FCC Test Report

Product Name ： Wireless Access Point

Model No. ： AP-90M

Applicant ： ICOM Incorporated

Address ： 1-1-32 Kamiminami, Hirano-ku, Osaka, 547-0003, Japan

Date of Receipt ： 2014/09/10

Issued Date ： 2015/02/02

Report No. ： 1490280R-ITUSP01V00

Report Version ： V1.0

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.
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Test Report

Issued Date : 2015/02/02
Report No. : 1490280R-ITUSP01V00

Product Name	:	Wireless Access Point
Applicant	:	ICOM Incorporated
Address	:	1-1-32 Kamiminami, Hirano-ku, Osaka, 547-0003, Japan
Manufacturer	:	ICOM Incorporated
Model No.	:	AP-90M
EUT Rated Voltage	:	AC 100-240V, 50-60Hz
EUT Test Voltage	:	AC 120V / 60Hz
Trade Name	:	ICOM
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart B: 2013 Class B CISPR 22: 2008, ANSI C63.4: 2009
Test Result	:	Complied
Performed Location	:	Quietek Corporation (Linkou Laboratory) No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C. TEL:+866-2-8601-3788 / FAX:+886-2-8601-3789

Documented By : Genie Chang
(Senior Adm. Specialist / Genie Chang)

Reviewed By : Ting Chen
(Engineer / Ting Chen)

Approved By :
(Director / Vincent Lin)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scopes:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
Norway	**:**	**DNV**
USA	**:**	**FCC**
Japan	**:**	**VCCI**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :
No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

LinKou Testing Laboratory :
No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

Suzhou (China) Testing Laboratory :
No. 99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou,China.
TEL : +86-512-6251-5088 / FAX : +86-512-6251-5098 E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	Wireless Access Point
Trade Name	ICOM
Model No.	AP-90M

Component	
Power Adapter	MFR: ICOM, M/N: SA142B-12U Input: AC 100-240V, 50/60Hz, 1.2A Output: DC 12V⎓3.5A 42W Cable Out: Non-shielded, 1.4m, with one ferrite core bonded.

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Pre-Test Mode	
Mode 1: Normal Operation	
Final Test Mode	
Emission	Mode 1: Normal Operation

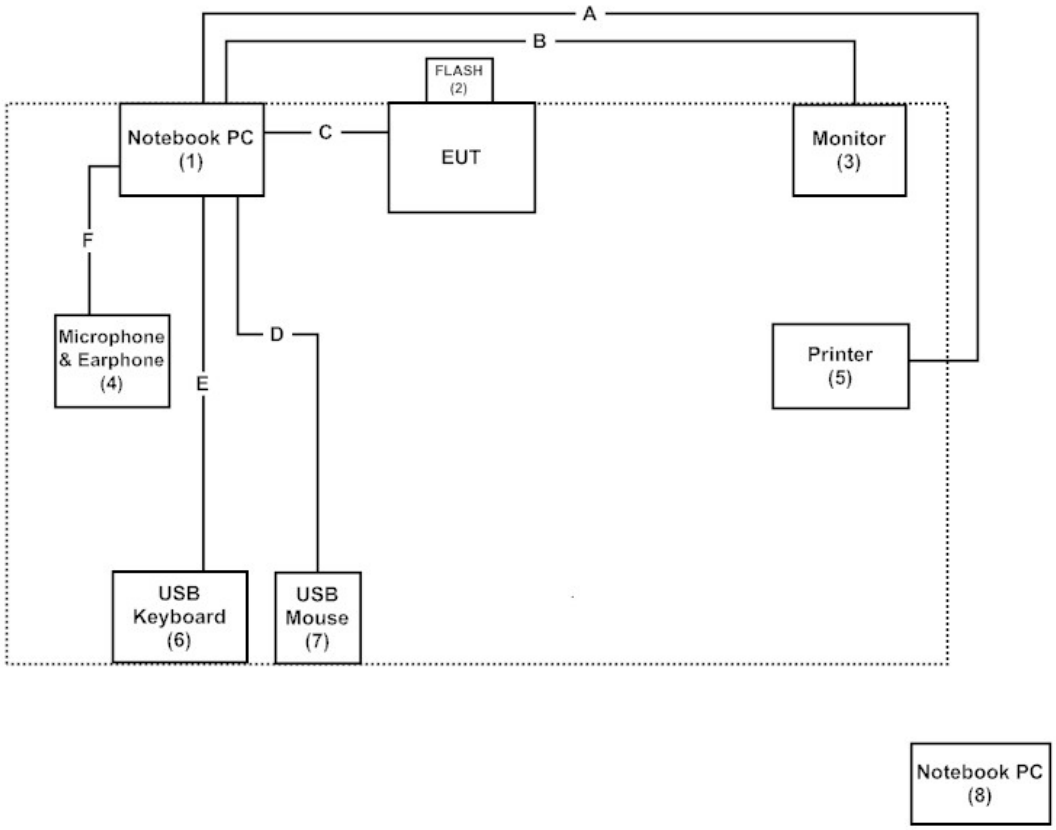
1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude E7440	2BMFTY1	Non-Shielded, 1.8m
2	FLASH 512MB	Pqi	U172P	BB55-5122RC072000701486	N/A
3	Monitor	DELL	U2410f	CN-082WXD-72872-23E-ACDL	Non-Shielded, 1.8m
4	Microphone & Earphone	Ergotech	ET-E201	N/A	N/A
5	Printer	EPSON	StyLus C63	FAPY094255	Non-Shielded, 1.8m
6	Keyboard	Logitech	Y-U0009	LZ027HU	N/A
7	USB Mouse	Logitech	M-UAL-96	LZ923A40006	N/A
8	Notebook PC	ASUS	N53S	N53SN-021A2630QM	Non-Shielded, 0.8m

1.4. Configuration of Tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.5m
B	HDMI Cable	Shielded, 1.8m
C	LAN Cable	Non-Shielded, 1.2m
D	USB Mouse Cable	Shielded, 1.8m
E	USB Keyboard Cable	Shielded, 1.8m
F	Earphone & Microphone Cable	Shielded, 1.6m

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of all equipment.
3	All the features of the EUT operation normally.

2. Technical Test

2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Emission			
Performed Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart B: 2013 Class B ANSI C63.4: 2009	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart B: 2013 Class B ANSI C63.4: 2009	Yes	No

2.2. List of Test Equipment

Conducted Emission / SR1

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
EMI Test Receiver	R&S	ESCS 30	100367	2014/12/10
LISN	R&S	ENV216	100085	2015/01/19
LISN	R&S	ESH3-Z5	836679/023	2015/01/19
Pulse Limiter	R&S	ESH3-Z2	357.8810.52-1	2014/09/17
Coaxial Cable	QTK(Arnist)	RG 400	LC016-RG	2014/06/25

Radiated Emission / Site5

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Bilog Antenna	Schaffner Chase	CBL6112B	2919	2014/06/13
EMI Test Receiver	R&S	ESCS 30	100149	2014/06/12
Coaxial Cable	QTK(Arnist)	RG 214	LC005-RG	2014/06/20
Coaxial signal switch	Arnist	MP59B	6100034519	2014/06/20
Site5 NSA	QTK	N/A	N/A	2014/06/20

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Radiated Emission / CB7

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
EMI Test Receiver	R&S	ESU26	100433	2014/07/31
Horn Antenna	ETS-Lindgren	3117	00135205	2014/03/26
Horn Antenna	SCHWARZBECK	9120D	576	2014/11/21
Pre-Amplifier	COM-POWER	PAM-118	443019	2014/07/09
CB7 VSWR	QTK	N/A	N/A	2014/07/05

2.3. Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.26 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.19 dB.

2.4. Test Environment

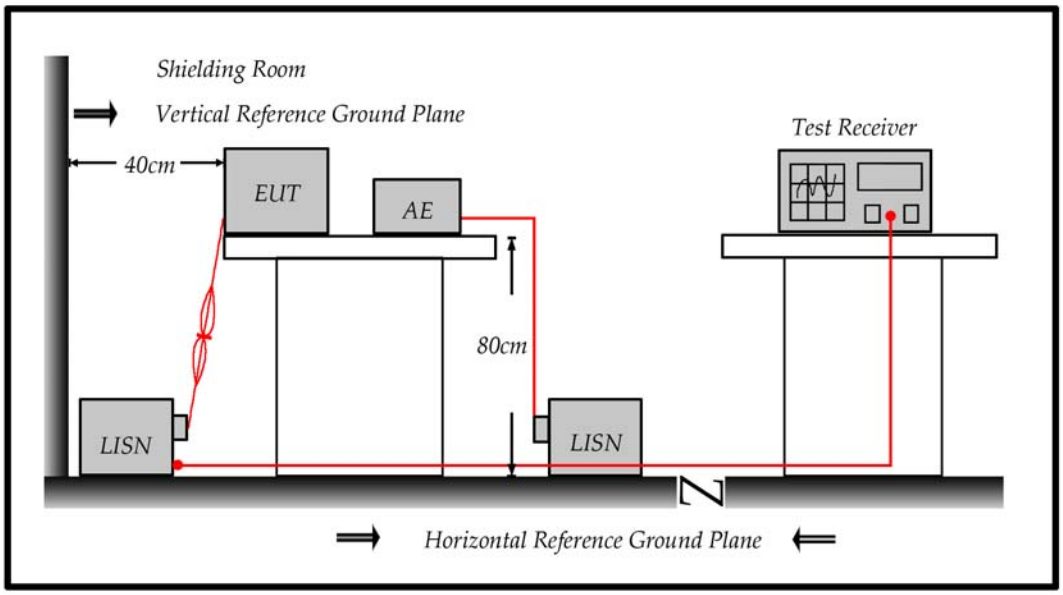
Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	15-35	21.9
	Humidity (%RH)	25-75	64
	Barometric pressure (mbar)	860-1060	950-1000
Radiated Emission	Temperature (°C)	15-35	23
	Humidity (%RH)	25-75	60
	Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

3.1. Test Specification

According to Standard : FCC Part 15 Subpart B, ANSI C63.4

3.2. Test Setup



3.3. Limit

Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 – 46
0.50-5.0	56	46
5.0 - 30	60	50

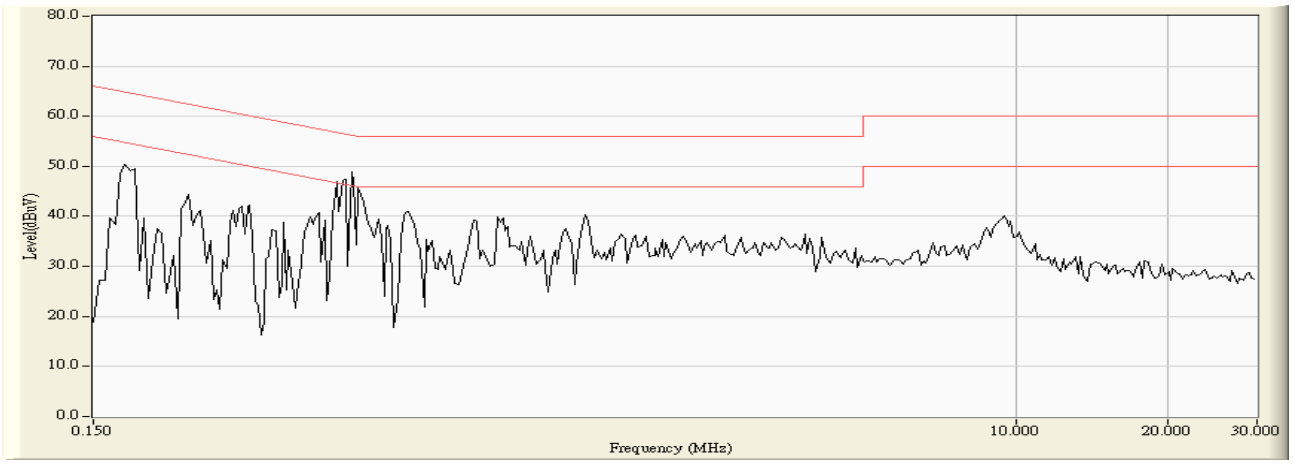
Remarks: In the above table, the tighter limit applies at the band edges.

3.4. Test Procedure

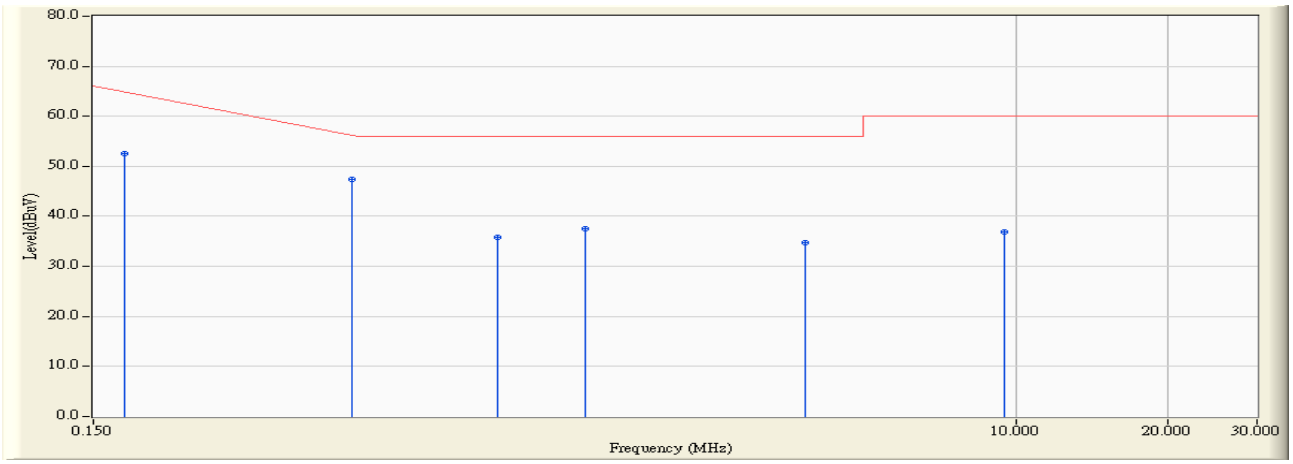
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
(Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Test Result

Site : SR1	**Time : 2014/11/28 - 09:45**
Limit : CISPR_B_00M_QP	**Margin : 10**
EUT : Wireless Access Point	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**



Site : SR1	**Time : 2014/11/28 - 09:46**
Limit : CISPR_B_00M_QP	**Margin : 0**
EUT : Wireless Access Point	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**

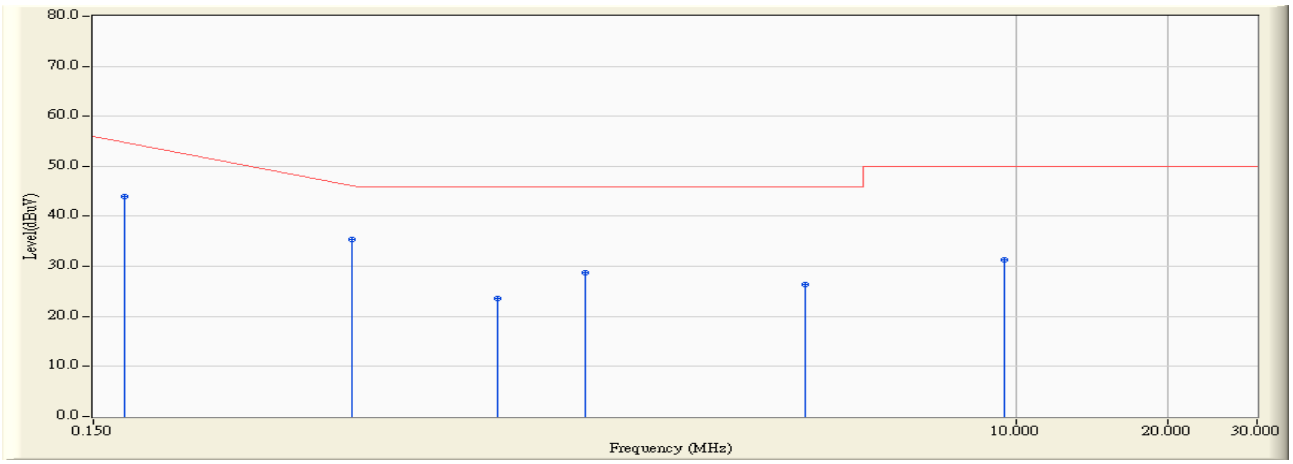


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.173	9.460	43.180	52.640	-12.703	65.343	QUASIPEAK
2	*	0.486	9.478	37.950	47.428	-8.972	56.400	QUASIPEAK
3		0.943	9.515	26.210	35.725	-20.275	56.000	QUASIPEAK
4		1.412	9.543	27.890	37.433	-18.567	56.000	QUASIPEAK
5		3.822	9.625	25.020	34.645	-21.355	56.000	QUASIPEAK
6		9.470	9.736	27.110	36.846	-23.154	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR1	**Time : 2014/11/28 - 09:46**
Limit : CISPR_B_00M_AV	**Margin : 0**
EUT : Wireless Access Point	**Probe : ENV_216_L1 - Line1**
Power : AC 120V/60Hz	**Note : Mode 1**

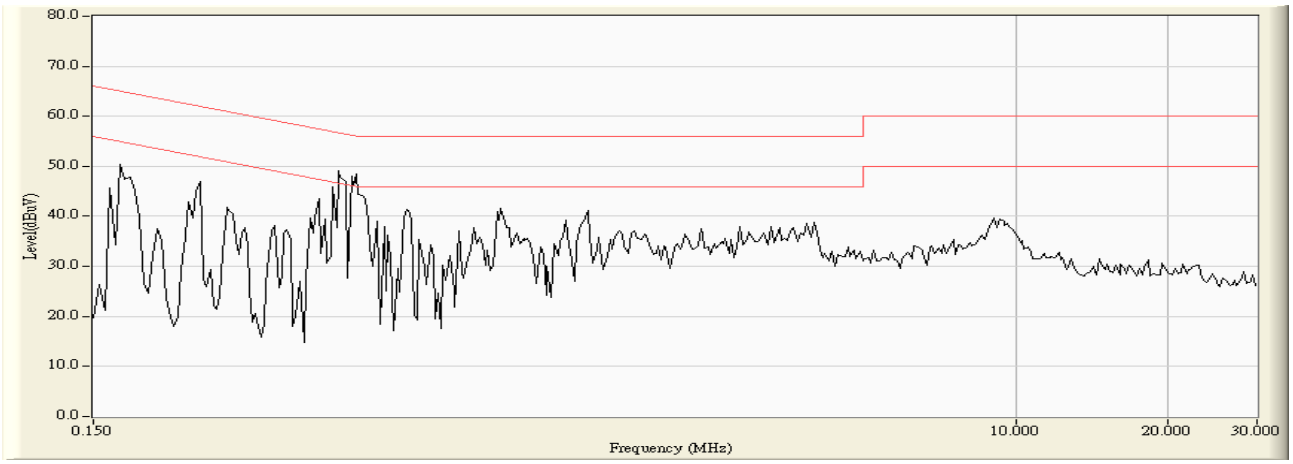


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.173	9.460	34.430	43.890	-11.453	55.343	AVERAGE
2	*	0.486	9.478	25.950	35.428	-10.972	46.400	AVERAGE
3		0.943	9.515	14.150	23.665	-22.335	46.000	AVERAGE
4		1.412	9.543	19.240	28.783	-17.217	46.000	AVERAGE
5		3.822	9.625	16.720	26.345	-19.655	46.000	AVERAGE
6		9.470	9.736	21.660	31.396	-18.604	50.000	AVERAGE

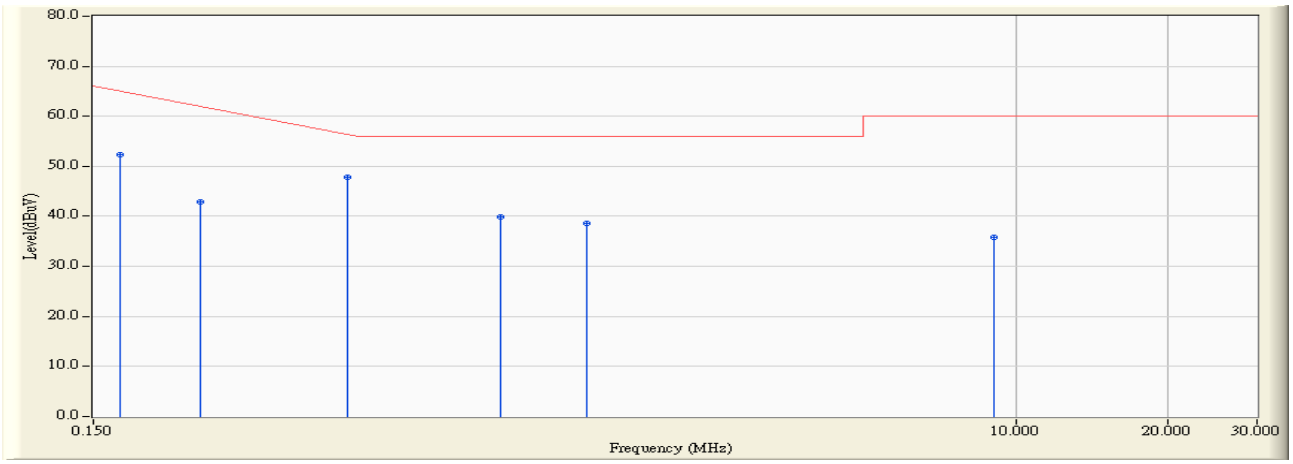
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR1	**Time : 2014/11/28 - 09:47**
Limit : CISPR_B_00M_QP	**Margin : 10**
EUT : Wireless Access Point	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**



Site : SR1	**Time : 2014/11/28 - 09:48**
Limit : CISPR_B_00M_QP	**Margin : 0**
EUT : Wireless Access Point	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**

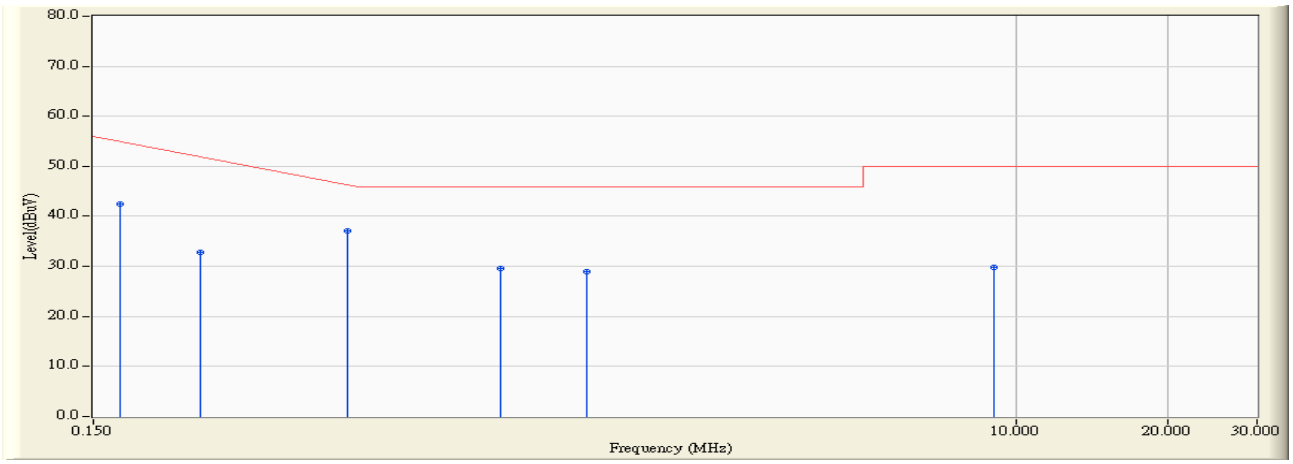


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.170	9.499	42.900	52.399	-13.030	65.429	QUASIPEAK
2		0.244	9.504	33.480	42.984	-20.330	63.314	QUASIPEAK
3	*	0.478	9.518	38.310	47.828	-8.801	56.629	QUASIPEAK
4		0.959	9.546	30.450	39.996	-16.004	56.000	QUASIPEAK
5		1.423	9.574	29.070	38.644	-17.356	56.000	QUASIPEAK
6		9.037	9.782	26.020	35.802	-24.198	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : SR1	**Time : 2014/11/28 - 09:48**
Limit : CISPR_B_00M_AV	**Margin : 0**
EUT : Wireless Access Point	**Probe : ENV_216_N - Line2**
Power : AC 120V/60Hz	**Note : Mode 1**



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.170	9.499	32.980	42.479	-12.950	55.429	AVERAGE
2		0.244	9.504	23.300	32.804	-20.510	53.314	AVERAGE
3	*	0.478	9.518	27.600	37.118	-9.511	46.629	AVERAGE
4		0.959	9.546	20.110	29.656	-16.344	46.000	AVERAGE
5		1.423	9.574	19.320	28.894	-17.106	46.000	AVERAGE
6		9.037	9.782	20.130	29.912	-20.088	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

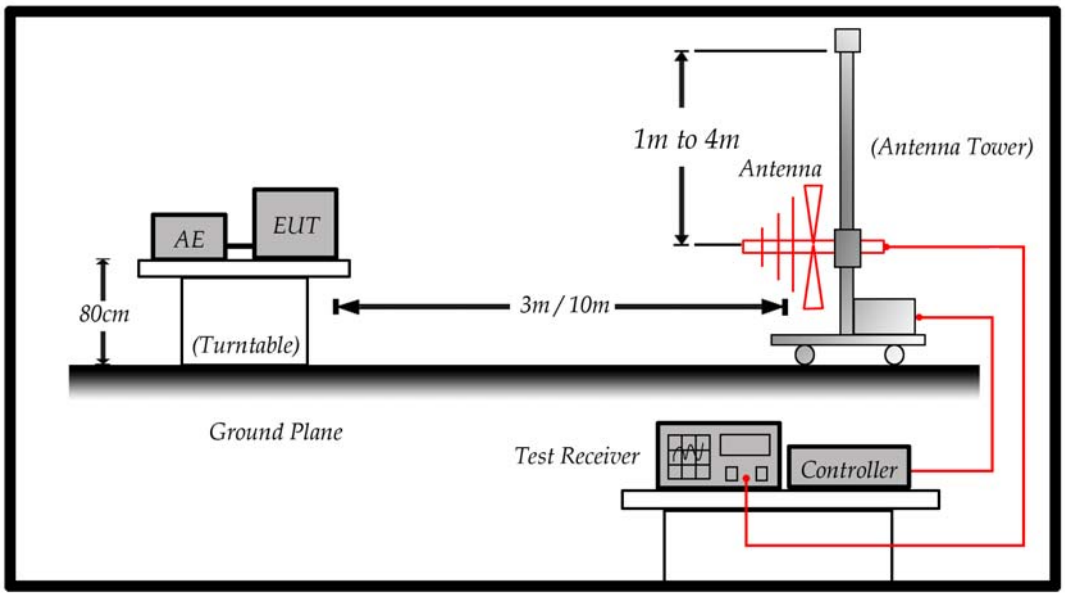
4. Radiated Emission

4.1. Test Specification

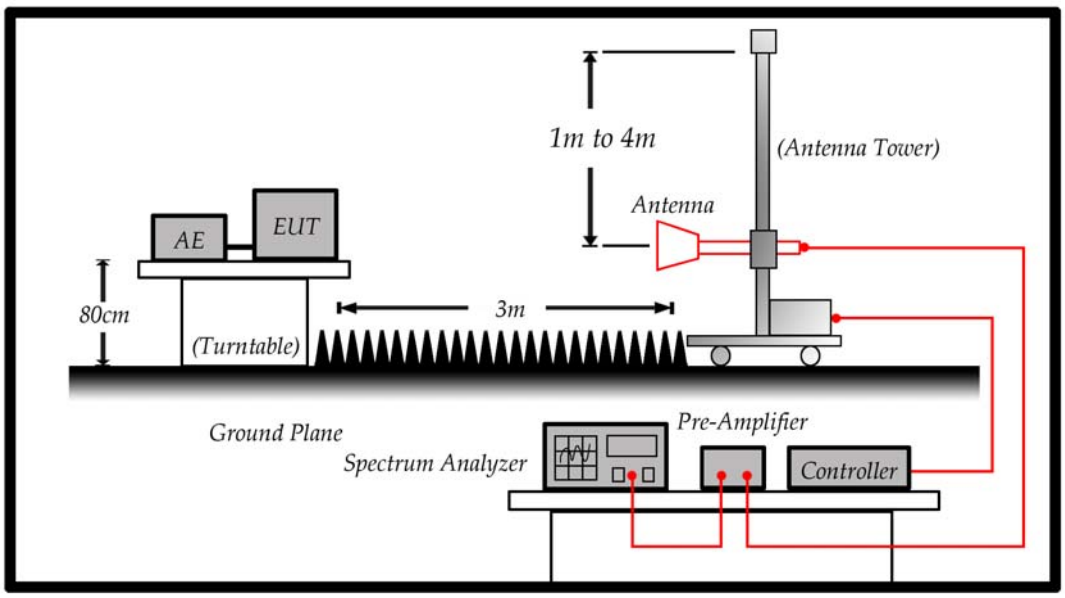
According to EMC Standard : FCC Part 15 Subpart B, ANSI C63.4

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

Under 1GHz test shall not exceed the following value:

Limits		
Frequency (MHz)	Distance (m)	dBuV/m
30 – 230	10	30
230 – 1000	10	37

Remark:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Above 1GHz test shall not exceed the following value:

FCC Part 15 Subpart B Paragraph 15.109 Limits (dBuV/m)		
Frequency (MHz)	Distance (m)	dBuV/m
30-88	3	40
88-216	3	43.5
216-960	3	46
Above 960	3	54

Remark:

1. The tighter limit shall apply at the edge between two frequency bands.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

The turn table can rotate 360 degrees to determine the position of the maximum emission level and the antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the folowing table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

On any frequency or frequencies below or equal to 1000 MHz, the radiated limits shown are based on measuring equipment employing a quasi-peak detector function and above 1000 MHz, the radiated limits shown are based measuring equipment employing an average detector function.

When average radiated emission measurement are included emission measurement Above 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

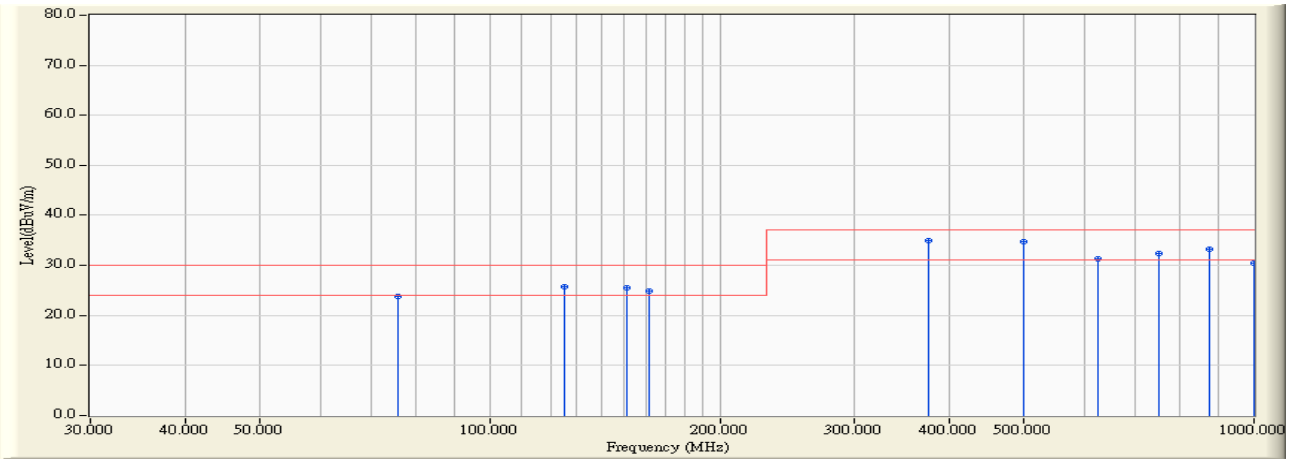
For class A, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and above 1GHz.

For class B, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and 3 meters for above 1GHz.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 kHz and above 1GHz is 1MHz.

4.5. Test Result

Site : Site5	**Time : 2014/11/28 - 21:21**
Limit : CISPR_B_10M_QP	**Margin : 6**
EUT : Wireless Access Point	**Probe : Site5_CBL6112_10M_1406 - HORIZONTAL**
Power : AC 120V/60Hz	**Note : Mode 1**

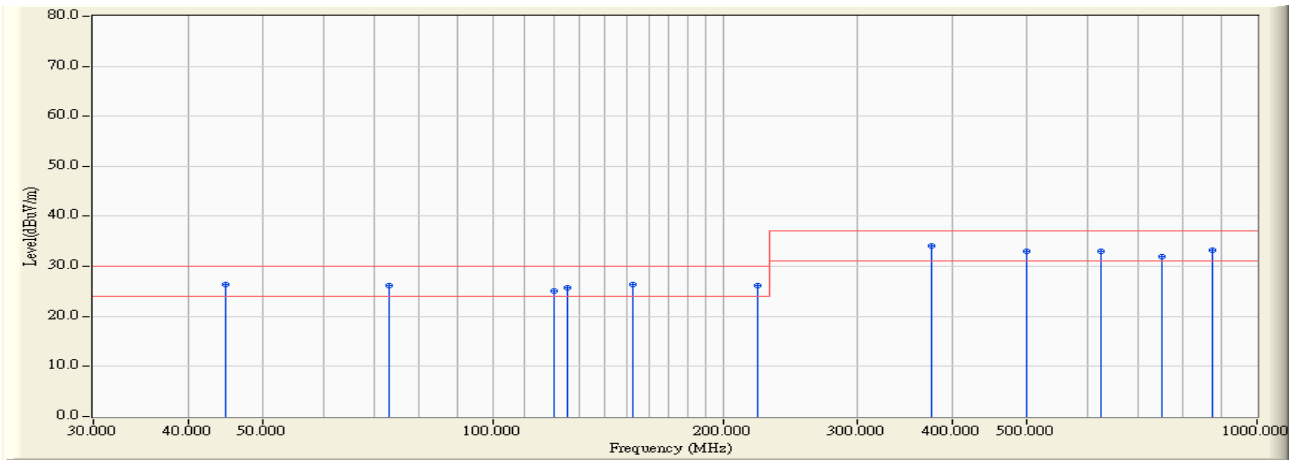


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		75.900	8.752	15.000	23.752	-6.248	30.000	QUASIPEAK
2		125.000	14.600	11.100	25.701	-4.299	30.000	QUASIPEAK
3		151.000	13.197	12.400	25.598	-4.402	30.000	QUASIPEAK
4		161.600	12.880	12.100	24.980	-5.020	30.000	QUASIPEAK
5	*	375.000	19.760	15.200	34.960	-2.040	37.000	QUASIPEAK
6		500.000	23.021	11.700	34.721	-2.279	37.000	QUASIPEAK
7		625.000	25.270	6.000	31.270	-5.730	37.000	QUASIPEAK
8		750.000	26.933	5.500	32.433	-4.567	37.000	QUASIPEAK
9		875.000	27.941	5.300	33.241	-3.759	37.000	QUASIPEAK
10		1000.000	29.410	1.000	30.410	-6.590	37.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : Site5	**Time : 2014/11/28 - 21:25**
Limit : CISPR_B_10M_QP	**Margin : 6**
EUT : Wireless Access Point	**Probe : Site5_CBL6112_10M_1406 - VERTICAL**
Power : AC 120V/60Hz	**Note : Mode 1**

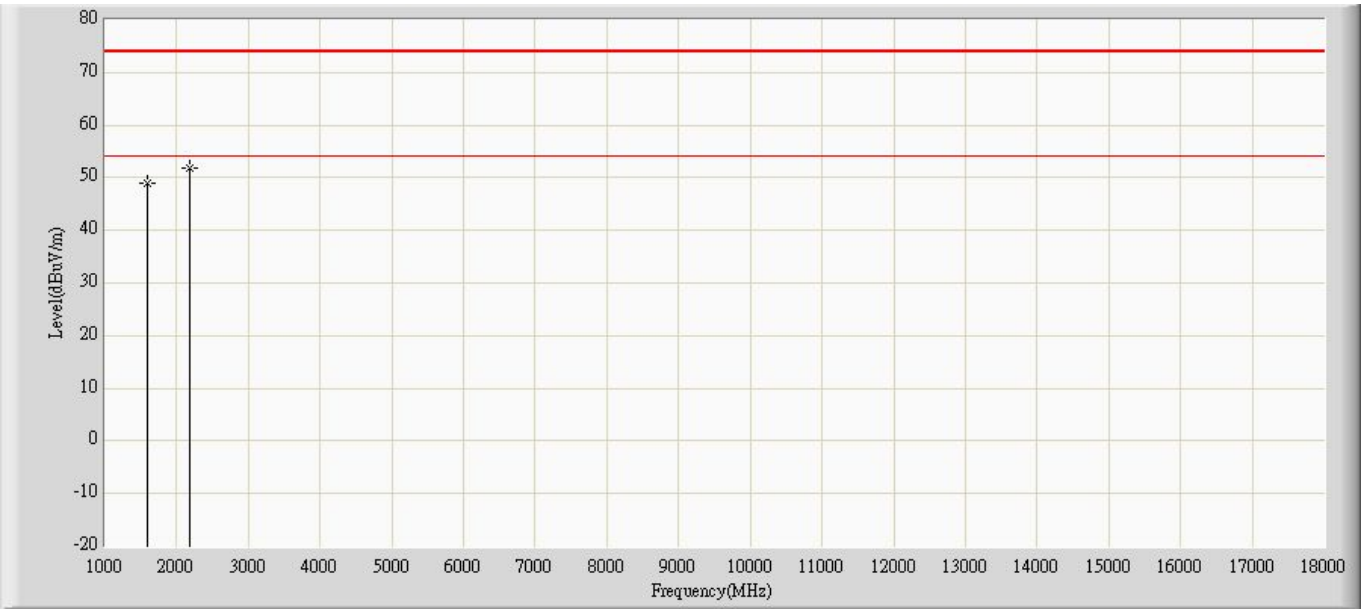


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		44.700	12.158	14.300	26.457	-3.543	30.000	QUASIPEAK
2		73.000	8.453	17.700	26.153	-3.847	30.000	QUASIPEAK
3		120.000	14.644	10.400	25.044	-4.956	30.000	QUASIPEAK
4		125.000	14.600	11.200	25.801	-4.199	30.000	QUASIPEAK
5		152.300	13.158	13.200	26.358	-3.642	30.000	QUASIPEAK
6		221.700	12.827	13.300	26.127	-3.873	30.000	QUASIPEAK
7	*	375.000	19.760	14.300	34.060	-2.940	37.000	QUASIPEAK
8		500.000	23.021	10.000	33.021	-3.979	37.000	QUASIPEAK
9		625.000	25.270	7.700	32.970	-4.030	37.000	QUASIPEAK
10		750.000	26.933	5.100	32.033	-4.967	37.000	QUASIPEAK
11		875.000	27.941	5.200	33.141	-3.859	37.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site: CB7	Time: 2014/11/28 - 11:13
Limit: FCC_B_(Above_1G)	Margin: 0
Probe: CB7_Horn_9120D_1403_D866	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Note: Mode 1	

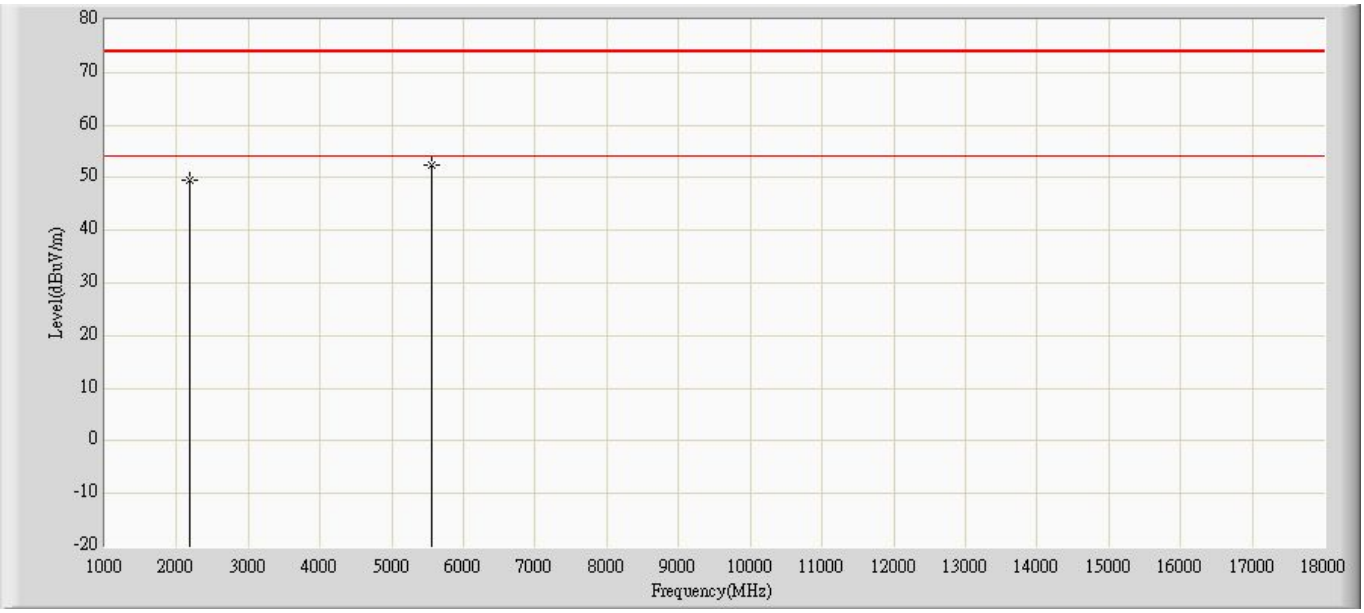


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			1600.000	49.020	46.350	-24.980	74.000	2.670	PK
2		*	2185.000	51.761	47.860	-22.239	74.000	3.901	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: CB7	Time: 2014/11/28 - 11:20
Limit: FCC_B_(Above_1G)	Margin: 0
Probe: CB7_Horn_9120D_1403_D866	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Note: Mode 1	

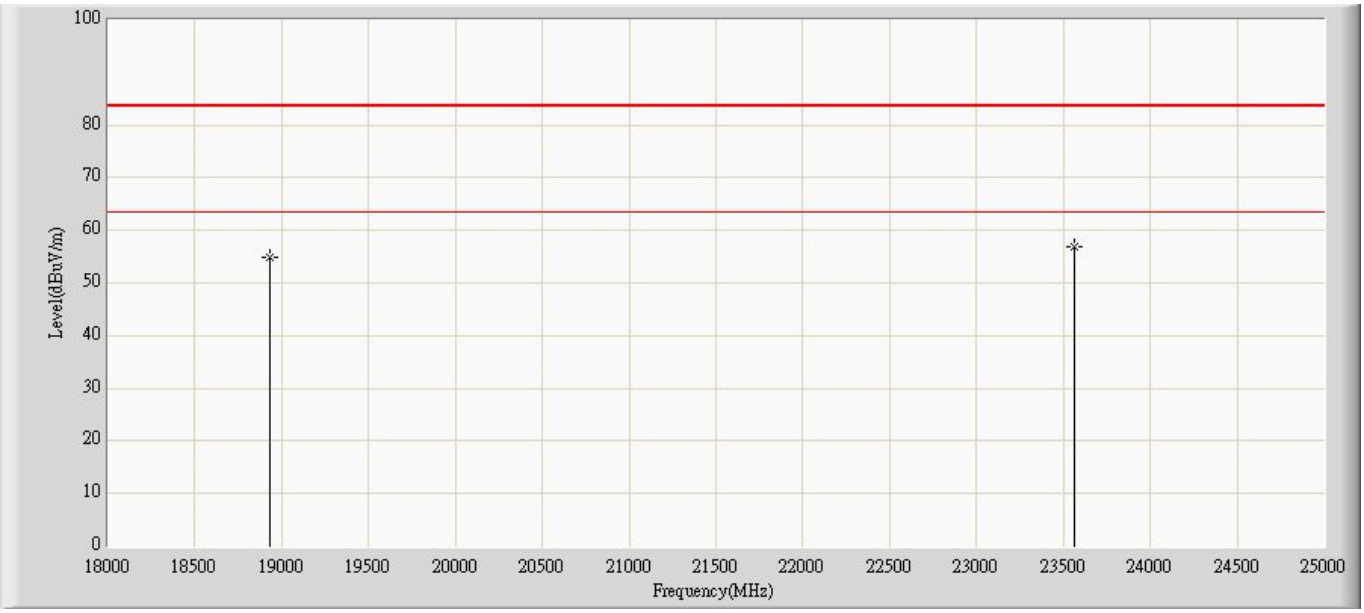


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2180.000	49.601	45.700	-24.399	74.000	3.900	PK
2		*	5550.000	52.529	40.320	-21.471	74.000	12.209	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: CB7	Time: 2014/11/28 - 11:36
Limit: FCC_B_18-40G(Above_1G)	Margin: 0
Probe: HA9170_209_18G-40G	Polarity: Horizontal
EUT: Wireless Access Point	Power: AC 120V/60Hz
Note: Mode 1	

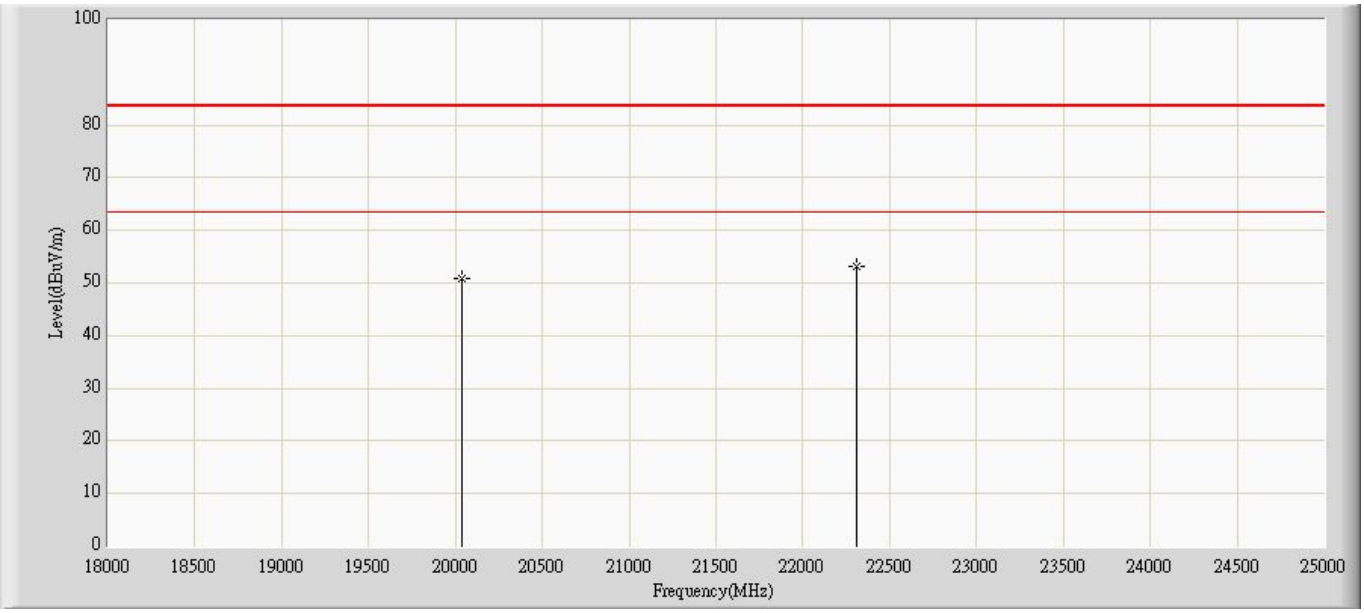


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			18933.000	55.022	68.260	-28.518	83.540	-13.238	PK
2		*	23566.000	56.920	62.080	-26.620	83.540	-5.160	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Site: CB7	Time: 2014/11/28 - 11:42
Limit: FCC_B_18-40G(Above_1G)	Margin: 0
Probe: HA9170_209_18G-40G	Polarity: Vertical
EUT: Wireless Access Point	Power: AC 120V/60Hz
Note: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			20036.000	50.872	63.110	-32.668	83.540	-12.237	PK
2		*	22309.000	53.230	62.080	-30.310	83.540	-8.850	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).