

220VAC Input/12W Output Non-Isolated AC/DC Converter with Built-In Zero Cross Signal Output

BP5013

Absolute Maximum Ratings

Parameter	Symbol	Limits	Unit
Input voltage	V_i	-170	V
Zero-cross input voltage	V_1	120	V _{rms}
Operating temperature range	T_{opr}	-20 to +85	°C
Storage temperature range	T_{stg}	-25 to +105	°C
Maximum surface temperature	T_{smx}	105	°C
Maximum output power	P_o	12	W

Electrical Characteristics

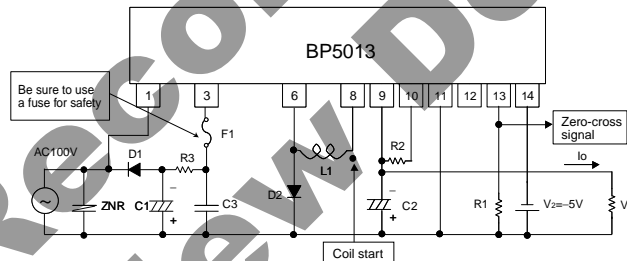
(Unless otherwise specified, $T_a=25^\circ\text{C}$, $V_i=-141\text{V}$, $I_o=100\text{mA}$, $V_2=-5\text{V}$, $R_1=10\text{k}\Omega$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage range	V_i	-113	-141	-170	V	DC
Output voltage	V_o	-11	-12	-13	V	-
Output current	I_o	-	-	1000	mA	*1
Line regulation	V_r	-	0.03	0.2	V	$V_i=-113$ to -170V
Load regulation	V_l	-	0.13	0.2	V	$I_o=0$ to 1000mA
Output ripple voltage	V_p	-	0.22	0.35	V _{p-p}	*2
Power conversion efficiency	η	75	83	-	%	-
Zero-cross signal H	V_{zH}	0	-	-0.3	V	$V_1=-141\text{V}$
Zero-cross signal L	V_{zL}	-4.6	-5.0	-5.3	V	$V_1=0\text{V}$

*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

Pin No.	Function
1	Zero-cross input 1 (ACin)
2	Skip
3	Input (V_i)
4	Skip
5	Skip
6	Coil 1 (Coil-1)
7	Skip
8	Coil 2 (Coil-2)
9	Output (V_o)
10	ADJ (VoADJ)
11	Common
12	Test
13	Zero-cross signal output (ZcOut)
14	Zero-cross signal input (-5V) (Zc)

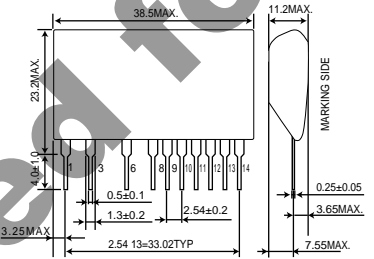


Please verify operation and characteristics in the customer's circuit before actual usage.
Ensure that the load current does not exceed the maximum rating.

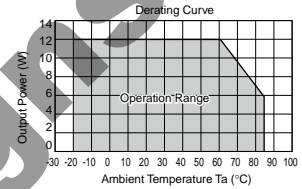
External Component Specifications

- F1: FUSE** Use a fast-acting fuse of 2.0A.
- C1: Input capacitor** Rated voltage : Beyond 250V, capacitance : 47 to 220 μF
Rated ripple current : 0.22Arms or higher
- C2: Output capacitor** Rated voltage : Please ensure a rated voltage (whose value is proportional to the output voltage) with sufficient margin
capacitance : 330 to 1000 μF , low impedance type
ESR : Less than 0.08 Ω
Rated ripple current : Beyond 1.0Arms
Evaluate under actual operating conditions since it affects the output ripple voltage.
- C3: Noise removal capacitor** Rated voltage : Beyond 250V, Capacity : 0.1 to 0.22 μF
Film or ceramic capacitor
- R3 : Noise removal resistor** Resistance : 10 to 22 Ω , Power : More than 1/4W
- D1: Rectifier diode** Peak reverse voltage : More than 400V
Mean rectifying current : More than 1.0A
Peak forward surge current : More than 20A
Full-wave rectification can be used.
- D2: Flywheel Diode** Peak reverse voltage : More than 400V
Mean rectifying current : More than 3.0A, Fast recovery diode
Please note that both the switching and efficiency characteristics of the module are affected by this diode. Recommended products : RF2001T4S (Rohm), 31DF4 (Nihon Inter), RU30 (Sanken).
- L1: Power inductor** Inductance : 330 μH ($V_o=-12\text{V}$)
Rated current : More than 1.3A
Please refer to the Output Voltage Settings table to the right.
- ZNR: Varistor** A varistor is required to protect against lightning surges and static electricity.
10kV 1/10W
- R1: Pull-up resistor** Refer to the Output Voltage Settings table to the right.
- R2: Output voltage setting resistor** Refer to the Output Voltage Settings table to the right.

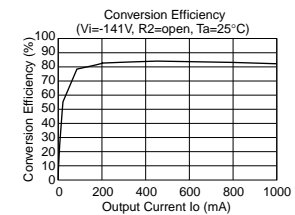
Dimensions (Unit : mm)



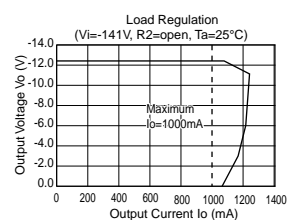
Derating Curve



Conversion Efficiency

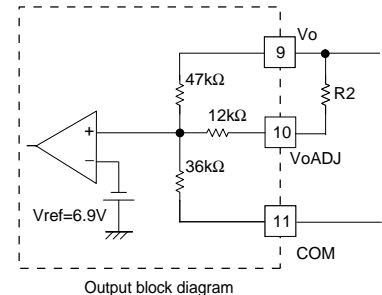


Load Regulation



Output Voltage Settings

V_o	I_o	R2	L1
-12V	1000mA	open	330 μH
-15V	800mA	75k Ω	470 μH
-24V	500mA	8.2k Ω	1mH
-30V	400mA	1.8k Ω	1mH



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.

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.

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.

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 copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.



Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

<http://www.rohm.com/contact/>

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [AC/DC Converters](#) category:

Click to view products by [ROHM](#) manufacturer:

Other Similar products are found below :

[BP5722A12](#) [ICE3AR0680VJZ](#) [ICE3AR2280CJZ](#) [ICE3BR0680JZ](#) [ICE3BR2280JZ](#) [SEA01](#) [FAN7621SSJX](#) [BP5011](#) [BP5055-12](#) [BP5718A12](#)
[ICE2QR4780Z](#) [NCP1124BP100G](#) [AP3983EP7-G1](#) [ICE2QR4765](#) [TEA19363T/1J](#) [AP3125CMKTR-G1](#) [ICE3AR10080CJZ](#) [SC1076P065G](#)
[47132](#) [47220](#) [47225](#) [APR3415BMTR-G1](#) [NCP1126BP100G](#) [HF500GP-40](#) [TNY179PN](#) [ICE3AR10080JZXKLA1](#) [BM2P0361-Z](#)
[BM2P249Q-Z](#) [BM521Q25F-GE2](#) [INN3164C-H107-TL](#) [HR1001CGS-P](#) [HR1001LGS-P](#) [BM2P131X-Z](#) [BM2P161X-Z](#) [BM2P181X-Z](#)
[BM2P201X-Z](#) [BM2P241X-Z](#) [LNK576DG-TL](#) [INN3278C-H215-TL](#) [INN3278C-H217-TL](#) [INN3678C-H605-TL](#) [NCP1342BMDCCDD1R2G](#)
[AP3304AW6-7](#) [TNY263PN](#) [TNY286PG](#) [TNY287PG](#) [TNY288DG-TL](#) [TNY288PG](#) [MP100GN](#) [BP5034D24](#)