

**Typical Features**

- ◆ Wide input voltage range: 85-265VAC/120-380VDC
- ◆ No load power consumption  $\leq 0.45W$
- ◆ Transfer Efficiency 88%(TYP.)
- ◆ Switching Frequency: 65KHz
- ◆ Protections: short circuit, over current
- ◆ Isolation voltage: 4000Vac
- ◆ Conform to IEC62368/UL62368/EN62368 test Standard
- ◆ PCB mounting



**Application Field**

**DA60-220SXXG9N4 Series-----** a compact size, high efficient power module offered by Aipu. It features universal input voltage range, AC and DC dual-use, low ripple, low temperature rise, low power consumption, high efficiency, high reliability, safer isolation, good EMC performance, For EMC and safety spec conform to EN55032, IEC/EN61000 standard. These series have important application for power, industry, instrument and smart home field. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.

**Typical Product List**

Certificate	Part No	Output Specifications			Max. Capacitive Load	Ripple & Noise 20MHz (Max)	Efficiency@ Full Load, 220Vac (Typical)
		Power	Voltage1	Current1			
		(W)	Vo1(V)	Io1(mA)			
/	DA60-220S12G9N4	60	12	5000	6000	120	85
	DA60-220S15G9N4	60	15	4000	5000	150	85
	DA60-220S24G9N4	60	24	2500	2000	150	86
	DA60-220S48G9N4	40	48	1250	600	150	87

Note 1: The typical value of output efficiency is based on module is full loaded and burned-in after half an hour.

Note 2: The fluctuation range of full load efficiency(% ,TYP) in table is  $\pm 2\%$ , full load efficiency= output power/module's input power.

Note 3: Ripple & Noise is tested by twisted pair method, details please refer to Ripple & Noise test at back.

**Input Specifications**

Item	Operating Condition	Min	Typ.	Max	Unit
Input Voltage Range	AC input	85	220	265	VAC
	DC input	120	310	380	VDC
Input Frequency range	-	47	50	63	Hz
Input Current	115VAC	/	/	1.20	A
	220VAC	/	/	0.70	

Surge Current	115VAC	/	/	10	
	220VAC	/	/	30	
Leakage Current	-	0.5mA TYP/230VAC/50Hz			
Recommended External Input Fuse	-	3.15A/250VAC slow fusing			
Hot Plug	-	Unavailable			
Remote Control Terminal	-	Unavailable			

**Output Specifications**

Item	Operating Condition	Min	Typ.	Max	Unit
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	%
No Load Power Consumption	Input 115VAC	-	-	0.45	W
	Input 220VAC	-	-		
Minimum Load	Single Output	0	-	-	%
Start up Delay Time	Nominal input voltage (full load)	-	1500	-	mS
Power-off Holding Time	Input 115VAC (full load)	-	200	-	mS
	Input 220VAC (full load)	-	100	-	
Dynamic Response	25%~50%~25%	-5.0	-	+5.0	%
	50%~75%~50%	-5.0	-	+5.0	mS
Output Overshoot	Full input voltage range	≤10%Vo			%
Short circuit Protection		Continuous, self-recovery			Hiccup
Temperature Drift	-	-	±0.03%	-	%/°C
Over Current Protection	Full input voltage range	≥130% Io, self-recovery			Hiccup

**General Specifications**

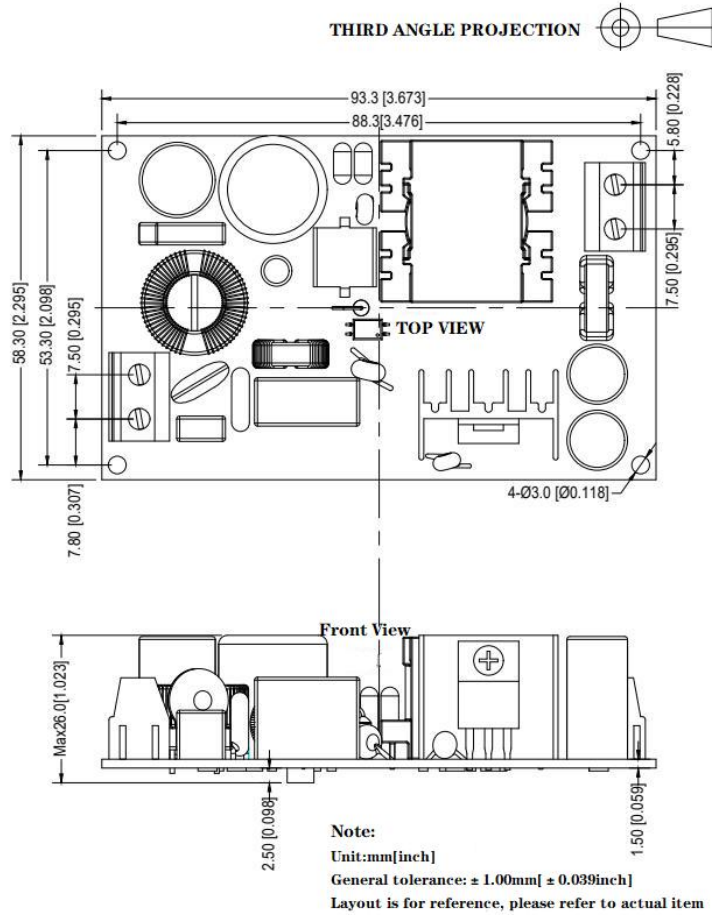
Item	Operating Condition	Min	Typ.	Max	Unit
Switching Frequency	-	-	65	-	KHz
Operating Temperature	-	-40	-	+75	°C
Storage Temperature	-	-40	-	+85	
Soldering Temperature	Wave soldering	260±4°C, time 5-10S			
	Manual soldering	360±8°C, time 4-7S			

Relative Humidity	-	10	-	90	%RH
Isolation Voltage	Input-Output, Test 1min, leakage current≤5mA	4000	-	-	VAC
Insulation Resistance	Input-Output@ DC500V	100	-	-	MΩ
Safety Standard	-	EN60950, IEC60950			
Vibration	-	10-55Hz, 10G, 30Min, along X, Y, Z			
Safety Class	-	CLASS II			
MTBF	-	MIL-HDBK-217F@25°C > 300,000H			
Cooling Method	-	Free air convection			

**EMC Characteristics**

Total Item		Sub Item	Test Standard	Class
EMC	EMI	CE	CISPR22/EN55032	CLASS B (See Recommended Circuit on photo 2)
		RE	CISPR22/EN55032	CLASS B (See Recommended Circuit on photo 2)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B (See Recommended Circuit on photo 1)
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria B (See Recommended Circuit on photo 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, short interruptions and voltage variations immunity		IEC/EN61000-4-11	0%~70% Perf.Criteria B

**Dimension**



Packing Code	L x W x H	
-	93.3 x 58.3 x 26.0 mm	3.673 × 2.295 × 1.023 inch

**Pin Specification**

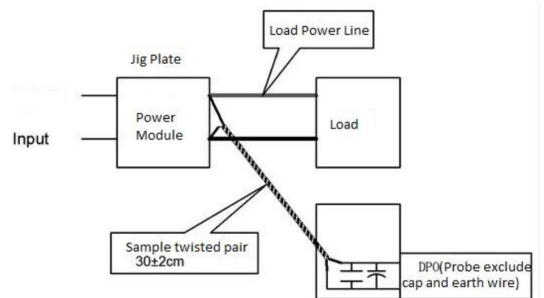
Pin	1	2	3	4
Single(S)	AC(N)	AC(L)	V+	V-

**Ripple & Noise Test: (Twisted Pair Method 20MHZ bandwidth)**

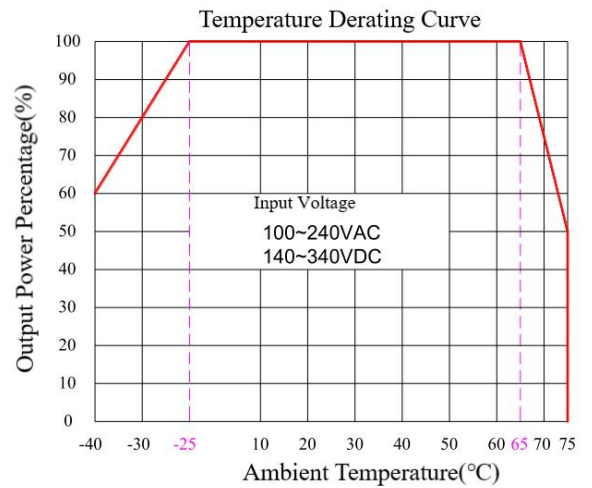
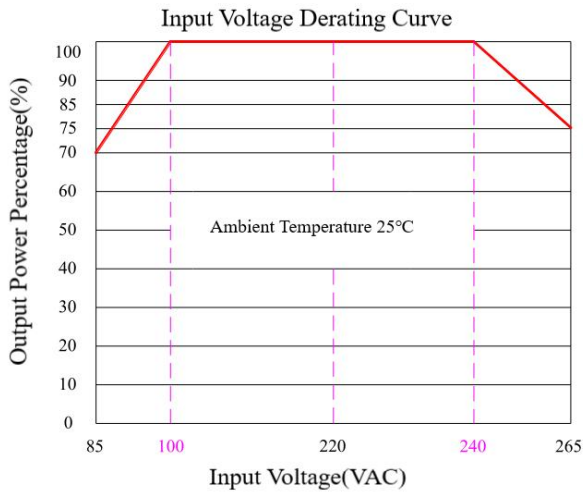
**Test Method:**

(1) 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

(2) Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



**Product Characteristic Curve**



Note 1: Input Voltage should be derated based on Input voltage derating curve when it is 85~100VAC/240~265VAC/120~140VDC/340~380VDC.

Note 2: Our product is suitable to use under natural air cooling environment, if use it under closed condition, please contact with us.

**Typical Application Circuit and EMC Recommended Circuit**

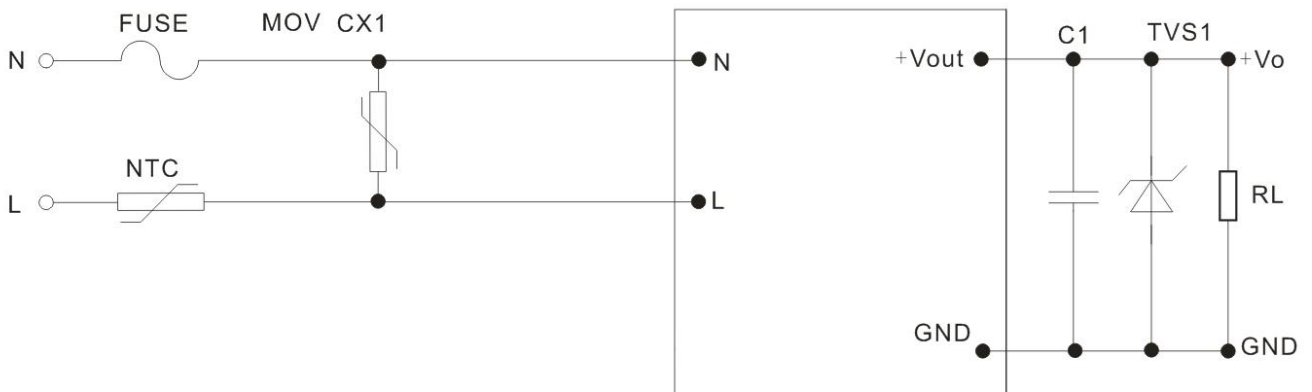


Photo 1

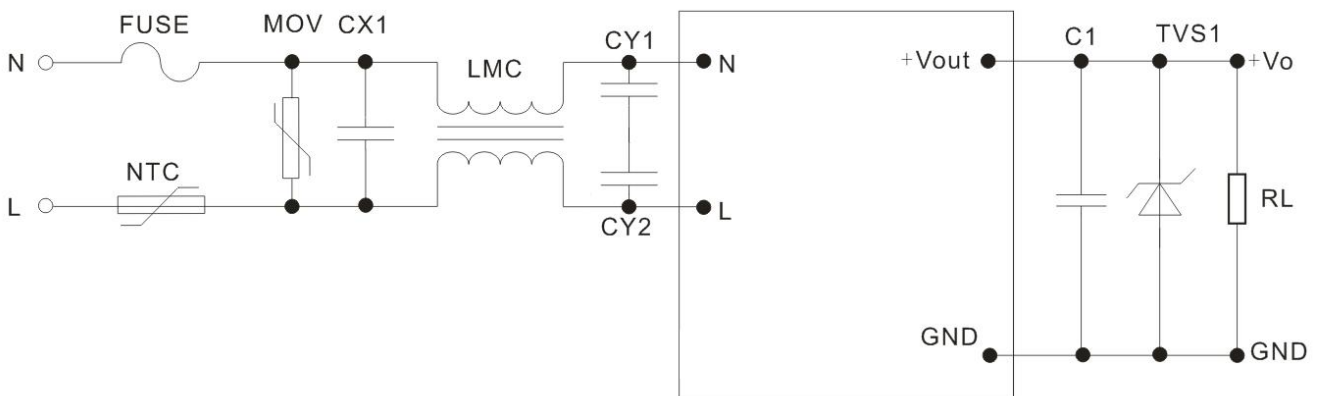


Photo 2

## NOTE 1:

1. Output filter capacitor C1 filters high frequency noise, recommended 1  $\mu$  F ceramic capacitor, capacitor withstand voltage derating > 80%.
2. TVS is recommended to use to protect post circuit (when module is abnormal), recommend 600W model.  
5V output: SMBJ7.0A, 9V output: SMBJ12.0A, 12V output : SMBJ20A, 15V output: SMBJ20.0A, 24V output: SMBJ30.0A, 48V output: SMBJ64A.
3. MOV is voltage dependent resistor, recommend model 10D561K, to protect module from lightning surge.
4. For general application requirements, customers could use recommended circuit Photo 1, If has higher EMC requirement, Photo 2 circuit is recommended, The specific for Photo 2:
  - 1) Varistor MOV: recommended 10D-561K, to protect module from lightning surge.
  - 2) Thermistor NTC: 10D-9.
  - 3) Safety capacitor CY1, CY2: 1000pF/400VAC.
  - 4) Safety capacitor CX: 0.1 $\mu$ F/275VAC.
  - 5) Common mode inductor LCM: 15mH-30mH.
  - 6) FUSE: necessary, recommend model 3.15A/250V, slow fusing.

## Note 2:

1. The product should be used within the specification range, or it will cause permanent damage to it;
2. The input terminal should connect to fuse;
3. If the product is worked under the minimum requested load, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
4. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of **Ta=25°C**, **humidity<75%** with nominal input voltage and rated output load(pure resistance load);
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, please directly contact our technician for specific information;
8. We can provide product customization service,
9. Specifications are subject to change without prior notice, please follow up with our website for newest manual.

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