

### Features

- ◆ High power density: 40W in 2"x2"x0.4" metal package
- ◆ Ultra wide 4:1 input voltage range
- ◆ Very high efficiency up to 87 %
- ◆ No minimum load required for single output models
- ◆ Over temperature protection
- ◆ Under voltage lockout
- ◆ Remote On/Off
- ◆ Shielded metal case with insulated baseplate
- ◆ Optional heat-sink
- ◆ 3-year product warranty



The TEN 40WI series is a family of high performance 40W dc-dc converter modules featuring ultra wide 4:1 input voltage ranges in a compact low profile case with industry-standard footprint. A very high efficiency allows an operating temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . Further standard features include remote On/Off, output voltage trimming, over voltage protection, under voltage lockout, over temperature and short circuit protection.

Typical applications for these products are battery operated equipment and distributed power architectures in communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required and space is limited on the PCB.

### Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 40-2410WI	9 – 36 VDC (24 VDC nominal)	3.3 VDC	10.0 A	86 %
TEN 40-2411WI		5.0 VDC	8.0 A	87 %
TEN 40-2412WI		12 VDC	3.35 A	87 %
TEN 40-2413WI		15 VDC	2.65 A	87 %
TEN 40-2422WI		$\pm 12$ VDC	$\pm 1.65$ A	86 %
TEN 40-2423WI		$\pm 15$ VDC	$\pm 1.35$ A	86 %
TEN 40-4810WI	18 – 75 VDC (48 VDC nominal)	3.3 VDC	10.0 A	86 %
TEN 40-4811WI		5.0 VDC	8.0 A	88 %
TEN 40-4812WI		12 VDC	3.35 A	87 %
TEN 40-4813WI		15 VDC	2.65 A	87 %
TEN 40-4822WI		$\pm 12$ VDC	$\pm 1.65$ A	86 %
TEN 40-4823WI		$\pm 15$ VDC	$\pm 1.35$ A	86 %

## Input Specifications

Input current (no load)	24 Vin single output models: 48 Vin single output models: dual putput models:	100 mA typ 60 mA typ 30 mA typ
Input current (full load) (nominal input 24/48 VDC)	3.3 VDC models: other models:	1680 / 840 mA typ. 2000 / 1000 mA typ.
Input voltage variation (dv/dt)		5 V/ms, max. (complies with ETS300 132 part 4.4)
Start-up voltage / under voltage lockout	24 Vin models: 48 Vin models:	9 VDC / 8 VDC (typ.) 18 VDC / 16 VDC (typ.)
Surge voltage (100 msec. max.)	24 Vin models: 48 Vin models:	50 V max. 100 V max.
EMC characteristics (with external capacitors)	see application note:	<a href="http://www.tracopower.com/products/ten40wi-application.pdf">www.tracopower.com/products/ten40wi-application.pdf</a> EN 55022 level A, FCC part 15, level A EN 61000-4-2, air: ±8 KV contact: ±6 KV, perf. criteria A EN 61000-4-4, ±2 KV, perf. criteria B EN 61000-4-5, ±1 KV, perf. criteria A
	- Conducted noise - ESD  - Fast transient - Surge	

## Output Specifications

Voltage set accuracy (at nominal input and full load)		±1 %
Output voltage adjustment		±10 % (see application note)
Regulation	- Input variation Vin min. to Vin max. - Load variation - Load cross variation 25 % / 100 %	0.2 % max. single output models: 0.5 % max. (0 – 100 % load) dual output models balanced load: 1.0 % max. (4 – 100 % load) 5 % max.
Temperature coefficient		0.02 %/K max.
Ripple and noise (20 MHz Bandwidth)	3.3 VDC & 5 VDC output models: dual outputs: all other outputs:	50 mVpk-pk max. 150 mVpk-pk max. 75 mVpk-pk max.
Start up time (nominal Vin and constant resistive load)		25 ms typ.
Transient response time (25 % load change)		250 µs typ.
Short circuit protection		indefinite (automatic recovery)
Over load protection		150 % of lout max. typ. foldback
Thermal shutdown		@ +110°C typ.
Over voltage protection	3.3 VDC models: 5 VDC models 12/±12 DC models: 15 VDC output:	3.9 V 6.2 V 15 /±15 V 18 /±18 V
Minimum load	single output model: dual output models:	not required. 1 % of rated max current (operation at lower load condition will not damage these converters, however, they may not meet all listed specifications)
Capacitive load output models	3.3 VDC models: 5.0 VDC models: 12 VDC models: 15 VDC models: ±12 VDC models: ±15 VDC models:	25'000 µF max. 13'000 µF max. 2'300 µF max. 1'500 µF max. 1'200 µF max. (each output) 750 µF max. (each output)

### General Specifications

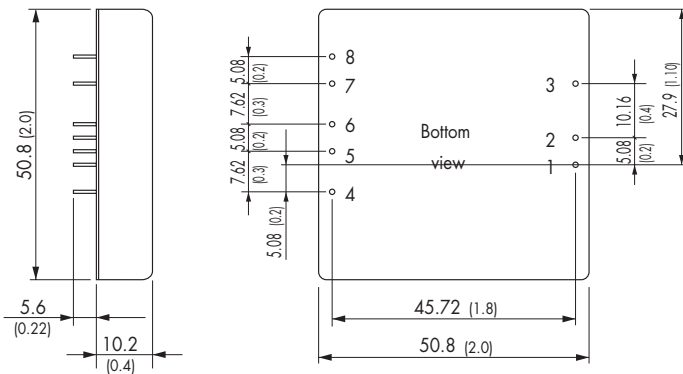
Temperature ranges	<ul style="list-style-type: none"> <li>- Operating</li> <li>- Case temperature</li> <li>- Storage</li> </ul>	-40°C to +85°C +105°C max. -55°C to +125°C
Derating		see application note
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>660'000 h
Isolation voltage (60 sec.)	- Input / Output	1'500 VDC
Isolation resistance	- Input / Output	>1'000 M Ohm
Isolation capacitance	- Input / Output	2500 pF max.
Remote On/Off	<ul style="list-style-type: none"> <li>- On:</li> <li>- Off:</li> <li>- Off idle current:</li> </ul>	3.0 ... 12 VDC or open circuit. 0 ... 1.2 VDC or short circuit pin 3 and pin 2 2.5 mA max.
Switching frequency (fixed)		300 kHz typ. (Pulse width modulation PWM)
Vibration		10 – 55 Hz, 10G, 30 minutes along X,Y,Z
Safety standards		UL 60950-1, IEC/EN 60950-1
Safety approvals	- UL/cUL	<a href="http://www.ul.com">www.ul.com</a> -> certifications -> File: e188913
Environmental compliance	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHs</li> </ul>	<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf</a> RoHS Directive 2011/65/EU

### Physical Specifications

Casing material	copper, nickel plated
Baseplate material	none conductive FR4
Potting material	epoxy (UL 94V-0 -rated)
Weight	60 g (2.1 oz)
Soldering temperature	max. 265°C / 10 sec.

**Application note:** [www.tracopower.com/products/ten40wi-application.pdf](http://www.tracopower.com/products/ten40wi-application.pdf)

**Outline Dimensions**



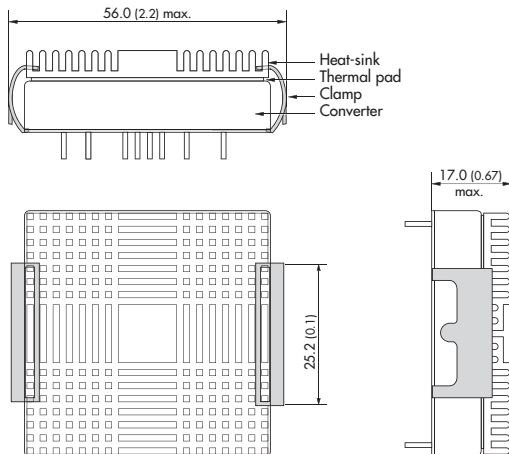
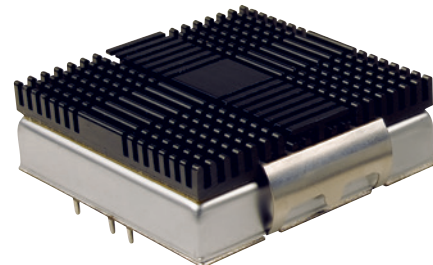
Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.04 ±0.002)  
 Pin pitch tolerances: ±0.35 (±0.014)  
 Case tolerances: ±0.5 (±0.02)

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

\*Sense line to be connected to the output either at the module or at the load under regard of polarity.

**Heat-Sink (Option)**

**Order code:** TEN-HS3  
 (cont.: heat-sink, thermal pad, 2 clamps)  
**Material:** Aluminum  
**Finish:** Anodic treatment (black)  
**Weight:** 22 g (0.78oz) (without converter)  
 Thermal impedance after assembling: 7.6 K/W



**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.