

STRUCTURE TYPE Silicon Monolithic Integrated Circuit  
Flexible Step-Down Switching Regulator

PRODUCT SERIES **BD9001F**

FEATURES

- Wide input Range:7~48V
- Integrated 2A P-ch Power MOS FET
- High Precision(Reference Voltage) : ±2%
- Adjustable Frequency:50~300KH z

○ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Parameter	Symbol	Limits	Unit
Supply Voltage	V <sub>IN</sub>	50	V
SW Pin Voltage	V <sub>SW</sub>	V <sub>IN</sub>	V
Output SW Current	I <sub>SW</sub>	2 <sup>(1)</sup>	A
EN Pin Voltage	V <sub>EN</sub>	V <sub>IN</sub>	V
RT, FB, INV Pin Voltage	V <sub>RT</sub> , V <sub>FB</sub> , V <sub>INV</sub>	7	V
Power Dissipation	P <sub>d</sub>	0.69 <sup>(2)</sup>	W
Operating Temperature Range	T <sub>opr</sub>	-40~+95	°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150	°C
Maximum Junction Temperature	T <sub>jmax</sub>	150	°C

(1) Do not however exceed Pd.

(2) Pd derated at 5.52mW/°C for temperature above Ta=25°C, Mounted on a double layer PCB 70mm×70mm×1.6mm.

○ OPERATING CONDITIONS

Parameter	Symbol	Min.	Max.	Unit
Recommend Supply Voltage	V <sub>IN</sub>	7	48	V
Output Switch Current	I <sub>SW</sub>	-	2	A
Oscillator Frequency	F <sub>OSC</sub>	50	300	kHz
Oscillator Timing Resistance	RT	100	800	kΩ
Output Voltage	V <sub>o</sub>	1 or V <sub>IN</sub> ×6%	V <sub>IN</sub>	V

\* The product described in this specification is a strategic product (and/or Service) subject to COCOM regulations. It should not be exported without Authorization from the appropriate government.

\* The product is not designed for protection against radioactive rays.

\* Status of this document

The Japanese version of this document is the formal specification.

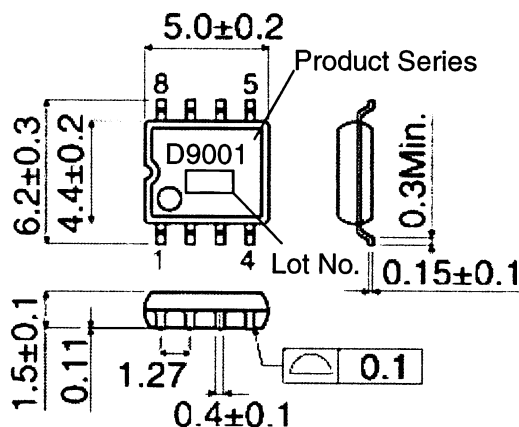
A customer may use this translation version only for a reference to help reading the formal version.

If there are any differences in translation version of this document, formal version takes priority.

○ ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=-40~95°C, VIN=13.2V, VEN=5V)

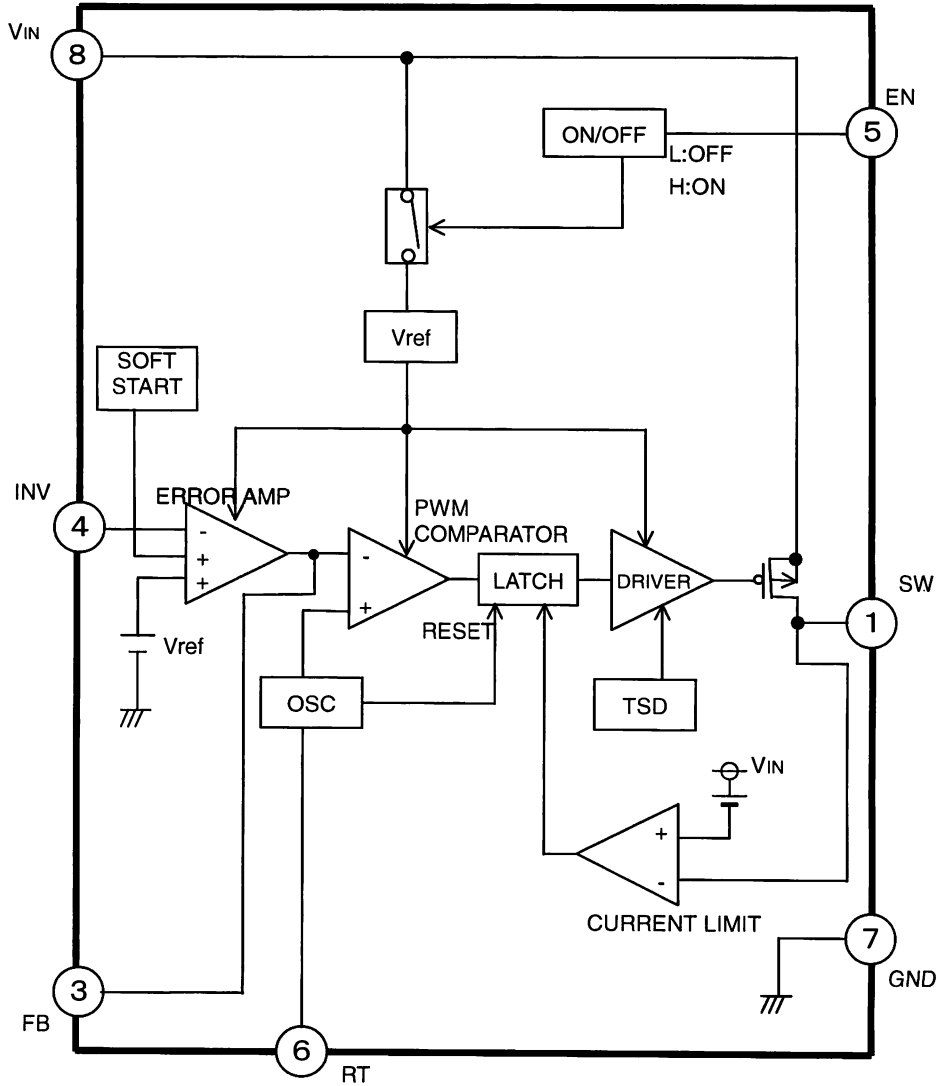
Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
[Entire Device]						
Stand-by Current	I <sub>STB</sub>	-	4	10	μA	V <sub>EN</sub> =0V, Ta=25°C
Quiescent Current	I <sub>Q</sub>	-	3	4.2	mA	I <sub>O</sub> =0A
[Switch]						
Switch On Resistance	R <sub>ON</sub>	-	0.53	0.9	Ω	I <sub>SW</sub> =50mA
Leakage Current	I <sub>OLEAK</sub>	-	0	30	μA	V <sub>IN</sub> =48V, V <sub>EN</sub> =0V
[Error Amplifier]						
Reference Voltage1	V <sub>REF1</sub>	0.98	1.00	1.02	V	V <sub>FB</sub> =V <sub>INV</sub> , Ta=25°C
Reference Voltage2	V <sub>REF2</sub>	0.96	1.00	1.04	V	V <sub>FB</sub> =V <sub>INV</sub>
Input Bias Current	I <sub>B</sub>	-1	-	-	μA	V <sub>INV</sub> =1.1V
Maximum FB Voltage	V <sub>FBH</sub>	2.4	2.5	-	V	V <sub>INV</sub> =0.5V
Minimum FB Voltage	V <sub>FBL</sub>	-	0.05	0.10	V	V <sub>INV</sub> =1.5V
FB sink current	I <sub>FBSINK</sub>	-5.0	-3.0	-0.5	mA	V <sub>FB</sub> =1.5V, V <sub>INV</sub> =1.5V
FB source current	I <sub>FBSOURCE</sub>	70	120	170	μA	V <sub>FB</sub> =1.5V, V <sub>INV</sub> =0.5V
[Oscillator Section]						
Switching Frequency	F <sub>OSC</sub>	82	102	122	kHz	RT=390kΩ
[Enable]						
Threshold Voltage	V <sub>EN</sub>	0.8	1.7	2.6	V	
Sense Current	I <sub>EN</sub>	-	13	50	μA	V <sub>EN</sub> =5V

○ PHYSICAL DIMENTIONS • MARKING



SOP8 (Unit: mm)

○ BLOCK DIAGRAM



※Refer to the Technical Note about the details of the application.

○ Pin No. • Pin Name

Pin No.	Pin Name
1	SW
2	N.C.
3	FB
4	INV
5	EN
6	RT
7	GND
8	VIN

## NOTES FOR USE

1. Absolute maximum range  
Absolute Maximum Ratings are those values beyond which the life of a device may be destroyed we cannot be defined the failure mode, such as short mode or open mode.  
Therefore physical security countermeasure, like fuse, is to be given when a specific mode to be beyond absolute maximum ratings is considered.
2. Operation supply voltage range  
The circuit functionality is guaranteed within operation of ambient temperature range, as long as it is within operation supply voltage range. The standard electrical characteristic values are guaranteed at the test circuit voltage of  $V_{IN}=13.2V$ . They cannot be guaranteed at other voltages in the operating range of 7V-48V. However, the variation will be small.
3. Grounding  
It is recommended that every capacitor (bypass and another capacitors) is grounded to PIN7 using single-point connections.
4. Input supply voltage  
Input supply pattern layout should be as short as possible.
5. VIN Terminal  
For reduce the influence of switching noise, bypass capacitor is connected between VIN and GND.
6. FB Terminal  
The FB terminal is for phase margin of the DC/DC system. A capacitor and a resistor or an only capacitor placed between the FB terminal and the INV terminal. The values of the capacitor and the resistor shall be adjusted according to the output current and the output capacitor value. The output may be oscillating if the value of capacitor is not sufficient, also the transient response may become insufficient if the value is too large. Therefore, the value of the capacitor and the resistor shall be adequately set up based on the condition of the temperature, and so on. Since the FB terminal also detects output short condition compulsorily applying an external voltage onto the FB terminal must not be performed because it may activate the timer latch protection circuit.
7. Electromagnetic Fields  
The IC is susceptible to strong electromagnetic fields and may cause malfunction. Therefore, caution should be used when placing it on the PCB.
8. Application Design  
When designing the external circuit, included adequate margins, including not only steady state but also transient characteristics.
9. Over Output Current Protection  
SW Output terminal has over current protection circuit of 4A, with prevents IC from being damage by short circuit at over current.
10. Thermal Shut Down Circuit  
A temperature control is built in the IC to prevent the damage due to overheat. Therefore, the output is turned off when the thermal circuit works and are turned on when the temperature goes down to the specified level.

### Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

#### About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available,  
please contact your nearest sales office.

Please contact our sales offices for details ;

U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
Atlanta	TEL : +1(770)754-5972	FAX : +1(770)754-0691
Dallas	TEL : +1(972)312-8818	FAX : +1(972)312-0330
Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
United Kingdom / London	TEL : +44(1)908-282-666	FAX : +44(1)908-282-528
France / Paris	TEL : +33(0)1 56 97 30 60	FAX : +33(0) 1 56 97 30 80
China / Hong Kong	TEL : +852(2)740-6262	FAX : +852(2)375-8971
Shanghai	TEL : +86(21)6279-2727	FAX : +86(21)6247-2066
Dilian	TEL : +86(411)8230-8549	FAX : +86(411)8230-8537
Beijing	TEL : +86(10)8525-2483	FAX : +86(10)8525-2489
Taiwan / Taipei	TEL : +866(2)2500-6956	FAX : +866(2)2503-2869
Korea / Seoul	TEL : +82(2)8182-700	FAX : +82(2)8182-715
Singapore	TEL : +65-6332-2322	FAX : +65-6332-5662
Malaysia / Kuala Lumpur	TEL : +60(3)7958-8355	FAX : +60(3)7958-8377
Philippines / Manila	TEL : +63(2)807-6872	FAX : +63(2)809-1422
Thailand / Bangkok	TEL : +66(2)254-4890	FAX : +66(2)256-6334

Japan /  
(Internal Sales)

Tokyo	2-1-1, Yaesu, Chuo-ku, Tokyo 104-0082	TEL : +81(3)5203-0321	FAX : +81(3)5203-0300
Yokohama	2-4-8, Shin Yokohama, Kohoku-ku, Yokohama, Kanagawa 222-8575	TEL : +81(45)476-2131	FAX : +81(45)476-2128
Nagoya	Dainagayo Building 9F 3-28-12, Meieki, Nakamura-ku, Nagoya, Aichi 450-0002	TEL : +81(52)581-8521	FAX : +81(52)561-2173
Kyoto	579-32 Higashi Shiokouji-cho, Karasuma Nishi-iru, Shiokoujidori, Shimogyo-ku, Kyoto 600-8216	TEL : +81(75)311-2121	FAX : +81(75)314-6559

(Contact address for overseas customers in Japan)

Yokohama	TEL : +81(45)476-9270	FAX : +81(045)476-9271
----------	-----------------------	------------------------