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SPECIFICATION

ZEN400

Oct, 2006
REV:01



MODEL: ZEN400

Revision History

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Author</u>

1. GENERAL DESCRIPTION AND SCOPE

This is the specification of Model ZEN400; AC-line powered switching power supply with active PFC (Power Factor Correction) circuit, meet EN61000-3-2 and with AC Input features 99Vac~264Vac.

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.

2.2 SAFETY

- NEMKO EN 60950-1
- UL 60950-1
- CB EN 60950-1
IEC 60950-1
- CE :
EN 55022:1998+A1: 2000, Class B
EN 61000-3-2: 2000
EN 61000-3-3: 1995+A1: 2001
CISPR22: 1997+A1: 2000, Class B
AS/NZS CISPR 22: 2002, Class B
- EN 55024: 1998+A1: 2001
IEC 61000-4-2: 2001
IEC 61000-4-3: 2002
IEC 61000-4-4:1995
+A1:2000+A2: 2001
IEC 61000-4-5: 2001
IEC 61000-4-6: 2001
IEC 61000-4-8: 2001

3. INPUT ELECTRICAL SPECIFICATIONS

3.1. AC INPUT

Parameter	Min.	Max.	Unit
V_{in} Voltage	99	264	VAC _{rms}
V_{in} Frequency	47	63	HZ

3.2. INRUSH CURRENT

(Cold start – 25 deg. C)

115V	No damage
230V	No damage

3.3. INPUT LINE CURRENT

115V	5.0 Amps – rms maximum
230V	2.5 Amps – rms maximum

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

A : 400W(25°C)

Output	Nominal	Regulation	Ripple/Noise	Min	Max	Notes
1	+3.3V	±5%	50mV	0A	20.0 A	
2	+5V	±5%	80mV	0A	14.0 A	
3	+12V1	±5%	120mV	0.2A	14.0 A	PEAK 15A
4	+12V2	±5%	120mV	0.2A	13.0 A	PEAK 16.5A
5	-12V	±10%	120mV	0 A	0.5 A	
6	+5VSB	±5%	50mV	0 A	2.5A	PEAK 3.5A

The +3.3V and +5V total output shall not exceed 130watts, total output power max shall not exceed 400W ,

B: 350W(40°C)

Output	Nominal	Regulation	Ripple/Noise	Min	Max	Notes
1	+3.3V	±5%	50mV	0A	20.0 A	
2	+5V	±5%	80mV	0A	12.0 A	
3	+12V1	±5%	120mV	0.2A	10.0 A	PEAK 11A
4	+12V2	±5%	120mV	0.2A	13.0 A	PEAK 16.5A
5	-12V	±10%	120mV	0 A	0.5 A	
6	+5VSB	±5%	50mV	0 A	2.5A	PEAK 3.5A

The +3.3V and +5V total output shall not exceed 130watts, total output power max shall not exceed 350W ,

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.

4.2 EFFICIENCY

In Standby mode, +5Vsb efficiency should be greater than 50% with a minimum loading of 100mA under I/P 230Vac.

Minimum Efficiency

Loading	Voltage	Full load	Typical load	Light load
Required Minimum Efficiency	115V	80%	80%	80%
Required Minimum Efficiency	230V	80%	80%	80%

The test loading condition is attached below

350W (loading shown in Amps)

Loading \ O/P	+12V1	+12V2	+5V	+3.3V	-12V	+5VSB
Full	7.9	11.9	9.5	15.9	0.3	1.0
Typical	4	6	4.8	7.9	0.1	1.0
Light	1.6	2.4	1.9	3.2	0.0	1.0

400W (loading shown in Amps)

Loading \ O/P	+12V1	+12V2	+5V	+3.3V	-12V	+5VSB
Full	11.2	12	11.2	16	0.3	1.0
Typical	5.6	6	5.6	8	0.1	1.0
Light	2.2	2.4	2.2	3.2	0.0	1.0

4.2.1. HOLD-UP TIME (@FULL LOAD)

99V ~264V: 17 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.

4.2.2 OUTPUT RISE TIME

For all output range voltages shall rise from $\leq 10\%$ of nominal to within the regulation ranges specified in Section 4.1.1 within 0.1 ms to 20 ms ($0.1 \text{ ms} \leq T_1 \leq 20 \text{ ms}$).

(10% TO 90% OF FINAL OUTPUT VALUE, @FULL LOAD)

4.2.3.OVER VOLTAGE PROTECTION

Voltage Source	Protection Point
+3.3V	3.7V-4.5V
+5V	5.7V-7.0V
+12V	13.1-15.6V

4.2.4.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, 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.

4.2.5.OVERLOAD PROTECTION

OUTPUT VOLTAGE	Max. overcurrent limit
+3.3V	50A
+5V	48A
+12V1	20A
+12V2	20A

4.2.6.POWER GOOD SIGNAL

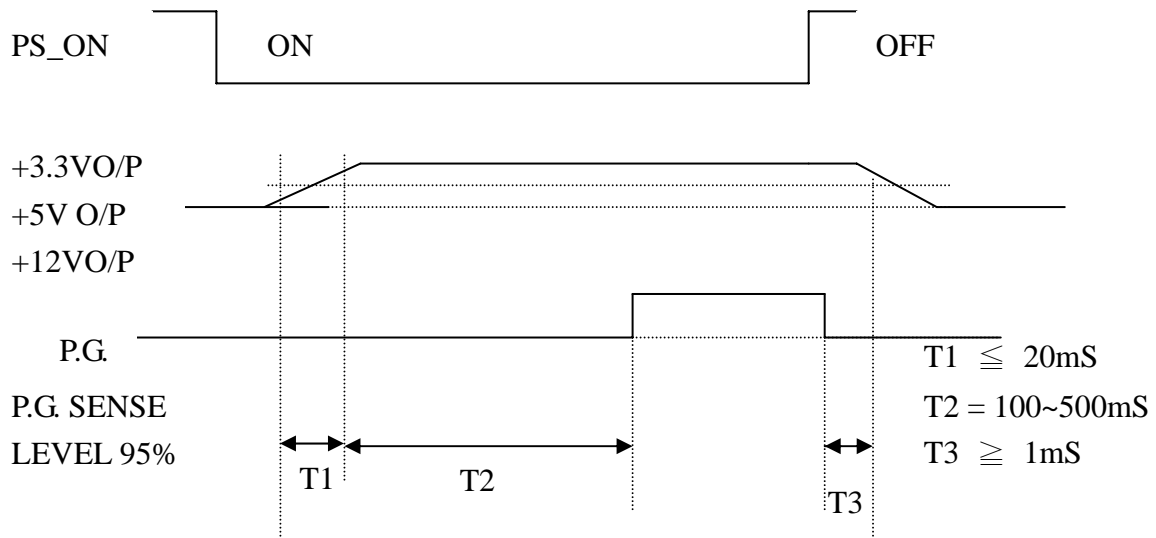
The power good signal is a TTL compatible signal for the purpose of initiating an orderly start-up procedure under normal input operating conditions. This signal is asserted (low) until +5Vdc has reached 4.75 volts during power up. Characteristics:

TTL signal asserted (low state) : less than 0.4V while sinking 4mA.

TTL signal asserted (high state): Between 2.4 V and 5 V output while sourcing 200 μ A

High state output impedance: less or equal to 1Kohm from output to common.

POWER GOOD @ 99Vac~264Vac,FULL LOAD	100 ~500mSec.
POWER FAIL @99Vac~264Vac, FULL LOAD	1 mSec. minimum



4.3 OUTPUT TRANSIENT LOAD RESPONSE

summarizes the expected output transient step sizes for each output. The transient load slew rate is = 1.0 A/ μ s.

DC Output Transient Step Sizes

Output	Max. setp size (% of rated output amps per Sec 4.1.1)	Max . step size (amps)
+12V1DC	40%	
+12V2DC	60%	
+5VDC	30%	
+3.3VDC	30%	
-12VDC		0.1A
+5VSB		0.5A

- Load-changing repetition rate of 50 Hz to 10 kHz
- Ac input range per section 3.1
- Capacitive loading per section 4.5

4.4. 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,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 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.

PS_ ON# Signal Characteristics

	Min.	Max.
V _{IL} , Input Low Voltage	0.0V	0.8V
I _{IL} , Input Low Current (V _{in} = 0.4V)		-1.6mA
V _{IH} , Input High Voltage (I _{in} = -200 μ A)	2.0V	
V _{IH} OPEN circuit, I _{in} = 0		5.25V

4.5 Capacitive Load

The power supply should be able to power up and operate normally with the following capacitances simultaneously present on the DC outputs. This capacitive loading should be used to check stability and should not be included for noise testing.

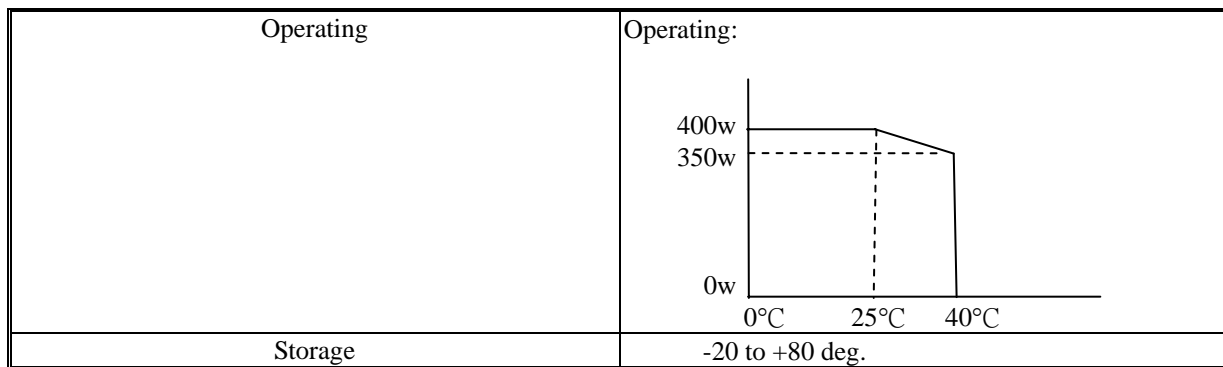
Output Capacitive Loads

Output	ATX12V Capacitive load (μ F)
+12V1DC	5000
+12V2DC	3000
+5VDC	6000
+3.3VDC	6000
-12VDC	350
+5VSB	350

5. ENVIRONMENTAL REQUIREMENTS

The power supply will be compliant with each item in this specification for the following Environmental conditions.

5.1. TEMPERATURE RANGE



5.2. HUMIDITY

Operating	5 –95% RH, Non-condensing
Storage	5 –95% RH, Non-condensing

5.3. VIBRATION

The subject power supply will withstand the following imposed conditions without experiencing non-recoverable failure or deviation from specified output characteristics.

Vibration Operating – Sine wave excited, 0.25 G maximum acceleration, 10-250 Hz swept at one

octave / min. Fifteen minute dwell at all resonant points, where resonance is defined as those exciting frequencies at which the device under test experiences excursions two times large than non-resonant excursions.

Plane of vibration to be along three mutually perpendicular axes.

5.4. MECHANICAL SHOCK

Non-operating 50 g, trapezoidal input; velocity change \cong 170 in/s

Three drops on each of six faces are applied to each sample.

6. SAFETY

6.1. LEAKAGE CURRENT

The leakage current from AC to safety ground will not exceed 3.5 mA-rms at 264Vac, 50 Hz.

7. ELECTROMAGNETIC 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 supply 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.

9. PHYSICAL REQUIREMENTS

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.