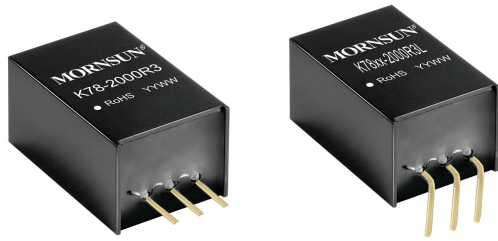


# DC/DC Converter

## K78xx-2000R3 Series

# MORNSUN®

Wide input voltage, non-isolated and regulated single output



**CE** Report **UKCA** Report **RoHS** Patent Protection  
EN 62368-1 BS EN 62368-1

K78xx-2000R3 series are high efficiency switching regulators and ideal substitutes of LM78xx series three-terminal linear regulators. The converters feature high efficiency, low loss, and there is no need for a heat sink. These products are widely used in applications such as industrial control, instrumentation and electric power.

## FEATURES

- High efficiency up to 96%
- No-load input current as low as 0.1mA
- Operating ambient temperature range: -40°C to +85°C
- Output short-circuit protection
- Pin compatible with LM78XX series linear regulators

## Selection Guide

Certification	Part Number	Input Voltage (VDC)*	Output		Full Load Efficiency(%) typ. Vin Min. / Vin Max.	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
--	K78X2-2000R3	24 (4.5-28)	1.8	2000	83/79	2000
EN/BS EN	K7802-2000R3	24 (4.5-36)	2.5	2000	89/83	2000
	K7803-2000R3(L)	24 (6-36)	3.3	2000	89/85	1800
	K7805-2000R3(L)	24 (8-36)	5	2000	92/89	1000
--	K78X6-2000R3(L)	24 (10-36)	6.5	2000	92/89	1000
EN/BS EN	K7809-2000R3	24 (13-36)	9	2000	95/92	680
	K7812-2000R3(L)	24 (16-36)	12	2000	96/94	470
	K7815-2000R3	24 (18-36)	15	2000	96/94	470

Note: For input voltage exceeding 30 VDC, an input electrolytic capacitor of 22μF/50V is required to prevent the module from being damaged by voltage spikes.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current	Nominal input voltage, 1.8V/2.5V output	--	0.2	0.5	mA
(Positive output )	Others	--	0.1	1	
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		Capacitance filter			

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## Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	1.8V/2.5V/3.3V output	--	±2	±4	%
		Other output	--	±2	±3	
Linear Regulation	Full load, input voltage range		--	±0.4	±0.8	
Load Regulation	10% -100% load step; nominal input voltage		--	±0.5	±1.5	
Ripple & Noise*	20MHz bandwidth, nominal input voltage, 100% load		--	30	75	mVp-p
Temperature Coefficient	Operating temperature -40℃ to +85℃		--	--	±0.03	%/℃
Transient Response Deviation	Nominal input, 25% load step (25%-50%-25%, 50%-75%-50% step)	1.8V, 2.5V output	--	±80	±150	mV
		Other output	--	±50	±150	
Transient Recovery Time			--	0.2	1	ms
Short-circuit Protection	Nominal input		Continuous, self-recovery			

Notes: \*1. The "parallel cable" method is used for ripple and noise test, please refer to Non-isolated DC-DC Converter Application Notes for specific information;  
\*2. Input voltage range, 20%-100% load ripple & noise is less than 100mVp-p, 0%-20% load ripple & noise is less than 180mVp-p.

## General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	See Fig. 1-①, Fig. 1-②	-40	--	85	℃
Storage Temperature		-55	--	125	
Pin Soldering Resistance Temperature	Soldering time: 10s (Max.)	--	--	260	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	Full load, nominal input	--	400	--	kHz
MTBF	MIL-HDBK-217F@25℃	2000	--	--	k hours

## Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	11.50 x 9.00 x 17.50 mm
Weight	3.8g (Typ.)
Cooling Method	Free air convection or forced convection

## Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)		
	RE	CISPR32/EN55032	CLASS B (see Fig. 3-② for recommended circuit)		
Immunity	ESD	IEC/EN 61000-4-2	Contact ±6kV	perf. Criteria B	
	RS	IEC/EN 61000-4-3	10V/m	perf. Criteria A	
	EFT	IEC/EN 61000-4-4	±1kV (see Fig. 3-① for recommended circuit)	perf. Criteria B	
	Surge	IEC/EN 61000-4-5	line to line ±1kV(see Fig. 3-① for recommended circuit)	perf. Criteria B	
	CS	IEC/EN 61000-4-6	3Vr.m.s	perf. Criteria A	

Typical Characteristic Curves

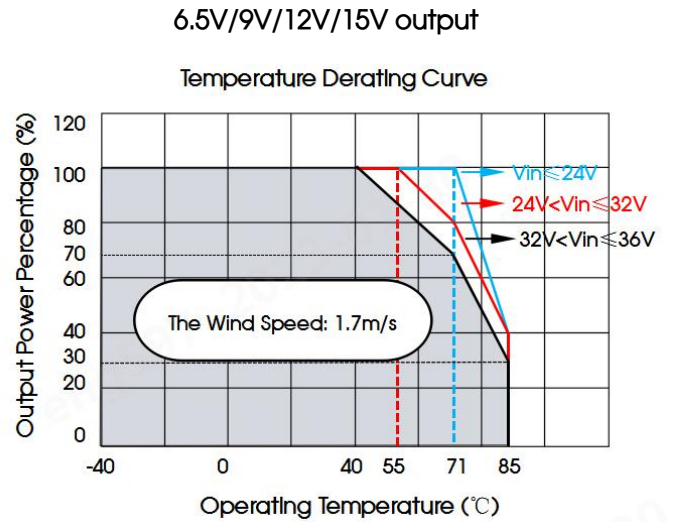
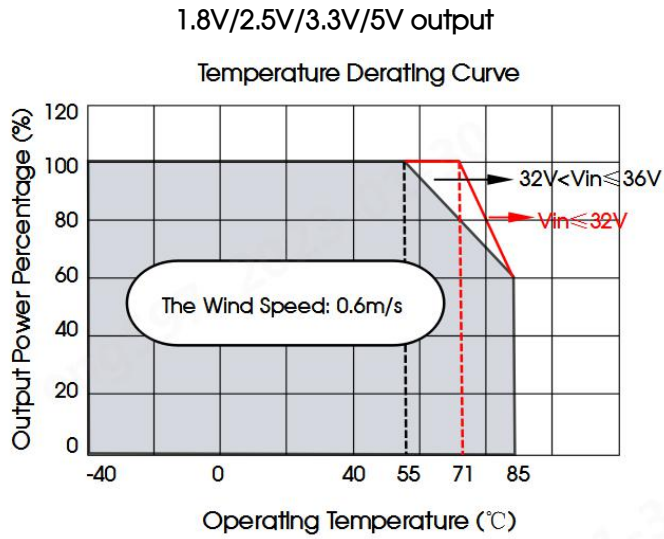


Fig. 1-① forced convection curve

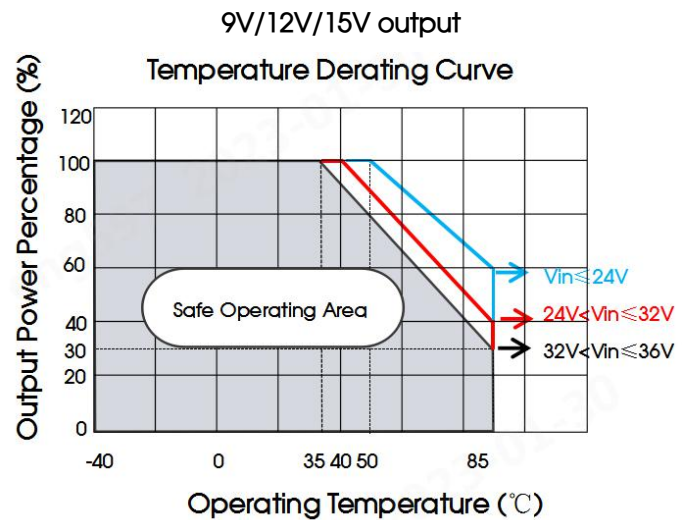
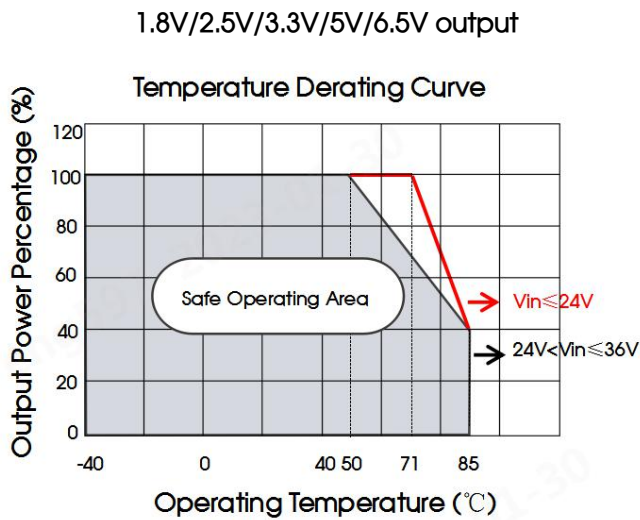
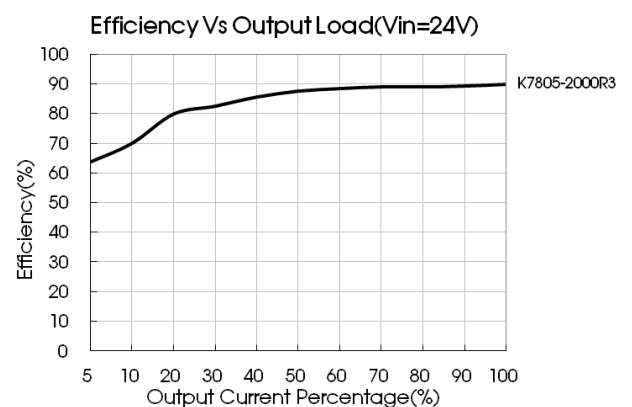
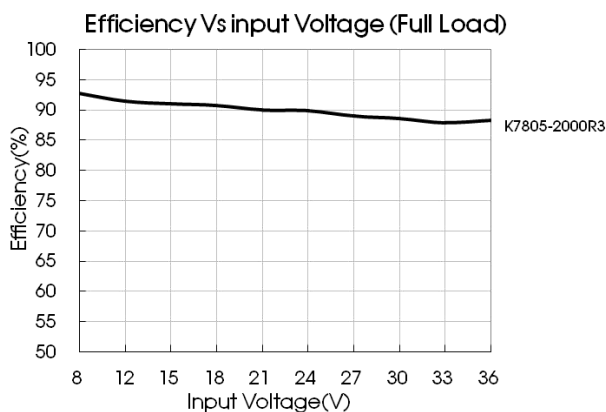
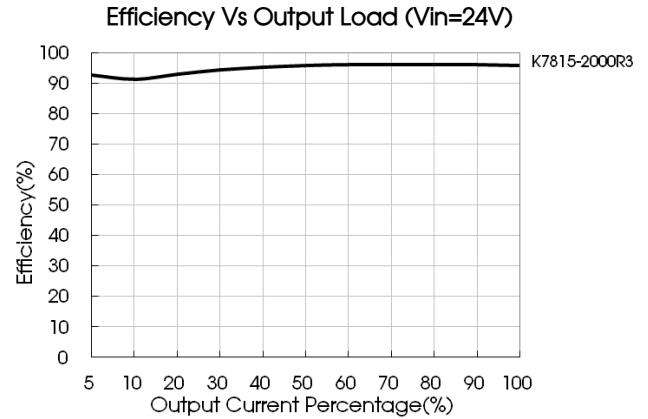
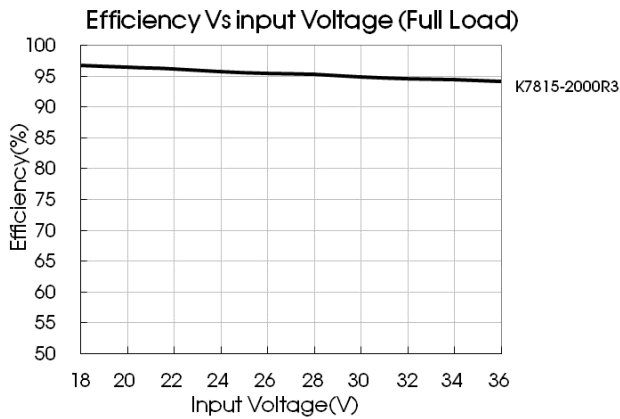


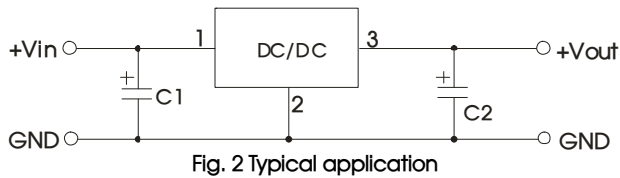
Fig. 1-② Free air convection curve





## Design Reference

### 1. Typical application



Sheet 1

Part No.	C1 (ceramic capacitor)	C2 (ceramic capacitor)
K78X2-2000R3	22μF/50V	22μF/10V
K7802-2000R3		22μF/10V
K7803-2000R3(L)		22μF/10V
K7805-2000R3(L)		22μF/10V
K78X6-2000R3(L)		22μF/10V
K7809-2000R3		22μF/16V
K7812-2000R3(L)		22μF/25V
K7815-2000R3		22μF/25V

Note:

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

### 2. EMC compliance circuit

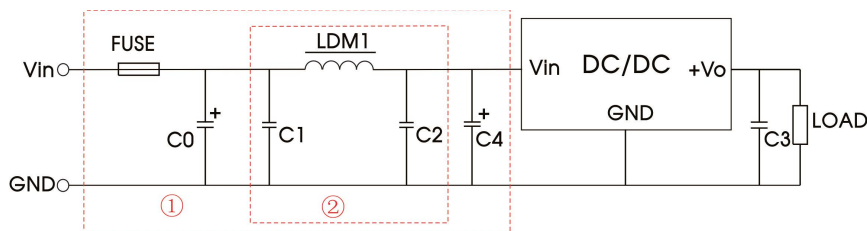


Fig. 3 EMC recommended circuit

FUSE	C0	LDM1	C4	C1/C2	C3
Selected based on the actual input current in application	100μF /100V	22μH	680μF /50V	10μF /50V	22μF /25V

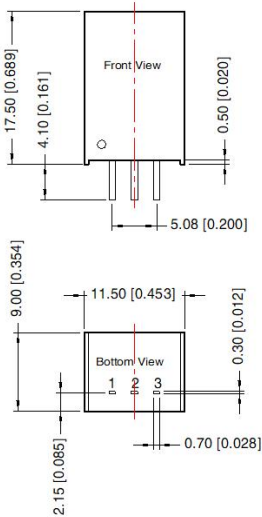
Note: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

### 3. For additional information please refer to DC-DC converter application notes on

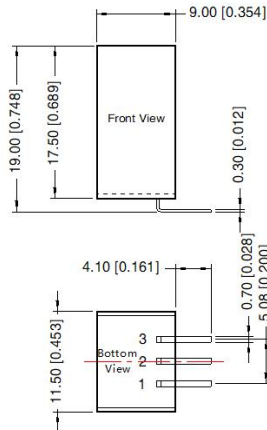
[www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout

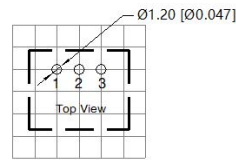
K78xx-2000R3



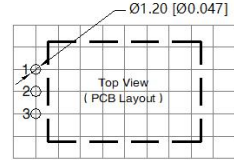
K78xx-2000R3L



K78xx-2000R3



K78xx-2000R3L



Note: Grid 2.54\*2.54mm

Pin-Out	
Pin	Mark
1	V <sub>in</sub>
2	GND
3	+V <sub>o</sub>

Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

Notes:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210021(Straight Legs Series), 58210027(Bend Legs Series);
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 T<sub>a</sub>=25°C, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet 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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