



## FEATURES

- ◆ Wide 2:1 Input Range
- ◆ Full SMD-Design
- ◆ High Efficiency up to 86%
- ◆ Extended Operating Temperature
- ◆ Range -40°C to 85°C
- ◆ I/O-isolation 1500 VDC
- ◆ Indefinite Short-Circuit Protection
- ◆ RoHS Compliance
- ◆ 24-pin DIP with Industry Standard Pinout
- ◆ High Reliability, MTBF >1 Mio. H
- ◆ 3 Year Product Warranty

## MODEL SELECTION

**WRB<sup>®</sup>24<sup>®</sup>05<sup>®</sup>Y<sup>®</sup>D<sup>®</sup>-5W(1000)<sup>®</sup>**

- ① Product Series
- ② Input Voltage
- ③ Output Voltage
- ④ Wide (2:1) Input Range
- ⑤ DIP24 Package Style
- ⑥ Rated Power(Output current)

## APPLICATIONS

The WRA-YD-5W&WRB-YD-5W of 2:1.State of the art SMD-technology guarantees a product with very high reliability and good cost or performance ratio. High efficiency allows an operating temperature range of -40 °C to +85 °C without derating. I/O-isolation of 1500 VDC together with conducted noise compliance to EN 55022-A and FCC, level A makes these converters ideal for a wide range of applications in communications, mobile battery powered equipments and industrial systems.



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## SELECTION GUIDE

| Order code     | Input Voltage<br>(VDC) | Output        |              | Efficiency<br>(%Typ.) |
|----------------|------------------------|---------------|--------------|-----------------------|
|                |                        | Voltage (VDC) | Current Max. |                       |
| WRB0503YD-1200 | 4.5 - 7                | 3.3           | 1200         | 75%                   |
| WRB0505YD-5W   | 4.5 - 7                | 5             | 1000         | 79%                   |
| WRA0505YD-5W   | 4.5 - 7                | ±5            | ±500         | 82%                   |
| WRB1203YD-1200 | 9 - 18                 | 3.3           | 1200         | 77%                   |
| WRB1205YD-5W   | 9 - 18                 | 5             | 1000         | 81%                   |
| WRA1205YD-5W   | 9 - 18                 | ±5            | ±500         | 81%                   |
| WRB2403YD-1200 | 18 - 36                | 3.3           | 1200         | 79%                   |
| WRB2405YD-5W   | 18 - 36                | 5             | 1000         | 83%                   |
| WRA2405YD-5W   | 18 - 36                | ±5            | ±500         | 83%                   |
| WRB4803YD-1200 | 36 - 75                | 3.3           | 1200         | 79%                   |
| WRB4805YD-5W   | 36 - 75                | 5             | 1000         | 83%                   |
| WRA4805YD-5W   | 36 - 75                | ±5            | ±500         | 83%                   |

## Input Specifications

|                                            |               |                                        |
|--------------------------------------------|---------------|----------------------------------------|
| Input current no load /full load           | 5 Vin models  | 50mA / 1460mA typ.                     |
|                                            | 12 Vin models | 20mA / 590mA typ.                      |
|                                            | 24 Vin models | 5mA / 290mA typ.                       |
|                                            | 48 Vin models | 3mA / 145mA typ.                       |
| Start-up voltage / under voltage shut down | 5 Vin models  | 4.4 VDC / 4.0 VDC                      |
|                                            | 12 Vin models | 8.0 VDC / 8.0 VDC                      |
|                                            | 24 Vin models | 16.0 VDC / 16.0 VDC                    |
|                                            | 48 Vin models | 32.0 VDC / 32.0 VDC                    |
| Surge voltage (1 sec. max.)                | 5 Vin models  | 10 V max.                              |
|                                            | 12 Vin models | 25 V max.                              |
|                                            | 24 Vin models | 50 V max.                              |
|                                            | 48 Vin models | 100 V max.                             |
| Reverse voltage protection                 |               | 1.0 A max.                             |
| Conducted noise (input)                    |               | EN 55022 level A, FCC part 15, level A |

## Output Specifications

|                                     |                                        |                                 |
|-------------------------------------|----------------------------------------|---------------------------------|
| Voltage set accuracy                |                                        | 1 %                             |
| Regulation                          | - Input variation Vin min. to Vin max. | 0.3 % max.                      |
|                                     | - Load variation 10 - 100 %            |                                 |
|                                     | - single output models                 | 1 % max.                        |
|                                     | - dual output models balanced load     | 1 % max.                        |
|                                     | - dual output models unbalanced        | 3 % max.                        |
| Ripple and noise (20 MHz Bandwidth) |                                        | 50 mVpk-pk max.                 |
| Temperature coefficient             |                                        | ± 0.02 % /K                     |
| Output current limitation           |                                        | >120 % of Iout max., constant   |
| Short-circuit protection            |                                        | indefinite (automatic recovery) |
| Capacitive load                     | - single output models                 | 6800 µF max.                    |
|                                     | - dual output models                   | 1000 µF max. (each output)      |

### General Specifications

|                                               |                        |                                                                                    |
|-----------------------------------------------|------------------------|------------------------------------------------------------------------------------|
| Temperature ranges                            | - Operating            | - 40 °C ... + 85 °C                                                                |
|                                               | - Case temperature     | +100 °C max.                                                                       |
|                                               | - Storage              | - 55 °C ... + 125 °C                                                               |
| Derating                                      |                        | 3.5% /K above 70 °C                                                                |
| Humidity(non condensing)                      |                        | 95 % rel H max.                                                                    |
| Reliability, calculated MTBF (MIL-HDBK-217 E) |                        | >1 Mio. h @ + 25 °C                                                                |
| Isolation voltage                             | Input/Output           | 1500 VDC                                                                           |
| Isolation capacity                            | Input/Output           | 380 pF typ.                                                                        |
| Isolation resistance                          | Input/Output (500 VDC) | > 1000 M Ohm                                                                       |
| Switching frequency                           |                        | 300 kHz typ. (Pulse frequency modulation PFM)                                      |
| Safety standards                              |                        | UL 60950, IEC 60950, EN 60950<br>Compliance up to 60 VDC input voltage(SELV limit) |
| Safety approval                               |                        | UL /cUL File E188913 (5Vin models pending)                                         |

### Physical Specifications

|                       |                        |
|-----------------------|------------------------|
| Case material         | steel, Nickel plated   |
| Baseplate material    | non conductive FR4     |
| Potting material      | epoxy (UL 94V-0 rated) |
| Weight                | 14 g (0.55 oz)         |
| Soldering temperature | max. 265 °C / 10 sec.  |

### APPLICATION NOTE

#### 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.

#### Recommended Circuit

All the WRA\_YD-5W & WRB\_YD-5W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under 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 100μF-47μF  
                                          Cout: 10μF/100mA

#### Input current

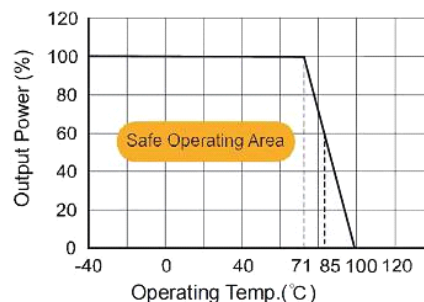
While using unstable power source, please ensure the output voltage and ripple voltage do not exceed indexes of the converter. Input current of power supply should afford the startup current of this kind of DC/DC module (See figure 2).

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

#### No parallel connection or plug and play

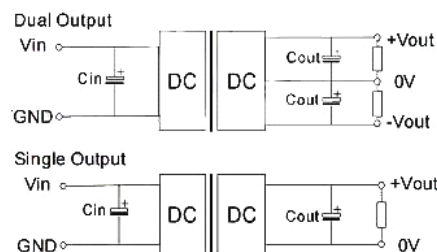
### TYPICAL CHARACTERISTICS

#### Temperature Derating Graph

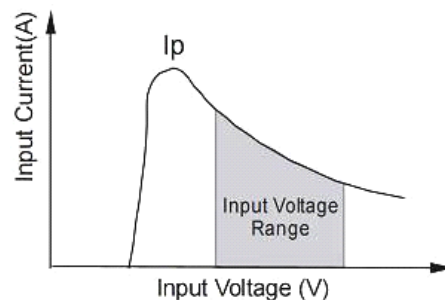


### RECOMMENDED CIRCUIT

#### Output Graph



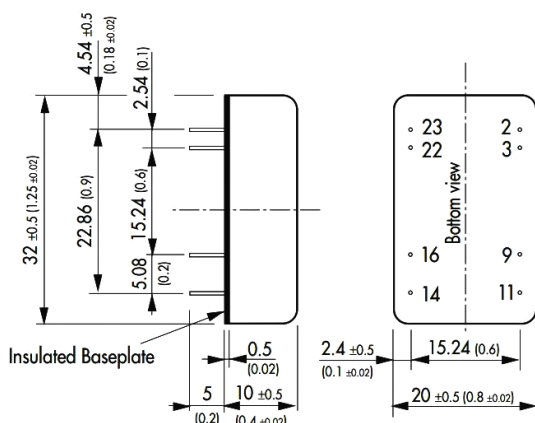
(Figure 1)



(Figure 2)

### OUTLINE DIMENSIONS & FOOTPRINT DETAILS

#### MECHANICAL DIMENSIONS

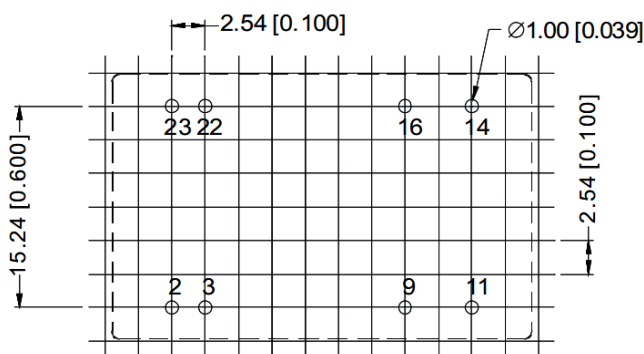


Note:

Pin diameter  $\phi 0.5 \pm 0.05$  (0.02  $\pm$  0.002)

Tolerances  $\pm 0.5$  (0.02)

#### RECOMMENDED FOOTPRINT



#### RECOMMENDED FOOTPRINT

Top view grid: 2.54mm (0.1inch)

diameter: 1.00mm (0.039inch)

#### FOOTPRINT DETAILS

| Pin    | Single     | Dual       |
|--------|------------|------------|
| 2, 3   | -Vin (GND) | -Vin (GND) |
| 9      | No pin     | Common     |
| 11     | No con.    | -Vout      |
| 14     | +Vout      | +Vout      |
| 16     | -Vout      | Common     |
| 22, 23 | +Vin (Vcc) | +Vin (Vcc) |

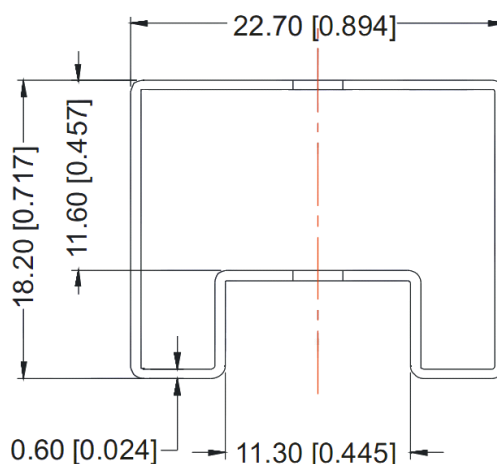
NC: No connection

**When the environment temperature is higher than 71°C, the product output power should be less than 60% of the rated power.**

**No parallel connection or plug and play.**

**Use dual output simultaneously, forbid pening output pin (0V) to use as single output.**

#### TUBE OUTLINE DIMENSIONS



Note:

Unit :mm[inch]

General tolerances:  $\pm 0.50$ mm [ $\pm 0.020$ inch]

L=530mm [20.866inch] Tube Quantity: 15pcs

L=220mm [8.661inch] Tube Quantity: 6pcs

#### RoHS COMPLIANT INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds.

The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

#### REACH COMPLIANT INFORMATION

This series has proven that this product does not contain harmful chemicals, it also has harmful chemical substances through the registration, inspection and approval.