



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

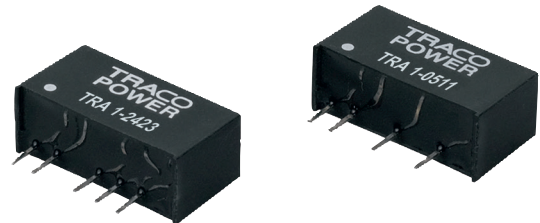
Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



### 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 ±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 ±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 ±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	30 mA / 240 mA typ.
	12 Vin models	12 mA / 100 mA typ.
	24 Vin models	11 mA / 50 mA typ.
Surge voltage (1 s max.)	5 Vin models	9 V max.
	12 Vin models	18 V max.
	24 Vin models	30 V max.
Reflected input ripple current	12 Vin models	4 mA typ.
	other models	8 mA typ.
Input filter	internal capacitor	
Reverse polarity input current	0.3 A max.	
Recommended input fuse (slow blow type)	5 Vin models:	500 mA
	12 Vin models:	200 mA
	24 Vin models:	100 mA

### Output Specifications

Voltage balance (dual output models, balanced loads)	0.1 % typ. / 1 % max.	
Regulation	- Input variation (1 % change of Vin)	1.05 % typ. / 1.2 % max.
	- Load variation	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:	220 µF max.
	dual output models:	100 µF max. (each output)

### General Specifications

Temperature ranges	- Operating	-40°C to +95°C
	- Case temperature	+95°C max.
	- Storage	-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	IEC 60950-1
	- CSA certification	UL 60950-1, CSA 60950-1-07
	- Certification documents	<a href="http://www.tracopower.com/overview/tra1">www.tracopower.com/overview/tra1</a>

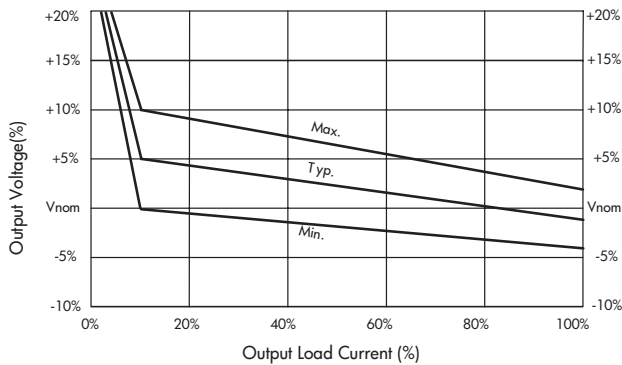
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.



**Physical Specifications**

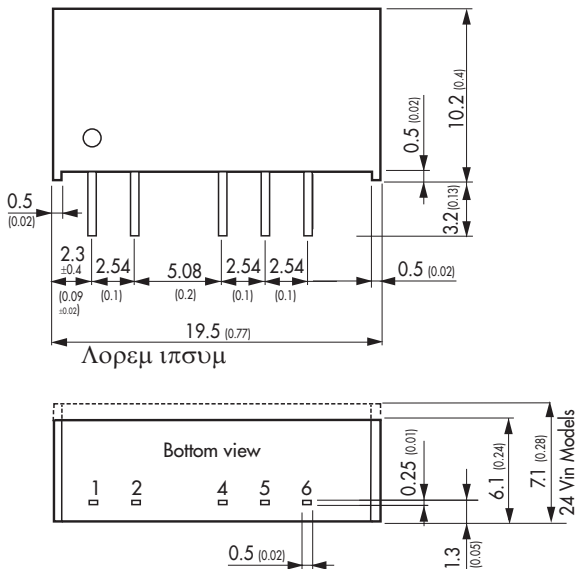
Casing material	non conductive plastic (UL 94V-0 rated)	
Weight	5 & 12 Vin models: <b>2.2 g</b> (0.07 oz)	24 Vin models: <b>2.6 g</b> (0.09 oz)
Soldering temperature	max. 260°C, 10 s (1.5 mm from case)	
Environmental compliance	- Reach - RoHS	<a href="http://www.tracopower.com/products/reach-declaration.pdf">www.tracopower.com/products/reach-declaration.pdf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

Graph 1: Load regulation



Supporting documents: [www.tracopower.com/overview/tra1](http://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:  $\pm 0.13$  ( $\pm 0.005$ )  
Case tolerances:  $\pm 0.25$  ( $\pm 0.01$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)