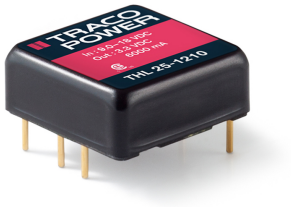
TRACO POWER

DC/DC Converter

THL 25 Series, 25 Watt

- **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°C and up to +85°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°C or up to +85°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
		Vnom	Imax	Vnom	Imax	typ.
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 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%** (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 (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 µF MLCC // 10 µF Tantalum)
		5 Vout models:	**100 mVp-p max.** (w/ 1 µF MLCC // 10 µF Tantalum)
		12 Vout models:	**150 mVp-p max.** (w/ 1 µF MLCC // 10 µF Tantalum)
		15 Vout models:	**150 mVp-p max.** (w/ 1 µF MLCC // 10 µF Tantalum)
	- dual output	12 / -12 Vout models:	**150 / 150 mVp-p max.** (w/ 1 µF MLCC // 10 µF Tantalum)
		15 / -15 Vout models:	**150 / 150 mVp-p max.** (w/ 1 µF MLCC // 10 µF 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			EN 55024 (IT Equipment)
	- Electrostatic Discharge	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
			–40°C to +85°C (with Heat Sink)
	- Case Temperature		+105°C max.
	- Storage Temperature		–50°C to +125°C
Power Derating	- High Temperature	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			17.6 K/W
			14.8 K/W (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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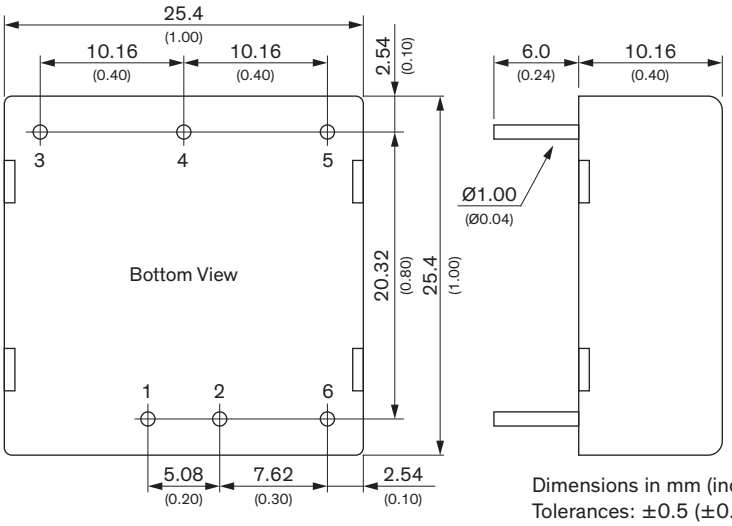
Outline Dimensions



Dimensions in mm (inch)
Tolerances: ±0.5 (±0.02)
Pin pitch tolerances ±0.25 (0.01)
Pin diameter Ø 1.0 (Ø 0.04)

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