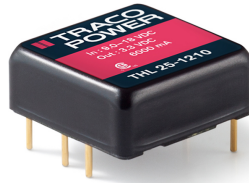


- High power density 25W converter
Ultra compact design: 1.0" x 1.0" x 0.4"
- Shielded metal case with isolated baseplate
- Wide 2:1 input voltage ranges
- Very high efficiency up to 90%
- Output voltage adjustable
- Remote On/Off control
- Operating temp. range -40°C to $+80^{\circ}\text{C}$
and up to $+85^{\circ}\text{C}$ with heat-sink
- I/O isolation voltage 1500 VDC
- 3-year product warranty



The THL 25 series is a generation of DC-DC converter modules with high power density. The product achieves 25 Watt output power and comes in a metal case with small 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. High efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to $+80^{\circ}\text{C}$ or up to $+85^{\circ}\text{C}$ 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 1		Output 2		Efficiency typ.
		Vnom	I _{max}	Vnom	I _{max}	
THL 25-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	6'000 mA			87 %
THL 25-1211		5 VDC	5'000 mA			89 %
THL 25-1212		12 VDC	2'090 mA			89 %
THL 25-1213		15 VDC	1'670 mA			89 %
THL 25-1222		+12 VDC	1'040 mA	-12 VDC	1'040 mA	89 %
THL 25-1223		+15 VDC	840 mA	-15 VDC	840 mA	89 %
THL 25-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	6'000 mA			88 %
THL 25-2411		5 VDC	5'000 mA			90 %
THL 25-2412		12 VDC	2'090 mA			90 %
THL 25-2413		15 VDC	1'670 mA			90 %
THL 25-2422		+12 VDC	1'040 mA	-12 VDC	1'040 mA	89 %
THL 25-2423		+15 VDC	840 mA	-15 VDC	840 mA	89 %
THL 25-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	6'000 mA			88 %
THL 25-4811		5 VDC	5'000 mA			90 %
THL 25-4812		12 VDC	2'090 mA			90 %
THL 25-4813		15 VDC	1'670 mA			90 %
THL 25-4822		+12 VDC	1'040 mA	-12 VDC	1'040 mA	89 %
THL 25-4823		+15 VDC	840 mA	-15 VDC	840 mA	89 %

Options	
THL-HS1	- Optional Heat Sink: www.tracopower.com/products/thl-hs1.pdf

Input Specifications

Input Current	- At no load	12 Vin models: 80 mA typ. 24 Vin models: 55 mA typ. 48 Vin models: 40 mA typ.
	- At full load	12 Vin models: 1'900 mA typ. (3.3 Vout model) 2'350 mA typ. (5 Vout model) 2'350 mA typ. (12 Vout model) 2'350 mA typ. (15 Vout model) 2'350 mA typ. (12 / -12 Vout model) 2'350 mA typ. (15 / -15 Vout model) 24 Vin models: 950 mA typ. (3.3 Vout model) 1'150 mA typ. (5 Vout model) 1'150 mA typ. (12 Vout model) 1'150 mA typ. (15 Vout model) 1'150 mA typ. (12 / -12 Vout model) 1'150 mA typ. (15 / -15 Vout model) 48 Vin models: 450 mA typ. (3.3 Vout model) 580 mA typ. (5 Vout model) 580 mA typ. (12 Vout model) 580 mA typ. (15 Vout model) 580 mA typ. (12 / -12 Vout model) 580 mA typ. (15 / -15 Vout model)
Surge Voltage		12 Vin models: 25 VDC max. (100 ms max.) 24 Vin models: 50 VDC max. (100 ms max.) 48 Vin models: 100 VDC max. (100 ms max.)
Reflected Ripple Current		12 Vin models: 80 mA_{p-p} typ. 24 Vin models: 50 mA_{p-p} typ. 48 Vin models: 30 mA_{p-p} typ.
Recommended Input Fuse		12 Vin models: 5'000 mA (slow blow) 24 Vin models: 2'500 mA (slow blow) 48 Vin models: 1'250 mA (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal LC-Type

Output Specifications

Output Voltage Adjustment		±10% (By external trim resistor) See application note: www.tracopower.com/overview/thl25 Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (V _{min} - V _{max})	single output models: 0.2% max. dual output models: 0.2% max.
	- Load Variation (0 - 100%)	single output models: 0.2% max. dual output models: 1% max. (Output 1) 1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models: 2% max.
	- Cross Regulation (25% / 100% asym. load)	dual output models: 5% max.

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: 100 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
		5 Vout models: 100 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
		12 Vout models: 150 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
		15 Vout models: 150 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
	- dual output	12 / -12 Vout models: 150 / 150 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
		15 / -15 Vout models: 150 / 150 mVp-p max. (w/ 1 μ F MLCC // 10 μ F Tantalum)
Capacitive Load	- single output	3.3 Vout models: 10'300 μF max.
		5 Vout models: 6'800 μF max.
		12 Vout models: 1'200 μF max.
		15 Vout models: 750 μF max.
	- dual output	12 / -12 Vout models: 680 / 680 μF max.
		15 / -15 Vout models: 380 / 380 μF max.
Minimum Load		Not required
Temperature Coefficient		± 0.02 %/K max.
Start-up Time		30 ms max. (Power On) 30 ms max. (Remote On)
Short Circuit Protection		Continuous, Automatic recovery
Output Current Limitation		150% typ. of Iout max.
Overvoltage Protection		118 - 125% of Vout nom. (depending on model) 3.9 VDC typ. (3.3 Vout models) 6.2 VDC typ. (5.1 Vout models) 15 VDC typ. (12 Vout models) 18 VDC typ. (15 Vout models)
Transient Response	- Response Deviation	3% typ. / 5% max. (75% to 100% Load Step)
	- Response Time	250 μs typ. (75% to 100% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1 EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/thl25

EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter)
	External filter proposal:	www.tracopower.com/overview/thl25
EMS Immunity	- Electrostatic Discharge	EN 55024 (IT Equipment) Air: EN 61000-4-2, ± 8 kV, perf. criteria A Contact: EN 61000-4-2, ± 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, ± 2 kV, perf. criteria A EN 61000-4-5, ± 1 kV, perf. criteria A
		Ext. input component: KY 220 μF, 100 V, ESR 48 mOhm
	- Conducted RF Disturbances	EN 61000-4-6, 10 Vrms, perf. criteria A

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

General Specifications

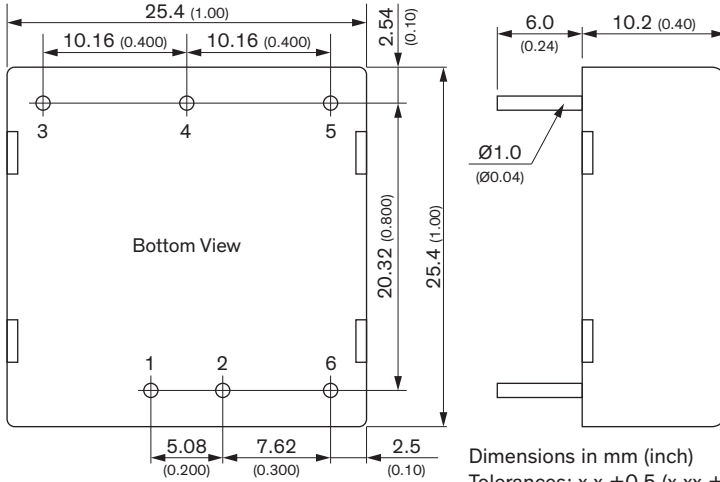
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +80°C
	- Case Temperature	-40°C to +85°C (with Heat Sink)
	- Storage Temperature	+105°C max.
		-50°C to +125°C
Power Derating	- High Temperature	Depending on model
		Depending on model (with Heat Sink)
		See application note: www.tracopower.com/overview/thl25
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 3.5 to 12 VDC or open circuit
		Off: 0 to 1.2 VDC or short circuit
		Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	3 mA typ.
	- Remote Pin Input Current	-0.5 to 0.5 mA
Altitude During Operation		6'000 m max.
Switching Frequency		285 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'500 VDC
	- Input to Output, 1 s	1'800 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'000 pF max.
Reliability	- Calculated MTBF	313'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product)
		See Cleaning Guideline: www.tracopower.com/info/cleaning.pdf
Housing Material		Alu alloy, black anodized coating
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Copper Alloy (C6801)
Pin Foundation Plating		Nickel (2.5 μm min.)
Pin Surface Plating		Gold (75 - 125 nm), glossy
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1" x 1"
Soldering Profile		Wave Soldering
		260°C / 10 s max.
Weight		16.5 g
Thermal Impedance	- Case to Ambient	17.6 K/W typ.
		14.8 K/W typ. (with Heat Sink)
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
		REACH SVHC list compliant
		REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf
		Exemptions: 7a
		(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/thl25
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All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Outline Dimensions



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