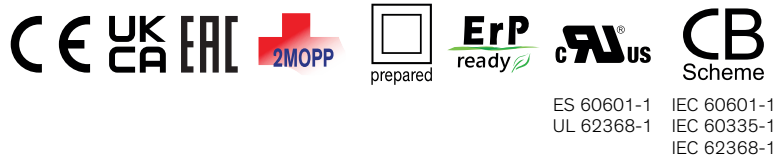
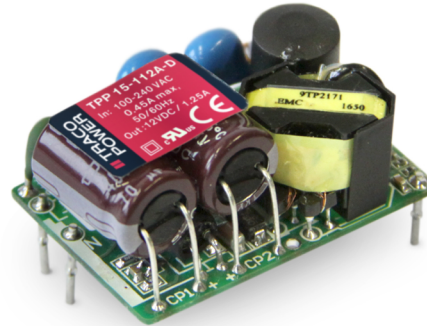


- High power density power supply (open frame)
- Certification according to IEC/EN/ES 60601-1 edition 3.2 for 2 x MOPP
- Low leakage current <100 μ A rated for BF applications
- EMC compliance to IEC 60601-1-2 4th edition
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance 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 <100 mW
- 5-year product warranty



The TPP 15A-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 100 μ A what makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 88.5% offers a high power density in the packaging format 1.0" x 1.5". The full load operating temperature range covers -40°C to $+60^{\circ}\text{C}$ 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 15-103A-D	15 W	3.3 VDC (2.97 - 3.63 VDC)	4'000 mA	84 %
TPP 15-105A-D		5 VDC (4.5 - 5.5 VDC)	3'000 mA	86 %
TPP 15-109A-D		9 VDC (8.1 - 9.9 VDC)	1'670 mA	86 %
TPP 15-112A-D		12 VDC (10.8 - 13.2 VDC)	1'250 mA	87 %
TPP 15-115A-D		15 VDC (13.5 - 16.5 VDC)	1'000 mA	87 %
TPP 15-124A-D		24 VDC (21.6 - 26.4 VDC)	625 mA	88 %
TPP 15-136A-D		36 VDC (32.4 - 39.6 VDC)	417 mA	88 %
TPP 15-148A-D		48 VDC (43.2 - 52.8 VDC)	313 mA	89 %

Note - Other output models are available on request.

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 Certified Range: 120 - 370 VDC Polarity: irrelevant (When operating with DC input voltage an external fuse T 1.0 A / 400 VDC is needed. Allowed types: Littlefuse 477 series, Cooper Bussmann type S505H-1-R, Bel Fuse type OADK)
Input Frequency		Operational Range: 47 - 440 Hz Certified: 50/60 Hz
Power Consumption	- No load & Vin = 230 VAC - No load & Vin = 115 VAC	100 mW max. (Ready to meet ErP directive) 100 mW max.
Input Current	- Full load & Vin = 230 VAC - Full load & Vin = 115 VAC	300 mA max. 450 mA max.
Input Inrush Current	- At 230 VAC - At 115 VAC	40 A max. 25 A max.
Input Protection		T 1.6 A / 250 VAC (Internal Fuse in L)
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/tpp15a-d Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)	0.2% max. 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: 40 mVp-p typ. (w/ 10 µF X5R) 5 VDC model: 40 mVp-p typ. (w/ 10 µF X5R) 9 VDC model: 70 mVp-p typ. (w/ 10 µF X5R) 12 VDC model: 70 mVp-p typ. (w/ 10 µF X5R) 15 VDC model: 70 mVp-p typ. (w/ 10 µF X5R) 24 VDC model: 100 mVp-p typ. (w/ 10 µF X5R) 36 VDC model: 100 mVp-p typ. (w/ 10 µF X5R) 48 VDC model: 140 mVp-p typ. (w/ 1 µF X7R)
Capacitive Load		3.3 VDC model: 6'000 µF max. 5 VDC model: 4'000 µF max. 9 VDC model: 1'860 µF max. 12 VDC model: 1'200 µF max. 15 VDC model: 820 µF max. 24 VDC model: 470 µF max. 36 VDC model: 220 µF max. 48 VDC model: 150 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Hold-up Time	- At 115 VAC	8 ms min.
Start-up Time	- At 230 VAC	850 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		120 - 200% of Iout max. 145% typ. of Iout max.
Overvoltage Protection		115 - 140% of Vout nom.
Transient Response	- Response Deviation - Response Time	8% max. (75% to 100% Load Step) 500 µs typ. (75% to 100% 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
	- Power Transformers	2 x MOPP (Means Of Patient Protection) IEC 61558-1 IEC 61558-2-16
	- Certification Documents	www.tracopower.com/overview/tpp15a-d
Protection Class		Class I & II (Prepared): Reinforced Insulation
		See application note: www.tracopower.com/info/protection-class.pdf
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 A (internal filter) EN 55011 class B (internal filter) EN 55014-1 (internal filter) EN 55032 class A (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class A (internal filter) FCC 47 Part 15 class B (internal filter) FCC 47 Part 18 class A (internal filter) FCC 47 Part 18 class B (internal filter)
	- Radiated Emissions	EN 55011 class A (internal filter) EN 55011 class B (internal filter) EN 55014-1 (internal filter) EN 55032 class A (internal filter) EN 55032 class B (internal filter) FCC 47 Part 15 class A (internal filter) FCC 47 Part 15 class B (internal filter) FCC 47 Part 18 class A (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

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

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
- RF Electromagnetic Field	Contact:	EN 61000-4-2, ±8 kV, perf. criteria A
- EFT (Burst) / Surge		EN 61000-4-3, 20 V/m, perf. criteria A
		EN 61000-4-4, ±2 kV, perf. criteria A
- Conducted RF Disturbances	L to L:	EN 61000-4-5, ±1 kV, perf. criteria A
- PF Magnetic Field		EN 61000-4-6, 20 Vrms, perf. criteria A
- 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
		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/tpp15a-d

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
	- Low Input Voltage	4 %/V below 90 VAC
	See application note:	www.tracopower.com/overview/tpp15a-d
Cooling System		Natural convection (20 LFM)
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		90 - 110 kHz (PWM)
Insulation System		Reinforced Insulation
Working Voltage (rated)		250 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	100 μA max.
Reliability	- Calculated MTBF	3'100'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Not allowed
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, half sine, 11 ms
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)

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

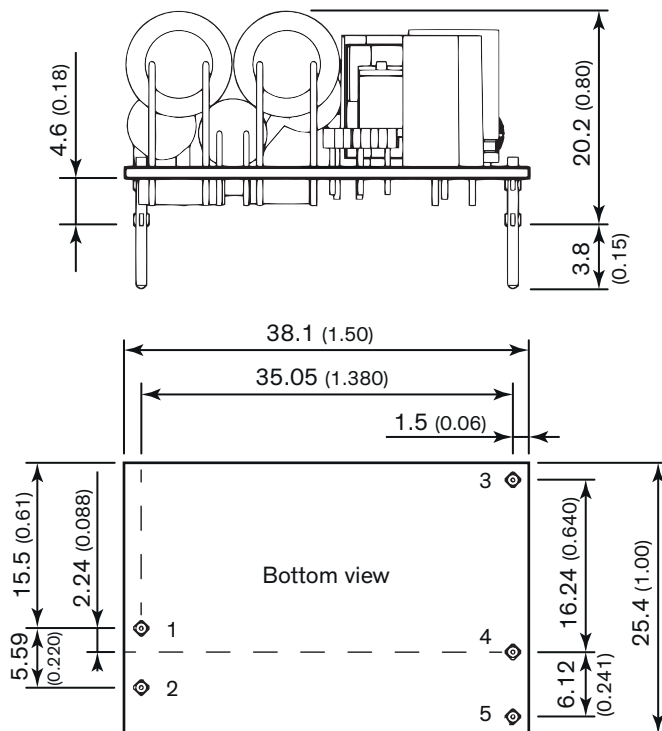
Soldering Profile	Lead-Free Wave Soldering 260°C / 6 s max.
Weight	16.5 g
Environmental Compliance	- REACH Declaration www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant - RoHS Declaration www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) - SCIP Reference Number 31b494fa-2a36-415b-947b-0f32804b2076

Additional Information

Supporting Documents	www.tracopower.com/overview/tpp15a-d
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

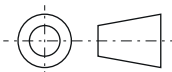
Outline Dimensions

12, 15, 24, 36, and 48 VDC models - without heatsink



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

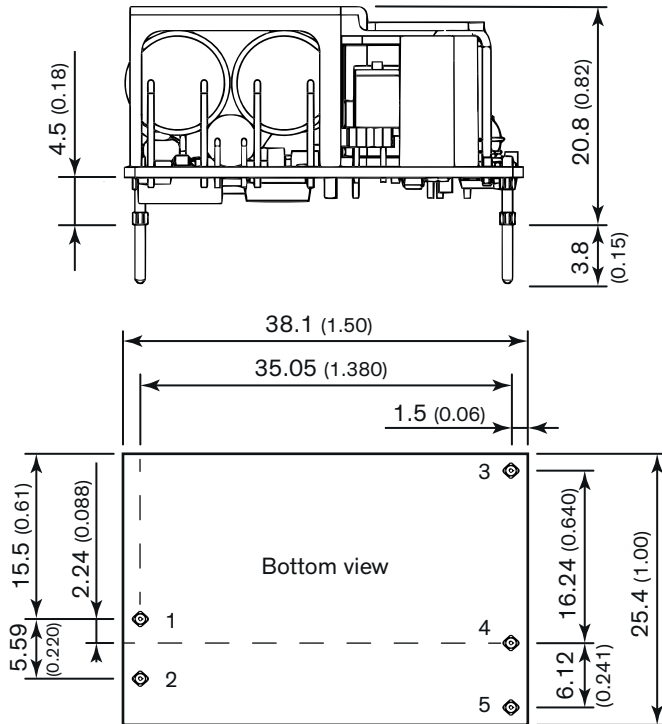
Print thickness: 1.0 mm (0.04)
Pin diameter: 1.0 mm (0.04)



Dimension in mm (inch)
Tolerance: x.x ±0.50 (x.xx ±0.02)
 x.xx ±0.25 (x.xxx ±0.010)
Pin dimension tolerance: ±0.10 (±0.004)

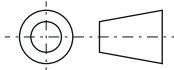
All specifications valid at 230 VAC, resistive full load and +25°C after warm-up time, unless otherwise stated.

3.3, 5, and 9 VDC models - with heatsink



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

Print thickness: 1.0 mm (0.04)
 Pin diameter: 1.0 mm (0.04)



Dimensions in mm (inch)
 Tolerance: $x.x \pm 0.50$ ($x.xx \pm 0.02$)
 $x.xx \pm 0.25$ ($x.xxx \pm 0.010$)
 Pin dimension tolerance: ± 0.10 (± 0.004)