

**SERIES:** VWRBT2 | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

- 2 W isolated output
- wide input (2:1)
- industry standard 16 pin SMT package style
- single regulated outputs
- 1,500 V isolation
- short circuit protection
- wide temperature (-40~85°C)
- efficiency up to 80%

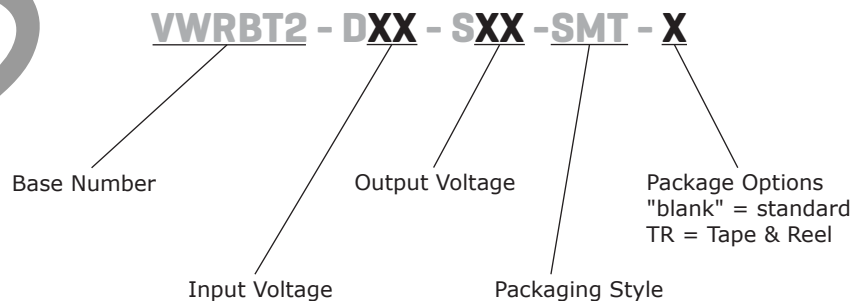


**MODEL**

| MODEL               | input voltage |             | output voltage<br>(Vdc) | output current |          | output power<br>max (W) | ripple and noise <sup>1</sup><br>typ (mVp-p) | efficiency<br>typ (%) |
|---------------------|---------------|-------------|-------------------------|----------------|----------|-------------------------|--|-----------------------|
|                     | typ (Vdc)     | range (Vdc) |                         | min (mA)       | max (mA) |                         |  |                       |
| VWRBT2-D12-S3.3-SMT | 12            | 9~18        | 3.3                     | 50             | 500      | 2                       | 35   | 70                    |
| VWRBT2-D12-S5-SMT   | 12            | 9~18        | 5                       | 40             | 400      | 2                       | 35   | 74                    |
| VWRBT2-D12-S9-SMT   | 12            | 9~18        | 9                       | 22             | 222      | 2                       | 35   | 76                    |
| VWRBT2-D12-S12-SMT  | 12            | 9~18        | 12                      | 16             | 167      | 2                       | 35   | 78                    |
| VWRBT2-D12-S15-SMT  | 12            | 9~18        | 15                      | 13             | 133      | 2                       | 35   | 79                    |
| VWRBT2-D24-S3.3-SMT | 24            | 18~36       | 3.3                     | 50             | 500      | 2                       | 35   | 72                    |
| VWRBT2-D24-S5-SMT   | 24            | 18~36       | 5                       | 40             | 400      | 2                       | 35   | 76                    |
| VWRBT2-D24-S9-SMT   | 24            | 18~36       | 9                       | 22             | 222      | 2                       | 35   | 78                    |
| VWRBT2-D24-S12-SMT  | 24            | 18~36       | 12                      | 16             | 167      | 2                       | 35   | 80                    |
| VWRBT2-D24-S15-SMT  | 24            | 18~36       | 15                      | 13             | 133      | 2                       | 35   | 80                    |

Notes: 1. ripple and noise are measured at 20 MHz BW

**PART NUMBER KEY**



**INPUT**

| parameter               | conditions/description | min | typ | max | units |
|-------------------------|------------------------|-----|-----|-----|-------|
| operating input voltage | 12 V input             | 9   | 12  | 18  | Vdc   |
|                         | 24 V input             | 18  | 24  | 36  | Vdc   |

**OUTPUT**

| parameter               | conditions/description              | min                          | typ  | max   | units |
|-------------------------|-------------------------------------|------------------------------|------|-------|-------|
| line regulation         | measured from low line to high line |                              | ±0.2 | ±0.5  | %     |
| load regulation         | measured from 10% to 100% full load |                              | ±0.5 | ±1    | %     |
| voltage accuracy        | positive                            |                              | ±1   | ±3    | %     |
|                         | negative                            | refer to recommended circuit |      | ±3    | ±5    |
| ripple & noise          |                                     |                              | 35   | 150   | mVp-p |
| switching frequency     | 100% load, nominal input voltage    |                              | 300  |       | kHz   |
| temperature coefficient |                                     |                              |      | ±0.03 | %/°C  |

**PROTECTIONS**

| parameter                | conditions/description         | min | typ | max | units |
|--------------------------|--------------------------------|-----|-----|-----|-------|
| short circuit protection | continuous, automatic recovery |     |     |     |       |

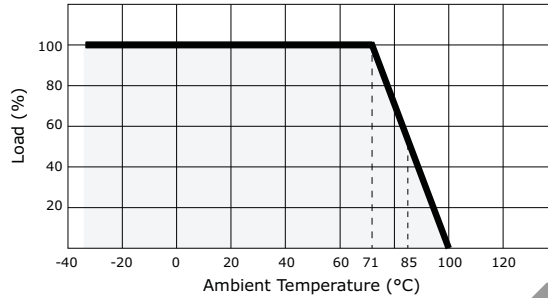
**SAFETY AND COMPLIANCE**

| parameter             | conditions/description            | min       | typ | max | units |
|-----------------------|-----------------------------------|-----------|-----|-----|-------|
| isolation voltage     | tested for 1 minute, at 1 mA max. | 1,500     |     |     | Vdc   |
| insulation resistance | at 500 Vdc                        | 1,000     |     |     | MΩ    |
| isolation capacitance | input to output                   |           | 85  |     | pF    |
| RoHS compliant        | yes                               |           |     |     |       |
| MTBF                  |                                   | 1,000,000 |     |     | hours |

**ENVIRONMENTAL**

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature |                        | -40 |     | 85  | °C    |
| storage temperature   |                        | -55 |     | 125 | °C    |
| storage humidity      | non-condensing         |     |     | 95  | %     |
| temperature rise      | at full load           |     | 15  |     | °C    |
| lead temperature      | for 10 seconds         |     |     | 300 | °C    |

## DERATING CURVES

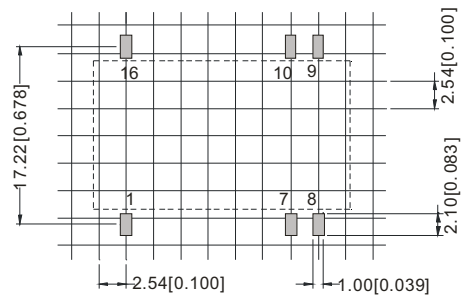
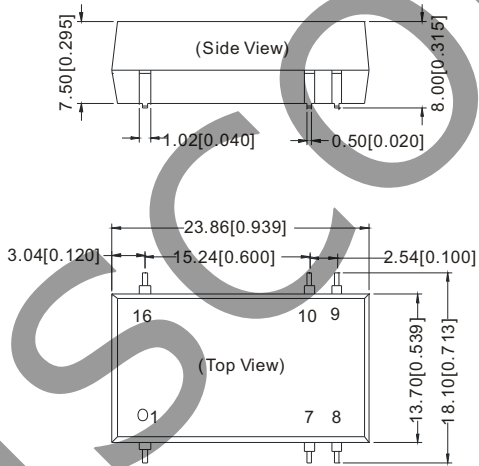


## MECHANICAL

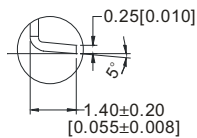
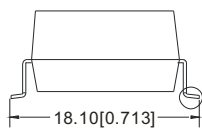
| parameter     | conditions/description                          | min | typ | max | units |
|---------------|---|-----|-----|-----|-------|
| dimensions    | 0.939 x 0.713 x 0.315 (23.86 x 18.10 x 8.10 mm) |     |     |     | inch  |
| case material | UL94-V0 epoxy resin                             |     |     |     |       |
| weight        |   |     | 5.2 |     | g     |

## MECHANICAL DRAWING

units: mm [inches]  
 tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]  
 pin section tolerance:  $\pm 0.10$  mm [ $\pm 0.004$ ]



| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | FUNCTION |
| 1               | GND      |
| 7               | NC       |
| 8               | NC       |
| 9               | +Vo      |
| 10              | 0 V      |
| 16              | +Vin     |



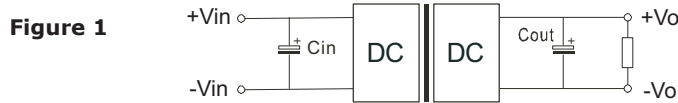
## APPLICATION NOTES

### 1. Requirement on Output Load

In order to ensure the product operates efficiently and reliably, make sure the specified range of input voltage is not exceeded and the minimum output load is not 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.

### 2. Recommended Circuit

All VWRBT2 converters have been tested according to the following recommended testing circuit before leaving the factory. This series should be tested under load, never under no load (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  | 12 V<br>24, 48 V    | 100 $\mu$ F<br>10 ~ 47 $\mu$ F |
| Cout | 10 $\mu$ F / 100 mA |                                |

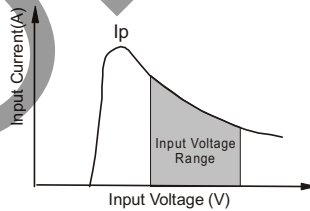
**Table 1**

| Vout (Vdc) | Cout ( $\mu$ F) |
|------------|-----------------|
| 3.3        | 2,200           |
| 5          | 1,000           |
| 9          | 680             |
| 12         | 470             |
| 15         | 330             |

### 3. 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  $I_p$ .

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



### 4. No parallel connection or plug and play

### 5. Solderability

reflow soldering, 240°C max.

## REVISION HISTORY

| rev. | description                 | date       |
|------|-----------------------------|------------|
| 1.0  | initial release             | 05/12/2008 |
| 1.01 | updated to new template     | 05/09/2012 |
| 1.02 | updated application notes   | 06/19/2012 |
| 1.03 | V-Infinity branding removed | 09/10/2012 |
| 1.04 | added TR package option     | 11/01/2012 |

The revision history provided is for informational purposes only and is believed to be accurate.



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