FCC TEST REPORT

REPORT NO.	:	**FD330410**
MODEL NAME	:	**BCM943241NG1630**
RECEIVED DATE	:	**Mar. 04, 2013**
FINAL TESTED DATE	:	**Mar. 27, 2013**
ISSUED DATE	:	**Mar. 29, 2013**
TEST STANDARD	:	**47 CFR FCC Rules and Regulations Part 15 Subpart B, Class B Digital Device**
Filing Type	:	**Declaration of Conformity**
APPLICANT	:	**Broadcom Corporation**
ADDRESS	:	**190 Mathilda Place Sunnyvale CA 94086 U.S.A.**
Manufacturer	:	**Broadcom Corporation**
ADDRESS	:	**190 Mathilda Place Sunnyvale CA 94086 U.S.A.**
ISSUED BY	:	**SPORTON International Inc.**
LAB ADDRESS	:	**No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.**

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- This test report is only applicable to U.S.A..

Testing Laboratory
1190

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History of this test report

REPORT NO.	VERSION	ISSUED DATE	Description
FD330410	Rev. 01	Mar. 29, 2013	Initial issue of report

Certificate No.: CB10203072

CERTIFICATE OF COMPLIANCE

EQUIPMENT NAME	:	**802.11a/b/g/n WLAN + Bluetooth Card**
BRAND NAME	:	**Broadcom**
MODEL NAME	:	**BCM943241NG1630**
APPLICANT	:	**Broadcom Corporation**
ADDRESS	:	**190 Mathilda Place Sunnyvale CA 94086 U.S.A.**
FINAL TESTED DATE	:	**Mar. 27, 2013**
TEST STANDARD	:	**47 CFR FCC Rules and Regulations Part 15 Subpart B, Class B Digital Device**

I **HEREBY** CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 – 2003**.

The above equipment has been tested by **SPORTON International Inc.** LAB., and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMI characteristics under the conditions specified in this report.

Ray Yeh

1. SUMMARY OF TEST RESULTS

After estimating all the combination of every test mode, the result shown as below is the worst case.

The EUT has been tested according to the following specifications.

EMISSION			
Test Standard	**Test Type**	**Result**	**Remarks**
47 CFR FCC Rules and Regulations Part 15 Subpart B, Class B Digital Device	AC Power Port Conducted emission test 150 kHz – 30 MHz	PASS	Meet minimum passing margin is -11.88dB at 0.17584MHz.
	Radiated emission test 30 MHz – 1,000 MHz @ 3 m 1,000 MHz – 26,500 MHz @ 3 m	PASS	Meet minimum passing margin is -3.62dB at 134.76MHz.

2. General Description of Equipment under Test

Product Detail	
Equipment Name	802.11a/b/g/n WLAN + Bluetooth Card
Model Name	BCM943241NG1630
Brand Name	Broadcom
Power supply	From Host System

2.1. Feature of Equipment under Test

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3. Test Configuration of Equipment under Test

3.1. Test Manner

3.1.1. Test Mode

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Conducted Emission test	
Test Mode	Description
1	EUT with WIFI function
2	EUT with BT function
Mode 1 is the worst case, so it was selected to record in this test report.	

Radiated Emissions	
Test Mode	Description
1	EUT with WIFI function
2	EUT with BT function
Mode 2 is the worst case, so it was selected to record in this test report.	

Note: The WLAN and Bluetooth function can't work at the same time for software currently, so we test each WLAN and Bluetooth function separately.

3.2. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

For Conducted Emission test:

Support Unit	Brand	Model	FCC ID
Wireless AP	Planex	GW-AP54SGX	N/A
Notebook	DELL	E6430	QDS-BRCM1049LE
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A

For Radiated Emissions test:

Support Unit	Brand	Model	FCC ID
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Notebook	DELL	E4300	E2K512ANHMW
Notebook	DELL	D420	E2KWM3945ABG
BT Card	BROADCOM	43241chip	N/A

3.3. EUT Operation Condition：

For Conducted Emission test:

An executive program, EMCTEST.EXE under WIN 7, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

a. Turn on the power of all equipment.

b. The NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

c. Repeat the step b.

At the same time, the following programs were executed:

Executed "ping.exe" to link with the remote workstation to receive and transmit signal by WLAN.

For Radiated Emissions test:

An executive program, EMCTEST.EXE under WIN 7, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

a. Turn on the power of all equipment.

b. The NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

c. Repeat the step b.

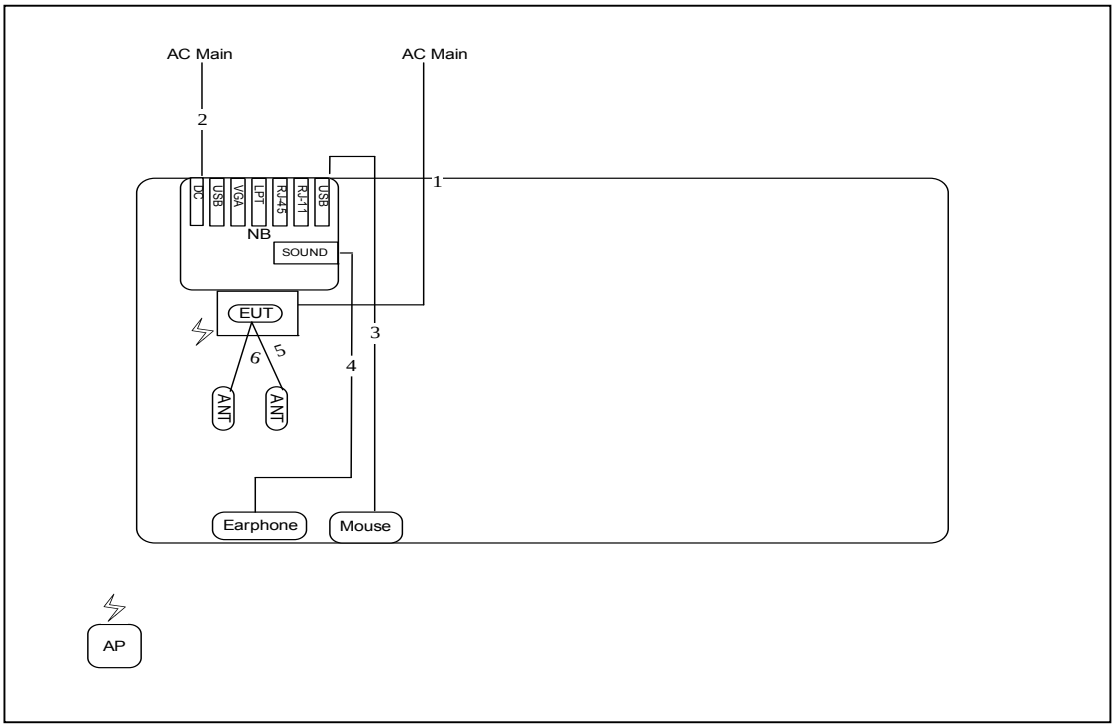
At the same time, the following programs were executed:

Executed "Broadcom Blue Tool" to link with the remote workstation to receive and transmit signal by Bluetooth.

3.4. Connection Diagram of Test System

3.4.1. AC Power Line Conduction Emissions Test Configuration

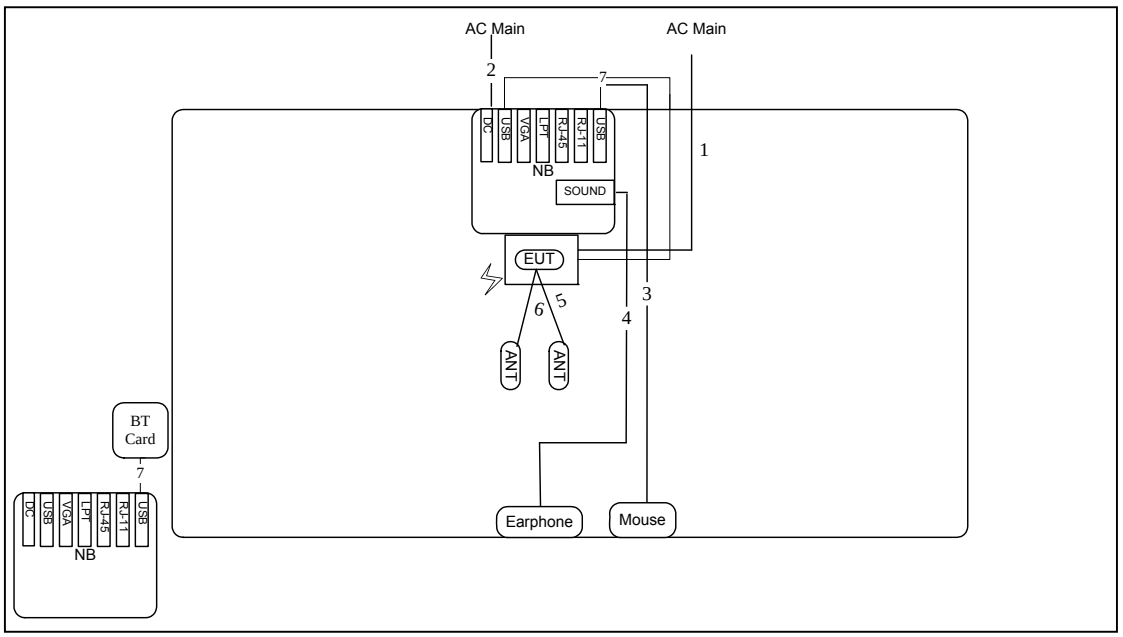
Test Mode : Mode 1



Item	Connection	Shield	Length
1	AC power cable	No	1.8m
2	AC power cable	No	2.6m
3	USB cable	No	1.8m
4	Audio cable	No	1.1m
5	Antenna cable	No	0.2m
6	Antenna cable	No	0.2m

3.4.2. Radiation Emissions Test Configuration

Test Mode : Mode 2



Item	Connection	Shield	Length
1	Power cable	No	1.8m
2	Power cable	No	0.75m
3	USB cable	No	1.8m
4	Audio cable	No	1.1m
5	Antenna cable	No	0.2m
6	Antenna cable	No	0.2m
7	USB cable	No	1.8m

4. General Information of Test

4.1. Test Facility

Test Site Location	:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.
TEL	:	886-3-656-9065
FAX	:	886-3-656-9085
Test Site No.	:	Conduction: CO01-CB Radiation: 03CH01-CB

4.2. Test Voltage

Power Type	Test Voltage
AC Power Supply	120 V / 60 Hz

4.3. Standard for Methods of Measurement

ANSI C63.4-2003

4.4. Frequency Range Investigated

Test Items	Frequency Range
Conducted emission test	150 kHz to 30 MHz
Radiated emission test	30 MHz to 26,500 MHz

4.5. Test Distance

Test Items	Test Distance
Radiated emission test below 1 GHz (30 MHz to 1,000 MHz)	3 m
Radiated emission test above 1 GHz (1,000 MHz to 26,500 MHz)	3 m

5. Test of Conducted Emission

5.1. Limit

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

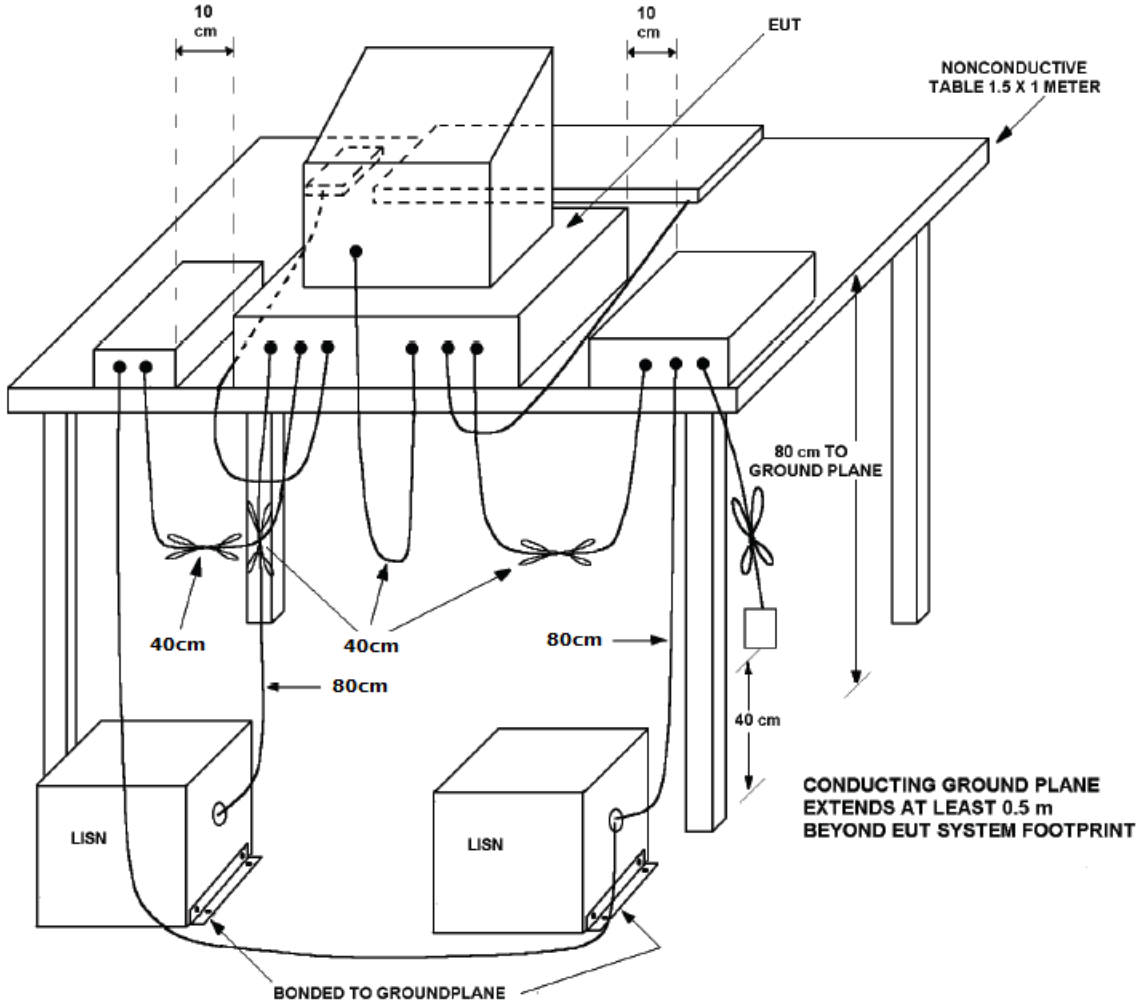
5.2. Description of Major Test Instruments

Test Receiver	R&S ESCS 30
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

5.3. Test Procedures

a. 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.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connect to the other LISN.
d. The LISN provides 50 Ω coupling impedance for the measuring instrument.
e. The FCC states that a 50 Ω, 50 uH LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.4. Typical Test Setup Layout of Conducted Emission

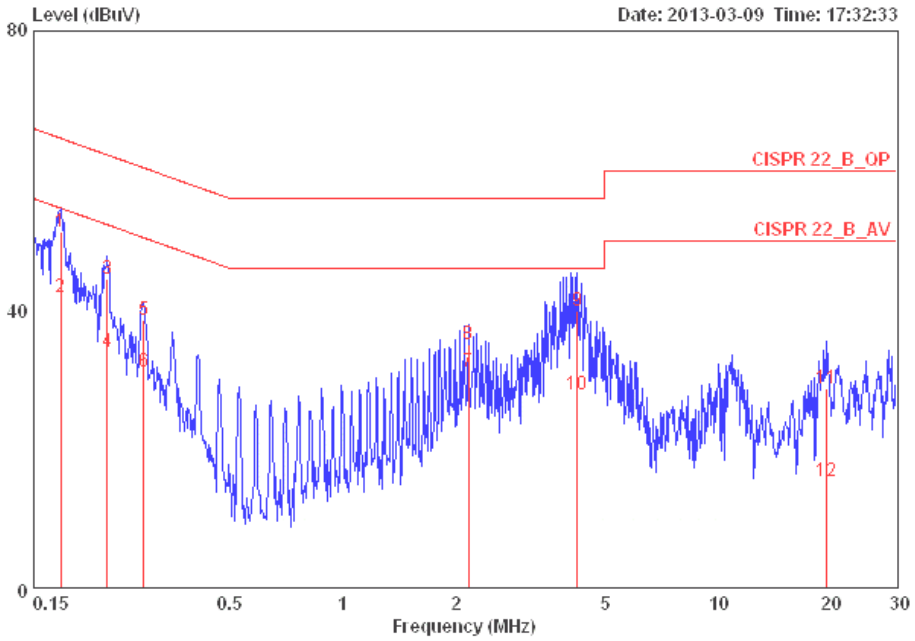


5.5. Test Result of AC Power Ports

Temperature	25℃	Humidity	52%
Test Engineer	Kane Liu	Test Mode	Mode 1
Frequency Range	0.15 MHz to 30 MHz		

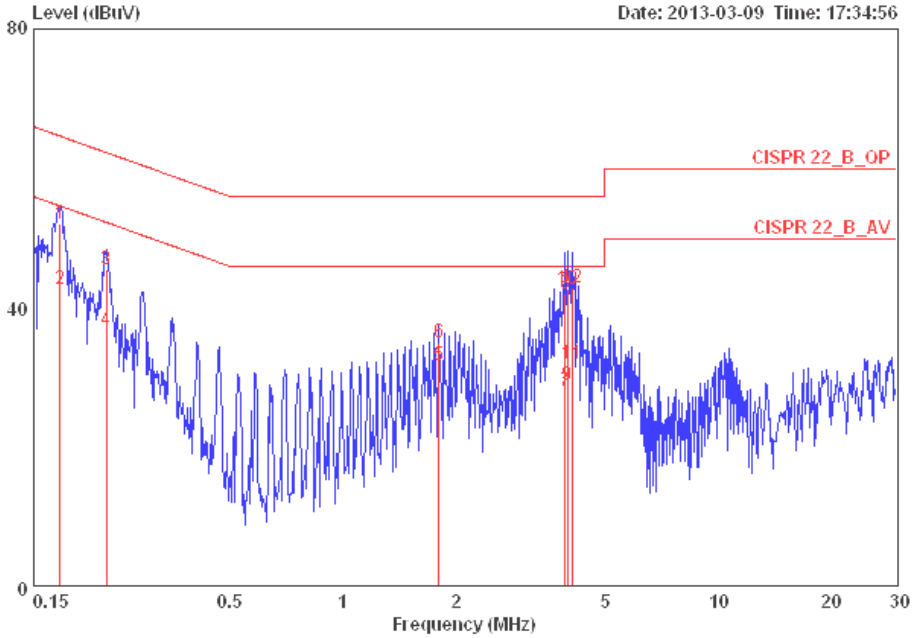
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.
- The test was passed at the minimum margin that marked by a frame in the following table

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17678	51.27	-13.36	64.64	50.93	0.15	0.19	QP
2	0.17678	41.94	-12.69	54.64	41.60	0.15	0.19	AVERAGE
3	0.23533	44.44	-17.82	62.26	44.09	0.15	0.20	QP
4	0.23533	33.92	-18.34	52.26	33.57	0.15	0.20	AVERAGE
5	0.29398	38.54	-21.87	60.41	38.19	0.15	0.20	QP
6	0.29398	31.16	-19.25	50.41	30.81	0.15	0.20	AVERAGE
7	2.167	31.27	-14.73	46.00	30.84	0.19	0.23	AVERAGE
8	2.167	35.00	-21.00	56.00	34.57	0.19	0.23	QP
9	4.224	39.93	-16.07	56.00	39.40	0.22	0.30	QP
10	4.224	27.98	-18.02	46.00	27.45	0.22	0.30	AVERAGE
11	19.428	28.76	-31.24	60.00	27.79	0.47	0.50	QP
12	19.428	15.37	-34.63	50.00	14.40	0.47	0.50	AVERAGE

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17584	52.09	-12.59	64.68	51.82	0.08	0.19	QP
2 @	0.17584	42.80	-11.88	54.68	42.53	0.08	0.19	AVERAGE
3	0.23409	45.62	-16.68	62.30	45.34	0.08	0.20	QP
4	0.23409	36.85	-15.45	52.30	36.57	0.08	0.20	AVERAGE
5	1.810	31.88	-14.12	46.00	31.55	0.11	0.23	AVERAGE
6	1.810	35.20	-20.80	56.00	34.87	0.11	0.23	QP
7	3.922	28.06	-17.94	46.00	27.63	0.13	0.30	AVERAGE
8	3.922	41.97	-14.03	56.00	41.54	0.13	0.30	QP
9	3.985	29.09	-16.91	46.00	28.66	0.13	0.30	AVERAGE
10	3.985	42.65	-13.35	56.00	42.22	0.13	0.30	QP
11	4.092	32.00	-14.00	46.00	31.57	0.13	0.30	AVERAGE
12	4.092	42.90	-13.10	56.00	42.47	0.13	0.30	QP

6. Test of Radiated Emission

6.1. Limit

Radiated Emission below 1 GHz test at 3 m:

Frequency (MHz)	QP (dBuV/m)
30~88	40
88~216	43.5
216~960	46
Above 960	54

Radiated Emission above 1 GHz test at 3 m:

Frequency (MHz)	PK (dBuV/m)	AV (dBuV/m)
Above 1 GHz	74	54

Note: For Average, Detector=CISPR AV

6.2. Description of Major Test Instruments

6.2.1. 30 MHz ~ 1,000 MHz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

6.2.2. Above 1 GHz

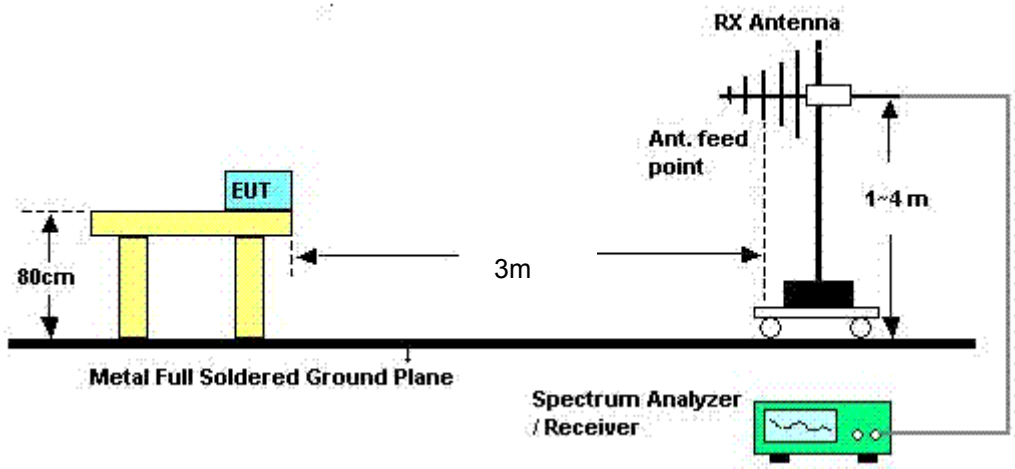
Spectrum Parameter	Setting
Start Frequency	1000 MHz
Stop Frequency	5th harmonic of highest frequency
RB / VB	1 MHz / 3MHz for Peak ; 1 MHz / 10Hz for Average

6.3. Test Procedures

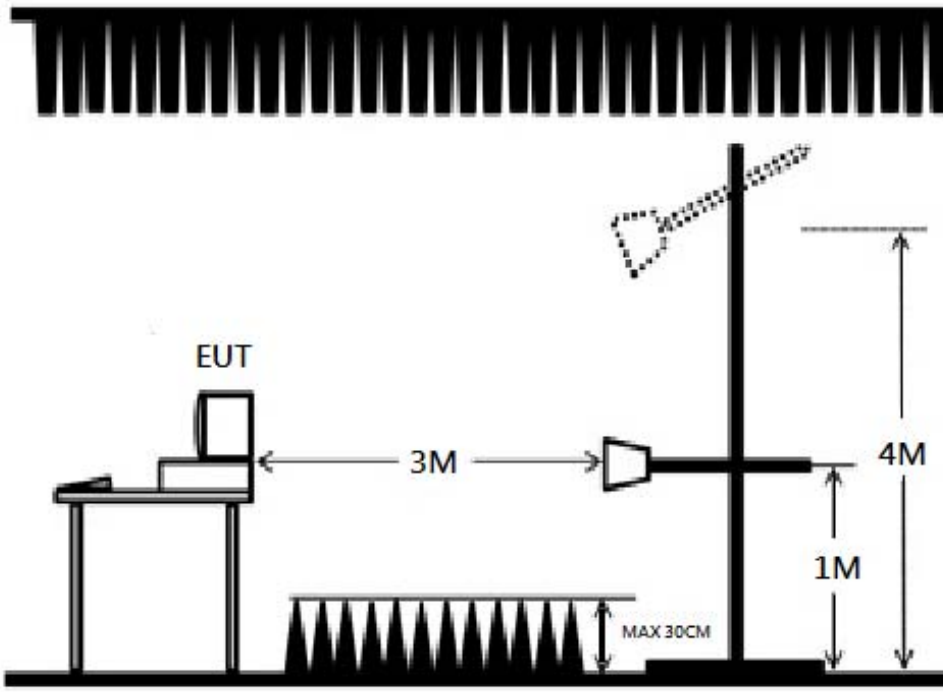
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3m meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. 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 turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

6.4. Typical Test Setup Layout of Radiated Emission

<Below 1GHz>:



<Above 1GHz>:

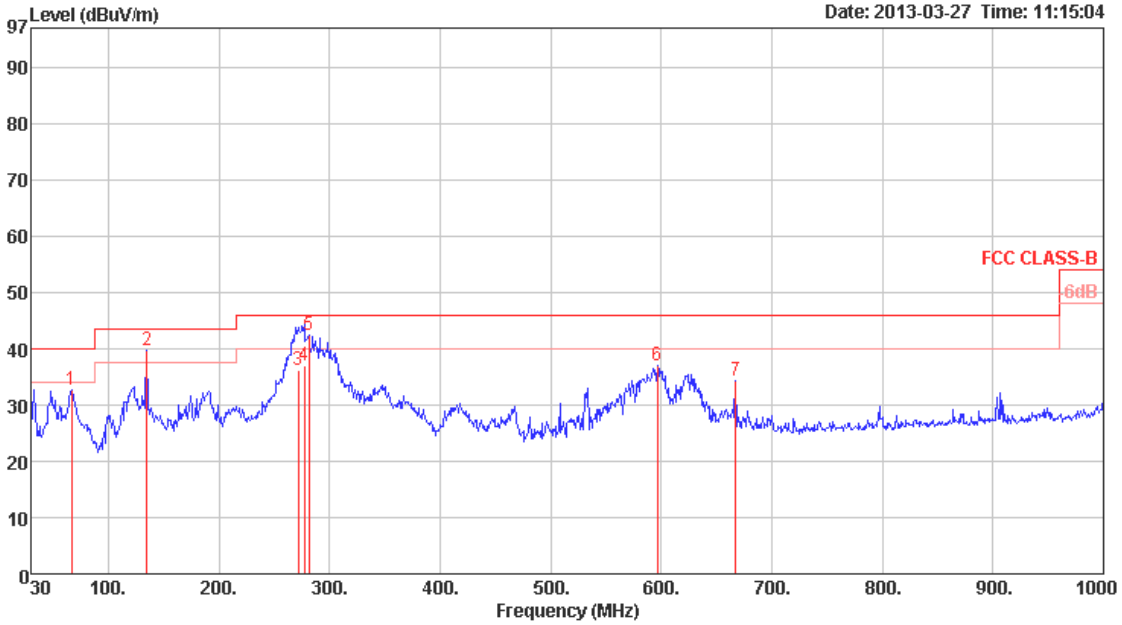


6.5. Test Result of Radiated Emission below 1 GHz

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Test Mode	Mode 2
Frequency Range	30 MHz to 1,000 MHz	Test Distance	3 m

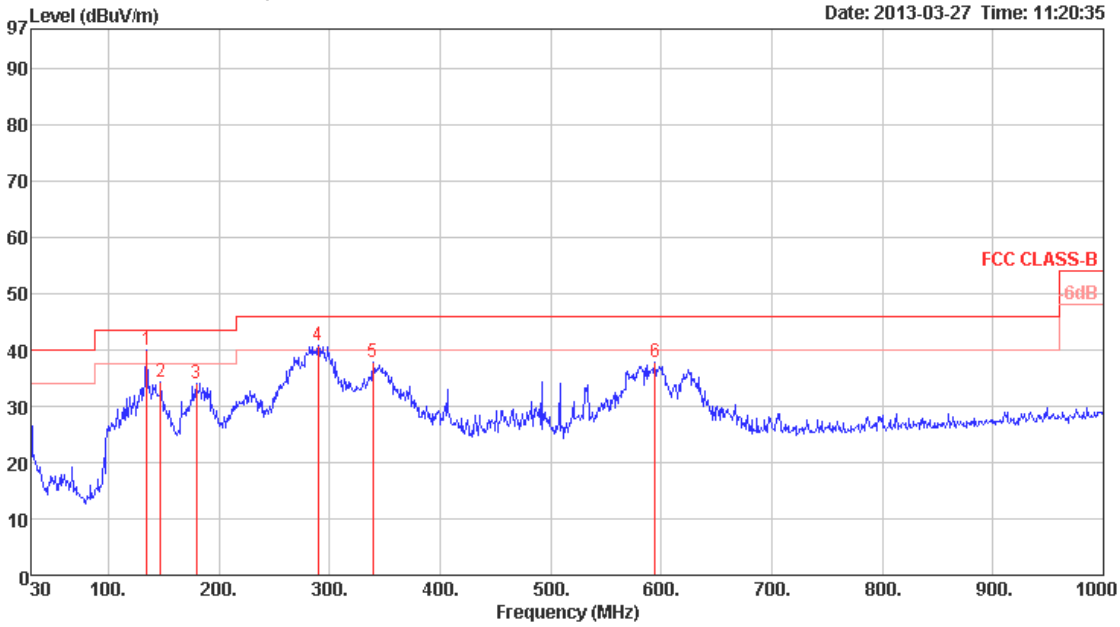
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
- The test was passed at the minimum margin that marked by the frame in the following test record

Vertical 30 MHz to 1,000 MHz



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	66.86	32.76	40.00	-7.24	52.85	0.96	6.68	27.73	Peak	400	0	VERTICAL
2	134.76	39.79	43.50	-3.71	53.52	1.40	12.30	27.43	Peak	400	0	VERTICAL
3	271.53	36.25	46.00	-9.75	48.30	1.89	13.02	26.96	QP	100	265	VERTICAL
4	277.35	36.97	46.00	-9.03	48.91	1.92	13.09	26.95	QP	100	265	VERTICAL
5	281.23	42.37	46.00	-3.63	54.23	1.94	13.14	26.94	Peak	400	0	VERTICAL
6	596.48	37.03	46.00	-8.97	43.59	2.81	18.73	28.10	Peak	400	0	VERTICAL
7	667.29	34.22	46.00	-11.78	40.24	3.03	18.98	28.03	Peak	400	0	VERTICAL

Horizontal 30 MHz to 1,000 MHz



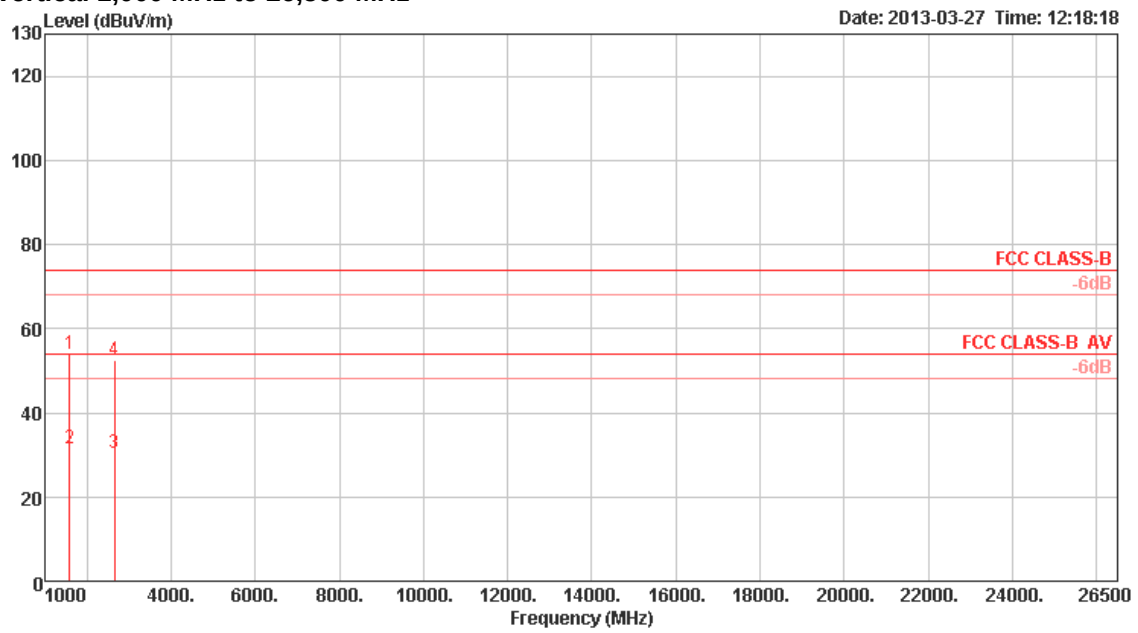
	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	134.76	39.88	43.50	-3.62	53.61	1.40	12.30	27.43	Peak	100	0	HORIZONTAL
2	147.37	34.40	43.50	-9.10	48.35	1.42	11.99	27.36	Peak	100	0	HORIZONTAL
3	179.38	34.02	43.50	-9.48	46.52	1.56	13.14	27.20	Peak	100	0	HORIZONTAL
4	289.96	40.85	46.00	-5.15	52.55	1.98	13.24	26.92	Peak	100	0	HORIZONTAL
5	339.43	37.86	46.00	-8.14	48.52	2.09	14.43	27.18	Peak	100	0	HORIZONTAL
6	594.54	37.82	46.00	-8.18	44.41	2.81	18.70	28.10	Peak	100	0	HORIZONTAL

6.6. Test Result of Radiated Emission above 1 GHz

Temperature	26℃	Humidity	60%
Test Engineer	Jim Huang	Test Mode	Mode 2
Frequency Range	1,000 MHz to 26,500 MHz	Test Distance	3 m

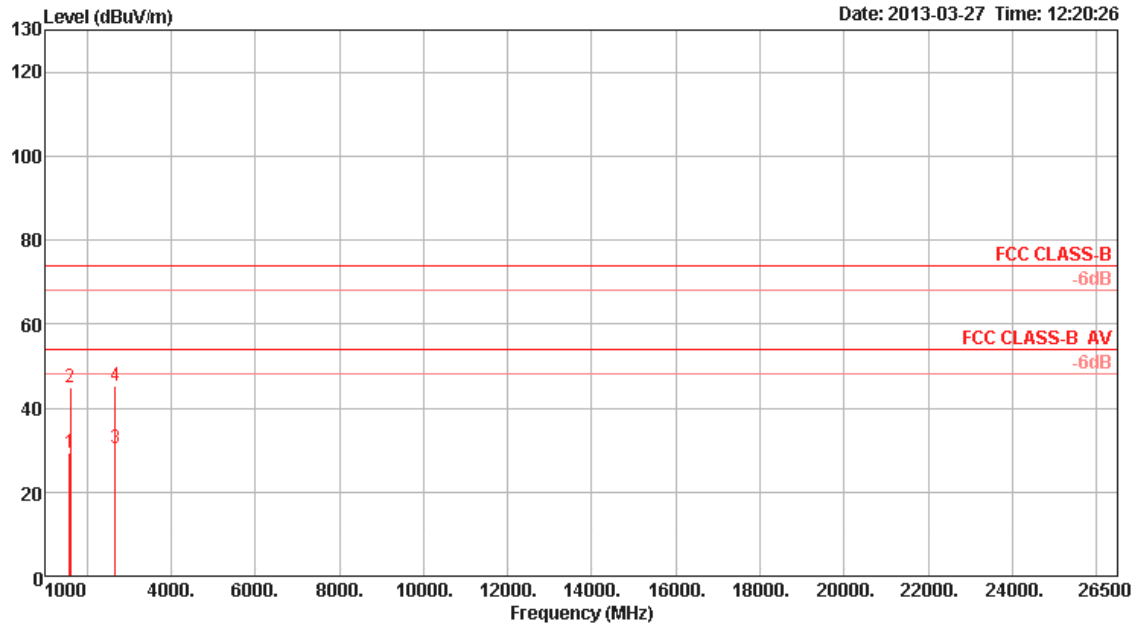
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
- The test was passed at the minimum margin that marked by the frame in the following test record

Vertical 1,000 MHz to 26,500 MHz



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1593.52	53.94	74.00	-20.06	59.77	3.21	25.86	34.90	Peak	100	28	VERTICAL
2	1596.68	31.60	54.00	-22.40	37.43	3.21	25.86	34.90	Average	100	28	VERTICAL
3	2660.00	30.58	54.00	-23.42	32.62	4.20	28.83	35.07	Average	100	26	VERTICAL
4	2662.80	52.55	74.00	-21.45	54.59	4.20	28.83	35.07	Peak	100	26	VERTICAL

Horizontal 1,000 MHz to 26,500 MHz



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	1593.84	29.45	54.00	-24.55	35.28	3.21	25.86	34.90	Average	100	81	HORIZONTAL
2	1597.08	44.93	74.00	-29.07	50.76	3.21	25.86	34.90	Peak	100	81	HORIZONTAL
3	2664.48	30.33	54.00	-23.67	32.37	4.20	28.83	35.07	Average	153	172	HORIZONTAL
4	2664.72	45.19	74.00	-28.81	47.23	4.20	28.83	35.07	Peak	153	172	HORIZONTAL

7. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 21, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)

Note: Calibration Interval of instruments listed above is one year.

*Calibration Interval of instruments listed above is two year.

N.C.R. means Non-Calibration required.

8. Uncertainty of Test Site

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

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
combined standard uncertainty Ue(y)	1.2			
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	2.4			

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.1727	dB	normal(k=1)	0.1727
Cable loss	0.1736	dB	normal(k=2)	0.0868
Antenna gain	0.1687	dB	normal(k=2)	0.0843
Site imperfection	0.4898	dB	Triangular	0.2
Pre-amplifier gain	0.3661	dB	normal(k=2)	0.183
Transmitter antenna	1.7	dB	rectangular	0.9815
Signal generator	0.5	dB	rectangular	0.2887
Mismatch	0.08	dB	u-shape	0.244
Spectrum analyzer	0.5	dB	rectangular	0.2887
combined standard uncertainty Ue(y)	1.1434			
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	2.2869			