

- Continuous short circuit protection
- I/O isolation: 1'060 VAC
- Operating temperature range  
-40 to +80 °C without derating
- Input voltage ranges ( $\pm 10\%$ ):  
5, 12, 24 VDC
- High efficiency up to 84%
- SIP-7 package
- Unregulated outputs
- 3-year product warranty



The TBA 2 is a 2 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  $-40^{\circ}\text{C}$  to  $80^{\circ}\text{C}$  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 typ.
		Vnom	I <sub>max</sub>	Vnom	I <sub>max</sub>	
TBA 2-0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	400 mA			78 %
TBA 2-0512		12 VDC	165 mA			82 %
TBA 2-0513		15 VDC	130 mA			82 %
TBA 2-0521		+5 VDC	200 mA	-5 VDC	200 mA	79 %
TBA 2-0522		+12 VDC	80 mA	-12 VDC	80 mA	82 %
TBA 2-0523		+15 VDC	65 mA	-15 VDC	65 mA	82 %
TBA 2-1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	400 mA			79 %
TBA 2-1212		12 VDC	165 mA			82 %
TBA 2-1213		15 VDC	130 mA			84 %
TBA 2-1221		+5 VDC	200 mA	-5 VDC	200 mA	79 %
TBA 2-1222		+12 VDC	80 mA	-12 VDC	80 mA	83 %
TBA 2-1223		+15 VDC	65 mA	-15 VDC	65 mA	84 %
TBA 2-2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	400 mA			78 %
TBA 2-2412		12 VDC	165 mA			84 %
TBA 2-2413		15 VDC	130 mA			84 %
TBA 2-2421		+5 VDC	200 mA	-5 VDC	200 mA	80 %
TBA 2-2422		+12 VDC	80 mA	-12 VDC	80 mA	84 %
TBA 2-2423		+15 VDC	65 mA	-15 VDC	65 mA	84 %

## Input Specifications

Input Current	- At no load	5 Vin models: <b>35 mA typ.</b> 12 Vin models: <b>18 mA typ.</b> 24 Vin models: <b>10 mA typ.</b>
Surge Voltage		5 Vin models: <b>9 VDC max.</b> (1 s max.) 12 Vin models: <b>18 VDC max.</b> (1 s max.) 24 Vin models: <b>30 VDC max.</b> (1 s max.)
Recommended Input Fuse		5 Vin models: <b>1'000 mA</b> (slow blow) 12 Vin models: <b>400 mA</b> (slow blow) 24 Vin models: <b>200 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Capacitor</b> (add. external 22 µF, ESR <0.1Ω, recommended)

## Output Specifications

Voltage Set Accuracy		<b>±3% max.</b> (at 60% for 5VDC models) <b>±3% max.</b> (at 80% for other models)
Regulation	- Input Variation (1% Vin step) - Load Variation - Voltage Balance (symmetrical load)	single output models: <b>1.5% max.</b> dual output models: <b>1.5% max.</b> See application note: <a href="http://www.tracopower.com/overview/tba2">www.tracopower.com/overview/tba2</a> dual output models: <b>1% max.</b>
Ripple and Noise	- 20 MHz Bandwidth	<b>120 mVp-p typ.</b> <b>250 mVp-p max.</b>
Capacitive Load	- single output  - dual output	5 Vout models: <b>470 µF max.</b> 12 Vout models: <b>470 µF max.</b> 15 Vout models: <b>470 µF max.</b> 5 / -5 Vout models: <b>220 / 220 µF max.</b> 12 / -12 Vout models: <b>220 / 220 µF max.</b> 15 / -15 Vout models: <b>220 / 220 µF max.</b>
Minimum Load		<b>10 % of Iout max.</b> (Operation at lower load will not damage the converter, but it may not meet all specifications)
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>10 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>

## Safety Specifications

Safety Standards	- IT / Multimedia Equipment	<b>Designed for EN 62368-1</b> (no certification)
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## General Specifications

Relative Humidity		<b>95% max.</b> (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	<b>-40°C to +90°C</b> <b>+95°C max.</b> <b>-55°C to +125°C</b>
Power Derating	- High Temperature	<b>6.67 %/K above 80°C</b>
Cooling System		<b>Natural convection</b> (20 LFM)
Switching Frequency		<b>30 - 200 kHz</b> (PWM)
Insulation System		<b>Functional Insulation</b>
Isolation Test Voltage	- Input to Output, 60 s	<b>1'500 VDC</b>
Isolation Resistance	- Input to Output, 500 VDC	<b>1'000 MΩ min.</b>
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	<b>20 pF max.</b>
Reliability	- Calculated MTBF	<b>2'000'000 h</b> (MIL-HDBK-217F, ground benign)
Washing Process		<b>Not allowed</b>

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

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	Wave Soldering 265 °C / 5 s max.
Weight	2.8 g
Environmental Compliance	<p>- REACH Declaration <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a>  REACH SVHC list compliant  REACH Annex XVII compliant</p> <p>- RoHS Declaration <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a>  <b>Exemptions: 7a, 7c-I</b>  (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).  The SCIP number is provided on request.)</p>

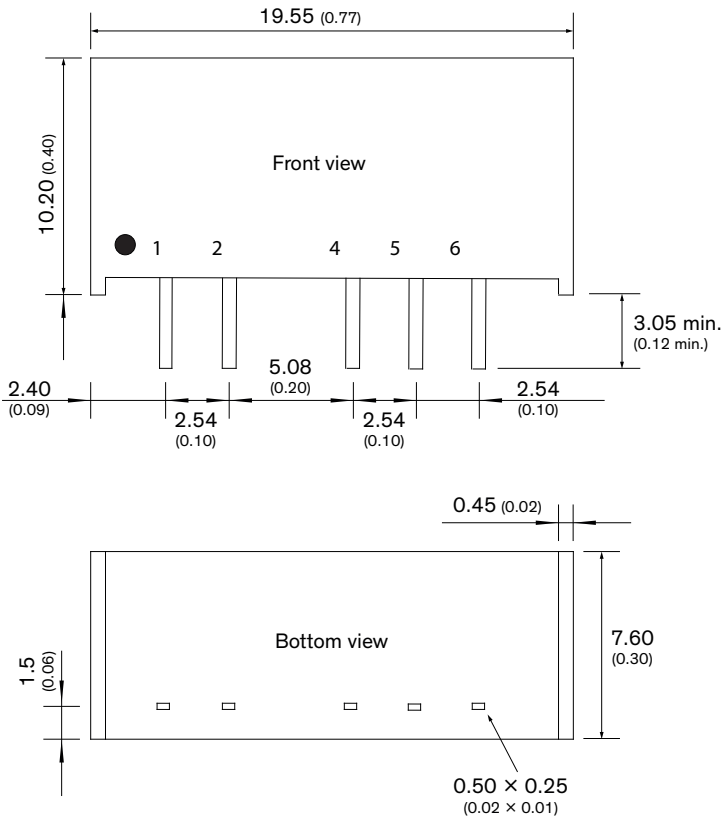
## Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tba2](http://www.tracopower.com/overview/tba2)

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### Outline Dimensions



Dimensions in mm (inch)  
Tolerances:  $\pm 0.35$  ( $\pm 0.01$ )

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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