

DC/DC Converter

TEN 40WIE Series, 40 Watt

- Developed to maximize quality in a cost efficient design
- Excellent temperature capabilities
- 2" x 1" metal package (6-side shielded)
- Wide 4:1 input voltage range:
9-36, 18-75 VDC
- Minimal heat development due to high efficiencies up to 93%
- Operating temperature range -40 to +85°C
- 1600 VDC I/O-isolation
- Remote On/Off and Trim function
- Protection against short circuit, overvoltage and overtemperature
- 3-year product warranty



The TEN 40WIE is rounding out Traco Power's existing 40 Watt product range. Driven by current market trends this series was developed to maximize quality and cost efficiency in one product. Due to a new design approach the TEN 40WIE thus offers a cost efficient solution with not only no concession on quality or reliability but even improved specifications compared to its predecessor. It comes in a standard 2" x 1" metal package with a 4:1 input voltage range. High efficiencies of up to 93% allow for an operating temperature range (natural convection) of -40 to +70°C without power derating (model dependent). Certified according to the latest IT standard (IEC/EN/UL 62368-1) and equipped with additional features like remote on/off function and protection against short circuit, overvoltage and over temperature the TEN 40WIE series is suitable for many industrial applications.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
TEN 40-2410WIE	9 - 36 VDC (24 VDC nom.)	3.3 VDC	12'200 mA			90 %
TEN 40-2411WIE		5 VDC	8'000 mA			92 %
TEN 40-2412WIE		12 VDC	3'333 mA			92 %
TEN 40-2413WIE		15 VDC	2'666 mA			93 %
TEN 40-2415WIE		24 VDC	1'666 mA			91 %
TEN 40-2422WIE		+12 VDC	1'666 mA	-12 VDC	1'666 mA	91 %
TEN 40-2423WIE		+15 VDC	1'333 mA	-15 VDC	1'333 mA	91 %
TEN 40-2425WIE		+24 VDC	833 mA	-24 VDC	833 mA	91 %
TEN 40-4810WIE	18 - 75 VDC (48 VDC nom.)	3.3 VDC	12'200 mA			90 %
TEN 40-4811WIE		5 VDC	8'000 mA			91 %
TEN 40-4812WIE		12 VDC	3'333 mA			92 %
TEN 40-4813WIE		15 VDC	2'666 mA			92 %
TEN 40-4815WIE		24 VDC	1'666 mA			92 %
TEN 40-4822WIE		+12 VDC	1'666 mA	-12 VDC	1'666 mA	91 %
TEN 40-4823WIE		+15 VDC	1'333 mA	-15 VDC	1'333 mA	91 %
TEN 40-4825WIE		+24 VDC	833 mA	-24 VDC	833 mA	92 %

Options

TEN-HS1	- Optional Heat Sink with Height = 0.22 inch: www.tracopower.com/overview/ten-hs1
TEN-HS8	- Optional Heat Sink with Height = 0.3 inch: www.tracopower.com/overview/ten-hs8
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink with Height = 0.8 inch: www.tracopower.com/overview/ten-hs10
	- Optional Heat Sink with Height = 0.5 inch: www.tracopower.com/overview/ten-hs9
	- Optional models with pre-assembled heatsink
	- Optional models with inverse Remote On/Off function (passive = off)

Input Specifications

Input Current	- At no load	24 Vin models: 15 mA typ. 48 Vin models: 10 mA typ.
Surge Voltage		24 Vin models: 50 VDC max. (1 s max.) 48 Vin models: 100 VDC max. (1 s 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.
Recommended Input Fuse		24 Vin models: 8'000 mA (fast acting) 48 Vin models: 4'000 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Pi-Type

Output Specifications

Output Voltage Adjustment		-10% to +20% (15 & 24 Vout models) ±10% (other models) (single output models only) (By external trim resistor) See application note: www.tracopower.com/overview/ten40wie Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) - Cross Regulation (25% / 100% asym. load)	single output models: 0.2% max. dual output models: 0.2% max. single output models: 0.3% max. dual output models: 0.5% max. (Output 1) 0.5% max. (Output 2) dual output models: 5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output - dual output	3.3 Vout models: 75 mVp-p typ. 5 Vout models: 75 mVp-p typ. 12 Vout models: 100 mVp-p typ. 15 Vout models: 100 mVp-p typ. 24 Vout models: 150 mVp-p typ. 12 / -12 Vout models: 100 / 100 mVp-p typ. 15 / -15 Vout models: 100 / 100 mVp-p typ. 24 / -24 Vout models: 150 / 150 mVp-p typ.
Capacitive Load	- single output - dual output	3.3 Vout models: 22'000 µF max. 5 Vout models: 12'000 µF max. 12 Vout models: 2'000 µF max. 15 Vout models: 1'300 µF max. 24 Vout models: 490 µF max. 12 / -12 Vout models: 980 / 980 µF max. 15 / -15 Vout models: 630 / 630 µF max. 24 / -24 Vout models: 250 / 250 µF max.
Minimum Load		Not required
Temperature Coefficient		±0.02 %/K max.
Start-up Time		30 ms typ. / 60 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		150% typ. of Iout max.
Overvoltage Protection		125% typ. of Vout nom. (By Zener diode)
Transient Response	- Response Time	250 µs typ. (25% Load Step)

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

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/ten40wie
Pollution Degree		PD 2

EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	External filter proposal:	www.tracopower.com/overview/ten40wie
EMS (Immunity)	- 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, 10 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:	2 x KY 220 μ F SMDJ36A (12 Vin models) 2 x KY 220 μ F SMDJ58A (24 Vin models) 2 x KY 220 μ F SMDJ120A (48 Vin models)
	- 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/ten40wie

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/ten40wie
Over Temperature Protection Switch Off	- Protection Mode	115°C typ. (Automatic recovery)
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	3 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation		2'000 m max.
Switching Frequency		225 - 275 kHz (PWM) 250 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
	- Input to Case, 60 s	1'600 VDC
	- Output to Case, 60 s	1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M Ω min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'500 pF max.
Reliability	- Calculated MTBF	1'245'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf

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

Environment	- Vibration - Mechanical Shock - Thermal Shock	MIL-STD-810F MIL-STD-810F MIL-STD-810F
Housing Material		Copper
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Silicone (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		2" x 1"
Soldering Profile		Lead-Free Wave Soldering 260°C / 6 s max.
Weight		34 g
Thermal Impedance	- Case to Ambient	10.8 K/W typ. (without heatsink) 10.3 W/K typ. (with heatsink TEN-HS1) 9.3 W/K typ. (with heatsink TEN-HS8) 7.7 W/K typ. (with heatsink TEN-HS9) 6.2 W/K typ. (with heatsink TEN-HS10)
Environmental Compliance	- REACH Declaration - RoHS Declaration - SCIP Reference Number	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant 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).) 066cb3a2-f918-4ca5-9d61-45dba6944ab5

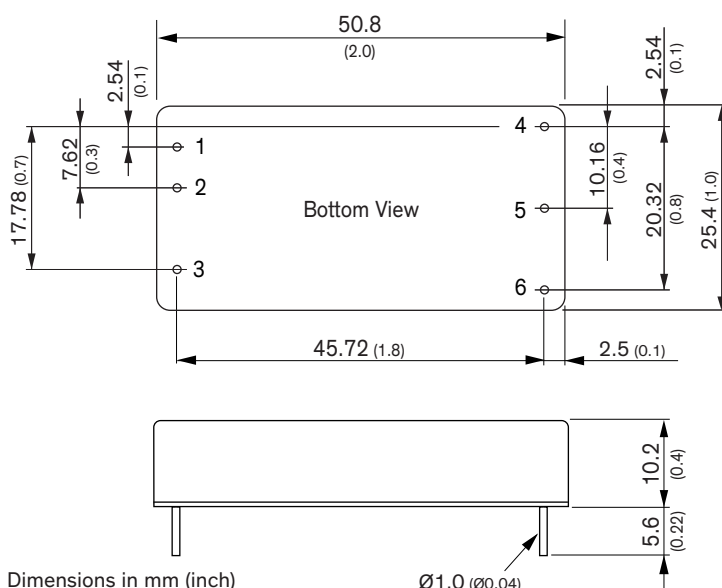
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/ten40wie

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Outline Dimensions



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

Dimensions in mm (inch)
 Tolerances: x.x ±0.5 (±0.02)
 x.xx ±0.25 (±0.01)
 Pin dimension tolerance ±0.1 (±0.004)

Ø1.0 (Ø0.04)