



# 全漢企業股份有限公司

## 電氣規格書

版次 : 11  
 文件編號 : ESD02000381  
 附件版本 : 07  
 作者 : 詹慧玲  
 客戶 :  
 製造商名稱 :  
 Model No/Type :  
 備註 : 1.增加延伸機種(9PA4000220)---FSP400-60PFN(S034)  
 送簽 : RD2 共用帳號  
 研發部門 : RD2  
 機密 : N  
 編號 :  
 發行日期 : 2003/10/7-10:53:31  
 ISO 編號 :



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相關料號：

9PA4000200

FSP400-60PFN,ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,FSP,W/PFC(A),6L1S,FULL RANGE,RD2

9PA4000201

FSP400-60PFN(F041),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,FSP(F/S),W/PFC(A),6L1S,5,RD2

9PA4000202

FSP400-60PFN(A271),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,AOPEN,W/PFC(A),9L2S,7,RD2

9PA4000203

FSP400-60PFN(S031),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,SPI,W/PFC(A),6L1S,7,WO/AUTO,RD2

9PA4000204

FSP400-60PFN(I221),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,IEI,W/PFC(A),8L2S,OEM,7,W/AUTO,RD2

9PA4000205

FSP400-60PFN(S032),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,SPI,W/PFC(A),0L0S,7,FULL RANGE,RD2

9PA4000206

FSP400-60PFN(S033),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,SPI,W/PFC(A),2L0S,INTEL,FULL RANGE,RD2

9PA4000207

FSP400-60PFN(T041),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,ZALMAN,W/PFC(A),7L2S,INTEL,FULL RANGE,9PA4000200,RD2

9PA4000208

FSP400-60PFN(T042),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,ZALMAN,W/PFC(A),7L2S,INTEL,FULL RANGE,9PA4000207,RD2

9PA4000209

FSP400-60PFN(F042),ATX,SPS,S,W/NK,W/IO,WO/O,WO/SS,NEXUS,W/PFC(A),6L1S,INTEL,FULL RANGE,9PA4000201,RD2

9PA4000210

FSP400-60PFN(S201),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,FSP,W/PFC(A),8L1S,INTEL,FULL RANGE,9PA4000200,RD2

9PA4000211

FSP400-60PFN(F043),ATX,SPS,S,W/NK,W/IO,WO/O,WO/SS,NEXUS,W/PFC(A),6L1S,INTEL,FULL RANGE,9PA4000209,RD2

9PA4000212      KEEP 不生產 7/28/03\SA 機種,FSP400-60PFN(SL011)

9PA4000213

FSP400-60PFN(A272),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,AOPEN,W/PFC(A),9L2S,O

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EM,OBL,INTEL,FULL RANGE,9PA4000202,RD2

9PA4000214

FSP400-60PFN(F061),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,FSP(F/S),W/PFC(A),6L1S,INTEL,FULL RANGE,9PA4000201,RD2

9PA4000215

FSP400-60PFN(X701),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,FSP,W/PFC(A),6L1S,INTEL,FULL RANGE,9PA4000200,RD2

9PA4000216 FSP400-60PFN(I041),ATX,SPS,B,W/NK,W/IO,WO/O,WO/SS,POWER MAN,W/PFC(A),6L3S,INTEL,FULL RANGE,9PA4000200,RD2

9PA4000219

FSP400-60PFN(M221),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,FSP,W/PFC(A),6L1S,INTEL,FULL RANGE,9PA4000200,RD2

9PA4000220


FSP400-60PFN(S034),ATX,SPS,B,W/NK,WO/IO,WO/O,WO/SS,SPI,W/PFC(A),4L1S,INTEL,FULL RANGE,9PA4000203,RD2



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# SPECIFICATION

## **FSP400-60PFN** **(9PA4000200)**

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

<b>P.E</b>	<b>R/D</b>	<b>APPROVED</b>	<b>REV.</b>
			<b>7</b>

DATE: October 3, 2003

編號：7000-0105



全漢企業股份有限公司  
SPI Electronic Co., Ltd .

**MODEL: FSP400-60PFN**

**Revision History**

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
5	1. Page 11 --- Revise 9.1 MTBF change from “50000 hours” to “100000 hours” ...	2003.04.07	Paul
6	1. Page 3 --- Revise 2.2 Safety 2. Page 11 --- Delete 10. SAFETY REQUIREMENTS	2003.09.24	Joyhare
7	1. Page 3 --- Revise 2.2 Safety	2003.10.03	Joyhare

## **1. GENERAL DESCRIPTION AND SCOPE**

This is the specification of Model FSP400-60PFN; 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-C22.2 NO. 950-95
- IEC 60950
- UL 1950
- CE

## **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  
P2 : The equivalent of MOLEX 90331-0010, 6 pin connector  
P3,P4,P5,P6,P7,P8 : The equivalent of AMP 1-480424-0, 4 pin connector  
PA :The equivalent of AMP 171822-4, 4 pin connector  
PB :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		P2 DISK DRIVER		P3,P4,P5, P6,P7,P8 DISK DRIVER		PA DISK DRIVER		PB DISK DRIVER	
PIN1	+3.3V	ORANGE	COM	BLACK	+12V	YELLOW	+12V	YELLOW	COM	BLACK
PIN2	+3.3V	ORANGE	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK
PIN3	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK	+12V	YELLOW
PIN4	+5V	RED	+3.3V	ORANGE	+5V	RED	+5V	RED	+12V	YELLOW
PIN5	COM	BLACK	+3.3V	ORANGE						
PIN6	+5V	RED	+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	-5V	WHITE								
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

Output	Nominal	Regulation	Ripple/Noise	Min	Max	peak
1	+3.3V	±5%	50mV	0.3A	28.0 A	
2	+5V	±5%	50mV	0.5A	40.0 A	
3	+12V	±5%	120mV	0A	15.0 A	18.0 A
4	-5V	±5%	100mV	0 A	0.3A	
5	-12V	±5%	120mV	0 A	0.8 A	
6	+5VSB	±5%	100mV	0 A	2.0A	

The +3.3V and +5V total output shall not exceed 235watts, the +3.3V, +5V and +12V total output power shall not exceed 380W and the total output for this subject power supply is 400 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	-5V	-12V
ALL MAX	HHHHH	28.0A	28.5A	12.0A	0.3A	0.8A
+5V MAX other MIN	LHLLL	0.3A	40.0 A	1.5A	0A	0A
+3.3V MAX other MIN	HLLLL	28.0 A	2.5 A	0.2A	0A	0A
+12V MAX other MIN	LLHLL	0.3 A	2.0 A	18.0A	0A	0A
ALL MIN	LLLLL	0.3 A	0.5A	0A	0A	0A

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

115V / 60Hz : 17 mSec. Minimum.

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.

#### 4.1.4. OUTPUT RISE TIME

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

115V-rms or 230V-rms + 5Vdc : 70ms Maximum

#### 4.1.5.OVER VOLTAGE PROTECTION

+5V<sub>dc</sub> output: +5.58V<sub>dc</sub> minimum, + 6.82V<sub>dc</sub> maximum  
 + 3.3V<sub>dc</sub> output: +3.5V<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 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 -5V or -12V 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

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 40 amps before the output voltage drops below 0.5 volts and is latched off. The +12V output shall not exceed 22 amps under the same ramp conditions starting at full load before it is latched off.

The overload protection must be such that the power supply is protected from damage by entering a shutdown condition.

#### 4.1.8.POWER GOOD SIGNAL

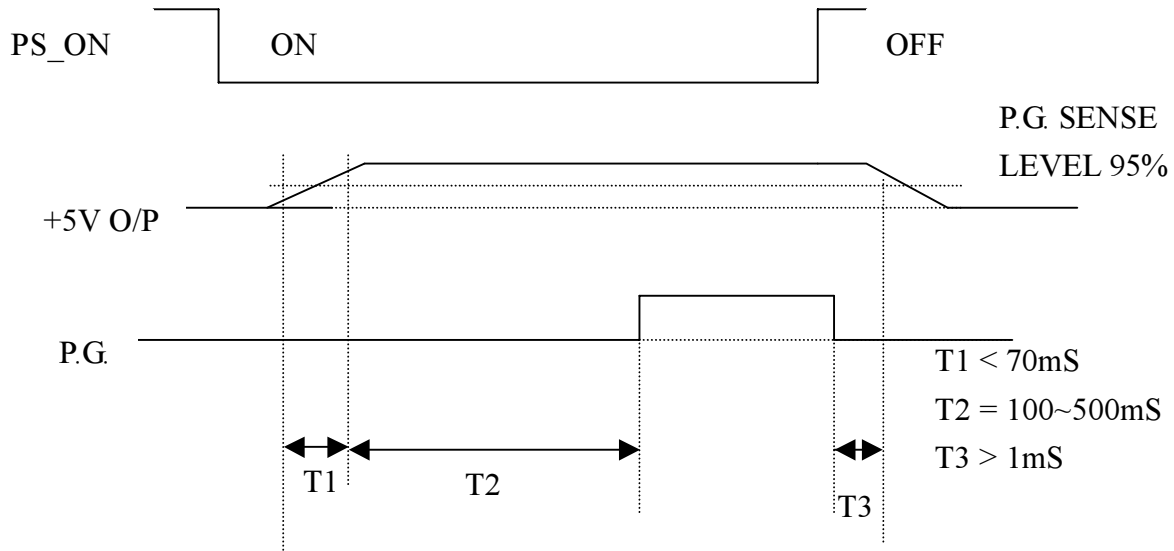
The power good signal is a TTL compatible signal for the purpose of initiating an orderly star-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

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

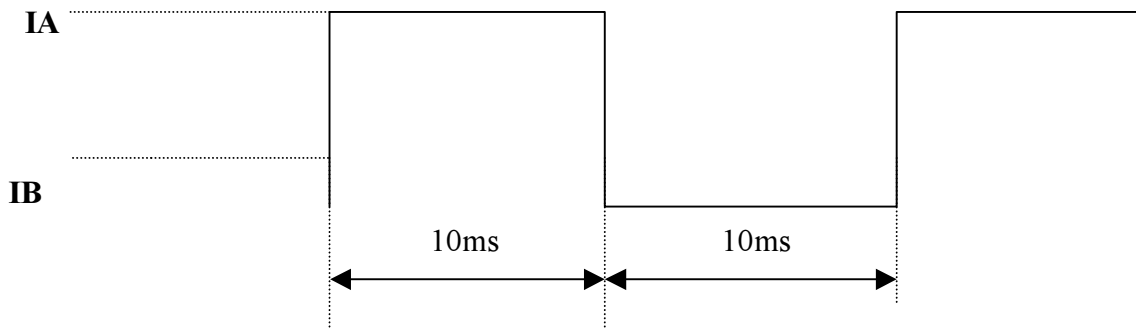
+5V and +12V must be within specification for a step change in current as specified below. The outputs will be tested one section at a time with all other sections at maximum load. The test transition will be from IA to IB and IB to IA. The step current will have a nominal transition time of 0.5 amp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

+5V vdc:

IA: 28.5 amps  
 IB: 21.3 amps  
 Volts variation: 400 mV max (p-p)  
 Setting time: 10 ms max

+12V vdc:

IA: 12.0 amps  
 IB: 9.0 amps  
 Volts variation: 450 mV max (p-p)  
 Setting time: 10 ms max



### 4.3. INPUT ELECTRICAL SPECIFICATIONS

#### 4.3.1. INPUT RATING: FULL RANGE INPUT

PARAMETER		UNITS
V-in Range	95 - 264	V-rms

#### 4.3.2. INPUT FREQUENCY

NOMINAL FREQUENCY	
115V	60Hz
230V	50Hz

#### 4.3.3. INRUSH CURRENT

(Cold start – 25 deg. C)

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

#### 4.3.4. INPUT LINE CURRENT

115V	8.0 Amps – rms maximum
230V	4.0 Amps – rms maximum

### 4.4. EFFICIENCY

#### 4.4.1 General

115 VAC @Full Load	65% minimum
230 VAC @Full Load	65% 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, -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. Table 15 lists 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.

**Table 15. 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 μA)	2.0V	
V <sub>IH OPEN</sub> 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	5 –95% RH, Non-condensing
Storage	5 –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, 80mm, 12VDC fan.

### 6. SAFETY

#### 6.1. LEAKAGE CURRENT

In addition to the UL CSA and NEMKO safety requirements, the leakage current from AC to safety ground will not exceed 0.75 mA-rms at 115Vac, 60 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.