MORNSUN®

K78XX-500R2 Series

WIDE INPUT NON-ISOLATED & REGULATED SINGLE OUTPUT

Patent Protection **RoHS** CE

FEATURES

- Efficiency up to 96%
- Operating temperature range: -40°C ~ +85°C
- Low ripple and noise
- Supporting negative output perfectly
- Short circuit protection, thermal shutdown
- Sip package, meet UL94-V0
- Pin-out compatible with LM78XX linears
- EN60950 approved

PART NUMBER SYSTEM

K78XX-500R2

- Output Current
- Output Voltage
- Product Series

APPLICATIONS

K78XX-500R2 series high efficiency switching regulators are ideally suited to replace 78xx linear regulators and are pin compatible. They are widely used in industrial control, instrumentation, and electric power applications.

SELECTION GUIDE

Part Number	Input Voltage(VDC)		Ouput Voltage (VDC)	Ouput Current (mA)	Efficiency (%,max)		Approval
	Nominal	Nominal			Vin(Min)	Vin (Max)	
K7801-500R2	12	4.75-28	1.5	500	77	66	CE
	12	*4.75-25	-1.5	-400	66	64	
K78X2-500R2	12	4.75-28	1.8	500	81	69	
	12	*4.75-25	-1.8	-400	70	68	
K7802-500R2	12	4.75-28	2.5	500	87	76	
	12	*4.75-25	-2.5	-400	73	73	
K7803-500R2	24	4.75-28	3.3	500	91	81	
	12	*4.75-25	-3.3	-400	74	78	
K7805-500R2	24	6.5-32	5.0	500	94	86	
	12	6.5-27	-5.0	-400	78	83	
K78X6-500R2	24	8-32	6.5	500	94	87	
	12	6.5-25	-6.5	-300	82	84	
K7809-500R2	24	11-32	9.0	500	95	91	
	12	7.0-23	-9.0	-200	85	86	
K7812-500R2	24	15-32	12	500	95	92	
	12	7-20	-12	-200	83	87	
K7815-500R2	24	18-32	15	500	96	93	
	12	7-17	-15	-200	81	87	

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
No-load Input Power	Input Voltage Range	--	0.12	0.256	W
Reverse Polarity Input		Forbidden			
Input Filter		Capacitance Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage accuracy	100% load，input voltage range	--	±2	±3	%
Line Regulation	Input voltage range	--	±0.2	±0.4	

Load Regulation	From 10% to 100% full load		--	±0.4	±0.6	
Switching Frequency	100% load, input Voltage Range		280	330	450	KHz
Temperature Drift	-40℃～+85℃		--	--	±0.02	%/°C
Ripple & Noise*	20MHz bandwidth (refer to figure 6)	Positive output	--	20	30	mVp-p
		Negative output	--	20	35	
Over Temperature Protection	IC inside		--	--	150	℃
Short circuit protection			Continuous, automatic recovery			
Max. Capacitive Load	Positive output		--	--	1000	μF
	Negative output		--	--	680	
Dynamic Load Stability	Nominal input, 25%load step change		--	55	250	mV
Dynamic Load Recovery Time			--	0.5	1	mS
Thermal Impedance			--	85	--	℃/W
Note:* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.						

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
MTBF	MIL-HDBK-217F@25℃	2000	--	--	K hours
Case material		Plastic(UL94-V0)			
Safety approvals		EN60950			
Dimensions		11.60*7.50*10.20			mm
Weight		--	2.0	--	g

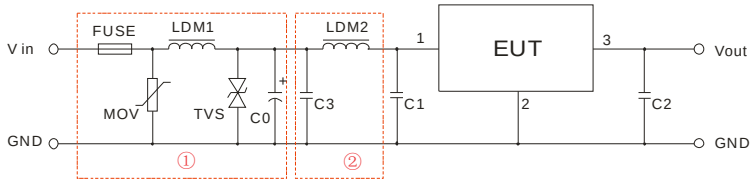
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 71℃, see figure 9)	-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 （Recommended Circuit Refer to Figure 1-②）	
	RE	CISPR22/EN55022 CLASS B （Recommended Circuit Refer to Figure 1-②）	
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 (Recommended Circuit Refer to Figure 1-①)	perf. Criteria B
		IEC/EN 61000-4-4 ±4KV	perf. Criteria B
	Surge	IEC/EN 61000-4-5 ±2KV (Recommended Circuit Refer to Figure 1-①)	perf. Criteria B
	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



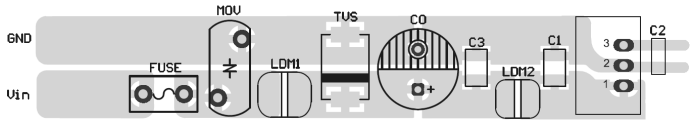
(Figure 1) EMC Recommended Circuit

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:

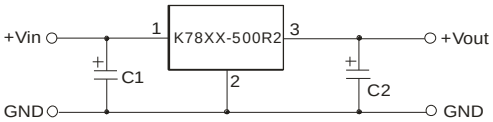
Components	Standard Parameter
FUSE	Choose according to practical input current
MOV	S10K35
LDM1	82μH
TVS	SMCJ36CA
C0	120μF/50V
C3	4.7μF/50V
LDM2	33μH

EMC RECOMMENDED CIRCUIT PCB LAYOUT

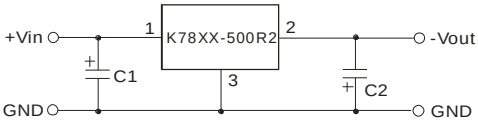


(Figure 2)

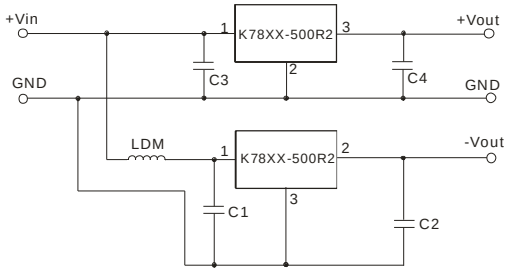
TYPICAL APPLICATION CIRCUIT



(Figure 3) Positive output application circuit



(Figure 4) Negative output application circuit



(Figure 5) Positive and Negative output parallelling application circuit

EXTERNAL CAPACITOR TABLE

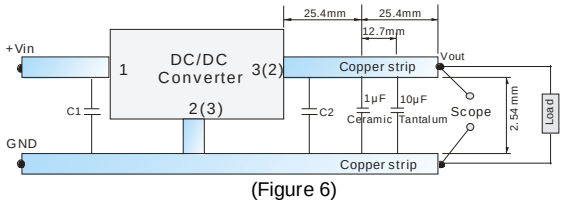
Part Number	C1,C3 (Ceramic Capacitor)	C2,C4 (Ceramic Capacitor)
K7801-500R2	10μF/50V	10μF/6.3V
K78X2-500R2		10μF/6.3V
K7802-500R2		10μF/6.3V
K7803-500R2		10μF/6.3V
K7805-500R2		10μF/10V
K78X6-500R2		10μF/16V
K7809-500R2		10μF/16V
K7812-500R2		10μF/25V
K7815-500R2		10μF/25V

Note:

1. When the products used as negative output and the input-voltage under (Vin-min+2V),C1 and C2 must be added in the circuit, and they should be placed as near as the products' footprints. Others apply to the application-environment .
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. When the products used as the circuit like figure 7,an inductor named as LDM up to 10μH is recommended in the circuit to reduce the mutual interference.
4. For the product of output voltage is below 3.3V or at 3.3V, if the input voltage of model's negative output is less than 4.85V, The output need to add a dummy load of not less than 5mA.
5. Cannot use in parallel for output and hot swap for input.

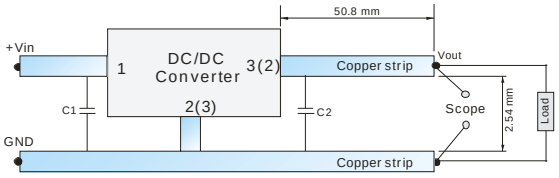
TEST CONFIGURATIONS (TA=25°C)

1.Efficiency and Output Voltage Ripple Test



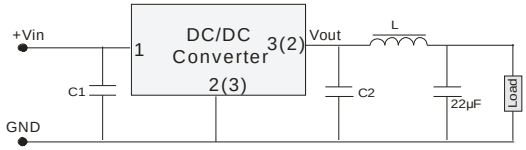
(Figure 6)

2.Start-up and Load Transient Response Test



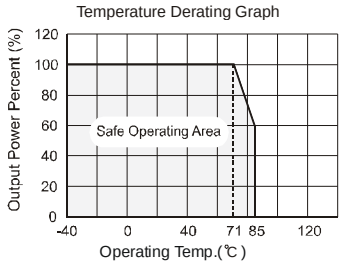
(Figure 7)

OUTPUT RIPPLE REDUCTION



To reduce output ripple, it is recommended to add a LC filter in output port.
L: Recommended parameter 10μH ~ 47μH.
(Figure 8)

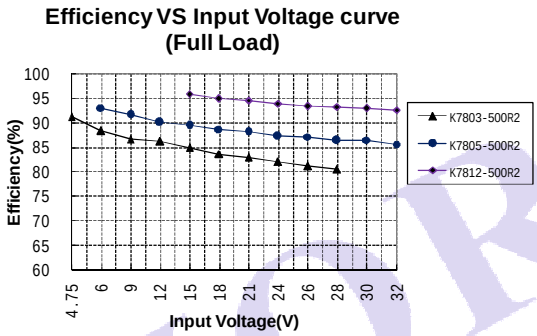
TYPICAL DERATING CURVE

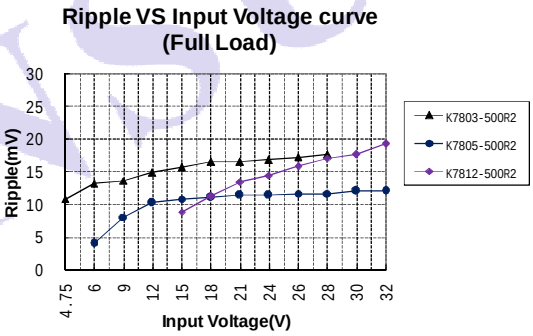


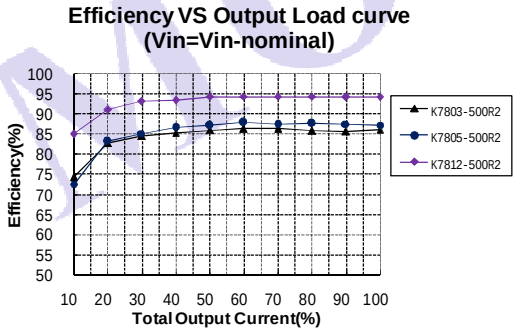
(Figure 9)

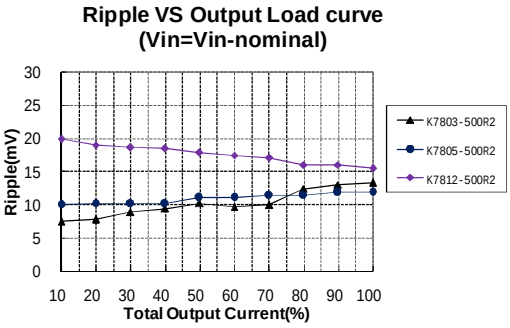
TYPICAL CHARACTER CURVE

Positive output character curve

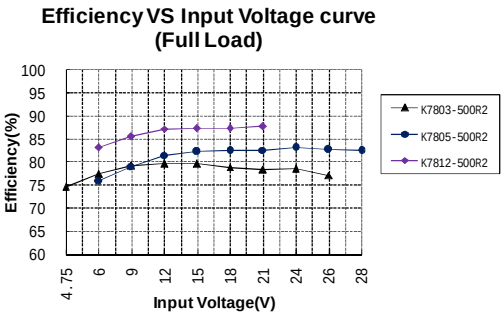


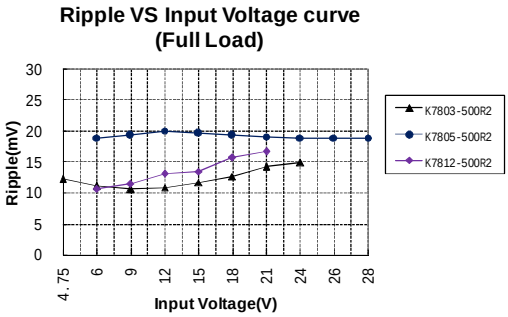




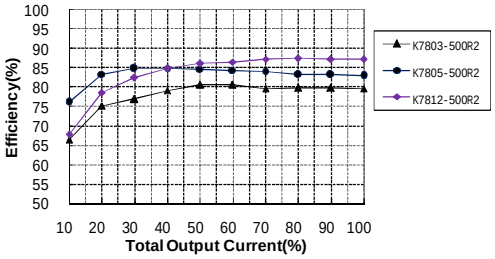


Negative output character curve

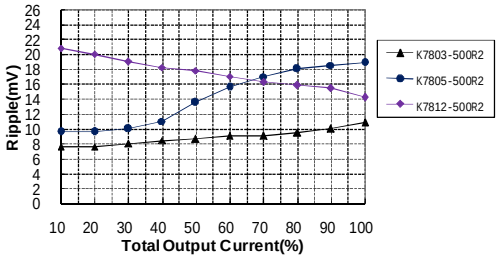




Efficiency VS Output Load curve (Vin=Vin-nominal)

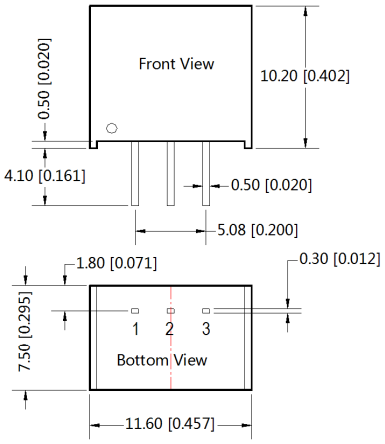


Ripple VS Output Load curve (Vin=Vin-nominal)



OUTLINE DIMENSION & FOOTPRINT DETAILS

MECHANICAL DIMENSIONS

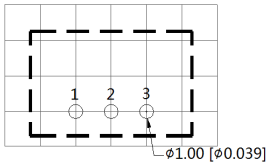


PIN CONNECTION		
Pin	Positive Output	Nagetive Output
1	Vin	Vin
2	GND	-Vo
3	+Vo	GND

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

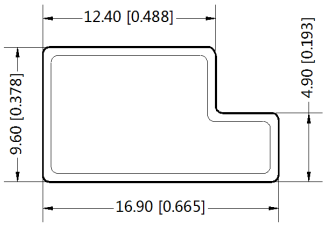
THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS



Note : Grid 2.54*2.54mm

TUBE PACKAGING DIMENSIONS



Note:
Unit :mm[inch]
General tolerances :±0.50[±0.020]
L=530[20.866] Tube Quantity:43 pcs
L=220[8.661] Tube Quantity:17pcs
Inner carton(S): L*W*H=255*170*80
Outer carton(S): L*W*H=375*280*270, 6 inner cartons(S)
Inner carton(L): L*W*H=580*200*100
Outer carton(L): L*W*H=600*215*220, 2 inner cartons(L)
Outer carton(L): L*W*H=600*215*325, 3 inner cartons(L)

Note:
1. Max. Capacitive Load is tested at input voltage range and full load.
2. All specifications are measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all test methods are based on our corporate standards.
4. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
5. Please contact our technical support for any specific requirement.
6. Specifications of this product are subject to changes without prior notice.

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