Typical Features

- ◆ Input voltage range 85-305VAC/120-430VDC
- ◆ No load power consumption ≤0.55W@220VAC
- ◆ Efficiency up to 85% (Typ.)
- ◆ Operating temperature from -40℃ to +85℃
- ◆ Switching frequency 65KHz
- ◆ Short-circuit & over current protections
- ◆ Isolation voltage 4200VAC
- ◆ Altitude during operation 4000m Max
- ◆ Compliant with IEC/EN62368/UL62368
- ◆ Conform to CE
- ◆ Enclosed plastic case, flame class UL94-V0
- ◆ PCB DIP Mounting

Application Field

FA25-220SXXH2D4P2 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 no load power consumption, high reliability, safety isolated and good EMC performance. This series of products can be widely used in the fields of Electricity power, Industrial, Instrument and Smart home devices, 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(VDC)	Io(mA)	(uF)	mVp-p	%
-	FA25-220S09H2D4P2	220	85-305	25	9	2780	3000	100	84
-	FA25-220S12H2D4P2				12	2083	2000	120	84
-	FA25-220S15H2D4P2				15	1667	2000	120	85
-	FA25-220S24H2D4P2				24	1042	700	150	85

Note 1: The suffix -T indicates the chassis package, -TS indicates the package of DIN Rail which width is 35mm.

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: 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	305	VAC
	DC Input	120	310	430	VDC
Input frequency range	-	47	50	63	Hz
Input current	Input 115VAC	-	-	0.55	A
	Input 220VAC	-	-	0.30	
Surge current	Input 115VAC	-	-	15	
	Input 220VAC	-	-	25	
No load power consumption	Input 115VAC	-	-	0.55	W
	Input 220VAC	-	-		
Leakage current	-	0.5mA TYP/230VAC/50Hz			
Fuse inside	-	3.15A/300VAC Slow-blow fuse			
Hot plug	-	N/A			
ON/OFF Control	-	N/A			

Output Specifications

Item		Test Condition	Min.	Typ.	Max.	Unit
Voltage accuracy		Full input voltage range, any load	-	±1.0	±3.0	%
Line regulation		Rated Load	-	-	±1.0	%
Load regulation		Nominal input voltage, 20%~100% load	-	-	±1.0	%
Minimum load		Single Output	5	-	-	%
Temperature drift coefficient		-	-	-	±0.03%	%/℃
Turn-on delay time		Input 115VAC (full load)	-	-	2000	mS
		Input 220VAC (full load)	-	-		
Power-off hold-up time		Input 115VAC (full load)	-	50	-	mS
		Input 220VAC (full load)	-	100	-	
Dynamic response	Overshoot range	25%~50%~25% 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
Over current protection		Input 220VAC	120% Io	-	200%Io	Hiccup
Ripple & Noise		5%-100% load, 20MHz bandwidth	-	50	150	mVp-p

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

General Specifications

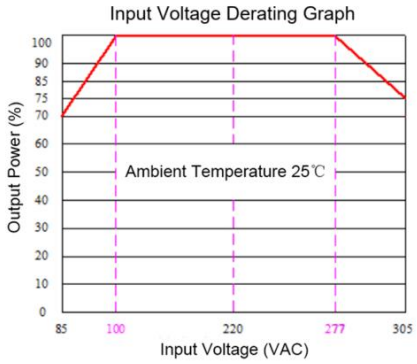
Items	Test Conditions	Min.	Typ.	Max.	Unit
Switching frequency	-	-	65	-	KHz
Operating temperature	Refer to the Temperature Derating Graph	-40	-	+85	℃
Storage temperature	-	-40	-	+90	
Soldering temperature	Wave-soldering	260±4℃, timing 5-10S			
	Manual-soldering	360±8℃, timing 4-7S			
Relative humidity	-	10	-	90	%RH
Isolation voltage	I/P-O/P, Test 1 min, leakage current ≤5mA	4200	-	-	VAC
Insulation resistance	I/P-O/P, @DC500V	100	-	-	MΩ
MTBF	MIL-HDBK-217F@25℃	300	-	-	K hours
Safety standard	-	IEC/EN62368			
Vibration	-	10-55Hz,10G, 30 Min, along X, Y, Z			
Safety class	-	CLASS II			
Flame class of case	-	UL94-V0			

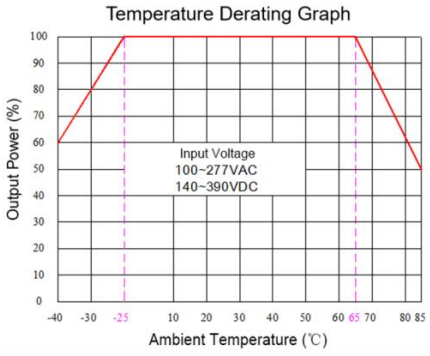
Weight & Dimensions	Part No.	Weight (Typ.)	Dimensions L x W x H	
	FA25-220SXXH2D4P2	100g	70.00X48.00X23.50 mm	2.756X1.890X0.925 inch
	FA25-220SXXH2D4P2-T	120g	96.00X53.80X32.50 mm	3.779X2.118X1.279 inch
	FA25-220SXXH2D4P2-TS	140g	96.00X53.80X37.00 mm	3.779X2.118X1.456 inch

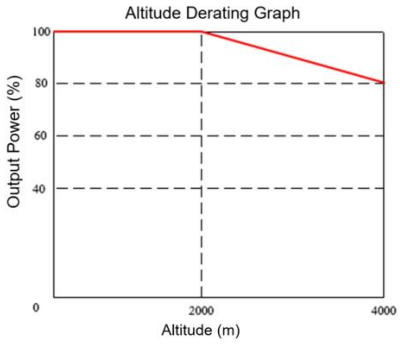
EMC Performances

Item			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (Open-frame)
		RE	CISPR32/EN55032	CLASS B (Open-frame)
	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 ±8KV / Air ±15KV Perf. Criteria B (with the Recommended Circuit 2)
		Surge	IEC/EN61000-4-5	Line to line ±2KV / line to ground ±4KV Perf. Criteria B (Open-frame)
				Line to line ±4KV / line to ground ±6KV Perf. Criteria B (with the Recommended Circuit 2)
		EFT	IEC/EN61000-4-4	±2KV Perf. Criteria B (Open-frame)
				±4KV Perf. Criteria B (with the Recommended Circuit 2)
		Voltage dips & interruptions	IEC/EN61000-4-11	0%~70% Perf. Criteria B

Product Characteristic Curves



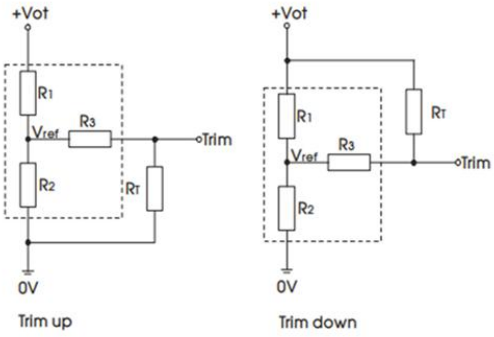




Note 1: The output power should be derated based on the input voltage derating graph at 85~100VAC/120~140VDC & 277~305VAC/390~430VDC.

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

Trim & Trim Resistance Calculation



Trim resistance calculating formula

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

RT is the Trim resistor, a is a custom parameter, Vot is the required voltage of Trim up or Trim down.

Note: Trim up & down circuits, the components in the dotted area are inside of the converter.

Vout (VDC)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref (V)	Vot (V)
9	9.31	3.55	1	2.5	Output Voltage Trim Range: ⩽±10%
12	9.53	2.50	1	2.5	
15	9.53	1.88	1	2.5	
24	30	3.46	1	2.5	

Recommended Circuits for Application

1. Typical application circuit diagram

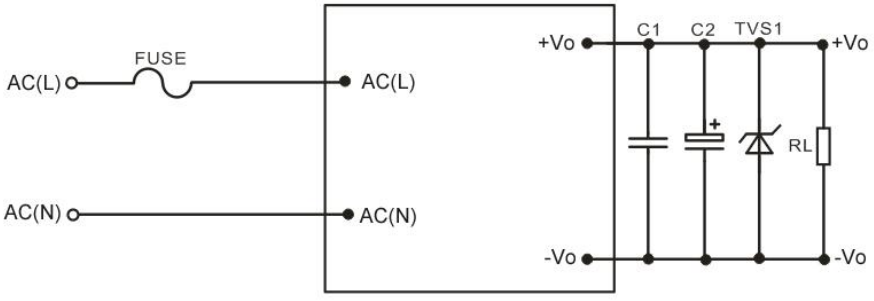


Figure - Circuit 1

Note:

A high-frequency, low-resistance electrolytic capacitor is recommended for C2 which capacitance and current should refer to the technical specifications of its manufacturer. The withstand voltage of C2 should be derated to be at least 80%. C1 is used to suppress the high-frequency noise, ceramic SMD capacitor 0.1uF/50V/1206 is recommended. TVS1 is to protect the output circuit when the power supply operates at abnormal condition. An external FUSE (3.15A/300V Time-delay fuse) is recommended.

Part No.	C2	TVS1
FA25-220S09H2D4P2	330/16V	SMBJ12A
FA25-220S12H2D4P2	330/16V	SMBJ15A
FA25-220S15H2D4P2	330/25V	SMBJ20A
FA25-220S24H2D4P2	220/35V	SMBJ30A

2. Recommended circuit diagram for EMC

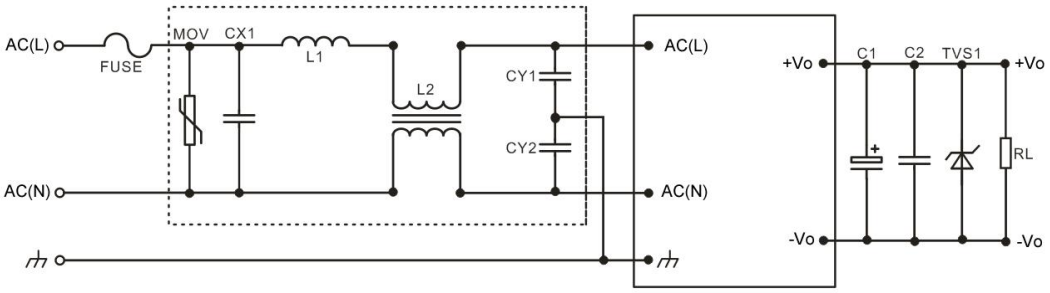
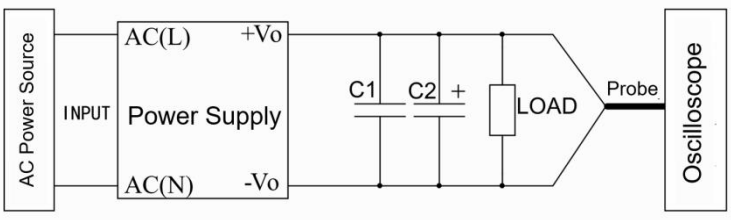


Figure - Circuit 2

Component No.	Description	Parameters
FUSE	Slow-blow Fuse	3.15A/300VAC, Slow-blow (required)
MOV	Metal Oxide Varistor	14D561K/4500A
CX1	X Capacitor	X2/224K/310VAC
L1	Differential Mode Inductor	2.0μH/2.5A Drum Core (I-shape)
L2	Common Mode Inductor	15mH/2.5A T12X7X6mm
CY1, CY2	Y Capacitor	Y1/102M/400VAC

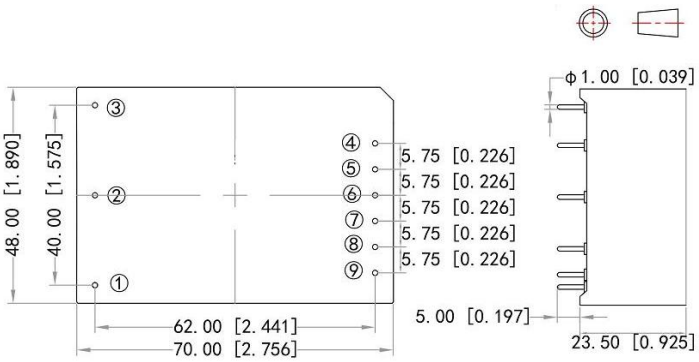
Ripple & Noise Test Instruction (Parallel-line Method, 20MHz Bandwidth)

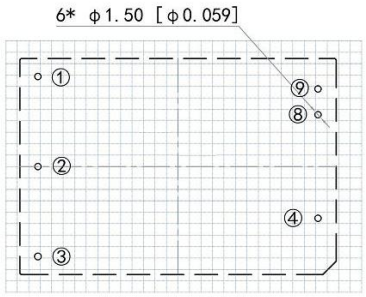


1. The ripple and noise test uses a parallel connection. Set the oscilloscope bandwidth to 20 MHz (100 MHz bandwidth). Remove the probe cap and ground clip from the probe, and connect C1 (0.1 μF ceramic capacitor) and C2 (10 μF high-frequency low-ESR electrolytic capacitor) in parallel at the probe tip. Use the "Sample" sampling mode on the oscilloscope.

2. Schematic diagram for output ripple and noise testing: Connect the module's input terminal to the input power supply; connect the power supply's output to the electronic load via the fixture board; and use a separate test lead to sample directly from the power supply's output port. Select insulated wires with an appropriate wire gauge based on the magnitude of the output current.

H2D4P2 Mechanical Dimensions





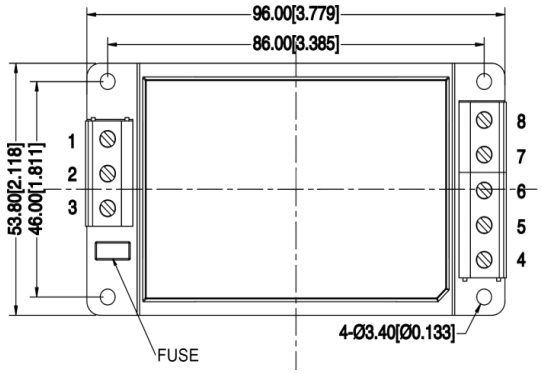
PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

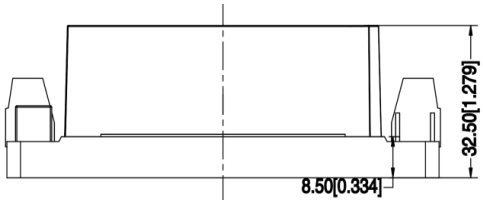
Note:
Unit: mm[inch]
Pin diameter tolerance: ±0.10 [±0.004]
General tolerance: ±0.50 [±0.020]

Pin-out Function Description

Pin No.	1	2	3	4	5	6	7	8	9
Symbol	FG	AC(N)	AC(L)	+Vo	NP	NP	NP	-Vo	Trim
Description	Frame Ground	AC Neutral	AC Line	Output Positive	No Pin	No Pin	No Pin	Output Negative	Output Trim

H2D4P2-T Mechanical Dimensions



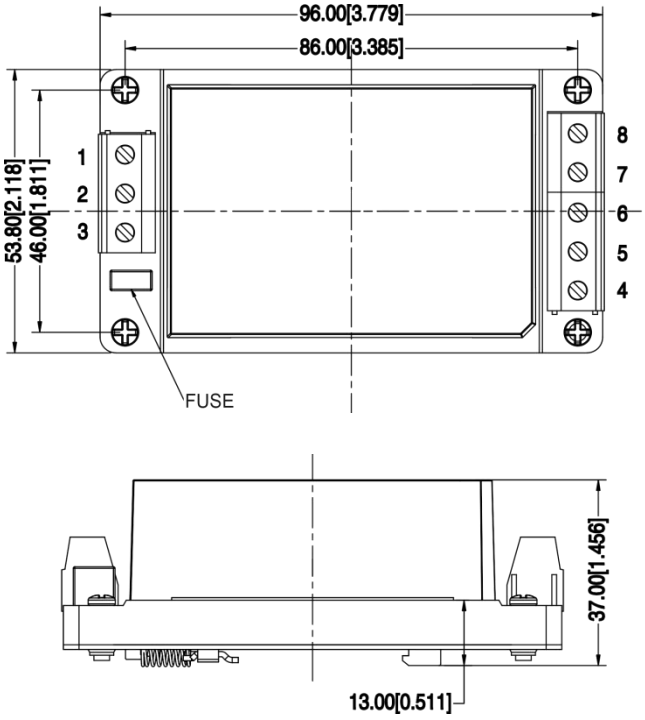


Note:
Unit: mm[inch]
Lead wires gauge: 24-12 AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.0 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6	7	8
Symbol	FG	AC(N)	AC(L)	+Vo	NC	Trim	NC	-Vo
Description	Frame Ground	AC Neutral	AC Line	Output Positive	No Connection	Output Trim	No Connection	Output Negative

H2D4P2-TS Mechanical Dimensions



Note:
Unit: mm[inch]
Lead wires gauge: 24-12 AWG
Screwing torque: 0.4 N.m Max
General tolerance: ±1.0 [±0.039]

Terminal Function Description

Terminal No.	1	2	3	4	5	6	7	8
Symbol	FG	AC(N)	AC(L)	+Vo	NC	Trim	NC	-Vo
Description	Frame Ground	AC Neutral	AC Line	Output Positive	No Connection	Output Trim	No Connection	Output Negative

Application Notice

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

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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