

## Evaluating the **ADM2463E** and **ADM2763E** 500 kbps, 5.7 kV RMS, Signal Isolated, Full Duplex RS-485 Transceivers with $\pm 15$ kV IEC ESD

### FEATURES

- Simplified evaluation of the **ADM2463E** and **ADM2763E** signal isolated, 500 kbps, full duplex RS-485 transceiver
- 2-layer PCB compliant to EN 55032 Class B radiated emissions
- Footprint for standard full duplex, 16-lead, SOIC\_W package with  $>8$  mm creepage and clearance
- On-board **ADP7104** LDO regulators with jumper options for simplified evaluation in multiple supply configurations
- Flexible, low voltage  $V_{DD1}$  supply rail for interfacing with I/O nodes as low as 1.7 V
- Wide bus voltage  $V_{DD2}$  supply rail from 3 V to 5.5 V
- IEC 61000-4-2 ESD protection on the A pin, B pin, Y pin, and Z pin
- $\geq \pm 12$  kV contact discharge and  $\geq \pm 15$  kV air discharge
- SMA connector for Tx/D input signal
- Optional on-board **LTC1799** oscillator for providing Tx/D signal
- Screw terminal blocks for connecting power, digital, and RS-485 signals
- Jumper-selectable enable and disable for digital input signals
- Resistors and footprints for termination and loopback test
- Test points for measuring all signals

### EVALUATION KIT CONTENTS

EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ

### EQUIPMENT NEEDED

- Oscilloscope
- Signal generator
- 3 V to 5.5 V secondary side supply
- 1.7 V to 5.5 V primary side supply

### DOCUMENTS NEEDED

- ADM2463E** data sheet
- ADM2763E** data sheet

### GENERAL DESCRIPTION

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ allow simplified, efficient evaluation of the **ADM2463E** and **ADM2763E** 5.7 kV rms, 500 kbps signal isolated RS-485 transceivers. The functionality of the EVAL-ADM2463EEBZ and the EVAL-ADM2763EEBZ are the same. Figure 1 shows the EVAL-ADM2463EEBZ and represents both evaluation boards.

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ come with options for the evaluation of the **ADM2463E** and **ADM2763E** devices in an individual system. Digital and RS-485 bus signals are easily accessible via the screw terminal blocks on the evaluation boards. Each digital input can be configured via the on-board jumper options.

Two on-board **ADP7104** low dropout (LDO) regulators accept an input voltage of up to 20 V and output a range of selectable supply voltages to the  $V_{DD1}$  pin and  $V_{DD2}$  pin, configurable via jumper options. The LDO regulators can be bypassed to power the **ADM2463E** and **ADM2763E**  $V_{DD1}$  supply pins and  $V_{DD2}$  supply pins directly from an external power supply.

The flexible  $V_{DD1}$  pin primary side logic supply allows the device to operate with a digital input/output (I/O) voltage from 1.7 V to 5.5 V, which enables communication with modern nodes using either a 1.8 V or 2.5 V power supply. The  $V_{DD1}$  pin can also be supplied from the **ADP7104** regulated supply.

Alternative methods can be used to provide the transmit data input (Tx/D) signal to the device. An optional **LTC1799** oscillator is included on the evaluation boards and can be configured to provide a clock signal as the Tx/D digital input within a 10 kHz to 250 kHz range. A terminal block allows an easy wired connection to a microcontroller or processor. For optimal signal integrity, use the on-board Subminiature Version A (SMA) connector to connect an external data signal.

The evaluation boards have footprints for the **ADM2463E** and **ADM2763E** full duplex, signal isolated, RS-485 transceivers in a 10.10 mm  $\times$  10 mm, 16-lead, standard small outline, wide body (SOIC\_W) package.

For full details on the **ADM2463E** and **ADM2763E**, see the **ADM2463E** and **ADM2763E** data sheets, which must be used in conjunction with this user guide when using the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ.

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**REVISION HISTORY**

6/2020—Revision 0: Initial Version

### EVALUATION BOARD PHOTOGRAPH

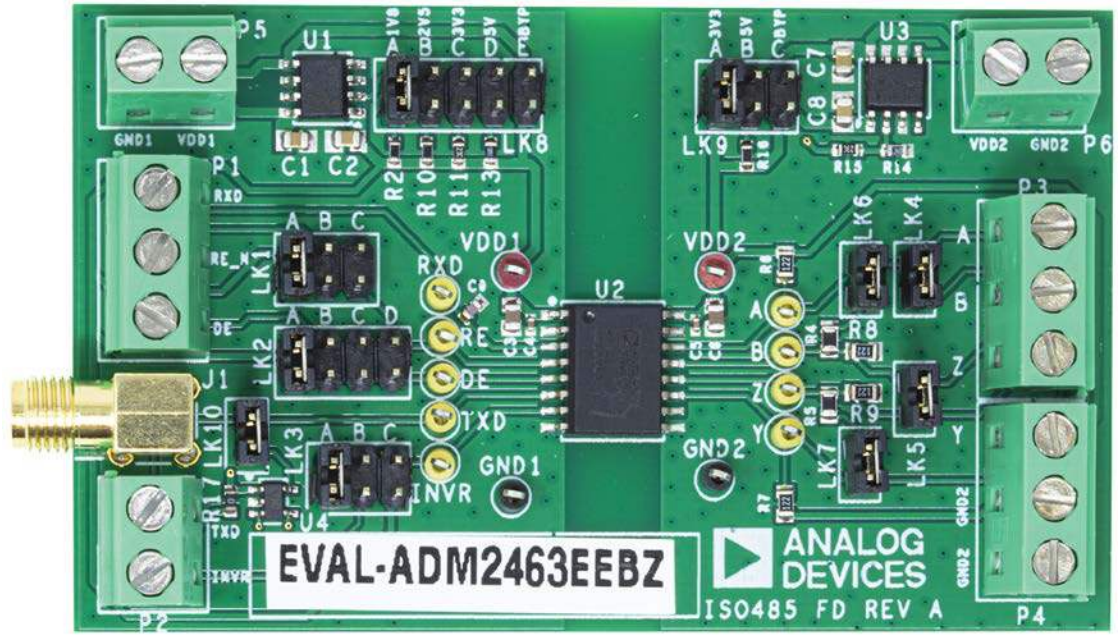


Figure 1. EVAL-ADM2463EEBZ

## EVALUATION BOARD HARDWARE

### SETTING UP THE EVALUATION BOARD

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ are used to evaluate the [ADM2463E](#) and [ADM2763E](#) isolated RS-485 transceivers, which require a power supply on both sides of the device. The evaluation boards are powered via the VDD1 and VDD2 connections on the P5 and P6 screw terminal connectors. The supply voltages connected to these terminals can either be regulated or connected directly to the  $V_{DD1}$  pin and  $V_{DD2}$  pin of the [ADM2463E](#) or [ADM2763E](#). Insert the LK8 jumper into Position E to power the  $V_{DD1}$  pin directly from the VDD1 connector. Insert the LK9 jumper into Position C to power the  $V_{DD2}$  pin directly from the VDD2 terminal on P6.

The two on-board [ADP7104](#) voltage regulators can be configured to provide a range of regulated supply voltages to the  $V_{DD1}$  pin and  $V_{DD2}$  pin of the [ADM2463E](#) or [ADM2763E](#). Various voltage options can be selected using the LK8 and LK9 jumpers. The  $V_{DD1}$  pin is fitted with a 10  $\mu\text{F}$  decoupling capacitor (C3) and a 0.1  $\mu\text{F}$  decoupling capacitor (C4). The  $V_{DD2}$  pin is fitted with a 10  $\mu\text{F}$  decoupling capacitor (C6) and a 0.1  $\mu\text{F}$  decoupling capacitor (C5).

See Table 1, Table 2, and Table 3 for more details on the jumper and power supply connections. The corresponding labeled test points allow monitoring of the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ  $V_{DD1}$  and  $V_{DD2}$  supply voltages.

**Table 1. Jumper Configurations**

Link	Jumper Connection	Description
LK1	A	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $\overline{\text{RE}}$ input to the $V_{DD1}$ pin. This setting disables the receiver.
	B	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $\overline{\text{RE}}$ input to the $\overline{\text{RE}}$ terminal on the P1 connector.
	C	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $\overline{\text{RE}}$ input to the $\text{GND}_1$ pin. This setting enables the receiver.
LK2	A	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> DE input to the $V_{DD1}$ pin. This setting enables the driver.
	B	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> DE input to the DE terminal on the P1 connector.
	C	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> DE input to the $\text{GND}_1$ pin. This setting disables the driver.
	D	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> DE input to the $\overline{\text{RE}}$ input signal. Therefore, the input for both $\overline{\text{RE}}$ and DE is set by the LK1 jumper. This setting ensures that when the driver is enabled, the receiver is disabled, or when the driver is disabled, the receiver is enabled.
LK3	A	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> INVR input to the $V_{DD1}$ pin. This setting enables the receiver inversion feature.
	B	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> INVR input to the INVR terminal on the P2 connector.
	C	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> INVR input to the $\text{GND}_1$ pin. This setting is used for normal receiver operation.
LK4	Inserted	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin A to Pin Y.
	Not inserted	Disconnects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin A from Pin Y.
LK5	Inserted	Connects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin B to Pin Z.
	Not inserted	Disconnects the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin B from Pin Z.
LK6	Inserted	Connects the 120 $\Omega$ R4 termination resistor across the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin A and Pin B.
	Not inserted	Disconnects the 120 $\Omega$ R4 termination resistor across the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin A and Pin B.
LK7	Inserted	Connects the 120 $\Omega$ R5 termination resistor across the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin Y and Pin Z.
	Not inserted	Disconnects the 120 $\Omega$ R5 termination resistor across the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> Pin Y and Pin Z.
LK8	A	Configures the <a href="#">ADP7104</a> voltage regulator, U1, to supply a regulated 1.8 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD1}$ pin.
	B	Configures the <a href="#">ADP7104</a> voltage regulator, U1, to supply a regulated 2.5 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD1}$ pin.
	C	Configures the <a href="#">ADP7104</a> voltage regulator, U1, to supply a regulated 3.3 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD1}$ pin.
	D	Configures the <a href="#">ADP7104</a> voltage regulator, U1, to supply a regulated 5 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD1}$ pin.
	E	Bypasses the <a href="#">ADP7104</a> voltage regulator, U1, and powers the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD1}$ supply pin directly from the VDD1 terminal on the P5 connector.
LK9	A	Configures the <a href="#">ADP7104</a> voltage regulator, U3, to supply a regulated 3.3 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD2}$ pin.
	B	Configures the <a href="#">ADP7104</a> voltage regulator, U3, to supply a regulated 5 V to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD2}$ pin.
	C	Bypasses the <a href="#">ADP7104</a> voltage regulator, U3, and powers the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> $V_{DD2}$ supply pin directly from the VDD2 terminal on the P6 connector.
LK10	Inserted	Connects the output of the <a href="#">LTC1799</a> oscillator to the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> TxD pin.
	Not inserted	Disconnects the output of the <a href="#">LTC1799</a> oscillator from the <a href="#">ADM2463E</a> or <a href="#">ADM2763E</a> TxD pin.

## INPUT AND OUTPUT CONNECTIONS

Digital input and output signals are connected via the P1 and P2 screw terminal blocks to allow wire connections from the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ to a signal generator or microcontroller. The evaluation boards include screw terminals for receiver data output (RxD), receiver enable (RE), and driver enable (DE) on P1. Screw terminals for the TxD and receiver invert (INVR) functions are also available on P2. Alternatively, jumper connections can connect these signals to the  $V_{DD1}$  pin or  $GND_1$  pins of the [ADM2463E](#) or [ADM2763E](#) (see Table 1).

Connections to the RS-485 bus are made via the P3 and P4 screw terminal blocks. The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ have four bus input and output signals: Signal A for the noninverting input signal, Signal B for the inverting input signal, Signal Y for the noninverting output signal, and Signal Z for the inverting output signal. The bus cables also include a common ground connection and can be connected to the P4 screw terminal block of the evaluation boards. Test points are available on the evaluation boards and are appropriately labeled for all digital and bus input and output signals.

## RADIATED EMISSIONS

The [ADM2463E](#) or [ADM2763E](#) encodes data across the isolation barrier using an amplitude shift keying (ASK) modulation scheme, which is optimized for both high noise immunity and minimal radiated emissions. The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ are 2-layer printed circuit boards (PCB) that meet the EN 55032 Class B radiated emissions requirements under full load while operating at a maximum data rate of 500 kbps. To maximize the margin to the EN 55032 Class B specification, adhere to the following guidelines:

- Place a 0.1  $\mu\text{F}$  capacitor (C4) between the  $V_{DD1}$  pin and  $GND_1$  pin.
- Place a 0.1  $\mu\text{F}$  capacitor (C5) between the  $V_{DD2}$  pin and  $GND_1$  pin.
- Ensure that the decoupling capacitors are placed as close as possible to the corresponding [ADM2463E](#) or [ADM2763E](#) pins.

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ, designed according to these guidelines, meet EN 55032 Class B requirements with margin.

## OTHER BOARD COMPONENTS

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ have footprints for the R4 and R5 termination resistors. The 120  $\Omega$  termination resistors are fitted to the evaluation boards, but these resistors can be removed or replaced with a resistor of a different value as needed. Insert the LK6 jumper to connect the R4 resistor and add a 120  $\Omega$  load to the RS-485 receiver. Insert the LK7 jumper to connect the R5 resistor and add a 120  $\Omega$  load to the RS-485 driver. The LK6 and LK7 jumpers can be inserted to connect the RS-485 driver outputs to the RS-485 receiver inputs. When LK4, LK5, LK6, and LK7 are inserted, the two 120  $\Omega$  termination

resistors are connected in parallel, resulting in a 60  $\Omega$  load on the RS-485 driver.

### Biasing Resistors for Bus Idle Fail-Safe

The [ADM2463E](#) or [ADM2763E](#) has a built in receiver fail-safe for the bus idle condition, but there are footprints on the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ for fitting the R6 and R7 pull-up resistors to the  $V_{DD2}$  supply on the [ADM2463E](#) or [ADM2763E](#) Pin A and Pin Y, as well as the R8 and R9 pull-down resistors to the  $GND_2$  supply on Pin B and Pin Z. These resistors can be fitted if the user is connecting to other devices that require external biasing resistors on the bus. The exact value required for a 200 mV minimum differential voltage in the bus idle condition depends on the minimum supply voltage and the termination scheme. For 5 V transceiver operation, 1140  $\Omega$  is recommended. For 3.3 V transceiver operation, 900  $\Omega$  is recommended.

See the [AN-960 Application Note, RS-485/RS-422 Circuit Implementation Guide](#), for more information about the bus idle fail-safe.

### On-Board LTC1799 Oscillator

An [LTC1799](#) clock oscillator is provided on the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ to allow convenient evaluation of the [ADM2463E](#) or [ADM2763E](#) without the need for an external signal source.

To use the [LTC1799](#) oscillator for evaluation, insert the LK10 jumper. This setting connects the clock oscillator output to the [ADM2463E](#) or [ADM2763E](#) TxD input pin.

The sum of the R3 and R12 resistors can be used to configure the switching frequency of the clock oscillator ( $f_{osc}$ ) within the 100 kHz to 250 kHz range. The frequency is calculated using the following equation:

$$f_{osc} = 10 \text{ MHz} \left( \frac{10 \text{ k}}{N (R3 + R12)} \right)$$

where:

$$4 \text{ k}\Omega \leq (R3 + R12) \leq 1 \text{ M}\Omega.$$

$N = 1$  or  $10$

The value of  $N$  is controlled with the R18 resistor. When R18 is not inserted,  $N = 10$ . Insert a 0  $\Omega$  resistor at R18 to set  $N = 1$  for higher frequency operation. The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ ship with  $N = 10$  and  $R3 + R12 = 40 \text{ k}\Omega$ , setting the oscillator output frequency to 250 kHz.

The [LTC1799](#) oscillator is powered from the  $V_{DD1}$  supply, and can only be used when the  $V_{DD1}$  supply voltage is between 2.7 V and 5.5 V. By removing the 0  $\Omega$  R17 resistor, the [LTC1799](#) can be disconnected from the  $V_{DD1}$  supply.



**ADP7104 LDO Regulator**

The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ feature two on-board ADP7104 LDO regulators that allow flexible power supply configurations during evaluation.

The V<sub>DD1</sub> regulator, U1, is powered from the VDD1 terminal on Connector P5, and is configured using the LK8 jumper. This jumper position selects the regulator output to the V<sub>DD1</sub> pin. Options of 1.8 V, 2.5 V, 3.3 V, and 5 V are available. To bypass the V<sub>DD1</sub> ADP7104 regulator, U1, and power the V<sub>DD1</sub> pin directly from the VDD1 terminal, insert the LK8 jumper into Position E.

The V<sub>DD2</sub> regulator, U3, is powered from the VDD2 terminal on Connector P6, and is configured using the LK9 jumper. This jumper position selects the regulator output to the ADM2463E or ADM2763E V<sub>DD2</sub> pin. Options of 3.3 V and 5 V are available. To bypass the V<sub>DD2</sub> regulator, U3, and power the V<sub>DD2</sub> pin directly from the VDD2 terminal, insert the LK9 jumper into Position C.

Table 2 and Table 3 lists the supported power supply configurations and the associated jumper configurations.

**Table 2. Primary Side Input Supply Configurations**

Jumper LK8	VDD1 Input Voltage Range	V <sub>DD1</sub> Supply
A	2.2 V to 20 V	Regulator provides 1.8 V
B	2.9 V to 20 V	Regulator provides 2.5 V
C	3.7 V to 20 V	Regulator provides 3.3 V
D	5.4 V to 20 V	Regulator provides 5 V
E	1.7 V to 5.5 V	Supplied directly from the VDD1 terminal on P5

**Table 3. Secondary Side Input Supply Configurations**

Jumper LK9	VDD2 Input Voltage Range	V <sub>DD2</sub> Supply
A	3.7 V to 20 V	Regulator provides 3.3 V
B	5.4 V to 20 V	Regulator provides 5 V
C	3 V to 5.5 V	Supplied directly from the VDD2 terminal on P6

**FULL DUPLEX RS-485 TRANSCEIVERS LOOPBACK TEST**

A loopback test can be set up with the EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ by closing the LK4 and LK5 jumpers. The details of this test are shown in Table 1 and in Figure 2. A signal generator is connected to the TxD pin, which allows verification of the bus signals and the receiver output. Note that during the test, the jumper position for LK1 is Position C, LK2 is Position A, and LK3 is Position C. See Table 2 for the jumper configurations for different power supply configurations. The LK6 and LK7 jumpers can be inserted to terminate the transmitter and receiver with 120 Ω resistors. Connect both jumpers when the board is configured in parallel by the loopback to ensure that the test is conducted with a standard RS-485 load of 60 Ω (bus terminated at both ends by 120 Ω).

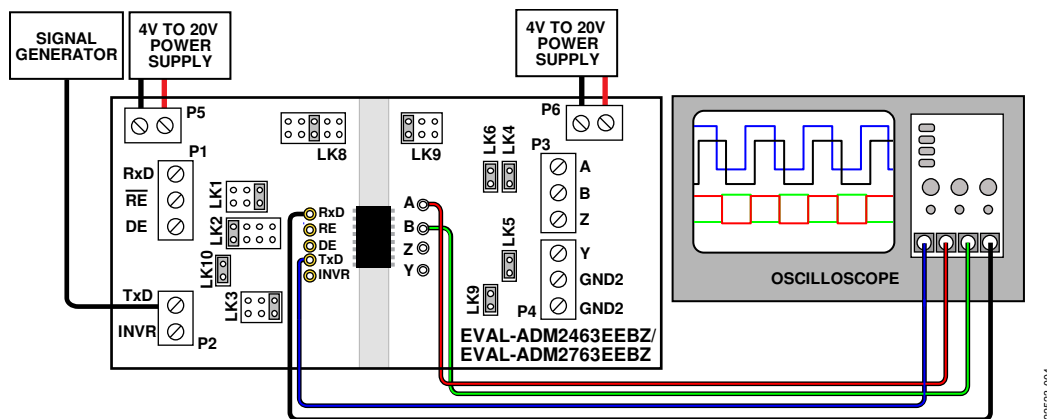


Figure 2. Full Duplex RS-485 Loopback Test

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**IEC 61000-4-2 ELECTROSTATIC DISCHARGE (ESD) PROTECTION**

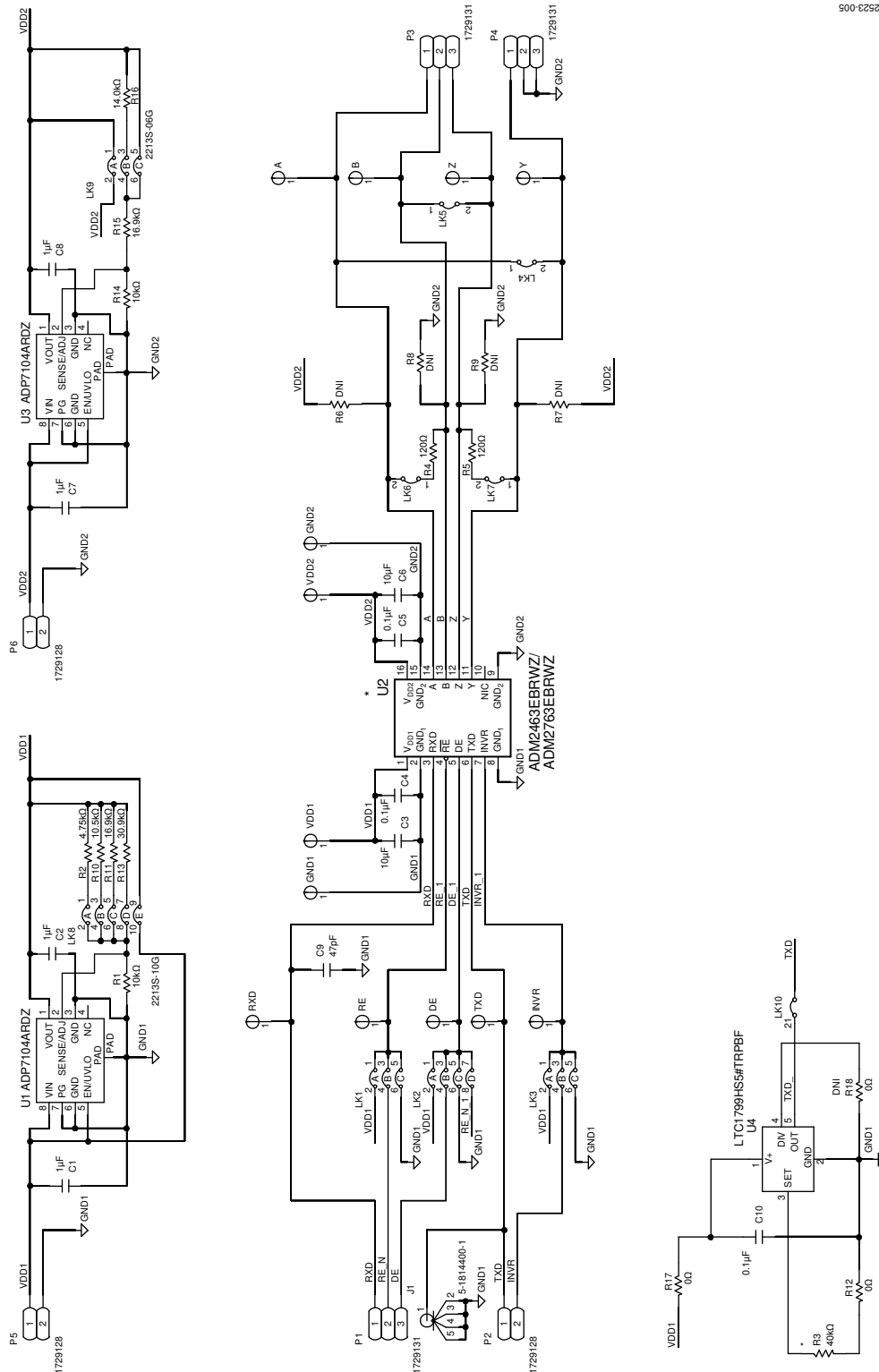
The EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ are tested and verified to achieve protection against IEC 61000-4-2 ESD to  $\geq \pm 12$  kV (contact discharge) and  $\geq \pm 15$  kV (air discharge) on the [ADM2463E](#) or [ADM2763E](#) Pin A, Pin B, Pin Y, and Pin Z.

The IEC 61000-4-2 ESD standard describes testing using two coupling methods known as contact discharge and air discharge. Contact discharge implies a direct contact between the discharge

gun and the equipment under test (EUT). The [ADM2463E](#) or [ADM2763E](#) is tested using both of these methods.

During testing, the [ADM2463E](#) or [ADM2763E](#) Pin A, Pin B, Pin Y, and Pin Z are subjected to at least 10 positive and 10 negative single discharges with a 1 sec interval between each pulse. The highest specified IEC 61000-4-2 ESD test is Level 4, which defines a contact discharge voltage of  $\pm 8$  kV and an air discharge voltage of  $\pm 15$  kV.

EVALUATION BOARD SCHEMATIC AND ARTWORK



22523-005

Figure 3. EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ Schematic



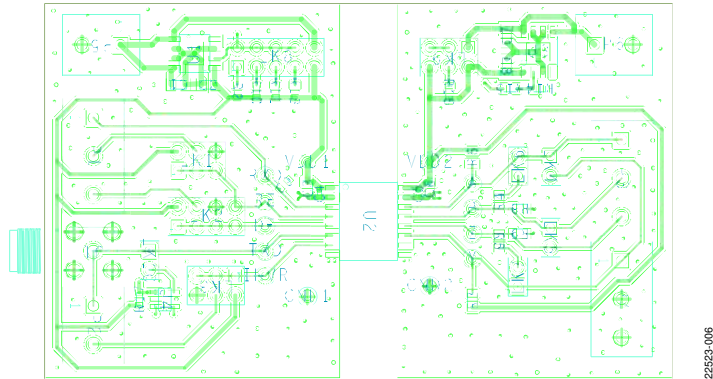


Figure 4. EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ Component Side, Layer 1

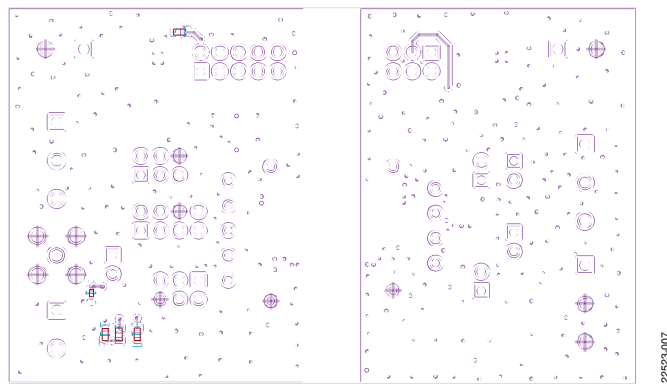


Figure 5. EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ, Layer 2

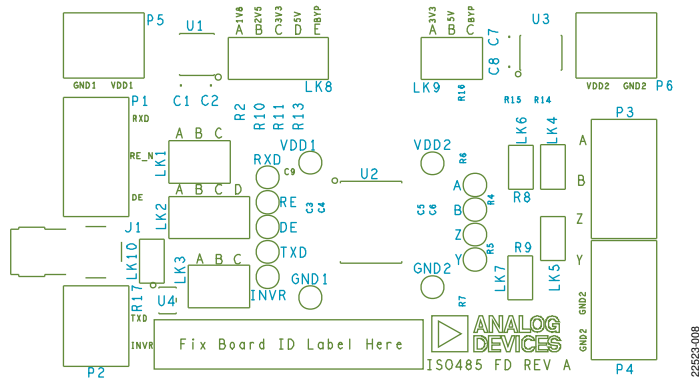


Figure 6. EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ, Silkscreen

## ORDERING INFORMATION

## BILL OF MATERIALS

Table 4. EVAL-ADM2463EEBZ/EVAL-ADM2763EEBZ Bill of Materials

Qty	Reference Designator	Description	Manufacturer	Part Number
9	A, B, DE, INVR, RE, RxD, TxD, Y, Z	Test points, yellow	Keystone Electronics	36-5004-ND
3	C4, C5, C10	Capacitors, 0.1 $\mu$ F, 0402	Murata	GRM155R61E104KA87D
4	C1, C2, C7, C8	Capacitors, 1 $\mu$ F, 0805	Murata	GCM21BR71E105KA56L
2	C3, C6	Capacitors, 10 $\mu$ F, 0805	TDK	C2012X5R1E106K085AC
1	C9	Capacitor, 47 pF, 0603	AVX Corporation	06035A470JAT2A
2	GND1, GND2	Test points, black	Components Corporation	TP-105-01-00
1	J1	Coaxial, right angle SMA connector	TE Connectivity	5-1814400-1
3	LK1, LK3, LK9	6-pin (3 $\times$ 2), 0.1 inch headers and shorting blocks	Multicomp	2213S-06G
1	LK2	8-pin (4 $\times$ 2), 0.1 inch header and shorting block	Multicomp	2213S-08G
1	LK8	10-pin (5 $\times$ 2), 0.1 inch header and shorting block	Multicomp	2213S-10G
5	LK4 to LK7, LK10	2-pin (1 $\times$ 2), 0.1 inch headers and shorting blocks	Harwin	M20-9990246
3	P1, P3, P4	Three-position terminal blocks	Phoenix Contact	1729131
3	P2, P5, P6	Two-position terminal blocks	Phoenix Contact	1729128
2	R12, R17	Resistors, 0 $\Omega$ , 0603	Multicomp	MC0603WG00000T5E-TC
1	R18	Resistor, do not install (DNI), 0603	Not applicable	Not applicable
2	R1, R14	Resistors, 10 k $\Omega$ , 0603	Panasonic	ERJ-3EKF1002V
1	R10	Resistor, 10.5 k $\Omega$ , 0603	Panasonic	ERA-3AEB1052V
2	R11, R15	Resistors, 16.9 k $\Omega$ , 0603	Panasonic	ERJ-3EKF1692V
1	R13	Resistor, 30.9 k $\Omega$ , 0603	Panasonic	ERJ-3EKF3092V
1	R16	Resistor, 14 k $\Omega$ , 0603	Panasonic	ERJ-3EKF1402V
1	R2	Resistor, 4.75 k $\Omega$ , 0603	Panasonic	ERJ-3EKF4751V
1	R3	Resistor, 40 k $\Omega$ , 0603	Vishay	CRCW060340K0FKEA
4	R6 to R9	Resistors, DNI, 0805	Not applicable	Not applicable
2	R4, R5	Resistors, 120 $\Omega$ , 0805	Panasonic	ERJ-P6WF1200V
2	U1, U3	Low noise CMOS LDO regulators	Analog Devices	<a href="#">ADP7104ARDZ-R7</a>
1	U2	500 kbps, 5.7 kV, signal isolated RS-485 transceiver, and 500 kbps, high working voltage isolated RS-485 transceiver	Analog Devices	<a href="#">ADM2463EBRWZ</a> , <a href="#">ADM2763EBRWZ</a>
1	U4	1 kHz to 33 MHz oscillator	Analog Devices	<a href="#">LTC1799HS5#TRPBF</a>
2	VDD1, VDD2	Test points, red	Components Corporation	TP-105-01-02

## 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.

### Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the "Evaluation Board"), you are agreeing to be bound by the terms and conditions set forth below ("Agreement") unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you ("Customer") and Analog Devices, Inc. ("ADI"), with its principal place of business at One Technology Way, Norwood, MA 02062, USA. Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term "Third Party" includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. Customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. Customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. Customer agrees to return to ADI the Evaluation Board at that time. LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED "AS IS" AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM CUSTOMER'S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI'S TOTAL LIABILITY FROM ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS (\$100.00). EXPORT. Customer agrees that it will not directly or indirectly export the Evaluation Board to another country, and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

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