

100VAC Input/-12VDC (200mA) Output

# Non-Isolated AC/DC Converter

**BP5090-12**

## Absolute Maximum Ratings

| Parameter                   | Symbol     | Limits      | Unit |
|-----------------------------|------------|-------------|------|
| Input voltage               | $V_i$      | -195        | V    |
| Operating temperature range | $T_{opr}$  | -20 to +85  | °C   |
| Storage temperature range   | $T_{stg}$  | -25 to +105 | °C   |
| Maximum surface temperature | $T_{smax}$ | 100         | °C   |
| Output current              | $I_o$      | 200         | mA   |

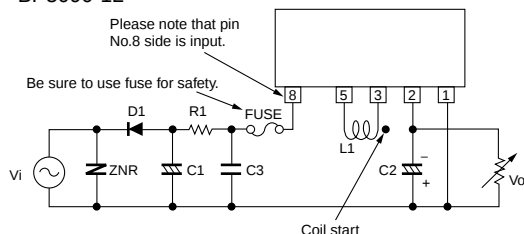
## Electrical Characteristics

| Parameter             | Symbol | Min.  | Typ.  | Max.  | Unit | Conditions               |
|-----------------------|--------|-------|-------|-------|------|--------------------------|
| Input voltage range   | $V_i$  | -113  | -141  | -195  | V    | DC(80 to 138VAC)         |
| Output voltage        | $V_o$  | -11.5 | -12.5 | -13.2 | V    |                          |
| Output current        | $I_o$  | -     | -     | 200   | mA   | *1                       |
| Line regulation       | $V_r$  | -     | 0.04  | 0.20  | V    | $V_i = -113$ to $-195$ V |
| Load regulation       | $V_l$  | -     | 0.03  | 0.20  | V    | $I_o = 0$ to 200mA       |
| Output ripple voltage | $V_p$  | -     | 0.07  | 0.20  | Vp-p | *2                       |
| Conversion efficiency | $\eta$ | 74    | 82    | -     | %    |                          |

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

\*2 Spike noise is not included in output ripple voltage.

## Application Circuit

**BP5090-12**


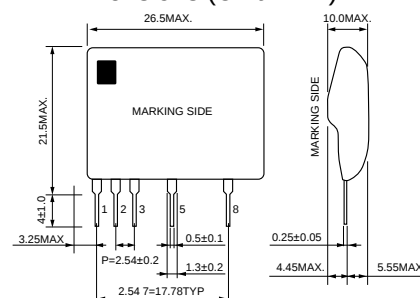
| Pin No. | Function       |
|---------|----------------|
| 1       | Common         |
| 2       | Output         |
| 3       | Power inductor |
| 4       | Skip           |
| 5       | Power inductor |
| 6       | Skip           |
| 7       | Skip           |
| 8       | Input          |

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

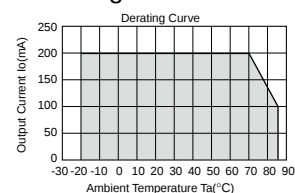
## External Component Specifications

|                             |                                                                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FUSE: FUSE                  | Use a fast-acting fuse of 1.0A.                                                                                                                                                                                                                 |
| C1: Input capacitor         | Rated voltage : More than 250V<br>Capacitance : 22 to 100μF                                                                                                                                                                                     |
| C2: Output capacitor        | Rated voltage : More than 25V<br>Capacitance : 100 to 470μF, low impedance type<br>ESR : Less than 0.16Ω<br>Rated ripple current : More than 0.58Arms<br>Evaluate under actual operating conditions since it affects the output ripple voltage. |
| C3: Noise removal capacitor | Rated voltage : More than 250V<br>Use a film or ceramic capacitor<br>Capacitance : 0.1 to 0.22μF                                                                                                                                                |
| L1: Choke coil              | Inductance : 820μH<br>Rated current : More than 0.42A.<br>Select components that do not easily get magnetically saturated at high temperature.                                                                                                  |
| R1: Noise removal resistor  | Resistance : 10 to 22Ω<br>Power : More than 1/4W                                                                                                                                                                                                |
| D1: Rectifier diode         | Peak reverse voltage : More than 400V<br>Mean rectifying current : More than 1.0A<br>Peak forward surge current : More than 20A<br>Full-wave rectification can be used.                                                                         |
| ZNR: Varistor               | A varistor is required to protect against lightning surges and static electricity.                                                                                                                                                              |

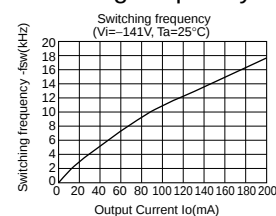
## Dimensions (Unit : mm)



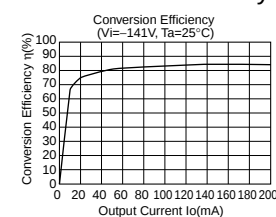
## Derating Curve



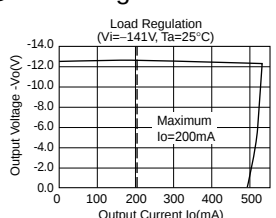
## Switching frequency



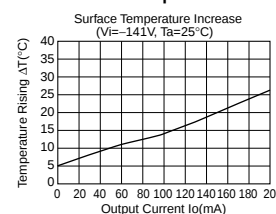
## Conversion Efficiency



## 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

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  - [b] Problems arising from the use of the products listed herein
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