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# SPECIFICATION



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FSP500-80BU

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# SPECIFICATION

## **FSP500-80BU**

**9PB5000100**

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

**SEP 17, 2007**

**REV:7**



全漢企業股份有限公司  
SPI Electronic Co.,Ltd.

**MODEL: FSP500-80BU**

**Revision History**

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
2	1.Revise 3.3 CONNECTOR PIN DESIGNATIONS -(page 4) 2.Revise 4.1.1. OUTPUT RATING—(page5)	2004.03.08	Karl
3	1. Revise 2.2 SAFETY ---(page3) 2. Revise 6.1 LEAKAGE CURRENT---(page10)	2004.06.25	Winnie
4	1. Revise 3.3 CONNECTOR PIN DESIGNATIONS---(page4) 2. Revise 4.1.1 OUTPUT RATING---(page5)	2004.10.12	Karl
5	5.2. HUMIDITY	2006.03.17	Winnie
6	2.2 SAFETY	2006.07.03	Winnie
7	DELETE 2.2 SAFETY	2007.09.17	Winnie

## 1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP500-80BU; 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.

### 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 : Line filter,10A/250V, UL/CSA/VDE approved.
- P1 : The equivalent of MOLEX 39-01-2240, 24 pin connector
- P3 :The equivalent of MOLEX 90331, 6 pin connector
- P2 : The equivalent of MOLEX 39-01-2080, 8 pin connector
- P6~7, P9,P10~13 : The equivalent of AMP 1-480424-0, 4 pin connector
- P8 :The equivalent of AMP 171822-4, 4 pin connector
- P4 :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:

PIN	P1 SYSTEM BOARD		P3 SYSTEM BOARD		P6~7, P10~13 DISK DRIVER		P9 DISK DRIVER		P8 DISK DRIVER		P2 SYSTEM BOARD		P4 DISK DRIVER	
	VOLTAGE	COLOR	FUNCTION	COLOR	VOLTAGE	COLOR	VOLTAGE	COLOR	VOLTAGE	COLOR	FUNCTION	COLOR	VOLTAGE	COLOR
PIN1	+3.3V	ORANGE	COM	BLACK	+12V3	YELLOW/WHITE	+12V2	YELLOW/BLUE	+5V	RED	COM	BLACK	COM	BLACK
PIN2	+3.3V	ORANGE	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK
PIN3	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	+12V1	YELLOW/BLACK
PIN4	+5V	RED	+3.3 V	ORANGE	+5V	RED	+5V	RED	+12V2	YELLOW/BLUE	COM	BLACK	+12V1	YELLOW/BLACK
PIN5	COM	BLACK	+3.3 V	ORANGE							+12V1	YELLOW/BLACK		
PIN6	+5V	RED	+5V	RED							+12V1	YELLOW/BLACK		
PIN7	COM	BLACK									+12V1	YELLOW/BLACK		
PIN8	PW-OK	GRAY									+12V1	YELLOW/BLACK		
PIN9	+5VSB	PURPLE												
PIN 10	+12V2	YELLOW/BLUE												
PIN 11	+12V2	YELLOW/BLUE												
PIN 12	+3.3V	ORANGE												
PIN 13	+3.3V	ORANGE												
	+3.3VS	BROWN												
PIN 14	-12V	BLUE												
PIN 15	COM	BLACK												
PIN 16	PS_ON	GREEN												
PIN 17	COM	BLACK												
PIN 18	COM	BLACK												
PIN 19	COM	BLACK												
PIN 20	-5V	WHITE												
PIN 21	+5V	RED												
PIN 22	+5V	RED												
PIN 23	+5V	RED												
PIN 24	COM	BLACK												

## 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

Output	Nominal	Regulation	Ripple/Noise	Min	Max	Notes
1	+3.3V	±5%	50mV	0.2A	30.0A	
2	+5V	±5%	50mV	0.2A	30.0 A	
3	-5V	±10%	120mV	0 A	0.3A	
4	+12V <sub>1</sub>	±5%	120mV	0.2A	15.0 A	Found on connector, P2,P4
5	+12V <sub>2</sub>	±5%	120mV	0.2A	15.0A	Found on connector, P1,P8,P9
6	+12V <sub>3</sub>	±5%	120mV	0.2A	18.0A	Found on connector, P6,P7,P10~P13
7	-12V	±10%	120mV	0 A	0.8 A	
8	+5VSB	±5%	50mV	0 A	2.0A	

The +3.3V and +5V total output shall not exceed 220watts,+12V<sub>1</sub>&+12V<sub>2</sub>&+12V<sub>3</sub> total output shall not exceed 40A, -5V and -12V total output shall not exceed 10W, the +3.3V, +5V and +12V total output power shall not exceed 500W and the total output for this subject power supply is 480 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.

	+3.3V	+5V	+12V <sub>1</sub>	+12V <sub>2</sub>	+12V <sub>3</sub>	-5V	-12V	+5Vsb
1	24.0A	28.0A	5.0A	6.6A	10.0A	0.3A	0.7A	2.0A
2	30.0A	5.0A	4.0A	2.0A	1.0A	0.1A	0.4A	1.0A
3	15.0 A	15.0A	10.0A	4.0A	2.0A	0.1 A	0.4A	1.0A
4	0.5 A	30.0A	4.0A	2.0A	1.0A	0.0 A	0.0A	0.0A
5	0.5 A	5.0 A	15.0A	10.0A	5.5A	0.3 A	0.0A	0.5A
6	0.5 A	7.0 A	10.0A	4.0A	10.0A	0.1 A	0.3A	1.0A
7	9.0A	2.0A	6.0A	15.0A	5.0A	0.0A	0.0A	0.0A
8	9.0A	7.0A	2.0A	0.2A	0.2A	0.0A	0.0A	0.0A
9	0.2A	0.2A	0.2A	0.2A	0.2A	0.0A	0.0A	0.0A

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

115V / 60Hz : 18 mSec. Minimum.

230V / 50Hz : 18 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.

#### 4.1.4.OUTPUT RISE TIME

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

115V-rms or 230V-rms + 5Vdc : 50ms Maximum

#### 4.1.5.OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	4.5V
+5V	6.5V
+12V <sub>1</sub>	15.6V
+12V <sub>2</sub>	15.6V
+12V <sub>3</sub>	15.6V

#### 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 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.

In the event of an output short circuit condition on -12V and -5V output, the power supply will not be damaged. 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

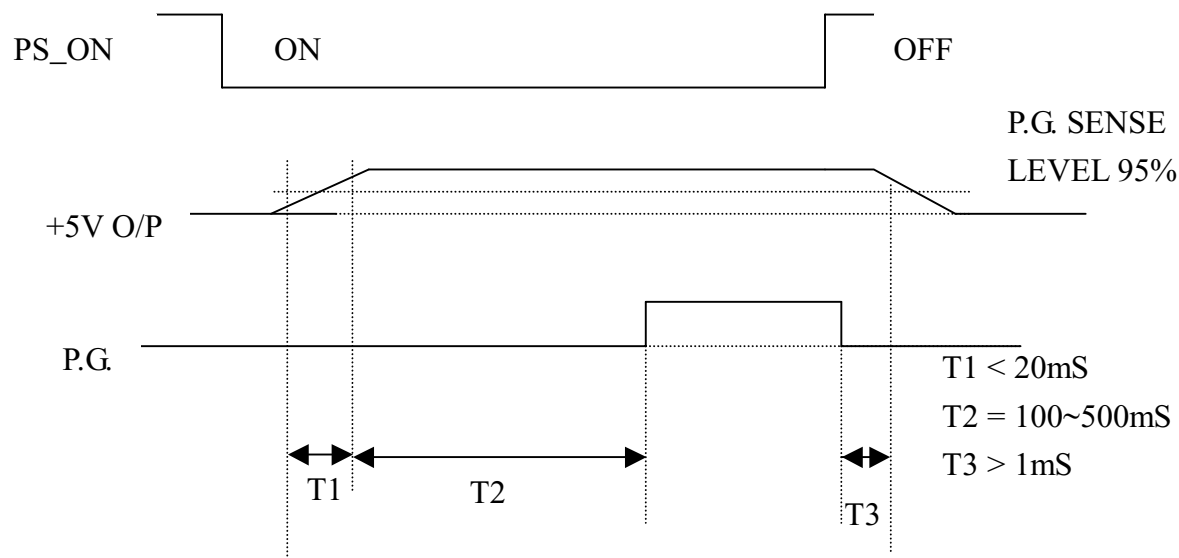
OUTPUT VOLTAGE	Max. overcurrent limit
+3.3V	50A
+5V	45A
+12V <sub>1</sub>	19.5A
+12V <sub>2</sub>	19.5A
+12V <sub>3</sub>	19.5A

#### 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

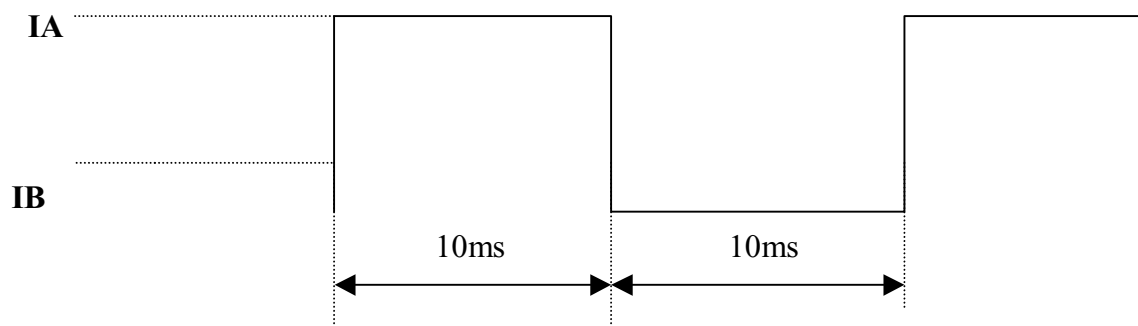
+5V and +12V must be within specification for a step change in current as specified below. The outputs will be tested one section at a time with all other sections at maximum load. The test transition will be from IA to IB and IB to IA. The step current will have a nominal transition time of 0.5 amp per microsecond for +5V and 0.1 amp per microsecond for +12V.

**+5Vdc:**

IA: 28.0amps  
 IB: 22.0amps  
 Volts variation: 400 mV max (p-p)  
 Setting time: 10 ms max

**+12V(V<sub>1</sub>,V<sub>2</sub> or V<sub>3</sub>)**

IA: 10.0 amps  
 IB: 7.5 amps  
 Volts variation: 450 mV max (p-p)  
 Setting time: 10 ms max



**4.3. INPUT ELECTRICAL SPECIFICATIONS**

**4.3.1. AC INPUT**

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 ±1.0V of nominal.

**4.3.2. INRUSH CURRENT**

(Cold start – 25 deg. C)

115V	80 Amps - peak
230V	120 Amps - peak

### 4.3.3. INPUT LINE CURRENT

115V	9.0 Amps – rms maximum
230V	5.0 Amps – rms maximum

### 4.4. EFFICIENCY

115 VAC @Full Load	70% minimum
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### 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 seven main DC output rails: +12V<sub>1</sub>DC, +12V<sub>2</sub>DC, +12V<sub>3</sub>DC, +5VDC, +3.3VDC, -5VDC, 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.
V <sub>IL</sub> , Input Low Voltage	0.0V	0.8V
I <sub>IL</sub> , Input Low Current (V <sub>in</sub> = 0.4V)		-1.6mA
V <sub>IH</sub> , Input High Voltage (I <sub>in</sub> = -200 $\mu$ A)	2.0V	
V <sub>IH</sub> OPEN circuit, I <sub>in</sub> = 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	0 to +50 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 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.

## 5.4. SHOCK

The subject power supply 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 subject power supply is cooled by a self-contained, 40mm, 12VDC fan.

## 6. SAFETY

### 6.1. LEAKAGE CURRENT

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

## **7. ELECTROMAGNETIC COMPATIBILITY**

### **7.1 LINE CONDUCTED EMI**

The subject power supply will meet FCC and VFG class B requirements under full load conditions.

### **7.2. RADIATED EMI**

The subject power supply will meet FCC and CISPR 22 requirements under normal load conditions.

## **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.