



RoHS

K78LXX-500 Series

WIDE INPUT NON-ISOLATED REGULATED OUTPUT

FEATURES

- Efficiency up to 96%
- Temperature range: -40°C to +85°C
- No heat sink required
- Pin-out compatible with LM78XX linears
- Thermal shutdown
- Low ripple and noise
- SIP package
- Industry standard pinout
- MTBF>2,000,000 hours

PRODUCT PROGRAM

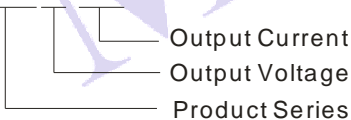
Part Number	Input Voltage (VDC)		Output		Efficiency (%) (Typ.)	
	Normal	Range	Voltage (VDC)	Current (mA)	Vin (Min)	Vin (Max)
K78L03-500	12	4.5-30	3.3	500	90	77
K78L05-500	12	6.5-30	5.0	500	94	81
K78LX6-500	24	8-30	6.5	500	95	85
K78L09-500	24	11-30	9.0	500	95	89
K78L12-500	24	15-30	12	500	96	92
K78L15-500	24	18-30	15	500	96	93

APPLICATIONS

The K78LXX-500 Series high efficiency switching regulators are ideally suited to replace 78xx linear regulators and are pin compatible. The efficiency of up to 96% means that very little energy is wasted as heat so there is no need for any heat sinks with their additional space and mounting costs.

MODEL SELECTION

K78L05-500



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OUTPUT SPECIFICATIONS

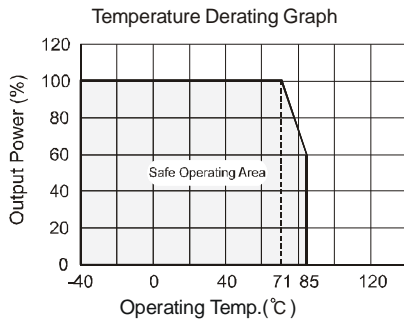
Item	Test Conditions	Min.	Typ.	Max.	Units
Output voltage accuracy	Input voltage range at full load		±2	±3	%
Line regulation*	Input voltage range at full load		±0.3	±0.5	
Load regulation	Normal input ,10% to 100% load		±0.5	±0.75	
Ripple & Noise	20MHz Bandwidth (refer to figure 3)		20	35	mVp-p
Thermal shutdown	Internal IC junction		160		°C
Output current limit	Normal input voltage		2000		mA
Quiescent current			5	13	
Temperature coefficient	-40 °C to +85 °C ambient			±0.02	%/°C
Max capacitance load				1000	µF

* K78L03-500 is ±1.0% (Max)

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Storage humidity range				95	%
Operating temp. range	Power derating (above 71°C)	-40		85	°C
Operating case temperature				100	
Storage temp. range		-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)	2000			k hours
Weight			2.0		g

TYPICAL TEMPERATURE CURVE

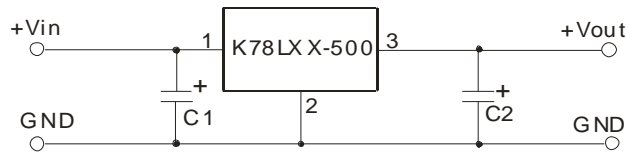


(figure 1)

EXTERNAL CAPACITOR TABLE

Part Number	C1 (ceramic capacitor)	C2 (ceramic capacitor)
K78L03-500	10 μ F/50V	22 μ F/16V
K78L05-500	10 μ F/50V	22 μ F/16V
K78LX6-500	10 μ F/50V	10 μ F/16V
K78L09-500	10 μ F/50V	10 μ F/16V
K78L12-500	10 μ F/50V	10 μ F/25V
K78L15-500	10 μ F/50V	10 μ F/25V

STANDARD APPLICATION CIRCUIT



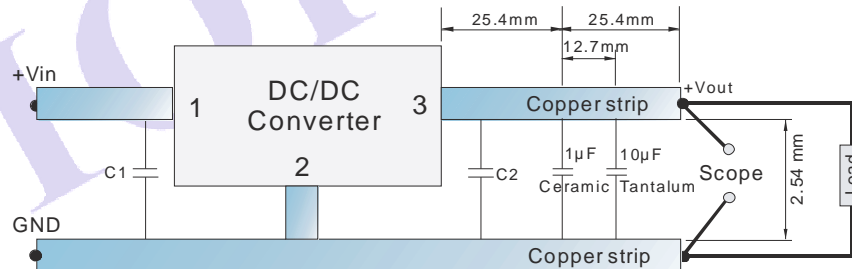
Note:

1. C1 and C2 are required and should be fitted close to the converter pins.
2. 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.
3. No parallel connection or plug and play.
4. Output can not short-circuit, or it may cause permanent damage to the device.

(figure 2)

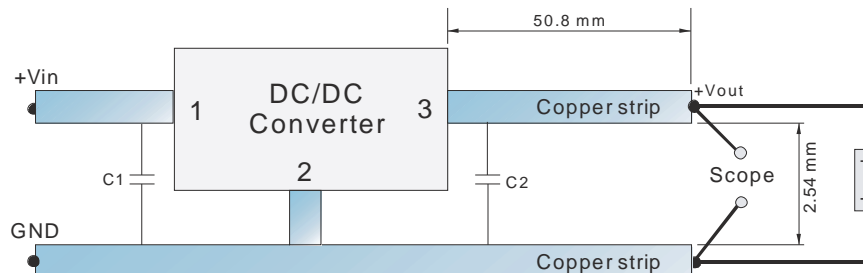
TEST CONFIGURATIONS (TA=25°C)

1 Efficiency and Output Voltage Ripple Test



(figure 3)

2 Start-up and Load Transient Response Test

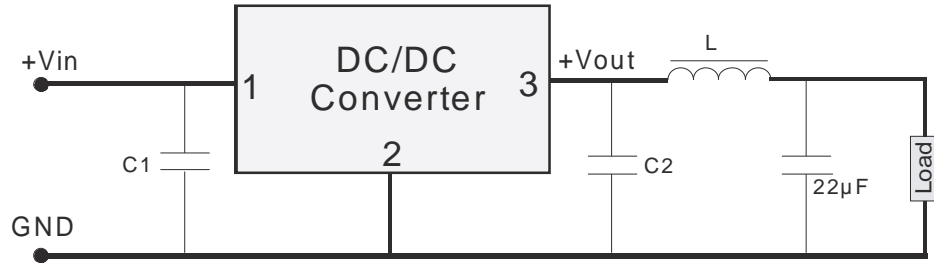


(figure 4)

OUTPUT RIPPLE REDUCTION

To reduce output ripple, it is recommended to add a LC filter in output port.

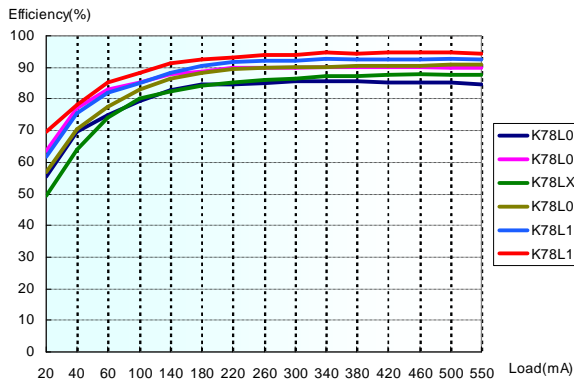
L: Recommended parameter $10\mu\text{H} \sim 47\mu\text{H}$.



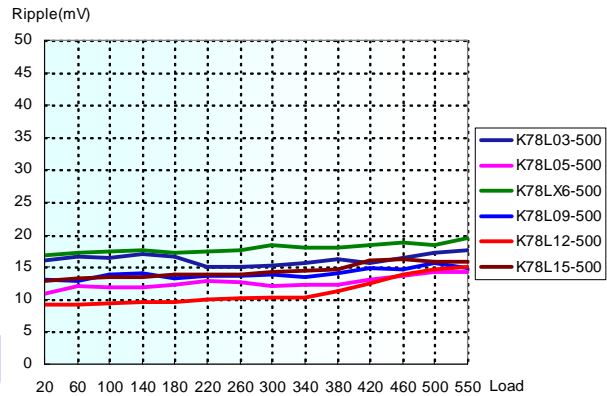
(figure 5)

CHARACTERISTIC CURVE (TA=25°C)

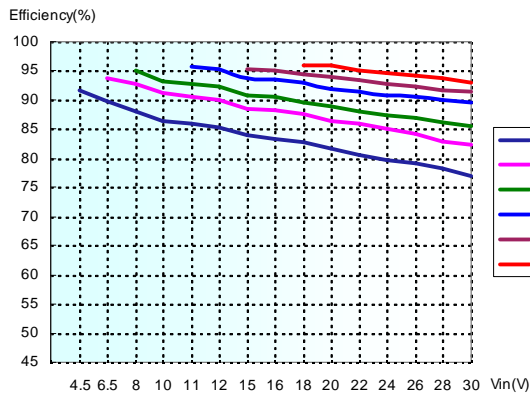
1 Efficiency and Output Voltage Ripple



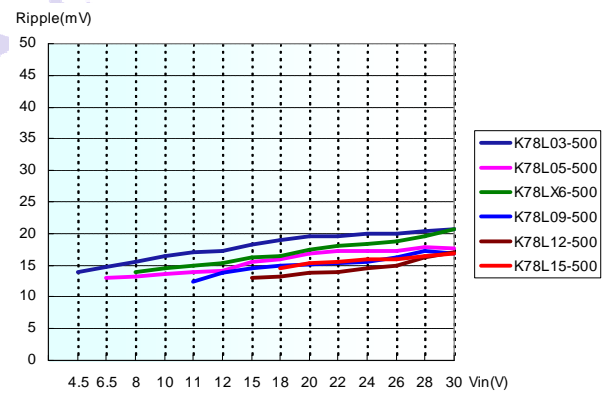
Efficiency VS Output Load (Vin=Norm)



Output Voltage Ripple VS Output Load (Vin=Norm)



Efficiency VS Input Voltage (Full Load)

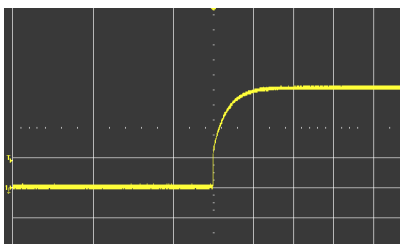


Output Voltage Ripple VS Input Voltage (Full Load)

2 Start-up Waveform

K78L03-500

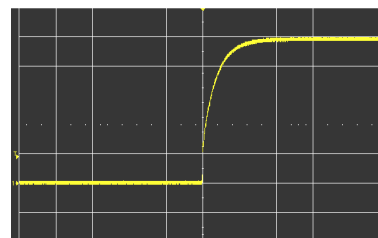
Vin=12Vdc, Out=3.3V/500mA, Cin=10µF, Co=22µF



CH1:1V/div, Time:5ms/div

K78L05-500

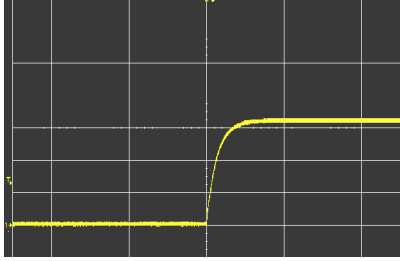
Vin=12Vdc, Out=5V/500mA, Cin=10µF, Co=22µF



CH1:1V/div, Time:5ms/div

K78LX6-500

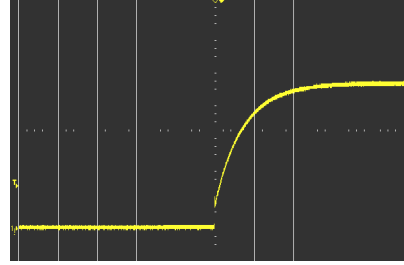
Vin=24Vdc, Out=6.5V/500mA, Cin=10μF, Co=10μF



CH1:2V/div, Time:5ms/div

K78L09-500

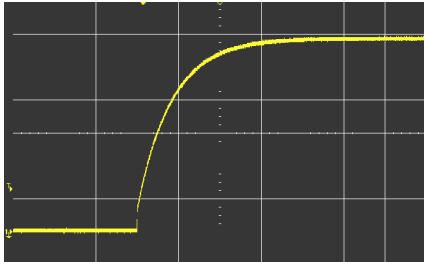
Vin=24Vdc, Out=9V/500mA, Cin=10μF, Co=10μF



CH1:2V/div, Time:5ms/div

K78L12-500

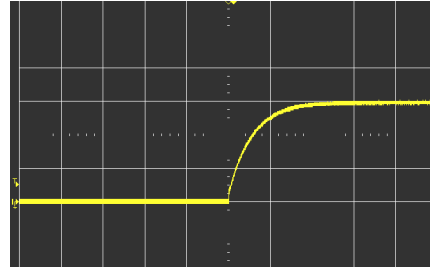
Vin=24Vdc, Out=12V/500mA, Cin=10μF, Co=10μF



CH1:2V/div, Time:10ms/div

K78L15-500

Vin=24Vdc, Out=15V/500mA, Cin=10μF, Co=10μF

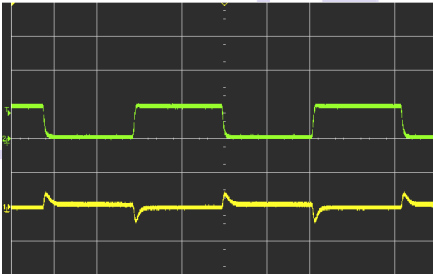


CH1:5V/div, Time:10ms/div

3 Load Transient Response

K78L03-500

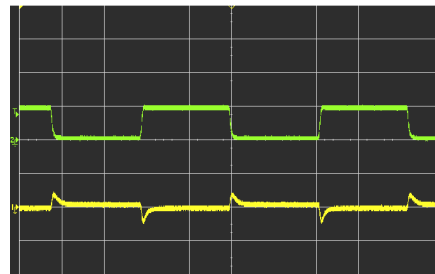
Vin=12Vdc, Vout=3.3V, Cin=10μF, Co=22μF



CH1: Vout, 200mV/div
CH2: ILoad, 500mA/div
Time: 500μs/div

K78L05-500

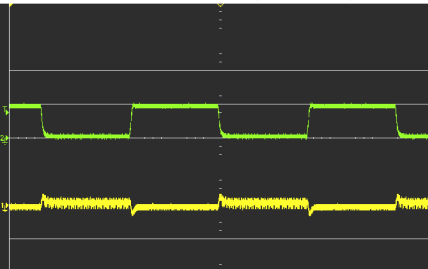
Vin=12Vdc, Vout=5V, Cin=10μF, Co=22μF



CH1: Vout, 200mV/div
CH2: ILoad, 500mA/div
Time: 500μs/div

K78LX6-500

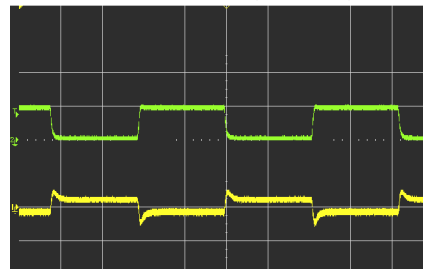
Vin=24Vdc, Vout=6.5V, Cin=10μF, Co=10μF



CH1:Vout, 200mV/div
CH2:ILoad, 500mA/div
Time: 500μs/div

K78L09-500

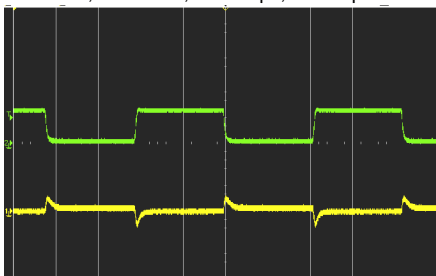
Vin=24Vdc, Vout=9V, Cin=10μF, Co=10μF



CH1: Vout,200mV/div
CH2: ILoad,500mA/div
Time: 500μs/div

K78L12-500

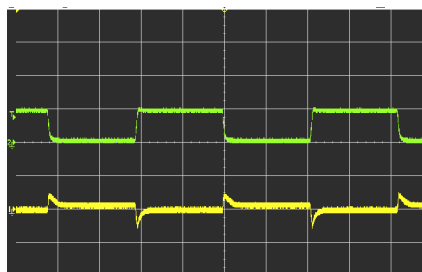
Vin=24Vdc, Vout=12V, Cin=10μF, Co=10μF



CH1: Vout, 200mV/div
CH2: ILoad, 500mA/div
Time: 500μs/div

K78L15-500

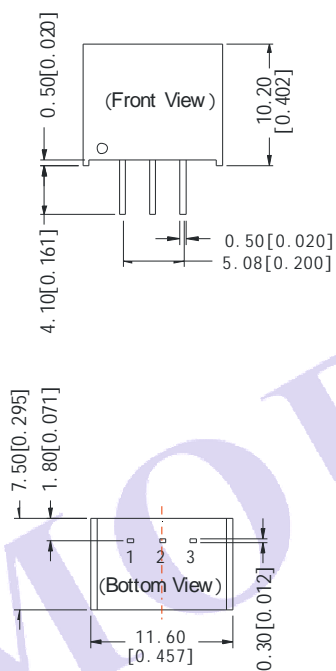
Vin=24Vdc, Vout=15V, Cin=10μF, Co=10μF



CH1: Vout, 200mV/div
CH2: ILoad, 500mA/div
Time: 500μs/div

PACKAGE STYLE AND PINNING

MECHANICAL DIMMENSIONS

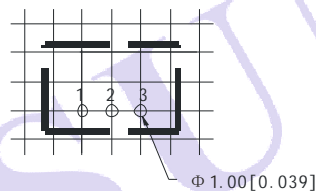


FOOTPRINT DETAILS

Pin	Function
1	+Vin
2	GND
3	+Vout

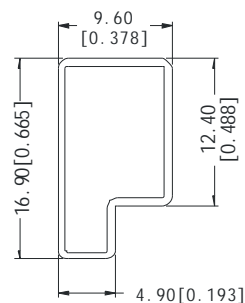
Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10mm [± 0.004inch]
General tolerances: ± 0.25mm [± 0.010inch]

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS



Note:
Unit: mm[inch]
General tolerance ±0.50mm [±0.020inch]
L=530mm [20.866inch] Packaging quantity: 43 pcs
L=220mm [8.661inch] Packaging quantity: 17 pcs
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:

1. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test methods of indications are based on corporate standards.