SPECIFICATION

文件資料管理
FSP
禁止翻印外洩 · All rights reserved

ESD-00002375

FSP500-50WDB

Date:2024-05-14 09:19

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

FSP500-50WDB

Main Feature
Active PFC Circuit
Full Range Input

OCT 30, 2019
REV:1.2

全漢企業股份有限公司
FSP GROUP FSP TECHNOLOGY INC.

MODEL: FSP500-50WDB

Revision History

Rev	Description	Date	Author
1.1	Add 4.5. Standby Power Consumption (5Vsb)	2019/7/25	Karl
1.2	修正 4.5. Standby Power Consumption & 5.4. VIBRATION 敘述	2019/10/30	Karl

全漢企業股份有限公司
FSP GROUP FSP TECHNOLOGY INC.

CONTENTS

1. GENERAL DESCRIPTION AND SCOPE 5
2. REFERENCE DOCUMENTS 5
2.1 EMI REGULATORY 5
3. PHYSICAL REQUIREMENTS 5
3.1 MECHANICAL SPECIFICATIONS 5
4. ELECTRICAL REQUIREMENTS 5
4.1.1. OUTPUT RATING 6
4.1.2. LOAD CAPACITY SPECIFICATIONS 6
4.1.3. HOLD-UP TIME 6
4.1.4.OUTPUT RISE TIME 7
4.1.5.OVER VOLTAGE PROTECTION 7
4.1.6.SHORT CIRCUIT PROTECTION 7
4.1.7. OVER POWER PROTECTION 7
4.1.8.POWER GOOD SIGNAL 7
4.2. OUTPUT TRANSIENT LOAD RESPONSE 8
4.3. INPUT ELECTRICAL SPECIFICATIONS 9
4.3.1. VOLTAGE RANGE 9
4.3.2. INPUT FREQUENCY 9
4.3.3. INRUSH CURRENT 9
4.3.4. INPUT LINE CURRENT 10
4.4. EFFICIENCY 10
4.5. Standby Power Consumption (5Vsb): 10
4.6. PS_ ON 10
5. ENVIRONMENTAL REQUIREMENTS 11
5.1. TEMPERATURE RANGE 11
5.2. HUMIDITY 11
5.3 ALTITUDE 11
5.4. VIBRATION 11
5.5. SHOCK 12
6. SAFETY 12
6.1. LEAKAGE CURRENT 12
7.1 LINE CONDUCTED EMI 12
7.2. RADIATED EMI 12

8. LABELLING 12
8.1. MODEL NUMBER LABEL 13
8.2 DC OUTPUT IDENTIFICATION 13
9. RELIABILITY 13
9.1. MTBF 13

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP500-50WDB; 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.

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
1	+3.3V	±5%	50 mV	0A	14.0 A
2	+5V	±5%	50 mV	0A	16.0 A
3	+12V	±5%	120 mV	0.05A	41.0 A
4	-12V	±10%	120 mV	0 A	0.3A
5	+5Vsb	±5%	50 mV	0 A	3A
6	-5V	±10%	100mV	0A	0.1A

※ -5V option

The +3.3V and +5V total output shall not exceed 90watts. The total output for this subject power supply is 500 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	+3.3V	+5V	+12V	-12V	5VSB
1	8.31A	9.5A	34.13A	0.25A	2.5A
2	4.16A	4.75 A	17.07A	0.12A	1.25A
3	1.66 A	1.9A	6.83A	0.05A	0.5A
4	14 A	0A	0.05A	0A	0.1A
5	7A	0 A	0.05A	0A	0.1A
6	0A	8A	0.05A	0A	0.1A
7	0A	16A	0.05A	0A	0.1A
8	0A	8A	10A	0A	0.1A
9	0A	0A	20A	0A	0.1A
10	0A	0A	41A	0A	0.1A
11	0A	0A	20A	0A	0.1A
12	0A	0A	0.05A	0A	0A

4.1.3. HOLD-UP TIME

115V / 60Hz : ≧13ms
230V / 50Hz : ≧17ms

A classified document Level: Confidential All rights reserved

4.1.4.OUTPUT RISE TIME

(10% TO 90% OF FINAL OUTPUT VALUE,)

4.1.5.OVER VOLTAGE PROTECTION

+5V_{dc} output: +5.7 V_{dc} minimum, + 7V_{dc} maximum
+12Vdc output: +13.3Vdc $_{minimum}$, +16V_{dc} maximum
+ 3.3V_{dc} output: +3.7Vdc $_{minimum}$, + 4.5V_{dc} 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. 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.(PS/ON)

In the event of an output short circuit condition –12V output, the power supply will be latch off. 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.

+5vsb output short circuit condition : output auto restart .

4.1.7. OVER POWER PROTECTION

Total output shall not exceed 500 watts , in the event of an output total power condition on output , If the total exceed 150% , the power supply will shutdown and latch off without damage to the power supply.

4.1.8.POWER GOOD SIGNAL

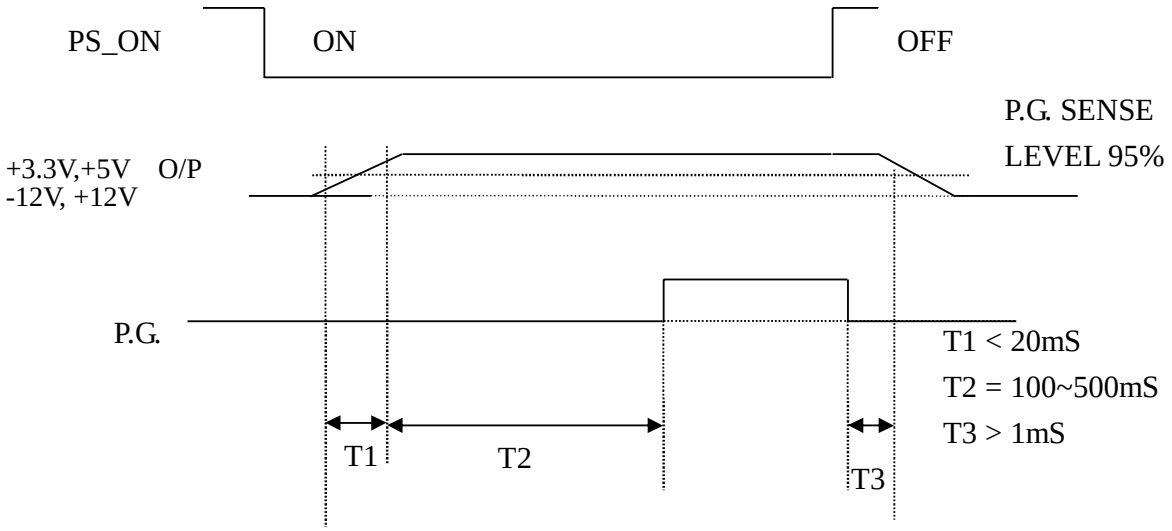
The power good signal is a TTL compatible signal for the purpose of initiating an orderly star-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

TTL signal asserted (low state) : less than 0.5V while sinking 4mA.

TTL signal asserted (high state): greater than 2.5V – 5.25V while sourcing 500uA.

High state output impedance: less or equal to 1.5Kohm from output to common.

POWER GOOD @ 115/230V, Typical (100%) LOAD	100 –500mSec.
POWER FAIL @115/230V, Typical (100%) LOAD	1 mSec. minimum



4.2. OUTPUT TRANSIENT LOAD RESPONSE

+5V and +12Vand+3.3V 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.

On TRANSIENT test, power good signal should be take with ch4.1.8.

+5Vdc:

IA: 16.0 amps

IB: 11.2amps

Volts variation: +5V +-5%

Setting time: 10 ms max

+5Vsb: 0.1A , 12V: 0.1A , 3.3V: 0A , -12V: 0A

+12Vdc:

IA: 41.0 amps

IB: 28.7 amps

Volts variatio n: +12V +-5%

Setting time: 10 ms max

+5Vsb: 0.1A , 5V: 0A , 3.3V: 0A , -12V: 0A

+3.3Vdc:

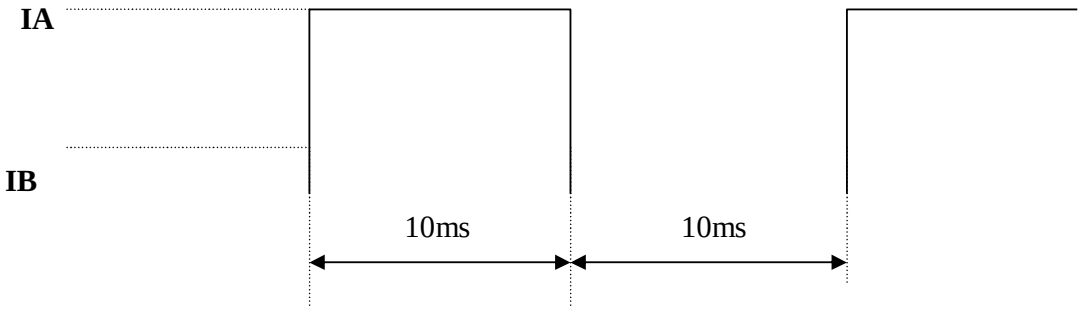
IA: 14.0 amps

IB: 9.8 amps

Volts variation: +3.3V +-5%

Setting time: 10 ms max

+5Vsb: 0.1A , 5V: 0A , 12V:0.1A , -12V: 0A



Transient Load Requirements

Output	△ Step Load Size	Load Slew Rate	Capacitive Load
+3.3 V	30% of max load	0.1 A / µs	3300 µF
+5 V	30% of max load	0.1 A / µs	3300 µF
12V	30% of max load	0.1 A / µs	4700 µF

4.3. INPUT ELECTRICAL SPECIFICATIONS

4.3.1. VOLTAGE RANGE

PARAMETER		UNITS
V-in Range	90 - 264	V-rms

4.3.2. INPUT FREQUENCY

INPUT FREQUENCY	47–63Hz

4.3.3. INRUSH CURRENT

(Cold start – 25 deg. C)

115V	50A
230V	100A

4.3.4. INPUT LINE CURRENT

115V	7 Amps – rms maximum
230V	3.5 Amps – rms maximum

4.4. EFFICIENCY

	Full load (100%)	Typical load (50%)	Light load (20%)
115VAC	87%	90%	87%
230VAC	87%	90%	87%

(loading shown in Amps)

Loading	+12V	+5V	+3.3V	-12V	+5Vsb
Full (100%)	34.13A	9.50A	8.31A	0.25A	2.50A
Typical (50%)	17.07A	4.75A	4.16A	0.12A	1.25A
Light (20%)	6.83A	1.90A	1.66A	0.05A	0.50A

4.5. Standby Power Consumption (5Vsb):

Efficiency > 45% @ 5Vsb/45mA &230Vac input (2013 Lot 6)

Efficiency > 45% @ 5Vsb/90mA &230Vac input

Efficiency > 75% @ 5Vsb/550mA &230Vac input

Efficiency > 75% @ 5Vsb/1A &230Vac input

Efficiency> 75% @ 5Vsb/1.5A &230Vac input

Efficiency > 75% @ 5Vsb/3A &230Vac input

4.6. 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 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.
VIL, Input Low Voltage	0.0V	0.8V
IIL, Input Low Current (Vin = 0.4V)		-1.6mA
VIH, Input High Voltage (lin = -200 μ A)	2.0V	
VIH OPEN circuit, lin = 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	-10 to +50 deg.
Storage	-40 to +80 deg. C

5.2. HUMIDITY

Operating	85% RH, Non-condensing
Storage	95% RH, Non-condensing

5.3 ALTITUDE

Operating: sea level to 5,000m

5.4. VIBRATION

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Vibration Operation, $0.01g^2/Hz$ at 5 Hz sloping to $0.02g^2/Hz$ at 20 Hz, and maintaining $0.02g^2/Hz$ from 20 Hz to 500 Hz. The area under the PSD curve is 3.13gRMS. The duration shall be 20 minutes per axis for all three axes on all samples.

Plane of vibration to be along three mutually perpendicular axes.

5.5. SHOCK

The subject power supplies will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Storage	40G, 9 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.

5.6 COOLING SPECIFICATIONS

5.6.1. The PSU is cooled by a self-contained FAN, 70mm, 12VDC.

6. SAFETY

6.1. LEAKAGE CURRENT

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

7. ELECTORMAGNETIC COMPATIBILITY

7.1 LINE CONDUCTED EMI

The subject power supplies will meet FCC class B requirements .

7.2. RADIATED EMI

The subject power supplies will meet FCC and CISPR 22 requirements .

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℃, maximum-output load, and nominal AC input voltage.