

COVER PAGE FOR TEST REPORT

Product Category:	Information Technology Equipment Including Electrical Business Equipment
Product Category CCN:	NWGQ, NWGQ7
Test Procedure:	Listing
Product:	Flat Panel Monitor
Model/Type Reference:	ES-3115XXXXXXXX, ES-3117XXXXXXXX and ES-3112XXXXXXXX
Rating(s):	12 V dc, 4 A
Standards:	UL 60950-1:2003, First Edition CSA C22.2 No. 60950-1-03 1st Ed. April 1, 2003
Applicant Name and Address:	ADVANTECH CO LTD 4TH FL 108-3 MING-CHUAN RD SHING-TIEN CITY TAIPEI HSIEN TAIWAN
This Report includes the following parts, in addition to this cover page: <ol style="list-style-type: none">1. Specific Technical Criteria2. Clause Verdicts3. Critical Components4. Test Results5. National Differences6. Enclosures	

This is to certify that representative samples of the products covered by this Test Report have been investigated by Underwriters Laboratories Inc. ('UL') 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 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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Pursuant to the Corporate Services Agreement between UL International Services Limited and UL, UL hereby accepts and issues this Test Report.

Test Report By:

Reviewed By:

Leslie Shih
Engineer

Derek Chen
Associate Project Engineer
UL International Services Limited

SPECIFIC TECHNICAL CRITERIA

UL 60950-1, First Edition Information technology equipment - Safety- Part 1: General Requirements	
Report Reference No.....	E180881-A58-UL-1
Compiled by	Leslie Shih
Reviewed by	Derek Chen
Date of issue	2004-10-13
Standards	UL 60950-1:2003, First Edition CSA C22.2 No. 60950-1-03 1st Ed. April 1, 2003
Test procedure	Listing
Non-standard test method	N/A
Test item description	Flat Panel Monitor
Trademark	None
Model and/or type reference	ES-3115XXXXXXXX, ES-3117XXXXXXXX and ES-3112XXXXXXXX
Rating(s)	12 V dc, 4 A

Particulars: test item vs. test requirements	
Equipment mobility	movable
Operating condition	continuous
Mains supply tolerance (%)	No direct connection to mains supply - no tolerances applied.
Tested for IT power systems	N/A
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class III (supplied by SELV)
Mass of equipment (kg)	4.22 kg (ES-3115XXXXXXXX), 5.02 (ES-3117XXXXXXXX), 3.08 (ES-3112XXXXXXXX)
Protection against ingress of water	IP X0

Possible test case verdicts:	
- 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")

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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

GENERAL PRODUCT INFORMATION:	
CA1.0	Report Summary
CA1.1	N/A
CB1.0	Product Description
CB1.1	The unit was configured as follows: Electronic components were mounted on PWB and then housed within a metal enclosure incorporated with an UL Listed external adaptor marked with "LPS".
CC1.0	Model Differences
CC1.1	Model ES-3117XXXXXXX is similar to Model ES-3115XXXXXXX except for alternating shape of metal enclosure and Model designation. Model ES-3112XXXXXXX is similar to model ES-3115XXXXXXX except for model designation, inverter, flate panel side and enclosure shape.
CD1.0	Additional Information
CD1.1	N/A
CE1.0	Technical Considerations
CE1.2	The product was submitted and tested for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 50 degree C
CE1.8	The following accessible locations (with circuit/schematic designation) are within a limited current circuit: Secondary side of D/A Inverter.

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.2	Input current	<p>The steady state input current of the equipment did not exceed the RATED CURRENT by more than 10% under NORMAL LOAD. (See appended table 1.6.2)</p> <p>For model 3112XXXXXXXXX, the test had been conducted.</p>	Pass
2.4.2	Limit values	<p>Current did not exceed 0.7 mA peak or 2 mA dc when frequencies not exceeding 1 kHz and did not exceed 0.7 mA multiplied the value of the frequency in kilohertz but 70 mA peak maximum when frequencies exceeding 1kHz.</p> <p>For model 3112XXXXXXXXX inverter Lecerf Technology IV-12B, min. limit value 28.224 mA measured in CN3 pin 4-E, while R21 short, max. limit value 70 mA.</p>	Pass
	Frequency (Hz)	<p>(Report reference No: E180881-A58) (Inverter Lecerf Technology PN LV-1201-D) Frequency > 1 KHz. Min. measured 45.87 KHz from CN3 pin 1 to pin 2 when normal condition. (Inverter Lecerf Technology PN LV-17AA) Frequency > 1 KHz. Min. measured 49.5 KHz from CN2 pin 1 to Earth when R3 short.</p> <p>For model 3112XXXXXXXXX inverter Lecerf Technology IV-12B, min. Frequency value 40.32 KHz measured in CN3 pin 4-E, while R21 short, max. Frequency value 120 MHz measured in CN3 pin 4-E, while D4 short.</p>	

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Measured current (mA)	<p>(Report reference No: E180881-A58) (Inverter Lecerf Technology PN LV-1201-D) Frequency > 1 KHz. Max. measured 36.8 mA from CN3 pin 1 to Earth when C3 short; only measured 9.6 mA from CN3 pin 1 to pin 2 when normal condition. (Inverter Lecerf Technology PN LV-17AA) Frequency > 1 KHz. Max. measured 39.2 mA from CN2 pin 1 to Earth when C3 short; only measured 21.2 mA from CN2 pin 1 to Earth when R3 short.</p> <p>For model 3112XXXXXXX inverter Lecerf Technology IV-12B, min. measured current value 0.4 mA in CN3 pin 4-E, while D4 short, max. measured current value 34.8 mA in CN3 pin 1-E, while L1 short.</p>	-
	Measured voltage (V)	<p>(Report reference No: E180881-A58) (Inverter Lecerf Technology PN LV-1201-D) Frequency > 1 KHz. Max. measured 73.6 Vpk from CN3 pin 1 to Earth when C3 short in Method I. 1280 Vpk in Method II. (Inverter Lecerf Technology PN LV-17AA) Frequency > 1 KHz. Max. measured 78.4 Vpk from CN2 pin 1 to Earth when C3 short in Method I. 1640 Vpk in Method II.</p> <p>For model 3112XXXXXXX inverter Lecerf Technology IV-12B, min. measured voltage value 0.8 V in CN3 pin 4-E, while D4 short. max. measured</p>	-

IEC 60950-1			
Clause	Requirement + Test	Result - Remark	Verdict
		voltage value 69.6 V in CN3 pin 1-E, while L1 short. Open circuit voltage 1.56 KV.	
	Measured capacitance (mF).....:	(Report reference No: E180881-A58) (Inverter Lecerf Technology PN LV-1201-D) 33 pF. (Inverter Lecerf Technology PN LV-17AA) 22 pF. For model 3112XXXXXXX inverter Lecerf Technology IV-12B, open circuit voltage 1.56 KV, 22pF, 0.03432 uC.	
4.2.10	Wall or ceiling mounted equipment; force (N)	Mounting means withstands four times unit weight or 50N minimum. For model 3112XXXXXXX, unit forced 9.24 Kg, which was 3 times the weight of unit, the test had been conducted.	Pass
4.5.1	Maximum temperatures	The equipment and its components or parts did not attain excessive temperatures during normal operation. (See appended table 4.5) For model 3112XXXXXXX, the test had been conducted.	Pass
5.3.1	Protection against overload and abnormal operation	(See appended table 5.3) For model 3112XXXXXXX, the test had been conducted.	Pass

IEC 60950-1				
Clause	Requirement + Test	Result - Remark		Verdict
10A-1 Capacitors (C3, C4)	Various	Various	33pF maximum, 3kV	--
10A-2-1 Transformers (T1, T2)	Various	Various	Open type	--
10A-2-2 Transformers (T1, T2), Bobbin	Various	Various	Liquid Crystal Polymer (L.C.P.), nine-flanges type, rated V-2 minimum, minimum thickness 0.3 mm or Phenolic, Min. 0.71 mm.	UL
10A-2-3 Transformers (T1, T2), Wiring	Various	Various	105 °C min.	UL
10B DC/AC Inverter, alternate	Lecerf Technology	LV-17AA	I/P: 12 Vdc, 2.5 A max. O/P: 1800 Vrms max., 7.5 mA max.	--
10B-1 Capacitors (C3, C4, C21, C22)	Various	Various	22pF maximum, 3kV	--
10B-2-1 Transformers (T1, T2)	Various	Various	Open type	--
10B-2-2 Transformers (T1, T2), Bobbin	Various	Various	Liquid Crystal Polymer (L.C.P.), nine-flanges type, rated V-2 minimum, minimum thickness 0.3 mm or Phenolic, Min. 0.71 mm.	UL
10B-2-3 Transformers (T1, T2), Wiring	Various	Various	105 °C min.	UL
11 Speakers	--	--	Optional two provided, 8 ohm max., 2 Watt max.	--
12. DC/AC Inverter (for Model IES-3112)	Lecerf Technology	IV-12B	I/P: 13 Vdc, 1.6 A max. O/P: 1350 Vrms max., 15.0 mA max.	--
12-1 Transformer (T2)	Lecerf Technology	X08-C	Class 105°C, overall 20.5 by 19.9 by 9.9 mm	--
12-1-1 Winding Wire	--	--	Enameled copper wire, 130 °C	UL

IEC 60950-1				
Clause	Requirement + Test	Result - Remark		Verdict
12-1-2 Bobbin	--	--	V-0, 130 °C, overall 19.0 by 18.9 by 9.5 mm, 0.71 mm thick min.	QMFZ2 UL
12-1-3 Core	--	--	Ferrite core, overall 20.4 by 19.6 by 6.2 mm	--
12-2 Capacitor (C1, C8)	--	--	22pF/3KV	--

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
--	4.0	12.0	6.67	553	--	Maximum normal load (ES-3112XXXXXXXXX)
supplementary information:						

4.5	TABLE: temperature rise measurements						Pass
	test voltage (V).....	12 Vdc	12 Vdc	---	---	---	---
	t1 (°C)	---	---	---	---	---	---
	t2 (°C)	50 degree C	50 degree C	---	---	---	---
maximum temperature T of part/at:		T (°C)					allowed Tmax (°C)
Normal Condition (Model ES-3112XXXXXXXXX)		Test Condition 3: 12 V dc, Duration 3.25 hrs (Model ES-3112XXXXX XXX).	--	--	--	--	--
Ambient		23.6 (45)	--	--	--	--	--
DC Jack body		33.6(55.0)	--	--	--	--	--
PWB under U4		47.8(68.2)	--	--	--	--	105
C10 body		40.5(61.9)	--	--	--	--	85
L1 coil		43(64.4)	--	--	--	--	95
PWB under U8		42.4(63.8)	--	--	--	--	105
PWB under U1		34.2(55.6)	--	--	--	--	105
PWB under D7		55.1(76.5)	--	--	--	--	105
L2 coil of DC/AC Inverter		52.3(73.7)	--	--	--	--	95
T2 coil of DC/AC Inverter		54.6(76.0)	--	--	--	--	95
T2 core of DC/AC Inverter		55.6(77.0)	--	--	--	--	95
Panel body		40.8(62.2)	--	--	--	--	--
Enclosure outside near T1		31.4(52.8)	--	--	--	--	70

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

temperature T of winding:	R ₁ (Ω)	R ₂ (Ω)	T (°C)	allowed Tmax (°C)	insulation class
supplementary information: (Report reference No: E180881-A58) Conditions: Test Condition 1: 12 V dc, Duration 3.75 hrs (Model ES-3115); Test Condition 2: 12 V dc, Duration 3.25 hrs (Model ES-3117). Test Condition 1: 12 V dc, Duration 3.0 hrs under Condition B Comments: (for Model ES-3112XXXXXXXX) With a specified max. ambient temperature of 45 degree C, the max. temperature is calculated as follows: Component with: - Max. absolute temp. of 85 degree C (Capacitor) - Max. absolute temp. of 105-10 = 95 degree C (Windings) - Max. absolute temp. of 105 degree C (PWB) External or Internal metal surfaces of equipment which may be touched: - Required Tmax. = 45K+25 = 70 degree C					

5.3	TABLE: fault condition tests						Pass
	ambient temperature (°C) : 25 degree C						—
	model/type of power supply : ---						—
	manufacturer of power supply : ---						—
	rated markings of power supply : ---						—
component No.	fault	test voltage (V)	test time	fuse No.	fuse current (A)	result	
Ventilation openings (Model ES-3112)	Blocked	12 Vdc	2.85 hrs	--	--	NC, NT, CT; max. measured current 0.553 A; measured temp. of T2 coil/core 59.9/60.2 °C.	
supplementary information:							

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Enclosure
National Differences

(Total 2 Pages including this Cover Page)

USA / Canada

- * No National Differences Declared
- ** Only Group Differences

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IEC 60950-1			
SubClause	Difference + Test	Result - Remark	Verdict

USA / Canada - Differences to IEC 60950-1:2001, First Edition			
1.1.1	Equipment able to be installed in accordance with ANSI/NFPA 75 and NEC Art. 645 unless intended for use outside of computer room and provided with such instructions.		Pass

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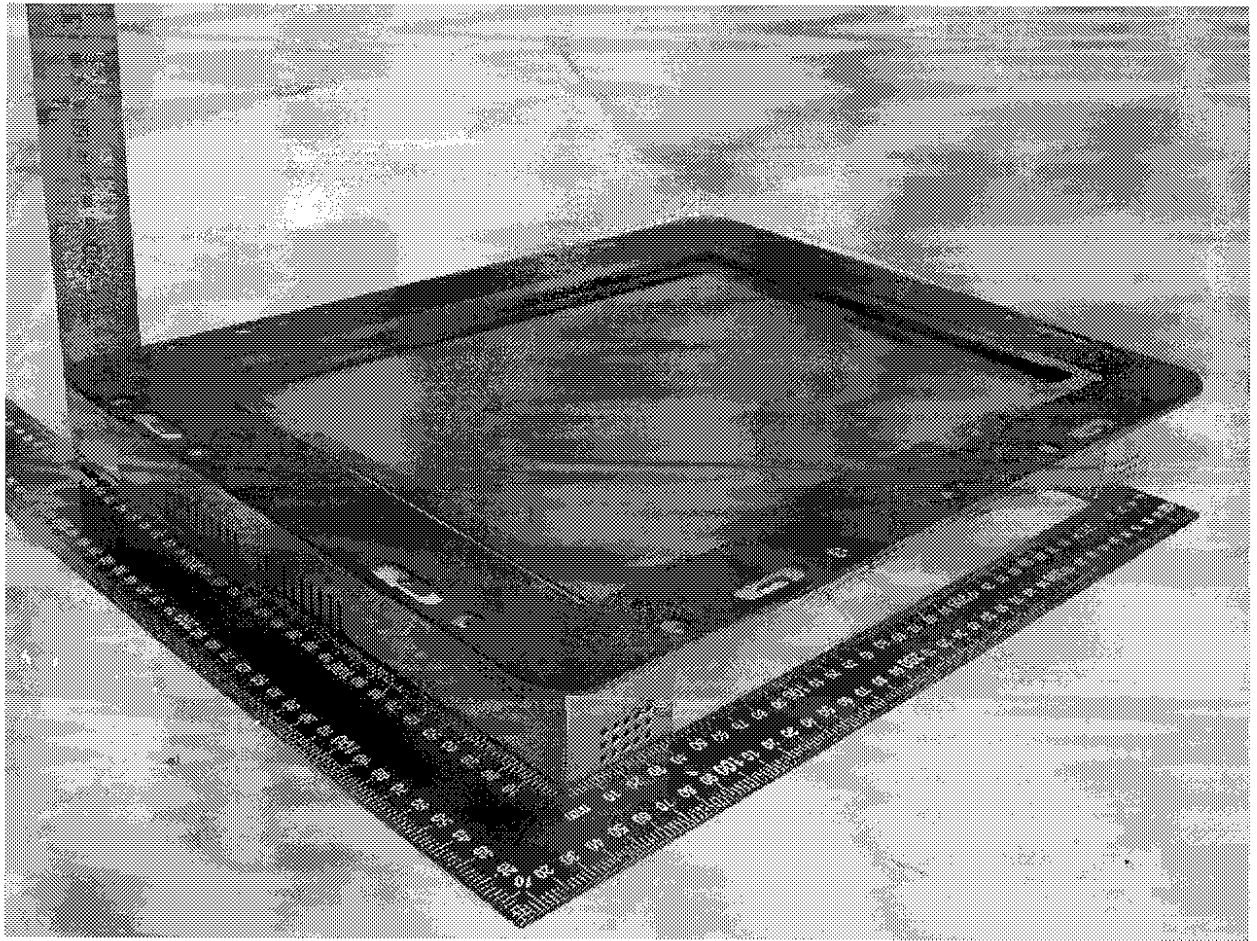
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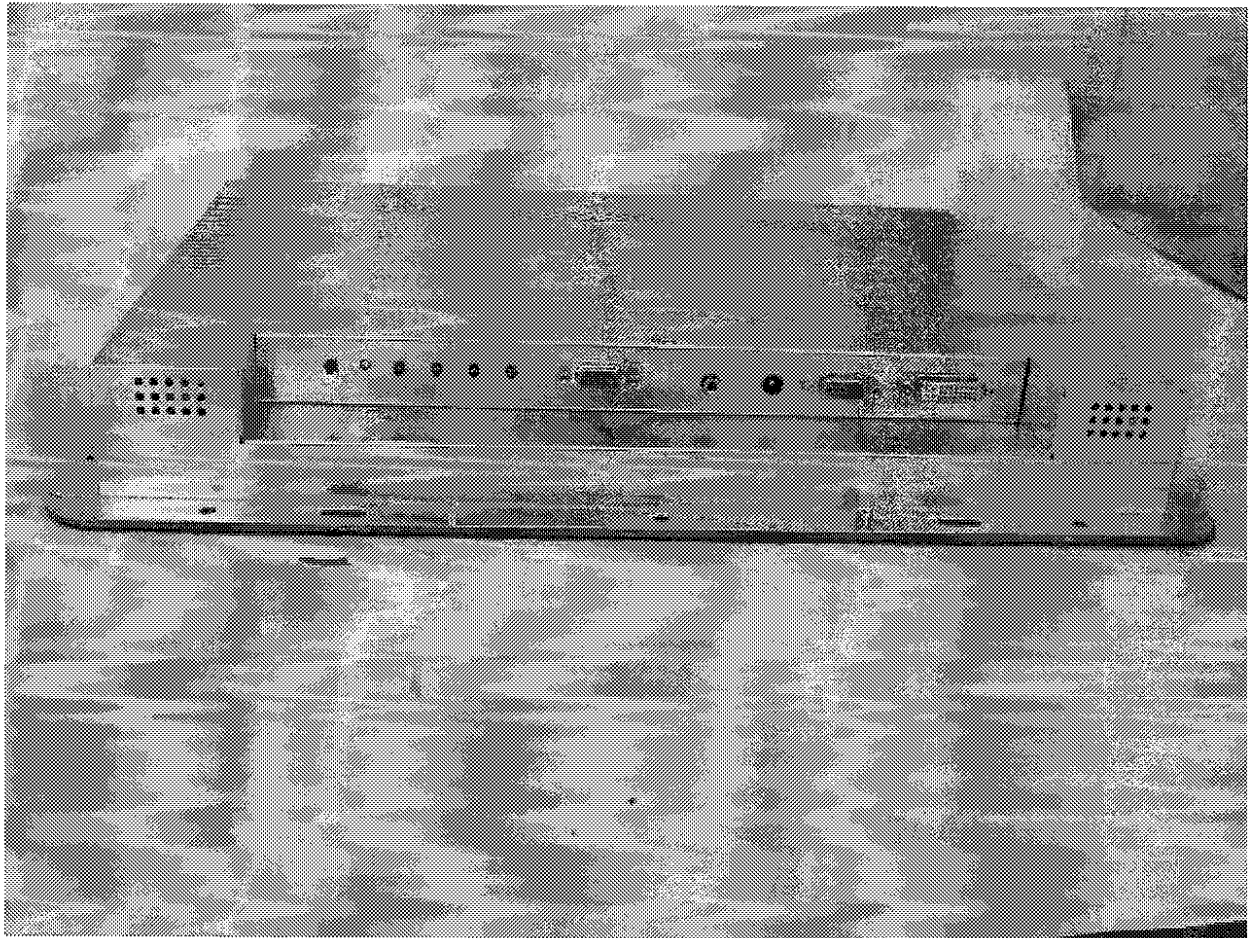
Enclosure

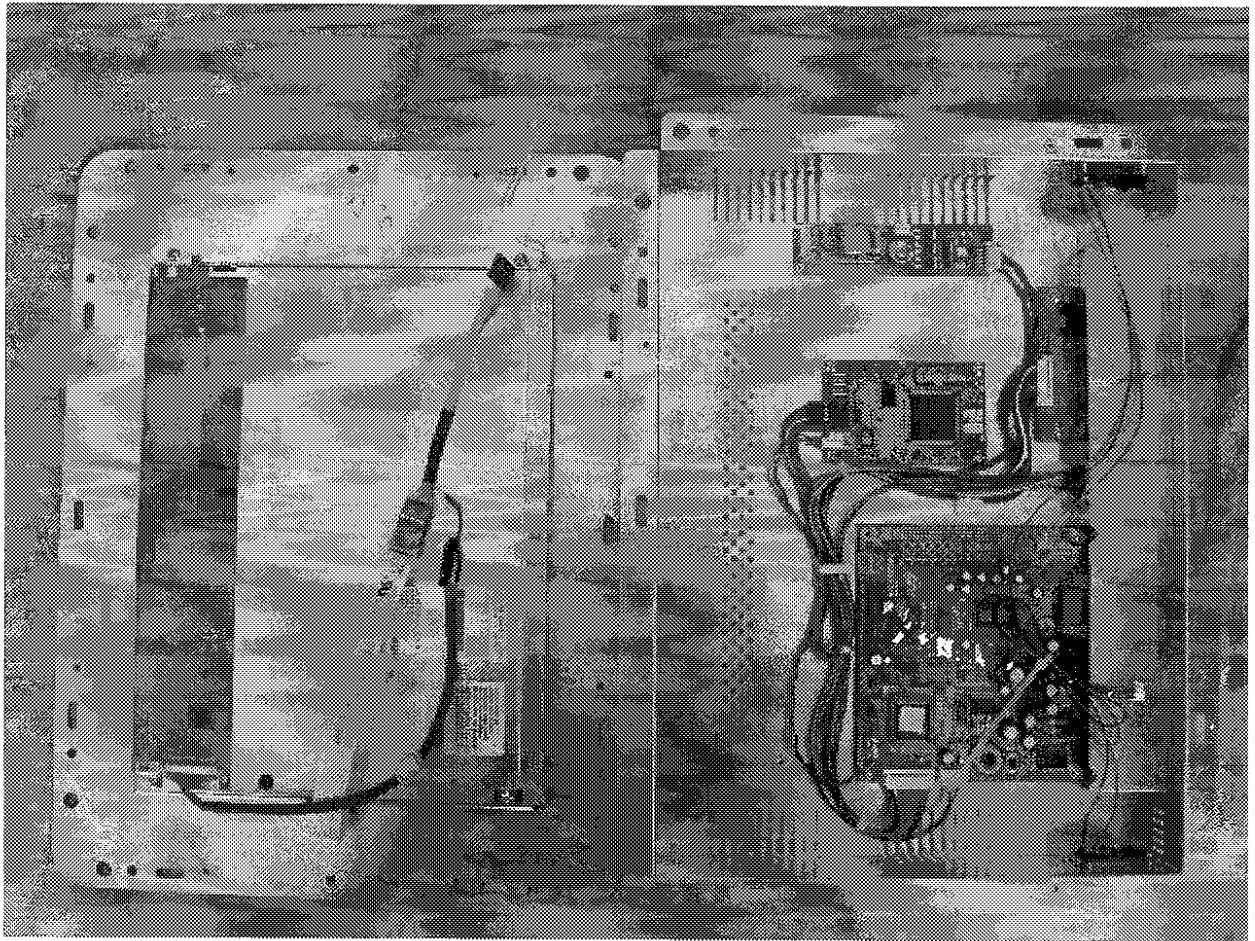
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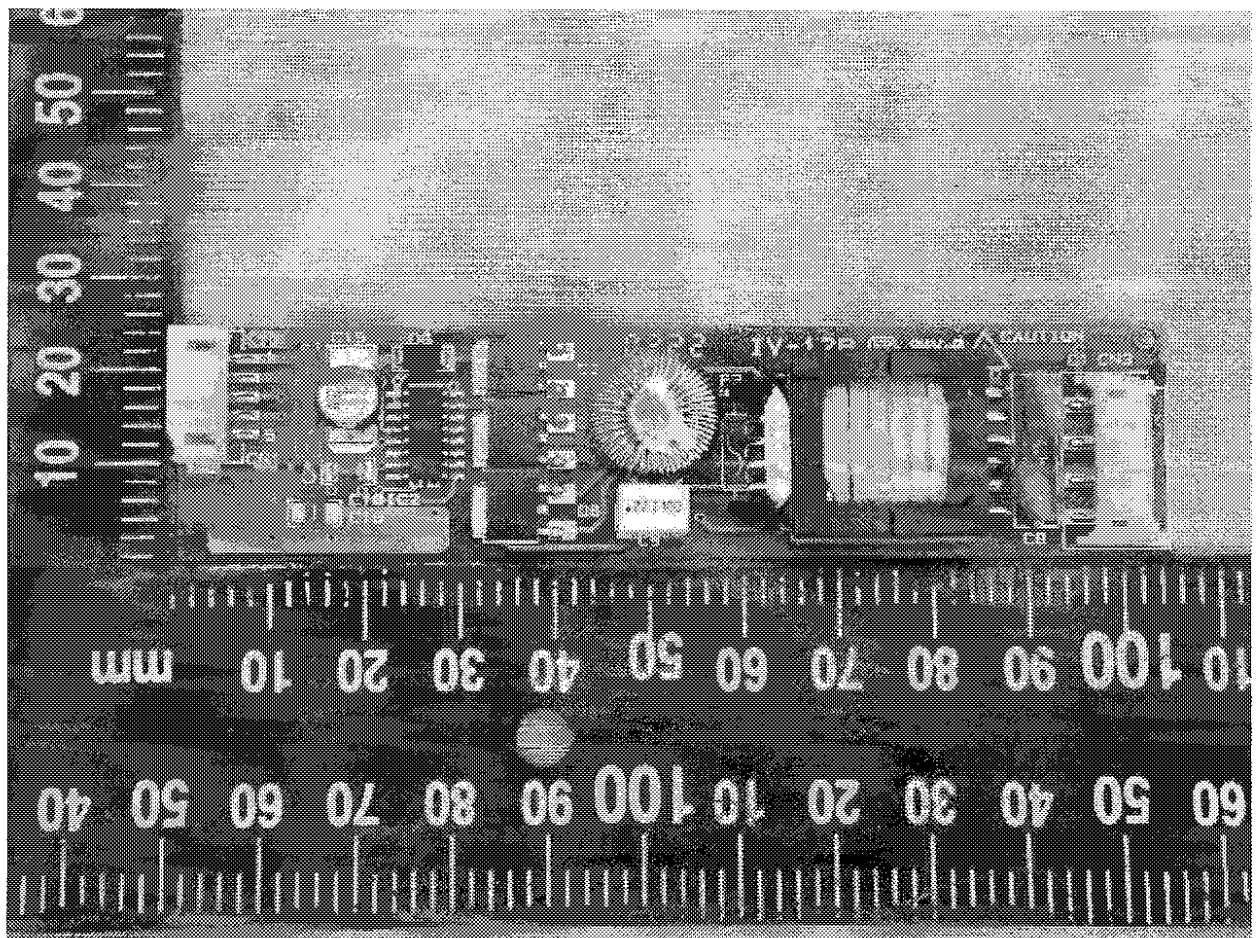
(Total 5 Pages including this Cover Page)

Supplement Id	Description
3-01	Overall view of Enclosure A
3-02	Internal view of Enclosure A
3-03	Overall view of Enclosure B
3-04	Internal view of Enclosure B
3-05	Front overall view
3-06	Rear overall view
3-07	Internal view
3-08	Inverter, Lecerf Technology/IV-12B









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Enclosure

Diagrams

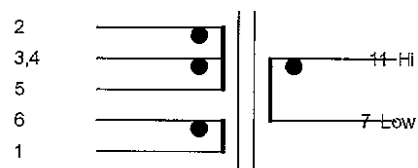
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Supplement Id	Description
4-01	Inverter transformer Construction of PN LV-1201-D
4-02	Inverter transformer Construction of PN LV-17AA
4-03	Inverter transformer Construction of IV-12B

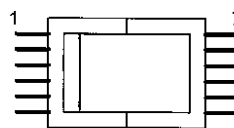


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TRANSFORMER SPECIFICATION(X08-C)



X08-C



TOP VIEW

WINDING SPECIFICATION

Coil	Terminal	Winding spec.	Remarks
W1	2~3,4	2UEW 0.4	10 Ts
W2	3,4~5	2UEW 0.4	10 Ts
W3	6~1	2UEW 0.4	2 Ts
W4	7~12	2UEW 0.09	1500 Ts

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Enclosure
Schematics + PWB

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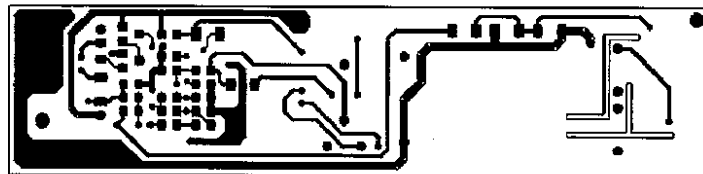
Supplement Id	Description
5-01	Trace Layout of Inverter Lecerf Technology PN LV-1201-D
5-02	Trace Layout of Inverter Lecerf Technology PN LV-17AA
5-03	Trace Layout of Inverter Lecerf Technology IV-12B



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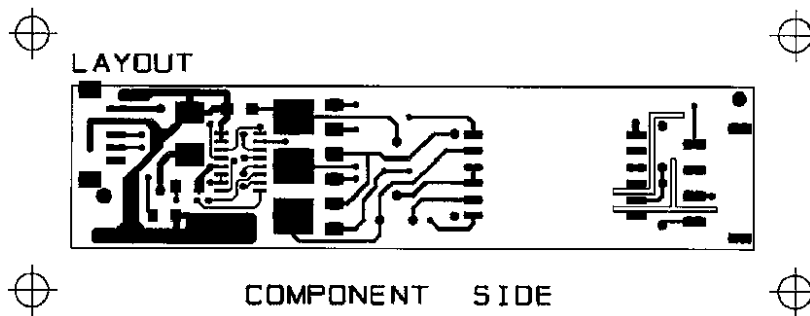


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Enclosure

Test Record

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Supplement Id	Description
-	Test Record 1
-	Test Record 2

Test Record No. 2

The manufacturer submitted representative production sample(s) of Flat Panel Monitor, model 3112XXXXXXX. Unless otherwise noted in the above list of tests, all tests were conducted by ADT, in Taoyuan, under the CAP program. Tests noted by the initials "UL" were witnessed by a member of UL staff. Unless above tests, others were not considered necessary based on the results of previous investigation, due to alternate model designation, inverter, flat panel side and enclosure shape for model ES-3112XXXXXXX.

The following tests were conducted:

Test	Comments
End Product Reference Page	
General Guidelines	
Input: Single-Phase (1.6.2)	
Limited Current Circuit Measurement (2.4.1, 2.4.2)	"UL"
Loading (4.2.10)	
Heating (4.5.1, 1.4.12, 1.4.13)	
Abnormal Operation (5.3.1 - 5.3.8.2)	

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.