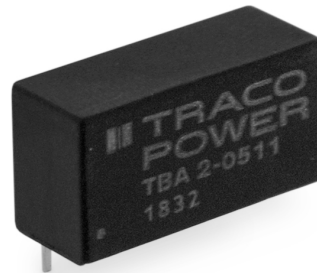


- Continuous short circuit protection
- I/O isolation: 1'500 VDC
- Operating temperature range  
-40 to +80 °C without derating
- Input voltage ranges ( $\pm 10\%$ ):  
5, 12, 24 VDC
- High efficiency up to 84%
- SIP-7 plastic package
- Unregulated outputs
- 3-year product warranty



The TBA 2 is an elementary 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-isolations of either 1'500 VDC. It offers a broad application range in any space and cost critical application.

| Models     |                                            |                |                     |                 |
|------------|--------------------------------------------|----------------|---------------------|-----------------|
| Order code | Input voltage                              | Output voltage | Output current max. | Efficiency typ. |
| TBA 2-0511 | <b>4.5 – 5.5 VDC</b><br>(5 VDC nominal)    | 5 VDC          | 400 mA              | 78 %            |
| TBA 2-0512 |                                            | 12 VDC         | 165 mA              | 82 %            |
| TBA 2-0513 |                                            | 15 VDC         | 130 mA              | 82 %            |
| TBA 2-0521 |                                            | $\pm 5$ VDC    | $\pm 200$ mA        | 79 %            |
| TBA 2-0522 |                                            | $\pm 12$ VDC   | $\pm 80$ mA         | 82 %            |
| TBA 2-0523 |                                            | $\pm 15$ VDC   | $\pm 65$ mA         | 82 %            |
| TBA 2-1211 | <b>10.8 – 13.2 VDC</b><br>(12 VDC nominal) | 5 VDC          | 400 mA              | 79 %            |
| TBA 2-1212 |                                            | 12 VDC         | 165 mA              | 82 %            |
| TBA 2-1213 |                                            | 15 VDC         | 130 mA              | 84 %            |
| TBA 2-1221 |                                            | $\pm 5$ VDC    | $\pm 200$ mA        | 79 %            |
| TBA 2-1222 |                                            | $\pm 12$ VDC   | $\pm 80$ mA         | 83 %            |
| TBA 2-1223 |                                            | $\pm 15$ VDC   | $\pm 65$ mA         | 84 %            |
| TBA 2-2411 | <b>21.6 – 26.4 VDC</b><br>(24 VDC nominal) | 5 VDC          | 400 mA              | 78 %            |
| TBA 2-2412 |                                            | 12 VDC         | 165 mA              | 84 %            |
| TBA 2-2413 |                                            | 15 VDC         | 130 mA              | 84 %            |
| TBA 2-2421 |                                            | $\pm 5$ VDC    | $\pm 200$ mA        | 80 %            |
| TBA 2-2422 |                                            | $\pm 12$ VDC   | $\pm 80$ mA         | 84 %            |
| TBA 2-2423 |                                            | $\pm 15$ VDC   | $\pm 65$ mA         | 84 %            |

## Input Specifications

|                          |                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------|
| Input current at no load | 5 Vin models: 35 mA typ.<br>12 Vin models: 18 mA typ.<br>24 Vin models: 10 mA typ.                                     |
| Surge voltage (1 s max.) | 5 Vin models: 9 V max.<br>12 Vin models: 18 V max.<br>24 Vin models: 30 V max.                                         |
| Input filter             | internal capacitor<br>(external capacitor recommended)*                                                                |
| Recommended input fuse   | 5 Vin models: 1.0 A (slow blow type)<br>12 Vin models: 0.4 A (slow blow type)<br>24 Vin models: 0.2 A (slow blow type) |

## Output Specifications

|                                     |                                                                                                                                                                |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                | 5 & $\pm 5$ Vout models: $\pm 3$ % max. (at 60 % load)<br>other output models: $\pm 3$ % max. (at 80 % load)                                                   |
| Regulation                          | – Input variation (at 1 % change of Vin) 1.5 % max.<br>– Load variation See graphs on page 3<br>– Cross regulation (at full load) dual output models: 1 % max. |
| Temperature coefficient             | $\pm 0.02$ %/K max.                                                                                                                                            |
| Ripple and noise (20 MHz Bandwidth) | 120 mVp-p typ. / 250 mVp-p max.                                                                                                                                |
| Short circuit protection            | continuous, automatic recovery                                                                                                                                 |
| Start up time                       | 10 ms max.                                                                                                                                                     |
| Capacitive load                     | single output models: 470 $\mu$ F max.<br>dual output models: 220 $\mu$ F max. (each output)                                                                   |

## General Specifications

|                                                                      |                                                                                                  |                                                                                                                                               |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature ranges                                                   | – Operating (natural convection: 20 LFM, 0.1 m/s)<br>– Case temperature<br>– Storage temperature | –40°C to +90°C<br>+95°C max.<br>–55°C to +125°C                                                                                               |
| Derating                                                             |                                                                                                  | 6.67 %/K above 80°C                                                                                                                           |
| Humidity (non condensing)                                            |                                                                                                  | 95 % rel H max.                                                                                                                               |
| Isolation voltage                                                    | – I/O isolation voltage (60 s)                                                                   | 1'500 VDC                                                                                                                                     |
| Isolation resistance (input/output)                                  |                                                                                                  | 1 GOhm min.                                                                                                                                   |
| Isolation capacitance (input/output)                                 |                                                                                                  | 20 pF max.                                                                                                                                    |
| Reliability, calculated MTBF (MIL-HDBK-217F at +25°C, ground benign) |                                                                                                  | 2'000'000 h                                                                                                                                   |
| Switching frequency                                                  |                                                                                                  | 30 – 200 kHz (pulse width modulation)                                                                                                         |
| Environmental compliance                                             | – Reach<br>– RoHS                                                                                | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>RoHS directive 2011/65/EU |

## Physical Specifications

|                  |                          |
|------------------|--------------------------|
| Casing material  | Plastic (UL 94V-0 rated) |
| Potting material | Epoxy (UL 94V-0 rated)   |
| Pin material     | Tinned copper            |
| Package weight   | 2.8 g (0.09 oz)          |

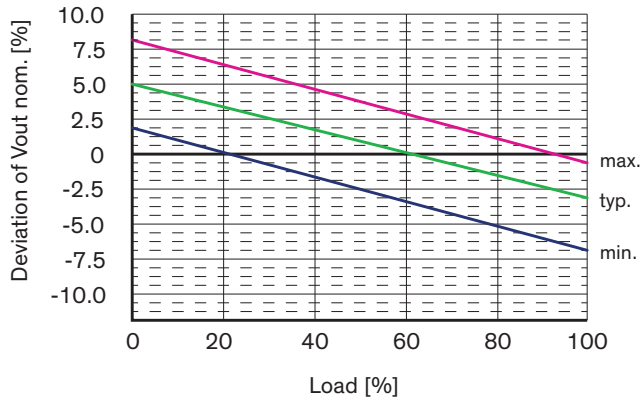
\*In case of long input lines or hot plug-in requirements, we recommended to use an external low ESR capacitor (22 $\mu$ F) near to the converter's input pins.

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

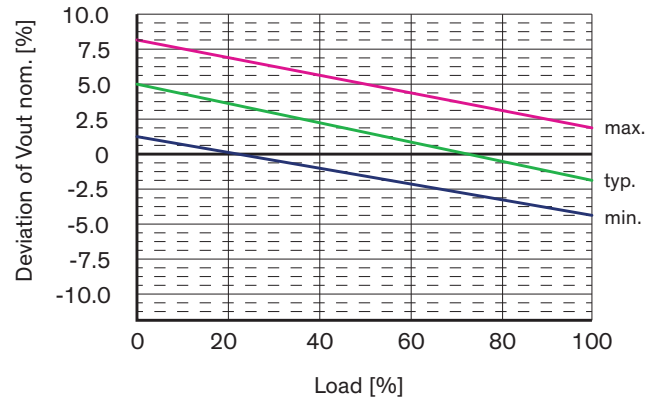
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

### Load Variation

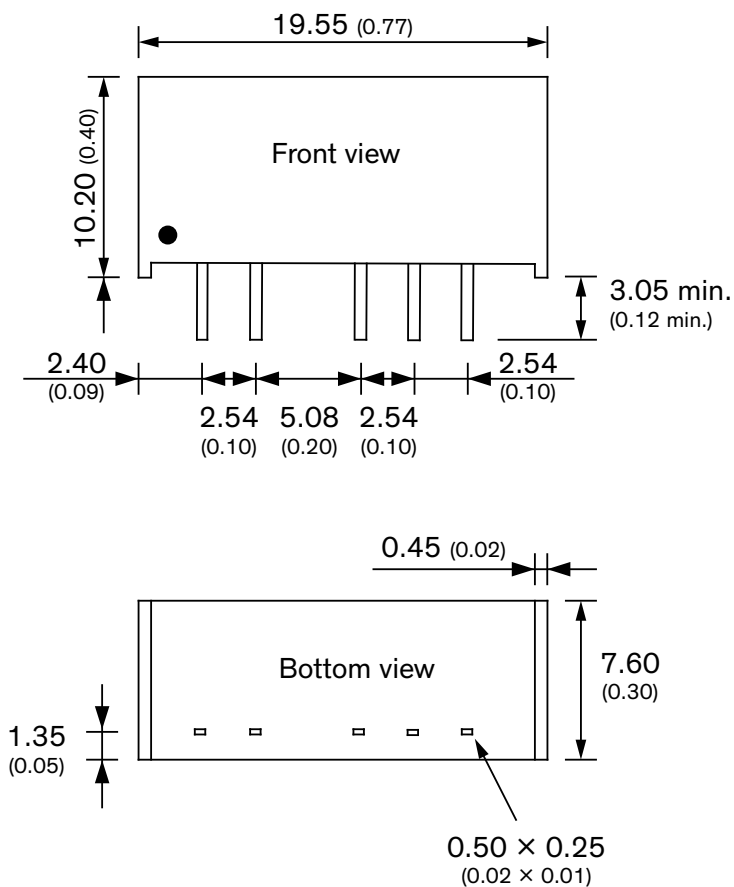
5 &  $\pm 5$  Vout models



Other output models



### 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)  
Tolerances: x.xx  $\pm 0.25$  ( $\pm 0.01$ )