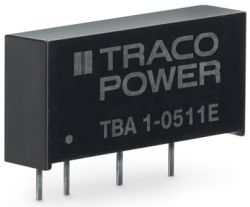
TRACO POWER

Unregulated DC/DC Converter

TBA 1E Series, 1 Watt

- **Continuous short circuit protection**
- **I/O isolation: 1'500 VDC**
- **Operating temperature range -40 to +85 °C without derating**
- **Input voltage ranges (±10%): 5, 12, 24 VDC**
- **High efficiency up to 82%**
- **SIP-7 package**
- **Unregulated outputs**
- **3-year product warranty**



The TBA 1E is a 1 Watt DC/DC SIP converter series which is specifically designed to offer a low-cost solution with no concession on quality and lifetime. The new design improves on the industry standard features and offers an integrated continuous short circuit protection circuit, an operating temperature range from –40°C to 85°C without derating and I/O-isolation of 1'500 VDC. It offers a broad application range in any space and cost critical application.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TBA 1-0511E	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	200 mA			79 %
TBA 1-0512E		12 VDC	84 mA			82 %
TBA 1-0513E		15 VDC	66 mA			82 %
TBA 1-0521E		+5 VDC	100 mA	–5 VDC	100 mA	79 %
TBA 1-0522E		+12 VDC	41 mA	–12 VDC	41 mA	82 %
TBA 1-0523E		+15 VDC	33 mA	–15 VDC	33 mA	82 %
TBA 1-1211E	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	200 mA			79 %
TBA 1-1212E		12 VDC	84 mA			80 %
TBA 1-1213E		15 VDC	66 mA			80 %
TBA 1-1221E		+5 VDC	100 mA	–5 VDC	100 mA	79 %
TBA 1-1222E		+12 VDC	41 mA	–12 VDC	41 mA	80 %
TBA 1-1223E		+15 VDC	33 mA	–15 VDC	33 mA	80 %
TBA 1-2411E	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	200 mA			79 %
TBA 1-2412E		12 VDC	84 mA			82 %
TBA 1-2413E		15 VDC	66 mA			82 %
TBA 1-2421E		+5 VDC	100 mA	–5 VDC	100 mA	79 %
TBA 1-2422E		+12 VDC	41 mA	–12 VDC	41 mA	82 %
TBA 1-2423E		+15 VDC	33 mA	–15 VDC	33 mA	82 %

Input Specifications

Input Current	- At no load	5 Vin models:	**25 mA typ.**
		12 Vin models:	**15 mA typ.**
		24 Vin models:	**10 mA typ.**
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:	**500 mA** (slow blow)
		12 Vin models:	**200 mA** (slow blow)
		24 Vin models:	**100 mA** (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			**Internal Capacitor** (add. external 22 µF, ESR <0.1Ω, recommended)

Output Specifications

Voltage Set Accuracy			**±3% max.** (at 60% for 5VDC models)
			±3% max. (at 80% for other models)
Regulation (Unregulated)	- Input Variation (1% Vin step)	single output models:	**1.5% max.**
		dual output models:	**1.5% max.**
	- Load Variation	See application note:	www.tracopower.com/overview/tba1e
	- Voltage Balance (symmetrical load)	dual output models:	**1% max.**
Ripple and Noise	- 20 MHz Bandwidth		**150 mVp-p max.**
			100 mVp-p typ.
			(To further reduce Ripple and Noise, a capacitor with 0.47 µF X7R is recommended.)
Capacitive Load	- single output	5 Vout models:	**2'200 µF max.**
		12 Vout models:	**470 µF max.**
		15 Vout models:	**470 µF max.**
	- dual output	5 / -5 Vout models:	**2'200 / 2'200 µF max.**
		12 / -12 Vout models:	**470 / 470 µF max.**
		15 / -15 Vout models:	**220 / 220 µF max.**
Minimum Load			**10 % of Iout max.**
			(Operation at lower load will not damage the converter, but it may not meet all specifications)
Temperature Coefficient			**±0.02 %/K max.**
Start-up Time			**10 ms max.**
Short Circuit Protection			**Continuous, Automatic recovery**

Safety Specifications

Standards	- IT / Multimedia Equipment	**Designed for IEC/EN/UL 62368-1** (not certified)

General Specifications

Relative Humidity		**95% max.** (non condensing)
Temperature Ranges	- Operating Temperature	**–40°C to +95°C**
	- Case Temperature	**+105°C max.**
	- Storage Temperature	**–55°C to +125°C**
Power Derating	- High Temperature	**5 %/K above 85°C**
	See application note:	www.tracopower.com/overview/tba1e
Cooling System		**Natural convection** (20 LFM)
Switching Frequency		**40 - 200 kHz** (PWM)
Insulation System		**Functional Insulation**
Isolation Test Voltage	- Input to Output, 60 s	**1'500 VDC**
Isolation Resistance	- Input to Output, 500 VDC	**1'000 MΩ min.**

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

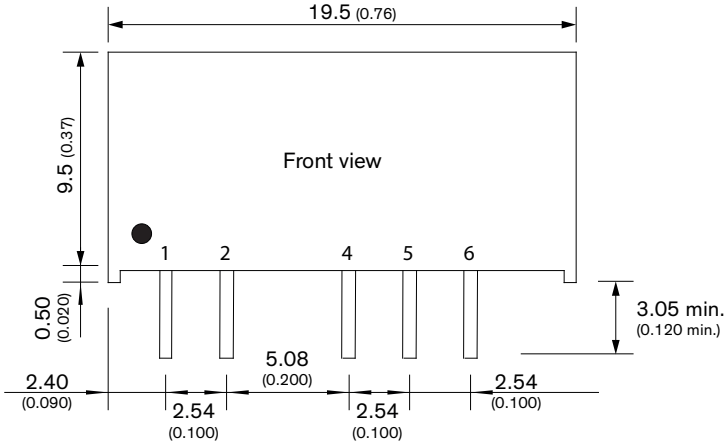
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	10 pF max.
Reliability	- Calculated MTBF	2'000'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Not allowed
Housing Material		Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Pin Material		Nickel-Iron (Alloy 42)
Pin Foundation Plating		Nickel (1.5 µm min.)
Pin Surface Plating		Tin (3 µm min.), bright
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		SIP7
Soldering Profile		Lead-Free Wave Soldering 265 °C / 5 s max.
Weight		2.3 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: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	35d39b5e-e369-45fb-a208-435cec104a17

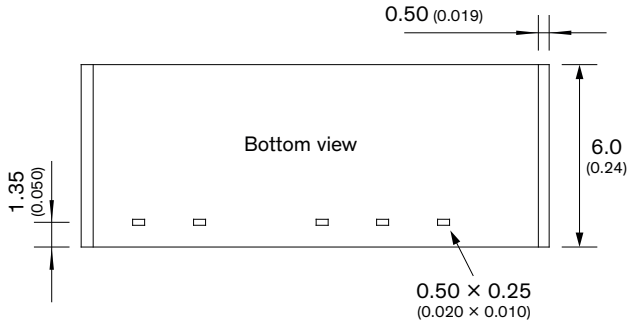
Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tba1e

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

Outline Dimensions





Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Pin dimension tolerances: ±0.1 (±0.004)

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

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