

- 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



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<br>(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<br>(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<br>(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 %            |

## Input Specifications

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

## Output Specifications

|                           |                                            |                                                                                                                                                                                     |
|---------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage Set Accuracy      |                                            | ±1% max.                                                                                                                                                                            |
| Regulation                | - Input Variation (Vmin - Vmax)            | single output models: 0.2% max.<br>dual output models: 0.5% max.                                                                                                                    |
|                           | - Load Variation (0 - 100%)                | single output models: 0.5% max.<br>dual output models: 1% max. (Output 1)<br>1% max. (Output 2)                                                                                     |
|                           | - Cross Regulation (25% / 100% asym. load) | dual output models: 5% max.                                                                                                                                                         |
|                           |                                            |                                                                                                                                                                                     |
| Ripple and Noise          | - 20 MHz Bandwidth                         | 60 mVp-p typ.                                                                                                                                                                       |
| Capacitive Load           | - single output                            | 3.3 Vout models: 4'700 µF max.<br>5.1 Vout models: 3'300 µF max.<br>12 Vout models: 600 µF max.<br>15 Vout models: 400 µF max.                                                      |
|                           | - dual output                              | 5 / -5 Vout models: 1'500 / 1'500 µF max.<br>12 / -12 Vout models: 288 / 288 µF max.<br>15 / -15 Vout models: 200 / 200 µF max.                                                     |
| Minimum Load              |                                            | Not required                                                                                                                                                                        |
| Temperature Coefficient   |                                            | ±0.02 %/K max.                                                                                                                                                                      |
| Start-up Time             |                                            | 60 ms max. (Power On)<br>60 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.<br>(depending on model)<br>3.9 VDC typ. (3.3 Vout models)<br>6.2 VDC typ. (5.1 Vout models)<br>15 VDC typ. (12 Vout models)<br>18 VDC typ. (15 Vout models) |
| Transient Response        | - Response Deviation                       | 8% max. (25% Load Step)                                                                                                                                                             |
|                           | - Response Time                            | 250 µs typ. (25% Load Step)                                                                                                                                                         |

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

## Safety Specifications

|                       |                             |                                                                                            |
|-----------------------|-----------------------------|--------------------------------------------------------------------------------------------|
| Safety Standards      | - IT / Multimedia Equipment | EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>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)<br>EN 55032 class B (with external filter)<br>FCC Part 15 class A (internal filter)            |
|                           | - Radiated Emissions        | EN 55032 class A (internal filter)<br>EN 55032 class B (with external filter)<br>FCC 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              | - Electrostatic Discharge   | EN 55024 (IT Equipment)<br>Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>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<br>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<br>EN 61000-4-6, 10 Vrms, perf. criteria A                           |
|                           | - PF Magnetic Field         | Continuous: EN 61000-4-8, 100 A/m, perf. criteria A<br>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 +85°C                                                                                                   |
|                           | - Case Temperature              | +105°C max.                                                                                                      |
|                           | - Storage Temperature           | -55°C to +125°C                                                                                                  |
| Power Derating            | - High Temperature              | 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     | On: 3.0 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin     |
|                           | - Off Idle Input Current        | 2.5 mA typ.                                                                                                      |
|                           | - Remote Pin Input Current      | -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         | 1'600 VDC                                                                                                        |
|                           | - Input to Case, 60 s           | 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           |                                 | Allowed (hermetical product)                                                                                     |
|                           | See Cleaning Guideline:         | <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>                   |
| Environment               | - Vibration                     | MIL-STD-810F                                                                                                     |
|                           | - Thermal Shock                 | MIL-STD-810F                                                                                                     |
| Housing Material          |                                 | Copper, Nickel plated                                                                                            |

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

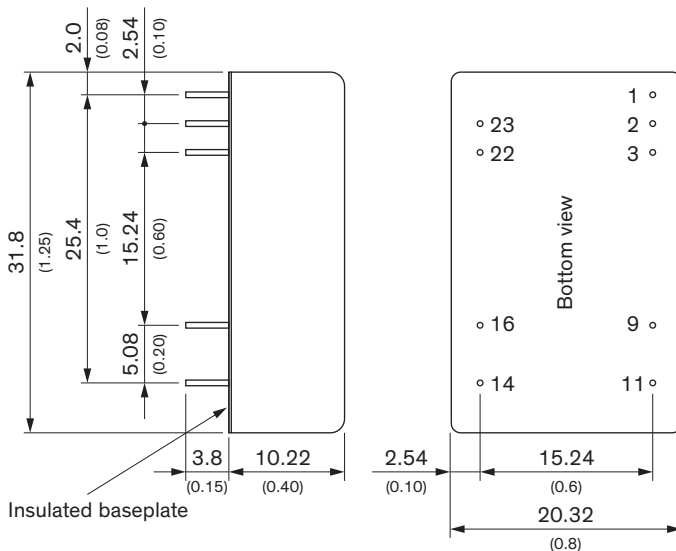
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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           | DIP24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Soldering Profile        | Wave Soldering<br>265°C / 10 s max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Weight                   | 16.2 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Thermal Impedance        | 20 K/W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Environmental Compliance | - REACH Declaration<br><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).<br>The SCIP number is provided on request.) |
|                          | - RoHS Declaration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/thd15n](http://www.tracopower.com/overview/thd15n)

### Outline Dimensions



Dimensions in mm (inch)  
Tolerances: x.x ±0.5 (x.xx ±0.02)  
x.xx ±0.25 (x.xxx ±0.01)  
Pin Ø 0.5 ±0.1 (0.02 ±0.004)

| Pinout |               |               |
|--------|---------------|---------------|
| Pin    | 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

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## TRACO Power:

|                                     |                                     |                                     |                                     |                                     |                                     |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <a href="#"><u>THD 15-2423N</u></a> | <a href="#"><u>THD 15-2411N</u></a> | <a href="#"><u>THD 15-1222N</u></a> | <a href="#"><u>THD 15-2413N</u></a> | <a href="#"><u>THD 15-2410N</u></a> | <a href="#"><u>THD 15-2412N</u></a> | <a href="#"><u>THD 15-4821N</u></a> |
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