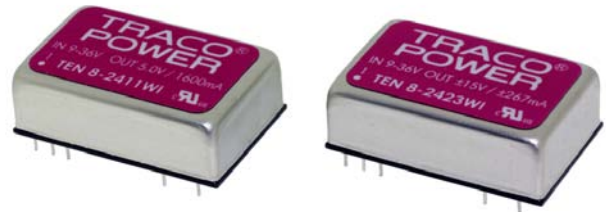


Features

- ◆ DIP-24 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
- ◆ High efficiency up to 88 %
- ◆ No minimum load required
- ◆ Operating temperature range
–40°C to +85°C
- ◆ Remote On/Off
- ◆ Under voltage lock-out circuit
- ◆ 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 8 Watt dc/dc converter modules featuring ultra wide 4:1 input voltage ranges in a DIP-24 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. Typical applications for these converters are also 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 8-2410WI TEN 8-2411WI TEN 8-2412WI TEN 8-2413WI TEN 8-2421WI TEN 8-2422WI TEN 8-2423WI	9 – 36 VDC (24 VDC nominal)	3.3 VDC 5 VDC 12 VDC 15 VDC ±5 VDC ±12 VDC ±15 VDC	2'400 mA 1'600 mA 666 mA 533 mA ±800 mA ±333 mA ±267 mA	85 % 87 % 86 % 86 % 84 % 86 % 86 %
TEN 8-4810WI TEN 8-4811WI TEN 8-4812WI TEN 8-4813WI TEN 8-4821WI TEN 8-4822WI TEN 8-4823WI	18 – 75 VDC (48 VDC nominal)	3.3 VDC 5 VDC 12 VDC 15 VDC ±5 VDC ±12 VDC ±15 VDC	2'400 mA 1'600 mA 666 mA 533 mA ±800 mA ±333 mA ±267 mA	85 % 87 % 87 % 88 % 84 % 87 % 87 %
TEN 8-7210WI TEN 8-7211WI TEN 8-7212WI TEN 8-7213WI TEN 8-7221WI TEN 8-7222WI TEN 8-7223WI	43 – 160 VDC (110 VDC nominal)	3.3 VDC 5 VDC 12 VDC 15 VDC ±5 VDC ±12 VDC ±15 VDC	2'400 mA 1'600 mA 666 mA 533 mA ±800 mA ±333 mA ±267 mA	84 % 85 % 86 % 86 % 82 % 85 % 85 %

Input Specifications

Input current (no load)	9–36 Vin, 3.3 VDC & 5 VDC models:	40 mA typ.
	9–36 Vin other models:	25 mA typ.
	18–75 Vin, 3.3 VDC & 5 VDC models:	20 mA typ.
	18–75 Vin other models:	13 mA typ.
	43–160 Vin, 3.3 VDC & 5 VDC models:	8 mA typ.
	43–160 Vin other models:	5 mA typ.
Input current (full load)	9–36 Vin models:	410 mA typ
	18–75 Vin models:	210 mA typ
	43–160 Vin models:	90 mA typ.
Input voltage variation (dv/dt)		5 V/ms, max. (complies with ETS300 132 part 4.4)
Start-up voltage	9–36 Vin models:	9.0 VDC (or lower)
	18–75 Vin models:	18 VDC (or lower)
	43–160 Vin models:	43 VDC (or lower)
Under voltage shut down (lock-out circuit)	9–36 Vin models:	8.0 VDC typ.
	18–75 Vin models:	16 VDC typ.
	43–160 Vin models:	42 VDC typ.
Surge voltage (100 msec. max.)	9–36 Vin models:	50 V max.
	18–75 Vin models:	100 V max.
	43–160 Vin models:	170 V max.
Reflected ripple current		20 mAp-p typ.
Conducted noise		EN 55022 class A with external components see application note:
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 μ F, 100 V, ESR 48 mOhm 110 Vin models: Nippon chemi-con KXJ 150 μ F, 200 V, ESR 48 mOhm
Conducted immunity		EN 61000-4-6, 10 Vrms, perf. criteria A

Output Specifications

Voltage set accuracy		± 1 %
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)	24/48 Vin models:	50 mVp-p typ.
	110 Vin models:	75 mVp-p typ.
Start up time (constant resistive load)	– Power On	450 ms typ.
	– Remote On	5 ms typ.
Transient Response (25% load step change)		250 μ s typ.
Short circuit protection		indefinite (automatic recovery)
Over load protection		150 % of lout max. typ.

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

Output Specifications

Over voltage protection (only single output models)	3.3 V output:	3.9 V
	5 V output:	6.2 V
	12 V output:	15 V
	15 V output:	18 V
Capacitive load	3.3 VDC & 5 VDC models:	1330 µF
	12 VDC models:	288 µF
	15 VDC models:	200 µF
	±5 VDC models:	900 µF (each output)
	±12 VDC models:	133 µF (each output)
	±15 VDC models:	90 µF (each output)

General Specifications

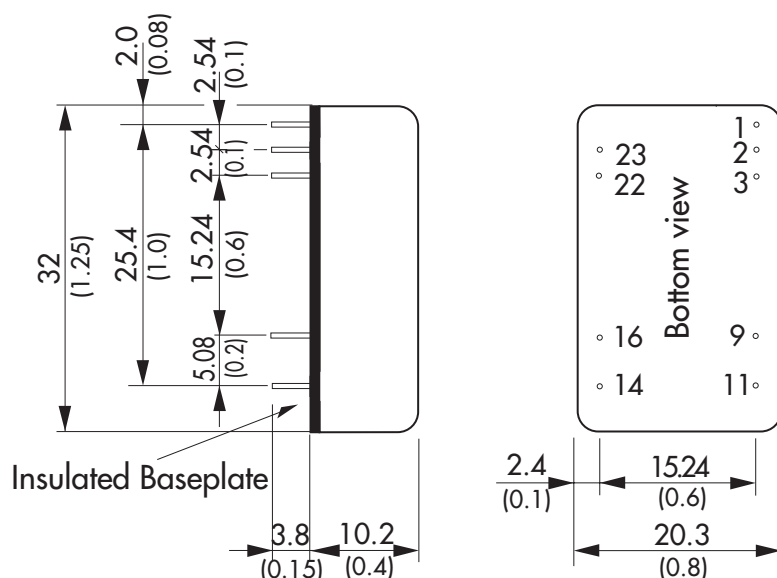
Temperature ranges	– Operating	–40°C to +85°C
	– Case temperature	+105°C max.
	– Storage	–55°C to +125°C
Power derating		3 %/K above +70°C
Thermal inpedance	– Natural convection	18.2°C/W
	– Natural convection with heat sink	15.8°C/W
Humidity (non condensing)		5 – 95 % rel. H max.
Isolation voltage (60 sec.)	– Input / Output	1500 VDC
Isolation resistance	– Input / Output	>1000 M Ohm
Isolation capacitance	– Input / Output	1500 pF max.
Switching frequency		300 kHz typ. (pulse width modulation PWM)
Thermal shock, mechanical shock & vibration		EN 61373, MIL-STD-810F
	– Test conditions	www.tracopower.com/products/mil810.pdf
Safety standards		UL/cUL 60950-1, IEC/EN 60950-1, EN 50155
Safety approvals	– UL/cUL	www.ul.com -> certifications -> File e188913
	– Railway	www.tracopower.com/products/ten8wi-coc.pdf
Remote On/Off	– On:	3.0 ... 12 VDC or open circuit
	– Off:	0 ... 1.2 VDC or short circuit pin 1 and pin 2/3
	– Off idle current:	2.5 mA
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		1 Mio. h
Environmental compliance	– Reach	www.tracopower.com/products/ten8wi-reach.pdf
	– RoHS	RoHS directive 2002/95/EC

Application note: www.tracopower.com/products/ten8wi-application.pdf

Physical Specifications

Casing material	copper, nickel plated
Baseplate material	non conductive FR4
Potting material	epoxy (UL94V-0 rated)
Weight	18 g (0.63 oz)
Soldering temperature	max. 265°C / 10 sec.

Outline Dimensions



Pin-Out

Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin (GND)	-Vin (GND)
3	-Vin (GND)	-Vin (GND)
9	ntc	Common
11	ntc	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

ntc = not to connect

Dimensions in [mm], () = Inch
 Pin diameter $\varnothing 0.5 \pm 0.05$ (0.02 ± 0.002)
 Tolerances ± 0.5 (± 0.02)
 Pin pitch tolerances ± 0.25 (± 0.001)

Specifications can be changed any time without notice.