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## ABSTRACT

This user guide describes the TLIN1028x-Q1 evaluation module (EVM). This EVM helps designers evaluate device performance, support fast development, and analyze automotive local interconnect network (LIN) systems using TLIN1028x-Q1 LIN physical layer transceiver devices.



Figure 1-1. TLIN1028EVM Board Image

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## Trademarks

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## 1 Introduction

### 1.1 Features

The EVM supports the following features:

- *Commander Mode* and *Responder Mode* configurations
- Terminal block and header pins are available on all power and LIN bus connections
- Access to the VCC output of the integrated LDO.

### 1.2 Description

The TLIN1028x EVM provides users with the ability to evaluate the TI TLIN1028x-Q1 family of single-channel LIN system basis chip (SBC) transceivers. The EVM allows both commander and responder mode applications to be evaluated through the use of a single jumper that connects or disconnects the external 1-kΩ pullup resistor and series diode required in commander mode from the LIN bus.

The EVM has access to the integrated, low-voltage VCC rail that provides the pull-up for RXD, and the logic level for the enable (EN) control input pins through the use of a jumper. The TLIN1028x-Q1 supports a  $V_{IH}$  from 2 V to 5.5 V, allowing operation with a variety of microcontrollers with common IO voltage levels such as 2.5 V, 3.3 V, and 5 V. Non-populated capacitor pads are available on the TXD, RXD, and LIN pins to accommodate a variety of different tests requiring various capacitive load conditions.

If additional ESD protection is desired, a diode pad is available on the LIN bus to accommodate any SOD323 diode. A header is provided on the power and LIN bus connections to allow the EVM to be evaluated in a larger system.

## 2 EVM Setup and Requirements

Use the following equipment to evaluate the performance of the TLIN1028x-Q1 device:

- Power supply capable of supplying the desired supply voltage. Typical LIN applications use 12 V or 24 V, but the TLIN1028x-Q1 operates with any supply voltage from 5.5 V to 28 V. Connect this voltage across the VBAT and GND pins of either the J1 and J9 banana jacks, or pins 1 and 3 of the J6 header.
- If the LIN bus interface is to be observed on an oscilloscope, use probes capable of tolerating voltages as large as VBAT.
- The logic interface pins (TXD, RXD, and EN) may interface to a microcontroller, pattern generator, or logic analyzer with logic levels matching the VCC voltage.
- Access to LDO output can be used for testing load and thermal capabilities.

### 2.1 Commander Mode

To configure the board for commander mode, place a shunt on J8 to connect the external 1-kΩ resistor and series diode to the LIN bus per the LIN specification.

### 2.2 Responder Mode

To configure the board for responder mode, remove the shunt on J8 to disconnect the external 1-kΩ resistor and series diode from the LIN bus per the LIN specification.

### 2.3 TXD and RXD

Access to the TXD and RXD pins is available on the J3 2x2 header on the board. GND pins are also included on this header to allow for easy driving using a function generator or return path for an oscilloscope probe. Pads to add capacitance to the TXD and RXD traces are available by using the C7 and C8 pads, respectively.

### 2.4 VCC Load Testing

J10 gives access to the integrated LDO output, with a GND connection on the other header pin for convenience. Loads can be applied here to test the stability and performance of the integrated LDO.

### 2.5 LED Indication

LEDs D2 and D3 indicate when EN is high (D2), and when VCC is high (D3). These LEDs are only connected to their respective signals if the sliders on S1 are in the "on" position, as indicated on the S1 component.

### 3 Schematic and Bill of Materials

#### 3.1 Schematic

Figure 3-1 illustrates the EVM schematic.

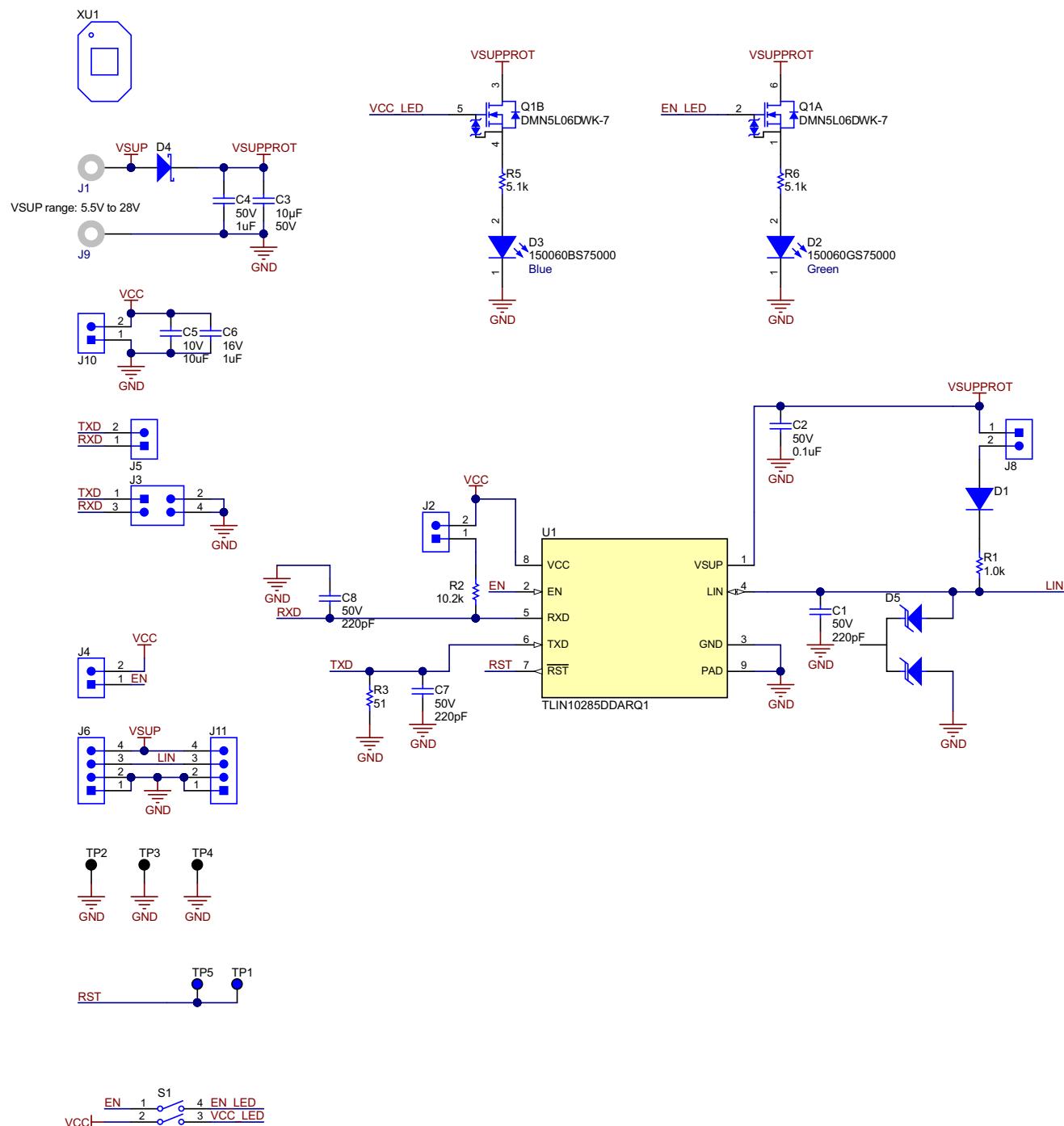


Figure 3-1. TLIN1028EVM Schematic

### 3.2 Bill of Materials

Table 3-1 lists the EVM BOM.

**Table 3-1. Bill of Materials**

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
C1,C7, C8	3	220pF, 50V	CAP, CERM, 220 pF, 50 V, $\pm 10\%$ , X7R, 0603	0603	C0603C221K5RACTU	Kemet
C2	1	0.1uF, 50V	CAP, CERM, 0.1 $\mu$ F, 50 V, $\pm 10\%$ , X7R, 0603	0603	885012206095	Wurth Elektronik
C3	1	10uF, 50V	CAP, CERM, 10 $\mu$ F, 50 V, $\pm 10\%$ , JB, 1206	1206	C3216JB1H106K160AB	TDK
C4	1	1uF	CAP, CERM, 15 pF, 50 V, +/-5%, X7R, 0805	0805	C0805C105K5RACTU	Kemet
C5	1	10uF	CAP, CERM, 220 pF, 50 V, $\pm 1\%$ , X7R, 0805	0805	885012207026	Wurth Elektronik
C6	1	1uF	CAP, CERM, 1 uF, 16 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0603	0603	GCM188R71C105KA64D	MuRata
C9	1	0.01uF	CAP, CERM, 0.01 $\mu$ F, 50 V, +/- 5%, X7R, 0603	0603	C0603C103J5RACTU	Kemet
D1	1	75V	Diode, Switching, 75 V, 0.15 A, AEC-Q101, DO-213AC	DO-213AC	LL4448-GS08	Vishay-Semiconductor
D2	1	Green	LED, Green, SMD	LED_0603	150060GS75000	Wurth Elektronik
D3	1	Blue	LED, Blue, SMD	LED_0603	150060BS75000	Wurth Elektronik
D4	1	80V	Diode, Schottky, 80 V, 1 A, SMB	SMB	B180B-13-F	Diodes Inc.
D5	1	27V	Diode, TVS, Uni, 27 V, 38Vc, SOT-23	SOT-23	MMBZ27VCL-7-F	Diodes Inc.
FID1, FID2, FID3	3		Fiducial Mark. There is nothing to buy or mount.	N/A	N/A	N/A
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 X 0.20, Clear	Transparent Bumpon	SJ-5303	3M
J1, J9	2		Standard Banana Jack, Uninsulated, 8.9mm	Keystone575-8	575-8	Keystone
J2, J4, J5, J8, J10	5		Header, 100mil, 2x1, Gold, TH	Header, 2x1, 100mil	5-146261-1	TE Connectivity
J3	1		Header, 2.54mm, 2x2, Gold, TH	Header, 2.54mm, 2x2, TH	PBC02DAAN	Sullins Connector Solutions
J6, J11	2		Header, 2.54 mm, 4x1 Gold, TH	Header, 2.54 mm, 4x1, TH	PBC04SAAN	Sullins Connector Solutions
Q1	1	50V	MOSFET, 2-CH, N-CH, 50V, 0.305 A, AEC-Q101, SOT-363	SOT-363	DMN5L06DWK-7	Diodes Inc.
R1	1	1.0k	RES, 1.0 k, 5%, 0.1 W, 0603	0603	CRCW06031K00JNEA	Vishay-Dale
R2	1	10.2k	RES, 10.2 k, 1%, 0.1 W, 0603	0603	CRCW060310K2FKEA	Vishay-Dale
R3	1	51	RES, 51, 5%, 0.1 W, 0603	0603	CRCW060351R0JNEA	Vishay-Dale
R5, R6	2	5.1k	RES, 5.1 k, 5%, 01 W, 0603	0603	RC0603JR-075K1L	Yageo
S1	1		Switch, SPST, 2Pos, SMD	6.55x6.68mm	SD02H0SB	C&K Components
TP1, TP5	2		Test Point, Multipurpose, Blue, TH	Blue Multipurpose Testpoint	5127	Keystone
TP2, TP3, TP4	3		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone
U1	1		Automotive Local Interconnect Network Transceiver, DDA0008G (SOIC-8)	DDA0008G	TLIN10285DDARQ1	Texas Instruments

## 4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<b>Changes from Revision * (August 2019) to Revision A (March 2022)</b>	<b>Page</b>
• Changed all instances of legacy terminology to commander and responder where mentioned.....	1
• Changed all product part number references to <i>TLIN1028x-Q1</i> .....	1
• Deleted <b>Feature</b> : Ability to test the local WAKE feature. ( <i>TLIN1238x only</i> ) .....	3
• Deleted references to <i>TLINx038x-Q1</i> and <i>TLINx238x-Q1</i> in the <b>Description</b> .....	3
• Deleted section <i>2.3 Local Wake-up</i> .....	3
• Changed U1 from <i>TLIN1028DDA</i> to <i>TLIN10285DDARQ1</i> in <b>Figure 3-1</b> .....	4
• Changed U1 from <i>TLIN1028DRB</i> to <i>TLIN10285DDARQ1</i> in <b>Table 3-1</b> .....	5

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