

High efficiency switching-type motor driver

BP5801

The BP5801 is an output-variable type DC motor driver module. This module can change the output voltage for driving the DC motor by inputting PWM signal or DC voltage into the control terminal. The power conversion efficiency is high, and power saving of the application can be realized, since the input voltage can be changed into the specified output voltage by the switching system. Further, this module can be used as the output-variable type DC / DC converter.

● Applications

Refrigerator, The rotation-control type DC motor driver and the output-variable type DC / DC converter

● Features

- 1) Electrical power loss is small even when there is a difference between the input voltage and motor driving voltage, since electrical power conversion efficiency is high (90% Typ.) as the switching system is employed for changing the voltage.
- 2) Motor driving voltage can be set to any optional value by the control signal.
- 3) The control signal corresponds with both PWM signal and DC voltage.
- 4) The control terminal is easy to be designed, as it is only one-terminal type.
- 5) This can be used as the output-variable type DC / DC converter as well.
- 6) Space-saving package of SIP.

● Absolute maximum ratings (Ta=25°C)

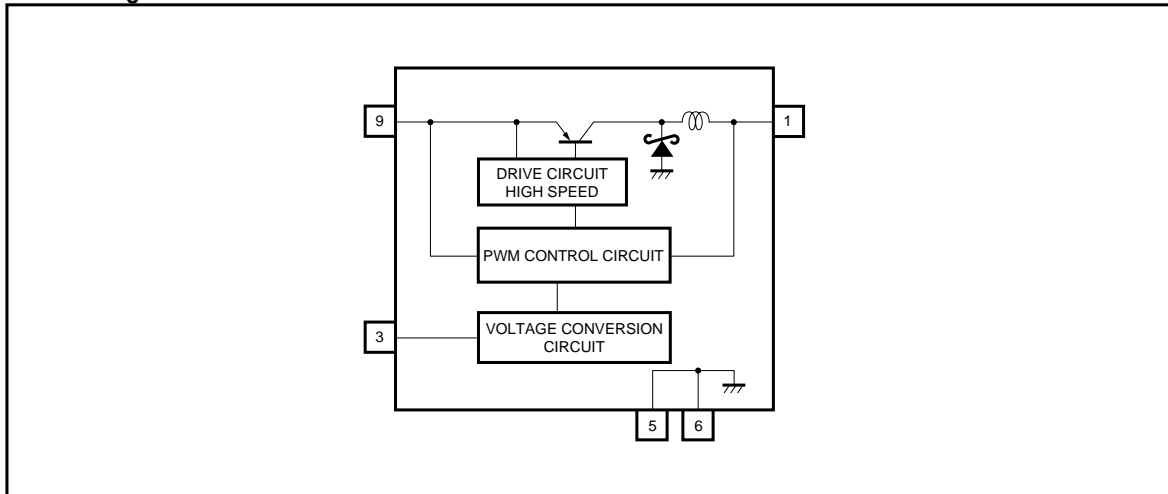
Parameter	Symbol	Limits	Unit	Remarks
Power supply voltage	V _{IN}	20	V	–
Output current	I _o	0.4 (1.3 at peak)	A	*1
CTL input voltage	V _{CTL}	6	V	3pin
Operating temperature range	T _{opr}	–10 ~ +60	°C	–
Storage temperature range	T _{stg}	–25 ~ +80	°C	–

*1 Derating is necessary. Based on the derating curve.

● Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V _{IN}	12	13	15	V

● Block diagram



● Pin descriptions

Pin No.	Pin name	Function
1	OUT	Output pin for motor drive : connect a low impedance capacitor with a recommended capacitance of 470 μ F / 35V.
2	TP	Test pin ; use this internally connected pin in OPEN mode.
3	CTL	Output voltage control pin ; PWM signal or DC signal is inputted. The output voltage can be changed either by changing the duty of PWM signal or by changing the DC voltage value.
5, 6	GND	Ground pin
7, 8	TP	Test pin ; use this internally connected pin in OPEN mode.
9	V _{IN}	Input pin ; connect a low impedance capacitor with a recommended capacitance of 100 μ F / 35V.

● Electrical characteristics (unless otherwise noted, Ta=25°C, V_{IN}=13V, I_o=0.4A, f_{CTL}=50Hz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output voltage	V _o	11	12	13	V	D _{CTL} =100% (5V fixed)
		5	6	7	V	D _{CTL} =50%
Ripple noise voltage	v	–	–	50	mV _{PP}	D _{CTL} =100% *1
Efficiency	η	80	90	–	%	D _{CTL} =100%
CTL frequency	f _{CTL}	50	–	–	Hz	
CTL input resistance	R _{CTL}	200	–	–	k Ω	Pin 3
Standby current	I _{IN}	–	4	–	mA	Pin 3=GND
Circuit current at no signal	I _{IN}	–	4	–	mA	Pin 3=GND

*1 Spike noise is not included.

● Measurement circuit

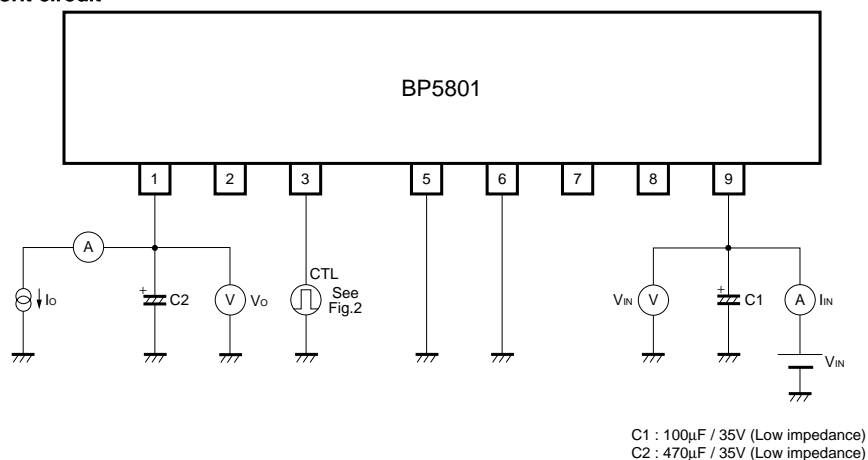


Fig.1

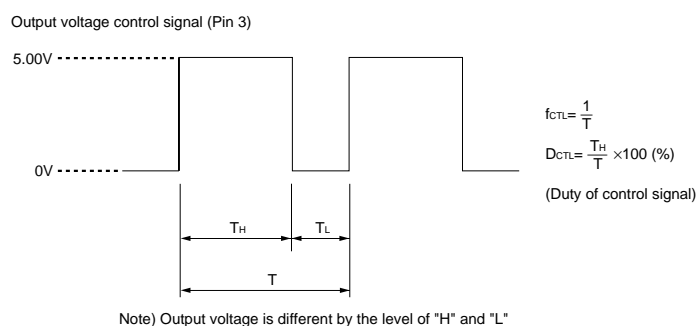


Fig.2

● Circuit operations

(1) Description

BP5801 is a DC motor driver that can establish any output voltage by inputting PWM signal and DC voltage into the control pin (3pin).Electrical power loss is small even when there is a difference between the input voltage and output voltage, since changing from the input voltage into the specified output voltage can be made by the switching system. This module is most suitable in case that the number of rotation of the motor is controlled by changing the driving voltage, or in case that the motor of a lower specified voltage than 13V is driven by the electrical power supply of 13V.

(2) Control signals

1) PWM signal

The output voltage will be controlled by that duty. The larger the duty is, the higher the output voltage will be. It is necessary to be attentive, because the output voltage value changes depending on the H-level and L-level values of PWM signal as well, at this time.

2) DC voltage

The output voltage will be controlled by PC voltage value. The higher the voltage, the higher the output voltage will be.

● Application example

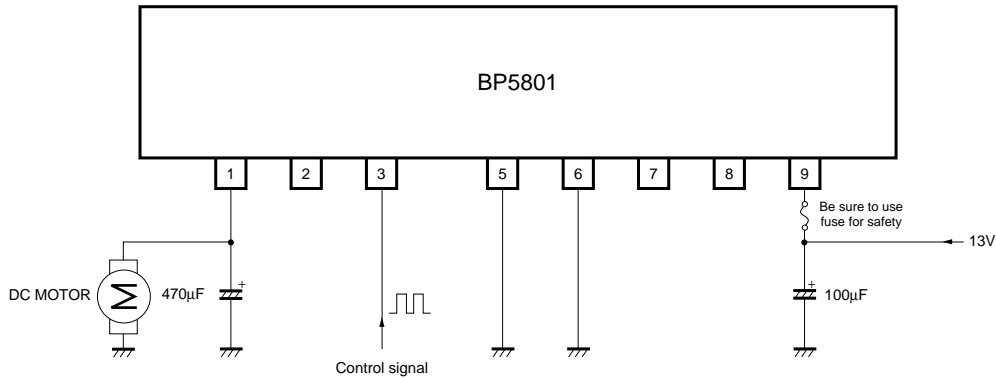


Fig.3

● Operation notes

- (1) The output current should be reduced according to an increase in the output voltage or ambient temperature. Use the module within the derating curve range.
- (2) The protection circuit for output current is not incorporated. Be sure to take safety measures such as fusing if short-circuit loads or overcurrent is probable.
- (3) External capacitor
Since the switching system is employed for the purpose of changing the voltage, ripple current flows to the capacitor to be added to pins 1, 9. Select the product of which allowable ripple current is more than this value.

● Electrical characteristic curves

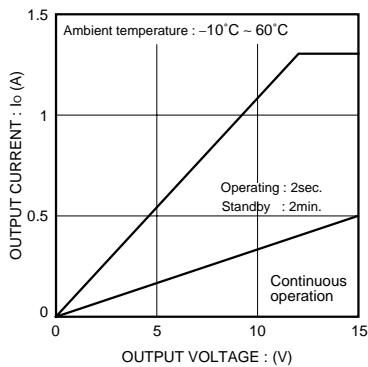


Fig.4 Derating curve

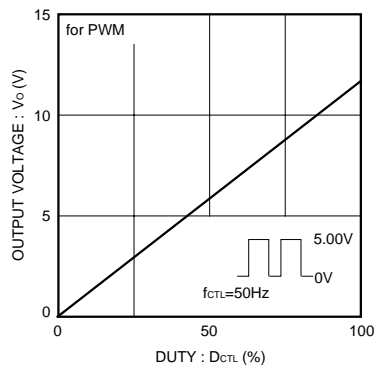


Fig.5 Output voltage vs. Duty

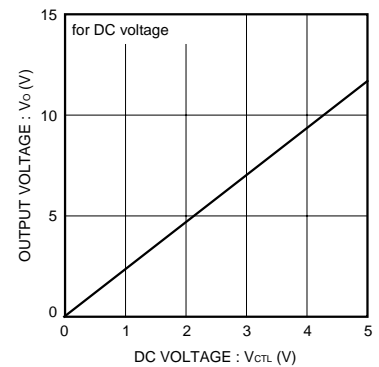
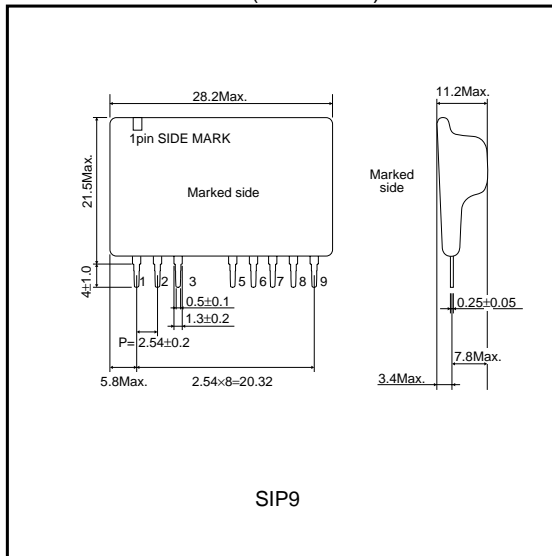


Fig.6 Output voltage vs. DC voltage

● External dimensions (Units : mm)



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 - [b] Installation of redundant circuits in the case of single-circuit failure
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 - [c] Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [d] Use in places where the products are exposed to static electricity or electromagnetic waves
 - [e] Use in proximity to heat-producing components, plastic cords, or other flammable items
 - [f] Use involving sealing or coating the products with resin or other coating materials
 - [g] Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering
 - [h] Use of the products in places subject to dew condensation
- 3) The products are not radiation resistant.
- 4) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
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