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# SPECIFICATION

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禁止翻印外傳

## ESD14004014

## FSP500-702UN

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# SPECIFICATION

# FSP500-702UN

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

**JAN,02,2014**
**REV:1.4**

全漢企業股份有限公司
FSP TECHNOLOGY INC.

## MODEL: FSP500-702UN

**Revision History**

| Rev | Description | Date | Author |
|---|---|---|---|
| 1.1 | +5VSB LOAD 改爲 3.5A | 6/22 | ANDY |
| 1.2 | 修改 4.1.3. HOLD-UP TIME 爲(80% LOAD) | 9/23 | ANDY |
| 1.3 | 4.1.8.POWER GOOD SIGNAL (80% LOAD) | 04/09/2012 | Winnie (Andy) |
| 1.4 | ADD 5.5 ALTITUDE | 01/02/2014 | Winnie (Andy) |



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## 1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model FSP500-702UN 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.



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4.1.1. OUTPUT RATING

| Output | Nominal | Regulation | Ripple/Noise | Min | Max | peak |
|---|---|---|---|---|---|---|
| 1 | +3.3V | 3.3V ±5% | 50mV | 0.1A | 20.0 A | |
| 2 | +5V | +5V ±5% | 50mV | 0.1A | 20.0 A | |
| 3 | +12V1 | 12V ±5% | 120mV | 0.5A | 16.0 A | |
| 4 | +12V2 | 12V ±5% | 120mV | 0.5A | 16.0 A | |
| 5 | +12V3 | 12V ±5% | 120mV | 0.5A | 16.0 A | |
| 6 | -12V | -12V ±10% | 120mV | 0 A | 0.5 A | |
| 7 | +5VSB | +5Vsb ±5% | 50mV | 0 A | 3.5A | |

(1) Maximum continuous total DC output power should not exceed 500W.

(2) Combined 3.3V and 5V power shall not exceed 130W.

(3) 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) -5V is option

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 | +12V1 | +12V2 | +12V3 | -12V | +5Vsb |
|---|---|---|---|---|---|---|---|---|
| ALL MAX | HHHHHH | 10.77A | 10.77A | 11A | 11A | 11A | 0.34A | 3A |
| +5V MAX other MIN | LHLLLL | 0.1A | 20.0 A | 0.5A | 0.5A | 0.5A | 0.05A | 0.1A |
| +3.3V MAX other MIN | HLLLLL | 20.0 A | 0.1A | 0.5A | 0.5A | 0.5A | 0.05A | 0A |
| +12V1 MAX other MIN | LLHLLL | 0.1A | 0.1A | 16.0A | 0.5A | 0.5A | 0.05A | 0A |
| +12V2 MAX other MIN | LLLHLL | 0.1A | 0.1A | 0.5A | 16.0A | 0.5A | 0.05A | 0A |
| +12V3MAX other MIN | LLLLHL | 0.1A | 0.1A | 0.5A | 0.5A | 16.0A | 0.05A | 0A |
| ALL MIN | LLLLLL | 0.1A | 0.1A | 0.5A | 0.5A | 0.5A | 0.05A | 0A |

4.1.3. HOLD-UP TIME (80% LOAD)

115V / 60Hz : 16 mSec. Minimum.

230V / 50Hz : 16 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 : 20ms Maximum

4.1.5.OVER VOLTAGE PROTECTION

| Voltage Source | Protection Point |
|---|---|
| + 3.3 $V_{dc}$ | 3.5V-4.5V |
| +5$V_{dc}$ | 5.5V-6.82V |
| +12$V_{1dc}$, +12$V_{2dc}$ ,+12$V_{3dc}$ | 13.4V-15.6V |

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.OVER CURRENT PROTECTION

| | |
|---|---|
| 3.3V | 25A-45A |
| 5V | 25A-45A |
| 12V1 | 18A-22A |
| 12V2 | 18A-22A |
| 12V3 | 18A-22A |

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



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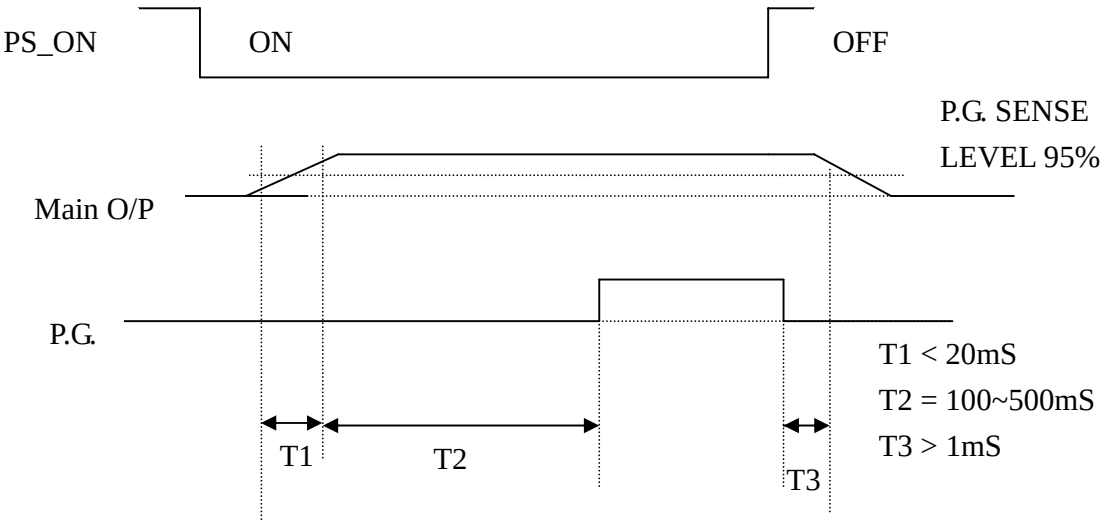
reached 4.75 volts during power up. Characteristics:

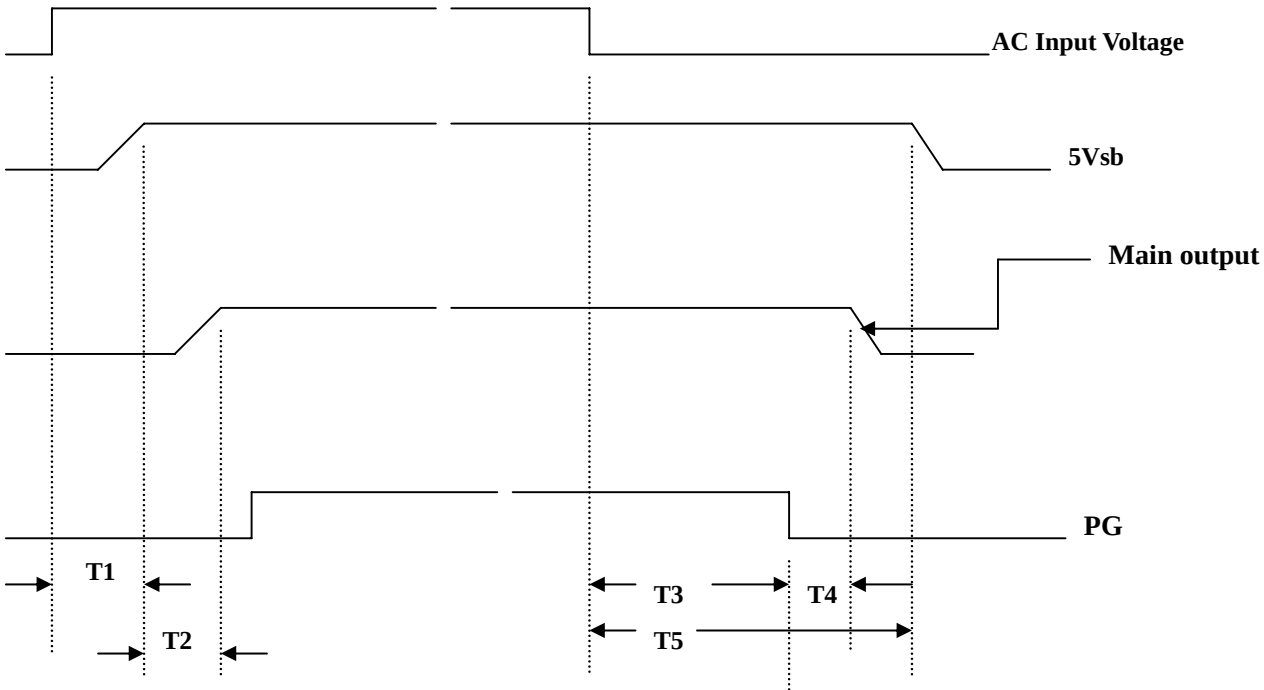
TTL signal asserted (low state) : less than 0.5V while sinking 10mA.
TTL signal asserted (high state): greater than 4.75V while sourcing 500uA.
High state output impedance: less or equal to 1Kohm from output to common.

| | |
|---|---|
| POWER GOOD @ 115/230V,80% LOAD | 100 –500mSec. |
| POWER FAIL @115/230V, 80% LOAD | 1 mSec. minimum |

(A) Remote ON-OFF Timing:




**(B) AC ON / OFF Timing :**




| | |
|---|---|
| Turn-on Time | T1<1500ms |
| VAUX-on Delay | T2>1ms |
| RIDE-Through | T3>16ms |
| Hold-up | T4>1ms |

4.2. OUTPUT TRANSIENT LOAD RESPONSE

The output voltages shall remain within the limits specified in 4.1.1 output rating table in page 6 for the step loading and within the limits specified in Table 1 for the capacitive loading. The load transient repetition rate shall be tested between 50Hz and 5 kHz at duty cycles ranging from 10%-90%. The load transient repetition rate is only a test specification. The step load may occur anywhere within the MIN load to the MAX load shown in Table 1.

**Table 1: Transient Load Reguirements**

| Output | Step Load Size | Load Slew Rate | Capacitive Load |
|---|---|---|---|
| +3.3V | 30% of max load | 0.5A/us | 4700uF |
| +5V | 30% of max load | 0.5A/us | 4700uF |
| +12V1,+12V2,+12V3 | 65% of max load | 1.0A/us | 2200uF |
| +5Vsb | 25% of max load | 0.5A/us | 100uF |

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 | 40A |
| 230V | 80A |

(No damage)

4.3.4. INPUT LINE CURRENT

| | |
|---|---|
| 115V | 8Amps – rms maximum |
| 230V | 4 Amps – rms maximum |

4.4. EFFICIENCY

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

| Loading | +12V1 | +12V2 | +12V3 | +5V | +3.3V | -12V | +5Vsb |
|---|---|---|---|---|---|---|---|
| Full (100%) | 10.97 | 10.97 | 10.97 | 10.74 | 10.74 | 0.34 | 2.4 |
| Typical (50%) | 5.48 | 5.48 | 5.48 | 5.37 | 5.37 | 0.17 | 1.2 |
| Light (20%) | 2.19 | 2.19 | 2.19 | 2.15 | 2.15 | 0.07 | 0.48 |

**Standby Power Consumption (5Vsb):**

Input Power < 1W @ 5Vsb/100mA & 230Vac input

PS_ON input signal @ High State

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,-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 (lin = -200 $\mu$ 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 | 0 to +50 deg. C |
|---|---|
| Storage | -20 to +80 deg. C |

5.2. HUMIDITY

| | |
|---|---|
| Operating | 85% RH, Non-condensing |
| Storage | 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 ALTITUDE**
The power supply is applied for tropical climates and use at altitudes not exceeding 5000m above Sea level

**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 supply will meet FCC and VFG class B requirements under full load conditions.

7.2. RADIATED EMI

The subject power suppy 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℃, 100% -output load, and nominal AC input voltage.