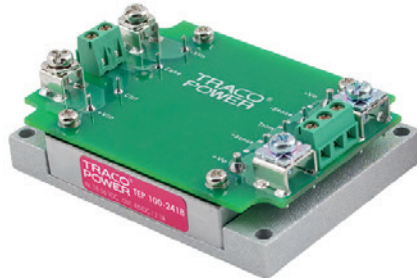


### Features

- ◆ Rugged, compact metal case
- ◆ Easy chassis mount
- ◆ Screw terminal adaptor available for easy connection
- ◆ Wide 2:1 input voltage range
- ◆ Full load operation up to 60°C with convection cooling
- ◆ Soft start
- ◆ Under voltage lock-out circuit
- ◆ Reverse input voltage protection
- ◆ Input protection filter
- ◆ 3-year product warranty



(Models pictured with chassis mount adaptor and optional heatsink)

The TEP-100 Series is a family of isolated high performance dc-dc converter modules with ultra-wide 2:1 input voltage ranges which come in a rugged, sealed metal case.

These converters are suitable for a wide range of applications, but the product is designed particularly also for industrial applications where often no PCB mounting is possible but the module has to be mounted on a chassis. Four threaded M3 inserts in the module makes chassis mount or attachment of a heatsink for

optimal thermal management very simple.

For easy connection there is also an unique adaptor available with screw terminals. A very high efficiency allows an operating temperature up to +60°C with natural convection cooling without power derating. Further features include output voltage trimming, Remote On/Off and under voltage lockout. The very wide input voltage range and reverse input voltage protection make these converters also an interesting solution for battery operated systems.

### Models

| Order code*  | Input voltage                   | Output voltage | Output current max. | Efficiency typ. |
|--------------|---------------------------------|----------------|---------------------|-----------------|
| TEP 100-1210 | 9 – 18 VDC<br>(12 VDC nominal)  | 3.3 VDC        | 25.0 A              | 90 %            |
| TEP 100-1211 |                                 | 5.0 VDC        | 20.0 A              | 91 %            |
| TEP 100-1212 |                                 | 12 VDC         | 8.4 A               | 91 %            |
| TEP 100-1213 |                                 | 15 VDC         | 6.7 A               | 91 %            |
| TEP 100-1215 |                                 | 24 VDC         | 4.2 A               | 90 %            |
| TEP 100-1216 |                                 | 28 VDC         | 3.6 A               | 90 %            |
| TEP 100-1218 |                                 | 48 VDC         | 2.1 A               | 90 %            |
| TEP 100-2410 | 18 – 36 VDC<br>(24 VDC nominal) | 3.3 VDC        | 25.0 A              | 91 %            |
| TEP 100-2411 |                                 | 5.0 VDC        | 20.0 A              | 93 %            |
| TEP 100-2412 |                                 | 12 VDC         | 8.4 A               | 93 %            |
| TEP 100-2413 |                                 | 15 VDC         | 6.7 A               | 93 %            |
| TEP 100-2415 |                                 | 24 VDC         | 4.2 A               | 92 %            |
| TEP 100-2416 |                                 | 28 VDC         | 3.6 A               | 92 %            |
| TEP 100-2418 |                                 | 48 VDC         | 2.1 A               | 92 %            |
| TEP 100-4810 | 36 – 75 VDC<br>(48 VDC nominal) | 3.3 VDC        | 25.0 A              | 91 %            |
| TEP 100-4811 |                                 | 5.0 VDC        | 20.0 A              | 93 %            |
| TEP 100-4812 |                                 | 12 VDC         | 8.4 A               | 93 %            |
| TEP 100-4813 |                                 | 15 VDC         | 6.7 A               | 93 %            |
| TEP 100-4815 |                                 | 24 VDC         | 4.2 A               | 92 %            |
| TEP 100-4816 |                                 | 28 VDC         | 3.6 A               | 92 %            |
| TEP 100-4818 |                                 | 48 VDC         | 2.1 A               | 92 %            |

\* – add suffix **-CM**, **-CMF** for models with chassis mount adaptor, see last page.

– add suffix **-N** for negative remote control, see page 3 -> Remote On/Off

## Input Specifications

|  |   |  |
|--|---|--|
| Input current at no load   | 12 Vin; 3.3 – 15 VDC models:            | 160 mA typ.  |
|  | 12 Vin; 24 – 48 VDC models:             | 100 mA typ.  |
|  | 24 Vin; 3.3 – 15 VDC models:            | 185 mA typ.  |
|  | 24 Vin; 24 – 48 VDC models:             | 85 mA typ.   |
|  | 48 Vin; 3.3 – 15 VDC models:            | 90 mA typ.   |
|  | 48 Vin; 24 – 48 VDC models:             | 40 mA typ.   |
| Input current at full load   | 12 Vin models:                          | 9.4 A typ.   |
|  | 24 Vin models:                          | 4.6 A typ.   |
|  | 48 Vin models:                          | 2.3 A typ.   |
| Start-up voltage   | 12 Vin models:                          | 8.5 VDC (or lower)   |
|  | 24 Vin models:                          | 17.5 VDC (or lower)  |
|  | 48 Vin models:                          | 35.5 VDC (or lower)  |
| Under voltage shut down (lock-out circuit)   | 12 Vin models:                          | 7.5 VDC typ.   |
|  | 24 Vin models:                          | 16 VDC typ.  |
|  | 48 Vin models:                          | 34 VDC typ.  |
| Surge voltage (100 msec. max.)   | 12 Vin models:                          | 36 V max.  |
|  | 24 Vin models:                          | 50 V max.  |
|  | 48 Vin models:                          | 100 V max.   |
| Conducted noise  |   | EN 55022 level A, FCC part 15, level A<br>(chassis mount option –CFM required) |
| EMC immunity   | – ESD (electrostatic discharge)         | EN 50121-3-2   |
|  |   | EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A                       |
|  |   | EN 61000-4-3, 10 V/m, perf. criteria A   |
|  |   | EN 61000-4-4, ±2 kV, perf. criteria A  |
|  | – Radiated immunity                     | EN 61000-4-5, ±2 kV perf. criteria A   |
| Nippon chemi-con KY 200 µF, 100 V, ESR 48 Ohm<br>or with chassis mount option –CFM |   |  |
| – Fast transient / surge (with external input capacitor)                           | EN 61000-4-6, 10 Vrms, perf. criteria A |  |
| – Conducted immunity   |   |  |
| Reverse voltage protection   |   | parallel diode   |

## Output Specifications

|                                     |  |   |            |
|-------------------------------------|--|---|------------|
| Voltage set accuracy                |  | ±1 %  |            |
| Output voltage adjustment           |  | +10 % / –20 % by external resistor<br>see application note: |            |
| Regulation                          | – Input variation Vin min. to Vin max. | 0.2 % max.  |            |
|                                     | – Load variation (0 – 100 %)           | 3.3 – 15 VDC models:  | 0.3 % max. |
|                                     |  | 24 – 48 VDC models:   | 0.3 % max. |
| Temperature coefficient             |  | ±0.02 %/K   |            |
| Minimum load                        |  | not required  |            |
| Remote sense                        |  | 10 % max. of Vout nom.<br>(including trim up value)         |            |
| Ripple and noise (20 MHz Bandwidth) | 3.3 & 5 VDC models:                    | 75 mVpk-pk max.   |            |
|                                     | 12 & 15 VDC models:                    | 100 mVpk-pk max.  |            |
|                                     | 24 & 28 VDC models:                    | 200 mVpk-pk max.  |            |
|                                     | 48 VDC models:                         | 300 mVpk-pk max.  |            |

### Output Specifications

|   |  |
|---|--|
| Start up time (nominal Vin and constant resistive load) | 25 ms typ. (at power On or remote On)  |
| Transient response (25% load step change)               | 200 µs typ.  |
| Output current limitation                               | at 110 -140 % of Iout max.   |
| Over voltage protection                                 | at 115 -130 % of Vout nom.   |
| Short circuit protection                                | indefinite, automatic recovery   |
| Capacitive load   | 3.3 & 5 VDC models: 40'000 µF max.<br>12 VDC models: 7'000 µF max.<br>15 VDC models: 4'460 µF max.<br>24 VDC models: 1'750 µF max.<br>28 VDC models: 1'280 µF max.<br>48 VDC models: 430 µF max. |

### General Specifications

|   |  |  |
|---|--|--|
| Temperature ranges  | <ul style="list-style-type: none"> <li>- Operating</li> <li>- Case temperature</li> <li>- Storage</li> </ul>                                     | -40°C to +75°C<br>+105°C max.<br>-55°C to +125°C   |
| Thermal impedance   | <ul style="list-style-type: none"> <li>- without Heatsink</li> <li>- with Heatsink</li> </ul>  | 6.7°C/W<br>4.7°C/W   |
| Derating  |  | See derating graphs page 4   |
| Over temperature protection   |  | at 115°C   |
| Thermal shock   |  | acc. MIL-STD-810F  |
| Humidity (non condensing)   |  | 95 % rel H max.  |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +70°C, ground benign) |  | 331'000 h  |
| Isolation voltage (60sec.)  | <ul style="list-style-type: none"> <li>- Input/Output</li> <li>- Input/Case</li> </ul>   | 2'250 VDC (basic insulation)<br>1'600 VDC  |
| Isolation capacitance   | - Input/Output   | 2500 pF max.   |
| Isolation resistance  | - Input/Output (500 VDC)   | >1 GOhm min.   |
| Switching frequency   |  | 300 kHz typ. (puls width modulation)   |
| Safety standards  |  | UL 60950-1 , IEC/EN 60950-1  |
| Safety approvals  | - UL/cUL   | <a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913   |
| Remote On/Off   | <ul style="list-style-type: none"> <li>- positive logic (standard)</li> <li>- negative logic (option -N)</li> <li>- Off idle current:</li> </ul> | <ul style="list-style-type: none"> <li>- On: 3 to 12 VDC or open circuit</li> <li>- Off: 0 to 1.2 VDC or short circuit pin 1 and 3</li> <li>- On: 0 to 1.2 VDC or short circuit pin 1 and 3</li> <li>- Off: 3 to 12 VDC or open circuit</li> <li>3 mA</li> </ul> |
| Environmental compliance  | <ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>  | <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a><br>RoHS directive 2011/65/EU  |

**Application note:** [www.tracopower.com/products/tep100-application.pdf](http://www.tracopower.com/products/tep100-application.pdf)

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

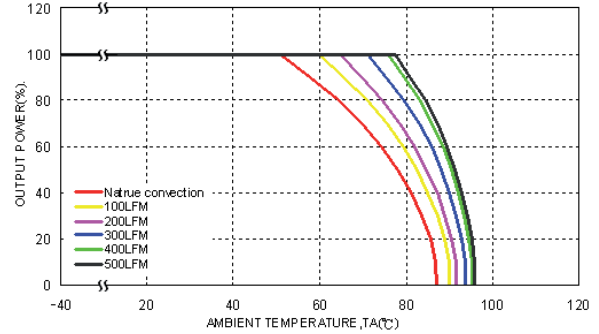
**Output Power Derating**

Models with heatsink

Models without heatsink

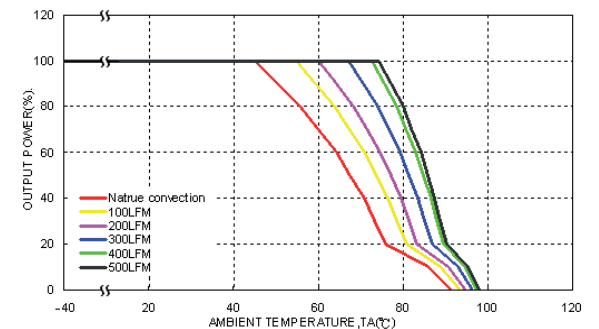
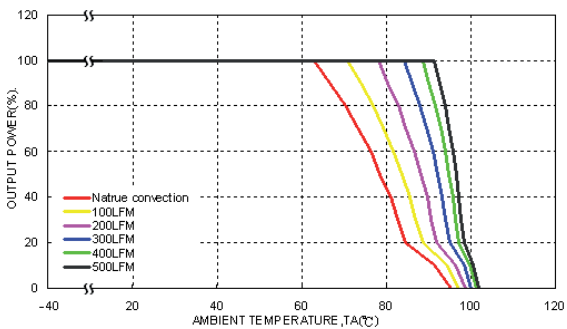
24 Vin models: Output 3.3–15 VDC

24 Vin models: Output 3.3–15 VDC



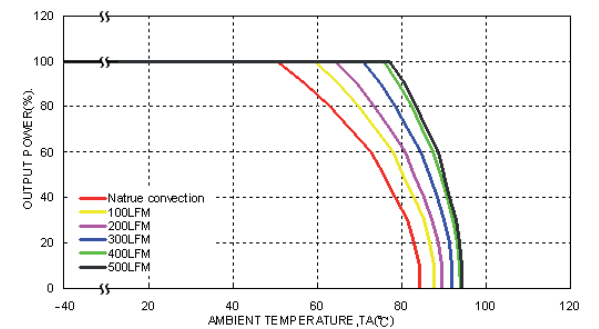
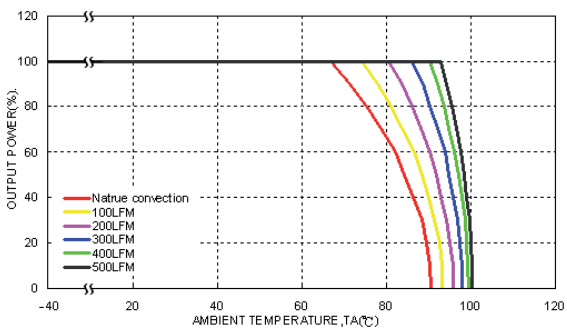
24 Vin models: Output 24–48 VDC

24 Vin models: Output 24–48 VDC



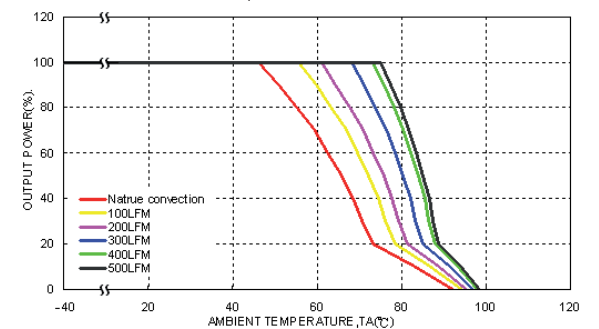
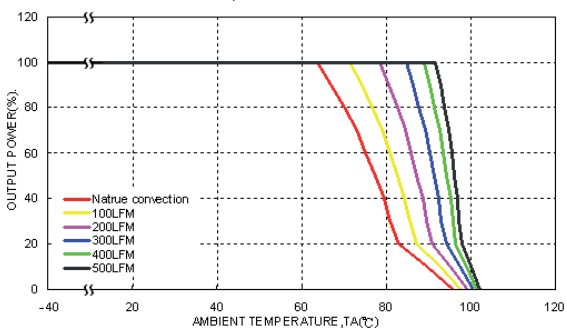
48 Vin models: Output 3.3–15 VDC

48 Vin models: Output 3.3–15 VDC



48 Vin models: Output 24–48 VDC

48 Vin models: Output 24–48 VDC



**Specifications**

|                  |                          |
|------------------|--------------------------|
| Casing material  | metal                    |
| Potting material | silicone (UL94V-0 rated) |
| Base material    | FR4                      |
| Vibration        | acc. MIL-STD-810F        |

**Dimensions**

TEP 100 module



Weight: 97 g (3.42 oz)

Pin diameter pin 5 & 9: 0.08 (2.0)  
Pin diameter other pins: 0.04 (1.0)

| Pin-Out |               |
|---------|---------------|
| Pin     |               |
| 1       | - Vin         |
| 2       | Case          |
| 3       | Remote On/Off |
| 4       | + Vin         |
| 5       | - Vout        |
| 6       | - Sense*      |
| 7       | Trim          |
| 8       | + Sense*      |
| 9       | + Vout        |

\*Sense line to be connected to the output either at the module or at the load under regard of polarity.

**TEP-HS1 Heatsink (pictured with heatsink mounted)**



Order code: TEP-HS1

Includes heatsink with thermal pad and mounting screws  
For to order modules with mounted heatsink ask factory.

Weight: 135 g (4.76oz)  
(Heatsink + Converter)

Dimensions in Inch, ( ) = mm  
Tolerances:  $\pm 0.02$  ( $\pm 0.5$ )  
Pin pitch tolerances:  $\pm 0.01$  ( $\pm 0.25$ )  
Mounting hole pitch tolerances:  $\pm 0.01$  ( $\pm 0.25$ )

**Chassis Mount Adaptor**

TEP 100 module with chassis mount adaptor (suffix -CM or -CMF)

For easy chassis mounting the converter modules can be supplied with an adaptor option consisting of a screw terminal connection board (soldered to converter pins) and a chassis mount adaptor. In addition this Chassis mount option is available with an EMI-filter (see EMI specification)

Suffix -CM: Chassis mount adaptor



Suffix -CMF: Chassis mount adaptor with EMI filter



Please note that adaptors cannot be ordered as separate items but are factory assembled.

Weight: -CM 200 g (7.05oz)  
Weight: -CMF 287 g (10.12oz)

\*Sense line to be connected to the output either at the module or at the load under regard of polarity.

| Connection |               |
|------------|---------------|
| Pin        |               |
| 1          | - Vin         |
| 2          | Case          |
| 3          | Remote On/Off |
| 4          | + Vin         |
| 5          | - Vout        |
| 6          | - Sense*      |
| 7          | Trim          |
| 8          | + Sense*      |
| 9          | + Vout        |

Dimensions in Inch, ( ) = mm  
Tolerances  $\pm 0.02$  ( $\pm 0.5$ )  
Mounting hole pitch tolerances  $\pm 0.01$  ( $\pm 0.25$ )

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



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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
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- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
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- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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