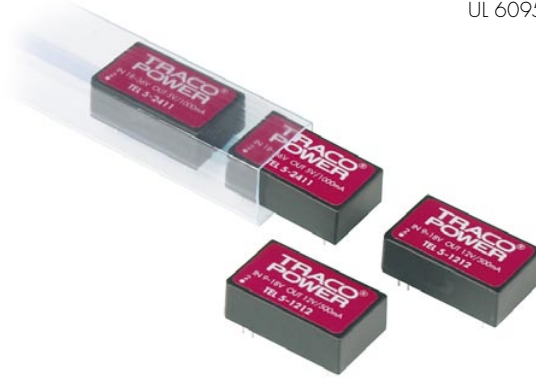




UL 60950-1

#### Features

- ◆ Wide 2:1 Input Range
- ◆ Cost efficient SMD-Design
- ◆ High Power Density
- ◆ High Efficiency up to 86%
- ◆ Regulated Outputs
- ◆ I/O-Isolation 1'500 VDC
- ◆ Indefinite Short-Circuit Protection  
24-pin DIP with Industry Standard Pinout
- ◆ High Reliability, MTBF >1 Mio. h
- ◆ Internal EMI Filter to comply with  
EN 55022, Class A (optional)
- ◆ Lead free Design, RoHS compliant
- ◆ 3 Year Product Warranty



The TEL 5 Series is a range of DC/DC-converter modules with wide input range of 2:1. State of the art SMD-technology guarantees a product with very high reliability and excellent cost /performance ratio. High efficiency allows an operating temperature range of  $-25^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  at full load. This product series provides an economical solution for many cost critical applications in industrial and consumer electronics.

| Models     |                     |                |                     |                 |
|------------|---------------------|----------------|---------------------|-----------------|
| Ordercode  | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
| TEL 5-1210 | 9 – 18 VDC          | 3.3 VDC        | 1200 mA             | 77 %            |
| TEL 5-1211 |                     | 5 VDC          | 1000 mA             | 81 %            |
| TEL 5-1212 |                     | 12 VDC         | 500 mA              | 84 %            |
| TEL 5-1222 |                     | $\pm 12$ VDC   | $\pm 250$ mA        | 84 %            |
| TEL 5-1223 |                     | $\pm 15$ VDC   | $\pm 200$ mA        | 84 %            |
| TEL 5-2410 | 18 – 36 VDC         | 3.3 VDC        | 1200 mA             | 79 %            |
| TEL 5-2411 |                     | 5 VDC          | 1000 mA             | 83 %            |
| TEL 5-2412 |                     | 12 VDC         | 500 mA              | 86 %            |
| TEL 5-2422 |                     | $\pm 12$ VDC   | $\pm 250$ mA        | 86 %            |
| TEL 5-2423 |                     | $\pm 15$ VDC   | $\pm 200$ mA        | 86 %            |

### Input Specifications

|   |   |
|---|---|
| Input current no load /full load              | 12 Vin models: 20 mA / 590 mA typ.<br>24 Vin models: 5 mA / 290 mA typ. |
| Start-up voltage /<br>under voltage shut down | 12 Vin models: 8.0 VDC / 8.0 VDC<br>24 Vin models: 16.0 VDC / 16.0 VDC  |
| Surge voltage (1 sec. max.)                   | 12 Vin models: 25 V max.<br>24 Vin models: 50 V max.                    |
| Reverse voltage protection                    | 1.0 A max.  |

### Output Specifications

|                                     |  |
|-------------------------------------|--|
| Voltage set accuracy                | ± 1 %  |
| Regulation                          | – Input variation Vin min. to Vin max. 0.3 % max.<br>– Load variation 20 – 100 %<br>single output models 1 % max.<br>dual output models balanced load 2 % max. |
| Ripple and noise (20 MHz Bandwidth) | 75 mVpk-pk max.  |
| Temperature coefficient             | ± 0.02 % /K  |
| Output current limitation           | >120 % of Iout max., constant current  |
| Short circuit protection            | indefinite (automatic recovery)  |
| Capacitive load                     | single output models: 6800 µF max.<br>dual output models: 1000 µF max. (each output)   |

### General Specifications

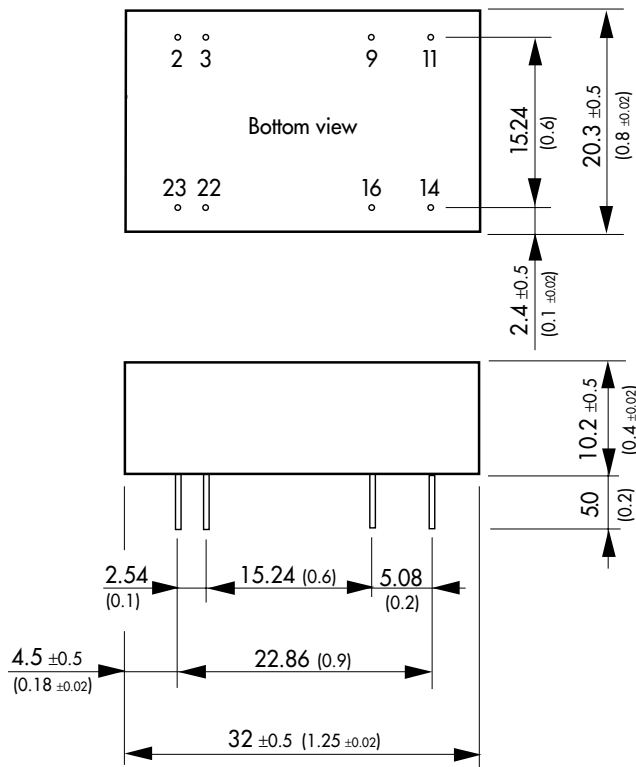
|  |  |
|--|--|
| Temperature ranges   | – Operating – 25 °C ... + 71°C (no derating)<br>– Case temperature + 90 °C<br>– Storage – 40 °C ... + 125 °C           |
| Humidity (non condensing)                                  | 95 % rel H max.  |
| Reliability, calculated MTBF (MIL-HDBK:217E ground benign) | > 1 Mio. h @ + 25 °C   |
| Isolation voltage (60 sec) – Input/Output                  | 1'500 VDC  |
| Isolation capacity – Input/Output                          | 380 pF typ.  |
| Isolation resistance – Input/Output (500 VDC)              | > 1'000 M Ohm  |
| Switching frequency  | 300 kHz typ.   |
| Safety standards   | UL 60950-1, IEC 60950-1, EN 60950-1  |
| Safety approvals   | CSA File No. 226037<br><a href="http://directories.csa-international.org">http://directories.csa-international.org</a> |

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

**Physical Specifications**

|                       |   |
|-----------------------|---|
| Case material         | non conductive plastic (UL 94V-0 rated) |
| Weight                | 17 g (0.60 oz)                          |
| Soldering temperature | max. 265 °C / 10 sec.                   |

**Outline Dimensions mm (inches)**



| Pin-Out |            |            |
|---------|------------|------------|
| Pin     | Single     | Dual       |
| 2       | -Vin (GND) | -Vin (GND) |
| 3       | -Vin (GND) | -Vin (GND) |
| 9       | No pin     | Common     |
| 11      | No con.    | -Vout      |
| 14      | +Vout      | +Vout      |
| 16      | -Vout      | Common     |
| 22      | +Vin (Vcc) | +Vin (Vcc) |
| 23      | +Vin (Vcc) | +Vin (Vcc) |

Pin diameter  $\varnothing 0.5 \pm 0.05$  (0.02 ±0.002)  
Tolerances  $\pm 0.5$  (0.02)

Specifications can be changed any time without notice