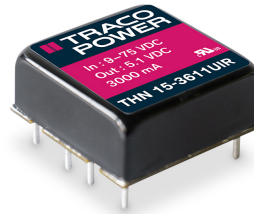


## DC/DC Railway Converter

## 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
- Reinforced 3000VAC I/O isolation
- Remote on/off and trim function
- Protection against short-circuit (SCP), overvoltage (OVP) and overtemperature (OTP)
- 3-year product warranty



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 typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
THN 15-361UIR	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: <a href="http://www.tracopower.com/products/thn-hs2.pdf">www.tracopower.com/products/thn-hs2.pdf</a>
on demand (backorder with MOQ non stocking item)	- Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs3.pdf">www.tracopower.com/products/thn-hs3.pdf</a>
	- Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs4.pdf">www.tracopower.com/products/thn-hs4.pdf</a>
	- Optional model with 5 VDC / 3'000 mA Output and 9 - 75 VDC Input
	- Optional model with 5 VDC / 3'000 mA Output and 14 - 160 VDC Input
	- 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.

## Input Specifications

Input Current	- At no load	72 Vin models: <b>8 mA typ.</b> 36 Vin models: <b>15 mA typ.</b> (5 Vout model) <b>15 mA typ.</b> (5.1 Vout model) <b>12 mA typ.</b> (12 Vout model) <b>12 mA typ.</b> (15 Vout model) <b>12 mA typ.</b> (24 Vout model) <b>12 mA typ.</b> (12 / -12 Vout model) <b>12 mA typ.</b> (15 / -15 Vout model)
Surge Voltage		36 Vin models: <b>100 VDC max.</b> (1 s max.) 72 Vin models: <b>200 VDC max.</b> (1 s max.)
Under Voltage Lockout		36 Vin models: <b>7.3 VDC min. / 7.7 VDC typ. / 8.1 VDC max.</b> 72 Vin models: <b>10 VDC min. / 11 VDC typ. / 12 VDC max.</b>
Recommended Input Fuse		36 Vin models: <b>3'150 mA</b> (slow blow) 72 Vin models: <b>2'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>

## Output Specifications

Output Voltage Adjustment		<b>±10%</b> (12 Vout models) <b>-10% to +20%</b> (other models) (single output models only) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%) - Voltage Balance (symmetrical load) - Cross Regulation (25% / 100% asym. load)	single output models: <b>0.2% max.</b> dual output models: <b>0.5% max.</b> single output models: <b>0.2% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2) dual output models: <b>2% max.</b> dual output models: <b>5% max.</b>
Ripple and Noise (20 MHz Bandwidth)	- single output - dual output	5 Vout models: <b>75 mVp-p typ.</b> (w/ 22 µF) 5.1 Vout models: <b>75 mVp-p typ.</b> (w/ 22 µF) 12 Vout models: <b>100 mVp-p typ.</b> (w/ 22 µF) 15 Vout models: <b>100 mVp-p typ.</b> (w/ 22 µF) 24 Vout models: <b>125 mVp-p typ.</b> (w/ 4.7 µF) 12 / -12 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 10 µF) 15 / -15 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 10 µF)
Capacitive Load	- single output - dual output	5 Vout models: <b>3'600 µF max.</b> 5.1 Vout models: <b>3'600 µF max.</b> 12 Vout models: <b>600 µF max.</b> 15 Vout models: <b>500 µF max.</b> 24 Vout models: <b>200 µF max.</b> 12 / -12 Vout models: <b>360 / 360 µF max.</b> 15 / -15 Vout models: <b>250 / 250 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Hold-up Time		<b>10 ms min.</b> (acc. to EN 50155 Class S2, see application note for BUS connection: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> )
Start-up Time		<b>30 ms typ. / 40 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>

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

Output Current Limitation		155% typ. of I <sub>out</sub> max.
Overvoltage Protection		113 - 164% of V <sub>out</sub> nom. (depending on model) 6.3 - 7.4 VDC (5 V <sub>out</sub> , 5.1 V <sub>out</sub> model) 13.5 - 19.6 VDC (12 V <sub>out</sub> model) 18.3 - 22 VDC (15 V <sub>out</sub> model) 29.1 - 32.5 VDC (24 V <sub>out</sub> 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 - Certification Documents	EN 50155 <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a> (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	- Conducted Emissions	EN 50121-3-2 (EMC for Rolling Stock) 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: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a>
EMS Immunity	- Electrostatic Discharge	EN 50121-3-2 (EMC for Rolling Stock) EN 55035 (Multimedia) 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
	- Conducted RF Disturbances	Ext. input component: 220μF, 100V, KY    TVS SMDJ120A (36 V <sub>in</sub> ) 150μF, 200V, KXJ    TVS SMBJ220A (72 V <sub>in</sub> ) EN 61000-4-6, 10 V <sub>rms</sub> , 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 +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: <a href="http://www.tracopower.com/overview/thn15uir">www.tracopower.com/overview/thn15uir</a>
Over Temperature Protection Switch Off	- Protection Mode - Measurement Point	115°C typ. (Automatic recovery at 103°C typ.) 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.

Remote Control	- Voltage Controlled Remote  - Off Idle Input Current - Remote Pin Input Current	On: 3.0 to 15 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -0.5 to 1.0 mA (Optional models with inverse Remote On/Off function (passive = off))
Altitude During Operation		5'000 m max.
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 - Input to Case, 60 s - Output to Case, 60 s	3'000 VDC 2'250 VDC 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 <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Environment	- Vibration  - Mechanical Shock  - Thermal Shock - Flammability	MIL-STD-810F EN 61373 MIL-STD-810F EN 61373 MIL-STD-810F EN 45545-2 <a href="http://www.tracopower.com/info/en45545-declaration.pdf">www.tracopower.com/info/en45545-declaration.pdf</a>
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  - 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, 7c-1 (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) e8c77501-f5e8-4c14-b6f5-b63b90842bc7

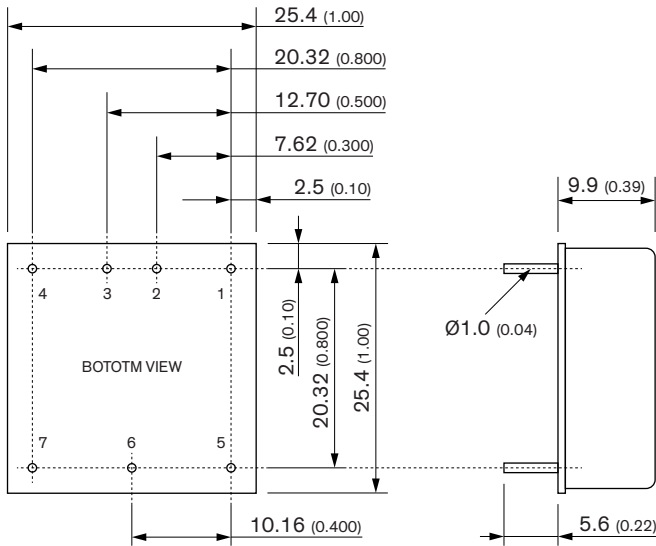
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thn15uir](http://www.tracopower.com/overview/thn15uir)

### Outline Dimensions



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

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)



Nieuwland Parc 13i  
2952 DA Alblasserdam

T +31 (0)78 6215900

F +31 (0)78 6215815

E [info@ave-nl.com](mailto:info@ave-nl.com)

W [www.ave-nl.com](http://www.ave-nl.com)