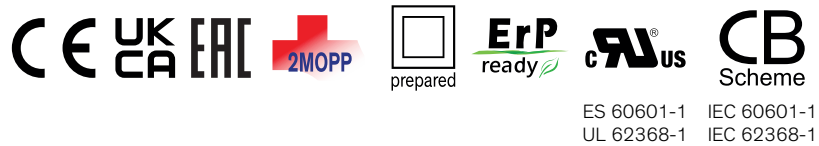


- Open frame 150 W power supply with JST connection in 2.0" x 4.0" package
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <100 µA rated for BF applications
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria 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

Order Code	Output Power max.	Output Voltage nom. (adjustable)	Output Current max. (Forced air cooling)	Output Current max. (Natural convection)	Efficiency typ.
TPP 150-112A-J	150 W	12 VDC (10.8 - 13.2 VDC)	12'500 mA	8'340 mA	91 %
TPP 150-115A-J		15 VDC (13.5 - 16.5 VDC)	10'000 mA	7'340 mA	92 %
TPP 150-124A-J		24 VDC (21.6 - 26.4 VDC)	6'250 mA	4'590 mA	92 %
TPP 150-128A-J		28 VDC (25.2 - 30.8 VDC)	5'360 mA	3'930 mA	92 %
TPP 150-136A-J		36 VDC (32.4 - 39.6 VDC)	4'170 mA	3'060 mA	92 %
TPP 150-148A-J		48 VDC (43.2 - 52.8 VDC)	3'130 mA	2'090 mA	92 %

## Input Specifications

Input Voltage	- AC Range	Operational Range: <b>85 - 264 VAC</b> (Full Range) Rated Range: <b>100 - 240 VAC</b> (Full Range)
	- DC Range	Operational Range: <b>120 - 370 VDC</b> (Designed for, no certification) Polarity: <b>+DC: L / -DC: N</b>
Input Frequency		Operational Range: <b>47 - 440 Hz</b> Certified: <b>50/60 Hz</b>
Input Current	- Full Load & Vin = 230 VAC	<b>800 mA max.</b>
	- Full Load & Vin = 115 VAC	<b>1'700 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) 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 (20 MHz Bandwidth)	12 VDC model:	<b>120 mVp-p typ.</b> (w/ 1 µF X7R)
	15 VDC model:	<b>150 mVp-p typ.</b> (w/ 1 µF X7R)
	24 VDC model:	<b>220 mVp-p typ.</b> (w/ 1 µF X7R)
	28 VDC model:	<b>220 mVp-p typ.</b> (w/ 1 µF X7R)
	36 VDC model:	<b>250 mVp-p typ.</b> (w/ 1 µF X7R)
	48 VDC model:	<b>250 mVp-p typ.</b> (w/ 0.1 µF X7R)
Capacitive Load	12 VDC model:	<b>10'400 µF max.</b>
	15 VDC model:	<b>6'600 µF max.</b>
	24 VDC model:	<b>2'600 µF max.</b>
	28 VDC model:	<b>1'900 µF max.</b>
	36 VDC model:	<b>1'150 µF max.</b>
	48 VDC model:	<b>650 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 62368-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection) <a href="http://www.tracopower.com/overview/tpp150a-j">www.tracopower.com/overview/tpp150a-j</a>
	- Certification Documents	
	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 55032 class B (internal filter) FCC Part 15 class B (internal filter) FCC Part 18 class B (internal filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55032 class A (internal filter) FCC Part 15 class A (internal filter) FCC Part 18 class A (internal filter)
	- Harmonic Current Emissions	EN 61000-3-2, class A EN 61000-3-2, class D
	- Voltage Fluctuations & Flicker	EN 61000-3-3
EMS Immunity	- Electrostatic Discharge	EN 55024 (IT Equipment) EN 55035 (Multimedia) 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
	- RF Electromagnetic Field	EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, ±2 kV, perf. criteria A L to L: EN 61000-4-5, ±1 kV, perf. criteria A L to PE: EN 61000-4-5, ±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 30%, 25 periods, perf. criteria A 60%, 5 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >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	Depending on model
	- Low Input Voltage	1.33 %/V below 100 VAC See application note: <a href="http://www.tracopower.com/overview/tpp150a-j">www.tracopower.com/overview/tpp150a-j</a>
Cooling System	- Option 1	Forced air cooling (with external fan, 10 CFM)
	- Option 2	Natural convection (20 LFM)
Fan Power Source	- Characteristic	Variable fan speed (temperature regulated)
	- Output Voltage	12 VDC
	- Output Current	500 mA max.

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

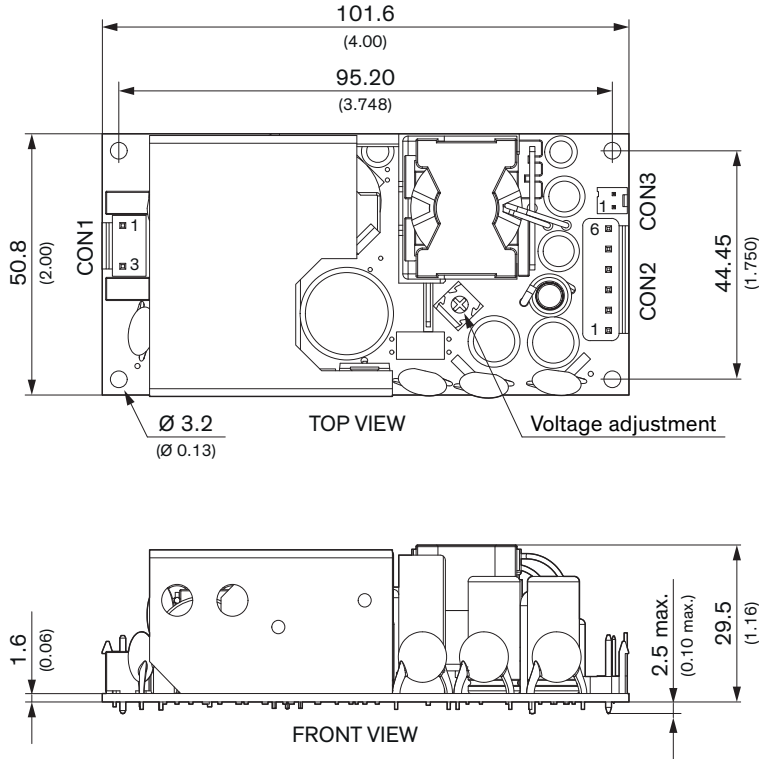
Altitude During Operation	5'000 m max.
Switching Frequency	45 - 75 kHz (PWM QR)
Insulation System	Reinforced Insulation
Working Voltage (rated)	250 VAC
Isolation Test Voltage	<ul style="list-style-type: none"> <li>- Input to Output, 60 s</li> <li>- Input to Case or PE, 60 s</li> <li>- Output to Case or PE, 60 s</li> </ul>
	4'000 VAC
	2'000 VAC
	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
	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
	<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.)
	- RoHS Declaration

## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp150a-j](http://www.tracopower.com/overview/tpp150a-j)

## Outline Dimensions



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

### Pin connectors

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

\*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: 2759  
and Molex housing: 22-01-1022