DC/DC Converters

TEN 25WI Series, 25/30 Watt

UL 60950-1

Features

- Ultra wide 4:1 input voltage range
- Adjustable output voltage
- Remote On/Off
- Continuous short circuit protection
- Over voltage protection
- Over temperature protection
- I/O isolation 1500 VDC
- Input filter meets EN 55032, class A and FCC, level A without external components
- Fully RoHS compliant
- 3-year product warranty



The TEN 25WI series is a family of high performance dc-dc converter modules up to 30 Watt featuring ultra wide 4:1 input voltage ranges in a compact low profile case with industry standard footprint. Standard features include remote On/Off, output voltage trimming, over voltage protection, under voltage lockout, over temperature and short circuit protection.
An other features is the internal EMI-filter to meet EN 55032, class A. Typical applications for these converter modules are industrial electronics, communication systems, battery operated equipment and distributed power systems.

Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 25-2410WI		3.3 VDC	5'500 mA	82 %
TEN 25-2411WI		5 VDC	5'000 mA	85 %
TEN 25-2412WI	**10 – 40 VDC**	12 VDC	2'500 mA	89 %
TEN 25-2413WI	(24 VDC nominal)	15 VDC	2'000 mA	89 %
TEN 25-2422WI		±12 VDC	±1'250 mA	89 %
TEN 25-2423WI		±15 VDC	±1'000 mA	89 %
TEN 25-4810WI		3,3 VDC	5'500 mA	82 %
TEN 25-4811WI		5 VDC	5'000 mA	85 %
TEN 25-4812WI	**18 – 75 VDC**	12 VDC	2'500 mA	89 %
TEN 25-4813WI	(48 VDC nominal)	15 VDC	2'000 mA	89 %
TEN 25-4822WI		±12 VDC	±1'250 mA	89 %
TEN 25-4823WI		±15 VDC	±1'000 mA	89 %

Input Specifications

Input current no load	24 V models:	20 mA max.
	48 V models:	10 mA max.
Input current full load	24 V; 3.3 VDC models:	920 mA typ.
	24 V; 5.0 VDC models:	1220 mA typ.
	24 V; other output models:	1400 mA typ.
	48 V; 3.3 VDC models:	460 mA typ.
	48 V; 5.0 VDC models:	610 mA typ.
	48 V; other output models:	700 mA typ.
Surge voltage (100 ms max.)	24 V models:	50 V max.
	48 V models:	100 V max.
Reverse polarity		2 A max.
Reflected input ripple current	24 V models:	50 mA typ.
	48 V models:	25 mA typ.
Conducted noise (input)		EN 55032 level A, FCC part 15, level A
Start-up voltage / under voltage shut down	24 V models:	9.7 VDC / 9.3 VDC typ.
	48 V models:	17.5 VDC / 16.5 VDC typ.

Output Specifications

Voltage set accuracy		±1 %
Output voltage adj. range		±10 % with external resistor (see page 4)
Regulation	– Input variation Vin min. to Vin max.	0.5 % max.
	– Load variation 10 – 100 % single output models:	1.0 % max.
	dual output models balanced load:	2.0 % max.
Minimum load		10 % of rated max current (operation at lower load condition is safe but a higher output ripple will be experienced)
Temperature coefficient		±0.02 %/°C max.
Ripple and noise (20 MHz Bandwidth)		80 mVpk-pk max.
Transient response (25 % load step change)		150 µs typ.
Output current limitation		>120 % of Iout max.
Short circuit protection		indefinite, automatic recovery
Thermal shutdown		at 115°C typ.
Capacitive load	3.3 & 5 VDC models:	10'000 µF
	12 &15 VDC models:	1'000 µF
	dual output models:	330 µF

General Specifications

Temperature ranges	– Operating	–40°C to +85°C (with derating)
	– Casing	+105°C max.
	– Storage	–50°C to +125°C
Load derating	– without heatsink	2 %/K above 55°C
	– with heatsink	2.5 %/K above 65°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>550'000 h
Isolation voltage (60 s)	– Input/Output	1'500 VDC
Isolation capacitance	– Input/Output (100 kHz, 1 V)	1200 pF typ.
Isolation resistance	– Input/Output (500 VDC)	>1'000 MOhm
Switching frequency (fixed)		330 kHz typ. (puls width modulation)

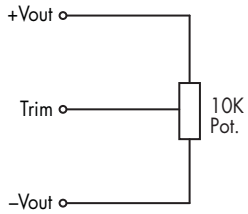
General Specifications

Remote On/Off:	– On: – Off: – Standby current:	2.5 to 100 VDC or open circuit. –1.0 to +1.0 VDC or short circuit pin 3 and 2 5 mA max.
Safety standards		UL/cUL 60950-1, IEC/EN 60950-1
Safety approvals	– UL/cUL	www.ul.com -> certifications -> File e188913

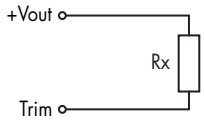
Physical Specifications

Casing material		copper, nickel plated
Baseplate		non conductive FR4
Potting material		silicon (UL 94 V-0 rated)
Weight		56 g (1.98 oz)
Soldering temperature		265°C / 10 s max.
Environmental compliance	– Reach – RoHS	www.tracopower.com/info/reach-declaration.pdf RoHS directive 2011/65/EU

Output Voltage Adjustments

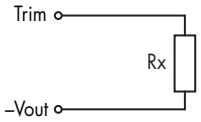


Trim down



$$Rx = \frac{36.667 \times Vo - 33 \times Vn}{Vn - Vo}$$

Trim up



$$Rx = \frac{33 \times Vn - 30 \times Vo}{Vo - Vn}$$

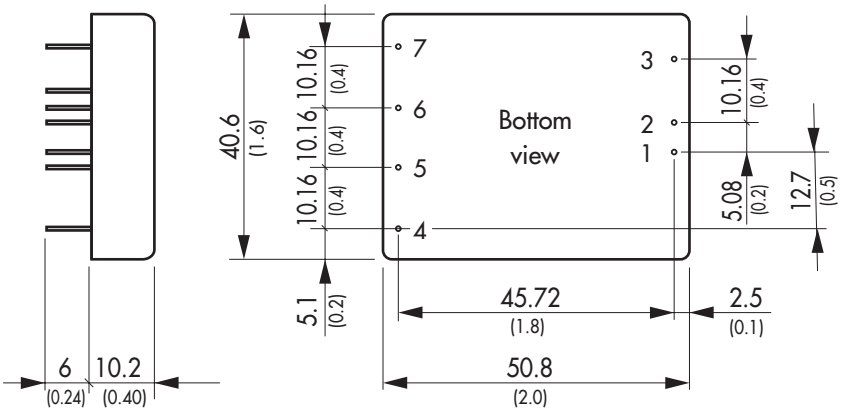
Vo = adjusted output voltage [VDC]
Vn = nominal output voltage [VDC]
Rx = trim resistor [Kohm]

Nominal output voltage at open Trim input.

Application note: www.tracopower.com/overview/ten25wi

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

Outline Dimensions



Pin-Out		
Pin	**Single**	**Dual**
1	+Vin (Vcc)	+Vin (Vcc)
2	–Vin (GND)	–Vin (GND)
3	Remote On/Off	
4	No pin	+ Vout
5	+ Vout	Common
6	–Vout	–Vout
7	Trim	

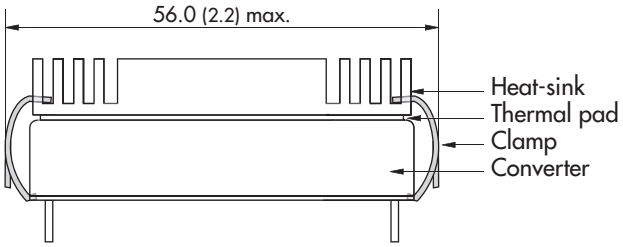
*Optional versions:

- without remote and trim pins add suffix **-B** (e.g.TEN 25-2412WI-B)
- without remote pin add suffix **-B1** (e.g. TEN 25-2413WI-B1)
- without trim pin add suffix **-B2** (e.g. TEN-25-4811WI-B2)

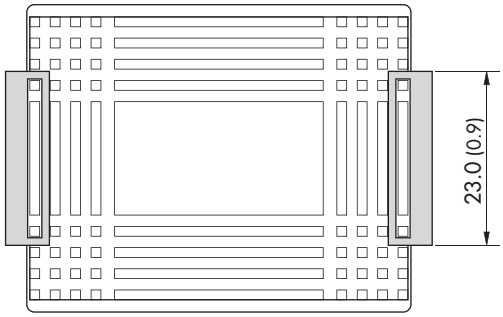
Dimensions in [mm], () = Inch
Pin diameter: 1.0 ±0.05 (0.02 ±0.002)
Pin pitch tolerances: ±0.35 (±0.014)
Case tolerances: ±0.5 (±0.02)

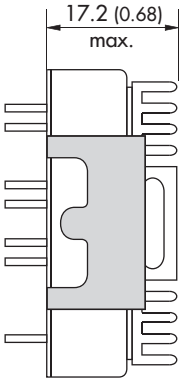
Heat-Sink (Option)

Heat-sink TEN-HS5 (optional)



Order code: **TEN-HS5**
(cont.: heat-sink, thermal pad, 2 clamps)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 15 g (0.53oz) (without converter)





Note:
The product label on converter has to be removed before mounting the heat-sink.
For volume orders converters will be supplied with heat-sinks already mounted. Please contact factory for quotation.
Separate heat-sinks are only available for prototypes and small quantity orders.