

# **OPTIREG™ Linear TLS715B0NAV50 Demoboard**

## **Low Dropout Linear Voltage Regulator**

### **About this document**

#### **Scope and purpose**

This document provides information about the usage of the TLS715B0NAV50 Demoboard.

The OPTIREG™ Linear TLS715B0NAV50 is a voltage regulator with ultra low quiescent current from Infineon Technologies AG. The OPTIREG™ Linear TLS715B0NAV50 is available in the PG-TSNP-7 package.

Please also refer to the corresponding Data Sheet for device-specific information.

#### **Intended audience**

This document is as intended for engineers who develop applications.

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## Introduction

# 1 Introduction

This document describes the demoboard for the TLS715B0NAV50 and explains its functionality. It includes a brief summary of the used passive components, as well as a short explanation on how to use the demoboard correctly. The description of the TLS715B0NAV50 is not subject of this document. Specifications and parameters for the device shall be taken from the corresponding datasheet.

**Table 1** provides an overview of the family members of TLS710/TLS715B0 voltage regulators.

**Table 1 FamilyOverview**

Type	Output voltage	Output current	Dropout voltage	Enable	Package
TLS715B0NAV50	5.0 V	150 mA	180 mV	Yes	PG-TSNP-7
TLS710B0EJV50	5.0 V	100 mA	200 mV	Yes	PG-DSO-8 EP
TLS715B0EJV50	5.0 V	150 mA	200 mV	Yes	PG-DSO-8 EP

## 1.1 General Description

The OPTIREG™ Linear TLS715B0NAV50 is a low dropout linear voltage regulator for load current up to 150 mA. An input voltage of up to 40V is regulated to  $V_{Q,nom} = 5\text{ V}$  with  $\pm 2\%$  precision.

The TLS715B0NAV50, with a typical quiescent current of 36  $\mu\text{A}$ , is the ideal solution for systems requiring very low operating current, such as those permanently connected to the battery.

It features a very low dropout voltage of 180 mV, when the output current is less than 100 mA. In addition, the dropout region begins at input voltages of 4.0 V (extended operating range). This makes the TLS715B0NAV50 suitable to supply automotive systems with start-stop requirements.

The device can be switched on and off by the Enable feature.

In addition, the new fast regulation concept of the TLS715B0NAV50 requires only a single 1 $\mu\text{F}$  output capacitor to maintain stable regulation.

The device is designed for the harsh environment of automotive applications. Therefore, standard features like output current limitation and overtemperature shutdown are implemented and protect the device against failures like output short circuit to GND, over-current and over-temperature. The TLS715B0NAV50 can be also used in all other applications requiring a stabilized 5 V supply voltage.

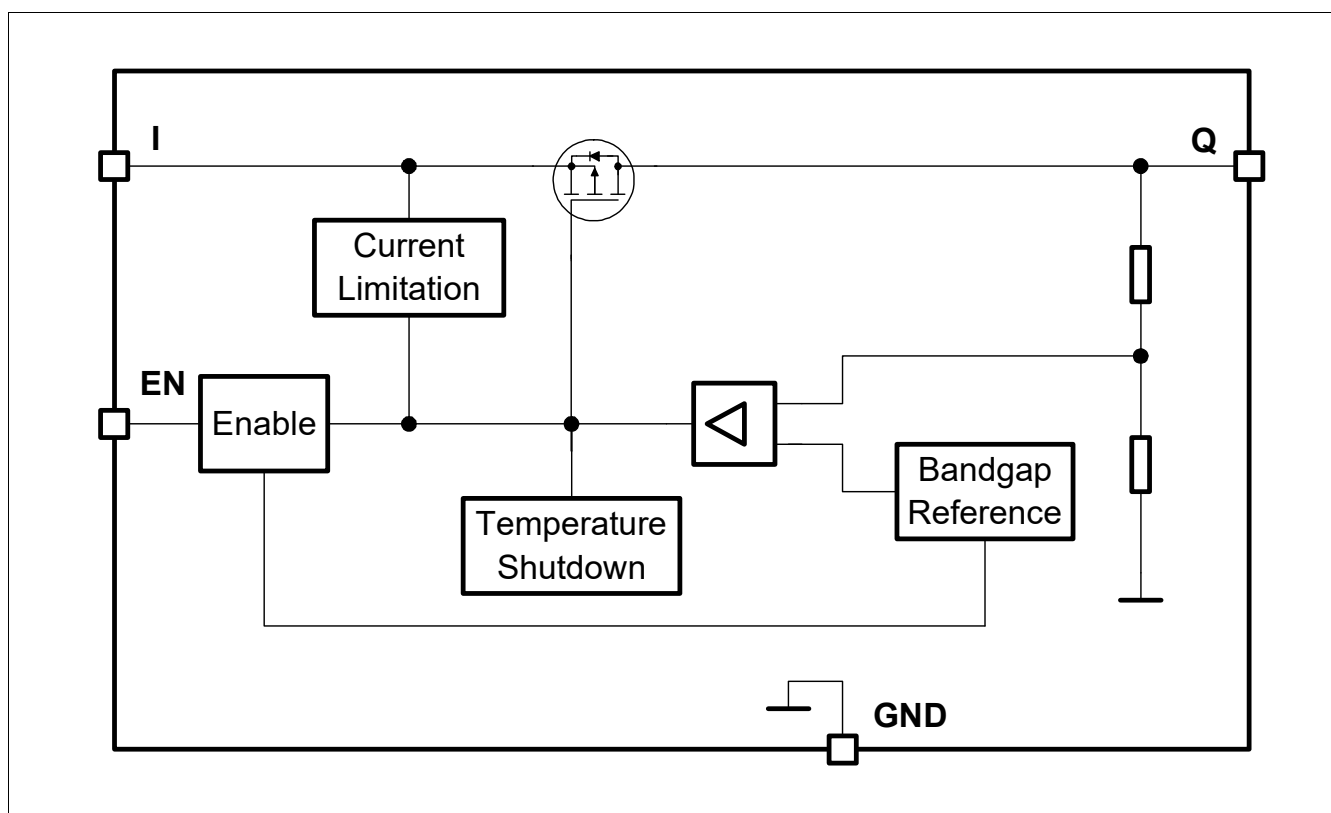
## Introduction

### 1.2 TLS715B0NAV50 Feature List

- Wide input voltage range from 4.0 V to 40 V
- Output voltage 5 V
- Output voltage accuracy  $\pm 2\%$
- Output current up 150 mA
- Low current consumption of 36  $\mu\text{A}$
- Very low dropout voltage of typ. 180 mV at 100 mA output current
- Stable with small output capacitor of 1  $\mu\text{F}$
- Enable
- Overtemperature shutdown
- Output current limitation
- Wide temperature range from  $-40\text{ }^\circ\text{C}$  up to  $150\text{ }^\circ\text{C}$
- Green Product (RoHS compliant)

### 1.3 Block Diagram

**Figure 1** shows the block diagram of TLS715B0NAV50.



**Figure 1** Block Diagram of TLS715B0NAV50

Demoboard

## 2 Demoboard

Figure 2 shows a TLS715B0NAV50 Demoboard.

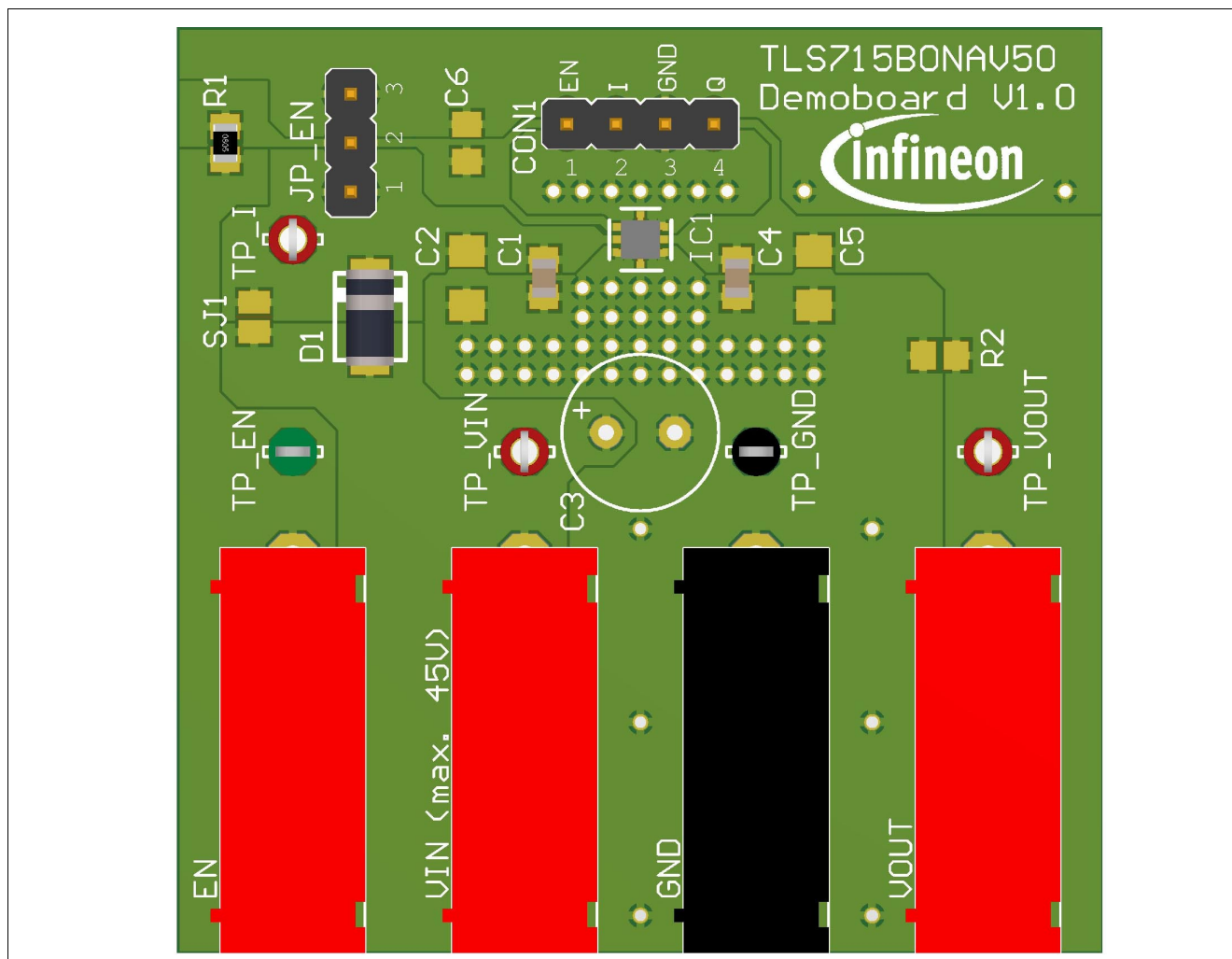


Figure 2 TLS715B0NAV50 Demo Board

**Demoboard**

**2.1 Operating Conditions**

To avoid any electrical damage of the Demoboard, the maximum operating range defined in [Table 2](#) must be followed.

**Table 2 Operating Range<sup>1)</sup>**

Parameter	Symbol	Limit Values		Unit	Note
		Min.	Max.		
Board Supply <sup>2)</sup>	VIN	0	45	V	Power supply
Regulator Output	VOUT	0	7	V	Regulated output voltage
Enable Signal	EN	0	45 <sup>3)</sup>	V	Enable signal to switch on the regulator
Ground	GND	0	0	V	System GND

- 1) The Demo Board operates at ambient temperature of 25°C.
- 2) Functional input voltage range starts from 4 V to 40 V.
- 3) Absolute max rating.

**2.2 Board Configuration**

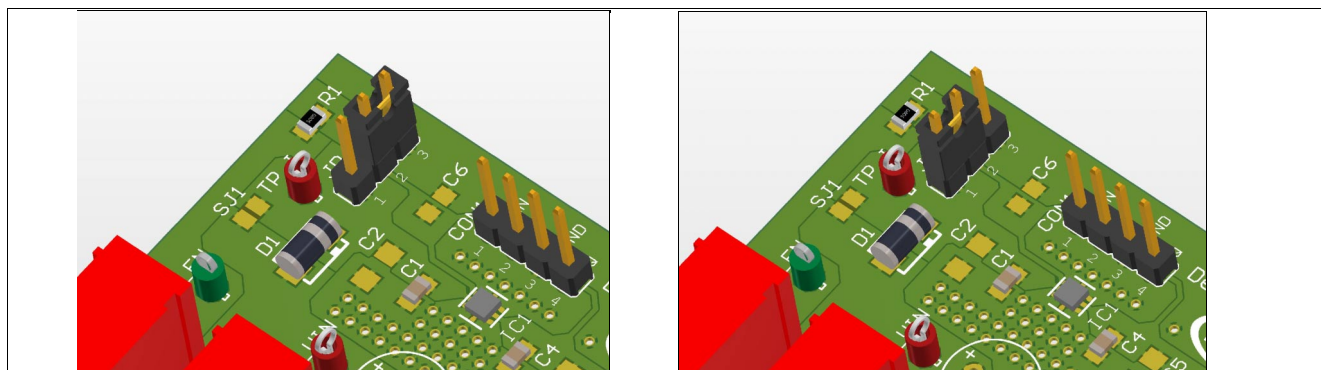
The TLS715B0NAV50 Demoboard can be easily configured via jumpers on the board. The board provides the following configuration options:

- Bypassing the reverse protection diode D2 via solder option SJ1
- Connecting enable signal with the supply voltage VIN (CON1)
- Placeholder for additional input capacitor (C2)
- Placeholder for additional output capacitor (C5)
- Placeholder for additional bulk input capacitor (C3)
- Placeholder for EN-input filter capacitance (C6)

**Demoboard**

**2.2.1 Enable Function**

The jumper on the pin header JP\_EN1 can be used to connect the EN signal to a external source via the corresponding banana jack, or to GND, or to VIN. An overview of the different options is given in [Table 3 “Jumper JP\\_EN1 setting for enable function” on Page 7.](#)



**Figure 3 Illustration of the two possible jumper positions**

**Table 3 Jumper JP\_EN1 setting for enable function**

JP_EN1	Enable Function
open	EN is connected to the EN banana jack and can be driven by an external source <sup>1)</sup> Please consider placing C6 in this configuration to buffer EN when using long supply leads
Short pins 1,2	EN is connected to the supply voltage VIN; the regulator is enabled when it is supplied
Short pins 2,3	EN is shorted to GND and the regulator remains disabled

1) When no signal is applied externally, the regulator will remain disabled due to the internal pull-down resistor on EN

**2.2.2 Signal Adaption**

For easy signal adaption e.g. connecting probes for an oscilloscope, connectors TP\_VIN, TP\_I , TP\_EN, TP\_VOUT and TP\_GND can be used.

**Table 4 Signals on connector**

Connector	Accessible Signals
TP_VIN	- VIN (input voltage including reverse polarity protection diode)
TP_I	- Regulator pin input voltage
TP_EN	- EN (enable input signal)
TP_VOUT	- VOUT (output voltage)
TP_GND	- GND

Schematic and Layout

### 3 Schematic and Layout

#### 3.1 Schematic

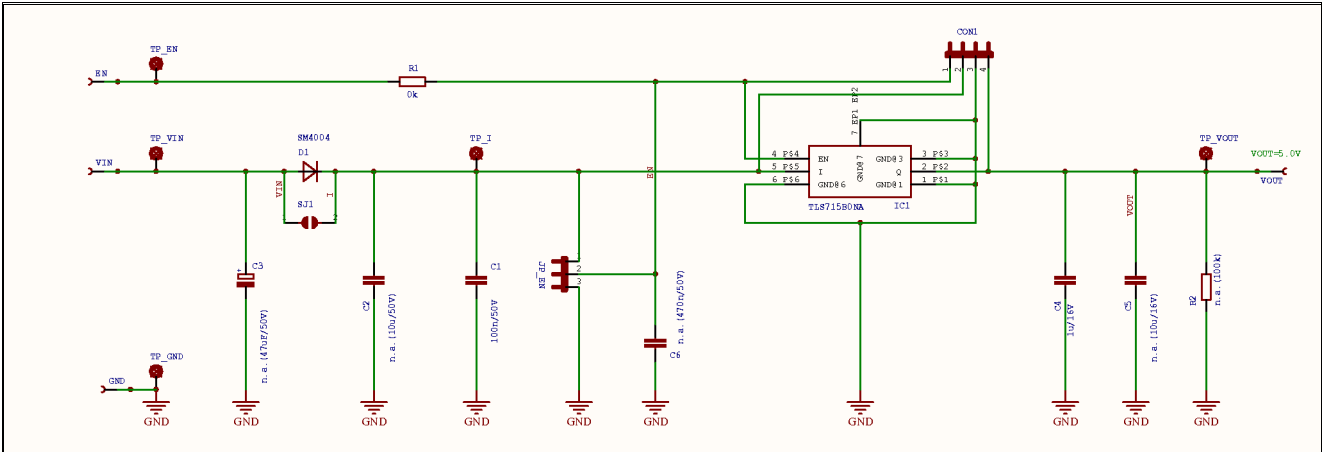


Figure 4 Schematic of TLS715B0NAV50 Demoboard

#### 3.2 Layout

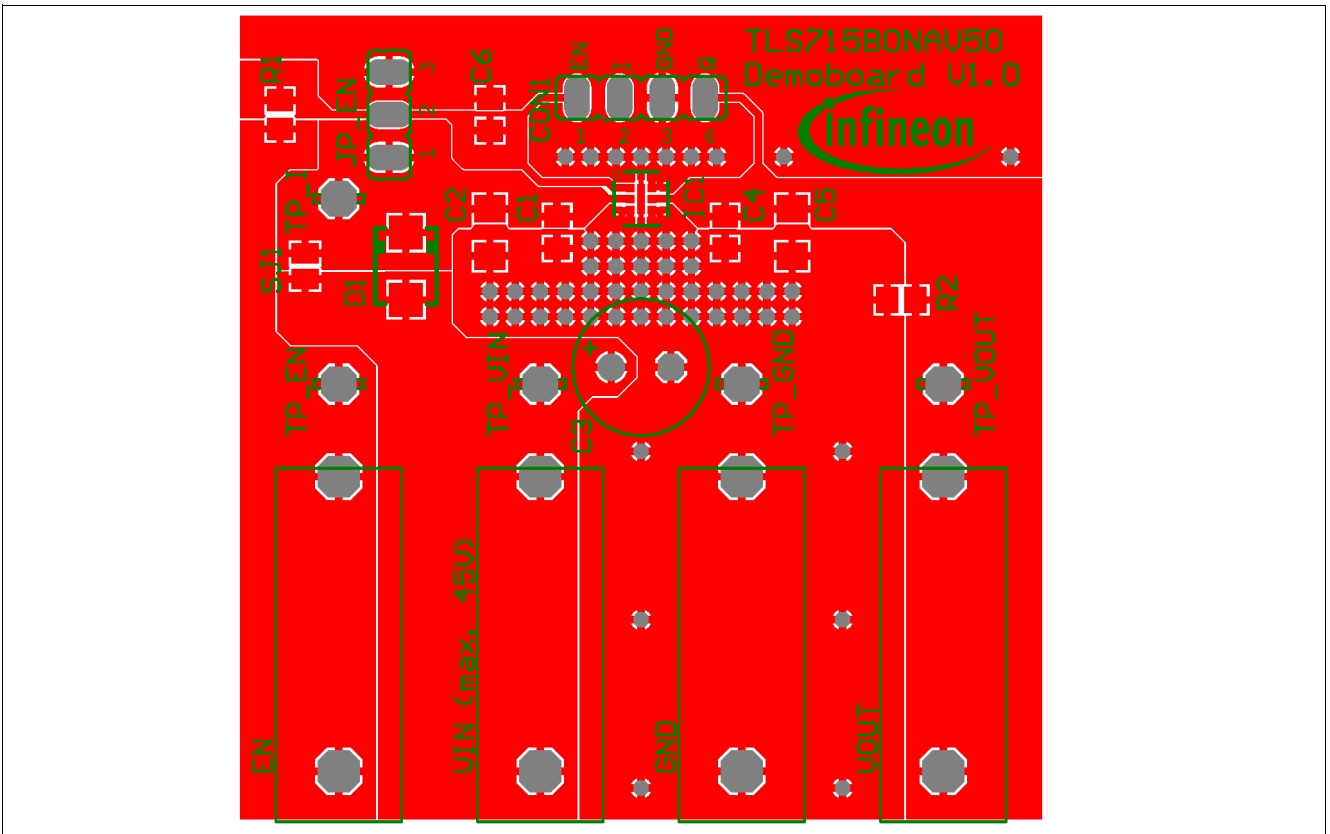


Figure 5 Top Layer of TLS715B0NAV50 Demoboard



Schematic and Layout

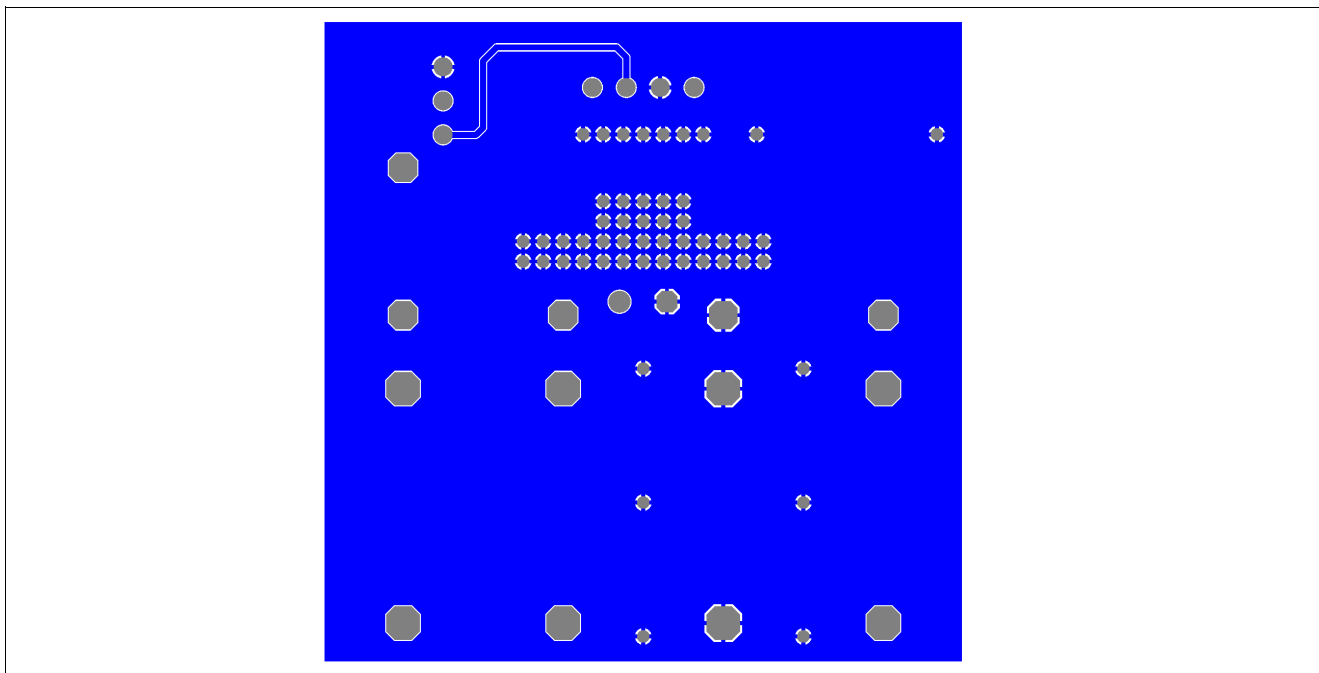


Figure 6 Bottom Layer of TLS715B0NAV50 Demoboard

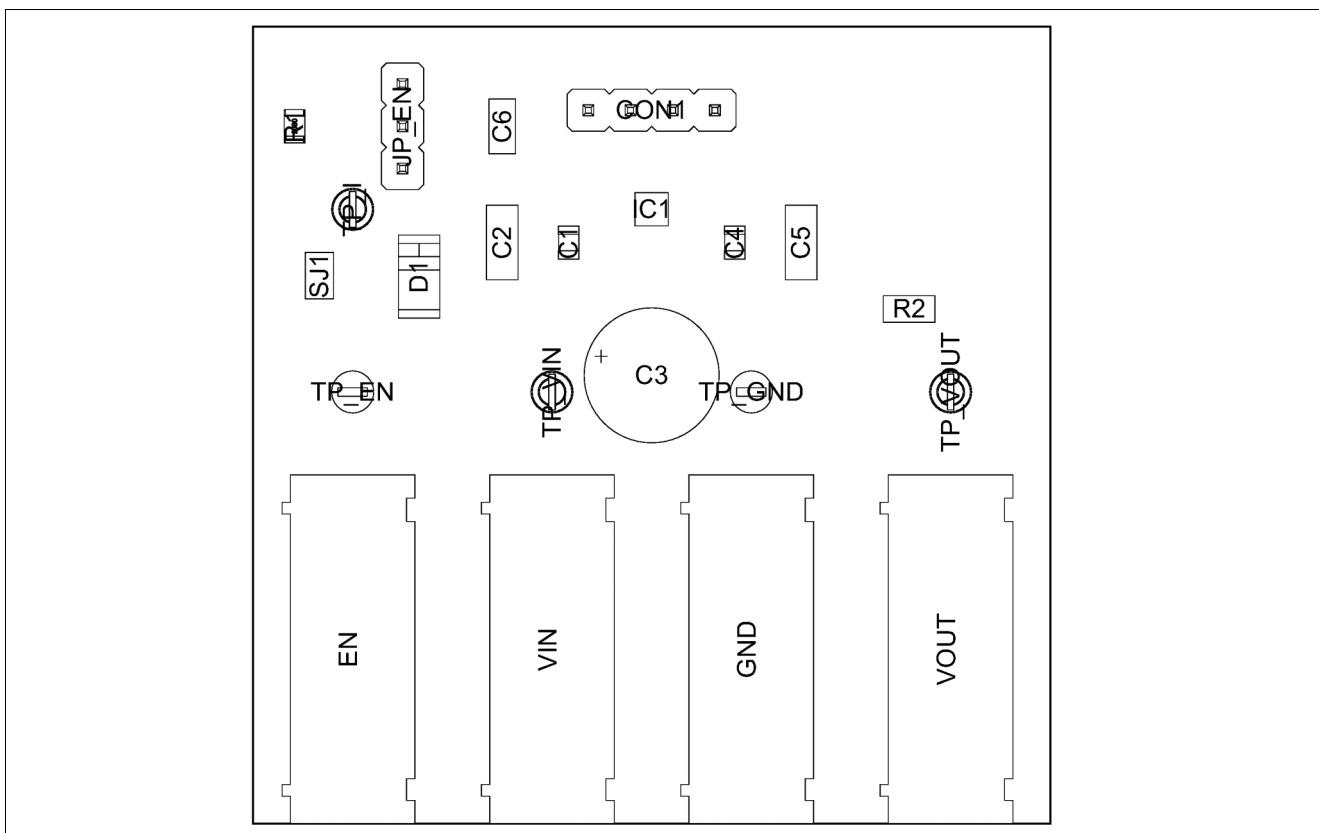


Figure 7 Top Layer components of TLS715B0NAV50 Demoboard

**Bill of Material**

**4 Bill of Material**

**Table 5 Bill of Material**

<b>Part</b>	<b>Value</b>	<b>Package</b>
VIN, VOUT, GND, EN	Banana jack	BABU4MM
C1	100 nF/50 V	C0805
C2	n.p. (10 uF/50 V)	C1206
C3	n.p. (47 uF/50V)	E5-8,5
C4	1 uF/16 V	C0805
C5	n.p. (10 uF/16 V)	C1206
C6	n.p. (470 nF/50 V)	C0805
CON1, JP_EN	-	4/3 - pin header 2.54mm pitch
D1	SM4004	SMA
R1	0Ω	R0805
R2	n.p. (100 kΩ)	R0805
TP_EN, TP_GND, TP_I, TP_VIN, TP_V OUT	-	TEST POINT, KEYSTONE 5000
SJ1	-	solder jumper
D1	SM4004	diode
IC1	TLS715B0NAV50	PG-TSNP-7

## **5 General Information**

### **5.1 Restrictions**

This Demoboard is offering limited features allowing you only to evaluate and test the 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. You are not authorized to use the Demoboard in any production system.

### **5.2 Additional Information**

- For further information you may contact <http://www.infineon.com/>

**Revision History**

## **6 Revision History**

<b>Revision</b>	<b>Date</b>	<b>Changes</b>
1.0	2019-09-24	Initial version.

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