

## WR-K SERIES

Single, dual and triple output



[ 2 YEAR WARRANTY ]

- Low profile – 0.91 inch high
- Efficiencies to 84%
- UL approved (Single outputs)
- 2:1 input range
- PCB or chassis mounting
- Pi input filter
- OVP on all outputs

WR-K Series devices are efficient, high power DC/DC converters with single, dual and triple outputs supplying 50 to 60 Watts. Their low profile 3.5 x 5.5 x 0.91 inch package provides a power density of 3.4 Watts per cubic inch. Efficiencies range from 78% to 84%. These converters feature unique dual power stages utilising forward converters with MOSFET switching at 100kHz. A Pi network input filter is also included. High efficiency is virtually constant down to 30% output loading. Other features include output short circuit protection, overvoltage protection, remote sensing of primary output, input surge protection and remote on/off control. The 2:1 input voltage ranges are 9 to 18VDC, 18 to 36VDC and 36 to 72VDC. Typical applications for WR-K Series power supplies include telecoms, distributed power systems and industrial automation.

### SPECIFICATION All specifications are typical at nominal input, full load at 25°C unless otherwise stated

| OUTPUT SPECIFICATIONS         |  |   |
|-------------------------------|--|---|
| Voltage accuracy              |  | ±1.0%                                     |
| Voltage adjustability         | Singles and duals, Note 7, 8   | ±10%                                      |
| Remote sense                  | See Note 5, 6  | Yes                                       |
| Line regulation               | HL-LL<br>Triples, -5V output   | ±0.5%, max.<br>±1% max.                   |
| Load regulation<br>Note 3, 11 | FL-0.25%FL<br>Dual output<br>Triples, -5V output   | ±1.0% max<br>±2% max.<br>±5.0% max.       |
| Ripple and noise              | 5Hz to 20MHz   | 75mV pk-pk<br>10mV rms, max.              |
| Transient response            | 25% step load,<br>change   | ±1.0% error band<br>500µs recovery max.   |
| Temperature coefficient       |  | ±0.02%/°C, max.                           |
| Overvoltage protection        | See Note 4   | OVP clamp on<br>all outputs               |
| Short circuit protection      | All outputs  | Continuous<br>automatic recovery          |
| INPUT SPECIFICATIONS          |  |   |
| Input voltage range           | 12VDC<br>24VDC<br>48VDC  | 9 to 18VDC<br>18 to 36VDC<br>36 to 72VDC  |
| No load input current         | Singles, duals at 12Vin<br>Triples at 12Vin<br>Singles, duals at 24 and 48Vin<br>Triples at 24 and 48Vin | 25mA<br>70mA<br>20mA<br>45mA              |
| Input filter                  |  | Pi network                                |
| Reverse voltage protection    | Note 12  | Internal shunt diode<br>Use external fuse |
| Surge protection              |  | Transient clamp                           |

| INPUT SPECIFICATIONS CONTINUED       |  |  |
|--------------------------------------|--|--|
| Remote ON/OFF<br>Logic compatibility |  | CMOS or open collector TTL<br>+5.5VDC min. or open-circuit<br>max. 1.8VDC  |
| E <sub>c</sub> -ON                   |  | 5mA  |
| E <sub>c</sub> -OFF                  |  | 0VDC < E <sub>in</sub> < 9VDC; 100kΩ   |
| Shutdown idle current                |  | Referenced to input minus  |
| Input resistance                     |  |  |
| Control common                       |  |  |
| GENERAL SPECIFICATIONS               |  |  |
| Efficiency                           | See table  | 78%, min.  |
| Isolation voltage<br>See Note 9      | Input/output<br>Input/case   | 500VDC, min.<br>250VDC, min.   |
| Switching frequency                  | Fixed  | 100kHz   |
| Approvals and standards              | Safety   | UL478  |
| Case material                        |  | Black coated aluminium with<br>non-conductive base   |
| Weight<br>(without heatsink)         | Single/dual<br>Triple  | 454g (16.03oz)<br>390g (13.77oz)   |
| MTBF                                 | See Note 10  | 840,000 hours  |
| ENVIRONMENTAL SPECIFICATIONS         |  |  |
| Thermal performance                  | Operating ambient<br>Operating with<br>optional heatsink<br>Operating, case<br>Non-operating amb.<br>Derating above<br>+85°C case<br>Cooling | -25°C to +55°C<br>-25°C to +71°C<br>-25°C to +85°C<br>-55°C to +105°C<br>Linearly to 0 Watts<br>at +100°C<br>Free-air convection<br>cooled or conduction |
| Relative humidity                    | Non-condensing   | 5% to 95% RH   |
| Altitude                             | Operating<br>Non operating   | 10,000 feet max.<br>40,000 feet max.   |
| Vibration, 5Hz to 500Hz              | Pressure   | 2.5G rms (approx.)   |

## 50 to 60 Watt Wide input DC/DC converters

| INPUT VOLTAGE          | OUTPUT VOLTAGE 1 | OUTPUT VOLTAGE 2 | OUTPUT VOLTAGE 3 | OUTPUT POWER | INPUT CURRENT <sup>(1)</sup> | TYPICAL EFFICIENCY | CASE OPTION <sup>(2)</sup> | MODEL NUMBER   |
|------------------------|------------------|------------------|------------------|--------------|------------------------------|--------------------|----------------------------|----------------|
| SINGLE OUTPUT          |                  |                  |                  |              |                              |                    |                            |                |
| 9-18VDC                | 5V@10A           | –                | –                | 50W          | 5.3A                         | 78%                |                            | WR12S05/50K    |
| 9-18VDC                | 12V@5A           | –                | –                | 60W          | 6.3A                         | 80%                | -1, -3                     | WR12S12/60K    |
| 9-18VDC                | 15V@4A           | –                | –                | 60W          | 6.3A                         | 80%                | -1,                        | WR12S15/60K    |
| 18-36VDC               | 5V@10A           | –                | –                | 50W          | 2.7A                         | 78%                | -1, -3                     | WR24S05/50K    |
| 18-36VDC               | 12V@5A           | –                | –                | 60W          | 3.1A                         | 80%                | -1, -3                     | WR24S12/60K    |
| 18-36VDC               | 15V@4A           | –                | –                | 60W          | 3A                           | 80%                | -1                         | WR24S15/60K    |
| 36-72VDC               | 5V@10A           | –                | –                | 50W          | 1.3A                         | 78%                | -1                         | WR48S05/50K    |
| 36-72VDC               | 12V@5A           | –                | –                | 60W          | 1.6A                         | 80%                | -1                         | WR48S12/60K    |
| 36-72VDC               | 15V@4A           | –                | –                | 60W          | 1.6A                         | 80%                | -1                         | WR48S15/60K    |
| DUAL OUTPUT, Note 11   |                  |                  |                  |              |                              |                    |                            |                |
| 9-18VDC                | 5V@5A            | 5V@5A            | –                | 50W          | 5.2A                         | 80%                | -1                         | WR12D05/50K    |
| 9-18VDC                | 12V@2.5A         | 12V@2.5A         | –                | 60W          | 6.1A                         | 82%                | -1                         | WR12D12/60K    |
| 9-18VDC                | 15V@2A           | 15V@2A           | –                | 60W          | 6.1A                         | 82%                | -1                         | WR12D15/60K    |
| 9-18VDC                | 5V@5A            | 12V@2.5A         | –                | 55W          | 5.66A                        | 81%                | -1, -3                     | WR12D05-12/55K |
| 18-36VDC               | 12V@2.5A         | 12V@2.5A         | –                | 60W          | 3.05A                        | 82%                | -1, -3                     | WR24D12/60K    |
| 18-36VDC               | 15V@2A           | 15V@2A           | –                | 60W          | 3.05A                        | 82%                | -1, -3                     | WR24D15/60K    |
| 18-36VDC               | 5V@5A            | 12V@2.5A         | –                | 55W          | 2.83A                        | 81%                | -1, -3                     | WR24D05-12/55K |
| 36-72VDC               | 5V@5A            | 5V@5A            | –                | 50W          | 1.27A                        | 82%                | -1                         | WR48D05/50K    |
| 36-72VDC               | 12V@2.5A         | 12V@2.5A         | –                | 60W          | 1.49A                        | 84%                | -1                         | WR48D12/60K    |
| 36-72VDC               | 5V@5A            | 12V@2.50A        | –                | 55W          | 1.4A                         | 82%                | -1                         | WR48D05-12/55K |
| TRIPLE OUTPUT, Note 11 |                  |                  |                  |              |                              |                    |                            |                |
| 9-18VDC                | +5V@5A           | -12V@1.25A       | +12V@1.25A       | 55W          | 5.72A                        | 80%                | -1                         | WR12T05-12/55K |
| 9-18VDC                | +5V@5A           | -15V@1A          | +15V@1A          | 55W          | 5.72A                        | 80%                | -1, -3                     | WR12T05-15/55K |
| 18-36VDC               | +5V@5A           | -12V@1.25A       | +12V@1.25A       | 55W          | 2.83A                        | 81%                | -1, -3                     | WR24T05-12/55K |
| 18-36VDC               | +5V@5A           | -15V@1A          | +15V@1A          | 55W          | 2.83A                        | 81%                | -1, -3                     | WR24T05-15/55K |
| 36-72VDC               | +5V@5A           | -12V@1.25A       | +12V@1.25A       | 55W          | 1.4A                         | 82%                | -1                         | WR48T05-12/55K |
| 36-72VDC               | +5V@5A           | -15V@1A          | +15V@1A          | 55W          | 1.4A                         | 82%                | -1                         | WR48T05-15/55K |
| 36-72VDC               | +12V@2.5A        | -5V@0.5A         | +5V@5A           | 57.5W        | 1.46A                        | 83%                | -1                         | WR48T12-05/55K |
| 36-72VDC               | +15V@2A          | -5V@0.5A         | +5V@5A           | 57.5W        | 1.46A                        | 83%                | -1                         | WR48T15-05/55K |

### Notes

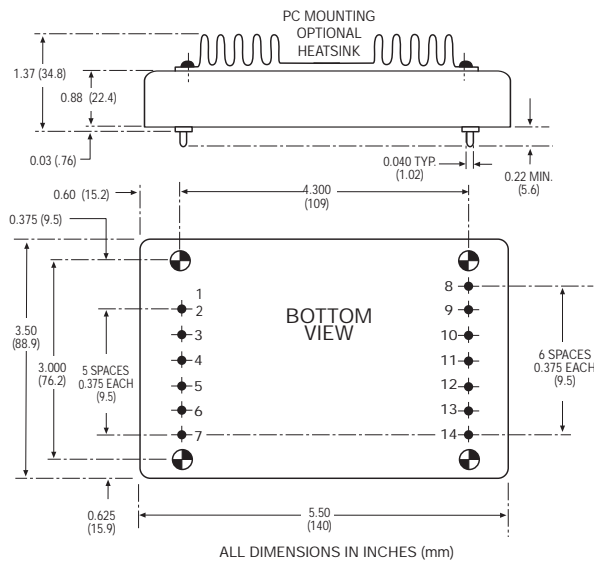
- At nominal input voltage 12, 24 or 48VDC, full load.
- To order the optional heatsink on the PC mount model, add the suffix '-1' to the model number e.g. **WR24D05-12/55K-1**. To order the chassis mount version with barrier terminal strip, add the suffix '-3' to the model number e.g. **WR24D05-12/55K-3**. Limit one option per unit.
- No minimum load required for operation.
- 5V outputs clamped at 6.8V; 12V or 15V outputs clamped at 18V.
- Can compensate for up to 1V drop between converter and load (all single-output versions, and output 1 of dual-output and triple-output versions).
- Remote sense is provided on all singles, and output #1 of duals and triples. If remote sense is not being utilised on single output units, for normal operation pin 14 should be jumpered to pin 10 and pin 12 to pin 8. For dual output units, if remote sense is not being utilised, connect pin 11 to pin 10 and pin 8 to pin 9. Remote sense can compensate up to 1V drop between converter and load.
- Single output models: to trim up connect pin 13 to pin 12 through a 10kΩ resistor; to trim down, connect pin 13 to pin 14 through a 10kΩ resistor.
- Dual output models: the trim facility is provided only for output #2. To trim up connect pin 13 to pin 12 through a 10kΩ resistor; to trim down connect pin 13 to pin 14 through a 10kΩ resistor.
- In many cases, the isolation specification may be upgraded.
- MTBF figures are based on actual product performance.
- The two-stage design of the WR-K Series provides isolation between outputs which means outputs can be referenced as either positive or negative. On dual output models, the outputs can be referenced as positive or negative. On triple output models, the 5V main output is isolated from the auxiliary outputs. No load sharing is possible.
- For reverse input voltage protection, connect an external fuse in series with the input.
- Fixed frequency design provides for easier input filtering and better noise performance.
- Standard specifications are conservative and can be optimised for specific applications. In particular, converter start-up at lower than specified temperature, wider input voltage range, and, output voltage adjustment are all relatively simple modifications to the standard product. Consult factory for details.

### International Safety Standard Approvals

 UL478 File No. E131987 (48V)

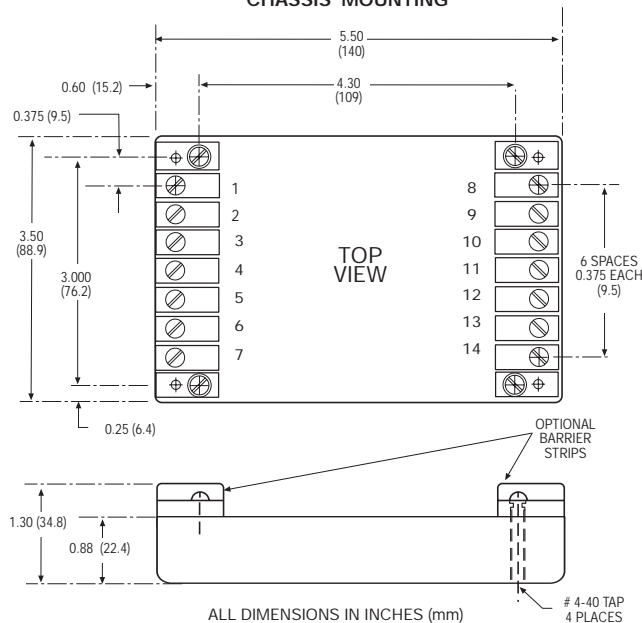
# 50 to 60 Watt Wide input DC/DC converters

| PIN CONNECTIONS (6,7,8) |         |         |         |         |          |            |              |
|-------------------------|---------|---------|---------|---------|----------|------------|--------------|
| TERM                    | SINGLE  | DUAL    | TRIPLE  | TERM    | SINGLE   | DUAL       | TRIPLE       |
| INPUTS                  |         |         |         | OUTPUTS |          |            |              |
| 1                       | No Pin  | No Pin  | No Pin  | 8       | - Output | - Sense 1  | - Sense 1    |
| 2                       | - Input | - Input | - Input | 9       | - Output | - Output 1 | - Output 1   |
| 3                       | - Input | - Input | - Input | 10      | + Output | + Output 1 | + Output 1   |
| 4                       | + Input | + Input | + Input | 11      | + Output | + Sense 1  | + Sense 1    |
| 5                       | + Input | + Input | + Input | 12      | - Sense  | - Output 2 | - Output 2   |
| 6                       | Control | Control | Control | 13      | Trim     | Trim 2     | Common 2 & 3 |
| 7                       | Case    | Case    | Case    | 14      | + Sense  | + Output 2 | + Output 3   |



## CASE K3

### CHASSIS MOUNTING



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