

220VAC Input/−12VDC (250mA) Output

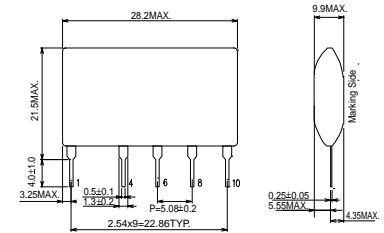
Non-Isolated AC/DC Converter

BP5055-12

● Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit	Conditions
Input voltage	V_i	−600	V	DC
Operating temperature range	T_{opr}	−20 to 80	°C	Refer to derating curve
Storage temperature range	T_{stg}	−25 to 105	°C	
Case temperature	T_{cmax}	105	°C	Ambient temperature + the module self-heating $\leq T_{cmax}$
Output current	I_{omax1}	250	mA	PEAK value of current ($V_i = -420V$)
	I_{omax2}	130	mA	PEAK value of current ($V_i = -420V$ to $-600V$)

● Dimensions (Unit : mm)



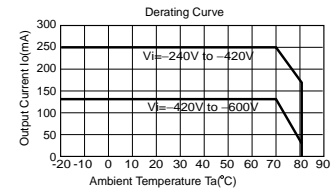
● Electrical Characteristics

(Unless otherwise specified $T_a=25^\circ C$, $V_i=-311V$, $I_o=250mA$)

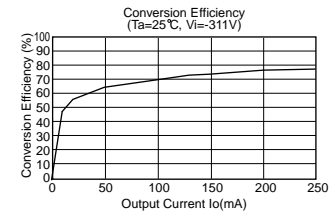
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage range	V_i	−240	−311	−600	V	DC
Output voltage	V_o	−12.0	−12.7	−13.4	V	
Output current1	I_{o1}	−	−	250	mA	$V_i = -240V$ to $-420V$ *1
Output current2	I_{o2}	−	−	130	mA	$V_i = -420V$ to $-600V$ *1
Line regulation	V_r	−	0.07	0.25	V	$V_i = -240V$ to $-600V$ $I_o=130mA$
Load regulation	V_l	−	0.05	0.20	V	$I_o=0$ to $250mA$
Output ripple voltage	V_p	−	0.08	0.20	Vp-p	*2
Conversion efficiency	η	70	77	−	%	

*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.

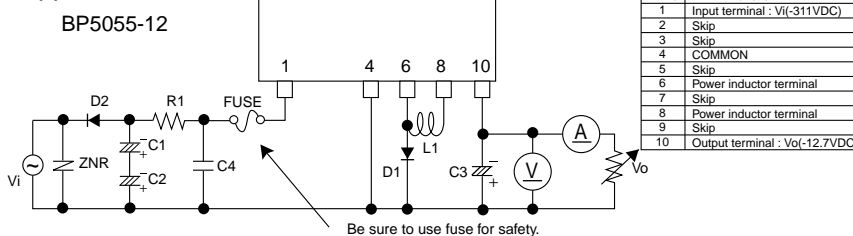
● Derating Curve



● Conversion Efficiency



● Application Circuit



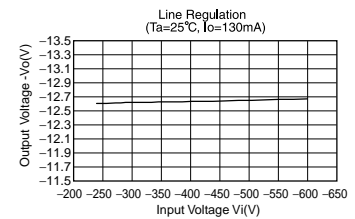
Pin No.	Function
1	Input terminal : $V_i(-311VDC)$
2	Skip
3	Skip
4	COMMON
5	Skip
6	Power inductor terminal
7	Skip
8	Power inductor terminal
9	Skip
10	Output terminal : $V_o(-12.7VDC)$

Be sure to use fuse for safety.
Please verify operation and characteristics in the customer's circuit before actual usage.
Ensure that the load current does not exceed the maximum rating.

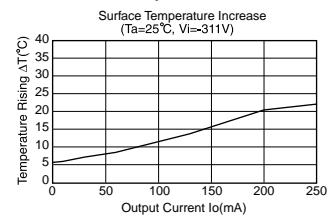
External Component Specifications

- FUSE: fuse Use a quick-acting fuse (1A)
- C1, C2: Input capacitor above 450V, 22 to 100 μ F
Ripple current 0.7Arms or greater
- C3: Output capacitor above 30V, 220 to 1000 μ F, low impedance
ESR: 0.18 Ω Max.
Ripple current 0.65Arms or higher
Capacitor impedance affects the output ripple voltage.
- C4: Noise reduction capacitor Above 600V, 0.1 to 0.22 μ F
Film or ceramic capacitor. Evaluate under actual operating conditions.
- L1: Power inductor Inductance: 1.0mH, Rating current: above 0.74A
Select components that do not easily get magnetically saturated at high temperature.
Recommended part : C13-FR 1.0mH (MITSUMI)
- D1: Flywheel diode Above 1000V, current: above 1.0A
Fast recovery diode
Please note that both the switching and efficiency characteristics of the module are affected by this diode.
Recommended products: UF4007 (VISHAY)
- D2: Rectifier diode Use a rectifying diode with a peak reverse voltage of 1kV or higher, an average rectification current of 1A or larger and a peak surge current of 20A or larger. When using a large capacitance input capacitor, select a component that endures the inrush current during power up. Full-wave rectification can be used.
- R1: Noise reduction resistor 10 to 22 Ω , 1W
Determine the ideal value through actual testing.
- ZNR: Varistor A varistor is required to protect against lightning surges and static electricity.

● 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. 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
- 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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