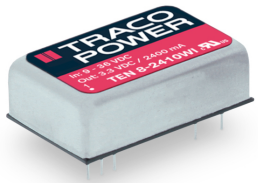
TRACO POWER

DC/DC Railway Converter

TEN 8WI Series, 8 Watt

- **Ultra wide 4:1 input range up to 160 VDC**
- **Certified for Railway applications (EN 50155)**
- **Operating temperature range -40°C to + 85°C**
- **Input under voltage lockout**
- **I/O isolation 1500 VDC**
- **Input filter to meet EN 55022 class A**
- **Remote On/Off**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

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 equipment.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TEN 8-2410WI	9 - 36 VDC (24 VDC nom.)	3.3 VDC	2'400 mA			85 %
TEN 8-2411WI		5 VDC	1'600 mA			87 %
TEN 8-2412WI		12 VDC	666 mA			86 %
TEN 8-2413WI		15 VDC	533 mA			86 %
TEN 8-2421WI		+5 VDC	800 mA	–5 VDC	800 mA	84 %
TEN 8-2422WI		+12 VDC	333 mA	–12 VDC	333 mA	86 %
TEN 8-2423WI		+15 VDC	267 mA	–15 VDC	267 mA	86 %
TEN 8-4810WI	18 - 75 VDC (48 VDC nom.)	3.3 VDC	2'400 mA			85 %
TEN 8-4811WI		5 VDC	1'600 mA			87 %
TEN 8-4812WI		12 VDC	666 mA			87 %
TEN 8-4813WI		15 VDC	533 mA			88 %
TEN 8-4821WI		+5 VDC	800 mA	–5 VDC	800 mA	84 %
TEN 8-4822WI		+12 VDC	333 mA	–12 VDC	333 mA	87 %
TEN 8-4823WI		+15 VDC	267 mA	–15 VDC	267 mA	87 %
TEN 8-7210WI	43 - 160 VDC (110 VDC nom.)	3.3 VDC	2'400 mA			84 %
TEN 8-7211WI		5 VDC	1'600 mA			85 %
TEN 8-7212WI		12 VDC	666 mA			86 %
TEN 8-7213WI		15 VDC	533 mA			86 %
TEN 8-7221WI		+5 VDC	800 mA	–5 VDC	800 mA	82 %
TEN 8-7222WI		+12 VDC	333 mA	–12 VDC	333 mA	85 %
TEN 8-7223WI		+15 VDC	267 mA	–15 VDC	267 mA	85 %

Input Specifications

Input Current	- At no load	24 Vin models:	30 mA typ.
		48 Vin models:	15 mA typ.
		110 Vin models:	6 mA typ.
	- At full load	24 Vin models:	390 mA typ. / 1'400 mA max.
		48 Vin models:	190 mA typ. / 700 mA max.
		110 Vin models:	90 mA typ. / 300 mA max.
Surge Voltage		24 Vin models:	50 VDC max. (100 ms max.)
		48 Vin models:	100 VDC max. (100 ms max.)
		110 Vin models:	170 VDC max. (100 ms max.)
Under Voltage Lockout		24 Vin models:	7 VDC min. / 8 VDC typ. / 8.8 VDC max.
		48 Vin models:	15 VDC min. / 16 VDC typ. / 17.5 VDC max.
		110 Vin models:	37 VDC min. / 40 VDC typ. / 42 VDC max.
Reflected Ripple Current		24 Vin models:	22 mA typ.
		48 Vin models:	13 mA typ.
		110 Vin models:	19 mA typ.
Recommended Input Fuse		24 Vin models:	2'000 mA (slow blow)
		48 Vin models:	1'000 mA (slow blow)
		110 Vin models:	500 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Pi-Type

Output Specifications

Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.2% max.
	- Load Variation (10 - 90%)	single output models:	0.3% max.
		dual output models:	0.8% max. (Output 1)
			0.8% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise (20 MHz Bandwidth)		24 Vin models:	50 mVp-p typ.
		48 Vin models:	50 mVp-p typ.
		110 Vin models:	75 mVp-p typ.
Capacitive Load	- single output	3.3 Vout models:	1'330 µF max.
		5 Vout models:	1'330 µF max.
		12 Vout models:	288 µF max.
		15 Vout models:	200 µF max.
	- dual output	5 / -5 Vout models:	900 / 900 µF max.
		12 / -12 Vout models:	133 / 133 µF max.
		15 / -15 Vout models:	90 / 90 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			10 ms min. (acc. to EN 50155 Class S2, see application note for ext. capacitor calculation: www.tracopower.com/info/holdup_en50155.pdf)
Start-up Time			450 ms typ. (Power On)
			5 ms typ. (Remote On)
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			150% typ. of Iout max.

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

Overvoltage Protection		118 - 125% of Vout nom. (depending on model) 3.9 VDC typ. (3.3 VDC single model) 6.2 VDC typ. (5 VDC single model) 15 VDC typ. (12 VDC single model) 18 VDC typ. (15 VDC single model)
Transient Response	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/ten8wi
Pollution Degree		PD 2

EMC Specifications

EMI (Emissions)			EN 50121-3-2 (EMC for Rolling Stock)
	- Conducted Emissions		EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55011 class A (with external filter) EN 55011 class B (with external filter) EN 55032 class A (with external filter) EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/overview/ten8wi
EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 20 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component:	24 & 48 Vin models: KY 220 µF, 100 V 110 Vin models: KX J 150 µF, 200 V
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A
EMC / Environmental	- Certification Documents		www.tracopower.com/overview/ten8wi

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		–40°C to +85°C
	- Case Temperature		+105°C max.
	- Storage Temperature		–55°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/overview/ten8wi
Cooling System			Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)		On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current		2.5 mA typ.
	- Remote Pin Input Current		-0.5 to 0.5 mA
Altitude During Operation			4'000 m max.
Switching Frequency			270 - 330 kHz (PWM) 300 kHz typ. (PWM)

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

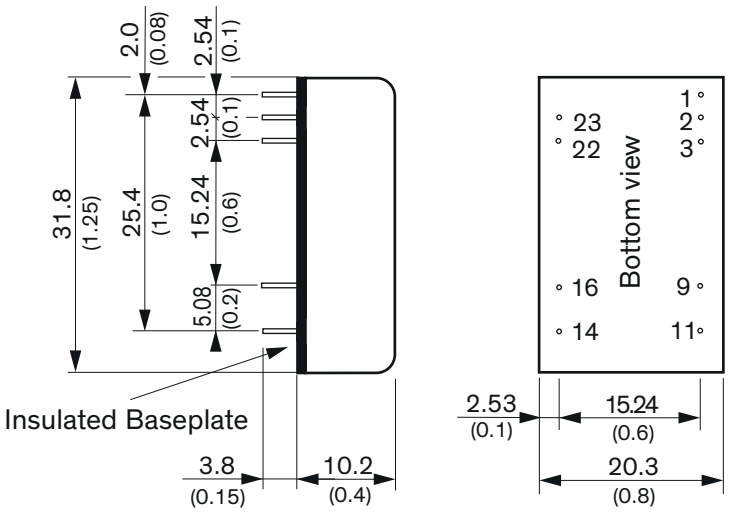
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'500 pF max.
Reliability	- Calculated MTBF	2'800'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F EN 61373
	- Mechanical Shock	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F
	- Flammability	EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf
Housing Material		Copper, Nickel plated
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP24
Soldering Profile		Lead-Free Wave Soldering 265°C / 10 s max.
Weight		18 g
Thermal Impedance	- Case to Ambient	20 K/W typ.
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	573c65ce-31ac-421a-90aa-64b9b97fa7de

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/ten8wi

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

Outline Dimensions



Pinout		
Pin	**Single**	**Dual**
1	Remote On/Off	
2	–Vin	
3	–Vin	
9	NC	Common
11	NC	–Vout
14	+Vout	
16	–Vout	Common
22	+Vin	
23	+Vin	

NC: Not connected

Dimensions in mm (inch)
Pin diameter Ø 0.5 ±0.05 (0.02 ±0.002)
Tolerances ±0.5 (±0.02)
Pin pich tolerances ±0.25 (±0.001)

© Copyright 2024 Traco Electronic AG