SPORTON International Inc.
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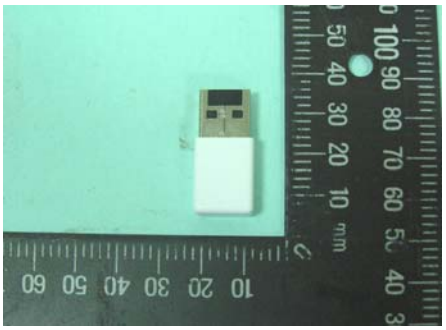
CE EMC TEST REPORT

Applicant's company	**AboCom Systems, Inc**
Applicant Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.
Manufacturer's company	**AboCom Systems, Inc**
Manufacturer Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Product Name	802.11b/g/n Micro Mini Wireless LAN USB2.0 Adapter
Brand Name	AboCom
Model Name	WU5205
Test Standard	EN 301 489-1 V1.6.1 (2005-09) EN 301 489-17 V1.2.1 (2002-08)
Received Date	Jul. 30, 2008
Final Test Date	Aug. 08, 2006
Submission Type	Original Equipment



Statement

The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Table of Contents

History of This Test Report

Original Issue Date: Aug. 11, 2008

Report No.: EH873102

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. CERTIFICATE OF COMPLIANCE

Product Name	:	802.11b/g/n Micro Mini Wireless LAN USB2.0 Adapter
Brand Name	:	AboCom
Model Name	:	WU5205
Applicant	:	AboCom Systems, Inc
Test Standard	:	EN 301 489-1 V1.6.1 (2005-09)
		EN 301 489-17 V1.2.1 (2002-08)

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 30, 2008 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Wayne Hsu

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

2.1. Emission Tests

Applicable Standard : EN 301 489-1 V1.6.1 (2005-09)				
Part	**Test Standard**	**Description of Test**	**Result**	**Under Limit**
4.1	EN 55022:2006	AC Power Conducted Emissions	Complies	17.54 dB
-	EN 55022:2006	Telecom Line Conducted Emissions	-	-
4.2	EN 55022:2006	Radiated Emissions	Complies	6.17 dB
-	EN 61000-3-2:2000/A1:2001	Harmonic Current Emissions	Complies	-
-	EN 61000-3-3:1995/A1:2001	Voltage Fluctuations and Flicker	Complies	-

Note: According to EN 301 489-1 V1.6.1 (2005-09) section 3.1, the radiated emission test is not required. Due to the EUT is a DC-powered equipment from PC host; it's not necessary to apply for Harmonic Current Emissions, Voltage Fluctuations and Flicker test.

2.2. Immunity Tests

Applicable Standard : EN 301 489-1 V1.6.1 (2005-09)				
Part	**Test Standard**	**Description of Test**	**Result**	**Criteria**
5.1	EN 61000-4-2:1995/A1:1998/A2:2001	ESD (EUT of Enclosure)	Complies	A
5.2	EN 61000-4-3:1996/A1:1998/A2:2001	RS (EUT of Enclosure)	Complies	A
5.3	EN 61000-4-4:1995/A1:2000/A2:2001	EFT (EUT of AC Power Port)	Complies	-
5.3	EN 61000-4-4:1995/A1:2000/A2:2001	EFT (EUT of Telecom Port)	Complies	-
5.4	EN 61000-4-5:1995/A1:2001	Surge (EUT of AC Power Port)	Complies	-
5.4	EN 61000-4-5:1995/A1:2001	Surge (EUT of Telecom Port)	Complies	-
5.5	EN 61000-4-6:1996/A1:2001	CS (EUT of AC Power Port)	Complies	-
5.5	EN 61000-4-6:1996/A1:2001	CS (EUT of Telecom Port)	Complies	-
5.6	EN 61000-4-11:1994/A1:2001	DIP (EUT of AC Power Port)	Complies	-

Note: Due to the EUT is a DC-powered equipment from PC host; it need to only apply for Table 1 of EN 301 489-1 V1.6.1 (2005-09). It's not necessary to apply for EFT, Surge, CS, DIP test.

2.3. Uncertainty

Test Items	Uncertainty	Remark
Conducted Emissions	±2.3dB	Confidence levels of 95%
Radiated Emissions	±3.7dB	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Detail

Draft n

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	see the below table for Draft n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for Draft n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	13 for 20MHz bandwidth ; 9 for 40MHz bandwidth
EIRP Output Power	MCS0(20MHz) : 19.72 dBm MCS0(40MHz) : 19.82 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11b/g

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Band	2400 ~ 2483.5MHz
Channel Number	13
EIRP Output Power	11b: 19.77 dBm ; 11g: 19.79 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)	
Band width Mode	20 MHz	40 MHz
802.11b	V	X
802.11g	V	X
Draft n	V	V

Draft n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
A	WALSIN	RFANT3216120A5T	Chip Antenna	N/A	2.12	TX / RX Ant.

Note: The EUT has one antenna (1TX, 1RX).

Antenna A can be used as transmitting antenna and receiving antenna.

Ant. A : TX/RX

3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	8	2447 MHz
	2	2417 MHz	9	2452 MHz
	3	2422 MHz	10	2457 MHz
	4	2427 MHz	11	2462 MHz
	5	2432 MHz	12	2467 MHz
	6	2437 MHz	13	2472 MHz
	7	2442 MHz		

3.5. Table for Testing Locations

Test Site No.	Site Category	Location	Test Site No.	Site Category	Location
10CH01-HY	SAC	Hwa Ya	ES01-HY	ESD	Hwa Ya
CO04-HY	CON	Hwa Ya	EX01-HY	EFT, DIP, Surge	Hwa Ya
RS01/02-HY	RS	Hwa Ya	CL01-HY	Clamp	Hwa Ya
CS01-HY	CS	Hwa Ya			

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 7 for Test Site Address.

3.6. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	M1330	E2KWM3945ABG
Notebook	DELL	D520	E2KWM3945ABG
Wireless AP	Planex	GW-AP54SGX	N/A
Mouse	QSKY	Lx-619B	DoC

3.7. EUT Operation during Test

<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 NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

At the same time, the following programs were executed:

Executed "QA" to link with the remote workstation to receive and transmit signal by WLAN.

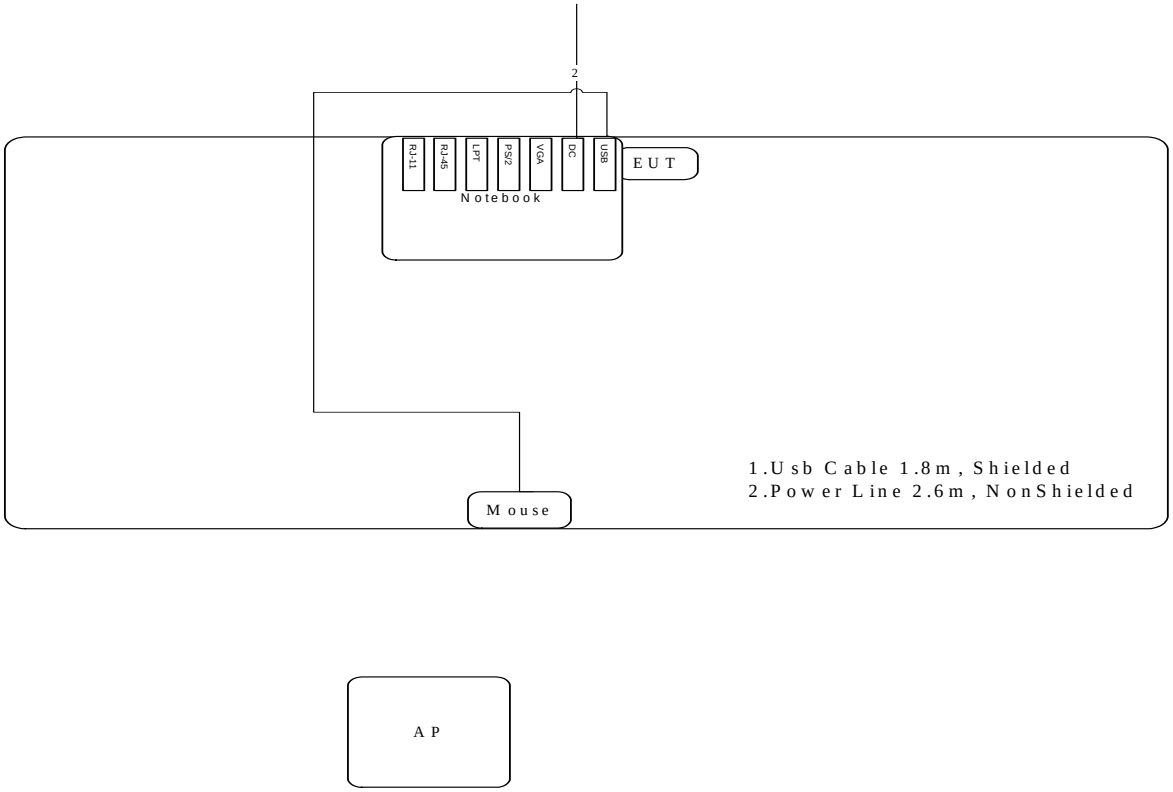
<EMS>

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

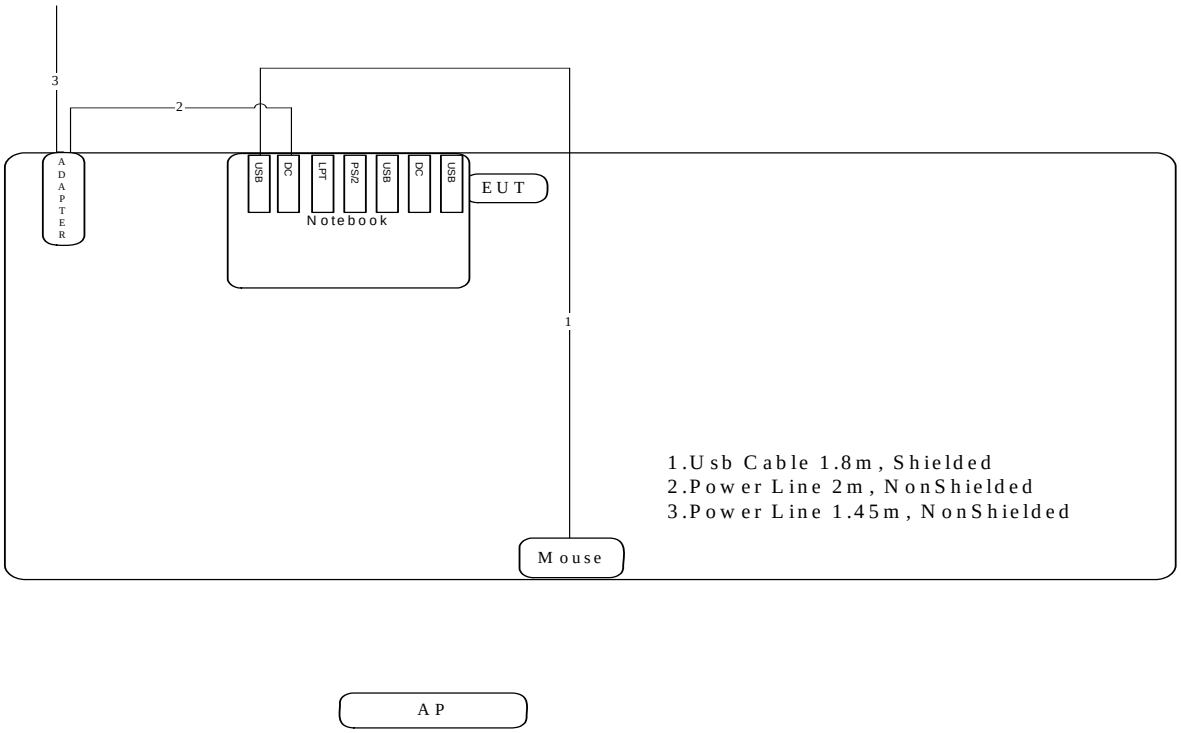
Executed " ping.exe" to link with the remote workstation to receive and transmit signal by WLAN.

3.8. Test Configurations

3.8.1. Radiation Emissions Test Configuration



3.8.2. AC Power Line Conduction Emissions Test Configuration



3.9. EMS Performance Criteria Description

Criteria	Performance criteria
A	No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.
B	After the test, loss of function is allowed. But functions shall be self-recoverable.
C	After the test, loss of function is allowed. But functions shall be recoverable by the operator.

4. EMISSION TESTS RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

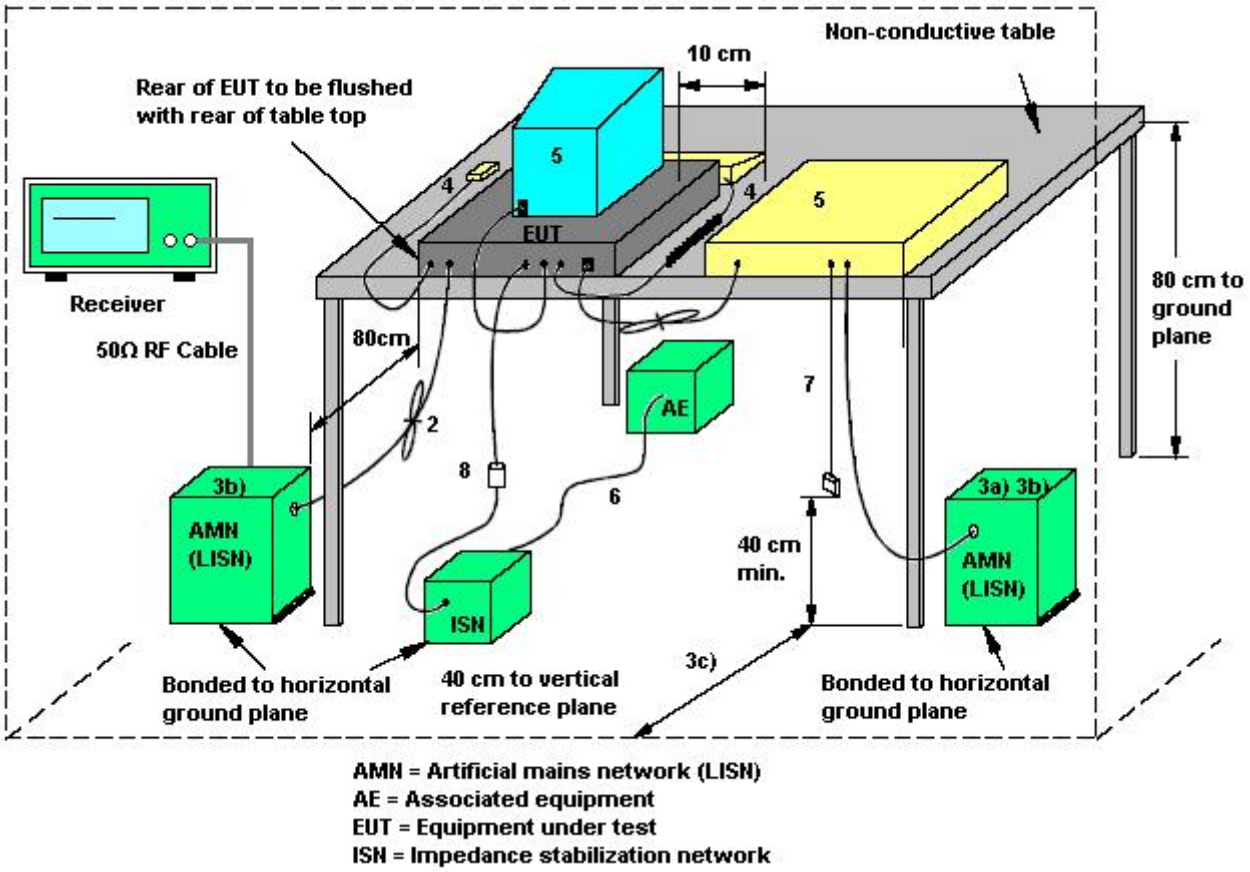
Please refer to section 6 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

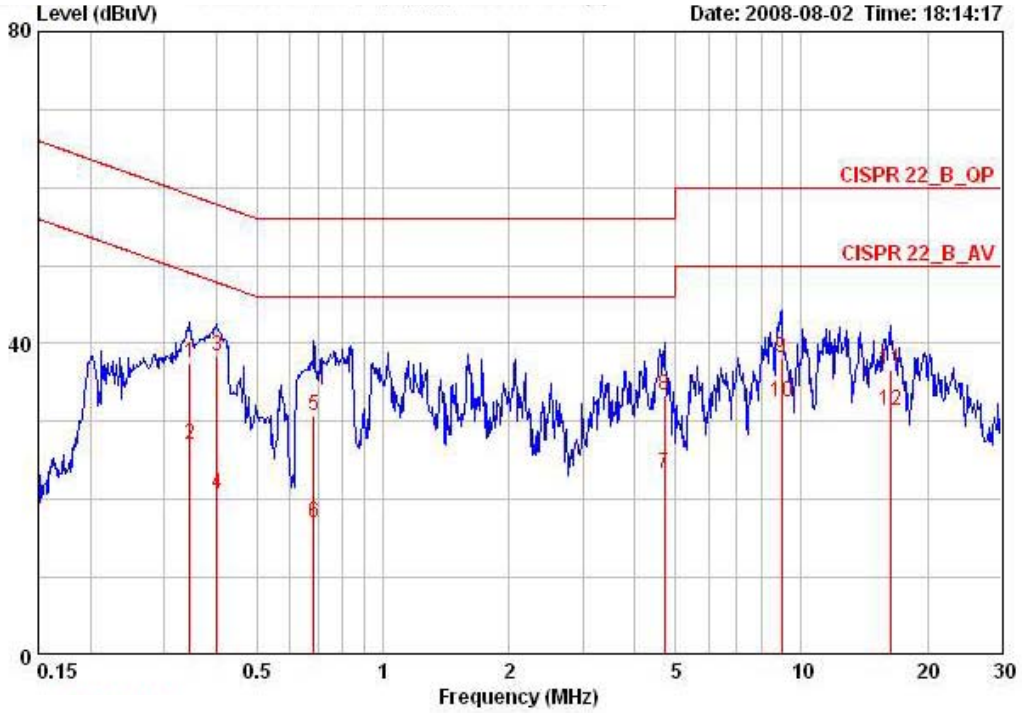
1. If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
2. Excess mains cord shall be bundled in the centre or shortened to appropriate length.
3. EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.
4. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
5. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
6. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
7. Cables of hand operated devices, such as keyboards, mouses, etc. shall be placed as for normal usage.
8. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
9. I/O signal cable intended for external connection.
10. The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
11. If used, the current probe shall be placed at 0,1 m from the ISN.

4.1.5. Test Deviation

There is no deviation with the original standard.

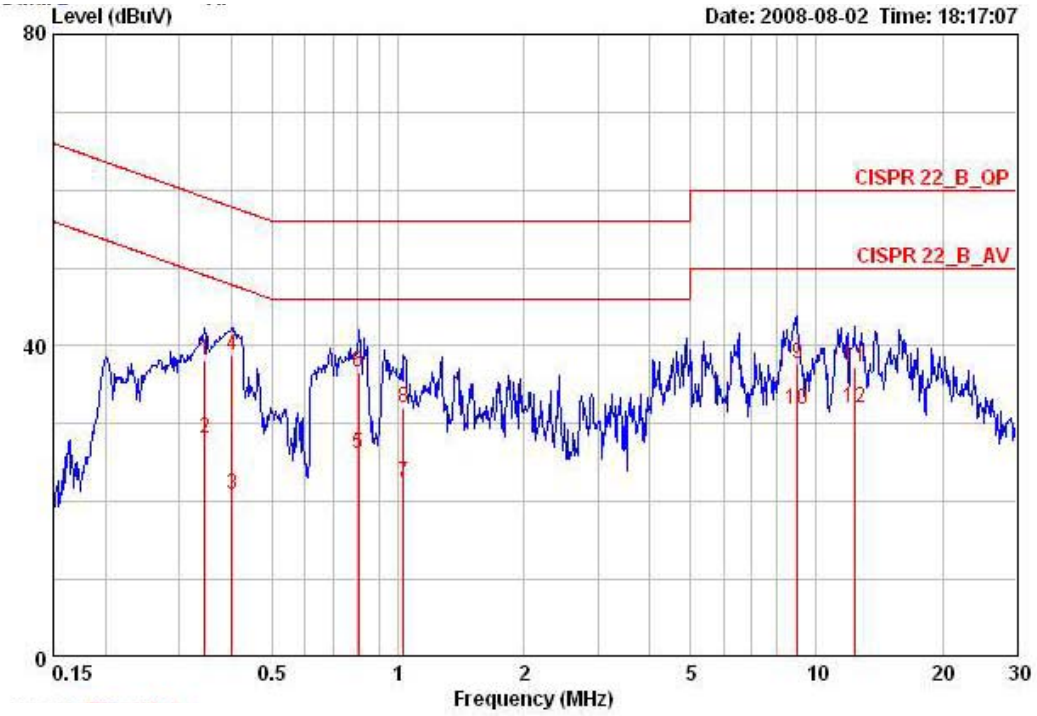
4.1.6. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	54%
Test Engineer	Aric Li	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.34463	37.39	-21.70	59.09	37.16	0.03	0.20	QP
2	0.34463	26.96	-22.13	49.09	26.73	0.03	0.20	AVERAGE
3	0.40187	38.40	-19.41	57.81	38.17	0.03	0.20	QP
4	0.40187	20.62	-27.19	47.81	20.39	0.03	0.20	AVERAGE
5	0.68263	30.76	-25.24	56.00	30.53	0.03	0.20	QP
6	0.68263	16.96	-29.04	46.00	16.73	0.03	0.20	AVERAGE
7	4.696	23.39	-22.61	46.00	22.95	0.14	0.30	AVERAGE
8	4.696	33.32	-22.68	56.00	32.88	0.14	0.30	QP
9	8.964	38.20	-21.80	60.00	37.58	0.32	0.30	QP
10 @	8.964	32.46	-17.54	50.00	31.84	0.32	0.30	AVERAGE
11	16.312	36.68	-23.32	60.00	35.65	0.63	0.40	QP
12	16.312	31.40	-18.60	50.00	30.37	0.63	0.40	AVERAGE

Temperature	25°C	Humidity	54%
Test Engineer	Aric Li	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.34463	38.06	-21.03	59.09	37.79	0.07	0.20	QP
2	0.34463	28.19	-20.90	49.09	27.92	0.07	0.20	AVERAGE
3	0.40187	20.82	-26.99	47.81	20.55	0.07	0.20	AVERAGE
4	0.40187	38.72	-19.09	57.81	38.45	0.07	0.20	QP
5	0.80449	26.24	-19.76	46.00	25.97	0.07	0.20	AVERAGE
6	0.80449	36.55	-19.45	56.00	36.28	0.07	0.20	QP
7	1.032	22.50	-23.50	46.00	22.24	0.07	0.19	AVERAGE
8	1.032	31.99	-24.01	56.00	31.73	0.07	0.19	QP
9	9.011	37.74	-22.26	60.00	37.08	0.36	0.30	QP
10	9.011	31.74	-18.26	50.00	31.08	0.36	0.30	AVERAGE
11	12.318	37.25	-22.75	60.00	36.37	0.48	0.40	QP
12	12.318	31.99	-18.01	50.00	31.11	0.48	0.40	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Radiated Emissions Measurement

4.2.1. Limit

Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz.The quasi-peak measuring receiver shall be in accordance with clause 2 of CISPR 16-1. Receivers with peak detectors shall be in accordance with clause 3 of CISPR 16-1, and shall have a 6 dB bandwidth in accordance with clause 2 of CISPR 16-1.

Frequency of Emission (MHz)	Field Strength QP Limit (dBuV/m) at 10m
30~230	30
230~1000	37

4.2.2. Measuring Instruments and Setting

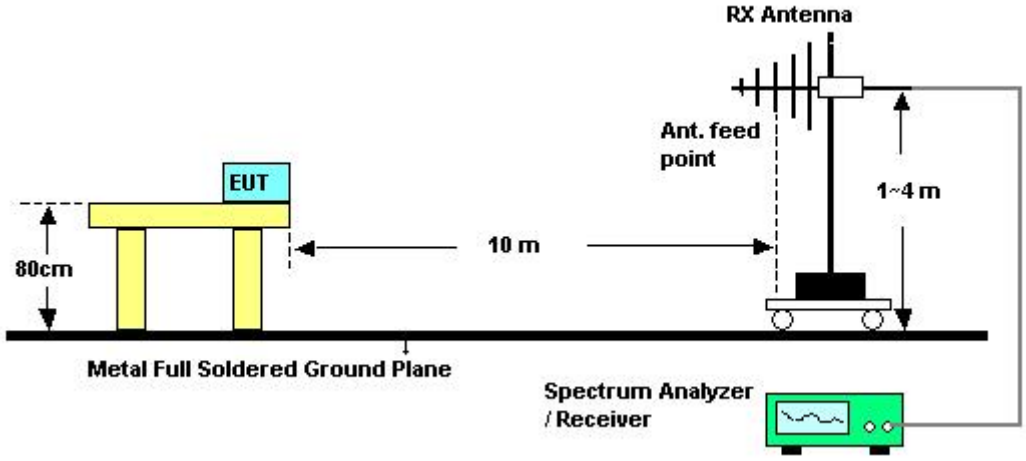
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.3. Test Procedures

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 10 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

4.2.4. Test Setup Layout



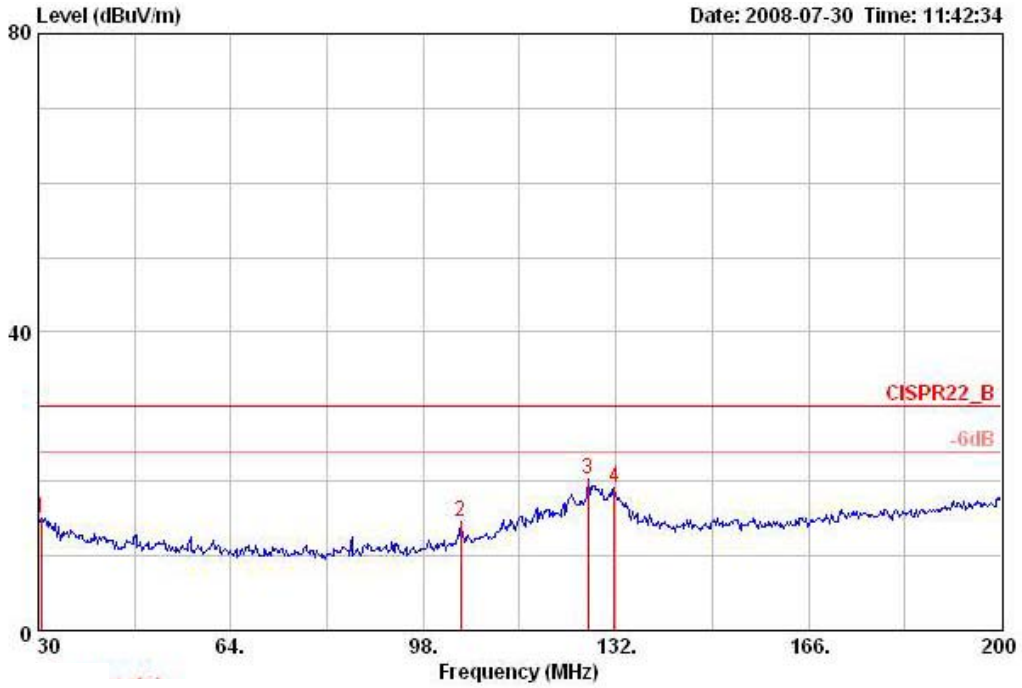
4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. Results for Radiated Emissions (30MHz~1GHz)

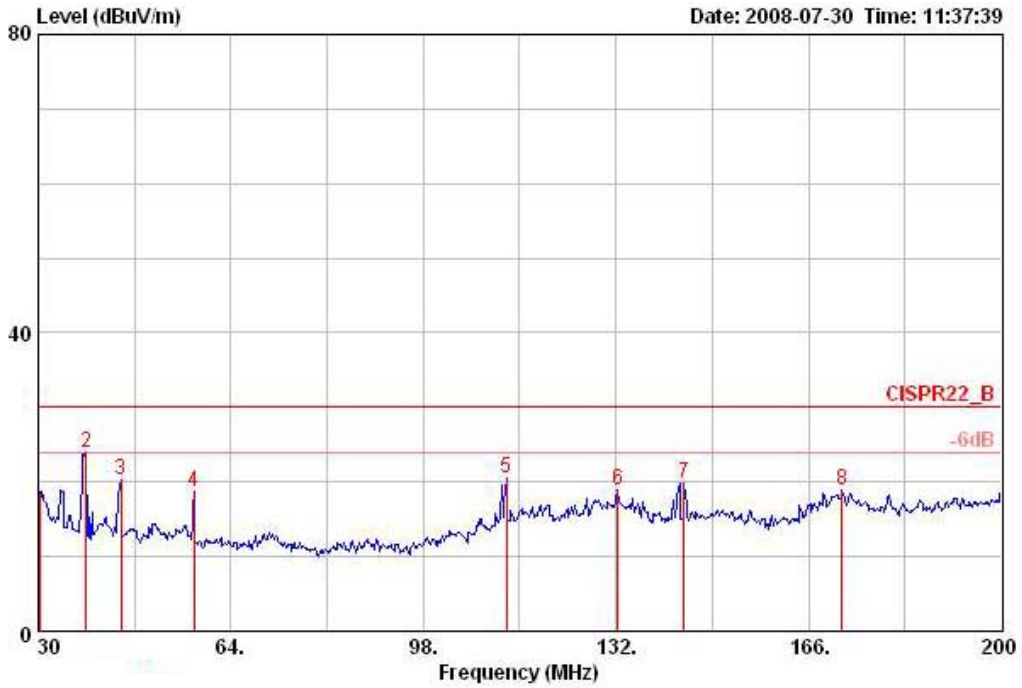
Temperature	23℃	Humidity	54%
Test Engineer	Cloud Peng	Configurations	Normal Link

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg	
1	30.510	15.14	-14.86	30.00	28.43	28.47	1.71	13.46	Peak	---	---	HORIZONTAL
2	104.630	14.59	-15.41	30.00	30.51	28.25	2.34	9.98	Peak	---	---	HORIZONTAL
3	127.070	20.19	-9.81	30.00	34.70	28.11	2.53	11.06	Peak	---	---	HORIZONTAL
4	131.660	19.08	-10.92	30.00	33.42	28.09	2.57	11.17	Peak	---	---	HORIZONTAL

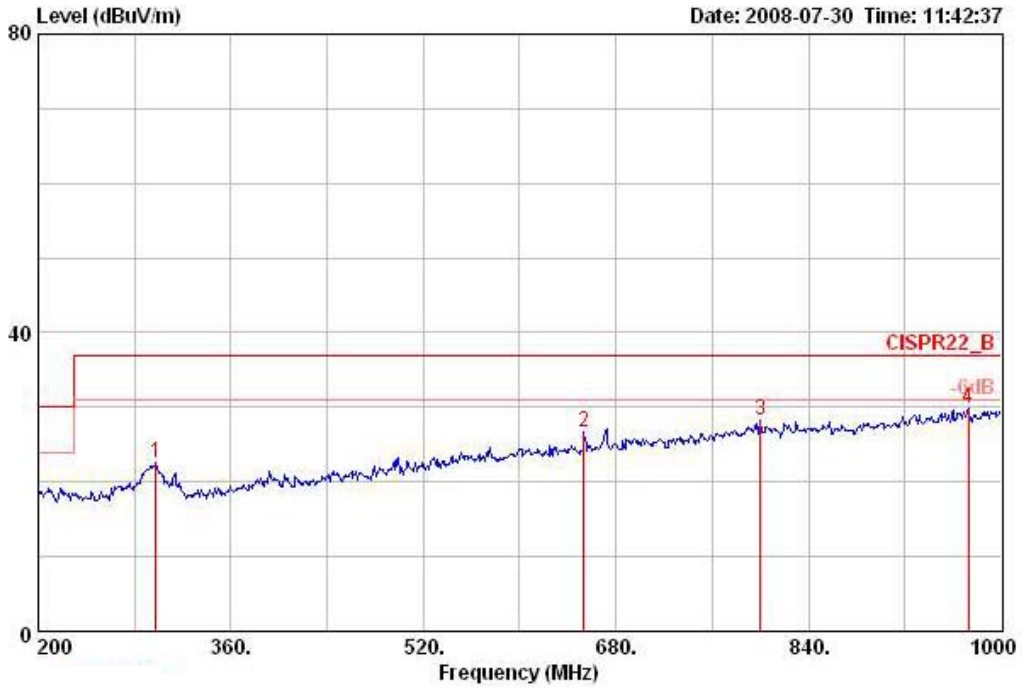
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg	
1	30.170	18.76	-11.24	30.00	31.94	28.48	1.71	13.59	Peak	---	---	VERTICAL
2 @	38.500	23.83	-6.17	30.00	39.14	28.47	1.78	11.37	Peak	100	160	VERTICAL
3	44.620	20.21	-9.79	30.00	36.19	28.43	1.83	10.62	Peak	---	---	VERTICAL
4	57.540	18.65	-11.35	30.00	35.59	28.42	1.94	9.53	Peak	---	---	VERTICAL
5	112.620	20.63	-9.37	30.00	36.11	28.19	2.41	10.30	Peak	---	---	VERTICAL
6	132.340	18.96	-11.04	30.00	33.28	28.08	2.58	11.18	Peak	---	---	VERTICAL
7	144.070	19.90	-10.10	30.00	33.52	28.02	2.68	11.73	Peak	---	---	VERTICAL
8	171.950	18.95	-11.05	30.00	30.89	27.85	2.91	13.00	Peak	---	---	VERTICAL

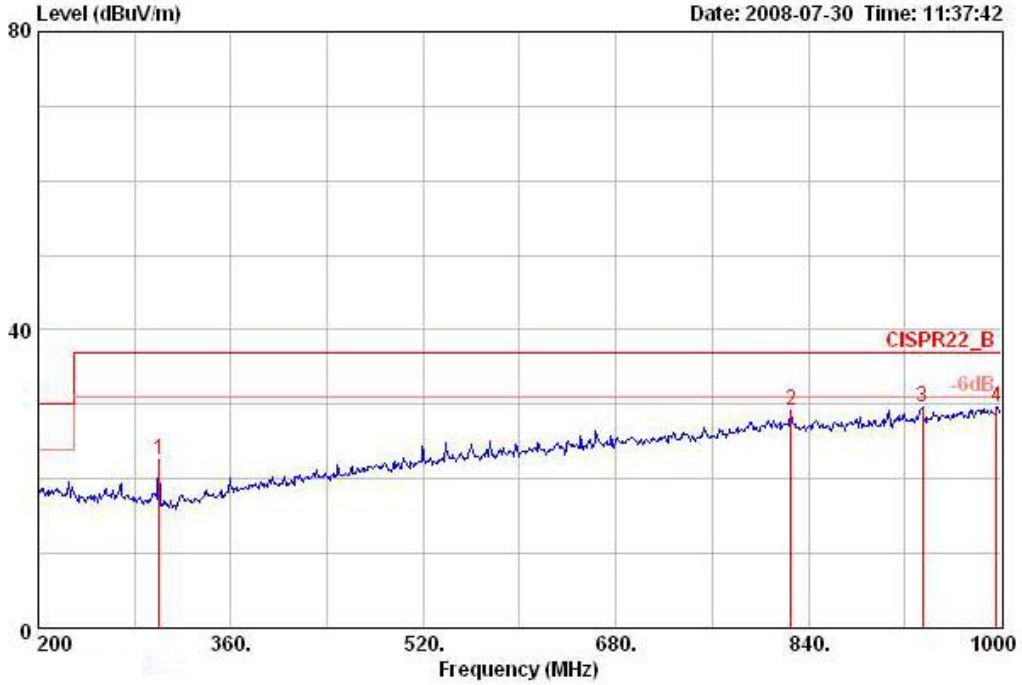
Temperature	23℃	Humidity	54%
Test Engineer	Cloud Peng	Configurations	Normal Link

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg	
1	297.600	22.50	-14.50	37.00	33.54	27.24	3.20	13.00	Peak	---	---	HORIZONTAL
2	653.600	26.58	-10.42	37.00	29.57	27.81	5.00	19.81	Peak	---	---	HORIZONTAL
3	800.000	28.15	-8.85	37.00	28.34	26.67	5.61	20.87	Peak	---	---	HORIZONTAL
4	972.800	29.77	-7.23	37.00	27.81	26.63	6.14	22.45	Peak	400	120	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg	
1	300.800	22.67	-14.33	37.00	33.66	27.25	3.22	13.04	Peak	---	---	VERTICAL
2	825.600	29.09	-7.91	37.00	29.14	26.82	5.69	21.08	Peak	---	---	VERTICAL
3	934.400	29.60	-7.40	37.00	28.17	26.70	6.10	22.02	Peak	---	---	VERTICAL
4	996.000	29.68	-7.32	37.00	27.46	26.59	6.10	22.71	Peak	---	---	VERTICAL

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

V: Vertical Polarization ; H: Horizontal Polarization.

5. IMMUNITY TESTS RESULT

5.1. Electrostatic Discharge Immunity Measurement (ESD)

5.1.1. Limit

Air discharges and contact charges are estimated to enclosure of EUT on all connectors and conducting surfaces.

Contact Discharges to the conductive surfaces and to coupling planes:

The EUT shall be exposed to at least 20 discharges 10 each at negative and positive polarity.One of the test points shall be subjected to at least 50 indirect discharges (contact) to the center of the front edge of the horizontal coupling plane(HCP). The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode [see IEC 61000-4-2 for use of the Vertical Conducting Plane (VCP)]. Tests shall be performed at a maximum repetition rate of one discharge per second.

Air Discharge at seam between apertures and insulation surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges of each polarity and test level shall be applied to the selected test point for each area.

The preferential range of test levels for the ESD test is given in following levels:

Contact discharge Test voltage ±4 kV ; Air discharge Test voltage ±8 kV

Performance criteria is the criteria B (Transient Phenomena for Transmitter / Receiver).

5.1.2. Measuring Instruments and Setting

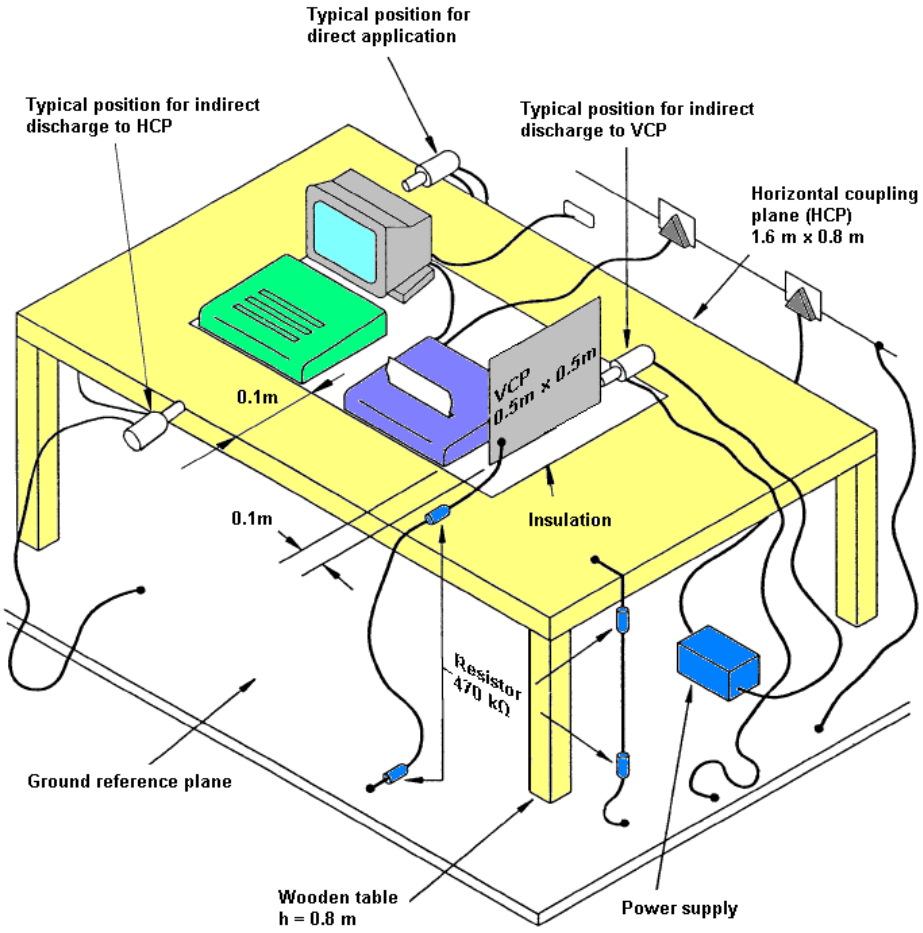
Please refer to section 6 of equipments list in this report. The following table is the setting of the electrostatic discharge simulator.

Electrostatic Discharge Simulator	Discharge Setting
Contact Charge Voltage	±4 kV
Air Charge Voltage	±8 kV
Rise Time	5nS + 30%
Half-Value width	30nS + 30%
Polarity	Positive/Negative
Single Discharge Mode	1 discharge per 1s

5.1.3. Test Procedures

1. 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).
2. 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.
3. 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.
4. The test shall be performed with both air discharge and contact discharge. On pre-selected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On pre-selected points at least 10 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
5. 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.
6. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
7. 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.
8. 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 re-triggered 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.

5.1.4. Test Setup Layout



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 resister 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.

5.1.5. Test Deviation

There is no deviation with the original standard.

5.1.6. Test Result of Electrostatic Discharge Immunity

Temperature	25°C	**Humidity**	41%
Pressure	98.6 kPa	**Test Engineer**	Cloud Peng
Discharge Mode	Contact Discharge	**Test Voltage**	±4 kV
Tested No.	10 single	**Configurations**	Normal Link
Performance	Required Criteria B	**Test Date**	Aug. 08, 2008

Test Point	Observation	Criteria
HCP (At Front)	No performance degradation was observed.	A
HCP (At Left)	No performance degradation was observed.	A
HCP (At Right)	No performance degradation was observed.	A
HCP (At Rear)	No performance degradation was observed.	A
VCP (At Front)	No performance degradation was observed.	A
VCP (At Left)	No performance degradation was observed.	A
VCP (At Right)	No performance degradation was observed.	A
VCP (At Rear)	No performance degradation was observed.	A
USB PORT	No performance degradation was observed.	A

Temperature	25°C	**Humidity**	41%
Pressure	98.6 kPa	**Test Engineer**	Cloud Peng
Discharge Mode	Air Discharge	**Test Voltage**	±8 kV
Tested No.	10 single	**Configurations**	Normal Link
Performance	Required Criteria B	**Test Date**	Aug. 08, 2008

Test Point	Observation	Criteria
CASE	No performance degradation was observed.	A

5.2. Radio Frequency Electromagnetic Field Immunity Measurement (RS)

5.2.1. Limit

Most electronic equipment is in some manner affected by electromagnetic radiation. RF immunity test entails subjecting the equipment under test to a uniform field of radiated electromagnetic energy of a specified electromagnetic field strength and frequency and monitoring the functionality of the device as the frequency is swept over a specified frequency range.

The preferential range of test field strength levels for the RS test is given in following levels:

80～1GHz 3V/m; 1.4～2GHz: 3V/m

Performance criteria is the criteria A (Continuous Phenomena for Transmitter/ Receiver).

5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the RS Immunity Test System.

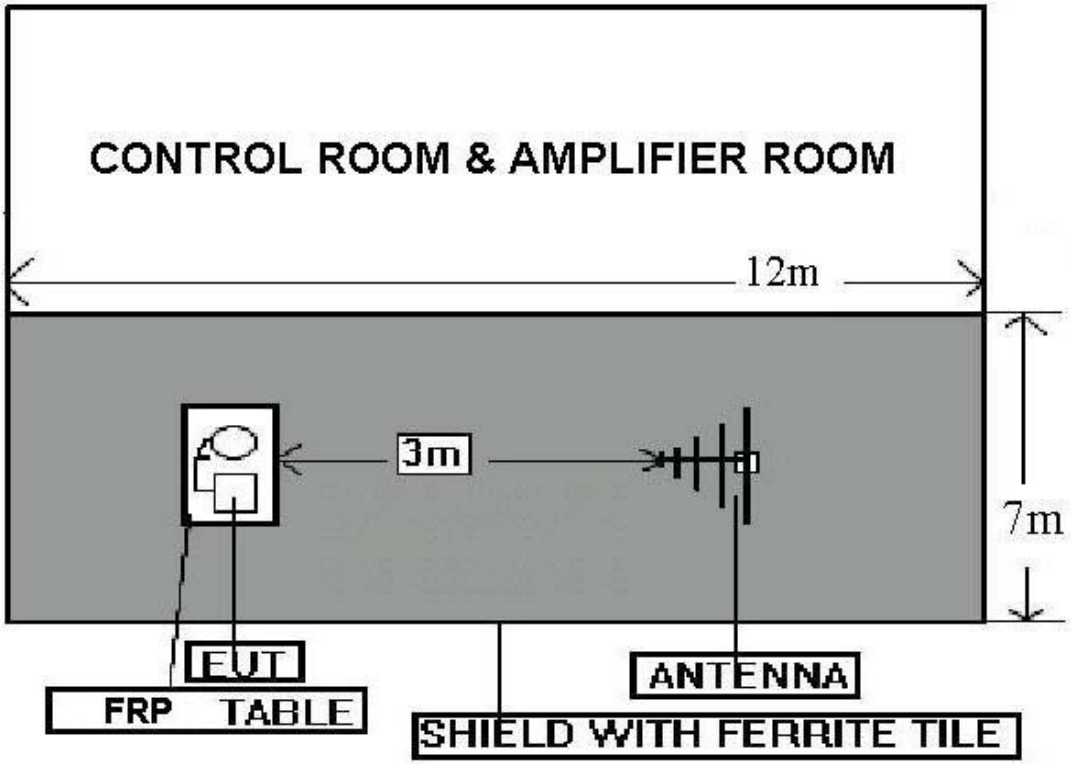
RS Immunity Test System	Setting
Method Used	Bilog / Horn antenna and Fully-anechoic chamber
Field Strength Exposure	3 V/m (measured un-modulated carrier)
Frequency Range/Modulation	80-1000MHz and 1400-2000 MHz, 80% AM modulation
Antenna Polarization	Vertical & Horizontal
Test Distance	3m
Frequency Steps	1% step
Dwell Time	2.9 sec
Exposures	Front, Back, Left and Right of the EUT

5.2.3. Test Procedures

1. The equipment to be tested is placed in the center of the enclosure on a FRP table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
2. The bilog / horn antenna which is enabling the complete frequency range of 80-1000MHz and 1400-2000 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.
3. 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 bilog / horn antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. The circular polarization of the field from the log-spiral antenna makes a change of position of the antenna unnecessary.
4. At each of the above conditions, the frequency range is swept 80-1000MHz and 1400-2000 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*10-3 decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

5.2.4. Test Setup Layout



Note: The SPORTON 12m × 7m × 7m Fully Anechoic 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.

5.2.5. Test Deviation

There is no deviation with the original standard.

5.2.6. Test Result of Radio Frequency Electromagnetic Field Immunity

Temperature	25°C	Humidity	55%
Pressure	98.6 kPa	Test Engineer	Cloud Peng
Performance	Required Criteria A	Configurations	Normal Link
Test Date	Aug. 08, 2008		

EUT Face Exposed	Observation	Performance
Front	No performance degradation was observed.	A
Back	No performance degradation was observed.	A
Left	No performance degradation was observed.	A
Right	No performance degradation was observed.	A

6. LIST OF MEASURING EQUIPMENTS

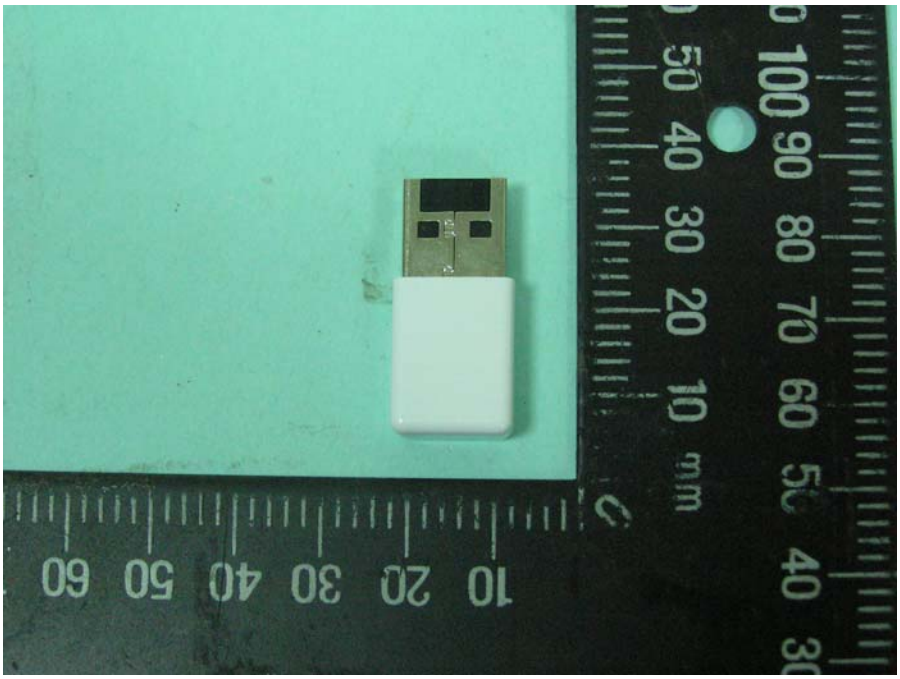
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Mar. 03, 2008	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 31, 2008	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2008	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2008	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz –30MHz	Mar. 27, 2008	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
10m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-10M	10CH01-HY	30MHz~1GHz 10m, 3m	Apr. 14, 2008	Radiation (10CH01-HY)
Spectrum Analyzer	R&S	FSP7	838858/013	9kHz – 7GHz	Feb. 13, 2008	Radiation (10CH01- HY)
Receiver	R&S	ESI7	838496/009	9kHz-7GHz	Jan. 29, 2008	Radiation (10CH01-HY)
Amplifier	Aglient	8447D	2944A10825	100kHz – 1.3GHz	May. 24, 2008	Radiation (10CH01-HY)
Amplifier	Aglient	8447D	2944A10826	100kHz – 1.3GHz	May. 29, 2008	Radiation (10CH01-HY)
Biconical Antenna	Schwarzbeck	VHBB 9124	286	30MHz –200MHz	Aug. 07, 2008	Radiation (10CH01-HY)
Log Antenna	Schwarzbeck	VUSLP 9111	206	200MHz -1GHz	Aug. 07, 2008	Radiation (10CH01-HY)
Turn Table	HD	DT 60 RPS	1513/004/00	0 ~ 360 degree	N/A	Radiation (10CH01-HY)
Antenna Mast	HD	MA240	240/556/00	1 m - 4 m	N/A	Radiation (10CH01-HY)
Antenna Mast	HD	MA240	240/559/00	1 m - 4 m	N/A	Radiation (10CH01-HY)
RF Cable-R10m	BELDEN	RG8/U	CB023-INSIDE	30MHz~1GHz	Nov. 30, 2007	Radiation (10CH01-HY)
RF Cable-R10m	Suhner Switzerland + Rosenberger	RG223/U + UAA220A-0	CB022-DOOR	30MHz~1GHz	Nov. 30, 2007	Radiation (10CH01-HY)
ESD Simulator	KEYTEK	MZ-15/EC	9503213	Air: 0 kV - 15 kV Contact: 0 kV - 8 kV	Jun. 28, 2008	ESD
RS immunity Test system	HP	EMS test System	2062	80 MHz - 1 GHz 3V/m 10v/m	Nov. 21, 2007	RS
Amplifier	AR	250W 1000AM1	320482	80 MHz - 1 GHz	Nov. 21, 2007	RS
Power Meter	EMC Automation	438A	3513U04050	100 kHz - 4.2 GHz	Nov. 22, 2007	RS
Signal Generator	HP	8648A	3426A00771	100 kHz - 1 GHz	Nov. 23, 2007	RS
Power Sensor	HP	8481D	3318A13140	100 kHz - 1 GHz	Nov. 23, 2007	RS
Power Sensor	HP	8482A	3318A26464	100 kHz - 1 GHz	Nov. 23, 2007	RS
Attenuator	HP	8491A	53603	100 kHz - 1 GHz	Nov. 22, 2007	RS
Field Strength Monitoring Antennas (Probe)	AR	FP3000A	16077	0.1 MHz - 1 GHz	Oct. 26, 2007	RS

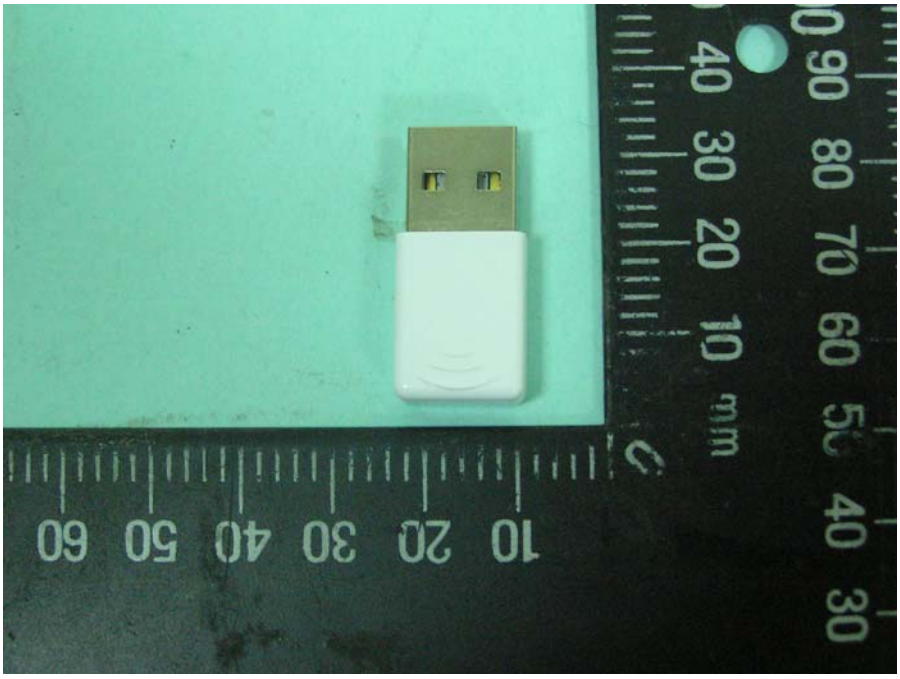
Note: Calibration Interval of instruments listed above is one year.

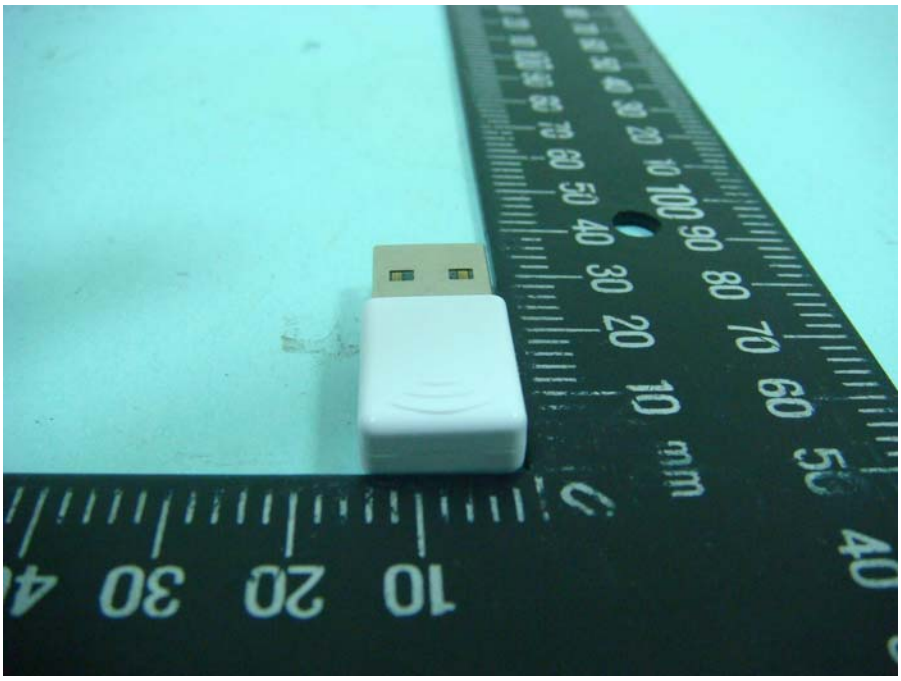
7. TEST LOCATION

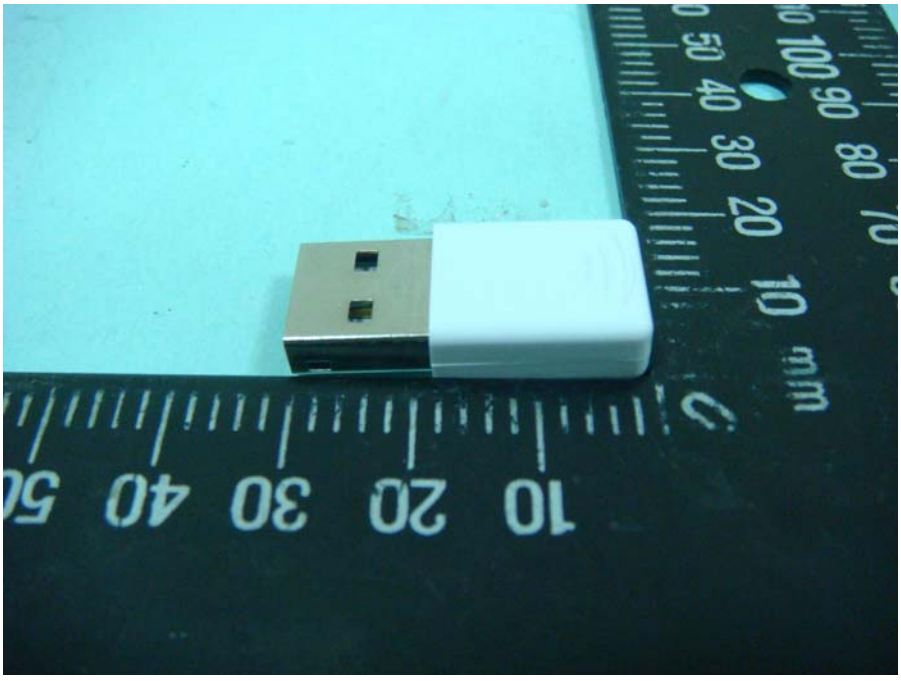
SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

APPENDIX A. Photographs of EUT









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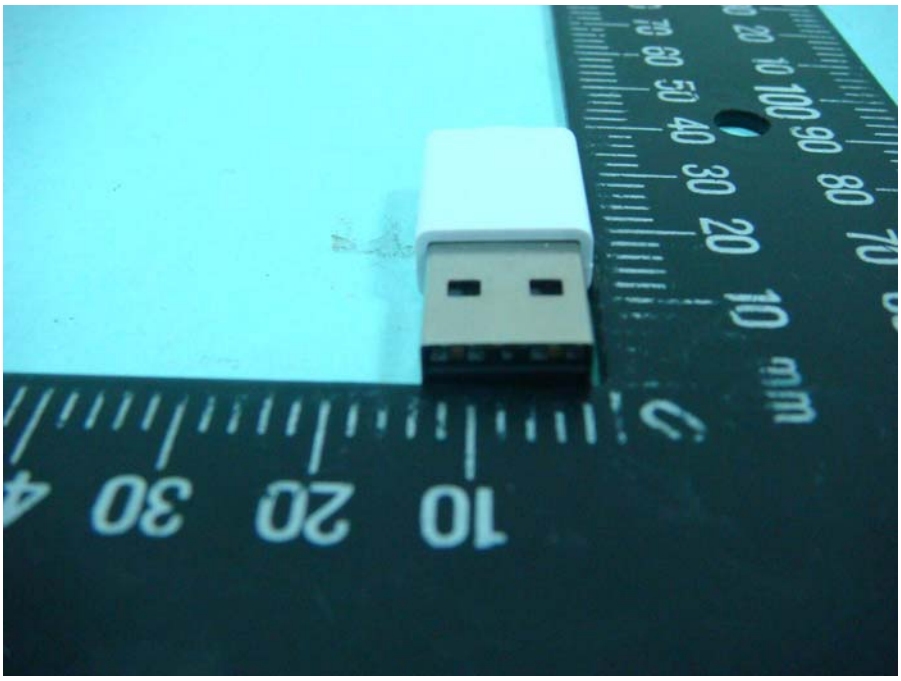
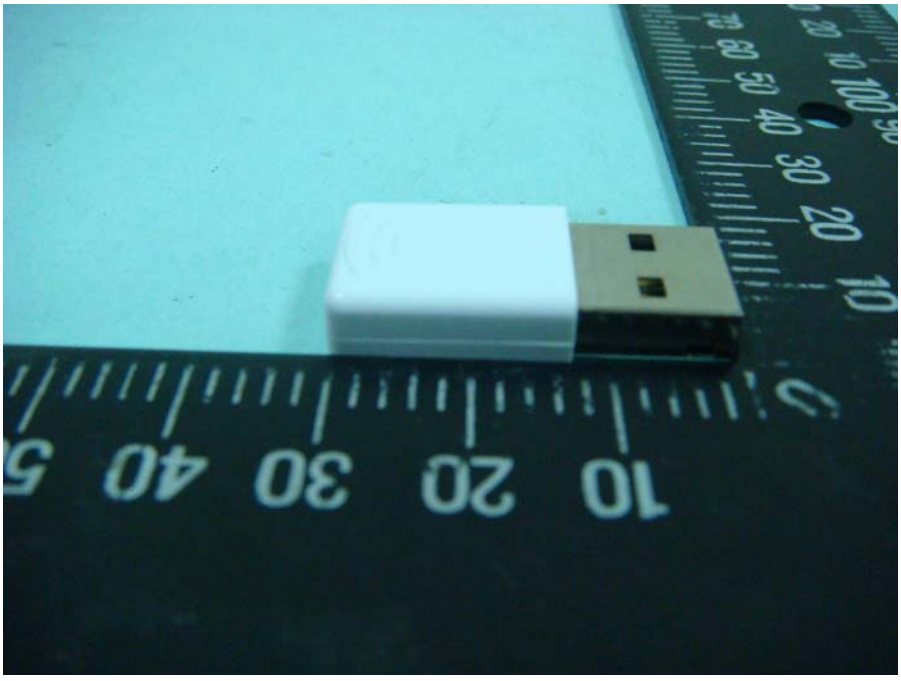
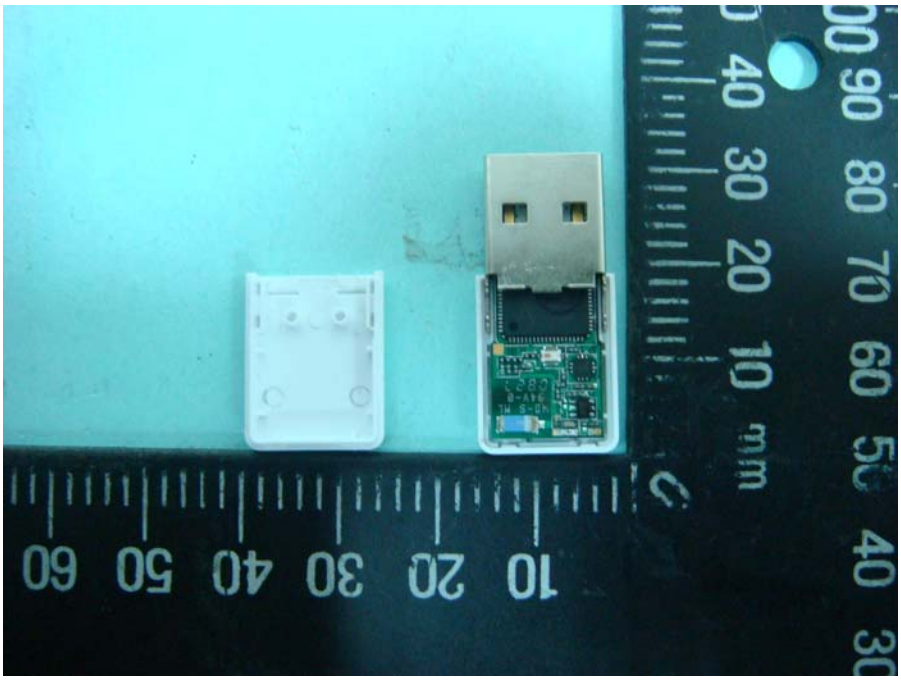
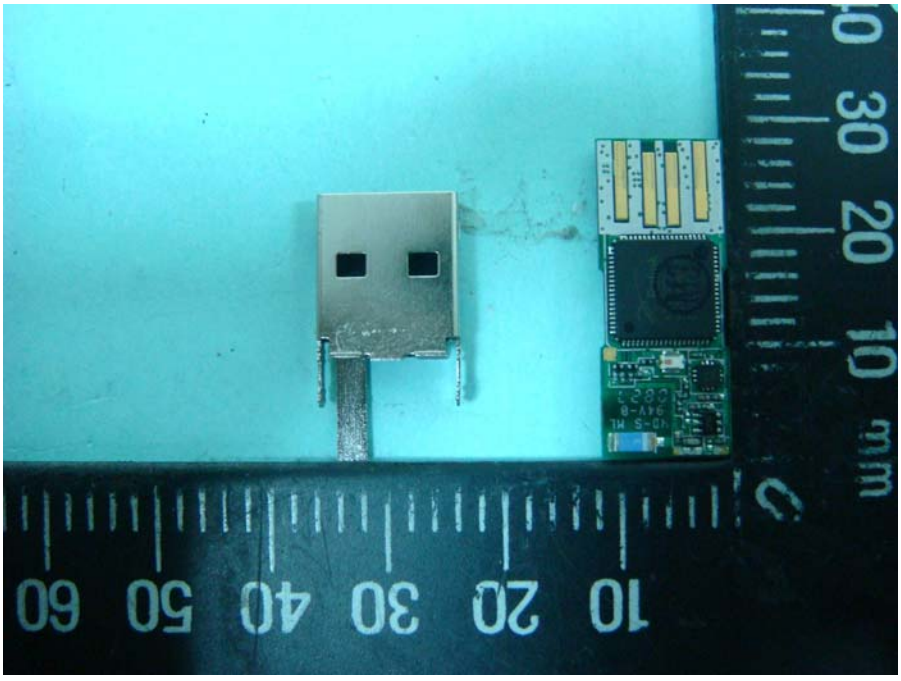
FAX : 886-2-2696-2255









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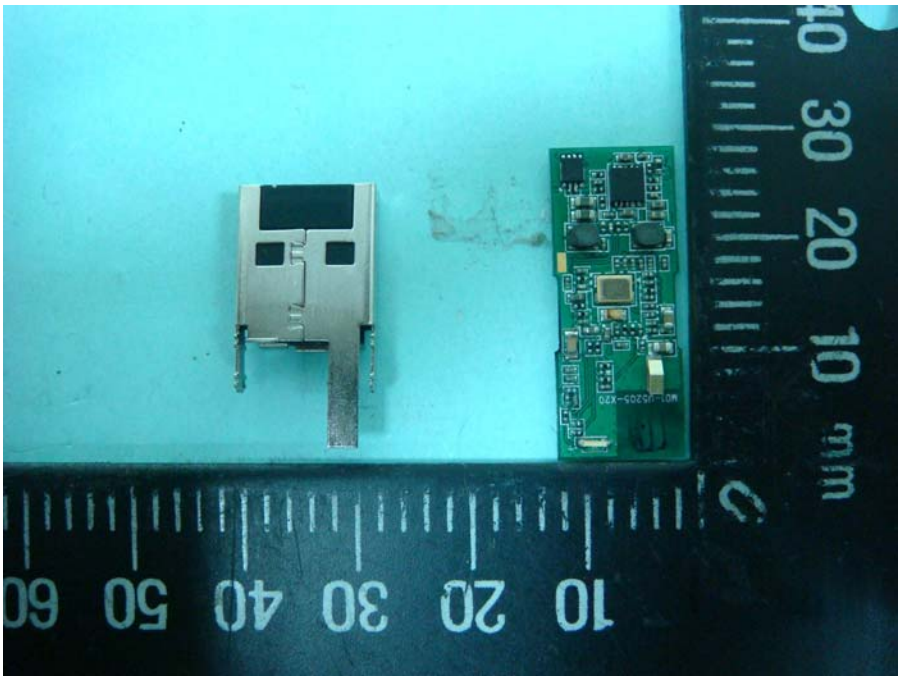
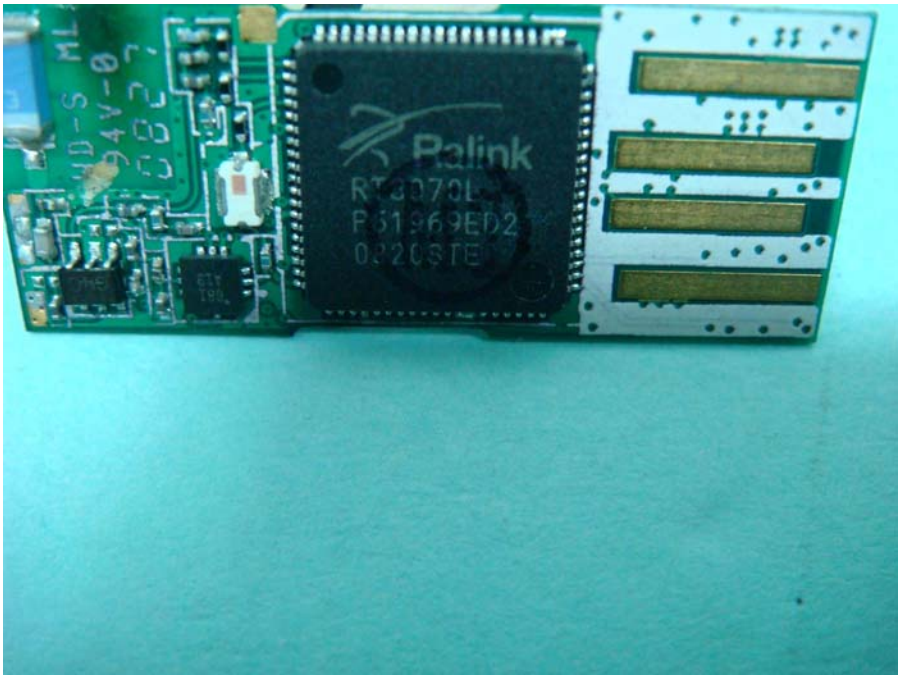
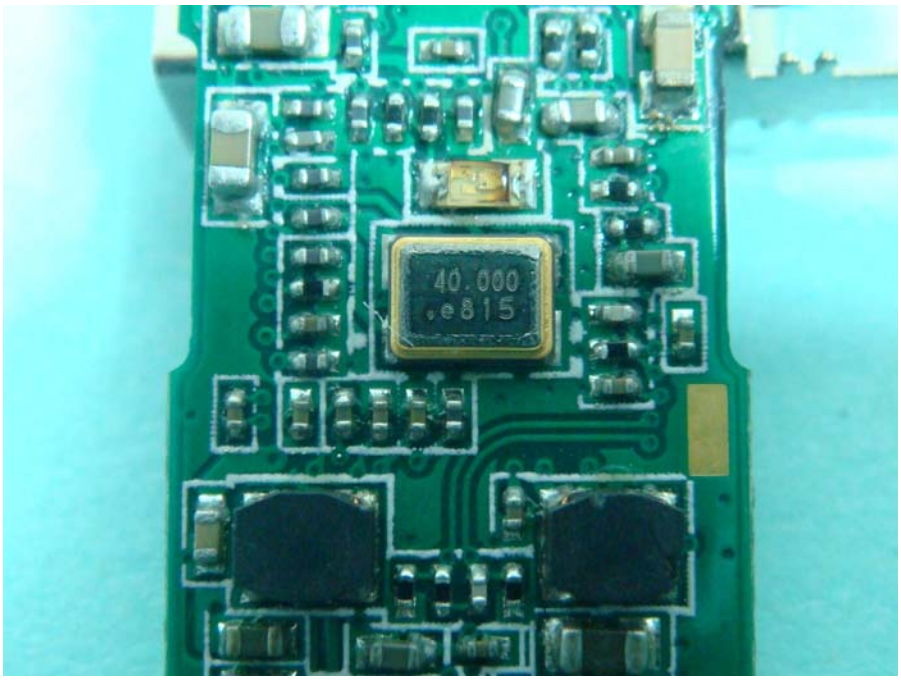

10 20 30 40 50 60
40 30 20 10 mm


Ralink

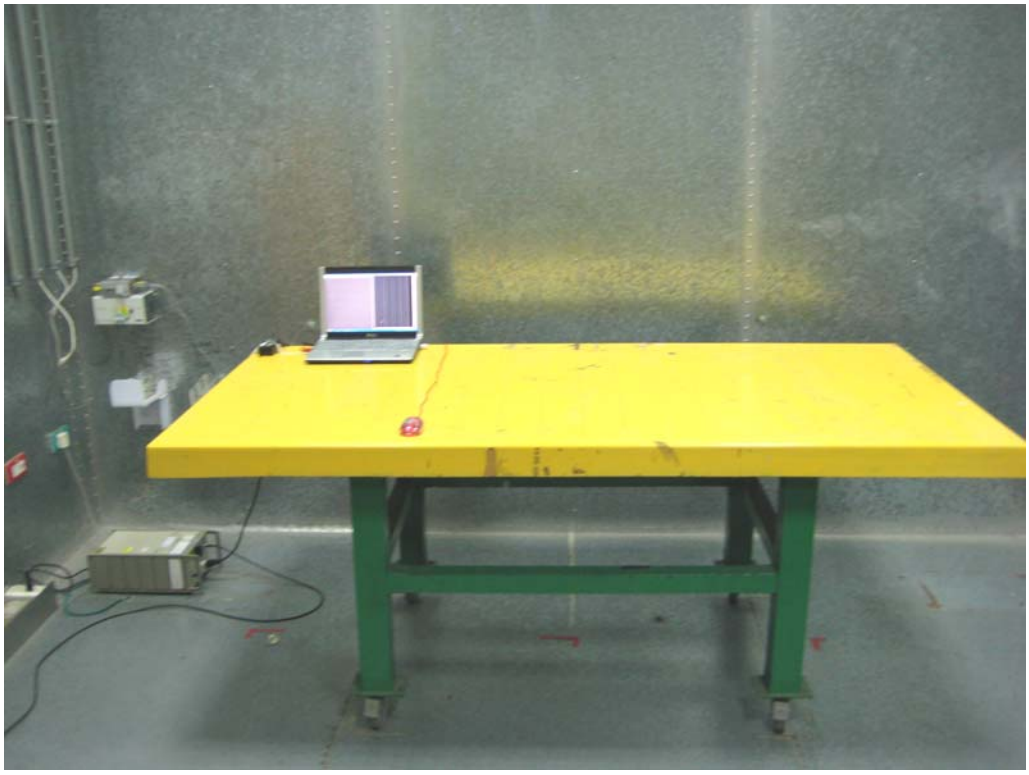


SPORTON International Inc.
TEL : 886-2-2696-2468
FAX : 886-2-2696-2255

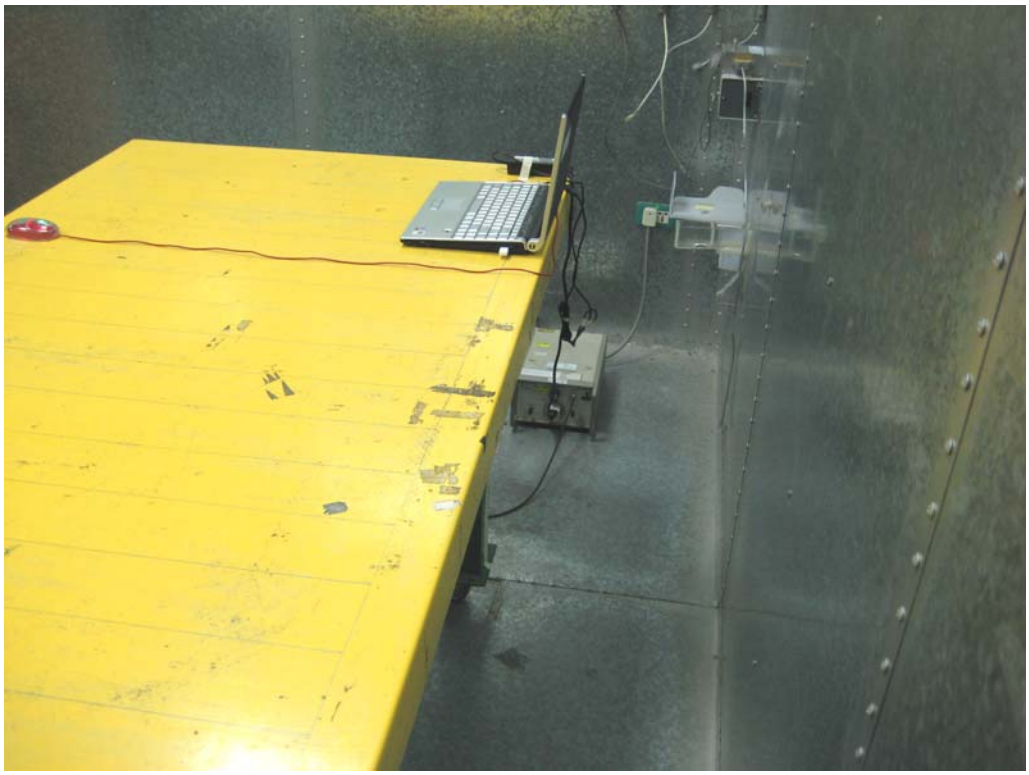
Appendix B. Test Photos

1. Photographs of Conducted Emissions Test Configuration

FRONT VIEW

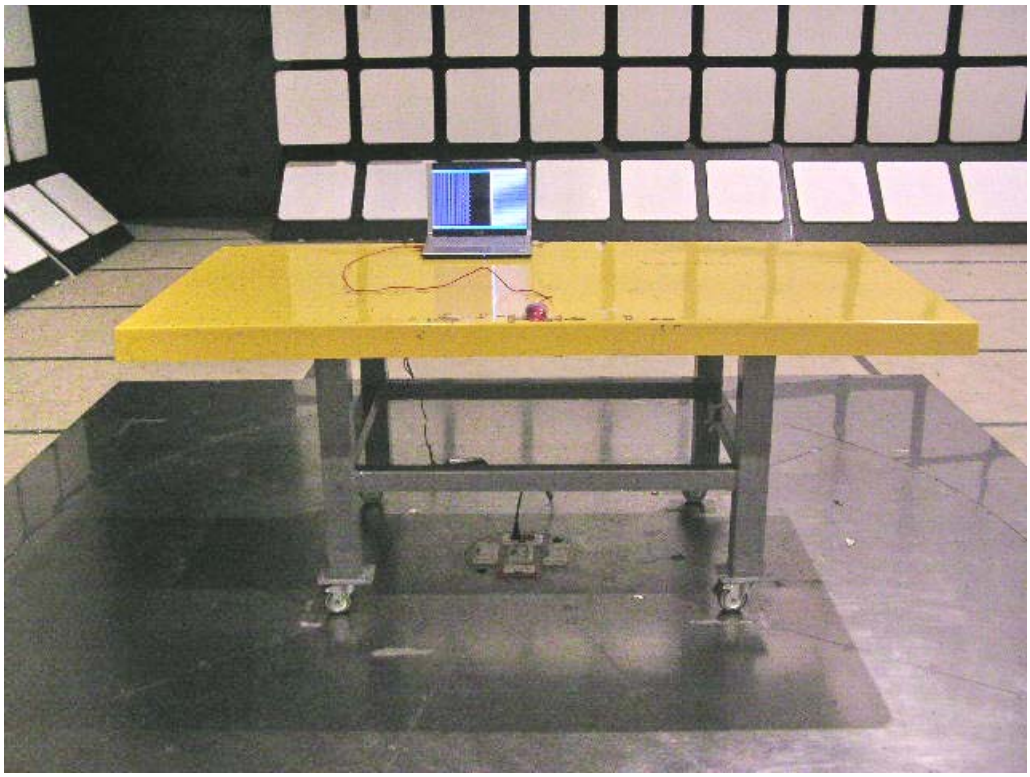


REAR VIEW



2. Photographs of Radiated Emissions Test Configuration

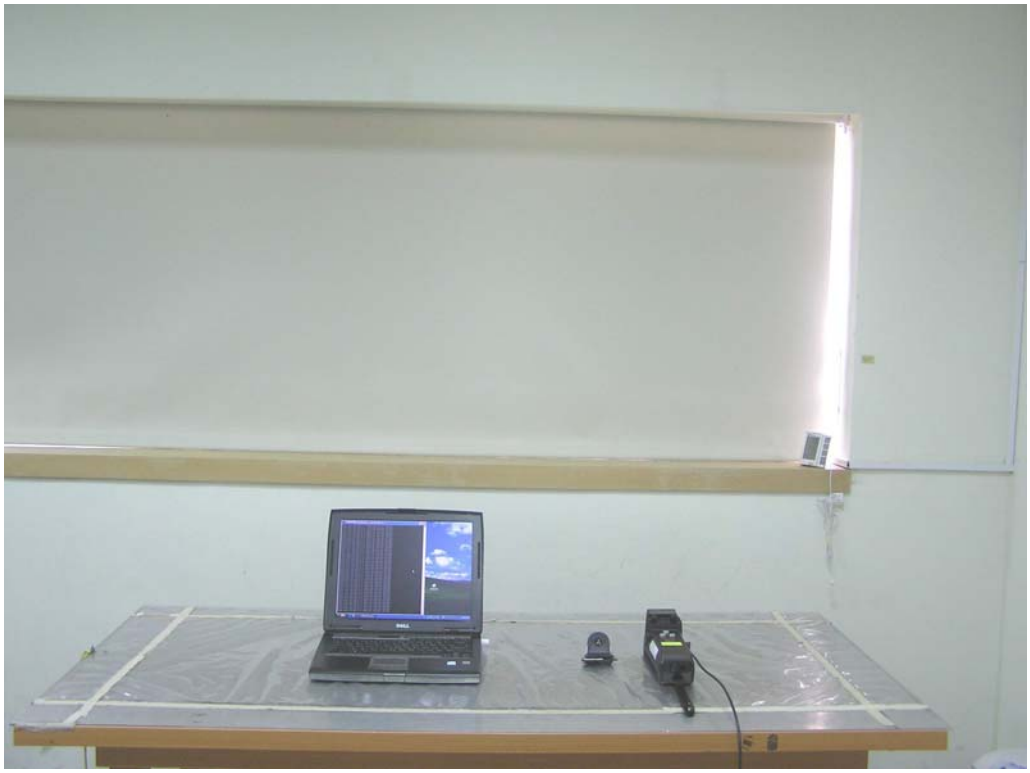
FRONT VIEW



REAR VIEW

3. Photographs of ESD Immunity Test Configuration

FRONT VIEW



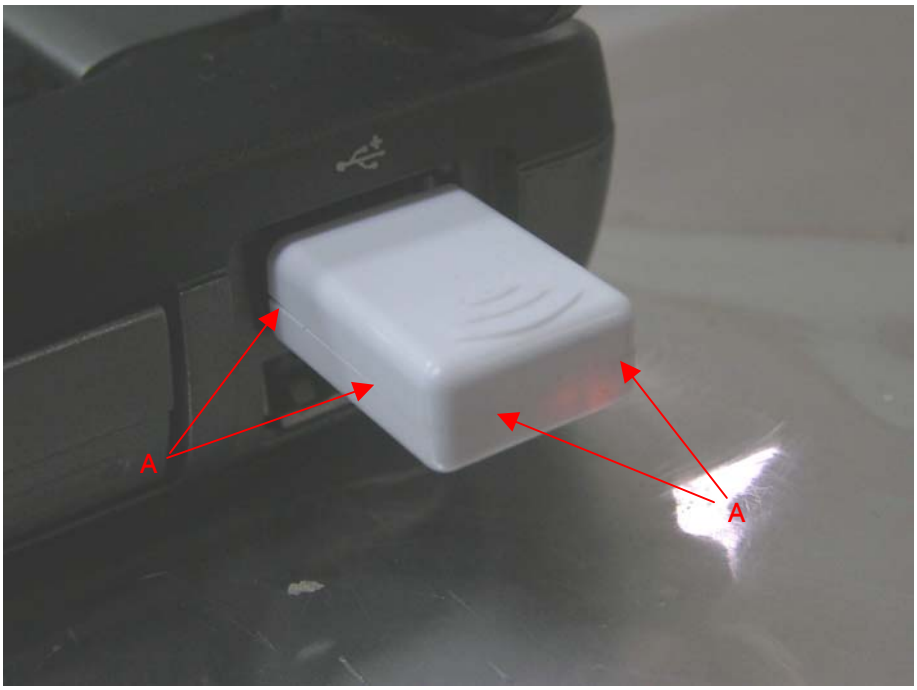
REAR VIEW

Photographs of Electrostatic Discharge Immunity Test

Description : Electronics Discharge (ESD) of Test Point

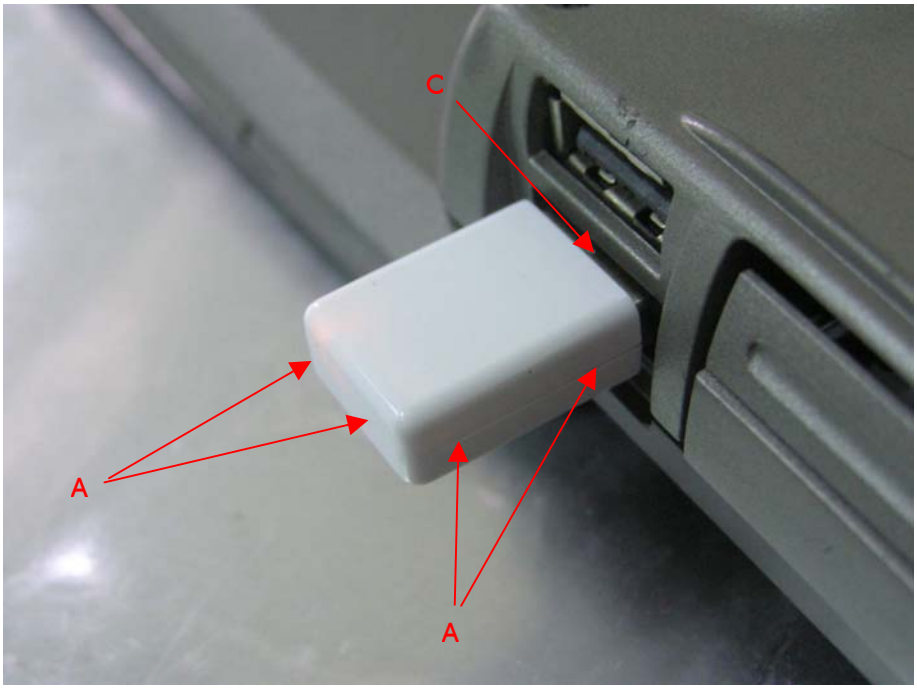
Description:
"A" means
Air Discharge

"



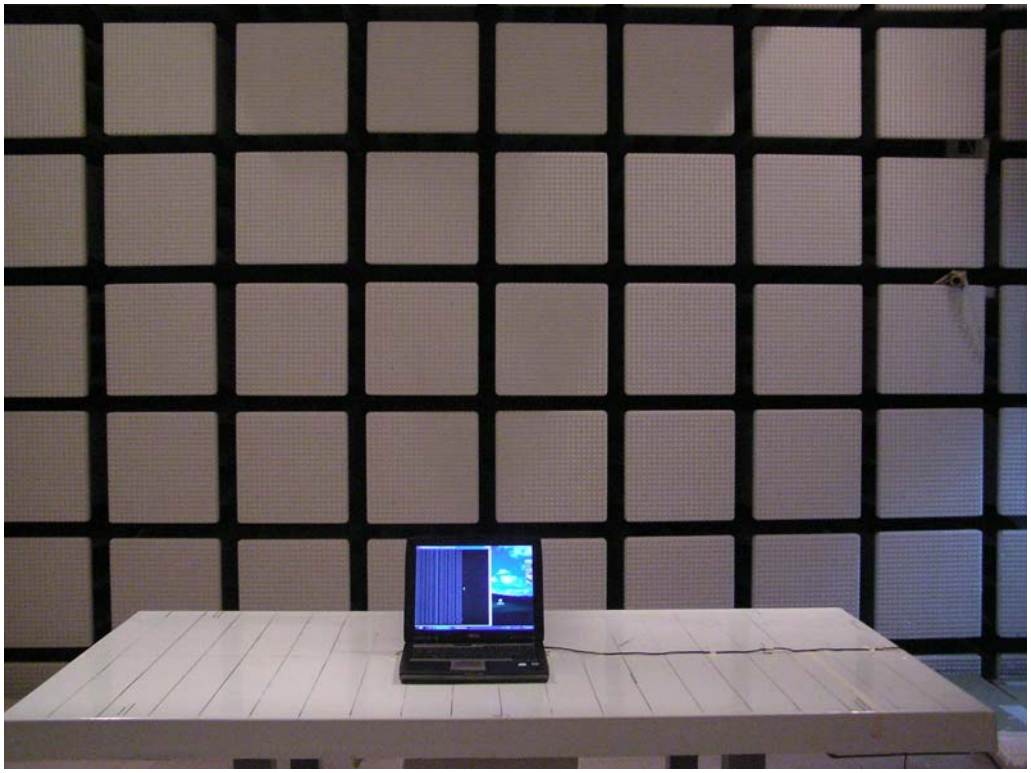
Description:
"A" means
Air Discharge

"C" means
Contact Discharge



4. Photographs of RS Immunity Test Configuration

FRONT VIEW



REAR VIEW