DC/DC Converters

TRA 1 Series, 1 Watt

CB Scheme

c SP us

UL 60950-1

Features

- Semi-regulated output (load)
- Industry standard pinout
- High efficiency up to 88%
- Single and dual output models
- I/O isolation voltage 1000 VDC
- Operationally reliable up to 5'000m altitude
- Operating temperature range –40°C to +85°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 %
TRA 1- 0521		±5 VDC	±100 mA	5.2 %	84 %
TRA 1- 0522		±12 VDC	±42 mA	4.6 %	86 %
TRA 1- 0523		±15 VDC	±34 mA	4.5 %	86 %
TRA 1- 1211	12 VDC ±10%	5 VDC	200 mA	5 %	84 %
TRA 1- 1219		9 VDC	110 mA	3.4 %	86 %
TRA 1- 1212		12 VDC	84 mA	3.4 %	88 %
TRA 1- 1213		15 VDC	67 mA	2.7 %	88 %
TRA 1- 1221		±5 VDC	±100 mA	3.9 %	84 %
TRA 1- 1222		±12 VDC	±42 mA	2.9 %	88 %
TRA 1- 1223		±15 VDC	±34 mA	2.6 %	87 %
TRA 1- 2411	24 VDC ±10%	5 VDC	200 mA	3.7 %	84 %
TRA 1- 2419		9 VDC	110 mA	2.5 %	86 %
TRA 1- 2412		12 VDC	84 mA	2.4 %	87 %
TRA 1- 2413		15 VDC	67 mA	2.3 %	87 %
TRA 1- 2421		±5 VDC	±100 mA	3.7 %	83 %
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 sec. 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
Reverse voltage protection		0.3 A max.
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)		1 % max.
Regulation	– Input variation – Load variation	1.05 % / 1 % change of Vin see graph 1 on page 3
Ripple and noise (20 MHz Bandwidth)		60 mV pk-pk max.
Temperature coefficient		± 0.02 %/K
Short circuit		limited 0.5 sec. max.
Capacitive load	single output models: dual output models:	220 µF max. 100 µF max. (each output)

General Specifications

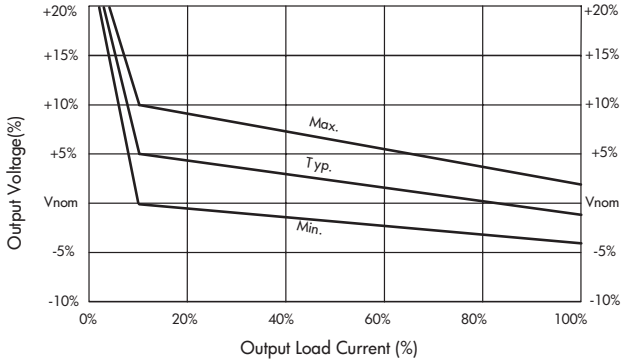
Temperature ranges	– Operating – Case temperature – Storage	–40°C to +85°C (without derating) +105°C max. –50°C to +125°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>2'000'000 h
Isolation voltage (60 sec.)	Input/Output	1'000 VDC
Isolation capacitance	Input/Output	60 pF typ.
Isolation resistance	Input/Output	>1'000 Mohm
Switching frequency		100 kHz typ. (frequency modulation)
Frequency change over line and load		–50 / +20 kHz max.
Altitude during operation		up to 5'000 m (16'400 ft) 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)	www.tracopower.com/products/tra-cb.pdf www.tracopower.com/products/tra-csa.pdf

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

Physical Specifications

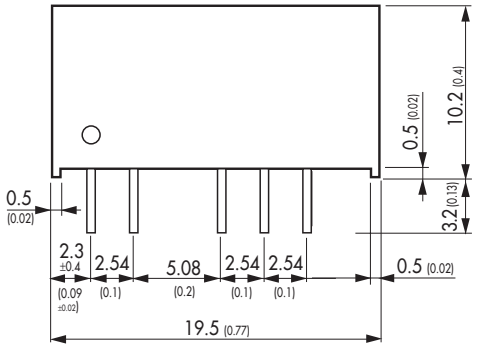
Casing material		non conductive plastic (UL 94V-0 rated)
Weight	– 5 & 12 VDC models – 24 VDC models	2.2 g (0.07 oz) 2.6 g (0.09 oz)
Soldering temperature		max. 260°C, 10 sec, 1.5 mm from case
Environmental compliance	– Reach – RoHS	www.tracopower.com/products/tra1-reach.pdf RoHS directive 2002/95/EC

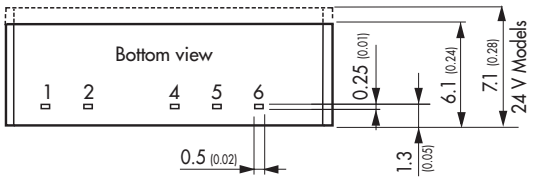
Graph 1: Load regulation



Application note: www.tracopower.com/products/tra1-application.pdf

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 any time without notice.