



1500UR series

Single & Dual Output DC/DC Converter



DESCRIPTIONS

The 1500UR series is a family of miniature 15W DC/DC converters specifically designed for board mount power distribution applications where space is critical, but performance and power cannot be sacrificed. Standard features include an ultra-wide 4:1 input voltage range, efficiency as high as 83% and continuous short circuit protection by input current limiting. 14 models operate from (4:1) input voltage ranges of 10 to 40 VDC or 18 to 72 VDC and provide tightly regulated outputs of 3.3, 5, 12, 15, ± 5 , ± 12 or ± 15 VDC. All models are packaged in a compact, low profile 2" X 2" X 0.4" metal case.

OUTPUT CHARACTERISTICS

| | Min | Typ | Max | Unit/Comments |
|----------------------------------|-----|------|------------|---|
| Output Voltage Accuracy | | | | |
| 3.3V Outputs | | | ± 100 | mV ¹ |
| All Other Models | | | ± 1.0 | % ¹ |
| Voltage Balance: | | | | |
| Dual Outputs | | | ± 2.0 | %; Equal Output Loads |
| Voltage Trim Range (Single Only) | | | | |
| 3.3 Vout | | | ± 3.0 | % |
| All Other Models | | | ± 5.0 | %; Output Voltage |
| Line Regulation | | | ± 1.0 | % ² |
| Load Regulation | | | ± 1.0 | % ³ |
| Ripple/Noise | | | | |
| 3.3V Outputs | | 100 | | mV; p-p, Nom.Line FL, 20Mhz B.W. using 1 μ f bypass capacitor |
| All Other Models | | 1.25 | | %; p-p, Nom.Line FL, 20Mhz B.W. using 1 μ f bypass capacitor |
| Short Circuit Protection | | | | Continuous, Automatic Recovery |
| Transient Recovery Time | | 300 | | μ S to within 1% error band for 50% step load change |
| Temperature Coefficient | | | ± 0.02 | % per °C |

¹ = Output voltage at nominal line & FL

² = Output voltage measured from minimum input line to maximum

³ = Output voltage measured from FL to 10% Load

FEATURES

- 6 sided Continuous Shielding
- 4:1 Ultra-Wide Input Voltage Range
- Output Voltage Trim (Single Output only)
- -25°C to +75°C Operating Temperature Range
- Efficiency to 83%
- 1400 VDC Input/Output Isolation
- 9.4W/In³ Power Density

INPUT CHARACTERISTICS

| | Min | Typ | Max | Unit/Comments |
|--------------------------------|-----|------|-----|--------------------|
| Input Voltage | | | | |
| 20 VDC Input Models | 10 | 20 | 40 | VDC |
| 36 VDC Input Models | 18 | 36 | 72 | VDC |
| Input Fuse Requirements | | | | |
| 20 VDC Input Models | | 2000 | | mA; Slow blow type |
| 36 VDC Input Models | | 1000 | | mA; Slow blow type |
| Reverse Polarity Input Current | | | 12 | Amp |
| Input Filter | | | | LC Type |

GENERAL CHARACTERISTICS

| | Min | Typ | Max | Unit/Comments |
|-----------------------|------|-----|-----|--------------------------------------|
| Switching Frequency | 130 | | | kHz |
| Isolation Voltage | 1400 | | | VDC, 1 minute |
| Isolation Resistance | 1000 | | | Mohm, 500VDC |
| Isolation Capacitance | | 100 | | pF, 100kHz, 1Volt |
| MTBF (MIL-HBK-217F) | 865 | | | Thousand Hours, +25°C, Ground Benign |



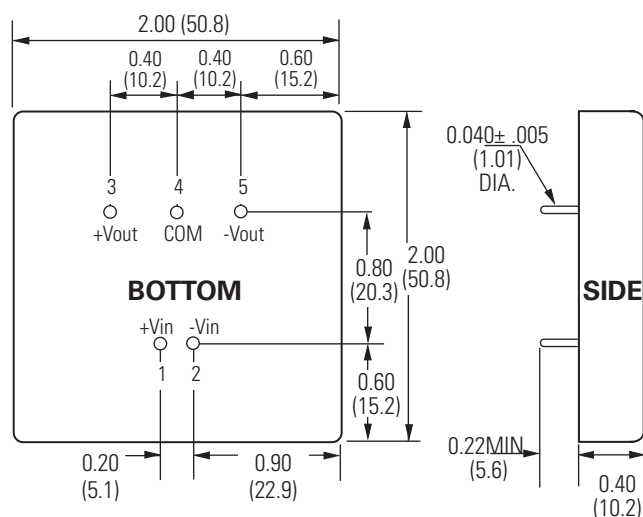
ENVIRONMENTAL SPECIFICATIONS

| | Min | Typ | Max | Unit/Comments |
|-----------------------|-----|-----|------|----------------------------|
| Operating Temp. Range | -25 | | +75 | °C; Ambient |
| Storage Temp. Range | -55 | | +125 | °C |
| Relative Humidity | | | +95 | % Humidity; non-condensing |
| Cooling | | | | Free-Air Convection |

PHYSICAL CHARACTERISTICS

| | Unit/Comments |
|---------------------|---|
| Case Size | 2.0 X 2.0 X 0.4 inches (51.0 X 51.0 X 10.2 mm) |
| Case Material | Coated Metal with Non-Conductive Base |
| Shield Connection | |
| 20 VDC Input Models | Negative Input, Pin 2 |
| 36 VDC Input Models | Positive Input, Pin 1 |
| Flammability | UL94V-0 |
| Weight | 79 Grams |

OUTLINE DRAWING



PIN OUT CHART

| Pins | Single | Dual |
|------|--------|----------|
| 1 | +Vin | + Vin |
| 2 | - Vin | - Vin |
| 3 | + Vout | + Vout |
| 4 | Trim | ± Common |
| 5 | - Vout | - Vout |

Notes:

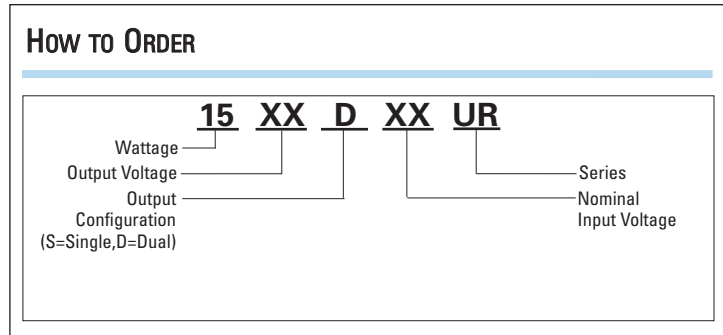
1. Unless otherwise specified dimensions are in inches (mm).

| Tolerances | Inches | mm |
|------------|----------------|--------------|
| | X.XX = ±0.02 | X.X = ±0.5 |
| | X.XXX = ±0.010 | X.XX = ±0.25 |

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 10 microfarad (minimum) capacitor across output is recommended for operation.



How To ORDER



MODEL SELECTION CHART

| Model | Nominal Input Voltage (VDC) | Output Voltage (VDC) | Full Load Output Current (mA) | No Load Input Current (mA) | Full Load Input Current (mA) | Output Over Voltage (V) | Efficiency @ FL (%) |
|-----------|-----------------------------|----------------------|-------------------------------|----------------------------|------------------------------|-------------------------|---------------------|
| 1503S20UR | 20 | 3.3 | 4500 | 40 | 900 | 5.8 | 82 |
| 1505S20UR | 20 | 5 | 3000 | 40 | 900 | 6.8 | 83 |
| 1512S20UR | 20 | 12 | 1250 | 40 | 960 | 15 | 78 |
| 1515S20UR | 20 | 15 | 1000 | 40 | 950 | 18 | 79 |
| 1505D20UR | 20 | ±5 | ±1500 | 40 | 920 | ±6.8 | 81 |
| 1512D20UR | 20 | ±12 | ±625 | 40 | 960 | ±15 | 78 |
| 1515D20UR | 20 | ±15 | ±500 | 40 | 1000 | ±18 | 75 |
| 1503S36UR | 36 | 3.3 | 4500 | 40 | 500 | 5.8 | 82 |
| 1505S36UR | 36 | 5 | 3000 | 40 | 500 | 6.8 | 83 |
| 1512S36UR | 36 | 12 | 1250 | 40 | 510 | 15 | 81 |
| 1515S36UR | 36 | 15 | 1000 | 40 | 500 | 18 | 83 |
| 1505D36UR | 36 | ±5 | ±1500 | 40 | 510 | ±6.8 | 81 |
| 1512D36UR | 36 | ±12 | ±625 | 40 | 520 | ±15 | 80 |
| 1515D36UR | 36 | ±15 | ±500 | 40 | 520 | ±18 | 80 |



OUTPUT VOLTAGE TRIM (1500UR SERIES, SINGLE OUTPUT ONLY)

The converter's output voltage may be trimmed to $\pm 5\%$ of the nominal output voltage.

TRIM UP

Trim output voltage up by connecting an external resistor between Pins 4 and 5. Use the following equation. Reference Table 1 for variable A.

$$R_{adj-up} = \frac{A}{\Delta \%} - 24 \text{ (k}\Omega\text{)}$$

Example:

If we want to trim 5% up for 12V output units, where $A = 1.97$, $\Delta \% = 0.05$

$$R_{adj-up} = \frac{1.97}{0.05} - 24 \text{ k}\Omega = 15.4 \text{ k}\Omega$$

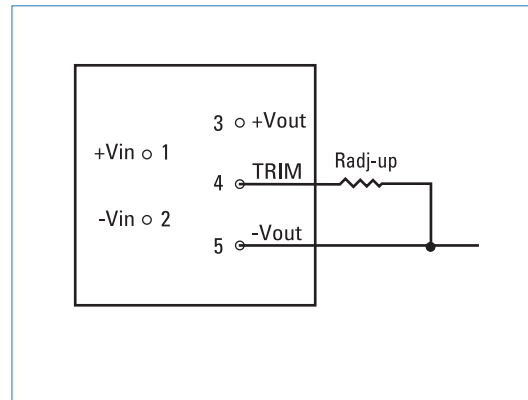


Table 1.

| Output Voltage | A |
|----------------|------|
| 3.3V | 0.75 |
| 5V | 1.25 |
| 12V | 1.97 |
| 15V | 2.07 |

TRIM DOWN

Trim output voltage down by connecting an external resistor between Pins 3 and 4. Use the following equation. Reference Table 2 for variable C and D.

$$R_{adj-down} = \frac{C}{\Delta \%} - D \text{ (k}\Omega\text{)}$$

Example:

If we want to trim 2% down for 5V output units, where $C = 1.25$, $D = 26.5$, $\Delta \% = 0.02$

$$R_{adj-down} = \frac{1.25}{0.02} - 26.5 \text{ k}\Omega = 36 \text{ k}\Omega$$

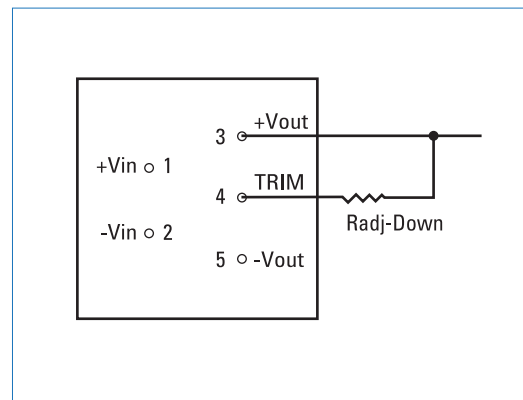


Table 2.

| Output Voltage | C | D |
|----------------|------|------|
| 3.3V | 1.25 | 26 |
| 5V | 1.25 | 26.5 |
| 12V | 7.55 | 33.5 |
| 15V | 10.3 | 36.4 |