TLS805x1LD/TLS810x1LD Demoboard

Z8F55443029

Preface

Scope and purpose

This application note provides information about the usage of the TLS805x1LD/TLS810x1LD Demoboard. The TLS805x1LD/TLS810x1LD Demoboard is a demonstrates the ultra low quiescent current linear voltage regulator family TLS805x1LD/TLS810x1LD in PG-TSON-10 package from Infineon Technologies AG. Please also refer to the corresponding Data Sheets *[2]*–*[11]*.

Intended audience

This document is intended for engineers who develop applications.

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1 Introduction

Table 1 shows an overview of the PG-TSON-10 package members of the device family.

Table 1 Family overview (PG-TSON-10 package)

Type	Output voltage	Output current	Enable	Reset
TLS810A1LDV50	5.0 V	100 mA	–	–
TLS810A1LDV33	3.3 V	100 mA	–	–
TLS810B1LDV50	5.0 V	100 mA	✓	–
TLS810B1LDV33	3.3 V	100 mA	✓	–
TLS810D1LDV50	5.0 V	100 mA	✓	✓
TLS810D1LDV33	3.3 V	100 mA	✓	✓
TLS805B1LDV50	5.0 V	50 mA	✓	–
TLS805B1LDV33	3.3 V	50 mA	✓	–
TLS805B1LDV	Adjustable	50 mA	✓	–
TLS805D1LDV50	5.0 V	50 mA	✓	✓

1.1 General description

The TLS805x1/TLS810x1 series is a family of linear voltage regulators that offers:

- wide input voltage range: 3 V to 42 V
- low drop out voltage
- ultra low quiescent current: 5 µA to 10 µA

These features make the TLS805x1/TLS810x1 voltage regulators perfectly suitable for automotive supply systems and for other supply systems that are permanently connected to the battery.

Benefits of the TLS805x1/TLS810x1:

- accuracy of 2 %
- maximum output current up to 50 mA or 100 mA
- output voltage versions:
  - fixed 5 V
  - fixed 3.3 V
  - adjustable
- fast regulation
- very good stability characteristics
- only a small ceramic capacitor of 1 µF at the output is reqired
- internal features that protect the device from immediate damage:
  - output current limitation
  - overtemperature shutdown

The tracking region starts at an input voltage of 2.75 V (extended operating range). This makes the TLS805x1/ TLS810x1 regulators also suitable for supplying automotive systems that need to operate in cranking condition.

For descriptions of features please refer to our brochure "What the Designer Should Know" *[1]*.

Please refer to the Data Sheets *[2]*–*[11]* for device-specific information.

1.2 TLS805x1/TLS810x1 features

- Ultra low quiescent current: 5 µA to 10 µA
- Wide input voltage range: 2.75 V to 42 V
- Output current capacity up to 50 mA[1)]/100 mA[2)]
- Shutdown current less than 1 µA[3)]
- Low drop out voltage
- Output overcurrent protection
- Overtemperature shutdown
- Enable[3)]
- Reset[4)]
- Wide temperature range
- Green product (RoHS compliant)
- AEC Qualified

1.3 Block diagram

Figure 1 shows the block diagram of TLS810D1, which represents the full feature version of a complete family of regulators with several options in respect to output voltage, output current capability and feature set.

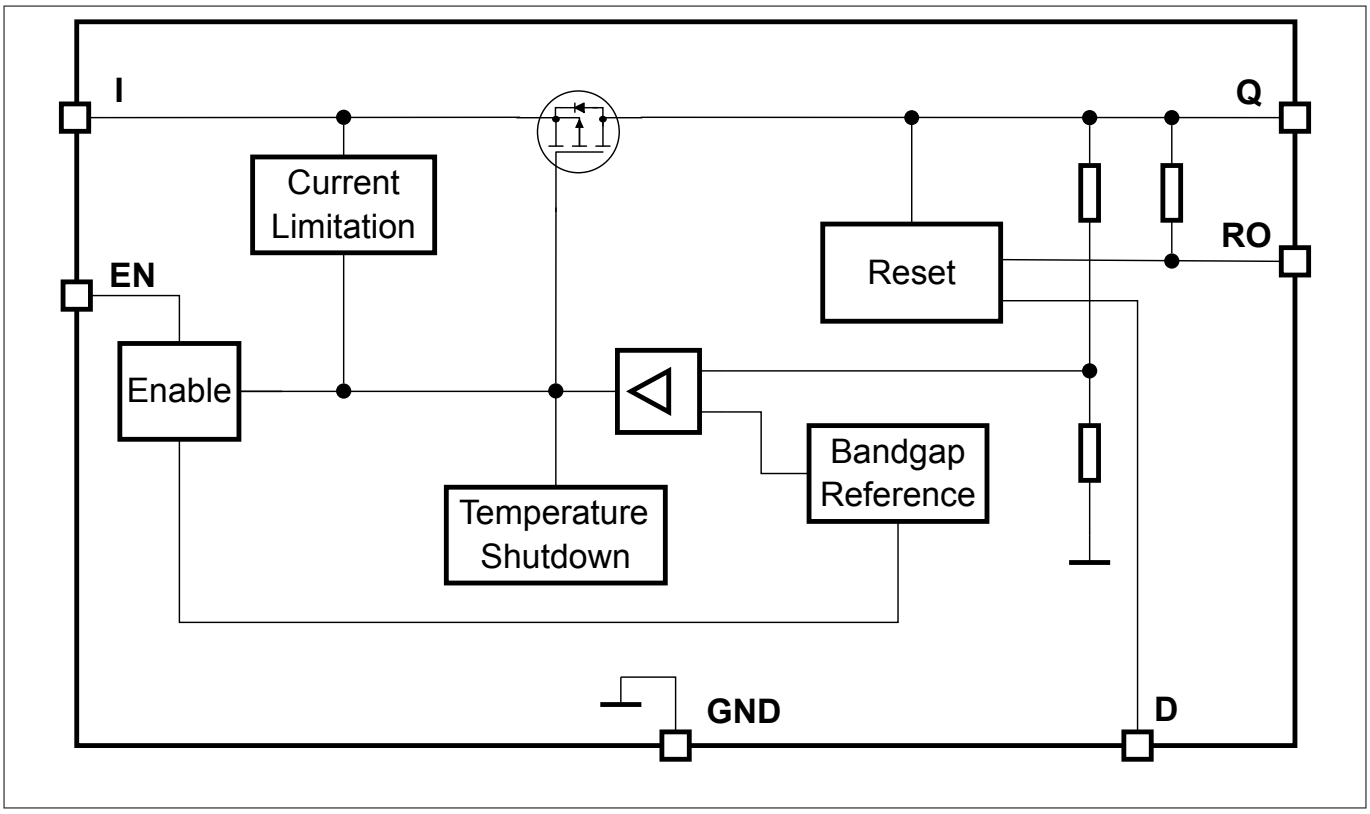


Figure 1 Block diagram of TLS810D1

1 TLS805x1
2 TLS810x1
3 TLS805/810B1, TLS805/810D1
4 TLS805/810C1, TLS805/810D1

2 Demoboard

The TLS805x1LD/TLS810x1LD Demoboard is available for all family members in a PG-TSON-10 package (see the device list in ***Table 1***).

Figure 2 shows a TLS805x1LD/TLS810x1LD Demoboard equipped with TLS810D1LDV50.

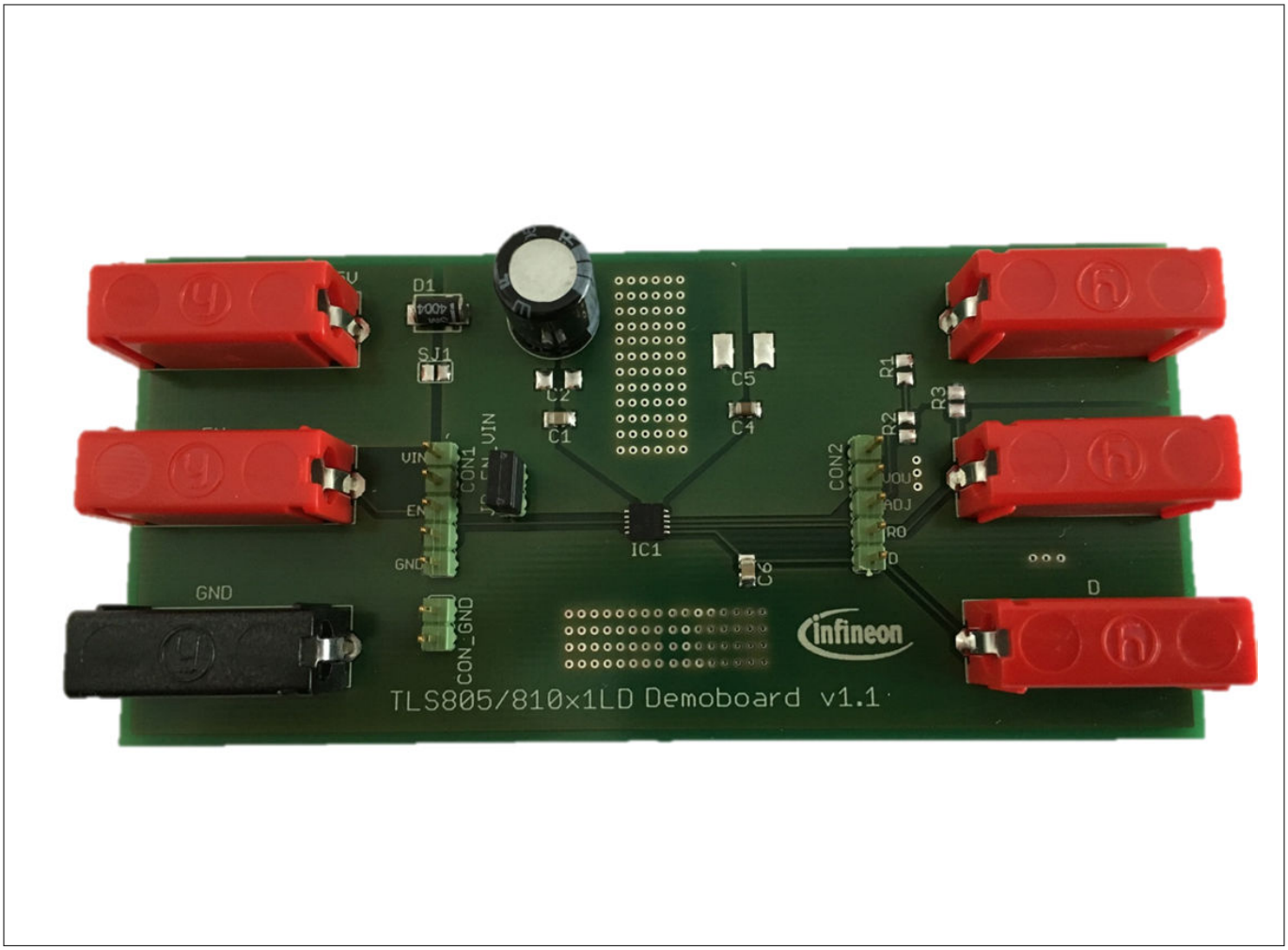


Figure 2 TLS805x1LD/TLS810x1LD Demoboard

2.1 Operating conditions

To avoid electrical damage of the Demoboard, the operating range defined in ***Table 2*** must be followed.

Table 2 Operating range[1)]

Parameter	Symbol	Limit values		Unit	Note
		Min.	Max.		
Board supply[2)]	VIN	0	45	V	Power supply
Regulator output	VOUT	0	7[3)]/45[4)]	V	Regulated output voltage
Enable input signal	EN	0	45[5)]	V	Enable signal to switch on the regulator
Reset output signal	RO	0	7[5)]	V	Indicates, whether reset has occurred
Delay capacitor pin	D	0	7[5)]	V	Connecting the delay capacitor for reset
Ground	GND	0	0	V	System GND

2.2 Demoboard configuration

The TLS805x1LD/TLS810x1LD Demoboard can be easily configured via jumpers on the board. The board provides the following configuration options:

- Bypassing the reverse protection diode D1 via soldering option SJ1
- Connecting the Enable input signal to the supply voltage VIN (JP_EN_VIN)
- Placeholder for additional input capacitor (C2)
- Placeholder for additional output capacitor (C5)
- Placeholder for external voltage divider for the adjustable output voltage variants (R1, R2)
- Placeholder for pull up resistor on Reset output signal (R3)

2.2.1 Enable function

The jumper JP_EN_VIN can be used to connect the EN signal to the supply voltage VIN.

Table 3 Jumper JP_EN_VIN setting for enable function

JP_EN_VIN	Enable function
set	EN is connected to the supply voltage VIN; the regulator is enabled while it is supplied
open	EN is supplied from external via connector EN (Banana jack)[6)]

2.2.2 Signal adaption

The connectors CON1, CON2 and CON_GND permit easy signal adaption, for example with probes for an oscilloscope.

1 The Demoboard operates at an ambient temperature of 25°C
2 Functional input voltage range: 2.75 V to 42 V
3 Absolute maximum rating of fixed output voltage versions; nominal output voltage depends on the voltage version.
4 Absolute maximum rating of the adjustable output voltage version
5 Absolute maximum rating
6 Without supplying a signal to EN, the regulator is disabled because of an internal pull down resistor

Table 4 Signals on connector

Connector	Accessible signal
CON1	• VIN (input voltage) • EN (Enable input signal) • GND (ground)
CON2	• VOUT (output voltage) • ADJ (adjust signal) • RO (Reset output signal) • D (delay capacitor pin)
CON_GND	GND (ground)

2.2.3 Output voltage adjust

For the regulators with adjustable output voltage, an external resistor divider connected to the adjust pin ADJ sets the output voltage in the range of 1.2 V to $V_I - V_{dr}$.

The output voltage is easily calculated when neglecting the current flowing into the ADJ pin:

$$V_Q = \frac{R_1 + R_2}{R_2} \times V_{ref}$$

Equation 1

with

- V_{ref}: internal reference voltage, typically 1.2 V
- R_1: resistor between regulator output Q and adjust pin ADJ
- R_2: resistor between adjust pin ADJ and GND

In order to neglect the current flowing into the ADJ pin, the values of R_1 and R_2 must be selected according to the criterion $R_2 \leq 250$ kΩ.

To set the output voltage to 1.2 V, the adjust pin ADJ must be directly connected to the output pin Q.

On the Demoboard equipped with TLS805B1LDV, the resistors R_1 and R_2 with the following values are mounted by default :

- $R_1 = 470$ kΩ
- $R_2 = 150$ kΩ

The nominal output voltage with the default resistor divider setting on the Demoboard is typically 4.96 V.

3 Schematic and layout

3.1 Schematic

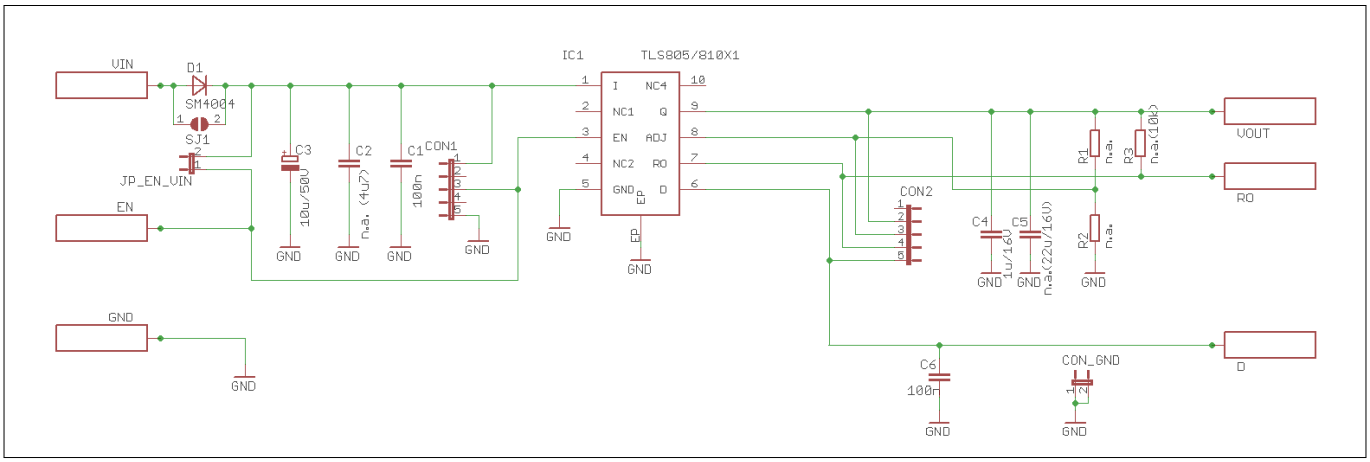


Figure 3 Schematic of TLS805x1LD/TLS810x1LD Demoboard

3.2 Layout

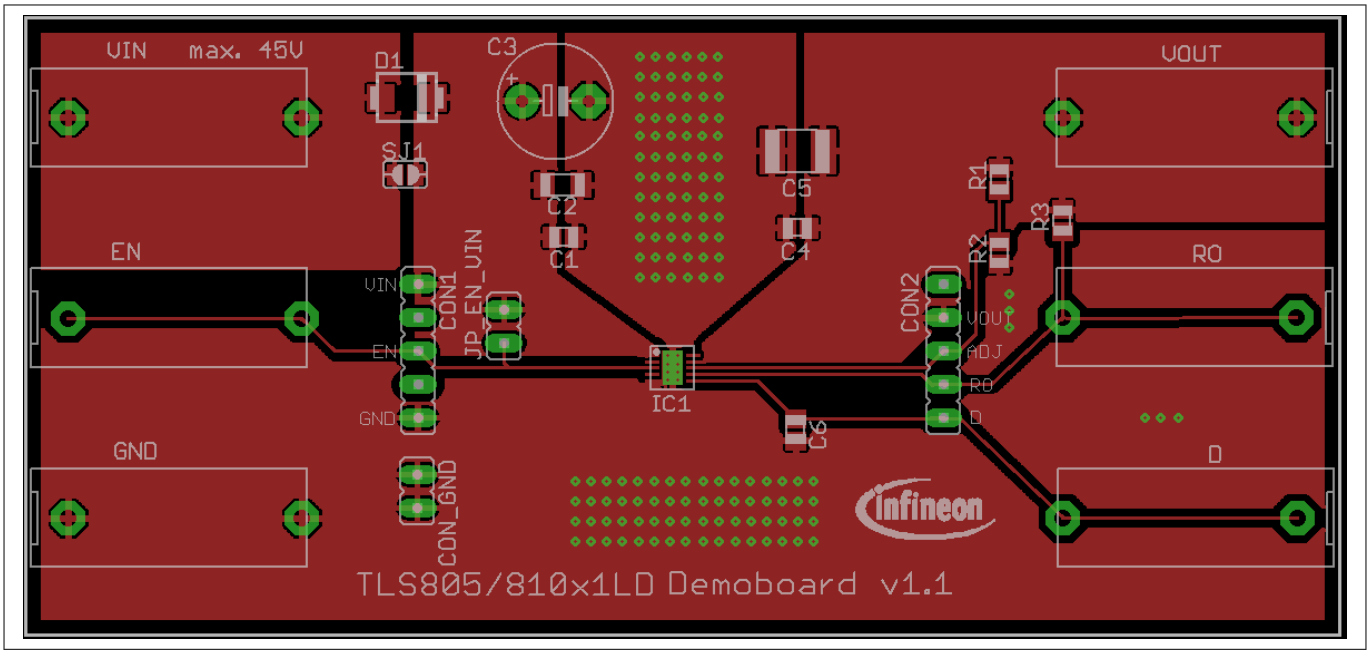


Figure 4 Top layer of TLS805x1LD/TLS810x1LD Demoboard

Schematic and layout

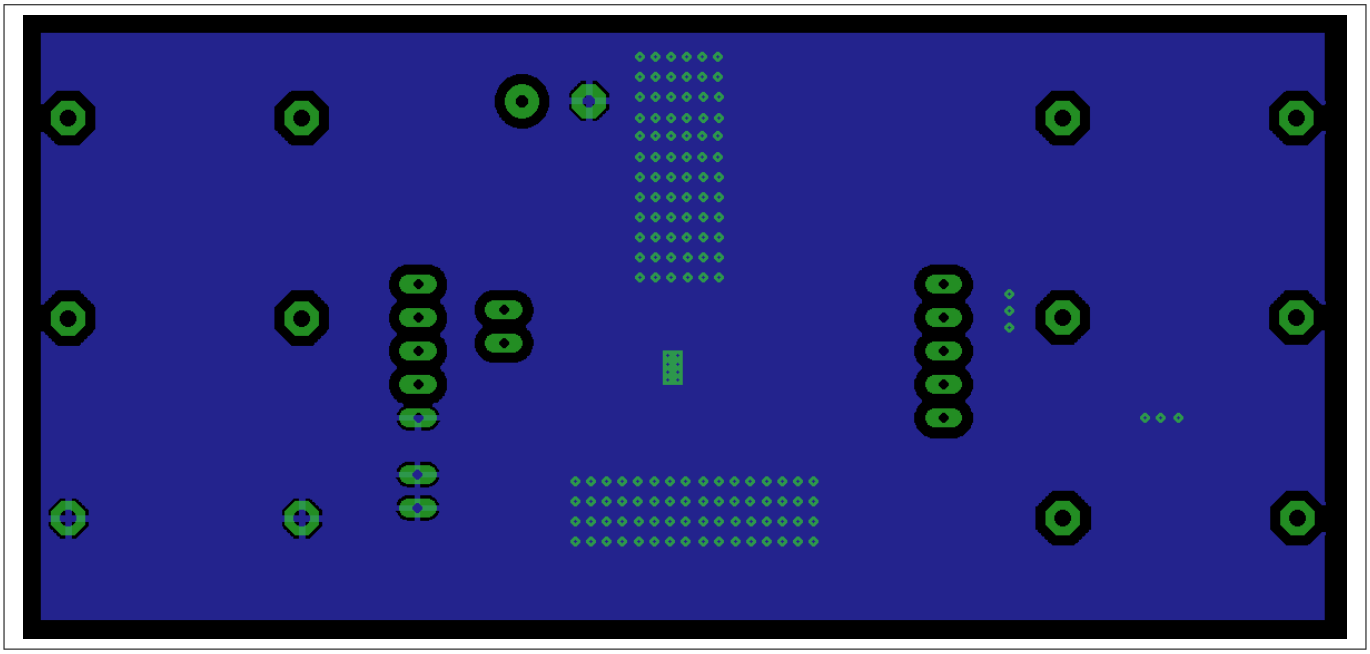


Figure 5 Bottom layer of TLS805x1LD/TLS810x1LD Demoboard

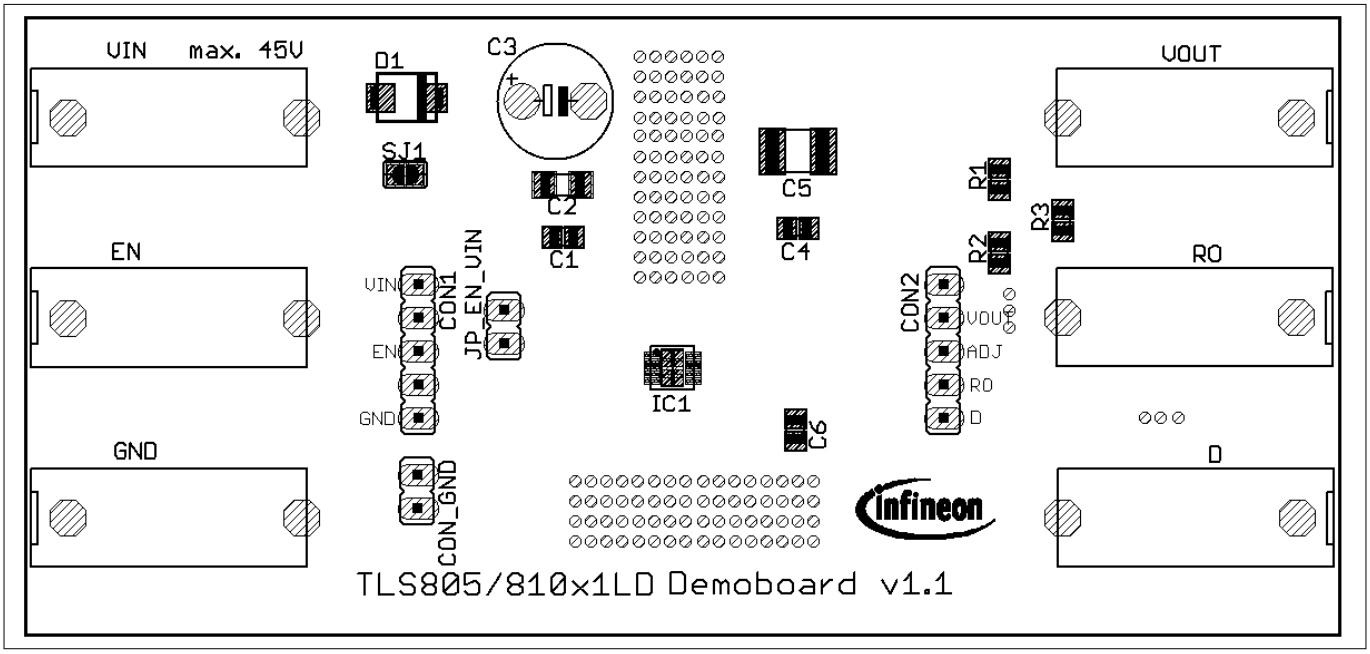


Figure 6 Top layer components of TLS805x1LD/TLS810x1LD Demoboard

4 Bill of material

Table 5 Bill of Material

Part	Value	Package
VIN	Banana jack	BABU4MM
VOUT	Banana jack	BABU4MM
EN	Banana jack	BABU4MM
D	Banana jack	BABU4MM
RO	Banana jack	BABU4MM
GND	Banana jack	BABU4MM
R1	n.a. / 470 kΩ	R0805
R2	n.a. / 150 kΩ	R0805
R3	n.a. (10 kΩ)	R0805
C1	100 nF/50 V	C0805
C2	n.a. (4.7 µF/50 V)	C1206
C3	10 µF/50 V	E5-8.5
C4	1 µF/16 V	C0805
C5	n.a. (10 µF/16 V)	C1812
C6	100 nF/16 V	C0805
CON1	5 pin connector	
CON2	5 pin connector	
CON_GND	2 pin connector	
JP_EN_VIN		jumper
SJ1		solder jumper
D1	SM4004	diode
IC1	TLS805/810x1LD	PG-TSON-10

5 Restrictions

This Demoboard offers limited features only for evaluation and testing of Infineon products. The Demoboard is not an end product (or finished appliance), nor is it intended or authorized by Infineon to be integrated into end products. The Demoboard may not be used in any production system.

For further information please contact ***www.infineon.com***.

6 References

Table 6

Number	Bibliography
[1]	What The Designer Should Know – Introduction to Automotive Linear Voltage Regulators. Infineon Technologies AG
[2]	TLS810A1LDV50 Data Sheet, Infineon Technologies AG
[3]	TLS810A1LDV33 Data Sheet, Infineon Technologies AG
[4]	TLS810B1LDV50 Data Sheet, Infineon Technologies AG
[5]	TLS810B1LDV33 Data Sheet, Infineon Technologies AG
[6]	TLS810D1LDV50 Data Sheet, Infineon Technologies AG
[7]	TLS810D1LDV33 Data Sheet, Infineon Technologies AG
[8]	TLS805B1LDV50 Data Sheet, Infineon Technologies AG
[9]	TLS805B1LDV33 Data Sheet, Infineon Technologies AG
[10]	TLS805B1LDV Data Sheet, Infineon Technologies AG
[11]	TLS805D1LDV50 Data Sheet, Infineon Technologies AG

7 Revision history

Revision	Date	Changes
1.01	2017-02-13	Editorial changes
1.0	2016-06-02	Initial version

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