

Appendix A. Collocation 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 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)	100KHz / 100KHz for peak

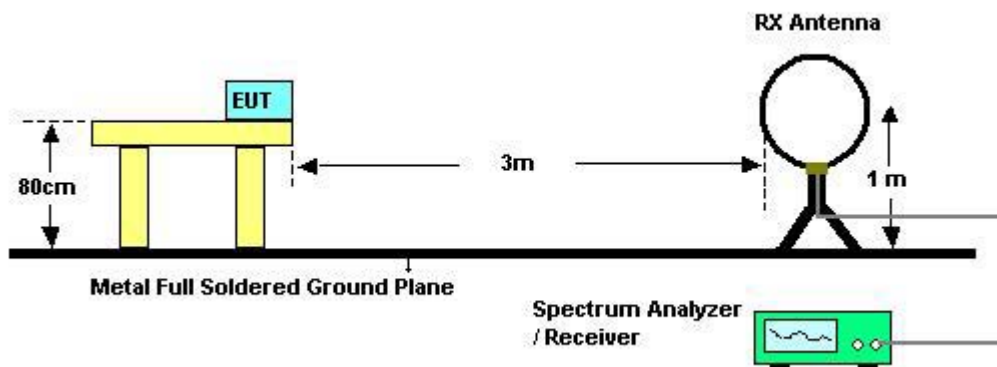
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

1.1.3. Test Procedures

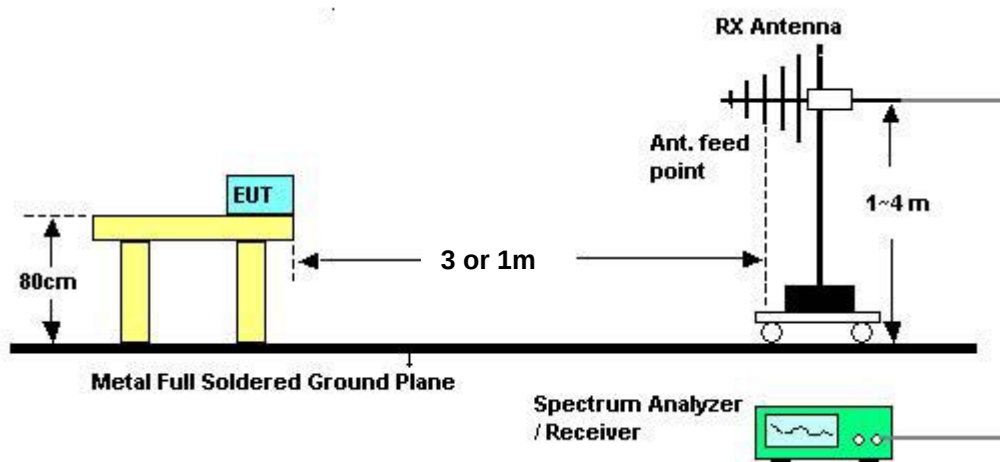
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

Temperature	24	Humidity	53%
Test Engineer	Vic Hsiao		

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

Note:

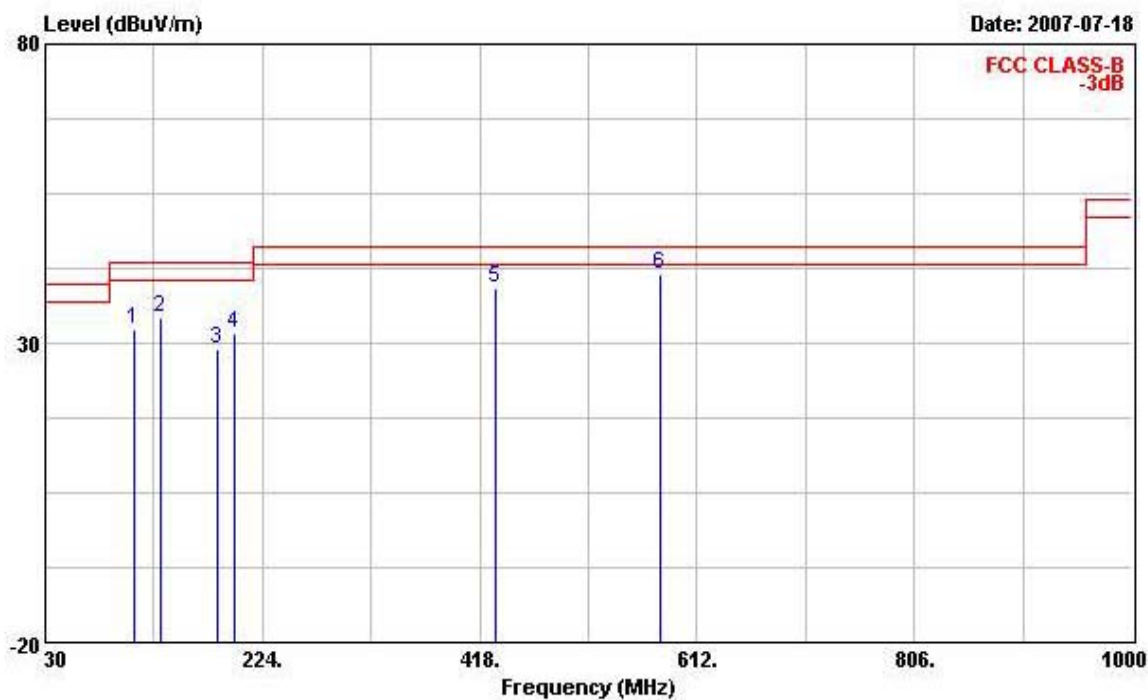
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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

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

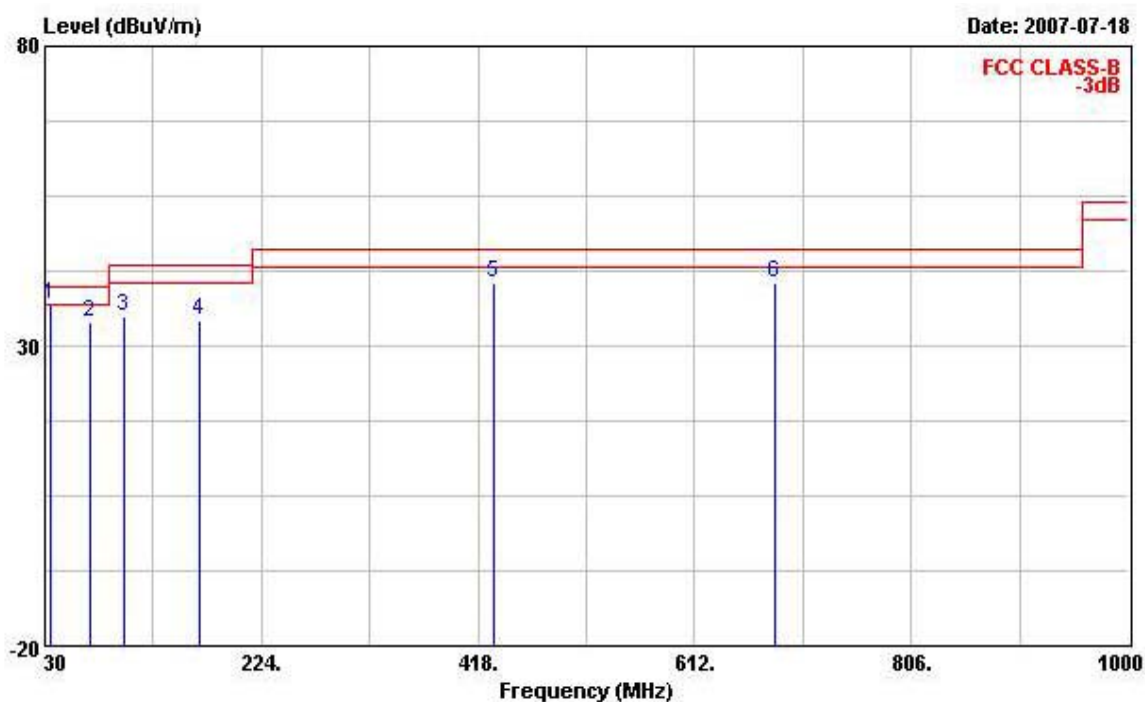
1.1.8. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25	Humidity	54%
Test Engineer	Duncan	Configurations	Mode 1

Horizontal

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	109.540	32.35	45.03	-11.15	43.50	12.40	2.72	27.80	Peak
2	132.820	34.13	47.00	-9.37	43.50	12.10	2.96	27.93	Peak
3	184.230	29.12	44.81	-14.38	43.50	9.10	3.07	27.87	Peak
4	198.780	31.51	46.46	-11.99	43.50	9.61	3.54	28.09	Peak
5	432.550	39.11	46.53	-6.89	46.00	17.08	4.42	28.92	QP
6	579.990	41.54	47.02	-4.46	46.00	19.30	4.79	29.57	Peak

Vertical



	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	35.820	36.82	47.08	-3.18	40.00	14.94	2.50	27.70	QP
2	70.740	33.98	52.18	-6.02	40.00	6.10	3.42	27.73	Peak
3	101.780	34.93	48.40	-8.57	43.50	11.44	2.83	27.74	Peak
4	167.740	34.21	48.90	-9.29	43.50	9.81	3.36	27.86	Peak
5	431.580	40.50	47.91	-5.50	46.00	17.09	4.41	28.91	Peak
6	684.750	40.41	45.07	-5.59	46.00	19.86	5.24	29.77	Peak

Note:

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

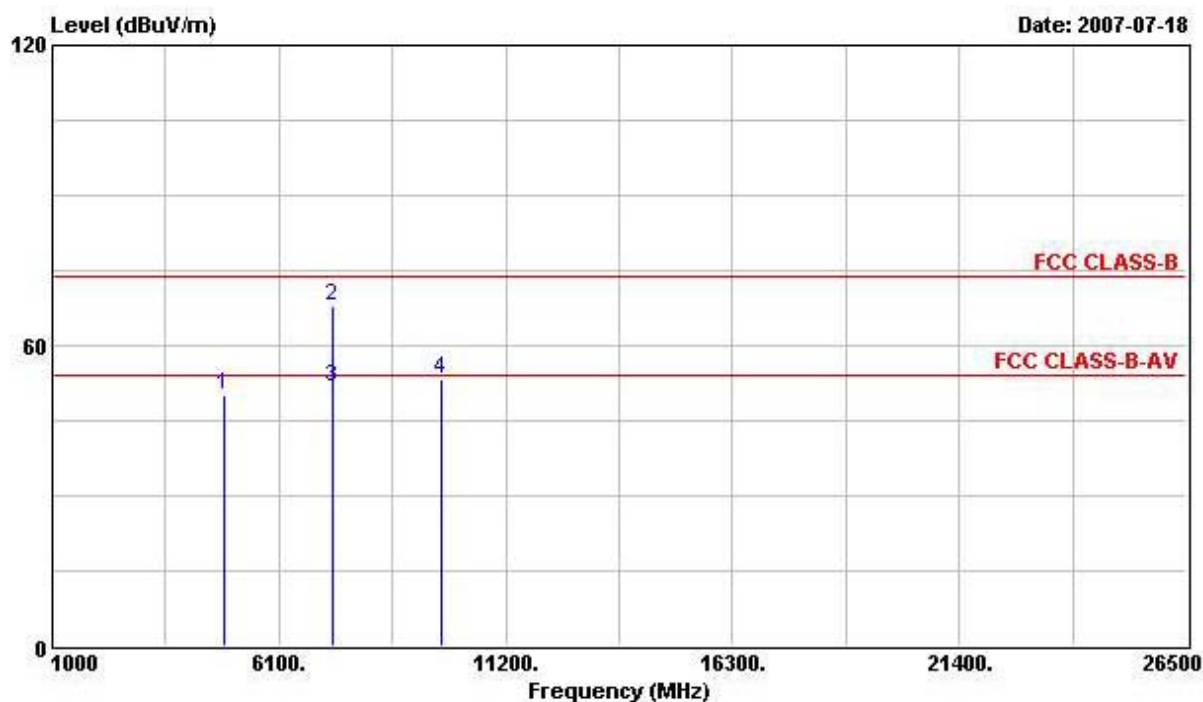
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

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

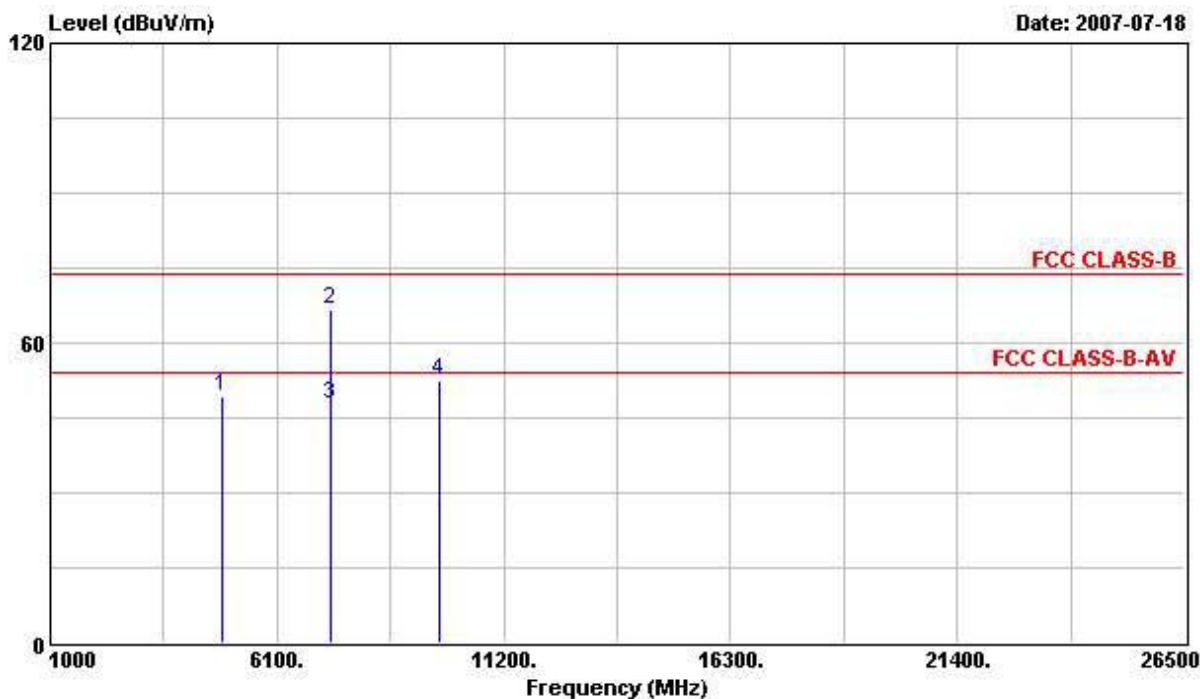
Temperature	24	Humidity	53%
Test Engineer	Vic Hsiao	Configurations	802.11g CH 6 + Bluetooth CH78 Mode

Horizontal



	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	4876.000	50.31	45.52	-3.69	54.00	33.16	4.36	32.73	Average
2	7308.000	67.90	59.61	-6.10	74.00	35.94	5.30	32.96	PEAK
3	7308.000	51.65	43.37	-2.35	54.00	35.94	5.30	32.96	Average
4	9743.950	53.43	41.67	-20.57	74.00	38.58	6.58	33.40	PEAK

Vertical



	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	4876.000	49.21	44.41	-4.79	54.00	33.16	4.36	32.73	Average
2	7312.000	66.81	58.53	-7.19	74.00	35.94	5.30	32.97	PEAK
3	7312.000	47.69	39.41	-6.31	54.00	35.94	5.30	32.97	Average
4	9752.050	52.50	40.70	-21.50	74.00	38.62	6.58	33.40	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.

1.2. Band Edge Emissions Measurement

1.2.1. Limit

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

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

1.2.2. 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)	100 KHz /100 KHz for Peak

1.2.3. Test Procedures

1. The test procedure is the same as section 3.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

1.2.4. Test Setup Layout

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

1.2.5. Test Deviation

There is no deviation with the original standard.

1.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

1.2.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25	Humidity	54%
Test Engineer	Duncan	Configurations	802.11b CH 1, 6, 11 +BT CH 00, 39, 78 Mode

Channel 1

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	2390.000	57.72	26.60	-16.28	74.00	28.29	2.82	0.00	Peak
2 @	2414.500	109.24	78.09			28.33	2.82	0.00	Peak
1	2390.000	45.63	14.51	-8.37	54.00	28.29	2.82	0.00	Average
2 @	2414.500	99.77	68.62			28.33	2.82	0.00	Average

Channel 6

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1 @	2438.060	102.26	71.02			28.40	2.85	0.00	Peak
1 @	2438.060	93.28	62.04			28.40	2.85	0.00	Average

Channel 11

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1 @	2464.090	105.18	73.88			28.43	2.87	0.00	Peak
2	2483.500	56.37	25.03	-17.63	74.00	28.47	2.87	0.00	Peak
1 @	2464.090	97.47	66.17			28.43	2.87	0.00	Average
2	2483.500	44.78	13.44	-9.22	54.00	28.47	2.87	0.00	Average

Temperature	25	Humidity	54%
Test Engineer	Duncan	Configurations	802.11g CH 1, 6, 11 +BT CH 00, 39, 78 Mode

Channel 1

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1	2390.000	67.27	36.15	-6.73	74.00	28.29	2.82	0.00	Peak
2 ☺	2416.780	104.44	73.29			28.33	2.82	0.00	Peak
1	2390.000	49.35	18.23	-4.65	54.00	28.29	2.82	0.00	Average
2 ☺	2416.780	94.50	63.35			28.33	2.82	0.00	Average

Channel 6

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1 ☺	2430.650	99.25	68.04			28.36	2.85	0.00	Peak
1 ☺	2430.650	89.60	58.39			28.36	2.85	0.00	Average

Channel 11

	Freq	Level	Read Level	Over Limit	Limit	Antenna Line Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dBuV	dB	dBuV/m	dB/m	dB	dB	
1 ☺	2466.940	100.11	68.81			28.43	2.87	0.00	Peak
2	2483.500	62.41	31.07	-11.59	74.00	28.47	2.87	0.00	Peak
1 ☺	2466.940	90.26	58.96			28.43	2.87	0.00	Average
2	2483.500	47.46	16.12	-6.54	54.00	28.47	2.87	0.00	Average

Note:

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

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

2. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2007	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	CPA9231A	1886	9 kHz - 2 GHz	Jan. 22, 2007	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jun.07, 2007	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100004/040	9 kHz - 40 GHz	Sep. 21, 2006	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 21, 2007	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 04, 2007	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	NCR	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 02, 2006	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 02, 2006	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is one year. NCR: Non-Calibration required.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	MITEQ	AMF-6F-260400	923364	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	May 23, 2006*	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 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085