FCC RADIO TEST REPORT

According to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment	:	**802.11 abgn(1X1)+Bluetooth(2.1)module**
Brand Name	:	**DT Research Inc.**
Model No.	:	**DT430**
Filing Type	:	**New Application**
Applicant	:	**Summit Data Communications,Inc.**
Manufacturer		526 South Main St. Suite 805 Akron, OH 44311
FCC ID	:	**TWG-SDCMSD40NBT**
Received Date	:	May 30, 2012
Final Test Date	:	Aug. 20, 2012

Statement

Test result included is only for the 802.11a/n (5725~5850 MHz) 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 C63.4-2009** 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: Aug. 28, 2012
Report No.: FR260551AI
■ No additional attachment.
□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

According to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment	:	802.11 abgn(1X1)+Bluetooth(2.1)module
Brand Name	:	DT Research Inc.
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Applicant	:	Summit Data Communications,Inc. 526 South Main St. Suite 805 Akron, OH 44311

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on May 30, 2012 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	7.35 dB
-	15.247(b)(3)	Maximum Peak Output Power	Complies	-
-	15.247(e)	Power Spectral Density	Complies	-
-	15.247(a)(2)	6dB Spectrum Bandwidth Measurement	Complies	-
3.2	15.247(d)	Radiated Emissions	Complies	3.95 dB
3.3	15.247(d)	Band Edge and Fundamental Emissions	Complies	-
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 Summit / SDC-MSD40NBT.

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth Measurement	$\pm 8.5\times10^{-8}$	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 802.11a/n 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	From 5V adapter
Data Modulation Data Rate (Mbps)	OFDM for IEEE 802.11a (BPSK / QPSK / 16QAM / 64QAM) (6/9/12/18/24/36/48/54) See the below table for IEEE 802.11n
Frequency Range	5725 ~ 5850MHz
Channel Number	5 for 20MHz bandwidth ; 2 for 40MHz bandwidth

IEEE 802.11n Modulation Scheme

MCS	Spatial	Modulation	Coding Rate	Data rate(Mbps)
Index	Streams	Type	Type	20 MHz channel 800nsGI
0	1	BPSK	1/2	6.5
1	1	QPSK	1/2	13
2	1	QPSK	3/4	19.5
3	1	16-QAM	1/2	26
4	1	16-QAM	3/4	39
5	1	64-QAM	2/3	52
6	1	64-QAM	3/4	58.5
7	1	64-QAM	5/6	65

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 Accessories

Accessories Information				
AC Adapter	Brand Name	L.T.E.	Model Name	LTE18W-S1
	Power Rating	I/P: 100-240Vac, 50/60Hz, 0.5A; O/P: 5Vdc 3A, MAX:15W		

Note: Regarding to more detail and other information, please refer to user manual.

2.3 Table for Filed Antenna

Antenna Category (Ant. Cat.)	
☒	Integral antenna (antenna permanently attached)
	☒ Temporary RF connector provided ; ☐ No temporary RF connector provided

Transmitter Outputs & Receiver Inputs Information			
Modulation	**Transmitter Outputs**	**Receiver Inputs**	**Transmitter Output Signals**
802.11a	1	1	-
802.11n HT20	1	1	-

Antenna General Information									
Antenna Port (Total 2 Port)		1(TX/RX)							
Maximum RF Output Power Level (PL)		1							
Transmit Chains Power Distribution		☒ symmetrical distribution ☐ asymmetrical distribution							
Ant. No.	**PL**	**Ant. Port** [Ant No. *X* connect to Ant. Port *Y*]	**Ant. Cat.**	**Ant. Type**	**Brand**	**Model**	**G_{ANT}** (dBi)	**DG (dBi)** [correlated] **N_{TX} = 1**	**DG (dBi)** [uncorrelated] **N_{TX} = 2**
1	1	1	Integral	PCB	--	--	4.57	N/A	4.57

Note 1: For all transmitter outputs with equal antenna gains, directional gain is to be computed as follows:
Any transmit signals are correlated, Directional Gain (DG) = G_{ANT} + 10 log(N) dBi
All transmit signals are completely uncorrelated, Directional Gain (DG)= G_{ANT}

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

2.4 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	-	-

2.5 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 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
AC Power Line Conducted Emissions	Transmitting mode	-	-
Radiated Emissions Below 1GHz	11a/BPSK	6 Mbps	157
	MCS 0 (20MHz)	6.5 Mbps	157
Radiated Emissions Above 1GHz Fundamental Emissions	11a/BPSK	6 Mbps	149/157/161
	MCS 0 (20MHz)	6.5 Mbps	149/157/161
Band Edge Emissions	11a/BPSK	6 Mbps	149/161
	MCS 0 (20MHz)	6.5 Mbps	149/157/161

2.6 Table for Testing Locations

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

Semi Anechoic Chamber (SAC).

2.7 Table for Supporting Units

The EUT was tested alone.

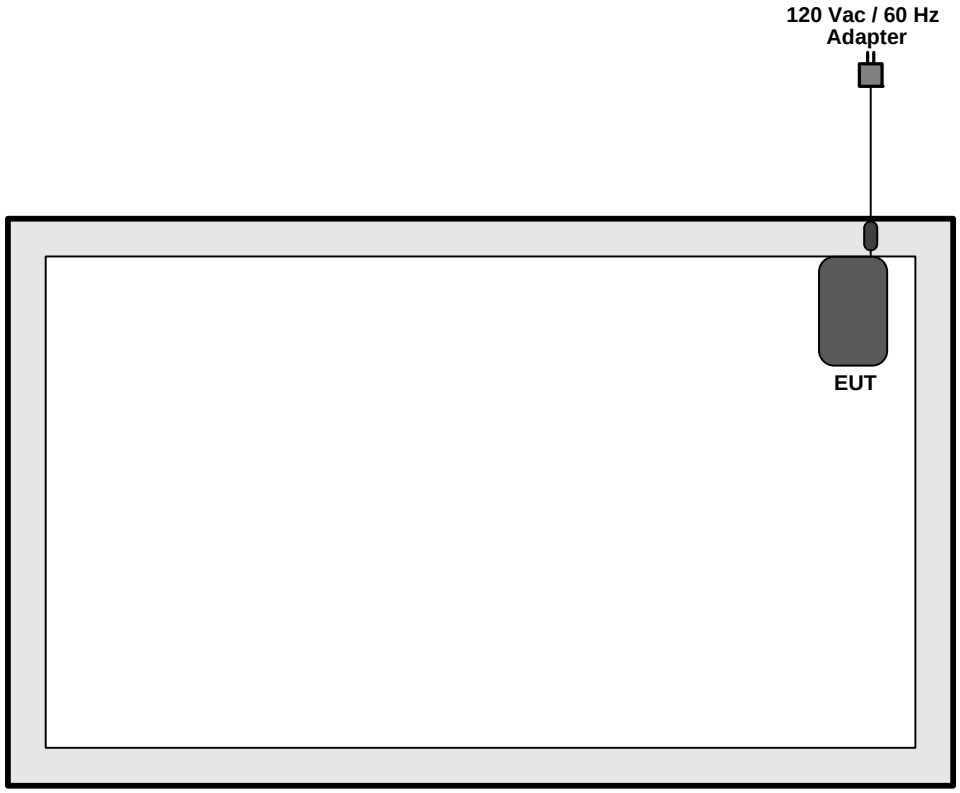
2.8 EUT Operation during Test

The program was executed as follows:

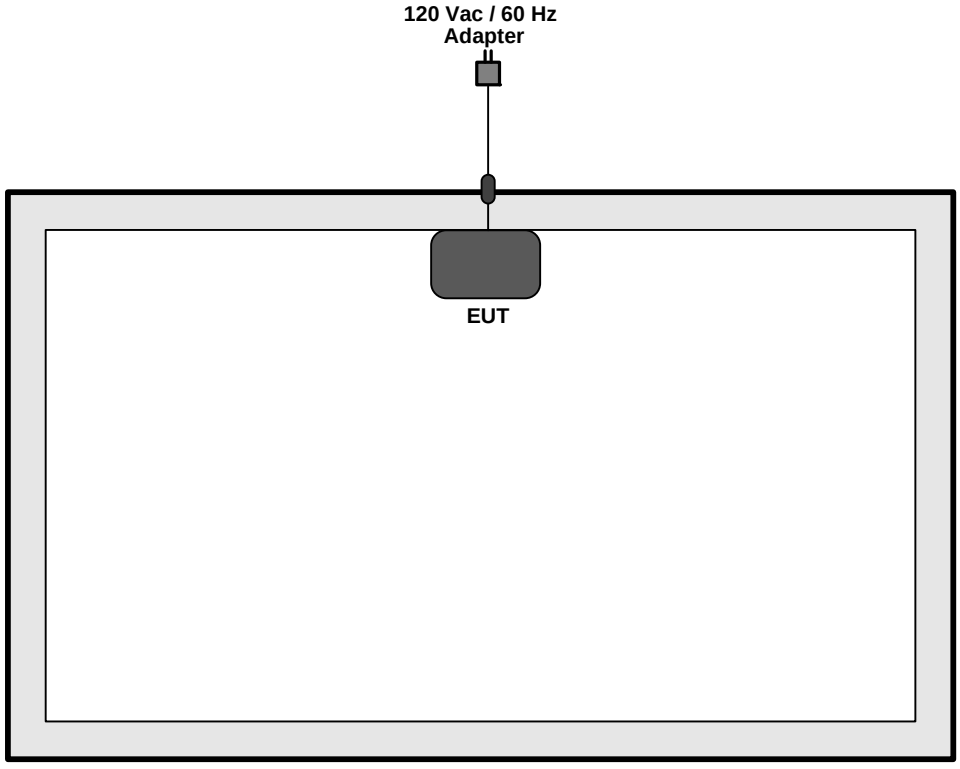
- Executed “sru-CE-ARM” to keep transmitting signals at fixed frequency.

2.9 Test Configuration

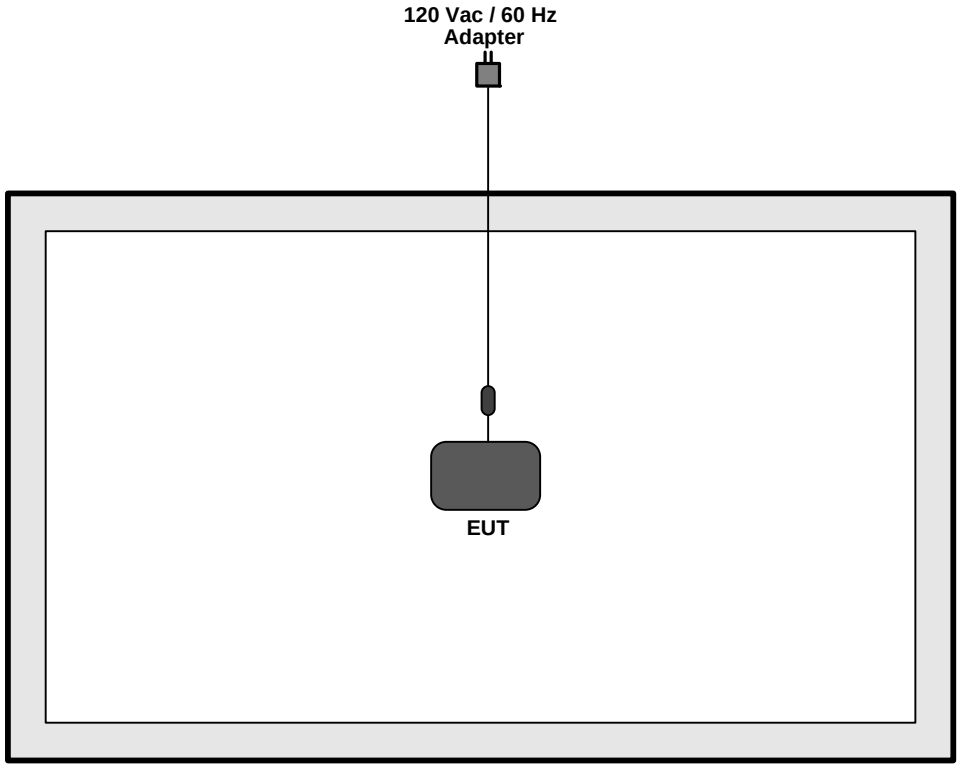
For conducted emissions



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

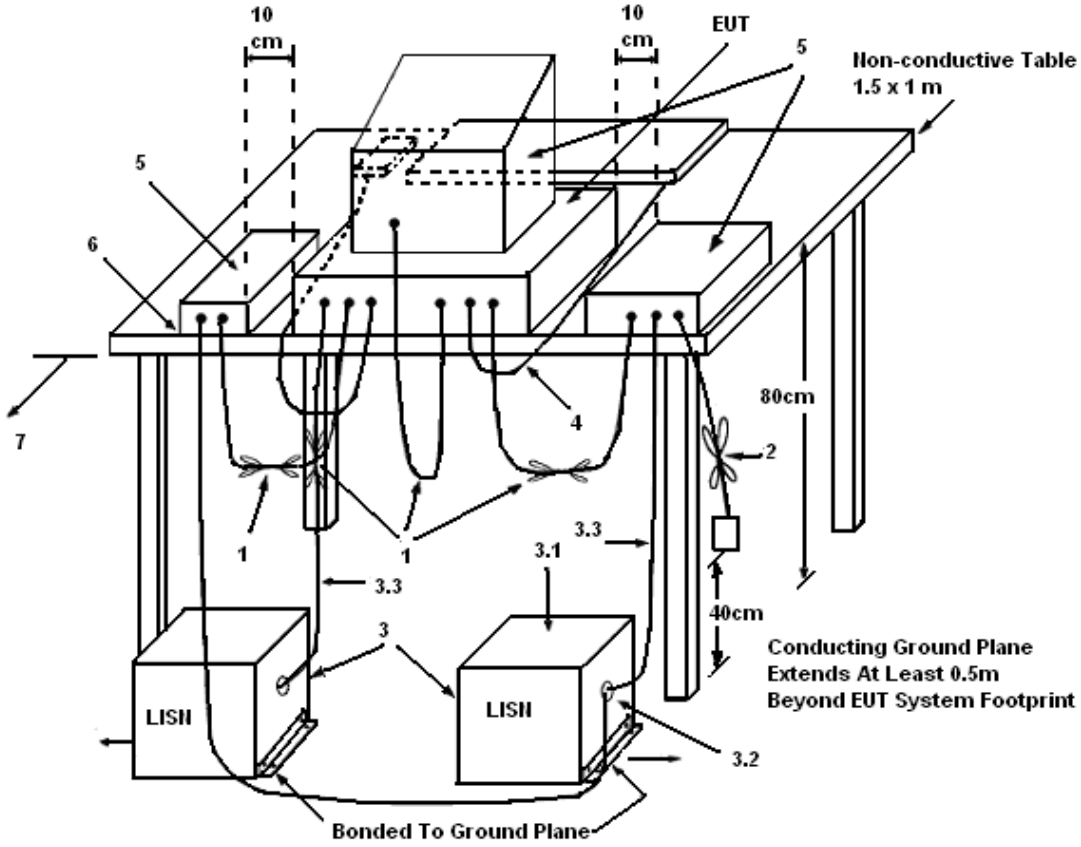
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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 was warmed up for 15 minutes before testing started.
2. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connect to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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.

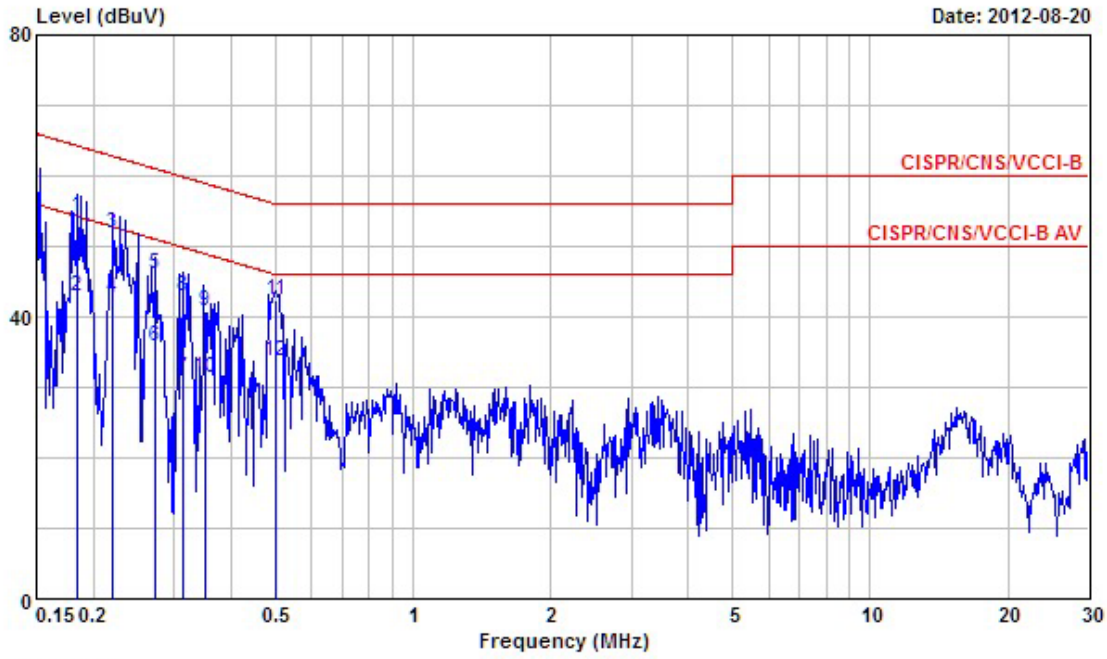
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

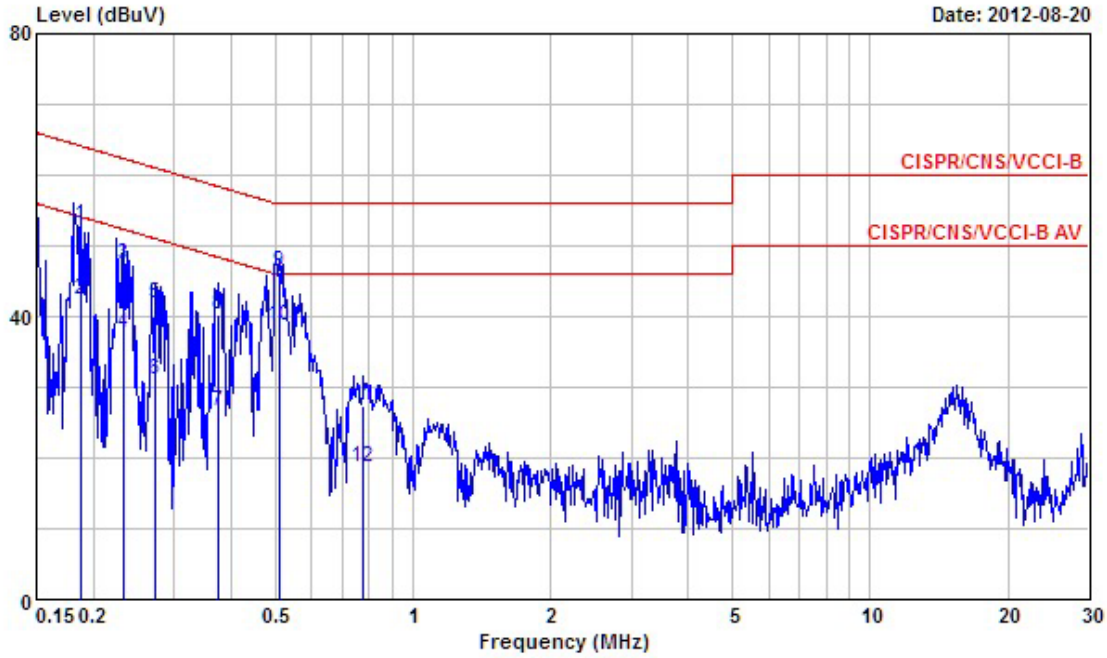
Final Test Date	Aug. 20, 2012	**Test Site No.**	CO04-HY
Temperature	26.1℃	**Humidity**	49%
Test Engineer	Bill	**Configuration**	Transmitting Mode

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.1844300	54.23	-10.05	64.28	53.65	0.23	0.35	QP
2	0.1844300	42.79	-11.49	54.28	42.21	0.23	0.35	Average
3	0.2208340	51.91	-10.88	62.79	51.36	0.23	0.32	QP
4	0.2208340	42.51	-10.28	52.79	41.96	0.23	0.32	Average
5	0.2729650	45.99	-15.04	61.03	45.41	0.23	0.35	QP
6	0.2729650	35.82	-15.21	51.03	35.24	0.23	0.35	Average
7	0.3132810	31.20	-18.68	49.88	30.61	0.22	0.37	Average
8	0.3132810	42.85	-17.03	59.88	42.26	0.22	0.37	QP
9	0.3503010	40.74	-18.22	58.96	40.14	0.22	0.38	QP
10	0.3503010	31.34	-17.62	48.96	30.74	0.22	0.38	Average
11	0.5020260	42.30	-13.70	56.00	41.70	0.22	0.38	QP
12	0.5020260	33.65	-12.35	46.00	33.05	0.22	0.38	Average

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1873850	53.01	-11.14	64.15	52.56	0.11	0.34	QP
2	0.1873850	42.45	-11.70	54.15	42.00	0.11	0.34	Average
3	0.2328500	47.34	-15.01	62.35	46.91	0.11	0.32	QP
4	0.2328500	37.66	-14.69	52.35	37.23	0.11	0.32	Average
5	0.2729650	41.94	-19.09	61.03	41.48	0.11	0.35	QP
6	0.2729650	31.06	-19.97	51.03	30.60	0.11	0.35	Average
7	0.3751190	26.54	-21.85	48.39	26.05	0.10	0.39	Average
8	0.3751190	40.26	-18.13	58.39	39.77	0.10	0.39	QP
9	@0.5080260	46.27	-9.73	56.00	45.80	0.10	0.37	QP
10	@0.5080260	38.65	-7.35	46.00	38.18	0.10	0.37	Average
11	0.7793120	27.33	-28.67	56.00	26.89	0.11	0.33	QP
12	0.7793120	18.59	-27.41	46.00	18.15	0.11	0.33	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

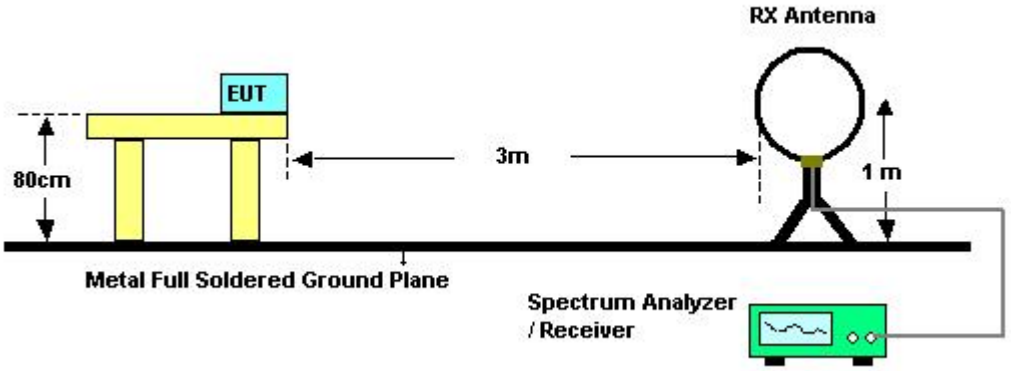
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.3 Test Procedures

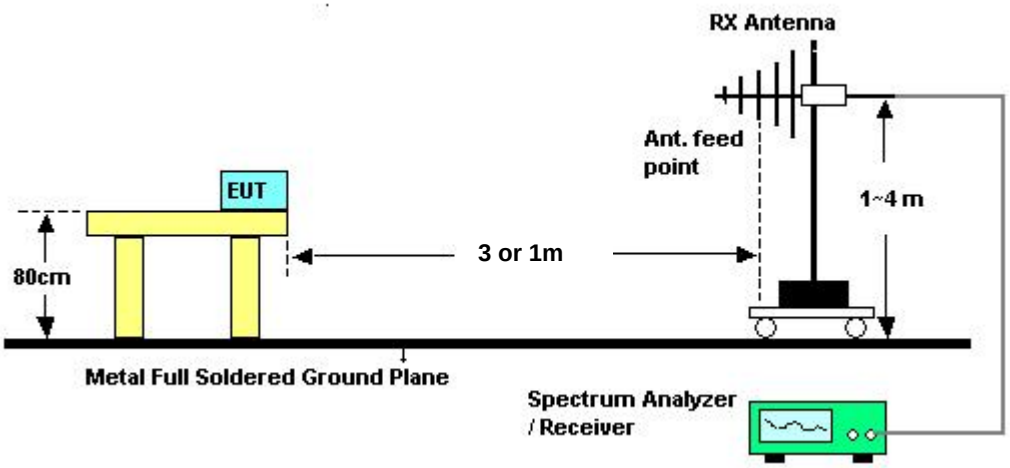
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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	Aug. 08, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao		

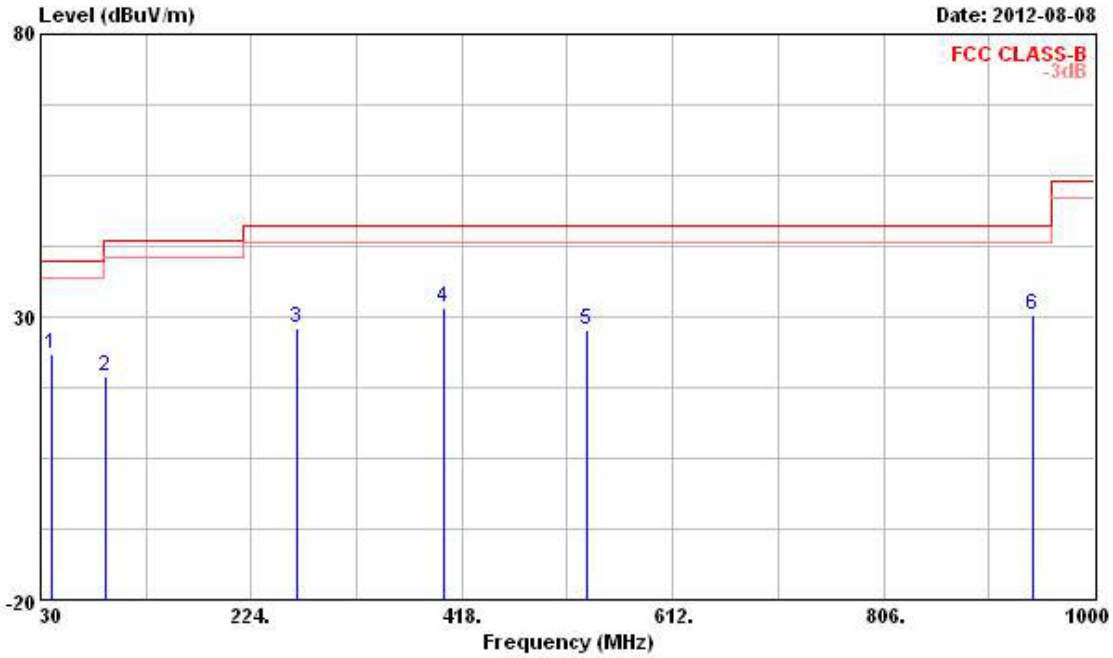
Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

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)

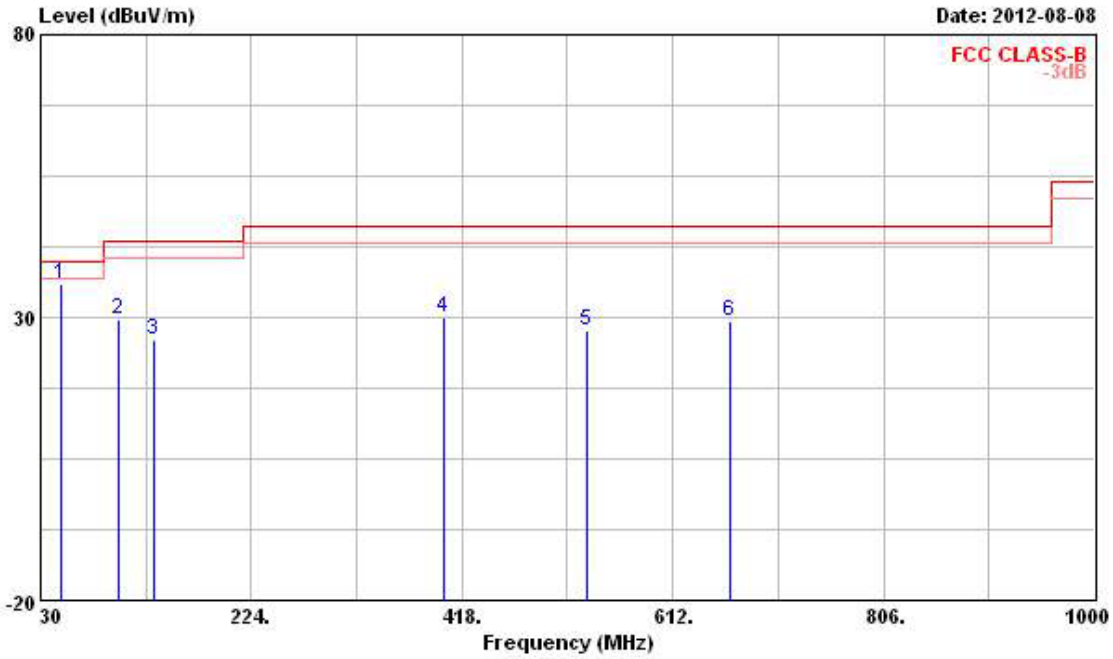
Final Test Date	Aug. 08, 2012	Test Site No.	03CH02-HY
Temperature	24.6℃	Humidity	61%
Test Engineer	Hsiao	Configuration	802.11a Ch. 157

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	40.670	23.47	-16.53	40.00	37.31	13.01	1.05	27.90	Peak	---	---
2	90.140	19.41	-24.09	43.50	36.18	9.50	1.58	27.85	Peak	---	---
3	265.710	27.87	-18.13	46.00	39.06	13.22	2.84	27.25	Peak	---	---
4	400.540	31.66	-14.34	46.00	40.87	15.27	3.40	27.88	Peak	---	---
5	532.460	27.86	-18.14	46.00	34.08	18.21	3.97	28.40	Peak	---	---
6	943.740	30.39	-15.61	46.00	31.22	21.11	5.50	27.44	Peak	---	---

Vertical

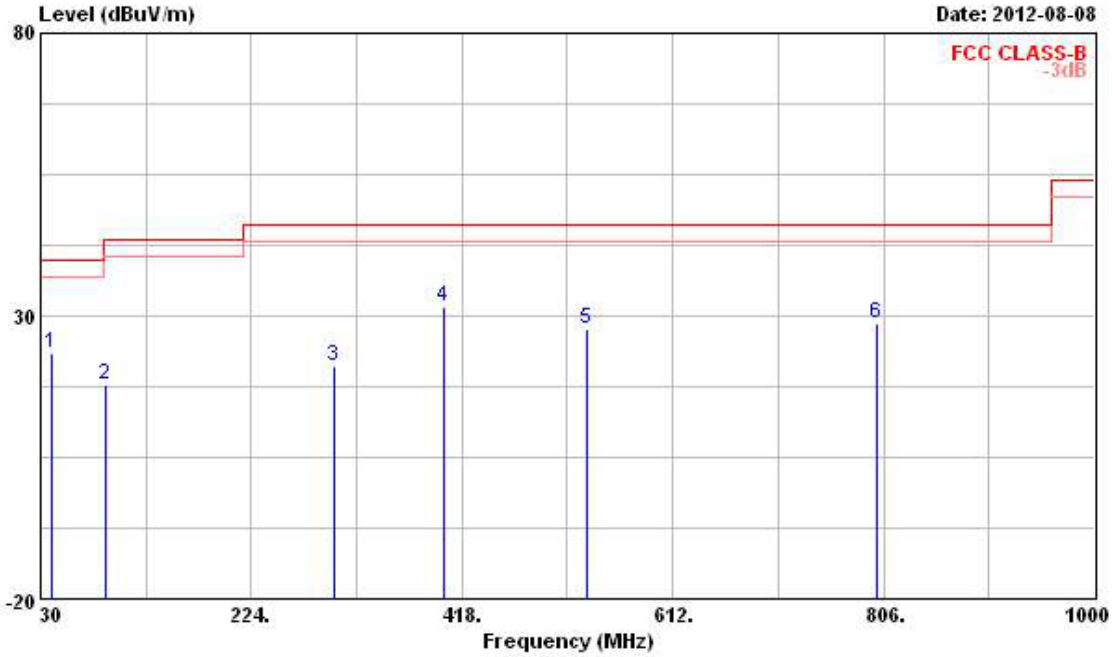


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	48.430	36.05	-3.95	40.00	52.41	10.34	1.16	27.86	Peak	---	---
2	101.780	29.70	-13.80	43.50	44.45	11.41	1.68	27.84	Peak	---	---
3	133.790	25.90	-17.60	43.50	39.18	12.49	1.93	27.70	Peak	---	---
4	400.540	30.10	-15.90	46.00	39.31	15.27	3.40	27.88	Peak	---	---
5	532.460	27.63	-18.37	46.00	33.85	18.21	3.97	28.40	Peak	---	---
6	665.350	29.50	-16.50	46.00	34.09	19.31	4.44	28.34	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.

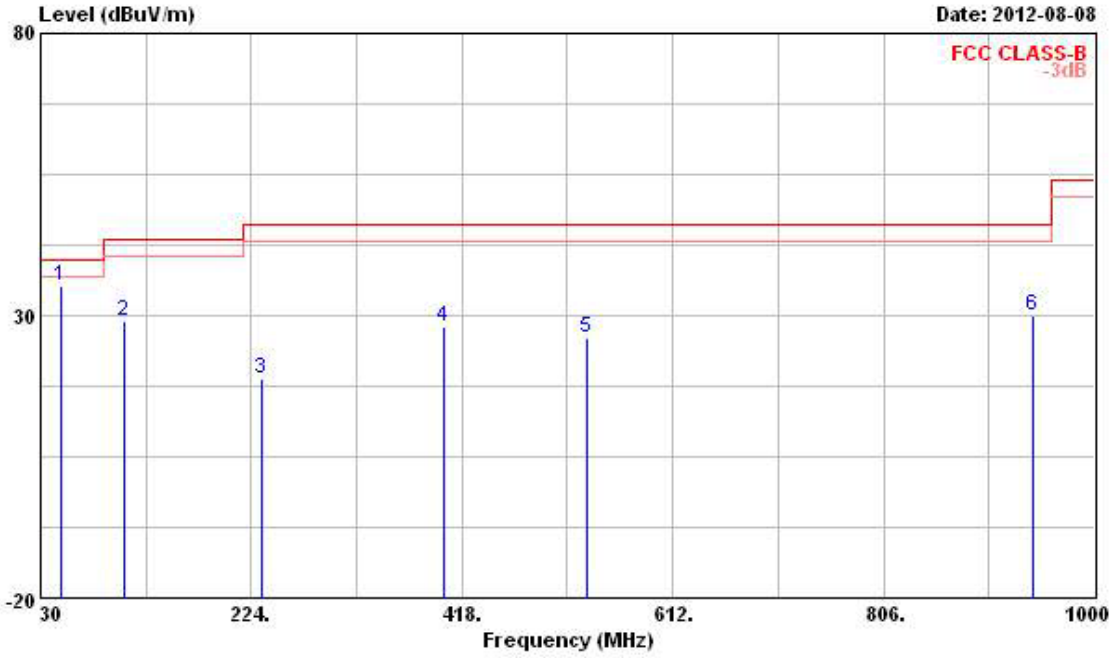
Final Test Date	Aug. 08, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11n Ch. 157 (20MHz)

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	40.670	23.56	-16.44	40.00	37.40	13.01	1.05	27.90	Peak	---	---
2	90.140	17.72	-25.78	43.50	34.49	9.50	1.58	27.85	Peak	---	---
3	299.660	21.04	-24.96	46.00	31.54	13.70	2.96	27.16	Peak	---	---
4	400.540	31.67	-14.33	46.00	40.88	15.27	3.40	27.88	Peak	---	---
5	532.460	27.82	-18.18	46.00	34.04	18.21	3.97	28.40	Peak	---	---
6	800.180	28.72	-17.28	46.00	31.50	20.27	4.89	27.94	Peak	---	---

Vertical



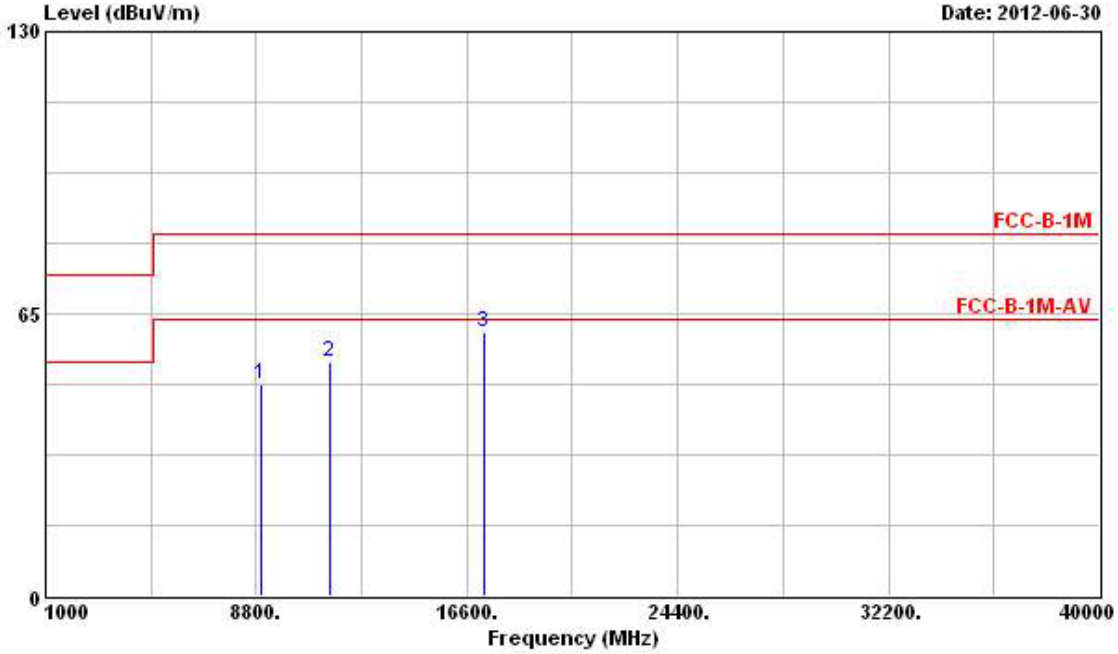
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	48.430	35.41	-4.59	40.00	51.77	10.34	1.16	27.86	Peak	---	---
2	106.630	29.09	-14.41	43.50	43.20	11.99	1.72	27.82	Peak	---	---
3	233.700	18.85	-27.15	46.00	31.05	12.46	2.67	27.33	Peak	---	---
4	400.540	28.15	-17.85	46.00	37.36	15.27	3.40	27.88	Peak	---	---
5	532.460	26.01	-19.99	46.00	32.23	18.21	3.97	28.40	Peak	---	---
6	943.740	29.92	-16.08	46.00	30.75	21.11	5.50	27.44	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)

Final Test Date	Jun. 30, 2012	Test Site No.	03CH02-HY
Temperature	24.6℃	Humidity	61%
Test Engineer	Hsiao	Configuration	802.11a Ch. 149

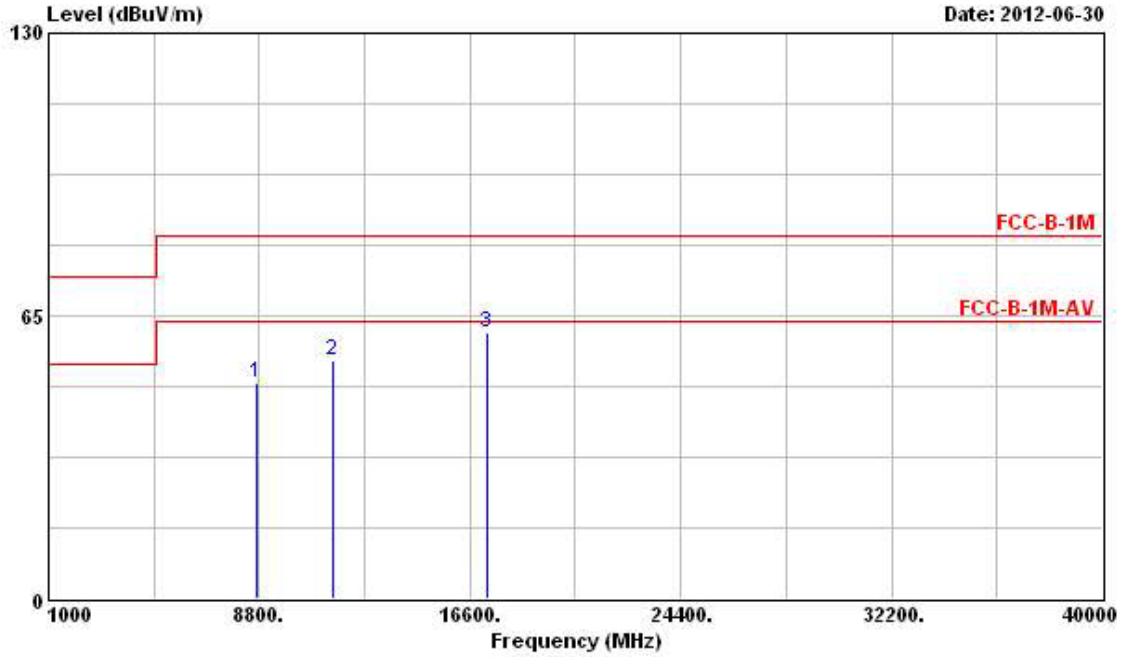
Horizontal



	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	8958.000	48.96			39.99	38.14	6.14	35.31	Peak	---	---
2	11490.000	53.71	-9.83	63.54	41.21	40.59	6.63	34.72	PK	---	---
3	17235.000	60.83			42.70	43.56	8.55	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 3.3.7).

Vertical

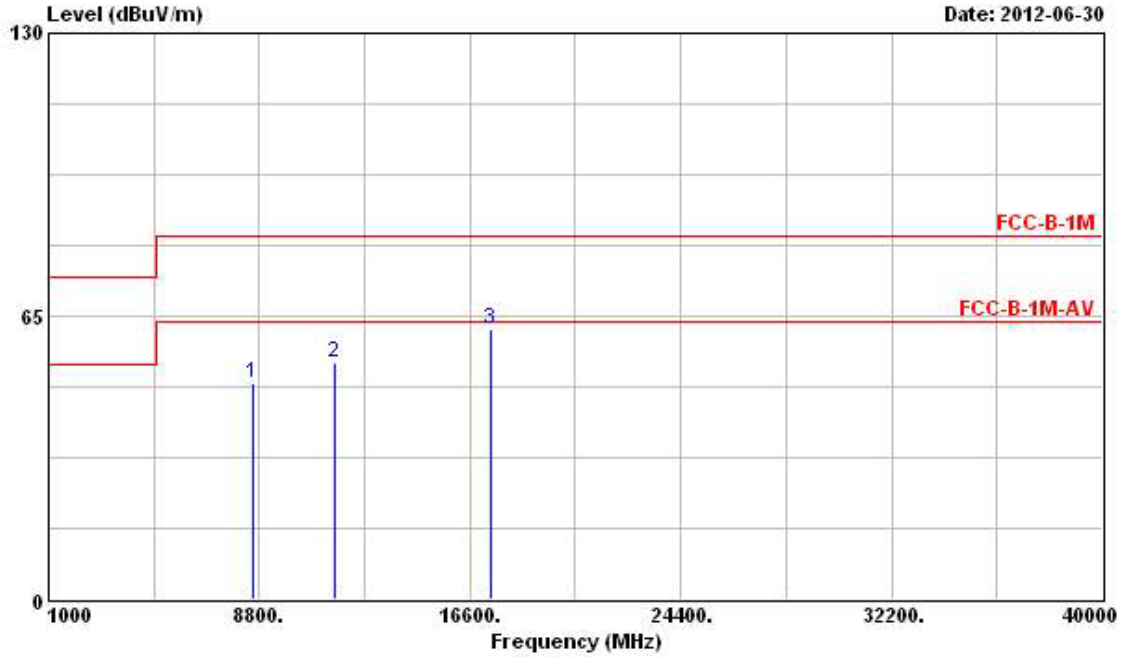


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8727.000	49.76			40.69	38.31	6.04	35.28	Peak	---	---
2	11490.000	54.64	-8.90	63.54	42.14	40.59	6.63	34.72	PK	---	---
3	17235.000	61.11			42.98	43.56	8.55	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 3.3.7).

Final Test Date	Jun. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11a Ch. 157

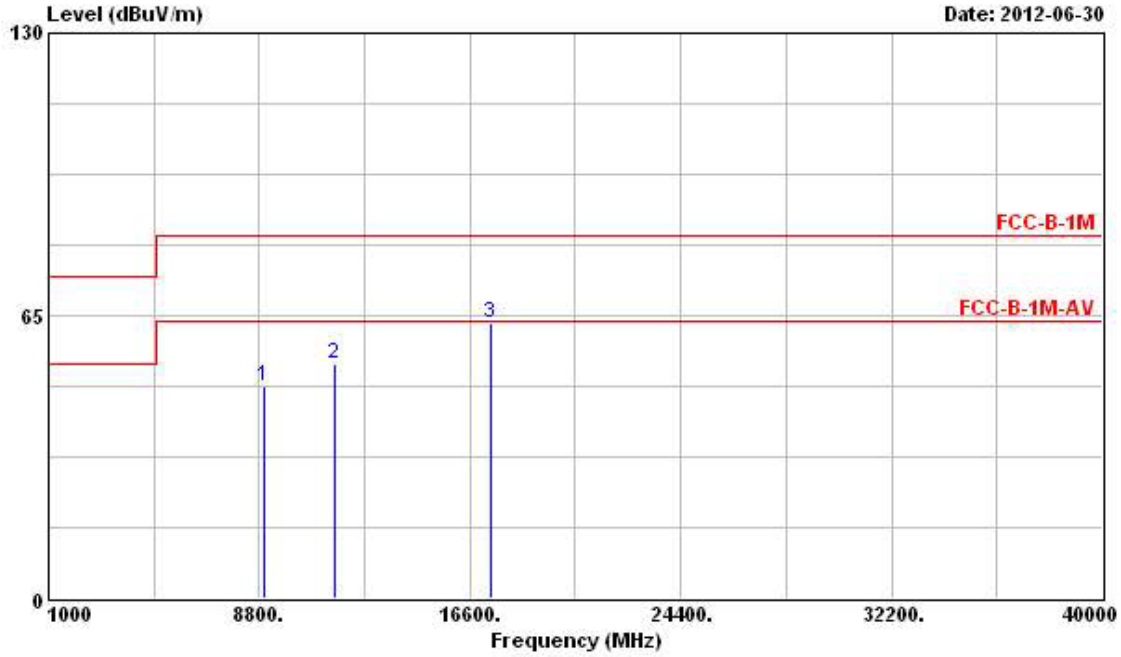
Horizontal



	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	8573.000	49.56			40.39	38.45	5.97	35.25	Peak	---	---
2	11570.000	54.11	-9.43	63.54	41.61	40.63	6.63	34.76	PK	---	---
3	17355.000	62.14			44.13	43.49	8.50	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 3.3.7).

Vertical

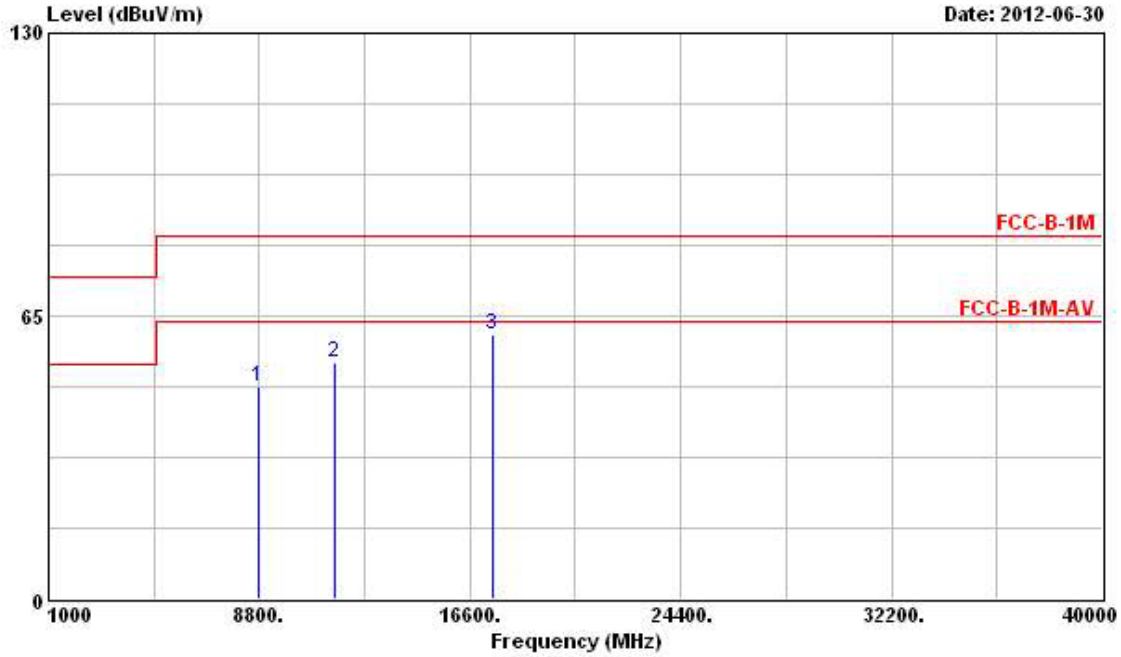


	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	eamp ctor dB	Remark	Ant Pos cm	Table Pos deg
1	8958.000	48.66			39.69	38.14	6.14	35.31	Peak	---	---
2	11570.000	53.78	-9.76	63.54	41.28	40.63	6.63	34.76	PK	---	---
3	17355.000	63.49			45.48	43.49	8.50	33.98	Peak	---	---

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 3.3.7).

Final Test Date	Jun. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11a Ch. 161

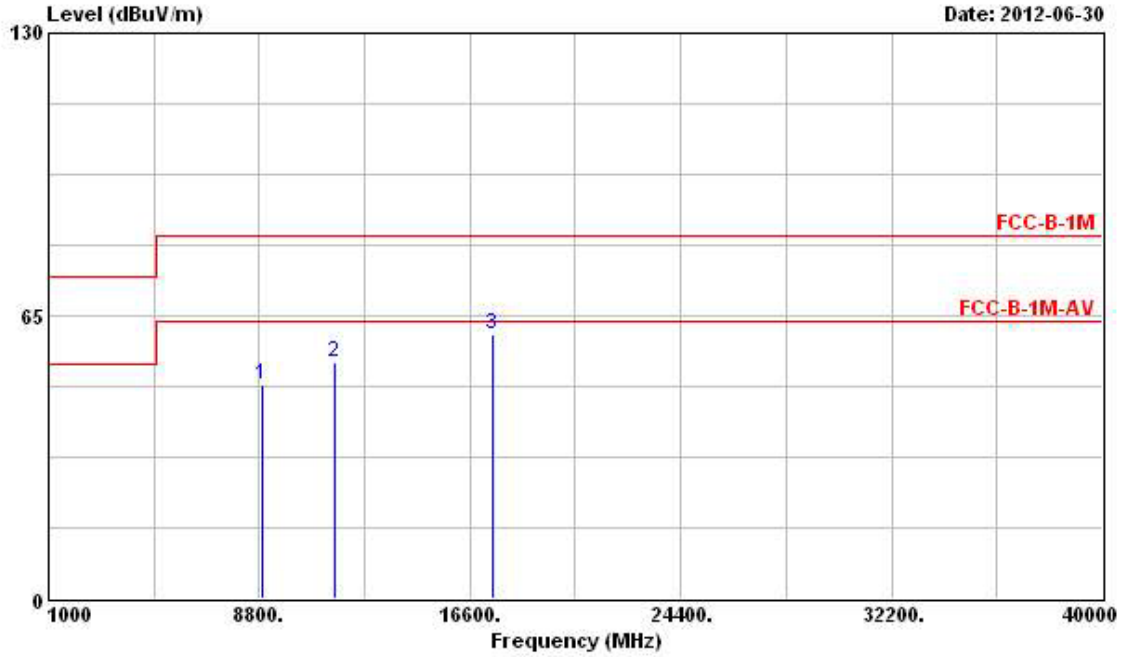
Horizontal



	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	8760.000	48.83			39.75	38.30	6.06	35.28	Peak	---	---
2	11610.000	54.13	-9.41	63.54	41.64	40.64	6.63	34.78	PK	---	---
3	17415.000	60.53			42.60	43.45	8.46	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 3.3.7).

Vertical

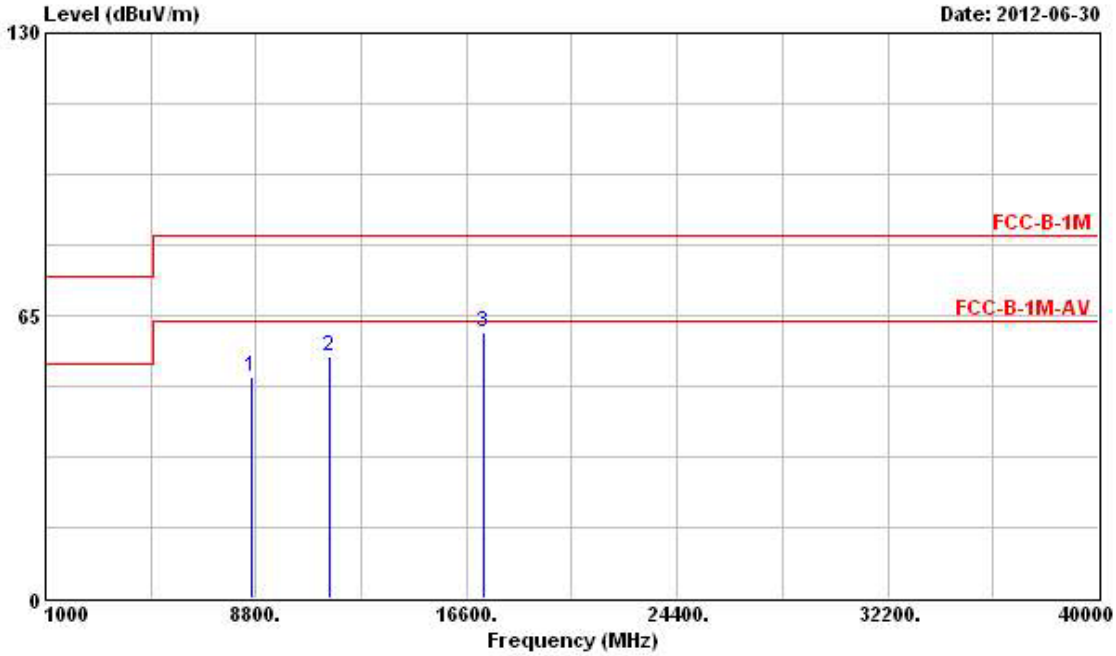


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8903.000	49.33			40.32	38.18	6.13	35.30	Peak	---	---
2	11610.000	54.21	-9.33	63.54	41.72	40.64	6.63	34.78	PK	---	---
3	17415.000	60.70			42.77	43.45	8.46	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 3.3.7).

Final Test Date	Jun. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11n Ch. 149 (20MHz)

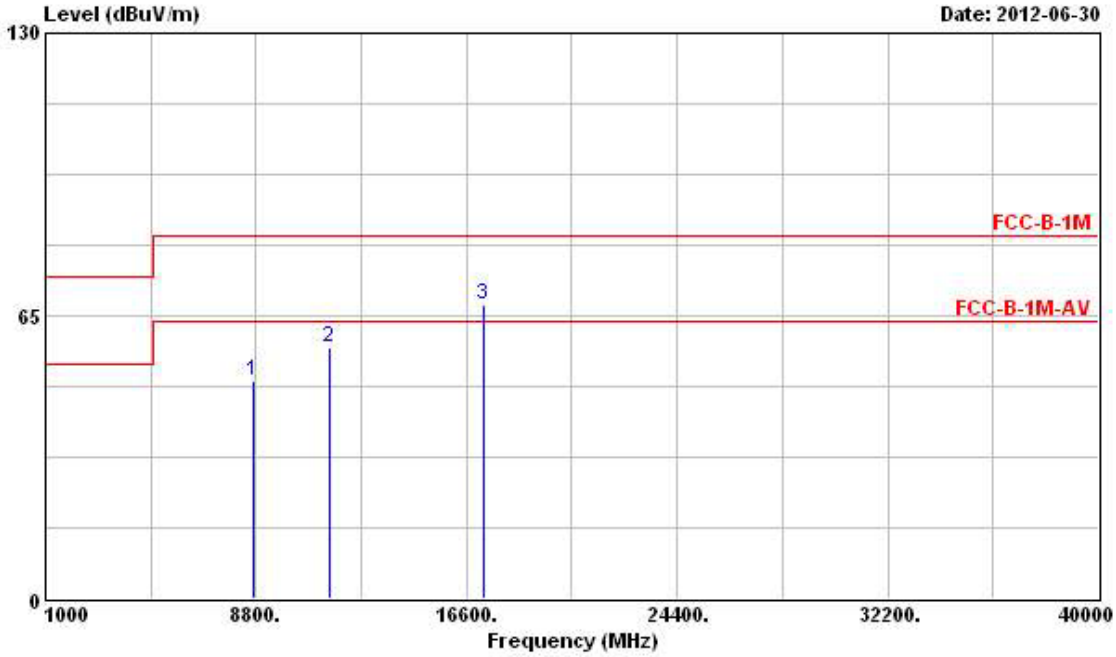
Horizontal



	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	8617.000	50.93			41.79	38.41	5.99	35.26	Peak	---	---
2	11490.000	55.44	-8.10	63.54	42.94	40.59	6.63	34.72	PK	---	---
3	17235.000	61.10			42.97	43.56	8.55	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 3.3.7).

Vertical

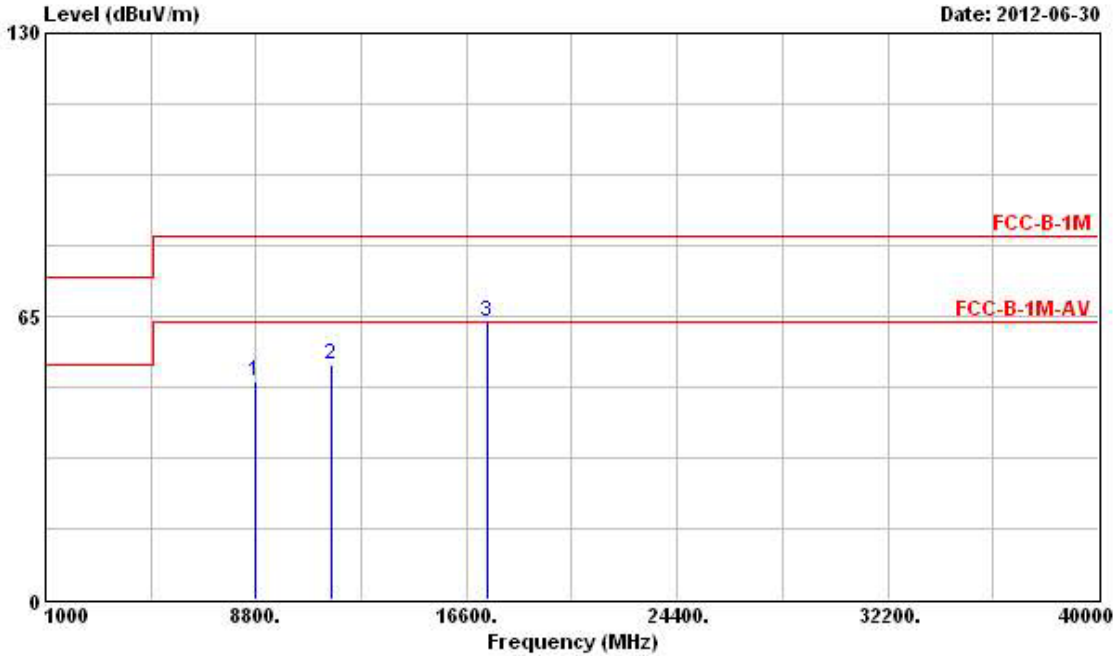


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8738.000	49.97			40.90	38.31	6.04	35.28	Peak	---	---
2	11490.000	57.64	-5.90	63.54	45.14	40.59	6.63	34.72	PK	---	---
3	17235.000	67.54			49.41	43.56	8.55	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 3.3.7).

Final Test Date	Jun. 30, 2012	Test Site No.	03CH02-HY
Temperature	24.6℃	Humidity	61%
Test Engineer	Hsiao	Configuration	802.11n Ch. 157 (20MHz)

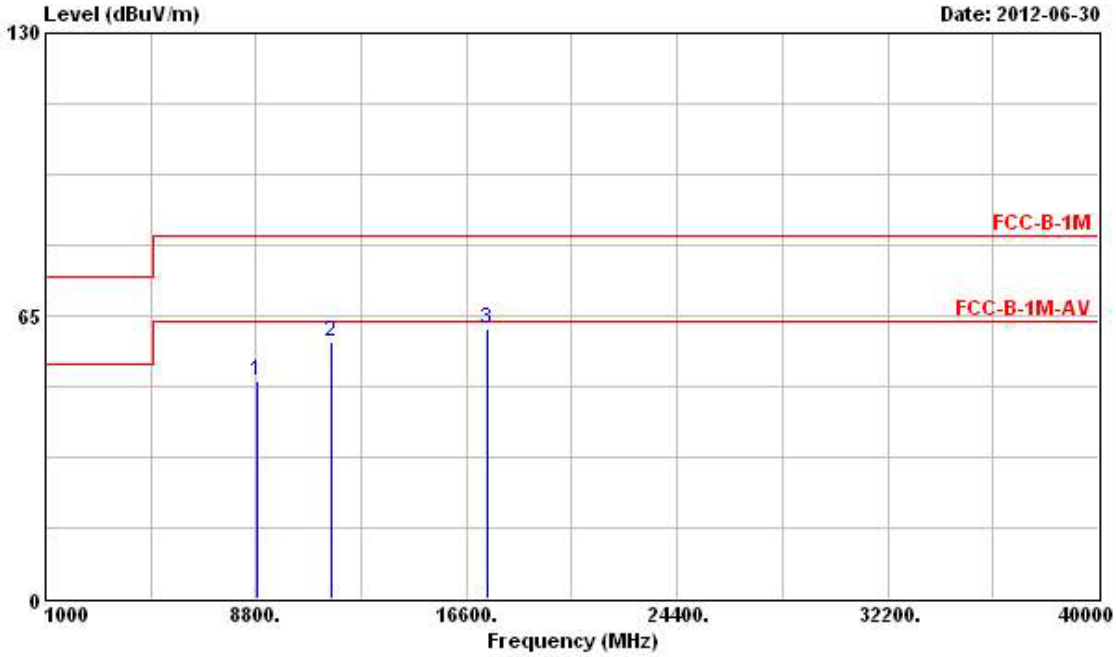
Horizontal



	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	amp :or dB	Remark	Ant Pos cm	Table Pos deg
1	8793.000	50.13			41.07	38.27	6.08	35.29	Peak	---	---
2	11570.000	53.86	-9.68	63.54	41.36	40.63	6.63	34.76	PK	---	---
3	17355.000	63.88			45.87	43.49	8.50	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 3.3.7).

Vertical

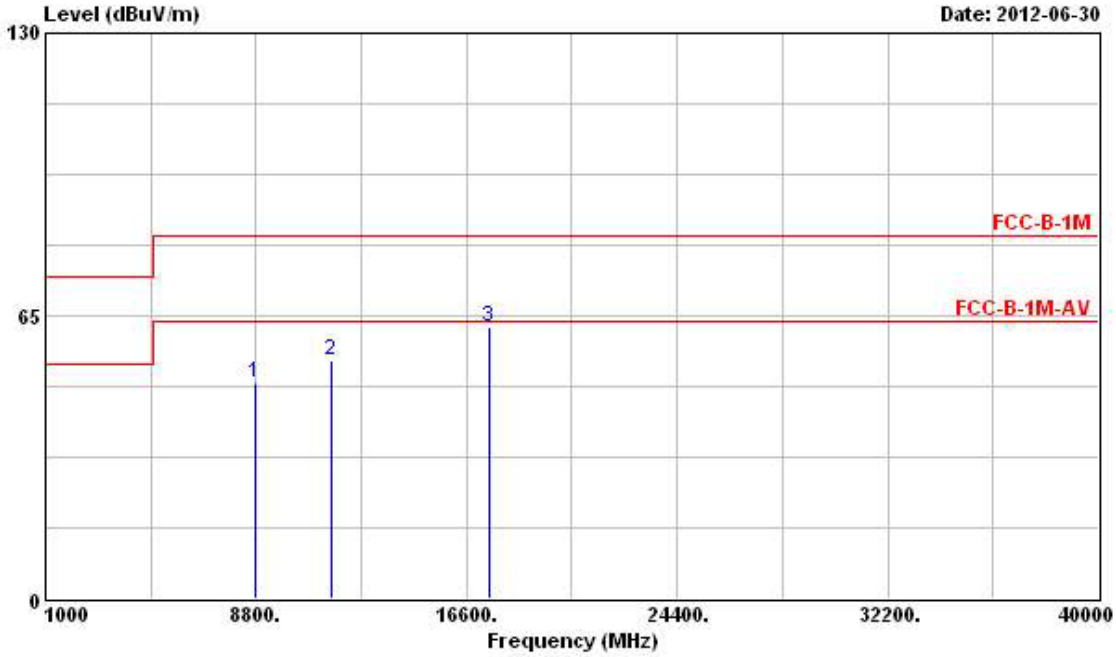


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	8870.000	50.06			41.04	38.21	6.11	35.30	Peak	---	---
2	@11570.000	58.94	-4.60	63.54	46.44	40.63	6.63	34.76	PK	---	---
3	17355.000	61.84			43.83	43.49	8.50	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	Jun. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11n Ch. 161 (20MHz)

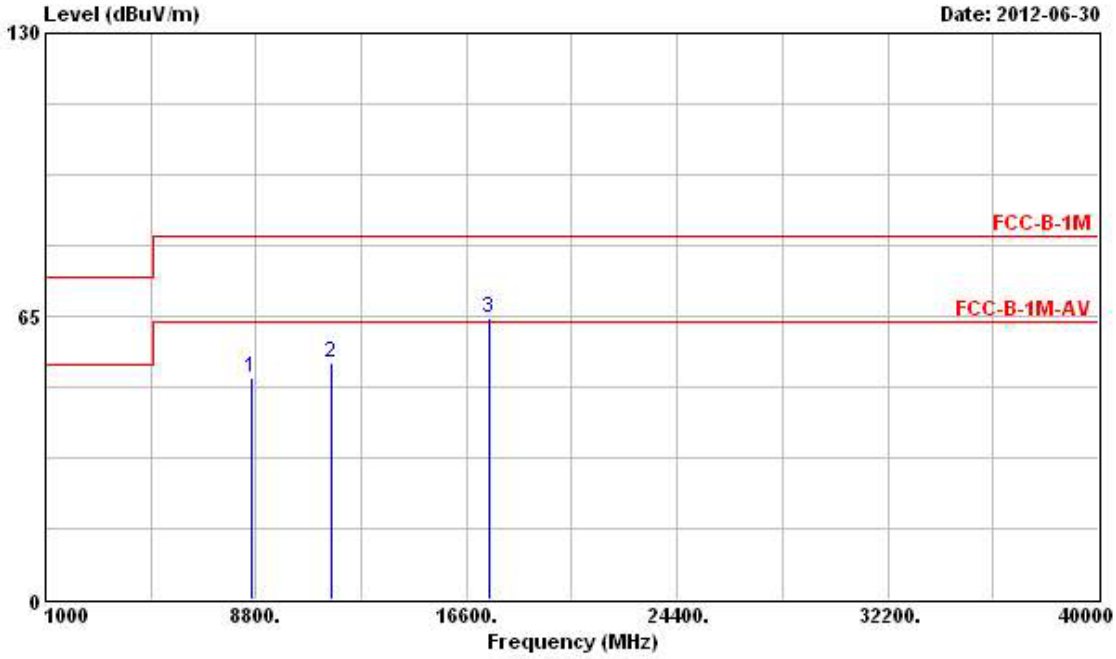
Horizontal



	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	8782.000	49.43			40.36	38.27	6.08	35.28	Peak	---	---
2	11610.000	54.57	-8.97	63.54	42.08	40.64	6.63	34.78	PK	---	---
3	17415.000	62.26			44.33	43.45	8.46	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



	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	eamp ctor dB	Remark	Ant Pos cm	Table Pos deg
1	8661.000	50.96			41.84	38.37	6.01	35.26	Peak	---	---
2	11610.000	54.45	-9.09	63.54	41.96	40.64	6.63	34.78	PK	---	---
3	17415.000	64.50			46.57	43.45	8.46	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 3.3.7).

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

Final Test Date	Jun. 30, 2012	Test Site No.	03CH02-HY
Temperature	24.6℃	Humidity	61%
Test Engineer	Hsiao	Configuration	802.11a Ch. 149, 157, 161

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	63.38			21.37	36.97	5.04	0.00	Average	---	---
2 @	5744.010	101.94			59.88	36.99	5.07	0.00	Average	---	---
1 @	5724.130	82.52			40.51	36.97	5.04	0.00	Peak	---	---
2 @	5745.130	113.69			71.63	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 @	5707.310	59.42			17.43	36.95	5.04	0.00	Average	---	---
2 @	5784.150	101.68			59.56	37.03	5.09	0.00	Average	---	---
3 @	5863.030	59.11			16.85	37.13	5.13	0.00	Average	---	---
1	5703.230	72.54			30.55	36.95	5.04	0.00	Peak	---	---
2 @	5786.870	112.18			70.04	37.05	5.09	0.00	Peak	---	---
3	5860.310	71.86			29.60	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 161

	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 @	5804.150	100.52			58.36	37.07	5.09	0.00	Average	---	---
2 @	5850.000	59.04			16.82	37.11	5.11	0.00	Average	---	---
1 @	5804.750	112.46			70.30	37.07	5.09	0.00	Peak	---	---
2	5854.930	73.26			31.02	37.13	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	Jun. 30, 2012	**Test Site No.**	03CH02-HY
Temperature	24.6℃	**Humidity**	61%
Test Engineer	Hsiao	**Configuration**	802.11n (20MHz) Ch. 149, 157, 161

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	68.67			26.66	36.97	5.04	0.00	Average	---	---
2 @	5746.250	103.21			61.15	36.99	5.07	0.00	Average	---	---
1 @	5724.900	89.09			47.08	36.97	5.04	0.00	Peak	---	---
2 @	5745.900	114.34			72.28	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 @	5703.230	59.62			17.63	36.95	5.04	0.00	Average	---	---
2 @	5783.980	102.97			60.85	37.03	5.09	0.00	Average	---	---
3 @	5866.260	59.12			16.86	37.13	5.13	0.00	Average	---	---
1	5710.030	72.55			30.56	36.95	5.04	0.00	Peak	---	---
2 @	5783.300	113.35			71.23	37.03	5.09	0.00	Peak	---	---
3	5858.950	72.76			30.50	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 161

	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 @	5803.930	101.07			58.91	37.07	5.09	0.00	Average	---	---
2 @	5850.130	59.06			16.84	37.11	5.11	0.00	Average	---	---
1 @	5802.650	112.14			69.98	37.07	5.09	0.00	Peak	---	---
2	5851.850	72.38			30.16	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.

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 2.3 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	Mar. 23, 2012	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Feb. 08, 2012	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz ~ 30MHz	Apr. 20, 2012	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	CB049	9kHz ~ 30MHz	Apr. 25, 2012	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	9kHz ~ 40GHz	Sep. 01, 2011	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 10, 2012	Radiation (03CH02-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May. 10, 2012	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	Aug. 08, 2011	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 15, 2011	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Nov. 11, 2011	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 06, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	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 ~ 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	Sep. 09, 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 221, Taiwan, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C
	TEL	:	886-3-327-3456
	FAX	:	886-3-327-0973
LINKOU	ADD	:	No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C.
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, 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. : L1190-120405

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:April 05, 2012

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