

- Ultra compact size: 1.0" x 1.0" x 0.4"
- Shielded metal casing with isolated baseplate
- Ultrawide 4:1 input voltage ranges
- Very high efficiency up to 90%
- Output voltage adjustable
- Remote On/Off control
- Operating temp. range  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$  and up to  $85^{\circ}\text{C}$  with heat-sink
- I/O isolation voltage 1600 VDC
- Input filter meets EN 55032 class A without external components
- 3-year product warranty



The THN 20WI series models are high performance DC/DC converters. They achieve 20 W output power and come in a small size metal casing (1.0" x 1.0" x 0.4"). The models feature an ultra-wide 4:1 input voltage range while the output voltages are precisely regulated even under no load conditions. Highest efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to  $85^{\circ}\text{C}$ . The low no-load input current characteristics and the remote On/Off control make these converters an ideal solution for battery operated systems. Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is critical.

### Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
THN 20-2410WI	9 - 36 VDC (24 VDC nom.)	3.3 VDC	4'500 mA			89 %
THN 20-2411WI		5 VDC	4'000 mA			89 %
THN 20-2411WI-A1		5 VDC	4'000 mA			88 %
THN 20-2412WI		12 VDC	1'670 mA			89 %
THN 20-2413WI		15 VDC	1'330 mA			89 %
THN 20-2415WI		24 VDC	833 mA			91 %
THN 20-2422WI		+12 VDC	833 mA	-12 VDC	833 mA	89 %
THN 20-2423WI		+15 VDC	667 mA	-15 VDC	667 mA	90 %
THN 20-2425WI		+24 VDC	417 mA	-24 VDC	417 mA	91 %
THN 20-4810WI	18 - 75 VDC (48 VDC nom.)	3.3 VDC	4'500 mA			90 %
THN 20-4811WI		5 VDC	4'000 mA			90 %
THN 20-4811WI-A1		5 VDC	4'000 mA			89 %
THN 20-4812WI		12 VDC	1'670 mA			89 %
THN 20-4813WI		15 VDC	1'330 mA			90 %
THN 20-4815WI		24 VDC	833 mA			91 %
THN 20-4822WI		+12 VDC	833 mA	-12 VDC	833 mA	89 %
THN 20-4823WI		+15 VDC	667 mA	-15 VDC	667 mA	90 %
THN 20-4825WI		+24 VDC	417 mA	-24 VDC	417 mA	91 %

### Options

THN-HS1	- Optional Heat Sink: <a href="http://www.tracopower.com/products/thn-hs1.pdf">www.tracopower.com/products/thn-hs1.pdf</a>
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Note - Suffix -A1: Adjustable output up to 6 VDC, suitable for low ripple & noise applications in conjunction with an LDO regulator.  
 -  $\pm 24$  Vout models: The output can also be used in serial circuit for single 48 VDC operation.

### Input Specifications

Input Current	- At no load	24 Vin models: <b>8 mA typ.</b> 48 Vin models: <b>7 mA typ.</b>
Surge Voltage		24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Under Voltage Lockout		24 Vin models: <b>7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.</b> 48 Vin models: <b>15.5 VDC min. / 16 VDC typ. / 17.5 VDC max.</b>
Reflected Ripple Current		24 Vin models: <b>30 mA<sub>p-p</sub> typ.</b> 48 Vin models: <b>30 mA<sub>p-p</sub> typ.</b>
Recommended Input Fuse		24 Vin models: <b>4'000 mA</b> (slow blow) 48 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		-10% to +20% (A1 & 24 Vout models) <b>±10%</b> (other single models) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/thn20wi">www.tracopower.com/overview/thn20wi</a> Output power must not exceed rated power!
Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (Vmin - Vmax)	single output models: <b>0.2% max.</b> dual output models: <b>0.5% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>0.2% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models: <b>5% max.</b>
Ripple and Noise (20 MHz Bandwidth)	- single output	3.3 Vout models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 5 Vout models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 12 Vout models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 15 Vout models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 24 Vout models: <b>75 mV<sub>p-p</sub> typ.</b> (w/ 6.8μF X7R)
	- dual output	12 / -12 Vout models: <b>100 / 100 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 15 / -15 Vout models: <b>100 / 100 mV<sub>p-p</sub> typ.</b> (w/ 1μF X7R // 10μF TC) 24 / -24 Vout models: <b>100 / 100 mV<sub>p-p</sub> typ.</b> (w/ 4.7μF X7R)
Capacitive Load	- single output	3.3 Vout models: <b>7'000 μF max.</b> 5 Vout models: <b>5'000 μF max.</b> 12 Vout models: <b>850 μF max.</b> 15 Vout models: <b>700 μF max.</b> 24 Vout models: <b>220 μF max.</b>
	- dual output	12 / -12 Vout models: <b>500 / 500 μF max.</b> 15 / -15 Vout models: <b>350 / 350 μF max.</b> 24 / -24 Vout models: <b>100 / 100 μF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>30 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>125 - 190% of I<sub>out</sub> max.</b> <b>150% typ. of I<sub>out</sub> max.</b>
Overvoltage Protection		<b>112 - 164% of V<sub>out</sub> nom.</b>
Transient Response	- Response Time	<b>250 μs typ.</b> (25% Load Step)

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

### Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents	<a href="http://www.tracopower.com/overview/thn20wi">www.tracopower.com/overview/thn20wi</a>
Pollution Degree		PD 2
Over Voltage Category		OVC I

### EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (internal filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55032 class A (internal filter) EN 55032 class B (with external filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/thn20wi">www.tracopower.com/overview/thn20wi</a>
EMS Immunity	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: 220 $\mu$ F, 100 V 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 +75°C -40°C to +85°C (with Heat Sink)
	- Case Temperature	+105°C max.
	- Storage Temperature	-55°C to +125°C
Power Derating	- High Temperature	See application note: <a href="http://www.tracopower.com/overview/thn20wi">www.tracopower.com/overview/thn20wi</a>
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	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 - Remote Pin Input Current	2 mA typ. -0.5 to 1.0 mA
Altitude During Operation		5'000 m max.
Switching Frequency		275 kHz typ. (PWM) ( $\pm 10\%$ , 3.3 & 5 Vout model) 330 kHz typ. (PWM) ( $\pm 10\%$ , other models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
	- Input to Case, 60 s	1'000 VDC
	- Output to Case, 60 s	1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'500 pF max.
Reliability	- Calculated MTBF	1'400'000 h (MIL-HDBK-217F, ground benign)
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Copper, Nickel plated
Base Material		Non-conductive FR4 (UL94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper

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

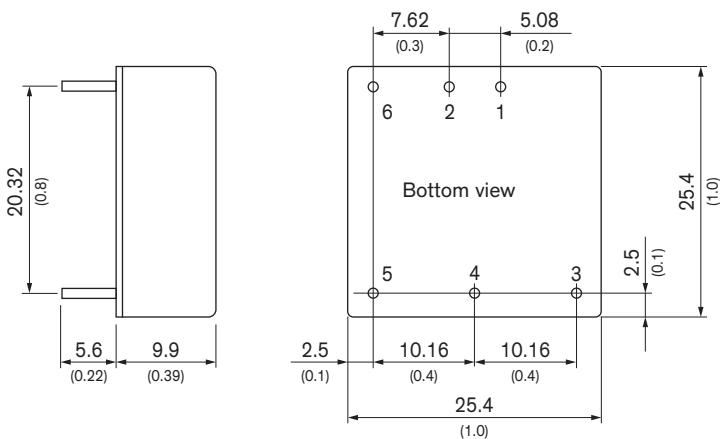
Pin Foundation Plating	Nickel (2 - 3 $\mu\text{m}$ )
Pin Surface Plating	Tin (3 - 5 $\mu\text{m}$ ), matte
Soldering Profile	265°C / 10 s max.
Connection Type	THD (Through-Hole Device)
Weight	15 g
Thermal Impedance	17.6 K/W 14.8 K/W (with Heat Sink)
Environmental Compliance	- REACH Declaration <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant - RoHS Declaration <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> 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/thn20wi](http://www.tracopower.com/overview/thn20wi)

### Outline Dimensions



Dimensions in mm (inch)  
Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )  
Pin pitch tolerances  $\pm 0.25$  ( $\pm 0.01$ )  
Pin diameter  $\varnothing 1.0$  (0.04)

Pinout		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off

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