

# TPS92610-Q1 EVM User's Guide

The TPS92610-Q1 evaluation module (EVM) user's guide describes the characteristics and operation of the TPS92610-Q1 EVM. A complete schematic diagram, printed-circuit board layout, and bill of materials (BOM) are also included.

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## 1 Introduction

The TPS92610-Q1 EVM helps designers evaluate the operation and performance of the TPS92610-Q1 device, a linear single-channel LED driver for automotive lighting applications. It is a simple and elegant solution to deliver constant current for a single LED string with full LED diagnostics.

### 1.1 Features

The EVM has the following features:

- LED short and open detection with auto-recovery
- Single-LED short detection with auto-recovery
- Open-fault detection mask during dropout mode

### 1.2 Typical Applications

The EVM is used in the following application:

- Automotive convenience lighting: dome light, door handles, reading lamp, and miscellaneous lamps
- Automotive rear lamp, center high-mounted stop lamp, side markers, blind spot detection indicator, charging indicator
- General-purpose LED driver application

## 2 TPS92610EVM Description

This section describes the connectors, test points and jumpers of TPS92610EVM.

### 2.1 TPS92610EVM Board

Figure 1 displays the EVM board.

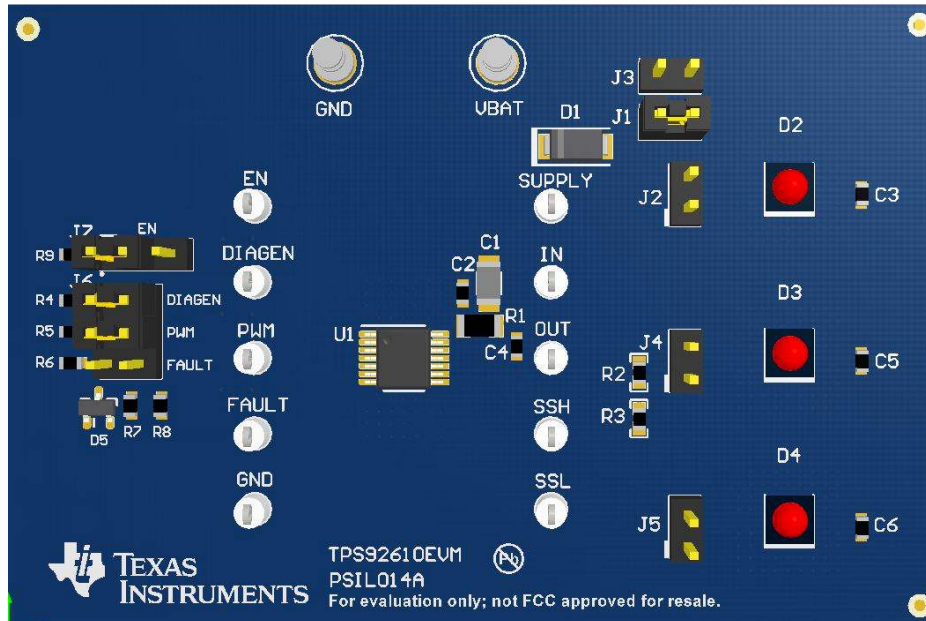


Figure 1. TPS92610EVM Board

### 2.2 Connectors

The EVM has the following connectors:

- TP1 (VBAT): Input power supply
- TP2 (GND): Supply ground

### 2.3 Test Points

All the pins on the TPS92610-Q1 device have test points on the EVM, helping users observe the waveform on the pins, including EN, DIAGEN, PWM, FAULT, GND, SUPPLY, IN, OUT, SSH and SSL.

### 2.4 Jumpers

#### 2.4.1 LED Connection Configuration Jumpers – J1, J2, J3, J4, J5

Jumpers J1–J5 are used to configure the connection of the LED string, including LED open, LED short to GND and single-LED short.

Table 1. Jumpers J1–J5

Designator	Attached Function	With Shunt	Without Shunt
J1	LED open	LED string connected to OUT	LED string open
J3	LED short	LED string short to GND	Normal operation
J2	Single-LED short	Short LED D2	Normal operation
J4	Single-LED short	Short LED D3	Normal operation
J5	Single-LED short	Short LED D4	Normal operation

### 2.4.2 Control Signal Input Jumpers – J6, J7

Jumpers J6 and J7 are used to configure the control signals, including DIAGEN, PWM, FAULT, and EN.

**Table 2. Jumpers J6 and J7**

Designator	Attached Function	Jumper Position	Result
J6 (pins 1–2)	DIAGEN	With shunt	Enable LED-open and single-LED short detection when SUPPLY > 9 V (DIAGEN connected to SUPPLY via a resistor divider)
		Without shunt	Disable LED-open and single-LED short detection (DIAGEN connected to GND via R7)
J6 (pins 3–4)	PWM	With shunt	Enable PWM when SUPPLY > 6 V (PWM connected to SUPPLY via a resistor divider)
		Without shunt	Disable PWM or use external control signal (PWM connected to GND via R8)
J6 (pins 5–6)	FAULT	With shunt	FAULT externally pulled up
		Without shunt	FAULT floating
J7	EN	With shunt on pins 1–2	The device is enabled (EN connected to SUPPLY via R9)
		With shunt on pins 2–3	The device is disabled (EN connected to GND)

## 3 Test Setup

Table 3 shows the typical parameters for the TPS92610EVM. The typical input voltage range is from 9 V to 16 V. The full-scale output current of the TPS92610EVM is 200 mA. Users can adjust the output current by changing the sensing resistor.

**Table 3. TPS92610EVM Parameters**

Parameter	Value
Input voltage	9 V–16 V typical
Output current	200 mA
LED	3s1p LED string

Follow these steps for the EVM test setup:

1. Set the voltage of the dc power supply to 12 V and set the current limit to 500 mA.
2. Connect the positive and negative outputs of the power supply to connectors VBAT and GND on the EVM board.
3. With the default jumper connections, the board should begin operating as soon as the power supply is turned on. Modify the jumpers for other operating modes.

## 4 Board Layout

Figure 2 illustrates the EVM board layout.

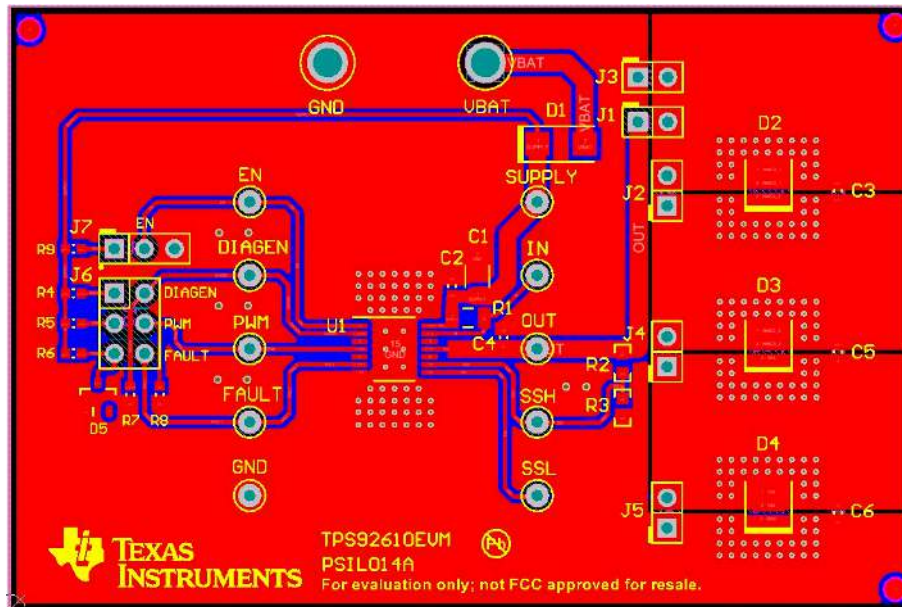


Figure 2. TPS92610EVM Layout

## 5 Schematic and Bill of Materials

### 5.1 Schematic

Figure 3 shows the EVM schematic.

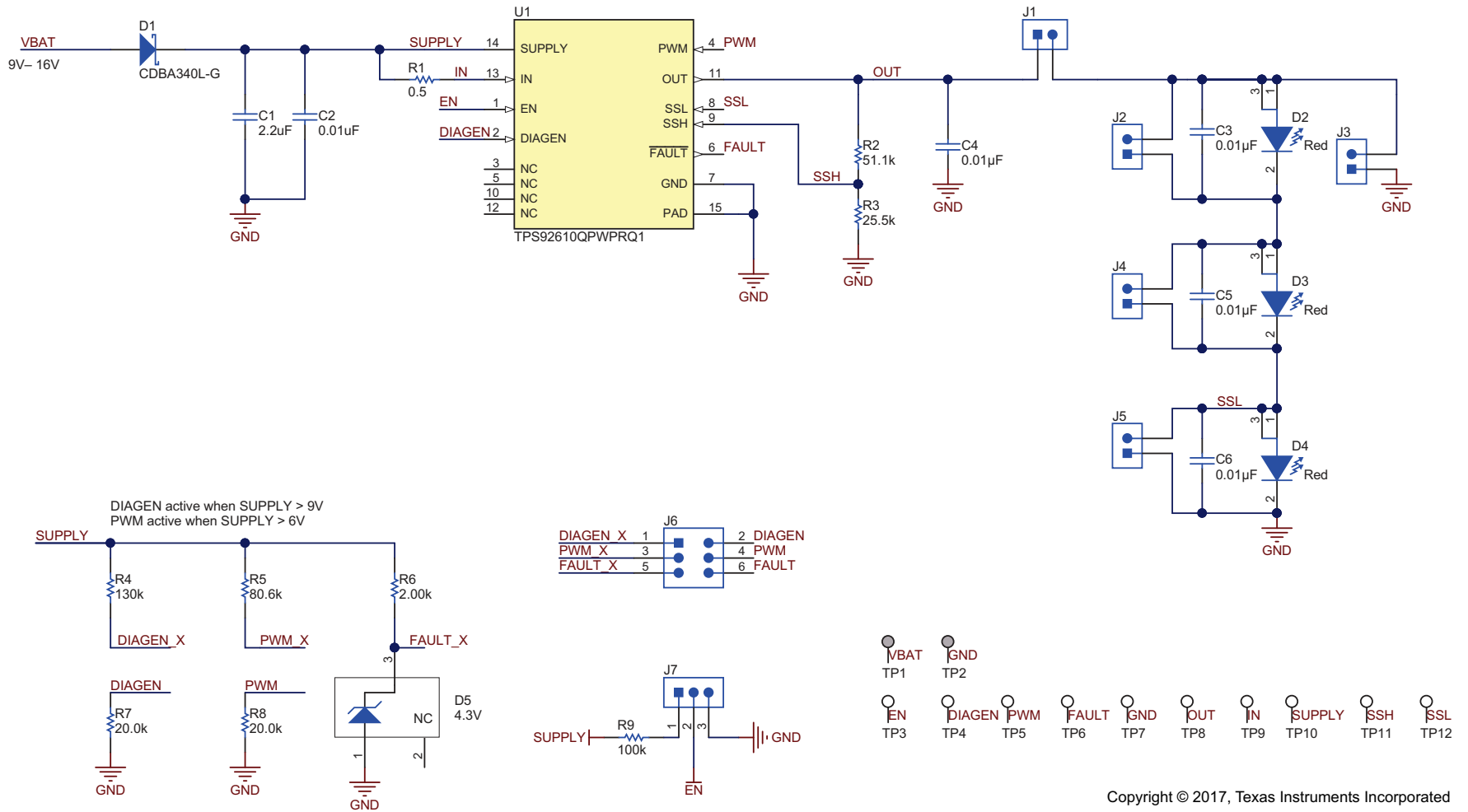


Figure 3. TPS92610EVM Schematic

## 5.2 Bill of Materials

Table 4 lists the TPS92610EVM BOM.

**Table 4. TPS92610EVM Bill of Materials**

Item No.	Designator	QTY	Value	Part Number	Manufacturer	Description	Package Reference
1	C1	1	2.2 uF	C3216X7R1H225K160AB	TDK	CAP, CERM, 2.2 uF, 50 V, ±10%, X7R, 1206	1206
2	C2, C4	2	0.01 uF	C0603X103K5RACTU	Kemet	CAP, CERM, 0.01 uF, 50 V, ±10%, X7R, 0603	0603
3	C3, C5, C6	3	0.01 uF	0603ZC103KAT2A	AVX	CAP, CERM, 0.01 uF, 10 V, ±10%, X7R, 0603	0603
4	D1	1	40 V	CDBA340L-G	Comchip Technology	Diode, Schottky, 40 V, 3 A, SMA	SMA
5	D2, D3, D4	3	Red	LR H9GP-HZKX-1-1-Z	OSRAM	LED, Red, SMD	3.85x3.85mm
6	D5	1	4.3 V	BZX84C4V3-7-F	Diodes Inc.	Diode, Zener, 4.3 V, 300 mW, SOT-23	SOT-23
7	J1, J2, J3, J4, J5	5		TSW-102-07-G-S	Samtec	Header, 100mil, 2x1, Gold, TH	2x1 Header
8	J6	1		TSW-103-07-G-D	Samtec	Header, 100mil, 3x2, Gold, TH	3x2 Header
9	J7	1		TSW-103-07-G-S	Samtec	Header, 100mil, 3x1, Gold, TH	3x1 Header
10	R1	1	0.5 Ω	CSR1206FKR500	Stackpole Electronics Inc	RES, 0.5 Ω, 1%, 0.5 W, 1206	1206
11	R2	1	51.1 kΩ	CRCW060351K1FKEA	Vishay-Dale	RES, 51.1 kΩ, 1%, 0.1 W, 0603	0603
12	R3	1	25.5 kΩ	CRCW060325K5FKEA	Vishay-Dale	RES, 25.5 kΩ, 1%, 0.1 W, 0603	0603
13	R4	1	130 kΩ	CRCW0603130KFKEA	Vishay-Dale	RES, 130 kΩ, 1%, 0.1 W, 0603	0603
14	R5	1	80.6 kΩ	RT0603DRE0780K6L	Yageo America	RES, 80.6 kΩ, 0.5%, 0.1 W, 0603	0603
15	R6	1	2.00 kΩ	CRCW06032K00FKEA	Vishay-Dale	RES, 2.00 kΩ, 1%, 0.1 W, 0603	0603
16	R7, R8	2	20.0 kΩ	CRCW060320K0FKEA	Vishay-Dale	RES, 20.0 kΩ, 1%, 0.1 W, 0603	0603
17	R9	1	100 kΩ	CRCW0603100KJNEA	Vishay-Dale	RES, 100 kΩ, 5%, 0.1 W, 0603	0603
18	SH-J1, SH-J2, SH-J3, SH-J4	4	1x2	SNT-100-BK-G	Samtec	Shunt, 100mil, Gold plated, Black	Shunt
19	TP1, TP2	2		1502-2	Keystone	Terminal, Turret, TH, Double	Keystone1502-2
20	TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12	10		5002	Keystone	Test Point, Miniature, White, TH	White Miniature Testpoint
21	U1	1		TPS92610QPWPRQ1	Texas Instruments	Automotive Single-Channel LED Driver, PWP0014E (TSSOP-14)	PWP0014E

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- Increase the separation between the equipment and receiver.
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#### Concernant les EVMs avec appareils radio:

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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