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SPECIFICATION

FSP220-50FBB

MAR.03.2020
REV: 1.0

TPS TOTAL POWER SOLUTIONS

MODEL: FSP220-50FBB

Revision History

Rev	Description	Date	Author
1.0	4.1.1. OUTPUT RATING(Min load)	03.03.2020	Winnie (Jimmy)

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model **FSP220-50 FBB**; 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	peak
1	+3.3V	±5%	50mV	0A	10.0 A	-
2	+5V	±5%	50mV	0A	14.0 A	-
3	+12V	±5%	120mV	0.05A	14.0 A	16.0A
4	-12V	±10%	120mV	0 A	0.3 A	
5	+5VSB	±5%	50mV	0 A	2.5A	-

(1) Total combined output of 3.3V and 5V is ≦ 80W.

(2) total output for this subject power supply is 220 watts.

(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.

4.1.2. LOAD CAPACITY SPECIFICATIONS

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

No	Load Condition	Output Load				
		+3.3V	+5V	+12V	-12V	+5Vsb
1	Cond.1	10.0	9.4	10.32	0.3	2.5
2	Cond.2	10.0	0	0.05	0.0	0.0
3	Cond.3	0	14.0	0.05	0.0	0.0
4	Cond.4	0	0	14.0	0.0	0.0
5	Cond.5	3.0	3.0	3.0	0.3	0.0
6	Cond.6	0	0	0.05	0.0	2.5

4.1.3. HOLD-UP TIME (@FULL 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	3.7V-4.8V
+5V	5.55V-7.0V
+12V	13.3V-16V

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

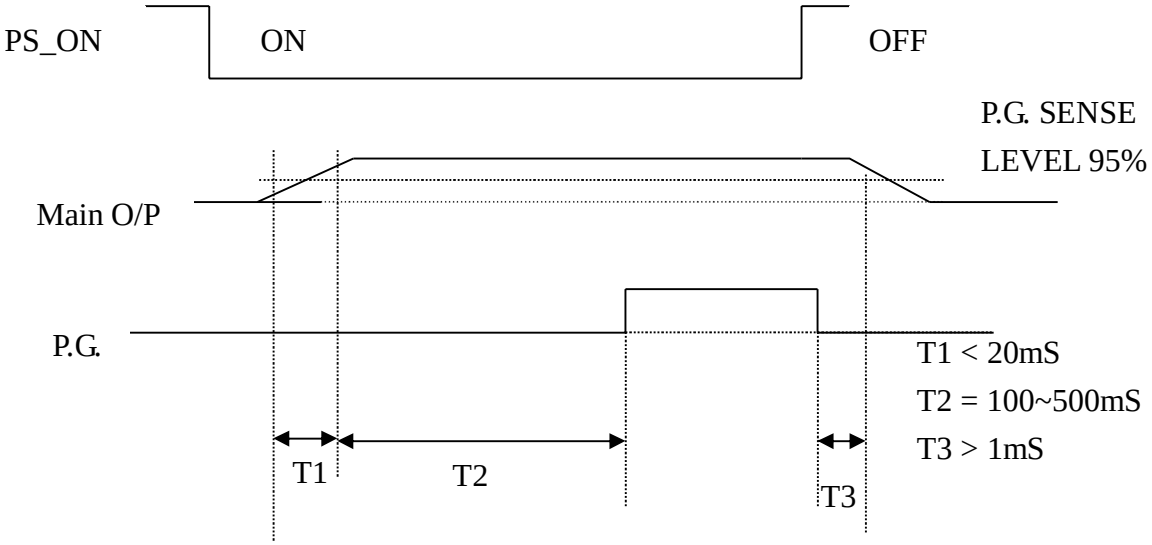
3.3V	40A max
5V	40A max
12V	30A max

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 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

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	1000uF
+5V	30% of max load	0.5A/us	1000uF
+12V	40% of max load	1.0A/us	2200uF

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	NO damage
230V	NO damage

4.3.4. INPUT LINE CURRENT

115V	4.0 Amps – rms maximum
230V	2.0 Amps – rms maximum

4.4. EFFICIENCY

4.4.1

	Full load (100%)	Typical load (50%)	Light load (20%)
115VAC	85%	88%	85%

※ Meet 80plus SILVER level

※ The efficiency will be adjusted in accordance with the change in the output wire

(loading shown in Amps)

Loading	+12V	+5V	+3.3V	-12V	+5Vsb
Full (100%)	11.66	9.06	6.47	0.25	2.08
Typical (50%)	5.83	4.53	3.24	0.12	1.04
Light (20%)	2.33	1.81	1.29	0.05	0.42

Standby Power Consumption (5Vsb):

Input Power < 0.5W @ 5Vsb/45mA & 230Vac input

PS_ON input signal @ High State

4.4.2 OTHER LOW POWER SYSTEM REQUIREMENTS

For power supplies designed for low standby power,the following provides some general guidance. Requirements will vary with geographic region and target end user market.

To help meet the Blue Angel*,RAL-UZ 78,US Presidential executive order 13221,future EPA requirements,and other low power system requirements,it is recommended that the +5VSB standby supply should be as efficient as possible. Standby efficiency is measured with the main outputs off(PS_ON# high state). Standby efficiency should be greater than 50% with a minimum loading of 100mA.

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 (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	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 Operation, 0.01g²/Hz at 5 Hz sloping to 0.02g²/Hz at 20 Hz, and maintaining 0.02g²/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.

5.4. SHOCK

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.
Operation: 10G, 11 mSec. Half-sine wave pulse in both directions on three mutually perpendicular axes.
Storage: 40G, 9 mSec. 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.

6.2 HI-POT
Pri-PE-->1500VAC ,Cut off current 12mA
Pri-Sec-->3000VAC ,Cut off current 12mA

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