

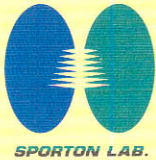


**SPORTON LAB.**

Certificate No: EC871707

# CERTIFICATE

- **EQUIPMENT : NAS (Network Attached Storage)**  
**MODEL NO. : NS04-4250 series**  
**APPLICANT : Lanner Electronics Inc.**  
7F, No. 173, Sec. 2, Ta Tung Rd.,  
Hsi-Chih, Taipei Hsien, Taiwan



**HEREBY CERTIFY THAT:**

THE MEASUREMENTS SHOWN IN THIS TEST REPORT WERE MADE IN ACCORDANCE WITH THE PROCEDURES GIVEN IN **EUROPEAN COUNCIL DIRECTIVE 2004/108/EC**. THE EQUIPMENT WAS **PASSED** THE TEST PERFORMED ACCORDING TO **European Standard EN 55022:2006 Class B, EN 61000-3-2:2006, EN 61000-3-3:1995/A1:2001/A2:2005, EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:1995/A2:2000, IEC 61000-4-3:2002, IEC 61000-4-4:2004, IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000, IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000) and Australian Standard AS/NZS CISPR 22:2006 Class B.** THE TEST WAS CARRIED OUT ON **Jul. 25, 2008** AT **SPORTON INTERNATIONAL INC. LAB.**

*Castries Huang Jul 26 2008*  
Castries Huang  
Supervisor

# EMC TEST REPORT

according to

**European Standard EN 55022:2006 Class B,  
EN 61000-3-2:2006, EN 61000-3-3:1995/A1:2001/A2:2005 and  
EN 55024:1998/A1:2001/A2:2003 ( IEC 61000-4-2:1995/A2:2000,  
IEC 61000-4-3:2002, IEC 61000-4-4:2004,  
IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000,  
IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000 ) and  
Australian Standard AS/NZS CISPR 22:2006 Class B**

Equipment : NAS (Network Attached Storage)

Model No. : NS04-4250 series

Applicant : **Lanner Electronics Inc.**  
7F, No. 173, Sec. 2, Ta Tung Rd.,  
Hsi-Chih, Taipei Hsien, Taiwan

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- This test report is only applicable to European Community.

***SPORTON International Inc.***

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## Table of Contents

History of this test report.....	iii
<b>CERTIFICATE OF COMPLIANCE.....</b>	<b>1</b>
<b>1. General Description of Equipment under Test.....</b>	<b>2</b>
1.1 Applicant.....	2
1.2 Manufacturer.....	2
1.3 Basic Description of Equipment under Test.....	2
1.4 Feature of Equipment under Test.....	2
<b>2. Test Configuration of Equipment under Test.....</b>	<b>3</b>
2.1 Test Manner.....	3
2.2 Description of Test System.....	3
<b>3. Test Software.....</b>	<b>8</b>
<b>4. General Information of Test.....</b>	<b>9</b>
4.1 Test Facility.....	9
4.2 Test Voltage.....	9
4.3 Standard for Methods of Measurement.....	9
4.4 Test in Compliance with.....	9
4.5 Frequency Range Investigated.....	9
4.6 Test Distance.....	9
<b>5. Test of Conducted Powerline.....</b>	<b>10</b>
5.1 Description of Major Test Instruments.....	10
5.2 Test Procedures.....	10
5.3 Typical Test Setup Layout of Conducted Powerline & disturbances at telecommunication ports.....	11
5.4 Test Result of AC Powerline Conducted Emission.....	12
5.5 Test Result of Disturbances at Telecommunication Ports.....	14
5.6 Photographs of Conducted Powerline Test Configuration.....	17
<b>6. Test of Radiated Emission.....</b>	<b>18</b>
6.1 Description of Major Test Instruments.....	18
6.2 Test Procedures.....	19
6.3 Typical Test Setup Layout of Radiated Emission.....	20
6.4 Test Result of Radiated Emission.....	21
6.5 Photographs of Radiated Emission Test Configuration.....	25
<b>7. Harmonics Test.....</b>	<b>26</b>
<b>8. Voltage Fluctuations Test.....</b>	<b>27</b>
8.1 Standard.....	27
8.2 Test Procedure.....	27
8.3 Test Equipment Settings.....	27
8.4 Test Setup.....	27
8.5 Test Result of Voltage Fluctuation and Flicker Test.....	28
8.6 Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test.....	29
<b>9. Electrostatic Discharge Immunity Test (ESD).....</b>	<b>30</b>
9.1 Test Setup.....	30
9.2 Test Setup for Tests Performed in Laboratory.....	31
9.3 ESD Test Procedure.....	32
9.4 Test Severity Levels.....	33
9.5 Test Points.....	34
9.6 Photographs of Electrostatic Discharge Immunity Test.....	36

---

<b>10. Radio Frequency Electromagnetic Field Immunity Test (RS)</b> .....	<b>37</b>
10.1 Test Setup .....	37
10.2 Test Procedure.....	38
10.3 Test Severity Levels.....	38
10.4 Photographs of Radio Frequency Electromagnetic Field Immunity Test .....	39
<b>11. Electrical Fast Transient/Burst Immunity Test (EFT/BURST)</b> .....	<b>40</b>
11.1 Test Setup .....	40
11.2 Test on Power Line .....	41
11.3 Test on Communication Lines.....	41
11.4 Test Procedure.....	41
11.5 Test Severity Levels.....	42
11.6 Photographs of Electrical Fast Transient/Burst Immunity Test .....	43
<b>12. Surge Immunity Test</b> .....	<b>45</b>
12.1 Test Record.....	45
12.2 Test Level.....	46
12.3 Test Procedure.....	46
12.4 Operating Condition .....	47
12.5 Photographs of Surge Immunity Test.....	48
<b>13. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test ( CS )</b> .....	<b>49</b>
13.1 Test Level.....	49
13.2 Operating Condition .....	49
13.3 Test Procedure.....	50
13.4 Photographs of CS Test.....	51
<b>14. Power Frequency Magnetic Field immunity tests</b> .....	<b>52</b>
14.1 Test Record.....	52
14.2 Test Setup .....	52
14.3 Photographs of Power Frequency Magnetic Field immunity tests .....	53
<b>15. Voltage Dips and Voltage Interruption Immunity Tests</b> .....	<b>54</b>
15.1 Test Record of Voltage Interruption .....	54
15.2 Test Record of Voltage Dips .....	54
15.3 Testing Requirement and Procedure .....	55
15.4 Test Conditions .....	55
15.5 Operating Condition .....	55
15.6 Photographs of Voltage Dips and Voltage Interruption Immunity Tests.....	56
<b>16. List of Measuring Equipment Used</b> .....	<b>57</b>
<b>17. Declaration of Conformity and the CE Mark</b> .....	<b>59</b>
<b>Appendix A. Photographs of EUT</b> .....	<b>A1 ~ A21</b>

**History of this test report**

Original Report Issue Date: Jul. 29, 2008

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

## CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55022:2006 Class B,  
EN 61000-3-2:2006, EN 61000-3-3:1995/A1:2001/A2:2005 and  
EN 55024:1998/A1:2001/A2:2003 ( IEC 61000-4-2:1995/A2:2000,  
IEC 61000-4-3:2002, IEC 61000-4-4:2004,  
IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000,  
IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000 ) and  
Australian Standard AS/NZS CISPR 22:2006 Class B**

Equipment : NAS (Network Attached Storage)

Model No. : NS04-4250 series

Applicant : **Lanner Electronics Inc.**  
7F, No. 173, Sec. 2, Ta Tung Rd.,  
Hsi-Chih, Taipei Hsien, Taiwan

**I HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 2004/108/EC**. The equipment was **passed** the test performed according to **European Standard EN 55022:2006 Class B, EN 61000-3-2:2006, EN 61000-3-3:1995/A1:2001/A2:2005, EN 55024:1998/A1:2001/A2:2003 ( IEC 61000-4-2:1995/A2:2000, IEC 61000-4-3:2002, IEC 61000-4-4:2004, IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000, IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000 ) and Australian Standard AS/NZS CISPR 22:2006 Class B**.  
The test was carried out on Jul. 25, 2008 at **SPORTON International Inc. LAB**.

  
Castries Huang  
Supervisor

**SPORTON International Inc.**

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## 1. General Description of Equipment under Test

### 1.1 Applicant

Lanner Electronics Inc.  
7F, No. 173, Sec. 2, Ta Tung Rd.,  
His-Chih, Taipei Hsien, Taiwan

### 1.2 Manufacturer

Lanner Electronics Inc.  
9F, 151, Section 2 Datong Road,  
Sijhih City, Taipei 221, Taiwan, R.O.C.

### 1.3 Basic Description of Equipment under Test

Equipment : NAS (Network Attached Storage)  
Model No. : NS04-4250 series  
Trade Name : Lanner Electronics Inc.  
RJ45 Cable : Non-Shielded, 1.8 m  
RJ45 Cable : Non-Shielded, 10 m  
Power Supply Type : Switching  
AC Power Cord : Non-Shielded, 1.8 m, 3 pin

### 1.4 Feature of Equipment under Test

Please refer to user manual.

## 2. Test Configuration of Equipment under Test

### 2.1 Test Manner

- a. During testing, the interface cables and equipment positions were varied according to European Standard EN 55022.
- b. The complete test system included remote workstation, hp compaq PC, DELL LCD Monitor, HP PS/2 Keyboard, HP PS/2 Mouse, HP Printer, ACEEX Modem, EXCEDING SATA&USB2.0 HDD, SANDISK Flash Disk and EUT for EMI test. The remote workstation included hp compaq PC, DELL Monitor, HP PS/2 Keyboard and HP PS/2 Mouse.
- c. The following modes were performed for EMI test:  
Mode 1. LAN: 1Gbps  
Mode 2. LAN: 100Mbps  
Mode 3. LAN: 10Mbps  
cause "mode 1" generated the worst test result, it was reported as final data.
- d. The following modes were performed for disturbances at telecommunication ports test:  
Mode 1. LAN: 1Gbps-10%  
Mode 2. LAN: 100Mbps-10%  
Mode 3. LAN: 10Mbps-10%
- e. The complete test system included remote workstation, DELL PC, DELL LCD Monitor, DELL USB Keyboard, DELL USB Mouse, SANDISK Flash Disk, MAPOWER ESATA HDD and EUT for EMS test. The remote workstation included DELL PC, DELL LCD Monitor, DELL USB Keyboard and DELL PS/2 Mouse.
- f. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.

### 2.2 Description of Test System

#### < EMI >

Support Unit 1. -- Personal Computer (HP Compaq) – for local workstation

FCC ID	: N/A
Model No.	: D330uT
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0018
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.



## Support Unit 2. – LCD Monitor (DELL) – for local workstation

FCC ID : N/A  
Model No. : E198WFPf  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0024  
Data Cable : Shielded, 1.8m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

## Support Unit 3. -- PS/2 Keyboard (HP) – for local and remote workstation

FCC ID : N/A  
Model No. : KB-0133  
Serial No. : SP0042  
Data Cable : Shielded, 360 degree via metal backshells, 1.9m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

## Support Unit 4. -- PS/2 Mouse (HP) – for local and remote workstation

FCC ID : JNZ211443  
Model No. : M-S69  
Serial No. : SP0033  
Data Cable : Non-Shielded, 1.85m

## Support Unit 5. -- Printer (HP) – for local workstation

FCC ID : B94C2642X  
Model No. : C2642A  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0058  
Data Cable : Shielded, 360 degree via metal backshells, 1.2m

## Support Unit 6. -- Modem (ACEEX) – for local workstation

FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0065  
Data Cable : Shielded, 360 degree via metal backshells, 1.15m

Support Unit 7. – SATA&USB2.0 HDD (EXCEDING) – for local workstation

FCC ID : N/A  
Model No. : MAP-AD21CS  
Serial No. : SP0001  
Data Cable : Shielded, 1.0m

Support Unit 8. –Flash Disk (SANDISK) – for local workstation

FCC ID : N/A  
Model No. : 512MB  
Serial No. : SP0001

Support Unit 9. -- Personal Computer (hp compaq) – for remote workstation

FCC ID : N/A  
Model No. : D330uT  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0036  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 10. – Monitor (DELL) – for remote workstation

FCC ID : N/A  
Model No. : E770s  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0067  
Data Cable : Shielded, 360 degree via metal backshells, 1.8m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity..

**< EMS >**

Support Unit 1. -- Personal Computer (DELL) – for local and remote workstation

FCC ID : N/A  
Model No. : 470  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0050  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. – LCD Monitor (DELL) – for local workstation

FCC ID : N/A  
Model No. : E198WFPf  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0067  
Data Cable : Shielded, 360 degree via metal backshells, 1.8 m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. – USB Keyboard (DELL) – for local and remote workstation

FCC ID : N/A  
Model No. : SK-8115  
Serial No. : SP0001  
Data Cable : Shielded, 2.0m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. – USB Mouse (DELL) – for local and remote workstation

FCC ID : N/A  
Model No. : MOA8BO  
Serial No. : SP0012  
Data Cable : Shielded, 1.8m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 5. – SATA&USB2.0 HDD (MAPOWER) – for local workstation

FCC ID : N/A  
Model No. : MAP-AD21  
Serial No. : SP0001  
Data Cable : Shielded, 1.0m

Support Unit 6. –Flash Disk (SANDISK) – for local workstation

FCC ID : N/A  
Model No. : 512MB  
Serial No. : SP0001

Support Unit 7. – LCD Monitor (DELL) – for remote workstation

FCC ID : N/A  
Model No. : 1704FPTt  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0067  
Data Cable : Shielded, 360 degree via metal backshells, 1.8 m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

### 3. Test Software

#### < EMI >

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the modem.
- f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- g. Repeat the steps from c to f.

At the same time, the following programs were executed:

- Executed "Winthrax.exe" to read and write data from EUT and external SATA&USB2.0 HDD.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.

#### < EMS >

During the test, the following programs under WIN XP were executed:

- Executed "Copy.exe" to read and write data from EUT and external SATA&USB2.0 HDD.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.

## 4. General Information of Test

### 4.1 Test Facility

#### <EMI>

This test was carried out by SPORTON International Inc.

Test Site Location : No. 3, Lane 238, Kang Lo Street, Nei Hwu District,  
Taipei 11424, Taiwan, R.O.C.  
TEL : 886-2-2631-4739  
FAX : 886-2-2631-9740

Test Site No : CO01-NH, OS01-NH

#### <EMS>

Test Site Location : 3F, No.587, Tanmeu St., Neihu District, Taipei, Taiwan, R.O.C.  
TEL : 886-2-2793-1705

### 4.2 Test Voltage

230V / 50Hz

### 4.3 Standard for Methods of Measurement

EMI Test (conduction and radiation) : European Standard EN 55022 Class B  
: Australian Standard AS/NZS CISPR 22:2006 Class B  
Harmonics Test : European Standard EN 61000-3-2.  
Voltage Fluctuations Test : European Standard EN 61000-3-3.  
EMS Test : European Standard EN 55024.  
(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,  
CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

### 4.4 Test in Compliance with

EMI Test (conduction and radiation) : European Standard EN 55022 Class B  
: Australian Standard AS/NZS CISPR 22:2006 Class B  
Harmonics Test : European Standard EN 61000-3-2.  
Voltage Fluctuations Test : European Standard EN 61000-3-3.  
EMS Test : European Standard EN 55024.  
(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,  
CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

### 4.5 Frequency Range Investigated

- Conducted emission test: from 150 kHz to 30 MHz
- Radiated emission test: from 30 MHz to 1,000 MHz
- Radio frequency electromagnetic field immunity test : 80-1000 MHz.

### 4.6 Test Distance

- The test distance of radiated emission test from antenna to EUT is 10 M.
- The test distance of radio frequency electromagnetic field immunity test from antenna to EUT is 3 M.

## 5. Test of Conducted Powerline

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 55022 Clause 9 and Australian Standard AS/NZS CISPR 22. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

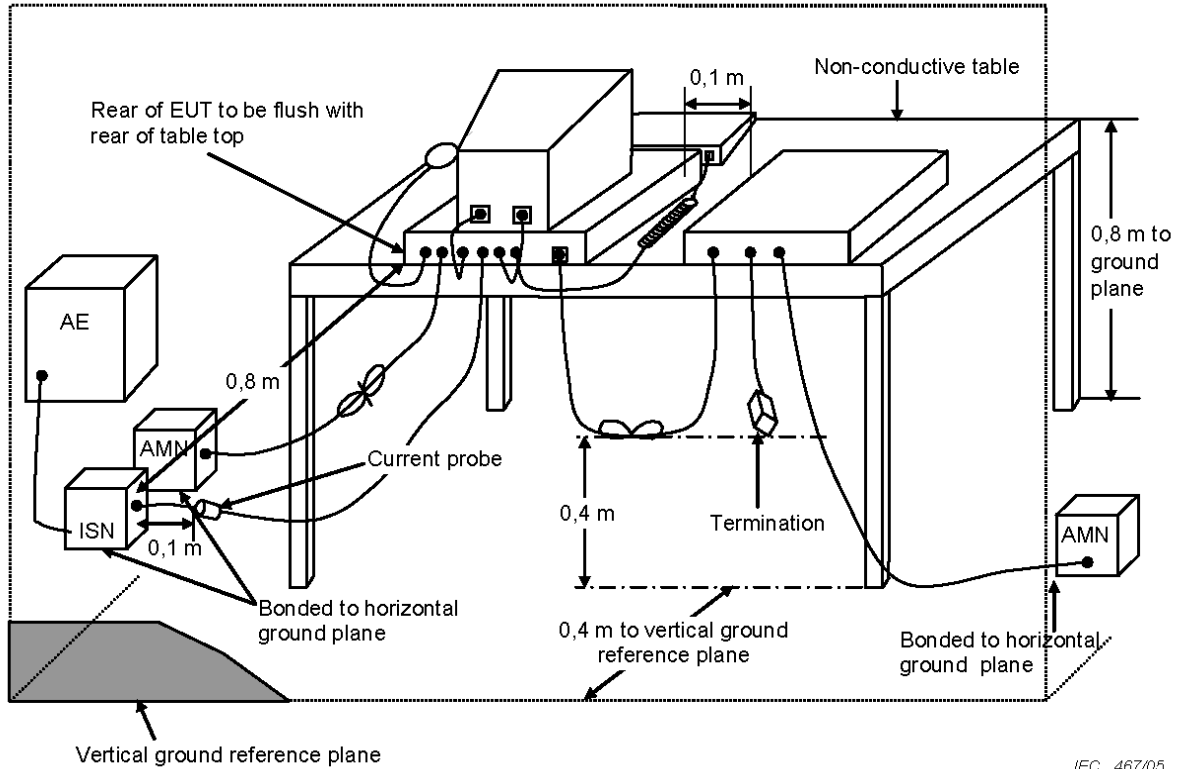
### 5.1 Description of Major Test Instruments

● Test Receiver	( R&S ESCS 30 )
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

### 5.2 Test Procedures

- a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. Connect Telecommunication port to ISN (Impedance Stabilization Network)
- d. All the support units are connect to the other LISN.
- e. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- f. The CISPR states that a 50 ohm , 50 microhenry LISN should be used.
- g. Both sides of AC line were checked for maximum conducted interference.
- h. The frequency range from 150 kHz to 30 MHz was searched.
- i. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3 Typical Test Setup Layout of Conducted Powerline & disturbances at telecommunication ports



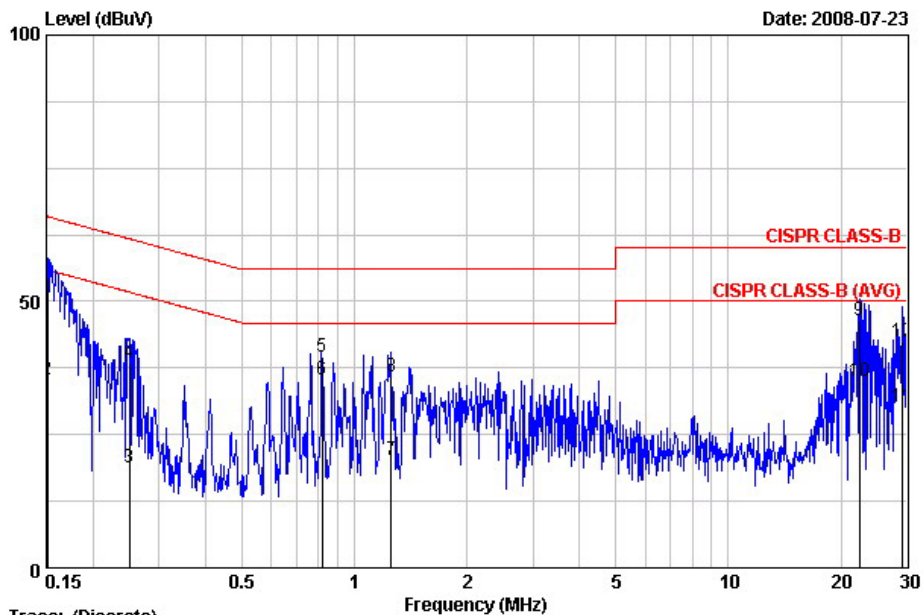


### 5.4 Test Result of AC Powerline Conducted Emission

#### 5.4.1 Test Mode: Mode 1

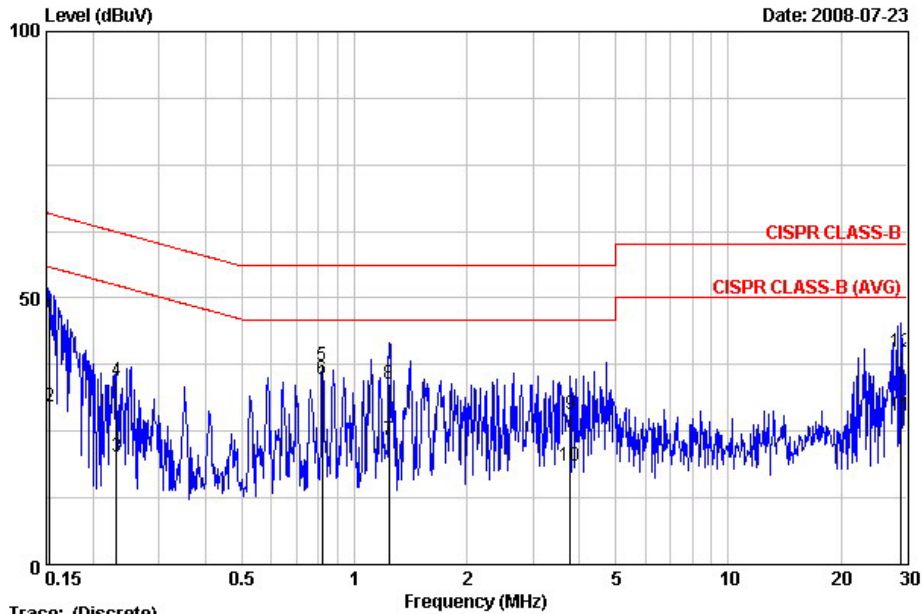
- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature: 27
- Relative Humidity: 52 %
- All emissions not reported here are more than 10 dB below the prescribed limit.
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level

The test was passed at the minimum margin that marked by the frame in the following table



Trace: (Discrete)  
 Site : CO01-NH  
 Condition : CISPR CLASS-B LISN-NSLK3127-970527 LINE  
 out : NAS  
 power : AC 230V  
 memo : LAN 1G  
 memo :  
 memo :  
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.151	54.39	-11.57	65.96	54.35	0.04	0.00	QP
2	0.151	35.30	-20.66	55.96	35.26	0.04	0.00	AVERAGE
3	0.251	18.70	-33.03	51.73	18.66	0.04	0.00	AVERAGE
4	0.251	38.44	-23.29	61.73	38.40	0.04	0.00	QP
5	0.820	39.71	-16.29	56.00	39.66	0.05	0.00	QP
<b>6</b>	<b>0.820</b>	<b>35.39</b>	<b>-10.61</b>	<b>46.00</b>	<b>35.34</b>	<b>0.05</b>	<b>0.00</b>	<b>AVERAGE</b>
7	1.255	20.26	-25.74	46.00	20.17	0.06	0.03	AVERAGE
8	1.255	35.95	-20.05	56.00	35.86	0.06	0.03	QP
9	22.415	46.39	-13.61	60.00	45.86	0.28	0.25	QP
10	22.415	35.10	-14.90	50.00	34.57	0.28	0.25	AVERAGE
11	29.061	30.18	-19.82	50.00	29.48	0.32	0.38	AVERAGE
12	29.061	42.42	-17.58	60.00	41.72	0.32	0.38	QP



Trace: (Discrete)

Site : CO01-NH  
 Condition : CISPR CLASS-B LISN-NSLK3127-970527 NEUTRAL  
 Setup : NAS  
 power : AC 230V  
 memo : LAN 1G  
 memo :  
 memo :  
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.153	46.51	-19.31	65.82	46.47	0.04	0.00	QP
2	0.153	29.76	-26.06	55.82	29.72	0.04	0.00	AVERAGE
3	0.232	20.14	-32.25	52.39	20.10	0.04	0.00	AVERAGE
4	0.232	34.41	-27.98	62.39	34.37	0.04	0.00	QP
5	0.819	37.23	-18.77	56.00	37.18	0.05	0.00	QP
6	0.819	34.75	-11.25	46.00	34.70	0.05	0.00	AVERAGE
7	1.236	23.22	-22.78	46.00	23.14	0.05	0.03	AVERAGE
8	1.236	33.98	-22.02	56.00	33.90	0.05	0.03	QP
9	3.779	28.28	-27.72	56.00	28.11	0.07	0.10	QP
10	3.779	18.43	-27.57	46.00	18.26	0.07	0.10	AVERAGE
11	28.908	27.83	-22.17	50.00	27.14	0.31	0.38	AVERAGE
12	28.908	39.84	-20.16	60.00	39.15	0.31	0.38	QP

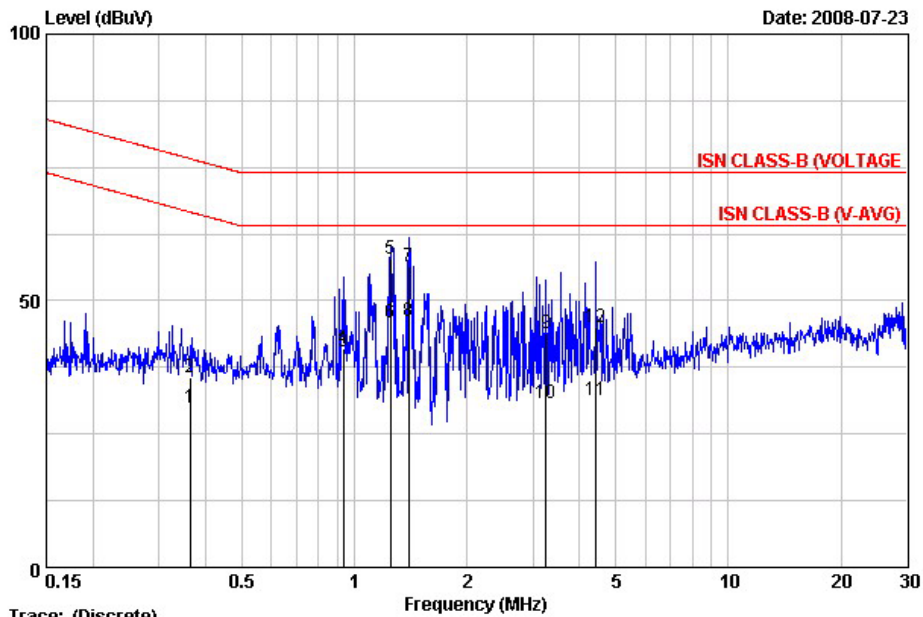
Test Engineer : Eddie  
 Eddie Lee

**5.5 Test Result of Disturbances at Telecommunication Ports**

5.5.1 Test Mode: Mode 1

- Frequency Range of Test : from 150 kHz to 30 MHz
- emperature: 27
- Relative Humidity: 52 %
- Corrected Reading(dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

**The test was passed at the minimum margin that marked by the frame in the following table**



Trace: (Discrete)  
 Site : CO01-NH  
 Condition : ISN CLASS-B (VOLTAGE ISNT800-20070305)  
 eut : NAS  
 power : AC 230V  
 memo : LAN 1G-10%  
 memo :  
 memo :  
 memo :

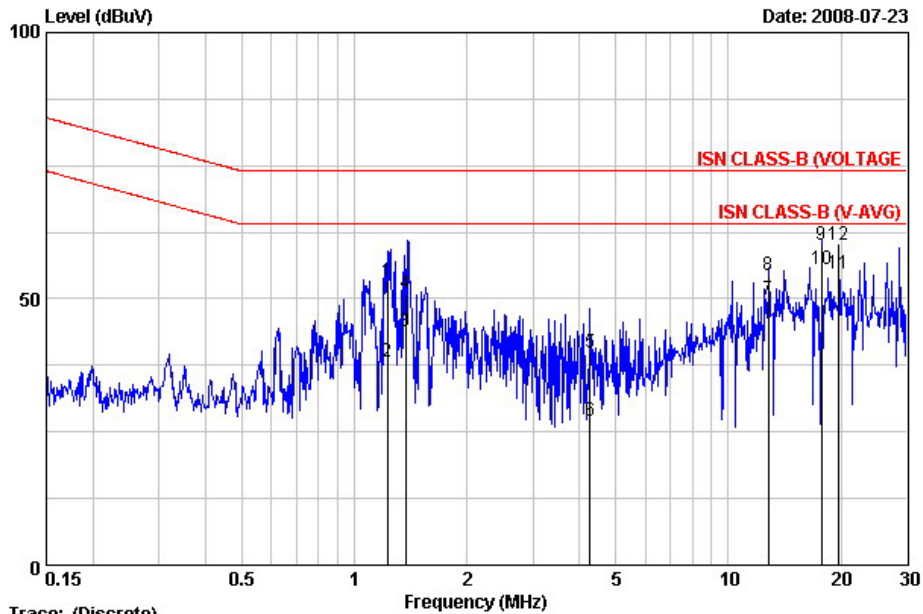
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.363	30.05	-36.60	66.65	20.25	9.80	0.00	AVERAGE
2	0.363	35.71	-40.94	76.65	25.91	9.80	0.00	QP
3	0.933	40.33	-23.67	64.00	30.76	9.57	0.00	AVERAGE
4	0.933	41.15	-32.85	74.00	31.58	9.57	0.00	QP
5	1.249	57.76	-16.24	74.00	48.23	9.50	0.03	QP
6	1.249	45.92	-18.08	64.00	36.39	9.50	0.03	AVERAGE
7	1.396	56.50	-17.50	74.00	46.98	9.47	0.05	QP
8	1.396	46.05	-17.95	64.00	36.53	9.47	0.05	AVERAGE
9	3.258	43.98	-30.02	74.00	34.34	9.54	0.10	QP
10	3.258	30.76	-33.24	64.00	21.12	9.54	0.10	AVERAGE
11	4.430	31.44	-32.56	64.00	21.68	9.64	0.11	AVERAGE
12	4.430	45.00	-29.00	74.00	35.24	9.64	0.11	QP

Test Engineer : Eddie  
 Eddie Lee

5.5.2 Test Mode: Mode 2

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 27
- Relative Humidity: 52 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

**The test was passed at the minimum margin that marked by the frame in the following table**



Trace: (Discrete)

Site : CO01-NH  
 Condition : ISN CLASS-B (VOLTAGE ISNT800-20070305)  
 Input : NAS  
 power : AC 230V  
 memo : LAN 100-10%  
 memo :  
 memo :  
 memo :

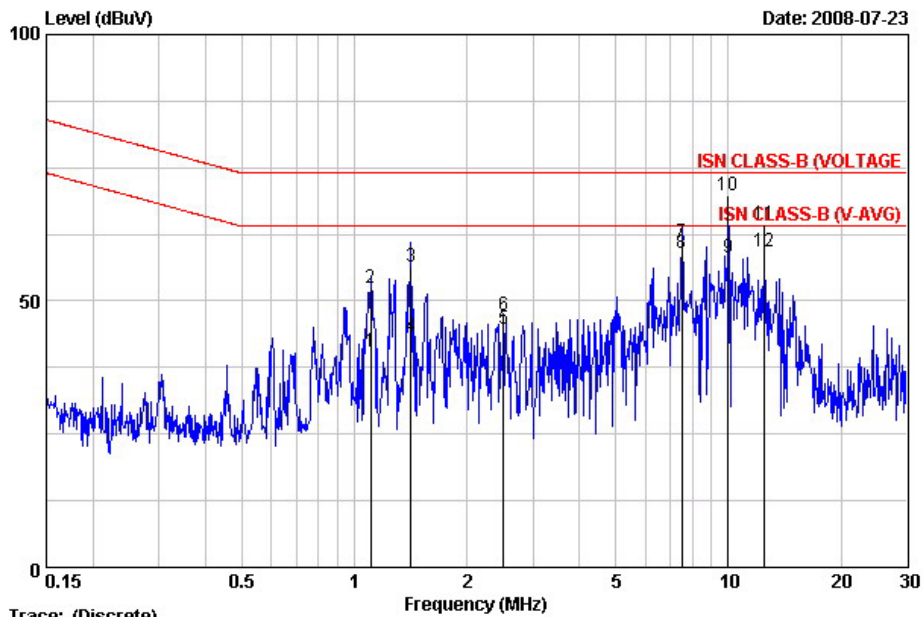
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	1.227	53.34	-20.66	74.00	43.81	9.50	0.03	QP
2	1.227	38.09	-25.91	64.00	28.56	9.50	0.03	AVERAGE
3	1.372	43.96	-20.04	64.00	34.44	9.47	0.05	AVERAGE
4	1.372	50.96	-23.04	74.00	41.44	9.47	0.05	QP
5	4.269	39.80	-34.20	74.00	30.06	9.63	0.11	QP
6	4.269	26.95	-37.05	64.00	17.21	9.63	0.11	AVERAGE
7	12.811	49.79	-14.21	64.00	39.60	9.99	0.20	AVERAGE
8	12.811	54.47	-19.53	74.00	44.28	9.99	0.20	QP
9	17.695	60.18	-13.82	74.00	49.88	10.10	0.20	QP
10	17.695	55.60	-8.40	64.00	45.30	10.10	0.20	AVERAGE
11	19.710	54.71	-9.29	64.00	44.37	10.14	0.20	AVERAGE
12	19.710	60.07	-13.93	74.00	49.73	10.14	0.20	QP

Test Engineer : Eddie Lee  
 Eddie Lee

5.5.3 Test Mode: Mode 3

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 27
- Relative Humidity: 52 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

**The test was passed at the minimum margin that marked by the frame in the following table**



Trace: (Discrete)

Site : CO01-NH  
 Condition : ISN CLASS-B (VOLTAGE ISNT800-20070305)  
 eut : NAS  
 power : AC 230V  
 memo : LAN 10-10%  
 memo :  
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	1.106	40.35	-23.65	64.00	30.81	9.53	0.01	AVERAGE
2	1.106	52.43	-21.57	74.00	42.89	9.53	0.01	QP
3	1.418	56.37	-17.63	74.00	46.85	9.47	0.05	QP
4	1.418	43.21	-20.79	64.00	33.69	9.47	0.05	AVERAGE
5	2.500	44.86	-19.14	64.00	35.30	9.46	0.10	AVERAGE
6	2.500	47.43	-26.57	74.00	37.87	9.46	0.10	QP
7	7.497	61.11	-12.89	74.00	51.12	9.82	0.17	QP
8	7.497	59.03	-4.97	64.00	49.04	9.82	0.17	AVERAGE
9	10.000	58.09	-5.91	64.00	47.98	9.91	0.20	AVERAGE
10	10.000	69.75	-4.25	74.00	59.64	9.91	0.20	QP
11	12.499	64.25	-9.75	74.00	54.06	9.99	0.20	QP
12	12.499	59.37	-4.63	64.00	49.18	9.99	0.20	AVERAGE

Test Engineer : Eddie Lee  
 Eddie Lee

### 5.6 Photographs of Conducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



## 6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in European Standard EN 55022, Clause 10 and Australian Standard AS/NZS CISPR 22. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

### 6.1 Description of Major Test Instruments

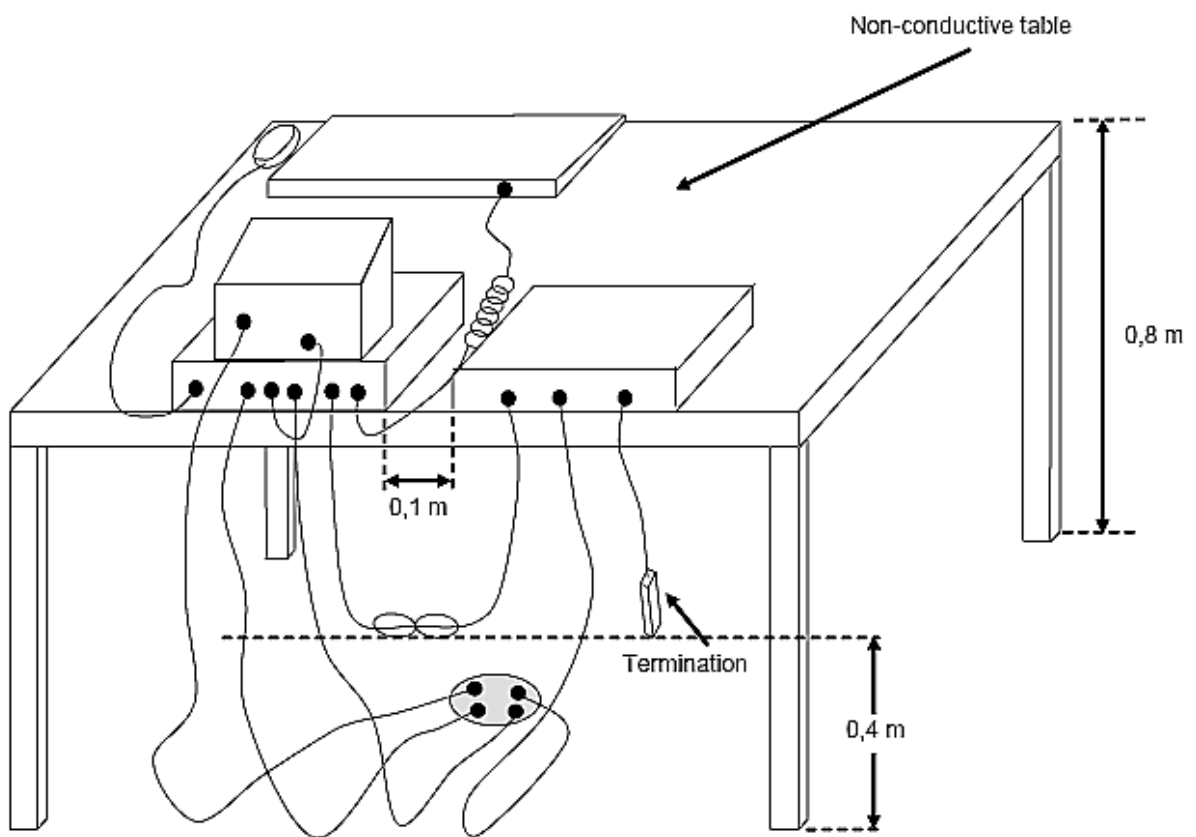
- Amplifier ( HP 8447D )
  - RF Gain 25 dB
  - Signal Input 0.1 MHz - 1.3 GHz
  
- Spectrum Analyzer ( R&S FSP )
  - Attenuation 10 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 120 kHz
  - Signal Input 9 kHz - 7 GHz
  
- Test Receiver ( R&S ESCS 30 )
  - Resolution Bandwidth 120 kHz
  - Frequency Band 9 kHz - 2.75 GHz
  - Quasi-Peak Detector ON for Quasi-Peak Mode  
OFF for Peak Mode

## 6.2 Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.



### 6.3 Typical Test Setup Layout of Radiated Emission

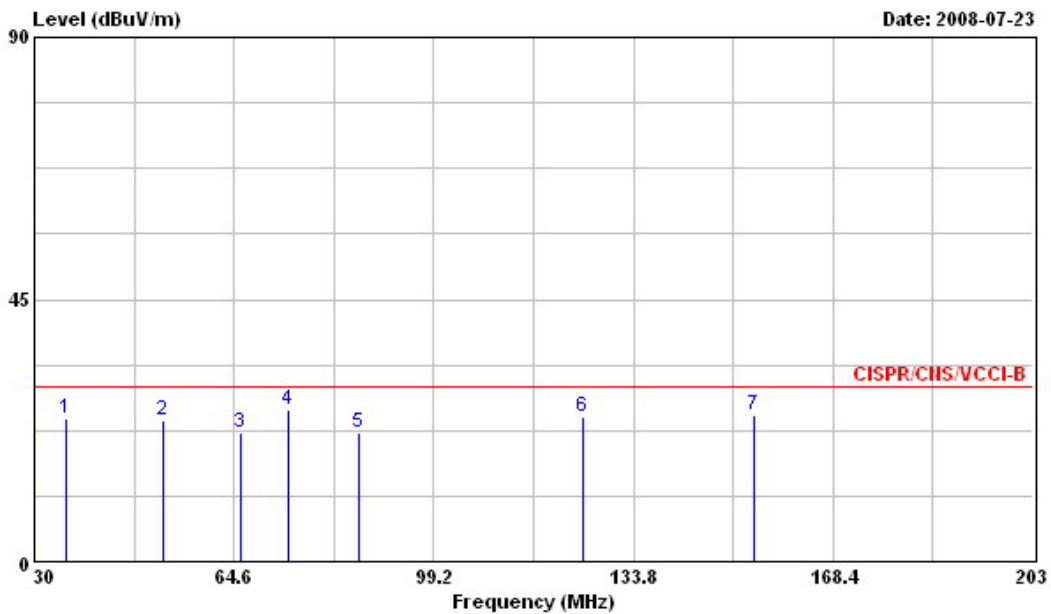


**6.4 Test Result of Radiated Emission**

6.4.1 Test Mode: Mode 1

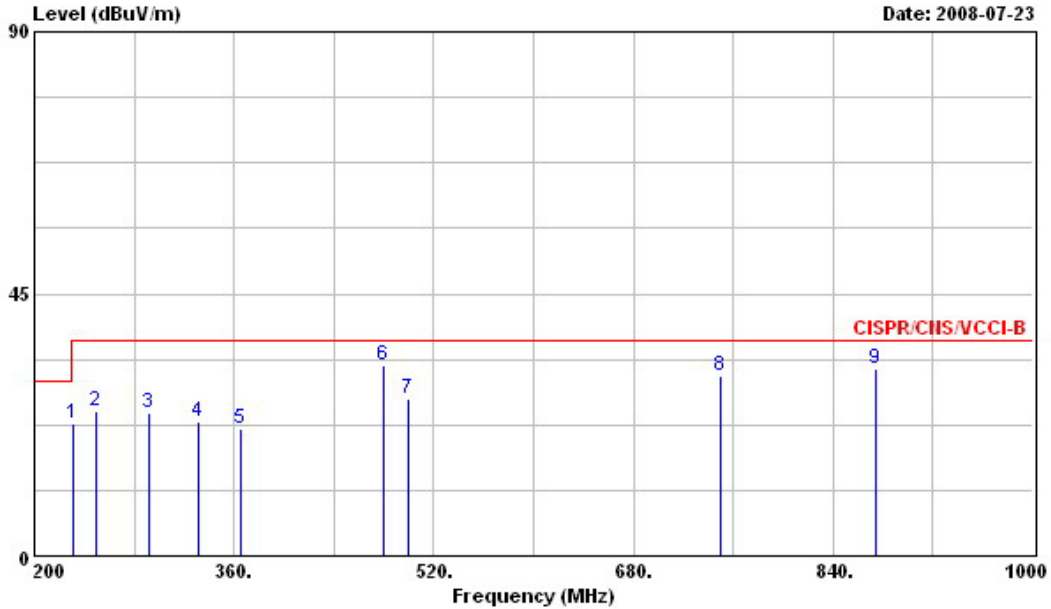
- Frequency Range of Test: from 30 MHz to 1,000 MHz
- Temperature: 28
- Relative Humidity: 51 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following test record



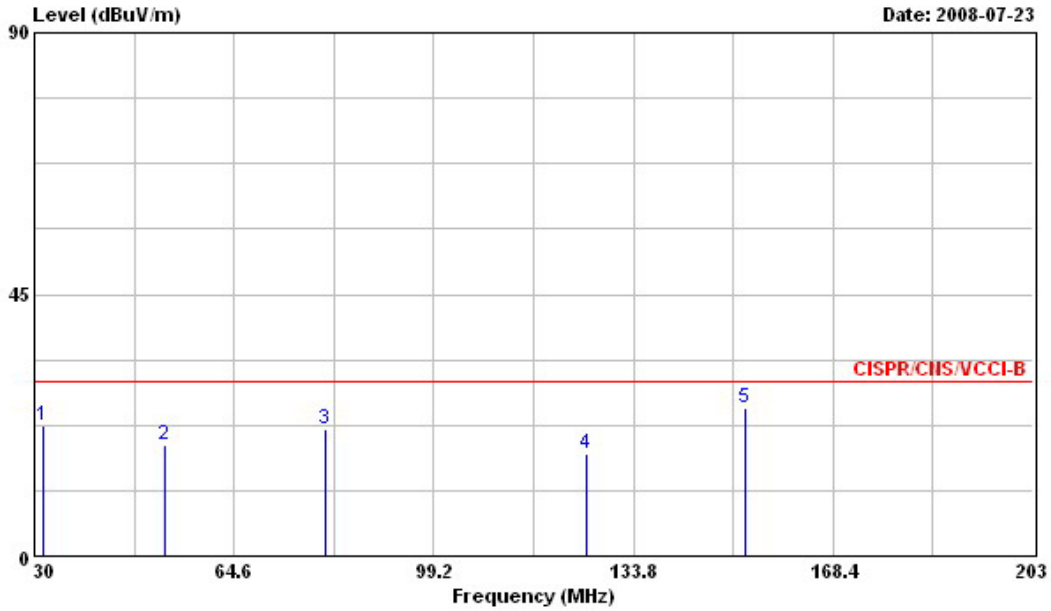
Site : OS01-NH  
 Condition : CISPR/CNS/VCCI-B 10m OS01-ANT-12-24-2007 VERTICAL  
 EUT : NAS  
 POWER : 230V/50Hz  
 MEMO : EMCTEST,WINTHRAX  
 : LAN:1G

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp		Rnt	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	35.540	24.47	-5.53	30.00	35.80	15.30	0.84	27.47	QP	---	---
2	52.320	24.26	-5.74	30.00	43.40	7.28	0.98	27.40	Peak	---	---
3	65.640	22.17	-7.83	30.00	43.30	5.16	1.08	27.37	QP	---	---
4	73.940	25.94	-4.06	30.00	46.15	5.98	1.16	27.35	Peak	100	158
5	86.230	21.97	-8.03	30.00	40.10	7.90	1.30	27.33	Peak	---	---
6	125.000	24.81	-5.19	30.00	39.61	10.92	1.48	27.20	QP	---	---
7	154.730	25.15	-4.85	30.00	40.40	10.12	1.71	27.08	QP	---	---



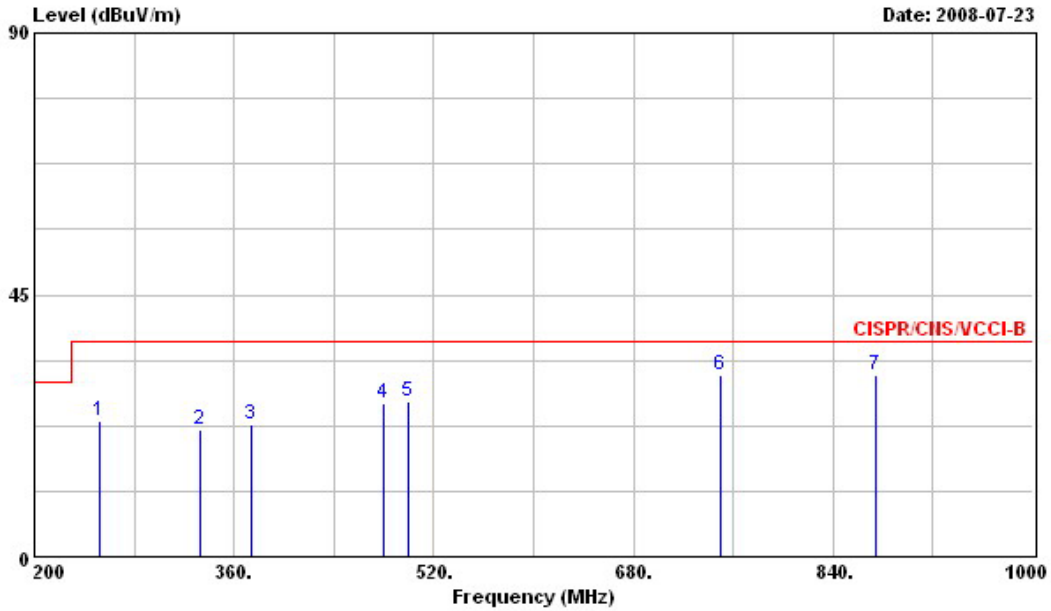
Site : OS01-NH  
 Condition : CISPR/CNS/VCCL-B 10m OS01-ANT-12-24-2007 VERTICAL  
 EUT : NAS  
 POWER : 230V/50Hz  
 MEMO : EMCTEST,WINTHRAX  
 : LAN:1G

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
		dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	231.200	22.76	-14.24	37.00	36.80	10.70	2.10	26.84 Peak	---	---
2	249.600	24.77	-12.23	37.00	37.18	12.12	2.27	26.80 Peak	---	---
3	292.000	24.49	-12.51	37.00	35.70	12.96	2.55	26.72 Peak	---	---
4	331.200	23.17	-13.83	37.00	33.31	13.97	2.75	26.86 Peak	---	---
5	365.600	21.74	-15.26	37.00	30.98	14.88	2.91	27.03 Peak	---	---
6 @	480.000	32.86	-4.14	37.00	39.75	17.48	3.63	28.00 Peak	---	---
7 @	499.200	27.04	-9.96	37.00	33.53	17.88	3.82	28.19 Peak	---	---
8 @	749.600	30.86	-6.14	37.00	31.91	21.75	5.20	28.00 Peak	---	---
9 @	874.400	32.06	-4.94	37.00	30.97	23.10	5.59	27.60 Peak	---	---




Site : OS01-NH  
 Condition : CISPR/CNS/VCCL-B 10m OS01-ANT-12-24-2007 HORIZONTAL  
 EUT : NAS  
 POWER : 230V/50Hz  
 MEMO : EMCTEST,WINTHRAX  
 : LAN:1G

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	31.560	22.39	-7.61	30.00	31.64	17.44	0.80	27.49	Peak	---	---
2	52.660	19.03	-10.97	30.00	38.17	7.28	0.98	27.40	Peak	---	---
3 @	80.520	21.87	-8.13	30.00	41.00	7.00	1.21	27.34	Peak	---	---
4	125.670	17.55	-12.45	30.00	32.36	10.90	1.49	27.20	Peak	---	---
5 @	153.180	25.46	-4.54	30.00	40.59	10.27	1.69	27.09	Peak	---	---



Site : OS01-NH  
 Condition : CISPR/CNS/VCCL-B 10m OS01-ANT-12-24-2007 HORIZONTAL  
 EUT : NAS  
 POWER : 230V/50Hz  
 MEMO : EMCTEST,WINTHRAX  
 : LAN:1G

Line	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	252.800	23.19	-13.81	37.00	35.41	12.25	2.32	26.79	Peak	---	---
2	332.800	21.70	-15.30	37.00	31.83	13.99	2.75	26.87	Peak	---	---
3	374.400	22.59	-14.41	37.00	31.51	15.12	3.03	27.07	Peak	---	---
4	480.000	26.24	-10.76	37.00	33.13	17.48	3.63	28.00	Peak	---	---
5	499.200	26.59	-10.41	37.00	33.08	17.88	3.82	28.19	Peak	---	---
6	749.600	31.19	-5.81	37.00	32.24	21.75	5.20	28.00	Peak	---	---
7	874.400	31.18	-5.82	37.00	30.09	23.10	5.59	27.60	Peak	---	---

Test Engineer :   
 Louis Lin

## 6.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



## 7. Harmonics Test

As specified on clause 7 and figure Z1 of EN 61000-3-2:2006, the limits are not specified for equipment with a rated power of 75W or less.

The EUT meets the above condition, so it conforms to EN 61000-3-2.

## 8. Voltage Fluctuations Test

### 8.1 Standard

- Standard : EN 61000-3-3:1995/A1:2001/A2:2005

### 8.2 Test Procedure

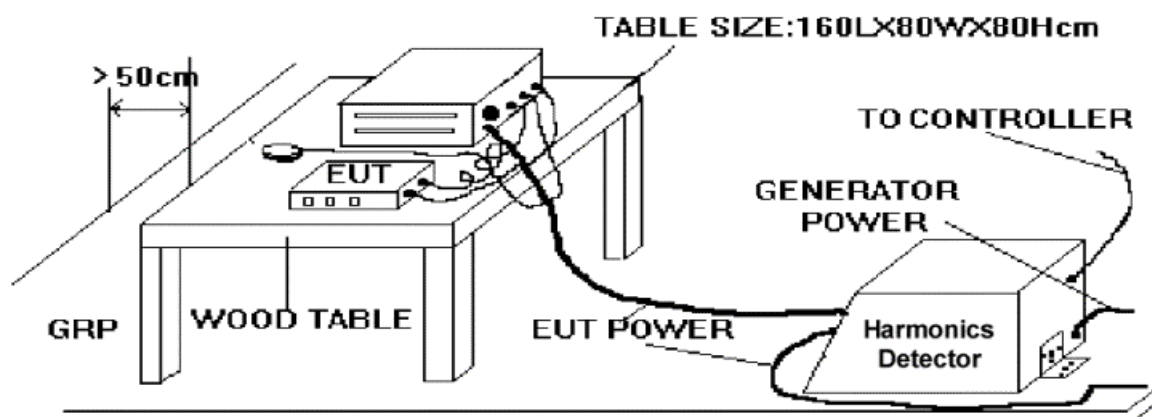
The equipment shall be tested under the conditions of **Clause 5**.

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of  $\pm 8\%$  is achieved during the whole assessment procedure.

### 8.3 Test Equipment Settings

- Line Voltage : 230 V
- Line Frequency : 50 Hz
- Measurement Delay : 10.0 seconds
- Pst Integration Time : 10 minutes
- Pst Integration Periods : 1
- Test Duration : 00:10:00 minutes

### 8.4 Test Setup





## 8.5 Test Result of Voltage Fluctuation and Flicker Test

### 8.5.1 Test Data of Voltage Fluctuation and Flicker

- FINAL TEST RESULT : **PASS**
- Temperature : 23
- Relative Humidity : 49 %
- Test Date : Jul. 24, 2008

Urms = 230.1V    Freq = 50.000    Range: 1 A  
Irms = 0.338A    Ipk = 0.548A    cf = 1.621  
P = 70.78W    Pap = 77.75VA    pf = 0.910

Test - Time : 1 x 10min = 10min ( 100 %)

LIN (Line Impedance Network) : Soft LIN 0.24 Ohm +j 0.15 Ohm N: 0.16 Ohm +j 0.10 Ohm

Limits : Plt : 0.65    Pst : 1.00  
          dmax : 4.00 %    dc : 3.30 %  
          dtLim : 3.30 %    dt>Lim: 500ms

Test completed, Result: PASSED

Test Engineer: \_\_\_\_\_



Tony Hsu

**8.6 Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test**

FRONT VIEW



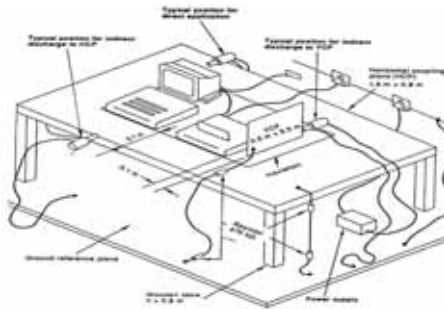
REAR VIEW



## 9. Electrostatic Discharge Immunity Test (ESD)

- FINAL TEST RESULT : **PASS**
- Pass Performance Criteria : A
- Required performance criteria : B
- Basic Standard : IEC 61000-4-2:1995/A2:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 3 for air discharge,  
: 2 for contact discharge
- Tested voltage :  $\pm 2 / \pm 4 / \pm 8$  KV for air discharge,  
:  $\pm 2 / \pm 4$  KV for contact discharge
- Temperature : 21
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal

### 9.1 Test Setup



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner :

- a. CONTACT DISCHARGE to the conductive surfaces and to coupling plane;
- b. AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

## 9.2 Test Setup for Tests Performed in Laboratory

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB., we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1m minimum was provided between the EUT and the wall of the lab. and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resistor located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.

### 9.3 ESD Test Procedure

- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
  - ambient temperature: 15 to 35 ;
  - relative humidity : 30% to 60%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with both air discharge and contact discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On preselected points at least 25 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
  - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
  - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
  - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT . After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

## 9.4 Test Severity Levels

### 9.4.1 Contact Discharge

Level	Test Voltage (KV) of Contact discharge
1	$\pm 2$
2	$\pm 4$
3	$\pm 6$
4	$\pm 8$
X	Specified

Remark : "X" is an open level.

### 9.4.2 Air Discharge

Level	Test Voltage (KV) of Air Discharge
1	$\pm 2$
2	$\pm 4$
3	$\pm 8$
4	$\pm 15$
X	Specified

Remark : "X" is an open level.

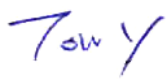
## 9.5 Test Points

### 9.5.1 Test Result of Air Discharge

Test Point	Voltage	Tested No.
LED	$\pm 2 / \pm 4 / \pm 8$ KV	BY 10
POWER SWITCH	$\pm 2 / \pm 4 / \pm 8$ KV	BY 10

## 9.5.2 Test Result of Contact Discharge

Test Point	Voltage	Tested No.
HCP (At Front)	$\pm 2 / \pm 4$ kV	BY 25
HCP (At Left)	$\pm 2 / \pm 4$ kV	BY 25
HCP (At Right)	$\pm 2 / \pm 4$ kV	BY 25
HCP (At Rear)	$\pm 2 / \pm 4$ kV	BY 25
VCP (At Front)	$\pm 2 / \pm 4$ kV	BY 25
VCP (At Left)	$\pm 2 / \pm 4$ kV	BY 25
VCP (At Right)	$\pm 2 / \pm 4$ kV	BY 25
VCP (At Rear)	$\pm 2 / \pm 4$ kV	BY 25
CASE	$\pm 2 / \pm 4$ kV	BY 25
SCREW	$\pm 2 / \pm 4$ kV	BY 25
ESATA PORT	$\pm 2 / \pm 4$ kV	BY 25
RJ45 PORT	$\pm 2 / \pm 4$ kV	BY 25
USB PORT	$\pm 2 / \pm 4$ kV	BY 25

Test Engineer: 

Tony Hsu

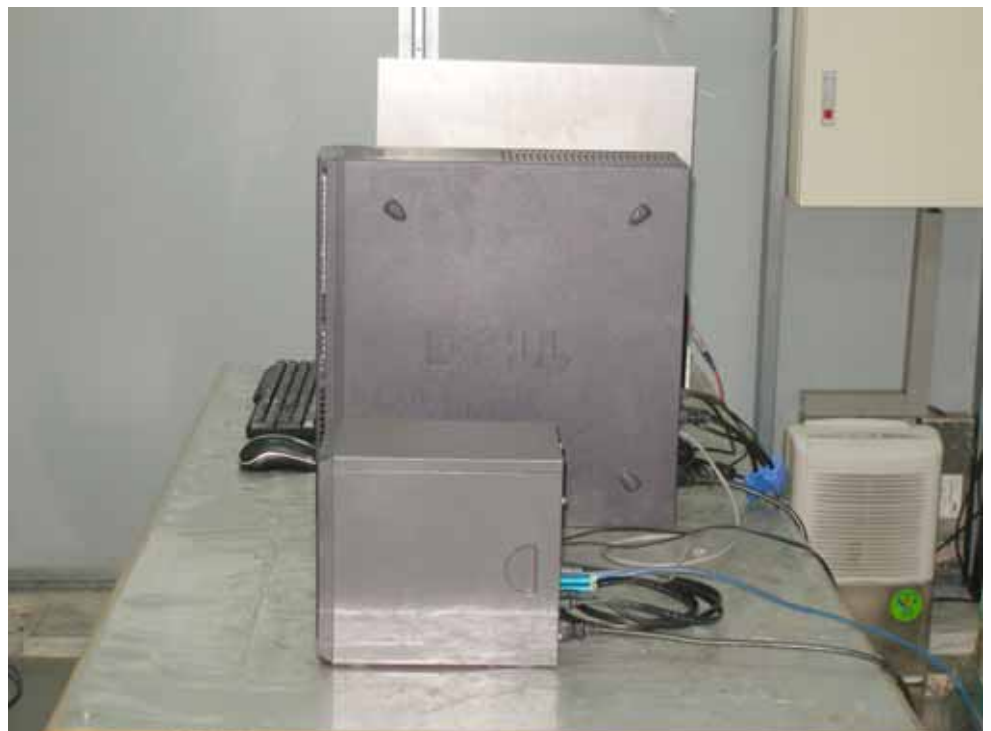


**9.6 Photographs of Electrostatic Discharge Immunity Test**

FRONT VIEW



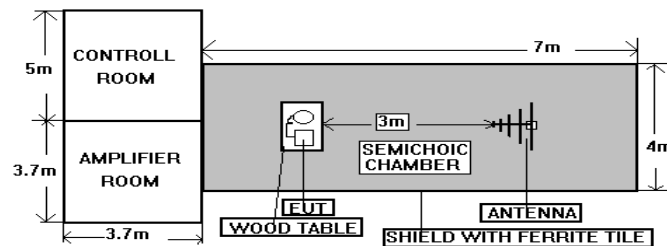
REAR VIEW



## 10. Radio Frequency Electromagnetic Field Immunity Test (RS)

- FINAL TEST RESULT : **PASS**
- Pass Performance Criteria : A
- Required performance criteria : A
- Basic Standard : IEC 61000-4-3:2002
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Frequency Range : 80-1000 MHz
- Additional Selection Frequency : 80, 120, 160, 230, 434, 460, 600, 863, 900MHz
- Dwell Time : 2.9 seconds
- Field Strength : 3 V/m (Modulated 80% AM at 1kHz)
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal

### 10.1 Test Setup



**NOTE :** The SPORTON 7m x 4m x 4m semicoic chamber is compliance with the sixteen points uniform field requirement as stated in IEC 1000-4-3 Section 6.2.

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semicoic chamber.

**10.2 Test Procedure**

- a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
- b. The bilog antenna which is enabling the complete frequency range of 80-1000 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
- c. The test is normally performed with the generating antenna facing each of four sides of the EUT. The polarization of the field generated by the broadband (bilog) antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- e. At each of the above conditions, the frequency range is swept 80-1000 MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of  $1.5 \times 10^{-3}$  decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

**10.3 Test Severity Levels**

Frequency Band : 80-1000 MHz

Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified

Remark : "X" is an open class.

Test Engineer: Tony Hsu  
 Tony Hsu

### 10.4 Photographs of Radio Frequency Electromagnetic Field Immunity Test

FRONT VIEW



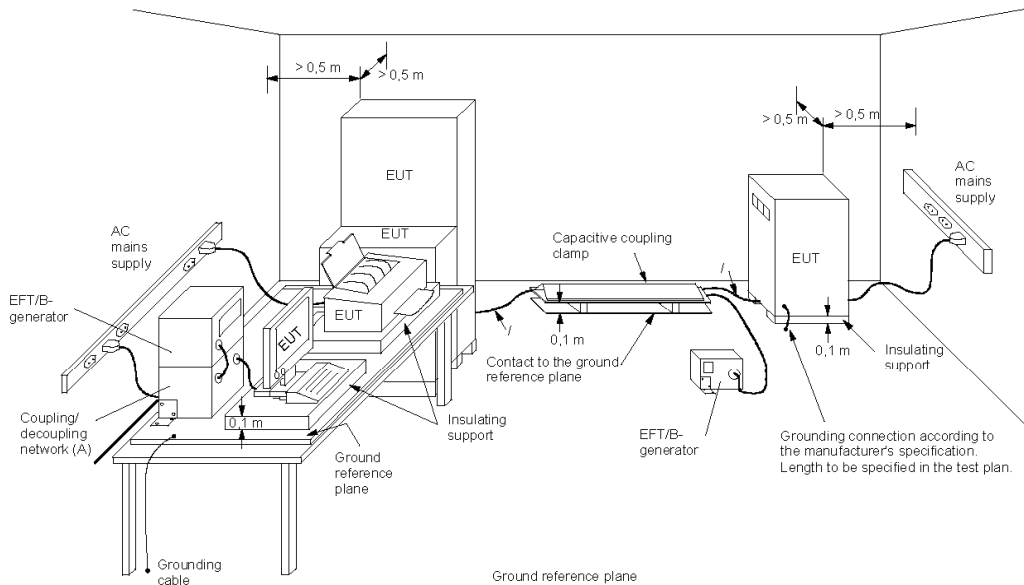
REAR VIEW



## 11. Electrical Fast Transient/Burst Immunity Test (EFT/BURST)

- FINAL TEST RESULT : **PASS**
- Pass Performance Criteria : A
- Required performance criteria : B
- Basic Standard : IEC 61000-4-4:2004
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : on Power Supply -- 2  
: on I/O signal, data and control line -- 2
- Test Voltage : on Power Supply --  $\pm 0.5 / \pm 1.0$  KV  
: on I/O signal, data and control line --  $\pm 0.25 / \pm 0.5$  KV
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal.

### 11.1 Test Setup



**Key**

- / length between clamp and the EUT to be tested (should be  $0.5 \text{ m} \pm 0.05 \text{ m}$ )
- (A) location for supply line coupling
- (B) location for signal lines coupling

IEC 901/04

The EUT was placed on a ground reference plane and was insulated from it by an insulating support about

0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the GRP.. The GRP. was a metallic sheet (copper or aluminum) of 0.25 mm ,minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB. we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. Using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

## 11.2 Test on Power Line

- a. The EFT/B-generator was located on the GRP.. The length from the EFT/B-generator to the EUT as not exceed 1 m.
- b. The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

## 11.3 Test on Communication Lines

- a. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP..
- b. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

## 11.4 Test Procedure

- a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
  - ambient temperature: 15 to 35 ;
  - relative humidity : 45% to 75%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
- c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
- d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :


- Normal performance within the specification limits.
- Temporary degradation or loss of function or performance which is self-recoverable.
- Temporary degradation or loss of function or performance which requires operator intervention or system reset.
- Degradation or loss of function which is not recoverable due to damage of equipment (components).

**11.5 Test Severity Levels**

The following test severity levels are recommended for the fast transient/burst test :

Open circuit output test voltage $\pm$ 10%		
Level	On Power Supply	On I/O signal, data and control line
1	0.5 KV	0.25 KV
2	1.0 KV	0.50 KV
3	2.0 KV	1.00 KV
4	4.0 KV	2.00 KV
X	Specified	Specified

Remark : " X " is an open level. The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.

Test Engineer: Tony Hsu  


### 11.6 Photographs of Electrical Fast Transient/Burst Immunity Test

FRONT VIEW



REAR VIEW





CLAMP



## 12. Surge Immunity Test

- FINAL TEST RESULT : **PASS**
- Pass performance Criteria : A
- Required performance criteria : B
- Basic Standard : IEC 61000-4-5:1995/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Surge wave form (Tr/Th) : 1, 2/50 ( 8/20 )  $\mu$  s
- Level : on RJ45 Ports – N/A  
: on Input AC Power Port -- 3
- Test Voltage : on RJ45 Ports – N/A  
: on Input AC Power Port --  $\pm 0.5/1.0/2.0$  kV
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal
- Remark : The test on RJ45 Ports are not required due to normal functioning cannot be achieved because of the impact of the CDN on the EUT.

### 12.1 Test Record

Voltage ( kV )	Test Location	Polarity	Phase Angle				Test Result
			0°	90°	180°	270°	
1 kV	L - N	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>
2 kV	L - PE	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>
	N - PE	+	A	A	A	A	<b><u>PASS</u></b>
		-	A	A	A	A	<b><u>PASS</u></b>

# Remark : PE = Earth reference

## 12.2 Test Level

Level	Open-circuit test voltage, $\pm 10\%$ , KV
1	0.5
2	1.0
3	2.0
4	4.0
x	Specified

NOTE - x is an open class.  
This level can be specified in the product specification.

## 12.3 Test Procedure

a. Climatic conditions

The climatic conditions shall comply with the following requirements :

- ambient temperature : 15 to 35
- relative humidity : 10 % to 75 %
- atmospheric pressure : 86 kPa to 106 kPa ( 860 mbar to 1060 mbar )

b. Electromagnetic conditions

The electromagnetic environment of the laboratory shall not influence the test results.

c. The test shall be performed according the test plan that shall specify the test set-up with

- generator and other equipment utilized;
- test level ( voltage/current );
- generator source impedance;
- internal or external generator trigger;
- number of tests : at least five positive and five negative at the selected points;
- repetition rate : maximum 1/min.
- inputs and outputs to be tested;
- representative operating conditions of the EUT;
- sequence of application of the surge to the circuit;
- phase angle in the case of a.c. power supply;
- actual installation conditions, for example :

AC : neutral earthed,

DC : ( + ) or ( - ) earthed to simulated the actual earthing conditions.

- d. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave ( positive and negative ).
- e. The surges have to be applied line to line and line(s) and earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
- f. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan.
- g. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worstcase voltage breakdown level ( let-through level ) of the primary protection.
- h. If the actual operating signal sources are not available, they may be simulated. Under no circumstances may the test level exceed the product specification. The test shall be carried out according to the test plan.
- i. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied. For acceptance test a previously unstressed equipment shall be used to the protection devices shall be replaced.

## 12.4 Operating Condition

Full system

Test Engineer: \_\_\_\_\_



Tony Hsu

### 12.5 Photographs of Surge Immunity Test

FRONT VIEW



REAR VIEW



### 13. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test ( CS )

- FINAL TEST RESULT : **PASS**
- Pass performance Criteria : A
- Required performance criteria : A
- Basic Standard : IEC 61000-4-6:1996/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Test Voltage : 3 V rms ( Modulated, 1KHz, 80%, AM )
- Frequency Range : 0.15 MHz to 80 MHz
- Additional Selection Frequency : 0.2, 1, 7.1, 13.56, 21, 27.12, 40.68MHz
- Dwell Time : 2.9 seconds
- Test Port : on AC Power Ports and Telecom Ports
- Frequency step size : 1 %
- Coupling mode : CDN-M16 SW M3 for AC power, CDN-RJ45 for Telecom Ports
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal

#### 13.1 Test Level

Level	Voltage Level ( EMF ),
1	1 V rms
2	3 V rms
3	10 V rms
x	Specified

NOTE - x is an open class.  
This level can be specified in the product specification.

#### 13.2 Operating Condition

Full system

**13.3 Test Procedure**

- a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
- b. This test method test can be performed without using a sell shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF-input ports of the coupling devices are terminated by a 50 ohm load resistor.
- d. The frequency range is swept from 150 KHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1KHz sinewave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
- e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- f. An alternative test procedure may be adopted, wherein the frequency range is swept incrementally, with a step size not exceeding 4% of the start ad thereafter 4% of the preceding frequency value. The test level should be at least twice the value of the specified test level.
- g. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.
- h. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.
- i. The use of special exercising programs is recommended.
- j. Testing shall be performed according to a Test Plan, which shall be included in the test report.
- k. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

Test Engineer: \_\_\_\_\_



Tony Hsu

**13.4 Photographs of CS Test**

FRONT VIEW



REAR VIEW





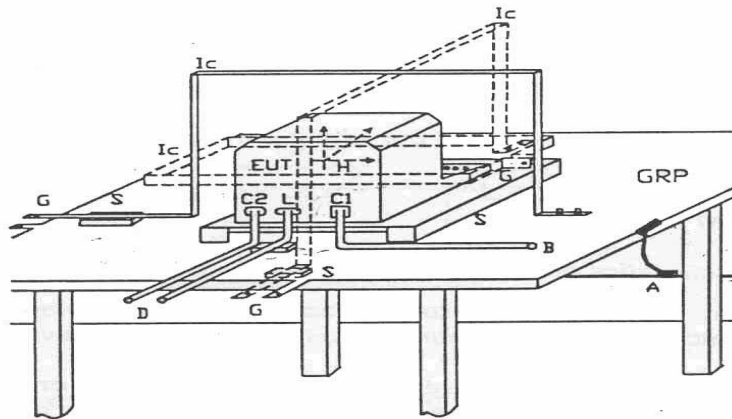
## 14. Power Frequency Magnetic Field immunity tests

- FINAL TEST RESULT : **PASS**
- Pass performance Criteria : A
- Required performance criteria : A
- Basic Standard : IEC 61000-4-8:1993/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008
- Observation : Normal

### 14.1 Test Record

Power Frequency Magnetic Field	Testing duration	Coil Orientation	Results	Remark
50Hz, 1A/m	1.0 Min	X-axis	Pass	Normal
50Hz, 1A/m	1.0 Min	Y-axis	Pass	Normal
50Hz, 1A/m	1.0 Min	Z-axis	Pass	Normal

### 14.2 Test Setup



- GRP : Ground plane
- A : Safety earth
- S : Insulating support
- EUT : Equipment under test
- Lc : Induction coil
- E : Earth terminal
- C1 : Power supply circuit
- C2 : Signal circuit
- L : Communication line
- B : To power supply source
- D : To signal source, simulator
- G : To the test generator

Test Engineer: Tony Hsu

*Tony Hsu*  
Tony Hsu

### 14.3 Photographs of Power Frequency Magnetic Field immunity tests

FRONT VIEW



REAR VIEW



## 15. Voltage Dips and Voltage Interruption Immunity Tests

- FINAL TEST RESULT : **PASS**
- Pass Performance Criteria : C for voltage interruption, A for voltage dips
- Required Performance Criteria : C for voltage interruption, B/C for voltage dips
- Basic Standard : IEC 61000-4-11:1994/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 23
- Relative Humidity : 49 %
- Atmospheric Pressure : 103 kPa
- Test Date : Jul. 25, 2008

### 15.1 Test Record of Voltage Interruption

Voltage ( V )	Phase Angle		% Reduction	Duration (periods)	<b>Observation</b>
	0 °	180 °			
100/240	C	C	>95%	250	After the interruption, the power of EUT was off. The power of the EUT must be reset by the operator.

### 15.2 Test Record of Voltage Dips

Voltage ( V )	Phase Angle		% Reduction	Duration (periods)	<b>Observation</b>
	0 °	180 °			
100/240	A	A	30	25	Normal
100/240	A	A	>95 %	0.5	Normal

### 15.3 Testing Requirement and Procedure

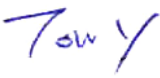
The test was based on IEC 61000-4-11:1994/A1:2000

### 15.4 Test Conditions

1. Source voltage and frequency : 100/240V / 50Hz, Single phase.
2. Test of interval : 10 sec.
3. Level and duration : Sequency of 3 dips/interrupts.
4. Voltage rise (and fall) time : 1 ~ 5  $\mu$ s.

### 15.5 Operating Condition

Full system

Test Engineer:   
Tony Hsu

### 15.6 Photographs of Voltage Dips and Voltage Interruption Immunity Tests

FRONT VIEW



REAR VIEW



## 16. List of Measuring Equipment Used

### < EMI >

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Receiver	R&S	ESCS 30	100357	9 kHz - 2.75 GHz	Oct. 23, 2007	Conduction (CO01-NH)
LISN	SCHWARZBECK	NSLK8127	8127-477	9kHz – 30MHz	Nov. 11, 2007	Conduction (CO01-NH)
LISN	KYORITSU	KNW-407	8-1010-15	9kHz – 30MHz	Dec. 20, 2007	Conduction (CO01-NH)
Power Filter	CORCOM	MR12030	N/A	30A*2	N/A	Conduction (CO01-NH)
RF Cable-CON	Suhner Switzerland	RG223/U	CB004	9kHz – 30MHz	Dec. 16, 2007	Conduction (CO01-NH)
ISN	SCHAFFNER	ISN T4	24853	9kHz – 30MHz	Oct. 09, 2007	Conduction (Telecommunication port)
Impedance Stabilization Network	TESEQ GMBH	T8	24558	150kHz – 230MHz	Aug. 23, 2007	Conduction (Telecommunication port)
Open Area Test Site	SPORTON	OATS-10	OS01-NH	30 MHz - 1 GHz 10m	Nov. 17, 2007	Radiation (OS01-NH)
Amplifier	HP	8447D	2944A06292	0.1 MHz - 1.3 GHz	Mar. 31, 2008	Radiation (OS01-NH)
Spectrum Analyzer	R&S	FSP	838858/038	9 kHz – 7 GHz	Oct. 11, 2007	Radiation (OS01-NH)
Receiver	R&S	ESCS 30	100358	9 kHz - 2.75 GHz	Nov. 06, 2007	Radiation (OS01-NH)
Bilog Antenna	SCHAFFNER	CBL6111C	2738	30 MHz - 1 GHz	Dec. 22, 2007	Radiation (OS01-NH)
Turn Table	EMCO	1060-1.211	9507-1805	0 - 360 degree	N/A	Radiation (OS01-NH)
Antenna Mast	EMCO	1051-1.2	9503-1876	1 m - 4 m	N/A	Radiation (OS01-NH)
RF Cable-R10m	BELDEN	RG8/U	CB001	30 MHz - 1 GHz	Nov. 12, 2007	Radiation (OS01-NH)

Calibration Interval of instruments listed above is one year.

**< EMS >**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
ESD Simulator	KEYTEK	MZ-15/EC	0302197	Air: 0 KV - 15 KV Contact: 0 KV -8KV	Apr. 07, 2008	ESD
Amplifier	AMPLIFIER& RESEARCH	150W1000	312366	80M~1GHz	Sep. 10, 2007	RS
Amplifier	AMPLIFIER& RESEARCH	30S1G3	312505	80M~3GHz	Sep. 10, 2007	RS
DUAL DIRECTIONAL COUPLER	AMPLIFIER& RESEARCH	DC6180A	312453	0.8-4.2GHz	Sep. 10, 2007	RS
DUAL DIRECTIONAL COUPLER	AMPLIFIER& RESEARCH	DC7144A	312782	80-1GHz	Sep. 10, 2007	RS
Antenna	AMPLIFIER& RESEARCH	AT1080A	312637	80M~1GHz	Sep. 14, 2007	RS
Antenna	AMPLIFIER& RESEARCH	AT4002A	312601	80M~5GHz	Sep. 14, 2007	RS
INTEGRATED MEASUREMENT SYSTEM	ROHDE& SCHWARZ	IMS	100007	9kHz~3GHz	Sep. 12, 2007	RS
NRP-Z91 POWER SENSOR 6GHZ	ROHDE& SCHWARZ	1168.8004.02	100095	9kHz~3GHz	Sep. 12, 2007	RS
EFT Generator	KEYTEK	EMCPRO	0609221	0 KV - 4.4 KV	Sep. 05, 2007	EFT
EFT/Clamp	KeyTek	CCL-4/S	0303191	0 KV -1 KV	N/A	EFT
SURGE Generator Bi-Wave	KEYTEK	EMCPRO	0609221	0 KV -6 KV/2 0KV-500V/12	Sep. 05, 2007	SURGE
SURGE/CDN	KEYTEK	EMCPRO	0609221	0 KV -4 KV/2 0KV-500V/12	Sep. 05, 2007	SURGE
SURGE Generator Ring-Wave	KEYTEK	EMCPRO	0609221	0 KV -6 KV/2 0KV-500V/12	Sep. 05, 2007	SURGE
Conducted Immunity Test System	SCHAFFNER	NSG2070	1091	100KHz ~ 250MHz FM 1KHz 80%	Jun. 10, 2008	CS
Attenuator	EM TEST	75W-DC-250 MHz 06	0004166A	150 kHz - 230 MHz	May 28, 2008	CS
Koppel- Eutkoppelnetzwerk	FRANKONIA	CDN M2+M3	A3011018	150k~230MHz	Jun. 03, 2008	CS
Coupling/ Decoupling Network	FRANKONIA	CDN RJ45	A3023005	150k~230MHz	May 27, 2008	CS
Magnetic Field Antenna	FCC	F-1000-4-8/9/10-L-1M	9830	0~125A	Apr. 07, 2008	Magnetic
Magnetic Generator	FCC	F-1000-4-8-G-125A	05004	0~125A	Apr. 07, 2008	Magnetic
PQF Generator	KEYTEK	EMCPRO	0609221	230VA/50Hz/60Hz 0%Open/5S 0%Short/5S 40%0.10S 70%/0.01S	Sep. 05, 2007	DIP
Harmonic/Flicker Test System	EMC PARTNER	Harmonics -1000	088	4000VA 16A PEAK	Sep. 05, 2007	Harmonics, Flicker

Calibration Interval of instruments listed above is one year.

## 17. Declaration of Conformity and the CE Mark

There are three possible procedures pertaining to the declaration of conformity :

### 17.1 Conformity Testing and Declaration of Conformity by the Manufacturer or His Authorized Representative Established within the Community or by an Importer.

- Article 10 (1) of the EMC Directive,
- § 3 (1) no. 2a of the EMC Act.

### 17.2 Declaration of Conformity Issued by the Manufacturer or His Authorized Representative Established within the Community or by an Importer Following Testing of the Product and Issued of an EC certificate of conformity by a competent body.

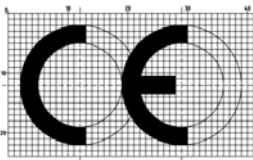
- Article 10 (2) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act.

### 17.3 Declaration of Conformity Issued by the Manufacturer or His Authorized Representative Established within the Community or by an Importer Following Testing and Certification of the Product by a Notified Body.

- Article 10 (5) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act (radio transmitting installations).

### 17.4 Specimen For The CE Marking Of Electrical / Electronical Equipment

The components of the CE marking shall have substantially the same vertical dimension, which may not be less than 5 mm.





**APPENDIX A. Photographs of EUT**







Lanner Electronics Inc.

Model : NS04-4250

Input Rated : 100-240V~50/60Hz

Serial Number :



0980105050002

Ver.: V0.2

**MADE IN TAIWAN**















