

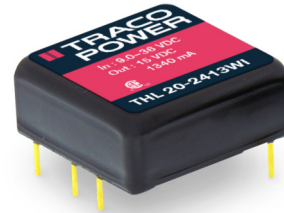


**THE DATASHEET OF  
THL 20-2413WI**



### Features

- **Smallest encapsulated 20W converter!**  
Ultra compact size: 1.0" x 1.0" x 0.4"
- Shielded metal case 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 1500 VDC
- Lead free design, RoHS compliant
- 3-year product warranty



The THL 20WI series is the latest generation of dc-dc converter modules with highest power density. The product achieves 20 Watt 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 ultra wide 4:1 input voltage range and precisely regulated output voltages. 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. 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.
THL 20-2410WI	9 – 36 VDC (24 VDC nominal)	3.3 VDC	4500 mA	87 %
THL 20-2411WI		5.0 VDC	4000 mA	89 %
THL 20-2412WI		12 VDC	1670 mA	89 %
THL 20-2413WI		15 VDC	1340 mA	89 %
THL 20-2415WI		24 VDC	835 mA	88 %
THL 20-2422WI		$\pm 12$ VDC	$\pm 835$ mA	89 %
THL 20-2423WI		$\pm 15$ VDC	$\pm 670$ mA	89 %
THL 20-4810WI	18 – 75 VDC (48 VDC nominal)	3.3 VDC	4500 mA	88 %
THL 20-4811WI		5.0 VDC	4000 mA	89 %
THL 20-4812WI		12 VDC	1670 mA	89 %
THL 20-4813WI		15 VDC	1340 mA	89 %
THL 20-4815WI		24 VDC	835 mA	88 %
THL 20-4822WI		$\pm 12$ VDC	$\pm 835$ mA	89 %
THL 20-4823WI		$\pm 15$ VDC	$\pm 670$ mA	89 %

### Input Specifications

<b>Input current at no load</b> (at nominal input voltage)	- 24 Vin	3.3 VDC models: <b>80 mA typ.</b> 5.0 VDC models: <b>90 mA Typ.</b> all other models: <b>40 mA typ.</b>
	- 48 Vin	3.3 VDC models: <b>40 mA typ.</b> 5.0 VDC models: <b>45 mA typ.</b> all other models: <b>25 mA typ.</b>
<b>Input current at full load</b> (at nominal input voltage)	- 24 Vin	3.3 VDC models: <b>700 mA typ.</b> other models: <b>940 mA typ..</b>
	- 48 Vin	3.3 VDC models: <b>350 mA typ.</b> other models: <b>470 mA typ.</b>
<b>Start-up voltage</b>		24 V models: <b>9 VDC (or lower)</b> 48 V models: <b>18 VDC (or lower)</b>
<b>Surge voltage</b> (1 s max.)		24 Vin models: <b>50 V max.</b> 48 Vin models: <b>100 V max.</b>
<b>Reflected input ripple current</b>	24 Vin models:	<b>50 mAp-p typ.</b>
	48 Vin models:	<b>30 mAp-p typ.</b>
<b>Conducted noise</b> (input)		<b>EN 55032 class A, FCC part 15, level A with ext. components</b> (see application note)
<b>ESD</b> (electrostatic discharge)		<b>EN 61000-4-2, air ±8 kV, contact ±4 kV, perf. criteria B</b>
<b>Radiated immunity</b>		<b>EN 61000-4-3, 10 V/m, perf. criteria A</b>
<b>Recommended input fuse</b> (slow blow)	24 Vin models:	<b>5000 mA</b>
	48 Vin models:	<b>2500 mA</b>

### Output Specifications

<b>Voltage set accuracy</b>		<b>±1 %</b>
<b>Output voltage adj. range</b>		<b>±10 %</b> for single output models only
	- For further information see application note	<a href="http://www.tracopower.com/overview/thl20wi">www.tracopower.com/overview/thl20wi</a>
<b>Regulation</b>	- Input variation (Vmin – Vmax)	single output models: <b>0.2 % max.</b> dual output models: <b>0.5 % max.</b>
	- Load variation	single output models: <b>0.5 % max.</b> (0 – 100 % load) dual output models: <b>1.0 % max.</b> (8 – 100 % balanced load)
<b>Minimum load</b>	single output models:	<b>not required</b>
	dual output models:	<b>8 % of rated max current</b> (operation at lower load condition will not damage the converters. However, they may not meet all listed specifications)
<b>Ripple and noise</b> (20 MHz bandwidth)	3.3 & 5.0 VDC models:	<b>75 mVp-p typ.</b>
	12 & 15 VDC models:	<b>100 mVp-p typ.</b>
	24 VDC models:	<b>150 mVp-p typ.</b> Measured with a 1µF M/C and a 10µF T/C
<b>Temperature coefficient</b>		<b>±0.02 %/K</b>
<b>Output current limitation</b>		<b>at 150 % of Iout max., foldback</b>
<b>Short circuit protection</b>		<b>indefinite, automatic recovery</b>
<b>Transient response setting time</b>		<b>300 µs typ.</b> (25% load step change)
<b>Max. capacitive load</b>	3.3 VDC models:	<b>10'300 µF</b>
	5 VDC models:	<b>6'800 µF</b>
	12 VDC models:	<b>1'200 µF</b>
	15 VDC models:	<b>750 µF</b>
	24 VDC models:	<b>300 µF</b>
	±12 VDC models:	<b>680 µF</b> (each output)
	±15 VDC models:	<b>380 µF</b> (each output)

## General Specifications

<b>Temperature ranges</b>	<ul style="list-style-type: none"> <li>- Operating (convection cooling 50 LFM, 0.25 m/s)</li> <li>- Operating with heat sink (natural convection 20 LFM)</li> <li>- Case temperature</li> <li>- Storage</li> </ul>	<ul style="list-style-type: none"> <li>-40°C to +75°C (with derating)</li> <li>-40°C to +85°C (with derating)</li> <li>+105°C max.</li> <li>-50°C to +125°C</li> </ul>
<b>Load derating</b> (convection cooling 50 LFM, 0.25 m/s)	<ul style="list-style-type: none"> <li>- without heat sink</li> <li>- with heat sink</li> </ul>	<ul style="list-style-type: none"> <li>24 Vin; 3.3 VDC models: 2.5 %/K above +64°C</li> <li>48 Vin; 3.3 VDC models: 2.7 %/K above +68°C</li> <li>5, 12 &amp; 15 VDC single output models: 2.2 %/K above +60°C</li> <li>24 VDC output models: 2.0 %/K above +55°C</li> <li>dual output models: 2.2 %/K above +60°C</li> <li>24 V; 3.3 VDC models: 3.3 %/K above +70°C</li> <li>48 V; 3.3 VDC models: 3.2 %/K above +74°C</li> <li>5, 12 &amp; 15 VDC output models: 3.1 %/K above +67°C</li> <li>24 VDC output models: 2.7 %/K above +63°C</li> <li>dual output models: 3.1 %/K above +67°C</li> </ul>
<b>Thermal impedance</b>	<ul style="list-style-type: none"> <li>- Natural convection</li> <li>- Natural convection with heat sink</li> </ul>	<ul style="list-style-type: none"> <li>18.2°C/W</li> <li>15.3°C/W</li> </ul>
<b>Humidity</b> (non condensing)		95 % rel H max.
<b>Reliability, calculated MTBF</b> (MIL-HDBK-217F, at +25°C, ground benign)		>451'600 h
<b>Isolation voltage</b> (60 s)	- Input/Output	1500 VDC
<b>Isolation capacitance</b>	<ul style="list-style-type: none"> <li>- Input/Output (100 kHz, 1 V)</li> <li>- Input/Case</li> <li>- Output/Case</li> </ul>	<ul style="list-style-type: none"> <li>1500 pF max.</li> <li>1000 VDC</li> <li>1000 VDC</li> </ul>
<b>Isolation resistance</b>	- Input/Output (500 VDC)	>1000 MOhm
<b>Remote On/Off</b>	<ul style="list-style-type: none"> <li>- On:</li> <li>- Off:</li> <li>- Off idle current:</li> </ul>	<ul style="list-style-type: none"> <li>3.5 ... 12 VDC or open circuit</li> <li>0 ... 1.2 VDC or short circuit pin 6 and pin 2</li> <li>10 mA</li> </ul>
<b>Switching frequency</b> (fixed)		330 kHz typ. (pulse width modulation PWM)
<b>Altitude during operation</b>		5'000 m max. (16'400 ft) approved
<b>Safety standards</b> (designed to meet)		UL/cUL 60950-1, IEC/EN 60950-1
<b>Safety approvals</b>	<ul style="list-style-type: none"> <li>- CSA certificate of compliance</li> <li>- CB test certificate</li> <li>- Certification documents</li> </ul>	<ul style="list-style-type: none"> <li>CAN/CSA-C22.2 No 60950-1-07, Am 1:2011</li> <li>ANSI/UL Std No 60950-1, 2nd Ed, AM 1:2011</li> <li>IEC 60950-1:2005 2nd Ed, Am 1:2009</li> <li><a href="http://www.tracopower.com/overview/thl20wi">www.tracopower.com/overview/thl20wi</a></li> </ul>
<b>Environmental compliance</b>	<ul style="list-style-type: none"> <li>- Reach</li> <li>- RoHS</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a></li> <li>RoHS directive 2011/65/EU</li> </ul>

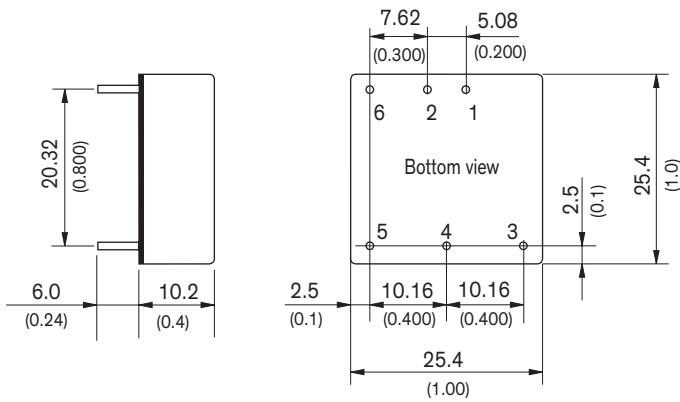
## Physical Specifications

<b>Casing material</b>	aluminium alloy
<b>Pin material</b>	copper alloy with gold plating nickel subplate
<b>Baseplate</b>	non conductive FR4
<b>Potting material</b>	epoxy (UL 94V-0 rated)
<b>Weight</b>	15 g (0.53 oz)
<b>Soldering temperature</b>	260°C / 10 s max.

**Application note :** [www.tracopower.com/overview/thl20wi](http://www.tracopower.com/overview/thl20wi)

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:** THL-HS1

(cont.: heat-sink, thermal pad, 2 clamps)

**Material:** Aluminum

**Finish:** Anodic treatment (black)

**Weight:** 4 g (0.14 oz) without converter

Thermal impedance after assembling: 15.8 K/W

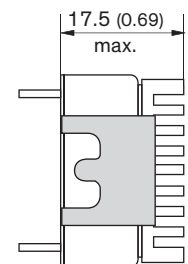
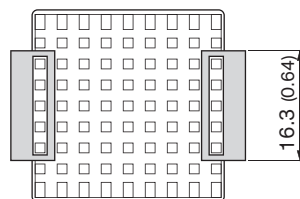
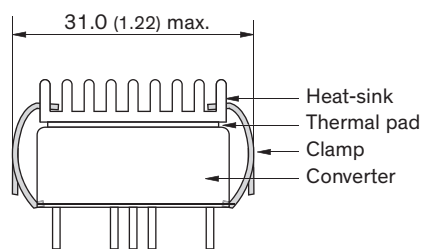


**Note:**

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)

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View THL 20-2413WI on WIN SOURCE](#)
-  [Traco Power Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management