



1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP550-60PLN; 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.

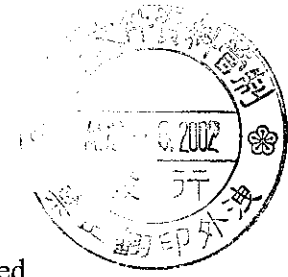
2.2 SAFETY

- NEMKO EN 60950
- TUV EN60950 OR VDE EN60950
- CSA 22.2 NO. 234 LEVEL 3
- IEC 950
- UL 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 39-01-2240, 24 pin connector
- P2 : The equivalent of MOLEX 39-01-2080, 8 pin connector
- P4 - P7, P9 - P13 : The equivalent of AMP 1-480424-0, 4 pin connector
- P8 : The equivalent of AMP 171822-4, 4 pin connector

3.3 CONNECTOR PIN DESIGNATIONS

The pin designations and color codes are defined as follows:

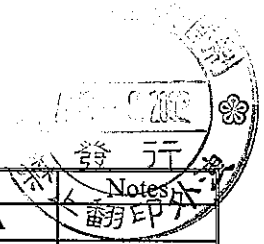
	P1 SYSTEM BOARD		P2 DISK DRIVER		P4-P7, P9 - P13 DISK DRIVER		P8 DISK DRIVER	
PIN1	+3.3V	ORANGE	COM	BLACK	+12V	YELLOW	+12V	YELLOW
PIN2	+3.3V	ORANGE	COM	BLACK	COM	BLACK	COM	BLACK
PIN3	COM	BLACK	COM	BLACK	COM	BLACK	COM	BLACK
PIN4	+5V	RED	COM	BLACK	+5V	RED	+5V	RED
PIN5	COM	BLACK	+12V	YELLOW				
PIN6	+5V	RED	+12V	YELLOW				
PIN7	COM	BLACK	+12V	YELLOW				
PIN8	PWR-OK	GRAY	+12V	YELLOW				
PIN9	+5VSB	PURPLE						
PIN10	+12V	YELLOW						
PIN11	+12V	YELLOW						
PIN12	+3.3V	ORANGE						
PIN13	+3.3V	ORANGE						
PIN14	-12V	BLUE						
PIN15	COM	BLACK						
PIN16	PS_ON	GREEN						
PIN17	COM	BLACK						
PIN18	COM	BLACK						
PIN19	COM	BLACK						
PIN20	-5V	WHITE (OPTION)						
PIN21	+5V	RED						
PIN22	+5V	RED						
PIN23	+5V	RED						
PIN24	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% - 4%	50mV	0.4A	27.0 A	
2	+5V	+5% - 4%	50mV	3.0A	29.0 A	
3	-5V	± 10%	120mV	0 A	0.3A	
4	+12V CPU	+5% - 4%	120mV	1.0A	18.0 A	Found on connector P2
5	+12V I/O	+5% - 4%	120mV	1.0A	18.0 A	Found on connector P1
6	-12V	+9% - 5%	120mV	0 A	0.8 A	
7	+5VSB	+5% - 4%	50mV	0 A	2.0A	

550W: The +3.3V and +5V total output shall not exceed 150watts, the +3.3V, +5V and +12V total output power shall not exceed 528W and the total output for this subject power supply is 550 watts(30°C). 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.

500W: The +3.3V and +5V total output shall not exceed 150watts, the +3.3V, +5V and +12V total output power shall not exceed 478W and the total output for this subject power supply is 500 watts(50°C). 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.

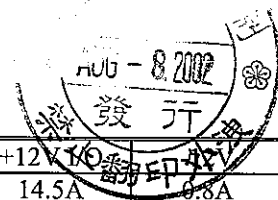
4.1.2. LOAD CAPACITY SPECIFICATIONS

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

550W:

LOAD	STM.	+3.3V	+5V	-5V	+12V CPU	+12V I/O	-12V
ALL MAX	HHHHHH	12.0A	17.0A	0.3A	17.0A	16.5A	0.8A
+5V MAX other MIN	LHLLLL	0.4 A	29.0 A	0.0A	1.0A	1.0A	0A
+3.3V MAX other MIN	HLLLLL	27.0 A	3.0 A	0.0 A	1.0A	1.0A	0A
+12V CPU MAX other MIN	LLLHLL	0.4 A	3.0 A	0.0 A	18.0A	1.0A	0A
+12V I/O MAX other MIN	LLLLHL	0.4 A	3.0 A	0.0 A	1.0A	18.0A	0A
ALL MIN	LLLLLL	0.4 A	3.0 A	0.0 A	1.0A	1.0A	0A

500W:



LOAD	STM.	+3.3V	+5V	-5V	+12V CPU	+12V I/O	+5V
ALL MAX	HHHHHH	12.0A	17.0A	0.3A	15.0A	14.5A	0.8A
+5V MAX other MIN	LHLLLL	0.4 A	29.0 A	0.0A	1.0A	1.0A	0A
+3.3V MAX other MIN	HLLLLL	27.0 A	3.0 A	0.0 A	1.0A	1.0A	0A
+12V CPU MAX other MIN	LLLHLL	0.4 A	3.0 A	0.0 A	18.0A	1.0A	0A
+12V I/O MAX other MIN	LLLHL	0.4 A	3.0 A	0.0 A	1.0A	18.0A	0A
ALL MIN	LLLLLL	0.4 A	3.0 A	0.0 A	1.0A	1.0A	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

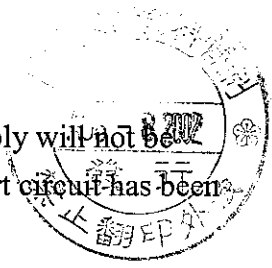
4.1.5. OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	3.8V-4.5V
+5V	5.6V-6.5V
+12V	13.0-14.5V

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 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

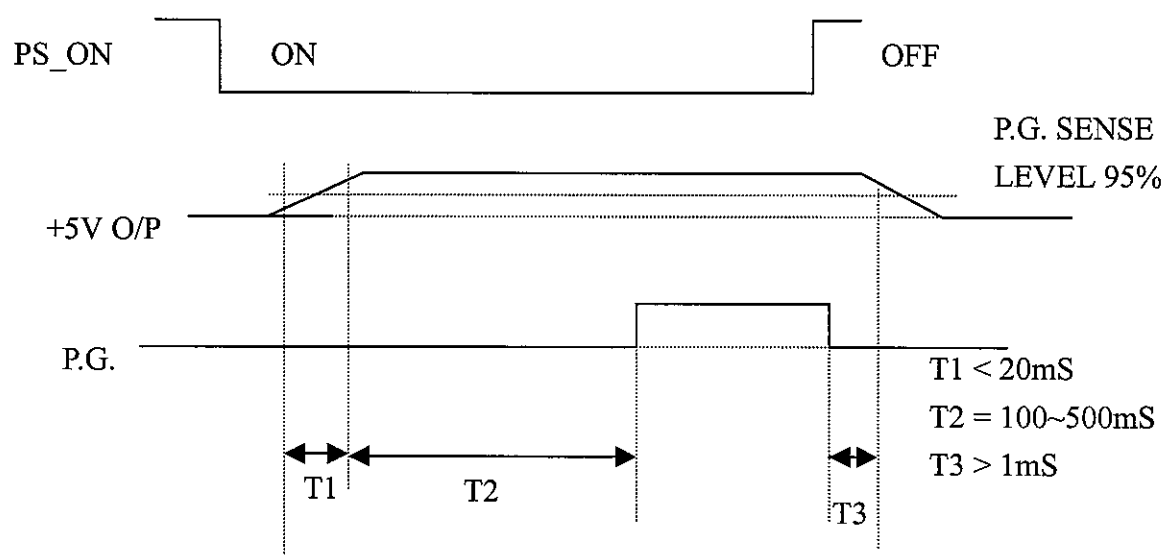
OUTPUT VOLTAGE	Max. overcurrent limit
+3.3V	45A
+5V	45A
+12V CPU	20A
+12V I/O	20A

4.1.8.POWER GOOD SIGNAL

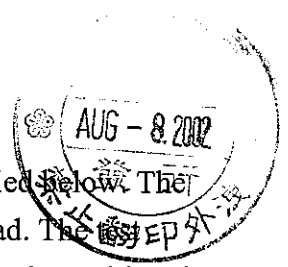
The power good signal is a TTL compatible signal for the purpose of initiating an orderly start-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

- 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



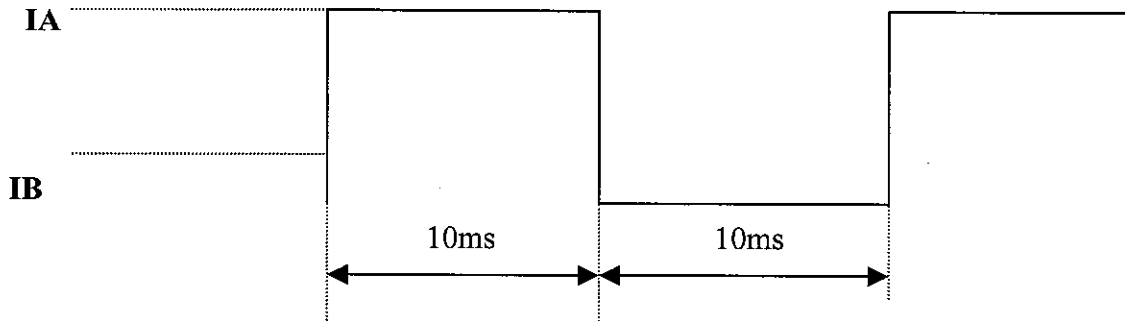
+5V and +12V must be within specification for a step change in current as specified below. The outputs will be tested one section at a time with all other sections at maximum load. The transition will be from IA to IB and IB to IA. The step current will have a nominal transition time of 0.5 amp per microsecond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

+5V vdc:

IA: 26.8amps
 IB: 20.1amps
 Volts variation: 400 mV max (p-p)
 Setting time: 10 ms max

+12V vdc:

IA: 18.0 amps
 IB: 14.0amps
 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. ⁽¹⁾	Max.	Unit
V _{in} (115VAC)	90	115	135	VAC _{rms}
V _{in} (230VAC)	180	230	265	VAC _{rms}
V _{in} 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	10.0 Amps – rms maximum
230V	5.0 Amps – rms maximum

4.4. EFFICIENCY

115 VAC @Full Load	63% 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 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.

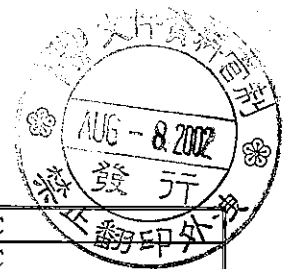
The power supply shall provide an internal pull-up to TTL high. The power supply shall also provide debounce circuitry on PS_ON# to prevent it from oscillating on/off at startup when activated by a mechanical switch. The DC output enable circuitry must be SELV-compliant.

Table 15. PS_ON# Signal Characteristics

	Min.	Max.
VIL, Input Low Voltage	0.0V	0.8V
IIL, Input Low Current (Vin = 0.4V)		-1.6mA
VIH, Input High Voltage (Iin = -200 μA)	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

550W Operating	0 to +30 deg. C
500W 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.

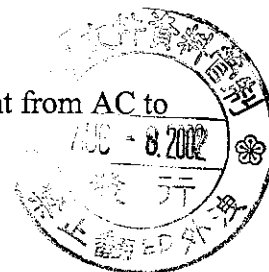
5.5 COOLING SPECIFICATIONS

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.

10. SAFETY REQUIREMENTS

10.1. SAFETY

The subject power supply designed to meet the following safety regulations

- NEMKO
- TUV or VDE
- UL 1950
- CSA 22.2 LEVEL 3
- CE

