

100VAC Input/12VDC (300mA) Output

# Non-Isolated AC/DC Converter

**BP5039B12**

## Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
Input voltage	$V_i$	170	V
Maximum Output current	$I_{oMAX}$	400 *	mA <sub>pk</sub>
ESD endurance	$V_{surge}$	2	kV
Maximum surface temperature	$T_{CMAX}$	105	°C
Operating temperature range	$T_{opr}$	-20 to +80	°C
Storage temperature range	$T_{stg}$	-25 to +105	°C

\* Peak and within 10ms

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage range	$V_i$	113	141	170	V	DC(80 to 120VAC)
Output voltage	$V_o$	11	12	13	V	$V_i=141V$ , $I_o=100mA$
Output current	$I_o$	0	—	300	mA	$V_i=141V$ *1
Line regulation	$V_r$	-0.10	0.04	0.10	V	$V_i=113$ to $170V$ , $I_o=100mA$
Load regulation	$V_l$	-0.20	0.05	0.20	V	$V_i=141V$ , $I_o=0$ to $100mA$ *2
Output ripple voltage	$V_p$	—	0.07	0.15	V <sub>p-p</sub>	$V_i=141V$ , $I_o=100mA$
Power conversion efficiency	$\eta$	65	78	—	%	$V_i=141V$ , $I_o=300mA$ *2

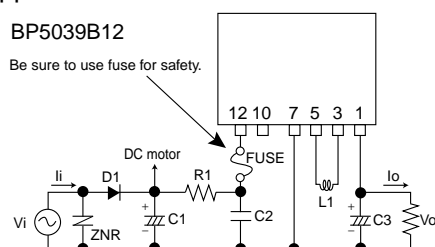
\*1 Maximum output current varies depending on ambient temperature ; please refer to derating curve.

\*2 Please refer to Load regulation, Conversion efficiency.

## Application Circuit

**BP5039B12**

Be sure to use fuse for safety.



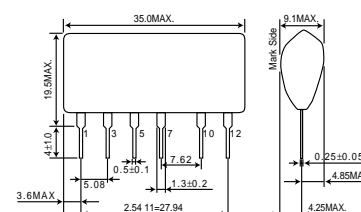
Pin No.	Function
1	Output terminal $V_o$ (12V)
2	Not used
3	Choke coil connect
4	Not used
5	Choke coil connect
6	Not used
7	COMMON
8	Not used
9	Not used
10	N.C.
11	Not used
12	Input terminal $V_i$ (141VDC)

 Please verify operation and characteristics in the customer's circuit before actual usage.  
 Ensure that the load current does not exceed the maximum rating.

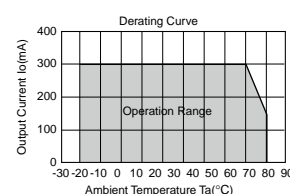
## External Component Specifications

FUSE: FUSE	Use a fast-acting fuse of 1.0A.
C1: Input capacitor	Rated voltage : Beyond 250V Capacity : 22 to 820 $\mu$ F Rated ripple current : Beyond 0.13Arms
C2: Noise removal capacitor	Rated voltage : Beyond 250V Capacity : 0.1 to 0.22 $\mu$ F Film or ceramic capacitor
C3: Output capacitor	Rated voltage : Beyond 25V Capacity : 100 to 470 $\mu$ F, low impedance type ESR : Less than 0.4 $\Omega$ Rated ripple current : Beyond 0.25Arms Evaluate under actual operating conditions
L1: Power inductor	Inductance : 1.0mH Rated current : More than 600mA
D1: Rectifier diode	Peak reverse voltage : More than 400V Mean rectifying current : More than 0.5A Peak forward surge current : More than 20A Full-wave rectification can be used
R1: Noise removal resistor	Resistance : 10 to 22 $\Omega$ Power : More than 1/4W
ZNR: Varistor	Use a varistor to protect against lighting surges and static electricity.

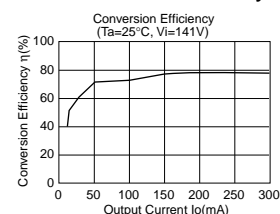
## Dimensions (Unit : mm)



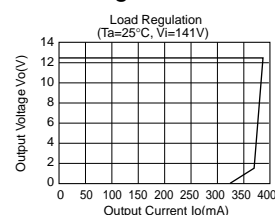
## Derating Curve



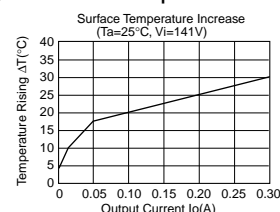
## Conversion Efficiency



## Load Regulation



## Surface Temperature Increase



# Power Module Usage Precautions

## Safety Precautions

- 1) The products are designed and manufactured for use in ordinary electronic equipment (i.e. AV/OA/telecommunication/amusement equipment, home appliances). Please consult with the Company's (ROHM) sales staff if intended for use in devices requiring high reliability (e.g. medical/transport/aircraft/spacecraft equipment, nuclear power/fuel controllers, automotive/safety devices) and whose malfunction may result in injury or death. In this case, failsafe measures must be taken, including the following:
  - [a] Installation of protection circuits in order to improve system safety
  - [b] Incorporation of redundant circuits in the case of single-circuit failure
- 2) The products are designed for use under normal conditions. Application in special environments can cause a deterioration in product performance. Therefore, verification and confirmation of product performance, prior to use, is recommended. The following environments are considered to be 'special':
  - [a] Outdoors, exposed to direct sunlight or dust
  - [b] In contact with liquids, such as water, oils, chemicals, or organic solvents
  - [c] In areas where exposure to the sea air or corrosive gases (i.e. Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>) can occur
  - [d] In places where the products may be in contact with static electricity or electromagnetic waves
  - [e] In proximity to heat-producing items, plastic cords, or flammable materials
  - [f] In contact with sealing or coating products, such as resin
  - [g] In contact with unclean solder or exposed to water or water-soluble cleaning agents used after soldering
  - [h] In areas where dew condensation occurs
- 3) The products are not designed to be radiation resistant
- 4) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
- 5) The Company should be notified of any product safety issues. Moreover, product safety issues should be periodically monitored by the customer.

## Application Notes

- 1) A sufficient margin must be allowed if changes are made to the peripheral circuit due to variations in the inherent tolerances of the external components as well as transient and static characteristics. In addition, please be aware that the Company has not conducted investigations on whether or not particular changes in the example application circuits would result in patent infringement.
- 2) The application examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods.  
Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

## Notes Regarding Industrial Property

- 1) The specifications included herein contain information related to the Company's industrial property. Their use other than pertaining to the relevant products is forbidden. Duplication and/or disclosure to a third party without express written permission is strictly prohibited.
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  - [a] Infringement of the intellectual property rights of a third party
  - [b] Problems arising from the use of the products listed herein
- 3) The Company prohibits the purchaser from exercising or using the intellectual/industrial property rights or any rights belonging to or are controlled by the Company, other than the right to use, sell, or dispose of the products.

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