SERIES: VSK-S20-T | **DESCRIPTION:** AC-DC POWER SUPPLY

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FEATURES

- up to 20W continuous power
- compact chassis mount design
- universal input (85~264 Vac / 100~370 Vdc)
- single, regulated output from 3.3~24 Vdc
- over voltage, over current, and short circuit protections
- UL/cUL safety approvals
- efficiency up to 85%



MODEL

MODEL	output voltage (Vdc)	output current max (A)	output power max (W)	ripple and noise[1] typ (mVp-p)	efficiency typ (%)
VSK-S20-3R3U-T	3.3	4.1	13.5	50	74
VSK-S20-5U-T	5	3.5	17.5	50	78
VSK-S20-9U-T	9	2.1	20	50	80
VSK-S20-12U-T	12	1.6	20	50	82
VSK-S20-15U-T	15	1.3	20	50	83
VSK-S20-24U-T	24	0.85	20	50	85

Notes: 1. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 uF ceramic and 10 uF electrolytic capacitors on the output.

PART NUMBER KEY

VSK-S20 - XXU - T

Base Number — Output Voltage

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INPUT

parameter	conditions/description	min	typ	max	units
voltage		85 100		264 370	Vac Vdc
frequency		47		63	Hz
current	at 115 Vac at 230 Vac			600 340	mA mA
inrush current	at 115 Vac at 230 Vac		16 30		A A
leakage current	at 230 Vac, 50 Hz (RMS)		0.1		mA
input fuse	3.15 A/250 V, slow-blow type (included on chassis)				

OUTPUT

parameter	conditions/description	min	typ	max	units
capacitive load	3.3 Vdc output model 5 Vdc output model 9 Vdc output model 12 Vdc output model 15 Vdc output model 24 Vdc output model			48,000 12,000 7,200 5,400 2,700 1,800	µF µF µF µF µF µF
line regulation	at full load		±0.5		%
load regulation	at 10~100% load		±1		%
voltage set accuracy			±2		%
adjustability			±10		%
hold-up time	at 115 Vac at 230 Vac		15 80		ms ms
switching frequency			65		kHz
temperature coefficient			±0.02		%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
over current protection	auto restart	110			%
short circuit protection	continuous, auto restart				
over voltage protection	3.3 Vdc output model 5 Vdc output model 9 Vdc output model 12 Vdc output model 15 Vdc output model 24 Vdc output model			7.5 7.5 12 20 20 30	Vdc Vdc Vdc Vdc Vdc Vdc

SAFETY & COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute input to ground for 1 minute	3,000 2,000			Vac Vac
safety approvals	UL60950-1, CE				
safety class	class I				
conducted emissions	CISPR22/EN55022, Class B				
radiated emissions	CISPR22/EN55022, Class B				
ESD	IEC/EN61000-4-2 Class B, contact ±6 kV/air ±8 kV				
radiated immunity	IEC/EN61000-4-3 Class A, 10V/m				
EFT/burst	IEC/EN61000-4-4 Class B, ±2 kV				
	IEC/EN61000-4-4 Class B, ±4 kV (external circuit required, see figure 2)				

DISCONTINUED

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SAFETY & COMPLIANCE (CONTINUED)

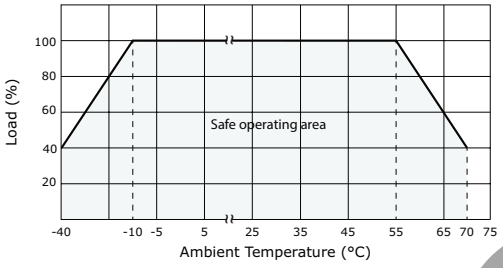
parameter	conditions/description	min	typ	max	units
surge	IEC/EN61000-4-5 Class B, ±1 kV/±2 kV IEC/EN61000-4-5 Class B, ±2 kV/±4 kV (external circuit required, see figure 2)				
conducted immunity	IEC/EN61000-4-6 Class A, 10 Vr.m.s				
PFM	IEC/EN61000-4-8 Class A, 10 A/m				
voltage dips & interruptions	IEC/EN61000-4-11 Class B, 0%-70%				
MTBF	as per MIL-HDBK-217F at 25°C	300,000			hrs
RoHS	2011/65/EU				

ENVIRONMENTAL

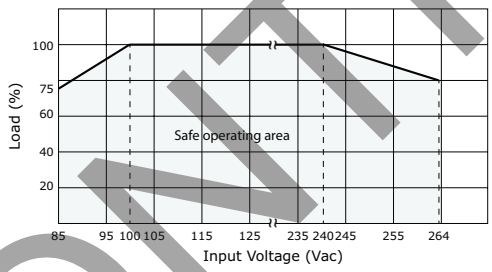
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		70	°C
storage temperature		-40		105	°C
storage humidity	non-condensing			95	%

DERATING CURVES

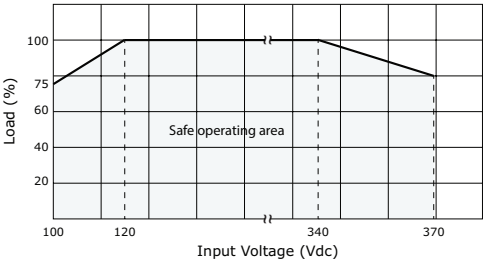
load vs. ambient temperature
(at 100~240 Vac)



load vs. input voltage (Vac)
(at 25°C)



load vs. input voltage (Vdc)
(at 25°C)



DISCONTINUED

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MECHANICAL

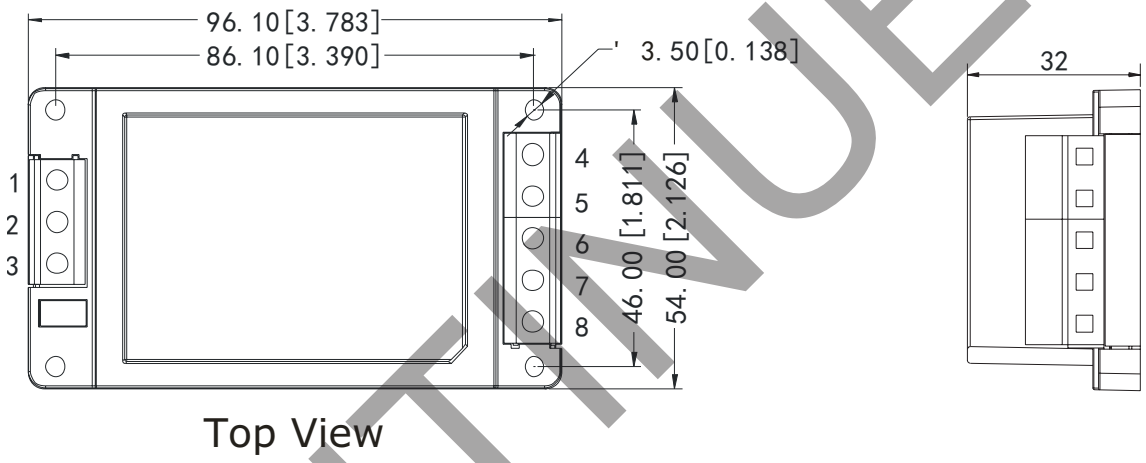
parameter	conditions/description	min	typ	max	units
dimensions	96.10 x 54.00 x 32.00 (3.783 x 2.126 x 1.259 inch)				mm
case material	UL94V-0				
weight			170		g
cooling	convection cooling				

MECHANICAL DRAWING

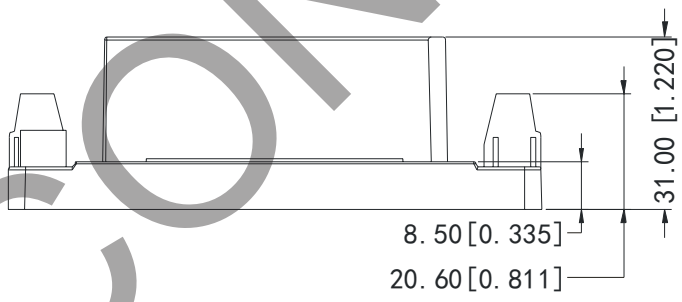
units: mm[inches]
tolerance: ±0.50[±0.020]

wire range: 24~12 AWG

PIN CONNECTIONS	
PIN	FUNCTION
1	GND ⏚
2	AC(N)
3	AC(L)
4	-Vo
5	NC
6	TRIM
7	NC
8	+Vo



Top View



Side View

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TYPICAL APPLICATION CIRCUIT

Figure 1

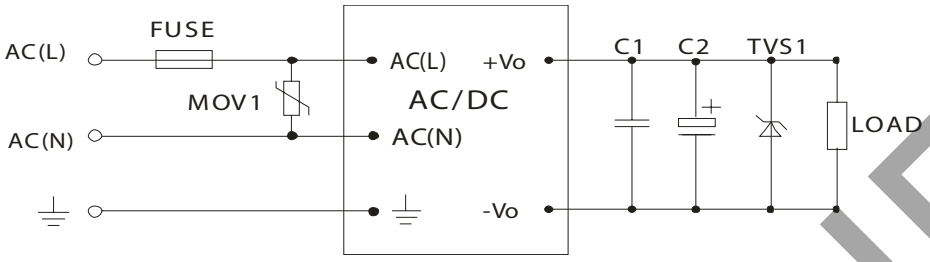


Table 1

Recommended External Circuit Components					
MODEL	FUSE[1]	MOV1	C1	C2	TVS
VSK-S20-3R3U-T	3.15A/250V	S14K350	1μF	330μF	SMBJ7.0A
VSK-S20-5U-T	3.15A/250V	S14K350	1μF	330μF	SMBJ7.0A
VSK-S20-9U-T	3.15A/250V	S14K350	1μF	220μF	SMBJ12A
VSK-S20-12U-T	3.15A/250V	S14K350	1μF	220μF	SMBJ20A
VSK-S20-15U-T	3.15A/250V	S14K350	1μF	220μF	SMBJ20A
VSK-S20-24U-T	3.15A/250V	S14K350	1μF	220μF	SMBJ30A

Note: 1. Fuse included on chassis

EMC RECOMMENDED CIRCUIT

Figure 2

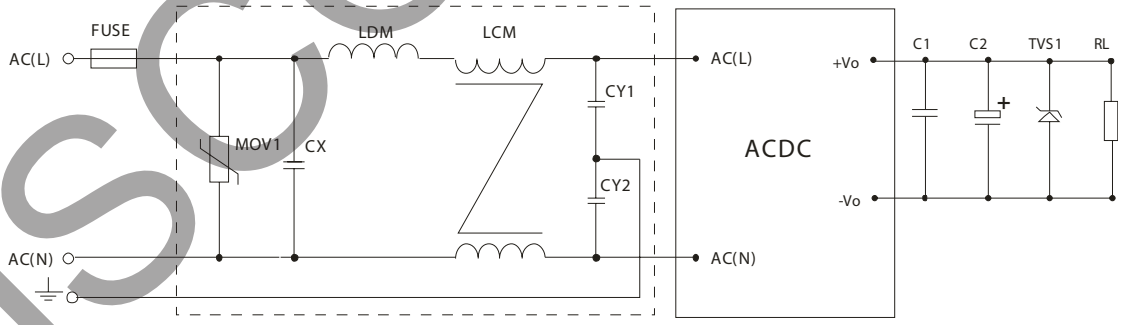


Table 2

Recommended External Circuit Components	
MOV1	S14K350
CY1, CY2	1000pF/400Vac
CX	0.1μF/275Vac
LCM	10mH
LDM	4.7μH/2A

Note: Also refer to Table 1

DISCONTINUED

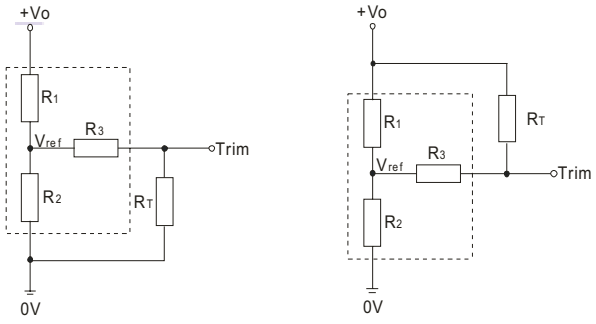
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APPLICATION NOTES

1. **Output voltage trimming**
   Leave open if not used.

Figure 3

Application Circuit for Trim pin
(part in broken line is the interior of models)



Formula for Trim Resistor

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vo' - Vref} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - Vref}{Vref} \cdot R_2$$

Note: Value for R1, R2, R3, and Vref refer to Table 3
R_T: Trim Resistor
a: User-defined parameter, no actual meanings
Vo': The trim up/down voltage

Table 3

Vout (Vdc)	R1 (kΩ)	R2 (kΩ)	R3 (kΩ)	Vref (V)
3.3	3.3	1.98	1	1.24
5	3.3	3.3	1	2.5
9	7.5	2.87	1	2.5
12	3.83	1	1	2.5
15	7.5	1.5	1	2.5
24	8.66	1	1	2.5

DISCONTINUED

Notes: 1. Output filtering capacitor C2 is an electrolytic capacitor, It is recommended to use high frequency and low impedance electrolytic capacitors. For capacitance and current of capacitor please refer to manufacture's datasheet. Voltage derating of capacitor should be 80% or above. C1 is used to filter high frequency noise. TVS is recommended component to protect post-circuits (when converter fails).
2. All specifications measured at Ta=25C, humidity <75%, nominal input voltage, and rated output load, unless otherwise specified.

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REVISION HISTORY

rev.	description	date
1.0	initial release	09/06/2012
1.01	updated spec	01/08/2014
1.02	updated operating and storage temperatures, updated spec	06/11/2015
1.03	company logo updated	10/29/2020

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

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