1Z	ISL32741EIBZ evaluation board

1.4 Related Literature

- For a full list of related documents, visit our website
  - ISL32741E product page

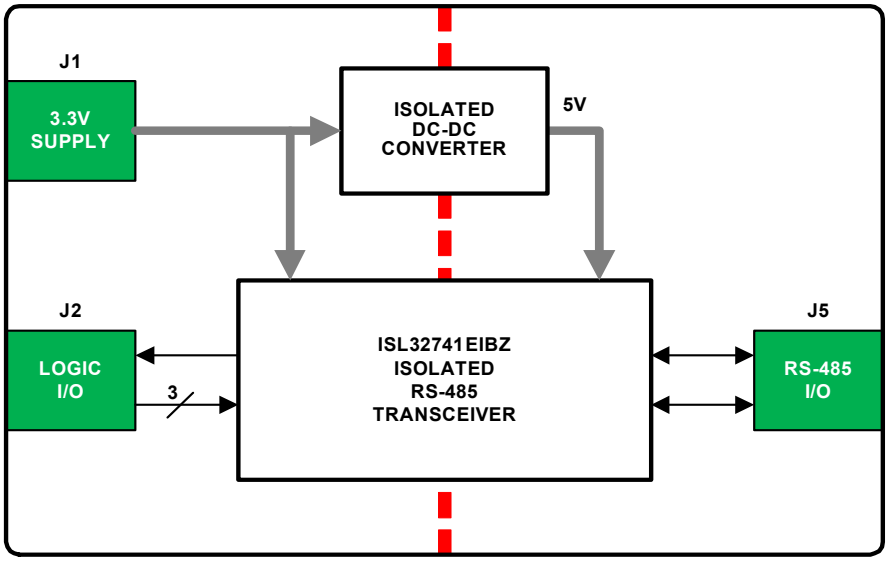


Figure 1. Block Diagram

2. Functional Description

The ISL32741E is a reinforced isolated, 40Mbps, 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 tables in "Truth Tables".

The DE input should be held low during power-up to prevent false drive data pulses on the bus. This is accomplished by connecting DE through 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 is 54kΩ minimum. The receiver includes a "full fail-safe" function that ensures a high-level receiver output if the receiver inputs are unconnected (floating) or shorted. The receiver output is tri-statable through the active low $\overline{RE}$ input.

The driver is a differential output device that delivers at least 2.1V 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 ISL32741E is tri-statable through the active high DE input. The outputs of the ISL32741E driver are not slew rate limited, so faster output transition times allow data rates of at least 40Mbps.

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, ensure 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 2).

2.1 Truth Tables

Receiving			
Inputs			**Output**
$\overline{RE}$	DE	A-B	RO
0	0	$V_{AB} \geq -0.05V$	1
0	0	$-0.05V > V_{AB} > -0.2V$	Undetermined
0	0	$V_{AB} \leq -0.2V$	0
0	0	Inputs Open/Shorted	1
1	1	X	High-Z
1	0	X	High-Z*

Transmitting					
Inputs			**Outputs**		
$\overline{RE}$	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*

Note: *Transceiver shutdown mode

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 ISL32741EVAL1Z Evaluation Board

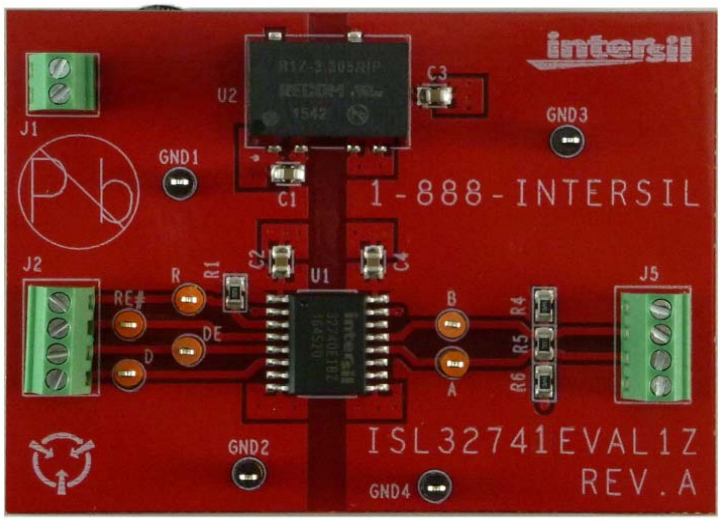


Figure 2. Top Side

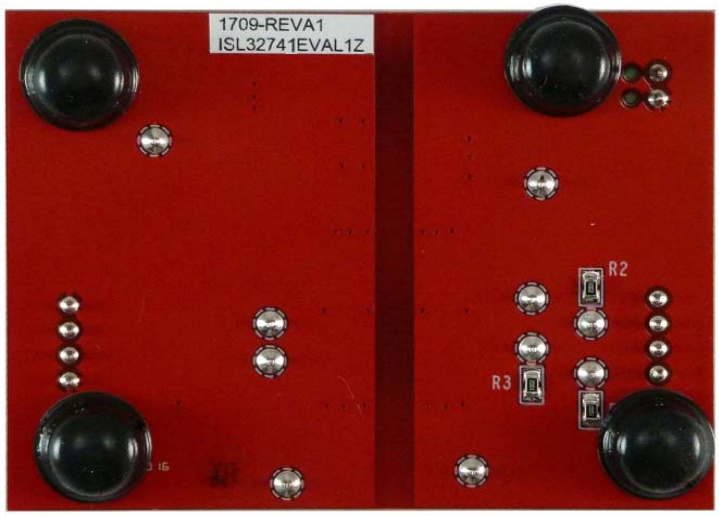


Figure 3. Bottom Side

3.2 ISL32741EVAL1Z Circuit Schematic

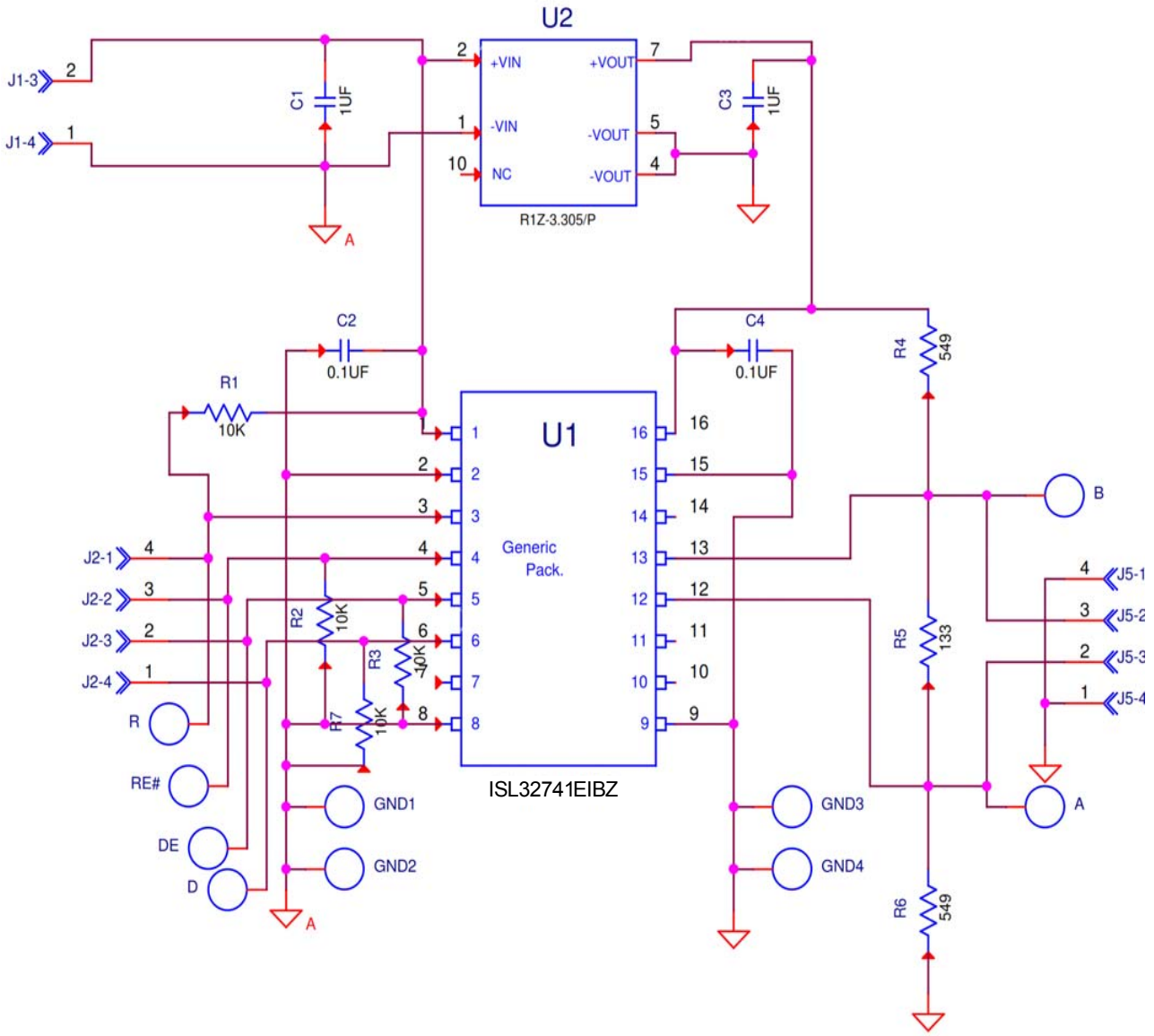


Figure 4. ISL32741EVAL1Z Schematic

3.3 Bill of Materials

Manufacturer Part	Qty	Reference Designator	Description	Manufacturer
ISL32741EVAL1ZREVAPCB	1		PWB-PCB, ISL32741EVAL1Z, REVA, ROHS	Imagineering Inc
ISL32741EIBZ	1	U1	6KV REINFORCED ISOLATED, 40Mbps, 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(PbFREE)	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

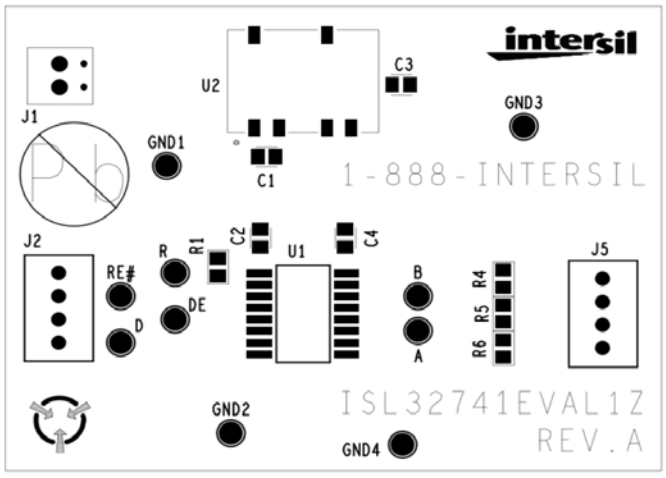


Figure 5. Silkscreen Top

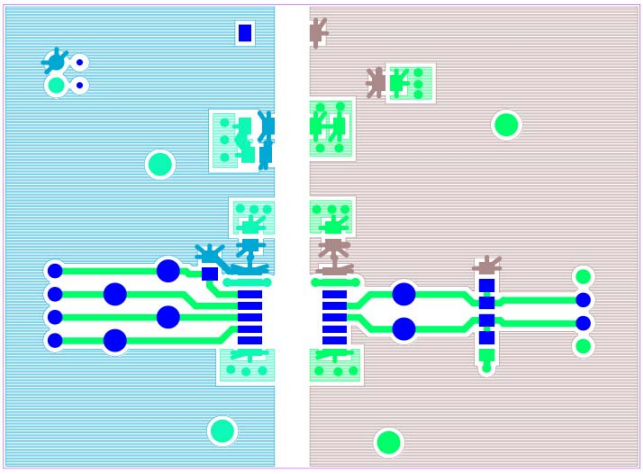


Figure 6. Top Layer

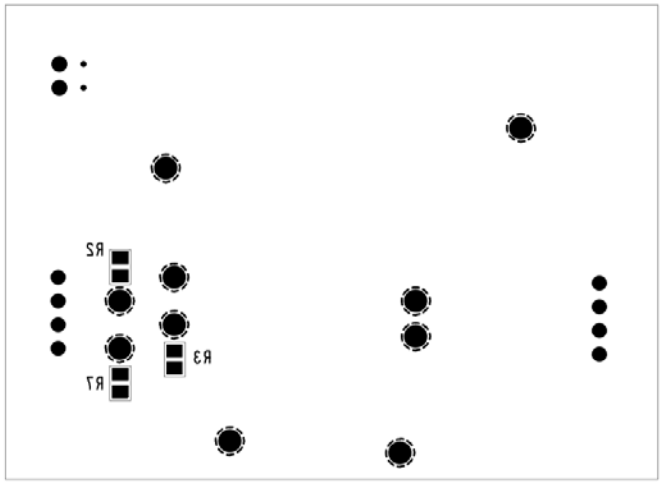


Figure 7. Silkscreen Bottom

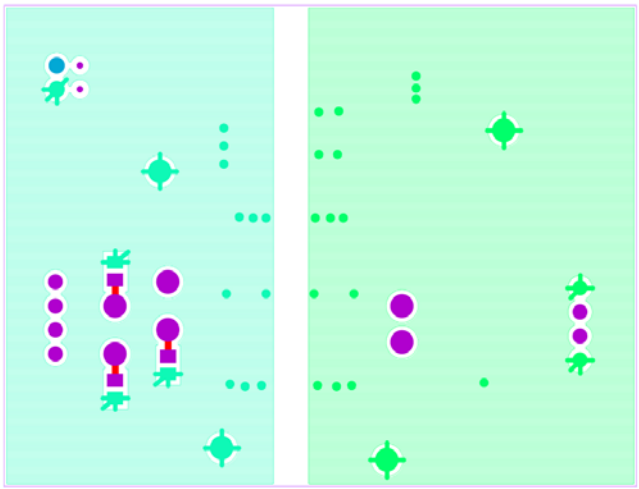


Figure 8. Bottom Layer

4. Typical Performance Curves

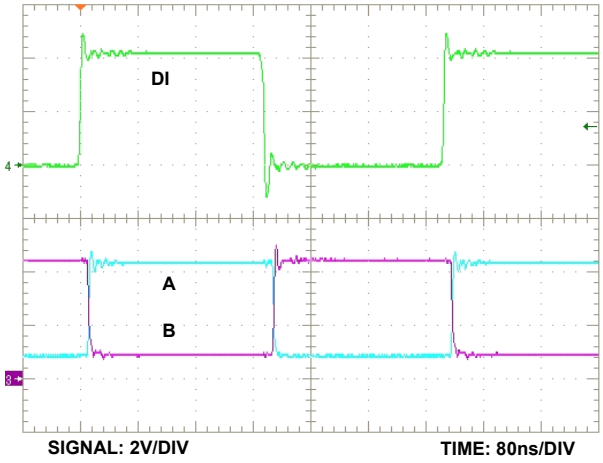


Figure 9. Transmit Mode

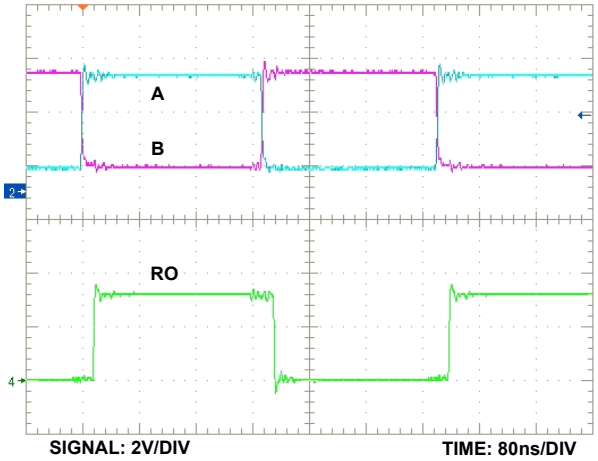


Figure 10. Receive Mode

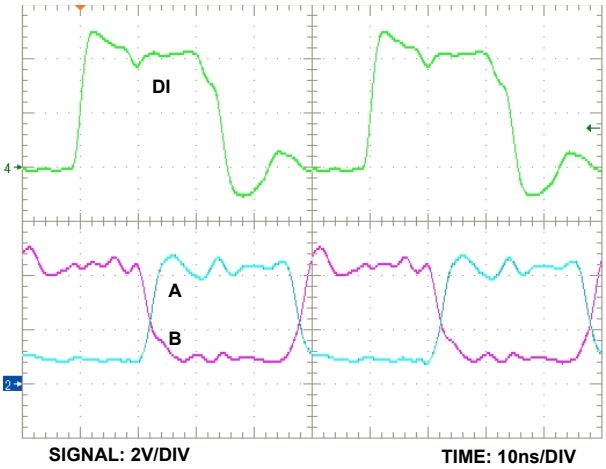


Figure 11. Transmit Mode

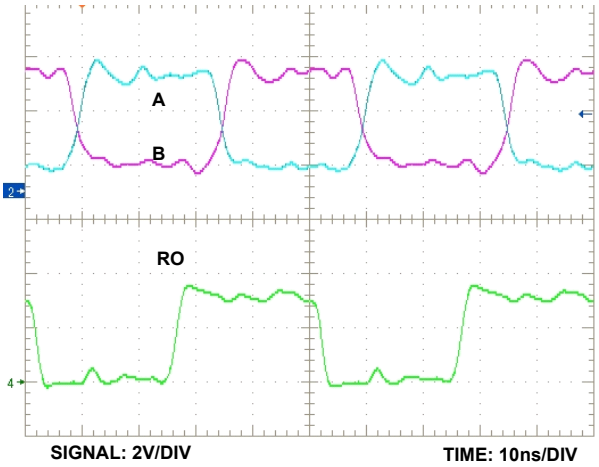


Figure 12. Receive Mode

5. Revision History

Rev.	Date	Description
1.00	Aug 24, 2017	Updated the truth tables on page 3.
0.00	May 31, 2017	Initial release

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