

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°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 | | ± 12 VDC | ± 835 mA | 89 % |
| THL 20-2423WI | | ± 15 VDC | ± 670 mA | 89 % |
| THL 20-4810WI | | 18 – 75 VDC (48 VDC nominal) | 3.3 VDC | 4500 mA |
| THL 20-4811WI | 5.0 VDC | | 4000 mA | 89 % |
| THL 20-4812WI | 12 VDC | | 1670 mA | 89 % |
| THL 20-4813WI | 15 VDC | | 1340 mA | 90 % |
| THL 20-4815WI | 24 VDC | | 835 mA | 88 % |
| THL 20-4822WI | ± 12 VDC | | ± 835 mA | 89 % |
| THL 20-4823WI | ± 15 VDC | | ± 670 mA | 89 % |

Input Specifications

| | | |
|---|--|--|
| Input current at no load (at nominal input voltage) | 24 V single output models: 24 V dual output models: 48 V single output models: 48 V dual output models: | 80 mA typ. 40 mA typ. 40 mA typ. 25 mA typ. |
| Input current at full load (at nominal input voltage) | 24 V; 3.3 VDC models: 24 V; other models: 48 V; 3.3 VDC models: 48 V; other models: | 700 mA typ. 940 mA typ.. 350 mA typ. 470 mA typ. |
| Start-up voltage | 24 V models: 48 V models: | 9 VDC (or lower) 18 VDC (or lower) |
| Surge voltage (1 sec. max.) | 24 Vin models: 48 Vin models: | 50 V max. 100 V max. |
| Reflected input ripple current | 24 V models: 48 V models: | 50 mA _{p-p} typ. 30 mA _{p-p} typ. |
| Conducted noise (input) | | EN 55022 class A, FCC part 15, level A with external components (see application note) |
| ESD (electrostatic discharge) | | EN 61000-4-2, air ±8 kV, contact ±4 kV, perf. criteria B |
| Radiated immunity | | EN 61000-4-3, 10 V/m, perf. criteria A |
| Recommended input fuse (slow blow) | 24 V models: 48 V models: | 5000 mA 2500 mA |

Output Specifications

| | | |
|-------------------------------------|--|---|
| Voltage set accuracy | | ±1 % |
| Output voltage adj. range | | ±10 % for single output models only. Trim up via resistor over Trim and -Vout Trim down via resistor over Trim and +Vout (Resistor values tba, 0 Ohm=max. adjustment) |
| Regulation | – Input variation (Vmin – Vmax) – Load variation | single output models: 0.2 % max. dual output models: 0.5 % max. single output models: 0.5 % max. (0 – 100 % load) dual output models: 1.0 % max. (8 – 100 % balanced load) |
| Minimum load | | single output models: not required dual output models: 8 % of rated max current (operation at lower load condition will not damage the converters. However, they may not meet all listed specifications) |
| Ripple and noise (20 MHz bandwidth) | 3.3 & 5.0 VDC models: 12 & 15 VDC models: 24 VDC models: | 75 mV _{p-p} typ. 100 mV _{p-p} typ. 150 mV _{p-p} typ. Measured with a 1μF M/C and a 10μF T/C |
| Temperature coefficient | | ±0.02 %/K |
| Output current limitation | | at 150 % of Iout max., foldback |
| Short circuit protection | | indefinite, automatic recovery |
| Transient response setting time | | 300 μs typ. (25% load step change) |
| Max. capacitive load | 3.3 VDC models: 5 VDC models: 12 VDC models: 15 VDC models: 24 VDC models: ±12 VDC models: ±15 VDC models: | 10'300 μF 6'800 μF 1'200 μF 750 μF 300 μF 680 μF (each output) 380 μF (each output) |

General Specifications

| | | |
|---|--|--|
| Temperature ranges | <ul style="list-style-type: none"> - Operating (convection cooling 50 LFM, 0.25 m/s) - Operating with heat sink (natural convection 20 LFM) - Case temperature - Storage | <ul style="list-style-type: none"> -40°C to +75°C (with derating) -40°C to +85°C (with derating) +105°C max. -50°C to +125°C |
| Load derating (convection cooling 50 LFM, 0.25 m/s) | <ul style="list-style-type: none"> - without heat sink <li style="padding-left: 20px;">24 V; 3.3 VDC models: <li style="padding-left: 20px;">48 V; 3.3 VDC models: <li style="padding-left: 20px;">5, 12 & 15 VDC single output models: <li style="padding-left: 20px;">24 VDC output models: <li style="padding-left: 40px;">dual output models: - with heat sink <li style="padding-left: 20px;">24 V; 3.3 VDC models: <li style="padding-left: 20px;">48 V; 3.3 VDC models: <li style="padding-left: 20px;">5, 12 & 15 VDC output models: <li style="padding-left: 20px;">24 VDC output models: <li style="padding-left: 40px;">dual output models: | <ul style="list-style-type: none"> 2.5 %/K above +64°C 2.7 %/K above +68°C 2.2 %/K above +60°C 2.0 %/K above +55°C 2.2 %/K above +60°C 3.3 %/K above +70°C 3.2 %/K above +74°C 3.1 %/K above +67°C 2.7 %/K above +63°C 3.1 %/K above +67°C |
| Thermal inpedance | <ul style="list-style-type: none"> - Natural convection - Natural convection with heat sink | <ul style="list-style-type: none"> 18.2°C/W 15.8°C/W |
| Humidity (non condensing) | | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | | >346'000 h |
| Isolation voltage (60sec.) | - Input/Output | 1500 VDC |
| Isolation capacitance | - Input/Output | 1500 pF typ. |
| Isolation resistance | - Input/Output (500 VDC) | >1000 MOhm |
| Remote On/Off | <ul style="list-style-type: none"> - On: - Off: - Off idle current: | <ul style="list-style-type: none"> 3.5 ... 15 VDC or open circuit 0 ... 1.2 VDC or short circuit pin 6 and pin 2 8 mA |
| Switching frequency (fixed) | | 330 kHz typ. (pulse width modulation PWM) |
| Altitude during operation | | 5'000 m max. (16400 ft) approved |
| Safety standards (designed to meet) | | UL/cUL 60950-1, IEC/EN 60950-1 |
| Safety approvals | <ul style="list-style-type: none"> - CB test certificate according IEC 60950-1 - CSA certificate for UL/cUL 60950-1 | www.tracopower.com/products/thl20wi-cb.pdf www.tracopower.com/products/thl20wi-csa.pdf |
| Environmental compliance | <ul style="list-style-type: none"> - Reach - RoHS | www.tracopower.com/products/thl20wi-reach.pdf RoHS directive 2011/65/EU |

Physical Specifications

| | |
|-----------------------|------------------------|
| Casing material | metal |
| Baseplate | non conductive FR4 |
| Potting material | epoxy (UL 94V-0 rated) |
| Weight | 15 g (0.53 oz) |
| Soldering temperature | max. 260°C / 10sec. |

Application note : www.tracopower.com/products/thl20wi-application.pdf

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 | |

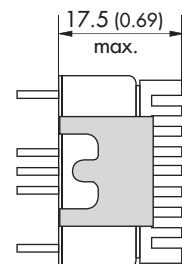
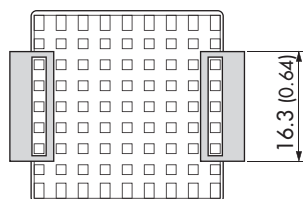
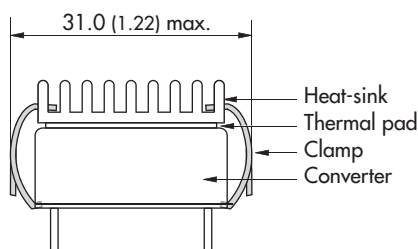
Dimensions in [mm], () = Inch
 Pin diameter \varnothing 1.0 (0.04)
 Pin pitch tolerances: ± 0.25 (± 0.01)
 Tolerances: ± 0.5 (± 0.02)

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