OPTIREG™ linear voltage regulator TLS850F3TUVxx demoboard

Z8F80607085

Family overview

Support

Preface

Scope and purpose

This document describes the usage of the OPTIREG™ linear voltage regulator TLS850F3TUVxx demoboard for the TLS850F3TUV33 and TLS850F3TUV50 from Infineon Technologies AG. Please also refer to the corresponding datasheets.

Intended audience

This document is intended for engineers who develop applications.

Table of contents

1 Introduction

1.1 General description

The TLS850F3TUV33 and TLS850F3TUV50 are monolithic integrated low drop out voltage regulators for loads up to 500 mA in a PG-TO252-7 package (DPAK). With an input voltage range of 3 V to 42 V and very low quiescent current of only 26 µA, these devices are perfectly suitable for automotive or other supply systems connected to the battery permanently. Both variants provide an output voltage accuracy of ±2%.

The loop concept combines fast regulation and very good stability while requiring only one small ceramic capacitor of 1 µF at the output. The operating range starts already at an input voltage of only 3 V (extended operating range). This makes the devices also suitable to supply automotive systems that need to operate during cranking condition.

Additional features include:

- reset circuit to supervise the output voltage and delay the reset at power-on
- watchdog circuit to monitor a microcontroller
- shared external delay capacitor to set both reset timing and watchdog timing
- output current limitation
- thermal shutdown

1.2 TLS850F3TUV33 and TLS850F3TUV50 features

- Output voltage 5 V and 3.3 V ±2%
- Current capability 500 mA
- Input voltage range from 3 V to 42 V
- Stable with 1 µF ceramic output capacitor
- Ultra low current consumption: typically 26 µA
- Very low drop out voltage: typically 300 mV at 250 mA
- Watchdog circuit for monitoring a microprocessor
- Watchdog inhibit
- Reset circuit supervises the output voltage
  - Programmable delay time
- Output current limitation
- Overtemperature shutdown
- Automotive temperature range T_j = -40°C to 150°C
- Green Product (RoHS compliant)

1.3 Block diagram

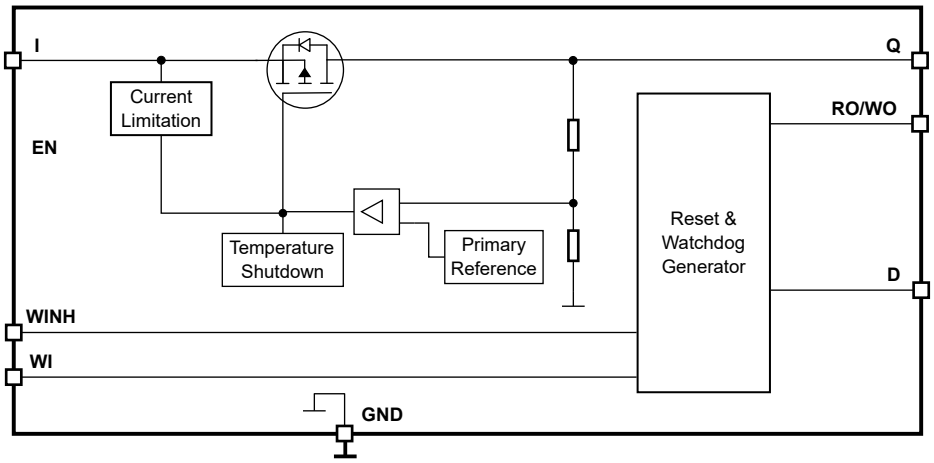

Figure 1 Block diagram TLS850F3TUVxx

2 Demoboard

2.1 Assembly

There are two different demoboard assemblies available. One for the TLS850F3TUV33 and one for the TLS850F3TUV50.

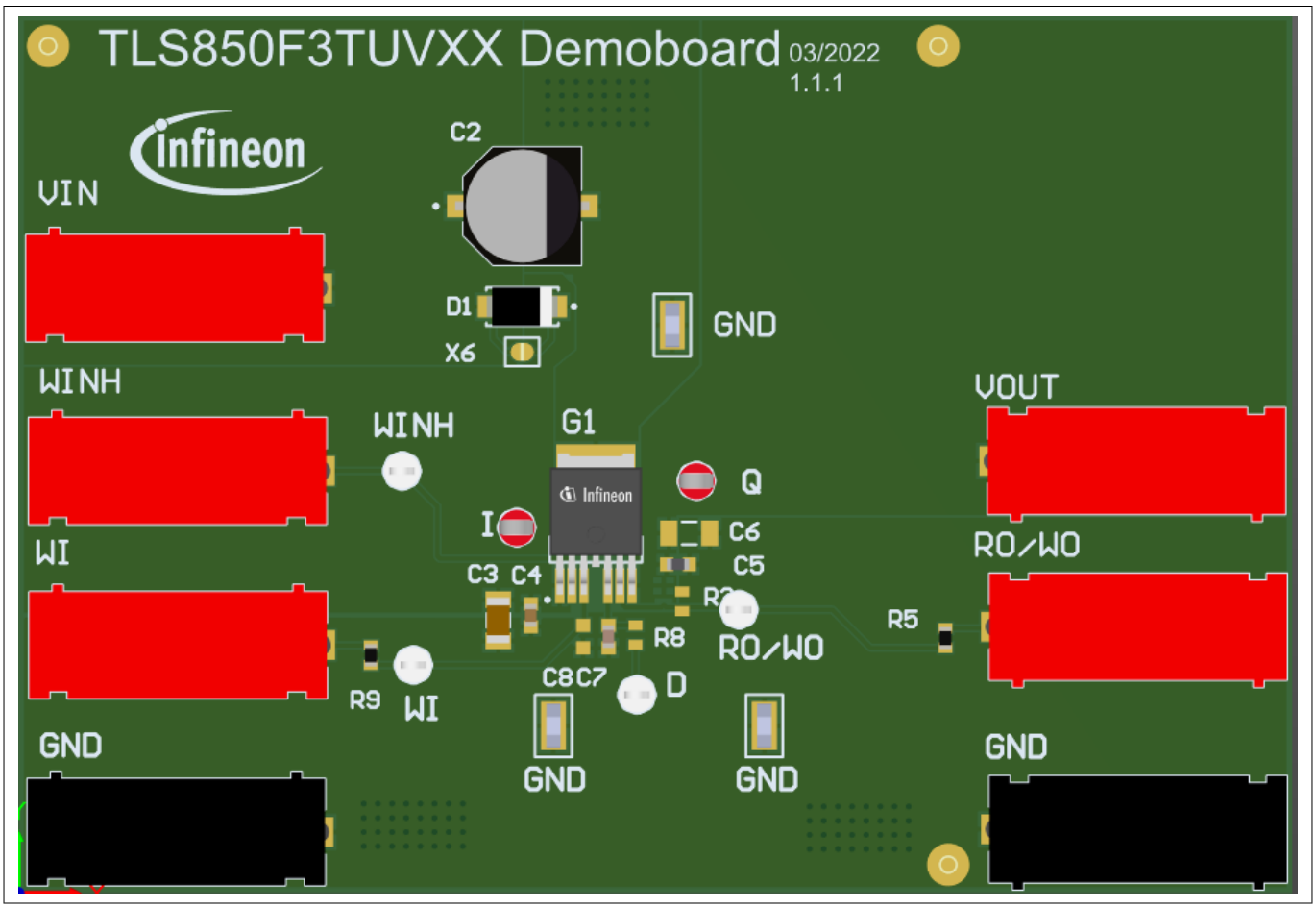

Figure 2 Assembly TLS850F3TUVxx demoboard

2.2 Operating conditions

To avoid electrical damage of the demoboard, the values in Table 1 must be maintained.

Table 1 Limit values for operation[1)]

Parameter	Symbol[2)]	Values			Unit	Note or condition
		Min.	Typ.	Max.		
Board supply voltage	V_{IN}	0	–	42	V	–
Output voltage	V_Q	-0.3	–	7	V	3)
Output current	I_Q	0	–	500	mA	Limited by overcurrent protection
Watchdog inhibit	V_{WINH}	-0.3	–	7	V	3)
Reset output/watchdog output	$V_{RO/WO}$	-0.3	–	7	V	3)
Watchdog input	V_{WI}	-0.3	–	7	V	3)
Ground voltage	V_{GND}	0	–	0	V	–

1) T_A = 25°C.
2) Symbols refer to the connectors of the demoboard.
3) Absolute maximum rating.

2.3 Configuration

The demoboard has no configuration options.

2.3.1 Signal adaption

For easy signal adaption, for example connecting probes of an oscilloscope, test points are scattered across the PCB. The label of each test point indicates the probed signal. For further information on the mapping between test points and signals see Figure 4. The GND clip of the probe can be attached to one of several ground hooks as shown in Figure 3.

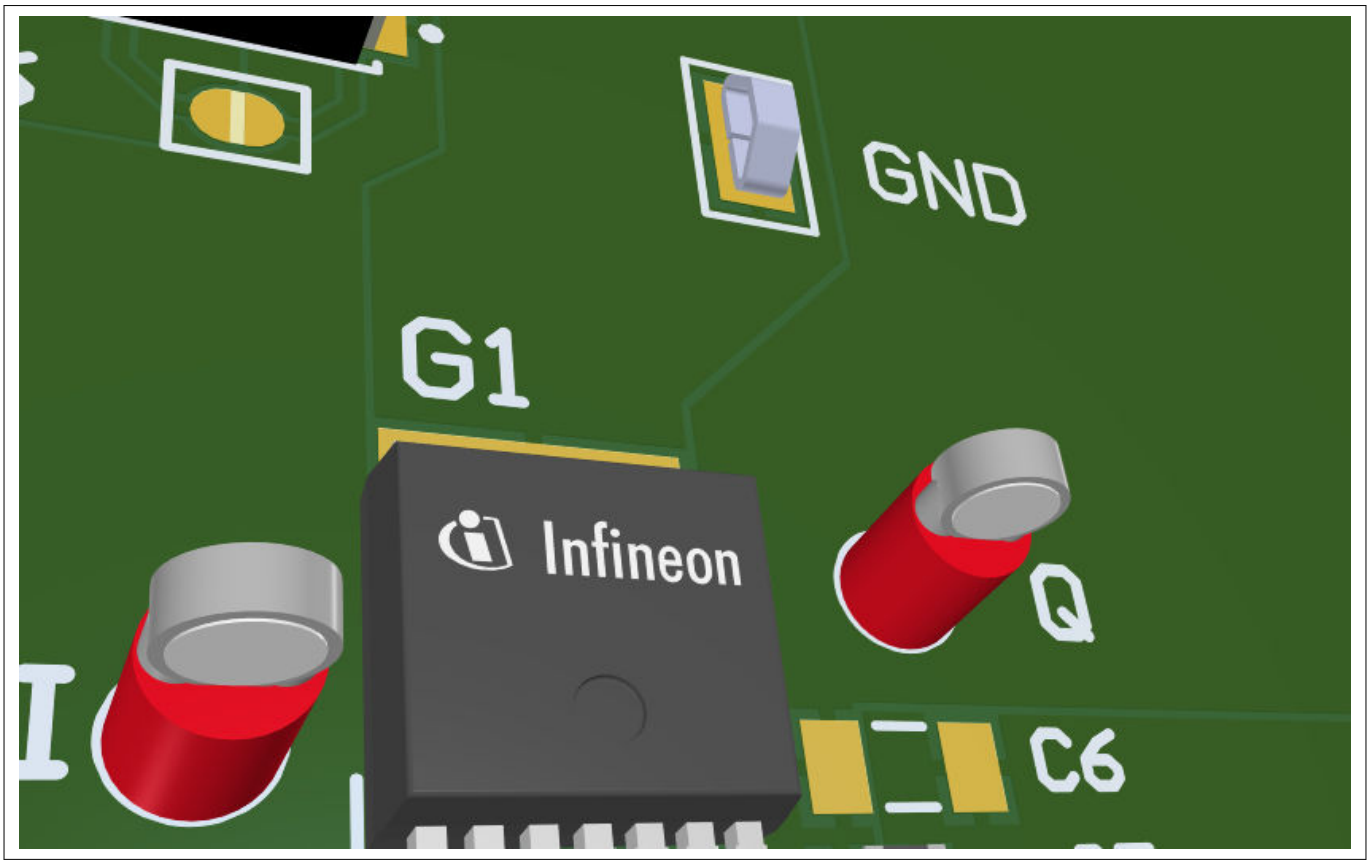

Figure 3 Testpoint and GND hook example

2.4 Connectors

Table 2 Connectors and device pin mapping

Label	PIN	Function
VIN	I	Regulator input
WINH	WINH	Watchdog inhibit input: "Low" activates the watchdog function. "High" deactivates the watchdog function. This pin has an integrated pull-down resistor.
WI	WI	Watchdog input: Serve watchdog with trigger input signal. This pin has an integrated pull-down resistor.
VOUT	Q	Regulator output
RO/WO	RO/WO	Reset output/Watchdog output: This pin has an integrated pull-up resistor to Q. It is an open collector output. If the reset and watchdog functions are not needed, then leave this pin open.
GND_VOUT, GND_VIN	GND	Ground

3 Schematic and layout

3.1 Schematic

The schematic in Figure 4 is assembled with either the TLS850F3TUV33 or the TLS850F3TUV50 mounted. Not mounted parts are optional and marked with a red cross.

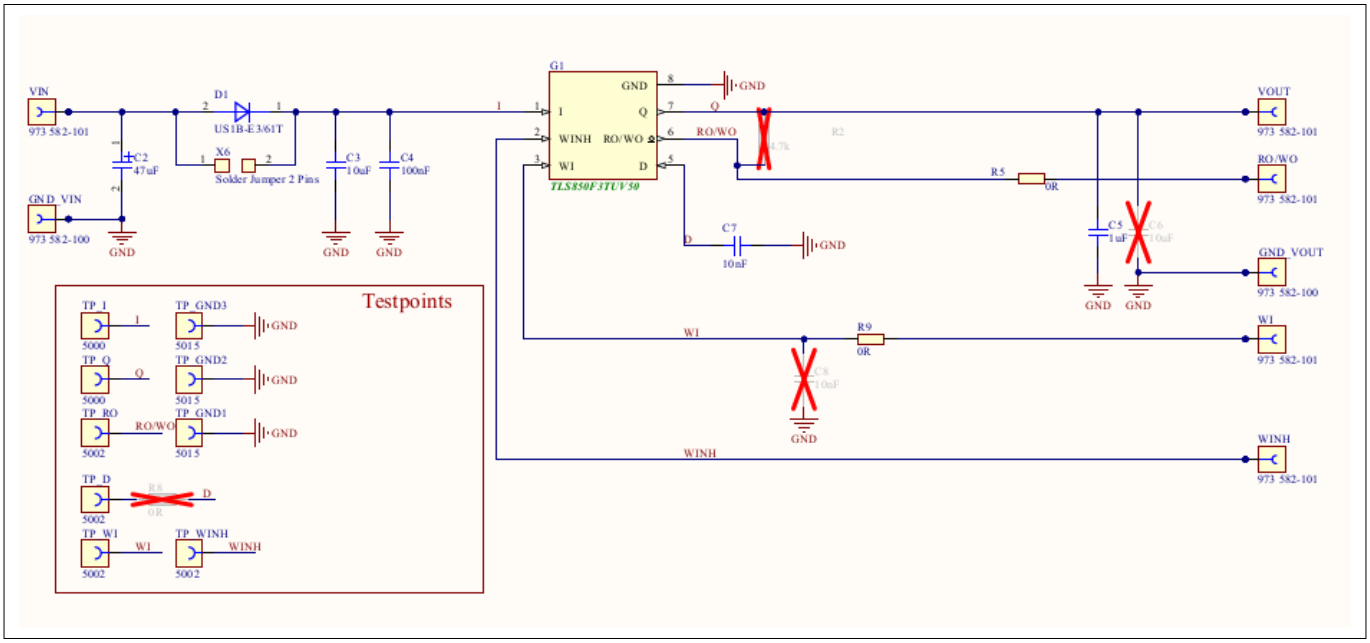

Figure 4 Schematic TLS850F3TUVxx demoboard

3.2 Layout

The PCB uses a four layer standard stack-up. The product can also be soldered to double layer boards. However, four layers offer better thermal characteristics. The configuration on this demoboard is comparable to the 2s2p thermal interface situation.

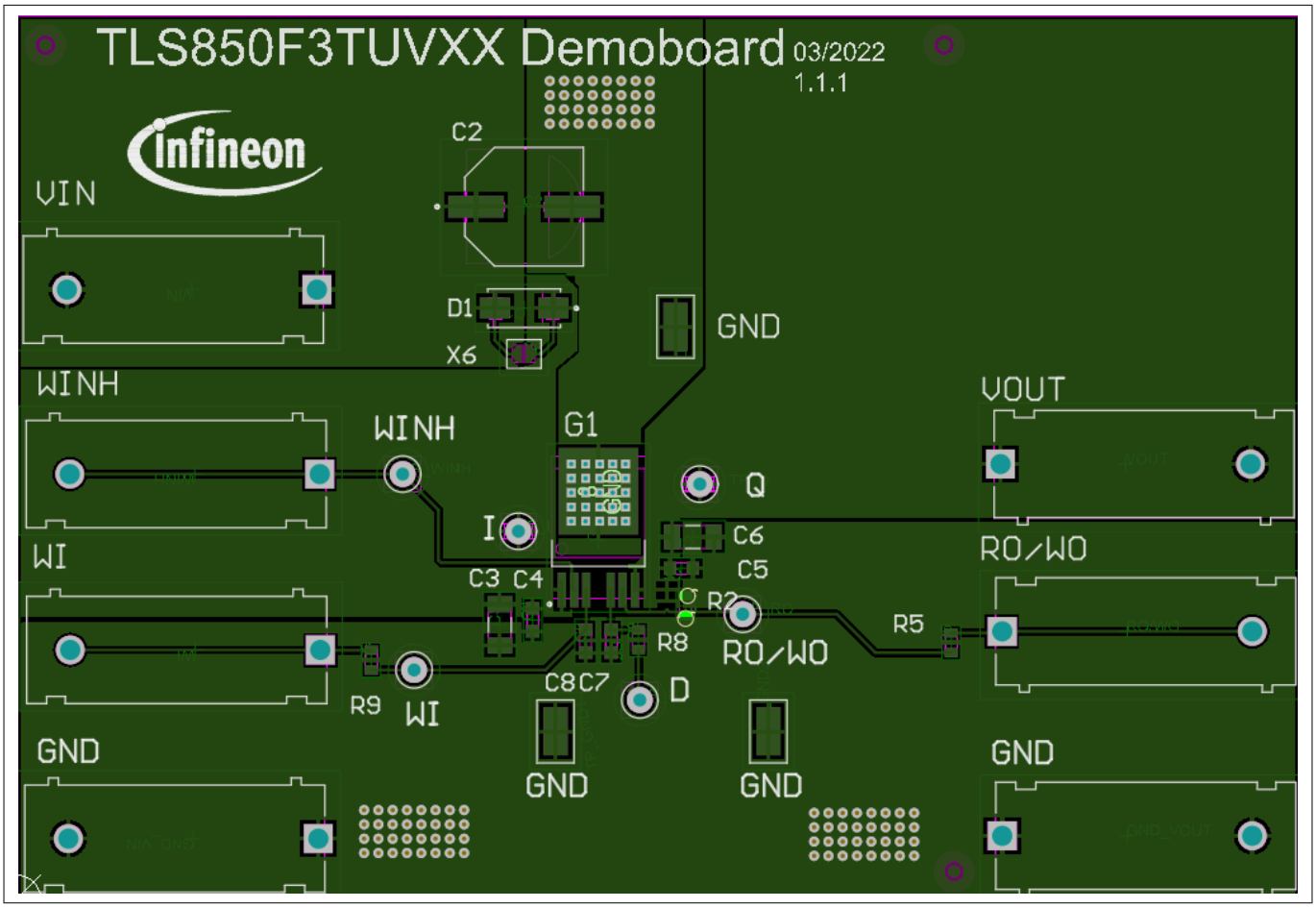

Figure 5 Top layer and components TLS850F3TUVxx demoboard

3 Schematic and layout

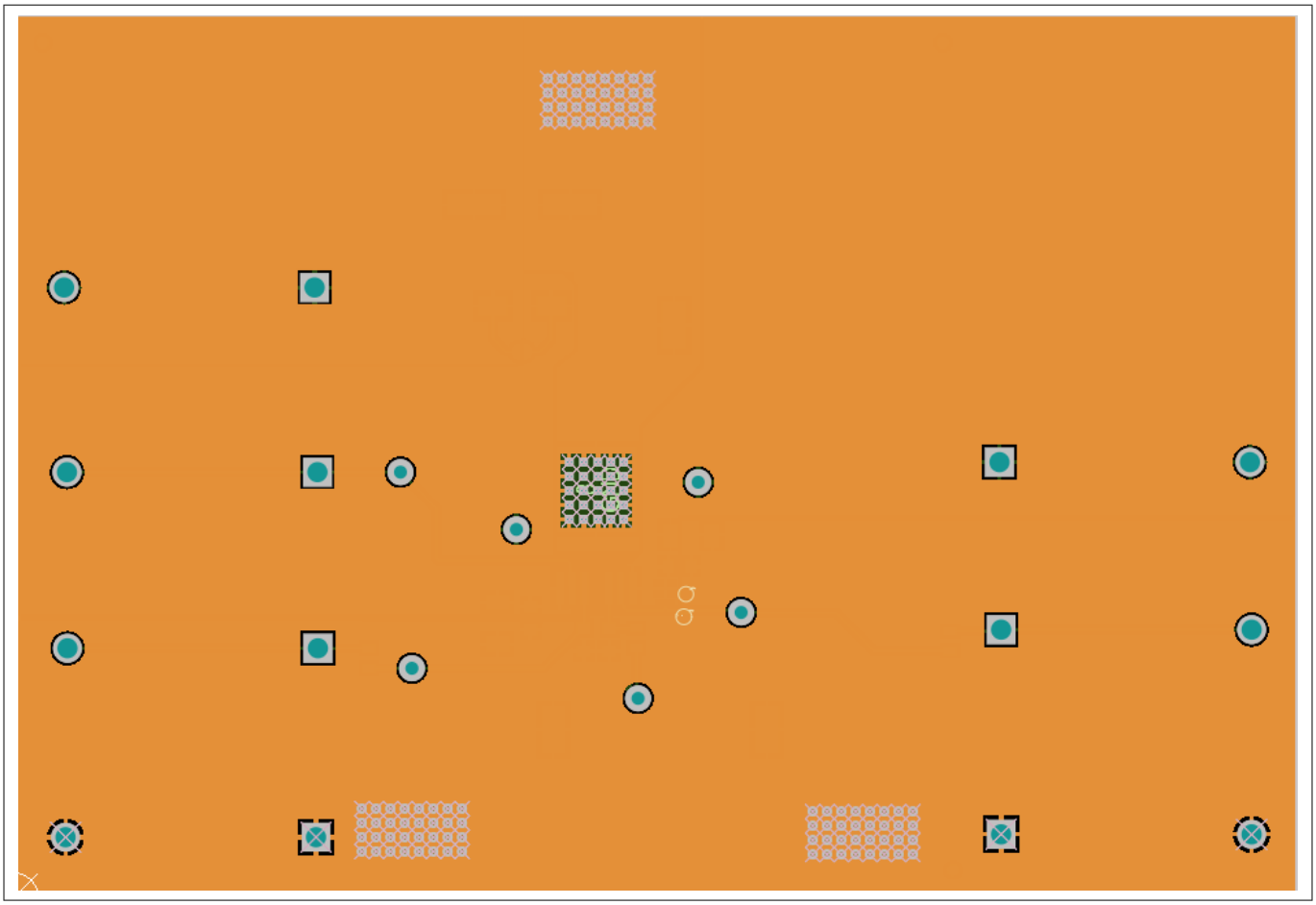

Figure 6 Bottom layer TLS850F3TUVxx demoboard

4 Bill of materials

The bill of materials shows the components on the TLS850F3TUVxx demoboard. For the mounting condition of each component see Figure 4 and Figure 5. Mechanical parts, such as connectors or test-points are not mentioned.

Table 3 Bill of materials TLS850F3TUVxx demoboard

Part	Value	Package
D1	US1B-E3/61T	DO-214
C2	47 µF / 50 V	n.a.
C3	10 µF / 50 V	1206
C4	100 nF / 50 V	0603
C5	1 µF / 16 V	0603
C7	10 nF / 50 V	0603
R5, R9	0 Ω	0603

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 visit www.infineon.com.

6 Revision history

Revision	Date	Changes
1.0	2024-05-08	Document created.

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