

Switching Regulator Series

Isolated Flyback DC/DC Converter BD7F100EFJ-LB Evaluation Board

BD7F100EFJ-EVK-002 (24V→±15V, 0.165A)

BD7F100EFJ-EVK-002 Evaluation board delivers outputs 15volts and -15 volts from an input 24 volts using BD7F100EFJ-LB, Isolated Flyback DC/DC converter integrated circuit, with output current rating of maximum 0.165A.

Performance specification

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

$V_{IN} = 24V$, $V_{OUT1} = 15V$, $V_{OUT2} = -15V$, Unless otherwise specified.

Parameter	Min	Typ	Max	Units	Conditions
Input Voltage		24.0		V	
Output Voltage 1		15.0		V	R4=3.9kΩ, R5=76.8kΩ
Output Voltage 2		-15.0		V	R4=3.9kΩ, R5=76.8kΩ
Output Current 1 Range	3.2		165	mA	Maximum Output Power:5W
Output Current 2 Range	3.2		165	mA	
Operating Frequency		400		kHz	
Maximum Efficiency		81.7		%	$I_O = 165mA$

Evaluation Board

PCB size: 70mmx50mmx1.6mm

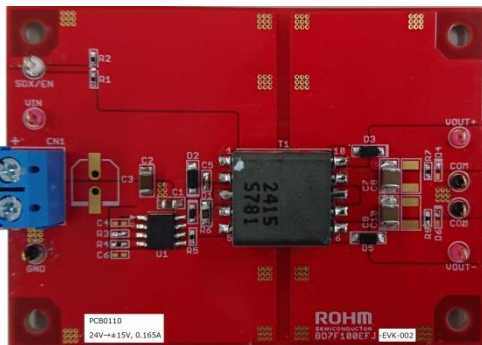


Figure 1. BD7F100EFJ-EVK-002 Evaluation Board

Top View

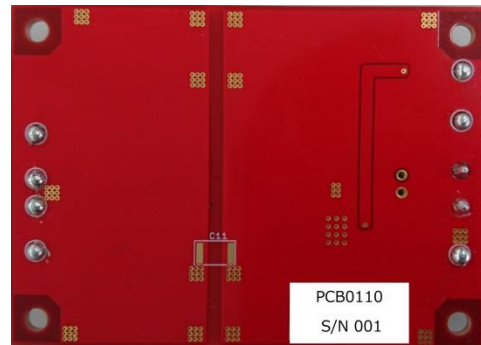


Figure 2. BD7F100EFJ-EVK-002 Evaluation Board

Bottom View

Operation Procedures

1. Necessary equipments

- (1) DC power-supply of 24V/0.5A
- (2) Maximum 0.165A load per output
- (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 165mA and over it will be disabled.
- (3) Connect positive-terminal of power-supply to VIN terminal and negative-terminal to GND terminal with a pair of wires.
- (4) Connect positive-terminal of load 1 to VOUT+ terminal and negative-terminal to COM terminal with a pair of wires.
- (5) Connect positive-terminal of load 2 to COM terminal and negative-terminal to VOUT- terminal with a pair of wires.
- (6) Connect positive-terminal of DC voltmeter 1 to VIN and negative-terminal to GND for input-voltage measurement.
- (7) Connect positive-terminal of DC voltmeter 2 to VOUT+ and negative-terminal to COM for output-voltage measurement.
- (8) Connect positive-terminal of DC voltmeter 3 to VOUT- and negative-terminal to COM for output-voltage measurement.
- (9) DC power-supply output is turned ON.
- (10) Check DC voltmeter 2 displays 15V.
- (11) Check DC voltmeter 3 displays -15V.
- (12) The load is enabled.

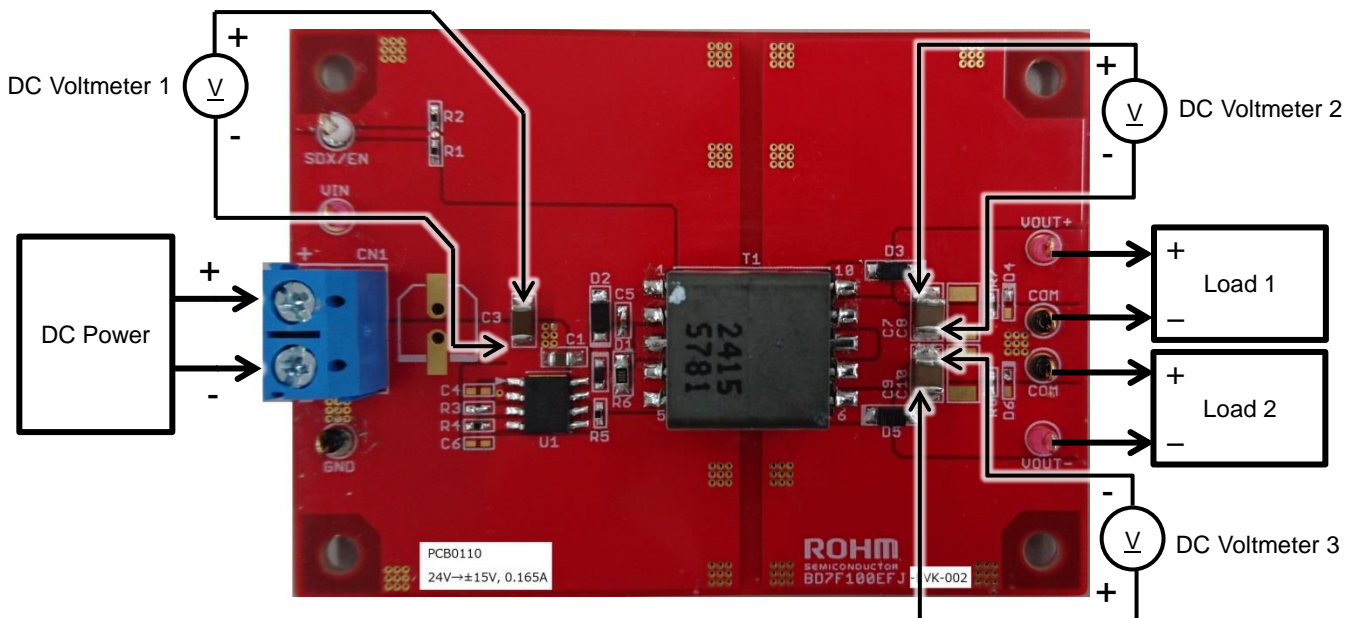


Figure 3. Connection Diagram

Circuit Diagram

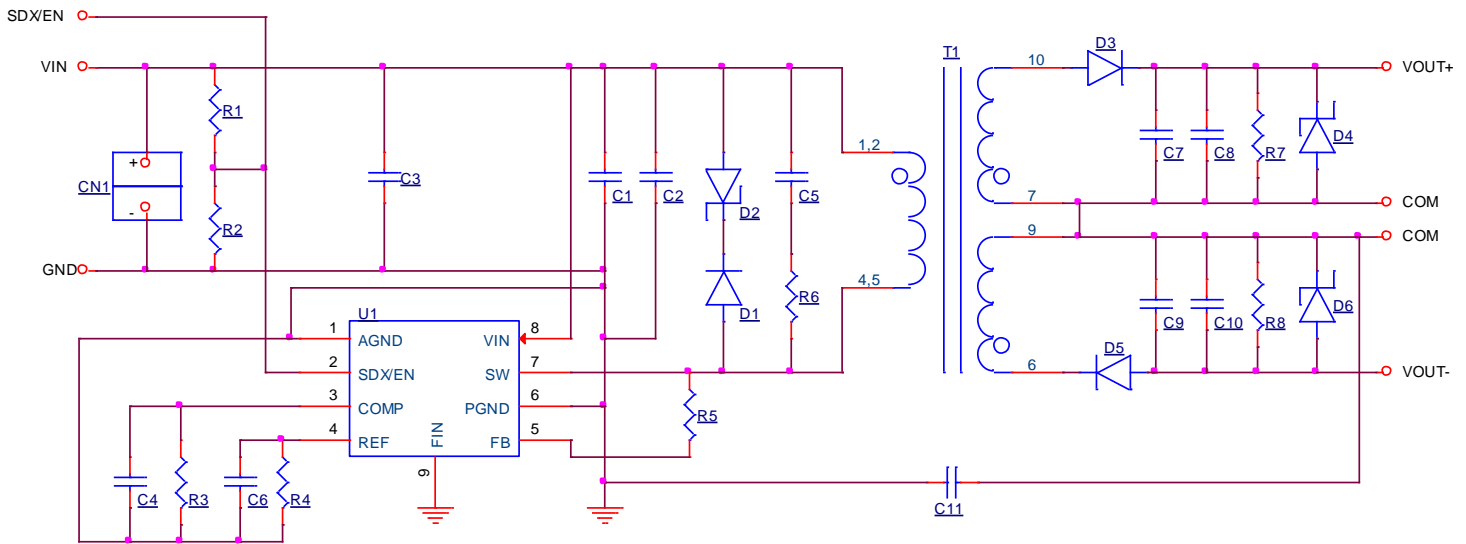
 $V_{IN} = 24V, V_{OUT1} = 15V, V_{OUT2} = -15V$


Figure 4. BD7F100EFJ-EVK-002 Circuit Diagram

Bill of Materials

No.	Value	Description	Size	Part Number / Series	Manufacturer
C1	1 μ F	Capacitor, Chip, 50V, X7R	2012	GRM21BR71H105KA12	MURATA
C2	4.7 μ F	Capacitor, Chip, 50V, X7R	3216	GRM31CR71H475KA12	MURATA
C3	-	Notinstalled	-	-	-
C4	-	Notinstalled	-	-	-
C5	4700pF	Capacitor, Chip, 50V, R	1005	GRM155R11H472KA01	MURATA
C6	-	Notinstalled	-	-	-
C7	10 μ F	Capacitor, Chip, 25V, X7R	3225	GRM32DR71E106KA12	MURATA
C8	-	Notinstalled	-	-	-
C9	10 μ F	Capacitor, Chip, 25V, X7R	3225	GRM32DR71E106KA12	MURATA
C10	-	Notinstalled	-	-	-
C11	-	Notinstalled	-	-	-
D1	1SS400SM	Diode	1608	1SS400SM	ROHM
D2	KDZ18B	Diode, Zener	3516	KDZ18B	ROHM
D3	RB160MM-90	Diode, Schottky	3516	RB160MM-90	ROHM
D4	-	Notinstalled	-	-	-
D5	RB160MM-90	Diode, Schottky	3516	RB160MM-90	ROHM
D6	-	Notinstalled	-	-	-
R1	1M Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1004	ROHM
R2	120k Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1203	ROHM
R3	-	Short	-	-	-
R4	3.9k Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF3901	ROHM
R5	76.8k Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF7682	ROHM
R6	1k Ω	Resistor, Chip, 2/5W, 1%	2012	ESR10EZPF1001	ROHM
R7	4.7 k Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF4701	ROHM
R8	4.7 k Ω	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF4701	ROHM
T1	50 μ H	Transformer, Np:Ns=1:1:1, \pm 20%	13.5 x 20.0 x 12.5mm	CEP1311D-2415052R	sumida
U1	BD7F100EFJ	I.C. BD7F100EFJ	HTSOP-J8	BD7F100EFJ	ROHM

Layout

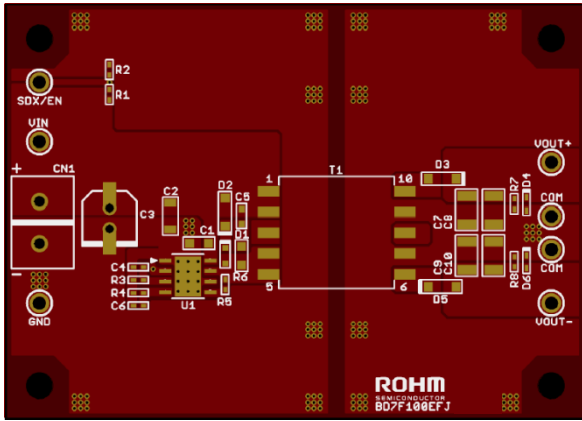


Figure 5. Top Silk Screen and Layout
(Top View)

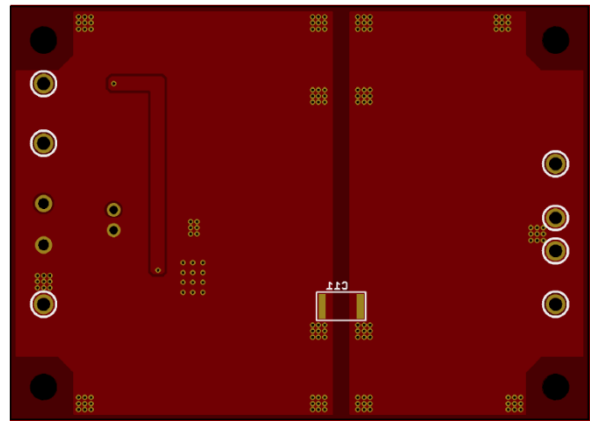


Figure 6. Bottom Silk Screen and Layout
(Top View)

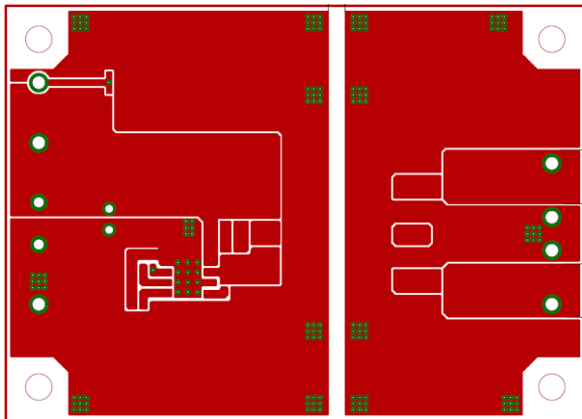


Figure 7. Top Side Layout
(Top View)

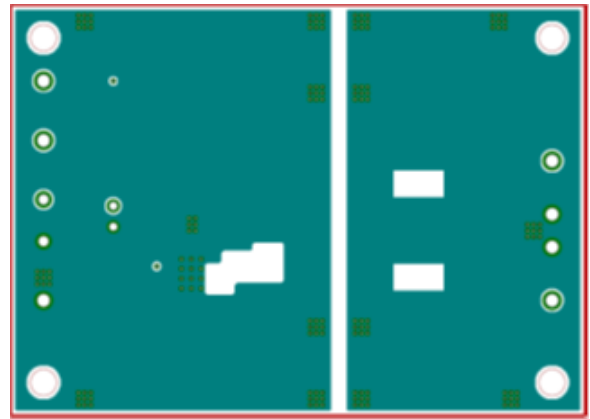


Figure 8. Middle Layer1 Layout
(Top View)

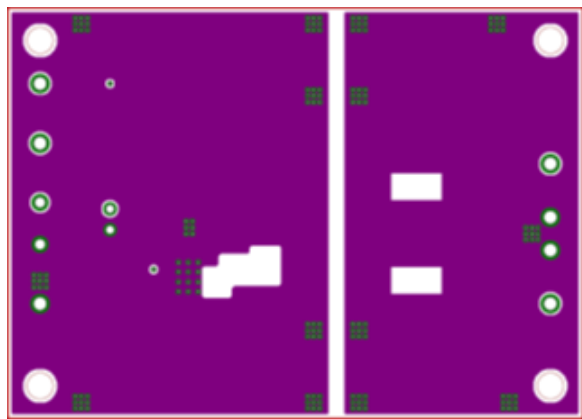


Figure 9. Middle Layer2 Layout
(Top View)

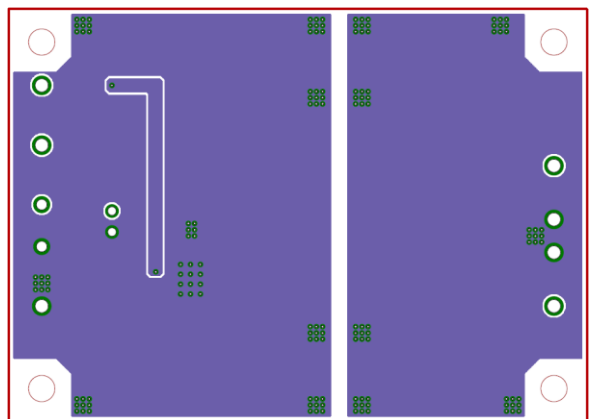


Figure 10. Bottom Side Layer Layout
(Top View)

Reference Application Data

$V_{IN} = 24V, V_{OUT1} = 15V, V_{OUT2} = -15V$

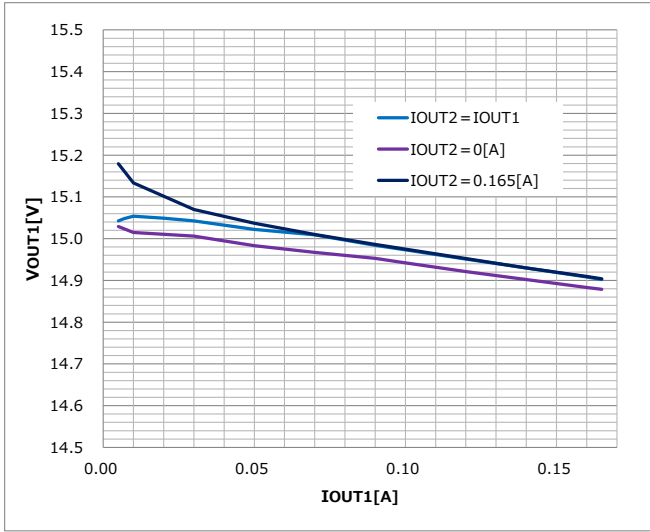


Figure 11. Load Regulation (V_{OUT1})

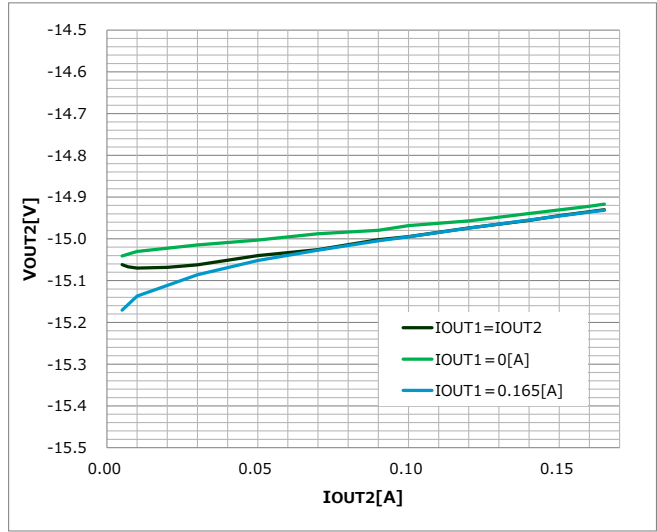


Figure 12. Load Regulation (V_{OUT2})

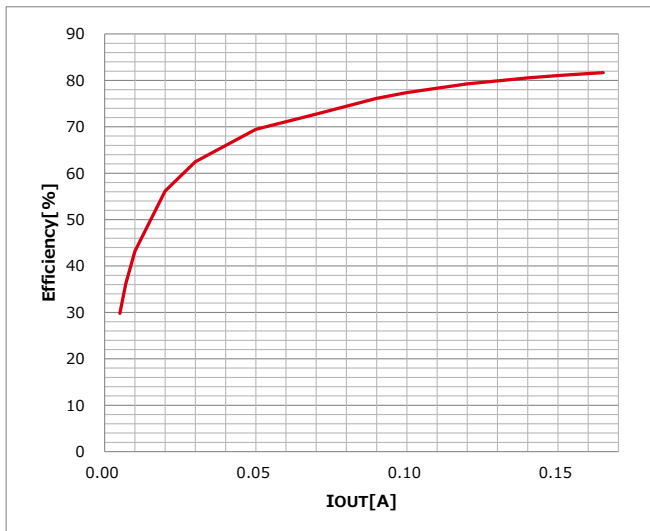


Figure 13. Efficiency vs Load Current
(I_{OUT} = I_{OUT1} = I_{OUT2})

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<High Voltage Safety Precautions>

◇ Read all safety precautions before use

Please note that this document covers only the BD7F100EFJ-LB evaluation board (BD7F100EFJ-EVK-002) and its functions. For additional information, please refer to the datasheet.

To ensure safe operation, please carefully read all precautions before handling the evaluation board



Depending on the configuration of the board and voltages used,
Potentially lethal voltages may be generated.
Therefore, please make sure to read and observe all safety precautions described in the red box below.

Before Use

- [1] Verify that the parts/components are not damaged or missing (i.e. due to the drops).
- [2] Check that there are no conductive foreign objects on the board.
- [3] Be careful when performing soldering on the module and/or evaluation board to ensure that solder splash does not occur.
- [4] Check that there is no condensation or water droplets on the circuit board.

During Use

- [5] Be careful to not allow conductive objects to come into contact with the board.
- [6] **Brief accidental contact or even bringing your hand close to the board may result in discharge and lead to severe injury or death. Therefore, DO NOT touch the board with your bare hands or bring them too close to the board.**
In addition, as mentioned above please exercise extreme caution when using conductive tools such as tweezers and screwdrivers.
- [7] If used under conditions beyond its rated voltage, it may cause defects such as short-circuit or, depending on the circumstances, explosion or other permanent damages.
- [8] Be sure to wear insulated gloves when handling is required during operation.

After Use

- [9] The ROHM Evaluation Board contains the circuits which store the high voltage. Since it stores the charges even after the connected power circuits are cut, please discharge the electricity after using it, and please deal with it after confirming such electric discharge.
- [10] Protect against electric shocks by wearing insulated gloves when handling.

This evaluation board is intended for use only in research and development facilities and should be handled **only by qualified personnel familiar with all safety and operating procedures.**

We recommend carrying out operation in a safe environment that includes the use of high voltage signage at all entrances, safety interlocks, and protective glasses.