



全漢企業股份有限公司
FSP TECHNOLOGY INC.

台灣 桃園市建國東路 22 號
NO.22, Jianguo E. Rd., Taoyuan City, Taiwan, R.O.C.
TEL:+886-3-375-9888 FAX:+886-3-375-6966

SPECIFICATION

EPSILON 88PLUS 500

Main Feature:

Meet 80 PLUS Silver

Active PFC Circuit

Full Range Input

High Efficiency

High Power Density

Lower Acoustic Noise

Oct. 23, 2008

REV : 1.00



全漢企業股份有限公司
FSP TECHNOLOGY INC.

MODEL: EPSILON 88PLUS 500

Revision History

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
1.00	Original	2008/10/23	

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model EPSILON 88PLUS 500; AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 and with Full Range Input features.

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

- TUV EN60950-1
- IEC 60950-1
- UL 60950-1
- 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

3. INPUT ELECTRICAL SPECIFICATIONS

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 $\pm 1.0V$ 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
115V	< 5.5Amps – rms	> 0.95	> 0.8
230V	< 3.0Amps – rms	> 0.9	> 0.75

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)								
Load	5V	3.3V	12V1	12V2	12V3	12V4	-12V	+5Vsb
Full	11.38	11.87	8.11	8.11	8.11	8.11	0.40	2.00
Typical	5.69	5.94	4.05	4.05	4.05	4.05	0.20	1.00
Light	2.28	2.37	1.62	1.62	1.62	1.62	0.08	0.40

Table 2. Minimum Efficiency Vs Load

Loading	Full load	Typical load	Light load
115V Required Minimum Efficiency	85%	88%	85%
230V Required Minimum Efficiency	85%	88%	85%

◆ Minimum Efficiency for test purposes are considered to be within $\pm 1.0\%$ of nominal.

4.0. OUTPUT ELECTRICAL REQUIREMENTS

4.1 OUTPUT VOLTAGE AND CURRENT RATING

Output	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	LOAD REG	LINE REG.	RIPPLE& NOISE
+3.3 V	0.2A	12A	24A	$\pm 5\%$	$\pm 1\%$	75mV P-P
+5 V	0.2A	11.5A	23A	$\pm 5\%$	$\pm 1\%$	75mV P-P
+12V1	0A	9A	18A	$\pm 5\%$	$\pm 1\%$	140mV P-P
+12V2	0A	9A	18A	$\pm 5\%$	$\pm 1\%$	140mV P-P
+12V3	0.5A	9A	18A	$\pm 5\%$	$\pm 1\%$	140mV P-P
+12V4	0.1A	9A	18A	$\pm 5\%$	$\pm 1\%$	140mV P-P
-12V	0A	0.25A	0.5A	$\pm 10\%$	$\pm 1\%$	200mV P-P
+5VSB	0A	1.25A	2.5 A	$\pm 5\%$	$\pm 1\%$	75mV P-P

(1) +3.3V & 5V total output not exceed 120W.

(2) maximum combined current for the 12V outputs shall be 40.5A

(3) total output for this subject power supply is 500W watts

(4) Voltages and ripple are measured at the load side of mating connectors with a 0.1uF monolithic ceramic capacitor paralleled by a 10uF 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	12V3	12V4	-12V	+5VSB
Condition_1	x	x	x	x	x	x	x	2.5A
Condition_2	0.2A	0.2A	0A	0A	0.5A	0.1A	0A	0A
Condition_3	1A	1A	1A	1A	1A	1A	0.5A	0A
Condition_4	0.5A	3A	2.06A	2.06A	18A	18A	0.1A	0.1A
Condition_5	0.5A	3A	18A	18A	2.06A	2.06A	0.1A	0.1A
Condition_6	1A	15A	3A	3A	3A	3A	0.1A	0.1A
Condition_7	1.51A	23A	7.88A	7.88A	7.88A	7.88A	0.1A	0.1A
Condition_8	24A	8.16A	7.53A	7.53A	7.53A	7.53A	0.5A	2.5A
Condition_9	24A	1A	1A	1A	1A	1A	0A	0.1A

4.3. HOLD-UP TIME (@Typical Load of Table 1)

115V / 60Hz : 25 mSec. Minimum.

230V / 50Hz : 25 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)

115V-rms or 230V-rms + 5Vdc/3.3Vdc : 20ms Maximum

115V-rms or 230V-rms + 12Vdc : 20ms Maximum

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

115V-rms or 230V-rms - 12Vdc : 20ms Maximum

4.5.OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	3.76V-4.5V
+5V	5.6V-7.0V
12VDC	13.0V-16.5V

4.6.OVER-CURRENT PROTECTION

OUTPUT VOLTAGE	Max. overcurrent limit
+3.3V	60A
+5V	60A
12V1	40A
12V2	40A
12V3	40A
12V4	40A

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 ,+12V1,+12V2,+12V3 or 12V4 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.

4.8. POWER SIGNAL

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

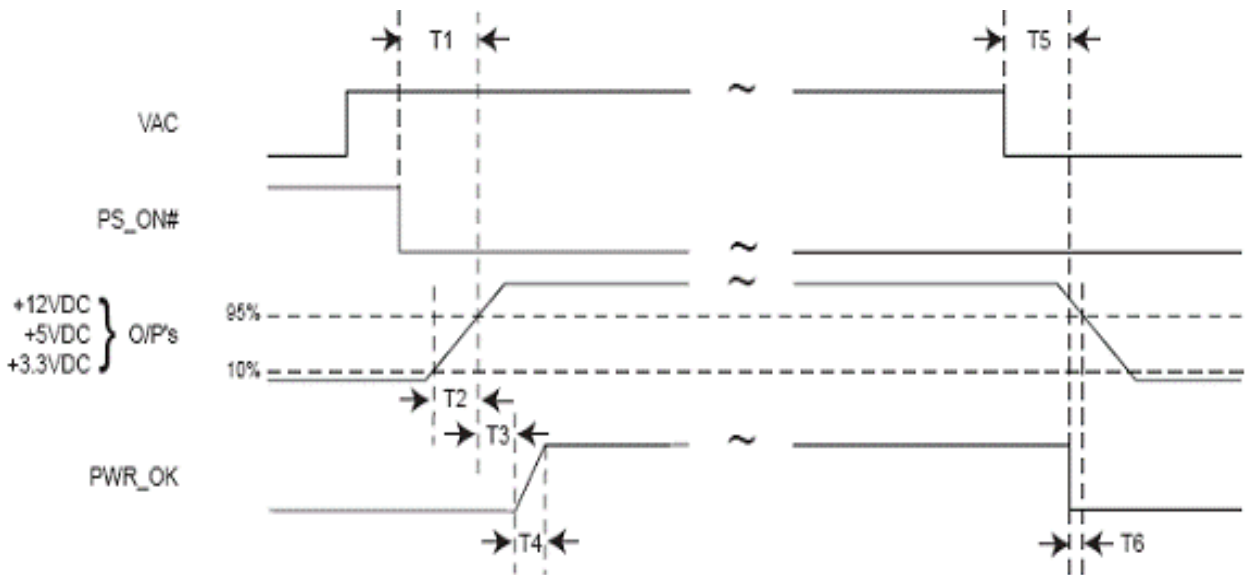


Figure:

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

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

T3: Power-ok delay time: 100 ms < T3 < 500 ms

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

T5 + T6: AC loss to output hold-up time : $T5 + T6 \geq 17$ ms

5.0 ENVIRONMENTAL REQUIREMENTS

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

5.1. TEMPERATURE RANGE

Operating	+10 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 GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than 3.5 mA.

5.5 RELIABILITY

The power supply reliability, when calculated by MIL-HDBK-217; latest revision, are exceed 100,000 hours with all output at maximum load and an ambient temperature of 25°C.

5.6 DIELECTRIC STRENGTH

Primary to Frame Ground : 1800 Vac for 1 sec.

Primary to Secondary : 1800Vac for 1 sec

5.7 INSULATION RESISTANCE

Primary to Frame Ground : 20 Meg.ohms Minimum

Primary to Secondary : 20 Meg.ohms Minimum

6.0 FAN NOISE REQUIREMENTS

6.1. The subject power supply is cooled by a self-contained, 120mm, 12VDC fan.

6.2. FAN NOISE

AC INPUT	FULL (Table.1)	TYPICAL (Table.1)	LIGHT (Table.1)
115V	NOISE \leq 30dB	NOISE \leq 25dB	NOISE \leq 25dB
230V	NOISE \leq 30dB	NOISE \leq 25dB	NOISE \leq 25dB

7.0. 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.

8.0 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.