Non Isolated Board Mount DC / DC Converters

multicomp PRO

Wide input voltage non-isolated and regulated single output

RoHS Compliant

Description

MP-K78Lxx-1000R3 series are high efficiency switching regulators and ideal substitutes of 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

c UL us CE CB Patent Protection

Features

- High efficiency up to 96%
- No-load input current as low as 0.1mA
- Operating ambient temperature range: -40°C to +85°C
- Negative output available
- Output short-circuit protection
- Pin-out compatible with LM78XX linear regulators
- IEC60950, UL60950, EN60950 approved

Selection Guide

Part Number	Input Voltage (VDC)*	Output		Full Load Efficiency (%) Vin Min. / Vin Max.	Capacitive Load (µF) Max.
	Nominal (Range)	Voltage (VDC)	Current (mA) Max.		
MP-K78L03-1000R3	24 (6-36)	3.3	1000	89/80	680
MP-K78L05-1000R3	24 (8-36)	5		93/86	
	12 (8-27)	-5	-500	86/82	330
MP-K78L12-1000R3	24 (16-36)	12	1000	95/92	680
	12 (8-20)	-12	-300	88/87	330
MP-K78L15-1000R3	24 (20-36)	15	1000	96/94	680
	12 (8-18)	-15	-300	89/89	330

Note: * 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.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
No-load Input Current	Positive output	--	0.1	1	mA
Reverse Polarity at Input		Avoid / Not protected			
Input Filter		PI filter			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Full load, input voltage range	MP-K78L03-1000R3	--	±2	±4	%
		Others	--		±3	
Linear Regulation	Full load, input voltage range		--	±0.2	±4	
Load Regulation	Nominal input,10% -100% load		--	±0.4	±0.6	
Ripple & Noise*	20MHz bandwidth, nominal input, 20% -100% load	1.5/1.8/2.5/3.3 VDC output, 20% -100% load	--	20	75	mVp-p
Temperature Coefficient	Operating temperature -40°C to +85°C		--	--	±0.03	%/°C
Transient Response Deviation	Nominal input, 25% load step change		--	50	300	mV
Transient Recovery Time			--	0.1	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 DC-DC Converter Application Notes for specific information;
2 With the load lower than 20%, the maximum ripple and noise of 3.3V/5V output products will be 100mVp-p, 12V/15V output products will be 2%Vo.

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Operating Temperature	Derating when operating temperature≥71°C (see Fig. 1)		-40	--	85	°C
Storage Temperature			-55	--	125	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	260	
Storage Humidity	Non-condensing		5	--	620	%RH
Switching Frequency	Full load, nominal input	MP-K78L03-1000R3/ MP-K78L05-1000R3	420	520	--	MHz
		Others	580	680	780	
MTBF	MIL-HDBK-217F@25°C		2000	--	--	K hours

Mechanical Specifications

Dimensions	11.5mm × 7.5mm × 17.5mm
Weight	1.5g (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

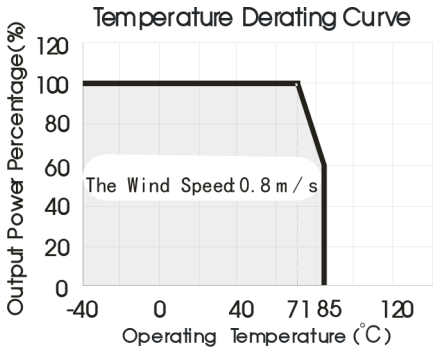
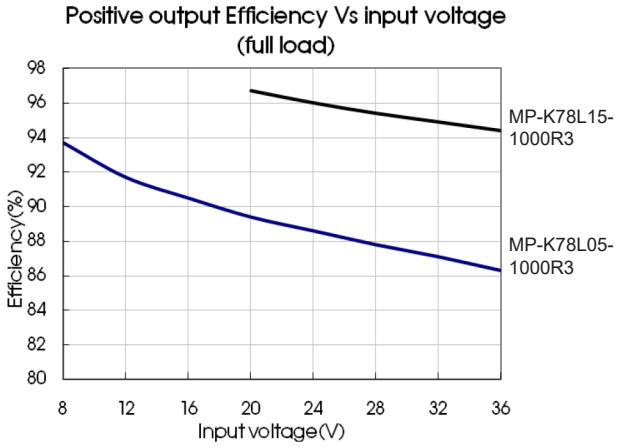
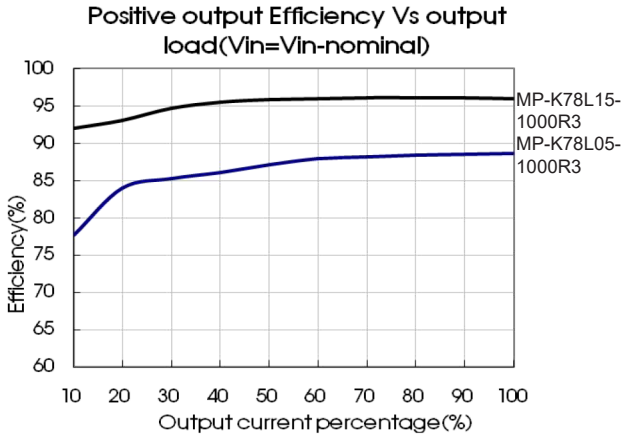
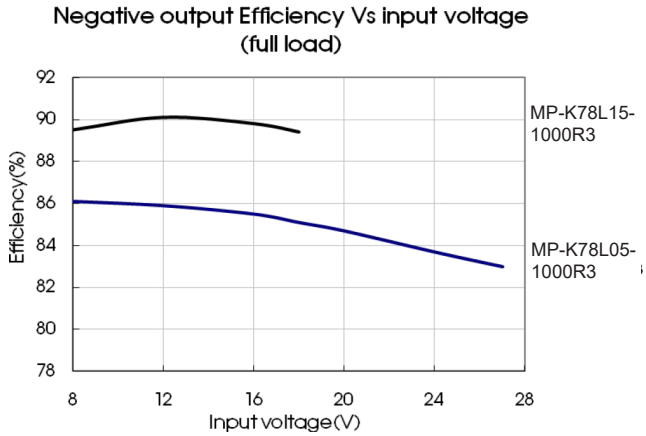
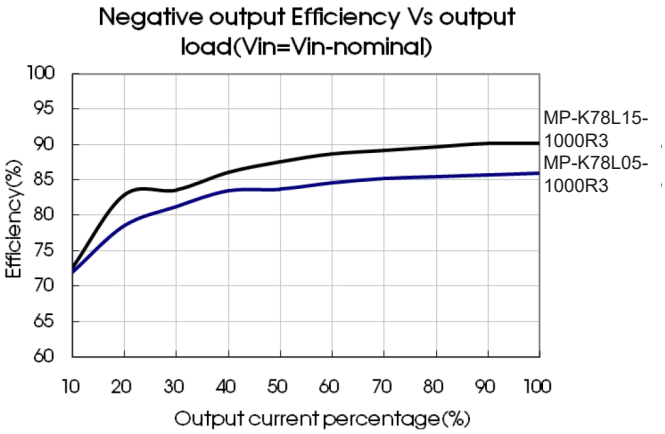


Fig. 1









Design Reference

1. Typical application

Fig. 2 Typical application circuit

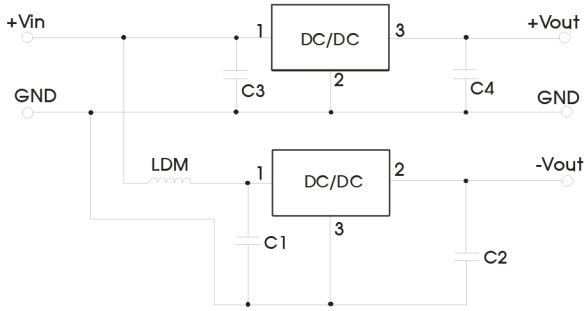


Fig. 3 Positive and negative output application circuit

Table 1

Part Number	C1/C3 (ceramic capacitor)	C2/C4 (ceramic capacitor)
MP-K78L03-1000R3	10µF/50V	22µF/10V
MP-K78L05-1000R3		
MP-K78L12-1000R3		22µF/25V
MP-K78L15-1000R3		

Note:

1. The required C1 and C2 (C3 and C4) capacitors 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;
3. For certain applications, increased values 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

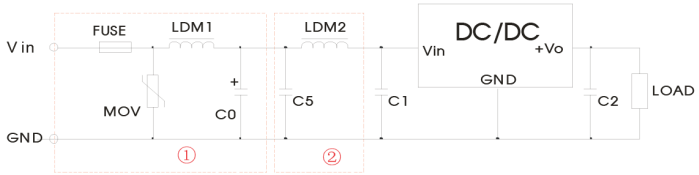
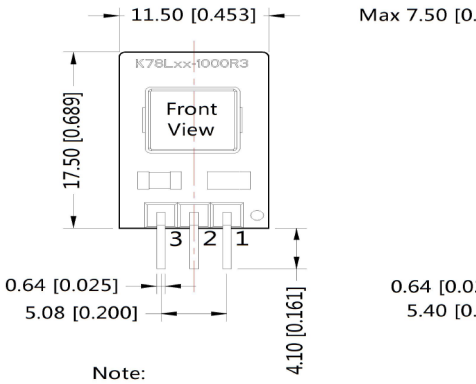


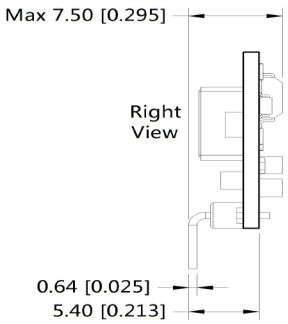
Fig.4 Recommended compliance circuit

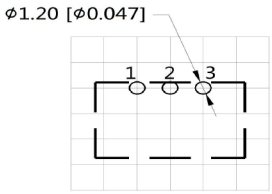
FUSE	MOV	LDM1	C0	C1/C2	C5	LDM2
Selected fuse value according to actual input current	S20K30	82μH	680μF /50V	Refer to table 1	4.7μF /50V	12μH

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION







Note : Grid 2.54*2.54mm

Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

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