OPTIREG™ Switcher TLF51801

How to use the TLF51801 demo board

About this document

Scope and purpose

This document describes how to use the OPTIREG™ Switcher TLF51801 demo board.
Please refer to data sheet for additional information.

Table of Contents

About this document **1**
Table of Contents **2**
1 Abstract **3**
2 Description **4**
2.1 Quick Start 4
2.2 Demo board description 5
2.3 Adjustment of output voltage V_{OUT} and external Bootstrap Diode 7
2.4 Current limitation configurations 8
2.5 Input filter 10
3 Revision History **11**

1 Abstract

The following application note shall enable the user to operate the TLF51801ELV demo board. The TLF51801ELV is a Step-Down controller with external power stage, capable to deliver 10 A or more (depending on Mosfets of external power stage) and adjustable output voltage.

The board is equipped with a TLF51801ELV, it is preset to 5 V output voltage, current limitation is set to ~5 A.

Current limitation may be done via shunt resistor or via R_{DSON} measurement of highside Mosfet, the board offers both possibilities. The board is preadjusted for shunt current limitation.

The board offer the possibility to modify the schematic. Please refer to the data sheet for more information.

Note: The following information is given as a hint for the implementation of our devices only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.

2 Description

2.1 Quick Start

The following figure shows how to connect the application board for operation

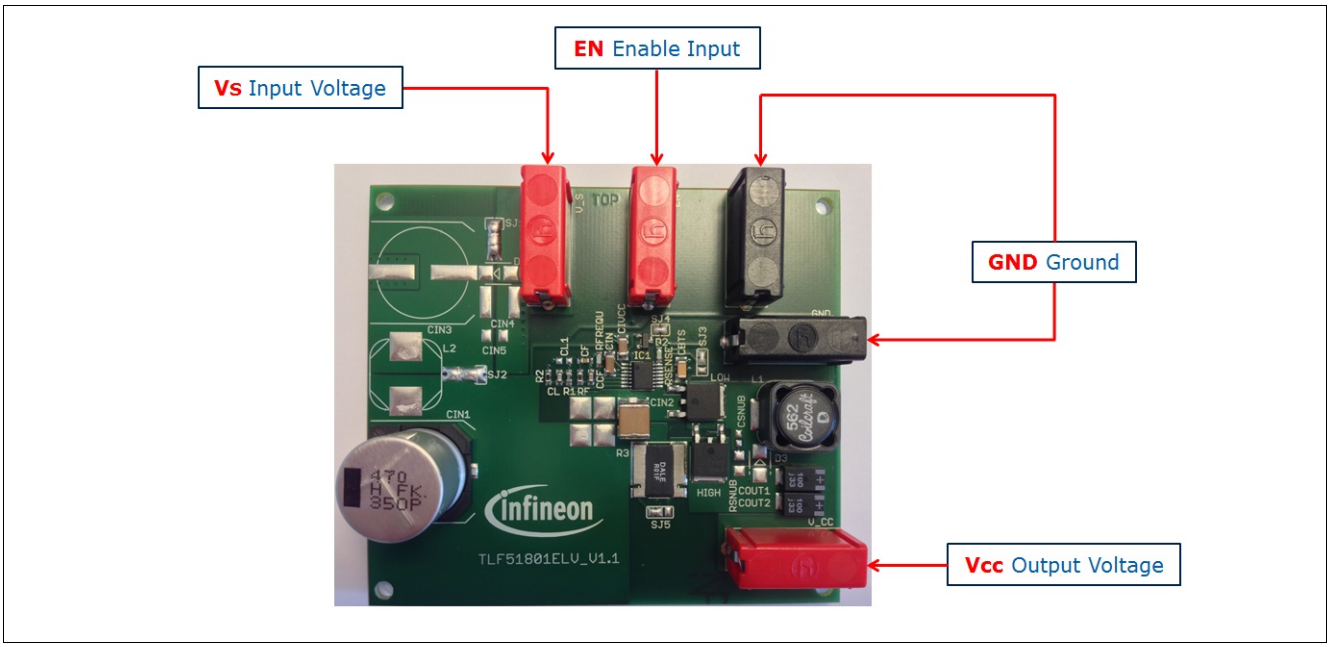

Figure 1 Quick Start - How to connect the demo board

2.2 Demo board description

A TLF51801ELV demo board is used to demonstrate the behavior of the device.

The demo board is supplied by a laboratory power supply with variable input voltage, the output is connected to a resistive load. The following figures show the schematic and the bill of material of the demo board.

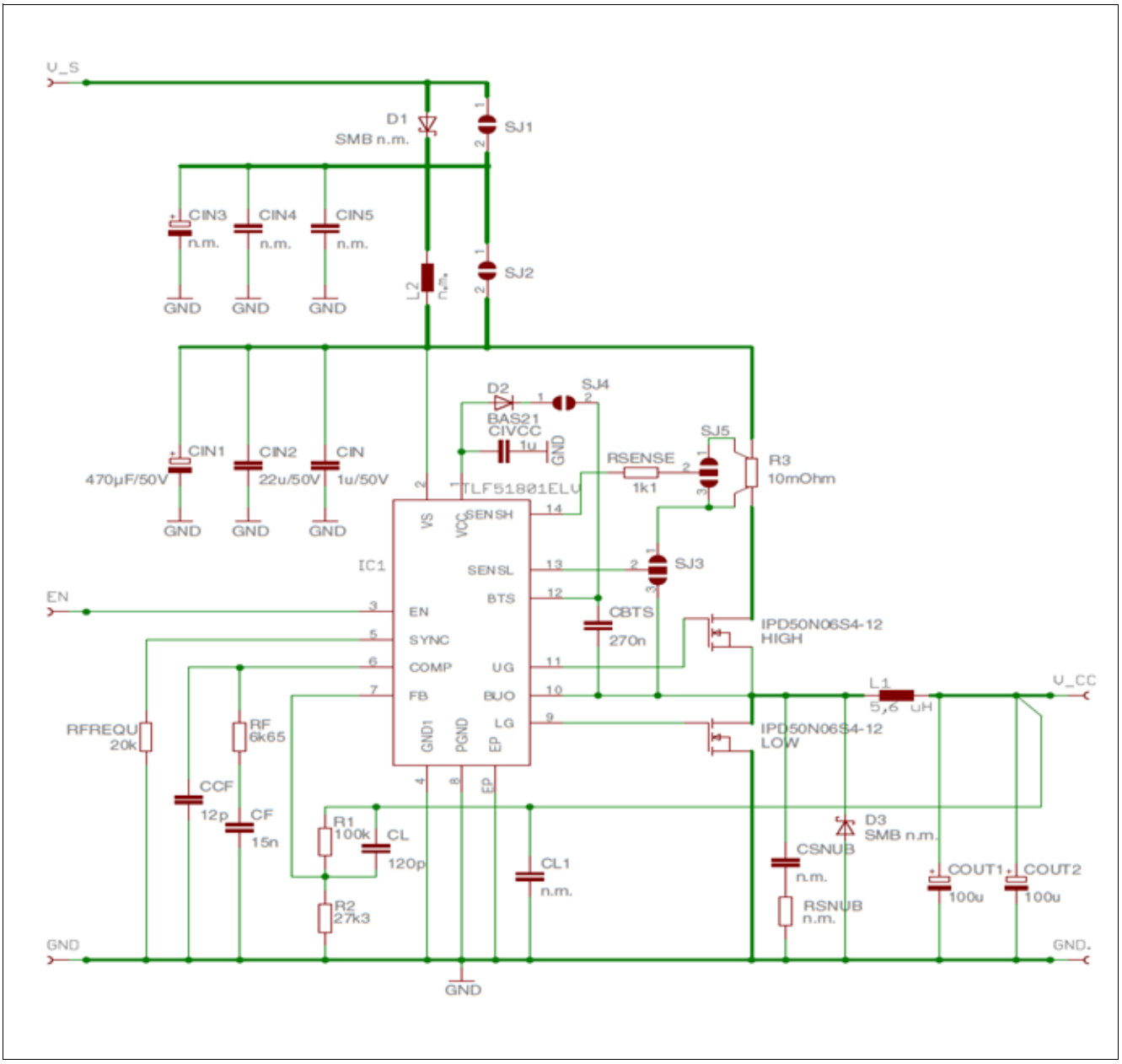

Figure 2 Demoboard schematic

Description

Ref	Value	Manufacturer	Part number	Type	Qty
L_1	5.6µH	Coilcraft	MSS1278T-562ML_	Inductor	1
LOW, HIGH	N-ch, 60 V, 12 mΩ	Infineon	IPD50N06S4L-12	Transistor	2
C_{OUT1}, C_{OUT2}	100µF - 10mΩ ESR	Rubycon	6SW100M	Capacitor, Poly Al, 6.3V	2
C_{IN2}	22µF	Kemet	C2220C226M5R2CTU	Capacitor, X7R, 50V	1
C_{IN1}	470µF	Panasonic	EEEFK1H471AM	Capacitor, Al, 50V	1
R_{FREQ}	20kΩ	Panasonic	ERJ3EKF2002V	Resistor, ±1%, 0.1W	1
R_1	100kΩ	Panasonic	ERJ3EKF1003V	Resistor, ±1%, 0.1W	1
R_2	27.3kΩ	Panasonic	ERJ3EKF2742V	Resistor, ±1%, 0.1W	1
R_F	6.65kΩ	Panasonic	ERJ3EKF6651V	Resistor, ±1%, 0.1W	1
R_{sense}	1.1kΩ	Panasonic	ERJ3EKF1101V	Resistor, ±1%, 0.1W	1
R_{shunt}	10mΩ	Vishay Dale	WSL3637R0100FEB	Resistor, ±1%, 3W	1
C_{CF}	12pF	Kemet	C0603C120J5GACTU	Capacitor, C0G	1
C_L	120pF	Kemet	C0603C121J5GACTU	Capacitor, C0G	1
C_F	15nF	Kemet	C0603C153K5RACTU	Capacitor, X7R, 50V	1
C_{IVCC}	1µF	Kemet	C1206C105K4RACTU	Capacitor, X7R, 16V	1
C_{IN}	1µF	Kemet	C1206C105K5RACTU	Capacitor, X7R, 50V	1
C_{BTS}	270nF	Kemet	C1206C274K5RACTU	Capacitor, X7R, 50V	1

Figure 3 Demoboard bill of material

2.3 Adjustment of output voltage V_{OUT} and external Bootstrap Diode

The output voltage of the demo board is adjustable in the range 1.2 V up to D_{max} * V_S varying the ratio between R1 and R2 (both marked within yellow frame)

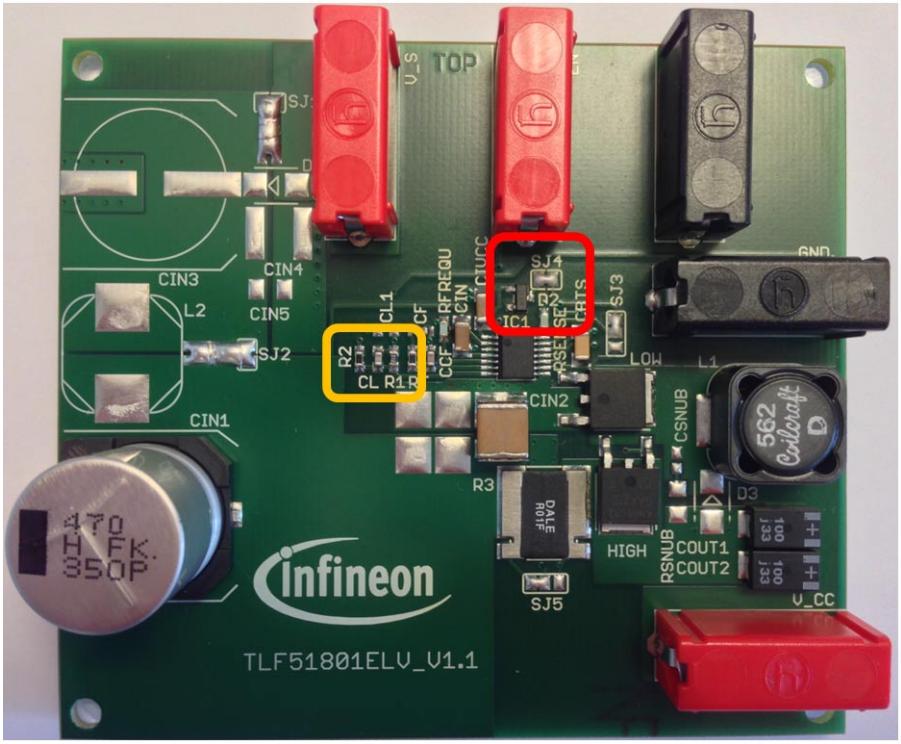

Figure 4 Adjustment of V_{OUT} and external BTS diode

Beside the internal bootstrap diode there is the possibility to run the device up to ~ 99% duty cycle just using an external BTS diode (Schottky). The place is marked by a red frame.

If a very high duty cycle is not needed please remove the short on SJ4 between 1 and 2 (marked with red frame, please refer also to figure 2 schematic. In this case the device will run at maximum 91% duty cycle.

For more details please refer to data sheet.

2.4 Current limitation configurations

The TLF51801ELV permits to implement the current limitation adopting two methods:

Via Shunt resistor: This method is more precise but requires area on the PCB and an additional component.
Via of the R_{DSON} high side Mosfet: Less precise but cost-effective solution and efficiency optimization.

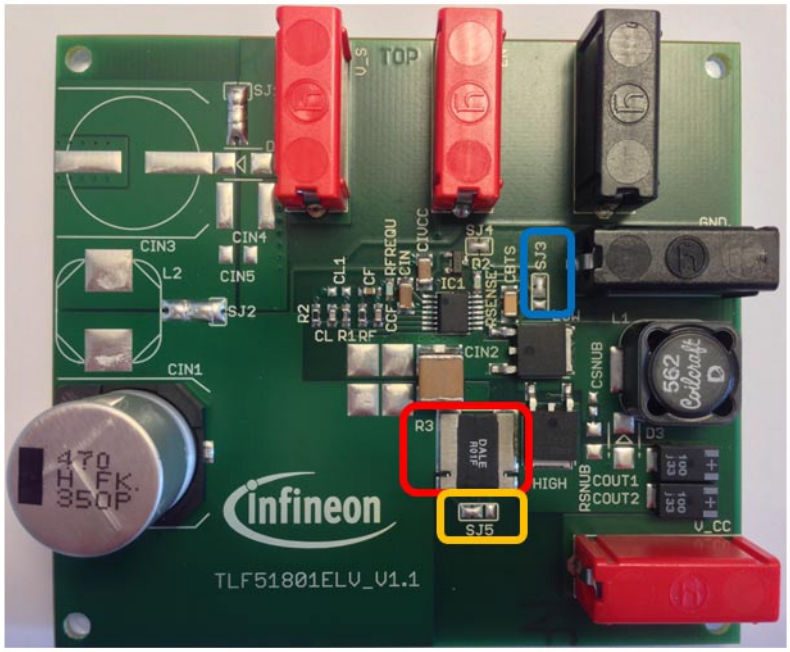

Figure 5 Current limitation via shunt resistor

The demo board is equipped with a shunt resistor R3 (red frame), allowing the user to test the shunt resistor method for the current limitation. The shunt resistor is located in series to the drain of the high side Mosfet (please refer to data sheet for detailed explanation)

Please mount the desired shunt resistor and connect SJ5 (yellow frame) between 1 and 2 and SJ3 (blue frame) between 1 and 2- please refer to figure 2 schematic

Please note that the demo board is configurated in shunt resistor current limitation configuration.

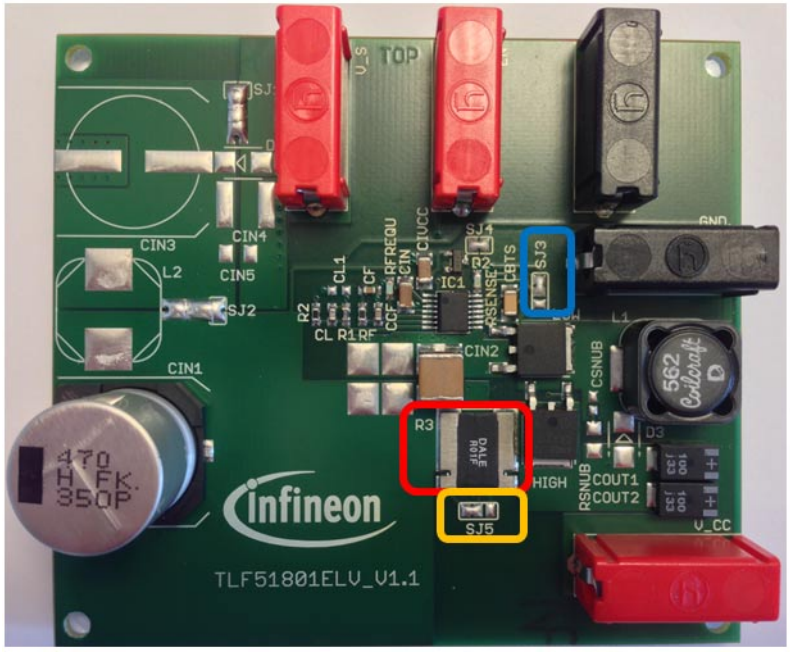

Figure 6 Current limitation via R_{DSON}

The demo board allows the user to test the R_{DSON} method for the current limitation. The built-in $R_{DSON}$of the high side Mosfet is used together with the R_{SENCE} to create the voltage divider (please refer to data sheet for detailed explanation)

Please bypass the shunt resistor simply connecting SJ5 (yellow frame) between 2 and 3 and SJ3 (blue frame) between 2 and 3 - please refer to figure 2 schematic

Remove the shunt resistor (red frame) in series to the drain of the high side Mosfet.

2.5 Input filter

If needed there is the possibilty foreseen to mount an input filter on the demo board, the mounting area is shown by red frame..

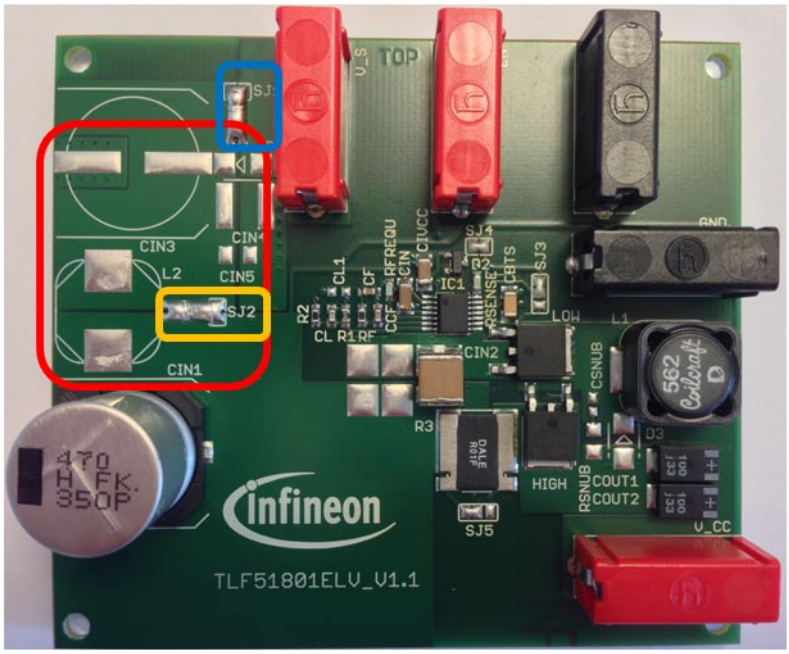

Figure 7 Input filter

If the input filter is not mounted please connect SJ1 (blue frame) between 1 and 2and SJ2 (yellow frame) between 1 and 2 - please refer to figure 2 schematic

The demo board is preset for testing without input filter

3 Revision History

Revision	Date	Changes
1.0	2018-08-01	Application Note created.

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

Edition 2018-08-01
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

Document reference
Z8F62791010

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**).

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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Infineon:
DEMOBOARDTLF51801ELTOBO1

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:
moschip.ru
moschip.ru_4
moschip.ru_6
moschip.ru_9