TRACO POWER

DC/DC Converter

TEP 40UIR Series, 40 Watt

- **Ultra-wide 12:1 input voltage range 9–75, 14–160 VDC**
- **Compact 2.3”x1.45”x0.5” standard package (quarter brick)**
- **Bus pin to easily extend hold-up time**
- **EN 50155 and EN 61373 approval for railway applications**
- **Qualification for fire behavior according to EN 45545-2**
- **Operating temperature range –40°C to +85°C**
- **I/O-isolation 3‘000 VAC**
- **High efficiency up to 91%**
- **Adjustable output voltage, Remote On/Off and adjustable under voltage lockout**
- **3 year product warranty**

UL 62368-1 IEC 62368-1

The TEP 40UIR is a series of high performance 40 Watt railway DC/DC converters with ultra wide 12:1 input voltage range featuring a compact ¼ brick (2.3”x1.45”x0.5”) metal package. The ultra wide input allows the converter to act as an all-in-one solution if different voltage ranges have to be covered in the same application, resolving the issue of having multiple different converters installed. An internal circuit implemented in these modules helps to extend the hold-up time with ease as it eliminates the need of expensive high voltage capacitors to cover the full input range. With only a 25V capacitor (independent of the input voltage) the whole input range can be covered effectively reducing cost, size an inrush current. All models are approved for railway applications according to EN 50155, EN 61373, EN 45545-2 and offer standard features such as high efficiency up to 91%, an operating temperature range of -40° to +85°C and an I/O-isolation voltage of 3’000 VAC. An adjustable under voltage lockout function, remote on/off and adjustable outputs round out the features and ensure that these converter modules fit in any application setup.

Models

Order Code	Input Voltage Range	Output Voltage nom.	Output Current max.	Efficiency typ.
TEP 40-3611UIR	9 - 75 VDC (36 VDC nom.)	5 VDC	8'000 mA	89 %
TEP 40-3612UIR		12 VDC	3'330 mA	91 %
TEP 40-3613UIR		15 VDC	2'670 mA	91 %
TEP 40-3615UIR		24 VDC	1'670 mA	90 %
TEP 40-3618UIR		48 VDC	830 mA	91 %
TEP 40-7211UIR	14 - 160 VDC (72 VDC nom.)	5 VDC	8'000 mA	89 %
TEP 40-7212UIR		12 VDC	3'330 mA	91 %
TEP 40-7213UIR		15 VDC	2'670 mA	91 %
TEP 40-7215UIR		24 VDC	1'670 mA	90 %
TEP 40-7218UIR		48 VDC	830 mA	90 %

Options

TEP-HS2	- Optional Heat Sink: www.tracopower.com/products/tep-hs2.pdf
TEP-HS4	- Optional Heat Sink: www.tracopower.com/products/tep-hs4.pdf
on demand (backorder with MOQ non stocking item)	- Heat Sink (large profile): www.tracopower.com/products/tep-hs3.pdf - Heat Sink (large profile): www.tracopower.com/products/tep-hs5.pdf

Input Specifications

Input Current	- At no load	36 Vin models:	24 mA typ.
		72 Vin models:	17 mA typ.
Surge Voltage		36 Vin models:	100 VDC max. (1 s max.)
		72 Vin models:	185 VDC max. (1 s max.)
Start-up Voltage		36 Vin models:	9 VDC
		72 Vin models:	14 VDC
			(The Start-up voltage as well as the Shutdown voltage can be adjusted by a resistor between UVLO and -Vin pins. see application note: www.tracopower.com/overview/tep40uir)
Under Voltage Lockout		36 Vin models:	7.3 VDC min. / 7.7 VDC typ. / 8.1 VDC max.
		72 Vin models:	10 VDC min. / 11 VDC typ. / 12 VDC max.
Recommended Input Fuse		36 Vin models:	8'000 mA (fast acting)
		72 Vin models:	5'000 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			−20% to +10% (By external trim resistor)
		See application note:	www.tracopower.com/overview/tep40uir
			Output power must not exceed rated power!
Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)		0.1% max.
	- Load Variation (0 - 100%)		0.1% max.
Ripple and Noise (20 MHz Bandwidth)		5 Vout models:	75 mVp-p typ. (w/ 1 µF X7R // 22 µF poscap)
		12 Vout models:	100 mVp-p typ. (w/ 22 µF X7R)
		15 Vout models:	100 mVp-p typ. (w/ 22 µF X7R)
		24 Vout models:	200 mVp-p typ. (w/ 4.7 µF X7R)
		48 Vout models:	300 mVp-p typ. (w/ 2.2 µF X7R)
Capacitive Load		5 Vout models:	16'000 µF max.
		12 Vout models:	2'800 µF max.
		15 Vout models:	1'800 µF max.
		24 Vout models:	720 µF max.
		48 Vout models:	180 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			10 ms min. (acc. to EN 50155 Class S2 see application note for BUS connection: www.tracopower.com/overview/tep40uir)
Start-up Time			75 ms typ. / 100 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			120 - 140% of Iout max.
Overvoltage Protection			120 - 135% of Vout nom.
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
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/tep40uir

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

EMC Specifications

EMI Emissions			EN 50121-3-2 (EMC for Rolling Stock)
	- 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/tep40uir
EMS Immunity			EN 50155 (Railway Applications)
			EN 55024 (IT Equipment)
	- 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, 20 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:	36 V models: 2 x KY 220 µF
			72 V models: 2 x KXJ 150 µF
	- 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/tep40uir
Over Temperature Protection Switch Off	- Protection Mode		110°C typ. (Automatic recovery at 95°C typ.)
Cooling System			Natural convection (20 LFM)
Sense Function			10% max. of Vout nom. (If sense function is not used, sense pins should be connected to output pins.)
Remote Control	- Voltage Controlled Remote		On: 0 to 1.2 VDC or short circuit Off: 3 to 12 VDC or open circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current		3 mA typ.
	- Remote Pin Input Current		-0.5 to 1.0 mA
Switching Frequency			160 - 200 kHz 180 kHz typ.
Insulation System			Reinforced Insulation (72 Vin models) Basic Insulation (36 Vin models)
Isolation Test Voltage	- Input to Output, 60 s		3'000 VAC (72 Vin models) 2'250 VDC (36 Vin models)
	- Input to Case, 60 s		1'500 VAC (72 Vin models) 1'600 VDC (36 Vin models)
	- Output to Case, 60 s		1'500 VAC (72 Vin models) 1'600 VDC (36 Vin models)
Isolation Resistance	- Input to Output, 500 VDC		1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V		1'000 pF max.
Reliability	- Calculated MTBF		830'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration		MIL-STD-810F EN 61373
	- Thermal Shock		MIL-STD-810F EN 61373
Housing Material			Alu base-plate w. plastic case
Potting Material			Silicone (UL 94 V-0 rated)

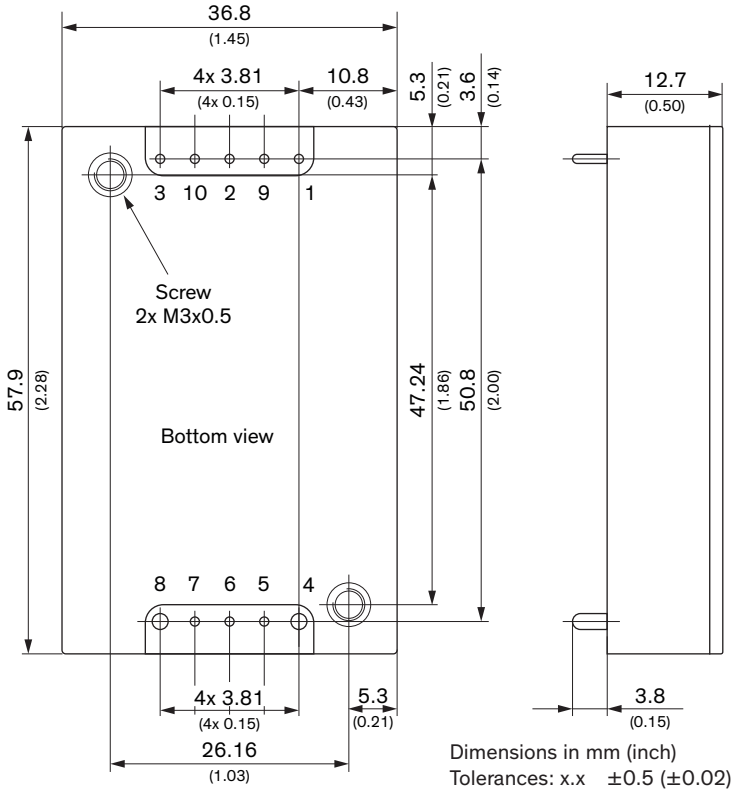
All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

Connection Type		THD (Through-Hole Device)
Weight		64 g
Thermal Impedance		8.27 K/W
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf
	- Flammability (EN 45545-2)	www.tracopower.com/info/en45545-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tep40uir

Outline Dimensions



Pin (4, 8): 1.5 (0.06)
Pin (other): 1.0 (0.04)

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (±0.02)
x.xx ±0.25 (±0.01)
Pin diameter ±0.1 (±0.004)
Screw lock torque: Max. 0.34 N·m (3.5 kgf·cm)

Pinout	
Pin	**Signal**
1	–Vin (GND)
2	Remote On/Off
3	+Vin (Vcc)
4	–Vout
5	–Sense
6	Trim
7	+Sense
8	+Vout
9	Bus
10	UVLO

