

- Open frame 100 W power supply with JST connection in 2.0" x 3.0" package
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <75 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



ES 60601-1 IEC 60601-1  
UL 62368-1 IEC 62368-1

The TPP 100A-J series of 100 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 75 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 3.0" 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

| Order Code     | Output Power max. | Output Voltage nom. (adjustable) | Output Current max. | Efficiency typ. |
|----------------|-------------------|----------------------------------|---------------------|-----------------|
| TPP 100-112A-J | 100 W             | 12 VDC (10.8 - 13.2 VDC)         | 8'340 mA            | 91 %            |
| TPP 100-115A-J |                   | 15 VDC (13.5 - 16.5 VDC)         | 6'670 mA            | 92 %            |
| TPP 100-124A-J |                   | 24 VDC (21.6 - 26.4 VDC)         | 4'170 mA            | 92 %            |
| TPP 100-128A-J |                   | 28 VDC (25.2 - 30.8 VDC)         | 3'580 mA            | 92 %            |
| TPP 100-136A-J |                   | 36 VDC (32.4 - 39.6 VDC)         | 2'780 mA            | 91 %            |
| TPP 100-148A-J |                   | 48 VDC (43.2 - 52.8 VDC)         | 2'090 mA            | 91 %            |

### Options

|                                                     |                                         |
|-----------------------------------------------------|-----------------------------------------|
| on demand<br>(backorder with MOQ non stocking item) | - Optional model with 18 VDC / 5'560 mA |
|-----------------------------------------------------|-----------------------------------------|

## Input Specifications

|                        |                             |                                                                                                              |
|------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------|
| Input Voltage          | - AC Range                  | Operational Range: <b>85 - 264 VAC</b> (Full Range)<br>Rated Range: <b>100 - 240 VAC</b> (Full Range)        |
|                        | - DC Range                  | Operational Range: <b>120 - 370 VDC</b> (Designed for, no certification)<br>Polarity: <b>+DC: L / -DC: N</b> |
| Input Frequency        |                             | Operational Range: <b>47 - 440 Hz</b><br>Certified: <b>50/60 Hz</b>                                          |
|                        |                             |                                                                                                              |
| Input Current          | - Full Load & Vin = 230 VAC | <b>550 mA max.</b>                                                                                           |
|                        | - Full Load & Vin = 115 VAC | <b>1'150 mA max.</b>                                                                                         |
| Power Consumption      | - No load & Vin = 230 VAC   | <b>300 mW max.</b> (Ready to meet ErP directive)                                                             |
|                        | - No load & Vin = 115 VAC   | <b>300 mW max.</b>                                                                                           |
| Input Inrush Current   | - At 230 VAC                | <b>60 A max.</b>                                                                                             |
|                        | - At 115 VAC                | <b>35 A max.</b>                                                                                             |
| Power Factor           | - At 230 VAC                | <b>0.95 min.</b> (Active Power Factor Correction)                                                            |
|                        | - At 115 VAC                | <b>0.95 min.</b> (Active Power Factor Correction)                                                            |
| Input Protection       |                             | <b>T 3.15 A / 250 VAC</b> (Internal Fuse in L & N)                                                           |
| Recommended Input Fuse |                             | (The need of an external fuse has to be assessed in the final application.)                                  |

## Output Specifications

|                                        |                                 |                                                                                  |
|----------------------------------------|---------------------------------|----------------------------------------------------------------------------------|
| Output Voltage Adjustment              |                                 | <b>±10%</b> (By trim potentiometer)<br>Output power must not exceed rated power! |
| Voltage Set Accuracy                   |                                 | <b>±1% max.</b>                                                                  |
| Regulation                             | - Input Variation (Vmin - Vmax) | <b>0.2% max.</b>                                                                 |
|                                        | - Load Variation (0 - 100%)     | <b>0.5% max.</b>                                                                 |
| Ripple and Noise<br>(20 MHz Bandwidth) | 12 VDC model:                   | <b>120 mVp-p typ.</b> (w/ 10 µF X7R)                                             |
|                                        | 15 VDC model:                   | <b>150 mVp-p typ.</b> (w/ 10 µF X7R)                                             |
|                                        | 18 VDC model:                   | <b>160 mVp-p typ.</b> (w/ 10 µF X7R)                                             |
|                                        | 24 VDC model:                   | <b>160 mVp-p typ.</b> (w/ 1 µF X7R)                                              |
|                                        | 28 VDC model:                   | <b>180 mVp-p typ.</b> (w/ 1 µF X7R)                                              |
|                                        | 36 VDC model:                   | <b>190 mVp-p typ.</b> (w/ 1 µF X7R)                                              |
|                                        | 48 VDC model:                   | <b>340 mVp-p typ.</b> (w/ 0.1 µF X7R)                                            |
|                                        |                                 |                                                                                  |
| Capacitive Load                        | 12 VDC model:                   | <b>6'950 µF max.</b>                                                             |
|                                        | 15 VDC model:                   | <b>4'450 µF max.</b>                                                             |
|                                        | 18 VDC model:                   | <b>3'100 µF max.</b>                                                             |
|                                        | 24 VDC model:                   | <b>1'750 µF max.</b>                                                             |
|                                        | 28 VDC model:                   | <b>1'280 µF max.</b>                                                             |
|                                        | 36 VDC model:                   | <b>770 µF max.</b>                                                               |
|                                        | 48 VDC model:                   | <b>430 µF max.</b>                                                               |
| Minimum Load                           |                                 | <b>Not required</b>                                                              |
| Temperature Coefficient                |                                 | <b>±0.02 %/K max.</b>                                                            |
| Hold-up Time                           | - At 230 VAC                    | <b>16 ms min.</b>                                                                |
|                                        | - At 115 VAC                    | <b>16 ms min.</b>                                                                |
| Start-up Time                          | - At 230 VAC                    | <b>1'000 ms max.</b>                                                             |
|                                        | - At 115 VAC                    | <b>1'000 ms max.</b>                                                             |
| Short Circuit Protection               |                                 | <b>Continuous, Automatic recovery</b>                                            |
| Output Current Limitation              |                                 | <b>115 - 150% of Iout max.</b>                                                   |
| Overvoltage Protection                 |                                 | <b>115 - 135% of Vout nom.</b>                                                   |
| Transient Response                     | - Response Deviation            | <b>3% max.</b> (50% to 75% Load Step)                                            |
|                                        | - Response Time                 | <b>500 µs typ.</b> (50% to 75% Load Step)                                        |

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

## Safety Specifications

|                       |                             |                                                                                                                                            |
|-----------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Safety Standards      | - IT / Multimedia Equipment | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1                                                         |
|                       | - Medical Equipment         | EN 60601-1<br>IEC 60601-1<br>ANSI/AAMI ES 60601-1                                                                                          |
|                       | - Certification Documents   | 2 x MOPP (Means Of Patient Protection)<br><a href="http://www.tracopower.com/overview/tpp100a-j">www.tracopower.com/overview/tpp100a-j</a> |
|                       | 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)<br>EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC Part 15 class B (internal filter)<br>FCC Part 18 class B (internal filter) |
|               | - Radiated Emissions             | EN 55011 class A (internal filter)<br>EN 55032 class A (internal filter)<br>FCC Part 15 class A (internal filter)<br>FCC Part 18 class A (internal filter)                                             |
|               | - Harmonic Current Emissions     | EN 61000-3-2, class A<br>EN 61000-3-2, class D                                                                                                                                                         |
|               | - Voltage Fluctuations & Flicker | EN 61000-3-3                                                                                                                                                                                           |
| EMS Immunity  | - Electrostatic Discharge        | EN 55024 (IT Equipment)<br>EN 60601-1-2 edition 4 (Medical Devices)<br>Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 8$ kV, perf. criteria A                         |
|               | - RF Electromagnetic Field       | EN 61000-4-3, 20 V/m, perf. criteria A                                                                                                                                                                 |
|               | - EFT (Burst) / Surge            | EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A<br>L to PE: EN 61000-4-5, $\pm 2$ kV, perf. criteria A                                                |
|               | - Conducted RF Disturbances      | EN 61000-4-6, 20 Vrms, perf. criteria A                                                                                                                                                                |
|               | - PF Magnetic Field              | Continuous: EN 61000-4-8, 10 A/m, perf. criteria A                                                                                                                                                     |
|               | - Voltage Dips & Interruptions   | 230 VAC / 50 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria B                  |
|               |                                  | 115 VAC / 60 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria B                  |
|               |                                  |                                                                                                                                                                                                        |
|               |                                  |                                                                                                                                                                                                        |
|               |                                  |                                                                                                                                                                                                        |
|               |                                  |                                                                                                                                                                                                        |

## 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      | 2 %/K above 55°C            |
|                    | - Low Input Voltage     | 1.33 %/V below 100 VAC      |
| Cooling System     |                         | Natural convection (20 LFM) |

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

|                                 |                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Altitude During Operation       | 5'000 m max.                                                                                                                                                     |
| Switching Frequency             | 45 - 75 kHz (PWM QR)                                                                                                                                             |
| Insulation System               | Reinforced Insulation                                                                                                                                            |
| Working Voltage (rated)         | 250 VAC                                                                                                                                                          |
| Isolation Test Voltage          | - Input to Output, 60 s<br>- Input to Case or PE, 60 s<br>- Output to Case or PE, 60 s                                                                           |
|                                 | 4'000 VAC                                                                                                                                                        |
|                                 | 1'500 VAC                                                                                                                                                        |
|                                 | 1'500 VAC                                                                                                                                                        |
| Isolation Resistance            | - Input to Output, 500 VDC                                                                                                                                       |
|                                 | 100 MΩ min.                                                                                                                                                      |
| Leakage Current<br>(at 264 VAC) | - Touch Current                                                                                                                                                  |
|                                 | 75 μA max.                                                                                                                                                       |
| Reliability                     | - Calculated MTBF                                                                                                                                                |
|                                 | 790'000 h (MIL-HDBK-217F, ground benign)                                                                                                                         |
| Environment                     | - Vibration                                                                                                                                                      |
|                                 | IEC 60068-2-6                                                                                                                                                    |
|                                 | 5 g, 3 axis, sine sweep, 5-500 Hz, 1 oct/min                                                                                                                     |
|                                 | 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                          | 156 g                                                                                                                                                            |
| Environmental Compliance        | - REACH Declaration                                                                                                                                              |
|                                 | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>                                                 |
|                                 | REACH SVHC list compliant                                                                                                                                        |
|                                 | REACH Annex XVII compliant                                                                                                                                       |
|                                 | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>                                                   |
|                                 | 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.) |

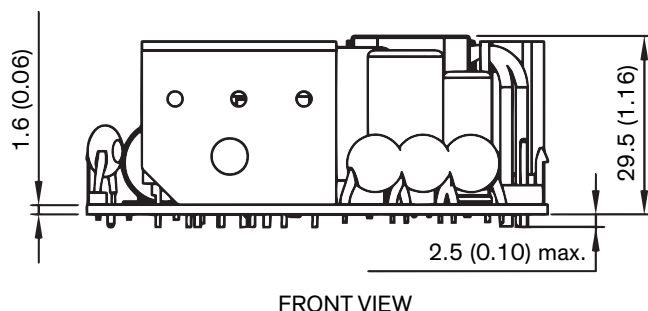
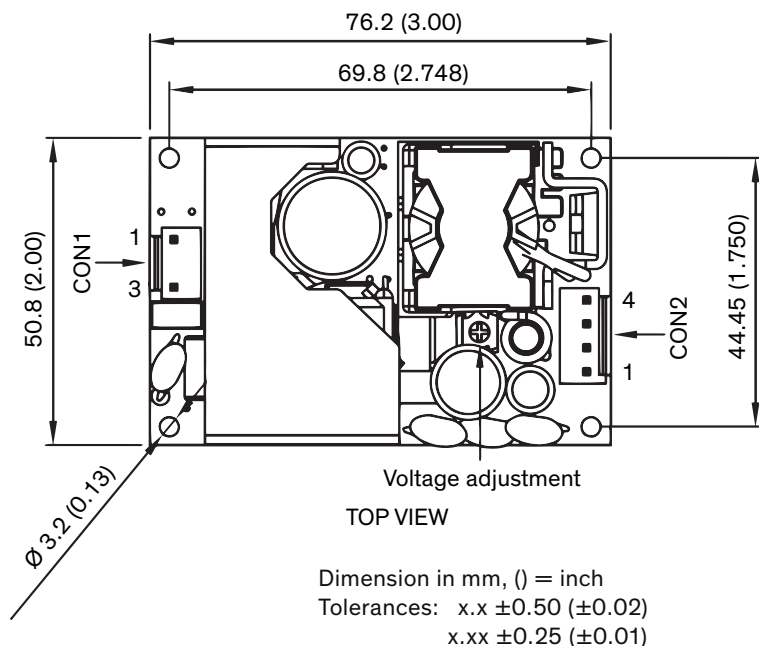
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp100a-j](http://www.tracopower.com/overview/tpp100a-j)

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## Outline Dimensions



### Pin connectors

| Input (CON1) |          | Output (CON2) |          |
|--------------|----------|---------------|----------|
| Pin          | Function | Pin*          | Function |
| 1            | Line     | 1,2           | -Vout    |
| 3            | Neutral  | 3,4           | +Vout    |

\*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-4N