

TLD2252-2EP rear combination lamp evaluation board

User Manual

About this document

Scope and purpose

The purpose of the TLD2252-2EP rear combination lamp evaluation board (TLD2252-2_RCL_EVAL) board is to help designers evaluate the features and the performance of the TLD2252-2EP, a two-channel linear current source LED driver for automotive LED lighting applications. TLD2252-2EP provides a simple and compact solution for the implementation of a rear combination lamp (RCL).

This user manual provides the usage instructions of the TLD2252-2_RCL_EVAL board (schematic version S00, PCB version P00).

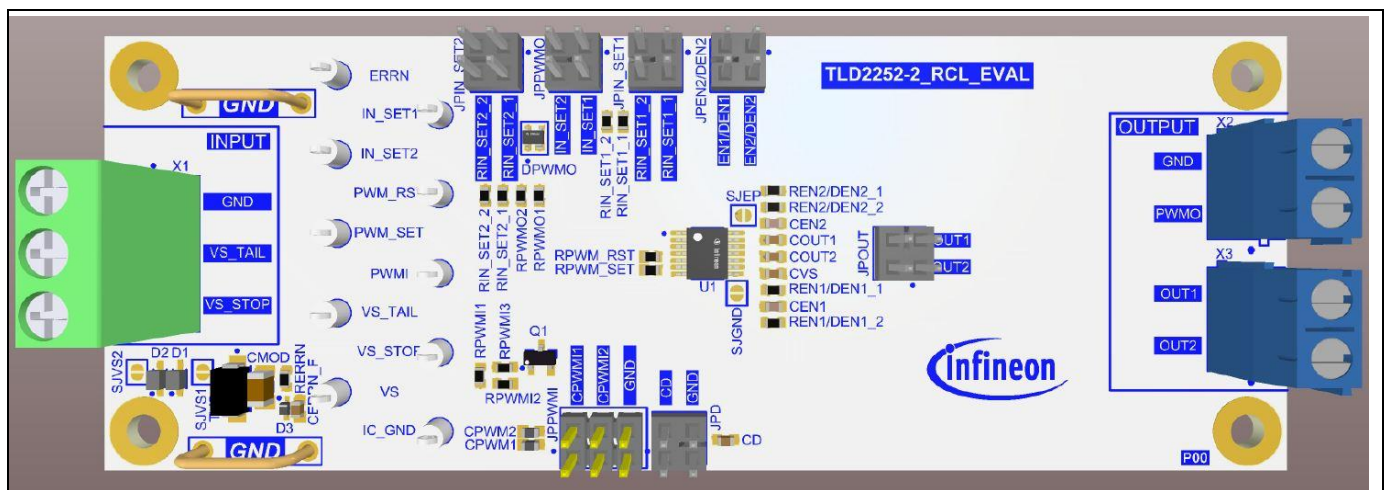


Figure 1 TLD2252-2_RCL_EVAL board

Intended audience

Hardware engineers, system architects.

Related information

Table 1 Supplementary links and document references

Reference	Description
LITIX™ Basic+ TLD2252-2EP product home page	Product website which contains reference information for the LITIX™ Basic+ TLD2252-2EP including datasheet, application notes, simulation models, boards and relevant training
LITIX™ Basic+ family website	All information about LITIX™ Basic+ family products
LITIX™ Basic+ LED driver family: How to implement a rear combination lamp	Application note regarding the main operating principles of the pulse width modulation (PWM) engine integrated into the LITIX™ Basic+ TLD2252-2EP, TLD2141-3EP and TLD2142-1EP, and how to build a rear combination lamp (RCL) using PWM
LITIX™ Basic+ LED driver family: Diagnosis and fault management	Application note regarding the main operating principles of the diagnosis and fault management features integrated in the LITIX™ Basic+ family.
LITIX™ Basic+ Boards	Available evaluation boards for LITIX™ Basic+
LED rear lighting - application page	Application website for rear LED lighting

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1 TLD2252-2_RCL_EVAL description

The TLD2252-2_RCL_EVAL is an evaluation board equipped with one LITIX™ Basic+ TLD2252-2EP and on-board LEDs for easy evaluation of an RCL application when realized with use of the TLD2252-2EP pulse width modulation (PWM) engine.

The board can be used within the typical automotive voltage range, 8 V to 16 V. It gives the user the freedom to evaluate all of the TLD2252-2EP features and possible configurations by setting the necessary jumpers accordingly.

As the PWM-engine of LITIX™ Basic+ TLD2252-2EP can be used to drive other LITIX™ Basic+ devices, the TLD2252-2_RCL_EVAL board can be used in combination with the [BASICPLUS DEMOBOARD](#) for combined family evaluation.

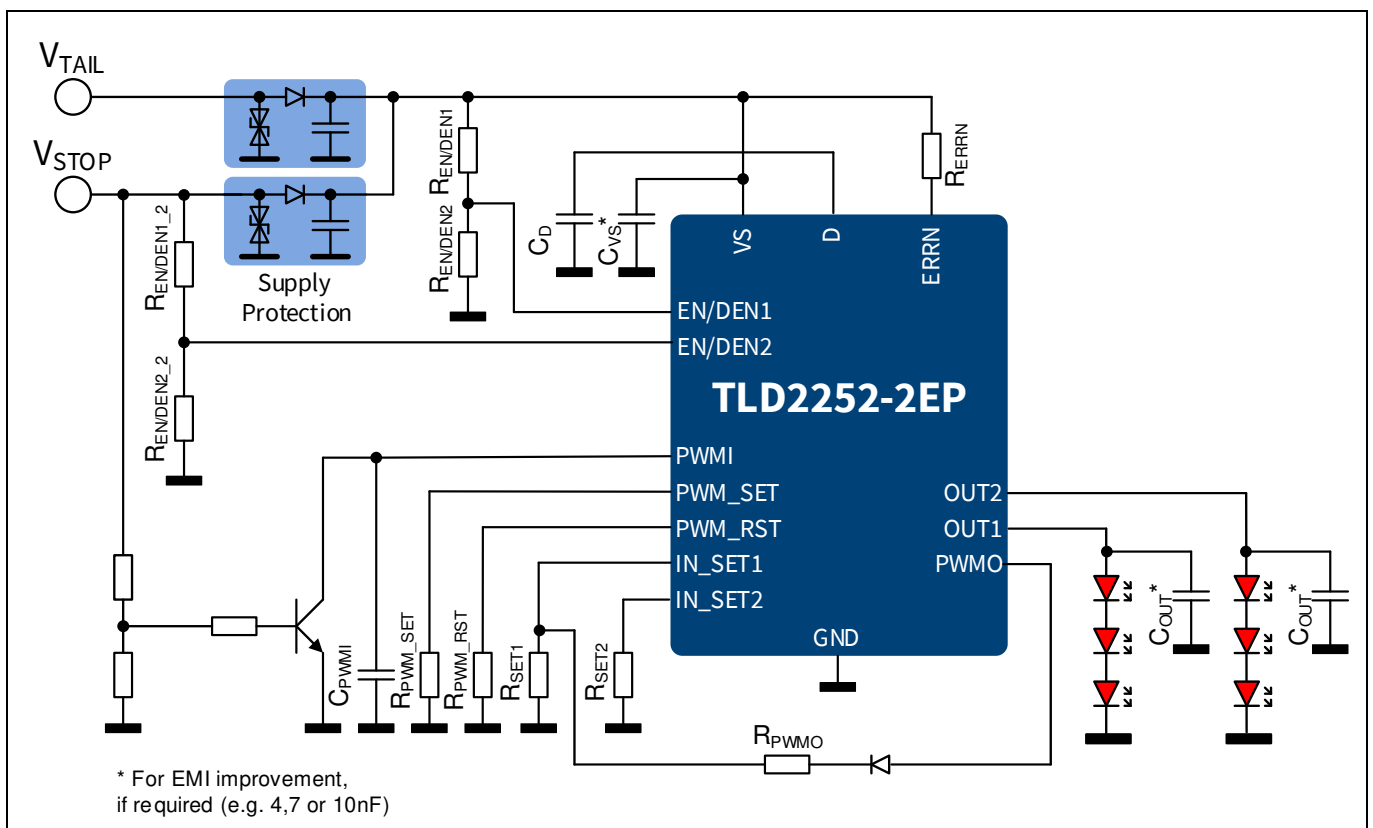


Figure 2 Rear combination lamp implemented with LITIX™ Basic+ TLD2252-2EP

1.1 Key features

The TLD2252-2_RCL_EVAL has the following features:

1. Equipped with one LITIX™ Basic+ TLD2252-2EP
2. Typical supply voltage range 8 V to 16 V
3. Equipped with jumpers for evaluation of the features in different configurations (e.g. PWM-engine)
4. On-board LED load, 3 LEDs per output channel
5. Possibility to connect external load
6. Possibility to drive other LITIX™ Basic+ devices with PWM-signal, in combination with [BASICPLUS DEMOBOARD](#)
7. 11.4 cm x 4.2 cm 2-layer PCB

1.2 Connectors and jumpers

The TLD2252-2_RCL_EVAL board connectors are described in Table 2.

Table 2 TLD2252-2_RCL_EVAL connectors

Connector	Description
INPUT	
VS_STOP	Power supply, typical 8 V to 16 V, and deactivation of the internal PWM engine of the LITIX™ Basic+ TLD2252-2EP
VS_TAIL	Power supply, typical 8 V to 16 V, and activation of the internal PWM engine of the LITIX™ Basic+ TLD2252-2EP
GND	Ground
OUTPUT	
GND	Ground
PWMO	LITIX™ Basic+ TLD2252-2EP PWM signal to drive other LITIX™ Basic devices
OUT1	External load for output channel 1, OUT1
OUT2	External load for output channel 2, OUT2

The TLD2252-2_RCL_EVAL board jumpers are described in Table 3.

Table 3 TLD2252-2_RCL_EVAL board jumpers

Jumper	Description and configuration
JPN_SET1	Sets the output current of OUT1: <ul style="list-style-type: none"> RIN_SET1_1 (36.5 kΩ): sets the output current to 10 mA RIN_SET1_2 (7.32 kΩ): sets the output current to 50 mA
JPPWMO	PWM output enable: <ul style="list-style-type: none"> IN_SET1: enables PWM at OUT1 IN_SET2: enables PWM at OUT2
JPN_SET2	Sets the output current of OUT2: <ul style="list-style-type: none"> RIN_SET2_1 (14.7 kΩ): sets the output current to 50 mA RIN_SET2_2 (7.32 kΩ): sets the output current to 100 mA
JPEN2/DEN2	Activate the device and diagnosis for OUT2: <ul style="list-style-type: none"> EN1/DEN1: use the resistor divider on EN1/DEN1 (REN1/DEN1_1) to activate OUT2 EN2/DEN2: use separate resistor divider EN1/DEN1 (REN1/DEN1_1) to activate OUT2. During tail function (board supplied via VS_TAIL), place jumper on EN1/DEN1 position
JPOUT	On board load connection <ul style="list-style-type: none"> OUT1: connects OUT1 to on-board load OUT2: connects OUT2 to on-board load
JPD	Diagnosis management <ul style="list-style-type: none"> GND: when a fault is detected only the channel under fault condition will be deactivated. The error will be communicated via ERRN

Jumper	Description and configuration
	<ul style="list-style-type: none"> • Open: when a fault is detected both channels will switch off • CD: when a fault is detected both channels will switch off after a delay time $t_{D(set)}$. Delay time is set by CD capacitor
JPPWMI	PWMI connection <ul style="list-style-type: none"> • CPWMI1 (120 nF): sets the PWM frequency to 220 Hz and duty cycle 10% • CPWMI2 (68 nF): sets the PWM frequency to 400 Hz and duty cycle 10% • GND: duty cycle is 100% The duty cycle is set by the RPWM_SET (4.53 kΩ) and RPWM_RST (41.2 kΩ) resistors
JPOUT	On board load connection <ul style="list-style-type: none"> • OUT1: connects OUT1 to on-board load. Leave open to connect to external load • OUT2: connects OUT2 to on-board load. Leave open to connect to external load

1.3 On-board load

The TLD2252-2_RCL_EVAL board is equipped with on-board LED load (on the bottom side) for easy evaluation.

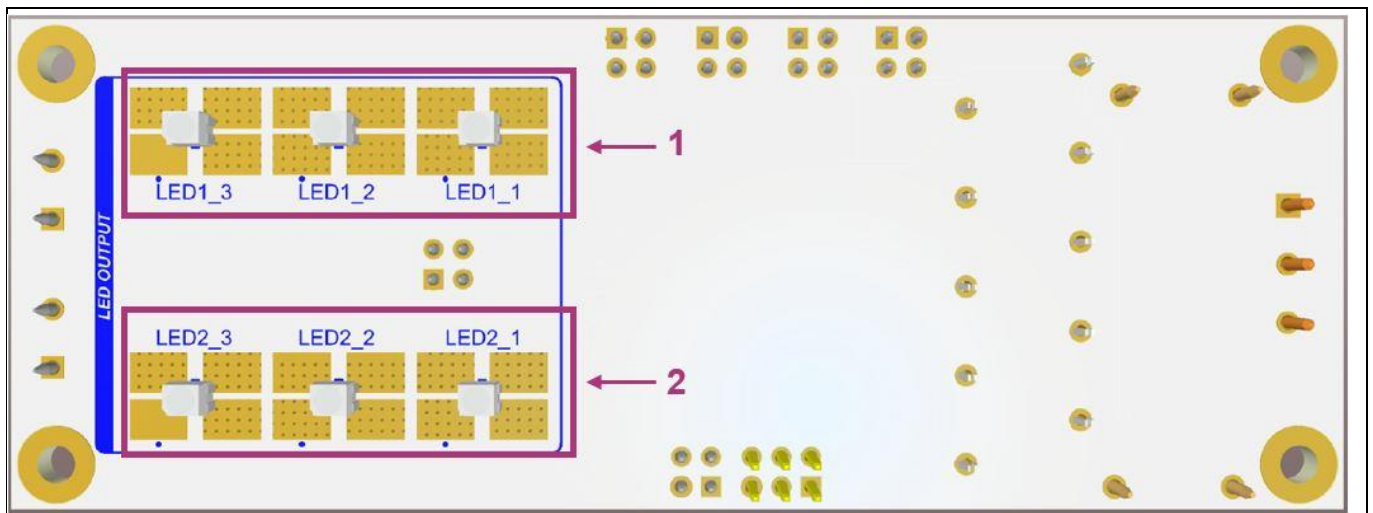


Figure 3 On-board LED load

The on-board LED load shown in Figure 3 is described in Table 4.

Table 4 On-board LED load

Load	Description
LED OUTPUT	
Load 1	3 x 1 LEDs in series; used when OUT1 of JPOUT is bypassed
Load 2	3 x 1 LEDs in series; used when OUT2 of JPOUT is bypassed

1.4 Test points

The TLD2252-2_RCL_EVAL board is equipped with several test points and two ground terminals for easy monitoring of significant voltages, Figure 4.

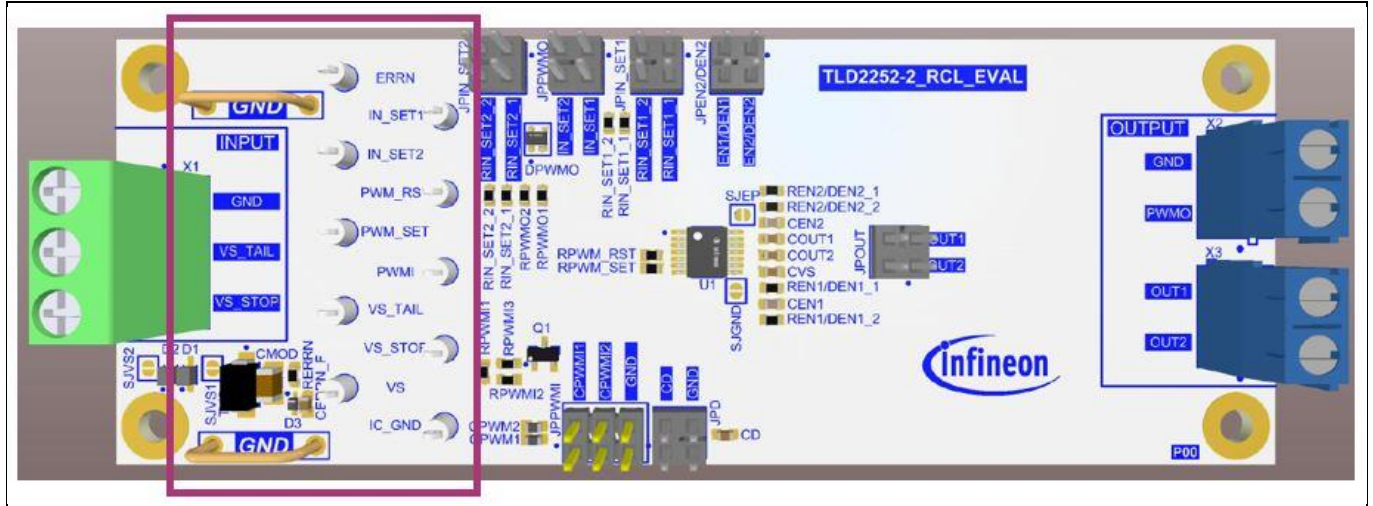


Figure 4 Test points and ground terminals

Quick start

2 Quick start

- Connect a voltage source to VS_TAIL or VS_STOP and GND, typical 8 V to 16 V
- Select the output current by placing jumpers at JPN_SET1 and JPN_SET2
- Configure the diagnosis management at JPD
- Select if PWM will be used by placing a jumper at JPPWMI (only available when supply at VS_TAIL)
- Select the output channels that will driven by the PWM engine by placing a jumper at JPPWMO (only available when supply at VS_TAIL)
- Enable output channel 2 by placing a jumper at JPEN/DEN2 (when supply at VS_TAIL, bypass EN1/DEN1)
- Select load by bypassing OUT1 and OUT2 of JPOUT in order to use the on-board LED load

3 Schematics, layout and bill of material

For the calculation of the external components required for the LITIX™ Basic+ TLD2252-2EP and used on the TLD2252-2_RCL_EVAL board refer to the following documentation:

- [LITIX™ Basic+ TLD2252-2EP data sheet](#)
- [LITIX™ Basic+ LED driver family: How to implement a rear combination lamp](#)
- [LITIX™ Basic+ LED driver family: Diagnosis and fault management](#)

3.1 Schematics

In Figure 5, the top-level schematic of the TLD2252-2_RCL_EVAL board is shown. Figure 6, Figure 7 and Figure 8 show the schematic of the power supply circuit, the TLD2252-2EP and the on-board LED load respectively.

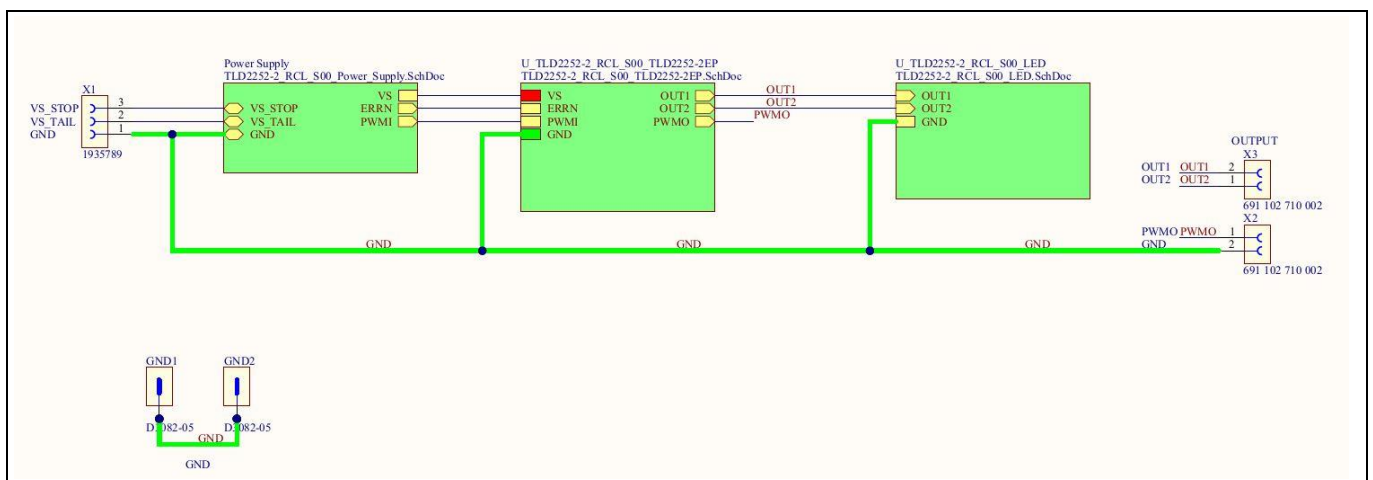


Figure 5 Schematic of TLD2252-2_RCL_EVAL board – top level

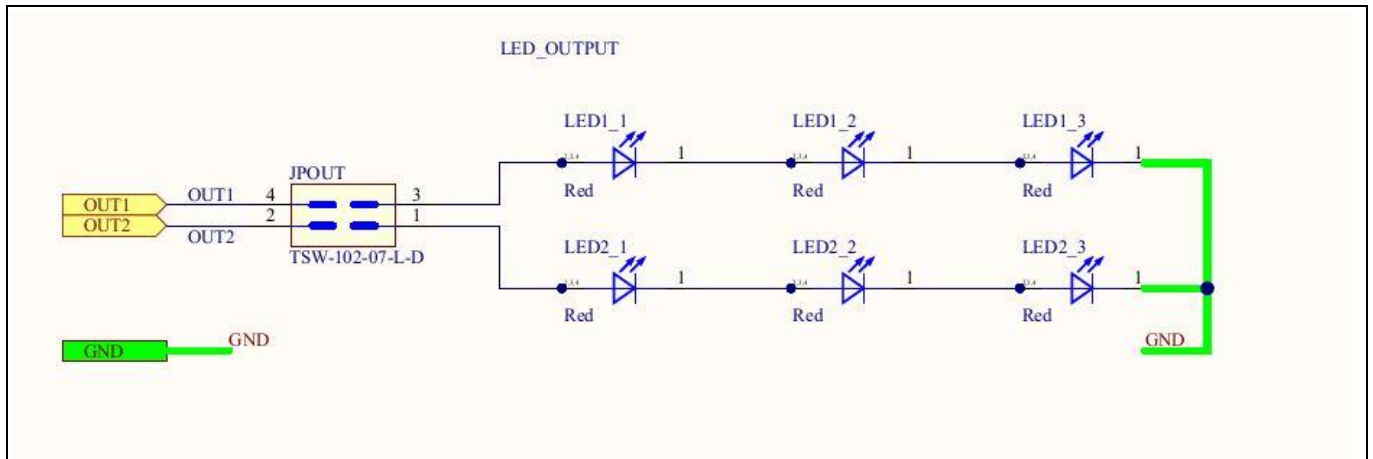


Figure 8 Schematic of TLD2252-2_RCL_EVAL board – on-board LED load

3.2 Layout

Figure 9 and Figure 10 show the layout of the TLD2252-2_RCL_EVAL board.

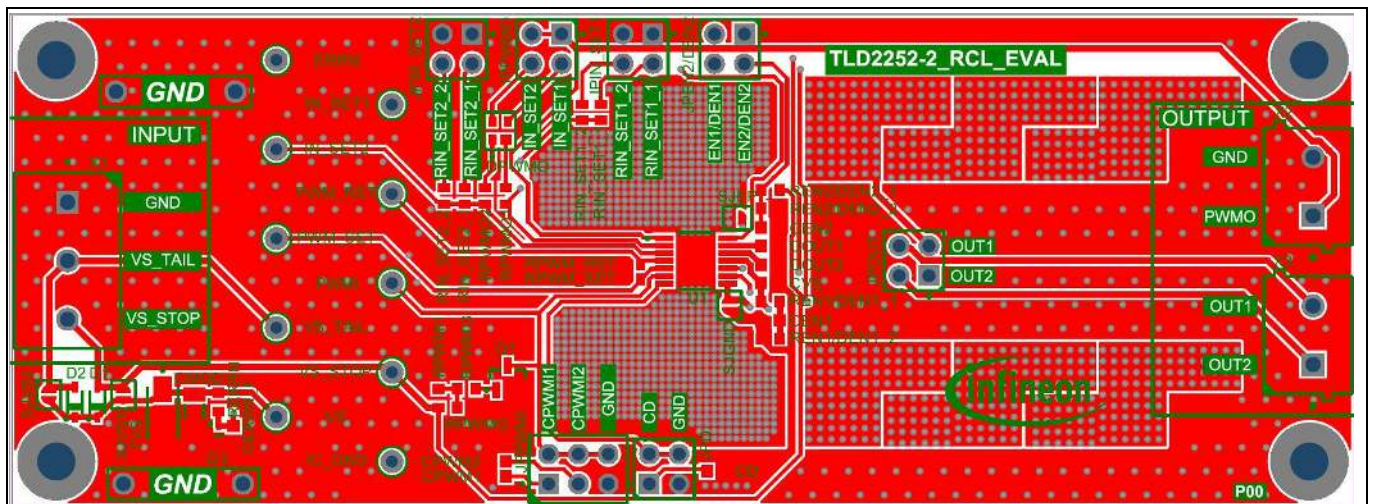


Figure 9 Layout of TLD2252-2_RCL_EVAL board – top layer

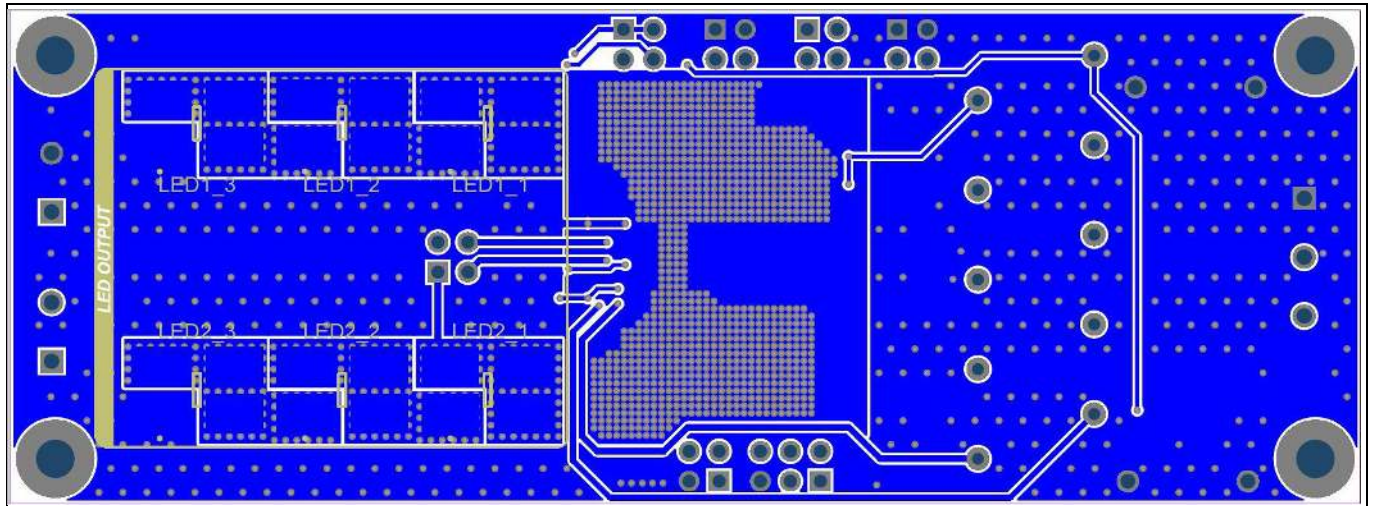


Figure 10 Layout of TLD2252-2_RCL_EVAL board - bottom layer

3.3 Bill of materials

Table 5 shows the TLD2252-2_RCL_EVAL board bill of material.

Table 5 Bill of material

Designator	Value	Manufacturer	Manufacturer order number
CD, CERRN_F, COUT1, COUT2, CVS	10 nF	AVX	06035F103K4Z2A
CEN1, CEN2	10 nF	MuRata	GCM188R71H103JA37
CMOD	2.2 μ F	MuRata	GRM31CR71H225KA88
CPWM1	120 nF	Kemet	C0603C124K4RACTU
CPWM2	68nF	Kemet	C0603C683M4RACTU
D1, D2	BAT165	Infineon Technologies AG	BAT165
D3	5.60V	Vishay	BZX584C5V6-V-G
DPWMO	BAS40-07W	Infineon Technologies AG	BAS40-07W
ERRN, IC_GND, IN_SET1, IN_SET2, PWM_RST, PWM_SET, PWMI, VS, VS_STOP, VS_TAIL	5002	Keystone Electronics Corp.	5002
GND1, GND2	D3082-05	Harwin	D3082-05
JPD, JPEN2/DEN2, JPIN_SET1, JPIN_SET2, JPOUT, JPPWMO	TSW-102-07-L-D	Samtec	TSW-102-07-L-D
JPPWMI	TSW-103-08-G-D	Samtec	TSW-103-08-G-D
LED1_1, LED1_2, LED1_3, LED2_1, LED2_2, LED2_3	Red	OSRAM Opto Semiconductors	Q65110A4135
Q1	BC846ALT1G	ON Semiconductor	BC846ALT1G
REN1/DEN1_1, REN2/DEN2_1, RPWMI1, RPWMI3	10k	Yageo	RC0603FR-0710KL

Designator	Value	Manufacturer	Manufacturer order number
REN1/DEN1_2, REN2/DEN2_2, RPWMI2	3.6k	Yageo	AC0603FR-073K6L
RERRN	20k	Yageo	AC0603JR-0720KL
RIN_SET1_1	36.5k	Vishay	CRCW060336K5FK
RIN_SET1_2, RIN_SET2_2, RPWMO1, RPWMO2	7.32k	Vishay	CRCW06037K32FK
RIN_SET2_1	14.7k	Vishay	CRCW060314K7FK
RPWM_RST	41.2k	Vishay	CRCW060341K2FK
RPWM_SET	4.53k	Vishay	CRCW06034K53FK
SJEP, SJGND, SJVS1, SJVS2	Solder Jumper 2 Pins	Infineon Technologies AG	Solder Jumper 2 Pins
TVS	SMAJ30CA	Littelfuse	SMAJ30CA
U1	TLD2252-2EP	Infineon Technologies AG	TLD2252-2EP
X1	1935789	Phoenix Contact	1935789
X2, X3	691 102 710 002	Würth Elektronik	691 102 710 002

3.4 PCB design data

The Altium project is available on the [TLD2252-2 RCL EVAL website](#).

Revision history

Document version	Date of release	Description of changes
Rev.1.00	2020-12-03	Initial release

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