

### Features

- ◆ Smallest encapsulated 30 W converter
- ◆ 2" x 1" x 0.4" shielded metal package with isolated baseplate
- ◆ Single- and dual output models
- ◆ I/O isolation voltage 1500 VDC
- ◆ Excellent efficiency up to 91 %
- ◆ Operating temp. range -40°C to +85°C
- ◆ Remote On/Off
- ◆ Over-temperature protection
- ◆ 3-year product warranty



The TEN-30 series is the latest generation of high performance dc-dc converter modules setting a new standard concerning power density. This product with 30W comes in an encapsulated, shielded metal package with a footprint of only 1.0" x 2.0". All models have wide 2:1 input voltage range and precisely regulated, isolated output voltages. Advanced circuit topology provides high efficiency up to 91% which allows an industrial operating temperature range of -40°C to +85°C (with derating).

Further features include remote On/Off, trimmable output, under-voltage lockout and overtemperature protection. Typical applications for these converters are mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is critical.

### Models

Ordercode	Input voltage	Output voltage	Output current max.	Efficiency typ.
TEN 30-1207	9 – 18 VDC (nominal 12 VDC)	1.5 VDC	8'500 mA	79 %
TEN 30-1209		2.5 VDC	8'000 mA	84 %
TEN 30-1210		3.3 VDC	8'000 mA	85 %
TEN 30-1211		5.1 VDC	6'000 mA	87 %
TEN 30-1212		12 VDC	2'500 mA	89 %
TEN 30-1213		15 VDC	2'000 mA	89 %
TEN 30-1221		± 5 VDC	± 3'000 mA	87 %
TEN 30-1222		± 12 VDC	± 1'250 mA	87 %
TEN 30-1223		± 15 VDC	± 1'000 mA	87 %
TEN 30-2407		18 – 36 VDC (nominal 24 VDC)	1.5 VDC	8'500 mA
TEN 30-2409	2.5 VDC		8'000 mA	85 %
TEN 30-2410	3.3 VDC		8'000 mA	87 %
TEN 30-2411	5.1 VDC		6'000 mA	90 %
TEN 30-2412	12 VDC		2'500 mA	91 %
TEN 30-2413	15 VDC		2'000 mA	91 %
TEN 30-2421	± 5 VDC		± 3'000 mA	90 %
TEN 30-2422	± 12 VDC		± 1'250 mA	89 %
TEN 30-2423	± 15 VDC		± 1'000 mA	90 %
TEN 30-4807	36 – 75 VDC (nominal 48 VDC)		1.5 VDC	8'500 mA
TEN 30-4809		2.5 VDC	8'000 mA	85 %
TEN 30-4810		3.3 VDC	7'500 mA	87 %
TEN 30-4811		5.1 VDC	6'000 mA	89 %
TEN 30-4812		12 VDC	2'500 mA	91 %
TEN 30-4813		15 VDC	2'000 mA	91 %
TEN 30-4821		± 5 VDC	± 3'000 mA	90 %
TEN 30-4822		± 12 VDC	± 1'250 mA	88 %
TEN 30-4823		± 15 VDC	± 1'000 mA	89 %

### Input Specifications

Input current at no load	12 V; $\pm 12$ / $\pm 15$ Vout models: 50 mA max. 12 V; other models: 100 mA max. 24 V; 12 / 15 Vout models: 30 mA max. 24 V; $\pm 12$ / $\pm 15$ Vout models: 30 mA max. 24 V; other models: 70 mA max. 48 V; $\pm 12$ / $\pm 15$ Vout models: 30 mA max. 48 V; other models: 45 mA max.
Input current at full load	12 V; 1.5 Vout models: 1400 mA typ. 12 V; 2.5 Vout models: 2100 mA typ. 12 V; 3.3 Vout models: 2700 mA typ. 12 V; other output models: 3000 mA typ. 24 V; 1.5 Vout models: 700 mA typ. 24 V; 2.5 Vout models: 1000 mA typ. 24 V; 3.3 Vout models: 1300 mA typ. 24 V; other output models: 1500 mA typ. 48 V; 1.5 Vout models: 350 mA typ. 48 V; 2.5 Vout models: 500 mA typ. 48 V; 3.3 Vout models: 650 mA typ. 48 V; other output models: 750 mA typ.
Start-up voltage / under voltage shut down	12 V models: 9 VDC / 8 VDC typ. 24 V models: 18 VDC / 16 VDC typ. 48 V models: 36 VDC / 32 VDC typ.
Surge voltage (100 msec. max.)	12 V models: 25 V max. 24 V models: 50 V max.. 48 V models: 100 V max.
Conducted noise (input)	EN 55022 class A with input capacitor 12 V models: 10 $\mu$ F / 25 V 1812 MLCC 24 V models: 4.7 $\mu$ F / 50 V 1812 MLCC 48 V models: 2.2 $\mu$ F / 100 V 1812 MLCC

### Output Specifications

Voltage set accuracy	$\pm 1$ %
Output voltage adj. range	$\pm 10$ % (only for single output models)
Regulation	– Input variation Vin min. to Vin max. 0.2 % max. – Load variation 0 – 100 % 0.5 % max. – single output models 1.0 % max. – dual output models balanced load 5.0 % max. – dual output models unbalanced load (25% /100%)
Minimum load	not required
Temperature coefficient	$\pm 0.02$ %/K
Ripple and noise (20 MHz Bandwidth)	100 mVpk-pk max. (150 mVpk-pk for 12/ $\pm 12$ /15/ $\pm 15$ V models)
Start up time (nominal Vin and constant resistive load)	30 ms typ.
Transient response time (25% load change)	250 $\mu$ s typ.
Short circuit protection	indefinite, automatic recovery
Over load protection	150 % of Iout max. typ.
Thermal shutdown	@ 115°C typ.
Over voltage protection	1.5 VDC models: 2.0 V 2.5 VDC models: 3.3 V 3.3 VDC models: 3.9 V 5.1 VDC models: 6.2 V 12 VDC models: 15 V 15 VDC models: 18 V

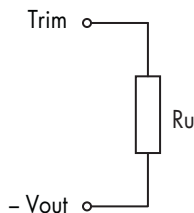
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**General Specifications**

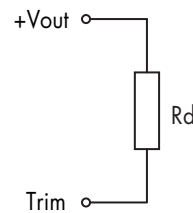
Capacitive load	1.5 / 2.5 / 3.3 Vout models: 20'000 $\mu$ F 5.1 Vout models: 14'400 $\mu$ F 12 Vout models: 3'000 $\mu$ F 15 Vout models: 2'000 $\mu$ F $\pm$ 5 Vout models: $\pm$ 3'000 $\mu$ F $\pm$ 12 Vout models: $\pm$ 2'000 $\mu$ F $\pm$ 15 Vout models: $\pm$ 1'300 $\mu$ F
Temperature ranges	- Operating -40°C to +85°C - Case temperature +100°C max. - Storage -55°C to +125°C
Load derating	3.3 %/K above 60°C
Humidity (non condensing)	5 % to 95 % rel H max.
Thermal inpedance	- Natural convection 12 °C/W - Natural convection with heat sink 10 °C/W
Reliability, calculated MTBF (MIL-HDBK-217F, @ 25°C, ground benign)	550'000 h
Isolation voltage (60 sec.)	- Input/Output 1'500 VDC
Isolation capacity	- Input/Output 1500 pF max.
Isolation resistance	- Input/Output (500 VDC) >1'000 MOhm
Remote On/Off:	- On: 3 to 12 VDC or open circuit. - Off: 0 to 1.2 VDC or short circuit pin 3 and pin 2 - Standby current: 3 mA max.
Switching frequency (fixed)	430 kHz typ. (puls width modulation)
Vibration and thermal shock	MIL-STD-810E
Safety standards	UL/cUL 60950-1, IEC/EN 60950-1 compliance
Safety approvals	UL (File no.: tba)

**Output Voltage Adjustment**

**Trim up**



**Trim down**



Nominal output voltage at open Trim input!

**Ru [kohm]**

output	1.5	2.5	3.3V	5.1V	12V	15V
+5%	0.56	4.3	6.8	5.1	43	47
+10%	0.051	0.33	0.75	0.75	4.3	1.8

**Rd [kohm]**

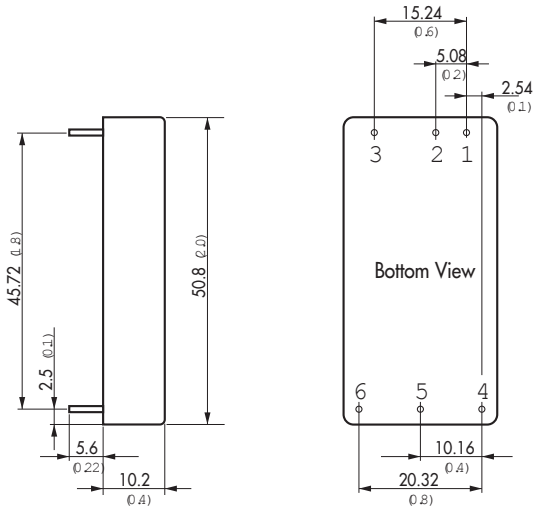
output	1.5	2.5	3.3V	5.1V	12V	15V
-5%	0.68	6.2	8.2	6.2	56	56
-10%	0.062	0.75	0.62	0.82	5.6	2.2

**Physical Specifications**

Casing material	copper, nickel plated
Baseplate	non conductive FR4
Potting material	epoxy (UL 94V-0 -rated)
Weight	31 g (1.1 oz)
Soldering temperature	max. 265°C / 10 sec.

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

**Outline Dimensions**



Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	-Vin (GND)	-Vin (GND)
3	Remote On/Off	
4	+ Vout	+ Vout
5	-Vout	Common
6	Trim	-Vout

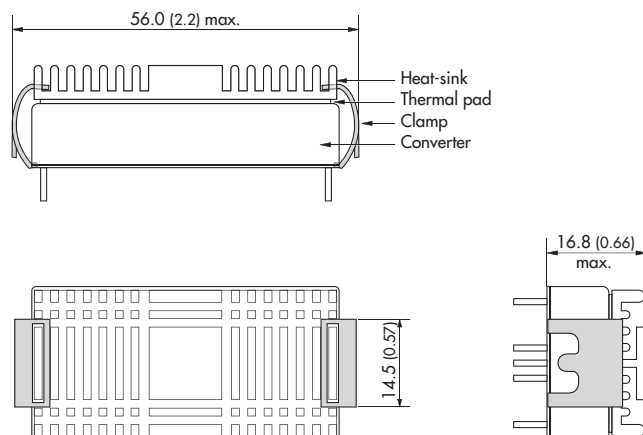
Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.1 (0.04 ±0.004)  
 Pin pitch tolerances: ±0.25 (±0.01)  
 Case tolerances: ±0.5 (±0.02)

**Heat-Sink (Option)**

**Order code:** TEN-HS1  
 (cont.: heat-sink, thermal pad, 2 clamps)  
**Material:** Aluminum  
**Finish:** Anodic treatment (black)  
**Weight:** 17g (0.60oz) without converter  
 Thermal impedance after assembling: 10 K/W



**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 any time without notice.