電氣規格書

ESD-00002479

FSP400-50RDB

Released Date:2020/01/31-07:40:08

SPECIFICATION

FSP400-50RDB

1U Redundant Power Supply

Rev1.0

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Rev.	Description of Changes	Author / Owner	Date
1.0	Public release	Jack Wu / RAZ02	2019/06/26

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1. Purpose

This Power Supply Design Guide defines a common redundant power sub-system for use in Pedestal servers and workstation systems. The power sub-system is made up of a cage (with a power distribution board) and hot-swap redundant power modules. This design guide covers the mechanical and electrical requirements of this power sub-system, which may range from 400 watts and is used in a hot-swap redundant configuration. The parameters of this supply are defined in this design guide for open industry use.

All outputs and shall communicate to external devices through Inter-Integrated (I^2C) Circuit protocol.

The power supply will have an EEPROM for storing powers supply FRU information.(Refer to 7.6)

2. *Definitions/Terms/Acronyms*

Table 1:

Required	The status given to items within this design guide, which are required to meet SSI guidelines and a large majority of system applications.
Recommended	The status given to items within this design guide which are not required to meet SSI guidelines, however, are required by many system applications.
Optional	The status given to items within this design guide, which are not required to meet SSI guidelines, however, some system applications may optionally use these features.
Autoranging	A power supply that automatically senses and adjusts itself to the proper input voltage range (110 VAC or 220 VAC). No manual switches or manual adjustments are needed.
Dropout	A condition that allows the line voltage input to the power supply to drop to below the minimum operating voltage.
Latch Off	A power supply, after detecting a fault condition, shuts itself off. Even if the fault condition disappears, the supply does not restart unless manual or electronic intervention occurs. Manual intervention commonly includes briefly removing and then reconnecting the supply, or it could be done through a switch. Electronic intervention could be done by electronic signals in the Server System.
Monotonically	A waveform changes from one level to another in a steady fashion, without intermediate retracement or oscillation.
Noise	The periodic or random signals over frequency band of 0 Hz to 20 MHz.
Overcurrent	A condition in which a supply attempts to provide more output current than the amount for which it is rated. This commonly occurs if there is a "short circuit" condition in the load attached to the supply.
PFC	Power Factor Corrected.
Ripple	The periodic or random signals over a frequency band of 0 Hz to 20 MHz.
Rise Time	Rise time is defined as the time it takes any output voltage to rise from 10% to 95% of its nominal voltage.
Sag	The condition where the AC line voltage drops below the nominal voltage conditions.
Surge	The condition where the AC line voltage rises above nominal voltage.
VSB or Standby Voltage	An output voltage that is present whenever AC power is applied to the AC inputs of the supply.
MTBF	Mean time between failure
PWOK	A typical logic level output signal provided by the supply that signals the Server System that all DC output voltages are within their specified range.

3. Mechanical Overview

The 1U mini redundant is a power sub-system made up of a cage and redundant, hot swappable power supply modules. The cage is intended to be mounted in the system and not redundant or hot swappable. The exterior face of the cage accepts hot swappable power supply modules. The distribution board within the cage distributes output power from the modules to a wire harness. Cooling fans, EMI filtering, and IEC inlet connector(s) may be located in the modules.

Dimensions: 106mm (W) × 41.3mm (H) × 260mm (L)

3.1 Temperature Requirements

The operation ambient temperature shall be 0℃ to 50℃.

The non-operation ambient temperature shall be -20°C to 80°C.

3.2 Relative Humidity

Operating: 5% to 90 % relative humidity (non-condensing)

Non-operating: 5% to 90 % relative humidity (non-condensing)

4. AC Input Requirements

The power supply modules shall incorporate universal power input with active power factor correction, which shall reduce line harmonics in accordance with the EN61000-3-2 and JEIDA MITI standards.

4.1 AC Inlet Connector

The AC input connector shall be an *IEC 320 C-14* power inlet. This inlet is rated for 10A/250 VAC.

4.2 Redundant AC Inlets

The power supply assembly have dual redundant AC inlets. The power supply shall be able to operate over its full, specified range of requirements with either or both AC input powered. If there is a loss of one AC inlet the power supplies shall continue to operate with no interruption of performance. It is required that all redundant power supply modules be present to support redundant AC inlets.

4.3 AC Input Voltage Specification

The power supply must operate within all specified limits over the following input voltage range.

Table 2: AC Input Rating

PARAMETE	MIN	RATED	MAX
Voltage	90	100-240 V_{rms}	264 V_{rms}
Current		5-2.5A	
Frequency	47 Hz		63 Hz

4.4 Power Factor

The power factor shall be greater than 0.95 at full load / 100 Vrms input voltage conditions , and 0.9 at full load / 240Vrms input voltage conditions

4.5 Input Under Voltage

Brown-out(AC UVP)

The power supply shall power off if the AC input is below VAC_{low_limit} and shall start (auto recover) if $VAC_{recover}$ is reached. Input of VAC below $VAC_{recover}$ shall not cause any damage to the power supply, including the input fuse.

$VAC_{recover}$ (Brownin)	VAC_{low_limit} (Brownout)
84VAC ±6VAC	75VAC ±5VAC

4.5.1 Voltage Hold-up Time

The power supply holdup time requirements to 100% of maximum load.

4.6 Efficiency

Efficiency shall be tested at AC input voltages of 115VAC and 230VAC. And only insert one power module into the power cage. The voltage should measure on the back plane.

Table 3: 400W Efficiency

Loading	+12V	+5V	+3.3V	-12V	+5Vsb	Efficiency
Full Load	25.97	9.21	9.21	0.37	1.48	82.00%

4.7 AC Line Dropout

An AC line dropout is defined to be when the AC input drops to 0 VAC at any phase of the AC line for any length of time. During an AC dropout of one cycle or less the power supply must meet dynamic voltage regulation requirements up to 75% of the rated output load. An AC line dropout of one cycle or less shall not cause any tripping of control signals or protection circuits. If the AC dropout lasts longer than one cycle or the load is greater than 75%, the power supply should recover and meet all turn on requirements. The power supply must meet the AC dropout requirement over rated AC voltages, frequencies, and output loading conditions. Any dropout of the AC line shall not cause damage to the power supply. In the case of redundant AC inputs, the AC line dropout may occur on either or both AC inlet.

4.8 AC Line Fuse

The power supply shall incorporate one input fuse on the LINE side for input over-current protection to prevent damage to the power supply and meet product safety requirements. Fuses should be slow blow type or equivalent to prevent nuisance trips. AC inrush current shall not cause the AC line fuse to blow under any conditions. All protection circuits in the power supply shall not cause the AC fuse to blow unless a component in the power supply has failed. This includes DC output load short conditions.

4.9 AC Inrush

An additional inrush current limit is recommended for some system applications that require multiple systems on a single AC circuit. Under all other conditions , power supply should not be damaged.

(Cold start – 25 deg. C)

115V	40A
230V	80A

4.10 AC Line Transient Specification

AC line transient conditions shall be defined as “sag” and “surge” conditions. Sag conditions (also referred to as “brownout” conditions) will be defined as the AC line voltage dropping below nominal voltage. Surge conditions will be defined as the AC line voltage rising above nominal voltage.

The power supply shall meet the requirements under the following AC line sag and surge conditions.

Table 4: AC Line Sag Transient Performance

AC Line Sag				
Duration	Sag	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltage ranges	50/60 Hz	No loss of function or performance
0 to ½ AC cycle	100%	Nominal AC Voltage ranges	50/60 Hz	No loss of function or performance
>1 AC cycle	>10%	Nominal AC Voltage ranges	50/60 Hz	Loss of function acceptable, self recoverable

Table 5: AC Line Surge Transient Performance

AC Line Surge				
Duration	Surge	Operating AC Voltage	Line Frequency	Performance Criteria
Continuous	10%	Nominal AC Voltages	50/60 Hz	No loss of function or performance
0 to ½ AC cycle	30%	Mid-point of nominal AC Voltages	50/60 Hz	No loss of function or performance

4.11 AC Line Fast Transient Specification

The power supply shall meet the *EN61000-4-5* directive and any additional requirements in *IEC1000-4-5:1995* and the Level 3 requirements for surge-withstand capability, with the following conditions and exceptions:

・ These input transients must not cause any out-of-regulation conditions, such as overshoot and undershoot, nor must it cause any nuisance trips of any of the power supply protection circuits.

・ The surge-withstand test must not produce damage to the power supply.

・ The supply must meet surge-withstand test conditions under maximum and minimum DC-output load conditions.

5. DC Output Specification

5.1 Output Power/Currents

The following tables define the power and current ratings for different recommended power levels. Depending upon the system design, the power supply modules may have less outputs than required by the system (example: +12V and 5VSB). If there are less outputs than required by the system on the module, the cage shall have additional DC/DC converters to generate the voltages not produced by the modules (example: +12V/+5V, +12V/+3.3V, +12V/-12V). The combined output power of all outputs from the cage shall not exceed the rated output power. The power assembly shall meet both static and dynamic voltage regulation requirements over the full load ranges. The power sub-assembly shall supply redundant power over the full load ranges.

Table 6: 400 W Load Ratings

Voltage	Minimum Continuous	Maximum Continuous	Peak
+3.3 V	0 A	20.0 A	
+5 V	0 A	20.0 A	
+12V	0.1A	33.34A	
-12 V	0 A	0.5A	
+5 VSB	0 A	2 A	

1 Maximum continuous total DC output power should not exceed 400 W.
2 Maximum continuous combined load on +3.3 VDC and +5 VDC outputs shall not exceed 103 W.

5.1.1 Standby Outputs

The 5 VSB output shall be present when an AC input greater than the power supply turn on voltage is applied.

5.2 Voltage Regulation

The power assembly output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. These limits include the peak-peak ripple/noise specified in Section 5.10. All outputs are measured with reference to the return remote sense (ReturnS) signal. The 5 V, 12V, –12 V, and 5 VSB outputs are measured at the power assembly connectors referenced to ReturnS. The +3.3 V is measured at its remote sense signal (3.3VS) located at the signal connector.

Table 7: Voltage Regulation Limits

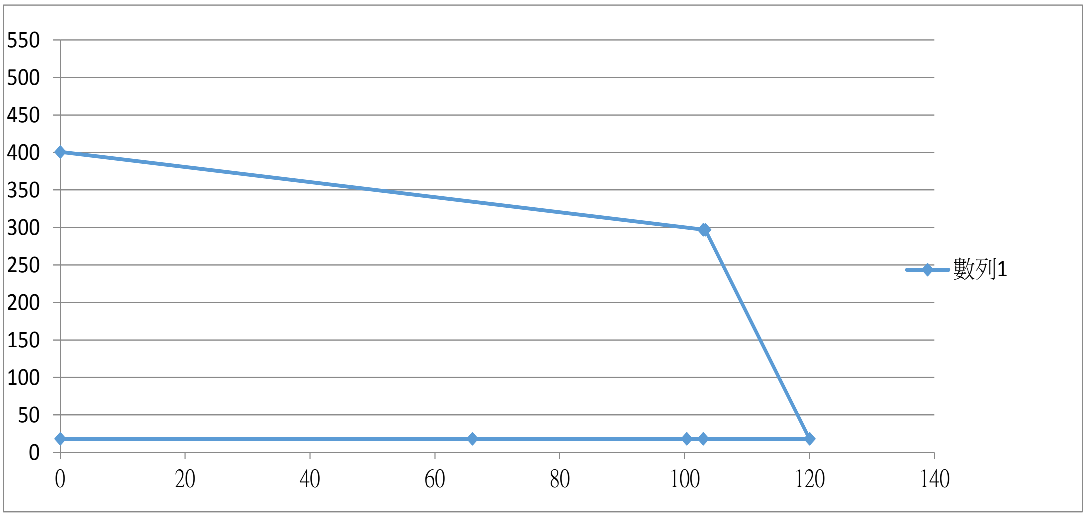
Parameter	MIN	NOM	MAX	Units	Tolerance
+3.3 V	+3.135	+3.30	+3.46	Vrms	+5/-5%
+5 V	+4.75	+5.00	+5.25	Vrms	+5/-5%
+12V	+11.40	+12.00	+12.60	Vrms	+5/-5%
-12 V	-10.80	-12.20	-13.20	Vrms	+10/-10%
+5 VSB	+4.75	+5.00	+5.25	Vrms	+5/-5%

5.3 Cross Regulation

Each output shall remain within the specified limits for the +5V, +3.3V , +12V , -12V and 5Vsb which acceptable load combinations are in the following table.

Table 8: 400W Cross Regulation Table

400W Cross regulation table								
Loading	+3.3V/A	+5V/A	+3.3 & +5V Combine Power	+12V/A Combine	+12V Power	-12V/A	+5Vsb/A	Total Power
L-1	0	0	0	1.5	18	0.	0	18
L-2	20	0	66	1.5	18	0.	0	84
L-3	20	7.4	103	1.5	18	0.	0	121
L-4	0.1	20	100	1.5	18	0.	2	128
L-5	6.06	20	120	1.5	18	0.	0	138
L-6	1	20	103	24.75	297	0.	0	400
L-7	20	7.4	103	24.75	297	0.	0	400
L-8	0	0	0	33.4	401	0.	0	401



5.4 Dynamic Loading

The output voltages shall remain within the limits specified in Table 9 for the step loading and within the limits specified in for the capacitive loading. The load transient repetition rate shall be tested between 50 Hz 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 6.

Table 9: Transient Load Requirements

Output	Step Load Size	Load Slew Rate	Capacitive Load
+3.3 V	20% of max load	0.5 A/μs	2200 μF
+5 V	20% of max load	0.5 A/μs	2200 μF
+12V	30% of max load	0.5 A/μs	6600 μF
+5 VSB	25% of max load	0.5 A/μs	1 μF

5.5 Capacitive Loading

The power supply shall be stable and meet all requirements, except dynamic loading requirements, with the following capacitive loading ranges.

Note: Up to 10,000 μF of the +12V capacitive loading may be on the +12V output.

Table 10: Capacitive Loading Conditions

Output	MIN	MAX	Units
+3.3 V	10	12,000	μF
+5 V	10	12,000	μF
+12 V	10	11,000	μF
- 5 V	1	350	μF
-12 V	1	350	μF
+5 VSB	1	350	μF

5.6 Ripple / Noise

The maximum allowed ripple/noise output of the power supply is defined in Table 11. This is measured over a bandwidth of 0 Hz to 20 MHz at the power supply output connectors. A 10 μF tantalum capacitor in parallel with a 0.1 μF ceramic capacitor are placed at the point of measurement.

Table 11: Ripple and Noise

+3.3 V	+5 V	+12 V	-12 V	+5 VSB
50 mVp-p	50 mVp-p	120 mVp-p	120 mVp-p	50 mVp-p

5.7 Load sharing

The +12 V output shall have active load sharing. When operating at 50% of full load, the output current of any 1+1 power supplies shall be within (+/-10%). For example, if power supply #1 is operating at 20A, then all other power supplies within the system shall be operating between 18A to 22A (+/- 10% of 20A).

5.8 Hot Swap Requirements

The power supply modules shall be hot swappable. Hot swapping a power supply is the process of inserting and extracting a power supply from an operating power system. During this process the output voltages shall remain within the limits specified in Table 7 with the capacitive load specified . The hot swap test must be conducted when the sub-system is operating under both static and dynamic conditions. The sub-system shall not exceed the maximum inrush current as specified in section 6. The power supply can be hot swapped by the following methods:

AC connecting separately to each module. Up to two power supplies may be on a single AC power source. Extraction: The AC power will be disconnected from the power supply first and then the power supply is extracted from the sub-system. This could occur in standby mode or powered on mode. Insertion: The module is inserted into the cage and then AC power will be connected to the power supply module.

For power modules with AC docking at the same time as DC. Extraction: The module is extracted from the cage and both AC and DC disconnect at the same time. This could occur in standby or power on mode. No damage or arcing shall occur to the DC or AC contacts which could cause damage. Insertion: The AC and DC connect at the same time as the module is inserted into the cage. No damage to the connector contacts shall occur. The module may power on or come up into standby mode.

Many variations of the above are possible. Supplies need to be compatible with these different variations depending upon the sub-system construction. In general, a failed (off by internal latch or external control) supply may be removed, then replaced with a good power supply, however, hot swap needs to work with operational as well as failed power supplies. The newly inserted power supply may get turned on by inserting the supply into the system or by system management recognizing an inserted supply and explicitly turning it on.

5.9 Timing Requirements

These are the timing requirements for the power supply operation. The output voltages must rise from 10% to within regulation limits (T_{vout_rise}) within 1 to 70ms. The +3.3V, +5V and +12V output voltages should start to rise approximately at the same time. All outputs must rise monotonically. Each output voltage shall reach regulation within 50ms (T_{vout_on}) of each other during turn on of the power supply. Each output voltage shall fall out of regulation within 400msec (T_{vout_off}) of each other during turn off. Refer to Figure 1 Power Supply Timing. Figure 2 Turn-on Turn-off Timing shows the timing requirements for the power supply being turned on and off via the AC input with PSON held low, and the power supply being turned on and off with the PSON signal after AC input is applied.

Table 12: Output Voltage Timing

ITEM	DESCRIPTION	MIN		MAX	UNITS
T_{vout_rise}	Output voltage rise time from each main output.	1		70	msec
T_{vout_on}	All main outputs must be within regulation of each other within this time.			50	msec
T_{vout_off}	All main outputs must leave regulation within this time.			400	msec

Figure 1: Power Supply Timing

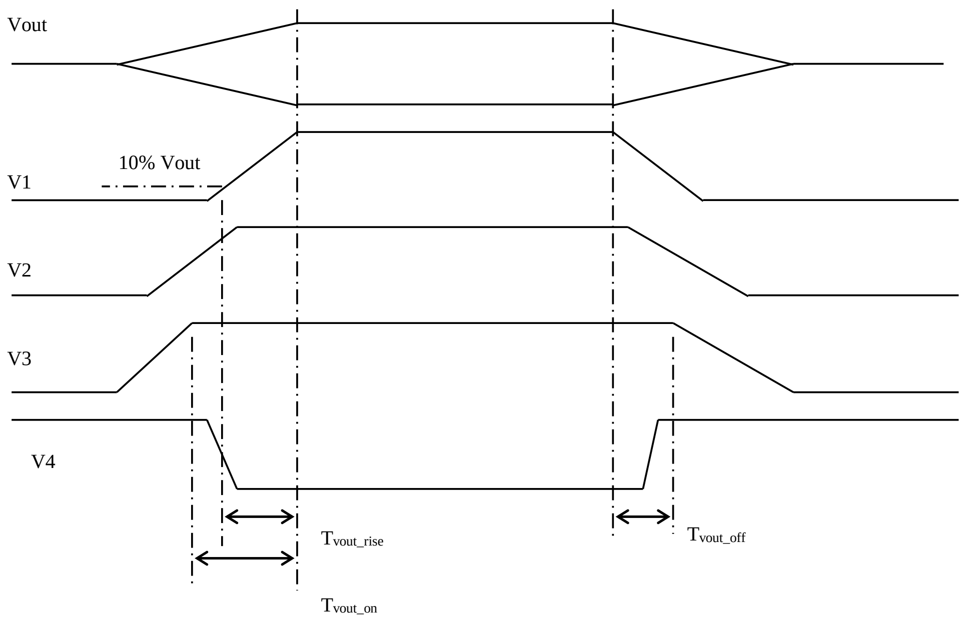
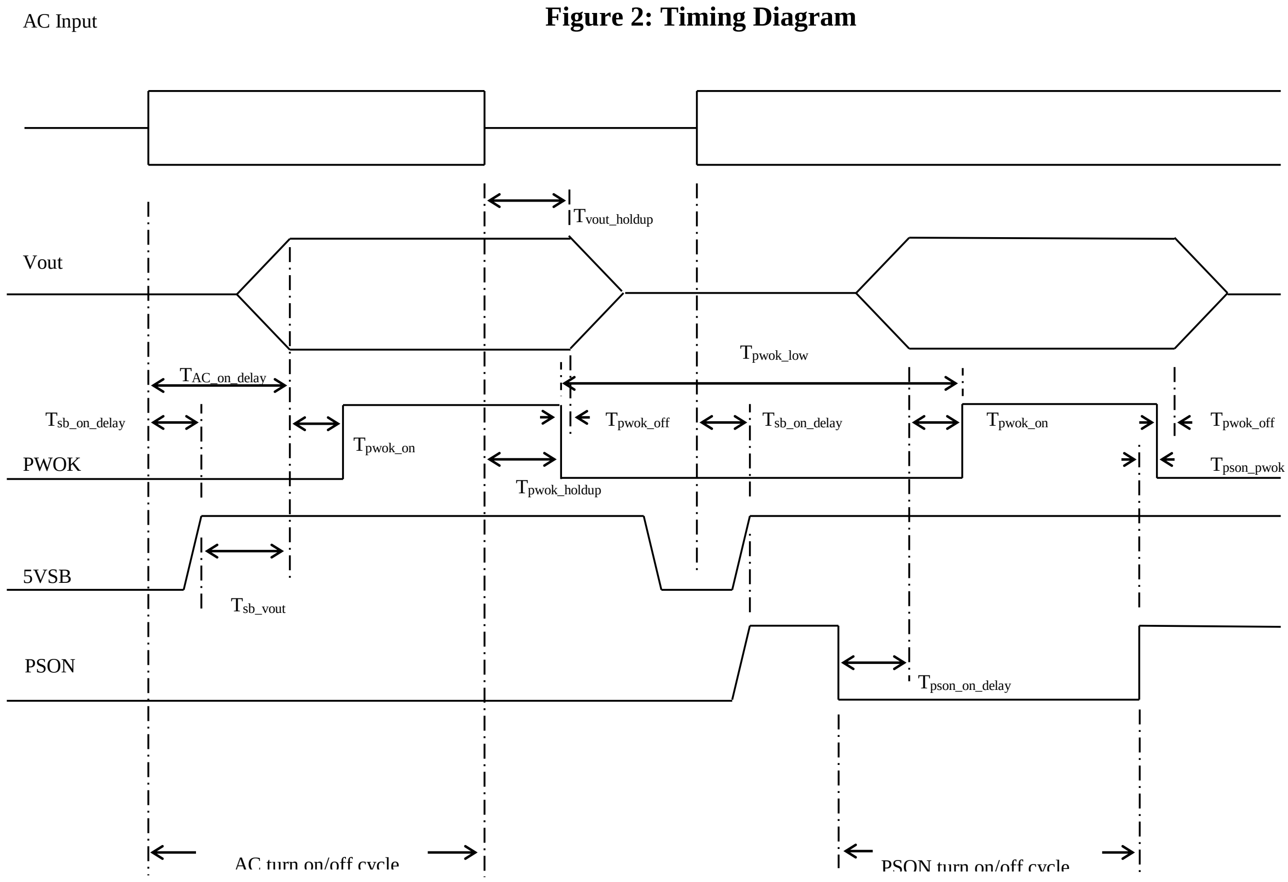


Table 13: Turn On/Turn Off Timing

ITEM	DESCRIPTION	MIN	MAX	UNIS
$T_{sb\_on\_delay}$	Delay from AC being applied to 5VSB being within regulation.		3000	msec
$T_{ac\_on\_delay}$	Delay from AC being applied to all output voltages being within regulation.		4500	msec
T_{vout_holdup}	Time all output voltages stay within regulation after loss of AC.	16		msec
T_{pwok_holdup}	Delay from loss of AC to deassertion of PWOK	16		msec
$T_{pson\_on\_delay}$	Delay from PSON# active to output voltages within regulation limits.	5	400	msec
T_{pson_pwok}	Delay from PSON# deactive to PWOK being deasserted.		100	msec
T_{pwok_on}	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	500	msec
T_{pwok_off}	Delay from PWOK deasserted to output voltages (3.3V, 5V, 12V) dropping out of regulation limits.	1		msec
T_{pwok_low}	Duration of PWOK being in the deasserted state during an off/on cycle using AC or the PSON signal.	100		msec
T_{sb_vout}	Delay from 5VSB being in regulation to O/Ps being in regulation at AC turn on.	50	1000	msec

Figure 2: Timing Diagram



6. Protection Circuits

Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown. If the power supply latches off due to a protection circuit tripping, an AC cycle OFF for 15 s and a PSON# cycle HIGH for 1 s must be able to reset the power supply.
connectors.

6.1.1 Over Current Protection

The Over Current Condition shall be measured internal to the power supply on all outputs, and preventing outputs to exceed current limits specified in below table. The power supply shall shutdown and latch off after an Over Current condition on main outputs.

Table 14: Over Current/Short Circuit Protection

Voltage	Over Current Limit (Iout limit)
+3.3 V	24A---32A
+5 V	24A---32A
+12 V	45.5A---52.5A

6.1.2 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.

The +5Vsb shall be auto recover without damage when Short Circuit Protection.

6.2 Over Voltage Protection

The power supply over voltage protection shall be locally sensed in the hot swap modules. The power supply shall shutdown and latch off after an over voltage condition occurs. This latch shall be cleared by toggling the PSON# signal or by an AC power interruption. Table 15 contains the over voltage limits. The values are measured at the output of the power supply's connectors. The voltage shall never exceed the maximum levels when measured at the power pins of the power supply connector during any single point of fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector.

Table 15: Over Voltage Limits

Output Voltage	MIN (V)	MAX (V)
+3.3 V	3.8	4.5
+5 V	5.7	6.5
+12V	13.3	14.5

7. Control and Indicator Functions

The following sections define the input and output signals from the power supply.

Signals that can be defined as low true use the following convention:

signal# = low true

7.1 PSON#

The PSON# signal is required to remotely turn on/off the power supply. PSON# is an active low signal that turns on the +3.3 V, +5 V, +12 V, and -12 V power rails. When this signal is not pulled low by the system, or left open, the outputs (except the +5 VSB and Vbias) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. Refer to *Figure 2* for timing diagram.

Table 16: PSON# Signal Characteristic

Signal Type	Accepts an open collector/drain input from the system. Pull-up to VSB located in power supply.	
PSON# = Low, PSKILL = Low	ON	
PSON# = Open, PSKILL = Low or Open	OFF	
PSON# = Low, PSKILL = Open	OFF	
	MIN	**MAX**
Logic level low (power supply ON)	0V	1.0V
Logic level high (power supply OFF)	2.0V	5.25V
Source current, Vpson = low		4mA
Power up delay: $T_{pson\_on\_delay}$	5msec	400msec
PWOK delay: T_{pson_pwok}		50msec

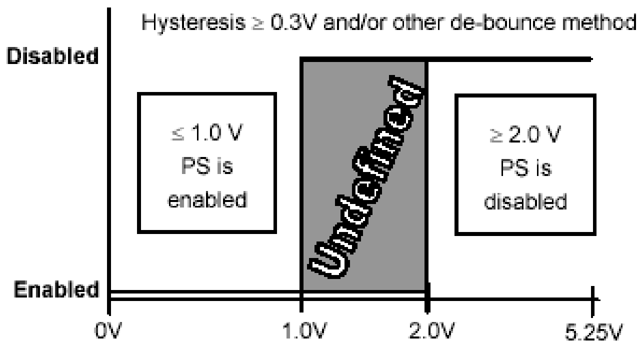


Figure 3: PSON# Signal Characteristics

7.2 PWOK (Power OK)

PWOK is a power OK signal and will be pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be pull to a LOW state. See *Figure 2* for a representation of the timing characteristics of PWOK. The start of the PWOK delay time shall be inhibited as long as any power supply output is in current limit.

Table 17: PWOK Signal Characteristics

Signal Type	Open collector/drain output from power supply. Pull-up to VSB located in power supply.	
PWOK = High	Power OK	
PWOK = Low	Power Not OK	
	MIN	**MAX**
Logic level low voltage, Isink=4mA	0V	0.5
Logic level high voltage, Isource=200µA	2.4V	5.25V
Sink current, PWOK = low		4mA
Source current, PWOK = high		2mA
PWOK delay: T_{pwok_on}	100ms	500ms
PWOK rise and fall time		100µsec
Power down delay: T_{pwok_off}	1ms	200msec
High-state output impedance	1.5 kΩ from output to common	

7.3 Alarm Sound (RESET BUTTON)

This is an alarm to report the one of the single module is fail or whithout PWOK in redundant mode. It will be to sound the alarm till the PWOK is High or push the RESET button.

7.4 Power Supply LED Indicators

There will be a LED to indicate power supply status. When AC is applied to the PSU and standby voltages are available the LED shall DARK. The LED shall turn ON GREEN to indicate that all the power outputs are available.

The LED shall be visible on the power supply's exterior face. The LED location shall meet ESD requirements. LED shall be securely mounted in such a way that incidental pressure on the LED shall not cause it to become displaced.

7.5 Power Fail Signal (PG-PS1 & PG-PS2) (Optional)

This signal will inform the user which one module power is fail. There are two signal (PG-PS1 & PG-PS2) for Module_1 or Module_2.

Table 18: Power fail signal Signal Characteristics

Open collector/drain output from power supply. Pull-up to VSB located in power supply.	
PG-PS1 or PG-PS2	
MIN	**MAX**
0V	0.4V
2.4V	5.25V

Figure 4: Module schematic diagram

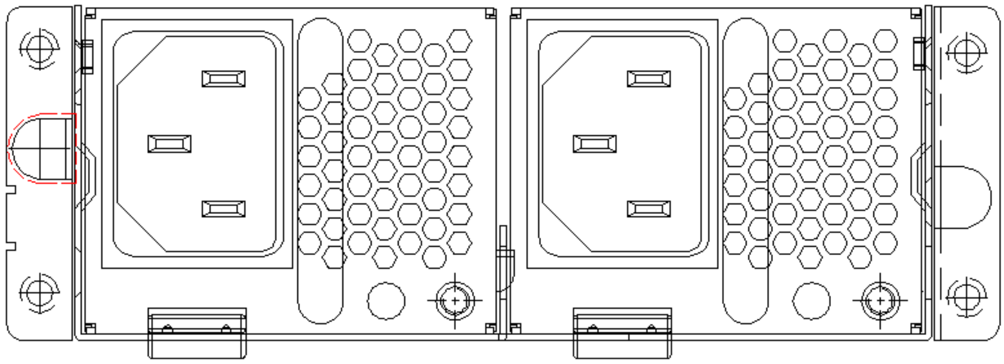


Table 19: Status

PSU Module 1	PSU Module 2	PG-PS1	PG-PS2	PWOK
Installed	Installed	High	High	High
Installed	Failure	High	Low	High
Failure	Installed	Low	High	High
Not installed	Installed	Low	High	High
Installed	Not installed	High	Low	High
Not installed	Failure	Low	Low	Low
Failure	Not installed	Low	Low	Low
Failure	Failure	Low	Low	Low

Installed=Module is installed in the drawer and working well

Not installed=No module , drawer is empty

Failure=Defective module installed in the drawer

7.6 EEPROM Contents

項次	名稱	數值	單位
1	Manufacturer Name	FSP GROUP	
2	Product Name	FSP400-50RDB	
3	Product Part/Model Number		
4	Product Version		
5	Product Serial Number	S1234567890	
6	Asset Tag		
7	FRU File ID	1H.0001.0029.001	
8	PSU Address		
9	EEPROM Address	AC	
10	Protocol	IPMI	
11	Last Ouput	N	
12	Overall capacity(watts)	400	W
13	Peak VA	0	W
14	Inrush current	0	A
15	Inrush interval in ms	1	ms
16	Low end Input voltage range 1	9000	10mV
17	High end Input voltage range 1	26400	10mV
18	Low end Input voltage range 2	0	10mV
19	High end Input voltage range 2	0	10mV
20	Low end Input frequency range	47	Hz
21	High end Input frequency range	63	Hz
22	A/C dropout tolerance in ms	16	ms
23	Peak Wattage-Hold up time in seconds	15	s
24	Last Ouput	N	
25	Standby Output	N	
26	Output 1 Nominal Voltage in 10mV	330	10 mV
27	Output 1 Maximum negative voltage deviation in 10mV	3135	10 mV

28	Output 1 Maximum positive voltage deviation in 10mV		3465	10 mV
29	Output 1 Ripple and Noise Pk-Pk 10Hz to 20MHz in mV		50	mV
30	Output 1 Minimum current draw in mA		0	mA
31	Output 1 Maximum current draw in mA		20000	mA
32	Last Ouput	N		
33	Standby Output	N		
34	Output 2 Nominal Voltage in 10mV		500	10 mV
35	Output 2 Maximum negative voltage deviation in 10mV		475	10 mV
36	Output 2 Maximum positive voltage deviation in 10mV		525	10 mV
37	Output 2 Ripple and Noise Pk-Pk 10Hz to 20MHz in mV		50	mV
38	Output 2 Minimum current draw in mA		0	mA
39	Output 2 Maximum current draw in mA		20000	mA
40	Last Ouput	N		
41	Standby Output	N		
42	Output 3 Nominal Voltage in 10mV		1200	10 mV
43	Output 3 Maximum negative voltage deviation in 10mV		1140	10 mV
44	Output 3 Maximum positive voltage deviation in 10mV		1260	10 mV
45	Output 3 Ripple and Noise Pk-Pk 10Hz to 20MHz in mV		120	mV
46	Output 3 Minimum current draw in mA		500	mA
47	Output 3 Maximum current draw in mA		35000	mA
48	Last Ouput	N		
49	Standby Output	N		
50	Output 4 Nominal Voltage in 10mV		-1200	10 mV
51	Output 4 Maximum negative voltage deviation in 10mV		-1320	10 mV
52	Output 4 Maximum positive voltage deviation in 10mV		-1080	10 mV
53	Output 4 Ripple and Noise Pk-Pk 10Hz to 20MHz in mV		120	mV
54	Output 4 Minimum current draw in mA		0	mA
55	Output 4 Maximum current draw in mA		500	mA
56	Last Ouput	Y		
57	Standby Output	Y		
58	Output 5 Nominal Voltage in 10mV		500	10 mV
59	Output 5 Maximum negative voltage deviation in 10mV		475	10 mV
60	Output 5 Maximum positive voltage deviation in 10mV		525	10 mV
61	Output 5 Ripple and Noise Pk-Pk 10Hz to 20MHz in mV		50	mV
62	Output 5 Minimum current draw in mA		0	mA
63	Output 5 Maximum current draw in mA		2000	mA

8. *MTBF*

Using ***Bellcore***, the calculated MTBF＞100,000 Hrs at 25° C, nominal input..