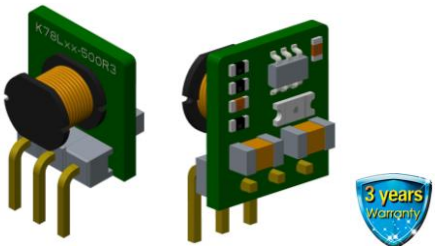
EN

Datasheet

RS Pro K78Lxx-500R3 DC-DC Converter

Wide input voltage non-isolated and regulated single output.



Features

- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range -40℃ to +85℃
- Output short-circuit protection
- IEC60950, UL60950, EN60950 approved
- 3 Year Warranty

K78Lxx-500R3 series switching regulators are drop in replacements for LM78xx series three-terminal linear regulators. The high efficiency of these converters allows operation at full load without the need for a heat sink. With low ripple and standby power consumption these regulated converters are widely used in instrumentation, IoT and battery powered applications.

Selection Guide

Certification	RS Stock no. (Standard Pack)	RS Stock no. (Tube Pack 100pcs)	Part No.	Input Voltage (VDC)*	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Capacitive Load (µF) Max.
				Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
UL/CE	1933966	1933965	K78L03-500R3	24 (4.75-36)	3.3	500	86/80	680
	1933969	1933968	K78L05-500R3	24 (6.5-36)	5.0	500	90/84	680
	1933971	1933970	K78L12-500R3	24 (15-36)	12	500	94/91	680

Note: * For input voltage exceeding 30 VDC, an input electrolytic capacitor of 22uF/50V is required 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
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		Capacitance filter			

DC/DC Converter

K78Lxx-500R3 Series

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	K78L03-500R3	--	±2	±4	%
		Others	--	±2	±3	
Linear Regulation	Full load, input voltage range		--	±0.2	±0.4	
Load Regulation	Nominal input, 10% -100% load	3.3/5 VDC output	--	±0.6	--	
		12VDC output	--	±0.3	--	
Ripple & Noise*	20MHz bandwidth, nominal input, 10% -100% load		--	20	75	mVp-p
Temperature Coefficient	Operating temperature -40℃ ~ +85℃		--	--	±0.03	%/℃
Transient Response Deviation	Nominal input, 25% load step change		--	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 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 12V output parts to 2%Vo max.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	单位
Operating Temperature	Derating when operating temperature≥71℃ (see Fig. 1)	-40	--	85	℃
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	260	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input	550	--	850	KHz
MTBF	MIL-HDBK-217F@25℃	2000	--	--	K hours

Mechanical Specifications

Dimensions	10.00 x 7.20 x 11.00 mm
Weight	1.0g (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
	CS	IEC/EN 61000-4-6 3Vr.m.s	perf. Criteria A

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Typical Characteristic Curves

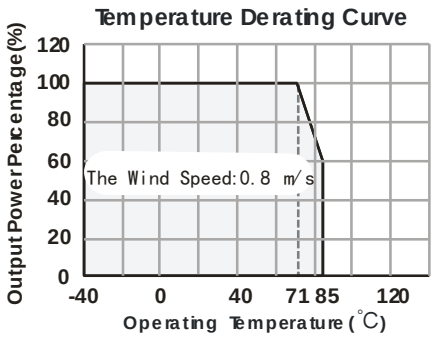
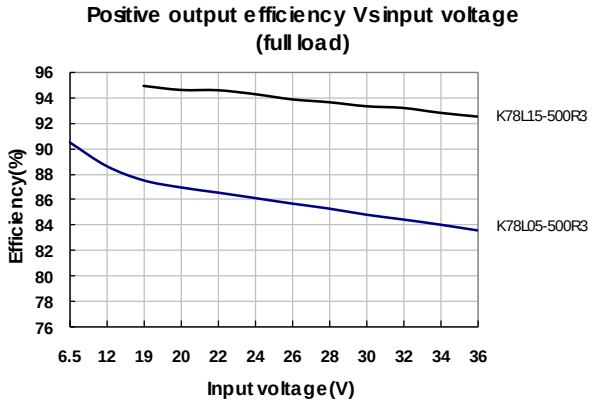
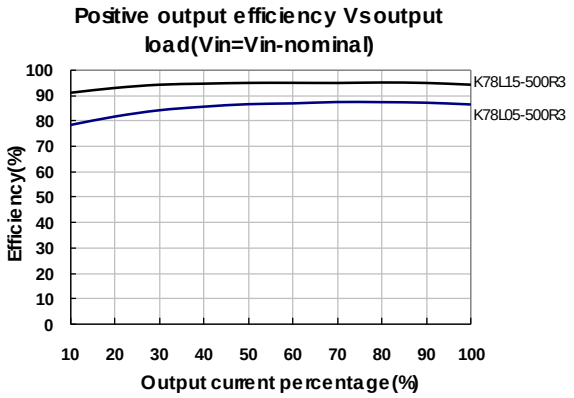


Fig. 1





Design Reference

1. Typical application

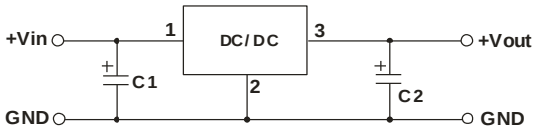


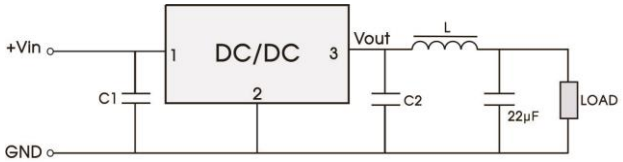
Fig.2 Positive output application circuit

table 1

Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)
K78L03-500R3	10μF/50V	22μF/10V
K78L05-500R3		22μF/10V
K78L12-500R3		22μF/25V

Note:

1. C1 and C2(C3 and C4) are required and should be connected close to the pin terminal 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 10μH which helps reducing mutual interference.
4. Converter cannot be used for hot swap and with output in parallel.
5. Connecting a "LC" filter at the converter output helps to further reduced the output ripple. The recommended inductor value (L) is 10μH-47μH.



Positive output

Fig. 4 External "LC" output filter circuit diagram

2. EMC compliance circuit

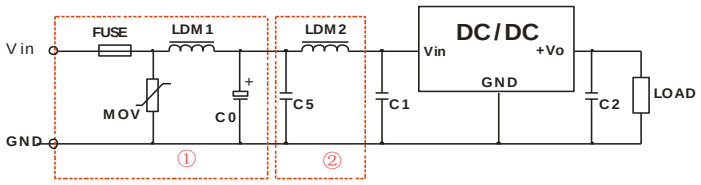
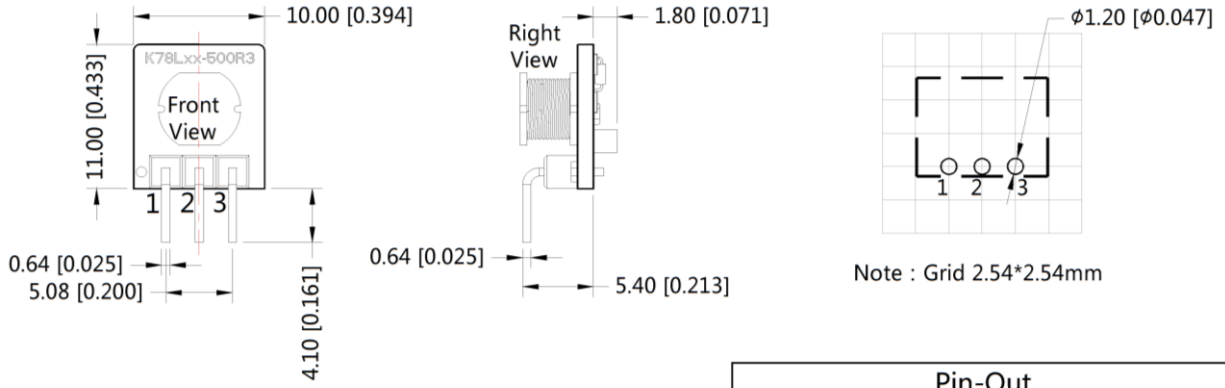


Fig. 5 Recommended compliance circuit

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

Pin-Out		
Pin	Positive Output	Negative Output
1	Vin	Vin
2	GND	-Vo
3	+Vo	GND

Notes:

1. The max. capacitive load should be tested within the input voltage range and under full load conditions;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this data table 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.