Non-isolated AC/DC converter BP5053-12

AC220V input, –12V/250mA output

● Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit	Conditions
Input voltage	Vi	–420	V	DC
Operating temperature range	Topr	–20 to +80	℃	Refer to derating curve
Storage temperature range	Tstg	–25 to +105	℃	
Allowable maximum surface temperature	Tcmax	105	℃	Ambient temperature + the module self-heating ≦Tcmax
Maximum Output current	Io	250	mA	PEAK value of current

● Electrical Characteristics

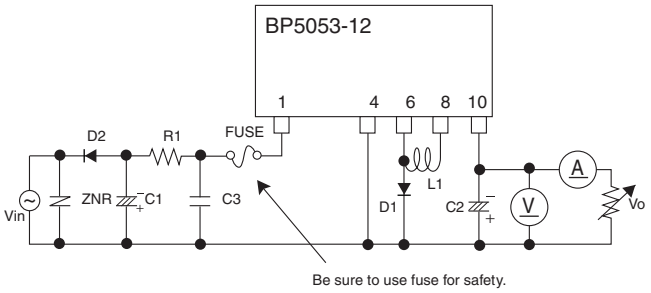
Unless otherwise specified Ta=25°C, Vi=311V, Io=250mA

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage range	Vi	–240	–311	–390	V	DC
Output voltage	Vo	–12.0	–12.7	–13.4	V	
Output current	Io	–	–	250	mA	*1
Line regulation	Vr	–	0.01	0.20	V	Vi= –240 to –390V
Load regulation	Vl	–	0.10	0.20	V	Io=0 to 250mA
Output ripple voltage	Vp	–	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.

● Application circuit

BP5053-12



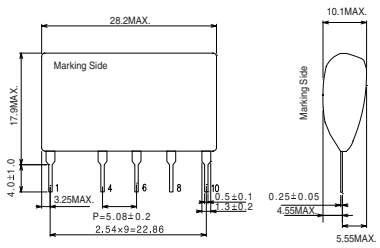
Pin No.	Function
1	Input terminal : Vi(-311VDC)
2	Skip
3	Skip
4	COMMON
5	Skip
6	Power inductor terminal
7	Skip
8	Power inductor terminal
9	Skip
10	Output terminal : Vo(-12.7VDC)

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.

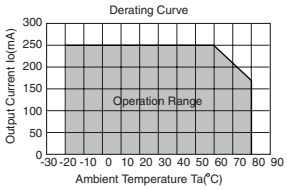
External components setting

FUSE: fuse	Please make sure to use quick acting fuse (1.0A)
C1: Input capacitor	Above 450V, 22μF to 100μF Ripple current is 0.7Arms above
C2: Output capacitor	Above 30V, 220μF to 1000μF ,Low impedance ESR 0.18Ω max. Ripple current is 0.65Arms above. Impedance of capacitor affects the output ripple voltage.
C3: Noise removal capacitor	Above 450V, 0.1μF to 0.22μF 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	10Ω to 22Ω 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.

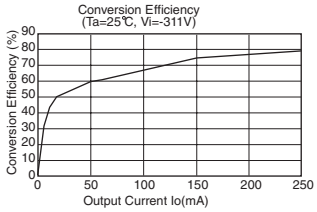
● Dimensions(Unit : mm)



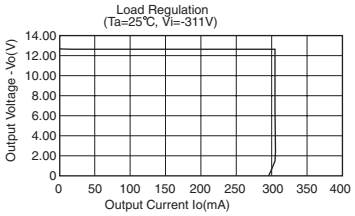
● Derating Curve



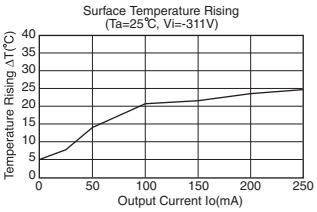
● Conversion Efficiency



● Load Regulation



● Surface Temperature Rising



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.