COMPUWARE
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Document Name
Product Specification

Release Document

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Date	Description	Revision
2012-03-19	Release	0
2012-05-29	Relax EMI class B margin from 6dB to 0.01dB margin	1
2012-06-05	Change EMI from class B to Class A with 6dB margin	2

Approved By	**Signing By**	**Prepared By**
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1 Purpose

This specification defines 2U multiple output power supply. The parameters of this supply are defined in this specification for ITE commercial using. This specification defines max continuous output at 600W with 90 -140V and 650W with 180 - 264Vac input, 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. The power supply contains fans for cooling, while meeting acoustic requirements.

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 for office business computer systems.

2.1 AC Inlet Connector

The AC input connector shall be an IEC 320 C-14 power inlet. This inlet is rated for 15A / 250 VAC.

2.2 AC Input Voltage Specifications

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 87 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

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. Input voltage range for AC minimum startup voltage, 78-87VAC, and maximum turn off voltage range 73 to 82VAC.

2.4 Efficiency

This power supply shall meet 80PLUS Gold efficiency requirement, which is power efficiency with 87%, 90% and 87% at 20%, 50% and 100% respectively at 115Vac input. At standby mode (PSON=off) with minimum loading at 5Vsb, the input power shall be less than 1W with 90mA loading at 5Vsb.
The peak efficiency shall be above 90% under 230V/50Hz input between 50%-60% loading.

Also power factor performance shall meet the below requirements in table 2.

Table 2: Efficiency and Power Factor requirement

Load (%)	115Vac (600W)		230Vac (650W)	
	Power Factor	Efficiency (%)	Power Factor	Efficiency (%)
10	At least 0.8	At least 80	At least 0.8	At least 80
20	At least 0.92	At least 87	At least 0.9	At least 87
50	At least 0.97	At least 90	At least 0.95	At least 90
100	At least 0.99	At least 87	At least 0.97	At least 87

2.5 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.

2.6 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, during repetitive ON/OFF cycling of AC, and over the specified temperature range. The peak inrush current shall be less than 30A peak and less than the ratings of its critical component. This peak inrush current does not include inrush current induced by EMI filter.

2.7 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
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 1: AC Line Sag Transient Performance

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
> ½ AC cycle	>10%	Nominal AC Voltage ranges	50/60 Hz	Loss of function acceptable, self-recoverable

Table 2: AC Line Surge Transient Performance

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

2.8 AC Line Fast Transient Specification

The power supply shall meet the EN61000-4-5 directive and any additional requirements in IEC1000-45:1995 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 output load conditions.

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 may have remote sense return (Return_S) to regulate out ground drops for all output voltages; +3.3V, +5V, +12V, -12V and +5VSB. The power supply may use remote sense (3.3VS) to regulate out drops in the system for the +3.3V output. The +5V, +12V, -12V and +5VSB outputs only use remote sense referenced to the Return_S signal. The remote sense input impedance to the power supply must be greater than 200 Ω on 3.3VS and Return_S. 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 remote sense return (Return_S) must be able to regulate out a minimum of 200mv drop in the power ground return. The current in any 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 points.

3.3 Output Load Condition

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. Power supply should not be damaged when any output voltage has zero loading.

Table 4：600/650W Load Ratings			
Load Range			
Voltage	Min. Continuous	Max. Continuous	Peak (peak duration)
+3.3V	0.8A	25A	
+5V	1.0A	30A	
+12V	1.0A	49/54A	
-12V	0 A	0.5A	
+5VSB	0 A	3.0A	4A (at least 12 seconds)

Note：

1. Maximum continuous total DC output power should not exceed 600W@(90-140Vac)
2. Maximum continuous total DC output power should not exceed 650W@(180-264Vac)
3. Maximum combined continuous power of 5V and 3.3V should not exceed 160W.

Under no load or minimum load condition, the power supply must be able to power on or off successfully. Voltage regulation level should also be maintained. No load condition to any or all voltage rails should not cause any protection circuit to be triggered.

3.3.1 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 normally off when 5Vsb is on during standby mode.

3.4 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	+3.140	+3.30	+3.465	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%

There should never be any negative voltage for all outputs and signals, excluding -12V. During standby (PSON=off), all outputs, except +5VSB, should be below 50mV.

3.5 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 captive loading. The load transient repetition rate shall be tested of 1KHZ 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	65% of max load	0.5A/us	2200uf
+5VSB	25% of max load	0.5A/us	1uf

3.6 Capacitance Loading

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

Table 7 ： Capacitive Loading Conditions			
Output	MIN	MAX	Units
+3.3V	10	12,000	uF
+5V	10	12,000	uF
+12V	10	11,000	uF
-12V	1	350	uF
+5VSB	1	350	uF

3.7 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 10μF tantalum capacitor in a parallel with a 0.1μF ceramic capacitor is placed at the point of measurement.

Table 8 Ripple and Noise

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

3.8 Timing Requirements

These are the timing requirements for the power supply operation. The output voltages must rise from 10% to within regulation limits. (Tvout_rise) within 2 to 20ms; except for 5VSB which is required to rise from 10% to regulation limits within 1 to 20ms. The +3.3V, +5V, and +12V output voltages should start to rise at about 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 must never be greater than the +3.3V output by more than 2.25V. Each output voltage shall reach regulation within 20ms (Tvout_on) of each other during turn on of the power supply. Each output

voltage shall fall out of regulation within 400ms (Tvout_off) of each other during turn off. Figure 1 and figure 2 show the turn ON and turn OFF timing requirements. In Figure 2 the timing is shown with both AC and PSON# controlling the ON/OFF of the power supply.

Table 9: Output Voltage Timing

ITEM	DESCRIPTION	MIN	MAX	UNITS
Tvout_rise	Output voltage rise time from each main output	2	20	ms
	Output voltage rise time for the 5VSB output.	1	20	ms
Tvout_on	All main outputs must be within regulation of each other		20	ms
Tvout_off	All main outputs must leave regulation within this time		400	ms

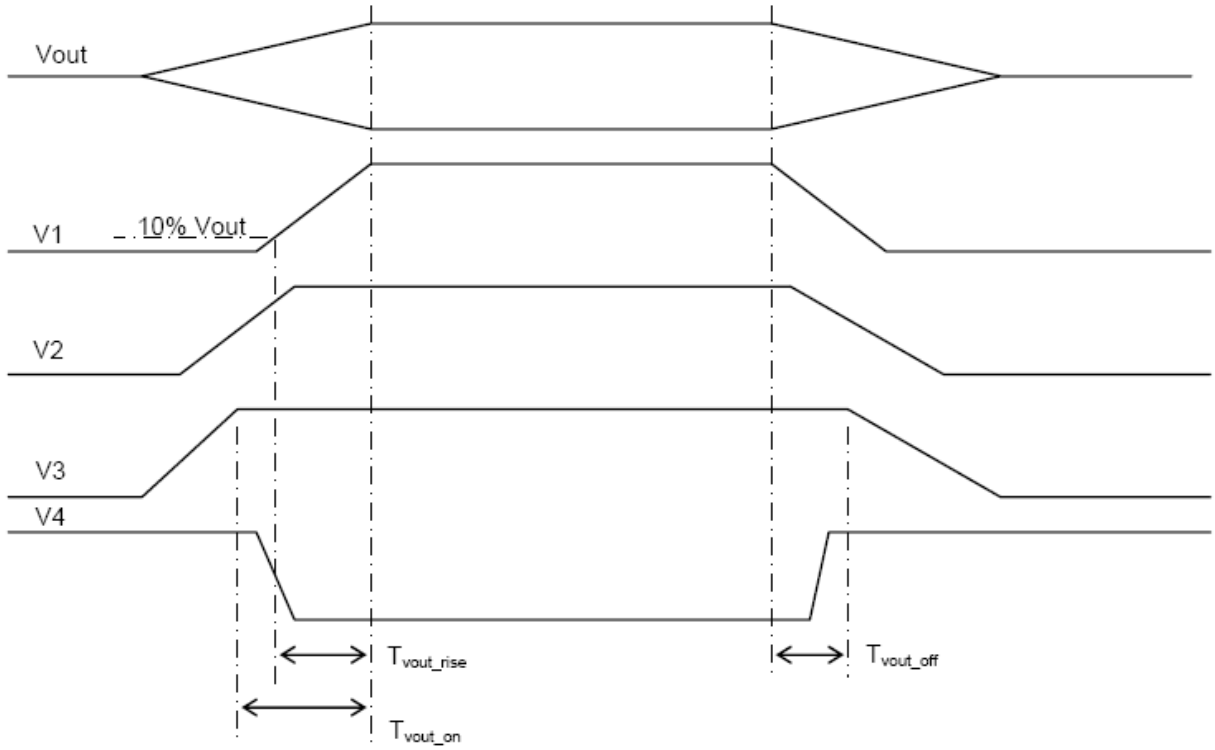


Figure 1 Output Voltage Timing

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		1500	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. Tested at 75% of maximum load and over 100-240VAC input	18		msec
T pwok_holdup	Delay from loss of AC to desertion of PWOK. Tested at 75% of maximum load and over 100-240VAC input	17		msec
Tpson_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	400	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
T sb_vout	Delay from 5 VSB being in regulation to O/Ps being in regulation at AC turn on	50	1000	msec
Tsb_holdup	Time 5VSB output voltage stays within regulation after loss of AC	70	5000	msec

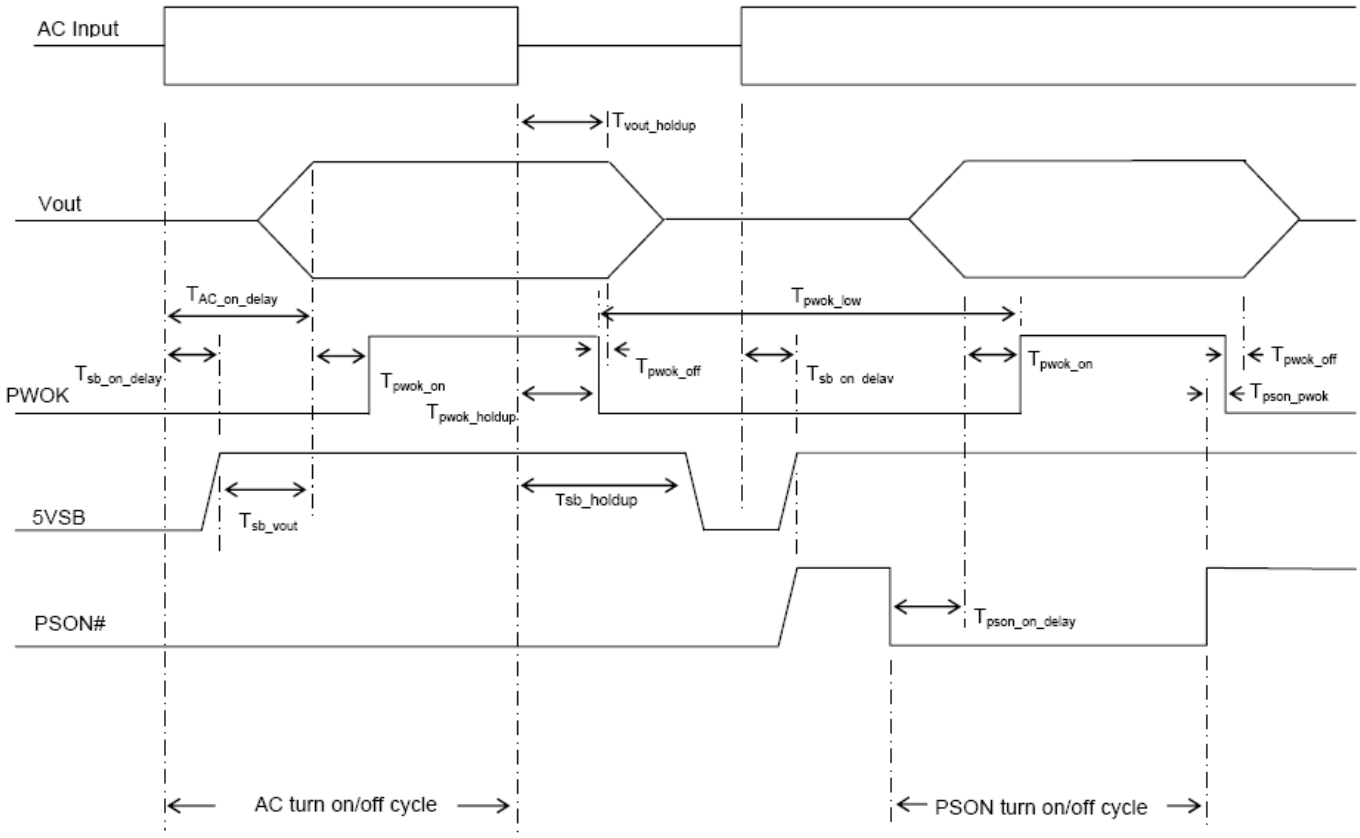


Figure 2 Turn on/off Timing

3.8.1 +5 VDC / +3.3 VDC Power Sequencing

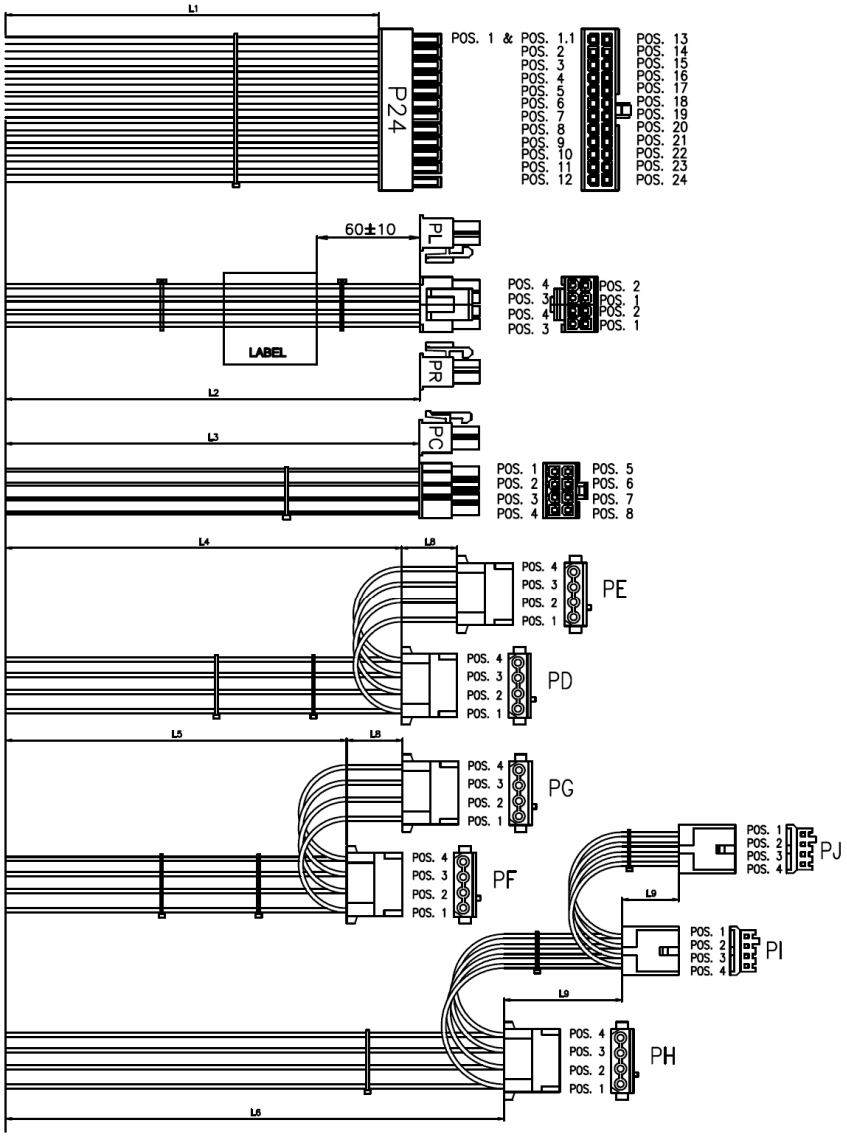
The +12V DC and +5V V DC output levels must be equal to or greater than the +3.3V DC output at all time during power-on and normal operation. The time between any output of +12V DC and +5V DC reaching its minimum in-regulation level and +3.3V DC reaching its minimum in-regulation level must be less than or equal to 20ms.

3.9 Output connector

For 24pin, 8pin, 4pin connectors, terminal contacts, they should use high current contact Molex 44476-1111 or equivalent.
For 4pin HD contacts use Tyco 61314-1 or equivalent.

3.9.1 24Pin output

The below image is just for reference.



P24

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L1(mm)
POS. 1	+3.3V	ORANGE	16 AWG	290±15
	+3.3Vs	ORANGE	22 AWG	
POS. 2	+3.3V	ORANGE	16 AWG	
POS. 3	GND	BLACK	16 AWG	
POS. 4	+5V	RED	16 AWG	
POS. 5	GND	BLACK	16 AWG	
POS. 6	+5V	RED	16 AWG	
POS. 7	GND	BLACK	16 AWG	
	GND	BLACK	22 AWG	
POS. 8	PG	GRAY	24 AWG	
POS. 9	+5VSB	PURPLE	16 AWG	
POS. 10	+12V	YELLOW	16 AWG	
POS. 11	+12V	YELLOW	16 AWG	
POS. 12	+3.3V	ORANGE	16 AWG	
POS. 13	+3.3V	ORANGE	16 AWG	
POS. 14	-12V	BLUE	22 AWG	
POS. 15	GND	BLACK	16 AWG	
POS. 16	PS-ON	GREEN	22 AWG	
POS. 17	GND	BLACK	16 AWG	
POS. 18	GND	BLACK	16 AWG	
POS. 19	GND	BLACK	16 AWG	
POS. 20	FAN_QUIET	WHITE	24 AWG	
POS. 21	+5V	RED	16 AWG	
POS. 22	+5V	RED	16 AWG	
POS. 23	+5V	RED	16 AWG	
POS. 24	GND	BLACK	16 AWG	

PL

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L2 (MM)
POS. 1	COM	BLACK	18 AWG	310±20
POS. 2	COM	BLACK	18 AWG	
POS. 3	+12V	YELLOW	18 AWG	
POS. 4	+12V	YELLOW	18 AWG	

PR

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L (MM)
POS. 1	COM	BLACK	18 AWG	310±20
POS. 2	COM	BLACK	18 AWG	
POS. 3	+12V	YELLOW	18 AWG	
POS. 4	+12V	YELLOW	18 AWG	

PC

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L3(mm)
POS. 1	COM	BLACK	18 AWG	180±15
POS. 2	COM	BLACK	18 AWG	
POS. 3	COM	BLACK	18 AWG	
POS. 4	COM	BLACK	18 AWG	
POS. 5	+12V	YELLOW	18 AWG	
POS. 6	+12V	YELLOW	18 AWG	
POS. 7	+12V	YELLOW	18 AWG	
POS. 8	+12V	YELLOW	18 AWG	

PD

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L4(mm)
POS. 1	+12V	YELLOW	18 AWG	600±15
POS. 2	GND	BLACK	18 AWG	
POS. 3	GND	BLACK	18 AWG	
POS. 4	+5V	RED	18 AWG	

PE

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L8(mm)
POS. 1	+12V	YELLOW	18 AWG	50±15
POS. 2	GND	BLACK	18 AWG	
POS. 3	GND	BLACK	18 AWG	
POS. 4	+5V	RED	18 AWG	

PF

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L5(mm)
POS. 1	+12V	YELLOW	18 AWG	460±15
POS. 2	GND	BLACK	18 AWG	
POS. 3	GND	BLACK	18 AWG	
POS. 4	+5V	RED	18 AWG	

PG

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L8(mm)
POS. 1	+12V	YELLOW	18 AWG	50±15
POS. 2	GND	BLACK	18 AWG	
POS. 3	GND	BLACK	18 AWG	
POS. 4	+5V	RED	18 AWG	

PH

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L6(mm)
POS. 1	+12V	YELLOW	18 AWG	320±15
POS. 2	GND	BLACK	18 AWG	
POS. 3	GND	BLACK	18 AWG	
POS. 4	+5V	RED	18 AWG	

PI

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L9(mm)
POS. 1	+5V	RED	22 AWG	160±15
POS. 2	GND	BLACK	22 AWG	
POS. 3	GND	BLACK	22 AWG	
POS. 4	+12V	YELLOW	22 AWG	

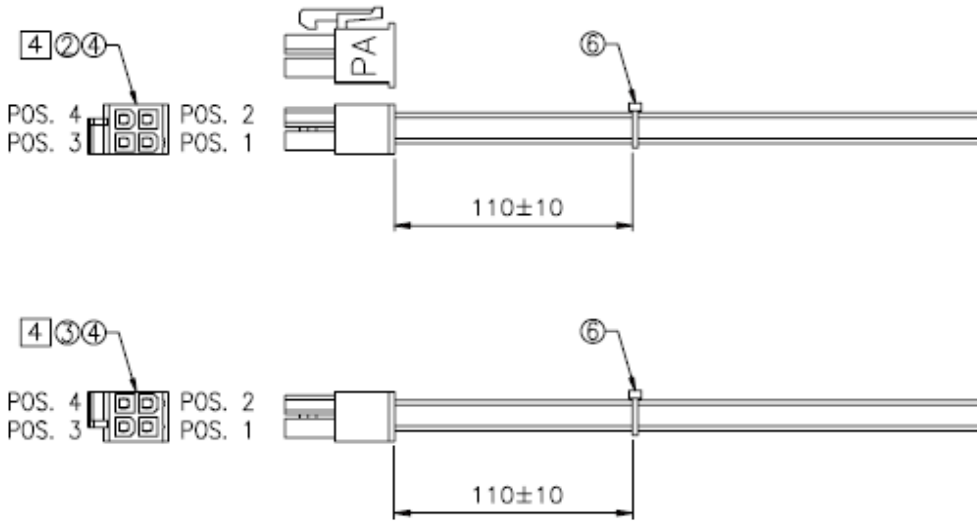
PJ

CONN. NO	RATING	WIRE COLOR	WIRE AWG	L9(mm)
POS. 1	+5V	RED	22 AWG	160±15
POS. 2	GND	BLACK	22 AWG	
POS. 3	GND	BLACK	22 AWG	
POS. 4	+12V	YELLOW	22 AWG	

Cable lengths tolerance +/-10mm.
24-pin: 29cm +/-1cm;
8-pin: 22cm +/-1cm;
4+4 8-pin: 31cm +/-1cm
HDD 4pin Molex PD: 60cm +/-1cm;
HDD 4pin Molex PE: 5cm +/-1cm;
HDD 4pin Molex PF: 46cm +/-1cm;
HDD 4pin Molex PG: 5cm +/-1cm;
HDD 4pin Molex PH 32m +/-1cm;
Floppy 4pin PI: 16cm +/-1cm;
Floppy 4pin PJ: 16cm +/-1cm;

3.9.2 4+4 8Pin Connector Detail

4+4 8pin housings use Yestone: 9357-08-L and 9357-08-R or equivalent. Terminal uses 44476-1111 or equivalent. Example drawing below:



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 5sec shall be able to reset the power supply.

4.1 Over Current Limit

The power supply shall have current limit to prevent the +3.3V, +5V, -12V, 5Vsb and +12V outputs from exceeding the values shown in Table11. If the current limits are exceeded, the power supply shall shutdown and latch off in timing (about 200ms) with no damage occur to PDB self and power supply. The Latch will be cleared by toggling the PSON # signal. The power supply shall not be damaged from repeated power cycling in this condition. Those outputs shall be protected so that no damage occurs to the power supply under a shorted output condition.

The +5VSB shall be protected and under over current limitation or shorted conditions so that no damage can occur to the power supply. 5VSB over current protection should be in hiccup mode (with at least 500ms off duty hiccup period) with OCP trigger delay of 200ms to 1 second to prevent mis-triggering of protection due to surge output loading current.

Table 11 ：Over current Protection	
Voltage	Over Current Limit (I out Limit)
+3.3V	110 % minimum , 150% maximum
+5V	110 % minimum , 150% maximum
+12V	110 % minimum , 150 % maximum
+5Vsb	4.5A minimum , 6.5A maximum
-12V	.55A minimum , 2A maximum

Note: Over current protection should not be triggered during the peak current duration and within the peak current limit as stated in table 4.

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. 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 by PSON signal on/off status. 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 degree C of ambient temperature hysteresis.

5. Control and Indicator Functions

The following sections define the input and output signals from the power supply. Signals are 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, -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. For manufacturing quality assurance, ON/OFF cycle should be tested with an ON/OFF cycle period of 6 seconds or less, with 50% PSON duty cycle logic low, another remaining 50% PSON duty cycle logic high. However, the product should be successfully turned on/off without any timing constrains.

Table 14 PSON# Signal Characteristics

Signal Type	Accepts an open collector/drain input from the system. Pull-up to 5VSB 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	5.25V
Source current, Vpson = low	*	4mA
Power up delay: T pson_on_delay	*	400msec
PWOK delay: T pson__pwok	*	50msec

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.

Table 15 PWOK Signal Characteristics

Signal Type	Open collector/drain output from power supply. Pull-up to 5V 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 = 200μA	2.4V	5.25V
PWOK delay: T pwok_ON	100ms	400ms
PWOK rise and fall time	*	100μsec
Power down delay: T pwok_off	1ms	

6. MTBF

The power supply shall have a minimum MTBF at continuous operation of 1) 200,000 hours at 100% load and 50 degree C, as calculated b Bellcore RPP, or 2) 300,000 hours demonstrated at 100% load and 50 degree C.

7. Definitions / Terms / Acronyms

Table 16 ：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 Correction
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.
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 a thermal fan speed control with a 80mm PWM fan by using AVC, Sanyo,

Nidec, or Delta Fan which shall have lower than 2 cm/sec^2 accelerate speed with 12V fan input measured on power supply surface. Fan speed vs. output power should meet the acoustic sound power level table below.

Acoustic Sound Power Level Table (100-240Vac input)

	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	3.5	3.5	4.0	45

Excluding internal fan (fan is turned off), the power supply acoustic sound power should be less than 15dBA during 100-240Vac input during standby and power on with all loading and temperature condition.

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.

9. Temperature Requirement

The power supply shall operate within all specified limits over T_{op} temperature range. All airflow shall pass through the power supply and not over the exterior surfaces of the power supply.

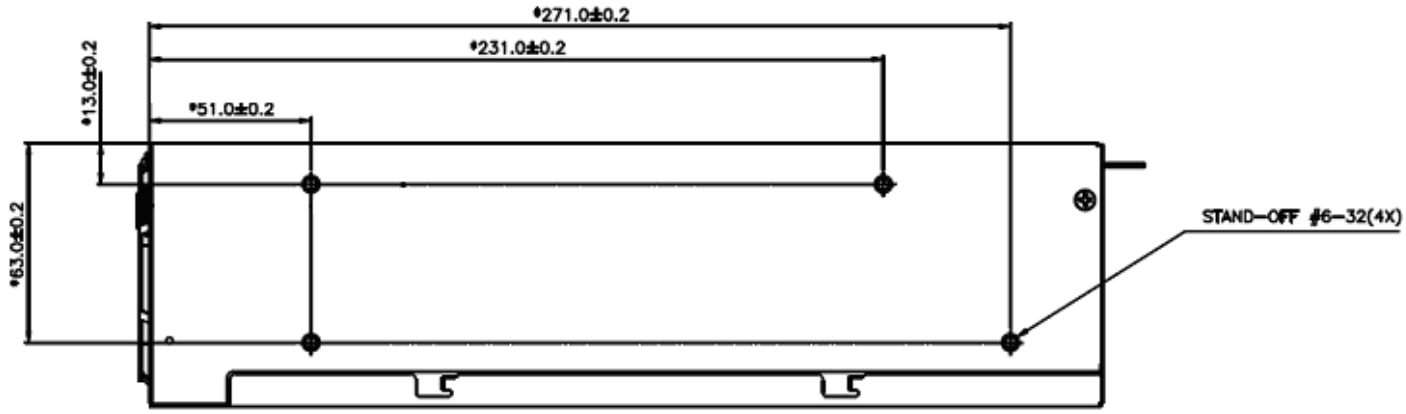
Table 17：Thermal Requirements

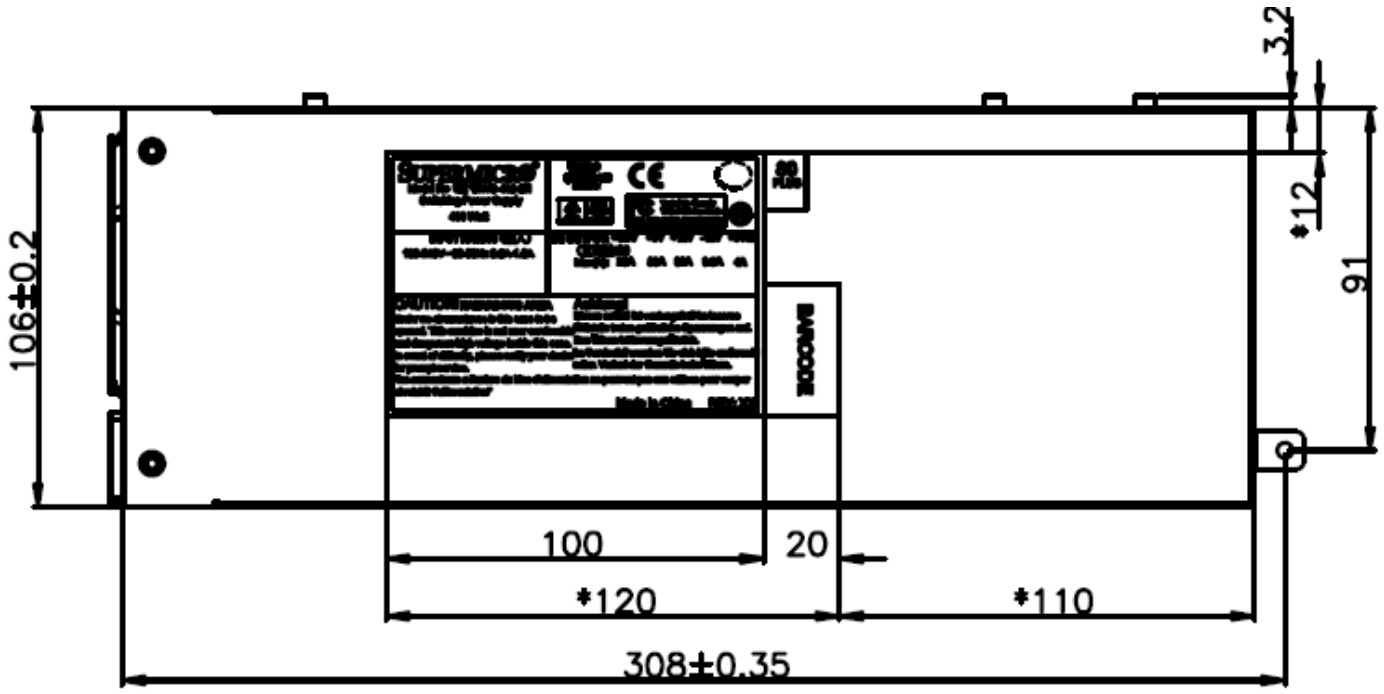
Item	Description	MIN	MAX	Units
T_{op}	Operating temperature range	0	50	Degree C
T_{non-op}	Non-operating temperature range	-10	70	Degree C

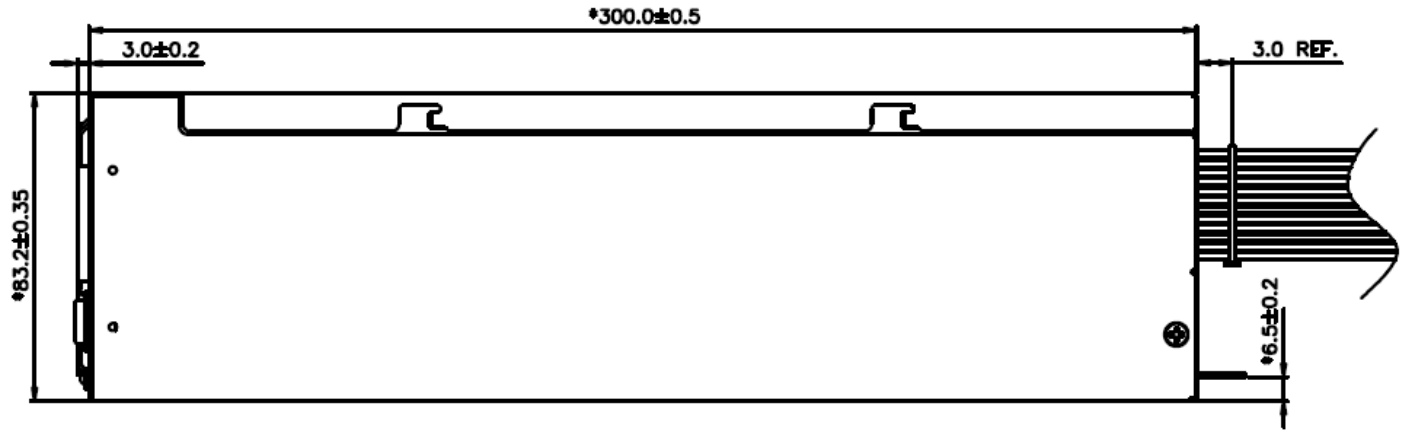
The power supply must meet UL enclosure requirements for temperature rise limits. All sides of the power supply, with exception to the air exhaust side, must be classified as " Handle, Knobs, grips, etc. held for short periods of time only ".

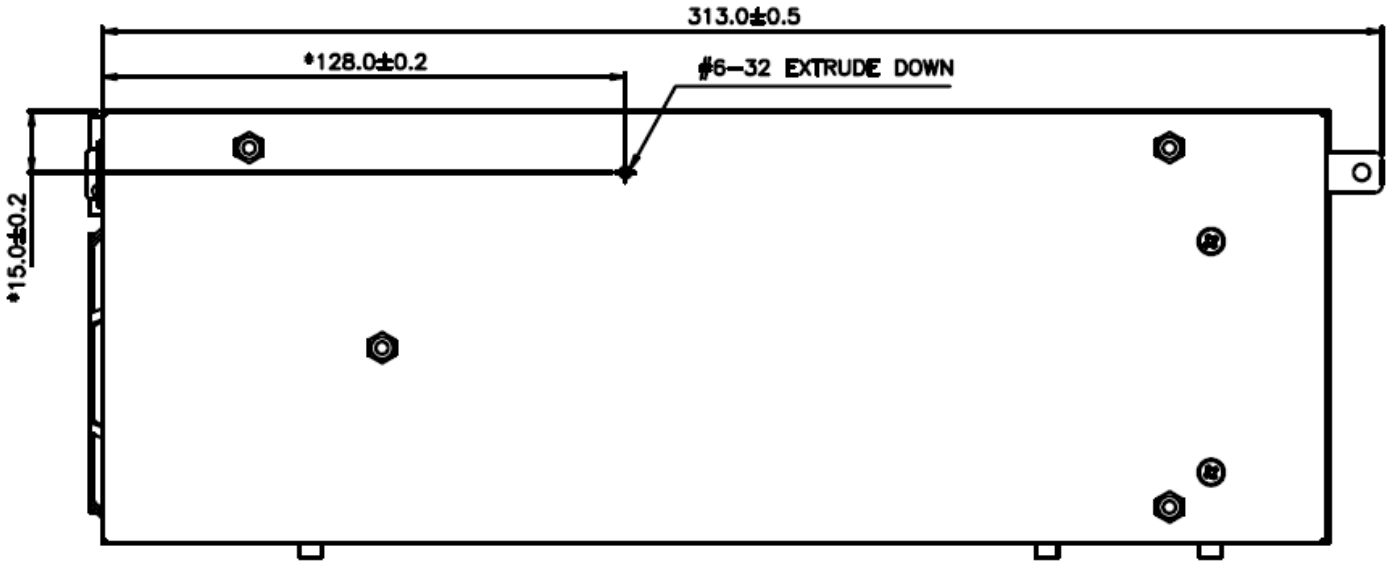
10. Mechanical Drawing (for reference only)

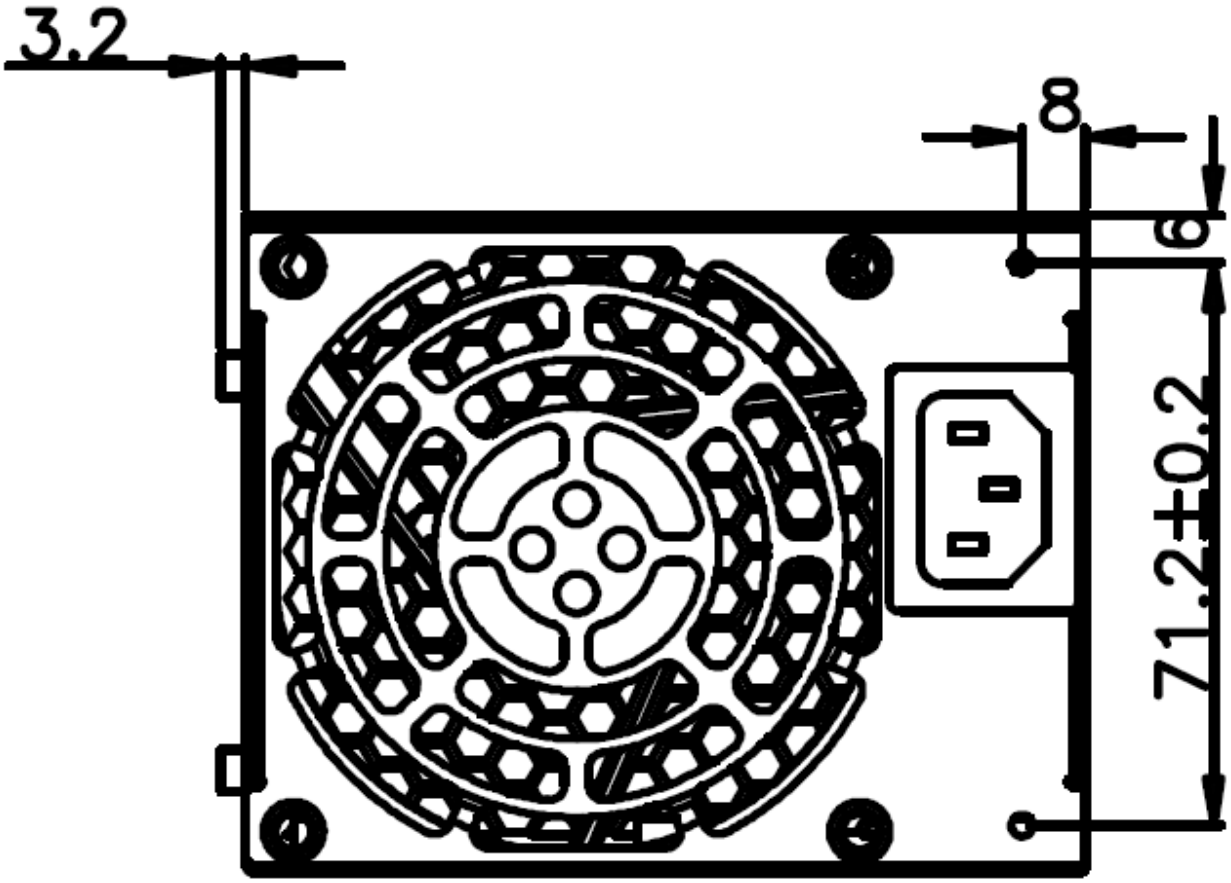
Dimension: 106W x 300L x 83.2H (measurement in mm)

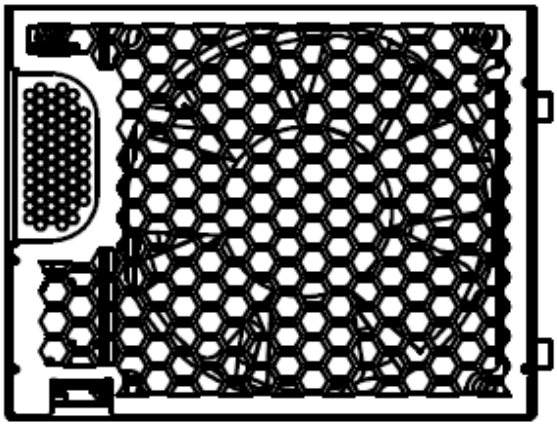

*271.0±0.2
*231.0±0.2
*13.0±0.2
*51.0±0.2
*63.0±0.2
STAND-OFF #6-32(4X)


3.2
*12
91
106±0.2
100
20
*120
*110
308±0.35


*300.0±0.5
3.0±0.2
3.0 REF.
*83.2±0.35
*6.5±0.2


313.0±0.5
*128.0±0.2
#6-32 EXTRUDE DOWN
*15.0±0.2


3.2
8
6
71.2±0.2



10.1 Connectors and Pin Assignment:

See 3.9.

11. Compliance Requirement

The power supply must comply with all regulatory requirements for its intended geographical market. Depending on the chosen market, regulatory requirements may vary. Although a power supply can be designed for worldwide compliance, there may be cost factors that drive different versions of supplies for different geographically targeted markets.

This specification requires that the power supply meet all regulatory requirements for the intended market at the time of manufacturing. Typically this includes:

- UL
- C-UL
- TUV
- CCC
- CB
- CISPR Class A
- FCC Class A
- CE for power supply itself (CE/immunity criteria A)
- RoHS (Full ROHS lead free 6/6)
- China RoHS
- Efficiency 80Plus Gold
- Immunity to meet ITE machine category on EN61000-4-X
- EUP (Energy Using Product) Directive 2005/32/EC
- BSMI-CNS 14336-1 (99 年版)
- REACH
- **Regulatory requirement:**

  Meet:

EN 60950-1: 2006+A11: 2009+A1: 2010+A12:2011;
EN55022:2010,
EN55024:2010,
EN 60100-3-2: 2006+A2:2009

The power supply itself meets class A with 6 dB margin of EMI limits for CE, FCC, CISPR tested with 20%, 50% and 100% full load, and 5Vsb only output resistance loading, and certificated with CE compliance. The power supply must be pre-heated by max loading burn in for more than 30 minutes right before the Conducted and Radiated Emission test. Vendor must provide Conducted & Radiated Emission testing data during each development stage (DVT, PR and MP).

The power supply, when installed in the system, shall meet immunity requirements specified in **EN55024: 2010**. 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. Conformance must be designated with the European Union CE Marking.
Specific immunity level requirements are left to customer requirements.

12. Environmental Requirements

This power supply shall pass HALT and reliability tests. Test condition: input 90Vac and 264Vac with full load.

Temperature

Operating: 0 to 50 degree Celsius

Non-operating: -10 to 60 degree Celsius

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.

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/hour

Abnormal Operating Ambient(at sea level):

N/A degrees Celsius
N/A survival time

HUMIDITY

Operating: 20% to 90% RH, Non-condensing
Storage: 5% to 95% RH, Non-condensing

ALTITUDE

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

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

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. 5-500Hz, 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. 5-500Hz, 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.

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**.**

HALT Test

The power supply should carry through HALT testing to demonstrate reliability performance. Test condition: input 90Vac and 264Vac with full load.

13. Capacitors Selection

All electrolytic capacitors must use Japanese brands: Nichicon, Rubycon, Toshiba, Murata, TDK, Nippon Chemi-con, NEC, Sanyo Electronics, Hitachi, and Panasonic Electronics.

For MLCC capacitor selection:
Japan: Murata, Taiyo-Yuden, TDK, Panasonics
USA: AVX, Kemet
Taiwan: Yageo
For capacitance less than 1uF, choose MLCC from Taiwan Yageo or tier one Japan, US suppliers only.
For capacitance higher or equal to 1uF, choose Tier one MLCC suppliers from Japan or US only.

14. Serial number:

P6532AYWWA00001

15. EC History List:

Version	History Change	Remark
001	**Draft release.**	**2011/5/13**