

### Features

- ◆ Smallest encapsulated 20W 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  $-40^{\circ}\text{C}$  to  $+75^{\circ}\text{C}$   
and up to  $85^{\circ}\text{C}$  with heat-sink
- ◆ I/O isolation voltage 1500 VDC
- ◆ Input filter meets EN 55022 class A  
without external components
- ◆ No minimum load required
- ◆ Lead free design, RoHS compliant
- ◆ 3-year product warranty

CB  
Scheme  
UL 60950-1

cULus  
UL 60950-1



The THN-20 series is the latest generation of high performance dc-dc converter modules with highest power density. The product achieves 20W output power while it comes in a metal case with dimensions of only 1.0"x 1.0"x 0.4".

All models have an 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  $75^{\circ}\text{C}$  or  $85^{\circ}\text{C}$  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 equipments, 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 voltage	Output current max.	Efficiency typ.
THN 20-1210	<b>9 – 18 VDC</b> (12 VDC nominal)	3.3 VDC	4500 mA	86 %
THN 20-1211		5.0 VDC	4000 mA	90 %
THN 20-1212		12 VDC	1670 mA	89 %
THN 20-1213		15 VDC	1330 mA	89 %
THN 20-1222		$\pm 12$ VDC	$\pm 833$ mA	89 %
THN 20-1223		$\pm 15$ VDC	$\pm 667$ mA	89 %
THN 20-2410	<b>18 – 36 VDC</b> (24 VDC nominal)	3.3 VDC	4500 mA	86 %
THN 20-2411		5.0 VDC	4000 mA	90 %
THN 20-2412		12 VDC	1670 mA	90 %
THN 20-2413		15 VDC	1330 mA	90 %
THN 20-2422		$\pm 12$ VDC	$\pm 833$ mA	90 %
THN 20-2423		$\pm 15$ VDC	$\pm 667$ mA	90 %
THN 20-4810	<b>36 – 75 VDC</b> (48 VDC nominal)	3.3 VDC	4500 mA	86 %
THN 20-4811		5.0 VDC	4000 mA	90 %
THN 20-4812		12 VDC	1670 mA	90 %
THN 20-4813		15 VDC	1330 mA	90 %
THN 20-4822		$\pm 12$ VDC	$\pm 833$ mA	90 %
THN 20-4823		$\pm 15$ VDC	$\pm 667$ mA	90 %

### Input Specifications

Input current at no load (at nominal input voltage)	12 Vin models: 10 mA typ. 24 Vin models: 6 mA typ. 48 Vin models: 4 mA typ.						
Input current at full load (at nominal input voltage)	<table border="0"> <tr> <td>– 12 Vin</td> <td>3.3 VDC models: 1510 mA typ. other models: 1960 mA typ.</td> </tr> <tr> <td>– 24 Vin</td> <td>3.3 VDC models: 755 mA typ. other models: 970 mA typ..</td> </tr> <tr> <td>– 48 Vin</td> <td>3.3 VDC models: 375 mA typ. other models: 485 mA typ.</td> </tr> </table>	– 12 Vin	3.3 VDC models: 1510 mA typ. other models: 1960 mA typ.	– 24 Vin	3.3 VDC models: 755 mA typ. other models: 970 mA typ..	– 48 Vin	3.3 VDC models: 375 mA typ. other models: 485 mA typ.
– 12 Vin	3.3 VDC models: 1510 mA typ. other models: 1960 mA typ.						
– 24 Vin	3.3 VDC models: 755 mA typ. other models: 970 mA typ..						
– 48 Vin	3.3 VDC models: 375 mA typ. other models: 485 mA typ.						
Start-up voltage / under voltage shut down	12 Vin models: 9 VDC / 8 VDC 24 Vin models: 18 VDC / 16 VDC 48 Vin models: 36 VDC / 33 VDC						
Surge voltage (1 sec. max.)	12 Vin models: 25 V max. 24 Vin models: 50 V max. 48 Vin models: 100 V max.						
Reflected input ripple current	30 mA <sub>p-p</sub> typ.						
Conducted noise (input)	EN 55022 class A, FCC part 15, level A without external components						
ESD (electrostatic discharge)	EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A						
Radiated immunity	EN 61000-4-3, 10 V/m, perf. criteria A						
Fast transient / Surge	EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±2 kV perf. criteria A With external input capacitor e.g. Nippon chemi-con KY 200 µF, 100 V, ESR 48 mOhm						
Conducted immunity	EN 61000-4-6, 10 V <sub>rms</sub> , perf. criteria A						

### Output Specifications

Voltage set accuracy	±1 %				
Output voltage adjustment range	24 Vin models: –10 / +20 % all other models: ±10 % only for single output models				
Regulation	<table border="0"> <tr> <td>– Input variation (V<sub>min</sub> – V<sub>max</sub>)</td> <td>single output models: 0.2 % max. dual output models: 0.5 % max.</td> </tr> <tr> <td>– Load variation (0 – 100%)</td> <td>single output models: 0.2 % max. dual output models balanced load: 1.0 % max. dual output models unbalanced load (25% /100%): 5.0 % max.</td> </tr> </table>	– Input variation (V <sub>min</sub> – V <sub>max</sub> )	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 balanced load: 1.0 % max. dual output models unbalanced load (25% /100%): 5.0 % max.
– Input variation (V <sub>min</sub> – V <sub>max</sub> )	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 balanced load: 1.0 % max. dual output models unbalanced load (25% /100%): 5.0 % max.				
Minimum load	not required				
Ripple and noise (20 MHz bandwidth)	single output models: 75 mV <sub>p-p</sub> typ. with external capacitor dual output models: 100 mV <sub>p-p</sub> typ. with external capacitor				
Temperature coefficient	±0.02 %/K				
Output current limitation	typ. 150 % of I <sub>out max.</sub> , Hiccup				
Short circuit protection	continuous, automatic recovery				
Over voltage protection	3.3 VDC models: 3.7 – 5.4 V <sub>out</sub> 5 VDC models: 5.6 – 7.0 V <sub>out</sub> 12 VDC models: 13.5 – 19.6 V <sub>out</sub> 15 VDC models: 16.8 – 20.5 V <sub>out</sub>				
Start up time (nominal Vin and constant resistive load)	30 ms typ. (for power on and remote on)				
Transient response setting time	250 µs typ. (25% load step change)				

### Output Specifications

Max. capacitive load	3.3 VDC models:	7'000 $\mu$ F
	5 VDC models:	5'000 $\mu$ F
	12 VDC models:	850 $\mu$ F
	15 VDC models:	700 $\mu$ F
	$\pm$ 12 VDC models:	500 $\mu$ F (each output)
	$\pm$ 15 VDC models:	350 $\mu$ F (each output)

### General Specifications

Temperature ranges	- Operating without heat sink	-40°C to +75°C (with derating)
	- Operating with heat sink	-40°C to +85°C (with derating)
	- Case temperature	+105°C max.
	- Storage	-55°C to +125°C
Power derating	- Operating without heat sink	2.0 %/K above 60°C
	- Operating with heat sink	2.0 %/K above 70°C
Thermal impedance	- Natural convection	17.6°K/W
	- Natural convection with heat sink	14.8°K/W
Humidity (non condensing)		5 % to 95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1.4 Mio. h
Isolation voltage (60sec.)	- Input/Output	1'500 VDC
Isolation capacitance	- Input/Output	1000 pF typ.
Isolation resistance	- Input/Output (500 VDC)	>1'000 MOhm
Remote On/Off	- On:	3.0 ... 15 VDC or open circuit
	- Off:	0 ... 1.2 VDC or short circuit pin 6 and pin 2
	- Off idle current:	1.5 mA
Switching frequency (fixed)		330 kHz typ. (pulse width modulation PWM)
Vibration and thermal shock		EN 61373, MIL-STD-810F
Safety standards		UL /cUL 60950-1, EN 60950-1, IEC 60950-1
	- Certification documents	<a href="http://www.tracopower.com/overview/thn20">www.tracopower.com/overview/thn20</a>

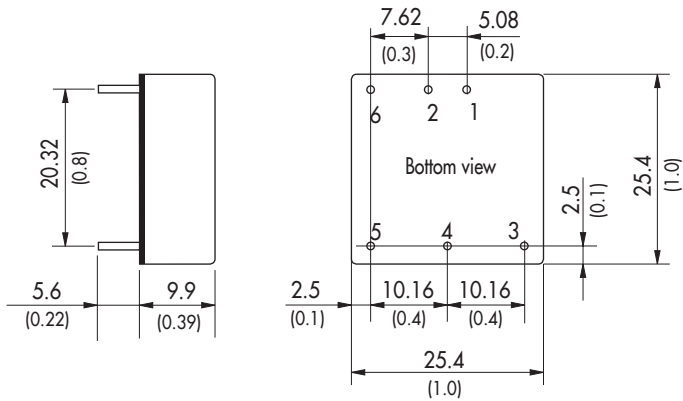
### Physical Specifications

Casing material		nickel coated copper
Baseplate		non conductive FR4
Potting material		silicone (UL 94V-0 rated)
Weight		15 g (0.53oz)
Soldering temperature		max. 265°C / 10 sec.
Environmental compliance	- Reach	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>
	- RoHS	RoHS directive 2011/65/EU

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

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

**Outline Dimensions**

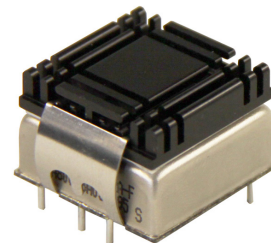


Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	+ Vout	+ Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off	

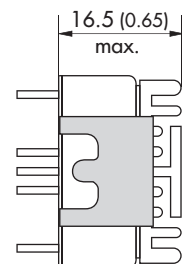
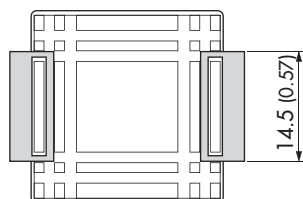
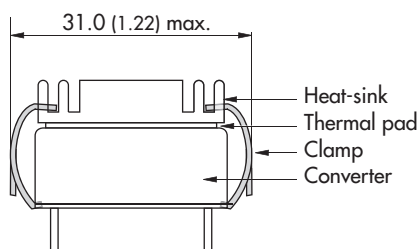
Dimensions in [mm], ( ) = Inch  
 Pin diameter  $\varnothing$  1.0 (0.04)  
 Pin pitch tolerances:  $\pm 0.25$  ( $\pm 0.01$ )  
 Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )

**Heat-Sink (Option)**

**Order code:** THN-HS1  
 (cont.: heat-sink, thermal pad, 2 clamps)  
**Material:** Aluminum  
**Finish:** Anodic treatment (black)  
**Weight:** 8 g (0.28oz) without converter  
 Thermal impedance after assembling: 14.8 K/W



**Note:**  
 The product label on converter has to be removed before mounting the heat-sink.  
 For volume orders converters will be supplied with heat-sink already mounted. Please contact factory for quotation.  
 Separate heat-sinks are only available for prototypes and small quantity orders.



Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)