Switching Regulator Series

Isolated Flyback DC/DC Converter
BD9615MUV-LB Evaluation Board

BD9615MUV-EVK-001 (24V→15V, 2A)

User's Guide

＜High Voltage Safety Precautions＞

◇ Read all safety precautions before use

Please note that this document covers only the BD9615MUV-LB evaluation board (BD9615MUV-EVK-0011) 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.

Switching Regulator Series

Isolated Flyback DC/DC Converter BD9615MUV-LB Evaluation Board

BD9615MUV-EVK-001 (24V→15V, 2A)

BD9615MUV-EVK-001 Evaluation board delivers an output 15 volts from an input 24 volts using BD9615MUV-LB, DC/DC converter integrated circuit, with output current rating of maximum 2A.

Performance specification

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

V_{IN} = 24V, V_{OUT} = 15V, Unless otherwise specified.

Parameter	Min	Typ	Max	Units	Conditions
Input Voltage		24.0		V	
Output Voltage		15.0		V	
Output Current Range	50		2000	mA	Maximum Output Power: 30W
Operating Frequency		130		kHz	
Maximum Efficiency		89.0		%	I_O = 1500mA

Evaluation Board

PCB size: 60mm×100mm×1.6mm

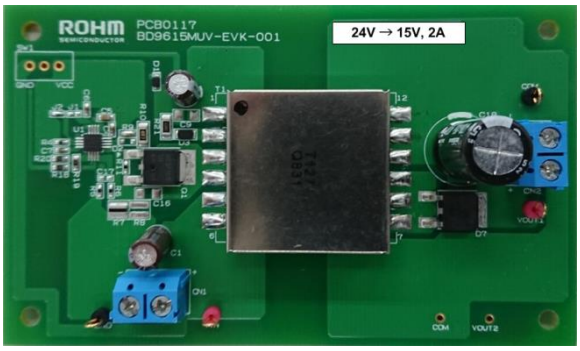

Figure 1. BD9615MUV-EVK-001 Evaluation Board Top View

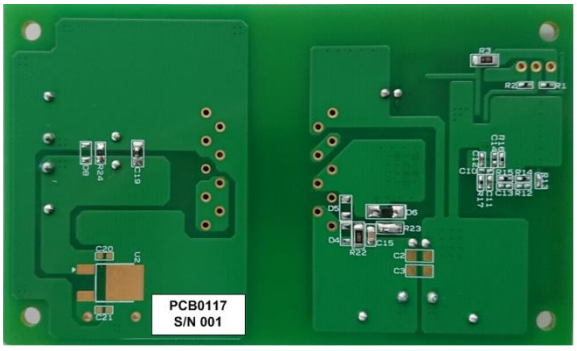

Figure 2. BD9615MUV-EVK-001 Evaluation Board Bottom View

Operation Procedures

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

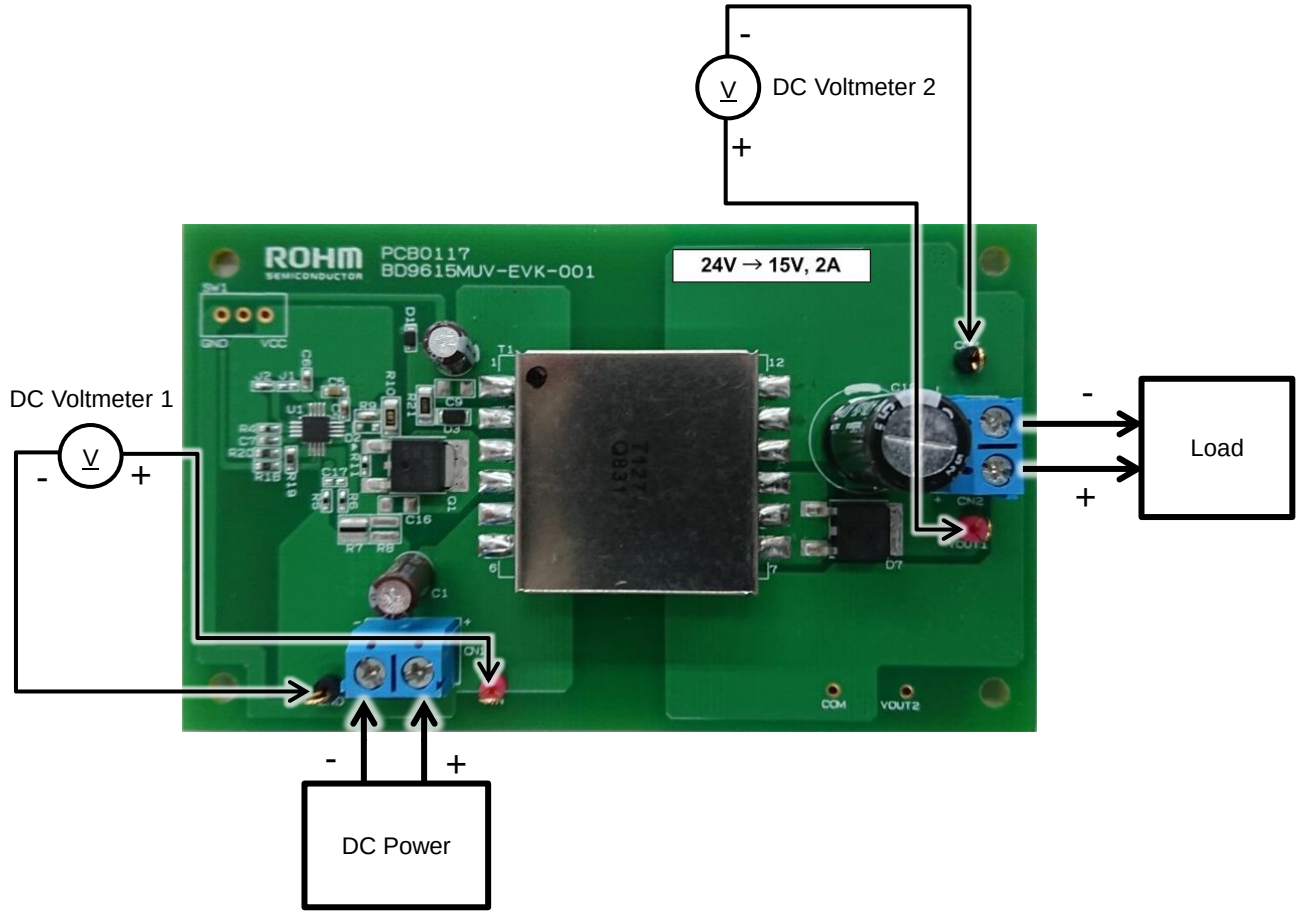

Figure 3. Connection Diagram

Circuit Diagram

V_{IN} = 24V, V_{OUT} = 15V

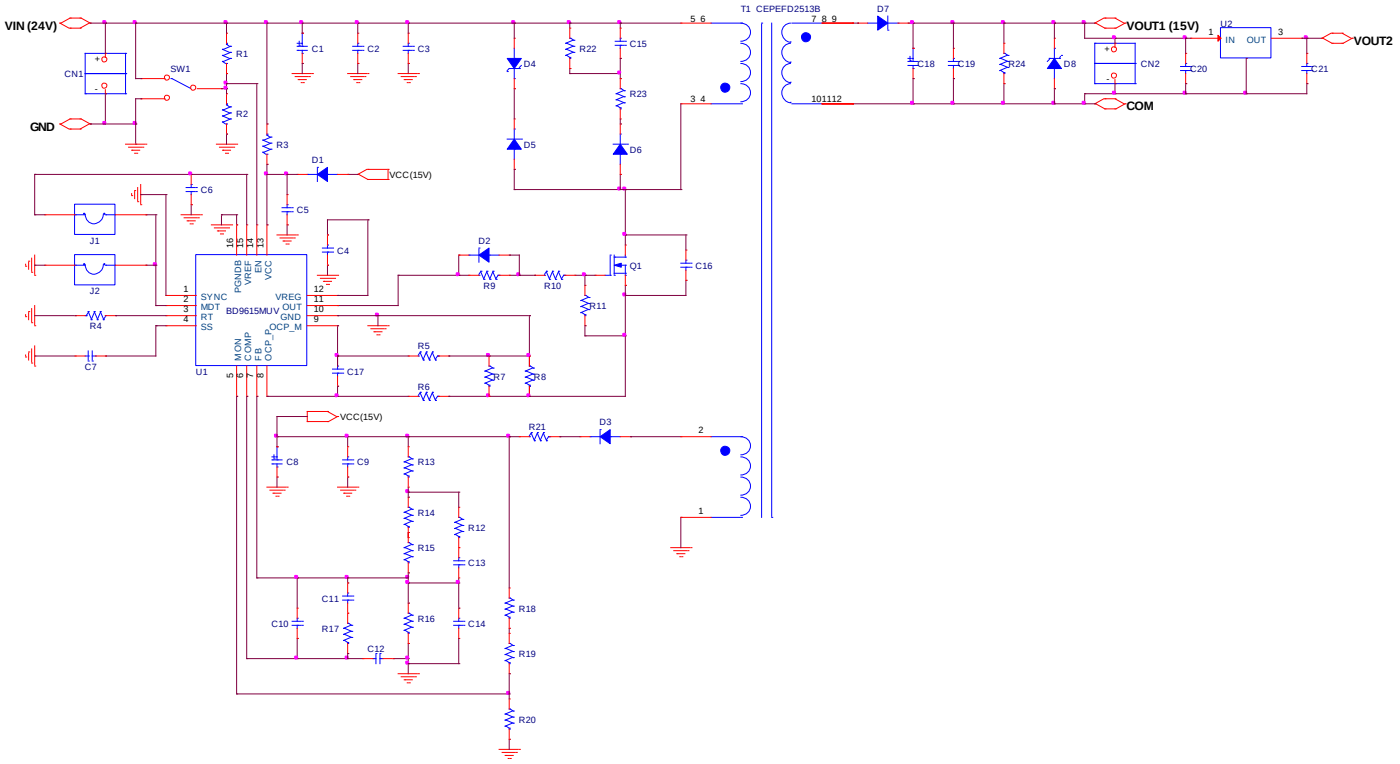

Figure 4. BD9615MUV-EVK-001 Circuit Diagram

Bill of Materials

No.	Value	Description	Size	Part Number / Series	Manufactuer
C1	27uF	Capacitor,AL Electrolytic , 50V	Φ5x11	EKZN500ELL270ME11D	NIPPON CHEMI-CON
C2	OPEN	Notinstalled	-	-	-
C3	OPEN	Notinstalled	-	-	-
C4	1uF	Capacitor, Chip, 35V, X5R	1005	GRM155R6YA105KE11	MURATA
C5	1uF	Capacitor, Chip, 50V, B	1608	GRM188B31H105KAA	MURATA
C6	1uF	Capacitor, Chip, 35V, X5R	1005	GRM155R6YA105KE11	MURATA
C7	0.22uF	Capacitor, Chip, 16V, X7R	1005	GRM155R71C224KA12	MURATA
C8	10uF	Capacitor,AL Electrolytic , 50V	Φ5x7	EKZE500ELL100ME07D	NIPPON CHEMI-CON
C9	OPEN	Notinstalled	-	-	-
C10	OPEN	Notinstalled	-	-	-
C11	0.1uF	Capacitor, Chip, 50V, X7R	1005	GRM155R71H104KE14	MURATA
C12	10000pF	Capacitor, Chip, 50V, X7R	1005	GRM155R71H103KA88	MURATA
C13	OPEN	Notinstalled	-	-	-
C14	OPEN	Notinstalled	-	-	-
C15	6800pF	Capacitor, Chip, 250V, X7R	2012	GRM21AR72E682KW01	MURATA
C16	OPEN	Notinstalled	-	-	-
C17	OPEN	Notinstalled	-	-	-
C18	470uF	Capacitor,AL Electrolytic , 35V	Φ10x20	UHD1V471MPD	nichicon
C19	2.2uF	Capacitor, Chip, 35V, X5R	1005	GRM155R6YA225KE11	MURATA
C20	OPEN	Notinstalled	-	-	-
C21	OPEN	Notinstalled	-	-	-
D1	1SS355VM	Diode	UMD2	1SS355VM	ROHM
D2	OPEN	Notinstalled	-	-	-
D3	RBR1MM60A	Diode	PMDU	RBR1MM60A	ROHM
D4	OPEN	Notinstalled	-	-	-
D5	OPEN	Notinstalled	-	-	-
D6	RF05VAM1S	Diode	TUMD2SM	RF05VAM1S	ROHM
D7	RBR10BM60A	Diode	TO-252	RBR10BM60A	ROHM
D8	OPEN	Notinstalled	-	-	-
J1	OPEN	Notinstalled	-	-	-
J2	SHORT	Short	-	-	-
Q1	RD3P100SN	MOSFET, 100V, 10A	TO-252	RD3P100SN	ROHM
R1	220K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF2203	ROHM
R2	20K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF2002	ROHM
R3	4.7K	Resistor, Chip, 1/4W, 1%	3216	MCR18MZPF4701	ROHM
R4	390K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF3903	ROHM
R5	100	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1000	ROHM
R6	100	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1000	ROHM
R7	0.02	Resistor, Chip, 1W, 1%	1632	LTR18EZPFSR020	ROHM
R8	OPEN	Notinstalled	-	-	-
R9	0	Short	-	-	-
R10	4.7	Resistor, Chip, 1/4W, 1%	3216	MCR18EZPJ4R7	ROHM
R11	100K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1003	ROHM
R12	OPEN	Notinstalled	-	-	-
R13	0	Short	-	-	-
R14	470K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF4703	ROHM
R15	10K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1002	ROHM
R16	27K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF2702	ROHM
R17	12K	Resistor, Chip, 1/16W, 1%	1005	MCR01MZPF1202	ROHM
R18	680	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX6800	ROHM
R19	680	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX6800	ROHM
R20	75	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX75R0	ROHM
R21	10	Resistor, Chip, 1/4W, 1%	3216	MCR18MZPF10R0	ROHM
R22	10K	Resistor, Chip, 1/2W, 1%	3216	ESR18EZPF1002	ROHM
R23	0	Short	-	-	-
R24	3.9K	Resistor, Chip, 1/10W, 1%	1608	MCR03EZPFX3901	ROHM
SW1	OPEN	Notinstalled	-	-	-
T1	33uH	Transformer, Np:Ns:Nd=13:8:8, Lp=33uH±15%	26.0 x 31.5 x 14.0mm	CEPEFD2513B	sumida
U1	BD9615MUV	IC	VQFN16KV3030	BD9615MUV	ROHM
U2	OPEN	Notinstalled	-	-	-

Layout

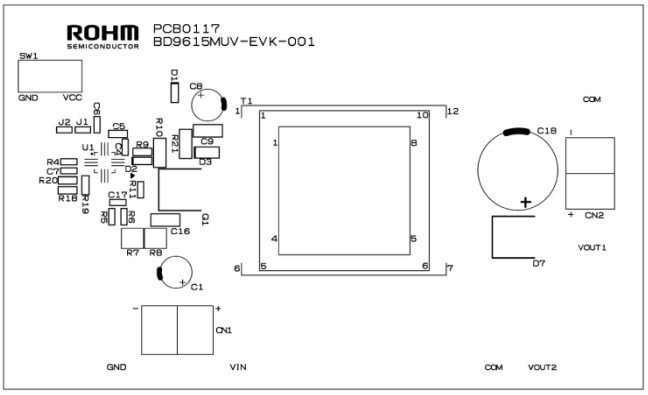

Figure 5. Top Silk Screen

(Top View)

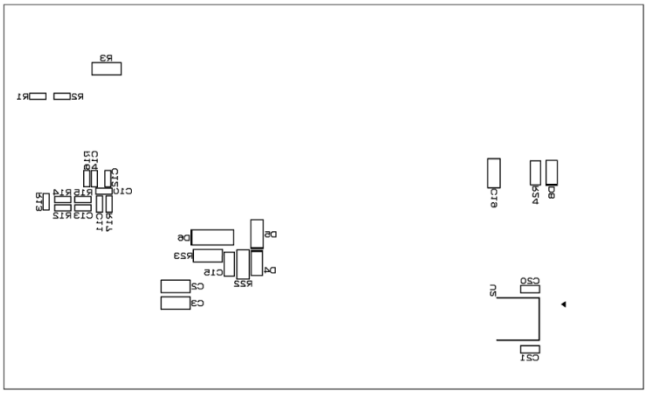

Figure 6 . Bottom Silk Screen

(Top View)

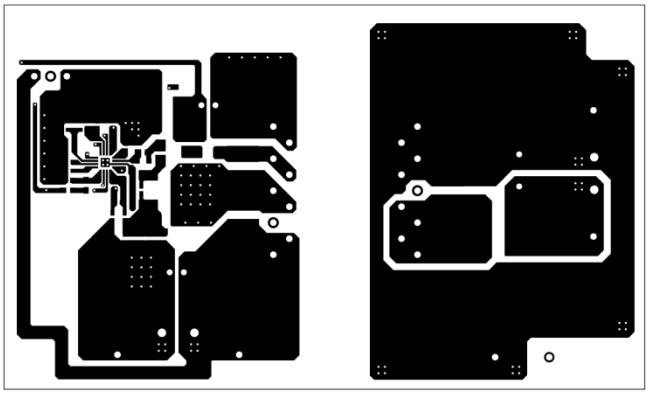

Figure 7. Top Side Layout

(Top View)

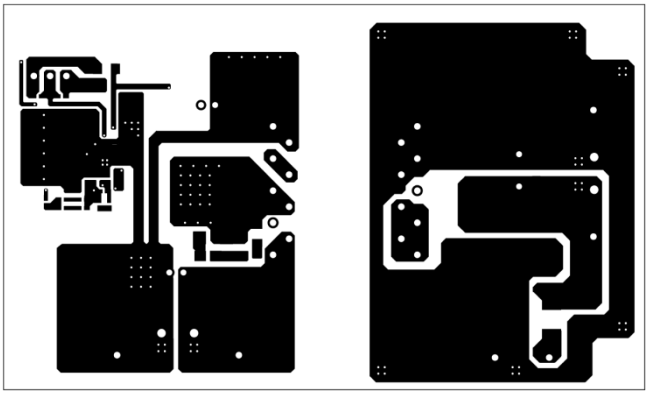

Figure 8. Bottom Side Layer Layout

(Top View)

Reference Application Data

V_{IN} = 24V, V_{OUT} = 15V

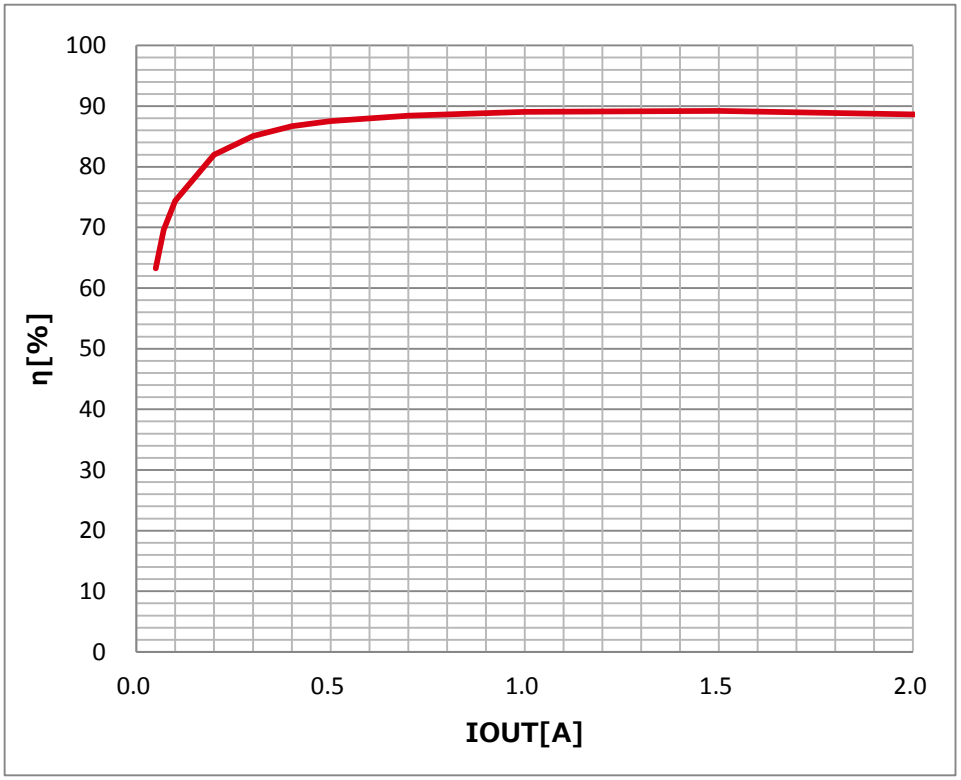

Figure 9. Efficiency vs Load Current

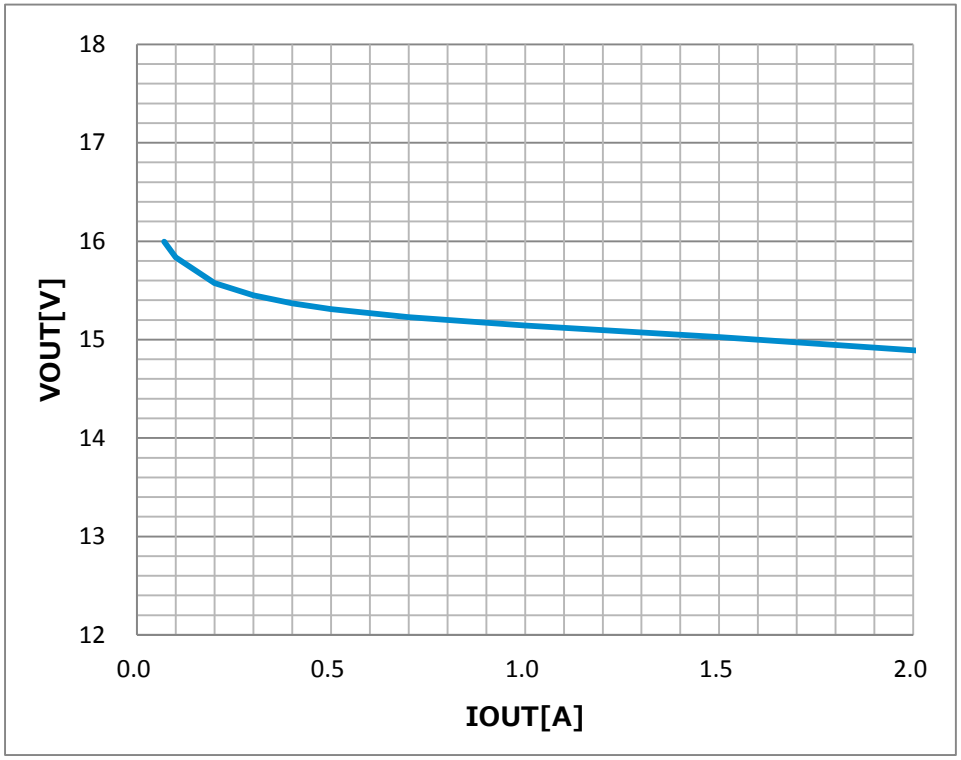

Figure 10. Load Regulation

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products specified in this document are not designed to be radiation tolerant.

7) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

8) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

9) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

10) ROHM has used reasonable care to ensure the accuracy of the information contained in this document. However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

11) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. For more details, including RoHS compatibility, please contact a ROHM sales office. ROHM shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.

12) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act.

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ROHM SEMICONDUCTOR

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