DC/DC Converters

TEN 50 Series, 50 Watt

Features

- Highest power density: 50 W in 1" x 2" x 0.4" package
- Excellent efficiency up to 92 %
- Operating temperature range –40°C to +85°C
- No minimum load required
- Output voltage adjustable
- Remote On/Off
- I/O isolation 1500 VDC
- 3-year product warranty

The TEN 50 Series is a range of isolated high performance dc-dc converter modules. Due to the very high efficiency of up to 92% and the use of highest reliable components these 50 W converters come with a footprint of only 1.0" x 2.0". The 12 models have a wide 2:1 input voltage range and a tight output voltage regulation. They do not need a minimum load and a offer a high efficiency also at low load conditions. The output voltage is adjustable by external resistor. Remote On/Off and protection against overload and short circuit are standard features of these converters.

Typical applications are in mobile equipment, instrumentation, distributed power architectures in communication and industrial electronics and everywhere where space on the PCB is critical.

Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency
TEN 50-1210	9 – 18 VDC (nominal 12 VDC)	3.3 VDC	10'000 mA	89 %
TEN 50-1211		5.0 VDC	10'000 mA	90 %
TEN 50-1212		12 VDC	4'170 mA	91 %
TEN 50-1213		15 VDC	3'330 mA	91 %
TEN 50-1215		24 VDC	2'080 mA	91 %
TEN 50-2410	18 – 36 VDC (nominal 24 VDC)	3.3 VDC	10'000 mA	89 %
TEN 50-2411		5.0 VDC	10'000 mA	92 %
TEN 50-2412		12 VDC	4'170 mA	92 %
TEN 50-2413		15 VDC	3'330 mA	92 %
TEN 50-2415		24 VDC	2'080 mA	91 %
TEN 50-4810	36 – 75 VDC (nominal 48 VDC)	3.3 VDC	10'000 mA	89 %
TEN 50-4811		5.0 VDC	10'000 mA	92 %
TEN 50-4812		12 VDC	4'170 mA	92 %
TEN 50-4813		15 VDC	3'330 mA	92 %
TEN 50-4815		24 VDC	2'080 mA	91 %

Input Specifications

Input current at no load (nominal input voltage)	12 V; 3.3 & 5.0 VDC models:	85 mA typ. / 110 mA typ.
	12 V; 12 & 15 VDC models:	160 mA typ.
	12 V; 24 VDC models:	250 mA typ.
	24 V; 3.3 & 5.0 VDC models:	50 mA typ. / 70 mA typ.
	24 V; 12 & 15 VDC output models:	85 mA typ.
	24 V; 24 VDC models:	110 mA typ.
	48 V; 3.3 & 5.0 VDC models:	35 mA typ. / 45 mA typ.
	48 V; 12 & 15 VDC models:	50 mA typ.
	48 V; 24 VDC models:	60 mA typ.
Surge voltage (100 msec. max.)	12 V models:	25 V max.
	24 V models:	50 V max.
	48 V models:	100 V max.
Reflected input ripple current	12 V models:	50 mA typ.
	24 V models:	40 mA typ.
	48 V models:	30 mA typ.
Conducted noise (input)		EN 55022 class A, FCC part 15 level A
		with external input capacitor (1210 MLCC):
	12 V models:	22 µF /25 V
	24 V models:	3.3 µF /50 V
	48 V models:	2.2 µF /100 V
Start-up voltage / under voltage shut down	12 V models:	9.0 VDC max./ 8.3 VDC (or lower)
	24 V models:	18 VDC max./ 16.5 VDC (or lower)
	48 V models:	36 VDC max./ 33 VDC (or lower)
Recommended input fuse (slow blow)	12 V models:	10 A
	24 V models:	5 A
	48 V models:	2.5 A

Output Specifications

Voltage set accuracy		±1.0 %
Output voltage adjustment range	24 VDC models:	+20 / -10 %
	other models:	±10 % with external resistor (see page 3)
Regulation – Input variation Vin min. to Vin max.		0.5 % max.
– Load variation 0 – 100 %		0.5 % max.
Minimum load		not required
Temperature coefficient		±0.02 %/K
Ripple and noise (20 MHz Bandwidth)	3.3 & 5.0 VDC models:	100 mVpk-pk. typ.
(measured with 1 µF MLCC and a 10 µF tantalum capacitor)	12, 15 & 24 VDC models:	150 mVpk-pk typ.
Transient response (alignment to 1% at load step change 75% to 100%)		250 µs typ.
Output current limitation		at 150% of Iout max.
Short circuit protection	24 VDC models:	0.3 Hz. typ.
	other models:	hiccup mode 1.5 Hz, automatic recovery
Capacitive load	3.3 VDC models:	25'800 µF max.
	5.0 VDC models:	17'000 µF max.
	12.0 VDC models:	2'900 µF max.
	15.0 VDC models:	1'900 µF max.
	24.0 VDC models:	750 µF max.

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

General Specifications

Temperature ranges	– Operating (natural convection cooling 20 LFM) – Case temperature – Storage	–40°C to +85°C (see load derating) +105°C max. –50°C to +125°C
Load derating	– without heatsink – with heatsink	1.1 %/K above 50°C 1.3 %/K above 60°C
Thermal impedance	– Natural convection 20 LFM – Natural convection 20 LFM with heatsink	12°C/W 10°C/W
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>220'000 h
Isolation voltage (60 sec.)	– Input/Output	1500 VDC
Isolation capacitance	– Input/Output	2200 pF max. (100 kHz, 1 V)
Isolation resistance	– Input/Output	>1000 Mohm (500 VDC)
Switching frequency	24 VDC models: other models:	285 kHz typ. 320 kHz typ. (pulse width modulation PWM)
Remote On/Off	– On: – Off: – Off idle current:	3.5 to 12 VDC to -Vin or open circuit. 0 to +1.2 VDC or short circuit to -Vin 2.5 mA typ.
Safety standards		UL/cUL 60950-1 2nd edition, IEC 60950-1:2005 (2nd Edition); +A1:2009
Safety approvals	– CSA certificate (UL/cUL 60950-1 2nd edition) – CB test certificate (IEC/EN 60950-1 2nd edition)	www.tracopower.com/products/ten50-csa.pdf www.tracopower.com/products/ten50-cb.pdf

pending

Physical Specifications

Casing material		alluminium alloy, 6-side shielded, insulating baseplate
Potting material		epoxy (UL 94V-0 rated)
Weight		30 g (1.05 oz)
Soldering temperature		max. 260°C / 10 sec. (1.5 mm from casing)
Environmental compliance	– Reach – RoHS	www.tracopower.com/products/ten50-reach.pdf directive 2011/65/EU

Application note: www.tracopower.com/products/ten50-application.pdf

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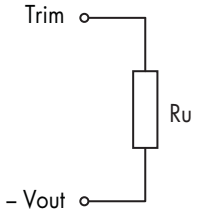
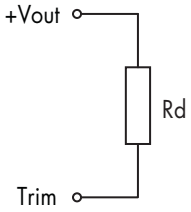
Output Voltage Adjustment

Trim up



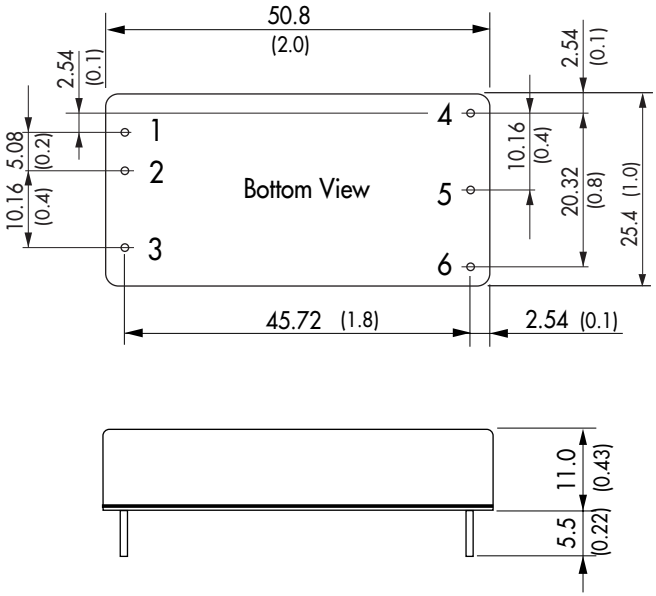
Trim down



for resistor values see application note

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

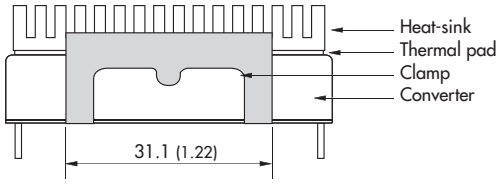
Outline Dimensions

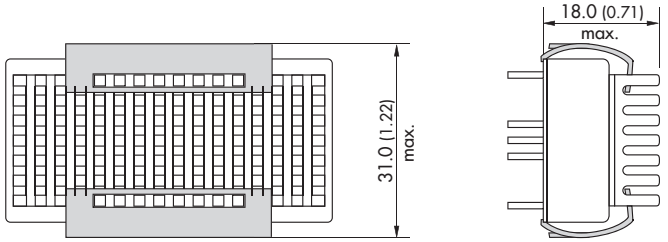


Pin-Out	
Pin	**Single**
1	+Vin (Vcc)
2	–Vin (GND)
3	Remote On/Off
4	+Vout
5	–Vout
6	Trim

Dimensions in [mm], () = Inch
Pin diameter: 1.0 ±0.05 (0.04 ±0.002)
Pin pitch tolerance: ±0.13 (±0.005)
Case tolerances: ±0.25 (±0.01)

Heat-sink TEN-HS4 (optional)





Order code: **TEN-HS4**
(cont.: heat-sink, thermal pad, 2 clamps)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 9 g (0.31oz) without converter
Thermal impedance after assembling: 10 K/W

Note:
Before attaching the heatsink, the product label on converter has to be removed for optimal performance.
For volume orders we can supply the converters with heatsink already mounted. Please contact us for a relative quotation.