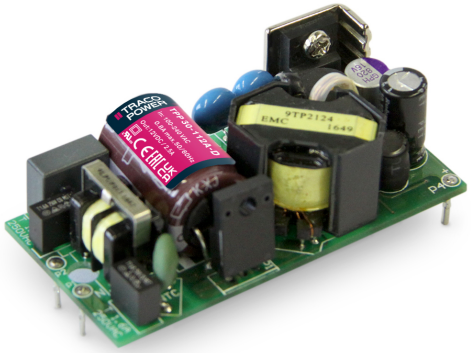
TRACO POWER

AC/DC Medical Power Supply

TPP 30A-D Series, 30 Watt

- **High power density power supply (open frame)**
- **Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP**
- **Low leakage current <75 µA rated for BF applications**
- **EMC compliance to IEC 60601-1-2 4th edition**
- **Risk management process according to ISO 14971 incl. risk management file**
- **Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3**
- **Protection class II**
- **Operating up to 5000 m altitude**
- **Ready to meet ErP directive, no load power consumption <60 mW**
- **5-year product warranty**



ES 60601-1 IEC 60601-1
UL 62368-1 IEC 60335-1
IEC 62368-1

The TPP 30A-D AC/DC power supplies feature a reinforced double I/O isolation system according to medical safety standards IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP approved for an operating altitude of 5000 m. The earth leakage current is below 75 µA what makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 92% offers a high power density in the packaging format 1.36" x 2.74". The full load operating temperature range covers –40°C to +60°C while it goes up to 85°C with 50% load derating. The units operate in compliance to the medical EMC emission and immunity levels according to latest standard IEC 60601-1-2 4th edition.

Models

Order Code	Output Power max.	Output Voltage nom. (adjustable)	Output Current max.	Efficiency typ.
TPP 30-103A-D	20 W	3.3 VDC (2.97 - 3.63 VDC)	6'000 mA	84 %
TPP 30-105A-D	30 W	5 VDC (4.5 - 5.5 VDC)	6'000 mA	87 %
TPP 30-109A-D		9 VDC (8.1 - 9.9 VDC)	3'340 mA	88 %
TPP 30-112A-D		12 VDC (10.8 - 13.2 VDC)	2'500 mA	91 %
TPP 30-115A-D		15 VDC (13.5 - 16.5 VDC)	2'000 mA	91 %
TPP 30-124A-D		24 VDC (21.6 - 26.4 VDC)	1'250 mA	90 %
TPP 30-136A-D		36 VDC (32.4 - 39.6 VDC)	840 mA	90 %
TPP 30-148A-D		48 VDC (43.2 - 52.8 VDC)	630 mA	92 %

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**
Power Consumption	- No load & Vin = 230 VAC		**60 mW max.** (Ready to meet ErP directive)
	- No load & Vin = 115 VAC		**60 mW max.**
Input Current	- Full load & Vin = 230 VAC		**400 mA max.**
	- Full load & Vin = 115 VAC		**800 mA max.**
Input Inrush Current	- At 230 VAC		**40 A max.**
	- At 115 VAC		**25 A max.**
Input Protection			**T 1.6 A / 250 VAC** (Internal Fuse in L & N)
Recommended Input Fuse			(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/tpp30a-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%)		**0.7% max.** (3.3 and 5 VDC model)
			0.5% max. (other output models)
Ripple and Noise (20 MHz Bandwidth)		3.3 VDC model:	**50 mVp-p typ.** (w/ 10 µF X7R)
		5 VDC model:	**50 mVp-p typ.** (w/ 10 µF X7R)
		9 VDC model:	**50 mVp-p typ.** (w/ 10 µF X7R)
		12 VDC model:	**50 mVp-p typ.** (w/ 1 µF X7R)
		15 VDC model:	**50 mVp-p typ.** (w/ 1 µF X7R)
		24 VDC model:	**50 mVp-p typ.** (w/ 1 µF X7R)
		36 VDC model:	**50 mVp-p typ.** (w/ 1 µF X7R)
		48 VDC model:	**50 mVp-p typ.** (w/ 0.1 µF X7R)
Capacitive Load		3.3 VDC model:	**10'000 µF max.**
		5 VDC model:	**12'000 µF max.**
		9 VDC model:	**3'720 µF max.**
		12 VDC model:	**2'085 µF max.**
		15 VDC model:	**1'350 µF max.**
		24 VDC model:	**520 µF max.**
		36 VDC model:	**235 µF max.**
		48 VDC model:	**130 µF max.**
Minimum Load			Not required
Temperature Coefficient			**±0.02 %/K max.**
Hold-up Time	- At 115 VAC		**16 ms min.**
Start-up Time	- At 230 VAC		**1'500 ms max.**
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			**110 - 170% of Iout max.**
			140% typ. of Iout max.
Overvoltage Protection			**125 - 140% of Vout nom.**
Transient Response	- Response Deviation		**3% max.** (50% to 75% Load Step)
	- Response Time		**500 µs typ.** (50% to 75% Load Step)

All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Household	EN 60335-1 IEC 60335-1
	- Medical Equipment	EN 60601-1 IEC 60601-1 ANSI/AAMI ES 60601-1 2 x MOPP (Means Of Patient Protection)
	- Power Transformers	IEC 61558-1 IEC 61558-2-16
	- Certification Documents	www.tracopower.com/overview/tpp30a-d
Protection Class		Class I & II (Prepared): Reinforced Insulation
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI (Emissions)			EN 60601-1-2 edition 4 (Medical Devices)
	- Conducted Emissions		EN 55011 class B (internal filter) EN 55014-1 (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class B (internal filter) FCC 47 Part 18 class B (internal filter)
	- Radiated Emissions		EN 55011 class B (internal filter) EN 55014-1 (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class B (internal filter) FCC 47 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) EN 55024 (IT Equipment) EN 55035 (Multimedia) EN 55014-2 (Household Appliances Tools)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±15 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±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, ±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 60%, 1 period, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A
		115 VAC / 60 Hz:	EN 61000-4-11 30%, 25 periods, perf. criteria A 60%, 1 period, perf. criteria A >95%, 1 period, perf. criteria A >95%, 250 periods, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/overview/tpp30a-d

General Specifications

Relative Humidity	95% max. (non condensing)

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Temperature Ranges	- Operating Temperature	–40°C to +85°C
	- Storage Temperature	–40°C to +85°C
Power Derating	- High Temperature	Depending on model
	- Low Input Voltage	4 %/V below 90 VAC
	See application note:	www.tracopower.com/overview/tpp30a-d
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		30 - 60 kHz (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		272 VAC
Isolation Test Voltage	- Input to Output, 60 s	4'000 VAC
	- Input to Case or PE, 60 s	1'500 VAC
	- Output to Case or PE, 60 s	1'500 VAC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Resistance	- Input to Output, 500 VDC	100 MΩ min.
Leakage Current (at 264 VAC)	- Touch Current	75 µA max.
Reliability	- Calculated MTBF	3'300'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Not allowed
Environment	- Vibration	IEC 60068-2-6
	- Mechanical Shock	IEC 60068-2-27
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Open Frame
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Soldering Profile		Lead-Free Wave Soldering 260°C / 6 s max.
Weight		58 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).)
	- SCIP Reference Number	ea46c584-bfb7-47ad-bebf-79fd02614da1

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tpp30a-d

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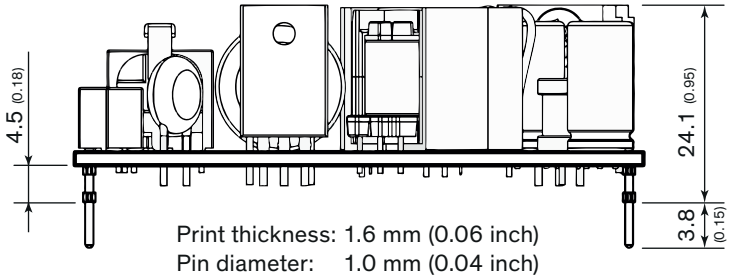
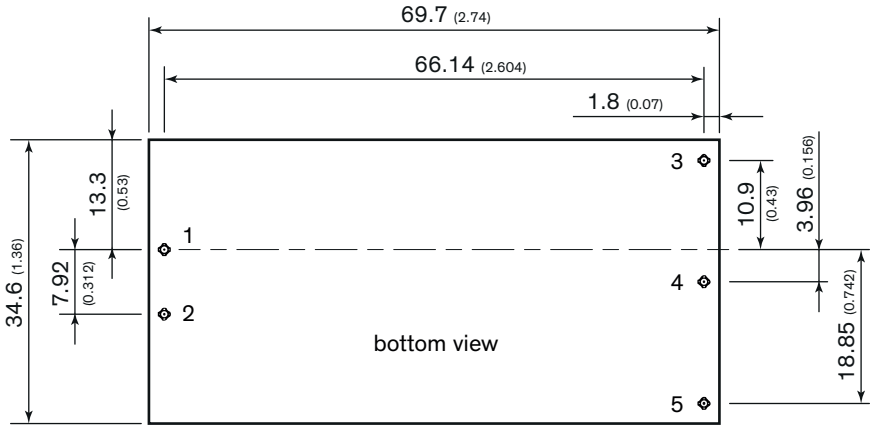
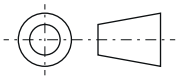
Outline Dimensions



Print thickness: 1.6 mm (0.06 inch)
Pin diameter: 1.0 mm (0.04 inch)

PCB Pinout	
Pin	**Function**
1	Neutral
2	Line
3	+Vout
4	–Vout
5	Trim





Dimension in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.010)
Pin pitch tolerance: ±0.25 (±0.010)
Pin dimension tolerance: ±0.10 (±0.004)