

# WDD30U SERIES

DC - DC CONVERTER

23 ~ 30W SINGLE & DUAL OUTPUT



## FEATURES

- EFFICIENCY UP TO 89%
- 2:1 WIDE INPUT RANGE
- I/O ISOLATION
- INPUT  $\pi$  FILTER
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 3 YEARS WARRANTY



EN 60950-1



## MODEL LIST

| MODEL NO. | INPUT VOLTAGE | INPUT CURRENT<br>(typ.)   (max.) |  | OUTPUT WATTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | CAPACITOR LOAD (max.) |
|-----------|---------------|----------------------------------|--|----------------|----------------|----------------|-------------|-------------|-----------------------|
|-----------|---------------|----------------------------------|--|----------------|----------------|----------------|-------------|-------------|-----------------------|

### Single Output Models

|               |           |        |        |          |          |         |     |     |              |
|---------------|-----------|--------|--------|----------|----------|---------|-----|-----|--------------|
| WDD30 - 03S1U | 9~18 VDC  | 2.4 A  | 3.3 A  | 23 WATTS | +3.3 VDC | 7000 mA | 79% | 81% | 7000 $\mu$ F |
| WDD30 - 05S1U | 9~18 VDC  | 2.5 A  | 3.35 A | 25 WATTS | + 5 VDC  | 5000 mA | 83% | 85% | 7000 $\mu$ F |
| WDD30 - 12S1U | 9~18 VDC  | 3.0 A  | 4.1 A  | 30 WATTS | + 12 VDC | 2500 mA | 82% | 84% | 1000 $\mu$ F |
| WDD30 - 15S1U | 9~18 VDC  | 2.97 A | 4.1 A  | 30 WATTS | + 15 VDC | 2000 mA | 83% | 85% | 470 $\mu$ F  |
| WDD30 - 03S2U | 18~36 VDC | 1.19 A | 1.62 A | 23 WATTS | +3.3 VDC | 7000 mA | 80% | 82% | 7000 $\mu$ F |
| WDD30 - 05S2U | 18~36 VDC | 1.22 A | 1.66 A | 25 WATTS | + 5 VDC  | 5000 mA | 84% | 86% | 7000 $\mu$ F |
| WDD30 - 12S2U | 18~36 VDC | 1.42 A | 1.95 A | 30 WATTS | + 12 VDC | 2500 mA | 86% | 88% | 3500 $\mu$ F |
| WDD30 - 15S2U | 18~36 VDC | 1.42 A | 1.95 A | 30 WATTS | + 15 VDC | 2000 mA | 87% | 89% | 1000 $\mu$ F |
| WDD30 - 03S3U | 35~75 VDC | 0.59 A | 0.82 A | 23 WATTS | +3.3 VDC | 7000 mA | 81% | 83% | 7000 $\mu$ F |
| WDD30 - 05S3U | 35~75 VDC | 0.6 A  | 0.82 A | 25 WATTS | + 5 VDC  | 5000 mA | 82% | 84% | 7000 $\mu$ F |
| WDD30 - 12S3U | 35~75 VDC | 0.71 A | 1.0 A  | 30 WATTS | + 12 VDC | 2500 mA | 86% | 88% | 3500 $\mu$ F |
| WDD30 - 15S3U | 35~75 VDC | 0.7 A  | 1.0 A  | 30 WATTS | + 15 VDC | 2000 mA | 87% | 89% | 1000 $\mu$ F |

### Dual Output Models

|               |           |        |        |          |              |               |     |     |                    |
|---------------|-----------|--------|--------|----------|--------------|---------------|-----|-----|--------------------|
| WDD30 - 05D1U | 9~18 VDC  | 2.51 A | 3.4 A  | 25 WATTS | $\pm$ 5 VDC  | $\pm$ 2500 mA | 82% | 84% | $\pm$ 3500 $\mu$ F |
| WDD30 - 12D1U | 9~18 VDC  | 2.95 A | 4.1 A  | 30 WATTS | $\pm$ 12 VDC | $\pm$ 1250 mA | 83% | 85% | $\pm$ 470 $\mu$ F  |
| WDD30 - 15D1U | 9~18 VDC  | 2.94 A | 4.0 A  | 30 WATTS | $\pm$ 15 VDC | $\pm$ 1000 mA | 84% | 86% | $\pm$ 470 $\mu$ F  |
| WDD30 - 05D2U | 18~36 VDC | 1.24 A | 1.7 A  | 25 WATTS | $\pm$ 5 VDC  | $\pm$ 2500 mA | 83% | 85% | $\pm$ 3500 $\mu$ F |
| WDD30 - 12D2U | 18~36 VDC | 1.41 A | 1.95 A | 30 WATTS | $\pm$ 12 VDC | $\pm$ 1250 mA | 86% | 88% | $\pm$ 470 $\mu$ F  |
| WDD30 - 15D2U | 18~36 VDC | 1.42 A | 1.95 A | 30 WATTS | $\pm$ 15 VDC | $\pm$ 1000 mA | 87% | 89% | $\pm$ 470 $\mu$ F  |
| WDD30 - 05D3U | 35~75 VDC | 0.62 A | 0.88 A | 25 WATTS | $\pm$ 5 VDC  | $\pm$ 2500 mA | 83% | 85% | $\pm$ 3500 $\mu$ F |
| WDD30 - 12D3U | 35~75 VDC | 0.7 A  | 1.0 A  | 30 WATTS | $\pm$ 12 VDC | $\pm$ 1250 mA | 86% | 88% | $\pm$ 470 $\mu$ F  |
| WDD30 - 15D3U | 35~75 VDC | 0.71 A | 1.0 A  | 30 WATTS | $\pm$ 15 VDC | $\pm$ 1000 mA | 87% | 89% | $\pm$ 470 $\mu$ F  |

### SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

#### GENERAL

| Characteristics         | Conditions                           | min.                    | typ.    | max.   | unit   |
|-------------------------|--------------------------------------|-------------------------|---------|--------|--------|
| Switching frequency     | Vi nom, Io nom                       |                         | 250     |        | KHz    |
| Isolation voltage       | Input - Output                       | 1500                    |         |        | VDC    |
| Isolation resistance    | Input - Output, @ 500VDC             | 100                     |         |        | MΩ     |
| Isolation capacitance   | 100KHz / 1V                          |                         |         | 1000   | PF     |
| Ambient temperature     | Vi nom, 3.3V & 5V output models      | -40                     |         | + 61   | °C     |
|                         | Io nom 12V, 15V & dual output models | -40                     |         | + 71   | °C     |
| Case temperature        | Operating at Vi nom, Io nom          |                         |         | + 100  | °C     |
| Derating                | Vi nom                               | See derating curve      |         |        |        |
| Storage temperature     | Non operational                      | -40                     |         | + 100  | °C     |
| Relative humidity       | Vi nom, Io nom                       | 20                      |         | 95     | % RH   |
| Temperature coefficient | Vi nom, Io min                       |                         |         | ± 0.02 | % / °C |
| Dimension               |                                      | L50.8 x W40.64 x H10.16 |         |        | mm     |
| MTBF                    | Belcore issue 6@40°C, GB             |                         | 7480000 |        | Hours  |
| Cooling                 | Free air convection                  |                         |         |        |        |

#### INPUT SPECIFICATIONS

| Characteristics          | Conditions                | min.       | typ. | max. | unit |
|--------------------------|---------------------------|------------|------|------|------|
| Input voltage range      | Ta min ... Ta max, Io nom | 9          | 12   | 18   | VDC  |
|                          |                           | 18         | 24   | 36   | VDC  |
|                          |                           | 35         | 48   | 75   | VDC  |
| No load input current    | Vi nom, Io = 0            | 12V models |      | 25   | mA   |
|                          |                           | 24V models |      | 20   | mA   |
|                          |                           | 48V models |      | 15   | mA   |
| Input voltage w/o damage | Io nom                    | 12V models |      | 20   | VDC  |
|                          |                           | 24V models |      | 40   | VDC  |
|                          |                           | 48V models |      | 80   | VDC  |
| Startup voltage          | Io nom                    | 12V models |      | 8.5  | VDC  |
|                          |                           | 24V models |      | 16   | VDC  |
|                          |                           | 48V models |      | 33   | VDC  |
| Input filter             | Pi type                   |            |      |      |      |

#### OUTPUT SPECIFICATIONS

| Characteristics               | Conditions                                    | min.                                           | typ. | max. | unit |
|-------------------------------|-----------------------------------------------|------------------------------------------------|------|------|------|
| Output voltage accuracy       | Vi nom, Io nom                                |                                                |      | ± 2  | %    |
| Minimum load                  | Vi nom single output models                   | 0                                              |      |      | %    |
|                               | Vi nom dual output models (each output)       | 10                                             |      |      | %    |
| Line regulation               | Io nom, Vi min ... Vi max                     |                                                |      | ± 1  | %    |
| Load regulation               | Vi nom, Io 0 ... Io nom, single output models |                                                |      | ± 2  | %    |
|                               | Vi nom, Io min ... Io nom, dual output models |                                                |      | ± 5  | %    |
| Cross regulation (Dual model) | Aymmetrical load 10% - 100% FL                |                                                |      | ± 5  | %    |
| Startup time                  | Vi nom, Io nom                                |                                                |      | 30   | ms   |
| Transient recovery time       | Vi nom, I ~ 0.5 Io nom                        |                                                |      | 500  | μs   |
| Ripple & noise                | Vi nom, Io nom, 3.3V & 5V models              |                                                |      | 100  | mV   |
|                               | BW = 20MHz 12V, 15V & dual                    |                                                |      | 150  | mV   |
| Voltage trim range (I)        | Vi nom 3.3V model                             |                                                | ± 5  |      | %    |
|                               | 5V, 12V, 15V & dual                           |                                                | ± 10 |      | %    |
| Efficiency                    | Vi nom, Io nom, Po / Pi                       | Up to 89%, See model list and efficiency curve |      |      |      |

NOTE 1 : Pls refer to Fig 1 & Table 1 for connection and resistance recommended.

### SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

### CONTROL AND PROTECTION

|                            |                                                                                                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------|
| Remote ON / OFF            | ON : opened or 8 ~ 10VDC applied, reference to input GND<br>OFF : -0.3 ~ 2VDC applied, reference to input GND |
| Input reversed             | Shunt diode built in, external fuse recommended (12Vin : 5A, 24Vin : 2A, 48Vin : 1.25A)                       |
| Output short circuit       | Current limited (Auto-recovery)                                                                               |
| Rated over load protection | 110%min....140%max                                                                                            |

### APPROVALS AND STANDARD

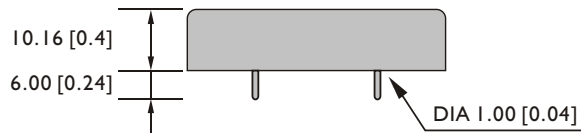
|           |                                                                                    |
|-----------|------------------------------------------------------------------------------------|
| UL/cUL    | UL 60950-I Recognized                                                              |
| TUV       | EN 60950-I, CB scheme                                                              |
| CE        | EN 61204-3, EN 55022, Class A, EN 61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-6 |
| Vibration | meet IEC 60068-2-6 (10-500 Hz, 2G, along X, Y, Z each Axis, 60 min for each Axis)  |

### PHYSICAL CHARACTERISTICS

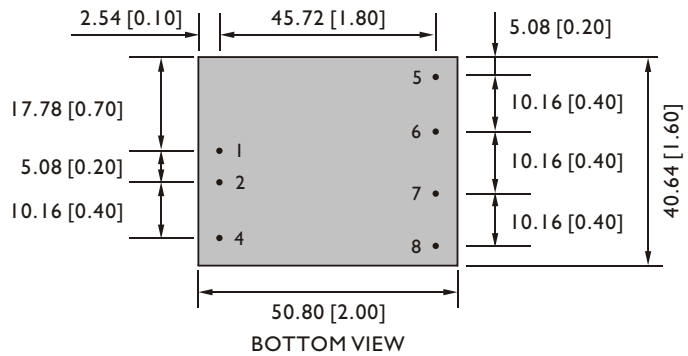
|                  |                                                |
|------------------|------------------------------------------------|
| Case size        | 50.8 x 40.64 x 10.16 mm (2 x 1.6 x 0.4 inches) |
| Case material    | Plastic base / Metal case                      |
| Weight           | 60 g                                           |
| Potting material | Silicone                                       |

### MECHANISM & PIN CONFIGURATION

mm [inch]



| GENERAL TOLERANCE          |             |
|----------------------------|-------------|
| 0.00[0.00] - 30.00[1.18]   | ±0.30[0.01] |
| 30.00[1.18] - 120.00[4.72] | ±0.50[0.02] |



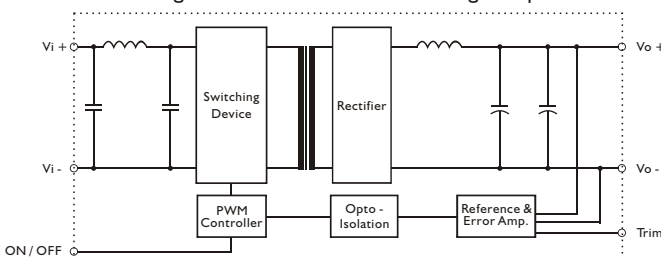
### PIN ASSIGNMENT

#### GENERAL

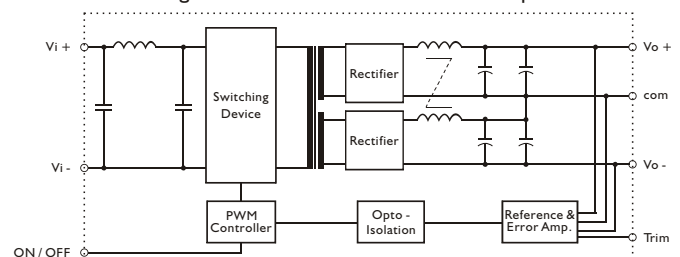
| PIN NO. | 1    | 2    | 4        | 5      | 6    | 7    | 8    |
|---------|------|------|----------|--------|------|------|------|
| SINGLE  | Vi + | Vi - | ON / OFF | NO PIN | Vo + | Vo - | Trim |
| DUAL    | Vi + | Vi - | ON / OFF | Vo +   | com  | Vo - | Trim |

### CIRCUIT SCHEMATIC

• Block diagram for WDD30U series with single output

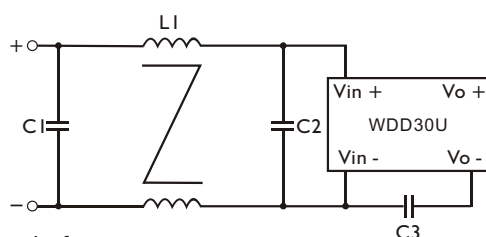


• Block diagram for WDD30U series with dual output

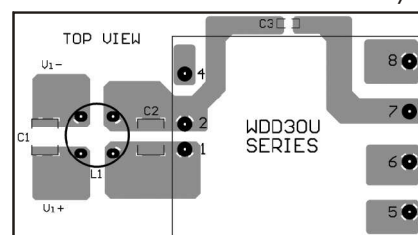


### RECOMMENDED CIRCUIT

• Recommended filter for EN55022 Class B compliance



• Recommended EN 55022 Class B filter circuit layout.

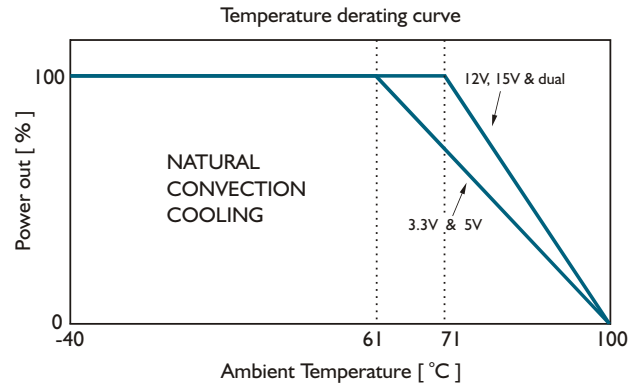


### RECOMMENDED CIRCUIT

- The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

|             | C1                      | C2                      | C3             | LI                 |
|-------------|-------------------------|-------------------------|----------------|--------------------|
| WDD30-XXX1U | 3.3 $\mu$ F / 50V MLCC  | 3.3 $\mu$ F / 50V MLCC  | InF / 2KV MLCC | 1.5mH Common Choke |
| WDD30-XXX2U | 1.5 $\mu$ F / 50V MLCC  | 1.5 $\mu$ F / 50V MLCC  | InF / 2KV MLCC | 3.5mH Common Choke |
| WDD30-XXX3U | 3.3 $\mu$ F / 100V MLCC | 3.3 $\mu$ F / 100V MLCC | InF / 2KV MLCC | 0.5mH Common Choke |

### DERATING AND EFFICIENCY CURVE



### DERATING AND EFFICIENCY CURVE

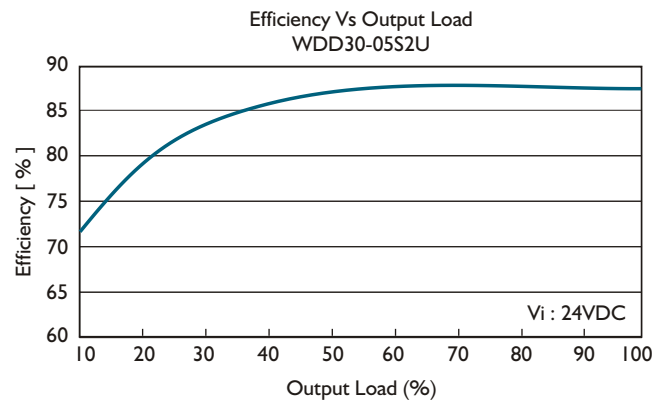
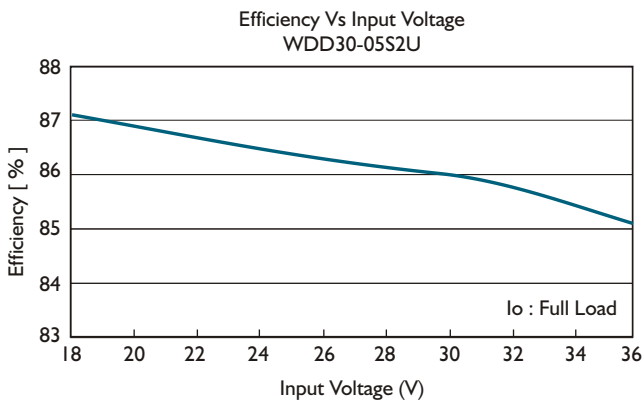
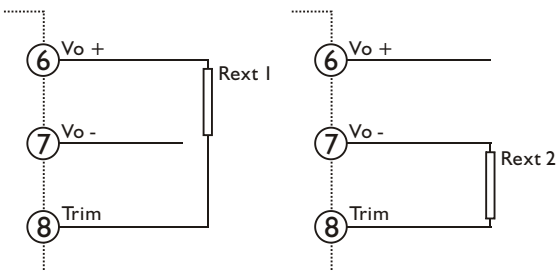


Fig. 1 Trim connection

( For Single output )



( For Dual output )

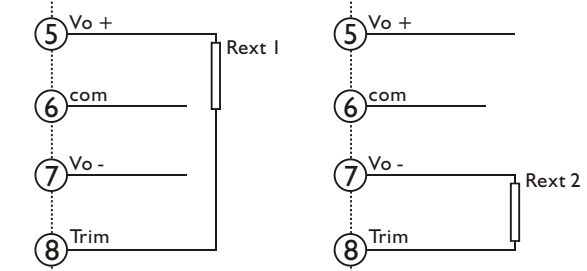


Table 1 Typical resistor values for various output voltage adjustment settings

| Type        | Rext 1        |               | Rext 2        |               |
|-------------|---------------|---------------|---------------|---------------|
|             | Vo nom -2.5%  | Vo nom -5%    | Vo nom +2.5%  | Vo nom +5%    |
| WDD30-03SXU | 20K $\Omega$  | 0 $\Omega$    | 30K $\Omega$  | 5.6K $\Omega$ |
| Type        | Vo nom -5%    | Vo nom -10%   | Vo nom +5%    | Vo nom +10%   |
| WDD30-05SXU | 5.6K $\Omega$ | 0 $\Omega$    | 1.5K $\Omega$ | 1K $\Omega$   |
| WDD30-12SXU | 43K $\Omega$  | 20K $\Omega$  | 10K $\Omega$  | 1K $\Omega$   |
| WDD30-15SXU | 120K $\Omega$ | 56K $\Omega$  | 24K $\Omega$  | 4.7K $\Omega$ |
| WDD30-05DXU | 330K $\Omega$ | 150K $\Omega$ | 10K $\Omega$  | 3K $\Omega$   |
| WDD30-12DXU | 130K $\Omega$ | 56K $\Omega$  | 10K $\Omega$  | 2K $\Omega$   |
| WDD30-15DXU | 130K $\Omega$ | 68K $\Omega$  | 15K $\Omega$  | 2K $\Omega$   |