



Spectrum Research & Testing Lab., Inc.
No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.: A05100404
Report No.: EMCA03051901-02
Page: 1 of 1
Date: Oct. 08 2005

Product Name: SATA CardBus
Model No.: PC-113, PC-113R, PC-112, PC-112R, ST-109R
Applicant: LyCOM Technology Inc.
4F-3, No. 48, Bau-Chiau Rd.,
Hsin-Tien, Taipei Hsien,
Taiwan, R.O.C.

Date of Receipt: Oct. 04, 2005

Finished date of Test: Oct. 08, 2005

Applicable Standards: **Emission**

EN 55022:1998, Class B

EN 61000-3-2:1995+A1:1998
+A2:1998

EN 61000-3-3:1995+A1:1998

Immunity

EN 55024:1998

- IEC 61000-4-2:1995+A1:1998

- IEC 61000-4-3:1995+A1:1998

- IEC 61000-4-4:1995

- IEC 61000-4-5:1995

- IEC 61000-4-6:1996

- IEC 61000-4-8:1993

- IEC 61000-4-11:1994

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one set sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Checked By :

Sunyou Chen
(Sunyou Chen)

Date:

10/8/2005

Approved By :

Johnson Ho
(Johnson Ho, Director)

Date:

10/8/2005

NVLAQ[®]

Lab Code: 200099-0



Table of Contents

1.	DOCUMENT POLICY AND TEST STATEMENT	5
1.1	DOCUMENT POLICY	5
1.2	TEST STATEMENT	5
2.	DESCRIPTION OF EUT AND TEST MODE.....	6
2.1	GENERAL DESCRIPTION OF EUT	6
2.2	DESCRIPTION OF EUT INTERNAL DEVICE	6
2.3	DESCRIPTION OF TEST MODE	7
3.	DESCRIPTION OF APPLIED STANDARDS	7
4.	EMISSION TEST	8
4.1	CONDUCTED EMISSION TEST FOR POWER PORT	8
4.1.1	CONDUCTED EMISSION LIMIT.....	8
4.1.2	TEST EQUIPMENT.....	8
4.1.3	TEST SETUP	9
4.1.4	TEST PROCEDURE	9
4.1.5	DESCRIPTION OF SUPPORT UNIT	10
4.1.6	EUT OPERATING CONDITION	10
4.1.7	TEST RESULT	11
4.2	RADIATED EMISSION TEST	13
4.2.1	RADIATED EMISSION LIMIT.....	13
4.2.2	TEST EQUIPMENT.....	13
4.2.3	TEST SET-UP.....	14
4.2.4	TEST PROCEDURE	14
4.2.5	DESCRIPTION OF SUPPORT UNIT	15
4.2.6	EUT OPERATING CONDITION	15
4.2.7	TEST RESULT	16
4.3	CURRENT HARMONICS TEST	17
4.3.2	TEST EQUIPMENT.....	18
4.3.3	TEST SETUP	18
4.3.4	TEST PROCEDURE	18
4.3.5	DESCRIPTION OF SUPPORT UNIT	18
4.3.6	EUT OPERATING CONDITION	18
4.3.7	TEST RESULT	19
4.4	VOLTAGE FLUCTUATIONS	20
4.4.1	LIMIT	20
4.4.2	TEST EQUIPMENT.....	20
4.4.3	TEST PROCEDURE	20
4.4.4	TEST SETUP	21
4.4.5	DESCRIPTION OF SUPPORT UNIT	21
4.4.6	EUT OPERATING CONDITION	21
4.4.7	TEST RESULT	22
5.	ELECTROSTATIC DISCHARGE IMMUNITY TEST	23
5.1	TEST EQUIPMENT	23
5.2	TEST PROCEDURE	23
5.3	TEST SET-UP	24



5.4	DESCRIPTION OF SUPPORT UNIT	25
5.5	EUT OPERATING CONDITION	25
5.6	TEST CONDITION AND PERFORMANCE CRITERION	25
5.7	SUMMARY OF TEST RESULT	26
6.	RADIATED IMMUNITY TEST	27
6.1	TEST EQUIPMENT	27
6.2	TEST PROCEDURE	27
6.3	TEST SETUP	28
6.4	DESCRIPTION OF SUPPORT UNIT	29
6.5	EUT OPERATING CONDITION	29
6.6	TEST CONDITION / PERFORMANCE CRITERIA	29
6.7	TEST RESULT	29
7.	ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST	30
7.1	TEST EQUIPMENT	30
7.2	TEST PROCEDURE	30
7.3	TEST SET-UP	31
7.4	DESCRIPTION OF SUPPORT UNIT	31
7.5	EUT OPERATING CONDITION	31
7.6	TEST CONDITION / PERFORMANCE CRITERIA	32
7.7	SUMMARY OF TEST RESULT	32
8.	SURGE TEST (POWER LINE).....	33
8.1	TEST EQUIPMENT	33
8.2	TEST PROCEDURE	33
8.3	TEST SET-UP	33
8.4	DESCRIPTION OF SUPPORT UNIT	33
8.5	EUT OPERATING CONDITION	33
8.6	TEST CONDITION / PERFORMANCE CRITERIA	34
8.7	SUMMARY OF TEST RESULT	34
9.	INDUCED RF FIELDS (CONDUCTED SUSCEPTIBILITY) TEST	35
9.1	TEST EQUIPMENT	35
9.2	TEST PROCEDURE	36
9.3	TEST SET-UP	36
9.4	DESCRIPTION OF SUPPORT UNIT	36
9.5	EUT OPERATING CONDITION	36
9.6	TEST CONDITION / PERFORMANCE CRITERIA	37
9.7	SUMMARY OF TEST RESULT	37
10.	POWER FREQUENCY MAGNETIC-FIELD TEST	39
10.1	TEST EQUIPMENT	39
10.2	TEST PROCEDURE	39
10.3	TEST SET-UP	39
10.4	DESCRIPTION OF SUPPORT UNIT	39
10.5	EUT OPERATING CONDITION	40
10.6	TEST CONDITION / PERFORMANCE CRITERIA	40
10.7	SUMMARY OF TEST RESULT	40



Spectrum Research & Testing Lab., Inc.
No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.:A05100404
Report No.:EMCA03051901-02
Page:4 of 4
Date: Oct. 08, 2005

11.	VOLTAGE DIPS, INTERRUPTS, VARIATIONS TEST	41
11.1	TEST EQUIPMENT	41
11.2	TEST PROCEDURE.....	41
11.3	TEST SET-UP	41
11.4	DESCRIPTION OF SUPPORT UNIT.....	41
11.5	EUT OPERATING CONDITION	41
11.6	TEST CONDITION / PERFORMANCE CRITERIA.....	42
11.7	SUMMARY OF TEST RESULT	42
12.	PHOTOS OF TESTING	43
13.	TERMS OF ABRIVATION.....	52

 <p>Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.</p>	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:5 of 5 Date: Oct. 08, 2005
---	----------------------	---

1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.
- The report must not be used by the applicant to claim that the product is endorsed by NVLAP, TÜV, NEMKO and SRT.
- The NVLAP logo applies only to the applicable standards specified in this report.

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- AC power source, 230 VAC/50 Hz, was used during the test.
- The EN 61000-3-2:1995+A1:1998+A2:1998(Harmonic test) and EN 61000-3-3:1995+A1:1998(Flicker test) are not included in the scope of NVLAP logo usage.
- The EN 61000-3-2:1995+A1:1998+A2:1998(Harmonic test) and EN 61000-3-3:1995+A1:1998(Flicker test) are included in the scope of TÜV, NEMKO and SRT logo usage.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:6 of 6 Date: Oct. 08, 2005
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2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	SATA CardBus
MODEL NO.	PC-113,PC-113R,PC-112,PC-112R,ST-109R
POWER SUPPLY	N/A
CABLE	N/A

NOTE:

The EUT consisted of one SATA card (presented in this report as EUT1) and one HDD (presented in this report as EUT2).

For more detailed information, please refer to the EUT's specification or user's manual provided by manufacturer.

2.2 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	REMARK
N/A			

NOTE:

1. The highest clock of EUT1 and EUT2 are 25MHz.
2. Frequency range to be measured.
 Radiated emission is 30 MHz to 1 GHz.

 <p>Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.</p>	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:7 of 7 Date: Oct. 08, 2005
---	----------------------	---

2.3 DESCRIPTION OF TEST MODE

The EUT was tested for emission measurement under the following situations:
For certain test items, the test object is either EUT1 or EUT2. When either one represented the test object, the other was regarded as one of the support units.

3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of ITE interface device and according to the specifications provided by the applicant, it must comply with the requirements of the following standards:

EN 55022:1998, Class B	EN 55024:1998
EN 61000-3-2:1995+ A1:1998+A2:1998	- IEC 61000-4-2:1995+A1:1998
EN 61000-3-3:1995+A1:1998	- IEC 61000-4-3:1995+A1:1998
	- IEC 61000-4-4:1995
	- IEC 61000-4-5:1995
	- IEC 61000-4-6:1996
	- IEC 61000-4-8:1993
	- IEC 61000-4-11:1994

However, the standards of EN 61000-3-2, EN 61000-3-3, IEC 61000-4-5 and IEC 61000-4-11 were not measured for EUT1 for the power source of EUT1 is DC from PC. All tests have been performed and recorded as per the required standards.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:8 of 8 Date: Oct. 08, 2005
--	----------------------	---

4. EMISSION TEST

4.1 CONDUCTED EMISSION TEST FOR POWER PORT

4.1.1 CONDUCTED EMISSION LIMIT

Frequency (MHz)	Class A (dB μ V)		Class B (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST EQUIPMENT

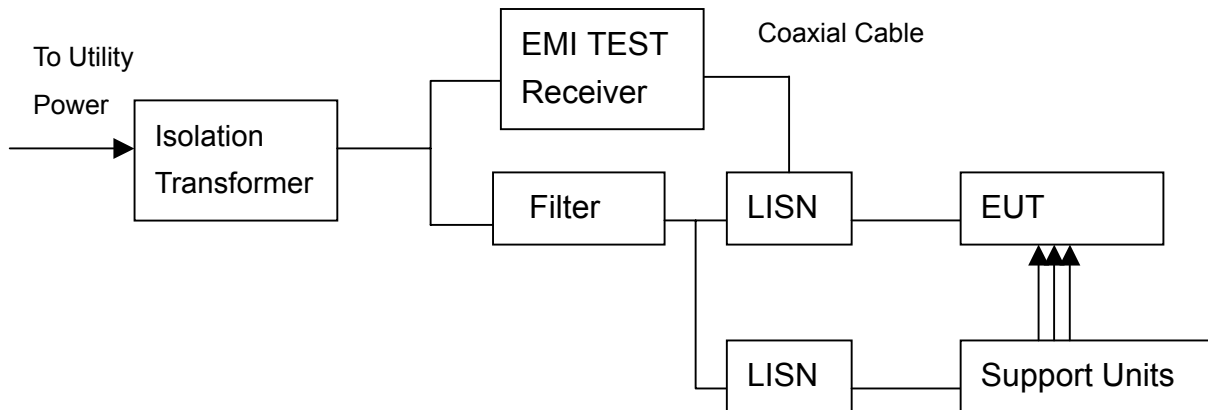
The following test equipment was used for the test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz TO 30 MHz	ROHDE & SCHWARZ	ESHS30/ 826003/008	AUG. 2006 R&S
LISN (for EUT)	50 μ H, 50 ohm	SOLAR ELECTRONICS	8012-50-R-24-BNC / 924839	JUN. 2006 ETC
LISN (for Peripheral)	50 μ H, 50 ohm	SOLAR ELECTRONICS	9252-50-R-24-BNC / 951318	JUN. 2006 ETC
50 ohm TERMINATOR	50 ohm	HP	11593A/ 2	MAY 2006 ETC
COAXIAL CABLE	3m	SUNCITY	J400/ 3M	JUL. 2006 SRT
ISOLATION TRANSFORMER	N/A	APC	AFC-11015/ F102040016	N/A
FILTER	2 LINE, 30A	FIL.COIL	FC-943/ 771	N/A
GROUND PLANE	2.3M (H) x 2.4M (W)	SRT	N/A	APR. 2006 SRT
GROUND PLANE	2.4M (H) x 2.4M (W)	SRT	N/A	APR. 2006 SRT

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



4.1.3 TEST SETUP



NOTE:

1. The EUT was put on a wooden table with 0.8m height above ground plane, and 0.4m away from reference ground plane (> 2mx2m).
2. For the actual test configuration, please refer to the photos of testing.
3. The serial no. of the LISN connected to EUT is 951318.
4. The serial no. of the LISN connected to support units is 924839.

4.1.4 TEST PROCEDURE

The EUT was tested according to the requirement of EN 55022:1998. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50Ω/50μH as specified. All readings were quasi-peak and average values with 10 kHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. Both lines of the power mains of EUT were measured and the cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

First, Find the margin or higher points at least 6 points by software, then use manual to find the maximum data. The procedure is referred on the test procedure of SRT LAB.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:10 of 10 Date: Oct. 08, 2005
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4.1.5 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of EN 55022:1998. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

NO	DEVICE	BRAND	MODEL #	CABLE
1	MONITOR	SAMSUNG	PG17IS	1.5m unshielded power cord 1.2m shielded data cable
2	PRINTER	EPSON	STYLUS C20SX	1.5m unshielded power cord 1.2m shielded data cable
3	MODEM	ACEEX	DM-1414	1.5m unshielded DC power cable 1.2m shielded data cable
4	MOUSE	LOGITECH	MS-34	1.5m unshielded data cable
5	HDD	HITACHI	DK23CA-10	N/A
6	NOTEBOOK	IBM	560Z	1.5m unshielded power cord
7	ADAPTOR	WELLAND	PA-213-50	1.5m unshielded power cord

NOTE : For the actual test configuration, please refer to the photos of testing.

4.1.6 EUT OPERATING CONDITION

- Under Windows 98 ran "EMI TEST" and "Ping.bat" programs and PC sent "H" pattern or accessed the following peripherals directly or via EUT:
 - Color Monitor
 - RS232
 - Keyboard
 - Mouse
 - Printer
 - FDD
 - HDD
- Under Windows XP run "XCOPY" program.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404
		Report No.:EMCA03051901-02
		Page:11 of 11
		Date: Oct. 08, 2005

4.1.7 TEST RESULT

Temperature:	25 °C	Humidity:	52 %RH
Frequency Range:	0.15 – 30 MHz	Test Object:	EUT2
Receiver Detector:	Q.P. and AV.	Tested By:	Tom Lin
		Tested Date:	Aug. 25, 2003

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dB μ V)		Emission Level (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.205	0.20	48.8	45.6	49.0	45.8	63.4	53.4	-14.4	-7.6
0.509	0.20	45.8	45.3	46.0	45.5	56.0	46.0	-10.0	-0.5
0.607	0.20	40.8	39.7	41.0	39.9	56.0	46.0	-15.0	-6.1
2.029	0.20	43.1	42.7	43.3	42.9	56.0	46.0	-12.7	-3.1
3.654	0.26	44.9	41.2	45.2	41.5	56.0	46.0	-10.8	-4.5
5.884	0.33	48.5	46.2	48.8	46.5	60.0	50.0	-11.2	-3.5

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dB μ V)		Emission Level (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.205	0.20	46.0	40.0	46.2	40.2	63.4	53.4	-17.2	-13.2
0.408	0.20	41.3	38.5	41.5	38.7	57.7	47.7	-16.2	-9.0
1.322	0.20	38.7	36.9	38.9	37.1	56.0	46.0	-17.1	-8.9
2.951	0.20	38.9	37.4	39.1	37.6	56.0	46.0	-16.9	-8.4
5.904	0.33	44.0	41.2	44.3	41.5	60.0	50.0	-15.7	-8.5
9.974	0.40	37.7	31.2	38.1	31.6	60.0	50.0	-21.9	-18.4

NOTE :

1. Measurement uncertainty is +/-2dB
2. Emission level = Reading value + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies were very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404
		Report No.:EMCA03051901-02
		Page:12 of 12
		Date: Oct. 08, 2005

Temperature:	<u>25 °C</u>	Humidity:	<u>52 %RH</u>
Frequency Range:	<u>0.15 – 30 MHz</u>	Test Object:	<u>EUT1</u>
Receiver Detector:	<u>Q.P. and AV.</u>	Tested By:	<u>Tom Lin</u>
		Tested Date:	<u>Aug. 25, 2003</u>

Power Line Measured : Line

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dB μ V)		Emission Level (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.162	0.20	53.6	52.5	53.8	52.7	65.4	55.4	-11.6	-2.7
0.420	0.20	40.1	34.8	40.3	35.0	57.4	47.4	-17.1	-12.4
0.740	0.20	39.2	28.9	39.4	29.1	56.0	46.0	-16.6	-16.9
2.623	0.20	37.4	25.4	37.6	25.6	56.0	46.0	-18.4	-20.4
8.529	0.37	42.0	31.1	42.4	31.5	60.0	50.0	-17.6	-18.5
19.236	0.58	42.9	36.4	43.5	37.0	60.0	50.0	-16.5	-13.0

Power Line Measured : Neutral

Freq. (MHz)	Correct. Factor (dB)	Reading Value (dB μ V)		Emission Level (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.170	0.20	52.0	39.4	52.2	39.6	65.0	55.0	-12.8	-15.4
0.759	0.20	40.8	27.8	41.0	28.0	56.0	46.0	-15.0	-18.0
1.232	0.20	40.8	28.9	41.0	29.1	56.0	46.0	-15.0	-16.9
3.060	0.20	44.6	22.5	44.8	22.7	56.0	46.0	-11.2	-23.3
7.642	0.36	42.6	28.1	43.0	28.5	60.0	50.0	-17.0	-21.5
8.130	0.37	41.3	30.1	41.7	30.5	60.0	50.0	-18.3	-19.5

NOTE :

1. Measurement uncertainty is +/-2dB
2. Emission level = Reading value + Correction factor
3. Correction Factor = Cable loss + Insertion loss of LISN
4. Margin value = Emission level - Limit
5. The emission of other frequencies were very low against the limit.
6. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:13 of 13 Date: Oct. 08, 2005
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4.2 RADIATED EMISSION TEST

4.2.1 RADIATED EMISSION LIMIT

EN 55022:1998 limits of radiated emission measurement for frequency below 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dB μ V/m	dB μ V/m
30 – 230	40	30
230 - 1000	47	37

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).

4.2.2 TEST EQUIPMENT

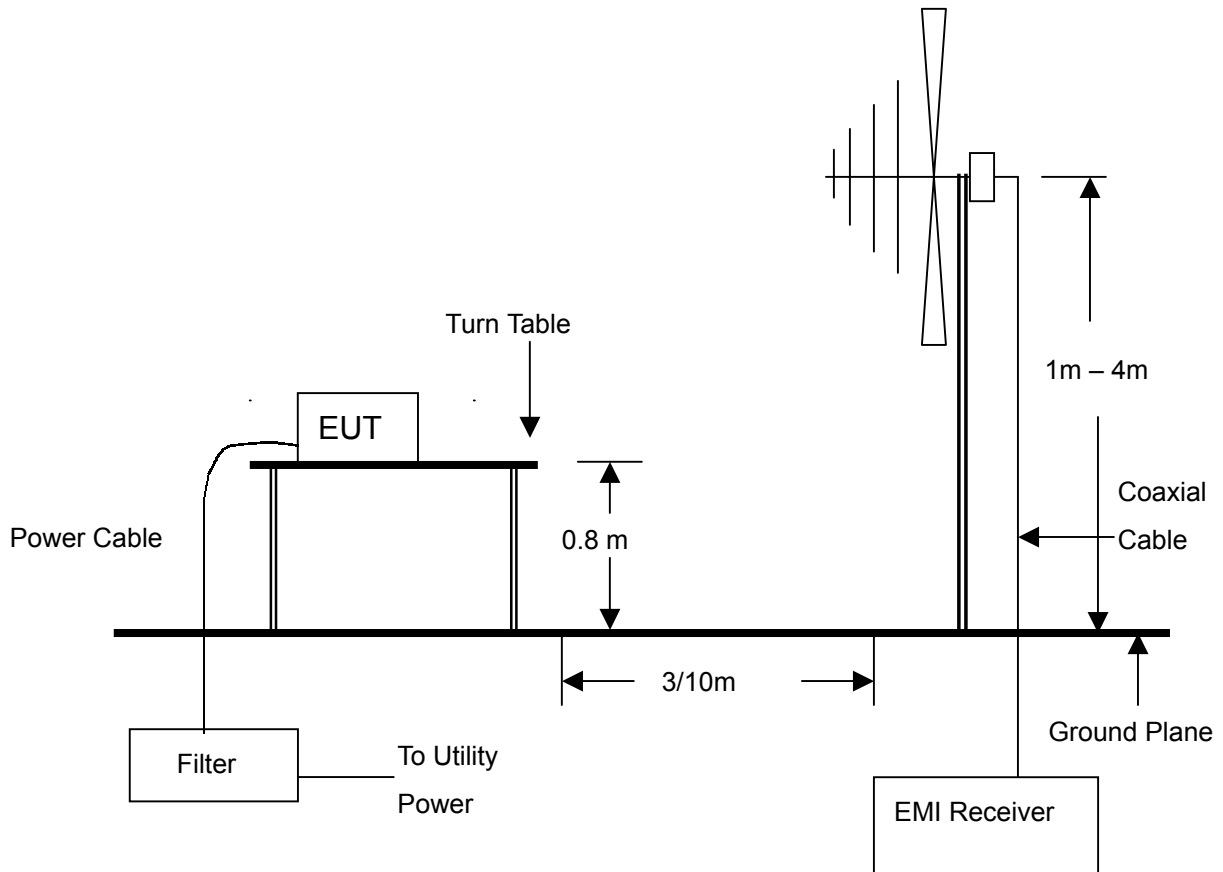
The following test equipment was used during the radiated emission test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	20 MHz TO 1 GHz	ROHDE & SCHWARZ	ESVS30/ 841977/003	AUG. 2006 R&S
BI-LOG ANTENNA	25 MHz TO 2 GHz	EMCO	3142/ 9701-1124	APR. 2006 SRT
OATS	3 – 10 M MEASUREMENT	SRT	SRT-1	APR. 2006 SRT
COAXIAL CABLE	25M	SUNCITY	J400/ 25M	AUG. 2006 SRT
FILTER	2 LINE, 30A	FIL.COIL	FC-943/ 869	N/A
FREQUENCY CONVERTER	N/A	APC	AFC-2KBB/ F100030031	AUG. 2006 SRT

NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.
2. The Open Area Test Site (SRT-1) is registered by FCC with No. 90957 and VCCI with No. R-1081.
3. The Open Area Test Site (SRT-2) is registered by FCC with No. 98458 and VCCI with No. R-1168.

4.2.3 TEST SET-UP



NOTE:

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

4.2.4 TEST PROCEDURE

The EUT was tested according to the requirement of EN 55022:1998. The measurements were made at an open area test site with 10 meter measurement distance. The frequency spectrum measured from 30 MHz to 1 GHz. All readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency. First, Find the margin or higher points at least 6 points by software, then use manual to find the maximum data. The procedure is referred on the test procedure of SRT LAB.

 <p>Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.</p>	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:15 of 15 Date: Oct. 08, 2005
---	----------------------	---

4.2.5 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

4.2.6 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404
		Report No.:EMCA03051901-02
		Page:16 of 16
		Date: Oct. 08, 2005

4.2.7 TEST RESULT

Temperature:	25 °C	Humidity:	50 %RH
Frequency Range:	30 – 1000 MHz	Measured Distance:	10m
Receiver Detector:	Q.P.	Tested Object:	EUT1+EUT2
Tested By:	Tom Lin	Tested Date:	Aug. 25, 2003

Antenna Polarization: Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
75.9600	1.09	7.10	18.5	26.7	30.0	-3.3	254	4
149.9900	1.48	8.54	15.2	25.2	30.0	-4.8	291	4
299.9850	2.06	14.42	13.8	30.3	37.0	-6.7	98	4
449.9770	2.51	16.89	12.1	31.5	37.0	-5.5	125	4
601.4750	2.73	20.81	9.3	32.8	37.0	-4.2	61	4
749.9555	2.98	22.78	11.0	36.8	37.0	-0.2	88	4

Antenna Polarization: Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
99.4152	1.12	8.34	17.5	27.0	30.0	-3.0	41	1
118.5284	1.32	7.54	13.8	22.7	30.0	-7.3	60	1
149.9900	1.48	8.54	18.2	28.2	30.0	-1.8	94	1
200.4970	1.63	9.90	10.5	22.0	30.0	-8.0	101	1
449.9773	2.51	16.89	13.4	32.8	37.0	-4.2	117	1
749.9623	2.98	22.78	8.9	34.7	37.0	-2.3	52	1

NOTE :

1. Measurement uncertainty is +/-4dB.
2. "": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:17 of 17 Date: Oct. 08, 2005
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4.3 CURRENT HARMONICS TEST

4.3.1 LIMIT

For Class A Equipment

EVEN HARMONICS		ODD HARMONICS	
HARMONICS ORDER	LIMIT (Amp.)	HARMONICS ORDER	LIMIT (Amp.)
2	1.08	3	2.30
4	0.43	5	1.14
6	0.30	7	0.77
8 < n < 40	0.23 x 8 / n	9	0.40
		11	0.33
		13	0.21
		15 < n < 39	0.15 x 8 / n

For Class D Equipment

Harmonics Order n	Max. permissible harmonics current per watt (mA/W)	Max. permissible harmonics current (A)
Odd Harmonics only		
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13	0.30	0.21
15 ≤ n ≤ 39	3.85 / n	0.15 x 15 / n

NOTE:

1. Class A and Class D are judged by test equipment automatically as per Section 5 of EN 61000-3-2:1995

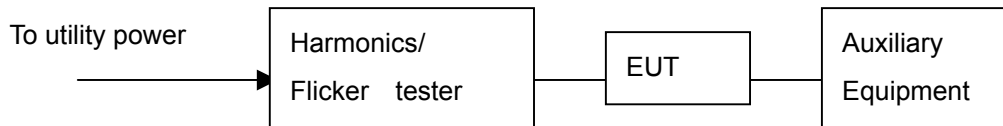
2. The above limits for Class D equipment are for all applications having an active input power > 75 W. No limits apply for equipment with an active input power up to and including 75 W.

4.3.2 TEST EQUIPMENT

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # /	DUE DATE OF CAL. & CAL. CENTER
MAIN UNIT	HP	6842A/ 3734A00212	MAR. 2006 AGILENT

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST SETUP



NOTE :

1. The EUT system was put on a wooden table with 0.8m high.
2. For the actual test configuration, please refer to the photos of testing.

4.3.4 TEST PROCEDURE

According to EN61000-3-2:1995+A1:1998+A2:1998

4.3.5 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

4.3.6 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.



Spectrum Research & Testing Lab., Inc.
No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.:A05100404
Report No.:EMCA03051901-02
Page:19 of 19
Date: Oct. 08, 2005

4.3.7 TEST RESULT

Temperature:	<u>26 °C</u>	Humidity:	<u>46% RH</u>
Fundamental Current:	<u>0.033A</u>	Max. Power	<u></u>
Voltage:	<u>225.6Vrms</u>	Consumption:	<u>4.5W</u>
Power Factor:	<u>0.308</u>	Tested Object:	<u>EUT2</u>
Tested By:	<u>Tom Lin</u>	Test Date:	<u>Aug. 25, 2003</u>

Maximum Reading Data:

Odd Harm. Order	Reading Data (A)	Limit (A)	Test Result
3	0.0196	0.9	PASS

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:20 of 20 Date: Oct. 08, 2005
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4.4 VOLTAGE FLUCTUATIONS

4.4.1 LIMIT

Short-term flicker (P_{st}) : 1.0

Long-term flicker (P_{lt}) : 0.65

Relative steady-state voltage change (D_c) : $\leq 3\%$

Relative voltage change characteristic ($D(t) > 3\%$) ; ($T_{D(t)}$) : ≤ 200 ms

Maximum relative voltage change (D_{max}) : $\leq 4\%$

TEST ITEM	LIMIT	NOTE
P_{st}	1.0	P_{st} means short-term flicker indicator.
P_{lt}	0.65	P_{lt} means long-term flicker indicator.
$T_{D(t)}$ (ms)	200	$T_{D(t)}$ means maximum time that $D(t)$ exceeds 3 %.
D_{max} (%)	4%	D_{max} means maximum relative voltage change.
D_c (%)	3%	D_c means relative steady-state voltage change

4.4.2 TEST EQUIPMENT

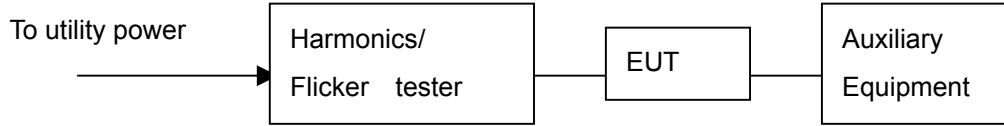
EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # /	DUE DATE OF CAL. & CAL. CENTER
MAIN UNIT	HP	6842A/ 3734A00212	MAR. 2006 AGILENT

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURE

According to EN 61000-3-3:1995+A1:1998

4.4.4 TEST SETUP



- NOTE :**
1. The EUT system was put on a wooden table with 0.8m high.
 2. For the actual test configuration, please refer to the photos of testing.

4.4.5 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

4.4.6 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:22 of 22 Date: Oct. 08, 2005
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4.4.7 TEST RESULT

Temperature:	<u>26 °C</u>	Humidity:	<u>46% RH</u>
Input Voltage:	<u>225.6Vrms</u>	Observation	
Ampere:	<u>0.1Arms</u>	Period:	<u>1Hr</u>
Power Factor:	<u>0.300</u>	Tested Object:	<u>EUT2</u>
Tested By:	<u>Tom Lin</u>	Test Date:	<u>Aug. 25, 2003</u>

Test Result:

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	TEST RESULT
P _{st}	0.07	1.0	PASS
P _{lt}	0.07	0.65	PASS
T _{D(t)} (ms)	0	200	PASS
D _{max} (%)	0%	4%	PASS
D _c (%)	0%	3%	PASS

NOTE:

1. P_{st} means short-term flicker indicator.
2. P_{lt} means long-term flicker indicator.
3. T_{D(t)} means maximum time that D(t) exceeds 3 %.
4. D_{max} means maximum relative voltage change.
5. D_c means relative steady-state voltage change.
6. N/A: Not applicable.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:23 of 23 Date: Oct. 08, 2005
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5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1 TEST EQUIPMENT

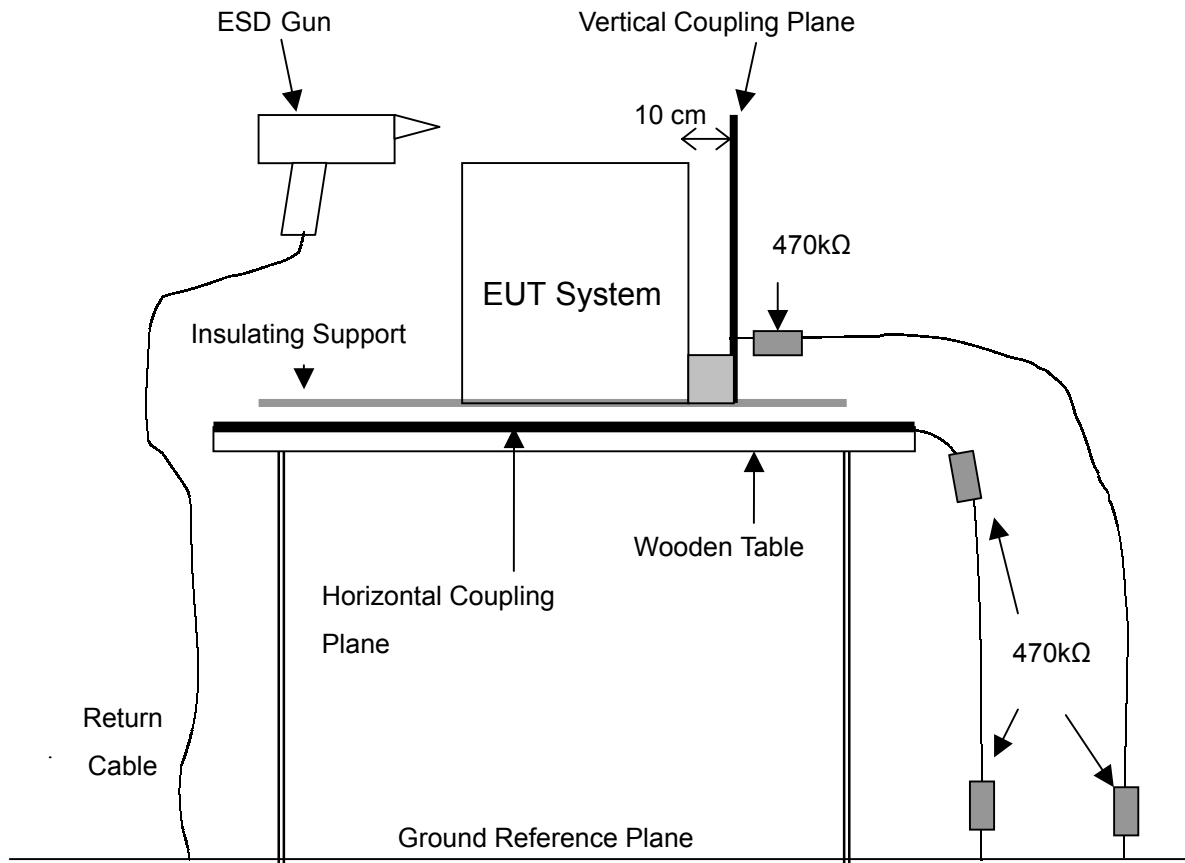
EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER
ESD SIMULATOR	NOISEKEN	ESS-100L(A)/TC-815P/ 8099C02238/7099C02	NOV. 2005 ETC
HCP (1.6M x 0.8M)	SRT	WITH TWO 470k OHM CABLE	APR. 2006 SRT
VCP (0.5M x 0.5M)	SRT	WITH TWO 470k OHM CABLE	APR. 2006 SRT
GROUND PLANE (3.4M x 2.4M)	SRT	N/A	N/A

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

5.2 TEST PROCEDURE

According to IEC/EN 61000-4-2:1995+A1:1998

5.3 TEST SET-UP



NOTE :

1. The wooden table should be 0.8m high for table top EUT and 0.1m for floor-standing EUT.
2. For the actual test configuration, please refer to the photos of testing.
3. A distance of 1m minimum was provided between EUT and walls / other metallic structure.

5.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

5.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

5.6 TEST CONDITION AND PERFORMANCE CRITERION

1. Test condition

- (1) R-C Network : 330 Ω , 150 pF
- (2) Test level: Air Discharge : $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$
 - Contact discharge : $\pm 2\text{kV}$, $\pm 4\text{kV}$
 - HCP discharge : $\pm 2\text{kV}$, $\pm 4\text{kV}$
 - VCP discharge : $\pm 2\text{kV}$, $\pm 4\text{kV}$
- (3) Discharge mode : Single discharge
- (4) Discharge period : at least 1 s
- (5) Discharge polarity : Positive and Negative
- (6) Number of discharge : Minimum 50 times at each test point of contact discharge and at least 200 times of discharge to EUT in total. Minimum 10 times at each test area of air discharge selected.

2. Standard requirement : Criterion B

3. Performance criterion

- (1) Criterion A : Normal performance during test
- (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable
- (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:26 of 26 Date: Oct. 08, 2005
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5.7 SUMMARY OF TEST RESULT

Temperature:	<u>20 °C</u>	Humidity:	<u>48% RH</u>
Test Object:	<u>EUT1+EUT2</u>	Tested By:	<u>Tom Lin</u>
Atmospheric Air Pressure:	<u>101.2 kPa</u>	Tested Date:	<u>Aug. 25, 2003</u>

Test Result: Criterion B pass

SEVERITY LEVEL	COUPLING MODE & TEST OBSERVATION			
	AIR DISCHARGE	CONTACT DISCHARGE	HCP	VCP
±2kV	A	A	A	A
±4kV	A	B	A	A
±8kV	B	NR	NR	NR

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

B: The function of data copy was delayed during testing.

NR: No requirement

Description of test points:

1. Metallic part of SATA port on EUT1 & EUT2.
2. Screw of EUT2.
3. Case of EUT2.
4. HCP.
5. VCP.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:27 of 27 Date: Oct. 08, 2005
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6. RADIATED IMMUNITY TEST

6.1 TEST EQUIPMENT

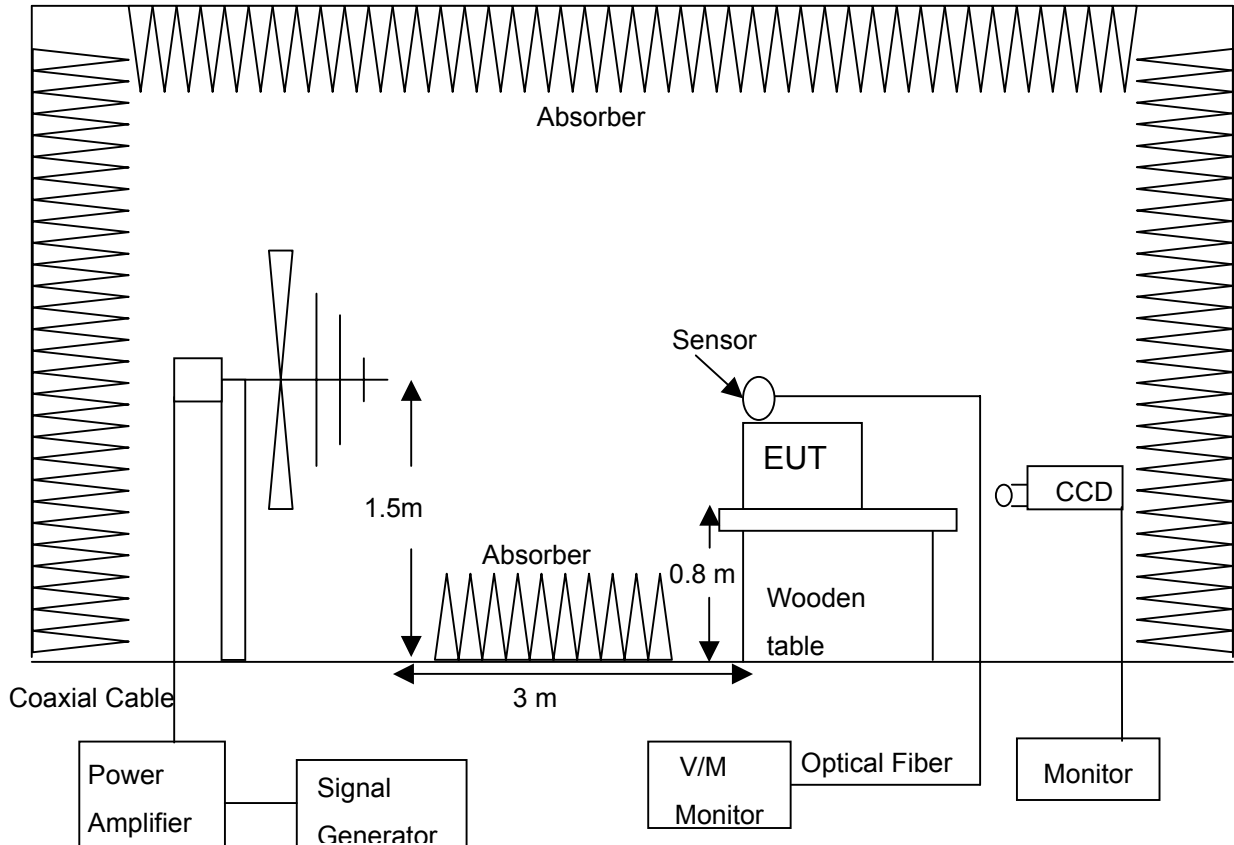
EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER
SIGNAL GENERATOR	HP	8648A/ 3636A022776	JUN. 2006 ETC
ANTENNA	SCHAFFNER CHASE	CBL6111/ 1188	AUG. 2006 SRT
FIELD SENSOR	AMPLIFIER RESEARCH	FP2000/ 28499	DEC. 2005 ETC
POWER AMPLIFIER	AMPLIFIER RESEARCH	100W1000M1/ 19509	JUN. 2006 ETC
ANECHOIC CHAMBER	SRT	A05/ SRT005	SEP. 2006 SRT
V/M MONITOR	A.R.	FM2000/ 15970	N/A
MONITOR	SHIN	SI-609/ 905130	N/A
CCD	TOPVIEW	N/A/ 95113762	N/A
ABSORBER	ETS	N/A	N/A
COAXIAL CABLE	SUNCITY	J400/ 30CM	APR. 2006 SRT
COAXIAL CABLE	TIME	LMR-400/ 4M	APR. 2006 SRT

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

6.2 TEST PROCEDURE

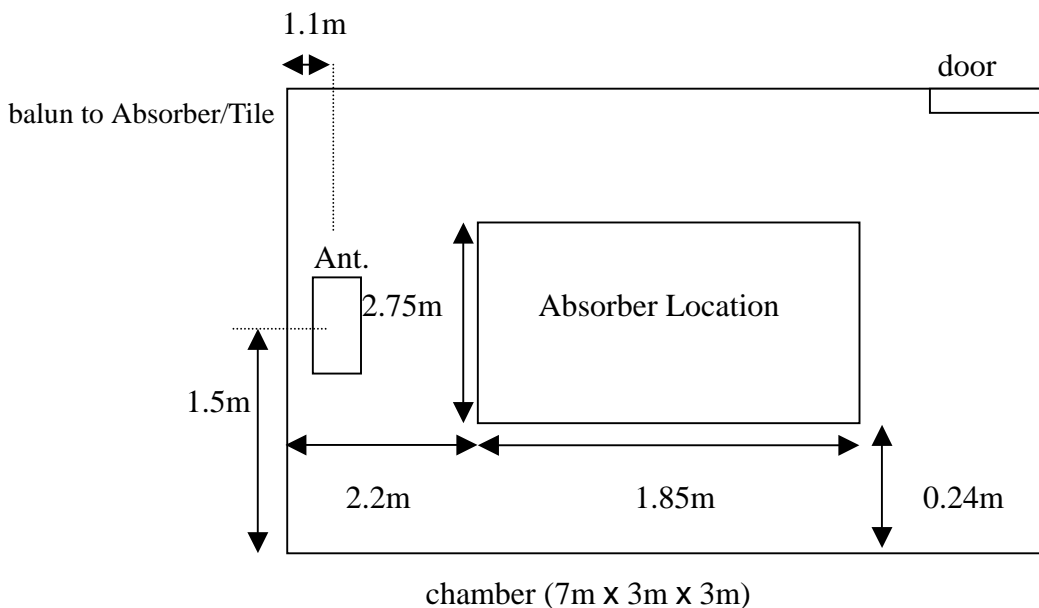
According to IEC/EN 61000-4-3:1995+A1:1998

6.3 TEST SETUP



NOTE :

1. The wooden table should be 0.8m high for table top EUT and 0.1m for floor-standing EUT.
2. For the actual test configuration, please refer to the photos of testing.



6.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

6.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

6.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition

- (1) Source voltage and frequency : 230V/50Hz, single phase
- (2) Sweeping frequency : 80MHz – 1 GHz
- (3) Test level : 3V/m, the frequency step is 1%
- (4) The four sides of EUT are tested : front, rear, left, right
- (5) Modulation : 80%AM, 1kHz Dwell time for each frequency is 3 sec.
- (6) Antenna Polarization : Horizontal and Vertical
- (7) Standard requirement : Criterion A

2. Performance criterion

- (1) Criterion A : Normal performance during test
- (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable.
- (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset.

6.7 TEST RESULT

Temperature:	<u>24°C</u>	Humidity:	<u>56% RH</u>
Test Object:	<u>EUT1+EUT2</u>	Tested By:	<u>Tom Lin</u>
		Tested Date:	<u>Aug. 13, 2003</u>

Test Result : Criterion A pass

FREQUENCY	LEVEL	MODULATION	DIRECTION	TEST RESULT (CRITERION)	
				H	V
80MHz - 1GHz	3V/m	80%AM, 1kHz	FRONT	A	A
80MHz - 1GHz	3V/m	80%AM, 1kHz	REAR	A	A
80MHz - 1GHz	3V/m	80%AM, 1kHz	LEFT	A	A
80MHz - 1GHz	3V/m	80%AM, 1kHz	RIGHT	A	A

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:30 of 30 Date: Oct. 08, 2005
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7. ELECTRICAL FAST TRANSIENT / BURST IMMUNITY TEST

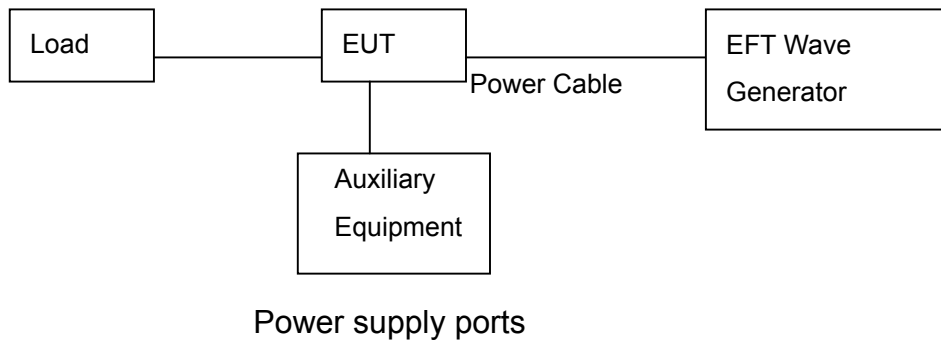
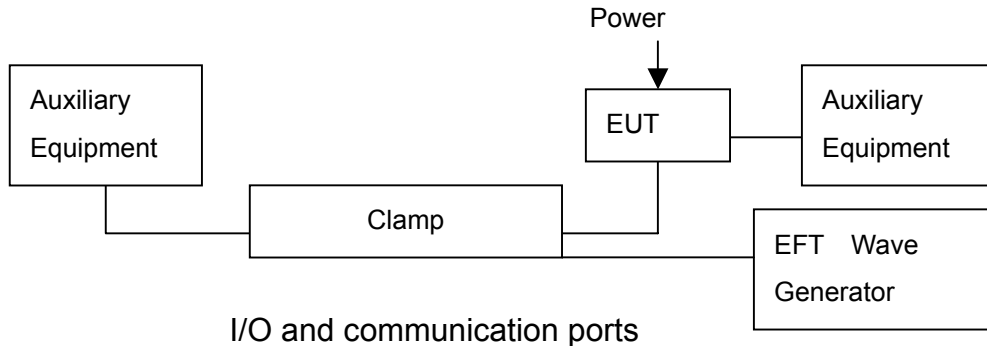
7.1 TEST EQUIPMENT

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL & CAL CENTER
EFT GENERATOR	HAEFELY	PEFT-JUNIOR / 583-333-122	NOV. 2005 ETC
CLAMP	HAEFELY	TRENCH / 080421-12	NOV. 2005 ETC
GROUND PLANE 2M x 3M	SRT	N/A	APR. 2006 SRT

7.2 TEST PROCEDURE

According to IEC/EN 61000-4-4:1995

7.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m height for table top EUT and 0.1m for floor-standing EUT above ground reference plane.
2. For the actual test configuration, please refer to the photos of testing.
3. The minimum distance between the EUT and all other conductive structure was more than 0.5m.
4. The minimum distance between the coupling plates of the coupling clamps (if used) and all over conductive structures, except the ground plane beneath the coupling clamp and beneath the EUT was more than 0.5m.
5. The power cable connecting EUT was controlled under 1m.

7.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

7.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

7.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition

- (1) Source voltage and frequency : 230V/50Hz, single phase
- (2) Pulse risetime and duration : 5ns / 50ns
- (3) Pulse repetition : 5kHz
- (4) Polarity : Positive Polarization and Negative Polarization
- (5) Burst duration and period : 15ms / 300ms
- (6) Test duration : 61sec each line
- (7) Time between test : 10Sec
- (8) Severity levels : Power Line $\pm 1kV$
Signal/Control Line $\pm 0.5kV$
- (9) Standard requirement : Criterion B

2. Performance criterion

- (1) Criterion A : Normal performance during test
- (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable.
- (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset.

7.7 SUMMARY OF TEST RESULT

Temperature:	<u>24 °C</u>	Humidity:	<u>54% RH</u>
Test Object:	<u>EUT1+EUT2</u>	Tested By:	<u>Tom Lin</u>
Atmospheric Air Pressure:	<u>101.2 kPa</u>	Tested Date:	<u>Aug. 13, 2003</u>

Test Result : Criterion A pass

Voltage		0.5kV		1kV	
Polarity		+	-	+	-
Test Line	L1	A	A	A	A
	L2	A	A	A	A
	GND	A	A	A	A
	Signal/ Control Line	NR	NR	NR	NR

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

NR: No requirement

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:33 of 33 Date: Oct. 08, 2005
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8. SURGE TEST (POWER LINE)

8.1 TEST EQUIPMENT

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER
SURGE TEST (System Mainframe)	SCHAFFNER	NSG 2050 / 199904-057SC	OCT. 2005 ETC
SURGE TEST (Impulse Network)	SCHAFFNER	PNW 2050 / 256	OCT. 2005 ETC
SURGE TEST (Pulse Coupling Network)	SCHAFFNER	CDN 131/133 / 520	OCT. 2005 ETC

8.2 TEST PROCEDURE

According to IEC/EN 61000-4-5:1995

8.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m height above ground reference plane.
2. For the actual test configuration, please refer to the photos of testing.

8.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

8.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

8.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition
 - (1) Test level : Common mode : $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, $\pm 2\text{kV}$
Differential mode : $\pm 0.25\text{kV}$, $\pm 0.5\text{kV}$, $\pm 1\text{kV}$
 - (2) Number of Pulse : 5
 - (3) Phase : 0° , 90° , 180° , 270°
 - (4) Polarity : Positive and Negative polarization
 - (5) Repetition : 60 s
 - (6) Waveform : 1.2/50 μs (open circuit)
 - (7) Standard requirement : Criterion B

2. Performance criterion
 - (1) Criterion A : Normal performance during test
 - (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable
 - (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset

8.7 SUMMARY OF TEST RESULT

Temperature:	<u>24 °C</u>	Humidity:	<u>58% RH</u>
Test Object:	<u>EUT2</u>	Tested By:	<u>Tom Lin</u>
Atmospheric Air Pressure:	<u>101.2 kPa</u>	Tested Date:	<u>Aug. 13, 2003</u>

Test Result : Criterion A pass

Mode	Coupling	Voltage	Phase			
			0°	90°	180°	270°
Common	L + PE N + PE	+/-0.5kV	A	A	A	A
		+/-1kV	A	A	A	A
		+/-2kV	A	A	A	A
Differential	L + N	+/-0.25kV	A	A	A	A
		+/-0.5kV	A	A	A	A
		+/-1kV	A	A	A	A

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:35 of 35 Date: Oct. 08, 2005
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9. INDUCED RF FIELDS (CONDUCTED SUSCEPTIBILITY) TEST

9.1 TEST EQUIPMENT

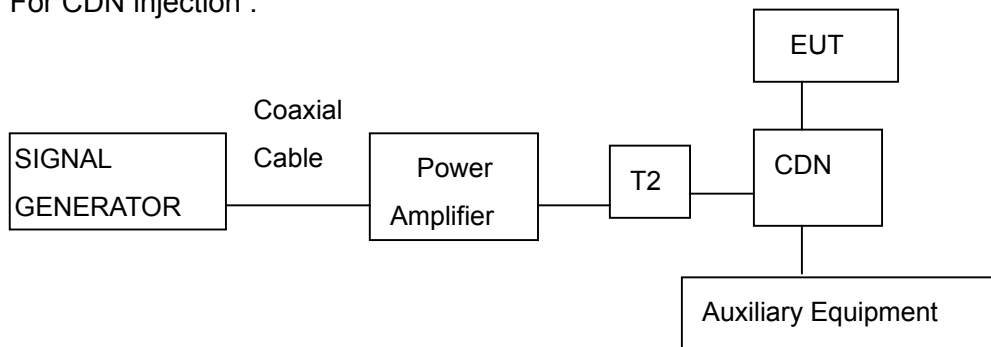
EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER	FINAL TEST BE USED
EM INJECTION CLAMP	FCC	F-203I-23mm/110	MAY 2006 ETC	
POWER LINE CDN	FCC	FCC-801-M4-32A/9808	MAY 2006 ETC	
POWER LINE CDN	FCC	FCC-801-M5-32A/9812	MAY 2006 ETC	
POWER LINE CDN	FCC	FCC-801-M1-32A/9820	MAY 2006 ETC	
SIGNAL LINE CDN	FCC	FCC-801-T2/9830	MAY 2006 ETC	
SIGNAL LINE CDN	FCC	FCC-801-T4/9831	MAY 2006 ETC	
SIGNAL LINE CDN	FCC	FCC-801-T6/9832	MAY 2006 ETC	
SIGNAL LINE CDN	FCC	FCC-801-S9/9843	MAY 2006 ETC	
POWER LINE CDN	FCC	FCC-801-M2-32A/9840	NOV. 2005 ETC	
SIGNAL GENERATOR	HP	8648A/3636A02776	JUN. 2006 ETC	√
POWER AMPLIFIER	A.R.	150A100A/19553	MAY 2006 ETC	√
DUAL DIRECTION COULPER	A.R.	DC2600/25893	SEP. 2006 ETC	√
POWER METER	BOONTON	4232A/29001	MAY 2006 ETC	√
SIGNAL LINE CDN	FCC	FCC-801-S25/9845	MAY 2006 ETC	
POWER LINE CDN	FCC	FCC-801-M3-32A/9874	MAY 2006 ETC	√
T2	EM-TEST	ATT6/75/1001-40	N/A	√
COAXIAL CABLE	SUNCITY	CABLE14/#14-1M	APR. 2006 SRT	√
COAXIAL CABLE	SUNCITY	CABLE05/#5-5M	APR. 2006 SRT	√
COAXIAL CABLE	SUNCITY	J400/2M	APR. 2006 SRT	√

9.2 TEST PROCEDURE

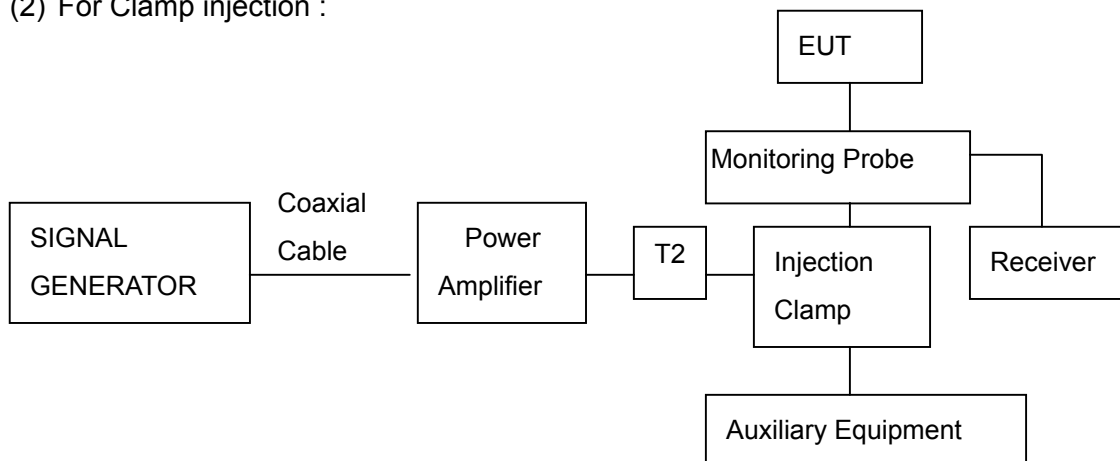
According to IEC/EN 61000-4-6:1996

9.3 TEST SET-UP

(1) For CDN injection :



(2) For Clamp injection :



NOTE :

1. The EUT system was put on a wooden table with 0.1m height above ground.
2. For the actual test configuration, please refer to the photos of testing.
3. The distance between CDN(Clamp) and EUT was controlled between 0.1m and 0.3m.
4. The model no. of the CDN connected to EUT is FCC-801-M3-32A.

9.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

9.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.



9.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition

- (1) Source voltage and frequency : 230 V/ 50 Hz, single phase
- (2) Sweeping frequency : 150 kHz – 80 MHz
- (3) Test level : 3 V, the frequency step is 1%
- (4) Modulation : AM 80%, 1 kHz
- (5) Dwell time for each frequency : 3 sec
- (6) Standard requirement : Criterion A

2. Performance criterion

- (1) Criterion A : Normal performance during test
- (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable
- (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset

9.7 SUMMARY OF TEST RESULT

Temperature: 24°C Humidity: 51% RH
Test Object: EUT1 Tested By: Tom Lin
Test Result : Criterion A pass Tested Date: Aug. 13, 2003

FREQUENCY	LEVEL	MODULATION	INJECTION METHOD	TEST RESULT (CRITERION)
150kHz - 80MHz	3V	80% AM, 1 kHz	M3	A

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:38 of 38 Date: Oct. 08, 2005
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Temperature:	<u>24°C</u>	Humidity:	<u>51% RH</u>
Test Object:	<u>EUT2</u>	Tested By:	<u>Tom Lin</u>
Test Result :	<u>Criterion A pass</u>	Tested Date:	<u>Aug. 13, 2003</u>

FREQUENCY	LEVEL	MODULATION	INJECTION METHOD	TEST RESULT (CRITERION)
150kHz - 80MHz	3V	80% AM, 1 kHz	M2	A

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

10. POWER FREQUENCY MAGNETIC-FIELD TEST

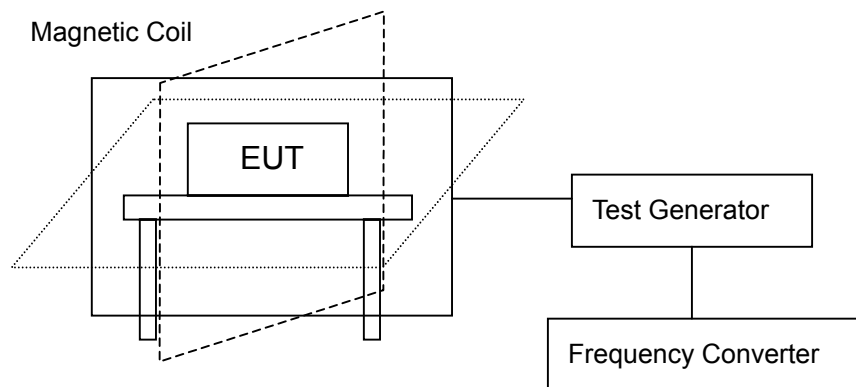
10.1 TEST EQUIPMENT

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER
MAGNETIC FIELD TESTER	HAEFELY	MAG 100.1/ 080.015-04	JAN. 2006 SRT
MAGNETIC FIELD COIL	HAEFELY	MAG 100.1/ 080.015-04	JAN. 2006 SRT
MAGNETIC FIELD METER	F.W.BELL	4080/ 19990416	MAR. 2006 ITRI

10.2 TEST PROCEDURE

According to IEC/EN 61000-4-8:1993

10.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m height above ground.
2. For the actual test configuration, please refer to the photos of testing
3. $1A/m = 12.56mG$, $3A/m = 37.68mG$, $10A/m = 125.6mG$,

10.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:40 of 40 Date: Oct. 08, 2005
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10.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

10.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition

- (1) Test axis : X, Y and Z axes
- (2) Test time : 5 min / each axis
- (3) Field strength : 3 A/m
- (4) Standard requirement : Criterion A

2. Performance criterion

- (1) Criterion A : Normal performance during test
- (2) Criterion B : Temporary degradation or loss of function or performance which is self-recoverable
- (3) Criterion C : Temporary degradation or loss of function or performance which requires operator intervention system reset

10.7 SUMMARY OF TEST RESULT

Temperature:	<u>24°C</u>	Humidity:	<u>54%H</u>
Test Object:	<u>EUT1+EUT2</u>	Tested By:	<u>Tom Lin</u>
Frequency of Magnetic Field:	<u>50Hz, 60Hz</u>	Tested Date:	<u>Aug. 14, 2003</u>

Test Result : Criterion A pass

ORIENTATION	FIELD STRENGTH	TEST RESULT (CRITERION)
X	3 A/m	A
Y	3 A/m	A
Z	3 A/m	A

NOTE:

Description of test observation:

A: There was no change compared with initial operation during the test.

 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:41 of 41 Date: Oct. 08, 2005
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11. VOLTAGE DIPS, INTERRUPTS, VARIATIONS TEST

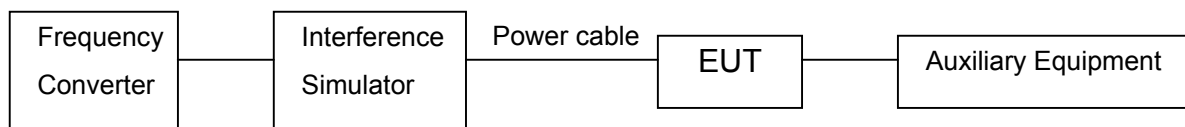
11.1 TEST EQUIPMENT

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #	DUE DATE OF CAL. & CAL. CENTER
INTERFERENCE SIMULATOR	HAEFELY	PLINE 1610/ 083-732-05	APR. 2006 ETC

11.2 TEST PROCEDURE

According to IEC/EN 61000-4-11:1994

11.3 TEST SET-UP



NOTE :

1. The EUT system was put on a wooden table with 0.8m height above ground.
2. For the actual test configuration, please refer to the photos of testing.

11.4 DESCRIPTION OF SUPPORT UNIT

Same as section 4.1.5 of this report.

11.5 EUT OPERATING CONDITION

Same as section 4.1.6 of this report.

11.6 TEST CONDITION / PERFORMANCE CRITERIA

1. Test condition

- | | |
|----------------------------------|--|
| (1) Source voltage and frequency | : 230V/50Hz, single phase |
| (2) Test level | : Dip depth 95%, 0.5 period
30%, 25 period
Interrupt 95%, 250 period |
| (3) Phase | : 0°, 180° |
| (4) Test duration | : 2min each phase |
| (5) Time between test | : 10 sec |
| (6) Standard requirement | : Dip 95% : Criterion B;
Dip 30% : Criterion C;
Interrupt > 95%: Criterion C |

2. Performance criterion

- | | |
|-----------------|---|
| (1) Criterion A | : Normal performance during test |
| (2) Criterion B | : Temporary degradation or loss of function or performance which is self-recoverable. |
| (3) Criterion C | : Temporary degradation or loss of function or performance which requires operator intervention system reset. |

11.7 SUMMARY OF TEST RESULT

Temperature:	<u>24°C</u>	Humidity:	<u>54% RH</u>
Test Object:	<u>EUT2</u>	Tested By:	<u>Tom Lin</u>
		Tested Date:	<u>Aug. 14, 2003</u>

AC POWER	DIP DEPTH	INTERVAL	DIP TIME	TEST TIME	PHASE	TEST RESULT (Criterion)
230V/50Hz	95%	10 sec	0.5 period	2 min	0°	A
					180°	A
	30%	10 sec	25 period	2 min	0°	A
					180°	A
	95% (interrupt)	10 sec	250 period	2 min	0°	B
					180°	B

NOTE:

- The power voltage range: 100V to 240V, and the range 140V is 140% of the lowest voltage.
- Description of test observation:
 - A: There was no change compared with initial operation during the test.
 - B: EUT delayed in data copy during testing.



12. PHOTOS OF TESTING

- Conducted test (EUT1)





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No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.:A05100404
Report No.:EMCA03051901-02
Page:44 of 44
Date: Oct. 08, 2005

- Conducted test (EUT2)





- Radiated test (EUT1+EUT2)





- Harmonics test (EUT2)



- Voltage fluctuations test (EUT2)





- Electrostatic discharge immunity test (EUT1+EUT2)



- Electrical fast transient / burst immunity test (EUT1+EUT2)





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No. 101-10, Ling 8,
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City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.:A05100404
Report No.:EMCA03051901-02
Page:48 of 48
Date: Oct. 08, 2005

- Radiated immunity test (EUT1+EUT2)





-Surge test (power line) (EUT2)



- Inducted RF fields (conducted susceptibility) test (EUT1)





- Inducted RF fields (conducted susceptibility) test (EUT2)



- Power frequency magnetic-field test (EUT1+EUT2)





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No. 101-10, Ling 8,
Shan-Tong Li, Chung-Li
City, Taoyuan, Taiwan,
R.O.C.

TEST REPORT

Reference No.:A05100404
Report No.:EMCA03051901-02
Page:51 of 51
Date: Oct. 08, 2005

- Voltage dips, interrupts, variations test (EUT2)



 Spectrum Research & Testing Lab., Inc. No. 101-10, Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan, Taiwan, R.O.C.	<h1>TEST REPORT</h1>	Reference No.:A05100404 Report No.:EMCA03051901-02 Page:52 of 52 Date: Oct. 08, 2005
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13. TERMS OF ABRIVATION

AV.	Average detection
AZ(°)	Turn table azimuth
Correct.	Correction
EL(m)	Antenna height (meter)
EUT	Equipment Under Test
Horiz.	Horizontal direction
LISN	Line Impedance Stabilization Network
NSA	Normalized Site Attenuation
Q.P.	Quasi-peak detection
SRT Lab	Spectrum Research & Testing Laboratory, Inc.
Vert.	Vertical direction