

FCC RADIO TEST REPORT

Applicant's company	Atheros Communications, Inc.
Applicant Address	1700 Technology Dr San Jose, California 95110, United States
FCC ID	PPD-AR5B195
Manufacturer's company	Atheros Communications, Inc.
Manufacturer Address	1700 Technology Dr San Jose, California 95110, United States

Product Name	802.11n-BT COMBO CARD
Brand Name	ATHEROS
Model Name	AR5B195
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Dec. 16, 2010
Final Test Date	Feb. 14, 2011
Submission Type	Class II Change
Class II Change	Please refer to section 3.7



Statement

Test result included is only for the Bluetooth part 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.

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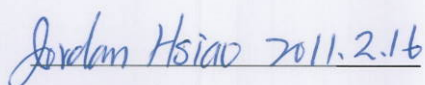
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0D1513AB	Rev. 01	Initial issue of report	Feb. 15, 2011

1. CERTIFICATE OF COMPLIANCE

Product Name : 802.11n-BT COMBO CARD
Brand Name : ATHEROS
Model Name : AR5B195
Applicant : Atheros Communications, 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 Dec. 16, 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

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	4.70 dB
4.6	15.247(d)	Radiated Emissions	Complies	4.08 dB
4.7	15.247(d)	Band Edge Emissions	Complies	7.09 dB
4.8	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Conducted Output Power	±0.8dB	Confidence levels of 95%
Hopping Channel Separation	±8.5×10 ⁻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°C	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

Items	Description
Power Type	From Host System
Modulation	FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)
Data Rate (Mbps)	GFSK: 1 ; $\pi/4$ -QPSK: 2 ; 8DPSK: 3
Frequency Range	2400 ~ 2483.5MHz
Channel Number	79
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
1	Aristotle Enterprises Inc.	RFA-02-P33-70-200-K	Dipole Antenna	I-PEX	3.2	TX / RX Ant.
2	Aristotle Enterprises Inc.	RFA-02-P33-70-200-K	Dipole Antenna	I-PEX	3.2	TX / RX Ant.

Note: The EUT has two antennas (1TX, 1RX).

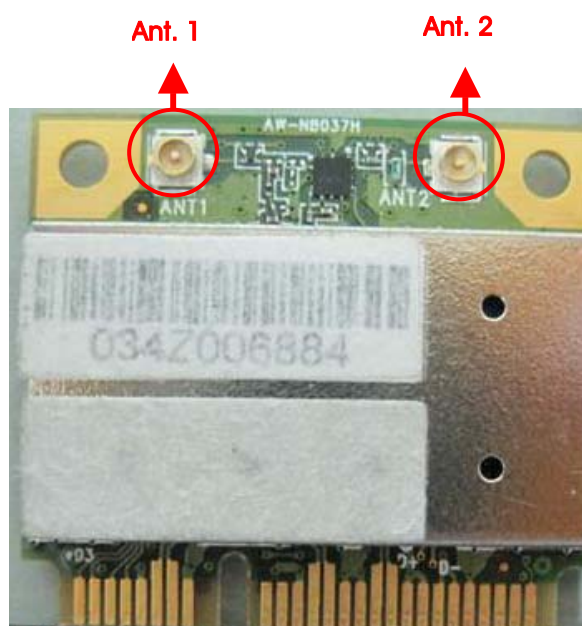
<For WLAN Function>:

Only Ant. 1 can be used as transmitting antenna.

The EUT supports the Ant. 1 and Ant. 2 with RX diversity function.

<For Bluetooth Function>:

Only Ant. 2 can be used as transmitting/receiving antenna.



3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	0	2402 MHz	40	2442 MHz
	1	2403 MHz	:	:
	:	:	77	2479 MHz
	38	2440 MHz	78	2480 MHz
	39	2441 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.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emissions	Normal Link	-	-	-
Max. Conducted Output Power	8DPSK	3 Mbps	0/39/78	NA
Radiated Emissions Below 1GHz	8DPSK	-	-	-
Radiated Emissions Above 1GHz	8DPSK	3 Mbps	0/39/78	2
Band Edge Emissions	8DPSK	3 Mbps	0/78	2

Note:

<For MPE and Co-location Test>:

The EUT could be applied with Bluetooth and wireless LAN function; therefore Maximum Permissible Exposure (please refer to Appendix C) and Co-location (please refer to Appendix D) tests are added for simultaneously transmit between Bluetooth and wireless LAN function.

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	187376	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	187376	IC 4086D	-

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 CCS project number: 09U12738-2

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

Modifications	Description	Performance Checking
Added one antenna	<p>One different type antenna was added.</p> <p><Original Project>: Antenna Type: PIFA Antenna</p> <p><Class II Change Project>: Antenna Type: Dipole Antenna</p>	<p>Conducted Emissions</p> <p>Radiated Emissions</p> <p>Band Edge Emissions</p>

3.8. Table for Supporting Units

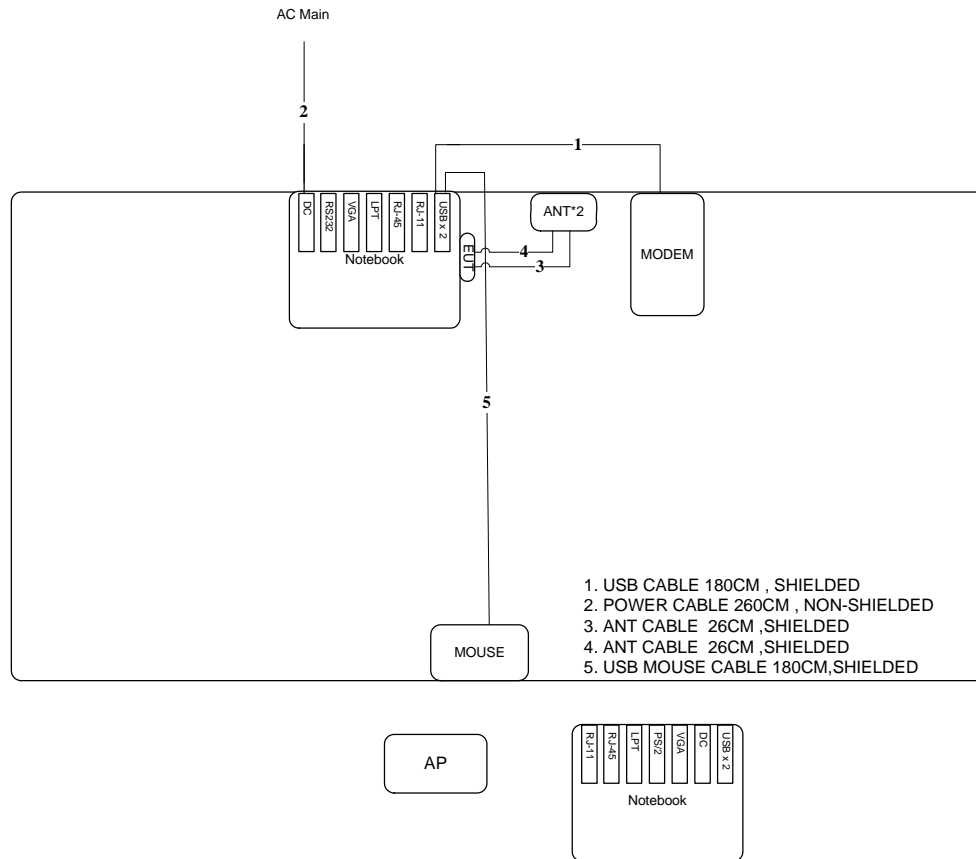
Support Unit	Brand	Model	FCC ID
Notebook	DELL	PP25L	E2K4965AGNM
Notebook	DELL	D400	E2K24GBRL
Mouse	Logitech	M-U0026	DoC
Modem	ACEEX	DM1414	IFAXDM1414
Wireless AP	Planex	GW-AP54SGX	N/A

3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

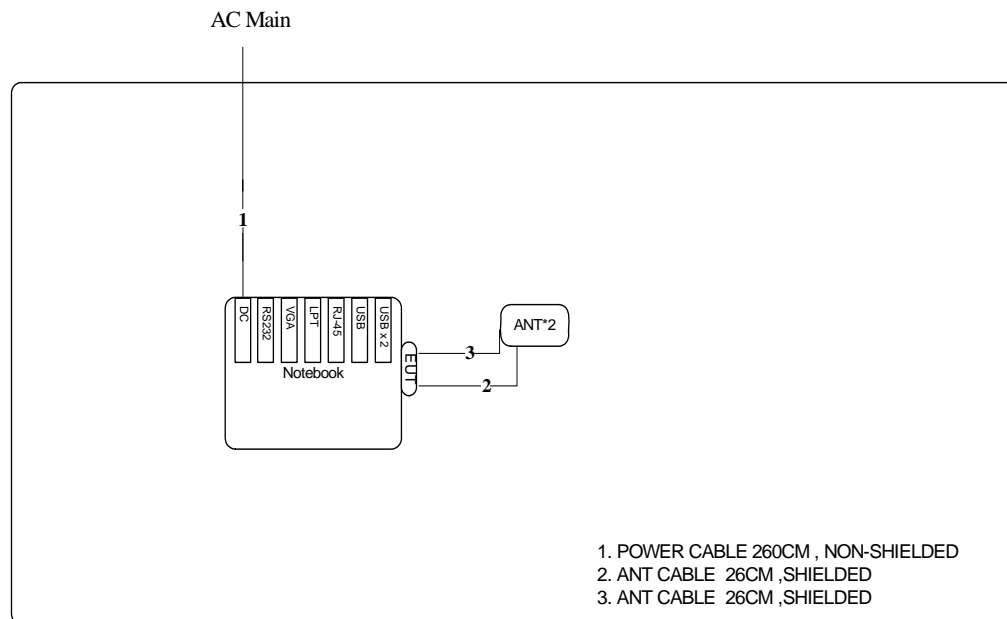
<For Bluetooth Function>:

Test Configuration: 9KHz~1GHz

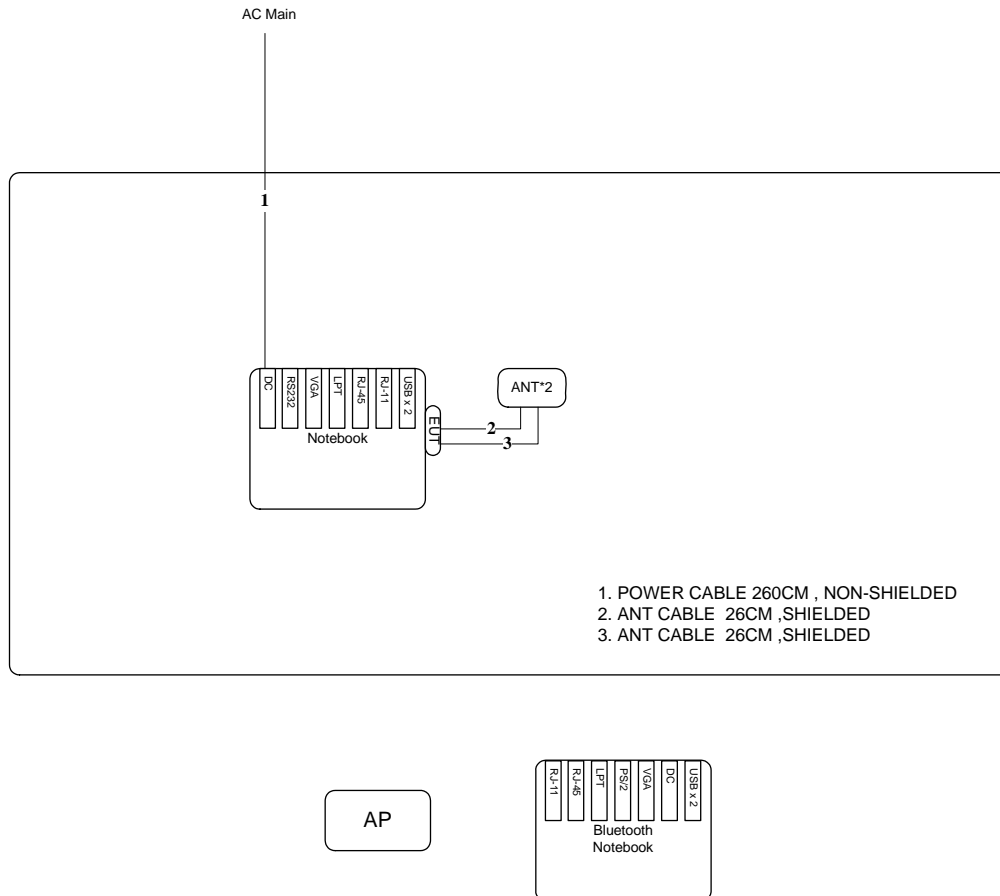


<For Bluetooth Function>:

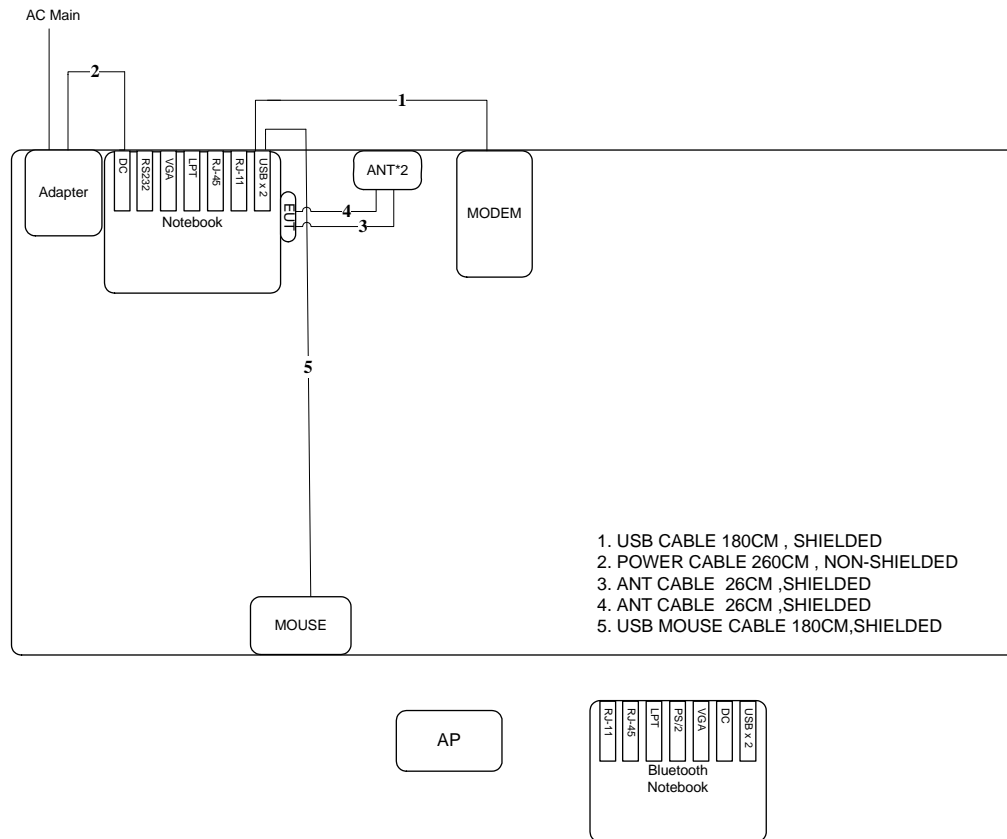
Test Configuration: above 1GHz



<For Co-Location Function> :



3.9.2. AC Power Line Conduction Emissions Test Configuration



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For a Low-power Radio-frequency Device 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.



- (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.

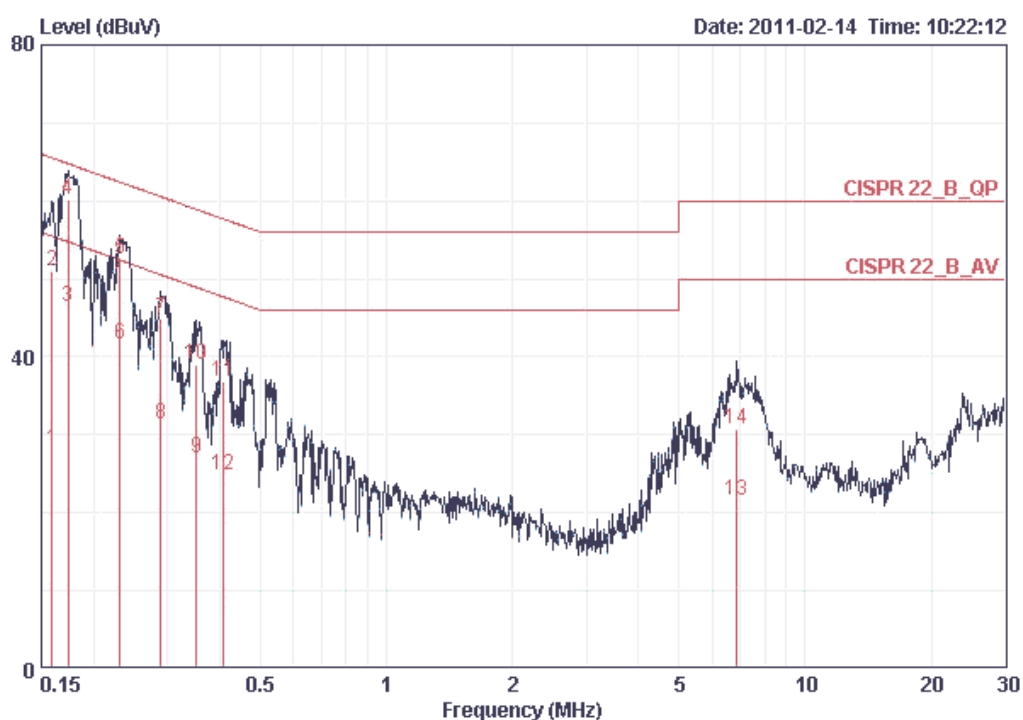
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

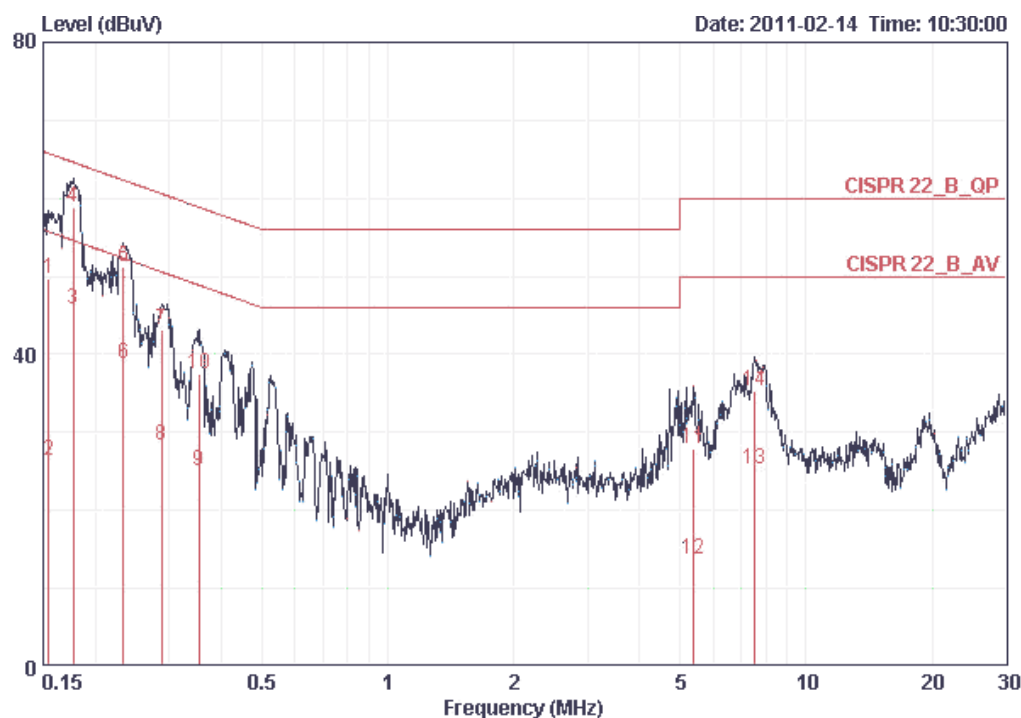
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	52%
Test Engineer	Peter Wu	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	0.15900	28.19	-27.33	55.52	27.92	0.07	0.20	AVERAGE
2	0.15900	50.93	-14.59	65.52	50.66	0.07	0.20	QP
3	0.17399	46.33	-8.44	54.77	46.07	0.06	0.20	AVERAGE
4 B	0.17399	60.07	-4.70	64.77	59.81	0.06	0.20	QP
5	0.23162	52.57	-9.83	62.39	52.32	0.05	0.20	QP
6	0.23162	41.67	-10.73	52.39	41.42	0.05	0.20	AVERAGE
7	0.28935	44.83	-15.71	60.54	44.59	0.04	0.20	QP
8	0.28935	31.41	-19.13	50.54	31.17	0.04	0.20	AVERAGE
9	0.35201	27.00	-21.91	48.91	26.77	0.03	0.20	AVERAGE
10	0.35201	39.03	-19.88	58.91	38.80	0.03	0.20	QP
11	0.40831	36.88	-20.80	57.68	36.65	0.03	0.20	QP
12	0.40831	24.81	-22.87	47.68	24.58	0.03	0.20	AVERAGE
13	6.878	21.50	-28.50	50.00	20.92	0.25	0.33	AVERAGE
14	6.878	30.80	-29.20	60.00	30.22	0.25	0.33	QP

Temperature	24°C	Humidity	52%
Test Engineer	Peter Wu	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	0.15485	49.76	-15.97	65.74	49.46	0.10	0.20	QP
2	0.15485	26.35	-29.38	55.74	26.05	0.10	0.20	AVERAGE
3	0.17678	45.79	-8.85	54.64	45.50	0.09	0.20	AVERAGE
4	0.17678	58.93	-5.71	64.64	58.64	0.09	0.20	QP
5	0.23285	51.16	-11.19	62.35	50.88	0.08	0.20	QP
6	0.23285	38.91	-13.44	52.35	38.63	0.08	0.20	AVERAGE
7	0.28782	43.21	-17.37	60.59	42.94	0.07	0.20	QP
8	0.28782	28.38	-22.20	50.59	28.11	0.07	0.20	AVERAGE
9	0.35388	25.14	-23.73	48.87	24.87	0.07	0.20	AVERAGE
10	0.35388	37.39	-21.48	58.87	37.12	0.07	0.20	QP
11	5.362	27.87	-32.13	60.00	27.35	0.22	0.30	QP
12	5.362	13.69	-36.31	50.00	13.17	0.22	0.30	AVERAGE
13	7.526	25.25	-24.75	50.00	24.54	0.31	0.40	AVERAGE
14	7.526	35.23	-24.77	60.00	34.52	0.31	0.40	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 (microvolts/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)	1000KHz / 1000KHz for peak

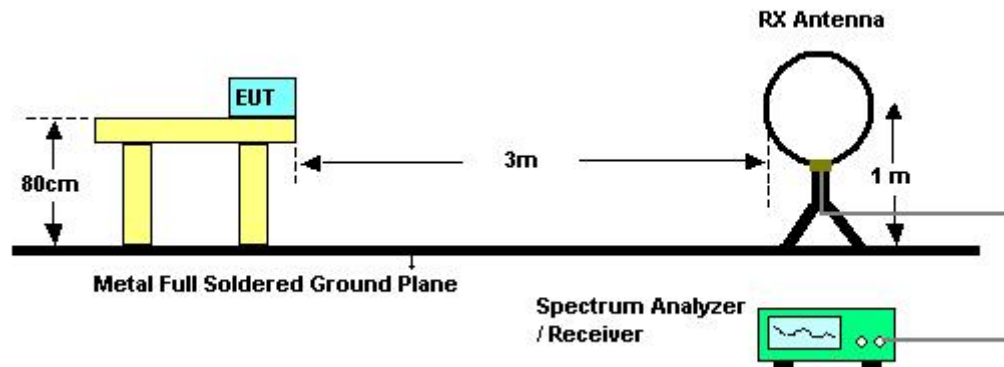
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.3. Test Procedures

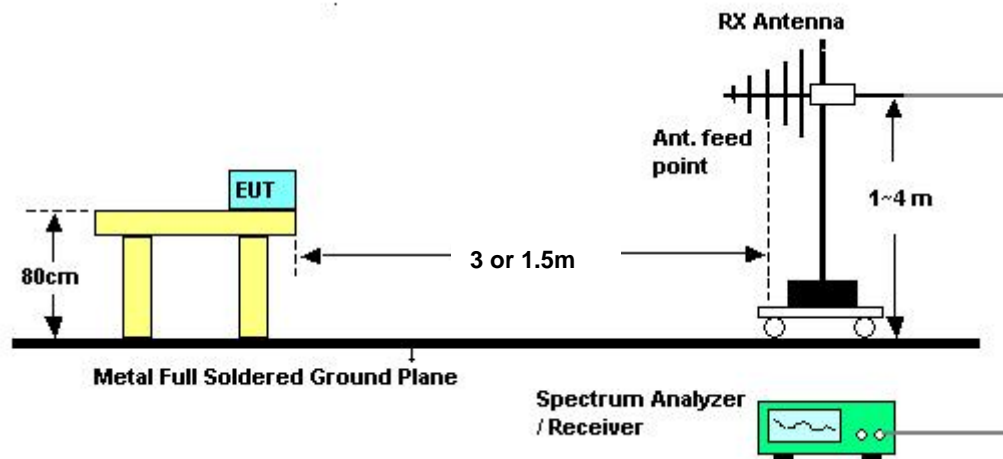
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (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	23°C	Humidity	62%
Test Engineer	Sean Ku	Evaluating Date	Feb. 11, 2011

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

Note:

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

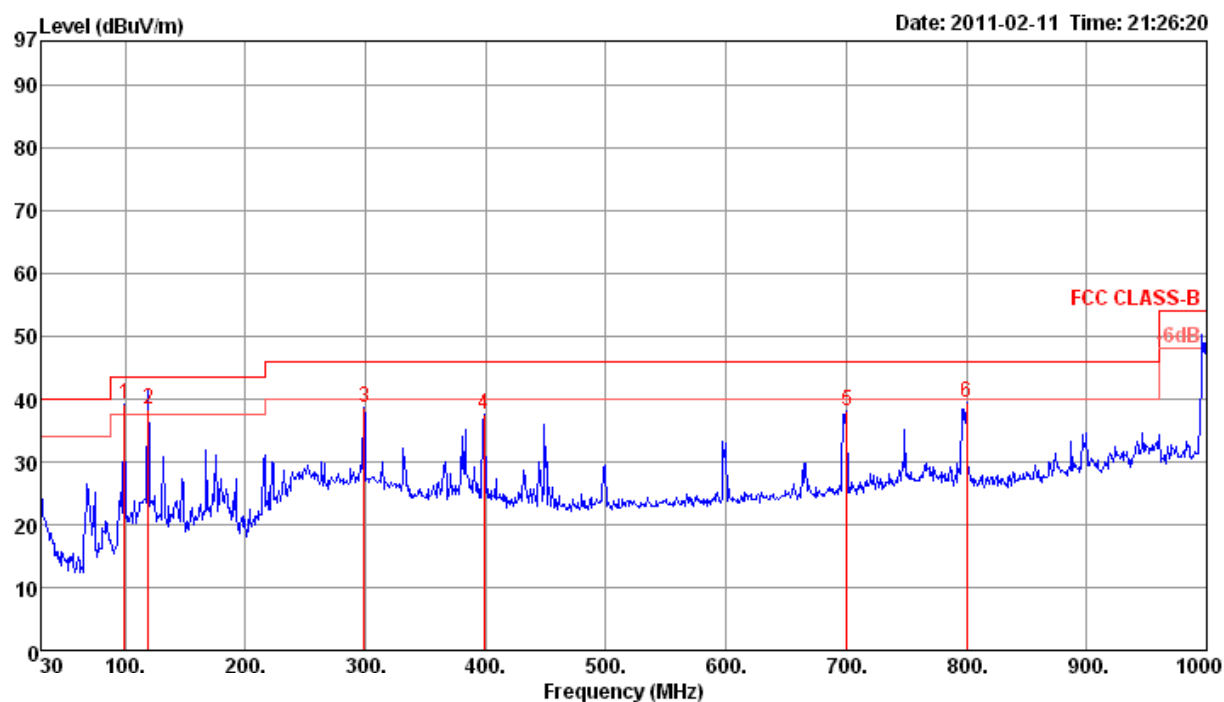
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

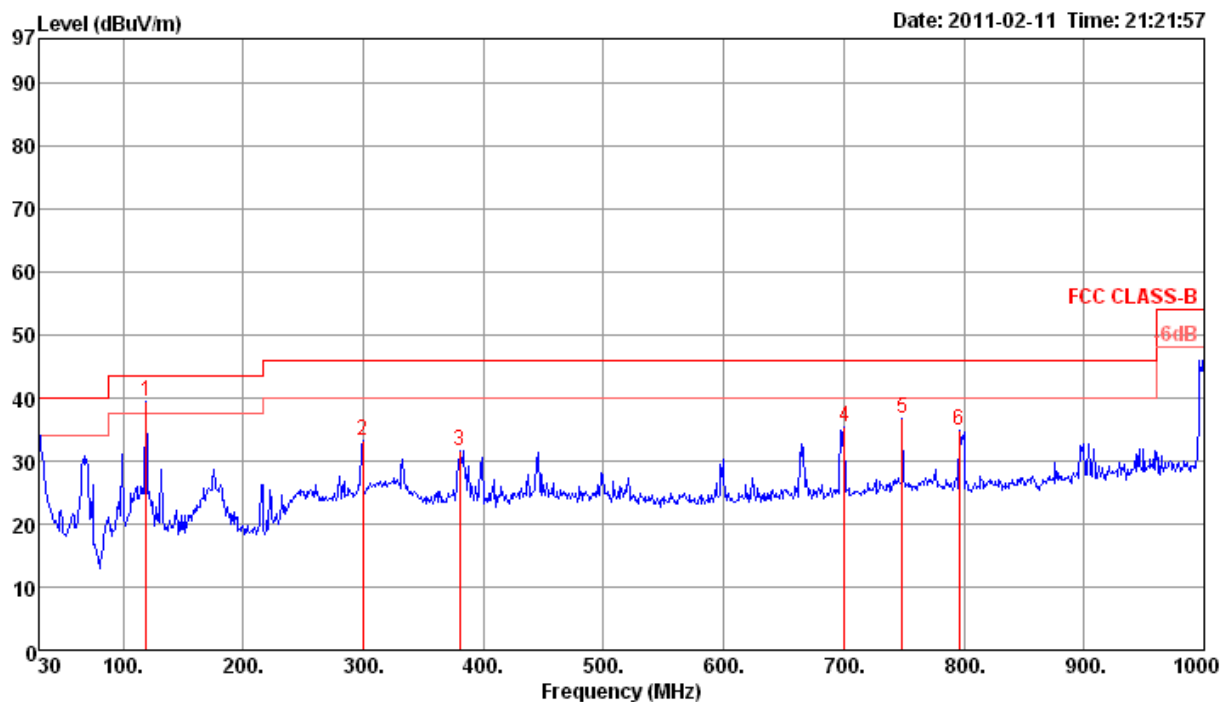
Temperature	23°C	Humidity	62%
Test Engineer	Sean Ku	Configurations	Channel 39

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	deg	cm		
1 p	99.84	39.05	43.50	-4.45	54.46	1.20	27.60	10.99	0	100	Peak	HORIZONTAL
2 !	119.24	38.36	43.50	-5.14	52.20	1.20	27.50	12.46	0	100	Peak	HORIZONTAL
3	298.69	38.53	46.00	-7.47	49.98	2.10	26.90	13.35	0	100	Peak	HORIZONTAL
4	398.60	37.43	46.00	-8.57	46.69	2.30	27.59	16.03	0	100	Peak	HORIZONTAL
5	700.27	38.21	46.00	-7.79	43.81	3.30	27.99	19.09	0	100	Peak	HORIZONTAL
6	800.18	39.55	46.00	-6.45	44.08	3.30	27.60	19.77	0	100	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	119.24	39.42	43.50	-4.08	53.26	1.20	27.50	12.46	0	400	Peak	VERTICAL
2	299.66	33.27	46.00	-12.73	44.71	2.10	26.90	13.36	0	400	Peak	VERTICAL
3	380.17	31.65	46.00	-14.35	41.32	2.26	27.47	15.54	0	400	Peak	VERTICAL
4	700.27	35.34	46.00	-10.66	40.94	3.30	27.99	19.09	0	400	Peak	VERTICAL
5	748.77	36.77	46.00	-9.23	41.65	3.50	27.80	19.42	0	400	Peak	VERTICAL
6	796.30	34.81	46.00	-11.19	39.37	3.32	27.62	19.74	0	400	Peak	VERTICAL

Note:

The amplitude of spurious emissions which 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	23°C	Humidity	62%
Test Engineer	Sean Ku	Configurations	Channel 0
Test Date	Feb. 11, 2011		

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 a	4803.58	34.25	54.00	-19.75	31.86	4.23	35.20	33.36	198	100	Average	HORIZONTAL
2 p	4803.62	45.94	74.00	-28.06	43.55	4.23	35.20	33.36	198	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 a	4803.56	39.95	54.00	-14.05	37.56	4.23	35.20	33.36	338	100	Average	VERTICAL
2 p	4803.64	49.31	74.00	-24.69	46.92	4.23	35.20	33.36	338	100	Peak	VERTICAL

Temperature	23°C	Humidity	62%
Test Engineer	Sean Ku	Configurations	Channel 39
Test Date	Feb. 11, 2011		

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 p	4881.13	45.63	74.00	-28.37	43.02	4.33	35.20	33.48	298	100	Peak	HORIZONTAL
2 a	4881.52	33.82	54.00	-20.18	31.21	4.33	35.20	33.48	298	100	Average	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 a	4881.56	40.96	54.00	-13.04	38.35	4.33	35.20	33.48	262	146	Average	VERTICAL
2 p	4881.70	50.28	74.00	-23.72	47.67	4.33	35.20	33.48	262	146	Peak	VERTICAL

Temperature	23°C	Humidity	62%
Test Engineer	Sean Ku	Configurations	Channel 78
Test Date	Feb. 11, 2011		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	4959.60	33.28	54.00	-20.72	30.42	4.42	35.20	33.64	246	100	Average	HORIZONTAL
2 p	4959.76	44.71	74.00	-29.29	41.85	4.42	35.20	33.64	246	100	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	4959.56	40.24	54.00	-13.76	37.38	4.42	35.20	33.64	218	115	Average	VERTICAL
2 p	4959.99	49.13	74.00	-24.87	46.27	4.42	35.20	33.64	218	115	Peak	VERTICAL

Note:

The amplitude of spurious emissions which 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. Band Edge Emissions Measurement

4.3.1. 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

4.3.2. 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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1 MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

4.3.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.3.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23°C	Humidity	62%
Test Engineer	Sean Ku	Configurations	Channel 0, 39, 78
Test Date	Feb. 11, 2011		

Channel 0

	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	2390.00	55.32	74.00	-18.68	24.39	2.88	0.00	28.05	281	100	Peak	VERTICAL
2	2390.00	44.47	54.00	-9.53	13.54	2.88	0.00	28.05	281	100	Average	VERTICAL
3 a	2401.60	85.85	54.00	31.85	54.88	2.88	0.00	28.09	281	100	Average	VERTICAL
4 p	2402.00	102.45	74.00	28.45	71.48	2.88	0.00	28.09	281	100	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 2402 MHz.

Channel 39

	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 a	2440.60	85.91	54.00	31.91	54.84	2.89	0.00	28.18	280	100	Average	VERTICAL
2 p	2441.20	102.55	74.00	28.55	71.46	2.91	0.00	28.18	280	100	Peak	VERTICAL
3	2488.60	59.00	74.00	-15.00	27.77	2.93	0.00	28.30	280	100	Peak	VERTICAL
4	2490.20	44.73	54.00	-9.27	13.50	2.93	0.00	28.30	280	100	Average	VERTICAL

Item 1, 2 are the fundamental frequency at 2441 MHz.

Channel 78

	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 a	2479.60	85.05	54.00	31.05	53.86	2.93	0.00	28.26	27	100	Average	VERTICAL
2 p	2480.00	101.28	74.00	27.28	70.09	2.93	0.00	28.26	27	100	Peak	VERTICAL
3	2483.50	46.91	54.00	-7.09	15.72	2.93	0.00	28.26	27	100	Average	VERTICAL
4	2484.70	65.04	74.00	-8.96	33.85	2.93	0.00	28.26	27	100	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 2480 MHz.

Note:

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

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

4.4. Antenna Requirements

4.4.1. 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.

4.4.2. 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)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Oct. 17, 2010	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 22, 2010	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Oct. 08, 2010	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 17, 2010	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2010	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Nov. 17, 2010	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP	100304	9kHz ~ 40GHz	Nov. 22, 2010	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 06, 2010	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N/A	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N/A	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2010	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 17, 2010	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 17, 2010	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Radiation (03CH01-CB)

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 2 nd 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

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 Arrangement with Foreign Authorities



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

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