

FCC Test Report

APPLICANT : Ubiquiti Networks
EQUIPMENT : m POWER
BRAND NAME : Ubiquiti Networks
MODEL NAME : mPower
FCC ID : SWX-MPOWERP
STANDARD : FCC 47 CFR FCC Part 15 Subpart B
CLASSIFICATION : Certification

The product was received on Nov. 14, 2012 and completely tested on Nov. 20, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC2N1443	Rev. 01	Initial issue of report	Dec. 26, 2012



SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.107	7.2.4	AC Conducted Emission	< 15.107 limits < RSS-Gen table 2 limits	PASS	Under limit 8.30 dB at 0.702 MHz
3.2	15.109	7.2.3.2	Radiated Emission	< 15.109 limits or < RSS-Gen table 1 limits (Section 6)	PASS	Under limit 2.92 dB at 399.400 MHz for Quasi-Peak



1. General Description

1.1. Applicant

Ubiquiti Networks
2580 Orchard Parkway San Jose, CA 95131

1.2. Manufacturer

Nanning FuGui Precision Industrial Co., LTD.
No. 18, Zhongbu Road, Nanning New& High-Tech Industrial Development Zone, Guangxi

1.3. Feature of Equipment Under Test

Product Feature	
Equipment	m POWER
Brand Name	Ubiquiti Networks
Model Name	mPower
FCC ID	SWX-MPOWERP
EUT supports Radios application	WLAN 11bgn
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Product Specification subjective to this standard	
Tx Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz
Rx Frequency Range	802.11b/g/n: 2412 MHz ~ 2462 MHz
Antenna Type	WLAN : Monopole Antenna
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4. Test Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH06HY	722060/4086B-1

1.5. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B
- ANSI C63.4-2003
- IC RSS-Gen Issue 3

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

1.6. Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	LCD Monitor	Dell	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
5.	Table Lamp	Sampo	LH-K704TL	N/A	N/A	Unshielded, 1.8 m
6.	Lamp A	N/A	N/A	N/A	N/A	Unshielded, 1.8 m
7.	Lamp B	N/A	N/A	N/A	N/A	Unshielded, 1.8 m

2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction (150 KHz to 30 MHz), radiation (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following tables are showing the test modes as the worst cases and recorded in this report.

Item	EUT Configuration	Test Condition	
		EMI AC	EMI RE
1.	Charging Mode (EUT with adapter)	☒	☒

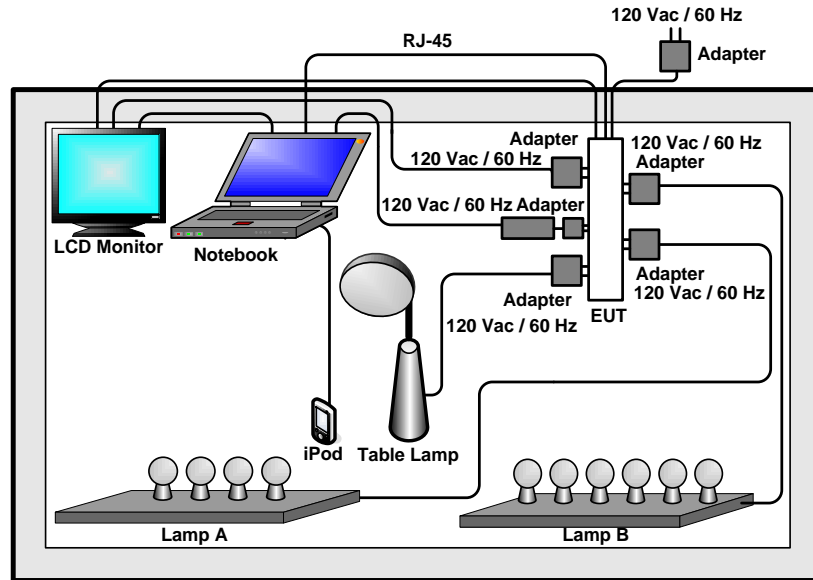
Abbreviations:

- EMI AC: AC conducted emissions
- EMI RE : EUT radiated emissions

Test Items	EUT Configure Mode	Function Type
AC Conducted Emission	1	Mode 1 : WLAN Idle + Lan Link + TC
Radiated Emissions < 1GHz	1	Mode 1 : WLAN Idle + Lan Link + TC
Radiated Emissions ≥ 1GHz	1	Mode 1 : WLAN Idle + Lan Link + TC

Remark: TC stands for Test Configuration, and consist Lamp A, Lamp B, Notebook, LCD Monitor, Table Lamp.

2.2. Connection Diagram of Test System



2.3. Test Software

The EUT links with Notebook via WLAN function.

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

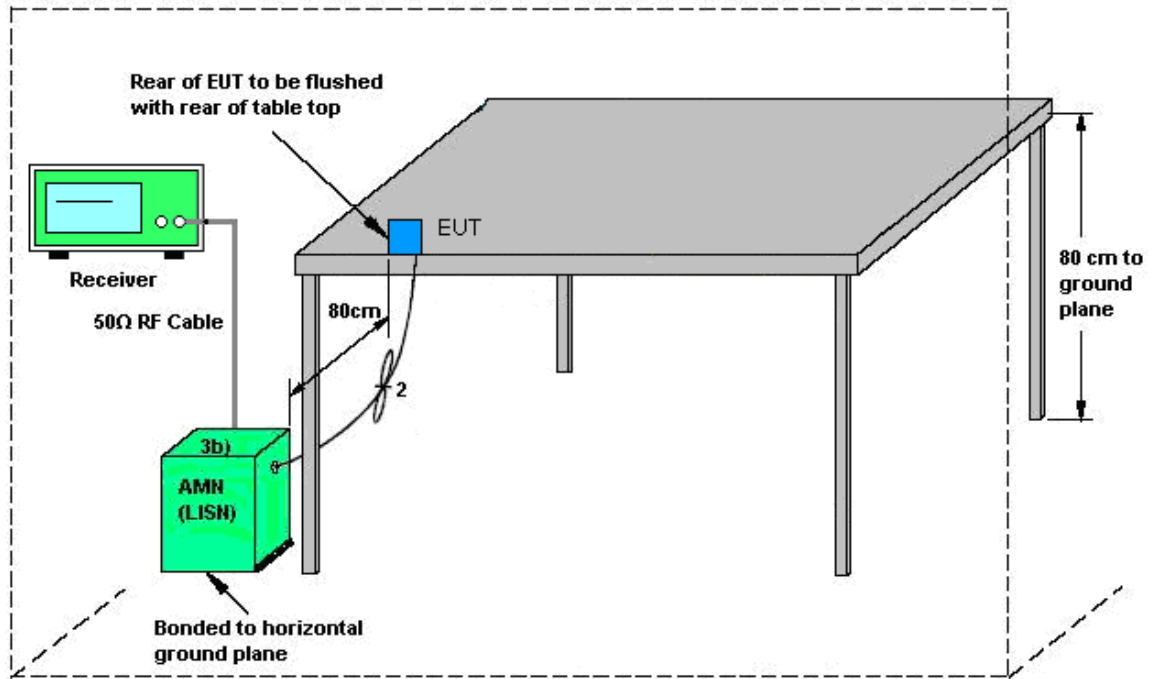
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 KHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

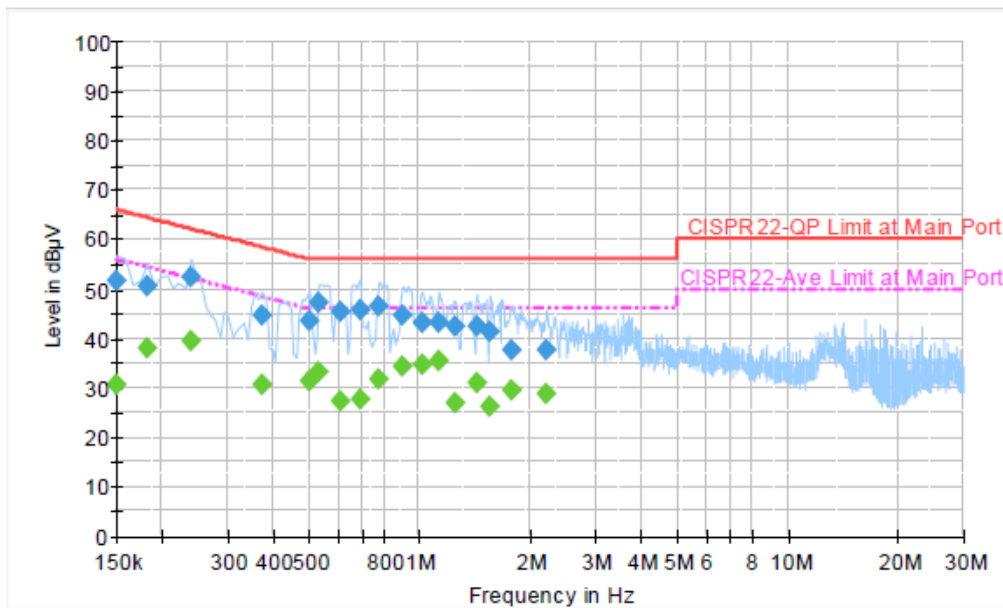
3.1.4 Test Setup



AMN = Artificial mains network (LISN)
 AE = Associated equipment
 EUT = Equipment under test
 ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Idle + Lan Link + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

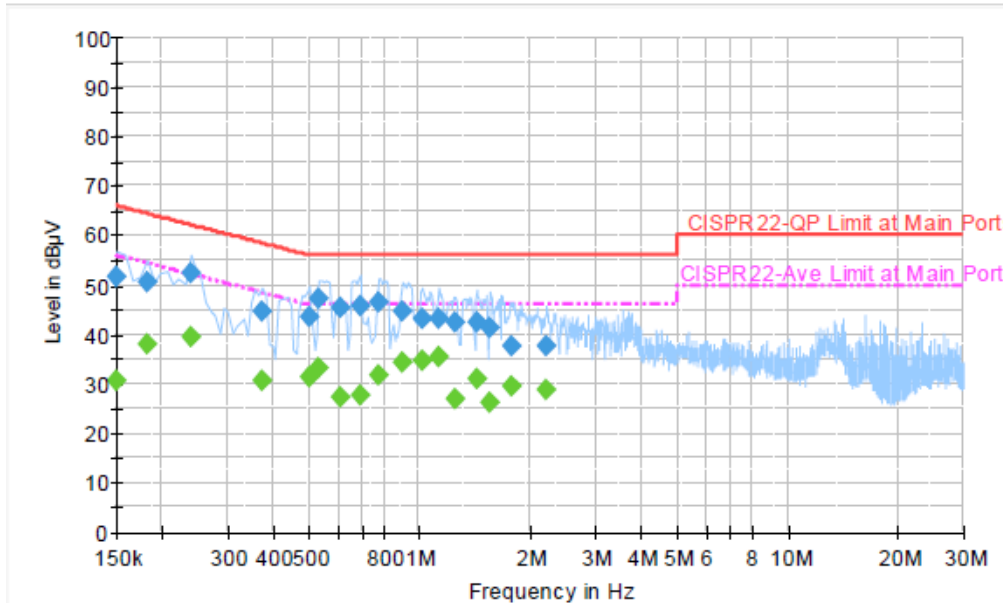


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	51.6	Off	L1	19.4	14.4	66.0
0.182000	50.5	Off	L1	19.4	13.9	64.4
0.238000	52.2	Off	L1	19.5	10.0	62.2
0.374000	44.7	Off	L1	19.4	13.7	58.4
0.502000	43.5	Off	L1	19.3	12.5	56.0
0.534000	47.2	Off	L1	19.4	8.8	56.0
0.606000	45.3	Off	L1	19.4	10.7	56.0
0.694000	45.7	Off	L1	19.5	10.3	56.0
0.774000	46.3	Off	L1	19.5	9.7	56.0
0.902000	44.7	Off	L1	19.4	11.3	56.0
1.014000	43.2	Off	L1	19.5	12.8	56.0
1.126000	43.0	Off	L1	19.4	13.0	56.0
1.254000	42.6	Off	L1	19.5	13.4	56.0
1.430000	42.3	Off	L1	19.5	13.7	56.0
1.542000	41.2	Off	L1	19.4	14.8	56.0
1.782000	37.8	Off	L1	19.5	18.2	56.0
2.214000	37.5	Off	L1	19.6	18.5	56.0



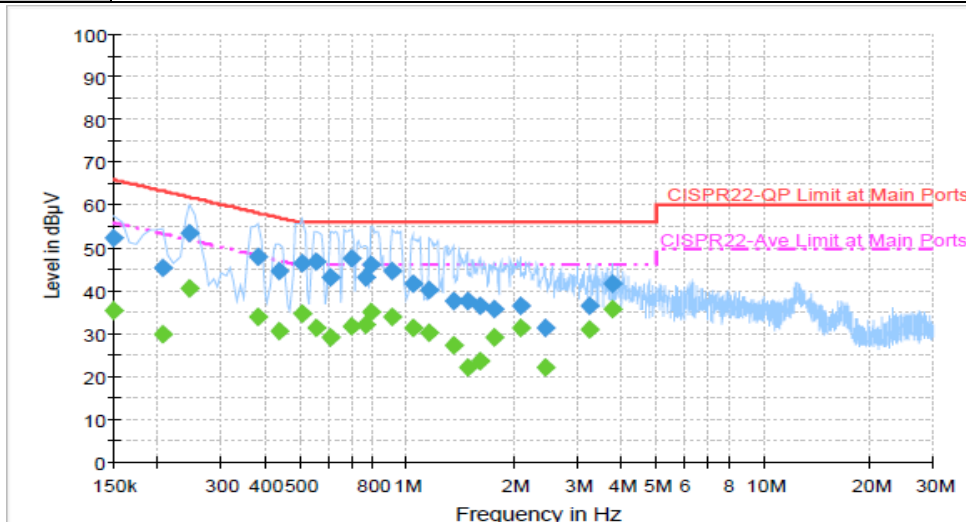
Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Idle + Lan Link + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	30.8	Off	L1	19.4	25.2	56.0
0.182000	37.9	Off	L1	19.4	16.5	54.4
0.238000	39.6	Off	L1	19.5	12.6	52.2
0.374000	30.8	Off	L1	19.4	17.6	48.4
0.502000	31.5	Off	L1	19.3	14.5	46.0
0.534000	33.2	Off	L1	19.4	12.8	46.0
0.606000	27.2	Off	L1	19.4	18.8	46.0
0.694000	27.6	Off	L1	19.5	18.4	46.0
0.774000	31.9	Off	L1	19.5	14.1	46.0
0.902000	34.5	Off	L1	19.4	11.5	46.0
1.014000	34.8	Off	L1	19.5	11.2	46.0
1.126000	35.3	Off	L1	19.4	10.7	46.0
1.254000	26.9	Off	L1	19.5	19.1	46.0
1.430000	30.9	Off	L1	19.5	15.1	46.0
1.542000	26.3	Off	L1	19.4	19.7	46.0
1.782000	29.6	Off	L1	19.5	16.4	46.0
2.214000	28.6	Off	L1	19.6	17.4	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Idle + Lan Link + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

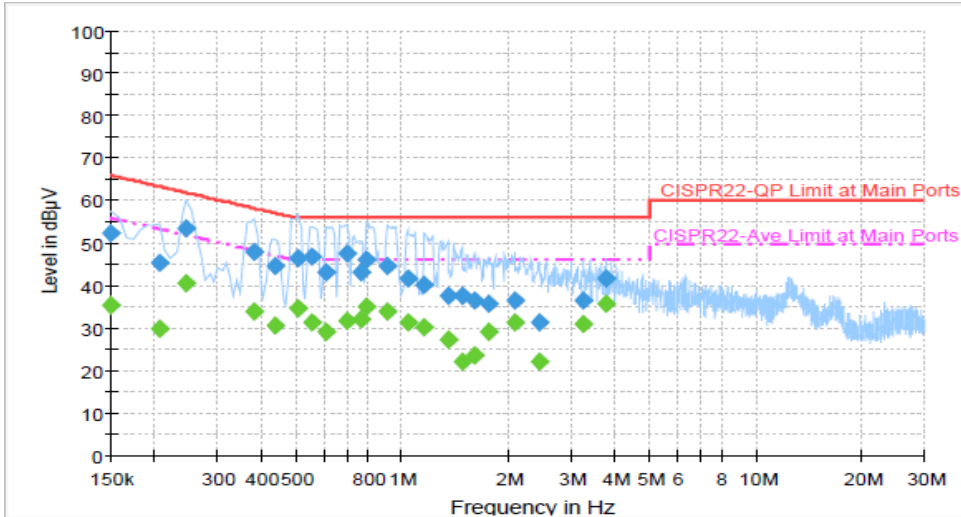


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	52.5	Off	N	19.4	13.5	66.0
0.206000	45.4	Off	N	19.4	18.0	63.4
0.246000	53.4	Off	N	19.4	8.5	61.9
0.382000	48.0	Off	N	19.4	10.2	58.2
0.438000	44.6	Off	N	19.4	12.5	57.1
0.510000	46.5	Off	N	19.4	9.5	56.0
0.558000	46.9	Off	N	19.4	9.1	56.0
0.606000	43.4	Off	N	19.4	12.6	56.0
0.702000	47.7	Off	N	19.5	8.3	56.0
0.766000	43.2	Off	N	19.5	12.8	56.0
0.790000	46.0	Off	N	19.5	10.0	56.0
0.910000	44.8	Off	N	19.4	11.2	56.0
1.038000	41.7	Off	N	19.5	14.3	56.0
1.158000	40.1	Off	N	19.5	15.9	56.0
1.350000	37.6	Off	N	19.5	18.4	56.0
1.478000	37.8	Off	N	19.4	18.2	56.0
1.598000	36.4	Off	N	19.5	19.6	56.0
1.758000	35.8	Off	N	19.5	20.2	56.0
2.086000	36.7	Off	N	19.6	19.3	56.0
2.446000	31.5	Off	N	19.7	24.5	56.0
3.262000	36.5	Off	N	19.7	19.5	56.0
3.782000	41.6	Off	N	19.6	14.4	56.0



Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Idle + Lan Link + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	35.3	Off	N	19.4	20.7	56.0
0.206000	30.0	Off	N	19.4	23.4	53.4
0.246000	40.7	Off	N	19.4	11.2	51.9
0.382000	33.9	Off	N	19.4	14.3	48.2
0.438000	30.8	Off	N	19.4	16.3	47.1
0.510000	34.8	Off	N	19.4	11.2	46.0
0.558000	31.2	Off	N	19.4	14.8	46.0
0.606000	29.0	Off	N	19.4	17.0	46.0
0.702000	31.9	Off	N	19.5	14.1	46.0
0.766000	32.2	Off	N	19.5	13.8	46.0
0.790000	35.0	Off	N	19.5	11.0	46.0
0.910000	34.1	Off	N	19.4	11.9	46.0
1.038000	31.5	Off	N	19.5	14.5	46.0
1.158000	30.1	Off	N	19.5	15.9	46.0
1.350000	27.5	Off	N	19.5	18.5	46.0
1.478000	22.0	Off	N	19.4	24.0	46.0
1.598000	23.7	Off	N	19.5	22.3	46.0
1.758000	29.0	Off	N	19.5	17.0	46.0
2.086000	31.4	Off	N	19.6	14.6	46.0
2.446000	22.1	Off	N	19.7	23.9	46.0
3.262000	31.1	Off	N	19.7	14.9	46.0
3.782000	35.9	Off	N	19.6	10.1	46.0

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

See list of measuring instruments of this test report.

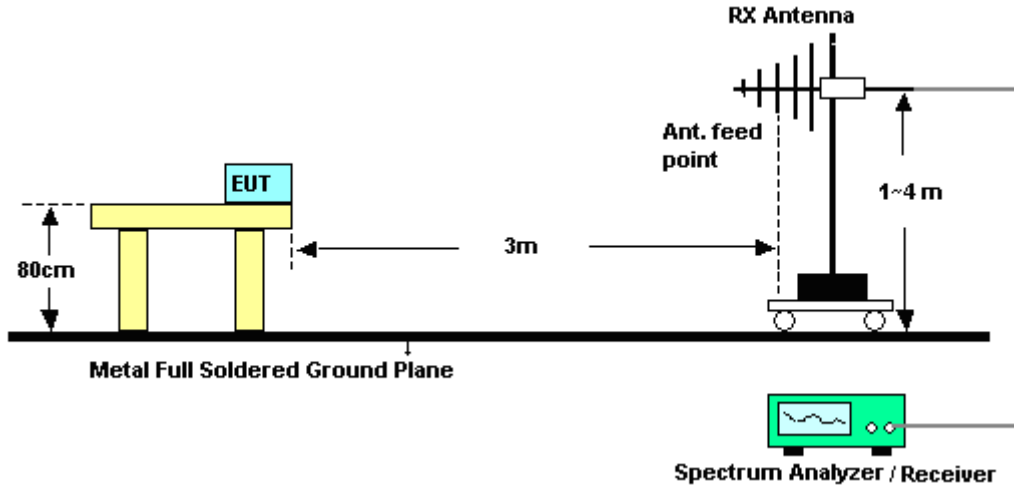


3.2.3. Test Procedures

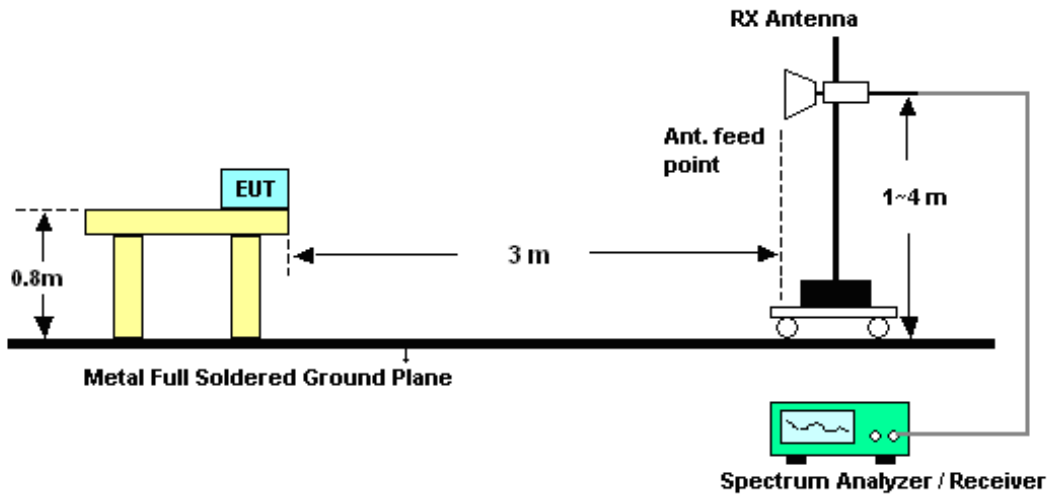
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBuV/m) = 20 log Emission level (uV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



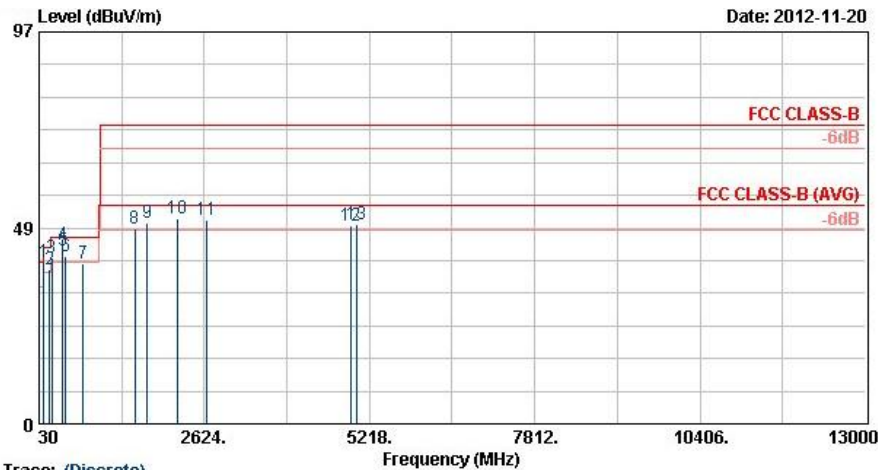
For radiated emissions above 1GHz





3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Hayden Wu	Relative Humidity :	45~47%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	WLAN Idle + Lan Link + TC		



Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B HF-ANT_120801 HORIZONTAL
 Power : 120Vac/60Hz
 Mode : Mode 1

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBUV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	
			dB	dBUV/m	dBUV	dB/m	dB	dB	cm	deg	
1 @	108.84	40.13	-3.37	43.50	58.32	11.94	1.15	31.28	---	---	Peak
2 !	199.83	38.36	-5.14	43.50	59.25	9.30	1.54	31.73	---	---	Peak
3 !	231.69	41.10	-4.90	46.00	60.15	10.34	1.66	31.05	---	---	Peak
4 @	399.40	44.29	-1.71	46.00	58.21	15.70	2.19	31.81	100	82	Peak
5 @	399.40	43.08	-2.92	46.00	57.00	15.70	2.19	31.81	100	82	QP
6 !	449.80	41.49	-4.51	46.00	53.47	16.80	2.31	31.09	---	---	Peak
7	724.90	39.70	-6.30	46.00	48.80	19.34	2.97	31.41	---	---	Peak
8	1532.00	48.38	-25.62	74.00	69.44	28.07	4.79	53.91	---	---	Peak
9	1726.00	49.86	-24.14	74.00	68.91	29.67	5.23	53.95	---	---	Peak
10	2196.00	50.73	-23.27	74.00	66.45	32.07	6.18	53.96	100	0	Peak
11	2666.00	50.41	-23.59	74.00	64.72	32.70	6.92	53.93	---	---	Peak
12	4924.00	49.17	-24.83	74.00	59.92	34.83	10.21	55.78	---	---	Peak
13	5028.00	49.33	-24.67	74.00	60.18	34.82	10.26	55.94	---	---	Peak



Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Hayden Wu	Relative Humidity :	45~47%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WLAN Idle + Lan Link + TC		



Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B HF-ANT_120801 VERTICAL
 Power : 120Vac/60Hz
 Mode : Mode 1

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.54	32.18	-7.82	40.00	44.85	18.22	0.65	31.54	---	---	Peak
2 @	117.48	40.04	-3.46	43.50	57.66	12.46	1.20	31.28	100	235	Peak
3	231.69	38.97	-7.03	46.00	58.02	10.34	1.66	31.05	---	---	Peak
4	399.40	36.54	-9.46	46.00	50.46	15.70	2.19	31.81	---	---	Peak
5 !	724.90	42.28	-3.72	46.00	51.38	19.34	2.97	31.41	---	---	Peak
6	875.40	39.93	-6.07	46.00	47.29	20.42	3.30	31.08	---	---	Peak
7	1956.00	47.13	-26.87	74.00	63.93	31.40	5.79	53.99	---	---	Peak
8	2068.00	48.34	-25.66	74.00	64.46	31.90	5.97	53.99	---	---	Peak
9	2222.00	50.00	-24.00	74.00	65.63	32.11	6.21	53.96	---	---	Peak
10	2318.00	50.12	-23.88	74.00	65.45	32.26	6.35	53.93	100	0	Peak
11	2934.00	46.82	-27.18	74.00	60.29	33.02	7.49	53.99	---	---	Peak
12	3214.00	46.98	-27.02	74.00	60.14	33.10	7.78	54.04	---	---	Peak



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Nov. 20, 2012	Sep. 02, 2013	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Nov. 20, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Nov. 20, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Nov. 20, 2012	N/A	Conduction (CO05-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 23, 2011	Nov. 20, 2012	Nov. 22, 2012	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz ~ 1000MHz	May 04, 2012	Nov. 20, 2012	May. 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Nov. 20, 2012	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Nov. 20, 2012	Jul. 31, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Nov. 20, 2012	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Nov. 20, 2012	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Nov. 20, 2012	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Nov. 20, 2012	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Nov. 20, 2012	Feb. 26, 2013	Radiation (03CH06-HY)



5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95%(U = 2Uc(y))	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP2N1443 as below.