AC/DC Medical Power Supply

TPP 150A-J Series, 150 Watt

- Open frame 150 W power supply with JST connection in 2.0" x 4.0" package
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <100 µA rated for BF applications
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Active power factor correction >0.95
- Protection class I and II prepared
- Operating up to 5000 m altitude
- Ready to meet ErP directive, <0.3 W no load power consumption
- 5-year product warranty

The TPP 150A-J series of 150 Watt AC/DC open frame power supplies feature a reinforced double I/O isolation system according to latest medical safety standards (60601-1 3rd edition, 2 x MOPP). The earth leakage current is below 100 µA which makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 92% allows a high power density for the standard 2.0" x 4.0" packaging format. The full load operating temperature range is –25°C to +55°C while it goes up to 80°C with 50% load derating. The EMC characteristic is dedicated for applications in industrial and medical fields. High reliability is provided by the use of industrial quality grade components and an excellent thermal management. It makes the products an ideal solution for medical devices and for demanding safety and space critical applications.

**Models**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP 150-112A-J</td>
<td>150 W</td>
<td>12 VDC (10.8 - 13.2 VDC)</td>
<td>12'500 mA</td>
<td>8'340 mA</td>
<td>91 %</td>
</tr>
<tr>
<td>TPP 150-115A-J</td>
<td></td>
<td>15 VDC (13.5 - 16.5 VDC)</td>
<td>10'000 mA</td>
<td>7'340 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPP 150-124A-J</td>
<td></td>
<td>24 VDC (21.6 - 26.4 VDC)</td>
<td>6'250 mA</td>
<td>4'890 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPP 150-128A-J</td>
<td></td>
<td>28 VDC (25.2 - 30.8 VDC)</td>
<td>5'360 mA</td>
<td>3'930 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPP 150-136A-J</td>
<td></td>
<td>36 VDC (32.4 - 39.6 VDC)</td>
<td>4'170 mA</td>
<td>3'060 mA</td>
<td>92 %</td>
</tr>
<tr>
<td>TPP 150-148A-J</td>
<td></td>
<td>48 VDC (43.2 - 52.8 VDC)</td>
<td>3'130 mA</td>
<td>2'090 mA</td>
<td>92 %</td>
</tr>
</tbody>
</table>
## Input Specifications

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Operational Range: 85 - 264 VAC (Full Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- AC Range</td>
<td>Rated Range: 100 - 240 VAC (Full Range)</td>
</tr>
<tr>
<td>- DC Range</td>
<td>Operational Range: 120 - 370 VDC (Designed for, no certification)</td>
</tr>
<tr>
<td></td>
<td>Polarity: +DC: L / −DC: N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Frequency</th>
<th>Operational Range: 47 - 440 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Certified: 50/60 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Current</th>
<th>800 mA max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Full Load &amp; Vin = 230 VAC</td>
<td>1'700 mA max.</td>
</tr>
<tr>
<td>- Full Load &amp; Vin = 115 VAC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Consumption</th>
<th>300 mW max. (Ready to meet ErP directive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- No load &amp; Vin = 230 VAC</td>
<td>300 mW max.</td>
</tr>
<tr>
<td>- No load &amp; Vin = 115 VAC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Inrush Current</th>
<th>60 A max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- At 230 VAC</td>
<td>35 A max.</td>
</tr>
<tr>
<td>- At 115 VAC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Factor</th>
<th>0.95 min. (Active Power Factor Correction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- At 230 VAC</td>
<td>0.95 min. (Active Power Factor Correction)</td>
</tr>
<tr>
<td>- At 115 VAC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Protection</th>
<th>T 3.15 A / 250 VAC (Internal Fuse in L &amp; N)</th>
</tr>
</thead>
</table>

### Recommended Input Fuse
(The need of an external fuse has to be assessed in the final application.)

## Output Specifications

### Output Voltage Adjustment

±10% (By trim potentiometer)

Output power must not exceed rated power!

### Voltage Set Accuracy

±1% max.

### Regulation

- Input Variation (Vmin - Vmax)
  0.2% max.
- Load Variation (0 - 100%)
  0.5% max.

### Ripple and Noise (20 MHz Bandwidth)

<table>
<thead>
<tr>
<th></th>
<th>12 VDC model: 120 mVp-p typ. (w/ 1 µF X7R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 VDC model:</td>
<td>150 mVp-p typ. (w/ 1 µF X7R)</td>
</tr>
<tr>
<td>24 VDC model:</td>
<td>220 mVp-p typ. (w/ 1 µF X7R)</td>
</tr>
<tr>
<td>28 VDC model:</td>
<td>220 mVp-p typ. (w/ 1 µF X7R)</td>
</tr>
<tr>
<td>36 VDC model:</td>
<td>250 mVp-p typ. (w/ 1 µF X7R)</td>
</tr>
<tr>
<td>48 VDC model:</td>
<td>250 mVp-p typ. (w/ 0.1 µF X7R)</td>
</tr>
</tbody>
</table>

### Capacitive Load

<table>
<thead>
<tr>
<th></th>
<th>12 VDC model: 10'400 µF max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 VDC model:</td>
<td>6'600 µF max.</td>
</tr>
<tr>
<td>24 VDC model:</td>
<td>2'600 µF max.</td>
</tr>
<tr>
<td>28 VDC model:</td>
<td>1'900 µF max.</td>
</tr>
<tr>
<td>36 VDC model:</td>
<td>1'150 µF max.</td>
</tr>
<tr>
<td>48 VDC model:</td>
<td>650 µF max.</td>
</tr>
</tbody>
</table>

### Minimum Load

Not required

### Temperature Coefficient

±0.02 %/K max.

### Hold-up Time

- At 230 VAC: 16 ms min.
- At 115 VAC: 16 ms min.

### Start-up Time

- At 230 VAC: 1'000 ms max.
- At 115 VAC: 1'000 ms max.

### Short Circuit Protection

Continuous, Automatic recovery

### Output Current Limitation

115 - 150% of Iout max.

### Overvoltage Protection

115 - 135% of Vout nom.

### Transient Response

- Response Deviation: 3% max. (50% to 75% Load Step)
- Response Time: 500 µs typ. (50% to 75% Load Step)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

www.tracopower.com  September 20, 2022  Page 2 / 5
### Safety Specifications

**Safety Standards**
- IT / Multimedia Equipment: EN 62368-1
- IEC 62368-1
- UL 60950-1
- UL 62368-1
- Medical Equipment: EN 60601-1
- IEC 60601-1
- ANSI/AAMI ES 60601-1

**Protection Class**
- Class I & II (Prepared: Reinforced Insulation)

**Pollution Degree**
- PD 2

**Over Voltage Category**
- OVC II

### EMC Specifications

**EMI Emissions**
- Conducted Emissions: EN 60601-1-2 edition 4 (Medical Devices)
  - EN 55011 class B (internal filter)
  - EN 55011 class A (internal filter)
  - FCC Part 15 class B (internal filter)
  - FCC Part 18 class B (internal filter)
- Radiated Emissions: EN 55032 class A (internal filter)
- Harmonic Current Emissions: EN 61000-3-2, class A
- Voltage Fluctuations & Flicker: EN 61000-3-3

**EMS Immunity**
- Electrostatic Discharge: EN 60601-1-2 edition 4 (Medical Devices)
  - Air: EN 61000-4-2, ±15 kV, perf. criteria A
  - Contact: EN 61000-4-2, ±8 kV, perf. criteria A
  - L to L: EN 61000-4-4, ±2 kV, perf. criteria A
  - L to PE: EN 61000-4-5, ±1 kV, perf. criteria A
  - EN 61000-4-6, 20 Vrms, perf. criteria A
- RF Electromagnetic Field: EN 61000-4-3, 20 V/m, perf. criteria A
- EFT (Burst) / Surge: EN 61000-4-11
- Conducted RF Disturbances: EN 61000-4-2, 10 A/m, perf. criteria A
- PF Magnetic Field: EN 61000-4-8, 10 A/m, perf. criteria A
- Voltage Dips & Interruptions: EN 61000-4-11

### General Specifications

**Relative Humidity**
- 95% max. (non condensing)

**Temperature Ranges**
- Operating Temperature: –25°C to +85°C
- Storage Temperature: –40°C to +85°C

**Power Derating**
- High Temperature: See application note: www.tracopower.com/overview/tpp150a-j
- Low Input Voltage: 1.33 %/V below 100 VAC

**Cooling System**
- Option 1: Forced air cooling (with external fan, 10 CPM)
- Option 2: Natural convection (20 LFM)

**Fan Power Source**
- Characteristic: Variable fan speed (temperature regulated)
- Output Voltage: 12 VDC
- Output Current: 500 mA max.

**Altitude During Operation**
- 5'000 m max.

**Switching Frequency**
- 45 - 75 kHz (PWM CR)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

### Insulation System
- **Working Voltage (rated):** 250 VAC

### Isolation Test Voltage
- Input to Output, 60 s: 4'000 VAC
- Input to Case or PE, 60 s: 2'000 VAC
- Output to Case or PE, 60 s: 2'000 VAC

### Isolation Resistance
- Input to Output, 500 VDC: 100 MΩ min.

### Leakage Current (at 264 VAC)
- Touch Current: 100 μA max.

### Reliability
- Calculated MTBF: 786'000 h (MIL-HDBK-217F, ground benign)

### Environment
- **Vibration**
  - IEC 60068-2-6
  - 5 g, 3 axis, sine sweep, 10-500 Hz, 1 oct/min
- **Mechanical Shock**
  - IEC 60068-2-27
  - 50 g, 3 axis, half sine, 11 ms

### Housing Type
- Open Frame

### Mounting Type
- Chassis Mount

### Connection Type
- Pin Connector

### Weight
- 187 g

### Environmental Compliance
- **REACH Declaration**
  - www.tracopower.com/info/reach-declaration.pdf
  - REACH SVHC list compliant
  - REACH Annex XVII compliant
- **RoHS Declaration**
  - www.tracopower.com/info/rohs-declaration.pdf
  - Exemptions: 7a, 7c-I
  - (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

### Supporting Documents
- **Overview Link** (for additional Documents)
  - www.tracopower.com/overview/tpp150a-j

---

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
**Outline Dimensions**

**Pin connectors**

<table>
<thead>
<tr>
<th>Input (CON1)</th>
<th>Output (CON2)</th>
<th>Fan (CON3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin</td>
<td>Function</td>
<td>Pin*</td>
</tr>
<tr>
<td>1</td>
<td>Line</td>
<td>1-3</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>4-6</td>
</tr>
</tbody>
</table>

*Terminal rated for 7 A max. (at higher current connection has to be split)*

**CON1:** JST series  
- mates with JST crimp terminal: SVH-21T-P1.1  
- and terminal housing: VHR-3N

**CON2:** JST series  
- mates with JST crimp terminal: SVH-21T-P1.1  
- and terminal housing: VHR-6N

**CON3:** Molex series  
- mates with Molex crimp terminals: 2769  
- and Molex housing: 22-01-1022

Dimension in mm, () = inch  
Tolerances:  
- x.x ±0.50 (±0.02)  
- x.xx ±0.25 (±0.01)