

RoHS

## K78UXX-500(L) Series

**WIDE INPUT NON-ISOLATED & REGULATED  
SINGLE POSITIVE /NEGATIVE OUTPUT**

### FEATURES

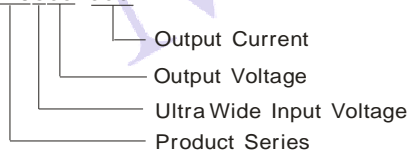
- Efficiency up to 95%
- Ultra wide input voltage range can up to 8:1
- Operating temperature: -40°C ~ +85°C
- Pin-out compatible with LM78XX Linear
- Short circuit protection, thermal shutdown
- Low ripple and noise
- Micro miniature SIP package, meet UL94-V0 requirement
- No heatsink required
- Industry standard pinout
- MTBE>2,000,000Hours

### APPLICATIONS

The K78UXX-500(L) series high efficiency switching regulators are ideally suited to replace LM78xx linear regulators and are pin compatible. It has ultra wide input voltage range, the efficiency of up to 95% means that very little energy is wasted as heat so there is no need for any heatsinks with their additional space and mounting costs.

### MODEL SELECTION

K78U05-500



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PRODUCT PROGRAM							
Part Number	Input Voltage(VDC)		Output			Efficiency(%) (typ.)	
	Nominal	Range	Voltage (VDC)	Current(mA)		Vin (Min.)	Vin (Max.)
K78U03-500(L)	48	9.0~72.0	3.3	10	500	82	75
K78U05-500(L)		9.0~72.0	5.0	10	500	87	81
*K78U06-500(L)		9.0~72.0	6.5	10	500	91	84
*K78U09-500(L)		14.0~72.0	9.0	10	500	92	86
*K78U12-500(L)		17.0~72.0	12.0	10	500	93	89
*K78U15-500(L)		20.0~72.0	15.0	10	500	94	90
K78U24-300(L)		36.0~72.0	24.0	6	300	95	91

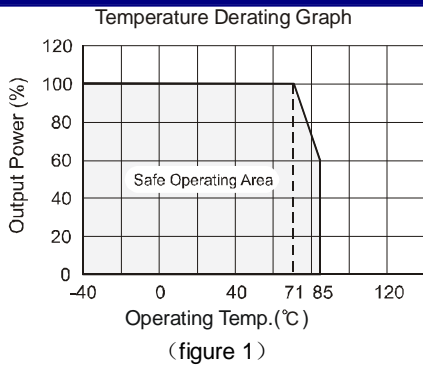
Note: Add suffix "L" for 90° bend pins, for example: K78U05-500L. \*\*\*Designing.

OUTPUT SPECIFICATIONS						
Item	Test conditions	Min.	Typ.	Max.	Units	
Output voltage accuracy	100% full load		±2	±3		
Line regulation	Vin=min. to max. at full load		±0.4	±1.0	%	
Load regulation*	From 10% to 100% Load		±0.3	±0.6		
Ripple & Noise	20MHz bandwidth, from 10% to 100% Load, without any external capacitor (refer to figure 2)		20	60	mVp-p	
Short circuit input power	Vin=Nominal		0.72	1.2	W	
Short circuit protection		Continuous, automatic				
Thermal shutdown			160		°C	
Switching frequency	100% full load	120		800	kHz	
Output current limit	Vin=Nominal		700	1200	mA	
Quiescent current	Vin=Nominal, Min. Load		1	5		
Temperature coefficient	-40°C ~ +85°C ambient			±0.015	%/°C	
Tendencies load	From 10% to 100% Load			±100	mV	
			1.0	1.5	ms	
Max capacitance load				100	µF	

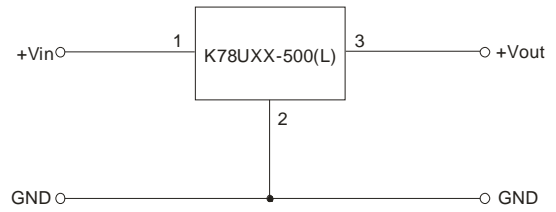
Note: "GND" Pin can not vacant, or it will damage the module.

COMMON SPECIFICATIONS						
Item	Test conditions	Min.	Typ.	Max.	Units	
Storage humidity				95	%	
Operating temperature		-40		85	°C	
Operating case temp.			65	100		
Storage temperature		-55		125		
Lead temperature	1.5mm from case for 10 seconds			300		
Cooling		Free Air Convection				
Case material		Plastic (UL94-V0)				
MTBF	25°C (MIL-HDBK-217F)	3500			k hours	
	71°C (MIL-HDBK-217F)	1500				
Hop swap		Not supported				
Thermal resistance				60	°C/W	
EMI conducted	Refer to figure 5	EN55022, CLASS B				
RFI conducted						
Electrostatic discharge		IEC/EN 61000-4-2 level 4				
Safety approvals		EN-60950-1 standards				
Weight			4		g	

## TYPICAL CHARECTERISTICS



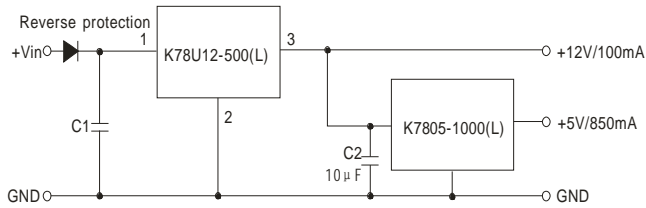
## TYPICAL APPLICATION CIRCUIT



The regulator proposed to establish the input voltage by soft-start, no plug and play, if the input voltage changes from low voltage to high voltage abruptly, the regulator might be damaged.

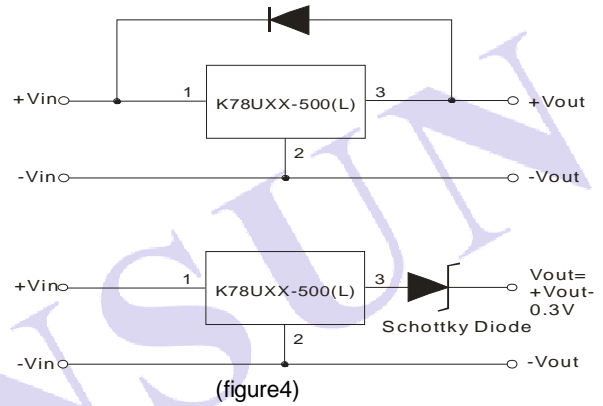
## APPLICATION EXAMPLE

High voltage input, Multiple Outputs, with greater load

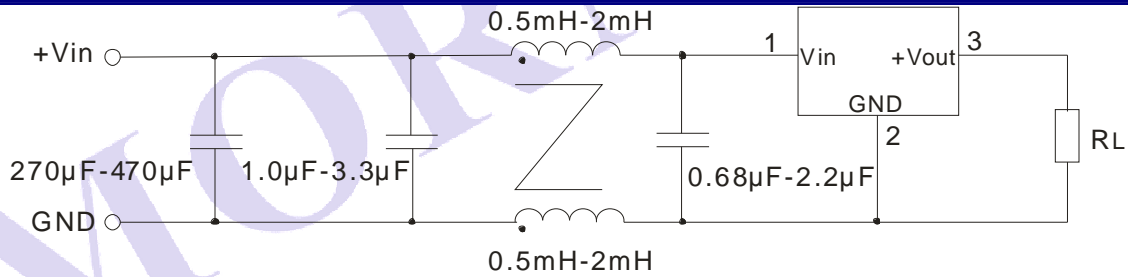


Note: 1. the input current amount of the back-grade regulator and the pre-class load should be less than or equal the max load current of the pre-class regulator.  
2. If further filtering is required, please add components as per the above circuit. We recommend not to add components, if request, please make sure the capacitors  $C1 \leq 2.2\mu F$ ,  $C2 \leq 10\mu F$  more close to the back-grade regulator.

## MODULES PROTECT RECOMMENDED CIRCUIT

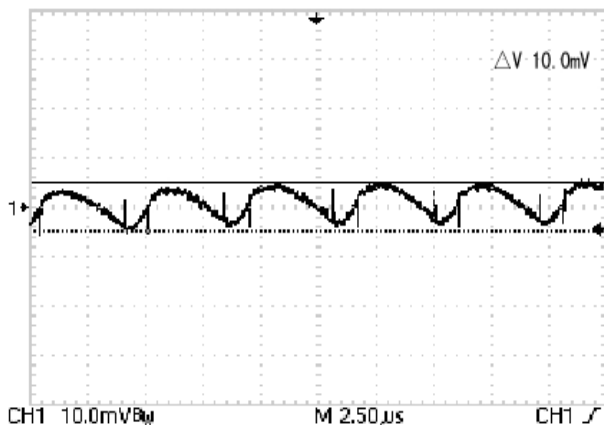


## EMC RECOMMENDED CIRCUIT

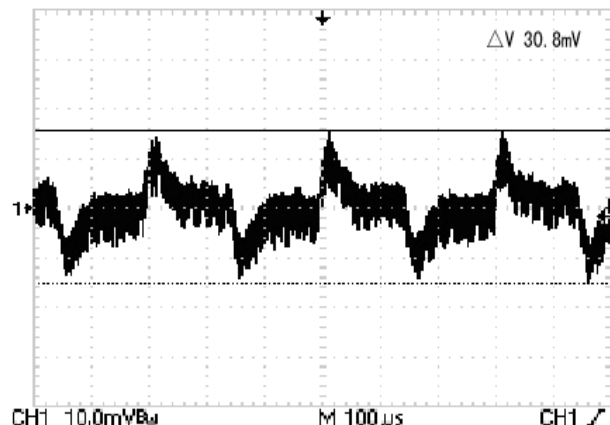


## TEST CONFIGURATIONS (TA=25°C)

### 1、 FULL LOAD OUTPUT RIPPLE & NOISE MEASURED GRAPH

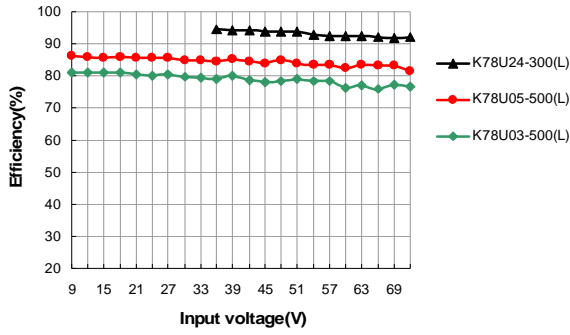


### 2、 LOAD TRANSIENT RESPONSE WAVEFORM



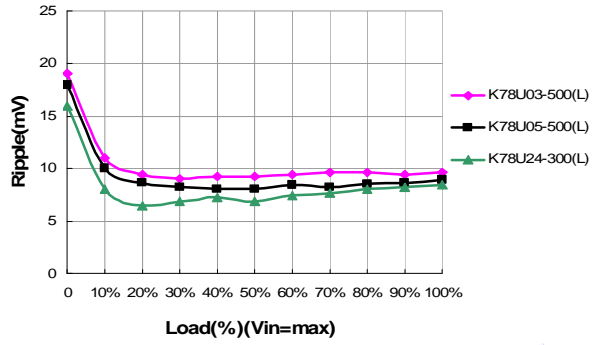
## Efficiency

Efficiency VS Input voltage (full load)

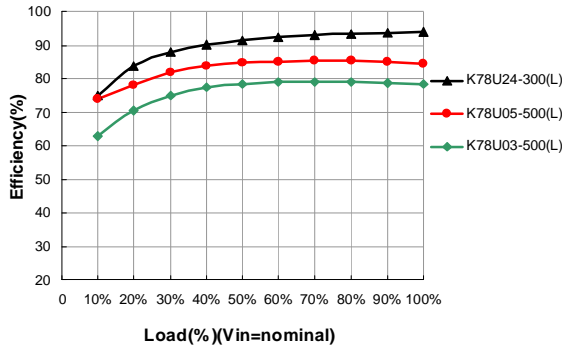


## Ripple

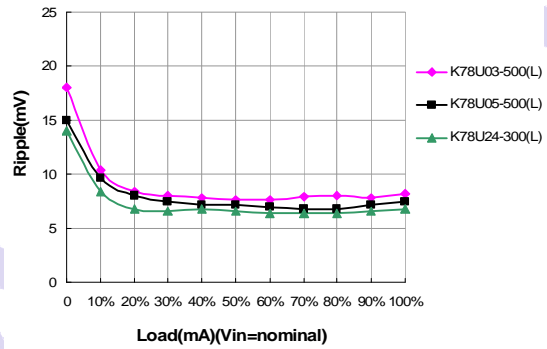
Ripple VS Load



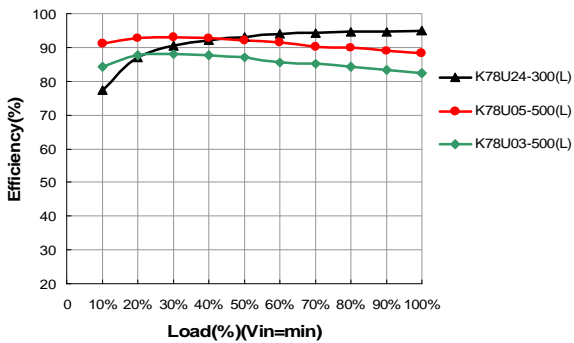
Efficiency VS Load



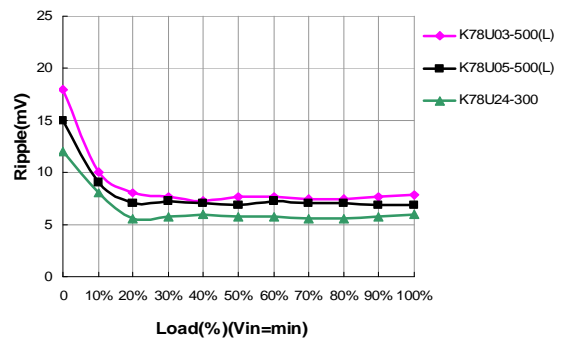
Ripple VS Load



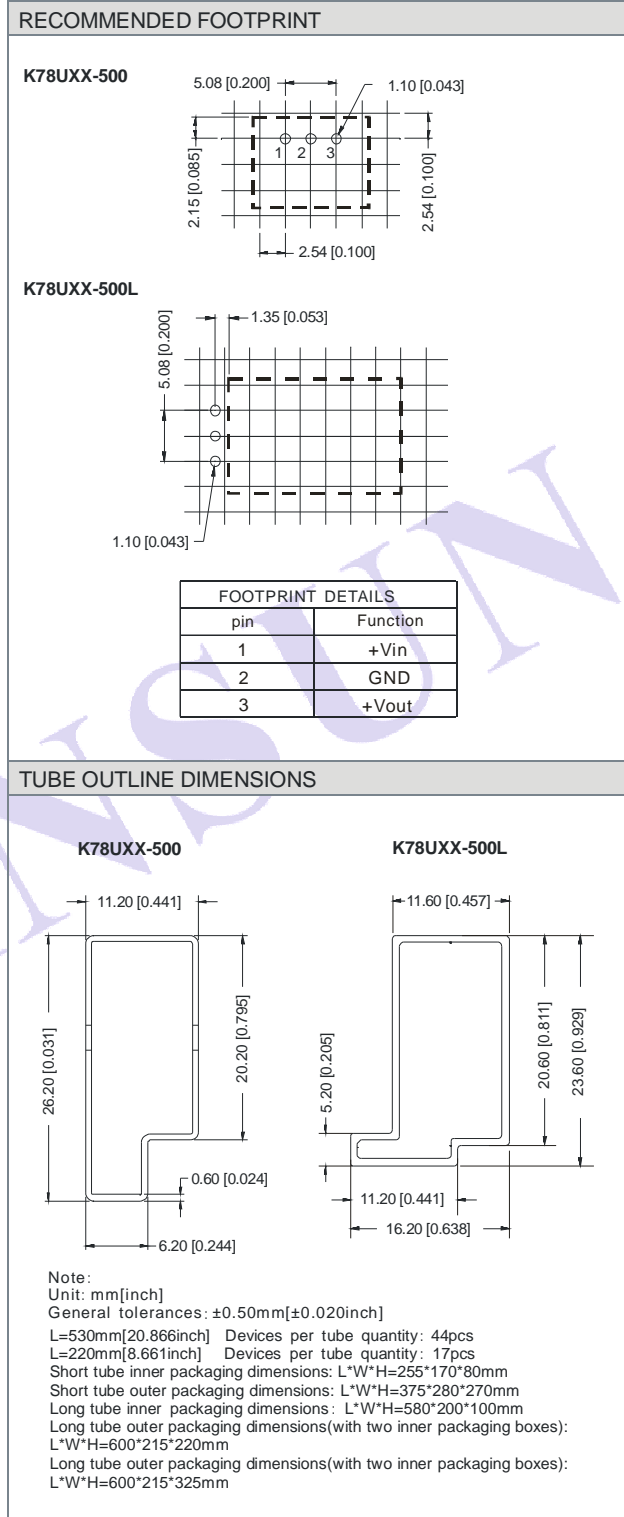
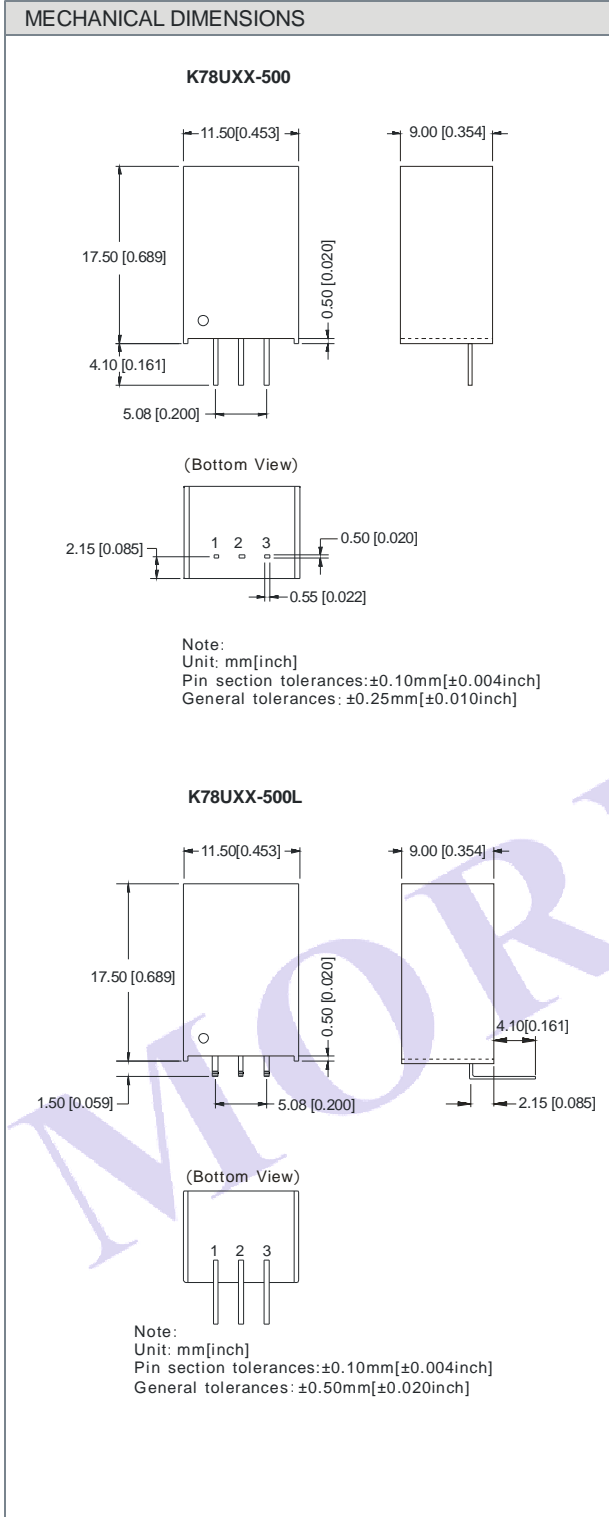
Efficiency VS Load



Ripple VS Load



# OUTLINE DIMENSIONS & FOOTPRINT DETAILS



Note:

1. The load shouldn't be less than 10%, and the output external capacitor should not be too large (recommend  $<10\mu\text{F}$ ), otherwise ripple will increase dramatically.
2. Operation under 10% load will not damage the converter; However, they may not meet all specification listed
3. All specifications measured at  $T_a=25^\circ\text{C}$ , humidity $<75\%$ , nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on corporate standards.