

## Appendix D. Co-location

## 1.1. Co-Location Measurement

### 1.1.1. Limit

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 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

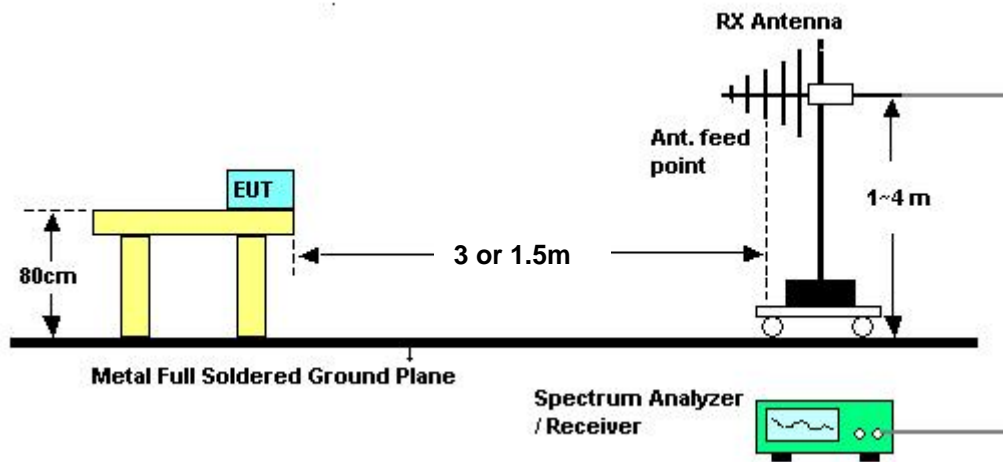
Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for peak

### 1.1.3. Test Procedures

1. 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 horn 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. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
6. 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.
7. 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.

### 1.1.4. Test Setup Layout

For radiated emissions above 1000MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

### 1.1.5. Test Deviation

There is no deviation with the original standard.

### 1.1.6. EUT Operation during Test

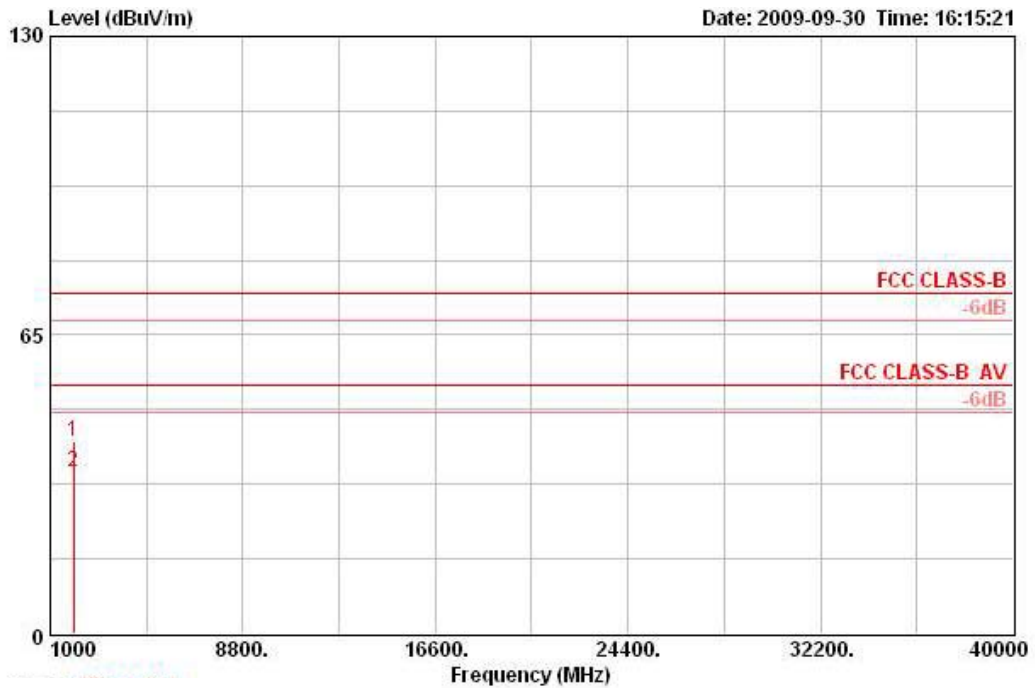
The EUT was programmed to be in continuously transmitting mode.

## 2. Results of Radiated Emissions for Co-located

<For Antenna 1>:

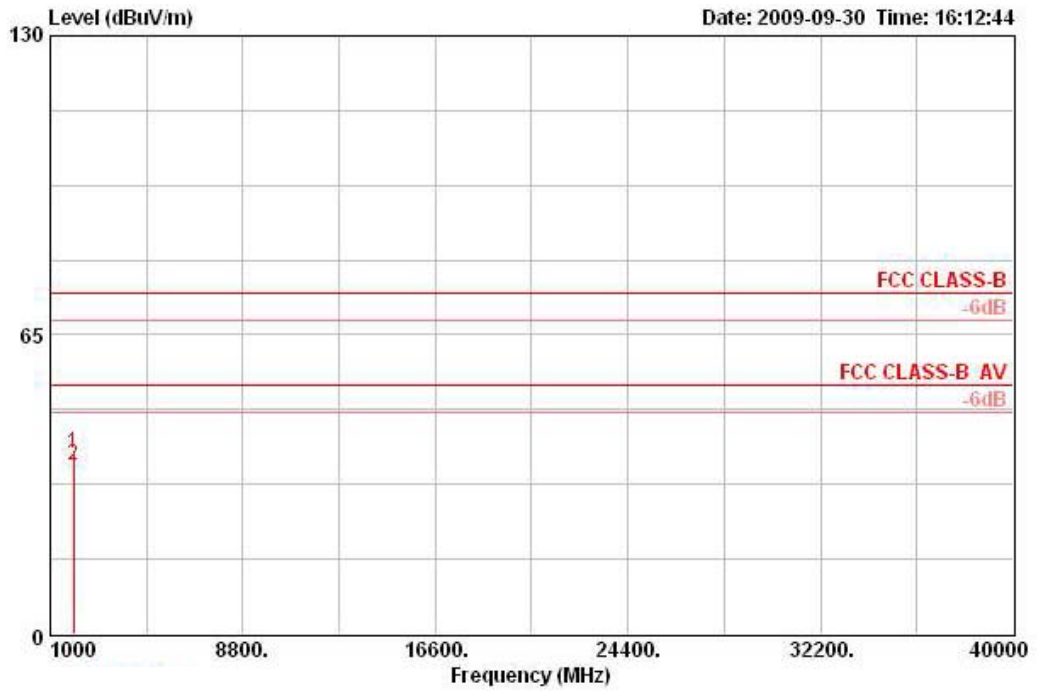
Temperature	26.8°C	Humidity	56%
Test Engineer	Beck Wu	Configurations	2.4GHz + 5 GHz TX Normal Link / Antenna 1
Test Result	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.960	41.69	-32.31	74.00	46.01	26.94	34.90	3.64	PEAK	HORIZONTAL	271	100
2	1949.990	35.36	-18.64	54.00	39.68	26.94	34.90	3.64	AVERAGE	HORIZONTAL	271	100

Vertical

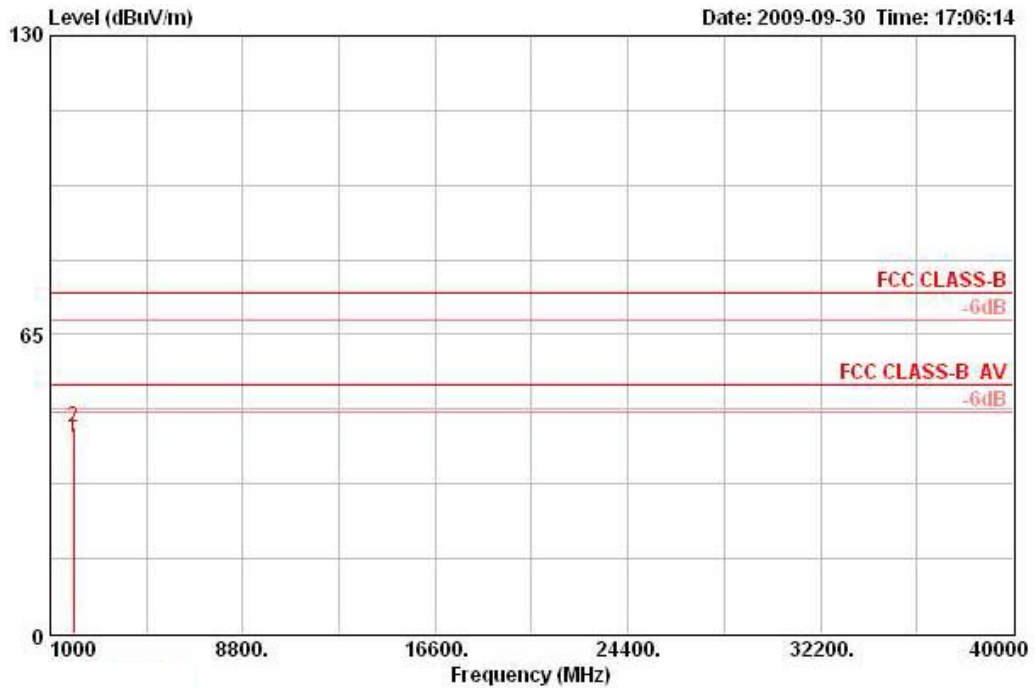


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.930	39.43	-34.57	74.00	43.75	26.94	34.90	3.64	PEAK	VERTICAL	190	122
2	1950.010	36.53	-17.47	54.00	40.85	26.94	34.90	3.64	AVERAGE	VERTICAL	190	122

<For Antenna 2>:

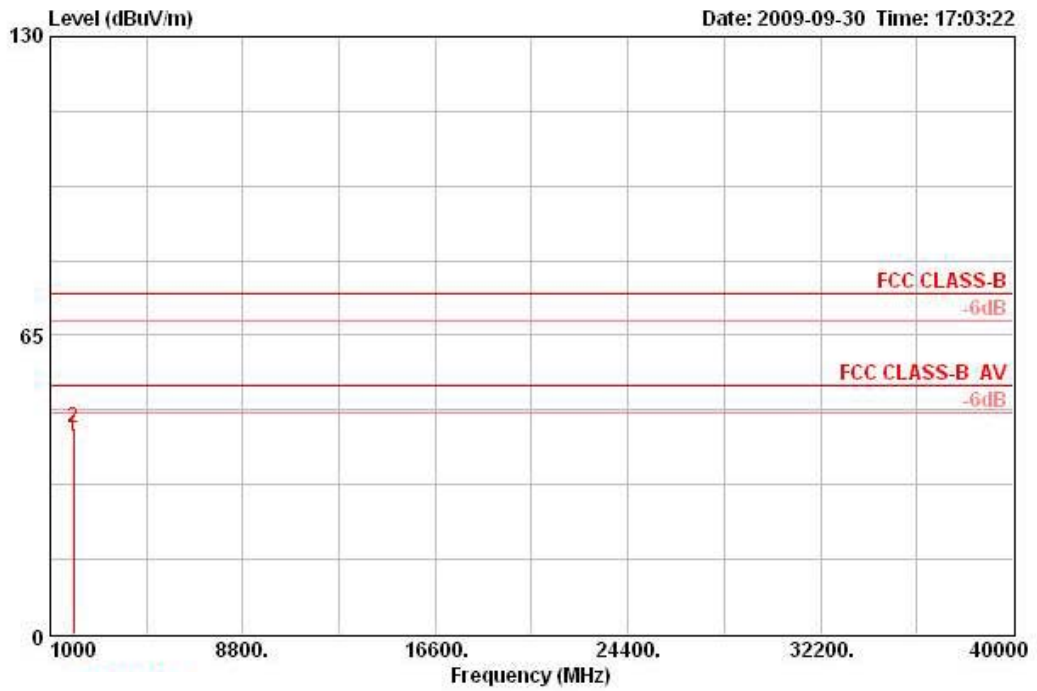
<b>Temperature</b>	26.8°C	<b>Humidity</b>	56%
<b>Test Engineer</b>	Beck Wu	<b>Configurations</b>	2.4GHz + 5 GHz TX Normal Link / Antenna 2
<b>Test Result</b>	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1950.010	42.62	-11.38	54.00	46.93	26.94	34.90	3.64	AVERAGE	HORIZONTAL	80	109
2	1950.110	44.81	-29.19	74.00	49.13	26.94	34.90	3.64	PEAK	HORIZONTAL	80	109

Vertical



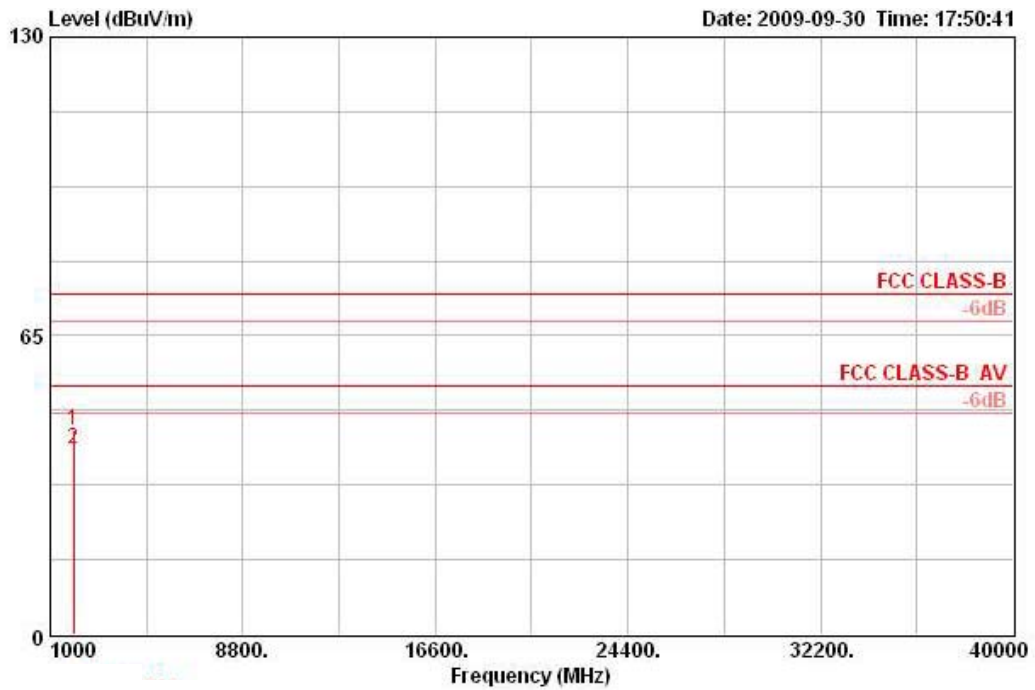
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1950.010	42.92	-11.08	54.00	47.24	26.94	34.90	3.64	AVERAGE	VERTICAL	222	100
2	1950.080	44.94	-29.06	74.00	49.26	26.94	34.90	3.64	PEAK	VERTICAL	222	100



<For Antenna 3>:

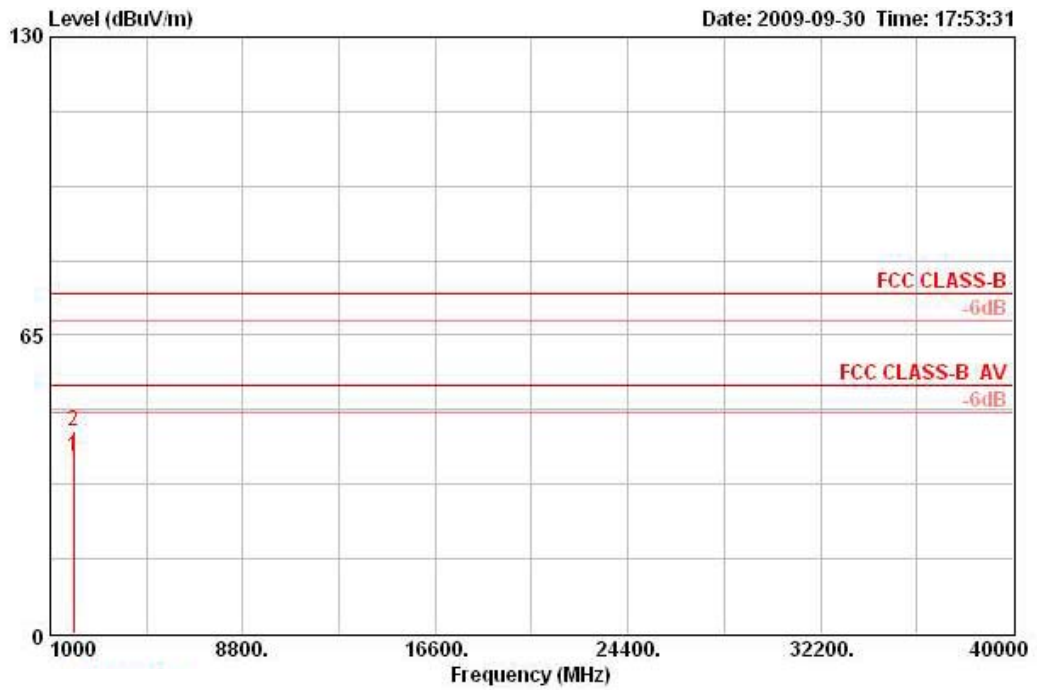
Temperature	26.8°C	Humidity	56%
Test Engineer	Beck Wu	Configurations	2.4GHz + 5 GHz TX Normal Link / Antenna 3
Test Result	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.890	44.45	-29.55	74.00	48.77	26.94	34.90	3.64	PEAK	HORIZONTAL	166	124
2	1950.030	40.54	-13.46	54.00	44.86	26.94	34.90	3.64	AVERAGE	HORIZONTAL	166	124

Vertical

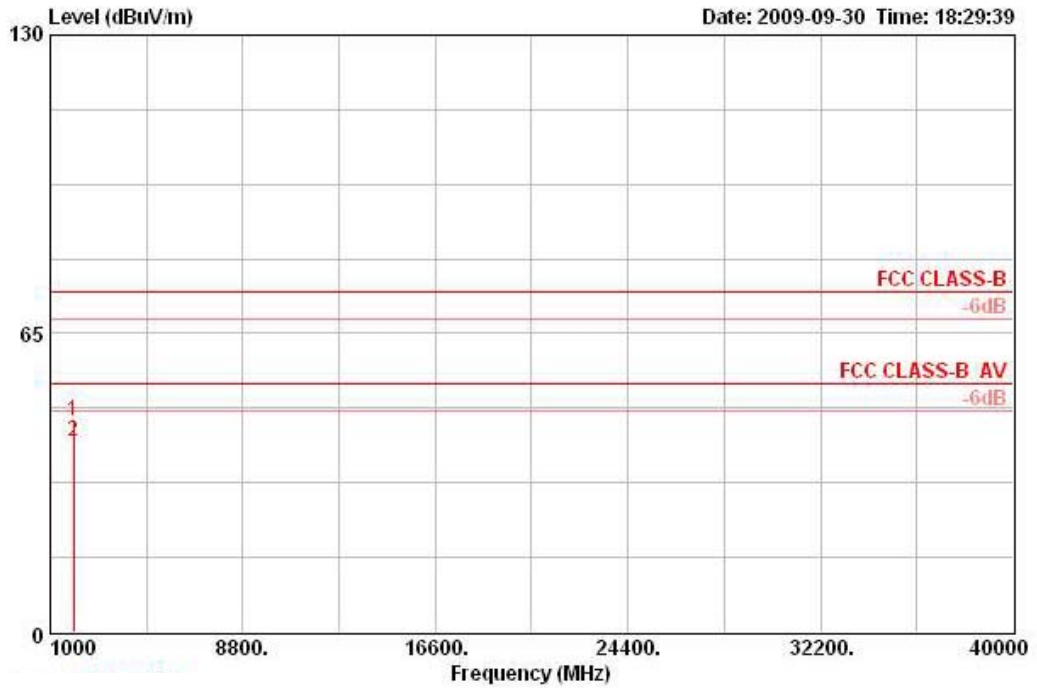


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1950.010	38.63	-15.37	54.00	42.95	26.94	34.90	3.64	AVERAGE	VERTICAL	203	100
2	1950.310	43.94	-30.06	74.00	48.26	26.94	34.90	3.64	PEAK	VERTICAL	203	100

<For Antenna 4>:

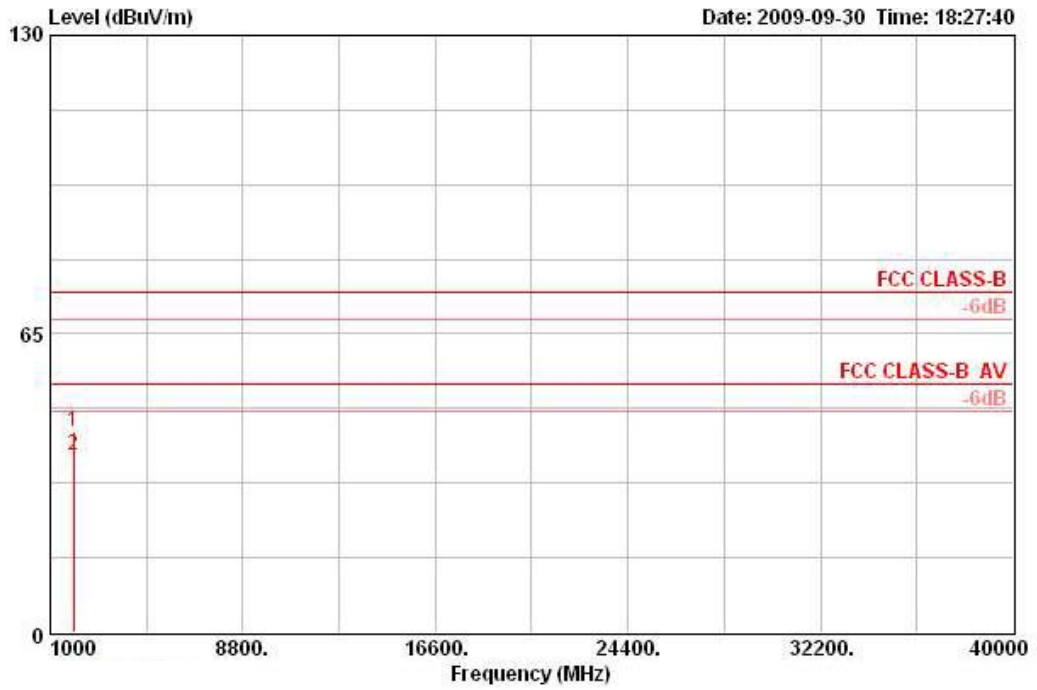
<b>Temperature</b>	26.8°C	<b>Humidity</b>	56%
<b>Test Engineer</b>	Beck Wu	<b>Configurations</b>	2.4GHz + 5 GHz TX Normal Link / Antenna 4
<b>Test Result</b>	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.910	45.75	-28.25	74.00	50.07	26.94	34.90	3.64	PEAK	HORIZONTAL	325	104
2 @	1949.990	41.34	-12.66	54.00	45.66	26.94	34.90	3.64	AVERAGE	HORIZONTAL	325	104

Vertical

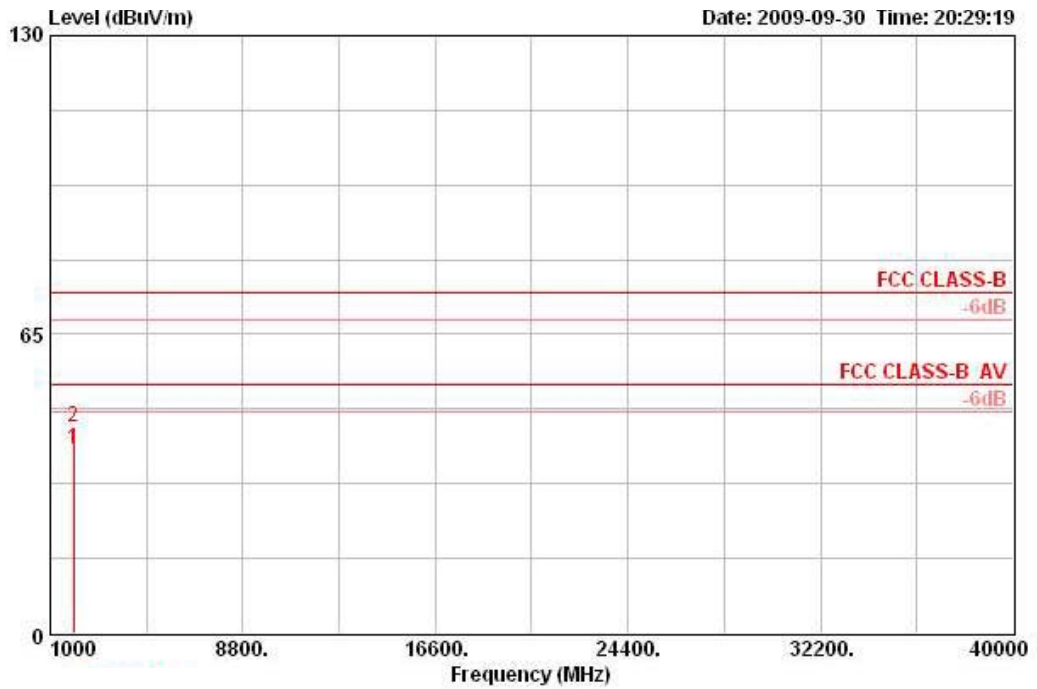


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.880	43.55	-30.45	74.00	47.86	26.94	34.90	3.64	PEAK	VERTICAL	79	100
2	1950.010	38.40	-15.60	54.00	42.72	26.94	34.90	3.64	AVERAGE	VERTICAL	79	100

<For Antenna 5>:

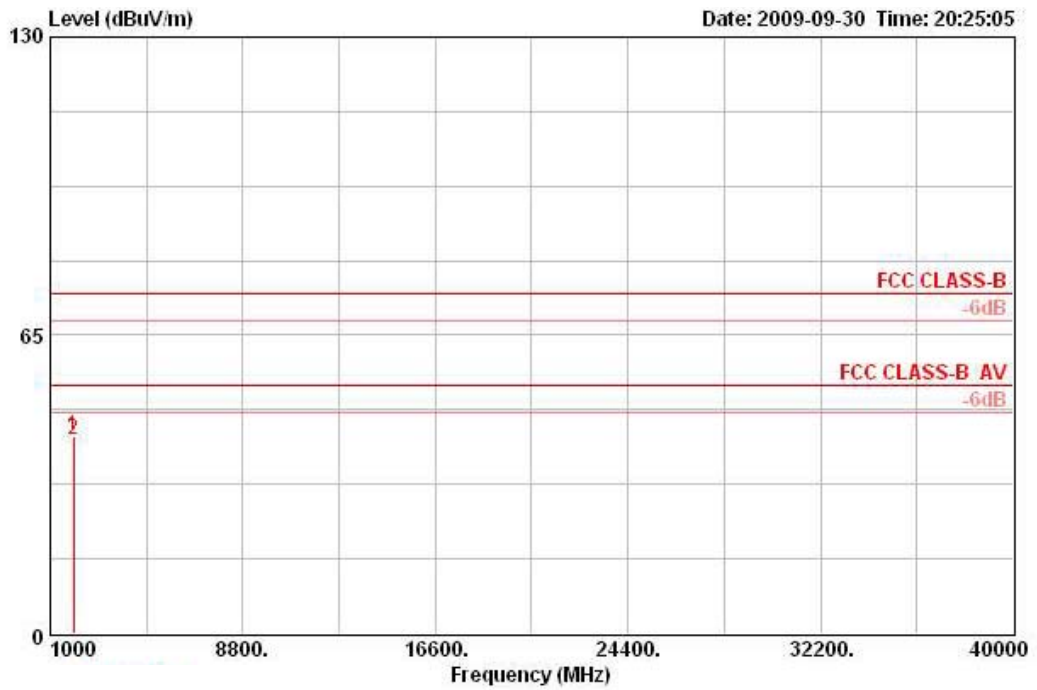
<b>Temperature</b>	26.8°C	<b>Humidity</b>	56%
<b>Test Engineer</b>	Beck Wu	<b>Configurations</b>	2.4GHz + 5 GHz TX Normal Link / Antenna 5
<b>Test Result</b>	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1950.020	40.17	-13.83	54.00	44.49	26.94	34.90	3.64	AVERAGE	HORIZONTAL	238	100
2	1950.040	44.92	-29.08	74.00	49.24	26.94	34.90	3.64	PEAK	HORIZONTAL	238	100

Vertical

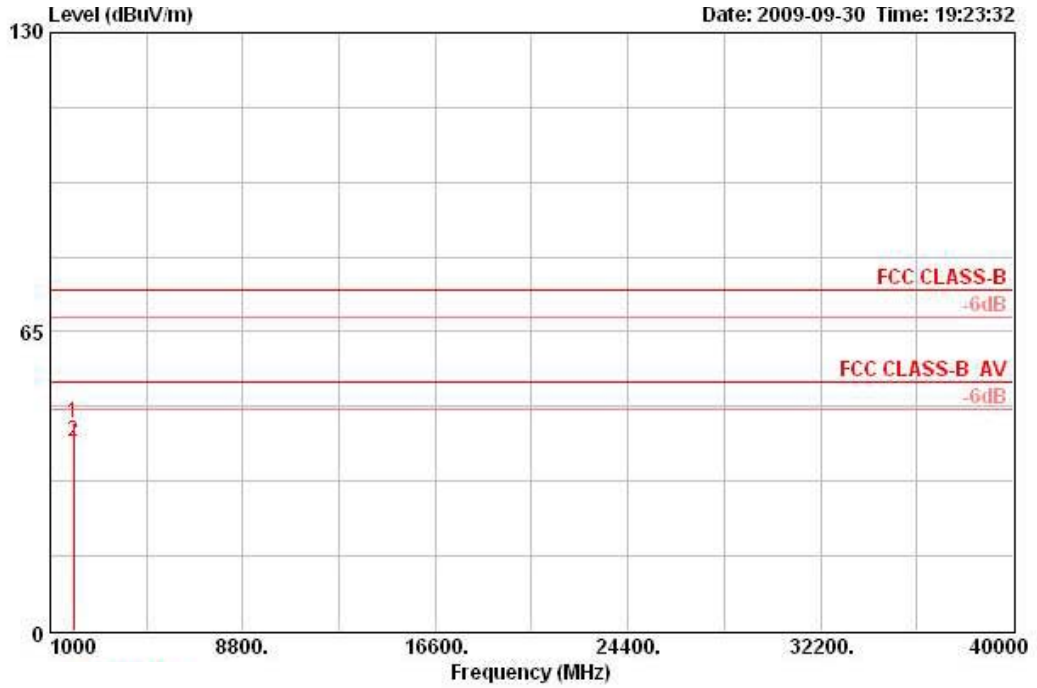


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1950.000	42.83	-31.17	74.00	47.15	26.94	34.90	3.64	PEAK	VERTICAL	300	145
2	1950.010	42.22	-11.78	54.00	46.54	26.94	34.90	3.64	AVERAGE	VERTICAL	300	145

<For Antenna 6>:

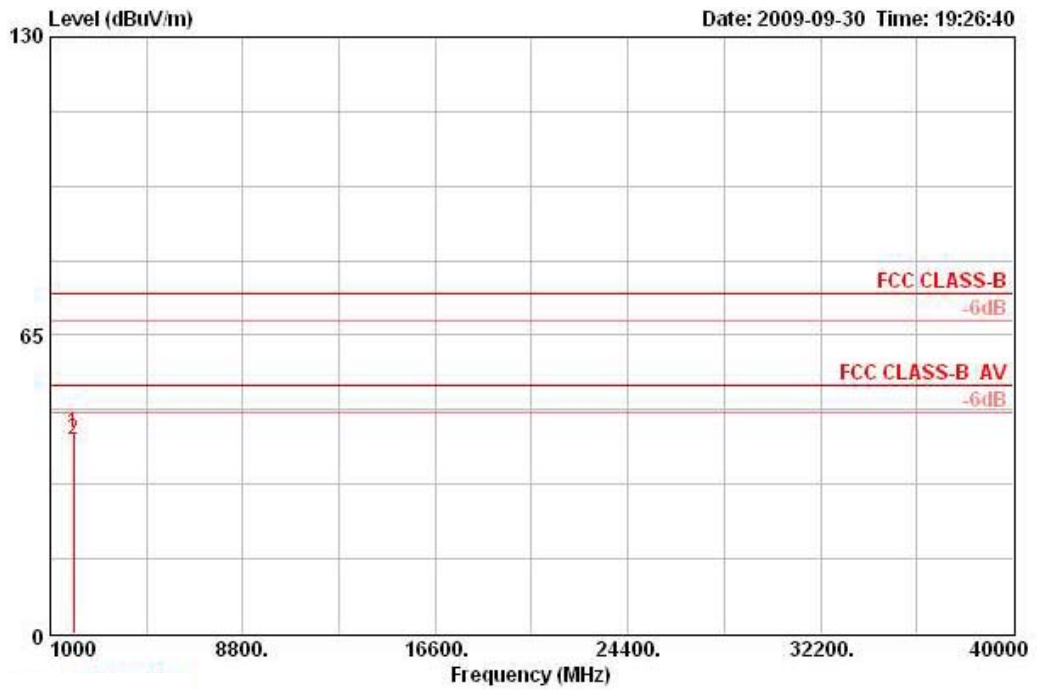
Temperature	26.8°C	Humidity	56%
Test Engineer	Beck Wu	Configurations	2.4GHz + 5 GHz TX Normal Link / Antenna 6
Test Result	Pass		

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.840	45.27	-28.73	74.00	49.59	26.94	34.90	3.64	PEAK	HORIZONTAL	176	100
2	1950.010	41.21	-12.79	54.00	45.53	26.94	34.90	3.64	AVERAGE	HORIZONTAL	176	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	1949.900	43.81	-30.19	74.00	48.12	26.94	34.90	3.64	PEAK	VERTICAL	195	117
2	1950.010	42.05	-11.95	54.00	46.37	26.94	34.90	3.64	AVERAGE	VERTICAL	195	117