DC/DC Converter

K78xxM-1000R3 Series

MORNSUN®

Wide input voltage non-isolated and regulated single output

CE RoHS

FEATURES

- High efficiency up to 96%
- No-load input current as low as 0.3mA
- Operating ambient temperature range: -40℃ to +85℃
- Support the negative output
- Output short-circuit protection
- Pin-out compatible with LM78XX linear regulators
- EN62368 approved

K78xxM-1000R3 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 products are widely used in applications such as industrial control, instrumentation and electric power.

Selection Guide

Certification	Part No.	Input Voltage (VDC)*	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Capacitive Load (μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
CE	K7803M-1000R3	24 (6-36)	3.3	1000	90/80	680
	K7805M-1000R3	24 (8-36)	5	1000	93/85	680
		12 (8-27)	-5	-500	85/81	330
	K78X6M-1000R3	24 (10-36)	6.5	1000	93/85	680
	K7809M-1000R3	24 (13-36)	9	1000	94/89	680
	K7812M-1000R3	24 (16-36)	12	1000	95/92	680
		12 (8-20)	-12	-300	88/87	330
	K7815M-1000R3	24 (20-36)	15	1000	96/93	680
		12 (8-18)	-15	-300	87/88	330

Note: * For input voltages exceeding 30 VDC, an input capacitor of 22μF/50V is required.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current	Positive output	--	0.3	1	mA
	Negative output	--	1	4	
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		Capacitance filter			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	K7803M-1000R3	--	±2	±4	%
		Others	--	±1.5	±3	
Linear Regulation	Full load, input voltage range		--	±0.2	±0.4	
Load Regulation	Nominal input voltage, 10% -100% load	Positive output	--	±0.4	±0.6	
		Negative output	--	±0.4	±0.8	

Ripple & Noise*	20MHz bandwidth, nominal input voltage, 20% -100% load	--	25	75	mVp-p
Temperature Coefficient	100% load	--	--	±0.03	%/℃
Transient Response Deviation	Nominal input voltage, 25% load step change	--	±60	±200	mV
Transient Recovery Time		--	--	1	ms
Short-circuit Protection	Nominal input voltage	Continuous, self-recovery			

Notes : *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%, the maximum Ripple and Noise for 3.3/5V output parts increase to 100mVp-p and for 6.5/9/12/15V output parts increase to 2%Vo.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature*	See Fig.1	-40	--	85	℃
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	260	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input	--	520	--	KHz
MTBF	MIL-HDBK-217F@25℃	2000	--	--	K hours

Note: * When Vin >30V, for positive output of 6.5V/9V/12V/15V, product start to derating from temperature ≥ 55℃ and derating to 40%Io if the temperature is 85℃.

Mechanical Specifications

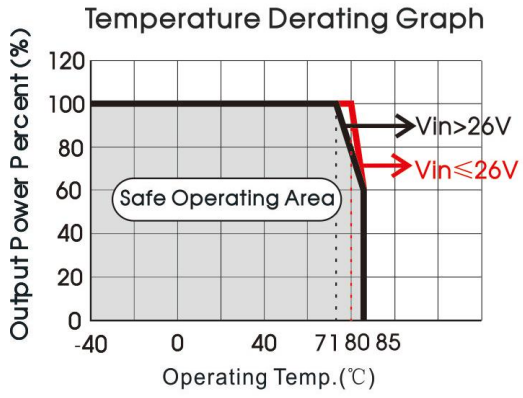
Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	11.60 x 8.00 x 10.40 mm
Weight	1.9g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

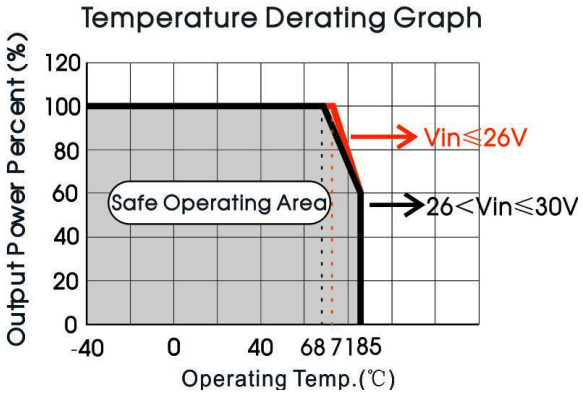
Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 4-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig. 4-② for recommended circuit)	
Immunity	ESD	IEC/EN 61000-4-2	Contact ±4KV	perf. Criteria B
	RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN 61000-4-4	±1KV (see Fig. 4-① for recommended 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

3.3V/5V output



6.5V/9V/12V/15V output



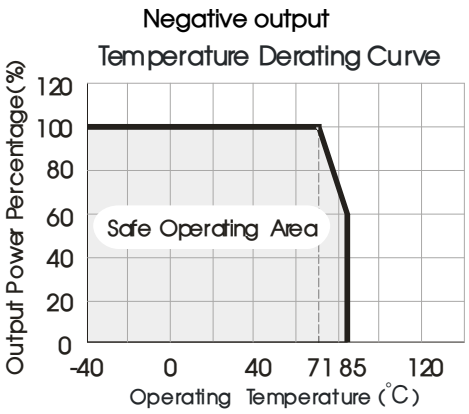
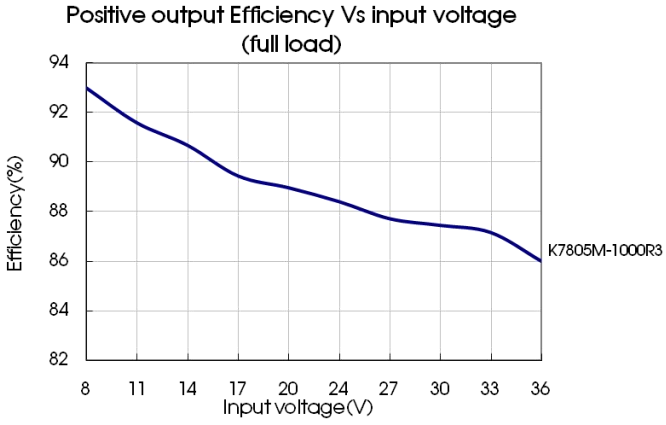
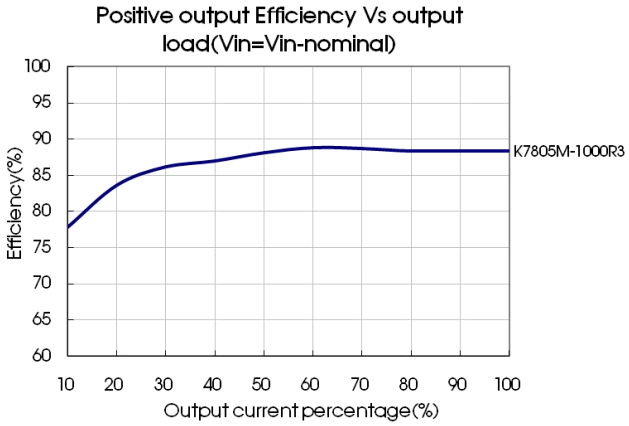


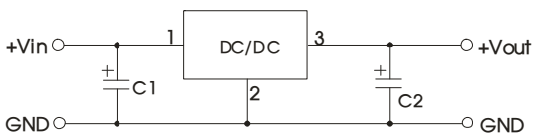
Fig. 1



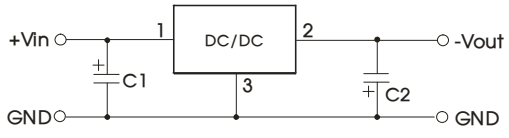


Design Reference

1. Typical application



Positive output application circuit



Negative output application circuit

Fig. 2 Typical application circuit

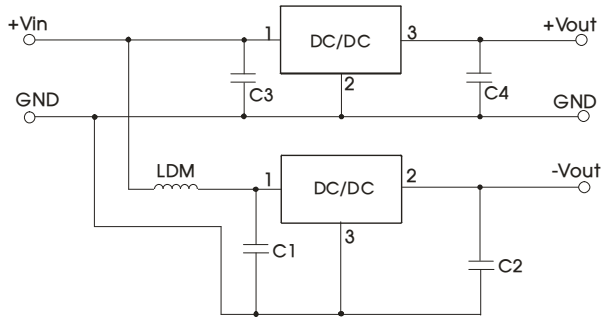


Fig. 3 Positive and Negative output application circuit

Table 1

Part No.	C1/C3 (ceramic capacitor)	C2/C4 (ceramic capacitor)
K7803M-1000R3	10μF/50V	22μF/10V
K7805M-1000R3		22μF/10V
K78X6M-1000R3		22μF/16V
K7809M-1000R3		22μF/16V
K7812M-1000R3		22μF/25V
K7815M-1000R3		22μF/25V

Notes:
1. The required capacitors C1 and C2 (C3 and C4) must be connected close as possible to the terminals of the module.
2. Refer to Table 1 for C1 and C2 (C3 and C4) capacitor values.
3. For certain applications, increased values for C2 and C4 and/or tantalum or low ESR electrolytic capacitors may also be used instead .
4. 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.
5. Converter cannot be used for hot swap and with output in parallel.

2. EMC Compliance circuit

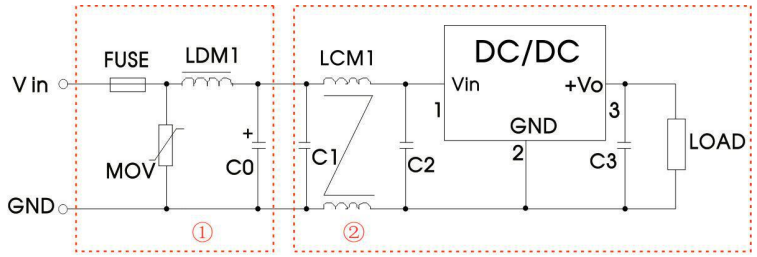
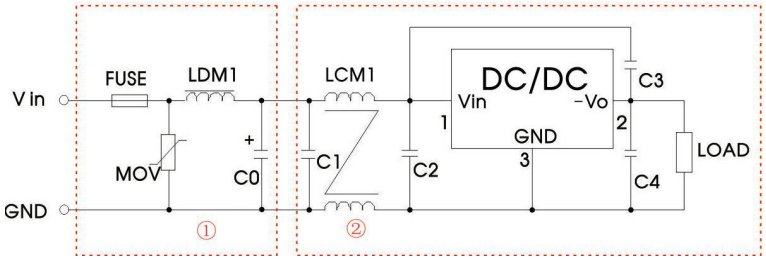
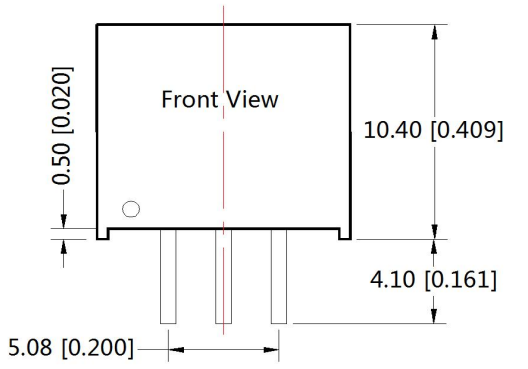
	EMC recommended compliance circuit	Parameter description
Positive Output		FUSE: Select fuse value according to actual input current MOV: S20K30 LDM1: 82μH C0: 680μF /50V LCM1: 4.7mH C1/C2: 4.7μF /50V C3: Refer to the Cout in table 1
Negative Output		FUSE: Select fuse value according to actual input current MOV: S20K30 LDM1: 82μH C0: 680μF /50V LCM1: 4.7mH C1/C3/C4: 4.7μF /50V C2: 10μF /50V

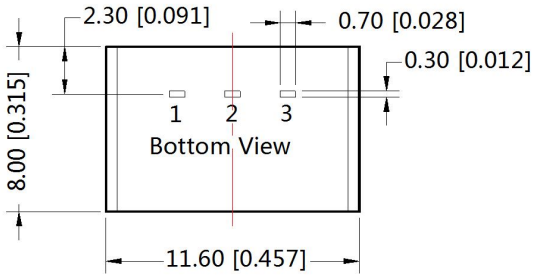
Fig. 4 Recommended compliance circuit

Notes: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

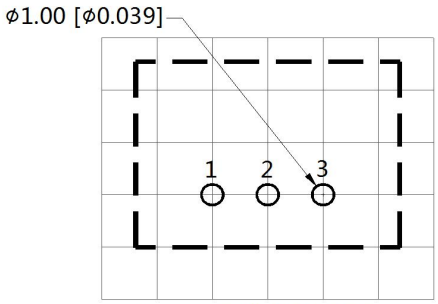
3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout





THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

Pin-Out		
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: ±0.50[±0.020]

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210074,
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datatable are based on our company 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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