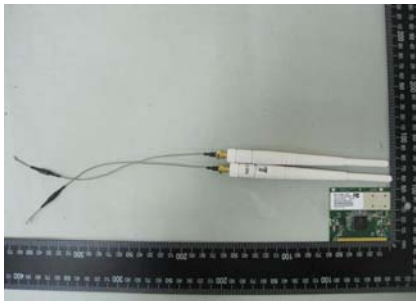
SPORTON International Inc.
No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	**Z-Com, Inc.**
Applicant Address	5F, No.8 HSIN-ANN RD.HSINCHU SCIENCE PARK, HSINCHU, TAIWAN
FCC ID	**M4Y-AN622V01**
Manufacturer's company	**Z-Com, Inc.**
Manufacturer Address	5F, No.8 HSIN-ANN RD.HSINCHU SCIENCE PARK, HSINCHU, TAIWAN

Product Name	IEEE 802.11 a/b/g/n Wireless mini-pci card
Brand Name	Z-COM
Model Name	AN-622
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Jun. 24, 2010
Final Test Date	Feb. 10, 2011
Submission Type	Class II Change
Class II Change	Please refer to section 3.7



Statement

Test result included is only for the 802.11n, 802.11b/g part and 802.11a (5725 ~ 5850MHz) of the product.
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 measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.
The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

Table of Contents

History of This Test Report

Original Issue Date: Fed. 14, 2011

Report No.: FR062421-01AB

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No.: CB10002026

1. CERTIFICATE OF COMPLIANCE

Product Name	:	IEEE 802.11 a/b/g/n Wireless mini-pci card
Brand Name	:	Z-COM
Model Name	:	AN-622
Applicant	:	Z-Com, Inc.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jun. 24, 2010 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.

Jordan Hsiao 2011.2.16

Jordan Hsiao
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	14.38 dB
-	15.247(b)(3)	Maximum Conducted Output Power	NA	-
-	15.247(e)	Power Spectral Density	NA	-
-	15.247(a)(2)	6dB Spectrum Bandwidth	NA	-
4.2	15.247(d)	Radiated Emissions	Complies	3.41 dB
-	15.247(d)	Band Edge Emissions	NA	-
-	15.203	Antenna Requirements	NA	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	<For 2.4GHz Band>: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth <For 5GHz Band>: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	<For 2.4GHz Band>: MCS8 (20MHz): 17.68 MHz ; MCS8 (40MHz): 36.32 MHz <For 5GHz Band>: MCS8 (20MHz): 17.80 MHz ; MCS8 (40MHz): 36.40 MHz
Conducted Output Power	<For 2.4GHz Band>: MCS8 (20MHz): 27.22 dBm ; MCS8 (40MHz): 23.40 dBm <For 5GHz Band>: MCS8 (20MHz): 25.43 dBm ; MCS8 (40MHz): 24.26 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a/b/g

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
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 Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 15.64 MHz ; 11g: 16.56 MHz ; 11a: 16.92 MHz
Conducted Output Power	11b: 24.95 dBm ; 11g: 28.34 dBm ; 11a: 24.96 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Two (TX)	
Band width Mode	20 MHz	40 MHz
IEEE 802.11a	V	X
IEEE 802.11b	V	X
IEEE 802.11g	V	X
IEEE 802.11n	V	V

IEEE 802.11n 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
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0	14.444	30
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0	28.889	60
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0	43.333	90
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0	57.778	120
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0	86.667	180
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0	115.556	240
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0	130.000	270
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0	144.444	300

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

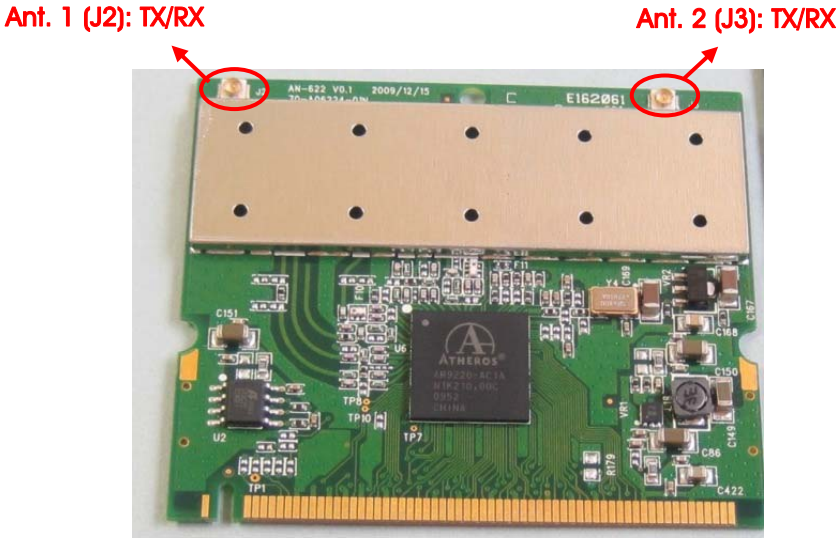
N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Remark
					2.4GHz	5GHz	
1 (J2)	WHA YU	AN-1721	Dipole Antenna	I-PEX	2	3	TX/RX
2 (J3)	WHA YU	AN-1721	Dipole Antenna	I-PEX	2	3	TX/RX

Note: The EUT has two antennas (2TX/2RX).

Ant. 1 & Ant. 2 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

<For 2.4GHz Band>:

Frequency Allocation for 802.11b/g

There are two bandwidth systems for IEEE 802.11n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel 3~Channel 9.

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

<For 5GHz Band>:

Frequency Allocation for 802.11a

There are two bandwidth systems for IEEE 802.11n.

For 20MHz bandwidth systems, use Channel 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 151, 159.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz	149	5745 MHz	159	5795 MHz
	151	5755 MHz	161	5805 MHz
	153	5765 MHz	165	5825 MHz
	157	5785 MHz	-	-

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

<For 2.4GHz Band>:

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	MCS8/20MHz	13Mbps	1/6/11	1+2
	MCS8/40MHz	27Mbps	3/6/9	1+2
	11b/CCK	1 Mbps	1/6/11	1+2
	11g/BPSK	6 Mbps	1/6/11	1+2

<For 5GHz Band>:

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	MCS8/20MHz	13Mbps	149/157/165	1+2
	MCS8/40MHz	27Mbps	151/159	1+2
	11a/BPSK	6 Mbps	149/157/165	1+2

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	879474	IC 4086	-
CO01-CB	Conduction	Hsin Chu	879474	IC 4086	-

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

Please refer section 6 for Test Site Address.

3.7. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR062421AB

Below is the table for the change of the product with respect to the original one.

Modifications	Description	Performance Checking
Add one antenna	Original report has one antenna. And the antenna gain is 2dBi for 2.4GHz Band and 5GHz Band. New antenna: Dipole Antenna: AN-1721. Antenna gain: 2dBi for 2.4GHz Band and 3dBi for 5GHz Band. Due to the additional antenna is the same like original one, and the antenna gain of 2.4GHz Band is identical, the antenna gain of 5GHz Band is higher than original one, after evaluated, Conducted Emissions Test and Radiated Emissions Test were performed and recorded in this report.	AC Power Line Conducted Emissions Radiated Emissions

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D420	E2KWM3945ABG
Notebook	DELL	D400	E2K24GBRL
Mouse	iCooky	AMS0706W	DoC
Modem	ACEEX	DM1414	IFAXDM1414
Wireless AP	Planex	GW-AP54SGX	N/A

3.9. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

<For 2.4GHz Band>:

Power Parameters of IEEE 802.11n MCS8 20MHz Ant. 1, Ant. 2

Test Software Version	ART Build #9		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n 20MHz	12	18	12

Power Parameters of IEEE 802.11n MCS8 40MHz Ant. 1, Ant. 2

Test Software Version	ART Build #9		
Frequency	2422 MHz	2437 MHz	2452 MHz
IEEE 802.11n 40MHz	10	15	10.5

Power Parameters of IEEE 802.11b/g Ant. 1, Ant. 2

Test Software Version	ART Build #9		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	16	18.5	15
IEEE 802.11g	14	20	14.5

<For 5GHz Band>:

Power Parameters of IEEE 802.11n MCS8 20MHz Ant. 1, Ant. 2

Test Software Version	ART Build #9		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n 20MHz	21	21	21

Power Parameters of IEEE 802.11n MCS8 40MHz Ant. 1, Ant. 2

Test Software Version	ART Build #9	
Frequency	5755 MHz	5795 MHz
IEEE 802.11n 40MHz	20	21

Power Parameters of IEEE 802.11a Ant. 1, Ant. 2

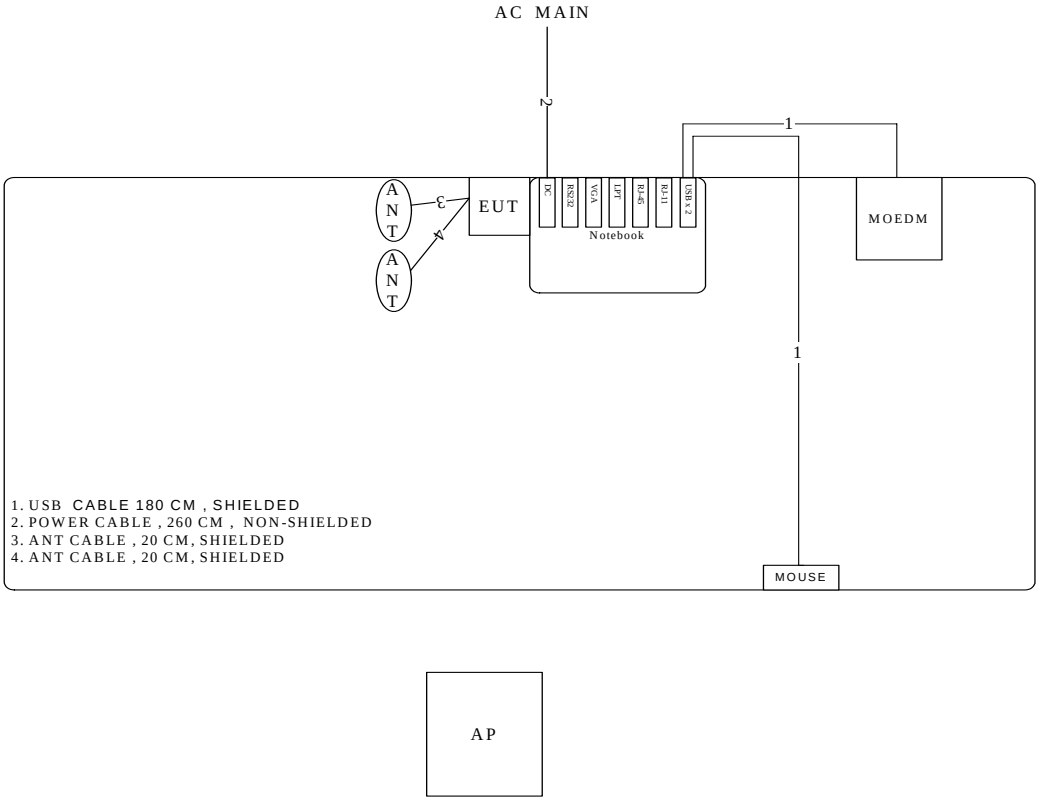
Test Software Version	ART Build #9		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	21	21	21

During the test, "ART Build #9" under WIN XP was executed to control the EUT continuously transmit RF signal.

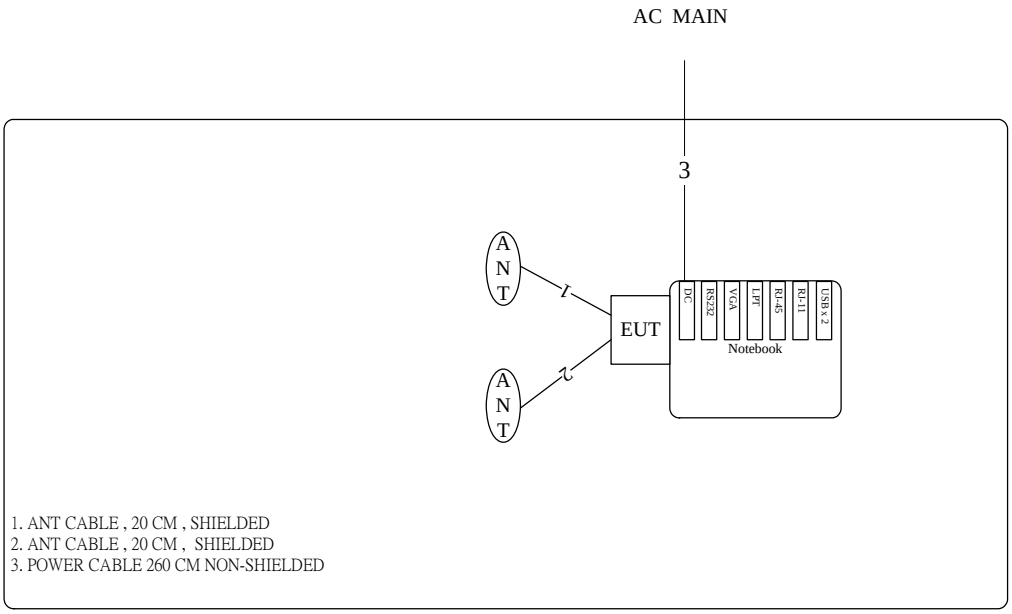
3.10. Test Configurations

3.10.1. Radiation Emissions Test Configuration

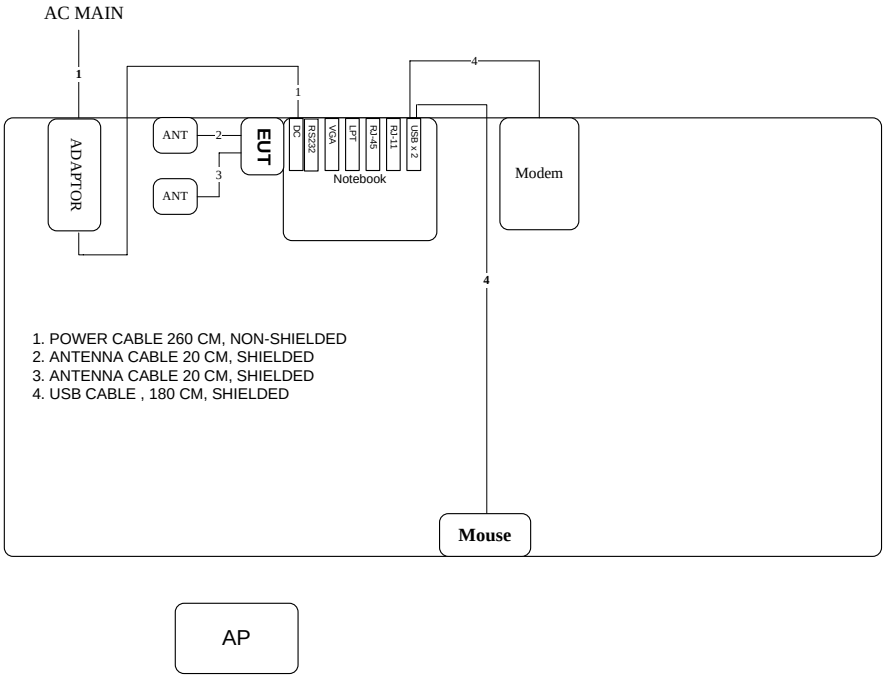
Test Configuration: 9kHz~1GHz



Test Configuration: Above 1GHz



3.10.2. AC Power Line Conduction Emissions Test Configuration



1. POWER CABLE 260 CM, NON-SHIELDED
2. ANTENNA CABLE 20 CM, SHIELDED
3. ANTENNA CABLE 20 CM, SHIELDED
4. USB CABLE , 180 CM, SHIELDED

AP

4. TEST 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

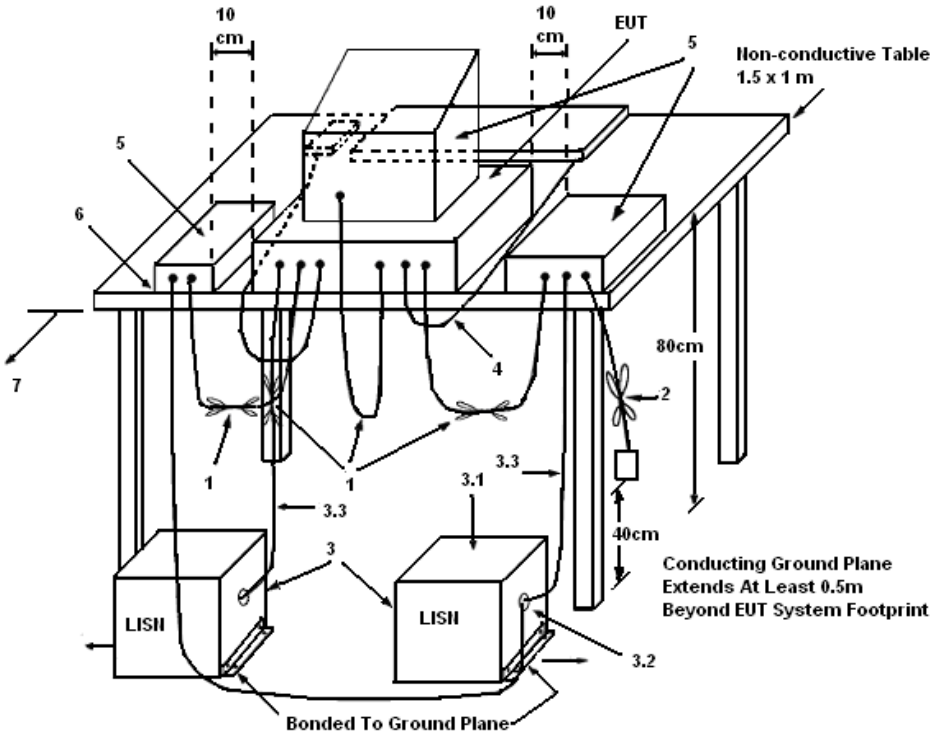
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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. Configure the EUT according to ANSI C63.4. 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



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

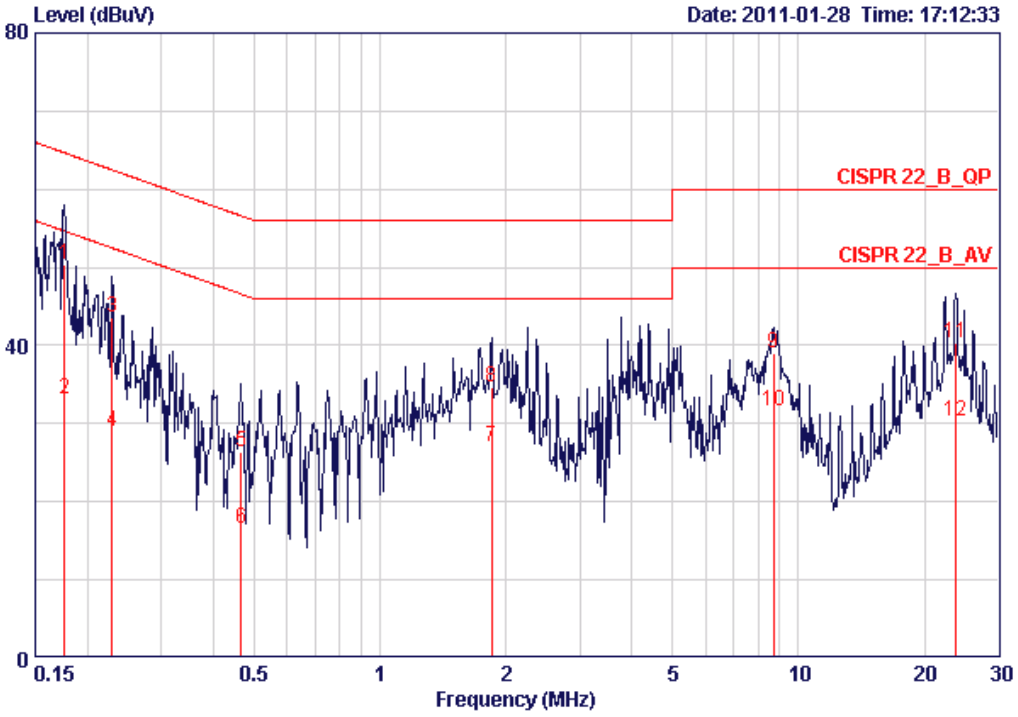
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

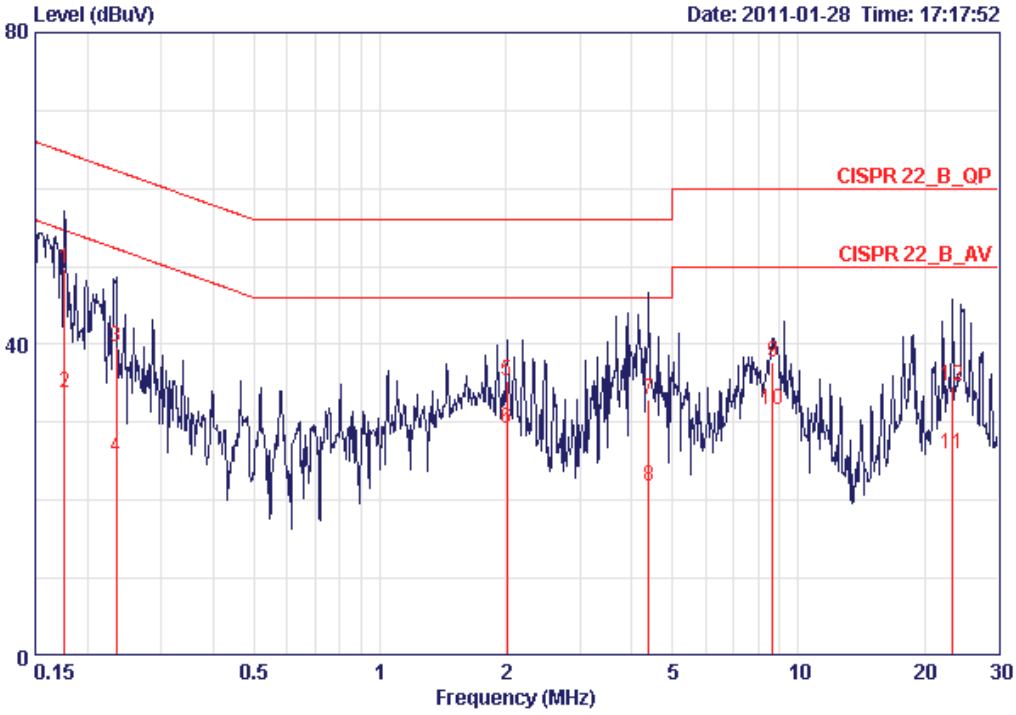
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	22°C	Humidity	51%
Test Engineer	Sin Chang	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	0.17584	50.30	-14.38	64.68	50.04	0.06	0.20	QP
2	0.17584	33.12	-21.56	54.68	32.86	0.06	0.20	AVERAGE
3	0.22918	43.53	-18.95	62.48	43.28	0.05	0.20	QP
4	0.22918	28.96	-23.52	52.48	28.71	0.05	0.20	AVERAGE
5	0.46614	26.35	-30.23	56.58	26.12	0.03	0.20	QP
6	0.46614	16.60	-29.98	46.58	16.37	0.03	0.20	AVERAGE
7	1.848	27.06	-18.94	46.00	26.84	0.05	0.17	AVERAGE
8	1.848	34.64	-21.36	56.00	34.42	0.05	0.17	QP
9	8.729	38.96	-21.04	60.00	38.35	0.31	0.30	QP
10	8.729	31.68	-18.32	50.00	31.07	0.31	0.30	AVERAGE
11	23.762	40.43	-19.57	60.00	38.87	1.06	0.50	QP
12	23.762	30.26	-19.74	50.00	28.70	1.06	0.50	AVERAGE

Temperature	22°C	Humidity	51%
Test Engineer	Sin Chang	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	0.17584	49.70	-14.98	64.68	49.41	0.09	0.20	QP
2	0.17584	33.74	-20.94	54.68	33.45	0.09	0.20	AVERAGE
3	0.23409	39.77	-22.54	62.30	39.49	0.08	0.20	QP
4	0.23409	25.44	-26.87	52.30	25.16	0.08	0.20	AVERAGE
5	2.012	35.40	-20.60	56.00	35.11	0.09	0.20	QP
6	2.012	29.31	-16.69	46.00	29.02	0.09	0.20	AVERAGE
7	4.384	33.01	-22.99	56.00	32.54	0.17	0.30	QP
8	4.384	21.70	-24.30	46.00	21.23	0.17	0.30	AVERAGE
9	8.683	37.65	-22.35	60.00	37.00	0.35	0.30	QP
10	8.683	31.64	-18.36	50.00	30.99	0.35	0.30	AVERAGE
11	23.387	25.84	-24.16	50.00	24.28	1.06	0.50	AVERAGE
12	23.387	34.57	-25.43	60.00	33.01	1.06	0.50	QP

Note: Level = Read Level + LISN Factor + Cable Loss.

4.2. Radiated Emissions Measurement

4.2.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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 spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for peak

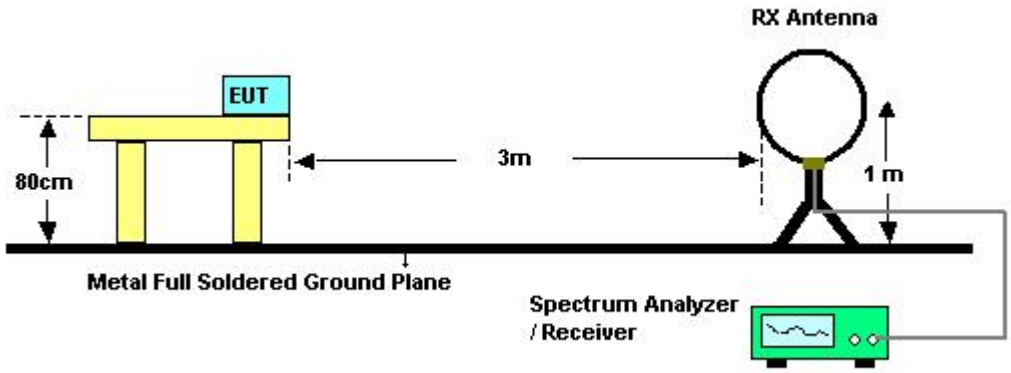
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.3. Test Procedures

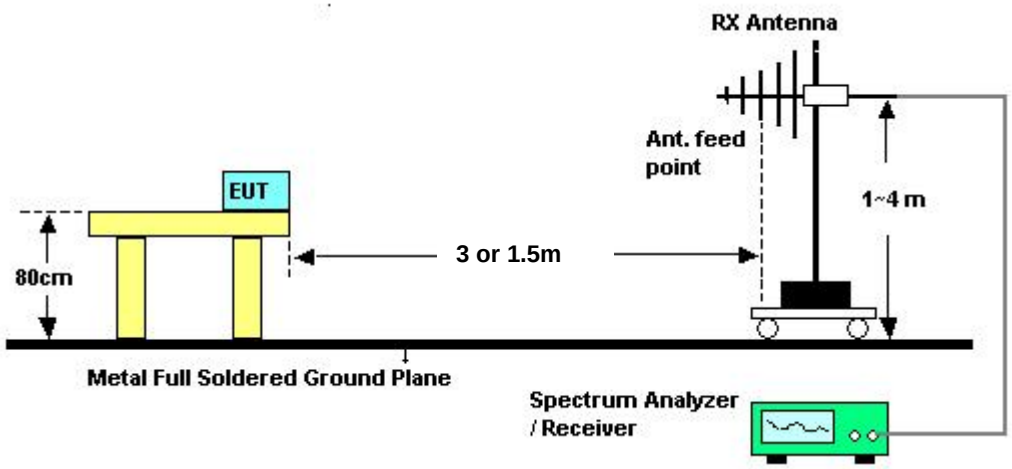
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, 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. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.2.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang		
Evaluating Date	Feb. 10, 2011		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

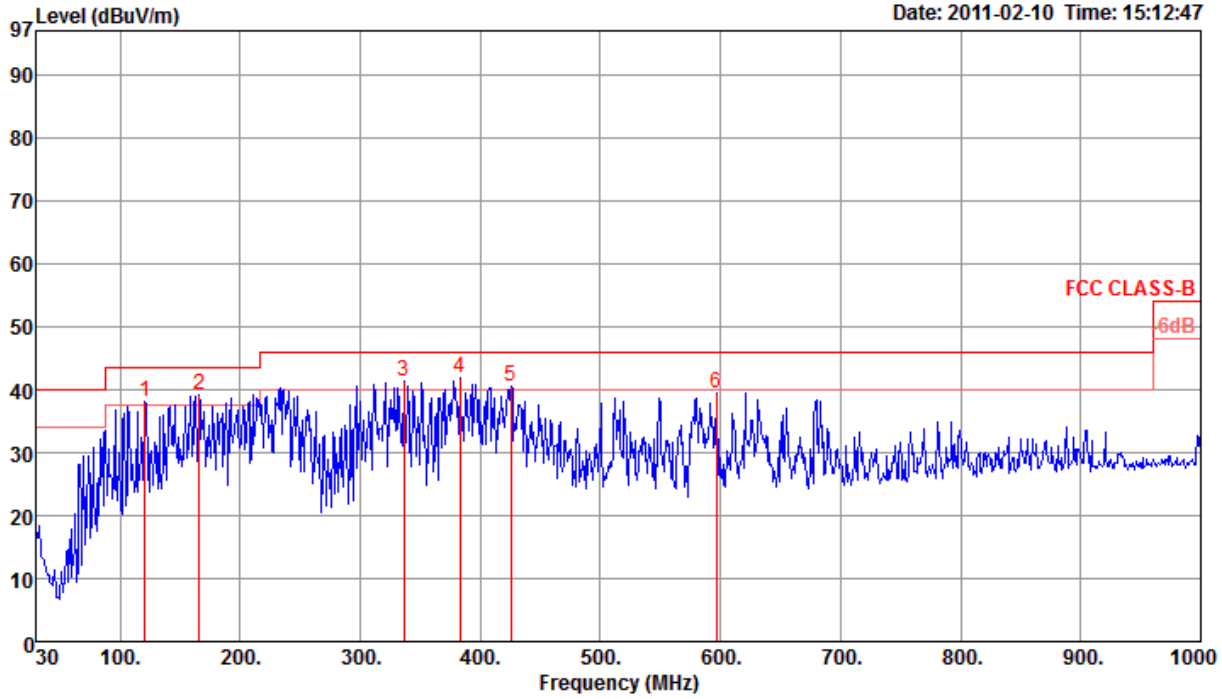
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8. Results of Radiated Emissions (30MHz~1GHz)

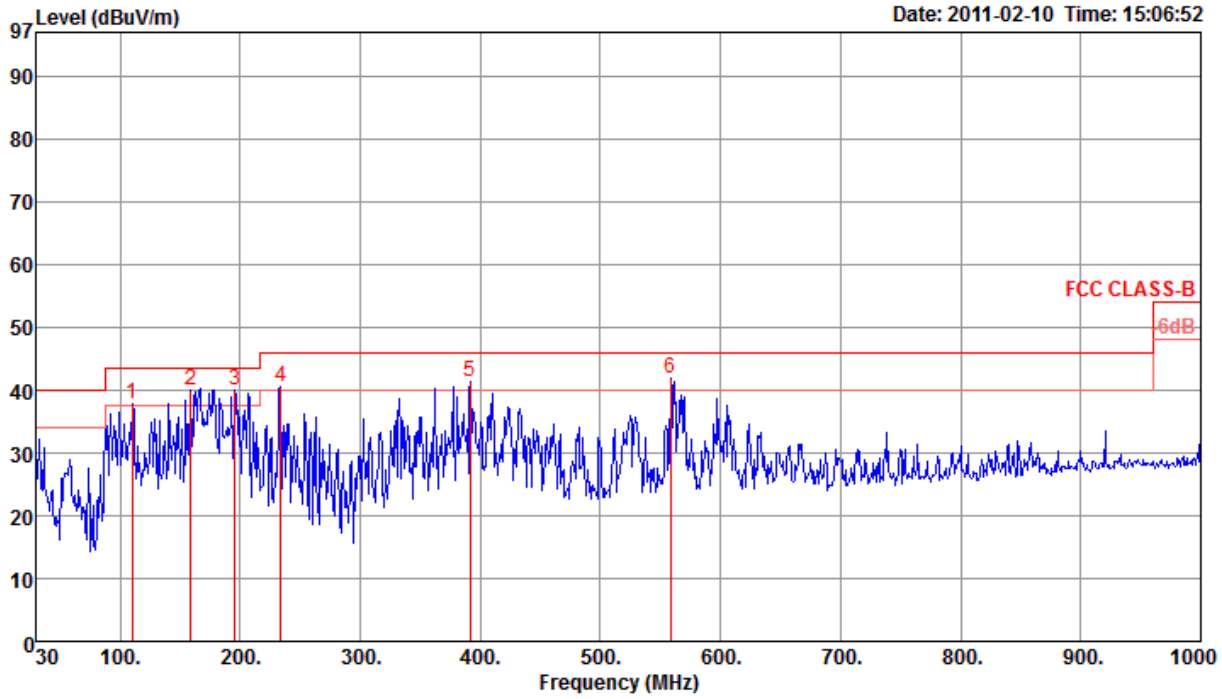
Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	Normal Link

Horizontal



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	121.18	38.03	43.50	-5.47	51.91	1.21	27.50	12.41	0	100	Peak	HORIZONTAL
2	!	165.80	39.21	43.50	-4.29	55.32	1.53	27.27	9.63	0	100	Peak	HORIZONTAL
3	!	336.52	41.35	46.00	-4.65	51.86	2.17	27.15	14.47	0	100	Peak	HORIZONTAL
4	p	383.08	41.96	46.00	-4.04	51.41	2.27	27.48	15.76	287	100	Peak	HORIZONTAL
5	!	425.76	40.51	46.00	-5.49	49.21	2.46	27.73	16.57	0	100	Peak	HORIZONTAL
6		596.48	39.39	46.00	-6.61	45.83	2.89	28.10	18.77	0	100	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 !	110.51	37.70	43.50	-5.80	52.40	1.20	27.55	11.65	0	400	Peak	VERTICAL
2 !	159.01	39.92	43.50	-3.58	55.75	1.50	27.31	9.98	124	100	Peak	VERTICAL
3 p	195.87	40.09	43.50	-3.41	56.16	1.68	27.12	9.37	0	400	Peak	VERTICAL
4 !	233.70	40.66	46.00	-5.34	54.26	1.83	27.03	11.60	0	400	Peak	VERTICAL
5 !	391.81	41.41	46.00	-4.59	50.68	2.28	27.55	16.00	0	400	Peak	VERTICAL
6 !	558.65	42.01	46.00	-3.99	48.99	2.82	28.10	18.30	0	400	Peak	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

4.2.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	11a IEEE 802.11n MCS8 20MHz CH 149 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11489.00	40.21	60.00	-19.79	31.60	5.11	38.78	35.28	245	107	Average	HORIZONTAL
2	11489.70	52.13	80.00	-27.87	43.52	5.11	38.78	35.28	245	107	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11490.74	46.86	60.00	-13.14	38.25	5.11	38.78	35.28	314	100	Average	VERTICAL
2	11490.80	60.22	80.00	-19.78	51.61	5.11	38.78	35.28	314	100	Peak	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	11a IEEE 802.11n MCS8 20MHz CH 157 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11568.83	41.18	60.00	-18.82	32.52	5.13	38.83	35.30	43	114	Average	HORIZONTAL
2	11569.02	54.24	80.00	-25.76	45.58	5.13	38.83	35.30	43	114	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11569.34	45.07	60.00	-14.93	36.41	5.13	38.83	35.30	316	108	Average	VERTICAL
2	11569.61	58.76	80.00	-21.24	50.10	5.13	38.83	35.30	316	108	Peak	VERTICAL

Temperature	25℃	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	11a IEEE 802.11n MCS8 20MHz CH 165 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11647.21	39.85	60.00	-20.15	31.13	5.16	38.86	35.30	310	112	Average	HORIZONTAL
2	11647.56	53.32	80.00	-26.68	44.60	5.16	38.86	35.30	310	112	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11647.73	43.94	60.00	-16.06	35.22	5.16	38.86	35.30	178	104	Average	VERTICAL
2	11647.76	57.95	80.00	-22.05	49.23	5.16	38.86	35.30	178	104	Peak	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	11a IEEE 802.11n MCS8 40MHz CH 151 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11509.83	36.80	60.00	-23.20	28.17	5.12	38.79	35.28	172	100	Average	HORIZONTAL
2	11510.17	49.58	80.00	-30.42	40.95	5.12	38.79	35.28	172	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11509.10	51.81	80.00	-28.19	43.18	5.12	38.79	35.28	313	100	Peak	VERTICAL
2	11509.10	38.56	60.00	-21.44	29.93	5.12	38.79	35.28	313	100	Average	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	11a IEEE 802.11n MCS8 40MHz CH 159 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11591.80	39.09	60.00	-20.91	30.42	5.14	38.83	35.30	179	100	Average	HORIZONTAL
2	11608.10	51.08	80.00	-28.92	42.39	5.15	38.84	35.30	179	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11591.74	40.04	60.00	-19.96	31.37	5.14	38.83	35.30	21	100	Average	VERTICAL
2	11591.83	54.23	80.00	-25.77	45.56	5.14	38.83	35.30	21	100	Peak	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	IEEE 802.11a CH 149 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11490.60	57.80	80.00	-22.20	49.19	5.11	38.78	35.28	225	112	Peak	HORIZONTAL
2	11490.69	42.70	60.00	-17.30	34.09	5.11	38.78	35.28	225	112	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11490.94	63.10	80.00	-16.90	54.49	5.11	38.78	35.28	235	100	Peak	VERTICAL
2	11490.98	47.16	60.00	-12.84	38.55	5.11	38.78	35.28	235	100	Average	VERTICAL

Temperature	25℃	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	IEEE 802.11a CH 157 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11571.49	41.68	60.00	-18.32	33.01	5.14	38.83	35.30	51	129	Average	HORIZONTAL
2	11571.82	55.57	80.00	-24.43	46.90	5.14	38.83	35.30	51	129	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11570.80	47.14	60.00	-12.86	38.47	5.14	38.83	35.30	316	100	Average	VERTICAL
2	11570.92	63.76	80.00	-16.24	55.09	5.14	38.83	35.30	316	100	Peak	VERTICAL

Temperature	25℃	Humidity	56%
Test Engineer	Satoshi Yang	Configurations	IEEE 802.11a CH 165 / Ant. 1 + Ant. 2
Test Date	Feb. 01, 2011		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11646.26	39.84	60.00	-20.16	31.12	5.16	38.86	35.30	218	100	Average	HORIZONTAL
2	11646.54	53.42	80.00	-26.58	44.70	5.16	38.86	35.30	218	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	11646.46	44.30	60.00	-15.70	35.58	5.16	38.86	35.30	314	100	Average	VERTICAL
2	11646.63	60.79	80.00	-19.21	52.07	5.16	38.86	35.30	314	100	Peak	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

4.3. Antenna Requirements

4.3.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.3.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Sep. 01,2010	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Oct. 28, 2010	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9K ~ 30MHz	Nov. 16, 2010	Conduction (CO01-CB)
PULSE LIMITER	R&S	ESH3-Z2	100430	9K~30MHz	Jan. 04, 2011	Conduction (CO01-CB)
COND Cable	-	Cable	-	0.15MHz~30MHz	Dec. 04,2010	Conduction (CO01-CB)
Horn Antenna	EMCO	3115	9610-4976	1GHz ~ 18GHz	Aug. 07, 2010	Radiation (03CH01CB)
BILOG ANTENNA	Schaffner	CBL6112B	2928	30MHz ~ 2GHz	Mar. 19, 2010	Radiation (03CH01CB)
Pre-Amplifier	COM-POWER	PA-103	161054	1MHz ~ 1000MHz	Dec. 13, 2010	Radiation (03CH01CB)
Pre-Amplifier	Agilent	8449B	3008A02099	1GHz ~ 26.5GHz	Nov. 15, 2010	Radiation (03CH01CB)
Spectrum analyzer	R&S	FSP40	100080	9KHz ~ 40GHz	Nov. 17, 2010	Radiation (03CH01CB)
Pre-Amplifier	Richtec	FPA 6592G	60027	9KHz ~ 2GHz	Jul. 28, 2010	Radiation (03CH01CB)
Signal analyzer	R&S	FSV-30	101026	-	Jul. 23, 2010	Radiation (03CH01CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Oct. 25, 2010	Radiation (03CH01CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 09, 2010	Radiation (03CH01CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Jul. 04, 2010	Radiation (03CH01CB)
Pre-Amplifier	Agilent	8447D	2944A10940	0.1MHz ~ 1.3GHz	Nov. 09, 2010	Radiation (03CH01CB)
Spectrum analyzer	R&S	FSP	100304	9kHz ~ 40GHz	Nov. 15, 2010	Radiation (03CH01CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Radiation (03CH01CB)

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

Note: For "*" Calibration Interval of instruments listed above is two years.

6. 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 Street, Zhubei City, Hsinchu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

7. TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-091230

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2005
Accreditation Number	:	1190
Originally Accredited	:	December 15, 2003
Effective Period	:	January 10, 2010 to January 09, 2013
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : December 30, 2009

P1, total 22 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix