

Switching Regulator Series

Step-Down DC/DC Converter BD9E101FJ-LB Evaluation Board

BD9E101FJ-EVK-001

BD9E101FJ-EVK-001 Evaluation board delivers an output 5.0 volts from an input 7.2 to 36 volts using BD9E101FJ-LB, a synchronous rectification step-down DC/DC converter integrated circuit, with output current rating of maximum 1A. The output voltage can be set by changing the external parts of circuit and the loop-response characteristics also can be adjusted by the phase compensation circuit.

Performance specification

These are representative values, and it is not a guaranteed against the characteristics.

$V_{IN} = 24V$, $V_{OUT} = 5.0V$, Unless otherwise specified.

Parameter	Min	Typ	Max	Units	Conditions
Input Voltage Range	7.0 ^(NOTE1)		36	V	
Output Voltage		5.0		V	R1=12k Ω , R2=3k Ω
Output Voltage Setting Range	$V_{IN} \times 0.0855$ ^(NOTE2)		$V_{IN} \times 0.7$	V	
Output Current Range	0		1	A	
Loop Band Width		31.6		kHz	
Phase Margin		77.1		degrees	
Input Ripple Voltage		90		mVpp	$I_o = 1A$
Output Ripple Voltage		60		mVpp	$I_o = 1A$
Output Rising Time		3		ms	
Operating Frequency		570		kHz	
Maximum Efficiency		85.4		%	$I_o = 0.85A$

(NOTE1) When the output voltage is 5.0V, it is 7.2V by limiting ratio of the maximum duty.

(NOTE2) However, $(V_{IN} \times 0.0855) \geq 1.0V$

Operation Procedures

1. Necessary equipments

- (1) DC power-supply of 7.2V to 36V/1A
- (2) Maximum 1A load
- (3) DC voltmeter

2. Connecting the equipments

- (1) DC power-supply presets to 24V and then the power output turns off.
- (2) The maximum load should be set at 1A and over it will be disabled.
- (3) Check Jumper pin of SW1 is short, between intermediate-terminal and OFF-side terminal.
- (4) Connect positive-terminal of power-supply to VIN+ terminal and negative-terminal to GND-terminal with a pair of wires.
- (5) Connect load's positive-terminal to VOUT+ terminal and negative-terminal to GND-terminal with a pair of wires.
- (6) Connect positive-terminal of DC voltmeter 1 to TP1 and negative-terminal to TP2 for input-voltage measurement.
- (7) Connect positive-terminal of DC voltmeter 2 to TP3 and negative-terminal to TP4 for output-voltage measurement.
- (8) DC power-supply output is turned ON.
- (9) IC is enable (EN) by shorting Jumper-pin of SW1 between intermediate-terminal and ON-side terminal.
- (10) Check DC voltmeter 2 displays 5.0V.
- (11) The load is enabled.
- (12) Check at DC voltmeter 1 whether the voltage-drop (loss) is not caused by the wire's resistance.

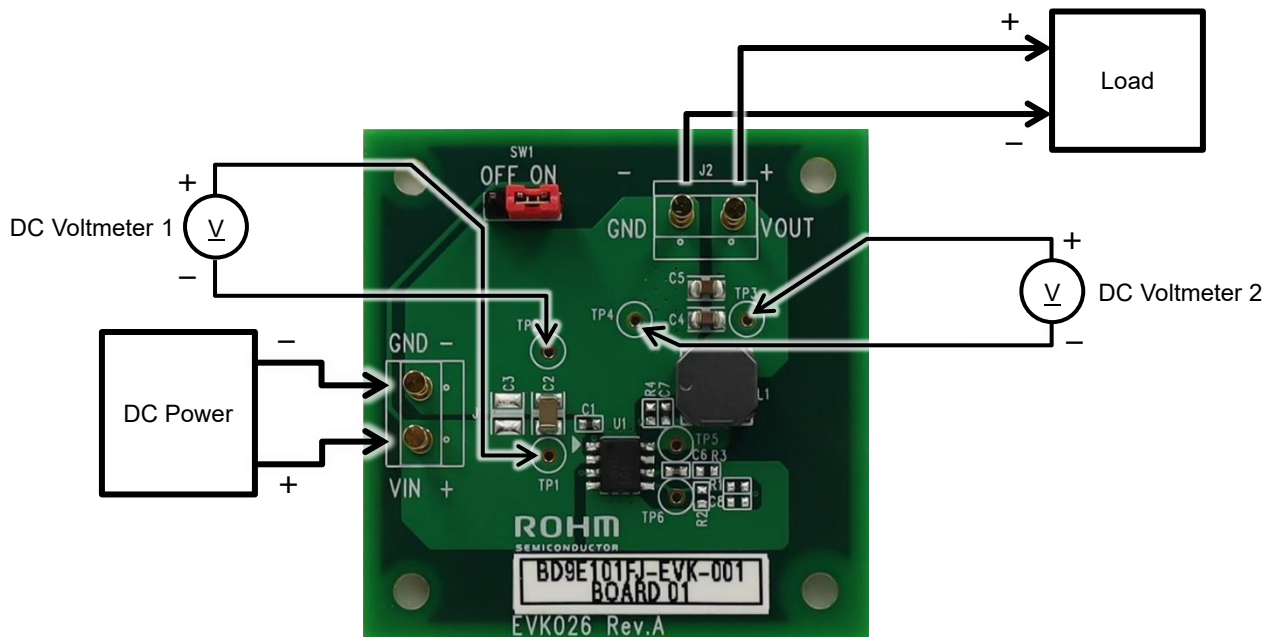


Figure 1. Connection Diagram

Enable-Pin

To minimize current consumption during standby-mode and normal operation, Enable-mode can be switched by controlling EN pin (3pin) of the IC. Standby-mode is enabled by shorting Jumper-pin of SW1 between intermediate-terminal and OFF-side terminal and normal-mode operation by shorting between intermediate-terminal and ON-side terminal.

It also can be switched between standby-mode and normal-mode operation by removing Jumper-pin and controlling the voltage between EN and GND-terminal. Standby-mode is enabled when the voltage of EN is under 0.8V, and normal-mode operation when it is over 2.5V.

Circuit Diagram

V_{IN} = 7.2V to 36V, V_{OUT} = 5.0V

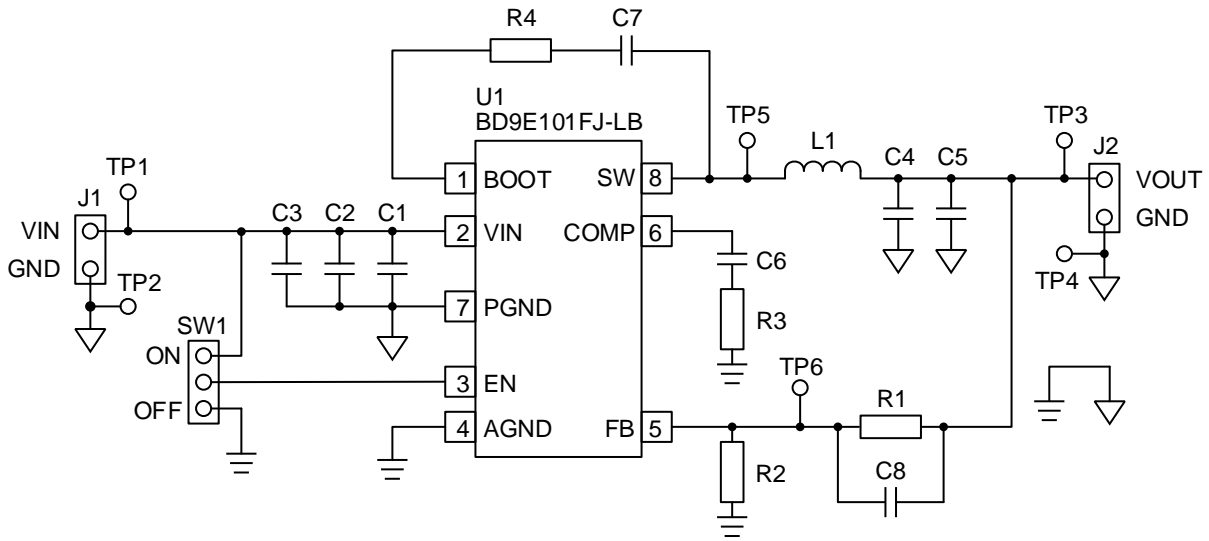


Figure 2. BD9E101FJ-EVK-001 Circuit Diagram

Bill of Materials

Count	Reference Designator	Type	Value	Description	Manufacturer Part Number	Manufacturer	Configuration (mm)
2	C1, C7	Ceramic Capacitor	0.1μF	50V, X7S, ±10%	GRM155C71H104KE19	MURATA	1005
1	C2	Ceramic Capacitor	10μF	50V, X7T, ±10%	GRM31CD71H106KE11	MURATA	3216
0	C3	Ceramic Capacitor	-	-	-	-	3225
1	C4	Ceramic Capacitor	22μF	10V, X7T, ±20%	GRM21BD71A226ME44	MURATA	2012
1	C5	Ceramic Capacitor	22μF	10V, X7T, ±20%	GRM21BD71A226ME44	MURATA	2012
1	C6	Ceramic Capacitor	4700pF	50V, X7R, ±10%	GRM155R71H472KA01	MURATA	1005
1	C8	Ceramic Capacitor	-	-	-	-	1608
1	L1	Inductor	10μH	±20%, 4.3A	1217AS-H-100M	MURATA	8080
1	R1	Resistor	12kΩ	1/16W, 1%	MCR01 series	ROHM	1005
1	R2	Resistor	3kΩ	1/16W, 1%	MCR01 series	ROHM	1005
1	R3	Resistor	30kΩ	1/16W, 1%	MCR01 series	ROHM	1005
1	R4	Resistor	0Ω	Jumper	MCR01 series	ROHM	1005
1	SW1	Pin header	-	-	-	-	-
1	U1	IC	-	Buck DC/DC Converter	BD9E101FJ-LB	ROHM	SOP-J8
2	J1, J2	Terminal Block	-	-	-	-	-
1	-	Jumper	-	-	-	-	-

(Note) The parts used may have been changed from the part numbers listed in the User's Guide due to reasons such as discontinuation of production.

Layout

PCB size: 50mm×50mm×1.6mm

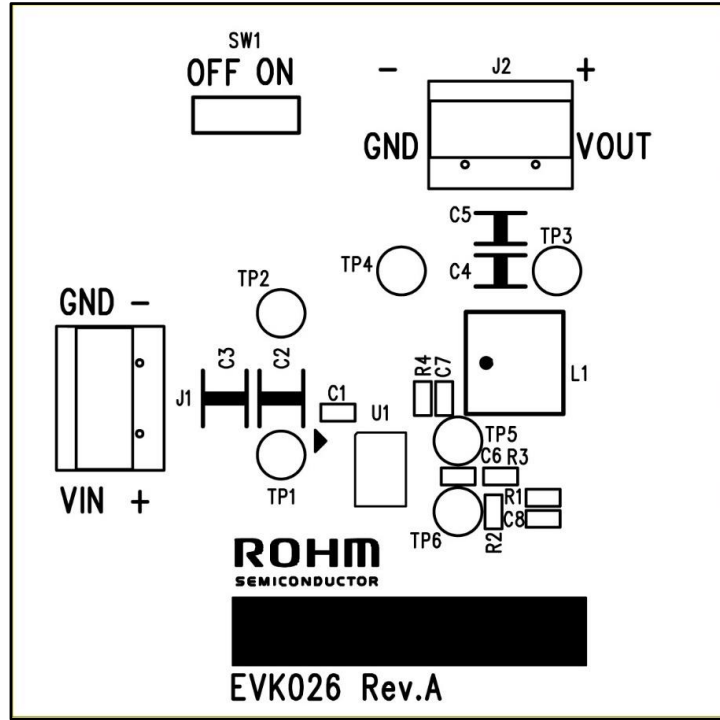


Figure 3. Top Silk Screen (Top view)

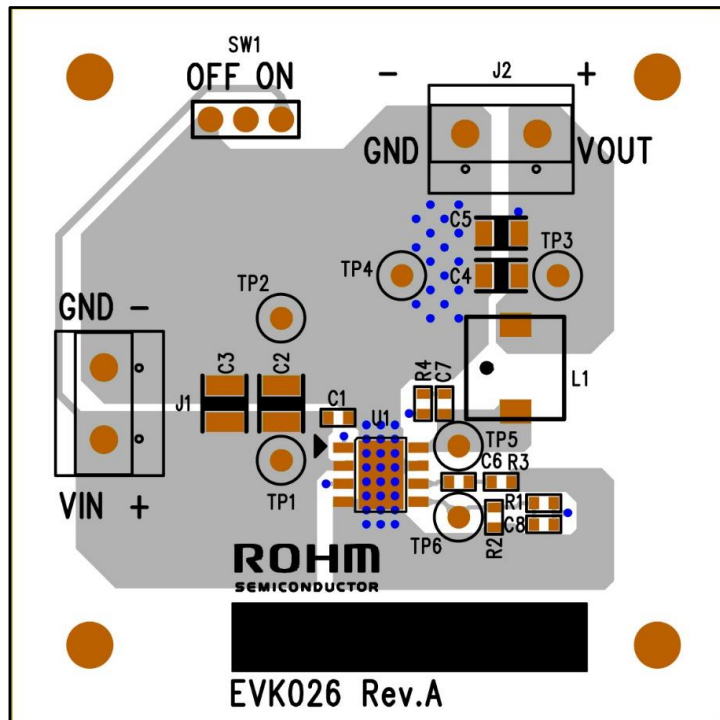


Figure 4. Top Silk Screen and Layout (Top view)

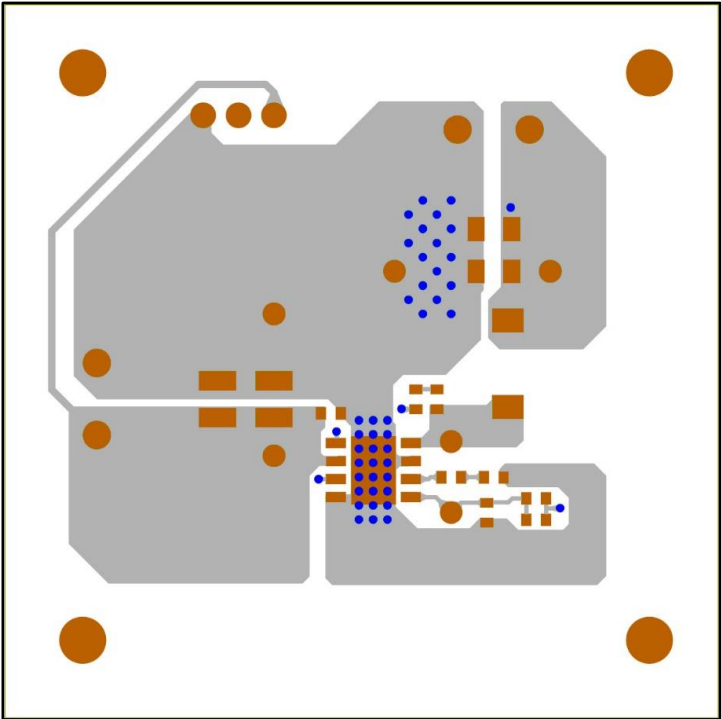


Figure 5. Top Side Layout (Top view)

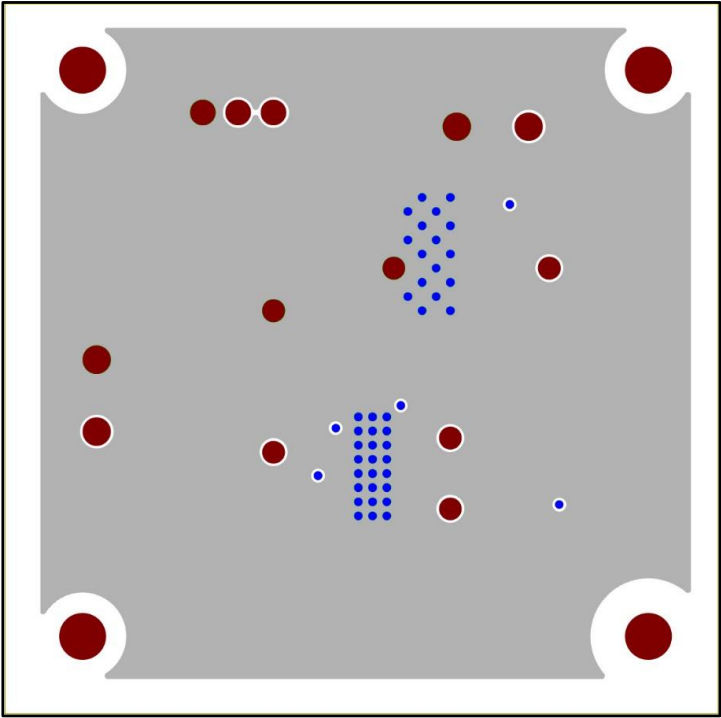


Figure 6. L2 Layout (Top view)

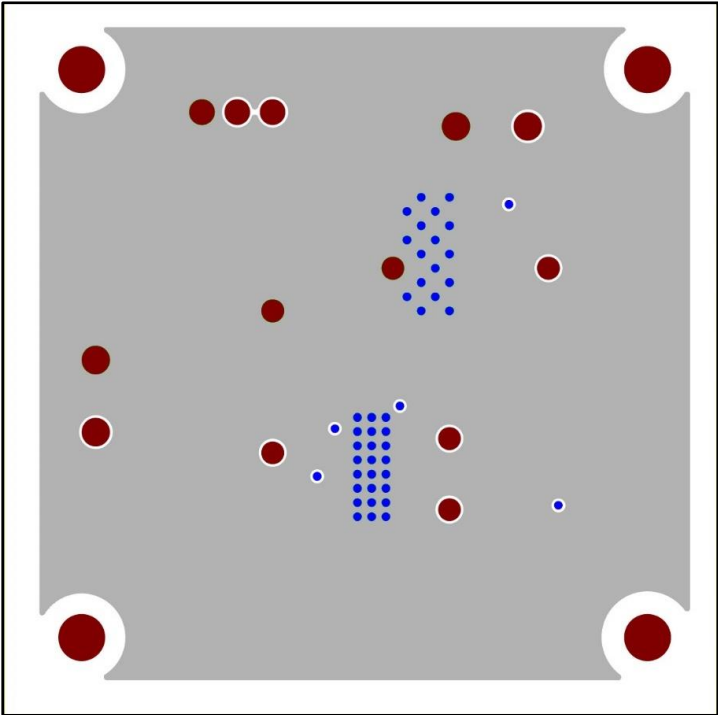


Figure 7. L3 Layout (Top view)

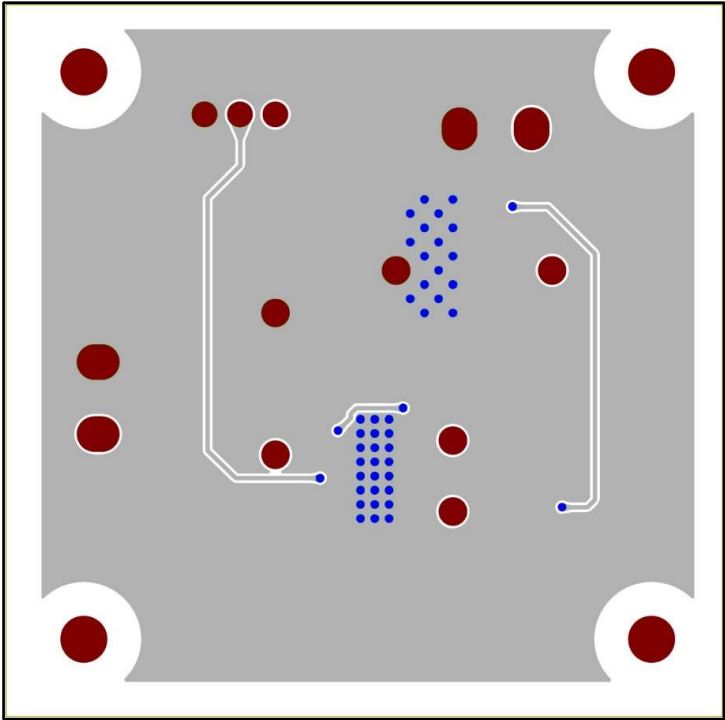


Figure 8. Bottom Side Layout (Top view)

Revision History

Date	Revision	Changes
11.Apr.2024	Rev. 004	Parts list changed. Application data has been removed as it can be referenced in the datasheet.

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