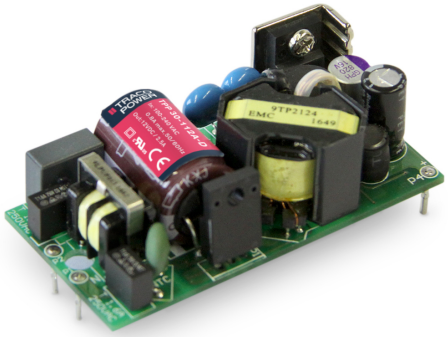
TRACO POWER

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 3rd edition 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 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 3rd edition 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	85 - 264 VAC (Full Range)
	- DC Range	120 - 370 VDC (Designed for, no certification)
Input Frequency		47 - 63 Hz
Input Current	- Full Load & Vin = 230 VAC	400 mA max.
	- Full Load & Vin = 115 VAC	800 mA max.
Power Consumption	- at no Load	60 mW max. (Ready to meet ErP directive)
Input Inrush Current	- at 230 VAC	40 A max.
Input Protection		T 1.6 A / 250 VAC (Internal Fuse in L & N)

Output Specifications

Output Voltage Adjustment			±10% (By external trim resistor)
		Refer to 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. (with 10 µF X7R)
		5 VDC model:	50 mVp-p typ. (with 10 µF X7R)
		9 VDC model:	50 mVp-p typ. (with 10 µF X7R)
		12 VDC model:	50 mVp-p typ. (with 1 µF X7R)
		15 VDC model:	50 mVp-p typ. (with 1 µF X7R)
		24 VDC model:	50 mVp-p typ. (with 1 µF X7R)
		36 VDC model:	50 mVp-p typ. (with 1 µF X7R)
		48 VDC model:	50 mVp-p typ. (with 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 nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Household	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 II Prepared: Reinforced Insulation
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMC Emissions			EN 60601-1-2 edition 4 (Medical Devices)
	- Conducted Emissions		EN 55011 class B (internal filter) EN 55014-1 EN 55032 class B (internal filter) FCC Part 15, class B FCC Part 18, class B
	- Radiated Emissions		EN 55011 class B (internal filter) EN 55014-1 EN 55032 class B (internal filter) FCC Part 15, class B FCC Part 18, class B
	- Harmonic Current Emissions		EN 61000-3-2, class A
	- Voltage Fluctuations & Flicker		EN 61000-3-3
EMC Immunity			EN 55024 (IT Equipment) EN 60601-1-2 edition 4 (Medical Devices) EN 55014-2 (Household Appliances Tools)
	- Electrostatic Discharge	Air: Contact:	EN 61000-4-2, ±15 kV, perf. criteria A EN 61000-4-2, ±8 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst)		EN 61000-4-4, ±2 kV, perf. criteria A
	- Surge	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		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

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +85°C
	- Storage Temperature	–40°C to +85°C

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

Power Derating	- High Temperature	see application note www.tracopower.com/overview/tpp30a-d
	- Low Input Voltage	4 %/V below 90 VAC
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Switching Frequency		30 - 60 kHz (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		272 VAC
Isolation Test Voltage	- Input to Output, 60 s	5'657 VDC
	- Input to Case or PE, 60 s	2'121 VDC
	- Output to Case or PE, 60 s	2'121 VDC
Creepage	- Input to Output	8 mm min.
Clearance	- Input to Output	8 mm min.
Isolation Resistance	- Input to Output, 500 VDC	100 MOhm min.
Leakage Current (at 264 VAC)	- Touch Current	75 µA max.
Reliability	- Calculated MTBF	3'300'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	IEC 60068-2-6
	- Mechanical Shock	IEC 60068-2-27
Connection Type		THD (Through-Hole Device)
Weight		58 g
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

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

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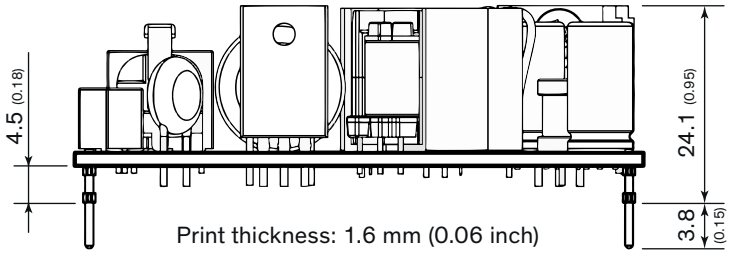
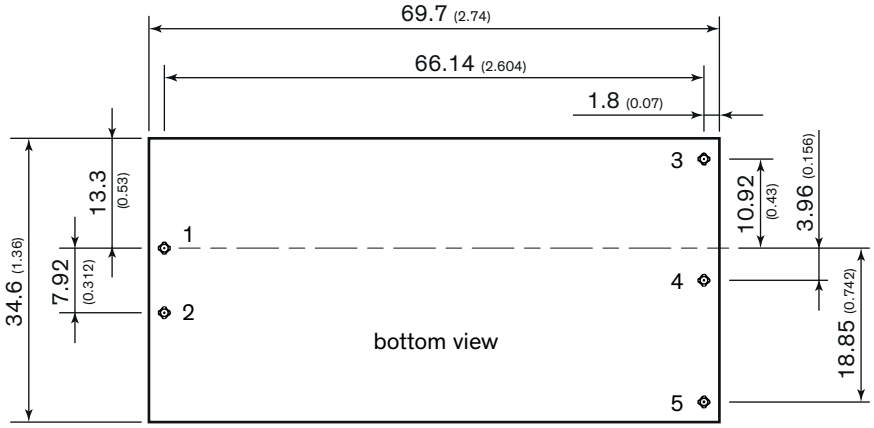
Outline Dimensions



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



Dimension in mm, () = inch
Tolerances: x.x ±0.50 (±0.02)
x.xx ±0.25 (±0.01)
Pin pitch tolerance: ±0.25 (±0.010)
Pin dimension tolerance: ±0.10 (±0.004)

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

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