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SPECIFICATION



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SPECIFICATION

FSP500-60HCN

9PA5004300

**Main Feature:
Low Noise
Active PFC Circuit
Meet 2010 ErP
ATX2.3 Version**

**JAN. 19, 2010
REV : 1.03**



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MODEL: FSP500-60HCN

Revision History

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
1.00		2009/07/24	
1.01	Revise: 4.3. HOLD-UP TIME (@80% Full Load of Table 1.)	2009/08/14	
1.02	Revise 3.4. EFFICIENCY Add 3.4.2 Standby Power Consumption (5Vsb)	2009/11/12	
1.03	Add 2.1. SAFETY	2010/01/19	

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP500-60HCN; AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2. Also, 5Vsb power is less than $1W_{input}$ at power off mode (PS_ON input at high state) which is comply with ErP Lot 6 year 2010 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. SAFETY

- CB: IEC 60950-1:2005 (2nd Edition) and/or EN 60950-1:2006 + A11:2009
- TUV: EN 60950-1:2006+A11
- CE: EN 61204-3/2000
EN 55022/2006
EN 61000-3-2/2006
EN 61000-3-3/1995+A1/2001 +A2/2005
EN 55024/1998 +A1/2001+A2/2003

3. INPUT ELECTRICAL SPECIFICATIONS

3.1. AC INPUT

Parameter	Min.	Nom. ⁽¹⁾	Max.	Unit
V _{in} (230VAC)	207	230	265	VAC _{rms}
V _{in} Frequency	47	--	63	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	< 3.0Amps – 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

500W(loading shown in Amps)						
Loading	+12V1	+12V2	+5V	+3.3V	-12V	+5Vsb
FULL	15.69	15.69	12.92	12.92	0.44	2.18
TYPICAL	7.85	7.85	6.46	6.46	0.22	1.09
LIGHT	3.14	3.14	2.58	2.58	0.09	0.44

Table 2. Minimum Efficiency Vs Load

Loading	Voltage	FULL	TYPICAL	LIGHT
Required Minimum Efficiency	230V	78%	80%	78%

3.4.2 Standby Power Consumption (5Vsb):

Input Power < 1W @ 5Vsb/100mA & 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	Ripple & Noise
+3.3V	0.1A	12A	24A		±5%	±1%	50mV P-P	70mV P-P
+5V	0.2A	12A	24A		±5%	±1%	50mV P-P	70mV P-P
+12V1	0.1A	9A	18A		±5%	±1%	120mV P-P	140mV P-P
+12V2	0.5A	9A	18A	19A	±5%	±1%	120mV P-P	140mV P-P
-12V	0A	0.25A	0.5A		±10%	±1%	120mV P-P	140mV P-P
+5VSB	0A	1.25A	2.5A	3.5A	±5%	±1%	50mV P-P	70mV P-P

(1) +3.3V & +5V total output not exceed 123W.

(2) Maximum combined current for the +12V outputs shall be 36A .

(3) +12V2 Peak current is 19A (less then 10m Sec.) , minimum voltage during peak is >11.0Vdc.

(4) +5Vsb Peak current is 3.5A(less then 500m Sec.) , minimum voltage during peak is > 4.5Vdc.

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	2.5A
Condition_2	0.2A	0.2A	0.1A	0.5A	0A	0A
Condition_3	0.3A	0.2A	1A	0.5A	0.5A	0.05A
Condition_4	0.5A	5A	18A	18A	0A	0.5A
Condition_5	0.1A	15A	2A	2A	0A	0.5A
Condition_6	1A	24A	15.5A	15A	0.3A	1A
Condition_7	12A	12A	10A	10A	0.25A	2A
Condition_8	20A	2A	2A	2A	0A	1A
Condition_9	24A	8.7A	15.5A	15A	0.5A	1A

4.3. HOLD-UP TIME (@80% Full Load of Table 1.)

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.

4.4. OUTPUT RISE TIME

(10% TO 95% OF FINAL OUTPUT VALUE, @ Full Load)

230V-rms + 3.3Vdc : 20ms Maximum
 + 5Vdc : 20ms Maximum
 + 12Vdc : 20ms Maximum
 + 5Vsb : 20ms Maximum
 - 12Vdc : 20ms Maximum

4.5. OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	3.76V-4.8V
+5V	5.6V-7.0V
+12V	13.0V-16.5V

4.6. OVER CURRENT PROTECTION

Over-current test values: (Table 1. Full Load)

Output Voltage	Max. over current limit
+3.3V	60A
+5V	48A
+12V1 DC	30A
+12V2 DC	30A

4.7. 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.

4.8. POWER SIGNAL

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

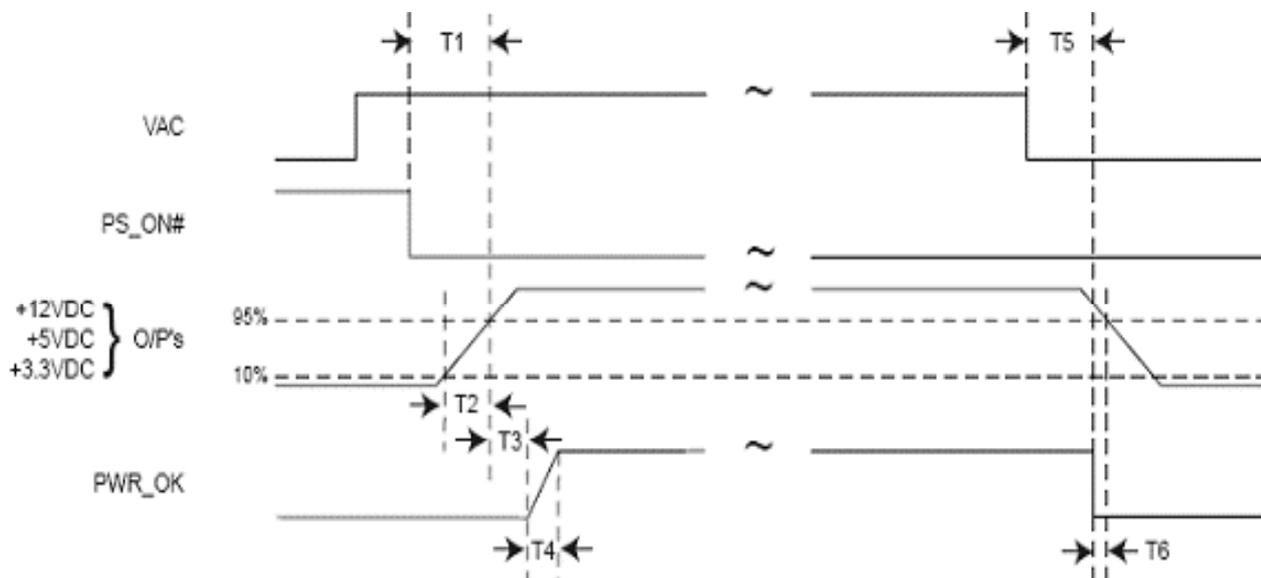


Figure:

T1: Power-on time shall be less than 500 ms ($T1 < 500 \text{ ms}$).

T2: Rise time : 0.1 ms to 20 ms ($0.1 \text{ ms} \leq T2 \leq 20 \text{ ms}$).

T3: Power-ok delay time: $100 \text{ ms} < T3 < 500 \text{ ms}$

T4: Power-ok rise time: $T4 \leq 1 \text{ ms}$

T5 + T6: AC loss to PWR_OK hold-up time : $T5 + T6 \geq 17 \text{ ms}$

4.9. The main power supply shall be off when the PS_ON pin is floating (open collector). The ON/STBY pin of P1 must remain off state for 5 Sec (maximum) prior to switching to the ON state

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 $\leq 38\text{dB}$	NOISE $\leq 30\text{dB}$	NOISE $\leq 25\text{dB}$

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

The maximum continuous power rating of supply is 500W at 25°C .

De-rate 2W/°C from 25°C to 40°C .

The maximum continuous power rating of supply is 470W at 40°C .

6.2. HUMIDITY

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

6.3. VIBRATION

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Vibration Operating – Sine wave excited, 0.25 G maximum acceleration, 10-250 Hz swept at one octave / min. Fifteen minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times large than non-resonant excursions.

Plane of vibration to be along three mutually perpendicular axes.

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 typical load and an ambient temperature of 25°C .

6.6. DIELECTRIC STRENGTH

Primary to Frame Ground : 1800Vac 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.