

- High power block with excellent thermal convection
- Operating temperature -40°C to +93°
- Ultra wide 4:1 input voltage range
- EN 50155 approval for railway applications
- Excellent efficiency up to 88%
- Input filter meet EN 55022, class B
- I/O isolation up to 3000 VDC
- Under voltage lock-out circuit
- Protection against overvoltage, over-temperature and short circuit
- Output LED indicator



The TEQ-20WIR Series is a family of isolated high performance dc-dc converter modules with ultra-wide 4:1 input voltage ranges which come in a rugged metal case. These converters are suitable for a wide range of applications, but the product is designed particularly also for industrial applications where often no PCB mounting is possible but the module has to be mounted on a chassis. A very high efficiency and the heatsink construction allows an operating temperature up to +83°C with natural convection cooling without power derating and up to +93°C with power derating. Further features include under voltage lockout, over temperature protection and short circuit protection.

| Models         |  |                |                     |                 |
|----------------|--|----------------|---------------------|-----------------|
| Order code     | Input voltage                            | Output voltage | Output current max. | Efficiency typ. |
| TEQ 20-2411WIR | <b>9 - 36 VDC</b><br>(nominal 24 VDC)    | 5 VDC          | 4000 mA             | 87 %            |
| TEQ 20-2412WIR |  | 12 VDC         | 1670 mA             | 88 %            |
| TEQ 20-2413WIR |  | 15 VDC         | 1330 mA             | 87 %            |
| TEQ 20-2415WIR |  | 24 VDC         | 833 mA              | 87 %            |
| TEQ 20-4811WIR | <b>18 - 75 VDC</b><br>(nominal 48 VDC)   | 5 VDC          | 4000 mA             | 87 %            |
| TEQ 20-4812WIR |  | 12 VDC         | 1670 mA             | 88 %            |
| TEQ 20-4813WIR |  | 15 VDC         | 1330 mA             | 88 %            |
| TEQ 20-4815WIR |  | 24 VDC         | 833 mA              | 87 %            |
| TEQ 20-7211WIR | <b>43 - 160 VDC</b><br>(nominal 110 VDC) | 5 VDC          | 4000 mA             | 86 %            |
| TEQ 20-7212WIR |  | 12 VDC         | 1670 mA             | 87 %            |
| TEQ 20-7213WIR |  | 15 VDC         | 1330 mA             | 87 %            |
| TEQ 20-7215WIR |  | 24 VDC         | 833 mA              | 87 %            |

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## Input Specifications

|                             |   |
|-----------------------------|---|
| Input current no load       | 24 Vin models: 8 mA typ.<br>48 Vin models: 6 mA typ.<br>110 Vin models: 5 mA typ.   |
| Surge voltage (1 sec. max.) | 24 Vin models: 50 VDC max<br>48 Vin models: 100 VDC max.<br>110 Vin models: 170 VDC max.  |
| Start-up voltage            | 24 Vin models: 9 VDC (or lower)<br>48 Vin models: 18 VDC (or lower)<br>110 Vin models: 43 VDC (or lower)  |
| Under voltage shut down     | 24 Vin models: 8 VDC typ.<br>48 Vin models: 16 VDC typ<br>110 Vin models: 40 VDC typ.   |
| Inrush current              | 15 A typ.   |
| Input fuse                  | 24 Vin models: 4 A (slow blow)<br>48 Vin models: 2 A (slow blow)<br>110 Vin models: 1 A (slow blow)   |
| EMC emissions               | – conducted immunity<br>EN55022 class B (internal filter)   |
| EMC immunity                | – Electrostatic discharge ESD<br>EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A<br>– Radiated immunity<br>EN 61000-4-3, 20 V/m, perf. criteria A<br>– Fast transient<br>EN 61000-4-4, ±2 kV, perf. criteria A<br>– Surge<br>EN 61000-4-5, ±1 kV perf. criteria A<br>– Conducted immunity<br>EN 61000-4-6, 10 Vrms, perf. criteria A<br>– Magnetic field immunity<br>EN 61000-4-8, 100 A/m, perf. criteria A |

## Output Specifications

|   |  |
|---|--|
| Voltage set accuracy                      | ±1 %   |
| Regulation                                | – Input variation<br>– Load variation 0 – 100 %<br>5 VDC models: 0.5 % max.<br>other models: 1.5 % max.<br>1.0% max.             |
| Temperature coefficient                   | ±0.02 %/K typ.   |
| Start up time (constant resistive load)   | 100 ms typ.  |
| Hold up time                              | 10 ms min. (acc. EN50155 class S2)   |
| Minimum load                              | not required   |
| Ripple and noise (20 MHz Bandwidth)       | 5 VDC models: 75 mVp-p max.<br>12 & 15 VDC models: 100 mVp-p max.<br>24 VDC models: 150 mVp-p max.                               |
| Transient response (25% load step change) | 250 µs typ.  |
| Over-voltage protection                   | 5 VDC models: at 6.2 VDC typ.<br>12 VDC models: at 15 VDC typ.<br>15 VDC models: at 20 VDC typ.<br>24 VDC models: at 30 VDC typ. |
| Output indicator                          | green LED  |
| Current limitation                        | at 150 % of rated lout max., hiccup mode   |
| Short circuit protection                  | continuous, automatic recovery   |
| Capacitive load                           | 5 VDC models: 5'000 µF<br>12 VDC models: 850 µF<br>15 VDC models: 700 µF<br>24 VDC models: 250 µF                                |

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

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## General Specifications

|  |  |   |
|--|--|---|
| Temperature ranges   | – Operating (natural convection 20LFM, 0,1m/s)<br>– Storage temperature  | –40°C to +83°C (without derating)<br>–40°C to +93°C (with derating)<br>–40°C to +105°C  |
| Derating   |  | 5.8 %/K above 83°C (depending on model)   |
| Mechanical shock   |  | acc. EN61373, MIL-STD-810F  |
| Thermal shock  |  | acc. MIL-STD-810F   |
| Vibration  |  | acc. EN61373, MIL-STD-810F  |
| Humidity (non condensing)  |  | 5 - 95 % rel H max.   |
| Isolation voltage (60 sec)   | – Input/Output<br>– Input/Case   | 2'250 VDC<br>1'600 VDC  |
| Isolation capacitance (input/output)                                 |  | 6'000 pF typ.   |
| Isolation resistance (input/output)                                  |  | >1 Gohm   |
| Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign) |  | 1'600'000 h   |
| Switching frequency  |  | 330 kHz ±33 kHz (PWM)   |
| Safety standards & approvals   | – CB test certificate<br>– UL online certification E188913, QOQO2<br>– Railway immunity<br>– Certification documents (pending) | IEC/EN 60950-1<br>UL 60950-1<br>EN50155<br><a href="http://www.tracopower.com/overview/teq20wir">www.tracopower.com/overview/teq20wir</a>             |
| Environmental compliance   | – Reach<br>– RoHS  | <a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a><br>RoHS directive 2011/65/EU |

## Physical Specifications

|                       |                     |
|-----------------------|---------------------|
| Casing material       | aluminium           |
| Package weight        | 122g (4,30oz)       |
| Soldering temperature | max. 260°C / 10 sec |

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

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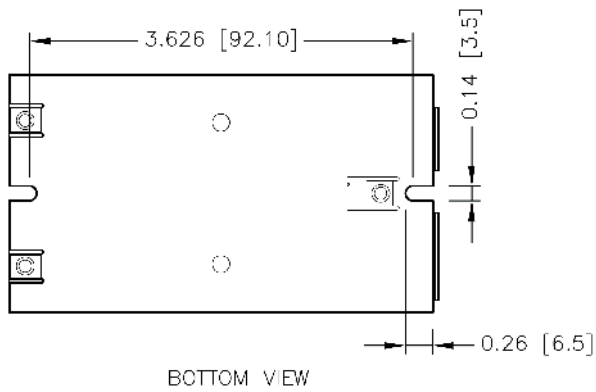
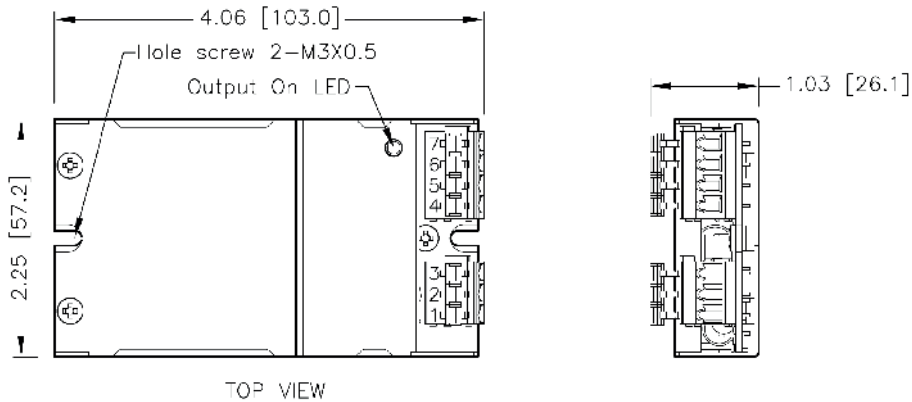
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## Outline Dimensions



| Terminal connection |            |
|---------------------|------------|
| Terminal            |            |
| 1                   | +Vin       |
| 2                   | -Vin (GND) |
| 3                   | NC         |
| 4                   | NC         |
| 5                   | -Vout      |
| 6                   | +Vout      |
| 7                   | NC         |

Dimensions in [mm], ( ) = Inch  
 Tolerances: x.x ±0.5 (±0.02)  
               x.xx ±0.25 (±0.01)  
 Screw max. torque: 5.0 kgf - cm (0.49 Nm)  
 Spring terminals: 12 - 18 AWG

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