DC/DC Converters
TEN 50WI Series, 50 Watt

Features
◆ Very high power density:
  50 W in 1" x 2" x 0.4" package
◆ Wide 4:1 input range
◆ Excellent efficiency up to 92 %
◆ Operating temperature range
  –40°C to +80°C
◆ Protection against over-temperature
◆ No minimum load required
◆ Output voltage adjustable
◆ Remote On/Off
◆ I/O isolation 1500 VDC
◆ 3-year product warranty

The TEN 50WI Series is a range of isolated high performance DC/DC converter modules. With a very high efficiency of up to 92% and the use of highest reliable components these 50 W converters can be packed into the standard 1.0" x 2.0" casing. The 10 models have a wide 4:1 input voltage range and a tight output voltage regulation. They do not need a minimum load and offer a high efficiency also at low load conditions. The output voltage is adjustable by external resistor. Remote On/Off and protection against overload and short circuit are standard features of these converters.

Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is critical.

<table>
<thead>
<tr>
<th>Models</th>
<th>Order code</th>
<th>Input voltage range</th>
<th>Output voltage</th>
<th>Output current max.</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEN 50-2410WI</td>
<td></td>
<td>3.3 VDC</td>
<td>10’000 mA</td>
<td>90 %</td>
<td></td>
</tr>
<tr>
<td>TEN 50-2411WI</td>
<td></td>
<td>5.0 VDC</td>
<td>10’000 mA</td>
<td>91 %</td>
<td></td>
</tr>
<tr>
<td>TEN 50-2412WI</td>
<td></td>
<td>12 VDC</td>
<td>4'170 mA</td>
<td>92 %</td>
<td></td>
</tr>
<tr>
<td>TEN 50-2413WI</td>
<td></td>
<td>15 VDC</td>
<td>3'330 mA</td>
<td>92 %</td>
<td></td>
</tr>
<tr>
<td>TEN 50-2415WI</td>
<td></td>
<td>24 VDC</td>
<td>2'080 mA</td>
<td>91 %</td>
<td></td>
</tr>
</tbody>
</table>

| TEN 50-2410WI   | 9 – 36 VDC (nominal 24 VDC) |            | 10’000 mA      | 90 %                |
| TEN 50-2411WI   |            | 5.0 VDC             | 10’000 mA      | 91 %                |
| TEN 50-2412WI   |            | 12 VDC              | 4'170 mA       | 92 %                |
| TEN 50-2413WI   |            | 15 VDC              | 3'330 mA       | 92 %                |
| TEN 50-2415WI   |            | 24 VDC              | 2'080 mA       | 91 %                |

| TEN 50-4810WI   | 18 – 75 VDC (nominal 48 VDC) | 3.3 VDC | 10’000 mA | 90 %                |
| TEN 50-4811WI   |            | 5.0 VDC             | 10’000 mA      | 91 %                |
| TEN 50-4812WI   |            | 12 VDC              | 4'170 mA       | 92 %                |
| TEN 50-4813WI   |            | 15 VDC              | 3'330 mA       | 92 %                |
| TEN 50-4815WI   |            | 24 VDC              | 2'080 mA       | 91 %                |
# DC/DC Converters

## TEN 50WI Series

### 50 Watt

## Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
</table>
| Input current at no load (nominal input voltage) | 24 Vin models: 80 mA typ.  
48 Vin models: 50 mA typ. |
| Recommended input fuse (slow blow)   | 24 Vin models: 1000 mA  
48 Vin models: 250 mA          |
| Surge voltage (100 msec. max.)       | 24 Vin models: 50 V max.  
48 Vin models: 100 V max.       |
| Reflected input ripple current       | 24Vin models: 40 mA typ.  
48Vin models: 30 mA typ.         |
| Conducted noise (input)              | EN 55022 class A, FCC part 15 level A  
with external LC see application note |
| Start-up voltage / under voltage shut down | 24 Vin models: 9 VDC max./ 7.5 VDC typ.  
48 Vin models: 18 VDC max./ 16 VDC typ. |

### EMC immunity
- 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, ±1 kV perf. criteria A  
Nippon chemicon KY 220 µF, 100 V, ESR 48 mOhm  
EN 61000-4-6, 10 Vrms, perf. criteria A

### Conducted immunity
- EN 61000-4-6, 10 Vrms, perf. criteria A

## Output Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage set accuracy</td>
<td>±1.0 % max.</td>
</tr>
</tbody>
</table>
| Output voltage adjustment range      | 24 VDC models: +20 / −10 %  
other models: ±10 %                   |
| Regulation                           | 0.5 % max.             |
| Minimum load                         | not required           |
| Temperature coefficient              | ±0.02 %/K              |
| Ripple and noise (20 MHz Bandwidth)  | 3.3 & 5.0 VDC models: 100 mVpk-pk, typ.  
other models: 150 mVpk-pk typ.  
with 1µF MLCC and a 10µF tantalum capacitor |
| Transient response (alignment to 1% at load step change 75% to 100%) | 250 µs typ. |
| Output current limitation            | at 150% of Iout max.   |
| Short circuit protection             | hiccup mode, automatic recovery |
| Capacitive load                      | 3.3 VDC models: 26'000 µF max.  
5.0 VDC models: 17'000 µF max.  
12.0 VDC models: 3'000 µF max.  
15.0 VDC models: 2'000 µF max.  
24.0 VDC models: 750 µF max.         |

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

http://www.tracopower.com
**General Specifications**

**Temperature ranges**
- Operating (natural convection 20 LFM) $-40^\circ C$ to $+80^\circ C$ (with derating)
- Operating with heat sink (natural convection 20 LFM) $-40^\circ C$ to $+85^\circ C$ (with derating)
- Case temperature $+105^\circ C$ max.
- Storage $-50^\circ C$ to $+125^\circ C$

**Load derating**
- without heat sink 2.0 %/K above $+55^\circ C$
- with heat sink 2.5 %/K above $+65^\circ C$

**Over temperature protection**
at $+110^\circ C$ typ.

**Thermal impedance**
- Natural convection 20 LFM $12^\circ C/W$
- Natural convection 20 LFM with heatsink $10^\circ C/W$

**Humidity** (non condensing) 95 % rel H max.

**Reliability, calculated MTBF** (MIL-HDBK-217F, at $+25^\circ C$, ground benign) $>230'900$ h

**Isolation voltage [60 sec.]**
- Input/Output $1500$ VDC

**Isolation capacitance**
- Input/Output $2200$ pF max. (100 kHz, 1 V)

**Isolation resistance**
- Input/Output $>1000$ Mohm (500 VDC)

**Switching frequency**
285 kHz typ.

**Remote On/Off**
- On: 3.5 to 12 VDC to $-\text{Vin}$ or open circuit.
- Off: 0 to +1.2 VDC or short circuit to $-\text{Vin}$
- Off idle current: 2.5 mA typ.

**Safety standards**
- CAN/CSA-C22.2 No 60950-1-07, 2nd ed; A1:2011
- ANSI/UL No. 60950-1, 2nd ed.; A1:2011,
- IEC 60950-1:2005 (2nd edition); Am 1:2009
- www.tracopower.com/overview/ten50wi

**Physical Specifications**

**Casing material**
- Alluminium alloy, 6-side shielded, insulating baseplate

**Potting material**
- Epoxy (UL 94V-0 rated)

**Weight**
- 34 g (1.05 oz)

**Soldering temperature**
- Max. 260°C / 10 sec. (1.5 mm from casing)

**Environmental compliance**
- Reach
directive 2011/65/EU
- RoHS

**Supporting documents:**
www.tracopower.com/overview/ten50wi

All specifications valid at nominal input voltage, full load and $+25^\circ C$ after warm-up time unless otherwise stated.
**Pin-Out**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>Remote On/Off</td>
</tr>
<tr>
<td>4</td>
<td>+Vout</td>
</tr>
<tr>
<td>5</td>
<td>–Vout</td>
</tr>
<tr>
<td>6</td>
<td>Trim</td>
</tr>
</tbody>
</table>

Dimensions in [mm], () = Inch
- Pin diameter: 1.0 ±0.05 (0.04 ±0.002)
- Pin pitch tolerance: ±0.13 (±0.005)
- Case tolerances: ±0.25 (±0.01)

**Order code:** TEN-HS6  
(cont.: heat-sink, thermal pad, 2 clamps)

- **Material:** Aluminum  
- **Finish:** Anodic treatment (black)  
- **Weight:** 9 g (0.31 oz) without converter  
- Thermal impedance after assembling: 10 K/W

**Note:**  
Before attaching the heatsink, the product label on converter has to be removed for optimal performance. For volume orders we can supply the converters with heatsink already mounted. Please contact us for a relative quotation.