DC/DC Converters

TEP 160WIR Series, 144 – 182 Watt

Features

- Compact metal package
- Ultra wide 4:1 input voltage ranges 8.5–36, 16.5–75, 43–160 VDC
- EN 50155 approval for railway applications
- Very high efficiency up to 91%
- No minimum load
- Soft start
- Ajustable output voltage +10/-20%
- Sense line
- Remote On/Off input
- Under voltage lock-out circuit
- Reverse input voltage protection
- Over temperature protection
- Optional Heatsink
- Optional as chassis mount models with screw terminal block and EMI Filter
- 3-year product warranty

(Models pictured with optional heatsink)

The TEP 160WIR Series is a family of isolated high performance dc-dc converter modules with ultra-wide 4:1 input voltage ranges which come in a rugged, sealed industry standard half brick package.
A very high efficiency allows full power operation without forced air cooling at 25°C This temperature can be increased to 40°C with optional mounted heatsink or up to 60°C when mounted on an iron base plate. The very wide input voltage range and reverse input voltage protection make these converters interesting solution for battery operated systems. Typical applications are in telecom/datacom, industry control and railway systems for on board power distribution.
These series is available in many optional designs on demand --> see options.

Standard Models

Order code	Input voltage	Output voltage	Output current max.	Efficiency typ.
TEP 160–2412WIR	8.5 – 36 VDC (24 VDC nominal)	12 VDC	12 A	90 %
TEP 160–2413WIR		15 VDC	9.5 A	91 %
TEP 160–2415WIR		24 VDC	6.0 A	90 %
TEP 160–2416WIR		28 VDC	5.0 A	90 %
TEP 160–2418WIR		48 VDC	3.0 A	90 %
TEP 160–4812WIR	16.5 – 75 VDC (48 VDC nominal)	12 VDC	13 A	91 %
TEP 160–4813WIR		15 VDC	10 A	91 %
TEP 160–4815WIR		24 VDC	6.5 A	91 %
TEP 160–4816WIR		28 VDC	5.5 A	91 %
TEP 160–4818WIR		48 VDC	3.2 A	91 %
TEP 160–7212WIR	43 – 160 VDC (110 VDC nominal)	12 VDC	15 A	90 %
TEP 160–7213WIR		15 VDC	12 A	90 %
TEP 160–7215WIR		24 VDC	7.5 A	90 %
TEP 160–7216WIR		28 VDC	6.5 A	90 %
TEP 160–7218WIR		48 VDC	3.8 A	90 %

Options

TEP-HS1	Heat-sink for standard version (incl. mounting screws and thermal pad)
TEP-MK1	Din-rail mounting kit for chassis mount models (incl. mounting screws)
TCK-xxx	Common mode chokes for filter proposals to meet EN55022 class A/B --> see application note
on demand	Models with 3.3 VDC/~ 40 A or 5.0 VDC/~ 30 A output
	Chassis mount models with screw terminal block
	Chassis mount models with screw terminal block and input filter to meet EN 555022 class A
	Negative (passive = Off) Remote On/Off function (standard is passive = On)
	Sync pin to synchronize switching frequency of up to 3 units (EMC reason)

Input Specifications

Input current at no load (nominal input voltage)	24 V models:	25 mA typ.
	48 V models:	20 mA typ.
	110 V models:	10 mA typ.
Start-up voltage	24 V models:	9.0 VDC max.
	48 V models:	18 VDC max.
	110 V models:	43 VDC max.
Under voltage shut down (lock-out circuit)	24 V models:	7.3 – 8.1 VDC
	48 V models:	15.5 – 16.3 VDC
	110 V models:	33.0 – 36.0 VDC
Surge voltage (1 sec. max.)	24 V models:	50 VDC
	48 V models:	100 VDC
	110 V models:	185 VDC
Conducted noise		EN 55022 class A/B with external components see application note
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, 20 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
	24 / 48 V models:	chemi-con KY 200 µF, 100 V, ESR 48 mOhm
	110 V models:	ruby-con BXF 100 µF, 250 V
– Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A
Reverse voltage protection		parallel diode
Recommended input fuse (slow blow)	24 V models:	20 A
	48 / 110 V models:	10 A

Output Specifications

Voltage set accuracy (at full load, nominal input)		±1 %
Output voltage adjustment		+10 % / –20 % by external resistor see application note
Regulation – Input variation Vin min. to Vin max.		0.1 % max.
– Load variation (0 – 100%)		0.1 % max.
Temperature coefficient		±0.02 %/K
Minimum load		not required
Remote sense		10 % max. of Vout nom. (trim up value to subtract)
Ripple and noise (20 MHz Bandwidth)	12 / 15 VDC models:	100 mVp-p typ.
	24 / 28 VDC models:	200 mVp-p typ.
	48 VDC models:	300 mVp-p typ.
Start up time (nominal Vin and constant resistive load)		75 ms typ. (at power On or remote On)
Transient response (25% load step change)		250 µs typ.
Output current limitation		at 120 – 150 % of Iout max.
Over voltage protection		at 115 – 130 % of Vout nom.
Short circuit protection		indefinite, automatic recovery.

General Specifications

Temperature ranges	– Operating		–40°C to +75°C
	– Case temperature		+115°C max.
	– Storage		–55°C to +125°C
Thermal impedance	– without heat-sink		6.1°C/W
	– with heat-sink		5.1°C/W
Power Derating			depending on installation!
	– without heat-sink		1.5 %/K above +25°C
	– with heat-sink		1.5 %/K above +40°C
	– with iron base plate (19" x 3.5" x 0.063")		1.8 %/K above +60°C
			please refer to application note for temperature measure point that should not exceed 115°C.
Over temperature protection			at +120°C
Thermal shock, mechanical shock & vibration			EN 61373, MIL-STD-810F
	– Test conditions		www.tracopower.com/products/mil810.pdf
Humidity (non condensing)			95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +70°C, ground benign)			350'000 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			250 kHz typ. (puls width modulation)
Safety standards			EN 50155, UL 60950-1, IEC/EN 60950-1
Safety approvals	– UL/cUL		www.ul.com -> certifications -> File e188913
	– Railway		www.tracopower.com/products/tep-coc.pdf
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)	– 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/products/tep160wir-application.pdf

Max. capacitive load [µF]	12 VDC	15 VDC	24 VDC	28 VDC	48 VDC
24 VDC Input models	10'000	6'300	2'500	1'700	620
48 VDC Input models	10'800	6'600	2'700	1'900	660
110 VDC Input models	12'500	8'000	3'100	2'300	790

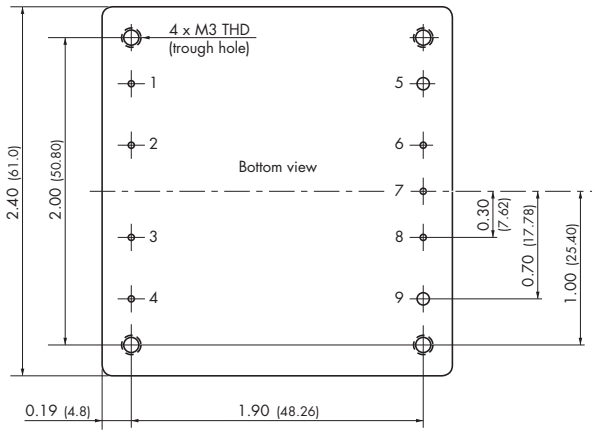
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

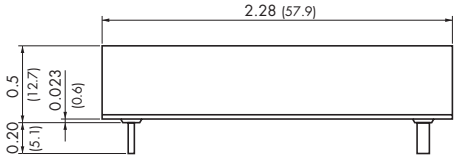
General Specifications

Casing material	metal
Potting material	silicone (UL94V-0 rated)
Base material	FR4

Dimensions

TEP 160WIR module





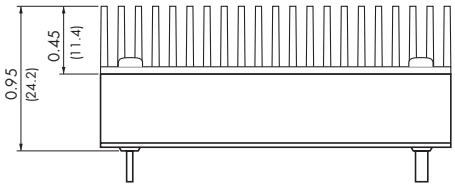
Weight: 105 g (3.70oz)

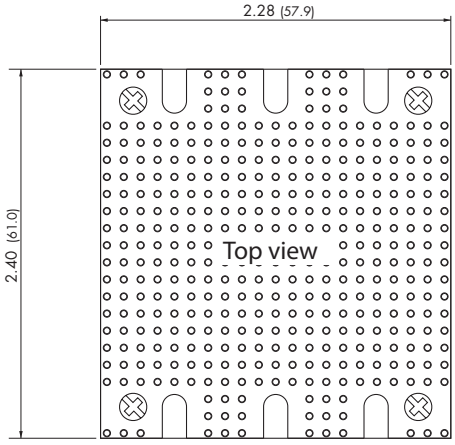
Pin diameter pin 5 & 9: 0.08 (2.0)
Pin diameter other pins: 0.04 (1.0)

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)





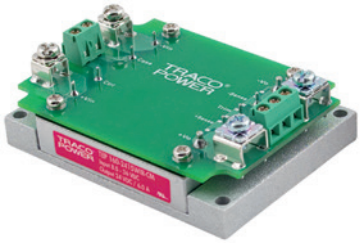
Order code: TEP-HS1
Includes heatsink with termal pad and mounting screws
To order modules with mounted heatsink ask factory.

Weight: 142 g (5.01oz)
(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)

Options (on demand)

Chassis mount models with screw terminal block



Chassis mount models with screw terminal block and input filter to meet EN 555022 class A

TEP-MK1 DIN-rail clip for chassis mount models