

- Compact encapsulated 40 Watt PCB module (3.2"x2.2")
- I/O isolation 4000 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
- Low leakage current <100 µA rated for BF applications
- Operating temperature -40°C to 80°C
- EMC compliance according to IEC 60601-1-2 4th edition and EN55032 class B
- Operating up to 5000m altitude
- 5-year product warranty



The TPP 40E-D is a 40 Watt encapsulated AC/DC modules in a PCB package. It features a reinforced double I/O isolation system according to latest medical safety standards (60601-1 3rd edition, 2 x MOPP). The leakage current is below 100 µA and makes the module suitable for BF (body floating) applications. The excellent efficiency of up to 93% allows a high power density and compact design (3.2" x 2.2"). The operating temperature range is -40°C to +80°C with derating above 60°C. The EMC characteristic is dedicated for applications in industrial and medical fields. High reliability is provided by use of high quality components and an excellent thermal management making the TPP 40E-D 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 40-105E-D	40 W	5 VDC (4.5 - 5.5 VDC)	8'000 mA	90 %
TPP 40-112E-D		12 VDC (10.8 - 13.2 VDC)	3'340 mA	92 %
TPP 40-115E-D		15 VDC (13.5 - 16.5 VDC)	2'670 mA	92 %
TPP 40-124E-D		24 VDC (21.6 - 26.4 VDC)	1'670 mA	92 %
TPP 40-136E-D		36 VDC (32.4 - 39.6 VDC)	1'120 mA	92 %
TPP 40-148E-D		48 VDC (43.2 - 52.8 VDC)	840 mA	93 %

Input Specifications

Input Voltage	- AC Range	Operational Range: 85 - 264 VAC (Full Range) Rated Range: 100 - 240 VAC (Full Range)
	- DC Range	Operational Range: 120 - 370 VDC (Designed for, no certification) Polarity: +DC: L / -DC: N
Input Frequency		Operational Range: 47 - 440 Hz Certified: 50/60 Hz
Input Current	- Full Load & Vin = 230 VAC	500 mA max.
	- Full Load & Vin = 115 VAC	980 mA max.
Power Consumption	- No load & Vin = 230 VAC	210 mW max. (Ready to meet ErP directive)
	- No load & Vin = 115 VAC	210 mW max.
Input Inrush Current	- At 230 VAC	80 A max.
	- At 115 VAC	30 A max.
Input Protection		T 3.15 A / 250 VAC (Internal Fuse L & N)
Recommended Input Fuse		3'150 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)

Output Specifications

Output Voltage Adjustment		±10% (By external trim resistor)
	See application note:	www.tracopower.com/overview/tpp40e-d Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax)	0.2% max.
	- Load Variation (0 - 100%)	0.5% max.
Ripple and Noise (20 MHz Bandwidth)	5 VDC model:	100 mVp-p max. (w/ 10 µF)
	12 VDC model:	100 mVp-p max. (w/ 10 µF)
	15 VDC model:	100 mVp-p max. (w/ 10 µF)
	24 VDC model:	120 mVp-p max. (w/ 1 µF)
	36 VDC model:	120 mVp-p max. (w/ 1 µF)
	48 VDC model:	200 mVp-p max. (w/ 0.1 µF)
	5 VDC model:	75 mVp-p typ. (w/ 10 µF)
	12 VDC model:	75 mVp-p typ. (w/ 10 µF)
	15 VDC model:	75 mVp-p typ. (w/ 10 µF)
	24 VDC model:	75 mVp-p typ. (w/ 1 µF)
	36 VDC model:	75 mVp-p typ. (w/ 1 µF)
	48 VDC model:	150 mVp-p typ. (w/ 0.1 µF)
Capacitive Load	5 VDC model:	16'000 µF max.
	12 VDC model:	2'785 µF max.
	15 VDC model:	1'780 µF max.
	24 VDC model:	700 µF max.
	36 VDC model:	310 µF max.
	48 VDC model:	175 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Hold-up Time	- At 230 VAC	120 ms min.
	- At 115 VAC	25 ms min.
Start-up Time	- At 230 VAC	1'000 ms max.
	- At 115 VAC	1'000 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		120 - 180% of Iout max.
		145% typ. of Iout max.
Overvoltage Protection		130% typ. of Vout nom.
		125 - 140% of Vout nom.

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

Transient Response	- Response Deviation	3% max. (50% to 75% Load Step at 2.5 A/μs)
	- Response Time	600 μs typ. (50% to 75% Load Step at 2.5 A/μs)

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	www.tracopower.com/overview/tpp40e-d
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 B (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 - Voltage Fluctuations & Flicker	EN 61000-3-2, class A EN 61000-3-3
EMS Immunity	- Electrostatic Discharge	EN 60601-1-2 edition 4 (Medical Devices)
		Air: EN 61000-4-2, ±15 kV, perf. criteria A Contact: EN 61000-4-2, ±8 kV, perf. criteria B
	- RF Electromagnetic Field - EFT (Burst) / Surge	EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A
		L to L: EN 61000-4-5, ±1 kV, perf. criteria A EN 61000-4-6, 20 Vrms, perf. criteria A
	- Conducted RF Disturbances - PF Magnetic Field - 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

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
	See application note: www.tracopower.com/overview/tpp40e-d	
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		50 - 130 kHz (PWM QR)
Insulation System		Reinforced Insulation

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Working Voltage (rated)	250 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.
	- Input to Case or PE 4 mm min.
	- Output to Case or PE 4 mm min.
Clearance	- Input to Output 4 mm min.
	- Input to Case or PE 4 mm min.
	- Output to Case or PE 4 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	- Touch Current 100 µA max.
Reliability	- Calculated MTBF 3'010'000 h (MIL-HDBK-217F, ground benign)
Washing Process	According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
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 -40 to +85°C, 72 cycles, 30 min each
Housing Material	Plastic (UL 94 V-0 rated)
Potting Material	Silicone (UL 94 V-0 rated)
Pin Material	Tinned Copper
Pin Foundation Plating	Nickel (2 - 3 µm)
Pin Surface Plating	Tin (3 - 5 µm), matte
Housing Type	Plastic Case
Mounting Type	PCB Mount
Connection Type	THD (Through-Hole Device)
Soldering Profile	Wave Soldering 260°C / 6 s
Weight	265 g
Environmental Compliance	- REACH Declaration www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (Q5A rule).)
	- SCIP Reference Number e0808fbc-055d-4eef-90bb-caafc30942c6

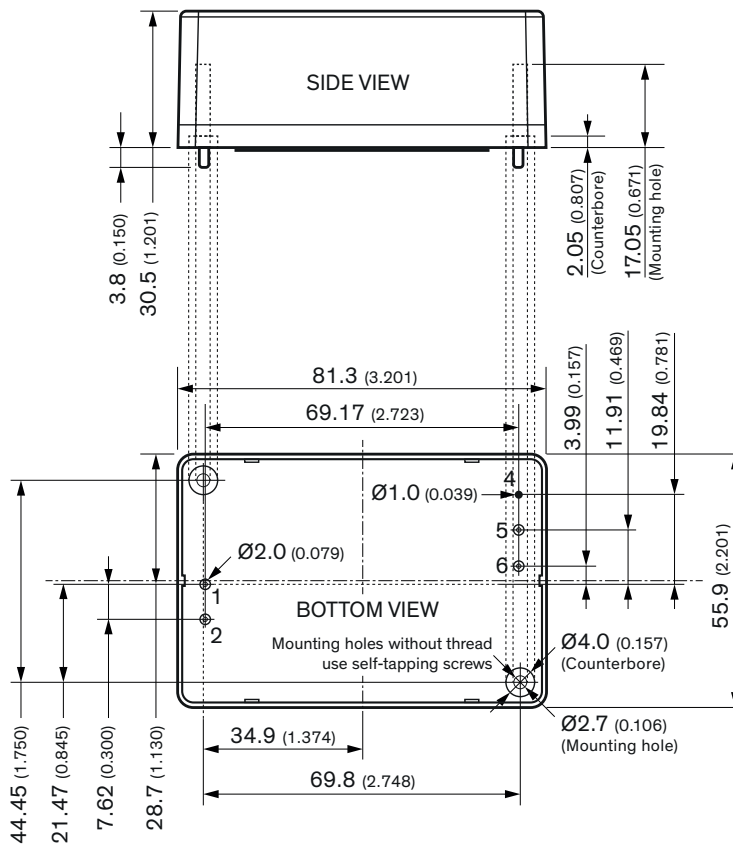
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/tpp40e-d

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Outline Dimensions



Pinout	
Pin	Function
1	AC (N)
2	AC (L)
4	Trim
5	-Vout
6	+Vout

All dimensions in mm (inch)

Tolerance: x.x ±0.5 (x.xx ±0.02)

x.xx ±0.25 (x.xxx ±0.01)

Suggested screw: ST2.9 X 6.5

Max. screw locked torque: 0.34 Nm (3.5 kgf cm)