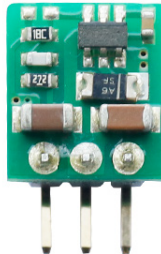
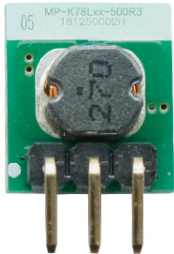


Non Isolated Board Mount DC / DC Converters

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Wide input voltage non-isolated and regulated single output

**RoHS
Compliant**



Description

MP-K78Lxx-500R3 series are high efficiency switching regulators and ideal substitutes of LM78xx series three-terminal linear regulators. The converters feature high efficiency, low loss, short circuit protection, positive or negative output voltage, and there is no need for a heat sink. These products are widely used in applications such as industrial control, instrumentation, electric power.



Features

- High efficiency up to 95%
- No-load input current as low as 0.2mA
- Operating ambient temperature range: -40°C to +85°C
- Negative output available
- Output short-circuit protection
- Pin-out compatible with LM78XX linear regulators
- IEC60950, UL60950, EN60950 approved

Selection Guide

Part Number	Input Voltage (VDC)*	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Capacitive Load (µF) Max.
	Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
MP-K78L03-500R3	24 (4.75-36)	3.3	500	86/80	680
MP-K78L05-500R3	24 (6.5-36)	5		90/84	
MP-K78L12-500R3	12 (7-31)	-5	-300	80/81	330
	24 (15-36)	12	500	94/91	680
MP-K78L15-500R3	12 (8-24)	-12	-150	84/85	330
	24 (19-36)	15	500	95/93	680
MP-K78L15-500R3	12 (8-21)	-15	-150	85/87	330

Note: * For input voltage exceeding 30 VDC, an input electrolytic capacitor of 22µF/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			

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Output Specifications						
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	MP-K78L03-500R3	--	±2	±4	%
		Others	--		±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	--	
		±12/±15 VDC output		±0.3	--	
Ripple & Noise*	20MHz bandwidth, nominal input, 10% -100% load		--	20	75	mVp-p
Temperature Coefficient	Operating temperature -40°C to +85°C		--	--	±0.03	%/°C
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			

Notes: * 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/15V output parts to 2%Vo max.

General Specifications						
Item	Operating Conditions		Min.	Typ.	Max.	Unit
Operating Temperature	Derating when operating temperature ≥ 71°C (see Fig. 1)		-40	--	85	°C
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°C		2000	--	--	K hours

Mechanical Specifications	
Dimensions	10mm × 7.2mm × 11mm
Weight	1g (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. 4-1 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

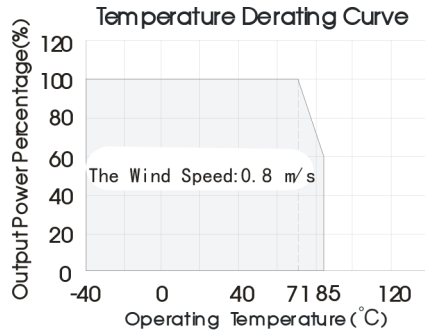
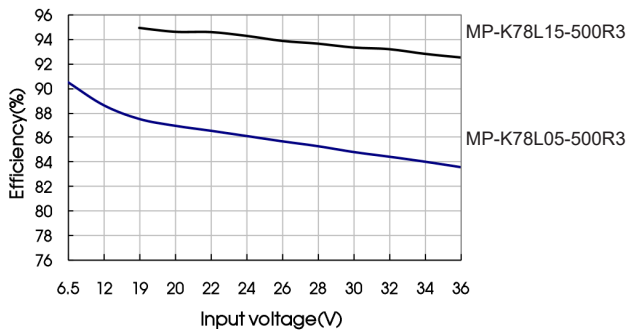
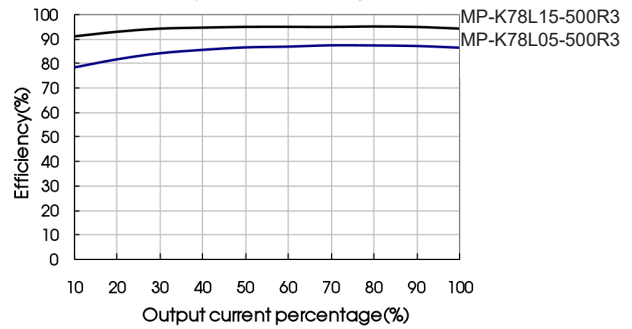


Fig. 1

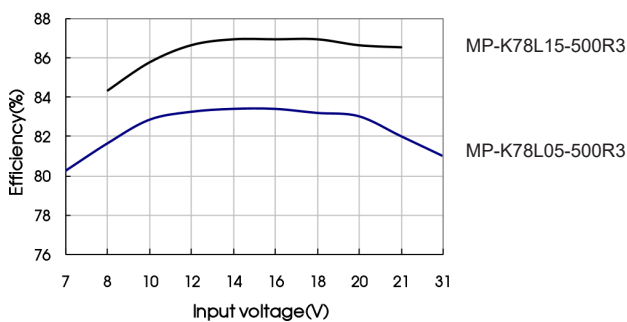
Positive output efficiency Vs input voltage (full load)



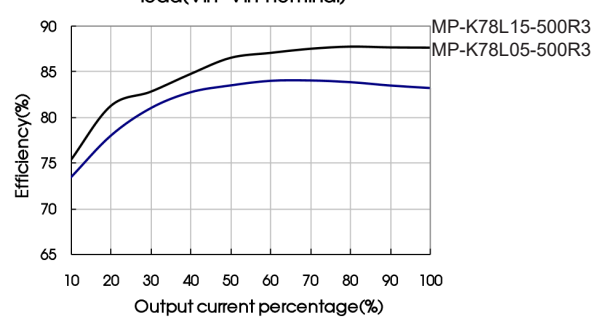
Positive output efficiency Vs output load (Vin=Vin-nominal)



Negative output efficiency Vs input voltage (full load)



Negative output efficiency Vs output load (Vin=Vin-nominal)



Non Isolated Board Mount DC / DC Converters

Design Reference

1. Typical application

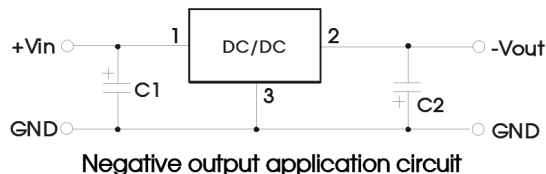
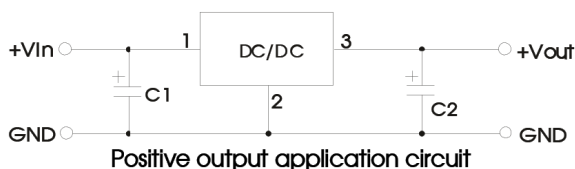


Fig. 2 Typical application circuit

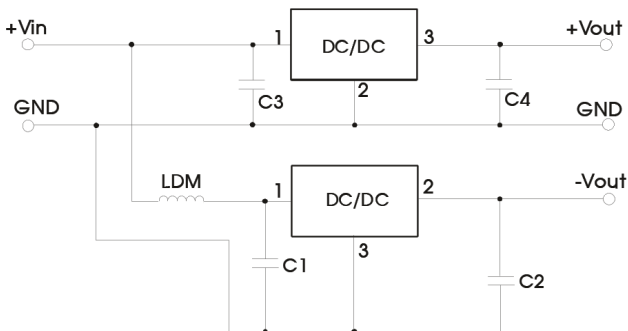


Fig. 3 Positive and negative output application circuit

Table 1

Part Number	C1/C3 (ceramic capacitor)	C2/C4 (ceramic capacitor)
MP-K78L03-500R3	10 μ F/50V	22 μ F/10V
MP-K78L05-500R3		
MP-K78L12-500R3		22 μ F/25V
MP-K78L15-500R3		

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 (C3 and C4) 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 μ H 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 10 μ H-47 μ H.

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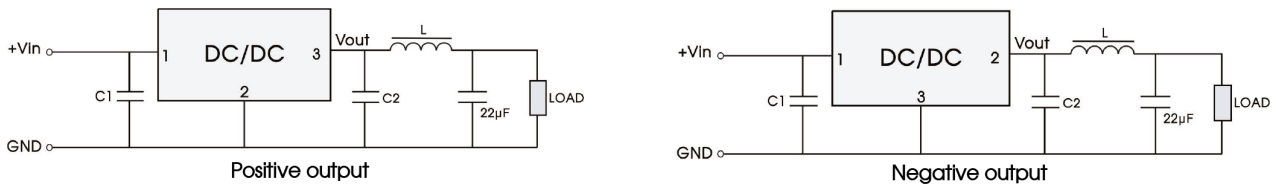


Fig. 4 External "LC" output filter circuit diagram

2. EMC compliance circuit

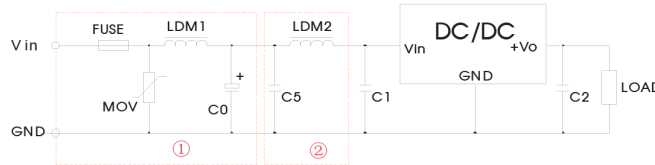


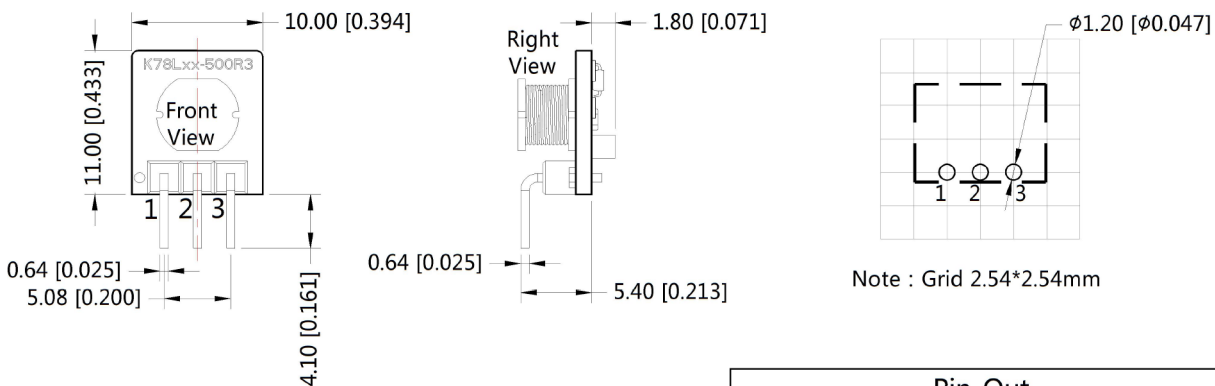
Fig. 5 Recommended compliance circuit

FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Select fuse value according to actual input current	S20K30	82µH	680µF /50V	Refer to table 1	4.7µF /50V	12µH

Note: For EMC tests we use Part 1 in Fig. 5 for immunity and part 2 for emissions test. Selecting based on needs.

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

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