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FSP TECHNOLOGY INC.

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SPECIFICATION



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SPECIFICATION

RA2-450

9PA4507400

Main Feature:

**Meet 80 Plus Silver
DC-to-DC converter
Synchronous rectification
ATX 12V V2.4&EPS 12V V2.92**

Mar. 04, 2016

REV : 1.02



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MODEL: RA2-450

Revision History

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>
1.00	Original	2015/12/08	古昭禹
1.01	Add Main Feature : Universal Output 4.9 Capacitive Load Revise 4.5 Over current limit	2015/12/11	古昭禹
1.02	Revise 4.1. OUTPUT VOLTAGE AND CURRENT RATING 4.5. OVER CURRENT PROTECTION 4.6. OVER POWER PROTECTION 4.7. POWER SIGNAL 4.9. Dynamic	2016/03/04	呂玉嬋

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model RA2-450 AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 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

2.2. SAFETY

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	264	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	> 0.80
230V	< 3.0Amps – rms	> 0.90	> 0.65

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

450W(loading shown in Amps)					
Load	+3.3V	+5V	+12V	-12V	+5Vsb
Light	1.92	1.92	5.96	0.05	0.4
Typical	4.79	4.79	14.9	0.12	0.99
Full	9.58	9.58	29.81	0.24	1.99

Table 2. Minimum Efficiency & Load

Load	Voltage	Light	Typical	Full
Required Minimum Efficiency	115V	85%	88%	85%
	230V	85%	88%	85%

4. OUTPUT ELECTRICAL REQUIREMENTS

4.1. OUTPUT VOLTAGE AND CURRENT RATING

Output	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	PEAK LOAD	LOAD REG.	LINE REG.	Ripple & Noise
+3.3V	0A	10A	20A		±5%	±1%	50mV P-P
+5V	0A	10A	20A		±5%	±1%	50mV P-P
+12V	0.15A	18.75A	37.5A		±5%	±1%	100mV P-P
-12V	0A	0.15A	0.3A		±10%	±1%	120mV P-P
+5Vsb	0A	1.25A	2.5A		±5%	±1%	50mV P-P

(1) +3.3V & +5V total output not exceed 100W.

(2) Maximum combined current for the +12V outputs shall be 37.5A.

Voltages and ripple are measured at the load side of mating connectors with a 0.1 uF monolithic ceramic capacitor paralleled by a 10 uF 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	+12V	-12V	+5Vsb
Condition_1	X	X	X	X	2.5A
Condition_2	0A	0A	0.15A	0A	0A
Condition_3	2A	2A	1A	0.05A	1A
Condition_4	4A	4A	4A	0.1A	1.5A
Condition_5	12A	10A	10A	0.3A	2.5A
Condition_6	12A	12A	28A	0.3A	2.5A
Condition_7	3A	3A	35A	0.1A	1A
Condition_8	0A	0A	37.5A	0.1A	0.05A
Condition_9	7.6A	7.6A	23.8A	0.2A	1.6A

4.3. OVER VOLTAGE PROTECTION

Voltage Source	Over Voltage Protection Point
+3.3V	3.76V-4.8V
+5V	5.75V-7.0V
+12V	13.5V-15.5V

4.4. 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, +12V 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.

4.5. OVER CURRENT PROTECTION

Test :Condition_4

OUTPUT VOLTAGE	Over current limit
+3.3V	25A~55A
+5V	25A~55A

4.6. OVER POWER PROTECTION

The power supply shall be shut down and latch off, when the output wattage of the power supply is higher from 495W to 585W.

4.7. POWER SIGNAL

POWER GOOD @230V, FULL LOAD	100 –500mSec.
POWER FAIL @230V, 80%FULL LOAD	1 mSec. minimum

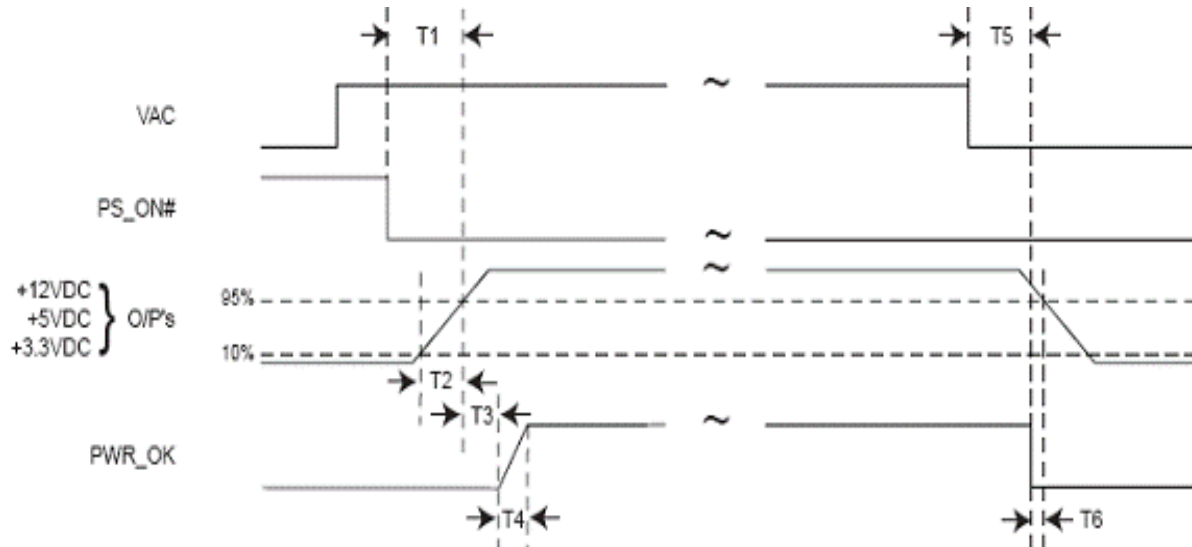


Figure:

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 PWR_OK hold-up time

OUTPUT RISE TIME

(10% TO 95% OF FINAL OUTPUT VALUE @ Full load of Table 1)

115V-rms or 230V-rms : +12V&+5V&+3.3V&-12V&+5Vsb : 20ms Maximum

4.8. HOLD-UP TIME (80% Full load ; Condition_9)

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.

4.9. Dynamic

LOAD	+3.3V	+5V	+12V	-12V	+5Vsb
+3.3V	1A~10A	5A	20A	0.2A	2A
+5V	5A	10A~20A	28A	0.2A	2A
+12V	0A	0A	0A~25A	0.2A	2A
Capacitive Load	10000uF	10000uF	10000uF	350uF	10000uF

5. FAN NOISE REQUIREMENTS

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

5.2. FAN NOISE

AC INPUT	Full (Table 1.)	Typical (Table 1.)	Light (Table 1.)
115V	NOISE \leq 40dB	NOISE \leq 30dB	NOISE \leq 25dB
230V			

6. ENVIRONMENTAL REQUIREMENTS

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

6.1. TEMPERATURE RANGE

Operating	+0 to +40 deg. C
Storage	-40 to +70 deg. C

6.2. HUMIDITY

Operating	5 –95% RH, Non-condensing
Storage	5 –95% RH, Non-condensing

6.3. VIBRATION

Random Vibration

0.01g²/ Hz at 5 Hz, sloping to 0.02g²/ Hz at 20 Hz, and maintaining 0.02g²/ Hz from 20Hz to 500Hz. The area under the PSD curve is 3.13gRMS.

The duration shall be 20 minutes per axis for all three axes on all samples.

6.4. GROUND LEAKAGE CURRENT

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

6.5. 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.

6.6. DIELECTRIC STRENGTH

Primary to Frame Ground : 1800 Vac for 1 sec.

Primary to Secondary : 1800Vac for 1 sec

6.7. INSULATION RESISTANCE

Primary to Frame Ground : 20 Meg.ohms Minimum

Primary to Secondary : 20 Meg.ohms Minimum

7. 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. 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.