Power Module

DC/DC converter for LCDs

BP5319 / BP5319X

The BP5319, BP5319X is a DC/DC converter designed for driving liquid crystal displays(LCDs).
If this module is used, a negative power supply for LCD can be made of the power supply easily 5V.

● **Applications**

A power supply for the LCD panels in copiers, facsimile, personal computers, word processors, musical instrument, and units.

● **Features**

1) High accurate output voltage (-24V±0.75V).
2) High conversion efficiency (75%Typ).
3) An output voltage can be changed by the external resistor.
4) Built-in protect circuit.
5) Built-in ON/OFF switch.
6) Compact and light.
7) Available as an upright or L-shaped lead type.

● **Absolute maximum ratings** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Input voltage	V_{IN}	7	V
Output current	Io	30	mA
ON/OFF control voltage	V_{CTL}	7	V
Operating temperature	Topr	-10~+60	°C
Storage temperature	Tstg	-30~+85	°C

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Power Module

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V_{IN}	4.5	-	5.5	V	
Output current	I_{OUT}	-	-	30	mA	
Out put voltage	V_{OUT}	-24.75	-24.00	-23.25	V	V_{IN}=5V, I_{OUT}=25mA
Line regulation	$\Delta V1$	-	-	0.24	V	V_{IN}=4.5~5.5V, I_{OUT}=25mA
Load regulation	$\Delta V2$	-	-	0.24	V	V_{IN}=5V, I_{OUT}=0~25mA
Output voltage temperature Coefficient	ΔVt	-	-10	-	mV/°C	V_{IN}=5V, I_{OUT}=25mA[*2]
Ripple noise voltage	$\nu 1$	-	-	150	mV_{P-P}	V_{IN}=5V, I_{OUT}=25mA[*1]
Conversion efficiency	η	70	75	-	%	V_{IN}=5V, I_{OUT}=25mA
ON/OFF CTL voltage when OFF	V_{CTL}	2.0	-	-	V	V_{IN}=5V
ON/OFF CTL voltage when ON	V_{CTL}	-	-	0.5	V	V_{IN}=5V
			(Alternatively, when Open)			
ON/OFF CTL input current	I_{CTL}	-	100	150	μA	V_{IN}=4.5~5.5V, V_{CTL}=5V[*2]
Current consumption when OFF	I_{OFF}	-	-	0.5	mA	V_{IN}=4.5~5.5V, V_{CTL}=5V[*2]
R1 resistance	R1	50	-	∞	kΩ	V_{IN}=4.5~5.5V, V_{CTL}=5V[*2]
R2 resistance	R2	50	-	∞	kΩ	V_{IN}=4.5~5.5V, V_{CTL}=5V[*2]

*1 Measured with a bandwidth of 20MHz.

*2 Ta = -10~60°C

●**Pin descriptions**

Pin No,	Pin name	Function
1	Co	Output smoothing capacitor connection pin; connect a low-impedance capacitor with a recommended capacitance of 47μF between this pin and GND.
2	V_{OUT}	Output pin
3	V_{ref}	Output voltage adjustment pin for contrast; output voltage is adjusted by connecting a resistor between pins 2 and 3 or pins 3 and 4.
4.7	GND	Ground pin. pins 4 and 7 is internal connection.
8	V_{CTL}	Output ON/OFF control pin; output starts when the pin is LOW level or OPEN, and stops when the pin HIGH level.
9	V_{IN}	Input pin; connect a low-impedance capacitor with a recommended capacitance of 100μF between this pin and GND.

●**Measurement circuit**
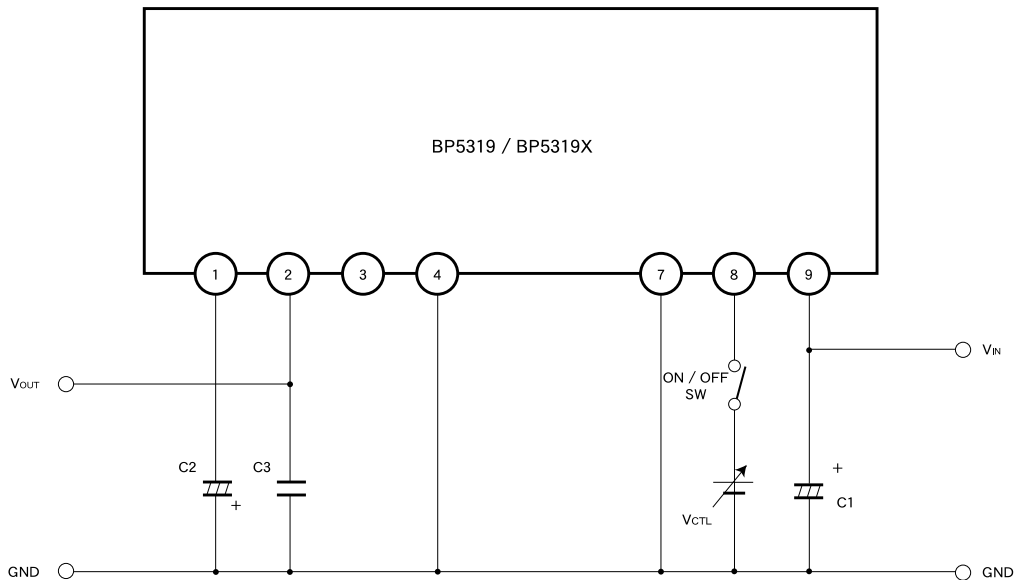
C1 : 100μF / 16V （NICHICON PL-series or equivalent）
C2 : 47μF / 35V （NICHICON PL-series or equivalent）
C3 : 0.022μF / 50V （Ceramic capacitor）

●**Operation notes**

(1) Place I/O external capacitors as near as possible to the connection pins. In particular, make sure to minimize the impedance between the input-side capacitor(C1)and pin 9
(Reference value: A length less than 50mm for a copper foil of 1.0mm wide and 35μm thickness).
(2) Avoid frequent switching using the ON/OFF CTL pin (four times per second at the maximum).

●**Application example**

(1) When increasing the output voltage
(A minus side).
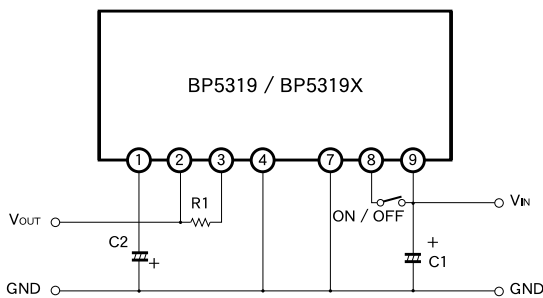
(2) When reducing the output voltage
(It is drawn to the zero electric potential wear).
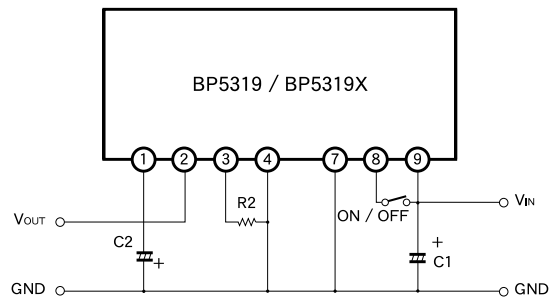
Note) Set up the change of the output voltage in the range of the territory(Fig.2) which can be used.
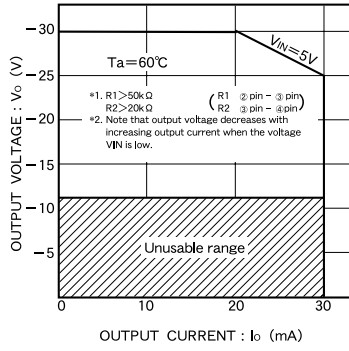
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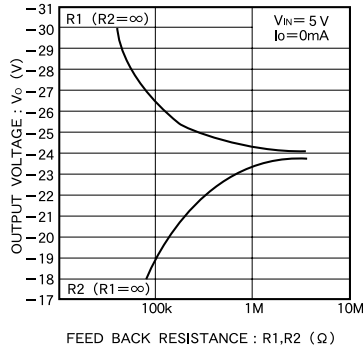● Electrical characteristic curves

Fig.2 Use possibility range

Ta=60℃

※1. R1>50kΩ
R2>20kΩ

(R1 ②pin － ③pin
R2 ③pin － ④pin)

※2. Note that output voltage decreases with increasing output current when the voltage VIN is low.

VIN＝5V

Unusable range

OUTPUT VOLTAGE : Vo (V)

OUTPUT CURRENT : Io (mA)

Fig.3 Output voltage vs.
Feedback resistance (R1, R2)

R1 (R2=∞)

R2 (R1=∞)

VIN＝5 V
Io＝0mA

OUTPUT VOLTAGE : Vo (V)

FEED BACK RESISTANCE : R1,R2 (Ω)

Fig.4 Output voltage vs.
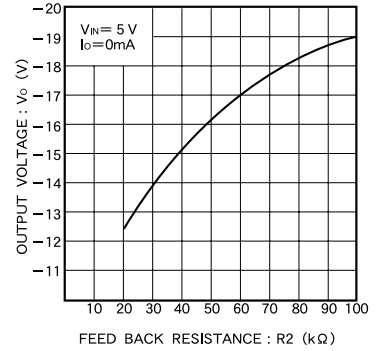Feedback resistance (R2<100kΩ)

VIN＝5 V
Io＝0mA

OUTPUT VOLTAGE : Vo (V)

FEED BACK RESISTANCE : R2 (kΩ)

● External dimensions (Units: mm)

BP5319

24.5Max.

15.5Max.

4.0±1.0

Pin No.1 2 3 4 7 8 9

Pitch
2.54±0.2

2.54×8＝20.32

2.1Max.   2.1Max.

0.5±0.1

1.3±0.2

6.0Max.

Marked side

0.25±0.05

5.0Max. 1.0Max.

BP5319X

24.5Max.

16.3Max.

Pin No.1 2 3 4 7 8 9

Pitch
2.54±0.2

2.54×8＝20.32

2.1Max.   2.1Max.

0.5±0.1

1.3±0.2

6.0Max.

0.25±0.05

4.5±1.0

5.0Max. 1.0Max.

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