

### Features

- ◆ Supplementary and reinforced insulation
- ◆ I/O isolation 3000 VACrms rated for 1000 Vrms working voltage
- ◆ Medical safety to UL 60601-1 and IEC/EN 60601-1 3rd Edition, 2 x MOOP
- ◆ Industrial safety to IEC/EN/UL 60950-1
- ◆ 9-40 VDC, 18-80 VDC and 36-160 VDC
- ◆ Extended operating temperature range -40°C to 85°C max.
- ◆ Input filter meets EN 55032 class A without ext. components
- ◆ Continuous short circuit protection
- ◆ High reliability, MTBF >1 Mio. hours
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty



The THP-3 series is a new range of high performance 3W DC/DC converters in a low profile DIL-24 package with standard industry pin-out. The very high I/O-isolation system of these converters and input voltages up to 160 VDC make this product the best choice for many demanding applications in railroad and transportation systems, medical equipment, instrumentation, everywhere where high basic-, supplementary- or reinforced insulation is requested to meet specific safety standards. A high efficiency allows safe operation in a temperature range of -40°C to +70°C at full load. Full SMD-design with exclusive use of ceramic capacitors ensure a very high reliability and a long product lifetime.

### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
THP 3-2411	9 – 40 VDC (24 VDC nominal)	5 VDC	600 mA	78 %
THP 3-2412		12 VDC	250 mA	83 %
THP 3-2422		±12 VDC	±125 mA	83 %
THP 3-2423		±15 VDC	±100 mA	83 %
THP 3-4811	18 – 80 VDC (48 VDC nominal)	5 VDC	600 mA	78 %
THP 3-4812		12 VDC	250 mA	83 %
THP 3-4822		±12 VDC	±125 mA	83 %
THP 3-4823		±15 VDC	±100 mA	83 %
THP 3-7211	36 – 160 VDC (72 VDC nominal)	5 VDC	600 mA	78 %
THP 3-7212		12 VDC	250 mA	83 %
THP 3-7222		±12 VDC	±125 mA	83 %
THP 3-7223		±15 VDC	±100 mA	83 %

### Input Specifications

Input current at no load / full load	24 Vin models: 20 mA typ. / 160 mA typ. 48 Vin models: 10 mA typ. / 100 mA typ. 72 Vin models: 5 mA typ. / 85 mA typ.
Start-up voltage / under voltage shut down	24 Vin models: 9 VDC / 8.5 VDC 48 Vin models: 17 VDC / 16 VDC 72 Vin models: 34 VDC / 32 VDC
Recommended external input fuse (slow blow)	24 Vin models: 1.0 A 48 Vin models: 0.6 A 72 Vin models: 0.3 A
Surge voltage (1 sec. max.)	24 Vin models: 50 V max. 48 Vin models: 100 V max. 72 Vin models: 180 V max.
Reverse voltage protection	0.3 A max.
Input filter	EN 55032, FCC part 15, class A

### Output Specifications

Voltage set accuracy	±1 %
Voltage balance (dual output models)	2 % max.
Regulation	– Input variation Vin min. to Vin max.      0.5 % max. – Load variation 25 – 100 %:                      1.0 % max.
Minimum load	15 % of rated max. output current. (Operation at lower load is safe but major deviations to specified data may occur)
Ripple and noise (20 MHz Bandwidth)	5 VDC models: 75 mVpk-pk typ. other models: 100 mVpk-pk typ.
Temperature coefficient	±0.02 %/K typ.
Current limitation	>120 % Iout max.
Startup rise time 0 % to 100 % Vout	25 mS max.
Short circuit protection	indefinite (automatic recovery)
Capacitive load	5 VDC models: 1000 µF max. 12 VDC models: 470 µF max. Dual output models: 220 µF max. (each output)

### Isolation / Safety

I/O isolation test voltage (flash tested 1 sec.)	6000 Vpk
I/O isolation voltage (50Hz, 60sec.)	3000 VACrms, rated for 1000 Vrms working voltage, 2 x MOOP
Leakage current (at 240VAC, 60Hz)	2 µA
I/O isolation capacitance (at 100KHz, 1V)	7 pF typ.
I/O isolation resistance (at 500VDC)	>1000 Mohm
Safety standards	IEC/EN 60950-1, UL 60950-1 IEC/EN 62368-1, UL 62368-1 CSA C22.2 No. 60950-1-03 IEC/EN 60601-1 3rd edition, 2 x MOOP, UL 60601-1, CSA C22.2 No. 601.1
Safety approvals	CB certificate acc. IEC 60950-1 & 60601-1 CSA certificate acc. UL 60950-1 & 60601-1 – Certification documents      see <a href="#">supporting documents</a>

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

**General Specifications**

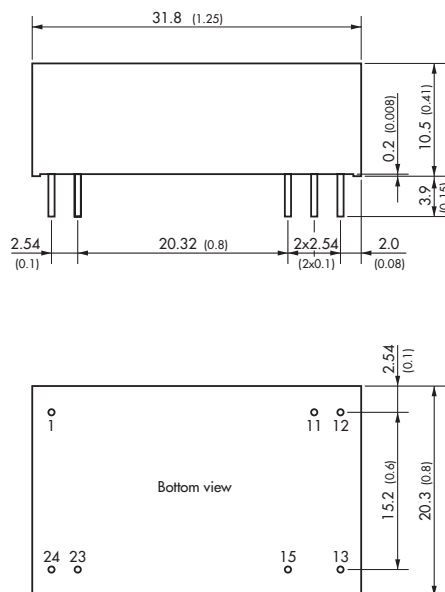
Temperature ranges	- Operating - Casing - Storage	-40°C to +85°C +95°C max. -40°C to +125°C
Derating		3.3 %/K above +70°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C ground benign)		>1 Mio. h
Switching frequency		150 kHz typ. (puls width modulation)
Casing material		non conductive plastic (UL 94V-0-rated)
Potting material		Silicon TSE 3331 (UL 94V-0-rated)
Weight		13.3 g (0.47 oz)
Soldering temperature		max. 265°C / 10 sec.
Altitude during operation		up to 5'000 m (16'400 ft) approved
Environmental compliance	- Reach - RoHS	<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> RoHS directive 2011/65/EU

**Supporting documents:** [www.tracopower.com/overview/thp3](http://www.tracopower.com/overview/thp3)



- The component is not be used in an oxygen rich environment.
- The component is not to be used in conjunction with flammable anaesthetics and agents.
- The component has to be disposed appropriately. Please refer to local regulations (Waste Electrical and Electronic Equipment).
- A modification of the component is not allowed.

**Outline Dimensions**



Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
11	No pin	Common
12	-Vout	No pin
13	+Vout	-Vout
15	No pin	+Vout
23	-Vin (GND)	-Vin (GND)
24	-Vin (GND)	-Vin (GND)

Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing 0.6 \pm 0.05$  (0.024  $\pm$  0.002)  
 Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
 Pin pitch tolerances  $\pm 0.2$  ( $\pm 0.01$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)