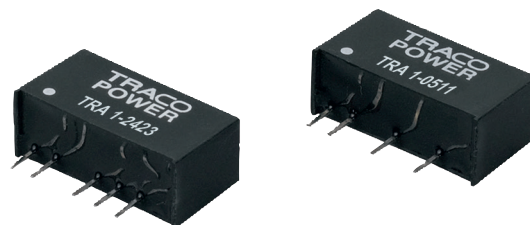


Features

- ◆ Semi-regulated output (load)
- ◆ Industry standard pinout
- ◆ High efficiency up to 88.5%
- ◆ Single and dual output models
- ◆ I/O isolation voltage 1000 VDC
- ◆ Operationally reliable up to 5'000m altitude
- ◆ Operating temperature range
-40°C to +95°C
- ◆ 3-year product warranty



The TRA 1 series are miniature, I/O-isolated 1W DC/DC-converters with a semi load regulation. They are the ideal solution to power drivers and circuits where unregulated DC/DC converters do not meet the input voltage range at load change.

Models

Order code	Input voltage	Output voltage	Output current max.	Load regulation max.	Efficiency typ.
TRA 1- 0511	5 VDC $\pm 10\%$	5 VDC	200 mA	6.5 %	84 %
TRA 1- 0519		9 VDC	110 mA	5 %	87 %
TRA 1- 0512		12 VDC	84 mA	5.2 %	87 %
TRA 1- 0513		15 VDC	67 mA	5 %	87.5 %
TRA 1- 0521		± 5 VDC	± 100 mA	5.2 %	84.5 %
TRA 1- 0522		± 12 VDC	± 42 mA	4.6 %	86.5 %
TRA 1- 0523		± 15 VDC	± 34 mA	4.5 %	86.5 %
TRA 1- 1211	12 VDC $\pm 10\%$	5 VDC	200 mA	5 %	84 %
TRA 1- 1219		9 VDC	110 mA	3.4 %	86.5 %
TRA 1- 1212		12 VDC	84 mA	3.4 %	88.5 %
TRA 1- 1213		15 VDC	67 mA	2.7 %	88 %
TRA 1- 1221		± 5 VDC	± 100 mA	3.9 %	84.5 %
TRA 1- 1222		± 12 VDC	± 42 mA	2.9 %	88.5 %
TRA 1- 1223		± 15 VDC	± 34 mA	2.6 %	87.5 %
TRA 1- 2411	24 VDC $\pm 10\%$	5 VDC	200 mA	3.7 %	84 %
TRA 1- 2419		9 VDC	110 mA	2.5 %	86.5 %
TRA 1- 2412		12 VDC	84 mA	2.4 %	87.5 %
TRA 1- 2413		15 VDC	67 mA	2.3 %	87.5 %
TRA 1- 2421		± 5 VDC	± 100 mA	3.7 %	83.5 %
TRA 1- 2422		± 12 VDC	± 42 mA	2.4 %	87 %
TRA 1- 2423		± 15 VDC	± 34 mA	2.3 %	87 %

Input Specifications

Input current no load / full load	5 Vin models 12 Vin models 24 Vin models	30 mA / 240 mA typ. 12 mA / 100 mA typ. 11 mA / 50 mA typ.
Surge voltage (1 s max.)	5 Vin models 12 Vin models 24 Vin models	9 V max. 18 V max. 30 V max.
Reflected input ripple current	12 Vin models other models	4 mA typ. 8 mA typ.
Input filter		internal capacitor
Recommended input fuse (slow blow type)	5 Vin models: 12 Vin models: 24 Vin models:	500 mA 200 mA 100 mA

Output Specifications

Voltage balance (dual output models, balanced loads)		0.1 % typ. / 1 % max.
Regulation	– Input variation (1 % change of Vin) – Load variation	1.05 % typ. / 1.2 % max. see model table and graph 1 on page 3
Ripple and noise (20 MHz Bandwidth)		60 mVp-p max.
Temperature coefficient		±0.01 %/K typ. / ±0.02 %/K max.
Short circuit		limited 0.5 s max.
Capacitive load	single output models: dual output models:	220 µF max. 100 µF max. (each output)

General Specifications

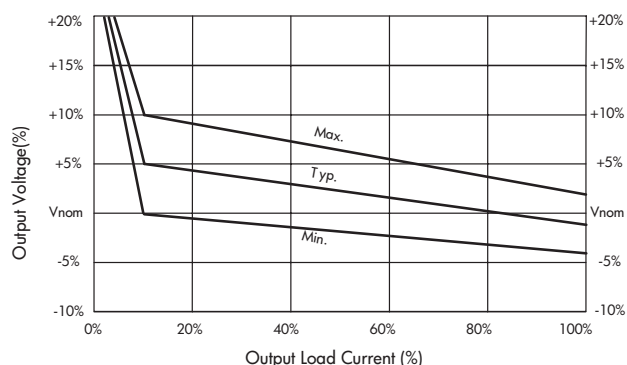
Temperature ranges	– Operating – Case temperature – Storage	–40°C to +95°C +95°C max. –50°C to +125°C
Derating		5 %/K above +85°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>2'000'000 h
Isolation voltage (60 s)	Input/Output	1'000 VDC
Isolation capacitance	Input/Output	60 pF typ. / 120 pF max.
Isolation resistance	Input/Output	>1'000 MOhm
Switching frequency		50 to 120 kHz (frequency modulation)
Altitude during operation		up to 5'000 m approved
Safety standards		IEC 60950-1:2005 (2nd edition) + Am 1:2009 EN 60950-1:2006 + Am 1:2010 + Am 11:2009
Safety approvals	– CB scheme – CSA certification – Certification documents	IEC 60950-1 UL 60950-1, CSA 60950-1-07 www.tracopower.com/overview/tra1

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

Physical Specifications

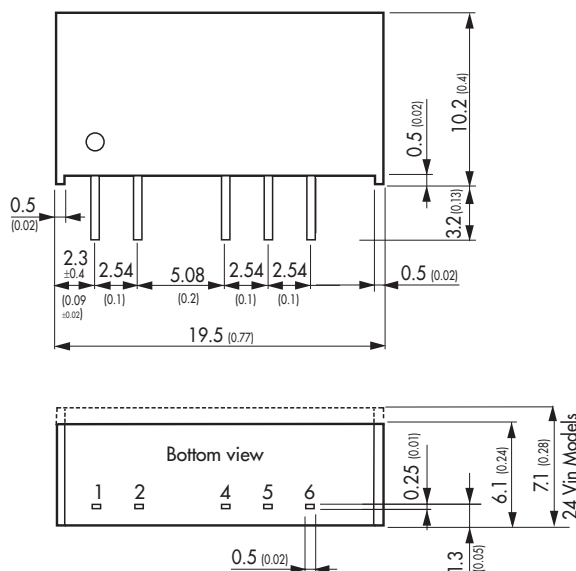
Casing material	non conductive plastic (UL 94V-0 rated)	
Weight	5 & 12 Vin models:	2.2 g (0.07 oz)
	24 Vin models:	2.6 g (0.09 oz)
Soldering temperature	max. 260°C, 10 s (1.5 mm from case)	
Environmental compliance	– Reach – RoHS www.tracopower.com/products/reach-declaration.pdf RoHS directive 2011/65/EU	

Graph 1: Load regulation



Supporting documents: www.tracopower.com/overview/tra1

Outline Dimensions



Pin-Out

Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
4	-Vout	-Vout
5	No pin	Common
6	+Vout	+Vout

Dimensions in [mm], () = Inch
 Pin pitch tolerances: ± 0.13 (± 0.005)
 Case tolerances: ± 0.25 (± 0.01)

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at www.tracopower.com

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TRACO Power:

[TRA 1-2412](#) [TRA 1-2423](#) [TRA 1-0511](#) [TRA 1-1211](#) [TRA 1-2413](#) [TRA 1-0519](#) [TRA 1-0513](#) [TRA 1-2421](#) [TRA 1-0521](#) [TRA 1-1223](#) [TRA 1-0523](#) [TRA 1-2422](#) [TRA 1-1212](#) [TRA 1-2411](#) [TRA 1-1213](#) [TRA 1-1219](#) [TRA 1-1221](#) [TRA 1-1222](#) [TRA 1-2419](#) [TRA 1-0522](#) [TRA 1-0512](#)