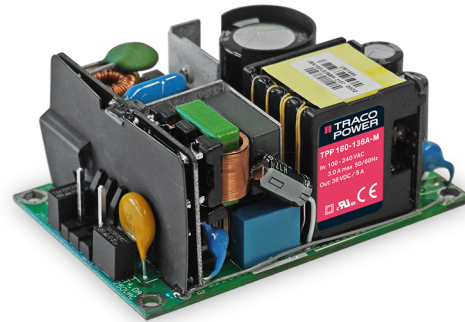


- **High power-density: 180 Watt in 3"x2" package (open frame)**
- **I/O isolation 3000 VAC rated for 250 VAC working voltage**
- **Certification according to IEC/EN/ES 60601-1 3rd edition for 2 x MOPP**
- **Risk management process according to ISO 14971 incl. risk management file**
- **Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3**
- **Peak power operation up to 220 Watt for 5s**
- **Operating temperature -40°C to 85°C**
- **Active power factor correction >0.9**
- **Operating up to 5000m altitude**
- **5-year product warranty**



The TPP 180A-M is series of open frame AC/DC power supplies coming in an open frame package. They feature a reinforced double I/O isolation (3000 VAC) system according to latest medical safety standards (60601-1 3rd edition, 2 x MOPP). The leakage current is below 100  $\mu$ A and makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 94% allows a high power-density and compact design (3" x 2"). The operating temperature range is -40°C to +85°C with derating above 50°C. In natural convection operation these power supplies deliver 150 Watt going up to 180 Watt with forced air cooling. Additionally, they can deliver 220 Watt peak power for 5s. The EMC characteristic is dedicated for applications in industrial and medical fields. High reliability is provided by using high quality components and an excellent thermal management making the TPP 180A-M an ideal solution for industrial and 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)	Output Current peak	Efficiency typ.
TPP 180-112A-M	180 W	12 VDC (11.0 - 13.0 VDC)	15'000 mA	12'500 mA	18'334 mA	92 %
TPP 180-115A-M		15 VDC (13.8 - 16.2 VDC)	12'000 mA	10'000 mA	14'667 mA	92 %
TPP 180-124A-M		24 VDC (22.1 - 25.9 VDC)	7'500 mA	6'250 mA	9'167 mA	94 %
TPP 180-136A-M		36 VDC (33.1 - 38.9 VDC)	5'000 mA	4'170 mA	6'111 mA	93 %
TPP 180-148A-M		48 VDC (44.2 - 51.8 VDC)	3'750 mA	3'130 mA	4'583 mA	93 %
TPP 180-153A-M		53 VDC (48.8 - 57.2 VDC)	3'400 mA	2'830 mA	4'151 mA	93 %

Options	
on demand (backorder with MOQ non stocking item)	- Optional model with 18 VDC / 10'000 mA - Optional model with 28 VDC / 6'430 mA

### 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		<b>47 - 63 Hz</b>
Input Current	- Full Load & Vin = 230 VAC	<b>1'500 mA max.</b>
	- Full Load & Vin = 115 VAC	<b>2'550 mA max.</b>
Power Consumption	- At no load	<b>200 mW max.</b> (Ready to meet ErP directive)
	- At no load	<b>150 mW typ.</b> (Ready to meet ErP directive)
Input Inrush Current	- At 230 VAC	<b>100 A max.</b>
	- At 115 VAC	<b>50 A max.</b>
Power Factor	- At 230 VAC	<b>0.9 min.</b> (Active Power Factor Correction)
	- At 115 VAC	<b>0.9 min.</b> (Active Power Factor Correction)
Input Protection		<b>T 4 A / 250 VAC</b>
Recommended Input Fuse		<b>4'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)

### Output Specifications

Output Voltage Adjustment		<b>±8%</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>
Boost Power		Output Current peak: See model table Peak power time: <b>5 s max.</b> Peak power duty cycle: <b>20% max.</b> Average operation power: <b>99 W max.</b> (at natural convection)
Ripple and Noise (20 MHz Bandwidth)	12 VDC model:	<b>200 mVp-p max.</b> (w/ 1 µF)
	15 VDC model:	<b>200 mVp-p max.</b> (w/ 1 µF)
	18 VDC model:	<b>220 mVp-p max.</b> (w/ 1 µF)
	24 VDC model:	<b>220 mVp-p max.</b> (w/ 1 µF)
	28 VDC model:	<b>220 mVp-p max.</b> (w/ 1 µF)
	36 VDC model:	<b>220 mVp-p max.</b> (w/ 1 µF)
	48 VDC model:	<b>350 mVp-p max.</b> (w/ 0.1 µF)
Capacitive Load	53 VDC model:	<b>350 mVp-p max.</b> (w/ 0.1 µF)
	12 VDC model:	<b>10'000 µF max.</b>
	15 VDC model:	<b>6'800 µF max.</b>
	18 VDC model:	<b>4'700 µF max.</b>
	24 VDC model:	<b>2'700 µF max.</b>
Minimum Load	28 VDC model:	<b>1'800 µF max.</b>
	36 VDC model:	<b>1'200 µF max.</b>
	48 VDC model:	<b>680 µF max.</b>
	53 VDC model:	<b>560 µF max.</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Hold-up Time	- At 230 VAC	<b>10 ms min.</b>
	- At 115 VAC	<b>10 ms min.</b>
Start-up Time	- At 230 VAC	<b>1'500 ms max.</b>
	- At 115 VAC	<b>1'500 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>130 - 175% of Iout max.</b>
		<b>150% typ. of Iout max.</b>

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

Overvoltage Protection		115 - 135% of Vout nom.
Transient Response	- Response Deviation	3% typ. / 10% max. (75% to 100% Load Step)
	- Response Time	600 $\mu$ s typ. (75% to 100% Load Step)

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Certification Documents	<a href="http://www.tracopower.com/overview/tpp180a-m">www.tracopower.com/overview/tpp180a-m</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 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 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, $\pm 15$ 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 L to L: EN 61000-4-5, $\pm 1$ kV, perf. criteria A L to PE: EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances	EN 61000-4-6, 20 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 30 A/m, perf. criteria A 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A
	- Voltage Dips & Interruptions	230 VAC / 50 Hz: EN 61000-4-11 30%, 25 periods, perf. criteria A >95%, 0.5 periods, perf. criteria B >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 B >95%, 250 periods, perf. criteria B

### 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	See application note: <a href="http://www.tracopower.com/overview/tpp180a-m">www.tracopower.com/overview/tpp180a-m</a>
	- Low Input Voltage	1.33 %/V below 100 VAC

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

Over Temperature Protection Switch Off	- Protection Mode	115°C min. / 125°C typ. / 135°C max. (Automatic recovery at 112°C typ.)
	- Measurement Point	See application note: <a href="http://www.tracopower.com/overview/tpp180a-m">www.tracopower.com/overview/tpp180a-m</a>
Cooling System	- Option 1 - Option 2	Forced air cooling (with external fan, 10 CFM) Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		135 - 205 kHz (PWM) 170 kHz typ. (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 2'500 VAC 2'500 VAC
Creepage	- Input to Output - Input to Case or PE - Output to Case or PE	27.5 mm min. 5 mm min. 4.3 mm min.
Clearance	- Input to Output - Input to Case or PE - Output to Case or PE	9.3 mm min. 5 mm min. 4.3 mm min.
Isolation Resistance	- Input to Output, 500 VDC	100 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'250 pF typ. / 1'500 pF max.
Leakage Current (264 VAC / 63 Hz)	- Touch Current	100 μA max.
Reliability	- Calculated MTBF	1'145'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	IEC 60068-2-6 5 g, 3 axis, sine sweep, 3x30 min, 5-500 Hz
	- Mechanical Shock	IEC 60068-2-27 50 g, 3 axis, 11 ms
	- Thermal Shock	MIL-STD-810F
Housing Type		Open Frame
Mounting Type		Chassis Mount
Connection Type		Pin Connector
Weight		162 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
	- RoHS Declaration	<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.)

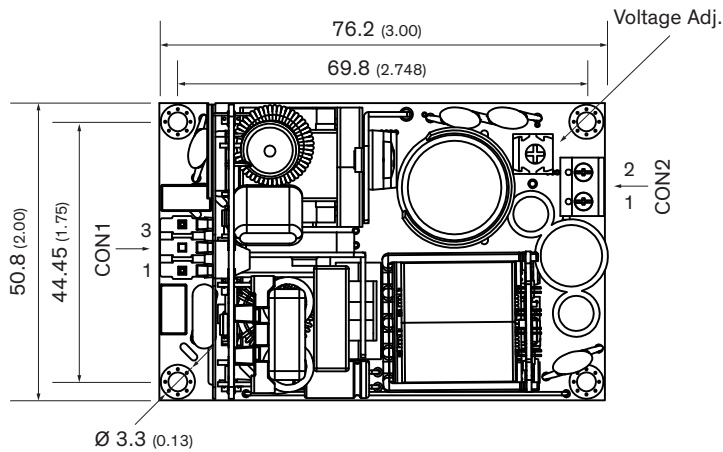
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpp180a-m](http://www.tracopower.com/overview/tpp180a-m)

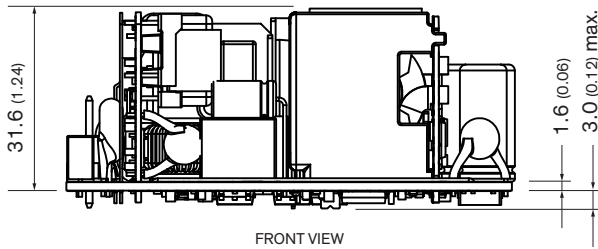
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

**Outline Dimensions**



Pin connectors			
Input (CON1)		Output (CON2)	
Pin	Function	Pin	Function
1	AC (N) / DC-	1	+Vout
3	AC (L) / DC+	2	-Vout

**CON1:** Molex Housing 90-50-8031  
Molex Crimp Terminals 2478, 6838, 45570



All dimensions in mm (inch)

Tolerance: X.X ±0.5 (X.XX ±0.02)  
X.XX ±0.25 (X.XXX ±0.01)

CON2 screw locked torque: max. 2.5 kgfcm / 0.25 Nm  
wires 24 -14 AWG