DC/DC Converters
TEN 8WI Series, 8 Watt

Features
◆ High Power Density in DIP-24 Metal Package
◆ Ultra wide 4:1 Input Voltage Range
◆ High Efficiency up to 88%
◆ Operating Temperature Range: -40°C to +85°C
◆ Remote On/Off
◆ Under Voltage Lockout
◆ 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 8W DC/DC converter modules featuring ultra wide 4:1 input voltage ranges in a DIP-24 package with industry-standard footprint. A very high efficiency allows an operating temperature range of -40°C to +85°C. Full SMD-design with exclusive use of ceramic capacitors guarantees a high reliability and long product lifetime. Further standard features include remote On/Off, over voltage protection, under voltage lockout and short circuit protection. Typical applications for these converters are battery operated equipment, instrumentation, communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required.

Models

<table>
<thead>
<tr>
<th>Order code</th>
<th>Input voltage range</th>
<th>Output voltage</th>
<th>Output current max.</th>
<th>Efficiency typ.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEN 8-2410WI</td>
<td>9 – 36 VDC (24 VDC nominal)</td>
<td>3.3 VDC</td>
<td>2’000 mA</td>
<td>85 %</td>
</tr>
<tr>
<td>TEN 8-2411WI</td>
<td></td>
<td>5 VDC</td>
<td>1’500 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TEN 8-2412WI</td>
<td></td>
<td>12 VDC</td>
<td>665 mA</td>
<td>86 %</td>
</tr>
<tr>
<td>TEN 8-2413WI</td>
<td></td>
<td>15 VDC</td>
<td>535 mA</td>
<td>86 %</td>
</tr>
<tr>
<td>TEN 8-2421WI</td>
<td>± 5 VDC</td>
<td>± 800 mA</td>
<td></td>
<td>84 %</td>
</tr>
<tr>
<td>TEN 8-2422WI</td>
<td>±12 VDC</td>
<td>± 335 mA</td>
<td></td>
<td>86 %</td>
</tr>
<tr>
<td>TEN 8-2423WI</td>
<td>±15 VDC</td>
<td>± 265 mA</td>
<td></td>
<td>86 %</td>
</tr>
<tr>
<td>TEN 8-4810WI</td>
<td>18 – 75 VDC (48 VDC nominal)</td>
<td>3.3 VDC</td>
<td>2’000 mA</td>
<td>85 %</td>
</tr>
<tr>
<td>TEN 8-4811WI</td>
<td></td>
<td>5 VDC</td>
<td>1’500 mA</td>
<td>87 %</td>
</tr>
<tr>
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<td></td>
<td>12 VDC</td>
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<td>± 265 mA</td>
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</tbody>
</table>

http://www.tracopower.com
### Input Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>9–36 Vin, 3.3VDC &amp; 5VDC output models</th>
<th>9–36 Vin other output models</th>
<th>18–75 Vin, 3.3VDC &amp; 5VDC output models</th>
<th>18–75 Vin other output models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input current (no load)</td>
<td>40 mA typ.</td>
<td>25 mA typ.</td>
<td>20 mA typ.</td>
<td>13 mA typ.</td>
</tr>
<tr>
<td>Input current (full load)</td>
<td>410 mA typ.</td>
<td></td>
<td>210 mA typ.</td>
<td></td>
</tr>
<tr>
<td>Input voltage variation (dv/dt)</td>
<td>5 V/ms, max.</td>
<td></td>
<td>(complies with ETS300 132 part 4.4)</td>
<td></td>
</tr>
<tr>
<td>Start-up voltage / under voltage lockout</td>
<td>9.0 VDC / 8.0 VDC (typ.)</td>
<td>18 VDC / 16 VDC (typ.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge voltage (100 msec. max.)</td>
<td>50 V max.</td>
<td></td>
<td>100 V max.</td>
<td></td>
</tr>
</tbody>
</table>

#### Conducted noise (input)

- EN 55022 level A, FCC part 15, level A with external capacitor (see note 1)
- EN 61000-4-2, Perf. Criteria B
- EN 61000-4-4, Perf. Criteria B
- EN 61000-4-5, Perf. Criteria B

### Output Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>± 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage set accuracy</td>
<td></td>
</tr>
<tr>
<td>Regulation</td>
<td></td>
</tr>
<tr>
<td>- Input variation Vin min. to Vin max</td>
<td>0.2 % max.</td>
</tr>
<tr>
<td>- Load variation 10% – 100%</td>
<td>0.5 % max.</td>
</tr>
<tr>
<td>- Dual output models</td>
<td>1 % max.</td>
</tr>
<tr>
<td>- Load cross variation 25% / 100%</td>
<td>5 % max.</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>± 0.02 % /K</td>
</tr>
<tr>
<td>Ripple and noise (20 MHz Bandwidth)</td>
<td>50 mVpk-pk max.</td>
</tr>
<tr>
<td>Start up time (constant resistive load)</td>
<td>450 ms typ.</td>
</tr>
<tr>
<td>- Power On</td>
<td>5 ms max.</td>
</tr>
<tr>
<td>- Remote On</td>
<td></td>
</tr>
<tr>
<td>Transient Response (25% load step change)</td>
<td>250 µs typ.</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>indefinite (automatic recovery)</td>
</tr>
<tr>
<td>Over load protection</td>
<td>150% of Iout max. typ.</td>
</tr>
<tr>
<td>Over voltage protection</td>
<td></td>
</tr>
<tr>
<td>- 3.3 V output</td>
<td>3.9 V</td>
</tr>
<tr>
<td>- 5 V output</td>
<td>6.2 V</td>
</tr>
<tr>
<td>- 12 V output</td>
<td>15 V</td>
</tr>
<tr>
<td>- 15 V output</td>
<td>18 V</td>
</tr>
</tbody>
</table>

Capacitive load: tba

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature ranges</td>
<td></td>
</tr>
<tr>
<td>- Operating</td>
<td>-40 °C ... +85 °C</td>
</tr>
<tr>
<td>- Case temperature</td>
<td>+100 °C max.</td>
</tr>
<tr>
<td>- Storage</td>
<td>-55 °C ... +125 °C</td>
</tr>
<tr>
<td>Derating</td>
<td>see graph below</td>
</tr>
<tr>
<td>Humidity (non condensing)</td>
<td>95 % rel. H max.</td>
</tr>
<tr>
<td>Reliability, calculated MTBF</td>
<td>1 Mio. h @ +25°C</td>
</tr>
<tr>
<td>Isolation voltage (60 sec)</td>
<td>1'500 VDC</td>
</tr>
<tr>
<td>Isolation resistance</td>
<td>&gt; 1'000 M Ohm</td>
</tr>
<tr>
<td>Isolation capacity</td>
<td>300 pF max.</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>300 kHz typ. (pulse width modulation PWM)</td>
</tr>
<tr>
<td>Vibration</td>
<td>10-55Hz, 10G, 30 minutes along X,Y,Z</td>
</tr>
<tr>
<td>Safety standards</td>
<td>UL/cUL 60950-1, IEC/EN 60950-1</td>
</tr>
<tr>
<td>Safety approvals</td>
<td>UL/cUL File tba</td>
</tr>
<tr>
<td>Remote On/Off</td>
<td></td>
</tr>
<tr>
<td>- On</td>
<td>3.5 ... 12 VDC or open circuit</td>
</tr>
<tr>
<td>- Off</td>
<td>0 ... 1.2 VDC or short circuit pin 1 and pin 2/3</td>
</tr>
<tr>
<td>- Off idle current</td>
<td>2.5 mA</td>
</tr>
</tbody>
</table>

**Note 1:**
In order to meet conducted emissions EN55022-A an aluminium electrolytic capacitor (low ESR) has to be installed between +Vin and -Vin. The capacitor should be capable to handle 0.5A ripple current.

### Power Derating

![Power Derating Graph](image-url)

- Natural convection
- Forced cooling with 500 LFM

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case material</td>
<td>copper, nickel plated</td>
</tr>
<tr>
<td>Baseplate material</td>
<td>non conductive FR4</td>
</tr>
<tr>
<td>Potting material</td>
<td>epoxy (UL94V-0 rated)</td>
</tr>
<tr>
<td>Weight</td>
<td>18 g (0.60 oz)</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>max. 265 °C / 10 sec.</td>
</tr>
</tbody>
</table>

Outline Dimensions

Pin-Out

<table>
<thead>
<tr>
<th>Pin</th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remote On/Off</td>
<td>Remote On/Off</td>
</tr>
<tr>
<td>2</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>3</td>
<td>–Vin (GND)</td>
<td>–Vin (GND)</td>
</tr>
<tr>
<td>9</td>
<td>No con.</td>
<td>Common</td>
</tr>
<tr>
<td>11</td>
<td>No con.</td>
<td>–Vout</td>
</tr>
<tr>
<td>14</td>
<td>+Vout</td>
<td>+Vout</td>
</tr>
<tr>
<td>16</td>
<td>–Vout</td>
<td>Common</td>
</tr>
<tr>
<td>22</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
<tr>
<td>23</td>
<td>+Vin (Vcc)</td>
<td>+Vin (Vcc)</td>
</tr>
</tbody>
</table>

Dimensions in [mm], () = Inch
Pin diameter ø 0.5 ±0.05 (0.02 ±0.002)
Tolerances ±0.5 [0.02]
Pin pitch tolerances ±0.35 (0.014)