AC / DC converter

BP5039-12 / BP5039-15 / BP5039A

The BP5039-12, BP5039-15 and BP5039A are AC / DC converters which provide DC output from a commercial power supply (100V AC). Using these modules enable simple, easy drive of microcomputers, LEDs, and many other electronic components without using a transformer. They allow set PCBs to be kept compact and lightweight, with extremely few attachments.

●Applications

Power supply circuits for vacuum cleaners, washing machines, refrigerators, electric carpets, electric rice cookers and crock pots, irons, cordless telephones, air conditioners, air purifiers, humidifiers, dehumidifiers, illumination devices and other small household appliance, as well as power supply circuits for gas, fire and smoke alarms, DC motors, sensors, and other similar devices.

●Features

1) Elimination of a transformer enables compact, lightweight power supply boards.
2) Wide input voltage range.(80 to 120Vrms for AC voltage conversion.)
3) DC power supply 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) Allow easy assemblage of components.

●List of the BP5039 series

Parameter	BP5039-12	BP5039-15	BP5039A	Unit
Power supply voltage	113~170	113~170	113~170	V
Output voltage	12	15	24	V
Output current	300	200	200	mA

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits			Unit
		BP5039-12	BP5039-15	BP5039A	
Power supply voltage	V_{IN}	170	170	170	V
Output current	I_O	300	200	200	mA
Operating temperature range	Topr	−20~+80	−25~+80	−20~+80	°C
Storage temperature range	Tstg	−25~+105	−25~+105	−25~+105	°C

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{IN}	113	141	170	$V_{(DC)}$

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

BP5039-12

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_{IN}	113	141	170	V	DC
Output voltage	V_O	11	12	13	V	V_{IN} = 141V, I_O = 100mA
Output current	I_O	0	–	300	mA	V_{IN} = 141V *1
Line regulation	Vr	–0.10	0.04	+0.10	V	V_{IN} = 113V~170V, I_O = 100mA
Load regulation	Vl	–0.20	0.05	+0.20	V	V_{IN} = 141V, I_O = 0~100mA
Output ripple voltage	Vp	–	0.07	0.15	V_{PP}	V_{IN} = 141V, I_O = 100mA *2
Conversion efficiency	η	65	74	–	%	V_{IN} = 141V, I_O = 300mA

*1 Maximum output current varies depending on ambient temperature; please refer to derating curve.
*2 Spike noise is not included in output ripple voltage.

BP5039-15

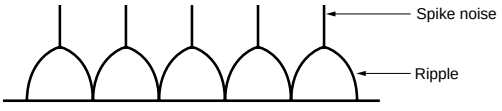
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_{IN}	113	141	170	V	DC
Output voltage	V_O	14.25	15.0	15.75	V	V_{IN} = 141V *1
Output current	I_O	0	–	200	mA	V_{IN} = 113V~170V, I_O = 100mA
Line regulation	Vr	–0.20	0.05	+0.20	V	V_{IN} = 141V, I_O = 0~100mA
Load regulation	Vl	–0.20	0.05	+0.20	V	V_{IN} = 141V, I_O = 100mA *2
Output ripple voltage	Vp	–	0.07	0.15	V_{PP}	V_{IN} = 141V, I_O = 200mA
Conversion efficiency	η	60	74	–	%	V_{IN} = 141V, I_O = 200mA
Surface temperature rise	Tc	–	38	–	K	V_{IN} = 141V, I_O = 200mA

*1 Maximum output current varies depending on ambient temperature; please refer to derating curve.
*2 Spike noise is not included in output ripple voltage.

BA5039A

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_{IN}	113	141	170	V	DC
Output voltage	V_O	22	24	26	V	V_{IN} = 141V, I_O = 100mA
Output current	I_O	0	–	200	mA	V_{IN} = 141V *1
Line regulation	Vr	–0.15	0.04	+0.15	V	V_{IN} = 113V~170V, I_O = 100mA
Load regulation	Vl	–0.50	0.25	+0.50	V	V_{IN} = 141V, I_O = 0~+100mA
Output ripple voltage	Vp	–	0.07	–	V_{PP}	V_{IN} = 141V, I_O = 100mA *2
Conversion efficiency	η	70	82	–	%	V_{IN} = 141V, I_O = 200mA

*1 Maximum output current varies depending on ambient temperature; please refer to derating curve.
*2 Spike noise is not included in output ripple voltage.



●Pin descriptions

Pin No.	Pin name
1	V_{OUT}
3	COIL
5	COIL
7	COMMON
10	N.C.
12	V_{IN}

Pins 2, 4, 6, 8, 9, 11 are removed.

●Measurement circuit

BP5039-12

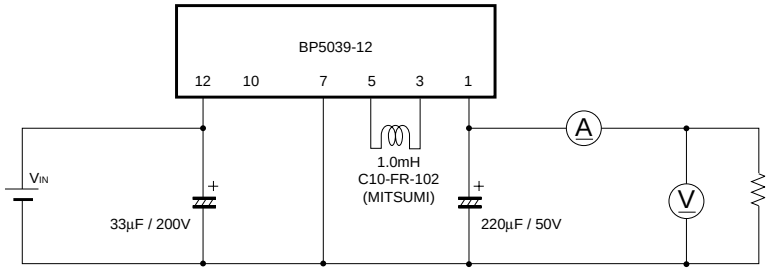


Fig.1

BP5039-15

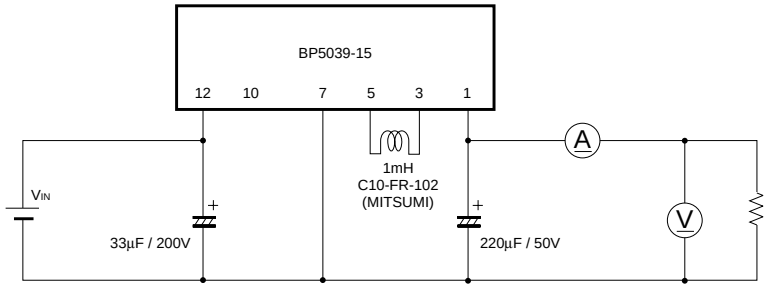


Fig.2

BP5039A

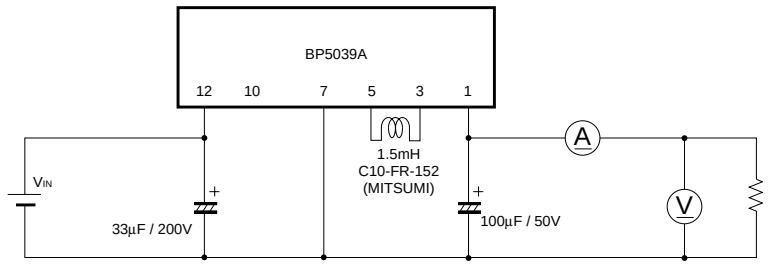


Fig.3

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

●**Application example**

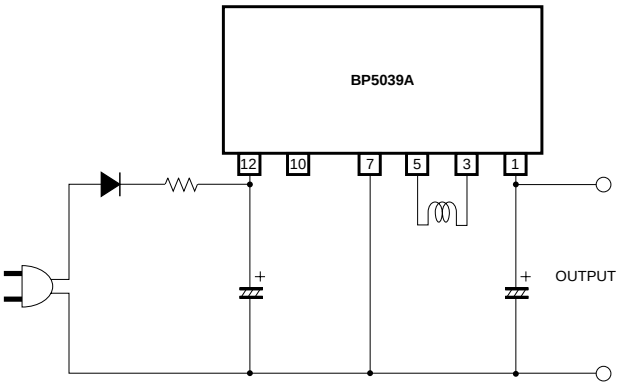


Fig.4

●**Operation notes**

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

(2) Over current and shorted circuit

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

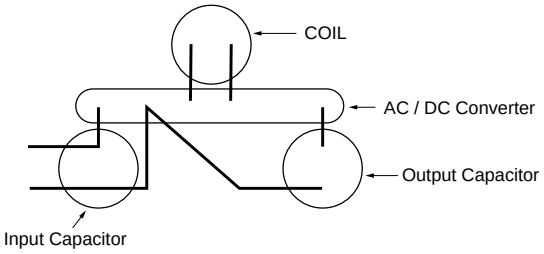
(3) Insulation

These products are not insulated on the primary and secondary sides, and there is a danger of electrical shock if they are touched.

(4) Avoid subjecting these products to strong impact.

(5) Lead pins should be securely soldered. if lead pins are not securely connected, irregular voltages could be produced, causing breakdowns and damage.

(6) The parts arrangement should be made as shown in the following figure.



(7) Soldering

It should be performed within 10 seconds at 260°C.

(8) Soldering iron

The temperature of the tip of the soldering iron should be less than 310°C, and the soldering should be performed within 3 seconds.

(9) Input voltage

Be careful so that the input voltage should not exceed the maximum input voltage. Further, since operation will be allowed even at the low voltage (about 40V), if operation at the low voltage is not required, cope with the situation by using an externally installed circuit.

(10) Operating temperature

The operating temperature should necessarily be within the range of the temperature designated in the specification. Since the surface temperature increase of these products will change depending on the use environment, be minded to actually measure the temperature each time.

(11) Smoothing capacitor for input pin

The capacitor should have a withstand voltage of at least 200V.

(12) Smoothing capacitor for output pin

The capacitor should have a withstand voltage of at least 25V. Capacitors designed for switching power supplies are especially suitable. In case that the general capacitors are used, be minded to use those of which allowable ripple current is 0.25Arms or more.

(13) Connections with other devices

Devices using the products should not be connected to other devices. If connected, insulation should be provided.

●Electrical characteristic curves

BP5039-12

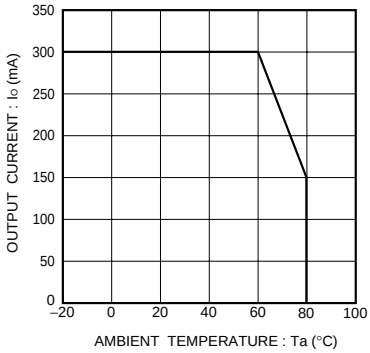


Fig.5 Derating curve

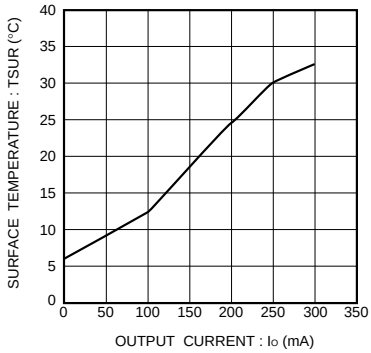


Fig.6 Surface temperature rise

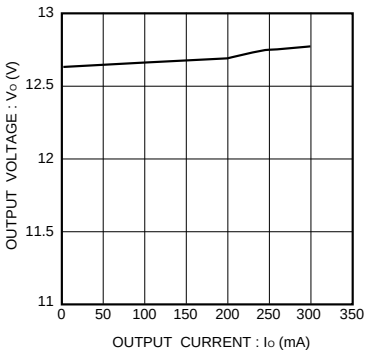


Fig.7 Output characteristic

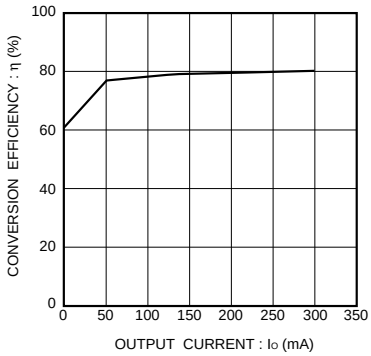


Fig.8 Conversion efficiency

BP5039-15

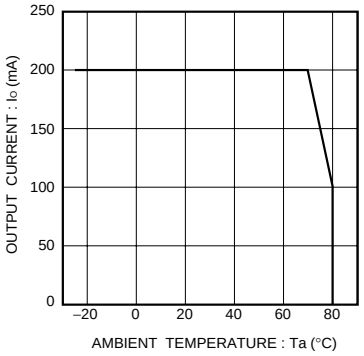


Fig.9 Derating curve

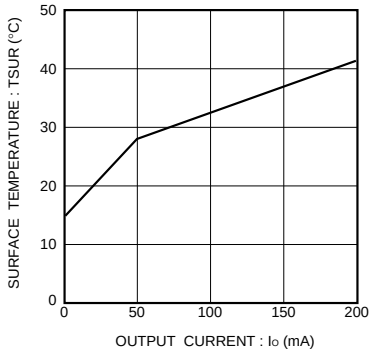


Fig.10 Surface temperature rise

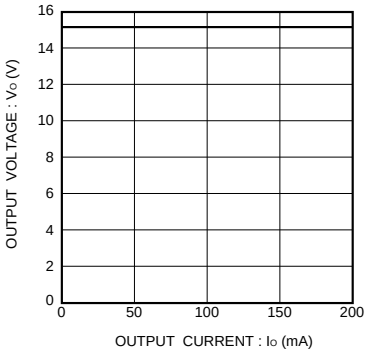


Fig.11 Output characteristic

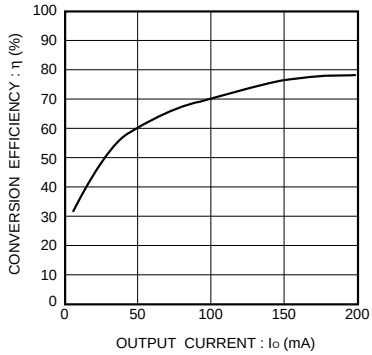


Fig.12 Conversion efficiency

BP5039A

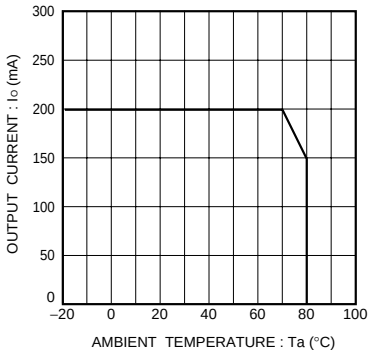


Fig.13 Derating curve

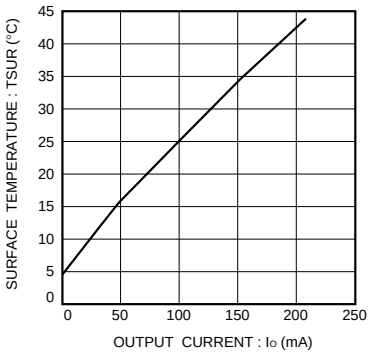


Fig.14 Surface temperature rise

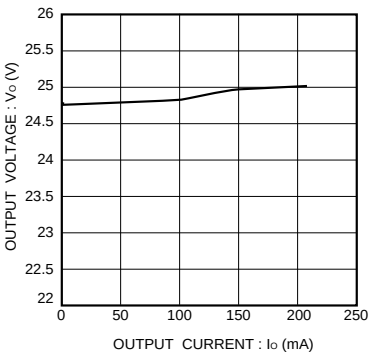


Fig.15 Output characteristic

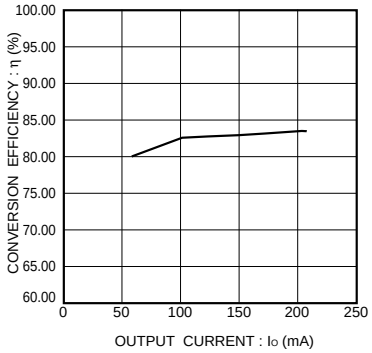
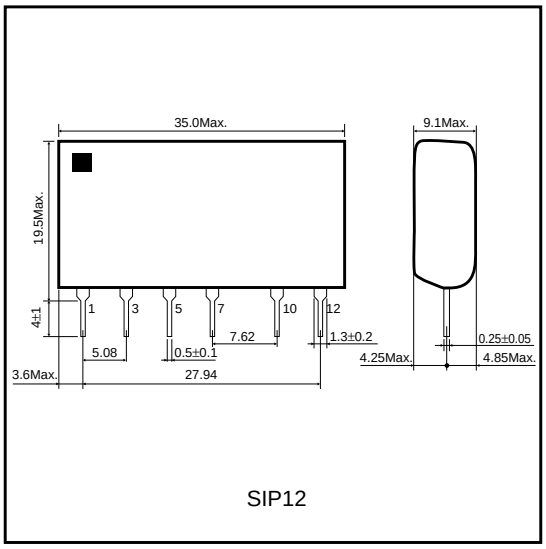


Fig.16 Conversion efficiency

●**External dimensions** (Units : mm)



SIP12

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