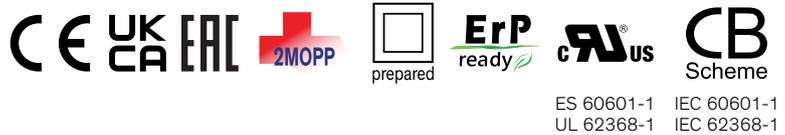


- Open frame power supply with pin connection
- Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP
- Low leakage current <75  $\mu$ A rated for BF applications
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- EMC compliance to IEC 60601-1-2 ed. 4
- Protection class I and II
- Operating up to 5000 m altitude
- Ready to meet ErP directive, <0.15 W no load power consumption
- 5-year product warranty



The TPP 65A Series of 65 Watt AC/DC power supplies feature a reinforced double I/O isolation system according to latest medical safety standards (60601-1 edition 3.2, 2 x MOPP). The leakage current is below 75  $\mu$ A what 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  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$  while it goes up to  $85^{\circ}\text{C}$  with 50% load derating. The EMC characteristic is dedicated for applications in industrial and domestic 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 65-105A-J	50 W	5 VDC (4.5 - 5.5 VDC)	10'000 mA	90 %
TPP 65-112A-J	65 W	12 VDC (10.8 - 13.2 VDC)	5'420 mA	93 %
TPP 65-124A-J		24 VDC (21.6 - 26.4 VDC)	2'710 mA	94 %
TPP 65-148A-J		48 VDC (43.2 - 52.8 VDC)	1'360 mA	93 %

### Options

on demand (backorder with MOQ non stocking item)	- Optional model with 15 VDC and 4'340 mA
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Note - Other output models are available on request.

### 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>
Power Consumption	- No load & Vin = 230 VAC - No load & Vin = 115 VAC	<b>150 mW max.</b> (Ready to meet ErP directive) <b>150 mW max.</b>
Input Current	- Full load & Vin = 230 VAC - Full load & Vin = 115 VAC	<b>950 mA max.</b> <b>1'650 mA max.</b>
Input Inrush Current	- At 230 VAC - At 115 VAC	<b>60 A max.</b> <b>35 A max.</b>
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) - Load Variation (0 - 100%)	<b>0.2% max.</b> <b>0.7% max.</b> (5 VDC model) <b>0.5% max.</b> (other output models)
Ripple and Noise (20 MHz Bandwidth)		5 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 12 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 15 VDC model: <b>75 mVp-p typ.</b> (w/ 10 µF X7R) 24 VDC model: <b>75 mVp-p typ.</b> (w/ 1 µF X7R) 48 VDC model: <b>150 mVp-p typ.</b> (w/ 0.1 µF X7R)
Capacitive Load		5 VDC model: <b>20'000 µF max.</b> 12 VDC model: <b>4'520 µF max.</b> 15 VDC model: <b>2'895 µF max.</b> 24 VDC model: <b>1'130 µF max.</b> 48 VDC model: <b>285 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>1'000 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>120 - 160% 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>3% max.</b> (50% to 75% Load Step) <b>600 µs typ.</b> (50% to 75% Load Step)

### Safety Specifications

Standards	- IT / Multimedia Equipment  - Medical Equipment  - Certification Documents	<b>EN 62368-1</b> <b>IEC 62368-1</b> <b>UL 62368-1</b> <b>EN 60601-1</b> <b>IEC 60601-1</b> <b>ANSI/AAMI ES 60601-1</b> <b>2 x MOPP</b> (Means Of Patient Protection) <a href="http://www.tracopower.com/overview/tp65a">www.tracopower.com/overview/tp65a</a>
Protection Class		<b>Class I &amp; II (Prepared): Reinforced Insulation</b>

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

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 47 Part 18 class B (internal filter)	
	- Radiated Emissions	EN 55011 class B (internal filter) EN 55032 class B (internal filter) 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)	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 15$ kV, perf. criteria A 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	
	- Conducted RF Disturbances	L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A	
	- PF Magnetic Field	EN 61000-4-6, 20 Vrms, perf. criteria A	
	- Voltage Dips & Interruptions	Continuous: EN 61000-4-8, 30 A/m, perf. criteria A 230 VAC / 50 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria B	
		115 VAC / 60 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A >95%, 0.5 periods, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria B	
	EMC / Environmental	- Certification Documents	<a href="http://www.tracopower.com/overview/tpp65a">www.tracopower.com/overview/tpp65a</a>

### General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Storage Temperature	-40°C to +85°C
Power Derating	- High Temperature	Depending on model
	- Low Input Voltage	4 %/V below 90 VAC
		See application note: <a href="http://www.tracopower.com/overview/tpp65a">www.tracopower.com/overview/tpp65a</a>
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		50 - 140 kHz (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		258 VAC
Isolation Test Voltage	- Input to Output, 60 s	4'000 VAC
	- Input to Case or PE, 60 s	2'500 VAC
	- Output to Case or PE, 60 s	2'500 VAC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Resistance	- Input to Output, 500 VDC	100 M $\Omega$ min.
Leakage Current (at 264 VAC)	- Touch Current	75 $\mu$ A max.
Reliability	- Calculated MTBF	1'500'000 h (MIL-HDBK-217F, ground benign)

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

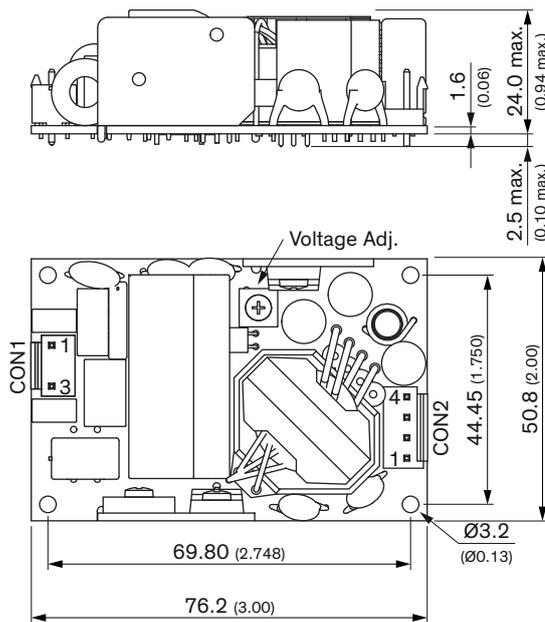
Environment	- Vibration - Mechanical Shock	IEC 60068-2-6 5 g, 3 axis, sine sweep, 5-500 Hz, 1 oct/min IEC 60068-2-27 50 g, 3 axis, half sine, 11 ms
Housing Type		Open Frame
Mounting Type		Chassis Mount
Connection Type		Pin Connector
Weight		117 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - 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.)) 4b1cc295-c90c-4971-8d48-2678e0b46d7b

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp65a](http://www.tracopower.com/overview/tpp65a)

### Outline Dimensions

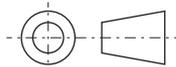


Dimensions in mm (inch)

Tolerances: x.x ±0.5 (x.x ±0.02)

x.xx ±0.25 (x.xxx ±0.010)

Mounting screw lock torque: Max. 0.33 Nm (3.4 kgfcm)



### Pin connectors

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

\*Terminal rated for 10 A max.  
(at higher current connection has to be split)

**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-4N