AC/DC Medical Power Supply

TPP 100A-J Series, 100 Watt

- **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×MOPP**
- **Low leakage current <75 µA rated for BF applications**
- **Risk management process according to ISO 14971 including 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
UL 60950-1

Encased version with screw terminal connection see TPP 100 Series

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 × 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 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 voltage	Output current max.	Efficiency max.
TPP 100-112A-J	12 VDC (10.8 - 13.2 VDC)	8.34 A	91 %
TPP 100-115A-J	15 VDC (13.5 - 16.5 VDC)	6.67 A	92 %
TPP 100-124A-J	24 VDC (21.6 - 26.4 VDC)	4.17 A	92 %
TPP 100-128A-J	28 VDC (25.2 - 30.8 VDC)	3.58 A	92 %
TPP 100-136A-J	36 VDC (32.4 - 39.6 VDC)	2.78 A	91 %
TPP 100-148A-J	48 VDC (43.2 - 52.8 VDC)	2.09 A	91 %

Input Specifications

Input voltage range	– AC range (universal input) – DC range	85 – 264 VAC 120 – 370 VDC
Input frequency		47 – 63 Hz
Input current at full load	– at 115 VAC / 230 VAC	1.15 A max. / 0.55 A max.
Input protection		T 3.15 A / 250 VAC (internal fuse)
Input inrush current	– at 230 VAC	60 A max.
Zero load power consumption		0.3 W max. (acc. ErP directive)
Power factor		0.95 min.

Output Specifications

Voltage set accuracy		±1%
Output voltage adjustment		±10%
Regulation	– Input variation (Vin min. to Vin max.) – Load variation (0 to 100%)	0.2% max. 0.5% max.
Minimum load		not required
Temperature coefficient		0.02 %/K max.
Hold-up time	– Vin = 115 VAC	16 ms min.
Start-up time		1 s max.
Rise time		20 ms typ.
Ripple and noise (20 MHz bandwidth)	12 Vout models: 15 Vout models: 24 Vout models: 28 Vout models: 36 Vout models: 48 Vout models:	120 mVp-p typ. w. cap. 10µF/25V 1206 X7R MLCC 150 mVp-p typ. w. cap. 10µF/25V 1206 X7R MLCC 160 mVp-p typ. w. cap. 1µF/50V 1206 X7R MLCC 180 mVp-p typ. w. cap. 1µF/50V 1206 X7R MLCC 190 mVp-p typ. w. cap. 1µF/50V 1206 X7R MLCC 340 mVp-p typ. w. cap. 0.1µF/100V 1206 X7R MLCC
Overvoltage protection		115 – 135% of nominal Vout
Overload protection		115 – 150% Iout typ.
Short circuit protection		Hiccup mode, continuous (automatic recovery)
Transiente response	– Peak deviation (25% load step change) – Recovery time	3% max. 500 µs typ.
Capacitive load	12 Vout models: 15 Vout models: 24 Vout models: 28 Vout models: 36 Vout models: 48 Vout models:	6‘950 µF max. 4‘450 µF max. 1‘750 µF max. 1‘280 µF max. 770 µF max. 430 µF max.

General Specifications

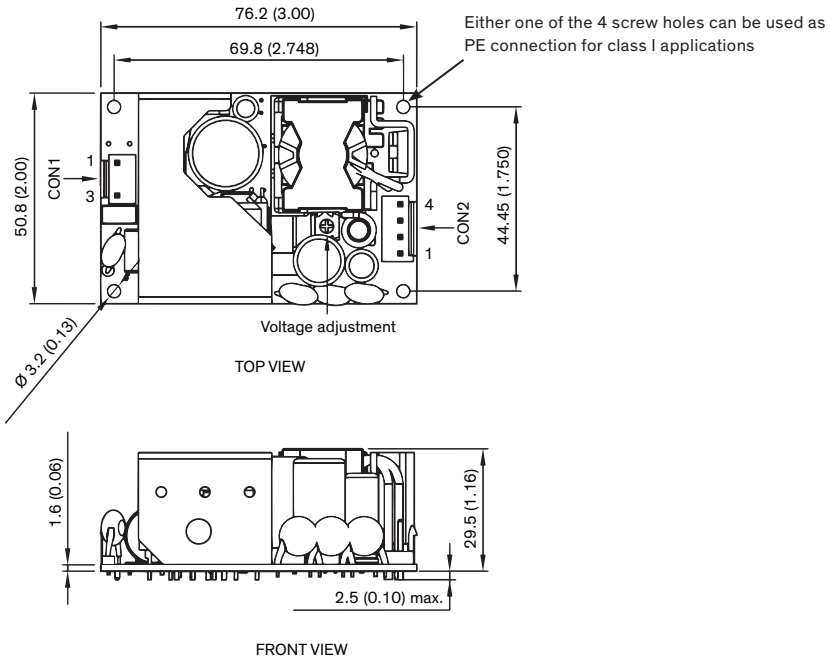
Temperature ranges	– Operating temperature – Max. case temperature – Storage temperature	–25°C to +85°C (with derating) +85°C –40°C to +85°C
Output power derating	– Temperature – Low input voltage	2 %/K above +55°C 1.33 %/K below 100 VAC
Storage temperature		–40°C to +85°C
Humidity (non condensing)		5 – 95 % rel. H.
Altitude during operation		5000 m max.
Switching frequency (at 230 VAC)		60 kHz typ. (pulse frequency modulation)
Isolation voltage (60 s) (2 × MOPP insulation)	– Input to Output – Input/Output to PE or Floating	4000 VAC 1500 VAC
Isolation resistance (at 500 VDC)		100 MOhm min.

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

General Specifications (continued)

Leakage current (at 264 VAC / 60 Hz)		75 µA max.
Reliability	– calculated MTBF at +25°C acc. MIL-HDBK-217F	790‘300 h
Protection class		class I and II prepared
EMC emissions	– Conducted / radiated input suppression	EN 55011 limits to IEC 60601-1-2 4th editon
	Conducted:	EN 55032 class B (internal filter)
	Radiated:	EN 55032 class A (internal filter)
	– Harmonic current emissions	IEC/EN 61000-3-2, class A & D
	– Voltage flicker	IEC/EN 61000-3-3
EMC immunity		IEC/EN 60601-1-2, EN 55024
	– Electrostatic discharge ESD	IEC/EN 61000-4-2, ±15kV/8kV perf. criteria A
	– RF field immunity	IEC/EN 61000-4-3, 20V/m perf. criteria A
	– Electrical fast transients/burst immunity	IEC/EN 61000-4-4, ±2kV perf. criteria A
	– Surge	IEC/EN 61000-4-5, ±1kV/2kV perf. criteria A
	– Conducted RF	IEC/EN 61000-4-6, 20 Vrms perf. criteria A
	– Magnetic field	IEC/EN 61000-4-8, 10A/m perf. criteria A
	– Voltage dip and interruptions	IEC/EN 61000-4-11, see below
Voltage dip and interruptions according to EN 60601-1-2 Reference: 230 VAC / 50Hz		30%, 500ms perf. criteria A 60%, 100ms perf. criteria A > 95%, 10ms perf. criteria A > 95%, 5000ms perf. criteria B
Safety standards and certification		IEC/EN/UL 60950-1, IEC/EN 60601-1 3rd edition, ANSI/AAMI ES60601-1:2005(R)2012
Environment	– Vibration	acc. IEC 60068-2-6
	– Shock	acc. IEC 60068-2-27
	– Thermal shock	acc. MIL-STD-810F
Environmental compliance	– Reach – RoHS	RoHS directive 2011/65/EU
Weight		156 g (5.5 oz)

Outline Dimensions



JST 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)

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

CON 2: JST series
mates with JST crimp terminal: SVH-21T-P1.1
and terminal housing: VHR-4N

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)