

## Datasheet

# RS Pro K78xxW-500R3 DC-DC Converter

Wide input voltage, non-isolated and regulated single output.



**RoHS**

*K78xxW-500R3 series switching regulators can be used as high efficiency alternatives to three-terminal linear regulators. These high efficiency products offer a wide dc input range, provide short circuit protection, operation without a heat sink and are widely used in applications such as industrial control and instrumentation of all types.*

## FEATURES

- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range -40°C ~ +85°C
- Output short circuit protection
- 3 Year Warranty

## Selection Guide

Certification	RS Stock no. (Standard Pack)	RS Stock no. (Tray Pack 56pcs)	Part Number	Input Voltage (VDC)	Output		Full Load Efficiency(%) typ. Vin Min. / Vin Max.	Max. Capacitive Load (µF)
				Nominal (Range)	Voltage (VDC)	Max. Output Current (mA)		
CE	1933984	1933983	K7805W-500R3	24 (6.5-36)	5	500	90/84	680
	1933986	1933985	K7812W-500R3	24 (15-36)	12	500	94/91	680

Note: When the input voltage exceeds 30VDC, the input needs to be connected with an electrolytic capacitor of 22µF/50V to prevent the module from being damaged by voltage spikes.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current	Positive output	--	0.2	1.5	mA
Input Reverse Polarity		Avoid / Not protected			
Input Filter		Capacitor filter			

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### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	Full load, input voltage range	K7803W-500R3	--	±2	±4	%
		Others	--	±2	±3	
Linear Regulation	Full load, input voltage range	--	±0.2	±0.4		
Load Regulation	10% -100% load step; nominal input voltage	--	±0.4	±1.5		
Ripple & Noise*	20MHz bandwidth, nominal input, 10% -100% load	--	20	75	mVp-p	
Temperature Coefficient	Operating temperature -40°C ~ +85°C	--	--	±0.03	%/°C	
Transient Response Deviation	Nominal input, 25% load step	--	50	250	mV	
Transient Recovery Time		--	0.2	1	ms	
Short-circuit Protection	Nominal input	Continuous, self-recovery				

Note: \*1.The "parallel cable" method is used for ripple and noise test, please refer to *Non-isolated DC-DC Converter Application Notes* for specific information;  
\*2.With light loads at or below 10%, ripple & noise for 3.3V/5V output parts increases to 150mVp-p max, and for 9V/12V/15V output parts to 2%Vo max.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	See Fig. 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Pin Soldering Resistance	Soldering time: 10s (Max.)	--	--	+260	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input	550	--	850	KHz
MTBF	MIL-HDBK-217F@25°C	2000	--	--	K hours

### Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	11.50 × 9.00 × 17.50 mm
Weight	5.0g (Typ.)
Cooling Method	Free air convection

### Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 5-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 5-② for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±4KV	perf. Criteria B
	RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN 61000-4-4	±1KV (see Fig. 5-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN 61000-4-5	line to line ±1KV (see Fig. 5-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN 61000-4-6	3Vr.m.s	perf. Criteria A

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## Typical Characteristic Curves

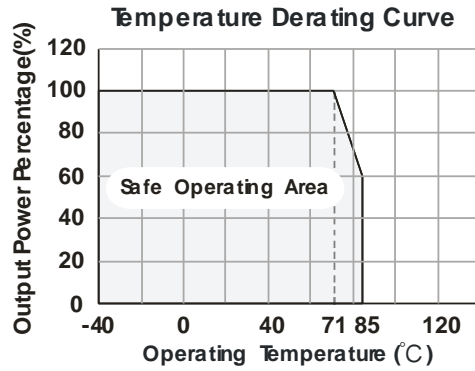
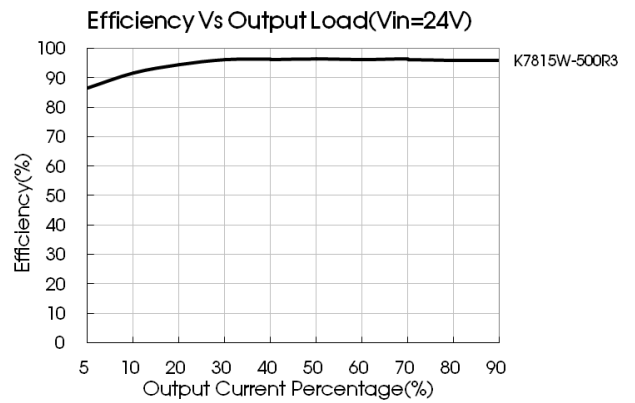
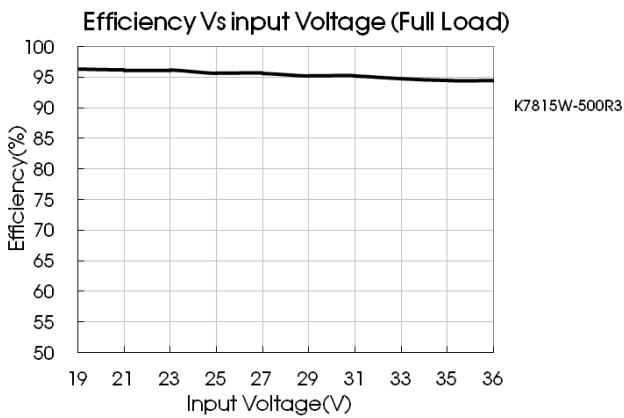
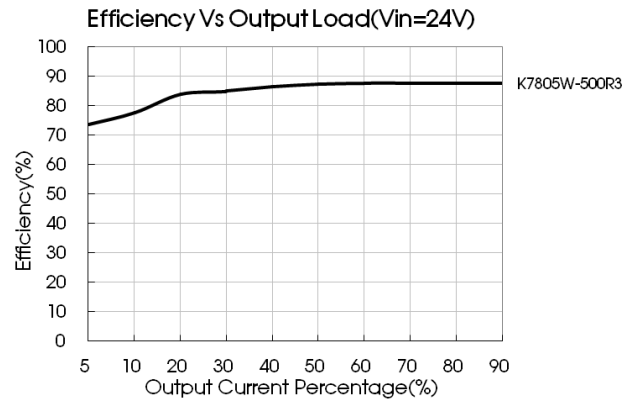
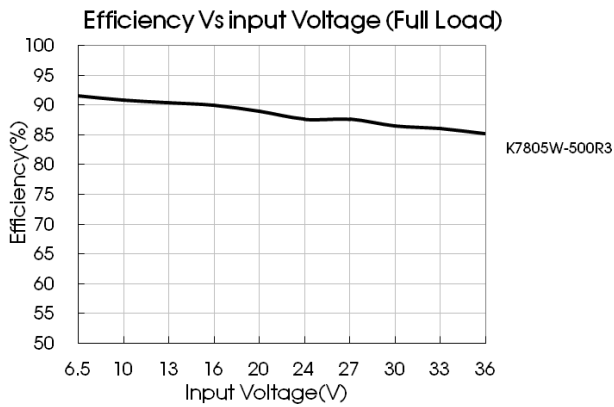


Fig. 1

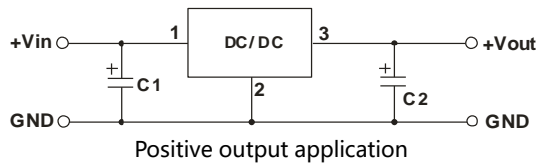


# DC/DC Converter

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### Design Reference

#### 1. Typical application



Sheet 1		
Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)
K7805W-500R3	10 $\mu$ F/50V	22 $\mu$ F/10V
K7812W-500R3		22 $\mu$ F/25V

Fig. 2 Typical application

- Note:
1. The required capacitors C1 and C2 must be connected as close as possible to the terminals of the module;
  2. Refer to Table 1 for C1 and C2 capacitor values. For certain applications, increased values and/or tantalum or low ESR electrolytic capacitors may also be used instead;
  3. When using configurations as shown in figure 3, we recommended to add an inductor (LDM) with a value of up to 10 $\mu$ H which helps reducing mutual interference;
  4. The products do not support parallel connection of their output and hot plug;
  5. To reduce the output ripple and noise further, it is suggested the use of a "LC" filter at the output terminals and recommend with value of L is 10 $\mu$ H-47 $\mu$ H.

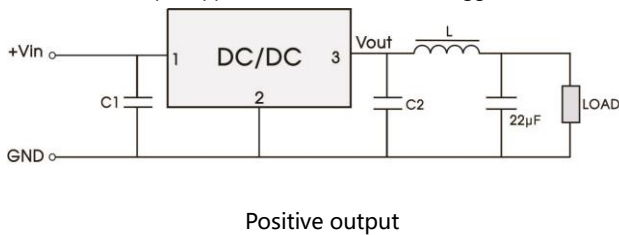


Fig. 4 "LC" filter application

#### 2. EMC compliance circuit

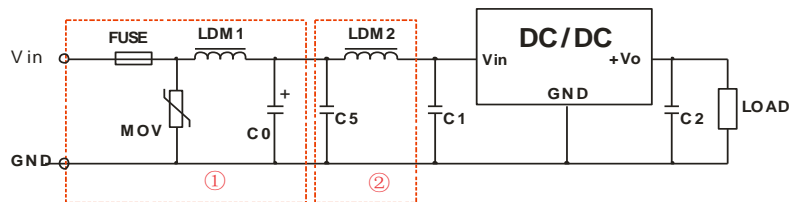


Fig. 5 EMC recommended circuit


FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Selected based on the actual input current from the customer	S20K30	82 $\mu$ H	680 $\mu$ F /50V	Refer to Sheet 1	4.7 $\mu$ F /50V	12 $\mu$ H

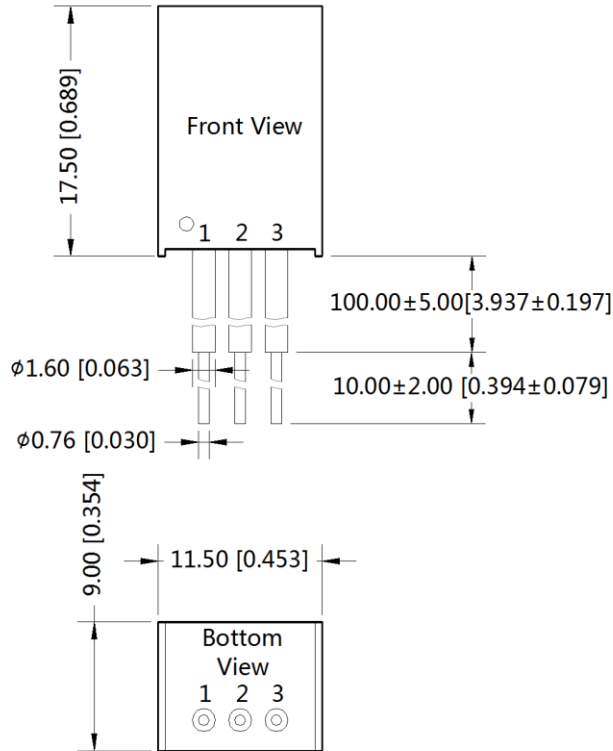
Notes: For EMC tests we use Part ① in Fig. 5 for immunity and part ② for emissions test.

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## Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Pin-Out		
Pin	Positive Output	Negative Output
1(Red)	Vin	Vin
2(Black)	GND	-Vo
3(Yellow)	+Vo	GND

Note:

Unit: mm[inch]

Wire type: UL1569 AWG22 ( 300V 105°C )

General tolerances: ±0.50[±0.020]

Notes:

1. The specified maximum capacitive load is tested under full load condition and over the input voltage range;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity < 75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations and shall be handled by qualified units.