



# THE DATASHEET OF TEC 3-4812

- Compact SIP-8 package
- I/O-isolation voltage 1'600 VDC
- Fully regulated outputs
- Operating temperature range  $-40^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$
- Continuous short circuit protection
- Remote On/Off
- Designed to meet IEC/EN/UL 62368-1 (not certified)
- 3-year product warranty



TEC 3 is a new series with the design purpose to improve the prevalent 3 Watt SIP-8 DC/DC converters in terms of cost, efficiency and performance. The latest technology and components effectuate a high efficiency for a low thermal loss. This enables an operating temperature range from  $-40^{\circ}\text{C}$  up to  $+90^{\circ}\text{C}$ . The converters are fully regulated over 0 - 100% load. The low input range input is extended from 4.5 to 13.2 VDC while models are also available with the standard 2:1 input ranges of 9-18, 18-36 and 36-75 VDC (see TEC 3WI series for 4:1 input ranges). The functional I/O-isolation system is designed to meet IEC/EN/UL 62368-1 (not certified) with a test voltage (60 s) of 1600 VDC.

### Models

| Order Code | Input Voltage Range            | Output 1 |                  | Output 2 |                  | Efficiency typ. |
|------------|--------------------------------|----------|------------------|----------|------------------|-----------------|
|            |                                | Vnom     | I <sub>max</sub> | Vnom     | I <sub>max</sub> |                 |
| TEC 3-0910 | 4.5 - 13.2 VDC<br>(9 VDC nom.) | 3.3 VDC  | 700 mA           |          |                  | 75 %            |
| TEC 3-0911 |                                | 5 VDC    | 600 mA           |          |                  | 78 %            |
| TEC 3-0919 |                                | 9 VDC    | 333 mA           |          |                  | 81 %            |
| TEC 3-0912 |                                | 12 VDC   | 250 mA           |          |                  | 83 %            |
| TEC 3-0913 |                                | 15 VDC   | 200 mA           |          |                  | 84 %            |
| TEC 3-0915 |                                | 24 VDC   | 125 mA           |          |                  | 82 %            |
| TEC 3-0921 |                                | +5 VDC   | 300 mA           | -5 VDC   | 300 mA           | 79 %            |
| TEC 3-0922 |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 82 %            |
| TEC 3-0923 |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 82 %            |
| TEC 3-1210 | 9 - 18 VDC<br>(12 VDC nom.)    | 3.3 VDC  | 700 mA           |          |                  | 77 %            |
| TEC 3-1211 |                                | 5 VDC    | 600 mA           |          |                  | 81 %            |
| TEC 3-1219 |                                | 9 VDC    | 333 mA           |          |                  | 82 %            |
| TEC 3-1212 |                                | 12 VDC   | 250 mA           |          |                  | 84 %            |
| TEC 3-1213 |                                | 15 VDC   | 200 mA           |          |                  | 85 %            |
| TEC 3-1215 |                                | 24 VDC   | 125 mA           |          |                  | 85 %            |
| TEC 3-1221 |                                | +5 VDC   | 300 mA           | -5 VDC   | 300 mA           | 81 %            |
| TEC 3-1222 |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 85 %            |
| TEC 3-1223 |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 83 %            |
| TEC 3-2410 | 18 - 36 VDC<br>(24 VDC nom.)   | 3.3 VDC  | 700 mA           |          |                  | 77 %            |
| TEC 3-2411 |                                | 5 VDC    | 600 mA           |          |                  | 82 %            |
| TEC 3-2419 |                                | 9 VDC    | 333 mA           |          |                  | 83 %            |
| TEC 3-2412 |                                | 12 VDC   | 250 mA           |          |                  | 85 %            |
| TEC 3-2413 |                                | 15 VDC   | 200 mA           |          |                  | 86 %            |
| TEC 3-2415 |                                | 24 VDC   | 125 mA           |          |                  | 84 %            |
| TEC 3-2421 |                                | +5 VDC   | 300 mA           | -5 VDC   | 300 mA           | 82 %            |
| TEC 3-2422 |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 84 %            |
| TEC 3-2423 |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 85 %            |
| TEC 3-4810 | 36 - 75 VDC<br>(48 VDC nom.)   | 3.3 VDC  | 700 mA           |          |                  | 75 %            |
| TEC 3-4811 |                                | 5 VDC    | 600 mA           |          |                  | 80 %            |
| TEC 3-4819 |                                | 9 VDC    | 333 mA           |          |                  | 82 %            |
| TEC 3-4812 |                                | 12 VDC   | 250 mA           |          |                  | 84 %            |
| TEC 3-4813 |                                | 15 VDC   | 200 mA           |          |                  | 85 %            |
| TEC 3-4815 |                                | 24 VDC   | 125 mA           |          |                  | 86 %            |
| TEC 3-4821 |                                | +5 VDC   | 300 mA           | -5 VDC   | 300 mA           | 80 %            |
| TEC 3-4822 |                                | +12 VDC  | 125 mA           | -12 VDC  | 125 mA           | 86 %            |
| TEC 3-4823 |                                | +15 VDC  | 100 mA           | -15 VDC  | 100 mA           | 83 %            |

## Input Specifications

|                        |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input Current          | - At no load | 9 Vin models: <b>55 mA typ.</b><br>12 Vin models: <b>30 mA typ.</b><br>48 Vin models: <b>8 mA typ.</b><br>24 Vin models: <b>12 mA typ.</b> (3.3 Vout model)<br><b>12 mA typ.</b> (5 Vout model)<br><b>12 mA typ.</b> (9 Vout model)<br><b>12 mA typ.</b> (12 Vout model)<br><b>12 mA typ.</b> (15 Vout model)<br><b>12 mA typ.</b> (24 Vout model)<br><b>12 mA typ.</b> (5 / -5 Vout model)<br><b>12 mA typ.</b> (12 / -12 Vout model)<br><b>15 mA typ.</b> (15 / -15 Vout model) |
| Surge Voltage          |              | 9 Vin models: <b>15 VDC max.</b> (1 s max.)<br>12 Vin models: <b>25 VDC max.</b> (1 s max.)<br>24 Vin models: <b>50 VDC max.</b> (1 s max.)<br>48 Vin models: <b>100 VDC max.</b> (1 s max.)                                                                                                                                                                                                                                                                                      |
| Under Voltage Lockout  |              | 9 Vin models: <b>2 VDC min. / 3 VDC typ. / 4 VDC max.</b><br>12 Vin models: <b>6 VDC min. / 7 VDC typ. / 8 VDC max.</b><br>24 Vin models: <b>13 VDC min. / 15 VDC typ. / 17 VDC max.</b><br>48 Vin models: <b>29 VDC min. / 32 VDC typ. / 35 VDC max.</b>                                                                                                                                                                                                                         |
| Recommended Input Fuse |              | 9 Vin models: <b>1'600 mA</b> (slow blow)<br>12 Vin models: <b>800 mA</b> (slow blow)<br>24 Vin models: <b>500 mA</b> (slow blow)<br>48 Vin models: <b>315 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.)                                                                                                                                                                                                                      |
| Input Filter           |              | <b>Internal Capacitor</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Output Specifications

|                           |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage Set Accuracy      |                                                                                                              | <b>±1% max.</b>                                                                                                                                                                                                                                                                                                                                                                                 |
| Regulation                | - Input Variation (Vmin - Vmax)<br>- Load Variation (0 - 100%)<br>- Cross Regulation (25% / 100% asym. load) | single output models: <b>0.2% max.</b><br>dual output models: <b>0.2% max.</b><br>single output models: <b>1% max.</b><br>dual output models: <b>1% max.</b> (Output 1)<br><b>1% max.</b> (Output 2)<br>dual output models: <b>5% max.</b>                                                                                                                                                      |
| Ripple and Noise          | - 20 MHz Bandwidth                                                                                           | <b>55 mVp-p max.</b>                                                                                                                                                                                                                                                                                                                                                                            |
| Capacitive Load           | - single output<br>- dual output                                                                             | 3.3 Vout models: <b>4'400 µF max.</b><br>5 Vout models: <b>2'200 µF max.</b><br>9 Vout models: <b>1'300 µF max.</b><br>12 Vout models: <b>1'000 µF max.</b><br>15 Vout models: <b>820 µF max.</b><br>24 Vout models: <b>470 µF max.</b><br>5 / -5 Vout models: <b>1'200 / 1'200 µF max.</b><br>12 / -12 Vout models: <b>520 / 520 µF max.</b><br>15 / -15 Vout models: <b>440 / 440 µF max.</b> |
| Minimum Load              |                                                                                                              | <b>Not required</b>                                                                                                                                                                                                                                                                                                                                                                             |
| Temperature Coefficient   |                                                                                                              | <b>±0.02 %/K max.</b>                                                                                                                                                                                                                                                                                                                                                                           |
| Start-up Time             |                                                                                                              | <b>10 ms typ. / 20 ms max.</b>                                                                                                                                                                                                                                                                                                                                                                  |
| Short Circuit Protection  |                                                                                                              | <b>Continuous, Automatic recovery</b>                                                                                                                                                                                                                                                                                                                                                           |
| Output Current Limitation |                                                                                                              | <b>140 - 240% of Iout max.</b><br><b>180% typ. of Iout max.</b>                                                                                                                                                                                                                                                                                                                                 |
| Transient Response        | - Response Time                                                                                              | <b>500 µs typ.</b> (25% Load Step)                                                                                                                                                                                                                                                                                                                                                              |

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

## Safety Specifications

|           |                             |                                                |
|-----------|-----------------------------|------------------------------------------------|
| Standards | - IT / Multimedia Equipment | Designed for IEC/EN/UL 62368-1 (not certified) |
|-----------|-----------------------------|------------------------------------------------|

## EMC Specifications

|               |                            |                                                                                                                  |
|---------------|----------------------------|------------------------------------------------------------------------------------------------------------------|
| EMI Emissions | - Conducted Emissions      | EN 55032 class A (with external filter)                                                                          |
|               | - Radiated Emissions       | EN 55032 class B (with external filter)                                                                          |
|               |                            | EN 55032 class A (with external filter)                                                                          |
|               |                            | EN 55032 class B (with external filter)                                                                          |
|               |                            | External filter proposal: <a href="http://www.tracopower.com/overview/tec3">www.tracopower.com/overview/tec3</a> |
| EMS Immunity  | - Electrostatic Discharge  | Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A                                                                  |
|               |                            | Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A                                                              |
|               | - RF Electromagnetic Field | EN 61000-4-3, 10 V/m, perf. criteria A                                                                           |
|               | - EFT (Burst) / Surge      | EN 61000-4-4, $\pm 2$ kV, perf. criteria A                                                                       |
|               |                            | EN 61000-4-5, $\pm 1$ kV, perf. criteria A                                                                       |
|               |                            | Ext. input component: KY 220 $\mu$ F / 100 V                                                                     |
|               |                            | - Conducted RF Disturbances                                                                                      |
|               |                            | - PF Magnetic Field                                                                                              |
|               |                            | Continuous: EN 61000-4-6, 10 Vrms, perf. criteria A                                                              |
|               |                            | 1 s: EN 61000-4-8, 100 A/m, perf. criteria A                                                                     |
|               |                            | 1 s: EN 61000-4-8, 1000 A/m, perf. criteria A                                                                    |

## General Specifications

|                        |                                            |                                                                                                                                       |
|------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Relative Humidity      |                                            | 95% max. (non condensing)                                                                                                             |
| Temperature Ranges     | - Operating Temperature                    | -40°C to +90°C                                                                                                                        |
|                        | - Case Temperature                         | +105°C max.                                                                                                                           |
|                        | - Storage Temperature                      | -55°C to +125°C                                                                                                                       |
| Power Derating         | - High Temperature                         | 3.4 %/K above 75°C                                                                                                                    |
|                        |                                            | See application note: <a href="http://www.tracopower.com/overview/tec3">www.tracopower.com/overview/tec3</a>                          |
| Cooling System         |                                            | Natural convection (20 LFM)                                                                                                           |
| Remote Control         | - Current Controlled Remote (passive = on) | On: open circuit                                                                                                                      |
|                        |                                            | Off: 2 to 4 mA current (internal 1 k $\Omega$ resistor)                                                                               |
|                        |                                            | Refers to 'Remote' and '-Vin' Pin                                                                                                     |
|                        |                                            | External circuit proposal: <a href="http://www.tracopower.com/info/current-remote.pdf">www.tracopower.com/info/current-remote.pdf</a> |
|                        |                                            | 2.5 mA typ.                                                                                                                           |
| Regulator Topology     |                                            | RCC Converter                                                                                                                         |
| Switching Frequency    |                                            | 100 kHz min. (PFM)                                                                                                                    |
| Insulation System      |                                            | Functional Insulation                                                                                                                 |
| Isolation Test Voltage | - Input to Output, 60 s                    | 1'600 VDC                                                                                                                             |
| Isolation Resistance   | - Input to Output, 500 VDC                 | 1'000 M $\Omega$ min.                                                                                                                 |
| Isolation Capacitance  | - Input to Output, 100 kHz, 1 V            | 50 pF max.                                                                                                                            |
| Reliability            | - Calculated MTBF                          | 5'124'000 h (MIL-HDBK-217F, ground benign)                                                                                            |
| Washing Process        |                                            | According to Cleaning Guideline                                                                                                       |
|                        |                                            | <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>                                        |
| Environment            | - Vibration                                | MIL-STD-810F                                                                                                                          |
|                        | - Mechanical Shock                         | MIL-STD-810F                                                                                                                          |
|                        | - Thermal Shock                            | MIL-STD-810F                                                                                                                          |
| Housing Material       |                                            | Non-conductive Plastic (UL 94 V-0 rated)                                                                                              |
| Potting Material       |                                            | Silicone (UL 94 V-0 rated)                                                                                                            |
| Pin Material           |                                            | Copper                                                                                                                                |
| Pin Foundation Plating |                                            | Nickel (1 - 2 $\mu$ m)                                                                                                                |
| Pin Surface Plating    |                                            | Tin (3 - 5 $\mu$ m), matte                                                                                                            |
| Housing Type           |                                            | Plastic Case                                                                                                                          |
| Mounting Type          |                                            | PCB Mount                                                                                                                             |
| Connection Type        |                                            | THD (Through-Hole Device)                                                                                                             |
| Footprint Type         |                                            | SIP8                                                                                                                                  |
| Soldering Profile      |                                            | Lead-Free Wave Soldering                                                                                                              |
|                        |                                            | 260°C / 10 s max.                                                                                                                     |

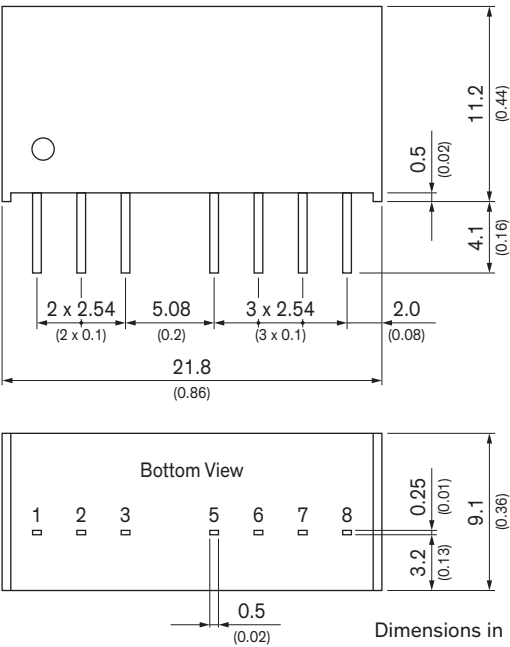
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weight                   | 4.5 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Environmental Compliance | - REACH Declaration<br><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)<br>e0986e5b-0522-4adb-9f26-096d17c4d764 |
|                          | - RoHS Declaration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                          | - SCIP Reference Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

Supporting Documents

Overview Link (for additional Documents)[www.tracopower.com/overview/tec3](http://www.tracopower.com/overview/tec3)

Outline Dimensions



Dimensions in mm (inch)  
Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )  
Pin dimension tolerance  $\pm 0.1$  (0.004)

| Pinout |               |               |
|--------|---------------|---------------|
| Pin    | Single        | Dual          |
| 1      | -Vin (GND)    | -Vin (GND)    |
| 2      | +Vin (Vcc)    | +Vin (Vcc)    |
| 3      | Remote On/Off | Remote On/Off |
| 5      | NC            | NC            |
| 6      | +Vout         | +Vout         |
| 7      | -Vout         | Common        |
| 8      | NC            | -Vout         |

NC: Not connected

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ View [TEC 3-4812](#) on WIN SOURCE
- ⊖ [Traco Power](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management