

Typical Features

- ◆ Wide input voltage range 21.6-305VAC/18-430VDC
- ◆ No load power consumption $\leq 0.85\text{W}@220\text{VAC}$
- ◆ Efficiency up to 81%(TYP.)
- ◆ Operating temperature from -40 to +85°C
- ◆ Switching frequency 65KHz
- ◆ Protection: SCP, OCP, OVP
- ◆ Isolation voltage 4000VAC
- ◆ Altitude during operating 5000m Max
- ◆ Compliant with IEC/EN/UL62368
- ◆ Enclosed plastic case, flame class UL94-V0



Application Field

FA10-A4SXXE is a series of CE-certified, compact switching power modules from AipuPower, featuring ultra-wide/ultra-low input and a universal voltage range (AC-DC compatible). This high-reliability series offers low ripple, minimal temperature rise, low power consumption, high efficiency, and reinforced safety isolation with excellent EMC performance. Compliant with EN55032 and IEC/EN61000 standards, these modules are widely used in power systems, industrial control, instrumentation, and smart homes. For operation in harsh electromagnetic environments, please refer to the recommended application circuits provided by AipuPower.

Selction Guide

Certificate	Part No.	Output Specifications			Max Capacitive Load @230VAC	Ripple & Noise 20MHz (Max)	Nominal Input, Full Load..Eff. (Typ.)
		Power	Voltage	Current	μF	mVp-p	%
		(W)	V_o (V)	I_o (mA)			
-	FA10-A4S05E	10	+5	2000	5000	100	76%
-	FA10-A4S09E	10	+9	1111	3600	100	78%
-	FA10-A4S12E	10	+12	833	2000	100	80%
-	FA10-A4S15E	10	+15	667	820	100	80%
-	FA10-A4S24E	10	+24	417	400	100	81%

Note: Full-load efficiency ($\pm 2\%$ Typ.) is calculated as total output power divided by input power.

Input Specifications

Item	Test Condition	Min	Typ.	Max	Unit
Input Voltage Range	AC input	21.6	230	305	VAC
	DC input	18	310	430	VDC
Input Frequency	-	47	50	63	Hz
No-load Power Consumption	115VAC input	-	-	0.85	W

	220VAC input	-	-		
Input Current	24VDC/24VAC	-	-	0.6	A
	115VAC	-	-	0.35	
	230VAC				
Inrush Current	115VAC	-	-	25	
	230VAC	-	-	40	
Leakage current	277VAC/50HZ	0.1mA RMS MAX			
Hot Plug		N/A			
Recommended External Fuse	-	2A/300VAC,slow-blow fuse			

Output Specifications

Item		Test Condition		Min	Typ.	Max	Unit
Voltage accuracy		Full input voltage range, any load	Vo	-	±2.0	-	%
Line regulation		Nominal load	Vo	-	±0.5	-	%
Load regulation		Nominal input voltage, 20%~100% load	Vo	-	±1	-	%
Ripple & Noise		5%-100% load, 20MHz bandwidth	Vo	-	-	100	mVp-p
		Note 1: Ripple and noise are measured using the parallel cable test method. For detailed procedures and setup, please refer to the "Ripple & Noise Test Instructions" section.					
Dynamic Response	Overshoot range	25%~50%~25%		-5.0	-	+5.0	%
	Recovery time	50%~75%~50%		-	-	+5.0	ms
Minimum load		Single Output		0	-	-	%
Temperature Coefficient		-		-	±0.02%	-	%/°C
Hold-up Time		Input 115VAC (full load)		-	8	-	mS
		Input 220VAC (full load)		-	40	-	
Output Start-up Overshoot Voltage		Universal Input Voltage Range		≤10%Vo			%Vo
Short-circuit Protection(SCP)				Continuous, Self-recovery			Hiccup
Over-voltage Protection (OVP)		Output 5VDC		≤7.5VDC(Hiccup mode)			
		Output 9VDC		≤15VDC(Hiccup mode)			
		Output 12VDC/15VDC		≤20VDC(Hiccup mode)			
		Output 24VDC		≤35VDC(Hiccup mode)			
Output Over-current Protection(OCP)		Input 230VAC		110%Io	-	-	Hiccup mode

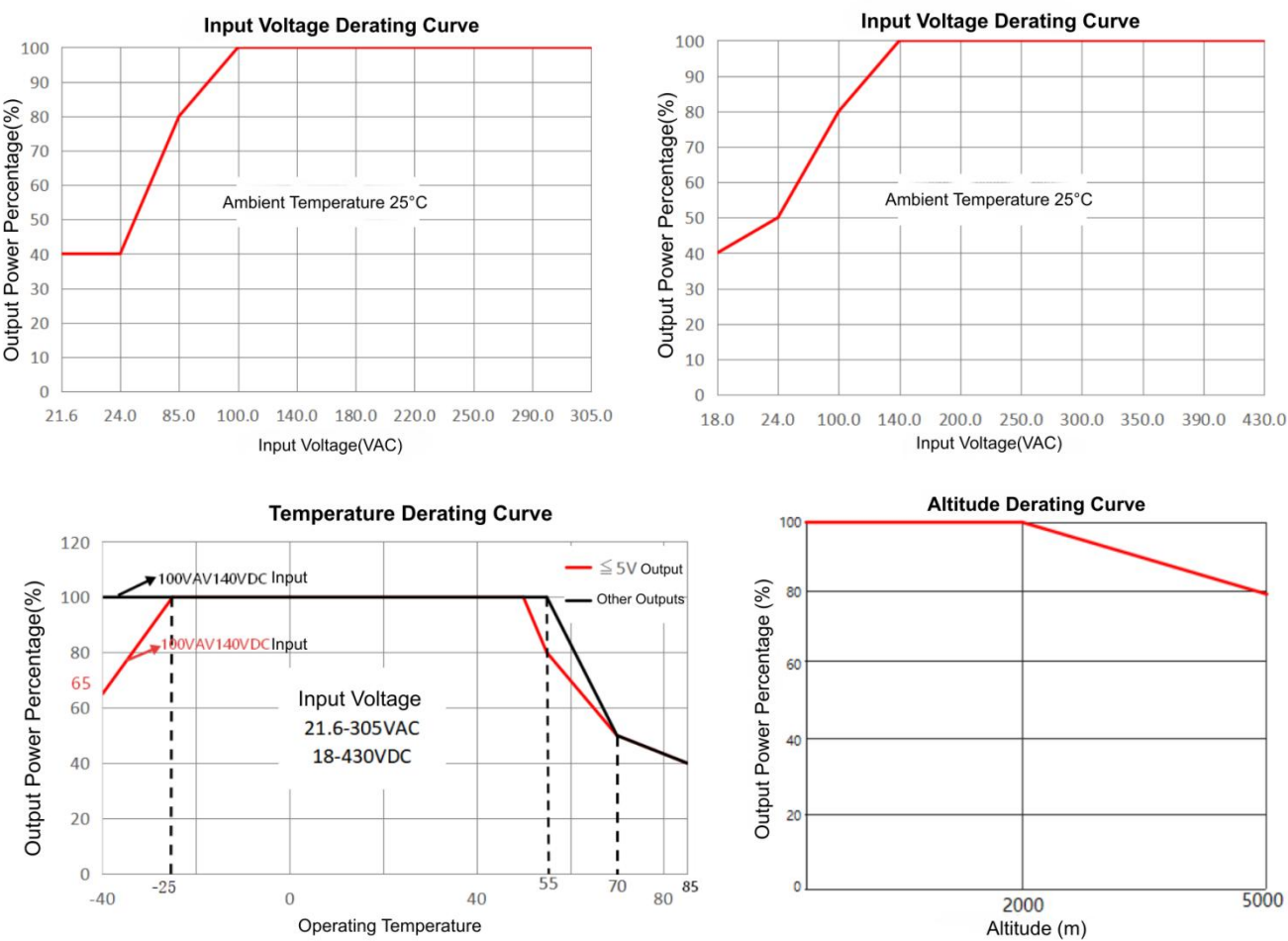
General Specifications

Item	Test Condition	Min	Typ.	Max	Unit
Switching Frequency		-	65	-	KHz
Operating Temperature	Refer to the Temperature Derating Graph	-40	-	+85	°C

Storage Temperature			-40	-	+110	
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
MTBF	MIL-HDBK-217F@25℃		300	-	-	khrs
Safety standard	-		EN62368 、 IEC62368			
Vibration	10-55Hz,10G,30 Min, along X, Y, Z					
Safety standard	-		CLASS II			
Case flame class	-		UL94-V0			
Weight & Dimensions	Part No.		Weight (Typ.)	Dimensions L x W x H		
	FA10-A4SXXE		50g	55.00x45.00x21.00 mm		2.165x1.772x0.827 inch

EMC Performance				
Items			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS A
			CISPR32/EN55032	CLASS B(Refers to Figure - Circuit 2)
		RE	CISPR32/EN55032	CLASS A
			CISPR32/EN55032	CLASS B(Refers to Figure - Circuit 2)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf. Criteria B (See Figure 2 for recommended circuit)
		CS	IEC/EN61000-4-6	10Vr.m.s Perf. Criteria B (See Figure 3 for recommend circuit)
		ESD	IEC/EN61000-4-2	Contact ±8KV / Air ±15KV Perf. Criteria B
		Surge	IEC/EN61000-4-5	Line to line ±1KV, line to ground ±1KV Perf. Criteria B (with the Recommended Circuit 3)
		EFT	IEC/EN61000-4-4	±2KV Perf. Criteria B
			IEC/EN61000-4-4	±4KV Perf. Criteria B (See Figure 3 for recommended circuit)
		Voltage dips & Interruptions	IEC/EN61000-4-11	0%~70% Perf. Criteria B

Product Characteristic Curves



Note 1: The input voltage range is 21.6~100VAC / 18~140VDC. Further voltage derating is required based on the temperature derating curve.

Note 2: This product is designed for use in a natural convection cooling environment. For applications in enclosed environments, please contact us for technical support.

Recommended Circuits for Application

1. Typical application circuit diagram

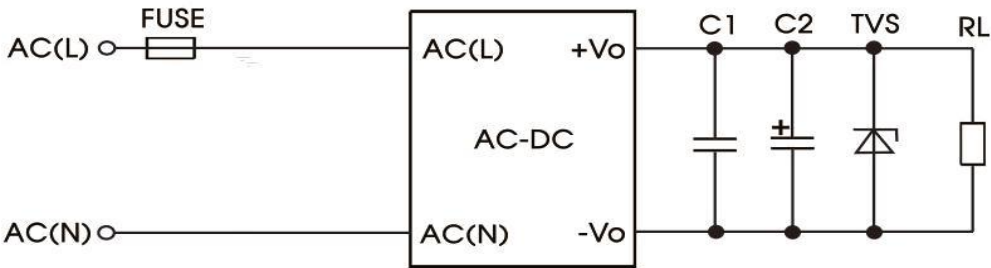


Figure 1. Typical Application Circuit

Model	FUSE	C1	C2	TVS
FA10-A4S05E	2A, 300VAC,	1μF/150V	220μF/16V	SMBJ7.0A

FA10-A4S09E	slow-blow(required)	Ceramic Capacitor	100 μ F/25V	SMBJ12.0A
FA10-A4S12E			100 μ F/25V	SMBJ20.0A
FA10-A4S15E			100 μ F/25V	SMBJ20.0A
FA10-A4S24E			100 μ F/35V	SMBJ30.0A

Notes:

- 1) C2 is an output high-frequency low-resistance electrolytic capacitor, used to reduce output ripple. It can be added based on specific application requirements. The rated voltage of the capacitor should be at least 1.2 times the output voltage.
- 2) TVS1 is a Transient Voltage Suppressor (TVS), used to protect the downstream circuit if the module's output voltage becomes abnormal. Please select the appropriate component model according to the table above.

2. Recommended EMC circuit diagram (for higher EMC requirement)

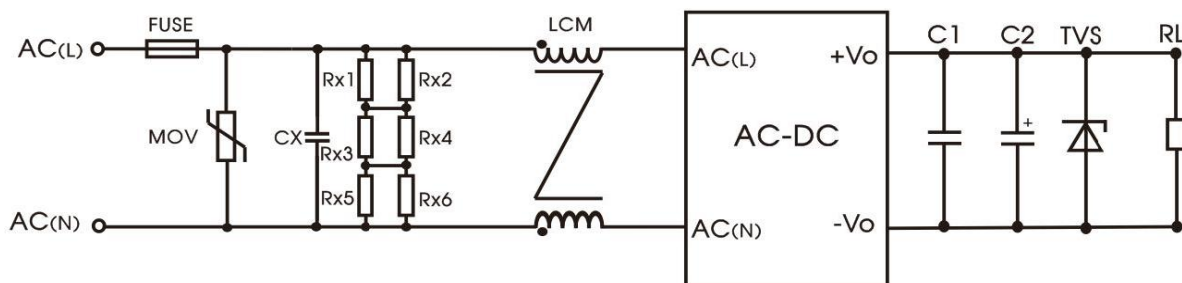


Figure 2. Recommended Circuit for Higher EMC Requirements

Model	FUSE	MOV	CX	LCM	C1	C2	TVS
FA10-A4S05E	2A, 300VAC, slow-blow(re quired)	14D561K	0.33 μ F/310VAC	30mH/2A	1 μ F/150V Ceramic Capacitor	220 μ F/16V	SMBJ7.0A
FA10-A4S09E						100 μ F/25V	SMBJ12.0A
FA10-A4S12E						100 μ F/25V	SMBJ20.0A
FA10-A4S15E						100 μ F/25V	SMBJ20.0A
FA10-A4S24E						100 μ F/35V	SMBJ30.0A

Note: Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 are discharge resistors for CX; the recommended resistance value is 1M Ω /150VDC.

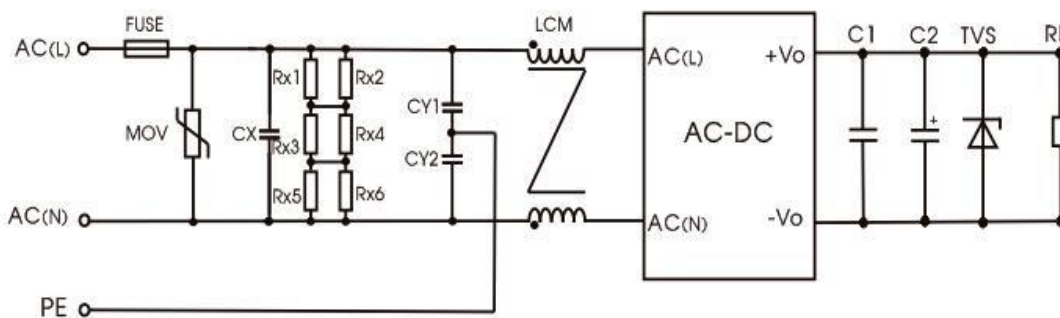


Figure 3. Recommended Circuit for Class I Equipment

Model	FUSE	MOV	CX	CY1/CY2	LCM	C1	C2	TVS
FA10-A4S05E	2A, 300VAC,	14D561K	0.33 μ F/310V	1000pF/400V	30mH/2A	1 μ F/150V	220 μ F/16V	SMBJ7.0A

FA10-A4S09E	slow-blow(re quired)		AC	AC		Ceramic Capacitor	100μF/25V	SMBJ12.0A
FA10-A4S12E							100μF/25V	SMBJ20.0A
FA10-A4S15E							100μF/25V	SMBJ20.0A
FA10-A4S24E							100μF/35V	SMBJ30.0A
Note: Rx1/Rx2/Rx3/Rx4/Rx5/Rx6 are discharge resistors for CX; the recommended resistance value is 1MΩ/150VDC.								

Notes:

- 1) C2 is an output high-frequency low-resistance electrolytic capacitor, used to reduce output ripple. It can be added based on specific application requirements. The rated voltage of the capacitor should be at least 1.2 times the output voltage.
- 2) TVS1 is a Transient Voltage Suppressor (TVS), used to protect the downstream circuit if the module's output voltage becomes abnormal. Please select the appropriate component model according to the table above.

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

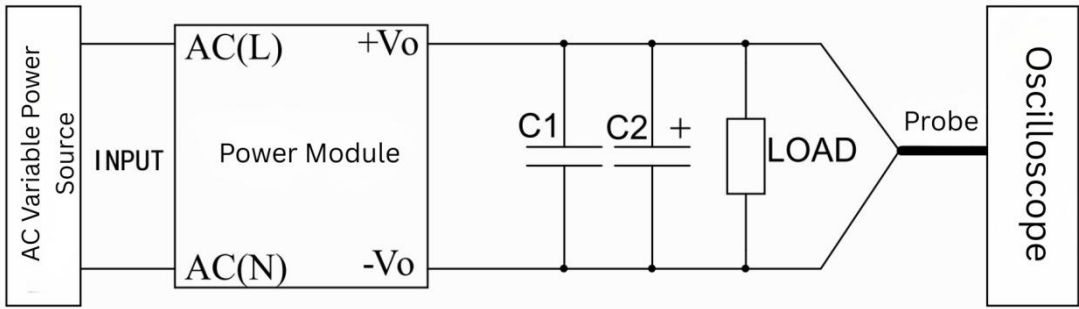
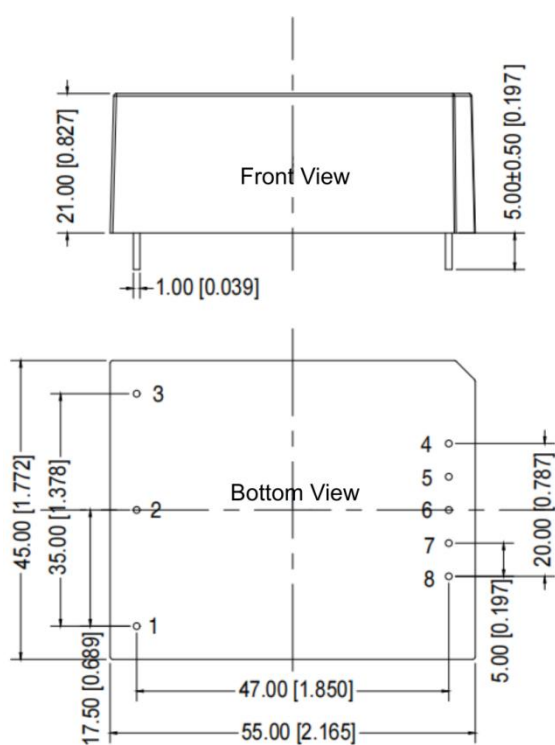


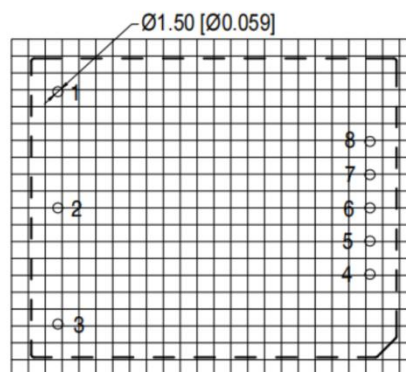
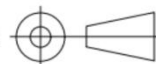
Figure - Circuit 3

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.

Mechanical Dimensions



Third Angle Projection



PCB Layout

Unit: mm[inch]

Grid: 2.54mm (0.1inch)

General tolerance: $\pm 0.1\text{mm}$ [$\pm 0.004\text{inch}$]Pin diameter tolerance: $\pm 0.50\text{mm}$ [$\pm 0.019\text{inch}$]

Pin-out Function Description

Pin No.	1	2	3	4	5	6	7	8
Single Channel(S)	NP	AC(N)	AC(L)	+Vo	NP	NP	NP	-Vo
Function	No Pin	AC Neutral	AC Line	Output Positive	No Pin	No Pin	No Pin	Output Negative

Notes:

1. Products must be used within the specified range; otherwise, permanent damage may occur.
2. A fuse must be connected at the input end of the product.
3. If the product operates below the minimum required load, performance specifications in this manual cannot be guaranteed.
4. If the product operates beyond the specified load range, performance specifications in this manual cannot be guaranteed.
5. Unless otherwise specified, all data are measured at $T_a=25^\circ\text{C}$, humidity $< 75\%$, nominal input voltage, and rated output (pure resistive) load.
6. All testing methods are based on our company's standards.
7. The above specifications apply only to the standard models listed in this manual. For non-standard models, some parameters may vary; please contact our technical staff for details.
8. Product customization services are available.

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