

K78LXX-500R2 Series

**WIDE INPUT NON-ISOLATED & REGULATED
SINGLE OUTPUT**



Patent Protection RoHS

PART NUMBER SYSTEM

K78LXX-500R2

Output Current
Output Voltage
Product Series

FEATURES

- Efficiency up to 93%
- Operating Temperature range:
-40°C ~ +85°C
- Pin-out compatible with LM78XX linears
- Short circuit protection, thermal shutdown
- Low ripple and noise
- Sip package, meet UL94-V0
- Low Temperature rise
- Industry standard pinout
- Low-cost

APPLICATIONS

K78LXX-500R2 series high efficiency switching regulators are ideally suited to replace 78xx linear regulators and are pin compatible.

SELECTION GUIDE

Part Number	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)	Efficiency (% max)	
	Nominal	Range			Vin (Min)	Vin (Max)
K78L03-500R2	12	4.75-18	3.3	500	90	83
K78L05-500R2	12	7.0-18	5.0	500	93	86

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
No-load Input Power	Input Voltage Range	--	0.096	0.144	W
Reverse Polarity Input		Forbidden			
Input Filter		Capacitance Filter (1μF)			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage accuracy	100% load, input voltage range	--	±2	±3	%
Line Regulation	Input voltage range	--	±0.4	±0.6	
Load Regulation	From 10% to 100% full load	--	±0.4	±0.6	
Switching Frequency	100% load, input Voltage Range	350	400	450	KHz
Output Current Limit		--	--	2800	mA
Temperature Drift	-40°C~+85 °C	--	--	±0.02	%/°C
Ripple & Noise*	20MHz bandwidth(refer to figure 2)	--	20	35	mVp-p
Over Temperature Protection	IC inside	--	--	160	°C
Short circuit input power	Input Voltage Range	--	0.8	1.8	W
Short circuit protection		Continuous, automatic recovery			
Max. Capacitive Load		--	--	1000	μF

Note: * Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

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COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
MTBF	MIL-HDBK-217F@25°C	2000	--	--	K hours
Case material		Plastic(UL94-V0)			
Dimensions		11.60*7.50*10.20			mm
Weight		--	2.0	--	g

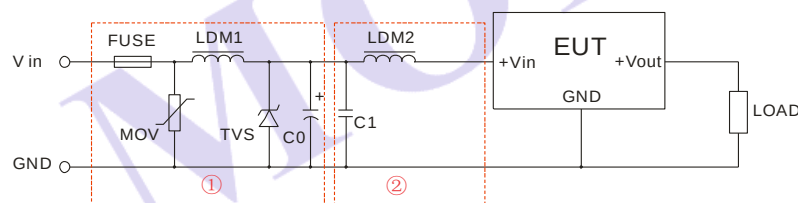
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 71°C)	-40	--	85	°C
Storage Temperature		-55	--	125	
The Max. Case Temperature	Operating temperature curve range	--	--	100	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS B	(External Circuit Refer to Figure1-②)
	RE	CISPR22/EN55022	CLASS B	(External Circuit Refer to Figure1-②)
EMS	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	±2KV	perf. Criteria B (External Circuit Refer to Figure 1-①)
	Surge	IEC/EN 61000-4-5	±2KV	perf. Criteria B (External Circuit Refer to Figure 1-①)
	CS	IEC/EN 61000-4-6	3Vr.ms	perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN 61000-4-29	0%-70%	perf. Criteria B

EMC RECOMMENDED CIRCUIT



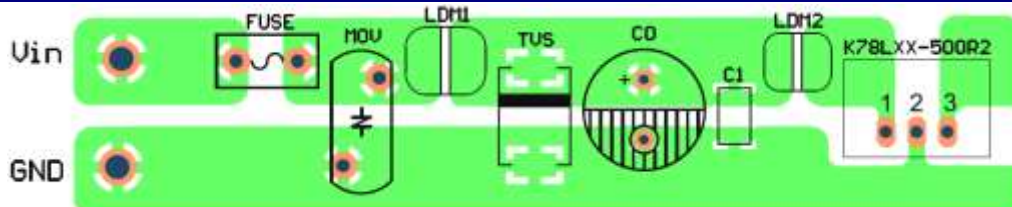
(Figure 1) EMC Recommended Circuit

Note: In Figure 1, part ① is EMS recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.

Recommended external circuit parameters:

Components	Standard Parameter
FUSE	Choose according to practical input current
MOV	10D560
LDM1	82μH
TVS	SMCJ36A
C0	470μF/25V
C1	4.7μF/50V
LDM2	12μH

EMC RECOMMENDED CIRCUIT PCB LAYOUT



(Figure 2)

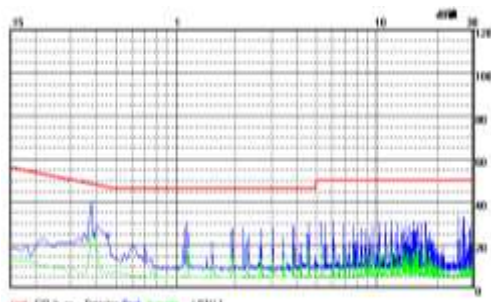
EMC TEST WAVEFORM(CLASS B APPLY CIRCUIT)

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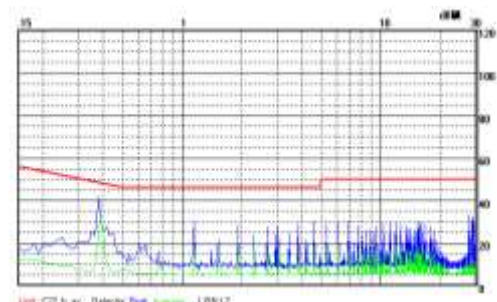
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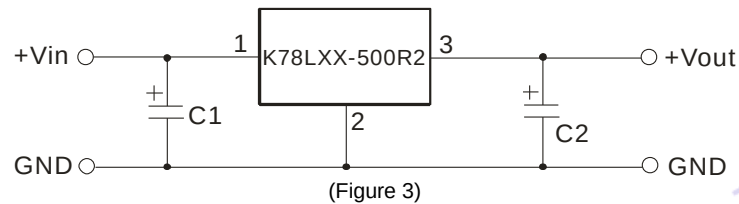


K78L05-500R2 CE (Positive line)



K78L05-500R2 CE (Negative line)

TYPICAL APPLICATION CIRCUIT



EXTERNAL CAPACITOR TABLE

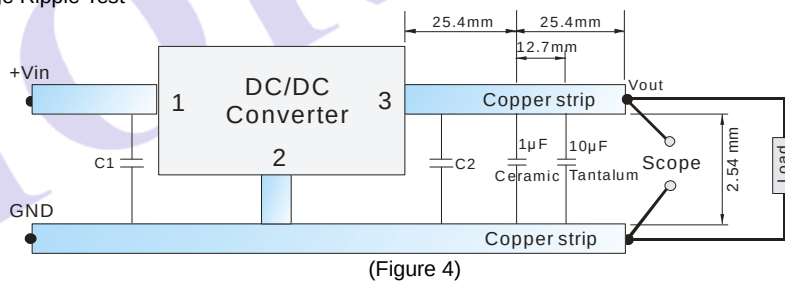
Part Number	C1 (Ceramic Capacitor)	C2 (Ceramic Capacitor)
K78L03-500R2	10 μ F/25V	10 μ F/6.3V
K78L05-500R2		10 μ F/10V

Note:

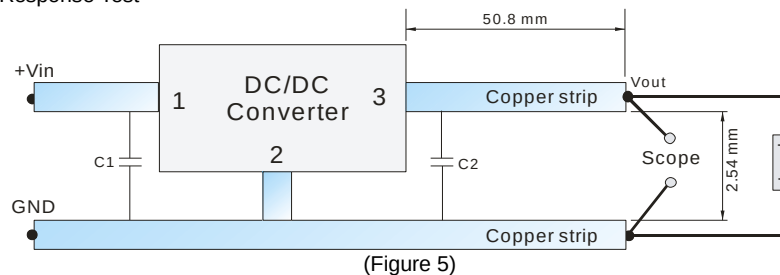
- General apply to the application-environment, C1 and C2 can be added in the circuit, and they should be placed as near as the products' footprints.
- The capacitance of C1,C2 sees external capacitor table, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
- Cannot use in parallel for output and hot swap for input.

TEST CONFIGURATIONS (TA=25°C)

1. Efficiency and Output Voltage Ripple Test



2. Start-up and Load Transient Response Test



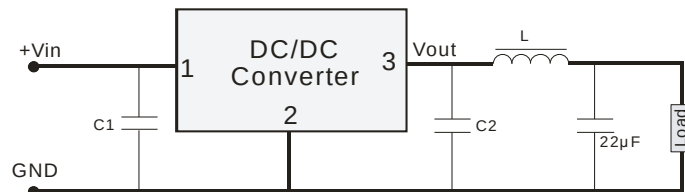
OUTPUT RIPPLE REDUCTION

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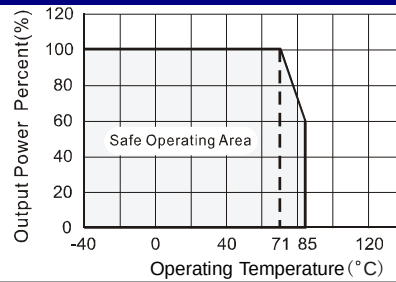
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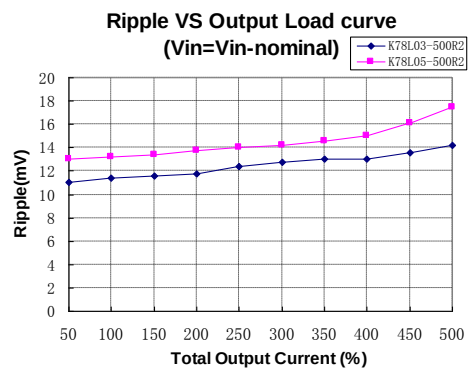
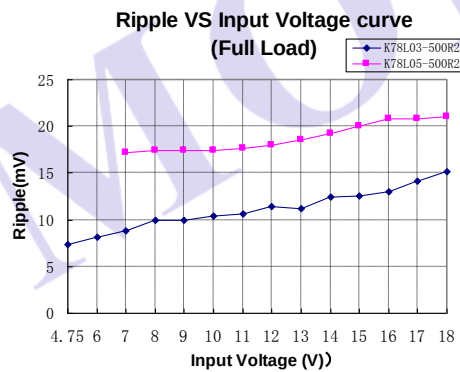
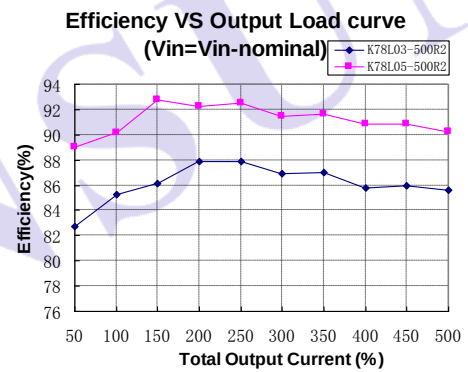
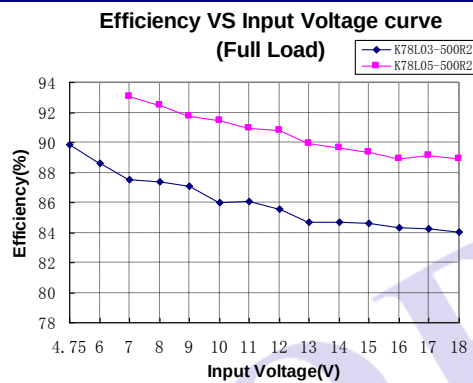


To reduce output ripple, it is recommended to add a LC filter in output port.
 L: Recommended parameter 10µH ~ 47µH.
 (Figure 6)

TYPICAL DERATING CURVE



TYPICAL CHARACTER CURVE



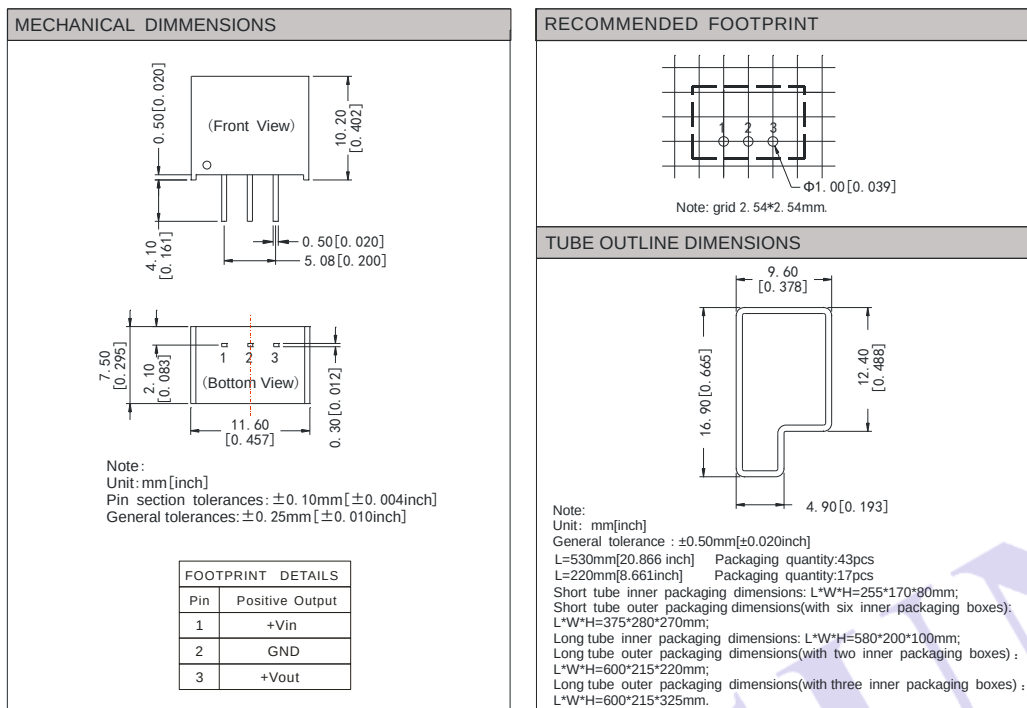
OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

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Note:

1. Max. Capacitive Load tested at input voltage range and full load.
2. All specifications measured at $T_a=25^\circ\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all the test methods of indications are based on our corporate standards.
4. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
5. Contact us for your specific requirement.
6. Specifications subject to change without prior notice.

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