



UNIPOWER
CORPORATION

WORLD CLASS
POWER
SOLUTIONS

PRICE: \$25.00

**L SERIES: LOW COST
POWER FACTOR CORRECTED
375 WATT SWITCHERS**

Manual No. L-1296-0

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1.0 INTRODUCTION

- 1.1 This Operating Manual should be read through carefully before installing and operating the L Series switching power supplies.
- 1.2 The L Series switching power supplies feature 375 watts output power in a compact size with power factor correction. See Figs. 1 and 2.

The series is designed as a low-cost, medium-power, multi-output power supply incorporating power factor correction for use in high-volume OEM applications. To keep costs low, the series uses a single-board design with two small, vertical, surface-mount control cards. Power density is up to 3.9W/cubic inch.

The models come in four versions. The standard version is an open-frame unit. Optional configurations include an open-board unit (without aluminum frame), a top-fan unit with cover, and an end-fan unit with cover. The open-board and open-frame units require external cooling.

Standard features of the L Series include power factor correction to 0.99 by means of high-frequency boost topology, universal input voltage range of 90 to 264VAC, and Level A EMI input filter. Power factor correction results in significantly lower AC RMS input current and low AC harmonic input currents that meet EN61000-3-2. Options include Level B EMI filter, inhibit control and DC power good, no-load operation on main output, and current sharing on V1 and V2 outputs.

For a complete description and specifications see the data sheet in the appendix.

2.0 SAFETY WARNINGS

- 2.1 This switching power supply has hazardous external and internal voltages. It should be handled, tested and installed only by qualified technical persons who are trained in the use of power supplies and are well aware of the hazards involved.
- 2.2 The AC input terminals are at hazardous voltage potentials. Do not touch this area when AC power is applied.
- 2.3 When operating this power supply, the AC input ground terminal must be connected to safety ground to minimize electrical shock hazard and to ensure low EMI (electromagnetic interference).

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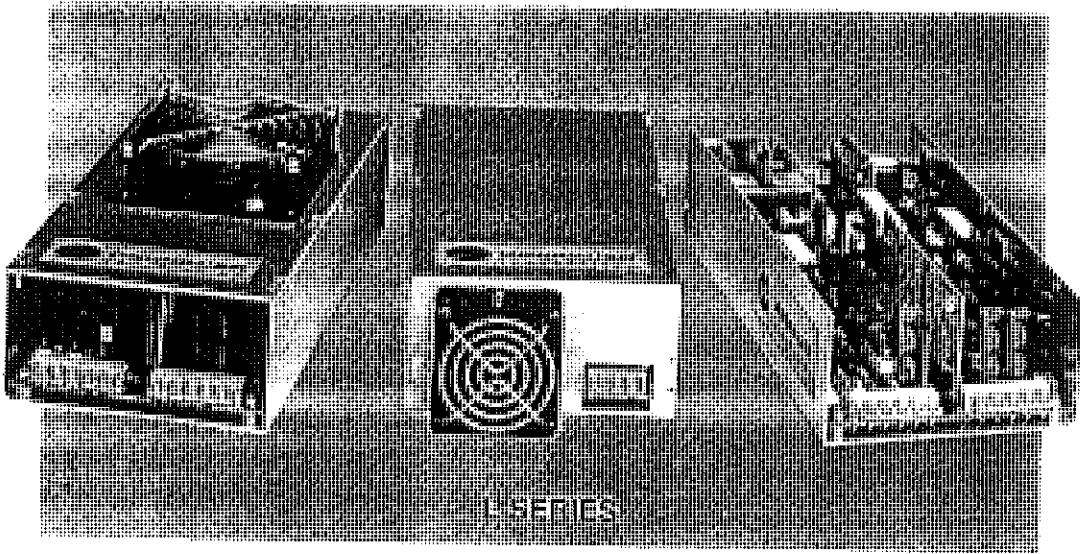


Figure 1. Three Versions of L Series: Top Fan, End Fan and Open Frame.

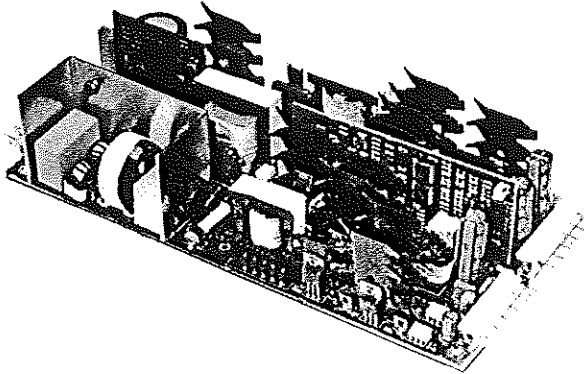


Figure 2. Open Board Version of L Series.

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- 2.4 The internal voltages are at hazardous potentials. If covered, the power supply cover should not be removed. There are no user-serviceable components in this unit. Removing the cover will void the warranty.

3.0 WARRANTY POLICY

ALL PRODUCTS of UNIPOWER Corporation are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance. This warranty is extended directly by the manufacturer to the buyer and is the sole warranty applicable. EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, THE MANUFACTURER MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As the sole and exclusive remedy under this warranty, the manufacturer, at its option, may repair or replace the non-conforming product or issue credit, provided the manufacturer's inspection establishes the existence of a defect. To exercise this remedy, the buyer must contact the manufacturer's Customer Service Department to obtain a Return Material Authorization number and shipping instructions. Products returned without prior authorization will be returned to buyer. Freight charges incurred in returning the defective products will be paid by UNIPOWER. Charges incurred in returning the material will be paid by the buyer. If the buyer fails to fully comply with the foregoing, the buyer shall not be entitled to any allowance or claim with respect to such product. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property or any other incidental or consequential losses) shall be available to the buyer.

4.0 UNPACKING AND INSPECTION

- 4.1 This L Series Power Supply was carefully tested, inspected and packaged for shipment from our factory. Upon receipt of the unit, it should be carefully unpacked and inspected for any damage in shipment. The final acceptance test report is included with each power supply.
- 4.2 If there is evidence of damage, do not attempt to test the unit. The freight carrier should be notified immediately, and a claim for the cost of the power system should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing materials as evidence of damage for the freight carrier's inspection.

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- 4.3 UNIPOWER Corporation will cooperate fully in case of any shipping damage investigation.
- 4.4 Always save the packing materials for later use in shipping the unit. Never ship the power system without proper packing.

5.0 DESCRIPTION OF OPERATION

- 5.1 **General.** The L Series employs a non-modular design on a single circuit board with two small, vertical control cards. See Fig. 3. The design incorporates an EMI input filter (Level A or B) and a high-frequency power factor correction (PFC) circuit operating at 100 kHz. The EMI input filter suppresses line noise and high frequency transients both from the AC power line and from the power supply to the line. The universal input voltage range is 90 to 264VAC continuous for worldwide operation.
- 5.2 **Power Factor Correction.** The PFC circuit achieves a 0.99 power factor by modifying the input current waveform from a series of high-amplitude current pulses into a much lower amplitude sine wave. This results in a much lower RMS input current for a given output power level. It also substantially reduces the harmonic content of the input current to the power supply.
- 5.3 **V1 and V2 Outputs.** The PFC circuit produces an output of approximately 385VDC which goes to a half-bridge power converter employing MOSFET switches. The power converter operates at 100 kHz in synchronism with the PFC circuit. The output of the power converter is a 24V amplitude pulse train which is then rectified and filtered. A switching regulator, also operating at 100 kHz in synchronism with the PFC circuit, then regulates the voltage to the V1 output level (5VDC for the standard output) or to the V2 output level (12VDC for the standard output). The V1 and V2 outputs have their returns connected together.
- 5.4 **V3 and V4 Outputs.** The V3 and V4 outputs are independent, low current outputs which are derived from a high-frequency transformer operating off the half-bridge power converter. The outputs of this transformer are rectified and filtered, then regulated by linear regulators.

6.0 FRONT AND REAR PANEL DESCRIPTIONS

- 6.1 The front panel view of the L Series is shown in Fig. 4. The case types are designated as follows and shown in Figs. 1 and 2:

Standard	Open Frame
Option M	Top-Mounted Fan with Cover
Option N	End-Mounted Fan with Cover
Option O	Open-Board Version

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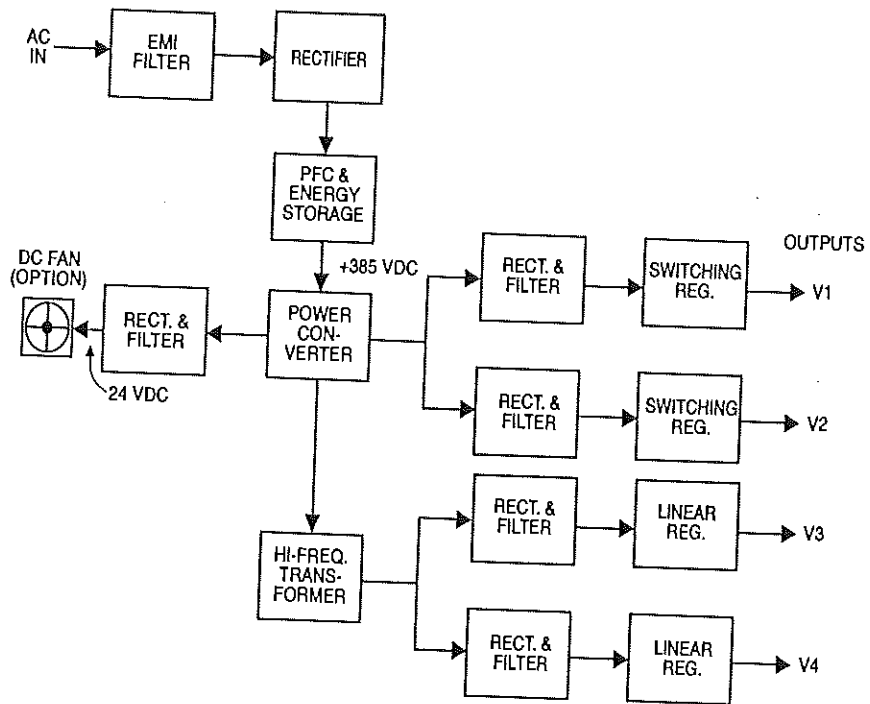


Figure 3. L Series Block Diagram.

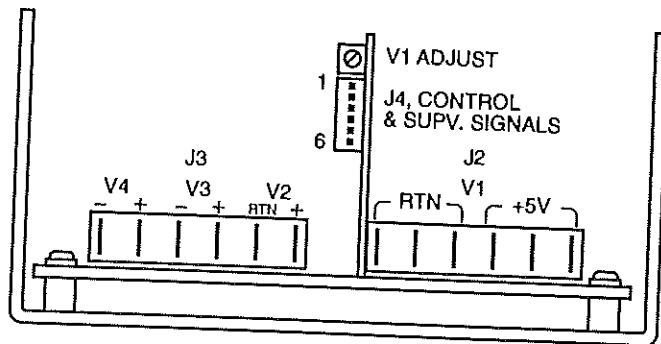


Figure 4. L Series Front View.

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- 6.2 The high-current V1 output is on J2, a 4-terminal LMI connector with quick-connect tab terminals. There are three paralleled +5V output terminals and three paralleled returns for V1. The high-current V2 output and the low-current V3 and V4 outputs are on J3, an identical LMI connector.
- 6.3 AC line, neutral and ground input connections are made to J1, a 4-terminal LMI connector. This connector is located at the rear of the power supply. See Fig. 7.
- 6.4 On the front of the power supply on the vertical control card, above each set of terminals, is a 6-pin connector for control and supervisory signals. This connector has standard 25 mil (0.6mm) square pins on 0.1 inch (2.5mm) centers. Mounted above this connector is the V1 voltage-adjustment potentiometer.

7.0 AVAILABLE OUTPUTS

- 7.1 The main output is 5 VDC and is adjustable over $\pm 5\%$. Note that the main output (V1) must have a minimum 5% load. 12, 24 or 48 VDC main outputs are also available on special order; consult the factory on this. The other outputs are fixed voltages with tolerances shown below:

V2	$\pm 3\%$
V3 & V4	$\pm 5\%$

- 7.2 The following table gives the output voltages and currents for each standard model.

STANDARD MODELS

MAX. WATTS	MODEL NUMBER	OUTPUT V1	OUTPUT V2	OUTPUT V3	OUTPUT V4
375	LF2300	+5V, 45A	+12V, 14.5A	-	-
	LF2303	+5V, 45A	+12V, 12.5A	-	12V, 2A
	LF2323	+5V, 45A	+12V, 12.5A	5V, 5A	12V, 2A
	LF2353	+5V, 45A	+12V, 12.5A	24V, 1A	12V, 2A

- NOTES:**
1. Maximum continuous total output power must not exceed 375 watts.
 2. 12, 24 or 48V main outputs are available. Consult factory.

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8.0 DESCRIPTION OF FEATURES AND OPTIONS

FEATURE/OPTION	DESCRIPTION
Safety Agency Approvals	UL1950; CSA22.2 No. 950; EN60950.
Turn-On Time	Less than one second from AC turn-on.
EMI Input Filter	Standard input line filter meets FCC and EN level A specifications. An optional filter, Option B, is available and meets EN level B requirements.
AC Undervoltage Protection	Power supply is protected for all conditions below low line voltage.
Thermal Protection	Power supply shuts down when the internal temperature reaches an excessive value. It automatically recovers when the AC input is cycled off and then on.
Isolated Outputs	V3 and V4 outputs are isolated from each other and from ground. V1 and V2 have common returns but are isolated from the other outputs and ground. The outputs can be referenced up to $\pm 400V$ with respect to ground or another isolated output.
Remote Sense	Remote sense is provided on the main output. Connecting the remote sense leads provides regulation at the point of load. Total external voltage drop from the DC output to the sense points can be up to 250mV for each sense lead. The outputs are open-sense protected.
Output Current Limiting and Short Circuit Protection	All outputs are short-term overload and short-circuit protected.
Overvoltage Protection	On main output (V1), OVP operates at 5.5 to 6.5V. The power supply shuts down and must be reset by cycling the AC input off and then on.
Reverse Voltage Protection, V1 & V2	To 100% of rated output current, maximum.
AC Power Fail	A TTL LO provides an advance warning of 3 msec. before the main output drops by 5% after an input power failure.
Class B EMI Filter (Option B)	With this option the power supply input EMI filter meets EN level B specifications.

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FEATURE/OPTION	DESCRIPTION
Inhibit and DC Power Good (Option D)	A short provided at the inhibit input turns off all power supply outputs, and an open turns them on. This input is referenced to the return (pin 4). The DC Power Good output goes to TTL HI when all outputs are at 90% of nominal value or higher.
No Load Operation on V1 (Option E)	With this option the main output (V1) can be operated down to zero load current instead of the normal minimum of 5% of full load.
Current Sharing (V1 & V2) (Option F)	V1 and V2 outputs can current share with identical outputs of another L Series power supply. Passive current sharing is employed.
Top-Mounted Fan with Cover (Option M)	Cooling fan and cover are mounted on top of power supply. See Figs. 1 and 5.
Rear-Mounted Fan with Cover (Option N)	With this option the power supply has a cover and the fan is mounted at the rear of the case. See Figs. 1 and 5.
Open-Board Version (Option O)	This option is an L Series without the aluminum frame.

9.0 OPERATING INFORMATION

9.1 **Input Voltage.** The L Series switching power supplies operate on standard 115VAC or 220-240VAC input voltages. The universal input voltage range (90-264VAC) accepts worldwide AC inputs. The connections are made to LMI quick-connect tab terminals.

9.2 **Outputs.** The output power connections are made to LMI quick-connect tab terminals. See Fig. 4. For the main output V1, the three right terminals are all +5V and the three left ones are the return.

The connecting wires for all outputs should be sized to carry the rated output current plus 30%. Connecting fast-on tabs must be clean and securely connected to the terminals to reduce contact resistance. All outputs should have a 0.1uF ceramic capacitor and 10uF electrolytic capacitor in parallel across each output at the backplane, connection point, or point of load to prevent noise pickup.

9.3 **Output Power.** The L Series has a maximum output power rating of 375 Watts. The ratings of the individual outputs when totaled, however, exceed this value. See the table of standard models in Section 7.2. **The continuous output power from all outputs must not exceed 375 Watts.**

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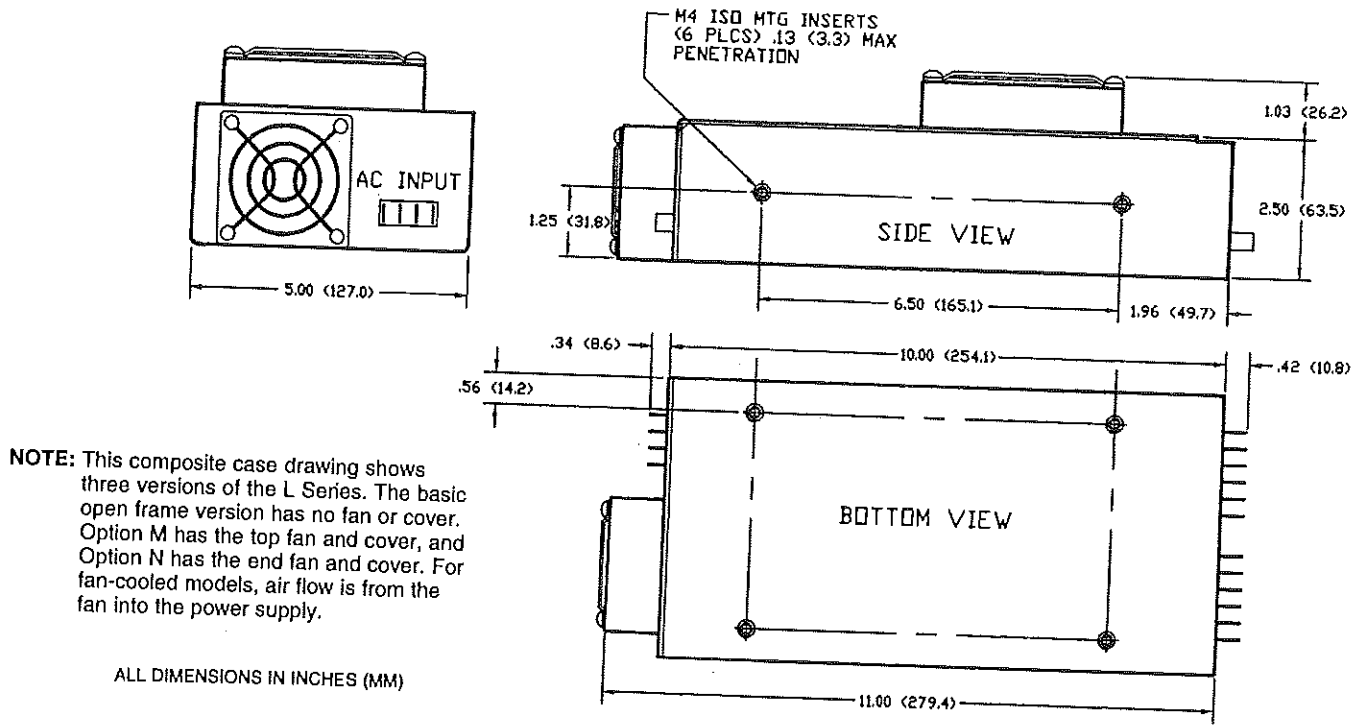


Figure 5. Composite L Series Case Drawing.

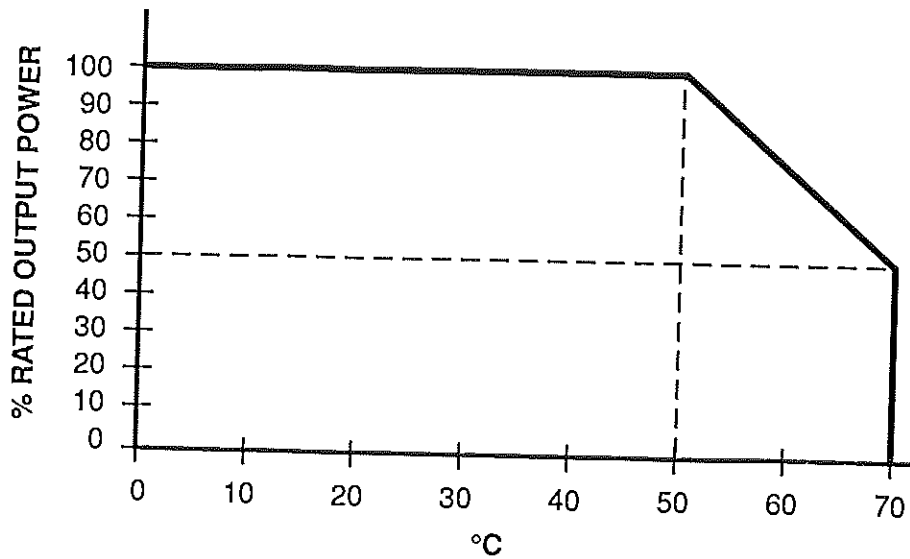


Figure 6. Output Power vs. Ambient Temperature.

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The maximum continuous output power of the power supply may be drawn at up to 50°C ambient temperature. Above 50°C the output must be derated at 2.5%/°C. See Fig. 6. The maximum operating temperature is 70°C, at which the maximum output power is 50% of rated power. For the standard open-frame or open-board versions, an air flow of 400 LFM min. across the length of the power supply must be maintained for proper cooling. The air should flow from rear to front (AC end to DC end) of the power supply.

- 9.4 **Remote Sensing.** Remote sense connections for the main output are made to pins 1 and 2 of the J4 connector.

The remote sense feature is used to regulate the output voltage at the point of load. The + Sense is connected to the + output at the load, and the – Sense is connected to the – output at the load. The sense leads should be a twisted pair to minimize noise pickup. The outputs can compensate for a total maximum voltage drop in the power leads of 500mV, or 250mV on each lead. Sense leads can be No. 22 or 24 AWG wire but should not exceed 10 feet (3 meters) in length. If remote sensing is not required, the sense terminals should be connected directly to the proper DC output terminals for local sensing.

- 9.5 **Control and Supervisory Signals.** The control and supervisory signals are accessible at the terminals of J4. The terminals are for Remote Sense, Inhibit, DC Power Good and AC Power Fail. The inputs and outputs that are used must have external 0.1uF ceramic capacitors across them to prevent noise pickup. For a description of each function see Section 11, “Description of Control and Supervisory Signals.”

- 9.6 **Current Sharing (Paralleled Outputs).** Two or more L Series units may have their V1 and V2 outputs connected in parallel to current share if the outputs have identical voltage and current ratings. Current sharing is done by passive means.

The current share function is implemented by first adjusting the main (V1) output voltages which are to be current shared to within $\pm 0.5\%$ of each other. This is required to balance the output currents as closely as possible. Then with the power off, V1 and V2 outputs are connected in parallel with remote sense leads connected to V1. After this, the V1 output voltages should not be adjusted since it will cause an imbalance in output currents. AC power may then be applied.

- 9.7 **Output Voltage Adjustment.** The main output voltage is independently adjustable by means of a potentiometer located above J4 and is adjustable over $\pm 5\%$. See Fig. 4. No output should be continuously operated beyond its current rating or power rating, and the total output power of all outputs must not exceed the maximum rating of the power supply. See the table in Section 7.2.

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9.8 **AC Power Fail Signal.** This signal on pin 6 of J4 is a warning signal for the loss of AC power. It is a TTL output signal which gives at least a 3 millisecond warning before the main output voltage drops by 5% due to loss of AC input power.

10.0 CONTROL & SUPERVISORY SIGNAL CONNECTIONS

The connections for the control and supervisory signals are shown in Fig. 4. Following are the pin designations:

CONNECTOR J4

PIN	FUNCTION
1	V1 - Sense
2	V1 + Sense
3	Inhibit
4	Return
5	DC Power Good
6	AC Power Fail

NOTE: The Control and Supervisory Signal connector J4 has standard 25 mil. (0.6mm) square, 0.1 inch (2.5mm) center pins.

CONNECTOR:

MATE:

J4, Molex 22-28-1064

Molex 2695, 4455, 6471, 7720, 7880 or 40555 Series

11.0 DESCRIPTION OF CONTROL AND SUPERVISORY SIGNALS

CONNECTOR J4

SIGNAL	PIN	DESCRIPTION
- Sense + Sense	1 2	These pins should be connected to the - output and + output, respectively, at the point of load. Total external voltage drop from the DC outputs to the sense points can be up to 250mV for each sense lead. The outputs are open-sense protected.
Inhibit (Input)	3	All power supply outputs are controlled by this input. A short to the Return (pin 4) turns the outputs off, and an open turns them on.
Return	4	This is the reference for the Inhibit, DC Power Good and AC Power Fail Signals.

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SIGNAL	PIN	DESCRIPTION
DC Power Good (Output)	5	This output goes to TTL HI when all outputs are at 90% of nominal value. A TTL HI sources 5mA and a TTL LO sinks 15mA.
AC Power Fail (Output)	6	A TTL LO (sinks 15mA) at this output provides an advance warning of 3 msec. before the main output drops by 5% after an input power failure. This output is the open collector of an NPN transistor. An external pull-up resistor must be provided. A value of 2K is satisfactory for most applications; the minimum permissible value is 330 ohms.

12.0 INSTALLATION

12.1 Mounting. See Fig. 5. The L Series has four threaded mounting inserts on the bottom and two on the side of the chassis. The inserts accept M4 screws with maximum penetration of 0.13 inch (3.3mm). Maximum torque on these screws is 9 in.-lbs. This mounting applies to the three versions with the aluminum frame: the open-frame version, top-fan version and end-fan version. For the open-board version there are six 0.156 inch diameter mounting holes for mounting the unit on standoffs. See Fig. 8 for the dimensions.

12.2 Cooling. The L Series open frame and open board (Option O) models must be cooled by means of a 400 LFM minimum air flow across the length of the power supply from rear to front. The M and N options are self-cooled by DC ball-bearing fans. Air flow is from the fan into the power supply. To ensure proper cooling, the power supply requires a minimum clearance of 1 inch (25mm) between all air intakes and outlets, and other surfaces.

12.3 Input Connections. See Fig. 7. AC input connections are made on LMI 117 304 01 connector with 1/4 inch quick-connect tab terminals. AC connections are made at the rear of the power supply. An 207.204.00.000 mating connector may also be used.

A three-wire AC line and plug must be used for the AC power connection with proper connection made to line, neutral and safety ground terminals. The proper line cord wire size must be used: no. 14 AWG is recommended.

12.4 Output Connections. Connections to the main output (V1) are made to an LMI 117 306 01 connector by means of 1/4 inch quick-connect tab terminals. An LMI 207.206.00.000 mating connector may also be used. The connections must be secure, and the terminals must be clean to reduce contact resistance. The wires must be of correct size to carry the rated output current plus 30%. The main output (V1) must have a 5% minimum load connected to it.

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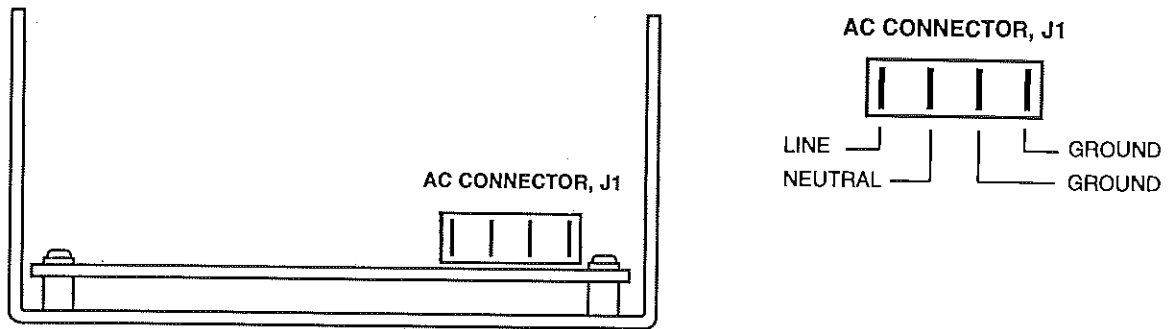
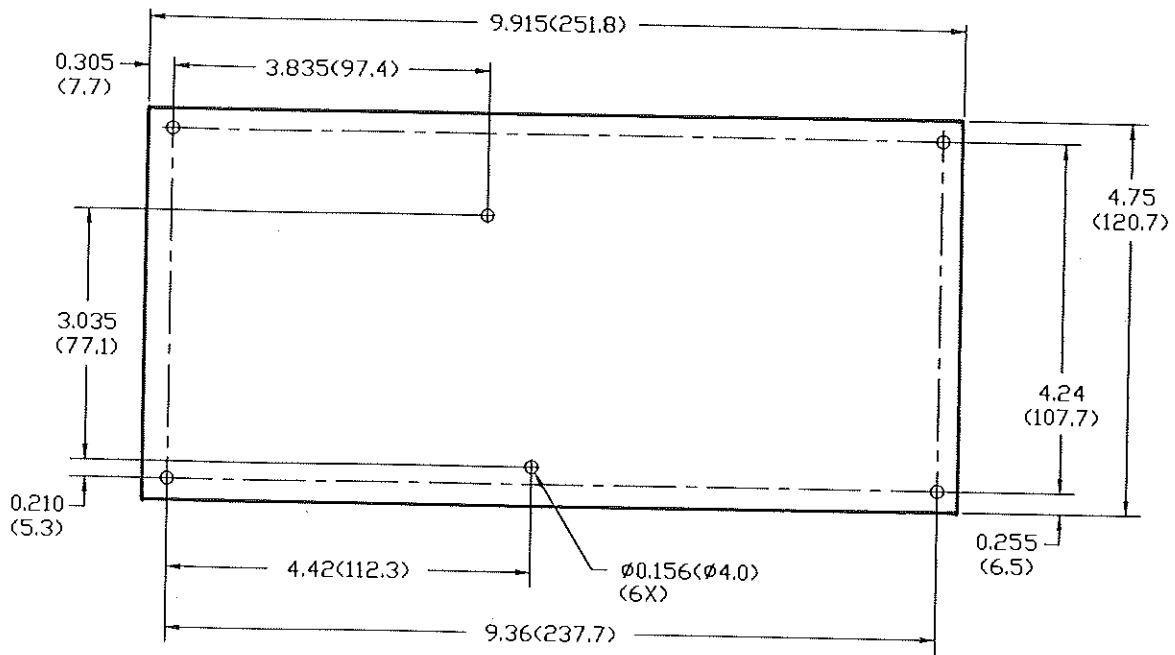


Figure 7. L Series Back View with AC Input Connector.



ALL DIMENSIONS IN INCHES (MM)

Figure 8. Mounting Dimensions for Open Board Version of L Series.

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Connections to V2, V3 and V4 are also an LMI 117 306 01 connector. The mating connector is the same as above. The connections should be clean and secure to reduce contact resistance, and the wire size must be able to carry the rated output current plus 30%.

- 12.5 **Control and Supervisory Signal Connections.** These connections are made to the J4 Molex 22-28-1064 connector by means of a standard connector with 25 mil square receptacles on 0.1 inch centers. Mating connectors are Molex 2695, 4455, 6471, 7720, 7880 or 40555 series. See Fig. 4 and Section 10.0.

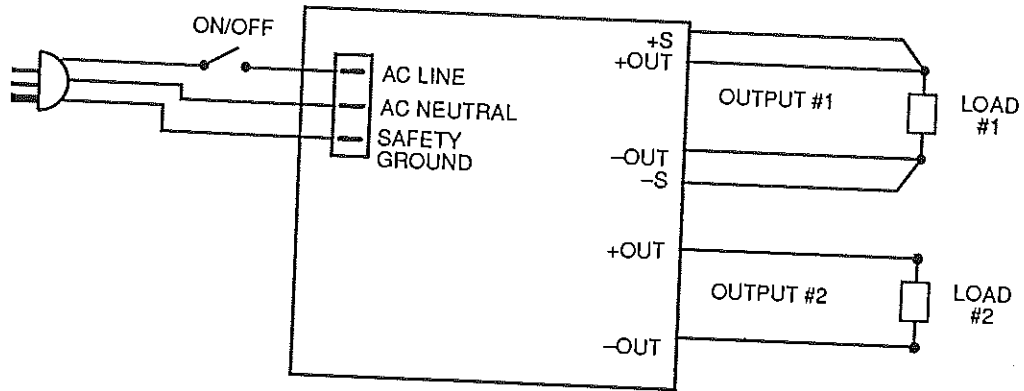
13.0 MAINTENANCE

No routine maintenance is required on the L Series power supplies except for periodic cleaning of dust and dirt around the fan intake on fan-cooled models or the circuit board and chassis on the other models. A small vacuum nozzle should be used for this. The power supply cover should not be removed, and AC power should be disconnected when cleaning.

14.0 POWER SUPPLY SETUP AND TESTING

- 14.1 **AC Power Connection.** Connect the AC power cord to the AC input terminals. See Fig. 7. Be sure to use a three-wire connection to the proper terminals including the safety connection. Do not plug in the AC power cord yet. See Fig. 9.
- 14.2 **Remote Sense Local Connection.** Connect the remote sense leads, with proper polarity, directly to the main output (V1) terminals on the front panel of the power supply. See Section 9.4. Make sure that the Inhibit input (pin 3 of J4) is left open. Connect a 50% load to each output.
- 14.3 **Output Voltage Check.** Plug the AC power cord into the wall socket and measure the main output voltage with a digital voltmeter to see that it is the correct value. The voltage should be within $\pm 0.5\%$ of nominal value as set at the factory. If a more precise value is required, adjust the V1 voltage-adjustment potentiometer. A clockwise adjustment increases the output voltage. Check voltages V2, V3 and V4 with the digital voltmeter to see that they are within specified values. V2 should be within $\pm 3\%$ of nominal value and V3 and V4 should be within $\pm 5\%$. See Section 9.7. Unplug the AC power cord.
- 14.4 **Current Sharing.** If the outputs are to be current shared (connected in parallel), follow the instructions in Section 9.6.
- 14.5 **Final Testing with Remote Sense and Loads.** With the AC input unplugged, connect the desired load to each output and connect the remote sense leads to the load points as described in Section 9.4. There must be a 5% minimum load on the

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NOTE: Remote sense leads (+S & -S) should be twisted to minimize noise pickup.

Figure 9. Connections for Setup and Testing.

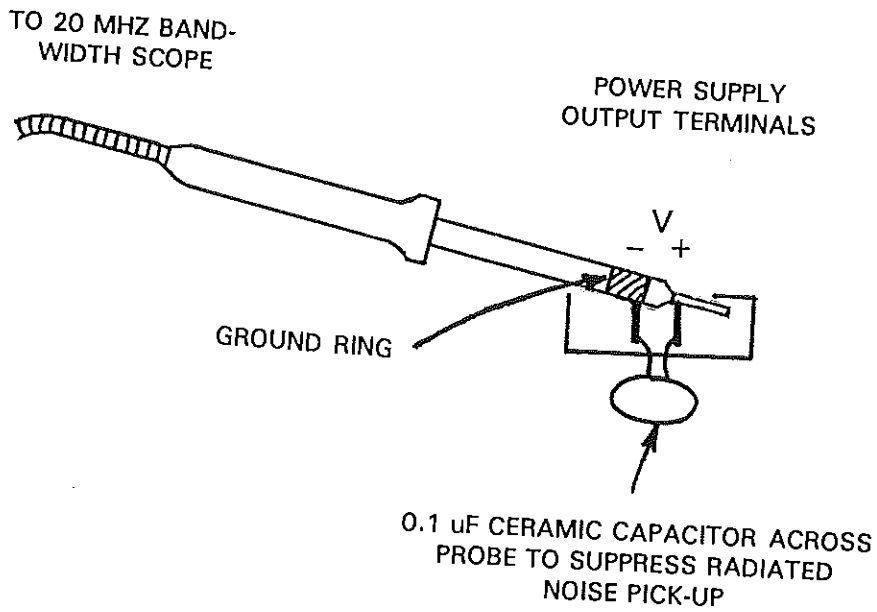


Figure 10. Output Ripple and Noise Measurement.

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main output unless the unit has Option E (no-load operation on V1). Plug the AC power cord into the wall socket and re-check the output voltages at the sense points with a digital voltmeter. These readings should be nearly the same as before, within the regulation specification for the outputs.

15.0 TROUBLE SHOOTING GUIDE

15.1 If you encounter difficulty and do not get the proper output voltages, go through the following trouble shooting guide.

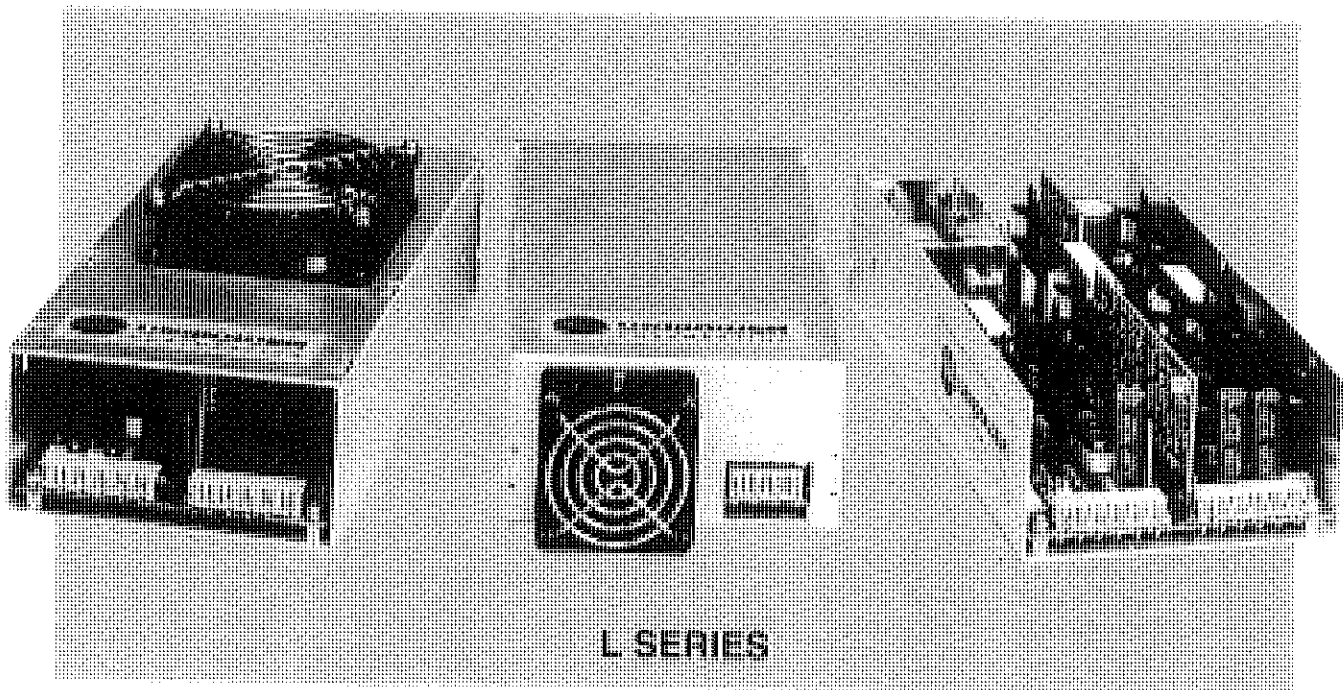
SYMPTOM	POSSIBLE CAUSE	ACTION TO TAKE
No output (all outputs).	No AC input.	Check connection to AC power
No output (one output).	Shorted output.	Remove short.
No output. (one or all outputs).	Overvoltage protection (OVP) is engaged.	Remove overvoltage condition on output. Cycle AC input off and then on.
No output (all outputs).	Overtemperature protection is activated.	Check to see that power supply is being properly cooled. Cycle AC input off and then on.
No output (all outputs).	Output is turned off by Inhibit control.	Check to see if pin 3 of J4 is shorted. It should open.
Output higher than nominal value (any output).	Remote sense leads not connected at main output (V1).	Connect sense leads as instructed in Section 9.4.
Noisy output voltages or poor regulation.	External pickup in sense leads.	Twist or shield sense leads and re-route away from noise source. Connect capacitors as instructed in Section 9.2.

15.2 If none of these actions solves the problem, call the UNIPOWER factory for help and try to resolve the problem over the telephone. If this is not successful, request an RMA (Return Material Authorization) number and return the power supply to UNIPOWER. Be sure to pack the unit carefully in the original packing material, if possible. UNIPOWER will fax a form to be filled out and returned with the unit. The unit may be shipped freight collect to UNIPOWER.

15.3 If output ripple and noise measurements are made, they should be done as shown in Fig. 10. An oscilloscope with 20 MHz bandwidth should be used. Remove the ground lead from the scope probe. Connect a 0.1 μ F ceramic capacitor across the output terminals as close as possible to the terminals. Then measure the output noise with the tip of the probe on the + output terminal and the probe ground ring on the - output terminal as shown in the figure. The ceramic capacitor across the output suppresses radiated noise pickup.

Low Cost, PF CORRECTED 375 WATT SWITCHERS

- ▲ Open Frame or Open Board
- ▲ Top Fan or End Fan Cooled
- ▲ For OEM High Volume



FEATURES

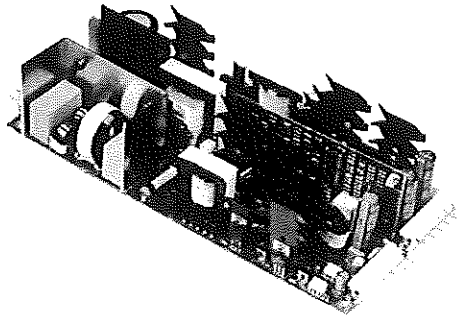
- ▶ 0.99 Power Factor
- ▶ Up to 3.9 W/Cu. Inch
- ▶ 5V, 45A Main Output
- ▶ 2 to 4 Outputs
- ▶ Universal Input, 90-264 VAC
- ▶ Class A or B EMI Filter
- ▶ Single Board Design
- ▶ PowerSpeed 5-Day Delivery



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GENERAL DESCRIPTION

UNIPOWER's new L Series switching power supplies feature 375 watts output power in a compact size with power factor correction. The units have up to four outputs with a main output of 5VDC at 45 amperes. Available auxiliary outputs are 12VDC at 14.5A, 12.5A and 2A, 5V at 5A and 24V at 1A. Other outputs, including main outputs of 12, 24 or 48VDC, are available on special order.

The L Series is designed as a low-cost, medium-power, multi-output power supply incorporating power factor correction for use in high-volume OEM applications. To keep costs low, the series uses a single-board design with two small, vertical, surface-mount control cards. Power density is up to 3.9W/cubic inch.

The models come in four versions. The standard version is an open-frame unit. Optional configurations include an open-board unit (without aluminum frame), a top-fan unit with cover, and an end-fan unit with cover. The open-board and open-frame units require external cooling.

The open-board version is an industry first for a 375-watt switcher with power factor correction. Because all power components have individual vertical heat sinks, they do not need the aluminum frame for heat sinking.

Standard features of the L Series include power factor correction to 0.99 by means of high-frequency boost topology, universal input voltage range of 90 to 264VAC, and Level A EMI input filter. Power factor correction results in significantly lower AC RMS input current and low AC harmonic input currents that meet EN61000-3-2. Options include Level B EMI filter, inhibit control and DC power good, no-load operation on main output, and current sharing on V1 and V2 outputs.

The main output V1 is adjustable over $\pm 5\%$; it also has remote sensing and overvoltage protection with power shutdown.



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SPECIFICATIONS

Typical at 120 or 230VAC in, full load and 25°C unless otherwise specified.

OUTPUT SPECIFICATIONS

Total Output Power, max.	375W
Main Output Voltage ¹ , V1	5VDC
Voltage Adjust Range, min.	$\pm 5\%$
Factory Set Tolerance ² , max.	$\pm 0.5\%$
Auxiliary Output Voltages ¹ , V2, V3 & V4	5, 12, 24VDC
Factory Set Tolerance ² , V2	$\pm 3\%$
V3 & V4	$\pm 5\%$
Minimum Load, V1 & V2	5%
V3 & V4	0A
Line Regulation	0.5%
Load Regulation, V1 & V2	1.0%
V3 & V4	3.0%
Ripple and Noise ³ , P-P	1% or 100 mV
Transient Recovery to 1% ⁴	300 μ sec.
Holdup Time	20 msec.
Temperature Coefficient	$\pm 0.02\%/^{\circ}\text{C}$
Overvoltage Protection, V1	Power Shutdown
Remote Sense	V1 Output

AC INPUT SPECIFICATIONS

Universal Input Voltage Range	90 to 264 VAC
Power Factor	0.99
Input Harmonic Currents	Meet EN61000-3-2
Input Frequency	47 to 63 Hz
Input Current, Full Load, 120VAC in	4.5A RMS
Full Load, 230VAC in	2.4A RMS
EMI Filter, Standard	FCC & EN Level A
Optional	EN Level B
Inrush Current, Cold Start	80A Peak
Input Protection, Internal	15A Fuse

GENERAL SPECIFICATIONS

Efficiency	70%
Switching Frequency	100 kHz
Isolation, min., Output to Chassis Ground	± 400 VDC

ENVIRONMENTAL SPECIFICATIONS

Operating Temp. Range, Rated Load	0°C to 50°C
Derating, 50°C to 70°C	2.5%/°C
Storage Temperature Range	-40°C to +85°C
Cooling Required, Open Versions, min.	400 LFM
Vibration	Per MIL-STD 810D, Method 514-3, Cat-I, Proc. I
Shock	Per MIL-STD 810D, Method 516-3, Proc. II, IV, VI

PHYSICAL SPECIFICATIONS

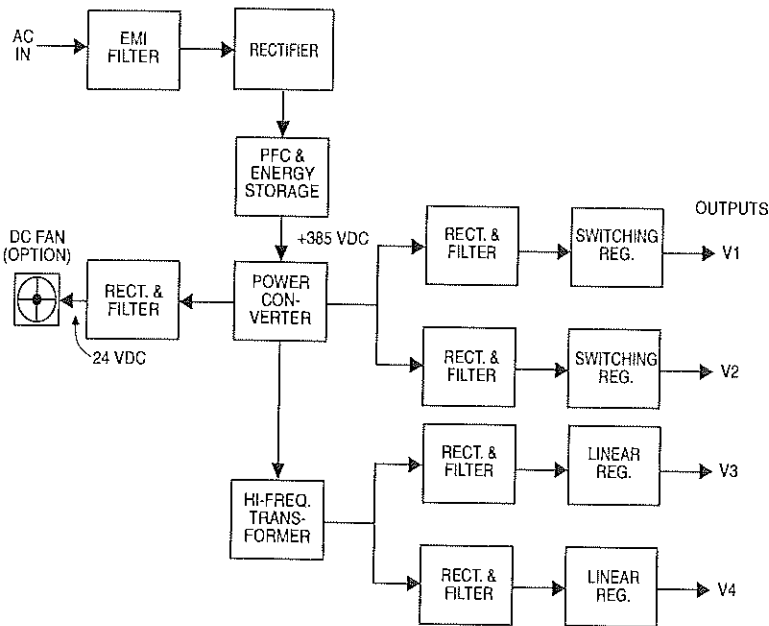
Case Material	Aluminum
Dimensions, Open Frame Version	2.44" H x 5" W x 9.94" D (62.0 x 127 x 252 mm)
Open-Board Version	2.05" H x 4.75" W x 9.90" D (52.1 x 121 x 251mm)
Top-Fan Version	3.53" H x 5" W x 10" D (89.7 x 127 x 254mm)
End-Fan Version	2.5" H x 5" W x 11" D (63.5 x 127 x 279mm)

NOTES:

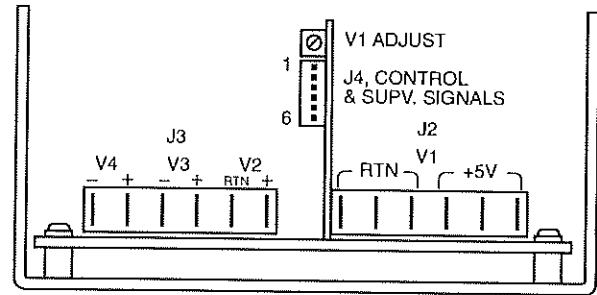
- Other voltages available including 12, 24 and 48VDC main outputs. Check with factory.
- For 50% load on all outputs.
- Whichever is greater; 20MHz bandwidth.
- For 25% of FL step change and recovery to 1%. All outputs deviate no more than 4% from nominal set point value.

TWO-YEAR WARRANTY

L SERIES BLOCK DIAGRAM



FRONT PANEL



NOTES:

1. V1 and V2 returns are connected together.
2. The three +V1 output terminals should be connected in parallel and the three V1 returns should also be connected in parallel.

CONNECTORS:

1. AC Input Connector J1 is LMI 117 304 01. Mating connectors are 1/4-inch quick-connect tab terminals.
2. DC Output Connectors J2 and J3 are LMI 117 306 01 and use same mating connectors as J1.
3. Control & Supervisory Signal Connector J4 is Molex 22-28-1064 with 25 mil. square pins on 0.1 inch centers. Mating connectors are Molex 2695, 4455, 6471, 7720 7880 or 40555 series.

L SERIES FEATURES

FEATURE/OPTION	DESCRIPTION
Turn-On Time	Less than one second from AC turn-on.
AC Undervoltage Protection	Power supply is protected for all conditions below low line voltage.
Thermal Protection	Power supply shuts down when the internal temperature reaches an excessive value and automatically recovers when the AC input is cycled off and then on.
Output Current Limiting and Short Circuit Protection	All outputs are short-term overload and short-circuit protected.
Overvoltage Protection	On main output (V1) OVP operates at 5.5 to 6.5V. The power supply shuts down and must be reset by cycling the AC input off and then on.
Reverse Voltage Protection, V1 & V2	To 100% of rated output current, maximum.
EMI Input Filter	The standard line input filter meets FCC and EN Level A specifications. An optional filter (Option B) meets EN Level B specifications.
Output Isolation	V3 and V4 outputs are isolated from each other and from ground. V1 and V2 have common returns but are isolated from the other outputs and ground. The outputs can be referenced up to $\pm 400V$ with respect to ground or another isolated output.
Current Sharing, V1 & V2 (Option F)	With this option two or more L Series power supplies can current share by adjusting each V1 to the same value and then connecting the V1s in parallel and the V2s in parallel.

CONTROL AND SUPERVISORY SIGNAL DESCRIPTIONS, J4

SIGNAL	PIN	DESCRIPTION
- Sense	1	These pins should be connected to the - output and + output, respectively, at the point of load. Total external voltage drop from the DC outputs to the sense points can be up to 250mV for each sense lead. The outputs are open-sense protected.
+ Sense	2	
Inhibit (Input)	3	All power supply outputs are controlled by this input. A short to the Return (pin 4) turns the outputs off, and an open turns them on.
Return	4	This is the reference for the Inhibit, DC Power Good and AC Power Fail signals.
DC Power Good (Output)	5	This output goes to TTL HI when all outputs are at 90% of nominal value.
AC Power Fail (Output)	6	A TTL LO at this output provides an advance warning of 3 msec. before the main output drops by 5% after an input power failure.

STANDARD MODELS

MAX. WATTS	MODEL NUMBER	OUTPUT V1	OUTPUT V2	OUTPUT V3	OUTPUT V4
375	LF2300	+5V, 45A	+12V, 14.5A	-	-
	LF2303	+5V, 45A	+12V, 12.5A	-	12V, 2A
	LF2323	+5V, 45A	+12V, 12.5A	5V, 5A	12V, 2A
	LF2353	+5V, 45A	+12V, 12.5A	24V, 1A	12V, 2A

NOTE: For other output combinations including V1 (main) outputs of 12, 24 or 48VDC, please contact factory.

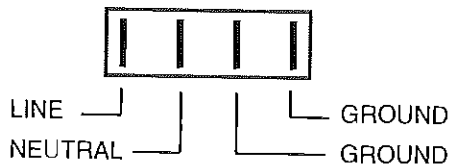
CONTROL & SUPERVISORY SIGNAL CONNECTIONS, J4

PIN	FUNCTION
1	V1 - Sense
2	V1 + Sense
3	Inhibit
4	Return
5	DC Power Good
6	AC Power Fail

POWERSPEED™ 5 Day Delivery

On all standard models in open frame, open-board, top-fan or end-fan versions. PowerSpeed models come with options B, D, E and F.

AC CONNECTOR, J1

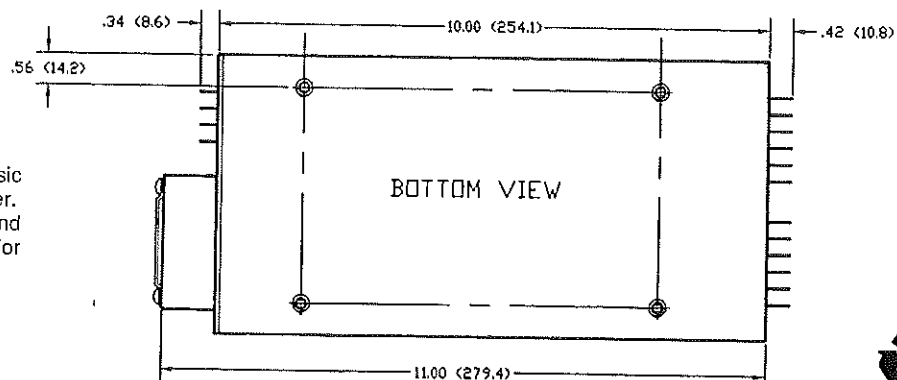
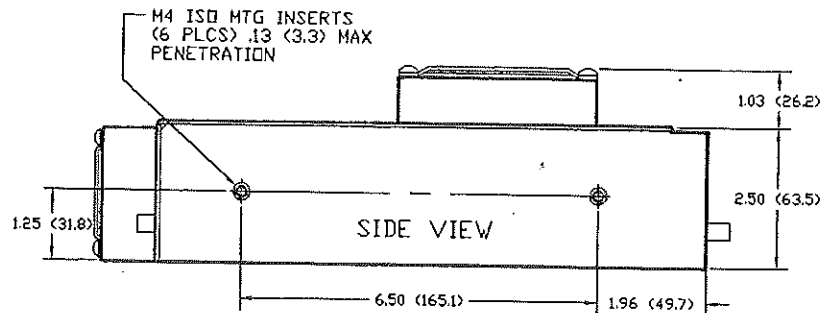
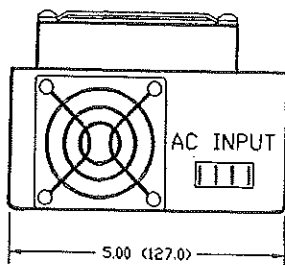


OPTIONS

CODE	OPTION
B	Class B EMI Filter
D	Inhibit & DC Power Good
E	No Load Operation on V1
F	Current Share (V1 & V2)
M	Top-Mounted Fan with Cover
N	End-Mounted Fan with Cover
O	Open-Board Version

NOTE: Add option suffix letter to model number.

CASE DRAWING



NOTE: This composite case drawing shows three versions of the L Series. The basic open frame version has no fan or cover. Option M has the top fan and cover, and Option N has the end fan and cover. For fan-cooled models, air flow is from the fan into the power supply.



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