

## **Co-location Report**

## 1 TEST RESULT

### 1.1 Radiated Emissions Measurement

#### 1.1.1 Limit

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

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

#### 1.1.2 Measuring Instruments and Setting

Please refer to section 2 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

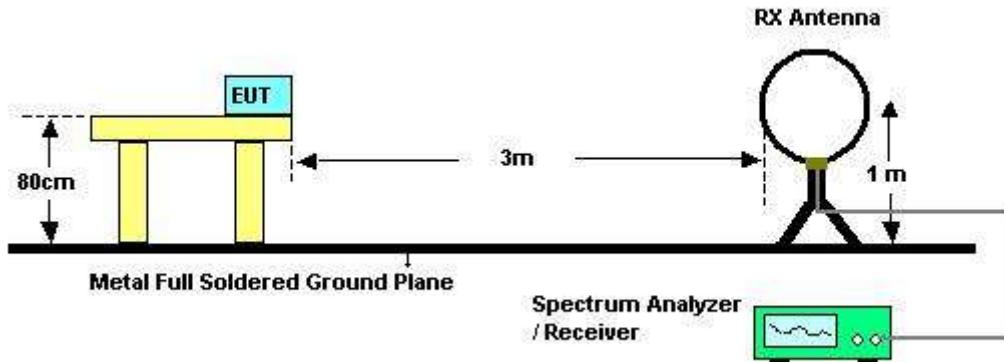
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

### 1.1.3 Test Procedures

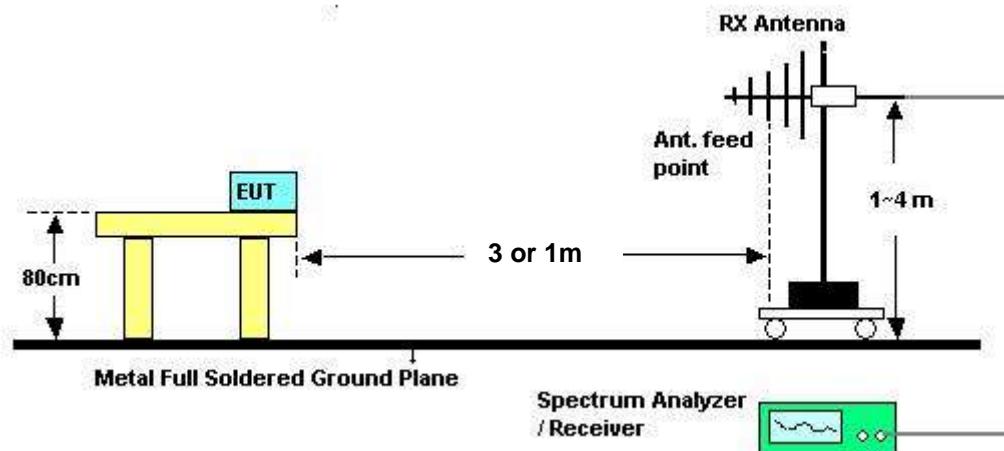
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

### 1.1.4 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 =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB);  
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

### 1.1.5 Test Deviation

There is no deviation with the original standard.

### 1.1.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 1.1.7 Results of Radiated Emissions (9kHz~30MHz)

Final Test Date	Dec. 03, 2011	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel		

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

## Note:

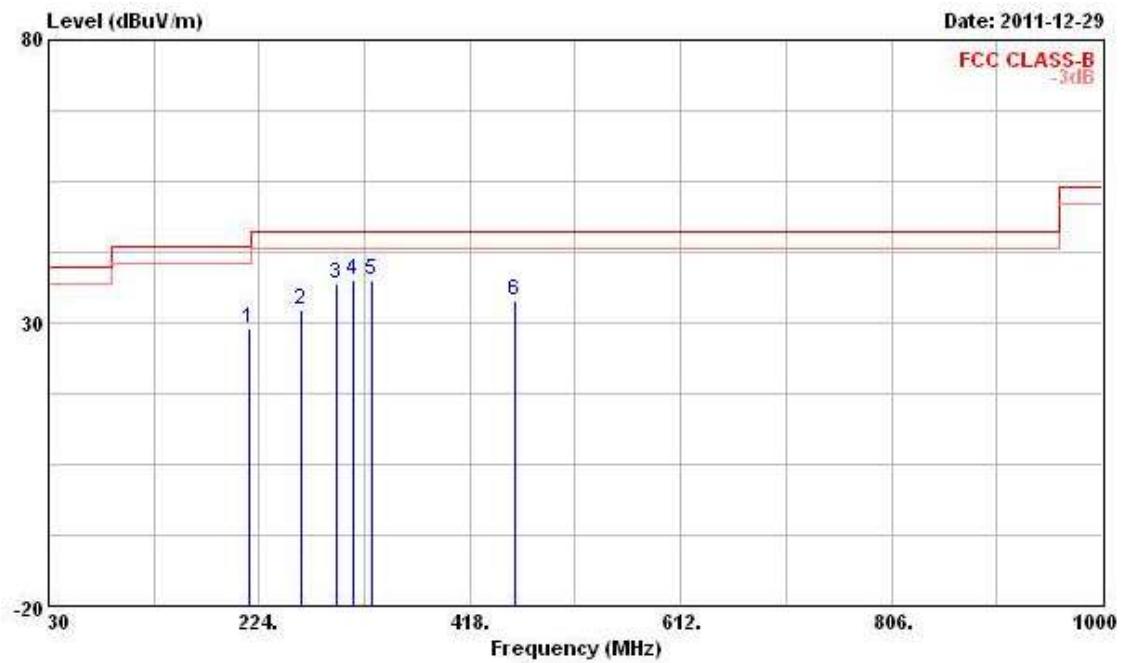
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);  
Limit line = specific limits (dBuV) + distance extrapolation factor.

## 1.1.8 Results of Radiated Emissions (30MHz~1GHz)

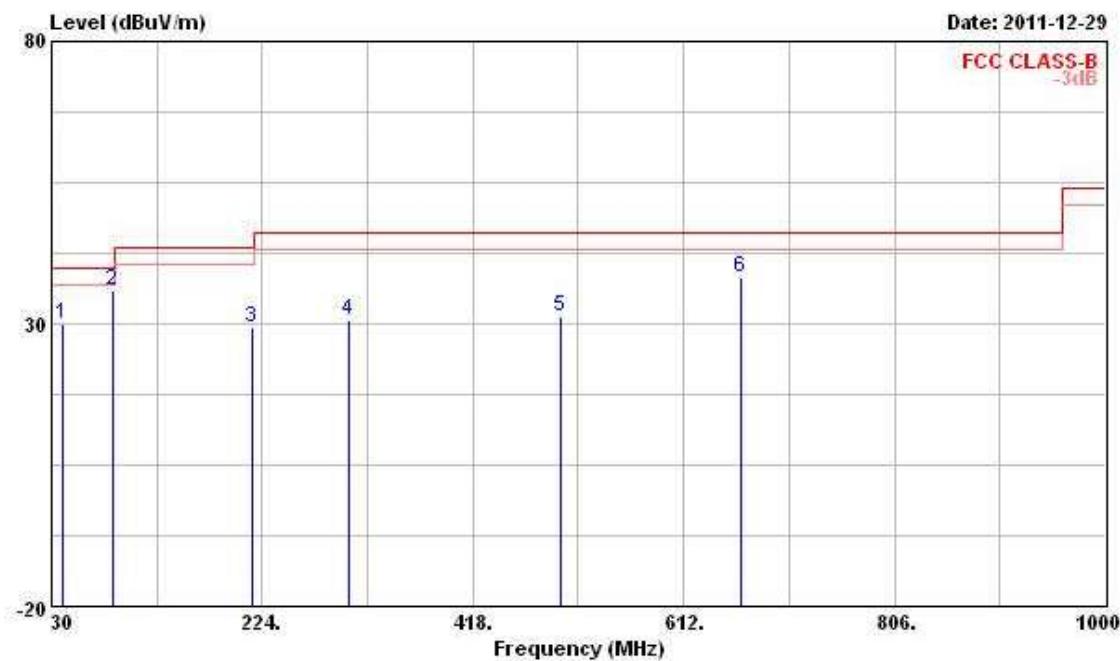
Final Test Date	Dec. 29, 2011	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 2438MHz & TX 13.56MHz

## Horizontal



Freq	Level	Over Limit	Line	Antenna		Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
				dBuV/m	dB					
MHz						dBuV	dB/m			
1	215.270	28.85	-14.65	43.50	41.82	11.86	2.54	27.37 Peak	---	---
2	261.830	32.15	-13.85	46.00	43.43	13.16	2.82	27.26 Peak	---	---
3 @	295.780	36.84	-9.16	46.00	47.42	13.65	2.94	27.17 Peak	---	---
4 @	311.300	37.57	-8.43	46.00	47.92	13.88	3.01	27.24 Peak	---	---
5 @	326.820	37.49	-8.51	46.00	47.63	14.13	3.08	27.35 Peak	---	---
6	458.740	34.10	-11.90	46.00	42.20	16.45	3.61	28.16 Peak	---	---

## Vertical



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table		
		Line	Limit	Antenna	Level	Level	Factor				
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	40.670	30.01	-9.99	40.00	43.85	13.01	1.05	27.90	Peak	---	---
2 @	87.230	36.05	-3.95	40.00	53.41	8.92	1.57	27.85	Peak	---	---
3	215.270	29.39	-14.11	43.50	42.36	11.86	2.54	27.37	Peak	---	---
4	304.510	30.60	-15.40	46.00	41.03	13.78	2.98	27.19	Peak	---	---
5	498.510	31.44	-14.56	46.00	38.72	17.26	3.82	28.36	Peak	---	---
6 @	665.350	38.35	-7.65	46.00	42.94	19.31	4.44	28.34	Peak	---	---

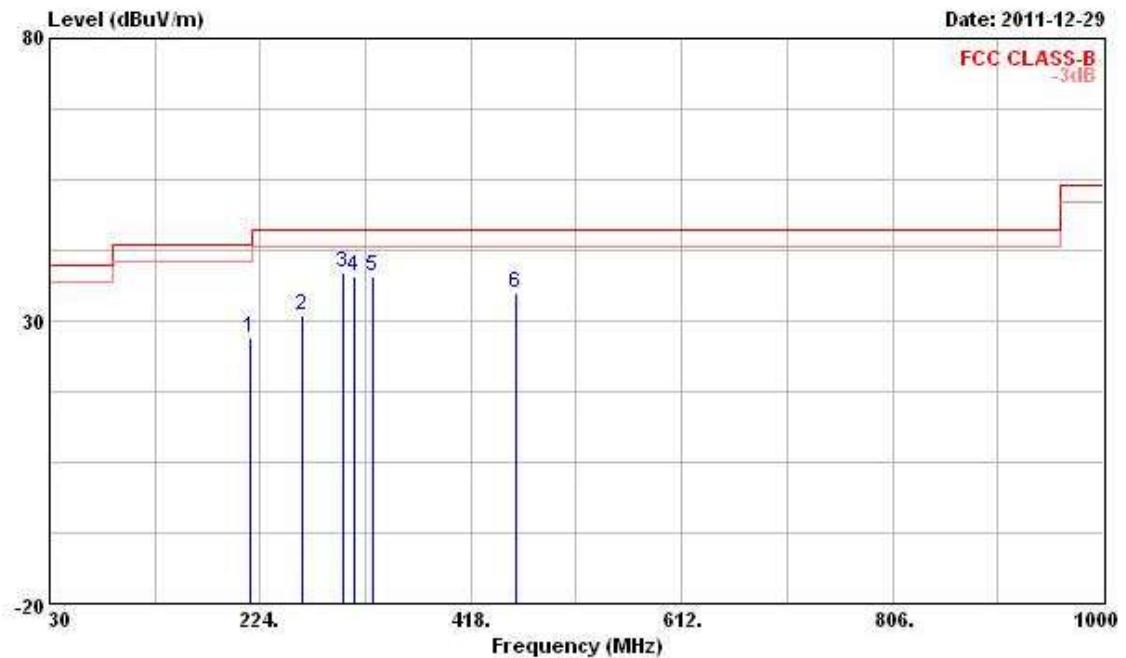
## Note:

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).

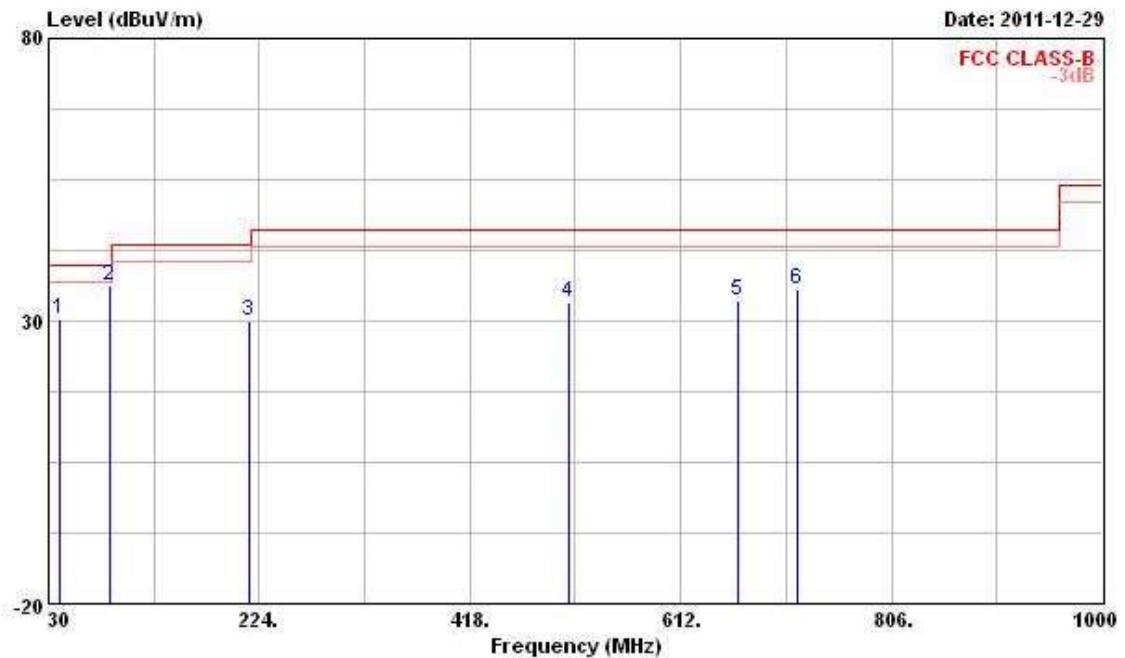
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Dec. 29, 2011	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 5210MHz & TX 13.56MHz

**Horizontal**

Freq	Level	Over Limit	Limit	Read		Antenna	Cable	Preamp	Remark	Ant Pos	Table Pos
				Line	Factor						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	dB	cm	deg	
1 215.270	27.17	-16.33	43.50	40.14	11.86	2.54	27.37	Peak	---	---	
2 261.830	31.04	-14.96	46.00	42.32	13.16	2.82	27.26	Peak	---	---	
3 @ 299.660	38.56	-7.44	46.00	49.06	13.70	2.96	27.16	Peak	---	---	
4 @ 311.300	38.02	-7.98	46.00	48.37	13.88	3.01	27.24	Peak	---	---	
5 @ 327.790	37.86	-8.14	46.00	47.99	14.14	3.08	27.35	Peak	---	---	
6 @ 458.740	34.97	-11.03	46.00	43.07	16.45	3.61	28.16	Peak	---	---	

## Vertical



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
		Line	Limit	Level	Factor	Loss	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @ 40.670	30.21	-9.79	40.00	44.05	13.01	1.05	27.90	Peak	---	---
2 @ 87.230	36.12	-3.88	40.00	53.48	8.92	1.57	27.85	Peak	---	---
3 215.270	30.10	-13.40	43.50	43.07	11.86	2.54	27.37	Peak	---	---
4 509.180	33.14	-12.86	46.00	40.09	17.56	3.87	28.38	Peak	---	---
5 665.350	33.50	-12.50	46.00	38.09	19.31	4.44	28.34	Peak	---	---
6 @ 719.670	35.55	-10.45	46.00	40.02	19.13	4.61	28.21	Peak	---	---

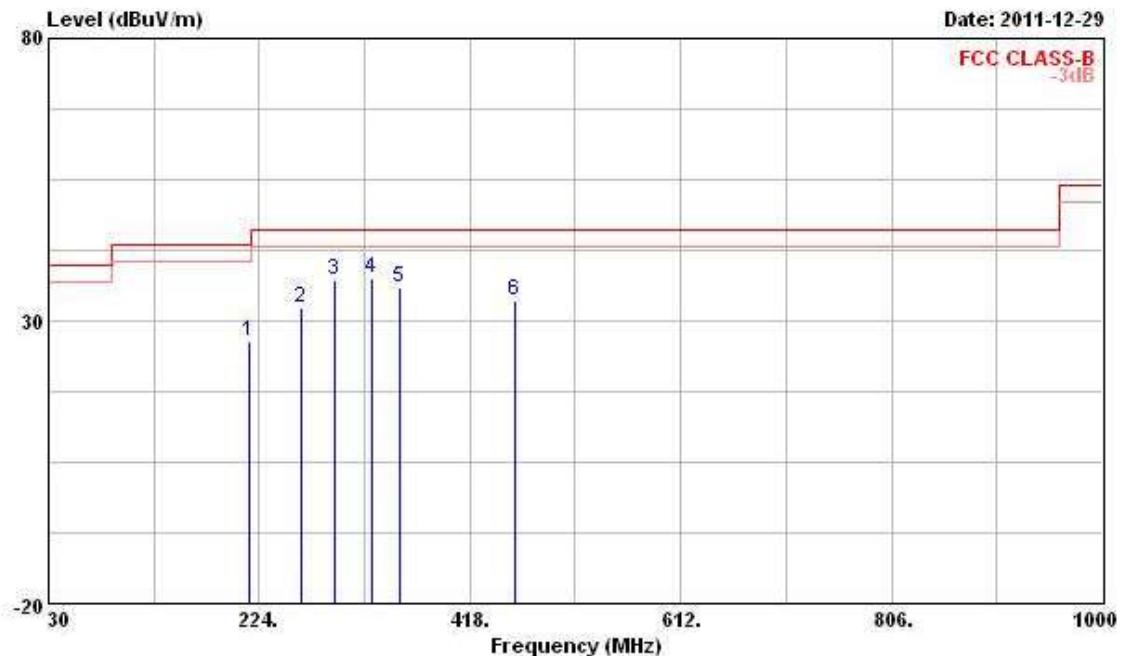
## Note:

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).

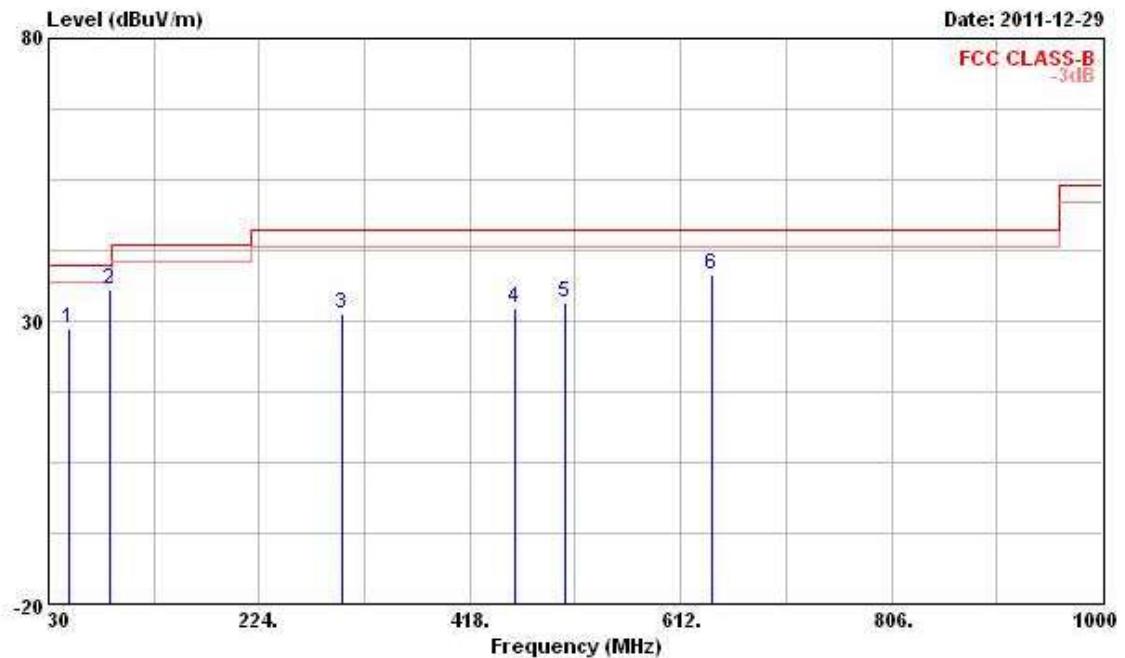
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Final Test Date	Dec. 29, 2011	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 5762MHz & TX 13.56MHz

**Horizontal**

Freq	Level	Over Limit	Limit	Read		Antenna	Cable	Preamp	Remark	Ant Pos	Table Pos
				Line	Level						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	dB	cm	deg	
1 215.270	26.28	-17.22	43.50	39.25	11.86	2.54	27.37	Peak	---	---	
2 261.830	32.25	-13.75	46.00	43.53	13.16	2.82	27.26	Peak	---	---	
3 @ 292.870	37.12	-8.88	46.00	47.77	13.60	2.93	27.18	Peak	---	---	
4 @ 327.790	37.73	-8.27	46.00	47.86	14.14	3.08	27.35	Peak	---	---	
5 @ 353.980	35.97	-10.03	46.00	45.78	14.54	3.20	27.55	Peak	---	---	
6 459.710	33.66	-12.34	46.00	41.74	16.47	3.62	28.17	Peak	---	---	

## Vertical



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
		Line	Limit	Antenna	Level	Loss	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	48.430	28.78	-11.22	40.00	45.14	10.34	1.16	27.86 Peak	---	---
2 @	87.230	35.64	-4.36	40.00	53.00	8.92	1.57	27.85 Peak	---	---
3	299.660	31.29	-14.71	46.00	41.79	13.70	2.96	27.16 Peak	---	---
4	459.710	32.28	-13.72	46.00	40.36	16.47	3.62	28.17 Peak	---	---
5	505.300	33.16	-12.84	46.00	40.22	17.45	3.86	28.37 Peak	---	---
6 @	641.100	38.14	-7.86	46.00	42.54	19.63	4.36	28.39 Peak	---	---

## Note:

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

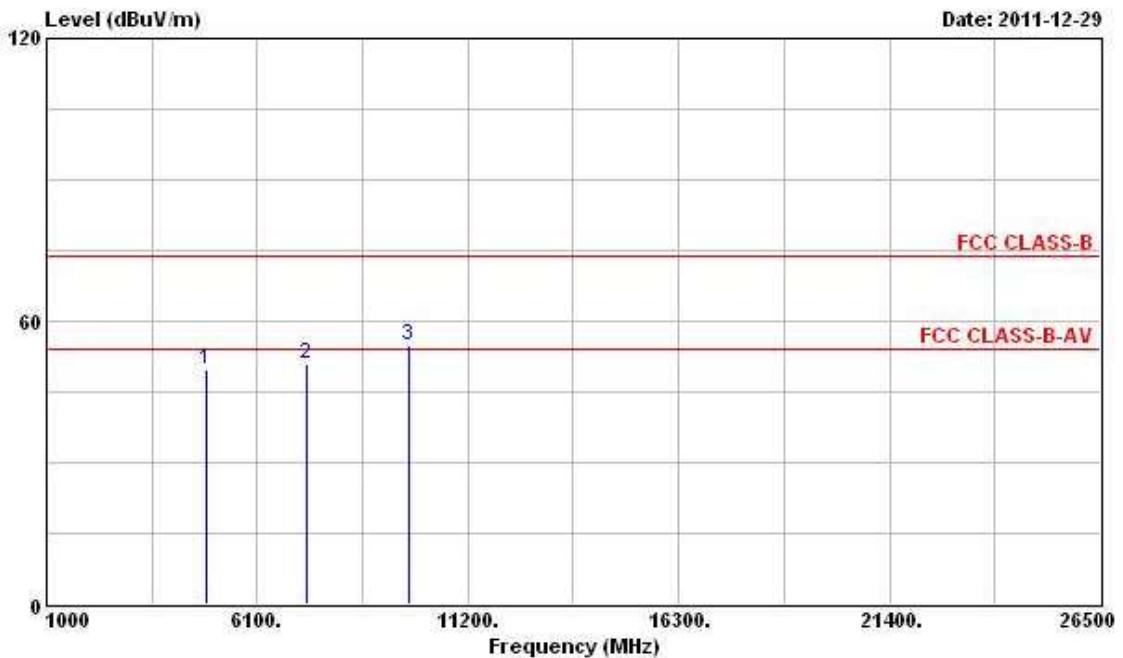
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

1.1.9 Results for Radiated Emissions (1GHz~10<sup>th</sup> Harmonic)

Final Test Date	Dec. 29, 2011	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 2438MHz & TX 13.56MHz

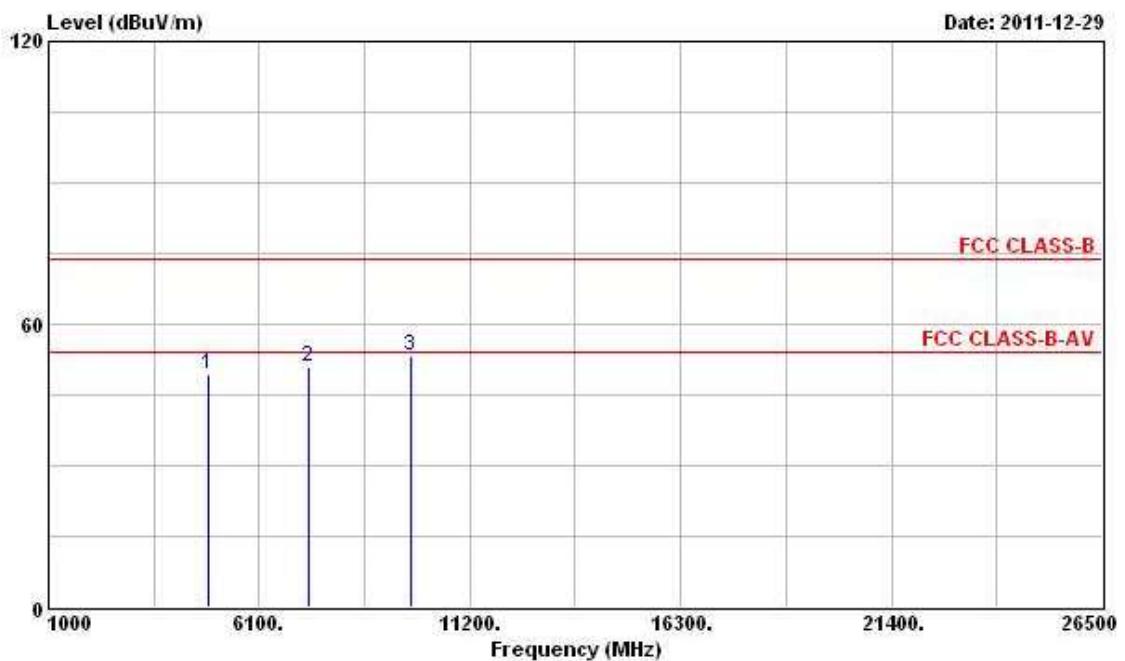
## Horizontal



Freq	Level	Over Limit	Limit	Read		Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
				Line	Antenna						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg		
1 @ 4876.000	49.55	-4.45	54.00	43.89	35.83	4.61	34.78	PK	---	---	
2 @ 7314.000	50.97	-3.03	54.00	42.57	37.86	5.64	35.10	PK	---	---	
3 @ 9752.000	54.93			44.54	39.51	6.36	35.48	Peak	---	---	

Note: The Item3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

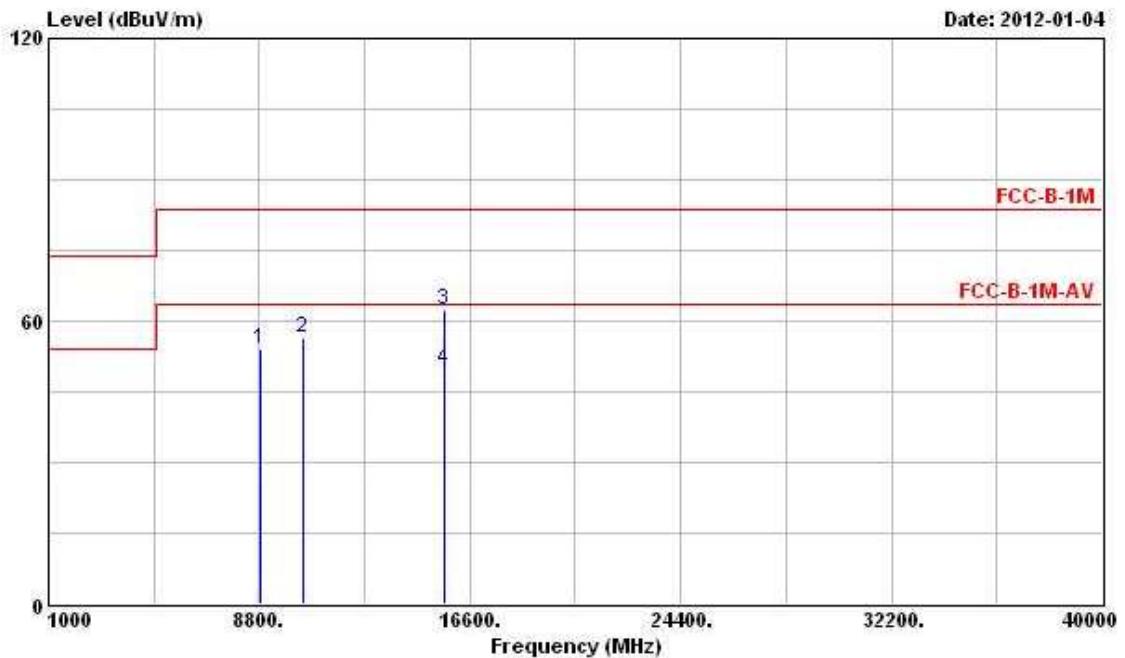
## Vertical



Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
		Line	Limit	Level	Factor	Cable	Preamp			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @ 4876.000	49.17	-4.83	54.00	44.16	35.18	4.61	34.78	PK	---	---
2 @ 7314.000	50.79	-3.21	54.00	43.33	36.92	5.64	35.10	PK	---	---
3 @ 9752.000	53.32			43.73	38.71	6.36	35.48	Peak	---	---

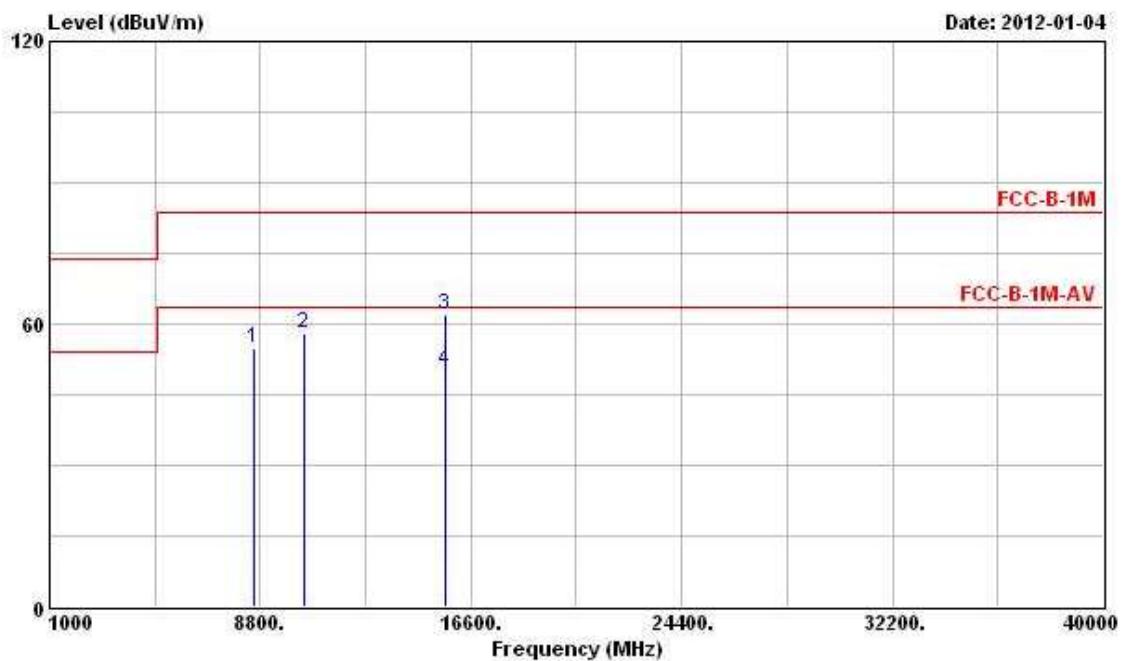
Note: The Item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Final Test Date	Jan. 04, 2012	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 5210MHz & TX 13.56MHz

**Horizontal**

Freq	Level	Over Limit	Limit	Read		Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
				Line	Antenna						
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	dB	cm	deg	
1 8837.000	53.94			44.91	38.23	6.09	35.29	Peak	---	---	
2 10420.000	56.39			44.74	40.05	6.78	35.18	Peak	---	---	
3 15630.000	62.24	-21.30	83.54	46.09	42.83	8.45	35.13	Peak	---	---	
4 15630.000	49.83	-13.71	63.54	33.68	42.83	8.45	35.13	Average	---	---	

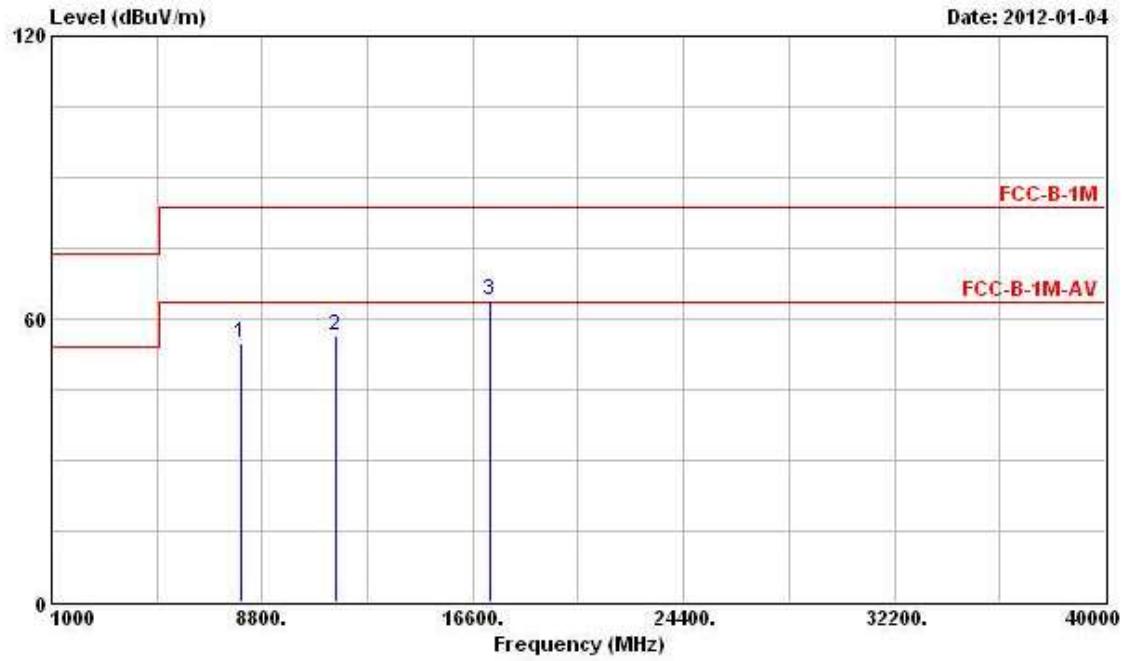
Note: The Items 1 and 2 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

*Vertical*

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
		Line	Limit	Level	Factor	Loss	Factor			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 8562.000	55.06			45.89	38.45	5.97	35.25	Peak	---	---
2 10420.000	58.04			46.39	40.05	6.78	35.18	Peak	---	---
3 15630.000	62.07	-21.47	83.54	45.92	42.83	8.45	35.13	Peak	---	---
4 15630.000	50.19	-13.35	63.54	34.04	42.83	8.45	35.13	Average	---	---

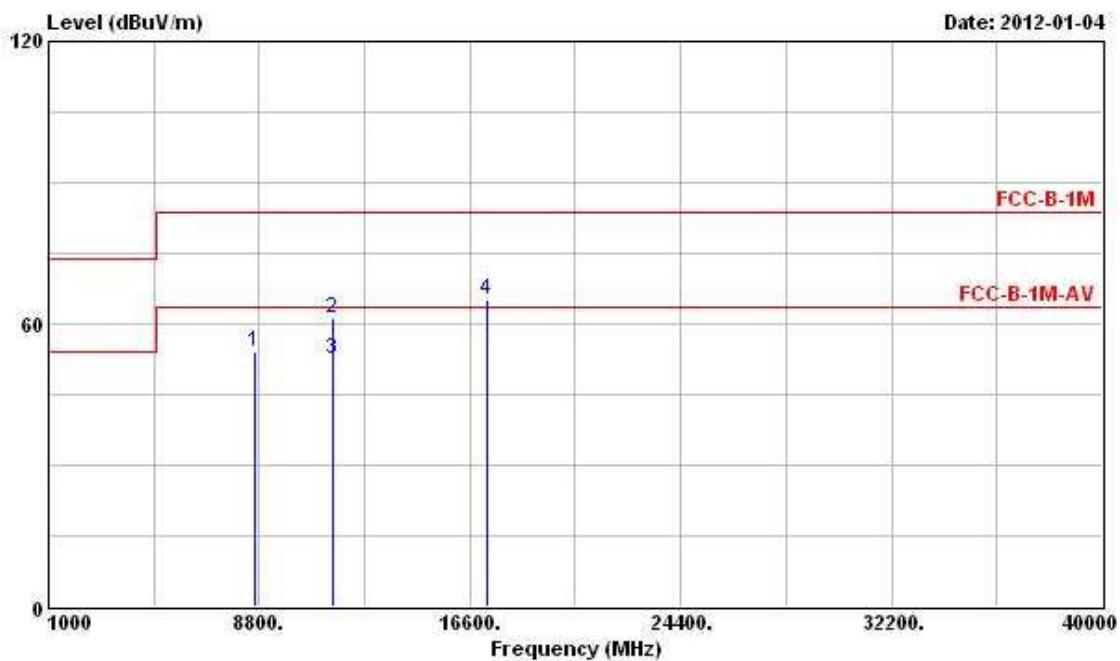
Note: The Items 1 and 2 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

Final Test Date	Jan. 04, 2012	Test Site No.	03CH02-HY
Temperature	22°C	Humidity	55%
Test Engineer	Daniel	Configuration	TX 5762MHz & TX 13.56MHz

**Horizontal**

Freq	Level	Over Limit	Limit Line	Read		Ant	Table		
				Antenna	Factor			Pos	Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 7990.000	54.98			46.25	38.19	5.80	35.26	Peak	---
2 @11524.000	56.25	-7.29	63.54	43.74	40.61	6.63	34.73	PK	---
3 17230.000	64.11			45.98	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.

**Vertical**

Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
		Line	Limit	Level	Factor	Cable	Preamp			
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 8630.000	54.12			44.98	38.39	6.01	35.26	Peak	---	---
2 11524.000	61.30	-22.24	83.54	48.79	40.61	6.63	34.73	Peak	---	---
3 @11524.000	52.39	-11.15	63.54	39.88	40.61	6.63	34.73	Average	---	---
4 17230.000	65.18			47.05	43.56	8.55	33.98	Peak	---	---

Note: The Items 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions.

## 1.2 RF Exposure Assessment

This NFC Module is subject to FCC 15.225 / IC RSS-210 Annex 2.6 and the measured power is 66.95 dBuV/m at 1m which is much lower than the power threshold of FCC (60/f mW) and IC (200mW), therefore the stand alone SAR is not required. There are two transmitter installed in the HP notebook, one is Wireless Audio Module and the other one is Bluetooth & Wireless LAN Combo Module.

For Wireless Audio Module, the maximum Average Power and SAR value is 14.35 dBm and 0.18W/kg respectively (from the Date of Grant: 12/21/2011 for FCC ID: ZQO-DWPCIE83). According to KDB 616217, the Simultaneous SAR evaluation is not required due to the sum of total SAR is much less than 1.6 W/kg.

For Bluetooth & Wireless LAN Combo Module (FCC ID: PD962230ANHU / IC ID: 1000M-62230ANHU), the antenna is on the top of screen and the distance for antenna-to-person is 20.7 cm, so it is defined as a Mobile Category for this HP Notebook. Therefore, the Simultaneous SAR evaluation is not required for the Bluetooth & Wireless LAN Combo Module with this NFC Module.

## 1.3 Product Details

The modular is limited to specific hosts (Notebook PC (Model name: TPN-Q105, TPN-Q105 series). The following radio modules were tested and resulted in co-location for the modules in this report:

FCC ID	IC ID
ZQO-DWPCIE83	2581A-DWPCIE83

Note: Due to the separation distance between this NFC Module and the Bluetooth & Wireless LAN Combo Module is 25 cm which is more than 20cm, the co-location evaluation is not required.

## 2 LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100305/040	9 kHz ~ 40 GHz	Feb. 11, 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 (03CH03-HY)

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

**3 TEST LOCATION**

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