

# TLS820x0 Demo Board

## Product Manual

### About this document

#### Scope and purpose

The TLS820x0 Demoboard is a demonstration of the Infineon low drop out linear voltage regulator. The TLS820F0 is the ideal IC to supply regulated voltage for general ECU's and infotainment applications. The fixed output voltage makes the TLS820F0 suitable of supplying the majority of standard applications.

This application note contains information for the TLS820x0 Demoboard.

The TLS820x0 Demoboard is assembled by default with the TLS820ELV33. It 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. [Table 1](#) provides an overview of this family in PG-SSOP14 package.

**Table 1** Family Overview (not all members listed)

Type	Output voltage	Output current	Enable	Reset	Watchdog
TLS820D0ELV33	3.3V	200mA	yes	yes	
TLS820D0ELV50	5.0V	200mA	yes	yes	
TLS820F0ELV33 <sup>1)</sup>	3.3V	200mA	yes	yes	yes
TLS820F0ELV50	5.0V	200mA	yes	yes	yes
TLS820F1ELV50	5.0V	200mA	yes	yes	yes

1) Default type

#### Intended audience

This document is intended for engineers who develop applications.

## 1 Introduction

### 1.1 General Description

The TLS820F0 is a high performance very low dropout linear voltage regulator for 5 V or 3.3 V supply.

With an input voltage range of 3 V to 40 V, very low quiescent of only 40uA these regulators are perfectly suitable for automotive or any other supply systems connected permanently to the battery. The TLS820F0 series is available with 5 V or 3.3 V versions at an accuracy of 2 % and maximum output current up to 200 mA.

The new loop concept combines fast regulation and very good stability while requiring only one small ceramic capacitor of 1  $\mu$ F at the output. At currents below 100mA device will have a very low typical dropout voltage of only 70 mV (for the 5 V device) and 80 mV(for the 3.3 V device). The tracking region starts already at input voltages of only 3 V (extended operating range). This makes the TLS820F0 also suitable to supply automotive systems that need to operate during cranking condition.

For more detailed information please see also TLS820F0 data sheet [\[1\]](#).

### 1.2 TLS820F0ELV33 Feature List

- Wide Input Voltage Range of 3.0V to 40V
- Fixed Output Voltage 3.3 V
- Output Voltage Precision  $\leq \pm 2\%$
- Output Current Capability of 200 mA
- Ultra Low Current Consumption typ. 40  $\mu$ A
- Very Low Dropout Voltage typ. 80mV @100 mA
- Stable with Ceramic Output Capacitor of 1  $\mu$ F
- Delayed Reset at Power-On with 2 Programmable Delay Times 8 ms / 16 ms
- Adjustable Reset Threshold down to 2.50V
- Watchdog with flexible timings and current dependant deactivation: 16 ms / 32 ms / 48 ms / 96 ms, Activated at  $I_Q > 5\text{mA}$
- Enable, Undervoltage Reset, Overtemperature Shutdown
- Output Current Limitation
- Wide Temperature Range
- Green Product (RoHS compliant)
- AEC Qualified

## Table of Contents

	<b>About this document</b> .....	<b>1</b>
<b>1</b>	<b>Introduction</b> .....	<b>2</b>
1.1	General Description .....	2
1.2	TLS820F0ELV33 Feature List .....	2
	<b>Table of Contents</b> .....	<b>3</b>
<b>2</b>	<b>Block Diagram</b> .....	<b>4</b>
<b>3</b>	<b>Demo Board</b> .....	<b>5</b>
3.1	Operating Conditions .....	5
3.2	Board Configuration .....	6
3.2.1	Enable Function .....	6
3.2.2	Watchdog Disable Function .....	6
3.2.3	Timing selection for Reset and Watchdog Function .....	7
3.2.4	Adjust Reset threshold .....	7
3.2.5	Signal Adaption .....	7
<b>4</b>	<b>Schematic and Layout</b> .....	<b>8</b>
4.1	Schematic .....	8
4.2	Layout .....	8
<b>5</b>	<b>Bill of Material</b> .....	<b>10</b>
<b>6</b>	<b>General Information</b> .....	<b>11</b>
6.1	Restrictions .....	11
6.2	Additional Information .....	11
6.3	Revision History .....	11

Block Diagram

## 2 Block Diagram

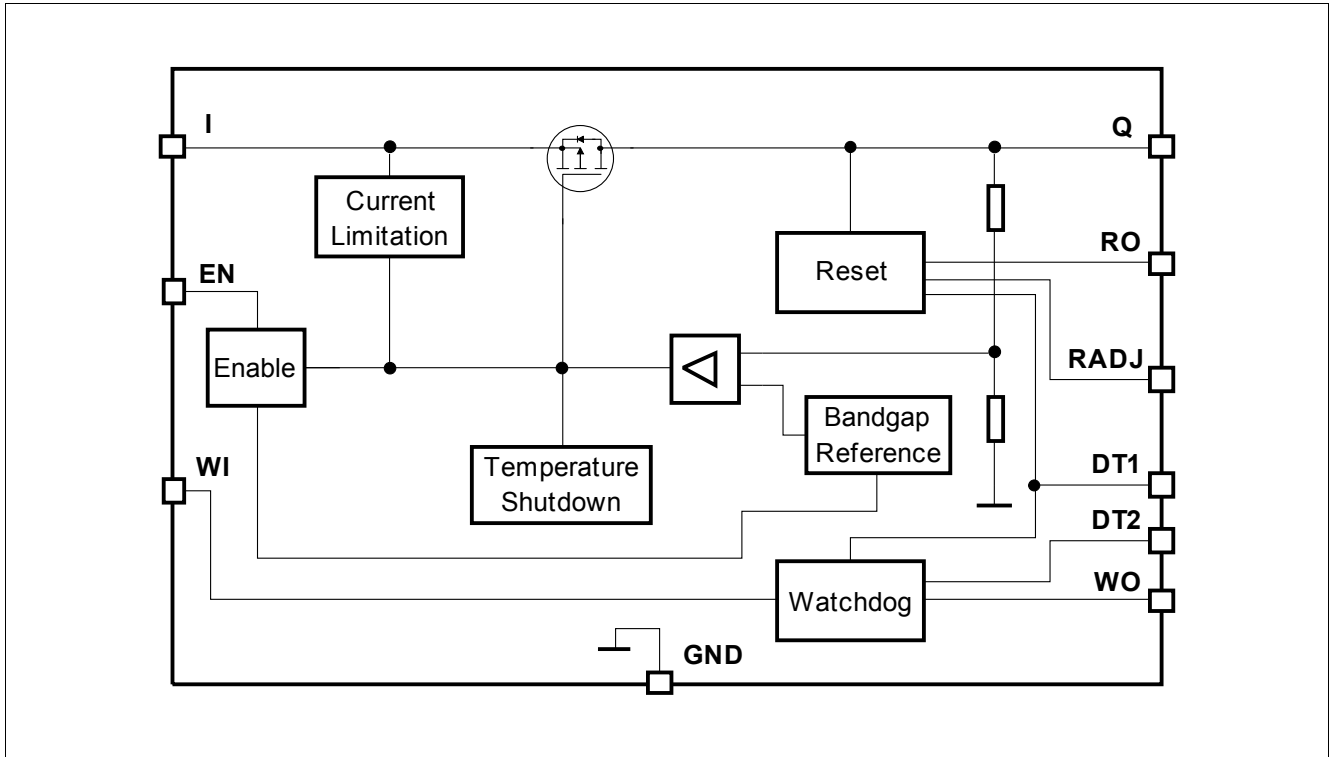


Figure 1 Block Diagram of TLS820F0ELV33

### 3 Demo Board

The TLS820x0 Demo Board is equipped by default with TLS820F0ELV33 and all necessary components.

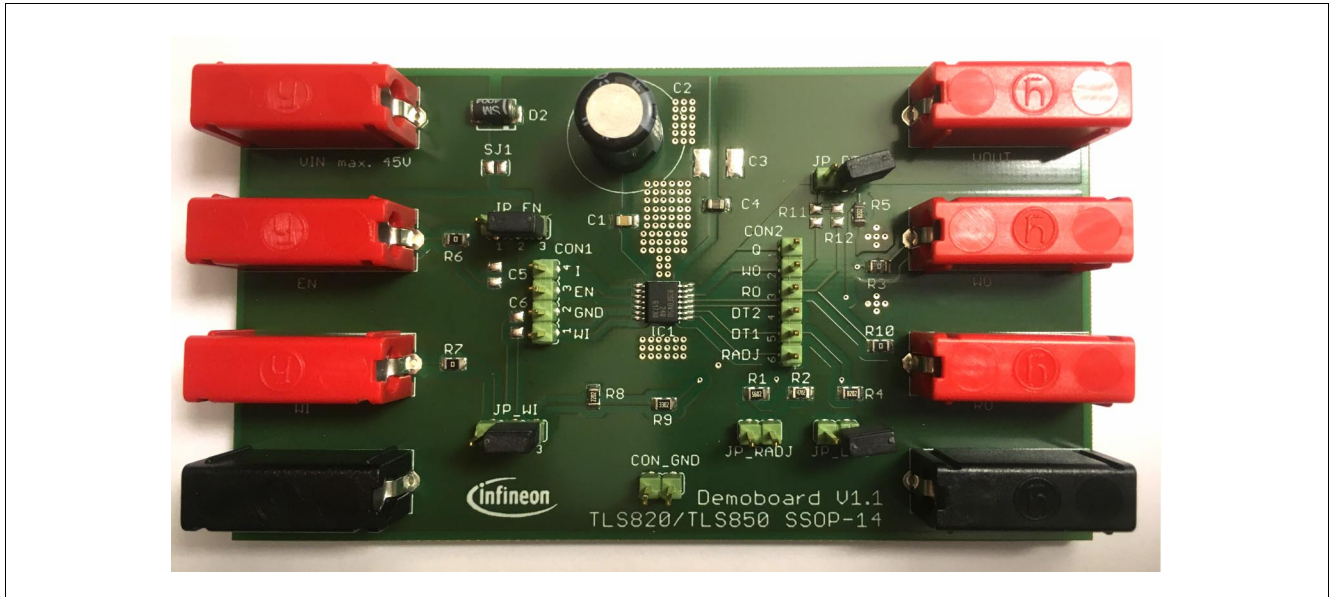


Figure 2 TLS820x0 Demo Board

#### 3.1 Operating Conditions

To avoid any electrical damage of the Demo Board, 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 <sup>3)</sup>	V	Regulated output for loads up to 200mA <sup>4)</sup>
Enable Signal	EN	0	45 <sup>5)</sup>	V	Enable signal to switch regulator on
Watchdog Input Signal	WI	0	7 <sup>5)</sup>	V	Serving the watchdog (e.g. from µC)
Watchdog Output Signal	WO	0	7 <sup>5)</sup>	V	Indication if watchdog event occurred
Reset Output Signal	RO	0	7 <sup>5)</sup>	V	Indication if reset occurred
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 3.0 V to 40 V.

3) Absolute max rating. Nominal output voltage depends on voltage version of TLS820F0.

4) Output current capability of the TLS820F0.

5) Absolute max rating.

## 3.2 Board Configuration

The TLS820x0 Demo Board 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
- Enable function (JP\_EN)
- Adjusting slope of external enable signal via resistor R6 and capacitor C5
- Watchdog disable function (JP\_WI)
- Adjusting slope of external watchdog signal via resistor R7 and capacitor C6
- Placeholder for additional output capacitor (C3)
- Placeholder for pull up resistor on reset output signal (R12)
- Placeholder for pull up resistor on watchdog output signal (R11)
- Timing selection for reset and watchdog function (JP\_DT1, JP\_DT2)
- Adjust reset threshold (JP\_RADJ)

### 3.2.1 Enable Function

The jumper JP\_EN can be used to configure the enable functionality.

**Table 3 Jumper setting for enable function**

JP_EN	Enable Function
set to 1 - 2	EN is connected to GND; regulator is disabled
set to 2 - 3	EN is connected to input (I); regulator is enabled while it is supplied <sup>1)</sup>
open	EN is supplied from external via connector EN (Banana jack) <sup>2)</sup>

1) Default setting.

2) Without supplying a signal to EN, the regulator is disabled because of an internal pull down resistor.

### 3.2.2 Watchdog Disable Function

The jumper JP\_WI can be used to configure the watchdog disable functionality.

**Table 4 Jumper setting for watchdog disable function**

JP_WI	Watchdog Disable Function
set to 1 - 2	WI is supplied from external via connector WI; e.g. from $\mu$ C to serve the watchdog <sup>1)</sup>
set to 2 - 3	WI is connected to 1.4V; watchdog is disabled
open	WI is set to GND via internal pulldown resistor; WO will be set periodically, because watchdog is not served

1) Default setting.

### 3.2.3 Timing selection for Reset and Watchdog Function

The jumpers JP\_DT1 and JP\_DT2 can be used to configure the reset and watchdog timing.

**Table 5 Jumper setting for reset and watchdog timing**

JP_DT1	JP_DT2	Reset Timing ( $t_{rd}$ ) <sup>1)</sup>	Watchdog Timing ( $t_{wl,tr,typ}$ )
set	set	8 ms <sup>2)</sup>	16 ms <sup>2)</sup>
open	set	16 ms	32 ms
set	open	8 ms	48 ms
open	open	16 ms	96 ms

1) JP\_DT2 setting doesn't affect the Reset Timing configuration.

2) Default setting.

### 3.2.4 Adjust Reset threshold

The jumper JP\_RADJ can be used to configure the adjustable reset threshold.

**Table 6 Jumper setting for adjustable reset threshold**

JP_RADJ	Adjustable reset threshold
set	Default reset threshold is set <sup>1)</sup> e.g. for TLS820F0V33 $V_{rt,low} = 3.05$ V (typ.) e.g. for TLS820F0V50 $V_{rt,low} = 4.6$ V (typ.)
open	Reset threshold is set to $V_{rt,low} = 2.63$ V (typ.)

1) Default setting.

### 3.2.5 Signal Adaption

For easy signal adaption e.g. connecting probes for an oscilloscope, connectors CON1, CON2 and CON\_GND can be used.

**Table 7 Signals on connector**

Connector	Accessible Signals
CON1	- WI, (watchdog input signal) - GND - EN (enable input signal) - I (power supply)
CON2	- Q, (output voltage) - WO (watchdog output signal) - RO (reset output signal) - DT2 (delay timing 2 signal) - DT1 (delay timing 1 signal) - RADJ (reset threshold adjust signal)
CON_GND	- GND

Schematic and Layout

## 4 Schematic and Layout

### 4.1 Schematic

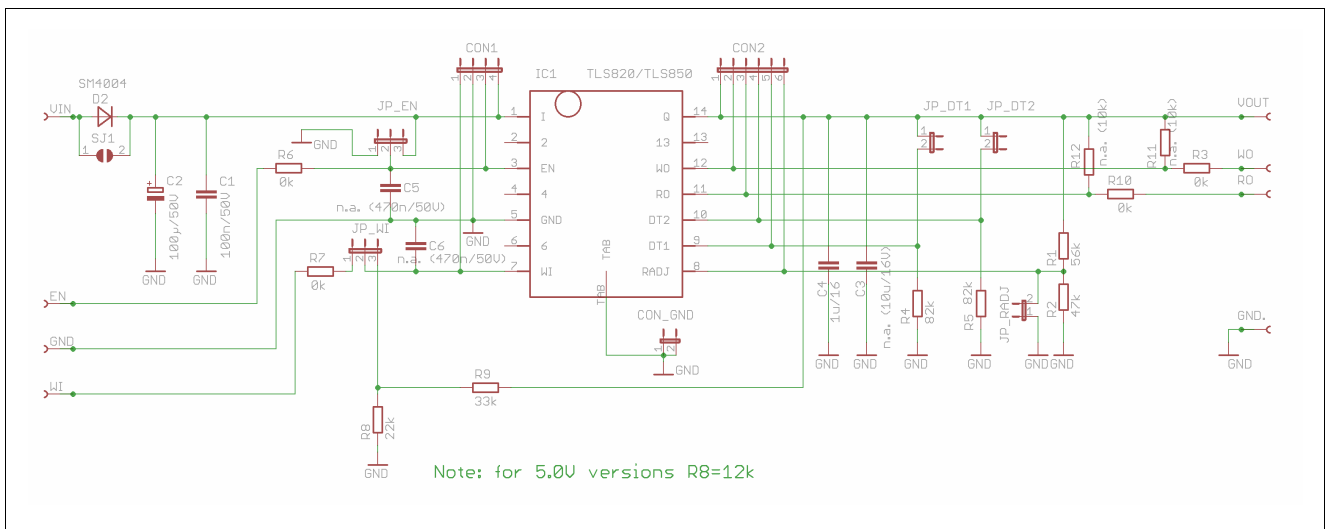


Figure 3 Schematic of TLS820x0 Demo Board

### 4.2 Layout

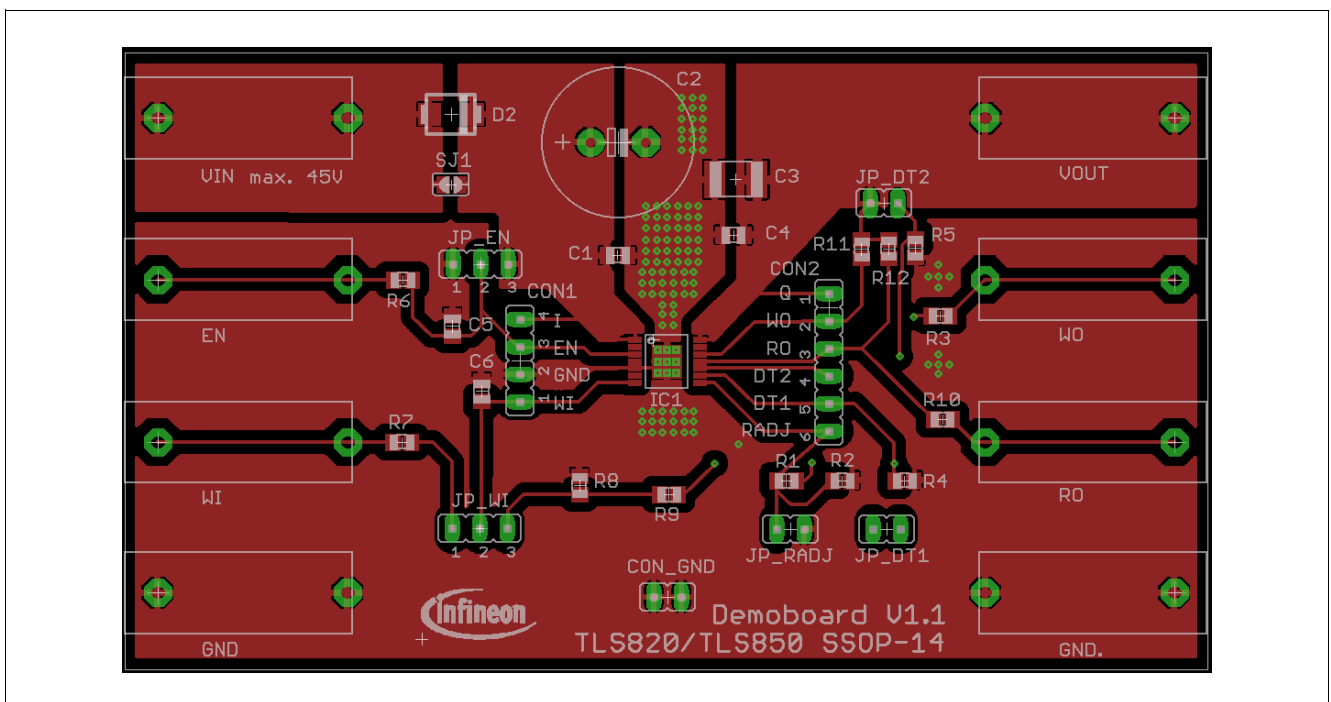


Figure 4 Top Layer of TLS820x0 Demo Board



Schematic and Layout

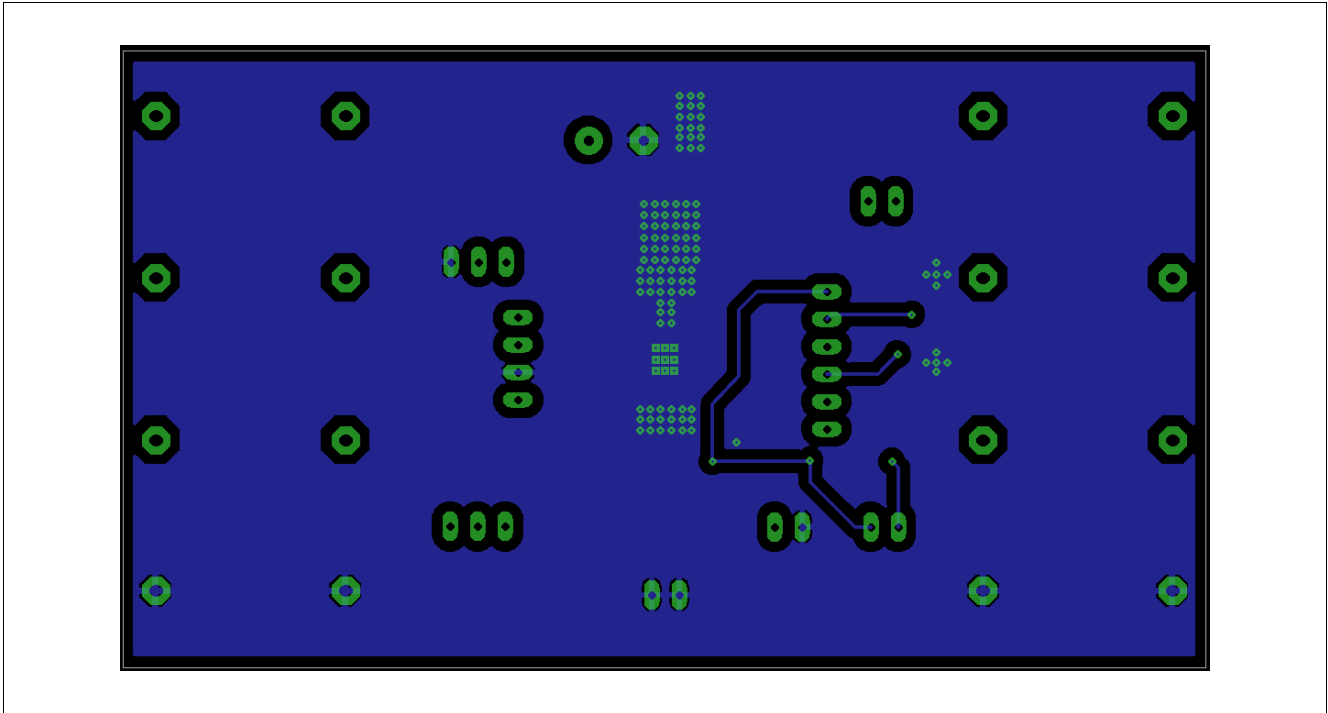


Figure 5 Bottom Layer of TLS820x0 Demo Board

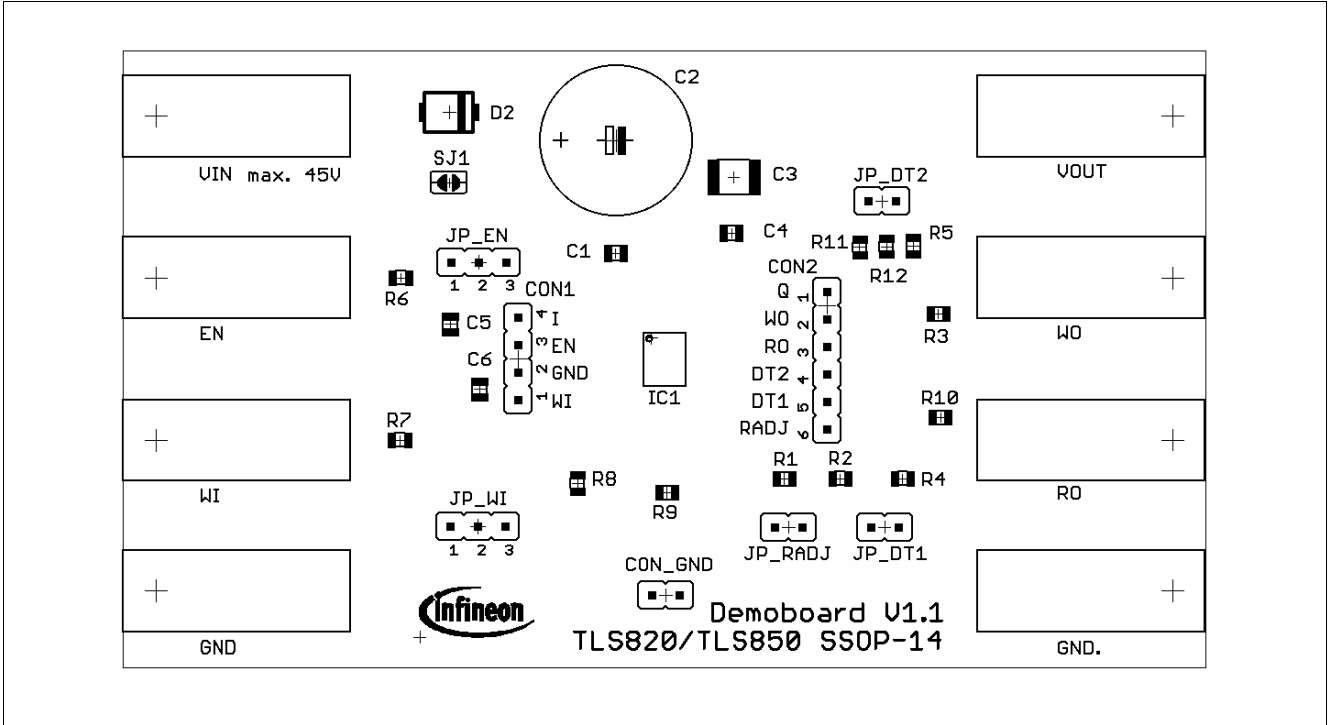


Figure 6 Top Layer components of TLS820x0 Demo Board

Bill of Material

## 5 Bill of Material

Table 8 Bill of Material

Part	Value	Package
VIN	Banana jack	BABU4MM
VOUT	Banana jack	BABU4MM
WI	Banana jack	BABU4MM
WO	Banana jack	BABU4MM
EN	Banana jack	BABU4MM
RO	Banana jack	BABU4MM
GND	Banana jack	BABU4MM
GND	Banana jack	BABU4MM
R1	56k, 0.1%	R0805
R2	47k, 0.1%	R0805
R3	0k	R0805
R4	82k, 1%	R0805
R5	82k, 1%	R0805
R6	0k	R0805
R7	0k	R0805
R8 <sup>1)</sup>	22k, 0.1%	R0805
R9	33k, 0.1%	R0805
R10	0k	R0805
R11	n.a. (10k, 1%)	R0805
R12	n.a. (10k, 1%)	R0805
C1	100n/50V	C0805
C2	100μ/50V	E5-13
C3	n.a. (10μ/16V)	C1812
C4	1μ/16V	C0805
C5	n.a. (470n/50V)	C0805
C6	n.a. (470n/50V)	C0805
CON1	4 pin connector	
CON2	6 pin connector	
CON_GND	2 pin connector	
JP_DT1		jumper
JP_DT2		jumper
JP_EN		jumper
JP_RADJ		jumper
JP_WI		jumper
SJ1		solder jumper

General Information

**Table 8 Bill of Material**

Part	Value	Package
D2	SM4004	diode
IC1	TLS820xx	PG-SSOP-14

1) For the 5 V device R8 value is 12k, 1%

## 6 General Information

### 6.1 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.

### 6.2 Additional Information

[1] TLS820F0 Data Sheet (For further information you may contact <http://www.infineon.com/>)

### 6.3 Revision History

Revision	Date	Changes
1.1	2018-02-29	Added the section <b>“About this document” on Page 1</b> Changes to the <b>“General Description” on Page 2</b> Added the <b>“Table of Contents” on Page 3</b> Changed <b>Figure 2, Figure 3, Figure 4, Figure 5, Figure 6</b> Changes to the Bill of Materials in <b>Table 8</b>
1.0	2013-04-10	Initial version

#### Trademarks of Infineon Technologies AG

All referenced product or service names and trademarks are the property of their respective owners.

**Edition 2018-02-29**  
**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**

**© 2018 Infineon Technologies AG.**  
**All Rights Reserved.**

**Do you have a question about any aspect of this document?**

**Email: [erratum@infineon.com](mailto:erratum@infineon.com)**

**Document reference**  
**Z8F61150665**

#### IMPORTANT NOTICE

The information contained in this application note is given as a hint for the implementation of the product only and shall in no event be regarded as a description or warranty of a certain functionality, condition or quality of the product. Before implementation of the product, the recipient of this application note must verify any function and other technical information given herein in the real application. Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind (including without limitation warranties of non-infringement of intellectual property rights of any third party) with respect to any and all information given in this application note.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

#### WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.