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# SPECIFICATION



ESD14043608

FSP600-60AHBC

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# SPECIFICATION

## **FSP600-60AHBC**

**9PA6006502**

**Main Feature:  
Meet 2013 ErP  
Meet 80Plus on 230Vac-in  
Active PFC Circuit  
ATX2.4 Version**

Jul .23, 2014

REV : 1.00



**MODEL: FSP600-60AHBC**

**Revision History**

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
1.00		2014/07/23	

## 1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP600-60AHBC AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 features. Also, 5Vsb power is less than  $0.5W_{input}$  at power off mode (PS\_ON input at high state) which is comply with ErP Lot 6 year 2013 requirement.

The specification below is intended to describe as detailedly as possible the functions and performance of the subject power supply. Any comment or additional requirements to this specification from our customers will be highly appreciated and treated as a new target for us to approach.

## 2. REFERENCE DOCUMENTS

The subject power supply will meet the EMI requirements and obtain main safety approvals as following:

### 2.1. EMI REGULATORY

EMC : EMI DIRECTIVE 2004/108/EC(EN55022 / EN55024)

### 2.2. SAFETY

CB : IEC 60950-1:2005+A1

TUV : EN 60950 – 1 : 2006+A11+A1+A12

CE : EN 50581;2012

### 3. INPUT ELECTRICAL SPECIFICATIONS

#### 3.1. AC INPUT

Parameter	Min.	Nom.	Max.	Unit
$V_{in}$ (230VAC)	180	230	264	VAC <sub>rms</sub>
$V_{in}$ Frequency	47	50	53	HZ

Nominal voltages for test purposes are considered to be within  $\pm 1.0V$  of nominal.

#### 3.2. INRUSH CURRENT

Maximum inrush current from power-on (with power on at any point on the AC sine) and including, but not limited to, three line cycles, shall be limited to a level below the surge rating of the input line cord, AC switch if present, bridge rectifier, fuse, and EMI filter components. Repetitive ON/OFF cycling of the AC input voltage should not damage the power supply or cause the input fuse to blow.

#### 3.3. INPUT LINE CURRENT & POWER FACTOR (P.F.)

(At Full load)

AC input	Input line current	P.F.@ Full Load	P.F.@ Pin=75W
230V	< 4.5Amps – rms	> 0.9	> 0.65

#### 3.4. EFFICIENCY

##### 3.4.1 General

Under the load conditions defined in Table 1. and Table 2. The loading condition for testing efficiency shown in Table 1 represents a fully loaded system. a ~ 50% (typical) loaded system. and a ~ 20% (light) loaded system.

**Table 1. Loading Table for Efficiency Measurements**

600W(loading shown in Amps)						
Loading	+12V1	+12V2	+5V	+3.3V	-12V	+5Vsb
FULL	19.32	19.32	14.49	14.49	0.26	2.58
TYPICAL	9.66	9.66	7.24	7.24	0.13	1.29
LIGHT	3.86	3.86	2.9	2.9	0.05	0.52

**Table 2. Minimum Efficiency Vs Load**

Loading	Voltage	Full	Typical	Light
Required Minimum Efficiency	230V	82%	85%	82%

**3.4.2 Standby Power Consumption (+5Vsb):**

Input Power < 0.5W @ 5Vsb/45mA & 230Vac input

PS\_ON input signal @ High State

**4. OUTPUT ELECTRICAL REQUIREMENTS****4.1. OUTPUT VOLTAGE AND CURRENT RATING**

Output	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	PEAK LOAD	LOAD REG.	LINE REG.	Ripple & Noise
+3.3V	0.2A	10A	20A		±5%	±1%	50mV P-P
+5V	0.2A	10A	20A		±5%	±1%	50mV P-P
+12V1	1A	15A	30A		±5%	±1%	120mV P-P
+12V2	0.05A	15A	30A		±5%	±1%	120mV P-P
-12V	0A	0.15A	0.3A		±10%	±1%	120mV P-P
+5VSB	0A	1.5A	3A		±5%	±1%	50mV P-P

(1) +3.3V & +5V total output not exceed 140W.

(2) Maximum combined current for the +12V outputs shall be 45A .

Voltages and ripple are measured at the load side of mating connectors with a 0.1 uF monolithic ceramic capacitor paralleled by a 10 uF electrolytic capacitor across the measuring terminals.

## 4.2. LOAD CAPACITY SPECIFICATIONS

The cross regulation defined as follows, the voltage regulation limits DC include DC Output ripple & noise.

LOAD	+3.3V	+5V	+12V1	+12V2	-12V	+5Vsb
Condition_1	X	X	X	X	X	3A
Condition_2	0.2A	0.2A	0.05A	0.05A	0A	0A
Condition_3	1A	1A	0.5A	0.5A	0.3A	0.1A
Condition_4	1A	11A	15A	30A	0.1A	0.1A
Condition_5	1A	18A	6.3A	6.3A	0.1A	0.1A
Condition_6	18A	3A	6.3A	6.3A	0.1A	0.1A
Condition_7	20A	14.8A	18.4A	18.4A	0.3A	3A
Condition_8	12.1A	20A	18.4A	18.4A	0.3A	3A
Condition_9	3.5A	6A	30A	15A	0.3A	3A
Condition_10	11.5A	11.6A	15.5A	15.5A	0.2A	2A
Condition_11	0.2A	0.2A	0.4A	0.4A	0A	0A

## 4.3. OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	3.76V-5.2V
+5V	5.75V-7.5V
+12V	13.5V-16.5V

#### 4.4. OVER CURRENT PROTECTION

OUTPUT VOLTAGE	Max. over current limit
+3.3V	45A
+5V	45A
+12V1	45A
+12V2	45A

OCP test load condition as below :

+3.3V OCP test load at the condition\_6

+5V OCP test load at the condition\_5

+12V OCP test load at the condition\_4

#### 4.5. Dynamic (Condition\_11)

#### 4.6. SHORT CIRCUIT PROTECTION

Output short circuit is defined to be a short circuit load of less than 0.1 ohm.

In the event of an output short circuit condition on +3.3V, +5V, +12V or -12V output, the power supply will shutdown and latch off without damage to the power supply. The power supply shall return to normal operation after the short circuit has been removed and the power switch has been turned off for no more than 2 seconds.

#### 4.7. POWER SIGNAL

POWER GOOD @230V, FULL LOAD	100 –500mSec.
POWER FAIL @230V, FULL LOAD	1 mSec. minimum



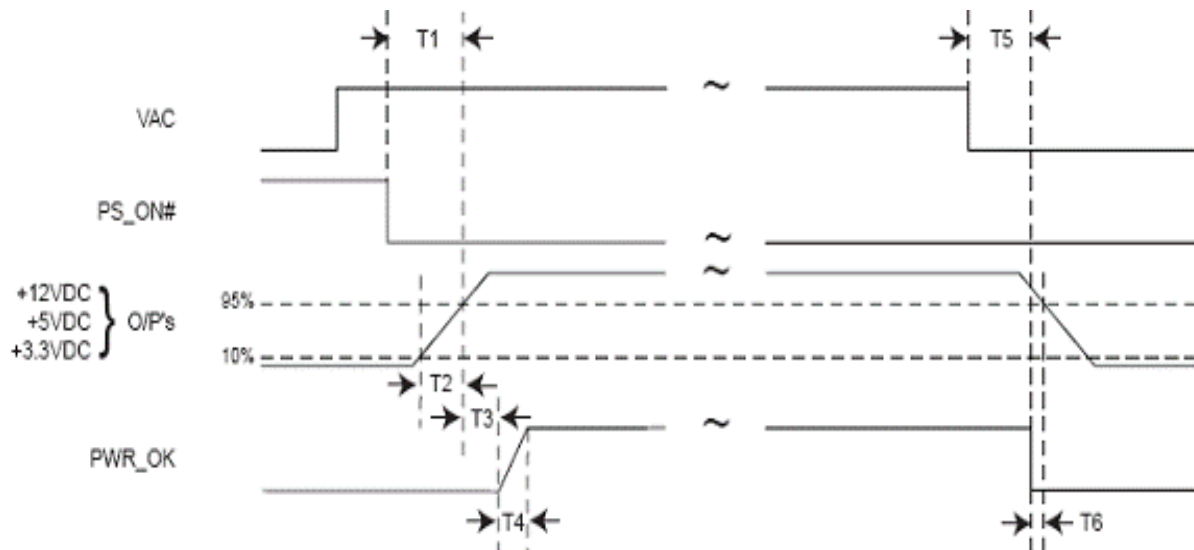


Figure:

- T1: Power-on time shall be less than 500 ms ( $T1 < 500$  ms).
- T2: Rise time : 0.1 ms to 20 ms ( $0.1 \text{ ms} \leq T2 \leq 20$  ms).
- T3: Power-ok delay time: 100 ms < T3 < 500 ms
- T4: Power-ok rise time:  $T4 \leq 1$  ms
- T5 + T6: AC loss to PWR\_OK hold-up time

#### OUTPUT RISE TIME

(10% TO 90% OF FINAL OUTPUT VALUE, @ FULL LOAD of Table 1.)

230V-rms	+ 3.3Vdc : 20ms Maximum + 5Vdc : 20ms Maximum + 12Vdc : 20ms Maximum + 5Vsb : 20ms Maximum - 12Vdc : 20ms Maximum
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#### 4.8. HOLD-UP TIME (@Condition\_10, 80% FULL LOAD)

230V / 50Hz : 17 mSec. Minimum.

The output voltage will remain within specification, in the event that the input power is removed or interrupted, for the duration of one cycle of the input frequency. The interruption may occur at any point in the AC voltage cycle. The power good signal shall remain high during this test.

## 5. FAN NOISE REQUIREMENTS

5.1. The subject power supply is cooled by a self-contained, 120mm, 12VDC fan.

### 5.2. FAN NOISE

AC INPUT	Full (Table 1.)	Typical (Table 1.)	Light (Table 1.)
230V	NOISE 38dB	NOISE 30dB	NOISE 28dB

## 6. ENVIRONMENTAL REQUIREMENTS

The power supply will be compliant with each item in this specification for the following Environmental conditions.

### 6.1. TEMPERATURE RANGE

Operating	+10 to +40 deg. C
Storage	-20 to +80 deg. C

### 6.2. HUMIDITY

Operating	5 –95% RH, Non-condensing
Storage	5 –95% RH, Non-condensing

### 6.3. VIBRATION

#### Random Vibration

0.01g<sup>2</sup>/ Hz at 5 Hz, sloping to 0.02g<sup>2</sup>/ Hz at 20 Hz, and maintaining 0.02g<sup>2</sup>/ Hz from 20Hz to 500Hz. The area under the PSD curve is 3.13gRMS.

The duration shall be 20 minutes per axis for all three axes on all samples.

### 6.4. GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than 3.5 mA.

### 6.5. RELIABILITY

The power supply reliability, when calculated by MIL-HDBK-217; latest revision, are exceed 100,000 hours with all output at maximum load and an ambient temperature of 25 .

## 6.6. DIELECTRIC STRENGTH

Primary to Frame Ground : 1800 Vac for 1 sec.

Primary to Secondary : 1800Vac for 1 sec

## 6.7. INSULATION RESISTANCE

Primary to Frame Ground : 20 Meg.ohms Minimum

Primary to Secondary : 20 Meg.ohms Minimum

## 7. LABELLING

Label marking will be permanent, legible and complied with all agency requirements.

### 7.1. MODEL NUMBER LABEL

Labels will be affixed to the sides of the power supply showing the following:

- Manufacturer's name and logo.
- Model no., serial no., revision level, location of manufacturer.
- The total power output and the maximum load for each output.
- AC input rating.

## 8. MECHANICAL SPECIFICATIONS

The mechanical drawing of the subject power supply, which indicate the form factor, location of the mounting holes, location, the length of the connectors, and other physical specifications of the subject power supply. Please refer to the attachment drawing.