

## **COVER PAGE FOR TEST REPORT**

Product Category:	Information Technology Equipment Including Electrical Business Equipment
Product Category CCN:	NWGQ, NWGQ7
Test Procedure:	Listing
Product:	Laptop Computer (OLPC)
Model/Type Reference:	XO-1
Rating(s):	12 Vdc, 1.42 A

Standards:	UL 60950-1, 1st Edition, 2006-07-07 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No. 60950-1-03, 1st Edition, 2006-07 (Information Technology Equipment - Safety - Part 1: General Requirements)
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Applicant Name and Address:	QUANTA COMPUTER INC 188 WEN-HWA 2ND RD KUEI SHAN HSIANG TAOYUAN HSIEN 333 TAIWAN
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This Report includes the following parts, in addition to this cover page:

1. Specific Technical Criteria
2. Clause Verdicts
3. Critical Components
4. Test Results
5. Enclosures

Issue Date: 2007-11-06  
Amendment 1 2007-12-11

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Report Reference #

E142692-A138-UL-1

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of Underwriters Laboratories Inc. ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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Test Report By:




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Reviewed By:



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## **SPECIFIC TECHNICAL CRITERIA**

<b>UL 60950-1, First Edition Information technology equipment - Safety- Part 1: General Requirements</b>	
Report Reference No .....	E142692-A138-UL-1
Compiled by .....	Kevin Hsu
Reviewed by .....	Derek Chen
Date of issue .....	2007-11-06
Standards .....	UL 60950-1, 1st Edition, 2006-07-07 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No. 60950-1-03, 1st Edition, 2006-07 (Information Technology Equipment - Safety - Part 1: General Requirements)
Test procedure .....	Listing
Non-standard test method .....	N/A
<b>Test item</b> description .....	Laptop Computer (OLPC)
Trademark .....	OLPC
	
Model and/or type reference .....	XO-1
Rating(s) .....	12 Vdc, 1.42 A

<b>Particulars: test item vs. test requirements</b>	
Equipment mobility .....	transportable
Operating condition .....	continuous
Mains supply tolerance (%) .....	No direct connection
Tested for IT power systems .....	No
IT testing, phase-phase voltage (V) .....	N/A
Class of equipment .....	Class III (supplied by SELV)
Mass of equipment (kg) .....	1.49 (max.)
Protection against ingress of water .....	IP 20

<b>Possible test case verdicts:</b>	
- test case does not apply to the test object .....	N / A
- test object does meet the requirement .....	Pass
- test object does not meet the requirement .....	Fail (acceptable only if a corresponding, less stringent national requirement is "Pass")

**General remarks:**

- "(see Enclosure #)" refers to additional information appended to the Test Report
- "(see appended table)" refers to a table appended to the Test Report
- Throughout the Test Report a point is used as the decimal separator

<b>GENERAL PRODUCT INFORMATION:</b>	
CA1.0	<b>Report Summary</b>
CA1.1	N/A
CB1.0	<b>Product Description</b>
CB1.1	<p>Electronic components are mounted on PWB, which is enclosed by plastic enclosure and accompanied with three USB ports, one Card Reader.</p> <p>The OLPC XO is a laptop computer system consisting of a (a) laptop computer, (b) direct-plug in power supply (power adapter) and (c) removable battery pack. The OLPC XO is intended for use as a child development tool primarily by children five years of age and older. In addition to IEC 60950-1, CSA/UL 60950-1 and EN 60950-1, applicable parts of ASTM F 963, 2007 Edition, Standard Consumer Safety Specification on Toy Safety, were applied to address use of the product by the intended user group.</p>
CC1.0	<b>Model Differences</b>
CC1.1	N/A
CD1.0	<b>Additional Information</b>
CD1.1	Additional investigation in accordance with EN 60950-1:2001+A11:2004 on the CB certificate.
CE1.0	<b>Technical Considerations</b>
CE1.2	The product was submitted and tested for use at the maximum ambient temperature (T <sub>ma</sub> ) permitted by the manufacturer's specification of: 45°C
CE1.7	The product was investigated to the following additional standards: 1. EN 60950-1:2001 (which includes all European national differences, including those specified in this test report)., 2. UL Standard for Safety for Electric Toys, UL 696, Ninth Edition, Dated March 15, 1996, Revisions: This Standard contains revisions through and including June 12, 2006., 3. ASTM F963, 2007 Edition, Standard Consumer Safety Specification on Toy Safety.
CE1.9	The following circuit locations (with circuit/schematic designation) were investigated as a limited power source (LPS): All USB ports.
CE2.0	Technical Considerations - Engineering Considerations: The OLPC XO is a laptop computer system consisting of a (a) laptop computer, (b) direct-plug in power supply (power adapter) and (c) removable battery pack. The OLPC XO is intended for use as a child development tool primarily by children five years of age and older. In addition to IEC 60950-1, CSA/UL 60950-1 and EN 60950-1, applicable parts of ASTM F 963, 2007 Edition, Standard Consumer Safety Specification on Toy Safety, were applied to address use of the product by the intended user group.

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.2	Input current	(see appended table 1.6.2)	Pass
4.5.1	Maximum temperatures	Operated in the most unfavorable way of operation given in the operating instructions until steady conditions established. (see appended table 4.5)	Pass
	Normal load condition per Annex L ..... :	Operated in the most unfavorable way of operation given in the operating instructions until steady conditions established.	Pass

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.5.1	TABLE: list of critical components					Pass
Object/part No.	Manufacturer/ trademark	type/model	technical data	Product Category CCN(s)	Required Marks of Conformity	Supplement ID
01 Connectors and Receptacles (secondary ELV/SELV circuits)	--	Metal/Plastic	Copper alloy pins housed in bodies of plastic rated V-2 min.	QMFZ2, ECBT2, RTRT2	UL	
02 Insulating Tubing/Sleeving	Various	Various	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; 105 degree C, 300V.	UZFT2, YDPU2, YDTU2	UL	
03 Label	Various	Various	60 degree C if Max. surface temperature not specified	PGDQ2 or PGJ12	UL	
04-01 Wiring, internal, secondary	Various	Various	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1; min 30 V, 60 degree C, routed away from primary uninsulated live parts, and unless insulated for the highest voltage involved, from insulated primary circuit wiring	AVLV2	UL	
05 Internal Plastic Part Materials	Various	Various	Min. V-2	QMFZ2	UL	
06 Printed Wiring Board	Various	Various	V-1 min., rated min. 105 degree C	ZPMV2	UL	
07 Plastic Material of Flexible Printed Wiring	Various	Various	V-2 min. or VTM-2 min. when no components mounted on surface	QMFZ2 or QMTS2	UL	
08 Enclosure	GE Plastics Pacific	CY0156	V-0 , 1.5 mm min., 70 degree C, overall 231.0 x 244.0 x 32.8 (with LCD panel) or 231.0 x 244.0 x 22.0 (without LCD panel area)	QMFZ2	UL	3-06
08a Enclosure	Chimei-Asahi	PC-540	V-0 , 1.5 mm min., 60 degree	QMFZ2	UL	3-06

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

(Alternate)	Corporation(TPI)		C, overall 231.0 x 244.0 x 32.8 (with LCD panel) or 231.0 x 244.0 x 22.0 (without LCD panel area)			
09 Power Adaptor	PI Electronics (H.K.) Ltd.	AD5953	INPUT: 100-240Vac 560mA 50/60Hz, OUTPUT: 12Vdc 1.417A.(Class II)	QQGQ	UL	
09a Power Adaptor (Alternate)	Lite-On	PA-1150-05Q1	I/P: 100-240VAC, 0.5A, 50-60HZ; O/P: 12V/1.42A(Class II)	QQGQ	UL	
09b Power Adaptor (Alternate)	Delta	ADP-17FB A	I/P: 100-240VAC, 0.8A, 50-60HZ; O/P: 12V/1.42A(Class II)	QQGQ	UL	
10 Battery pack	BYD	CL1	6.5 V, 3,100 mAh (Li-ion)	NWGQ/7, BBFS	UL	
10a Battery pack (Alternate)	Sylva Industries Ltd Rechargeable Battery Div	NTA2488	6.0 V, 3,000 mAh (Ni-MH)	NWGQ/7, BBFS	UL	
10b Battery pack (Alternate)	Sylva Industries Ltd Rechargeable Battery Div	NTA2490	7.3 V, 2800 mAh (Li-Fe)	NWGQ/7 BBFS	UL	
11 Mother board (for model XO-1)	Various	31CL1MB0060 Rev J	105 degree C	--	--	
11-1 Wireless LAN Card	Various	Various	3.3Vdc	--	--	
11-2 R.T.C. Battery	Hitachi Maxell Ltd.	ML1220	3V, 18 mAh rechargeable maximum abnormal charging current 10mA by multiple components Q33, D18 and R275 rated 1kohm	BBCV2	UL	
11-2a R.T.C. Battery (Alternate)	Matsushita Electric Industrial Co Ltd., Panasonic Corp Of North America.	ML1220	3V, 17 mAh rechargeable maximum abnormal charging current 10mA by multiple components Q33, D18 and R275 rated 1kohm	BBCV2	UL	
11-3. Protector IC U56 (for USB use)	RICHTEK	RT9703 series	2.0-5.5Vdc, 3.5A	--	--	



IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

11-3 a Protector IC U56 (for USB use) (Alternate)	GMT	G5282 series	2.0-5.5Vdc, 1.0 A	--	--	
11-4 SELV connectors	Various	Various	three USB ports Connector	QMFZ2, ECBT2, RTRT2	UL	
12 Speakers	Various	Various	Rated 8 ohm, max. 1.0 Watt, max. two provided	--	--	3-12
13 Keyboard	Various	Various	Min. flame HB	QMFZ2	UL	
14 LCD panel	Various	Various	7.5" TFT-LCD type, LED backlight module.	--	--	
15 Printed wiring board, flexible	Various	Various	Min V-2 or VTM-2, 105 degree C	ZPMV2 ZPXK2	UL	

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.6.2	TABLE: electrical data (in normal conditions)						Pass
fuse #	I rated (A)	U (V)	P (W)	I (mA)	I fuse (mA)	condition/status	
--	--	6.5Vdc	7.1	1090	1090	Maximum normal load with system discharge Battery pack power only D	
--	--	6 Vdc	6.9	1070	1070	Maximum normal load with system discharge Battery pack power only E	
---	--	--	--	--	--	Alternate Battery Pack, Sylva Industries Ltd Rechargeable Battery Div., Li-Fe Battery Pack, Model: NTA2490, rated 7.3 Vdc, 2800mAh	
--	1.42	12Vdc	17.1	1440	1440	Maximum normal load with empty battery pack, A and F.	
--	--	7.3 Vdc	11	1500	1500	Maximum normal load with system discharge Battery pack power only F	
supplementary information:							
Maximum Normal Load: The unit was installed fully discharged battery pack, playing software continuously, each USB ports load 2.5 W. Adaptor A. PI adaptor (Model AD5953LF) B. Delta adaptor (Model ADP-17FB A) C. Lite-on adaptor (Model PA-1150-05Q1) Battery pack model : D. BYD Battery Pack (Model CL1) E. Sylva Industries Ltd Rechargeable Battery Div., Battery Pack (Model NTA2488) F. Sylva Industries Ltd Rechargeable Battery Div., Li-Fe Battery Pack, (Model: NTA2490)							

4.5	TABLE: temperature rise measurements						Pass
test voltage (V).....	See below	--	--	--	--	--	—
t1 (°C).....	--	--	--	--	--	--	—
t2 (°C).....	--	--	--	--	--	--	—
maximum temperature T of part/at:	T (°C)					allowed Tmax (°C)	
5. Outside enclosure, top section, near CPU	34	54	32	52	--	95	
9. Outside enclosure, bottom surface, battery pack (Sylva Industries Ltd Rechargeable Battery Div.,)	27	47	29	49	--	75	
Alternate Battery Pack, Sylva Industries Ltd Rechargeable Battery Div., Li-Fe Battery Pack, Model: NTA2490, rated 7.3 Vdc, 2800mAh	Condition 3 (Original)	Condition 3 (Shift to 45)	Condition 4 (Original)	Condition 4 (Shift to 45)	--	--	
1.Amibent	25	45	25	45	--	--	
2. RTC battery	42	62	39	59	--	100	

IEC 60950-1						
Clause	Requirement + Test	Result - Remark				Verdict

3. CPU near PWB	42	62	44	64	--	105
4. Enclosure inside, top section, near CPU	39	59	40	60	--	70
5. Outside enclosure, top section, near CPU	35	55	35	55	--	95
6. Outside enclosure, top section, front panel LCD	31	51	30	50	--	75
7. Outside enclosure, bottom section, near mouse control board	26	46	26	46	--	75
8. Outside enclosure, bottom surface, battery pack (Sylva Industries Ltd Rechargeable Battery Div.,)	27	47	28	48	--	75
9. Enclosure inside near T1 (Adaptor)	48	68	32	52	--	95
temperature T of winding:		R <sub>1</sub> (Ω)	R <sub>2</sub> (Ω)	T (°C)	allowed Tmax (°C)	insulation class
supplementary information:						
Test Condition 1: Maximum normal load 12 Vdc, Duration 15hrs.50mins. Test Condition 2: Discharge battery pack only, Duration 2hrs.50mins. Test Condition 3: Maximum normal load 12 Vdc, Duration 15hrs.50mins. Test Condition 4: Discharge battery pack only, Duration 2hrs.50mins.						
Comments: The temperatures were measured under worst case normal mode defined in 1.2.2.1 load as described in 1.6.2 at voltages as described in 1.4.5. With max. ambient temperature specified as 45 degree C, the ore, the maximum temperature rise is calculated as follows: Components with: Max.temp.of 105 degree C(PWB) Max.temp.of 100 degree C(RTC)						
User accessible area: material is plastic 70 degree C (for Enclosure inside, top section, near CPU) material is plastic 75 degree C (for Outside enclosure, top section, front panel LCD) material is plastic 75 degree C (for Outside enclosure, bottom section, near mouse control board) material is plastic 75 degree C (for Outside enclosure, bottom surface, battery pack (BYD)/ (Sylva Industries Ltd Rechargeable Battery Div.,)) material is plastic 95 degree C (for Enclosure inside near T1 (Adaptor))						

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## **Enclosure**

### **Miscellaneous**

Supplement Id	Description
7-04	Datasheets for UL 696
7-05	Datasheets ASTM F963

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## **Enclosure**

### **Test Record**

Description
Test Record 1
CRD
Datasheets UL60950-1-1
Datasheets UL60950-1-2
Test Record 2
CRD
Datasheets

## Test Record No. 2

- The manufacturer submitted a sample representing production of representative production samples of Laptop Computer (OLPC), Model XO-1 employing alternate Battery Pack manufacturer by Sylva Industries Ltd Rechargeable Battery Div., Li-Fe Battery Pack, Model: NTA2490, rated 7.3 Vdc, 2800mAh and Enclosure manufacturer by Chimei-Asahi Corporation(TPI), Model PC-540, rated V-0 , 1.5 mm min., 60 degree C. - The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the U.S. and Canadian (Bi-National) Standard for Safety of Information Technology Equipment, CAN/CSA-C22.2 No. 60950-1-03, First Edition, including revisions through revision date July 7, 2006, UL 60950-1, First Edition, including revisions through revision date October 31, 2007. - The following tests conducted in accordance with UL60950-1, 1st Edition, Revised Date October 31, 2007, Information Technology Equipment-Safety-Part 1: General Requirements were considered representative of the same tests required by Canadian Standards, CNA/CSA-C22.2 No.60950-1-03, 1st Edition, Revised Date July 7, 2006, Information Technology Equipment-Safety-Part 1: General Requirements. - All IEC/EN/UL60950-1 tests were conducted by Underwriters Laboratories Taiwan Co., Ltd. - Unless otherwise indicated, all tests were conducted on Model XO-1. - Only limited tests were performed on Model Model XO-1, employing alternate Battery Pack manufacturer by Sylva Industries Ltd Rechargeable Battery Div., Li-Fe Battery Pack, Model: NTA2490, rated 7.3 Vdc, 2800mAh and Enclosure manufacturer by Chimei-Asahi Corporation(TPI), Model PC-540, rated V-0 , 1.5 mm min., 60 degree C, due to testing previously performed on the subject unit. -Test results reported relate only to the items tested.

The following tests were conducted:

Test	Testing Location/Comments
End Product Reference Page	
General Guidelines	
Input: Single-Phase (1.6.2)	
Heating (4.5.1, 1.4.12, 1.4.13)	

Test results are valid only for the tested equipment. These tests are considered representative of the products covered by this Test Report. The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard(s) referenced at the beginning of this Test Report.