

15ACFE1W_3.6 series

15W - AC-DC converter

AC-DC Converter

15 Watt

- ⊕ Wide input voltage range: 176-528VAC/248-745VDC
- ⊕ No-load power consumption $\leq 0.30W$
- ⊕ Transfer efficiency (typ. 82%)
- ⊕ Switching frequency: 65kHz
- ⊕ Protection: short circuit, over current
- ⊕ Isolation voltage: 3600VAC
- ⊕ Meets IEC62368/UL62368/EN62368 test standards
- ⊕ PCB Mounting
- ⊕ Ultra compact open frame, industrial design

Our versatile 15ACFE1W_3.6 series features a wide input voltage range of 176-528VAC/248-745VDC, making it adaptable to various applications. It offers low no-load power consumption $\leq 0.30W$ and a typical transfer efficiency of 82%. Operating at a switching frequency of 65kHz, it includes robust protection against short circuits and over current. With an isolation voltage of 3600VAC, it ensures safety and reliability. Additionally, it meets the IEC62368/UL62368/EN62368 test standards, supports PCB mounting, and boasts an ultra-compact open frame industrial design.



Common specifications

| | |
|---------------------------|---|
| Short circuit protection | Full input voltage range - Continuous, Self-recovery Hiccup |
| Over current protection | Input 220VAC - $\geq 110\%$ Io, Self-recovery - Hiccup |
| Switching frequency | 65 kHz (typ.) |
| Operating temperature | -40°C - +85°C (with derating) |
| Storage temperature | -40°C - +105°C |
| Soldering temperature | Wave soldering: 260°C ($\pm 4^\circ\text{C}$), time 5-10S Manual soldering: 360°C ($\pm 8^\circ\text{C}$), time 4-7S |
| Relative humidity | 10~90% RH |
| Hot plug | Unavailable |
| Remote control terminal | Unavailable |
| Safety standard | EN62368, IEC62368, UL62368 |
| Vibration | 10-55Hz, 10G, 30Min, along X, Y, Z |
| Safety class | CLASS II |
| MTBF (MIL-HDBK-217F@25°C) | >300,000 Hours |

Output specifications

| Item | Operating condition | Min | Typ | Max | Units |
|---------------------------|--|------|----------------|-----------|---------|
| Voltage accuracy | Full input voltage range, Any load - Vo | | ± 2.0 | ± 3.0 | % |
| Line Regulation | Nominal Load - Vo | | | ± 0.5 | % |
| Load regulation | Nominal input Voltage, 20%~100% load - Vo | | | ± 1.0 | % |
| No load power consumption | Input 176VAC Input 220VAC | | | 0.25 | W |
| Minimum load | Single Output | 0 | | | % |
| Turn-on delay time | Nominal input voltage (full load) | | 1000 | | mS |
| Power-off holding time | Input 176VAC (full load) Input 220VAC (full load) | | 50 80 | | mS |
| Dynamic response | Overshoot range 25%~50%~25% Recovery time 50%~75%~50% | -5.0 | 5.0 | +5.0 | % mS |
| Output overshoot | Full input voltage range | | $\leq 10\%V_o$ | | % |
| Drift coefficient | | - | $\pm 0.03\%$ | - | %/°C |

Input specifications

| Item | Operating condition | Min | Typ | Max | Units |
|-----------------------|-------------------------|-----|-----|------|-------|
| Input voltage range | AC input | 176 | 220 | 528 | VAC |
| | DC input | 248 | 310 | 745 | VDC |
| Input frequency range | | 47 | 50 | 63 | Hz |
| Input current | 176VAC | | | 0.25 | A |
| | 220VAC | | | 0.20 | |
| Surge current | 176VAC | | | 10 | A |
| | 220VAC | | | 20 | |
| External fuse | 2A/500VAC slow fusing | | | | |
| Leakage current | 0.25mA typ./230VAC/50Hz | | | | |

Isolation specifications

| Item | Operating Conditions | Min | Typ | Max | Units |
|-----------------------|--|------|-----|-----|-------|
| Isolation voltage | Input-Output, Test 1min, leakage current $\leq 5\text{mA}$ | 3600 | | | VAC |
| Insulation resistance | Input-Output @ DC500V | 100 | | | MΩ |

Example:

15ACFE1W_05S3.6

15 = 15Watt; AC = AC-DC; F = Open Frame; E1 = Cost effective; W = Wide input; 05 = 5Vout; S = Single output; 3.6 = 3.6 kVAC isolation

- The product should be used under the specification range, otherwise it will cause permanent damage to it.
- Product's input terminal should connect to fuse;
- If the product is not worked under the load range (below the minimum load or beyond the load range), we cannot ensure that the performance of product is in accordance with all the indexes in this manual;
- Unless otherwise specified, data in this datasheet are tested under conditions of $T_a = 25^\circ\text{C}$, humidity $< 75\%$ when inputting nominal voltage and outputting rated load (pure resistance load);
- All index testing methods in this datasheet are based on our company's corporate standards
- 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;
- We can provide customized product service;
- The product specification may be changed at any time without prior notice.

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15W - AC-DC converter

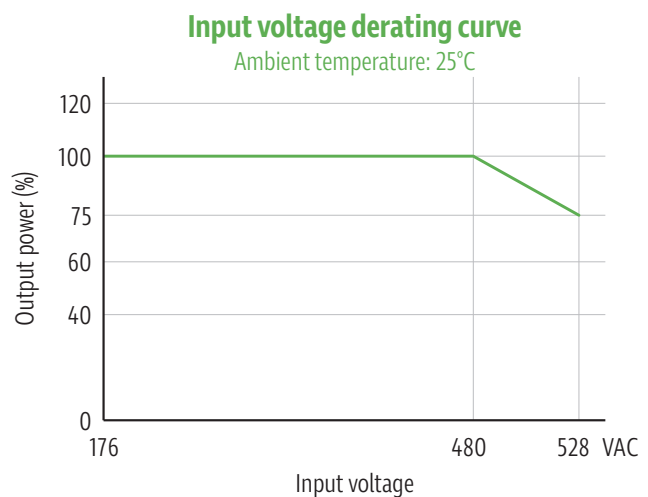
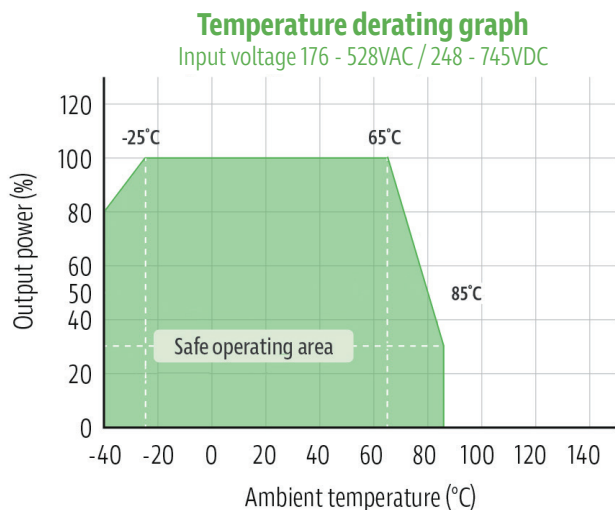
| EMC specifications | | | | | |
|--------------------|-----|--------------------------------|------------------|---|--|
| EMC | EMI | CE | CISPR22/EN55032 | CLASS B (see recommended circuit Photo 2) | |
| EMC | EMI | RE | CISPR22/EN55032 | CLASS B (see recommended circuit Photo 2) | |
| EMC | EMS | RS | IEC/EN61000-4-3 | 10V/m | Perf.Criteria A (see recommended circuit Photo1) |
| EMC | EMS | CS | IEC/EN61000-4-6 | 10Vr.m.s | Perf.Criteria A (see recommended circuit Photo1) |
| EMC | EMS | ESD | IEC/EN61000-4-2 | Contact ±6KV/ Air ±8KV | Perf.Criteria B |
| EMC | EMS | Surge | IEC/EN61000-4-5 | ±2KV | Perf.Criteria B (see recommended circuit Photo 2) |
| EMC | EMS | EFT | IEC/EN61000-4-4 | ±2KV ±4KV | Perf.Criteria B Perf.Criteria B (see recommended circuit Photo 2) |
| EMC | EMS | Voltage dips and interruptions | IEC/EN61000-4-11 | 0%-70% | Perf.Criteria B |

Product Selection Guide

| Approval | Model | Output Power (W) | Output Voltage Vo1(V) | Output Current Io1(mA) | Max. Capacitive Load (uF) | Ripple & Noise 20MHz (Max) mVp-p | Efficiency Full Load, 220VAC Typ. (%) |
|----------|-----------------|------------------|-----------------------|------------------------|---------------------------|----------------------------------|---------------------------------------|
| | 15ACFE1W_05S3.6 | 15 | 5 | 3000 | 3000 | 120 | 77 |
| | 15ACFE1W_12S3.6 | 15 | 12 | 1250 | 2000 | 120 | 82 |
| | 15ACFE1W_24S3.6 | 15 | 24 | 625 | 800 | 150 | 84 |

- Note:
- 1: The typical output efficiency is based on that product is full loaded and burned-in after half an hour.
 - 2: The fluctuation range of the full-load efficiency (% typ) in the table is ±2%. The full-load efficiency is the total output power divided by the input power of the module.
 - 3: The test method for ripple & noise adopts the twisted pair test method. Please see the following (ripple & noise test instructions) for details.

Product characteristic curve

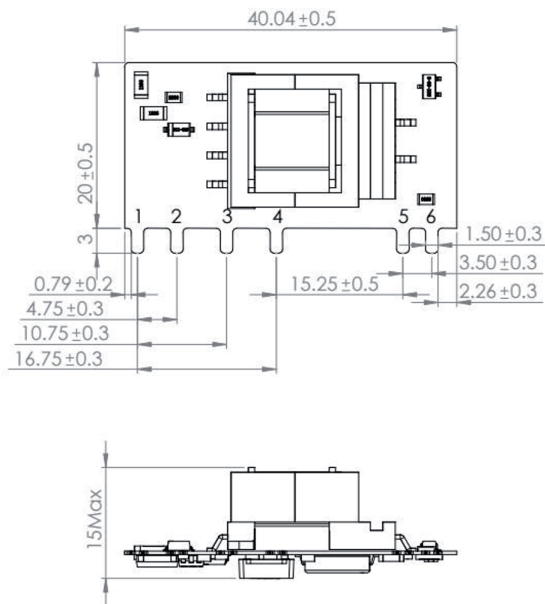


- Note:
1. Input Voltage should be derated base on Input Voltage Derating Curve when it is 480~528VAC /678~745VDC.
 2. Our product is suitable to use under natural air cooling environment, if use it under closed condition, please contact with us.

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Packing Dimension

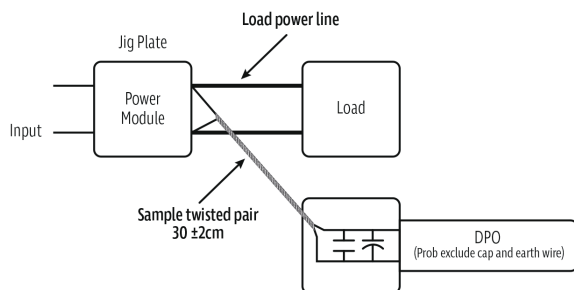


Note:
 unit: mm
 General tolerance: ± 1.00
 Layout of the device is for reference only, please refer to actual product

| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
|--------|-------|-------|-----|-----|-----|-----|
| Single | AC(L) | AC(N) | +Vc | -Vc | -Vo | +Vo |

Ripple & noise test: (twisted pair method 20MHz bandwidth)

Twisted pair method (20MHz bandwidth)



Test Method:

1. Connect the twisted pair, set the oscilloscope bandwidth to 20MHz, use a 100M bandwidth probe, and terminate with a 0.1uF polypropylene capacitor and a 10uF high-frequency low-resistance electrolytic capacitor in parallel. Configure the oscilloscope to sample mode.
2. Connect the input terminal to the power supply and the output terminal to the electronic load using a jig plate. Use a 30cm (± 2 cm) sampling line, and select the power line from appropriately insulated wires of the corresponding diameter according to the output current flow.

Typical application circuit

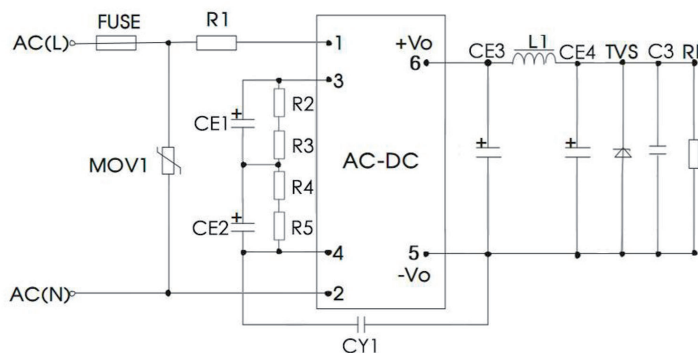


Photo 1

| Products Number | CE1, CE2 (necessary) | CE3 solid-state capacitor (necessary) | L1 (necessary) | CE4 (necessary) | FUSE (necessary) | MOV1 | R2,R3, R4,R5 chip resistor (necessary) | CY1 | C3 | TVS |
|-----------------|----------------------|---------------------------------------|----------------|-----------------|------------------|---------|--|----------|-----------|----------|
| 15ACFE1W_05S3.6 | 47uF/400 V | 1000uF/16V | 2.0uH/6.5A | 330uF/16V | 2A/500V | 14D911K | 1206/1M | 1nF/400V | 0.1uF/50V | SMBJ7.0A |
| 15ACFE1W_12S3.6 | 47uF/400 V | 470uF/16V | 2.0uH/6.5A | 330uF/16V | 2A/500V | 14D911K | 1206/1M | 1nF/400V | 0.1uF/50V | SMBJ20A |
| 15ACFE1W_24S3.6 | 47uF/400 V | 470uF/35V | 2.0uH/6.5A | 100uF/35V | 2A/500V | 14D911K | 1206/1M | 1nF/400V | 0.1uF/50V | SMBJ30A |

Note:

- CE1, CE2: When AC input, CE1, CE2 are the input filter electrolytic capacitors (must be connected externally); when DC input, CE1, CE2 are large filter capacitor in the EMC filter (must be connected externally), it is recommended to use ripple current >200mA@100KHz, electrolytic capacitor with ESR $\leq 100\Omega$ at low temperature.
- R2, R3, R4 and R5 are the voltage equalizing resistors of the electrolytic capacitors CE1 and CE2 (must be connected externally)
- R1 is a wire-wound resistor, the recommended model is 3W/6.8 Ω .

EMC recommended circuit (basic application)

| Application environment | Ambient temperature range | EMS Class | EMI Class |
|-------------------------|---------------------------|-----------|-----------|
| Basic application | -40°C-85°C | Class 3 | Class A |

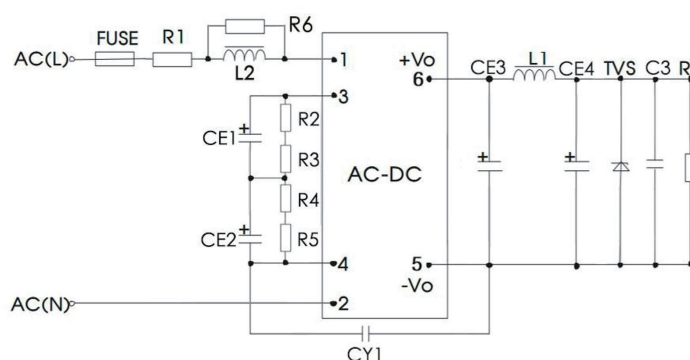


Photo 2-1

| Components | Recommended Value |
|------------------------------------|------------------------------------|
| R1 (wire-wound resistor, required) | 6.8 Ω /3W |
| R6 (Chip resistor) | 1206/4.7K |
| L2 | 2.2mH/Max:4.81 Ω /Min:0.31A |
| FUSE (necessary) | 2A/500V, slow fusing |

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.

Recommended circuits for general systems in general indoor environments

| | | | |
|-------------------------|---------------------------|-----------|-----------|
| Application environment | Ambient temperature range | EMS Class | EMI Class |
| General indoor | -25°C-55°C | Class 3 | Class B |

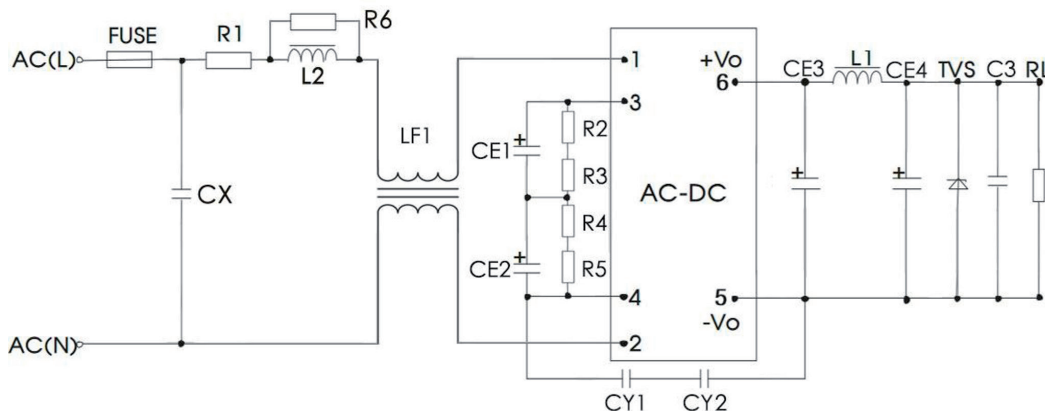


Photo 2-2

| Components | Recommended Value |
|------------------------------------|---------------------------|
| R1 (wire-wound resistor, required) | 6.8Ω/3W |
| R6(Chip resistor) | 1206/4.7K |
| L2 | 2.2mH/Max:4.81Ω/Min:0.31A |
| LF1 | 10mH/1A |
| CX | 0.1uF/480VAC |
| FUSE(necessary) | 2A/500V, slow fusing |

- Note:
1. In the home appliance application environment, the two Y capacitors on the primary and secondary sides need to be connected externally at the same time (CY1, CY2, specification value is 2.2nF/400VAC), which can meet 60335 certification;
 2. According to certification requirements, the X capacitor needs to be connected in parallel with a bleeder resistor. The recommended value is <math><3.8M\Omega</math>. The actual selection needs to be based on certification standards;
 3. 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.

Recommended circuits for general systems in indoor industrial environments

| | | | |
|-------------------------|---------------------------|-----------|-----------|
| Application environment | Ambient temperature range | EMS Class | EMI Class |
| Industrial Indoor | -25°C-50°C | Class 4 | Class B |

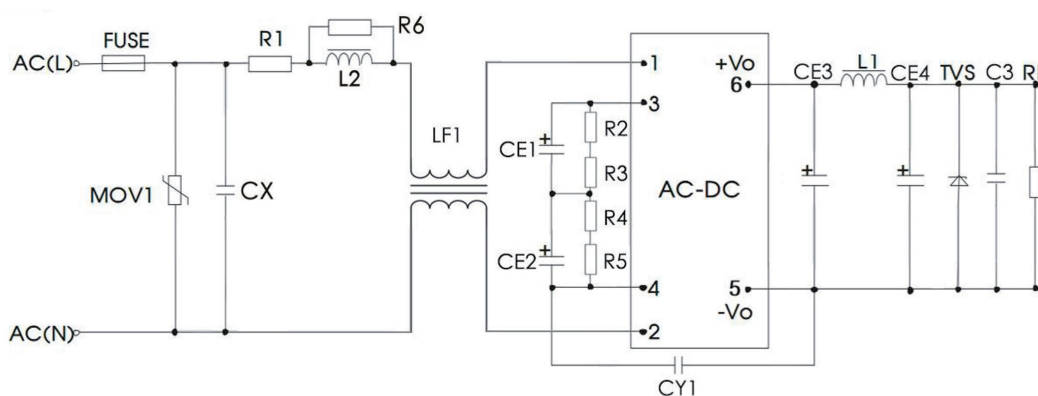


Photo 2-3

| Components | Recommended Value |
|------------------------------------|---------------------------|
| MOV1 | 14D911K |
| R1 (wire-wound resistor, required) | 6.8Ω/3W |
| R6(Chip resistor) | 1206/4.7K |
| L2 | 2.2mH/Max:4.81Ω/Min:0.31A |
| LF1 | 10mH/1A |
| CX | 0.1uF/480VAC |
| FUSE(necessary) | 2A/500V, slow fusing |

- Note:
1. According to certification requirements, the X capacitor needs to be connected in parallel with a bleeder resistor. The recommended value is <math><3.8M\Omega</math>. 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.

Recommended circuit for general system in outdoor general environment

| | | | |
|----------------------------|---------------------------|-----------|-----------|
| Application environment | Ambient temperature range | EMS Class | EMI Class |
| Output general environment | -40°C-85°C | Class 4 | Class A |

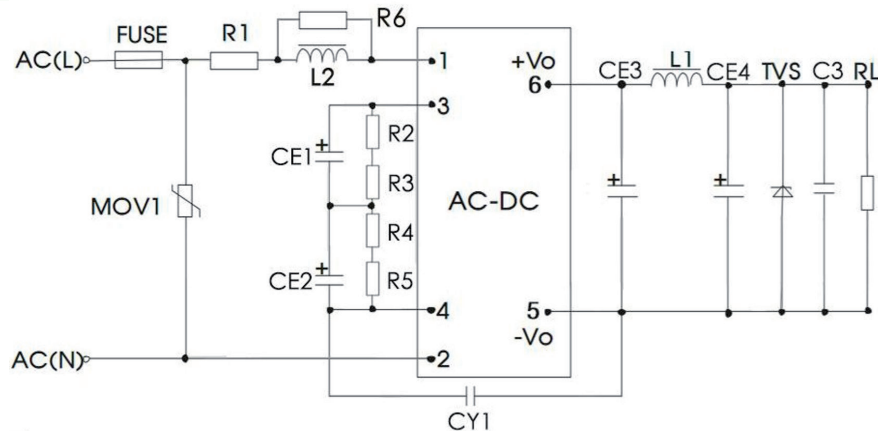


Photo 2-4

| Components | Recommended Value |
|------------------------------------|---------------------------|
| MOV1 | 14D911K |
| R1 (wire-wound resistor, required) | 6.8Ω/3W |
| R6(Chip resistor) | 1206/4.7K |
| L2 | 2.2mH/Max:4.81Ω/Min:0.31A |
| FUSE(necessary) | 2A/500V, slow fusing |

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.

Recommended circuits for general systems in outdoor industrial environments

| | | | |
|--------------------------------|---------------------------|-----------|-----------|
| Application environment | Ambient temperature range | EMS Class | EMI Class |
| Outdoor industrial environment | -40°C-85°C | Class 4 | Class A |

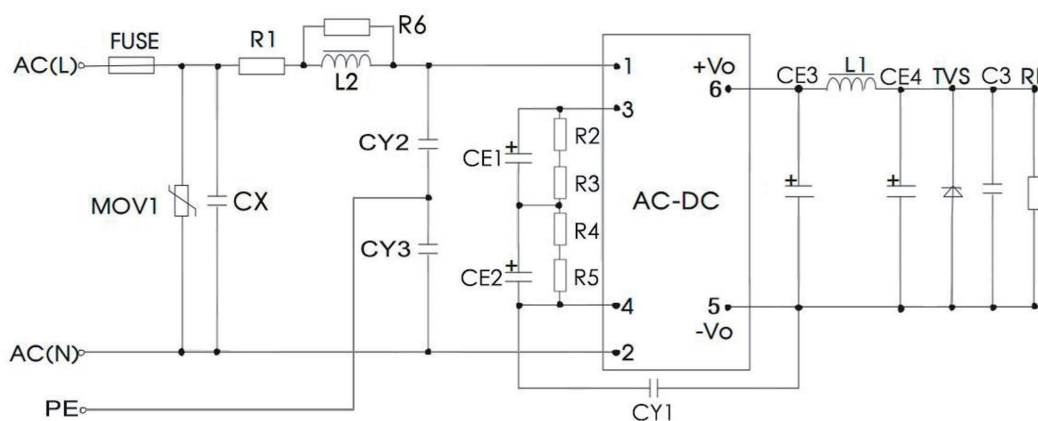


Photo 2-5

| Components | Recommended Value |
|------------------------------------|---------------------------|
| MOV | 14D911K |
| R1 (wire-wound resistor, required) | 6.8Ω/3W |
| R6(Chip resistor) | 1206/4.7K |
| L2 | 2.2mH/Max:4.81Ω/Min:0.31A |
| CY2,CY3 | 1nF/400VAC |
| CX | 0.1uF/480VAC |
| FUSE(necessary) | 2A/500V, slow fusing |

Note:
 1. According to certification requirements, the X capacitor needs to be connected in parallel with a bleeder resistor. The recommended value is $\lt; 3.8M\Omega$. 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.

Recommended circuit for general system in strong lightning surge environment

| | | | |
|------------------------------------|---------------------------|-----------|-----------|
| Application environment | Ambient temperature range | EMS Class | EMI Class |
| Strong lightning surge environment | -40°C-85°C | Class 4 | Class A |

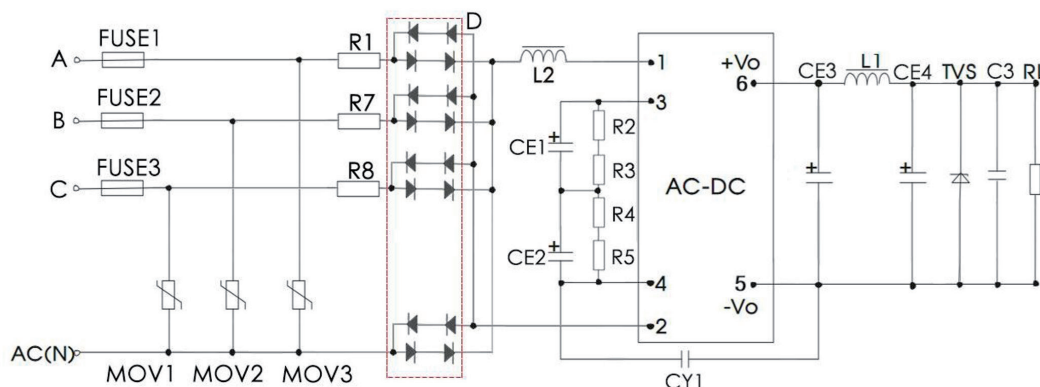


Photo 3-1: Recommended peripheral circuit diagram for high requirements of 4KV differential mode surge - full wave rectification

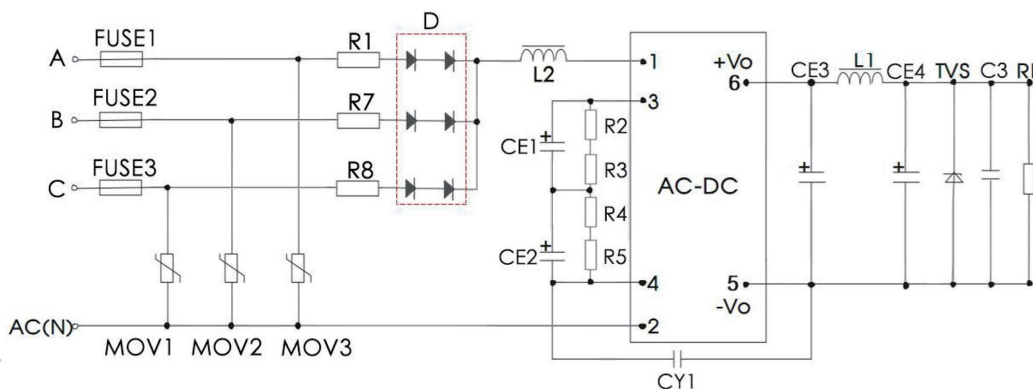


Photo 3-2: Recommended peripheral circuit diagram for high requirements of 4KV differential mode surge - half-wave rectification

| Components | Recommended Value |
|--|---------------------------|
| FUSE1, FUSE2, FUSE3(necessary) | 6.3A/500V, slow fusing |
| MOV1,MOV2,MOV3 | 14D911K |
| R1,R7,R8 (wire-wound resistor, required) | 12Ω/5W |
| D | 2A/1000V |
| L2 | 2.2mH/Max:4.81Ω/Min:0.31A |

Note:
R1, R7, and R8 are plug-in resistors at the input end. This resistor needs to be a wire-wound resistor. Do not choose a chip resistor or a carbon film resistor.