

RoHS

## K78UXX-500(L) Series

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

#### FEATURES

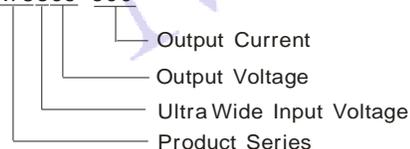
- Efficiency up to 95%
- Ultra wide input voltage range can up to 8:1
- Operating temperature: -40°C ~ +85°C
- Pin-out compatible with LM78XX Linear
- Short circuit protection, thermal shutdown
- Low ripple and noise
- Micro miniature SIP package, meet UL94-V0 requirement
- No heatsink required
- Industry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



#### MORNSUN Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou, P.R. China.

Tel: 86-20-38601850

Fax: 86-20-38601272

[Http://www.mornsun-power.com](http://www.mornsun-power.com)

PRODUCT PROGRAM							
Part Number	Input Voltage(VDC)		Output			Efficiency(%) (typ.)	
	Nominal	Range	Voltage (VDC)	Current(mA)		Vin (Min.)	Vin (Max.)
				Min.	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

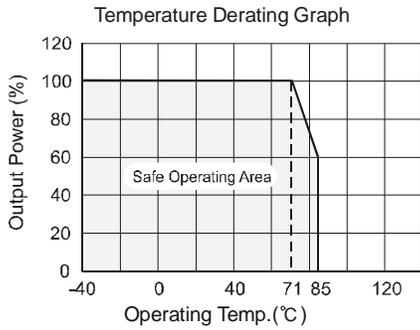
Note: Add suffix "L" for 90° bend pins, for example: K78U05-500L.

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 (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		1.0	1.5	ms	
Max capacitance load				100	µF	

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

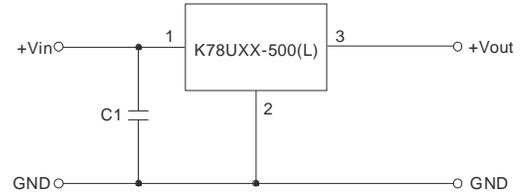
COMMON SPECIFICATIONS						
Item	Test conditions	Min.	Typ.	Max.	Units	
Storage humidity				95	%	
Operating temperature	Power derating (above 71°C)	-40		85		
Operating case temp.			65	100	°C	
Storage temperature		-55		125		
Lead temperature	1.5mm from case for 10 seconds			300		
Cooling		Free Air Convection				
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



(figure 1)

## TYPICAL APPLICATION CIRCUIT



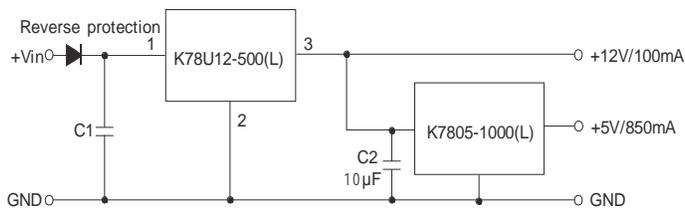
(figure 2)

Note:

1. 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.
2. If the applications is high-voltage input, the regulator must add an external capacitor C1( $\leq 47\mu\text{F}/100\text{V}$ ),to prevent voltage spikes caused by damage to the module.
3. No parallel connection.

## APPLICATION EXAMPLE

High voltage input, Multiple Outputs, with greater load

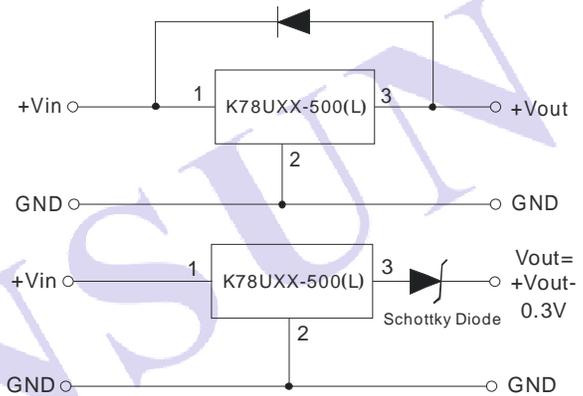


(figure 3)

Note:

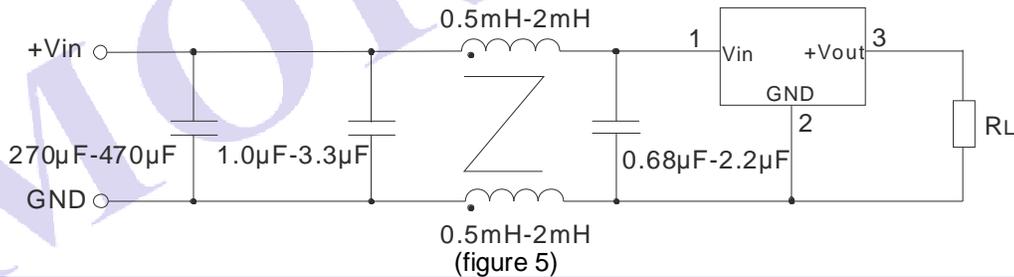
1. the input current amount of the back-grade regulator and the pre-class load should be less than or equal the max load current of the pre-class regulator.
2. If further filtering is required, please add components as per the above circuit(We recommend not to add components), if request, please make sure the capacitors C1  $\leq 47\mu\text{F}$ , C2  $\leq 10\mu\text{F}$  more close to the back-grade regulator.

## MODULES PROTECT RECOMMENDED CIRCUIT



(figure4)

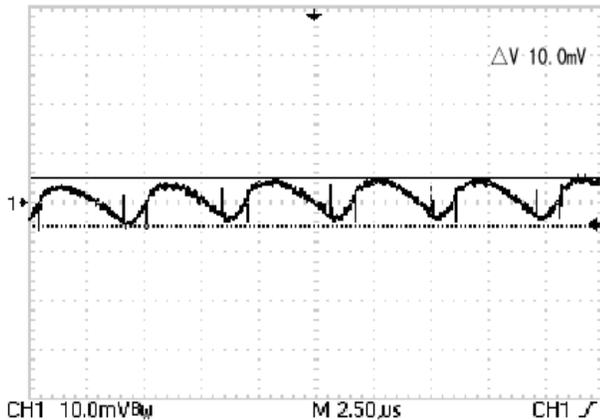
## EMC RECOMMENDED CIRCUIT



(figure 5)

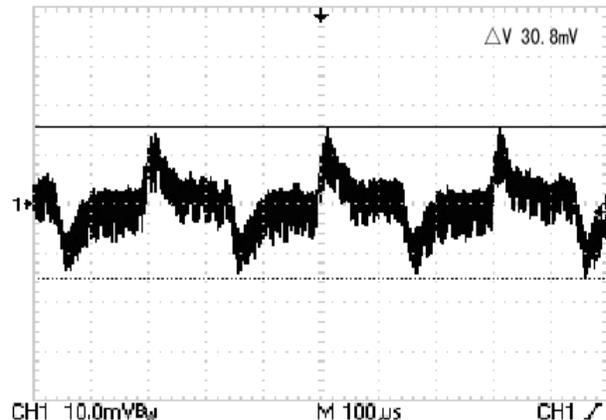
## TEST CONFIGURATIONS (TA=25°C)

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



(figure 6)

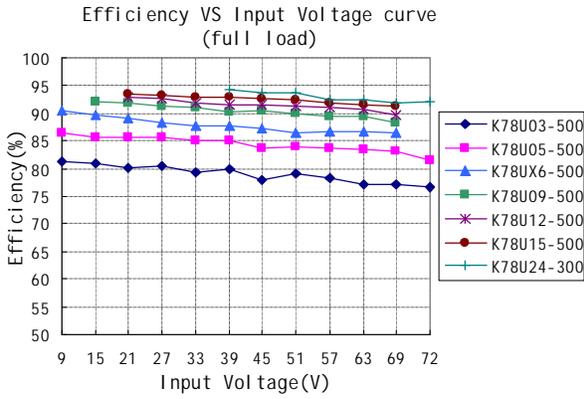
### 2、 LOAD TRANSIENT RESPONSE WAVEFORM



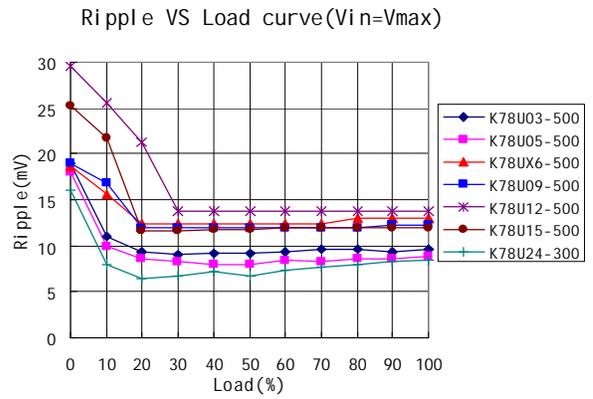
(figure 7)

**CHARACTERISTICS CURVE**

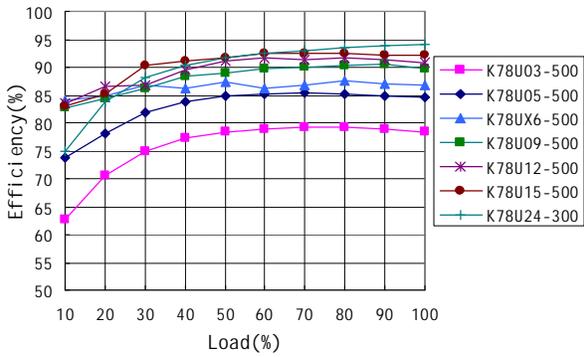
**Efficiency**



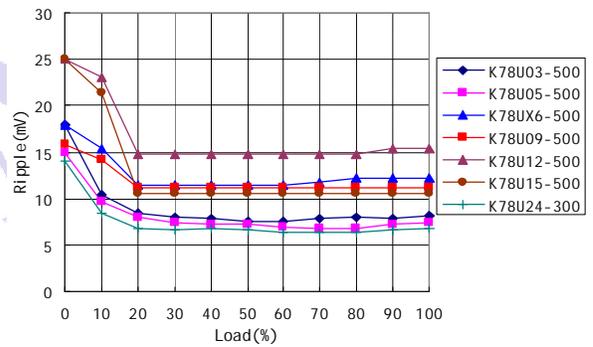
**Ripple**



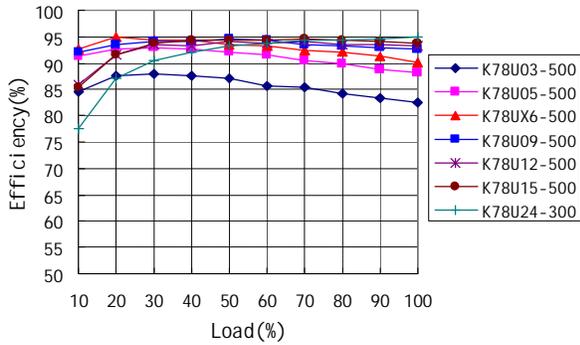
Efficiency VS Load curve (Vin=Vin-nominal)



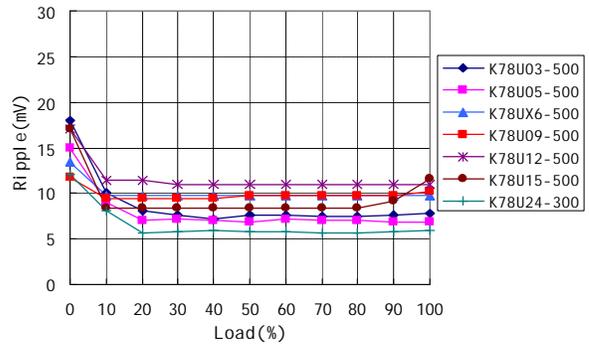
Ripple VS Load curve (Vin=Vin-nominal)



Efficiency VS Load curve (Vin=Vmin)



Ripple VS Load curve (Vin=Vmin)



# OUTLINE DIMENSIONS & FOOTPRINT DETAILS

### MECHANICAL DIMENSIONS

**K78UXX-500**

17.50 [0.689] (Front View)  
 4.10 [0.161]  
 5.08 [0.200]  
 0.50 [0.020]  
 11.50 [0.453] (Bottom View)  
 0.55 [0.022]  
 9.00 [0.354]  
 2.15 [0.085]

Note:  
 Unit:mm[inch]  
 Pin section tolerances:±0.10mm[±0.004inch]  
 General tolerances:±0.25mm[±0.010inch]

**K78UXX-500L**

9.00 [0.354] (Front View)  
 19.00 [0.748]  
 17.50 [0.689]  
 0.30 [0.012]  
 11.50 [0.453] (Bottom View)  
 0.50 [0.020]  
 0.55 [0.022]  
 5.08 [0.200]

Note:  
 Unit:mm[inch]  
 Pin section tolerances:±0.10mm[±0.004inch]  
 General tolerances:±0.25mm[±0.010inch]

### RECOMMENDED FOOTPRINT

**K78UXX-500**

Φ 1.00 [Φ 0.039]

**K78UXX-500L**

Φ 1.00 [0.039]

Note:  
 grid:2.54\*2.54mm.

FOOTPRINT DETAILS	
Pin	Function
1	+Vin
2	GND
3	+Vout

### TUBE OUTLINE DIMENSIONS

**K78UXX-500**

11.60 [0.457]  
 27.10 [1.067]  
 20.6 [0.811]  
 6.60 [0.260]

**K78UXX-500L**

11.40 [0.449]  
 23.40 [0.921]  
 20.40 [0.803]  
 4.20 [0.205]  
 11.00 [0.433]  
 16.00 [0.630]

Note:  
 Unit:mm[inch]  
 General tolerances:±0.50mm[±0.020inch]  
 L=530mm[20.866inch] Devices per tube quantity: 44pcs  
 L=220mm[8.661inch] Devices per tube quantity: 17pcs  
 Short tube inner packaging dimensions: L\*W\*H=255\*170\*80mm  
 Short tube outer packaging dimensions(with six inner packaging boxes): L\*W\*H=375\*280\*270mm  
 Long tube inner packaging dimensions: L\*W\*H=580\*200\*100mm  
 Long tube outer packaging dimensions(with two inner packaging boxes): L\*W\*H=600\*215\*220mm  
 Long tube outer packaging dimensions(with three inner packaging boxes): L\*W\*H=600\*215\*325mm

**Note:**

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

The copyright and authority for the interpretation of the products are reserved by MORNSUN

Specifications subject to change without notice.

K78UXX-500(L) A/2-2012 Page 4 of 4