# AC/DC Converter
## DA10-220SXXG9N4 Series

## Typical Features

- ◆ Wide input voltage range: 85-305VAC/120-430VDC
- ◆ No load power consumption ≤ 0.35W
- ◆ Transfer Efficiency 78%(TYP.)
- ◆ Switching Frequency: 65KHz
- ◆ Protections: short circuit, over current
- ◆ Isolation voltage: 3600Vac
- ◆ Meet IEC62368/UL62368/EN62368 test standard
- ◆ Ultra-small package for bare board, industrial design
- ◆ PCB mounting

## Application Field

***DA10-220SXXG9N4 Series-----*** *a compact size, high efficient power module offered by Aipu. It features universal input voltage range, AC and DC dual-use, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, safer isolation, good EMC performance. EMC and Safety standard meet international EN55032 ,IEC/EN61000. These series have important application for power, industry, instrument and smart home field. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.*

## Typical Product List

| Certificate | Part No. | Output Specifications | | | Max. Capacitive Load | Ripple& Noise 20MHz (Max) | Efficiency@ Full Load, 220Vac (Typical) |
|---|---|---|---|---|---|---|---|
| | | Power | Voltage | Current | | | |
| | | (W) | Vo(V) | Io(m A) | u F | mVp-p | % |
| - | DA10-220S3V3G9N4 | 6.6 | 3.3 | 2000 | 800 | 100 | 72 |
| - | DA10-220S05G9N4 | 10 | 5 | 2000 | 800 | 100 | 78 |
| - | DA10-220S09G9N4 | 10 | 9 | 1111 | 400 | 120 | 80 |
| - | DA10-220S12G9N4 | 10 | 12 | 833 | 300 | 120 | 82 |
| - | DA10-220S12V5G9N4 | 10 | 12.5 | 800 | 300 | 120 | 82 |
| - | *DA10-220S15G9N4 | 10 | 15 | 667 | 300 | 120 | 82 |
| - | DA10-220S24G9N4 | 10 | 24 | 416 | 47 | 150 | 84 |

Note 1: Due to space limitations, above is only a part of our product list, please contact our sales team for more items.

Note 2: The typical value of output efficiency is based on module is full loaded and burned-in after half an hour.

Note 3: "*" are models being developing.

Note 4: The fluctuation range of full load efficiency(%,TYP) in table is ±2%, full load efficiency= output power/module's input power.

Note 5: Ripple & Noise is tested by twisted pair method, details please refer to Ripple & Noise test at back.

## 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 |
| Input Current | 115VAC | / | / | 0.20 | A |
| | 220VAC | / | / | 0.15 | |
| Surge Current | 115VAC | / | / | 20 | |
| | 220VAC | / | / | 35 | |
| Leakage Current | - | 0.25mA TYP/230VAC/50Hz | | | |
| Recommended External Input Fuse | - | 1A-3A/250VAC slow fusing | | | |
| Hot Plug | - | Unavailable | | | |
| Remote Control Terminal | - | Unavailable | | | |

## Output Specifications

| Item | | Operating Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Voltage Accuracy | | Full input voltage range, 10-100% load (0%-10% load, could work if output stable) | 3.3V | - | ±2.0 | ±7.0 | % |
| | | | Others | - | ±2.0 | ±6.0 | |
| Line Regulation | | Nominal load | Vo | - | ±1.0 | ±3.0 | % |
| Load Regulation | | Nominal input voltage, 20%~100% load | Vo | - | ±1.0 | ±5.0 | % |
| No Load Consumption | | Input 115VAC | | - | - | 0.35 | W |
| | | Input 220VAC | | - | - | | |
| Minimum Load | | Single Output | | 10 | - | - | % |
| Start up Delay Time | | Nominal input voltage (full load) | | - | 1000 | - | mS |
| Power-off Holding Time | | Input 115VAC (full load) | | | 50 | | mS |
| | | Input 220VAC (full load) | | - | 80 | - | |
| Dynamic Response | Overshoot range | 25%~50%~25% 50%~75%~50% | | -5.0 | - | +5.0 | % |
| | Recovery time | | | -5.0 | - | +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 | | ≥110% Io, self-recovery | | | Hiccup |

## General Specifications

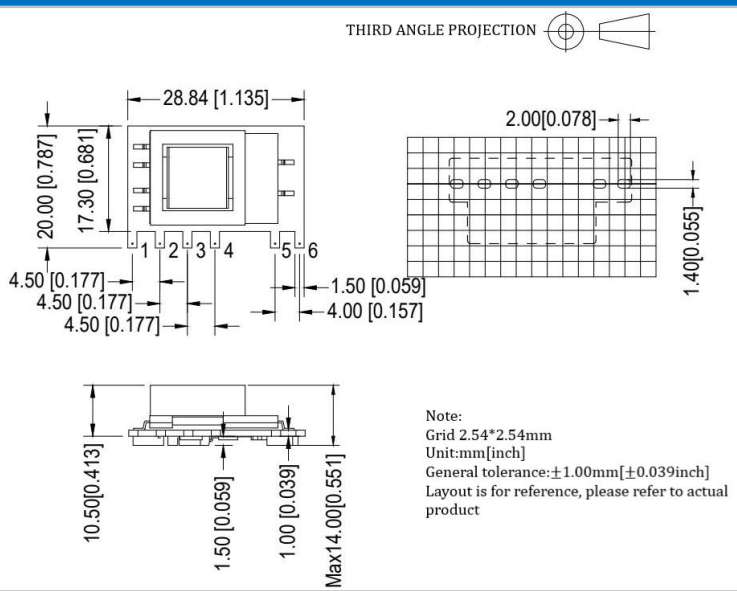
| Item | Operating Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Switching Frequency | - | - | 65 | - | KHz |
| Operating Temperature | - | -20 | - | +85 | ℃ |

| | | | | | | |
|---|---|---|---|---|---|---|
| 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 | Input-Output | Test 1min, leakage current≤5mA | 3600 | - | - | VAC |
| Insulation Resistance | Input-Output | @ DC500V | 100 | - | - | MΩ |
| Safety Standard | | - | EN62368、IEC62368 | | | |
| Vibration | | - | 10-55Hz,10G,30Min,alongX,Y,Z | | | |
| Safety Standard | | - | CLASS Ⅱ | | | |
| MTBF | | - | MIL-HDBK-217F@25℃＞300,000H | | | |

## EMC Characteristics

| Total Item | | Sub Item | Test Standard | Class |
|---|---|---|---|---|
| EMC | EMI | CE | CISPR22/EN55032 | CLASS B (See Recommended Circuit on photo 2) |
| | | RE | CISPR22/EN55032 | CLASS B (See Recommended Circuit on photo 2) |
| | EMS | RS | IEC/EN61000-4-3 | 10V/m Perf.Criteria B (See Recommended Circuit on photo 1) |
| | | CS | IEC/EN61000-4-6 | 10Vr.m.s Perf.Criteria B (See Recommended Circuit on photo 1) |
| | | ESD | IEC/EN61000-4-2 | Contact ±6KV / Air ±8KV Perf.Criteria B |
| | | Surge | IEC/EN61000-4-5 | ±1KV Perf.Criteria B |
| | | EFT | IEC/EN61000-4-4 | ±2KV Perf.Criteria B |
| | | Voltage dips and interruptions | IEC/EN61000-4-11 | 0%~70% Perf.Criteria B |

## Dimension



| Packing Code | L x W x H | |
|---|---|---|
| - | 28.84 x 20.0 x 14.0 mm | 1.135 × 0.787 × 0.551 inch |

## Pin Specification

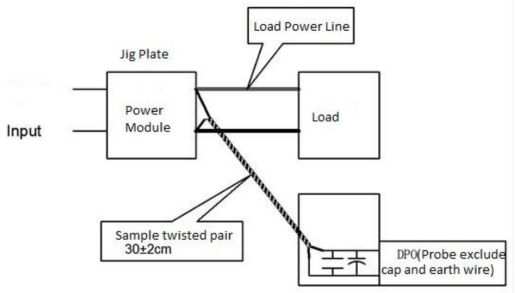
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **Single(S)** | AC(L) | AC(N) | +Vc | -Vc | -Vo | +Vo |

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

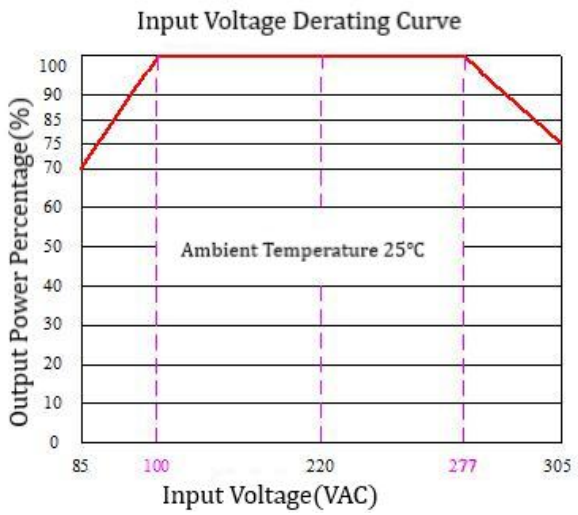
Test Method:

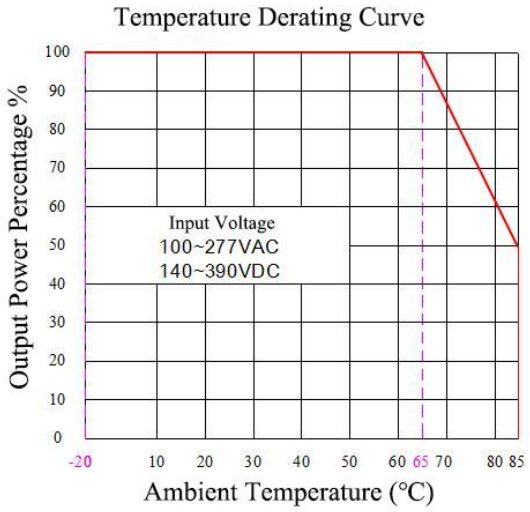
(1) 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

(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: Input Voltage should be derated based on Input voltage derating curve when it is 85~100VAC/277~305VAC/120~140VDC/390~430VDC.

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

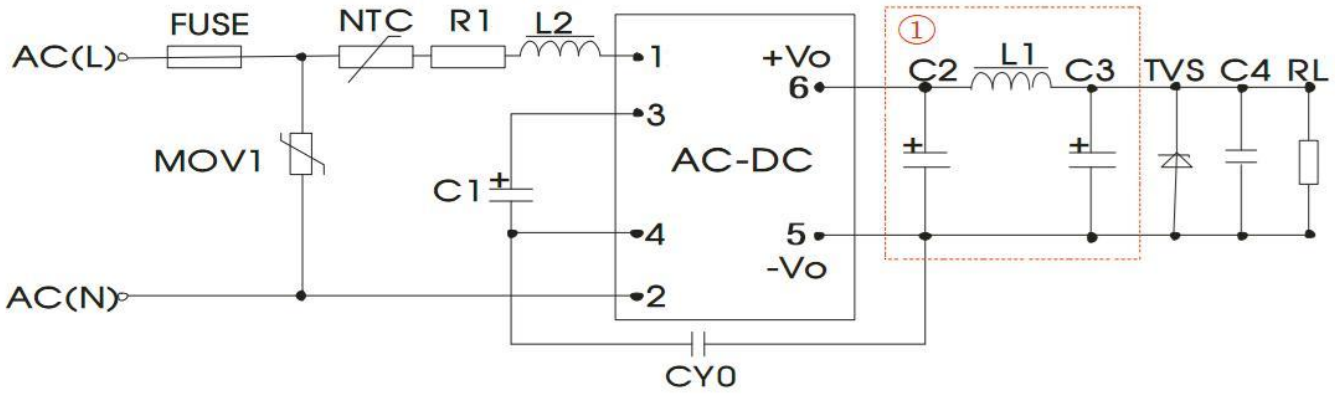



**Photo 1**
**Note: ① as Pi filter circuit**

| Products Number | C1 (Necessary) | C2 (Necessary to connect the external solid-state capacitor) | L1 (Necessary) | C3 (Necessary to connect the external solid-state capacitor) | C4 | L2 | NTC | CY0 | FUSE (Necessary) | TVS Tube |
|---|---|---|---|---|---|---|---|---|---|---|
| DA10-220S3V3G9N4 | 22uF /450V | 820uF/10V | 2.0uH | 330uF/10V | 0.1uF/ 50V | 4.7mH | 5D-9 | 1nF/ 400V | 2A/ 250V | SMBJ7.0A |
| DA10-220S05G9N4 | | 820uF/10V | | 330uF/10V | | | | | | SMBJ7.0A |
| DA10-220S09G9N4 | | 470uF/16V | | 100uF/16V | | | | | | SMBJ20A |
| DA10-220S12G9N4 | | 470uF/16V | | 100uF/16V | | | | | | SMBJ20A |
| DA10-220S12V5G9N4 | | 470uF/16V | | 100uF/16V | | | | | | SMBJ20A |
| DA10-220S15G9N4 | | 470uF/25V | | 100uF/25V | | | | | | SMBJ20A |
| DA10-220S24G9N4 | | 220uF/35V | | 47uF/35V | | | | | | SMBJ30A |

Note:

1) C1: AC input, C1 is input filter electrolytic capacitor (necessary), recommended value is 22uF/450V;
   DC input, C1 is big filter capacitor in the EMC filter (necessary), recommended value is 22uF/450V;
2) R1 is limited resistor, recommended value is 6.8Ω/3W;
3) MOV1 is piezoresistor, recommended model is 14D561K;

## 2. EMC recommended circuit (Used Under high EMC requirement)

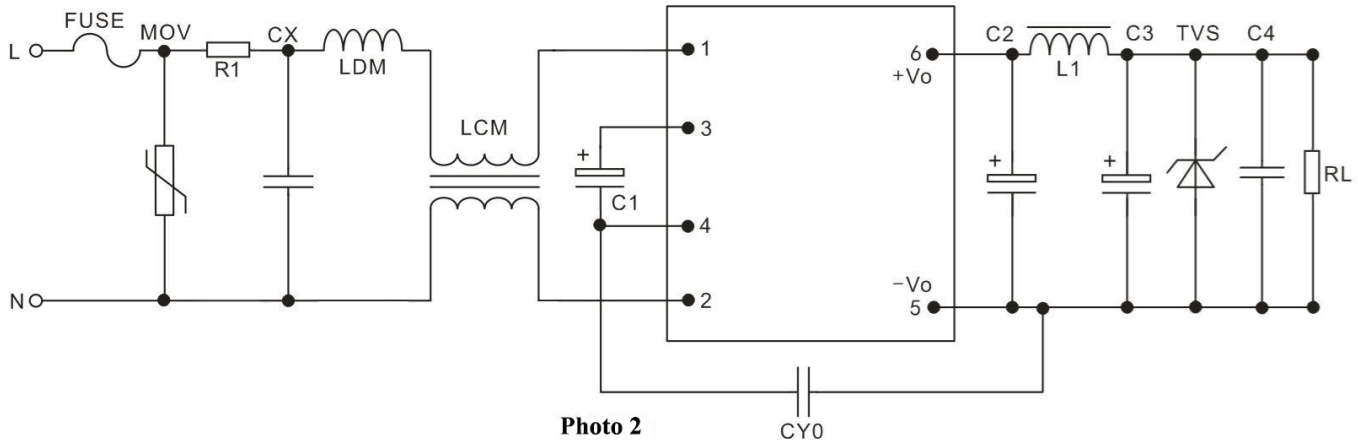



Photo 2

| | | | |
|---|---|---|---|
| FUSE | Recommend 2A, 250V (Necessary) | CY0 | 1nF/400VAC |
| MOV | 14D561K | LDM | 330uH |
| CX | Recommended 0.1uF/310VAC | R1 | winding resistor 6.8Ω/3W |
| LCM | 1.2mH/MAX:2.5Ω/MIN:0.35A | | |

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℃**, **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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