FLEX 12V Power Supply Specification

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1.0 Input Characteristics(输入特性)

1.1 Input Voltage Range（输入电压范围）

90Vac to 264Vac, single phase.

交流输入电压范围为 90-264V，单相。

Table1. Input Voltage Range

表格 1.输入电压范围

RANGE	MINIMUM	NORMAL	MAXIMUM	UNITS
Range	90	100~240	264	Vrms

1.2 Input Frequency Range（输入频率范围）

RANGE	MINIMUM	NORMAL	MAXIMUM	UNITS
Range	47	50-60	63	Hz

1.3 Input current（输入电流）

Maximum steady state input current shall be less than 5A RMS at 115VAC and 2.5A RMS at 230VAC with maximum load at 25℃.

25℃下，115V 交流最大稳态输入电流应小于 5A，230V 交流应小于 2.5A。

1.4 Inrush current（浪涌电流）

Power supply inrush current shall be less than the ratings of its critical components (including bulk rectifiers, fuses, and surge limiting device) under all conditions of line voltage of Section 1.1.

在 1.1 的输入电压条件下，电源的浪涌电流必须低于关键器件的额定值（包括整流桥、保险丝和浪涌限制设备）。

1.5 Power Efficiency（能效）

Min 84% efficiency under 20% full load condition, input Voltage: 115Vac/60Hz

在交流输入 115V/频率 60Hz、20%满载条件下：效率最低为 84%。

Min 87% efficiency under 50% full load condition, input Voltage: 115Vac/60Hz

在交流输入 115V/频率 60Hz、50%满载条件下：效率最低为 87%。

Min 84% efficiency under 100%full load condition, input Voltage: 115Vac/60Hz

在交流输入 115V/频率 60Hz、满载条件下：效率最低为 84%。

Efficiency test loading

效率测试负载

LOAD	+12V	+5V	+3.3V	-12V	+5VSB
100%	20A	6A	5A	0.3A	2A
50%	10A	3A	2.5A	0.15A	1A
20%	4	1.2A	1A	0.06	0.4A

1.6 Power factor（功率因数）

The power supply must use a PFC,PF≥0.90 @100% load at 230Vac/50Hz.

电源必须使用功率因数校正，在 230V/50Hz、100%负载下，功率因数大于 0.9。

1.7 Standby Consumption（待机损耗）

AC input power should not exceed 1W under +5VSB /0.05A,at 230Vac/50Hz.

在交流 230V/50Hz、+5VSB 负载 0.05A 下，交流输入电源功率不超过 1W。

2.0 Output Characteristics（输出特性）

2.1 Static output characteristics（静态输出特性）

Table2. Static output characteristics

表格 2.静态输出特性

Output Voltage	Load			Regulation	Ripple & Noise
	Min	Max	Surge		Max mV P-P
+5V	0.1A	15A		+/- 5%	50mV
+12V	0.1A	24A		+/- 5%	120mV
+5VSB	0A	2A		+/- 5%	50mV
+3.3V	0.1A	15A		+/- 5%	50mV
-12V	0A	0.3A		+/- 10%	120mV

At 25℃&40℃

25 摄氏度和 40 摄氏度下

(1) The total combined 3.3V&5V power shall not exceed 120W.
3.3V 和 5V 联合输出总功率不超过 120W

(2) The continuous output power shall not exceed 300W.
持续输出功率不应超过 300W

At 50℃

50 摄氏度下

（1） The continuous output power shall not exceed 240W.
持续输出功率不应超过 240W

2.2 Cross-load regulation（交叉负载调整率）

Table 3.Cross Regulation(UNIT: A)

表格 3.交叉负载

Range	+5V	+3.3V	+12V	-12V	+5VSB
1	0.3	0.3	0.5	0	0
2	15	6	15	0.3	2

3	5	10	13	0.3	2
4	0.5	0.75	24	0.3	1
5(full load)	6	5	20	0.3	2
6(20%)	1.2	1.1	4.8	0.06	0.4
7(50%)	3	2.75	12	0.15	1

Notes: A 0.1uF ceramic disk capacitor and 10uF tantalum capacitors should be put across output terminals during ripple & noise test. The oscilloscope bandwidth is set at 20 MHz and co-axial probe will be used to measure it.

注意：在纹波噪声测试时，输出端应并联 0.1uF 陶瓷电容和 10uF 钽电容。示波器带宽设置为 20MHz，并使用同轴探头进行测量。

2.3 Dynamic Load（动态负载）

The following transient loads are to be applied to the output. The waveform shall be a square wave with the slope of the rise and fall at 1A/(s(-12V and +5VSB at 0.2A/(s). The square wave shall have a frequency 50Hz to 10KHz with a duty cycle of 10 to 90%.

以下动态负载应用于输出。波形应为升降斜率为 1A/uS 的方波（-12V 和+5VSB 为 0.2A/uS）、电流方波频率从 50Hz 到 10KHz，占空比为 10%到 90%。

The output voltages shall not exceed regulation limits as defined in Table 2 under the following condition.

按照如下条件，输出电压不应超过表格 2 的规格限制。

Table4. Dynamic Load Step Sizes

表格 4.动态负载

OUTPUT	STEP LOAD	+12V	+5V	+3.3V	-12V	+5VSB	TRANSIENT TOLERANCE(%)
+12V	0.5~12A	N/A	0.3	0.3	0	0.2	+/-5
	12.5~24A	N/A	0.5	0.75	0.3	1	
+5V	0.3~5A	0.5	N/A	0.3	0	0.2	+/- 5
	10.5~15A	8	N/A	6	0.3	2	
+3.3V	0.3~5A	0.5	0.3	N/A	0	0.2	+/- 5
	10.5~15A	8	6	N/A	0.3	2	

(Adding external capacitor: 5V/10000uF, 12V/10000uF, 3.3V/10000uF, -12V/350uF, 5Vaux/350uF)
（增加额外电容：5V/10000uF, 12V/10000uF, 3.3V/10000uF, -12V/350uF, 5V 辅助输出/350uF）

2.4 Capacitive Load（容性负载）

The power supply should be able to power up and operate with the regulation limits defined in Table 2, with the following capacitances simultaneously present on the DC outputs.

电源应能在表2中规定的调节限值下通电和运行，直流输出端同时具有以下电容。

Table5. Output Capacitive Loads

表格5.输出容性负载

Output	Capacitive Load
+12V	10000μF
+5V	10000μF
+3.3V	10000μF
-12V	350μF
+5VSB	350μF

2.5 DC wire

The power supply shall have the output connector and wire harness configurations.

电源应具有输出连接器和束线配置

3.0 Protection （保护）

3.1 Over Voltage Protection（过压保护）

+5V:7V max, +12V: 15.6V max, +3.3V: 5V max

5V 最大 7V，12V 最大 15.6V，3.3V 最大 5V

3.2 Short Circuit Protection（短路保护）

The main output shall shut down and latch off for shorting +5V, +12V, -12V or +3.3V rails to DC-return and shorting.

在 5V、12V、-12V 或 3.3V 短路时，主输出应关闭、锁死。

3.3 Over Current Protection(过流保护)

The overload currents should be ramped at a minimum rate of 10A/s starting from max load. Any output shall not exceed requirement of the table. Otherwise, the power would shut down.

过载电流应在最大负载开始下以最小 10A/S 的步进进行。任何输出不应超过下表要求。另外，电源应关闭。

Over Current Protection

Output	+5V	+3.3V	+12V
Over Current Limit	18A-30A	18A-30A	24A~50A

3.4 Over Power Protection（过功率保护）

Any output shall not exceed requirement of the table. Otherwise, the unit would shut down.

输出不应超过下表的要求，否则电源应关闭。

Table6. Over Power Protection

表格6.过功率保护

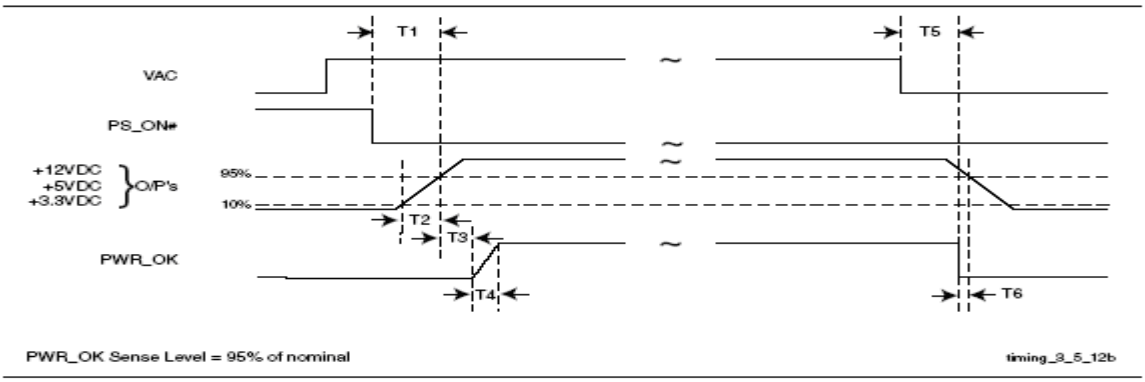
Input Voltage	115VAC/60Hz
OPP Range(Output Power)	350W~600W

3.5 Reset after shutdown（关机后复位）

When the power supply latches into shutdown state because of a fault condition on its output (over current, over voltage or short circuit), the power supply returns to nomal operation only after the fault has been removed and the ps-on has been cycled OFF/ON with a minimum OFF time of one sencond. Also, the latch shall reset within 30S when AC power has been removed and the load of 5VSB shall not less than 0.5A.

当电源因为一个输出的异常条件（过流、过压或短路）锁死至关闭状态时，在这个异常被排除且ps-on经过一个最小OFF时间为1S的OFF/ON循环后，该电源回到正常工作状态。并且，当AC源被移除且5VSB的负载不小于0.5A时，锁死应在30S内重置。

4.0 Time Sequence（时序）



Power Supply Timing

4.1 Power-on time T1（开机时间 T1）

The power-on time is defined as the time from when ps-on is pulled low to when the+12 VDC, +5 VDC, and +3.3 VDC outputs are within the regulation ranges specified in Section 2.1. The power-on time shall be less than 500 ms.

开机时间定义为从 ps-on 置低电平到输出电压达到正常电压范围内，且时间小于 500ms。

4.2 Rise time T2（上升时间 T2）

The output voltages shall rise from ≤10% of nominal to within the regulation ranges specified in Section

2.1 within 0.2 ms to 20 ms.

输出电压需在 20 毫秒时间内从 10%上升至正常电压范围内，且上升时间不能小于 0.2ms。

4.3 PWR_OK delay T3 (PG 延迟时间)

The Power Good signal shall have a turn-on delay of at least 100mS but not greater than 500 mS from the time the 3.3V and +5V output has reached their minimum regulation level.

从 3.3V 和+5V 输出电压达到正常范围起，电源需在 100 毫秒到 500ms 之间输出 PWR_OK 信号。

4.4 PWR_OK rise time T4（PG 上升时间 T4）

The Power Good signal shall have a rise time (measured from the 10% point to the 90% point) of less than 10 ms.

PWR_OK 信号上升时间（从电压 10%到 90%测量）应小于 10 毫秒。

4.5 AC loss to PWR_OK hold-up time T5

The DC output level for 5V;3.3V and 12V shall remain an up level at least 10msec after AC power is removed and the test condition:230V/60HZ, 70% of full load.

在市电断开后，PWR_OK应保持至少10毫秒不掉电，并应在3.3V或+5V掉出其电压范围之前。此测试在交流230V/60Hz，70%满载下进行。

4.6. Power Fail Delay Time T6

The Power _Down warning signal at least 1msec shall have a power Good Signal change Low Voltage to the 3.3V or +5V falls below their regulation limit.Test condition:115V/60Hz or 230/50Hz, 70% full load.

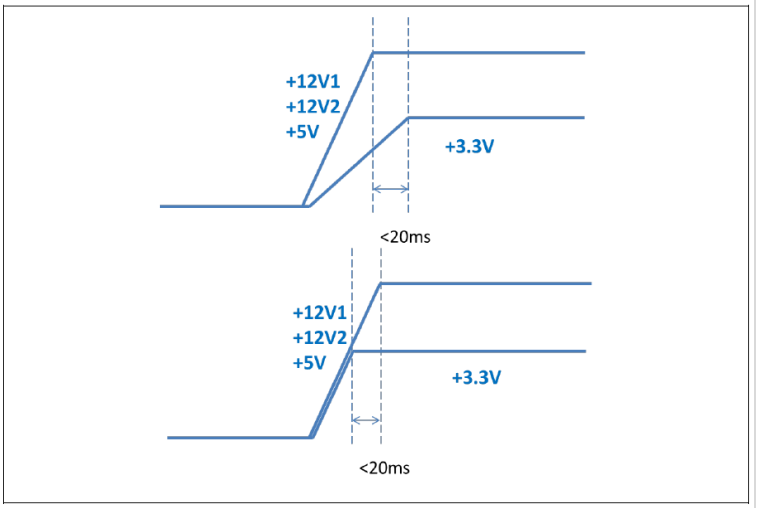
在市电关机后，PWR_OK信号需在5V或3.3V电压掉出电压范围前掉电，且间隔时间不少于1毫秒。测试条件：115V/60Hz或230V/50Hz，70%满载。

4.7 +5V/+3.3V power sequencing（+5V 和+3.3V 时序）

The +12V1 DC/+12V2 DC and +5V DC output levels must be equal to or greater than the +3.3V DC output at all times during power-up and normal operating. The time between any output of +12V1 DC/+12V2 DC and +5V DC reaching its minimum in-regulation level and +3.3V DC reching its minimum in-regulation level must be <=20 ms as shown in below figure.

在通电和正常工作期间，+12V1 DC/+12V2 DC 和 +5V DC输出电平必须总是大于或等于+3.3V输出。

+12V1 DC/+12V2 DC和+5V DC的任意输出达到其最小调节电平和+3.3V减小其最小调节电平必须小于等于20mS，如下图所示：



4.7 Power OK

The power supply shall provide a “Power Good” signal to reset system logic, indicate proper operation of the power supply, and give advance warning of impending loss of regulation at turn off.

电源会提供一个表示电源正常的信号，即PWR_OK，来控制系统逻辑，在输出电压掉出范围会提前告警系统。

The electrical characteristics for the Power OK output driver are shown below:
PWR_OK 信号的电气特性如下所示：

Table7. Power OK Signal Characteristics

表格7.PG信号特性

Power OK Signal Characteristics	
Signal Type	+5V TTL Compatible
Logic Level Low	<0.4V while sinking 4mA
Logic Level High	Between 2.4V and 5V output while sourcing 200μA
High-State Output Impedance Maximum Ripple & Noise	1kΩ from output to common 400mV p-p

4.8 PS-ON

ps-on is an active low, +5V tolerant TTL signal that allow the motherboard to remotely control the power supply. An internal pull-up resistor inside the power supply shall provide a TTL high output logic level, once an AC input voltage has been applied to the power supply. The electrical characteristics for the ps-on signal are shown below:
ps-on是一个低电压有效的+5V耐受TTL信号，允许主板远程控制电源。一旦向电源施加交流输入电压，电源内的内部上拉电阻器应提供TTL高输出逻辑电平。ps-on信号的电气特性如下所示：

Table8. PS-ON Signal Characteristics

表格8.PS-ON信号特性

PS-ON Signal Characteristics

Signal Description	Min	Max
Input Low Voltage	0.0V	0.8V
Input Low Current (Vin=0.4V)	-	-1.6mA
Input High Voltage (Iin=-200μA)	2.0V	
VIH open circuit Ripple & Noise	-	5.25V 400mV p-p

5.0 Auxiliary 5V Output（5V 辅助输出）

5.1 Auxiliary 5V Output（5V 辅助输出）

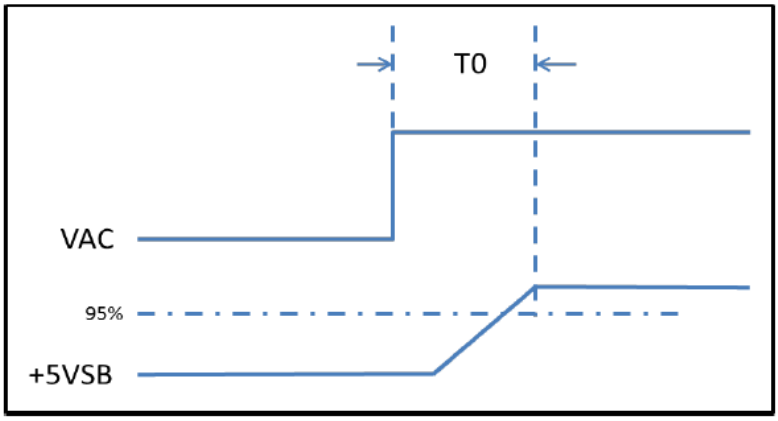
The 5V auxiliary output will be active and in regulation whenever an AC input within the specified operating range is applied to the power supply input. The ps-on pin of P1 will not affect the 5V auxiliary output.

当电源输入额定工作范围内的电压时，ps-on 信号不能影响到+5V 辅助电源输出。

5.2 Power-on time T0（上电时间 T0）

The power-on time of T0 is defined as the time from when AC power has input to when the +5 VSB outputs are within the regulation ranges specified in Section 2.1. T0 shall be less than 2S.

T0的上电时间定义为从AC输入与+5VSB上升到2.1定义的规格范围内的时间。T0应小于2S。



6.0 Environment（环境）

6.1 Operating ambient（工作环境）

Air Temperature	0 to 50 degrees centigrade
Relative Humidity	5 to 85 percent, non-condensing

6.2 Shipping and Storage（储存和运输）

Air Temperature	-40 to 55 degrees centigrade
Relative Humidity	5 to 95 percent, non-condensing

6.3 Altitude（海拔）

Operating to 5000 meters(16,404 ft)

工作在海拔 5000m（16404 英尺）

6.4 Cooling（散热）

The power supply shall provide forced air cooling for the host system.

电源散热方式为强制风冷。

6.5 Fan speed control（风扇转速控制）

The power supply shall contain thermal sensing circuitry capable of varying fan speed.

电源可以根据温度来调节风扇转数。

6.6 MTBF(平均故障间隔时间)

The MTBF shall be at least 50000H when the ambient temperature is 25℃ at full load according to Bellcore-TR-332 test method.

按照 Bellcore-TR-332 测试方法，在 25℃满载下，MTBF 应至少 50000H。

6.7 Supplementary instruction（补充说明）

The product is normally installed in a desktop systems and is in contact with the reliability of the systems .

产品通常安装在台式机系统及与系统可靠性相关。

7.0 Safety and EMC（安全和电磁兼容）

7.1 SAFETY REQUIREMENTS AND Certify（安全要求和认证）

The power supply has been certified by CCC ,CE,CB comply with GB4943-2022 (IEC62368-1). The CCC,CE,CB Safety mark shall appear on the product .

电源已通过 GB4943-2022 (IEC62368-1)的 CCC,CE,CB 认证，产品上应有 CCC,CE,CB 安全标志。

7.2 Conducted and radiated Emissions（传导和辐射）

Conducted and radiated emissions of the power supply shall comply with the requirements of GB/T 9254 (EN55032) Class B.

电源的传导和辐射发射干扰应符合 GB/T 9254 (EN55032) B 级的要求。

7.3 ESD（静电）

ESD of the power supply shall comply with the requirements of GB17626.2 (IEC61000-4-2) Level 4

（Contact Discharge -8KV/Air Discharge -15KV）.

电源的静电测试应符合 IEC61000-4-2 4 级(接触 8KV/空气 15KV)的要求。

7.4 EFT（电快速瞬变脉冲群）

EFT of the power supply shall comply with the requirements of GB17626.4 (IEC61000-4-4) Level 3.

电源的电快速瞬变脉冲群测试应符合 IEC61000-4-4 3 级的要求。

7.5 Voltage fluctuations and flicker(电压波动和闪烁)

Voltage fluctuations and flicker of the power supply shall comply with the requirements of GB17625.2(IEC61000-3-3).

电源的电压波动和闪烁测试应符合 GB17625.2(IEC61000-3-3)的要求。

7.6 Voltage dips，short interruptions and voltage variation Immunity（电压暂降、短时中断和电压变化的抗扰度）

Voltage dips，short interruptions and voltage variation Immunity of the power supply shall comply with the requirements of GB17626.11(IEC61000-4-11).

电源的电压暂降、短时中断和电压变化的抗扰度测试应符合 GB17626.11(IEC61000-4-11)的要求。

7.7 Surge Susceptibility（抗浪涌干扰）

Surge Susceptibility of the power supply shall comply with the requirements of GB17626.5 (IEC61000-4-5)

Level 3(Differential mode -1KV/Common mode -2KV).

电源的抗浪涌干扰测试应符合GB17626.5 (IEC61000-4-5) 3级(差模+/-1KV/共模+/-2KV)的要求。

7.8 Harmonic Current（谐波电流）

(1) The harmonic of the power line and neutral current shall comply the standard GB17625.1-2022 (IEC61000-3-2) for class D equipment.

谐波电流应符合 GB17625.1-2022 (IEC61000-3-2) D 标准要求。

(2) Measurement shall be performed at 75W input power and full output load, Input voltage shall be 230Vac/50Hz, Don't test in process under low range.

测量应在 75 瓦输入功率和全输出负载下进行，输入电压应为 230V/50Hz。

7.9 Hi-Pot（高压）

Input to GND: Voltage 1800VAC Time 3.0S, Cut off current 10mA MAX

输入对地之间施加 交流 1800V 电压持续 3.0s，截止电流应最大 10mA 。

7.10 Grounding Continuity Test（接地连续测试）

100mΩ MAX at 25.0A .

25A下100mΩ最大。

7.11 Ground Leakage Current（漏电流测试）

3.5mA MAX. at 264V/50Hz.

264V/50Hz 下 3.5mA 最大。

NOTE: To better simulate the using environment, the applicant required that EMI and EMS tests shall performed on EUT with a metal box(Length 65cm, Width 43cm, Height 18cm).

注意：为更好模拟使用环境，受试设备在测试 EMI 和 EMS 时，必须放置在金属盒子（长 65CM，宽 43CM，高 18CM）内。

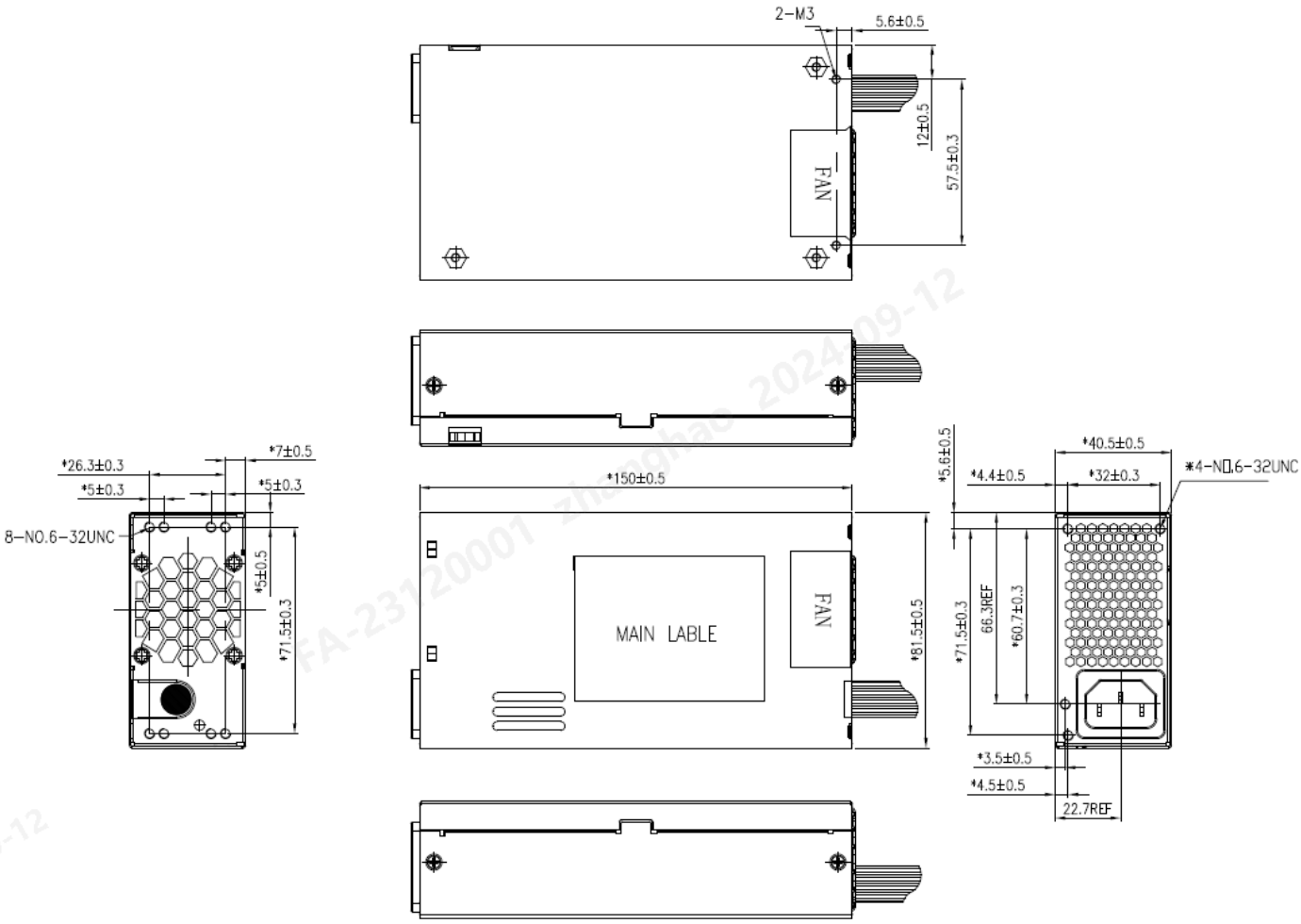
8.0 Requirement of Environment Protection（环保要求）

The power supply shall meet the RoHS requirement.

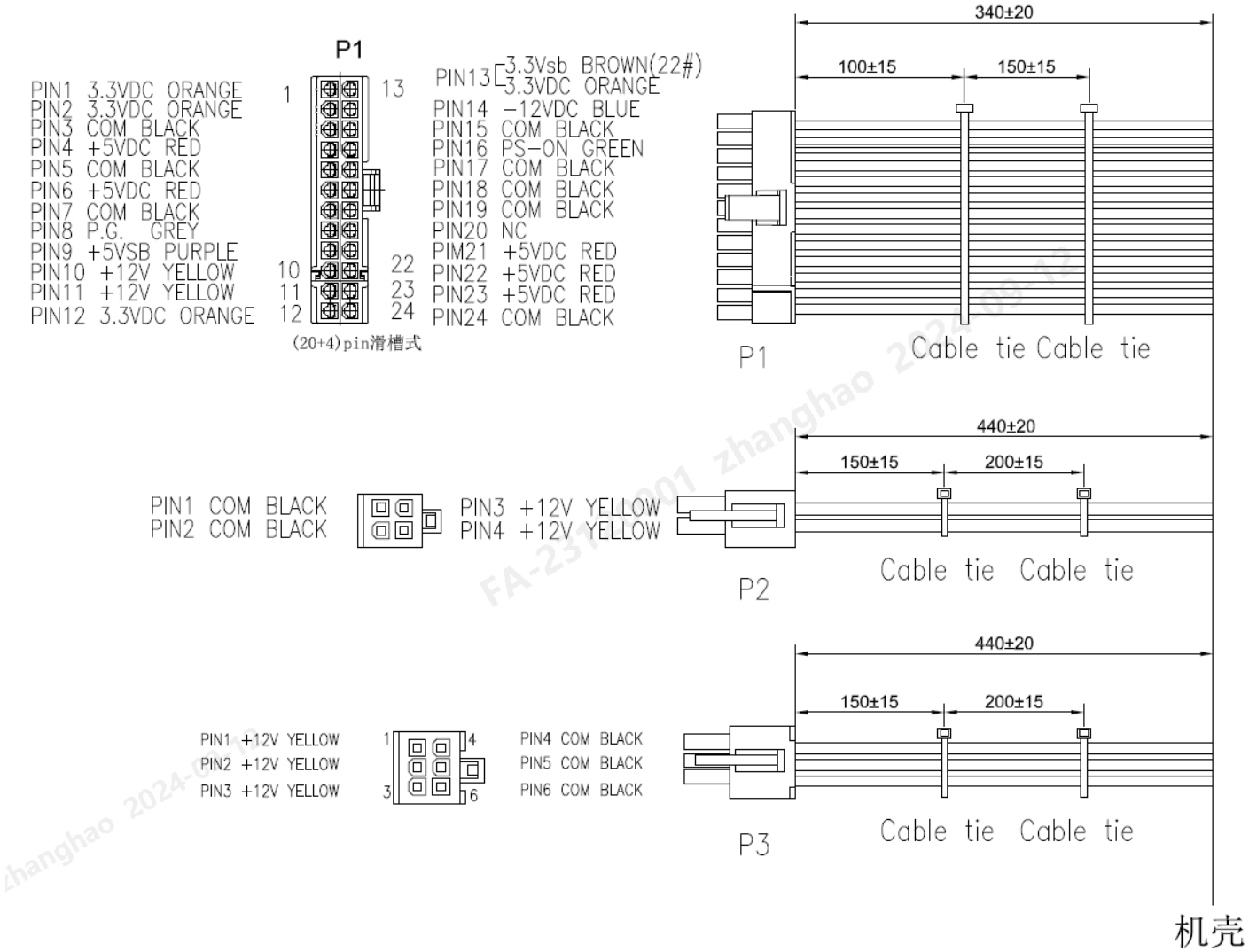
此款电源符合 RoHS 要求。

9.0 Mechanical（机械结构）

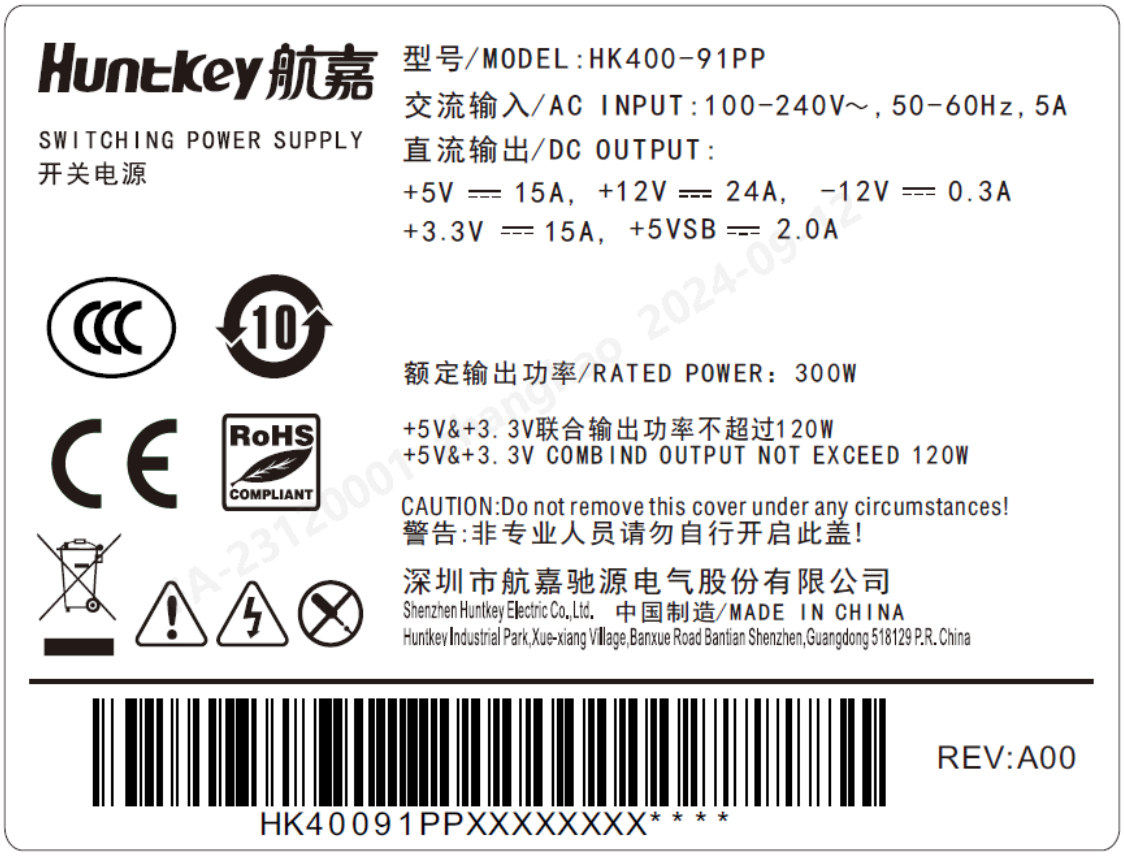
9.1 Mechanical outline（机械外观图）



9.2 DC wire drawing（DC 组合线）



9.3 Label drawing（标贴）



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