

MORNSUN®

WRA_D-10W & WRB_D-10W Series 10W, 2:1 WIDE INPUT ISOLATED & REGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



Patent Protection RoHS

FEATURES

- 2:1 wide input voltage range
- DIP package
- Efficiency up to 85%
- 1.5KVDC input/output Isolation
- Short circuit protection (automatic recovery)
- Operating temperature: -40°C to +85°C
- Metal shielding package
- No heat sink required
- Industry standard pinout
- MTBF>1,000,000 hours
- RoHS Compliance

APPLICATIONS

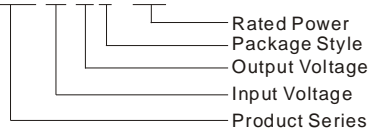
The WRA_D-10W & WRB_D-10W series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

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

MODEL SELECTION

WRA0515D-10W



PRODUCT PROGRAM

| Part Number | Input | | | Output | | | Efficiency (% , Typ.) |
|--------------|---------------|-------|-------|---------------|--------------|------|-----------------------|
| | Voltage (VDC) | | | Voltage (VDC) | Current (mA) | | |
| | Nominal | Range | Max.* | | Max. | Min. | |
| WRA0505D-10W | 5 | 4.5-9 | 11 | ±5 | ±1000 | ±100 | 76 |
| WRA0512D-10W | | | | ±12 | ±416 | ±42 | 80 |
| WRA0515D-10W | | | | ±15 | ±333 | ±33 | 82 |
| WRB0505D-10W | | | | 5 | 2000 | 200 | 76 |
| WRB0512D-10W | | | | 12 | 833 | 83 | 80 |
| WRB0515D-10W | | | | 15 | 666 | 66 | 82 |
| WRA1205D-10W | | | | 12 | 9-18 | 20 | ±5 |
| WRA1212D-10W | ±12 | ±416 | ±42 | | | | 82 |
| WRA1215D-10W | ±15 | ±333 | ±33 | | | | 84 |
| WRB1203D-10W | 3.3 | 2500 | 250 | | | | 72 |
| WRB1205D-10W | 5 | 2000 | 200 | | | | 79 |
| WRB1212D-10W | 12 | 833 | 83 | | | | 82 |
| WRB1215D-10W | 15 | 666 | 66 | | | | 84 |
| WRB1224D-10W | 24 | 416 | 42 | 82 | | | |
| WRA2405D-10W | 24 | 18-36 | 40 | ±5 | ±1000 | ±100 | 81 |
| WRA2412D-10W | | | | ±12 | ±416 | ±42 | 84 |
| WRA2415D-10W | | | | ±15 | ±333 | ±33 | 83 |
| WRA2424D-10W | | | | ±24 | ±208 | ±21 | 84 |
| WRB2403D-10W | | | | 3.3 | 2500 | 250 | 74 |
| WRB2405D-10W | | | | 5 | 2000 | 200 | 80 |
| WRB2412D-10W | | | | 12 | 833 | 83 | 84 |
| WRB2415D-10W | 15 | 666 | 66 | 85 | | | |
| WRB2424D-10W | 24 | 417 | 42 | 85 | | | |
| WRB2448D-10W | 48 | 208 | 21 | 84 | | | |
| WRA4805D-10W | 48 | 36-72 | 80 | ±5 | ±1000 | ±100 | 80 |
| WRA4812D-10W | | | | ±12 | ±416 | ±42 | 84 |
| WRA4815D-10W | | | | ±15 | ±333 | ±33 | 85 |
| WRB4803D-10W | | | | 3.3 | 2500 | 250 | 75 |
| WRB4805D-10W | | | | 5 | 2000 | 200 | 80 |
| WRB4812D-10W | | | | 12 | 833 | 83 | 83 |
| WRB4815D-10W | | | | 15 | 666 | 66 | 85 |
| WRB4824D-10W | 24 | 417 | 42 | 84 | | | |

*Input voltage can't exceed this value, or will cause the permanent damage. O: PWM mode, others PFM mode.

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COMMON SPECIFICATIONS

| Item | Test conditions | Min. | Typ. | Max. | Units |
|---------------------------|--------------------------------|------|------|------|---------|
| Storage Humidity | | | | 95 | % |
| Operating Temperature | | -40 | | 85 | °C |
| Storage Temperature | | -55 | | 125 | |
| Temp. Rise at Full Load | | | 40 | | |
| Lead Temperature | 1.5mm from case for 10 seconds | | | 300 | |
| No-load power consumption | | | 500 | | mW |
| Cooling | Free Air Convection | | | | |
| Short Circuit Protection | Continuous, automatic recovery | | | | |
| Case Material | Aluminum | | | | |
| MTBF | | 1000 | | | K hours |
| Weight | | | 23.5 | | g |

ISOLATION SPECIFICATIONS

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

OUTPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Units |
|-------------------------------|--------------------------------|------|------|-------|-------|
| Output power | Refer to products program | 1 | | 10 | W |
| Positive voltage accuracy | Refer to recommended circuit | | ±1 | ±3 | % |
| Negative voltage accuracy | Refer to recommended circuit | | ±3 | ±5 | |
| Load regulation | From 10% to 100% load | | ±0.5 | ±1* | |
| Line regulation(at full load) | Input voltage from low to high | | ±0.2 | ±0.5 | %/°C |
| Temperature drift (Vout) | Refer to recommended circuit | | | ±0.03 | |
| Ripple** | 20MHz Bandwidth | | 20 | 50 | mVp-p |
| Noise** | 20MHz Bandwidth | | 85 | 150 | |
| Switching frequency | 100% load, Input voltage range | | 300 | | KHz |

*Dual output models unbalanced load: ±5%.

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

APPLICATION NOTE

1) Requirement on Output Load

In order to ensure the product operate efficiently and reliably, in addition to a max load (namely full load), a minimum load is specified for this kind of DC/DC converter. Make sure the specified range of input voltage is not exceeded, the minimum output load no less than 10% load. If the actual load is less than the specified minimum load, the output ripple may increase sharply while its efficiency and reliability will reduce greatly. If the actual output power is very small, please add an appropriate resistor as extra loading, or contact our company for other lower output power products.

2) Recommended Circuit

All the WRA_D-10W & WRB_D-10W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load. Never be tested under no load (see Figure 1).

If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR. 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

Cout: 10μF/100mA

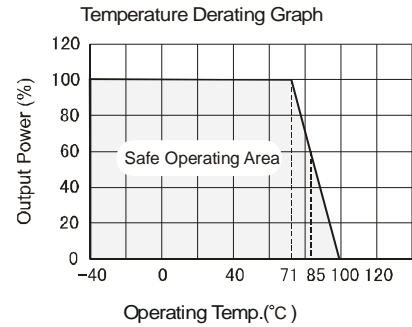
3) Input Current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the startup current of this kind of DC/DC module (See figure 2), General:

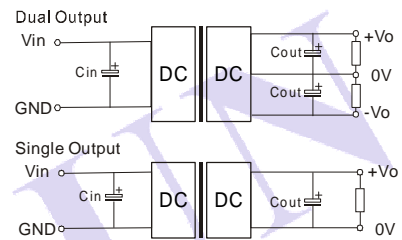
$$I_p \leq 1.4 \cdot I_{in-max}$$

4) No parallel connection or plug and play

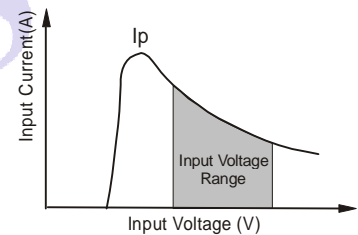
TYPICAL CHARECTERISTICS



RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

Output External Capacitor Table (Table 1)

| Single Vout (VDC) | Cout (uF) | Dual Vout (VDC) | Cout (uF) |
|-------------------|-----------|-----------------|-----------|
| 3.3 | 2200 | ±5 | 680 |
| 5 | 1000 | ±12 | 330 |
| 12 | 470 | ±15 | 220 |
| 15 | 330 | ±24 | 100 |
| 24 | 220 | - | - |
| 48 | 100 | - | - |

OUTLINE DIMENSIONS & FOOTPRINT DETAILS

MECHANICAL DIMENSIONS

WRA/B05XXD-10W: $\varnothing 1.00$ [0.039]
Other models: $\varnothing 0.80$ [0.031]

| FOOTPRINT DETAILS | | |
|-------------------|--------|------|
| Pin | Single | Dual |
| 1 | GND | GND |
| 2 | Vin | Vin |
| 3 | +Vo | +Vo |
| 4 | No Pin | 0V |
| 5 | 0V | -Vo |

Note:
Unit:mm[inch]
Pin diameter tolerances: $\pm 0.10\text{mm}$ [$\pm 0.004\text{inch}$]
General tolerances: $\pm 0.25\text{mm}$ [$\pm 0.010\text{inch}$]

RECOMMENDED FOOTPRINT

DUAL

WRA/B05XXD-10W: $\varnothing 1.50$ [0.059]
Other models: $\varnothing 1.30$ [0.051]

SINGLE

Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS

Note:
Unit :mm[inch]
General tolerances: $\pm 0.50\text{mm}$ [$\pm 0.020\text{inch}$]
L=220mm[8.661inch] pcs/tube: 7
Inner packaging dimensions: L*W*H=255*170*80mm
Outer packaging dimensions(with six inner package boxes):
L*W*H=375*280*270mm

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 $T_a=25^\circ\text{C}$, 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.