## Typical Features

- ◆ Wide input voltage range 85-265VAC/120-370VDC
- ◆ No-load power consumption ≤0.5W@220VAC
- ◆ Efficiency 79% (Typ.)
- ◆ Operating temperature from -40°C to +70°C
- ◆ Switching frequency 65KHz
- ◆ Short circuit, over current, over voltage protections
- ◆ Isolation voltage 4000VAC
- ◆ Altitude during operation 2000m Max
- ◆ Compliant with IEC/EN62368/UL62368
- ◆ With CE certificate
- ◆ Enclosed plastic case, flame class UL94-V0
- ◆ PCB DIP mounting


## Application Field

**FA20-220H05XXH2D4(-T)(-TS) Series** --- Compact size & high efficiency modular 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, Industry, Instrument, Smart home devices, etc. Additional circuit for EMC is recommended for the application with higher EMC requirement.

## Typical Product List

| Certificate | Part No. | Input Voltage Range | | Output Specification | | | | | Max. Capacitive Load @220VAC | Ripple & Noise @20MHz (Max) | Efficiency @Full load 220VAC (Typ.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Nominal | Range | Power | Voltage | | Current | | | | |
| | | (VAC) | (VAC) | P(W) | Vo1 (VDC) | Vo2 (VDC) | Io1 (mA) | Io2 (mA) | (uF) | (mVp-p) | % |
| CE | FA20-220H051212H2D4 | 220 | 85 - 265 | 20 | +5 | ±12 | 2000 | 400/400 | 9000/470/470 | 80/200/200 | 79 |
| CE | FA20-220H051515H2D4 | | | | +5 | ±15 | 2000 | 300/300 | 9000/470/470 | 80/200/200 | 79 |

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 is tested by the Parallel-line method (refer to the following test instruction).

Note 4: The suffix -T indicates the chassis package, -TS indicates the package of DIN Rail which width is 35mm.

Note 5: Please contact Aipu sales for other output voltages requirement of this series but not listed in this table.

## Input Specifications

| Item | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input voltage range | AC Input | 85 | 220 | 265 | VAC |
| | DC Input | 120 | 310 | 370 | VDC |
| Input frequency range | - | 47 | 50 | 63 | Hz |
| Input current | Input 115VAC | - | - | 0.60 | A |
| | Input 220VAC | - | - | 0.46 | |
| Surge current | Input 115VAC | - | - | 25 | A |
| | Input 220VAC | - | - | 45 | |
| Standby power consumption | Input 115VAC | - | - | 0.50 | W |
| | Input 220VAC | - | - | | |
| Leakage current | - | 0.5mA TYP/230VAC/50Hz | | | |
| Recommended external fuse | - | 2A/300VAC, Time-delay fuse | | | |
| Hot plug | - | Unavailable | | | |

## Output Specifications

| Item | | Test Condition | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage accuracy | | Full input voltage range, any load | Vo1 | - | ±1.0 | ±3.0 | % |
| | | | Vo2 | - | - | ±10.0 | |
| Line regulation | | Rated load | Vo1 | - | - | ±0.5 | % |
| | | | Vo2 | - | - | ±1.5 | |
| Load regulation | | Nominal input voltage, 20%~100% load | Vo1 | - | - | ±2.0 | % |
| | | | Vo2 | - | - | ±5.0 | |
| Ripple & Noise | | 5%-100% load, 20MHz bandwidth | Vo1 | - | 50 | 80 | mVp-p |
| | | | Vo2 | - | 100 | 200 | |
| Dynamic response | Overshoot range | 25%~50%~25% 50%~75%~50% | | -5.0 | - | +5.0 | % |
| | Recovery time | | | - | - | 5.0 | mS |
| Temperature drift coefficient | | - | | - | - | ±0.05 | %/℃ |
| Turn-on delay time | | Input 115VAC (full load) | | - | - | 2500 | mS |
| | | Input 220VAC (full load) | | - | - | | |
| Power-off hold up time | | Input 115VAC (full load) | | - | 10 | - | mS |
| | | Input 220VAC (full load) | | - | 60 | - | |
| Output overshooting | | Full input voltage range | | ≤10 (Vo1) | | | %Vo |
| Short circuit protection | | | | Continuous, Self-recovery | | | Hiccup |
| Over current protection | | Input 220VAC (Vo2 at rated load) | | 150%Io | - | 220%Io | mA |
| Over voltage protection | | 5VDC output | | ≤7.5 | | | VDC |
| | | 12VDC output | | ≤20 | | | |
| | | 15VDC output | | ≤20 | | | |

Note: The Ripple and Noise is tested by the Parallel-line method (refer to the following test instruction).

## General Specifications

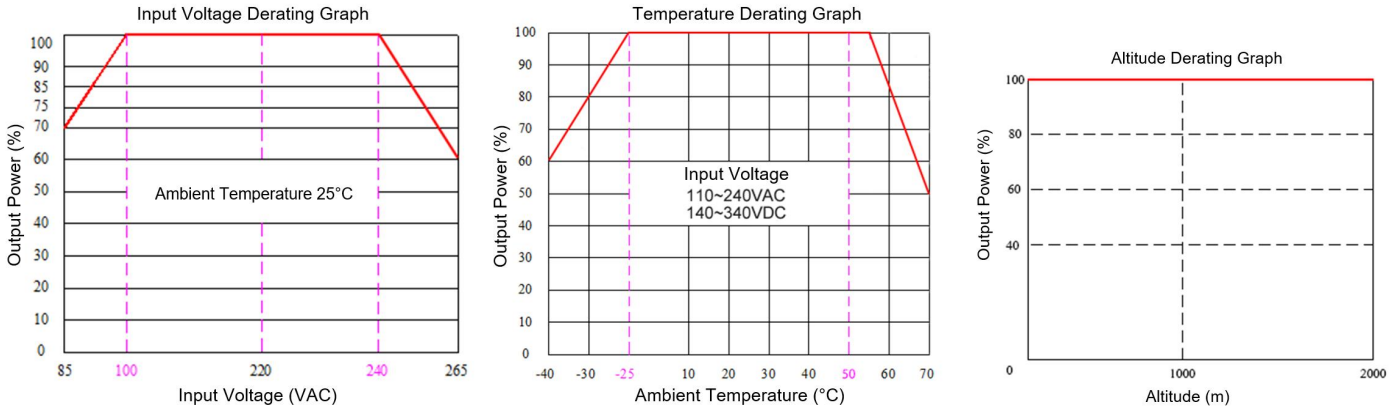
| Item | Test Condition | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Switching frequency | - | | - | 65 | - | KHz |
| Operating temperature | Refer to the Temperature Derating Graph | | -40 | - | +70 | ℃ |
| Storage temperature | - | | -40 | - | +85 | ℃ |
| Soldering temperature | 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 |
| | Vo1-Vo2 | | 500 | - | - | VDC |
| Insulation resistance | I/P-O/P | @DC500V | 100 | - | - | MΩ |
| MTBF | MIL-HDBK-217F@25℃ | | 300 | - | - | K Hours |
| Safety standard | - | | IEC62368/EN62368 | | | |
| Vibration | - | | 10-55Hz,10G, 30Min, along X, Y, Z | | | |
| Safety class | - | | CLASS Ⅰ | | | |
| Flame class of case | - | | UL94-V0 | | | |

| Weights & Dimensions | Package Code | Weight (Typ.) | Dimensions L x W x H | |
|---|---|---|---|---|
| | H2D4 | 130g | 70.00X48.00X23.50 mm | 2.756X1.890X0.925 inch |
| | H2D4-T | 170g | 96.00X53.80X32.50 mm | 3.779X2.118X1.279 inch |
| | H2D4-TS | 215g | 96.00X53.80X37.00 mm | 3.779X2.118X1.456 inch |

## EMC Performance

| Items | | | Test Standard | Performance/Class |
|---|---|---|---|---|
| EMC | EMI | CE | CISPR32/EN55032 | CLASS B (with the recommended circuit 2) |
| | | RE | CISPR32/EN55032 | CLASS B (with the recommended circuit 2) |
| | EMS | RS | IEC/EN61000-4-3 | 10V/m Perf. Criteria B (with the recommended circuit 2) |
| | | CS | IEC/EN61000-4-6 | 3Vr.m.s Perf. Criteria B (with the recommended circuit 2) |
| | | ESD | IEC/EN61000-4-2 | Contact ±6KV / Air ±8KV Perf. Criteria B |
| | | Surge | IEC/EN61000-4-5 | Line to line ±1KV, line to ground ±2KV Perf. Criteria B |
| | | | | Line to line ±2KV, line to ground ±4KV Perf. Criteria B (with the recommended circuit 2) |
| | | EFT | IEC/EN61000-4-4 | ±2KV Perf. Criteria B |
| | | | | ±4KV Perf. Criteria B (with the recommended circuit 2) |
| | | Voltage dips & 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/120~140VDC & 240~265VAC/340~370VDC.

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

## Recommended Circuits for Application

**1. Typical application circuit diagram**

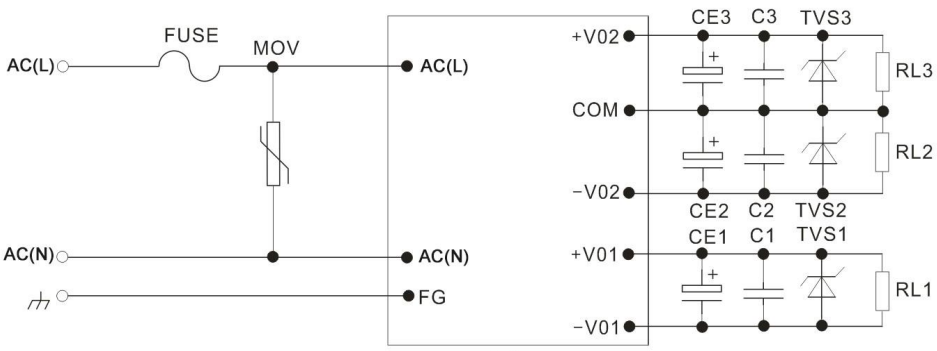



**Figure - Circuit 1**

| | | | |
|---|---|---|---|
| FUSE | 2A/300VAC time-delay fuse (required) | C1, C2, C3 | Ceramic capacitor 1uF/50V |
| MOV | 14D561K/4500A | TVS1, TVS2, TVS3 | See note below |
| CE1, CE2, CE3 | 100uF/25V High frequency low impedance electrolytic capacitor, withstanding voltage derated at least 80% of rated | | |

Note: 60W TVS diodes are recommended to protect the output circuit under abnormal conditions. SMBJ7.0A for 5V output, SMBJ12.0A for 9V output, SMBJ20A for 12V & 15V outputs, SMBJ30.0A for 24V output and SMBJ64A for 48V output.

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

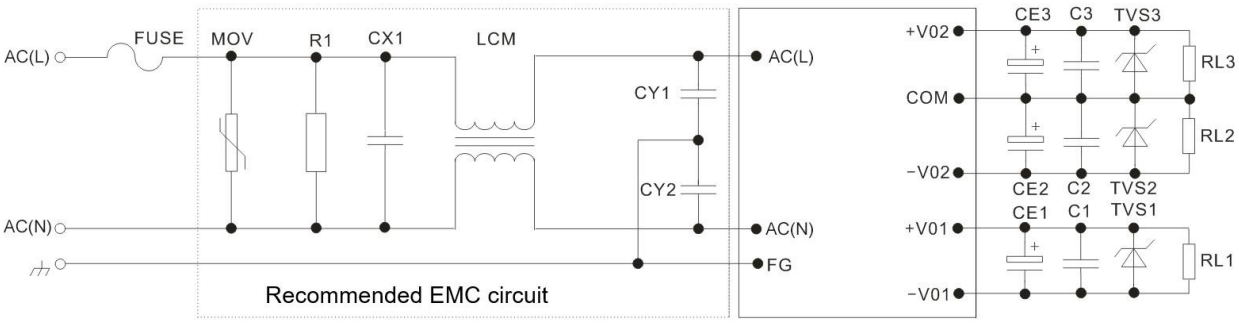
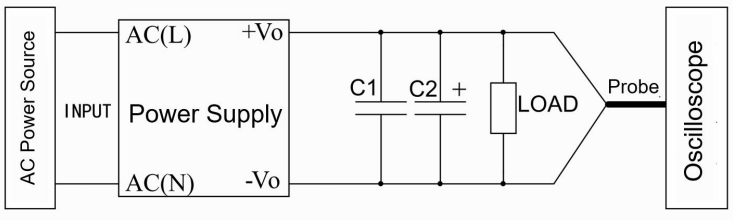



**Figure - Circuit 2**

| | | | |
|---|---|---|---|
| FUSE | 2A/300VAC time-delay fuse (required) | CY1, CY2 | Y1/102M/400VAC |
| MOV | 14D561K/4500A | CX1 | X2/222K/275VAC |
| R1 | Metal film resistor 680KΩ/1W | LCM | 25-35mH/2A |

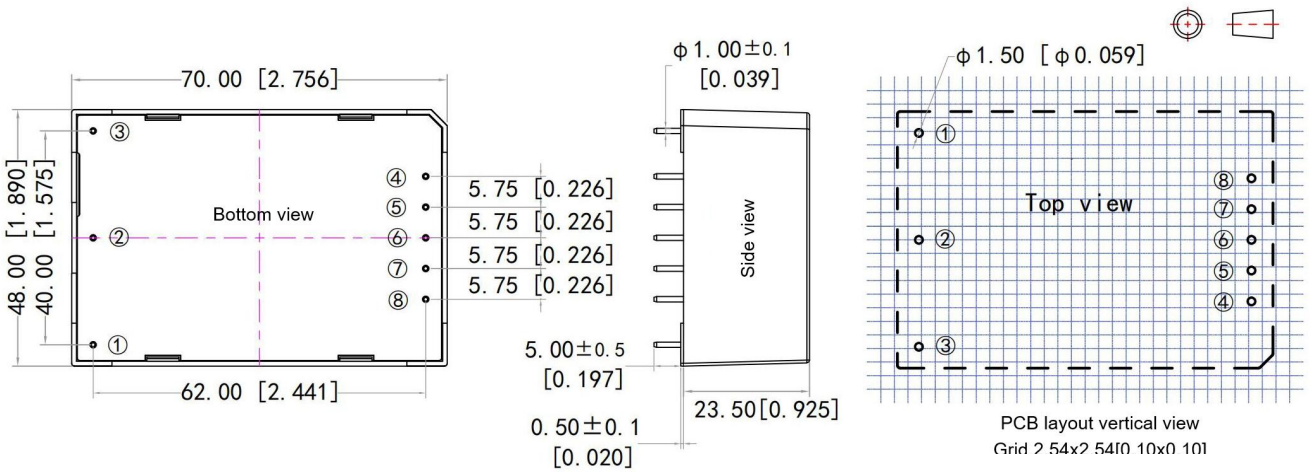
Note: All the other compoents not mentioned in above table should refer to the typical application recommendation.

## Ripple & Noise Test Instructions (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 impedance electrolytic capacitor C2(10uF) are connected in parallel with the probe.
2. Refer to the test diagram, 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 test can start at the converter output terminals after the input power on.

## Mechanical Dimensions

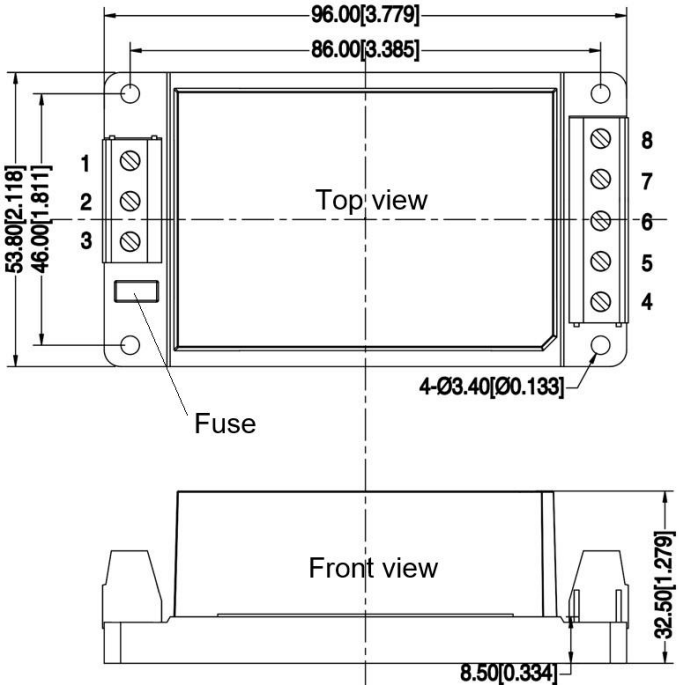



Unit: mm (inch)
Pin diameter tolerance ±0.1 (±0.004)
General tolerance ±0.5 (±0.020)

**Pin-out Function Description**

| Pin No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | FG | AC(N) | AC(L) | +Vo2 | COM | -Vo2 | +Vo1 | -Vo1 |

## -T Mechanical Dimensions

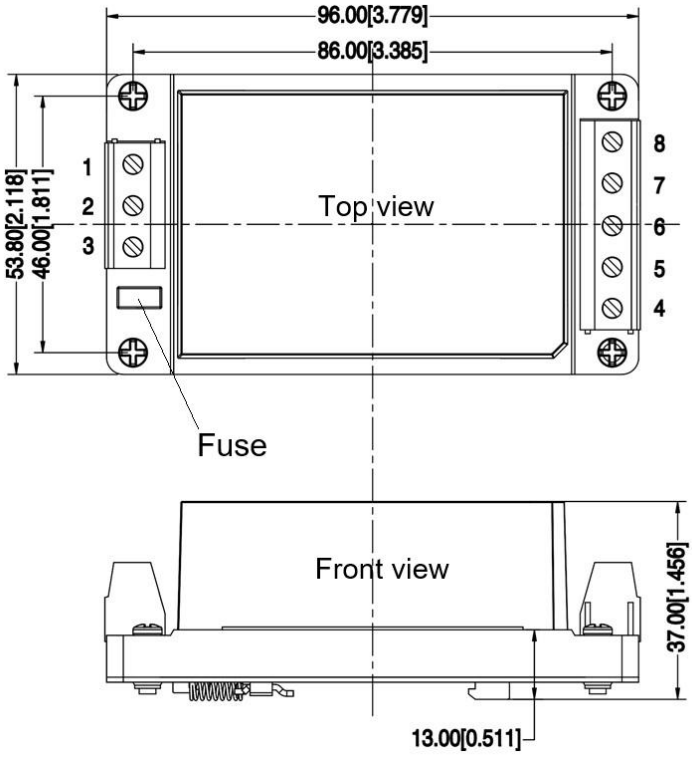



Note:
Unit: mm[inch]
Lead wires gauge: 24-12 AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.00[±0.039]

**Terminal Function Description**

| Terminal No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | FG | AC(N) | AC(L) | +Vo2 | COM | -Vo2 | +Vo1 | -Vo1 |

## -TS Mechanical Dimensions




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

**Terminal Function Description**

| Terminal No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | FG | AC(N) | AC(L) | +Vo2 | COM | -Vo2 | +Vo1 | -Vo1 |

**Application Notice**

1.The product should be used according to the specifications, otherwise it could be permanently damaged.

2. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.

3. The product performance cannot be guaranteed if it works under over-load condition.

4. 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).

5. All values or indicators on this datasheet have been tested based on Aipupower test specifications.

6.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.

7. Aipupower can provide customization service.

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