IX-350R2UPA9

Redundant Power Supply

(2U - 350W+350W)

SPECIFICATION

Revision: 1.0

3500 E. Francis St. Ontario, CA 91761, USA.
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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 350W. The redundant module is U1A-D10350-DRB-H.

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 160VDC 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	160-240 or 160-340			Vdc
Input current	<6A@100-240VAC @full load <6A@160-240VDC @full load <6A@160-340VDC @full load			

Note: 265Vac-300Vac input for any length time shall not cause damage to the power supply.

2.2 Inrush Current

40A max at any phase of 230Vac input when 25degC cold start, ignore the instantaneous charge current for X,Y caps, but the peak current derating time should < 200us.

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%	2.979A	2.979A	3.455A	0.119A	0.477A	≧85%
50%	7.447A	7.447A	8.638A	0.298A	1.191A	≧88%
100%	14.894A	14.894A	17.277A	0.596A	2.383A	≧87%

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 230Vac/50Hz.

Table3.

Load	20% Load	50% Load	100% Load
PF	> 0.88	> 0.95	> 0.99

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	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	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	0A	25A
+5V	0A	25A
+12V	1A	29A
-12V	0A	1A
+5Vsb	0A	4A

Note: The continuous total max output power is 350W for 90-264Vac input.

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.

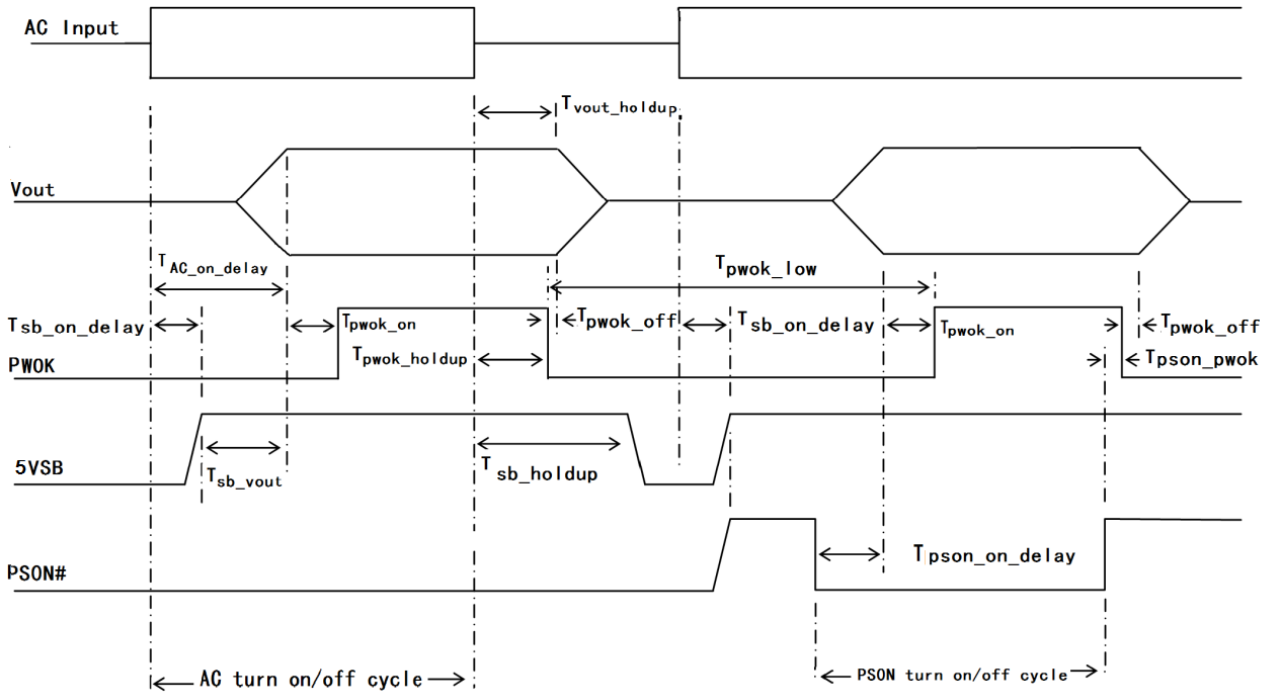
3.4 Timing

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.		25	ms
Tvout _rise	Output voltage rise from 10% to 90% time for 12V, 3.3V, 5V, -12V.		70	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.	11		ms
Tpwok_holdup	Delay from loss of AC to de-assertion of PWOK.	10		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	100		ms

	an OFF/ON cycle using AC or the PSON signal.			
Tpson_pwok	PWOK being de-asserted delay from PSON deactivate.		5	ms



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/5KHz 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%	0.25	50-5K	2200
+5V	30%	0.25	50-5K	2200
+12V	60%	0.5	50-5K	2200
-12V	0.5A	0.25	50-5K	100
+5Vsb	1A	0.25	50-5K	20

3.6 Capacitive Loading

The power supply shall be stable and can start up at no load with below capacitive loading.

Table11.

Output Voltage	+3.3V	+5V	+12V	-12V	+5Vsb
Capacitive loading (uF)	5000	5000	15000	350	350

3.7 LED Status

There are indicators of LED in power supply module next to the inlet socket. This LED shall have several kind of status as below.

Table12.

Power Supply Status	LED Status
Output ON and OK.	Green
No AC power to all power supplies.	OFF
AC present/Only 5Vsb on (PS off) or PS in cold redundant state.	1Hz Blink Green
AC cord unplugged or AC power lost; with a second power supply in parallels still with AC input power.	Amber
Power supply warning events where the power supply continuous to operate: High temperature , Fan Fail.	1Hz Blink Amber
Power supply critical event causing a shutdown: UVP, OVP, OCP, OTP, Fan Fail.	Amber
Power supply Firmware updating.	2Hz Blink Green

Note:

1. The power supply's LED is on the case's front panel.

3.8 Control Signal

3.8.1 Control and Status Signals

All control signals shall be TTL compatible with respect to the output return and shall be isolated from the primary circuit and be SELV (safety extra-low voltage circuit) rated.

3.8.2 PSON Input Signal

The PSON signal is required to remotely turn on/off the power supply. PSON is an active low signal that turn on the +12V power rail. When this signal is not pulled low by the system, or left open, the outputs (except the +5Vsb) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. Refer to section 3.4 for the timing diagram. This signal accepts an open collector/drain input from the system and a 20K ohm resistor pull up to +3.3Vs located in power supply.

Table13. PSON Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
PSON=Low	ON	0V	1.0V
PSON=High or Open	OFF	2.0V	3.46V

3.8.3 PWOK (Power OK) Output Signal

PWOK is a power OK signal and will be pulled high when the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a low state. The start of the PWOK delay time shall inhibited as long as any power supply output is in current limit. This signal is open collector/drain output and a 0.36K resistor pull-up to +5V located in module.

Table14. PWOK Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
PWOK=Low	Power Not OK	0V	0.4V
PWOK=High	Power OK	2.4V	5.25V

4.0 PROTECTION

When the 3.3V, 5V, -12V output's OCP/OVP or 12V output's 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 12V output's OCP,5Vsb output's OCP/OVP is triggered, the power supply will shut down and auto recovery when the fault condition removed.

4.6 Over Current Protection (OCP)

The power supply should have over current protection to prevent the outputs from exceeding limits. If the +12V, +5Vsb output's OCP triggered, the power supply should shut down and self-recovery after the over current condition removed. If the +3.3V, +5V, -12V output's OCP triggered, 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. The test should under 1+0 state.

3.3V & 5V: 26~38A,

5Vsb: 4.4~8A,

-12V: 1.1~2.0A,

12V: 35~40A.

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

CE, FCC, CCC,

6.2 Hi-pot

Primary to secondary, Hi-pot Withstand voltage: 10mA max 3000Vac, 50/60Hz or 5mA max 4242Vdc for 60 seconds when PCBA;

Primary to Earth, Hi-pot Withstand voltage: 10mA max 1800Vac, 50/60Hz or 5mA max 2545Vdc for 60 seconds.

6.3 Grounding Impedance Test

Grounding impedance test using grounding current 40A for 60S and the impedance is less than 100mohm.

6.4 Leakage Current

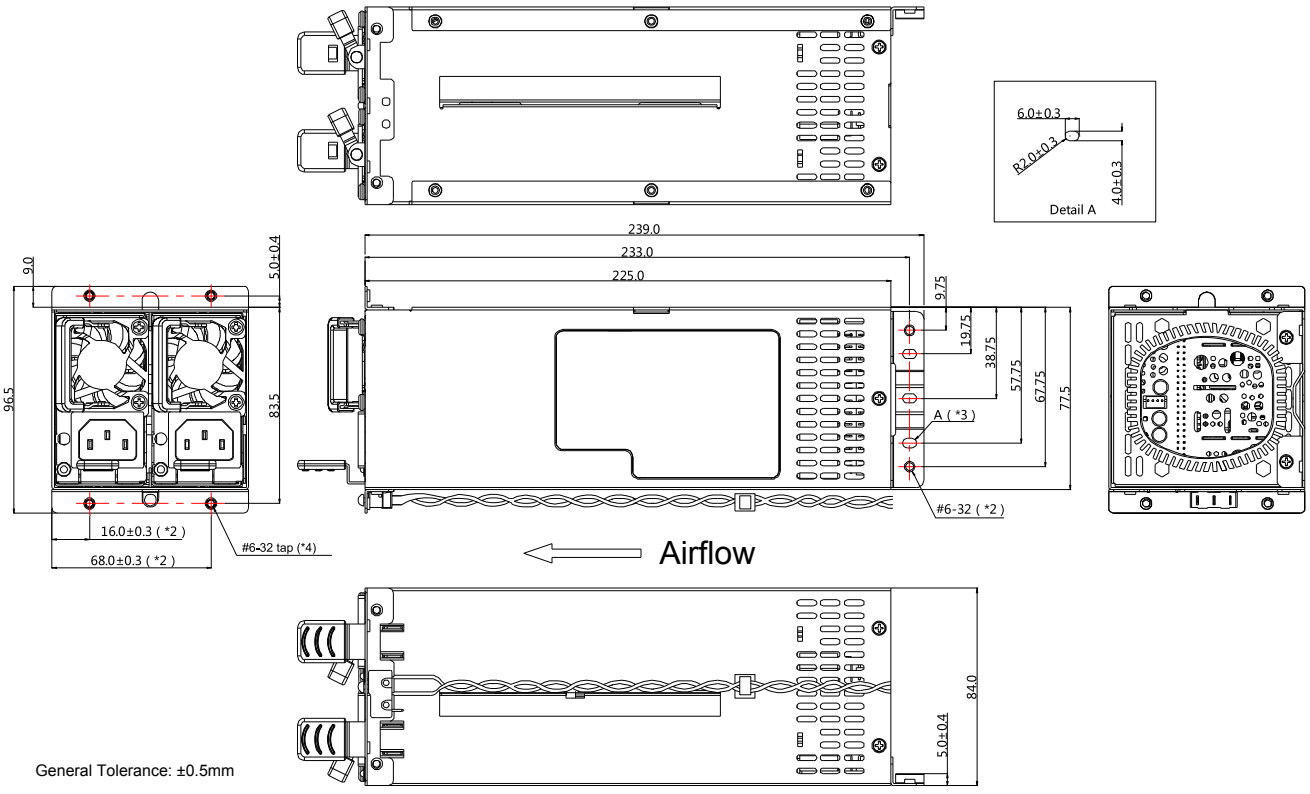
Leakage current refers to the voltage applied to the no fault, between the metal parts with electrical insulated from each other, or between charged parts and grounding parts, the current formed through the medium around the insulated surface called leakage current. Leakage current is the current flowing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

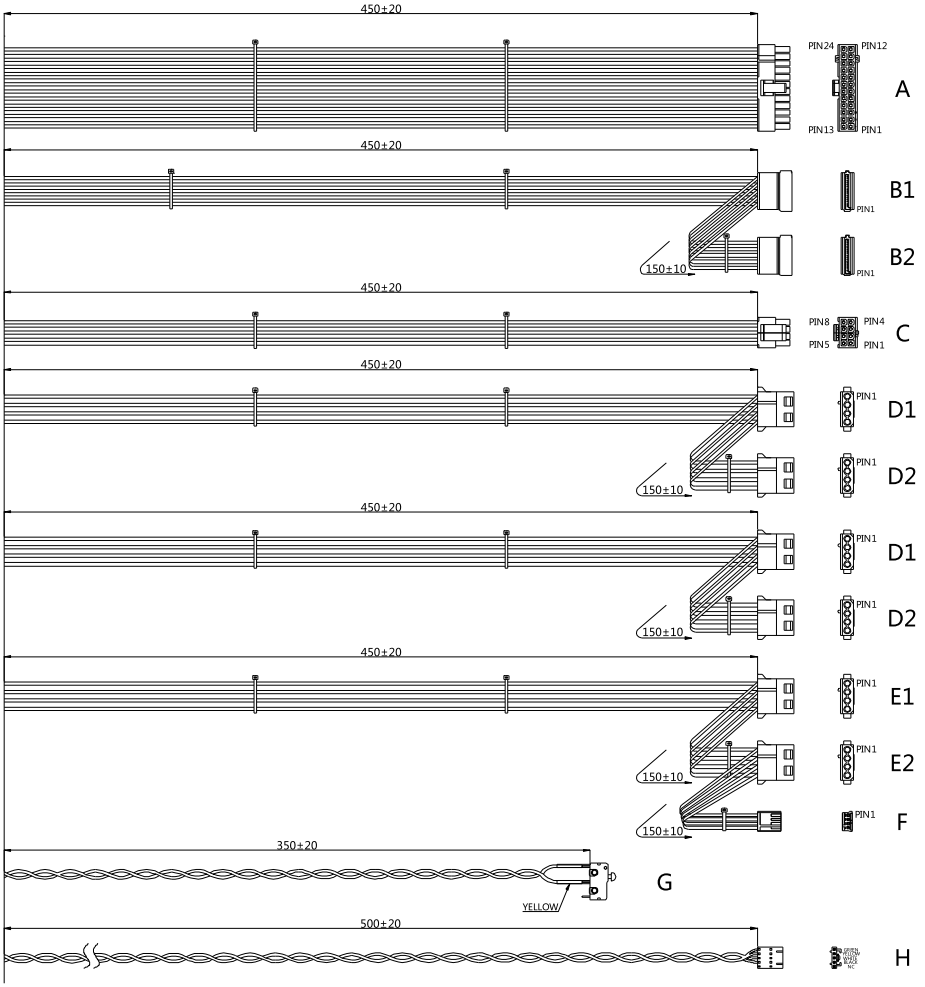
In order to ensure that the leakage current of the power supply case not cause leakage damage to the human body, after inserting the AC power, the leakage current of the power supply should meet the requirements of safety. Under 240Vac/60Hz conditions to be less than 3.5mA.

6.5 Insulation Resistance

Primary to Secondary: 500Vdc for 60S, the insulation resistance shall not be less than 100MΩ.

7.0 OUTLINE STRUCTURE





CON	PIN	WIRE COLOR	OUT PUT	WIRE SPECIFICATION	HOUSING (or EQ)
A	1	ORANGE	+3.3V	UL 1007 18AWG 80°C 300V	WST P20,4-I42002K2
		ORANGE	+3.3V SENSE	UL 1007 22AWG 80°C 300V	
	2	ORANGE	+3.3V	UL 1007 18AWG 80°C 300V	
	3	BLACK	GND		
	4	RED	+5V		
	5	BLACK	GND		
	6	RED	+5V		
	7	BLACK	GND		
	8	GRAY	PG	UL 1007 20AWG 80°C 300V	
	9	PURPLE	+5V SB	UL 1007 18AWG 80°C 300V	
	10	YELLOW	+12V		
		YELLOW	+12V SENSE	UL 1007 22AWG 80°C 300V	
	11	YELLOW	+12V	UL 1007 18AWG 80°C 300V	
	12	ORANGE	+3.3V		
	13	ORANGE	+3.3V		
	14	BLUE	-12V		
	15	BLACK	GND		
	16	GREEN	PS-ON	UL 1007 20AWG 80°C 300V	
	17	BLACK	GND	UL 1007 18AWG 80°C 300V	
	18	BLACK	GND		
	19	BLACK	GND		
	20	NC	NC	NC	
	21	RED	+5V	UL 1007 18AWG 80°C 300V	
		RED	+5V SENSE	UL 1007 22AWG 80°C 300V	
	22	RED	+5V	UL 1007 18AWG 80°C 300V	
	23	RED	+5V		
	24	BLACK	GND		
B1 B2	1	ORANGE	+3.3V	UL 1007 18AWG 80°C 300V	WST P5-I12707
	2				
	3				
	4	BLACK	GND		
	5				
	6				
	7	RED	+5V		
	8				
	9				
	10	BLACK	GND		
	11				
	12				
	13	YELLOW	+12V		
	14				
	15				
C	1	BLACK	GND	UL 1007 18AWG 80°C 300V	WST P8-I42002K3A
	2	BLACK	GND		
	3	BLACK	GND		
	4	BLACK	GND		
	5	YELLOW	+12V		
	6	YELLOW	+12V		
	7	YELLOW	+12V		
	8	YELLOW	+12V		
D1 D2 E1 E2 F	1	YELLOW	+12V	D1、D2、E1、E2 : UL 1007 18AWG 80°C 300V F : UL 1007 20AWG 80°C 300V	D1、D2、E1、E2 : WST P4-A10202 F : WST P4-I25001
	2	BLACK	GND		
	3	BLACK	GND		
	4	RED	+5V		
G	1	BLACK	GND	UL 1007 22AWG 80°C 300V	
	2	YELLOW	RESET		
H	1	GREEN	SCL	UL 1007 24AWG 80°C 300V	WST P5-I25402
	2	YELLOW	SDA		
	3	WHITE	ALERT		
	4	BLACK	GND		
	5	NC	NC		

8.0 ROHS

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

9.0 EMI AND EMS REQUIREMENT

Table15. EMI (Electromagnetic Interference) Requirements Table

Item	Description and Requirement	Criterion	Notes
Radiated Emissions	Frequency: 30MHz~1GHz Class A	EN 55032	230V/50Hz input
		FCC Part 15	120V/60Hz input
Conducted Emissions (Voltage)	Frequency: 150KHz~30MHz Class A	EN 55032	230V/50Hz input
		FCC Part 15	120V/60Hz input
Harmonic	EN 61000-3-2 Class D	EN 61000-3-2	230V/50Hz input
Voltage Flicker	Pst≦1.0 and Plt≦0.65 Voltage change≦3.3% Relative Voltage change≦4% The voltage changed over 3.3% duration time should≦500mS	EN 61000-3-3	230V/50Hz input

Table16. EMS (Electromagnetic Susceptibility) Requirements Table

Item	Description and Requirement	Level	Criterion
Surge	Different Mode: ±1KV 2ohm Common Mode: ±2KV 12ohm	B	EN61000-4-5 EN 55035 GR-1089-CORE
Electrical Fast Transient Group (EFT)	±2KV	B	EN61000-4-4 EN 55035 YD/T 1082
Electrical Static Discharge (ESD)	Touch: ±6KV Air: ±8KV	B	EN61000-4-2 EN 55035
Radiated Susceptibility (RS)	80M~2.7GHz 3V/m 80% AM	A	EN 61000-4-3 EN 55035
Conducted Susceptibility (CS)	150KHz~80MHz 3V/m 80% AM	A	EN 61000-4-6 EN 55035

Voltage Dips and Interruptions	0% Ut: 10ms 70% Ut: 500ms 0% Ut: 5000ms	B B C	EN 61000-4-11 EN 61000-4-29 EN 55024 GB 19286 EN 60601

Performance criterion of the voltage fluctuation immunity test:

A: The power supply should have no loss of function or degradation of performance according to its specification during the test.

B: Temporary loss of function or degradation of performance is acceptable, but all the outputs should be in an acceptable range and should recover to normal after the test. The power supply shouldn't loss any of outputs, reset or any abnormal warning when doing the test with system.

C: Temporary loss of function or shut down is acceptable, but the power supply should restart with an operator intervention or auto-restart normally after the test.

10.0 MECHANICAL PERFORMANCE

Non-operating:

Sine sweep: 5~500Hz @0.5gRMS at 0.5 octave/min; dwell 15 min at each of 3 resonant points;

Random profile: 5Hz @0.01g^2/Hz (slope up); 20~500Hz @0.02g^2/Hz (flat);

Input acceleration = 3.13gRMS; 10min.per axis for 3 axis on all samples.

11.0 MTBF

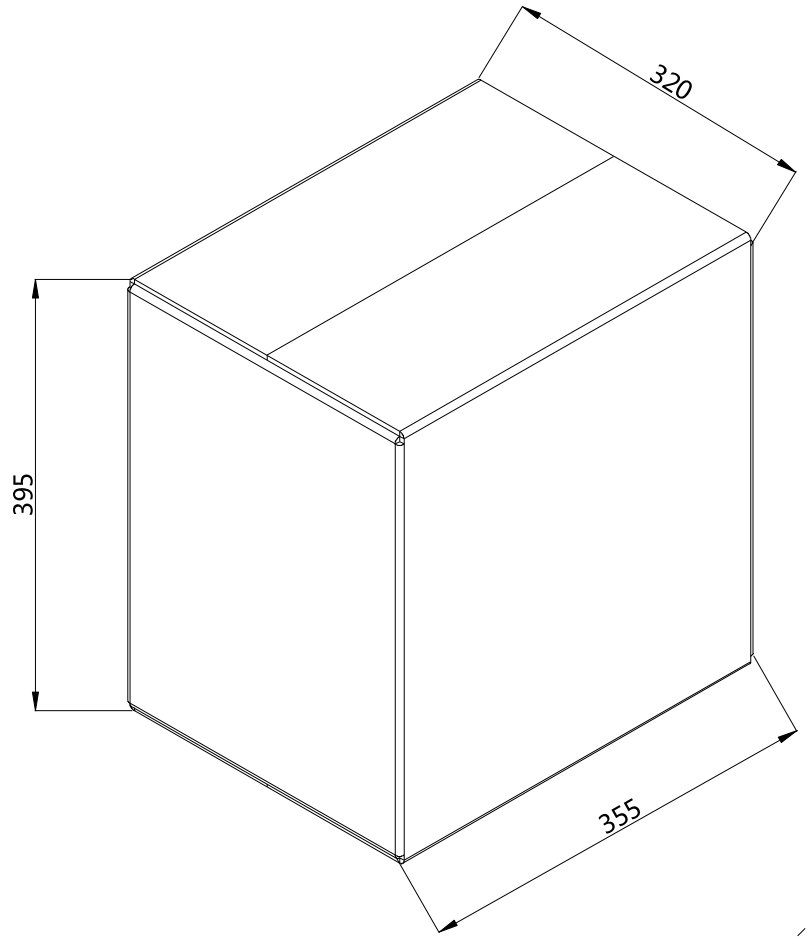
Quantitative reliability (Quantitative) performance requirements: MTBF (MTBF Mean Time Between Critical Failure), according to the Bellcore standard SR-332 Issue3, the PSU operates continuously under 25degC condition, 115VAC/60Hz 230V/50HZ, and 240VDC input voltage under 100% load, and MTBF is more than 100000 hours, the testing process should not be interrupted.

Table17.

Item	Requirement	Notes
E-CAP Life Time	≧5 years at 25℃ ambient	Should ≧3 years at 25℃ ambient when mating with the system of customer
CMTBF (Calculated MTBF)	≧250,000 hours, at 25℃ (≧100,000 hours, at 40℃) ambient temperature and full load	By Telcordia SR-332 issue 2

12.0 PACKAGE

12.1 Outline Diagram of Carton



Note:

Material: K=K, five layers of corrugated paper

13.0 SOFTWARE

13.1 Data Precision Requirement

Some data read from power supply should have a precision requirement as below table:

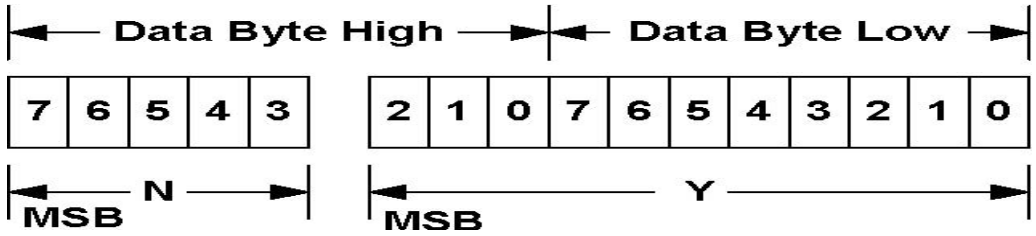
Table18. Required Accuracy(110V/60Hz,220V/50Hz Vac or 240Vdc)

Input Voltage	Output load condition	<10%	10%-20%	>20%
110Vac/220Vac/240Vdc	Read_VIN(88h)	No Spec	±5%	±5%
	Read_IIN(89h)		±5%	±5%
	Read_PIN(97h)		±5%	±5%
	Read_Vout(8Bh)		±5%	±5%
	Read_Iout(8Ch)		±5%	±5%
	Read_Pout(96h)		±5%	±5%
	Read_Temperature(8Dh) ambient temperature		±5℃	±5℃

13.2 PMBus Specification

Linear Data Formats

The Linear Data Format is a two byte value with: An 11 bit, two's complement mantissa and A 5 bit, two's complement exponent (scaling factor).The format of the two data bytes is illustrated in below Figure.



The relation between Y, N and the "real world" value is: $X = Y \cdot 2^{N}$

Where, as described above:

X is the "real world" value being communicated

Y is an 11 bit, two's complement integer;

N is a 5 bit, two's complement integer.

Devices that use the linear format must accept and be able to process any value of N.

13.3 PMBUS Command Supported

Table19. STATUS_WORD Command

Byte	Bit No.	Status Bit Name	Meaning	Support
Low	7	BUSY	A fault was declared because the device was busy and unable to respond.	No
	6	OFF	This bit is asserted if the unit is not providing power to the output, regardless of the reason, including simply not being enabled.	Yes
	5	VOUT_OV	An output over voltage fault has occurred.	Yes
	4	IOUT_OC	An output over current fault has occurred.	Yes
	3	VIN_UV	An input under voltage fault has occurred.	Yes
	2	TEMPERATURE	A temperature fault or warning has occurred.	Yes
	1	CML	A communications, memory or logic fault has occurred.	No
	0	NONE OF THE ABOVE	A fault or warning not listed in bits [7:1] of this byte has occurred.	No
High	7	VOUT	An output voltage fault or warning has occurred.	Yes
	6	IOUT/POUT	An output current or output power fault or warning has occurred.	Yes
	5	INPUT	An input voltage, input current, or input power fault or warning has occurred.	Yes
	4	MFR	A manufacturer specific fault or warning has occurred.	No
	3	POWER_ GOOD#	The POWER_GOOD signal, if present, is negated.	Yes
	2	FANS	A fan or airflow fault or warning has occurred.	Yes
	1	OTHER	A bit in STATUS_OTHER is set.	Yes
	0	UNKNOWN	A fault type not given in bits [15:1] of the STATUS_WORD has been detected.	No

Table20. STATUS_VOUT Command

Bit	Meaning	Support
7	VOUT Over voltage Fault	Yes
6	VOUT Over voltage Warning	No
5	VOUT Under voltage Warning	No
4	VOUT Under voltage Fault	Yes
3	VOUT_MAX Warning (An attempt has been made to set the output voltage to value higher than allowed by the VOUT_MAX command)	No
2	TON_MAX_FAULT	No
1	TOFF_MAX Warning	No
0	VOUT Tracking Error	No

Table21. STATUS_IOUT Command

Bit	Meaning	Support
7	IOUT Over current Fault	Yes
6	IOUT Over current And Low Voltage Shutdown Fault	No
5	IOUT Over current Warning	Yes
4	IOUT Undercurrent Fault	No
3	Current Share Fault	No
2	Power Limiting	No
1	POUT Overpower Fault	Yes
0	POUT Overpower Warning	Yes

Table22. STATUS_INPUT Command

Bit	Meaning	Support
7	VIN Over voltage Fault	Yes
6	VIN Over voltage Warning	Yes
5	VIN Under voltage Warning	Yes
4	VIN Under voltage Fault	Yes
3	Unit Off For Insufficient Input Voltage	No
2	IIN Over current Fault	No
1	IIN Over current Warning	No
0	PIN Overpower Warning	No

Table23. STATUS_TEMPERATURE Command

Bit	Meaning	Support
7	Over temperature Fault	Yes
6	Over temperature Warning	Yes
5	Under temperature Warnings	No
4	Under temperature Fault	No
3	Reserved	No
2	Reserved	
1	Reserved	
0	Reserved	

Table24. STATUS_FAN_1_2 Command

Bit	Meaning	Support
7	Fan 1 Fault	Yes
6	Fan 2 Fault	No
5	Fan 1 Warning	Yes
4	Fan 2 Warning	No
3	Fan 1 Speed Overridden	No
2	Fan 2 Speed Overridden	No
1	Airflow Fault	No
0	Airflow Warning	No

Table25. Supported Command Summary

CMD Code	Name	Type	Bytes	Conditions
03h	CLEAR_FAULTS	Send Byte	0	
05h	PAGE_PLUS_WRITE	Block Write	Variable	
06h	PAGE_PLUS_READ	Block Write-Block Read	Variable	
19h	CAPABILITY	Read Byte	1	
1Ah	QUERY	Block Read	1	
1Bh	SMBALERT_MASK	Block Write-Block Read	2	
20h	VOUT_MODE	Read Byte	1	
40h	VOUT_OV_FAULT_LIMIT	Read Word	2	
44h	VOUT_UV_FAULT_LIMIT	Read Word	2	
46h	IOUT_OC_FAULT_LIMIT	Read Word	2	
4Ah	IOUT_OC_WARN_LIMIT	Read Word	2	
4Fh	OT_FAULT_LIMIT	Read Word	2	
51h	OT_WARN_LIMIT	Read Word	2	
55h	VIN_OV_FAULT_LIMIT	Read Word	2	
57h	VIN_OV_WARN_LIMIT	Read Word	2	
58h	VIN_UV_WARN_LIMIT	Read Word	2	
59h	VIN_UV_FAULT_LIMIT	Read Word	2	
78h	STATUS_BYTE	Read Byte	1	
79h	STATUS_WORD	Read Word	2	
7Ah	STATUS_VOUT	Read Byte	1	
7Bh	STATUS_IOUT	Read Byte	1	
7Ch	STATUS _INPUT	Read Byte	1	

7Dh	STATUS_TEMPERATURE	Read Byte	1	
80h	READ_VIN_TYPE	Read Byte	1	00:NO AC; 01:AC; 02:HVDC
81h	STATUS_FANS_1_2	Read Byte	1	
86h	READ_EIN	Block Read	6	
87h	READ_EOUT	Block Read	6	
88h	READ_VIN	Read Word	2	
8Bh	READ_VOUT	Read Word	2	
8Ch	READ_IOUT	Read Word	2	
8Dh	READ_TEMPERATURE_1	Read Word	2	Ambient temperature
8Eh	READ_TEMPERATURE_2	Read Word	2	Primary Heatsink temperature
8Fh	READ_TEMPERATURE_3	Read Word	2	Secondary Heatsink temperature
90h	READ_FAN_SPEED_1	Read Word	2	Rpm value
96h	READ_POUT	Read Word	2	
97h	READ_PIN	Read Word	2	
98h	PMBUS_REVISION	Read Byte	1	V1.2
99h	MFR_ID	Read Block	7	See MFR Data table
9Ah	MFR_MODEL	Read Block	10	See MFR Data table
A0h	MFR_VIN_MIN	Read Word	2	See MFR Data table
A1h	MFR_VIN_MAX	Read Word	2	See MFR Data table
A4h	MFR_VOUT_MIN	Read Word	2	See MFR Data table
A5h	MFR_VOUT_MAX	Read Word	2	See MFR Data table
A6h	MFR_IOUT_MAX	Read Word	2	See MFR Data table
A7h	MFR_POUT_MAX	Read Word	2	See MFR Data table

A8h	MFR_TAMBIENT_MAX	Read Word	2	
A9h	MFR_TAMBIENT_MIN	Read Word	2	
D0h	SMART_ON_CONFIG	Write Byte Read Byte	1	00h Standard Redundancy 01h Smart On Active 02h Smart Standby 03h Smart Standby 04h Smart Standby

Table26. MFR Data Table

CMD Code	Name	Conditions
99h	MFR_ID	
9Ah	MFR_MODEL	
A0h	MFR_VIN_MIN	90
A1h	MFR_VIN_MAX	264
A4h	MFR_VOUT_MIN	11.4
A5h	MFR_VOUT_MAX	12.6
A6h	MFR_IOUT_MAX	29
A7h	MFR_POUT_MAX	350