

Non-isolated AC/DC converter

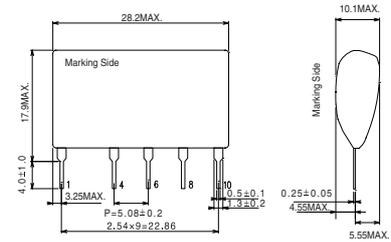
BP5053-12

AC220V input, -12V/250mA output

Absolute Maximum Ratings

| Parameter | Symbol | Limits | Unit | Conditions |
|---------------------------------------|------------|-------------|------|---------------------------------------------------------------|
| Input voltage | V_i | -420 | V | DC |
| Operating temperature range | T_{opr} | -20 to +80 | °C | Refer to derating curve |
| Storage temperature range | T_{stg} | -25 to +105 | °C | |
| Allowable maximum surface temperature | T_{cmax} | 105 | °C | Ambient temperature + the module self-heating $\leq T_{cmax}$ |
| Maximum Output current | I_o | 250 | mA | PEAK value of current |

Dimensions(Unit : mm)



Electrical Characteristics

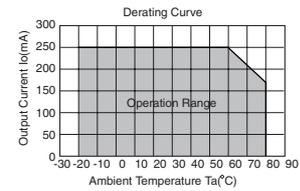
Unless otherwise specified $T_a=25^\circ\text{C}$, $V_i=311\text{V}$, $I_o=250\text{mA}$

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------------------|--------|-------|-------|-------|------|--------------------------------|
| Input voltage range | V_i | -240 | -311 | -390 | V | DC |
| Output voltage | V_o | -12.0 | -12.7 | -13.4 | V | |
| Output current | I_o | - | - | 250 | mA | *1 |
| Line regulation | V_r | - | 0.01 | 0.20 | V | $V_i = -240$ to -390V |
| Load regulation | V_l | - | 0.10 | 0.20 | V | $I_o = 0$ to 250mA |
| Output ripple voltage | V_p | - | 0.04 | 0.20 | Vp-p | *2 |
| Power conversion efficiency | η | 72 | 78 | - | % | |

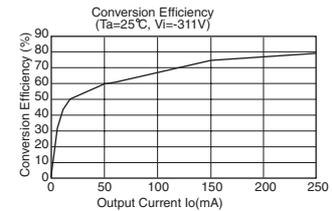
*1 Max output current should be reduced according to the surrounding temperature.

*2 The output ripple voltage may vary depending on the capacitance, environment, and location of peripheral components.

Derating Curve

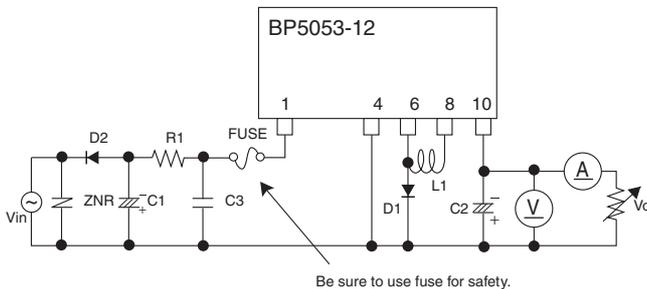


Conversion Efficiency



Application circuit

BP5053-12



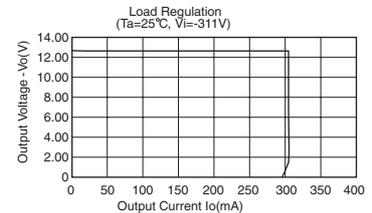
| Pin No. | Function |
|---------|------------------------------------------|
| 1 | Input terminal : $V_i(-311\text{VDC})$ |
| 2 | Skip |
| 3 | Skip |
| 4 | COMMON |
| 5 | Skip |
| 6 | Power inductor terminal |
| 7 | Skip |
| 8 | Power inductor terminal |
| 9 | Skip |
| 10 | Output terminal : $V_o(-12.7\text{VDC})$ |

For actual usage, Please kindly evaluate and confirm our part mounted in your product, Especially, Please make sure to confirm the load current does not exceed Max. rated current by using the current probe.

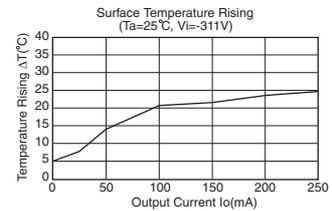
External components setting

- FUSE:** fuse Please make sure to use quick acting fuse (1.0A)
- C1:** Input capacitor Above 450V, 22 μF to 100 μF
Ripple current is 0.7Arms above
- C2:** Output capacitor Above 30V, 220 μF to 1000 μF ,Low impedance
ESR 0.18 Ω max.
Ripple current is 0.65Arms above.
Impedance of capacitor affects the output ripple voltage.
- C3:** Noise removal capacitor Above 450V, 0.1 μF to 0.22 μF Film capacitor or Ceramic capacitor
Reduce the noise terminal voltage.
The constant value should be evaluated in the product.
- L1:** Power inductor Inductance : 1.0mH, Rating current:above 0.74A
Choose components that do not easily get magnetically saturated in high temperature.
Recommended part : C13FR (MITSUMI)
- R1:** For noise terminal voltage reduction resistor 10 Ω to 22 Ω 1/4W
Reduce the noise terminal voltage.
The constant value should be evaluated in the product.
- D1:** Flywheel diode Above 600V, current : above 2.0A, Fast recovery diode
Please note that both the switching and efficiency characteristics of the module are affected by this diode.
Recommended part : CMF01 (Toshiba)
- D2:** Rectifier diode Use a rectifying diode with the peak reverse voltage of 800V or higher,
the average rectification current of 1A or large and the peak surge current of 20A or large. When using an input capacitor of a large capacity , choose a component that endures the inrush current on power-up.
This product is compatible with full-wave rectification.
- ZNR:** Varistor Be sure to use it to protect this product from thunder surge and the static electricity.

Load Regulation



Surface Temperature Rising



Power Module Usage Precautions

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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. Cl₂, H₂S, NH₃, SO₂, NO₂) 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.

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

Notes

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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.