


Typical Features
◆ Wide input voltage range 90-264VAC/122-370VDC
◆ No-load power consumption $\leq 0.5W@220VAC$
◆ Efficiency 86%(Typ.)
◆ Operating temperature from $-40^{\circ}C$ to $+70^{\circ}C$
◆ Output short circuit & over current protections
◆ Isolation voltage 4000VAC
◆ Switching frequency 65KHz
◆ PCB DIP mounting



**CE**  
EN62368-1

**Applications**

The **FA60-220SXXG2N4 series** consists of compact, high-efficiency power modules featuring universal AC/DC input, low ripple, low temperature rise, low power consumption, high reliability, and high safety isolation. Compliant with EN55032 and IEC/EN61000 standards with superior EMC performance, this series is widely used in power, industrial, instrumentation, and smart home sectors; for harsh EMC environments, please refer to the recommended application circuits.

**Selection Guide**

Certificate	Part No.	Input Voltage Range		Output Specification			Max. Capacitive Load @220VAC (uF)	Ripple & Noise @20MHz (Max) (mVp-p)	Efficiency @Full Load 220VAC (Typ.) (%)
		Nominal (VAC)	Range (VAC)	Power P(W)	Voltage Vo(VDC)	Current Io (mA)			
		(VAC)	(VAC)	P(W)	Vo(VDC)	Io (mA)			
CE	FA60-220S12G2N4	220	90-264	60	12	5000	14000	150	86
	FA60-220S24G2N4			60	24	2500	4000	150	86
	FA60-220S36G2N4			60	36	1666	1500	150	86
	FA60-220S37G2N4			60	37	1622	1500	150	86

Note 1: Due to space limitations, only partial products are listed above. For models not included in this list, please contact our sales department.

Note 2: Typical efficiency values are measured after the product has been operating at full load for 30 minutes (aging).

Note 3: The tolerance for full-load efficiency (% , TYP) is  $\pm 2\%$ . Full-load efficiency is calculated as the total output power divided by the module's input power.

Note 4: Ripple and noise are measured using the parallel cable method. Please refer to the "Ripple & Noise Test Instructions" section for detailed setup and configurations.

**Input Specifications**

Item	Test Condition	Min.	Typ.	Max.	Unit
Input voltage range	AC Input	90	220	264	VAC
	DC Input	122	310	370	VDC
Input frequency range	-	47	50	63	Hz
Input current	Input 115VAC	-	-	1.4	A

	Input 220VAC	-	-	0.7	
Surge current	Input 115VAC	-	-	30	
	Input 220VAC	-	-	50	
Standby power consumption	Input 115VAC	-	-	0.5	W
	Input 220VAC	-	-		
Leakage current	-	0.5mA TYP/230VAC/50Hz			
External fuse recommended	-	3.15A/250VAC Time-delay fuse			
Hot-plug	-	N/A			
ON/OFF control	-	N/A			

**Output Specifications**

Item		Test Condition	Min.	Typ.	Max.	Unit
Output voltage accuracy		Full input voltage range, any load	-	±2.0	±3.0	%
Line regulation		Nominal Load	-	-	±0.5	%
Load regulation		Nominal input Voltage, 20%~100% load	-	-	±1.0	%
Ripple & Noise		5%-100% load, 20MHz bandwidth	-	-	150	mVp-p
Minimum load		Single Output	0	-	-	%
Temperature drift coefficient		-	-	±0.03	-	%/°C
Turn-on delay time		Nominal input voltage (Full load)	-	-	800	mS
Hold up Time		Nominal input voltage (Full load)	50	-	-	mS
Dynamic response	Overshoot range	25%~50%~25%	-5.0	-	+5.0	%
	Recovery time	50%~75%~50%	-	-	5.0	mS
Output overshoot		Full input voltage range	≤10			%Vo
Short circuit protection			Continuous, self-recovery			Hiccup
Over current protection		Input 220VAC	110%Io	-	200%Io	Hiccup

**General Specifications**

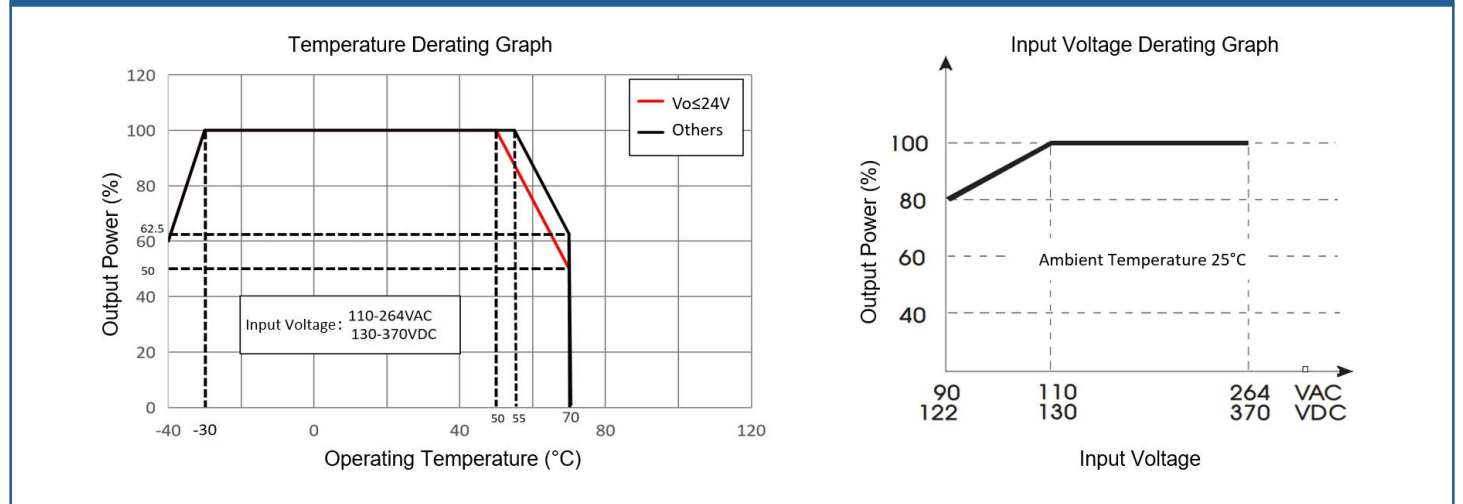
Item		Test Condition	Min.	Typ.	Max.	Unit
Switching Frequency		-	-	65	-	kHz
Operating Temperature		See Derating Curve	-40	-	+70	°C
Storage temperature		-	-40	-	+85	°C
Soldering temperature		Wave soldering	260±4°C, duration 5–10 s			
		Manual soldering	360±8°C, duration 4–7 s			
Relative Humidity		-	10	-	90	%RH
Isolation Voltage	I/P-O/P	Test 1min, leakage current ≤5mA	4000	-	-	VAC
	I/P-FG	Test 1min, leakage current ≤5mA	1500	-	-	VAC
	O/P-FG	Test 1min, leakage current ≤5mA	500	-	-	VAC
Insulation Resistance	Input-Output	@ 500 VDC applied	100	-	-	MΩ
MTBF		MIL-HDBK-217F at 25°C	300	-	-	K hours
Safety Standards		EN 62368, IEC 62368				
Vibration		10–55 Hz, 10 G, 30 min, along X, Y, Z				
Safety Class		CLASS II				

Enclosure Rating	UL 94 V-0			
Weight/Dimensions	Package Type	Weight (Typ)	Dimensions L x W x H	
	FA60-220S12G2N4	320g	109.00 x 58.50 x 30.00 mm	4.291 x 2.303 x 1.181 inches
	FA60-220S24G2N4	320g	109.00 x 58.50 x 30.00 mm	4.291 x 2.303 x 1.181 inches
	FA60-220S36G2N4	320g	109.00 x 58.50 x 30.00 mm	4.291 x 2.303 x 1.181 inches
	FA60-220S37G2N4	320g	109.00 x 58.50 x 30.00 mm	4.291 x 2.303 x 1.181 inches

**EMC Performance**

Component	Sub-item	Technical Standard	Performance Criteria	
EMC	EMI	CE	CISPR 32/EN 55032 CLASS B (See Figure 1 for recommended circuit)	
		RE	CISPR 32/EN 55032 CLASS B (see Figure 1 for recommended circuit)	
	EMS	Electrostatic Discharge (ESD)	IEC/EN 61000-4-2	Contact ±6 kV / Air ±8 kV Performance Criteria B
		Radiated Immunity	IEC/EN 61000-4-3	10V/m, Perf. Criteria B (See Fig. 1 for the recommended circuit)
		Burst Immunity (EFT)	IEC/EN 61000-4-4	±2 kV, Perf. Criteria B
		Surge Immunity	IEC/EN 61000-4-5	Line-to-line ±2 kV / Line-to-ground ±4 kV Perf. Criteria B(See Fig. 1 for the recommended circuit)
		CS	IEC/EN 61000-4-6	3 Vrms Per. Criteria B (See Fig. 1 for the recommended circuit)
		Voltage Dips & Interruptions	IEC/EN 61000-4-11	0%–70% Perf. Criteria B

**Product Characteristics Curves**



Note 1: For input voltages within 90-110 VAC or 122-130 VDC, voltage derating must be applied according to the input voltage derating curve.

Note 2: This product is designed for natural air convection cooling. For applications in enclosed environments, please contact our technical support.

**Typical EMC Application Diagram and Recommended Parameters**

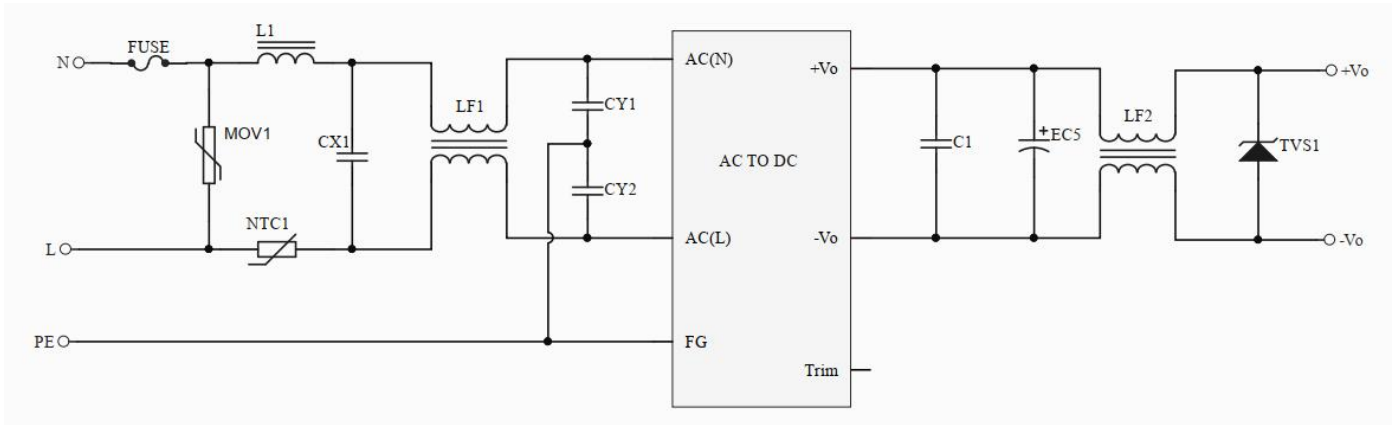
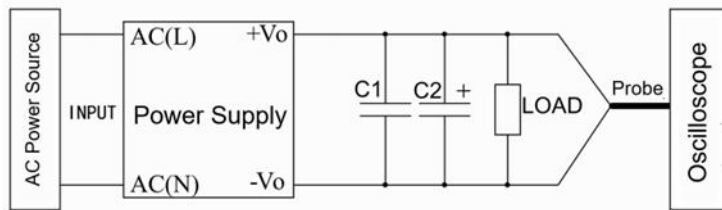


Figure 1

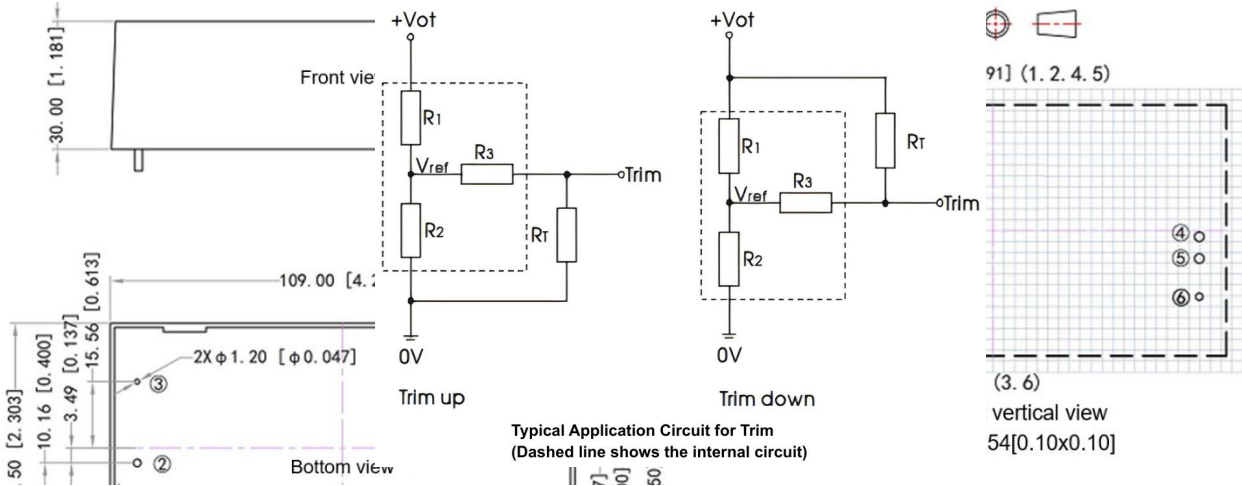
Model	FUSE ( )	MOV1	NTC1	L1	CX1	LF1	CY1, CY2	C1	LF2	EC5	TVS1
FA60-220S12G2N4	3.15A/250V (slow-blow)	14D56	5D-13	1.2 mH/1 .5 A	X2,334	10 mH/1.5 A	Y1/ 1nF/ 400VAC	1μF/5 0 V	150μ H/5 A	680μF/16V	SMBJ20.0A
FA60-220S24G2N4										470 μF/35 V	SMBJ30.0A
FA60-220S36G2N4										470 μF/50V	SMBJ50.0A
FA60-220S37G2N4										470 μF/50V	SMBJ50.0A

**Ripple & Noise Test Instruction (Parallel Cable 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.

**Output Voltage Trimming & Resistance Calculation**



Typical Application Circuit for Trim  
(Dashed line shows the internal circuit)

**Calculation Formulas for Trim Resistor**

$$\text{up: } R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3 \quad \alpha = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3 \quad \alpha = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

**RT: Resistance of the Trim resistor**      11.2mm  
**a: Self-defined parameter, no physical meaning**

**Pin Definitions**

Pin No.	1	2	3	4	5	6
Function	AC(N)	AC(L)	FG	+Vo	-Vo	Trim
	AC Input (Neutral)	AC Input (Line)	Frame Ground	Output Positive	Output Negative	Output Voltage Trimming

**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°C, 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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