

### Typical Features

- ◆ Wide input voltage range 85-305VAC/100-430VDC
- ◆ No-load power consumption  $\leq 0.3W@220VAC$
- ◆ Efficiency up to 86% (Typ.)
- ◆ Operating temperature from  $-40^{\circ}C$  to  $+75^{\circ}C$
- ◆ Switching frequency 65KHz
- ◆ Short circuit, over current & over voltage protections
- ◆ Isolation voltage 4000VAC
- ◆ Altitude during operation 5000m Max
- ◆ With UL/CB/CE/RoHS certificates
- ◆ Safety Class II



EN62368-1



IEC62368-1



UL62368-1

### Application Field

**FA15-220SXXG2N4 Series** --- Compact size & high efficiency modular power supplies with global adapted input voltage range (both AC & DC available), low ripple & noise, low temperature rise, low standby power consumption, high efficiency, high reliability and safety isolated. This series of products can be widely used in the fields of Industry, Office devices, Electric power and Household appliances, etc. Additional circuit diagram for EMC is recommended for the application with high EMC requirement.

### Typical Product List

| Certificate | Part No.          | Input Voltage |        | Output Specification |         |         | Max Capacitive Load @220VAC | Ripple & Noise 20MHz (Max) | Efficiency @Full load 220VAC (Typ.) |
|-------------|-------------------|---------------|--------|----------------------|---------|---------|-----------------------------|----------------------------|-------------------------------------|
|             |                   | Nominal       | Range  | Power                | Voltage | Current |                             |                            |                                     |
|             |                   | (VAC)         | (VAC)  | P(W)                 | Vo (V)  | Io (mA) |                             |                            |                                     |
| CE/UL/ROHS  | FA15-220S05G2N4   | 220           | 85-305 | 15                   | 5       | 3000    | 5000                        | 70                         | 85                                  |
| CE/UL/ROHS  | FA15-220S12G2N4   |               |        |                      | 12      | 1250    | 2000                        | 120                        | 85                                  |
| /           | FA15-220S12V3G2N4 |               |        |                      | 12.3    | 1220    | 2000                        | 120                        | 85                                  |
| CE/UL/ROHS  | FA15-220S12V5G2N4 |               |        |                      | 12.5    | 1200    | 2000                        | 120                        | 85                                  |
| UL/ROHS     | FA15-220S15G2N4   |               |        |                      | 15      | 1000    | 2000                        | 120                        | 85                                  |
| CE/UL/ROHS  | FA15-220S24G2N4   |               |        |                      | 24      | 625     | 1000                        | 120                        | 86                                  |

Note 1: The typical value of efficiency is based on the product tested after half an hour burn-in at full load.

Note 2: The minimum efficiency is defined as -2% of the typical value.

Note 3: Please contact Aipu sales for other output voltages requirement of this series but not listed in this table.

Note 4: The suffix -T indicates the chassis package, -TS indicates the package of DIN Rail.

### Input Specifications

| Item                | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------------|------|------|------|------|
| Input voltage range | AC Input        | 85   | 220  | 305  | VAC  |

|                           |                          |                       |     |      |     |
|---------------------------|--------------------------|-----------------------|-----|------|-----|
|                           | DC Input                 | 100                   | 310 | 430  | VDC |
| Input frequency range     | -                        | 47                    | 50  | 63   | Hz  |
| Input current             | Input 115VAC             | -                     | -   | 0.45 | A   |
|                           | Input 220VAC             | -                     | -   | 0.3  |     |
| Surge current             | Input 115VAC             | -                     | -   | 30   | A   |
|                           | Input 220VAC             | -                     | -   | 60   |     |
| No-load power consumption | Input 115VAC             | -                     | -   | 0.3  | W   |
|                           | Input 220VAC             | -                     | -   |      |     |
| Leakage current           | -                        | 0.5mA TYP/230VAC/50Hz |     |      |     |
| External fuse recommended | 2A/300VAC Slow-blow fuse |                       |     |      |     |
| Hot plug                  | -                        | N/A                   |     |      |     |
| ON/OFF control            | -                        | N/A                   |     |      |     |

**Output Specifications**

| Item                          |                 | Test Conditions                      | Min.                      | Typ.   | Max.   | Unit   |
|-------------------------------|-----------------|--------------------------------------|---------------------------|--------|--------|--------|
| Voltage accuracy              |                 | Full input voltage range, any load   | -                         | -      | ±3.0   | %      |
| Line regulation               |                 | Rated Load                           | -                         | -      | ±0.5   | %      |
| Load regulation               |                 | Nominal input voltage, 20%~100% load | -                         | -      | ±3.0   | %      |
| Minimum load                  |                 | Single Output                        | 0                         | -      | -      | %      |
| Dynamic response              | Overshoot range | 25%~50%~25%                          | -5.0                      | -      | +5.0   | %      |
|                               | Recovery time   | 50%~75%~50%                          | -                         | -      | +5.0   | mS     |
| Temperature drift coefficient |                 | -                                    | -                         | ±0.03% | -      | %/°C   |
| Turn-on delay time            |                 | Input 115VAC (full load)             | -                         | -      | 6000   | mS     |
|                               |                 | Input 220VAC (full load)             | -                         | -      | 3000   |        |
| Power-off hold up time        |                 | Input 115VAC (full load)             | -                         | 20     | -      | mS     |
|                               |                 | Input 220VAC (full load)             | -                         | 80     | -      |        |
| Output overshooting           |                 | Full input voltage range             | ≤10%Vo                    |        |        | %Vo    |
| Short circuit protection      |                 |                                      | Continuous, Self-recovery |        |        | Hiccup |
| Over current protection       |                 | Input 220VAC                         | 120%Io                    | -      | 170%Io | Hiccup |
| Over voltage protection       |                 | Output 5VDC                          | ≤7.5                      |        |        | VDC    |
|                               |                 | Output 12V/12.3V/12.5VDC             | ≤18                       |        |        |        |
|                               |                 | Output 15VDC                         | ≤20                       |        |        |        |
|                               |                 | Output 24VDC                         | ≤30                       |        |        |        |
| Noise & Ripple                |                 | 5%-100% load, 20MHz bandwidth        | -                         | -      | 120    | mVp-p  |

Note: The Ripple & Noise is tested by the Parallel-line Method, please refer to the following test instruction.

**General Specifications**

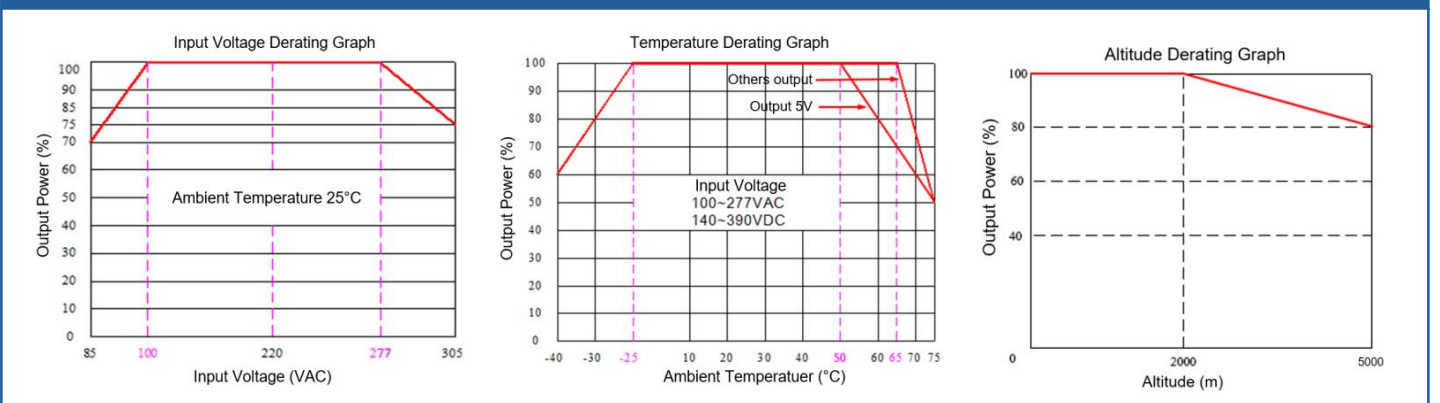
| Item                  | Test Conditions                         | Min. | Typ. | Max. | Unit |
|-----------------------|---|------|------|------|------|
| Switching frequency   | -                                       | 61   | 65   | 73   | KHz  |
| Operating temperature | Refer to the Temperature Derating Graph | -40  | -    | +75  | °C   |

|                       |                    |                                 |                                    |   |                            |         |
|-----------------------|--------------------|---------------------------------|------------------------------------|---|----------------------------|---------|
| Storage temperature   | -                  |                                 | -40                                | - | +90                        |         |
| Soldering temperature | Wave-soldering     |                                 | 260±4°C, timing 5-10S              |   |                            |         |
|                       | Manual-soldering   |                                 | 360±8°C, timing 4-7S               |   |                            |         |
| Relative humidity     | -                  |                                 | 10                                 | - | 90                         | %RH     |
| Isolation voltage     | I/P-O/P            | Test 1min, leakage current ≤5mA | 4000                               | - | -                          | VAC     |
| Insulation resistance | I/P-O/P            | @DC500V                         | 100                                | - | -                          | MΩ      |
| MTBF                  | MIL-HDBK-217F@25°C |                                 | 300                                | - | -                          | K Hours |
| Vibration             | -                  |                                 | 10-55Hz, 10G, 30Min, along X, Y, Z |   |                            |         |
| Safety class          | -                  |                                 | CLASS II                           |   |                            |         |
| Case flame class      | -                  |                                 | UL 94-V0                           |   |                            |         |
| Weight & Dimensions   | Part No.           | Weight (Typ.)                   | Dimensions L x W x H               |   |                            |         |
|                       | FA15-220SXXG2N4    | 50g                             | 47.60 x 26.80 x 23.50 mm           |   | 1.874 x 1.055 x 0.925 inch |         |
|                       | FA15-220SXXG2N4-T  | 65g                             | 76.00 x 31.50 x 32.50 mm           |   | 2.992 x 1.240 x 1.279 inch |         |
|                       | FA15-220SXXG2N4-TS | 85g                             | 76.00 x 31.50 x 37.50 mm           |   | 2.992 x 1.240 x 1.476 inch |         |

### EMC Performance

| Total item                     | Sub item         | Test Standard           | Performance/Class  |   |
|--------------------------------|------------------|-------------------------|--|---|
| EMC                            | EMI              | CE                      | CISPR32/EN55032 CLASS B (with the Recommended Circuit 1) |   |
|                                |                  | RE                      | CISPR32/EN55032 CLASS B (with the Recommended Circuit 1) |   |
|                                | EMS              | ESD                     | IEC/EN61000-4-2  | Contact ±6KV / Air ±8KV Perf. Criteria B  |
|                                |                  | RS                      | IEC/EN61000-4-3  | 10V/m Perf. Criteria A  |
|                                |                  | EFT                     | IEC/EN61000-4-4  | ±2KV Perf. Criteria B   |
|                                |                  |                         |  | ±4KV Perf. Criteria A (with the Recommended Circuit 1)                                    |
|                                |                  | Surge                   | IEC/EN61000-4-5  | Line to line ±1KV Perf. Criteria B  |
|                                |                  |                         |  | Line to line ±2KV / line to ground ±4KV Perf. Criteria A (with the Recommended Circuit 1) |
|                                |                  | CS                      | IEC/EN61000-4-6  | 10Vr.m.s Perf. Criteria A   |
|                                |                  | PFMF                    | IEC/EN61000-4-8  | 10A/m Perf. Criteria A  |
| Voltage dips and interruptions | IEC/EN61000-4-11 | 0%-70% Perf. Criteria B |  |   |

### Product Characteristics Graphs



Note 1: The output power should be derated based on the input voltage derating graph at 85~100VAC/100~140VDC & 277~305VAC/390~430VDC.

Note 2: This product is designed for natural convection cooling. Please contact us if it will be used in an enclosed environment.

### Recommended Circuits for Application

#### 1, EMC solution and recommended circuit diagram

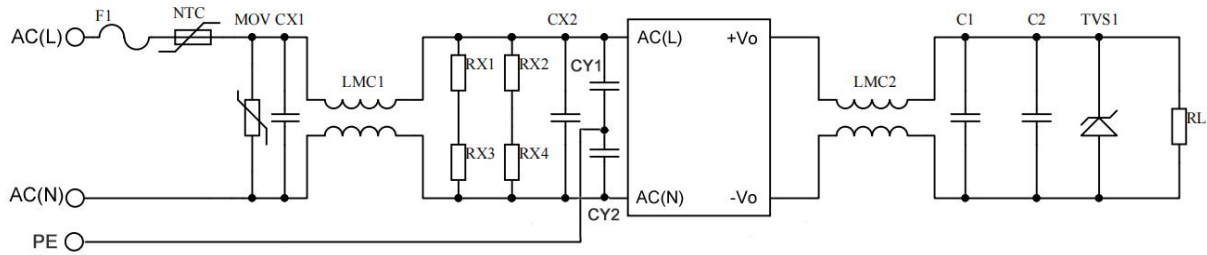


Figure – Circuit 1

|      |   |                    |                |
|------|---|--------------------|----------------|
| FUSE | 2.0A/300VAC, Time-delay fuse (Required) | CX1                | X2/224K/310VAC |
| MOV  | 14D561K/4500A                           | CX2                | X2/104K/310VAC |
| NTC  | 10D-11                                  | CY1, CY2           | Y1/102M/400VAC |
| LMC1 | 30mH/0.6A                               | RX1, RX2, RX3, RX4 | 1206/1MΩ/0.25W |
| LMC2 | 40μH/4A                                 | TVS1               | See note below |

Note:

- 1) C1 capacitance value should be less than the Max capacitive load, a high frequency low impedance electrolytic capacitor is recommended, the withstand voltage should be more than 1.5X of output voltage.
- 2) 0.1μF ceramic SMD capacitor is recommended for C2 which withstand voltage should be more than 1.5X of output voltage.
- 3) TVS1: SMBJ7.0A is recommended for 5V output, SMBJ20A for 12V/12.3V/12.5V/15V outputs, SMBJ30.0A for 24V output.

#### 2, External circuit diagram for FA15-220S05G2N4 to achieve low Ripple & Noise

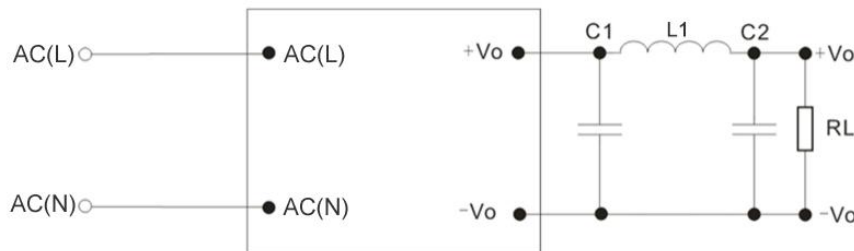
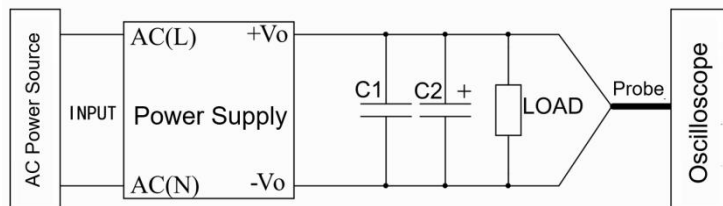


Figure - Circuit 2

Note:

- 1) Electrolytic capacitors 330μF/10V is recommended for C1 and 220μF/10V for C2
- 2) 2.2H/4A Drum choke is recommended for L1.

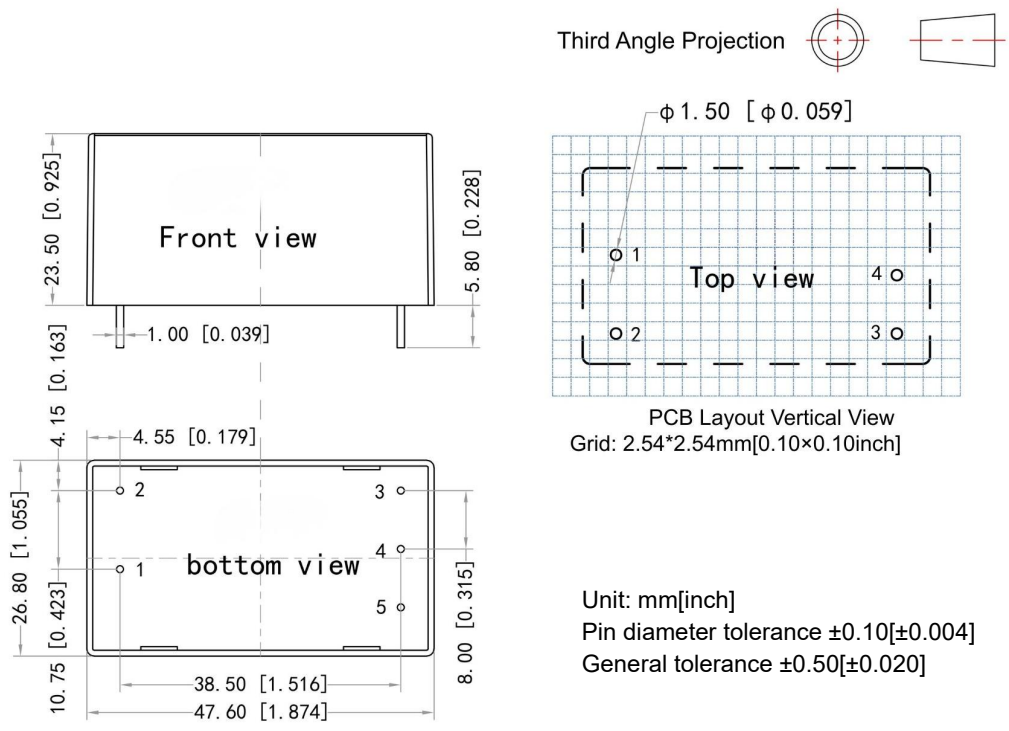
### Ripple & Noise Test Instruction (Parallel-line Method, 20MHz Bandwidth)



1. The Ripple & Noise test needs the cables in parallel, an oscilloscope that should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. One polypropylene capacitor C1(0.1uF) and one high-frequency low-resistance electrolytic capacitor C2(10uF) are connected in parallel with the probe.

2. Output ripple and noise test setup: Connect the input terminal of the module to the power supply, and connect the output to the electronic load via a test fixture board. Use separate sampling wires directly from the output ports for measurement. Select insulated power cables with an appropriate wire gauge based on the output current.

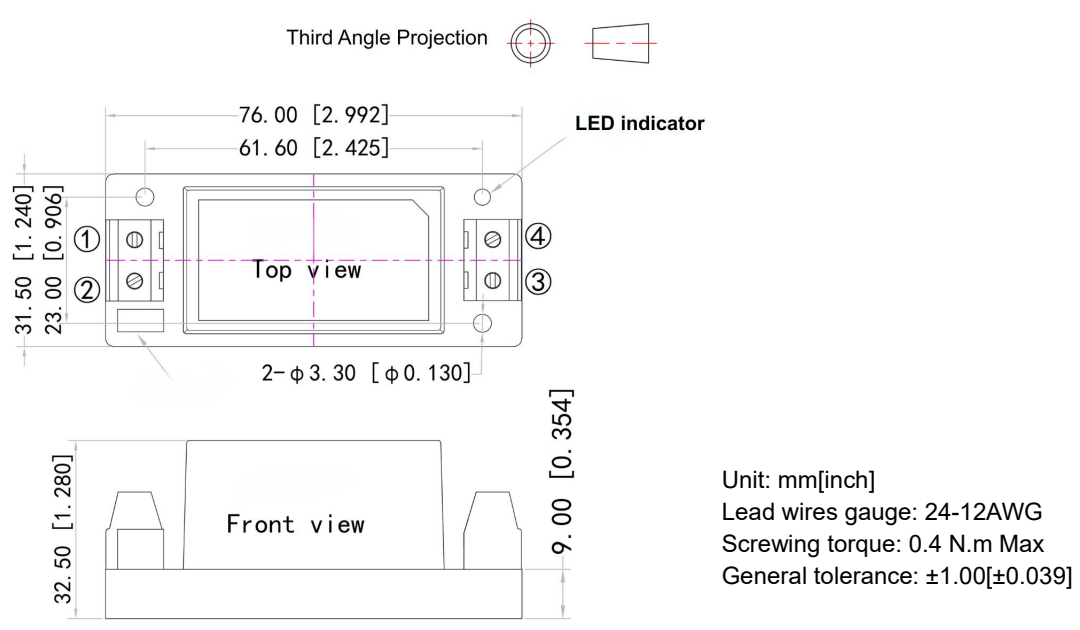
**Mechanical Dimensions**



**Pin-out Function Description**

| Pin No.     | 1               | 2                  | 3               | 4               | 5      |
|-------------|-----------------|--------------------|-----------------|-----------------|--------|
| Symbol      | AC(L)           | AC(N)              | -Vo             | +Vo             | NP     |
| Description | AC Input (Line) | AC Input (Neutral) | Negative Output | Positive Output | No Pin |

**(-T) Mechanical Dimensions**



| Terminal Function Description |                 |                    |                 |                 |
|-------------------------------|-----------------|--------------------|-----------------|-----------------|
| Terminal No.                  | 1               | 2                  | 3               | 4               |
| Symbol                        | AC(L)           | AC(N)              | -Vo             | +Vo             |
| Description                   | AC Input (Line) | AC Input (Neutral) | Negative Output | Positive Output |

**(-TS) Mechanical Dimensions**

Unit: mm[inch]  
Lead wires gauge: 24-12AWG  
Screwing torque: 0.4 N.m Max  
General tolerance: ±1.00[±0.039]

| Terminal Function Description |                 |                    |                 |                 |
|-------------------------------|-----------------|--------------------|-----------------|-----------------|
| Terminal No.                  | 1               | 2                  | 3               | 4               |
| Symbol                        | AC(L)           | AC(N)              | -Vo             | +Vo             |
| Description                   | AC Input (Line) | AC Input (Neutral) | Negative Output | Positive Output |

**Application Notice**

1. The product should be used according to the specifications, otherwise it could be permanently damaged.
2. A fuse should be used at the input.
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 on this datasheet 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.

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