

Features

- ◆ Compact metal package
- ◆ Wide 2:1 input voltage ranges
16.5–36, 33–75 VDC
- ◆ Very high efficiency up to 93%
- ◆ No minimum load
- ◆ Soft start
- ◆ Adjustable output voltage +10/-20%
- ◆ Sense line
- ◆ Remote On/Off input
- ◆ Reverse input voltage protection
- ◆ Over temperature protection
- ◆ Optional Heatsink
- ◆ 3-year product warranty



(Models pictured with optional heatsink)

The TEP 160 Series is a family of isolated high performance dc-dc converter modules with wide 2:1 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 160-2412 | 16.5 – 36 VDC (24 VDC nominal) | 12 VDC | 13 A | 92 % |
| TEP 160-2413 | | 15 VDC | 10 A | 92 % |
| TEP 160-2415 | | 24 VDC | 6.5 A | 93 % |
| TEP 160-2416 | | 28 VDC | 5.5 A | 93 % |
| TEP 160-2418 | | 48 VDC | 3.3 A | 92 % |
| TEP 160-4812 | 33 – 75 VDC (48 VDC nominal) | 12 VDC | 16 A | 92 % |
| TEP 160-4813 | | 15 VDC | 13 A | 93 % |
| TEP 160-4815 | | 24 VDC | 8 A | 92 % |
| TEP 160-4816 | | 28 VDC | 7 A | 92 % |
| TEP 160-4818 | | 48 VDC | 4 A | 92 % |
| TEP 160-48153 | | 53 VDC | 3.7 A | 92 % |

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 |
| | 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: 35 mA typ. 48 V models: 25 mA typ. |
| Start-up voltage | 24 V models: 18 VDC max. 48 V models: 34 VDC max. |
| Under voltage shut down | 24 V models: 15.5 – 16.3 VDC 48 V models: 31.6 – 32.5 VDC |
| Surge voltage (1 sec. max.) | 24 V models: 50 VDC 48 V models: 100 VDC |
| Conducted noise | EN 55022 class A/B with external components see application note |
| 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 | EN 61000-4-4, ± 2 kV, perf. criteria A EN 61000-4-5, ± 2 kV perf. criteria A With external input filter capacitor: 24/48V models: chemi-con KY 220 μ F, 100 V, ESR 48 mOhm |
| 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 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. – Load variation (0 – 100 %) |
| 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 – 53 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 μ s 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. |
| Capacitive load | 12 VDC models: 10'800 / 13'300 μ F 15 VDC models: 6'600 / 8'600 μ F 24 VDC models: 2'700 / 3'300 μ F 28 VDC models: 1'900 / 2'500 μ F 48 VDC models: 680 / 830 μ F 53 VDC model: 690 μ F |

General Specifications

| | | |
|---|---|---|
| Temperature ranges | <ul style="list-style-type: none"> – Operating – Case temperature – Storage | –40°C to +75°C +115°C max. –55°C to +125°C |
| Thermal impedance | <ul style="list-style-type: none"> – without heat-sink – with heat-sink | 6.1°C/W 5.1°C/W |
| Power derating | <ul style="list-style-type: none"> – without heat-sink – with heat-sink – with iron base plate (19" x 3.5" x 0.063") | depending on installation! 1.5 %/K above +25°C 1.5 %/K above +40°C 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 | | MIL-STD-810F |
| Humidity (non condensing) | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | | 75'000 h |
| Isolation voltage (60sec.) | <ul style="list-style-type: none"> – Input/Output – Input/Case | 2'250 VDC (basic insulation) 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 | | UL 60950-1, IEC/EN 60950-1 |
| Safety approvals | – online certification for UL/cUL 60950-1 | www.ul.com/database -> File e188913 www.tracopower.com/ul-files |
| Remote On/Off | <ul style="list-style-type: none"> – positive logic (standard) – negative logic (option) – Off idle current: | <ul style="list-style-type: none"> – On: 3 to 12 VDC or open circuit – Off: 0 to 1.2 VDC or short circuit pin 1 and 3 – On: 0 to 1.2 VDC or short circuit pin 1 and 3 – Off: 3 to 12 VDC or open circuit 3 mA |
| Environmental compliance | <ul style="list-style-type: none"> – Reach – RoHS | www.tracopower.com/products/tep160-reach.pdf RoHS directive 2011/65/EU |

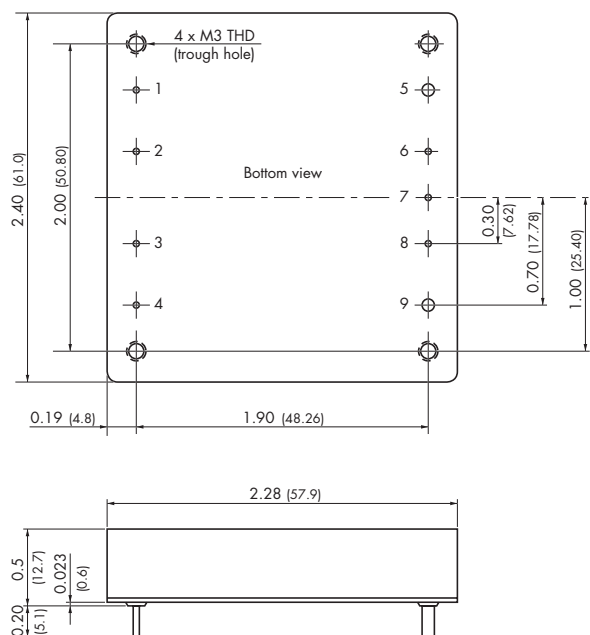
General Specifications

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

Application note: www.tracopower.com/products/tep160-application.pdf

Dimensions

TEP 160 module



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

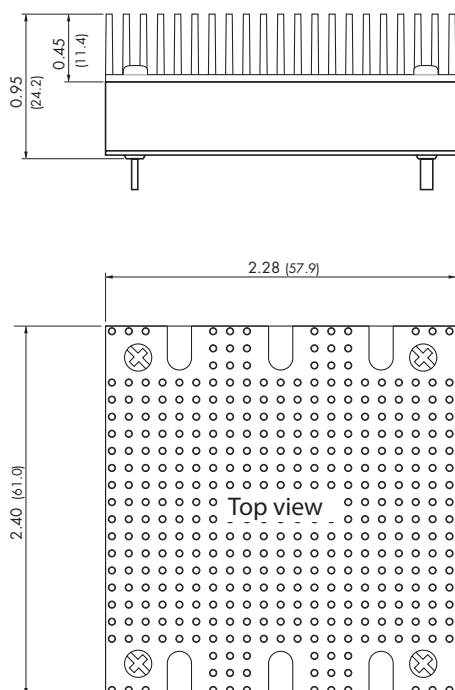
Weight: 105g (3.70oz)

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
 To order modules with mounted heatsink ask factory.

Weight: 142g (5.01oz)
 (Heatsink + Converter)

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