

- **Smallest encapsulated 20 W Converter!**  
Ultra compact size: 1.0" x 1.0" x 0.4"
- **Shielded metal case with isolated baseplate**
- **Wide 2:1 input voltage ranges**
- **Very high efficiency up to 90%**
- **Output voltage adjustable**
- **Remote On/Off control**
- **Operating temp. range -40°C to +75°C and up to 85 °C with heat-sink**
- **I/O isolation voltage 1500 VDC**
- **Input filter meets EN 55022 class A without external components**
- **3-year product warranty**



The THN 20 series is the latest generation of high performance DC/DC converter modules with highest power density. The product achieves 20 W output power while it comes in a metal case with dimensions of only 1.0" x 1.0" x 0.4". All models have a wide 2:1 input voltage range and precisely regulated output voltages, even under no load conditions. Highest efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to 75°C or 85°C with optional mounted heat sink. Together with low input current characteristics at minimal load and remote On/Off control these converters are the 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 20-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	4'500 mA			89 %
THN 20-1211		5 VDC	4'000 mA			89 %
THN 20-1212		12 VDC	1'670 mA			89 %
THN 20-1213		15 VDC	1'330 mA			89 %
THN 20-1222		+12 VDC	833 mA	-12 VDC	833 mA	89 %
THN 20-1223		+15 VDC	667 mA	-15 VDC	667 mA	90 %
THN 20-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	4'500 mA			90 %
THN 20-2411		5 VDC	4'000 mA			91 %
THN 20-2412		12 VDC	1'670 mA			90 %
THN 20-2413		15 VDC	1'330 mA			91 %
THN 20-2422		+12 VDC	833 mA	-12 VDC	833 mA	90 %
THN 20-2423		+15 VDC	667 mA	-15 VDC	667 mA	90 %
THN 20-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	4'500 mA			90 %
THN 20-4811		5 VDC	4'000 mA			90 %
THN 20-4812		12 VDC	1'670 mA			90 %
THN 20-4813		15 VDC	1'330 mA			90 %
THN 20-4822		+12 VDC	833 mA	-12 VDC	833 mA	89 %
THN 20-4823		+15 VDC	667 mA	-15 VDC	667 mA	90 %

### 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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## Input Specifications

Input Current	- At no load	12 Vin models: <b>10 mA typ.</b> 24 Vin models: <b>6 mA typ.</b> 48 Vin models: <b>4 mA typ.</b>
	- At full load	12 Vin models: <b>1'510 mA typ.</b> (3.3 Vout model) <b>1'960 mA typ.</b> (5 Vout model) <b>1'960 mA typ.</b> (12 Vout model) <b>1'960 mA typ.</b> (15 Vout model) <b>1'960 mA typ.</b> (12 / -12 Vout model) <b>1'960 mA typ.</b> (15 / -15 Vout model) 24 Vin models: <b>755 mA typ.</b> (3.3 Vout model) <b>970 mA typ.</b> (5 Vout model) <b>970 mA typ.</b> (12 Vout model) <b>970 mA typ.</b> (15 Vout model) <b>970 mA typ.</b> (12 / -12 Vout model) <b>970 mA typ.</b> (15 / -15 Vout model) 48 Vin models: <b>375 mA typ.</b> (3.3 Vout model) <b>485 mA typ.</b> (5 Vout model) <b>485 mA typ.</b> (12 Vout model) <b>485 mA typ.</b> (15 Vout model) <b>485 mA typ.</b> (12 / -12 Vout model) <b>485 mA typ.</b> (15 / -15 Vout model)
Surge Voltage		12 Vin models: <b>25 VDC max.</b> (1 s max.) 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		12 Vin models: <b>7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.</b> 24 Vin models: <b>15.5 VDC min. / 16 VDC typ. / 17.5 VDC max.</b> 48 Vin models: <b>32.5 VDC min. / 33 VDC typ. / 35.5 VDC max.</b>
Reflected Ripple Current		<b>30 mA<sub>p-p</sub> typ.</b>
Recommended Input Fuse		12 Vin models: <b>4'000 mA</b> (slow blow) 24 Vin models: <b>2'000 mA</b> (slow blow) 48 Vin models: <b>1'250 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% to +20%</b> (24 Vout single models) <b>±10%</b> (other single models) (By external trim resistor) See application note: <a href="http://www.tracopower.com/overview/thn20">www.tracopower.com/overview/thn20</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	dual output models: <b>5% max.</b>
	(25% / 100% asym. load)	

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

Ripple and Noise (20 MHz Bandwidth)	- single output	3.3 Vout models: <b>75 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC) 5 Vout models: <b>75 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC) 12 Vout models: <b>75 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC) 15 Vout models: <b>75 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC)
	- dual output	12 / -12 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC) 15 / -15 Vout models: <b>100 / 100 mVp-p typ.</b> (w/ 1 $\mu$ F X7R // 10 $\mu$ F TC)
Capacitive Load	- single output	3.3 Vout models: <b>7'000 <math>\mu</math>F max.</b> 5 Vout models: <b>5'000 <math>\mu</math>F max.</b> 12 Vout models: <b>850 <math>\mu</math>F max.</b> 15 Vout models: <b>700 <math>\mu</math>F max.</b>
	- dual output	12 / -12 Vout models: <b>500 / 500 <math>\mu</math>F max.</b> 15 / -15 Vout models: <b>350 / 350 <math>\mu</math>F max.</b>
Minimum Load		Not required
Temperature Coefficient		$\pm 0.02$ %/K max.
Start-up Time		30 ms max.
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		110 - 190% of Iout max.
		150% typ. of Iout max.
Overvoltage Protection		112 - 164% of Vout nom.
Transient Response	- Response Time	250 $\mu$ s typ. (25% Load Step)

### 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/thn20">www.tracopower.com/overview/thn20</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/thn20">www.tracopower.com/overview/thn20</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

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

Power Derating	- High Temperature	Depending on model Depending on model (with Heat Sink) See application note: <a href="http://www.tracopower.com/overview/thn20">www.tracopower.com/overview/thn20</a>
Cooling System		Natural convection (20 LFM)
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 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 - Input to Case, 60 s - Output to Case, 60 s	1'600 VDC 1'000 VDC 1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'000 pF max.
Reliability	- Calculated MTBF	1'400'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product) See Cleaning Guideline: <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Environment	- Vibration - Thermal Shock	MIL-STD-810F MIL-STD-810F
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 $\mu$ m)
Pin Surface Plating		Tin (3 - 5 $\mu$ m), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1" x 1"
Soldering Profile		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  - RoHS 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 <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.)

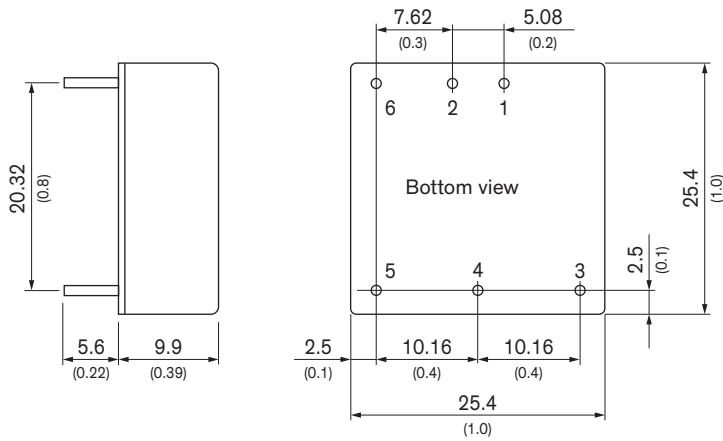
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thn20](http://www.tracopower.com/overview/thn20)

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

**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