DC/DC Converter

K78xx-1000R3(L) Series

MORNSUN®

Wide input voltage Non-Isolated and Regulated Single Output

c UL us CE CB Patent Protection RoHS

FEATURES

- High efficiency up to 96%
- No-load input current as low as 0.1mA
- Operating ambient temperature range -40℃ to +85℃
- Support the negative output
- Output short-circuit protection
- Pin compatible with LM78xx series
- IEC60950, UL60950, EN60950 Approval

K78xx-1000R3(L) series are high efficiency switching regulators and ideal substitutes for LM78xx series three-terminal linear regulators. The converters feature high efficiency, low loss, short circuit protection, positive or negative output voltage, and there is no need for a heat sink. These product are widely used in applications such as industrial control, instrumentation and electric power.

Selection Guide

Certification	Part No.	Input Voltage (VDC)①	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Max. Capacitive Load (μF)
		Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
UL/CE/CB	K7803-1000R3(L)	24 (6-36)	3.3	1000	90/81	680
	K7805-1000R3(L)	24 (8-36)	5	1000	93/86	680
		12 (8-27)	-5	-500	86/82	330
	K7809-1000R3(L)	24 (13-36)	9	1000	95/90	680
	K7812-1000R3(L)	24 (16-36)	12	1000	96/93	680
		12 (8-20)	-12	-300	89/88	330
	K7815-1000R3(L)	24 (20-36)	15	1000	96/94	680
		12 (8-18)	-15	-300	89/89	330

Note:
①For input voltage exceeding 30 VDC, an input capacitor of 22uF/50V is required;
② L-suffix: Add L-suffix for horizontal mount with 90 degree angled pins (K78xx-1000R3L).

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current	Positive output	--	0.1	1	mA
Input Filter		Capacitance filter			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	K7803-1000R3(L)	--	±2	±4	%
		Others	--	±2	±3	
Linear Regulation	Full load, input voltage range		--	±0.2	±0.4	
Load Regulation	Nominal input,10% -100% load		--	±0.4	±0.6	
Ripple & Noise*	20MHz bandwidth, nominal input, 20% -100% load		--	20	75	mVp-p
Temperature Coefficient	Operating ambient temperature -40℃ to +85℃		--	--	±0.03	%/℃

Transient Response Deviation	Nominal input voltage, 25% load step change	--	50	300	mV
Transient Recovery Time		--	0.1	1	ms
Short-circuit Protection	Nominal input	Continuous, self-recovery			

*Note:1. The "parallel cable" method is used for Ripple and noise test, please refer to *DC-DC Converter Application Notes* for specific information;
2. With light loads at or below 20%, Ripple & Noise for 3.3/5V output parts increases to 100mVp-p max, and for 9V/12V/15V output parts to 2%Vo max.

General Specifications

Item	Operating Condition		Min.	Typ.	Max.	Unit
Operating Temperature*	Derating if the temperature ≥71℃ (see Fig. 1)		-40	--	85	℃
Storage Temperature			-55	--	125	
Pin Soldering Resistance Temperature	Soldering time: 10 seconds		--	--	260	
Storage Humidity	Non-condensing		5	--	95	%RH
Switching Frequency	100% load, input voltage range	K7803-1000R3(L)/K7805-1000R3(L)	420	520	620	KHz
		Other output	580	680	780	
MTBF	MIL-HDBK-217F@25℃		2000	--	--	K hours

Note: *The K7803-2000 (L) part requires an input voltage ≥5V for operation at -40℃.

Mechanical Specifications

Case Material		Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	K78xx-1000R3	11.50 x 9.00 x 17.50 mm
	K78xx-1000R3L	19.00 x 11.50 x 9.00 mm
Weight		3.8g (Typ.)
Cooling Method		Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 4-② for recommended circuit)	
Immunity	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 ±1KV (see Fig. 4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN 61000-4-5 line to line ±1KV(see Fig. 4-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN 61000-4-6 3Vr.m.s	perf. Criteria A

Typical Characteristic Curves

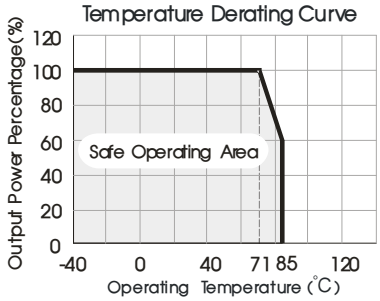
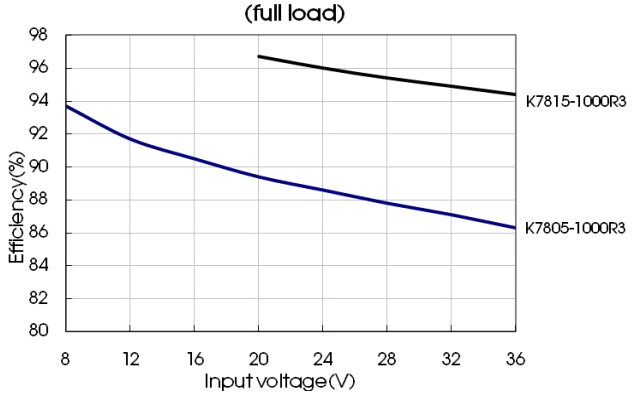
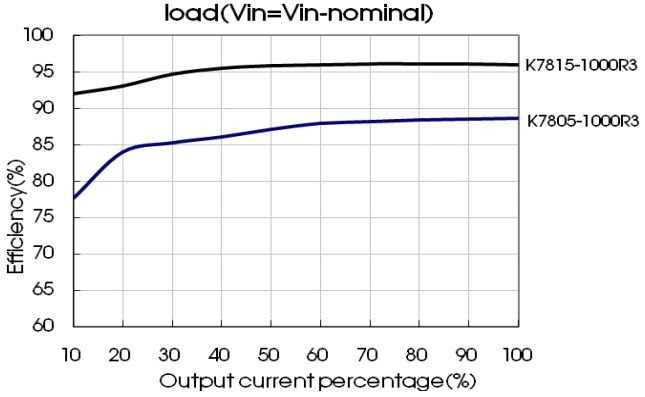


Fig. 1

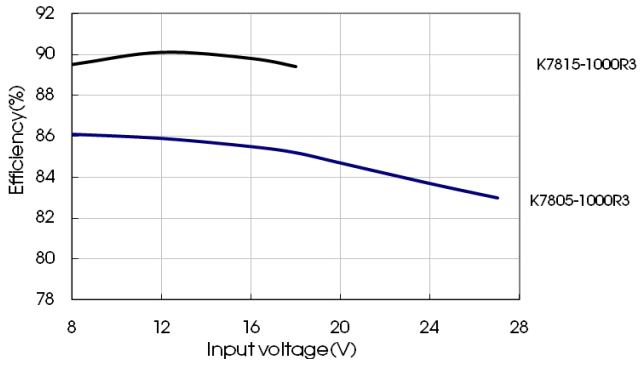
Positive output Efficiency Vs input voltage (full load)



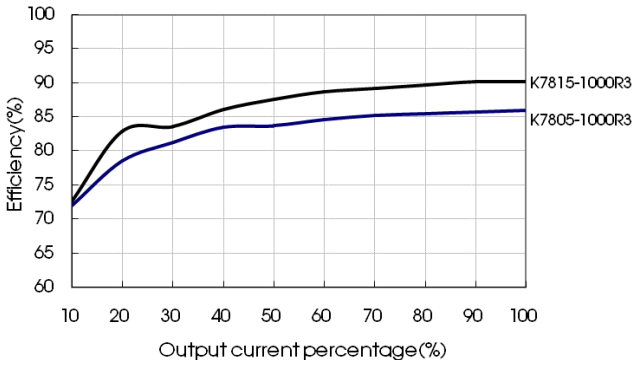
Positive output Efficiency Vs output load(Vin=Vin-nominal)



Negative output Efficiency Vs input voltage (full load)

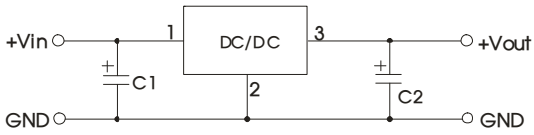


Negative output Efficiency Vs output load(Vin=Vin-nominal)

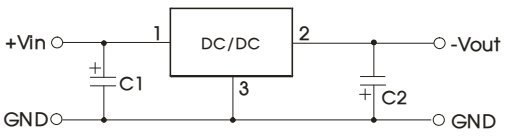


Design Reference

1. Typical application



Positive output application circuit



Negative output application circuit

Fig. 2 Typical application circuit

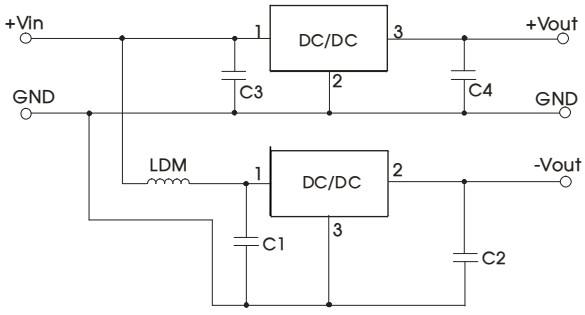


Fig. 3 Positive and Negative output application circuit

table 1

Part No.	C1/C3 (ceramic capacitor)	C2/C4 (ceramic capacitor)
K7803-1000R3(L)	10μF/50V	22μF/10V
K7805-1000R3(L)		22μF/10V
K7809-1000R3(L)		22μF/16V
K7812-1000R3(L)		22μF/25V
K7815-1000R3(L)		22μF/25V

Note:
1. The required capacitors C1 and C2 (C3 and C4) must be connected as close as possible to the terminals of the module;
2. Refer to Table 1 for C1 and C2 (C3 and C4) capacitor values. For certain applications, increased values for C2 and C4 and/or tantalum or low ESR electrolytic capacitors may also be used instead;
3. When using configurations as shown in figure 3, we recommended to add an inductor (LDM) with a value of up to 10μH which helps reducing mutual interference;
4. Converter cannot be used for hot swap and with output in parallel.

2. EMC compliance circuit

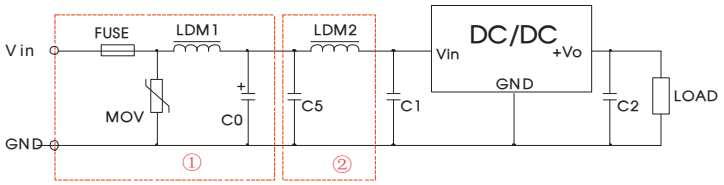


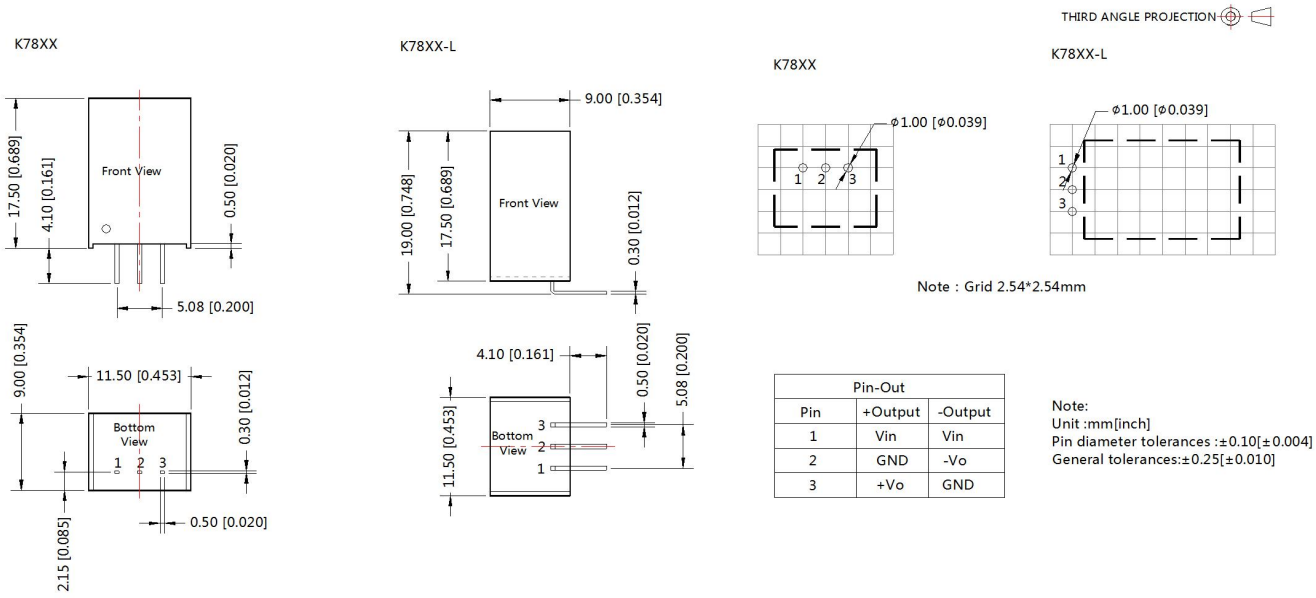
Fig. 4 EMC recommended circuit

FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Select fuse value according to actual input current	S20K30	82μH	680μF /50V	Refer to table 1	4.7μF /50V	12μH

Note: Part ① in Fig. 4 shows EMS compliance filter and part ② filter for EMI compliance; depending on requirement both filters ① and ② can be used in series as shown.

3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Pin-Out		
Pin	+Output	-Output
1	Vin	Vin
2	GND	-Vo
3	+Vo	GND

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

Notes:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210021 (K78xx-1000R3), 58210027 (K78xx-1000R3L);
2. The max. capacitive load should be tested within the input voltage range and under full load conditions;
3. Unless otherwise specified, data in this datatable should be tested under the conditions of Ta=25°C, humidity<75% when inputting nominal voltage and outputting rated load;
4. All index testing methods in this datatable are based on our Company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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