

LF500RU Series

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



Key Features:

- 5W Output Power
- Wide 4:1 Inputs
- Miniature SMT Case
- Tight Line/Load Regulation
- 1,500 VDC Isolation
- -40°C to +71°C Operation
- 14 Standard Models
- 1.0 MH MTBF Minimum
- Industry Standard Pin-Out



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	24 VDC Input	7.0	8.0	9.0	VDC
	48 VDC Input	14.0	16.0	18.0	
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	±2.0	%
Output Voltage Balance	Dual Output, Balanced Load		±0.5	±3.0	%
Line Regulation	For VIN = Min to Max		±0.2	±1.0	%
Load Regulation	I _{OUT} = 10% to 100%		±0.3	±1.0	%
Ripple & Noise (20 MHz)	See 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			%
Transient Response Time, See 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 (Autorecovery)				

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			340		kHz

Environmental

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

Physical

Case Size	See Mechanical Diagram (Page 2)				
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
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1			Level 2	

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	24 VDC Input			50.0	VDC
	48 VDC Input			100.0	
Peak Reflow Temperature	See Note 7			245	°C
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.

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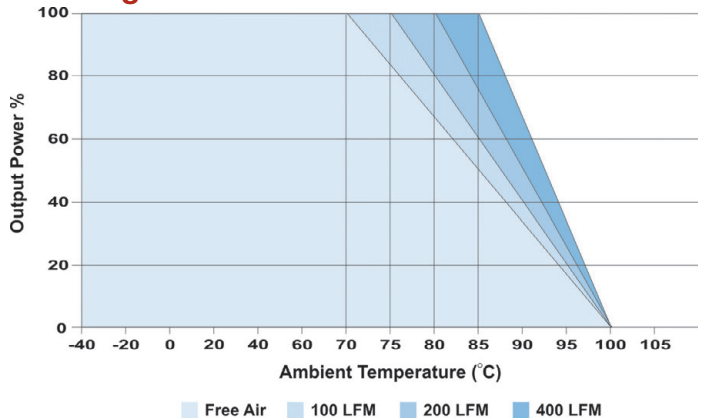
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Model Number	Input				Output			Reflected Ripple Cur. (mA)	Efficiency (% Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Full-Load	No-Load						
LF501RU	24	9.0 - 36.0	217	20	3.3	1,200	120.0	15	76	1,500
LF502RU	24	9.0 - 36.0	260	20	5.0	1,000	100.0	15	80	1,500
LF503RU	24	9.0 - 36.0	251	20	12.0	417	41.7	15	83	1,500
LF504RU	24	9.0 - 36.0	251	20	15.0	333	33.3	15	83	1,500
LF505RU	24	9.0 - 36.0	260	20	±5.0	±500	±50.0	15	80	1,500
LF506RU	24	9.0 - 36.0	251	20	±12.0	±208	±20.8	15	83	1,500
LF507RU	24	9.0 - 36.0	252	20	±15.0	±167	±16.7	15	83	1,500
LF511RU	48	18.0 - 75.0	109	10	3.3	1,200	120.0	10	76	700
LF512RU	48	18.0 - 75.0	130	10	5.0	1,000	100.0	10	80	700
LF513RU	48	18.0 - 75.0	126	10	12.0	417	41.7	10	83	700
LF514RU	48	18.0 - 75.0	125	10	15.0	333	33.3	10	83	700
LF515RU	48	18.0 - 75.0	130	10	±5.0	±500	±50.0	10	80	700
LF516RU	48	18.0 - 75.0	125	10	±12.0	±208	±20.8	10	83	700
LF517RU	48	18.0 - 75.0	126	10	±15.0	±167	±16.7	10	83	700

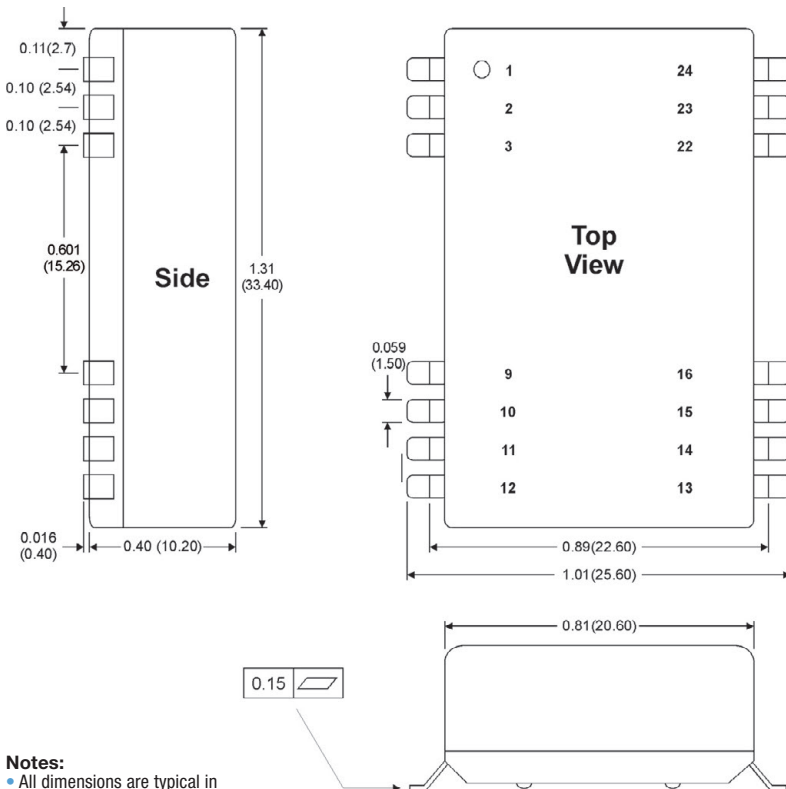
Notes:

- When measuring output ripple, it is recommended that an external 0.47 μ 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 μ 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 Ω at 100 kHz) capacitor be mounted close to the converter. For 24V input units a 4.7 μ F is recommended, and for 48V units a 2.2 μ F.
- Maximum capacitive load for 3.3V & 5V units is 2,000 μ F, for 12V units 470 μ F, for 15V & ±12V units 330 μ F, for ±5V units 680 μ F, and for ±15V units 220 μ F.
- The recommended reflow settings are a peak temperature of 245 °C for a maximum period (T_{PK}) of 10S and a time above liquidous (T_L) of <60 seconds at 217 °C. For more information, please contact the factory.
- 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



Mechanical Dimensions



Notes:

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

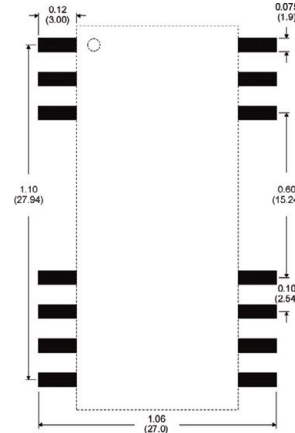
Remote ON/OFF

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 μ 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 μ A.

Board Layout



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



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