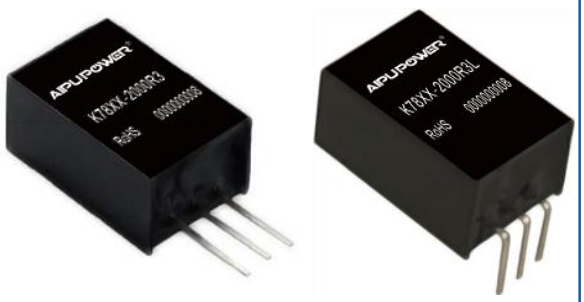
DC-DC Converter
K78XX-2000R3(L) Series

Typical Features

- ◆ Wide input voltage range, non-isolated regulated single output
- ◆ Efficiency up to 96% (Typ.)
- ◆ Low no-load power consumption, available for negative output.
- ◆ High power density, Mini size SIP package.
- ◆ Over-temperature protection, short circuit protection.
- ◆ Operating temperature from -40°C to +95°C.
- ◆ Plastic case, flame class UL94-V0



Application Field

This series of products can be widely used in the fields of Instrument, communication, pure digital circuits, general low-frequency analog circuit, relay drive circuits, data exchange circuits and other fields.

Typical product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current (Vo/Io)		Max. Capacitive Load	Efficiency (%) @Full load,	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	(μF)	Vin (Min.)	Vin (MAX)
-	K783V3-2000R3(L)	24	6-32	3.3	2000	1800	88	84
		12	8-27	-3.3	-1000	1000	85	82
	K7805-2000R3(L)	24	8-32	5	2000	1000	91	88
		12	8-27	-5	-1000	680	86	84
	K7812-2000R3(L)	24	15-32	12	2000	1000	95	91
		12	8-20	-12	-600	220	87	85
	K7815-2000R3(L)	24	18-32	15	2000	300	95	93
		12	8-18	-15	-600	100	87	86

Note 1: When input voltage exceeds 30VDC, connect an external 22uF/50V electrolytic capacitor to the input terminal to prevent module damage from voltage spikes.

Note 2: The Ripple & Noise is tested by the twisted pair method.

Note 3: Suffix "L" indicates bent pins.

Input Specifications

Parameter	Test Conditions	Min.	Typ.	Max	Unit
Input Surge Voltage		-	-	36	VDC
No-load Input Current	Nominal Input Voltage	-	0.2	1.5	mA
Input Reverse Polarity	N/A				
Input Filter	Capacitor Filter				
Hot Plug	N/A				

Output Specifications

Items	Test Condition		Min	Typ.	Max	Unit
Output voltage accuracy	Full input voltage range, 0%-100% load	3.3V output	-	±1	±2	%
		Other voltage output				
Line voltage regulation	Full input voltage range, 100% load		-	±0.3	±0.5	%
Load regulation	10%-100% load		-			%
Transient response deviation	25% rated load step, nominal input voltage		-	50	300	mV
Transient recovery time			-	0.2	1	ms
Temperature drift coefficient			-	-	±0.03	%/°C
Ripple & Noise	0%-100% load, 20MHz bandwidth	Positive Output +Vo	-	40	75	mVp-p
		Negative Output -Vo	-	75	150	mVp-p
Over current protection	input voltage range	%Io	-	-	300	%Io
Short circuit protection	Continuous, self-recovery					
Note: Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.						

General Specifications

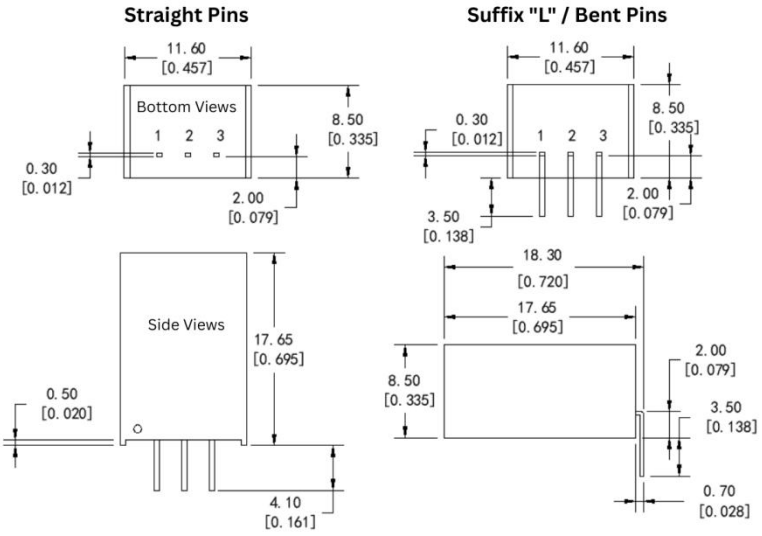
Items	Test Condition	Min	Typ.	Max	Unit
Switching frequency	Nominal input voltage, full load	-	410	-	KHz
Operating temperature	Refer to the Temperature Derating Curve(Figure 1)	-40	-	+85	°C
Storage temperature	/	-55	-	+125	
Case temperature	Within the operating derating range	-	-	110	
Pin soldering temperature	1.5mm from the case, soldering time 10S	-	-	300	
Relative humidity	No condensing	5	-	95	%RH
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z				
MTBF	MIL-HDBK-217F@25℃	3500	-	-	K hours
Case material	Plastic in black, flame class UL94-V0				
Unit weight	3.8g(Typ.)				
Cooling method	Nature Air				
Packaging (Straight Pins / Non-bent)	Per Tube（220*12.5*26.5mm）	17PCS			
	Per Carton (542*110*155mm)	1904PCS(Total 112 tubes)			
Packaging (Bent Pins / L-Suffix)	Per Tube（220*14.4*20mm）	17PCS			
	Per Carton (542*110*155mm)	1666PCS(Total 98 tubes)			
Unit dimension	L × W × H	11.60×8.5×17.65mm		0.457×0.355×0.695inch	

EMC Performance

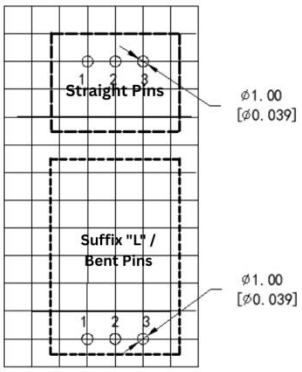
Category	Item	Test Standard	Performance Level
EMI	CE	CISPR32/EN55032	CLASS B (See recommended EMC circuit)
	RE	CISPR32/EN55032	CLASS B (See recommended EMC circuit)
EMS	ESD	IEC/EN61000-4-2	Contact±4kV perf.Criteria B
	RS	IEC/EN61000-4-3	10V/m perf. CriteriaA

	EFT	IEC/EN61000-4-4	±1kV perf. CriteriaB
	Surge Immunity	IEC/EN61000-4-5	±2kV line to line ±1kV perf. CriteriaB
	CS	IEC/EN61000-4-6	3 Vr.m.s perf. CriteriaA

Mechanical Dimensions



Package Dimensions



PCB Layout
Unit: mm[inch]
Grid: 2.54mm (0.1inch)
General tolerance: ±0.5mm[[±0.020inch]
Pin diameter tolerance:±0.10mm[±0.004}

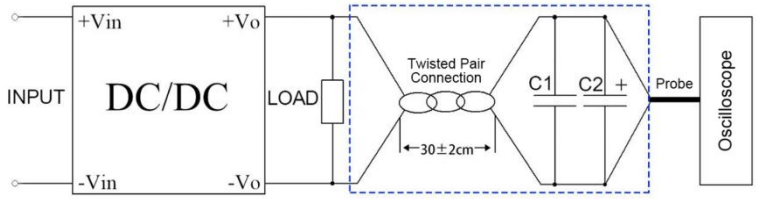
Recommended PCB Layout

Pin Function Description

Pin No.	1	2	3
Positive output	+Vin	GND	+Vo
Negative output	+Vin	-Vo	GND

Note: Please take the pin definition on the product label as the right one if it is different than the data sheet description.

Ripple & Noise Test Instruction (Twisted Pair Method, 20MHz bandwidth)



1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1μF) polypropylene capacitor and C2(10μF) high-frequency low-impedance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.
2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load. The test can start after the input power on.

Application Note:

1.Maximum capacitive load is tested under purely resistive full load conditions.
2. A minimum 10% load or a high-frequency low-ESR electrolytic capacitor (>=100uF) is recommended at the output; otherwise, output

voltage ripple and noise may increase.

3.We provide integrated power solutions and customized products. Due to space constraints, please contact our technical support for further inquiries.

Temperature Derating

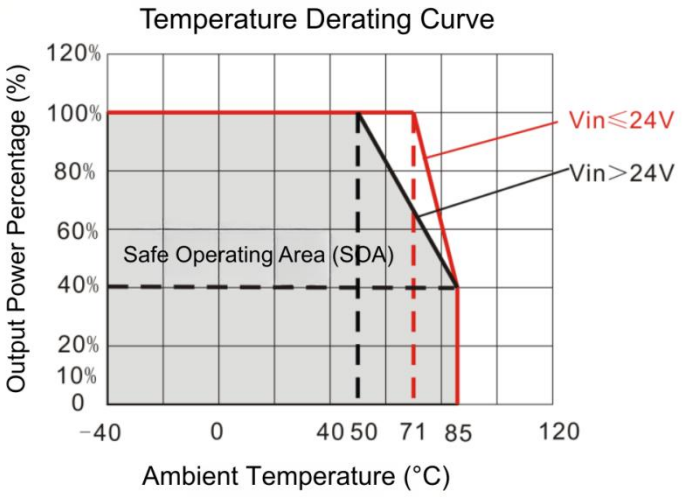


Figure 1

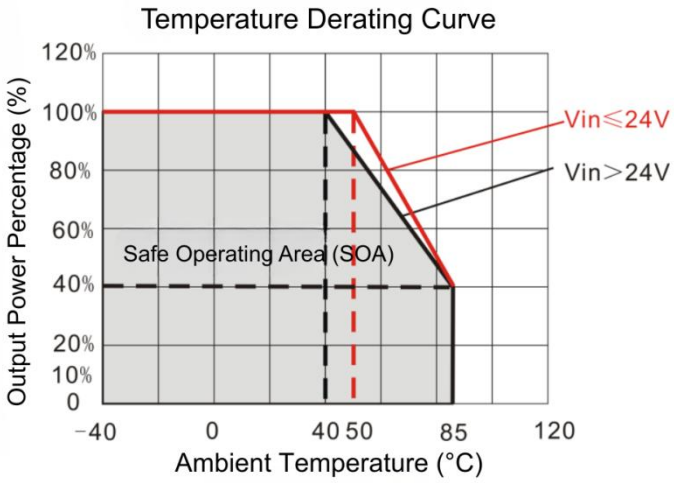


Figure 2

Recommended Circuits for Application

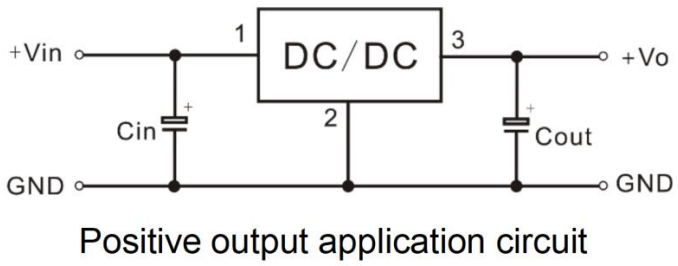
Output Load Requirements

a. To ensure efficient and reliable operation, it is recommended that the minimum load is not less than 10% of the rated load. If the required power is low, please connect a resistor in parallel at the output end equivalent to 10% of the rated load.

b. The maximum capacitive load is measured under nominal full load conditions. Do not exceed the maximum capacitive load during use; otherwise, it may cause start-up difficulties and damage the product.

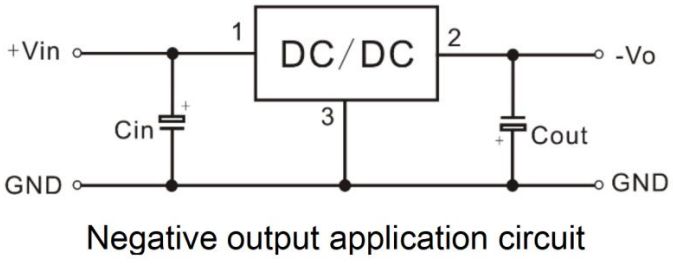
Recommended circuit

To ensure effective reduction of input/output ripple and noise, a capacitor filter network can be connected to the input and output terminals. The application circuits are shown in Figure 1, Figure 2 (negative output), and Figure 3 (parallel positive and negative outputs). The recommended value for LDM is 10μH. Appropriate filter capacitors must be selected; excessive capacitance may affect product startup. To ensure each output operates under safe and reliable conditions, recommended capacitive load values are detailed in Table 1. (C1 and C2 capacitance values refer to the External Capacitor Table, which can be appropriately increased as needed. Low-ESR tantalum or electrolytic capacitors can also be used.)



Positive output application circuit

Figure 1



Negative output application circuit

Figure 2

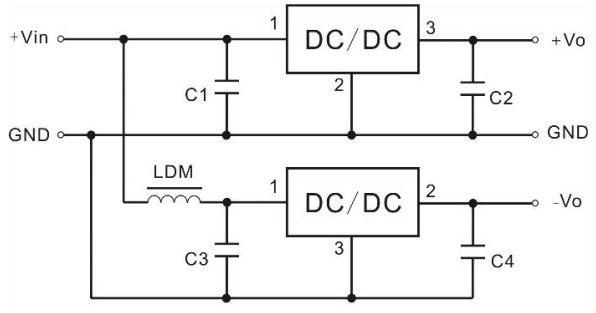
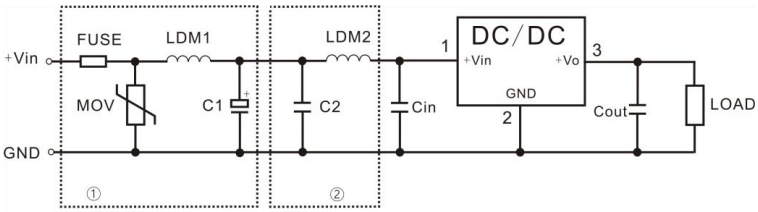


Figure 3 Application Circuit for Dual (Positive & Negative) Outputs in Parallel)

Product Model	C1/C3/Cin (Ceramic Capacitor)	C2/C4/Cout (Ceramic Capacitors)
K783V3-2000R3(L)	10μF/50V	22μF/10V
K7805-2000R3(L)		22μF/10V
K7812-2000R3(L)		22μF/25V
Recommended Capacitive Load Values (Table 1)		

1. Recommended EMC circuit diagrams

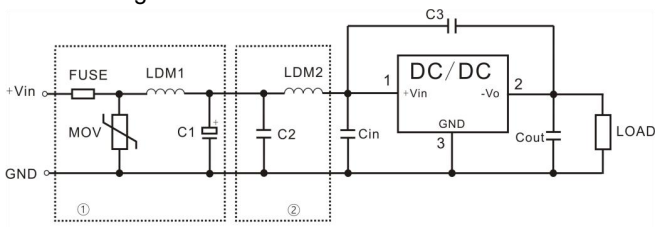
Positive output circuit diagram



Note: The part ① circuit is for EMC test, part ② for EMI filtering, both can be adjusted according to the actual situation

FUSE	Select by input current
MOV	20D470K
C1	680μF/50V
C2	4.7μF/50V
Cin/Cout	See Table 1
LDM1	82uH
LDM2	12uH

Negative output circuit diagram



Note: The part ① circuit is for EMC test, part ② for EMI filtering, both can be adjusted according to the actual situation

FUSE	Select by input current
MOV	20D470K
C1	680μF/50V
C2/C3	4.7μF/50V
Cin/Cout	See Table 1
LDM1	82uH
LDM2	12uH

Note:

1.This product cannot be used in parallel and does not support hot-swapping.

2.The product must be used within specified parameters; otherwise, permanent damage may occur.

3.Performance cannot be guaranteed if the product operates below the minimum required load.

4.If the product operates beyond its load range, compliance with all specifications cannot be guaranteed.

5.Unless otherwise specified, data are measured at Ta=25C, humidity < 75%, nominal input voltage, and rated resistive load.

6.All testing methods comply with our company standards.

7.The above specifications apply to standard models. For non-standard models, please contact our technical staff for details. Customized products are available upon request.

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