



ABSTRACT

The TPS92623-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 TPS92623-Q1EVM helps designers evaluate the operation and performance of the TPS92623-Q1, a linear triple-channels LED driver with full LED diagnostic for automotive lighting applications. For linear LED drivers used in automotive lighting end equipment, thermal is a big design challenge. TPS92623-Q1 can help designers to easily deal with the challenge, and TPS92623-Q1EVM can help to validate those features.

1.1 Features

The EVM has the following features:

- LED short and open and single LED short detection and auto-recover
- Open fault mask during dropout mode
- Thermal sharing with external resistor when supply voltage is high

1.2 Typical Application

The EVM is used in the following applications:

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

2 TPS92623-Q1EVM Description

Figure 2-1 displays the TPS92623-Q1EVM Board.

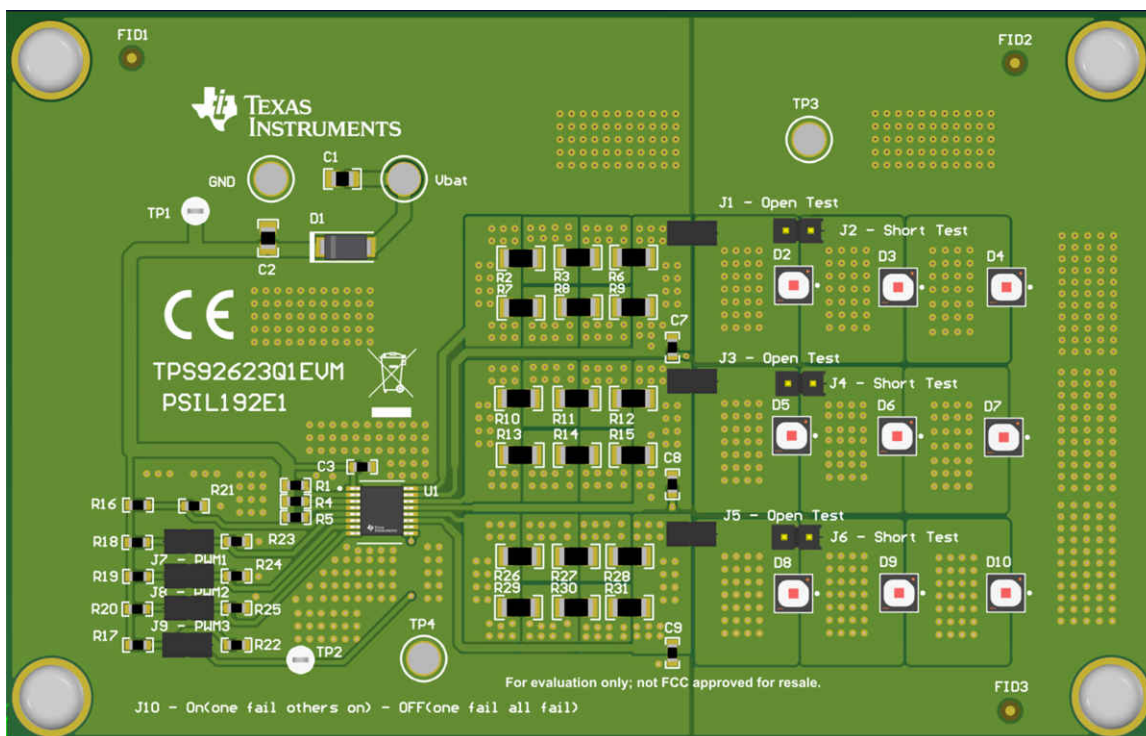


Figure 2-1. TPS92623-Q1EVM Board

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.
TP1	Vbat. This connector shows the positive input supply voltage.
TP2	Fault. This connector is the FAULT status output of the LED driver.
TP3	This connector is LED part ground.
TP4	This connector is device part ground.

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	LED1 open	LED1 string connect to Out1	LED1 string open
	J3	LED2 open	LED2 string connect to Out2	LED2 string open
	J5	LED3 open	LED3 string connect to Out3	LED3 string open
Short detect	J2	LED1 string short	Short all LEDs in LED1 string	3 LED series in LED1 string
	J4	LED2 string short	Short all LEDs in LED2 string	3 LED series in LED2 string
	J6	LED1 string short	Short all LEDs in LED3 string	3 LED series in LED3 string
PWM dimming input	J7	PWM1	Enable PWM1 (PWM1 connected to SUPPLY through a resistor)	Disable PWM1 or use external control signal
	J8	PWM2	Enable PWM2 (PWM2 connected to SUPPLY through a resistor)	Disable PWM2 or use external control signal
	J9	PWM3	Enable PWM3 (PWM3 connected to SUPPLY through a resistor)	Disable PWM3 or use external control signal
Fault options	J10	Fault	One fails, others on	One fails, others off

3 Test Setup

Table 3-1 shows the typical parameters for the TPS92623-Q1EVM. The typical input voltage range is from 9 V to 20 V. The full-scale output current of the TPS92623-Q1EVM is 150 mA per channel. Users can adjust the output current by changing the sensing resistor (Rsns).

Table 3-1. TPS92623-Q1EVM Parameters

Parameters	Value
Input voltage (V)	typical: 9-20
Output current per channel (mA)	130
LED per channel	3s1p LED string
Rsns (Ω)	1.15
Rres (Ω)	86.4

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 Schematic, Bill of Materials, and Layout

4.1 Schematics

Figure 4-1 shows the TPS92623-Q1EVM schematic.

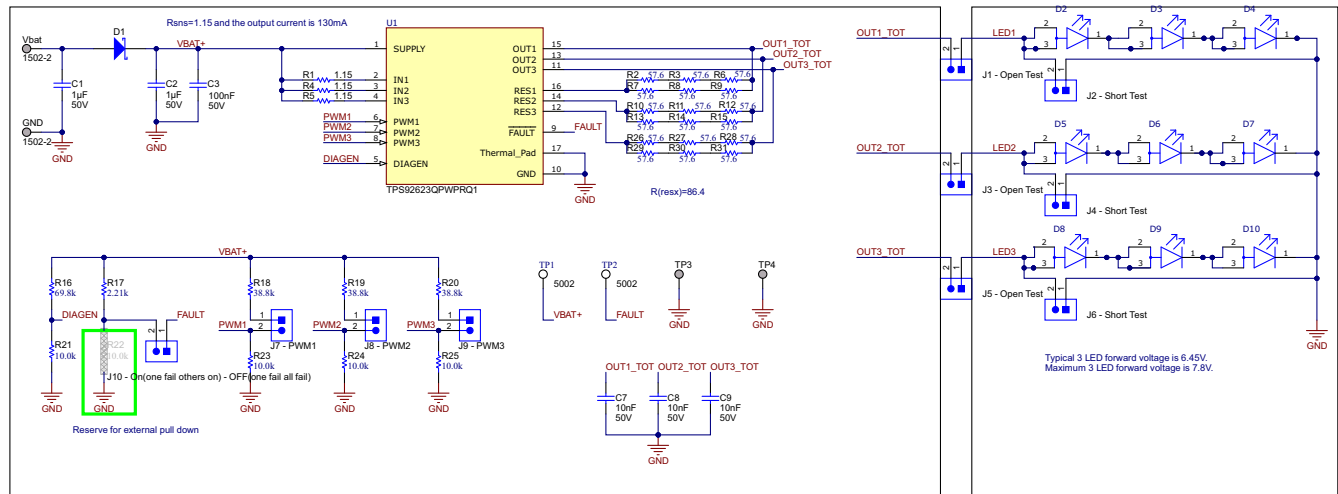


Figure 4-1. Schematic

4.2 Bill of Materials (BOM)

Table 4-1 lists the TPS92623-Q1EVM BOM.

Table 4-1. Bill of Materials

Item Number	Designator	Value	Quantity	Part Number	Manufacturer	Description
1	C1, C2	1 uF	2	08055C105K4Z2A	'AVX	CAP, CERM, 1 µF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0805
2	C3	0.1 uF	1	06035C104K4Z4A	AVX	CAP, CERM, 0.1 µF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 0, 0603
3	C7, C8, C9	0.01 uF	3	C1608X7R1H103K080A A	TDK	CAP, CERM, 0.01 uF, 50 V, +/- 10%, X7R, 0603
4	R1, R4, R5	1.15 ohm	3	CRCW06031R15FKEA	Vishay-Dale	RES, 1.15, 1%, 0.1 W, AEC-Q200 Grade 0, 0603
5	R2, R3, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R26, R27, R28, R29, R30, R31	57.6 ohm	18	CRCW120657R6FKEA	Vishay-Dale	RES, 57.6, 1%, 0.25 W, AEC-Q200 Grade 0, 1206
6	R17	2.21k ohm	1	CRCW060320K0FKEA	Vishay-Dale	RES, 2.21 k, 1%, 0.1 W, AEC-Q200 Grade 0, 0603
7	R18, R19, R20	38.8 k ohm	3	RT0603BRD0738K8L	Yageo America	RES, 38.8 k, 0.1%, 0.1 W, 0603
8	R16	69.8 k ohm	1	RT0603BRD0769K8L	Yageo America	RES, 69.8 k, 0.1%, 0.1 W, 0603
9	R21, R22, R23, R24, R25	10.0 k ohm	5	RCG060310K0FKEA	Vishay Draloric	RES, 10.0 k, 1%, 0.1 W, 0603
10	D1		1	SK36A-LTPMSCT-ND	Micro Commercial Co	DIODE, SCHOTTKY, 60V, 3A, DO214AC
11	SH-J1, SH-J2, SH-J3, SH-J4, SH-J6, SH-J7, SH-J8		7	SPC02SYAN	Sullins Connector Solutions	Shunt, 100mil, Flash Gold, Black
12	J1 - Open Test, J2 - Short Test, J3 - Open Test, J4 - Short Test, J5 - Open Test, J6 - Short Test, J7 - PWM1, J8 - PWM2, J9 - PWM3, J10 - On(OFF) - OFF(OFF)		10	TSW-102-23-T-S	Samtec	Header, 2.54mm, 2x1, Tin, TH
13	U1		1	TPS92623QPWPRQ1	Texas Instruments	Three-Channel, Automotive High Side LED Driver

4.3 Layout

Figure 4-2 illustrates the EVM board layout.

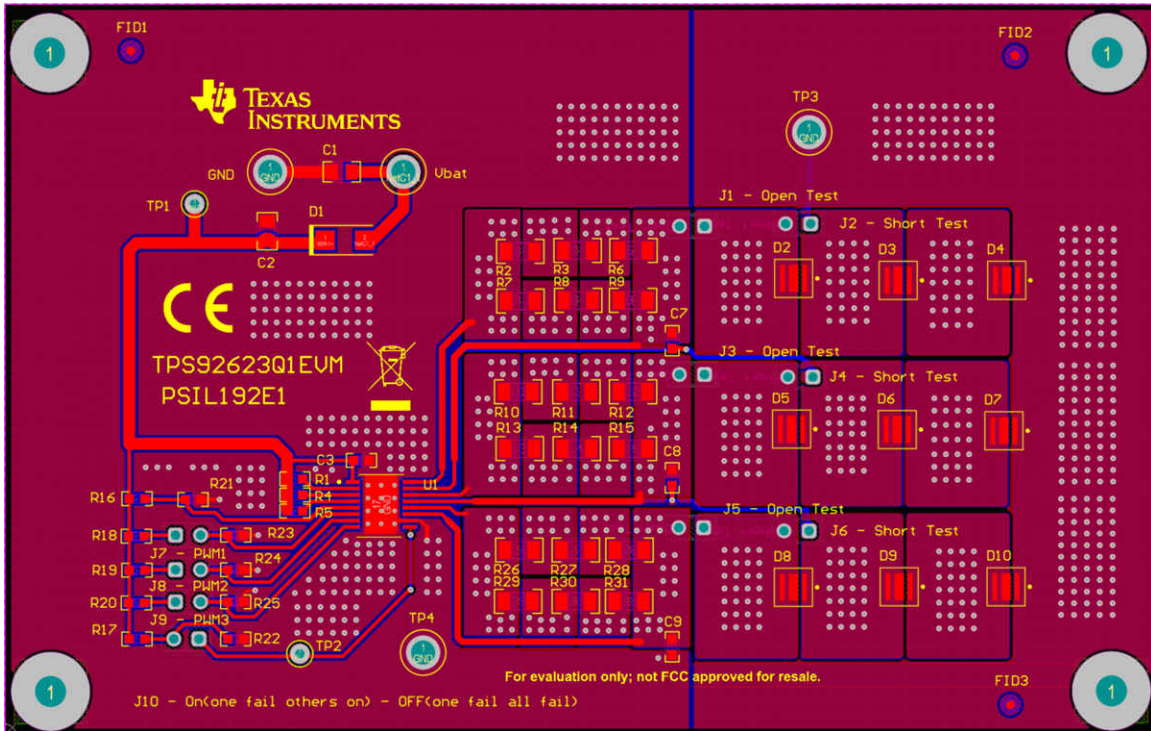


Figure 4-2. Layout

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