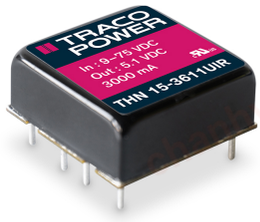
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TRACO POWER

DC/DC Railway Converter

THN 15UIR Series, 15 Watt

- **Compact 1”x1” housing**
- **Ultra-wide 12:1 input voltage range: 9–75, 14–160 VDC**
- **–40°C up to +70°C natural convection cooling without derating**
- **EN 50155, EN 45545-2 and EN 61373 certified**
- **Dedicated holdup capacitor connection**
- **Fully encapsulated**
- **3000 VDC I/O isolation**
- **Remote on/off and trim function**
- **Protection against short-circuit (SCP), overvoltage (OVP) and overtemperature (OTP)**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The THN 15UIR is a series of high-performance DC/DC converters with an ultra-wide 12:1 input voltage range and a power output of 15 watt. The THN 15UIR comes in a compact, fully encapsulated 1”x1” housing for highest reliability and effective cooling. Thanks to its dedicated holdup capacitor connection, the THN 15UIR meets extended holdup-time requirements without the need for bulky input capacitors. The THN 15UIR is EN 50155 certified for rolling stock applications, EN 61373 certified for resistance against mechanical shock and vibration and EN 45545-2 certified for fire behavior. The THN 15UIR also comes with IEC/EN/UL 62368-1 safety approvals for use in a wide range of demanding industrial applications.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
THN 15-3611UIR	9 - 75 VDC (36 VDC nom.)	5.1 VDC	3'000 mA			87 %
THN 15-3612UIR		12 VDC	1'250 mA			88 %
THN 15-3613UIR		15 VDC	1'000 mA			88 %
THN 15-3615UIR		24 VDC	625 mA			88 %
THN 15-3622UIR		+12 VDC	625 mA	–12 VDC	625 mA	87 %
THN 15-3623UIR		+15 VDC	500 mA	–15 VDC	500 mA	88 %
THN 15-7211UIR	14 - 160 VDC (72 VDC nom.)	5.1 VDC	3'000 mA			87 %
THN 15-7212UIR		12 VDC	1'250 mA			88 %
THN 15-7213UIR		15 VDC	1'000 mA			87 %
THN 15-7215UIR		24 VDC	625 mA			87 %
THN 15-7222UIR		+12 VDC	625 mA	–12 VDC	625 mA	87 %
THN 15-7223UIR		+15 VDC	500 mA	–15 VDC	500 mA	87 %

Options

THN-HS2	- Optional Heat Sink: www.tracopower.com/overview/thn-hs2
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink: www.tracopower.com/overview/thn-hs3 - Optional Heat Sink: www.tracopower.com/overview/thn-hs4 - Optional models with inverse Remote On/Off function (passive = off) - Optional models without adjustable UVLO and without BUS pin - Optional models with adjustable UVLO but without BUS pin

Note - 72 Vin models: If the input voltage exceeds 110 VDC, use an external 100 µF / 200 V capacitor between +Vin and -Vin to reduce voltage transient.

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Input Specifications

Input Current	- At no load	72 Vin models:	**8 mA typ.**
		36 Vin models:	**15 mA typ.** (5.1 Vout model)
			12 mA typ. (12 Vout model)
			12 mA typ. (15 Vout model)
			12 mA typ. (24 Vout model)
			12 mA typ. (12 / -12 Vout model)
			12 mA typ. (15 / -15 Vout model)
Surge Voltage		36 Vin models:	**100 VDC max.** (1 s max.)
		72 Vin models:	**200 VDC max.** (1 s max.)
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:	**3'150 mA** (slow blow)
		72 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%** (12 Vout models)
			–10% to +20% (other models)
			(single output models only)
			(By external trim resistor)
		See application note:	www.tracopower.com/overview/thn15uir
			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:	**0.5% max.**
	- Load Variation (0 - 100%)	single output models:	**0.2% max.**
		dual output models:	**1% max.** (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	**2% max.**
	- Cross Regulation (25% / 100% asym. load)	dual output models:	**5% max.**
Ripple and Noise (20 MHz Bandwidth)	- single output	5.1 Vout models:	**75 mVp-p typ.** (w/ 22 µF)
		12 Vout models:	**100 mVp-p typ.** (w/ 22 µF)
		15 Vout models:	**100 mVp-p typ.** (w/ 22 µF)
		24 Vout models:	**125 mVp-p typ.** (w/ 4.7 µF)
	- dual output	12 / -12 Vout models:	**100 / 100 mVp-p typ.** (w/ 10 µF)
		15 / -15 Vout models:	**100 / 100 mVp-p typ.** (w/ 10 µF)
Capacitive Load	- single output	5.1 Vout models:	**3'600 µF max.**
		12 Vout models:	**600 µF max.**
		15 Vout models:	**500 µF max.**
		24 Vout models:	**200 µF max.**
	- dual output	12 / -12 Vout models:	**360 / 360 µF max.**
		15 / -15 Vout models:	**250 / 250 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/thn15uir)
Start-up Time			**30 ms typ. / 40 ms max.**
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			155% typ. of Iout max.

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

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Overvoltage Protection		113 - 164% of Vout nom. (depending on model) 6.3 - 7.4 VDC (5.1 Vout model) 13.5 - 19.6 VDC (12 Vout model) 18.3 - 22 VDC (15 Vout model) 29.1 - 32.5 VDC (24 Vout model)
Transient Response	- Response Deviation	4% typ. (25% Load Step)
	- Response Time	250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Railway Applications	EN 50155
	- Certification Documents	www.tracopower.com/overview/thn15uir (A BUS capacitor must be connected to meet EN 50155 requirements. See application note.)
Pollution Degree		PD 2
Over Voltage Category		OVC II

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/thn15uir
EMS (Immunity)			EN 50121-3-2 (EMC for Rolling Stock) EN 55035 (Multimedia)
	- 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:	220µF, 100V, KY || TVS SMDJ120A (36 Vin) 150µF, 200V, KXJ || TVS SMBJ220A (72 Vin)
	- 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/thn15uir

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +105°C –40°C to +105°C (with Heat Sink)
	- 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/thn15uir
Over Temperature Protection Switch Off	- Protection Mode	115°C typ. (Automatic recovery at 103°C typ.)
	- Measurement Point	Case
Cooling System		Natural convection (20 LFM)

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

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Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.0 to 15 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2.5 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		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		190 - 250 kHz (PWM) 220 kHz typ. (PWM)
Insulation System		Functional Insulation
Working Voltage (rated)		75 VDC (36 Vin models) 113 VDC (72 Vin models)
Isolation Test Voltage	- Input to Output, 60 s	3'000 VDC
	- Input to Case, 60 s	2'250 VDC
	- Output to Case, 60 s	2'250 VDC
Creepage	- Input to Output	2 mm min.
Clearance	- Input to Output	2 mm min.
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'000 pF max.
Reliability	- Calculated MTBF	1'510'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F EN 61373
	- Mechanical Shock	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F
	- Flammability	EN 45545-2 www.tracopower.com/info/en45545-declaration.pdf
Housing Material		Copper, Nickel plated
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Tinned 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		1" x 1"
Soldering Profile		Lead-Free Wave Soldering 260°C / 6 s max.
Weight		17 g
Thermal Impedance	- Case to Ambient	15.5 K/W typ. (without Heatsink) 12.0 K/W typ. (with Heatsink THN-HS2) 10.4 K/W typ. (with Heatsink THN-HS3) 8.8 K/W typ. (with Heatsink THN-HS4)
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	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).)
	- SCIP Reference Number	e8c77501-f5e8-4c14-b6f5-b63b90842bc7

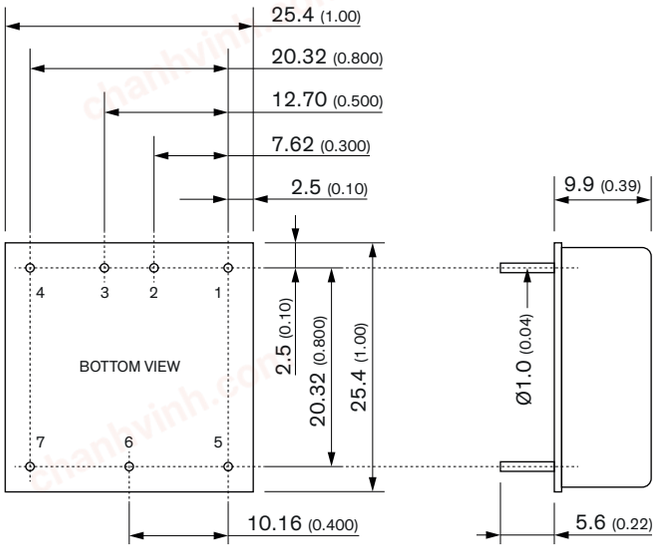
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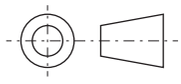
Supporting Documents

Overview Link (for additional Documents) www.tracopower.com/overview/thn15uir

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Pin diameter tolerance: ±0.10 (±0.004)



Pinout		
Pin	**Single**	**Dual**
1	No pin* / BUS / UVLO**	
2	+Vin	
3	–Vin	
4	Remote On/Off	
5	+Vout	
6	Trim	Common
7	–Vout	

* If neither BUS nor UVLO is present

** UVLO function is optional

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