

### Features

- ◆ High power block with excellent thermal convection
- ◆ Operating temperature -40°C to +75° without derating
- ◆ Increased shock & vibration resistance
- ◆ Ultra wide 4:1 input voltage range
- ◆ EN 50155 approval for railway applications
- ◆ Excellent efficiency up to 90%
- ◆ Input filter meet EN 55022, class A
- ◆ I/O insulation 2250 VDC
- ◆ Under voltage lock-out circuit
- ◆ Soft start
- ◆ Input protection filter



The TEQ-160WIR 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, sealed 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 overall heatsink construction allows an operating temperature

up to +75°C with natural convection cooling without power derating and up to +90°C with power derating. Further features include output voltage trimming, Remote On/Off and under voltage lockout. The very wide input voltage range and reverse input voltage protection make these converters also an interesting solution for battery operated systems.

### Models

Order code	Input voltage	Output voltage	Output current max.	Efficiency typ.
TEQ 160-4812WIR	19 – 75 VDC (48 VDC nominal)	12 VDC (9.6 – 13.2)	13 A	90 %
TEQ 160-4815WIR		24 VDC (19.2 – 26.4)	6.5 A	90 %
TEQ 160-4816WIR		28 VDC (22.4 – 30.8)	5.5 A	90 %
TEQ 160-4818WIR		48 VDC (38.4 – 52.8)	3.2 A	90 %
TEQ 160-7212WIR	43 – 160 VDC (110 VDC nominal)	12 VDC (9.6 – 13.2)	15 A	89 %
TEQ 160-7215WIR		24 VDC (19.2 – 26.4)	7.5 A	89 %
TEQ 160-7216WIR		28 VDC (22.4 – 30.8)	6.5 A	89 %
TEQ 160-7218WIR		48 VDC (38.4 – 52.8)	3.8 A	89 %

### Input Specifications

Input current at no load	48 Vin models: 20 mA typ. 110 Vin models: 10 mA typ.
Start-up voltage	48 Vin models: 18.0 VDC (or lower) 110 Vin models: 43.0 VDC (or lower)
Under voltage shut down (lock-out circuit)	48 Vin models: 15.8 VDC min. 110 Vin models: 34.5 VDC min
Surge voltage (1 sec. max.)	48 Vin models: 100 V max. 110 Vin models: 185 V max.
Conducted noise	EN 55022 class A
EMC immunity	EN 50121-3-2 EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A EN 61000-4-3, 20 V/m, perf. criteria A EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 1$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A EN 61000-4-6, 10 Vrms, perf. criteria A EN 50155
<ul style="list-style-type: none"> <li>- ESD (electrostatic discharge)</li> <li>- Radiated immunity</li> <li>- Fast transient / surge</li> <li>- Conducted immunity</li> <li>- Railway immunity</li> </ul>	
Reverse voltage protection	parallel diode

### Output Specifications

Voltage set accuracy	$\pm 1$ %
Output voltage adjustment	+10 % / -20 %
Regulation	<ul style="list-style-type: none"> <li>- Input variation Vin min. to Vin max. 0.1 % max.</li> <li>- Load variation (0 – 100 %) 0.1 % max.</li> </ul>
Temperature coefficient	$\pm 0.02$ %/K
Minimum load	not required
Remote sense	up to Vout nom. +10%
Ripple and noise (20 MHz Bandwidth)	<ul style="list-style-type: none"> <li>12 VDC models: 125 mVpk-pk max.</li> <li>24 &amp; 28 VDC models: 250 mVpk-pk max.</li> <li>48 VDC models: 350 mVpk-pk max.</li> </ul>

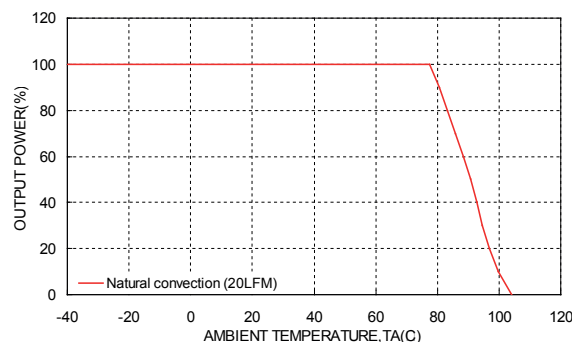
**Output Specifications**

Start up time (nominal Vin and constant resistive load)	75 ms typ. (at power On or remote On)
Transient response (25% load step change)	250 µs max.
Output current limitation	at 120 -150 % of Iout max.
Over voltage protection	at 115 -130 % of Vout nom.
Short circuit protection	hiccup, automatic recovery
Capacitive load (48Vin / 110Vin)	12 VDC models: 10'800 / 12'500 µF max. 24 VDC models: 2'700 / 3'100 µF max. 28 VDC models: 1'900 / 2'300 µF max. 48 VDC models: 660 / 790 µF max.

**General Specifications**

Temperature ranges	- Operating - Storage	-40°C to +105°C (up to +75°C w/o derating) -40°C to +105°C
Thermal impedance		1.45°C/W
Derating		See derating graph below
Over temperature protection		at 120°C
Thermal shock		acc. MIL-STD-810F
Shock & Vibration		acc. EN61373, MIL-STD-810F
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		TBD
Isolation voltage (60 sec.)	- Input/Output - Input/Case	2'250 VDC (basic insulation) 1'600 VDC
Isolation resistance	- Input/Output (500 VDC)	>1 GOhm min.
Switching frequency		250 kHz typ. (puls width modulation)
Safety standards	- CB test certificate  - CSA certificate of compliance - UL online certification E188913, QQGQ2 - Railway immunity - Flamability identified acc. - Certification documents	IEC/EN 60950-1 (ed. 2), EN 60950-1:2006/ A11:2009/A1:2010/A12:2011/A2:2013 UL 508, CSA C22.2 No. 107.1-01 UL 60950-1 2nd ed. +Am1 EN50155 EN45545-2 <a href="http://www.tracopower.com/overview/teq160wir">www.tracopower.com/overview/teq160wir</a>
Remote On/Off	- positive logic (standard)  - Off idle current:	- On: 3 to 12 VDC or open circuit - Off: 0 to 1.2 VDC or short circuit terminal 1 and 4 3 mA
Environmental compliance	- Reach document - RoHS	<a href="http://www.tracopower.com/overview/teq160wir">www.tracopower.com/overview/teq160wir</a> RoHS directive 2011/65/EU

Temperature derating



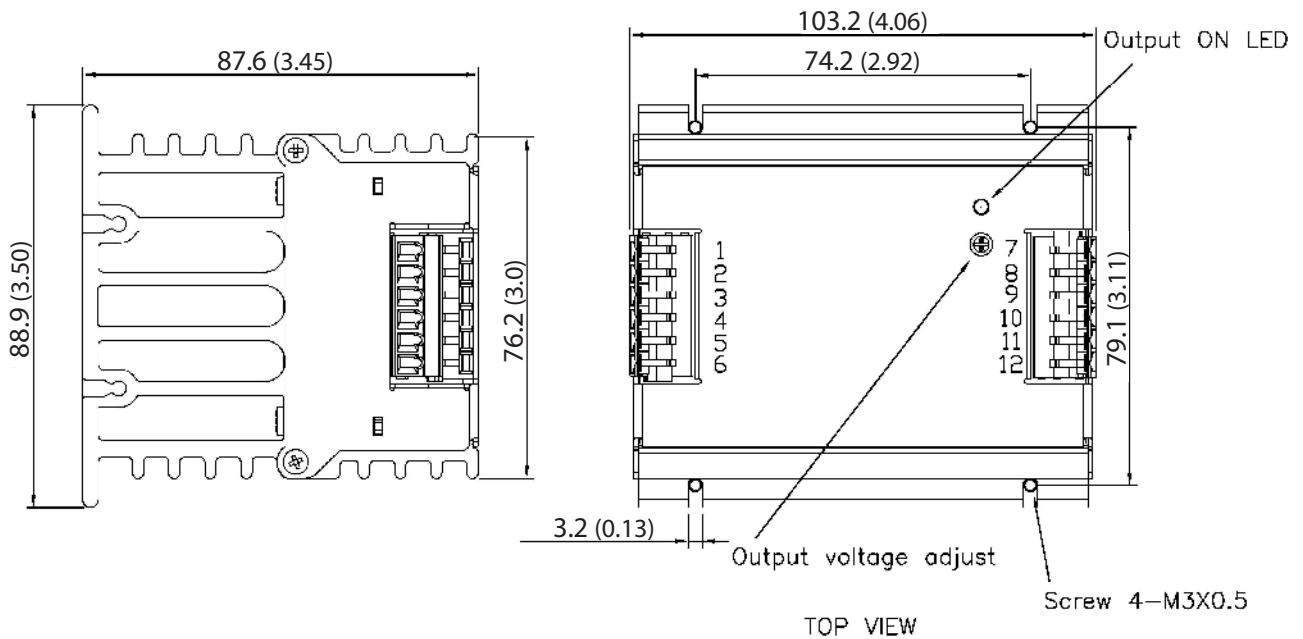
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Physical Specifications**

Casing material	aluminium
Potting material	silicone (UL94V-0 rated)
Base material	FR4
Weight	800 g (28.22oz)

**Dimensions**

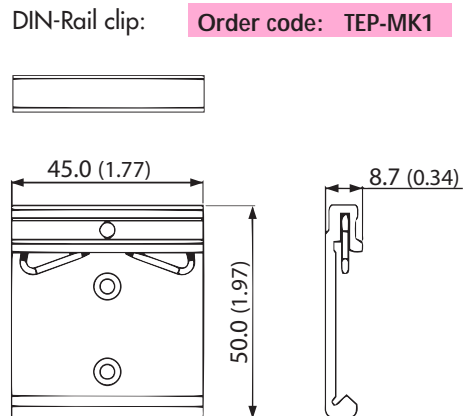
TEQ 160WIR module:



Weight: 800 g (28.22oz)

Connection	
Terminal	
1	- Vin
2	- Vin
3	NC
4	Ctrl (Remote On/Off)
5	+ Vin
6	+ Vin
7	- Vout
8	- Vout
9	- Sense*
10	+ Sense*
11	+ Vout
12	+ Vout

\*Sense line to be connected to the output either at the module or at the load under regard of polarity.



Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)

