



SPORTON LAB.

Certificate No: EC182530

CERTIFICATE

- **EQUIPMENT: NVRmini 2**
MODEL NO. : NVRMini 2 - 4 Bay
APPLICANT : NUUO Inc.

C Block, No.18, Sihyuan St., Taipei 100, 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/A1:2007 Class B, EN 61000-3-2:2006/A2:2009, EN 61000-3-3:2008 and EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:2008, IEC 61000-4-3:2006/A1:2007/A2:2010, IEC 61000-4-4:2004, IEC 61000-4-5:2005, IEC 61000-4-6:2008, IEC 61000-4-8:2009, IEC 61000-4-11:2004).

THE TEST WAS CARRIED OUT ON **Sep. 26, 2011** AT **SPORTON INTERNATIONAL INC. LAB.**

Castries Huang
Supervisor

CE EMC TEST REPORT

according to

**European Standard EN 55022:2006/A1:2007 Class B,
EN 61000-3-2:2006/A2:2009, EN 61000-3-3:2008 and
EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:2008,
IEC 61000-4-3:2006/A1:2007/A2:2010, IEC 61000-4-4:2004,
IEC 61000-4-5:2005, IEC 61000-4-6:2008,
IEC 61000-4-8:2009, IEC 61000-4-11:2004)**

Equipment : NVRmini 2
Model No. : NVRMini 2 - 4 Bay
Applicant : **NUUO Inc.**
C Block, No.18, Sihyuan St., Taipei 100, Taiwan

Statement

- 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.

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History of this test report

Report No.	Version	Issue Date	Description
EC182530	Rev.01	Sep. 29, 2011	Initial issue of report



CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55022:2006/A1:2007 Class B,
EN 61000-3-2:2006/A2:2009, EN 61000-3-3:2008 and
EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:2008,
IEC 61000-4-3:2006/A1:2007/A2:2010, IEC 61000-4-4:2004,
IEC 61000-4-5:2005, IEC 61000-4-6:2008,
IEC 61000-4-8:2009, IEC 61000-4-11:2004)**

Equipment : NVRmini 2
Model No. : NVRMini 2 - 4 Bay
Applicant : **NUUO Inc.**
C Block, No.18, Sihyuan St., Taipei 100, 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/A1:2007 Class B, EN 61000-3-2:2006/A2:2009, EN 61000-3-3:2008 and EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:2008, IEC 61000-4-3:2006/A1:2007/A2:2010, IEC 61000-4-4:2004, IEC 61000-4-5:2005, IEC 61000-4-6:2008, IEC 61000-4-8:2009, IEC 61000-4-11:2004)**.

The test was carried out on **Sep. 26, 2011** 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

NUUO Inc.
C Block, No.18, Sihyuan St., Taipei 100, Taiwan

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	: NVRmini 2
Model No.	: NVRMini 2 - 4 Bay
Trade Name	: NUUO Inc.
RJ45 Cable	: Non-Shielded, 20 m
RJ45 Cable	: Non-Shielded, 1.8 m
USB Cable x2	: D-Shielded, 1.8 m
Data Cable Type	: Please see section 2.2 of this test report for details
Power Supply Type	: From Adapter
AC Power Cord	: Non-Shielded, 1.4 m, 3 pin
DC Power Cable	: Non-Shielded, 1.5 m

1.4. Feature of Equipment under Test

Please refer to user manual.

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with personal computer and peripherals pursuant to European Standard EN 55022 and EN 55024.
- b. The complete test system included remote workstation, PC, LCD Monitor, Keyboard, Mouse, Printer, Modem, SATA HDD and EUT for Conducted and Radiated below 1GHz test. The remote workstation included Network Camera and POE Adapter.
- c. The complete test system included remote workstation, PC, LCD Monitor, Keyboard, Mouse, Printer, Modem, SATA HDD and EUT for Radiated above 1GHz test. The remote workstation included Network Camera and POE Adapter.
- d. The complete test system included remote workstation, PC, LCD Monitor, Keyboard, Mouse, USB2.0 Flash Disk, SATA HDD and EUT for EMS test. The remote workstation included Network Camera and POE Adapter.
- e. The following test modes were performed:

Test Items	Function Type
AC Conducted Emission	Mode 1. Remote control view access LAN:1G
ISN	Mode 1. LAN : 10Mbps Mode 2. LAN : 100Mbps Mode 3. LAN : 1Gbps
Radiated Emissions	Mode 1. Remote control view access LAN:1G < For below 1GHz & above 1GHz >
EMS	Mode 1. Remote control view access LAN:1G

- f. Frequency range investigated: Conduction 150 kHz to 30 MHz, radiation 30 MHz to 6,000 MHz.
- g. Frequency range investigated immunity test: CS 150 kHz to 80 MHz, RS 80 MHz to 1,000 MHz.

2.2. Description of Test System

< EMI ><Conducted and Radiated below 1GHz>

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	Personal Computer	DELL	DCTA	DoC	N/A	Local
2	LCD Monitor	DELL	E198WFPf	DoC	D-SUB Cable, D-Shielded, 1.8m	Local
3	USB Keyboard	DELL	SK-8175	DoC	USB Cable, AL-F-Shielded, 1.8m	Local
4	USB Mouse	DELL	MOC5UO	DoC	USB Cable, AL-F-Shielded, 1.8m	Local
5	Printer	HP	DJ400	B94C2642X	LPT Cable, D-Shielded, 1.2m	Local
6	Modem	ACEEX	DM1414	IFAXDM1414	RS-232 Cable, D-Shielded, 1.15m	Local
7	SATA HDD x2	EXCEDING	MAP-AD21CS	DoC	SATA Cable, D-Shielded, 1.0m	Local
8	Network Camera	vivotek	IP8330	N/A	RJ45 Cable, Non-Shielded, 0.4m	Remote
9	POE Adapter	I.T.E	PW130RA4800N02	N/A	Non-Shielded, 0.6m	Remote

< EMI ><Radiated above 1GHz>

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	Personal Computer	HP Compaq	D330uT	DoC	N/A	Local
2	LCD Monitor	DELL	2408WFPB	DoC	D-SUB Cable, Shielded, 1.8m	Local
3	PS/2 Keyboard	HP	KB-0133	DoC	PS/2 Cable, AL-F-Shielded, 1.8m	Local
4	PS/2 Mouse	HP	M-S69	JNZ211443	PS/2 Cable, AL-F-Shielded, 1.8m	Local
5	Printer	HP	DJ400	B94C2642X	LPT Cable, D-Shielded, 1.2m	Local
6	Modem	ACEEX	DM1414	IFAXDM1414	RS-232 Cable, B-Shielded, 1.5m	Local
7	SATA HDD x2	EXCEDING	MAP-AD21CS	DoC	SATA Cable, D-Shielded, 1.0m	Local
8	Network Camera	vivotek	IP8330	N/A	RJ45 Cable, Non-Shielded, 0.6m	Remote
9	POE Adapter	I.T.E	PWB0RA4800N02	N/A	Non-Shielded, 0.4m	Remote

< EMS >

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	Personal Computer	DELL	T3500	DoC	N/A	Local
2	LCD Monitor	DELL	E198WFPf	DoC	D-SUB Cable, D-Shielded, 1.8m	Local
3	USB Keyboard	DELL	SK-8115	DoC	USB Cable, AL-F-Shielded, 2.0m	Local
4	USB Mouse	DELL	MOA8BO	DoC	USB Cable, AL-F-Shielded, 1.8m	Local
5	USB2.0 Flash Disk	Transcend	JFV30	DoC	N/A	Local
6	SATA HDD x2	SMART · DRIVE	HD3-SERIES	DoC	SATA Cable, Shielded, 1.0m	Local
7	Network Camera	vivotek	IP8330	N/A	RJ45 Cable, Non-Shielded, 0.4m	Remote
8	POE Adapter	I.T.E	PW130RA4800N02	N/A	Non-Shielded, 0.6m	Remote

3. Test Software

< EMI >

Two executive programs, EMCTEST.EXE & EMITEST.EXE under WIN XP, which generate a complete line of continuously repeating " H " pattern were used as the test software.

The programs were 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" pattern to the monitor, and the monitor displays "H" patterns on the screen.
- d. The PC sends "H" messages to the printer, and then the printer prints them on the paper.
- e. The PC sends signal messages to the modem.
- f. The PC sends signal 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 "ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.
- Executed "Internet Explorer" to link to Internet to access data.

For ISN test, the EUT Executed "tfgen.exe" to traffic packet data generated software and keep 10% traffic load to link with the remote workstation by RJ45 cable.

< EMS >

At the same time, the following programs under WIN XP were executed:

- Executed "ping.exe" to link with the remote workstation to receive and transmit data by RJ45 cable.
- Executed "Internet Explorer" to link to Internet to access data.

4. General Information of Test

4.1. Test Facility

<EMI>

Test Site : 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, OS03-NH
Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055

Test Site No. : 10CH02-HY

<EMS>

Test Site Location : 3F, No.587, Tanmeu St., Neihu District, Taipei, Taiwan, R.O.C.
TEL : 886-2-2794-8886
FAX : 886-2-2794-9777

4.2. Test Voltage

AC 230V / 50Hz

4.3. Measurement Procedure

EMI Test (conduction and radiation) : European Standard EN 55022 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)

The test configuration, test modes and test software used in this test report are designated by the applicant.

4.4. Test in Compliance with

EMI Test (conduction and radiation) : European Standard EN 55022 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

- a. Conducted emission test: from 150 kHz to 30 MHz
- b. Radiated emission test: from 30 MHz to 6,000 MHz
- c. Radio frequency electromagnetic field immunity test: 80-1000 MHz

4.6. Test Distance

- a. The test distance of radiated emission test from antenna to EUT is 10 M (from 30MHz~1GHz).
- b. The test distance of radiated emission test from antenna to EUT is 3 M (from 1GHz~6GHz).
- c. 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. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meter 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.

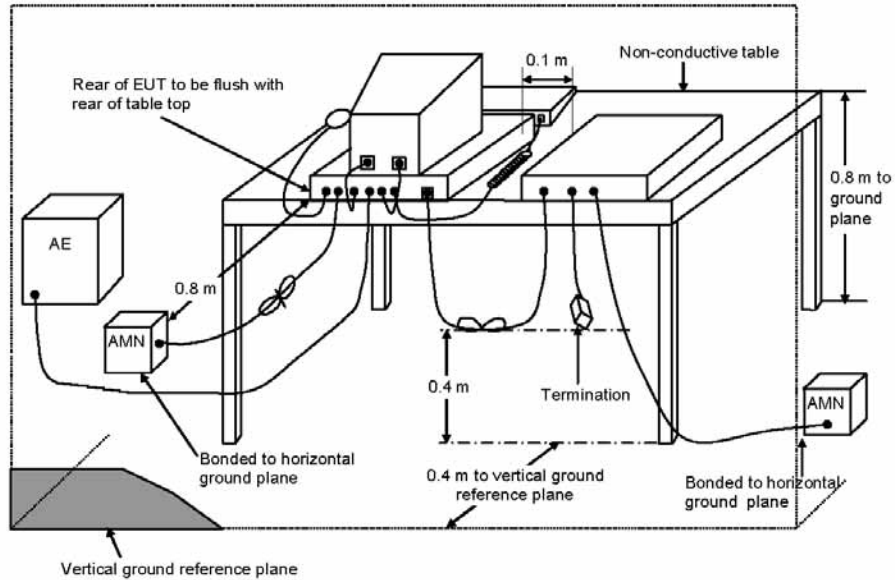
5.1. Description of Major Test Instruments

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

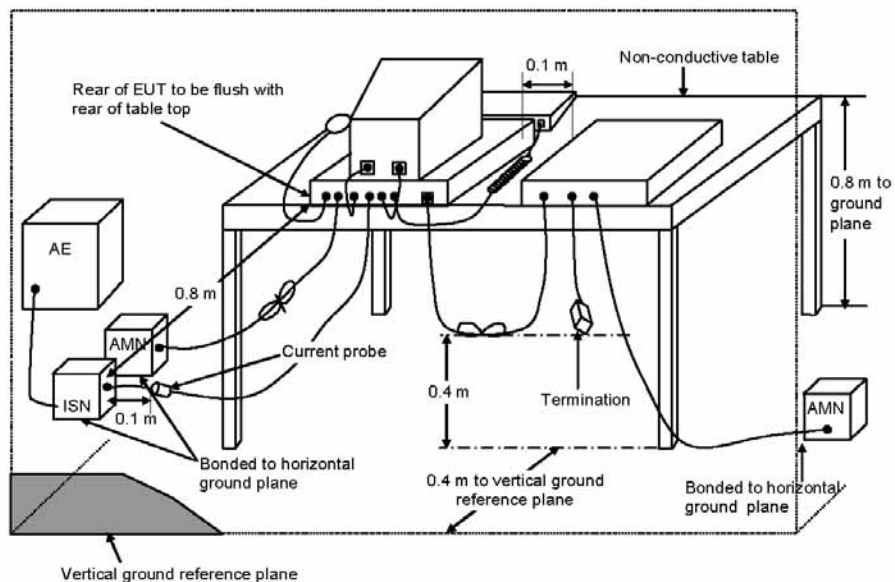
5.2. Test Procedures

- a. The EUT was placed on a desk 0.8 meter 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 meter 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



5.4. Typical Test Setup Layout of disturbances at telecommunication ports

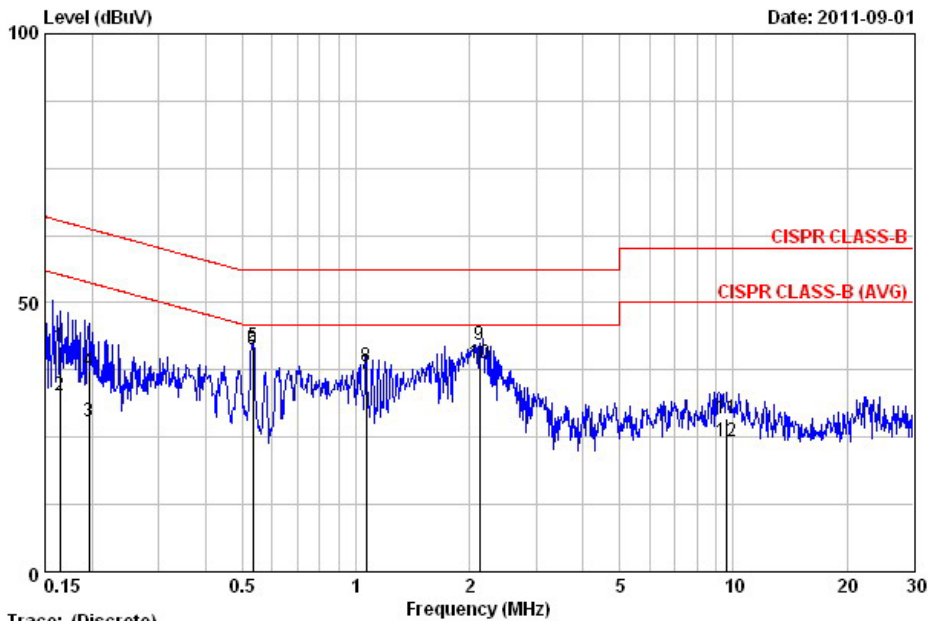


5.5. Test Result of AC Powerline Conducted Emission

Test Mode	Mode 1		
Test Frequency	0.15 MHz ~ 30 MHz	Test Site No.	CO01-NH
Test Voltage	AC 230V / 50Hz	Test Engineer	Eddie
Temperature	24 °C	Relative Humidity	51 %

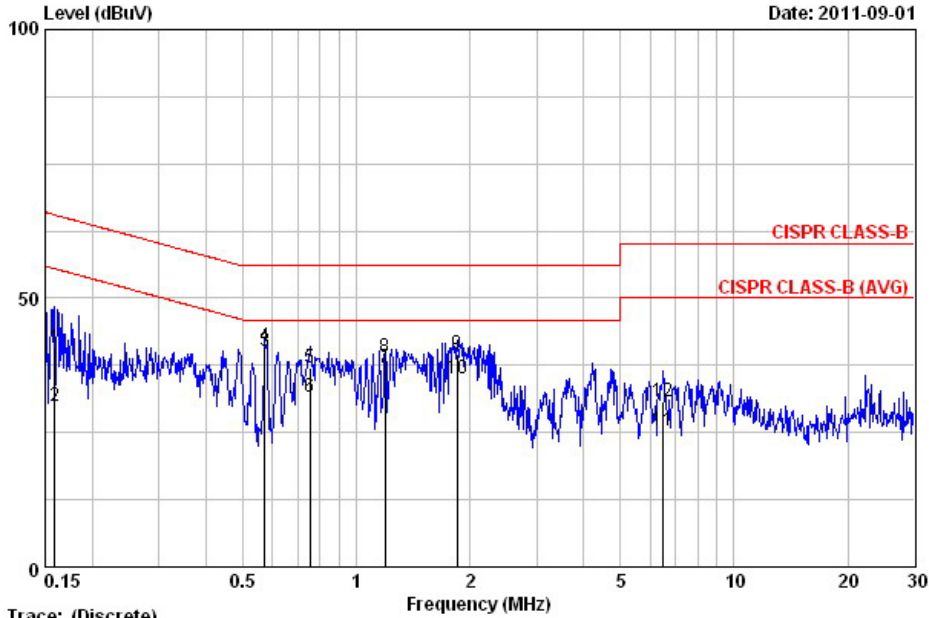
Note: 1. Corrected Reading (dB μ V) = LISN Factor + Cable Loss + Read Level = Level
 2. All emissions not reported here are more than 10 dB below the prescribed limit.

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



Trace: (Discrete)
 Site : CO01-NH
 Condition : CISPR CLASS-B 2011-NNB41-04/10153 LINE
 out :
 power : AC 230V
 memo :
 memo :
 memo :
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.164	41.74	-23.51	65.25	31.60	10.04	0.10	QP
2	0.164	32.76	-22.49	55.25	22.62	10.04	0.10	AVERAGE
3	0.197	27.95	-25.81	53.76	17.81	10.03	0.10	AVERAGE
4	0.197	37.36	-26.40	63.76	27.22	10.03	0.10	QP
5	0.532	41.78	-14.22	56.00	31.64	10.04	0.10	QP
6	0.532	41.27	-4.73	46.00	31.13	10.04	0.10	AVERAGE
7	1.063	36.65	-9.35	46.00	26.49	10.05	0.11	AVERAGE
8	1.063	38.16	-17.84	56.00	28.00	10.05	0.11	QP
9	2.129	42.04	-13.96	56.00	31.77	10.07	0.20	QP
10	2.129	38.71	-7.29	46.00	28.44	10.07	0.20	AVERAGE
11	9.603	28.47	-31.53	60.00	18.11	10.17	0.20	QP
12	9.603	24.22	-25.78	50.00	13.85	10.18	0.20	AVERAGE



Trace: (Discrete)

Site : CO01-NH
 Condition : CISPR CLASS-B 2011-NNB41-04/10153 NEUTRAL
 eut :
 power : AC 230V
 memo :
 memo :
 memo :
 memo :

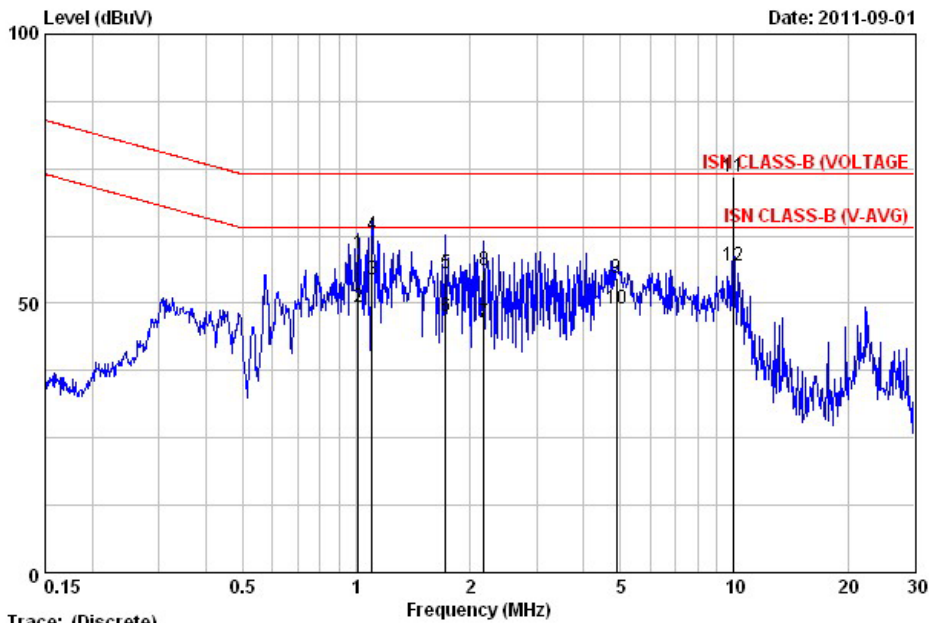
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.159	40.84	-24.68	65.52	30.76	9.98	0.10	QP
2	0.159	29.78	-25.74	55.52	19.70	9.98	0.10	AVERAGE
3	0.573	40.07	-5.93	46.00	29.98	9.99	0.10	AVERAGE
4	0.573	41.00	-15.00	56.00	30.91	9.99	0.10	QP
5	0.755	36.95	-19.05	56.00	26.86	9.99	0.10	QP
6	0.755	31.74	-14.26	46.00	21.65	9.99	0.10	AVERAGE
7	1.192	36.95	-9.05	46.00	26.83	9.99	0.12	AVERAGE
8	1.192	38.89	-17.11	56.00	28.77	9.99	0.12	QP
9	1.848	39.54	-16.46	56.00	29.34	10.01	0.19	QP
10	1.848	34.93	-11.07	46.00	24.73	10.01	0.19	AVERAGE
11	6.488	25.49	-24.51	50.00	15.21	10.08	0.20	AVERAGE
12	6.488	30.77	-29.23	60.00	20.49	10.08	0.20	QP

5.6. Test Result of disturbances at telecommunication ports

Test Mode	Mode 1		
Test Frequency	0.15 MHz ~ 30 MHz	Test Site No.	CO01-NH
Test Voltage	AC 230V / 50Hz	Test Engineer	Eddie
Temperature	24 °C	Relative Humidity	51 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
 2. 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 data



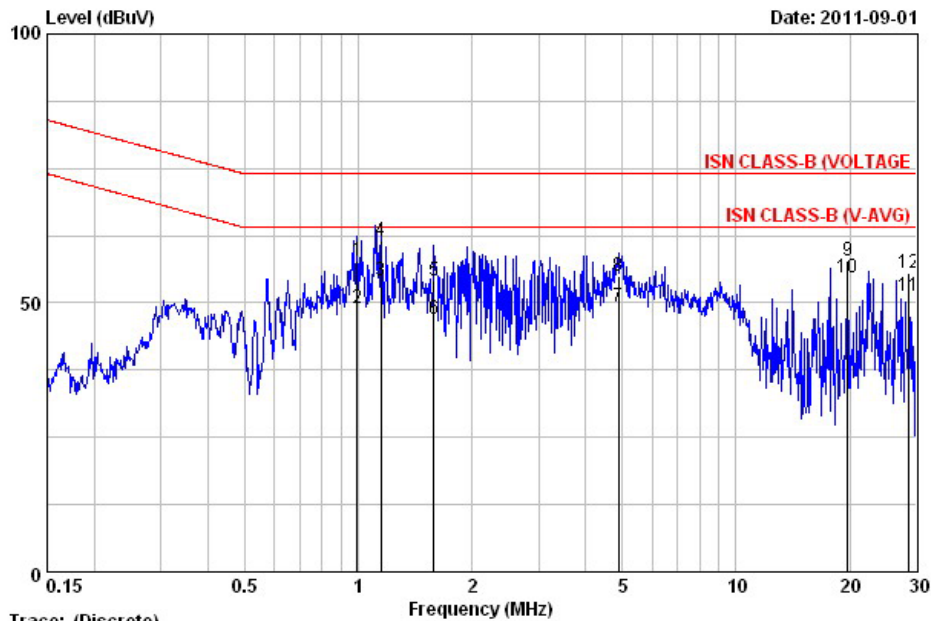
Site : CO01-NH
 Condition : ISN CLASS-B (VOLTAGE ISN-T400A-20100914)
 out :
 power : AC 230V
 memo : LAN 1
 memo : LAN 10M-10%
 memo :
 memo :

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	1.010	59.34	-14.66	74.00	49.56	9.68	0.10	QP
2	1.010	49.26	-14.74	64.00	39.48	9.68	0.10	AVERAGE
3 Ⓞ	1.102	54.31	-9.69	64.00	44.53	9.67	0.11	AVERAGE
4 Ⓞ	1.102	62.75	-11.25	74.00	52.97	9.67	0.11	QP
5	1.724	55.53	-18.47	74.00	45.73	9.62	0.18	QP
6	1.724	47.60	-16.40	64.00	37.80	9.62	0.18	AVERAGE
7	2.177	46.36	-17.64	64.00	36.56	9.60	0.20	AVERAGE
8	2.177	56.14	-17.86	74.00	46.34	9.60	0.20	QP
9	4.874	54.62	-19.38	74.00	44.88	9.54	0.20	QP
10	4.874	49.14	-14.86	64.00	39.40	9.54	0.20	AVERAGE
11 Ⓞ	10.000	73.50	-0.50	74.00	63.78	9.52	0.20	QP
12 Ⓞ	10.000	56.87	-7.13	64.00	47.15	9.52	0.20	AVERAGE

Test Mode	Mode 2		
Test Frequency	0.15 MHz ~ 30 MHz	Test Site No.	CO01-NH
Test Voltage	AC 230V / 50Hz	Test Engineer	Eddie
Temperature	24 °C	Relative Humidity	51 %

Note: 1. Corrected Reading (dBµV) = LISN Factor + Cable Loss + Read Level = Level
 2. 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 data



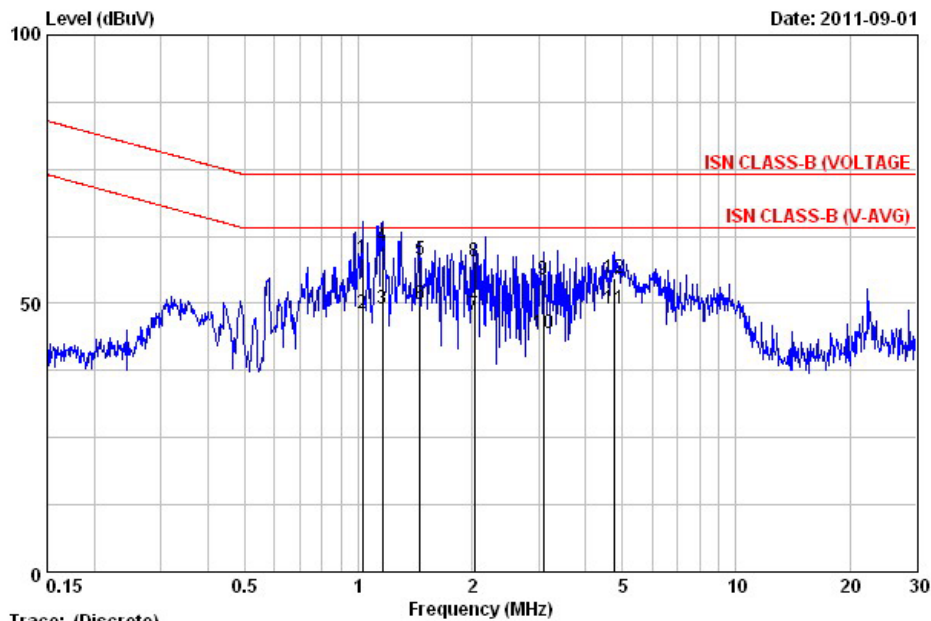
Trace: (Discrete)
 Site : CO01-NH
 Condition : ISN CLASS-B (VOLTAGE ISN-T400A-20100914)
 eut :
 power : AC 230V
 memo : LAN 1
 memo : LAN 100M-10%
 memo :
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.994	57.93	-16.07	74.00	48.15	9.68	0.10	QP
2	0.994	48.92	-15.08	64.00	39.14	9.68	0.10	AVERAGE
3	1.147	54.11	-9.89	64.00	44.32	9.67	0.12	AVERAGE
4	1.147	61.58	-12.42	74.00	51.79	9.67	0.12	QP
5	1.585	54.14	-19.86	74.00	44.34	9.63	0.17	QP
6	1.585	46.92	-17.08	64.00	37.12	9.63	0.17	AVERAGE
7	4.874	49.38	-14.62	64.00	39.64	9.54	0.20	AVERAGE
8	4.874	54.84	-19.16	74.00	45.10	9.54	0.20	QP
9	19.708	57.80	-16.20	74.00	48.02	9.49	0.29	QP
10	19.708	54.80	-9.20	64.00	45.02	9.49	0.29	AVERAGE
11	28.687	51.30	-12.70	64.00	41.43	9.50	0.38	AVERAGE
12	28.687	55.41	-18.59	74.00	45.54	9.50	0.38	QP

Test Mode	Mode 3		
Test Frequency	0.15 MHz ~ 30 MHz	Test Site No.	CO01-NH
Test Voltage	AC 230V / 50Hz	Test Engineer	Eddie
Temperature	24 °C	Relative Humidity	51 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
 2. 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 data



Trace: (Discrete)
 Site : CO01-NH
 Condition : ISN CLASS-B (VOLTAGE ISN-T800-20100914
 out :
 power : AC 230V
 memo : LAN 1
 memo : LAN 1G-10%
 memo :
 memo :

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	1.026	58.54	-15.46	74.00	48.77	9.67	0.10	QP
2	1.026	48.18	-15.82	64.00	38.41	9.67	0.10	AVERAGE
3	1.159	48.92	-15.08	64.00	39.14	9.66	0.12	AVERAGE
4	1.159	60.78	-13.22	74.00	51.00	9.66	0.12	QP
5	1.456	58.23	-15.77	74.00	48.43	9.64	0.15	QP
6	1.456	49.92	-14.08	64.00	40.12	9.64	0.15	AVERAGE
7	2.033	47.74	-16.26	64.00	37.92	9.62	0.20	AVERAGE
8	2.033	57.87	-16.13	74.00	48.05	9.62	0.20	QP
9	3.090	54.46	-19.54	74.00	44.67	9.59	0.20	QP
10	3.090	44.44	-19.56	64.00	34.65	9.59	0.20	AVERAGE
11	4.772	49.07	-14.93	64.00	39.31	9.56	0.20	AVERAGE
12	4.772	54.59	-19.41	74.00	44.83	9.56	0.20	QP

5.7. Photographs of Conducted Powerline and disturbances at telecommunication ports 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 6,000 MHz were measured with a bandwidth of 120 kHz for 30 MHz to 1,000 MHz and 1 MHz for above 1GHz according to the methods defines in European Standard EN 55022, Clause 10. 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

6.1.1. For Below 1GHz

- 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

6.1.2. For above 1GHz

- Amplifier (EMCI EMC330)
 - RF Gain 30 dB
 - Signal Input 1GHz - 8GHz

- Test Receiver (R&S ESI)
 - Attenuation 10 dB
 - Start Frequency 1000 MHz
 - Stop Frequency 6000 MHz
 - Resolution Bandwidth 1 MHz
 - Signal Input 20 Hz - 7 GHz

6.2. Test Procedures

< Below 1GHz >

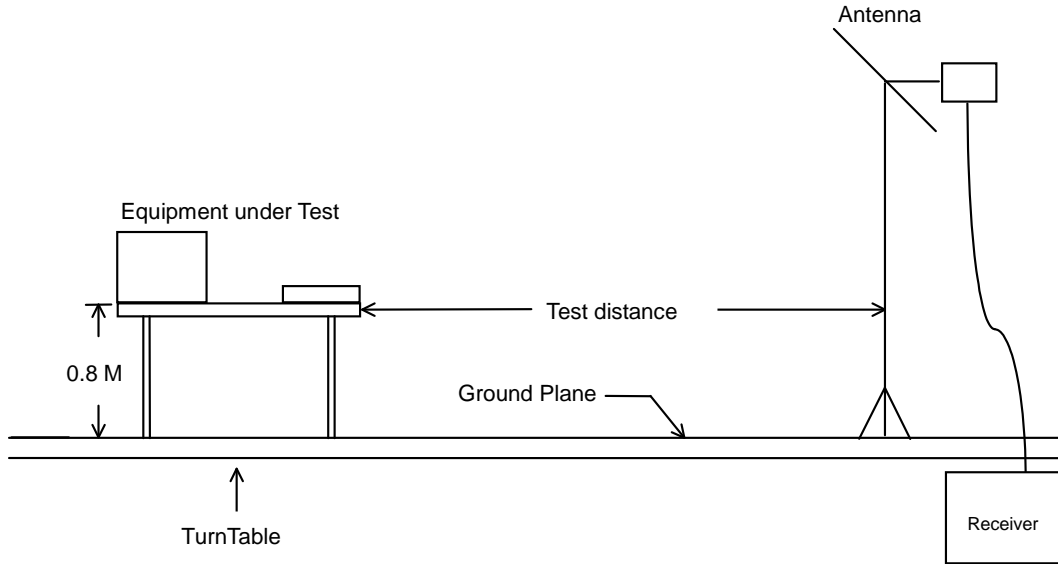
- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- 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.

< Above 1GHz >

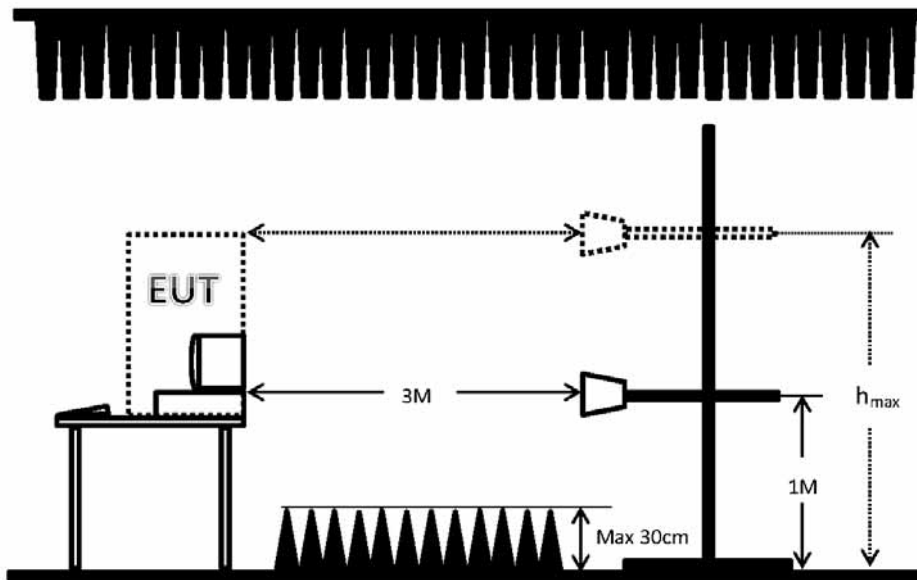
- a. Same test set up as below 1GHz radiated testing.
- b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
- c. There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.
- d. The table was rotated 360 degrees to determine the position of the highest radiation.
- e. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- f. Set the DRG Horn Antenna (Model: 3115) at 1M height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.
- g. When EUT locating on the turn-table, and its height is over 172cm (Antenna's 3dB beam width of 6GHz is 27°), the DRG Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.
- h. If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

6.3. Typical Test Setup Layout of Radiated Emission

< Below 1GHz >



< Above 1GHz >



Remark: When EUT's height is over 172cm, h_{max} = top of EUT

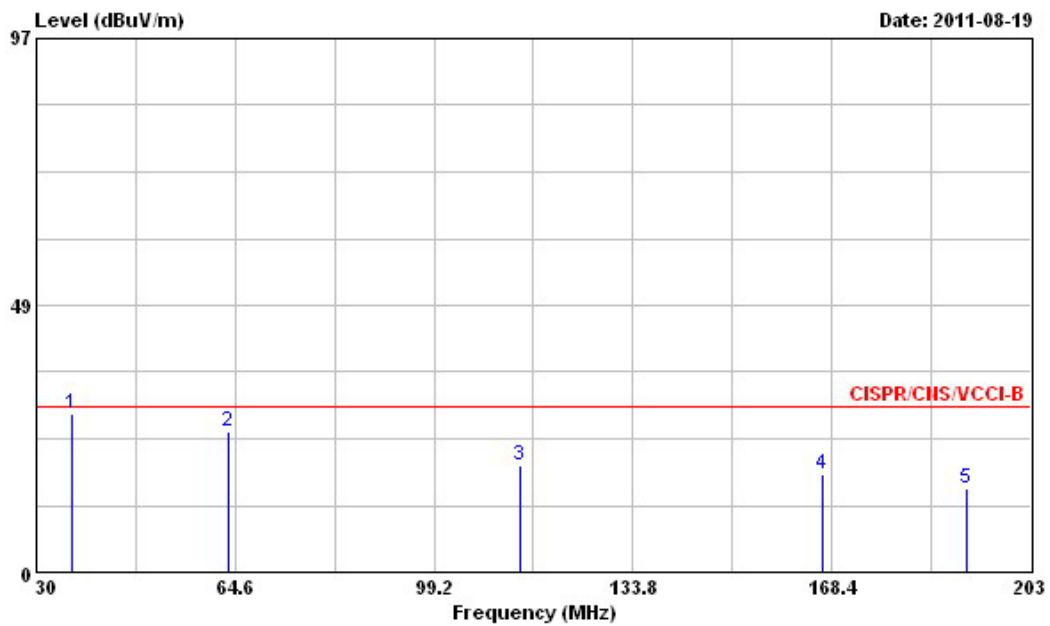
6.4. Test Result of Radiated Emission

Test mode	Mode 1	Test Site No.	OS03-NH
Test frequency	30 MHz ~ 1000 MHz	Test Engineer	Alan
Antenna distance	10 meters	Test Voltage	AC 230V / 50Hz
Temperature	28 °C	Relative Humidity	52 %

Note: 1. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)

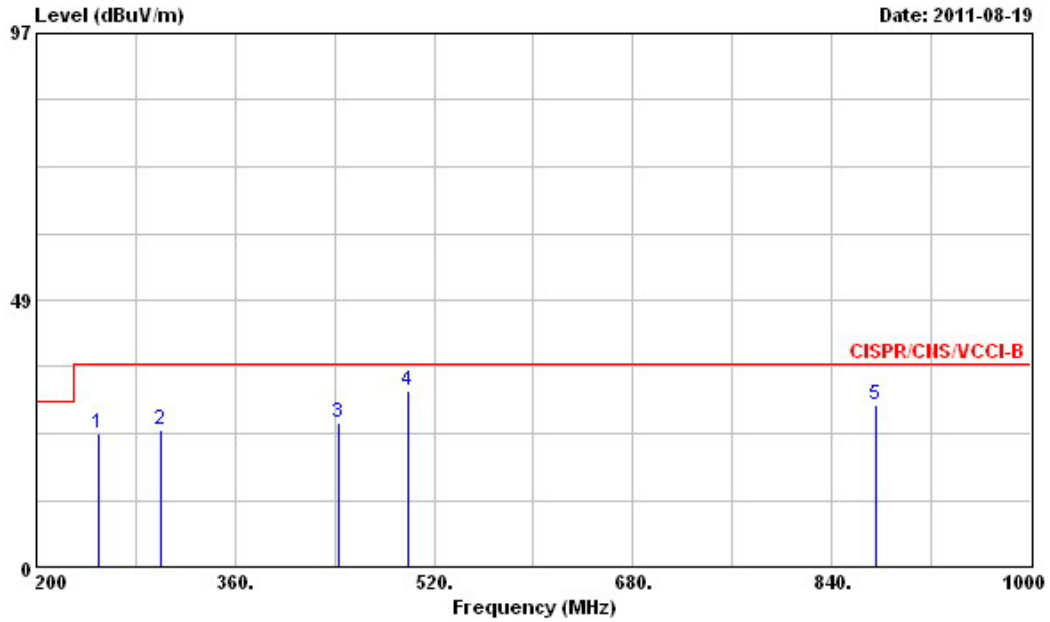
2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level

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



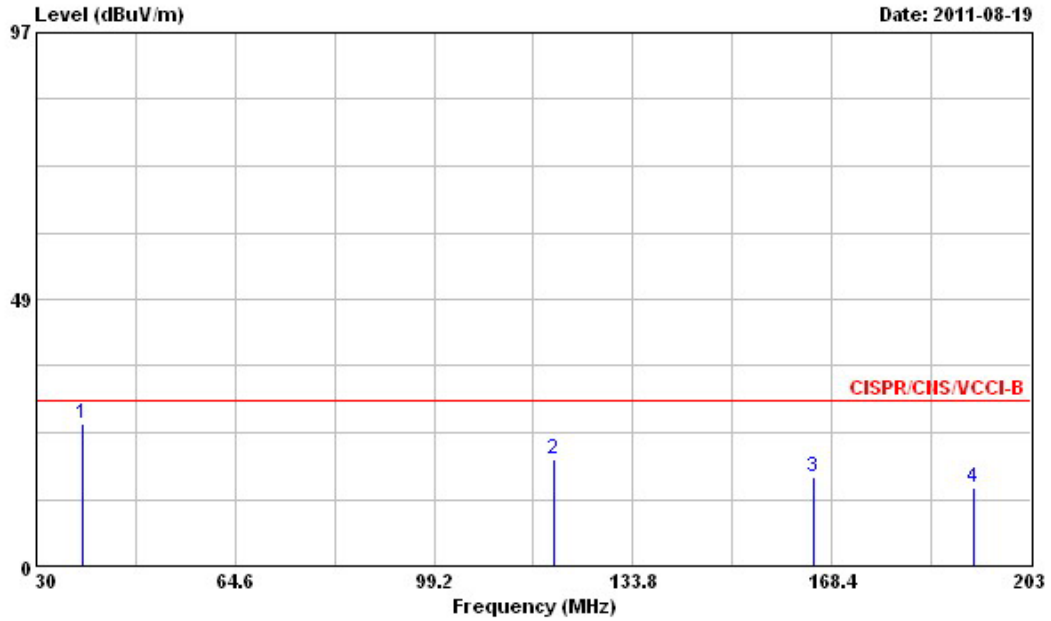
Site : OS03-NH
 Condition : CISPR/CNS/VCCL-B 10m OS03-ANT-02-28-2011 VERTICAL
 EUT : NVRmini2-4Bay
 POWER : AC 230V
 MEMO :

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	36.230	28.70	-1.30	30.00	41.10	14.99	1.11	28.50	QP	100	180
2	63.390	25.65	-4.35	30.00	46.20	6.40	1.49	28.44	Peak	---	---
3	114.250	19.41	-10.59	30.00	33.82	11.88	2.01	28.30	Peak	---	---
4	166.670	17.63	-12.37	30.00	33.59	9.67	2.45	28.08	Peak	---	---
5	191.760	15.28	-14.72	30.00	31.40	9.20	2.65	27.97	Peak	---	---



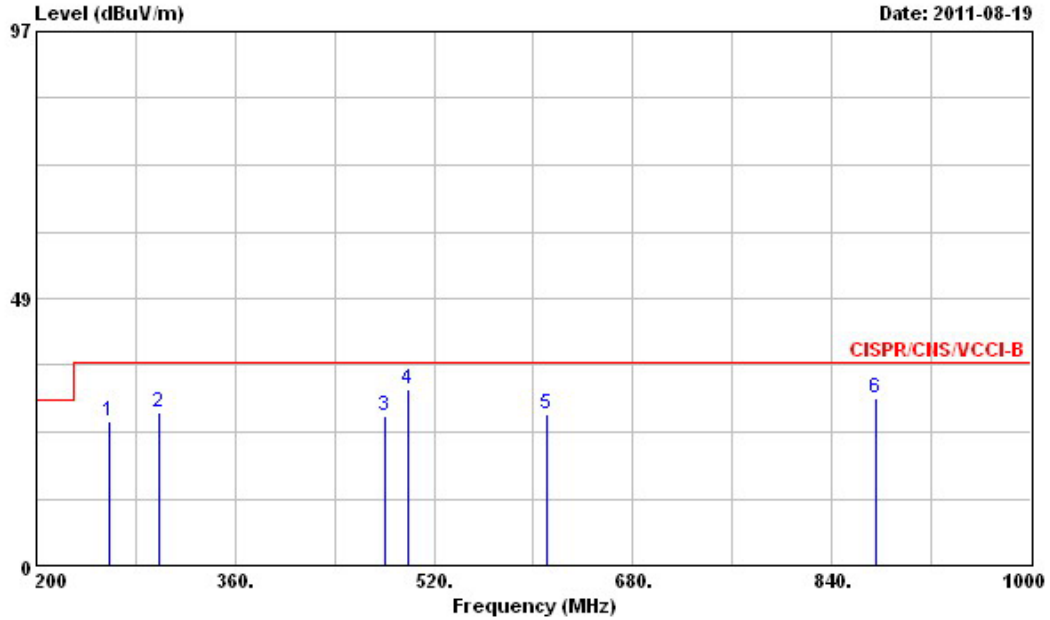
Site : OS03-NH
 Condition : CISPR/CNS/VCCL-B 10m OS03-ANT-02-28-2011 VERTICAL
 EUT : NVRmini2-4Bay
 POWER : AC 230V
 MEMO :

	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	249.600	24.29	-12.71	37.00	36.64	12.26	3.25	27.86	Peak	---	---
2	300.000	24.75	-12.25	37.00	35.41	13.31	3.80	27.77	Peak	---	---
3	443.200	26.11	-10.89	37.00	34.01	16.40	4.44	28.74	Peak	---	---
4	498.400	31.99	-5.01	37.00	39.00	17.35	4.71	29.07	Peak	---	---
5	875.200	29.38	-7.62	37.00	31.81	20.11	6.25	28.79	Peak	---	---



Site : OS03-NH
 Condition : CISPR/CNS/VCCL-B 10m OS03-ANT-02-28-2011 HORIZONTAL
 EUT : NVRmini2-4Bay
 POWER : AC 230V
 MEMO :

	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	38.130	25.78	-4.22	30.00	39.34	13.80	1.14	28.50	Peak	---	---
2	120.130	19.24	-10.76	30.00	33.22	12.28	2.02	28.28	Peak	---	---
3	165.110	16.07	-13.93	30.00	31.99	9.74	2.43	28.09	Peak	---	---
4	192.970	14.09	-15.91	30.00	30.20	9.20	2.66	27.97	Peak	---	---



Site : OS03-NH
 Condition : CISPR/CIS/VCCL-B 10m OS03-ANT-02-28-2011 HORIZONTAL
 EUT : NVRmini2-4Bay
 POWER : AC 230V
 MEMO :

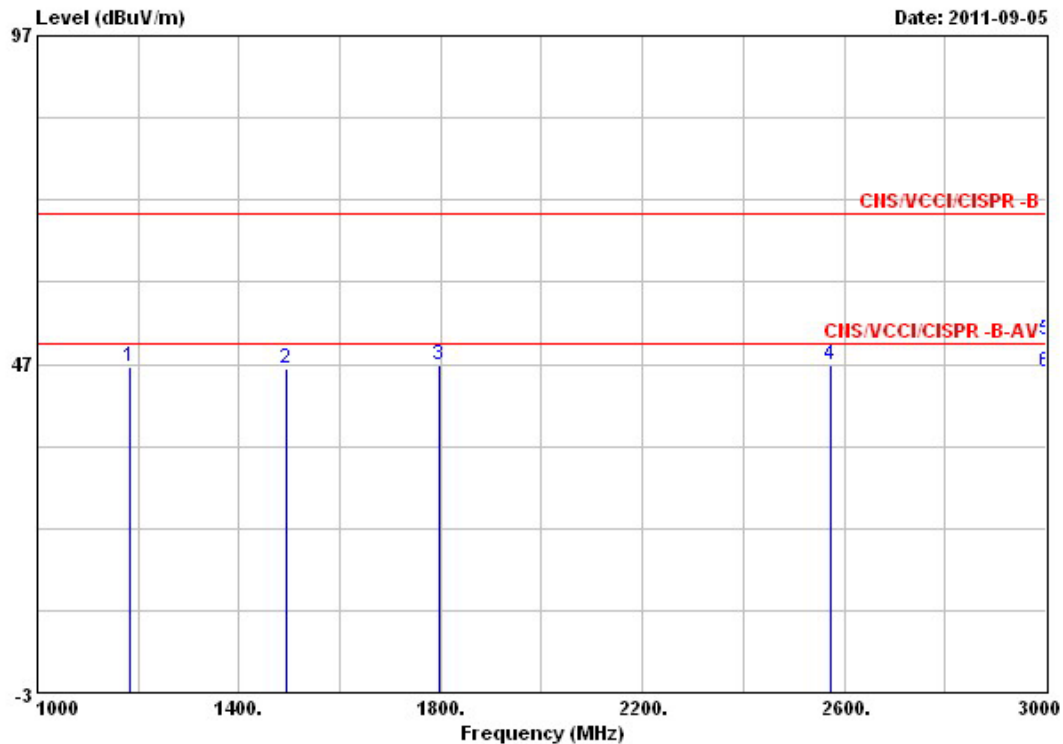
Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	258.400	26.22	-10.78	37.00	38.21	12.48	3.37	27.84 Peak	---	---
2	299.200	27.94	-9.06	37.00	38.60	13.31	3.80	27.77 Peak	---	---
3	480.000	27.29	-9.71	37.00	34.60	17.03	4.62	28.96 Peak	---	---
4	498.400	31.99	-5.01	37.00	39.00	17.35	4.71	29.07 Peak	---	---
5	611.200	27.55	-9.45	37.00	33.00	18.50	5.20	29.15 Peak	---	---
6	875.200	30.38	-6.62	37.00	32.81	20.11	6.25	28.79 Peak	---	---

Test mode	Mode 1	Test Site No.	10CH02-HY
Test frequency	1000 MHz ~ 6000 MHz	Test Engineer	Teddy
Antenna distance	3 meter	Test Voltage	AC 230V / 50Hz
Temperature	21 °C	Relative Humidity	50 %

Note: 1. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)

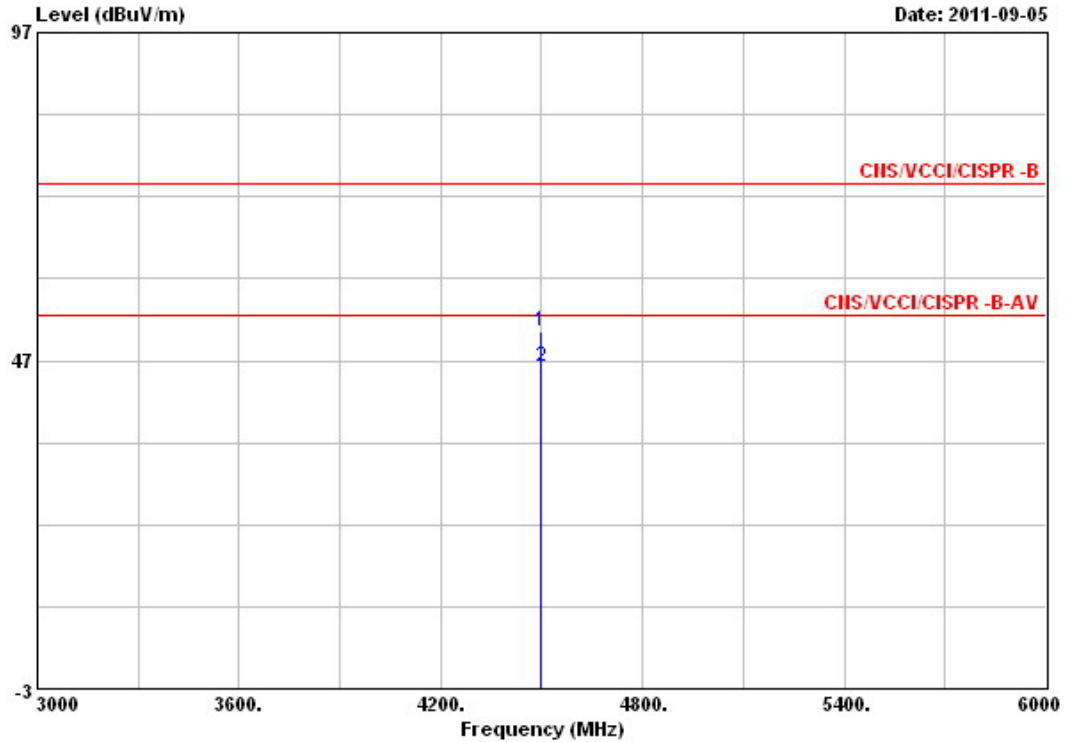
2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level

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



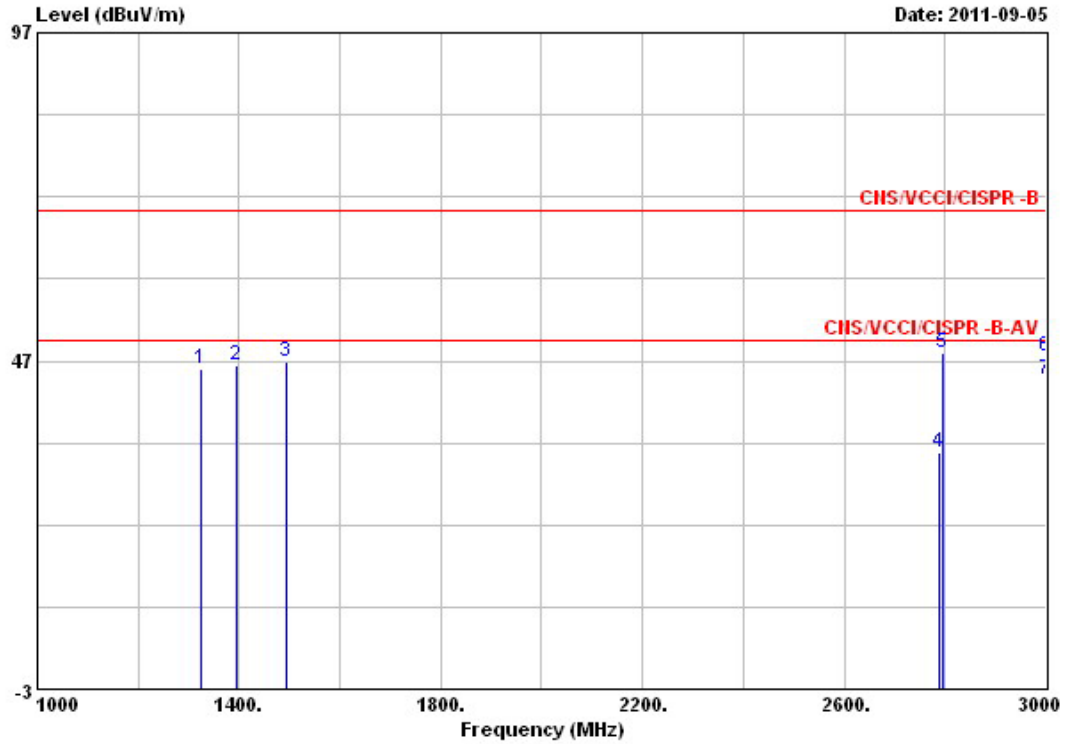
Site : 10CH02-HY
 Condition : CNS/VCCI/CISPR-B 3m 6903 HORN 990503 VERTICAL
 EUT :
 POWER: 230V/50Hz
 MODEL : NYRmini2-4Bay
 MEMO : LAN:1G
 : REMOTE CONTROL VIEW ACCESS

	Freq	Level	Over Limit	Limit	Read	Preamp	Cable	Antenna	Remark	Ant Pos	Table Pos
	MHz	dBUV/m	dB	dBUV/m	dBUV	dB	dB	dB/m		cm	deg
1	1182.000	46.54	-23.46	70.00	48.84	31.62	4.66	24.66	Peak	---	---
2	1494.000	46.40	-23.60	70.00	46.50	30.80	5.30	25.40	Peak	---	---
3	1796.000	46.77	-23.23	70.00	45.72	31.22	5.73	26.54	Peak	---	---
4	2574.000	46.86	-23.14	70.00	42.30	31.15	6.99	28.72	Peak	---	---
5	3000.000	50.62	-19.38	70.00	43.11	30.30	7.51	30.30	Peak	---	---
6	3000.000	45.85	-4.15	50.00	38.34	30.30	7.51	30.30	Average	100	132



Site : 10CH02-HY
 Condition : CNS/VCCI/CISPR -B 3m 6903 HORN 990503 VERTICAL
 EUT :
 POWER: 230V/50Hz
 MODEL : NVRmini2-4Bay
 MEMO : LAN:IG
 : REMOTE CONTROL VIEW ACCESS

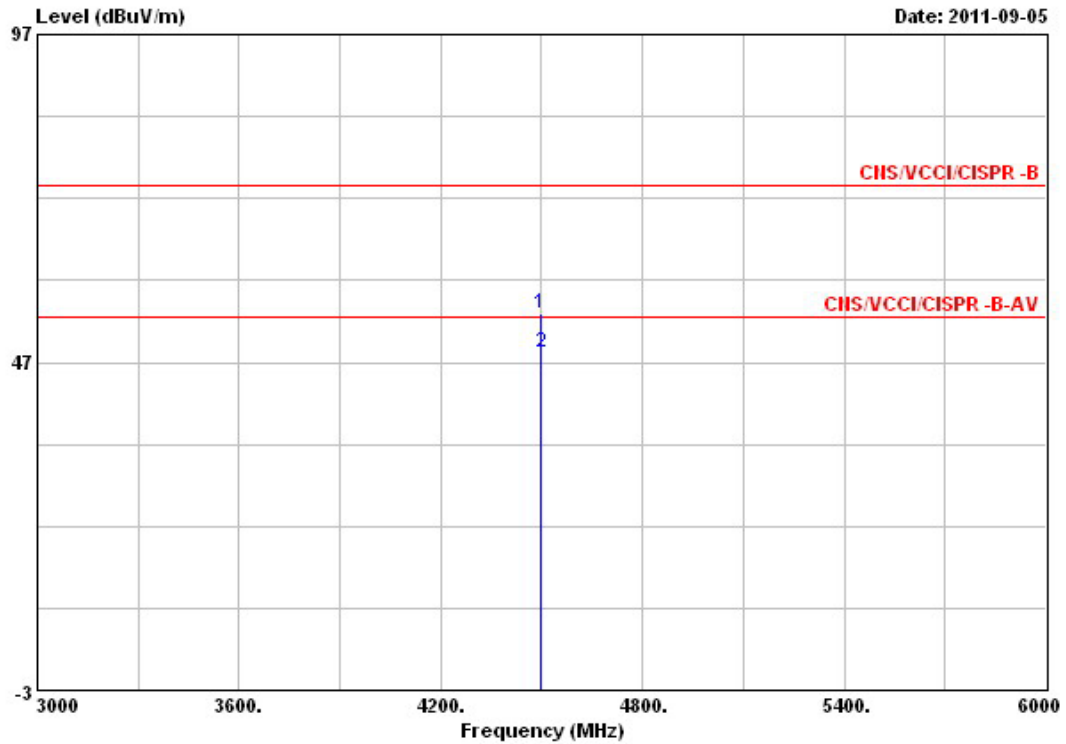
	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Loss	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	4497.000	51.34	-22.66	74.00	38.37	29.80	10.27	32.50	Peak	---	---
2	4500.000	46.04	-7.96	54.00	33.03	29.80	10.31	32.50	Average	100	180



Site : 10CH02-HY
 Condition : CNS/VCCI/CISPR -B 3m 6903 HORN 990503 HORIZONTAL
 EUT :
 POWER: 230V/50Hz
 MODEL : NVRmini2-4Bay
 MEMO : LAN:1G

: REMOTE CONTROL VIEW ACCESS

Freq	Level	Over	Limit	Read	Preamp	CableAntenna		Remark	Ant	Table	
		Limit	Line			Loss	Factor				Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg	
1	1324.000	45.73	-24.27	70.00	47.06	31.26	4.94	24.99	Peak	---	---
2	1396.000	46.22	-23.78	70.00	47.04	31.06	5.09	25.15	Peak	---	---
3	1494.000	46.90	-23.10	70.00	47.00	30.80	5.30	25.40	Peak	---	---
4	2790.000	33.02	-16.98	50.00	27.01	30.72	7.25	29.48	Average	100	200
5	2796.000	48.29	-21.71	70.00	42.20	30.70	7.25	29.54	Peak	---	---
6	3000.000	47.60	-22.40	70.00	40.09	30.30	7.51	30.30	Peak	---	---
7	3000.000	44.21	-5.79	50.00	36.70	30.30	7.51	30.30	Average	100	160



Site : 10CH02-HY
 Condition : CNS/VCCI/CISPR -B 3m 6903 HORN 990503 HORIZONTAL
 EUT :
 POWER: 230V/50Hz
 MODEL : NVRmini2-4Bay
 MEMO : LAN:1G
 : REMOTE CONTROL VIEW ACCESS

	Freq	Level	Over	Limit	Read	Preamp	CableAntenna		Remark	Ant	Table
			Limit	Line			Level	Factor		Loss	Factor
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	4497.000	54.42	-19.58	74.00	41.45	29.80	10.27	32.50	Peak	---	---
2 @	4500.000	48.60	-5.40	54.00	35.59	29.80	10.31	32.50	Average	100	200

6.5. Photographs of Radiated Emission Test Configuration

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

For Below 1GHz

FRONT VIEW

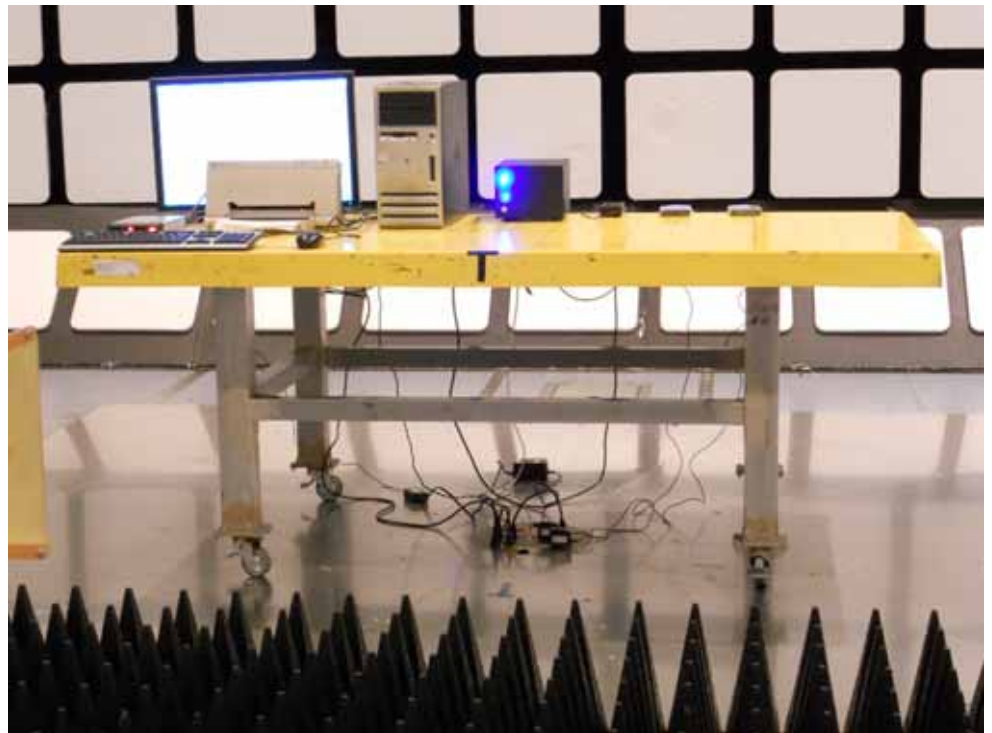


REAR VIEW

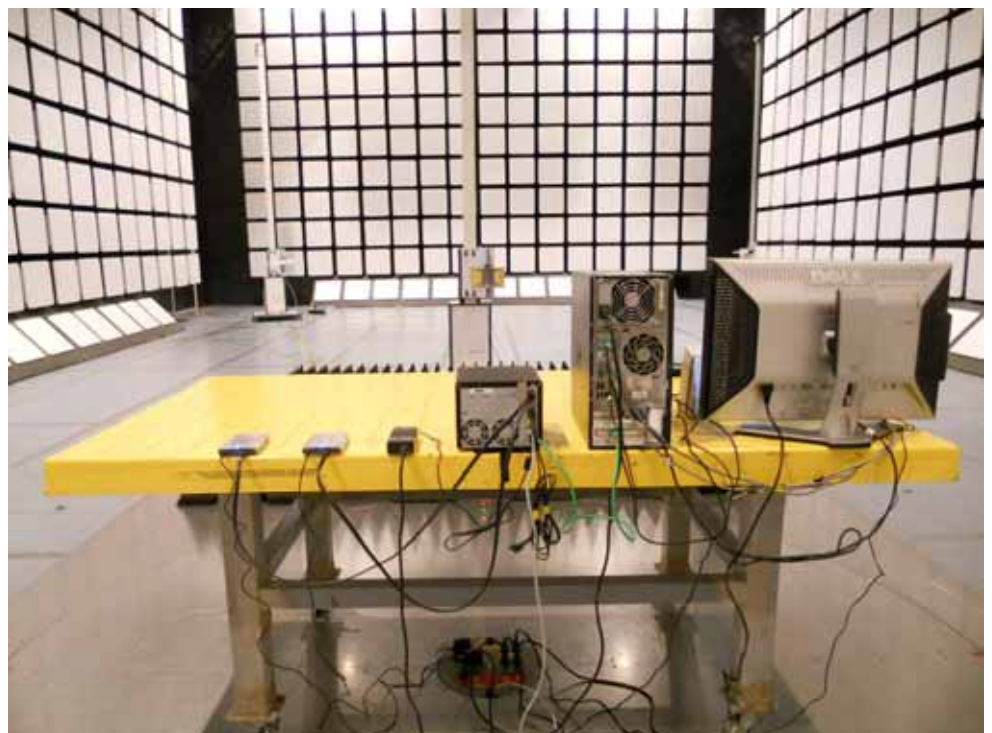


For Above 1GHz

FRONT VIEW



REAR VIEW



7. Harmonics Test

As specified on clause 7 of EN 61000-3-2:2006/A2:2009, 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

- Product Standard : EN 61000-3-3:2008

8.2. Test Procedure

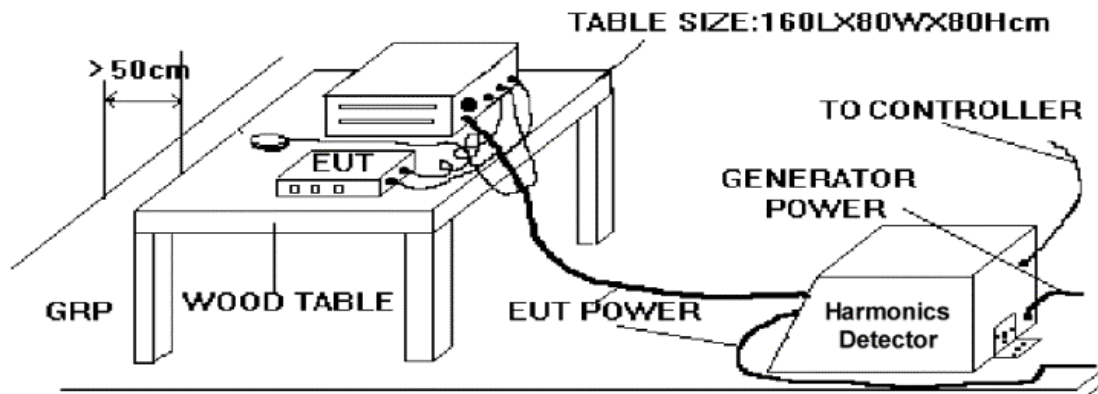
The equipment shall be tested under the conditions of **Clause 5**.

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	:	10.0 minutes
Pst Integration Periods	:	1
Test Duration	:	10.0 minutes

8.4. Test Setup



8.5. Test Result of Voltage Fluctuation and Flicker Test

Final Test Result : **PASS**
Temperature : 24 °C
Relative Humidity : 46 %
Atmospheric Pressure : 103 kPa
Test Date : Sep. 20, 2011
Test Engineer : Ben Hsu

Urms = 230.1V Freq = 49.987 Range: 2 A
Irms = 0.188A Ipk = 0.930A cf = 4.958
P = 17.52W S = 43.15VA pf = 0.406

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

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

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

Test completed, Result: PASSED

	Pst	P50s	P10s	P3s	P1s	P0.1s	dmax	dc	dt>Lim
1	0.072	0.010	0.010	0.010	0.010	0.010	0.000	0.010	0.000

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

FRONT VIEW



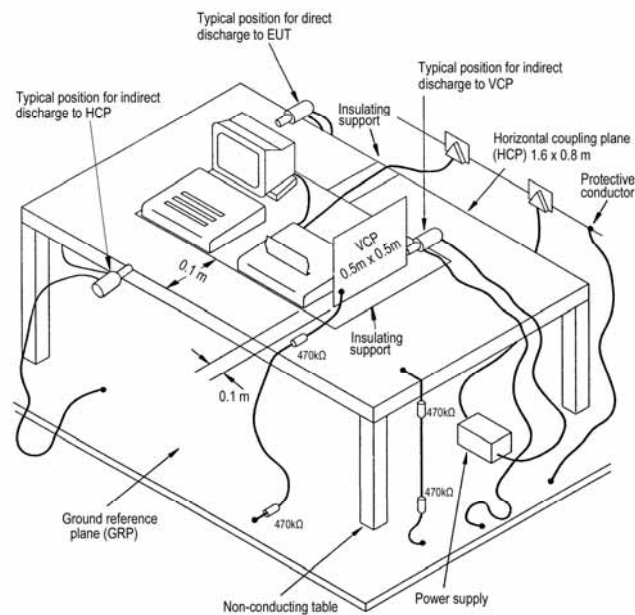
REAR VIEW



9. Electrostatic Discharge Immunity Test (ESD)

- Final Test Result : **PASS**
- Pass Performance Criteria : **B**
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-2:2008
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 3 for air discharge
: 2 for contact discharge
- Test Voltage : $\pm 2 / \pm 4 / \pm 8$ KV for air discharge
: $\pm 2 / \pm 4$ KV for contact discharge
- Temperature : 23 °C
- Relative Humidity : 43 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- Observation : During the test at contact discharge ± 4 kV on CASE and SCREW, data transmission was disconnected. After the test, the equipment continued to operate as intended without operator intervention.

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 1 m 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 0.2 m 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 resister located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8 m 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 °C to 35 °C;
 - 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	±2
2	±4
3	±6
4	±8
X	Specified
Remark : "X" is an open level.	

9.4.2. Air Discharge

Level	Test Voltage (KV) of Air Discharge
1	±2
2	±4
3	±8
4	±15
X	Specified
Remark : "X" is an open level.	

9.5. Test Points

9.5.1. Test Result of Air Discharge

Test Method	No. Of Discharges	Air Discharge/Round Tip						Test Record
		+2kV	-2kV	+4kV	-4kV	-8kV	+8kV	
LED	10	ND	ND	ND	ND	ND	ND	Note ¹
POWER SW	10	ND	ND	ND	ND	ND	ND	Note ¹
DC INPUT JACK	10	A	A	A	A	A	A	None
USB PORT	10	ND	ND	ND	ND	ND	ND	Note ¹
SATA PORT	10	ND	ND	ND	ND	ND	ND	Note ¹
Remark	1. The "ND" is means No Discharge.							

9.5.2. Test Result of Contact Discharge

9.5.2.1 Direct discharge

Test Method	No. Of Discharges	Contact Discharge/Pointed Tip				Test Record
		+2kV	-2kV	+4kV	-4kV	
CASE	25	A	A	B	B	Note ¹
SCREW	25	A	A	B	B	Note ¹
RJ45 PORT	25	A	A	A	A	None
Remark	1. The "Note ¹ " is means during the test at contact discharge $\pm 4kV$ on case and screw, data transmission was disconnected. After the test, the equipment continued to operate as intended without operator intervention					

9.5.2.2 Indirect discharge to HCP and VCP

Test Method	No. Of Discharges	Contact Discharge/Pointed Tip				Test Record
		+2kV	-2kV	+4kV	-4kV	
HCP (At Front)	25	A	A	A	A	None
HCP (At Left)	25	A	A	A	A	None
HCP (At Right)	25	A	A	A	A	None
HCP (At Rear)	25	A	A	A	A	None
VCP (At Front)	25	A	A	A	A	None
VCP (At Left)	25	A	A	A	A	None
VCP (At Right)	25	A	A	A	A	None
VCP (At Rear)	25	A	A	A	A	None

9.6. Photographs of Electrostatic Discharge Immunity Test

FRONT VIEW



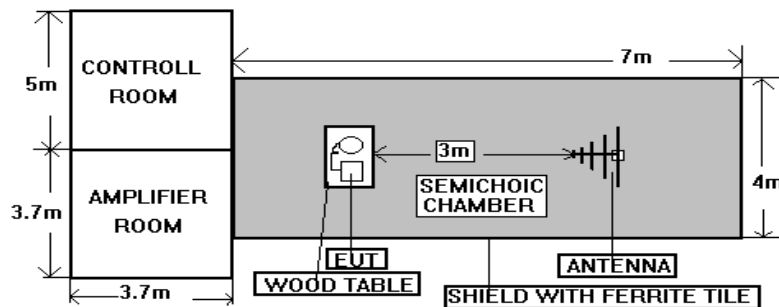
REAR VIEW



10. Radio Frequency Electromagnetic Field Immunity Test (RS)

- Final Test Result : **PASS**
- Pass Performance Criteria : **A**
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-3:2006/A1:2007/A2:2010
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Frequency Range : 80-1000 MHz
- Dwell Time : 2.9 seconds
- Field Strength : 3 V/m (unmodulated, r.m.s) 80% AM (1 kHz)
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- Observation : Normal.

10.1. Test Setup



NOTE : The SPORTON 7m x 4m x 4m semi-anechoic chamber is compliance with the sixteen point's 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 semi-anechoic 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 80-1000MHz 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 80-1000MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of $1.5 \cdot 10^{-3}$ decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

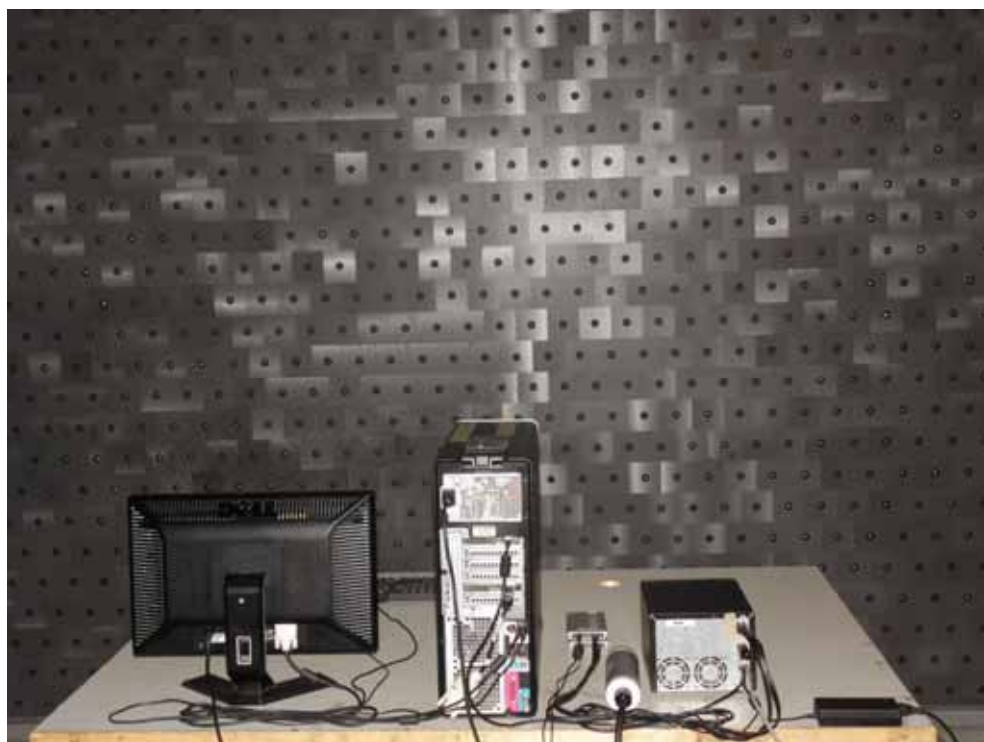
10.3. Test Severity Levels

Frequency Band : 80-1000MHz

Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified
Remark : "X" is an open class.	

10.4. Photographs of Radio Frequency Electromagnetic Field Immunity Test

FRONT VIEW



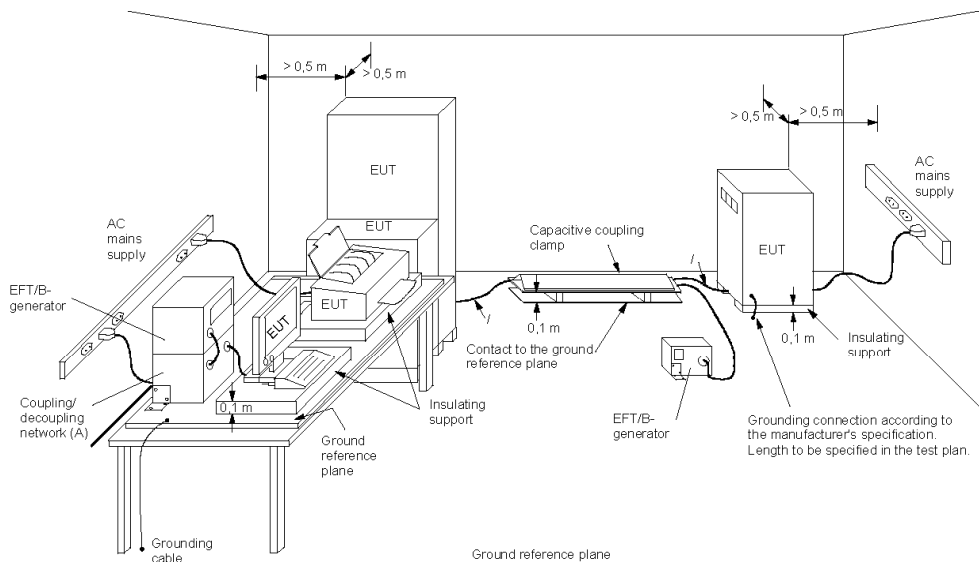
REAR VIEW



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 Input power ports -- 2
: on signal port and telecommunication ports -- 2
- Test Voltage : on Input power ports -- $\pm 0.5 / \pm 1.0$ kV
: on signal port and telecommunication ports -- $\pm 0.25 / \pm 0.5$ kV
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- 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 0.1 m thick. If the EUT is table-top equipment, it was located approximately 0.8 m 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 0.1 m 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 1 m 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 exceeds 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 °C to 35 °C;
 - 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 ± 10%		
Level	On Input power ports	On signal port and telecommunication ports
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.

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 61000-4-5:2005
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Surge wave form (Tr/Th) : 1, 2/50 (8/20) μ s
- Level :
 - on Input power ports -- 3
 - on signal port and telecommunication ports -- 2
- Test Voltage :
 - on Input power ports -- $\pm 0.5 / \pm 1.0 / \pm 2.0$ kV
 - on signal port and telecommunication ports -- $\pm 0.5 / \pm 1.0$ kV
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- Observation : Normal.

12.1. Test Record

- Input AC power port:

Voltage (KV)	Test Location	Polarity	Phase Angle				Remark
			0°	90°	180°	270°	
0.5/1.0	L - N	+	A	A	A	A	Normal
		-	A	A	A	A	Normal
0.5/1.0/2.0	L - PE	+	A	A	A	A	Normal
		-	A	A	A	A	Normal
	N - PE	+	A	A	A	A	Normal
		-	A	A	A	A	Normal

⊕ Remark : PE = Earth reference

- Ports for signal port and telecommunication port:

Tested on	Polarity	Phase Angle	No of Pulse	Pulse Volta	Sec. / 1 Pulse	Test Result
Line-G	+	—	5	0.5 / 1.0 KV	60	<u>PASS</u>
Line-G	—	—	5	0.5 / 1.0 KV	60	<u>PASS</u>

12.2. Test Level

Level	Open-circuit test voltage, ± 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 °C to 35 °C
 - 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 worst-case 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 previously unstressed equipment shall be used and protection devices shall be replaced.

12.4. Operating Condition

Full system

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 61000-4-6:2008
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Test Voltage : 3 V (unmodulated, r.m.s) 80% AM (1 kHz)
- Frequency Range : 0.15 MHz to 80 MHz
- Dwell time : 2.9 seconds
- Frequency step size : 1 %
- Coupling mode : CDN-M2+M3 for Input power ports
: CDN-RJ45 for signal port and telecommunication ports
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- 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 sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed 1.5×10^{-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. 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.
- g. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.
- h. The use of special exercising programs is recommended.
- i. Testing shall be performed according to a Test Plan, which shall be included in the test report.
- j. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

13.4. Photographs of CS tests

FRONT VIEW



REAR VIEW



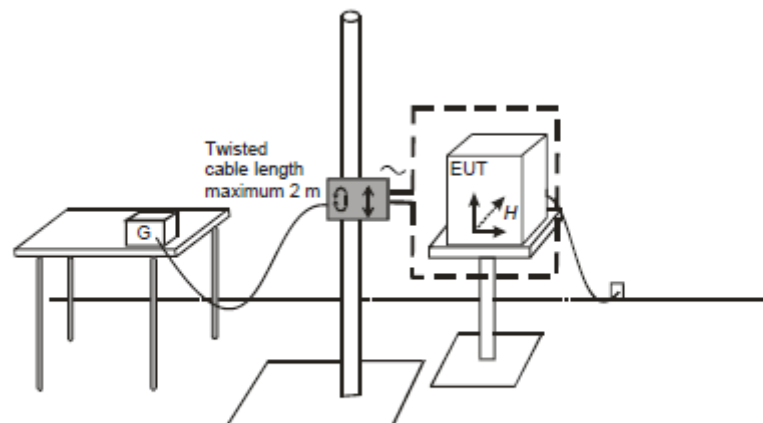
14. Power Frequency Magnetic Field immunity tests

- Final Test Result : **PASS**
- Pass Performance Criteria : **A**
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-8:2009
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu
- 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



EUT : Equipment under test G : Test Generator

14.3. Photographs of Power Frequency Magnetic Field immunity tests

FRONT VIEW



REAR VIEW



15. Voltage Dips and Voltage Interruptions Immunity Tests

- Final Test Result : **PASS**
- Pass Performance Criteria : **C** for voltage interruption, **A/A** for voltage dips
- Required Performance Criteria : C for voltage interruption, C/B for voltage dips
- Basic Standard : IEC 61000-4-11:2004
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Test Port : Input power ports
- Temperature : 24 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 103 kPa
- Test Date : Sep. 26, 2011
- Test Engineer : Ben Hsu

15.1. Test Record of Voltage Interruption

Voltage (V)	Phase Angle		Reduction Voltage	Duration (Periods)	Observation
	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 Voltage	Duration (Periods)	Observation
	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 61000-4-11:2004

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 μ s.

15.5. Operating Condition

Full system

15.6. Photographs of Voltage Dips and Voltage Interruptions 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	Nov. 16, 2010	Conduction (CO01-NH)
LISN	SCHAFFNER	NNB41	04/10153	9kHz - 30MHz	Nov. 16, 2010	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. 14, 2010	Conduction (CO01-NH)
Impedance Stabilization Network	TESEQ GMBH	ISN T400A	25669	150kHz - 30MHz	Sep. 14, 2010	Conduction (CO01-NH)
Impedance Stabilization Network	TESEQ GMBH	ISN T800	26105	150kHz - 30MHz	Sep. 14, 2010	Conduction (CO01-NH)
Open Area Test Site	SPORTON	OATS-10	OS03-NH	30 MHz - 1 GHz 10m, 3m	Nov. 13, 2010	Radiation (OS03-NH)
Amplifier	HP	8447D	2944A08292	0.1 MHz - 1.3 GHz	May 03, 2011	Radiation (OS03-NH)
Spectrum Analyzer	R&S	FSP	838858/038	9 kHz - 7 GHz	Jan. 11, 2011	Radiation (OS03-NH)
Receiver	R&S	ESCS 30	100357	9 kHz - 2.75 GHz	Nov. 16, 2010	Radiation (OS03-NH)
Bilog Antenna	CHASE	CBL6112D	25234	30 MHz - 2 GHz	Feb. 28, 2011	Radiation (OS03-NH)
Turn Table	EMCO	2080	9805-2065	0 - 360 degree	N/A	Radiation (OS03-NH)
Antenna Mast	EMCO	2075	9804-2151	1 m - 4 m	N/A	Radiation (OS03-NH)
RF Cable-R10m	HSCN	RG213U	2X11N	30 MHz - 1 GHz	Aug. 10, 2011	Radiation (OS03-NH)
Amplifier	EMCI	EMC330	980007	1 ~ 8 GHz	May 09, 2011	Radiation (10CH02-HY)
Horn Antenna	EMCO	3115	6903	1 ~ 8 GHz	May 04, 2011	Radiation (10CH02-HY)
Receiver	R&S	ESI	838496/008	20 Hz ~7 GHz	Apr. 24, 2011	Radiation (10CH02-HY)
RF Cable 5M	SUHNER	SUCOFLEX 104	SN : 304379/4	1 GHz ~18 GHz	Mar. 09, 2011	Radiation (10CH02-HY)
RF Cable 13M	SUHNER	SUCOFLEX 104	SN : 16647/4	1 GHz ~18 GHz	Mar. 09, 2011	Radiation (10CH02-HY)
10m Semi Anechoic Chamber	TDK	SAC-10M	10CH02-HY	1 GHz ~ 6 GHz 3m	Mar. 12, 2011	Radiation (10CH02-HY)

Calibration Interval of instruments listed above is one year.

<EMS>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
ESD Generator	TESEQ AG	NSG 437	192	Air: 0 ~ 30 KV Contact: 0 ~15KV	Aug. 30, 2011	ESD
Amplifier	AMPLIFIER& RESEARCH	250W1000A	0325368	80M~1GHz	Sep. 09, 2011	RS
DUAL DIRECTIONAL COUPLER	FARNKONIA	FLH200/100	1127	80-1GHz	Sep. 07, 2011	RS
S.G.	ROHDE& SCHWARZ	SML03	103349	9kHz~3.3GHz	Sep. 08, 2011	RS
METER	HP	438A	3513U04050	100 kHz~26.5 GHz	Sep. 08, 2011	RS
POWER Sensor	HP	8481D	3318A13140	10MHz~18GHz	Sep. 08, 2011	RS
POWER Sensor	HP	8482A	3318A26464	100 kHz~4.2GHz	Sep. 08, 2011	RS
Attenuator	HP	8491A	53603	3dB	N/A	RS
EFT Generator	KEYTEK	EMCPRO	0609221	0 KV - 4.4 KV	Oct. 01, 2010	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 Ω 0KV-500V/12 Ω	Oct. 01, 2010	SURGE
SURGE/CDN	KEYTEK	EMCPRO	0303189	0 KV -4 KV/2 Ω 0KV-500V/12 Ω	Oct. 01, 2010	SURGE
Conducted Immunity Test System	SCHAFFNER	NSG2070	1091	100KHz ~ 250MHz FM 1KHz 80%	Jun. 17, 2011	CS
Attenuator	EM TEST	75W-DC-250 MHz 06	0004166A	150 kHz – 230 MHz	Jun. 15, 2011	CS
Koppel- Eutkoppelnetzwerk	FRANKONIA	CDN M2+M3	A3011018	150k~230MHz	Jun. 19, 2011	CS
Coupling/ Decoupling Network	FRANKONIA	CDN RJ45	A3023005	150k~230MHz	Jun. 19, 2011	CS
Magnetic Field Antenna	FCC	F-1000-4-8/9/10-L-1M	9830	0~125A	Apr. 19, 2011	Magnetic
Magnetic Generator	FCC	F-1000-4-8-G-125A	05004	0~125A	Apr. 19, 2011	Magnetic
PQF Generator	KEYTEK	EMCPRO	0609221	230VA/50Hz/60Hz 0%Open/5S 0%Short/5S 40%0.10S 70%/0.01S	Oct. 01, 2010	DIP
Harmonic/Flicker Test System	EMC PARTNER	Harmonics -1000	088	4000VA 16A PEAK	Sep. 15, 2011	Harmonics, Flicker

Calibration Interval of instruments listed above is one year.

APPENDIX A. Photographs of EUT





