

#### Features

- Wide 2 : 1 Input Range
- High Efficiency up to 89%
- Extended Operating Temperature Range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Indefinite Short-Circuit Protection
- I/O-Isolation 1500 VDC
- Remote On/Off
- Input Filter meets EN 55022, Class A and FCC, Level A without external Components
- Industry Standard Pinout
- Shielded Metal Case with insulated Baseplate
- 3 Year Product Warranty



The TEN 20 series of DC/DC converters, comprising 18 different models, has been designed for a wide range of applications including communications, industrial systems and battery powered equipments. Full SMD-design with use of ceramic chip capacitors guarantees a high reliability and a long lifetime. Other features of this converters are internal filter to meet EN 55022, class A and FCC, level A and an extended temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

| Models      |                     |                |                     |                 |
|-------------|---------------------|----------------|---------------------|-----------------|
| Ordercode   | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
| TEN 20-1210 | 9 – 18 VDC          | 3,3 VDC        | 4'000 mA            | 81 %            |
| TEN 20-1211 |                     | 5 VDC          | 4'000 mA            | 84 %            |
| TEN 20-1212 |                     | 12 VDC         | 1'670 mA            | 88 %            |
| TEN 20-1213 |                     | 15 VDC         | 1'340 mA            | 88 %            |
| TEN 20-1222 |                     | $\pm 12$ VDC   | $\pm 835$ mA        | 88 %            |
| TEN 20-1223 |                     | $\pm 15$ VDC   | $\pm 670$ mA        | 88 %            |
| TEN 20-2410 | 18 – 36 VDC         | 3,3 VDC        | 4'000 mA            | 82 %            |
| TEN 20-2411 |                     | 5 VDC          | 4'000 mA            | 85 %            |
| TEN 20-2412 |                     | 12 VDC         | 1'670 mA            | 89 %            |
| TEN 20-2413 |                     | 15 VDC         | 1'340 mA            | 89 %            |
| TEN 20-2422 |                     | $\pm 12$ VDC   | $\pm 835$ mA        | 89 %            |
| TEN 20-2423 |                     | $\pm 15$ VDC   | $\pm 670$ mA        | 89 %            |
| TEN 20-4810 | 36 – 75 VDC         | 3,3 VDC        | 4'000 mA            | 82 %            |
| TEN 20-4811 |                     | 5 VDC          | 4'000 mA            | 85 %            |
| TEN 20-4812 |                     | 12 VDC         | 1'670 mA            | 89 %            |
| TEN 20-4813 |                     | 15 VDC         | 1'340 mA            | 89 %            |
| TEN 20-4822 |                     | $\pm 12$ VDC   | $\pm 835$ mA        | 89 %            |
| TEN 20-4823 |                     | $\pm 15$ VDC   | $\pm 670$ mA        | 89 %            |

### Input Specifications

|                                   |                |                      |                         |
|-----------------------------------|----------------|----------------------|-------------------------|
| Input current no load/full load   | 12 Vin;        | 3.3 Vout models:     | 30 mA typ./1360 mA typ. |
|                                   | 12 Vin;        | 5 Vout models:       | 30 mA typ./1985 mA typ. |
|                                   | 12 Vin;        | other output models: | 30 mA typ./1895 mA typ. |
|                                   | 24 Vin;        | 3.3 Vout models:     | 17 mA typ./ 670 mA typ. |
|                                   | 24 Vin;        | 5 Vout models:       | 17 mA typ./ 980 mA typ. |
|                                   | 24 Vin;        | other output models: | 17 mA typ./ 935 mA typ. |
|                                   | 48 Vin;        | 3.3 Vout models:     | 10 mA typ./ 335 mA typ. |
|                                   | 48 Vin;        | 5 Vout models:       | 10 mA typ./ 490 mA typ. |
|                                   | 48 Vin;        | other output models: | 10 mA typ./ 420 mA typ. |
| Surge voltage<br>(100 msec. max.) | 12 Vin models: | 25 V max.            |                         |
|                                   | 24 Vin models: | 50 V max..           |                         |
|                                   | 48 Vin models: | 100 V max.           |                         |

Conducted noise (input) EN 55022 Class A and FCC part 15, level A

### Output Specifications

|                                     |  |  |
|-------------------------------------|--|--|
| Voltage set accuracy                |  | ± 1 % max.   |
| Regulation                          | – Input variation Vin min. to Vin max. | 0.3 % max.   |
|                                     | – Load variation 10 – 100 %            | 0.5 % max.   |
|                                     |  | 1.0 % max. for 3.3VDC output models  |
| Ripple and noise (20 MHz Bandwidth) |  | 80 mVpk-pk max   |
| Temperature coefficient             |  | ± 0.02 % /K  |
| Output current limitation           |  | 110-160% of I out max., constant current   |
| Short circuit protection            |  | idefinite, automatic recovery  |
| Minimum load                        |  | 10% of rated max current (operation at lower load condition is safe but output ripple will increase) |
| Capacitive load                     | 3.3/5 Vout models:                     | 6'800 µF max.  |
|                                     | 12 /15 Vout models:                    | 680 µF max.  |
|                                     | ±12/ ±15 Vout models:                  | 270 µF max.  |

### General Specifications

|   |                          |   |
|---|--------------------------|---|
| Temperature ranges                            | – Operating              | – 40 °C ... + 85 °C                       |
|   | – Case temperature       | + 100 °C max.                             |
|   | – Storage                | – 55 °C ... + 125 °C                      |
| Derating                                      |                          | 3.5%/K above 70°C                         |
|   | 5 V Models               | 4.0%/K above 60 °C                        |
| Humidity (non condensing)                     |                          | 95 % rel H max.                           |
| Reliability, calculated MTBF (MIL-HDBK-217 E) |                          | >1Mio. h @ + 25 °C                        |
| Isolation voltage                             | – Input/Output           | 1'500 VDC                                 |
| Isolation capacity                            | – Input/Output           | 1'200 pF typ                              |
| Isolation resistance                          | – Input/Output (500 VDC) | > 1'000 MOhm                              |
| Switching frequency (fixed)                   |                          | 330 kHz typ. (Pulse width modulation PWM) |

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

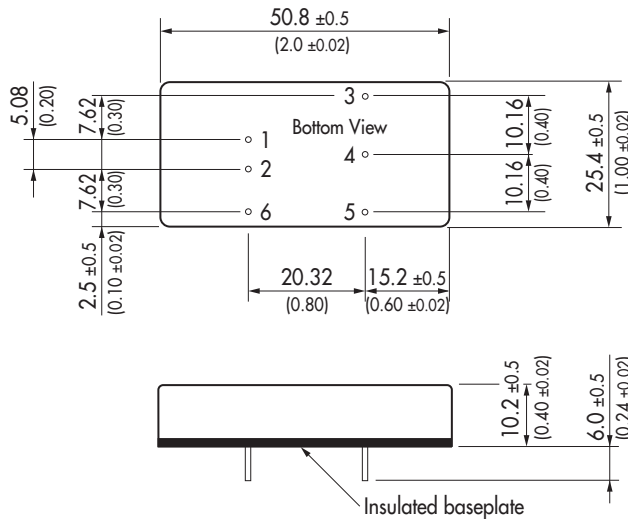
**General Specifications**

|                  |  |   |
|------------------|--|---|
| Remote ON/OFF    | ON:<br>OFF:<br>OFF standby input current:<br>Control common: | 2.5 ... 100 VDC or open circuit.<br>-1 ... 1.0 VDC or short circuit pin 2 and pin 6<br>5 mA max.<br>referenced to negativ input |
| Safety standards |  | UL 60950, EN 60950, IEC 60950 Compliance up to 60 VDC input voltage (SELV limit)  |
| Savety approvals |  | CSA   |

**Physical Specifications**

|                       |                                     |
|-----------------------|-------------------------------------|
| Case material         | Copper, Nickel plated               |
| Baseplate             | non conductive FR4                  |
| Potting material      | Silicon rubber TSE (UL 94V-0 rated) |
| Weight                | 30g (1.05oz)                        |
| Soldering temperature | max. 260 °C / 10 sec.               |

**Outline Dimensions mm (inches)**



| Pin-Out |               |               |
|---------|---------------|---------------|
| Pin     | Single        | Dual          |
| 1       | +Vin (Vcc)    | +Vin (Vcc)    |
| 2       | -Vin (GND)    | -Vin (GND)    |
| 3       | +Vout         | +Vout         |
| 4       | No pin        | Common        |
| 5       | -Vout         | -Vout         |
| 6       | Remote on/off | Remote on/off |

Pin diameter  $\varnothing 1.0 \pm 0.05$  (0.039  $\pm 0.002$ )

Dimensions in mm (Inch), Tolerance  $\pm 0.25$  ( 0.02)

Specifications can be changed any time without notice