ENGINEERING SPECIFICATION

30W AC Adaptor

Part Number: PA-1300-04CO

Approval By: _____

Customer	Rev.	Written By	Effective Date	LITE-ON Technology Corp.
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Revision History

REV.X01, 2011.12.19
-Initial release

REV.X02, 2012.02.13
-Update 3.1. STATIC DC LOAD test criteria
-Update 7.5. Under Voltage Protection test criteria.
-update 2.4. EPS Requirement

REV.A, 2012.03.29
-Update 3.2 Dynamic load test condition
-Delete the 7.5 Under voltage Protection

Table Contents

1. GENERAL

1.1. Scope

This specification defines the performance characteristics of a single phase, 30W, 1 outputs power supply. This specification also defines worldwide safety and electromagnetic compatibility requirements for the power supply which is intended for use in notebook products.

1.2. Type of Power

Without power line harmonics and input 3-pin (IEC 320 C6 type) model

2. INPUT REQUIREMENTS

2.1. Input Voltage

	MINIMUM	MAXIMUM	NOMINAL
LOW RANGE	90VAC	132VAC	100-120VAC
HIGH RANGE	180VAC	264VAC	200-240VAC

2.2. Frequency

	MINIMUM	MAXIMUM	NOMINAL
SINGLE PHASE	47Hz	63Hz	50-60Hz

2.3. Voltage Section

A full range will be provided to select the appropriate range.

2.4. EPS Requirement

The Adaptor shall be designed to meet EPS Requirement and no Load Power Loss shall be less than 0.3W at both 115Vac/60Hz and 230Vac/50Hz. And Average Efficiency value of 25%, 50%, 75% and 100% load condition shall be more than 83.5% with both 115VAC/230VAC (Warm up after 30minus).

2.5. Tiny load Efficiency

In addition the device must meet the No Load/Light Load requirements as specified below (measured at 115Vac/60Hz and 230Vac/50Hz):

No Load/Light Load	
Output Load	Maximum Input Power
0W	0.3W
0.25W	0.5W
0.5W	1W
1.0W	1.7W
1.5W	2.4W
11.6W	14W
18.7W	22W

2.6. Input Current

1 Amps maximum at input voltage within the low range as specified in paragraph 2.1 and at any combination of loading conditions.

0.8 Amps maximum at input voltage within the high range as specified in paragraph 2.1 and at any combination of loading conditions.

2.7. Inrush Current

The inrush current shall be less than the ratings of its critical components for all conditions of line voltage.

2.8. Power Supply Efficiency

The power supply efficiency shall not be less than 84% measure at the maximum load as specified in paragraph 3.1 with the AC input set at the nominal voltage.

3. OUTPUT REQUIREMENTS

3.1. Static DC Load (CV Domain)

NOMINAL VOLTAGE (V)	LOAD CURRENT(A)		REGULATION
	MIN.	MAX.	
19.0	0	1.58	18.55V~19.95V

3.2. Peak Load

NOMINAL VOLTAGE (V)	LOAD CURRENT(A)	REGULATION
19	2.054	> 18V

* Duty: Ton=10ms, Toff=10ms (100%)
* Load Condition: 100% - 130%

3.3. Dynamic Load

NOMINAL VOLTAGE (V)	LOAD CURRENT(A)		REGULATION
	MIN.	MAX.	
19.0	0	1.58	18.05V~19.95V

* Freq: 10Hz – 1K
* Slew Rate: 1A/us
* Duty: 50%
*** Load condition: 0.1A~0.765A and 0.765A~1.53A**
* As measuring in IC Green-Mode, the load should be set to 0.1~1.58A.

3.4. Ripple and Noise

The ripple and noise of the outputs shall be measured at the load end if the output cables when terminated to load impedance as specified in paragraph 3.3.

OUTPUT VOLTAGE		RIPPLE & NOISE (P-P)	
19.0	V	380	mV

* Use 20MHz Bandwidth frequency scope.

3.5. Load Impedance

Filter capacitors are connected to each pins of the mating output connector. Capacitance values and material type are listed below.

VOLTAGE NOM.(V)	CAPACITANCE NOM.	MATERIAL TYPE
19.0	0.47uF/47uF	CERAMIC/ELE

Add 0.47uF/47uF capacitors at output connector terminal.
Use 20MHz Bandwidth frequency scope.

3.6. Rise Time

The output rise time (measured from the 10% point to the 90% point on the waveform) shall be less than 100ms at nominal line and maximum load.

3.7. Hold Up Time

The power supply shall maintain voltage regulation within the specified limits in paragraph 3.1 for at least 5 milliseconds after lost of input voltage measure at 115 V/60Hz,240V/50Hz and at maximum output load.

4. NO LOAD OPERATION

The power supply shall be able to operate under no load condition. No damage to the power supply is allowed and internal component can not be stressed beyond its rating.

5. FREQUENCY OF OPERATION

To keep audible noise to a minimum, power supply shall be switched at frequencies higher than 20 kHz (except no load operation)

6. TEMPERATURE COEFFICIENT

The temperature coefficient of all outputs is 0.05% per degree centigrade maximum.

7. PROTECTION

7.1. Over Voltage Protection

The power supply should shutdown for any cause of over voltage conditions before any output exceeds its limits below.

NOMINAL OUTPUT VOLTAGE (V)	OVER VOLTAGE
	MAX.
19V	27V

The power supply is latched and power on reset is required.

7.2. Short Circuit Protection

A short circuit placed on DC output shall cause no damage to or shutting down the power supply. The power supply will be auto-recovery.
Average input <=1.2W

7.3. Over Current Protection

The power supply shall provide over current protection on output. Maximum current inception point of output shall be limited to the following values:

OUTPUT VOLTAGE (V)	CURRENT LIMIT (A)	
19.0	1.6A Min	3.5A Max

Delay time 10 To 100ms, No damaged.
The adaptor shall be auto-recover.

7.4. Over Temperature Protection

The Adaptor shall provide Over Temperature Protection, and when the power occur the over temperature protection, the PSU shall be latch-off.

7.5. Input Under Voltage

Vin < 90Vac, NO damage.

8. TURN ON TIME

The turn on time shall be less than 3 sec. for all line and load conditions. (measured from AC on point to the 90% point of the output voltage)

9. SAFETY REQUIREMENTS

The power supply must comply with the following national standards:

UL/CSA/TUV

9.1. DIELECTRIC STRENGTH

Must be No arcing, no damage and no noise as follow condition:
Primary to Secondary: 4242 VDC for 1 sec, and the cut off current <10mA
Primary to Ground: 2150 VDC for 1 sec, and the cut off current <10mA

9.2. INSULATION RESISTANCE

Primary to secondary: 30 Meg. ohms Min., 500VDC

9.3. GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than 75uA.

10. ELECTROMAGNETIC COMPATIBILITY

Power supply for use with the host system will be tested to confirm the following emission standards.

10.1. FCC REQUIREMENTS

Power supply shall comply with the United States Communication Commission (FCC) Rules and Regulations, Part 15, Subpart J, Computing Devices "Class B limits".

10.2. VDE REQUIREMENTS

Power supply shall conform to the "Class B" requirements of CISPR 22.

10.3. VCCI REQUIREMENTS

Power supply shall conform to the "Class II" requirements of VCCI.

10.4. CE MARK

10.4.1. Immunity requirement

The adapter shall meet the below Immunity requirement based on EN55024 (1998+A1: 2001+A2:2003).

1. IEC 61000-4.2 (2001) ESD.
2. IEC 61000-4.3 (2002+A1:2002) RES
3. IEC 61000-4.4 (2004) FTB
4. IEC 61000-4.5 (2001)
5. IEC 61000-4.6 (2003+A1:2004)
6. IEC 61000-4.8 (2001)
7. IEC 61000-4.11(2004) PLD

10.4.2. Emissions requirement

The adapter shall meet EN55022 (1998+A1: 2000+A2:2003 Class B)

10.4.3. Power line Harmonics

The adapter shall meet EN61000-3-2 (2000 Class D)

10.4.4. Voltage Fluctuation and Flicker

The adapter shall meet EN610003-3 (1955+A1:2001)

10.5. LIGHTNING SURGE

A 1K volt (applied differential mode), and a 2K volt (applied common mode) by IEC 801-5:1992 Draft 7/92.

10.6. ESD

The power supply shall meet Contact discharge 8KV and Air discharge 15KV requirement, when power supply is operating at maximum load condition. No damage to the power supply is allowed in Air discharge 20kV.

11. RELIABILITY

11.1. Calculation MTBF

The PSU should not less than 100K hrs at 35 degree C at both 110VAC and 220VAC by MIL-HDBK-217E or other method.

11.2. Operation Life

The Adaptor shall be designed for a min. life of 8400hrs (Power-ON Hour) at both 110VAC/220VAC, ambient temperature at 25 degree C.

12. ENVIRONMENT

12.1. Operating

Temperature: 0 to 40 degrees centigrade.

Relative Humidity: 8 to 90 percent, non-condensing.

12.2. Shipping and Storage

Temperature: -20 to +85 degrees centigrade.
Relative Humidity: 5 to 90 percent, non-condensing.

12.3. RoHS Requirement

The Adaptor shall be designed to meet RoHS requirement.

13. TEMPERATURE RISE of Case Surface

The case temperature of AC adaptor shall not exceed (ΔT) 45 degree C for the top case and (ΔT) 50 degree C for bottom case with 25℃ Amb/no air flow/ 100VAC/50Hz/full load, and amb. sensor*2 at A3 size board (10mm thickness) diagonal location.

14. ACOUSTIC NOISE

The PSU set up measured should be made at 5cm distance between adapter and microphone. Acoustic noise test is at 100Hz~15kHz < 25db and at 15kHz~20kHz <31db with 100 Vac / 240Vac input voltage, test load is 0.1A, 0.2A, 0.3A, to full load.

15. DIMENSION

89.5(L) X 36.0(W) X 26.5(H) Unit：mm