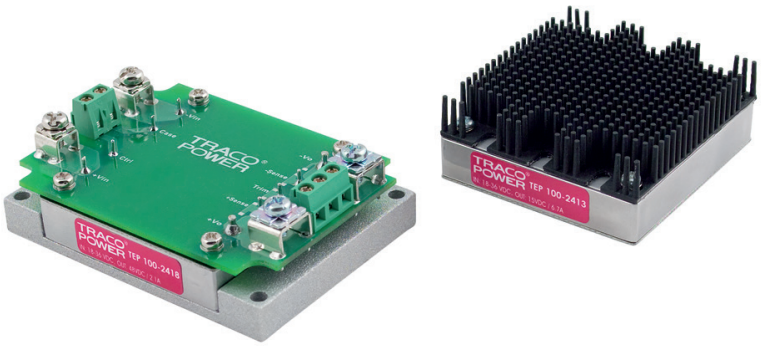
DC/DC Converters

TEP 100 Series, 100 Watt

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

cULus
UL 60950-1



(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 (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 (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 (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 (chassis mount option –CFM required)
EMC immunity			EN 50121-3-2
	– 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 (with external input capacitor)		EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV perf. criteria A Nippon chemi-con KY 200 µF, 100 V, ESR 48 Ohm or with chassis mount option –CFM
	– Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
Reverse voltage protection			parallel diode

Output Specifications

Voltage set accuracy			±1 %
Output voltage adjustment			+10 % / –20 % by external resistor 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. (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.
	12 VDC models:	7'000 µF max.
	15 VDC models:	4'460 µF max.
	24 VDC models:	1'750 µF max.
	28 VDC models:	1'280 µF max.
	48 VDC models:	430 µF max.

General Specifications

Temperature ranges	– Operating		–40°C to +75°C
	– Case temperature		+105°C max.
	– Storage		–55°C to +125°C
Thermal impedance	– without Heatsink		6.7°C/W
	– with Heatsink		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.)	– Input/Output		2'250 VDC (basic insulation)
	– Input/Case		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 approvals			UL 60950-1 , IEC/EN 60950-1
	– Certification documents		www.tracopower.com/overview/tep100
Remote On/Off	– positive logic (standard)	– On:	3 to 12 VDC or open circuit
		– Off:	0 to 1.2 VDC or short circuit pin 1 and 3
	– negative logic (option -N)	– On:	0 to 1.2 VDC or short circuit pin 1 and 3
		– Off:	3 to 12 VDC or open circuit
	– Off idle current:		3 mA
Environmental compliance	– Reach		www.tracopower.com/products/reach-declaration.pdf
	– RoHS		RoHS directive 2011/65/EU

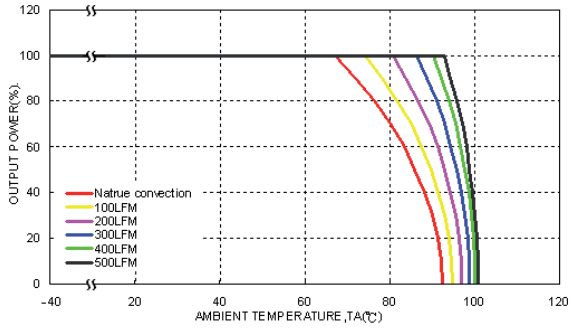
Application note: www.tracopower.com/overview/tep100

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

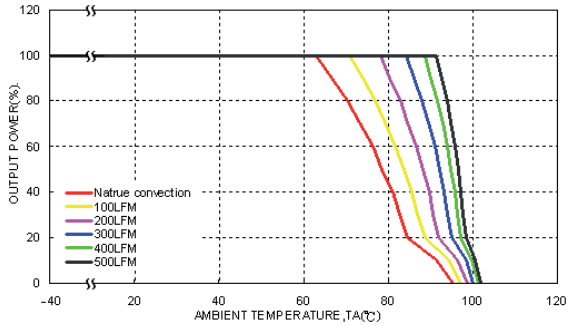
Output Power Derating

Models with heatsink

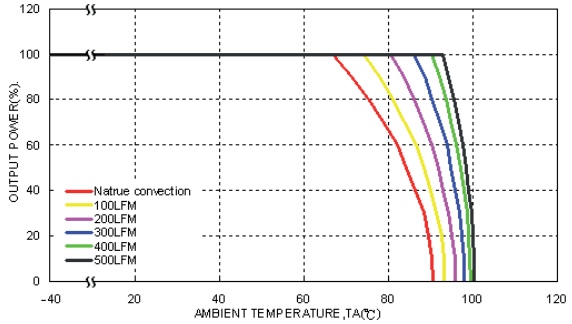
24 Vin models: Output 3.3–15 VDC



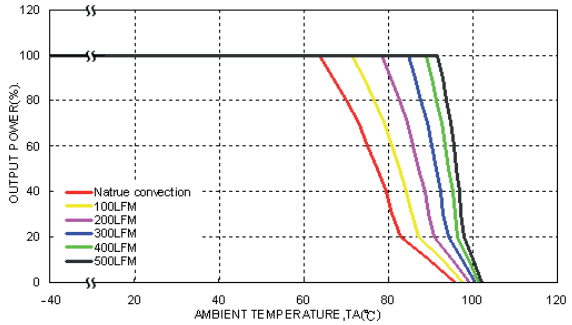
24 Vin models: Output 24–48 VDC



48 Vin models: Output 3.3–15 VDC

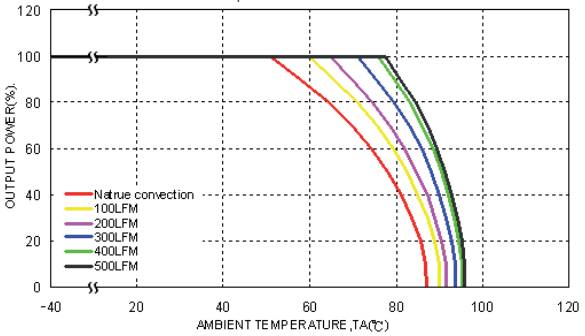


48 Vin models: Output 24–48 VDC

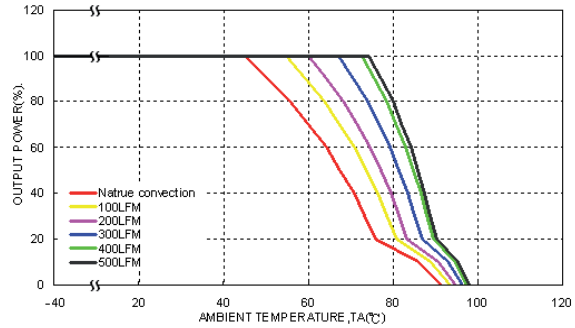


Models without heatsink

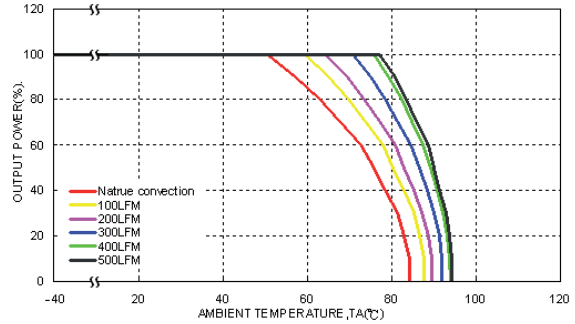
24 Vin models: Output 3.3–15 VDC



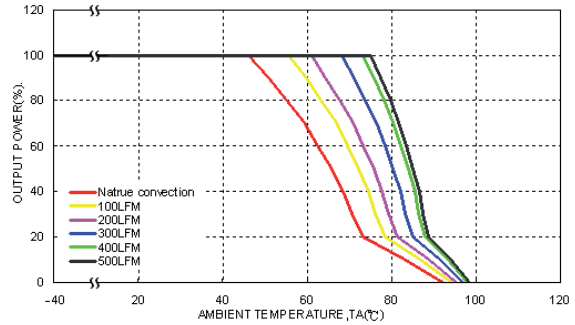
24 Vin models: Output 24–48 VDC



48 Vin models: Output 3.3–15 VDC



48 Vin models: Output 24–48 VDC

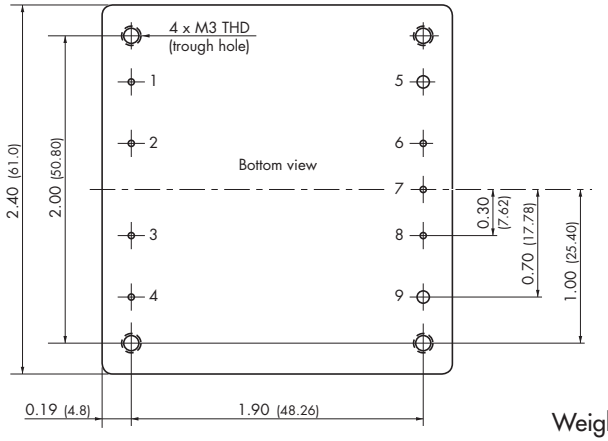


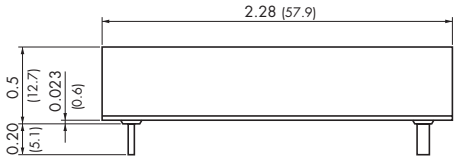
Specifications

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)

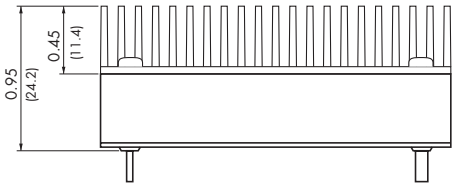
Pin diameter pin 5 & 9: 0.08 (2.0)
Pin diameter other pins: 0.04 (1.0)

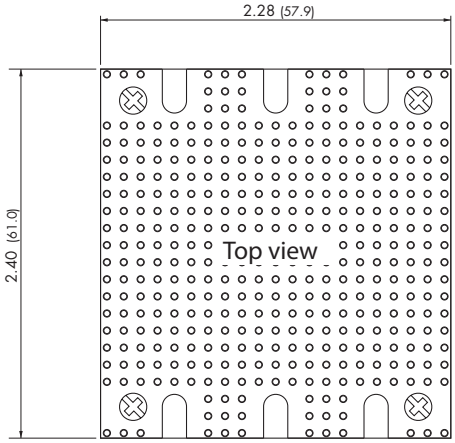
Pin-Out

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

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

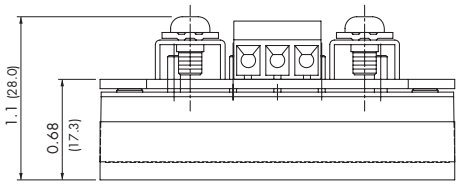
Dimensions in Inch, () = mm
Tolerances: ±0.02 (±0.5)
Pin pich tolerances: ±0.01 (±0.25)
Mounting hole pich tolerances: ±0.01 (±0.25)

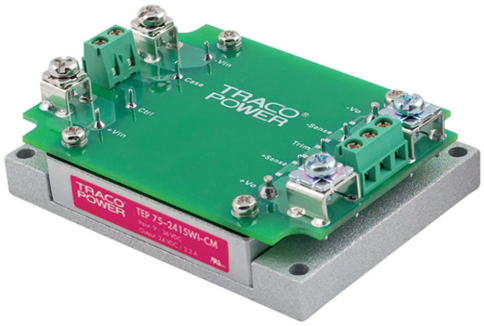
Chassis Mount Adaptor

TEP 100 module with chassis mount adabtor (suffix –CM or –CMF)

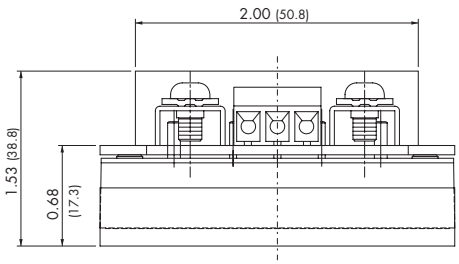
For easy chassis mounting the converter modules can be supplied with an adaptor option consisting of a screw terminal connection board (soldered to converter pins)and a chassis mount adaptor.
In addition this Chassis mount option is available with an EMI-filter(see EMI specification)

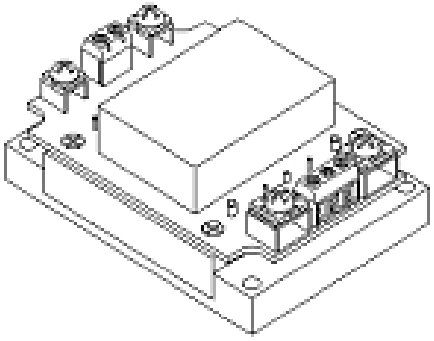
Suffix –CM: Chassis mount adaptor

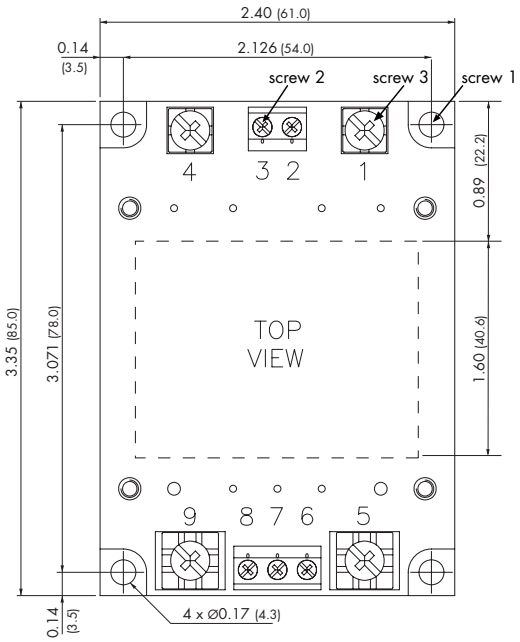




Suffix –CMF: Chassis mount adaptor with EMI filter







Please note that adaptors cannot be ordered as seperate 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 ±0.02 (±0.5)
Mounting hole pich tolerances ±0.01 (±0.25)