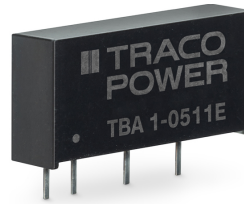


- Continuous short circuit protection
- I/O isolation: 1'060 VAC
- Operating temperature range  
-40 to +85 °C without derating
- Input voltage ranges ( $\pm 10\%$ ):  
5, 12, 24 VDC
- High efficiency up to 82%
- SIP-7 package
- Unregulated outputs
- 3-year product warranty



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  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  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 1-0511E | 4.5 - 5.5 VDC<br>(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<br>(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<br>(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: <b>25 mA typ.</b><br>12 Vin models: <b>15 mA typ.</b><br>24 Vin models: <b>10 mA typ.</b>  |
| Surge Voltage          |              | 5 Vin models: <b>9 VDC max.</b> (1 s max.)<br>12 Vin models: <b>18 VDC max.</b> (1 s max.)<br>24 Vin models: <b>30 VDC max.</b> (1 s max.)   |
| Recommended Input Fuse |              | 5 Vin models: <b>500 mA</b> (slow blow)<br>12 Vin models: <b>200 mA</b> (slow blow)<br>24 Vin models: <b>100 mA</b> (slow blow)<br>(The need of an external fuse has to be assessed in the final application.) |
| Input Filter           |              | <b>Internal Capacitor</b> (add. external 22 $\mu$ F, ESR <0.1 $\Omega$ , recommended)  |

### Output Specifications

|                          |   |   |
|--------------------------|---|---|
| Voltage Set Accuracy     |   | <b><math>\pm 3\%</math> max.</b> (at 60% for 5VDC models)<br><b><math>\pm 3\%</math> max.</b> (at 80% for other models)   |
| Regulation               | - Input Variation (1% Vin step)<br>- Load Variation<br>- Voltage Balance (symmetrical load) | single output models: <b>1.5% max.</b><br>dual output models: <b>1.5% max.</b><br>See application note: <a href="http://www.tracopower.com/overview/tba1e">www.tracopower.com/overview/tba1e</a><br>dual output models: <b>1% max.</b>  |
| Ripple and Noise         | - 20 MHz Bandwidth  | <b>100 mVp-p typ.</b><br><b>150 mVp-p max.</b>  |
| Capacitive Load          | - single output<br><br>- dual output  | 5 Vout models: <b>2'200 <math>\mu</math>F max.</b><br>12 Vout models: <b>470 <math>\mu</math>F max.</b><br>15 Vout models: <b>470 <math>\mu</math>F max.</b><br>5 / -5 Vout models: <b>2'200 / 2'200 <math>\mu</math>F max.</b><br>12 / -12 Vout models: <b>470 / 470 <math>\mu</math>F max.</b><br>15 / -15 Vout models: <b>220 / 220 <math>\mu</math>F max.</b> |
| Minimum Load             |   | <b>10 % of Iout max.</b><br>(Operation at lower load will not damage the converter, but it may not meet all specifications)   |
| Temperature Coefficient  |   | <b><math>\pm 0.02</math> %/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) |
|------------------|-----------------------------|---|

### General Specifications

|                        |  |   |
|------------------------|--|---|
| Relative Humidity      |  | <b>95% max.</b> (non condensing)                                      |
| Temperature Ranges     | - Operating Temperature<br>- Case Temperature<br>- Storage Temperature | <b>-40°C to +95°C</b><br><b>+105°C max.</b><br><b>-55°C to +125°C</b> |
| Power Derating         | - High Temperature   | <b>5 %/K above 85°C</b>   |
| Cooling System         |  | <b>Natural convection</b> (20 LFM)                                    |
| Switching Frequency    |  | <b>40 - 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 M<math>\Omega</math> min.</b>                                |
| Isolation Capacitance  | - Input to Output, 100 kHz, 1 V  | <b>10 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.

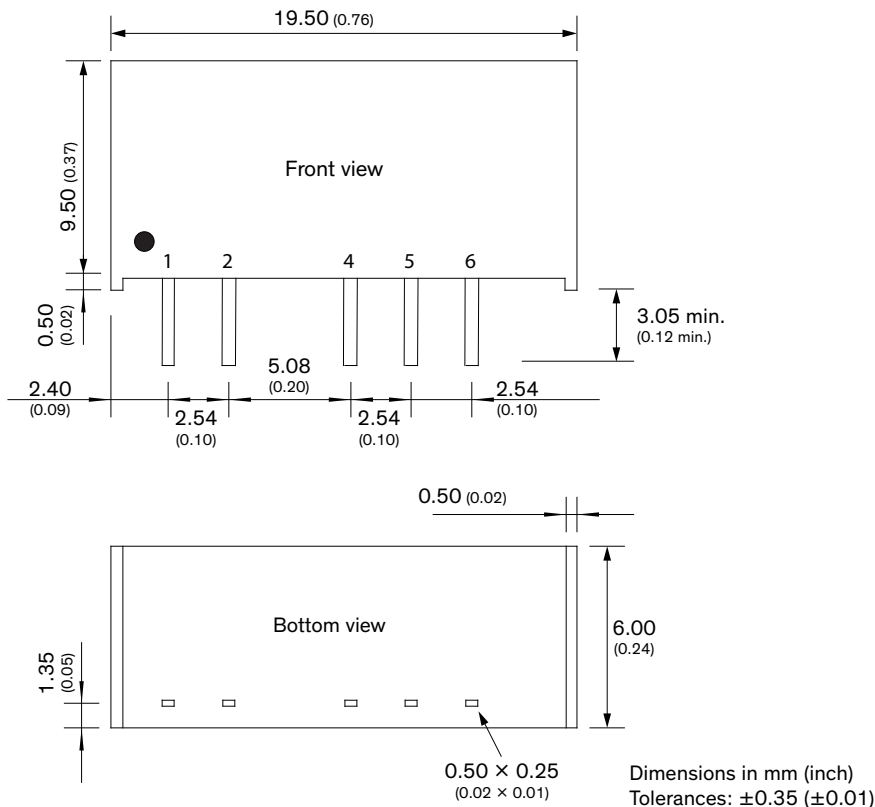
|                          |   |
|--------------------------|---|
| Housing Material         | Plastic (UL 94 V-0 rated)   |
| Potting Material         | Epoxy (UL 94 V-0 rated)   |
| Pin Material             | Nickel-Iron (Alloy 42)  |
| Pin Foundation Plating   | Nickel (1.5 µm min.)  |
| Pin Surface 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<br>265 °C / 5 s max.   |
| Weight                   | 2.3 g   |
| Environmental Compliance | - REACH Declaration<br><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant  |
|                          | - RoHS Declaration<br><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 7a, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).<br>The SCIP number is provided on request.) |

### Supporting Documents

Overview Link (for additional Documents)

[www.tracopower.com/overview/tba1e](http://www.tracopower.com/overview/tba1e)

### Outline Dimensions



| 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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