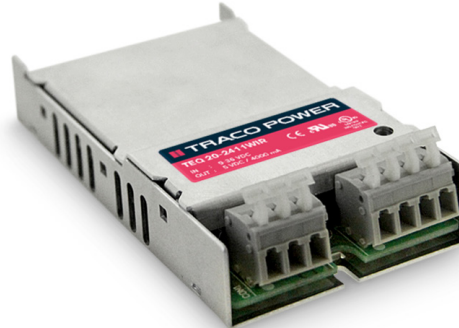


- High power block with excellent thermal convection
- Operating temperature -40°C to +93°
- Ultra wide 4:1 input voltage range
- EN 50155 approval for railway applications
- Excellent efficiency up to 88%
- Input filter meet EN 55032, class B
- I/O isolation 2'250 VDC
- Under voltage lock-out circuit
- 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	9 - 36 VDC (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 20-2422WIR		±12 VDC	833 mA	87 %
TEQ 20-2423WIR		±15 VDC	667 mA	88 %
TEQ 20-4811WIR		18 - 75 VDC (nominal 48 VDC)	5 VDC	4000 mA
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 20-4822WIR	±12 VDC		833 mA	87 %
TEQ 20-4823WIR	±15 VDC		667 mA	88 %
TEQ 20-7211WIR	43 - 160 VDC (nominal 110 VDC)		5 VDC	4000 mA
TEQ 20-7212WIR		12 VDC	1670 mA	87 %
TEQ 20-7213WIR		15 VDC	1330 mA	87 %
TEQ 20-7215WIR		24 VDC	833 mA	87 %
TEQ 20-7222WIR		±12 VDC	833 mA	87 %
TEQ 20-7223WIR		±15 VDC	667 mA	88 %

## Input Specifications

Input current no load	24 Vin models: 8 mA typ. 48 Vin models: 6 mA typ. 110 Vin models: 5 mA typ.
Surge voltage (1 s max.)	24 Vin models: 50 VDC max 48 Vin models: 100 VDC max. 110 Vin models: 170 VDC max.
Start-up voltage	24 Vin models: 9 VDC (or lower) 48 Vin models: 18 VDC (or lower) 110 Vin models: 43 VDC (or lower)
Under voltage shut down	24 Vin models: 8 VDC typ. 48 Vin models: 16 VDC typ 110 Vin models: 40 VDC typ.
Inrush current	15 A typ.
Input fuse	24 Vin models: 4 A (slow blow) 48 Vin models: 2 A (slow blow) 110 Vin models: 1 A (slow blow)
EMC emissions	– Conducted and radiated input suppression EN 55032 class B (internal filter)
EMC immunity	– Electrostatic discharge ESD EN 61000-4-2, air $\pm 8$ kV, contact $\pm 6$ kV, perf. criteria A – Radiated immunity EN 61000-4-3, 20 V/m, perf. criteria A – Fast transient EN 61000-4-4, $\pm 2$ kV, perf. criteria A – Surge EN 61000-4-5, $\pm 1$ kV perf. criteria A – Conducted immunity EN 61000-4-6, 10 Vrms, perf. criteria A – Magnetic field immunity EN 61000-4-8, 100 A/m, perf. criteria A

## Output Specifications

Voltage set accuracy	single output: $\pm 1$ % dual output: $+1$ % / $-1.2$ %
Regulation	– Input variation (Vin min. to Vin max.) – Load variation (0 to 100 %) 5 Vout models: 0.5 % max. 1.5 % max. other models: 1.0% max. – Cross regulation dual output: 5.0% max. (asymmetrical load 25 % / 100%)
Temperature coefficient	$\pm 0.02$ %/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 Vout models: 75 mVp-p max. ( $\pm 12$ ) & ( $\pm 15$ ) Vout models: 100 mVp-p max. 24 Vout models: 150 mVp-p max.
Transient response (25% load step change)	250 $\mu$ s typ.
Over-voltage protection	5 Vout models: at 6.2 VDC typ. ( $\pm 12$ ) Vout models: at 15 VDC typ. ( $\pm 15$ ) Vout models: at 20 VDC typ. 24 Vout 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 Vout models: 5'000 $\mu$ F ( $\pm 12$ ) Vout models: 850 $\mu$ F ( $\pm 15$ ) Vout models: 700 $\mu$ F 24 Vout models: 250 $\mu$ F

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

## General Specifications

Temperature ranges	<ul style="list-style-type: none"> <li>– Operating (natural convection: 20 LFM, 0.1 m/s)</li> <li>– Storage temperature</li> </ul>	–40°C to +83°C (without derating) –40°C to +93°C (with derating) –40°C to +105°C
Derating	<ul style="list-style-type: none"> <li>– Natural convection</li> <li>– Natural convection, with 2U base plate</li> </ul>	5.8 %/K above 83°C (depending on model) 7.7 %/K above 87°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 s)	<ul style="list-style-type: none"> <li>– Input to Output</li> <li>– Input/Output to Case</li> </ul>	2'250 VDC 1'600 VDC
Isolation capacitance (Input to Output)		6'000 pF typ.
Isolation resistance (Input to 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	<ul style="list-style-type: none"> <li>– CB test certificate</li> <li>– UL online certification E188913, QOQO2</li> <li>– Railway immunity</li> <li>– Certification documents</li> </ul>	IEC/EN 60950-1 UL 60950-1 EN50155 <a href="http://www.tracopower.com/overview/teq20wir">www.tracopower.com/overview/teq20wir</a>
Environmental compliance	<ul style="list-style-type: none"> <li>– Reach</li> <li>– RoHS</li> <li>– Flamability identified acc. EN 45545-2</li> </ul>	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>

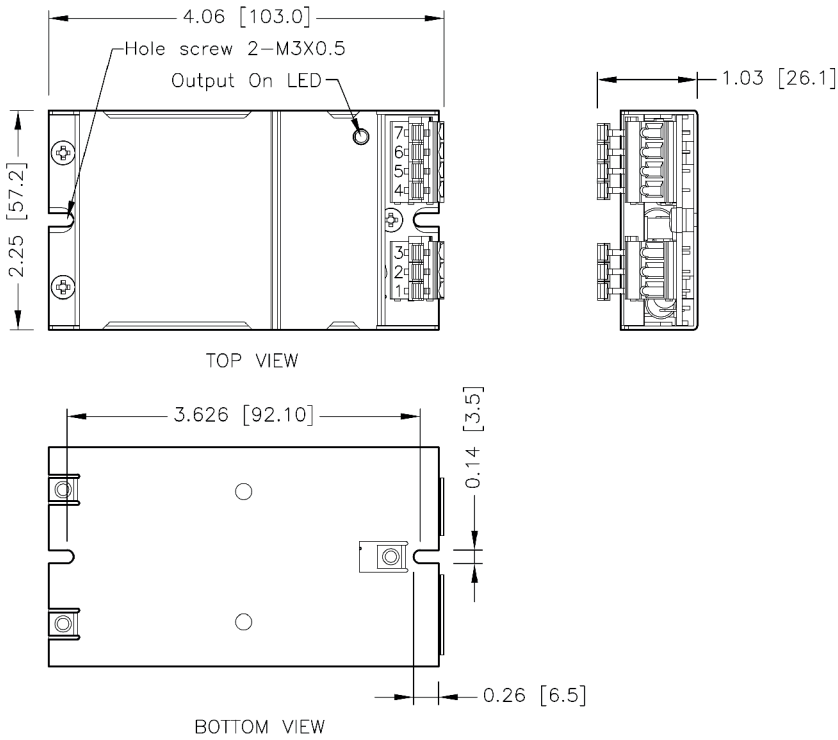
## Physical Specifications

Casing material	aluminium
Package weight	122 g (4.30 oz)

\* The 2U iron base-plate dimension is 19" x 3.5" x 0.063" (48.26 × 8.89 × 0.16 mm)

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

**Outline Dimensions**



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

Dimensions in Inch [mm]

Tolerances: x.x ±0.02 [±0.5]

x.xx ±0.01 [±0.25]

Screw max. torque: 5.0 kgf - cm (0.49 Nm)

Spring terminals: 12 - 18 AWG