

FCC Test Report

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

The product was received on Jul. 26, 2012 and completely tested on Aug. 01, 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.

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FCC ID : SWX-MPOWER

Page Number : 1 of 18

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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 12.60 dB at 0.150 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 1.52 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-MPOWER
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	2412 MHz ~ 2462 MHz
Rx Frequency Range	2412 MHz ~ 2462 MHz
Antenna Type	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	03CH06-HY	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.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
2.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Lamp	N/A	N/A	N/A	N/A	Unshielded, 1.8 m
4.	LCD Monitor	Dell	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
5.	LCD Monitor	Acer	H223HQ	FCC DoC	Shielded, 1.6 m	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)	☒	☒

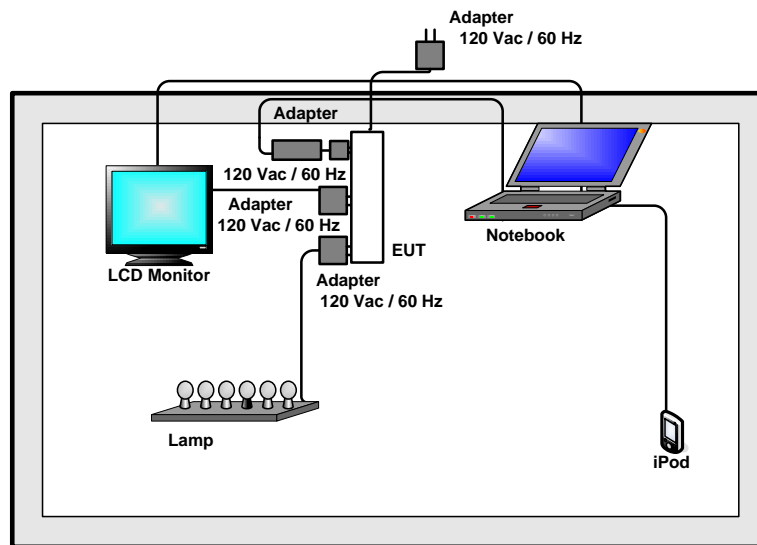
Abbreviations:

- 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 + TC
Radiated Emissions	1	Mode 1 : WLAN Idle + TC

Remark: TC stands for Test Configuration, and consists of notebook, monitor, and 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.

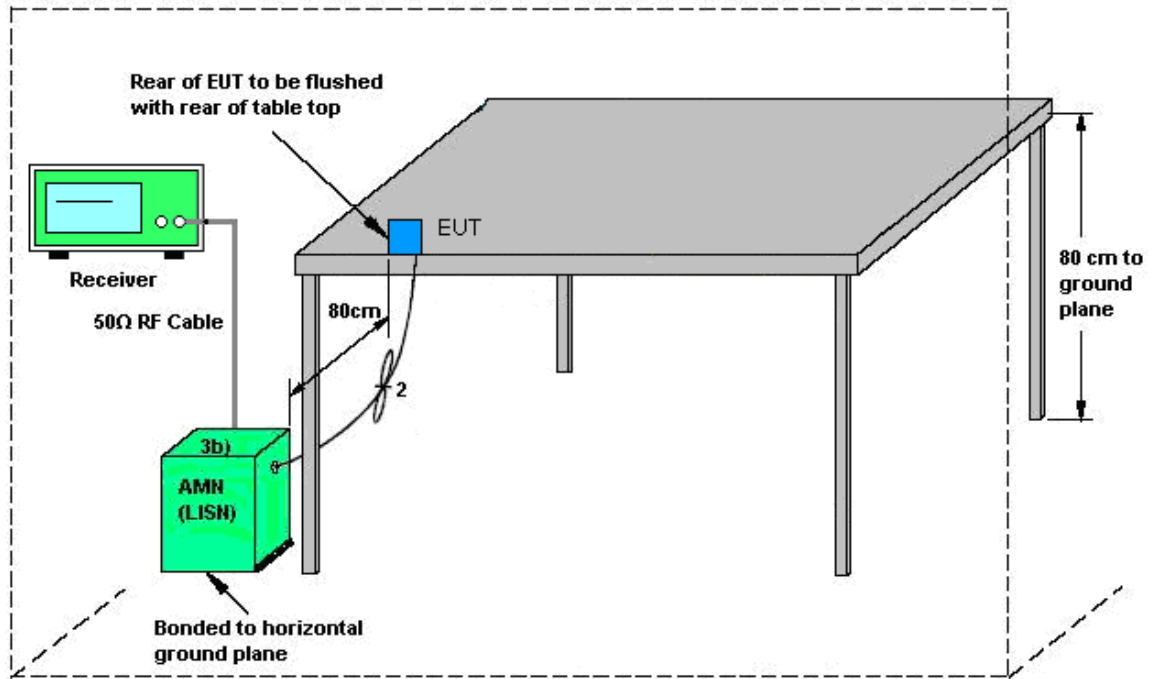
3.1.2 Measuring Instruments

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.

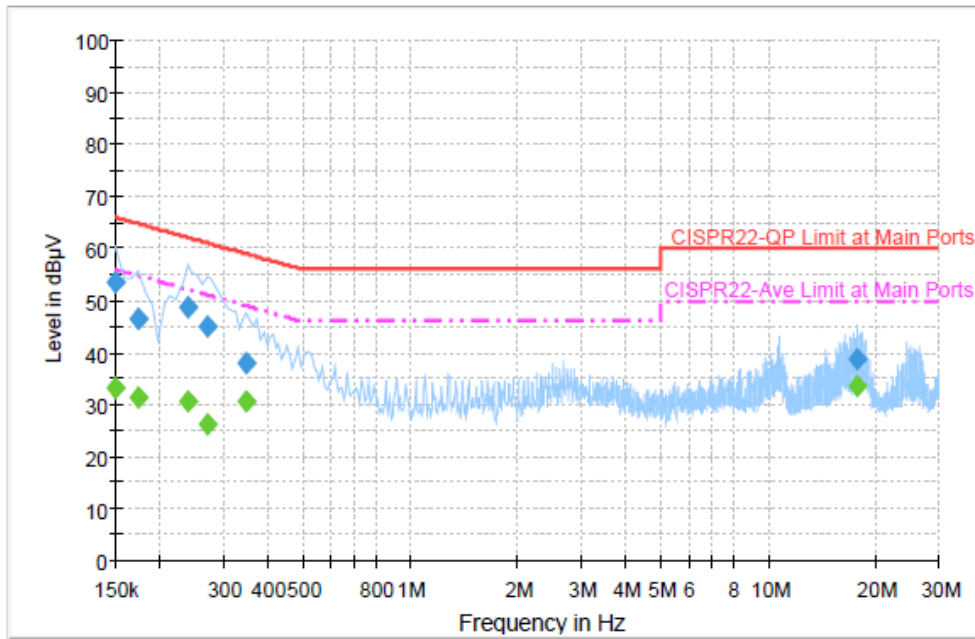
3.1.4 Test Setup



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 :	47~50%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Idle + TC		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



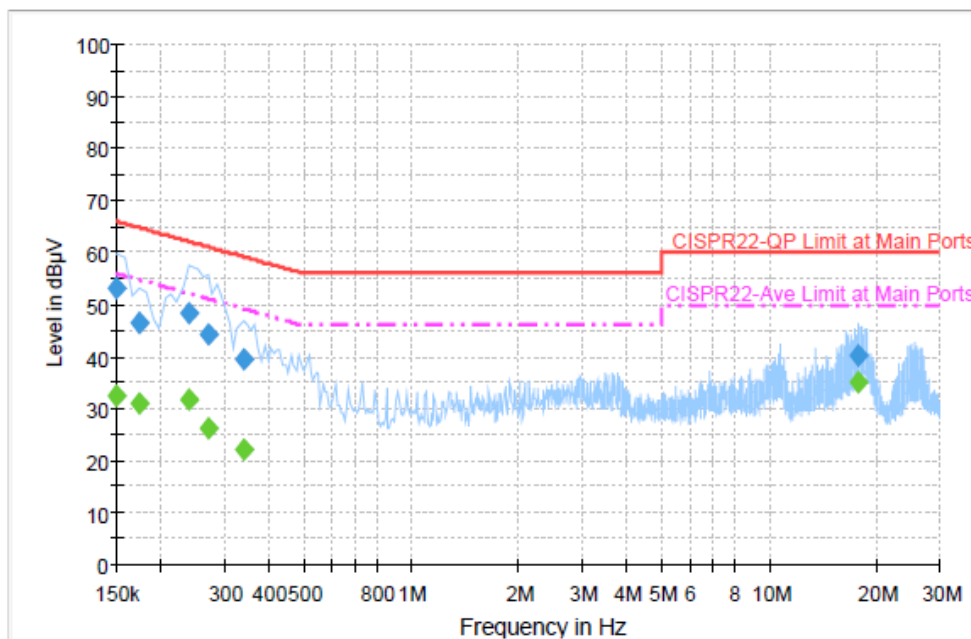
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	53.4	Off	L1	19.4	12.6	66.0
0.174000	46.7	Off	L1	19.3	18.1	64.8
0.238000	48.7	Off	L1	19.4	13.5	62.2
0.270000	44.9	Off	L1	19.4	16.2	61.1
0.350000	37.9	Off	L1	19.3	21.1	59.0
17.790000	38.8	Off	L1	19.9	21.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	33.1	Off	L1	19.4	22.9	56.0
0.174000	31.5	Off	L1	19.3	23.3	54.8
0.238000	30.8	Off	L1	19.4	21.4	52.2
0.270000	26.2	Off	L1	19.4	24.9	51.1
0.350000	30.5	Off	L1	19.3	18.5	49.0
17.790000	33.7	Off	L1	19.9	16.3	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	47~50%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Idle + 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	53.2	Off	N	19.4	12.8	66.0
0.174000	46.5	Off	N	19.3	18.3	64.8
0.238000	48.3	Off	N	19.4	13.9	62.2
0.270000	44.5	Off	N	19.4	16.6	61.1
0.342000	39.3	Off	N	19.4	19.9	59.2
17.790000	40.2	Off	N	20.0	19.8	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	32.4	Off	N	19.4	23.6	56.0
0.174000	31.1	Off	N	19.3	23.7	54.8
0.238000	31.7	Off	N	19.4	20.5	52.2
0.270000	26.2	Off	N	19.4	24.9	51.1
0.342000	22.1	Off	N	19.4	27.1	49.2
17.790000	35.0	Off	N	20.0	15.0	50.0

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

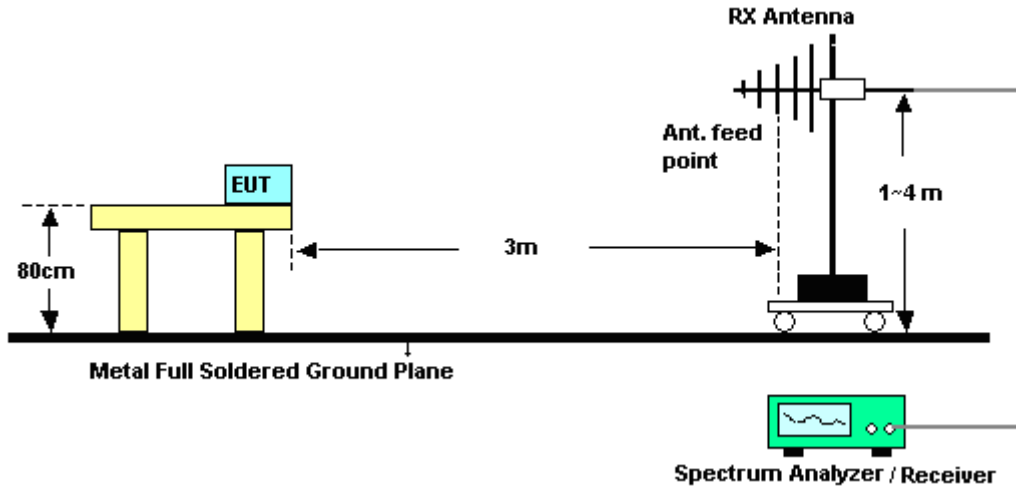
See list of measuring instruments of this test report.

3.2.3. Test Procedures

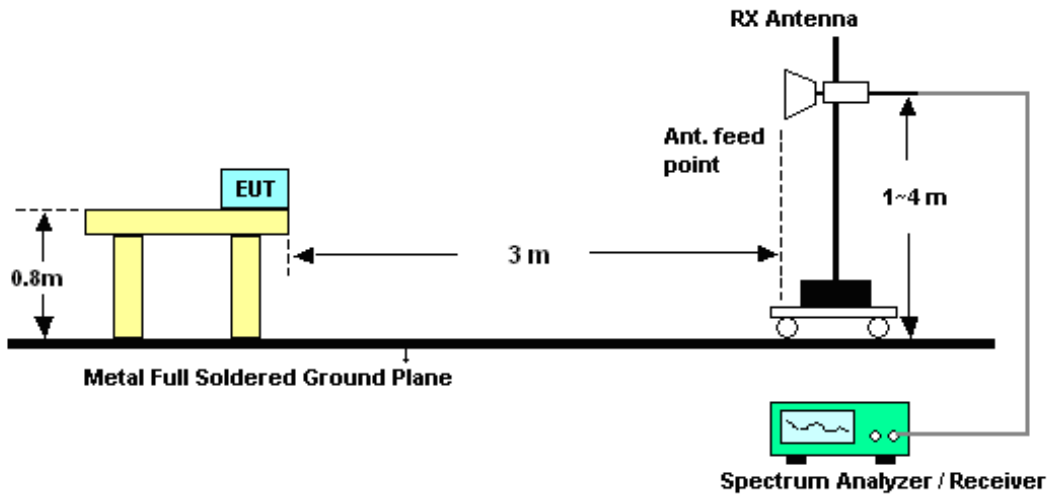
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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



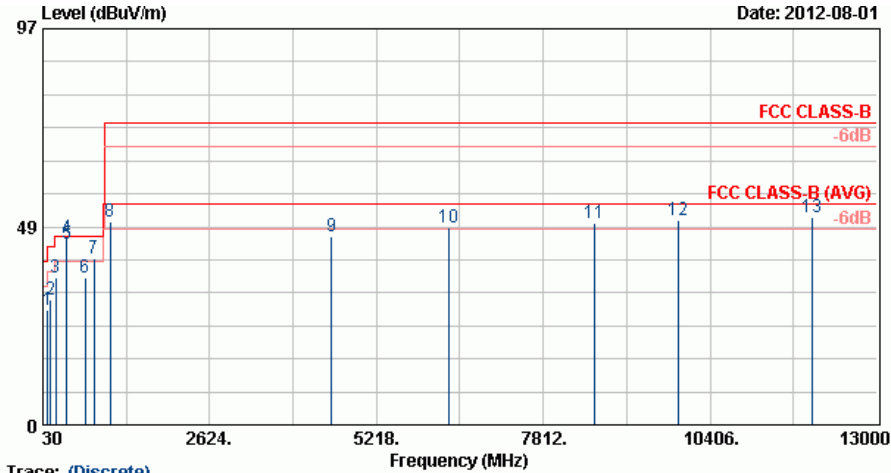
For radiated emissions above 1GHz





3.2.5. Test Result of Radiated Emission

Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Kai Wang	Relative Humidity :	47~50%
Test Distance :	3m	Polarization :	Horizontal
Function Type :	WLAN Idle + TC		

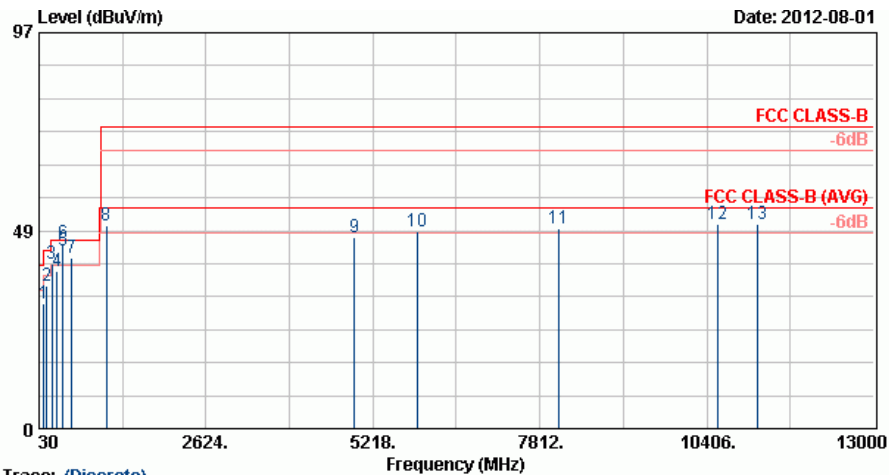


Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B HF-ANT_110802 HORIZONTAL
 Power : 120Vac/60Hz
 Project : FD 272643
 Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	108.03	28.10	-15.40	43.50	46.57	11.72	1.14	31.33	---	---	Peak
2	152.04	30.61	-12.89	43.50	50.44	10.06	1.37	31.25	---	---	Peak
3	230.34	36.14	-9.86	46.00	55.22	10.31	1.65	31.04	---	---	Peak
4 @	399.40	45.83			59.55	15.90	2.19	31.81	100		248 Peak
5 !	399.40	44.48	-1.52	46.00	58.20	15.90	2.19	31.81	100		248 QP
6	691.30	35.97	-10.03	46.00	46.00	18.92	2.87	31.82	---	---	Peak
7 !	827.80	40.77	-5.23	46.00	48.68	20.17	3.15	31.23	---	---	Peak
8	1074.00	49.87	-24.13	74.00	72.60	27.80	3.48	54.01	---	---	Peak
9	4524.00	46.04	-27.96	74.00	59.35	34.59	7.78	55.68	---	---	Peak
10	6338.00	48.49	-25.51	74.00	59.87	35.60	9.68	56.66	---	---	Peak
11	8598.00	49.45	-24.55	74.00	59.75	35.64	10.15	56.09	---	---	Peak
12	9904.00	49.96	-24.04	74.00	58.78	37.10	10.39	56.31	---	---	Peak
13	11994.00	50.81	-23.19	74.00	54.31	38.90	11.09	53.49	100	0	Peak



Test Mode :	Mode 1	Temperature :	23~24°C
Test Engineer :	Kai Wang	Relative Humidity :	47~50%
Test Distance :	3m	Polarization :	Vertical
Function Type :	WLAN Idle + TC		



Trace: (Discrete)
 Site : 03CH06-HY
 Condition : FCC CLASS-B HF-ANT_110802 VERTICAL
 Power : 120Vac/60Hz
 Project : FD 272643
 Mode : Mode 1

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB	dB	cm	deg	
1	108.03	30.48	-13.02	43.50	48.95	11.72	1.14	31.33	---	Peak
2	153.39	35.13	-8.37	43.50	54.97	10.04	1.38	31.26	---	Peak
3 !	230.34	40.23	-5.77	46.00	59.31	10.31	1.65	31.04	---	Peak
4	306.30	38.67	-7.33	46.00	54.82	13.39	1.93	31.47	---	Peak
5 !	399.40	43.70	-2.30	46.00	57.42	15.90	2.19	31.81	100	317 QP
6 @	399.40	45.35			59.07	15.90	2.19	31.81	100	317 Peak
7 !	537.30	41.74	-4.26	46.00	51.99	18.51	2.53	31.29	---	Peak
8	1074.00	49.85	-24.15	74.00	72.58	27.80	3.48	54.01	---	Peak
9	4928.00	46.74	-27.26	74.00	60.26	34.34	8.04	55.90	---	Peak
10	5918.00	48.18	-25.82	74.00	60.53	35.28	9.06	56.69	---	Peak
11	8094.00	49.13	-24.87	74.00	59.09	35.58	10.42	55.96	---	Peak
12	10578.00	50.00	-24.00	74.00	57.84	37.54	10.57	55.95	---	Peak
13	11194.00	50.14	-23.86	74.00	56.32	37.96	10.94	55.08	100	0 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	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	Jul. 27, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Jul. 27, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Jul. 27, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Jul. 27, 2012	N/A	Conduction (CO05-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 23, 2011	Jul. 31, 2012 ~ Aug. 01, 2012	Nov. 22, 2012	Radiation (03CH06-HY)
Spectrum Analyzer	R&S	FSP30	101352	9KHz-30GHz	Nov. 03, 2011	Jul. 31, 2012 ~ Aug. 01, 2012	Nov. 02, 2012	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/003	20MHz ~ 1000MHz	May 04, 2012	Jul. 31, 2012 ~ Aug. 01, 2012	May. 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 22, 2011	Jul. 31, 2012 ~ Aug. 01, 2012	Oct. 21, 2012	Radiation (03CH06-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Jul. 31, 2012 ~ Aug. 01, 2012	Aug. 09, 2012	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917025 1	15GHz ~ 40GHz	Oct. 20, 2011	Jul. 31, 2012 ~ Aug. 01, 2012	Oct. 19, 2012	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Jul. 31, 2012 ~ Aug. 01, 2012	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Jul. 31, 2012 ~ Aug. 01, 2012	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Jul. 31, 2012 ~ Aug. 01, 2012	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159087	1GHz~18GHz	Feb. 27, 2012	Jul. 31, 2012 ~ Aug. 01, 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 EP272643 as below.