

Flex 250W Power Supply Specification

Model: HK350-92FP S1

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Change List

Item	Spec. Revision	Revision Date	Revision Description	Reason
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Content

- 1.0 Input Characteristics**
- 1.1 Input Voltage Range
- 1.2 Input Frequency Range
- 1.3 Input current
- 1.4 Inrush current
- 1.5 Power Supply Efficiency and Power Factor
- 1.6 Standby Power Consumption
- 1.7 Harmonic Current
- 1.8 Brown out and Brown out recovery
- 1.9 Buck Capacitor Requirements
- 2.0 Output Characteristics**
- 2.1 Static output characteristics
- 2.2 Cross-load regulation
- 2.3 Dynamic Load
- 2.4 Capacitive Load
- 2.5 Output connector
- 3.0 Protection**
- 3.1 Over Voltage Protection
- 3.2 Short Circuit Protection
- 3.3 Over Power Protection
- 3.4 Reset after shutdown
- 3.5 Over Current Protection
- 3.6 Over Temperature Protection
- 4.0 Time Sequence**
- 4.1 Power-on time
- 4.2 Rise time
- 4.3 PWR_OK delay
- 4.4 PWR_OK rise
- 4.5 AC loss to PWR_OK hold-up time
- 4.6 Power OK
- 4.7 PS_ON
- 5.0 Remote Sense**
- 6.0 No load Operation**

7.0 Auxiliary 5V Output
8.0 Environment
8.1 Operating ambient
8.2 Shipping and Storage
8.3 Altitude
8.4 Cooling and Acoustics
9.0 Safety and EMC
9.1 SAFETY REQUIREMENTS AND Certify
9.2 Conducted and Radiated Emissions
9.3 ESD
9.4 EFT
9.5 Surge Susceptibility
9.6 Hi-Pot

9.7 Grounding Continuity Test
9.8 Ground Leakage Current
10.0 Reliability Requirements.....
10.1 Mean Time Between Failures
10.2 Operating Life Time
11.0 Burn in.....
12.0 Mechanical.....
12.1 Mechanical outline
12.2 DC wire drawing
12.3 Label drawing

1.0 Input Characteristics:

1.1 Input Voltage Range:

90Vac to 264Vac, single phase

Parameter Description	MINIMUM	NORMAL	MAXIMUM	UNITS
AC Voltage Range	90	100~240	264	Vrms

1.2 Input Frequency Range:

50+/-3Hz and 60+/-3Hz; Normal Frequency Range: 50-60Hz

1.3 Input current:

Input current is 5A Max.

1.4 Inrush current:

Power supply inrush current shall be less than the rating of its critical components (including rectifiers, fuses, and surge limiting device) under all conditions of line voltage of Section 1.1. Inrush current will be limited by less than 23% of melting I²T value of input fuse under any critical conditions specified within this specification.

1.5 Power Supply Efficiency and Power Factor:

(1) 70% min at 100% , 50% , 20% of full load under 115Vac/60Hz and 230Vac/50Hz input. Engineering samples must keep 0.5% design margin prior to mass production;

(2) PF is not less than 0.9 under 100% load with input voltage 100Vac-240Vac , 50Hz/60Hz.

Loading	+12V	+3.3V	+5V	+5Vsb	-12V
100%(A)	12	11	11.3	2	0.3
50%(A)	6	5.5	5.65	1	0.15
20%(A)	2.4	2.2	2.26	0.4	0.06

1.6 Standby Power Consumption:

AC input power should not exceed 1W under +5Vsb /0.1A, 230Vac/50Hz

1.7 Harmonic Current:

The harmonics of the power line and neutral currents must not exceed the limits of the table below when measured from 75W (input) to full load (output) .

Harmonic Number (n)	Maximum Permissible Harmonic Current per Watt (mA/W)	Absolute Maximum Permissible Harmonic Current (A)
3	3.4	2.3
5	1.9	1.14
7	1	0.77
9	0.5	0.4
11	0.35	0.33
≥13	3.85/n	0.15 x 15/n

(1) Measurement shall be performed at 75W input power and output full load, under input voltage 230Vac/50Hz

(2) Reference document: IEC 61000-3-2 Class D

1.8 Brown out and Brown out recovery:

The input voltage decreases at a fixed rate down to zero voltage, turns on to nominal voltage and

holds, then powers down to 0Vac, then recovers back at the same rate. The EUT is set at 80% load and ambient temperature at 45°C.

1.8.1 Brownout Conditions:

100Vac to 0Vac at 60Hz at fixed slope of 6V/min, back to 100Vac.

1.8.2 Brownout Recovery Conditions:

0Vac to 100Vac at 60Hz at fixed slope of 6V/min.

1.9 Buck Capacitor Requirements:

For active PFC, voltage rating of buck cap must be 450Vdc.

2.0 Output Characteristics:

2.1 Static output characteristics:

Output Voltage	Load		Regulation	Ripple & Noise
	Min	Max		Max mV P-P
1. +5V	0.3A	14A	+/- 5%	50mV
2. +12V	1A	14A	+/- 5%	120mV
3. +5Vsb	0A	2A	+/- 5%	50mV
4. +3.3V	0.5A	13A	+/- 5%	50mV
5. -12V	0A	0.3A	+/-10%	120mV

At 25°C

- (1) The total combined 3.3V&5V power shall not exceed 80W
- (2) The total combined 3.3V/5V/+12V power shall not exceed 240W.
- (3)The continuous output power shall not exceed 250W.

At 45°C

- (1) The total combined 3.3V&5V power shall not exceed 70W
- (2) The total combined 3.3V/5V/+12V power shall not exceed 190W.
- (3)The continuous output power shall not exceed 200W.

2.2 Cross-load regulation:

The cross-load regulation in defined in the matrix as below.(UNIT: A)

Load	+3.3V	+5V	+12V	+5Vsb	-12V	Comments
1	0.5	0.3	1	0	0	Min Load
2	2.2	2.26	2.4	0.4	0.06	20% Load
3	5.5	5.65	6	1.0	0.15	50% Load
4	8.8	9.04	9.6	1.6	0.24	80% Load
5	11	11.3	12	2.0	0.3	100% Load
6	13.0	7.4	13	2	0.3	3.3V max Load

7	3	14.0	13.04	2	0.3	5V max Load
8	9.09	7.68	14	2	0.3	12V max Load
9				2.0		Stand-by

Notes:

(1) 0.1uF and 10uF tantalum capacitors should be put across output terminals during ripple & noise test. The oscilloscope bandwidth is set at 20 MHz. The output voltages shall meet ripple&noise requirements.

2.3 Dynamic Load:

The following transient loads are to be applied to the output as below.

The output voltages shall not exceed regulation limits

The waveform shall be a square wave with the slope of the rise and fall at 0.1 A/μs

The square wave shall have a frequency 500Hz to 1KHz with a duty cycle of 50%.

NOM. OUTPUT VOLTAGE (VDC)	CURRENT Imin	CURRENT Imax	STEP LOAD CHANGE (%)	TRANSIENT TOLERANCE (%)
+5.0V	0.3A	14 A	20	±5
+12V	1 A	14 A	30	±5
+3.3V	0.5 A	13 A	20	±5

(Adding external capacitor: +5V/10000uF, +12V/10000uF, +3.3V/10000uF, -12V/350uF, 5Vsb/350uF)

Dynamic Load Step Sizes

Output	5V Load	3.3V Load	12V Load	-12V Load	5Vsb Load
5Vmin Load	0.3A-3.1A	0.5A	1A	0A	0A
5Vmax Load	11.2A-14A	3A	13.04A	0.3A	2A
3.3Vmin Load	0.3A	0.5A-3.1A	1A	0A	0A
3.3Vmax Load	7.4A	10.4A-13A	13A	0.3A	2A
12Vmin Load	0.3A	0.5A	1A-5.2A	0A	0A
12Vmax Load	7.68A	9.09A	9.8A-14A	0.3A	2A

2.4 Capacitive Load:

The power supply should be able to power up and operate with the regulation limits with the following capacitance simultaneously present on the DC outputs.

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

2.5 Output connector:

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

3.0 Protection:

3.1 Over Voltage Protection:

+5V:5.5V-7.5V, +12V:13.2V-16V, +3.3V: 3.75V-5V

3.2 Short Circuit Protection:

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

3.3 Over Power Protection:

The power supply will be shutdown and latch off when output power is at 275W~400W.

3.4 Reset after shutdown:

When the power supply latches into shutdown condition due to a fault on an output(over current, over voltage or short circuit), The power supply shall be cleared of a latch condition shall reset within 30S by toggling the PS_ON signal or AC power has been removed.

3.5 Over Current Protection:

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

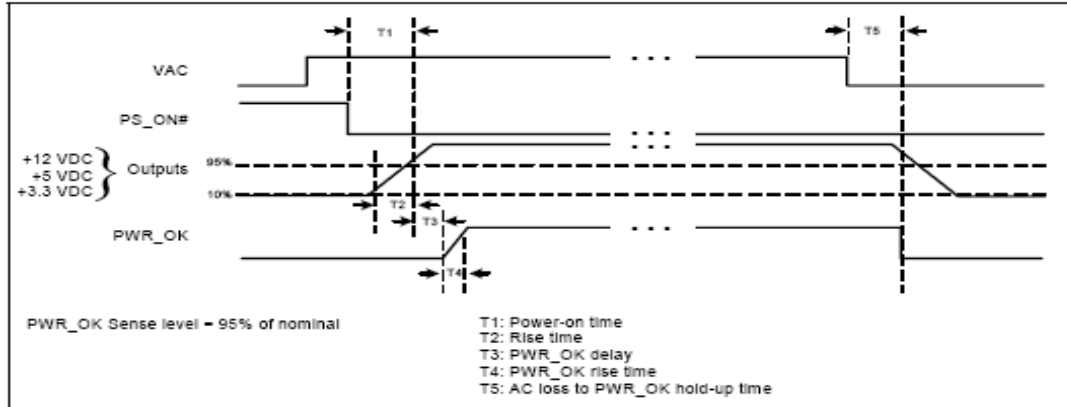
Table9 Over Current Protection

Output	+5V	+3.3V	+12V
Over Current Limit	28A-45A	28A-45A	18A~30A

3.6 Over Temperature Protection:

The power supply shall automatically shut down in the event of a fan failure, an airflow failure, or any other abnormal condition that results in excessive temperatures within the power supply. Hysteresis should be built in to avoid intermittent tripping.

4.0 Time Sequence:



4.1 Power-on time 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.

4.2 Rise time T2:

The output voltages shall rise from 10% of nominal to within the regulation ranges specified in Section 2.1 within 0.1 ms to 20 ms.

4.3 PWR_OK delay T3:

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.

4.4 PWR_OK rise T4:

The Power Good signal shall have a rise time (measured from the 10% point to the 95% point) of less than 10 milliseconds.

4.5 AC loss to PWR_OK hold-up time T5:

The Power Good Signal shall remain at up level for at least 16msec after AC power is removed and shall go to a down level before the 3.3V or +5V falls below their regulation limit (Test be done at 60% of full load, 115Vac/60Hz, 230Vac/50Hz).

4.6 Power OK (POK) :

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.

The electrical characteristics for the Power OK output driver are shown below:

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 200 μ A
High-State Output Impedance	1k Ω from output to common

4.7 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 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=-200 μ A)	2.0V	
VIH open circuit	-	5.25V

5.0 Remote Sense:

Remote sensing may be used to meet the DC regulation requirements. The remote sense lines can be connected in parallel with the power connections.

6.0 No load operation:

The power supply shall not cause any damage and/or hazardous conditions and no internal component shall be stressed beyond its rating.

7.0 Auxiliary 5V Output:

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 will not affect the 5V auxiliary output.

8.0 Environment:

8.1 Operating ambient:

Air Temperature	0 to 45 degrees centigrade
Relative Humidity	5 to 85 percent, non-condensing

8.2 Shipping and Storage:

Air Temperature	-40 to 70 degrees centigrade
Relative Humidity	5 to 95 percent, including condensation

8.3 Altitude:

Operating To 5000 meter

8.4 Cooling and Acoustics:

The power supply shall provide forced air cooling..

9.0 Safety and EMC:**9.1 SAFETY REQUIREMENTS AND Certify:**

The power supply has to be certified by CCC, Safety mark shall appear on the product.

9.2 Conducted and Radiated Emissions:

Conducted and radiated emissions of the power supply shall comply with the requirements of GB9254 Class B.

9.3 ESD:

ESD of the power supply shall comply with the requirements of IEC61000-4-2 Level 3.

9.4 EFT:

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

9.5 Surge Susceptibility:

Surge Susceptibility of the power supply shall comply with the requirements of IEC61000-4-5 Level 3.

9.6 Hi-Pot:

Input to GND : 1500Vac, duration time 3.0S minimum, Cut off current not exceed 10mA

9.7 Grounding Continuity Test:

100mΩ MAX at 25.0A .

9.8 Ground Leakage Current:

1.75mA MAX at 264Vac/ 50Hz input.

10.0 Reliability Requirements:**10.1 Mean Time Between Failures:**

The calculated MTBF shall be more than 100,000 hours at Full Load under 25°C ambient temperature. Calculation must be done at nominal input voltage (115Vac and 230Vac).

10.2 Operating Life Time:

The calculated lifetime of the PSU shall be minimum 33,000 hrs at 35°C ambient temperature at 80% of Max Load condition. If multiple Max Load conditions are defined the worst case condition must be considered. Calculation must be done at nominal input voltage (115Vac and 230Vac).

11.0 Burn in:

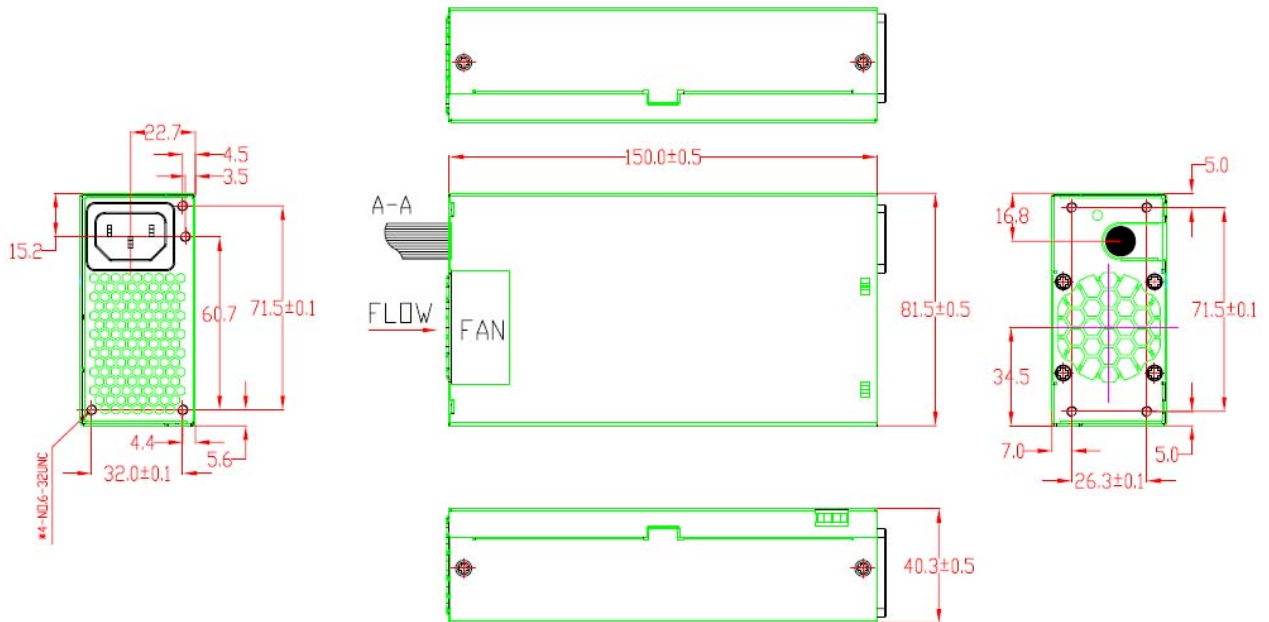
All products (during development) under this specification must be subjected to a functional burn in as described below:

- (1) Normal AC input specified in sec 1.1
- (2) 80% of maximum output loading.

- (3) 45°C ambient temperature.
- (4) 24 hours continuously with the minimum prior to production phase.

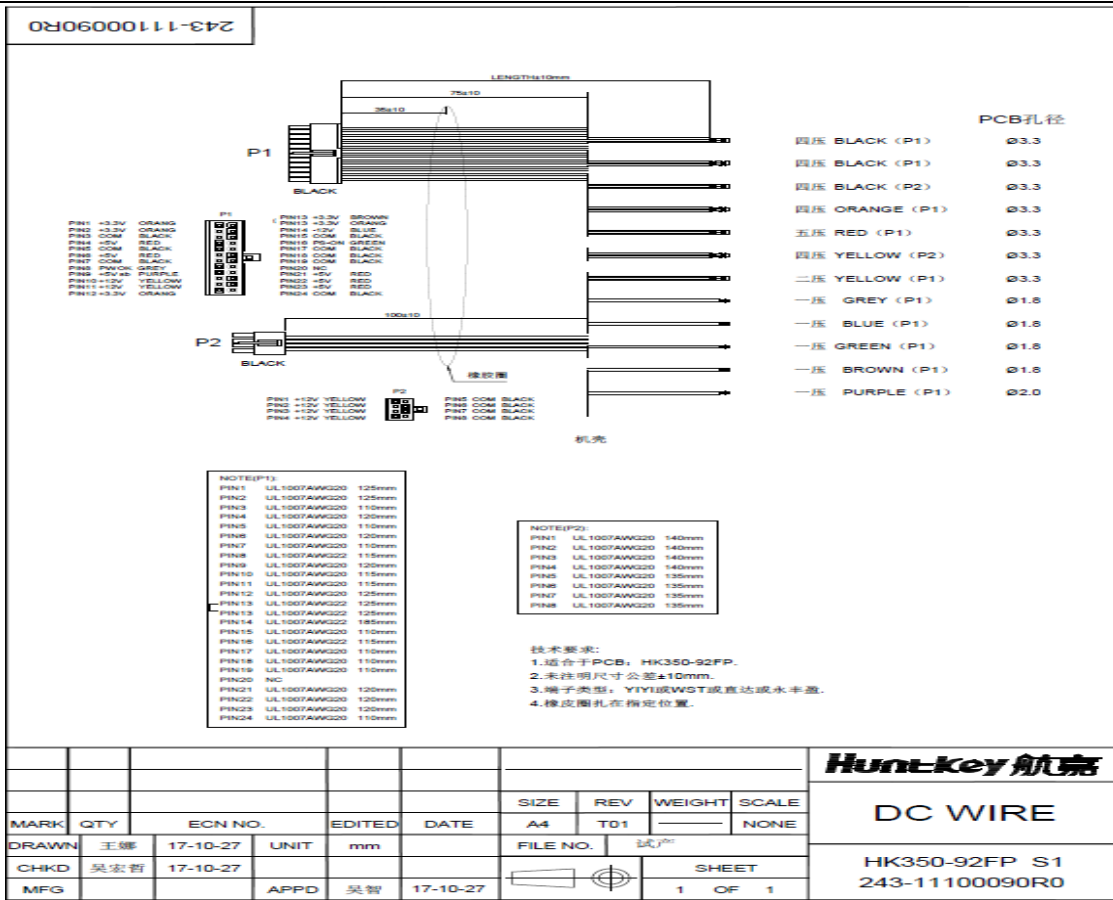
12.0 Mechanical:

12.1 Mechanical outline:




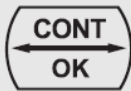





* Unmarked dimension tolerance : ±0.2mm.

12.2 DC wire drawing:



12.3 Label drawing:

		型号(MODEL): HK350-92FP S1 交流输入: 100-240V~, 50-60Hz, 5A (AC INPUT)
SWITCHING POWER SUPPLY 开关电源		
直流输出(DC OUTPUT): +5V $\overline{=}$ 14A(RED), +12V $\overline{=}$ 14A(YELLOW), +3.3V $\overline{=}$ 13A(ORANGE) -12V $\overline{=}$ 0.3A(BLUE), +5VSB $\overline{=}$ 2.0A(PURPLE), PG(GRAY) 额定输出功率(OUTPUT WATT): 250W +3.3V&+5V联合输出功率不超过80W. The total combined +3.3V&+5V power shall not exceed 80W. +3.3V&+5V&+12V联合输出功率不超过240W. The total combined +3.3V&+5V&+12V power shall not exceed 240W.		
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