

### Typical Features

- ◆ Wide input voltage range: 85-528VAC/100-745VDC
- ◆ No load power consumption:  $\leq 0.4\text{W}$  (230VAC)
- ◆ Transfer efficiency: typ.78% (230VAC)
- ◆ Switching Frequency: 65KHz(Typ)
- ◆ Protections: short circuit, over-current
- ◆ Isolation voltage :4000VAC
- ◆ PCB mounting



### Application Field

**DA5-380SXXGA9N4**--- a compact size, high efficient, power module offered by Aipu. This series of power module has the advantages of ultra-wide input voltage, AC and DC dual-use, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, and high safety isolation. Meet IEC62368, UL62368, EN62368 standards, widely used in industrial, office, power and civil and other fields. When the product is used in a harsh environment with electromagnetic compatibility, please refer to the application circuit given by our company.

### Typical Product List

Certificate	Part no.	Output Specifications			Capacitive Load(MAX) u F	Ripple& Noise 20MHz (MAX) mVp-p	Efficiency @ Full Load ,230VAC (Typ) %
		Power	Voltage	Current			
		(W)	Vout (V)	Iout (mA)			
-	DA5-380S05GA9N4	5	5	1000	700	80	74
	DA5-380S12GA9N4	5	12	416	500	100	78
	DA5-380S24GA9N4	5	24	208	300	150	80

Note 1: The ripple test needs to be tested under the conditions of adding peripherals;

Note 2: The minimum efficiency is defined as -2% of the typical value due to the instrumental error of the test equipment;

Note 3: The typical value of output efficiency is based on the product aging for half an hour under full load;

Note 4: Ripple & Noise is tested by twisted pair method, details please refer to Ripple & Noise test at back.

Note 5: "\*" are models being developing.

Note 6: Due to the limited space, the above is only a partial list of products. If you need products other than the list, please contact the sales department of our company.

### Input Specifications

Item	Operating Condition	Min	Typ.	Max	Unit
Input Voltage Range	AC input	85	230	528	VAC
	DC input	127	325	746	VDC
Input Frequency Range	-	47	50	63	Hz
Input Current	115VAC	-	-	0.30	A
	230VAC	-	-	0.20	
Surge Current	115VAC	-	-	15	
	230VAC	-	-	20	

No-load power consumption	Input 230VAC	-	-	0.4	W
	Output 528VAC	-	-	0.5	
External fuse		2.0A/500VAC,Slow fuse (necessary)			
leakage current	-	0.25mA TYP / 230VAC/50HZ			
Hot-plug	-	unavailable			
Remote Control Terminal	-	unavailable			

## Output Specifications

Item		Operating Condition	Min.	Typ.	Max.	Unit
Voltage Accuracy		Full input voltage range, Any load	-	±2.0	±3.0	%
Line Regulation		Nominal Load	-	-	±0.5	%
Load Regulation		Nominal input voltage,20%~100% load	-	-	±1.0	%
Minimum Load		Single Output	0	-	-	%
Turn-on Delay Time		Input 230VAC (full load)	-	500	-	mS
Power-off Holding Time		Input 230VAC (full load)	-	200	-	mS
Dynamic Response	Overshoot range	25%~50%~25% 50%~75%~50%	-5.0	-	+5.0	%
	Recovery time		-	-	5.0	mS
Output Over-shoot		Full input voltage range	≤10%Vo			%
Short circuit protection			Long-term short-circuit, self-recovery			Hiccup
Drift Coefficient		-	-	±0.03%	-	%/℃
Over Current Protection		Input 230VAC	≥110% Io self-recovery			Hiccup

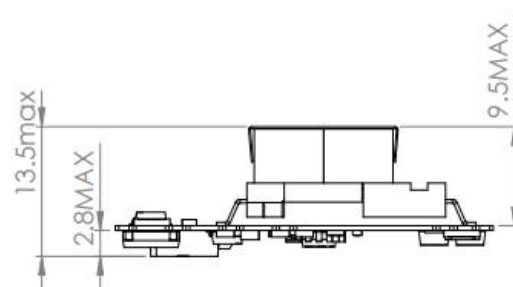
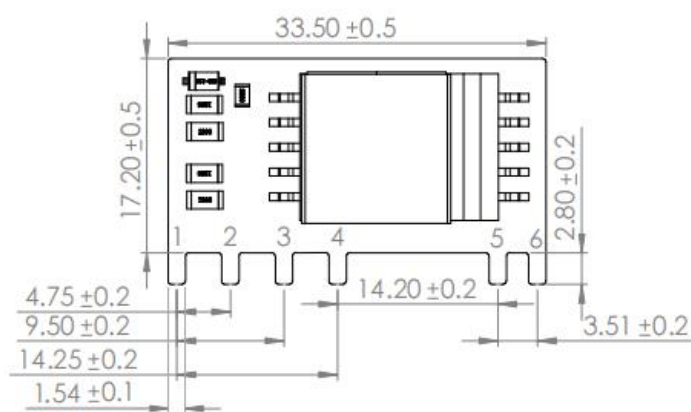
## General Specifications

Item		Operating Condition	Min.	Typ.	Max.	Unit
Switching Frequency		-	60	65	70	KHz
Operating Temperature		-	-40	-	+85	℃
		needs to be performed on the basis of the temperature derating curve. The derating curve diagram can be seen in the back (product characteristic curve).				
Storage Temperature		-	-40	-	+105	
Soldering Temperature		Wave-soldering	260±4℃, Time 5-10S			
		Manual-soldering	360±8℃, Time 4-7S			
Relative Humidity		-	10	-	90	%RH
Isolation Voltage	Input-Output	Test 1min, leakage current≤5mA	4000	-	-	VAC
Insulation Resistor	Input-Output	@ DC500V	100	-	-	MΩ
Vibration		-	10-55Hz,10G,30Min,alongX,Y,Z			
mean time between failures		-	MIL-HDBK-217F 25℃>300,000H			

## EMC Characteristics

Total Item	Sub Item	Test Standard	Class
EMC	EMI	CE	CISPR22/EN55022 CLASS B (recommend circuit see Diagram 2)
		RE	CISPR22/EN55022 CLASS B (recommend circuit see Diagram 2)
	EMS	ESD	Contact $\pm 6\text{KV}$ / Air $\pm 8\text{KV}$ Perf.Criteria B (recommend circuit see Diagram 2)
		RS	10V/m perf. CriteriaB (recommend circuit see Diagram 2)
		EFT	$\pm 2\text{KV}$ perf. Criteria B (recommend circuit see Diagram 2)
			$\pm 4\text{KV}$ perf. Criteria B (recommend circuit see Diagram 2)
		Surge	Line to line $\pm 2\text{KV}$ / line to ground $\pm 4\text{KV}$ (recommend circuit see Diagram 2)
		CS	10 Vr.m.s perf. Criteria B (recommend circuit see Diagram 2)

## Dimension



Note:

Unit: mm

Pin tolerance:  $\pm 1.0$ 

Layout is for reference, please refer to actual item

Packing Code	L x W x H	
-	33.5 X 20 X 13.5 mm	1.319 X 0.787 X 0.531 inch

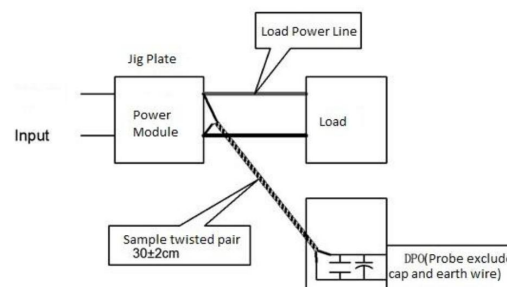
## Pin Specification

Pin	1	2	3	4	5	6
Single (S)	AC (L)	AC (N)	+V(CAP)	-V(CAP)	-Vo	+Vo

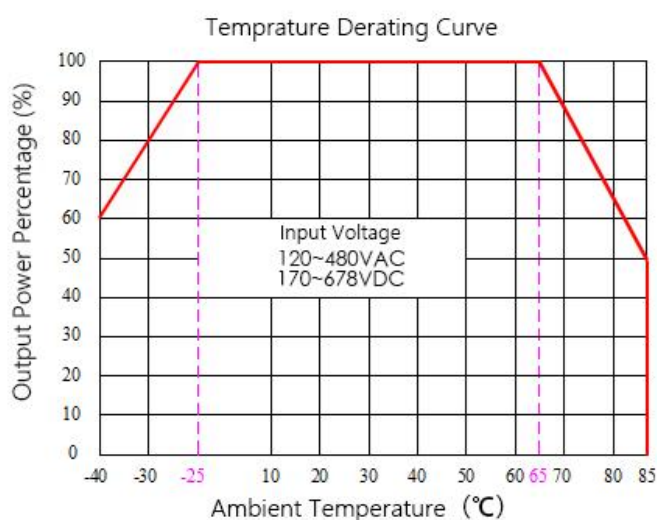
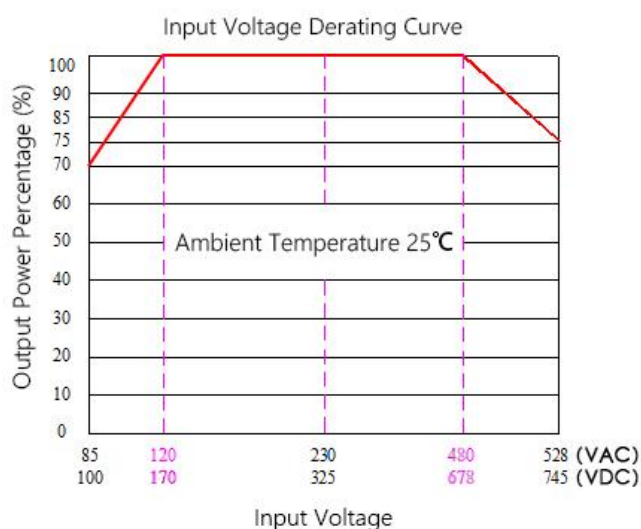
## Ripple & Noise Test: (Twisted Pair Method 20MHZ bandwidth)

### Test Method:

- (1) 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.
- (2) Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



## Product Characteristic Curve



Note 1: The input voltage is 85~120VAC/480~528VAC/100~1740VDC/678~745VDC, which needs to be derated based on the input voltage derating curve.

Note 2: Our product is suitable to use under natural air cooling environment, if use it under closed condition, please contact with us.

## Typical Application Circuit and EMC Recommended Circuit

## 1. Typical Application Circuit

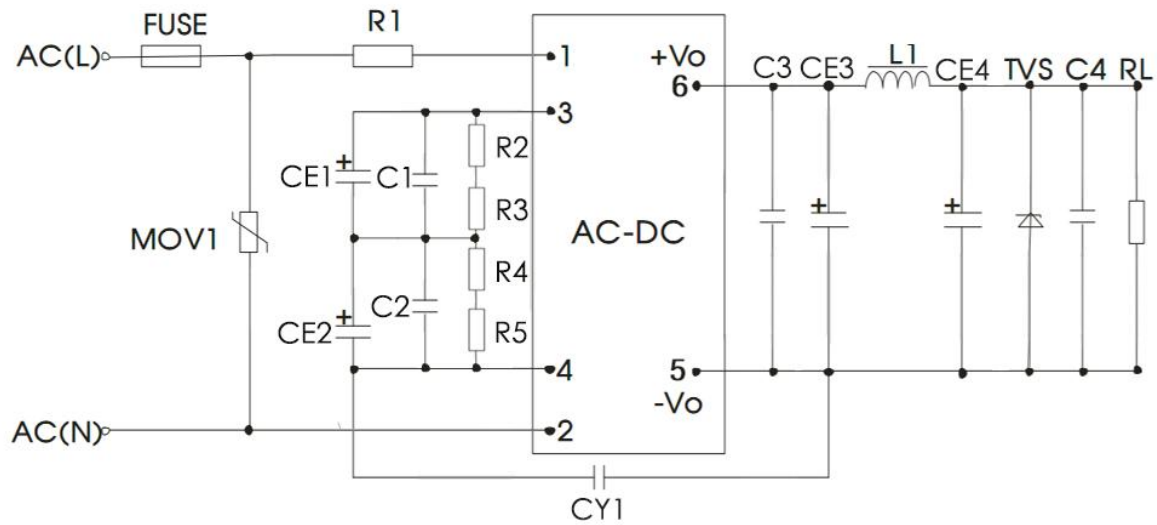


Diagram 1

## Recommended parameters:

Part No	CE3 (Solid state capacitor must be connected)	L1 (required)	CE4 (Must be connected with electrolytic capacitor)	C1、C2	CY1 (required)	C3、C4	TVS1
DA5-380S05GA9N4	470uF/16V	2.2uF/5A	100uF/25V	0.1uF/630V	1nF/400VAC	0.1uF/50V	SMBJ7.0A
DA5-380S12GA9N4	220uF/16V		47uF/35V				SMBJ20A
DA5-380S24GA9N4	100uF/35V						SMBJ30A

CE1,CE2 (required)			R2,R3,R4,R5 (required)
/	-25℃-85℃	-40℃-85℃	1206/1MΩ
85-528VAC	33uF/400V	47uF/400V	
165-528VAC	22uF/400V	33uF/400V	
85-305VAC	CE1: 10uF/450v CE2: Connecting wires	CE1: 22uF/450v CE2: Connecting wires	/

## Note:

- FUSE is a safety tube, the recommended specification is 1A/500Vac, slow break (must be connected)
- MOV is a varistor, 14D911K (required) .
- R1 is metal sheath/cement resistance, 20Ω/3W (required);
- CE1, CE2: For AC input, it is a filter electrolytic capacitor; for DC input, it is a large filter capacitor in the EMC filter; it is recommended to use electrolytic capacitors with ripple current >200mA@100KHz, and it is recommended to use electrolytic capacitors with ESR≤100Ω at low temperatures..
- R2, R3, R4 and R5 are the voltage equalizing resistors of CE1 and CE2 and must be connected.
- C3 and C4 are ceramic capacitors to filter out high-frequency noise.
- CE3 and CE4 are output filter capacitors, which together with L1 form a Pi-type filter circuit. It is recommended to use high-frequency, low-resistance electrolytic capacitors (ESR≤1.1Ω at low temperature -40° C) or solid capacitors. Please refer to each manufacturer for capacity and rated ripple current. Technical specifications provided. The capacitor withstand voltage should be derated by at least 80%.

## 2. EMC recommended circuit

### 1) Recommended circuit for general system in general indoor environment

Application Environment	Temperature Range	EMS Level	EMI Level
general indoor environment	-25°C~55°C	Level 3	CLASS B

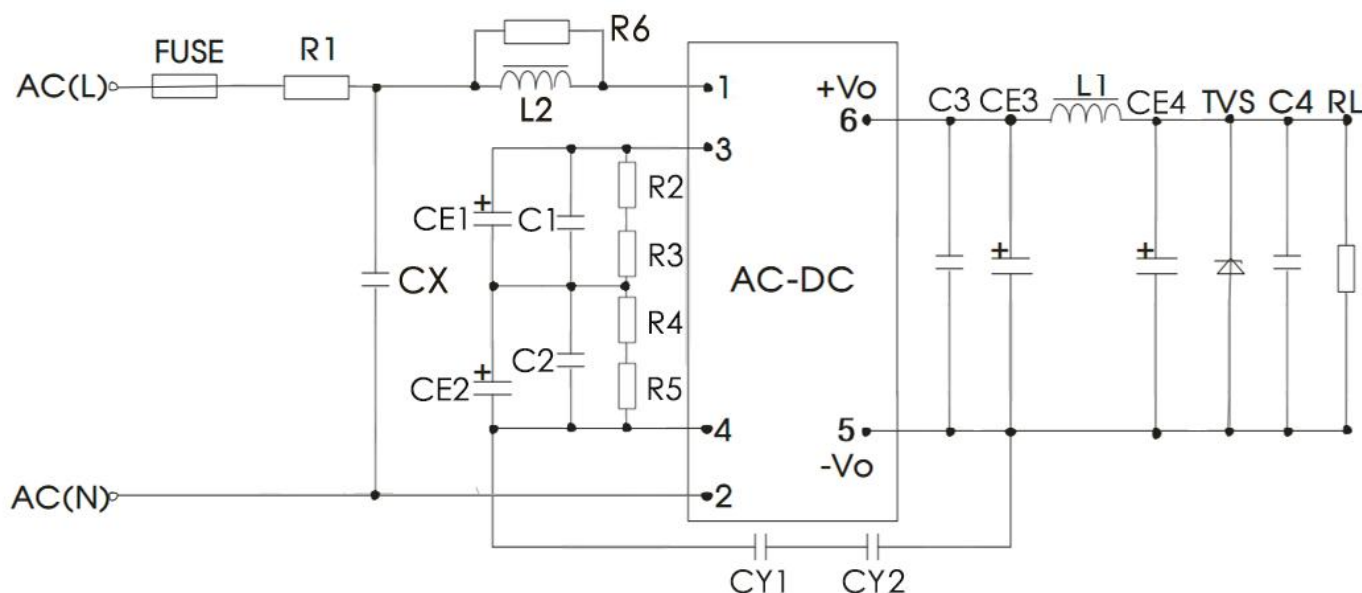


Diagram 2

#### Recommended parameters:

Components		Recommended Value
R1 (wire-wound resistor, required)		12 Ω /3W
R2 (Chip resistor)	Vout: 5V	1206/20K
	Vout: 12V	1206/2K
	Vout: 24V	1206/15K
L2	Vout: 5V	1.2mH/Max:2.5 Ω /Min:0.2A
	Vout: 12V,24V	4.7mH/Max:15 Ω /Min:0.2A
CX		0.1uF/480VAC
FUSE (Required)		1A/500V, Slow fuse

#### Note:

- In the home appliance application environment, the two Y capacitors on the original sides need to be connected externally at the same time (CY1, CY2, specification value is 2.2nF/400VAC), which can meet 60335 certification;
- According to certification requirements, the X capacitor needs to be connected in parallel with a bleeder resistor. The recommended value is <3.8MΩ. The actual selection needs to be based on certification standards;
- R1 is a plug-in resistor at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.



## 2) Recommended circuits for general systems in indoor industrial environments

Application Environment	Temperature Range	EMS Level	EMI Level
indoor industry environment	-25°C~55°C	Level 4	CLASS B

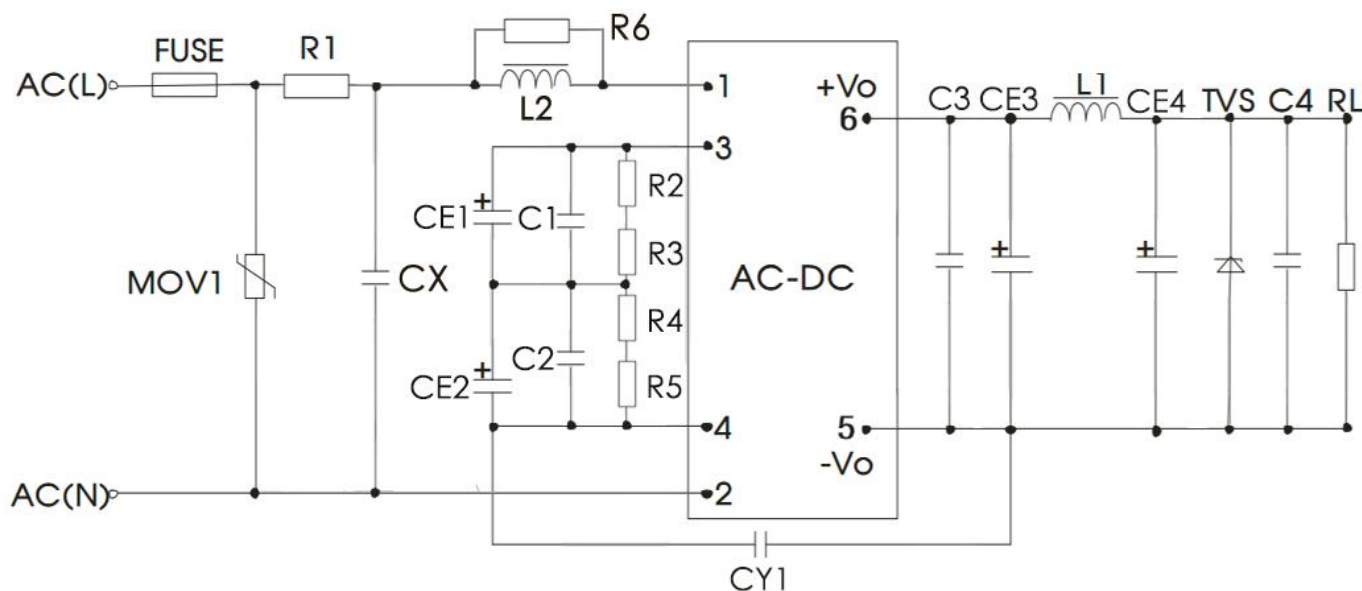


Diagram 3

Recommended parameters:

Component Tag		Recommended Value
MOV1		14D911K
R1 (wire-wound resistor, required)		12Ω/3W
R2 (Chip resistor)	Vout: 5V	1206/20K
	Vout: 12V	1206/2K
	Vout: 24V	1206/15K
L2	Vout: 5V	1.2mH/Max:2.5Ω/Min:0.2A
	Vout: 12V,24V	4.7mH/Max:15Ω/Min:0.2A
CX		0.1uF/480VAC
FUSE (Required)		2A/500V, Slow fuse
Note: 1. According to certification requirements, the X capacitor needs to be connected in parallel with a bleeder resistor. The recommended value is <3.8MΩ. The actual selection needs to be based on certification standards; 2.R1 is a plug-in resistor at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.		

**3) Recommended circuit for general system in general outdoor environment**

Application Environment	Temperature Range	EMS Level	EMI Level
general outdoor environment	-40℃-85℃	Level 4	CLASS A

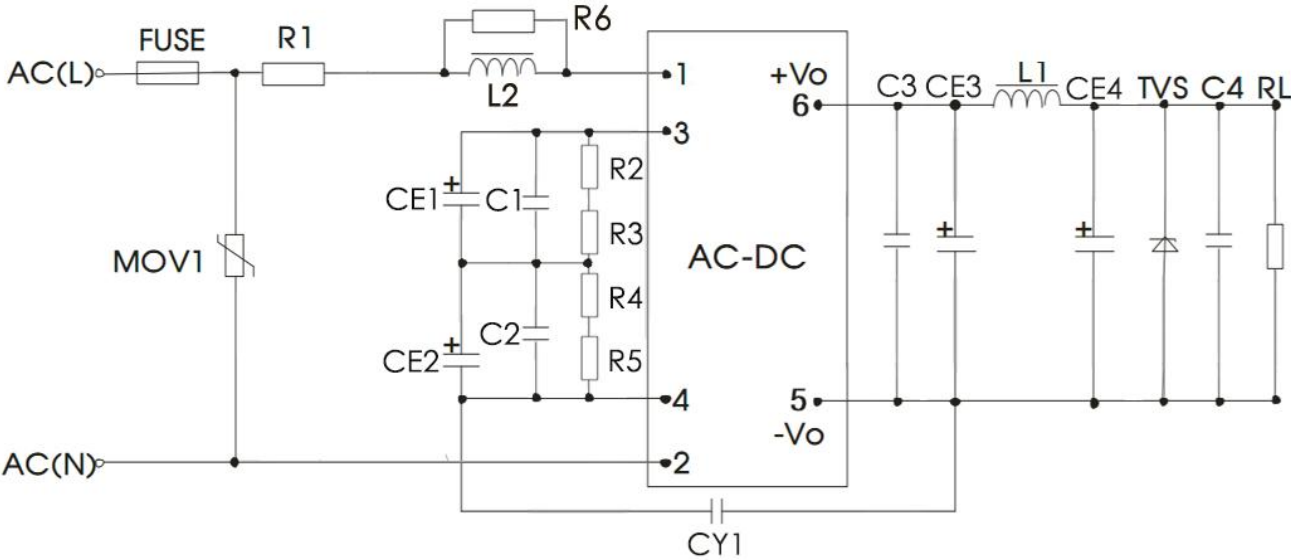


Diagram 4

Recommended parameters:

Component Tag		Recommended Value
MOV1		14D911K
R1 (wire-wound resistor, required)		12Ω/3W
R2 (Chip resistor)	Vout: 5V	1206/20K
	Vout: 12V	1206/2K
	Vout: 24V	1206/15K
L2	Vout: 5V	1.2mH/Max:2.5Ω/Min:0.2A
	Vout: 12V,24V	4.7mH/Max:15Ω/Min:0.2A
FUSE (require)		2A/500V, Slow fuse
Note: R1 is a plug-in resistor at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.		



**4) Recommended circuit for general system in outdoor industrial environment**

Application Environment	Temperature Range	EMS Level	EMI Level
outdoor industrial environment	-40℃-85℃	Level 4	CLASS A

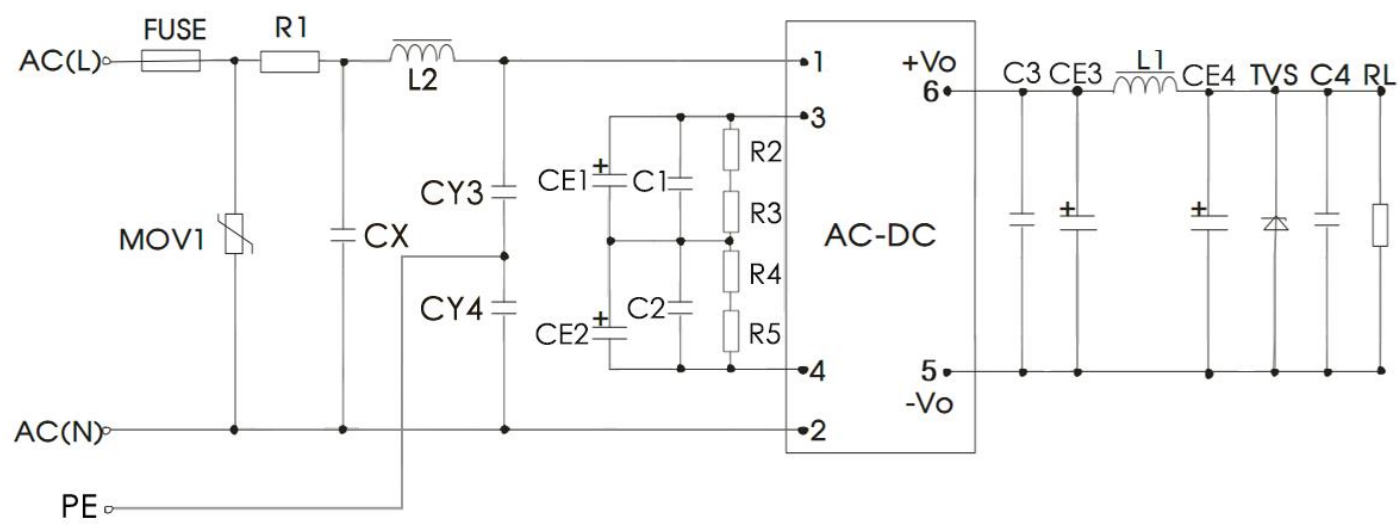


Diagram 5

Recommended parameters:

Component Tag		Recommended Value
MOV1		14D911K
R1 (wire-wound resistor, required)		12Ω/3W
L2	Vout: 5V	1.2mH/Max:2.5Ω/Min:0.2A
	Vout: 12V,24V	4.7mH/Max:15Ω/Min:0.2A
CX		0.1uF/480VAC
FUSE (required)		2A/500V, Slow fuse
CY3,CY4		1nF/400VAC
Note: R1 is a plug-in resistor at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.		

## 5) Recommended circuit for general system in strong lightning surge environment

Application Environment	Temperature Range	EMS Level	EMI Level
strong lightning surge environment	-40°C-85°C	Level 4	CLASS A

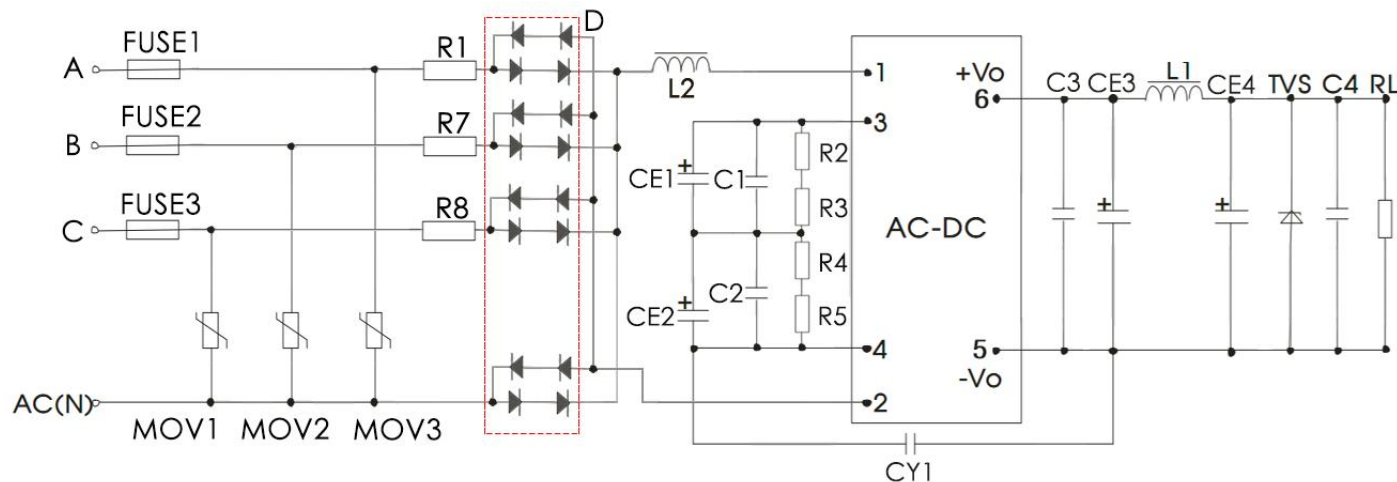


Diagram 6.1

Recommended peripheral circuit diagram for high requirements of 4KV differential mode surge - full wave rectification

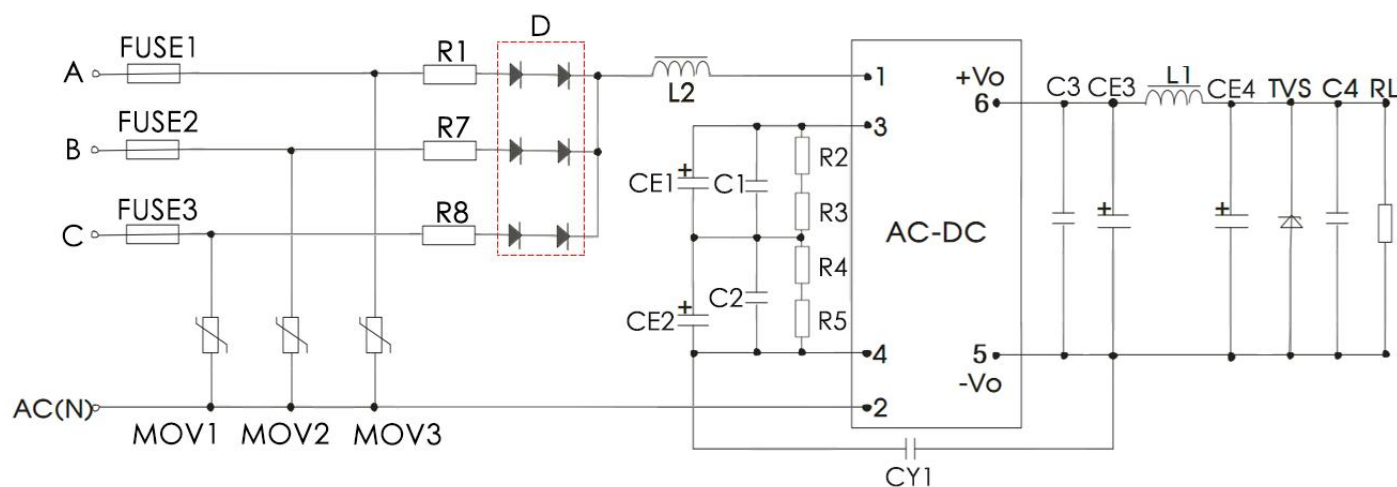


Diagram 6.2

Recommended peripheral circuit diagram for high requirements of 4KV differential mode surge - half-wave rectification

Recommended parameters:

Component Tag		Recommended Value
MOV1,MOV2,MOV3		14D911K
R1,R7,R8 (wire-wound resistor, required)		12 $\Omega$ /5W
L2	Vout: 5V	1.2mH/Max:2.5 $\Omega$ /Min:0.2A
	Vout: 12V,24V	4.7mH/Max:15 $\Omega$ /Min:0.2A
CX		0.1uF/480VAC
D		2A/1000V
FUSE1,FUSE2,FUSE3 (required)		2A/500V, slow fuse
Note: R1 is a plug-in resistor at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.		

## Note 1:

1. The product should be used within the specification range, or it will cause permanent damage to it;
2. The input terminal should connect to fuse;
3. If the product is worked under the minimum requested load, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of **Ta=25°C**, **humidity<75%** with nominal input voltage and rated output load(pure resistance load);
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, please directly contact our technician for specific information;
8. We can provide product customization service,
9. Specifications are subject to change without prior notice, please follow up with our website for newest manual.

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