General Descriptions
The BR300 is non-insulation step down type DC/DC converter module which include control IC, inductor, ceramic capacitor, pins. This product, with few external components, DC / DC converter can be configured easily, reducing design time, contributes to space saving.

Features
- Output 5V 1A 5W
- Outline 14mm x 14mm x 10mm (W x D x H)
- Weight 1.6g
- All in one
- Design free
- High efficiency 91% typ. (at Vin=8V,Io=0.6A)
- This product can achieve miniaturization by high-frequency switching technology.
- Protection functions
  - Over current Protection function (OCP): Auto restart
  - Thermal Shutdown Protection function (TSD): Auto restart

Applications
- Factory Automation
- Communication Devices
- Consumer
- Others

Electrical Characteristics
- Input voltage range DC 8 to 30V
- Circuit topology Step down chopper
- Switching frequency 350kHz

RoHS Directive Compliance
Lead, cadmium, mercury, hexavalent chromium and PBB, PBDE meet the specified criteria on the basis of EU Directive 2002/95/EC, except for nonrestricted materials.

Typical Application circuit

![Typical Application circuit diagram](image-url)
### Absolute maximum ratings

Valid at $Ta = 25^\circ C$, unless otherwise specified

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pins</th>
<th>Symbol</th>
<th>Rating</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>4-2</td>
<td>$V_{IN}$</td>
<td>-0.3 to +35</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

### Recommended Operating Conditions

Valid at $Ta = 25^\circ C$, unless otherwise specified

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pins</th>
<th>Symbol</th>
<th>MIN</th>
<th>MAX</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage range</td>
<td>4-2</td>
<td>$V_{IN}$</td>
<td>8</td>
<td>30</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output current range</td>
<td>1-2</td>
<td>$I_{O}$</td>
<td>0</td>
<td>1</td>
<td>A</td>
<td></td>
</tr>
</tbody>
</table>
Electrical characteristics  

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pins</th>
<th>Symbol</th>
<th>Rating</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>MIN</td>
<td>TYP</td>
<td>MAX</td>
</tr>
<tr>
<td>Input current</td>
<td>4-2</td>
<td>I&lt;sub&gt;IN&lt;/sub&gt;</td>
<td>0.24</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>Standby power</td>
<td>4-2</td>
<td>P&lt;sub&gt;STB&lt;/sub&gt;</td>
<td>0.16</td>
<td>-</td>
<td>W</td>
</tr>
<tr>
<td>Output voltage</td>
<td>1-2</td>
<td>V&lt;sub&gt;O&lt;/sub&gt;</td>
<td>5.00</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Constant Voltage Accuracy</td>
<td>1-2</td>
<td>V&lt;sub&gt;ACC&lt;/sub&gt;</td>
<td>3.0</td>
<td>-</td>
<td>3.0%</td>
</tr>
<tr>
<td>Output current</td>
<td>1-2</td>
<td>I&lt;sub&gt;O&lt;/sub&gt;</td>
<td>0.0</td>
<td>1.0</td>
<td>A</td>
</tr>
<tr>
<td>Maximum output power</td>
<td>1-2</td>
<td>P&lt;sub&gt;OUT(MAX)&lt;/sub&gt;</td>
<td>5.00</td>
<td></td>
<td>W</td>
</tr>
<tr>
<td>Output voltage ripple</td>
<td>1-2</td>
<td>V&lt;sub&gt;RIP&lt;/sub&gt;</td>
<td>50</td>
<td>-</td>
<td>mV&lt;sub&gt;P-P&lt;/sub&gt;</td>
</tr>
<tr>
<td>Output voltage noise</td>
<td>1-2</td>
<td>V&lt;sub&gt;NOISE&lt;/sub&gt;</td>
<td>50</td>
<td>-</td>
<td>mV&lt;sub&gt;P-P&lt;/sub&gt;</td>
</tr>
<tr>
<td>Output over current protection</td>
<td>1-2</td>
<td>I&lt;sub&gt;OCP&lt;/sub&gt;</td>
<td>1.1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td></td>
<td>T&lt;sub&gt;OP&lt;/sub&gt;</td>
<td>-20</td>
<td>-</td>
<td>85°C</td>
</tr>
<tr>
<td>Operating Humidity Range</td>
<td></td>
<td>H&lt;sub&gt;OP&lt;/sub&gt;</td>
<td>10</td>
<td>-</td>
<td>90%</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td></td>
<td>T&lt;sub&gt;TSTG&lt;/sub&gt;</td>
<td>-25</td>
<td>-</td>
<td>85°C</td>
</tr>
<tr>
<td>Storage Humidity Range</td>
<td></td>
<td>H&lt;sub&gt;HSTG&lt;/sub&gt;</td>
<td>5</td>
<td>-</td>
<td>95%</td>
</tr>
</tbody>
</table>

Vibration (Non Operation)  

| Frequency                            | -    | 10    | -    | 55  | Hz    |
| Acceleration                         | -    | 19.6  | -    | -   | m/s²  |
| Sweep Time                           | -    | 1.5   | -    |     | mm    |
| Vibration                            | -    | X,Y,Z | -    |     |       |
| Vibration Time                       | -    | 2     | -    | hour|

Shock Capability  

Dropped from heights of 50mm to a concrete surface. Each surface is dropped five times no failure

Product Weight  

1.6 g

Product Outline  

14x14x10 mm  
See the Package Outline

(1) The ripple measurement is made at both ends of electrolytic capacitors C<sub>o</sub>=470μF. For the Cin, YXF made by Rubycon or equivalent for switching power supplies is recommended. For the Co, low impedance ZL made by Rubycon or equivalent for switching power supplies is recommended. In this case, a 470μF electrolytic capacitor is connected to the position of 10mm wire length from the output terminal.
Non-insulation step down type DC/DC converter module

BR300

Typical Characteristics

Reference Data (Vin=8V/30V, Vo=5V)

Vin=8V

Io=0A

Vin=30V

Io=0A

Io=1A

SANKEN ELECTRIC CO., LTD.
**Temperature rise**

<table>
<thead>
<tr>
<th>Measurement points</th>
<th>Temperature (°C)</th>
<th>Temperature Rise (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inductor Top</td>
<td>75.3</td>
<td>50.2</td>
</tr>
<tr>
<td>Diode Top</td>
<td>71.9</td>
<td>46.8</td>
</tr>
<tr>
<td>Ceramic capacitor Top</td>
<td>67.2</td>
<td>42.1</td>
</tr>
<tr>
<td>IC Bottom</td>
<td>72.9</td>
<td>47.8</td>
</tr>
<tr>
<td>Input ceramic capacitor Bottom</td>
<td>65.5</td>
<td>40.4</td>
</tr>
<tr>
<td>Output ceramic capacitor Bottom</td>
<td>61.8</td>
<td>36.7</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>25.1</td>
<td></td>
</tr>
</tbody>
</table>

**Regulation**

- $V_{IN}=8V$
- $V_{IN}=12V$
- $V_{IN}=24V$
- $V_{IN}=30V$

**Efficiency**

- $V_{IN}=8V$
- $V_{IN}=12V$
- $V_{IN}=24V$
- $V_{IN}=30V$

**Output Characteristics**

- $V_{IN}=8V$
- $V_{IN}=12V$
- $V_{IN}=24V$
- $V_{IN}=30V$

**Derating Curve (Natural Cooling)**

- $V_{IN}=8V$
- $V_{IN}=12V$
- $V_{IN}=24V$
- $V_{IN}=30V$
5V 1A Non-insulation step down type DC/DC converter module

BR300

Block Diagram

Pin List Table

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V₀</td>
<td>Output terminal</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground terminal</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
<td>Non connection</td>
</tr>
<tr>
<td>4</td>
<td>V_IN</td>
<td>Input terminal</td>
</tr>
</tbody>
</table>

Pin function

1. V₀
   This pin is the output terminal of the positive electrode of the DC / DC converter. The output load can be taken from this pin and GND pin.

2. GND
   This pin is the ground terminal of the DC / DC converter. The output load can be taken from this pin and V₀ pin.

3. NC
   This pin is unconnected. Do not use this pin.

4. V_IN
   This pin is the input terminal of the positive electrode of the DC / DC converter. The input voltage of DC 8 to 30V can be supplied between this pin and GND pin.
Typical application circuit

- When handling the products, the operator must be grounded. To prevent shock hazard, grounded wrist straps should be used and at least 1MΩ of resistance from the operator to ground should be placed near the operator.
- Input electrolytic capacitor Cin of around 220μF should be connected to the input side of BR300. If the input voltage is stable, it is not required.
- Output electrolytic capacitor Co of around 470μF or chip ceramic capacitor of around 30μF should be connected to the output side of BR300.
  ※For the Cin, YXF made by Rubycon or equivalent for switching power supplies is recommended.
  For the Co, low impedance ZL made by Rubycon or three ceramic capacitors (GRM31CR71E106KA12 made by Murata) connected in parallel or equivalent for switching power supplies is recommended.
- Depending on PCB layout, output voltage ripple could be amplified. Please check the output voltage ripple on your set.

![Typical application circuit example](image-url)
5V 1A Non-insulation step down type DC/DC converter module

BR300

Package Outline

NOTES:
1) All dimensions are in millimeters
2) The tolerance is ±0.3mm unless otherwise specified.
3) Dimensions shown in () are reference dimensions.
4) Pb-free. Device composition compliant with the RoHS directive.
OPERATING PRECAUTIONS
Because reliability can be affected adversely by improper storage environments and handling methods, please observe the following cautions.

Cautions for Storage
- Ensure that storage conditions comply with the standard temperature (5 to 35°C) and the standard relative humidity (around 40 to 75%); avoid storage locations that experience extreme changes in temperature or humidity.
- Avoid locations where dust or harmful gases are present and avoid direct sunlight.
- Reinspect for rust on leads and solderability of products that have been stored for a long time.

Cautions for Testing and Handling
- When tests are carried out during inspection testing and other standard test periods, protect the products from power surges from the testing products, shorts between the product pins, and wrong connections. In addition, avoid tests exceeded ratings.

Soldering
- When soldering the products, please be sure to minimize the working time, within the following limits.
  - 260±5°C  10±1 s (Flow, 2times)
  - 350±5°C  3.0±0.5s (Soldering iron, 1time)
  At a distance of 3.4mm from the main body of the Products.

Electrostatic Discharge
- When handling the products, the operator must be grounded. To prevent shock hazard, grounded wrist straps should be used and at least 1MΩ of resistance from the operator to ground should be placed near the operator.
- Workbenches where the products are handled should be grounded and be provided with conductive table and floor mats.
- When using measuring equipment such as a curve tracer, the equipment should be grounded.
- When soldering the products, the head of a soldering iron or the solder bath must be grounded in order to prevent leak voltages generated by them from being applied to the products.
- The products should always be stored and transported in Sanken shipping containers or conductive containers, or be wrapped in aluminum foil.
5V 1A Non-insulation step down type DC/DC converter module

BR300

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