

#### Features

- ◆ Smallest encapsulated 30 W converter
- ◆ 2" x 1" x 0.4" shielded metal package
- ◆ Ultra wide 4:1 input voltage range
- ◆ Single- dual- and triple output models
- ◆ Very high efficiency up to 89%
- ◆ Operating temperature range  
-40 °C to +75 °C
- ◆ I/O isolation 1500 VDC
- ◆ Over Temperature Protection
- ◆ Under Voltage Lockout
- ◆ Short circuit protection
- ◆ Remote ON/Off
- ◆ Adjustable output voltage



The TEN 30WIN series is a family of high performance 30W dc-dc converter modules featuring ultra wide 4:1 input voltage ranges in a compact low profile case with industry-standard footprint. Standard features include remote On/Off, output voltage trimming, over voltage protection, under voltage lockout, over temperature 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 1	Output 2	Output 3	Efficiency typ..
TEN 30-2407WIN	9 – 36 VDC (24 VDC nominal)	1.5 VDC / 8.0 A			82 %
TEN 30-2409WIN		2.5 VDC / 8.0 A			84 %
TEN 30-2410WIN		3.3 VDC / 8.0 A			87 %
TEN 30-2411WIN		5.1 VDC / 6.0 A			88 %
TEN 30-2412WIN		12 VDC / 2.5 A			89 %
TEN 30-2413WIN		15 VDC / 2.0 A			89 %
TEN 30-2421WIN		+5 VDC / 3.0 A	-5 VDC / 3.0 A		88 %
TEN 30-2422WIN		+12 VDC / 1.25 A	-12 VDC / 1.25 A		86 %
TEN 30-2423WIN		+15 VDC / 1.0 A	-15 VDC / 1.0 A		86 %
TEN 30-2433WIN		3.3 VDC / 5.0 A	+12 VDC / 0.42 A	-12 VDC / 0.42 A	85 %
TEN 30-2434WIN		3.3 VDC / 5.0 A	+15 VDC / 0.33 A	-15 VDC / 0.33 A	85 %
TEN 30-2431WIN		5 VDC / 4.0 A	+12 VDC / 0.42 A	-12 VDC / 0.42 A	87 %
TEN 30-2432WIN		5 VDC / 4.0 A	+15 VDC / 0.33 A	-15 VDC / 0.33 A	87 %
TEN 30-4807WIN		18 – 75 VDC (48 VDC nominal)	1.5 VDC / 8.0 A		
TEN 30-4809WIN	2.5 VDC / 8.0 A				84 %
TEN 30-4810WIN	3.3 VDC / 8.0 A				87 %
TEN 30-4811WIN	5.1 VDC / 6.0 A				88 %
TEN 30-4812WIN	12 VDC / 2.5 A				89 %
TEN 30-4813WIN	15 VDC / 2.0 A				89 %
TEN 30-4821WIN	+5 VDC / 3.0 A		-5 VDC / 3.0 A		88 %
TEN 30-4822WIN	+12 VDC / 1.25 A		-12 VDC / 1.25 A		86 %
TEN 30-4823WIN	+15 VDC / 1.0 A		-15 VDC / 1.0 A		86 %
TEN 30-4833WIN	3.3 VDC / 5.0 A		+12 VDC / 0.42 A	-12 VDC / 0.42 A	86 %
TEN 30-4834WIN	3.3 VDC / 5.0 A		+15 VDC / 0.33 A	-15 VDC / 0.33 A	86 %
TEN 30-4831WIN	5 VDC / 4.0 A		+12 VDC / 0.42 A	-12 VDC / 0.42 A	88 %
TEN 30-4832WIN	5 VDC / 4.0 A		+15 VDC / 0.33 A	-15 VDC / 0.33 A	88 %

### Input Specifications

Input current at no load (nominal input)	1.5 – 5.1 V models, 24 VDC: 100 mA typ. 12 & 15 V models, 24 VDC: 40 mA typ. 1.5 – 5.1 V models, 48 VDC: 65 mA typ. 12 & 15 V models, 48 VDC: 30 mA typ.
Input current at full load (nominal input)	1.5 V model, 24 VDC: 650 mA typ. 2.5 V model, 24 VDC: 1050 mA typ. other models, 24 VDC: 1500 mA typ. 1.5 V model, 48 VDC: 320 mA typ. 2.5 V model, 48 VDC: 520 mA typ. other models, 48 VDC: 750 mA typ.
Input voltage variation (dv/dt)	5 V/ms, max. (complies with ETS300 132 part 4.4)
Start-up voltage / under voltage lockout	24 V models: 9 VDC / 8 VDC (typ.) 48 V models: 18 VDC / 16 VDC (typ.)
Surge voltage (100 msec. max.)	24 V models: 50 VDC max. 48 V models: 100 VDC max
Conducted noise	EN 55022 level A, FCC part 15, level A with external capacitor (see note 1)
ESD	EN 61000-4-2, perf. criteria A
Radiated immunity	EN 61000-4-3, perf. criteria A
Fast transient	EN 61000-4-4, perf. criteria A
Surge	EN 61000-4-5, perf. criteria A
Conducted immunity	EN 61000-4-6, perf. criteria A

### Output Specifications

Voltage set accuracy	±1 % (±5 % for auxiliary outputs)
Output voltage adjustment	±10 % (only for single output models)
Regulation	<ul style="list-style-type: none"> <li>– Input variation      single and dual output models: 0.2 % max.</li> <li>   triple output models: 1 % max. (main output)</li> <li>– Load variation      single output models: 0.5 % max. (0 – 100 %)</li> <li>   dual output models: 1 % max. (0 – 100 %)</li> <li>   triple output models (main/auxiliary): 1 % max. / 5 % max. (10 – 100 %)</li> </ul>
Temperature coefficient	±0.02 %/K max.
Ripple and noise (20 MHz Bandwidth)	1.5 V – 5.1 V models: 100 mVpk-pk max. triple output models: 75 mVpk-pk max. other models: 150 mVpk-pk max.
Start up time (nominal Vin and constant resistive load)	30 ms typ.
Transient response time (25% load change)	250 µs typ.
Short circuit protection	indefinite (automatic recovery)
Over load protection	150% of lout max typ.
Thermal shutdown	@ 115 °C typ.
Over voltage protection	1.5 V output: 2.0 V 2.5 V output: 3.3 V 3.3 V output: 3.9 V 5.1 V output: 6.2 V 12 V output: 15 V 15 V output: 18 V

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

### Output Specifications

Minimum load	single and dual output models: <b>not required</b> triple output models: <b>10% of rated max current</b> (operation at lower load condition will not damage the converters. However, they may not meet all listed specifications)
Capacitive load output models	1.5 – 3.3 V models: <b>20'000 <math>\mu</math>F max.</b> 5.1 V models: <b>14'000 <math>\mu</math>F max.</b> 12 & 15 V models: <b>2'000 <math>\mu</math>F max.</b> $\pm$ 5 V models: <b><math>\pm</math>3'000 <math>\mu</math>F max.</b> other dual output models: <b><math>\pm</math>1'300 <math>\mu</math>F max.</b> 3.3 V triple output models: <b>15'000 / <math>\pm</math>220 <math>\mu</math>F max.</b> (main / auxiliary) 5.1 V triple output models: <b>8'000 / <math>\pm</math>220 <math>\mu</math>F max.</b> (main / auxiliary)

### General Specifications

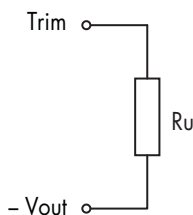
Temperature ranges	– Operating – Case temperature – Storage	–40 °C to +75 °C +105 °C max. –55 °C to +125 °C
Derating		3.2 %/K above 60 °C
Humidity (non condensing)		95 % rel. H max.
Reliability, calculated MTBF (MIL-HDBK-217 F)		tba
Isolation voltage (60 sec)	– Input / Output	1500 VDC
Isolation resistance	– Input / Output	>1000 M Ohm
Isolation capacity	– Input / Output	1500 pF max.
Remote On/Off	– On: – Off: – Off idle current:	3.0... 12 VDC or open circuit. 0 ... 1.2 VDC or short circuit pin 3 and pin 2 3 mA max.
Switching frequency (fixed)		400 kHz typ. (Pulse width modulation PWM)
Vibration		10 – 55 Hz, 10G, 30 minutes along X,Y,Z
Safety standards		UL 60950-1, EN 60950-1, IEC 60950-1
Safety approvals		UL /cUL File pending

#### Note 1:

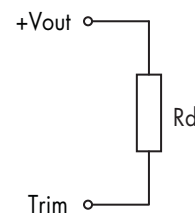
In order to meet conducted emissions EN55022-A and EN55011-A a capacitor between +Vin and -Vin has to be installed. The capacitor should be capable to handle 1 A ripple current. A suggestion is KY series of Nippon chemi-con, 330 $\mu$ F/50V, ESR 55mOhm for 24 Vin models and 220 $\mu$ F/100V, ESR 48 mOhm for 48 Vin models.

### Output Voltage Adjustment

#### Trim up



#### Trim down



Resistor values to be advised

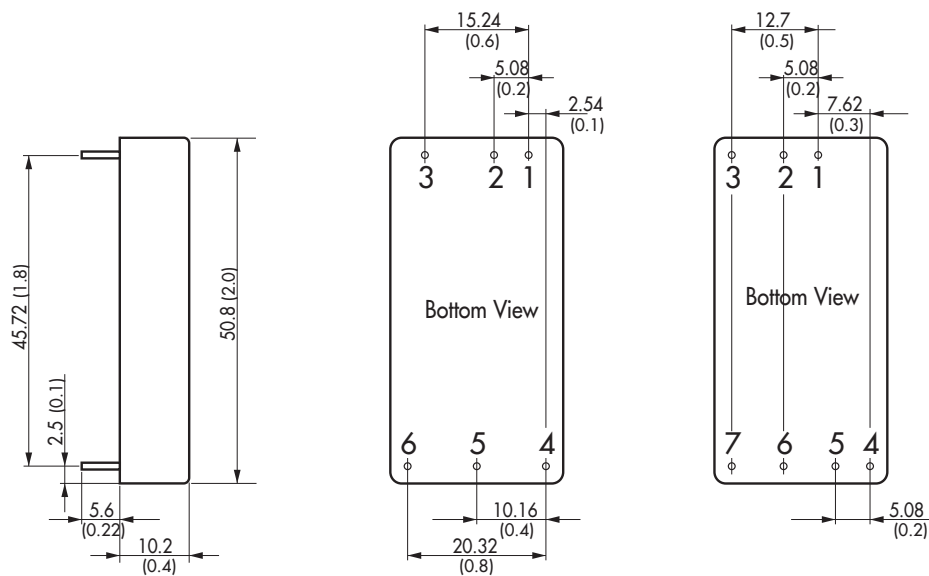
**Physical Specifications**

Case material	copper, nickel plated
Baseplate material	none conductive FR4
Potting material	epoxy (UL 94V-0 -rated)
Weight	31 g (1.1 oz)
Soldering temperature	max. 265 °C / 10 sec.

**Outline Dimensions**

Single- and dual output models

Triple output models



Dimensions in [mm], ( ) = Inch  
 Pin diameter: 1.0 ±0.05 (0.04 ±0.002)  
 Pin pitch tolerances: ±0.35 (±0.014)  
 Case tolerances: ±0.5 (±0.02)

**Pin-Out**

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

Specifications can be changed any time without notice.