AC/DC converter unit

BP5032

The BP5032 is an AC/DC converter which can be used to supply direct current (+24V, DC 50mA) voltage from a commercial power supply (100V AC) with a small number of attachments. Using this unit enables simple, easy drive of sets using microcomputers, without using a transformer. It also allows the board in the set to be kept compact and lightweight.

●Applications

Power supplies of electric rice cookers and crock pots, irons, electric carpets and other small household appliances; power supplies of illumination devices, fire and smoke alarms, sensors, and other warning devices

●Features

1) Smaller and lighter weight than transformer systems.
2) Wide input voltage range. (80 to 120V for AC voltage conversion, 113 to 170V for DC voltage input)
3) DC voltage source (24V, 50mA) 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 simplifies the manufacturing process for power supply circuit boards, and improves mass production capability of sets.

●Absolute maximum ratings (Ta=25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	170	V
Output current	Io	50	mA
Operating temperature	Topr	−25~80	℃
Storage temperature	Tstg	−25~105	℃

●Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	113	141	170	V (DC)

●Electrical characteristics (Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_I	113	141	170	V	DC
Output voltage	Vo	22	24	26	V	V_I=141V, Io=25mA*1
Output current	Io	0	—	50	mA	V_I=141V
Line regulation	Vr	—	0.02	0.1	V	V_I=113V~170V, Io=25mA
Load regulation	VI	—	0.05	0.15	V	V_I=141V, Io=0~25mA
Output ripple voltage	Vp	—	0.05	0.15	Vpp	V_I=141V, Io=25mA
Conversion efficiency	η	55	70	—	%	V_I=141V, Io=50mA*2

*1 Based on derating curve.

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

●Measurement circuit

Pin No.	Pin Name
1	Vout
2	NC
3	Internal connection pin
4	NC
5	Common
6	NC
7	Internal connection pin
8	NC
9	Not used
10	Vin

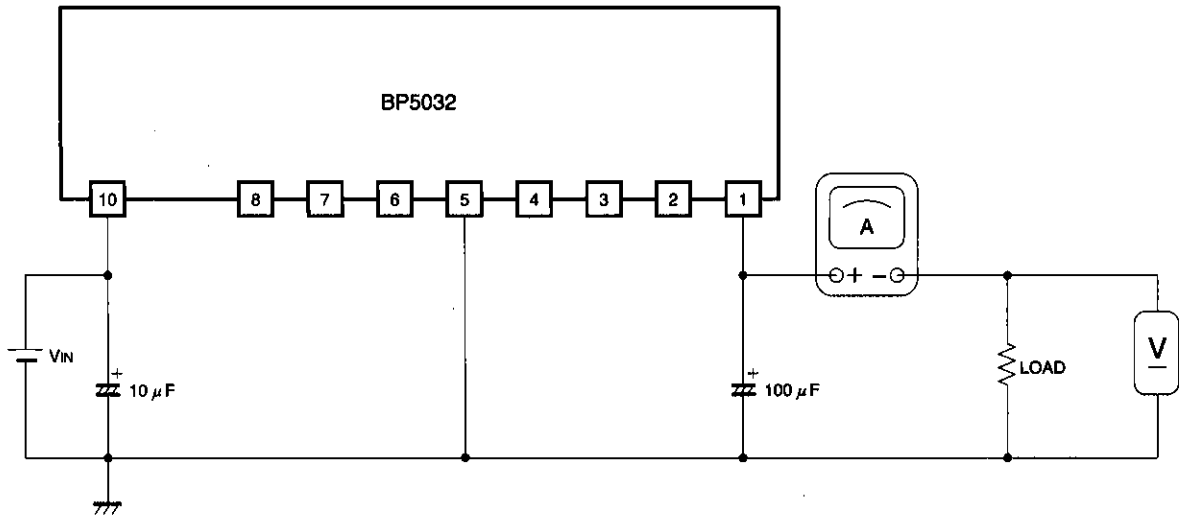


Fig.1

Use a low-impedance product for switching power supplies for the output capacitor.

●Basic power supply circuit

Half wave rectification circuit

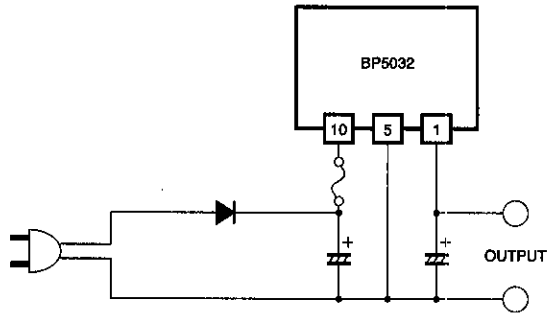


Fig.2

Full wave rectification circuit

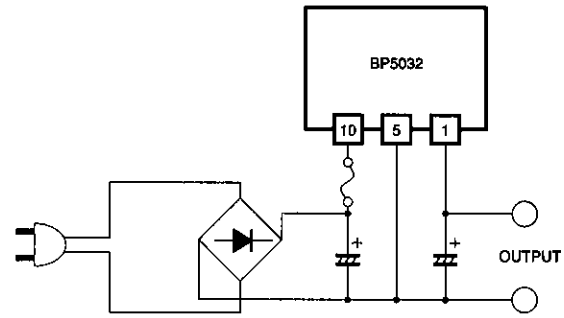


Fig.3

●Application circuit example

Example using electric rice cooker

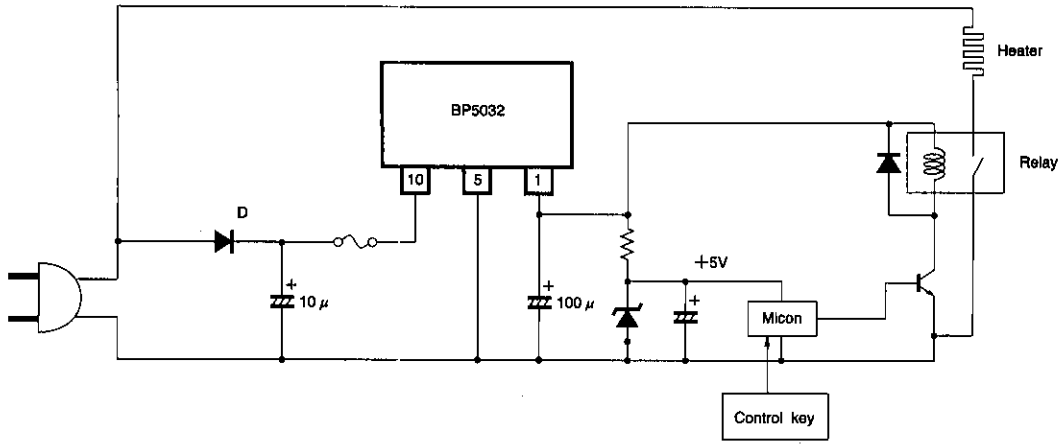


Fig.4

●Selecting attachments

(1) Diodes

The rectifying diodes used should fulfill the following conditions.

In the absolute maximum ratings, the reverse surge current should be 400V or higher, the average rectifying current should be 0.5A or higher, and the forward surge voltage should be 20A or higher. One example of a product which meets these standards is the 1SR35-400A.

(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. The capacitor should have a withstand resistance of at least 200V. Please refer to Figure 5 for examples of recommended capacitance values.

(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

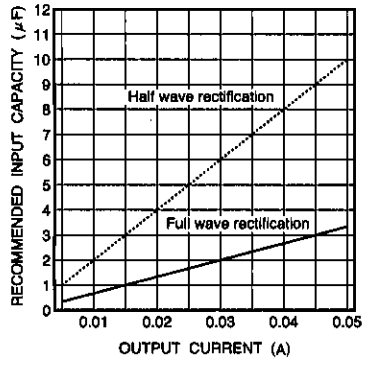


Fig.5 Recommended BP5030 input capacity

●Operation notes

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

(2) Lead pins should be securely soldered. If common pins are not securely connected, or pins which are connected internally but which are not used are connected to other pins, irregular voltages could be produced, causing breakdowns and damage.

(3) Excessive current and shorted loads

The excessive current limit is a drooping model. At 25℃, 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.

The fuse should have a fusion current of 0.5A.

(4) Avoid subjecting this product to strong impact.

(5) 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.

(6) Insulation

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

(7) Connections with other devices

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

(8) Pin noise voltage

The test circuit diagram below (Figure 7) was used in the test whose results are shown in Figure 6.

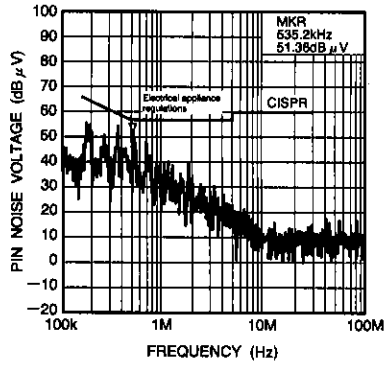


Fig.6 Pin noise voltage for the BP5032

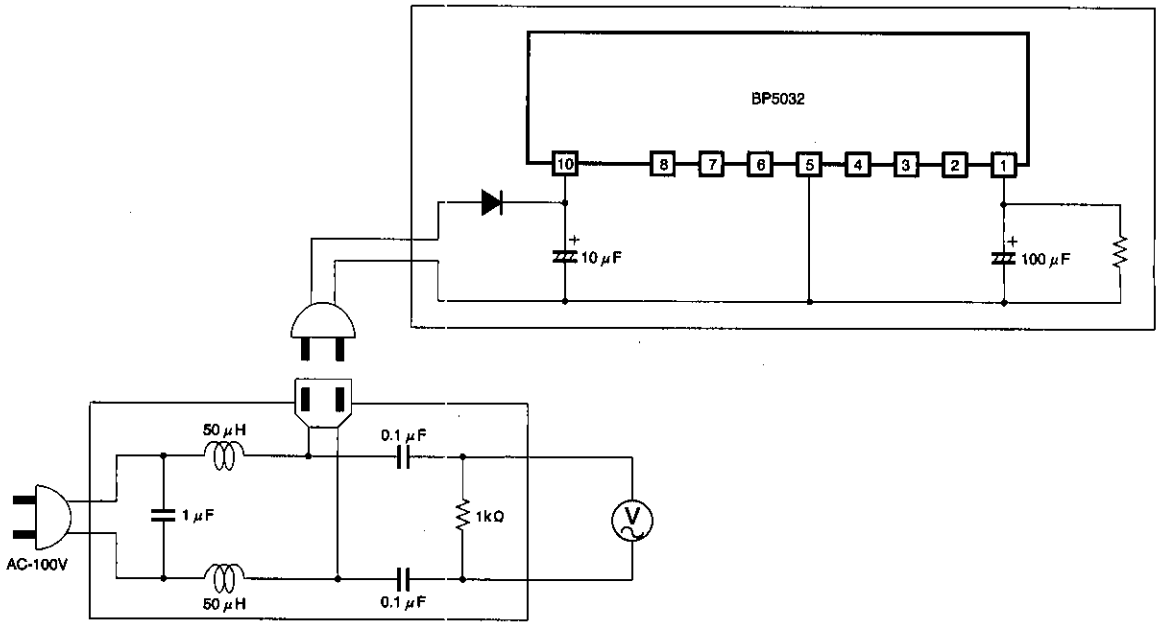


Fig.7 Test circuit

●Measurement data

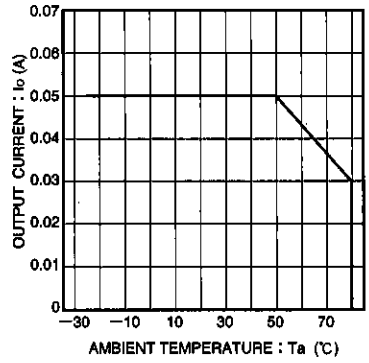


Fig.8 Derating curve

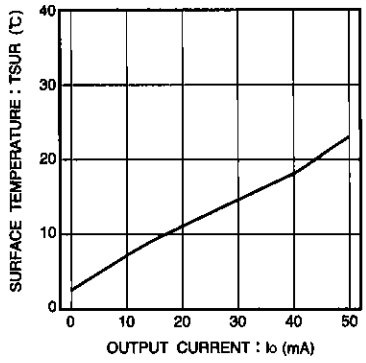


Fig.9 Surface temperature rise

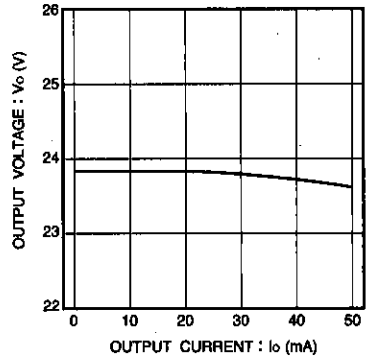


Fig.10 Output characteristic

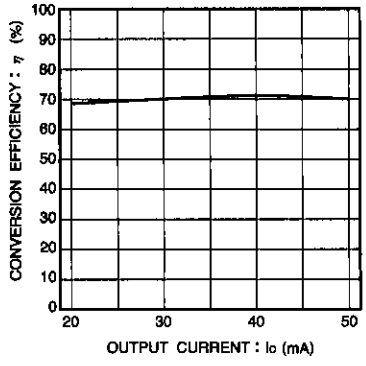
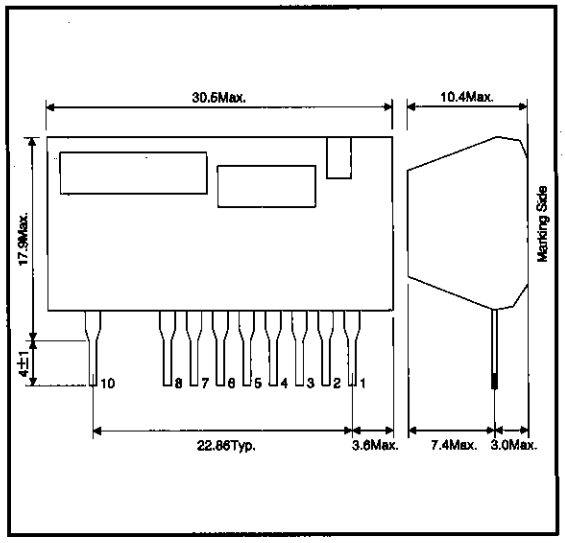


Fig.11 Conversion efficiency

●External dimensions (Units: mm)



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