

- 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



UL 62368-1 IEC 62368-1

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/overview/thl-hs1
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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 mAp-p typ. 24 Vin models: 50 mAp-p typ. 48 Vin models: 30 mAp-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% (single output models only) (By external trim resistor) See application note: www.tracopower.com/thl25-adj Output power must not exceed rated power!
Voltage Set Accuracy		±1% max.
Regulation	- Input Variation (Vmin - Vmax)	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 μ F max.
		5 Vout models:	6'800 μ F max.
		12 Vout models:	1'200 μ F max.
		15 Vout models:	750 μ F max.
	- dual output	12 / -12 Vout models:	680 / 680 μ F max.
		15 / -15 Vout models:	380 / 380 μ F max.
Minimum Load	Not required		
Temperature Coefficient	$\pm$ 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 μ s typ. (75% to 100% Load Step)	

Safety Specifications

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/thl25-safety-cert
Energy Source	- Output, acc. to 62368-1	ES1
Power Source	- Output, acc. to 62368-1	PS3
Over Voltage Category		Not mains connected

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/thl25-emc-filter

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

EMS (Immunity)		EN 55024 (IT Equipment)
		EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, ± 8 kV, perf. criteria A
	- RF Electromagnetic Field	Contact: EN 61000-4-2, ± 6 kV, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-3, 10 V/m, perf. criteria A
		EN 61000-4-4, ± 2 kV, perf. criteria A
		EN 61000-4-5, ± 1 kV, perf. criteria A
		Ext. input component: KY 220 μ F, 100 V, ESR 48 mOhm
	- Conducted RF Disturbances	EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, 3 A/m, perf. criteria A
EMC / Environmental	- Certification Documents	www.tracopower.com/thl25-emc-cert

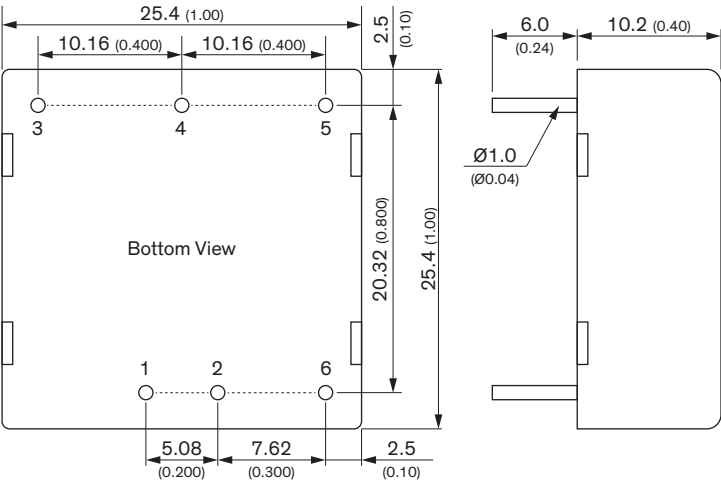
General Specifications		
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	-40°C to +80°C
	- Case Temperature	-40°C to +85°C (with heatsink THL-HS1)
	- Storage Temperature	+105°C max.
	- High Temperature	-50°C to +125°C
Power Derating		Depending on model
	See application note:	www.tracopower.com/thl25-cc
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.5 to 12 VDC or open circuit
		Off: 0 to 1.2 VDC or short circuit
	- Off Idle Input Current	Refers to 'Remote' and '-Vin' Pin
	- Remote Pin Input Current	3 mA typ.
Altitude During Operation		-0.5 to 0.5 mA
Switching Frequency		6'000 m max.
Insulation System		285 kHz typ. (PWM)
Isolation Test Voltage	- Input to Output, 60 s	Functional Insulation
	- Input to Output, 1 s	1'500 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'800 VDC
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'000 M Ω min.
Reliability	- Calculated MTBF	2'000 pF max.
Washing Process		313'000 h (MIL-HDBK-217F, ground benign)
Housing Material		According to Cleaning Guideline
Base Material		www.tracopower.com/info/cleaning.pdf
Potting Material		Alu alloy, black anodized coating
Pin Material		Non-conductive FR4 (UL 94 V-0 rated)
Pin Foundation Plating		Epoxy (UL 94 V-0 rated)
Pin Surface Plating		Copper Alloy (C6801)
Housing Type		Nickel (2.5 μ m min.)
Mounting Type		Gold (75 - 125 nm), glossy
Connection Type		Metal Case
Footprint Type		PCB Mount
Soldering Profile		THD (Through-Hole Device)
Weight		1" x 1"
Thermal Impedance	- Case to Ambient	Lead-Free Wave Soldering
		260°C / 10 s max.
		16.5 g
		17.6 K/W typ.
		14.8 K/W typ. (with heatsink THL-HS1)

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

Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf
	- RoHS Declaration	REACH SVHC list compliant REACH Annex XVII compliant www.tracopower.com/info/rohs-declaration.pdf
	- SCIP Reference Number	Exemptions: 7(a) (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).) 417b0817-1715-4eb8-b5e7-d3a799dc1fad

Additional Information	
Supporting Documents	www.tracopower.com/overview/thl25
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

Outline Dimensions



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

Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
 x.xx ± 0.25 (x.xxx ±0.010)
Pin tolerances: x.x ±0.05 (x.xx ±0.002)

