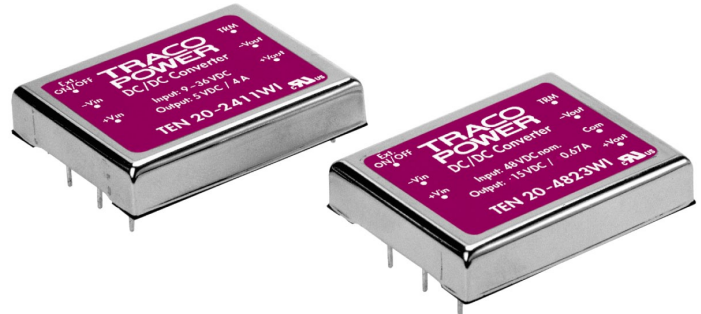




Features

- ◆ Ultra wide 4 : 1 Input Range
- ◆ Extended Operating Temperature Range
– 40°C to +85°C
- ◆ I/O-Isolation 1500 VDC
- ◆ Input Filter meets EN 55022, Class A and FCC, Level A without external Components
- ◆ Remote On/Off
- ◆ Adjustable Output
- ◆ Industry Standard Footprint
- ◆ Shielded Metal Case with insulated Baseplate
- ◆ Optional Heatsink
- ◆ Lead free Design - RoHS compliant
- ◆ 3 Year Product Warranty



The TEN 20WI series is a family of high performance 20W DC/DC converter modules featuring ultra wide 4:1 input voltage ranges in a compact 2" x 1.6" low profile package with industry-standard footprint. A very high efficiency allows an operating temperature range of –40°C to 85°C. A built-in EMI input filter complies with EN 55022, class A without external components. Further standard features include remote On/Off, output voltage trimming, over voltage protection and short-circuit protection.

Typical applications for these converters are battery operated equipment and distributed power architectures in communication and industrial electronics, everywhere where isolated, tightly regulated voltages are required.

Models

| Order code | Input voltage range | Output voltage | Output current max. | Efficiency typ. |
|---------------|---------------------|----------------|---------------------|-----------------|
| TEN 20-2411WI | 9 – 36 VDC | 5 VDC | 4'000 mA | 79 % |
| TEN 20-2412WI | | 12 VDC | 1'670 mA | 81 % |
| TEN 20-2413W | | 15 VDC | 1'330 mA | 81 % |
| TEN 20-2421W | | ± 5 VDC | ± 2'000 mA | 79 % |
| TEN 20-2422WI | | ± 12 VDC | ± 835 mA | 81 % |
| TEN 20-2423WI | | ± 15 VDC | ± 665 mA | 82 % |
| TEN 20-2411WI | 18 – 75 VDC | 5 VDC | 4'000 mA | 80 % |
| TEN 20-2412WI | | 12 VDC | 1'670 mA | 81 % |
| TEN 20-2413W | | 15 VDC | 1'330 mA | 81 % |
| TEN 20-2421W | | ± 5 VDC | ± 2'000 mA | 79 % |
| TEN 20-2422WI | | ± 12 VDC | ± 835 mA | 83 % |
| TEN 20-2423WI | | ± 15 VDC | ± 665 mA | 84 % |

Input Specifications

| | |
|-----------------------------------|---|
| Input current at no load | 24 Vin models: 35 mA typ. 48 Vin models: 25 mA typ. |
| Input current at full load | 24 Vin models: 1000 mA typ. 48 Vin models: 500 mA typ. |
| Surge voltage (100 msec. max.) | 24 Vin models: 50 V max. 48 Vin models: 100 V max. |
| Conducted noise (input) | EN 55022 level A, FCC part 15, level A |
| 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 | ± 2 % |
| Output voltage adjustment | ± 10 % |
| Regulation | <ul style="list-style-type: none"> - Input variation Vin min. to Vin max. ± 0.2 % max. - Load variation 25 – 100%: <ul style="list-style-type: none"> single output models: ± 0.5 % max. dual output models: ± 3 % max. - Load cross variation 25 % / 100 % ± 5 % max. |
| Temperature coefficient | ± 0.02 % /K |
| Ripple and noise (20 MHz Bandwidth) | <ul style="list-style-type: none"> single output models: 75 mVpk-pk max. dual output models: 100 mVpk-pk max. |
| Start up time (nominal Vin and constant resistive load) | 20 ms typ. |
| Transient Response (25% load step change) | 500 µs typ. |
| Short circuit protection | indefinite (automatic recovery) |
| Over load protection | 150% of Iout max typ. foldback |
| Over voltage protection | <ul style="list-style-type: none"> 5 Vout models: 6.2 V 12 Vout models: 15 V 15 Vout models: 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 | <ul style="list-style-type: none"> 5 Vout models / ± 5 Vout models: 6'800 µF max. / ± 3'400 µF max. 12 Vout models / ±12 Vout models: 2'200 µF max. / ± 680 µF max. 15 Vout models / ±15 Vout models: 755 µF max. / ± 450 µF max. |

General Specifications

| | |
|---|--|
| Temperature ranges | <ul style="list-style-type: none"> - Operating - 40 °C ... + 85 °C - Case temperature + 100 °C max. - Storage - 55 °C ... + 105 °C |
| Thermal impedance | <ul style="list-style-type: none"> - with heat-sink TEN-HS2 8.24 K /watt - without heat-sink 10 K /watt |
| Derating | see graphs on page 3 to 5 |
| Humidity (non condensing) | 95 % rel H max. |
| Reliability, calculated MTBF (MIL-HDBK-217 E) | > 440'000 h @ + 25°C |
| Isolation (Input/Output) | <ul style="list-style-type: none"> - Voltage 1'500 VDC - Capacity 300 pF max. - Resistance > 1'000 M Ohm |

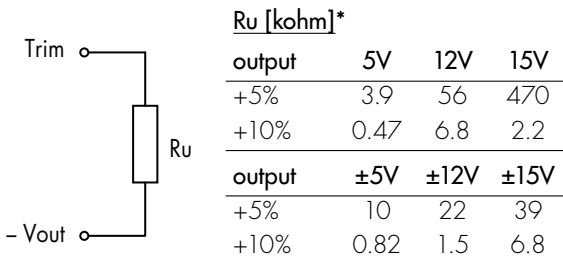
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

General Specifications

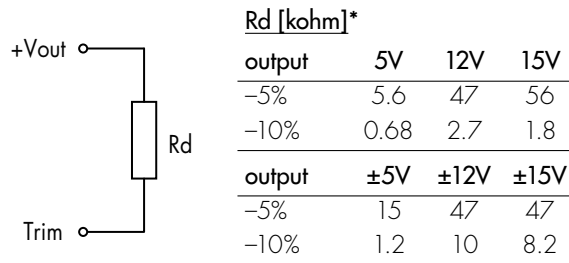
| | | |
|-----------------------------|--|---|
| Switching frequency (fixed) | | 300 kHz typ. (Pulse width modulation PWM) |
| Vibration | | 10-55Hz, 2G, 30 minutes along X,Y,Z |
| Remote On/Off | <ul style="list-style-type: none"> - ON: - OFF: - OFF idle current: | 3.5 ... 12 VDC or open circuit. 0 ... 1.2 VDC or short circuit pin 3 and pin 2 20 mA typ. |
| Safety standards | | UL 1950, EN 60950, IEC 60950 compliance up to 60 VDC input voltage (SELV limit) |
| Safety approvals | | UL /cUL File E 188913 |

Output Voltage Adjustment

Trim up

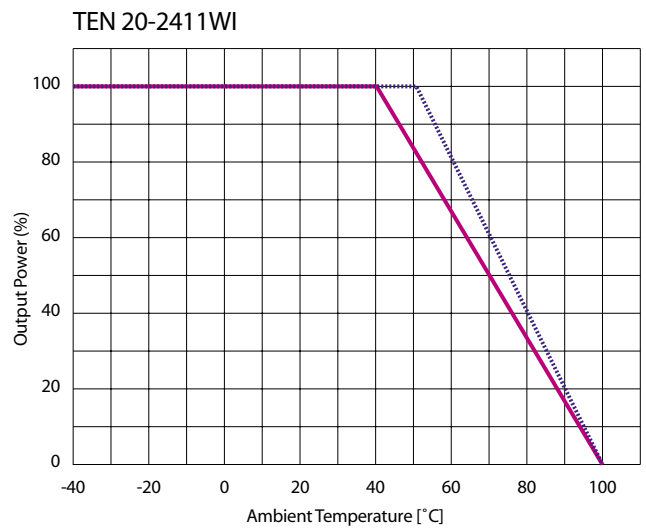
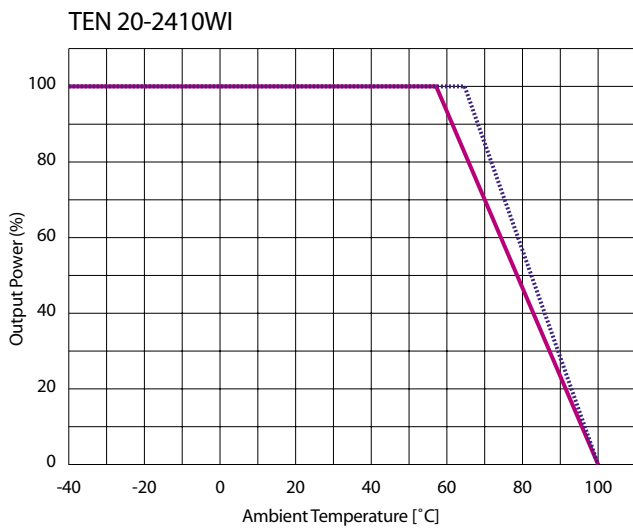
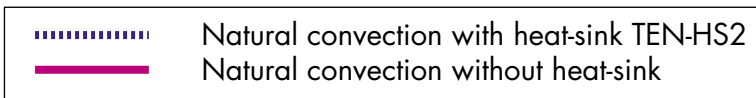


Trim down



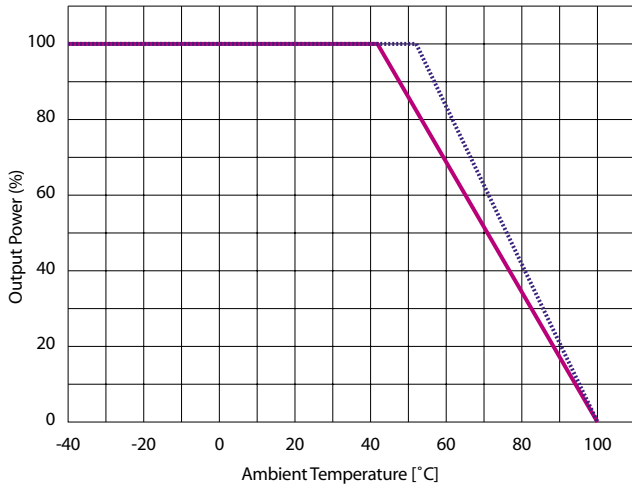
*approximate values

Power De-rating

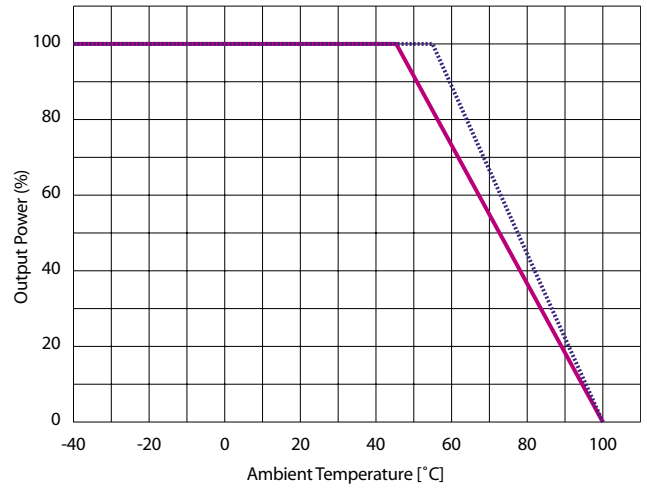


Power De-rating

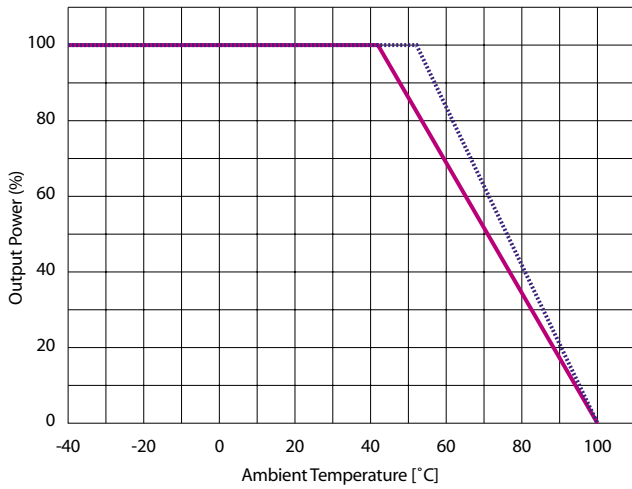
TEN 20-2412WI



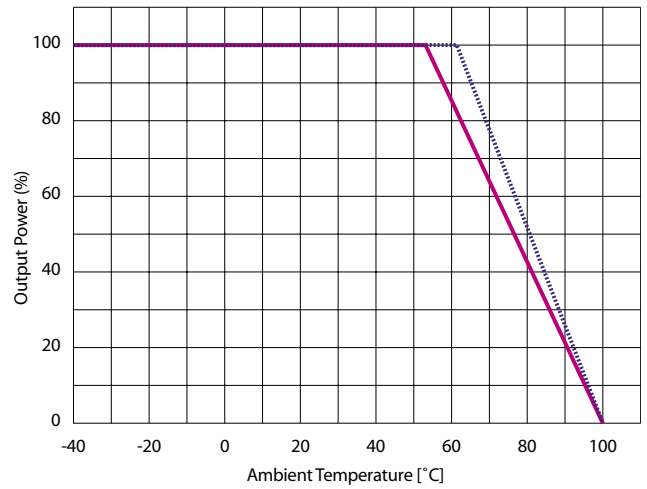
TEN 20-2413WI



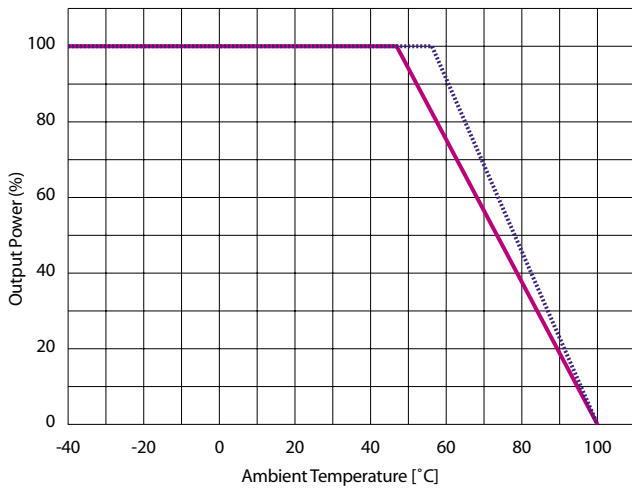
TEN 20-2421WI



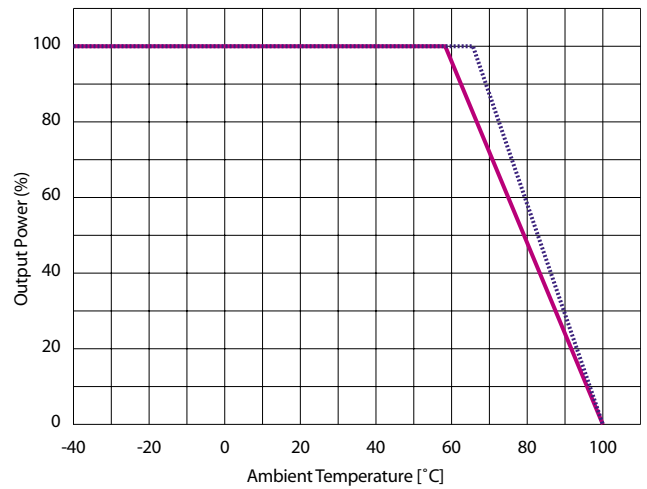
TEN 20-2422WI



TEN 20-2423WI

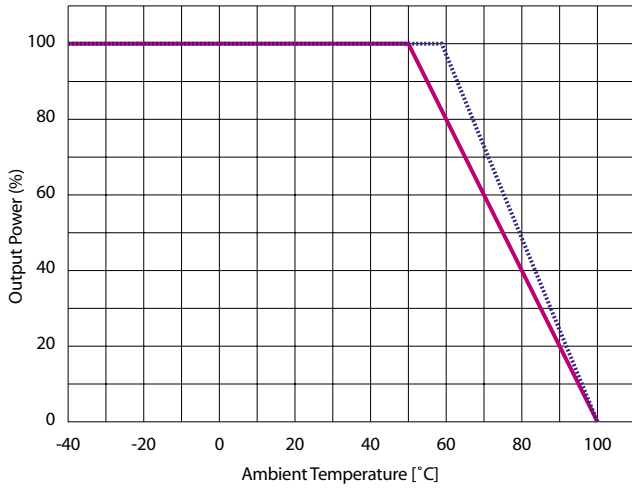


TEN 20-4810WI

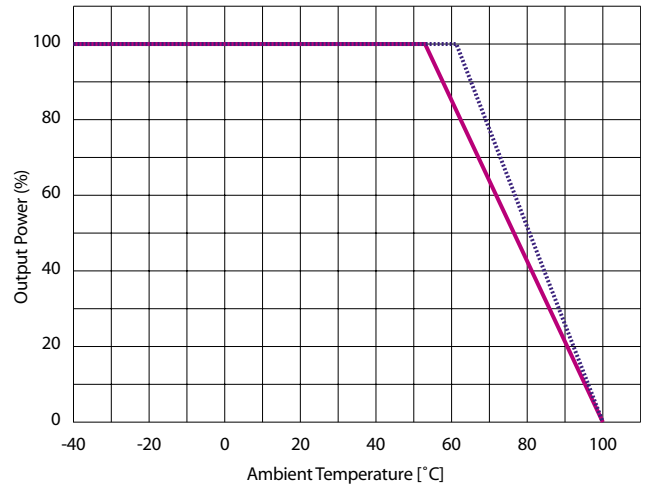


Power De-rating

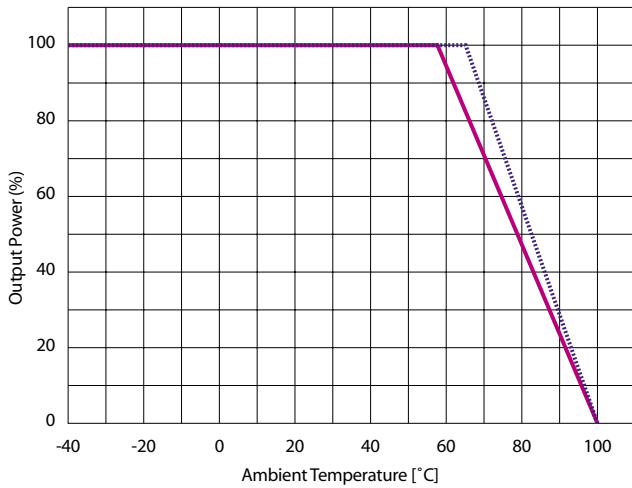
TEN 20-4811WI



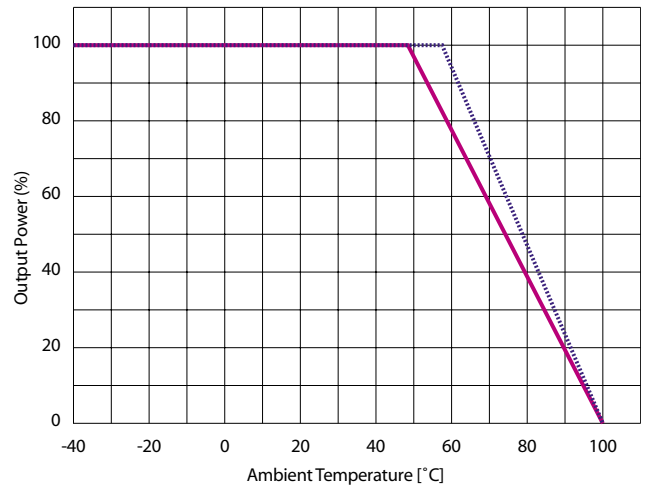
TEN 20-4812WI



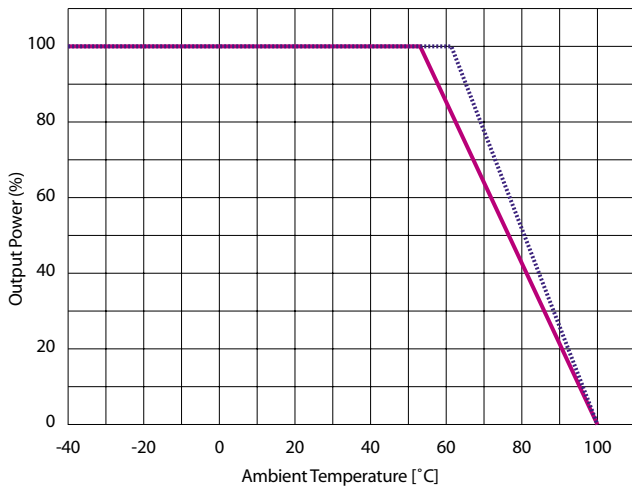
TEN 20-4813WI



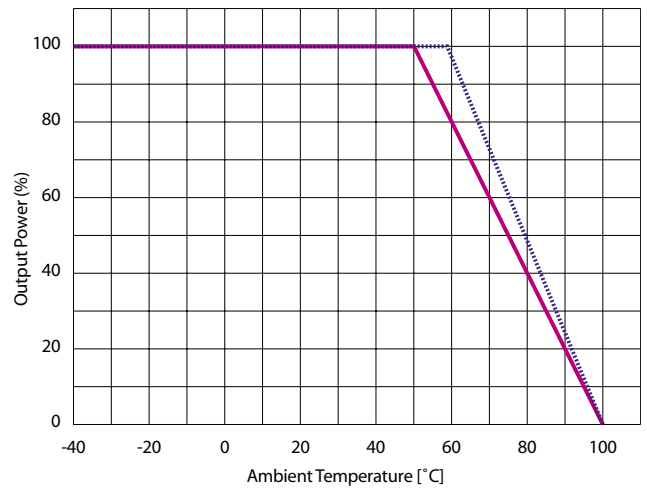
TEN 20-4821WI



TEN 20-4822WI



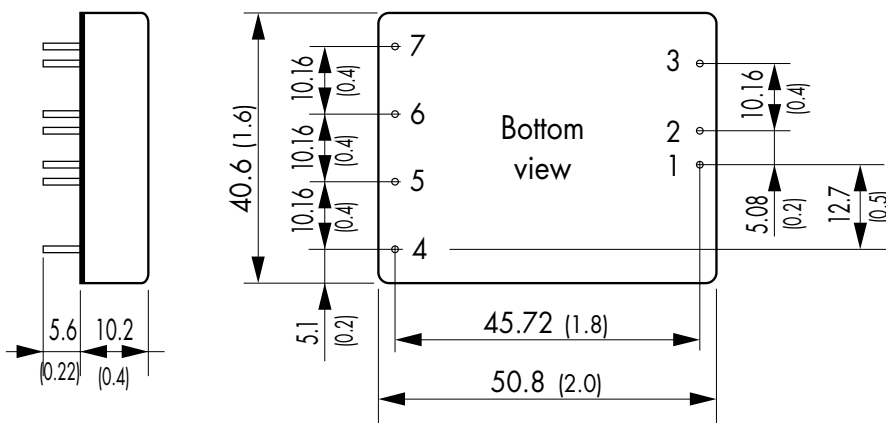
TEN 20-4823WI



Physical Specifications

| | |
|-----------------------|--------------------------|
| Case material | copper, nickel plated |
| Baseplate material | non conductive FR4 |
| Potting material | epoxy (UL 94V-0 - rated) |
| Weight | 50 g (1.2 oz) |
| Soldering temperature | max. 265 °C / 10 sec. |

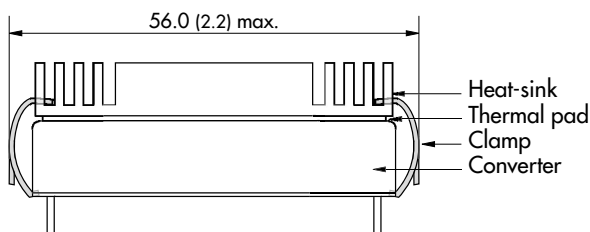
Outline Dimensions



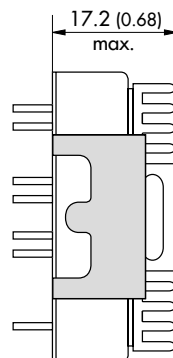
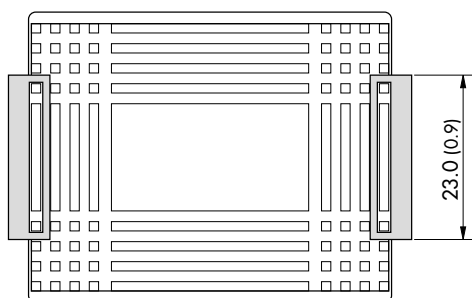
| Pin-Out | | |
|---------|---------------|------------|
| Pin | Single | Dual |
| 1 | +Vin (Vcc) | +Vin (Vcc) |
| 2 | -Vin (GND) | -Vin (GND) |
| 3 | Remote On/Off | |
| 4 | No pin | + Vout |
| 5 | + Vout | Common |
| 6 | -Vout | -Vout |
| 7 | Trim | |

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