DC/DC Converters

TEN 20WIR Series, 20 Watt

CB Scheme pending IEC 60950-1 cULus UL 60950-1

Features

- 2" x 1" metal package
- Ultra wide 4:1 input voltage range 9–36, 18–75, 43–160 VDC
- EN 50155 approval for railway applications
- Thermal shock and vibration resistant according EN 61373
- Input filter meets EN 55022 class B without external components
- High efficiency up to 89%
- No minimum load required
- Operating temperature range –40°C to +85°C
- Under voltage lock-out circuit
- Remote On/Off
- Output voltage adjustable
- Lead free design, RoHS compliant
- 3-year product warranty

The TEN 20WIR series is a family of high performance 20 Watt dc/dc converter modules featuring ultra wide 4:1 input voltage ranges in a 2" x 1" package with industry-standard footprint. Input voltages up to 160 VDC, excellent EMC characteristics and EN 50155 approval make this product the best choice for many demanding applications in railroad and transportation systems. Further standard features include remote On/Off, over voltage protection, under voltage lockout and short circuit protection. Low input current characteristics at minimal load make these converters also the ideal solution for battery-operated systems. Typical applications are in wireless networks, telecom/datacom, industry control systems and measurement equipments.

Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 20-2410WIR		3.3 VDC	4500 mA	85 %
TEN 20-2411WIR		5.0 VDC	4000 mA	88 %
TEN 20-2412WIR	**9 – 36 VDC**	12 VDC	1670 mA	89 %
TEN 20-2413WIR	(24 VDC nominal)	15 VDC	1330 mA	88 %
TEN 20-2422WIR		±12 VDC	±833 mA	88 %
TEN 20-2423WIR		±15 VDC	±667 mA	89 %
TEN 20-4810WIR		3.3 VDC	4500 mA	85 %
TEN 20-4811WIR		5.0 VDC	4000 mA	88 %
TEN 20-4812WIR	**18 – 75 VDC**	12 VDC	1670 mA	89 %
TEN 20-4813WIR	(48 VDC nominal)	15 VDC	1330 mA	89 %
TEN 20-4822WIR		±12 VDC	±833 mA	88 %
TEN 20-4823WIR		±15 VDC	±667 mA	89 %
TEN 20-7210WIR		3.3 VDC	4500 mA	85 %
TEN 20-7211WIR		5.0 VDC	4000 mA	87 %
TEN 20-7212WIR	**43 – 160 VDC**	12 VDC	1670 mA	88 %
TEN 20-7213WIR	(110 VDC nominal)	15 VDC	1330 mA	89 %
TEN 20-7222WIR		±12 VDC	±833 mA	88 %
TEN 20-7223WIR		±15 VDC	±667 mA	89 %

Input Specifications

Input current (no load)	24 Vin models:	6 mA typ.
	48 Vin models:	4 mA typ.
	110 Vin models:	3 mA typ.
Input current (full load)	24 Vin, 3.3 VDC models:	730 mA typ.
	24 Vin, other models:	950 mA typ.
	48 Vin, 3.3 VDC models:	365 mA typ.
	48 Vin, other models:	475 mA typ.
	110 Vin, 3.3 VDC models:	160 mA typ.
	110 Vin, other models:	210 mA typ.
Start-up voltage	24 Vin models:	9.0 VDC (or lower)
	48 Vin models:	18 VDC (or lower)
	110 Vin models:	43 VDC (or lower)
Under voltage shut down (lock-out circuit)	24 Vin models:	8.0 VDC typ.
	48 Vin models:	16 VDC typ.
	110 Vin models:	40 VDC typ.
Surge voltage (1 sec.)	24 Vin models:	50 V max.
	48 Vin models:	100 V max.
	110 Vin models:	170 V max.
Reflected ripple current		300 mAp-p typ.
Conducted noise	24 & 48 Vin models:	EN 55022 class B without external components
	110 Vin models:	EN 55022 class A without external components
ESD (electrostatic discharge)		EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A
Radiated immunity		EN 61000-4-3, 20 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, ±2 kV perf. criteria A
– external input capacitor	24 & 48 Vin models:	Nippon chemi-con KY 220 µF, 100 V, ESR 48 mOhm
	110 Vin models:	Nippon chemi-con KX J 150 µF, 200 V, ESR 48 mOhm
Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A

Output Specifications

Voltage set accuracy			±1 %
Voltage adjustment range			±10 %
Regulation	– Input variation Vin min. to Vin max.		0.2 % max.
	– Load variation 0 – 100 %	single output models:	0.5 % max.
		dual output models:	1 % max.
	– Load cross variation 25 % / 100 %		5 % max.
Minimum load			not required
Temperature coefficient			±0.02 %/K
Ripple and noise (20 MHz bandwidth, measured with 1 µF/ 50 V MLCC)		3.3 & 5.0 VDC models:	75 mVp-p typ.
		other models:	100 mVp-p typ.
Start up time (constant resistive load)	– Power On		30 ms typ.
	– Remote On		30 ms typ.
Transient response (25% load step change)			250 µs typ.
Short circuit protection			indefinite (automatic recovery)
Over load protection			150 % of Iout max. typ.
Over voltage protection (only single output models)		3.3 VDC models:	3.7 – 5.4 V
		5 VDC models:	5.6 – 7.0 V
		12 VDC models:	13.5 – 19.6 V
		15 VDC models:	16.8 – 20.5 V

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

Output Specifications

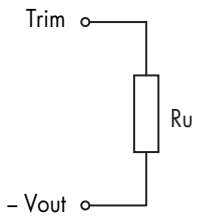
Capacitive load	3.3 VDC models:	7000 µF
	5.0 VDC models:	5000 µF
	12 VDC models:	850 µF
	15 VDC models:	700 µF
	±12 VDC models:	500 µF (each output)
	±15 VDC models:	350 µF (each output)

General Specifications

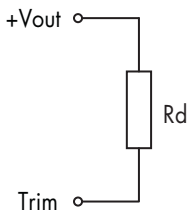
Temperature ranges	– Operating	–40°C to +85°C (with derating)
	– Casing temperature	+105°C max.
	– Storage	–55°C to +125°C
Power derating	– Natural convection	4.5 %/K above 73°C
	– Natural convection with heat sink (optional)	5.3 %/K above 78°C
Thermal impedance	– Natural convection	12°C/W
	– Natural convection with heat sink (optional)	10°C/W
Humidity (non condensing)		5 – 95 % rel. H max.
Isolation voltage (60 sec.)	– Input / Output	1500 VDC
Isolation resistance	– Input / Output	>1000 M Ohm
Isolation capacitance	– Input / Output	3000 pF max.
Switching frequency		330 kHz typ. (pulse width modulation PWM)
Vibration and thermal shock		EN 61373, MIL-STD-810E
Safety standards		UL/cUL 60950-1, IEC/EN 60950-1, EN 50155
Safety approvals	– UL/cUL (entry pending)	www.ul.com -> certifications -> File e188913
Remote On/Off	– On:	3.0 ... 15 VDC or open circuit
	– Off:	0 ... 1.2 VDC or short circuit pin 2 and pin 6
	– Off idle current:	2.5 mA
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		300'000 Mio. h

Output Voltage Adjustment (for single output models only)

Trim up



Trim down



Nominal output voltage at open Trim input
adjustment range ±10%, Ru, Rd to be adviced

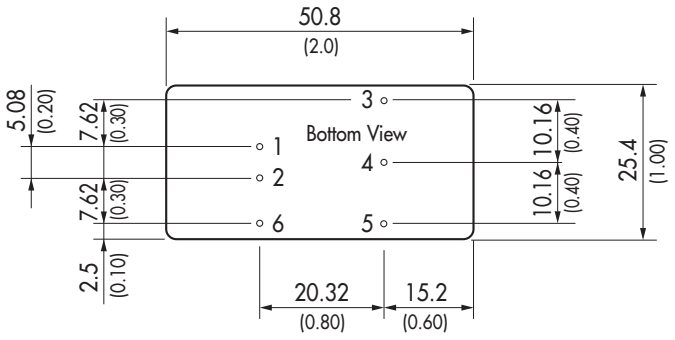
Application note: www.tracopower.com/products/ten20wir-application.pdf

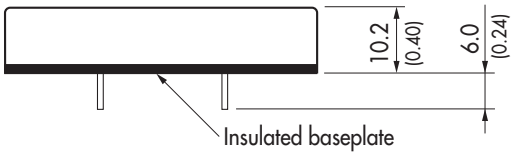
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

Physical Specifications

Casing material	copper, nickel plated
Baseplate material	non conductive FR4
Potting material	silicon (UL94V-0 rated)
Weight	30 g (1.06 oz)
Soldering temperature	max. +265°C / 10 sec.

Outline Dimensions



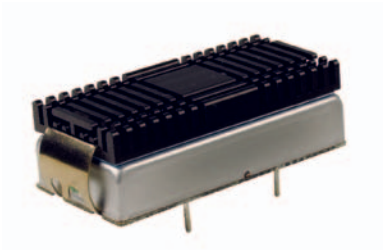


Pin-Out		
Pin	**Single**	**Dual**
1	+Vin (Vcc)	+Vin (Vcc)
2	–Vin (GND)	–Vin (GND)
3	+Vout	+Vout
4	Trim	Common
5	–Vout	–Vout
6	Remote On/Off	

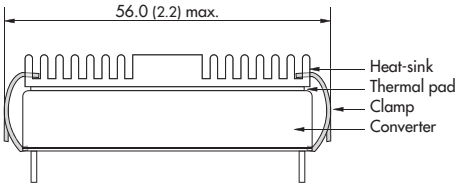
Dimensions in [mm], () = Inch
Pin diameter: 1.0 ±0.1 (0.04 ±0.004)
Pin pitch tolerances: ±0.25 (±0.01)
Case tolerances: ±0.5 (±0.02)

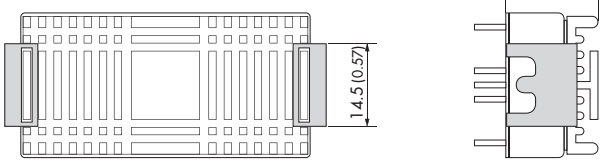
Heat-Sink (Option)

Order code: **TEN-HS1**
(cont.: heat-sink, thermal pad, 2 clamps)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 17g (0.60oz) 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.





Specifications can be changed any time without notice.

Dimensions in mm, () = Inch

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