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TRACO POWER

AC/DC Medical Power Supply

TPP 40E-D Series, 40 Watt

- **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**



ES 60601-1 IEC 60601-1
UL 62368-1 IEC 62368-1

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 %

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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.

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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		EN 61000-3-2, class A
	- Voltage Fluctuations & Flicker		EN 61000-3-3
EMS Immunity			EN 60601-1-2 edition 4 (Medical Devices)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±15 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±8 kV, perf. criteria B
	- RF Electromagnetic Field		EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
		L to L:	EN 61000-4-5, ±1 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
	- Voltage Dips & Interruptions	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		Allowed (hermetical product)
	See 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 (O5A rule). The SCIP number is provided on request.)

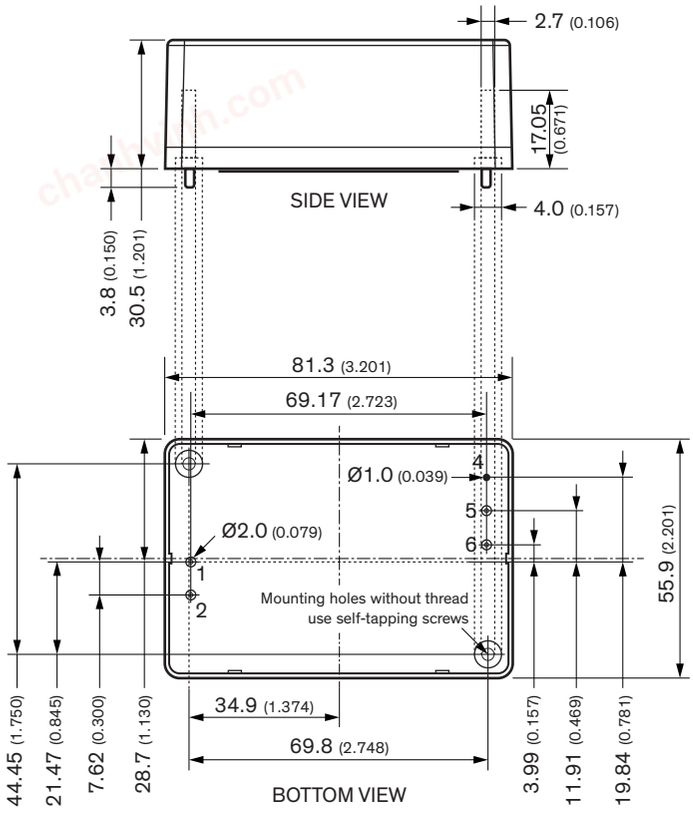
Supporting Documents

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 ±025 (X.XXX ±0.010)

Mounting Holes depth total: 17.05 (0.671)
Counterbore depth: 2.05 (0.807)

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