

WRB_S-1W & WRB_S-2W Series 1W & 2W, WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DC-DC CONVERTER

Patent Protection RoHS

FEATURES

- Miniature SIP Package
- 2:1 wide input voltage range
- Operating temperature: -40°C to +85°C
- I/O Isolation 1500VDC
- Short circuit protection(automatic recovery)
- Internal SMD construction
- RoHS Compliance

APPLICATIONS

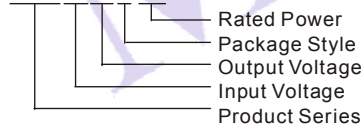
The WRB_S-1W & WRB_S-2W series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

- 1) Where the voltage of the input power supply is wide range (voltage range $\leq 2:1$);
- 2) Where isolation is necessary between input and output(isolation voltage $\leq 1500\text{VDC}$);
- 3) Where the regulation of the output voltage and the output ripple noise are demanded.

MODEL SELECTION

WRB2412S-2W



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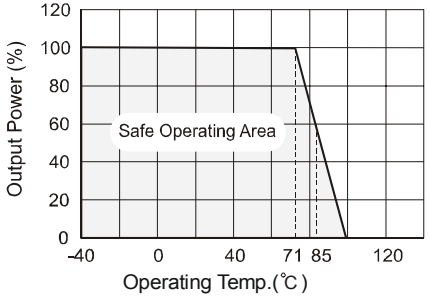
PRODUCT PROGRAM

| Part Number | Input | | | Output | | | Efficiency (% , Typ.) | | | |
|--------------|-----------------|-------|--------------------|----------------|--------------|------|-----------------------|-----|----|----|
| | Voltage (VDC) | | No Load (mA, Typ.) | Voltage (VDC) | Current (mA) | | | | | |
| | Nominal (Range) | Max.* | | | Max. | Min. | | | | |
| WRB0503S-1W | 5(4.5-9.0) | 11 | 40 | 3.3 | 303 | 30 | 66 | | | |
| WRB0505S-1W | | | | 5 | 200 | 20 | 67 | | | |
| WRB0509S-1W | | | | 9 | 111 | 11 | 71 | | | |
| WRB0515S-1W | | | | 15 | 67 | 7 | 72 | | | |
| WRB0524S-1W | | | | 24 | 42 | 4 | 70 | | | |
| WRB0503S-1W6 | | | | 3.3 | 500 | 50 | 64 | | | |
| WRB0505S-2W | | | | 5 | 400 | 40 | 67 | | | |
| WRB0509S-2W | | | | 9 | 222 | 22 | 72 | | | |
| WRB0512S-2W | | | | 12 | 167 | 16 | 73 | | | |
| WRB0515S-2W | | | | 15 | 133 | 13 | 72 | | | |
| WRB1203S-1W | | | | 12 (9.0-18) | 22 | 20 | 3.3 | 303 | 30 | 68 |
| WRB1205S-1W | | | | | | | 5 | 200 | 20 | 71 |
| WRB1209S-1W | 9 | 111 | 11 | | | | 74 | | | |
| WRB1212S-1W | 12 | 83 | 8 | | | | 75 | | | |
| WRB1215S-1W | 15 | 67 | 7 | | | | 77 | | | |
| WRB1224S-1W | 24 | 42 | 4 | | | | 72 | | | |
| WRB1205S-2W | 5 | 400 | 40 | | | | 75 | | | |
| WRB1209S-2W | 9 | 222 | 22 | | | | 77 | | | |
| WRB1212S-2W | 12 | 167 | 16 | | | | 79 | | | |
| WRB1215S-2W | 15 | 133 | 13 | | | | 80 | | | |
| WRB1224S-2W | 24 | 83 | 8 | | | | 78 | | | |
| WRB2403S-1W | 24(18-36) | 40 | 10 | | | | 3.3 | 303 | 30 | 72 |
| WRB2405S-1W | | | | 5 | 200 | 20 | 74 | | | |
| WRB2409S-1W | | | | 9 | 111 | 11 | 78 | | | |
| WRB2412S-1W | | | | 12 | 83 | 8 | 78 | | | |
| WRB2415S-1W | | | | 15 | 67 | 7 | 78 | | | |
| WRB2424S-1W | | | | 24 | 42 | 4 | 78 | | | |
| WRB2403S-1W6 | | | | 3.3 | 500 | 50 | 67 | | | |
| WRB2405S-2W | | | | 5 | 400 | 40 | 78 | | | |
| WRB2409S-2W | | | | 9 | 222 | 22 | 79 | | | |
| WRB2412S-2W | | | | 12 | 167 | 16 | 80 | | | |
| WRB2415S-2W | | | | 15 | 133 | 13 | 80 | | | |
| WRB2424S-2W | | | | 24 | 83 | 8 | 82 | | | |
| WRB4803S-1W | 48(36-72) | 80 | 5 | 3.3 | 303 | 30 | 71 | | | |
| WRB4805S-1W | | | | 5 | 200 | 20 | 73 | | | |
| WRB4812S-1W | | | | 12 | 83 | 8 | 78 | | | |
| WRB4805S-2W | | | | 5 | 400 | 40 | 75 | | | |
| WRB4812S-2W | | | | 12 | 167 | 16 | 78 | | | |
| WRB4815S-2W | | | | 15 | 133 | 13 | 78 | | | |

Note: 1.Models listed with strike-through text have been officially discontinued.
2.*Input voltage can't exceed this value, or will cause the permanent damage.

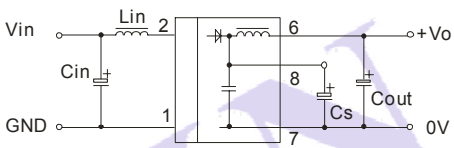
| COMMON SPECIFICATIONS | | | | | |
|--------------------------|--------------------------------|--------------------------------|------|------|---------|
| Item | Test Conditions | Min. | Typ. | Max. | Unit |
| Storage humidity | | | | 95 | % |
| Operating temperature | Power derating (above 71°C) | -40 | | 85 | °C |
| Storage temperature | | -55 | | 125 | |
| Temp. rise at full load | | | 15 | 35 | |
| Lead temperature | 1.5mm from case for 10 seconds | | | 300 | |
| Cooling | | Free Air Convection | | | |
| Short circuit protection | | Continuous, automatic recovery | | | |
| Case material | | Plastic(UL94-V0) | | | |
| MTBF | 25°C(MIL-HDBK-217F) | 1000 | | | k hours |
| Weight | | | 5.5 | | g |

TYPICAL TEMPERATURE CURVE



| ISOLATION SPECIFICATIONS | | | | | |
|--------------------------|---------------------------------|------|------|------|-------|
| Item | Test Conditions | Min. | Typ. | Max. | Units |
| Isolation voltage | Tested for 1 minute and 1mA max | 1500 | | | VDC |
| Isolation resistance | Test at 500VDC | 1000 | | | MΩ |
| Isolation capacitance | Input/Output, 100KHz/1V | | 80 | | pF |

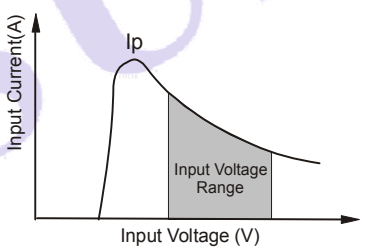
RECOMMENDE CIRCUIT



(Figure 1)

| OUTPUT SPECIFICATIONS | | | | | |
|--------------------------|--------------------------------|------|------|-------|--------|
| Item | Test Conditions | Min. | Typ. | Max. | Units |
| Output voltage accuracy | Refer to recommended circuit | | ±1 | ±3 | % |
| Load regulation | 10% to 100% load | | ±0.5 | ±0.75 | |
| Line regulation | Input voltage from low to high | | ±0.2 | ±0.5 | % / °C |
| Temperature drift (Vout) | Refer to recommended circuit | | | ±0.03 | |
| Ripple & Noise* | 20MHz Bandwidth | | 35 | 100 | mVp-p |
| Switching frequency | 100% load, input voltage range | | 300 | | kHz |

*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.



(Figure 2)

APPLICATION NOTE

1) Recommended circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).

However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees (Table 1). General:

- Cin: 5V,12V 100μF
- 24V,48V 10μF ~ 47μF
- Lin: 4.7μH ~ 120μH
- Cout: 100μF(typ)
- Lout: 2.2μH ~ 10μH
- Cs: 4.7μF ~ 22μF

2) Input current

While using unstable power source, please ensure the output voltage and ripple voltage do not exceed indexes of the converter. The preceding power source must be able to provide for converter sufficient starting current Ip (Figure 2).

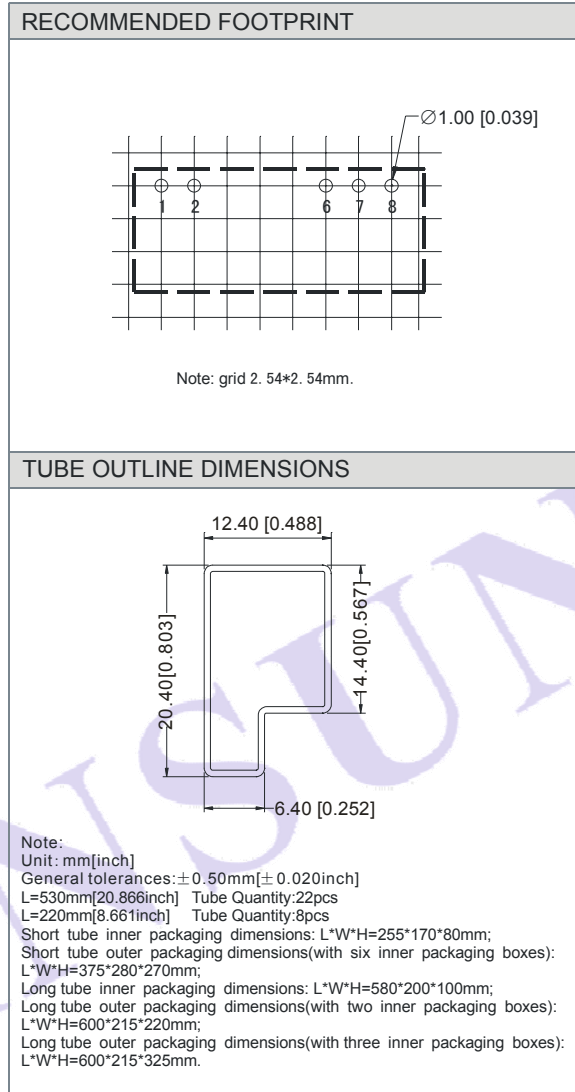
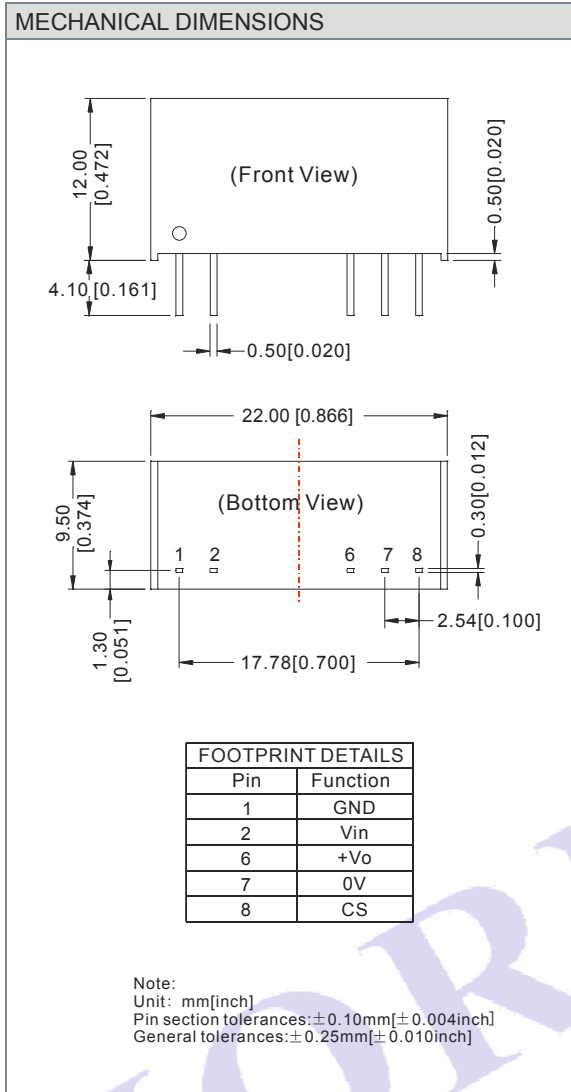
General: $I_p \leq 1.4 \cdot I_{in-max}$

3) No parallel connection or plug and play

External Capacitor Table (Table 1)

| Vout (VDC) | 2W:Cout (μF) | 1W:Cout (μF) |
|------------|--------------|--------------|
| 3.3 | 2200 | 1000 |
| 5 | 1000 | 560 |
| 9 | 820 | 470 |
| 12 | 680 | 330 |
| 15 | 560 | 270 |
| 24 | 470 | 220 |

OUTLINE DIMENSIONS & FOOTPRINT DETAILS



Note:

1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically.
2. Operation under 10% load will not damage the converter; However, they may not meet all specification listed.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on corporate standards.
5. Only typical models listed, other models may be different, please contact our technical person for more details.