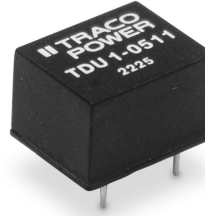


- Compact 1 Watt converter in DIP-8 package
- Continuous short circuit protection
- Unregulated outputs
- Operating temperature range -40 to +85 °C without derating
- I/O isolation 1'500 VDC
- Input voltage ranges ( $\pm 10\%$ ): 5, 12, 24 VDC
- Efficiency up to 83%
- 3-year product warranty



The TDU 1 series consists of a set of isolated 1 Watt DC/DC converters with unregulated outputs in a compact DIP-8 package. They are designed to offer a compact low-cost alternative to regulated series with no concession on quality and lifetime. They feature a continuous short circuit protection circuit, I/O-isolation of 1500 VDC and an operating temperature range from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  without derating. The compact dimensions of these converters make them an ideal solution for many space critical applications in communication equipment, instrumentation and industrial electronics.

## Models

Order Code	Input Voltage Range	Output Voltage nom.	Output Current max.	Efficiency typ.
TDU 1-0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	200 mA	80 %
TDU 1-0512		12 VDC	84 mA	82 %
TDU 1-0513		15 VDC	67 mA	83 %
TDU 1-1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	200 mA	79 %
TDU 1-1212		12 VDC	84 mA	81 %
TDU 1-1213		15 VDC	67 mA	82 %
TDU 1-2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	200 mA	78 %
TDU 1-2412		12 VDC	84 mA	80 %
TDU 1-2413		15 VDC	67 mA	81 %

## Input Specifications

Input Current	- At no load	5 Vin models: <b>30 mA typ. / 45 mA max.</b> 12 Vin models: <b>17 mA typ. / 25 mA max.</b> 24 Vin models: <b>10 mA typ. / 15 mA max.</b>
	- At full load	5 Vin models: <b>256 mA max.</b> (5 Vout model) <b>250 mA max.</b> (12 Vout model) <b>247 mA max.</b> (15 Vout model) 12 Vin models: <b>108 mA max.</b> (5 Vout model) <b>106 mA max.</b> (12 Vout model) <b>104 mA max.</b> (15 Vout model) 24 Vin models: <b>55 mA max.</b> (5 Vout model) <b>54 mA max.</b> (12 Vout model) <b>53 mA max.</b> (15 Vout model)
Surge Voltage		5 Vin models: <b>9 VDC max.</b> (1 s max.) 12 Vin models: <b>18 VDC max.</b> (1 s max.) 24 Vin models: <b>30 VDC max.</b> (1 s max.)
Recommended Input Fuse		5 Vin models: <b>600 mA</b> (slow blow) 12 Vin models: <b>250 mA</b> (slow blow) 24 Vin models: <b>150 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		Internal Capacitor

## Output Specifications

Voltage Set Accuracy		<b>±3% max.</b>
Regulation	- Input Variation (1% Vin step) - Load Variation	<b>1.5% max.</b> See application note: <a href="http://www.tracopower.com/overview/tdu1">www.tracopower.com/overview/tdu1</a>
Ripple and Noise	- 20 MHz Bandwidth	<b>100 mVp-p max.</b>
Capacitive Load		<b>220 µF max.</b>
Minimum Load		<b>2 % of Iout max.</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Short Circuit Protection		Continuous, Automatic recovery

## EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55032 class B (with external filter) External filter proposal: <a href="http://www.tracopower.com/overview/tdu1">www.tracopower.com/overview/tdu1</a>
EMS Immunity	- Electrostatic Discharge	Air: EN 61000-4-2, <b>±8 kV</b> , perf. criteria A Contact: EN 61000-4-2, <b>±6 kV</b> , perf. criteria A
	- RF Electromagnetic Field	EN 61000-4-3, <b>10 V/m</b> , perf. criteria A
	- EFT (Burst) / Surge	EN 61000-4-4, <b>±2 kV</b> , perf. criteria A EN 61000-4-5, <b>±1 kV</b> , perf. criteria A External filter proposal: <a href="http://www.tracopower.com/overview/tdu1">www.tracopower.com/overview/tdu1</a>
	- Conducted RF Disturbances	EN 61000-4-6, <b>10 Vrms</b> , perf. criteria A
	- PF Magnetic Field	Continuous: EN 61000-4-8, <b>30 A/m</b> , perf. criteria A

## General Specifications

Relative Humidity		<b>95% max.</b> (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	<b>-40°C to +85°C</b> (without derating) <b>+95°C max.</b> <b>-50°C to +125°C</b>
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.

Switching Frequency		20 - 95 kHz (Royer) 50 kHz typ. (Royer)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s	1'500 VDC 1'800 VDC
Creepage	- Input to Output	1.38 mm min.
Clearance	- Input to Output	1.38 mm min.
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	20 pF typ.
Reliability	- Calculated MTBF	5'000'000 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 - Mechanical Shock - Thermal Shock	IPC-9592B IPC-9592B IPC-9592B
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Phosphor Bronze (C5191)
Pin Foundation Plating		Nickel (1 μm min.)
Pin Surface Plating		Tin (3 - 5 μm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		DIP8
Soldering Profile		Wave Soldering 260°C / 4 s max.
Weight		2.1 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration	<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: No Exemptions

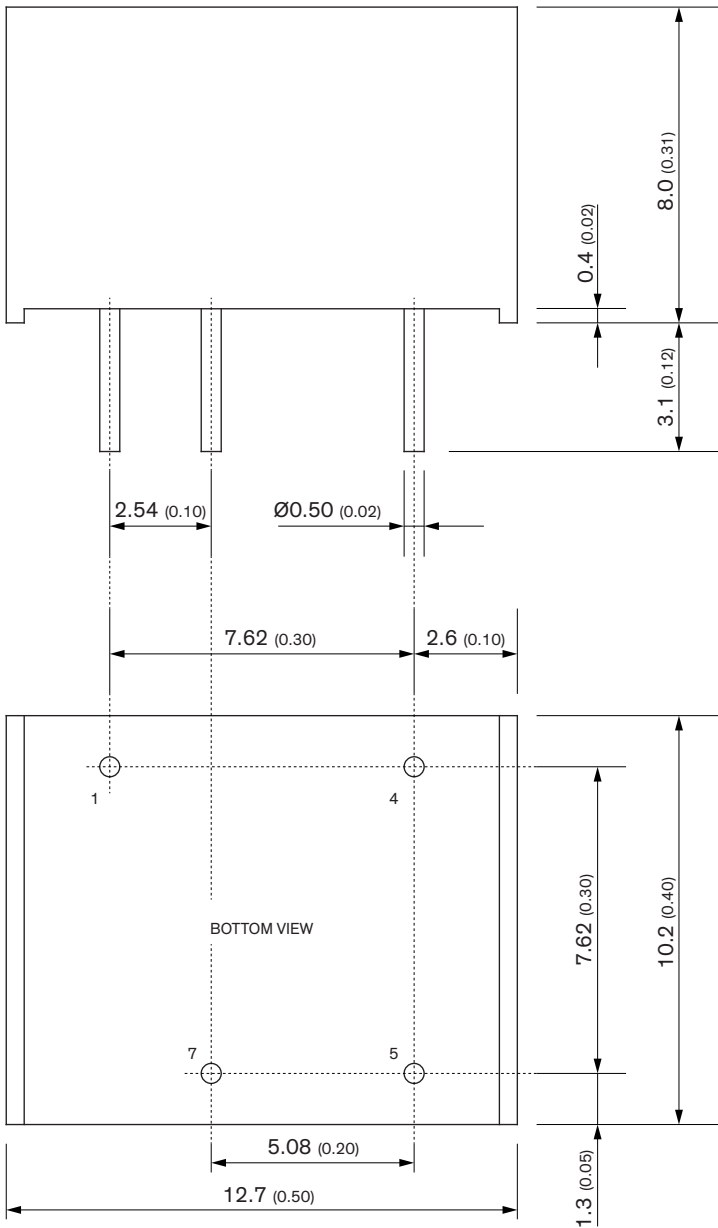
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tdu1](http://www.tracopower.com/overview/tdu1)

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

**Outline Dimensions**



Pinout	
Pin	Function
1	-Vin
4	+Vin
5	+Vout
7	-Vout

Dimensions in mm (inch)  
 Tolerances: x.x  $\pm 0.5$  ( $\pm 0.02$ )  
 x.xx  $\pm 0.25$  ( $\pm 0.01$ )  
 Pin tolerances:  $\pm 0.05$  ( $\pm 0.002$ )