

# DC / DC converter for LCDs

## BP5311A / BP5311XA

The BP5311A and BP5311XA are DC / DC converters for supplying power to liquid crystal display (LCD) panels. The modules supply a positive voltage for LCDs from a logic circuit power supply (+5). They are available in a single in-line package as an upright (BP5311A) or L-shaped lead (BP5311XA) type.

### ● Applications

LCD panels in personal computers and word processors.

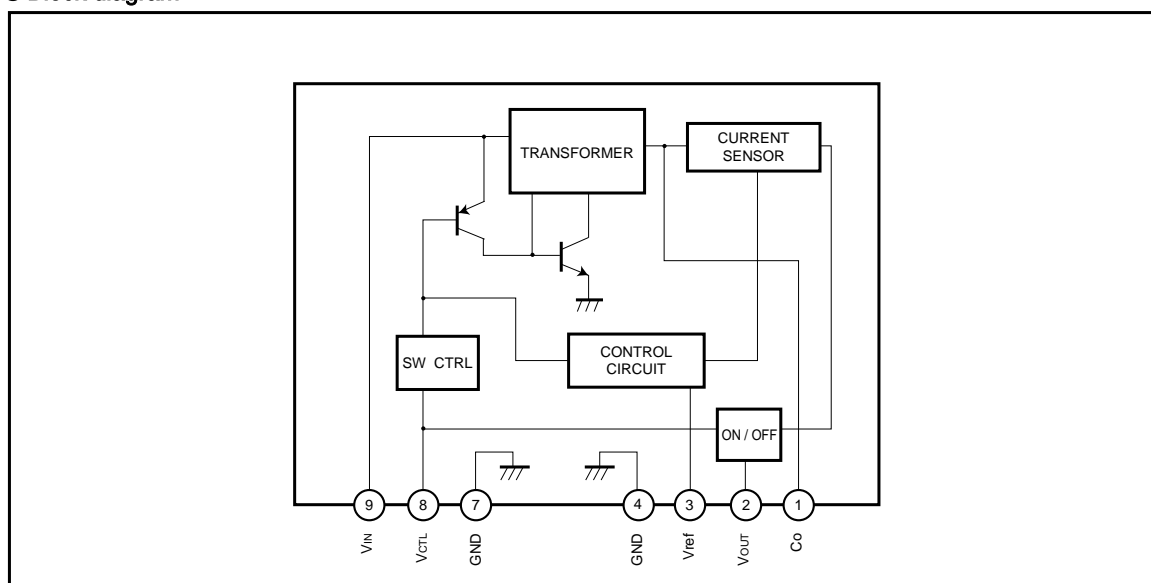
### ● Features

- 1) High conversion efficiency
- 2) Built-in protection circuit
- 3) Built-in ON/OFF switch.
- 4) Compact and light.
- 5) Surface mounting is possible because parts are concentrated on one side.
- 6) Available as an upright or L-shaped lead type.

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

| Parameter                   | Symbol    | Limits  | Unit |
|-----------------------------|-----------|---------|------|
| Power supply voltage        | $V_{IN}$  | 7       | V    |
| Operating temperature range | $T_{opr}$ | 0~60    | °C   |
| Storage temperature range   | $T_{stg}$ | -30~+85 | °C   |

### ● Block diagram



## ● Pin descriptions

| Pin No. | Pin name         | Function   |
|---------|------------------|--|
| 1       | Co               | Output smoothing capacitor connection pin ; connect a low-impedance capacitor with a recommended capacitance of 47 $\mu$ F between this and GND. |
| 2       | V <sub>OUT</sub> | Output pin.  |
| 3       | V <sub>ref</sub> | 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.  |
| 8       | V <sub>CTL</sub> | Output ON/OFF control pin ; output starts when the pin is HIGH level, and stops when the pin is LOW or OPEN.                                     |
| 9       | V <sub>IN</sub>  | Input pin ; connect a low-impedance capacitor with a recommended capacitance of 100 $\mu$ F between this pin and GND.                            |

● Electrical characteristics (unless otherwise noted, T<sub>a</sub>=25°C, V<sub>CTL</sub>=5V, R1~R2 resistors are disconnected)

| Parameter                     | Symbol            | Min. | Typ. | Max. | Unit              | Conditions  |
|-------------------------------|-------------------|------|------|------|-------------------|---|
| Input voltage                 | V <sub>IN</sub>   | 4.5  | 5.0  | 5.5  | V                 | –   |
| Output current                | I <sub>OUT</sub>  | –    | –    | 25   | mA                | –   |
| Output voltage                | V <sub>OUT1</sub> | 28.0 | 29.5 | 31.0 | V                 | V <sub>IN</sub> =4.5~5.5V, I <sub>OUT</sub> =0~25mA                     |
| Output voltage when OFF       | V <sub>OUT2</sub> | –    | –    | 0.3  | V                 | V <sub>IN</sub> =4.5~5.5V, V <sub>CTL</sub> =0V                         |
| Ripple noise voltage          | v <sub>1</sub>    | –    | 100  | 200  | mV <sub>P-P</sub> | V <sub>IN</sub> =5V, I <sub>OUT</sub> =20mA *                           |
| Efficiency                    | $\eta$            | 67   | 77   | –    | %                 | V <sub>IN</sub> =5V, I <sub>OUT</sub> =20mA                             |
| ON / OFF CTL voltage when ON  | V <sub>CTL</sub>  | 1.5  | –    | –    | V                 | V <sub>IN</sub> =5V, V <sub>O</sub> >28V                                |
| ON / OFF CTL voltage when OFF | V <sub>CTL</sub>  | –    | –    | 0.5  | V                 | V <sub>IN</sub> =5V, V <sub>O</sub> <0.3V<br>(Alternatively, when OPEN) |
| ON / OFF CTL current          | I <sub>CTL</sub>  | –    | –    | 500  | $\mu$ A           | V <sub>IN</sub> =5V, V <sub>CTL</sub> =1.5V                             |
| Current consumption when OFF  | I <sub>OFF</sub>  | –    | –    | 50   | $\mu$ A           | V <sub>IN</sub> =5V, V <sub>CTL</sub> =0V                               |

\* Measured with a band width of 20 MHz.

## ● Measurement circuit / Application example

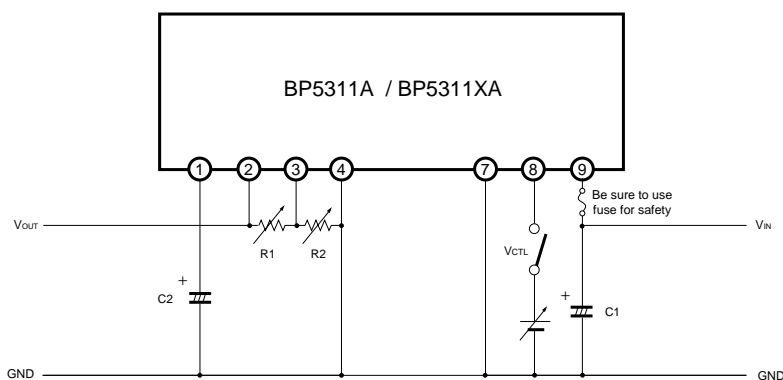


Fig.1

C1 : 100 $\mu$ F / 16V (Low impedance)C2 : 47 $\mu$ F / 35V (Low impedance)

R1, 2 : Resistors for adjusting output voltage (Contrast adjustment)

● Electrical characteristic curves

- (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. A length less than 50 mm is recommended for a copper foil of 1.0 mm wide and 35 $\mu$ m thick.
- (2) Avoid frequent switching using the ON/OFF CTL pin (five times per second at the maximum).
- (3) R1 and R2 resistors, which are used for changing the output voltage, are usually not required.

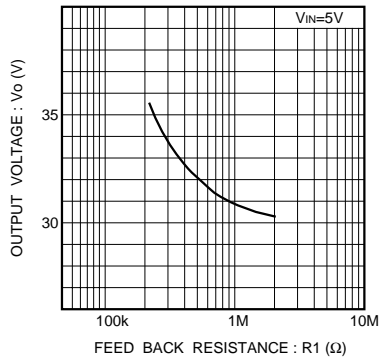


Fig.2 Output voltage vs. feedback resistance (R1)

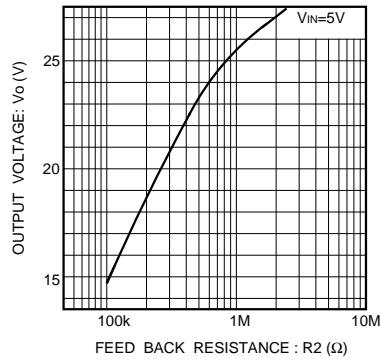
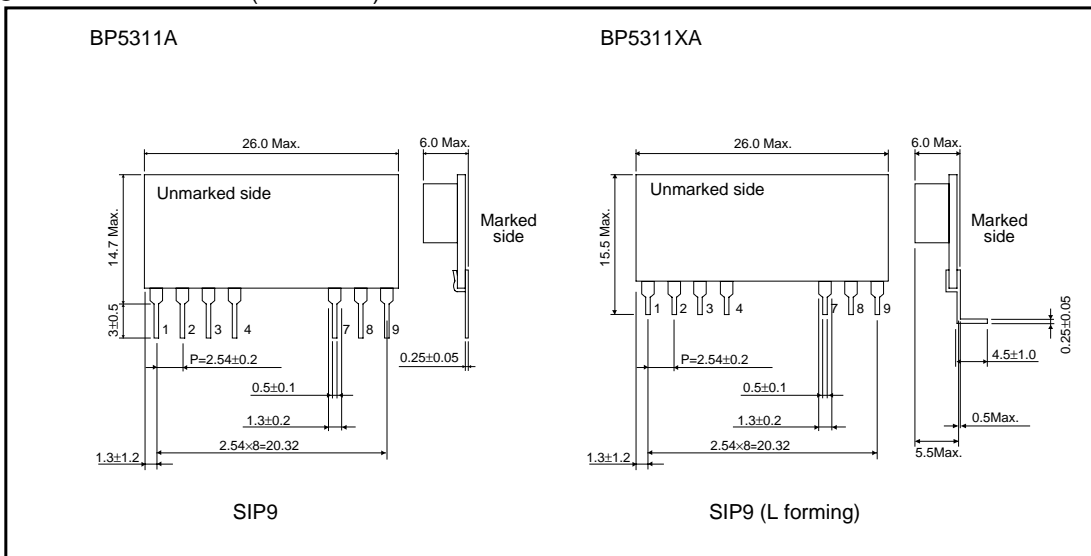


Fig.3 Output voltage and feedback resistance (R2)

● External dimensions (Units : mm)



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  - [g] Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering
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