PWS-865-PQ
Revision: 001

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1 Purpose

This specification defines non-redundant power supplies that support PS2 tower/rack mount server systems. The parameters of this supply are defined in this specification for ITE business office using. This specification defines a 865W power supply with five outputs; +3.3V, +5V, +12V, -12V, and +5VSB. An IEC connector is provided on the external face for AC input to the power supply.

2 AC Input Requirements

The power supply shall incorporate universal power input with active power factor correction, which shall reduce line harmonics in accordance with the EN61000-3-2 to meet ITE category for business and residential areas.

2.1 AC Inlet Connector

The AC input connector shall be an IEC 320 C-14 power inlet.

*2.*2 AC Input Voltage Specification

The power supply must operate within all specified limits over the following input voltage range. Harmonic distortion of up to 10% THD must not cause the power supply to go out of the specified limits. The power supply shall operate properly at 85 VAC input voltage to guarantee proper design margins.

Table 1 : AC Input Voltage Rating

Parameter	MIN	Rated	MAX
Voltage	90 Vrms	100 – 240 Vrms	264 Vrms
Frequency	47 HZ	50 / 60 Hz	63 HZ

Note:

The power supply shall power on when AC input voltage during 85~264VAC.

2.3 Input Under Voltage

The power supply shall contain protection circuitry such that application of an input voltage below the minimum specified in section 2.2 shall not cause damage to the power supply.

2.4 Efficiency

The power supply will have a minimum efficiency of 82% at maximum load under 115V /60Hz and 230V/50Hz. It also shall meet 80+ efficiency requirement, which is the efficiency higher than 80%

for output loading higher than or equal to 20% of rated output load.

2.5 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 over the rated load. An AC line drop out 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, 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 75% or less of the rated output loading conditions. Any dropout of the AC line shall not cause damage to the supply.

2.6 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.

2.7 AC Inrush

The power supply must meet inrush requirements for any rated AC voltage, during cold start, during turn on at any phase of AC voltage, during a single cycle AC dropout condition, and over the specified temperature range. The peak inrush current shall be less than 30A peak when AC rated voltage is under 270V. When the rated AC voltage is over 270V, the peak inrush current shall be less than 40A.

3 DC Output Specification

3.1 Grounding

The ground of the pins of the power supply wire harness provides the power return path. The wire harness ground pins shall be connected to safety ground (power supply enclosure).

3.2 Remote Sense

The power supply uses remote sense (3.3VS) to regulate out drops in the system for the +3.3V output. The remote sense input impedance to the power supply must be greater than 10 Ω on 3.3VS. This is the value of the resistor connecting the remote sense to the output voltage internal to the power supply. Remote sense must be able to regulate out a minimum of 200mv drop on the

+3.3V output. The current in remote sense line shall be less than 5mA to prevent voltage-sensing errors. The power supply must operate within specification over the full range of voltage drops from the power supply's output connector to the remote sense point.

3.3 Output Connector (cable drawing is just for reference, fan is 8cm and location on side)

All pin assignments for connector are following SSI EPS12V 2_91 SPEC except noted.

Connector housing: 24-Pin Molex 39-01-2240 or equivalent

Contact: Molex 44476-1111 or equivalent

P24 Baseboard Power Connector

Pin	Signal	18 AWG Color	Pin	Signal	18 AWG Color
1	+3.3 VDC[1]	Orange	13	+3.3 VDC	Orange
2	+3.3 VDC	Orange	14	-12 VDC	Blue
3	COM	Black	15	COM	Black
4	+5 VDC	Red	16	PS_ON	Green
5	COM	Black	17	COM	Black
6	+5 VDC	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	PWR OK	Gray	20	Reserved (-5 V in ATX)	N.C.
9	5 VSB	Purple	21	+5 VDC	Red
10	+12 V	Yellow	22	+5 VDC	Red
11	+12 V	Yellow	23	+5 VDC	Red
12	+3.3 VDC	Orange	24	COM	Black

Two Processor Power Connector

Connector housing: 8-Pin Molex 39-01-2080 or equivalent

Contact: Molex 44476-1111 or equivalent

PA Processor Power Connector

Pin	Signal	16 AWG color	Pin	Signal	16 AWG Color
1	COM	Black	5	+12 V	Yellow
2	COM	Black	6	+12 V	Yellow
3	COM	Black	7	+12 V	Yellow
4	COM	Black	8	+12 V	Yellow

PB Processor Power Connector

Pin	Signal	16 AWG color	Pin	Signal	16 AWG Color
1	COM	Black	5	+12 V	Yellow
2	COM	Black	6	+12 V	Yellow
3	COM	Black	7	+12 V	Yellow
4	COM	Black	8	+12 V	Yellow

+12V Baseboard Power Connector

Connector housing: 4-Pin Molex 39-01-2040 or equivalent
Contact: Molex 44476-1111 or equivalent

PC Processor Power Connector

Pin	Signal	18 AWG color	Pin	Signal	16 AWG Color
1	COM	Black	3	+12 V	Yellow
2	COM	Black	4	+12 V	Yellow

Peripheral Power Connectors

Connector housing: Amp 1-480424-9 or equivalent (black color)
Contact: Amp 61314-1 contact or equivalent

PD/E/F/G Peripheral Power Connectors

Pin	Signal	16 AWG Color
1	+12V	Yellow
2	COM	Black
3	COM	Black
4	+5 VDC	Red

Floppy Power Connector

PH Floppy Power Connector

Pin	Signal	22 AWG Color
1	+5 VDC	Red
2	COM	Black
3	COM	Black
4	+12V	Yellow

Serial ATA Power Connector

Connector Housing: Molex #675820000 or equivalent
Contact: Molex #67510000 or equivalent

PI/J/K/L/M/N/O/P Serial ATA Power Connector

Pin	Signal	18 AWG Color
5	+3.3VDC	Orange
4	COM	Black
3	+5VDC	Red
2	COM	Black
1	+12V4	Yellow/Green Stripe

Server Signal Connector

For server systems with SMBus features, the power supply may have an additional connector, which provides serial SMBus for FRU data and remote sense on 3.3V and Return.

Connector housing: 5-pin Molex 50-57-9405 or equivalent

Contacts: Molex 16-02-0088 or equivalent

PQ Server Signal Connector

Pin	Signal	24 AWG Color
1	SMBus Clock	White/Green Stripe
2	SMBus Data	White/Yellow Stripe
3	Power failure	red
4	Return	Black/White Stripe
5		

Four SLI Power Connectors

Connector housing: 6-Pin Molex 45559-0002 or equivalent

Contact: Molex 39-00-0207 or equivalent

PN/O/P/Q Peripheral Power Connectors

Pin	Signal	18 AWG Color
1	+12V	Yellow
2	+12V	Yellow
3	+12V	Yellow
4	COM	Black
5	COM	Black
6	COM	Black

Cable Length:

PA	**320+-10mm**	**8Pin 12V**
PB	**320+-10mm**	**8Pin 12V**
PC	**380+-10mm**	**4Pin 12V**
PD	**510+-10mm**	**HDD**
PE	**100+-10mm**	**HDD**
PF	**370+-10mm**	**HDD**
PG	**150+-10mm**	**HDD**
PH	**150+-10mm**	**FDD**

PI	**500+-10mm**	**SATA**
PJ	**650+-10mm**	**SATA**
PK	**800+-10mm**	**SATA**
PL	**950+-10mm**	**SATA**
PM	**500+-10mm**	**SATA**
PN	**650+-10mm**	**SATA**
PO	**800+-10mm**	**SATA**
PP	**950+-10mm**	**SATA**
PQ	**380+-10mm**	**I2C**
PR	**500+-10mm**	**SLI**
PS	**500+-10mm**	**SLI**
PT	**500+-10mm**	**SLI**
PU	**500+-10mm**	**SLI**
P24	**340+-10mm**	**24Pin**

3.4 Output Power / Current

The following table defines the output power and current ratings. The combined output power of all output shall not exceed the rated output power. The tables show the load ranges of the two power supply power levels. The power supply must meet both static and dynamic voltage regulation requirements for the minimum loading conditions.

Table 4：865W Load Ratings				
Load Range				
Voltage	**Minimum Continuous**		**Maximum Continuous**	**Peak**
+3.3V	0.3A		30.0A	
+5V	0.3A		30.0A	45A/0.5second
+12V	1.0A		70.0A	
-12V	0.0A		1.0A	
+5VSB	0.0A		6.5A	

Note：

1．Maximum continuous total DC output power should not exceed 865W.

2．The all output shall not exceed 5% of its over & under shoot at power on / off in Normal Voltage.

3．Peak power and current loading shall be supported for a minimum of 12 seconds.

3.4.1 Standby Output

The +5VSB output shall be present when an AC input greater than the power supply turn on voltage is applied. Main cooling fan shall be on when 5Vsb is on, but should operate at the lowest fan input voltage which is below 5.0V.

3.5 Voltage Regulation

The power supply output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. All outputs are measured with reference to the return remote sense (Return_S) signal. The +5V, +12V, -12V and +5VSB outputs are measured at the power supply connectors referenced to Returns. The +3.3V is measured at its remote sense signals (3.3VS) located at the signal connector.

Table 5 : Voltage Regulation Limits					
Parameter	MIN	NOM	MAX	Units	Tolerance
+3.3V	+3.14	+3.30	+3.46	Vrms	+5 / - 5%
+5V	+4.75	+5.00	+5.25	Vrms	+5 / -5%
+12V	+11.40	+12.00	+12.60	Vrms	+5 / -5%
-12V	-10.80	-12.00	-13.20	Vrms	+10 / -10%
+5VSB	+4.75	+5.00	+5.25	Vrms	+5 / -5%

3.6 Dynamic Loading

The output voltage shall remain within the limits specified in Table 5 for the step loading and within the limit specification in Table 6 for the capacitive loading. The load transient repetition rate shall be tested between 50HZ and 10KHZ 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 4.

Table 6 : Transient Load Requirements			
Output	△ Step Load Size	Load Slew Rate	Capacitor Load
+3.3V	30% of max load	0.5A/us	1000uF
+5V	30% of max load	0.5A/us	1000uF
+12V	50% of max load	0.5A/us	1000uF
+5VSB	25% of max load	0.5A/us	1uF

3.7 Capacitance Loading

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

Table 7 : Capacitance Loading Conditions			
Output	**MIN**	**MAX**	**Units**
+3.3V	10	12,000	‘uF
+5V	10	12,000	‘uF
+12V	10	12,000	uF
-12V	1	350	uF
+5VSB	1	350	‘uF

3.8 Ripple / Noise

The maximum allowed ripple / noise output of the power supply is defined in Table 8 Ripple / Noise

below. This is measured over a bandwidth of 0Hz to 20MHz at the power supply output connector. A 10μ F tantalum capacitor in a parallel with a 0.1μ F ceramic capacitor are placed at the point of measurement.

Table 8 Ripple and Noise

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

3.9 Timing Requirements

These are the timing requirements for single power supply operation. The output voltages must rise from 10% to within regulation limits. (Tvout_rise) within 0.1 to 20ms. The +3.3V, +5V, and +12V output voltages should start to rise approximately at the same time. All output shall rise monotonically. The +5V output needs to be greater than the +3.3V output during any point of the voltage rise. The +5V output shall never be greater than the +3.3V output by more than 2.25V. Each output voltage shall reach regulation within 0.1 to 65ms (Tvout_on) of each other and begin to turn off within 400ms (Tvout_off) of each other. Refer to (Figure 2 Output Voltage Timing) (Figure 3 Turn On/ Off Timing) shows the timing requirements for a single power supply being turned on and off via the AC input, with PSON held low and the PSON signal, with the AC input applied.

Table 9 Output Voltage Timing

ITEM	DESCRIPTION	MIN	MAX	UNITS
Tvout_rise	Output voltage rise time from each main output	0.1	20	msec
Tvout_on	All main outputs must be within regulation of each other	0.1	65	msec

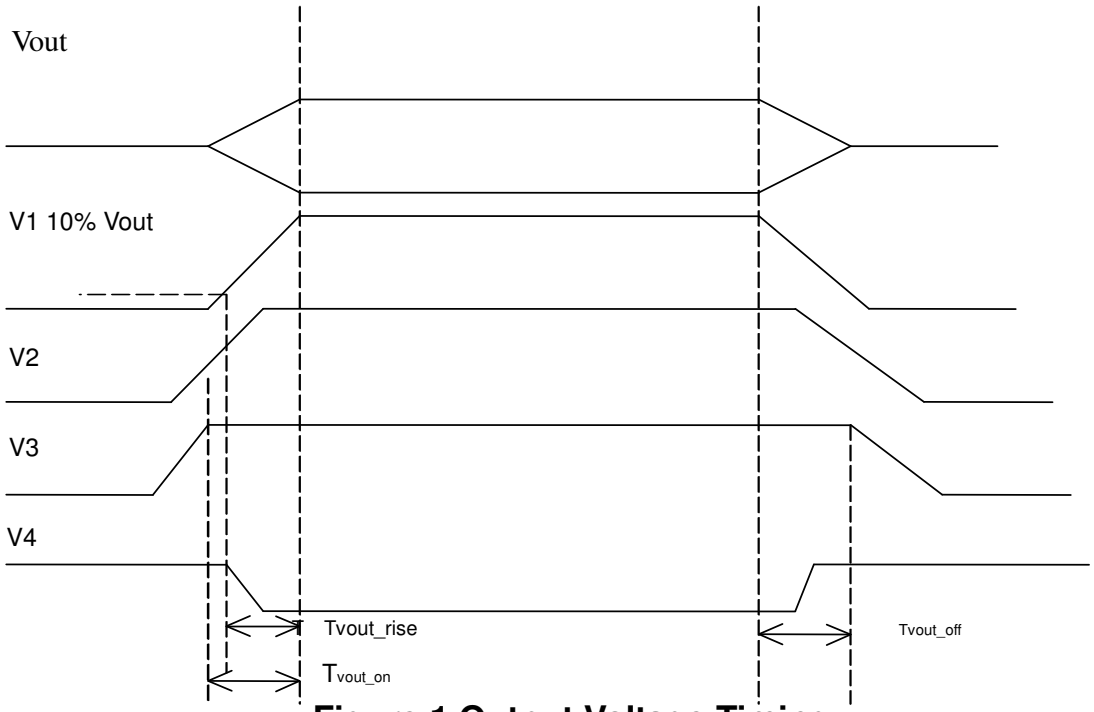

Figure 1 Output Voltage Timing

Table 10 Turn On / Off Timing

ITEM	DESCRIPTION	MIN	MAX	UNITS
T sb_on_delay	Delay from AC being applied to 5VSB being within regulation		2000	msec
T ac_on_delay	Delay from AC being applied to all output voltages being within regulation		2500	msec
T vout_holdup	Time all output voltages, including 5VSB, stay within regulation after loss of AC	18		msec
T pwok_holdup	Delay from loss of AC to desertion of PWOK	17		msec
T pson_on_delay	Delay from PSON# active to output voltages within regulation limits.	5	400	msec
T pson_pwok	Delay from PSON# deactivate to PWOK being disserted.		50	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 disserted to output voltages (3.3V, 5V, 12V,-12V,5VSB)dropping out of regulation limits.	1		msec
T pwok_low	Duration of PWOK being in the disserted state during an off/on cycle using AC or the PSON signal.	100		msec

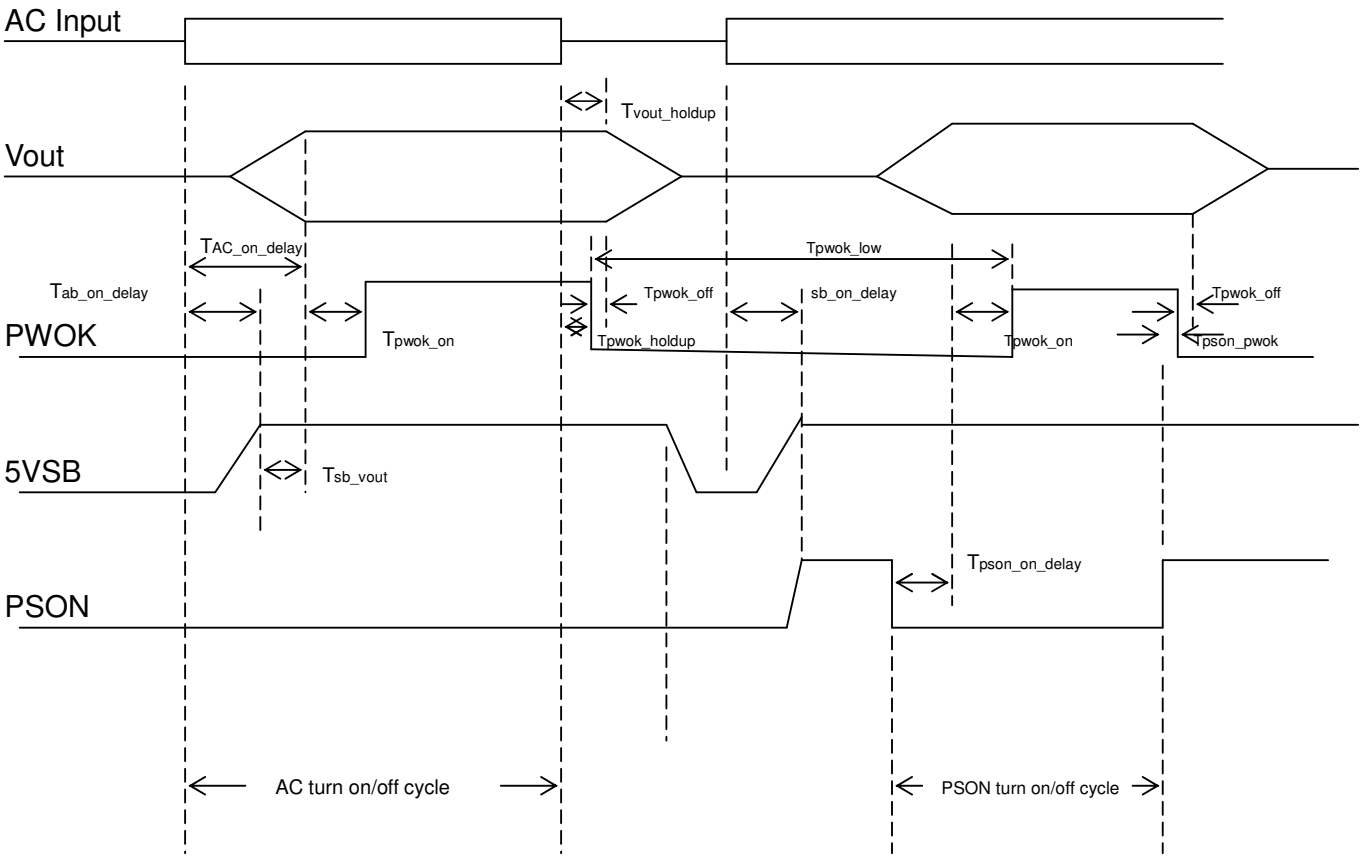

Figure 2 Turn on/off Timing

4. 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 15sec and a PSON# cycle HIGH for 1sec shall be able to reset the power supply.

4.1 Current Limit

The power supply shall have current limit to prevent the +3.3V, +5V, and +12V, outputs from exceeding the values shown in Table11. If the current limits are exceeded, the power supply shall shutdown and latch off. The Latch will be cleared by toggling the PSON # signal or by an AC power interruption. The power supply shall not be damaged from repeated power cycling in this condition. –12V and +5VSB shall be protected under over current or shorted conditions so that no damage can occur to the power supply. All outputs shall be protected so that no damage occurs to the power supply under a shorted output condition.

Table 11 : Over current Protection	
Voltage	**Over Current Limit (I out Limit)**
+3.3V	120 % minimum , 150% maximum
+5V	120 % minimum , 150% maximum
+12V	120 % minimum , 150% maximum
-12V	1.5A minimum, 4A maximum
5Vsb	7.3A minimum, 9A maximum

4.2 Over Voltage Protection

The power supply over voltage protection shall be locally sensed. 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. Table12 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 12 : Over Voltage Limits		
Output Voltage	**MIN (V)**	**MAX (V)**
+3.3V	3.9	4.5
+5V	5.7	6.5
+12V	13.3	14.5
-12V	-13.3	-14.5
+5Vsb	5.7	6.5V

4.3 Over Temperature Protection

The power supply will be protected against over temperature conditions cause by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shutdown. When the power supply temperature drops to within specified limits, the power supply shall restore power

automatically. The OTP circuit must have built in hysteresis such that the power supply will not oscillate on and off due to temperature recovering condition. The OTP trip level shall have a minimum of 4℃ of ambient temperature hysteresis.

4.4 I²C to meet Super Micro standard.

Salve address will be 0x70 (default).

The power supply can be read and written to as if it's an 2k bit (256 byte) I2C EEPROM. The power supply must support: Byte write and Random read. Read and write must work at speeds up to 100 kHz.

All the data stored in the power supply follows FRU spec.

In addition, the internal block is defined as follows:

Offset		Result of a read
0x09	Temperature	Value to represent the current temperature of the hottest spot inside the power supply This is an unsigned integer value in Celsius.
0x0A	Fan 1 speed (main fan)	Value to represent the RPM of the power supply fan #1 This should be the fan pulse count in 262 ms. We are assuming that two fan pulses equal one rotation. The system software will convert this value, to fan RPM, using: RPM=(1/0.262) *(Fan Pulse Count * 60 /2)
0x0B	Fan 2 speed (secondary fan)	Value to represent the RPM of the power supply fan #2 If counter ratating fan, Fan#2 is assumed to be stacked with fan#1
0x0C	Power Status	Value to represent DC GOOD status byte = hex 01 means DC GOOD byte = 00 means no DC output
0x0D	Temperature High Limit	Value is fixed and should be the highest acceptable temperature that the power supply can sustain based on offset 09.
0x0E	Fan 1 speed Low Limit	Value is fixed and should be the lowest fan #1 RPM acceptable
0x0F	Fan 2 speed Low Limit	Value is fixed and should be the lowest fan #2 RPM acceptable
0x10	Reserved (future use)	
0x11	Reserved (future use)	

0x12	Reserved (future use)	
0x13	Reserved (future use)	
0x14	AC RMS current (if available)	This byte, divided by 16, is the AC (RMS) input current.
0x15	DC output current(if available)	This byte, divided by 2, is the DC (+12V) output current.
0x16	Firmware version	Example: version 2.0 is encoded as 0x20 The smallest version number allowed is 2.0 Anything less than 2.0 (0x20) found at this location will be reported as version 1.0 by Supermicro health monitoring software
0x17	FRU file revision	Integer only
0x18	AC current limit (If available)	AC current upper limit; same scale factor as 0x14
0x19	DC current limit (if available)	DC current upper limit; same scale factor as 0x15
0x1A	Power supply wattage (if available)	Power supply wattage; lower byte
0x1B		Power supply wattage; higher byte

The power supply will support the “byte write” procedure defined in the I2C EEPROM spec.

Read only bytes --- writes to the following bytes should be ignored:

Offset	
0x09	Temperature
0x0A	Fan 1 speed (main fan)
0x0B	Fan 2 speed (secondary fan)
0x0C	Power Status
0x0D	Temperature High Limit
0x0E	Fan 1 speed Low Limit
0x0F	Fan 2 speed Low Limit
0x10	Reserved (future use)
0x11	Reserved (future use)
0x12	Reserved (future use)
0x13	Reserved (future use)

0x14	AC RMS current (if available)
0x15	DC output current(if available)
0x16	Firmware version
0x17	FRU file revision
0x18	AC current limit (If available)
0x19	DC current limit (if available)
0x1A	Power supply wattage (if available)
0x1B	

The power supply I2C microcontroller should not latch the system I2C bus by pulling SDA or SCL line low for more than 40 ms.

If the I2C bus SDA or SCL is stuck low for more than 40 ms, the power supply should reset either its I2C communication module, or itself.

The power supply needs to have 2k Ohm internal pull up on the SDA or SCL lines.

5. Control and Indicator Functions

The following sections define the input and output signals from the power supply. Signals is defined as low true use the following convention: signal# = low true

5.1 PSON#

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

Table 13 PSON# Signal Characteristics

Signal Type	Accepts an open collector/drain input from the system. Pull-up to VSB located in power supply.	
PSON# = Low	ON	
PSON# = Open or high	OFF	
	MIN	**MAX**
Logic level low (power supply ON)	0V	1.0V
Logic level high (power supply OFF)	2.0V	5.70V
Source current, Vpson = low		4mA
Power up delay: T pson_on_delay	5msec	400msec
PWOK delay: T pson__pwok		50msec

Table 14 PWOK Signal Characteristics

Signal Type	Open collector/drain output from power supply. Pull-up to 5VSB located in power supply.	
PWOK = High	Power OK	
PWOK = Low	Power Not OK	
	MIN	**MAX**
Logic level low voltage, Isink = 4Ma	0V	0.4V
Logic level high voltage, Isource = 200μ A	2.4V	5.25V
PWOK delay: T pwok_ON	100ms	500ms
PWOK rise and fall time		100μ sec
Power down delay: T pwok_off	1ms	

5.2 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 dearest to a LOW state. See Figure 2 On/ Off Timing for a representation of the timing characteristics of PWOK. The start of the PWOK delay time shall inhibited as long as any power supply output is in current limit.

6. MTBF

The life requirement shall be met the following condition. And the environmental temperature is

assumed to be 35℃ with 80% load. Furthermore, consider the longevity of FAN:

1. Normal operation (at the rated input/output): 100,000h or more.
2. AC input (operated at the rated current only for +5VSB): 100,000h or more.

7. Definitions / Terms / Acronyms

Table 19 : Definitions, Terms, and Acronyms (listed alphabetically)	
Full Ranging	A full-ranging power supply automatically senses and adjusts itself to the proper input voltage range (110 VAC or 220 VAC). No manual switches or manual adjustments are needed.
CFM	Cubic Feet per Minute (airflow).
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 than 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 re-treatment or oscillation.
MTBF	Mean time between failure
Noise	The periodic or random signals over frequency band of 0 Hz to 20 MHz.
Over current	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.
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.
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.

8. Airflow Requirements

The power supply shall have two 8cm variable thermal control-speed fan(s) from Sanyo Denki, or Sunon, or Delta. During full-speed fan operation., the power supply shall not exceed a acoustic noise level shown on below table,

Acoustic Sound Power Level Table

	Idle	Idle	Typical	Max
Ambient Temperature	25 degree C	35 degree C	40 degree C	45 degree C
% Loading	40%	40%	60%	100%
Sound Power BA	3.2	4.0	4.5	5.0

8.1 Fan Vibration.

Fan vibration should be well controlled to avoid large vibration. Accelerate velocity can’t over 1.0 m/s^2 on any place on the surface of power supply case with the 40 degree C Ambient temperature

and 100% loading with AC 115V input.

8.2 Redundant cooling fan

During normal “turned on” operation, two fans will be spinning at normal speed meeting the airflow and acoustic noise requirement.

The redundant cooling fan should have capability to provide enough cooling when one of the fans fails. When one of the two fans fails, the other remaining fan will run at full speed. The power supply should still meet all the specification when just one of the fan fails.

When one of the fan fails or power supply temperature is over maximum setting limit, alarm will be sounding, and a red LED will turn on. Press one red button can stop alarm sound, but red LED will still be on. Power supply will send failure signal on the 3rd pin of I2C connector. The 3rd pin is showing normally with 5V TTL high, and failure with TTL low (lower than 0.4V). Picture is shown on below.

When both fans fail, the power supply will turn off and will not be turn on again until at least one of the fan recovers.

9. Temperature Requirements

The power supply shall operate within all specified limits over T_{op} temperature range.

Table 20：Thermal Requirements

Item	Description	MIN	MAX	Units
T_{op}	Operating temperature range	0	50	℃
T_{non-op}	Non-operating temperature range	-40	70	℃

The power supply must meet UL enclosure requirements for temperature rise limits. All sides of the power supply, with exception to the air exhaust side, must be classified as “ Handle, Knobs, grips, etc. held for short periods of time only “.

10. Mechanical Drawing (Figure)

Power supply case drawing is as same as SMC SP650-RP.

11. Safety and Environment Requirements

11.1 Safety

The power supply must comply with all regulatory requirements for its intended geographical market. Depending on the chosen market, regulatory requirements may vary. This specification requires that the power supply meet all regulatory requirements for the intended market at the time

of manufacturing for ITE category. Typically this includes :

- **UL**
- **C-UL**
- **TUV**
- **CCC**
- **CB**
- **CISPR Class B**
- **FCC Class B**
- **CE**
- **RoHS full compliant (6/6)**

The power supply, when installed in the system, shall meet immunity requirements specified in EN55024 for ITE category of business office and residential areas. Specific tests are to be EN61000-4-2,-3,-4,-5,-6,-8. And –11. The power supply must maintain normal performance within specified limits. This testing must be completed by the system EMI engineer. Conformance must be designated with the European Union **CE Marking**. Specific immunity level requirements are left to customer requirements.

11.2 Environmental Requirements

11.2.1Temperature

Normal Operating Ambient(at sea level):

0 degrees Celsius minimum (operating and in standby)
50 degrees Celsius maximum (operating – power supply on)
maximum rate of change is 30 degrees Celsius/10 minutes

Abnormal Operating Ambient(at sea level):

N/A degrees Celsius
N/A survival time

11.2.2 HUMIDITY

Operating : 5% to 90% RH
Storage : 5% to 95% RH

11.2.3 ALTITUDE

Operating: to 10,000 feet (3,023 meters)

Non-operating: to 35,000 feet (10,580 meters)

11.2.4 SHOCK AND VIBRATION

Mechanical Shock

The device will withstand the following imposed conditions without electrical or mechanical failure:

Non-operating Square Wave Shock:	40G, Square wave at 200in/sec (508cm/sec); on all six sides
Non-operating Half Sine Shock:	Half Sine pulse for 70in/sec (178cm/sec) for 2ms; on all sides except top
Operating Half Sine Shock:	Half Sine pulse for 40in/sec (102cm/sec) for 2ms; on all sides except top

Vibration

Operating: Sinusoidal vibration, 0.5G (0-peak) acceleration. 3-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times larger than non-resonant excursions.

Plane of vibration to be along three mutually perpendicular axis.

Non-operating: Sinusoidal vibration, 1.0G (0-peak) acceleration. 3-500Hz, sweep at 1/2 octave/min from low to high frequency, and then from high to low. Thirty minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times larger than non-resonant excursions.

11.2.5 THERMAL SHOCK

Non-operating: -40 (+/-5) to +70 (+/-5) degrees Celsius, transition time not to exceed 5 minutes. Duration of exposure to temperature extremes will be 20

minutes**.**

13. Mechanical drawing

Please check 3.3 cable connector PDF file. Power supply dimension and mounting mechanism shall be as same as power supply case drawing on section 3.3 PDF file, only the fan location is different.

14. EC History List :

Version	History Change	Remark
001	**Product release**	**12/06/07**