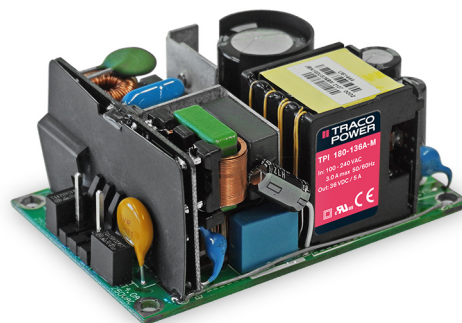


- **High power-density: 180 Watt in 3"x2" package (open frame)**
- **I/O isolation 3000 VAC rated for 250 VAC working voltage**
- **Certification according to IEC/EN/UL 62368-1**
- **Peak power operation up to 220 Watt for 5s**
- **Operating temperature -40°C to 85°C**
- **Active power factor correction >0.9**
- **Operating up to 5000m altitude**
- **High efficiency up to 94%**
- **Protection class II prepared**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TPI 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 and come with the latest industrial standard IEC/EN/UL 62368-1. 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 TPI 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. |
|----------------|-------------------|----------------------------------|------------------------------------------|------------------------------------------|---------------------|-----------------|
| TPI 180-112A-M | 180 W             | 12 VDC (11.0 - 13.0 VDC)         | 15'000 mA                                | 12'500 mA                                | 18'334 mA           | 92 %            |
| TPI 180-115A-M |                   | 15 VDC (13.8 - 16.2 VDC)         | 12'000 mA                                | 10'000 mA                                | 14'667 mA           | 92 %            |
| TPI 180-124A-M |                   | 24 VDC (22.1 - 25.9 VDC)         | 7'500 mA                                 | 6'250 mA                                 | 9'167 mA            | 94 %            |
| TPI 180-136A-M |                   | 36 VDC (33.1 - 38.9 VDC)         | 5'000 mA                                 | 4'170 mA                                 | 6'111 mA            | 93 %            |
| TPI 180-148A-M |                   | 48 VDC (44.2 - 51.8 VDC)         | 3'750 mA                                 | 3'130 mA                                 | 4'583 mA            | 93 %            |
| TPI 180-153A-M |                   | 53 VDC (48.8 - 57.2 VDC)         | 3'400 mA                                 | 2'830 mA                                 | 4'151 mA            | 93 %            |

### Options

|                                                            |                                                                                                                                             |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>on demand</b><br>(backorder with MOQ non stocking item) | <ul style="list-style-type: none"> <li>- Optional model with 18 VDC / 10'000 mA</li> <li>- Optional model with 28 VDC / 6'430 mA</li> </ul> |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|

## Input Specifications

|                        |                             |                                                                                                              |
|------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------|
| Input Voltage          | - AC Range                  | Operational Range: <b>85 - 264 VAC</b> (Full Range)<br>Rated Range: <b>100 - 240 VAC</b> (Full Range)        |
|                        | - DC Range                  | Operational Range: <b>120 - 370 VDC</b> (Designed for, no certification)<br>Polarity: <b>+DC: L / -DC: N</b> |
| Input Frequency        |                             | Operational Range: <b>47 - 440 Hz</b><br>Certified: <b>50/60 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      | - No load & Vin = 230 VAC   | <b>200 mW max.</b> (Ready to meet ErP directive)                                                             |
|                        | - No load & Vin = 115 VAC   | <b>200 mW max.</b>                                                                                           |
| 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)<br>(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)<br>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<br>Peak power time: <b>5 s max.</b><br>Peak power duty cycle: <b>20% max.</b><br>Average operation power: <b>99 W max.</b><br>(at natural convection) |
| Ripple and Noise<br>(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>                                                                                                                                                                       |
|                                        | 28 VDC model:                   | <b>1'800 µF max.</b>                                                                                                                                                                       |
|                                        | 36 VDC model:                   | <b>1'200 µF max.</b>                                                                                                                                                                       |
| Minimum Load                           | 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>                                                                                                                                                      |

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

|                           |                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Output Current Limitation | 130 - 175% of I <sub>out</sub> max.<br>150% typ. of I <sub>out</sub> max.                                                    |
| Overvoltage Protection    | 115 - 135% of V <sub>out</sub> nom.                                                                                          |
| Transient Response        | - Response Deviation<br>3% typ. / 10% max. (75% to 100% Load Step)<br>- Response Time<br>600 µs typ. (75% to 100% Load Step) |

## Safety Specifications

|                       |                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Safety Standards      | - IT / Multimedia Equipment<br>EN 62368-1<br>IEC 62368-1<br>UL 62368-1<br>- Certification Documents<br><a href="http://www.tracopower.com/overview/tpi180a-m">www.tracopower.com/overview/tpi180a-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<br>EN 55011 class B (internal filter)<br>EN 55032 class B (internal filter)<br>FCC Part 15 class B (internal filter)<br>FCC Part 18 class B (internal filter)<br>- Radiated Emissions<br>EN 55011 class A (internal filter)<br>EN 55032 class A (internal filter)<br>FCC Part 15 class A (internal filter)<br>FCC Part 18 class A (internal filter)<br>- Harmonic Current Emissions<br>EN 61000-3-2, class D<br>- Voltage Fluctuations & Flicker<br>EN 61000-3-3                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| EMS Immunity  | EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)<br>- Electrostatic Discharge<br>Air: EN 61000-4-2, ±15 kV, perf. criteria A<br>Contact: EN 61000-4-2, ±8 kV, perf. criteria A<br>EN 61000-4-3, 20 V/m, perf. criteria A<br>EN 61000-4-4, ±2 kV, perf. criteria A<br>L to L: EN 61000-4-5, ±1 kV, perf. criteria A<br>L to PE: EN 61000-4-5, ±2 kV, perf. criteria A<br>EN 61000-4-6, 20 V <sub>rms</sub> , perf. criteria A<br>- Conducted RF Disturbances<br>Continuous: EN 61000-4-8, 30 A/m, perf. criteria A<br>1 s: EN 61000-4-8, 1000 A/m, perf. criteria A<br>- PF Magnetic Field<br>230 VAC / 50 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria B<br>>95%, 250 periods, perf. criteria B<br>115 VAC / 60 Hz: EN 61000-4-11<br>30%, 25 periods, perf. criteria A<br>>95%, 0.5 periods, perf. criteria B<br>>95%, 250 periods, perf. criteria B<br>- Voltage Dips & Interruptions |

## General Specifications

|                                        |                                                                                                                                                                                                                                                  |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relative Humidity                      | 95% max. (non condensing)                                                                                                                                                                                                                        |
| Temperature Ranges                     | - Operating Temperature<br>-40°C to +85°C<br>- Storage Temperature<br>-40°C to +85°C                                                                                                                                                             |
| Power Derating                         | - High Temperature<br>Depending on model<br>- Low Input Voltage<br>1.33 %/V below 100 VAC<br>See application note: <a href="http://www.tracopower.com/overview/tpi180a-m">www.tracopower.com/overview/tpi180a-m</a>                              |
| Over Temperature Protection Switch Off | - Protection Mode<br>115°C min. / 125°C typ. / 135°C max.<br>(Automatic recovery at 112°C typ.)<br>- Measurement Point<br>See application note: <a href="http://www.tracopower.com/overview/tpi180a-m">www.tracopower.com/overview/tpi180a-m</a> |

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

|                                      |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cooling System                       | - Option 1<br>- Option 2                                                               | Forced air cooling (with external fan, 10 CFM)<br>Natural convection (20 LFM)                                                                                                                                                                                                                                                                                                                                                                                                             |
| Altitude During Operation            |                                                                                        | 5'000 m max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Switching Frequency                  |                                                                                        | 135 - 205 kHz (PWM)<br>170 kHz typ. (PWM)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Insulation System                    |                                                                                        | Reinforced Insulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Working Voltage (rated)              |                                                                                        | 250 VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Isolation Test Voltage               | - Input to Output, 60 s<br>- Input to Case or PE, 60 s<br>- Output to Case or PE, 60 s | 3'000 VAC<br>2'000 VAC<br>2'000 VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Creepage                             | - Input to Output<br>- Input to Case or PE<br>- Output to Case or PE                   | 27.5 mm min.<br>5 mm min.<br>4.3 mm min.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Clearance                            | - Input to Output<br>- Input to Case or PE<br>- Output to Case or PE                   | 9.3 mm min.<br>5 mm min.<br>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<br>(264 VAC / 63 Hz) | - Touch Current                                                                        | 300 μA max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Distance Through Isolation           |                                                                                        | 0.4 mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Reliability                          | - Calculated MTBF                                                                      | 1'145'000 h (MIL-HDBK-217F, ground benign)                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Environment                          | - Vibration<br><br>- Mechanical Shock<br><br>- Thermal Shock                           | IEC 60068-2-6<br>5 g, 3 axis, sine sweep, 3x30 min, 5-500 Hz<br>IEC 60068-2-27<br>50 g, 3 axis, 11 ms<br>MIL-STD-810F                                                                                                                                                                                                                                                                                                                                                                     |
| Housing Type                         |                                                                                        | Open Frame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Mounting Type                        |                                                                                        | Chassis Mount                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Connection Type                      |                                                                                        | Pin Connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weight                               |                                                                                        | 162 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Environmental Compliance             | - REACH Declaration<br><br>- RoHS Declaration<br><br>- SCIP Reference Number           | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>5cd32560-418e-4691-9d21-8a007c6079e1 |

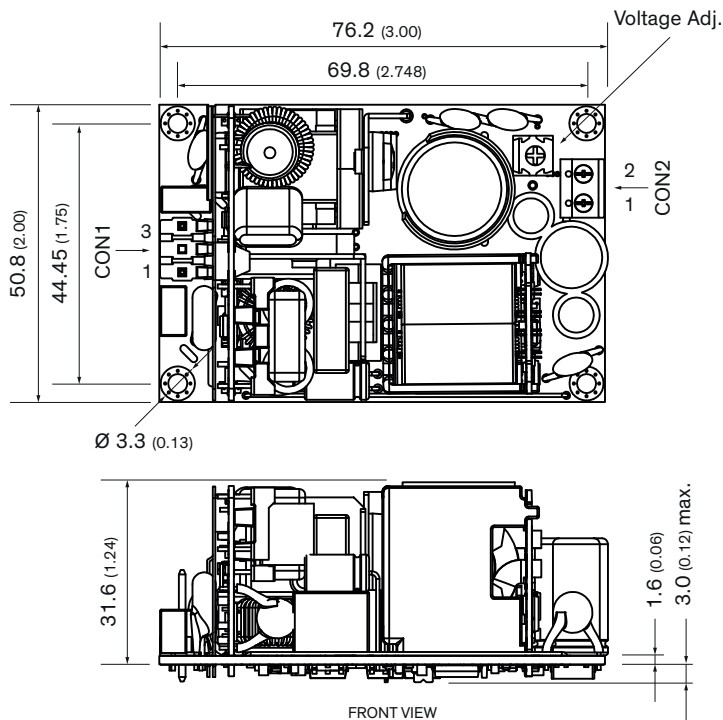
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tpi180a-m](http://www.tracopower.com/overview/tpi180a-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 09-50-8031  
Molex Crimp Terminals 08500106 (2478),  
08520112 (6838), 45570

**CON2:** Screw locked torque: 2.5 kgfcm / 0.25 Nm max.  
Wire dimension range: 24 - 14 AWG

All dimensions in mm (inch)

Tolerance: X.X  $\pm 0.5$  (X.XX  $\pm 0.02$ )

X.XX  $\pm 0.25$  (X.XXX  $\pm 0.01$ )

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

Mounting screw locked torque: max. 5.0 kgfcm / 0.49 Nm