



SERIES: VHK100W-DIN | DESCRIPTION: DC-DC CONVERTER

FEATURES

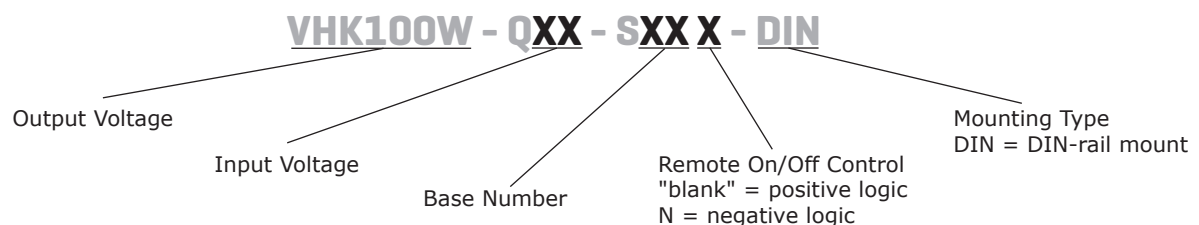
- up to 100 W isolated output
- rugged metal enclosure with integrated heat sink
- 4:1 input range (9~36 Vdc, 18~75 Vdc)
- single output from 3.3~48 Vdc
- 1,500 Vdc isolation
- over current, over temperature, over voltage, and short circuit protections
- remote on/off
- efficiency up to 87%
- comes with DIN-rail mount



MODEL	input voltage range (Vdc)	output voltage (Vdc)	output current max (A)	output power max (W)	ripple and noise ¹ max (mVp-p)	efficiency typ (%)
VHK100W-Q24-S3R3-DIN	9 ~ 36	3.3	20	66	100	80
VHK100W-Q24-S5-DIN	9 ~ 36	5	20	100	100	82
VHK100W-Q24-S12-DIN	9 ~ 36	12	8.3	100	150	84
VHK100W-Q24-S15-DIN	9 ~ 36	15	6.7	100	150	85.5
VHK100W-Q24-S24-DIN	9 ~ 36	24	4.17	100	240	85
VHK100W-Q24-S28-DIN	9 ~ 36	28	3.57	100	280	86
VHK100W-Q24-S48-DIN	9 ~ 36	48	2.08	100	480	84
VHK100W-Q48-S3R3-DIN	18 ~ 75	3.3	20	66	100	79
VHK100W-Q48-S5-DIN	18 ~ 75	5	20	100	100	84.5
VHK100W-Q48-S12-DIN	18 ~ 75	12	8.3	100	150	85.5
VHK100W-Q48-S15-DIN	18 ~ 75	15	6.7	100	150	86.5
VHK100W-Q48-S24-DIN	18 ~ 75	24	4.17	100	240	87
VHK100W-Q48-S28-DIN	18 ~ 75	28	3.57	100	280	86
VHK100W-Q48-S48-DIN	18 ~ 75	48	2.08	100	480	85

Note: 1. Ripple and noise are measured at full load, 20 MHz BW with 10 μ F tantalum capacitor and 1 μ F ceramic capacitor across output. The 48 Vdc output models only require the 1 μ F ceramic capacitor across the output.

PART NUMBER KEY



INPUT

parameter	conditions/description		min	typ	max	units
operating input voltage	24 Vdc input models		9	24	36	Vdc
	48 Vdc input models		18	48	75	Vdc
under voltage shutdown	24 Vdc input	power up		8.8		Vdc
		power down		8		Vdc
	48 Vdc input	power up		17		Vdc
		power down		16		Vdc
CTRL ¹	positive logic	models ON (>3.5 Vdc or open circuit)				
		models OFF (0~1.8 Vdc)				
	negative logic	models ON (0~1.8 Vdc)				
		models OFF (>3.5 Vdc or open circuit)				
filter	pi filter					
input fuse	20A time delay fuse for 24 Vin models, 10A time delay fuse for 48 Vin models					

Note: 1. Open collector refer to -Vin

OUTPUT

parameter	conditions/description	min	typ	max	units	
maximum capacitive load	3.3 and 5 V output models			20,000	μF	
	12 V output models			8,300	μF	
	15 V output models			6,700	μF	
	24 & 28 V output models			2,200	μF	
	48 V output models	47		470	μF	
line regulation ²	measured from high line to low line			±0.2	%	
load regulation ²	measured from full load to zero load			±0.2	%	
voltage accuracy ²				±1.5	%	
adjustability				±10	%	
switching frequency				250	kHz	
transient response	25% step load change				500	μs
temperature coefficient				±0.03	%/°C	

Note: 2. A 47 μF aluminum capacitor is required on the output for 48 Vdc output models.

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous				
over current protection	% nominal output current	110		140	%
over voltage protection		115		140	%
over temperature protection	shutdown		105		°C

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	for 1 minute: input to output; input to case; output to case	1,500			Vdc
isolation resistance		10			MΩ
RoHS	2011/65/EU (CE)				

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
operating temperature	see derating curve	-40		85	°C
storage temperature		-55		105	°C

MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	4.23 x 4.01 x 2.07 (107.5 x 101.8 x 52.6 mm)				inch
case material	steel and aluminum extrusion				
weight			651		g

MECHANICAL DRAWING

units: inch[mm]

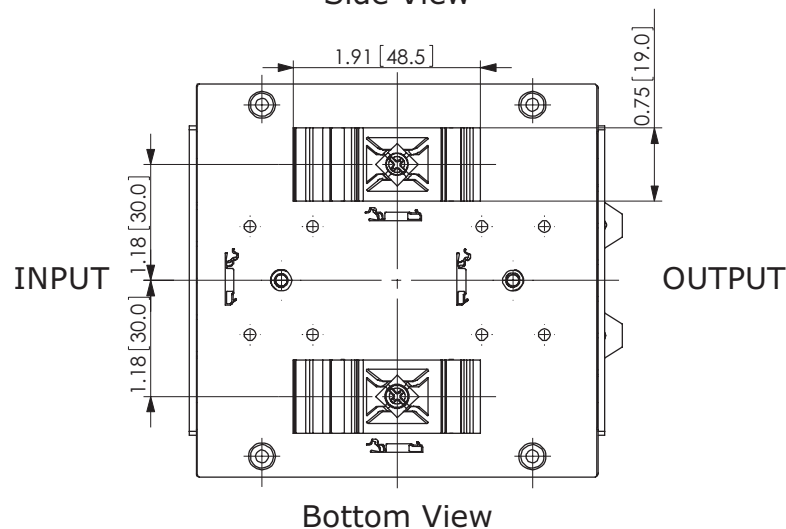
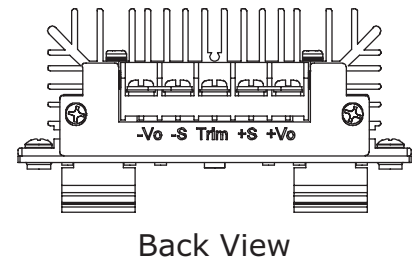
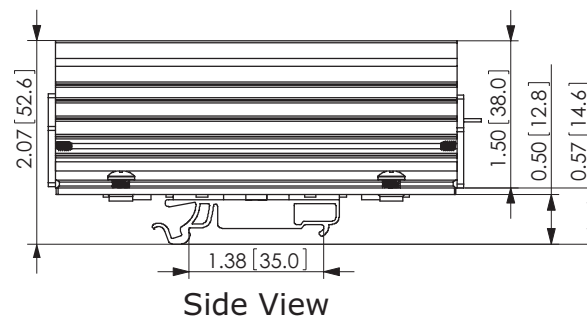
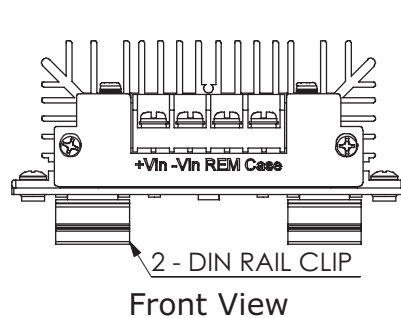
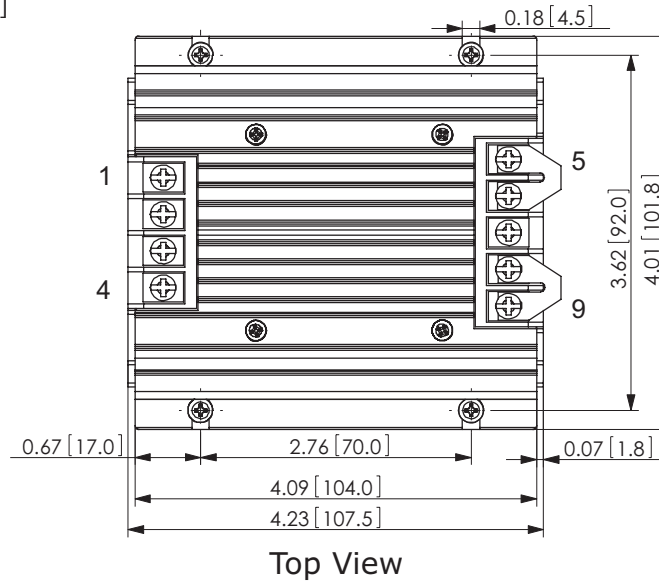
tolerance: X.XX = ± 0.02 [± 0.5]X.XXX = ± 0.010 [± 0.25]

wire range: 22~12 AWG

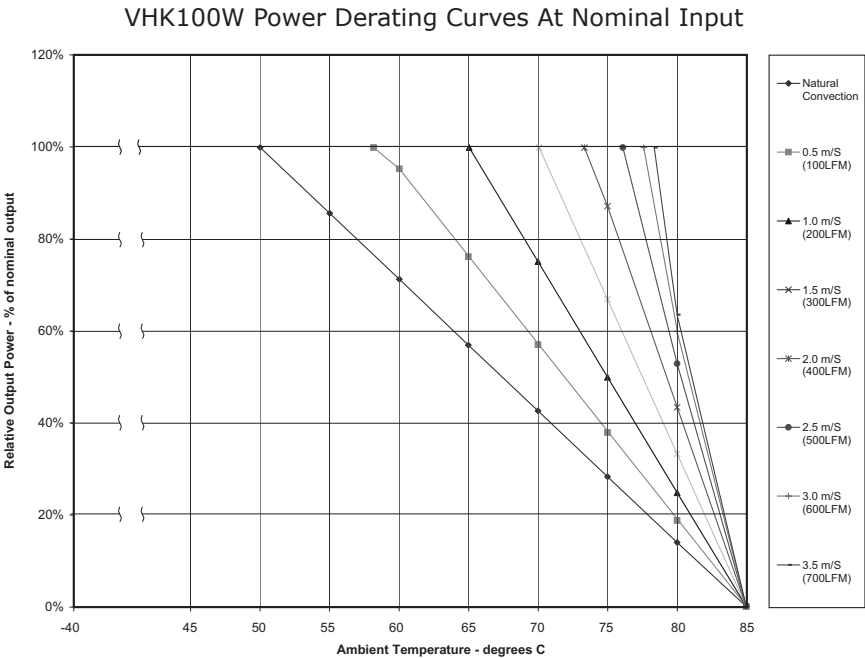
screw size: #6-32

mounts to TS35 rails

PIN CONNECTIONS	
PIN	FUNCTION
1	+Vin
2	-Vin
3	REM
4	CASE
5	+Vo
6	+S
7	TRIM
8	-S
9	-Vo



DERATING CURVES



TEST CONFIGURATION

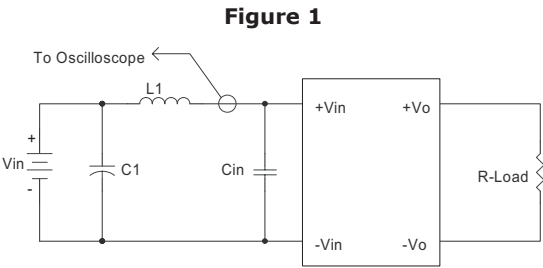


Table 1

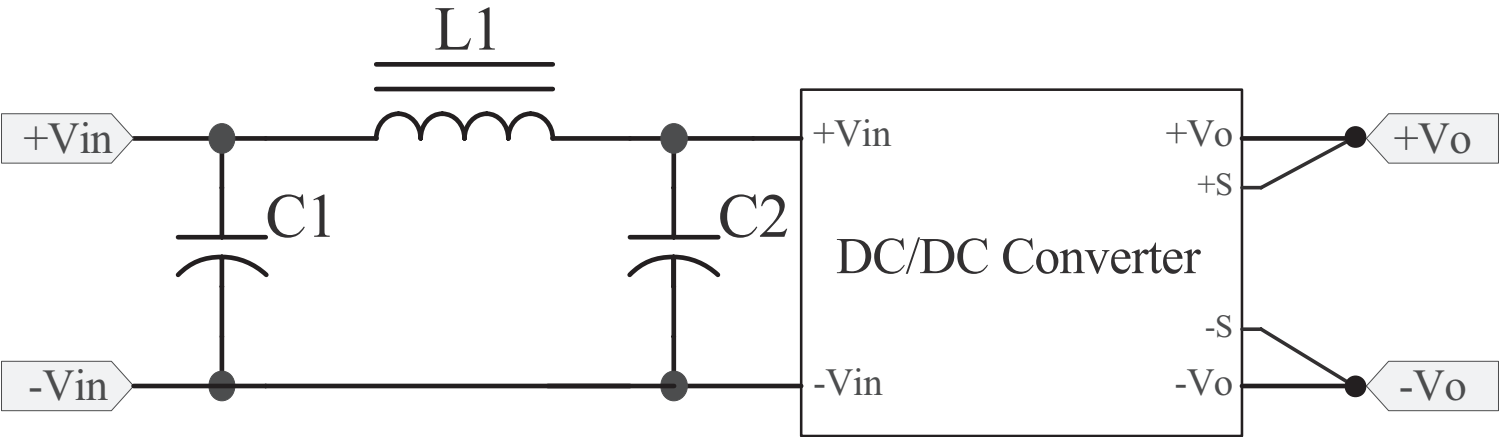
External components	
L1	12μH
C1	220μF, ESR < 0.1Ω at 100 KHz
Cin	33μF, ESR < 0.7Ω at 100 KHz

Note: Input reflected-ripple current is measured with an inductor L1 and Capacitor C1 to simulate source impedance.

EMC RECOMMENDED CIRCUITS

EN55022 CLASS A

Figure 2
Recommended Circuit for EN55022 Class A
(for all models)



EMC RECOMMENDED CIRCUITS (CONTINUED)

EN55022 CLASS A

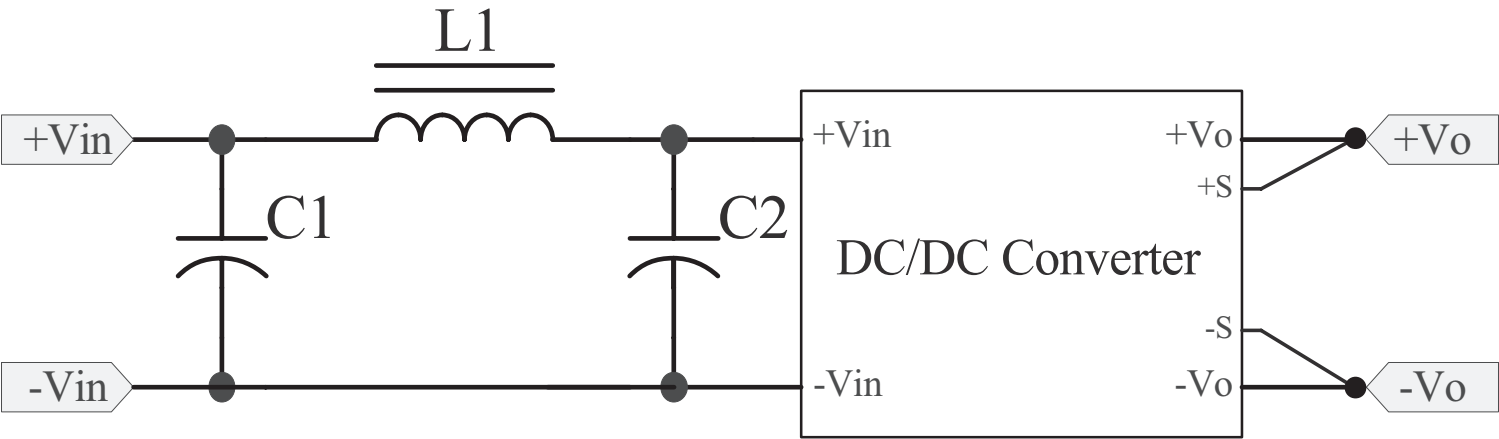
Table 2
Class A Recommended Components

Model	C1 ¹	C2 ¹	L1
VHK100W-Q24-S3R3	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S5	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S12	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S15	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S24	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S28	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q24-S48	47 μ F/50 V	47 μ F/50 V	3.4 μ H
VHK100W-Q48-S3R3	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S5	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S12	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S15	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S24	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S28	47 μ F/100 V	47 μ F/100 V	3.4 μ H
VHK100W-Q48-S48	47 μ F/100 V	47 μ F/100 V	3.4 μ H

Note: 1. Aluminum capacitors

EN55022 CLASS B

Figure 3
Recommended Circuit for EN55022 Class B
(for all 3.3, 5, 12, 15, 24, & 28 Vdc output models)



EMC RECOMMENDED CIRCUITS (CONTINUED)

EN55022 CLASS B

Figure 4
Recommended Circuit for EN55022 Class B
(for all 48 Vdc output models)

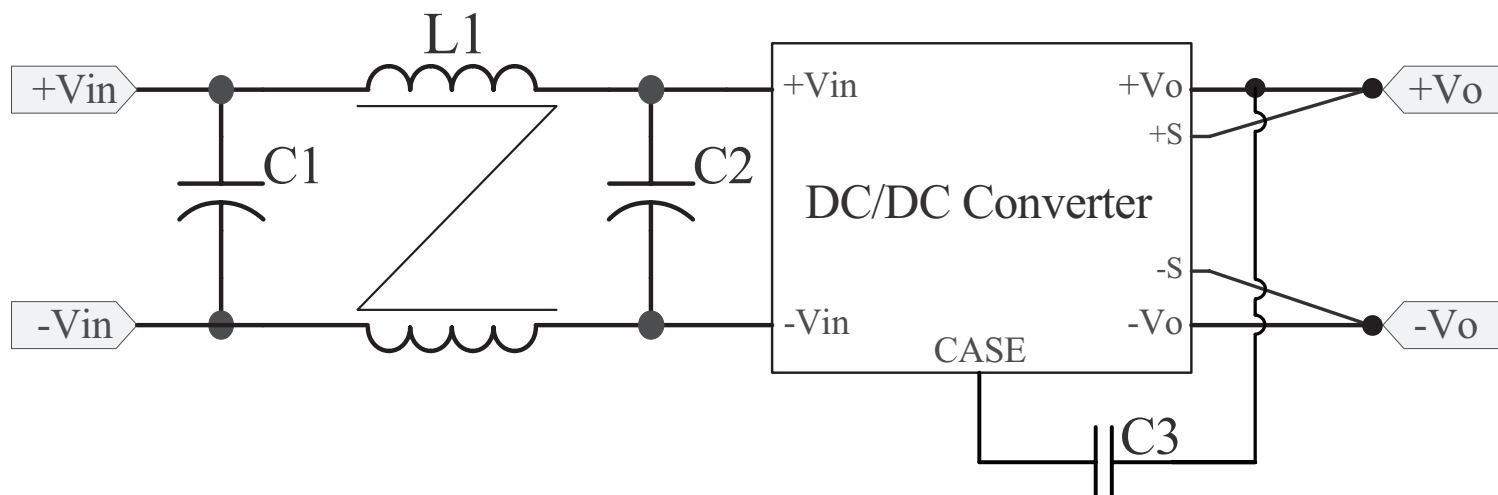


Table 3
Class B Recommended Components

Model	C1 ¹	C2 ¹	C3 ²	L1
VHK100W-Q24-S3R3	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S5	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S12	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S15	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S24	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S28	220 μ F/50 V	220 μ F/50 V	NC	3.4 μ H
VHK100W-Q24-S48	100 μ F/50 V	100 μ F/50 V	2200 pF/2 KV	0.53 mH
VHK100W-Q48-S3R3	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S5	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S12	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S15	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S24	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S28	47 μ F/100 V	47 μ F/100 V	NC	3.4 μ H
VHK100W-Q48-S48	47 μ F/100 V	47 μ F/100 V	2200 pF/2 KV	0.53 mH

Note: 1. Aluminum capacitors
2. Ceramic capacitors

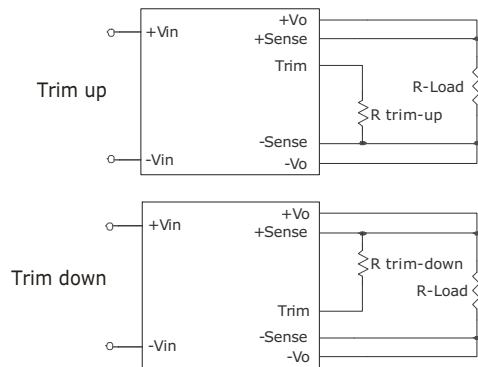
APPLICATION NOTES

1. Output Voltage Trimming

Leave open if not used.

Figure 5

Application Circuit for Trim pin



Formula for Trim Resistor

$$R_{trim - up} = \left(\frac{R_1(V_r - V_f(\frac{R_2}{R_2 + R_3}))}{V_o - V_{o, nom}} \right) - \frac{R_2 R_3}{R_2 + R_3} (K\Omega)$$

$$R_{trim - down} = \frac{R_1(V_o - V_r)}{V_{o, nom} - V_o} - R_2 (K\Omega)$$

Note: $R_{trim-up}$ is the external resistor in $K\Omega$
 $R_{trim-down}$ is the external resistor in $K\Omega$
 $V_{o, nom}$ is the nominal output voltage
 V_o is the desired output voltage
 $R_1, R_2, R_3,$ and V_r are internal (see Table 4).

Table 4

Vout (Vdc)	R1 (K Ω)	R2 (K Ω)	R3 (K Ω)	Vr (V)	Vf (V)
3.3	3	12	4.3	1.24	0.46
5	2.32	3.3	0	2.5	0
12	9.1	51	5.1	2.5	0.46
15	12	56	8.25	2.5	0.46
24	20	100	7.5	2.5	0.46
28	23.7	150	6.2	2.5	0.53
48	36	270	5.1	2.5	0.46

Note: 1. All specifications are measured at $T_a=25^\circ\text{C}$, nominal input voltage and full output load unless otherwise specified.

REVISION HISTORY

rev.	description	date
1.0	initial release	12/16/2013
1.01	changed DIN-rail mount	06/16/2014

The revision history provided is for informational purposes only and is believed to be accurate.

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- Техническая поддержка проекта;
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