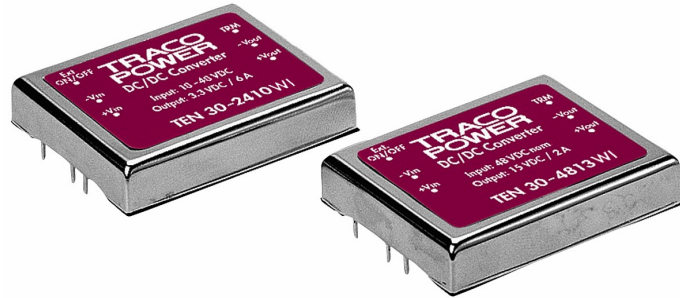




#### Features

- ◆ High Power Density: 30W in a 51x41x10 mm (2"x1.6"x0.4") Package
- ◆ Ultra Wide 4:1 Input Voltage Range
- ◆ Single Output Voltage Models from 1.8 to 15 VDC
- ◆ Dual Output Voltage Models
- ◆ Extended Operating Temperature Range: -40°C to 85°C
- ◆ Under Voltage Lockout
- ◆ Remote On/Off
- ◆ Shielded Metal Case with insulated Baseplate
- ◆ Optional Heatsink
- ◆ Lead free Design - RoHS compliant
- ◆ 3 Year Product Warranty



The TEN 30WI series is a family of high performance 30W dc-dc converters featuring ultra wide 4:1 input voltage ranges in a compact low profile package with industry-standard footprint. A very high efficiency allows operating temperatures up to 85°C. A built-in filter for both input and output minimizes the need for external filtering. Further standard features include remote On/Off, output voltage trimming, over voltage protection, under voltage lockout and short circuit protection. Typical applications for these products are battery operated equipment and distributed power architectures in communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required and space is limited on the PCB.

#### Models

| Order code    | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|---------------|---------------------|----------------|---------------------|-----------------|
| TEN 30-2408WI | 10 – 40 VDC         | 1.8 VDC        | 8'000 mA            | 80 %            |
| TEN 30-2409WI |                     | 2.5 VDC        | 8'000 mA            | 85 %            |
| TEN 30-2410WI |                     | 3.3 VDC        | 6'000 mA            | 87 %            |
| TEN 30-2411WI |                     | 5.1 VDC        | 6'000 mA            | 87 %            |
| TEN 30-2412WI |                     | 12 VDC         | 2'500 mA            | 87 %            |
| TEN 30-2413WI |                     | 15 VDC         | 2'000 mA            | 88 %            |
| TEN 30-2422WI |                     | ± 12 VDC       | ± 1'250 mA          | 85 %            |
| TEN 30-2423WI |                     | ± 15 VDC       | ± 1'000 mA          | 86 %            |
| TEN 30-4808WI | 18 – 75 VDC         | 1.8 VDC        | 8'000 mA            | 81 %            |
| TEN 30-4809WI |                     | 2.5 VDC        | 8'000 mA            | 86 %            |
| TEN 30-4810WI |                     | 3.3 VDC        | 6'000 mA            | 87 %            |
| TEN 30-4811WI |                     | 5.1 VDC        | 6'000 mA            | 88 %            |
| TEN 30-4812WI |                     | 12 VDC         | 2'500 mA            | 87 %            |
| TEN 30-4813WI |                     | 15 VDC         | 2'000 mA            | 88 %            |
| TEN 30-4822WI |                     | ± 12 VDC       | ± 1'250 mA          | 86 %            |
| TEN 30-4823WI |                     | ± 15 VDC       | ± 1'000 mA          | 87 %            |

### Input Specifications

|  |         |   |
|--|---------|---|
| Input current at no load                 | 24 Vin: | 1.8 Vout models: 45 mA typ.<br>2.5/3.3 Vout models: 60 mA typ.<br>other models: 80 mA typ.      |
|  | 48 Vin: | 1.8 Vout models: 25 mA typ.<br>2.5/3.3 Vout models: 40 mA typ.<br>other models: 55 mA typ.      |
| Input current at full load               | 24 Vin: | 1.8 Vout models: 760 mA typ.<br>2.5/3.3 Vout models: 1000 mA typ.<br>other models: 1500 mA typ. |
|  | 48 Vin: | 1.8 Vout models: 390 mA typ.<br>2.5 / 3.3 Vout models: 500 mA typ.<br>other models: 750 mA typ. |
| Input voltage variation (dv/dt)          |         | 5 V/ms, max.<br>(complies with ETS 300 132 part. 4.4)   |
| Start-up voltage / under voltage lockout |         | 24 Vin models: 10 VDC / 8 VDC (typ.)<br>48 Vin models: 18 VDC / 16 VDC (typ.)                   |
| Surge voltage (100 msec. max.)           |         | 24 Vin models: 50 V max.<br>48 Vin models: 100 V max.   |
| Conducted noise (input)                  |         | EN 55022 level A, FCC part 15, level A with external capacitor (see note 1)                     |
| ESD (input)                              |         | EN 61000-4-2, perf. criteria B  |
| Fast transient (input)                   |         | EN 61000-4-4, perf. criteria B  |
| Surge (input)                            |         | EN 61000-4-5, perf. criteria B  |

### Output Specifications

|   |  |   |
|---|--|---|
| Voltage set accuracy                                    |  | ± 1 %   |
| Output voltage adjustment                               |  | ± 10 %  |
| Regulation  | - Input variation Vin min. to Vin max. | ± 0.5 % max.  |
|   | - Load variation 10 – 100%:            | single output models: ± 0.5 % max.<br>dual output models: ± 1.0 % max.  |
|   | - Load cross variation 25 % / 100 %    | ± 5 % max.  |
| Temperature coefficient                                 |  | ± 0.02 % /K   |
| Ripple and noise (20 MHz Bandwidth):                    |  | 75 mVpk-pk max.   |
| Start up time (nominal Vin and constant resistive load) |  | 10 ms typ.  |
| Transient response setting time (25% load step chang)   |  | 300 µs typ.   |
| Short circuit protection                                |  | indefinite (automatic recovery)   |
| Over load protection                                    |  | 150% of Iout max typ. foldback  |
| Thermal shutdown  |  | @ 115°C typ   |
| Over voltage protection                                 | 1.8 / 2.5 Vout models:                 | 3.0 / 3.6 V   |
|   | 3.3 / 5.1 Vout models:                 | 3.9 / 6.2 V   |
|   | 12 / 15 Vout models:                   | 15 / 18 V   |
| Minimum load (only for dual output models)              |  | 10% of rated max current (operation at lower load condition will not damage these converters, however, they may not meet all listed specifications) |
| Capacitive load   | 1.8 / 2.5 Vout models:                 | 65'000 µF max./ 33'000 µF max.  |
|   | 3.3 / 5.0 Vout models:                 | 19'500 µF max./ 10'200 µF max.  |
|   | 12 / 15 Vout models:                   | 3'300 µF max./ 1'100 µF max.  |
|   | ±12 / ±15 Vout models:                 | ±1'000 µF max./ ±680 µF max. (per output)   |

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

**General Specifications**

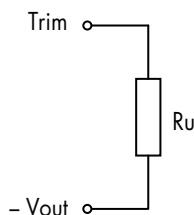
|   |   |  |
|---|---|--|
| Temperature ranges                            | - Operating<br>- Case temperature<br>- Storage  | - 40 °C ... + 85°C<br>+ 100 °C max.<br>- 55 °C ... + 105 °C                                    |
| Thermal impedance                             | - with heat-sink TEN-HS2<br>- without heat-sink | 8.24 K /Watt<br>10 K /Watt   |
| Derating                                      |   | see graphs on page 4 to 6  |
| Humidity (non condensing)                     |   | 95 % rel H max.  |
| Reliability, calculated MTBF (MIL-HDBK-217 E) |   | >350'000 h @ + 25°C  |
| Isolation (Input/Output)                      | - Voltage<br>- Capacity<br>- Resistance         | 1'500 VDC<br>1000 pF max.<br>>1'000 M Ohm  |
| Remote On/Off                                 | - On:<br>- Off:<br>- Off idle current:          | 3.5 ... 12 VDC or open circuit.<br>0 ... 1.2 VDC or short circuit pin 3 and pin 2<br>3 mA typ. |
| Switching frequency                           |   | 300 kHz typ. (pulse width modulation PWM)  |
| Vibration                                     |   | 10-55Hz, 2G, 30 minutes along X,Y,Z  |
| Safety standards                              |   | UL 60950, EN 60950, IEC 60950 compliance<br>up to 60 VDC input voltage (SELV limit)            |
| Safety approvals                              |   | UL /cUL File E188913   |

**Note 1:**

In order to meet conducted emissions EN55022-A and EN55011-A a capacitor between +Vin and -Vin has to be installed. The capacitor should be capable to handle 1 A ripple current. A suggestion is KMF Series of Nippon chemi-con, 220µF/100V, ESR 90mOhm.

**Output Voltage Adjustment**

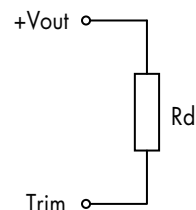
**Trim up**



**Ru [kohm]\***

| output | 1.8V  | 2.5V | 3.3V | 5V   |
|--------|-------|------|------|------|
| +5%    | 1.2   | 4.3  | 6.8  | 4.7  |
| +10%   | 0.068 | 0.82 | 1.5  | 0.56 |
| output | 12V   | 15V  | ±12V | ±15V |
| +5%    | 47    | 47   | 27   | 33   |
| +10%   | 8.2   | 6.8  | 2.2  | 2.7  |

**Trim down**



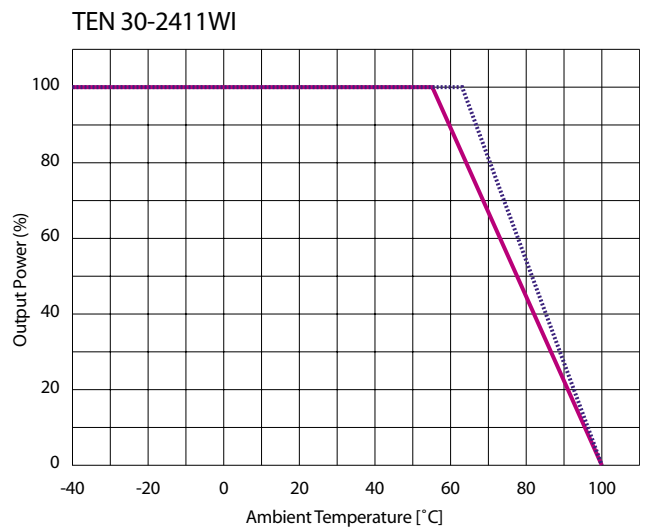
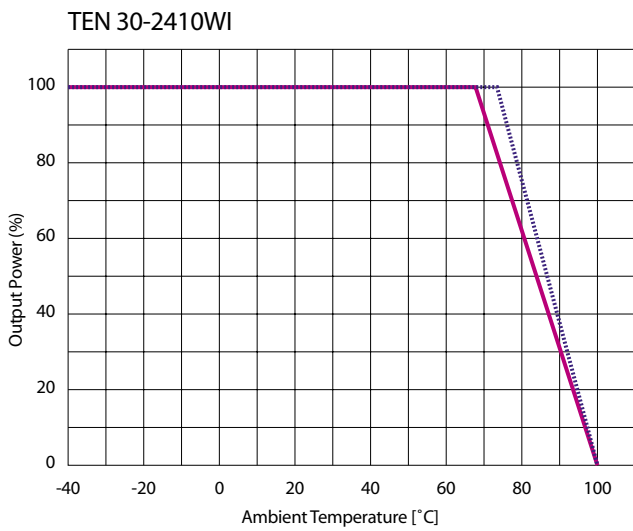
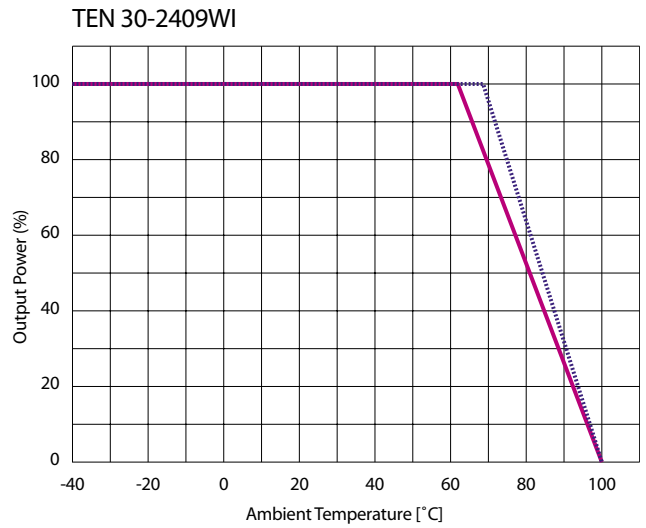
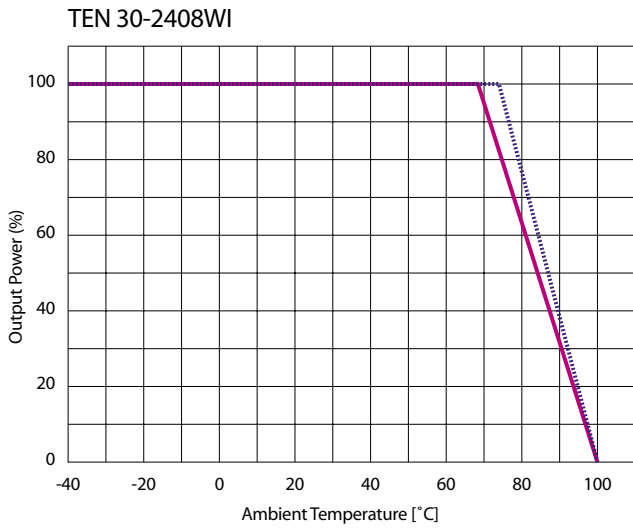
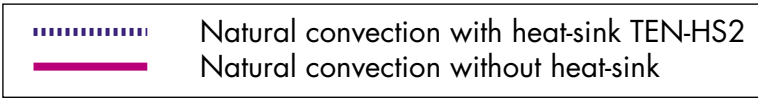
**Ru [kohm]\***

| output | 1.8V | 2.5V | 3.3V | 5V   |
|--------|------|------|------|------|
| -5%    | 1.8  | 6.8  | 8.2  | 5.6  |
| -10%   | 0.1  | 0.82 | 0.68 | 0.68 |
| output | 12V  | 15V  | ±12V | ±15V |
| -5%    | 56   | 56   | 33   | 39   |
| -10%   | 5.6  | 2.2  | 2.7  | 3.3  |

\*approximate values

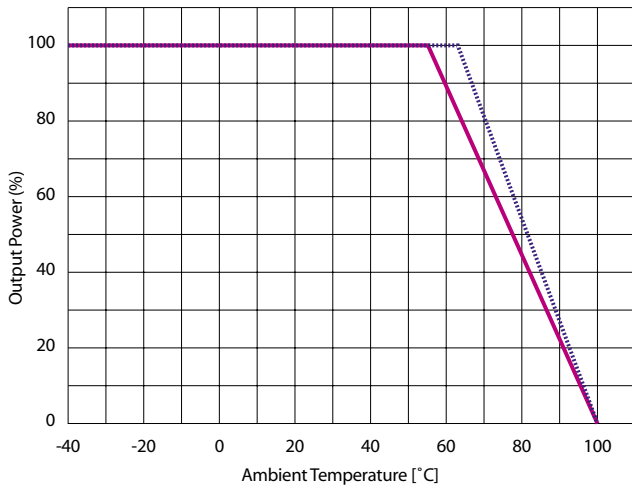
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Power De-rating**

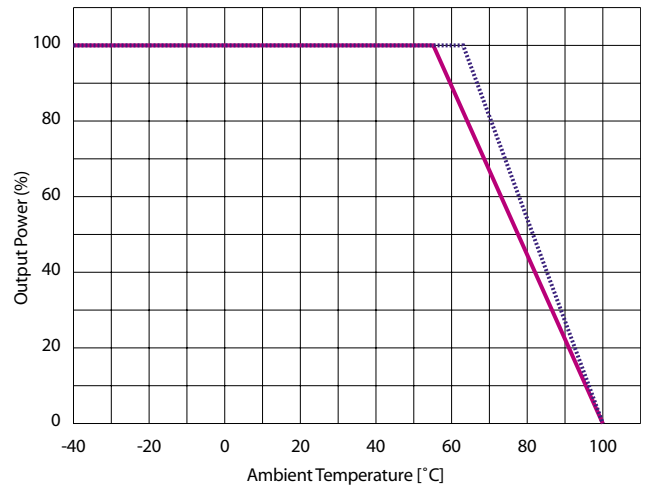


**Power De-rating**

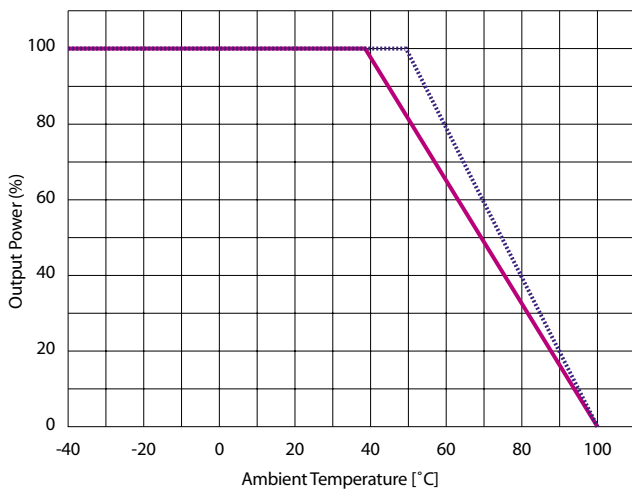
TEN 30-2412WI



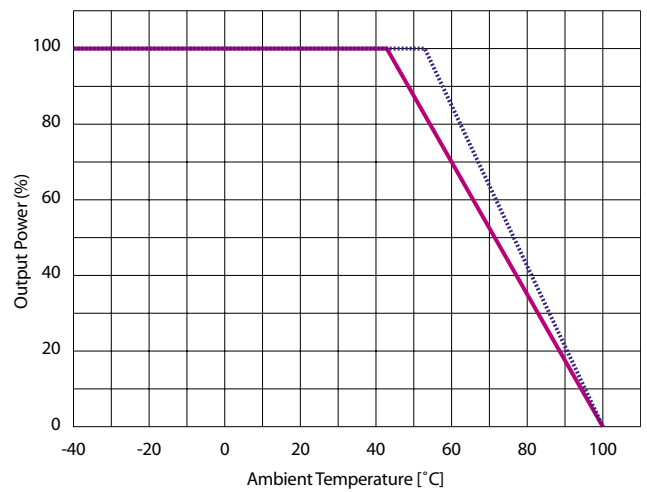
TEN 30-2413WI



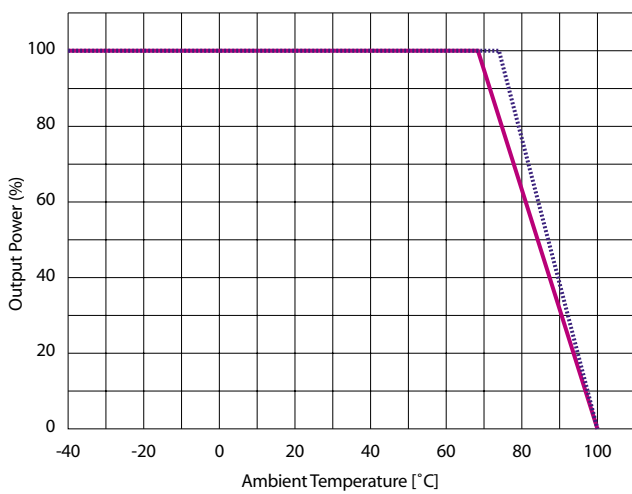
TEN 30-2422WI



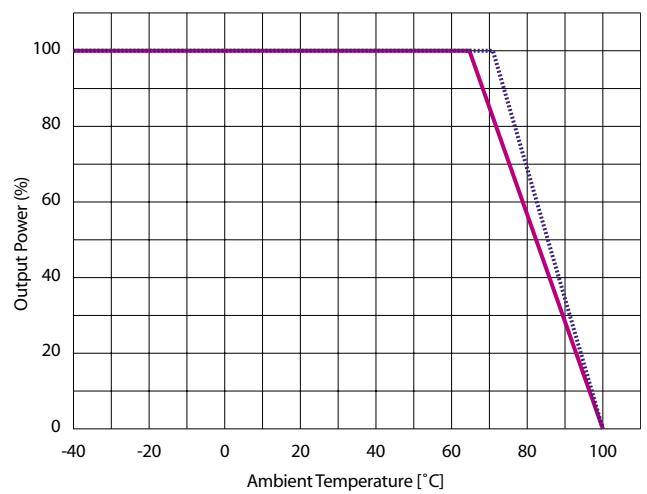
TEN 30-2423WI



TEN 30-4808WI

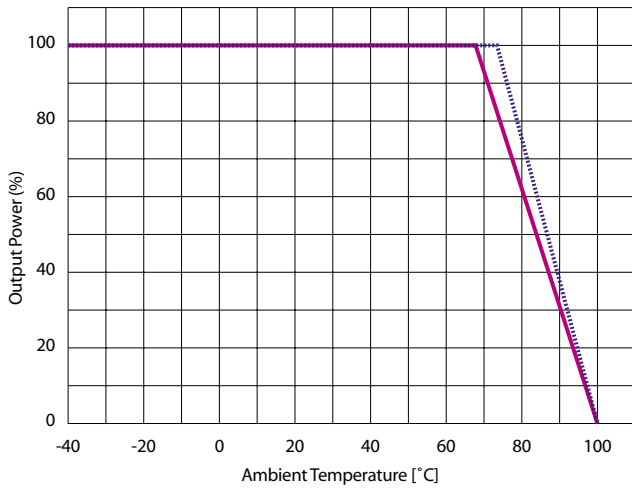


TEN 30-4809WI

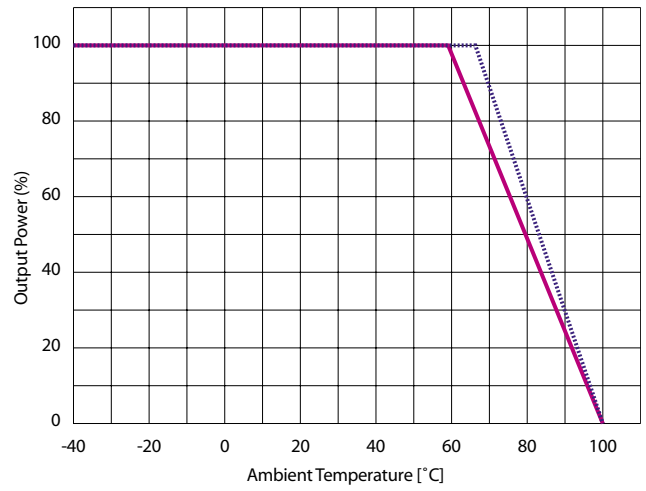


**Power De-rating**

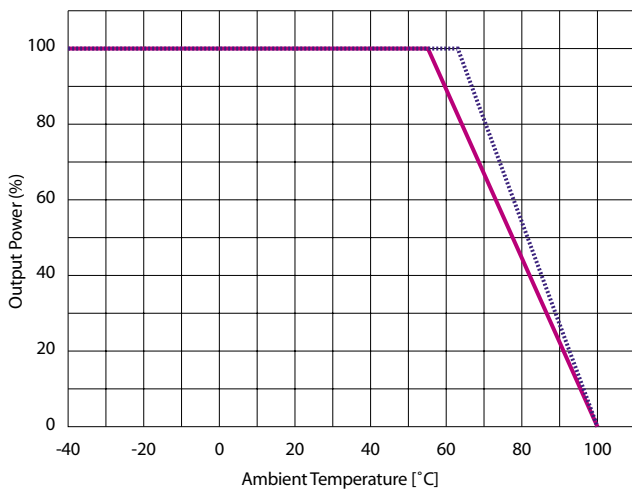
TEN 30-4810WI



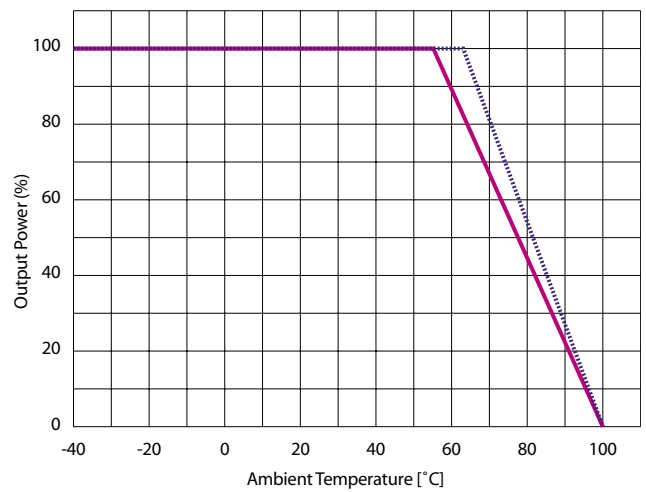
TEN 30-4811WI



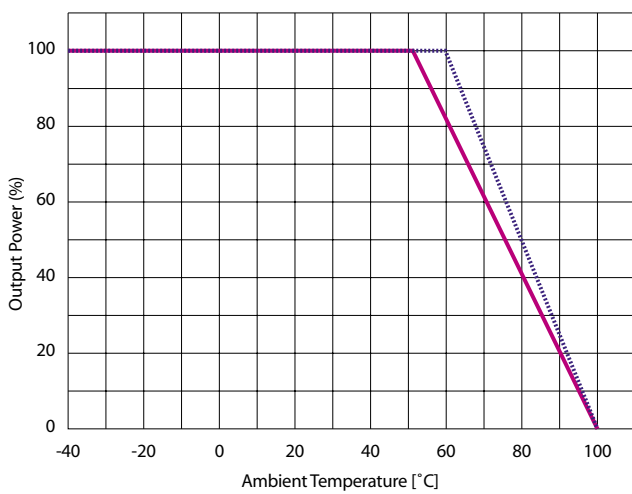
TEN 30-4812WI



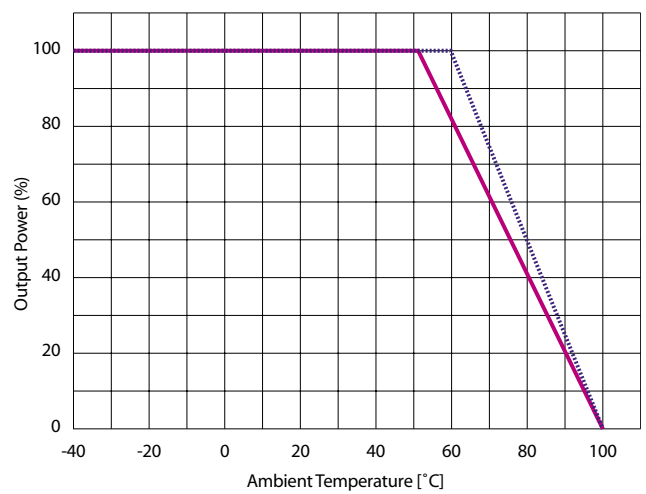
TEN 30-4812WI



TEN 30-4822WI



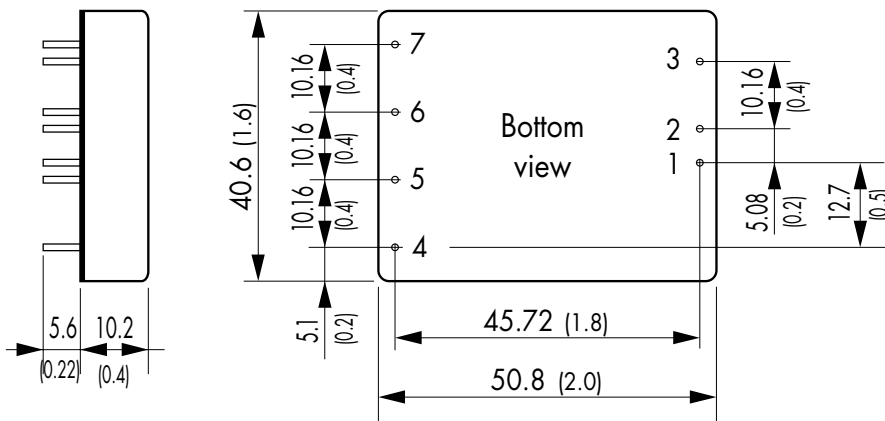
TEN 30-4822WI



**Physical Specifications**

|                       |                         |
|-----------------------|-------------------------|
| Case material         | copper, nickel plated   |
| Baseplate material    | none conductive FR4     |
| Potting material      | epoxy (UL 94V-0 -rated) |
| Weight                | 48 g (1.69 oz)          |
| Soldering temperature | max. 265 °C / 10 sec.   |

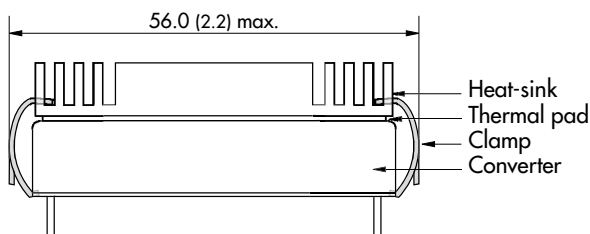
**Outline Dimensions**



| Pin-Out |               |            |
|---------|---------------|------------|
| Pin     | Single        | Dual       |
| 1       | +Vin (Vcc)    | +Vin (Vcc) |
| 2       | -Vin (GND)    | -Vin (GND) |
| 3       | Remote On/Off |            |
| 4       | No pin        | + Vout     |
| 5       | + Vout        | Common     |
| 6       | -Vout         | -Vout      |
| 7       | Trim          |            |

Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.02 ±0.002)  
 Pin pitch tolerances: ±0.35 (±0.014)  
 Case tolerances: ±0.5 (±0.02)

**Heat-sink TEN-HS2**



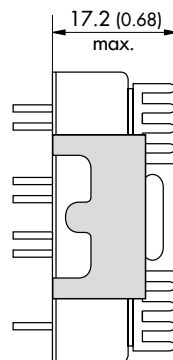
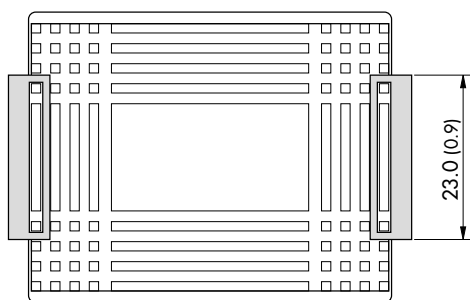
**Order code:** TEN-HS2

(cont.: heat-sink, thermal pad, 2 clamps)

**Material:** Aluminum

**Finish:** Anodic treatment (black)

**Weight:** 19g (0.67oz) (without converter)



**Note:**

The product label on converter has to be removed before mounting the heat-sink. For volume orders converters will be supplied with heat-sinks already mounted. Please contact factory for quotation. Separate heat-sinks are only available for prototypes and small quantity orders.

Specifications can be changed without notice