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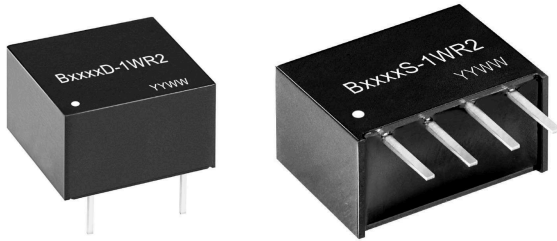
EN: This Datasheet is presented by the manufacturer.

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DC/DC Converter

B_S-1WR2 & B_D-1WR2 series

1W isolated DC-DC with Fixed Input Voltage;
unregulated Single Output



FEATURES

- Continuous short-circuit protection
- High efficiency up to 80%
- Operating ambient temperature -40°C to +105°C
- Compact SIP/DIP package
- Industry standard pin-out
- I/O isolation test voltage 1.5k VDC
- IEC60950, UL60950, EN60950 approval

B_S-1WR2 & B-D-1WR2 series is designed for use in distributed power supply systems and especially suitable in applications such as pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits, where:

- *The voltage of the input power supply is relatively stable with a variation of $\pm 10\%V_{in}$ or less;*
- *An input to output isolation voltage of up to 1500VDC is necessary;*
- *The requirement for a tight output regulation and low ripple & noise is not as strict.*

Selection Guide

| Certification | Part No. | Input Voltage (VDC) | Output | | Full Load Efficiency (%) Min./Typ. | Capacitive Load(μ F) Max. |
|---------------|-------------|---------------------|---------------|---------------------------|---------------------------------------|-----------------------------------|
| | | Nominal (Range) | Voltage (VDC) | Current (mA) Max./Min. | | |
| -- | B0303S-1WR2 | 3.3 (2.97-3.63) | 3.3 | 303/30 | 68/72 | 220 |
| UL/CE/CB | B0305S-1WR2 | | 5 | 200/20 | 72/76 | |
| | B0312S-1WR2 | | 12 | 84/9 | 76/80 | |
| -- | B0303D-1WR2 | 5 (4.5-5.5) | 3.3 | 303/30 | 68/72 | |
| | B0305D-1WR2 | | 5 | 200/20 | 72/76 | |
| UL/CE/CB | B0503S-1WR2 | | 3.3 | 303/30 | 68/72 | |
| | B0505S-1WR2 | 5 | 200/20 | 76/80 | | |
| | B0509S-1WR2 | 9 | 111/12 | 76/80 | | |
| | B0512S-1WR2 | 12 | 84/9 | 76/80 | | |
| | B0515S-1WR2 | 15 | 67/7 | 76/80 | | |
| -- | B0524S-1WR2 | 12 (10.8-13.2) | 24 | 42/4 | 76/80 | |
| | B0503D-1WR2 | | 3.3 | 303/30 | 68/72 | |
| | B0505D-1WR2 | | 5 | 200/20 | 76/80 | |
| | B0509D-1WR2 | | 9 | 111/12 | 76/80 | |
| UL/CE/CB | B0512D-1WR2 | | 12 | 84/9 | 76/80 | |
| | B0515D-1WR2 | | 15 | 67/7 | 76/80 | |
| | B0524D-1WR2 | 24 | 42/4 | 76/80 | | |
| -- | B1203S-1WR2 | 15 (13.5-16.5) | 3.3 | 303/30 | 68/72 | |
| | B1205S-1WR2 | | 5 | 200/20 | 76/80 | |
| | UL/CE/CB | | B1209S-1WR2 | 9 | 111/12 | 76/80 |
| | | | B1212S-1WR2 | 12 | 84/9 | 76/80 |
| | | | B1215S-1WR2 | 15 | 67/7 | 76/80 |
| | | | B1224S-1WR2 | 24 | 42/4 | 76/80 |
| -- | B1203D-1WR2 | 15 (13.5-16.5) | 3.3 | 303/30 | 68/72 | |
| | B1205D-1WR2 | | 5 | 200/20 | 76/80 | |
| | UL/CE/CB | | B1209D-1WR2 | 9 | 111/12 | 76/80 |
| | | | B1212D-1WR2 | 12 | 84/9 | 76/80 |
| | | | B1215D-1WR2 | 15 | 67/7 | 76/80 |
| -- | B1505S-1WR2 | 15 (13.5-16.5) | 5 | 200/20 | 76/80 | |
| | B1512S-1WR2 | | 12 | 84/9 | 76/80 | |
| | B1515S-1WR2 | | 15 | 67/7 | 76/80 | |

| | | | | | | |
|----------|-------------|-------------------|-----|--------|-------|-----|
| -- | B1505D-1WR2 | 15 (13.5-16.5) | 5 | 200/20 | 76/80 | 220 |
| | B1509D-1WR2 | | 9 | 111/12 | 76/80 | |
| | B1515D-1WR2 | | 15 | 67/7 | 76/80 | |
| | B2403S-1WR2 | | 3.3 | 303/30 | 68/72 | |
| UL/CE/CB | B2405S-1WR2 | 24 (21.6-26.4) | 5 | 200/20 | 76/80 | |
| | B2409S-1WR2 | | 9 | 111/12 | 76/80 | |
| | B2412S-1WR2 | | 12 | 84/9 | 76/80 | |
| | B2415S-1WR2 | | 15 | 67/7 | 76/80 | |
| | B2424S-1WR2 | | 24 | 42/4 | 76/80 | |
| -- | B2403D-1WR2 | | 3.3 | 303/30 | 68/72 | |
| UL/CE/CB | B2405D-1WR2 | | 5 | 200/20 | 76/80 | |
| | B2409D-1WR2 | | 9 | 111/12 | 76/80 | |
| | B2412D-1WR2 | | 12 | 84/9 | 76/80 | |
| | B2415D-1WR2 | | 15 | 67/7 | 76/80 | |
| | B2424D-1WR2 | | 24 | 42/4 | 76/80 | |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--|----------------------|------------------|--------|-------|------|
| Input Current (full load / no-load) | 3.3V input | -- | 404/30 | --/70 | mA |
| | 5V input | -- | 277/20 | --/60 | |
| | 12V input | -- | 115/15 | --/50 | |
| | 15V input | -- | 83/10 | --/35 | |
| | 24V input | -- | 57/17 | --/30 | |
| Reflected Ripple Current | | -- | 15 | -- | mA |
| Surge Voltage (1sec. max.) | 3.3 input | -0.7 | -- | 5 | VDC |
| | 5V input | -0.7 | -- | 9 | |
| | 12V input | -0.7 | -- | 18 | |
| | 15V input | -0.7 | -- | 21 | |
| | 24V input | -0.7 | -- | 30 | |
| Input Filter | | Filter capacitor | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|----------------------------|--|---------------------------------------|------|------------|-----------|----|
| Voltage Accuracy | | See Output Regulation Curves (Fig. 1) | | | | |
| Linear Regulation | Input voltage change: $\pm 1\%$ | 3.3VDC output | -- | -- | ± 1.5 | -- |
| | | Other output | -- | -- | ± 1.2 | |
| Load Regulation | 10%-100% load | 3.3VDC output | -- | 18 | -- | % |
| | | 5VDC output | -- | 12 | -- | |
| | | 9VDC output | -- | 8 | -- | |
| | | 12VDC output | -- | 7 | -- | |
| | | 15VDC output | -- | 6 | -- | |
| | | 24VDC output | -- | 5 | -- | |
| Ripple & Noise* | 20MHz bandwidth | -- | 60 | 150 | mVp-p | |
| Temperature Coefficient | Full load | -- | -- | ± 0.03 | %/°C | |
| Short-Circuit Protection** | B03xxS-1WR2/B03xxD-1WR2/ B24xxS-1WR2/B24xxD-1WR2/ B0524S-1WR2/ B0524D-1WR2 | -- | -- | 1 | s | |
| | | Continuous, self-recovery | | | | |

Notes: * The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

** At the end of the short circuit duration, the supply voltage must be disconnected from following models: B03xxS-1WR2 / B03xxD-1WR2 series, B24xxS-1WR2/ B24xxD-1WR2 series, and B0524S-1WR2/B0524D-1WR2.

DC/DC Converter

B_S-1WR2 & B_D-1WR2 series

| General Specifications | | | | | |
|--------------------------------------|---|------|------|------|---------|
| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
| Isolation | Input-output Electric strength test for 1 minute with a leakage current of 1mA max. | 1500 | -- | -- | VDC |
| Insulation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 20 | -- | pF |
| Operating Temperature | Derating when operating temperature up to 85°C, (see Fig. 2) | -40 | -- | 105 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25°C, nominal input, full load output | -- | 25 | -- | |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | 300 | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Switching Frequency | Full load, nominal input voltage | -- | 100 | -- | kHz |
| MTBF | MIL-HDBK-217F @ 25°C | 3500 | -- | -- | k hours |

| Mechanical Specifications | | |
|---------------------------|-----------------|---|
| Case Material | | Black plastic; flame-retardant and heat-resistant (UL94-V0) |
| Dimensions | B_S-1WR2 series | 11.60 x 6.00 x 10.16 mm |
| | B_D-1WR2 series | 12.70 x 10.16 x 8.20 mm |
| Weight | B_S-1WR2 series | 1.3g (Typ.) |
| | B_D-1WR2 series | 1.8g (Typ.) |
| Cooling Method | | Free air convection |

| Electromagnetic Compatibility (EMC) | | |
|-------------------------------------|-----|--|
| Emissions | CE | CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) |
| | RE | CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) |
| Immunity | ESD | IEC/EN61000-4-2 Contact ±8KV perf. Criteria B |

Typical Performance Curves

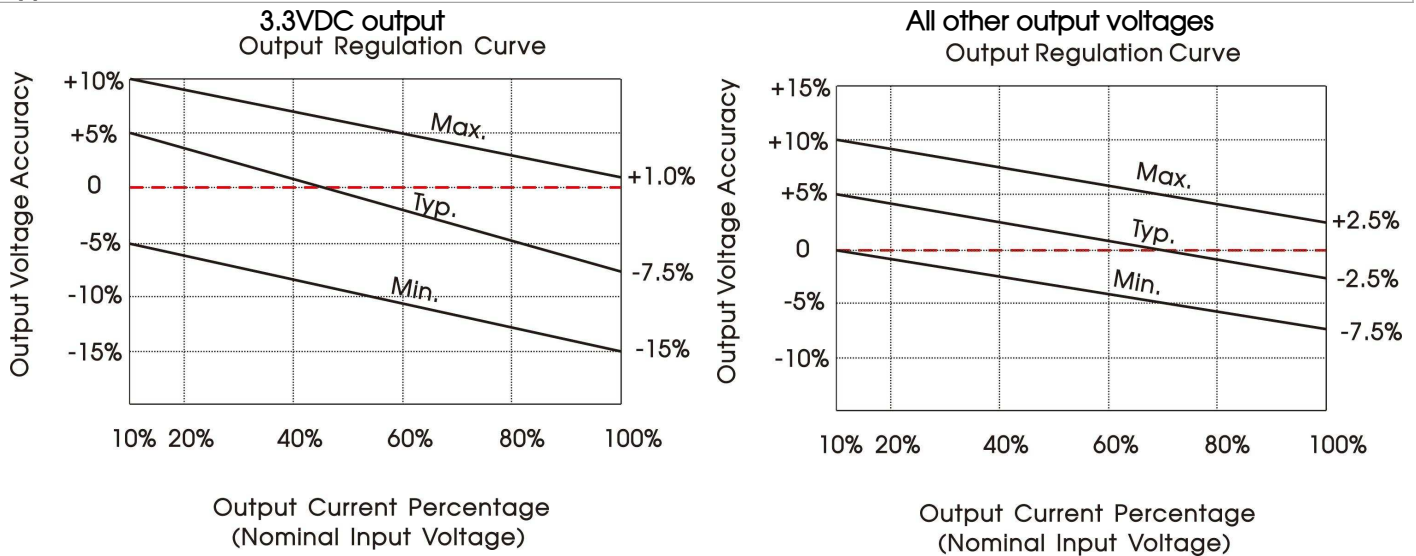


Fig. 1

DC/DC Converter

B_S-1WR2 & B_D-1WR2 series

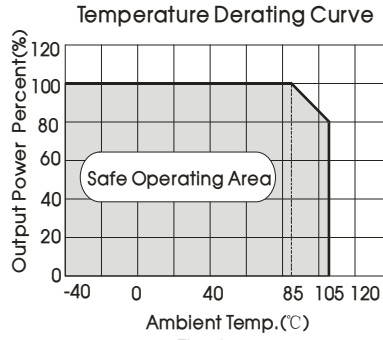
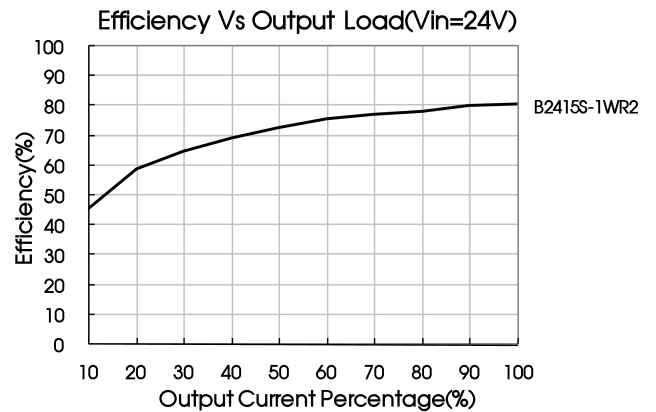
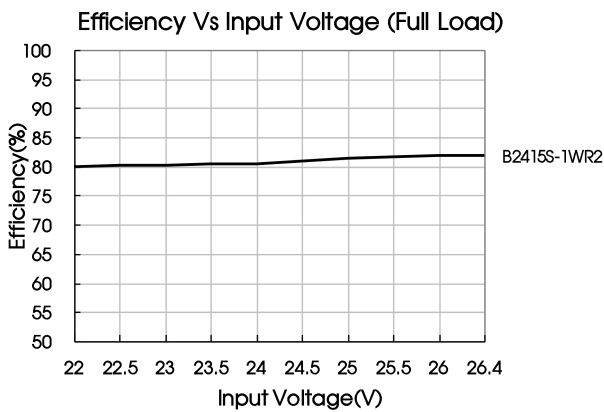
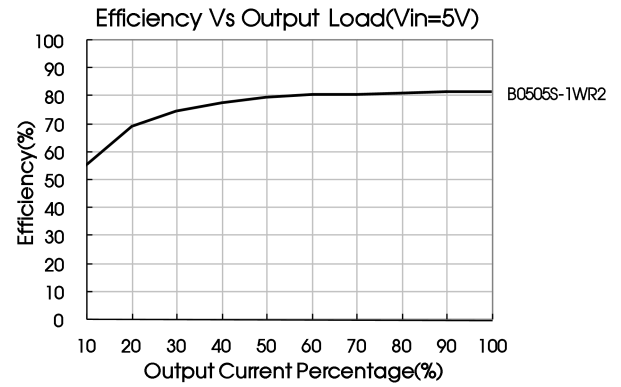
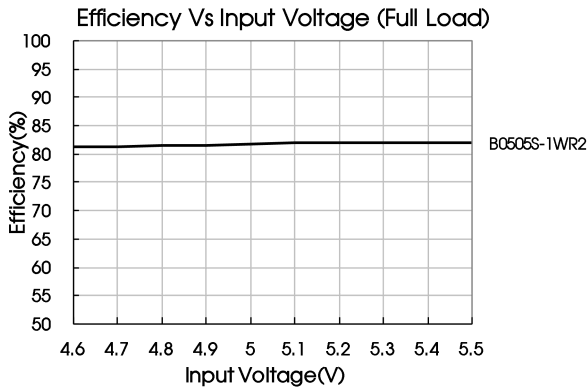


Fig. 2



Design Reference

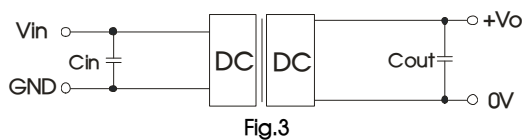
1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

Table 1: Recommended input and output capacitor values

| Vin(VDC) | Cin(μF) | Vo (VDC) | Cout(μF) |
|----------|---------|----------|----------|
| 3.3/5 | 4.7 | 3.3/5 | 10 |
| 12 | 2.2 | 9 | 4.7 |
| 15 | 2.2 | 12 | 2.2 |
| 24 | 1 | 15 | 1 |
| -- | -- | 24 | 0.47 |



DC/DC Converter

B_S-1WR2 & B_D-1WR2 series

2. EMC (CLASS B) compliance circuit

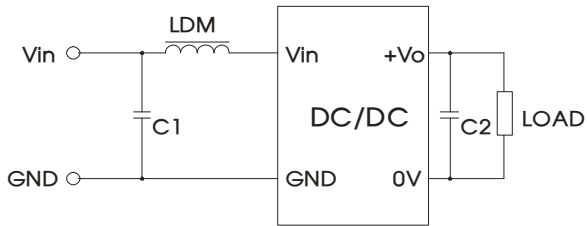


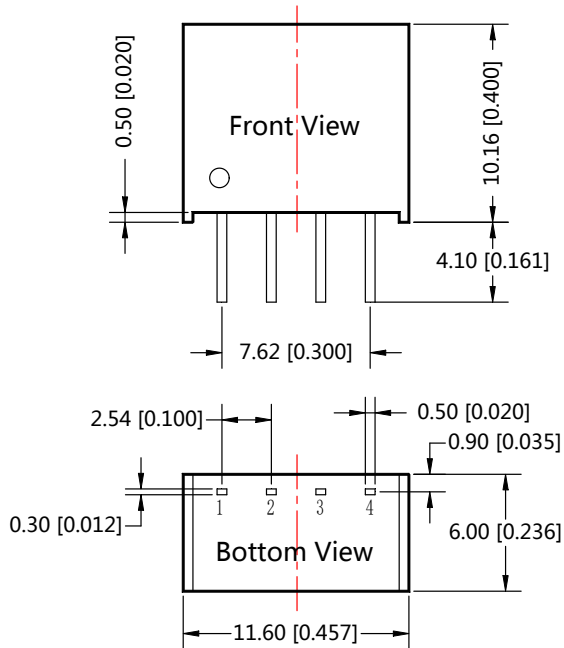
Fig. 4

| | | |
|---------------------|-----|----------------------------|
| Input voltage (VDC) | | 3.3/5/12/15/24 |
| EMI | C1 | 4.7 μ F /50V |
| | C2 | Refer to the Cout in Fig.3 |
| | LDM | 6.8 μ H |

3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

Dimensions and Recommended Layout (B_S-1WR2)



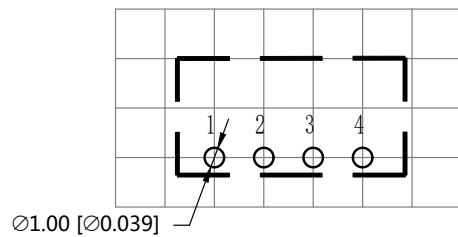
Note:

Unit :mm[inch]

Pin section tolerances : $\pm 0.10[\pm 0.004]$

General tolerances: $\pm 0.25[\pm 0.010]$

THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1 | GND |
| 2 | Vin |
| 3 | 0V |
| 4 | +Vo |

DC/DC Converter

B_S-1WR2 & B_D-1WR2 series

Dimensions and Recommended Layout (B_D-1WR2)

