深圳欧陆通电子股份有限公司 SHENZHENHONOR ELECTRONIC CO.,LTD ASPOWER Electrical Specification	Model Name	U1A-A10250-S
	Version	S3
	Release Date	2019/03/22

Electrical Specification

(With ATX output for Optimize (SGCC))

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REV	Description	Date
S0	Release	2018/04/12
S1	2.2 Inrush Current：Modify the definition of inrush current 4.2 Over Temperature Protection (OTP)：Modify the OTP description 6.1 Safety Certification: Increase safety certification	2018/12/19
S2	Update：7.2 Wireview Update：2.4 Power Factor	2019/01/26
S3	Modify 3.4 Timing	2019/03/22

Contents

1.0 SCOPE

The specification defines the key characteristics for the power supply. The power supply can be used for Server storage filed, and normal AC or HVDC input voltage can apply in the power supply. Output ports is include +12V, +5V, +3.3V, -12V and +5VSB. The power supply has fans for air-cooling. The max output power is 250W.

2.0 INPUT PARAMETER

2.1 Input Voltage/Input Current/Frequency

The power supply should operate in input limited voltage range, and follow the specification defined as below table, includes the limited value of input current, input voltage, working frequency. The power supply should be turned on when 90VAC or 145VDC at min load and max load.

Table1.

	Min	Rated	Max	Units
AC input voltage	90	100~240	264	Vrms
Frequency	47	50/60	63	Hz
HVDC input voltage	145	160~320	340	Vdc
Input current	<5A@100-240VAC <5A@160-320VDC			

2.2 Inrush Current

Inrush current does not cause power supply damage when cold start at 25°C with 230Vac input.

2.3 Efficiency

Efficiency testing should be in ambient temperature: 18degC-27degC, input voltage at 230Vac/50Hz. Below table provides efficiency requirement at various load for only one module.

Table2.

Load	+3.3V	+5V	+12V	-12V	+5Vsb	EFF
20%	1.4A	1.6A	2.9A	0.04A	0.4A	>79%
50%	3.5A	4A	7.3A	0.1A	1A	>80%
100%	7A	8A	14.5A	0.2A	2A	>80%

2.4 Power Factor

The power supply must meet the power factor requirements stated in the Energy Star Program Requirements for Computer Servers. These requirements are stated as below when one module. Test at 115Vac/60Hz or 230Vac/50Hz .

Table3.

Load	100% Load
PF	> 0.9

2.5 Surge and Sag

AC line transient conditions are defined as “sag” and “surge”. “Sag” is defined as the AC line voltage drops below nominal voltage; “Surge” is defined as the AC line voltage rises above nominal voltage. The power supply should meet below AC line sag and surge conditions.

Table4. Sag

Duration	Surge/Sag	Input Voltage	Frequency	Performance Criteria
0.5 AC cycle	95%	100~240Vac	50/60Hz	No loss of function or performance
>1.0 AC cycle	>30%	100~240Vac	50/60Hz	Loss of function acceptable, power supply can turn on automatically

Table5. Surge

Duration	Surge/Sag	Input Voltage	Frequency	Performance Criteria
Continuous	10%	100~240Vac	50/60Hz	No loss of function or performance
0 to 0.5 AC cycle	30%	115~230Vac	50/60Hz	No loss of function or performance

3.0 OUTPUT PARAMETER

3.1 Output Current

The following table defines the current rating. The combined output power of all outputs shall not exceed the rated output power. The power supply shall meet both static, dynamic voltage regulation and timing requirements for the min/ max loading conditions.

Table6.

Output Voltage	Min Current	Max current
+3.3V	0.3A	12A
+5V	0.5A	14A
+12V	1.0A	18A
-12V	0A	0.3A
+5Vsb	0A	2.5A

Note:

1. The continuous total max output power is 250W for 90~264Vac input.
2. The combined power of +5V and +3.3V is 80W max.

3.2 Voltage Regulation

The power supply output voltage must stay within the following voltage limits shown in below table when operating at steady state, dynamic loading conditions. All outputs are measured with reference to the return remote sense (ReturnS) signal.

Table7.

Output Voltage	Min	Rated	Max	Tolerance
+3.3V	3.135V	3.3V	3.465V	+/-5%
+5V	4.75V	5.0V	5.25V	+/-5%
+12V	11.4V	12.0V	12.6V	+/-5%
-12V	10.8V	12.0V	13.2V	+/-10%
+5Vsb	4.75V	5.0V	5.25V	+/-5%

3.3 Ripple & Noise

Table8.

Output voltage	Ripple & noise
+3.3V	<50mV
+5V	<50mV
+12V	<120mV
-12V	<120mV
+5Vsb	<50mV

Note:

1. This is measured over a bandwidth of 20MHz at the output connector. A 10μF Electrolytic capacitor in parallel with a 0.1μF ceramic capacitor are placed at the point of measurement.

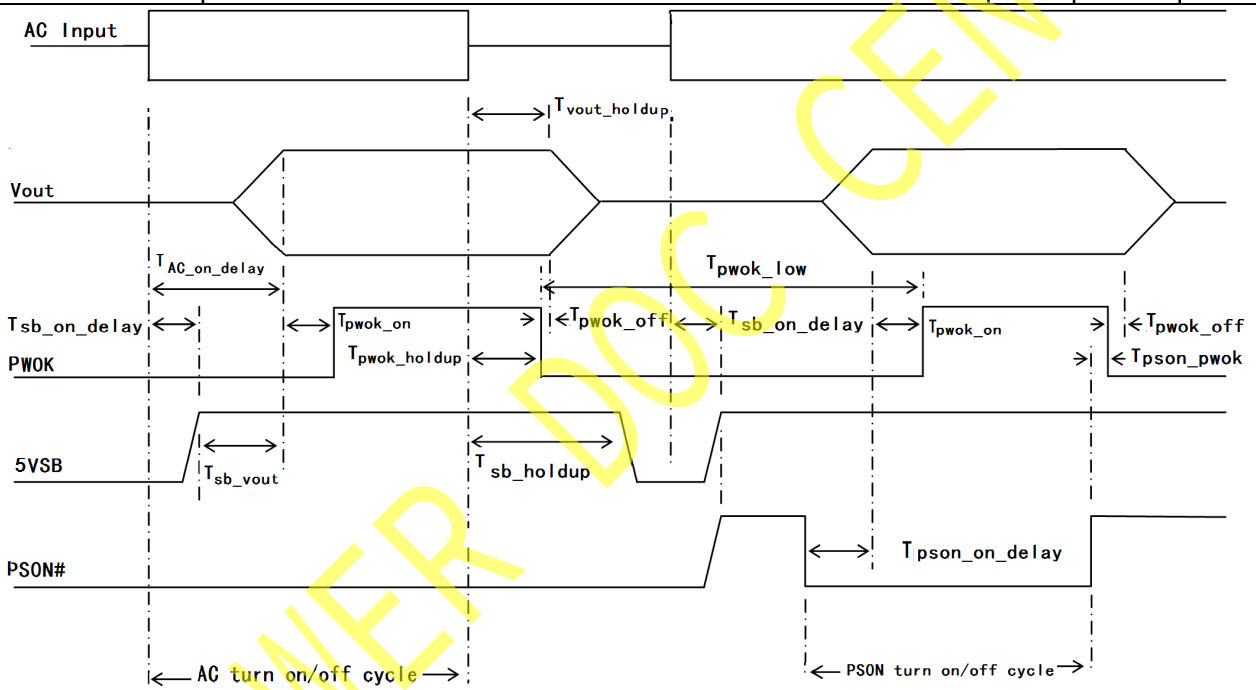
3.4 Timing

Below figure & table shows the power supply timing & requirements.

Table9. Turn On/Off Timing

Item	Description	Min	Max	Units
Tvout _rise	Output voltage rise from 10% to 90% time for 5Vsb.	1	20	ms
Tvout _rise	Output voltage rise from 10% to 90% time for 12V, 3.3V, 5V, -12V.	1	20	ms
Tsb_on_delay	Delay from AC being applied to 5Vsb being within regulation.		1500	ms
Tac_on_delay	Delay from AC being applied to 12V, 3.3V, 5V, -12V being within regulation.		3000	ms
Tsb_vout	Delay from 5Vsb being in regulation to 12V, 3.3V, 5V, -12V being in regulation at AC turn on.	50	1500	ms
Tpson_on_delay	Delay from PSON active to output voltages being within regulation limits.	5	400	ms
Tpwok_on	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	500	ms
Tvout_holdup	Time 12V, 3.3V, 5V, -12V output stay within regulation after AC loss.	14		ms

Tpwok_holdup	Delay from loss of AC to de-assertion of PWOK.	12		ms
T5Vsb_hold up	Time the 5Vsb output voltage stays within regulation after loss of AC.	70		ms
Tpwok_off	Delay from PWOK de-asserted to output voltages dropping out of regulation limits.	1		ms
Tpwok_low	Duration of PWOK being in the de-asserted state during an OFF/ON cycle using AC or the PSON signal.	100		ms
Tpson_pwok	PWOK being de-asserted delay from PSON deactivate.		50	ms



Note:

1. Rise time (Tvout _rise): The 12V, 3.3V, 5V, -12V must rise from 10% to 90% within regulation limits within 1 to 20ms.

For 5Vsb, it is allowed to rise up within 1.0 to 20ms. All outputs must rise monotonically.

2. Tsb-on & Tac-on delay time: The Tsb-on delay time for 5Vsb should be ≤ 1.5s at 115Vac/230Vac with full load.

The Tac-on delay time for 12V, 3.3V, 5V, -12V should be ≤ 3s at 115Vac/230Vac with full load.

3. Main output delay time (Tsb_vout): The 12V, 3.3V, 5V, -12V main output being in regulation delay from 5Vsb being in regulation should be 50 to 1500ms when at AC turn on.

4. Tpson_on_delay: The 12V, 3.3V, 5V, -12V output must be within regulation after PSON active for 5 to 400ms.

5. Power work OK delay (Tpwok_on): PWOK should delay from 12V, 3.3V, 5V, -12V output within regulation for 100 to 500ms.

6. Holdup time (Tvout_holdup): The holdup time for 12V should ≥ 14ms at 115/230Vac input and full load.

The holdup time for 5Vsb should ≥ 70ms at 115Vac/230Vac input with full load.

7. Power fail delay time (Tpwok_off): 12V dropping out of regulation delay from PWOK should≥ 1ms when power off at 80%full load.

8. Duration time for PWOK (Tpwok_low): The duration time of PWOK when OFF/ON cycle using AC or the PSON signal should ≥ 100ms.

9. PWOK delay PSON deactivates (Tpson_pwok): PWOK being de-asserted should delay from PSON deactivate≤ 50ms.

3.5 Dynamic

The load transient repetition rate shall be tested between 50Hz to 5KHz at 50% duty cycles. The test shall be at least in 50 Hz/1KHz/10KHz condition. The load transient repetition rate is only a test specification.

The output voltage shall remain within limits specified for the step loading, slew rate, and capacitive loading in below table.

Table10.

Output Voltage	Transient Step (A) Percent of Rated current	A/us	Frequency (Hz)	Cap (uF)
+3.3V	30% of max load	0.1	50-5K	5000
+5V	30% of max load	0.1	50-5K	5000
+12V	30% of max load	0.1	50-5K	5000

3.6 Capacitive Loading

The power supply shall be stable and can start up at min load with below capacitive loading.

Table11.

Output Voltage	+3.3V	+5V	+12V	-12V	+5Vsb
Capacitive loading (uF)	5000	5000	6000	350	350

4.0 PROTECTION

When the 12V, 3.3V, 5V, -12V output's OCP/OVP is triggered, the power supply will shut down and latched off. The latch can be cleared by toggling the PSON signal or by an AC power interruption. When the input UVP/OVP, OTP or 5Vsb output's OCP & OVP is triggered, the power supply will shut down and auto recovery when the fault condition removed.

4.1 Output Over Voltage Protection (Output OVP)

The power supply should have over voltage protection to prevent the outputs from exceeding limits, if the OVP occurred, the power supply should shut down and latch-off, the latch will be cleared by toggling the PSON signal or an AC on/off cycle operation, OVP limit. 12V output: 13.3~16Vdc, 3.3V output: 3.9~4.5Vdc, 5V output: 5.7~7.0Vdc.

4.2 Over Temperature Protection (OTP)

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shut down. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically, while the 5Vsb remains always on. The ambient over temperature point is 60±10℃.

4.3 Short Circuit Protection (SCP)

The power supply shall be protected from damage due to faults between outputs (+12V, +3.3V, +5V, +5Vsb, -12V) and GND. Short circuit of the power supply outputs shall not result in fire hazard, shock hazard, or damage to the power supply. Components shall not be damaged during the short circuit conditions. If the +12V,+3.3V, +5V, -12V,shorted to GND, the power supply will shut down and latched off. The latch state can be cleared by toggling the PSON signal or by an AC power interruption of 5 seconds nominal. All outputs shut down upon a short circuit of the +5Vsb.

4.4 Over Current Protection (OCP)

The power supply should have over current protection to prevent the outputs from exceeding limits, if the OCP occurred, the power supply should shut down an auto-recovered after removing OCP limit. 3.3V & 5V: 15~30A, 5Vsb: 3.5~7A, 12V: 20~30A.

5.0 OPERATE ENVIRONMENT

5.1 Operate Temperature

Operate temperature: 0℃ to +50℃.

5.2 Storage Temperature

Storage temperature: -40℃ to +70℃.

5.3 Operate Humidity

Operate Humidity (non-condensing): 10% to 90%.

5.4 Storage Humidity

Storage Humidity (non-condensing): 5% to 95%.

5.5 Operate Altitude

Operate Altitude: 0 to 5000m.

5.6 Storage Altitude

Storage Altitude: 0 to 6000m.

6.0 SAFETY

6.1 Safety Certification

Meet FCC

Meet CE

Meet CCC

Meet CB:(IEC60950-1:2005/AMD2:2013;IEC60950-1:2005/AMD2009;IEC60950-1:2005)

Meet S Mark

Meet BSMI

6.2 Hi-pot

Primary to secondary Hi-pot withstand voltage: 1500Vac/2121Vdc for 60s for power supply; or 3000Vac/4242Vdc for 60s when float output or PCBA.

Primary to grounding Hi-pot withstand voltage: 1500Vac/2121Vdc for 60s.

6.3 Grounding Impedance Test

Grounding impedance test using grounding current 25A and the impedance is less than 100mohm.

6.4 Leakage Current

Leakage current refers to the voltage applied to the no fault, between the metal parts with electrical insulated from each other, or between charged parts and grounding parts, the current formed through the medium around the insulated surface called leakage current. Leakage current is the current flowing

through the insulation part under the action of the electrical line or equipment in the absence of failure and voltage. Therefore, it is one of the important symbols to measure the insulation quality of electrical appliances, and is the main quota of product safety performance. The leakage current is limited to a very small value, which plays an important role in improving product safety performance.

In order to ensure that the leakage current of the power supply case not cause leakage damage to the human body, after inserting the AC power, the leakage current of the power supply should meet the requirements of safety. Under 240Vac/60Hz conditions to be less than 3.5mA.

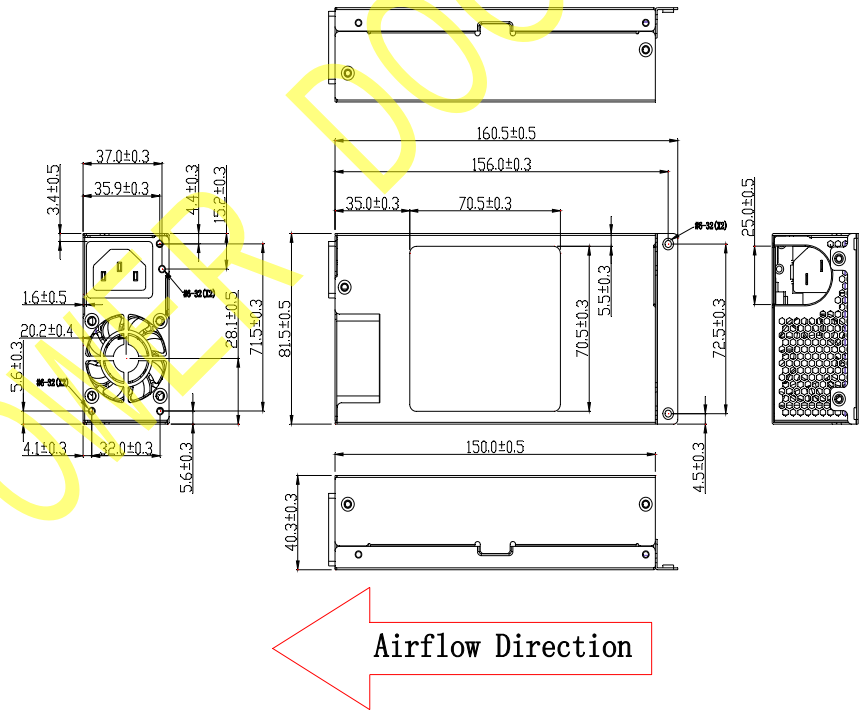
7.0 Dimensions:

7.1 Outline dimension:

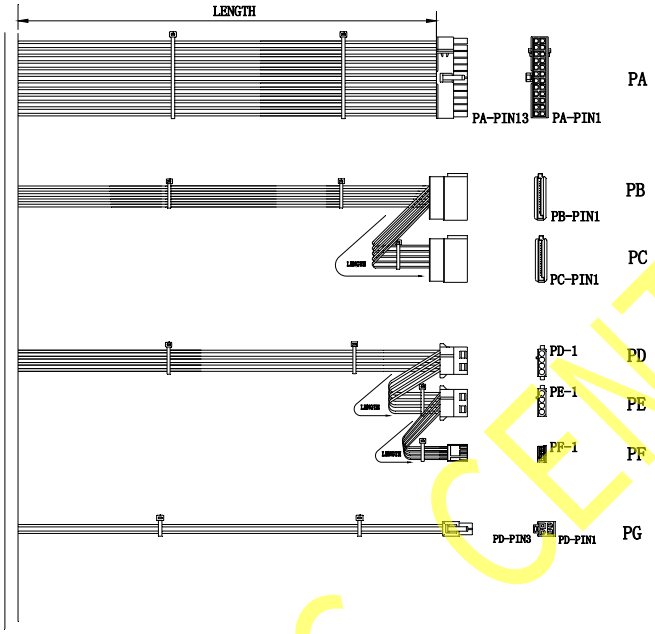
Length: 150.0mm;

Width: 81.5mm;

Thickness: 40.3mm.



7.2 Wire view:



CONN	PIN	WIRE COLOR	OUTPUT	WIRE SPECIFICATION	LENGTH (mm)
PA	1	ORANGE	+3.3VDC	UL/CSA 1007 20AWG 80° C 300V	PA 350.0 ± 30
		ORANGE	+3.3V REMOTE SONSE	UL/CSA 1007 22AWG 80° C 300V	
	2	ORANGE	+3.3VDC	UL/CSA 1007 20AWG 80° C 300V	
	3	BLACK	GND		
	4	RED	+5VDC		
	5	BLACK	GND		
	6	RED	+5VDC		
	7	BLACK	GND		
	8	GRAY	PG		
	9	PURPLE	+5 VSB		
	10	YELLOW	+12VDC		
	11	YELLOW	+12VDC		
	12	ORANGE	+3.3VDC		
	13	ORANGE	+3.3VDC		
	14	BLUE	-12VDC		
	15	BLACK	GND		
	16	GREEN	PS-ON		
	17	BLACK	GND		
	18	BLACK	GND		
	19	BLACK	GND		
	20	NC	NC		
	21	RED	+5VDC		
	22	RED	+5V		
	23	RED	+5V		
	24	BLACK	GND		
PB PC	1 2 3	ORANGE	+3.3VDC	UL/CSA 1007 20AWG 80° C 300V	PB 200±30mm PC 150±10mm
	4 5 6	BLACK	GND		
	7 8 9	RED	+5VDC		
	10 11 12	BLACK	GND		
	13 14 15	YELLOW	+12VDC		
PD PE PF	1	YELLOW	+12VDC	UL/CSA 1007 20AWG 80° C 300V	PD 300±30mm PE PF 150±10mm
	2	BLACK	GND		
	3	BLACK	GND		
	4	RED	+5VDC		
PG	1	BLACK	GND	UL/CSA 1007 20AWG 80° C 300V	PG 350±30mm
	2	BLACK	GND		
	3	YELLOW	+12VDC		
	4	YELLOW	+12VDC		

NOTE:

PA	HOUSING:	WST P20+4-I42002K2	OR EQU
	TERMINAL:	WST I42002BS(PS)-A	
PB PC	HOUSING:	WST P5-I12707	OR EQU
	TERMINAL:	WST I12707PS-L	
PD PE	HOUSING:	WST P4-A10202	OR EQU
	TERMINAL:	WST A10209BS(PS)	
PF	HOUSING:	WST P4-I25001T	OR EQU
	TERMINAL:	WST I25001BS(PS)	
PG	HOUSING:	WST P4-I42002	OR EQU
	TERMINAL:	WST H13009BS(PS)	

8.0 GOLD FINGER DEFINE

Table12. Output Terminals

Signal	Description	Note
GND	Outputs' return and it's also connected with the case.	Black wire
12V	The main output voltage.	Yellow wire
5V	5V output voltage.	Red wire

3.3V	3.3V output voltage.	Orange wire
-12V	-12V output voltage.	Blue wire
5Vsb	The auxiliary output voltage.	Purple wire
PSON	Remote ON/OFF control signal: When PSON signal is low; the power supply will turn on, and turn off when it's high.	Green wire
PWOK	Power supply work OK signal.	Gray wire
3.3V Sense	3.3V output voltage return sense for feedback.	

9.0 RESTRICTED SUBSTANCE

9.1 ROHS

Power supply must meet be Rohs6 compliant including the component, PCB, soldering material, case, wire, and so on.

9.2 Restricted Substance

Recycled Plastics: Post-consumer recycled content plastics to constitute have a minimum of 4% of total supplier plastic purchases.

Packaging: Minimum 50% total recycled content, including 30% post-consumer recycled content for corrugated materials. Corrugated – min. 50% total recycled content, min. 30% post-consumer content.

Minimum 50% of total recycled content by weight is across all new systems for cushions.

10.0 EMC

10.1 Lighting

1. Lightning test meet the IEC61000-4-4 electric fast transient standard, withstand voltage: +/- 2KV. Performance criterion: A.

Table13.

Lighting	Withstand Requirement
EFT	±2KV

2. Surge defined in 61000-4-5 standard, including the upper limit of the standard: 1 KV, including phase angle: 0 degree, 90 degree, 180 degree, 270 degree. It is suitable for input AC/DC power supply of four combinations (L1-L2, L1-PE, L1-L2-PE and L2-PE). Performance criterion: A.

The requirement for surge is listed in the table as below.

Table14.

Lighting	Common	Different
surge	±2KV	±2KV
resistance	12ohm	2ohm

Performance criterion:

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss.

10.2 ESD

Power supply should be able to meet the IEC61000-4-2 ESD standard, the need to meet the level 4 requirements of contact 4KV, isolation 8KV standard. It should not have power product shutdown, signal drop, product burning and other undesirable phenomena. Performance criterion: A.

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss.

Table15. ESD Degree of Severity

ESD Grade	Contact	Air
1	2KV	2KV
2	4KV	4KV
3	6KV	8KV
4	8KV	15KV

10.3 Conducted Susceptibility

Power supply should be able to meet the standard of conduction immunity of IEC 61000-4-6. Conducted, the size of the interfered equipment is much shorter than wavelength of the frequency interference under normal condition, and the lead wire of equipment (including power line, communication line and interface cable etc.) may be related to several wave-length of disturbance frequency, so these leads will generate interference through the conduction mode. The frequency range of simulation testing is 150KHz ~ 80MHz.

Table16.

Conducted Susceptibility	Frequency Segment (80% AM)	Performance Criterion
	150KHz~80MHz 3V/M	A

Performance criterion:

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss.

10.4 Radiated Susceptibility

Power supply should be able to meet the standard of radiation sensitivity of IEC 61000-4-3. Need to meet the level 3 test requirements, performance criteria: A. Radiation immunity is also called radiation sensitivity, and it is one of the most basic EMS test items, referring to the ability of resisting radiation for various devices, equipment or systems under the presence of radiation. The sensitivity is higher, and the anti-jamming ability is lower.

Table17.

Radiated Susceptibility	Frequency Segment (80% AM)	Performance Criterion
	80M Hz~1000MHz 10V/M	A

After amplitude modulation of the RF signal with 80% 1KHz sine wave (amplitude modulation), frequency sweep test in the selected frequency range at each frequency point, the dwell time of the modulated RF signal scan should not be less than the measured device response time required, and not be less than 0.5s.

Performance criterion: A.

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss

10.5 Voltage Dips

Power supply should be able to meet the standard voltage drop of IEC 61000-4-11, is suitable for electronic equipment that rated input current is no more than 16A per phase of. Voltage dips: it is a process that voltage has a sudden drop at a point in an electrical system, then returns to normal after a brief period of cycles or a few seconds.

Table18. Standard Parameters for Voltage Dips

	Dips Range	Dips Time	Performance Criterion
Voltage Dips	0%Ut	10ms	B
	70%Ut	500ms	B
	0%Ut	5000ms	C

Performance criterion: A

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss.

10.6 EMI

Electromagnetic interference (EMI) project basic requirements: radiation interference (RE) and conduction interference (CE), and it shall meet the standard requirements of CLASS A. Electromagnetic interference EMI (Electromagnetic Interference), there are two kinds: conduction interference and radiation interference.

Table19. Conduction Performance Requirement

Item	Frequency Segment	Reference Standard	Note
Conduction interference	150KHz~30MHz	EN 55022	115V/60Hz 230Vac/50Hz

Table20. Conduction CLASS A Standard Limitation

Frequency (MHz)	Limitation (dBuV/m)	
	QP	AVG
0.15-0.50	79	66
0.50-30	73	60

Table21. Radiation Index Requirements

Item	Frequency Segment	Reference Standard	Note
Radiation interference	30MHz~1GHz	EN 55022	115V/60Hz 230Vac/50Hz

Table22. Radiation Class A Standard Limitation

FREQ	Limitation (dBuV/m)
30-230MHz	50
230-1000MHz	57

10.7 Voltage Fluctuation and Flicker Requirements

Power supply should be able to withstand the voltage fluctuations, test standards based on IEC61000-3-3.

Table23. Voltage Fluctuation Limit

Voltage Fluctuation	Limitation	Reference Standard	Note
Relative voltage variation characteristics Dt	500ms	IEC61000-3-3	230Vac/50Hz
Maximum relative voltage change Dmax	4%		230Vac/50Hz
Relative steady state voltage change	≦3.3%		230Vac/50Hz

Table24. Flicker Limitation

Voltage Flicker	Limitation	Reference Standard	Note
Short term flicker Pst	1.0	IEC61000-3-3	230Vac/50Hz
Long term flicker Plt	0.65		230Vac/50Hz

10.8 Harmonic

Power supply should meet the requirements of IEC61000-3-2 CLASS A, power supply should follow the principle of harmonic suppression, according to the CLASS A standard, it is not exceed the current limit value under specified different load. When Input power is less than 600W, it should select Class D, the other selects the CLASS A level

Table25. Limitations for A Device

Number of Harmonic n	Allowable Harmonic Current Max (A)	Number of Harmonic n	Allowable Harmonic current max (A)
Odd Harmonic		Even Harmonic	
3	2.23	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8≦n≦40	0.23*8/n
11	0.33		
13	0.21		
15≦n≦39	0.15*15/n		

Table26. Limitation for D equipment

Number of Harmonic n	Maximum allowable harmonic current per watt /mA˙W	Allowable harmonic current maximum (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13≦n≦39	3.85/n	reference the table of A

10.9 Power Frequency Magnetic Field

Power frequency magnetic field is generated by the power frequency current in the conductor, or very little leakage flux generated by the nearby other devices (such as the transformer leakage flux). The character of power frequency magnetic field is low frequency, long wave, the test waveform for the power frequency sine wave, and cause various influence on various electrical and electronic equipment. According to the standard: IEC61000-4-8 experimental grade: 1, and performance determination: A.

Table27.

Level	Test Grade For Stable Sustained Magnetic Field
	Magnetic Field Intensity: A/m
1	1
2	3
3	10

Performance criterion:

A. Equipment can work in the specified conditions.

B. Test equipment temporary performance decline, loss of function or reset phenomenon, but it can be recovery itself.

C. Equipment has temporary performance decline or loss of function and it is restored by operator intervention or system.

D. Equipment has non recoverable performance degradation or loss of function due to component damage, software affected or data loss.

11.0 PART CONTROL REQUIREMENTS

1. All current limiting devices shall have UL, TUV or VDE certification and shall be identified as applications in which the device complies with IEC60950.

2. All printed circuit board ratings shall meet UL94V - 0 and those from UL certified PCB manufacturers.

3. All joints shall pass UL certification and UL flame retardant rating UL94V-0.

4. All wiring harness shall be from UL certified wiring harness manufacturer. SELV cable is rated at minimum 80V, 130degC.

5. Product safety labels must be printed with UL certified labels and ribbons. In addition labels can be purchased from UL label manufacturers for approval.

6. The product must have the correct regulatory marks to support the certification specified in this document.

12.0 MECHANICAL PERFORMANCE

Mechanical vibration experiment is mainly to simulate the product vibration experiment in the work and transport process, the purpose is to test whether the product can meet certain specifications of vibration intensity, the main test items include:

1. Work random vibration.
2. Work shock.
3. Packaging random vibration.

Table28.

NO	Experiment Item	Sample	Standard	Parameter	Criterion
1	work random vibration	≥3	IPC9592A-2010 IEC60068-2-64	ASD: 20~1000Hz: 0.04g2/Hz; 1000~2000Hz: 6db/oct; 2000Hz: 0.01g2/Hz. About 8Grms. 3 axial, each axial at least 10min. Test process sample power on, normal input voltage, no load. During the test, each power output and signal output should be monitored continuously. The monitoring period should be less than 1ms.	Power supply voltage is Within the specification limits during the test.
2	work shock	≥3	IPC9592A-2010 IEC60068-2-27	Half sine wave, 16ms, at least 30g. 3 axial, each axial 3 times. During the test, each power	Power supply voltage is Within the specification limits during the test.

				output and signal output should be monitored continuously. The monitoring period should be less than 1ms.	
3	packaging random vibration	≥3	IPC9592A-2010 IEC60068-2-64	ASD: 5~1000Hz: 0.05g2/Hz; 1000~2000Hz: 6db/oct; 2000Hz: 0.0125g2/Hz. About 9Grms. About 9Grms, 3 axial, each axial at least 10min. Each PSU should have independent packaging follow normal delivery.	After the test, product should be inspected. Allows minor damage without affecting appearance, installation, or function. Connector pins are not allowed to bend, switch damage, handle damage. Label readability is poor, metal deformation or bending. All equipment through functional testing. Test shipment packaging damage degree does not make judgment requirements.

13.0 MTBF

Quantitative reliability (Quantitative) performance requirements: MTBF (MTBF Mean Time Between Critical Failure), according to the Bellcore standard SR-332 Issue3, the PSU operates

continuously under 25degC condition, 115VAC/60Hz 230V/50HZ, and 240VDC input voltage under max load, and MTBF is more than 100000 hours, the testing process should not be interrupted.

Table29.

Input Voltage	Load	MTBF
115VAC/60Hz	+3.3V/7A, +5V/8A, +12V/14.5A, -12V/0.2A, +5Vsb/2A	100000hours
230VAC/50Hz	+3.3V/7A, +5V/8A, +12V/14.5A, -12V/0.2A, +5Vsb/2A	100000hours
240VDC	+3.3V/7A, +5V/8A, +12V/14.5A, -12V/0.2A, +5Vsb/2A	100000hours

14.0 HALT

Highly accelerated life test, HALT is a kind of process of defect detection, by setting the incremental stricter environmental stress, to expose accelerated test sample defects and weak points, and then have analysis and improvement to defects and faults at design, process and material aspects, so as to improve the purpose of reliability, the biggest feature is setting higher environmental stress of the designed sample running limitation, so that the exposure fault time is much shorter than the normal fault reliability time under the condition of force. Test procedure and test report must meet the "IPC9592B-2012" requirements.

High acceleration life test specific testing includes points as below:

1. Gradually apply stress until the product failure or fault.
2. Take temporary action to correct product failure or fault.
3. Continue to apply stress gradually until the product fails again and correct again.
4. Repeat the above test steps from failure to improve.
5. Find out the basic operating limitation and basic damage limits.

Experimental process:

1. Temperature uniformity test:

After the test at room temperature for the test sample, before low temperature step stress test and turn off test sample power, adjust wind tube position, Device surface temperature is at ambient temperature, adjust the temperature to 50degC, the Duration time for 5min, record temperature of the key chip, and the layout of the site after temperature stability, until the temperature difference of all points is less than Plus or minus 3degC, then start experiment.

2. Temperature step stress test:

Temperature step stress test, have two stages: low temperature and high temperature. The first implementation of low temperature stress test stage, then high temperature stress test, the specific steps are as follows: the test should start from room temperature (20 DEG to 30 DEG); the maximum temperature step level: -10degC (low step) and +10degC (high temperature step); each temperature dwell times should be enough long (at least 10 minutes), until the thermocouple measurements value on the sample reached stable. The function of the test sample can be carried out under temperature stable, may also have been carried out in the whole process of the test sample; until find the operating limits or test has reached limit capacity of HALT test box, the test can be stopped; After determining the operating limits of the product, temperature step test should to be continued. The stress range is between the sample operation and destroying limits and the limit of HALT test box.

3. Rapid temperature change cyclic stress test:

Rapid temperature cyclic stress tests shall be performed at least 5 cycles, unless the test sample exhibits a non-recoverable failure in the test. Temperature change test rate according to the provisions of test program (not to exceed the maximum temperature change rate of HALT equipment); the lowest temperature test than the lowest temperature limit of 10degC higher (or 80%), the highest temperature is 10 degrees lower than the maximum working temperature limit (or 80%). At least 5 minutes in the temperature extremes, dwell time should be long enough, until the thermocouple measurements on the sample to achieve stability. In the whole process of rapid temperature change cyclic stress test, the samples should be functional monitored to judge whether the test samples will cause failure due to rapid temperature changes.

4. Vibration step stress test:

The vibration order of the experiment was 5~10Grms (recommended 10Grms), the frequency was between 2 and 5000Hz, or higher frequency range. At the end of each vibration magnitude and sample dwell function tests, and then test the vibration magnitude increasing with 5~10Grms (recommended 10Grms), the dwell time at each order of magnitude should not be less than 10 minutes about vibration stress, then test the product function, Until find the sample's operation and destroying limits, due to the stress range, the sample may fail, so it is necessary in all vibration stress level test, reduce stress, determine whether the samples can return to normal.

5. Comprehensive stress test:

The comprehensive stress test performed at least 5 cycles, unless the sample failure does not be recovered in the experiment; the temperature cycling curve of extreme settings is same as rapid temperature change of cyclic stress, the resident time at the extreme temperature is at least 10 minutes;

Vibration level in the comprehensive vibration is the first four cycle, vibration =90%* vibration limit cycle number /4* operation, the fifth cycles of vibration stress reduced to 5Grms. After a certain period of time at vibration level, the test product should be functional detection. Test residence time will be appropriately extended according to the time required for product functional testing.

15.0 THERMAL SHOCK TEST

Thermal shock test is a testing technique to test the resistance of material to extreme high temperature or extremely low temperature. This situation is similar to the case of discontinuous in high temperature or low temperature. It can make various objects complete the test in the shortest time. The changing of chemical or physical damage producing in the TST is caused by Thermal changing or changing of other physical value. The effects of TST include electrochemical changes caused by product crack or fracture and displacement.

TEST method:

1. In the temperature controlling room, it change from normal temperature 25degC to low temperature -40degC usually, and bake for 30 minutes under low temperature.

2. Temperature of controlling room changes from low temperature -40degC to high Temperature 70degC usually, changing time is 2min., and high temperature baking for 30 minutes.

3. After 10 cycle changing between the high temperature of 70degC and low temperature -40degC, the temperature returned to normal temperature, and removed the power (at least restore for 4 hours).

4. Confirm the label, case withstand voltage and electrical performance of the tested product before and after test.

Note:

1. After TST test product, performance and appearance of PSU should not appear degradation and degradation phenomenon.

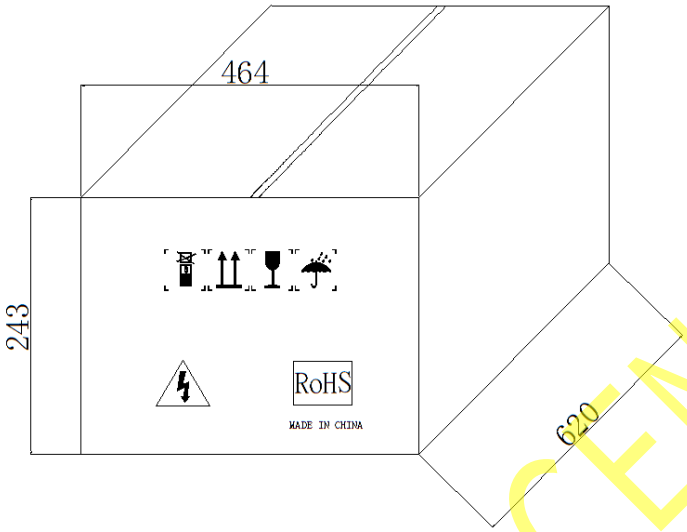
2. The dielectric strength and insulation resistance after thermal shock test products shall meet the requirements of specifications.

3. Products are non-operating condition.

16.0 PACKAGE

Power supply module package shall be the Anti-ESD bag to avoid power supply damage in shipment.

16.1 Outline Diagram of Carton



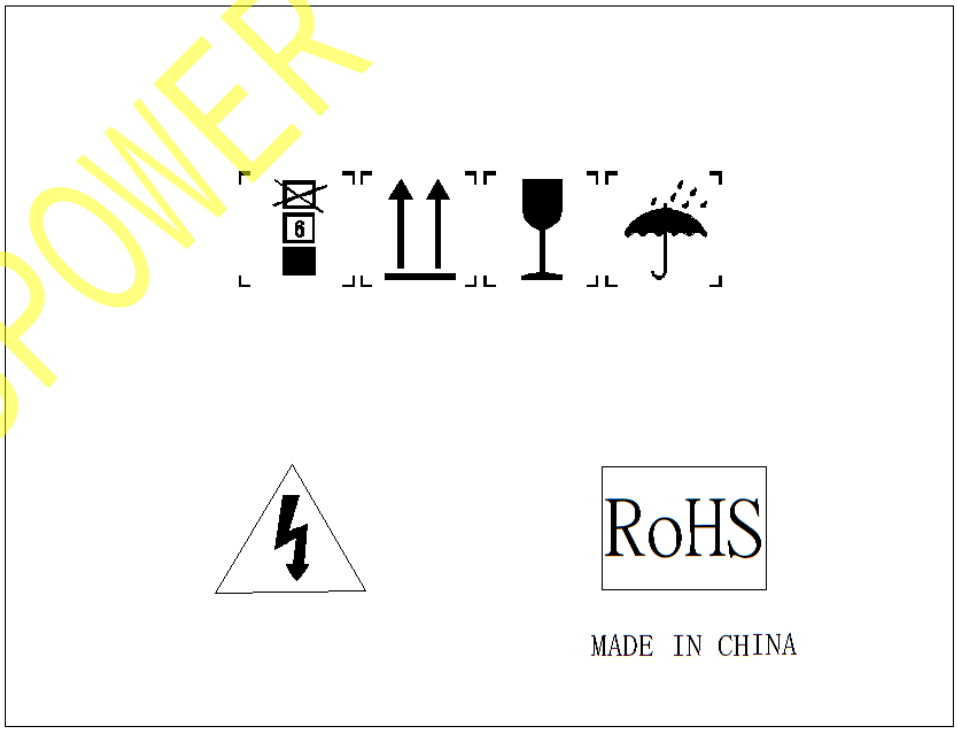
Note:

1. Material: outside the box: K=K, five layers of corrugated paper, the thickness: 6.0mm min, Naipoli: 11KG min.

2. Outline: bright and clean, no stain, yellow white and no color difference, no gap junction.

3. Dimension: above dimensions for carton size, tolerance +/-3mm.

16.2 Side Label



16.3 Front Label