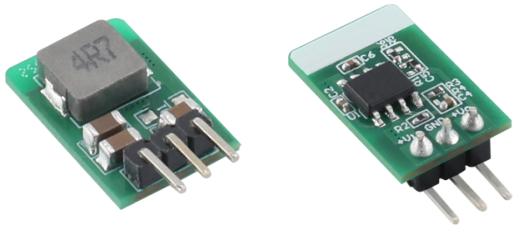
Typical Features

- ◆ Wide input voltage range, non-isolated regulated single output
- ◆ Efficiency up to 95% (Typ.)
- ◆ Low no load power consumption
- ◆ Mini size SIP package
- ◆ Short circuit protection, available for negative output
- ◆ Operating temperature from -40°C to +85°C
- ◆ Flame class UL94-V0



Application Field

This series of products can be widely used in the fields of instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.

Typical product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current (Vo/Io)		Max. Capacitive Load	Efficiency (%) @Full load	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	(uF)	Vin (Min.)	Vin (MAX.)
-	K78L3V3 -1000R3	24	6.5-34	3.3	1000	680	93	73
		12	4.5-28	-3.3	-500	330	87	72
-	K78L05 -1000R3	24	6.5-34	5	1000	680	95	83
		12	4.5-28	-5	-500	330	88	74

Note 1: When input voltage exceeds 30VDC, connect an external 22uF/50V electrolytic capacitor to the input terminal to prevent module damage from voltage spikes.

Note 2: The Ripple & Noise is tested by the twisted pair method.

Input Specifications

Items	Test Condition	Min	Typ.	Max	Unit
No load input current	Positive output	-	0.2	1.5	mA
	Negative output	-	1	4	
Input reversed	Not allowed				
Input filter	Capacitor Filter				
Hot-plug	Unavailable				

Output Specifications

Items	Test Condition		Min	Typ.	Max	Unit
Output voltage accuracy	Full input voltage range, 0%-100% load	3.3V output	-	±2	±4	%
		Others	-	±2	±3	%
Line voltage regulation	100% load		-	±0.2	±0.4	%

Load regulation	10%-100% load	Positive output	-	±0.4	±0.6	%
		Negative output	-	±0.4	±0.8	%
Transient response deviation	25% rated load step, nominal input voltage		-	50	300	mV
Transient recovery time			--	0.1	1	mS
Temperature drift coefficient			-	-	±0.03	%/°C
Ripple & Noise	0%-100% load, 20MHz bandwidth		-	40	75	mVp-p
Over current protection	Full input voltage range		-	-	300	%Io
Short circuit protection	Continuous, self-recovery					
Note: Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.						

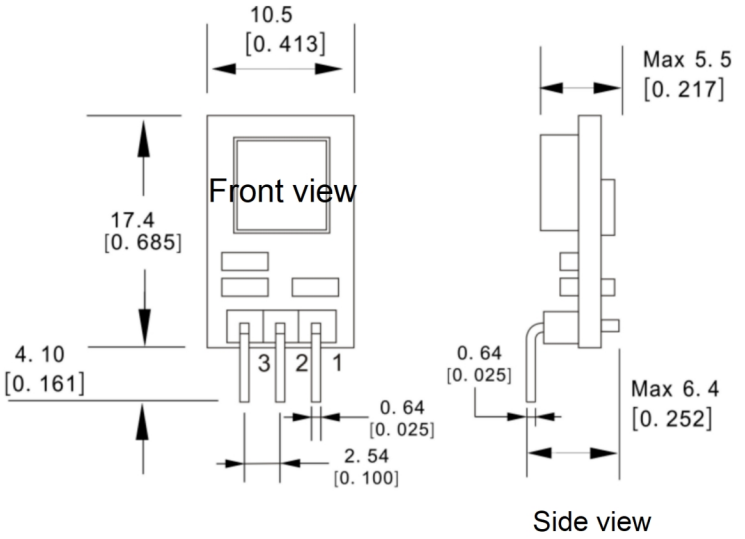
General Specifications

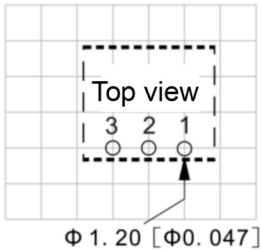
Items	Test Condition	Min	Typ.	Max	Unit
Switching frequency	Nominal input voltage, full load	-	800	-	KHz
Operating temperature	Refer to the Temperature Derating Graph(figure 1)	-40	-	+85	°C
Storage temperature	/	-55	-	+125	
Case temperature rise	Within the operating derating range	-	30°	-	
Pin soldering temperature	1.5mm from the case, soldering time 10S	-	-	300	
Relative humidity	No condensing	5	-	95	%RH
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z				
MTBF	MIL-HDBK-217F@25℃	3500	-	-	K hours
Case material	Flame class UL94-V0				
Unit weight	2.1g(Typ.)				
Cooling method	Nature Air				
Unit dimensions	L × W × H	10.5×6.4×17.4mm		0.413×0.252×0.685inch	

EMC Performance

Items			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
		RE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
	EMS	ESD	IEC/EN61000-4-2	Contact ±4kV perf.Criteria B
		RS	IEC/EN61000-4-3	10V/m perf. Criteria A
		EFT	IEC/EN61000-4-4	±1kV perf. Criteria B
		Surge	IEC/EN61000-4-5	±2kV line to line ±1kV perf. Criteria B
		CS	IEC/EN61000-4-6	3 Vr.m.s perf. Criteria A

Mechanical Dimensions





PCB layout vertical view
Grid 2.54×2.54[0.10×0.10]

Unit: mm [inch]

Terminal section tolerance: ±0.10[±0.004]

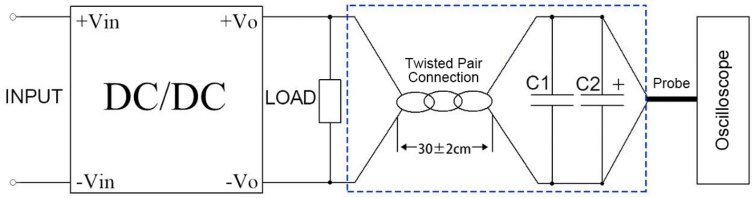
General tolerance: ±0.50[±0.020]

Pin Function Description

Pin No.	1	2	3
Positive output	+Vin	GND(Common)	+Vo
Negative output	+Vin	-Vo	GND(Common)

Note: Please take the pin definition on the product label as the right one if it is different than the data sheet description.

Ripple & Noise Test Instruction (Twisted Pair Method, 20MHz bandwidth)



1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1uF) polypropylene capacitor and C2(10uF) high-frequency low-impedance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.
2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load. The test can start after the input power on.
3. It is recommended to use a ≥10% load or a high-frequency low impedance electrolytic capacitor (≥100uF) load at the output to avoid the output ripple increasing.

Temperature Derating Graph

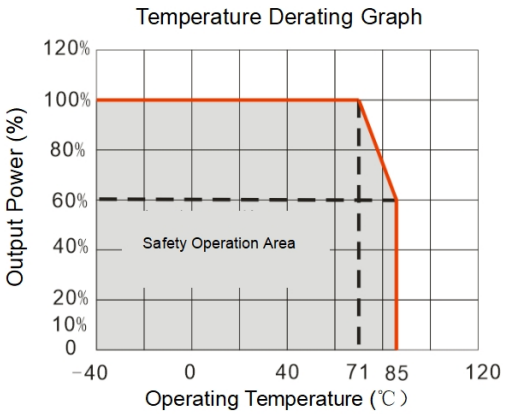
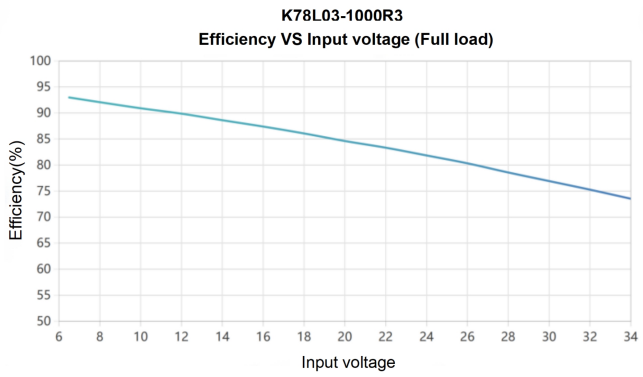
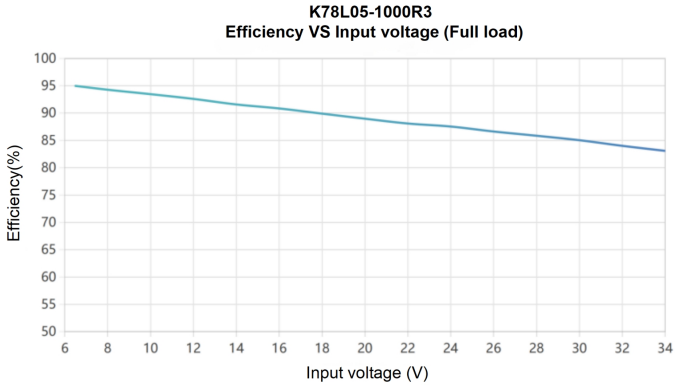
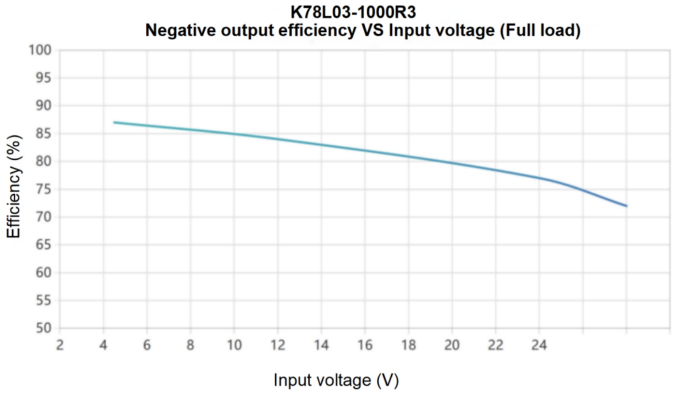
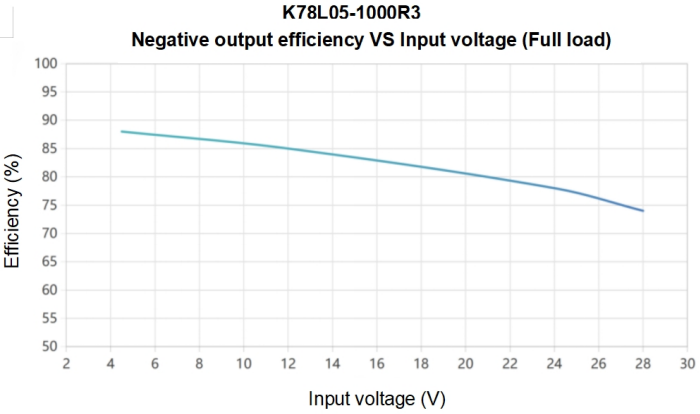


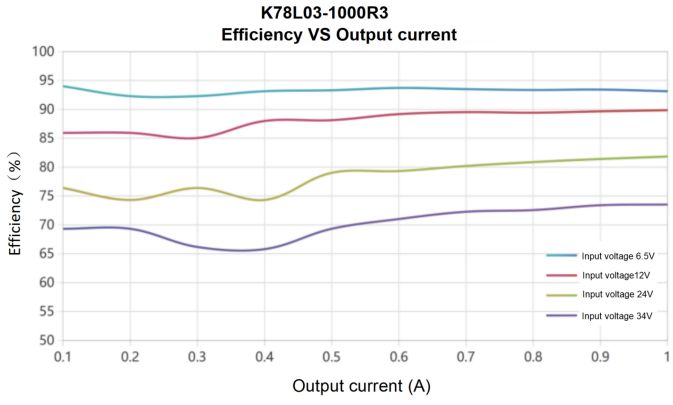
Figure 1

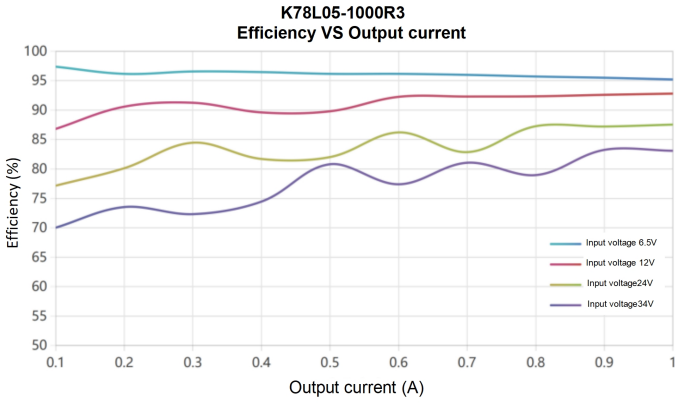












Recommended Circuits for Application

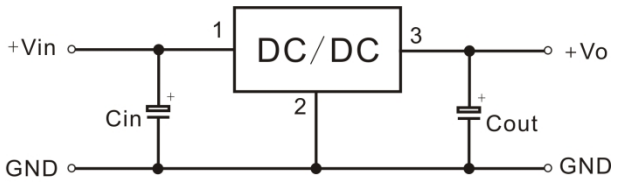
1. Output load requirements

a. In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side, the resistance equal to 10% nominal load.

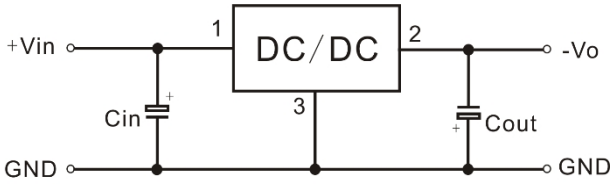
b. The maximum capacitive load is tested under nominal input full load, and cannot exceed the maximum capacitive load of output terminal under operation, otherwise it will cause it difficult to start up and damage the product.

2. Recommended circuit

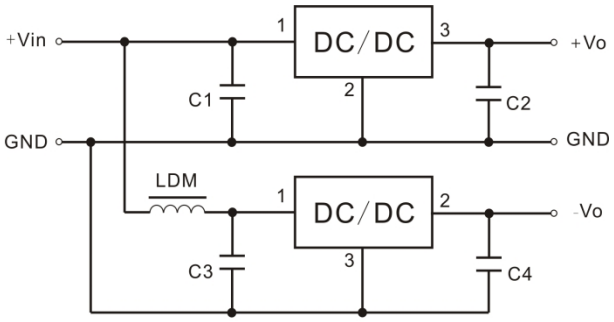
To effectively decrease the input and output ripple and noise, a capacitor filter can be connected to the input and output as below circuit diagrams (Figure 1 for the Positive output application, Figure 2 for the Negative output application and Figure 3 for Positive & Negative outputs connected in parallel application, 10uH is recommended for LDM). The suitable filtering capacitors should be chosen as the recommended capacitive load values in Table 1. The converter could not start if the capacitance is too big.



Positive output application circuit



Negative output application circuit

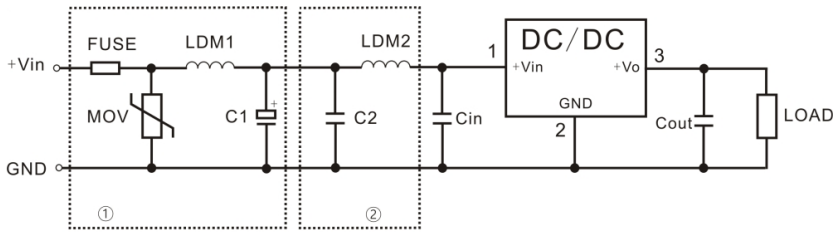


Positive and negative output parallel application circuit

Recommended Capacitive Load Values(Table 1)		
Part No.	C1/C3 (Ceramic Capacitor)	C2/C4 (Ceramic Capacitor)
K78L3V3 -1000R3	10uF/50V	22uF/10V
K78L05 -1000R3		22uF/10V

3. Recommended EMC circuit diagram

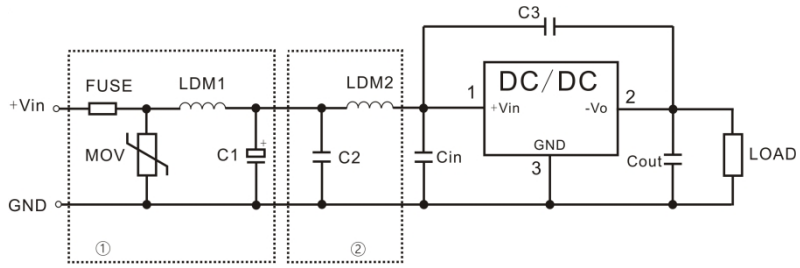
Positive output circuit diagram



FUSE	Select based on actual need
MOV	20D470K
C1	680uF/50V
C2	4.7uF/50V
Cin/Cout	Refer to table 1
LDM1	82uH
LDM2	12uH

Note: The part ① circuit is for EMC test, part ② for EMI filtering, both can be adjusted according to the actual situation

Negative output circuit diagram



Note: The part ① circuit is for EMC test, part ② for EMI filtering, both can be adjusted according to the actual situation

FUSE	Select based on actual need
MOV	20D470K
C1	680uF/50V
C2/C3	4.7uF/50V
Cin/Cout	Refer to table 1
LDM1	82uH
LDM2	12uH

Application Notice

1. Parallel connection of this product is not allowed, and hot-swapping is not available.
2. The product should be used according to the specifications, otherwise it could be permanently damaged.
3. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.
4. The product performance cannot be guaranteed if it works under over-load condition.
5. Unless otherwise specified, all values or indicators are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).
6. All values or indicators on this datasheet have been tested based on Aipupower test specifications.
7. The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.
8. Aipupower can provide customization service.

Guangzhou Aipu Electron Technology Co., Ltd
Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.
Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821
E-mail: sales@aipu-elec.com Website: www.aipupower.com