

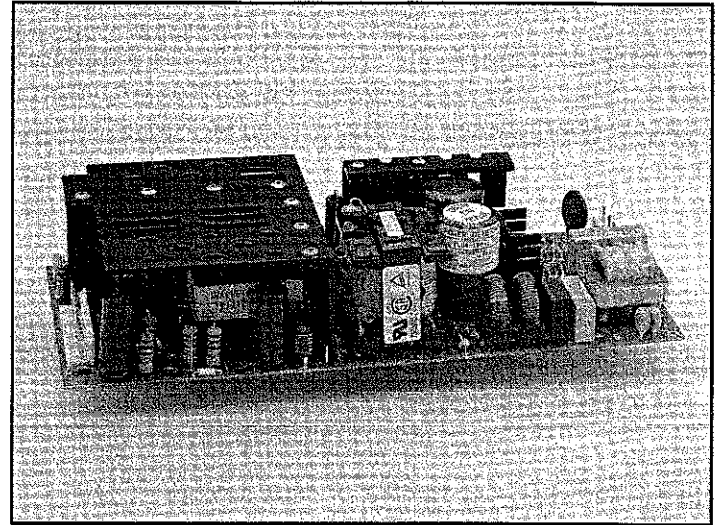
150W QUAD OUTPUT SWITCHING POWER SUPPLIES —AUTORANGING INPUT, ULTRA-HIGH RELIABILITY—

FEATURES

- 90-265 VAC Input Voltage Range
- 150 Watts Continuous Output Power
- UL1950 Approved
- CSA C22.2-950 Approved
- Meets VDE0805
- TUV/EN60950/IEC950 Approved
- VDE/FCC Class B Input Line Filter
- 0% Minimum Load on All Outputs
- Over-Current/Short-Circuit Protection
- 2-Year Warranty
- **Minimum 165,000 Hours MTBF**

APPLICATIONS

- Data Communications Equipment
- Microcomputer Systems
- Industrial Equipment



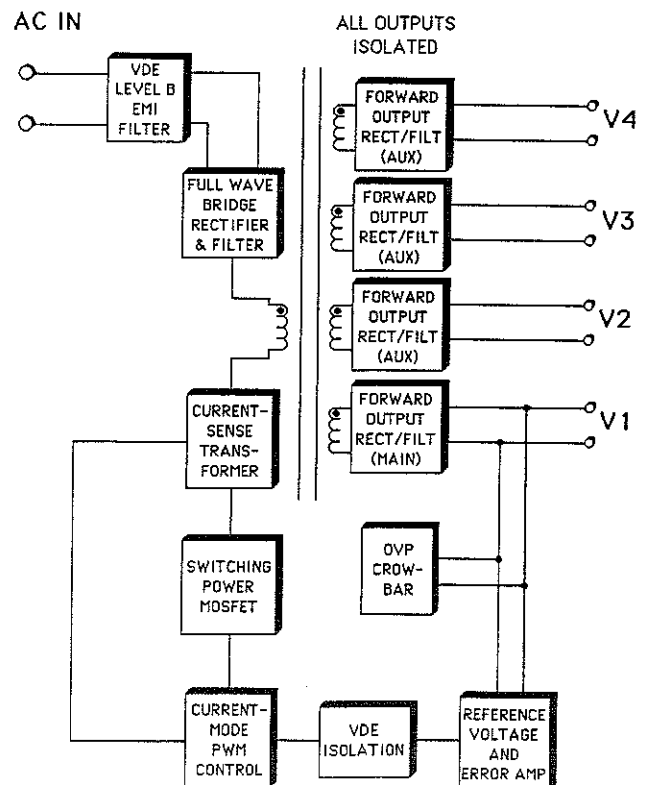
FLU4-150 is a series of four-output, 150-watt, open-frame switching power supplies. Approved to international safety agency standards, the supplies offer high-performance features such as auto-ranging inputs with an input voltage range of 90 VAC to 265 VAC and an on-board EMI suppression filter that complies to VDE/FCC Class B specifications.

Five models provide dc output of 5.0V and combinations of 5.0V, 12V, 15V and 24V. All outputs are fully isolated. Standard features include 32-millisecond hold-up time, 5300 VDC input/output isolation and an on-board input line fuse. The series provides soft start, indefinite short-circuit protection, over-voltage protection and current limiting. Efficiency is 70 percent, typical; primary output load regulation is 1 percent; the primary is adjustable by ± 5 percent. An optional power-fail warning function is available.

The FLU4-150 series is designed for ultra-high reliability. The minimum MTBF (calculated per the "parts stress" method of MIL-HDBK 217E) is 165,000 hours. Operation is specified over the temperature range of 0°C to +70°C with cooling by natural convection.

All models are fabricated on a double-sided 4.0 x 9.5-inch printed circuit board with a maximum component height of 2.0 inches.

FUNCTIONAL BLOCK DIAGRAM



FLU4-150 SERIES

GENERAL SPECIFICATIONS

| | |
|-------------------------------|--|
| AC INPUT..... | 90-265 VAC, single phase. |
| INPUT LINE FREQUENCY..... | 47-63 Hz. |
| INPUT LINE PROTECTION..... | MOV. Input line fuse provided on-board. (See Note 1.) |
| EMI FILTER..... | Standard. Exceeds requirements of VDE/FCC Class B by 10 dB, typical. |
| DC OUTPUT..... | See voltage/current rating chart. |
| CONTINUOUS OUTPUT POWER..... | 150 watts, maximum. |
| OUTPUT VOLTAGE ADJUST..... | Adjustable $\pm 5\%$, primary output only. |
| EFFICIENCY..... | 70%, typical. (Nominal input voltage line conditions and full load.) |
| HOLD-UP TIME..... | 32 ms at 115 VAC, 40 ms at 220 VAC. |
| OVERLOAD PROTECTION..... | Power-limit circuit. |
| SHORT-CIRCUIT PROTECTION..... | Indefinite. |
| OVER-VOLTAGE PROTECTION..... | Standard on all models, crowbar type, 120% V_{OUT} , typical. |
| SOFT START..... | Standard on all models. Prevents output overshoot and power transformer saturation at turn-on. |
| DESIGN TOPOLOGY..... | Forward converter, current-mode control. |
| FREQUENCY OF OPERATION..... | 50 kHz (fixed). |
| HI-POT ISOLATION..... | 5300 VDC, input-to-output for one minute (See Note 2). |
| NOISE, RIPPLE & SPIKES..... | 1% peak-to-peak, maximum (See Note 3). |
| TRANSIENT RESPONSE..... | 4 ms recovery to within 1% of regulation band with 5% maximum deviation. |
| POWER FAIL (OPTIONAL)..... | TTL-compatible, 4 ms, minimum, before loss of output. |

ENVIRONMENTAL OPERATING CHARACTERISTICS

| | |
|------------------------------|---|
| TEMPERATURE RANGE..... | 0°C to +70°C. |
| OUTPUT POWER DERATING..... | Derate output power and current linearly 2%/°C from +50°C to +70°C. |
| TEMPERATURE COEFFICIENT..... | $\pm 0.05\%/^{\circ}\text{C}$ over the entire operating temperature range. |
| RELATIVE HUMIDITY..... | 0 to 95%, non-condensing. |
| ALTITUDE..... | 0 to 10,000 feet. |
| COOLING..... | Convection cooling is adequate. When operating in a confined area, moving air is recommended. |

STORAGE CHARACTERISTICS

| | |
|------------------------|---------------------------|
| TEMPERATURE RANGE..... | -40°C to +85°C. |
| RELATIVE HUMIDITY..... | 0 to 95%, non-condensing. |

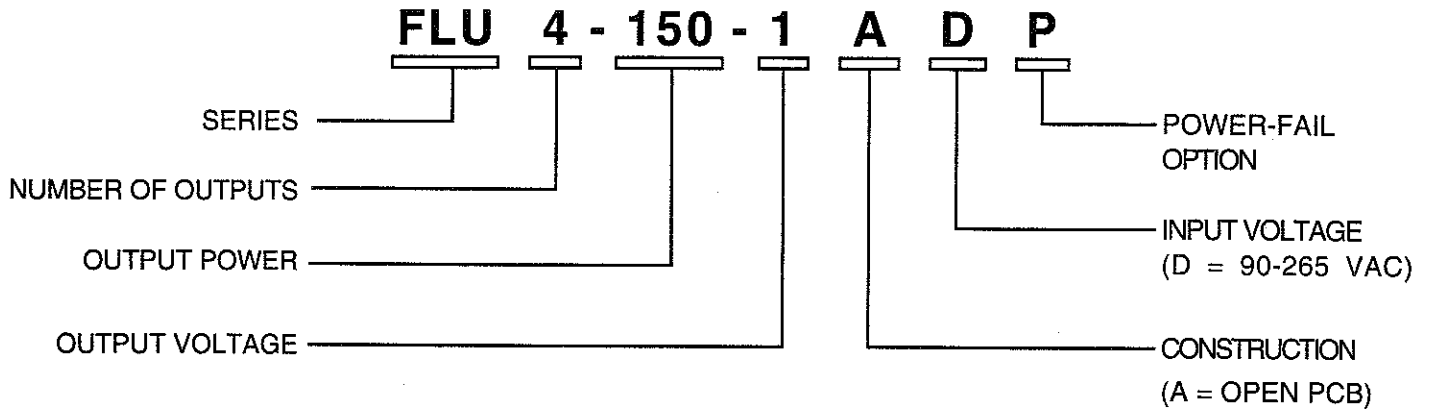
RELIABILITY

MEAN TIME BETWEEN FAILURES.....>165,000 Hours, per MIL-HDBK 217E Parts Stress Method. (Ground benign, +25°C.)

Notes:

1. Replace the input line fuse with the same type and rating. Recommended: **3.5A/250VAC slow-blow fuse.**
2. Hi-pot isolation is 2200 VDC from input to ground for 60 seconds.
3. Peak-to-peak and RMS metering equipment shall have a 20 MHz frequency response with probes and cables maintaining a frequency response of 20 Hz to 20 MHz. Output ripple and spikes are measured directly at the output terminals of the power supply with a 0.1 μF ceramic capacitor without the use of the probe ground clip.

MODEL SELECTION GUIDE



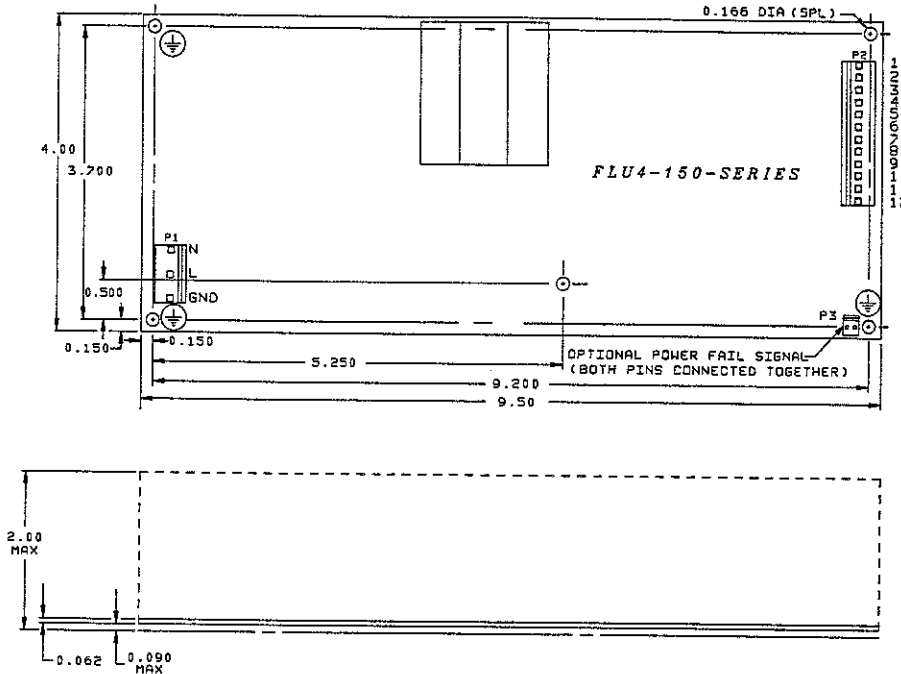
| Model Number | Output Voltage | | Output Current | | | | Line Reg. (Note 3) | Load Reg. (Note 4) | Cross-Reg. (Note 5) | Error Envelope (Note 6) |
|--------------|----------------|-----|----------------|----------|----------|----------|--------------------|--------------------|---------------------|-------------------------|
| | Output | (V) | Min. (A) | Nom. (A) | Max. (A) | Peak (A) | | | | |
| FLU4-150-1 | V1 | 5.0 | 0.0 | 10 | 15 | — | 0.3% | 1.0% | — | 1.0% |
| | V2 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V3 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V4 | 5.0 | 0.0 | 2.4 | 4.0 | — | 0.5% | 5.0% | 4.0% | 6.0% |
| FLU4-150-2 | V1 | 5.0 | 0.0 | 10 | 15 | — | 0.3% | 1.0% | — | 1.0% |
| | V2 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V3 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V4 | 12 | 0.0 | 3.6 | 6.0 | 8.0 | 0.5% | 5.0% | 4.0% | 6.0% |
| FLU4-150-3 | V1 | 5.0 | 0.0 | 10 | 15 | — | 0.3% | 1.0% | — | 1.0% |
| | V2 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V3 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V4 | 15 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 5.0% | 4.0% | 6.0% |
| FLU4-150-4 | V1 | 5.0 | 0.0 | 10 | 15 | — | 0.3% | 1.0% | — | 1.0% |
| | V2 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V3 | 12 | 0.0 | 2.4 | 4.0 | 8.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V4 | 24 | 0.0 | 1.5 | 3.0 | 4.0 | 0.5% | 5.0% | 3.0% | 6.0% |
| FLU4-150-5 | V1 | 5.0 | 0.0 | 10 | 15 | — | 0.3% | 1.0% | — | 1.0% |
| | V2 | 15 | 0.0 | 1.8 | 3.0 | 6.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V3 | 15 | 0.0 | 1.8 | 3.0 | 6.0 | 0.5% | 3.0% | 3.0% | 6.0% |
| | V4 | 5.0 | 0.0 | 2.4 | 4.0 | — | 0.5% | 5.0% | 4.0% | 6.0% |

Notes:

1. All outputs are electrically isolated from each other and may be referenced positive or negative.
2. The 12V, 15V, and 24V outputs will accept pulse load currents for a period of less than 60 seconds.
3. Line regulation is measured under nominal load conditions with the input voltage varied from 90 to 265 VAC.
4. Load regulation is measured at 115 VAC or 230 VAC input while the output under test is loaded to 60% of nominal load and varied $\pm 40\%$ of nominal load. Other outputs are held at nominal load.
5. Cross-regulation is tested by changing the load on the primary output (V1) from 8A to 12A while measuring the voltage change on the auxiliary output.
6. Error envelope is measured at nominal line conditions. The primary output (V1) is varied from 8A to 12A while auxiliary outputs are varied from 3A to 1.5A.
7. All measurements should be made directly at the terminals of the power supply.
8. The FLU4-150 series is approved to UL1950 (File E76127 and E140439), CSA 22.2-950 (File LR52335), and EN60950/IEC950 (TUV License R9171474).

FLU4-150 SERIES

MECHANICAL OUTLINE AND PIN CONFIGURATION



Notes:

1. Dimensions shown are in inches.
2. Tolerances = 0.00 ±0.01 inch.
0.000 ±0.005 inch

PIN-OUT

| Pin | FLU4-150-1 | FLU4-150-2 | FLU4-150-3 | FLU4-150-4 | FLU4-150-5 |
|-----|------------|------------|------------|------------|------------|
| 1 | +V4 (ISO) | +V4 (ISO) | +V4 (ISO) | +V4 (ISO) | +V4 (ISO) |
| 2 | -V4 (ISO) | -V4 (ISO) | -V4 (ISO) | -V4 (ISO) | -V4 (ISO) |
| 3 | +V3 (ISO) | +V3 (ISO) | +V3 (ISO) | +V3 (ISO) | +V3 (ISO) |
| 4 | -V3 (ISO) | -V3 (ISO) | -V3 (ISO) | -V3 (ISO) | -V3 (ISO) |
| 5 | -V2 (ISO) | -V2 (ISO) | -V2 (ISO) | -V2 (ISO) | -V2 (ISO) |
| 6 | +V2 (ISO) | +V2 (ISO) | +V2 (ISO) | +V2 (ISO) | +V2 (ISO) |
| 7 | -V1 (ISO) | -V1 (ISO) | -V1 (ISO) | -V1 (ISO) | -V1 (ISO) |
| 8 | (P.F. RTN) | (P.F. RTN) | (P.F. RTN) | (P.F. RTN) | (P.F. RTN) |
| 9 | | | | | |
| 10 | | | | | |
| 11 | +V1 (ISO) | +V1 (ISO) | +V1 (ISO) | +V1 (ISO) | +V1 (ISO) |
| 12 | | | | | |

CONNECTORS

| P1 Input Connector MOLEX 09-74-1051 | | | P2 Output Connector MOLEX 09-74-1121 | | P3 Power-Fail Connector MOLEX 22-23-2021 | |
|---|------------------|-----------------|---|--|---|--|
| Pin 1 AC Neutral | Pin 2 AC Line | Pin 3 Ground | | | | |
| MOLEX Mating Connector Housing 09-50-1051 Crimp Terminal 08-70-1030 | | | MOLEX Mating Connector Housing 09-50-1121 Crimp Terminal 08-70-1030 | | MOLEX Mating Connector Housing 22-01-2027 Crimp Terminal 16-02-1115 | |