DC/DC Converter

TEN 40 Series 40 Watt

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 +70°C
- Short Circuit Protection
- Six-Side shielded Metal Case
- 3 Years Product Warranty

The TEN 40 Series is a new range of 40W converters comprising 16 models with single -, dual- and triple output voltages. There also 2 models with two independent fully regulated outputs of 3.3 and 5.0VDC. All models are available With input voltage ranges of 18-36 VDC or 36-75VDC. 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 +70°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 typ.
TEN 40-2410	18 – 36 VDC	3.3 VDC/ 8 A			85 %
TEN 40-2411		5 VDC/ 8 A			87 %
TEN 40-2412		12 VDC/ 3.3 A			88 %
TEN 40-2420		*3.3 VDC/ 8 A	*5 VDC/ 8.0 A		82 %
TEN 40-2433		3.3 VDC/ 6 A	+12 VDC/ 0.4 A	–12 VDC/ 0.4 A	85 %
TEN 40-2434		3.3 VDC/ 6 A	+15 VDC/ 0.3 A	–15 VDC/ 0.3 A	85 %
TEN 40-2431		5 VDC/ 6 A	+12 VDC/ 0.4 A	–12 VDC/ 0.4 A	87 %
TEN 40-2432		5 VDC/ 6 A	+15 VDC/ 0.3 A	–15 VDC/ 0.3 A	87 %
TEN 40-4810	36 – 75 VDC	3.3 VDC/ 8 A			88 %
TEN 40-4811		5 VDC/ 8 A			89 %
TEN 40-4812		12 VDC/ 3.3 A			89 %
TEN 40-4820		*3.3 VDC/ 4 A	*5 VDC/ 4.0 A		83 %
TEN 40-4833		3.3 VDC/ 6 A	+12 VDC/ 0.4 A	–12 VDC/ 0.4 A	86 %
TEN 40-4834		3.3 VDC/ 6 A	+15 VDC/ 0.3 A	–15 VDC/ 0.3 A	86 %
TEN 40-4831		5 VDC/ 6 A	+12 VDC/ 0.4 A	–12 VDC/ 0.4 A	88 %
TEN 40-4832		5 VDC/ 6 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)		24 Vin models:	100 mA typ.
		48 Vin models:	50 mA typ.
Input current (full load)	24 Vin;	3.3 V single output models:	1300 mA typ.
	24 Vin;	3.3 V dual output models:	1690 mA typ.
	24 Vin;	3.3 V triple output models:	1480 mA typ.
	24 Vin;	other output models:	1930 mA typ.
	48 Vin;	3.3 V single output models:	650 mA typ.
	48 Vin;	3.3 V dual output models:	840 mA typ.
	48 Vin;	3.3 V triple output models:	730 mA typ.
	48 Vin;	other output models:	960 mA typ.
Start-up voltage / under voltage shut down		24 Vin models:	17.8 VDC / 15.8 VDC (typ.)
		48 Vin models:	36 VDC / 33 VDC (typ.)
Surge voltage (100 msec. 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 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:	4% max.
		triple output models (primary/auxilary):	1% max. / 5% max.
Ripple and noise (20 MHz Bandwidth)		3.3 V & 5 V outputs:	50 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	single output models (3.3 V / 5 V / 12V):		21'000 µF max./ 13'600 µF max./ 2'360 µF max.
	dual otput models (3.3 V / 5 V):		11'000 µF max. / 6'800 µF max.
	3.3 V triple output models:		13'000 µF max.
	5 V triple output models:		6'800 µF max.

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)
Savety 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.

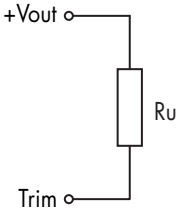
Reduction of conducted Noise with external Capacitor

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 (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 50V capacitor, for 48V input models use 100V capacitor.

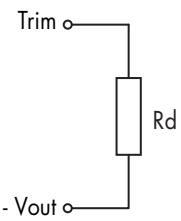
Output Voltage Adjustment

Trim up



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

Trim down

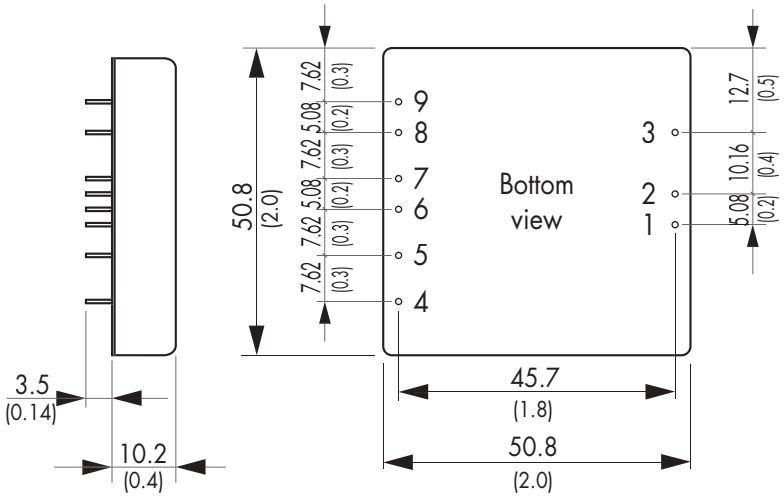


	Rd [kohm]*		
output	3.3V	5V	12V
-5%	8.2	5.6	47
-10%	0.68	0.68	2.7

* 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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