



ABSTRACT

This user guide describes the TLIN1039EVM which helps designers evaluate the TLIN1039-Q1 and TLIN1021A-Q1 devices in the SOT package. This EVM supports evaluating device performance, fast development, and analyze automotive local interconnect network (LIN) systems.

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Trademarks

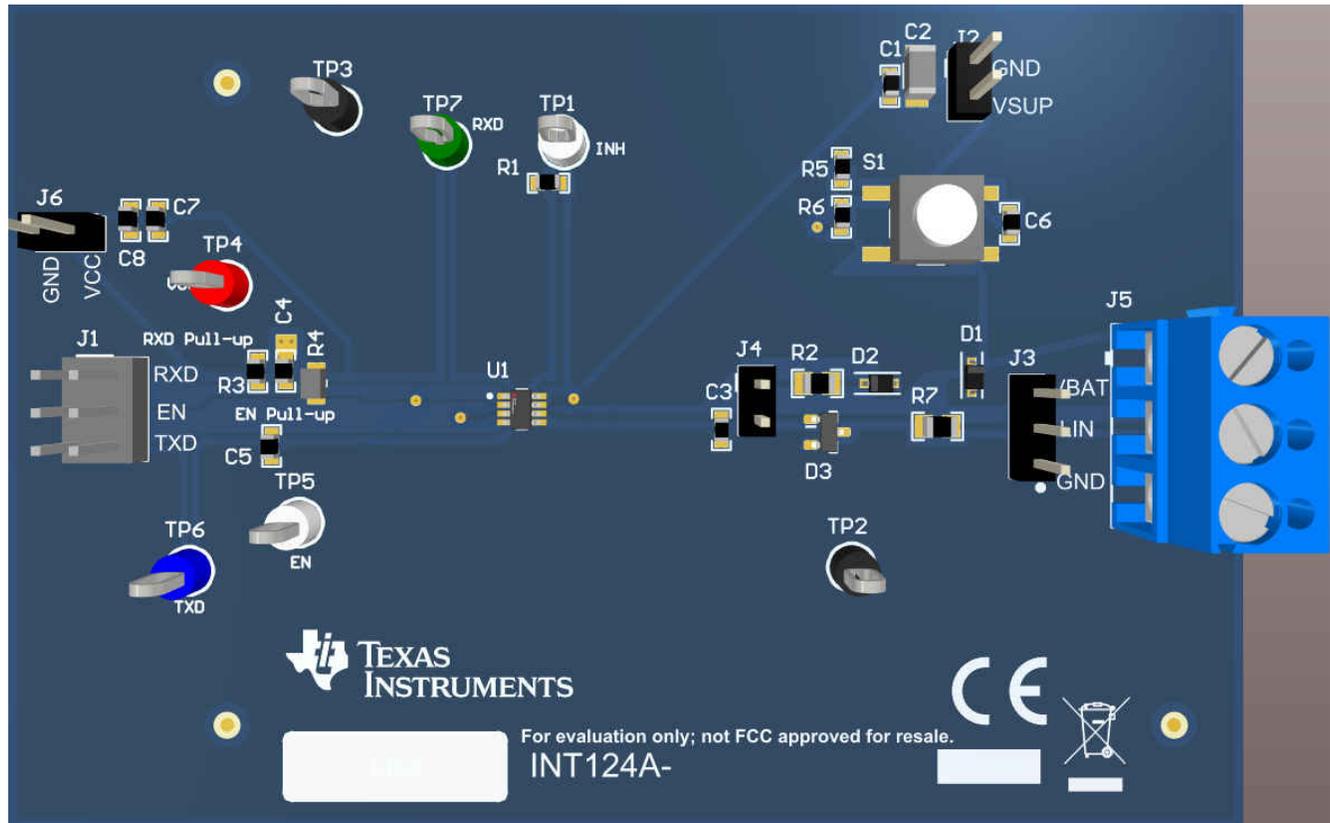
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1 Introduction

1.1 Features

This EVM supports the following features:

- Commander mode and Responder mode configurations
- Terminal block and headers pins are available on all power and LIN bus connections
- Optional VCC rail and pull-up resistors for EN input and RXD output
- A pushbutton circuit to engage local wake on the WAKE pin (TLIN1021A-Q1)



1.2 Description

The TLIN1039-Q1 EVM provides users with the ability to evaluate the TI TLIN1039-Q1 and TLIN1021A-Q1 single-channel, LIN transceivers in the SOT package. 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-k Ω pullup resistor and series diode required in commander mode from the LIN bus.

The EVM has a low-voltage VCC rail that provides the voltage to the pullup resistors on the received data (RXD) open-drain output, and enable (EN) control input pins. The TLIN1039-Q1 and TLIN1021A-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 3.3 V, and 5 V. Non-populated capacitor pads are available on the TXD and RXD pins to accommodate a variety of different tests requiring various capacitive load conditions.

The TLIN1039-Q1 and TLIN1021A-Q1 families support 12 V automotive applications and operate with a supply voltage from 4.5 V to 36 V, plus an extended bus fault protection of ± 45 V.

Furthermore, the TLIN1039-Q1 and TLIN1021A-Q1 transceivers include internally-protected bus terminals with greater than ± 8 -kV HBM and IEC ESD protection levels. If additional ESD protection is desired, a MMBZ27VCL diode is populated on the LIN bus. This can be removed to test other ESD diodes as well, as it is the common SOT23 package for ESD diodes. Both headers and wire-terminals are provided on the power and LIN bus connections to allow the EVM to be evaluated in a larger system while still allowing for test equipment to be connected to the signals under test.

2 EVM Setup and Requirements

Use the following equipment to evaluate the performance of the TLIN1039-Q1 and TLIN1021A-Q1 devices:

- Power supply capable of supplying the desired supply voltage. Typical LIN applications use 12 V or 24 V, but the TLIN1039-Q1 and TLIN1021A-Q1 operate with any supply voltage from 4.5 V to 36 V. Connect this voltage across the VBAT and GND pins of either the J2, J3, or J5 connectors.
- Power supply capable of supplying the desired IO pin voltage from 2 V to 5.5 V. Connect this voltage across the VCC and GND pins of the J6 connector.
- If the LIN bus interface or the INH pin (TLIN1021A-Q1) is to be observed on an oscilloscope, use probes capable of tolerating voltages as large as VBAT.
- The logic interface pins (TXD: TP6, RXD: TP7, and EN: TP5) may interface to a microcontroller, pattern generator, or logic analyzer with logic levels matching the VCC voltage.

Table 2-1. Test Points and Jumpers

Designator	Description
TP1	Test point to observe the INH pin
TP2	Test point to GND
TP3	Test point to GND
TP4	Test point to observe the VCC supply
TP5	Test point to observe the EN pin
TP6	Test point to observe the TXD pin
TP7	Test point to observe the RXD pin
J1	6-pin (3x2) header to observe/inject various logic signals on the U1 device <ul style="list-style-type: none"> • Pins 1,3, and 5 are all connected to GND • Pin 2 is connected to the RXD pin • Pin 4 is connected to the EN pin • Pin 6 is connected to the TXD pin
J2	2-pin (2x1) header for supplying or monitoring VSUP
J3	3-pin (3x1) header to observe the LIN bus and to supply VBAT
J4	2-pin (2x1) header connecting the commander mode external pull-up to the LIN bus. If shunted, U1 is in commander mode, if left open U1 is in responder mode.
J5	3-pin (3x1) header that has the same function as J3

2.1 Commander Mode

To configure the board for commander mode, place a shunt on J4 to connect the external 1-k Ω resistor and series diode to the LIN bus per the LIN specification.

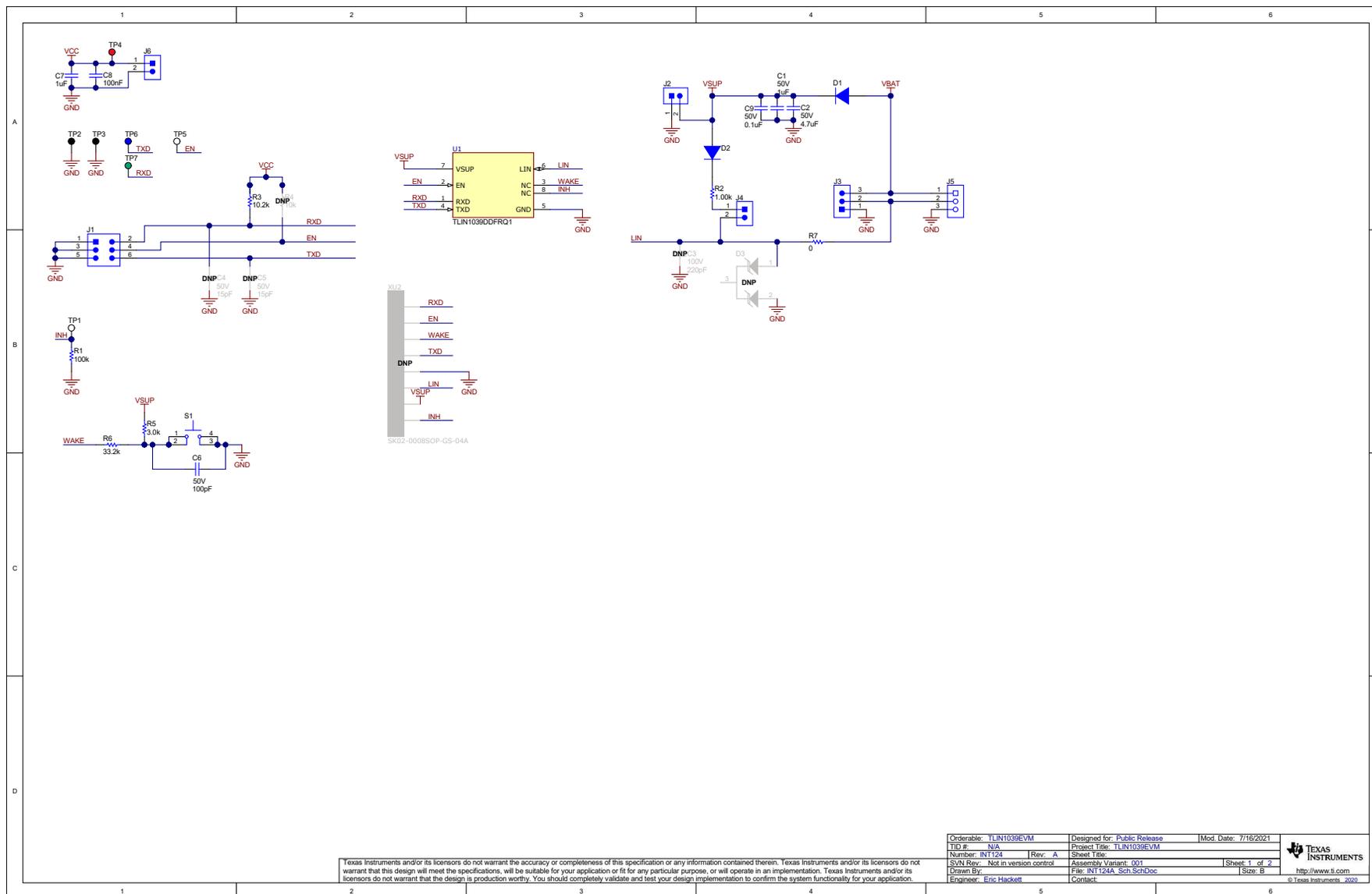
2.2 Responder Mode

To configure the board for responder mode, remove the shunt on J4 to disconnect the external 1-k Ω resistor and series diode from the LIN bus per the LIN specification.

2.3 Pushbutton Wake

To use the pushbutton Wake circuit, push down on the S1 button while the device is in sleep mode to transition it back to standby mode. The WAKE function is only present on the TLIN1021A-Q1 device.

3 Schematic and Bill of Materials



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Orderable: TLIN1039EVM	Designed for: Public Release	Mod. Date: 7/16/2021
TID #: N/A	Project Title: TLIN1039EVM	
Number: INT124	Rev: A	Sheet Title:
SVN Rev: Not in version control	Assembly Variant: 001	Sheet: 1 of 2
Drawn By:	File: INT124A_Sch_SchDoc	Size: B
Engineer: Eric Hackett	Contact:	http://www.ti.com



Figure 3-1. Schematic

Table 3-1. Bill of Materials

Designator	Qty	Value	Description	Package Reference	Part Number	Manufacturer	Alternate ⁽¹⁾ Part Number	Alternate Manufacturer
PCB	1		Printed Circuit Board		INT105	Any		
C1, C7	2	1uF	CAP, CERM, 1 uF, 50 V, +/- 10%, X7R, 0603	0603	UMK107AB7105KA-T	Taiyo Yuden		
C2	1	4.7uF	CAP, CERM, 4.7 uF, 50 V, +/- 20%, X7R, 1206_190	1206_190	C3216X7R1H475M160AC	TDK		
C3	1	220pF	CAP, CERM, 220 pF, 100 V, +/- 10%, X7R, 0603	0603	06031C221KAT2A	AVX		
C4, C5	2	15pF	CAP, CERM, 15 pF, 50 V, +/- 5%, C0G/NP0, 0603	0603	885012006052	Würth Elektronik		
C6	1	100pF	CAP, CERM, 100 pF, 50 V, +/- 1%, C0G/NP0, 0603	0603	06035A101FAT2A	AVX		
C8	1	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, 0603	0603	C1608X7R1H104K080AA	TDK		
C9	1	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 5%, X7R, 0805	0805	C0805C104J5RACTU	Kemet		
D1, D2	2	75V	Diode, Switching, 75 V, 0.15 A, AEC-Q101, SOD-323	SOD-323	1N4148WS-7-F	Diodes Inc.		
D3	1	27V	Diode, TVS, Uni, 27 V, 38 Vc, SOT-23	SOT-23	MMBZ27VCL-7-F	Diodes Inc.		
H9, H10, H11, H12	4		Bumpon, Hemisphere, 0.44 X 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M		
J1	1		Header, 100mil, 3x2, Tin, TH	3x2 Header	PEC03DAAN	Sullins Connector Solutions		
J2, J6, J7	3		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions		
J3	1		Header, 100mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions		
J5	1		Terminal Block, 5 mm, 3x1, Tin, TH	Terminal Block, 5 mm, 3x1, TH	691 101 710 003	Würth Elektronik		
LBL1	1		Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll	PCB Label 0.650 x 0.200 inch	THT-14-423-10	Brady		
R1	1	100k	RES, 100 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	ERJ-3GEYJ104V	Panasonic		
R2	1	1.00k	RES, 1.00 k, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	0805	ERJ-6ENF1001V	Panasonic		
R3	1	10.2k	RES, 10.2 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060310K2FKEA	Vishay-Dale		
R4	1	10k	RES, 10 k, 5%, 0.125 W, AEC-Q200 Grade 0, 0805	0805	CRCW080510K0JNEA	Vishay-Dale		
R5	1	3.0k	RES, 3.0 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW06033K00JNEA	Vishay-Dale		
R6	1	33.2k	RES, 33.2 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	CRCW060333K2FKEA	Vishay-Dale		
R7	1	0	RES, 0, 5%, 0.125 W, AEC-Q200 Grade 0, 0805	0805	CRCW08050000Z0EA	Vishay-Dale		
S2	1		Switch, Tactile, SPST-NO, 0.05A, 12V, SMT	6x5x6 mm	EVQP1D05M	Panasonic		
TP1, TP5	2		Test Point, Multipurpose, White, TH	White Multipurpose Testpoint	5012	Keystone		
TP2, TP3	2		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone		
TP4	1		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone		
TP6	1		Test Point, Multipurpose, Blue, TH	Blue Multipurpose Testpoint	5127	Keystone		
TP7	1		Test Point, Multipurpose, Green, TH	Green Multipurpose Testpoint	5126	Keystone		
U1	1		Local Interconnect Network (LIN) Transceiver with Local Wake and Inhibit, D0008B (SOIC-8)	D0008B	TLIN1021DRQ1	Texas Instruments	TLIN1021DQ1	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A		
XU1	0		Socket, SOP-8, 1.27 mm	Socket, IC	SK02-0008SOP-QS-11A	RS Tech Incorporated		

(1) Unless otherwise noted in the Alternate PartNumber and/or Alternate Manufacturer columns, all parts may be substituted with equivalents.

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