TRACO POWER

DC/DC Converter

TEN 40 Series 40 Watt

cULus

Features

- Very high Power Density: 40W in a 50x50x10mm Package
- Models with Single-,Dual- and Triple Output
- Models with two independent positive Outputs (3.3V/5.0V) with Power Sharing
- Very high Efficiency up to 89 %
- Remote on/off
- Operating Temperature Range –40°C to +71°C
- Short Circuit Protection
- Six-Side shielded Metal Case
- 3 Years Product Warranty

The TEN 40 Series is a range of 40 Watt converters comprising 31 models with single -, dual- and triple output voltages. There are also 2 models with two independent fully regulated outputs of 3.3 and 5.0 VDC. Overload and overvoltage protection, undervoltage shutdown and remote on/off are standard features. A very high efficiency achieved by synchronous rectifier design allows safe operating ambient temperature from –40°C to +71°C. The TEN 40 series has been designed for applications in communication systems, networking products, industrial electronics and distributed power systems.

Models

Ordercode	Input voltage range	Output 1	Output 2	Output 3	Efficiency
TEN 40-1210	9 – 18 VDC	3.3 VDC / 8.0 A			86 %
TEN 40-1211		5 VDC / 8.0 A			86 %
TEN 40-1212		12 VDC / 3.3 A			86 %
TEN 40-1220		*3.3 VDC / 8.0 A	*5 VDC / 8.0 A		85 %
TEN 40-1222		+12 VDC / 1.8 A	–12 VDC / 1.8 A		85 %
TEN 40-1223		+15 VDC / 1.4 A	–15 VDC / 1.4 A		85 %
TEN 40-1233		3.3 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	54 %
TEN 40-1234		3.3 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	84 %
TEN 40-1231		5 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	86 %
TEN 40-1232		5 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	86 %
TEN 40-2410	18 – 36 VDC	3.3 VDC / 8.0 A			85 %
TEN 40-2411		5 VDC / 8.0 A			87 %
TEN 40-2412		12 VDC / 3.3 A			88 %
TEN 40-2420		*3.3 VDC / 8.0 A	*5 VDC / 8.0 A		82 %
TEN 40-2422		+12 VDC / 1.8 A	–12 VDC / 1.8 A		87 %
TEN 40-2423		+15 VDC / 1.4 A	–15 VDC / 1.4 A		87 %
TEN 40-2433		3.3 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	85 %
TEN 40-2434		3.3 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	85 %
TEN 40-2431		5 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	87 %
TEN 40-2432		5 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	87 %
TEN 40-4810	36 – 75 VDC	3.3 VDC / 8.0 A			88 %
TEN 40-4811		5 VDC / 8.0 A			89 %
TEN 40-4812		12 VDC / 3.3 A			89 %
TEN 40-4820		*3.3 VDC / 4.0 A	*5 VDC / 8.0 A		83 %
TEN 40-4822		+12 VDC / 1.8 A	–12 VDC / 1.8 A		87 %
TEN 40-4823		+15 VDC / 1.4 A	–15 VDC / 1.4 A		87 %
TEN 40-4833		3.3 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	86 %
TEN 40-4834		3.3 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	86 %
TEN 40-4831		5 VDC / 6.0 A	+12 VDC / 0.4 A	–12 VDC / 0.4 A	88 %
TEN 40-4832		5 VDC / 6.0 A	+15 VDC / 0.3 A	–15 VDC / 0.3 A	88 %

* dynamic current allocation max. 8A total output current

Input Specifications

Input current (no load)	12 Vin models:	200 mA typ.
	24 Vin models:	100 mA typ.
	48 Vin models:	50 mA typ.
Input current (full load) (12/24/48 Vin)	3.3 V single output models:	2680 / 1325 / 655 mA typ.
	5.0 / 12 V single output models:	4065 / 2000 / 1000 mA typ.
	3.3 & 5 V dual output models:	3415 / 1685 / 825 mA typ.
	±12 / ±15 V dual output models:	4400 / 2100 / 1050 mA typ.
	3.3 V tripple output models:	3000 / 1500 / 750 mA typ.
	5.0 V tripple output models:	4000 / 1990 / 980 mA typ.
Start-up voltage / under voltage shut down	12 Vin models:	9 VDC / 8 VDC (typ.)
	24 Vin models:	17.8 VDC / 15.8 VDC (typ.)
	48 Vin models:	36 VDC / 33 VDC (typ.)
Surge voltage (100 msec. max.)	12/24/48 Vin models:	25/50/100 V max.
Conducted noise (Input)		EN 55022 level A, FCC part 15, level A with external capacitor (see note)

Output Specifications

Voltage set accuracy		± 1% (± 5% for auxilary outputs)
Output voltage adjustment (only single output models)		± 10%
Regulation	– Input variation Vin min. to Vin max.	
	single output models:	± 0.5 % max.
	dual output models:	± 1% max.
	triple output models (primary/auxilary):	± 1% max. / 5% max.
	– Load variation 10 – 100 %	
	single output models:	± 0.5% max.
	dual output models:	± 1% max.
	triple output models (primary/auxilary):	± 2% max. / ± 5% max.
Ripple and noise (20 MHz Bandwidth)	3.3 V & 5 V outputs:	50 mVpk-pk max.
	dual outputs:	150 mVpk-pk max.
	all other outputs:	75 mVpk-pk max.
Temperature coefficient		± 0.02 %/K
Output current limitation		110% – 140% Iout max.
Short circuit protection		indefinite (automatic recovery)
Capacitive load	output models (3.3 V / 5 V / 12 V / 15 V):	21'000 / 13'600 / 2'360 / 1510 µF max.
	dual output models (3.3 V / 5 V):	11'000 / 6'800 µF max.
	dual output models (± 12 V / ± 15V):	1'200 / 750 µF max. (on each output)
	3.3 V triple output models:	13'000 / 330 µF max. (main / on each auxilary)
	5 V triple output models:	6'800 / 110 µF max. (main / on each auxilary)

General Specifications

Temperature ranges	– Operating	– 40 °C ... + 71 °C
	– Case temperature	+ 100 °C max.
	– Storage	– 55 °C ... + 105 °C
Derating		2.5 %/K above 60°C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 E)		> 510'000 h @ + 25 °C

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

General Specifications

Isolation voltage	Input/Output	1'500 VDC
Isolation capacity	Input/Output	500 pF typ.
Isolation resistance	Input/Output	> 1'000 Mohm
Remote ON/OFF	ON: OFF: OFF idle current:	3.5 ... 12 VDC or open circuit. 0 ... 1.2 VDC or short circuit pin 3 and pin 2 2.5 mA max.
Switching frequency (fixed)		300 kHz typ. (Pulse width modulation PWM)
Safety standards		UL 1950, EN 60950, IEC 60950 Compliance up to 60 VDC input voltage(SELV limit)
Safety approvals		UL /cUL File E188913

Physical Specifications

Case material	Copper nickel plated
Baseplate	non conductive plastic
Potting material	Epoxy (UL 94V-0 – rated)
Weight	48 g (1.69 oz)
Soldering temperature	max. 260 °C / 10 sec.

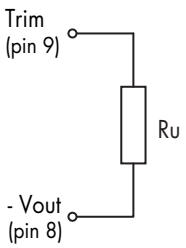
Reduction of conducted Noise with external Capacitor

In order to meet conducted emissions EN55022-A and EN55011-A a capacitor between +Vin and -Vin has to be installed.

Use electrolytic capacitor low ESR type or MLCC Cap for SMD (i.e. TCCR or THCR type from Nippon Chemi-Con). The value of capacitor is between 3.3µF and 100 µF, depending on the load. For 24V input models use a 50V capacitor, for 48V input models use a 100V capacitor.

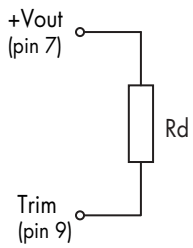
Output Voltage Adjustment

Trim up



	Ru [kohm]*		
output	3.3V	5V	12V
+5%	6.8	4.7	56
+10%	0.68	0.68	6.8

Trim down

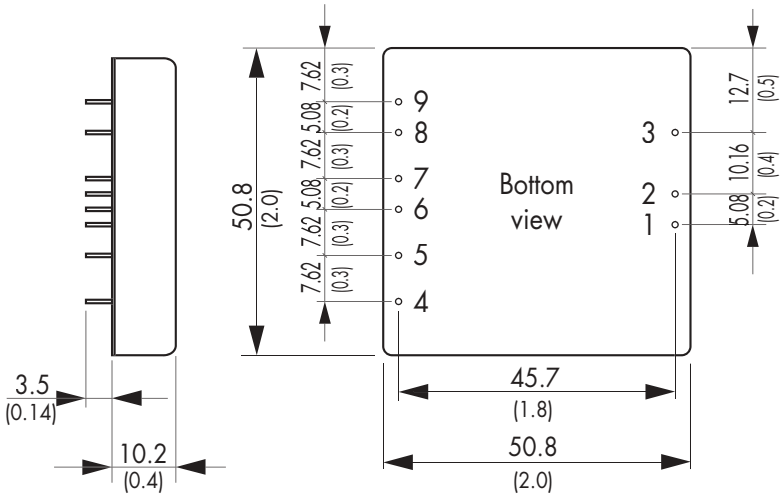


	Rd [kohm]*		
output	3.3V	5V	12V
-5%	8.2	5.6	47
-10%	0.68	0.68	2.7

* approximate values

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

Outline Dimensions mm (inches)



Dimensions in mm; () = Inches
Tolerances: ±0.5 (±0.02); Pin pitch: ±0.35 (±0.014)
Pin diameter: 1.0 ±0.05 (0.039 ±0.002)

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	No con.	+Vout 1	+Vout 2
5	–Sense	–Vout 1	Common
6	+Sense	No con.	–Vout 3
7	+Vout	No con.	+Vout 1
8	–Vout	+Vout 2	–Vout 1
9	Trim	–Vout 2	No con.

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