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Report No.: 1407RSU00303
Report Version: V01
Issue Date: 12-07-2014

MEASUREMENT REPORT
FCC Part 15B

FCC ID: SFK-WF122

APPLICANT: CIG Shanghai Co., Ltd.

Application Type:	Certification
Product:	High performance dual band 2x2 802.11n indoor AP
Model No.:	WF-122
FCC Classification:	FCC Class B Digital Device (JBP)
FCC Rule Part(s):	FCC Part 15 Subpart B
Test Procedure(s):	ANSI C63.4: 2009
Test Date:	De. 02 ~ 05, 2014

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2009. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date
1407RSU00303	Rev. 01	Initial report	12-07-2014

CONTENTS

§2.1033 General Information

Applicant:	CIG Shanghai Co., Ltd.
Applicant Address:	F/23, No.889 yishan Road, Xuhui District, Shanghai
Manufacturer:	The First Branch of CIG Shanghai Co. Ltd.
Manufacturer Address:	2-3/FL, Building D, 2059 Duhui Road, Minhang District, Shanghai
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT FCC Registration No.:	809388
Model No.:	WF-122
FCC ID:	SFK-WF122
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	FCC Class B Digital Device (JBP)

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

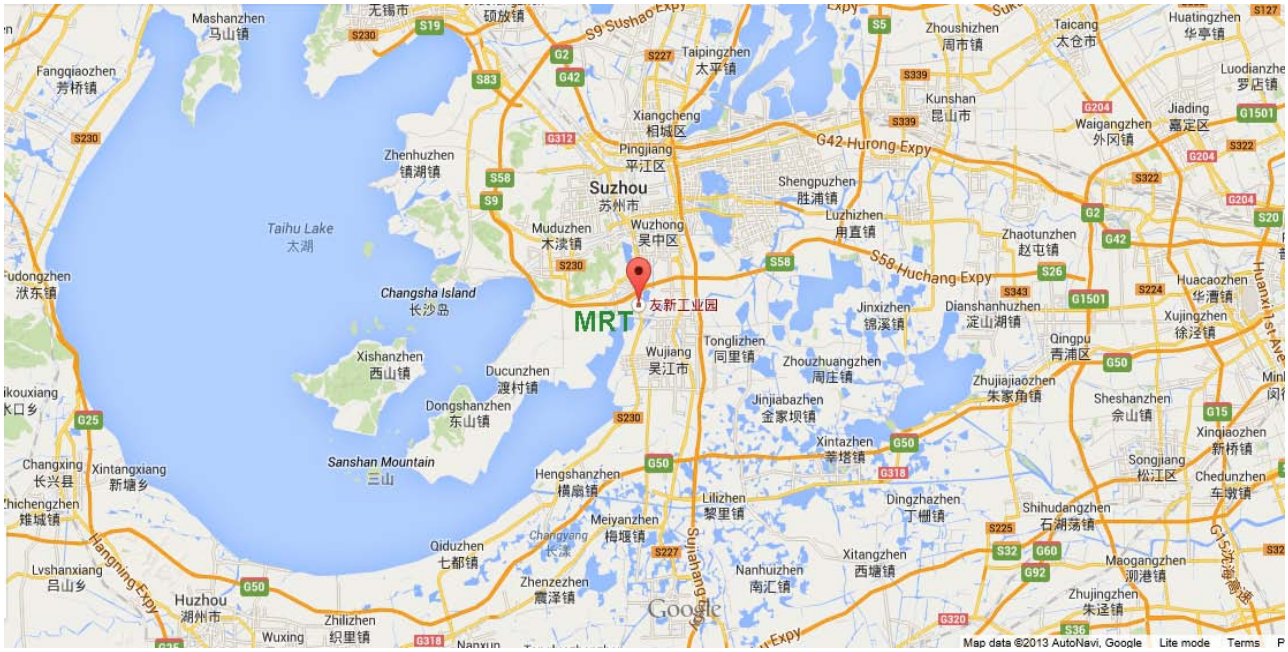
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	High performance dual band 2x2 802.11n indoor AP
Model No.	WF-122
Frequency Range	**For 2.4G Band:** 802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz **For 5.0G Band:** For 802.11a/n-HT20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40: 5190~5230MHz, 5755~5795MHz
Type of Modulation	802.11b: DSSS 802.11g/a/n: OFDM
Adapter	M/N: RD1201000-C5-HOG P/N: JQ-HOG2-1210-21R5 Input: 100-240V ~ 50/60Hz 0.6A MAX OUTPUT: 12Vdc, 1A

2.2. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	T_X Paths	Directional Gain (dBi)	
			Non Beam Forming	Beam Forming
PCB Antenna	2.4	2	1.95	--
	5.2	2	1.67	4.67
	5.8	2	1.87	4.87

Note:

1. Transmit at 2.4GHz & 5GHz support two antennas.
2. The EUT supports Beam Forming mode, and the Beam Forming support 802.11a/n/ac.

2.3. Device Capabilities

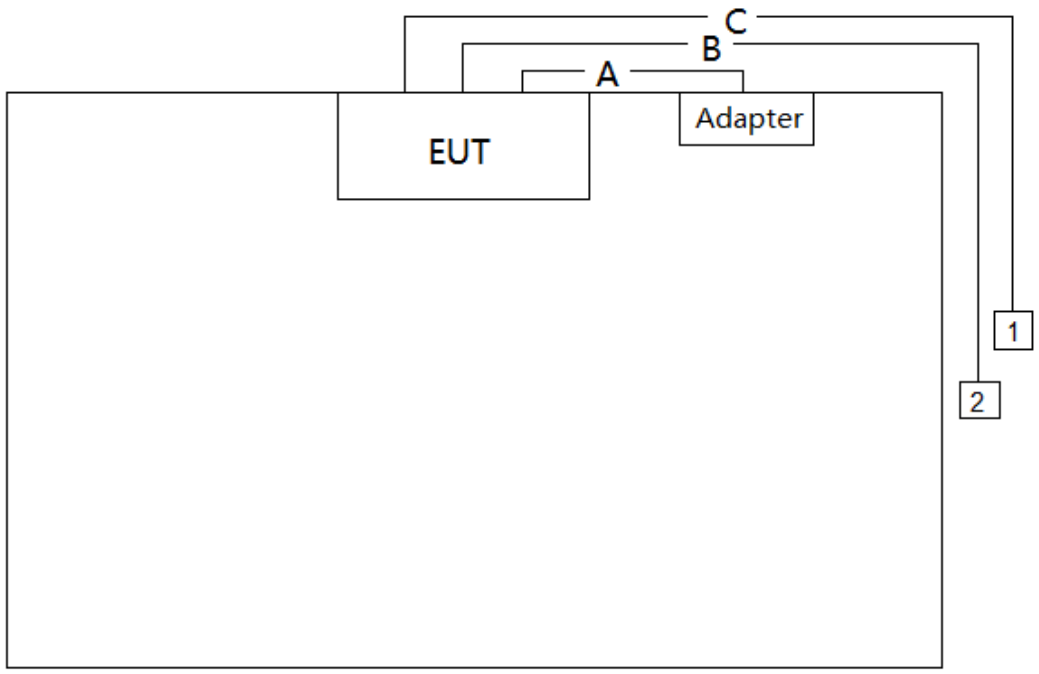
This device contains the following capabilities:

2.4G&5GHz (DTS/UNII)

2.4. Test Configuration

The High performance dual band 2x2 802.11n indoor AP FCC ID: SFK-WF122 was tested per the guidance FCC Part 15 Subpart B: 2013 and ANSI C63.4: 2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

Connection Diagram



Signal Cable Type		Signal cable Description
A	Power Cable	Non-shielding, 1m
B	LAN Cable	Non-shielding, >10m
C	Telecom Cable	Non-shielding, >10m

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	E430c	MP-4CFX213/10	Non-Shielded, 1.8m
2	Telephone	TCL	HCD868(79) TSD	N/A	N/A

2.5. Test Software

Not applicable.

2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.7. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2009) was used in the measurement of the **High performance dual band 2x2 802.11n indoor AP FCC ID: SFK-WF122.**

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150 kHz to 30 MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. Line conducted emissions test results are shown in Section 6.2.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30 MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30 MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB beam-width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2015/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2015/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2015/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2015/11/18
EMI Test Receiver	R&S	ESR7	101209	1 year	2015/11/08
Preamplifier	MRT	AP01G18	1310002	1 year	2015/12/13
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2015/11/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2015/11/08
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2015/11/15

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: ±3.5dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~1GHz: 4.07dB 1GHz~18GHz: 4.16 dB Vertical: 30MHz~1GHz: 4.18 dB 1GHz~18GHz: 4.76 dB

6. TEST RESULT

6.1. Summary

Product Name: **High performance dual band 2x2 802.11n indoor AP**

FCC ID: **SFK-WF122**

FCC Classification: **FCC Class B Digital Device (JBP)**

Test Mode: **Communication with Notebook**

FCC Part Section(s)	Test Description	Test Result
15.107	Conducted Emissions	Pass
15.109	Radiated Emissions	Pass

6.2. Conducted Emission Measurement

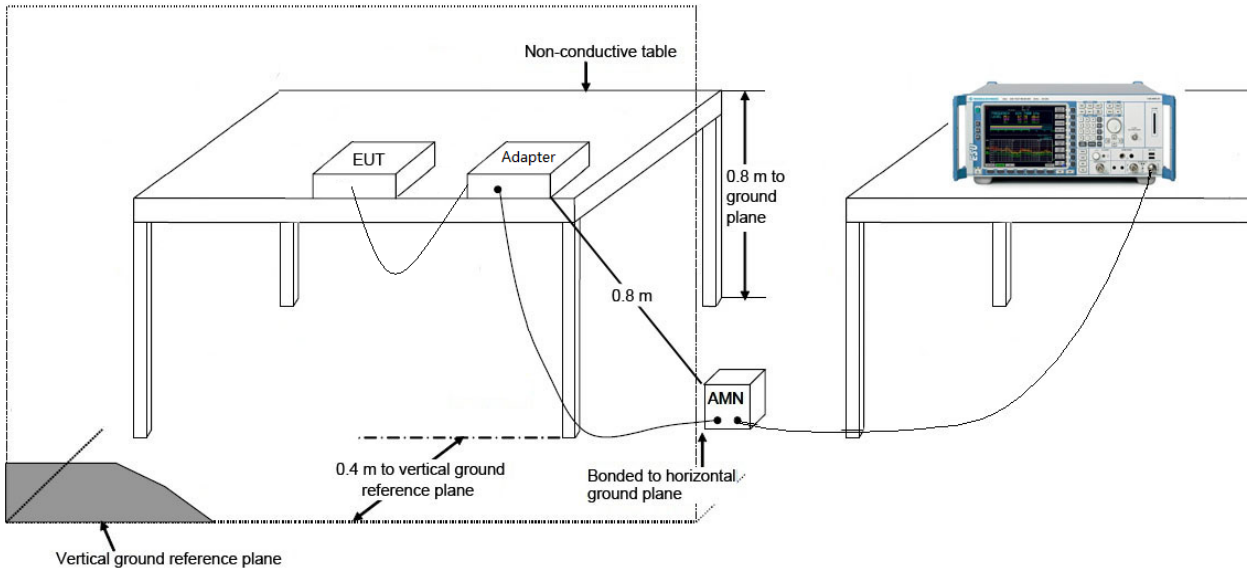
6.2.1. Test Limit

FCC Part 15.107 Limits		
Frequency (MHz)	QP (dBμV)	AV (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

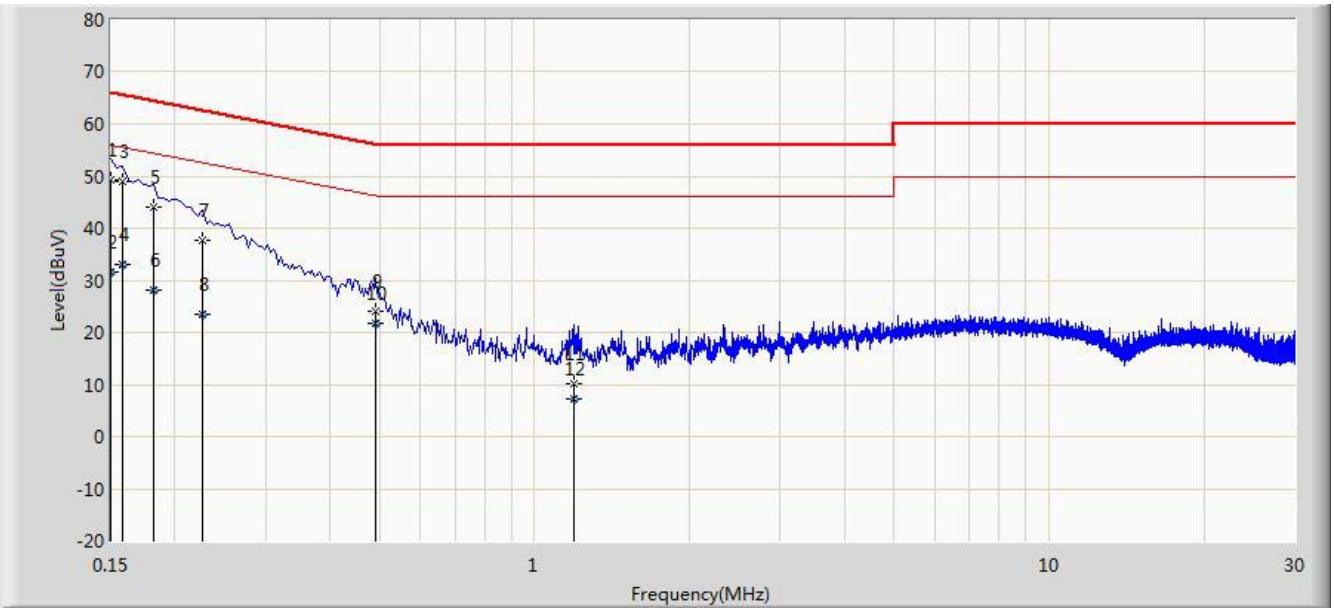
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result

Site: SR2	Time: 2014/12/05 - 14:55
Limit: FCC_Part15.107_CE_AC Power_ClassB	Engineer: Knight Lu
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	

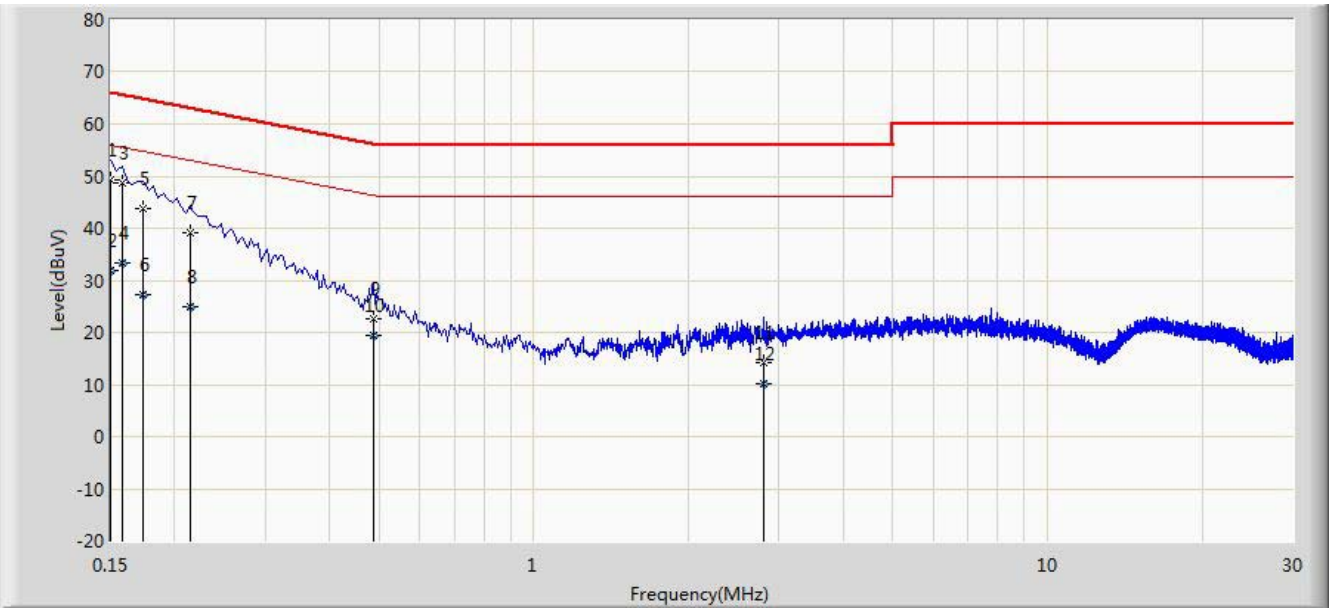


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.150	49.173	38.005	-16.827	66.000	11.168	QP
2			0.150	31.557	20.389	-24.443	56.000	11.168	AV
3		*	0.158	49.007	38.696	-16.561	65.568	10.311	QP
4			0.158	33.064	22.753	-22.504	55.568	10.311	AV
5			0.182	44.073	34.025	-20.321	64.394	10.048	QP
6			0.182	28.067	18.019	-26.327	54.394	10.048	AV
7			0.226	37.699	27.755	-24.896	62.595	9.944	QP
8			0.226	23.473	13.529	-29.122	52.595	9.944	AV
9			0.490	24.029	13.871	-32.138	56.168	10.158	QP
10			0.490	21.881	11.723	-24.287	46.168	10.158	AV
11			1.190	10.193	0.291	-45.807	56.000	9.902	QP
12			1.190	7.203	-2.699	-38.797	46.000	9.902	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SR2	Time: 2014/12/05 - 15:01
Limit: FCC_Part15.107_CE_AC Power_ClassB	Engineer: Knight Lu
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		*	0.150	49.236	38.093	-16.764	66.000	11.142	QP
2			0.150	31.949	20.807	-24.051	56.000	11.142	AV
3			0.158	48.756	38.466	-16.812	65.568	10.290	QP
4			0.158	33.334	23.044	-22.235	55.568	10.290	AV
5			0.174	43.754	33.698	-21.013	64.767	10.057	QP
6			0.174	27.322	17.265	-27.445	54.767	10.057	AV
7			0.214	39.251	29.263	-23.798	63.049	9.988	QP
8			0.214	24.794	14.806	-28.255	53.049	9.988	AV
9			0.486	22.662	12.485	-33.574	56.236	10.176	QP
10			0.486	19.404	9.228	-26.832	46.236	10.176	AV
11			2.802	14.219	4.367	-41.781	56.000	9.852	QP
12			2.802	10.271	0.419	-35.729	46.000	9.852	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

6.3. Radiated Emission Measurement

6.3.1. Test Limit

FCC Part 15.109 Limits		
Frequency (MHz)	Distance (m)	Level (dBμV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

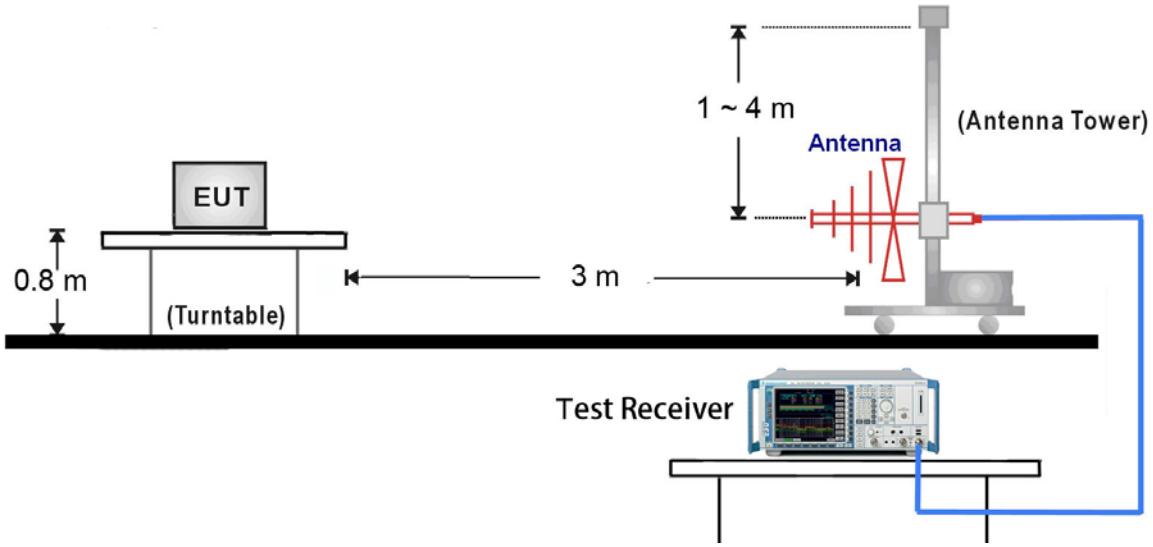
Note 1: The lower limit shall apply at the transition frequency.

Note 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.

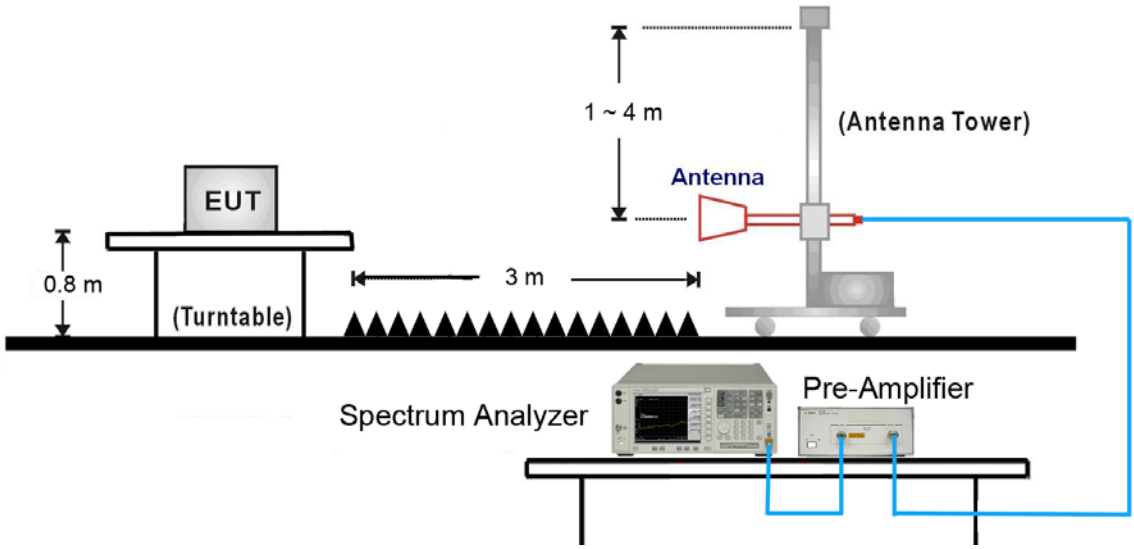
Note 3: E field strength (dBμV/m) = 20 log E field strength (uV/m)

6.3.2. Test Setup

30MHz ~ 1GHz Test Setup:

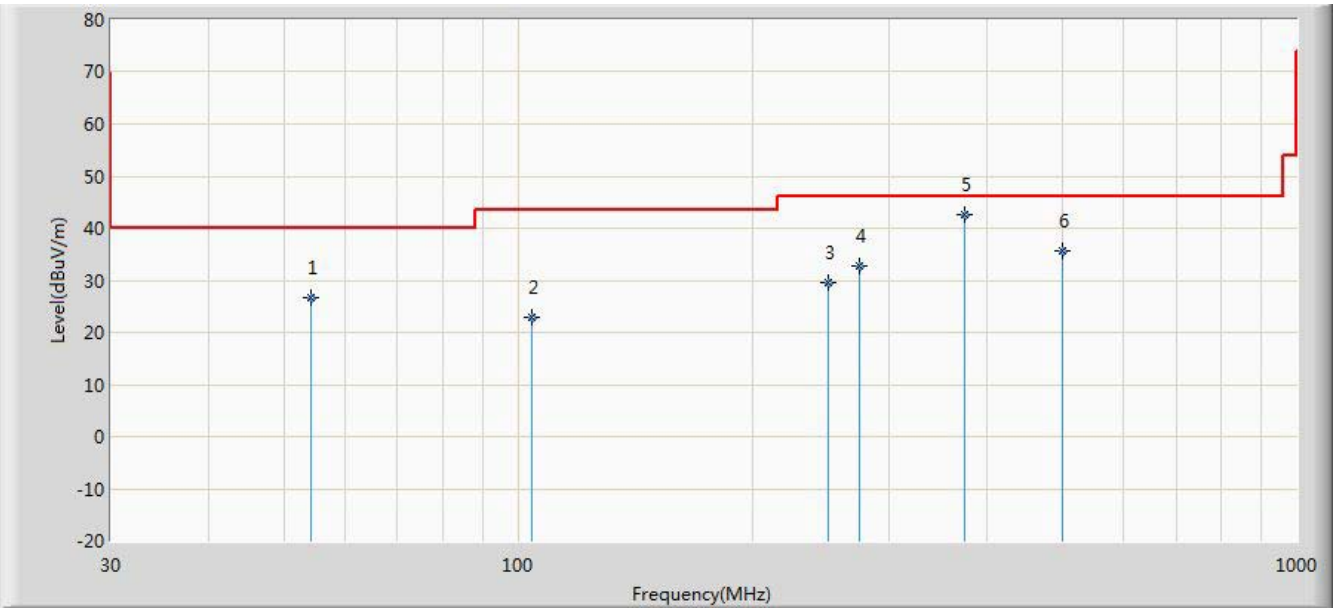


1GHz ~18GHz Test Setup:



6.3.3. Test Result

Site: AC1	Time: 2014/12/03 - 15:48
Limit: FCC_Part15.109_RE(3m)	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Horizontal
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	

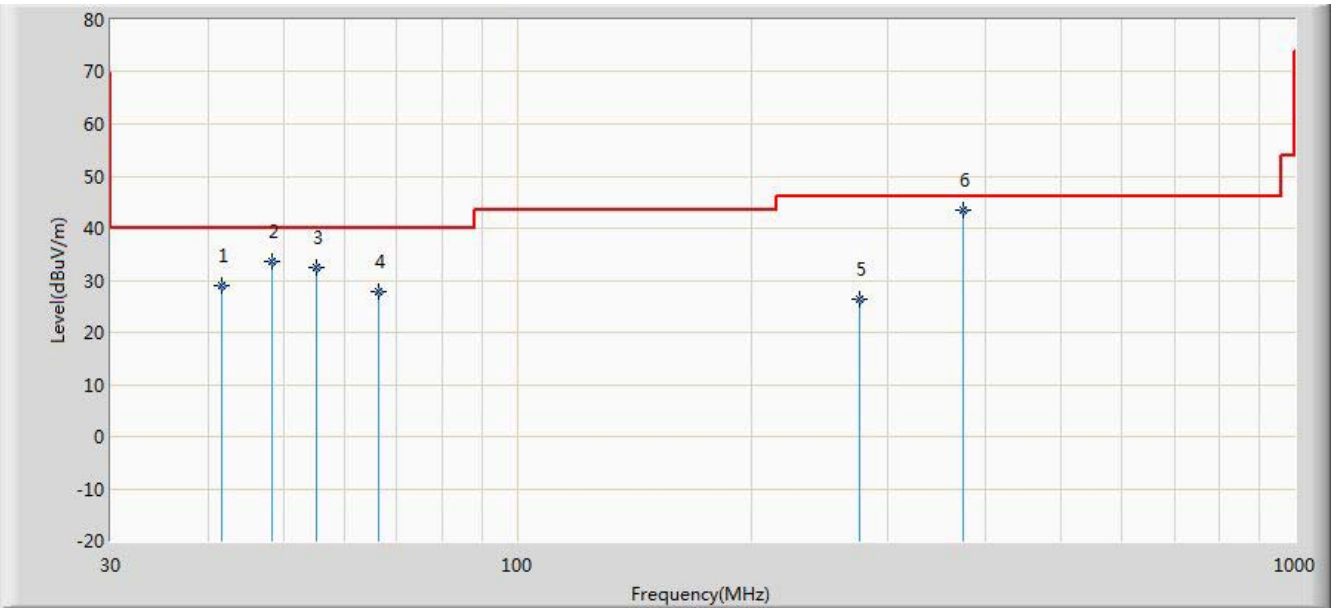


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			54.232	26.663	12.035	-13.337	40.000	14.628	QP
2			104.205	22.906	10.032	-20.594	43.500	12.875	QP
3			250.022	29.665	16.385	-16.335	46.000	13.279	QP
4			275.020	32.628	18.922	-13.372	46.000	13.707	QP
5		*	375.020	42.486	26.754	-3.514	46.000	15.732	QP
6			500.022	35.664	17.922	-10.336	46.000	17.742	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2014/12/03 - 15:48
Limit: FCC_Part15.109_RE(3m)	Engineer: Roy Cheng
Probe: VULB9162_0.03-8GHz	Polarity: Vertical
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	

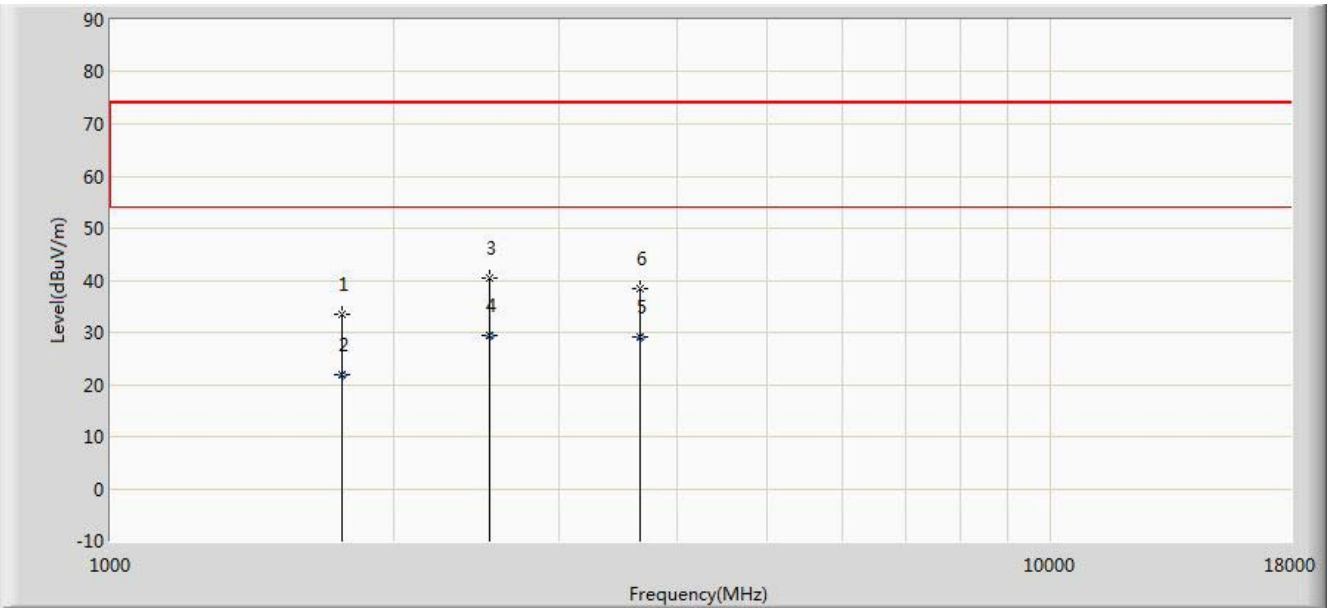


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			41.640	28.890	14.866	-11.110	40.000	14.024	QP
2			48.430	33.768	18.985	-6.232	40.000	14.783	QP
3			55.232	32.605	18.140	-7.395	40.000	14.465	QP
4			66.360	27.857	15.968	-12.143	40.000	11.889	QP
5			275.200	26.368	12.658	-19.632	46.000	13.710	QP
6		*	375.021	43.577	27.845	-2.423	46.000	15.732	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

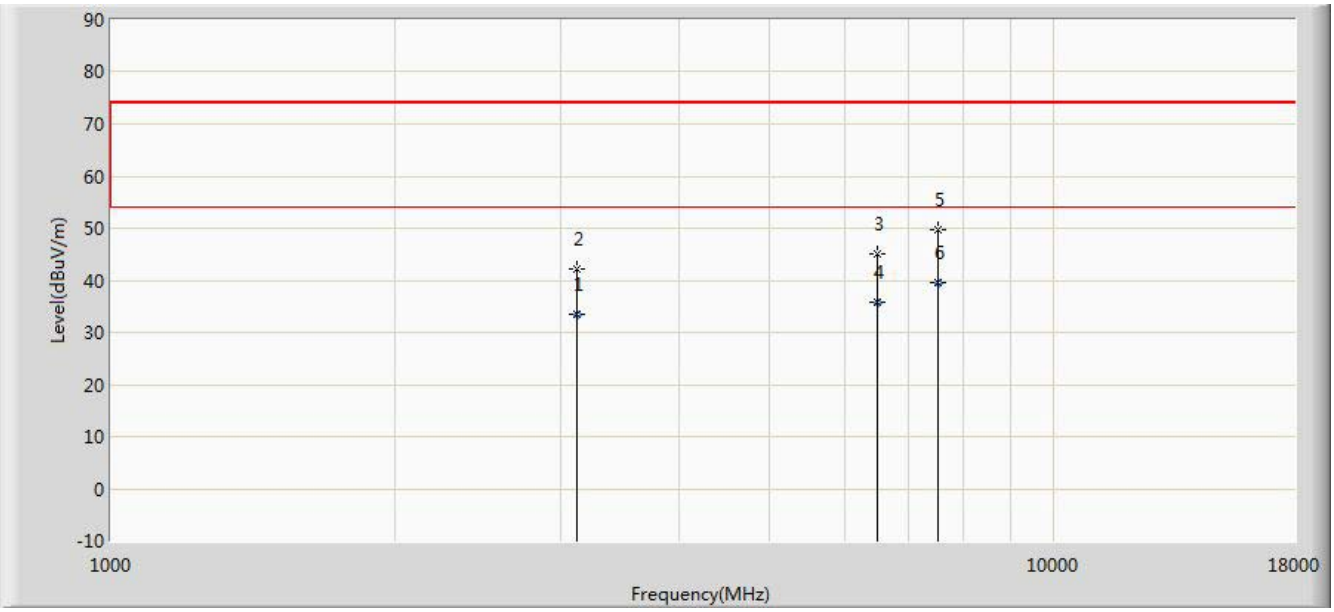
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2014/12/03 - 15:49
Limit: FCC_Part15.109_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			1765.000	33.547	33.997	-40.453	74.000	-0.450	PK
2			1765.020	21.753	22.203	-32.247	54.000	-0.450	AV
3			2530.000	40.335	37.635	-33.665	74.000	2.700	PK
4		*	2530.022	29.399	26.699	-24.601	54.000	2.700	AV
5			3660.255	29.120	25.140	-24.880	54.000	3.979	AV
6			3660.500	38.431	34.451	-35.569	74.000	3.980	PK

Site: AC1	Time: 2014/12/03 - 15:49
Limit: FCC_Part15.109_RE(3m)	Engineer: Roy Cheng
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: High performance dual band 2x2 802.11n indoor AP	Power: AC 120V/60Hz
Test Mode: Communication with Notebook	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			3116.355	33.513	29.985	-20.487	54.000	3.527	AV
2			3116.500	42.250	38.722	-31.750	74.000	3.527	PK
3			6491.000	45.023	34.231	-28.977	74.000	10.792	PK
4			6491.020	35.828	25.035	-18.172	54.000	10.793	AV
5			7545.000	49.720	35.057	-24.280	74.000	14.663	PK
6		*	7545.320	39.619	24.956	-14.381	54.000	14.664	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **High performance dual band 2x2 802.11n indoor AP FCC ID: SFK-WF122** has been tested to comply with the requirements specified in §15.107 and §15.109 of the FCC Rules.

The End