

- 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/overview/thn-hs1">www.tracopower.com/overview/thn-hs1</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		<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 models) (single output models only) (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>
Oversvoltage Protection		<b>112 - 164% of Vout nom.</b>
Transient Response	- Response Time	<b>250 µs typ.</b> (25% Load Step)

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

### Safety Specifications

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	Depending on model
		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 (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 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
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)
Washing Process		According to Cleaning Guideline <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F

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

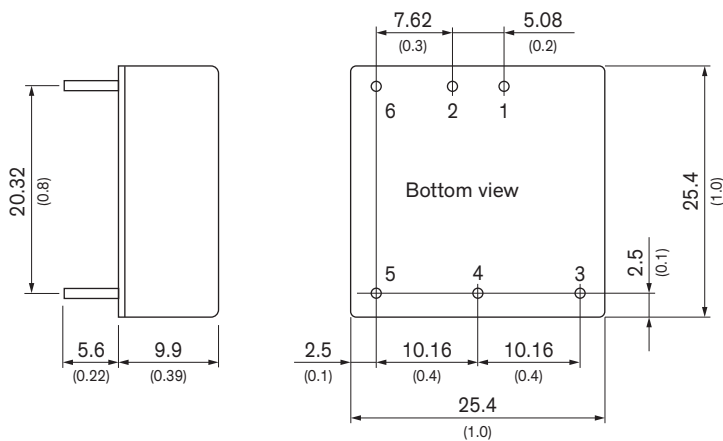
Housing Material	Copper, Nickel plated
Base Material	Non-conductive FR4 (UL 94 V-0 rated)
Potting Material	Silicone (UL 94 V-0 rated)
Pin Material	Copper
Pin Foundation Plating	Nickel (2 - 3 $\mu\text{m}$ )
Pin Surface Plating	Tin (3 - 5 $\mu\text{m}$ ), matte
Housing Type	Metal Case
Mounting Type	PCB Mount
Connection Type	THD (Through-Hole Device)
Footprint Type	1" x 1"
Soldering Profile	Lead-Free Wave Soldering 265°C / 10 s max.
Weight	15 g
Thermal Impedance	- Case to Ambient 17.6 K/W typ. 14.8 K/W typ. (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)) - SCIP Reference Number b4edc4bb-5f02-48ac-8e5a-36106726a10f

### 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