

AC / DC converter

BP5037

The BP5037 is an AC / DC converter that converts commercial AC100V power to +DC12V. It provides a simple power supply solution for computers, DC motors, and LEDs etc., and eliminates the need for a transformer.

●Applications

Home appliances such as rice cookers, IH cookers, air cleaners, refrigerators, and DC fan motors and sensors

●Features

- 1) By eliminating the need for a transformer, power supply PC boards can be made small and compact.
- 2) Wide input voltage range (AC80Vrms to AC120Vrms).
- 3) Allows simple construction of a DC power supply with few external parts.

●Absolute maximum ratings (Ta = 25°C)

| Parameter | Symbol | Limits | Unit |
|-----------------------|--------|----------|------|
| Power supply | V | 170 | V |
| Power dissipation | Pd | — | mW |
| Operating temperature | Topr | −25~+85 | °C |
| Storage temperature | Tstg | −25~+105 | °C |

●Recommended operating conditions (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit. |
|----------------------|-----------------|------|------|------|--------|
| Power supply voltage | V _{CC} | 113 | 141 | 170 | V (DC) |

●Pin descriptions

| Pin No. | Pin name |
|---------|------------------|
| 1 | V _{OUT} |
| 3 | COIL |
| 5 | COIL |
| 7 | COMMON |
| 10 | V _{IN} |

●Electrical characteristics (unless otherwise noted, Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-------------------------------|--------|------|------|------|-----------|--|
| Input voltage range | V_I | 113 | 141 | 170 | V | — |
| Output voltage | V_O | 22 | 24 | 26 | V | $V_I=141, I_O=100\text{mA}$ |
| Output current | I_O | 0 | — | 130 | mA | $V_I=141^{*1}$ |
| Line regulation | V_L | — | 0.05 | 0.15 | V | $V_I=112\sim170\text{V}, I_O=100\text{mA}$ |
| Load regulation | V_R | — | 0.07 | 0.2 | V | $I_O=0\sim100\text{mA}, V_I=141\text{V}$ |
| Output ripple voltage | V_p | — | 0.05 | 0.15 | V_{P-P} | $V_I=141\text{V}, I_O=100\text{mA}^{*2}$ |
| Voltage conversion efficiency | η | 70 | 78 | — | % | $V_I=141\text{V}, I_O=130\text{mA}$ |

*1 Maximum output current depends on the ambient temperature. Refer to the derating curve.

*2 Output ripple voltage does not include spike noise.

●Measurement circuit

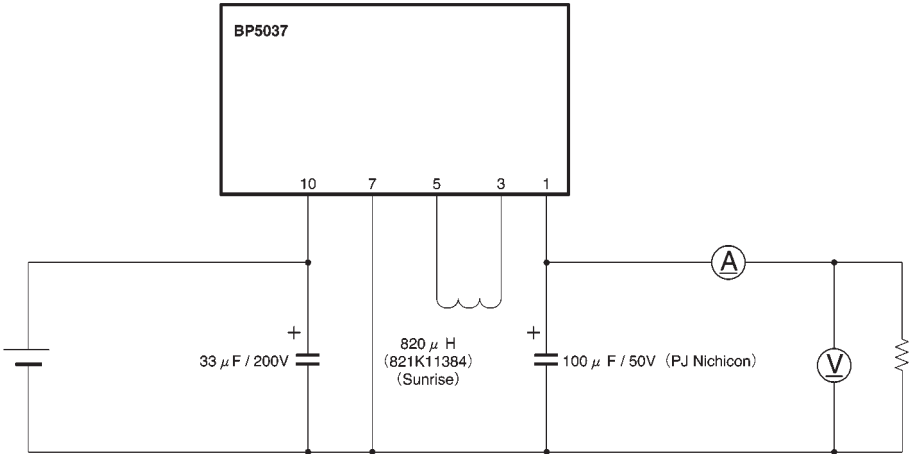


Fig.1

●Application examples

Half-wave rectification type

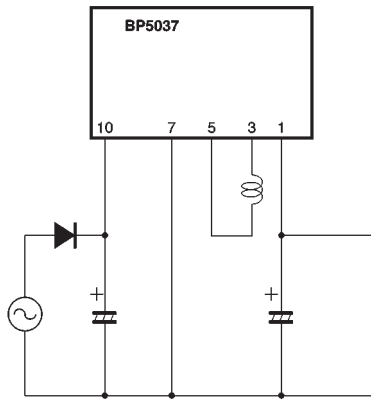


Fig.2

Full-wave rectification type

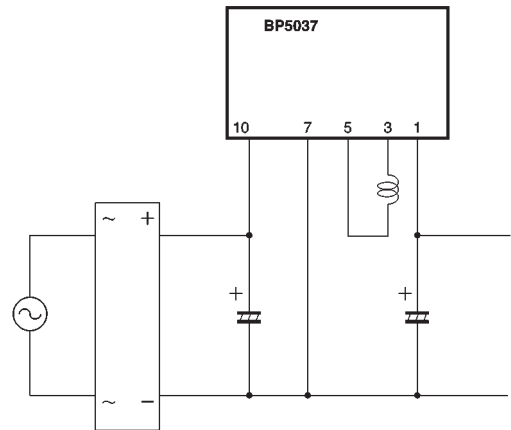


Fig.3

IH cooker application example

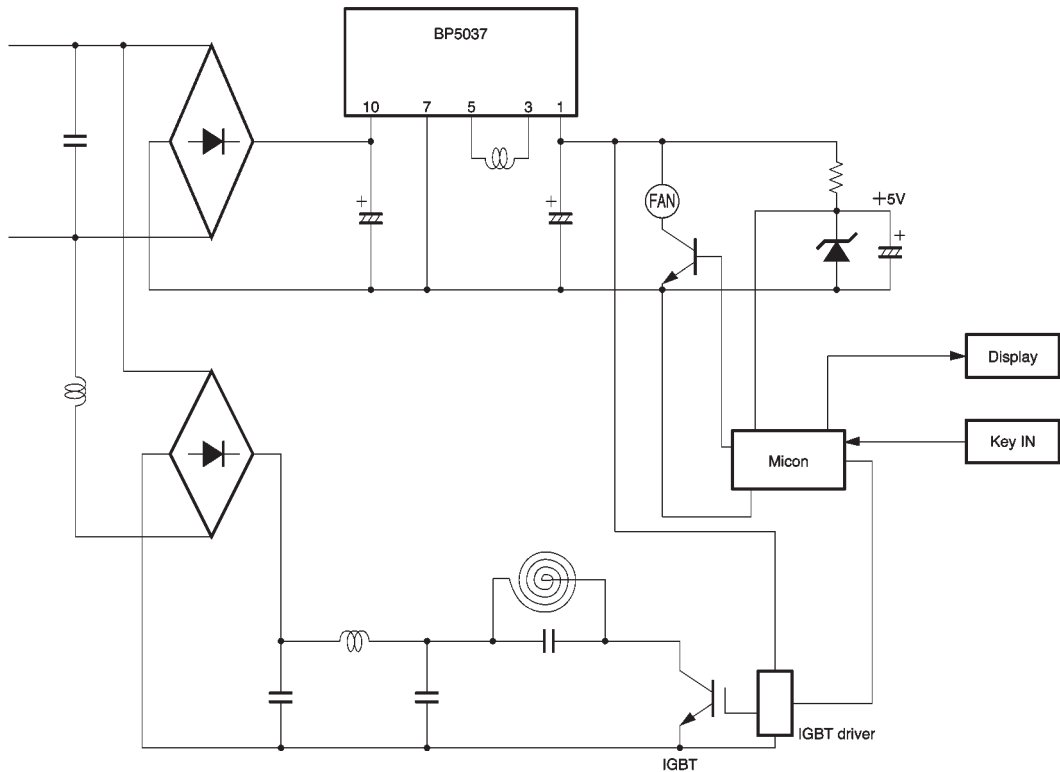


Fig.4

● External components

(1) Diode (D₁)

The rectifying diode should fulfill the following conditions. With regard to absolute ratings, the reverse surge current should be 400V or higher, the average rectifying current should be 0.5A or higher, and the forward surge current should be 20A or higher. An acceptable example is the 1SR35-400A.

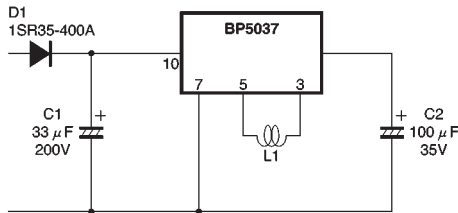


Fig.5

● Operation notes

(1) Component placement

Refer to the component placement diagram and keep the cross-hatched distances as small as possible.

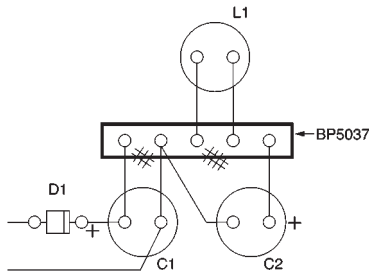


Fig.6

(2) In-rush current suppression resistor

Use an in-rush current suppression resistor of 10Ω or lower.

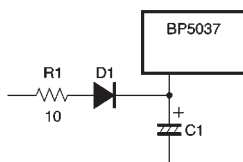


Fig.7

(3) The output current needs to be reduced as the ambient temperatures rises.

(2) Capacitor for input voltage smoothing

For half-wave rectification use a capacitor of at least 33μF, and for full-wave rectification use a capacitor of at least 10μF. In both cases, the capacitor should have a withstanding voltage of at least 200V.

(3) Coil (L₁)

The inductance should be in the range 820μH to 1.8mH, and the rated current should be at least 0.3A. This coil influences the characteristics of the BP5037, so consult your sales representative before use.

(4) Capacitor for output voltage smoothing (C₂)

This capacitor should have a low ESR. Capacitors designed for low-impedance switching power supplies are especially suitable.

The withstanding voltage should be at least 35V and the allowable ripple current should be at least 0.1A.

(4) Lead pins should be securely soldered.

If the common pins are not securely connected, or pins which connected internally but are not used are connected to other pins, abnormal voltages can be generated resulting in component failure.

(5) Excessive current and shorted leads

The excessive current limit is a drooping model. At 25°C, if excessive current which exceeds the absolute maximum ratings is produced intermittently, or is produced continuously for a total of one minute or longer, the product is vulnerable to damage.

If there is any danger of the load being shorted or excessive current being produced, always use a protective device such as a fuse.

(6) Do not subject this product to strong impact.

(7) Regulations governing electrical products

As a stand-alone product, this product is not subject to regulations governing electrical appliances.

Please be aware, therefore, that applications must be submitted for sets and not for individual products.

(8) Insulation

This product is not insulated on the primary or secondary sides, and there is danger of electrical shock if it is touched.

(9) Connection with other devices

Equipment using this product should not be connected to other equipment. If connected, insulation should be provided.

● Electrical characteristics curves

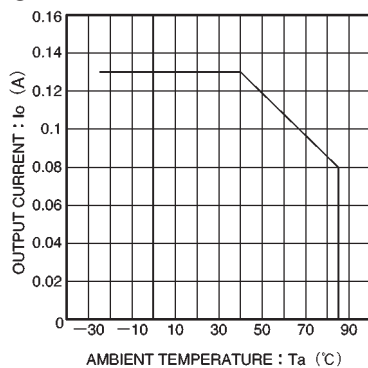


Fig.8 Derating curve

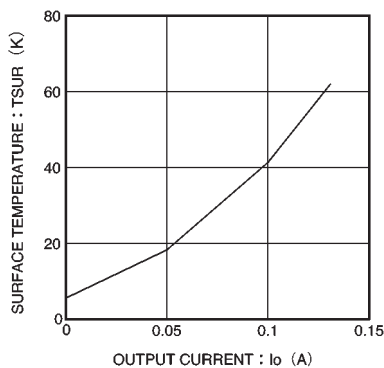


Fig.9 Surface temperature rise

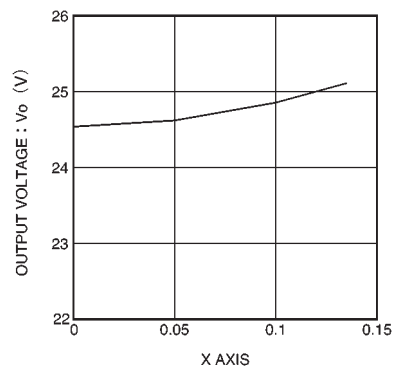


Fig.10 Output characteristics

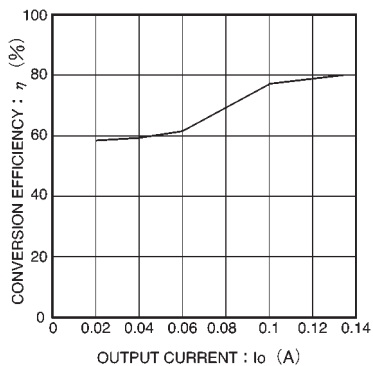


Fig.11 Power conversion efficiency

● External dimensions (Units: mm)

