

## Typical Features

- ◆ Wide input voltage range: 85-305VAC/120-430VDC
- ◆ No-load power consumption  $\leq 0.35\text{W}$  (Typ.)
- ◆ Transfer efficiency (Typ. 86%)
- ◆ Operating Temperature:  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
- ◆ Switching frequency: 65KHz
- ◆ Protection: Short Circuit, Over Current
- ◆ Isolation voltage: 4000Vac
- ◆ Complies with IEC/UL/EN 62368 testing standards
- ◆ Fully enclosed plastic housing, compliant with UL 94 V-0
- ◆ PCB Through-hole Mounting



## Application Fields

**FA15-220SXXF2N4 Series**-----is a small size, high efficiency module power supply provided by Aipu to customers. This series of power supplies has the advantages of global input voltage range, AC and DC dual-use, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, high safety isolation, and good EMC performance. EMC and safety standards meet international EN55032 and IEC/EN61000 standards. This series of products are widely used in many fields such as power, industry, instrumentation and smart home. When the product is used in a harsh environment with electromagnetic compatibility, please refer to the application circuit given by our company.

## Selection Guide

| Certificate | Model            | Output Specifications |         |         | Max. Capacity Load | Ripple and Noise<br>20 MHz<br>(Max) | Efficiency @ Full Load, 220 VAC (Typical) |
|-------------|------------------|-----------------------|---------|---------|--------------------|-------------------------------------|-------------------------------------------|
|             |                  | Power                 | Voltage | Current |                    |                                     |                                           |
|             |                  | (W)                   | Vo (V)  | Io (mA) | $\mu\text{F}$      | mVp-p                               | %                                         |
| -           | FA15-220S3V3F2N4 | 10                    | 3.3     | 3000    | 3000               | 80                                  | 71                                        |
|             | FA15-220S05F2N4  | 15                    | 5       | 3000    | 1000               | 80                                  | 74                                        |
|             | FA15-220S5V4F2N4 | 15                    | 5.4     | 2778    | 1000               | 80                                  | 75                                        |
|             | FA15-220S09F2N4  | 15                    | 9       | 1667    | 1000               | 80                                  | 82                                        |
|             | FA15-220S12F2N4  | 15                    | 12      | 1250    | 800                | 80                                  | 84                                        |
|             | FA15-220S15F2N4  | 15                    | 15      | 1000    | 800                | 80                                  | 84                                        |
|             | FA15-220S24F2N4  | 15                    | 24      | 625     | 500                | 100                                 | 86                                        |

Note 1: -T denotes a through-hole package; -TS denotes a DIN rail package with a rail width of 35 mm;

Note 2: "\*" indicates models currently under development;

Note 3: Typical output efficiency values are based on the product after 30 minutes of full-load aging;

Note 4: The full-load efficiency (% , TYP) in the table has a tolerance of  $\pm 2\%$ ; full-load efficiency is calculated as the total output power divided by the module's input power.

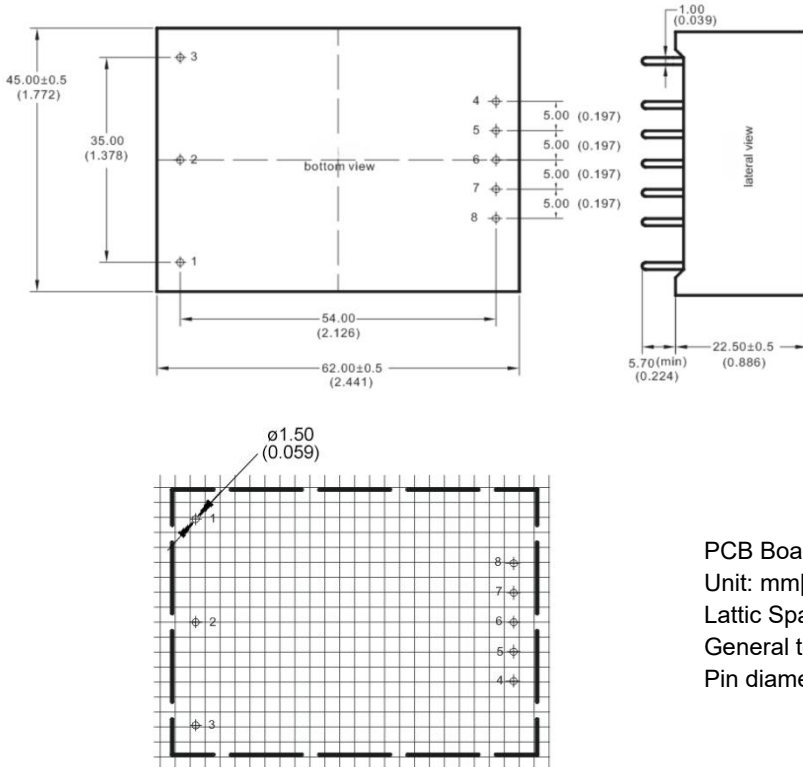
| Input Specifications             |                      |                                 |         |     |      |
|----------------------------------|----------------------|---------------------------------|---------|-----|------|
| Item                             | Operating Conditions | Minimum                         | Typical | Max | Unit |
| Input Voltage Range              | AC Input             | 85                              | 220     | 305 | VAC  |
|                                  | DC Input             | 120                             | 310     | 430 | VDC  |
| Input frequency range            | -                    | 47                              | 50      | 63  | Hz   |
| Input current                    | 115 VAC              | -                               | -       | 0.3 | A    |
|                                  | 220 VAC              | -                               | -       | 0.2 |      |
| Inrush current                   | 115 VAC              | -                               | -       | 10  |      |
|                                  | 220 VAC              | -                               | -       | 20  |      |
| Leakage current                  | -                    | 0.5 mA (typ.) / 230 VAC / 50 Hz |         |     |      |
| Recommended external fuse rating | -                    | 1A–2A/250VAC slow-blow fuse     |         |     |      |
| Hot Plug                         | -                    | N/A                             |         |     |      |
| Remote Control (CNT)             | -                    | N/A                             |         |     |      |

| Output Specifications     |               |                                                                                                                                                                                                                |    |                           |         |      |          |
|---------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------|---------|------|----------|
| Item                      |               | Operating Conditions                                                                                                                                                                                           |    | Minimum                   | Typical | Max  | Unit     |
| Voltage Accuracy          |               | Full Input Voltage Range, any load                                                                                                                                                                             | Vo | -                         | ±2.0    | ±4.0 | %        |
| Line Regulation           |               | Rated load                                                                                                                                                                                                     | Vo | -                         | -       | ±0.5 | %        |
| Load regulation           |               | 20%–100% of Nominal Input Voltage load                                                                                                                                                                         | Vo | -                         | -       | ±1.0 | %        |
| No-load Power Consumption |               | Input 115 VAC                                                                                                                                                                                                  |    | -                         | -       | 0.35 | W        |
|                           |               | Input 220 VAC                                                                                                                                                                                                  |    | -                         | -       |      |          |
| Minimum load              |               | Single-channel output                                                                                                                                                                                          |    | 0                         | -       | -    | %        |
| Start-up time             |               | Input Nominal Voltage (Full Load)                                                                                                                                                                              |    | -                         | 1000    | -    | ms       |
| Hold-up time              |               | Input 220 VAC (full load)                                                                                                                                                                                      |    | -                         | 200     | -    | mS       |
| Dynamic response          | Overshoot     | 25%–50%–25%<br>50%–75%–50%                                                                                                                                                                                     |    | -10                       | -       | +10  | %        |
|                           | Recovery time |                                                                                                                                                                                                                |    | -                         | 5       | -    | ms       |
| Output Overshoot          |               | Full Input Voltage Range                                                                                                                                                                                       |    | ≤10% Vo                   |         |      | %        |
| Short-circuit protection  |               |                                                                                                                                                                                                                |    | Continuous, self-recovery |         |      | Isolated |
| Drift coefficient         |               | -                                                                                                                                                                                                              |    | -                         | ±0.03%  | -    | %/°C     |
| Overcurrent protection    |               | Full Input Voltage Range                                                                                                                                                                                       |    | ≥130% Io, Self-recovery   |         |      | Isolated |
| Ripple & Noise            |               | -                                                                                                                                                                                                              |    | -                         | 50      | 100  | mV       |
|                           |               | Note: The test method for ripple and noise uses the twisted-pair test method. For specific test procedures and equipment configurations, please refer to the section below (Ripple & Noise Test Instructions). |    |                           |         |      |          |

| General Specifications |              |                                           |                                      |         |      |      |
|------------------------|--------------|-------------------------------------------|--------------------------------------|---------|------|------|
| Item                   |              | Operating Conditions                      | Min.                                 | Typical | Max  | Unit |
| Switching Frequency    |              | -                                         | -                                    | 65      | -    | kHz  |
| Operating temperature  |              | -                                         | -40                                  | -       | +105 | °C   |
| Storage temperature    |              | -                                         | -40                                  | -       | +110 |      |
| Soldering temperature  |              | Wave soldering                            | 260±4°C, duration 5–10 s             |         |      |      |
|                        |              | Manual soldering                          | 360±8°C, duration 4–7 s              |         |      |      |
| Relative Humidity      |              | -                                         | 10                                   | -       | 90   | %RH  |
| Isolation Voltage      | Input-Output | Test for 1 minute; leakage current ≤ 5 mA | 4000                                 | -       | -    | VAC  |
| Insulation Resistance  | Input-Output | @Applied DC 500 V                         | 100                                  | -       | -    | MΩ   |
| Safety Standards       |              | -                                         | EN 62368/IEC 62368                   |         |      |      |
| Vibration              |              | -                                         | 10–55 Hz, 10G, 30 min, along X, Y, Z |         |      |      |
| Safety Rating          |              | -                                         | CLASS II                             |         |      |      |
| Enclosure Rating       |              | -                                         | UL 94 V-0                            |         |      |      |
| MTBF                   |              | -                                         | MIL-HDBK-217F @ 25°C > 300,000 hours |         |      |      |
| Weight                 |              | Package Type                              | Weight (Typ)                         |         |      |      |
|                        |              | FA15-220SXXF2N4                           | 55 g                                 |         |      |      |
|                        |              | FA15-220SXXF2N4-T                         | 98g                                  |         |      |      |
|                        |              | FA15-220SXXF2N4-TS                        | 140g                                 |         |      |      |

| EMC Performance |     |                                                                   |                    |                                                                            |
|-----------------|-----|-------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------|
| Component       |     | Sub-item                                                          | Technical Standard | Performance Criteria                                                       |
| EMC             | EMI | CE                                                                | CISPR 22/EN 55032  | CLASS B                                                                    |
|                 |     | RE                                                                | CISPR 22/EN 55032  | CLASS B                                                                    |
|                 | EMS | RI                                                                | IEC/EN 61000-4-3   | 10 V/m Performance Criteria B<br>(See Figure 1 for recommended circuit)    |
|                 |     | CS                                                                | IEC/EN 61000-4-6   | 3 V r.m.s Performance Criteria B<br>(See Figure 1 for recommended circuit) |
|                 |     | ESD                                                               | IEC/EN 61000-4-2   | Contact ±6 kV / Air ±8 kV Performance Criteria B                           |
|                 |     | Surge                                                             | IEC/EN 61000-4-5   | ±1 kV Perf. Criteria B                                                     |
|                 |     | EFT/Burst                                                         | IEC/EN 61000-4-4   | ±2 kV Perf. Criteria B                                                     |
|                 |     | Voltage Dips, Short Interruptions and Voltage Variations Immunity | IEC/EN 61000-4-11  | 0%–70% Perf.Criteria B                                                     |

## F2 Package Dimensions



| Pin Description |          |                 |
|-----------------|----------|-----------------|
| Pin             | Function |                 |
| 1               | FG       | Input Ground    |
| 2               | AC(N)    | Neutral input   |
| 3               | AC(L)    | Live input      |
| 4               | +Vo      | Output Positive |
| 5               | NP       | No Pin          |
| 6               | NP       | No Pin          |
| 7               | NP       | No Pin          |
| 8               | -Vo      | Output Negative |

PCB Board Vertical View

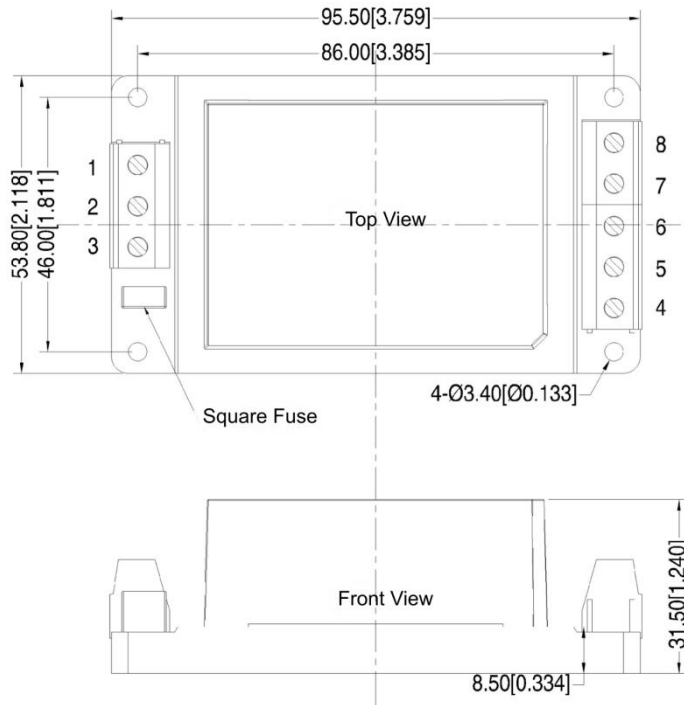
Unit: mm[inch]

Latic Spacing: 2.54mm(0.1 inch)

General tolerance: ±0.10mm(±0.004 inch)

Pin diameter tolerance: ±0.50mm(±0.019 inch)

## F2-T Mechanical Dimensions



| Pin Description |          |                 |
|-----------------|----------|-----------------|
| Pin             | Function |                 |
| 1               | FG       | Input Ground    |
| 2               | AC(N)    | Neutral input   |
| 3               | AC(L)    | Live input      |
| 4               | +Vo      | Output Positive |
| 5               | NC       | No function     |
| 6               | NC       | No function     |
| 7               | NC       | No function     |
| 8               | -Vo      | Output Negative |

Note:

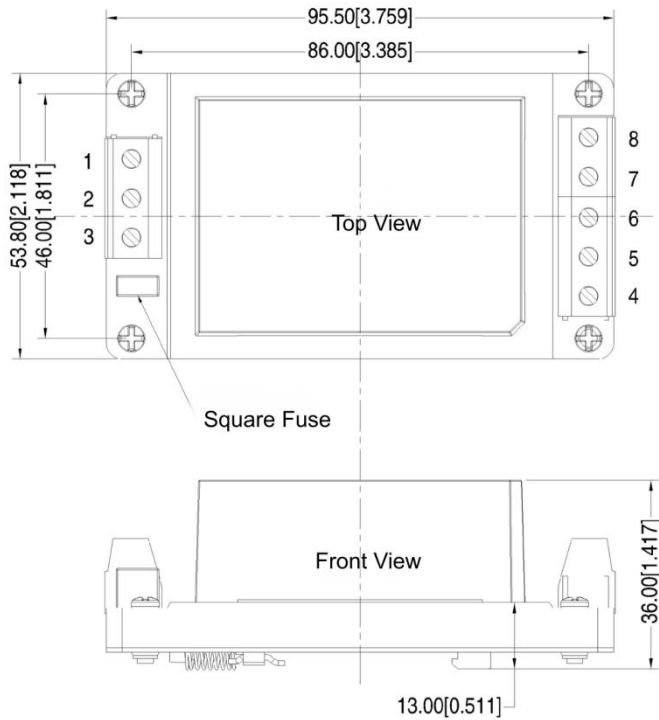
Unit: mm[inch]

Wire Gauge: 24-12 AWG

Tightening torque: 0.4 N · m (Max.)

General tolerances: ±1.00 mm [±0.039 inch]

F2-TS Mechanical Dimensions

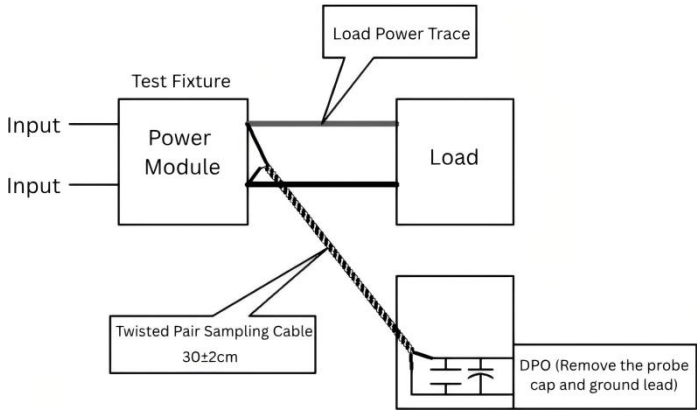


| Pin Description |          |                 |
|-----------------|----------|-----------------|
| Pin             | Function |                 |
| 1               | FG       | Input Ground    |
| 2               | AC(N)    | Neutral input   |
| 3               | AC(L)    | Live input      |
| 4               | +Vo      | Output Positive |
| 5               | NC       | No function     |
| 6               | NC       | No function     |
| 7               | NC       | No function     |
| 8               | -Vo      | Output Negative |

Note:  
Unit: mm[inch]  
Wire Gauge: 24-12 AWG  
Tightening torque: 0.4 N • m (Max.)  
General tolerances: ± 1.00 mm [± 0.039 inch]

| Package Code | L x W x H             |                          |
|--------------|-----------------------|--------------------------|
| F2           | 62.0 x 45.0 x 22.5 mm | 2.441 x 1.772 x 0.885 in |
| F2-T         | 95.5 x 53.8 x 31.5 mm | 3.759 x 2.118 x 1.240 in |
| F2-TS        | 95.5 x 53.8 x 36.0 mm | 3.759 x 2.118 x 1.417 in |

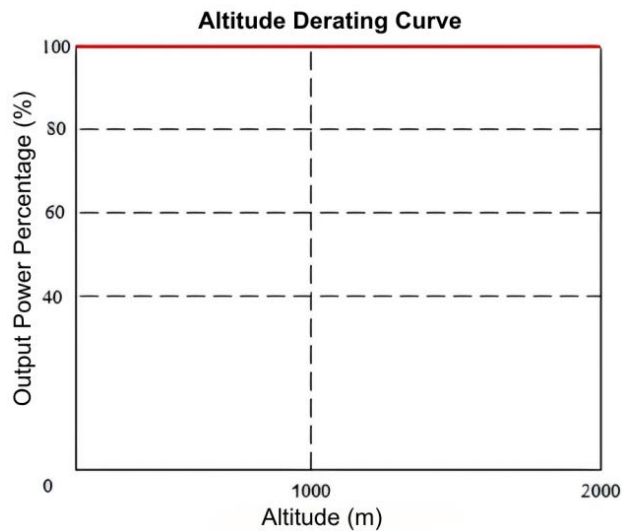
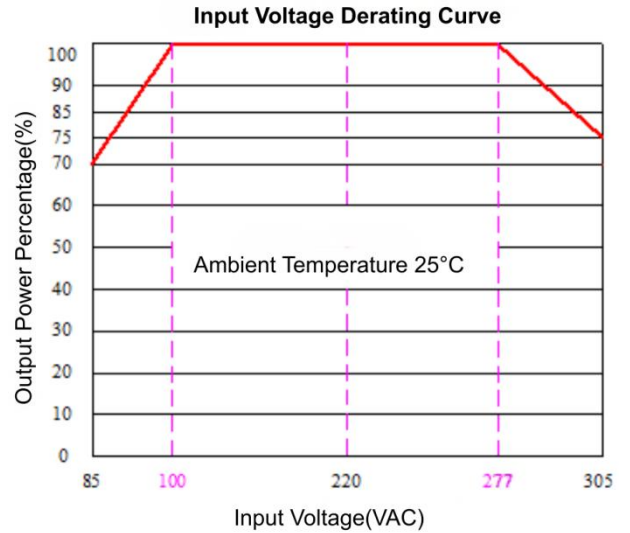
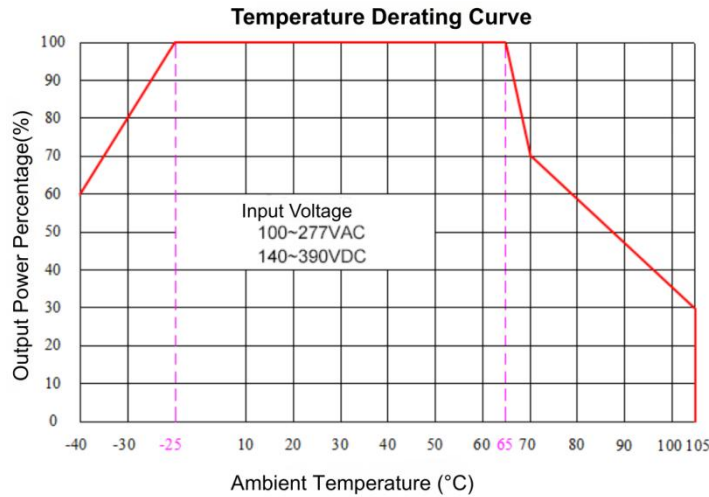
Ripple & Noise Test Specifications (Twisted-pair Method, 20 MHz Bandwidth)



Testing Methods:

1. Ripple & Noise: Measured using the 12# twisted pair method with oscilloscope bandwidth set to 20MHz (or 100MHz). A 0.1 μ F polypropylene capacitor and a 10 μ F high-frequency low-impedance electrolytic capacitor are connected in parallel at the probe tip. The oscilloscope is set to Sample mode.
2. Ripple & Noise Test Setup:  
Connect the module input to the power source and the output to the electronic load via a test fixture. Sampling is performed directly at the output ports using a 30cm ± 2cm [11.81 ± 0.79 inch] sampling wire. Power cables with appropriate gauges and insulation should be selected based on the output current.

## Product Characteristic Curves



Note 1: The input voltage ranges from 85–100 VAC, 277–305 VAC, 120–140 VDC, and 390–430 VDC. Operation must be based on the Derating Curve.

Note 2: This product is suitable for use in environments with natural convection cooling; please contact us if using it in enclosed environments.

Typical Application Circuit Diagram and EMC Recommended Parameters

1. Typical Application Circuit Diagram

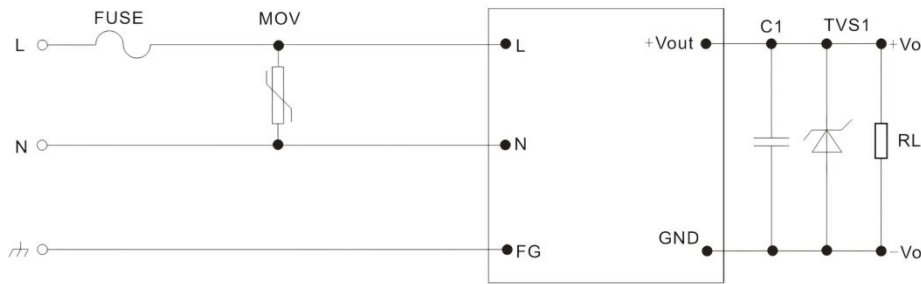


Figure 1

2. Recommended EMC Circuit Diagram

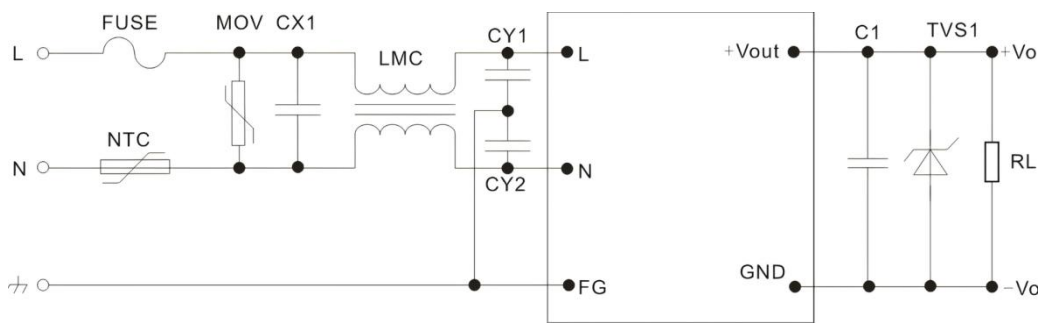


Figure 2

| Component Model | Recommended Value                    | Component Model | Recommended Value |
|-----------------|--------------------------------------|-----------------|-------------------|
| MOV             | 14D511K/4500A                        | NTC             | 5D-9              |
| CX1             | X2/0.1μF/305VAC                      | LMC             | 15 mH, 0.5 A      |
| FUSE            | 2A/300V, slow-blow, must be external | -               | -                 |
| CY1, CY2        | Y1/102M/400VAC                       | -               | -                 |

| Output Voltage               | 5V       | 9V      | 12V     | 15V     | 24V     | 48V     |
|------------------------------|----------|---------|---------|---------|---------|---------|
| Recommended TVS Diode Values | SMBJ7.0A | SMBJ12A | SMBJ20A | SMBJ20A | SMBJ30A | SMBJ64A |

Notes:

C1 is a ceramic capacitor used to filter high-frequency noise. A TVS is recommended to protect downstream circuits in case of module abnormality.

**Notes:**

1. The product must be used within the specified operating range; otherwise, it may be permanently damaged;
2. A fuse must be installed at the product's input;
3. If the product operates below the minimum required load, performance compliance with all Performance Specifications in this manual cannot be guaranteed;
4. If the product operates outside its rated load range, performance compliance with all Performance Specifications in this manual cannot be guaranteed.
5. Unless otherwise specified, the data above was measured at  $T_a = 25^{\circ}\text{C}$ , humidity < 75%, with the input at Nominal Input Voltage and the output at rated load (resistive load);
6. All test methods for the above specifications are based on our company's standards;
7. The Performance Specifications listed above apply to the product models included in this manual. Certain specifications for non-standard models may exceed the requirements stated above; please contact our technical staff directly for specific details;
8. We offer product customization services.

**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: <https://www.aipupower.com>