

Unregulated DC/DC Converter

TDU 1 Series, 1 Watt

- 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°C to 85°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: 30 mA typ. / 45 mA max. 12 Vin models: 17 mA typ. / 25 mA max. 24 Vin models: 10 mA typ. / 15 mA max.
	- At full load	5 Vin models: 256 mA max. (5 Vout model) 250 mA max. (12 Vout model) 247 mA max. (15 Vout model) 12 Vin models: 108 mA max. (5 Vout model) 106 mA max. (12 Vout model) 104 mA max. (15 Vout model) 24 Vin models: 55 mA max. (5 Vout model) 54 mA max. (12 Vout model) 53 mA max. (15 Vout model)
Surge Voltage		5 Vin models: 9 VDC max. (1 s max.) 12 Vin models: 18 VDC max. (1 s max.) 24 Vin models: 30 VDC max. (1 s max.)
Recommended Input Fuse		5 Vin models: 600 mA (slow blow) 12 Vin models: 250 mA (slow blow) 24 Vin models: 150 mA (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		±3% max.
Regulation (Unregulated)	- Input Variation (1% Vin step) - Load Variation	1.5% max. See application note: www.tracopower.com/overview/tdu1
Ripple and Noise	- 20 MHz Bandwidth	100 mVp-p max.
Capacitive Load		220 µF max.
Minimum Load		See application note: www.tracopower.com/overview/tdu1
Temperature Coefficient		±0.02 %/K max.
Short Circuit Protection		Continuous, Automatic recovery

EMC Specifications

EMI (Emissions)	- Conducted Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter)
	- Radiated Emissions	EN 55032 class A (with external filter) EN 55032 class B (with external filter) External filter proposal: www.tracopower.com/overview/tdu1
EMS (Immunity)	- Electrostatic Discharge	EN 55024 (IT Equipment) EN 55035 (Multimedia) Air: EN 61000-4-2, ±8 kV, perf. criteria A Contact: EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field - EFT (Burst) / Surge	EN 61000-4-3, 10 V/m, perf. criteria A EN 61000-4-4, ±2 kV, perf. criteria A EN 61000-4-5, ±1 kV, perf. criteria A External filter proposal: www.tracopower.com/overview/tdu1
	- Conducted RF Disturbances - PF Magnetic Field	EN 61000-4-6, 10 Vrms, perf. criteria A Continuous: EN 61000-4-8, 30 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 (without derating) +95°C max. -50°C to +125°C

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

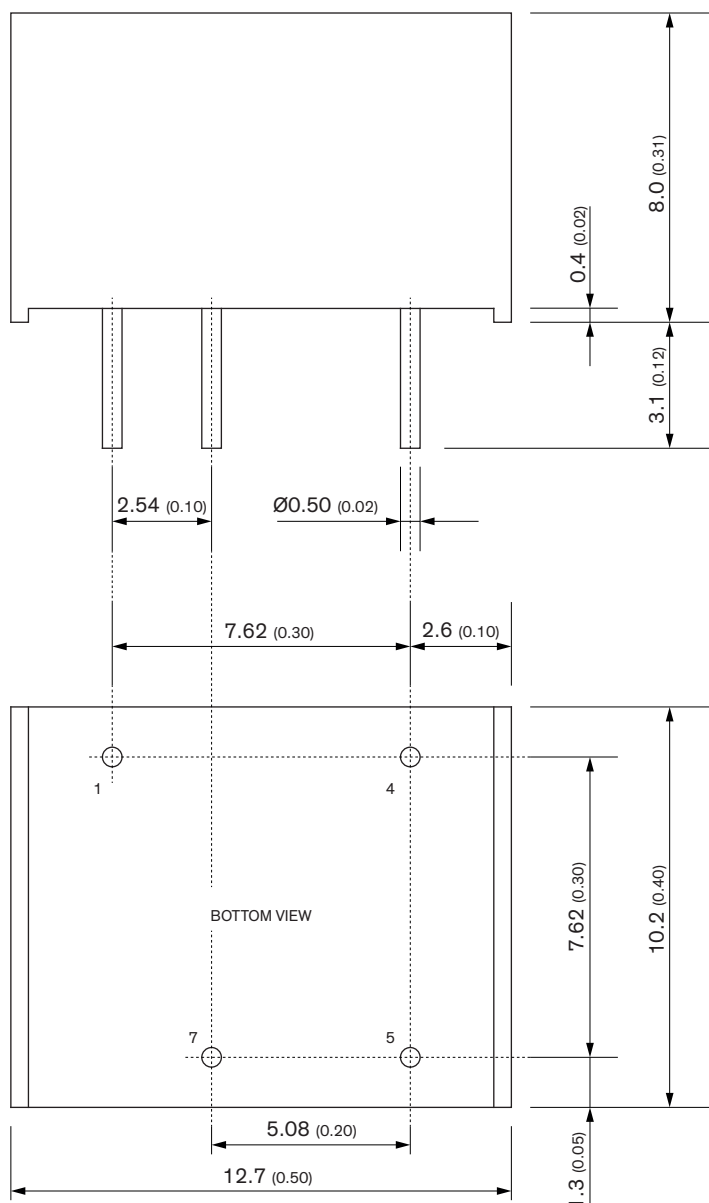
Cooling System	Natural convection (20 LFM)
Regulator Topology	Push-Pull Converter
Switching Frequency	20 - 95 kHz (Royer) 50 kHz typ. (Royer)
Insulation System	Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s 1'500 VDC 1'800 VDC
Creepage	- Input to Output 1.38 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	According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
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	Lead-Free Wave Soldering 260°C / 4 s max.
Weight	2.1 g
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: No Exemptions

Additional Information

Supporting Documents	www.tracopower.com/overview/tdu1
Frequently Asked Questions	www.tracopower.com/glossary-faq
Glossary	www.tracopower.com/info/glossary.pdf

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Outline Dimensions



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

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