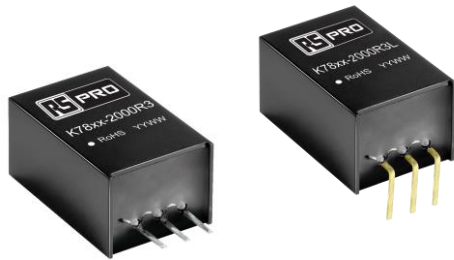


## Datasheet

# RS Pro K78xx-2000R3 DC-DC Converter

Wide input voltage non-isolated and regulated single output.



## 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
- EN62368 Approval
- 3 Year Warranty

*K78xx-2000R3 series switching regulators are drop in replacements for LM78xx series three-terminal linear regulators. The high efficiency of these converters allows operation at full load without the need for a heat sink. With low ripple and standby power consumption these regulated converters are widely used in instrumentation, IoT and battery powered applications.*

## Selection Guide

Certification	RS Stock no. (Standard Pack)	RS Stock no. (Tube Pack 44pcs)	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.		
CE	1934030	1934029	K7803-2000R3	24 (6-36)	3.3	2000	89/85	1800
	1934041	1934040	K7805-2000R3L	24 (8-36)	5	2000	92/89	1000
	1934032	1934031	K7805-2000R3	24 (8-36)	5	2000	92/89	1000
	1934043	1934042	K7805-2000R3L	24 (8-36)	5	2000	92/89	1000
	1934035	1934034	K7809-2000R3	24 (13-36)	9	2000	95/92	680
	1934037	1934036	K7812-2000R3	24 (16-36)	12	2000	96/94	470
	1934045	1934044	K7812-2000R3L	24 (16-36)	12	2000	96/94	470
	1934039	1934038	K7815-2000R3	24 (18-36)	15	2000	96/94	470

Note:

① For input voltage exceeding 30 VDC, an input electrolytic capacitor of 22uF/50V is required to prevent the module from being damaged by voltage spikes.

② L-suffix: Add L-suffix for horizontal mount with 90 degree angled pins (K78xx-2000R3L).

# DC/DC Converter

## K78xx-2000R3 Series

### Input Specifications

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

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	Full load, input voltage range	3.3V output	--	±2	±4	%
		Others	--	±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°C ~ +85°C	--	--	±0.03	%/°C	
Transient Response Deviation	Nominal input, 25% load step (25%-50%-25%, 50%-75%-50% step)	--	±50	±150	mV	
Transient Recovery Time		--	0.2	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 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	-40	--	85	°C
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°C	2000	--	--	K hours

### Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	11.50 × 9.00 × 17.50 mm
Weight	3.8g (Typ.)
Cooling Method	Free air convection

# DC/DC Converter

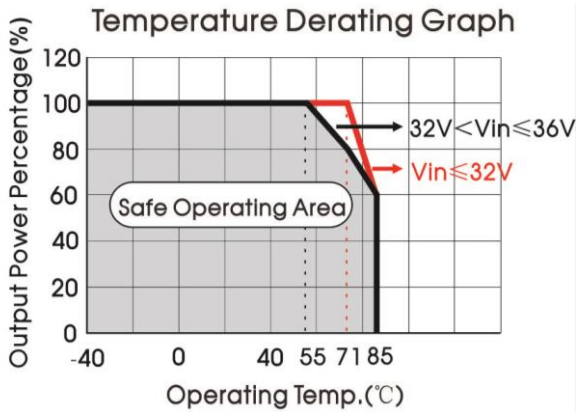
## K78xx-2000R3 Series

### 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	3V r.m.s	perf. Criteria A

### Typical Characteristic Curves

3.3V/5V output



9V/12V/15V output

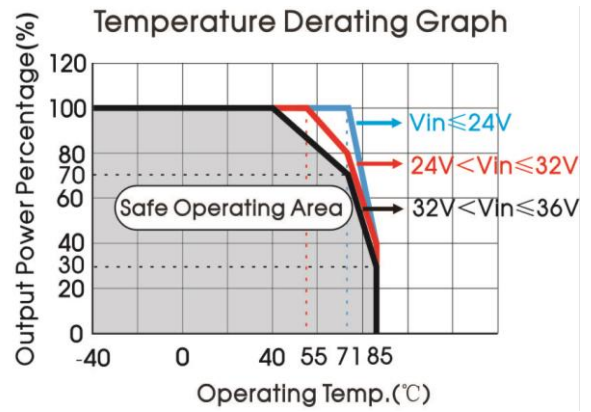
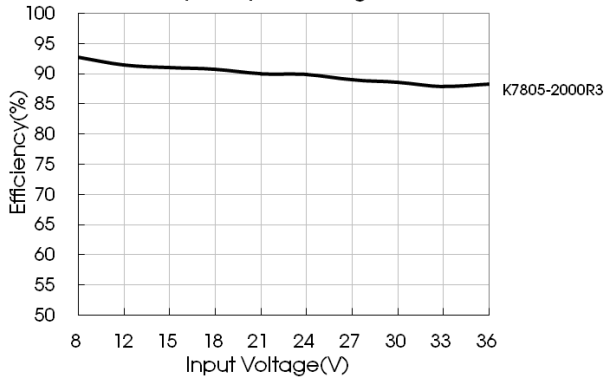
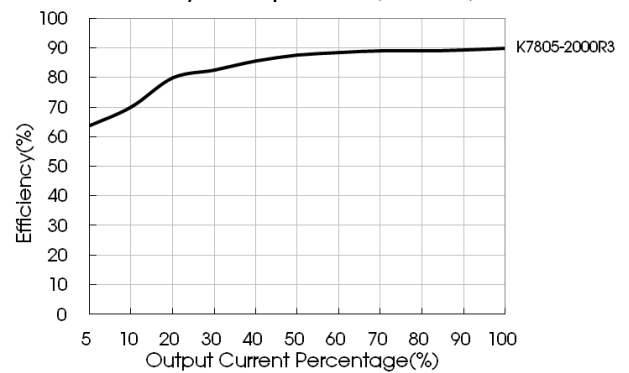


Fig. 1

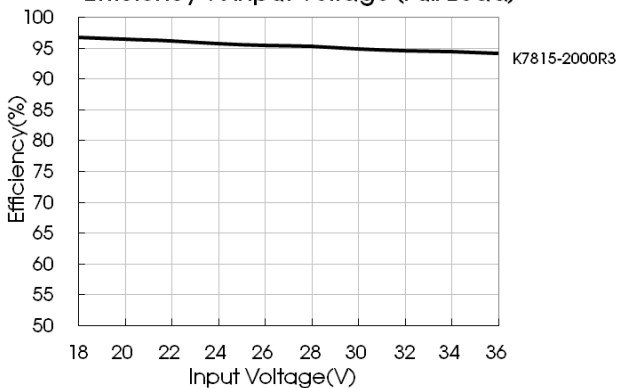
Efficiency Vs input Voltage (Full Load)



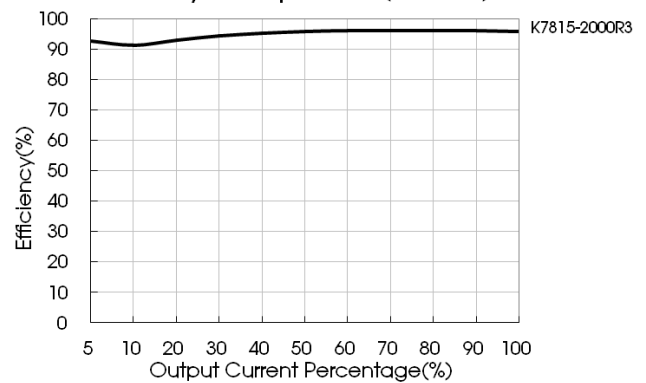
Efficiency Vs Output Load (Vin=24V)



Efficiency Vs input Voltage (Full Load)



Efficiency Vs Output Load (Vin=24V)



# DC/DC Converter

K78xx-2000R3 Series

## Design Reference

### 1. Typical application

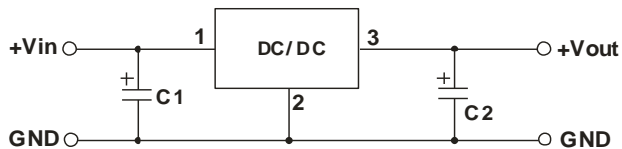


Fig. 2 Typical application

Sheet 1

Part No.	C1 (ceramic)	C2 (ceramic capacitor)
K7803-2000R3(L)		22 $\mu$ F/10V
K7805-2000R3(L)		22 $\mu$ F/10V
K7809-2000R3		22 $\mu$ F/16V
K7812-2000R3(L)		22 $\mu$ F/25V
K7815-2000R3		22 $\mu$ F/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

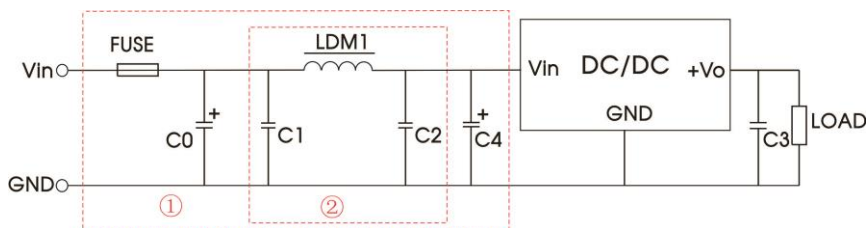


Fig. 3 EMC recommended circuit

FUSE	C0	LDM1	C4	C1/C2	C3
Selected based on the actual input current in application	100 $\mu$ F /100V	22 $\mu$ H	680 $\mu$ F /50V	10 $\mu$ F /50V	22 $\mu$ F /25V

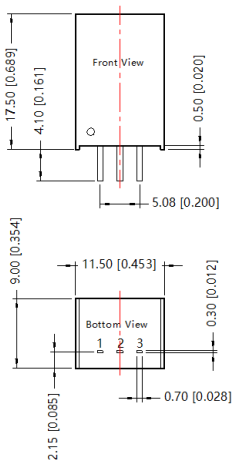
Note: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

# DC/DC Converter

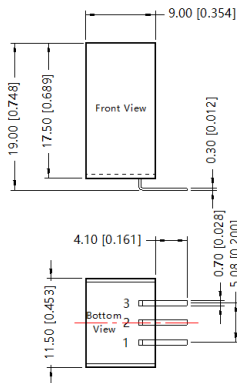
## K78xx-2000R3 Series

### Dimensions and Recommended Layout

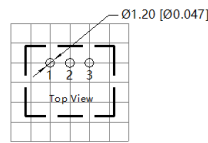
K78xx-2000R3



K78xx-2000R3L

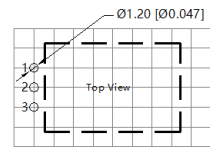


K78xx-2000R3



THIRD ANGLE PROJECTION

K78xx-2000R3L



Note : Grid 2.54\*2.54mm

Pin-Out	
Pin	Function
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. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations and shall be handled by qualified units.