

AC/DC converter unit

BP5041

The BP5041 is an AC/DC converter which can be used to supply +12V, 100mA DC output from a commercial power supply (200 to 230V AC). Using this unit enables simple, easy drive of microcomputers, LEDs, and other electronic components without using a transformer. It also allows set PCBs to be kept compact and lightweight, with extremely few attachments.

This product can accommodate the 200V AC power supplies used as household power supplies in Asia and Europe, as well as in buildings and facilities in Japan.

●Applications

Power supply circuits for vacuum cleaners, refrigerators, washing machines, air conditioners, irons, electric carpets, cordless telephones, air purifiers, humidifiers, dehumidifiers, home bakery devices, electric crock pots and rice cookers, illumination devices and other small household appliances, as well as power supply circuits for gas leakage sensors, and other industrial products

●Features

- 1) Elimination of a transformer enables compact, lightweight power supply boards.
- 2) Wide input voltage range. (226 to 358V DC for DC voltage conversion, 160 to 253V for AC voltage conversion)
- 3) DC power supplies can be easily configured, with few attachments.
- 4) Because no transformer is used, the power supply board is less vulnerable to splitting or cracking from impact or shock.
- 5) Hybridization of the IC reduces the number of labor hours in the assembly process.

●Absolute maximum ratings (Ta=25°C)

| Parameter | Symbol | Limits | Unit |
|-----------------------|------------------|---------|------|
| Power supply voltage | V _{CC} | 358 | V |
| Output current | I _o | 100 | mA |
| Operating temperature | T _{opr} | -25~80 | °C |
| Storage temperature | T _{stg} | -25~105 | °C |

●Recommended operating conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|----------------------|-----------------|------|------|------|--------|
| Power supply voltage | V _{CC} | 226 | 282 | 358 | V (DC) |

●Electrical characteristics (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------------------|--------|------|------|------|------|-------------------------------|
| Input voltage | V_i | 226 | 282 | 358 | V | DC |
| Output voltage | V_o | 11 | 12 | 13 | V | $V_i=282V, I_o=50mA$ |
| Output current | I_o | 0 | — | 100 | mA | $V_i=282V$ *1 |
| Line regulation | V_r | — | 0.02 | 0.15 | V | $V_i=226V\sim 358V, I_o=50mA$ |
| Load regulation | V_l | — | 0.05 | 0.15 | V | $V_i=282V, I_o=0\sim 50mA$ |
| Output ripple voltage | V_p | — | 0.05 | 0.15 | Vpp | $V_i=282V, I_o=50mA$ *2 |
| Conversion efficiency | η | 40 | 50 | — | % | $V_i=282V, I_o=100mA$ |

*1 Maximum output varies depending on ambient temperature; please refer to derating curve.

*2 Spike noise is not included in output ripple voltage.

●Measurement circuit

| Pin No. | Pin Name |
|---------|----------|
| 1 | Vout |
| 2 | Not used |
| 3 | NC |
| 4 | Not used |
| 5 | Common |
| 6 | Not used |
| 7 | NC |
| 8 | Not used |
| 9 | Not used |
| 10 | Vin |
| 11 | Not used |
| 12 | NC |
| 13 | Not used |
| 14 | NC |

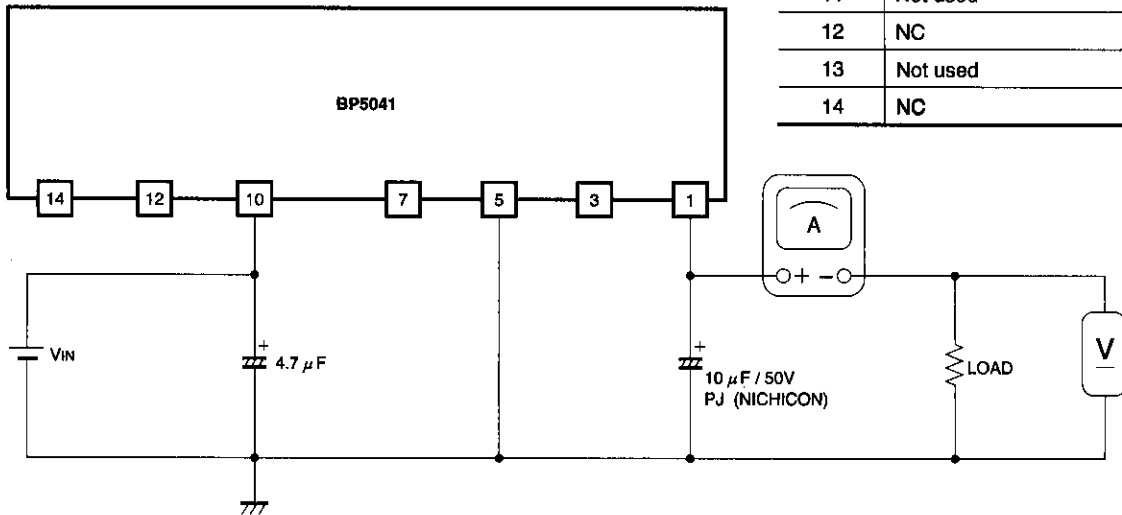


Fig.1

● Basic power supply circuit

Half wave rectification circuit

Full wave rectification circuit

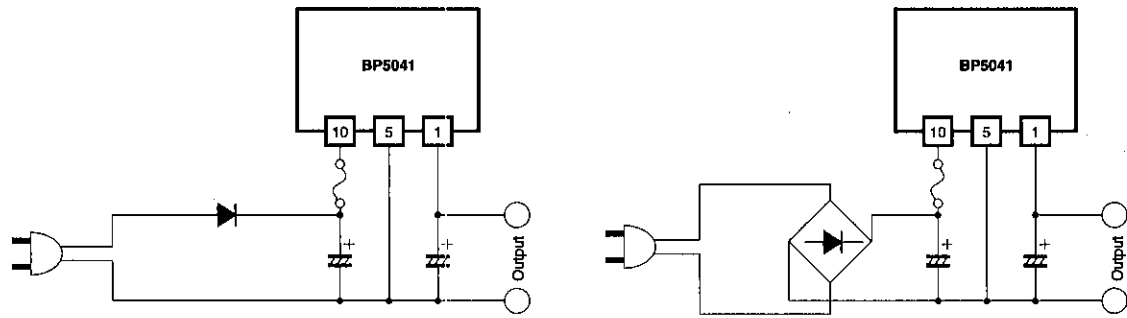


Fig.2

● Application circuit example

Application example for inventor lighting

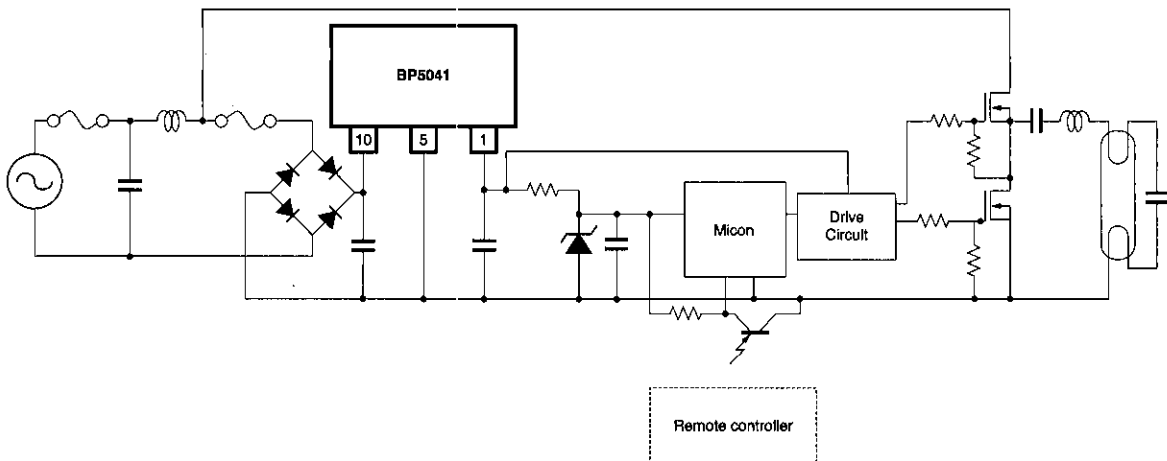


Fig.3

●Selecting attachments

(1) Diodes

The rectifying diodes used should fulfill the following conditions.

In the absolute maximum ratings, the reverse surge current should be 700V or higher, the average rectifying current should be 0.5A or higher, and the forward surge voltage should be 20A or higher.

(2) Capacitor for input voltage smoothing

A capacitor with a larger capacitance produces a more stable output voltage, but increases the surge current when the power supply is turned on. A capacitor of between 3.3 μ F and 10 μ F is recommended. The capacitor should have a withstand resistance of at least 400V.

(3) Capacitor for output voltage smoothing

This capacitor should have a low ESR. Capacitors designed for low-impedance switching power supplies are especially suitable. The ESR of the capacitor affects the output ripple voltage. Please refer to the table below for the names of products made by various manufacturers.

| Maker | Product |
|---------------------|-------------------|
| Nichicon | PJ series |
| Matsushita Electric | Model A FA series |

●Operation notes

(1) The output current needs to be reduced as the ambient temperature rises.

(2) Lead pins should be securely soldered. Avoid subjecting this product to strong impact.

(3) Excessive current and shorted loads

The excessive current limit is a drooping model of approximately 160mA. At 25°C, if excessive output current of higher than 100mA 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. The fuse should have a fusion current of 0.5A.

(4) 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.

(5) Insulation

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

(6) Connections with other devices

Devices using this product should not be connected to other devices. If connected, insulation should be provided.

(7) Pin noise voltage

The test circuit diagram below (Figure 5) was used in the test whose results are shown in Figure 4.

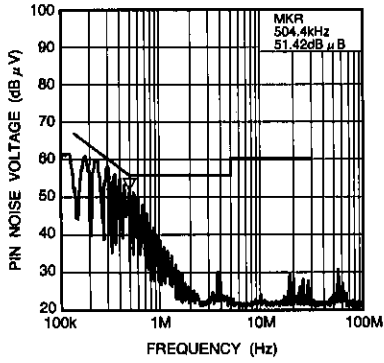


Fig.4 Pin noise voltage

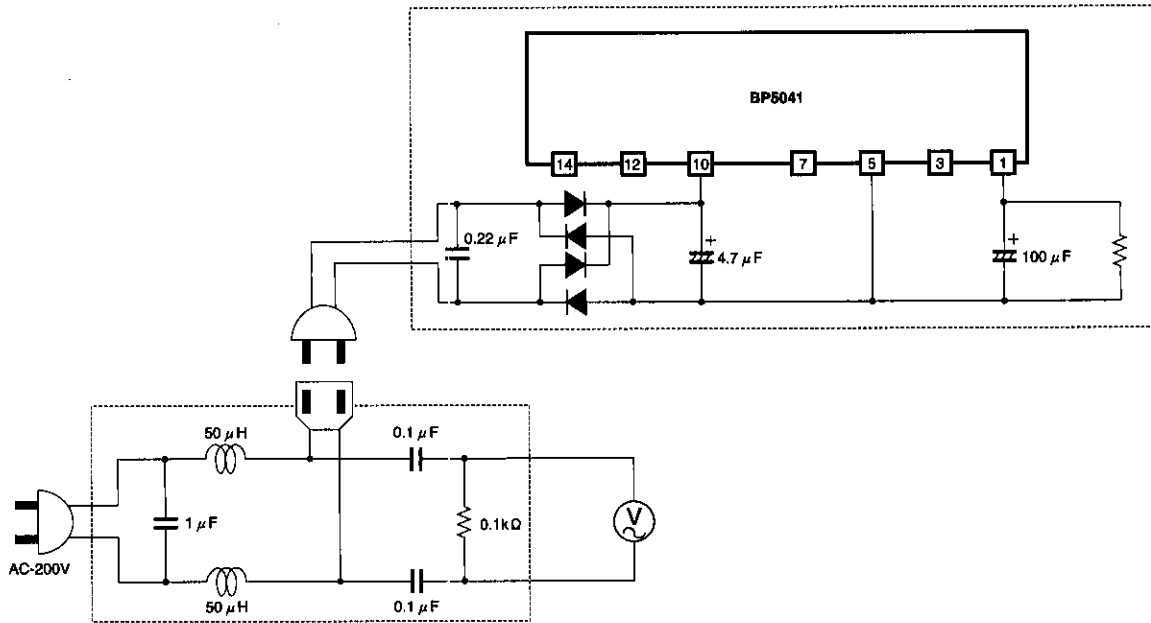


Fig.5 Test circuit

● Measurement data

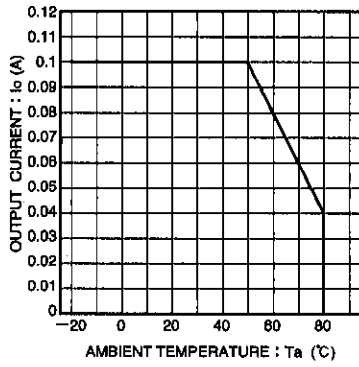


Fig.6 Derating curve

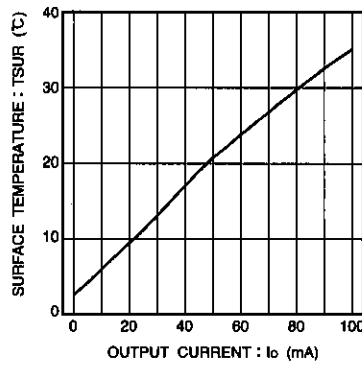


Fig.7 Surface temperature rise

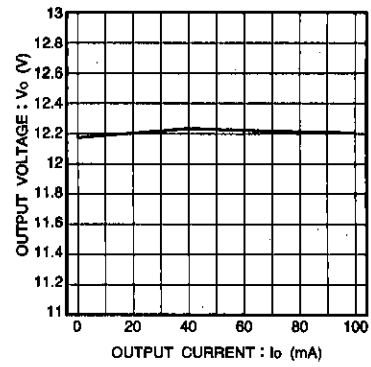


Fig.8 Output characteristic

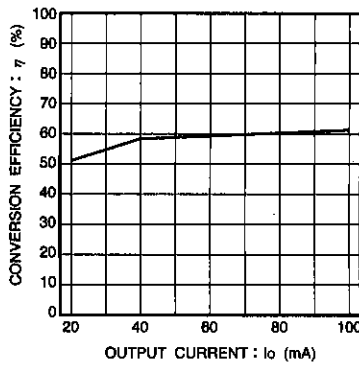
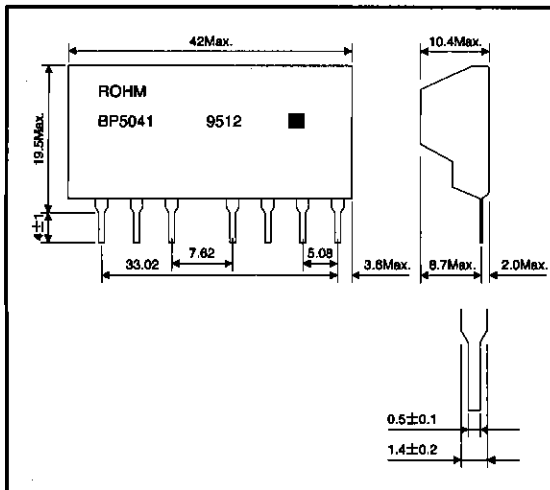


Fig.9 Conversion efficiency

● External dimensions (Units: mm)



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