

43V Asynchronous Boost WLED Driver Evaluation Board

General Description

The RT8511B is an LED driver IC that can support up to 10 WLED in series. It is composed of a current mode boost converter integrated with a 43V/2.2A power switch running at a fixed 500kHz frequency and covering a wide VIN range from 2.7V to 24V.

The white LED current is set with an external resistor, and the feedback voltage is regulated to 200mV (typ.). During operation, the LED current can be controlled by the PWM input signal in which the duty cycle determines the feedback reference voltage.

For brightness dimming, the RT8511B is able to maintain steady control of the LED current. Therefore, no audible noises are generated on the output capacitor. The RT8511B also has programmable overvoltage pin to prevent the output from exceeding absolute maximum ratings during open LED conditions. The RT8511B is available in WDFN-8L 2x2 package.

Table of Contents

General Description	1
Performance Sepcification Summary	2
Power-up Procedure	2
Detailed Description of Hardware	3
Bill of Materials.....	4
Typical Applications	5
Evaluation Board Layout.....	7
More Information.....	8
Important Notice for Richtek Evaluation Board.....	8

Performance Specification Summary

Summary of the RT8511BGQW Evaluation Board performance specification is provided in Table 1. The ambient temperature is 25°C.

Table 1. RT8511B Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		2.7	--	24	V
Feedback Voltage		0.195	0.2	0.205	V
LX Current Limit		1.66	2.2	2.74	A
Overvoltage Protection Threshold		1.14	1.2	1.26	V
Switching Frequency	V _{IN} = 2.7V to 24V	0.4	0.5	0.6	MHz
PWM Dimming Frequency		0.1	--	8	kHz

Power-up Procedure

Suggestion Required Equipments

- RT8511B Evaluation Board
- DC power supply capable of at least 20V and 5A
- LED Load Board
- Function Generator
- Oscilloscope

Quick Start Procedures

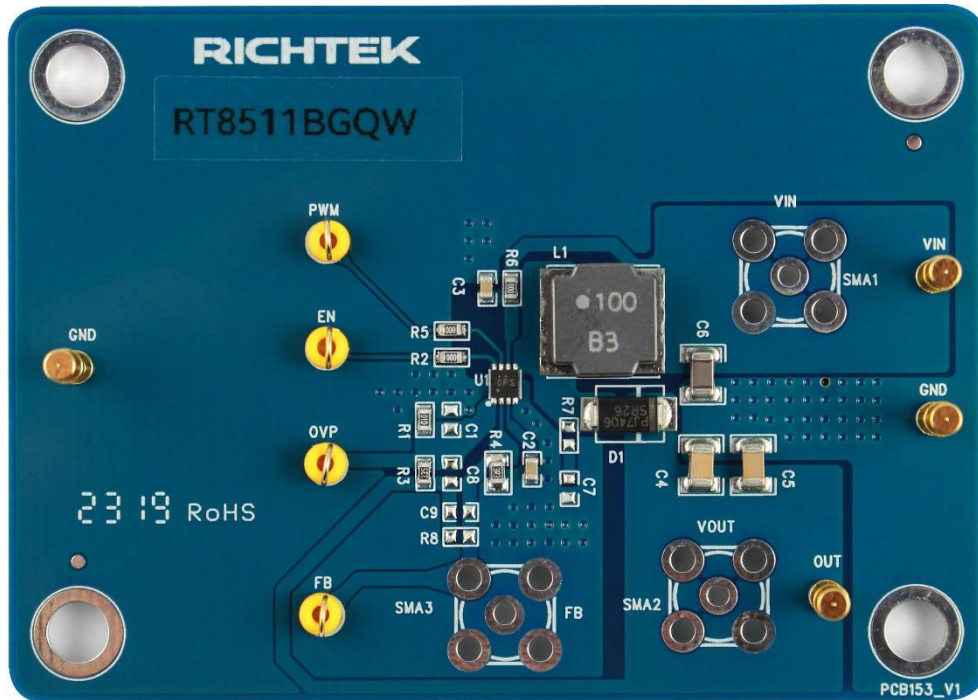
The Evaluation Board is fully assembled and tested. Follow the steps below to verify board operation. Do not turn on supplies until all connections are made. When measuring the output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the output voltage ripple by touching the probe tip and ground ring directly across the last output capacitor.

Proper measurement equipment setup and follow the procedure below.

- 1) With power off, connect the power supply for VIN and GND pins.
- 2) With power off, connect the power supply for EN and GND pins.
- 3) With power off, connect the Function Generator to PWM pin.
- 4) With power off, connect the LED Load Board to VOUT and FB pins.
- 5) Turn on the power supply at the input. Make sure that the input voltage does not exceeds 24V on the Evaluation Board.
- 6) Turn on the Function Generator at the PWM pin.
- 7) Check LED Load Board brightness.
- 8) Once the proper output voltage is established, adjust the PWM duty within the operating ranges and observe the output LED brightness , efficiency and other performance.

Detailed Description of Hardware

Headers Description and Placement



Carefully inspect all the components used in the EVB according to the following Bill of Materials table, and then make sure all the components are undamaged and correctly installed. If there is any missing or damaged component, which may occur during transportation, please contact our distributors or e-mail us at evb_service@richtek.com.

Test Points

The EVB is provided with the test points and pin names listed in the table below.

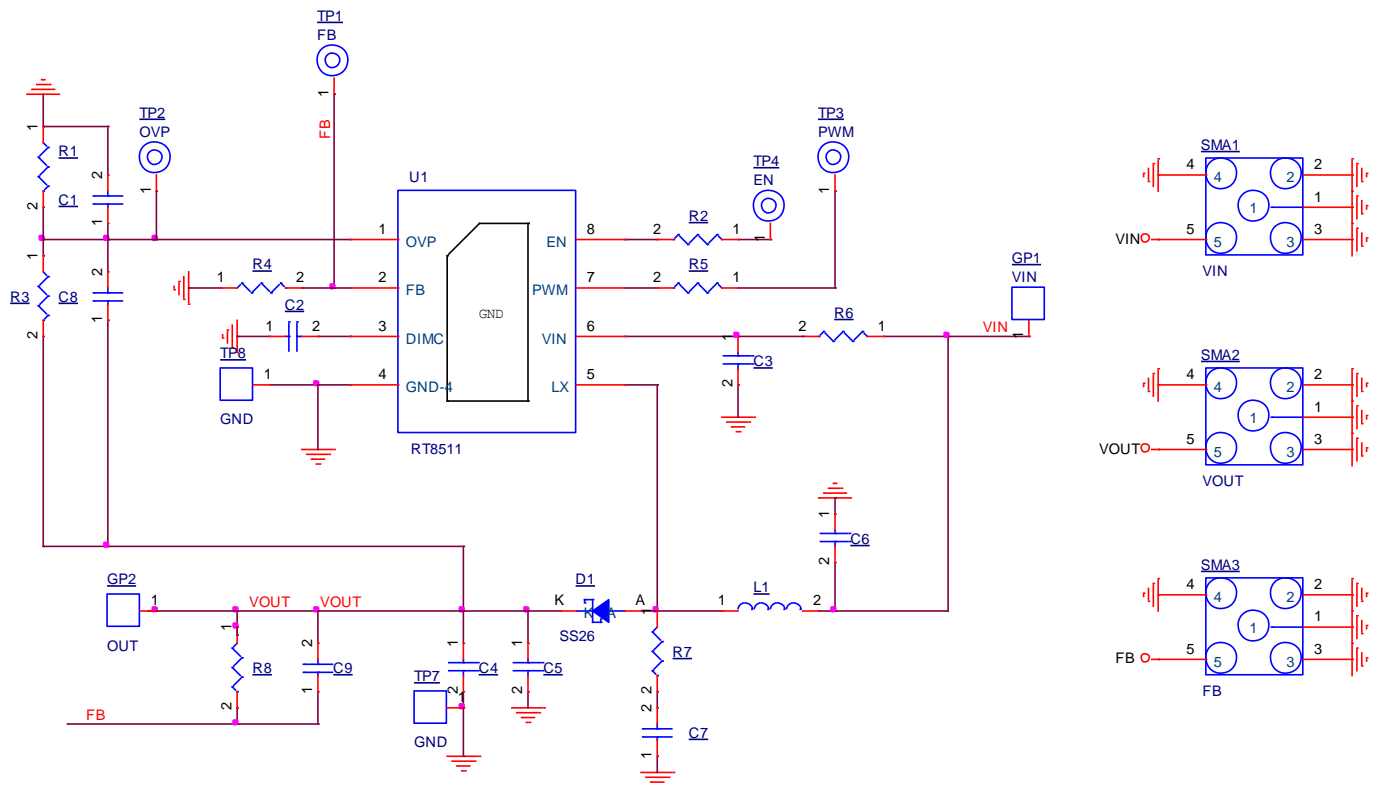
Test Point/ Pin Name	Function
OVP	Overvoltage protection for boost converter. The detecting threshold is 1.2V.
FB	Feedback. Connect a resistor between this pin and GND to set the LED current.
DIMC	PWM filter. Filter the PWM signal to a DC voltage.
GND	Ground.
LX	Switch node for boost converter.
VIN	Power supply input.
PWM	Dimming control input.
EN	Chip enable (active high) for boost converter.
GND	The exposed pad must be soldered to a large PCB and connected to AGND for maximum power dissipation.

Bill of Materials

VIN = 12V, VOUT = LED Load Board , IOUT = 60mA						
Reference	Count	Part Number	Value	Description	Package	Manufacturer
U1	1	RT8511BGQW	RT8511BGQW	LED Driver	WDFN-8L 2x2	RICHTEK
C2, C3	2	0603X105K250CT	1 μ F	Capacitor, Ceramic 25V/X5R	0603	WALSIN
C4, C5	2	0603B104K500CT	1 μ F	Capacitor, Ceramic 50V/X7R	1206	WALSN
C6	1	UMK316BJ225KD-T	2.2 μ F	Capacitor, Ceramic 50V/X5R	1206	TAIYO YUDEN
D1	1	SR26	60V/2A	D-SMA_DO-214AC	SMA/DO- 214AC	PANJIT
L1	1	LSXNH8080YKL100MJG	10 μ H	L-8x8		TAIYO YUDEN
R1	1	WR06X1003FTL	100k	Resistor, Chip 0603	0603	WALSIN
R2, R5, R6	3	WR06X1003FTL	0	Resistor, Chip 0603	0603	WALSIN
R3	1	WR06W3304FTL	3.3M	Resistor, Chip 0603	0603	WALSIN
R4	1	WR06W3R30FTL	3.3	Resistor, Chip 0603	0603	WALSIN

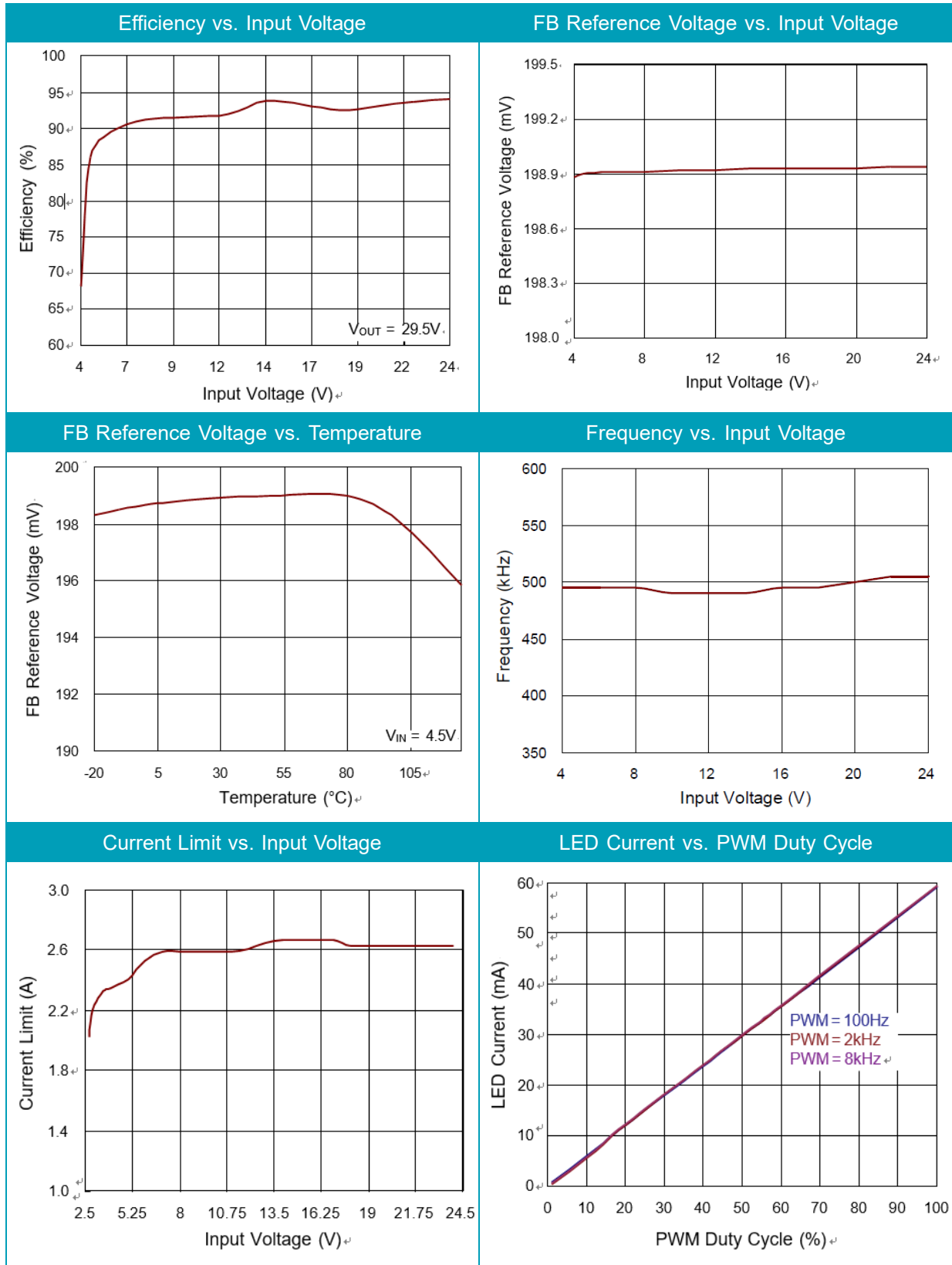
Typical Applications

EVB Schematic Diagram



1. The capacitance values of the input and output capacitors will influence the input and output voltage ripple.
2. MLCC capacitors have degrading capacitance at DC bias voltage, and especially smaller size MLCC capacitors will have much lower capacitance.

Measure Result



Evaluation Board Layout

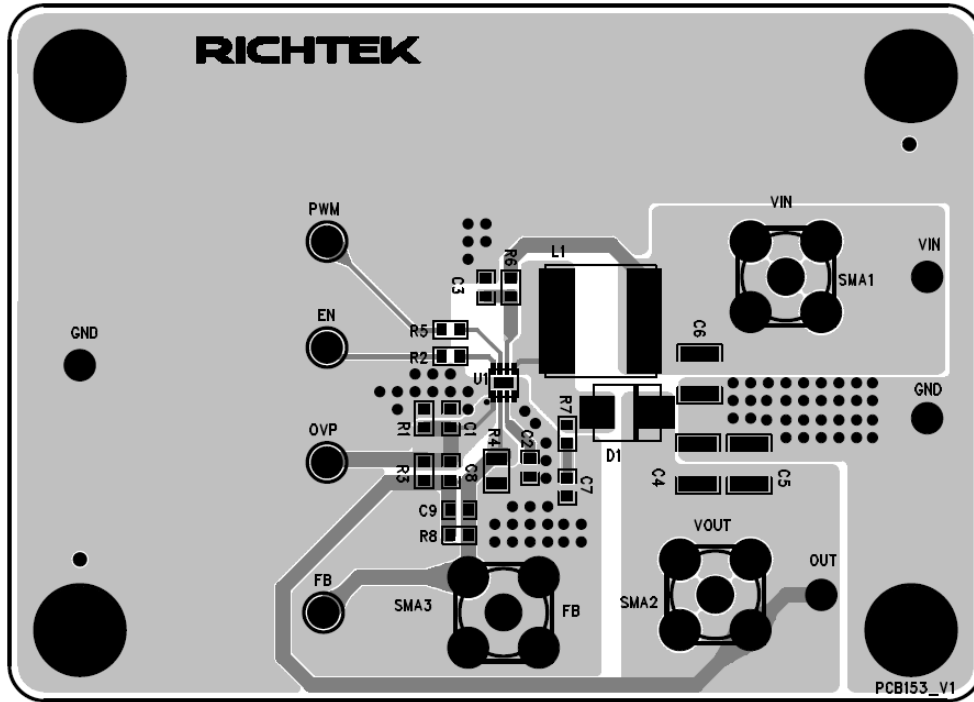


Figure 1. Top View

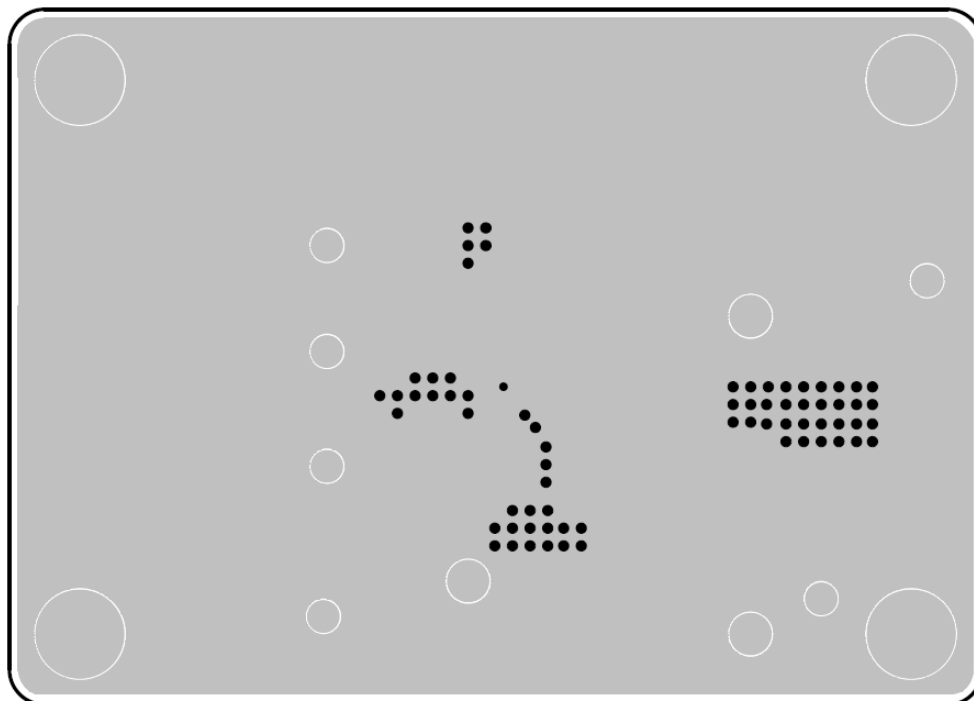


Figure 2. Bottom View

More Information

For more information, please find the related datasheet or application notes from Richtek website

<http://www.richtek.com>.

Important Notice for Richtek Evaluation Board

THIS DOCUMENT IS FOR REFERENCE ONLY, NOTHING CONTAINED IN THIS DOCUMENT SHALL BE CONSTRUED AS RICHTEK'S WARRANTY, EXPRESS OR IMPLIED, UNDER CONTRACT, TORT OR STATUTORY, WITH RESPECT TO THE PRESENTATION HEREIN. IN NO EVENT SHALL RICHTEK BE LIABLE TO BUYER OR USER FOR ANY AND ALL DAMAGES INCLUDING WITHOUT LIMITATION TO DIRECT, INDIRECT, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES.