



**THE DATASHEET OF
TLP3480(TP,E**



- Industry standard pinout
- Unregulated outputs
- Operating temperature range $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
- I/O isolation voltage 1000 VDC
- Efficiency up to 83 %
- 3-year product warranty



The TMH series are ultra miniature, isolated 2 Watt DC/DC-converters in a Single-in-Line package (SIP). Requiring only 1.5 cm² board space they offer the ideal solution in many space critical applications for board level power distribution. The use of SMD-technology makes it possible to offer a product with high performance at low cost.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
TMH 0505S	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	400 mA			76 %
TMH 0512S		12 VDC	165 mA			80 %
TMH 0515S		15 VDC	133 mA			80 %
TMH 0505D		+5 VDC	200 mA	-5 VDC	200 mA	77 %
TMH 0512D		+12 VDC	83 mA	-12 VDC	83 mA	79 %
TMH 0515D		+15 VDC	66 mA	-15 VDC	66 mA	79 %
TMH 1205S	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	400 mA			78 %
TMH 1212S		12 VDC	165 mA			82 %
TMH 1215S		15 VDC	133 mA			83 %
TMH 1205D		+5 VDC	200 mA	-5 VDC	200 mA	79 %
TMH 1212D		+12 VDC	83 mA	-12 VDC	83 mA	82 %
TMH 1215D		+15 VDC	66 mA	-15 VDC	66 mA	82 %
TMH 2405S	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	400 mA			77 %
TMH 2412S		12 VDC	165 mA			81 %
TMH 2415S		15 VDC	133 mA			82 %
TMH 2405D		+5 VDC	200 mA	-5 VDC	200 mA	79 %
TMH 2412D		+12 VDC	83 mA	-12 VDC	83 mA	81 %
TMH 2415D		+15 VDC	66 mA	-15 VDC	66 mA	82 %

Input Specifications

Input Current	- At no load	5 Vin models: 60 mA typ. 12 Vin models: 30 mA typ. 24 Vin models: 15 mA typ.
	- At full load	5 Vin models: 526 mA typ. (5 Vout model) 495 mA typ. (12 Vout model) 499 mA typ. (15 Vout model) 519 mA typ. (5 / -5 Vout model) 504 mA typ. (12 / -12 Vout model) 501 mA typ. (15 / -15 Vout model) 12 Vin models: 212 mA typ. (5 Vout model) 200 mA typ. (12 Vout model) 200 mA typ. (15 Vout model) 210 mA typ. (5 / -5 Vout model) 201 mA typ. (12 / -12 Vout model) 200 mA typ. (15 / -15 Vout model) 24 Vin models: 108 mA typ. (5 Vout model) 101 mA typ. (12 Vout model) 101 mA typ. (15 Vout model) 105 mA typ. (5 / -5 Vout model) 102 mA typ. (12 / -12 Vout model) 100 mA typ. (15 / -15 Vout model)
Surge Voltage		5 Vin models: 9 VDC max. (1 s max.) 12 Vin models: 18 VDC max. (1 s max.) 24 Vin models: 30 VDC max. (1 s max.)
Recommended Input Fuse		5 Vin models: 1'000 mA (slow blow) 12 Vin models: 500 mA (slow blow) 24 Vin models: 200 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type

Output Specifications

Voltage Set Accuracy		±3% max.
Regulation (Unregulated)	- Input Variation (1% Vin step)	single output models: 1.5% max. dual output models: 1.5% max.
	- Load Variation - Voltage Balance (symmetrical load)	See application note: www.tracopower.com/tmh-cc dual output models: 1% max.
Ripple and Noise	- 20 MHz Bandwidth	150 mVp-p max. 100 mVp-p typ. (To further reduce Ripple and Noise, a capacitor with 1.5 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models: 470 µF max. 12 Vout models: 470 µF max. 15 Vout models: 470 µF max.
	- dual output	5 / -5 Vout models: 390 / 390 µF max. 12 / -12 Vout models: 390 / 390 µF max. 15 / -15 Vout models: 390 / 390 µF max.
Minimum Load		See application note: www.tracopower.com/tmh-cc (Operation at lower load will not damage the converter, but it may not meet all specifications)
Temperature Coefficient		±0.02 %/K max.
Start-up Time		260 ms max.
Short Circuit Protection		Limited 0.5 s max., Automatic recovery

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

Safety Specifications

Over Voltage Category	Not mains connected
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EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 55032 class A (with external filter)
	- Radiated Emissions	EN 55032 class A (internal filter)
External filter proposal:		www.tracopower.com/tmh-emc-filter

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	-50°C to +125°C
Power Derating	- High Temperature	2.86 %/K above 70°C
	See application note: www.tracopower.com/tmh-cc	
Cooling System		Natural convection (20 LFM)
Regulator Topology		Push-Pull Converter
Switching Frequency		50 - 100 kHz (PFM)
		80 kHz typ. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'000 VDC
	- Input to Output, 1 s	1'200 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	80 pF typ.
		120 pF max.
Reliability	- Calculated MTBF	2'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Nickel-Iron (Alloy 42)
Pin Foundation Plating		Nickel (1 μm min.)
Pin Surface Plating		Tin (3 - 5 μm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		SIP7
Soldering Profile		Lead-Free Wave Soldering
		260°C / 10 s max.
Weight		2.7 g
Thermal Impedance	- Case to Ambient	52.5 K/W typ.
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) (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule))
	- SCIP Reference Number	13224883-cead-4b7f-b9ea-fc07cfac2927

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