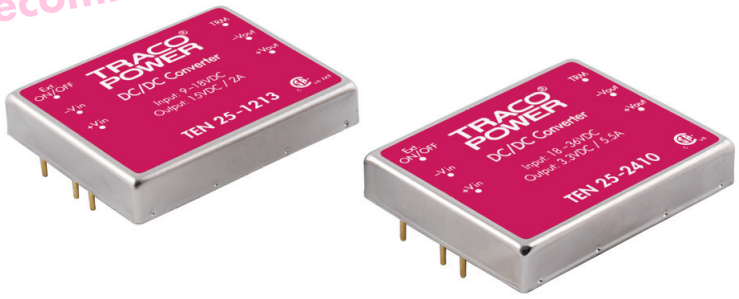
DC/DC Converters

TEN 25 Series, 25/30 Watt

Features

- Wide 2:1 input range
- Very high efficiency up to 89%
- Extended operating temperature range –40°C to +85°C
- Adjustable output voltage
- Remote On/Off
- Continuous short circuit protection
- Over voltage protection
- I/O isolation 1500 VDC
- Input filter meets EN 55022, Class A and FCC, Level A without external components
- Lead free design - RoHS compliant
- 3-year product warranty



The TEN 25 series is a range of isolated DC/DC converters with high power density in a 51x41x9.5mm shielded metal case. All 18 models have a wide 2:1 input voltage range. The very high efficiency allows a safe operating temperature range of –40°C to +85°C. Other features are internal EMI-filter to meet EN55022, class A and remote On/Off. Typical applications for these converter modules are industrial electronics, communication systems, battery operated equipment and distributed power systems.

Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 25-1210		3.3 VDC	5'500 mA	81 %
TEN 25-1211		5 VDC	5'000 mA	84 %
TEN 25-1212	**9 – 18 VDC**	12 VDC	2'500 mA	88 %
TEN 25-1213	(12 VDC nominal)	15 VDC	2'000 mA	88 %
TEN 25-1222		±12 VDC	±1'250 mA	88 %
TEN 25-1223		±15 VDC	±1'000 mA	88 %
TEN 25-2410		3.3 VDC	5'500 mA	82 %
TEN 25-2411		5 VDC	5'000 mA	85 %
TEN 25-2412	**18 – 36 VDC**	12 VDC	2'500 mA	89 %
TEN 25-2413	(24 VDC nominal)	15 VDC	2'000 mA	89 %
TEN 25-2422		±12 VDC	±1'250 mA	89 %
TEN 25-2423		±15 VDC	±1'000 mA	89 %
TEN 25-4810		3,3 VDC	5'500 mA	82 %
TEN 25-4811		5 VDC	5'000 mA	85 %
TEN 25-4812	**36 – 75 VDC**	12 VDC	2'500 mA	89 %
TEN 25-4813	(48 VDC nominal)	15 VDC	2'000 mA	89 %
TEN 25-4822		±12 VDC	±1'250 mA	89 %
TEN 25-4823		±15 VDC	±1'000 mA	89 %

Input Specifications

Input current no load		12 Vin models:	**40 mA max.**
		24 Vin models:	**20 mA max.**
		48 Vin models:	**10 mA max.**
Input current (full load)	12 Vin;	3.3/ 5 VDC models:	**1870 mA typ. / 2480 mA typ.**
	12 Vin;	other output models:	**2840 mA typ.**
	24 Vin;	3.3/ 5 VDC models:	**920 mA typ. / 1220 mA typ.**
	24 Vin;	other output models:	**1400 mA typ.**
	48 Vin;	3.3/ 5 VDC models:	**460 mA typ. / 610 mA typ.**
	48 Vin;	other output models:	**700 mA typ.**
Start-up voltage / under voltage shut down		12 Vin models:	**8.8 VDC / 8.3 VDC typ.**
		24 Vin models:	**17.5 VDC / 16.5 VDC typ.**
		48 Vin models:	**35.0 VDC / 33.0 VDC typ.**
Surge voltage (1000 msec. max.)		12 Vin models:	**25 V max.**
		24 Vin models:	**50 V max.**
		48 Vin models:	**100 V max.**
Conducted noise (input)			**EN 55022 class A, FCC part 15, level A**

Output Specifications

Voltage set accuracy			**±1 %**
Output voltage adj. range			**±10 %**
Regulation	– Input variation Vin min. to Vin max.		**0.3 % max.**
	– Load variation 10 – 100 %	single output models	**0.5 % max**
		dual output models balanced load	**1.0 % max.**
		dual output models unbalanced load	**2.0 % max.**
Ripple and noise (20 MHz Bandwidth)			**80 mVpk-pk max.**
Temperature coefficient			**±0.02 %/K**
Output current limitation			**>110 % of Iout max., constant current**
Short circuit protection			**indefinite, automatic recovery**
Capacitive load		single output models:	**470 µF**
		dual output models:	**220 µF** (for each output)

General Specifications

Temperature ranges	– Operating	**–40°C to +85°C**
	– Case temperature	**+105°C max.**
	– Storage	**–55°C to +125°C**
Load derating	– without heatsink	**2.2 %/K above +60°C**
	– with heatsink	**3.3 %/K above +70°C**
Humidity (non condensing)		**95 % rel H max.**
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		**>550'000 h**
Isolation voltage (60 sec.)	– Input/Output	**1'500 VDC**
Isolation capacitance	– Input/Output	**1200 pF typ.**
Isolation resistance	– Input/Output (500 VDC)	**>1'000 MOhm**
Switching frequency (fixed)		**330 kHz typ. (puls width modulation)**
Remote On/Off:	– On:	**3.5...12 VDC or open circuit.**
	– Off:	**0...1.2 VDC or short circuit pin 3 and pin 2**
	– Standby current:	**5 mA max.**
Safety approvals		**UL /cUL 60950, IEC/EN 60950 compliance up to 60 VDC input voltage (SELV limit)**

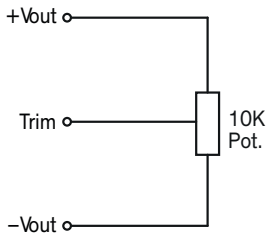
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

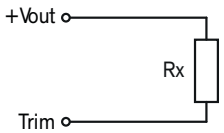
Physical Specifications

Casing material		copper, nickel plated
Baseplate		non conductive FR4
Potting material		silicon rubber (UL 94 V-0 rated)
Weight		48 g (1.69 oz)
Soldering temperature		max. 265°C / 10 sec.
Thermal Impedance		12.5 K/W typ. 10.2 K/W typ. (with Heatsink)
Environmental compliance	– Reach – RoHS	www.tracopower.com/info/reach-declaration.pdf RoHS directive 2011/65/EU

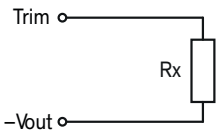
Supporting documents: www.tracopower.com/overview/ten25

Output Voltage Adjustments





$$Rx = \frac{36.667 \times Vo - 33 \times Vn}{Vn - Vo}$$



$$Rx = \frac{33 \times Vn - 30 \times Vo}{Vo - Vn}$$

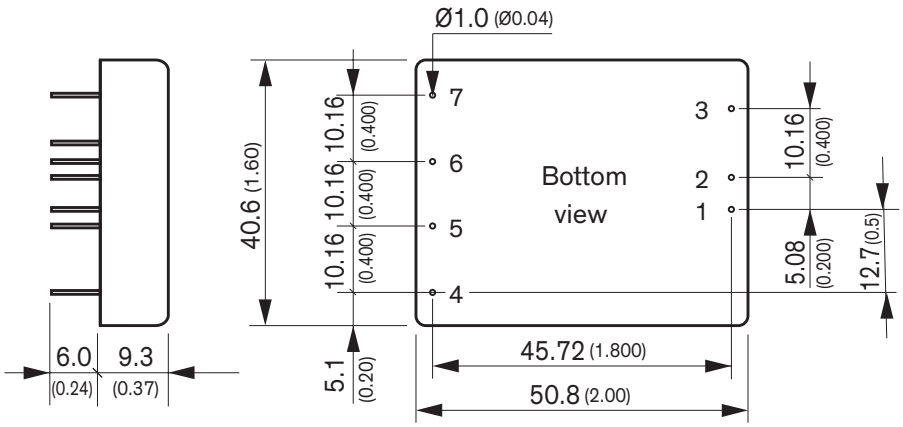
Rx = trim resistor [Kohm]

Vo = adjusted output voltage [VDC]
Dual output: Vo = | Vo_1 | + | Vo_2 |

Vn = nominal output voltage [VDC]
Dual output: Vn = | Vn_1 | + | Vn_2 |

Note: For dual output models both output voltages as absolute values must be added in the equation. This must be applied to nominal output voltage Un and adjusted output voltage Vo.

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)
General tolerances: x.x±0.5 (x.xx±0.01)
x.xx±0.25 (x.xxx±0.005)
Pin diameter tolerances: x.x±0.05 (x.xx±0.002)

Optional heat-sink see: www.tracopower.com/products/ten-hs5.pdf