



ABSTRACT

The TPS92629-Q1 Evaluation Module (EVM) user's guide describes the characteristics of the device and the operation of EVM. This user's guide includes a complete schematic diagram, printed-circuit board layout, and bill of materials (BOM).

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1 Introduction

The TPS92629Q1EVM helps designers evaluate the operation and performance of the TPS92629-Q1, a linear single-channel LED driver with full LED diagnostic and multi fault report out for automotive lighting applications. For linear LED drivers used in automotive lighting end equipment, thermal is a big design challenge. TPS92629-Q1 can help designers to easily deal with the challenge, and TPS92629Q1EVM can help to validate those features.

1.1 Features

The EVM has the following features:

- LED short-to-GND, short-to-battery, open-circuit detection and auto-recovery
- Multi fault report out through the different voltage levels of short-to-GND, short-to-battery, open-circuit, and thermal shutdown
- Open fault mask during low-dropout mode
- Analog and PWM dimming
- Thermal sharing with external resistors when supply voltage is high

1.2 Typical Application

The EVM is used in the following applications:

- Automotive exterior small light: blind spot detection indicator, door handle, charging inlet
- Automotive interior light: overhead console, reading lamp
- Automotive exterior rear light: rear lamp, center high mounted stop lamp, side marker
- General-purpose LED driver applications

2 TPS92629Q1EVM Description

This description section describes the connectors and jumpers of TPS92629Q1EVM.

Figure 2-1 displays the TPS92629Q1EVM Board.

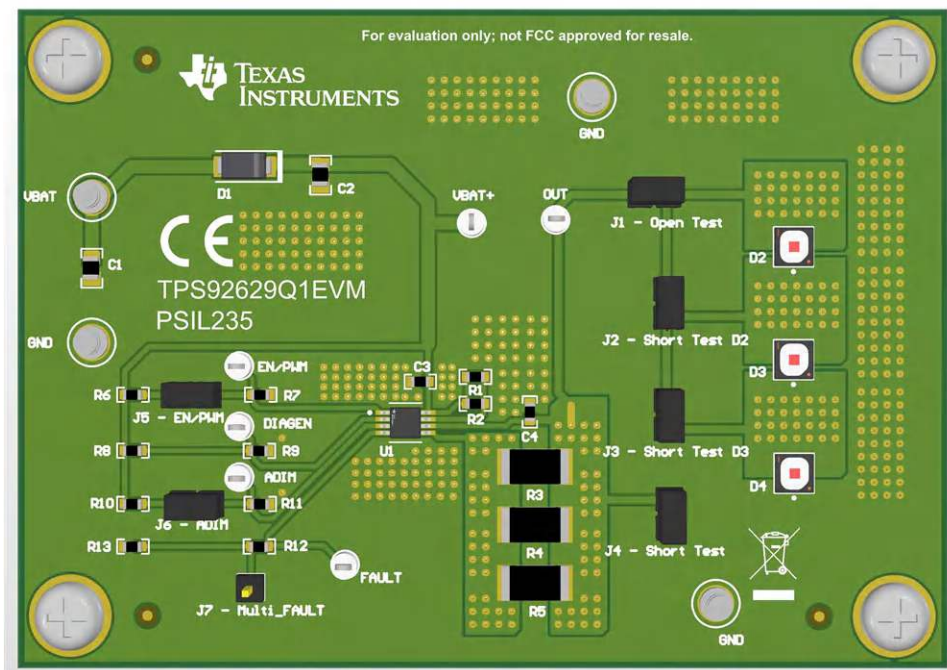


Figure 2-1. TPS92629Q1EVM Board

2.1 Connector Map

The EVM has the following connectors. Table 2-1 shows their functions.

Table 2-1. Connector Map

Connector	Description
VBAT	This connector is a power supply input.
GND	This connector is a device part ground.
VBAT+	SUPPLY. This connector shows the positive input supply voltage.
EN/PWM	EN/PWM. This connector shows a device enable input and PWM input.
DIAGEN	DIAGEN. This connector shows the LED open diagnostics enable input.
ADIM	ADIM. This connector shows a device PWM input for analog dimming.
FAULT	Fault. This connector is the FAULT status output of the LED driver.
Multi_FAULT	Mult_Fault. This connector is the multi fault status output of the LED driver.
OUT	This connector shows the output voltage.

2.2 Jumper Map

The EVM provides some jumpers for designers to conveniently validate the device. [Table 2-2](#) shows the jumper map.

Table 2-2. Jumper Map

Function	Designator	Attached Function	With Shunt	Without Shunt
Open detect	J1	LED open	LED string connect to Out	LED string open
Short detect	J2	Single LED short	Short single LED in LED string	3 LED series in LED string
	J3	Two LEDs short	Short two LEDs in LED string	3 LED series in LED string
	J4	LED string short	Short all LEDs in LED string	3 LED series in LED string
EN/PWM dimming input	J5	PWM	Enable device and PWM (PWM connected to SUPPLY through a resistor)	Disable device and PWM or use external control signal
Analog dimming Input	J6	ADIM	Enable analog dimming (ADIM connect to SUPPLY through a resistor)	Disable ADIM or use external control signal

3 Test Setup

Table 3-1 shows the typical parameters for the TPS92629Q1EVM. The typical input voltage range is from 9 V to 20 V. The full-scale output current of the TPS92629Q1EVM is 250 mA. Users can adjust the output current by changing the sensing resistor (Rsns).

Table 3-1. TPS92629Q1EVM Parameters

Parameters	Value
Input voltage (V)	typical: 9-20
Output current per channel (mA)	250mA
LED per channel	3s1p LED string
R _{sns} (Ω)	1.8
R _{res} (Ω)	25

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 1 A.
2. Connect the positive and negative outputs of the power supply to connectors VBAT and GND respectively on the EVM board.
3. With the default jumper connections, the board must begin operating after the power supply is turned on. Modify the jumpers for other operating modes.
4. For short-to-battery detection, set voltage of dc power to 10.5V and the current limit to 2A, avoid long-term failure condition for the risk of damaging LEDs.

4 Schematic, Bill of Materials, and Layout

4.1 Schematics

Figure 4-1 shows the TPS92629Q1EVM schematic.

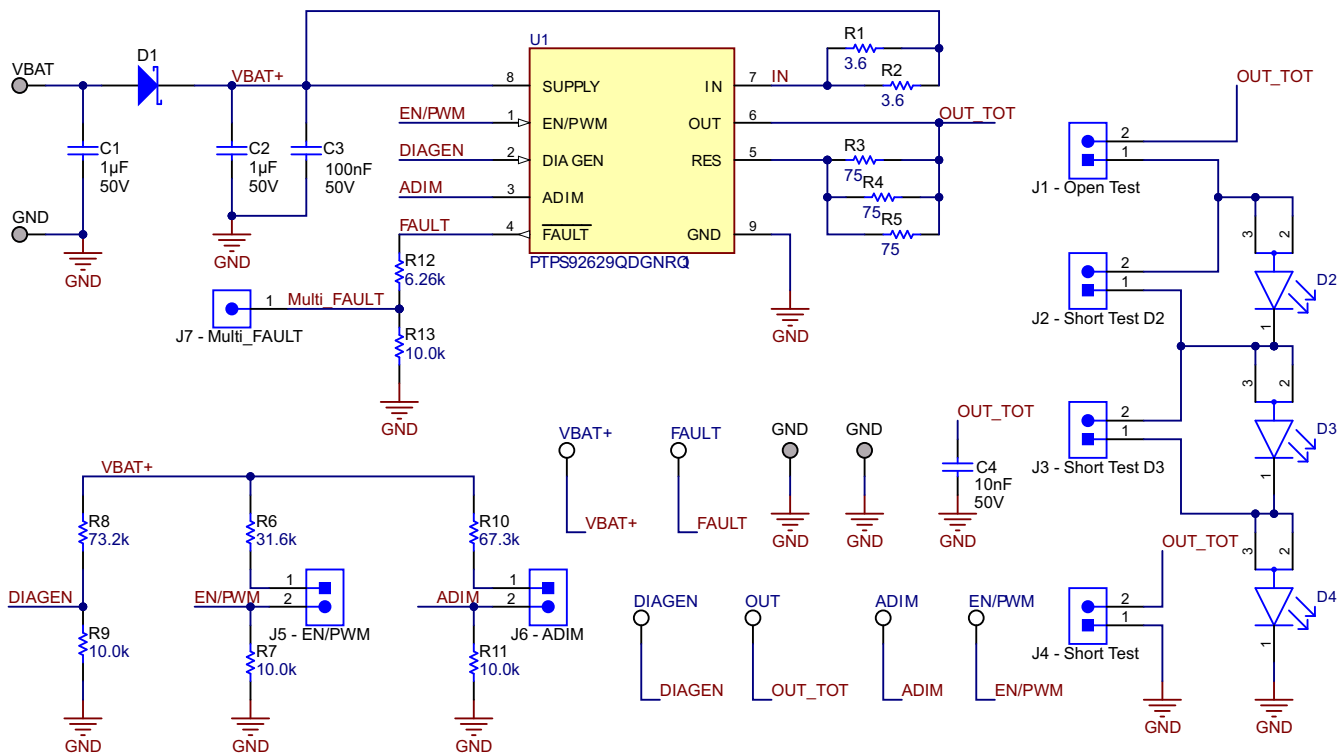


Figure 4-1. Schematic

4.2 Layout

Figure 4-2 illustrates the EVM board layout.

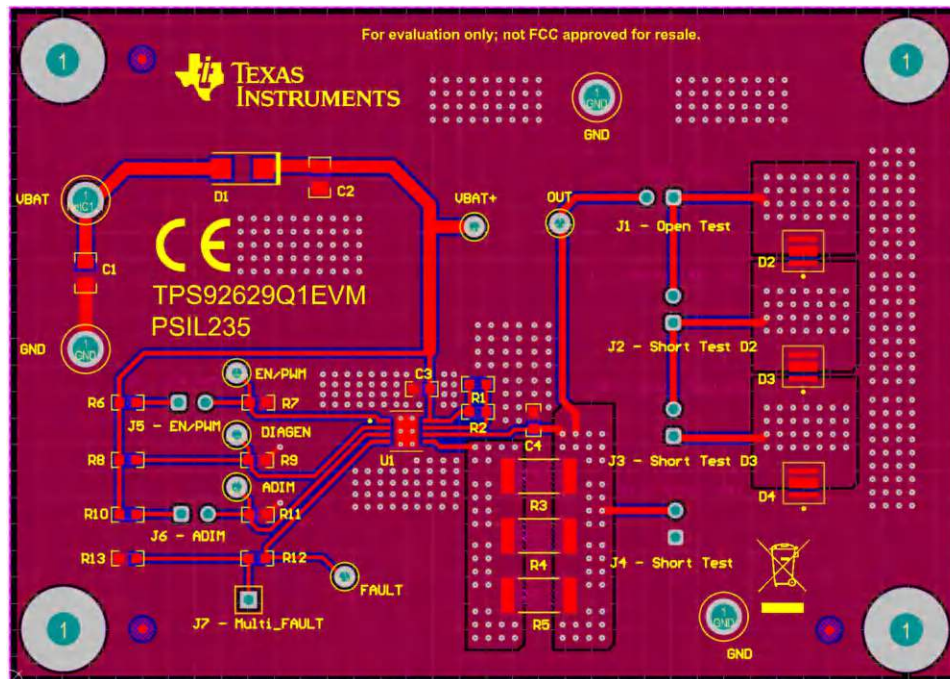


Figure 4-2. Layout

5 Bill of Materials (BOM)

Table 5-1 lists the TPS92629Q1EVM BOM.

Table 5-1. Bill of Materials

Designator	Quantity	Description	Part Number	Manufacturer
C1, C2	2	CAP, CERM, 1 μ F, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0805	08055C105K4Z2A	AVX
C3	1	CAP, CERM, 0.1 μ F, 50 V, +/- 10%, X7R, AEC-Q200 Grade 0, 0603	06035C104K4Z4A	AVX
C4	1	CAP, CERM, 0.01 μ F, 50 V, +/- 10%, X7R, 0603	C1608X7R1H103K080AA	TDK
D1	1	DIODE, SCHOTTKY, 60V, 3A, DO214AC	SK36A-LTPMSCT-ND	Micro Commercial Co
D2, D3, D4	3	LED Uni-Color Red 71lm 632nm Chip LED 3-Pin SMD T/R	LR H9PP-HZJZ-1-1-350-R18-Z	Osram Opto
R1, R2	2	RES, 3.6, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	CRCW06033R60JNEA	Vishay-Dale
R3, R4, R5	3	RES, 75, 5%, 1 W, AEC-Q200 Grade 0, 2512	CRCW251275R0JNEG	Vishay-Dale
R6	1	RES, 31.6 k, 0.1%, 0.1 W, 0603	RT0603BRD0731K6L	Yageo America
R7, R9, R11, R13	2	RES, 10.0 k, 1%, 0.1 W, 0603	RCG060310K0FKEA	Vishay Draloric
R8	1	RES, 73.2 k, 1%, 0.1 W, 0603	RC0603FR-0773K2L	Yageo
R10	1	RES, 67.3 k, 0.1%, 0.1 W, 0603	RT0603BRD0767K3L	Yageo America
R12	1	RES, 6.26 k, 0.1%, 0.1 W, 0603	RT0603BRD076K26L	Yageo America
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5, SH-J6	6	Shunt, 100mil, Flash Gold, Black	SPC02SYAN	Sullins Connector Solutions
J1 - Open Test, J2 - Short Test D2, J3 - Short Test D3, J4 - Short Test, J5 - EN/PWM, J6 - ADIM	6	Header, 2.54mm, 2x1, Tin, TH	TSW-102-23-T-S	Samtec
J7 - Multi_FAULT	1	Header, 100mil, 1pos, Gold, TH	TSW-101-07-G-S	Samtec
U1	1	Single-Channel, Automotive High Side LED Driver With Thermal Sharing Control	TPS92629QDGNRQ1	Texas Instruments

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