

- High power density power supply (encapsulated)
- Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP
- Low leakage current <75  $\mu$ A rated for BF applications
- EMC compliance to IEC 60601-1-2 4th edition
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Protection class II
- Operating up to 5000 m altitude
- Ready to meet ErP directive, no load power consumption <60 mW
- 5-year product warranty



ES 60601-1 IEC 60601-1  
UL 62368-1 IEC 60335-1  
IEC 62368-1

The TPP 30-J AC/DC power supplies feature a reinforced double I/O isolation system according to medical safety standards IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP approved for an operating altitude of 5000 m. The earth leakage current is below 75  $\mu$ A what makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 91.5% offers a high power density in the packaging format 1.5" x 3.95". The full load operating temperature range covers -40°C to +60°C while it goes up to 85°C with 50% load derating. The units operate in compliance to the medical EMC emission and immunity levels according to latest standard IEC 60601-1-2 4th edition.

| Models       |                   |                     |                     |                 |
|--------------|-------------------|---------------------|---------------------|-----------------|
| Order Code   | Output Power max. | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TPP 30-103-J | 20 W              | 3.3 VDC             | 6'000 mA            | 84 %            |
| TPP 30-105-J | 30 W              | 5 VDC               | 6'000 mA            | 87 %            |
| TPP 30-109-J |                   | 9 VDC               | 3'340 mA            | 88 %            |
| TPP 30-112-J |                   | 12 VDC              | 2'500 mA            | 91 %            |
| TPP 30-115-J |                   | 15 VDC              | 2'000 mA            | 91 %            |
| TPP 30-124-J |                   | 24 VDC              | 1'250 mA            | 90 %            |
| TPP 30-136-J |                   | 36 VDC              | 840 mA              | 90 %            |
| TPP 30-148-J |                   | 48 VDC              | 630 mA              | 92 %            |

## 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>                                          |
|                        |                             |                                                                                                              |
| Power Consumption      | - No load & Vin = 230 VAC   | <b>60 mW max.</b> (Ready to meet ErP directive)                                                              |
|                        | - No load & Vin = 115 VAC   | <b>60 mW max.</b>                                                                                            |
| Input Current          | - Full load & Vin = 230 VAC | <b>400 mA max.</b>                                                                                           |
|                        | - Full load & Vin = 115 VAC | <b>800 mA max.</b>                                                                                           |
| Input Inrush Current   | - At 230 VAC                | <b>40 A max.</b>                                                                                             |
|                        | - At 115 VAC                | <b>25 A max.</b>                                                                                             |
| Input Protection       |                             | <b>T 1.6 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

|                                        |                                 |                                           |
|----------------------------------------|---------------------------------|-------------------------------------------|
| Voltage Set Accuracy                   |                                 | <b>±1% max.</b>                           |
| Regulation                             | - Input Variation (Vmin - Vmax) | <b>0.2% max.</b>                          |
|                                        | - Load Variation (0 - 100%)     | <b>0.7% max.</b> (3.3 and 5 VDC model)    |
|                                        |                                 | <b>0.5% max.</b> (other output models)    |
| Ripple and Noise<br>(20 MHz Bandwidth) | 3.3 VDC model:                  | <b>50 mVp-p typ.</b> (w/ 10 µF X7R)       |
|                                        | 5 VDC model:                    | <b>50 mVp-p typ.</b> (w/ 10 µF X7R)       |
|                                        | 9 VDC model:                    | <b>50 mVp-p typ.</b> (w/ 10 µF X7R)       |
|                                        | 12 VDC model:                   | <b>50 mVp-p typ.</b> (w/ 1 µF X7R)        |
|                                        | 15 VDC model:                   | <b>50 mVp-p typ.</b> (w/ 1 µF X7R)        |
|                                        | 24 VDC model:                   | <b>50 mVp-p typ.</b> (w/ 1 µF X7R)        |
|                                        | 36 VDC model:                   | <b>50 mVp-p typ.</b> (w/ 1 µF X7R)        |
|                                        | 48 VDC model:                   | <b>50 mVp-p typ.</b> (w/ 0.1 µF X7R)      |
| Capacitive Load                        | 3.3 VDC model:                  | <b>10'000 µF max.</b>                     |
|                                        | 5 VDC model:                    | <b>12'000 µF max.</b>                     |
|                                        | 9 VDC model:                    | <b>3'720 µF max.</b>                      |
|                                        | 12 VDC model:                   | <b>2'085 µF max.</b>                      |
|                                        | 15 VDC model:                   | <b>1'350 µF max.</b>                      |
|                                        | 24 VDC model:                   | <b>520 µF max.</b>                        |
|                                        | 36 VDC model:                   | <b>235 µF max.</b>                        |
|                                        | 48 VDC model:                   | <b>130 µF max.</b>                        |
| Minimum Load                           |                                 | <b>Not required</b>                       |
| Temperature Coefficient                |                                 | <b>±0.02 %/K max.</b>                     |
| Hold-up Time                           | - At 115 VAC                    | <b>16 ms min.</b>                         |
| Start-up Time                          | - At 230 VAC                    | <b>1'500 ms max.</b>                      |
| Short Circuit Protection               |                                 | <b>Continuous, Automatic recovery</b>     |
| Output Current Limitation              |                                 | <b>110 - 170% of Iout max.</b>            |
|                                        |                                 | <b>140% typ. of Iout max.</b>             |
| Overvoltage Protection                 |                                 | <b>125 - 140% 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 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

## Safety Specifications

|                       |                             |                                                                                              |
|-----------------------|-----------------------------|----------------------------------------------------------------------------------------------|
| Standards             | - IT / Multimedia Equipment | EN 62368-1<br>IEC 62368-1<br>UL 62368-1                                                      |
|                       | - Household                 | EN 60335-1<br>IEC 60335-1                                                                    |
|                       | - Medical Equipment         | EN 60601-1<br>IEC 60601-1<br>ANSI/AAMI ES 60601-1<br>2 x MOPP (Means Of Patient Protection)  |
|                       | - Power Transformers        | IEC 61558-1<br>IEC 61558-2-16                                                                |
|                       | - Certification Documents   | <a href="http://www.tracopower.com/overview/tpp30-j">www.tracopower.com/overview/tpp30-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 55014-1 (internal filter)<br>EN 55032 class B (internal filter)<br>FCC 47 Part 15 class B (internal filter)<br>FCC 47 Part 18 class B (internal filter) |
|                     | - Radiated Emissions             | EN 55011 class B (internal filter)<br>EN 55014-1 (internal filter)<br>EN 55032 class B (internal filter)<br>FCC 47 Part 15 class B (internal filter)<br>FCC 47 Part 18 class B (internal filter)                                             |
|                     | - Harmonic Current Emissions     | EN 61000-3-2, class A                                                                                                                                                                                                                        |
|                     | - Voltage Fluctuations & Flicker | EN 61000-3-3                                                                                                                                                                                                                                 |
|                     |                                  |                                                                                                                                                                                                                                              |
| EMS (Immunity)      |                                  | EN 60601-1-2 edition 4 (Medical Devices)<br>EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)<br>EN 55014-2 (Household Appliances Tools)                                                                                                      |
|                     | - Electrostatic Discharge        | 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                                                                                                                                                                                                   |
|                     |                                  | L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A                                                                                                                                                                                           |
|                     | - Conducted RF Disturbances      | EN 61000-4-6, 20 Vrms, perf. criteria A                                                                                                                                                                                                      |
|                     | - PF Magnetic Field              | Continuous: EN 61000-4-8, 30 A/m, perf. criteria A                                                                                                                                                                                           |
|                     | - Voltage Dips & Interruptions   | 230 VAC / 50 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>60%, 1 period, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria A                                                            |
|                     |                                  | 115 VAC / 60 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>60%, 1 period, perf. criteria A<br>>95%, 1 period, perf. criteria A<br>>95%, 250 periods, perf. criteria A                                                            |
|                     |                                  |                                                                                                                                                                                                                                              |
|                     |                                  |                                                                                                                                                                                                                                              |
|                     |                                  |                                                                                                                                                                                                                                              |
|                     |                                  |                                                                                                                                                                                                                                              |
|                     |                                  |                                                                                                                                                                                                                                              |
|                     |                                  |                                                                                                                                                                                                                                              |
| EMC / Environmental | - Certification Documents        | <a href="http://www.tracopower.com/overview/tpp30-j">www.tracopower.com/overview/tpp30-j</a>                                                                                                                                                 |

## General Specifications

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

All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

|                                                                                                                    |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Ranges                                                                                                 | - Operating Temperature<br>- Storage Temperature                                       | -40°C to +85°C<br>-40°C to +85°C                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Power Derating                                                                                                     | - High Temperature<br>- Low Input Voltage                                              | Depending on model<br>4 %/V below 90 VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| See application note: <a href="http://www.tracopower.com/overview/tpp30-j">www.tracopower.com/overview/tpp30-j</a> |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Cooling System                                                                                                     |                                                                                        | Natural convection (20 LFM)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Altitude During Operation                                                                                          |                                                                                        | 5'000 m max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Regulator Topology                                                                                                 |                                                                                        | Flyback Converter                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Switching Frequency                                                                                                |                                                                                        | 30 - 60 kHz (PWM)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Insulation System                                                                                                  |                                                                                        | Reinforced Insulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Working Voltage (rated)                                                                                            |                                                                                        | 272 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<br>1'500 VAC<br>1'500 VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Creepage                                                                                                           | - Input to Output                                                                      | 8 mm min.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Clearance                                                                                                          | - Input to Output                                                                      | 8 mm min.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Isolation Resistance                                                                                               | - Input to Output, 500 VDC                                                             | 100 MΩ min.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Leakage Current<br>(at 264 VAC)                                                                                    | - Touch Current                                                                        | 75 µA max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Reliability                                                                                                        | - Calculated MTBF                                                                      | 3'300'000 h (MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Environment                                                                                                        | - Vibration<br>- Mechanical Shock                                                      | IEC 60068-2-6<br>IEC 60068-2-27                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Potting Material                                                                                                   |                                                                                        | Silicone (UL 94 V-0 rated)                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Housing Type                                                                                                       |                                                                                        | Plastic Case                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Mounting Type                                                                                                      |                                                                                        | Chassis Mount                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Connection Type                                                                                                    |                                                                                        | Pin Connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weight                                                                                                             |                                                                                        | 119 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Environmental Compliance                                                                                           | - REACH Declaration<br><br>- RoHS Declaration<br><br>- SCIP Reference Number           | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>b88c13b5-90cb-454f-b1fa-a544a20a0f87 |

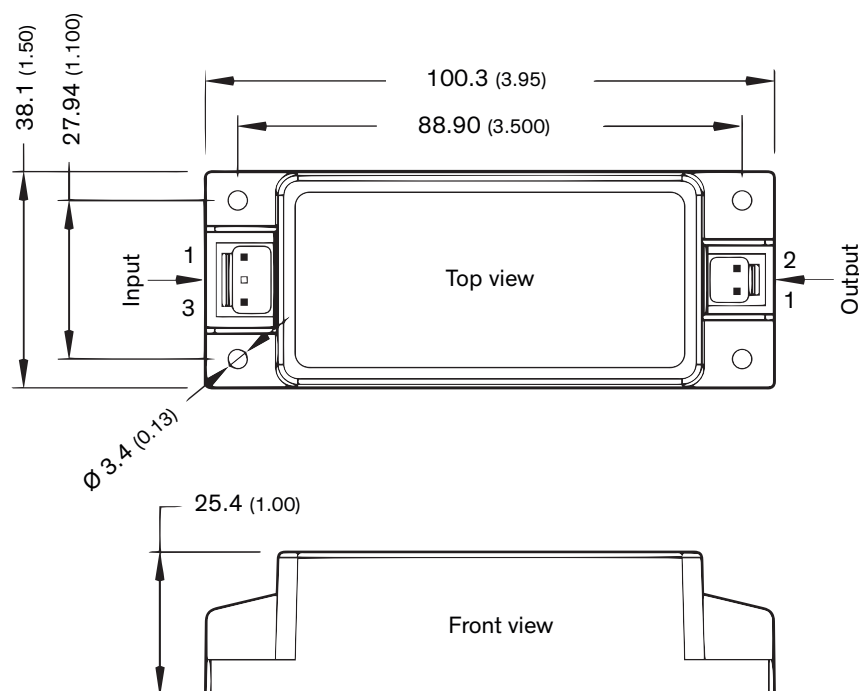
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp30-j](http://www.tracopower.com/overview/tpp30-j)

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## Outline Dimensions



### Pin connectors

| Input |          | Output |          |
|-------|----------|--------|----------|
| Pin   | Function | Pin    | Function |
| 1     | Line     | 1      | +Vout    |
| 3     | Neutral  | 2      | -Vout    |

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

**Output:** JST series  
mates with JST crimp terminal: SVH-21T-P1.1  
and terminal housing: VHR-2N

Dimension in mm (inch)

Tolerances: x.x  $\pm 0.50$  ( $\pm 0.02$ )

x.xx  $\pm 0.25$  ( $\pm 0.01$ )

Mounting screw locked torque: 5.0 kgfcm / 0.49 Nm

# Mouser Electronics

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