DC/DC Converters

TEN 8 Series, 8 Watt

Features

- DIP–24 package with industry standard footprint
- Wide 2:1 input voltage range
- Input filter meets EN 55022, class A
- Extended operating temperature range: -40°C to +85°C
- Remote On/Off
- Shielded metal casing with insulated baseplate
- Lead free design, RoHS compliant
- 3-year product warranty

The TEN 8 series is a family of high performance 8 Watt dc/dc-converter modules featuring wide 2:1 input voltage ranges in a DIP-24 package with industry standard footprint. A very high efficiency allows an operating temperature range of –40°C to +85°C. A built-in EMI input filter complies with EN 55022, class A without external components. Further standard features include remote On/Off and short-circuit protection.
Typical applications for these converters are battery operated equipment, instrumentation, 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 voltage	Output current max.	Efficiency typ.
TEN 8-1210	9 – 18 VDC (12 VDC nominal)	3.3 VDC	2'000 mA	80 %
TEN 8-1211		5 VDC	1'500 mA	83 %
TEN 8-1212		12 VDC	665 mA	88 %
TEN 8-1213		15 VDC	535 mA	87 %
TEN 8-1221		±5 VDC	±800 mA	83 %
TEN 8-1222		±12 VDC	±335 mA	87 %
TEN 8-1223		±15 VDC	±265 mA	85 %
TEN 8-2410	18 – 36 VDC (24 VDC nominal)	3.3 VDC	2'000 mA	80 %
TEN 8-2411		5 VDC	1'500 mA	83 %
TEN 8-2412		12 VDC	665 mA	86 %
TEN 8-2413		15 VDC	535 mA	85 %
TEN 8-2421		±5 VDC	±800 mA	82 %
TEN 8-2422		±12 VDC	±335 mA	86 %
TEN 8-2423		±15 VDC	±265 mA	85 %
TEN 8-4810	36 – 75 VDC (48 VDC nominal)	3.3 VDC	2'000 mA	80 %
TEN 8-4811		5 VDC	1'500 mA	83 %
TEN 8-4812		12 VDC	665 mA	86 %
TEN 8-4813		15 VDC	535 mA	86 %
TEN 8-4821		±5 VDC	±800 mA	85 %
TEN 8-4822		±12 VDC	±335 mA	87 %
TEN 8-4823		±15 VDC	±265 mA	87 %

Input Specifications

Input current (no load)		12 Vin models:	15 mA typ.
		24 Vin models:	15 mA typ.
		48 Vin models:	10 mA typ.
Input current (full load)	12 Vin;	3.3 VDC models:	720 mA typ.
	12 Vin;	other output models:	800 mA typ.
	24 Vin;	3.3 VDC models:	360 mA typ.
	24 Vin;	other output models:	400 mA typ.
	48 Vin;	3.3 VDC models:	180 mA typ.
	48 Vin;	other output models:	200 mA typ.
Surge voltage (100 msec. max.)		12 Vin models:	36 V max..
		24 Vin models:	50 V max..
		48 Vin models:	100 V max.
Conducted noise (input)			EN 55022 level A, FCC part 15, level A For 12 Vin models with external input capacitor: 4.7 µF / 25 V 1210 MLCC
ESD (electrostatic discharge)			EN 61000-4-2, air ±8 kV, contact ±6 kV, perf. criteria A
Radiated immunity			EN 61000-4-3, 10 V/m, perf. criteria A
Fast transient / Surge			EN 61000-4-4, ±2 kV, perf. criteria A 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, 10 Vrms, perf. criteria A

Output Specifications

Voltage set accuracy			±1 %
Regulation	– Input variation Vin min. to Vin max – Load variation 0 – 100 %		0.2 % max.
		single output models:	1 % max.
		dual output models:	1 % max. (balanced load) 5 % max. (Load cross variation 25 % / 100 %)
Temperature coefficient			0.02 %/K
Ripple and noise (20 MHz Bandwidth)			50 mVpk-pk typ.
Start up time (nominal Vin and constant resistive load)			700 ms max.
	– Remote on/off		5 ms typ.
Transient response (25% load step change)			200 µs typ.
Short circuit protection			indefinite (automatic recovery)
Over load protection			150 % of Iout max. typ. foldback
Capacitive load		3.3 Vout models:	3300 µF max.
		5 Vout models / ±5 Vout models:	1600 µF max. / ±1000 µF max.
		12 Vout models / ±12 Vout models:	350 µF max. / ±160 µF max.
		15 Vout models / ±15 Vout models:	240 µF max. / ±100 µF max.

General Specifications

Temperature ranges	– Operating	–40°C to +85°C
	– Casing	+100°C max.
	– Storage	–55°C to +105°C
Derating		3.3 %/K above +70°C
Humidity (non condensing)		95 % rel H max.

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

General Specifications

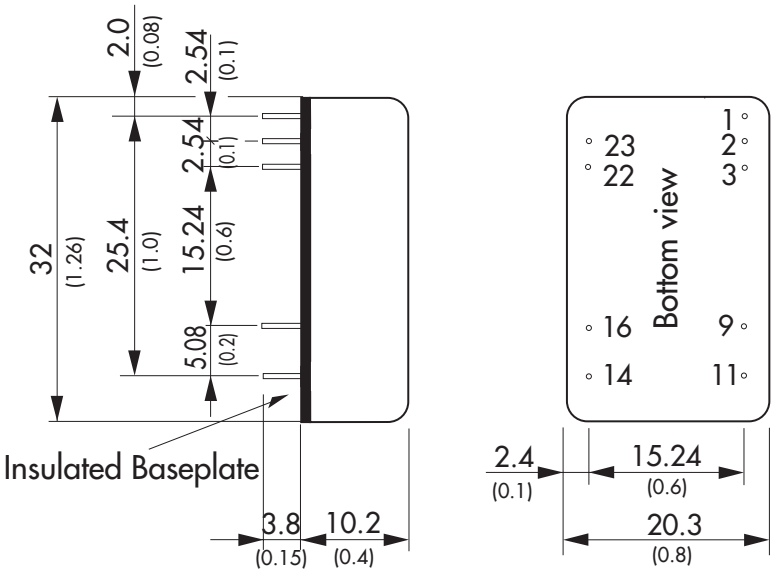
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)		>3.5 Mio h
Isolation voltage (60sec.)	– Input/Output	1500 VDC
Isolation capacitance	– Input/Output	300 pF max.
Isolation Resistance	– Input/Output	>1000 MOhm
Switching frequency		300 kHz typ. (pulse width modulation PWM)
Thermal shock, mechanical shock & vibration	– Test conditions	EN 61373, MIL-STD-810F www.tracopower.com/products/mil810.pdf
Safety approvals	– Certification documents	UL/cUL 60950-1, IEC/EN 60950-1 www.tracopower.com/overview/ten8
Remote On/Off	On: Off: Off idle current:	3.5 ... 12 VDC or open circuit 0 ... 1.2 VDC or short circuit pin 1 and pin 2/3 2.5 mA
Environmental compliance	– Reach – RoHS	www.tracopower.com/info/reach-declaration.pdf RoHS directive 2011/65/EU

Physical Specifications

Casing material	copper, nickel plated
Baseplate material	non conductive plastic
Potting material	epoxy (UL94V-0 rated)
Weight	17 g (0.60oz)
Soldering temperature max.	265°C / 10 sec.

Supporting documents: www.tracopower.com/overview/ten8

Outline Dimensions



Pin-Out		
Pin	**Single**	**Dual**
1	Remote On/Off	Remote On/Off
2	–Vin (GND)	–Vin (GND)
3	–Vin (GND)	–Vin (GND)
9	No con.	Common
11	No con.	–Vout
14	+Vout	+Vout
16	–Vout	Common
22	+Vin (Vcc)	+Vin (Vcc)
23	+Vin (Vcc)	+Vin (Vcc)

Dimensions in [mm], () = Inch
Pin diameter ⌀ 0.5 ±0.05 (0.02 ±0.002)
Tolerances ±0.5 (±0.02)
Pin pich tolerances ±0.25 (±0.01)