

## DC/DC Converter

## THD 15N Series, 15 Watt

Not recommended for new designs

- Highest power density in DIP 24 package
- Shielded metal case with isolated Baseplate
- Very high efficiency up to 91%
- Wide 2:1 input ranges
- No minimum load required
- Input filter meets EN 55022 class A without external components
- I/O isolation voltage 1500 VDC
- Operating temp. range : -40°C to +85°C
- Remote On/Off control
- Industry standard pinout
- 3-year product warranty



The THD 15N series models provide 15 Watt output power out of a very compact shielded metal case that occupies only 1 inch<sup>2</sup> of board space. The converters work with a high efficiency over the full load range and draw a very low input current at no load conditions. All models have a wide 2:1 input voltage range and a precisely regulated output voltage. Typical applications for these converters are mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on PCB is critical

Models						
Order Code	Input Voltage Range	Output 1		Output 2		Efficiency typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
THD 15-1210N *	9 - 18 VDC (12 VDC nom.)	3.3 VDC	4'000 mA			87 %
THD 15-1211N *		5.1 VDC	3'000 mA			90 %
THD 15-1212N *		12 VDC	1'250 mA			90 %
THD 15-1213N *		15 VDC	1'000 mA			90 %
THD 15-1221N *		+5 VDC	1'500 mA	-5 VDC	1'500 mA	86 %
THD 15-1222N *		+12 VDC	625 mA	-12 VDC	625 mA	90 %
THD 15-1223N *		+15 VDC	500 mA	-15 VDC	500 mA	90 %
THD 15-2410N *	18 - 36 VDC (24 VDC nom.)	3.3 VDC	4'000 mA			88 %
THD 15-2411N *		5.1 VDC	3'000 mA			90 %
THD 15-2412N *		12 VDC	1'250 mA			91 %
THD 15-2413N *		15 VDC	1'000 mA			91 %
THD 15-2421N *		+5 VDC	1'500 mA	-5 VDC	1'500 mA	87 %
THD 15-2422N *		+12 VDC	625 mA	-12 VDC	625 mA	90 %
THD 15-2423N *		+15 VDC	500 mA	-15 VDC	500 mA	90 %
THD 15-4810N *	36 - 75 VDC (48 VDC nom.)	3.3 VDC	4'000 mA			88 %
THD 15-4811N *		5.1 VDC	3'000 mA			90 %
THD 15-4812N *		12 VDC	1'250 mA			90 %
THD 15-4813N *		15 VDC	1'000 mA			91 %
THD 15-4821N *		+5 VDC	1'500 mA	-5 VDC	1'500 mA	87 %
THD 15-4822N *		+12 VDC	625 mA	-12 VDC	625 mA	90 %
THD 15-4823N *		+15 VDC	500 mA	-15 VDC	500 mA	90 %

Note \* Not recommended for new designs

## Input Specifications

Input Current	- At no load	12 Vin models: <b>8 mA typ.</b> 24 Vin models: <b>5 mA typ.</b> 48 Vin models: <b>4 mA typ.</b>
	- At full load	12 Vin models: <b>1'450 mA max.</b> 24 Vin models: <b>720 mA max.</b> 48 Vin models: <b>360 mA max.</b>
Surge Voltage		12 Vin models: <b>36 VDC max.</b> (1 s max.) 24 Vin models: <b>50 VDC max.</b> (1 s max.) 48 Vin models: <b>100 VDC max.</b> (1 s max.)
Under Voltage Lockout		12 Vin models: <b>7 VDC min. / 8 VDC typ. / 8.8 VDC max.</b> 24 Vin models: <b>15 VDC min. / 16 VDC typ. / 17.5 VDC max.</b> 48 Vin models: <b>32 VDC min. / 33.5 VDC typ. / 35 VDC max.</b>
Reflected Ripple Current		<b>20 mA<sub>p-p</sub> typ.</b>
Recommended Input Fuse		12 Vin models: <b>3'150 mA</b> (slow blow) 24 Vin models: <b>1'600 mA</b> (slow blow) 48 Vin models: <b>1'000 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Pi-Type</b>

## Output Specifications

Voltage Set Accuracy		<b>±1% max.</b>
Regulation	- Input Variation (V <sub>min</sub> - V <sub>max</sub> )	single output models: <b>0.2% max.</b> dual output models: <b>0.5% max.</b>
	- Load Variation (0 - 100%)	single output models: <b>0.5% max.</b> dual output models: <b>1% max.</b> (Output 1) <b>1% max.</b> (Output 2)
	- Cross Regulation (25% / 100% asym. load)	dual output models: <b>5% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>60 mV<sub>p-p</sub> typ.</b> (w/ 1 µF, 25 V, X7R, MLCC)
Capacitive Load	- single output	3.3 V <sub>out</sub> models: <b>4'700 µF max.</b> 5.1 V <sub>out</sub> models: <b>3'300 µF max.</b> 12 V <sub>out</sub> models: <b>600 µF max.</b> 15 V <sub>out</sub> models: <b>400 µF max.</b>
	- dual output	5 / -5 V <sub>out</sub> models: <b>1'500 / 1'500 µF max.</b> 12 / -12 V <sub>out</sub> models: <b>288 / 288 µF max.</b> 15 / -15 V <sub>out</sub> models: <b>200 / 200 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>60 ms max.</b> (Power On) <b>60 ms max.</b> (Remote On)
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>150% typ. of I<sub>out</sub> max.</b>
Overvoltage Protection		<b>118 - 125% of V<sub>out</sub> nom.</b> (depending on model) <b>3.9 VDC typ.</b> (3.3 V <sub>out</sub> models) <b>6.2 VDC typ.</b> (5.1 V <sub>out</sub> models) <b>15 VDC typ.</b> (12 V <sub>out</sub> models) <b>18 VDC typ.</b> (15 V <sub>out</sub> models)
Transient Response	- Response Deviation	<b>8% max.</b> (25% Load Step)
	- Response Time	<b>250 µs typ.</b> (25% Load Step)

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

## 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	<a href="http://www.tracopower.com/overview/thd15n">www.tracopower.com/overview/thd15n</a>
Pollution Degree		PD 2
Over Voltage Category		OVC I

## EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC 47 Part 15 class A (internal filter)
	- Radiated Emissions	EN 55032 class A (internal filter) EN 55032 class B (with external filter) FCC 47 Part 15 class A (internal filter)
	External filter proposal:	<a href="http://www.tracopower.com/overview/thd15n">www.tracopower.com/overview/thd15n</a>
EMS (Immunity)		EN 55024 (IT Equipment) EN 55035 (Multimedia)
	- Electrostatic Discharge	Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A Contact: EN 61000-4-2, $\pm 6$ kV, perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, $\pm 2$ kV, perf. criteria A EN 61000-4-5, $\pm 2$ kV, perf. criteria A
	- Conducted RF Disturbances	Ext. input component: Nippon chemi-con KY 220 $\mu$ F, 100 V 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 - Case Temperature - Storage Temperature	-40°C to +85°C +105°C max. -55°C to +125°C
Power Derating	- High Temperature	Depending on model
	See application note:	<a href="http://www.tracopower.com/overview/thd15n">www.tracopower.com/overview/thd15n</a>
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote (passive = on)  - Off Idle Input Current - Remote Pin Input Current	On: 3.0 to 12 VDC or open circuit Off: 0 to 1.2 VDC or short circuit Refers to 'Remote' and '-Vin' Pin 2.5 mA typ. -0.5 to 0.5 mA
Altitude During Operation		5'000 m max.
Switching Frequency		297 - 363 kHz (PWM) 330 kHz typ. (PWM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Case, 60 s	1'600 VDC 1'600 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 M $\Omega$ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	2'000 pF typ.
Reliability	- Calculated MTBF	1'800'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>

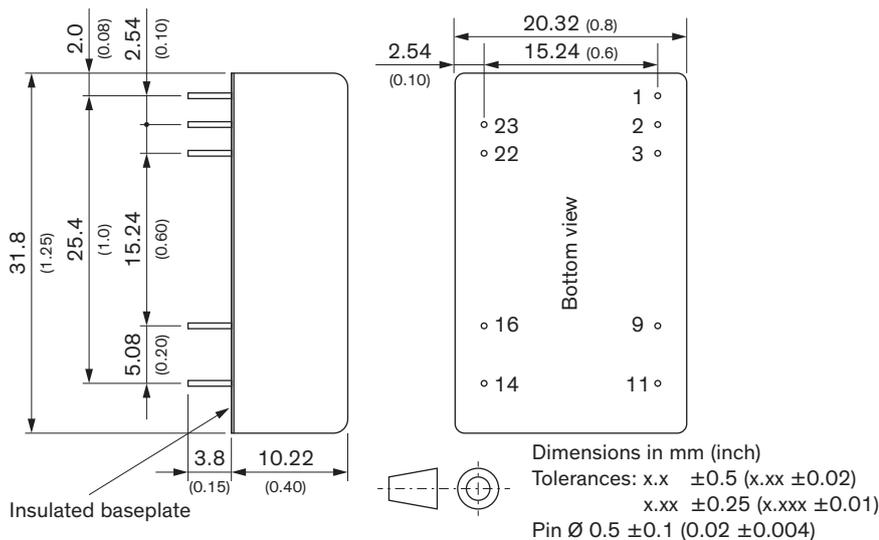
All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

Environment	- Vibration - Thermal Shock	MIL-STD-810F 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 $\mu\text{m}$ )
Pin Surface Plating		Tin (3 - 5 $\mu\text{m}$ ), matte
Housing Type		Metal Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP24
Soldering Profile		Lead-Free Wave Soldering 265°C / 10 s max.
Weight		16.2 g
Thermal Impedance	- Case to Ambient	20 K/W typ.
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - SCIP Reference Number	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule)) b9db1681-27a8-4582-8668-2de2b5959db2

### Additional Information

Supporting Documents	<a href="http://www.tracopower.com/overview/thd15n">www.tracopower.com/overview/thd15n</a>
Frequently Asked Questions	<a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>
Glossary	<a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a>

### Outline Dimensions



Pin	Pinout	
	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin (GND)	-Vin (GND)
3	-Vin (GND)	-Vin (GND)
9	NC	Common
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

NC: Not connected