

Current Mode Boost Controller Evaluation Board

General Description

The Evaluation Board demonstrates the RT8525DGQW's capability to be designed for a 19V/1A output from a 5V input at 200kHz switching frequency. The RT8525DGQW provides complete protection functions such as input undervoltage lockout, output undervoltage protection, output overvoltage protection, overcurrent protection and thermal shutdown. Cycle-by-cycle current limit provides protection against shorted outputs, and soft-start eliminates input current surge during start-up.

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Performance Specification Summary

Table 1 shows the summary of the RT8525DGQW Evaluation Board performance specification. The ambient temperature is 25°C.

Table 1. RT8525DGQW Evaluation Board Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		4.5	--	5	V
Output Current		0	--	1	A
Default Output Voltage		--	19	--	V
Operation Frequency		--	200	--	kHz
Maximum Efficiency	V _{IN} = 5V, V _{OUT} = 12V, I _{OUT} = 0.5A	--	92	--	%

Power-up Procedure

Suggestion Required Equipments

- RT8525DGQW Evaluation Board
- DC power supply capable of at least 10V and 5A
- Electronic load capable of 2A
- Oscilloscope

Quick Start Procedures

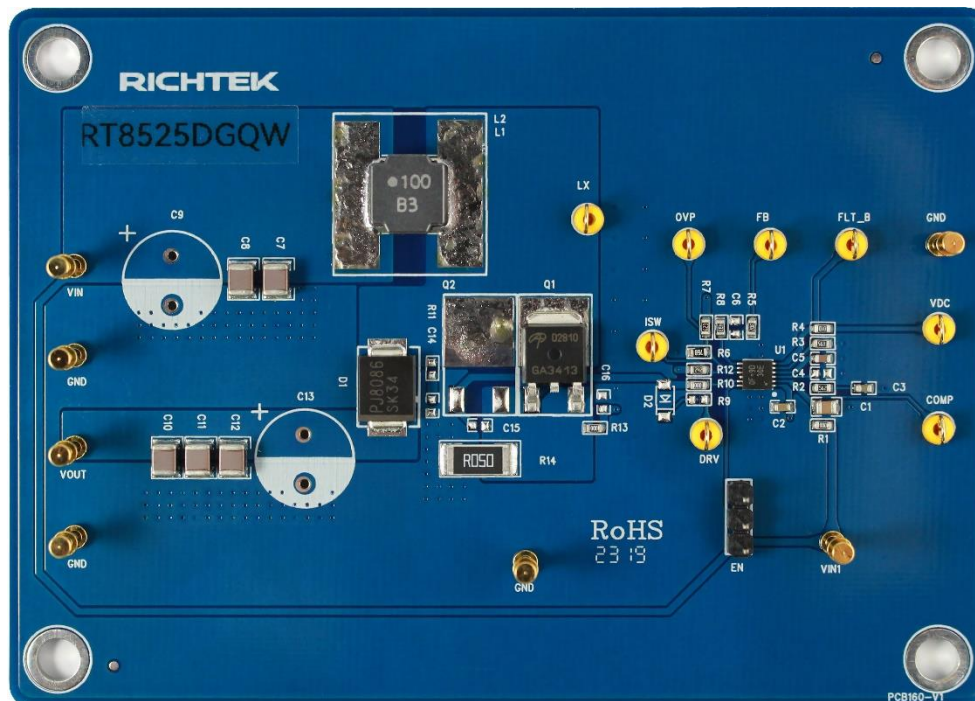
The Evaluation Board is fully assembled and tested. Follow the steps below to verify board operation. Do not turn on supplies until all connections are made. When measuring the output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the output voltage 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 input power supply to VIN and GND pins.
- 2) With power off, connect the electronic load between the VOUT and nearest GND pins.
- 3) Turn on the power supply at the input. Make sure that the input voltage does not exceeds 5V on the Evaluation Board.
- 4) Check for the proper output voltage using a voltmeter.
- 5) Once the proper output voltage is established, adjust the load within the operating ranges and observe the output voltage regulation, ripple voltage, 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
VIN	Input voltage.
VOUT	Output voltage.
GND	Ground.
EN/J1	Enable test point and EN jumper. Connect EN to ground to disable or enable.
LX	Switch node test point.
COMP	Compensation pin for error amplifier.
FLT_B	Test point for pullup voltage of the Open-drain power-good indication output.
VDC	Test point for uoutput of internal pre-regulator.
FB	Feedback test point.

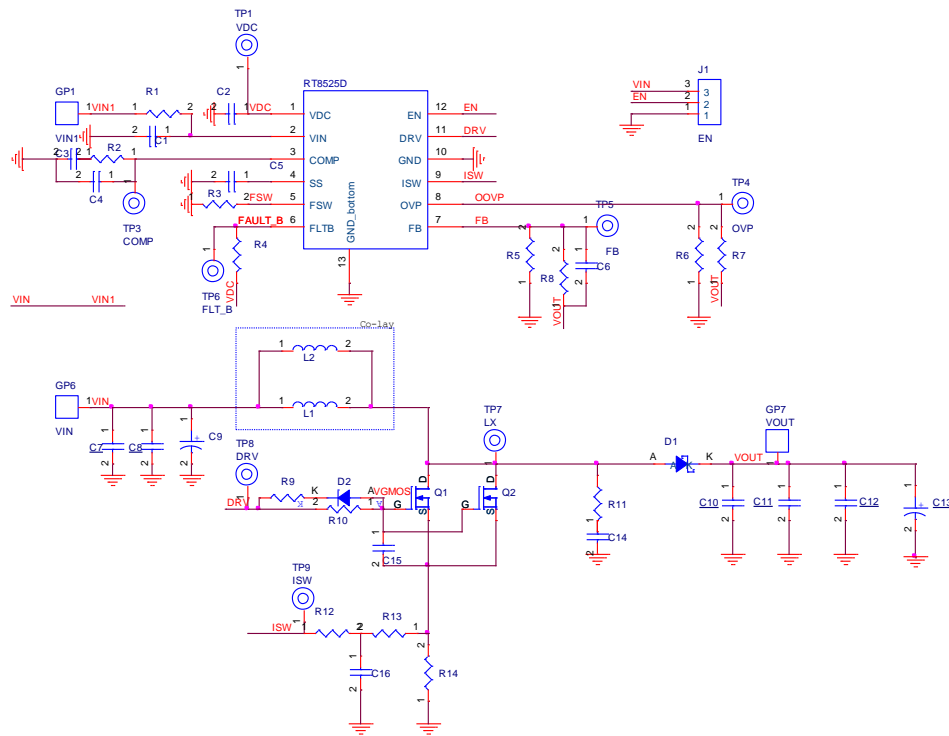
Test Point/ Pin Name	Function
OVP	Test point for overvoltage protection and undervoltage protection.
ISW	Test point for external MOSFET switch current sens.
DRV	Drive output for the N-MOSFET.

Bill of Materials

VIN = 12V, VOUT = 5V, IOUT = 0.5A, fsw = 500kHz						
Reference	Count	Part Number	Value	Description	Package	Manufacturer
U1	1	RT8525DGQW	RT8525DGQW	Step-Up Controller	WDFN-12L 3x3	RICHTEK
C1	1	GJ821BR71H105KA12	1μF	Capacitor, Ceramic, 50V, X7R	0805	MURATA
C2	1	GRM188R61H105KAALD	1μF	Capacitor, Ceramic, 50V, X7R	0603	MURATA
C3	1	0603B273K500CT	27nF	Capacitor, Ceramic, 50V, X7R	0603	WALSIN
C5	1	C1608X7R1C334K080AC	0.33μF	Capacitor, Ceramic, 16V, X7R	0603	TDK
C7, C8, C10, C11, C12	5	TMK325B7226KM-TR	22μF	Capacitor, Ceramic, 25V, X5R	1210	TAIYO YUDEN
D1	1	SK34	Schottky Diode, 40V/3A	Schottky Diode, 40V/3A	SMC	PANJIT
L1	1	NRS8040T100MJGJ	10μH	Inductor, Isat = 3.4A, 34mΩ	8x8	TAIYO YUDEN
Q1	1	IPD20N03L	AOD2810	AOD2810	TO-252-3	AOS
R1, R10, R13	3	WR06X000 PTL	0	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R2	1	WR06X5601FTL	5.6k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R3	1	WR06X5602FTL	56k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R4	1	WR06X1003FTL	100k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R5	1	RTT033001FTP	3k	Resistor, Chip, 1/10W, 1%	0603	RALEC
R6	1	CR0603F6K04P05	6.04k	Resistor, Chip, 1/10W, 1%	0603	EVER OHMS
R7	1	WR06X6202FTL	62k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R8	1	WR06X4302FTL	43k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R12	1	WR06X2401FTL	2.4k	Resistor, Chip, 1/10W, 1%	0603	WALSIN
R14	1	CR2512FR050E04Z	0.05	Resistor, Chip, 3W, 1%	2512	EVER OHMS

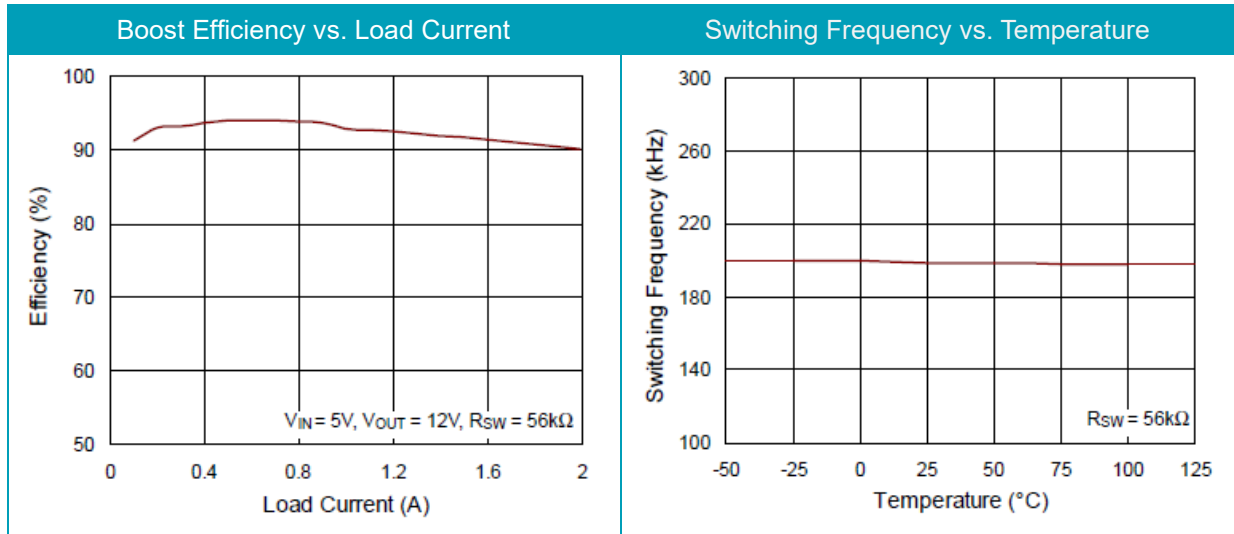
Typical Applications

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.

Measurement Result



Note: When measuring the input or 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 directly across the output capacitor.

Evaluation Board Layout

Figure 1 and Figure 2 are RT8525DGQW Evaluation Board layout. This board size is 100mm x 72mm and is constructed on two-layer PCB, top layers and bottom layers with 1 oz.

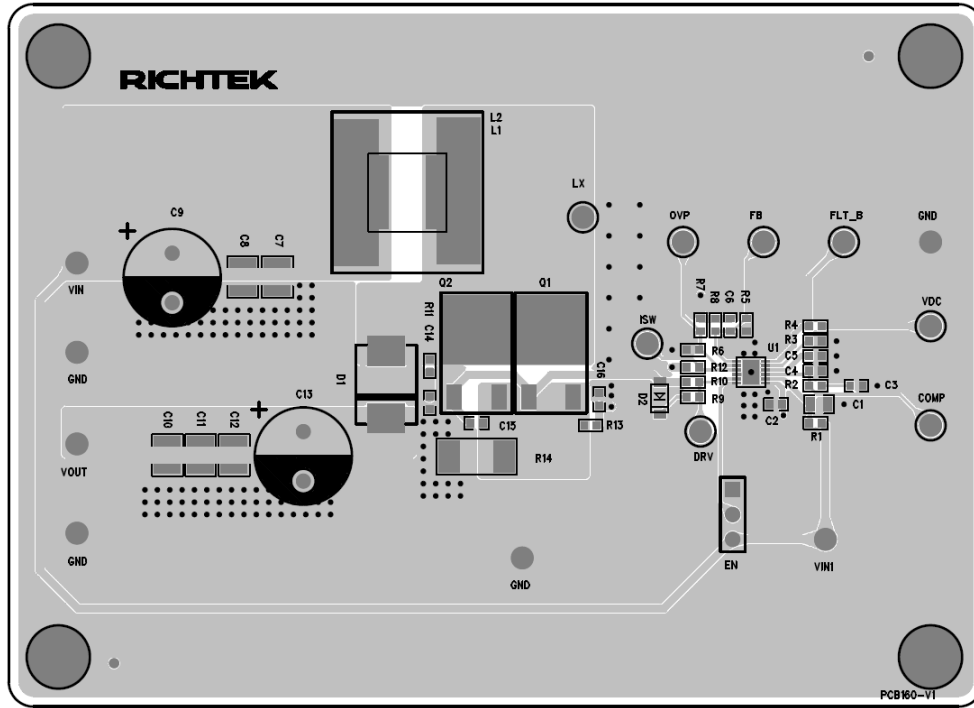


Figure 1. Top View (1st layer)

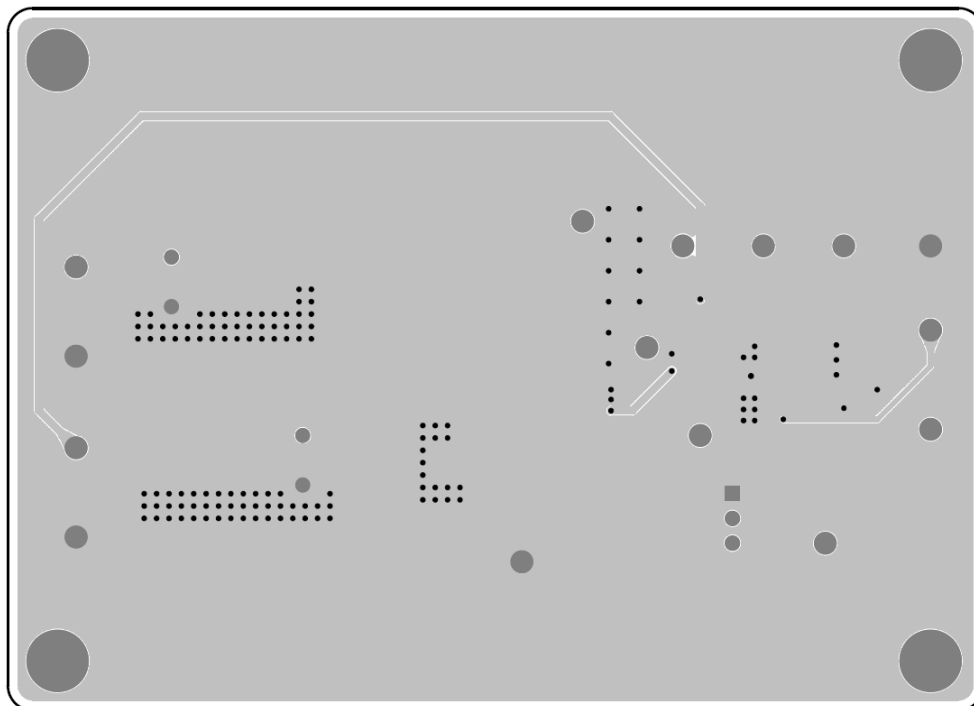


Figure 2. Bottom View (2nd Layer)

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

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