

100VAC Input/12VDC (1A) Output

# Isolated AC/DC Converter

**BP5718A12**

## ● Absolute Maximum Ratings

| Parameter                             | Symbol     | Limits      | Unit | Conditions  |
|---------------------------------------|------------|-------------|------|---|
| Pin 11 input voltage                  | $V_D$      | 500         | V    |   |
| Pin 7,8 input voltage                 | $V_{DD}$   | 25          | V    |   |
| Pin 11 input Current                  | $I_D$      | 500         | mA   |   |
| Pin 8 input Current                   | $I_{DD}$   | 10          | mA   |   |
| Output power                          | $P_o$      | 13          | W    |   |
| Withstand voltage                     | $V_I$      | 2.5         | kV   | 1 sec (between primary and secondary)                     |
| Maximum allowable surface temperature | $T_{cmax}$ | 105         | °C   | Ambient temperature + module self-heating $\leq T_{cmax}$ |
| Operating temperature range           | $T_{opr}$  | -25 to +80  | °C   |   |
| Storage temperature range             | $T_{stg}$  | -40 to +105 | °C   |   |

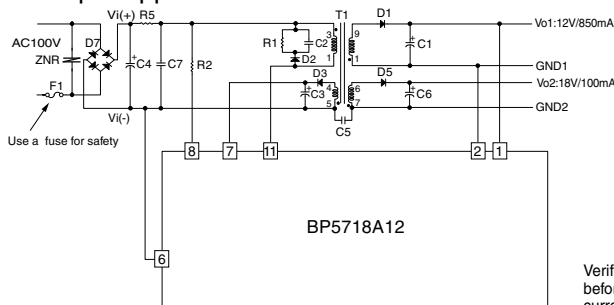
## ● Electrical Characteristics

| Parameter                       | Symbol          | Min. | Typ. | Max. | Unit | Conditions                           |
|---------------------------------|-----------------|------|------|------|------|--------------------------------------|
| Pin 11 input voltage            | $V_D$           | —    | —    | 350  | V    | $I_o=1000mA$                         |
| Operating power voltage (Pin 7) | $V_{DD}$        | 8.8  | 12   | 20   | V    | DC, $I_o=1000mA$ *1                  |
| Rated output voltage            | $V_o$           | 11.4 | 12.0 | 12.6 | V    |                                      |
| Rated output current            | $I_o$           | 0    | —    | 1000 | mA   | Refer to derating curve              |
| Line regulation                 | $\Delta V_r$    | —    | 5    | 200  | mV   | $V_i=113V$ to 195VDC<br>$I_o=1000mA$ |
| Load regulation                 | $\Delta V_L$    | —    | 58   | 200  | mV   | $I_o=50mA$ to 1000mA                 |
| Output ripple voltage           | $\Delta \gamma$ | —    | 135  | 500  | mVpp | *2                                   |
| Power conversion efficiency     | $\eta$          | 75   | 83   | —    | %    |                                      |

\*1: The operation starting voltage is between 15.5 and 17.5 V.

\*2: Pulsating noise is not included.

## ● Sample Application Circuit



| Pin No. | Terminal name | Terminal function   |
|---------|---------------|---|
| 1       | $V_o$         | Secondary 12V output voltage control terminal. Insert a 1000 $\mu$ F output smoothing capacitor before the GND for use. |
| 2       | GND           | Secondary 12V output GND terminal.  |
| 6       | $V_i(-)$      | Primary input negative terminal.  |
| 7       | $V_{DD}$      | Internal circuit power terminal.  |
| 8       | $V_s$         | Start-up terminal. Connect to $V_i(+)$ through an external resistor (1.5M $\Omega$ ).                                   |
| 9       | NC            | NC pin.   |
| 11      | $V_D$         | Drain terminal for the built-in FET.  |

Verify proper operation under actual conditions before use. In particular, confirm that the load current does not exceed the maximum rating.

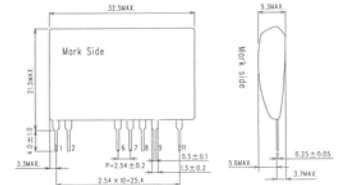
## External Component Settings

- \*C1: Output smoothing capacitor 1000 $\mu$ F/35V Low-impedance type
  - C2: Noise reduction capacitor 2200pF/400V or higher
  - \*C3: Output smoothing capacitor 10 $\mu$ F/50V Low-impedance type
  - C4: Input smoothing capacitor 100 $\mu$ F/250V
  - C5: Noise reduction capacitor Use if necessary
  - C6: Output smoothing capacitor 100 $\mu$ F/35V Low-impedance type
  - C7: Noise reduction capacitor Use if necessary
  - D1: Rectifier Diode 60V/6A
  - D2: Rectifier Diode 1kV/1A
  - D3: Rectifier Diode 80V/0.1A
  - D5: Rectifier Diode 100V or higher /1A
  - D7: Diode Bridge 800V/1A
  - R1: Resistor 100k $\Omega$  $\pm$ 5%, 3W
  - \*R2: Resistor 1.5M $\Omega$  $\pm$ 5%, 0.25W
  - R5: Noise reduction resistor Limiting element voltage 300V or higher
  - T1: Switching Transformer
  - F1: Fuse 1W or higher 10 to 22 $\Omega$
  - ZNR: Varistor
- Be sure to use this for safety. A varistor is required to protect against lightning surges and static electricity.

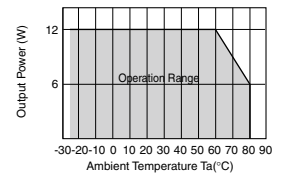
## Operation Notes

- An excessively large capacitance at C1 may cause the output to become inactive. Therefore, a capacitance between 1000 and 2200 $\mu$ F is recommended, with a rise time of 10ms or less.
- The capacitance of C3 should be 10 $\mu$ F, since an excessively small value will result in malfunction. The activation time is defined as:  $t(\text{sec})=R2 \cdot C3 \ln[1-17/(V_i-30\mu A \cdot R2)]$ , where  $V_i$  is the DC voltage after smoothing.
- The resistance of R2 should be 1.5M $\Omega$ , since an excessively small value will result in malfunction.
- Overcurrent (reset type) and overvoltage (latch type) protection circuits are built in, preventing damage from occurring due to unexpected conditions. The overvoltage protection circuit shuts down operation once  $V_{DD}$  exceeds 20V. In order to reset the input capacitor C4 must be discharged and the power turned back on.

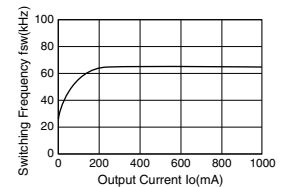
## ● Dimensions (Unit : mm)



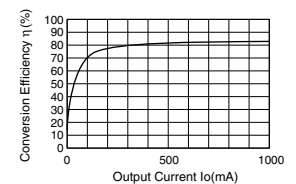
## ● Derating Curve



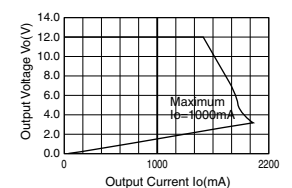
## ● Switching Frequency



## ● Conversion Efficiency



## ● Load Regulation



# 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.

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