FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment	:	**802.11abgn Wireless USB Module**
Brand Name	:	**SparkLAN**
Model No.	:	**WUBR-507N(P); WUBR-507N(P6)**
Filing Type	:	**Existing Change**
Applicant	:	**SparkLAN Communications, Inc.** 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan
FCC ID	:	**RYK-WUBR507N**
Manufacturer	:	**SparkLAN Communications, Inc.** 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan
Received Date	:	Nov. 08, 2010
Final Test Date	:	Jan. 30, 2012

Statement

Test result included is only for the printed antenna 802.11n (5725~5850 MHz / 2400~2483.5MHz) 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

SPORTON International Inc.

No. 52 Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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History of This Test Report

Original Issue Date: Mar. 27, 2012
Report No.: FR210523AI
■ No additional attachment.
□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description
FR0O1817AI	Nov. 10, 2010	Original.
FR210523AI	Mar. 27, 2012	Reason for change: Additional printed antenna in this report. Therefore, radiation was performed to verify the new components.

CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.247

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Applicant	:	SparkLAN Communications, Inc**.** 8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City 11493, Taiwan

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Nov. 08, 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.

Wayne Hsu / Assistant Manager

SPORTON International Inc.

No. 52 Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
3.1	15.207	AC Power Line Conducted Emissions	Complies	3.54 dB
-	15.247(b)(3)	Peak Output Power	Complies	-
-	15.247(e)	Power Spectral Density	Complies	-
-	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
3.2	15.247(d)	Radiated Emissions	Complies	3.03 dB
3.3	15.247(d)	Band Edge and Fundamental Emissions	Complies	1.03 dB
3.4	15.203	Antenna Requirements	Complies	-

Note: Standard clause 15.247(b)(3), 15.247(e), 15.247(a)(2) have been done module test by SparkLAN / WUBR-507N(M).

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Peak 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%

2 GENERAL INFORMATION

2.1 Product Details

Only the radio detail of IEEE 802.11n is shown in this report. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

Items	Description
Power Type	Power from host
Modulation Data Rate (Mbps)	See the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Frequency Range	5725 ~ 5850MHz / 2400 ~ 2483.5MHz
Channel Number	5G- 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth 2.4G- 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth

IEEE 802.11n Modulation Scheme

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps) 800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0

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

2.2 Table for Filed Antenna

Antenna Category Information	
☐	Equipment placed on the market without antennas
☒	Integral antenna (antenna permanently attached)
☒	Temporary RF connector provided
☐	No temporary RF connector provided
☐	External antenna (dedicated antennas)
☐	Single power level with corresponding antenna(s)
☐	Multiple power settings and corresponding antenna(s)
☐	Professional Install
☐	Unique antenna connector
☐	BIOS lock.

Antenna General Information						
Ant. No.	**Category**	**Type**	**Brand**	**Model**	**Gain (dBi)**	
					2.4G	**5G**
1	Internal	Printed	--	--	1.78	3.33
	Internal	Printed	--	--	1.78	3.33

☐ EUT is consist of single model antenna assembly for spatial multiplexing MIMO configuration.
☒ EUT is consist of multiple model antennas assembly (secondary source multiple model antennas regardless of spatial multiplexing MIMO configuration), the test (except DFS test) should be performed with highest antenna gain of each antenna type. Then Ant. No. 1 shall be performed the test.
☐ EUT is consist of multiple model antennas assembly for spatial multiplexing MIMO configuration (e.g. model A shall be installed in Port A and model B shall be installed in Port B…).

Transmitter Outputs & Receiver Inputs Information				
Modulation	**Transmitter Outputs**	**Receiver Inputs**	**Transmitter Output Signals**	**Co-location**
802.11n HT20 / HT40	2 (SM)	2	Uncorrelated	No

Note 1: CDD - Cyclic Delay Diversity (CDD) modes (e.g., legacy modes in 802.11n devices). In CDD modes, the same digital data is carried by each transmit antenna, but with different cyclic delays.
Note 2: STBC - Space Time Block Codes (STBC) for which different digital data is carried by each transmit antenna during any symbol period.
Note 3: SM - Spatial Multiplexing MIMO (SM-MIMO), for which independent data streams are sent to each transmit antenna.
Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other.

Antenna Directional Gain							
Port. No.	**Modulaton**	**Transmitter Outputs Signals Correlated**	**Transmitter Outputs (N)**	**Antenna Gain Combination (dBi)**		**Directional Gain (dBi)**	
				2.4G	**5G**	**2.4G**	**5G**
1+2	802.11n HT20 / HT40	Uncorrelated	2	1.78, 1.78	3.33, 3.33	1.78	3.33

☒ For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows
- Any transmit signals are correlated, Directional Gain = GANT + 10 log(N) dBi
- All transmit signals are completely uncorrelated, Directional Gain = GANT

☐ For all transmitter outputs with unequal antenna gains, directional gain is to be computed as follows:
- Any transmit signals are correlated, Directional Gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$ /N] dBi
- All transmit signals are completely uncorrelated, Directional Gain = 10 log[$(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10})$/N] dBi

2.3 Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (40MHz)
5725~5850 MHz	149	5745 MHz	151	5755 MHz
	153	5765 MHz	159	5795 MHz
	157	5785 MHz	-	-
	161	5805 MHz	-	-
	165	5825 MHz	-	-

Frequency Band	Channel No.	Frequency (20MHz)	Channel No.	Frequency (20MHz)
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	-	-

Frequency Band	Channel No.	Frequency (40MHz)
2400~2483.5MHz	3	2422 MHz
	4	2427 MHz
	5	2432 MHz
	6	2437 MHz
	7	2442 MHz
	8	2447 MHz
	9	2452 MHz

2.4 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 the entire possible configuration 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	Port. No.
AC Power Line Conducted Emissions Radiated Emissions Below 1GHz	Normal Mode	Auto	-	-
Radiated Emissions Above 1GHz	MCS 8 (20MHz)	13 Mbps	5G-149/157/165 2.4G-1/6/11	1+2
	MCS 8 (40MHz)	27 Mbps	5G-151/159 2.4G-3/6/9	1+2
Band Edge Emissions	MCS 8 (20MHz)	13 Mbps	5G-149/165 2.4G-1/11	1+2
	MCS 8 (40MHz)	27 Mbps	5G-151/159 2.4G-3/6/9	1+2

2.5 Table for Testing Locations

Test Site No.	Site Category	Location
CO04-HY	Conduction	Hwa Ya
03CH02-HY	SAC	Hwa Ya

Semi Anechoic Chamber (SAC).

2.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID	Remark
Notebook	DELL	PP20L	N/A	Conducted Emissions
(USB) Mouse	Microsoft	1004	N/A	
iPod Nano	Apple	A1119	N/A	
Wireless AP (Remote Workstation)	EDIMAX	BR-6204WG	NDD9562040507	
Mouse	Microsoft	1004	R31264	Radiated Emissions
Notebook	DELL	E5520	DoC	
iPod	APPLE	A1199	DoC	

2.7 EUT Operation during Test

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 reads the test program “Winthrax.exe” was executed to read and write data from EUT.
c. The NB sends "H" messages to the panel and displays "H" patterns on the screen.
d. Repeat the steps from b to c.

At the same time, the following programs were executed:

-Executed “Winthrax.exe” to read and write data from iPod.

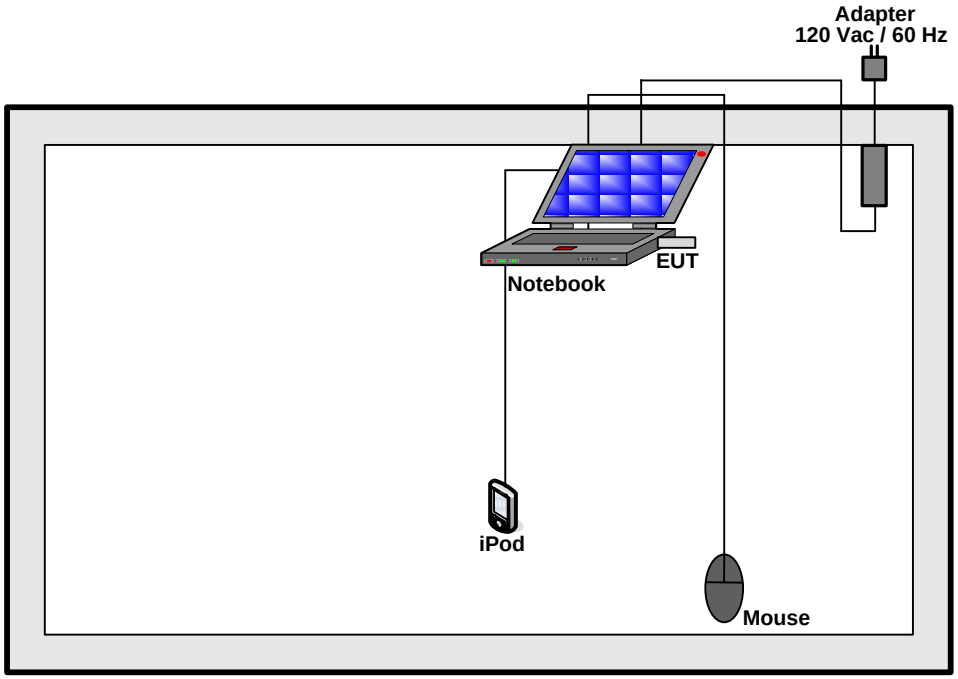
-Executed "ping.exe" to link with the remote workstation to receive and transmit data by WLAN.

Only Radiated used:

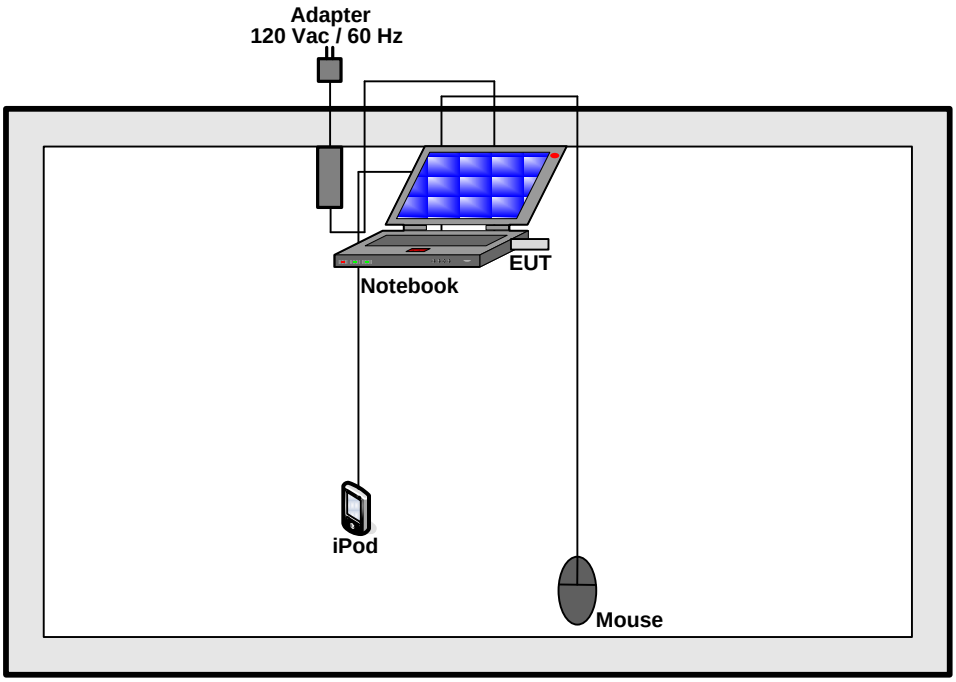
- Executed “Ralink RT3x7xQA” to keep transmitting signals at fixed frequency.

2.8 Test Configuration

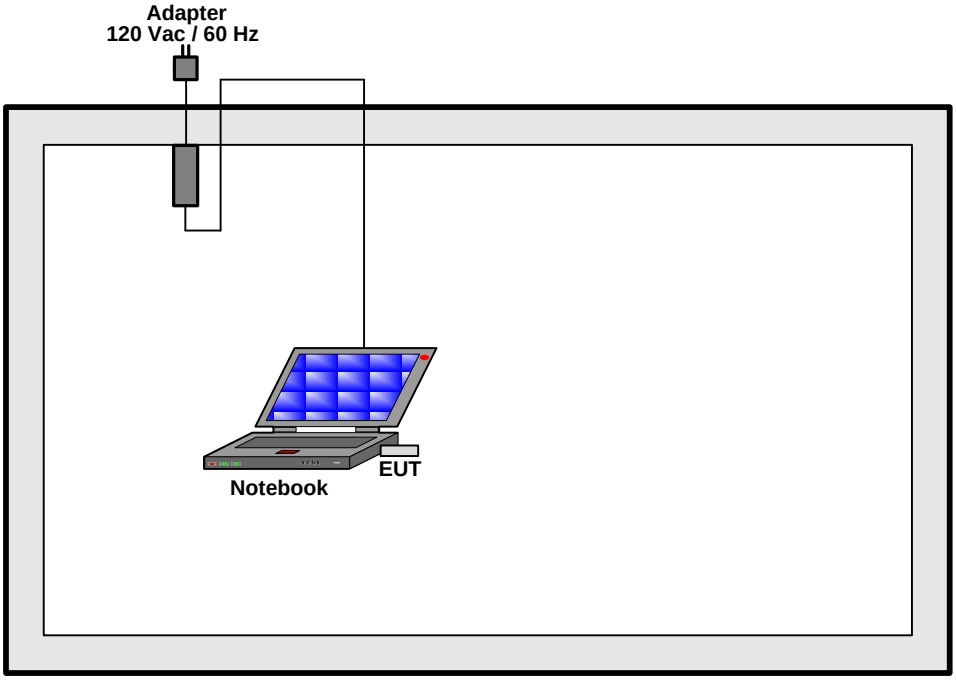
For conducted emissions



For radiated emissions 9kHz~1GHz



For radiated emissions above 1GHz



3 TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 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.

Class B

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

3.1.2 Measuring Instruments and Setting

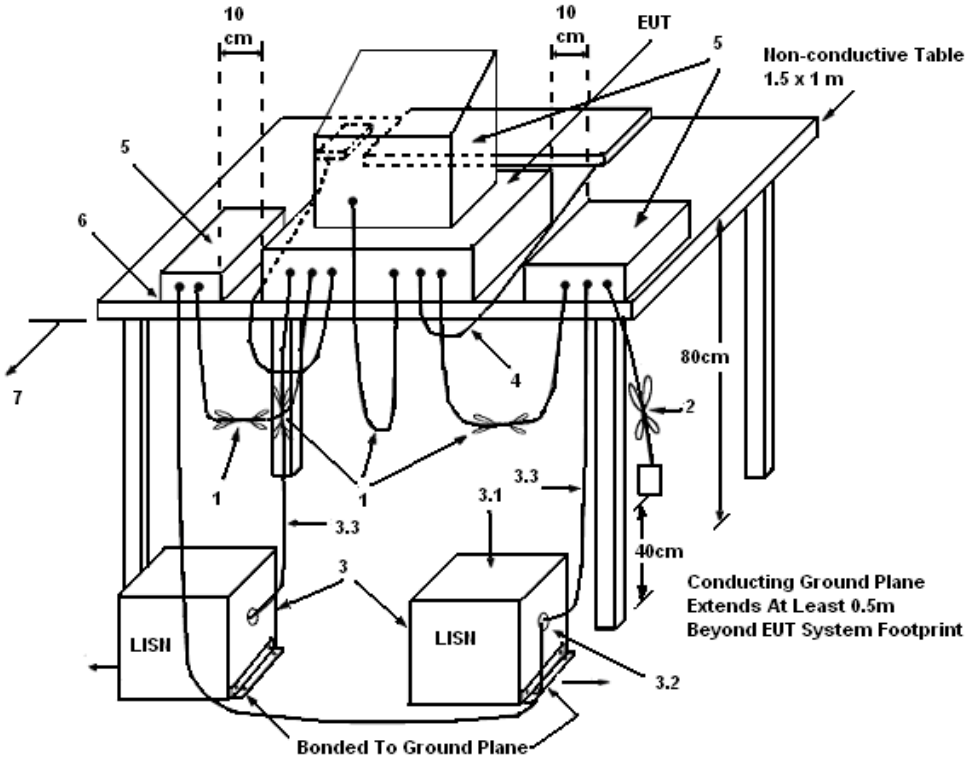
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 Test Procedures

1. The EUT warm up about 15 minutes then start test.
2. 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.
3. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The measurement has to be done between each power line and ground at the power terminal.

3.1.4 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.

3.1.5 Test Deviation

There is no deviation with the original standard.

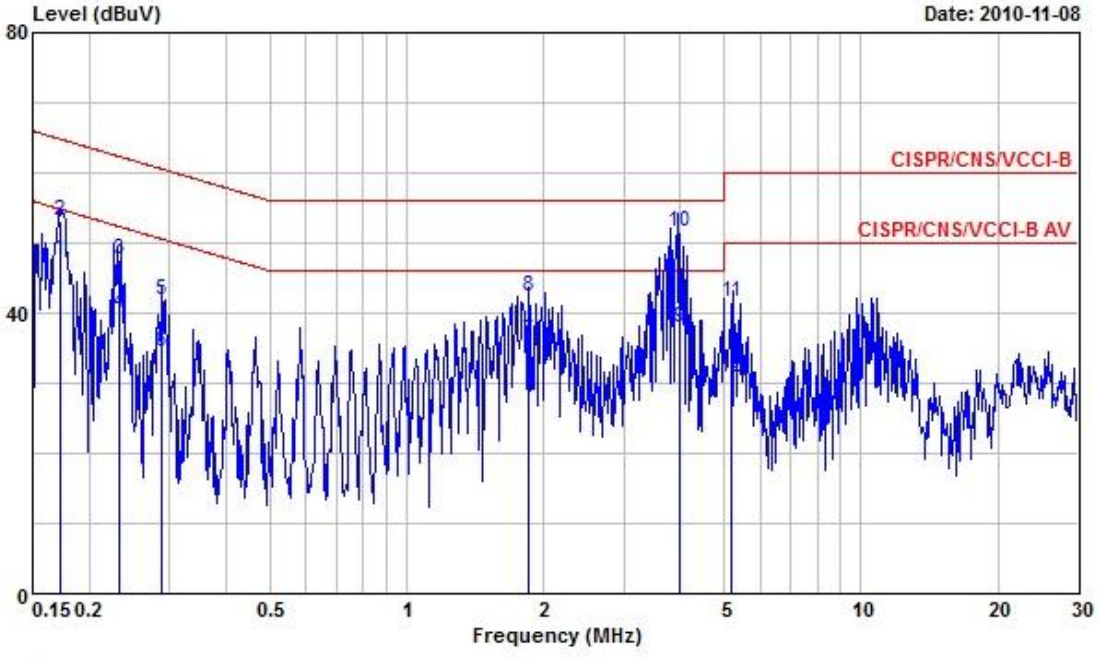
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

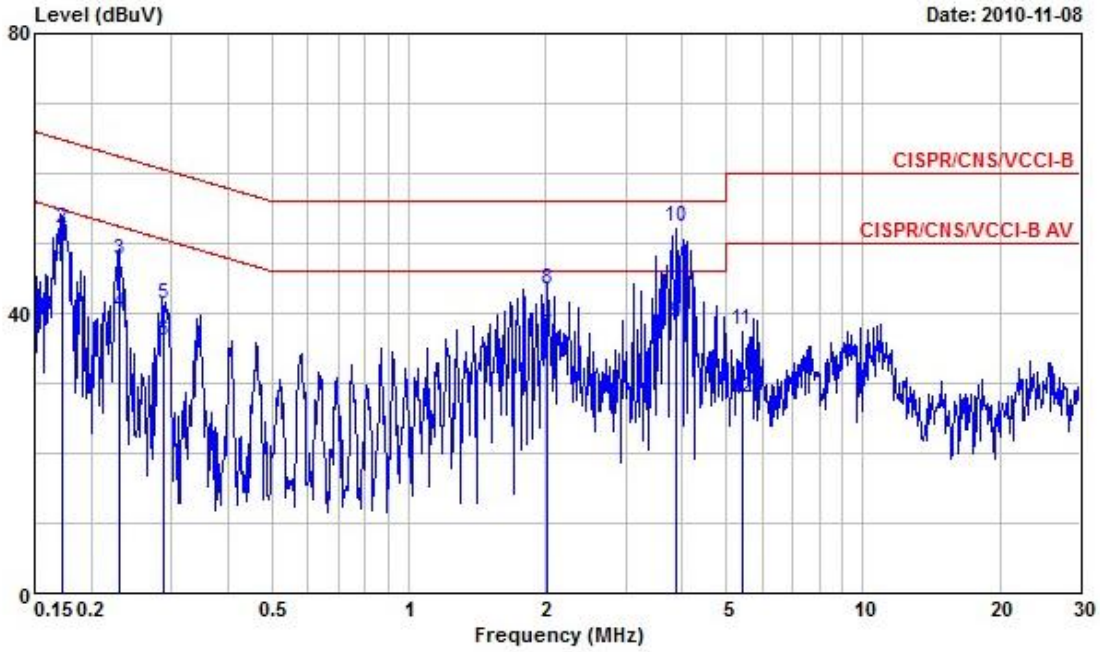
Final Test Date	Nov. 08, 2010	**Test Site No.**	CO04-HY
Temperature	24.9℃	**Humidity**	47.2%
Test Engineer	Jason	**Configuration**	Normal Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1730540	47.68	-7.13	54.81	47.31	0.08	0.29	Average
2	0.1730540	53.18	-11.63	64.81	52.81	0.08	0.29	QP
3	0.2316380	47.76	-14.63	62.39	47.40	0.08	0.28	QP
4	0.2316380	39.96	-12.43	52.39	39.60	0.08	0.28	Average
5	0.2893470	41.89	-18.65	60.54	41.59	0.09	0.21	QP
6	0.2893470	34.39	-16.15	50.54	34.09	0.09	0.21	Average
7	1.850	35.97	-10.03	46.00	35.70	0.13	0.14	Average
8	1.850	42.37	-13.63	56.00	42.10	0.13	0.14	QP
9	4.000	37.78	-8.22	46.00	37.40	0.16	0.22	Average
10	4.000	51.48	-4.52	56.00	51.10	0.16	0.22	QP
11	5.200	41.65	-18.35	60.00	41.21	0.19	0.25	QP
12	5.200	30.75	-19.25	50.00	30.31	0.19	0.25	Average

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1720450	46.27	-8.59	54.86	45.90	0.08	0.29	Average
2	0.1720450	52.14	-12.72	64.86	51.77	0.08	0.29	QP
3	0.2303960	47.66	-14.78	62.44	47.30	0.08	0.28	QP
4	0.2303960	39.96	-12.48	52.44	39.60	0.08	0.28	Average
5	0.2882840	41.39	-19.18	60.57	41.10	0.08	0.21	QP
6	0.2882840	35.99	-14.58	50.57	35.70	0.08	0.21	Average
7	2.020	36.95	-9.05	46.00	36.70	0.11	0.14	Average
8	2.020	43.55	-12.45	56.00	43.30	0.11	0.14	QP
9	3.870	38.76	-7.24	46.00	38.39	0.15	0.22	Average
10 @	3.870	52.46	-3.54	56.00	52.09	0.15	0.22	QP
11	5.420	37.75	-22.25	60.00	37.30	0.19	0.26	QP
12	5.420	27.95	-22.05	50.00	27.50	0.19	0.26	Average

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

3.2 Radiated Emissions Measurement

3.2.1 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequencies (MHz)	Field Strength (microvolt/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

3.2.2 Measuring Instruments and Setting

Please refer to section 4 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

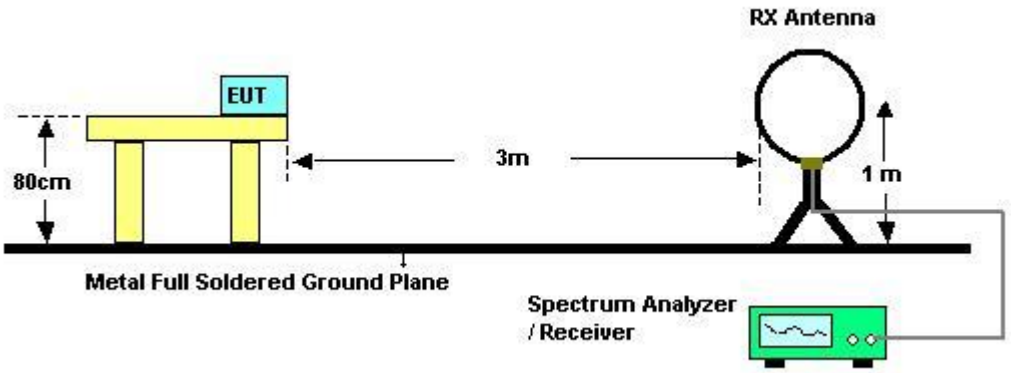
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.3 Test Procedures

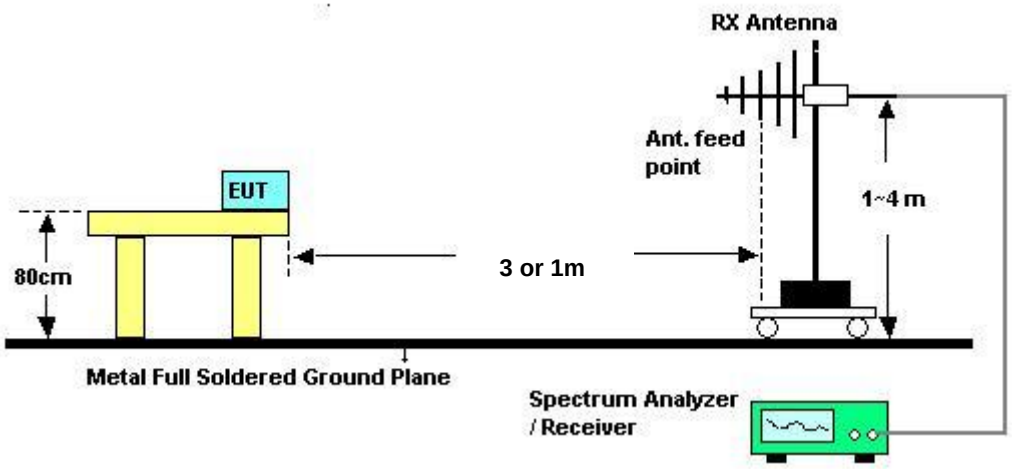
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

3.2.4 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 1m.
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Results of Radiated Emissions (9kHz~30MHz)

Final Test Date	Jan. 17, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak		

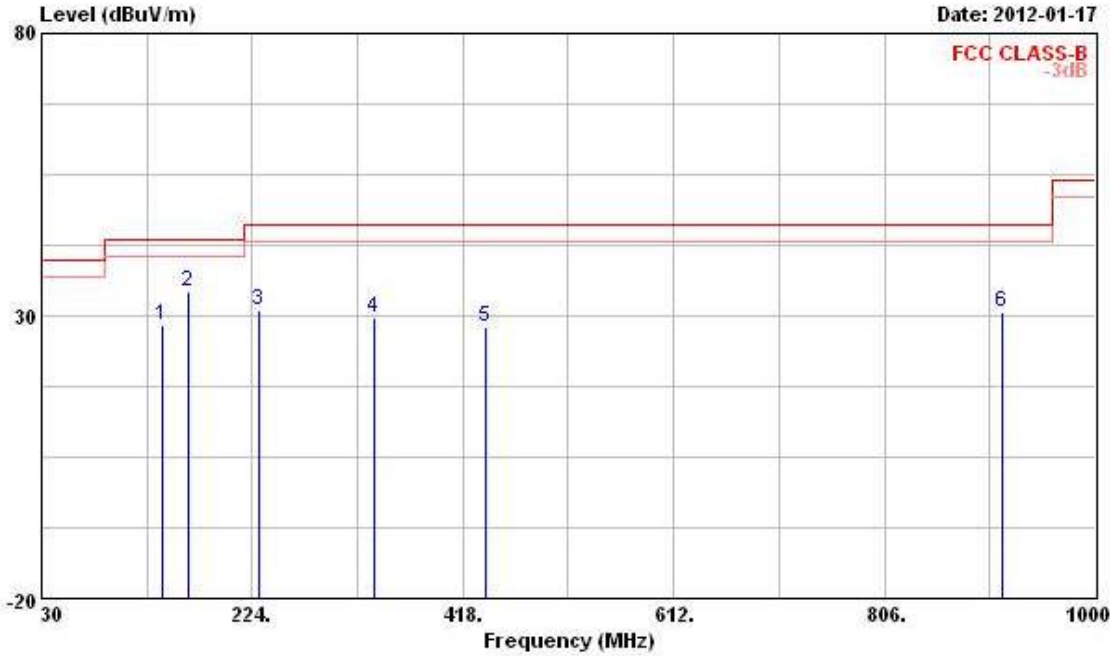
Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

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.

3.2.8 Results of Radiated Emissions (30MHz~1GHz)

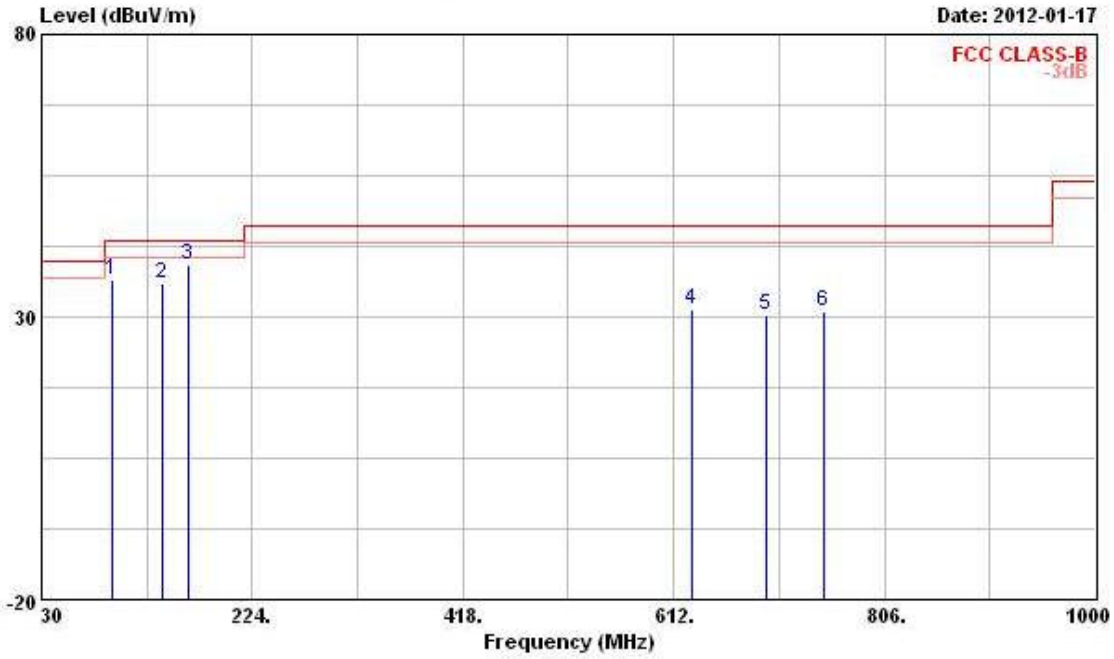
Final Test Date	Jan. 17, 2012	Test Site No.	03CH02-HY
Temperature	20℃	Humidity	66%
Test Engineer	Streak	Configurations	Normal Mode

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	141.550	28.30	-15.20	43.50	42.19	11.78	2.00	27.67	Peak	---	---
2	164.830	34.30	-9.20	43.50	49.38	10.34	2.14	27.56	Peak	---	---
3	230.790	31.13	-14.87	46.00	43.45	12.37	2.64	27.33	Peak	---	---
4	335.550	29.60	-16.40	46.00	39.63	14.26	3.12	27.41	Peak	---	---
5	439.340	28.13	-17.87	46.00	36.61	16.06	3.53	28.07	Peak	---	---
6	913.670	30.72	-15.28	46.00	32.57	20.37	5.33	27.55	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	94.990	36.51	-6.99	43.50	52.42	10.34	1.60	27.85	Peak	---	---
2	141.550	36.03	-7.47	43.50	49.92	11.78	2.00	27.67	Peak	---	---
3 @	164.830	39.13	-4.37	43.50	54.21	10.34	2.14	27.56	Peak	---	---
4	629.460	31.19	-14.81	46.00	35.48	19.79	4.33	28.41	Peak	---	---
5	696.390	30.35	-15.65	46.00	35.22	18.89	4.53	28.29	Peak	---	---
6	749.740	31.09	-14.91	46.00	34.94	19.55	4.71	28.11	Peak	---	---

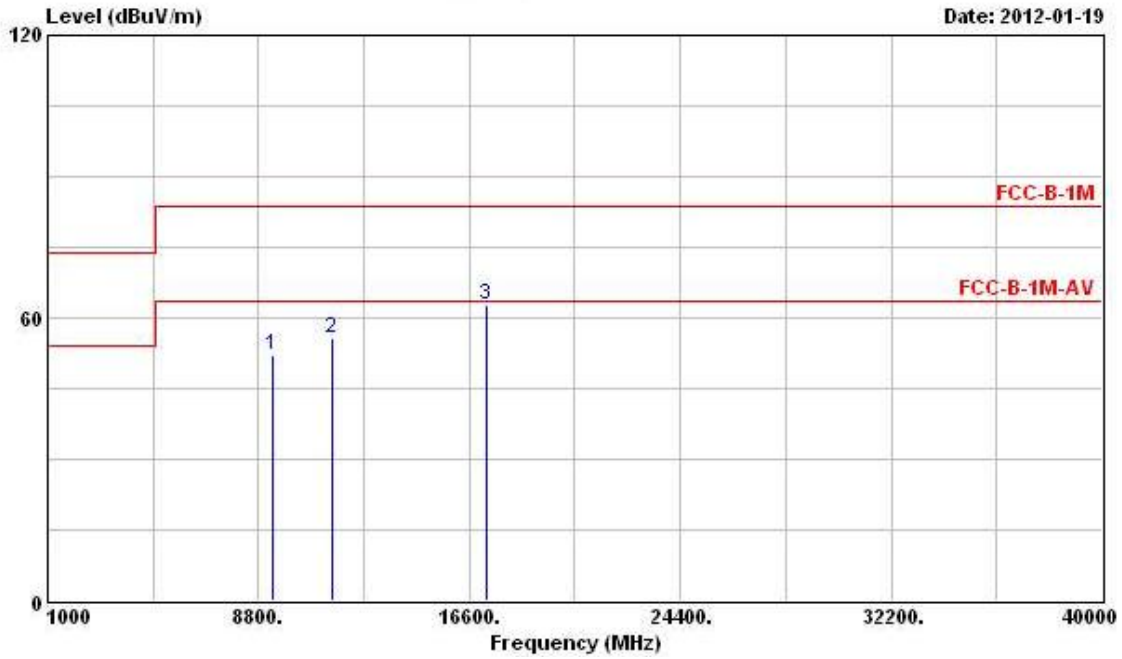
Note:
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

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

For Two Chains

Final Test Date	Jan. 19, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 149 (20MHz)

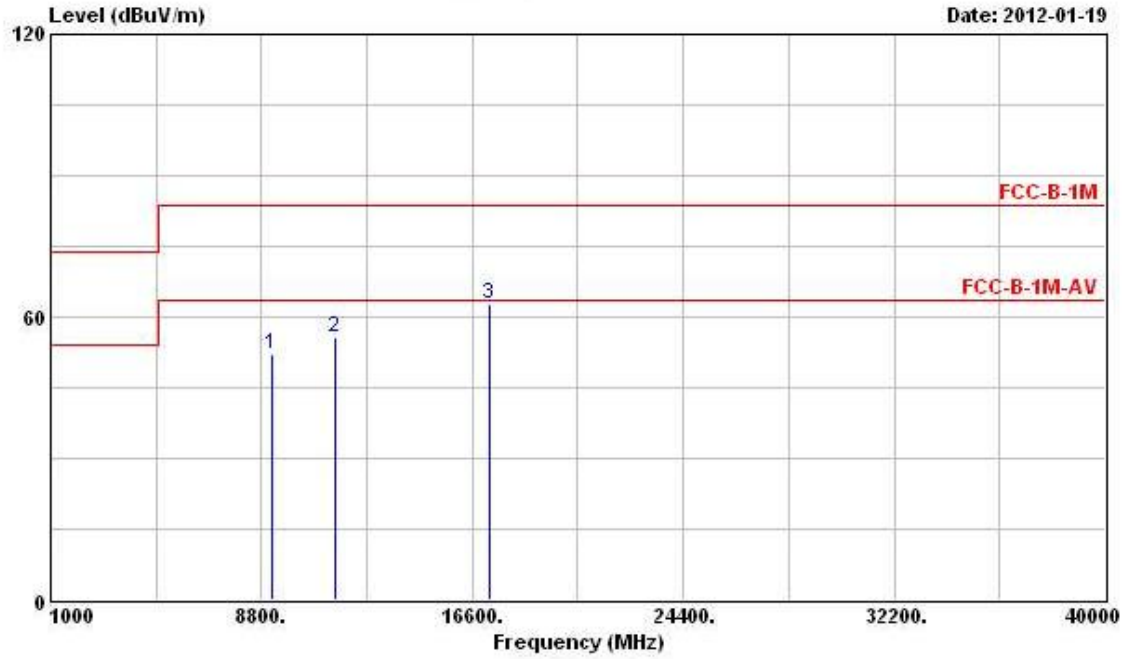
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	9320.000	52.18	-11.36	63.54	42.55	38.78	6.26	35.41	PK	---	---
2	11490.000	55.69	-7.85	63.54	43.19	40.59	6.63	34.72	PK	---	---
3	17235.000	62.92			44.79	43.56	8.55	33.98	Peak	---	---

Note: The item 3 is are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

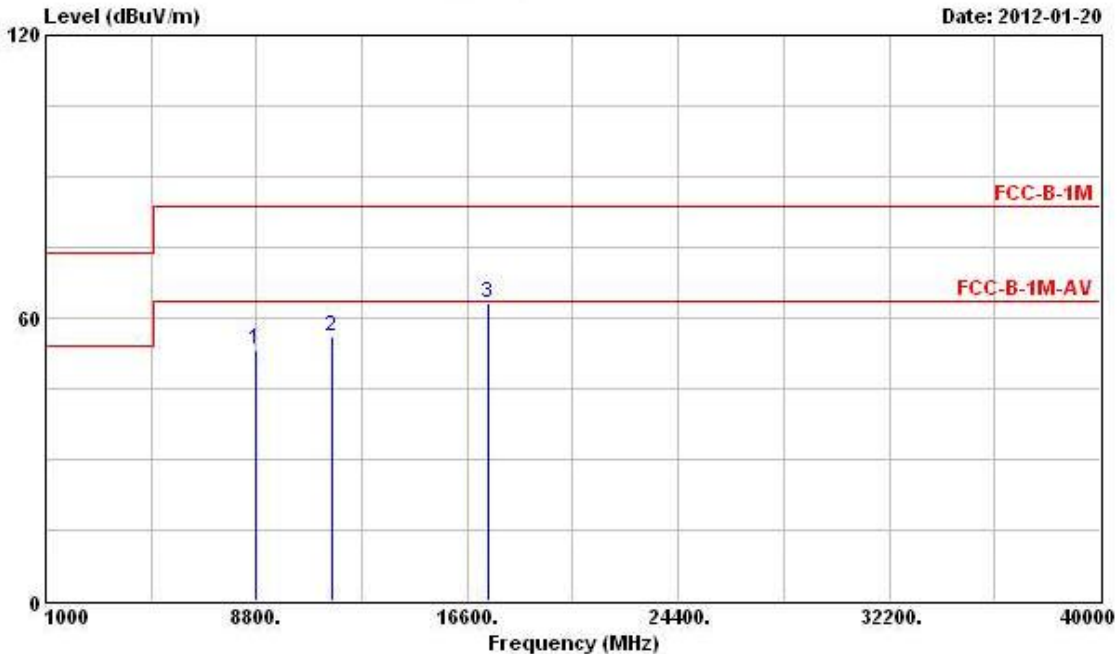


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	9190.000	52.16	-11.38	63.54	42.79	38.52	6.22	35.37	PK	---	---
2	11490.000	55.58	-7.96	63.54	43.08	40.59	6.63	34.72	PK	---	---
3	17235.000	62.59			44.46	43.56	8.55	33.98	Peak	---	---

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 20, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 157 (20MHz)

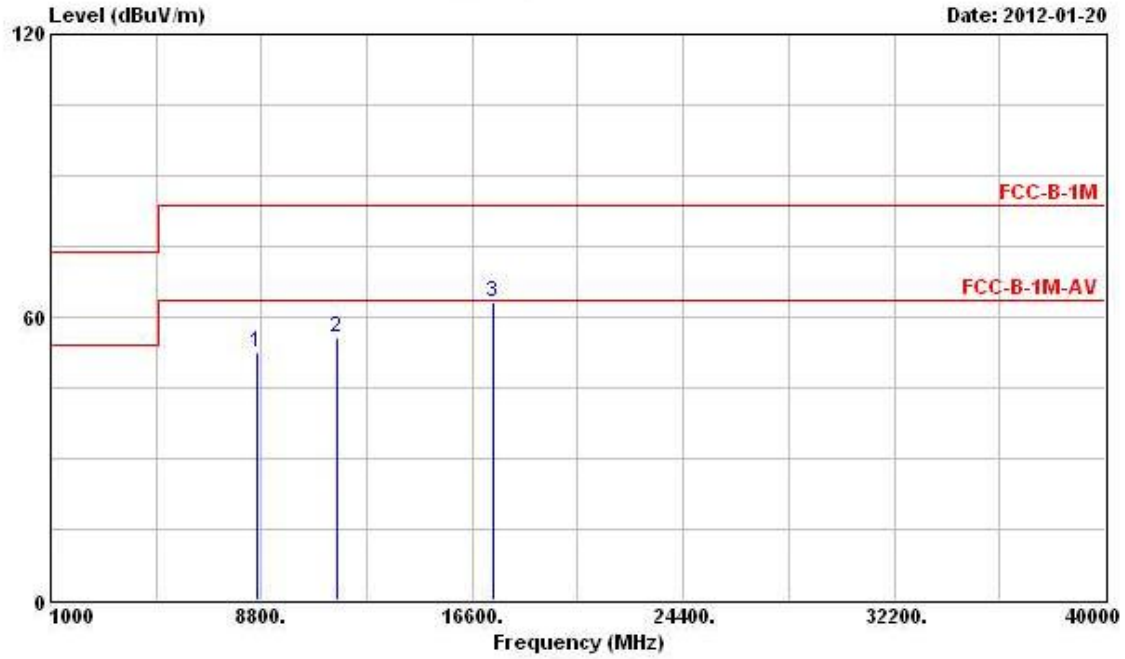
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8780.000	53.35			44.30	38.27	6.06	35.28	Peak	---	---
2	11570.000	55.95	-7.59	63.54	43.45	40.63	6.63	34.76	PK	---	---
3	17355.000	63.18			45.17	43.49	8.50	33.98	Peak	---	---

Note: The item 1 and 3 on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

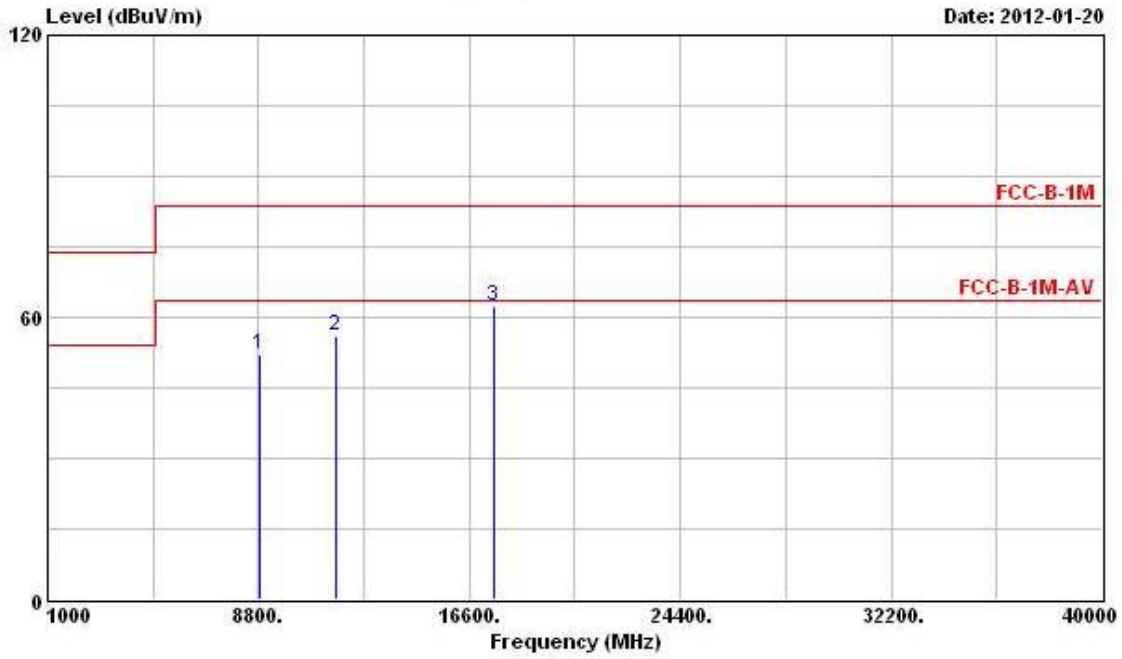


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8620.000	52.34			43.20	38.41	5.99	35.26	Peak	---	---
2	11570.000	55.54	-8.00	63.54	43.04	40.63	6.63	34.76	PK	---	---
3	17355.000	63.06			45.05	43.49	8.50	33.98	Peak	---	---

Note: The item 1 and 3 on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 20, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 165 (20MHz)

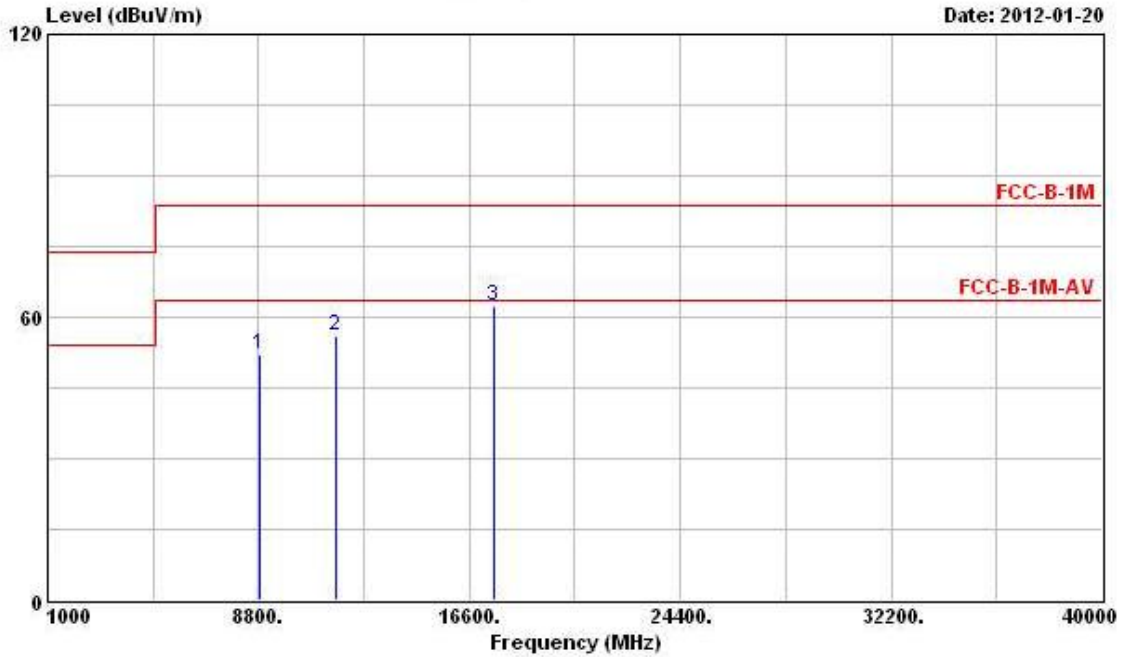
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8840.000	52.16			43.13	38.23	6.09	35.29	Peak	---	---
2	11650.000	55.90	-7.64	63.54	43.41	40.66	6.64	34.81	PK	---	---
3	17475.000	62.49			44.61	43.42	8.44	33.98	Peak	---	---

Note: The item 1 and 3 on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

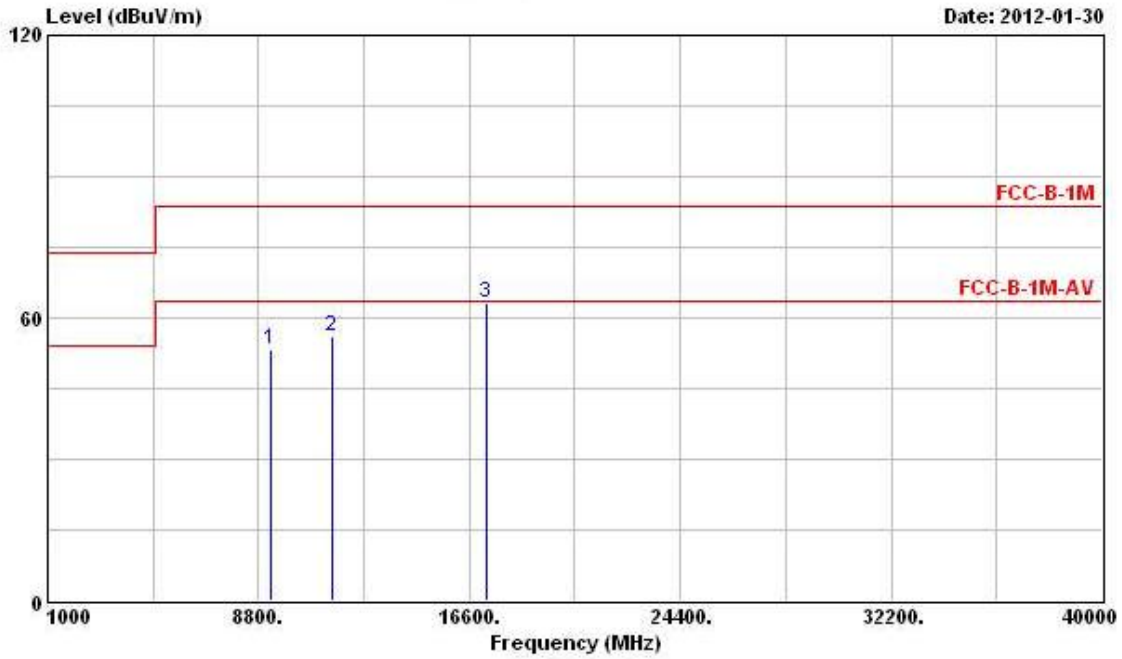


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8840.000	52.16			43.13	38.23	6.09	35.29	Peak	---	---
2	11650.000	55.90	-7.64	63.54	43.41	40.66	6.64	34.81	PK	---	---
3	17475.000	62.49			44.61	43.42	8.44	33.98	Peak	---	---

Note: The item 1 and 3 on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 151 (40MHz)

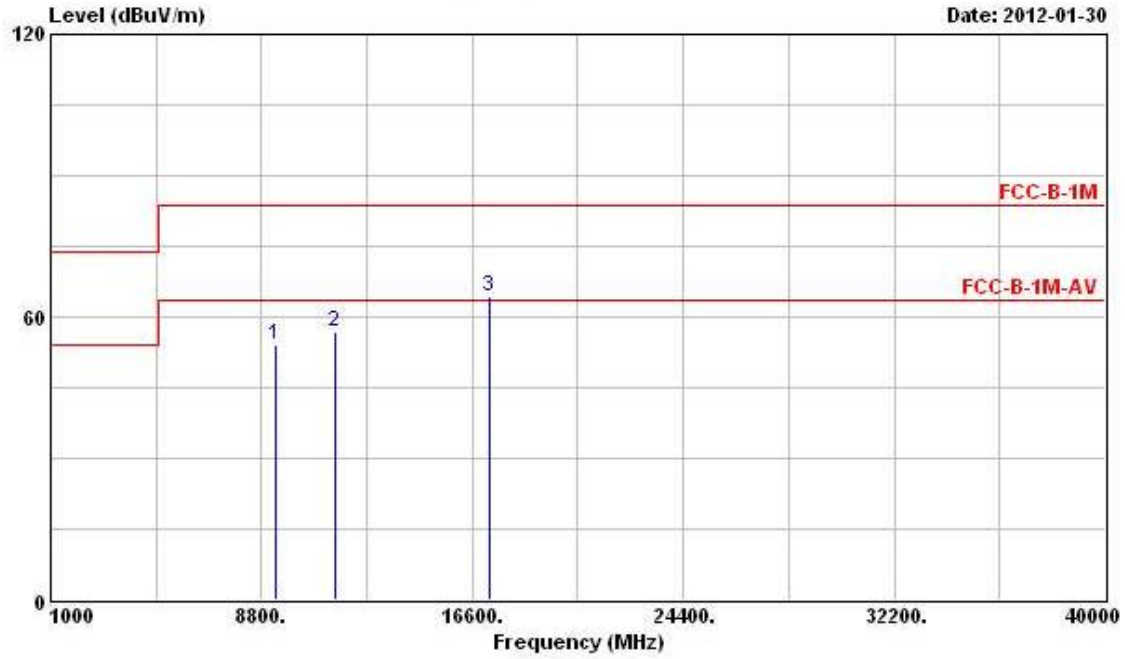
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	9250.000	53.36			43.87	38.63	6.25	35.39	Peak	---	---
2	11510.000	55.97	-7.57	63.54	43.46	40.60	6.63	34.72	PK	---	---
3	17265.000	62.97			44.87	43.54	8.54	33.98	Peak	---	---

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

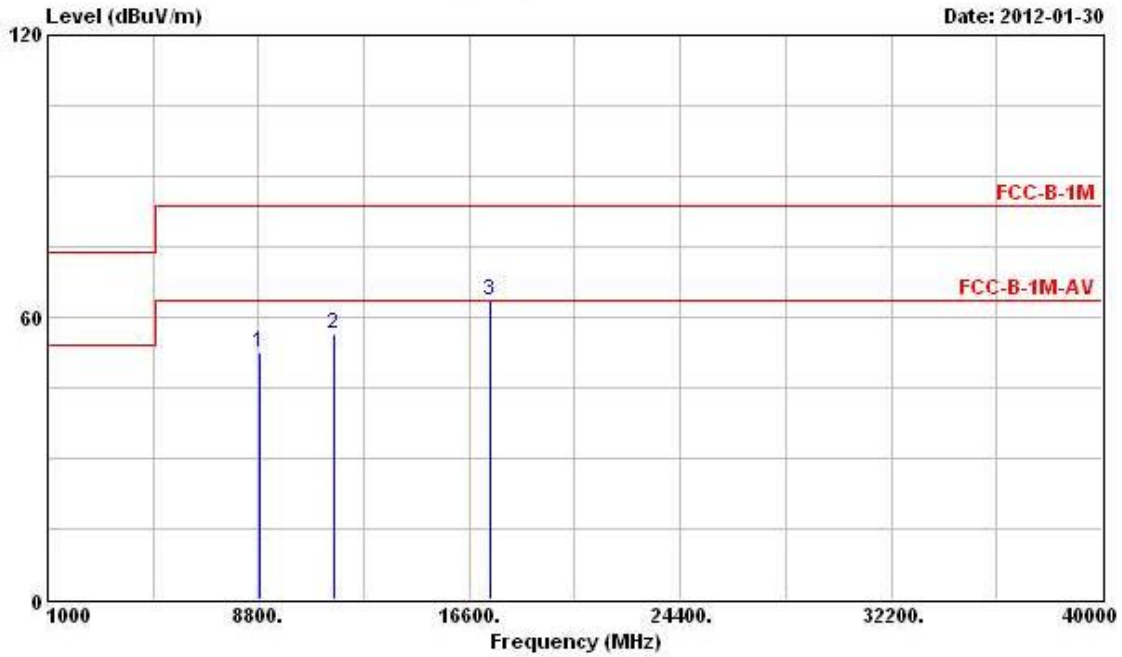


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	9321.000	54.04	-9.50	63.54	44.41	38.78	6.26	35.41	PK	---	---
2	11510.000	56.66	-6.88	63.54	44.15	40.60	6.63	34.72	PK	---	---
3	17265.000	64.37			46.27	43.54	8.54	33.98	Peak	---	---

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 159 (40MHz)

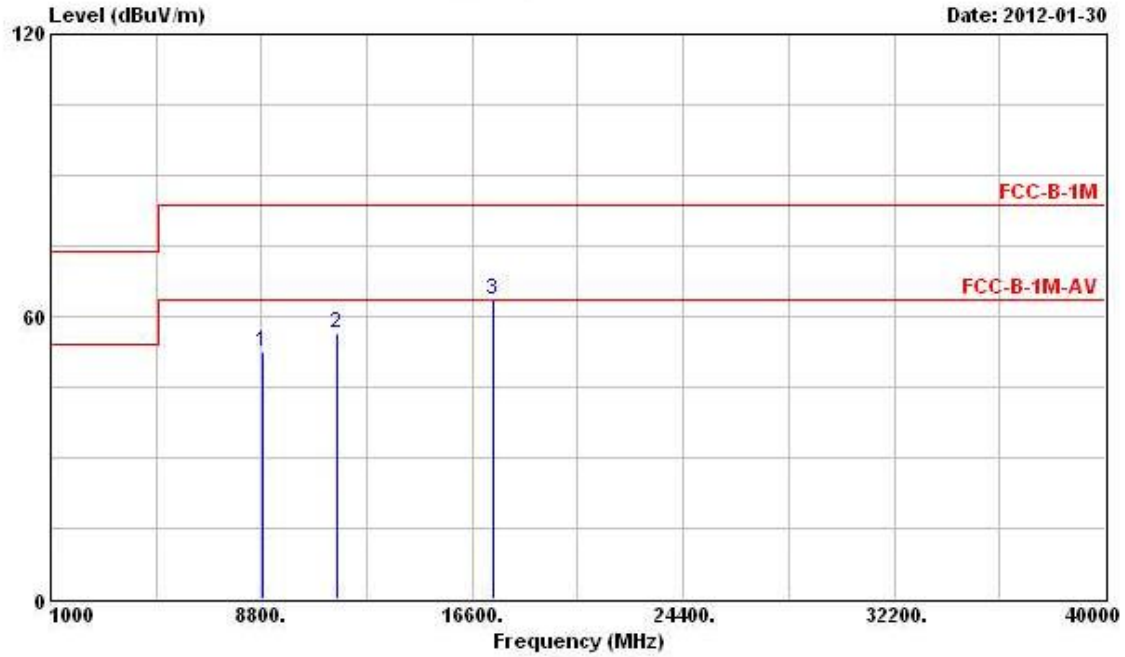
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8865.000	52.58			43.56	38.21	6.11	35.30	Peak	---	---
2	11590.000	56.49	-7.05	63.54	43.99	40.63	6.63	34.76	PK	---	---
3	17385.000	63.51			45.54	43.47	8.48	33.98	Peak	---	---

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

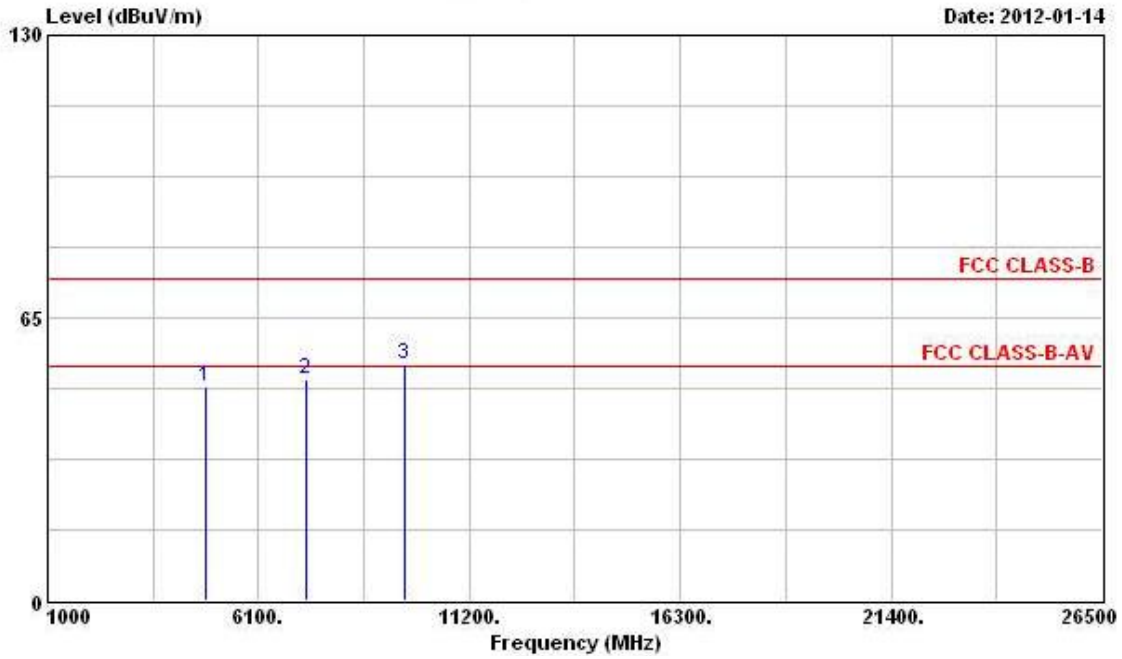


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8865.000	52.58			43.56	38.21	6.11	35.30	Peak	---	---
2	11590.000	56.49	-7.05	63.54	43.99	40.63	6.63	34.76	PK	---	---
3	17385.000	63.51			45.54	43.47	8.48	33.98	Peak	---	---

Note: The items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 1 (20MHz)

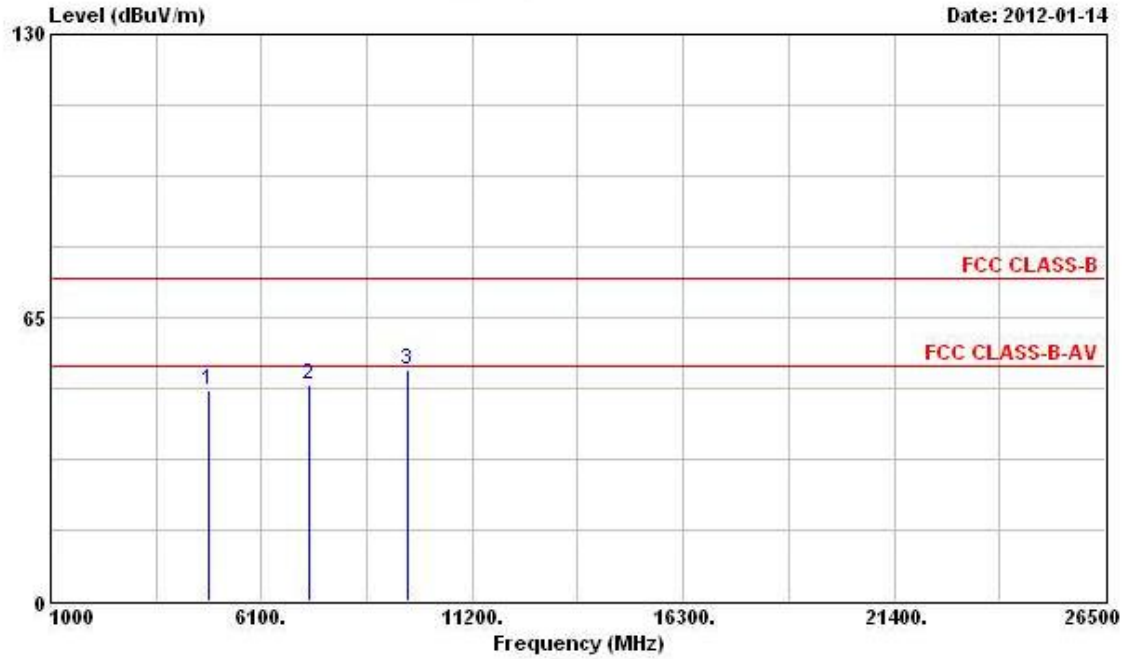
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4824.000	49.35	-4.65	54.00	43.81	35.76	4.58	34.80	PK	---	---
2	7236.000	50.68			42.28	37.85	5.63	35.08	Peak	---	---
3	9648.000	54.50			44.24	39.39	6.34	35.47	Peak	---	---

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

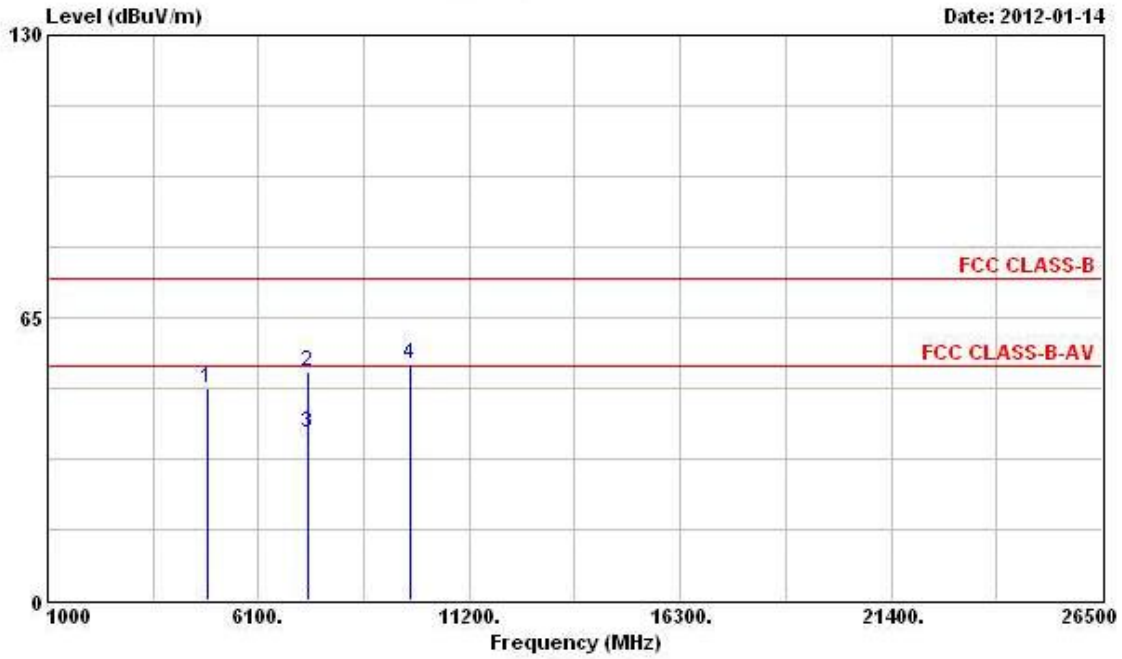


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4824.000	48.21	-5.79	54.00	43.30	35.13	4.58	34.80	PK	---	---
2	7236.000	49.58			42.13	36.90	5.63	35.08	Peak	---	---
3	9648.000	52.82			43.36	38.59	6.34	35.47	Peak	---	---

Note: The items 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 6 (20MHz)

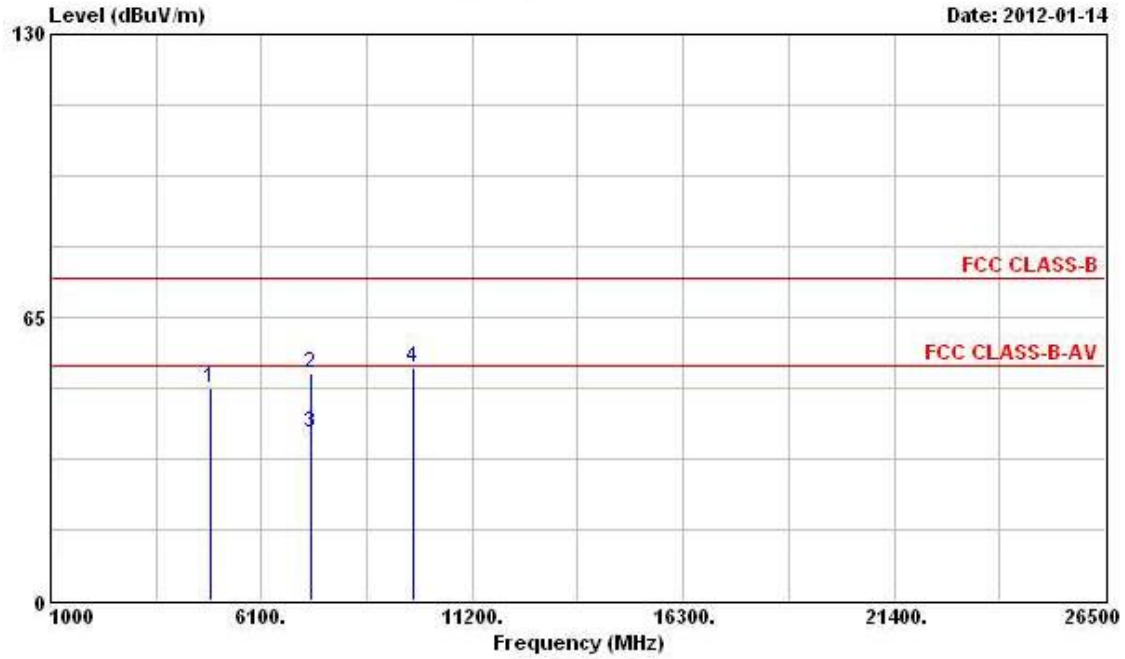
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4874.000	48.55	-5.45	54.00	42.89	35.83	4.61	34.78	PK	---	---
2	7311.000	52.47	-21.53	74.00	44.07	37.86	5.64	35.10	Peak	---	---
3	7311.000	38.39	-15.61	54.00	29.99	37.86	5.64	35.10	Average	---	---
4	9748.000	54.39			44.00	39.51	6.36	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

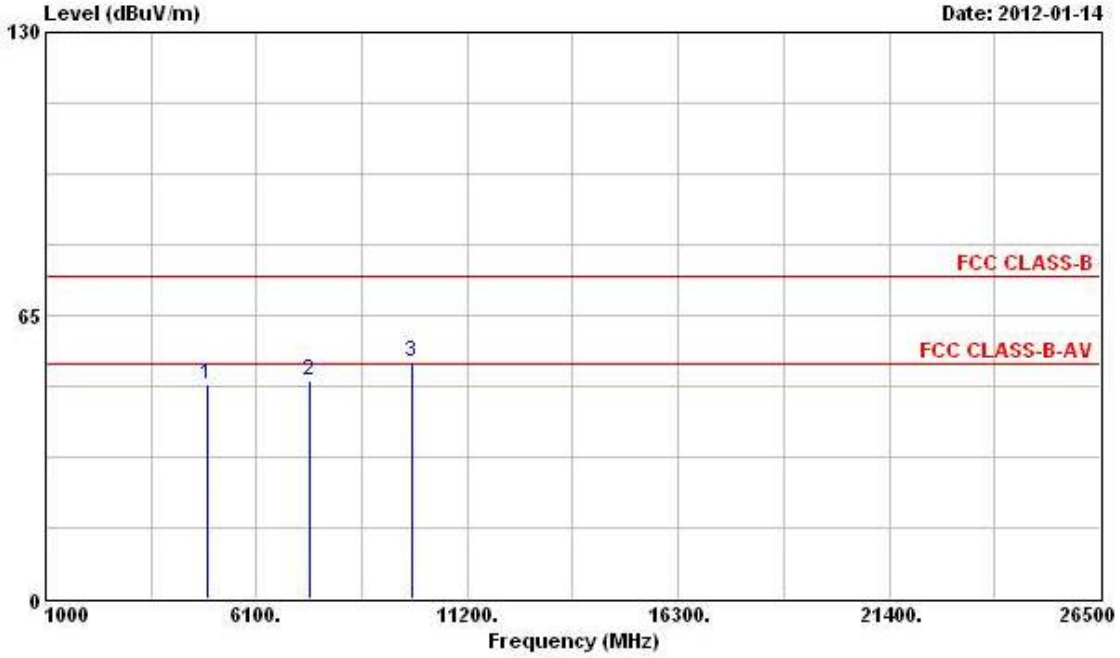


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4874.000	48.83	-5.17	54.00	43.82	35.18	4.61	34.78	PK	---	---
2	7311.000	52.25	-21.75	74.00	44.79	36.92	5.64	35.10	Peak	---	---
3	7311.000	38.41	-15.59	54.00	30.95	36.92	5.64	35.10	Average	---	---
4	9748.000	53.32			43.73	38.71	6.36	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 11 (20MHz)

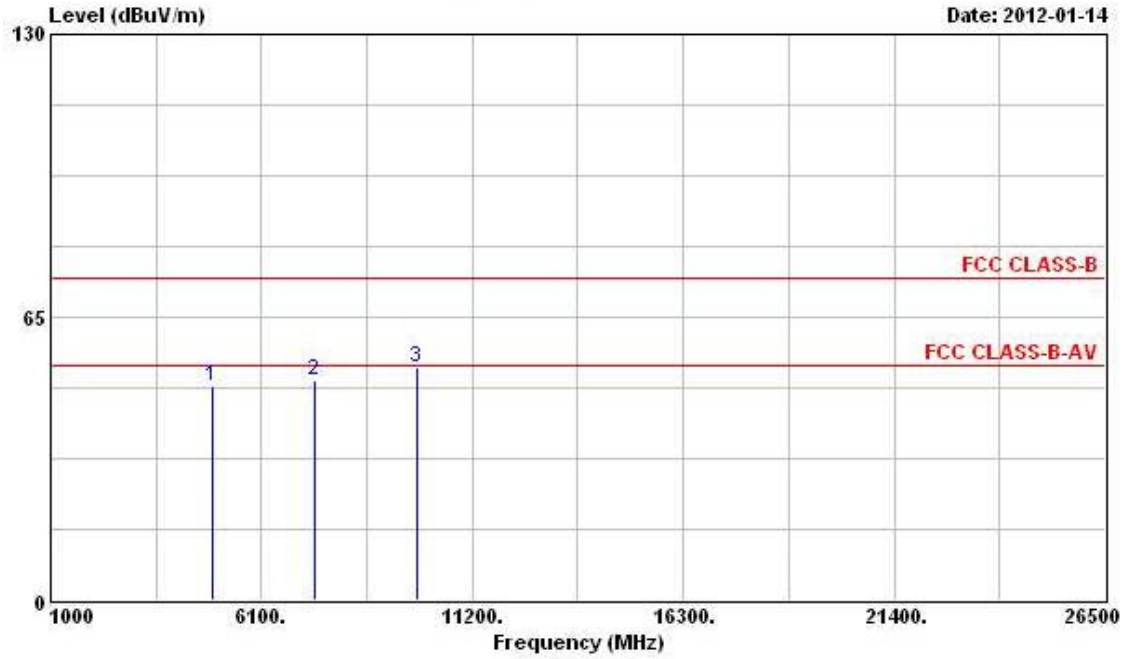
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4924.000	48.98	-5.02	54.00	43.17	35.90	4.68	34.77	PK	---	---
2 @	7386.000	50.20	-3.80	54.00	41.79	37.88	5.65	35.12	PK	---	---
3	9848.000	54.47			43.97	39.61	6.38	35.49	Peak	---	---

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

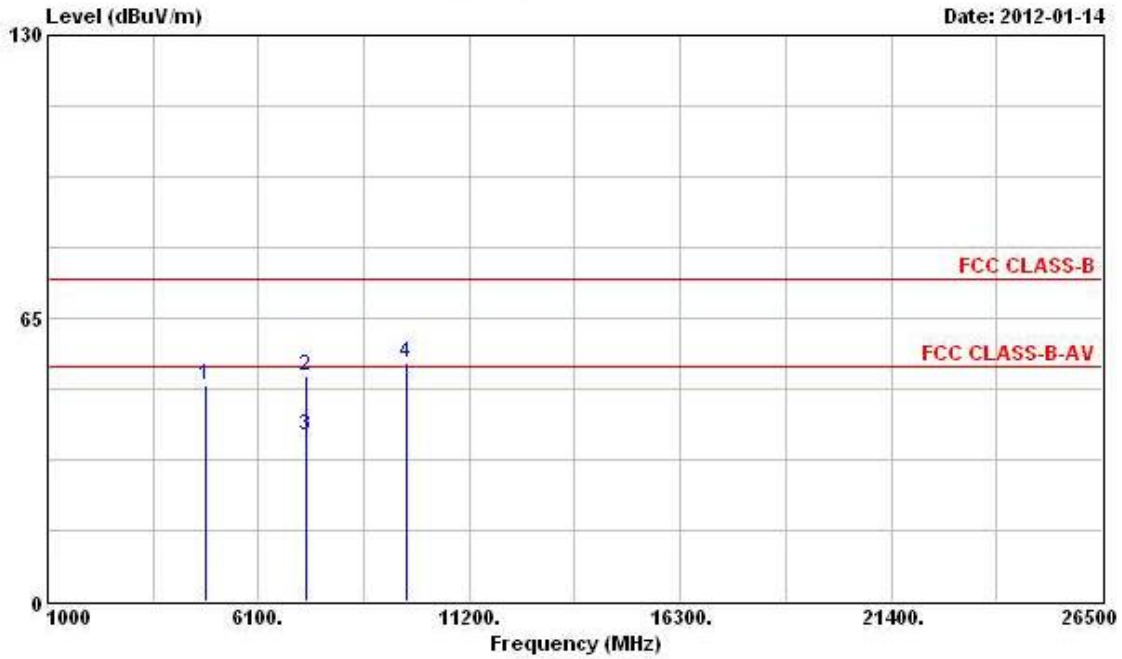


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	@ 4924.000	49.20	-4.80	54.00	44.06	35.23	4.68	34.77	PK	---	---
2	@ 7386.000	50.26	-3.74	54.00	42.77	36.96	5.65	35.12	PK	---	---
3	9848.000	53.45			43.75	38.81	6.38	35.49	Peak	---	---

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 3 (40MHz)

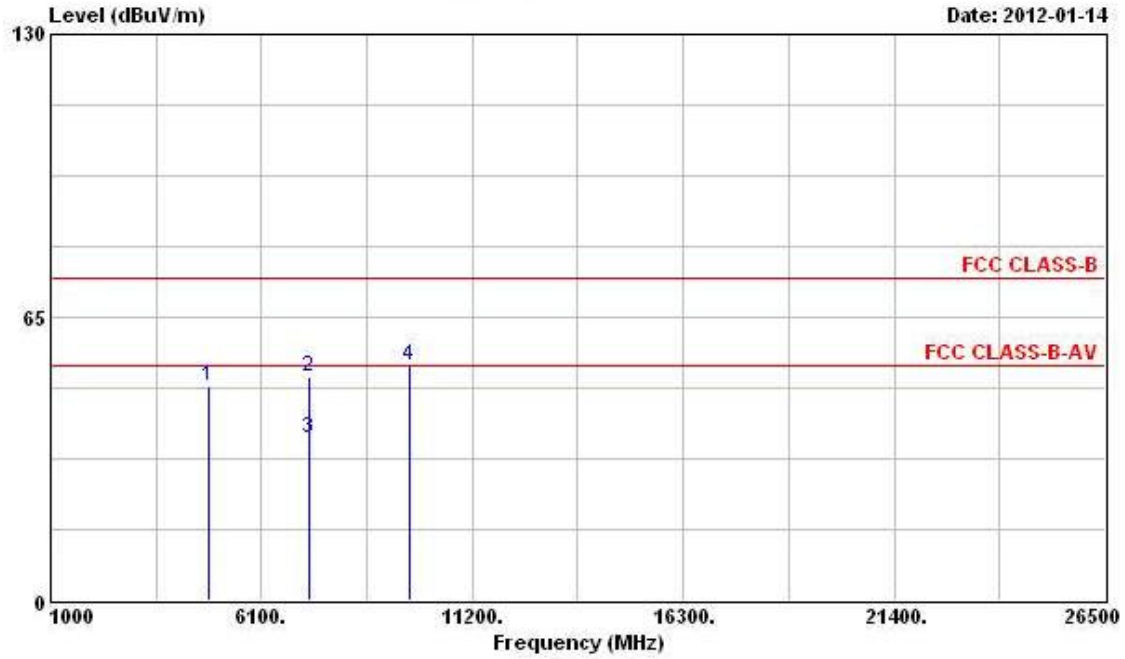
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4844.000	49.42	-4.58	54.00	43.82	35.78	4.61	34.79	PK	---	---
2	7266.000	51.75	-22.25	74.00	43.35	37.86	5.63	35.09	Peak	---	---
3	7266.000	37.94	-16.06	54.00	29.54	37.86	5.63	35.09	Average	---	---
4	9688.000	54.70	-----	-----	44.40	39.43	6.35	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

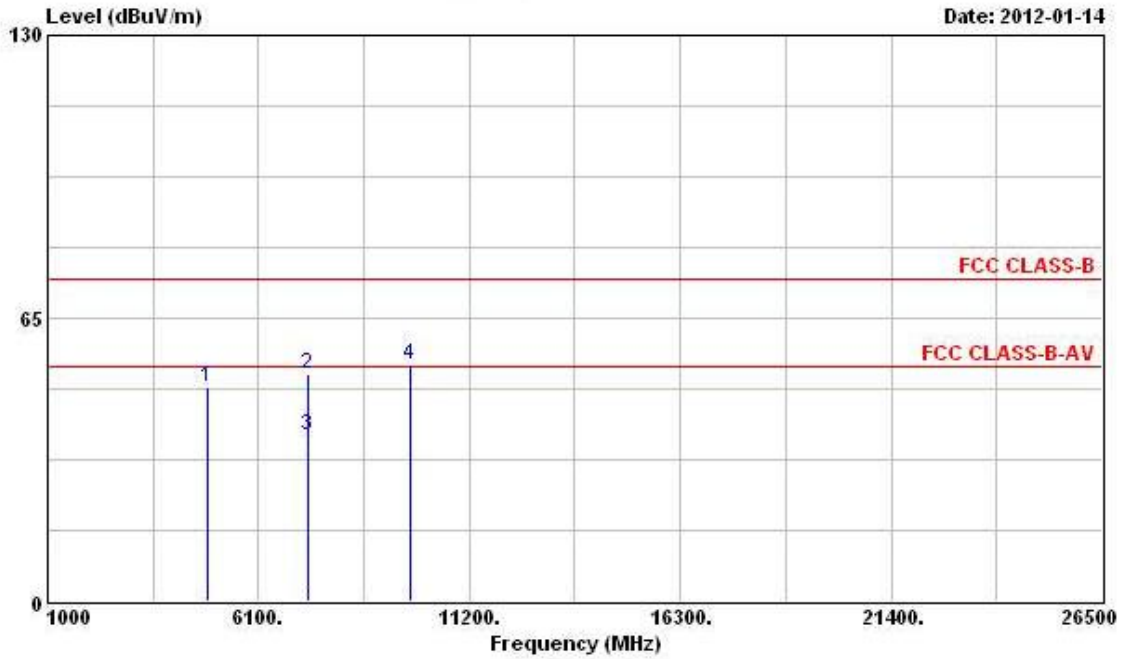


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4844.000	48.99	-5.01	54.00	44.03	35.14	4.61	34.79	PK	---	---
2	7266.000	51.44	-22.56	74.00	43.99	36.91	5.63	35.09	Peak	---	---
3	7266.000	37.31	-16.69	54.00	29.86	36.91	5.63	35.09	Average	---	---
4	9688.000	53.80			44.30	38.63	6.35	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 6 (40MHz)

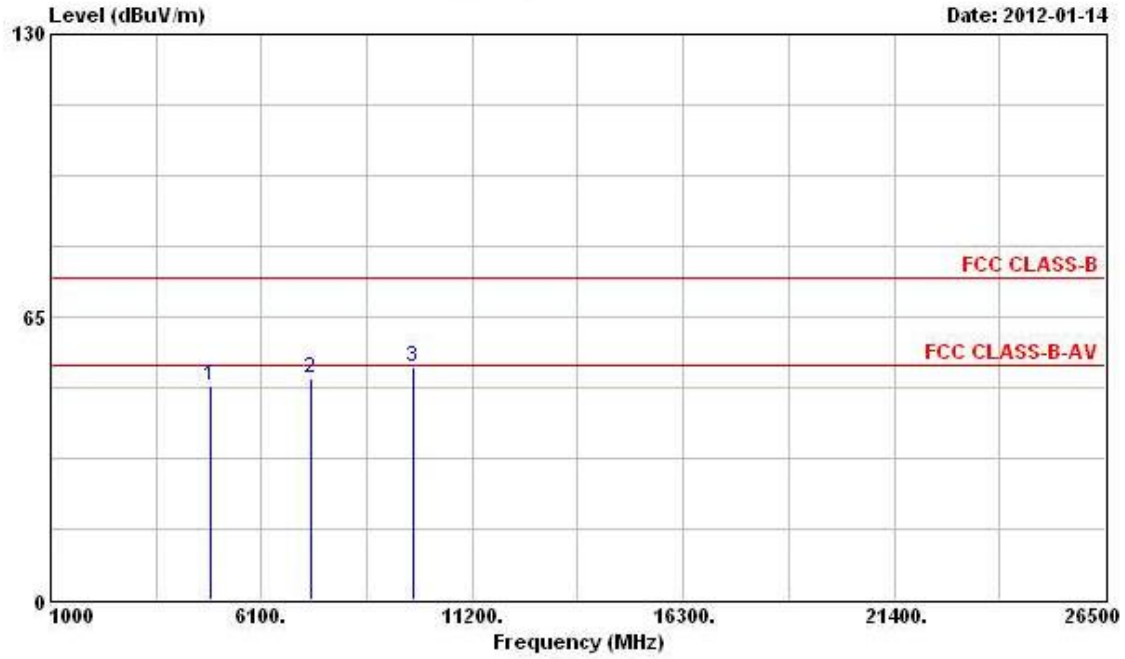
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4874.000	49.31	-4.69	54.00	43.65	35.83	4.61	34.78	PK	---	---
2	7311.000	51.99	-22.01	74.00	43.59	37.86	5.64	35.10	Peak	---	---
3	7311.000	38.08	-15.92	54.00	29.68	37.86	5.64	35.10	Average	---	---
4	9748.000	54.44			44.05	39.51	6.36	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

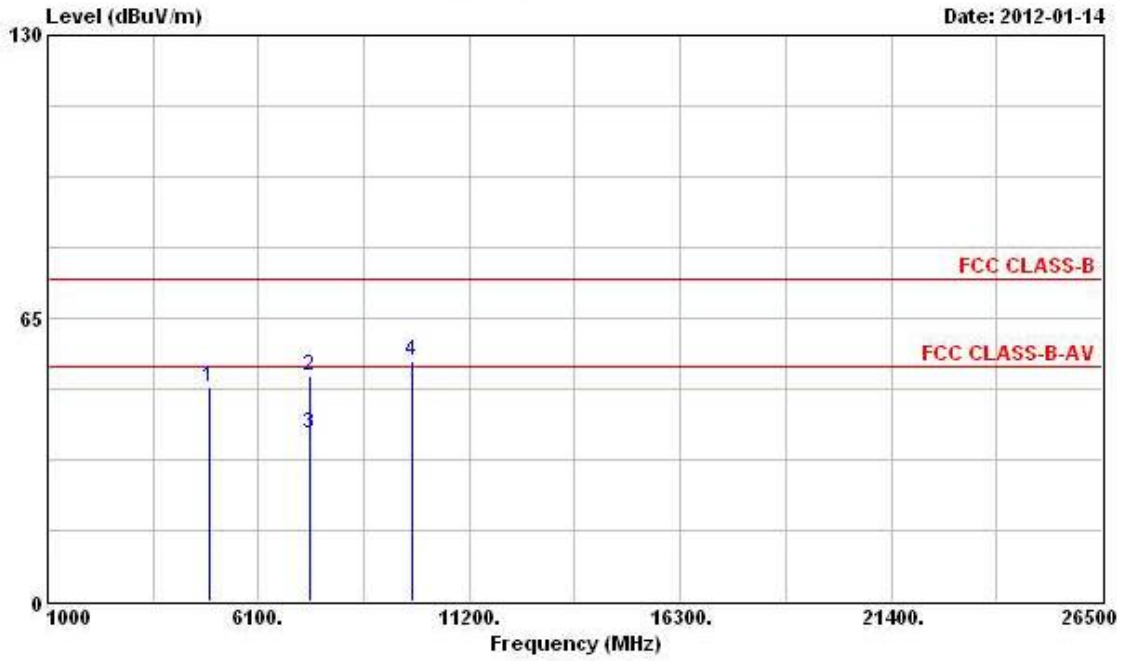


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4874.000	49.01	-4.99	54.00	44.00	35.18	4.61	34.78	PK	---	---
2 @	7311.000	50.97	-3.03	54.00	43.51	36.92	5.64	35.10	PK	---	---
3	9748.000	53.39			43.80	38.71	6.36	35.48	Peak	---	---

Note: The item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test Date	Jan. 14, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 9 (40MHz)

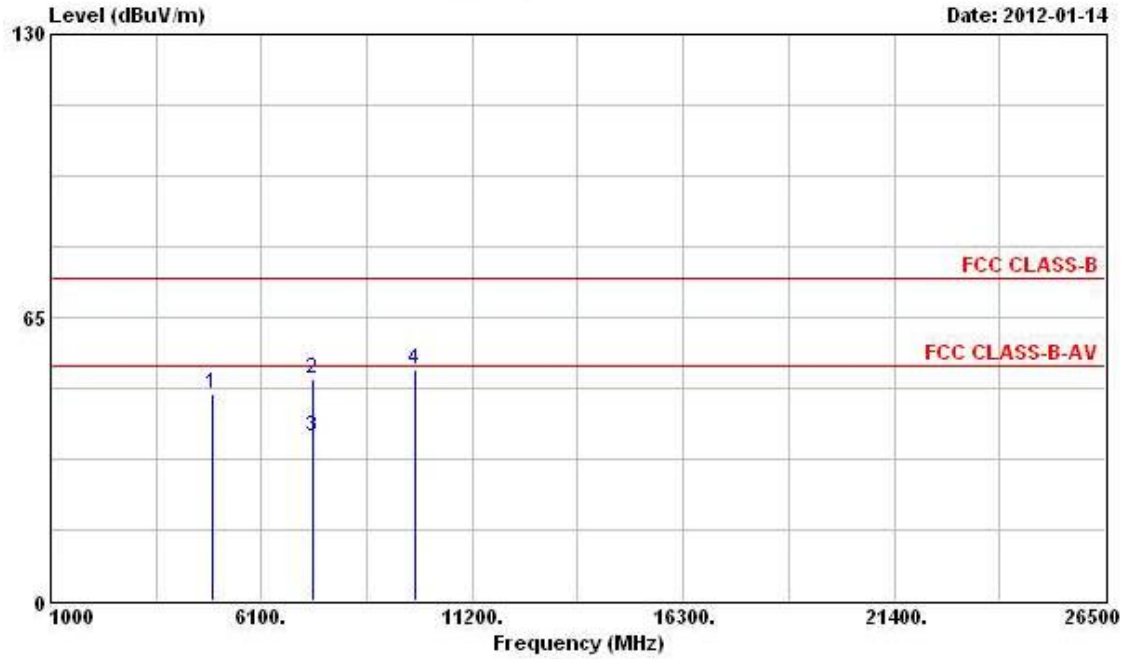
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4904.000	49.05	-4.95	54.00	43.31	35.88	4.64	34.78	PK	---	---
2	7356.000	51.94	-22.06	74.00	43.54	37.87	5.64	35.11	Peak	---	---
3	7356.000	38.44	-15.56	54.00	30.04	37.87	5.64	35.11	Average	---	---
4	9808.000	55.13			44.67	39.57	6.37	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4904.000	47.50	-6.50	54.00	42.43	35.21	4.64	34.78	PK	---	---
2	7356.000	51.09	-22.91	74.00	43.62	36.94	5.64	35.11	Peak	---	---
3	7356.000	37.48	-16.52	54.00	30.01	36.94	5.64	35.11	Average	---	---
4	9808.000	53.24			43.58	38.77	6.37	35.48	Peak	---	---

Note: The item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.3 Band Edge and Fundamental Emissions Measurement

3.3.1 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

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

3.3.2 Measuring Instruments and Setting

Please refer to section 4 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)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak

3.3.3 Test Procedures

1. The test procedure is the same as section 3.5.3; only the frequency range investigated is limited to 100MHz around band edges.
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.

3.3.4 Test Setup Layout

This test setup layout is the same as that shown in section 3.5.4.

3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.3.7 Test Result of Band Edge and Fundamental Emissions

For Two Chains:

Final Test Date	Jan. 13, 2012	Test Site No.	03CH02-HY
Temperature	20℃	Humidity	66%
Test Engineer	Streak	Configuration	5G 802.11n Ch. 149, 157, 165 (20MHz)

Channel 149

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5725.000	60.34			18.33	36.97	5.04	0.00	Average	---	---
2 @	5743.450	101.09			59.03	36.99	5.07	0.00	Average	---	---
1	5696.620	73.57			31.62	36.93	5.02	0.00	Peak	---	---
2 @	5747.090	112.28			70.22	36.99	5.07	0.00	Peak	---	---

The item 2 is fundamental emissions and the item 1 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Channel 157

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5716.830	60.24			18.25	36.95	5.04	0.00	Average	---	---
2 @	5780.070	101.07			58.95	37.03	5.09	0.00	Average	---	---
3 @	5851.470	60.05			17.83	37.11	5.11	0.00	Average	---	---
1	5717.510	73.06			31.05	36.97	5.04	0.00	Peak	---	---
2 @	5781.940	112.18			70.06	37.03	5.09	0.00	Peak	---	---
3	5860.310	73.30			31.04	37.13	5.13	0.00	Peak	---	---

The item 2 is fundamental emissions and the items 1 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Channel 165

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5822.870	100.40			58.20	37.09	5.11	0.00	Average	---	---
2 @	5854.050	59.82			17.58	37.13	5.11	0.00	Average	---	---
1 @	5821.990	112.00			69.80	37.09	5.11	0.00	Peak	---	---
2	5853.010	73.76			31.54	37.11	5.11	0.00	Peak	---	---

The item 1 is fundamental emissions and the item 2 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Note:

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

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

Final Test Date	Jan. 13, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	5G 802.11n Ch. 151, 159 (40MHz)

Channel 151

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5716.400	59.99			18.00	36.95	5.04	0.00	Average	---	---
2 @	5778.400	98.23			56.11	37.03	5.09	0.00	Average	---	---
1	5722.800	72.80			30.79	36.97	5.04	0.00	Peak	---	---
2 @	5778.500	110.23			68.11	37.03	5.09	0.00	Peak	---	---

The item 2 is fundamental emissions and the item 1 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Channel 159

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	5788.700	97.51			55.37	37.05	5.09	0.00	Average	---	---
2 @	5857.900	59.75			17.49	37.13	5.13	0.00	Average	---	---
1 @	5788.600	109.33			67.19	37.05	5.09	0.00	Peak	---	---
2	5865.400	72.77			30.51	37.13	5.13	0.00	Peak	---	---

The item 1 is fundamental emissions and the item 2 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.
Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Jan. 13, 2012	Test Site No.	03CH02-HY
Temperature	20℃	Humidity	66%
Test Engineer	Streak	Configuration	2.4G 802.11n Ch. 1, 6, 11(20MHz)

Channel 1

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2390.000	52.73	-1.27	54.00	17.92	31.79	3.02	0.00	Average	---	---
2 @	2413.170	102.18			67.30	31.86	3.02	0.00	Average	---	---
1 @	2390.000	68.84	-5.16	74.00	34.03	31.79	3.02	0.00	Peak	---	---
2 @	2413.930	113.86			78.98	31.86	3.02	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2438.820	103.69			68.65	31.99	3.05	0.00	Average	---	---
1 @	2438.060	115.00			79.96	31.99	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 11

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2460.290	102.19			67.08	32.06	3.05	0.00	Average	---	---
2 @	2483.500	52.97	-1.03	54.00	17.76	32.13	3.08	0.00	Average	---	---
1 @	2460.290	113.84			78.73	32.06	3.05	0.00	Peak	---	---
2 @	2483.850	70.82	-3.18	74.00	35.61	32.13	3.08	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Jan. 13, 2012	**Test Site No.**	03CH02-HY
Temperature	20℃	**Humidity**	66%
Test Engineer	Streak	**Configuration**	2.4G 802.11n Ch. 3, 6, 9 (40MHz)

Channel 3

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2390.000	52.48	-1.52	54.00	17.67	31.79	3.02	0.00	Average	---	---
2 @	2425.330	97.65			62.68	31.92	3.05	0.00	Average	---	---
1 @	2388.660	68.00	-6.00	74.00	33.19	31.79	3.02	0.00	Peak	---	---
2 @	2426.090	108.80			73.83	31.92	3.05	0.00	Peak	---	---

The item 2 is Fundamental Emissions.

Channel 6

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2439.770	99.83			64.79	31.99	3.05	0.00	Average	---	---
1 @	2440.530	111.31			76.27	31.99	3.05	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Channel 9

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	2456.490	97.88			62.77	32.06	3.05	0.00	Average	---	---
2 @	2483.850	52.92	-1.08	54.00	17.71	32.13	3.08	0.00	Average	---	---
1 @	2454.780	109.13			74.02	32.06	3.05	0.00	Peak	---	---
2 @	2486.130	67.50	-6.50	74.00	32.29	32.13	3.08	0.00	Peak	---	---

The item 1 is Fundamental Emissions.

Note:

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

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

3.4 Antenna Requirements

3.4.1 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.

3.4.2 Antenna Connector Construction

Please refer to section 2.2 in this test report; antenna connector complied with the requirements.

4 LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 06, 2010	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99041	9kHz – 30MHz	Mar. 23, 2010	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Apr. 29, 2010	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2010	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9 kHz ~ 40 GHz	Aug. 08, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz ~ 1 GHz 3m	May 11, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz ~ 1.3 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1 GHz ~ 26.5 GHz	Jul. 25, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1 GHz ~ 18 GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz ~ 1 GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1 GHz ~ 40 GHz	Mar. 07, 2011	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz ~ 2 GHz	Oct. 22, 2011	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010*	Radiation (03CH02-HY)

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

5 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

6 TAF CERTIFICATE OF ACCREDITATION

Certificate No.：L1190-110111

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：January 11, 2011

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