Switching Regulator Series

Isolated Flyback DC/DC Converter BD7F200HFN-LB Evaluation Board

BD7F200HFN-EVK-001 (24V→15V, 0.15A×4ch)

BD7F200HFN-EVK-001 Evaluation board delivers four outputs 15 volts from an input 24 volts using BD7F200HFN-LB, Isolated Flyback DC/DC converter integrated circuit, with output current rating of maximum 0.15A.

Performance specification

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

V_{IN} = 24V, V_{OUT1} = V_{OUT2} = V_{OUT3} = V_{OUT4} =15V, Unless otherwise specified.

Parameter	Min	Typ	Max	Units	Conditions
Input Voltage		24.0		V	
Output Voltages 1 to 4		15.0		V	R4=3.9kΩ, R5=78.7kΩ
Output Currents Range 1 to 4	20		150	mA	Maximum Output Power：10W
Operating Frequency		400		kHz	
Maximum Efficiency		83.6		%	$I_{OUT1\ to\ 4}$ = 150mA

Evaluation Board

PCB size: 90mm×70mm×1.6mm

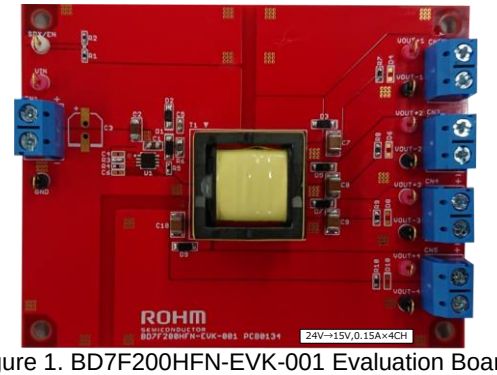


Figure 1. BD7F200HFN-EVK-001 Evaluation Board

Top View

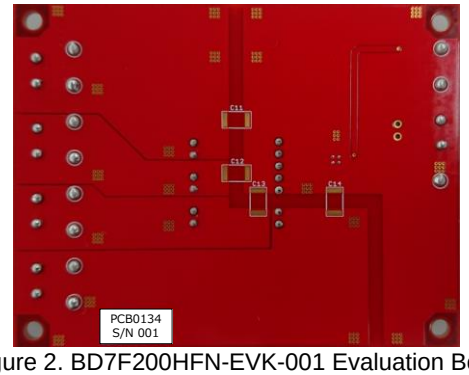


Figure 2. BD7F200HFN-EVK-001 Evaluation Board

Bottom View

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Operation Procedures

1. Necessary equipments

(1) DC power-supply of 24V / 1A

(2) Maximum 0.15A 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 150mA 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+ 1 terminal and negative-terminal to VOUT-1 terminal with a pair of wires.

(5) Connect positive-terminal of load 2 to VOUT+ 2 terminal and negative-terminal to VOUT-2 terminal with a pair of wires.

(6) Connect positive-terminal of load 3 to VOUT+ 3 terminal and negative-terminal to VOUT-3 terminal with a pair of wires.

(7) Connect positive-terminal of load 4 to VOUT+ 4 terminal and negative-terminal to VOUT-4 terminal with a pair of wires.

(8) Connect positive-terminal of DC voltmeter 1 to VIN and negative-terminal to GND for input-voltage measurement.

(9) Connect positive-terminal of DC voltmeter 2 to VOUT+1 and negative-terminal to VOUT-1 for output-voltage measurement.

(10) Connect positive-terminal of DC voltmeter 3 to VOUT+2 and negative-terminal to VOUT-2 for output-voltage measurement.

(11) Connect positive-terminal of DC voltmeter 4 to VOUT+3 and negative-terminal to VOUT-3 for output-voltage measurement.

(12) Connect positive-terminal of DC voltmeter 5 to VOUT+4 and negative-terminal to VOUT-4 for output-voltage measurement.

(13) DC power-supply output is turned ON.

(14) Check DC voltmeters 2 to 5 displays 15V.

(15) The loads 1 to 4 are enabled.

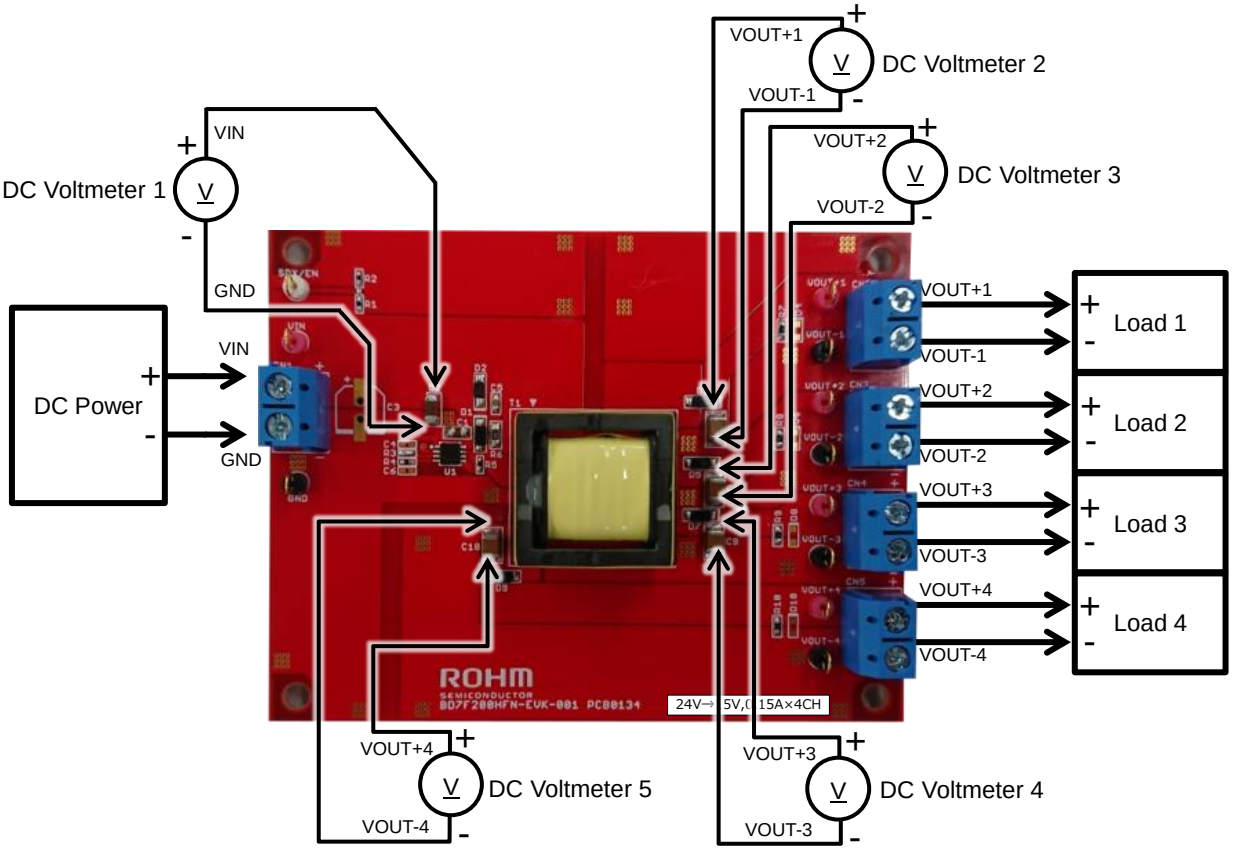


Figure 3. Connection Diagram

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Circuit Diagram

V_{IN} = 24V, V_{OUT1}= V_{OUT2}= V_{OUT3}= V_{OUT4}= 15V

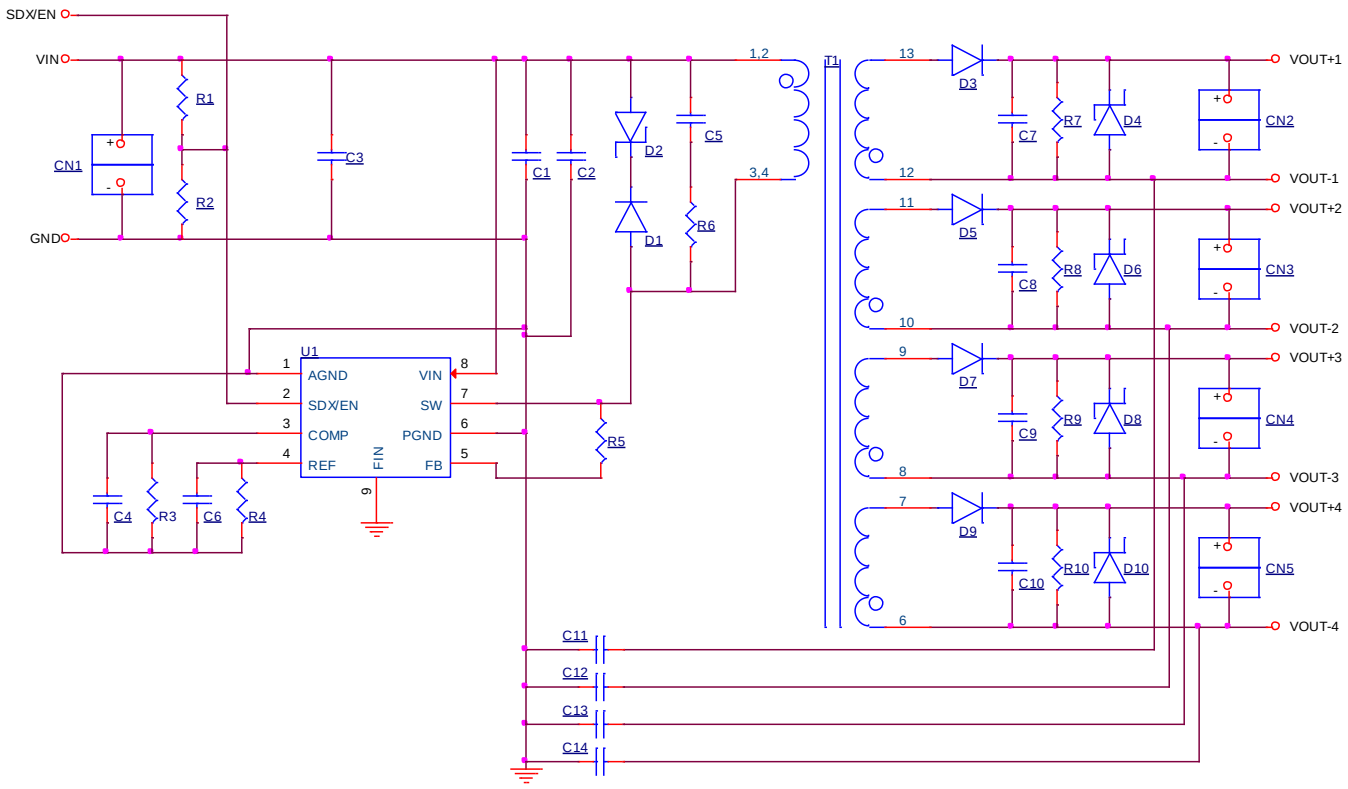


Figure 4. BD7F200HFN-EVK-001 Circuit Diagram

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Bill of Materials

No.	Value	Description	Size	Part Number / Series	Manufactuer
C1	1μF	Capacitor, Chip, 50V, X7R	2012	GRM21BR71H105KA12	MURATA
C2	4.7μF	Capacitor, Chip, 50V, X7R	3216	GRM31CR71H475KA12	MURATA
C3	-	Notinstalled	-	-	-
C4	-	Notinstalled	-	-	-
C5	470pF	Capacitor, Chip, 50V, X7R	1608	GRM188R71H471KA01	MURATA
C6	-	Notinstalled	-	-	-
C7	22μF	Capacitor, Chip, 25V, X7R	3225	GRM32ER71E226KE15	MURATA
C8	22μF	Capacitor, Chip, 25V, X7R	3225	GRM32ER71E226KE15	MURATA
C9	22μF	Capacitor, Chip, 25V, X7R	3225	GRM32ER71E226KE15	MURATA
C10	22μF	Capacitor, Chip, 25V, X7R	3225	GRM32ER71E226KE15	MURATA
C11	-	Notinstalled	-	-	-
C12	-	Notinstalled	-	-	-
C13	-	Notinstalled	-	-	-
C14	-	Notinstalled	-	-	-
D1	RB160MM-40	Diode, Schottky	PMDU	RB160MM-40	ROHM
D2	TFZ18B	Diode, Zener	TUMD2M	TFZ18B	ROHM
D3	RB160MM-90	Diode, Schottky	PMDU	RB160MM-90	ROHM
D4	-	Notinstalled	-	-	-
D5	RB160MM-90	Diode, Schottky	PMDU	RB160MM-90	ROHM
D6	-	Notinstalled	-	-	-
D7	RB160MM-90	Diode, Schottky	PMDU	RB160MM-90	ROHM
D8	-	Notinstalled	-	-	-
D9	RB160MM-90	Diode, Schottky	PMDU	RB160MM-90	ROHM
D10	-	Notinstalled	-	-	-
R1	1MΩ	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1004	ROHM
R2	120kΩ	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1203	ROHM
R3	-	Short	-	-	-
R4	3.9kΩ	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF3901	ROHM
R5	78.7kΩ	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF7872	ROHM
R6	1kΩ	Resistor, Chip, 2/5W, 1%	2012	ESR10EZPF1001	ROHM
R7	3.3kΩ	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX3301	ROHM
R8	3.3kΩ	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX3301	ROHM
R9	3.3kΩ	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX3301	ROHM
R10	3.3kΩ	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX3301	ROHM
T1	27μH	Transformer, Lp=27μH±20% Np:Ns1:Ns2:Ns3:Ns4=1:1:1:1:1	22.5 x 24.0 x 14.8mm	EFD2014 13307-T070	sumida
U1	BD7F200HFN	I.C. BD7F200HFN	HSON8	BD7F200HFN	ROHM

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Layout

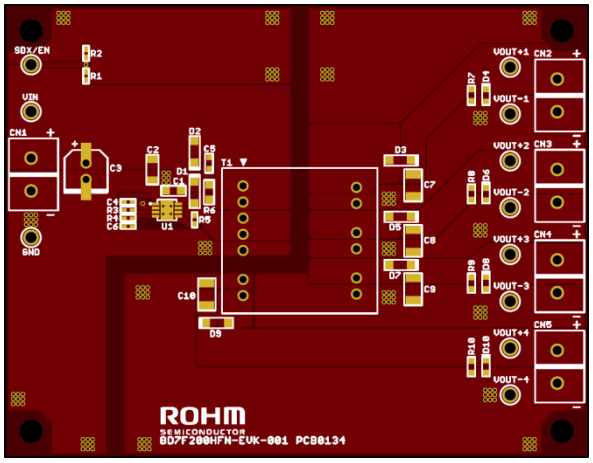


Figure 5. Top Silk Screen and Layout

(Top View)

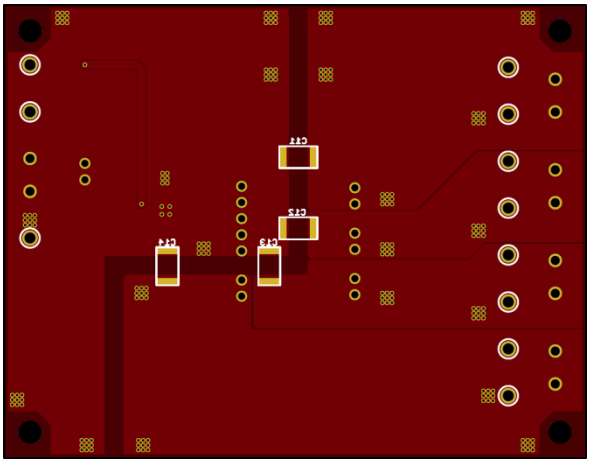


Figure 6 . Bottom Silk Screen and Layout

(Top View)

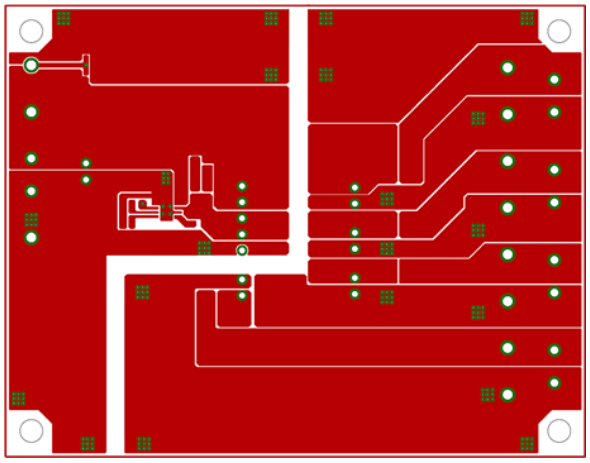


Figure 7. Top Side Layout

(Top View)

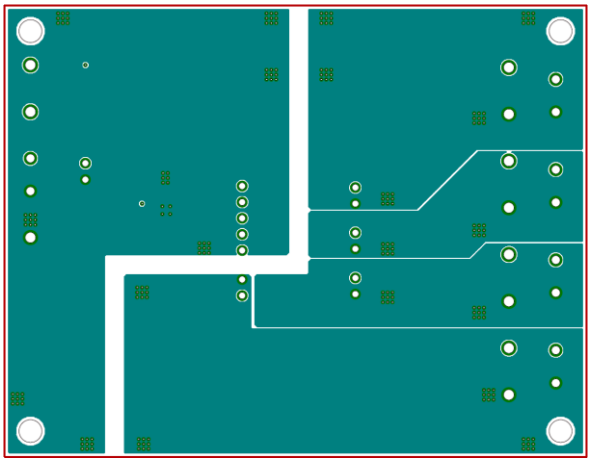


Figure 8. Middle Layer1 Layout

(Top View)

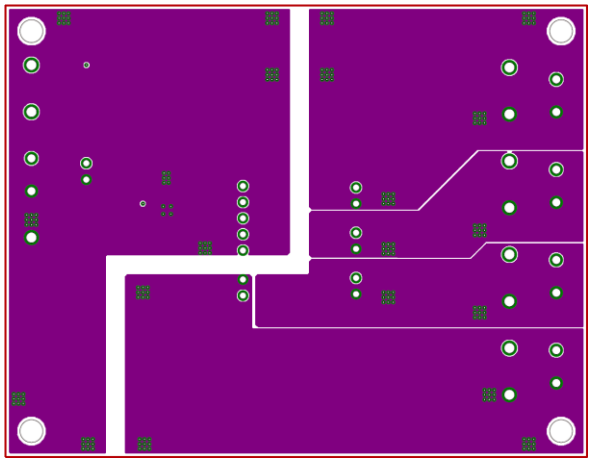


Figure 9. Middle Layer2 Layout

(Top View)

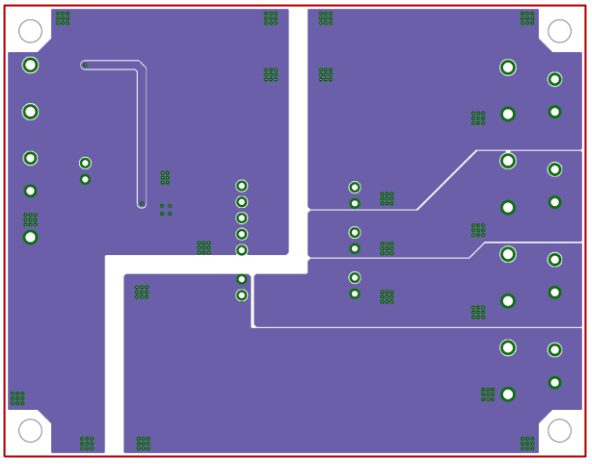


Figure 10. Bottom Side Layer Layout

(Top View)

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Reference Application Data

V_{IN} = 24V, $V_{OUT1} = V_{OUT2} = V_{OUT3} = V_{OUT4}$ =15V ($I_{OUT} = I_{OUT1} = I_{OUT2} = I_{OUT3} = I_{OUT4}$)

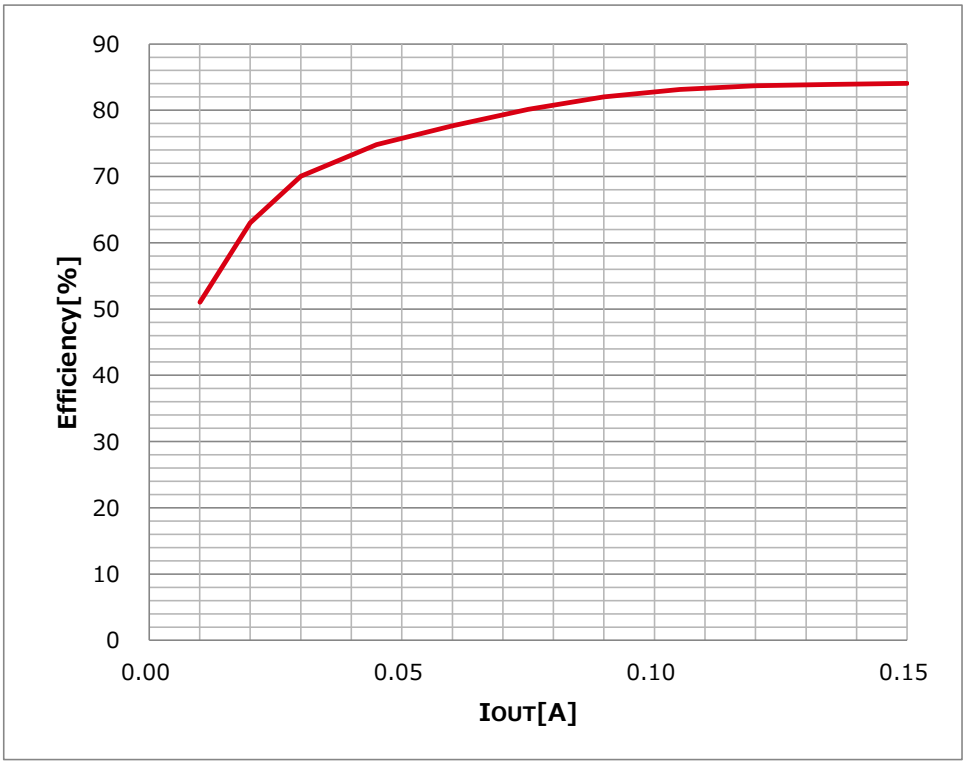


Figure 11. Efficiency vs Load Current

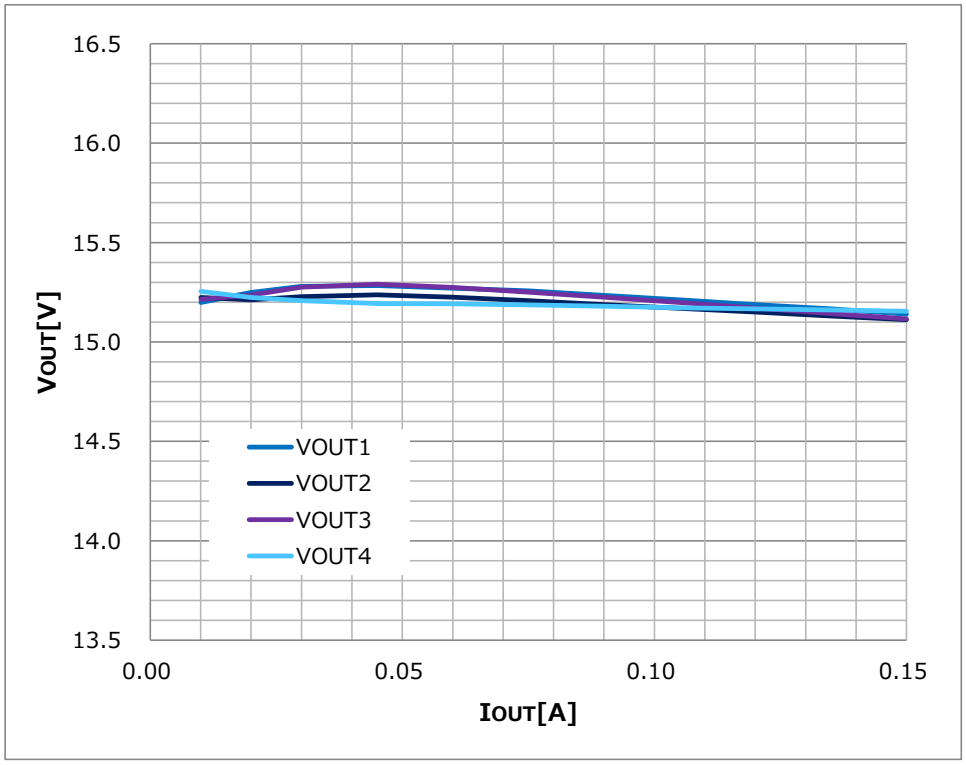


Figure 12. Load Regulation

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<High Voltage Safety Precautions>

◇ Read all safety precautions before use

Please note that this document covers only the BD7F200HFN-LB evaluation board (BD7F200HFN-EVK-001) 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 by 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.

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