

ISL32704EVAL1Z

Evaluation Board User Guide

UG104  
Rev 0.00  
January 3, 2017

**Description**

The ISL32704EVAL1Z board enables the evaluation of the [ISL32704E](#) isolated, half-duplex RS-485 transceiver in a typical bus node application, used in isolated industrial networks.

**Specifications**

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

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

**Key Features**

- Industry's smallest isolated RS-485 transceiver
- Drive capability of up to 32 x 1UL-transceivers
- Isolated 3.3V to 5V DC/DC converter with regulated output
- Small total device footprint of 183mm<sup>2</sup>

**Related Literature**

- For a full list of related documents, visit our website - [ISL32704E](#) product page

**Ordering Information**

PART NUMBER	DESCRIPTION
ISL32704EVAL1Z	ISL32704E evaluation board

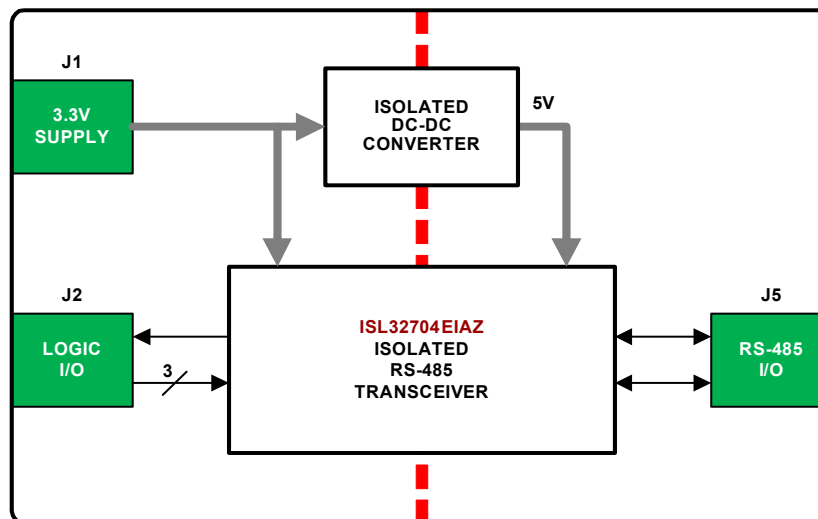


FIGURE 1. BLOCK DIAGRAM

## Functional Description

The ISL32704EIAZ 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 on the right.

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 via a 10k $\Omega$  pull-down resistor to GND1.

This transceiver utilizes a differential input receiver for maximum noise immunity and common-mode rejection. Input sensitivity is  $\pm 200\text{mV}$ , as required by the RS-485 specification.

The receiver input resistance meets the RS-485 "Unit Load" (UL) requirement of 12k $\Omega$  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 via the active low  $\overline{\text{RE}}$  input.

The RS-485 driver is a differential output device that delivers at least 1.5V across a 54 $\Omega$  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 via 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 2](#)).

## Truth Table

RECEIVING			
INPUTS			OUTPUT
$\overline{\text{RE}}$	DE	A-B	R
0	0	$\geq 0.2\text{V}$	1
0	0	$\leq -0.2\text{V}$	0
0	0	Inputs Open/Shorted	1
1	1	X	High-Z
1	0	X	High-Z

## Truth Table

TRANSMITTING					
INPUTS			OUTPUTS		
$\overline{\text{RE}}$	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

## PCB Layout Guidelines

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

# ISL32704EVAL1Z Evaluation Board



FIGURE 2. TOP SIDE



FIGURE 3. BOTTOM SIDE

# ISL32704EVAL1Z Circuit Schematic

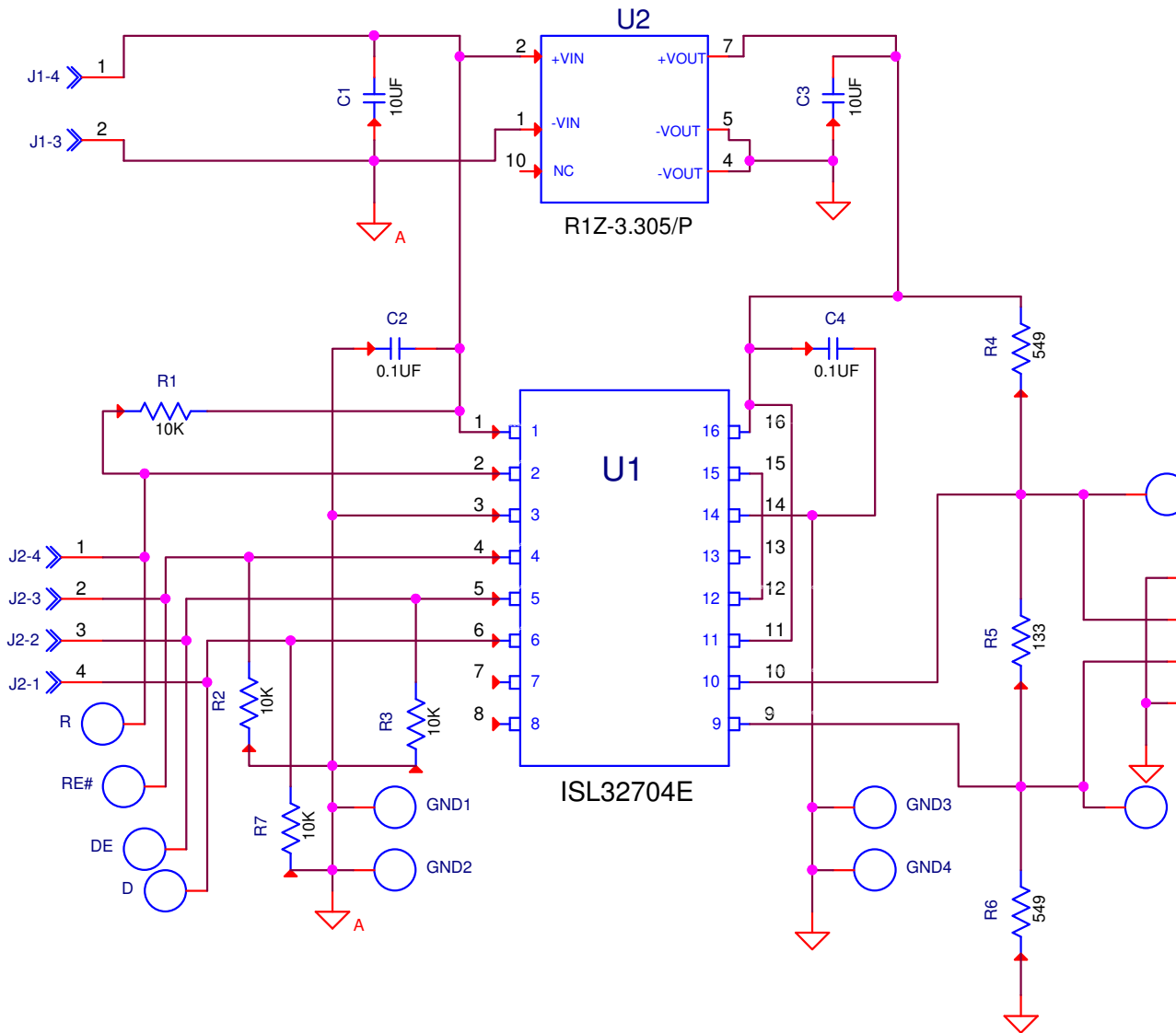


FIGURE 4. ISL32704EVAL1Z SCHEMATIC

## Bill of Materials

MANUFACTURER PART	QTY	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER
ISL32704EVAL1ZREVAPCB	1		PWB-PCB, ISL32704EVAL1Z, REVA, ROHS	IMAGINEERING INC
ISL32704EIAZ	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(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

# Board Layout

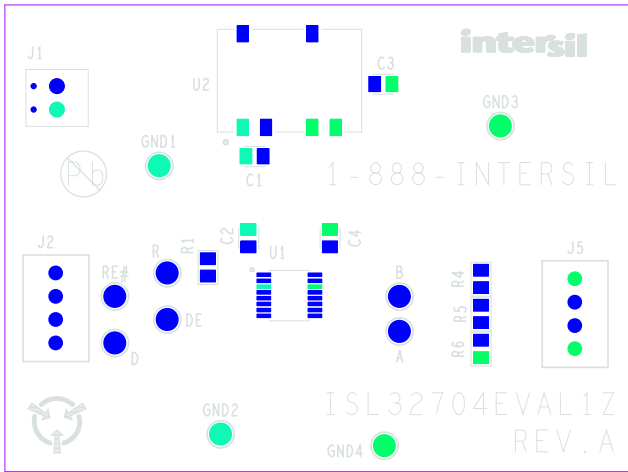


FIGURE 5. SILKSCREEN TOP

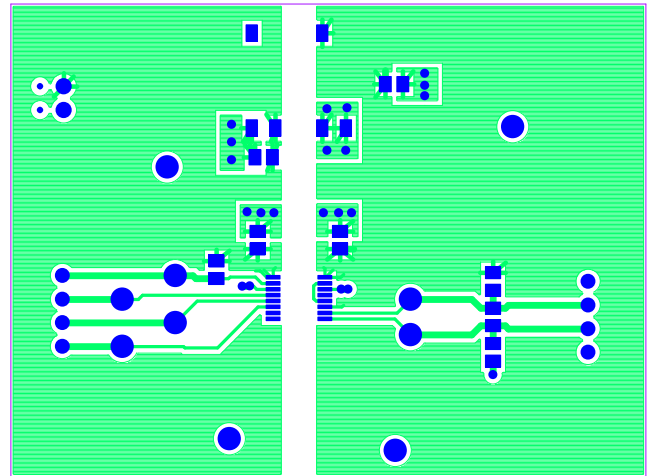


FIGURE 6. TOP LAYER

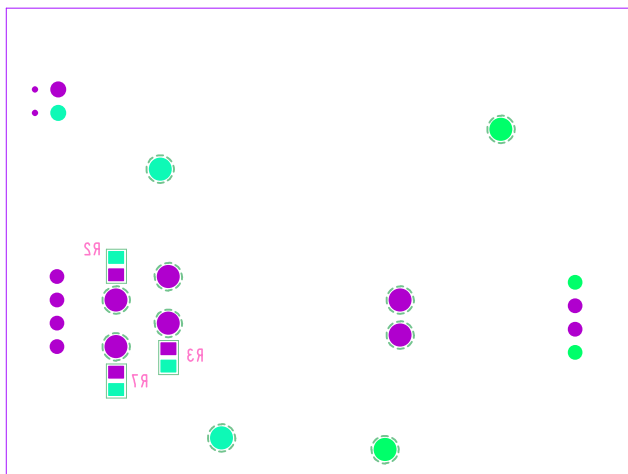


FIGURE 7. SILKSCREEN BOTTOM

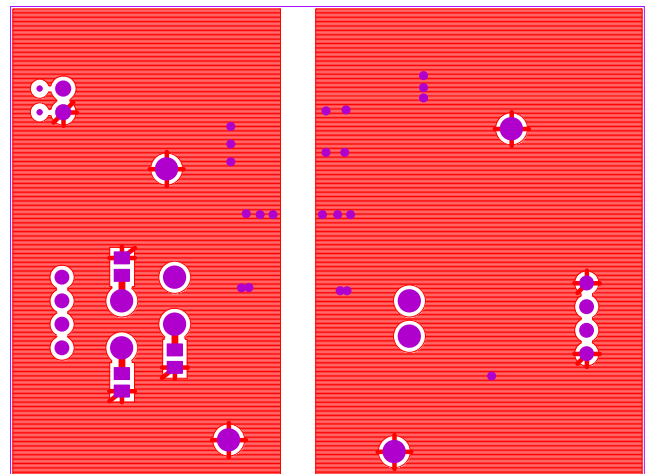


FIGURE 8. BOTTOM LAYER

# Typical Performance Curves

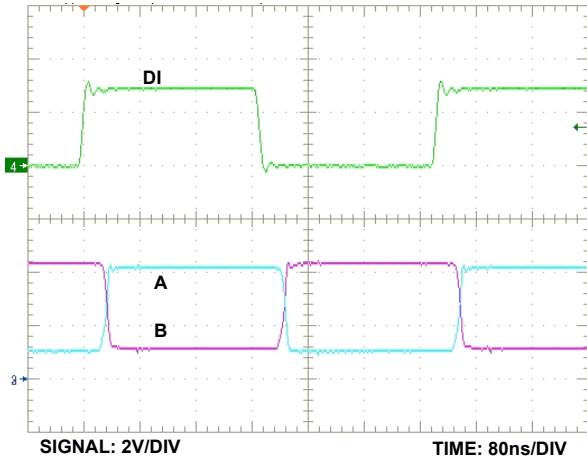


FIGURE 9. TRANSMIT MODE

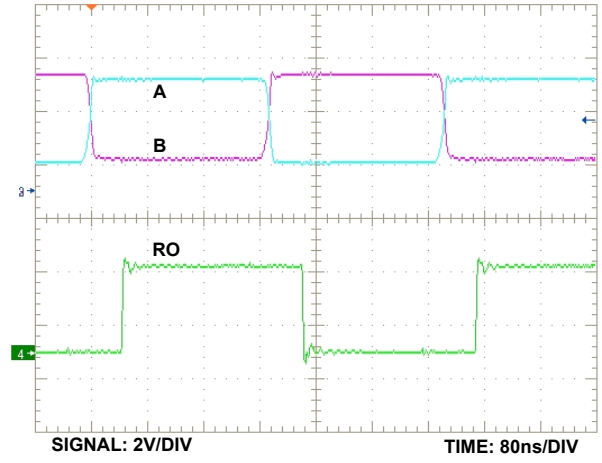


FIGURE 10. RECEIVE MODE

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