

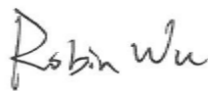



MEASUREMENT REPORT

FCC Part 15B

FCC ID:	SFK-WF0613A
APPLICANT:	CIG Shanghai Co., Ltd

Application Type: Certification
Product: 2.4GHz&5GHz 3x3 Outdoor AP
Model No.: WF-0613A
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: November 26 ~ 28, 2013

Reviewed By : 
(Supervisor: Robin Wu)

Approved By : 
(Manager: Marlin Chen)

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.

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Revision History

Report No.	Version	Description	Issue Date
1311RSU00103	Rev. 01	Initial report	11-29-2013

§2.1033 General Information

Applicant:	CIG Shanghai Co., Ltd
Applicant Address:	F/23, No.889 yishan Road, Xuhui District, Shanghai
Manufacturer:	CIG Shanghai Co., Ltd
Manufacturer Address:	F/23, No.889 yishan Road, Xuhui 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 Registration No.:	809388
Model Name:	WF-0613A
FCC ID:	SFK-WF0613A
Test Device Serial No.:	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
FCC Classification:	FCC Class B Digital Device (JBP)
Date(s) of Test:	November 26 ~ 28, 2013
Test Report S/N:	1311RSU00103

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	2.4GHz&5GHz 3x3 Outdoor AP
Model No.	WF-0613A
Frequency Range	802.11b/g/n: 2412 ~ 2462 MHz 802.11a/n: 5180 ~ 5240MHz, 5745 ~ 5825MHz
Type of Modulation	802.11b: DSSS 802.11a/g/n: OFDM

2.2. Description of Available Antennas

Frequency Band (GHz)	Antenna Gain (dBi)			Uncorrelated Gain (dBi)
	Chain A	Chain B	Chain C	
2.4	13	13	13	13
5.2	15	15	15	15
5.8	15	15	15	15

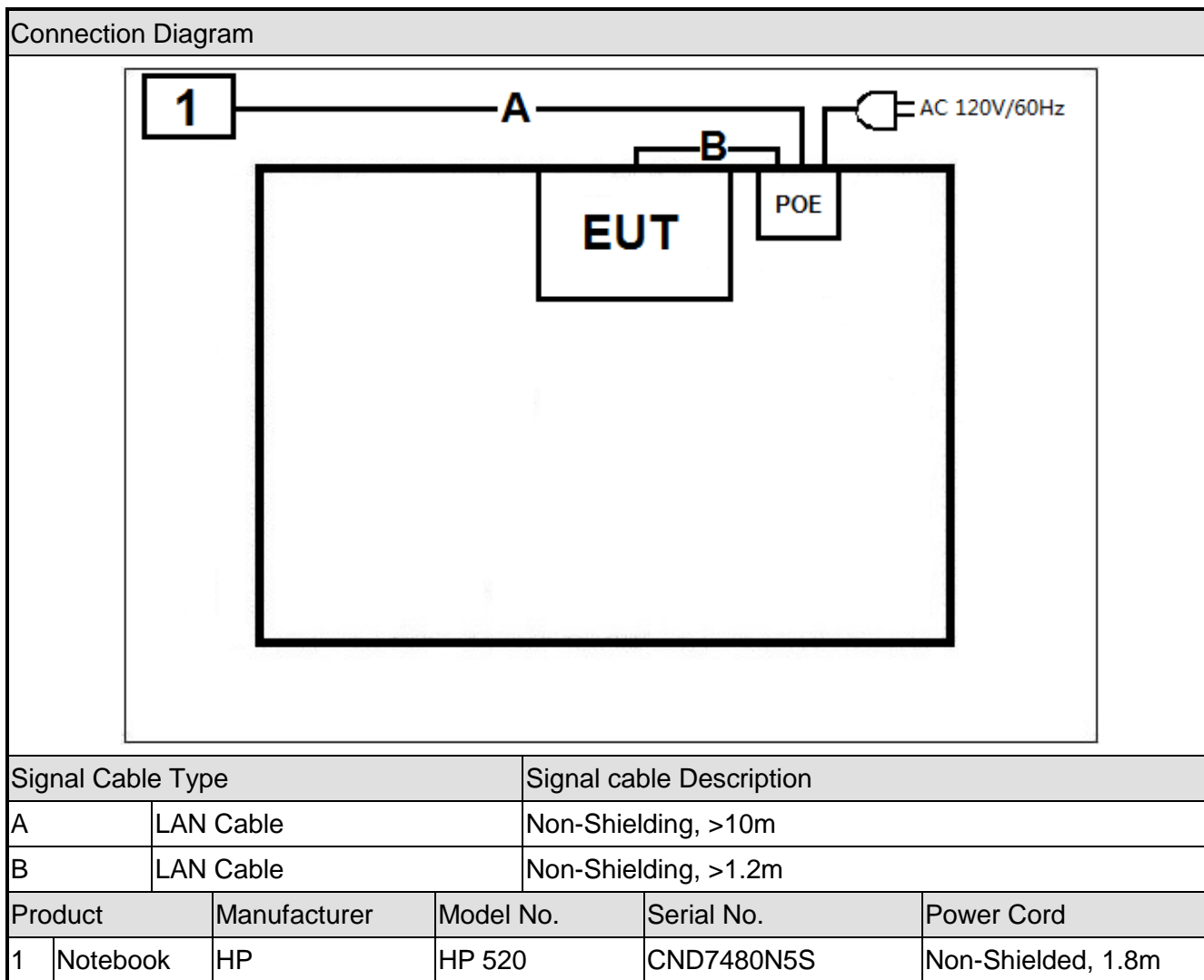
2.3. Device Capabilities

This device contains the following capabilities:

802.11a/b/g/n WLAN (DTS/NII)

2.4. Test Configuration

The 2.4GHz&5GHz 3x3 Outdoor AP FCC ID: SFK-WF0613A 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.



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 **2.4GHz&5GHz 3x3 Outdoor AP FCC ID: SFK-WF0613A**.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285. 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 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. 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 is 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 30MHz 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. 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, clock speed, mode of operation or video resolution, 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 Beamwidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
EMI Test Receiver	R&S	ESR7	101209	2014/07/16
Two-Line V-Network	R&S	ENV216	101683	2014/07/21
Two-Line V-Network	R&S	ENV216	101683	2014/07/21
Temperature/Humidity Meter	Anymetre	TH101B	SR2-01	2014/08/15

Radiated Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	2014/08/15
EMI Test Receiver	R&S	ESR7	101209	2014/07/16
Preamplifier	MRT	AP01G18	1310002	2014/10/08
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	2014/09/12
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	2014/09/12
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	2014/08/15

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 $k = 2$.

Conducted Emissions Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 150kHz~30MHz: $\pm 2.04\text{dB}$
Radiated Emissions Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz ~ 1GHz: $\pm 3.5\text{dB}$ 1GHz ~ 40GHz: $\pm 3.7\text{dB}$

6. TEST RESULT

6.1. Summary

Company Name: CIG Shanghai Co., Ltd
FCC ID: SFK-WF0613A
FCC Classification: FCC Class B Digital Device (JBP)
Test Mode: Normal Operation

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

6.2. Conducted Emission Measurement

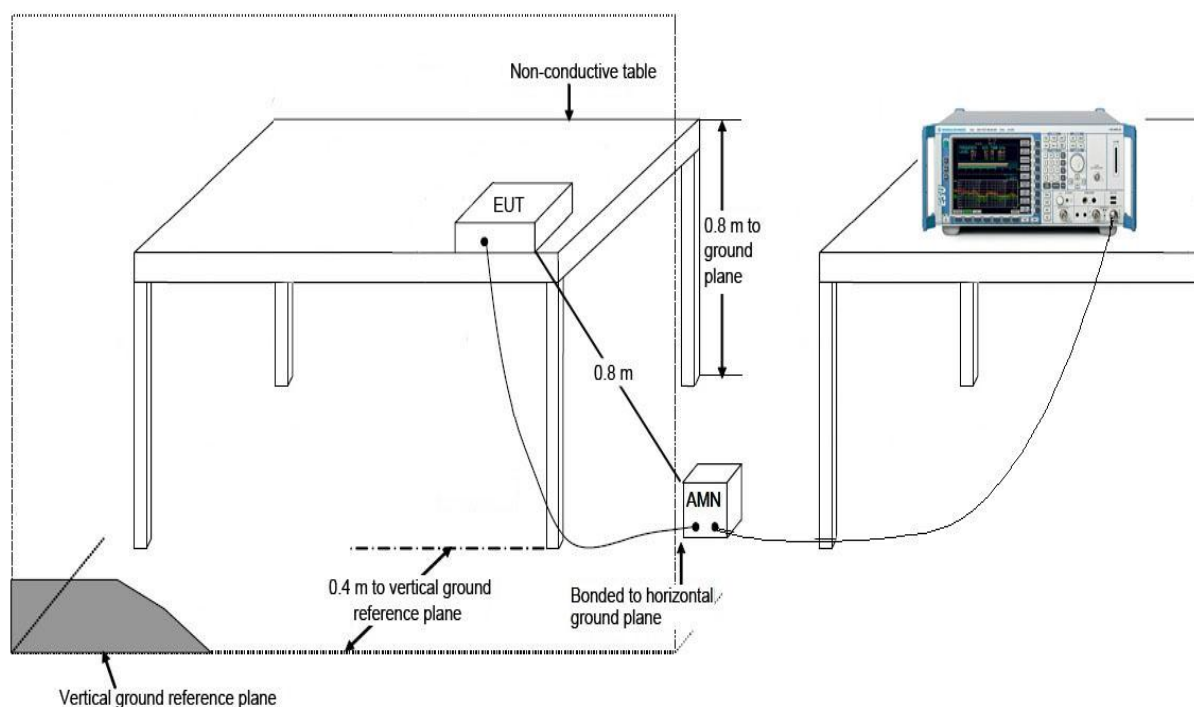
6.2.1. Test Limit

FCC Part 15.107 Limits		
Frequency (MHz)	QP (dB μ V)	AV (dB μ V)
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.

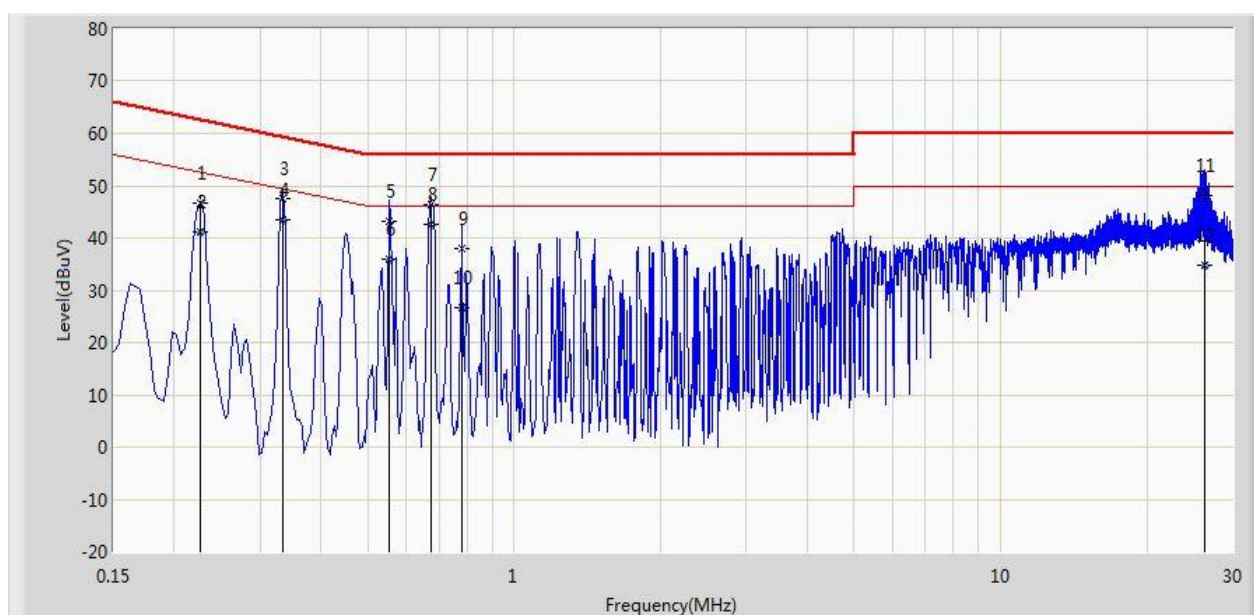
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



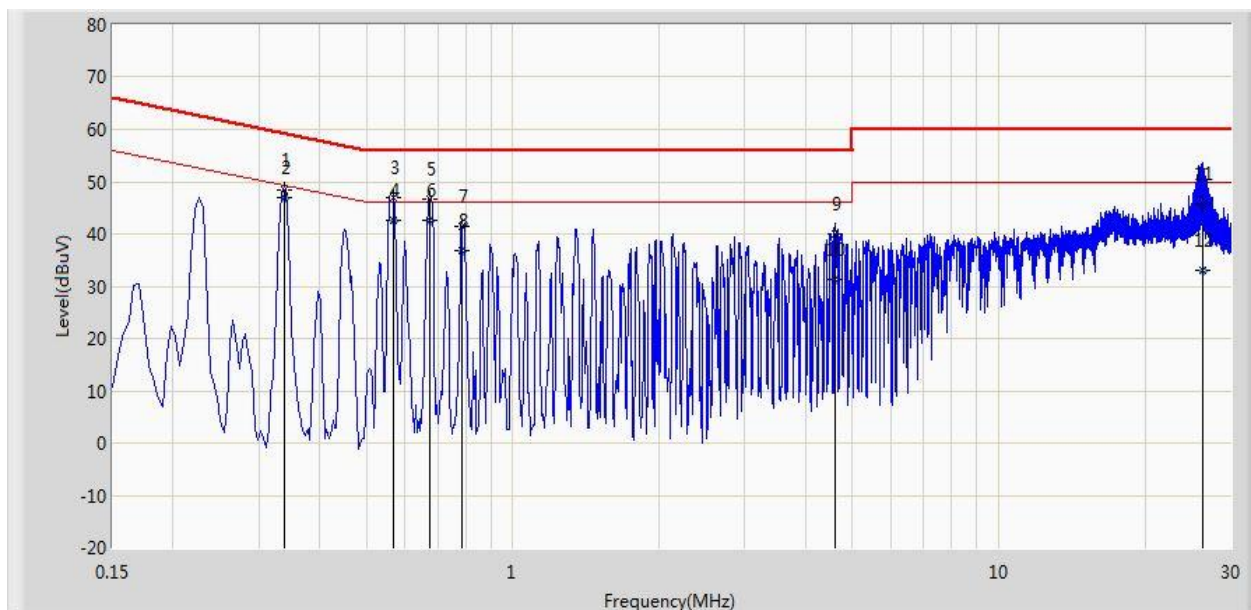
6.2.3. Test Result of Conducted Emissions

Test Engineer:	Roy Cheng	Test Data:	2013/11/27 - 11:07
Test Site:	SR2	Power:	AC 120V/60Hz
Limit:	FCC_Part15.107	Polarity:	Line
AMN:	LISN_101683-FILTER ON	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



Freq (MHz)	Level (dBμV)	Reading (dBμV)	Detector	Factor	Limit (dBμV)	Margin (dB)
0.226	46.658	36.714	QP	9.944	62.595	-15.938
0.226	41.154	31.210	AV	9.944	52.595	-11.441
0.334	47.430	37.398	QP	10.031	59.351	-11.921
0.334	43.557	33.526	AV	10.031	49.351	-5.794
0.554	43.123	32.985	QP	10.139	56.000	-12.877
0.554	35.809	25.670	AV	10.139	46.000	-10.191
0.674	46.448	36.371	QP	10.077	56.000	-9.552
0.674	42.667	32.591	AV	10.077	46.000	-3.333
0.778	37.968	27.946	QP	10.022	56.000	-18.032
0.778	26.760	16.737	AV	10.022	46.000	-19.240
26.230	48.032	37.802	QP	10.230	60.000	-11.968
26.230	34.914	24.684	AV	10.230	50.000	-15.086

Test Engineer:	Roy Cheng	Test Data:	2013/11/27 - 11:23
Test Site:	SR2	Power:	AC 120V/60Hz
Limit:	FCC_Part15.107	Polarity:	Neutral
AMN:	LISN_101683-FILTER ON	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



Freq (MHz)	Level (dBµV)	Reading (dBµV)	Detector	Factor	Limit (dBµV)	Margin (dB)
0.338	48.374	38.308	QP	10.066	59.252	-10.878
0.338	46.882	36.816	AV	10.066	49.252	-2.371
0.566	46.941	36.791	QP	10.150	56.000	-9.059
0.566	42.614	32.464	AV	10.150	46.000	-3.386
0.674	46.523	36.434	QP	10.090	56.000	-9.477
0.674	42.739	32.649	AV	10.090	46.000	-3.261
0.786	41.568	31.541	QP	10.027	56.000	-14.432
0.786	36.818	26.791	AV	10.027	46.000	-9.182
4.590	40.004	29.999	QP	10.005	56.000	-15.996
4.590	31.282	21.276	AV	10.005	46.000	-14.718
26.198	45.752	35.413	QP	10.339	60.000	-14.248
26.198	32.920	22.581	AV	10.339	50.000	-17.080

6.3. Radiated Emission Measurement

6.3.1. Test Limit

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

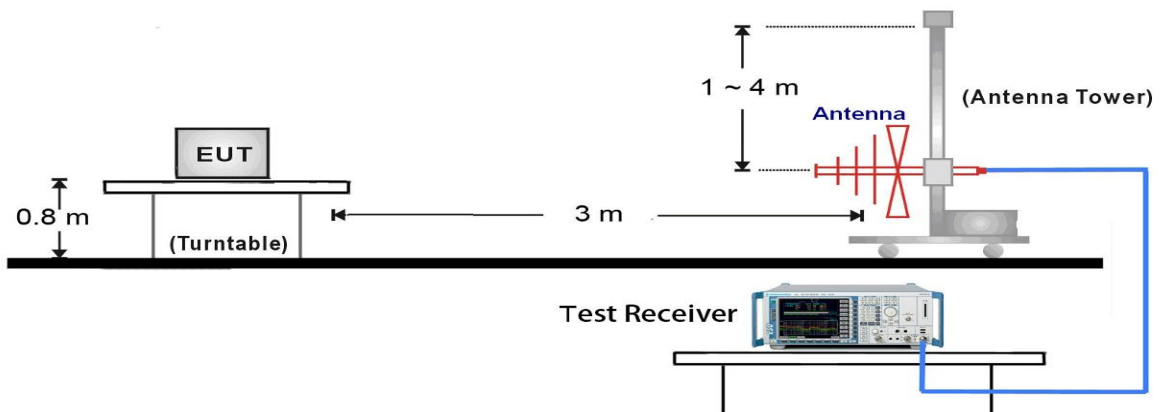
Note 1: The lower limit shall apply at the transition frequency.

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.

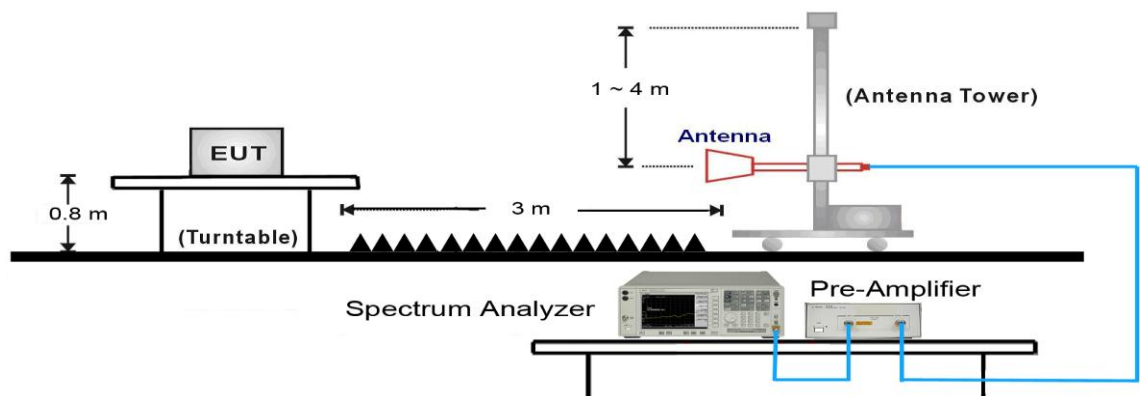
Note 3: E field strength (dB μ V/m) = 20 log E field strength (uV/m)

6.3.2. Test Setup

30MHz ~ 1GHz Test Setup:

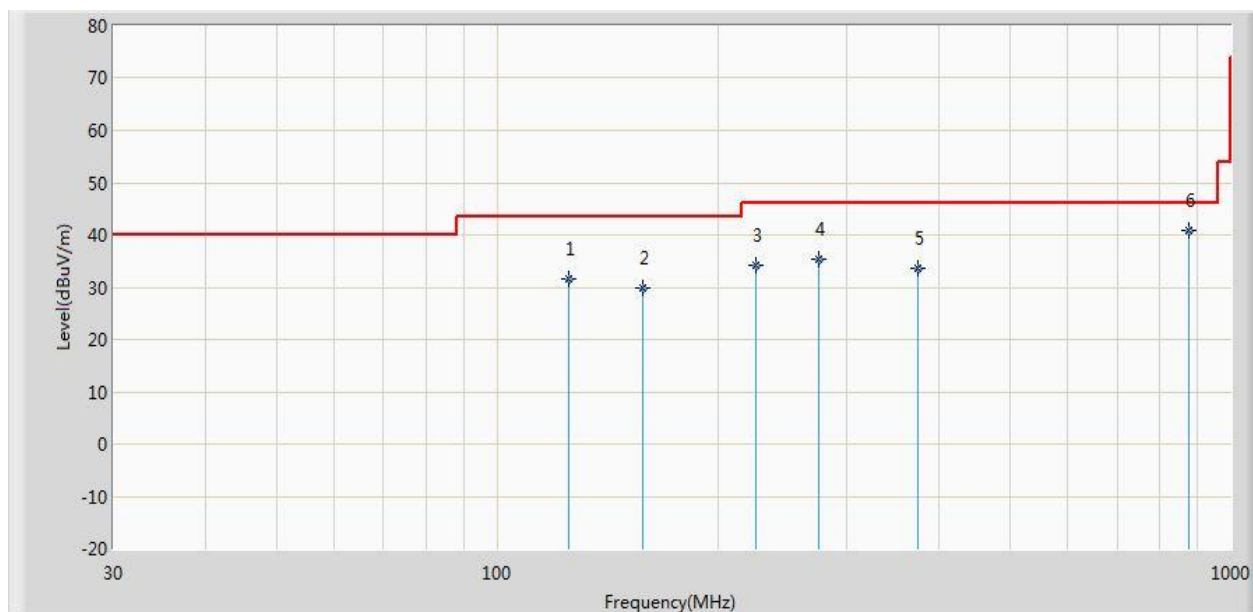


1GHz ~18GHz Test Setup:



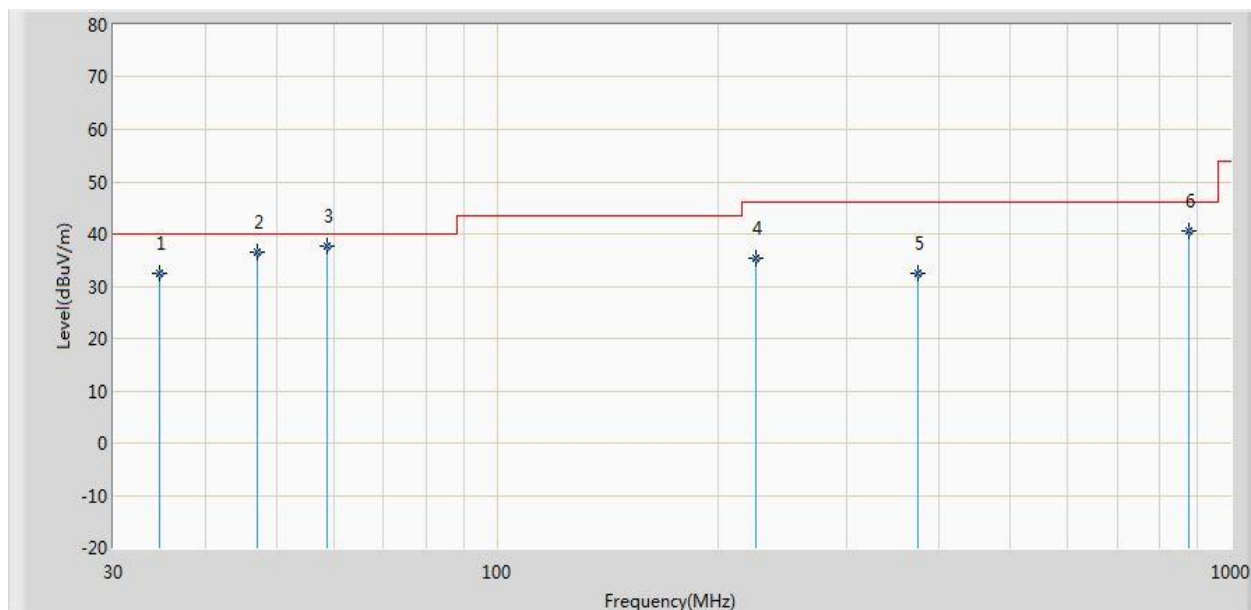
6.3.3. Test Result of Radiated Emissions

Test Engineer:	Roy Cheng	Test Data:	2013-11-27- 14:40:51
Test Site:	AC1	Power:	AC 120V/60Hz
Limit:	FCC_Part15.109	Polarity:	Horizontal
Antenna:	VULB_9162	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



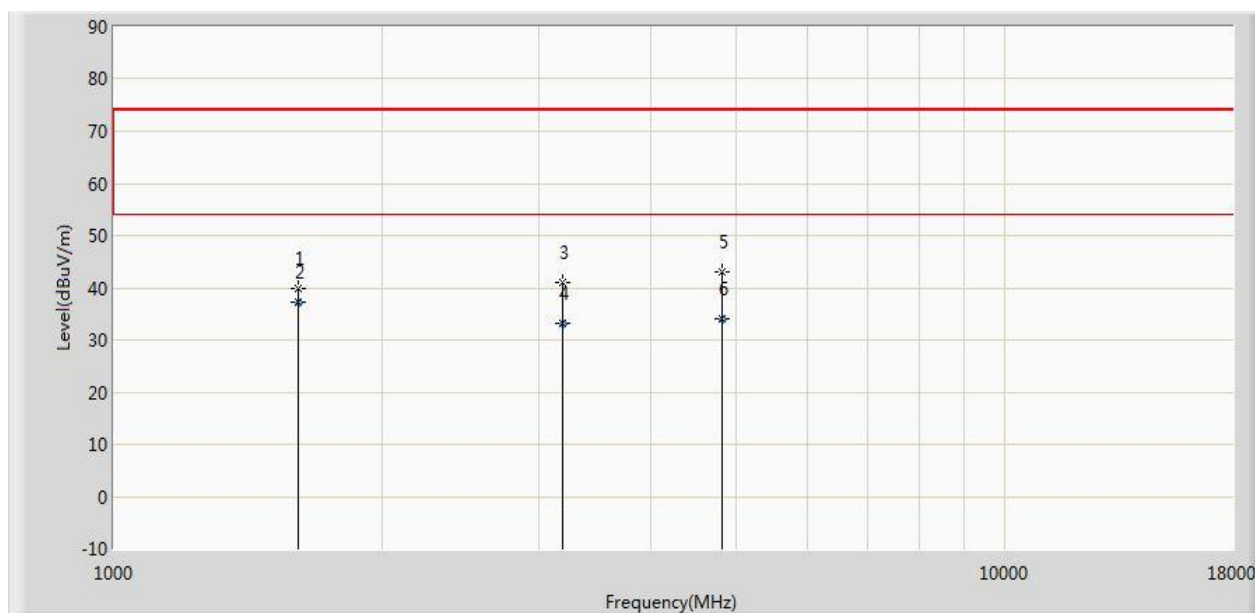
Freq (MHz)	Level (dBμV/m)	Reading (dBμV)	Detector	Factor (dB)	Limit (dBμV/m)	Margin (dB)
125.000	31.476	16.520	QP	14.956	43.500	-12.024
158.050	29.737	16.650	QP	13.087	43.500	-13.763
225.000	34.070	21.550	QP	12.520	46.000	-11.930
275.020	35.362	20.540	QP	14.822	46.000	-10.638
375.000	33.740	16.840	QP	16.900	46.000	-12.260
875.010	40.839	16.684	QP	24.155	46.000	-5.161

Test Engineer:	Roy Cheng	Test Data:	2013-11-27- 14:43:44
Test Site:	AC1	Power:	AC 120V/60Hz
Limit:	FCC_Part15.109	Polarity:	Vertical
Antenna:	VULB_9162	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



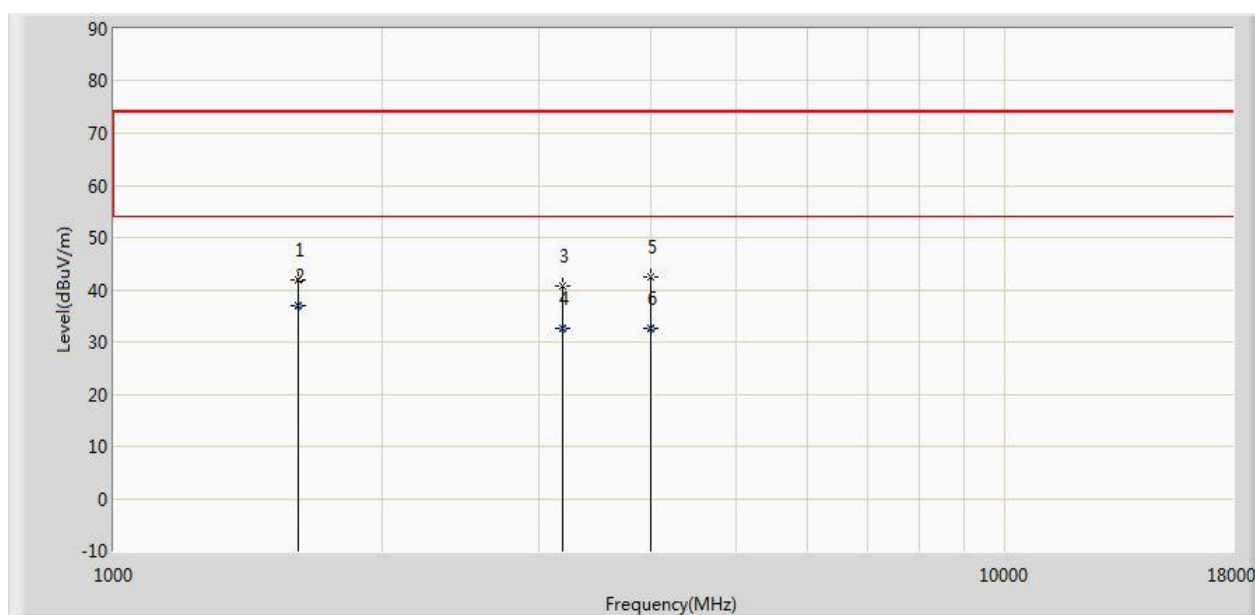
Freq (MHz)	Level (dB μ V/m)	Reading (dB μ V)	Detector	Factor (dB)	Limit (dB μ V/m)	Margin (dB)
34.600	32.397	15.021	QP	17.376	40.000	-7.603
47.021	36.446	27.244	QP	9.202	40.000	-3.554
58.736	37.541	29.863	QP	7.678	40.000	-2.459
225.010	35.356	22.934	QP	12.422	46.000	-10.644
375.010	32.456	15.665	QP	16.791	46.000	-13.544
875.012	40.618	16.866	QP	23.752	46.000	-5.382

Test Engineer:	Roy Cheng	Test Data:	2013-11-28- 20:40:51
Test Site:	AC1	Power:	AC 120V/60Hz
Limit:	FCC_Part15.109	Polarity:	Horizontal
Antenna:	BBHA9120D_1-18GHz	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



Freq (MHz)	Level (dB μ V/m)	Reading (dB μ V)	Detector	Factor (dB)	Limit (dB μ V/m)	Margin (dB)
1612.000	39.823	40.902	PK	-1.079	74.000	-34.177
1612.534	37.234	38.312	AV	-1.079	54.000	-16.766
3193.000	41.017	37.461	PK	3.556	74.000	-32.983
3194.254	33.123	29.571	AV	3.552	54.000	-20.877
4808.000	42.980	36.611	PK	6.369	74.000	-31.020
4808.350	34.052	27.682	AV	6.370	54.000	-19.948

Test Engineer:	Roy Cheng	Test Data:	2013-11-28- 20:43:44
Test Site:	AC1	Power:	AC 120V/60Hz
Limit:	FCC_Part15.109	Polarity:	Vertical
Antenna:	BBHA9120D_1-18GHz	EUT Model:	2.4GHz&5GHz 3x3 Outdoor AP
Test Mode:	Normal Operation		



Freq (MHz)	Level (dB μ V/m)	Reading (dB μ V)	Detector	Factor (dB)	Limit (dB μ V/m)	Margin (dB)
1612.000	41.855	42.934	PK	-1.079	74.000	-32.145
1612.350	37.036	38.114	AV	-1.079	54.000	-16.964
3193.000	40.606	37.050	PK	3.556	74.000	-33.394
3193.550	32.517	28.963	AV	3.554	54.000	-21.483
4009.000	42.388	37.901	PK	4.487	74.000	-31.612
4009.641	32.592	28.104	AV	4.488	54.000	-21.408

7. CONCLUSION

The data collected relate only the item(s) tested and show that the **2.4GHz&5GHz 3x3 Outdoor AP FCC ID: SFK-WF0613A** has been tested to comply with the requirements specified in §15.107 and §15.109 of the FCC Rules.

The End