

## 4.6. Radiated Emissions Measurement

### 4.6.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, in case the emission falls 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 (microrvolts/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

### 4.6.2. 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)	1000KHz / 1000KHz for peak

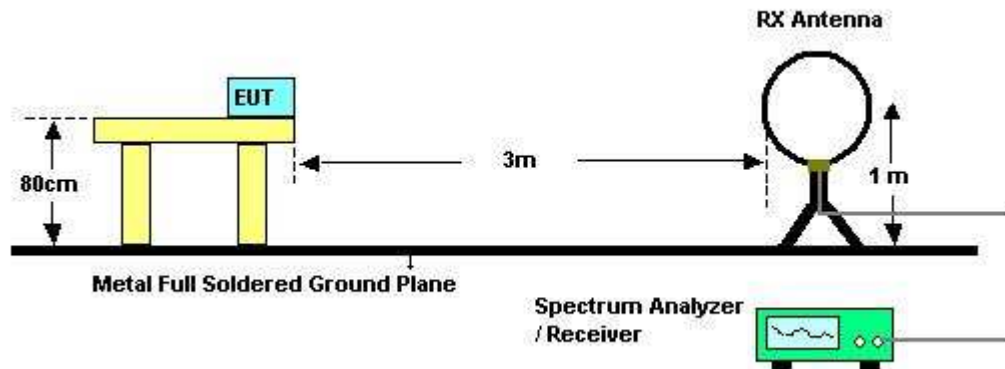
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 4.6.3. Test Procedures

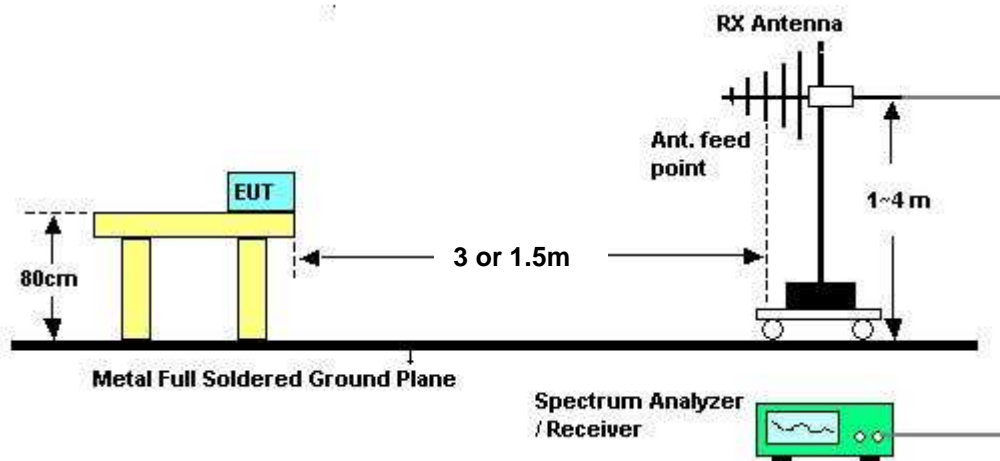
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

#### 4.6.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 5GHz 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].

#### 4.6.5. Test Deviation

There is no deviation with the original standard.

#### 4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

**4.6.7. Results of Radiated Emissions (9kHz~30MHz)**

<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang		
<b>Evaluating Date</b>	Nov. 24, 2009		

<b>Freq. (MHz)</b>	<b>Level (dBuV)</b>	<b>Over Limit (dB)</b>	<b>Limit Line (dBuV)</b>	<b>Remark</b>
-	-	-	-	See Note

Note:

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

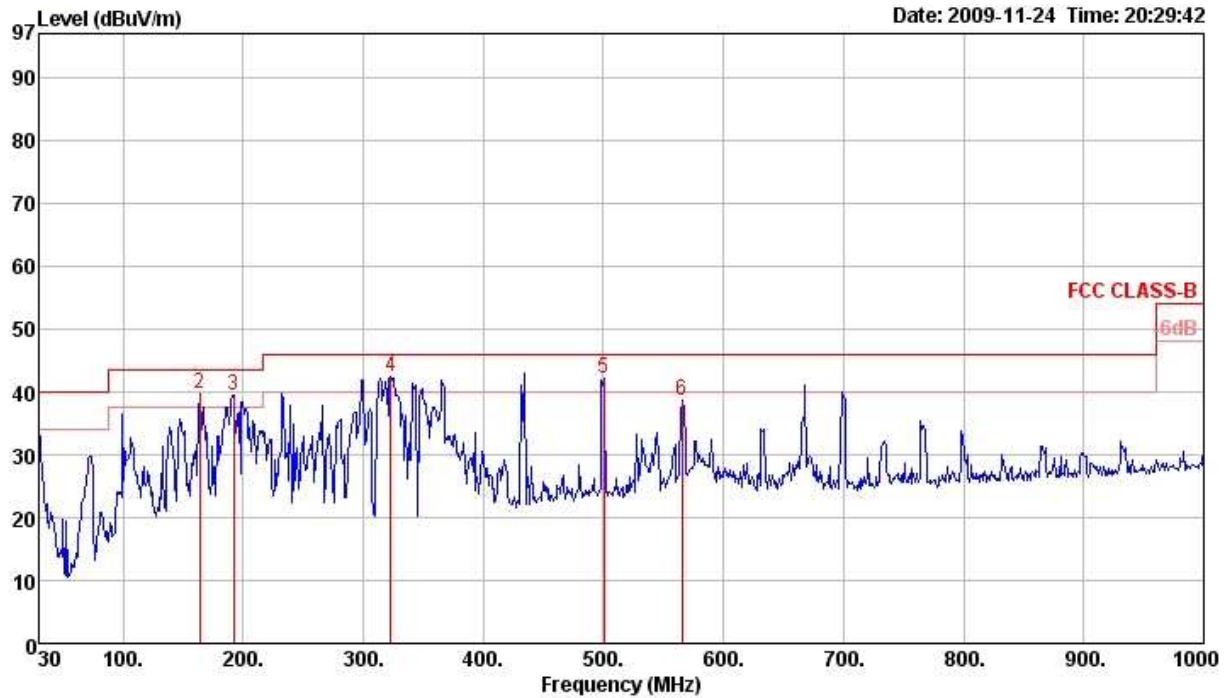
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

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

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

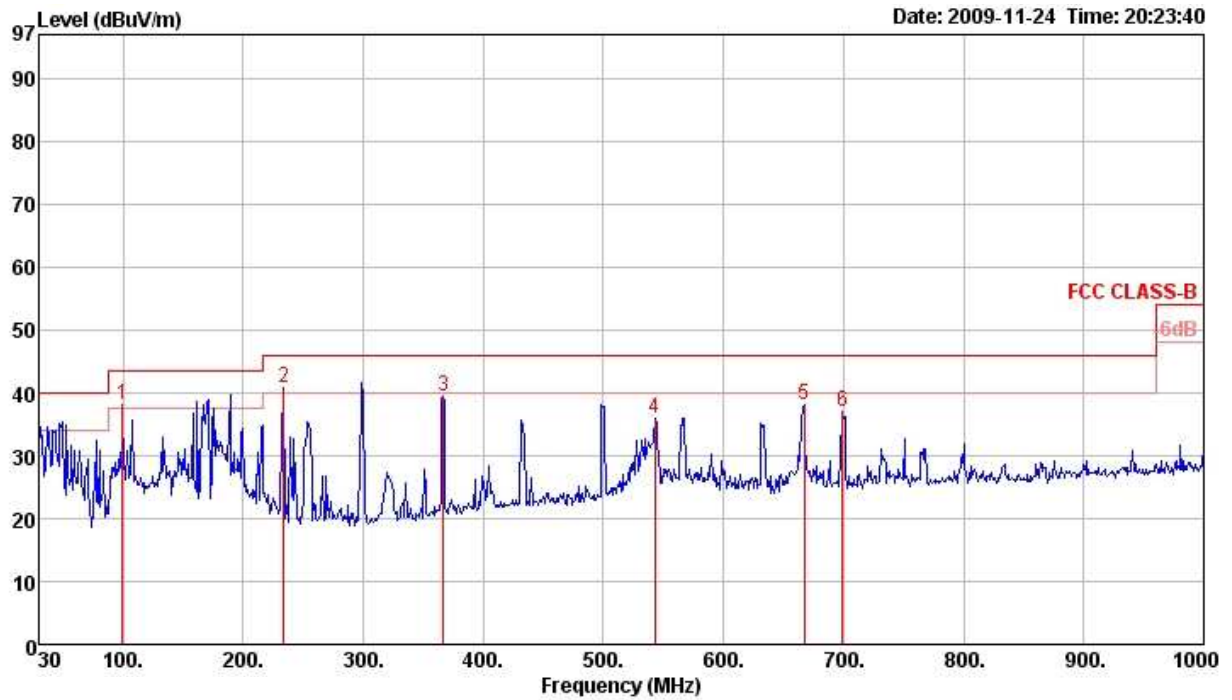
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	Normal Link

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	30.00	33.75	40.00	-6.25	42.29	0.50	27.80	18.76	0	100	Peak	HORIZONTAL
2 !	163.86	39.62	43.50	-3.88	53.06	1.52	27.28	12.32	0	100	Peak	HORIZONTAL
3 !	191.99	39.41	43.50	-4.09	54.20	1.66	27.14	10.69	0	100	Peak	HORIZONTAL
4 p	322.94	42.53	46.00	-3.47	53.45	2.15	27.06	13.99	0	100	Peak	HORIZONTAL
5 !	500.45	42.17	46.00	-3.83	49.94	2.70	28.10	17.63	0	100	Peak	HORIZONTAL
6	565.44	38.74	46.00	-7.26	45.64	2.83	28.10	18.37	0	100	Peak	HORIZONTAL

**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 !	99.84	38.12	43.50	-5.38	53.53	1.20	27.60	10.99	0	400	Peak	VERTICAL
2 p	233.70	40.89	46.00	-5.11	54.54	1.83	27.03	11.55	0	400	Peak	VERTICAL
3	366.59	39.34	46.00	-6.66	49.31	2.23	27.37	15.17	0	400	Peak	VERTICAL
4	543.13	35.99	46.00	-10.01	43.18	2.79	28.10	18.12	0	400	Peak	VERTICAL
5	667.29	38.08	46.00	-7.92	43.70	3.43	28.03	18.98	0	400	Peak	VERTICAL
6	699.30	36.90	46.00	-9.10	42.51	3.30	28.00	19.09	0	400	Peak	VERTICAL

**Note:**

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

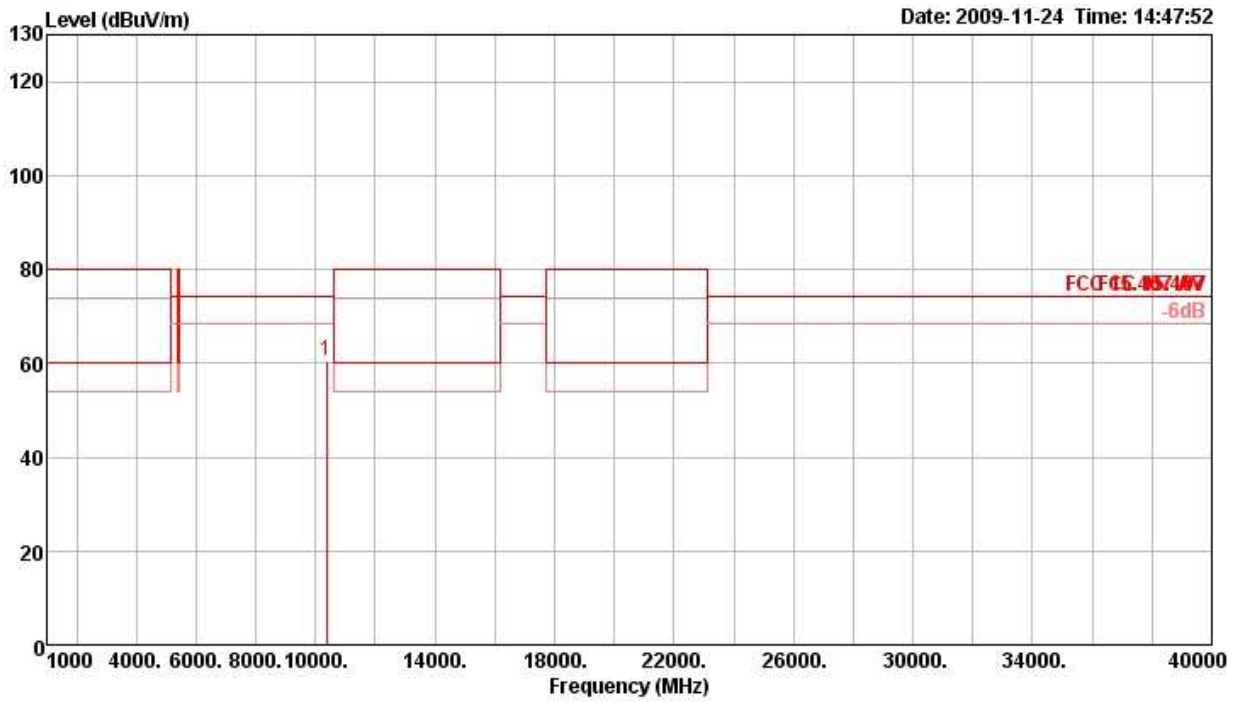
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

4.6.9. Results for Radiated Emissions (1GHz~40GHz)

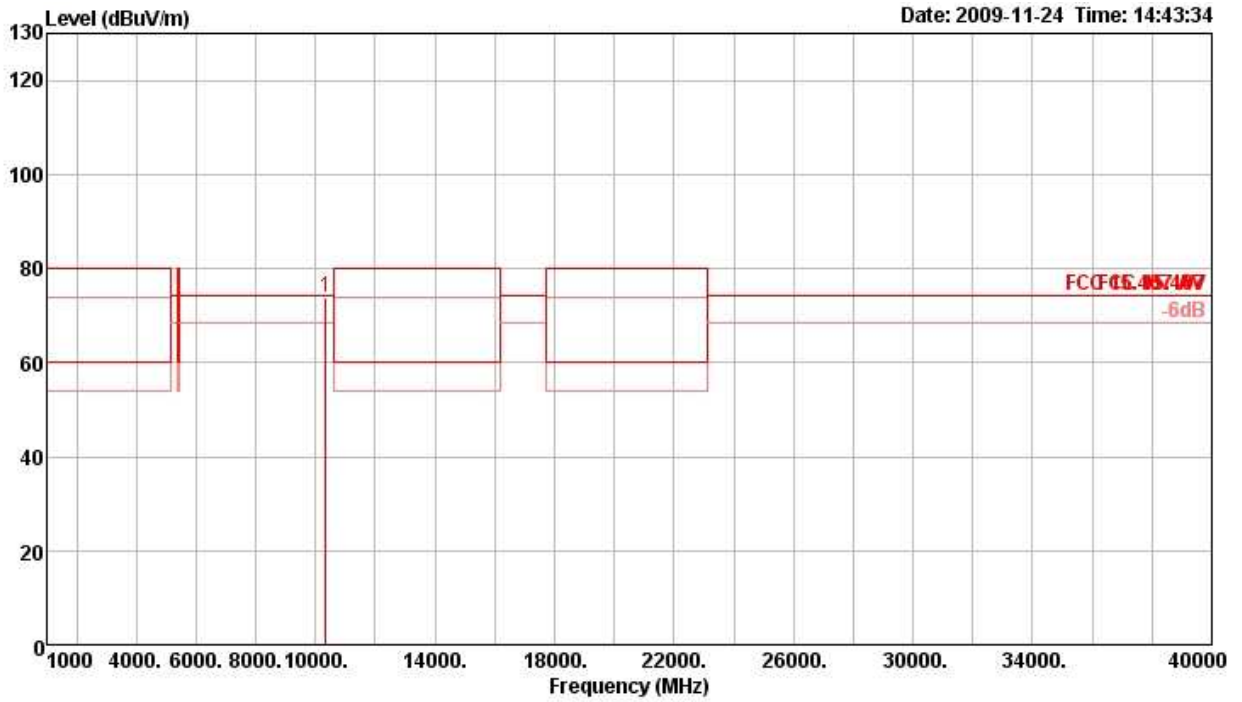
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11n MCS0 20MHz Ch 36, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10366.30	60.32	74.30	-13.98	52.51	4.65	35.36	38.52	342	104	Peak	HORIZONTAL

**Vertical**



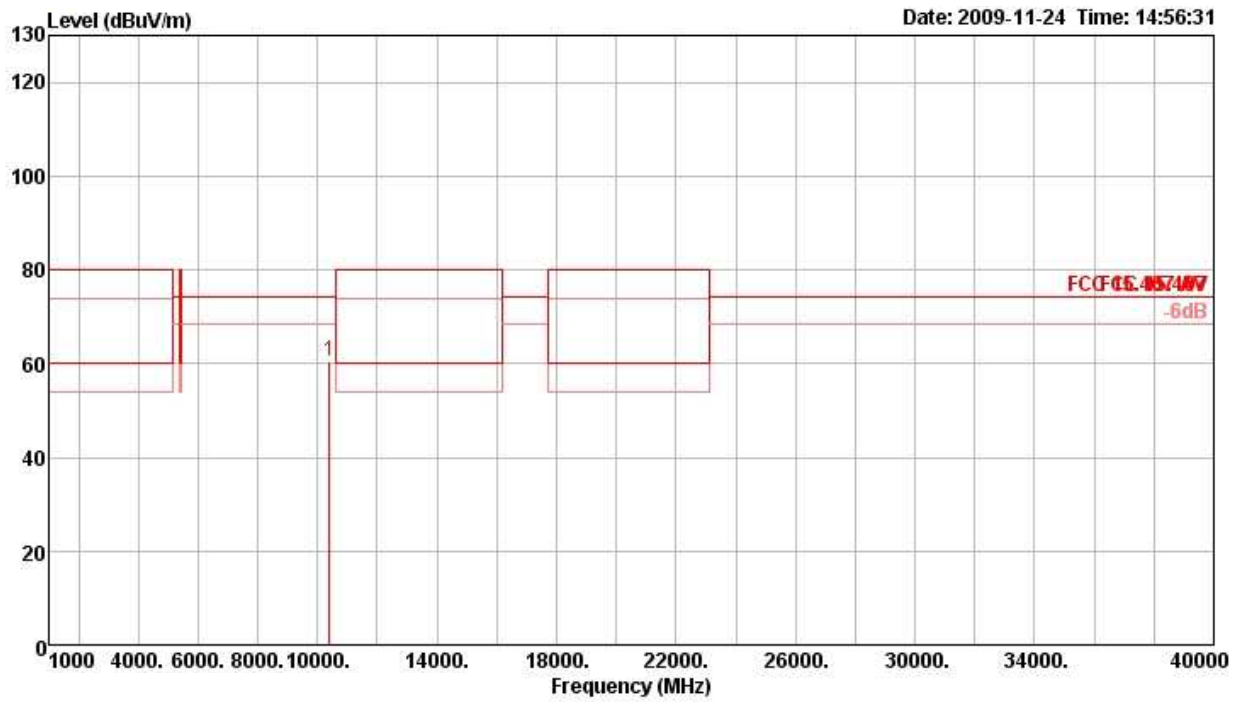
	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10350.80	73.93	74.30	-0.37	66.13	4.65	35.36	38.51	274	100	Peak	VERTICAL





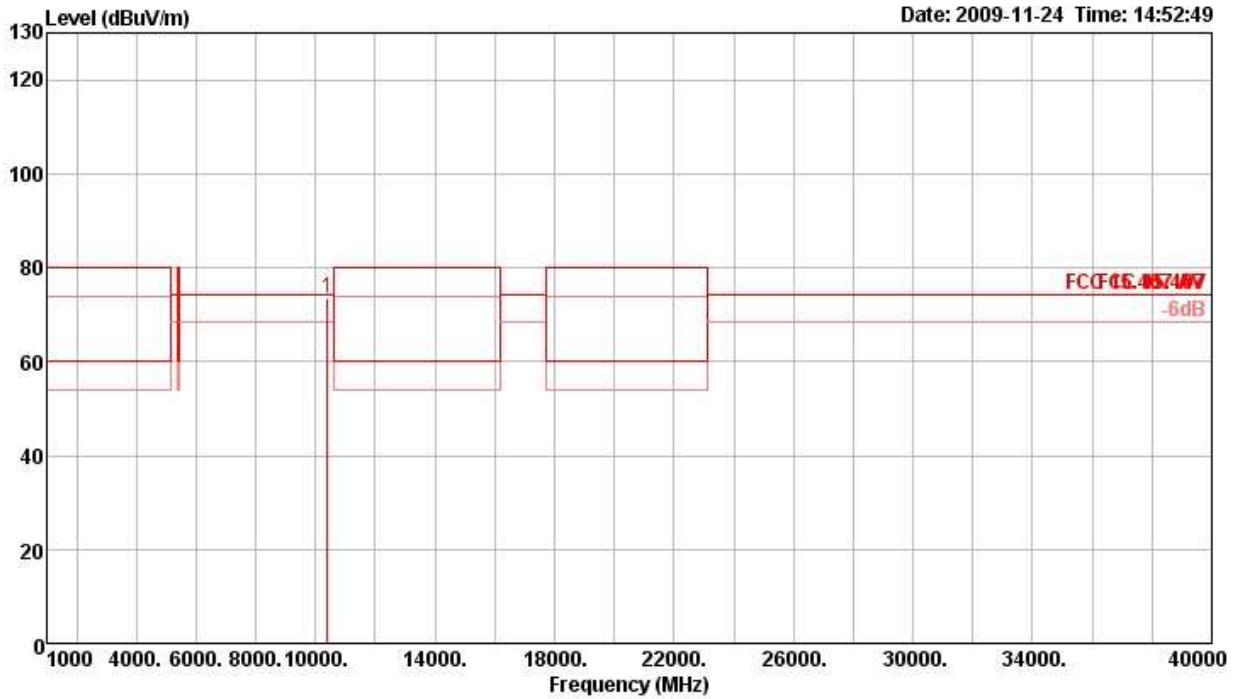
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 40, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10393.60	60.36	74.30	-13.94	52.47	4.68	35.33	38.54	195	121	Peak	HORIZONTAL

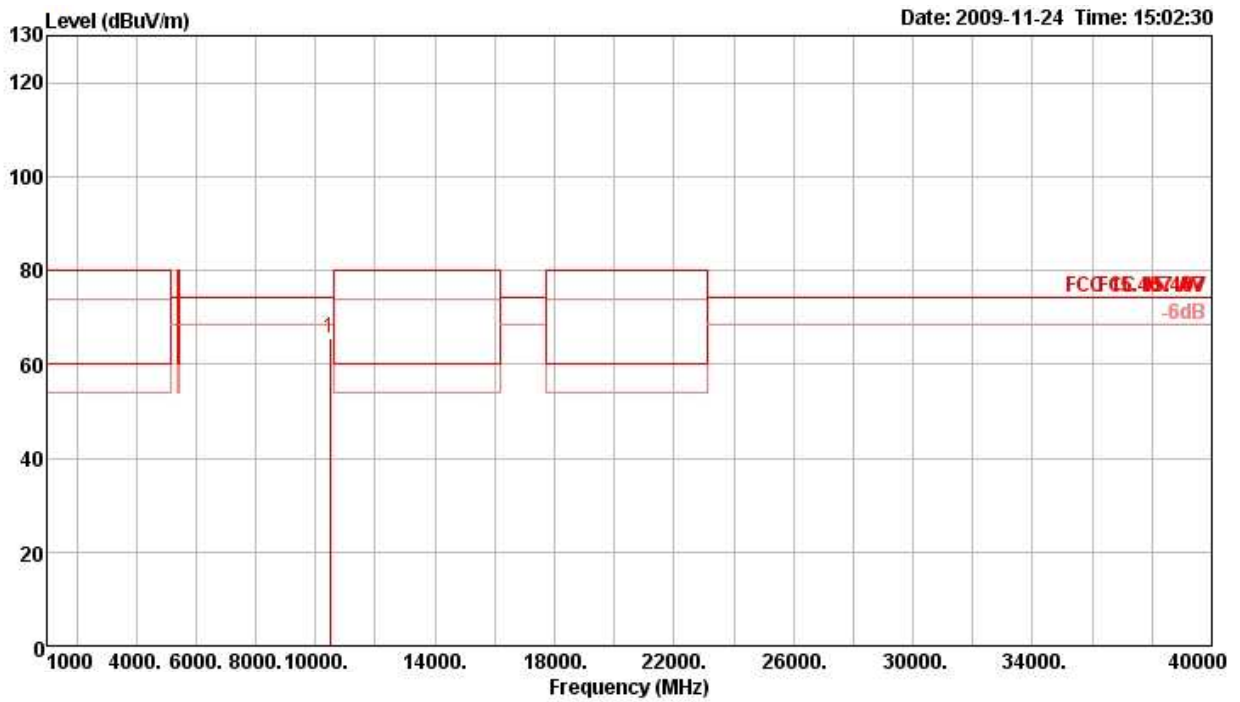
**Vertical**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10392.50	73.49	74.30	-0.81	65.61	4.68	35.33	38.53	276	100	Peak	VERTICAL

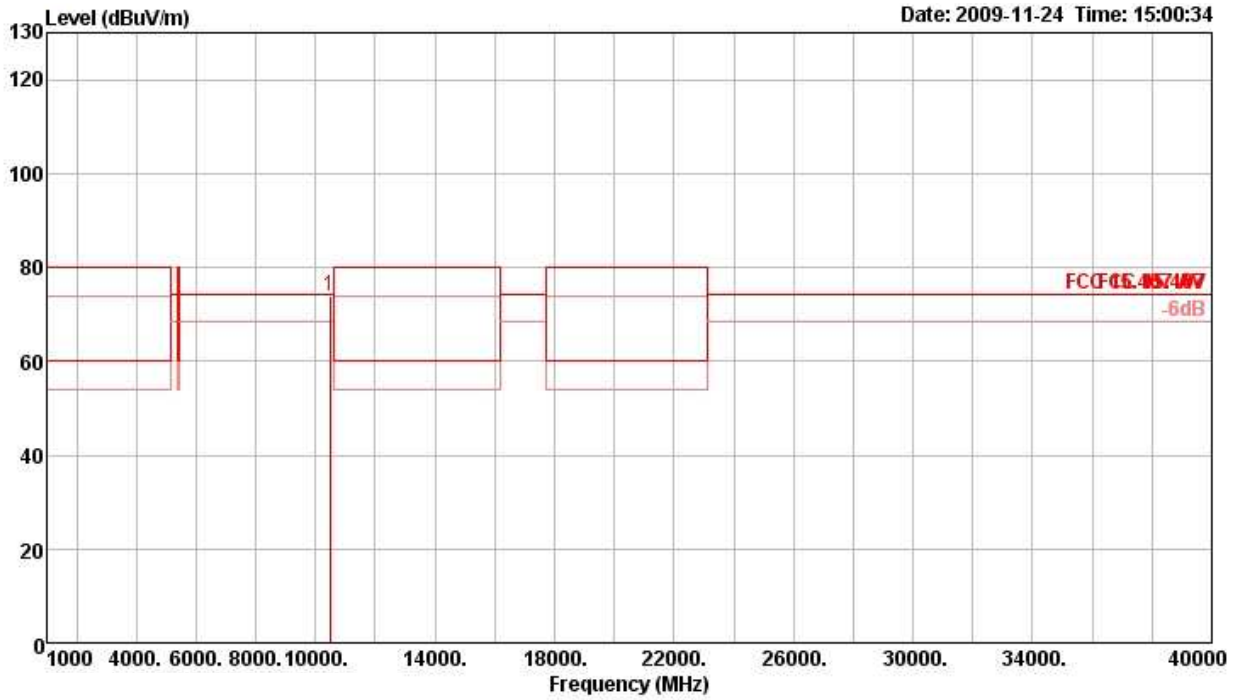
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 48, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10485.70	65.71	74.30	-8.59	57.57	4.76	35.21	38.59	36	128	Peak	HORIZONTAL

**Vertical**

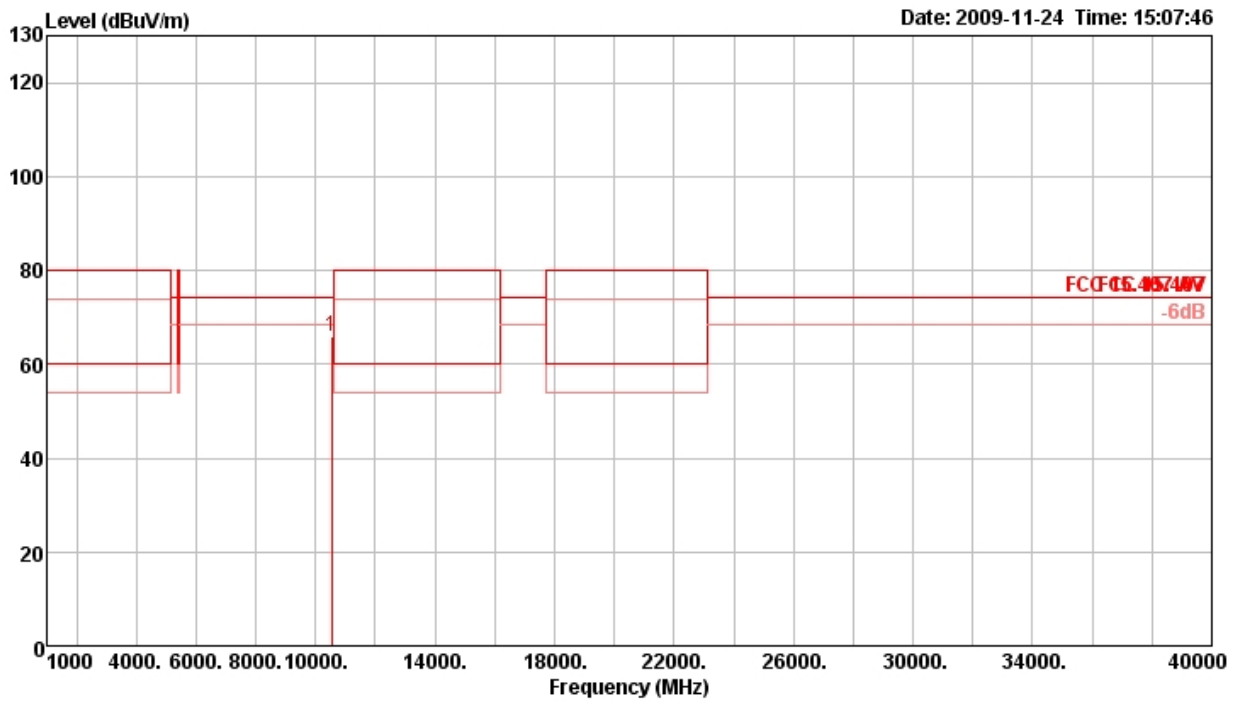


Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10485.20	73.71	74.30	-0.59	65.57	4.76	35.21	38.59	274	100	Peak	VERTICAL



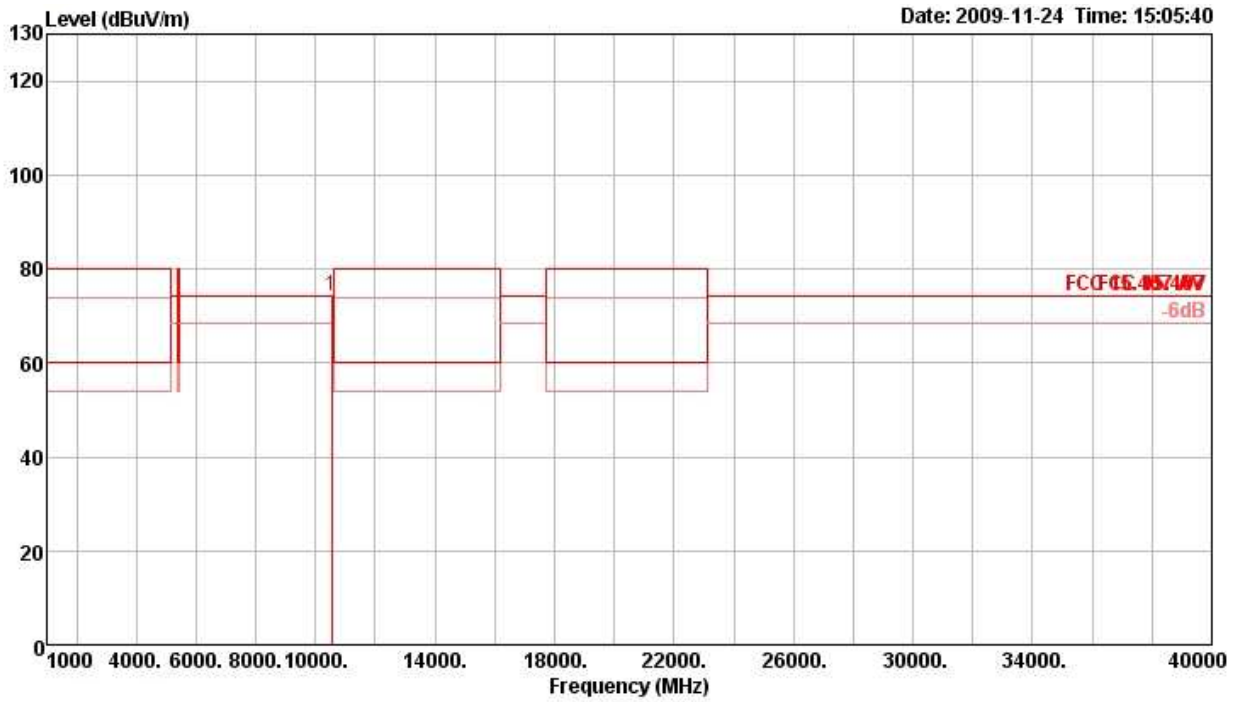
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 52, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10528.20	65.74	74.30	-8.56	57.54	4.76	35.15	38.59	173	110	Peak	HORIZONTAL

**Vertical**

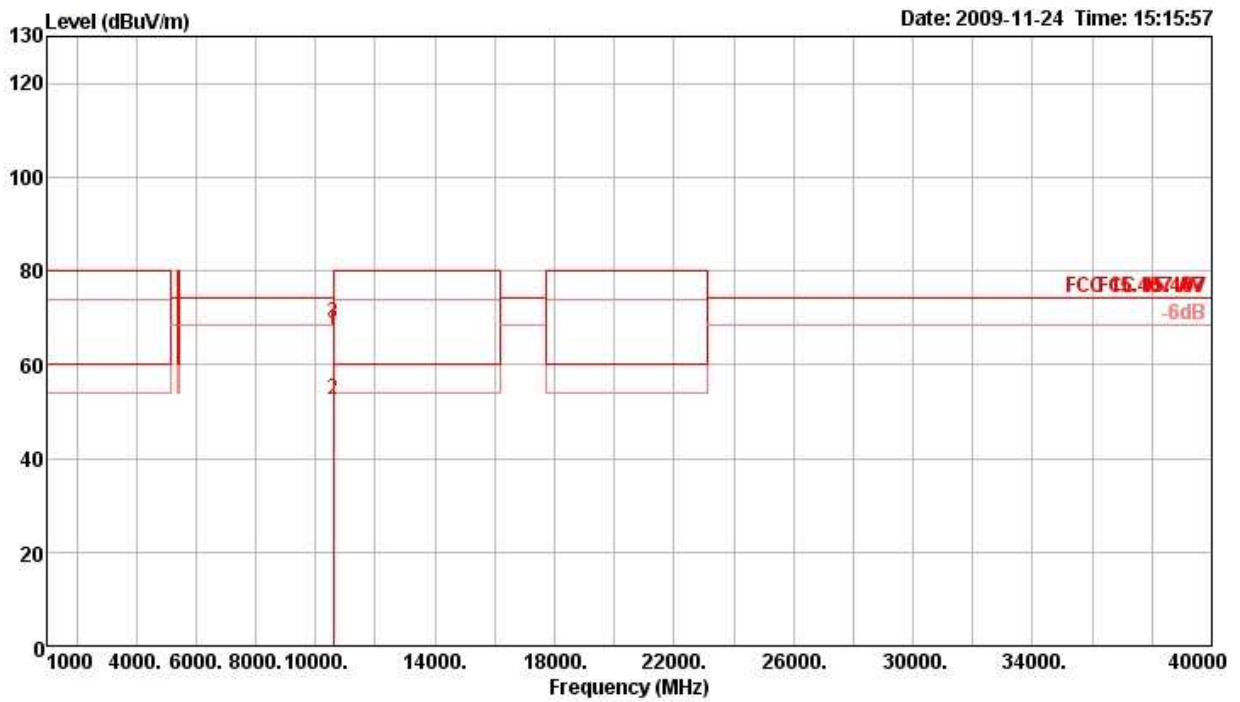


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Po1/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	10524.60	74.07	74.30	-0.23	65.87	4.76	35.15	38.59	275	100	Peak	VERTICAL



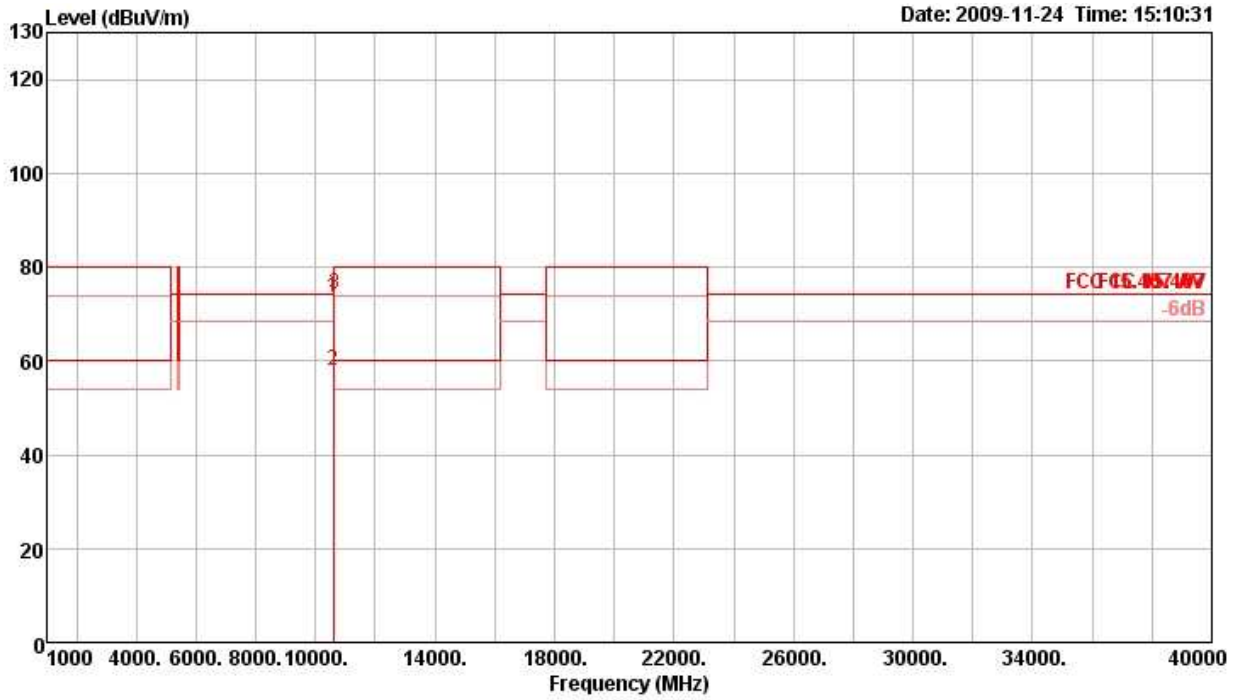
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 60, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p 10590.10	67.47	74.30	-6.83	59.27	4.73	35.10	38.57	37	128	Peak	HORIZONTAL
2	a 10606.30	52.64	60.00	-7.36	44.45	4.71	35.08	38.56	37	128	Average	HORIZONTAL
3	10606.80	68.71	80.00	-11.29	60.52	4.71	35.08	38.56	37	128	Peak	HORIZONTAL

**Vertical**

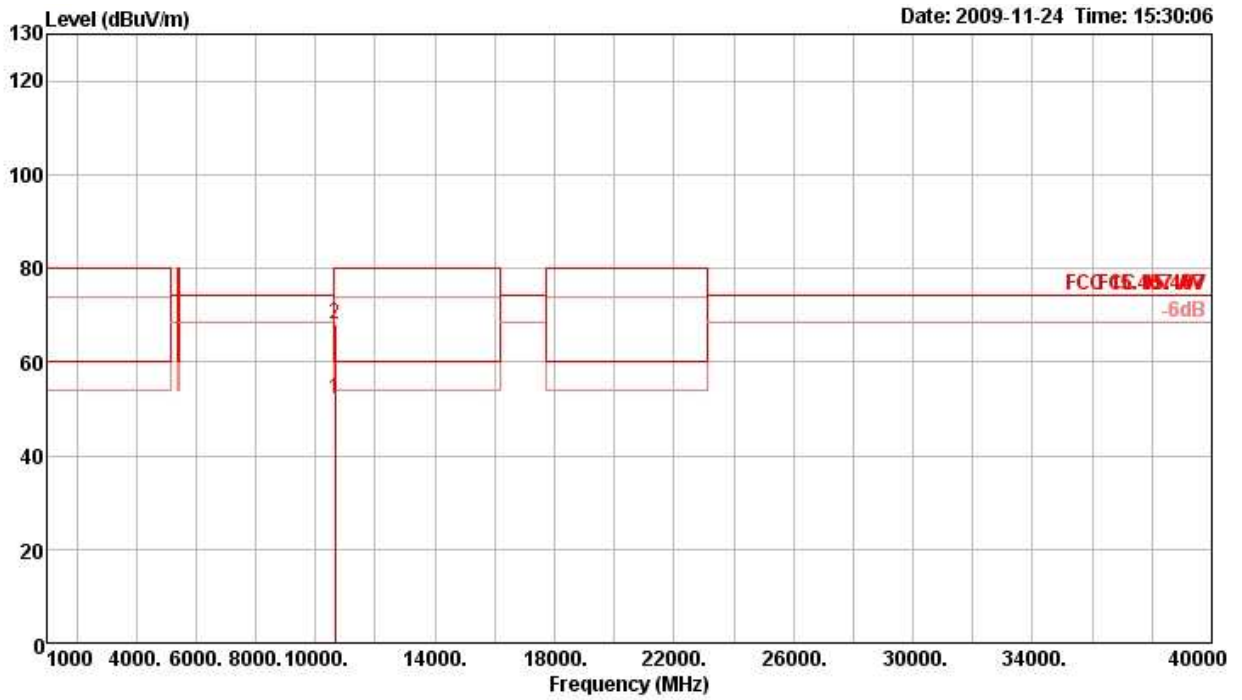


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10590.70	73.49	74.30	-0.81	65.29	4.73	35.10	38.57	276	100	Peak	VERTICAL
2 a	10605.10	57.80	60.00	-2.20	49.61	4.71	35.08	38.56	276	100	Average	VERTICAL
3 !	10608.10	74.16	80.00	-5.84	65.97	4.71	35.08	38.56	276	100	Peak	VERTICAL



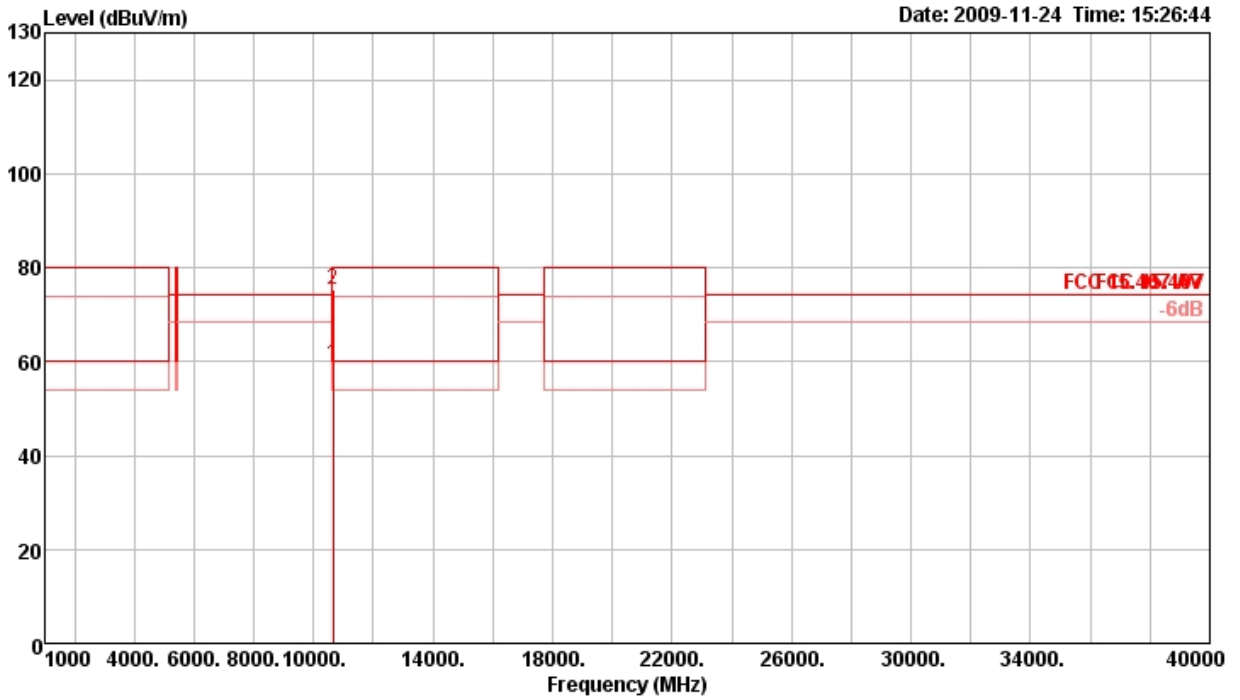
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 64, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	10646.70	52.23	60.00	-7.77	44.04	4.70	35.05	38.54	37	131	Average	HORIZONTAL
2 p	10648.00	68.15	80.00	-11.85	59.96	4.70	35.05	38.54	37	131	Peak	HORIZONTAL

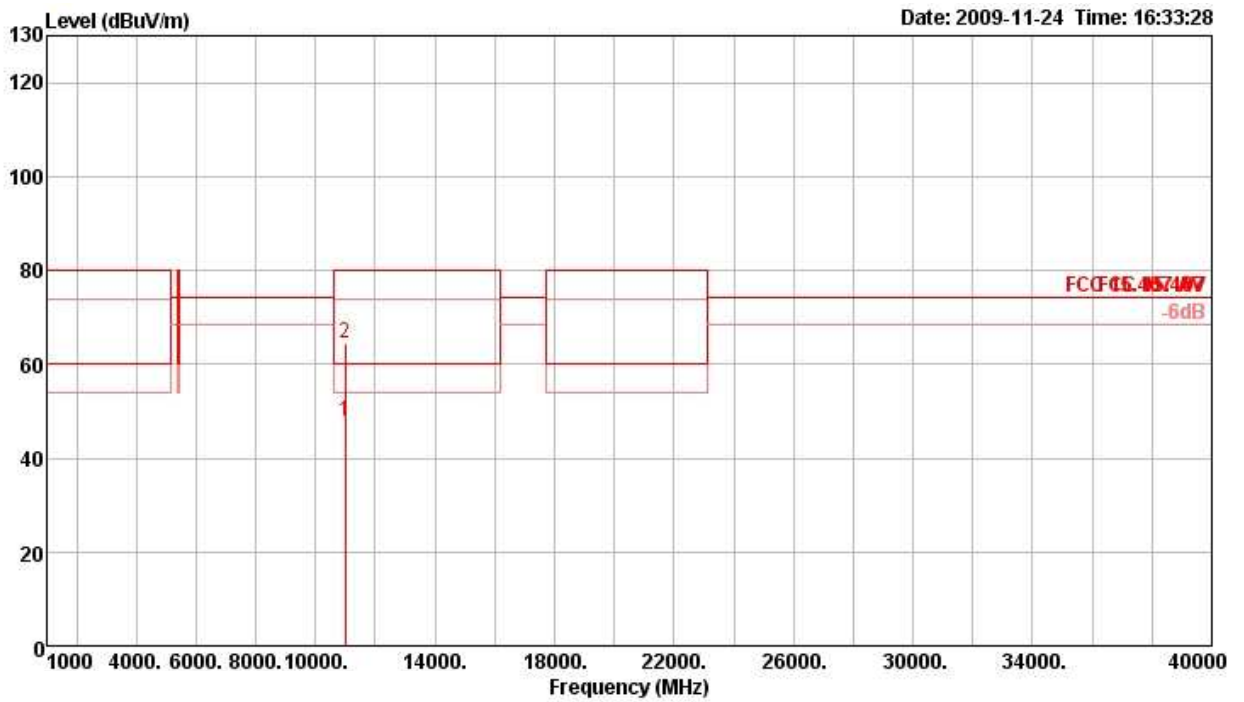
**Vertical**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	10644.90	59.23	60.00	-0.77	51.04	4.70	35.05	38.54	274	100	Average	VERTICAL
2 p	10645.70	75.19	80.00	-4.81	67.00	4.70	35.05	38.54	274	100	Peak	VERTICAL

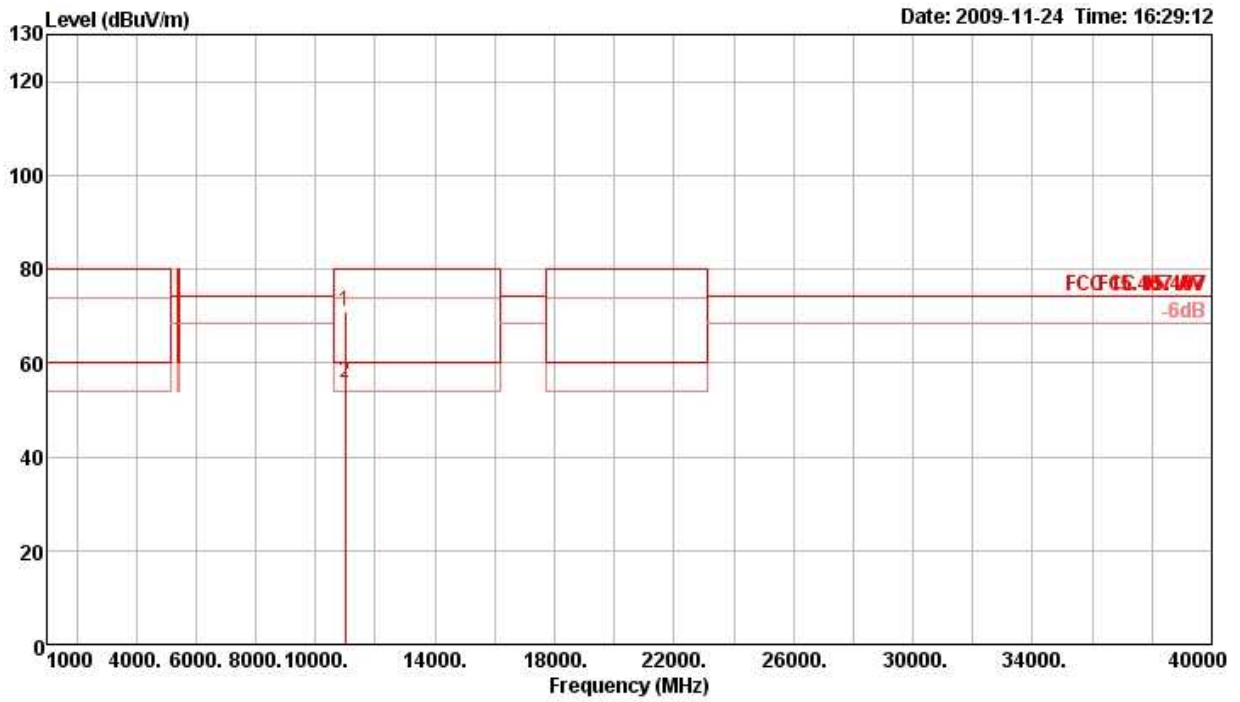
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 100, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	11004.20	47.76	60.00	-12.24	39.58	4.47	34.69	38.40	209	114	Average	HORIZONTAL
2 p	11004.20	64.44	80.00	-15.56	56.26	4.47	34.69	38.40	209	114	Peak	HORIZONTAL

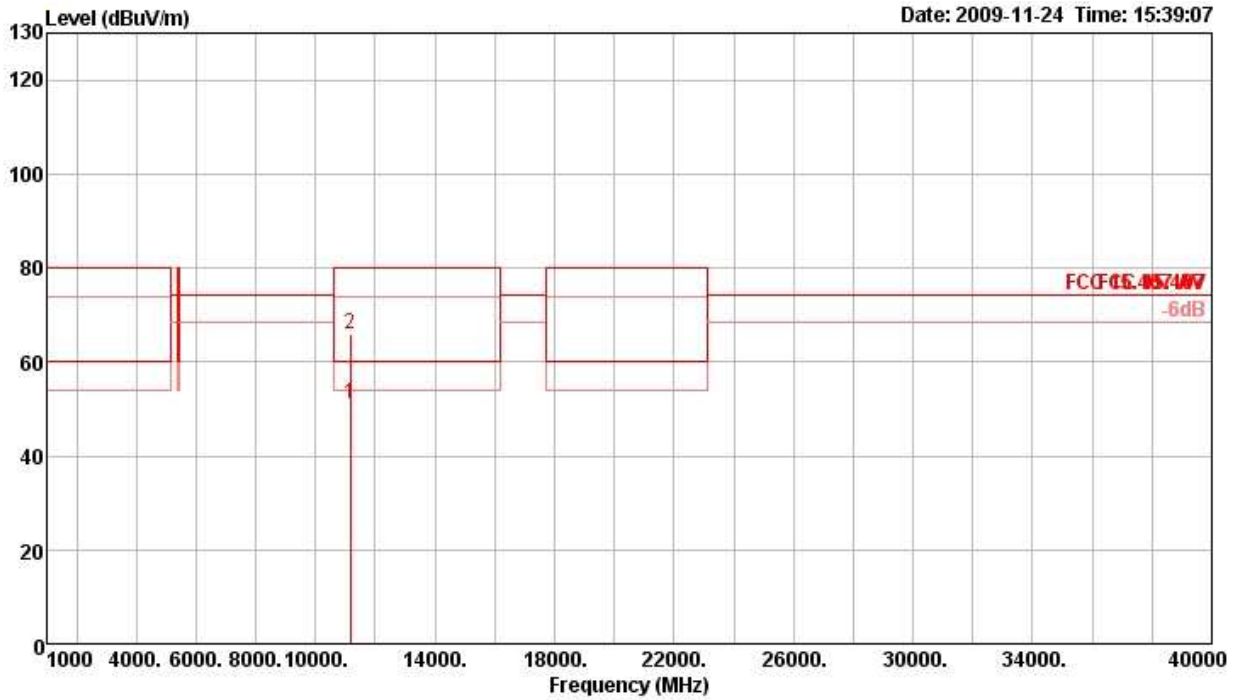
**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p 11000.10	70.81	80.00	-9.19	62.63	4.47	34.69	38.40	91	104	Peak	VERTICAL
2	a 11000.40	55.71	60.00	-4.29	47.53	4.47	34.69	38.40	91	104	Average	VERTICAL

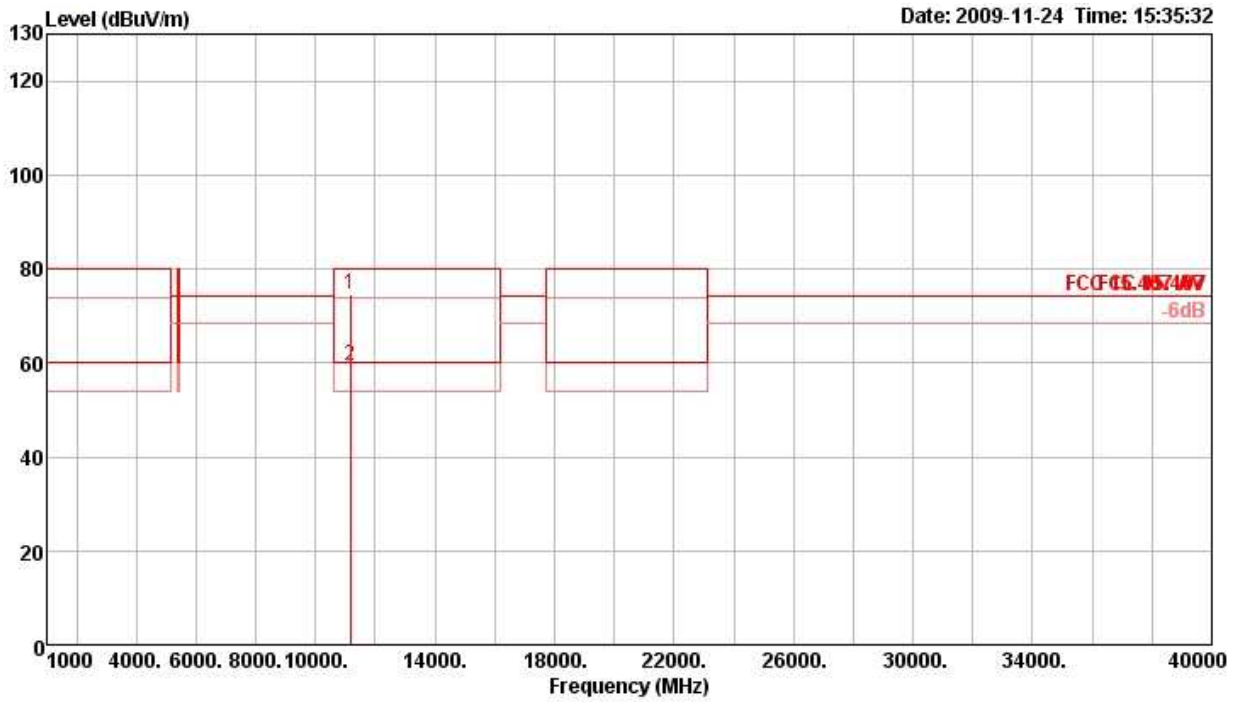
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 116, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	11160.80	51.14	60.00	-8.86	42.86	4.56	34.71	38.43	290	141	Average	HORIZONTAL
2 p	11162.10	65.75	80.00	-14.25	57.45	4.58	34.71	38.43	290	141	Peak	HORIZONTAL

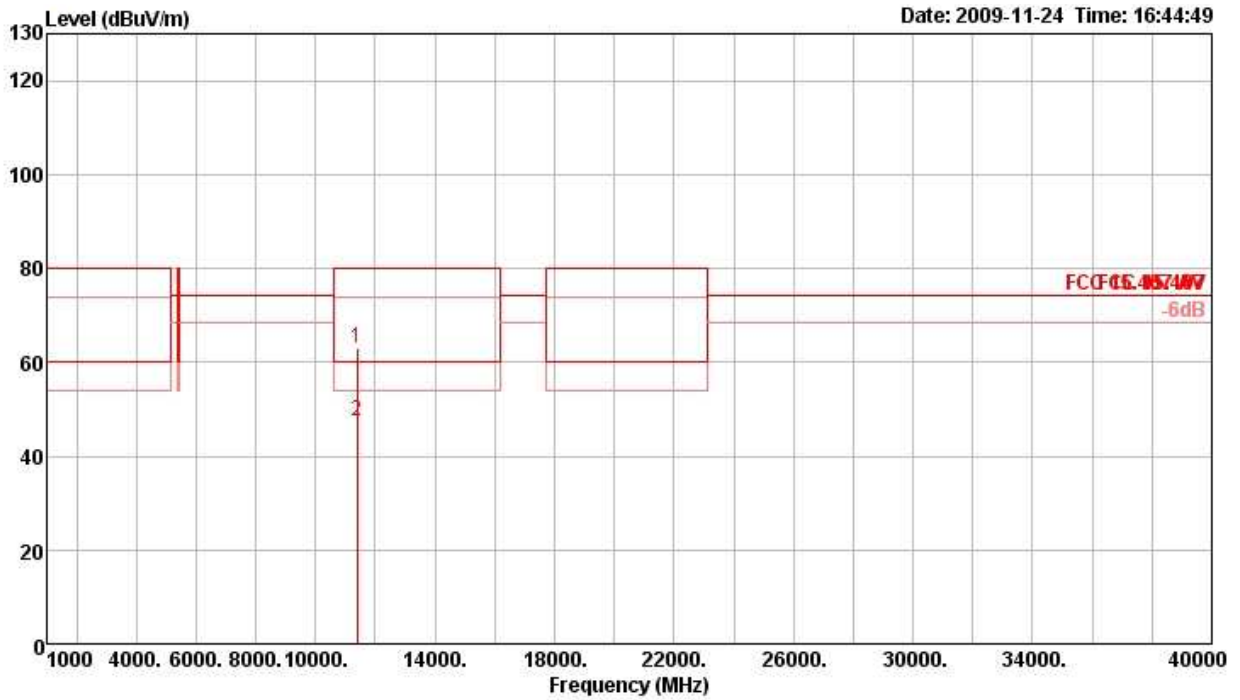
**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	11158.80	74.46	80.00	-5.54	66.18	4.56	34.71	38.43	90	114	Peak	VERTICAL
2 a	11159.30	59.52	60.00	-0.48	51.24	4.56	34.71	38.43	90	114	Average	VERTICAL

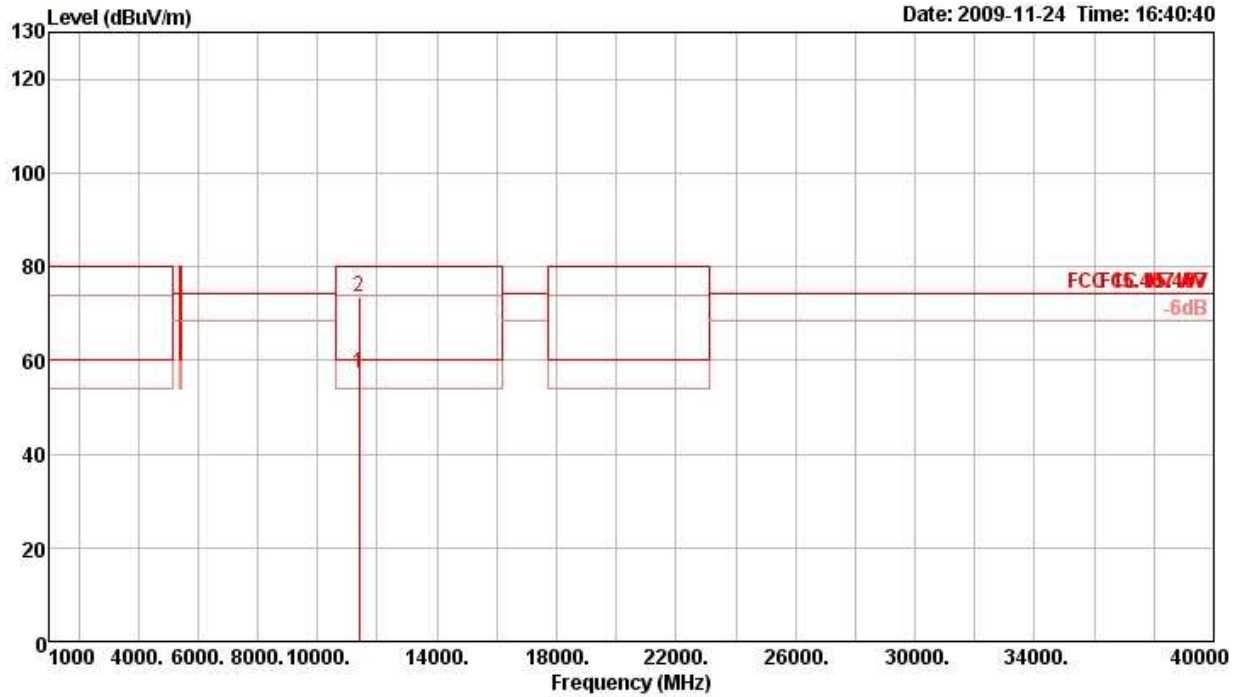
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 140, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p 11396.70	63.13	80.00	-16.87	54.67	4.72	34.74	38.48	179	109	Peak	HORIZONTAL
2	a 11399.30	47.50	60.00	-12.50	39.04	4.72	34.74	38.48	179	109	Average	HORIZONTAL

**Vertical**

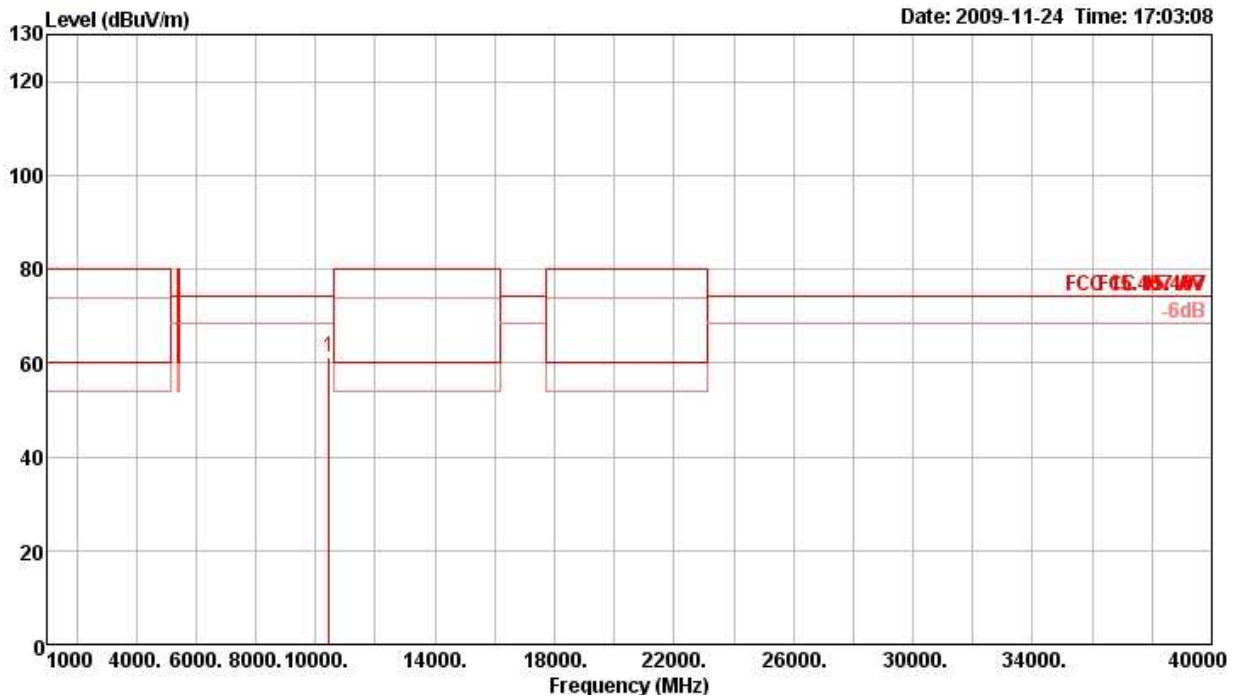


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	11399.00	57.19	60.00	-2.81	48.73	4.72	34.74	38.48	94	105	Average	VERTICAL
2 p	11400.30	73.34	80.00	-6.66	64.88	4.72	34.74	38.48	94	105	Peak	VERTICAL



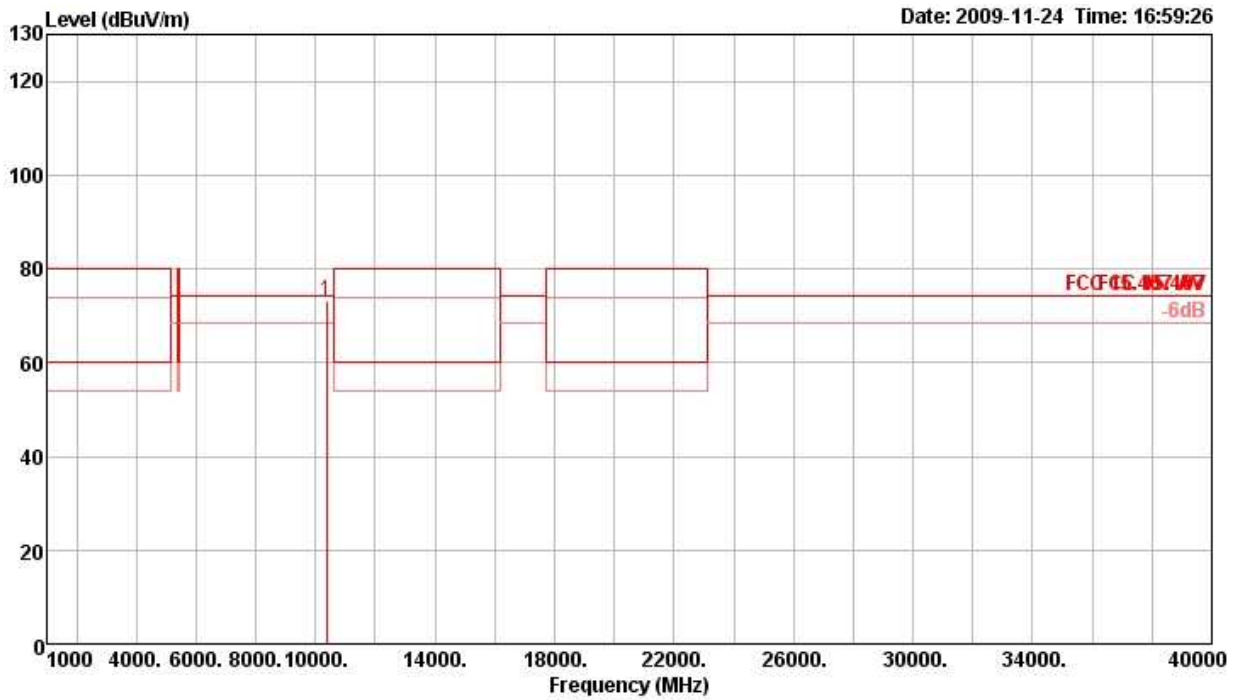
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 38, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10457.40	61.03	74.30	-13.27	52.96	4.74	35.24	38.57	205	113	Peak	HORIZONTAL

**Vertical**

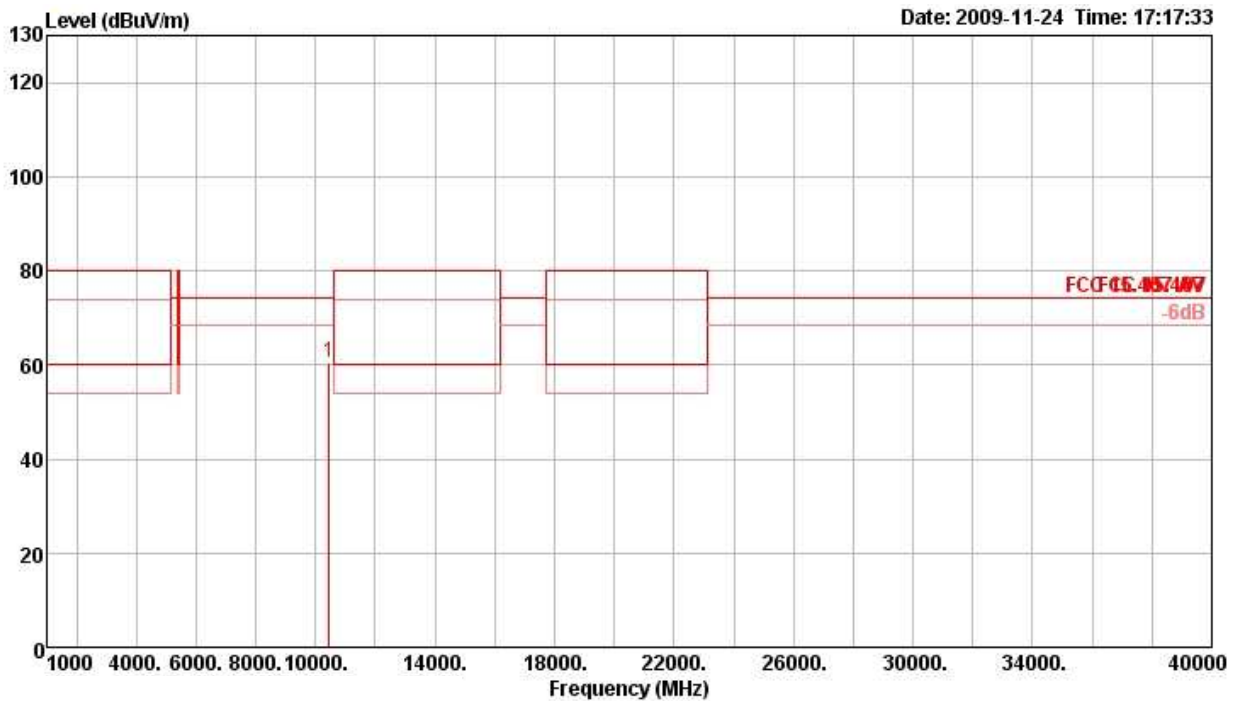


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10377.40	73.11	74.30	-1.19	65.23	4.68	35.33	38.53	276	100	Peak	VERTICAL



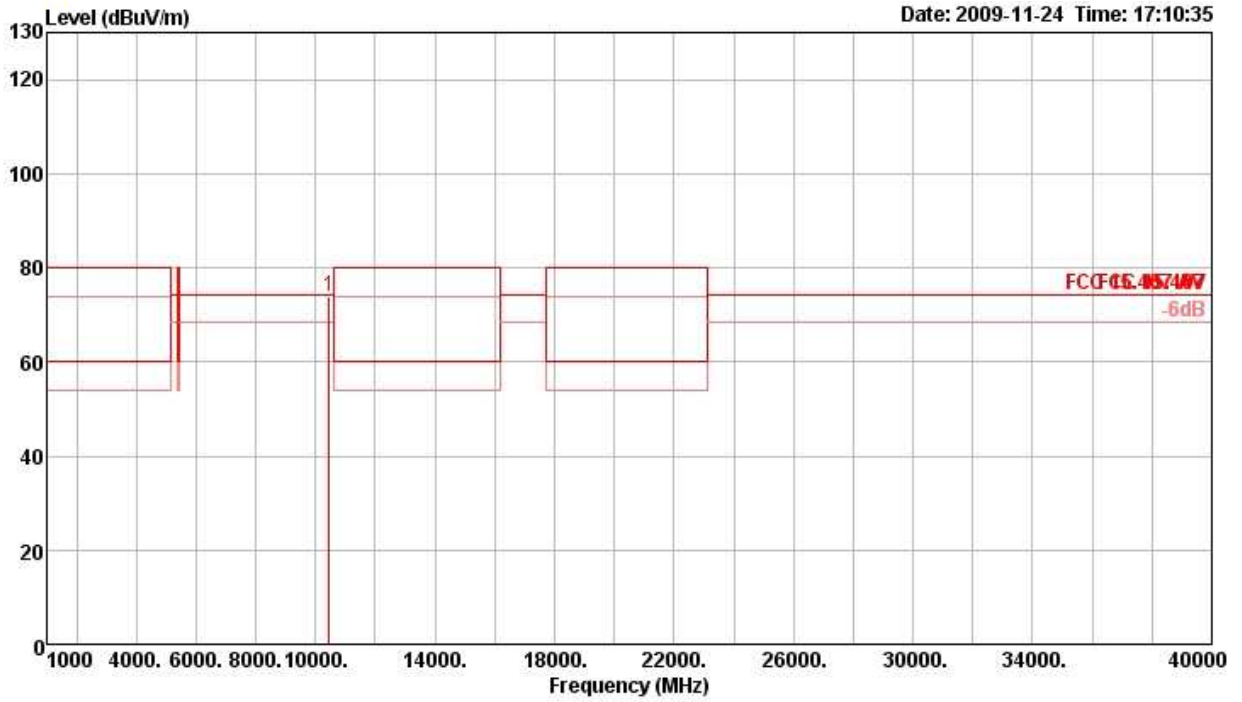
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11n MCS0 40MHz Ch 46, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10457.60	60.49	74.30	-13.81	52.42	4.74	35.24	38.57	245	120	Peak	HORIZONTAL

**Vertical**

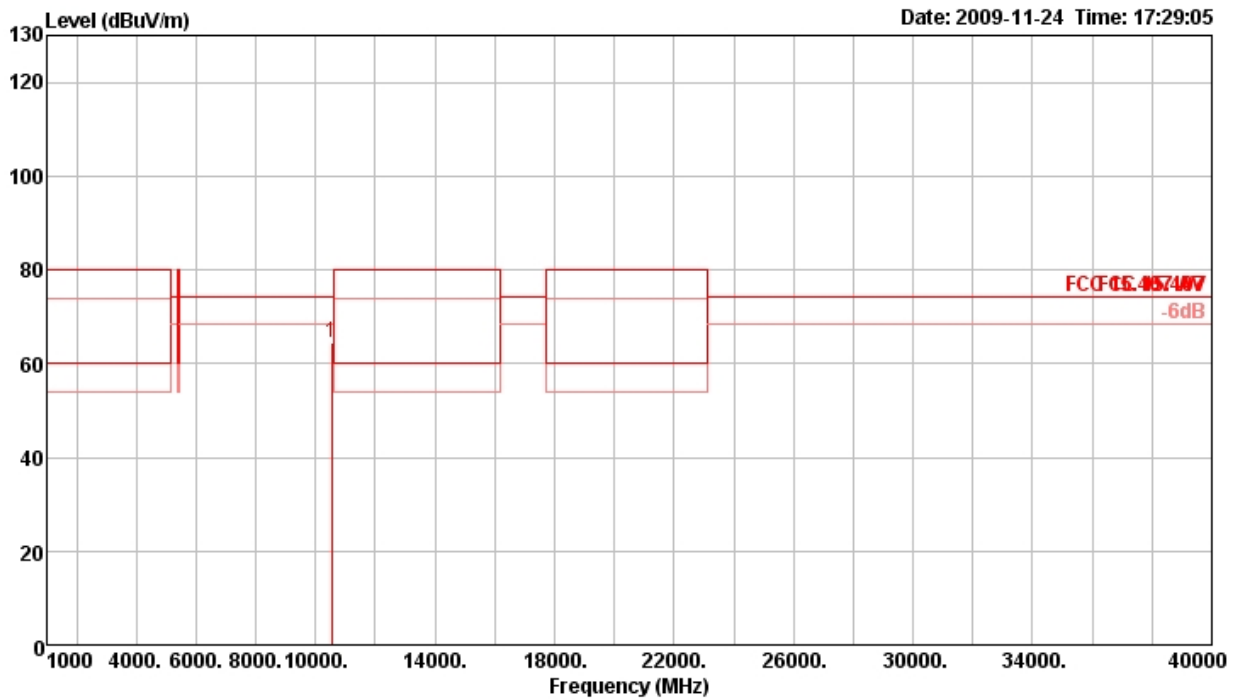


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	10457.60	73.95	74.30	-0.35	65.88	4.74	35.24	38.57	275	100	Peak	VERTICAL



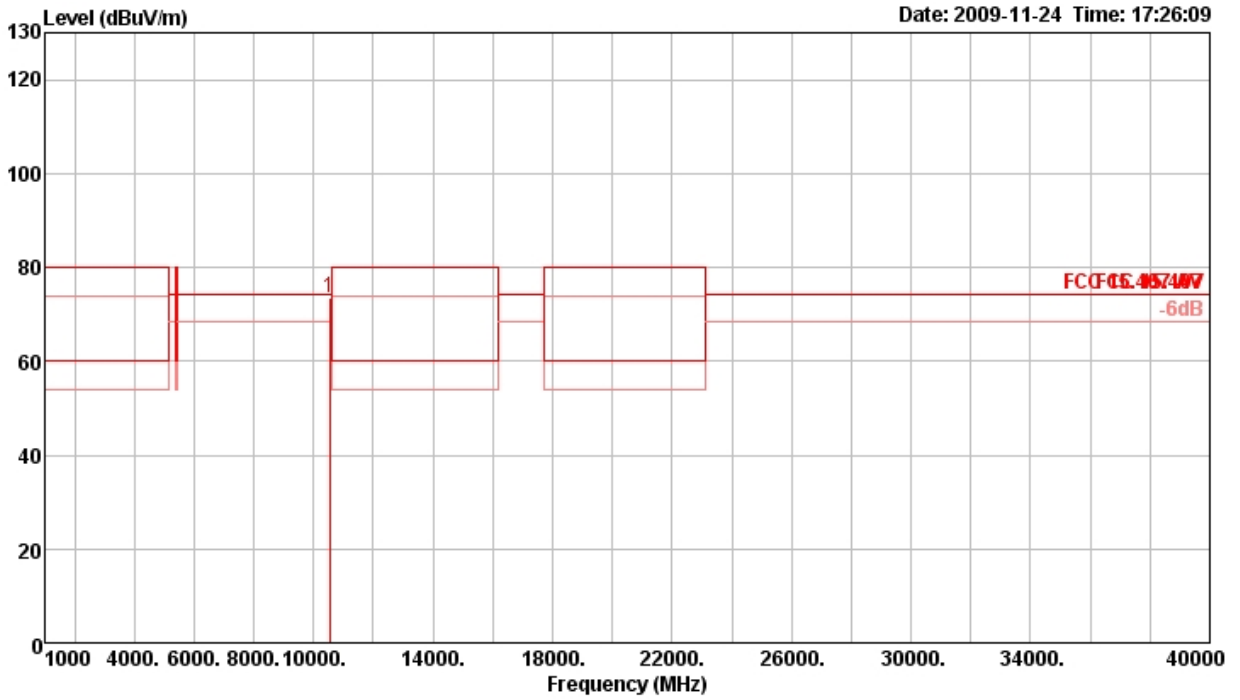
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 54, Ant. A + Ant. B

**Horizontal**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10537.40	64.59	74.30	-9.71	56.39	4.76	35.15	38.59	163	124	Peak	HORIZONTAL

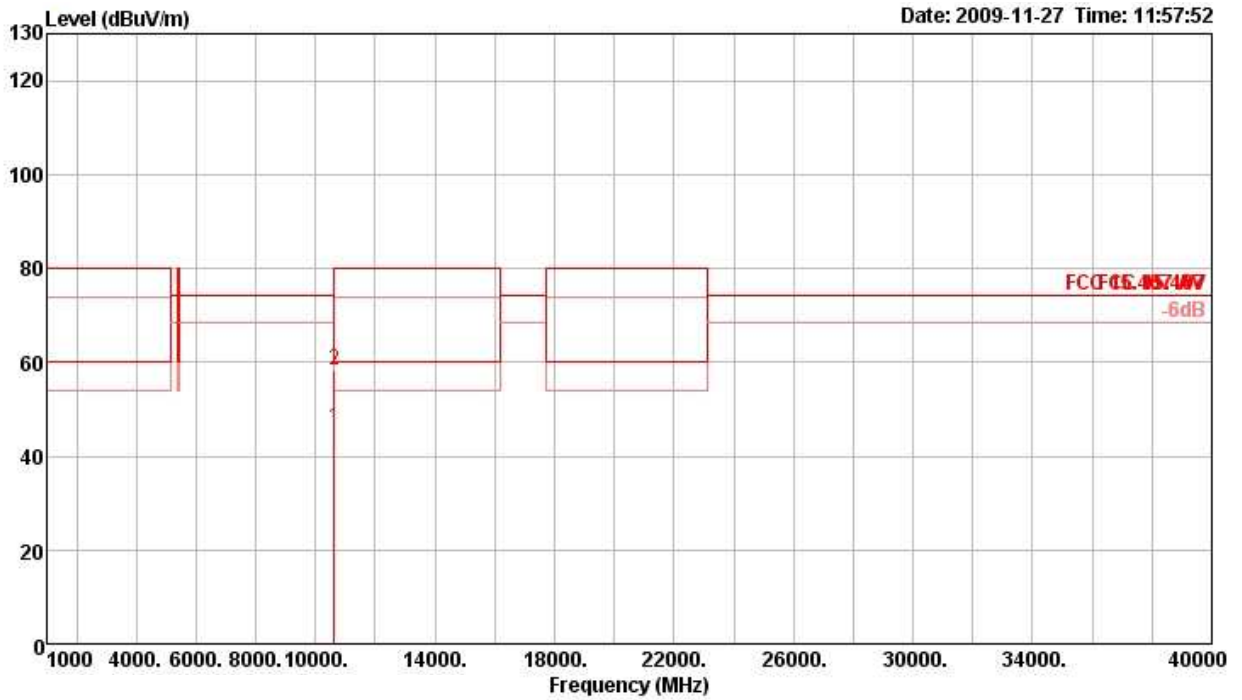
**Vertical**



Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p 10537.70	73.60	74.30	-0.70	65.40	4.76	35.15	38.59	274	100	Peak	VERTICAL

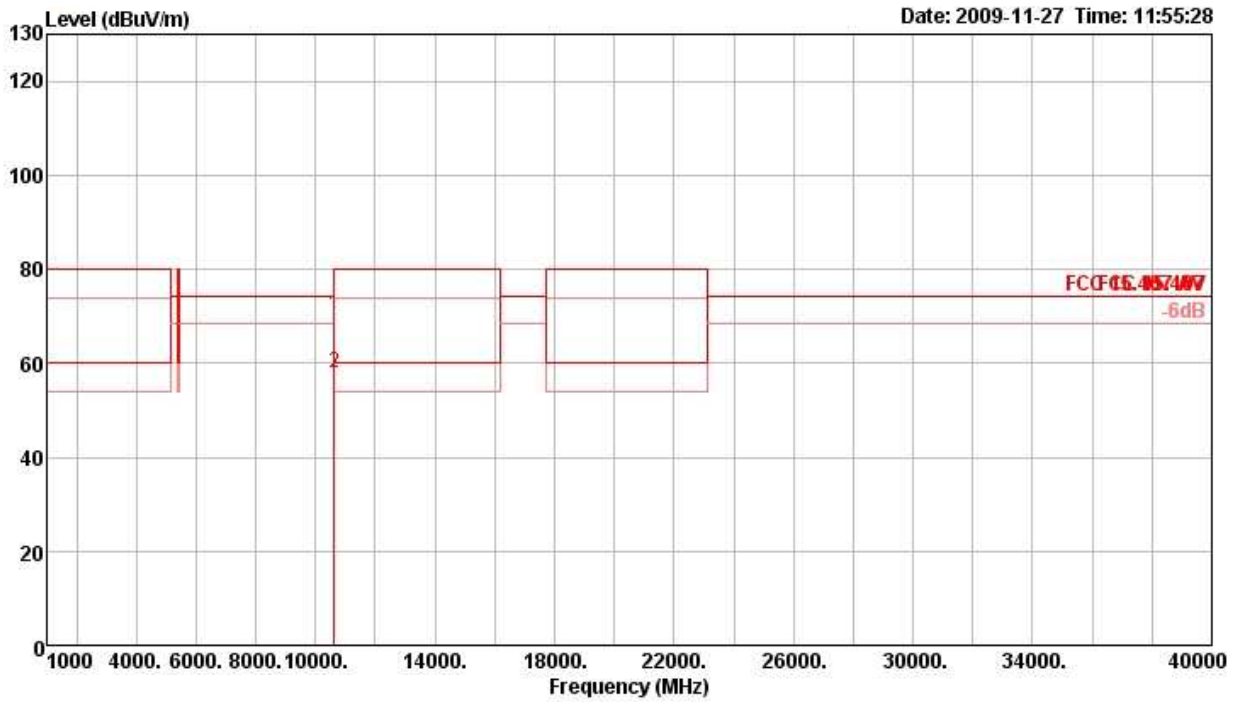
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 62, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	10624.20	45.83	60.00	-14.17	37.65	4.71	35.08	38.55	85	100	Average	HORIZONTAL
2 p	10624.80	58.46	80.00	-21.54	50.28	4.71	35.08	38.55	85	100	Peak	HORIZONTAL

**Vertical**

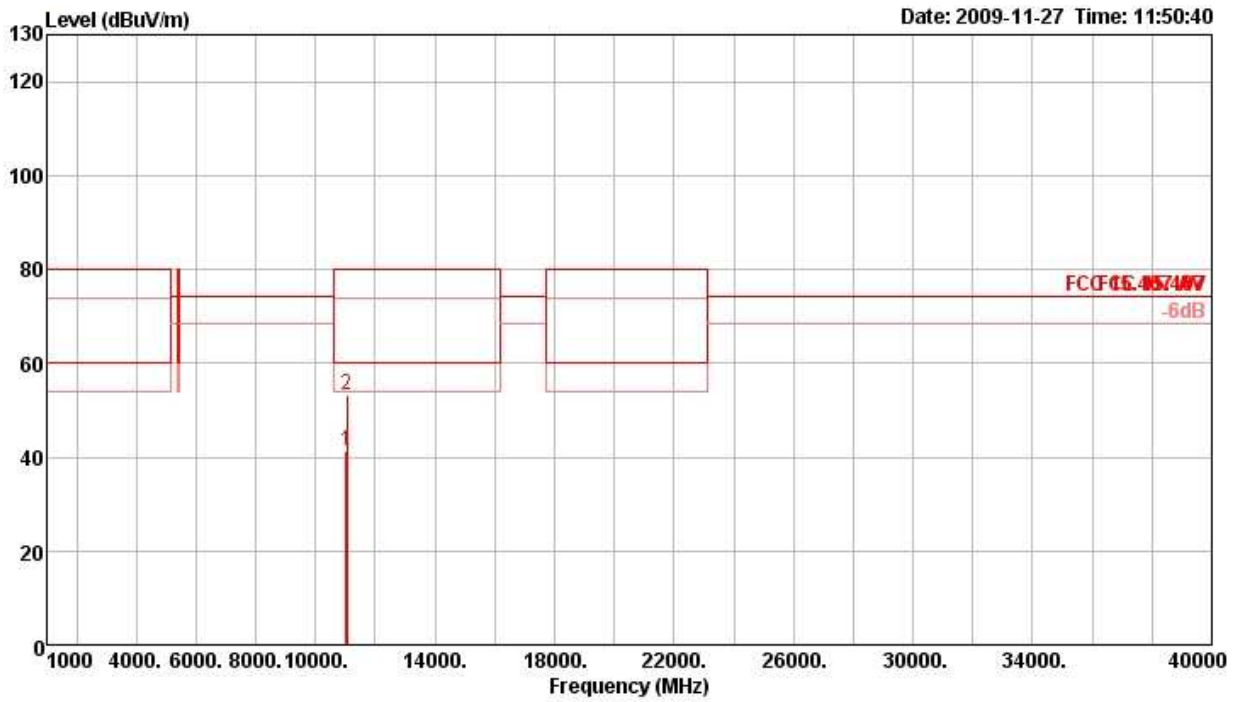


	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p 10617.40	70.27	80.00	-9.73	62.09	4.71	35.08	38.55	94	100	Peak	VERTICAL
2	a 10626.60	58.08	60.00	-1.92	49.88	4.70	35.05	38.55	94	100	Average	VERTICAL



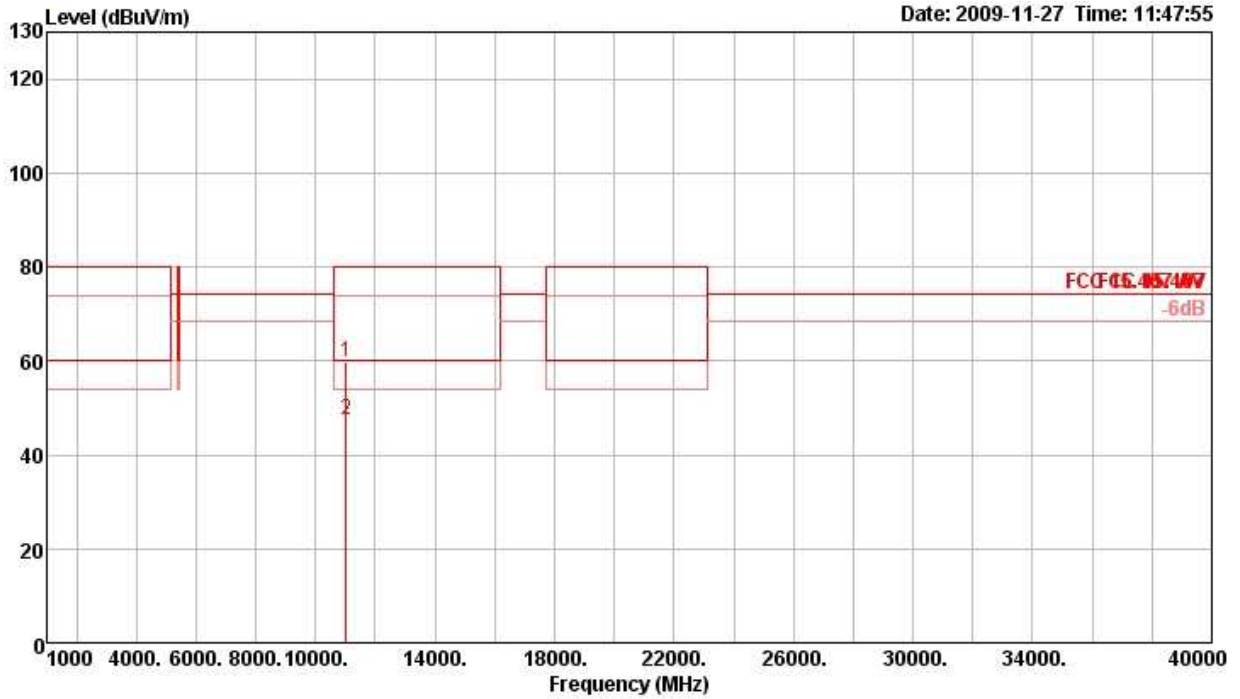
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 102, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	11021.00	41.15	60.00	-18.85	32.95	4.49	34.69	38.40	294	113	Average	HORIZONTAL
2 p	11038.40	53.22	80.00	-26.78	45.01	4.50	34.70	38.41	294	113	Peak	HORIZONTAL

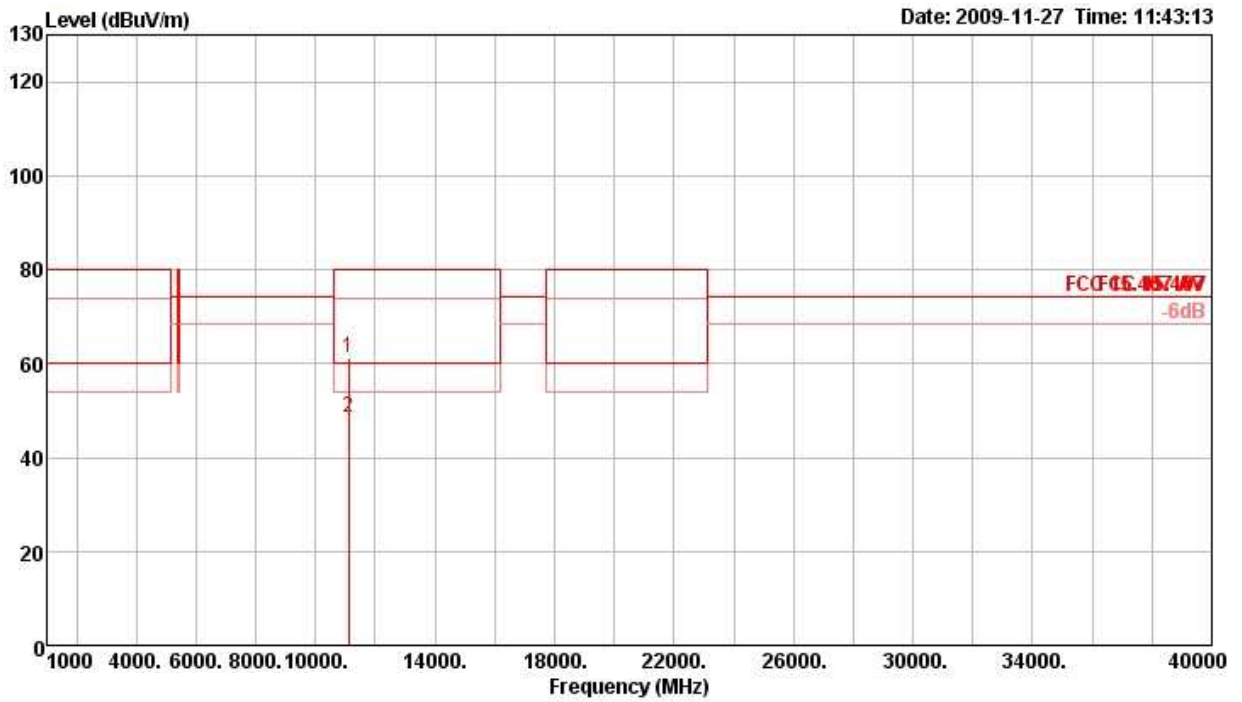
**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	11020.00	59.79	80.00	-20.21	51.59	4.49	34.69	38.40	91	100	Peak	VERTICAL
2 a	11021.40	47.35	60.00	-12.65	39.15	4.49	34.69	38.40	91	100	Average	VERTICAL

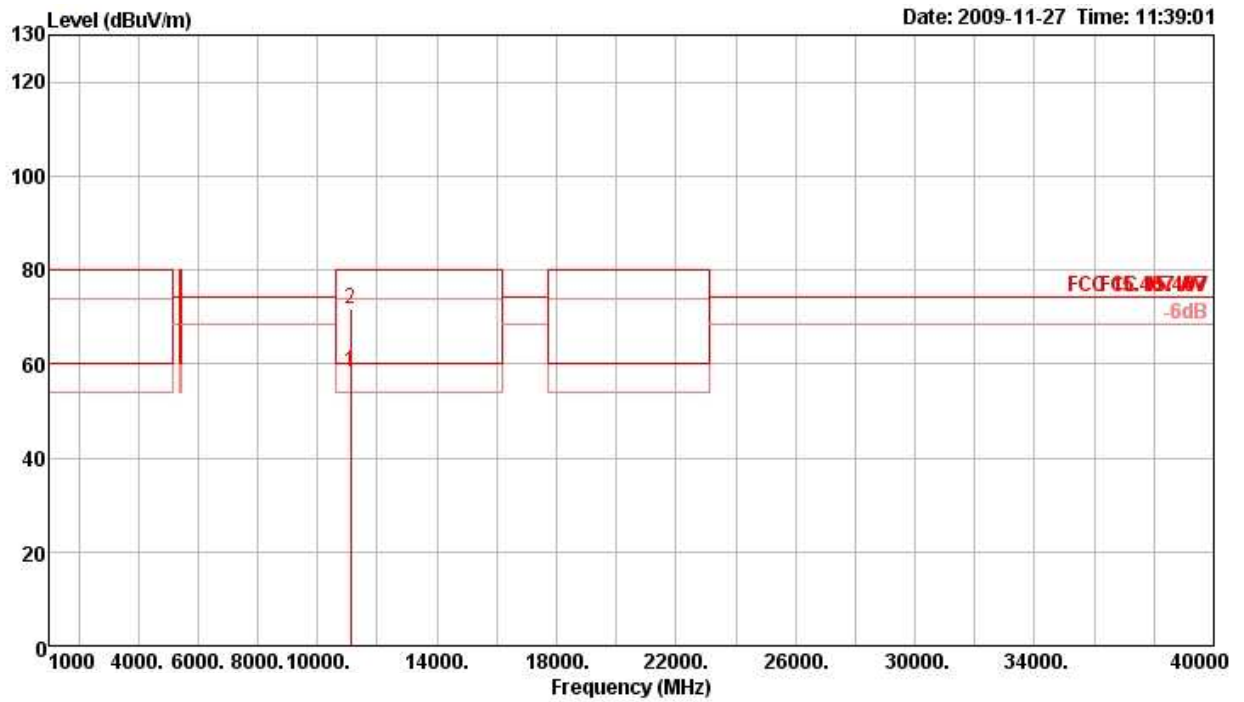
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 110, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p 11099.40	61.11	80.00	-18.89	52.86	4.53	34.70	38.42	84	100	Peak	HORIZONTAL
2	a 11101.00	48.56	60.00	-11.44	40.31	4.53	34.70	38.42	84	100	Average	HORIZONTAL

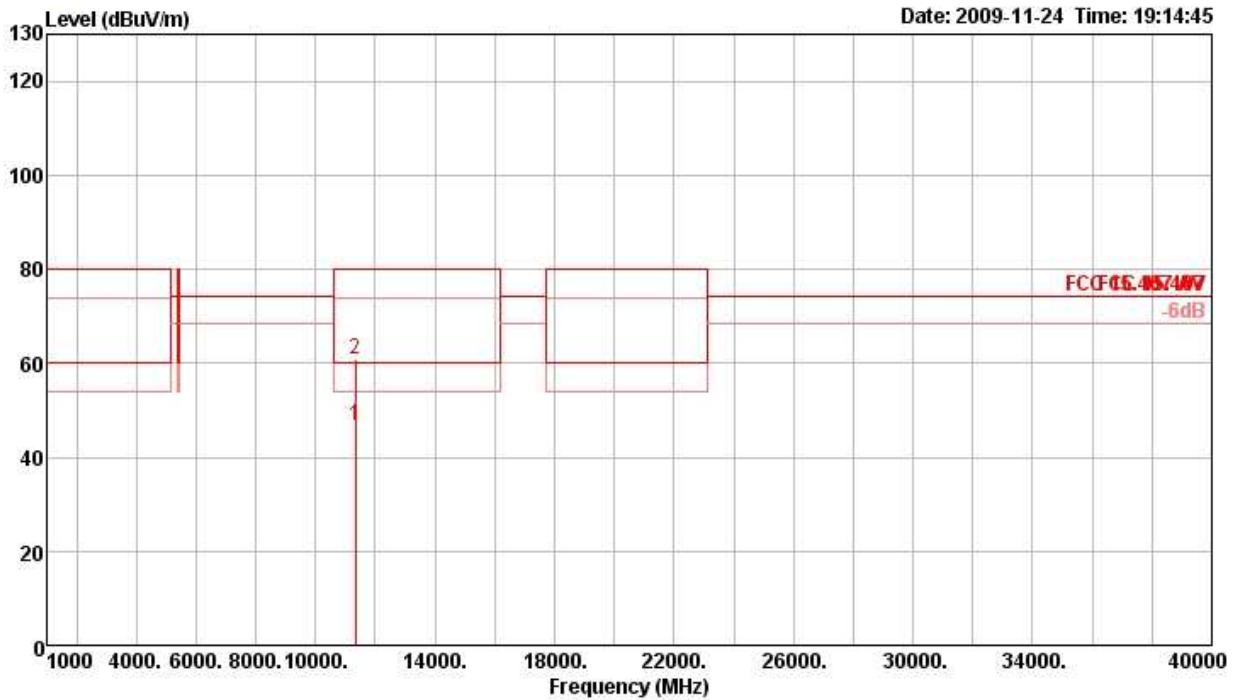
**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm			
1	a	11100.00	58.19	60.00	-1.81	49.94	4.53	34.70	38.42	96	100	Average	VERTICAL
2	p	11118.40	71.82	80.00	-8.18	63.55	4.55	34.70	38.42	96	100	Peak	VERTICAL

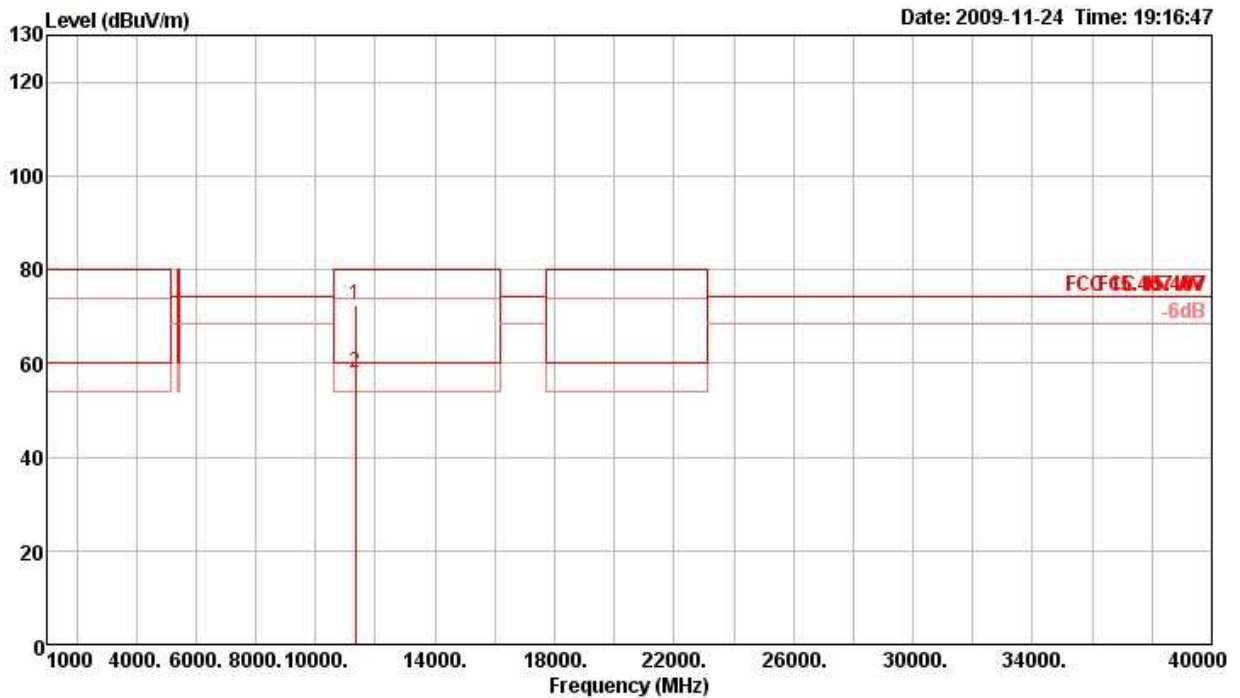
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 134, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	11337.49	46.56	60.00	-13.44	38.15	4.67	34.73	38.47	271	100	Average	HORIZONTAL
2 p	11338.07	60.78	80.00	-19.22	52.37	4.67	34.73	38.47	271	100	Peak	HORIZONTAL

**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	11337.18	72.38	80.00	-7.62	63.97	4.67	34.73	38.47	94	118	Peak	VERTICAL
2 a	11337.69	58.10	60.00	-1.90	49.69	4.67	34.73	38.47	94	118	Average	VERTICAL

**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.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

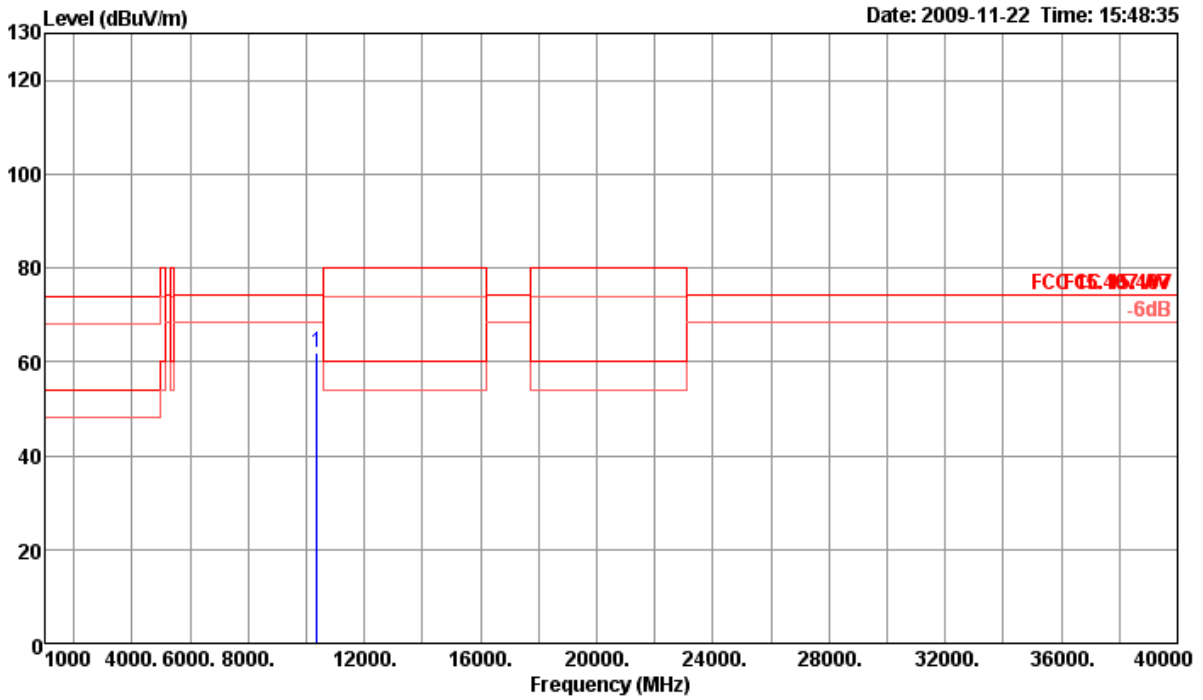
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

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



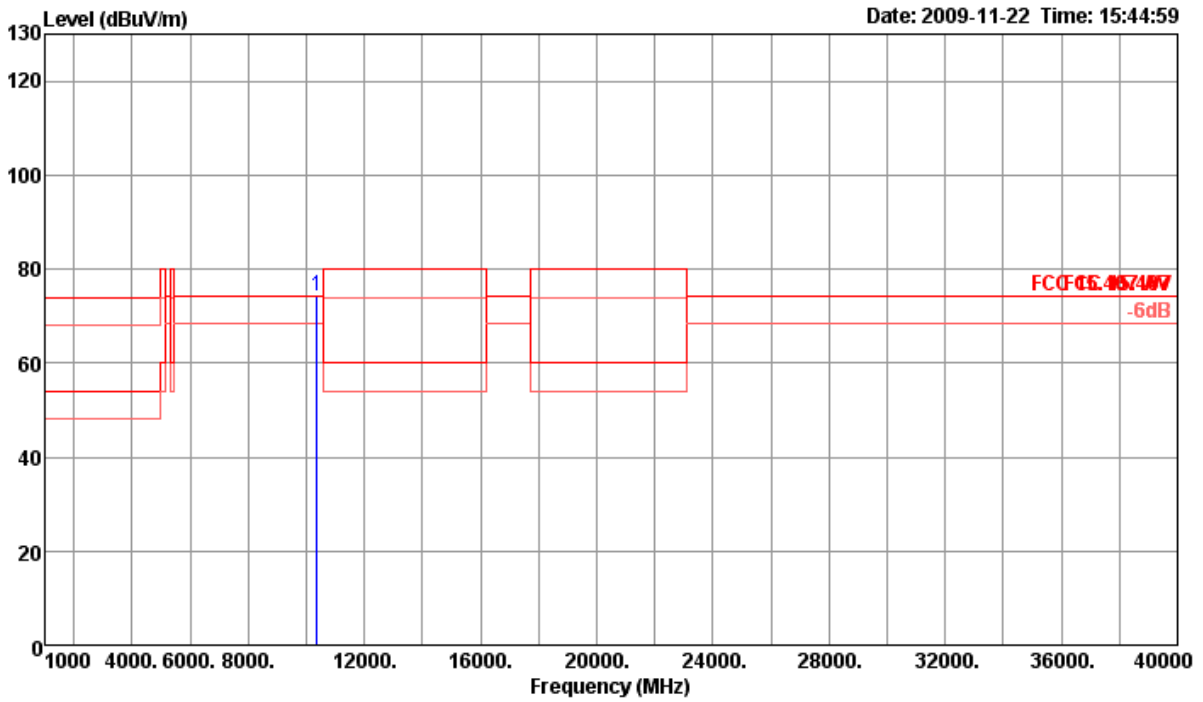
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 36, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	10358.20	61.98	74.30	-12.32	52.74	6.49	38.37	35.62	87	119	Peak	HORIZONTAL

**Vertical**



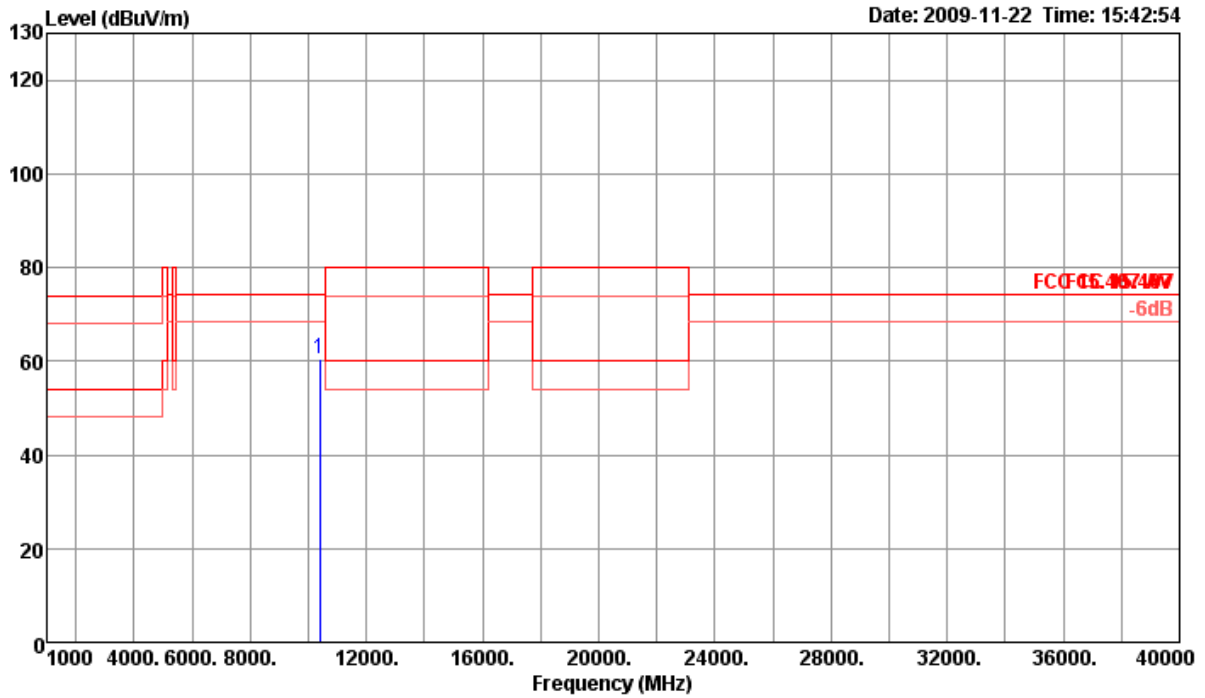
Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p 10358.00	74.22	74.30	-0.08	64.98	6.49	38.37	35.62	276	100	Peak	VERTICAL





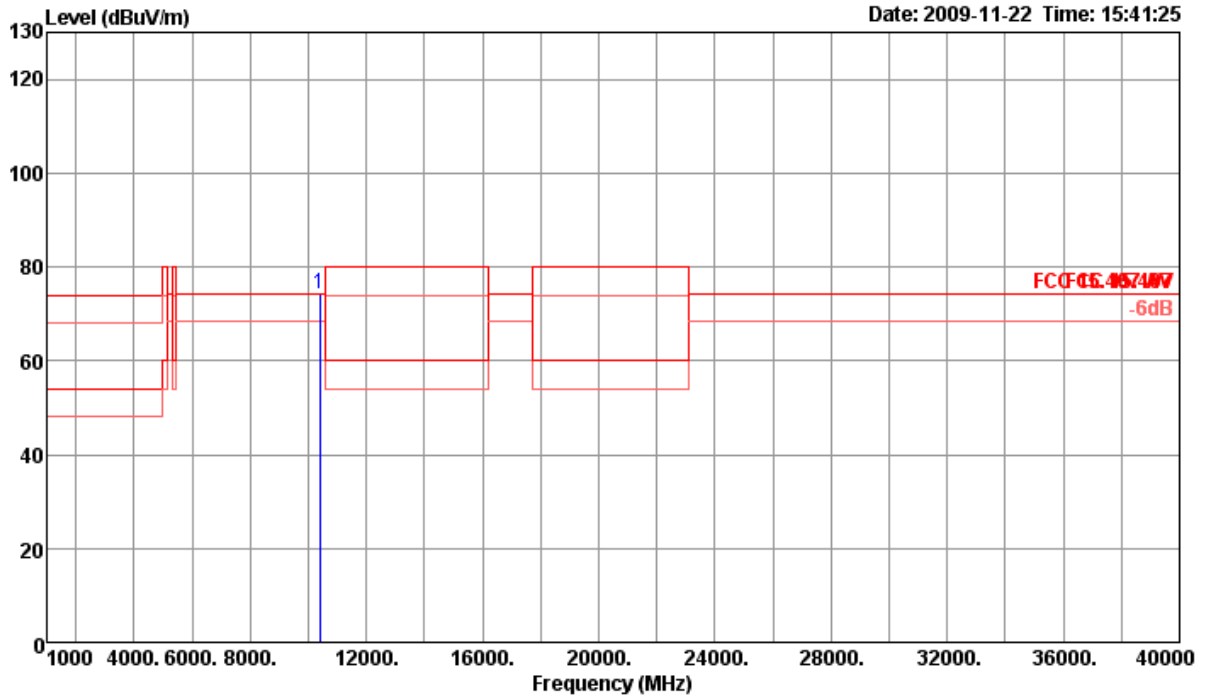
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 40, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	10402.60	60.39	74.30	-13.91	51.07	6.52	38.38	35.58	87	118	Peak	HORIZONTAL

**Vertical**

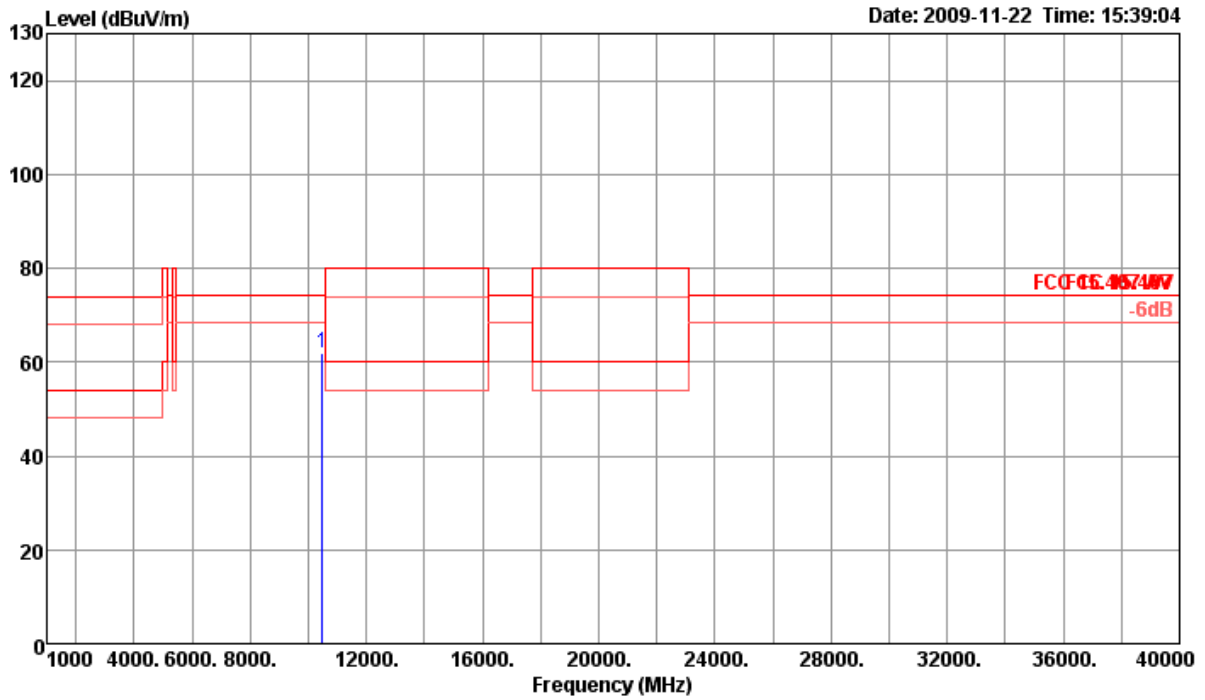


Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p 10407.70	74.27	74.30	-0.03	64.95	6.52	38.38	35.58	276	100	Peak	VERTICAL



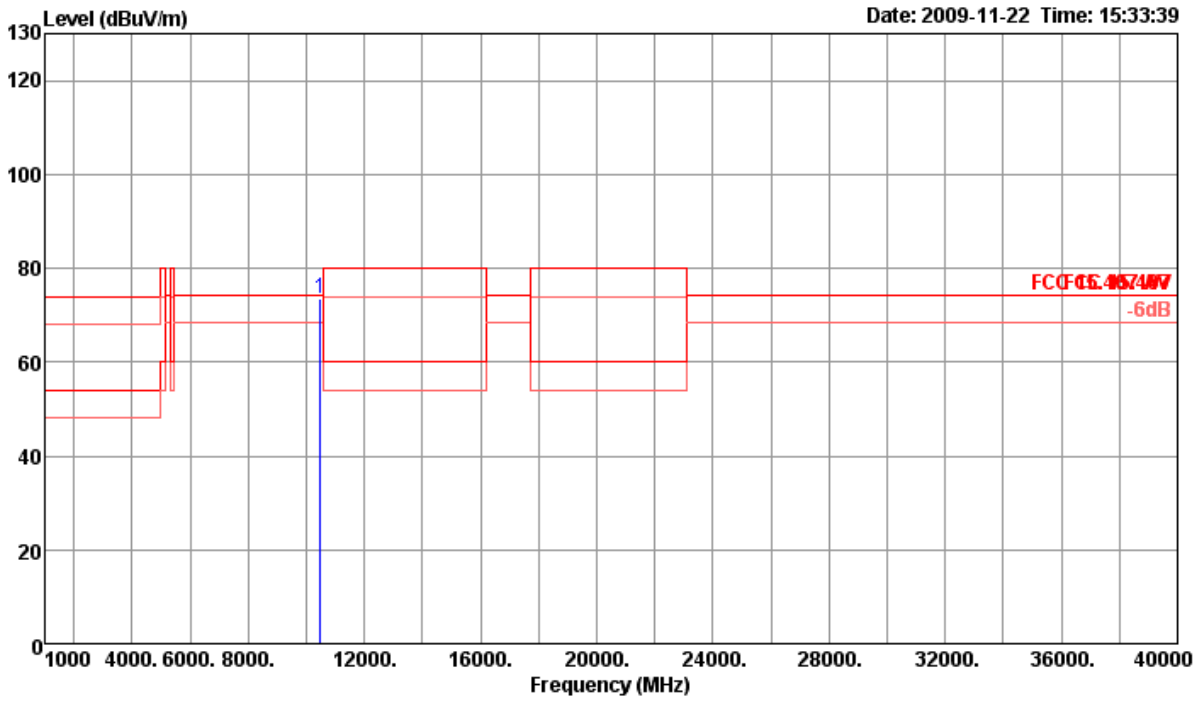
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 48, Ant. A + Ant. B

Horizontal



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Freq	Level	Limit	Over	Read	CableAntenna	Preamp	T/Pos	A/Pos	Remark	PoI/Phase	
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p 10477.90	61.89	74.30	-12.41	52.45	6.57	38.39	35.52	278	133 Peak	HORIZONTAL	

**Vertical**

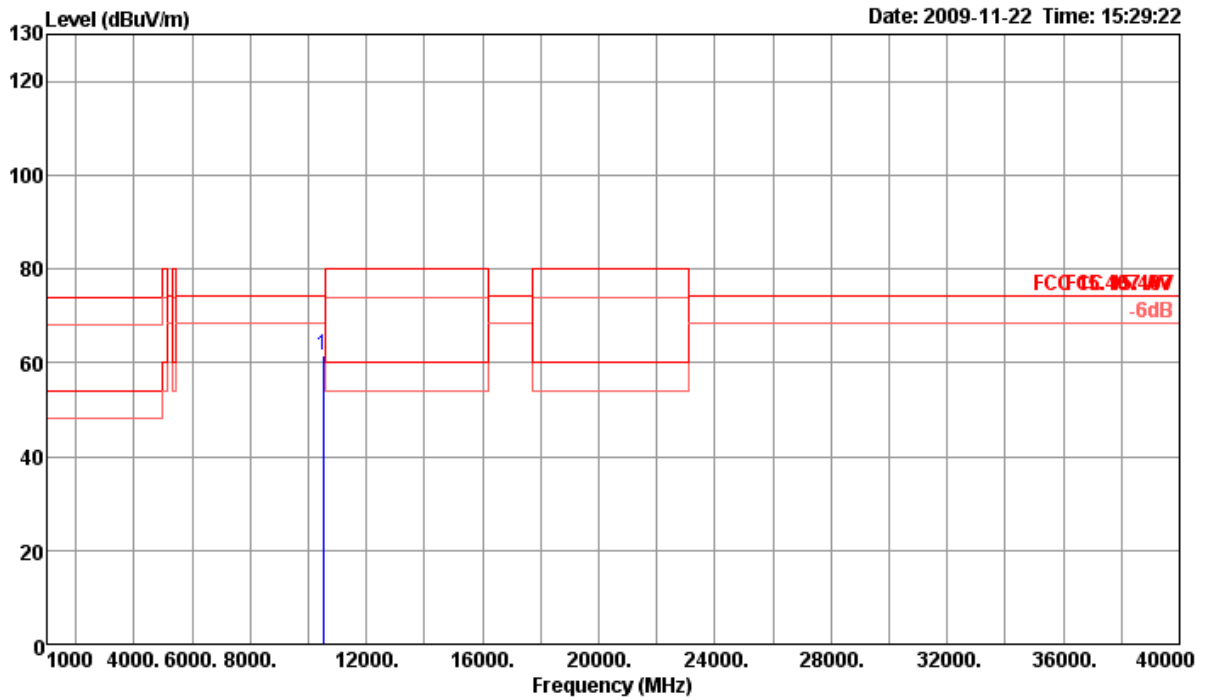


	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	10482.50	73.39	74.30	-0.91	63.94	6.57	38.40	35.52	277	100	Peak	VERTICAL



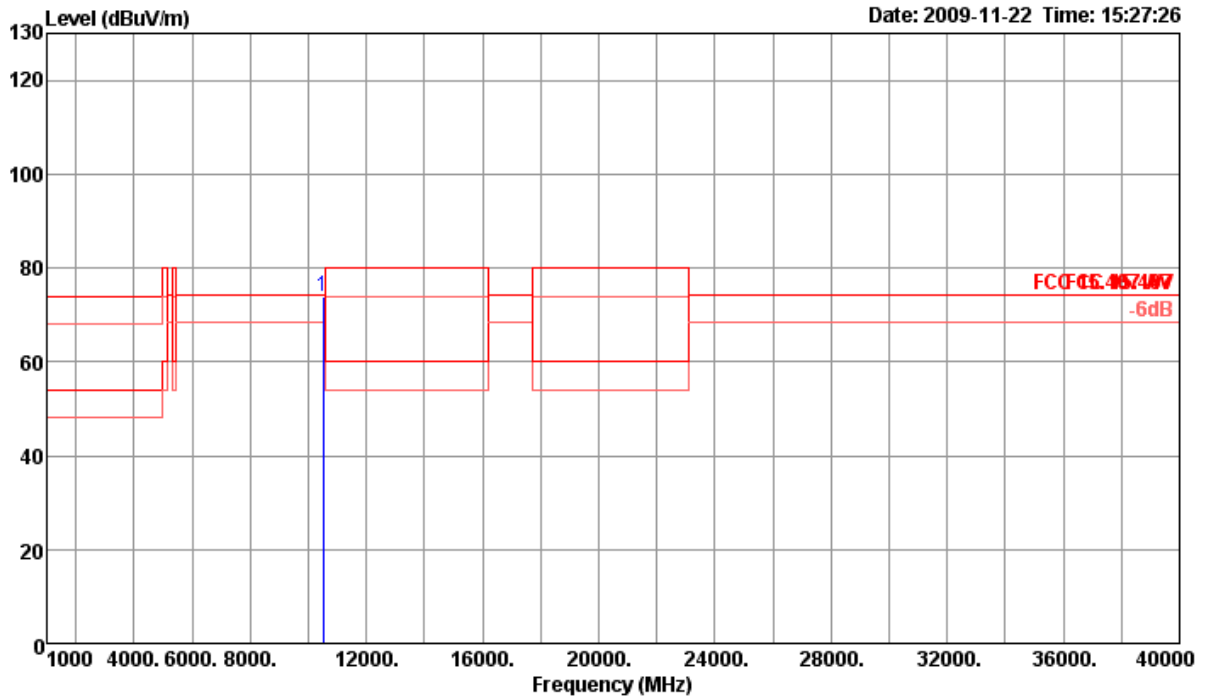
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 52, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10517.40	61.64	74.30	-12.66	52.16	6.58	38.40	35.50	139	115	Peak	HORIZONTAL

**Vertical**

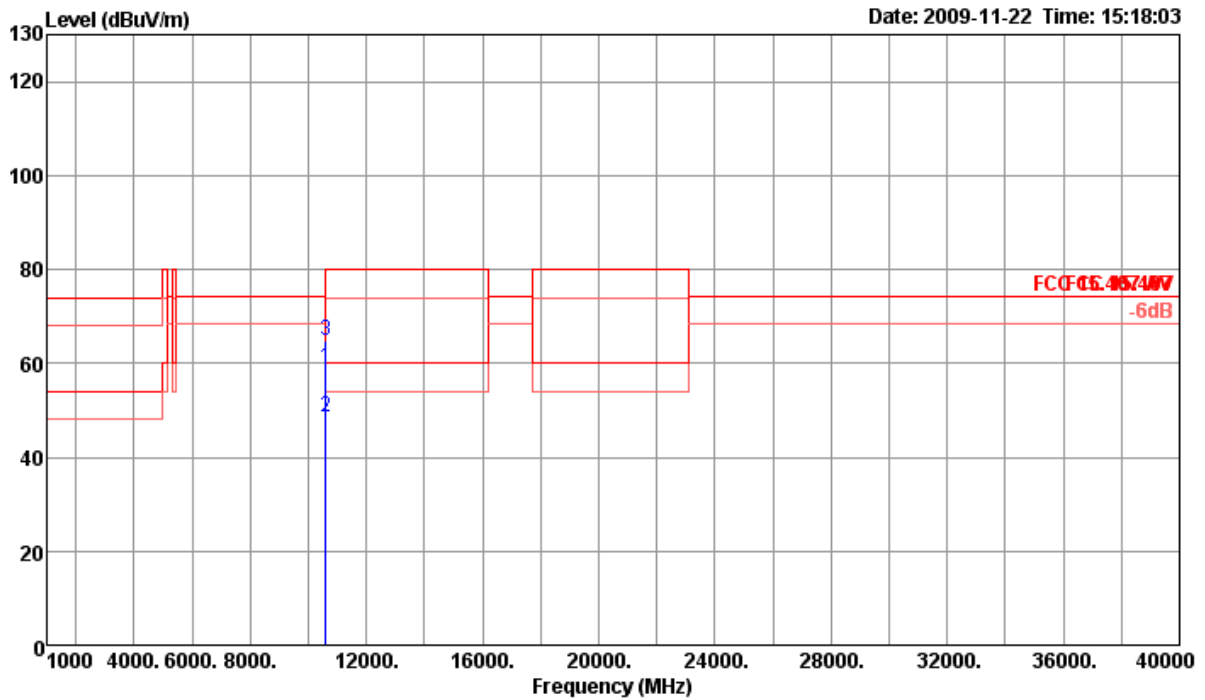


	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm	
1 p	10517.20	73.84	74.30	-0.46	64.37	6.58	38.39	35.50	276	100 Peak	VERTICAL



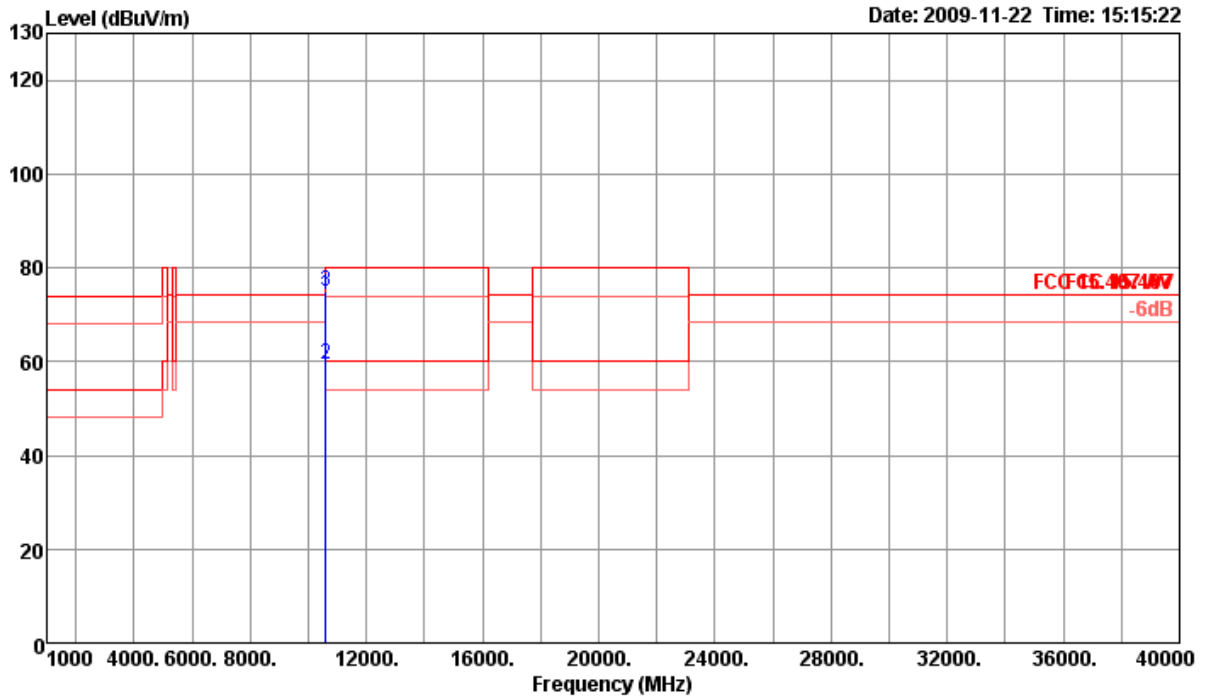
<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 60, Ant. A + Ant. B

**Horizontal**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	10596.30	58.98	74.30	-15.32	49.43	6.61	38.38	35.44	291	118	Peak	HORIZONTAL
2	a 10601.70	48.59	60.00	-11.41	39.02	6.61	38.38	35.42	291	118	Average	HORIZONTAL
3	p 10602.50	64.89	80.00	-15.11	55.32	6.61	38.38	35.42	291	118	Peak	HORIZONTAL

**Vertical**

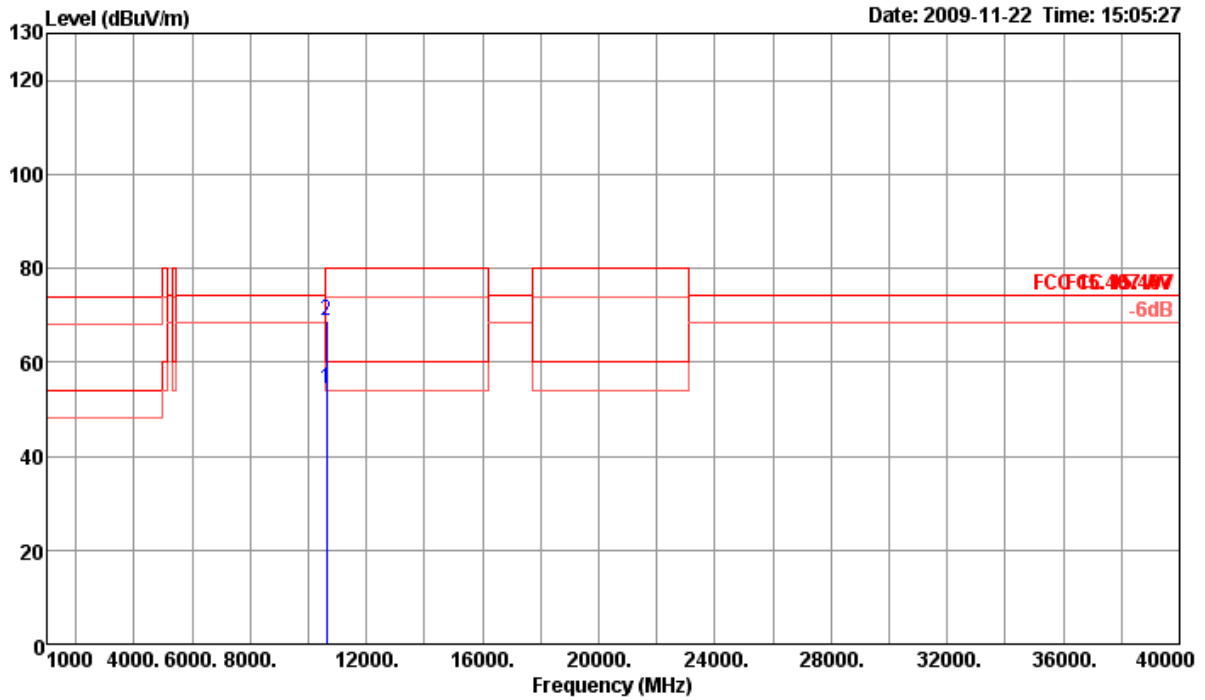


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	10597.70	74.27	74.30	-0.03	64.72	6.61	38.38	35.44	277	100	Peak	VERTICAL
2 a	10601.70	59.38	60.00	-0.62	49.81	6.61	38.38	35.42	277	100	Average	VERTICAL
3 !	10602.10	74.84	80.00	-5.16	65.27	6.61	38.38	35.42	277	100	Peak	VERTICAL



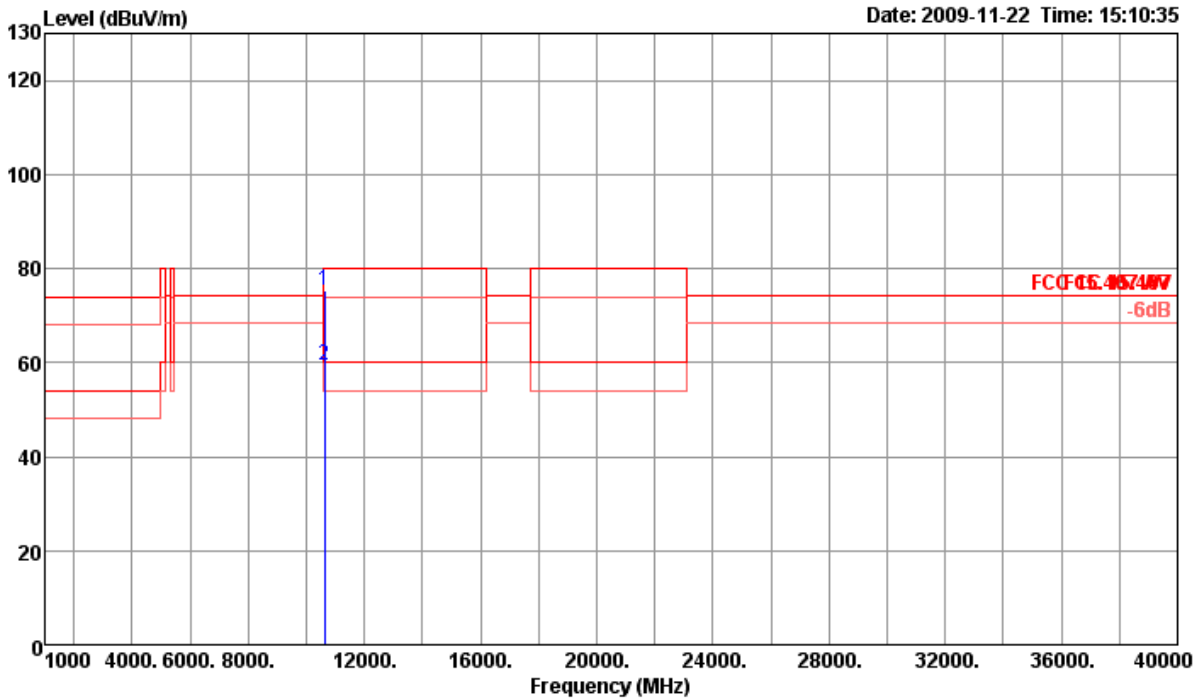
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 64, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 a	10636.80	54.48	60.00	-5.52	44.88	6.62	38.37	35.39	31	136	Average	HORIZONTAL
2 p	10637.60	68.96	80.00	-11.04	59.36	6.62	38.37	35.39	31	136	Peak	HORIZONTAL

**Vertical**

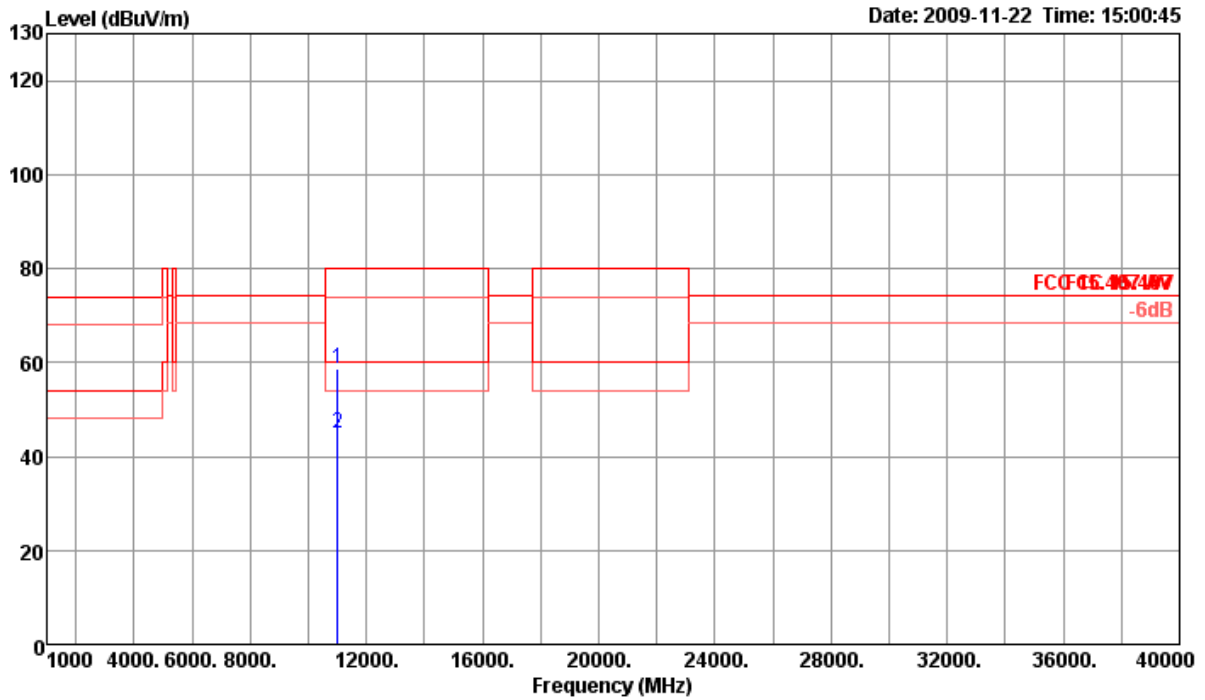


	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	10641.80	75.46	80.00	-4.54	65.86	6.62	38.37	35.39	277	100	Peak	VERTICAL
2 a	10641.90	59.41	60.00	-0.59	49.81	6.62	38.37	35.39	277	100	Average	VERTICAL



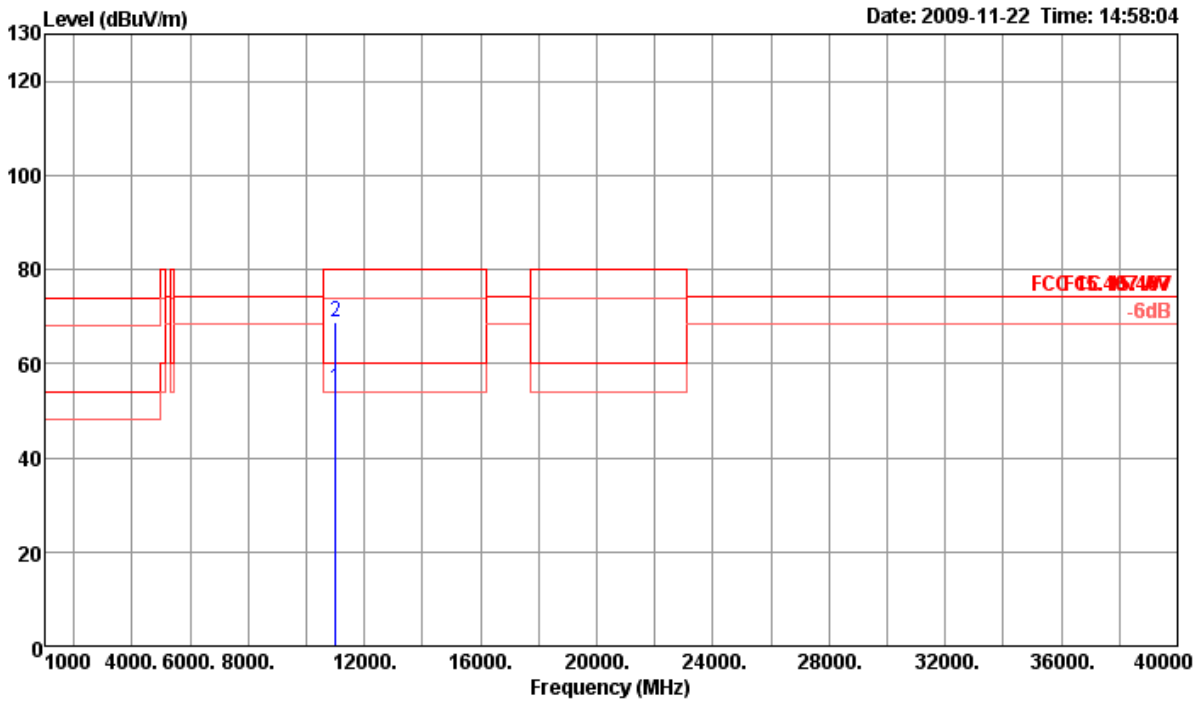
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 100, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	11000.30	58.55	80.00	-21.45	48.59	6.74	38.32	35.10	166	123	Peak	HORIZONTAL
2 a	11001.00	45.02	60.00	-14.98	35.06	6.74	38.32	35.10	166	123	Average	HORIZONTAL

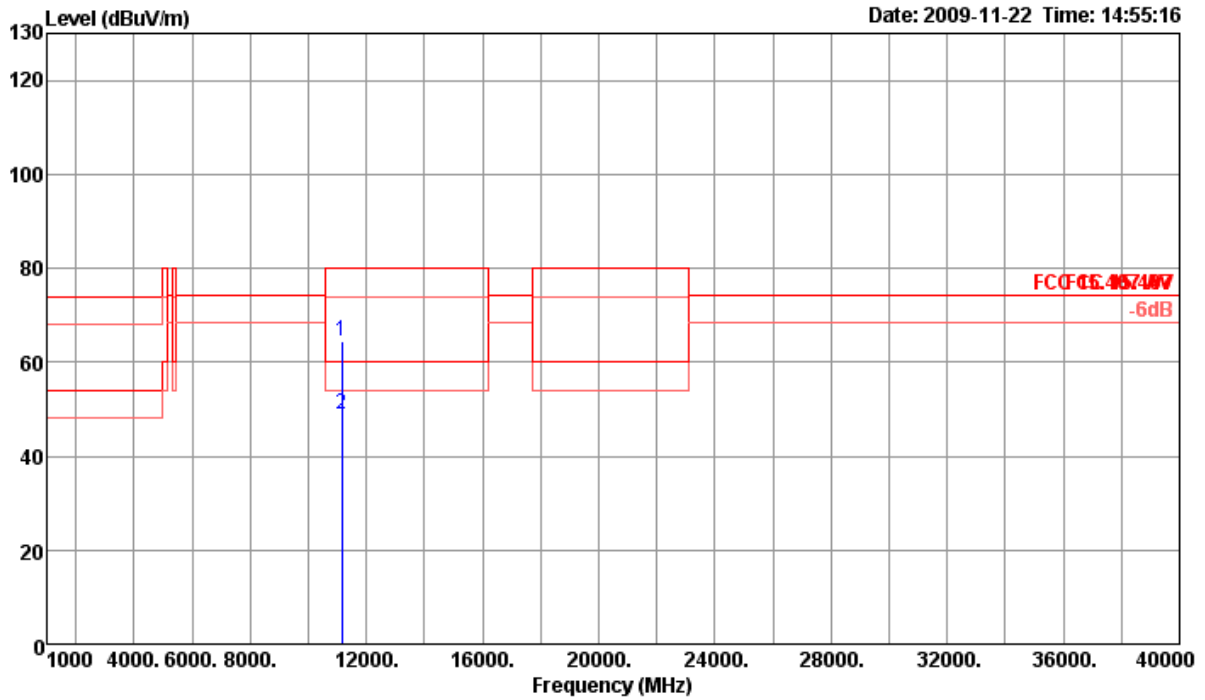
**Vertical**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 a	11000.30	54.81	60.00	-5.19	44.87	6.74	38.30	35.10	276	100	Average	VERTICAL
2 p	11010.00	68.67	80.00	-11.33	58.72	6.74	38.32	35.11	276	100	Peak	VERTICAL

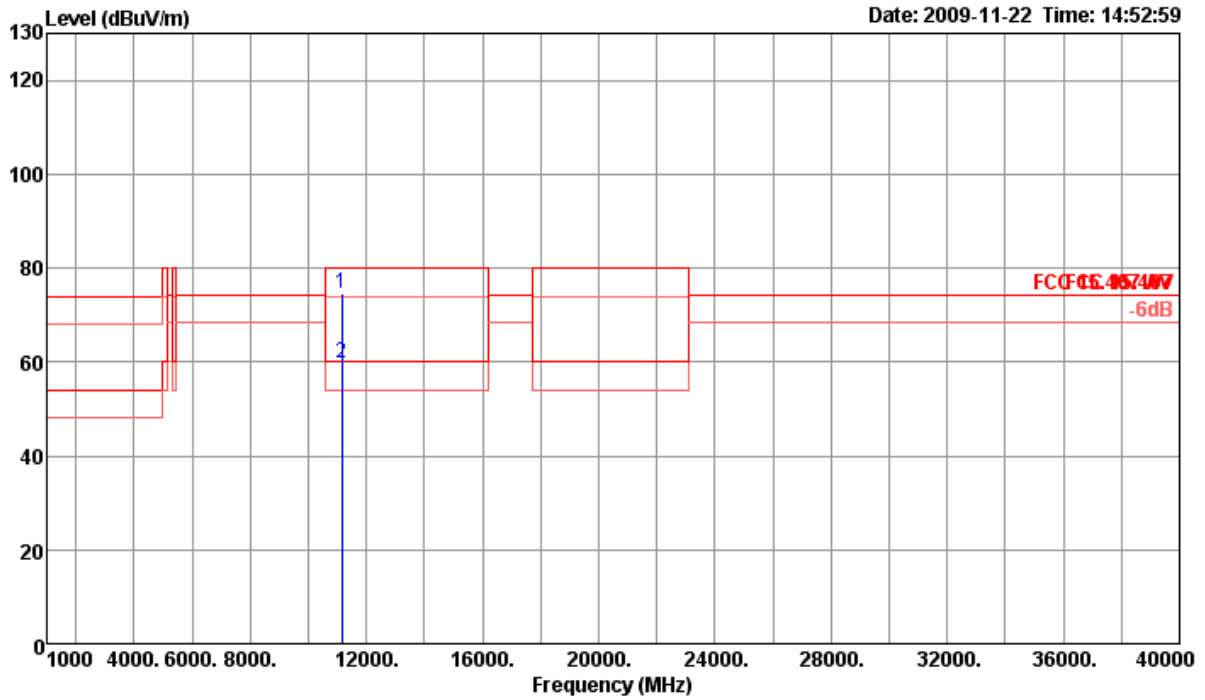
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 116, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	11155.40	64.59	80.00	-15.41	54.56	6.74	38.45	35.16	83	116	Peak	HORIZONTAL
2 a	11156.20	48.91	60.00	-11.09	38.88	6.74	38.45	35.16	83	116	Average	HORIZONTAL

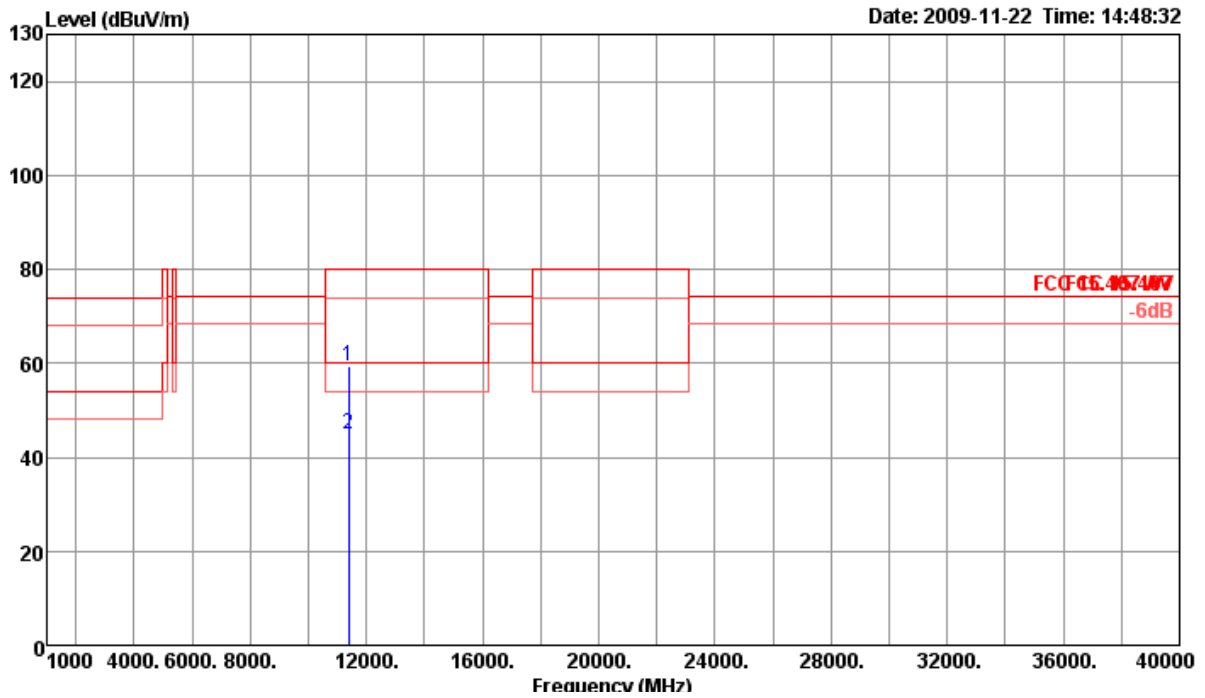
**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	11159.50	74.62	80.00	-5.38	64.58	6.74	38.47	35.17	279	100	Peak	VERTICAL
2 a	11160.40	59.70	60.00	-0.30	49.66	6.74	38.47	35.17	279	100	Average	VERTICAL

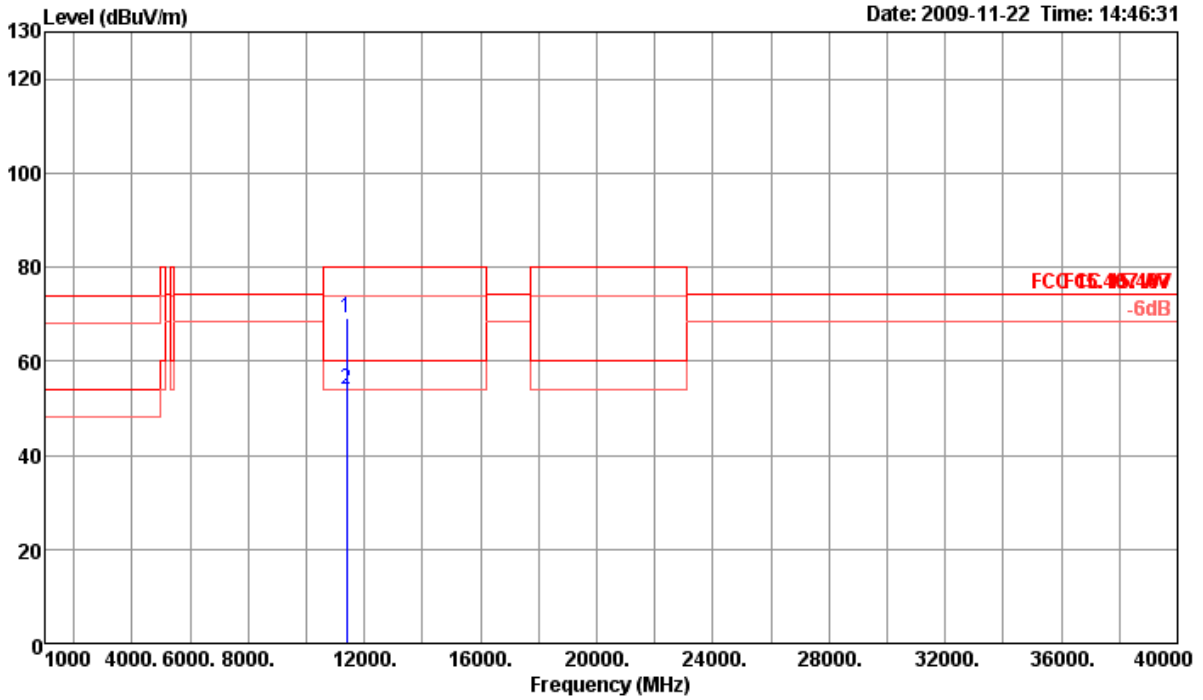
Temperature	24°C	Humidity	52%
Test Engineer	Johnson Chang	Configurations	IEEE 802.11a Ch 140, Ant. A + Ant. B

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	11395.20	59.48	80.00	-20.52	49.31	6.74	38.68	35.25	84	118	Peak	HORIZONTAL
2 a	11400.70	44.77	60.00	-15.23	34.58	6.74	38.70	35.25	84	118	Average	HORIZONTAL

**Vertical**



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	11395.80	69.27	80.00	-10.73	59.10	6.74	38.68	35.25	96	100	Peak	VERTICAL
2 a	11399.80	53.88	60.00	-6.12	43.69	6.74	38.70	35.25	96	100	Average	VERTICAL

**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.

The limits above 5GHz 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 (specific distance [3m] / test distance [1.5m]) (dB);

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



## 4.7. Band Edge Emissions Measurement

### 4.7.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, in case the emission falls 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

### 4.7.2. Measuring Instruments and Setting

Please refer to section 5 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)	1 MHz / 1 MHz for Peak

### 4.7.3. Test Procedures

1. The test procedure is the same as section 4.6.3, 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.

#### 4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

#### 4.7.5. Test Deviation

There is no deviation with the original standard.

#### 4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 4.7.7. Test Result of Band Edge and Fundamental Emissions

<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 36, 40, Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

##### Channel 36

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5149.00	68.42	80.00	-11.58	32.26	3.09	0.00	33.07	91	120	Peak	VERTICAL
2 !	5150.00	55.39	60.00	-4.61	19.23	3.09	0.00	33.07	91	120	Average	VERTICAL
3 a	5185.20	103.41	74.30			3.10	0.00	33.13	91	120	Average	VERTICAL
4 p	5187.80	114.69	74.30			3.10	0.00	33.13	91	120	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

##### Channel 40

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5146.80	67.45	80.00	-12.55	31.29	3.09	0.00	33.07	89	110	Peak	VERTICAL
2 !	5150.00	55.03	60.00	-4.97	18.87	3.09	0.00	33.07	89	110	Average	VERTICAL
3 a	5193.60	104.12	74.30			3.10	0.00	33.16	89	110	Average	VERTICAL
4 p	5194.80	114.50	74.30			3.11	0.00	33.16	89	110	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 60, 64, Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

**Channel 60**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	5300.80	106.15	74.30			3.14	0.00	33.34	99	109	Average	VERTICAL
2 p	5305.20	118.01	74.30			3.14	0.00	33.34	99	109	Peak	VERTICAL
3 !	5350.00	55.74	60.00	-4.26	19.15	3.16	0.00	33.43	99	109	Average	VERTICAL
4	5352.80	68.50	80.00	-11.50	31.91	3.16	0.00	33.43	99	109	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

**Channel 64**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	5323.20	107.07	74.30			3.15	0.00	33.37	253	110	Average	VERTICAL
2 p	5325.60	118.95	74.30			3.15	0.00	33.37	253	110	Peak	VERTICAL
3 !	5350.40	56.97	60.00	-3.03	20.38	3.16	0.00	33.43	253	110	Average	VERTICAL
4	5351.40	72.46	80.00	-7.54	35.87	3.16	0.00	33.43	253	110	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 20MHz Ch 100, 140, Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

**Channel 100**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5459.80	70.89	80.00	-9.11	34.09	3.19	0.00	33.61	100	112	Peak	VERTICAL
2 !	5460.00	58.16	60.00	-1.84	21.36	3.19	0.00	33.61	100	112	Average	VERTICAL
3 !	5468.60	74.18	74.30	-0.12	37.35	3.19	0.00	33.64	100	112	Peak	VERTICAL
4 a	5492.20	107.84	74.30			3.20	0.00	33.67	100	112	Average	VERTICAL
5 p	5495.00	119.84	74.30			3.20	0.00	33.67	100	112	Peak	VERTICAL

Item 4, 5 are the fundamental frequency at 5500 MHz.

**Channel 140**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	5692.40	108.47	74.30			3.22	0.00	34.27	98	106	Average	VERTICAL
2 p	5703.60	120.85	74.30			3.22	0.00	34.32	98	106	Peak	VERTICAL
3 !	5725.20	74.12	74.30	-0.18	36.52	3.23	0.00	34.37	98	106	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5700 MHz.



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 38, 46, Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

**Channel 38**

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 !	5150.00	59.81	60.00	-0.19	23.65	3.09	0.00	33.07	100	112	Average	VERTICAL
2	5150.00	73.44	80.00	-6.56	37.28	3.09	0.00	33.07	100	112	Peak	VERTICAL
3 a	5173.60	100.66	74.30			3.10	0.00	33.13	100	112	Average	VERTICAL
4 p	5192.80	113.03	74.30			3.10	0.00	33.16	100	112	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5190 MHz.

**Channel 46**

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5137.20	68.23	80.00	-11.77	32.11	3.08	0.00	33.04	100	114	Peak	VERTICAL
2 !	5150.00	55.28	60.00	-4.72	19.12	3.09	0.00	33.07	100	114	Average	VERTICAL
3 a	5241.60	101.40	74.30			3.12	0.00	33.25	100	114	Average	VERTICAL
4 p	5244.40	113.64	74.30			3.12	0.00	33.25	100	114	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5230 MHz.



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 54, 62, Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

**Channel 54**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	5256.80	101.62	74.30			3.12	0.00	33.25	98	118	Average	VERTICAL
2 p	5274.00	114.63	74.30			3.13	0.00	33.28	98	118	Peak	VERTICAL
3 !	5350.00	55.54	60.00	-4.46	18.95	3.16	0.00	33.43	98	118	Average	VERTICAL
4	5358.40	68.31	80.00	-11.69	31.72	3.16	0.00	33.43	98	118	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5270 MHz.

**Channel 62**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 a	5296.80	100.68	74.30			3.14	0.00	33.34	92	116	Average	VERTICAL
2 p	5300.40	112.92	74.30			3.14	0.00	33.34	92	116	Peak	VERTICAL
3 !	5350.04	59.09	60.00	-0.91	22.50	3.16	0.00	33.43	92	116	Average	VERTICAL
4	5351.20	73.62	80.00	-6.38	37.03	3.16	0.00	33.43	92	116	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5310 MHz.

<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11n MCS0 40MHz Ch 102, 110, 134 , Ant. A + Ant. B
<b>Test Date</b>	Nov. 24, 2009		

### Channel 102

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5458.80	71.78	80.00	-8.22	34.98	3.19	0.00	33.61	98	119	Peak	VERTICAL
2 !	5460.00	56.34	60.00	-3.66	19.54	3.19	0.00	33.61	98	119	Average	VERTICAL
3 !	5469.60	73.46	74.30	-0.84	36.63	3.19	0.00	33.64	98	119	Peak	VERTICAL
4 p	5512.80	114.77	74.30			3.20	0.00	33.70	98	119	Peak	VERTICAL
5 a	5516.40	101.15	74.30			3.20	0.00	33.75	98	119	Average	VERTICAL

Item 4, 5 are the fundamental frequency at 5510MHz.

### Channel 110

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	5457.60	73.87	80.00	-6.13	37.07	3.19	0.00	33.61	92	112	Peak	VERTICAL
2 !	5460.00	58.37	60.00	-1.63	21.57	3.19	0.00	33.61	92	112	Average	VERTICAL
3 !	5466.80	73.55	74.30	-0.75	36.72	3.19	0.00	33.64	92	112	Peak	VERTICAL
4 a	5535.60	107.54	74.30			3.21	0.00	33.80	92	112	Average	VERTICAL
5 p	5541.20	121.30	74.30			3.21	0.00	33.80	92	112	Peak	VERTICAL

Item 4, 5 are the fundamental frequency at 5550 MHz.

### Channel 134

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1 p	5655.20	118.66	74.30			3.22	0.00	34.17	251	110	Peak	VERTICAL
2 a	5678.00	105.66	74.30			3.22	0.00	34.22	251	110	Average	VERTICAL
3 !	5728.60	74.27	74.30	-0.03	36.67	3.23	0.00	34.37	251	110	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5670 MHz.

Note:

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

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

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

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



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 36, 40, Ant. A + Ant. B
<b>Test Date</b>	Nov. 22, 2009		

**Channel 36**

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5148.60	68.75	80.00	-11.25	31.02	4.06	33.67	0.00	173	99	Peak	VERTICAL
2 !	5150.00	55.75	60.00	-4.25	18.02	4.06	33.67	0.00	173	99	Average	VERTICAL
3 p	5183.20	114.09	74.30			4.08	33.73	0.00	173	99	Peak	VERTICAL
4 a	5183.80	103.06	74.30			4.08	33.73	0.00	173	99	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

**Channel 40**

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5146.40	68.03	80.00	-11.97	30.30	4.06	33.67	0.00	267	111	Peak	VERTICAL
2 !	5146.80	55.79	60.00	-4.21	18.06	4.06	33.67	0.00	267	111	Average	VERTICAL
3 a	5194.00	105.83	74.30			4.09	33.73	0.00	267	111	Average	VERTICAL
4 p	5196.00	115.63	74.30			4.09	33.76	0.00	267	111	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.





<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 60, 64, Ant. A + Ant. B
<b>Test Date</b>	Nov. 22, 2009		

**Channel 60**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 a	5293.20	103.35	74.30			4.14	33.91	0.00	183	104	Average	VERTICAL
2 p	5297.60	114.97	74.30			4.14	33.94	0.00	183	104	Peak	VERTICAL
3 !	5350.00	55.68	60.00	-4.32	17.48	4.17	34.03	0.00	183	104	Average	VERTICAL
4	5351.20	68.60	80.00	-11.40	30.40	4.17	34.03	0.00	183	104	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

**Channel 64**

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 a	5324.20	103.64	74.30			4.16	33.97	0.00	225	103	Average	VERTICAL
2 p	5327.20	115.26	74.30			4.16	33.97	0.00	225	103	Peak	VERTICAL
3 !	5350.00	56.00	60.00	-4.00	17.80	4.17	34.03	0.00	225	103	Average	VERTICAL
4	5353.00	71.84	80.00	-8.16	33.64	4.17	34.03	0.00	225	103	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.



<b>Temperature</b>	24°C	<b>Humidity</b>	52%
<b>Test Engineer</b>	Johnson Chang	<b>Configurations</b>	IEEE 802.11a Ch 100, 140, Ant. A + Ant. B
<b>Test Date</b>	Nov. 22, 2009		

**Channel 100**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 !	5459.40	58.75	60.00	-1.25	20.31	4.23	34.21	0.00	89	108	Average	VERTICAL
2	5459.40	72.97	80.00	-7.03	34.53	4.23	34.21	0.00	89	108	Peak	VERTICAL
3 !	5469.80	73.44	74.30	-0.86	34.96	4.24	34.24	0.00	89	108	Peak	VERTICAL
4 p	5492.60	120.07	74.30			4.24	34.26	0.00	89	108	Peak	VERTICAL
5 a	5495.40	109.21	74.30			4.26	34.26	0.00	89	108	Average	VERTICAL

Item 4, 5 are the fundamental frequency at 5500 MHz.

**Channel 140**

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1 p	5692.60	120.21	74.30			4.36	34.34	0.00	89	115	Peak	VERTICAL
2 a	5694.80	108.45	74.30			4.36	34.34	0.00	89	115	Average	VERTICAL
3 !	5725.40	74.11	74.30	-0.19	35.38	4.39	34.34	0.00	89	115	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5700 MHz.

Note:

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

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

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

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

## 4.8. Frequency Stability Measurement

### 4.8.1. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or  $\pm 20\text{ppm}$  (IEEE 802.11n specification).

### 4.8.2. Measuring Instruments and Setting

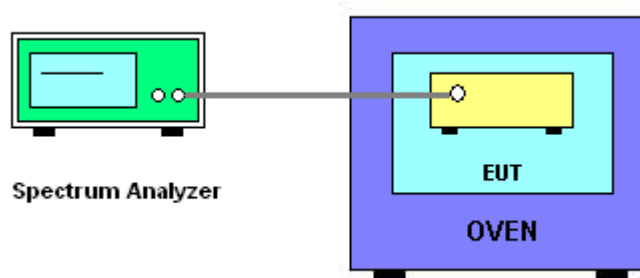
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

### 4.8.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and the limit is less than  $\pm 20\text{ppm}$  (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is  $-30^\circ\text{C} \sim 50^\circ\text{C}$ .
8. Measuring multiple antennas, the connector is required to link with Power Meter through a combiner.

### 4.8.4. Test Setup Layout



#### 4.8.5. Test Deviation

There is no deviation with the original standard.

#### 4.8.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

#### 4.8.7. Test Result of Frequency Stability

##### Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)	
	5200	5300
(V)		
126.50	5199.986800	5299.998000
110.00	5200.008700	5300.010000
93.50	5200.038600	5300.045000
Max. Deviation (MHz)	<b>0.038600</b>	<b>0.045000</b>
Max. Deviation (ppm)	<b>7.42</b>	<b>8.49</b>

##### Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)	
	5200	5300
(°C)		
-30	5200.032900	5300.035800
-20	5200.028700	5300.033000
-10	5200.019900	5300.024600
0	5200.015800	5300.021600
10	5200.004600	5300.001200
20	5199.998700	5299.999800
30	5199.994500	5299.996800
40	5199.991300	5299.994600
50	5199.991200	5299.993300
Max. Deviation (MHz)	<b>0.032900</b>	<b>0.035800</b>
Max. Deviation (ppm)	<b>6.33</b>	<b>6.7547</b>

## 4.9. Antenna Requirements

### 4.9.1. 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. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### 4.9.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

## 5. 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. 15, 2009	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 23, 2009	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2009	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2009	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz – 30MHz	Jun. 11, 2009	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 07, 2009	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 23, 2009	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2009	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Apr. 06, 2009*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100305	9 kHz - 40 GHz	Feb. 03, 2009	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 28, 2008*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Sep. 26, 2009	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 28, 2009	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.16, 2009	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Jan. 05, 2009	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)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 29, 2009	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 31, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100666	DC ~ 30GHz	Aug. 05, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 31, 2009	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 12, 2009*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Aug. 06, 2009	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2009	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2009	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Feb. 13, 2009	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 25, 2009	Conducted (TH01-HY)

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

Note: For "\*" Calibration Interval of instruments listed above is two years.

## 6. 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

## 7. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-091230

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**

<b>Accreditation Criteria</b>	: ISO/IEC 17025:2005
<b>Accreditation Number</b>	: 1190
<b>Originally Accredited</b>	: December 15, 2003
<b>Effective Period</b>	: January 10, 2010 to January 09, 2013
<b>Accredited Scope</b>	: Testing Field, see described in the Appendix
<b>Specific Accreditation Program</b>	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities

*Jay-san Chen*

Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : December 30, 2009

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix