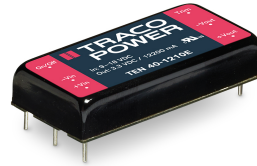


DC/DC Converter**TEN 40E Series, 40 Watt**

- Developed to maximize quality in a cost efficient design
- Excellent temperature capabilities
- 2" x 1" metal package (6-side shielded)
- Wide 2:1 input voltage range:
9-18, 18-36, 36-75 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



UL 62368-1 IEC 62368-1

The TEN 40E 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 40E 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 2:1 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 40E 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 40-1210E	9 - 18 VDC (12 VDC nom.)	3.3 VDC	12'200 mA			89 %
TEN 40-1211E		5 VDC	8'000 mA			90 %
TEN 40-1212E		12 VDC	3'333 mA			91 %
TEN 40-1213E		15 VDC	2'666 mA			91 %
TEN 40-1215E		24 VDC	1'666 mA			90 %
TEN 40-1222E		+12 VDC	1'666 mA	-12 VDC	1'666 mA	90 %
TEN 40-1223E		+15 VDC	1'333 mA	-15 VDC	1'333 mA	90 %
TEN 40-1225E		+24 VDC	833 mA	-24 VDC	833 mA	91 %
TEN 40-2410E	18 - 36 VDC (24 VDC nom.)	3.3 VDC	12'200 mA			90 %
TEN 40-2411E		5 VDC	8'000 mA			92 %
TEN 40-2412E		12 VDC	3'333 mA			92 %
TEN 40-2413E		15 VDC	2'666 mA			93 %
TEN 40-2415E		24 VDC	1'666 mA			91 %
TEN 40-2422E		+12 VDC	1'666 mA	-12 VDC	1'666 mA	91 %
TEN 40-2423E		+15 VDC	1'333 mA	-15 VDC	1'333 mA	91 %
TEN 40-2425E		+24 VDC	833 mA	-24 VDC	833 mA	91 %
TEN 40-4810E	36 - 75 VDC (48 VDC nom.)	3.3 VDC	12'200 mA			90 %
TEN 40-4811E		5 VDC	8'000 mA			91 %
TEN 40-4812E		12 VDC	3'333 mA			92 %
TEN 40-4813E		15 VDC	2'666 mA			92 %
TEN 40-4815E		24 VDC	1'666 mA			92 %
TEN 40-4822E		+12 VDC	1'666 mA	-12 VDC	1'666 mA	91 %
TEN 40-4823E		+15 VDC	1'333 mA	-15 VDC	1'333 mA	91 %
TEN 40-4825E		+24 VDC	833 mA	-24 VDC	833 mA	92 %

Options

TEN-HS1	- Optional Heat Sink with Height = 0.22 inch: www.tracopower.com/products/ten-hs1.pdf
TEN-HS8	- Optional Heat Sink with Height = 0.3 inch: www.tracopower.com/products/ten-hs8.pdf
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink with Height = 0.8 inch: www.tracopower.com/products/ten-hs10.pdf
	- Optional Heat Sink with Height = 0.5 inch: www.tracopower.com/products/ten-hs9.pdf
	- Optional models with factory assembled heat-sink
	- Optional models with inverse remote control

Input Specifications

Input Current	- At no load	12 Vin models:	20 mA typ.
		24 Vin models:	15 mA typ.
		48 Vin models:	10 mA typ.
Surge Voltage		12 Vin models:	25 VDC max. (1 s max.)
		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
Under Voltage Lockout		12 Vin models:	7 VDC min. / 8 VDC typ. / 8.8 VDC max.
		24 Vin models:	15 VDC min. / 16 VDC typ. / 17.5 VDC max.
		48 Vin models:	32 VDC min. / 33 VDC typ. / 35 VDC max.
Recommended Input Fuse		12 Vin models:	8'000 mA (fast acting)
		24 Vin models:	4'000 mA (slow blow)
		48 Vin models:	2'000 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 models only) (By external trim resistor)
			See application note: www.tracopower.com/overview/ten40e Output power must not exceed rated power!
Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.2% max.
	- Load Variation (0 - 100%)	single output models:	0.3% max.
		dual output models:	0.5% max. (Output 1) 0.5% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise (20 MHz Bandwidth)	- single 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.
	- dual output	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.

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

Capacitive Load	- single 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.
	- dual output	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)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1
		IEC 62368-1
		UL 62368-1
	- Certification Documents	www.tracopower.com/overview/ten40e

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/ten40e
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 µF // SMDJ36A (12 Vin models)
			2 x KY 220 µF // SMDJ58A (24 Vin models)
			2 x KY 220 µF // 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	

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	See application note: www.tracopower.com/overview/ten40e
Over Temperature Protection Switch Off	- Protection Mode	115°C typ. (Automatic recovery)
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	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 (Inverse Remote On/Off logic on demand)

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

Switching Frequency	225 - 275 kHz (PWM) 250 kHz typ. (PWM)
Insulation System	Functional Insulation
Isolation Test Voltage	1'600 VDC 1'600 VDC 1'600 VDC
Isolation Resistance	1'000 MΩ min.
Isolation Capacitance	1'500 pF max.
Reliability	1'245'000 h (MIL-HDBK-217F, ground benign)
Washing Process	Allowed (hermetical product)
	See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf
Environment	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"
Weight	34 g
Thermal Impedance	10.8 K/W 10.3 K/W (with Heat Sink)
Environmental Compliance	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). The SCIP number is provided on request.)

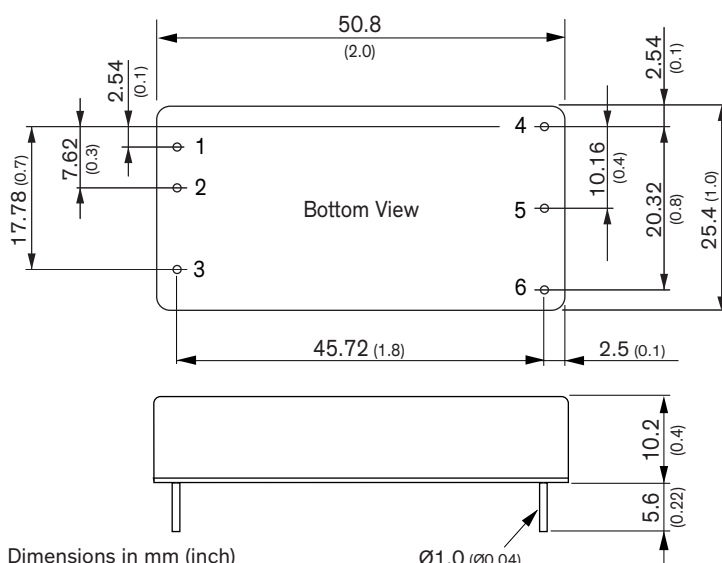
Supporting Documents

Overview Link (for additional Documents)

www.tracopower.com/overview/ten40e

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

Outline Dimensions



Dimensions in mm (inch)

Tolerances: x.x ±0.5 (±0.02)

x.xx ± 0.25 (± 0.01)

Pin dimension tolerance ± 0.1 (± 0.004)

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