

FC

Test Report

Product Name : WIRELESS-BGN 23DBM 2X2 NETWORK MINI
PCIE ADAPTER

Model No. : WLE200N2-23

Applicant : Compex Systems Pte Ltd

Address : 135 Joo Seng Road #08-01 Singapore 368363

Date of Receipt : 05/06/2013

Test Date : 05/06/2013~13/06/2013

Issued Date : 19/06/2013

Report No. : 136322R -ITUSP01V02

Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

Issued Date : 09/06/2013

Report No. : 136322R -ITUSP01V02



Product Name : WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER

Applicant : Compex Systems Pte Ltd

Address : 135 Joo Seng Road #08-01 Singapore 368363.

Manufacturer : Compex Systems Pte Ltd

Address : 135 Joo Seng Road #08-01 Singapore 368363.

Model No. : WLE200N2-23

EUT Voltage : DC 3.3V

Brand Name : COMPEX


Applicable Standard : FCC Part 15 Subpart B: 2012
ANSI C63.4: 2009

Test Result : Complied

Performed Location : Quietek Corporation (Linkou Laboratory)
No.5-22, Ruishukeng, Linkou Dist., New Taipei City
24451, Taiwan, R.O.C.
TEL:+866-2-8601-3788 / FAX:+886-2-8601-3789

Documented By : 
(Engineering Adm. Specialist / Rita Huang)

Reviewed By : 
(Engineering Supervisor / Tony Hsieh)

Approved By : 
(Manager / Vincent Lin)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scopes:

Taiwan R.O.C.	:	BSMI, NCC, TAF
Norway	:	Nemko, DNV
USA	:	FCC, NVLAP
Japan	:	VCCI

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :

No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

Linkou Testing Laboratory :

No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

Suzhou Testing Laboratory :

No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., SuZhou, China
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER
Brand Name	COMPEX
Model No.	WLE200N2-23
EUT Voltage	DC 3.3V

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

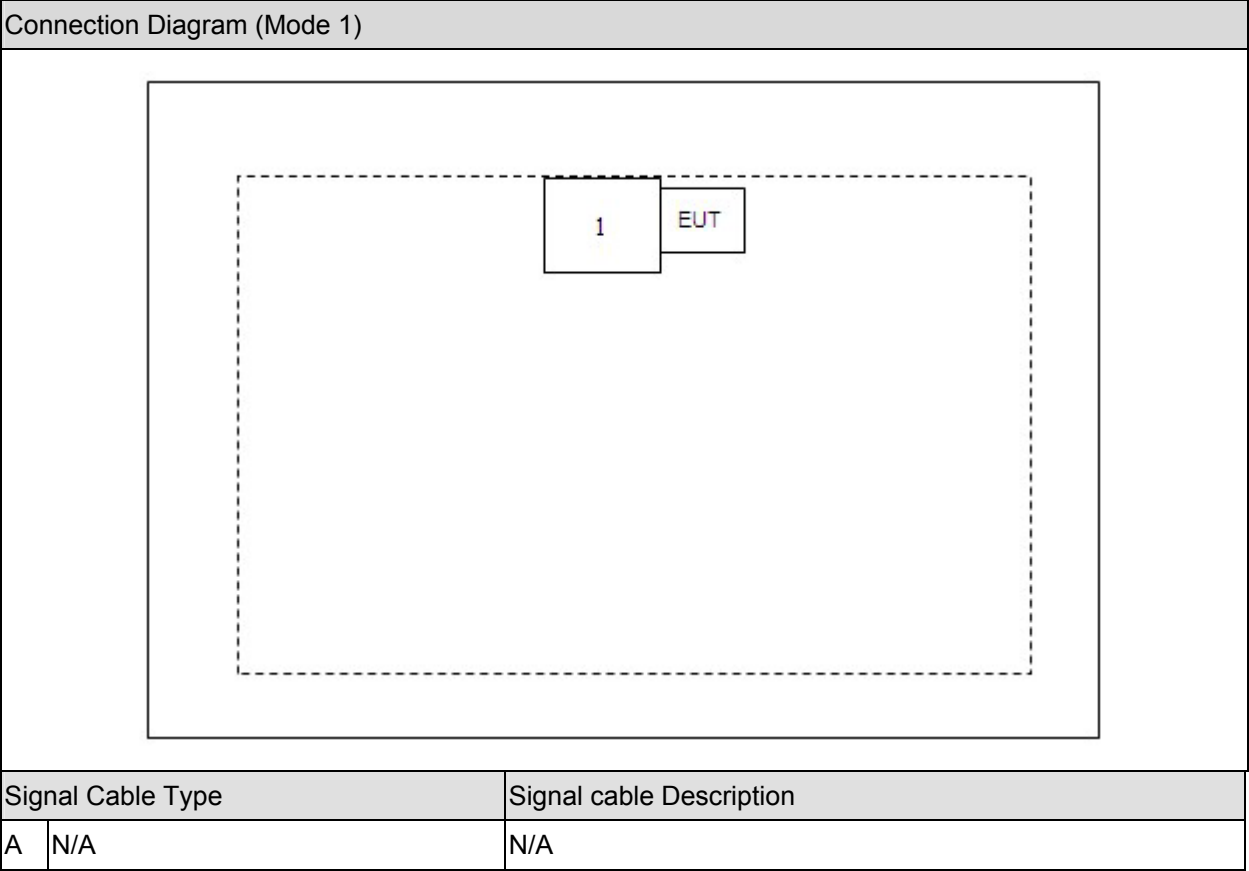
Test Mode
Mode 1: Normal Operation

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Dell	PP19L	JH097A01	Non-Shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Make the EUT work on “normal operation” mode.
4	Start Test.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

Emission			
Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC Part 15 Subpart B: 2012 ANSI C63.4: 2009	Yes	No
Radiated Emission	FCC Part 15 Subpart B: 2012 ANSI C63.4: 2009	Yes	No

2.2. List of Test Equipment

Conducted Emission / SR8

Instrument	Manufacturer	Model No.	Serial No.	Calibrated Date
EMI Test Receiver	R&S	ESCS 30	838251/001	2014/06/02
LISN	R&S	ESH3-Z5	836679/020	2014/04/07
LISN	R&S	ENV216	100097	2014/04/07
Pulse Limiter	R&S	ESH3-Z2	357.8810.52	2013/09/23

Radiated Emission / 9x6x6 Chamber

Instrument	Manufacturer	Model No.	Serial No.	Calibrated Date
EMI Test Receiver	Agilent	E4440A	MY46185846	2013/12/12
Bilog Antenna	Schaffner Chase	CBL6112B	2918	2013/07/28
EMI Test Receiver	R&S	ESCS 30	100121	2013/12/06
Pre-Amplifier	QTK	N/A	N/A	2013/07/07
CXA Signal Analyzer	Agilent	N9000A	MY50510072	2014/02/10
Horn Antenna	Schwarzbeck	9120D	576	2013/11/14
Pre-Amplifier	Quietek	AP-180C	CHM/071920	2013/07/12

2.3. Measurement Uncertainty

Conducted Emission
The maximum measurement uncertainty is evaluated as $\pm 2.26\text{dB}$.
Radiated Emission
The maximum measurement uncertainty is evaluated as $\pm 3.19\text{dB}$.

2.4. Test Environment

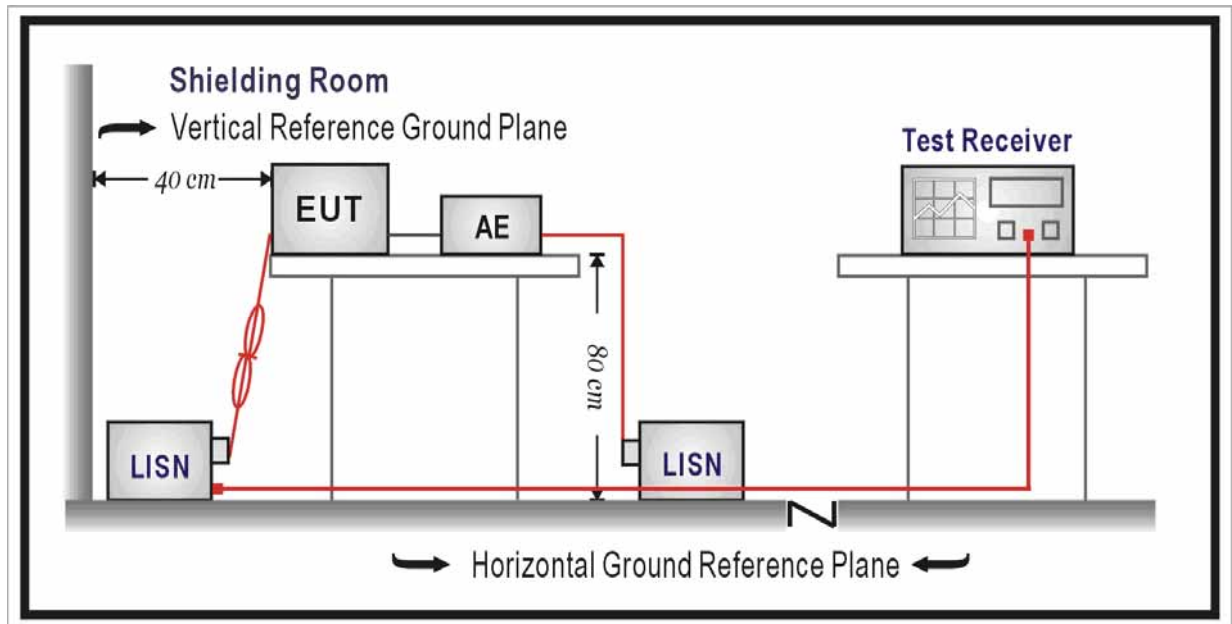
Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	15-35	25
	Humidity (%RH)	25-75	50
	Barometric pressure (mbar)	860-1060	950-1000
Radiated Emission	Temperature (°C)	15-35	25
	Humidity (%RH)	25-75	50
	Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

3.1. Test Specification

According to Standard: FCC Part 15 Subpart B, ANSI C63.4

3.2. Test Setup



3.3. Limit

Limits		
Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

NOTE: Decreases with the logarithm of the frequency.

Remarks: In the above table, the tighter limit applies at the band edges.

3.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50Ω / $50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω / $50\mu\text{H}$ coupling impedance with 50Ω termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on conducted measurement.

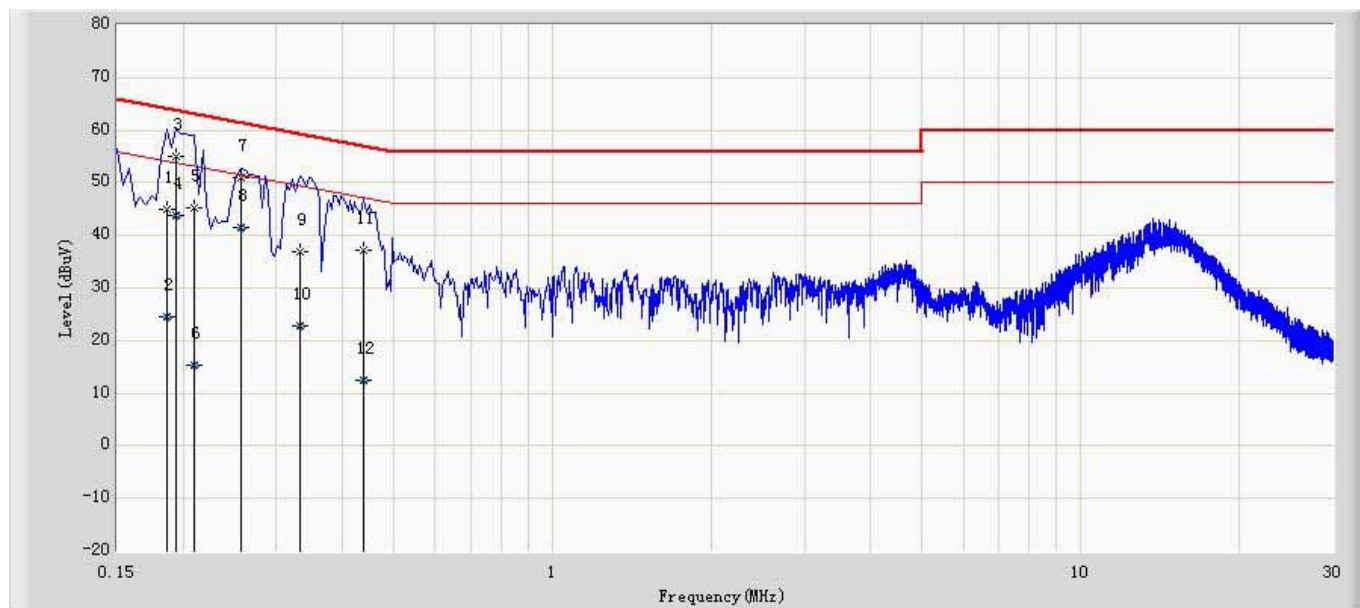
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Deviation from Test Standard

No deviation.

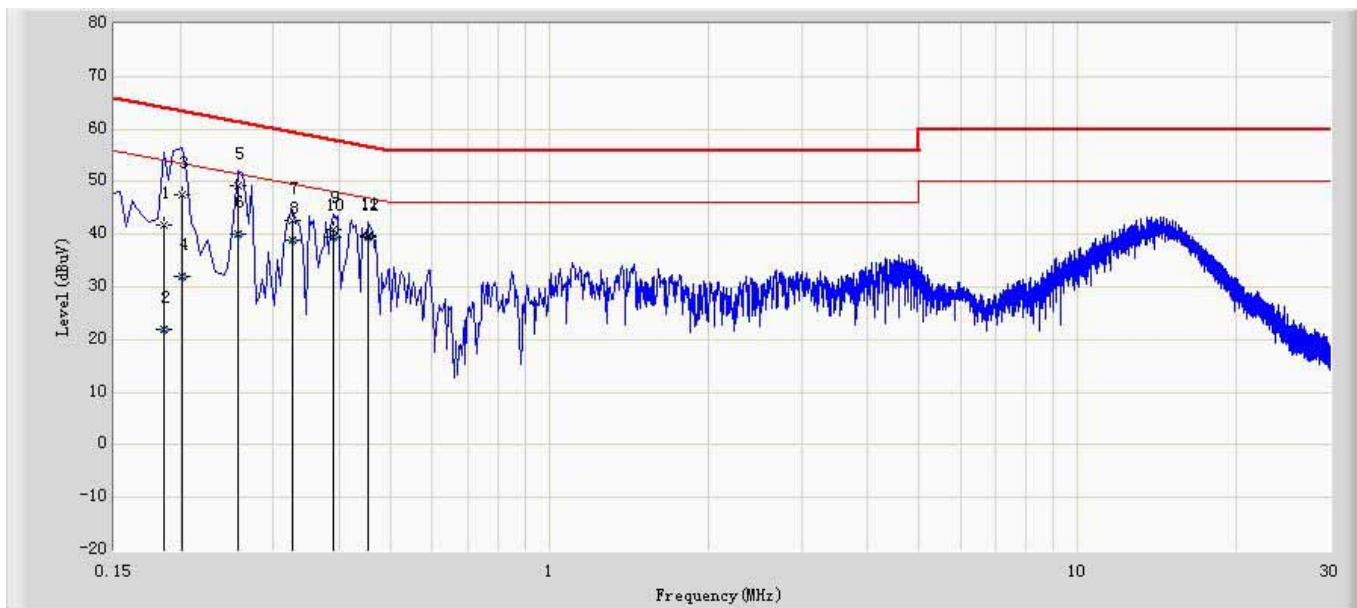
3.6. Test Result

Site: SR8	Time: 2013/05/16 - 20:11
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-L1	Polarity: Line
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.186	45.057	35.345	-19.156	64.213	9.712	QP
2		0.186	24.509	14.797	-29.704	54.213	9.712	AV
3	*	0.194	54.928	45.218	-8.936	63.864	9.710	QP
4		0.194	43.715	34.005	-10.149	53.864	9.710	AV
5		0.210	45.340	35.630	-17.865	63.205	9.710	QP
6		0.210	15.415	5.705	-37.790	53.205	9.710	AV
7		0.258	50.874	41.167	-10.622	61.496	9.707	QP
8		0.258	41.414	31.707	-10.082	51.496	9.707	AV
9		0.334	36.786	27.086	-22.565	59.351	9.700	QP
10		0.334	22.927	13.227	-26.424	49.351	9.700	AV
11		0.438	37.216	27.516	-19.884	57.100	9.700	QP
12		0.438	12.510	2.810	-34.590	47.100	9.700	AV

Site: SR8	Time: 2013/05/16 - 20:11
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216-N	Polarity: Neutral
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.186	41.725	32.004	-22.488	64.213	9.721	QP
2		0.186	21.931	12.210	-32.282	54.213	9.721	AV
3		0.202	47.519	37.799	-16.009	63.528	9.720	QP
4		0.202	31.891	22.171	-21.637	53.528	9.720	AV
5		0.258	49.181	39.464	-12.315	61.496	9.717	QP
6		0.258	40.159	30.442	-11.337	51.496	9.717	AV
7		0.326	42.570	32.860	-16.982	59.552	9.710	QP
8		0.326	38.795	29.085	-10.757	49.552	9.710	AV
9		0.390	40.907	31.207	-17.157	58.064	9.700	QP
10		0.390	39.343	29.643	-8.721	48.064	9.700	AV
11		0.454	39.808	30.106	-16.994	56.802	9.702	QP
12	*	0.454	39.379	29.677	-7.423	46.802	9.702	AV

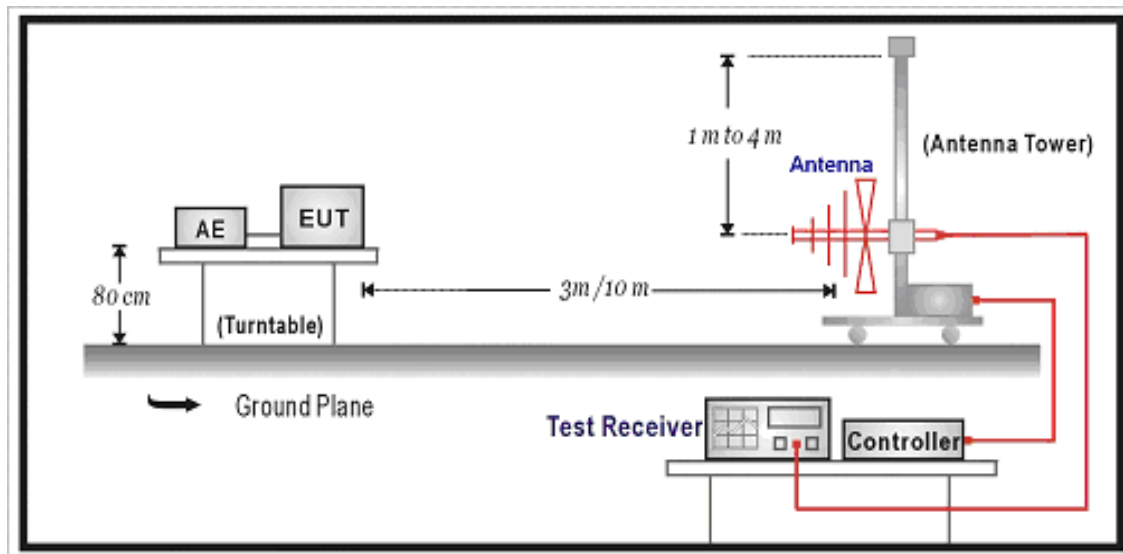
4. Radiated Emission

4.1. Test Specification

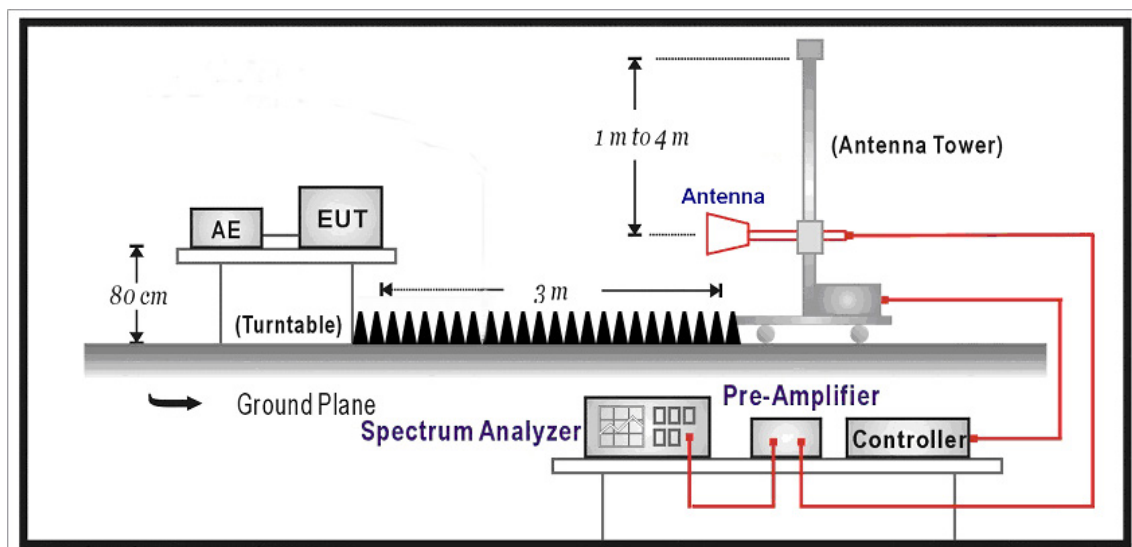
According to EMC Standard: FCC Part 15 Subpart B, ANSI C63.4

4.2. Test Setup

Below 1GHz Test Setup



Above 1GHz Test Setup



4.3. Limit

FCC Part 15 Subpart B Paragraph 15.109 Limits (dBuV/m)		
Frequency (MHz)	Distance (m)	dBuV/m
30-88	3	40
88-216	3	43.5
216-960	3	46
Above 960	3	54
NOTE: The lower limit shall apply at the transition frequency.		

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.

The turn table can rotate 360 degrees to determine the position of the maximum emission level and the antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

For an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

On any frequency or frequencies below or equal to 1000 MHz, the radiated limits shown are based on measuring equipment employing a quasi-peak detector function and above 1000 MHz, the radiated limits shown are based measuring equipment employing an average detector function.

When average radiated emission measurement are included emission measurement Above 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

For class A, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and above 1GHz.

For class B, the measurement distance between the EUT and antenna is 3 meters.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 kHz and above 1GHz is 1MHz.

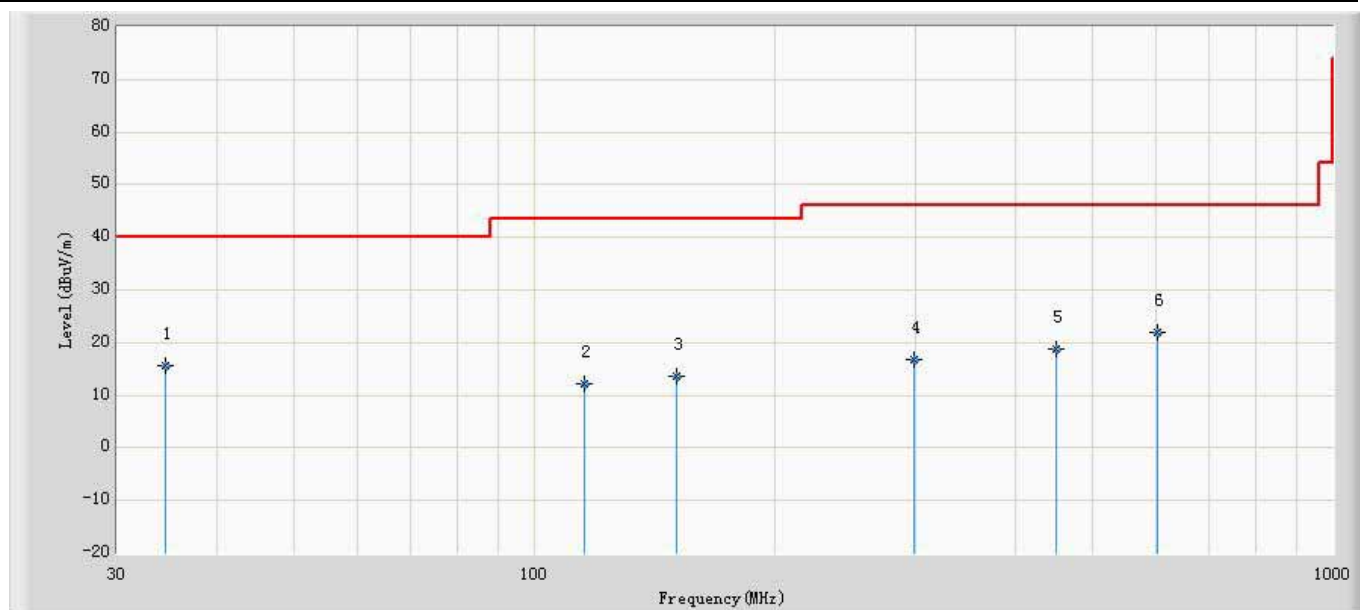
The measurement is performed in the 667MHz processor.

4.5. Deviation from Test Standard

No deviation.

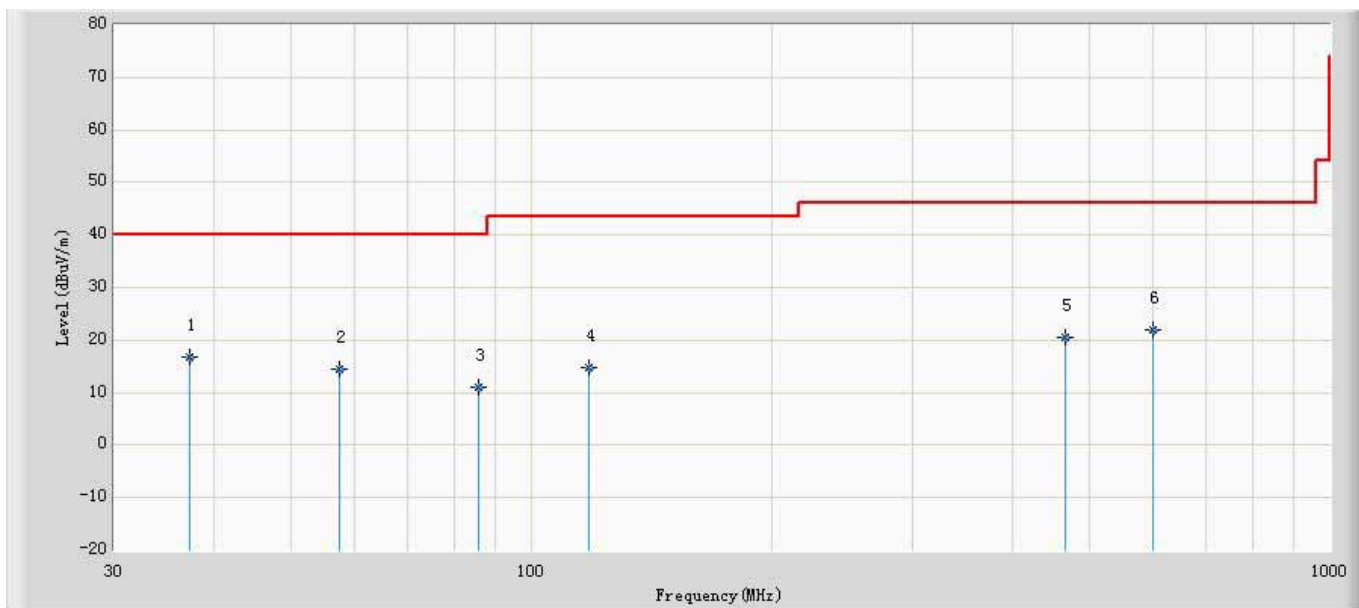
4.6. Test Result

Site: CB7	Time: 2013/05/28 - 21:25
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Horizontal
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



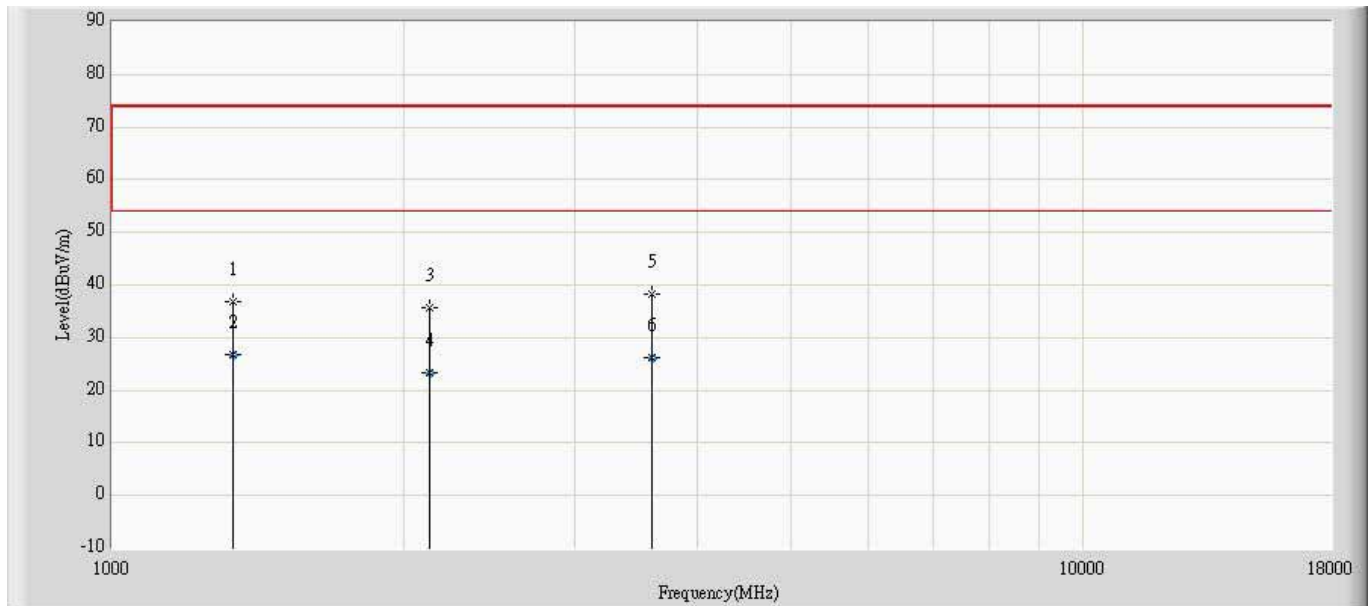
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		34.510	15.770	-1.051	-24.230	40.000	16.820	QP
2		115.500	12.240	-1.240	-31.260	43.500	13.480	QP
3		150.612	13.603	1.810	-29.897	43.500	11.793	QP
4		299.041	16.741	1.510	-29.259	46.000	15.231	QP
5		450.612	18.789	-0.541	-27.211	46.000	19.330	QP
6	*	602.440	22.090	0.410	-23.910	46.000	21.680	QP

Site: CB7	Time: 2013/05/28 - 21:26
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: CB7_CBL6112_0726	Polarity: Vertical
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



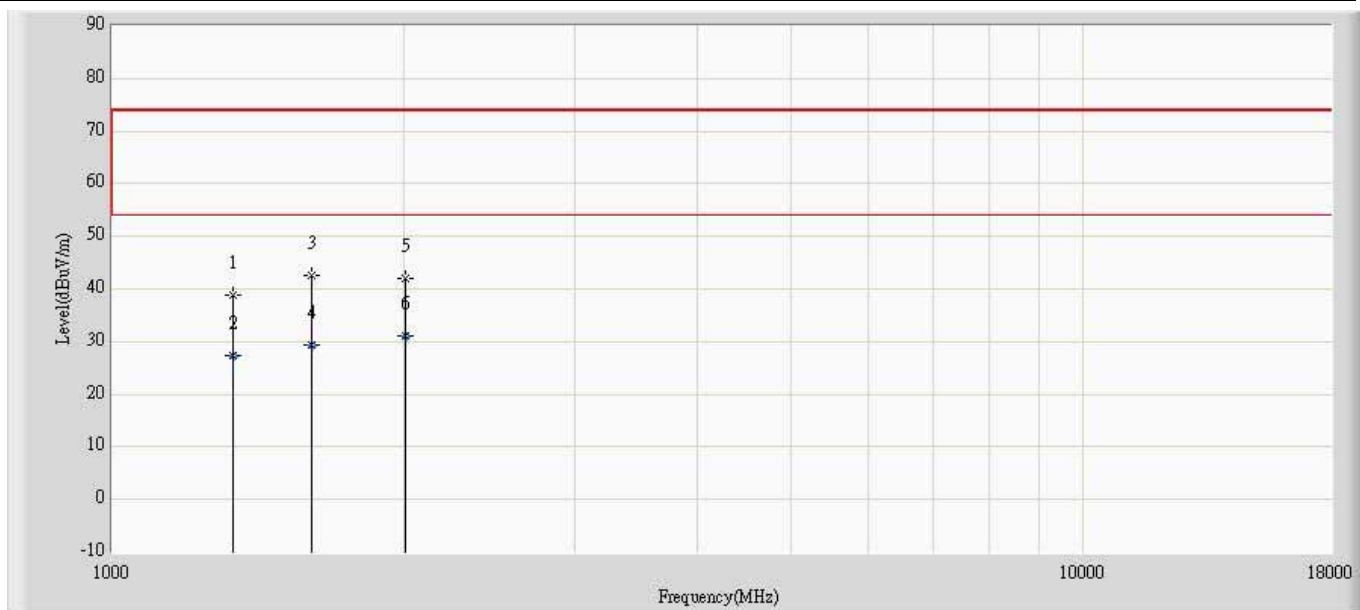
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	37.384	16.723	1.540	-23.277	40.000	15.183	QP
2		57.500	14.487	6.742	-25.513	40.000	7.745	QP
3		85.645	10.921	1.742	-29.079	40.000	9.180	QP
4		118.041	14.633	1.041	-28.867	43.500	13.592	QP
5		466.645	20.487	0.871	-25.513	46.000	19.616	QP
6		599.641	22.083	0.410	-23.917	46.000	21.673	QP

Site: CB7	Time: 2012/05/27 - 10:41
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: BBHA 9120D_576(1-18GHz)	Polarity: Horizontal
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			1331.500	36.791	57.926	-37.209	74.000	-21.134	PK
2		*	1331.500	26.925	48.060	-27.075	54.000	-21.134	AV
3			2122.000	35.621	53.501	-38.379	74.000	-17.880	PK
4			2122.000	23.276	41.156	-30.724	54.000	-17.880	AV
5			3601.000	38.147	53.204	-35.853	74.000	-15.057	PK
6			3601.000	26.169	41.226	-27.831	54.000	-15.057	AV

Site: CB7	Time: 2012/05/27 - 10:41
Limit: FCC_Part15.109_RE(3m)_ClassB	Margin: 0
Probe: BBHA 9120D_576(1-18GHz)	Polarity: Vertical
EUT: WIRELESS-BGN 23DBM 2X2 NETWORK MINI PCIE ADAPTER	Power: AC 120V/60Hz
Note: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			1331.500	38.778	59.913	-35.222	74.000	-21.134	PK
2			1331.500	27.416	48.551	-26.584	54.000	-21.134	AV
3			1603.500	42.581	63.510	-31.419	74.000	-20.930	PK
4			1603.500	29.486	50.415	-24.514	54.000	-20.930	AV
5			2003.000	41.882	61.291	-32.118	74.000	-19.409	PK
6		*	2003.000	31.032	50.441	-22.968	54.000	-19.409	AV

4.7. Test Photograph

Test Mode : Mode 1: Normal Operation

Description : Front View of Radiated Test



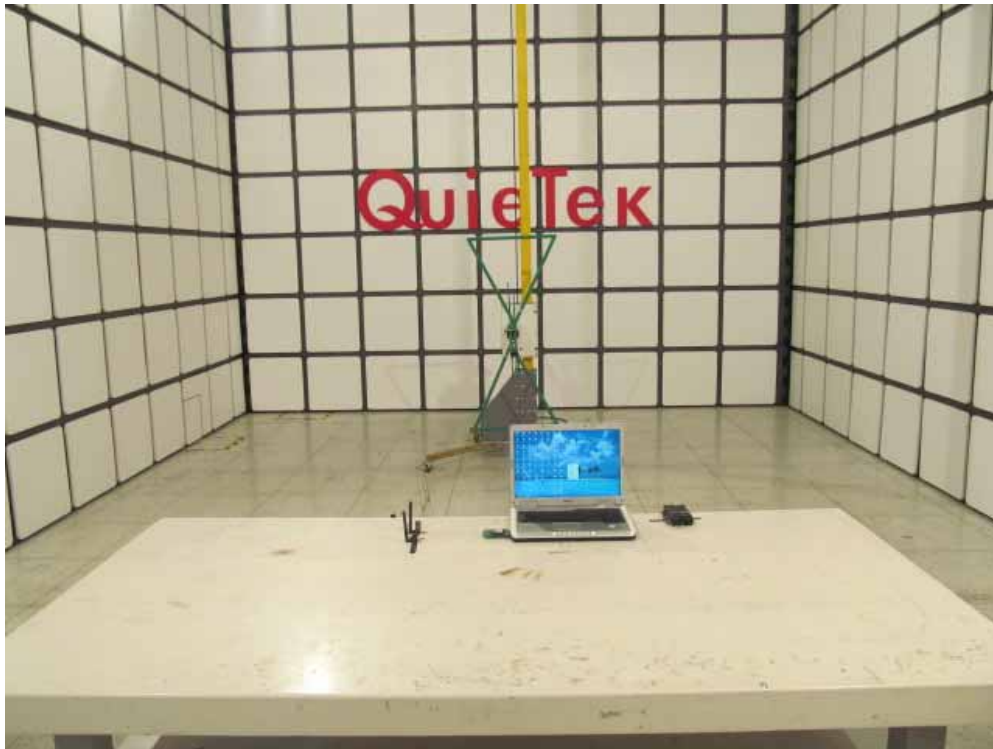
Test Mode : Mode 1: Normal Operation

Description : Back View of Radiated Test



Test Mode : Mode 1: Normal Operation

Description : Front View of High Frequency Radiated Test



Test Mode : Mode 1: Normal Operation

Description : Back View of High Frequency Radiated Test

