

#### 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.

Another feature 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	10 – 40 VDC (24 VDC nominal)	3.3 VDC	5'500 mA	82 %
TEN 25-2411WI		5 VDC	5'000 mA	85 %
TEN 25-2412WI		12 VDC	2'500 mA	89 %
TEN 25-2413WI		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	18 – 75 VDC (48 VDC nominal)	3,3 VDC	5'500 mA	82 %
TEN 25-4811WI		5 VDC	5'000 mA	85 %
TEN 25-4812WI		12 VDC	2'500 mA	89 %
TEN 25-4813WI		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: <b>20 mA max.</b> 48 V models: <b>10 mA max.</b>
Input current full load	24 V; 3.3 VDC models: <b>920 mA typ.</b> 24 V; 5.0 VDC models: <b>1220 mA typ.</b> 24 V; other output models: <b>1400 mA typ.</b> 48 V; 3.3 VDC models: <b>460 mA typ.</b> 48 V; 5.0 VDC models: <b>610 mA typ.</b> 48 V; other output models: <b>700 mA typ.</b>
Surge voltage (100 ms max.)	24 V models: <b>50 V max.</b> 48 V models: <b>100 V max.</b>
Reflected input ripple current	24 V models: <b>50 mA typ.</b> 48 V models: <b>25 mA typ.</b>
Conducted noise (input)	<b>EN 55032 level A, FCC part 15, level A</b>
Start-up voltage / under voltage shut down	24 V models: <b>9.7 VDC / 9.3 VDC typ.</b> 48 V models: <b>17.5 VDC / 16.5 VDC typ.</b>

### Output Specifications

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

### General Specifications

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

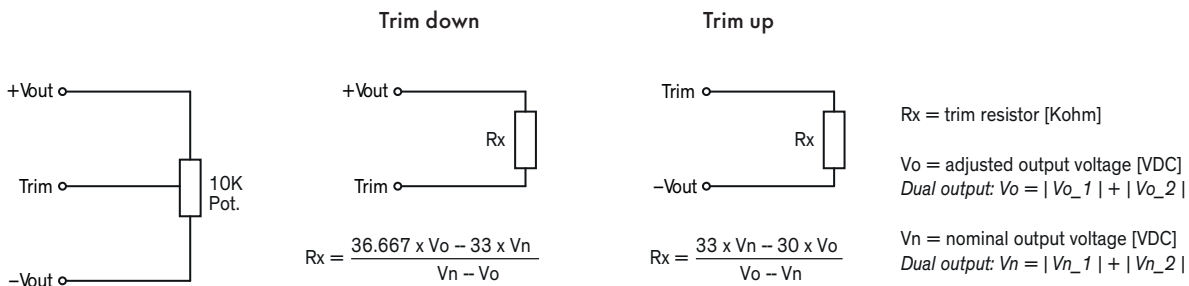
**General Specifications**

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	<a href="http://www.ul.com">www.ul.com</a> -> 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.
Thermal Impedance		12.5 K/W typ. 10.2 K/W typ. (with Heatsink)
Environmental compliance	- Reach - RoHS	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> RoHS directive 2011/65/EU

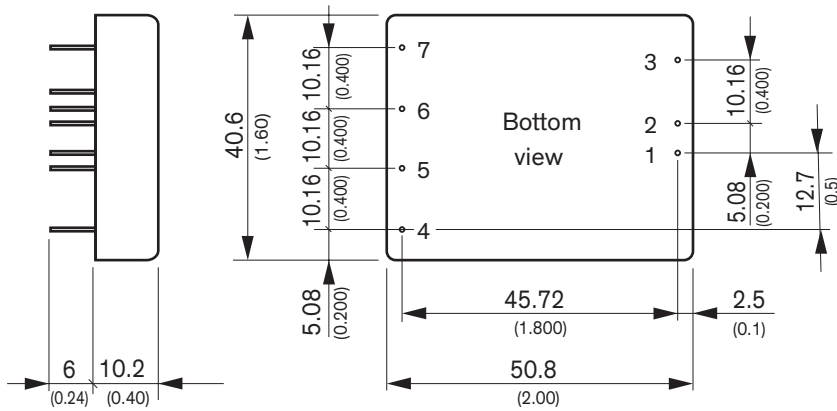
**Output Voltage Adjustments**



Note: For dual output models both output voltages as absolute values must be added in the equation. This must be applied to nominal output voltage  $V_n$  and adjusted output voltage  $V_o$ .

**Application note:** [www.tracopower.com/overview/ten25wi](http://www.tracopower.com/overview/ten25wi)

**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)**

Please refer to: [www.tracopower.com/products/ten-hs5.pdf](http://www.tracopower.com/products/ten-hs5.pdf)