

TLD5190IVREG-EVAL evaluation board

User Manual

About this document

Product description

- TLD5190: H-Bridge DC-DC controller designed for automotive applications
- Constant current (LED) and constant voltage regulation
- High power, high efficiency buck-boost architecture
- EMC optimized device: Spread spectrum

Scope and purpose

Scope of this user manual is to provide to the audience instructions on usage of the TLD5190QV device evaluation board TLD5190IVREG-EVAL schematic version S01 PCB version P01.

The TLD5190IVREG-EVAL is an evaluation platform for the TLD5190QV, which can work as buck-boost LED driver, or as a voltage regulator.

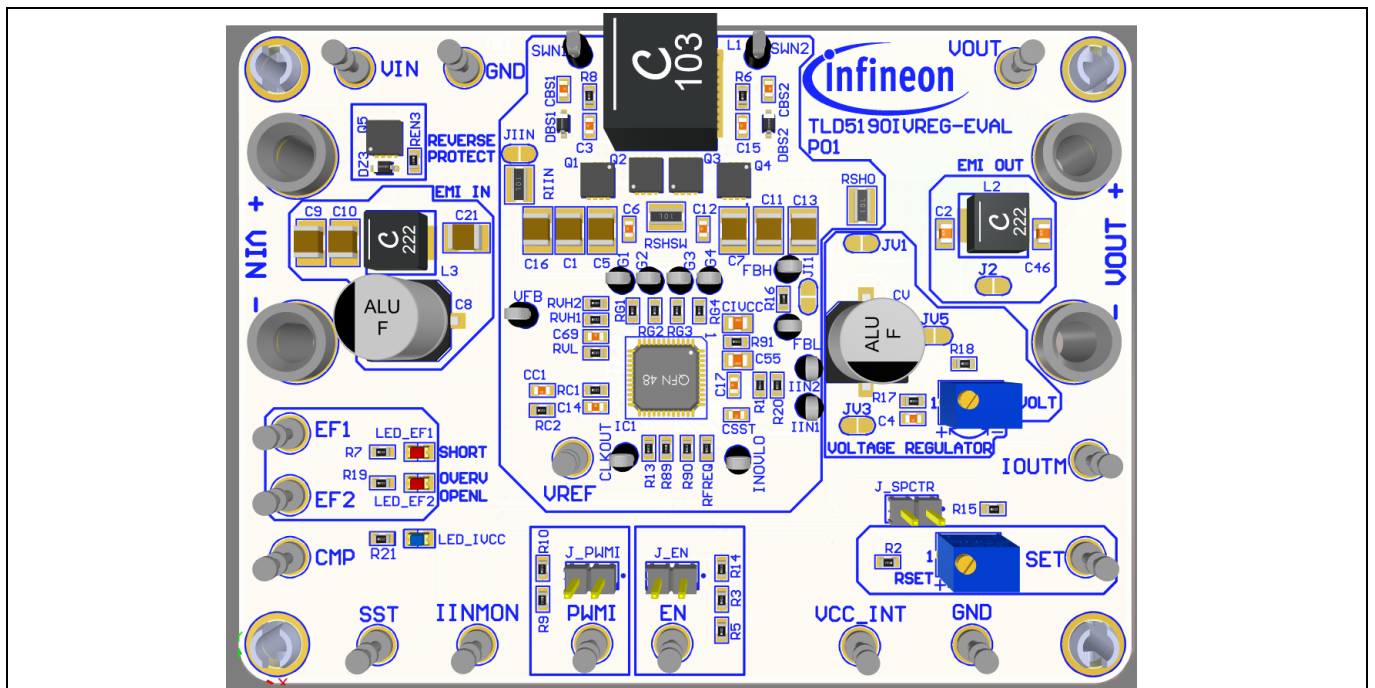


Figure 1 TLD5190IVREG-EVAL device evaluation board

Intended audience

Hardware engineers, software engineers, system architects

1 Table of contents

About this document	1
1 Table of contents	2
2 Description	3
3 Quick start procedure	4
3.1 Setup as LED driver	4
3.2 Set up as voltage regulator	5
4 Operating range and power derating	7
5 Electrical characteristics	8
6 PCB layout	9
7 Schematic	10
Revision history	11

Description

2 Description

The H-Bridge architecture is among the most efficient buck-boost topologies for high current applications. The TLD5190 provides digital and analog dimming control and 2 flags for diagnostic.

The TLD5190IVREG-EVAL is an evaluation platform for the TLD5190QV as LED driver or voltage regulator.

The default configuration is constant current LED driver with 1.5 A maximum output current. The output current can be increased up to 6 A by changing RSHO. If higher currents are needed, the output filter has to be bypassed.

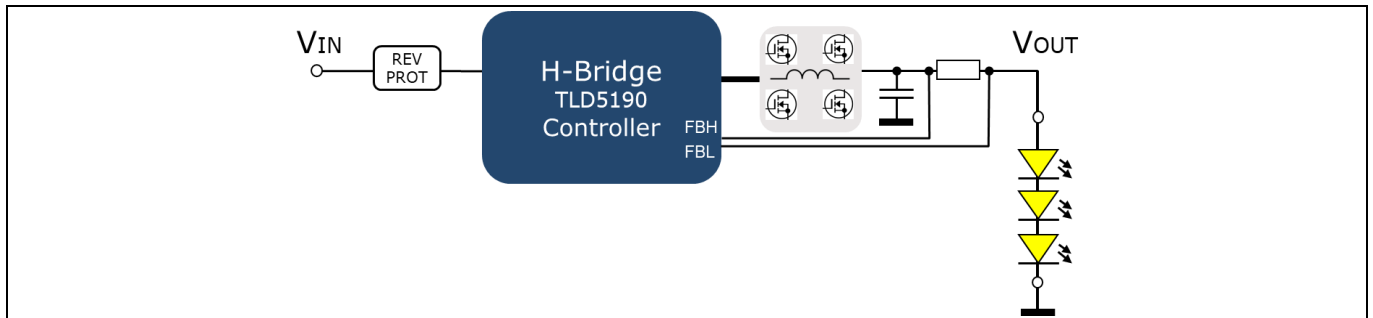


Figure 2 TLD5190QV as LED driver

By reconfiguring a few solder jumps, the board becomes a powerful voltage regulator.

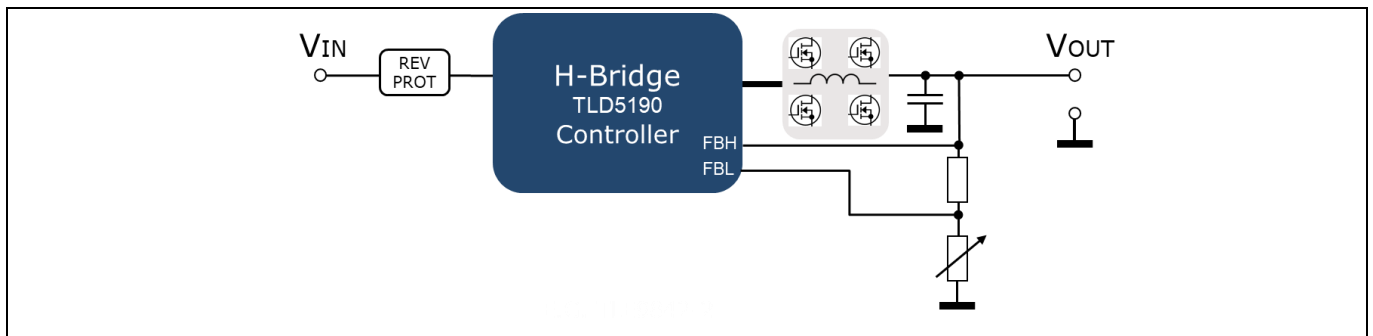


Figure 3 TLD5190QV as voltage regulator

On the board, in addition to the TLD5190QV device the following are present:

- Trimmer to adjust output voltage when set as voltage regulator
- Trimmer to adjust output current
- Two LEDs showing TLD5190QV faults status (EF1, EF2)

3 Quick start procedure

Below, step-by-step procedures are laid out for setup and running the TLD5190IVREG-EVAL in all available configurations.

3.1 Setup as LED driver

1. Configure solder jumper for LED driver configuration: Figure 4
2. J_EN (Enable) and J_PWMJ jumpers

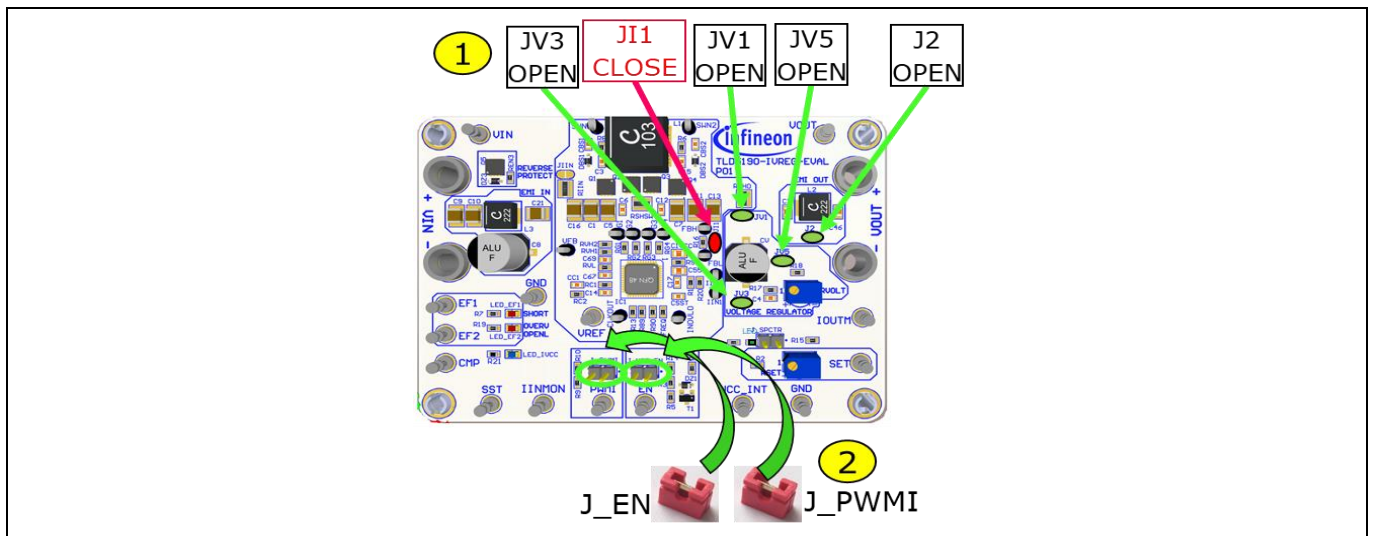


Figure 4 Connect loads and set jumpers

3. Connect the LED load
4. Connect a 12 V power supply to the V_{IN} connector → the blue LED should turn on indicating I_{VCC} present
5. Adjust I_{OUT} with RSET (>150 mA suggested for better accuracy and transient response)

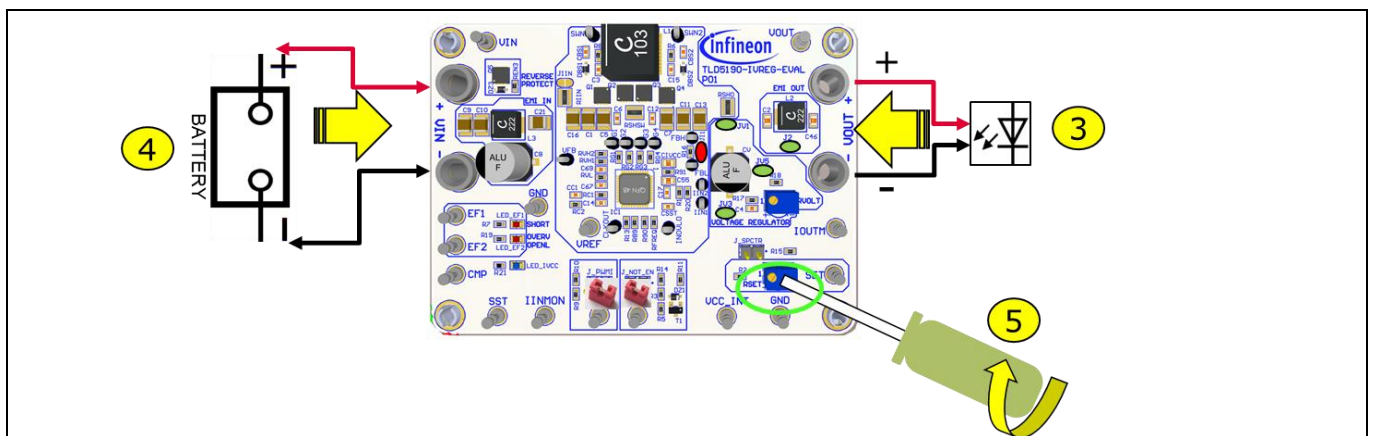


Figure 5 Connect power supply and adjust LED current

3.2 Set up as voltage regulator

1. Configure solder jumper for VREG (Figure 6), if $I_{OUT} > 3\text{ A}$ bypass RSHO with a solder joint on the resistor top
2. Connect J_EN and PWMI jumpers

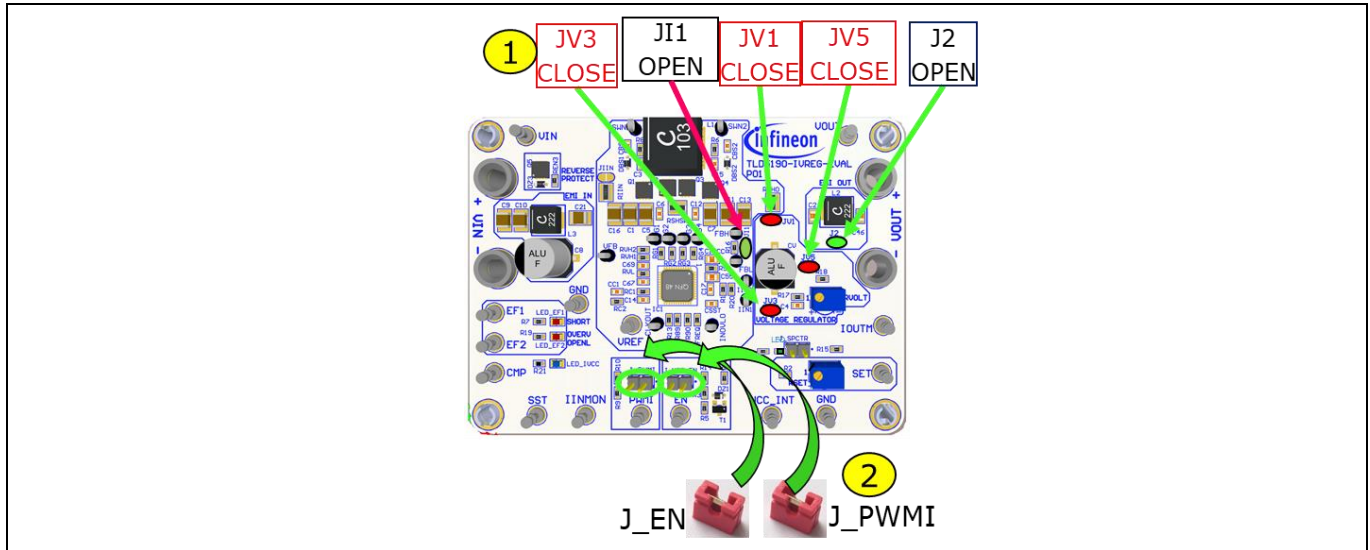


Figure 6 Voltage regulator: set EN jumpers, populate solder jumps

3. Connect a 12 V power supply to the V_{IN} connector
4. Rotate RSET trimmer fully clockwise (100% analog dimming, improves transient response and accuracy)

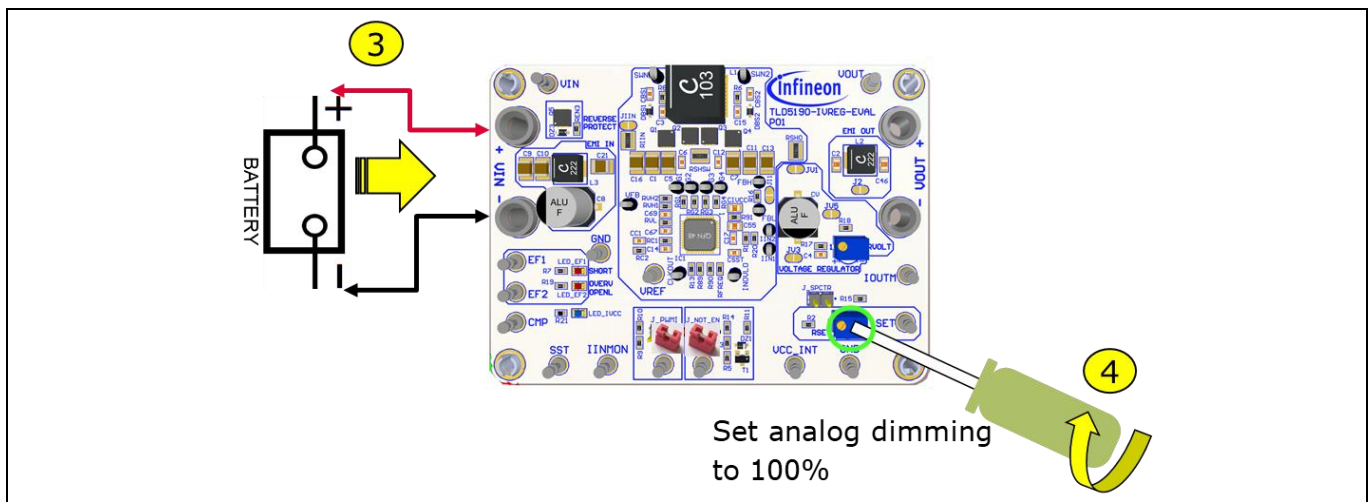


Figure 7 Voltage regulator: connect power supply

5. Rotate RVOLT trimmer to obtain the desired V_{OUT}

Quick start procedure

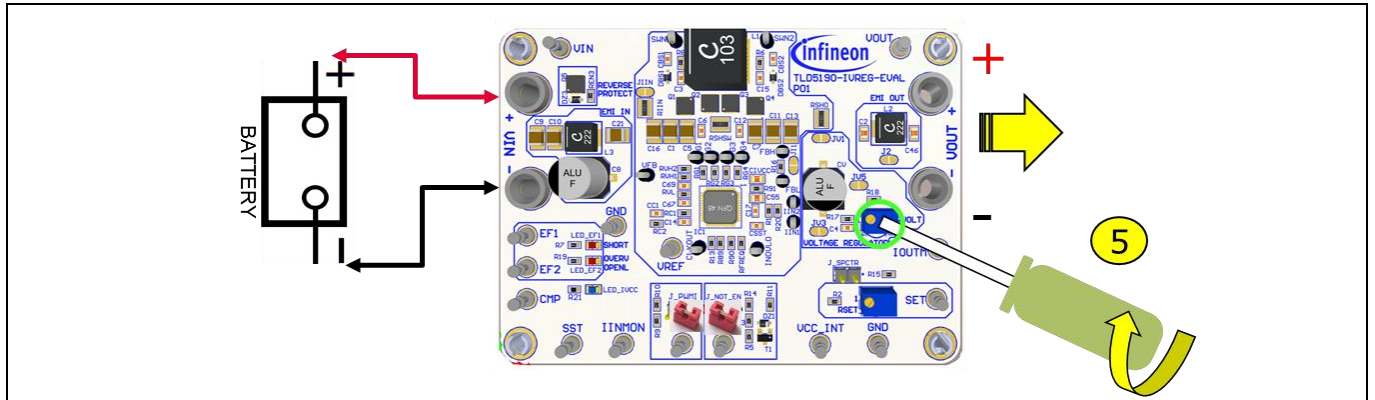


Figure 8 Adjust V_{OUT} using RVOLT

6. Connect the load

NOTE:

It is possible to adjust output voltage from 0 to full scale (previously set by RVOLT) by rotating RSET, but the best transient response is obtained when analog dimming is set to 100%.

4 Operating range and power derating

The TLD5190IVREG-EVAL has very high efficiency, so it can deliver up to 60 W at the output without a heat sink at $T_A = 25^\circ\text{C}$, $V_{IN} = 12\text{ V}$ (see Figure 10 for power-derating curve).

Please note that the module does not implement thermal protection, so ensure proper cooling when output power exceeds the power-derating curve. The heat sink has to be positioned below the switching MOSFETs as shown in Figure 9.

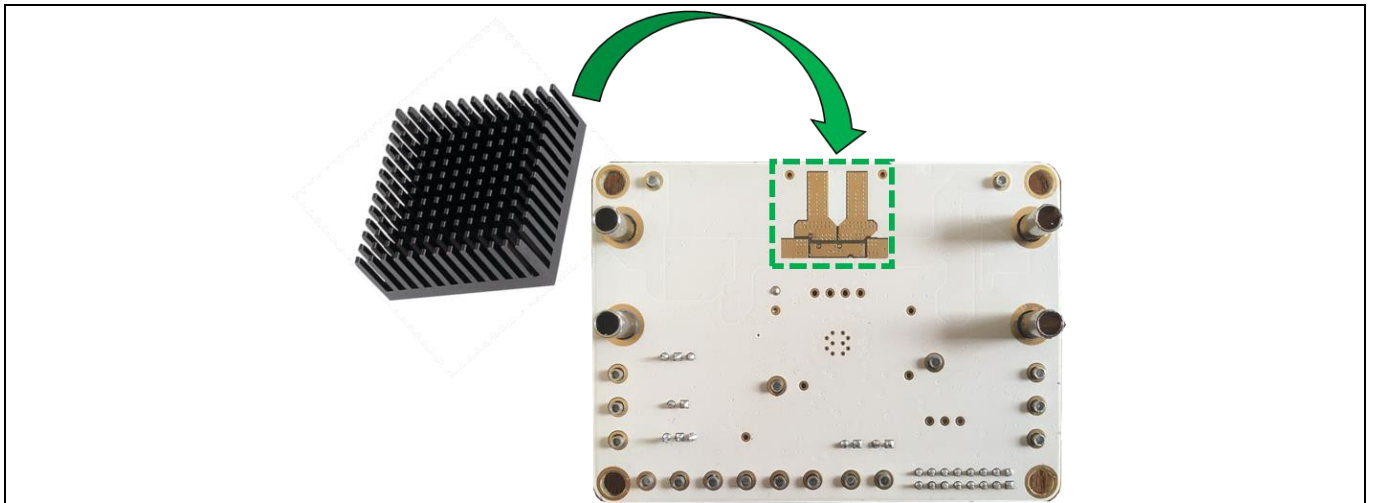


Figure 9 Heat sink placement (optional for P_{out} exceeding power derating curve)

The heat sink shall be electrically insulated from the PCB, by means of a thermal pad.

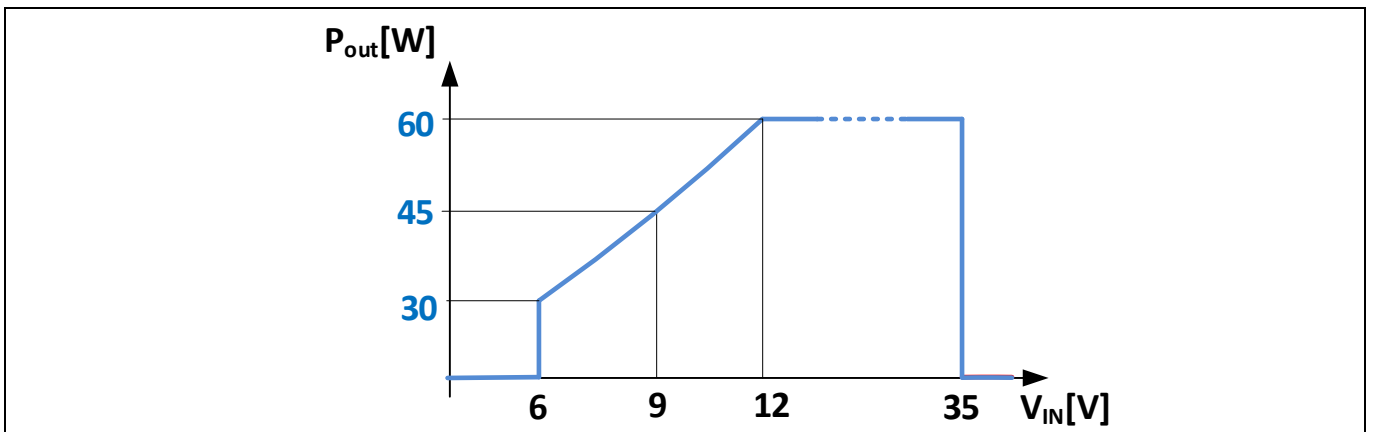


Figure 10 Output power derating curve ($T_A = 25^\circ\text{C}$, JIIN closed)

NOTE:

In order to reach 60 W output power, the input current limiter RIIN shunt has to be bypassed by closing JIIN, otherwise the input current would be limited to 5 A by the input current limiter features.

5 Electrical characteristics

Table 1 TLD5190IVREG-EVAL version S01 P01 – electrical characteristics

Parameter	Symbol	Value			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Input voltage	V_{IN}	5.5	-	35	V	Power derating may occur for $V_{IN} < 12\text{ V}$
Out voltage	V_{OUT}	5.5	-	41,8	V	LED driver mode Voltage mode
		5.5	-	22.5		
Output current	I_{OUT}	150	-	1500	mA	LED driver mode (up to 6 A by changing RSHO)
		0	-	6	A	Voltage mode
Output power	P_{OUT}	-	-	60	W	V_{IN} 12 V to 35 V, $T_A = 25^\circ\text{C}$ JIIN closed JIIN open (input current limiter ON) see Figure 10 for power derating curve
		-	-	50	W	
Switching frequency	Switching frequency	-	385	-	kHz	Spread spectrum deviation is present
PWM frequency	PWM_{freq}	100	-	500	Hz	
System efficiency	Eff	-	95	-	%	Measured in voltage mode $V_{IN} = 12\text{ V}$, $V_{OUT} = 15\text{ V}$, $I_{OUT} = 3\text{ A}$

6 PCB layout

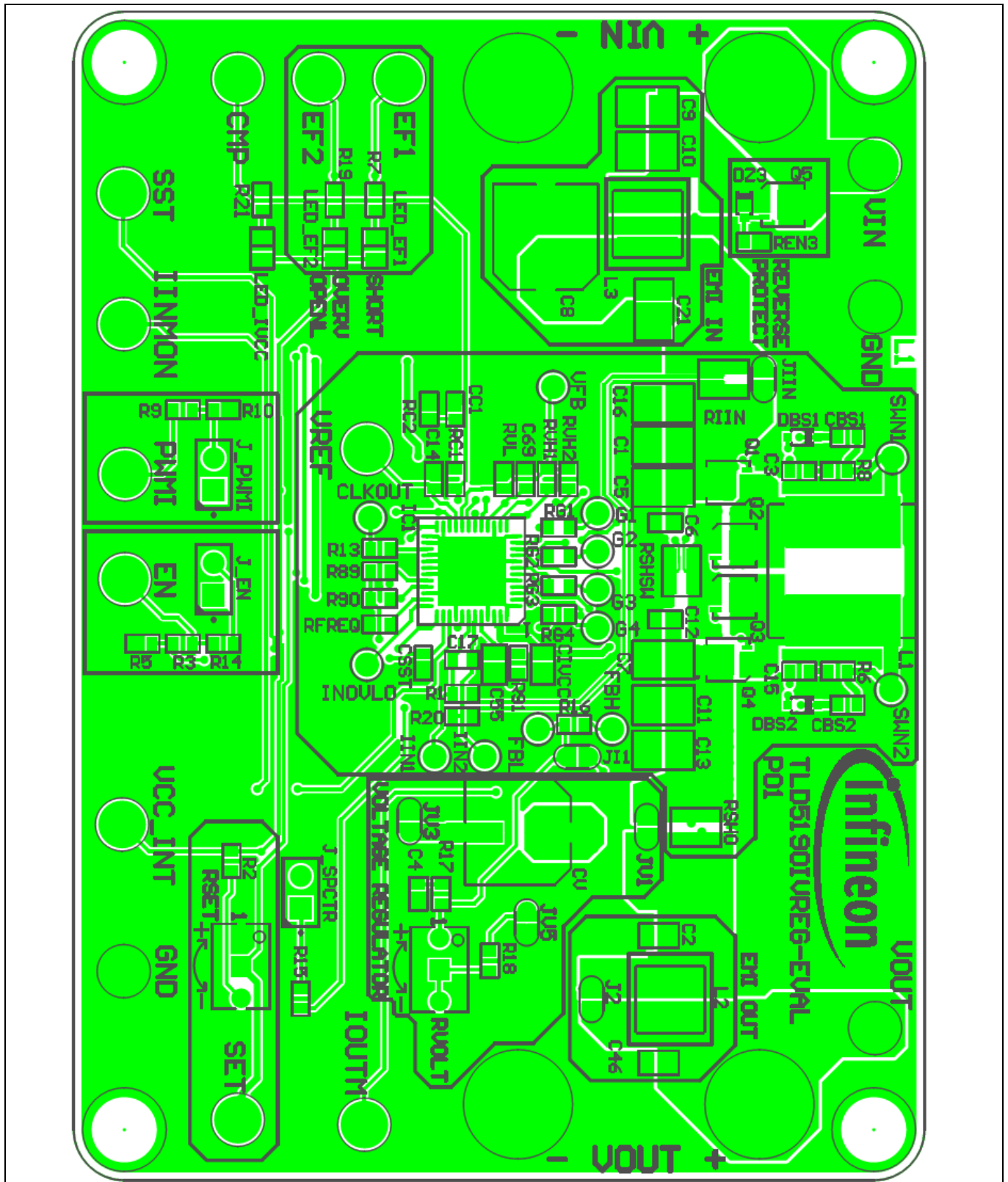


Figure 11 PCB layout top view

7 Schematic

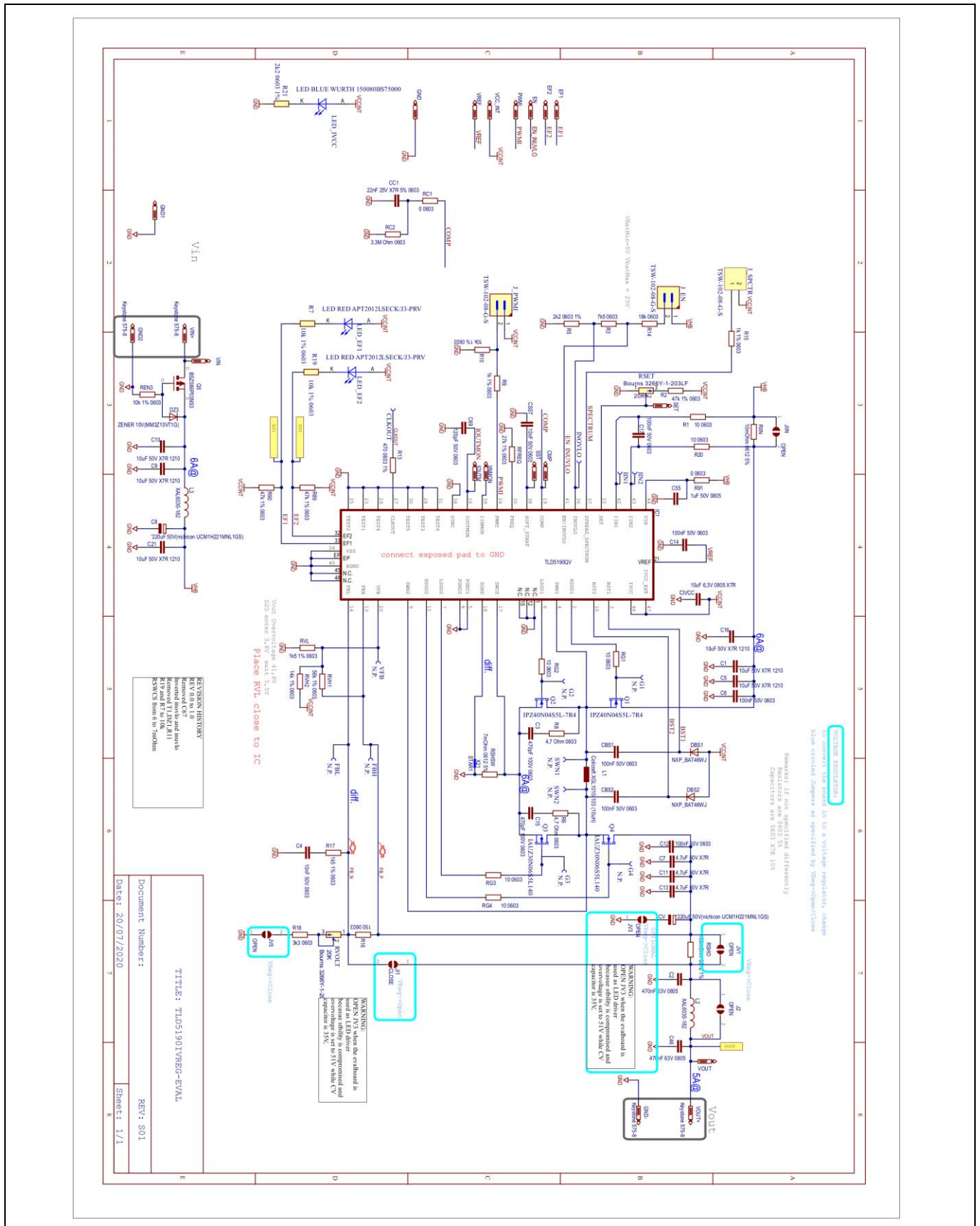


Figure 12 Schematic



Revision history

Document version	Date of release	Description of changes
Rev. 1.00	2020-07-22	Initial User Manual

Trademarks

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

Edition 2020-07-22

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2020 Infineon Technologies AG.

All Rights Reserved.

Do you have a question about this document?

Email: erratum@infineon.com

Document reference

UM TLD5542-1IVREG_eval

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 the product, technology delivery terms and conditions and prices please contact your 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 are reasonably be expected to result in personal injury.