# AC/DC Converter

## FA5-220SXXG2D4(-T)(-TS) Series

## Typical Features

- ◆ Wide input voltage range 85-305VAC/120-430VDC
- ◆ No load power consumption ≤ 0.25W
- ◆ Efficiency 76%(TYP.)
- ◆ Operating temperature from -40 to +85℃
- ◆ Switching Frequency 65KHz
- ◆ Short circuit & over-current protections
- ◆ Isolation voltage 4000Vac
- ◆ Altitude during operation 5000m Max
- ◆ Compliant with IEC/EN62368/UL62368
- ◆ With TUV-CE, CB & UL Certificates
- ◆ PCB DIP mounting

## Application Field

***FA5-220SXXG2D4(-T)(-TS) Series -----*** *Compact size high efficiency modular power supplies with global adapted input voltage range(both AC and DC available), low ripple, low temperature rise, low standby power consumption, high efficiency, high reliability, safety isolated & good EMC performance. This series of products can be widely used in the fields of electric power, industry, instrument and smart home devices, etc. The additional circuit for EMC is recommended in this data sheet for the application with high EMC requirement.*

## Typical Product List

| Certificate | Part No. | Output Specifications | | | Max Capacitive Load | Max Ripple & Noise 20MHz | Efficiency@ Full Load, 220Vac |
|---|---|---|---|---|---|---|---|
| | | Power | Voltage | Current | | | |
| | | (W) | Vo (V) | Io (mA) | uF | mVp-p | %(Typ.) |
| - | FA5-220S3V3G2D4 | 3.3 | 3.3 | 1000 | 2000 | 100 | 69 |
| CE/CB/UL | FA5-220S05G2D4 | 5 | 5 | 1000 | 2000 | 100 | 72 |
| CE/CB/UL | FA5-220S12G2D4 | 5 | 12 | 416 | 800 | 120 | 75 |
| - | FA5-220S12V3G2D4 | 5 | 12.3 | 406 | 800 | 120 | 76 |
| CE/CB/UL | FA5-220S12V5G2D4 | 5 | 12.5 | 400 | 800 | 120 | 76 |
| CE/CB/UL | FA5-220S15G2D4 | 5 | 15 | 333 | 800 | 120 | 76 |
| CE/CB/UL | FA5-220S24G2D4 | 5 | 24 | 208 | 300 | 150 | 78 |

Note 1 - Please contact Aipu sales for other output voltages requirement in this series but not listed in this table.

Note 2 - The typical value of efficiency is based on the product tested after half an hour burn-in at full load.

Note 3 - The full load efficiency should be in ±2% of the typical value in this table. The efficiency is calculated by the way that the full output power is divided by the input power.

Note 4 - The suffix -T is for a kind of Chassis packaging, -TS is for a kind of packaging of DIN Rail which width is 35mm.



## Input Specifications

| Item | Operating Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Input Voltage Range | AC input | 85 | 220 | 305 | VAC |
| | DC input | 120 | 310 | 430 | VDC |
| Input Frequency range | - | 47 | 50 | 63 | Hz |
| No Load Power Consumption | Input 115VAC | - | - | 0.25 | W |
| | Input 220VAC | - | - | | |
| Input Current | Input 115VAC | - | - | 0.12 | A |
| | Input 220VAC | - | - | 0.08 | |
| Surge Current | Input 115VAC | - | - | 15 | |
| | Input 220VAC | - | - | 20 | |
| Leakage Current | - | 0.5mA TYP/230VAC/50Hz | | | |
| Recommended External Fuse | - | 2A/300VAC Time-delay fuse | | | |
| 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 | | Rated load | - | - | ±0.5 | % |
| Load Regulation | | Nominal input voltage, 20%~100% load | - | - | ±1.0 | % |
| Minimum Load | | Single Output | 0 | - | - | % |
| Turn-on Delay Time | | Nominal input voltage, full load | - | 50 | - | mS |
| Power-off Hold up Time | | Input 115VAC, full load | - | 50 | - | mS |
| | | Input 220VAC, full load | - | 100 | - | |
| Dynamic Response | Overshoot range | 25%~50%~25%<br>50%~75%~50% | -5.0 | - | +5.0 | % |
| | Recovery time | | - | 5.0 | - | mS |
| Output Overshoot | | Full input voltage range | ≤10%Vo | | | % |
| Short circuit Protection | | | Continuous, self-recovery | | | Hiccup |
| Temperature Drift | | - | - | ±0.03% | - | %/℃ |
| Over Current Protection | | Input 220VAC | ≥130% Io, self-recovery | | | Hiccup |
| Ripple & Noise | | Full input voltage range | - | 60 | 150 | mV |
| | | Note - tested by twisted pair method, please refer to the following Ripple & Noise Test inspection | | | | |

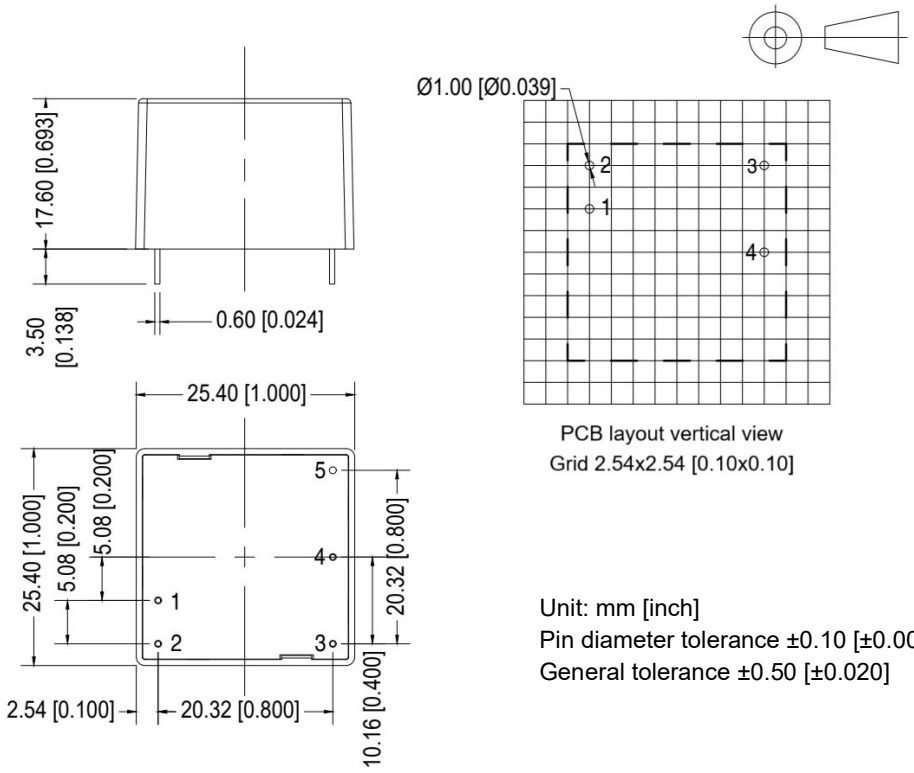
## General Specifications

| Item | | Operating Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Switching Frequency | | - | - | 65 | - | KHz |
| Operating Temperature | | Refer to the temperature derating curve | -40 | - | +85 | ℃ |
| 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 | I/P-O/P | Test 1min, leakage current ≤5mA | 4000 | - | - | VAC |
| Insulation Resistance | I/P-O/P | @ DC500V | 100 | - | - | MΩ |
| Safety Standard | | - | IEC/EN62368/UL62368 | | | |
| Vibration | | - | 10-55Hz,10G, 30 Min, along X, Y, Z | | | |
| Safety Standard | | - | CLASS II | | | |
| Flame Class of Case | | | UL94 V-0 | | | |
| MTBF | | - | MIL-HDBK-217F@25℃ ＞300,000H | | | |
| Product weight | | Part No. | Weight (Typ.) | | | |
| | | FA5-220SXXG2D4 | 18g | | | |
| | | FA5-220SXXG2D4-T | 38g | | | |
| | | FA5-220SXXG2D4-TS | 58g | | | |

## EMC Performance

| Total Item | | Sub Item | Test Standard | Performance/Class |
|---|---|---|---|---|
| EMC | EMI | CE | CISPR22/EN55032 | CLASS B (with Recommended Circuit 1) |
| | | RE | CISPR22/EN55032 | CLASS B (with Recommended Circuit 1) |
| | EMS | RS | IEC/EN61000-4-3 | 10V/m Perf.Criteria B (with Recommended Circuit 1) |
| | | CS | IEC/EN61000-4-6 | 3Vr.m.s Perf.Criteria B (with Recommended Circuit 1) |
| | | ESD | IEC/EN61000-4-2 | Contact ±6KV / Air ±8KV Perf.Criteria B |
| | | Surge | IEC/EN61000-4-5 | Line to line ±2KV / line to ground ±4KV<br>Perf.Criteria B (with Recommended Circuit 1) |
| | | EFT | IEC/EN61000-4-4 | ±2KV Perf.Criteria B |
| | | Voltage Dips & Interruptions | IEC/EN61000-4-11 | 0%~70% Perf.Criteria B |

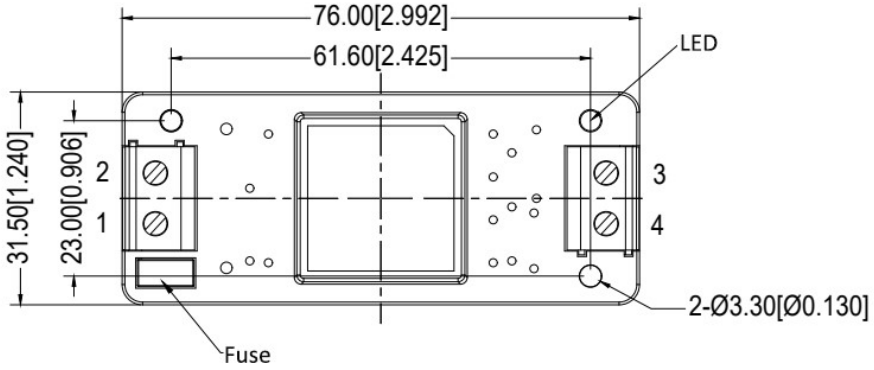
## Mechanical Dimensions

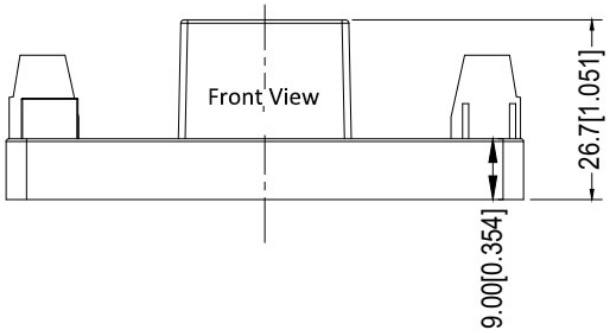



| Pin No. | Function |
|---|---|
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | +Vout |
| 4 | -Vout |
| 5 | No Pin |

Unit: mm [inch]
Pin diameter tolerance ±0.10 [±0.004]
General tolerance ±0.50 [±0.020]

## -T Mechanical Dimensions

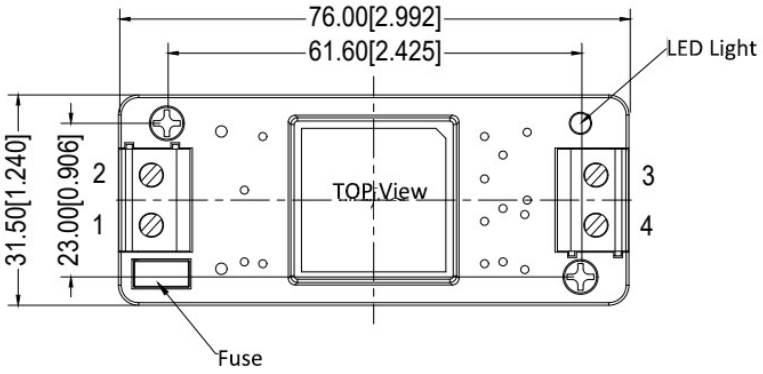


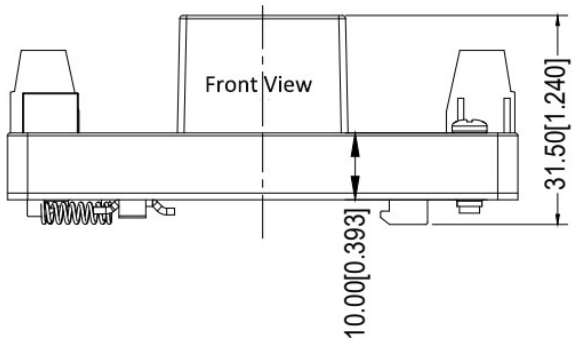

| Terminal No. | Function |
|---|---|
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | +Vout |
| 4 | -Vout |

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

## -TS Mechanical Dimensions




| Terminal No. | Function |
|---|---|
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | +Vout |
| 4 | -Vout |

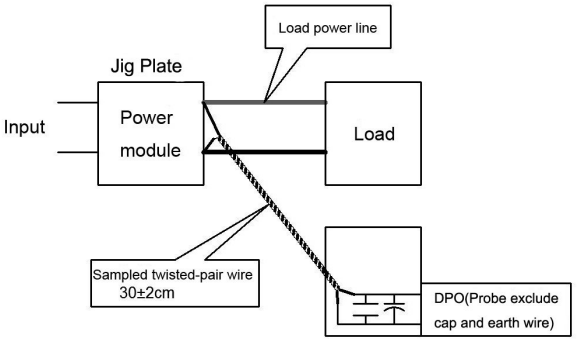



Note:
Unit: mm [inch]
Lead wire size 24-12AWG
Screwing torque 0.4 N.m Max
General tolerance: ±1.00 [±0.039]

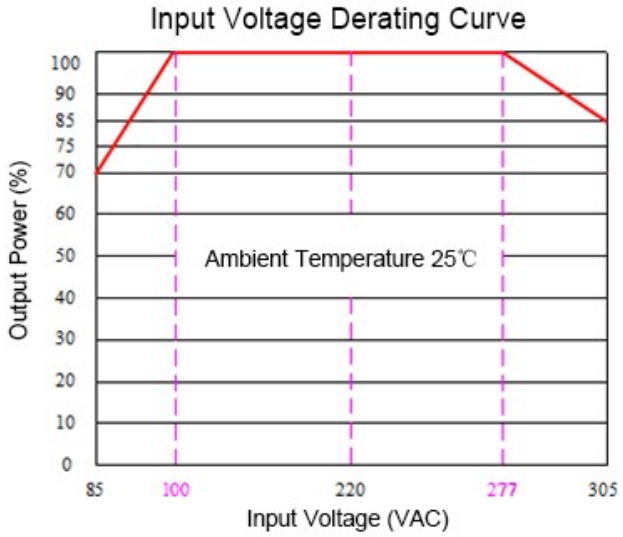
| Packaging Code | Dimensions L x W x H | |
|---|---|---|
| - | 25.4X25.4X17.6 mm | 1.000X1.000X0.693 inch |
| -T | 76.0X31.5X26.7 mm | 2.992X1.240X1.051 inch |
| -TS | 76.0X31.5X31.5 mm | 2.992X1.240X1.240 inch |

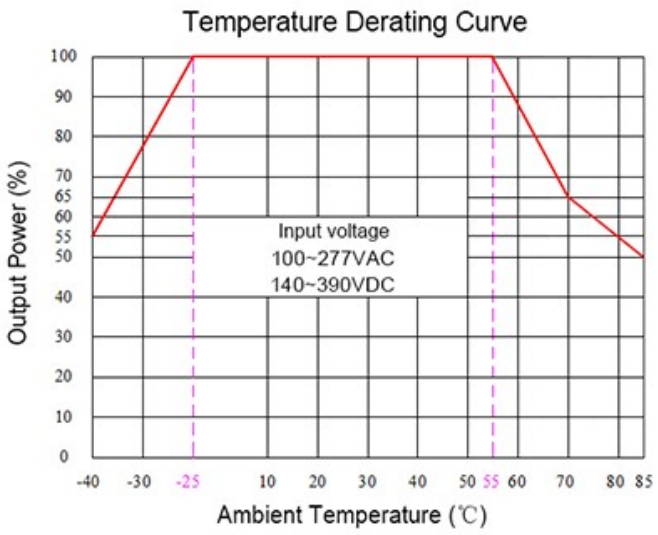
## Ripple & Noise Test Instructions (Twisted Pair Method, 20MHz Bandwidth)

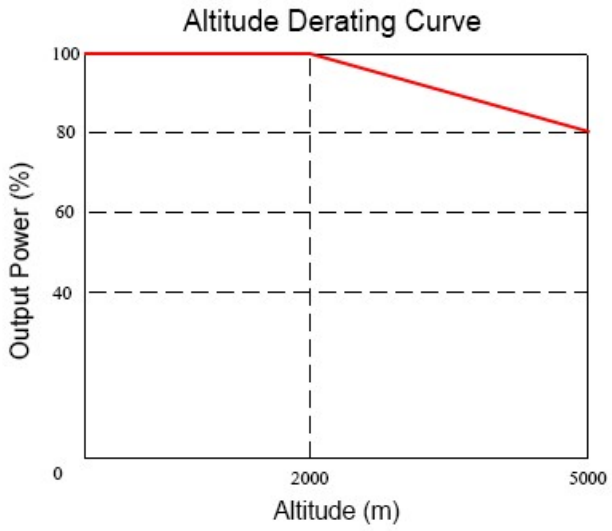
1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which bandwidth should be set to 20MHz, 0.1uF polypropylene capacitor and 10uF high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes (100M bandwidth). The oscilloscope should be set at the Sample Mode.
2. The test diagram is shown on the right. 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 twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the location is as close as possible to the output pins or terminals. The test can be started after input power on.



## Product Performance Curves



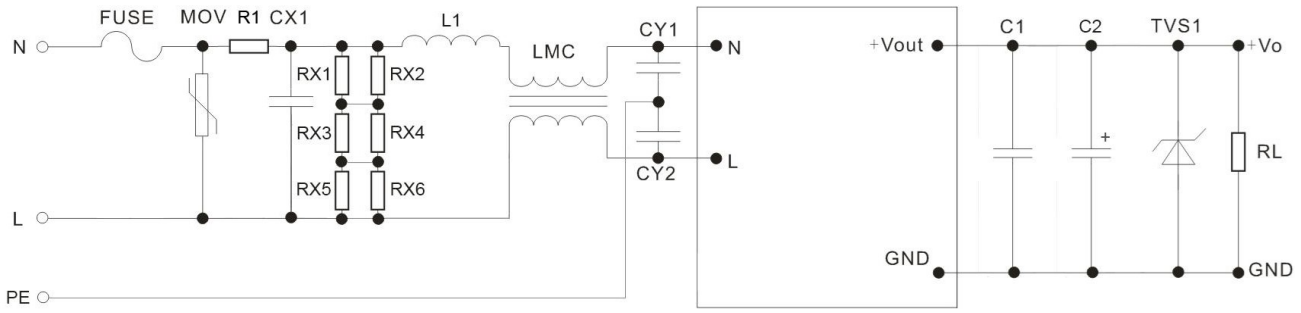




Note 1 - The output power should be derated based on the input voltage derating curve at 85~100VAC/ 277~305VAC & 120~140VDC/ 390~430VDC.

Note 2 - This product should operate at a natural air condition, please contact us if it need be used at a closed space.

## Recommended EMC Circuit for Application




**Circuit 1**

| Part No. | FUSE (*) | MOV | R1 (*) | CX1 | RX1 RX2 RX3 RX4 RX5 RX6 | L1 | LMC | CY1 CY2 | C1 | C2 | TVS1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FA5-220S3V3G2D4 | 2A/ 300V Time delay fuse | 14D561K/ 4500A | 33Ω/ 3W Wire-wound resistor | X2/ 334/ 305VAC | 1206/1.5M, 1/4W | 1.2mH/ 0.3A | 20mH/ 0.3A | Y1/ 1nF/ 400VAC | 1uF/50V | 100uF/ 16V | SMBJ7.0A |
| FA5-220S05G2D4 | | | | | | | | | | | |
| FA5-220S12G2D4 | | | | | | | | | | 68uF/ 16V | SMBJ20A |
| FA5-220S12V3G2D4 | | | | | | | | | | | |
| FA5-220S12V5G2D4 | | | | | | | | | | | |
| FA5-220S15G2D4 | | | | | | | | | | | |
| FA5-220S24G2D4 | | | | | | | | | | 47uF/ 35V | SMBJ30A |

Note - * marked component is necessary, not optional.

**Application Notice**

1.The products should be used according to the specifications in this datasheet, otherwise it could be permanently damaged.

2. A fuse should be connected at input.

3. The product performance in this datasheet cannot be guaranteed if it works at a lower load than the minimum load defined.

4. The product performance in this datasheet cannot be guaranteed if it works under over-load condition.

5. Unless otherwise specified, all values or indicators in this datasheet are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).

6. All values or indicators in this datasheet had been tested based on Aipupower test specifications.

7.The specifications are specially for the parts listed in 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: https://www.aipupower.com

