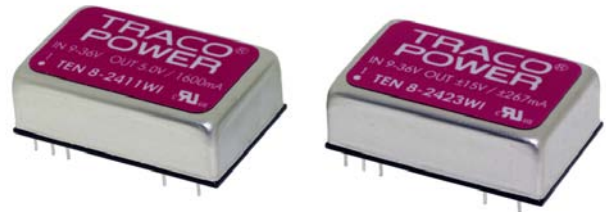


### Features

- ◆ DIP-24 metal package
- ◆ Ultra wide 4:1 input voltage range  
9–36, 18–75, 43–160 VDC
- ◆ EN 50155 approval for railway applications
- ◆ Thermal shock and vibration resistant according EN 61373
- ◆ High efficiency up to 88 %
- ◆ No minimum load required
- ◆ Operating temperature range  
–40°C to +85°C
- ◆ Remote On/Off
- ◆ Under voltage lock-out circuit
- ◆ Shielded metal case with insulated base plate
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty



The TEN 8WI series is a family of high performance 8 Watt dc/dc converter modules featuring ultra wide 4:1 input voltage ranges in a DIP-24 package with industry-standard footprint. Input voltages up to 160 VDC, excellent EMC characteristics and EN 50155 approval make this product the best choice for many demanding applications in railroad and transportation systems. Further standard features include remote On/Off, over voltage protection, under voltage lockout and short circuit protection. Typical applications for these converters are also in wireless networks, telecom/datacom, industry control systems and measurement equipments.

### Models

| Order code   | Input voltage range               | Output voltage                  | Output current max. | Efficiency typ. |
|--------------|-----------------------------------|---------------------------------|---------------------|-----------------|
| TEN 8-2410WI | 9 – 36 VDC<br>(24 VDC nominal)    | 3.3 VDC                         | 2'400 mA            | 85 %            |
| TEN 8-2411WI |                                   | 5 VDC                           | 1'600 mA            | 87 %            |
| TEN 8-2412WI |                                   | 12 VDC                          | 666 mA              | 86 %            |
| TEN 8-2413WI |                                   | 15 VDC                          | 533 mA              | 86 %            |
| TEN 8-2421WI |                                   | ±5 VDC                          | ±800 mA             | 84 %            |
| TEN 8-2422WI |                                   | ±12 VDC                         | ±333 mA             | 86 %            |
| TEN 8-2423WI |                                   | ±15 VDC                         | ±267 mA             | 86 %            |
| TEN 8-4810WI |                                   | 18 – 75 VDC<br>(48 VDC nominal) | 3.3 VDC             | 2'400 mA        |
| TEN 8-4811WI | 5 VDC                             |                                 | 1'600 mA            | 87 %            |
| TEN 8-4812WI | 12 VDC                            |                                 | 666 mA              | 87 %            |
| TEN 8-4813WI | 15 VDC                            |                                 | 533 mA              | 88 %            |
| TEN 8-4821WI | ±5 VDC                            |                                 | ±800 mA             | 84 %            |
| TEN 8-4822WI | ±12 VDC                           |                                 | ±333 mA             | 87 %            |
| TEN 8-4823WI | ±15 VDC                           |                                 | ±267 mA             | 87 %            |
| TEN 8-7210WI | 43 – 160 VDC<br>(110 VDC nominal) |                                 | 3.3 VDC             | 2'400 mA        |
| TEN 8-7211WI |                                   | 5 VDC                           | 1'600 mA            | 85 %            |
| TEN 8-7212WI |                                   | 12 VDC                          | 666 mA              | 86 %            |
| TEN 8-7213WI |                                   | 15 VDC                          | 533 mA              | 86 %            |
| TEN 8-7221WI |                                   | ±5 VDC                          | ±800 mA             | 82 %            |
| TEN 8-7222WI |                                   | ±12 VDC                         | ±333 mA             | 85 %            |
| TEN 8-7223WI |                                   | ±15 VDC                         | ±267 mA             | 85 %            |

### Input Specifications

|  |   |
|--|---|
| Input current (no load)                                | 9–36 Vin, 3.3 VDC & 5 VDC models: 40 mA typ.<br>9–36 Vin other models: 25 mA typ.<br>18–75 Vin, 3.3 VDC & 5 VDC models: 20 mA typ.<br>18–75 Vin other models: 13 mA typ.<br>43–160 Vin, 3.3 VDC & 5 VDC models: 8 mA typ.<br>43–160 Vin other models: 5 mA typ. |
| Input current (full load)                              | 9–36 Vin models: 410 mA typ<br>18–75 Vin models: 210 mA typ<br>43–160 Vin models: 90 mA typ.  |
| Input voltage variation (dv/dt)                        | 5 V/ms, max.<br>(complies with ETS300 132 part 4.4)   |
| Start-up voltage                                       | 9–36 Vin models: 9.0 VDC (or lower)<br>18–75 Vin models: 18 VDC (or lower)<br>43–160 Vin models: 43 VDC (or lower)  |
| Under voltage shut down (lock-out circuit)             | 9–36 Vin models: 8.0 VDC typ.<br>18–75 Vin models: 16 VDC typ.<br>43–160 Vin models: 42 VDC typ.  |
| Surge voltage (100 msec. max.)                         | 9–36 Vin models: 50 V max.<br>18–75 Vin models: 100 V max.<br>43–160 Vin models: 170 V max.   |
| Reflected ripple current                               | 20 mA <sub>p-p</sub> typ.   |
| Conducted noise  | EN 55022 class A with external components<br>see application note:  |
| ESD (electrostatic discharge)                          | EN 61000-4-2, air ±8 kV, contact ±6 kV,<br>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<br>EN 61000-4-5, ±2 kV perf. criteria A   |
| – external input capacitor                             | 24/48 Vin models: Nippon chemi-con KY 220 µF, 100 V, ESR 48 mOhm<br>110 Vin models: Nippon chemi-con KXJ 150 µF, 200 V, ESR 48 mOhm   |
| Conducted immunity                                     | EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A  |

### Output Specifications

|   |  |
|---|--|
| Voltage set accuracy                      | ±1 %   |
| Regulation                                | – Input variation Vin min. to Vin max. 0.2 % max.<br>– Load variation 0 – 100 % single output models: 0.5 % max.<br>dual output models: 1 % max.<br>– Load cross variation 25 % / 100 % 5 % max. |
| Minimum load                              | not required   |
| Temperature coefficient                   | ±0.02 %/K  |
| Ripple and noise (20 MHz bandwidth)       | 24/48 Vin models: 50 mV <sub>p-p</sub> typ.<br>110 Vin models: 75 mV <sub>p-p</sub> typ.   |
| Start up time                             | – Power On 450 ms typ.<br>(constant resistive load) – Remote On 5 ms typ.  |
| Transient Response (25% load step change) | 250 µs typ.  |
| Short circuit protection                  | indefinite (automatic recovery)  |
| Over load protection                      | 150 % of lout max. typ.  |

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

### Output Specifications

|   |   |
|---|---|
| Over voltage protection (only single output models) | 3.3 V output: 3.9 V<br>5 V output: 6.2 V<br>12 V output: 15 V<br>15 V output: 18 V  |
| Capacitive load                                     | 3.3 VDC & 5 VDC models: 1330 µF<br>12 VDC models: 288 µF<br>15 VDC models: 200 µF<br>±5 VDC models: 900 µF (each output)<br>±12 VDC models: 133 µF (each output)<br>±15 VDC models: 90 µF (each output) |

### General Specifications

|   |   |  |
|---|---|--|
| Temperature ranges  | <ul style="list-style-type: none"> <li>- Operating</li> <li>- Case temperature</li> <li>- Storage</li> </ul>        | -40°C to +85°C<br>+105°C max.<br>-55°C to +125°C   |
| Power derating  |   | 3 %/K above +70°C  |
| Thermal inpedance   | <ul style="list-style-type: none"> <li>- Natural convection</li> <li>- Natural convection with heat sink</li> </ul> | 18.2°C/W<br>15.8°C/W   |
| Humidity (non condensing)   |   | 5 – 95 % rel. H max.   |
| Isolation voltage (60 sec.)   | - Input / Output  | 1500 VDC   |
| Isolation resistance  | - Input / Output  | >1000 M Ohm  |
| Isolation capacitance   | - Input / Output  | 1500 pF max.   |
| Switching frequency   |   | 300 kHz typ. (pulse width modulation PWM)  |
| Thermal shock, mechanical shock & vibration                           | - Test conditions   | EN 61373, MIL-STD-810F<br><a href="http://www.tracopower.com/products/mil810.pdf">www.tracopower.com/products/mil810.pdf</a>   |
| Safety standards  |   | UL/cUL 60950-1, IEC/EN 60950-1, EN 50155   |
| Safety approvals  | <ul style="list-style-type: none"> <li>- UL/cUL</li> <li>- Railway</li> </ul>                                       | <a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913<br><a href="http://www.tracopower.com/products/ten8wi-coc.pdf">www.tracopower.com/products/ten8wi-coc.pdf</a> |
| Remote On/Off   | <ul style="list-style-type: none"> <li>- On:</li> <li>- Off:</li> <li>- Off idle current:</li> </ul>                | 3.0 ... 12 VDC or open circuit<br>0 ... 1.2 VDC or short circuit pin 1 and pin 2/3<br>2.5 mA   |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) |   | 1 Mio. h   |
| Environmental compliance  | <ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>   | <a href="http://www.tracopower.com/products/ten8wi-reach.pdf">www.tracopower.com/products/ten8wi-reach.pdf</a><br>RoHS directive 2002/95/EC  |

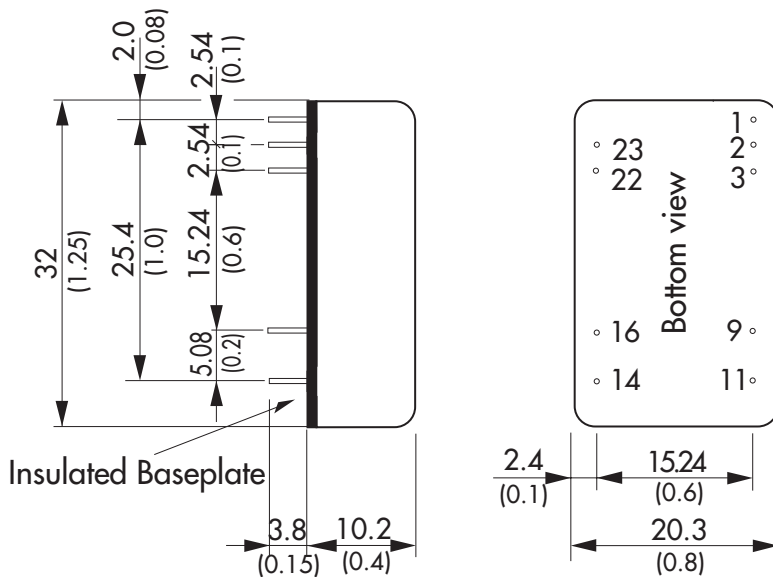
**Application note:** [www.tracopower.com/products/ten8wi-application.pdf](http://www.tracopower.com/products/ten8wi-application.pdf)

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

**Physical Specifications**

|                       |                       |
|-----------------------|-----------------------|
| Casing material       | copper, nickel plated |
| Baseplate material    | non conductive FR4    |
| Potting material      | epoxy (UL94V-0 rated) |
| Weight                | 18 g (0.63 oz)        |
| Soldering temperature | max. 265°C / 10 sec.  |

**Outline Dimensions**



| Pin-Out |               |               |
|---------|---------------|---------------|
| Pin     | Single        | Dual          |
| 1       | Remote On/Off | Remote On/Off |
| 2       | -Vin (GND)    | -Vin (GND)    |
| 3       | -Vin (GND)    | -Vin (GND)    |
| 9       | ntc           | Common        |
| 11      | ntc           | -Vout         |
| 14      | +Vout         | +Vout         |
| 16      | -Vout         | Common        |
| 22      | +Vin (Vcc)    | +Vin (Vcc)    |
| 23      | +Vin (Vcc)    | +Vin (Vcc)    |

ntc = not to connect

Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing 0.5 \pm 0.05$  (0.02  $\pm$  0.002)  
 Tolerances  $\pm 0.5$  ( $\pm 0.02$ )  
 Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.001$ )

Specifications can be changed any time without notice.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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