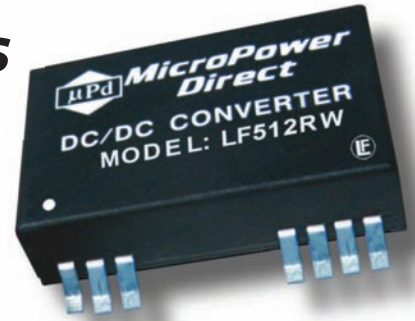


# LF500RW Series



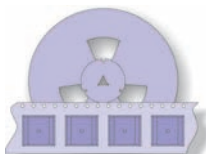
## Wide Input, 5W SMT Single & Dual Output DC/DC Converters

### Key Features:

- 5W Output Power
- Wide 2:1 Inputs
- Miniature SMT Case
- Tight Line/Load Regulation
- 1,500 VDC Isolation
- -40°C to +60°C Operation
- 21 Standard Models
- 1.0 MH MTBF Minimum
- Industry Standard Pin-Out



RoHS Compliant



Tape/Reel Available

### MicroPower Direct

292 Page Street  
Suite D  
Stoughton, MA 02072  
USA

T: (781) 344-8226  
F: (781) 344-8481  
E: sales@micropowerdirect.com  
W: www.micropowerdirect.com



### Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

#### Input

| Parameter                      | Conditions                            | Min. | Typ.  | Max.  | Units |
|--------------------------------|---------------------------------------|------|-------|-------|-------|
| Input Start Voltage            | 12 VDC Input                          | 7.5  | 8.0   | 9.0   | VDC   |
|                                | 24 VDC Input                          | 14.0 | 16.0  | 18.0  |       |
|                                | 48 VDC Input                          | 30.0 | 33.0  | 36.0  |       |
| Reverse Polarity Input Current |                                       |      |       | 1.0   | A     |
| Short Circuit Input Power      |                                       |      | 1,000 | 3,000 | mW    |
| Input Filter                   | π (Pi) Filter (Meets EN55022 Class A) |      |       |       |       |

#### Output

| Parameter                        | Conditions                     | Min. | Typ.  | Max.  | Units    |
|----------------------------------|--------------------------------|------|-------|-------|----------|
| Output Voltage Accuracy          |                                |      | ±0.5  | ±1.0  | %        |
| Output Voltage Balance           | Dual Output, Balanced Load     |      | ±0.5  | ±2.0  | %        |
| Line Regulation                  | For Vin = Min to Max           |      | ±0.1  | ±0.3  | %        |
| Load Regulation                  | I <sub>out</sub> = 20% to 100% |      | ±0.3  | ±1.0  | %        |
| Ripple & Noise (20 MHz) (Note 1) |                                |      | 50    | 85    | mV P - P |
| Ripple & Noise (20 MHz)          |                                |      |       | 100   | mV P - P |
| Ripple & Noise (20 MHz)          |                                |      |       | 15    | mV rms   |
| Output Power Protection          |                                | 115  | 140   | 165   | %        |
| Transient Response Time (Note 2) | 25% Load Step Change           |      | 250   | 500   | μS       |
| Transient Response Deviation     |                                |      | ±2    | ±6    | %        |
| Temperature Coefficient          |                                |      | ±0.01 | ±0.02 | %/°C     |
| Output Short Circuit             | Continuous                     |      |       |       |          |

#### General

| Parameter             | Conditions  | Min.  | Typ. | Max. | Units |
|-----------------------|-------------|-------|------|------|-------|
| Isolation Voltage     | 60 Seconds  | 1,500 |      |      | VDC   |
| Isolation Resistance  | 1,000 VDC   | 1,000 |      |      | MΩ    |
| Isolation Capacitance | 100 kHz, 1V |       | 650  | 750  | pF    |
| Switching Frequency   |             | 200   | 260  | 350  | kHz   |

#### Environmental

| Parameter                   | Conditions          | Min. | Typ. | Max. | Units |
|-----------------------------|---------------------|------|------|------|-------|
| Operating Temperature Range | Ambient             | -40  | +25  | +71  | °C    |
| Operating Temperature Range | Case                | -40  |      | +90  | °C    |
| Storage Temperature Range   |                     | -40  |      | +125 | °C    |
| Cooling                     | Free Air Convection |      |      |      |       |
| Humidity                    | RH, Non-condensing  |      |      | 95   | %     |

#### Physical

|               |   |  |  |  |  |
|---------------|---|--|--|--|--|
| Case Size     | 1.31 x 0.81 x 0.40 Inches (33.4 x 20.6 x 10.2 mm) |  |  |  |  |
| Case Material | Non-Conductive Black Plastic (UL94-V0)            |  |  |  |  |
| Weight        | 0.49 Oz (14g)                                     |  |  |  |  |

#### Reliability Specifications

| Parameter | Conditions                      | Min. | Typ. | Max. | Units  |
|-----------|---------------------------------|------|------|------|--------|
| MTBF      | MIL HDBK 217F, 25°C, Gnd Benign | 1.0  |      |      | MHours |

#### Absolute Maximum Ratings

| Parameter                   | Conditions                   | Min. | Typ. | Max.  | Units |
|-----------------------------|------------------------------|------|------|-------|-------|
| Input Voltage Surge (1 Sec) | 12 VDC Input                 | -0.7 |      | 25.0  | VDC   |
|                             | 24 VDC Input                 | -0.7 |      | 50.0  |       |
|                             | 48 VDC Input                 | -0.7 |      | 100.0 |       |
| Lead Temperature            | 1.5 mm From Case For 10 Sec. |      |      | 260   | °C    |
| Internal Power Dissipation  | All Models                   |      |      | 2,500 | mW    |

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

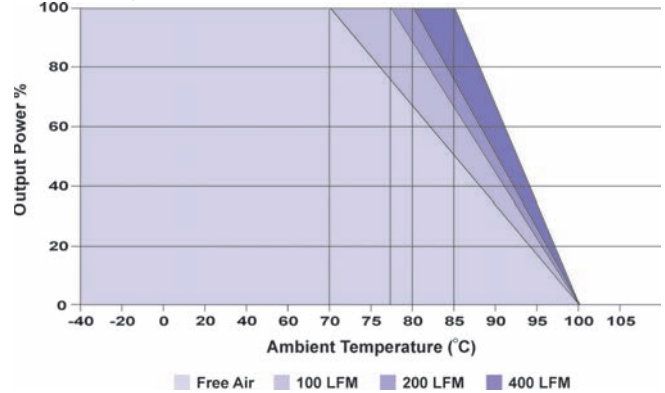
## Model Selection Guide

| Model Number | Input         |             |              |         | Output        |                   |                   | Reflected Ripple Cur. (mA) | Efficiency (% Typ) | Fuse Rating Slow-Blow (mA) |
|--------------|---------------|-------------|--------------|---------|---------------|-------------------|-------------------|----------------------------|--------------------|----------------------------|
|              | Voltage (VDC) |             | Current (mA) |         | Voltage (VDC) | Current (mA, Max) | Current (mA, Min) |                            |                    |                            |
|              | Nominal       | Range       | Full-Load    | No-Load |               |                   |                   |                            |                    |                            |
| LF501RW      | 12            | 9.0 - 18.0  | 434          | 20      | 3.3           | 1,200             | 120.0             | 25                         | 76                 | 1,500                      |
| LF502RW      | 12            | 9.0 - 18.0  | 521          | 20      | 5.0           | 1,000             | 100.0             | 25                         | 80                 | 1,500                      |
| LF503RW      | 12            | 9.0 - 18.0  | 502          | 20      | 12.0          | 417               | 41.7              | 25                         | 83                 | 1,500                      |
| LF504RW      | 12            | 9.0 - 18.0  | 502          | 20      | 15.0          | 333               | 33.3              | 25                         | 83                 | 1,500                      |
| LF505RW      | 12            | 9.0 - 18.0  | 521          | 20      | ±5.0          | ±500              | ±50.0             | 25                         | 80                 | 1,500                      |
| LF506RW      | 12            | 9.0 - 18.0  | 501          | 20      | ±12.0         | ±208              | ±20.8             | 25                         | 83                 | 1,500                      |
| LF507RW      | 12            | 9.0 - 18.0  | 503          | 20      | ±15.0         | ±167              | ±16.7             | 25                         | 83                 | 1,500                      |
| LF511RW      | 24            | 18.0 - 36.0 | 212          | 5       | 3.3           | 1,200             | 120.0             | 15                         | 78                 | 700                        |
| LF512RW      | 24            | 18.0 - 36.0 | 254          | 5       | 5.0           | 1,000             | 100.0             | 15                         | 82                 | 700                        |
| LF513RW      | 24            | 18.0 - 36.0 | 245          | 5       | 12.0          | 417               | 41.7              | 15                         | 85                 | 700                        |
| LF514RW      | 24            | 18.0 - 36.0 | 245          | 5       | 15.0          | 333               | 33.3              | 15                         | 85                 | 700                        |
| LF515RW      | 24            | 18.0 - 36.0 | 254          | 5       | ±5.0          | ±500              | ±50.0             | 15                         | 82                 | 700                        |
| LF516RW      | 24            | 18.0 - 36.0 | 245          | 5       | ±12.0         | ±208              | ±20.8             | 15                         | 85                 | 700                        |
| LF517RW      | 24            | 18.0 - 36.0 | 246          | 5       | ±15.0         | ±167              | ±16.7             | 15                         | 85                 | 700                        |
| LF521RW      | 48            | 36.0 - 75.0 | 106          | 3       | 3.3           | 1,200             | 120.0             | 10                         | 78                 | 350                        |
| LF522RW      | 48            | 36.0 - 75.0 | 127          | 3       | 5.0           | 1,000             | 100.0             | 10                         | 82                 | 350                        |
| LF523RW      | 48            | 36.0 - 75.0 | 123          | 3       | 12.0          | 417               | 41.7              | 10                         | 85                 | 350                        |
| LF524RW      | 48            | 36.0 - 75.0 | 122          | 3       | 15.0          | 333               | 33.3              | 10                         | 85                 | 350                        |
| LF525RW      | 48            | 36.0 - 75.0 | 127          | 3       | ±5.0          | ±500              | ±50.0             | 10                         | 82                 | 350                        |
| LF526RW      | 48            | 36.0 - 75.0 | 122          | 3       | ±12.0         | ±208              | ±20.8             | 10                         | 85                 | 350                        |
| LF527RW      | 48            | 36.0 - 75.0 | 123          | 3       | ±15.0         | ±167              | ±16.7             | 10                         | 85                 | 350                        |

### Notes:

- When measuring output ripple, it is recommended that an external 0.47  $\mu\text{F}$  ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units. For noise sensitive applications, the use of 3.3  $\mu\text{F}$  capacitors will reduce the output ripple.
- Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
- No-load operation will not damage these units, however, they may not meet specifications.
- Dual output units may provide a 10V, 24V or 30V output. To do this, connect the load across the positive (+Vout) and negative (-Vout) outputs and float the output common.
- The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to insure start-up. In this case, it is recommended that a low ESR (ESR < 1.0 $\Omega$  at 100 kHz) capacitor be mounted close to the converter. For 12V input units a 4.7  $\mu\text{F}$  is recommended, and for 24V & 48V units a 2.2  $\mu\text{F}$ .
- It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

### Derating Curve



### Remote ON/OFF

| Parameter             | Condition                           | Units |
|-----------------------|-------------------------------------|-------|
| Supply On             | 2.5 to 5.5 or Open Circuit          | VDC   |
| Supply Off            | -0.7 to 0.8                         | VDC   |
| Standby Input Current | 10                                  | mA    |
| Control Common        | Referenced to Negative Input (-Vin) |       |

### Remote ON/OFF Notes:

- Maximum sink current at the on/off pin (pin 1) during a logic low is 300  $\mu\text{A}$ .
- Maximum allowable leakage current of a switch connected to the on/off terminal (Pin 1) at logic high (2.5V to 100V) is 200  $\mu\text{A}$ .

### Capacitive Load

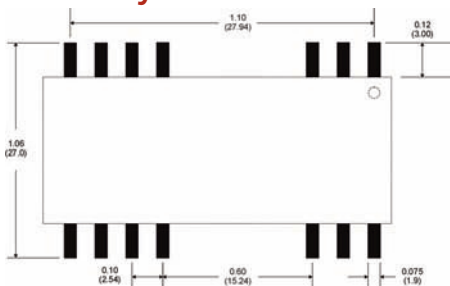
|                     |                   |
|---------------------|-------------------|
| Single Output (Max) | 680 $\mu\text{F}$ |
| Dual Output (Max)   | 100 $\mu\text{F}$ |

### Pin Connections

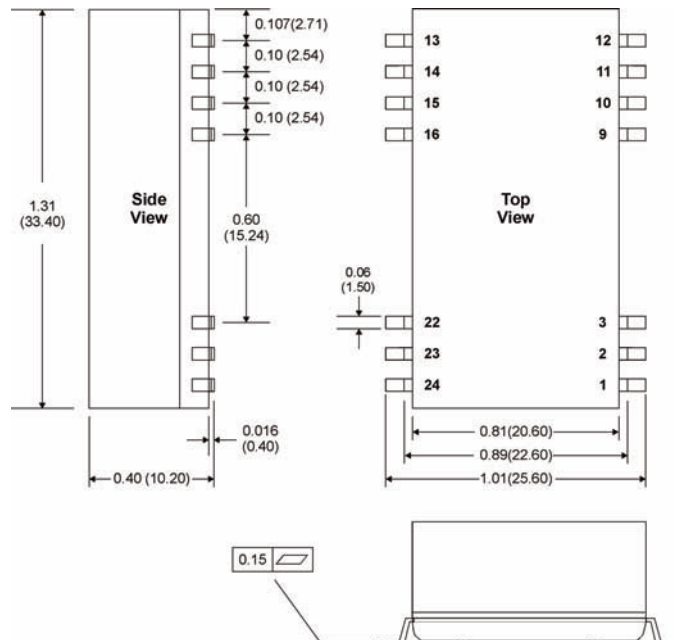
| Pin | Single | Dual   |
|-----|--------|--------|
| 1   | On/Off | On/Off |
| 2   | -Vin   | -Vin   |
| 3   | -Vin   | -Vin   |
| 9   | NC     | Common |
| 10  | NC     | NC     |
| 11  | NC     | -Vout  |
| 12  | NC     | NC     |
| 13  | NC     | NC     |
| 14  | +Vout  | +Vout  |
| 15  | NC     | NC     |
| 16  | -Vout  | Common |
| 22  | +Vin   | +Vin   |
| 23  | +Vin   | +Vin   |
| 24  | NC     | NC     |

NC: No Connection

### Board Layout



### Mechanical Dimensions



### Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx =  $\pm 0.01$  ( $\pm 0.25$ )
- Pin 1 is marked by a "dot" or indentation on the unit



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