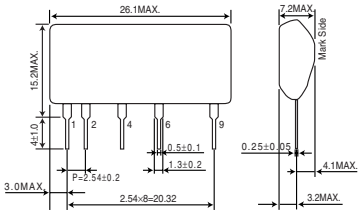
# AC/DC converter — BP5065C

## AC100V input, −12V/90mA output

### ● Absolute Maximum Ratings

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Input voltage | Vi | −170 | V |
| Output current | Io | 90 | mApk |
| ESD endurance | Vsurge | 2 | kV |
| Operating temperature range | Topr | −20 to +80 | °C |
| Storage temperature range | Tstg | −25 to +105 | °C |

### ● Dimensions (Unit : mm)

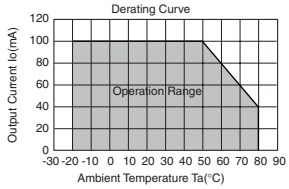



### ● Electrical Characteristics

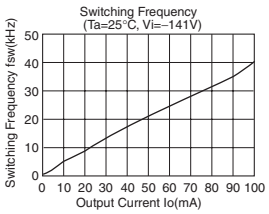
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Input voltage range | Vi | −113 | −141 | −170 | V | DC(80 to 120VAC) |
| Output voltage | Vo | −11.0 | −12.0 | −13.0 | V | Vi=−141V, Io=50mA |
| Output current | Io | 0 | – | 90 | mA | Vi=−141V ∗1 |
| Line regulation | Vr | – | 0.05 | 0.15 | V | Vi=−113 to −170V, Io=50mA |
| Load regulation | Vl | – | 0.07 | 0.20 | V | Vi=−141V, Io=0 to 50mA ∗2 |
| Output ripple voltage | Vp | – | 0.05 | 0.15 | Vp-p | Vi=−141V, Io=50mA |
| Power conversion efficiency | η | 60 | 68 | – | % | Vi=−141V, Io=100mA ∗2 |

∗1 Maximum output current varies depending on ambient temperature ; please refer to derating curve.
∗2 Please refer to Load regulation, Conversion efficiency.

### ● Derating Curve

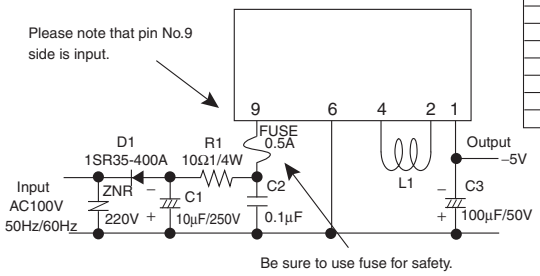



### ● Switching frequency




### ● Application circuit

BP5065C5

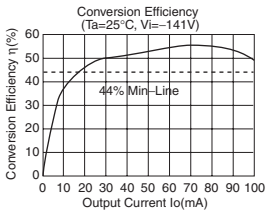



| Pin No. | Function |
|---|---|
| 1 | Output terminal Vo(−5V) |
| 2 | Coil connect |
| 3 | Skip |
| 4 | Coil connect |
| 5 | Skip |
| 6 | COMMON |
| 7 | Skip |
| 8 | Skip |
| 9 | Input terminal Vi(−141VDC) |

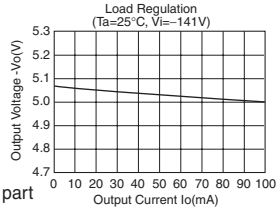
Be sure to use fuse for safety.

For actual usage, Please kindly evaluate and confirm our part mounted in your product,
Especially, Please make sure to confirm whether the load current exceed 200mA by current probe.

### ● Conversion Efficiency



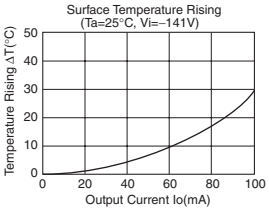

### ● Load Regulation




External components setting

| | |
|---|---|
| FUSE: Fuse | Please make sure to use fuse 0.5A |
| C1: Capacitor for input voltage smoothing | Capacitance : 4.7μF to 22μF Rated voltage : 200V or higher<br>Ripple current is 0.13Arms above. |
| C2: For noise terminal voltage reduction | Capacitance : 0.1μF to 0.22μF Rated voltage : 200V or higher<br>Film capacitor or ceramic capacitor. Reduce the noise terminal voltage.<br>The constant value should be evaluated in the set. |
| C3: Capacitor for Output voltage smoothing | Capacitance : 100μF to 470μF Rated voltage : 25V or higher, Low impedance part<br>Impedance is 0.39Ω max at High frequency range.<br>Ripple current is 0.1Arms above.<br>Impedance of capacitor affects the output ripple voltage. |
| D1: Rectifier diode | In the absolute maximum ratings, the reverse surge voltage should be 400V or higher, the average rectifying current should be 0.5A or higher, and the forward surge current should be 20A or higher. |
| L1: Choke coil | Coil for switching regulator. The inductance should be 1mH, the rated direct current should be 0.18A above.<br>Otherwise heating or abnormal oscilation occurs. |
| R1: For noise terminal voltage reduction | 10Ω to 22Ω, 1/4W<br>Reduce the noise terminal voltage.The constant value should be evaluated in set. |
| ZNR: Varistor | Varistor must be used. It protects this part from lightning surge and static electricity. |

### ● Surface Temperature Rising




Rev.A

# 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. $Cl_2$, $H_2S$, $NH_3$, $SO_2$, $NO_2$) 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.
2) Product information and data, including application examples, contained in the specifications are for reference purposes only; the Company does not guarantee the industrial/intellectual property rights or any other rights of a third party. Accordingly, the Company shall not bear responsibility for:
   [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.

## 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 with 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.