

- High power density power supply (encapsulated)
- Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP
- Low leakage current <75 µA 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 <75 mW
- 5-year product warranty



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

The TPP 15-J AC/DC power supplies feature a reinforced double I/O isolation system according to medical safety standards IEC/EN/ES 60601-1 3rd edition for 2 x MOPP approved for an operating altitude of 5000 m. The earth leakage current is below 75 µA what makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 88.5% offers a high power density in the packaging format 1.1" x 2.8". The full load operating temperature range covers -40°C to +70°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 15-103-J	13.2 W	3.3 VDC	4'000 mA	84 %
TPP 15-105-J	15 W	5 VDC	3'000 mA	86 %
TPP 15-109-J		9 VDC	1'670 mA	86 %
TPP 15-112-J		12 VDC	1'250 mA	87 %
TPP 15-115-J		15 VDC	1'000 mA	87 %
TPP 15-124-J		24 VDC	625 mA	88 %
TPP 15-136-J		36 VDC	417 mA	88 %
TPP 15-148-J		48 VDC	313 mA	89 %

## 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> Certified Range: <b>120 - 370 VDC</b> Polarity: <b>+DC: L / -DC: N</b> (When operating with DC input voltage an external fuse T 1.0 A / 400 VDC is needed. Allowed types: Littlefuse 477 series, Cooper Bussmann type S505H-1-R, Bel Fuse type OADK)
Input Frequency		Operational Range: <b>47 - 440 Hz</b> Certified: <b>50/60 Hz</b>
Input Current	- Full Load & Vin = 230 VAC - Full Load & Vin = 115 VAC	<b>300 mA max.</b> <b>450 mA max.</b>
Power Consumption	- No load & Vin = 230 VAC - No load & Vin = 115 VAC	<b>75 mW max.</b> (Ready to meet ErP directive) <b>75 mW max.</b>
Input Inrush Current	- At 230 VAC - At 115 VAC	<b>40 A max.</b> <b>25 A max.</b>
Input Protection		<b>T 1.6 A / 250 VAC</b> (Internal Fuse)
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) - Load Variation (0 - 100%)	<b>0.2% max.</b> <b>0.7% max.</b> (3.3 and 5 VDC model) <b>0.5% max.</b> (other output models)
Ripple and Noise (20 MHz Bandwidth)		3.3 VDC model: <b>40 mVp-p typ.</b> (w/ 10 µF X5R) 5 VDC model: <b>40 mVp-p typ.</b> (w/ 10 µF X5R) 9 VDC model: <b>70 mVp-p typ.</b> (w/ 10 µF X5R) 12 VDC model: <b>70 mVp-p typ.</b> (w/ 10 µF X5R) 15 VDC model: <b>70 mVp-p typ.</b> (w/ 10 µF X5R) 24 VDC model: <b>100 mVp-p typ.</b> (w/ 10 µF X5R) 36 VDC model: <b>100 mVp-p typ.</b> (w/ 10 µF X5R) 48 VDC model: <b>140 mVp-p typ.</b> (w/ 1 µF X7R)
Capacitive Load		3.3 VDC model: <b>6'000 µF max.</b> 5 VDC model: <b>4'000 µF max.</b> 9 VDC model: <b>1'860 µF max.</b> 12 VDC model: <b>1'200 µF max.</b> 15 VDC model: <b>820 µF max.</b> 24 VDC model: <b>470 µF max.</b> 36 VDC model: <b>220 µF max.</b> 48 VDC model: <b>150 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Hold-up Time	- At 115 VAC	<b>8 ms min.</b>
Start-up Time	- At 230 VAC	<b>500 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>120 - 200% of Iout max.</b> <b>145% typ. of Iout max.</b>
Overvoltage Protection		<b>125 - 140% of Vout nom.</b>
Transient Response	- Response Deviation - Response Time	<b>8% max.</b> (75% to 100% Load Step) <b>500 µs typ.</b> (75% to 100% 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 62368-1
	- Household	EN 60335-1 IEC 60335-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Power Transformers	IEC 61558-1 IEC 61558-2-16
	- Certification Documents	<a href="http://www.tracopower.com/overview/tpp15-j">www.tracopower.com/overview/tpp15-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) EN 55011 class B (internal filter) EN 55014-1 (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 B (internal filter) EN 55014-1 (internal filter) EN 55032 class B (internal filter) FCC Part 15 class B (internal filter) FCC Part 18 class B (internal filter)
	- Harmonic Current Emissions	EN 61000-3-2, class A
	- Voltage Fluctuations & Flicker	EN 61000-3-3
	EMS Immunity	
	- Electrostatic Discharge	Air: EN 61000-4-2, ±15 kV, perf. criteria A Contact: EN 61000-4-2, ±8 kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A
	- RF Electromagnetic Field	L to L: EN 61000-4-5, ±1 kV, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-6, 20 Vrms, perf. criteria A Continuous: EN 61000-4-8, 30 A/m, perf. criteria A
	- Conducted RF Disturbances	230 VAC / 50 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A 60%, 1 period, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A
	- PF Magnetic Field	115 VAC / 60 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A 60%, 1 period, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A
	- Voltage Dips & Interruptions	

## General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Storage Temperature	-40°C to +85°C

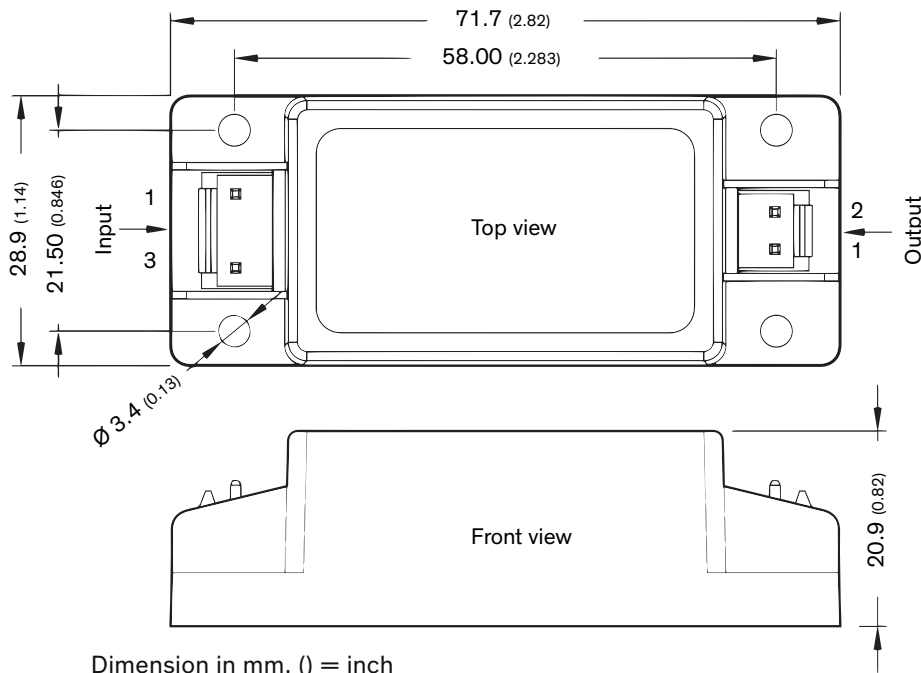
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Power Derating	- High Temperature - Low Input Voltage	Depending on model 4 %/V below 90 VAC See application note: <a href="http://www.tracopower.com/overview/tpp15-j">www.tracopower.com/overview/tpp15-j</a>
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		75 - 95 kHz (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		250 VAC
Isolation Test Voltage	- Input to Output, 60 s - Input to Case or PE, 60 s - Output to Case or PE, 60 s	4'000 VAC 1'500 VAC 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 (at 264 VAC)	- Touch Current	75 µA max.
Reliability	- Calculated MTBF	3'100'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration - Mechanical Shock	IEC 60068-2-6 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		48 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - SCIP Reference Number	<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.) b622bb38-ac9f-4bae-ad8f-6a5c8c7973c2

## Supporting Documents

Overview Link (for additional Documents) [www.tracopower.com/overview/tpp15-j](http://www.tracopower.com/overview/tpp15-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		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