

- Encased 150 W power supply with screw connection 2.44" x 4.6" 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 150 series of 150 Watt AC/DC encased 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 2.44" x 4.6" packaging format. The full load operating temperature range is -25°C to +70°C while it goes up to 80°C with 40% load derating. The EMC characteristic is dedicated for applications in industrial and domestic 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

| Order Code  | Output Power max. | Output Voltage nom. (adjustable) | Output Current max. | Efficiency typ. |
|-------------|-------------------|----------------------------------|---------------------|-----------------|
| TPP 150-112 | 150 W             | 12 VDC (10.8 - 13.2 VDC)         | 12'500 mA           | 91 %            |
| TPP 150-115 |                   | 15 VDC (13.5 - 16.5 VDC)         | 10'000 mA           | 92 %            |
| TPP 150-124 |                   | 24 VDC (21.6 - 26.4 VDC)         | 6'250 mA            | 92 %            |
| TPP 150-128 |                   | 28 VDC (25.2 - 30.8 VDC)         | 5'360 mA            | 92 %            |
| TPP 150-136 |                   | 36 VDC (32.4 - 39.6 VDC)         | 4'170 mA            | 92 %            |
| TPP 150-148 |                   | 48 VDC (43.2 - 52.8 VDC)         | 3'130 mA            | 92 %            |

### Input Specifications

|                      |                             |  |
|----------------------|-----------------------------|--|
| Input Voltage        | - AC Range                  | 85 - 264 VAC (Full Range)                      |
|                      | - DC Range                  | 120 - 370 VDC (designed for, no certification) |
| Input Frequency      |                             | 47 - 63 Hz                                     |
| Input Current        | - Full Load & Vin = 230 VAC | 800 mA max.                                    |
|                      | - Full Load & Vin = 115 VAC | 1700 mA max.                                   |
| Power Consumption    | - at no Load                | 1000 mW max.                                   |
| Input Inrush Current | - at 230 VAC                | 60 A max.                                      |
| Power Factor         |                             | 0.95 min. (Active Power Factor Correction)     |
| Input Protection     |                             | T 3.15 A / 250 VAC (Internal Fuse in L & N)    |

### Output Specifications

|  |                                 |                                    |
|--|---------------------------------|------------------------------------|
| Output Voltage Adjustment              |                                 | ±10% (by trim potentiometer)       |
| Voltage Set Accuracy                   |                                 | ±1% max.                           |
| Regulation                             | - Input Variation (Vmin - Vmax) | 0.2% max.                          |
|  | - Load Variation (0 - 100%)     | 0.5% max.                          |
| Ripple and Noise<br>(20 MHz Bandwidth) | 12 VDC model:                   | 120 mVp-p typ. (with 1 µF X7R)     |
|  | 15 VDC model:                   | 150 mVp-p typ. (with 1 µF X7R)     |
|  | 24 VDC model:                   | 220 mVp-p typ. (with 1 µF X7R)     |
|  | 28 VDC model:                   | 220 mVp-p typ. (with 1 µF X7R)     |
|  | 36 VDC model:                   | 250 mVp-p typ. (with 1 µF X7R)     |
|  | 48 VDC model:                   | 250 mVp-p typ. (with 0.1 µF X7R)   |
| Capacitive Load                        | 12 VDC model:                   | 10'400 µF max.                     |
|  | 15 VDC model:                   | 6'600 µF max.                      |
|  | 24 VDC model:                   | 2'600 µF max.                      |
|  | 28 VDC model:                   | 1'900 µF max.                      |
|  | 36 VDC model:                   | 1'150 µF max.                      |
|  | 48 VDC model:                   | 650 µF max.                        |
| Minimum Load                           |                                 | not required                       |
| Temperature Coefficient                |                                 | ±0.02 %/K                          |
| 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.                      |
| Output Current Limitation              |                                 | 115 - 150% of Iout max.            |
| Short Circuit Protection               |                                 | Continuous, automatic recovery     |
| 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) |

### Safety Specifications

|                       |                             |  |
|-----------------------|-----------------------------|--|
| Safety Standards      | - IT / Multimedia Equipment | UL 60950-1   |
|                       | - Medical Equipment         | EN 60601-1   |
|                       |                             | IEC 60601-1  |
|                       |                             | ANSI/AAMI ES 60601-1   |
|                       | - Certification Documents   | 2 x MOPP (Means Of Patient Protection)<br><a href="http://www.tracopower.com/overview/tpp150">www.tracopower.com/overview/tpp150</a> |
| Protection Class      |                             | Class I Prepared: Connection to PE<br>Class II Prepared: Reinforced Insulation   |
| Pollution Degree      |                             | PD 2: Office or Laboratory Environments  |
| Over Voltage Category |                             | OVC II   |

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

## EMC Specifications

|                                  |                  |   |
|----------------------------------|------------------|---|
| <b>EMC Emission</b>              |                  | EN 60601-1-2 edition 4 (Medical Devices)  |
| - Conducted Emissions            |                  | EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC Part 15, class B<br>FCC Part 18, class B                            |
| - Radiated Emissions             |                  | EN 55011 class A (internal filter)<br>EN 55032 class A (internal filter)<br>FCC Part 15, class A<br>FCC Part 18, class A                            |
| - Harmonic Current Emissions     |                  | EN 61000-3-2, class A<br>EN 61000-3-2, class D  |
| - Voltage Fluctuations & Flicker |                  | EN 61000-3-3  |
| <b>EMC Immunity</b>              |                  | EN 55024 (IT Equipment)   |
| - Electrostatic Discharge        |                  | EN 60601-1-2 edition 4 (Medical Devices)  |
| - RF Electromagnetic Field       | Air:             | EN 61000-4-2, ±15 kV, perf. criteria A  |
| - EFT (Burst)                    | Contact:         | EN 61000-4-2, ±8 kV, perf. criteria A<br>EN 61000-4-3, 20 V/m, perf. criteria A<br>EN 61000-4-4, ±2 kV, perf. criteria A                            |
| - Surge                          | L to L:          | EN 61000-4-5, ±1 kV, perf. criteria A   |
| - Conducted RF Disturbances      | L to PE:         | EN 61000-4-5, ±2 kV, perf. criteria A<br>EN 61000-4-6, 20 Vrms, perf. criteria A<br>EN 61000-4-8, 10 A/m, perf. criteria A                          |
| - PF Magnetic Field              | 230 VAC / 50 Hz: | EN 61000-4-11   |
| - Voltage Dips & Interruptions   |                  | 30%, perf. criteria A, 25 periods<br>60%, perf. criteria A, 5 periods<br>>95%, perf. criteria A, 0.5 periods<br>>95%, perf. criteria B, 250 periods |

## General Specifications

|                                  |                              |  |
|----------------------------------|------------------------------|--|
| <b>Relative Humidity</b>         |                              | 95% max. (non condensing)  |
| <b>Temperature Ranges</b>        | - Operating Temperature      | -25°C to +80°C   |
|                                  | - Storage Temperature        | -40°C to +75°C   |
| <b>Power Derating</b>            | - High Temperature           | see application note<br><a href="http://www.tracopower.com/overview/tpp150">www.tracopower.com/overview/tpp150</a> |
|                                  | - Low Input Voltage          | 1.33 %/V below 100V  |
| <b>Cooling system</b>            |                              | Forced air cooling (with internal fan)   |
| <b>Fan Power Source</b>          | - Characteristic             | Variable fan speed (temperature regulated)   |
|                                  | - Output Voltage             | 12 VDC   |
|                                  | - Output Current             | 500 mA max.  |
| <b>Altitude during Operation</b> |                              | 5000 m max.  |
| <b>Switching Frequency</b>       |                              | 45 - 75 kHz (PWM QR)   |
| <b>Insulation System</b>         |                              | Reinforced Insulation  |
| <b>Working Voltage (rated)</b>   |                              | 250 VAC  |
| <b>Isolation Test Voltage</b>    | - Input to Output, 60 s      | 5'657 VDC  |
|                                  | - Input to Case or PE, 60 s  | 2'828 VDC  |
|                                  | - Output to Case or PE, 60 s | 2'828 VDC  |
| <b>Isolation Resistance</b>      | - Input to Output, 500 VDC   | 100 MOhm min.  |
| <b>Leakage Current (264 VAC)</b> | - Touch Current              | 100 µA max.  |
| <b>Reliability</b>               | - Calculated MTBF            | 786'000 h (acc. to MIL-HDBK-217F)  |
| <b>Environment</b>               | - Vibration                  | IEC 60068-2-6  |
|                                  | - Mechanical Shock           | IEC 60068-2-27   |
|                                  | - Thermal Shock              | MIL-STD-810F   |
| <b>Housing Material</b>          |                              | Aluminum alloy, black anodized Coating   |
| <b>Connection Type</b>           |                              | Screw Terminal   |

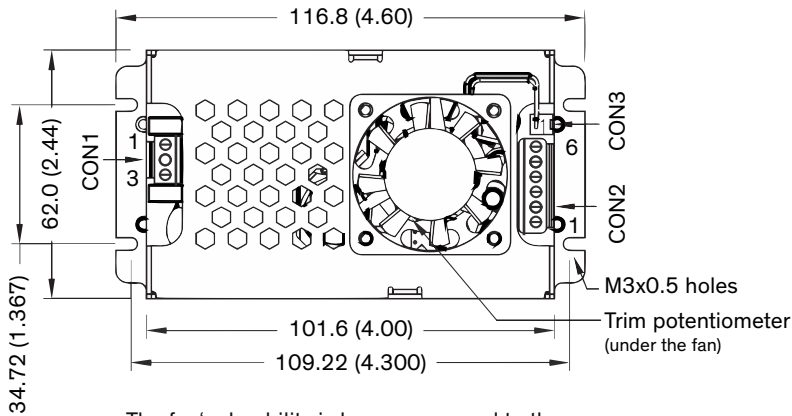
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

|                                  |  |
|----------------------------------|--|
| Weight                           | 273 g  |
| Environmental Compliance - Reach | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> |
| - RoHS                           | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>   |

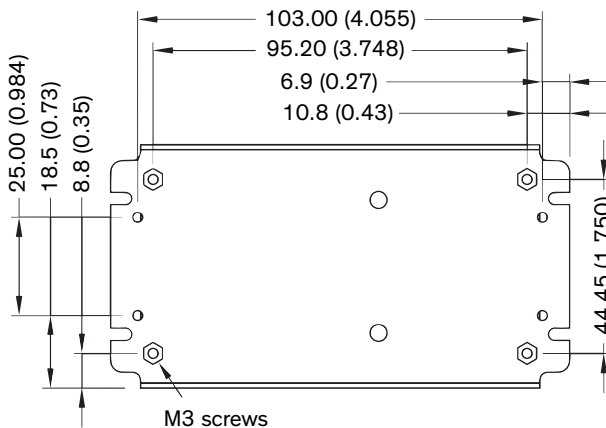
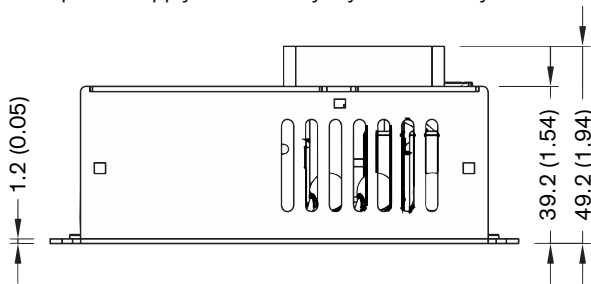
### Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/tpp150">www.tracopower.com/overview/tpp150</a> |
|--|--|

### Outline Dimensions



The fan's durability is lower compared to the power supply and has only 2 years warranty.



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

Each one of the 4 screw holes can be used as a PE connection for CLASS I application.

| Screw Terminal |                  | Molex |          | Fan (CON3) |          |
|----------------|------------------|-------|----------|------------|----------|
| Input (CON1)   | Output (CON2)    | Pin*  | Function | Pin        | Function |
| Pin 1          | Function Line    | 1-3   | -Vout    | 1          | -Fan     |
| Pin 3          | Function Neutral | 4-6   | +Vout    | 2          | +Fan     |

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

CON1: Screw Terminal

CON2: Screw Terminal

CON3: Molex series  
 mates with Molex crimp terminals: 2759  
 and Molex housing: 22-01-1022