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# SPECIFICATION



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FSP250-50PLB(1U)

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# SPECIFICATION

## **FSP250-50PLB(1U)**

**9PA2509000**

**Main Feature**  
**Active PFC Circuit**  
**Full Range Input**

**April 02 , 2006**

**REV: 03**

## 1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP250-50PLB(1U); AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 and with Full Range Input features. Designed and manufactured by FSP GROUP.

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

- FCC Part 15 Subpart J, Class 'B' 115 Vac operation.
- CISPR 22 Class 'B' 230 Vac operation.

### 2.2 SAFETY

- NEMKO EN 60950
- TUV EN60950 OR VDE EN60950
- CSA 22.2 NO. 234 LEVEL 3
- IEC 950
- UL 60950
- CE

EN 55022:1998+A1: 2000, Class B

EN 61000-3-2: 2000

EN 61000-3-3: 1995+A1: 2001

CISPR22: 1997+A1: 2000, Class B

AS/NZS CISPR 22: 2002, Class B

EN 55024: 1998+A1: 2001

IEC 61000-4-2: 2001

IEC 61000-4-3: 2002

IEC 61000-4-4:1995

+A1:2000+A2: 2001

IEC 61000-4-5: 2001

IEC 61000-4-6: 2001

IEC 61000-4-8: 2001

IEC 61000-4-11: 2001

### 3. PHYSICAL REQUIREMENTS

#### 3.1 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.

#### 3.2 CONNECTOR SPECIFICATIONS

The power supply connectors are:

- AC Inlet : Standard inlet socket 10A/250V, UL/CSA/VDE approved.  
 P1 : The equivalent of MOLEX 39-01-2200, 20 pin connector.  
 PA,PC,PD : The equivalent of AMP 1-480424-0, 4 pin connector.  
 PB : The equivalent of AMP 171822-4, 4 pin connector.  
 PE : The equivalent of MOLEX 39-01-2040, 4 pin connector.

#### 3.3 CONNECTOR PIN DESIGNATIONS

The pin designations and color codes are defined as follows:

	P1 SYSTEM BOARD		PA,PC,PD DISK DRIVER		PB DISK DRIVER		PE DISK DRIVER	
PIN1	+3.3V	ORANGE	+12V	YELLOW	+12V	YELLOW	COM	BLACK
PIN2	+3.3V	ORANGE	COM	BLACK	COM	BLACK	COM	BLACK
PIN3	COM	BLACK	COM	BLACK	COM	BLACK	+12V	YELLOW
PIN4	+5V	RED	+5V	RED	+5V	RED	+12V	YELLOW
PIN5	COM	BLACK						
PIN6	+5V	RED						
PIN7	COM	BLACK						
PIN8	PW-OK	GRAY						
PIN9	+5Vsb	PURPLE						
PIN10	+12V	YELLOW						
PIN11	+3.3V	ORANGE						
	+3.3VS	BROWN						
PIN12	-12V	BLUE						
PIN13	COM	BLACK						
PIN14	PS-ON	GREEN						
PIN15	COM	BLACK						
PIN16	COM	BLACK						
PIN17	COM	BLACK						
PIN18	NC	NC						
PIN19	+5V	RED						
PIN20	+5V	RED						

## 4. ELECTRICAL REQUIREMENTS

### 4.1 OUTPUT ELECTRICAL REQUIREMENTS

The subject power supply will meet all electrical specifications below, over the full operation temperature range and dynamic load regulation.

#### 4.1.1. OUTPUT RATING

##### 250W(25°C)

Output	Nominal	Regulation	Ripple/Noise	Min	Max	PEAK
1	+3.3V	±5%	50mV	0.5A	18.0A	
2	+5V	±5%	50mV	0.3A	20.0 A	
3	+12V	±5%	120mV	1.0A	16.0 A	18.0A
4	-12V	±10%	120mV	0.0 A	0.5A	
5	+5VSB	±5%	100mV	0.0 A	2.0A	2.5A

※ -12V,+3.3V, +5V,+12V will have the regulation to ±10% when all load take off.

The +3.3V and +5V total output shall not exceed 115 watts. The +3.3V, +5V,and +12V total output shall not exceed 236.4watts and the total output for this subject power supply is 250 watts.

##### 220W(50°C)

Output	Nominal	Regulation	Ripple/Noise	Min	Max	PEAK
1	+3.3V	±5%	50mV	0.5A	14.0A	
2	+5V	±5%	50mV	0.3A	18.0 A	
3	+12V	±5%	120mV	1.0A	14.0 A	16.0A
4	-12V	±5%	120mV	0.0 A	0.5A	
5	+5VSB	±5%	100mV	0.0 A	2.0A	2.5A

※ -12V,+3.3V, +5V,+12V will have the regulation to ±10% when all load take off.

The +3.3V and +5V total output shall not exceed 110 watts. The +3.3V, +5V,and +12V total output shall not exceed 206.4watts and the total output for this subject power supply is 220 watts.

Ripple and noise measurements shall be made under all specified load conditions through a single pole low pass filter with 20MHz cutoff frequency. Outputs shall bypassed at the connector with a 0.1uF ceramic disk capacitor and a 10uF electrolytic capacitor to simulate system loading.

#### 4.1.2. LOAD CAPACITY SPECIFICATIONS

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

LOAD	STM	+3.3V	+5V	+12V	-12V
ALL MAX	HHHH	15.0A	13.1A	10.1A	0.5A
+5V MAX other MIN	LHLL	0.5A	20.0 A	3.0A	0.0A
+3.3V MAX other MIN	HLLL	18.0 A	0.3 A	1.5A	0.0A
+12V MAX other MIN	LLHL	0.5 A	0.3 A	16.0A	0.0A
ALL MIN	LLLL	0.3 A	0.3 A	1.0A	0.0A

#### 4.1.3. HOLD-UP TIME (@FULL LOAD)

115V / 60Hz : 17 mSec. Minimum.

230V / 50Hz : 17 mSec. Minimum.

#### 4.1.4.OUTPUT RISE TIME

(10% TO 90% OF FINAL OUTPUT VALUE, @FULL LOAD)

115V-rms or 230V-rms + 5Vdc : 20ms Maximum

#### 4.1.5.OVER VOLTAGE PROTECTION

+5V<sub>dc</sub> output: +5.7 V<sub>dc</sub> minimum, + 6.5V<sub>dc</sub> maximum  
+12V<sub>dc</sub> output: +13.3V<sub>dc</sub> minimum, +15.6V<sub>dc</sub> maximum  
+ 3.3V<sub>dc</sub> output: +3.7V<sub>dc</sub> minimum, + 4.5V<sub>dc</sub> maximum

#### 4.1.6.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 or +12V output, the power supply will shutdown and latch off. 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.

In the event of an output short circuit condition –12V output, the power supply will not be latch off. The power supply shall return to normal operation as soon as the short circuit has been removed and the power switch has been turned off for no more than 2 seconds.

#### 4.1.7.OVERLOAD PROTECTION

Overload currents defined as a 10 amp/sec fault current ramp starting from full load, applied to the

+3.3V, +5V output, shall not cause that output to exceed 36 amps before the output voltage drops below 0.5 volts and is latched off. The +12V output shall not exceed 24 amps under the same ramp conditions starting at full load before it is latched off.

#### 4.1.8. POWER GOOD SIGNAL

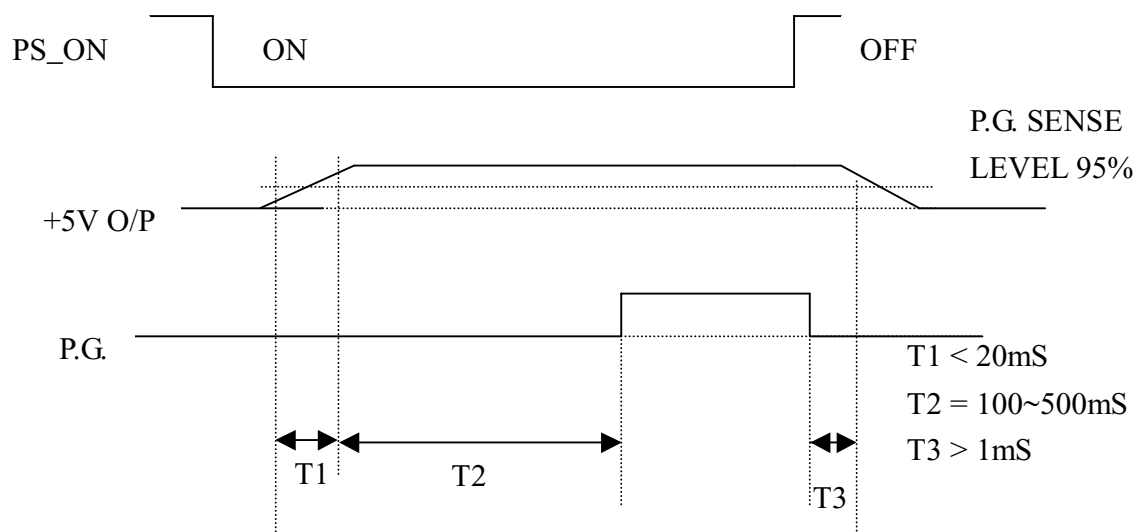
The power good signal is a TTL compatible signal for the purpose of initiating an orderly start-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

TTL signal asserted (low state) : less than 0.5V while sinking 10mA.

TTL signal asserted (high state): greater than 4.75V while sourcing 500uA.

High state output impedance: less or equal to 1Kohm from output to common.

POWER GOOD @ 115/230V, FULL LOAD	100 –500mSec.
POWER FAIL @115/230V, FULL LOAD	1 mSec. minimum



#### 4.2. OUTPUT TRANSIENT LOAD RESPONSE

+5V and +12V must be within specification for a step change in current as specified below. The outputs will be tested one section at a time with all other sections at maximum load. The test transition will be from IA to IB and IB to IA.

On TRANSIENT test, power good signal should be take with ch4.1.8.

**+5Vdc:**

IA: 20.0amps  
 IB: 15.0 amps  
 Volts variation: +5V +-5%  
 Setting time: 10 ms max  
 Transient load slew rate is 0.5A/ $\mu$ S

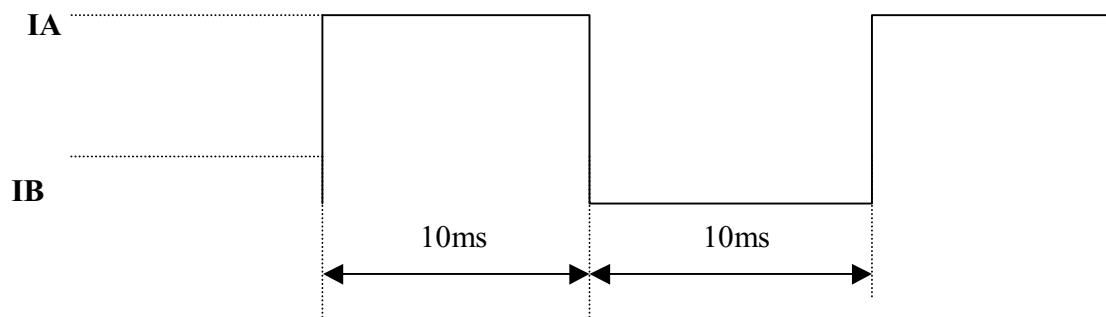
**+12V dc:**

IA: 16.0 amps  
 IB: 12.0 amps  
 Volts variation: +12V +-5%  
 Setting time: 10 ms max  
 Transient load slew rate is 0.1A/ $\mu$ S

**+3.3Vdc**

IA: 16.8 amps  
 IB: 13.0 amps  
 Volts variation: +3.3V +-5%  
 Setting time: 10 ms max  
 Transient load slew rate is 0.1A/ $\mu$ S

+5Vsb : 0.5A  
 -12V : 0.1A



### 4.3. INPUT ELECTRICAL SPECIFICATIONS

#### 4.3.1. AC Input

##### AC Input Line Requirements

Parameter	Min.	Nom. <sup>(1)</sup>	Max	Unit
V <sub>in</sub> (115VAC)	90	115	135	VAC <sub>rms</sub>
V <sub>in</sub> (230VAC)	180	230	265	VAC <sub>rms</sub>
V <sub>in</sub> Frequency	47	--	63	HZ

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

#### 4.3.2. INRUSH CURRENT

(Cold start – 25 deg. C)

115V	50 Amps - peak
230V	80 Amps - peak

#### 4.3.3. INPUT LINE CURRENT

115V	5.0 Amps – rms maximum
230V	3.0 Amps – rms maximum

#### 4.4. EFFICIENCY

115 VAC @Full Load	68% minimum
230 VAC @Full Load	68% minimum

#### 4.5. PS\_ON#

PS\_ON# is an active-low, TTL-compatible signal that allows a motherboard to remotely control the power supply in conjunction with features such as soft on/off, Wake on LAN+, or wake-on-modem. When PS\_ON# is pulled to TTL low, the power supply should turn on the five main DC output rails: +12VDC, +5VDC, +3.3VDC and –12VDC. When PS\_ON# is pulled to TTL high or open-circuited, the DC output rails should not deliver current and should be held at zero potential with respect to ground. PS\_ON# has no effect on the +5VSB output, which is always enabled whenever the AC power is present. (PS\_ON# signal characteristics.)

The power supply shall provide an internal pull-up to TTL high. The power supply shall also provide debounce circuitry on PS\_ON# to prevent it from oscillating on/off at startup when activated by a mechanical switch. The DC output enable circuitry must be SELV-compliant.

**PS\_ON# Signal Characteristics**

	Min.	Max.
VIL, Input Low Voltage	0.0V	0.8V
IIL, Input Low Current (Vin = 0.4V)		-1.6mA
VIH, Input High Voltage (Iin = -200 $\mu$ A)	2.0V	
VIH OPEN circuit, Iin = 0		5.25V

**5. ENVIRONMENTAL REQUIREMENTS**

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

**5.1. TEMPERATURE RANGE**

Operating	220W	0 to +50 deg. C
	250W	0 to +25 deg. C
Storage	-20 to +80 deg. C	

**5.2. HUMIDITY**

Operating	85% RH, Non-condensing
Storage	95% RH, Non-condensing

**5.3. VIBRATION**

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

Vibration Operating – Sine wave excited, 0.5 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.

**5.4. SHOCK**

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

Storage –40G, 11 mSec. half-sine wave pulse in both directions on three mutually perpendicular axes.

Operating -10G, 11mSec. half-sine wave pulse in both directions on three mutually Perpendicular axes.

## 5.5 COOLING SPECIFICATIONS

5.5.1. The PS is cooled by a self-contained, 40mm, 12VDC.

## 6. SAFETY

### 6.1. LEAKAGE CURRENT

The leakage current from AC to safety ground will not exceed 3.5 mA-rms at 264Vac, 50 Hz.

## 7. ELECTROMAGNETIC COMPATIBILITY

### 7.1 LINE CONDUCTED EMI

The subject power supplies will meet FCC and VFG class B requirements .

### 7.2. RADIATED EMI

The subject power supplies will meet FCC and CISPR 22 requirements .

## 8. LABELLING

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

### 8.1. 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.

### 8.2 DC OUTPUT IDENTIFICATION

Each output connector will be labeled.

## **9. RELIABILITY**

### **9.1. MTBF**

The power supply have a minimum predicted MTBF(MIL-HDBK-217) of 100,000 hours of continuous operation at 25°C, maximum-output load, and nominal AC input voltage.