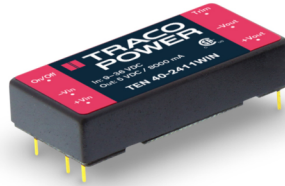


- **Highest power density: 40 W** in 1" x 2" x 0.4" package
- **Ultra wide 4:1 input range**
- **Excellent efficiency up to 90 %**
- **Output voltage adjustable**
- **Remote On/Off**
- **Protection against short circuit and over voltage**
- **I/O isolation 1500 VDC**
- **Operating temperature range -40°C to +75°C**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TEN 40WIN Series is a new range of isolated high performance DC/DC-converter modules. Due to the very high efficiency of up to 90% these 40 W converters come with a footprint of only 1.0" x 2.0". The 12 models have an ultra wide 4:1 input voltage range and a tight output voltage regulation. The output voltage is adjustable by external resistor. Remote On/Off and protection against overpower and over voltage are standard features of these converters. Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is limited.

### Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TEN 40-2410WIN	9 - 36 VDC (24 VDC nom.)	3.3 VDC	8'000 mA			89 %
TEN 40-2411WIN		5 VDC	8'000 mA			90 %
TEN 40-2412WIN		12 VDC	3'330 mA			89 %
TEN 40-2413WIN		15 VDC	2'670 mA			89 %
TEN 40-2415WIN		24 VDC	1'670 mA			91 %
TEN 40-2422WIN		+12 VDC	1'670 mA	-12 VDC	1'670 mA	88 %
TEN 40-2423WIN		+15 VDC	1'330 mA	-15 VDC	1'330 mA	88 %
TEN 40-4810WIN	18 - 75 VDC (48 VDC nom.)	3.3 VDC	8'000 mA			89 %
TEN 40-4811WIN		5 VDC	8'000 mA			90 %
TEN 40-4812WIN		12 VDC	3'330 mA			90 %
TEN 40-4813WIN		15 VDC	2'670 mA			90 %
TEN 40-4815WIN		24 VDC	1'670 mA			91 %
TEN 40-4822WIN		+12 VDC	1'670 mA	-12 VDC	1'670 mA	88 %
TEN 40-4823WIN		+15 VDC	1'330 mA	-15 VDC	1'330 mA	88 %

### Options

TEN-HS4	- Optional Heat Sink: <a href="http://www.tracopower.com/overview/ten-hs4">www.tracopower.com/overview/ten-hs4</a>
TEN-HS6	- Optional Heat Sink: <a href="http://www.tracopower.com/overview/ten-hs6">www.tracopower.com/overview/ten-hs6</a>

## Input Specifications

Input Current	- At no load	24 Vin models: <b>90 mA typ.</b> (3.3 Vout model) <b>90 mA typ.</b> (5 Vout model) <b>95 mA typ.</b> (12 Vout model) <b>105 mA typ.</b> (15 Vout model) <b>115 mA typ.</b> (24 Vout model) <b>65 mA typ.</b> (12 / -12 Vout model) <b>65 mA typ.</b> (15 / -15 Vout model)
	- At full load	24 Vin models: <b>1'240 mA max.</b> (3.3 Vout model) <b>1'850 mA max.</b> (5 Vout model) <b>1'870 mA max.</b> (12 Vout model) <b>1'870 mA max.</b> (15 Vout model) <b>1'835 mA max.</b> (24 Vout model) <b>1'890 mA max.</b> (12 / -12 Vout model) <b>1'890 mA max.</b> (15 / -15 Vout model)
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (100 ms max.) 48 Vin models: <b>100 VDC max.</b> (100 ms max.)
Under Voltage Lockout		24 Vin models: <b>8.3 VDC typ.</b> 48 Vin models: <b>16.5 VDC typ.</b>
Reflected Ripple Current		24 Vin models: <b>30 mAp-p typ.</b> 48 Vin models: <b>20 mAp-p typ.</b>
Recommended Input Fuse		24 Vin models: <b>8'000 mA</b> (slow blow) 48 Vin models: <b>4'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal LC-Type</b>

## Output Specifications

Output Voltage Adjustment		-10% to +20% (24 Vout models) <b>±10%</b> (other models) (single output models only) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/ten40win">www.tracopower.com/overview/ten40win</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>0.5% max.</b> dual output models: <b>0.5% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>0.5% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2)
	- Voltage Balance (symmetrical load)	dual output models: <b>2% max.</b>

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

<b>Ripple and Noise</b> (20 MHz Bandwidth)	- single output	3.3 Vout models: <b>100 mVp-p max.</b> (w/ 1µF MC    10µF TC) 5 Vout models: <b>100 mVp-p max.</b> (w/ 1µF MC    10µF TC) 12 Vout models: <b>150 mVp-p max.</b> (w/ 1µF MC    10µF TC) 15 Vout models: <b>150 mVp-p max.</b> (w/ 1µF MC    10µF TC) 24 Vout models: <b>150 mVp-p max.</b> (w/ 1µF MC    10µF TC)
	- dual output	12 / -12 Vout models: <b>150 / 150 mVp-p max.</b> (w/ 1µF MC    10µF TC) 15 / -15 Vout models: <b>150 / 150 mVp-p max.</b> (w/ 1µF MC    10µF TC)
<b>Capacitive Load</b>	- single output	3.3 Vout models: <b>21'000 µF max.</b> 5 Vout models: <b>13'600 µF max.</b> 12 Vout models: <b>2'400 µF max.</b> 15 Vout models: <b>1'500 µF max.</b> 24 Vout models: <b>600 µF max.</b>
	- dual output	12 / -12 Vout models: <b>1'200 / 1'200 µF max.</b> 15 / -15 Vout models: <b>750 / 750 µF max.</b>
<b>Minimum Load</b>	- single output	3.3 Vout models: <b>0 % of Iout max.</b> 5 Vout models: <b>0 % of Iout max.</b> 12 Vout models: <b>0 % of Iout max.</b> 15 Vout models: <b>0 % of Iout max.</b> 24 Vout models: <b>0 % of Iout max.</b>
	- dual output	12 / -12 Vout models: <b>9 % of Iout max.</b> 15 / -15 Vout models: <b>8 % of Iout max.</b>
<b>Temperature Coefficient</b>		<b>±0.02 %/K max.</b>
<b>Start-up Time</b>		<b>30 ms max.</b>
<b>Short Circuit Protection</b>		<b>Continuous, Automatic recovery</b>
<b>Output Current Limitation</b>		<b>150% typ. of Iout max.</b>
<b>Transient Response</b>	- Response Deviation	<b>3% typ. / 5% max.</b> (75% to 100% Load Step)
	- Response Time	<b>250 µs typ.</b> (75% to 100% Load Step)

### Safety Specifications

<b>Standards</b>	- IT / Multimedia Equipment	<b>CSA-C22.2, No. 60950-1</b> <b>EN 60950-1</b> <b>EN 62368-1</b> <b>IEC 60950-1</b> <b>IEC 62368-1</b> <b>UL 60950-1</b> <b>UL 62368-1</b>
	- Certification Documents	<a href="http://www.tracopower.com/overview/ten40win">www.tracopower.com/overview/ten40win</a>
<b>Pollution Degree</b>		<b>PD 3</b>
<b>Over Voltage Category</b>		<b>Not mains connected</b>

### EMC Specifications

<b>EMI (Emissions)</b>	- Conducted Emissions	<b>EN 55032 class A</b> (with external filter) <b>FCC 47 Part 15 class A</b> (with external filter)
	- Radiated Emissions	<b>EN 55032 class A</b> (with external filter) <b>FCC 47 Part 15 class A</b> (with external filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/ten40win">www.tracopower.com/overview/ten40win</a>
<b>EMS (Immunity)</b>		<b>EN 55024</b> (IT Equipment) <b>EN 55035</b> (Multimedia)
	- Electrostatic Discharge	Air: <b>EN 61000-4-2, ±8 kV, perf. criteria A</b> Contact: <b>EN 61000-4-2, ±6 kV, perf. criteria A</b>
	- RF Electromagnetic Field	<b>EN 61000-4-3, 10 V/m, perf. criteria A</b>
	- EFT (Burst) / Surge	<b>EN 61000-4-4, ±2 kV, perf. criteria A</b> <b>EN 61000-4-5, ±1 kV, perf. criteria A</b>
	- Conducted RF Disturbances	<b>EN 61000-4-6, 10 Vrms, perf. criteria A</b>
	- PF Magnetic Field	Continuous: <b>EN 61000-4-8, 3 A/m, perf. criteria A</b>

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

## General Specifications

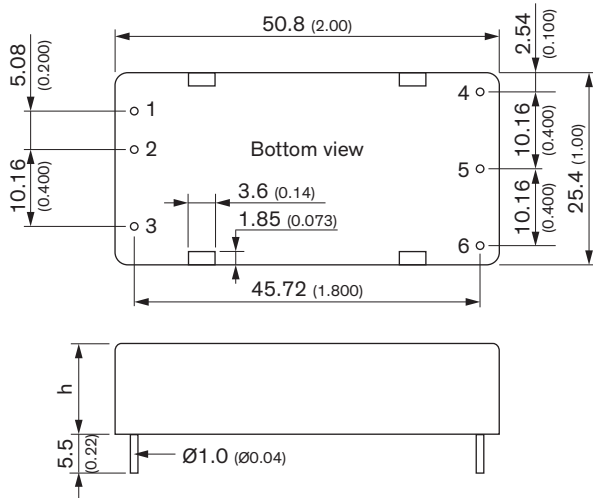
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +75°C +105°C max. -50°C to +125°C
Power Derating	- High Temperature	Depending on model See application note: <a href="http://www.tracopower.com/overview/ten40win">www.tracopower.com/overview/ten40win</a>
Over Temperature Protection Switch Off	- Protection Mode	110°C typ.
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)  - Off Idle Input Current - Remote Pin Input Current	On: 3.5 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA max. -0.5 to 0.5 mA
Altitude During Operation		6'000 m max.
Switching Frequency		285 kHz typ. (PWM) (24 Vout models) 320 kHz typ. (PWM) (other models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s	1'500 VDC 1'800 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'500 pF typ.
Reliability	- Calculated MTBF	330'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Housing Material		Alu alloy, black anodized coating
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2.5 μm min.)
Pin Surface Plating		Gold (75 - 125 nm), glossy
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		2" x 1"
Soldering Profile		Lead-Free Wave Soldering 260°C / 10 s max.
Weight		30 g
Thermal Impedance	- Case to Ambient	12 K/W typ. 10 K/W typ. (with Heat Sink)
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - SCIP Reference Number	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) 14ea9ef9-80c5-4478-895c-1762f23c29c8

## Supporting Documents

Overview Link (for additional Documents) [www.tracopower.com/overview/ten40win](http://www.tracopower.com/overview/ten40win)

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

**Outline Dimensions**



h=11.0 (0.43) for 24 VDC output models  
 h=10.2 (0.40) for other models

Dimensions in mm (inch)  
 Tolerances: x.x ±0.25 (x.xx ±0.01)  
                   x.xx ±0.13 (x.xxx ±0.005)  
 Pin diameter tolerances: x.x ±0.05 (x.xx ±0.002)

Pinout		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	Remote On/Off	Remote On/Off
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout