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

## Typical Features

- Wide input voltage range 85-305VAC/120-430VDC
- No load power consumption ≤ 0.45W @220VAC
- Efficiency 78%(TYP.)
- Operating temperature from -20°C to +80°C
- Switching Frequency 65KHz
- Short circuit & over current protections
- Isolation voltage 3600VAC
- Altitude during operation 5000m Max
- With ETL & CE certificates
- Complaint with IEC/EN62368/UL62368
- Mini size, open-frame, industrial level design
- PCB SIP mounting

RECOGNIZED COMPONENT ETL LISTED Intertek 5028278
CONFORMS TO UL STD. 62368-1
CERTIFIED TO CSA STD. C22.2 No. 62368-1
CE

## Application Field

***DA10-220SXXG9N4 Series -----*** *Mini size & open-frame AC-DC power supplies with global adapted input voltage range (both AC & DC available), low ripple, low temperature rise, low standby power consumption, high efficiency, high reliability, safety isolated and good EMC performance. This series of products can be widely used in the fields of electric power, industrial, instrument, smart home devices, etc. The additional circuit diagram 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 220VAC | Ripple & Noise 20MHz (Max) | Efficiency@ Full Load, 220VAC |
|---|---|---|---|---|---|---|---|
| | | Power | Voltage | Current | | | |
| | | (W) | Vo(V) | Io(mA) | u F | mVp-p | %(Typ.) |
| ETL/CE | 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 - The typical value of efficiency is based on the product tested after half an hour burn-in at full load.

Note 2 - 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 3 - The Ripple and Noise are tested by the twisted pair method according to the Test Instructions in the datasheet.

Note 4 - Please contact Aipu sales for other output voltages requirement in this series but not listed in this table.

## 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 | |
| No Load power Consumption | Input 115VAC | - | - | 0.45 | W |
| | Input 220VAC | - | - | | |
| Leakage Current | - | 0.25mA TYP/230VAC/50Hz | | | |
| Recommended External Fuse | - | 1A-3A/300VAC Time-delay fuse | | | |
| Hot Plug | - | Unavailable | | | |
| Remote Control | - | Unavailable | | | |

## Output Specifications

| Item | | Operating Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Voltage Accuracy | | Full input voltage range, 10-100% load (the unit can work stable at <10% load) | 3.3V | - | ±2.0 | ±7.0 | % |
| | | | Others | - | ±2.0 | ±5.0 | |
| Line Regulation | | Rated load | | - | ±0.75 | ±1.5 | % |
| Load Regulation | | Nominal input voltage, 20%~100% load | | - | ±1.5 | ±3.0 | % |
| Minimum Load | | Single Output | | 10 | - | - | % |
| Turn-on Delay Time | | Input 115VAC (full load) | | - | 1000 | - | mS |
| | | Input 220VAC (full load) | | - | | - | |
| Power-off Hold-up Time | | Input 115VAC (full load) | | | 50 | | mS |
| | | Input 220VAC (full load) | | - | 80 | - | |
| Dynamic Response | Overshoot range | 25%~50%~25%<br>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 |
| Ripple & Noise | | Full input voltage range | | - | 50 | 150 | mV |

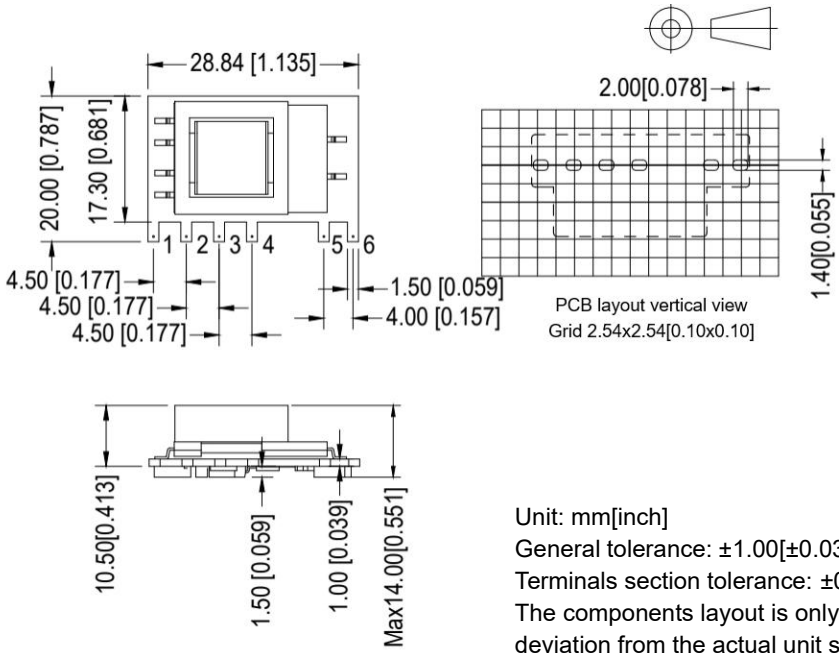
## General Specifications

| Item | Operating Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Switching Frequency | - | - | 65 | - | KHz |
| Operating Temperature | Full input voltage range<br>Please refer to the temperature derating graph | -20 | - | +80 | ℃ |
| | Input 220VAC | -40 | - | +80 | |
| 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 | - | IEC/EN62368/UL62368 | | | |
| Vibration | - | 10-55Hz, 10G, 30Min, along X, Y, Z | | | |
| Safety Class | - | CLASS Ⅱ | | | |
| MTBF | - | MIL-HDBK-217F@25℃＞300,000H | | | |
| Unit Weight | - | 9g (Typ.) | | | |

## EMC Performances

| Total Item | | Sub Item | Test Standard | Performance/Class |
|---|---|---|---|---|
| EMC | EMI | CE | CISPR22/EN55032 | CLASS B (with the Recommended Circuit 2) |
| | | RE | CISPR22/EN55032 | CLASS B (with the Recommended Circuit 2) |
| | EMS | RS | IEC/EN61000-4-3 | 10V/m Perf.Criteria B (with the Recommended Circuit 1) |
| | | CS | IEC/EN61000-4-6 | 10Vr.m.s Perf.Criteria B (with the Recommended Circuit 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 & interruptions | IEC/EN61000-4-11 | 0%~70% Perf.Criteria B |

## Mechanical Dimensions




| Terminal No. | Function |
|---|---|
| 1 | AC(L) |
| 2 | AC(N) |
| 3 | +Vcap |
| 4 | -Vcap |
| 5 | -Vout |
| 6 | +Vout |

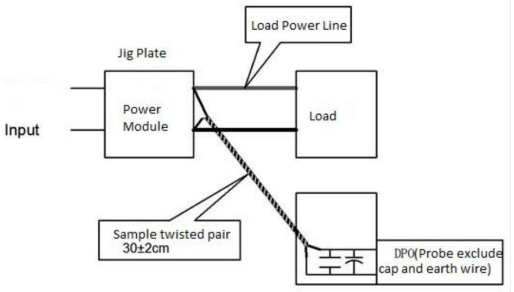
Unit: mm[inch]
General tolerance: ±1.00[±0.039]
Terminals section tolerance: ±0.25[±0.010]
The components layout is only for reference, any deviation from the actual unit should be accepted.

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

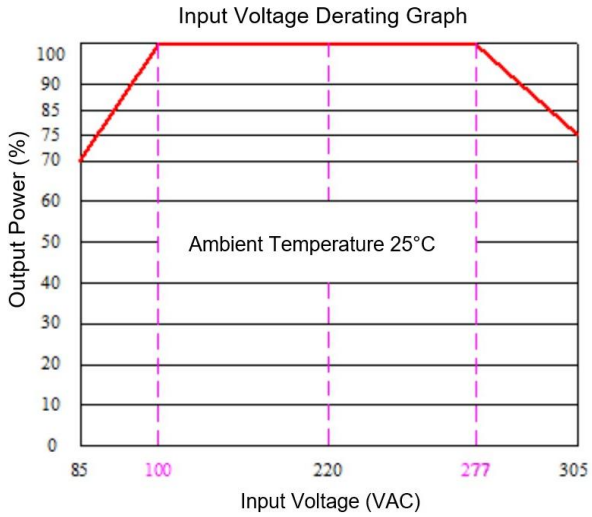
## Ripple & Noise Test Instruction (Twisted Pair Method, 20MHZ bandwidth)

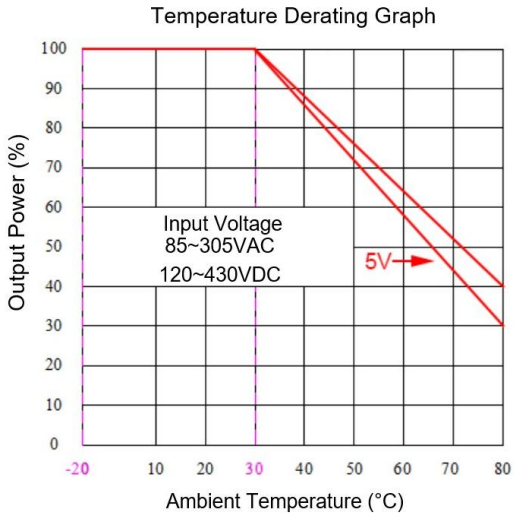
1) The Ripple & noise test need 12# twisted pair cables, an oscilloscope which bandwidth should be set to 20MHz, 0.1uF polypropylene capacitor and 10uF high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes (100M bandwidth). The oscilloscope should be set at the Sample Mode.

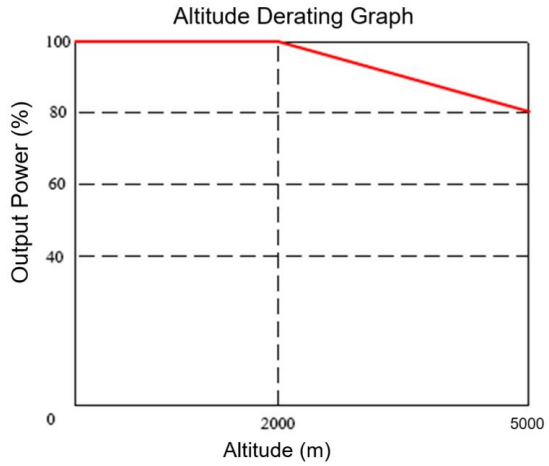
2) The test diagram is shown on the right. The converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the location is as close as possible to the output pins or terminals. The test can be start after input power on.




## Product Characteristics Graphs






Note 1 - The output power should be derated based on the input voltage derating graph at 85~100VAC/277~305VAC/120~140VDC/ 390~430VDC. The converters can be 100% rated power output at -40°C @220VAC input.

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

## Recommended Circuits Diagrams for Application

### 1. Typical Application Circuit Diagram

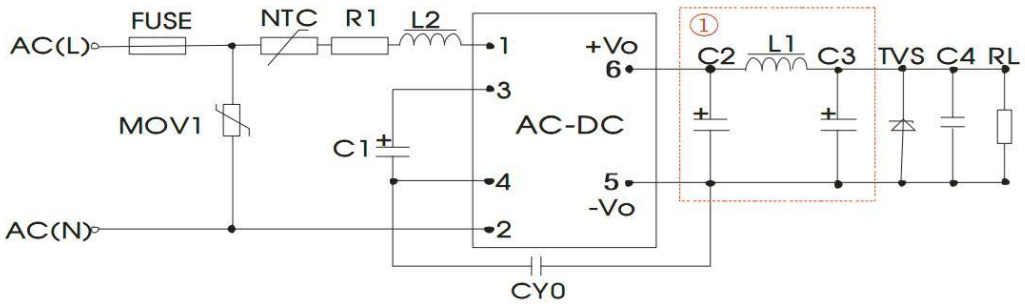



**Figure - Circuit 1 (Note ① is a π Type filtering)**

| Part No. | C1 (*) | C2 (* solid-state capacitor) | L1 (*) | C3 (* electrolytic capacitor) | C4 | L2 | NTC | CY0 | FUSE (*) | TVS |
|---|---|---|---|---|---|---|---|---|---|---|
| DA10-220S3V3G9N4 | 22uF /450V | 820uF/10V | 2.0uH/ 4A | 330uF/10V | 0.1uF /50V | 4.7mH /0.35A | 5D-9 | Y1 102M /400V AC | 2A/300V | 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 must be externally connected, it works as the input filter at AC input and works as the big filtering capacitor for the EMC filter at DC input. 22uF/450V electrolytic capacitor is recommended.

2) R1 is a current-limit resistor, 6.8Ω/3W is recommended.

3) 14D561K/4500A is recommended for MOV1.

4) The * marked components are necessary for application, not optional.

**2. Recommended circuit diagram for high EMC requirement**

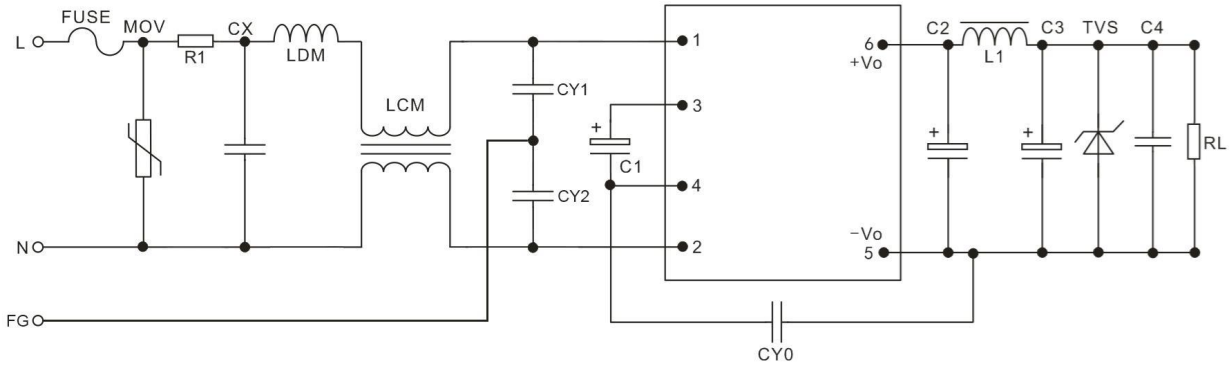



**Figure - Circuit 2**

| | | | |
|---|---|---|---|
| FUSE | 2A/300V (Necessary) | CY0, CY1, CY2 | Y1/102M/400VAC |
| MOV | 14D561K/4500A | LDM | 330uH/0.35A |
| CX | X2/224K/310VAC | R1 | Wire-wound resistor 6.8Ω/3W |
| LCM | 1.2mH/0.35A | | |

**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.

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