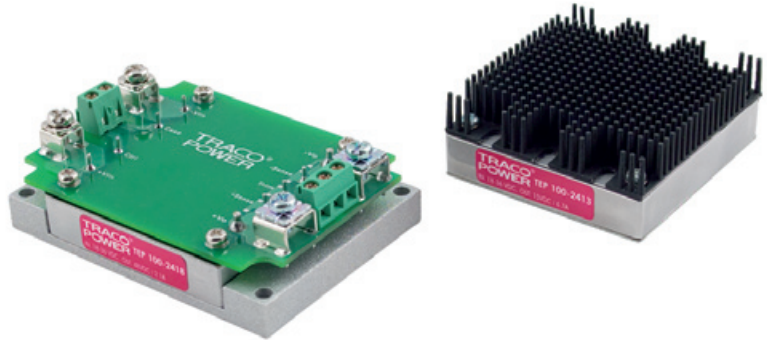


### Features

- ◆ 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
- ◆ 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 a 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 100-2411	18 – 36 VDC (24 VDC nominal)	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 100-4811	36 – 75 VDC (48 VDC nominal)	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	24 Vin; 5 – 15 VDC models: 185 mA typ. 24 Vin; 24 – 48 VDC models: 85 mA typ. 48 Vin; 5 – 15 VDC models: 90 mA typ. 48 Vin; 24 – 48 VDC models: 40 mA typ.
Input current at full load	24 Vin models: 4.6 A typ. 48 Vin models: 2.3 A typ.
Start-up voltage / under voltage shut down	24 Vin models: 17.5 VDC / 16 VDC typ. 48 Vin models: 35.5 VDC / 34 VDC typ.
Surge voltage (100 msec. max.)	24 Vin models: 50 V max. 48 Vin models: 100 V max.
Conducted noise	EN 55022 level A, FCC part 15, level A (chassis mount option –CFM required)
ESD (electrostatic discharge)	EN 61000-4-2, air ±8 kV, contact ± 6 kV, perf. criteria A
Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A
Fast transient / Surge	EN 61000-4-4, ± 2 kV, perf. criteria A EN 61000-4-5, ± 1 kV perf. criteria A With external input capacitor e.g. Nippon chemi-con KY 200 µF, 100 V, ESR 48 mOhm or with chassis mount option –CFM
Conducted immunity	EN 61000-4-3, 10 Vrms, perf. criteria A
Reverse voltage protection	parallel diode
Recommended input fuse (slow blow)	24 Vin models: 10 A 48 Vin models: 5 A

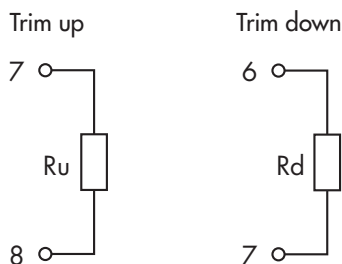
### Output Specifications

Voltage set accuracy	±1 %
Output voltage adjustment	+10% / -20% by external resistor (see table page 3)
Regulation	– Input variation Vin min. to Vin max. 0.2 % max. – Load variation (0 – 100 %) 5 – 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. (including trim up value)
Ripple and noise (20 MHz Bandwidth)	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.
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	1000 µF max.

**General Specifications**

Temperature ranges	- Operating - Case temperature - Storage	- 40 °C to +75 °C + 105 °C max. - 55 °C to + 125 °C
Thermal impedance	- without Heatsink - with Heatsink	6.7 °C/W 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, 25°C, ground benign)		75'000 h
Isolation voltage (60sec.)	- Input/Output - Input/Case	2'250 VDC (basic insulation) 1'500 VDC
Isolation capacity	- 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 60950-1, EN 60950-1
Safety approvals (pending)		UL 60950-1, CB- test report
Remote On/Off	- positive logic (standard)  - negative logic (option -N)  - Off idle current:	- On: 3 to 12 VDC or open circuit - Off: 0 to 1.2 VDC or short circuit pin 1 and 2 - On: 0 to 1.2 VDC or short circuit pin 1 and 2 - Off: 3 to 12 VDC or open circuit 3 mA

**External output trimming:**



Rd	5 VDC	12 VDC	15 VDC	24 VDC	28 VDC	48 VDC
+ 5 %	62	180	240	390	470	820
+ 10 %	33	91	120	200	240	430

Rd	any output
- 10 %	8.2
- 20 %	3.0

closest resistor out of the E24 array [kOhm]

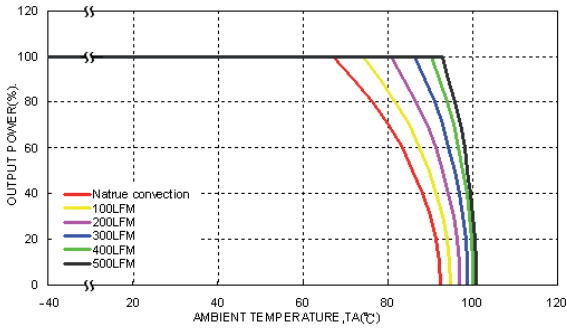
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Output Power Derating**

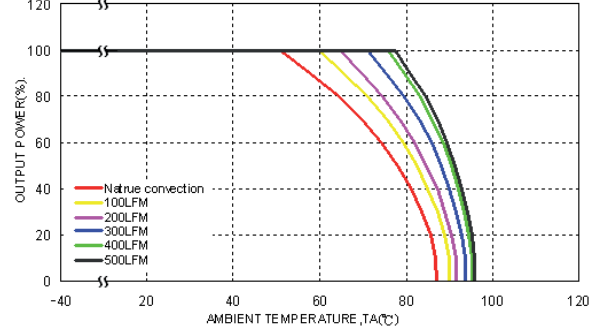
Models with heatsink

Models with without heatsink

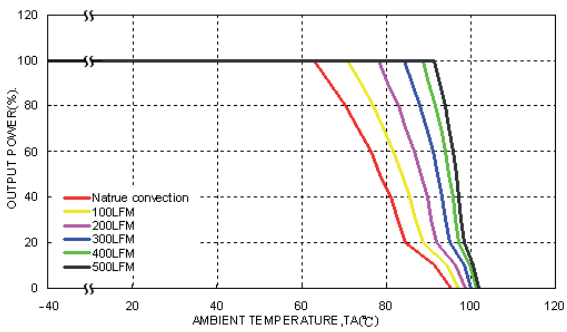
24 Vin models: Output 5-15 VDC



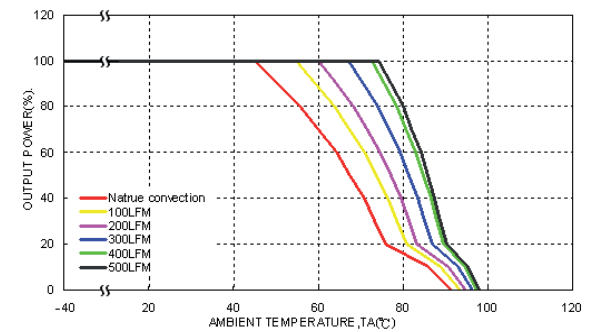
24 Vin models: Output 5-15 VDC



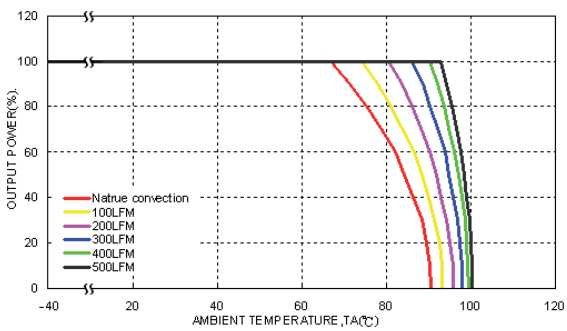
24 Vin models: Output 24-48 VDC



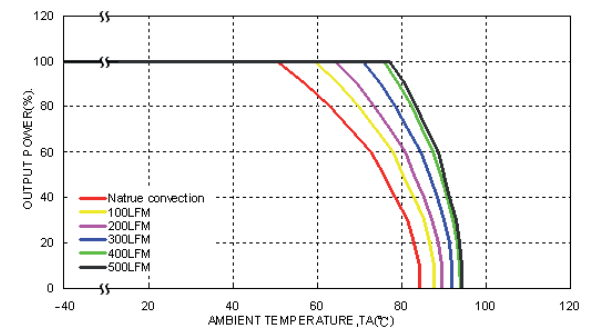
24 Vin models: Output 24-48 VDC



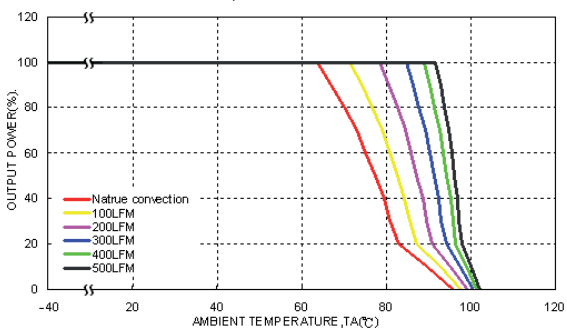
48 Vin models: Output 5-15 VDC



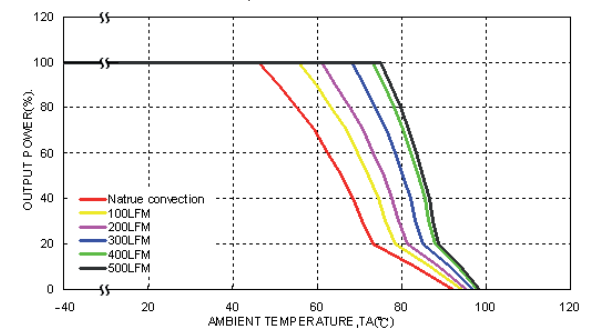
48 Vin models: Output 5-15 VDC



48 Vin models: Output 24-48 VDC



48 Vin models: Output 24-48 VDC

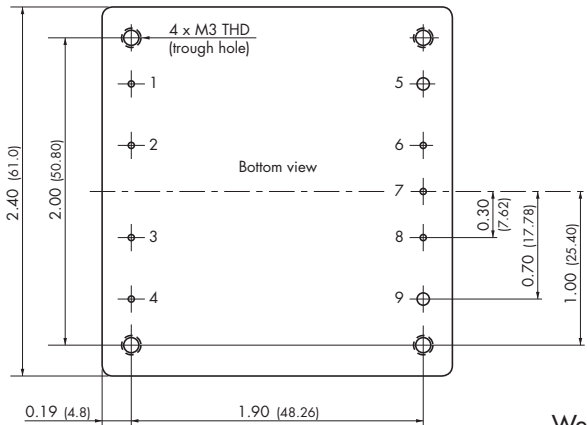


**General Specifications**

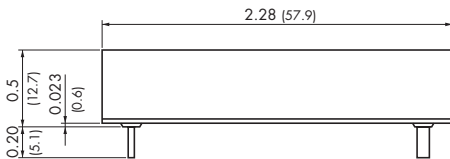
Case material	metal
Potting material	silicon (UL94V-0 rated)
Base material	FR4
Vibration	acc. MIL-STD-810F

**Dimensions**

TEP 100 module



Weight: 97g (3.42 oz)

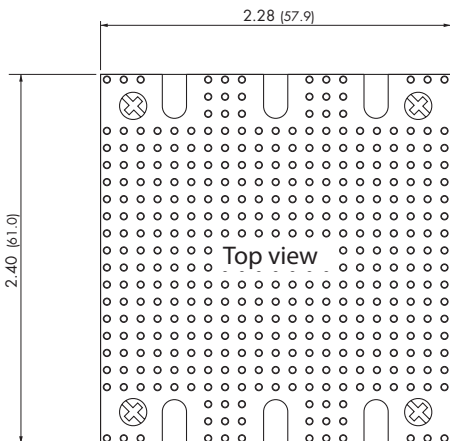
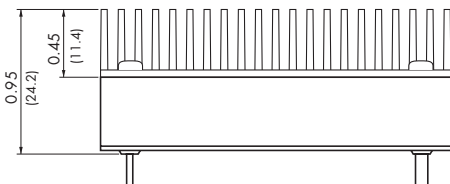


Pin diameter pin 5 & 9: 0.08 (2.0)  
Pin diameter other pins: 0.04 (1.0)

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: 135g (4.76 oz)  
(Heatsin + Converter)

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

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

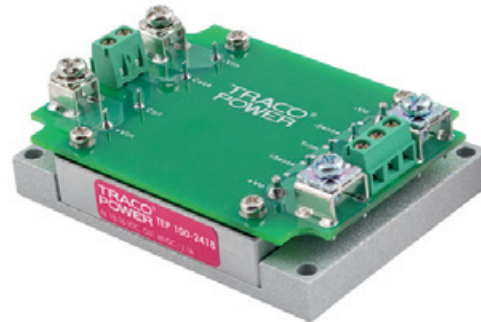
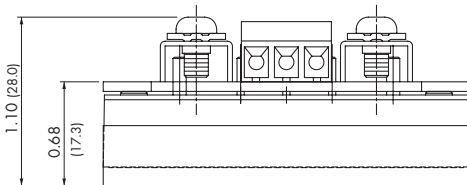
**Chassis Mount Adaptor**

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

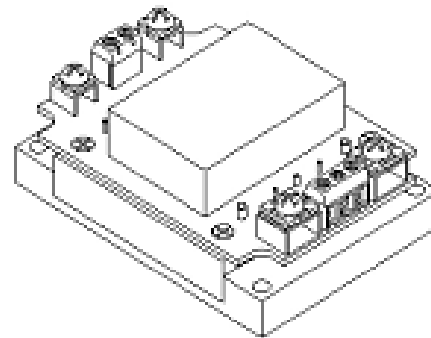
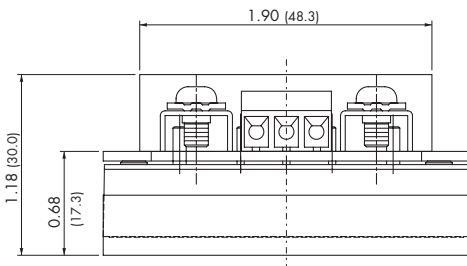
For easy chassis mounting the converter modules can be supplied with an adaptor option consisting of a screw terminal connection board (soldered to converter pins) and a chassis mount adaptor.

In addition this Chassis mount option is available with an EMI-filter (see EMI specification)

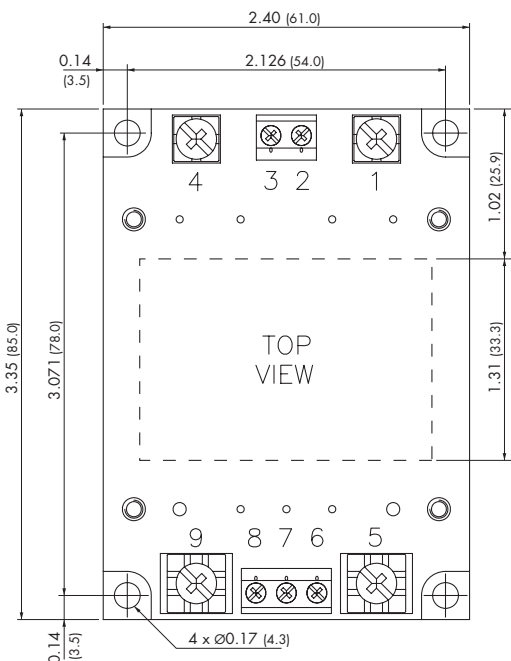
Suffix -CM: Chassis mount adaptor



Suffix -CMF: Chassis mount adaptor with EMI filter



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



Connection	
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.

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

Specifications can be changed any time without notice.