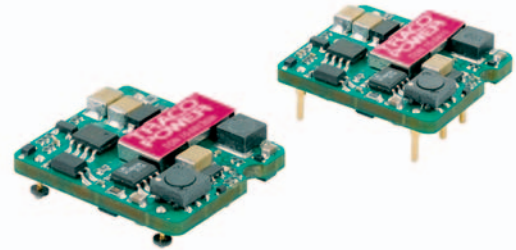


### Features

- ◆ Ultra compact 15W converter
- ◆ Cost efficient open frame design with industry standard pin-out
- ◆ Surface-mount (SM) and through-hole version
- ◆ I/O isolation voltage 2250V, rated for basic insulation
- ◆ Extended operating temperature range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- ◆ Remote On/Off
- ◆ Under voltage lockout
- ◆ Lead free design, RoHS compliant
- ◆ 3-years product warranty



The TON-15 series is a new generation of high performance 15W dc-dc converters with wide input voltage range and precisely regulated output voltage. The ultra compact open frame design with industry standard pin-out provides the designer now a 50% smaller, cost efficient alternative to existing 10 to 15W converters in the market. Built-in filters for both input and output minimize the need for external filtering.

Further features include remote On/Off, output voltage trimming, over voltage protection and short circuit protection. Typical applications are distributed power systems, instrumentation and industrial electronics, everywhere where space on the PCB is a critical factor.

### Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TON 15-2410	18 – 36 VDC (nominal 24 VDC)	3.3 VDC	3'500 mA	86 %
TON 15-2411		5.0 VDC	3'000 mA	87 %
TON 15-2412		12 VDC	1'250 mA	87 %
TON 15-2413		15 VDC	1'000 mA	88 %
TON 15-4810	36 – 75 VDC (nominal 48 VDC)	3.3 VDC	3'500 mA	85 %
TON 15-4811		5.0 VDC	3'000 mA	87 %
TON 15-4812		12 VDC	1'250 mA	87 %
TON 15-4813		15 VDC	1'000 mA	88 %

Add suffix **SM** for surface mount version

### Input Specifications

Input current at no load	24 V; 3.3/5 Vout models: 20 mA typ. 24 V; 12/15 Vout models: 15 mA typ. 48 V; 3.3/5 Vout models: 15 mA typ. 48 V; 12/15 Vout models: 10 mA typ.
Input current at full load	24 V; 3.3 Vout models: 590 mA typ. 24 V; other output models: 750 mA typ. 48 V; 3.3 Vout models: 300 mA typ. 48 V; other output models: 380 mA typ.
Input voltage variation (dv/dt)	5 V/ms, max. (complies with ETS 300 132 part. 4.4)
Start-up voltage / under voltage lockout	24 V models: 17 VDC / 14.5 VDC 48 V models: 33 VDC / 30.5 VDC
Surge voltage (100 msec. max.)	24 V models: 50 V max. 48 V models: 100 V max.
Input filter	capacitor type (see application note for compliance to EN 55022 class A/B)
Radiated immunity	EN 61000-4-3 10 V/m, perf. criteriy A
Fast transient / surge	EN 61000-4-4, ±2 kV, perf. criteria B EN 61000-4-5, ±1 kV perf. criteria A with external input capacitor e.g. Nippon chemi-con KY 220 µF, 100 V, ESR 48 mOhm
Conducted immunity	EN 61000-4-6, 3 Vrms, perf. criteria A
Reflected ripple current	30 mA <sub>p-p</sub> typ.

### Output Specifications

Voltage set accuracy	±1 %
Output voltage adjustment	±10 % (see application note)
Regulation	– Input variation Vin min. to Vin max: 0.2 % max. – Load variation 0 – 100 %: 0.2 % max.
Minimum load	0 % of rated max. load
Temperature coefficient	±0.02 %/K
Ripple and noise (20 MHz Bandwidth) (measured with 1 µF M/C and 10 µF TC)	3.3 & 5.0 Vout models: 75 mVpk-pk typ 12 & 15 Vout models: 100 mVpk-pk typ
Start up time	– Power On: 30 ms typ. – Remote On: 30 ms typ.
Transient response setting time (25% load step chang)	300 µs typ.
Short circuit protection	indefinite (automatic recovery)
Over load protection	at 150 % of lout max., foldback
Over voltage protection	3.3 Vout models: 3.7 – 5.4 Vout 5 Vout models: 5.6 – 7.0 Vout 12 Vout models: 13.5 – 19.8 Vout 15 Vout models: 16.8 – 20.5 Vout
Capacitive load	3.3 & 5.0 Vout models: 1'000 µF max. 12 Vout models: 330 µF max. 15 Vout models: 220 µF max.

**Application note:** [www.tracopower.com/products/ton15-application.pdf](http://www.tracopower.com/products/ton15-application.pdf)

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

**General Specifications**

Temperature ranges	- Operating - Storage	-40°C to +85°C (with derating) -55°C to +125°C
Derating		6.7 %/K above 75°C
Humidity (non condensing)		5 % to 95 % rel H
Thermal shock		acc. MIL-STD-810F
Vibration		acc. MIL-STD-810F
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>1.3 Mio. h
Isolation voltage (60 sec.)	- Input / Output	2'250 VDC (complies with basic insulation rating per EN 60950-1)
Isolation resistance	- Input / Output	>10 M Ohm
Isolation capacitance	- Input / Output	1000 pF max.
Switching frequency (Pulse width modulation PWM)	3.3 / 5 Vout models: 12 / 15 Vout models:	270 kHz typ. 470 kHz typ.
Remote On/Off	- On: - Off: - Off idle current:	3.0 to 15 VDC or open circuit. 0 to 1.2 VDC or short circuit pin 6 and pin 2 2.5 mA max. negative remote On/Off logic on demand
Safety standards		UL 60950-1, EN 60950-1, IEC 60950-1
Safety approvals	- UL/cUL	<a href="http://www.ul.com">www.ul.com</a> -> certifications -> File e188913
Environmental compliance	- Reach - RoHS	<a href="http://www.tracopower.com/products/ton15-reach.pdf">www.tracopower.com/products/ton15-reach.pdf</a> RoHS directive 2002/95/EC

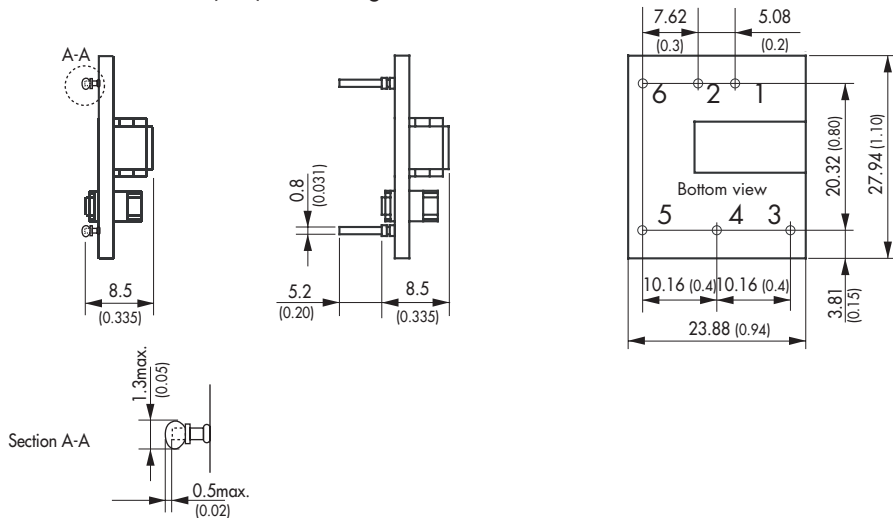
**Physical Specifications**

Weight		10.5 g (0.36 oz)
Soldering profile for trough hole version		max. 265°C / 10 sec. (wave soldering)
Lead-free reflow solder process for SMD-package models		as per J-STD-020D.01 (to find at: <a href="http://www.jedec.org">www.jedec.org</a> - free registration required)
Washing procedure		<a href="http://www.tracopower.com/products/ton15-clean.pdf">www.tracopower.com/products/ton15-clean.pdf</a>

**Outline Dimensions**

SMD version (SM)

trough hole version



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

Dimensions in [mm], ( ) = Inch  
Tolerances: ±0.5 (±0.02)  
Pin pitch tolerances: ±0.25 (±0.01)

Specifications can be changed any time without notice.