TRACO POWER

DC/DC Converter

THN 20 Series, 20 Watt

- **Smallest encapsulated 20 W Converter! Ultra compact size: 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 +75°C and up to 85 °C with heat-sink**
- **I/O isolation voltage 1500 VDC**
- **Input filter meets EN 55022 class A without external components**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The THN 20 series is the latest generation of high performance DC/DC converter modules with highest power density. The product achieves 20 W output power while it comes in a metal case with 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, even under no load conditions. Highest efficiency of up to 90% makes this product very reliable and applicable in temperature ranges of up to 75°C or 85°C with optional mounted heat sink. Together with low input current characteristics at minimal load and remote On/Off control these converters are the ideal solution for battery-operated systems. Typical applications are in mobile equipment, 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.
THN 20-1210	9 - 18 VDC (12 VDC nom.)	3.3 VDC	4'500 mA			89 %
THN 20-1211		5 VDC	4'000 mA			89 %
THN 20-1212		12 VDC	1'670 mA			89 %
THN 20-1213		15 VDC	1'330 mA			89 %
THN 20-1222		+12 VDC	833 mA	–12 VDC	833 mA	89 %
THN 20-1223		+15 VDC	667 mA	–15 VDC	667 mA	90 %
THN 20-2410	18 - 36 VDC (24 VDC nom.)	3.3 VDC	4'500 mA			90 %
THN 20-2411		5 VDC	4'000 mA			91 %
THN 20-2412		12 VDC	1'670 mA			90 %
THN 20-2413		15 VDC	1'330 mA			91 %
THN 20-2422		+12 VDC	833 mA	–12 VDC	833 mA	90 %
THN 20-2423		+15 VDC	667 mA	–15 VDC	667 mA	90 %
THN 20-4810	36 - 75 VDC (48 VDC nom.)	3.3 VDC	4'500 mA			90 %
THN 20-4811		5 VDC	4'000 mA			90 %
THN 20-4812		12 VDC	1'670 mA			90 %
THN 20-4813		15 VDC	1'330 mA			90 %
THN 20-4822		+12 VDC	833 mA	–12 VDC	833 mA	89 %
THN 20-4823		+15 VDC	667 mA	–15 VDC	667 mA	90 %

Options

THN-HS1	- Optional Heat Sink: www.tracopower.com/overview/thn-hs1

Input Specifications

Input Current	- At no load	12 Vin models:	**10 mA typ.**
		24 Vin models:	**6 mA typ.**
		48 Vin models:	**4 mA typ.**
	- At full load	12 Vin models:	**1'510 mA typ.** (3.3 Vout model)
			1'960 mA typ. (5 Vout model)
			1'960 mA typ. (12 Vout model)
			1'960 mA typ. (15 Vout model)
			1'960 mA typ. (12 / -12 Vout model)
			1'960 mA typ. (15 / -15 Vout model)
		24 Vin models:	**755 mA typ.** (3.3 Vout model)
			970 mA typ. (5 Vout model)
			970 mA typ. (12 Vout model)
			970 mA typ. (15 Vout model)
			970 mA typ. (12 / -12 Vout model)
			970 mA typ. (15 / -15 Vout model)
		48 Vin models:	**375 mA typ.** (3.3 Vout model)
			485 mA typ. (5 Vout model)
			485 mA typ. (12 Vout model)
			485 mA typ. (15 Vout model)
			485 mA typ. (12 / -12 Vout model)
			485 mA typ. (15 / -15 Vout model)
Surge Voltage		12 Vin models:	**25 VDC max.** (1 s max.)
		24 Vin models:	**50 VDC max.** (1 s max.)
		48 Vin models:	**100 VDC max.** (1 s max.)
Under Voltage Lockout		12 Vin models:	**7.5 VDC min. / 8 VDC typ. / 8.8 VDC max.**
		24 Vin models:	**15.5 VDC min. / 16 VDC typ. / 17.5 VDC max.**
		48 Vin models:	**32.5 VDC min. / 33 VDC typ. / 35.5 VDC max.**
Reflected Ripple Current			**30 mAp-p typ.**
Recommended Input Fuse		12 Vin models:	**4'000 mA** (slow blow)
		24 Vin models:	**2'000 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 Pi-Type**

Output Specifications

Output Voltage Adjustment			**–10% to +20%** (24 Vout models) **±10%** (other models) (single output models only) (By external trim resistor)
		See application note:	www.tracopower.com/thn20-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:	**0.5% max.**
	- Load Variation (0 - 100%)	single output models:	**0.2% max.**
		dual output models:	**1% max.** (Output 1)
			1% max. (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models:	**5% max.**
Ripple and Noise (20 MHz Bandwidth)	- single output	3.3 Vout models:	**75 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)
		5 Vout models:	**75 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)
		12 Vout models:	**75 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)
		15 Vout models:	**75 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)
	- dual output	12 / -12 Vout models:	**100 / 100 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)
		15 / -15 Vout models:	**100 / 100 mVp-p typ.** (w/ 1 µF X7R || 10 µF TC)

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

Capacitive Load	- single output	3.3 Vout models:	7'000 µF max.
		5 Vout models:	5'000 µF max.
		12 Vout models:	850 µF max.
		15 Vout models:	700 µF max.
	- dual output	12 / -12 Vout models:	500 / 500 µF max.
		15 / -15 Vout models:	350 / 350 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Start-up Time			30 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			110 - 190% of Iout max. 150% typ. of Iout max.
Overvoltage Protection			112 - 164% of Vout nom.
Transient Response	- Response Time		250 µs typ. (25% Load Step)

Safety Specifications

Standards	- IT / Multimedia Equipment		EN 60950-1 EN 62368-1 IEC 60950-1 IEC 62368-1 UL 60950-1 UL 62368-1
	- Certification Documents		www.tracopower.com/thn20-safety-cert
Energy Source	- Output, acc. to 62368-1		ES1
Power Source	- Output, acc. to 62368-1		PS3
Pollution Degree			PD 2
Over Voltage Category			Not mains connected

EMC Specifications

EMI (Emissions)	- Conducted Emissions		EN 55032 class A (internal filter) EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55032 class A (internal filter) EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/thn20-emc-filter
EMS (Immunity)	- 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, ±2 kV, perf. criteria A
		Ext. input component:	220 µF, 100 V
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A

General Specifications

Relative Humidity			95% max. (non condensing)
Temperature Ranges	- Operating Temperature		-40°C to +75°C -40°C to +85°C (with heatsink THN-HS1)
	- Case Temperature		+105°C max.
	- Storage Temperature		-55°C to +125°C
Power Derating	- High Temperature		Depending on model
		See application note:	www.tracopower.com/thn20-cc
Cooling System			Natural convection (20 LFM)

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

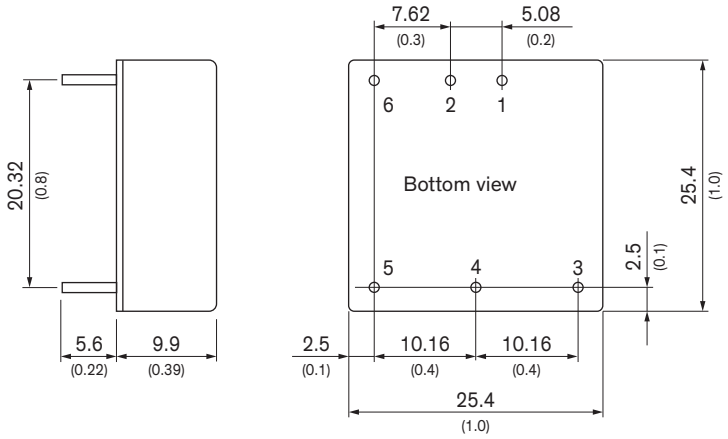
Remote Control	- Voltage Controlled Remote (passive = on)	On: 3.0 to 15 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2 mA typ.
	- Remote Pin Input Current	-0.5 to 1.0 mA
Altitude During Operation		5'000 m max.
Regulator Topology		Flyback Converter
Switching Frequency		275 kHz typ. (PWM) (±10%, 3.3 & 5 Vout model) 330 kHz typ. (PWM) (±10%, other models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
	- Input to Case, 60 s	1'000 VDC
	- Output to Case, 60 s	1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	1'000 pF max.
Reliability	- Calculated MTBF	1'400'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Copper, Nickel plated
Base Material		Non-conductive FR4 (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Copper
Pin Foundation Plating		Nickel (2 - 3 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		1" x 1"
Soldering Profile		Lead-Free Wave Soldering 265°C / 10 s max.
Weight		15 g
Thermal Impedance	- Case to Ambient	17.6 K/W typ. 14.8 K/W typ. (with heatsink THN-HS1)
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: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	47872c3c-f3a0-4ad5-ab75-2fa773c171c1

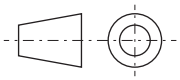
Additional Information

Supporting Documents	www.tracopower.com/overview/thn20
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

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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 (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

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