

# TEST REPORT

For

**Wireless LAN Module**

In conformity with

**FCC CFR 47 Part15 / RSS-210**

**Model: GN-1060**

**FCC ID / IC Certification No: BJI-GN1060 / 1004C-GN1060**

**Test Item: Wireless LAN Module**

**Report No: RY1008Z11R1**

**Issue Date: 11 August, 2010**

**Prepared for**

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## History

Report No.	Date	Revisions	Issued By
RY1008Z11R1	11 August, 2010	Initial Issue	K. Ohnishi

## 1 General information

### 1.1 Product description

Test item	: Wireless LAN Module
Model	: GN-1060
FCC ID	: BJI-GN1060
IC Certification No	: 1004C-GN1060
Serial numbers	: 619CU007073B
Frequency range	: IEEE 802.11b/g (2412 - 2462MHz) : draft IEEE 802.11n Standard-20MHz (2412 - 2462MHz) : draft IEEE 802.11n Standard-40MHz (2412 - 2452MHz)
Oscillator frequencies	: 40 MHz
Type of Modulation	: IEEE 802.11b (DSSS) : IEEE 802.11g (OFDM) : draft IEEE 802.11n Standard-20MHz (OFDM) : draft IEEE 802.11n Standard-40MHz (OFDM)
Antenna Type	: HTL008 (PIFA)
Antenna Gain	: 0.5 dBi
Receipt date of EUT	: 28 July, 2010
Nominal power source voltages	: AC 115V, 60Hz
Hardware version	: Ver1.0
Software version	: Ver1.0

### 1.2 Test(s) performed/ Summary of test result


Test specification(s)	: FCC CFR 47. Part 15 (October 1, 2009) / RSS-210 Issue 7, RSS-Gen Issue 2
Test method(s)	: ANSI C63.4: 2003
Test(s) started	: 29 July, 2010
Test(s) completed	: 1 August, 2010
Purpose of test(s)	: Grant for Certification of FCC
Summary of test result	: Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

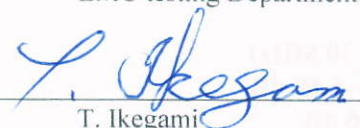
Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer



K. Ohnishi  
EMC testing Department

Reviewer



T. Ikegami  
Manager  
EMC testing Department

### 1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at RF Technologies Ltd., located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 1, 2009. The description of the test facilities has been filed under registration number 319924 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Each registered facility number is as follows;

Test site (Semi-Anechoic chamber 3m) R-2393

Test site (Shielded room) C-2617

Registered by Industry Canada (IC): The registered facility number is as follows;

Test site No. 1 (Semi-Anechoic chamber 3m): 6974A-1

Accredited by **National Voluntary Laboratory Accreditation Program (NVLAP)** for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB CODE 200780-0

### 1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring UKAS Publication LAB34: 2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2: 2003 “Uncertainty in EMC Measurements”.

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

Conducted emission: +/- 1.87 dB (10 kHz – 30 MHz)

Radiated emission (30MHz - 1000MHz): +/- 5.89 dB

Radiated emission (1GHz - 18GHz): +/- 5.76 dB

Radiated emission (18GHz - 26GHz): +/- 5.88 dB

## 1.5 Summary of test results

### 1.5.1 Table of test summary

Requirement of;	Section in FCC15	Section in RSS-210/ RSS-Gen	Result	Section in this report
1.5.1 Average Output Power	-	-	-	2.1
1.5.2 Transmitter Radiated Spurious Emissions	15.205 / 15.209	RSS-210 A8.5	Complied	2.2
1.5.3 Transmitter AC Power Line Conducted Emissions	15.207	RSS-Gen 7.2.2	Complied	2.3
1.5.4 Receiver Radiated Spurious Emissions	-	RSS-Gen 6	Complied	2.4

## 1.6 Setup of equipment under test (EUT)

### 1.6.1 Test configuration of EUT

#### Equipment(s) under test:

	Item	Manufacturer	Model No.	Serial No.
A	Wireless LAN Module	Toshiba TEC Corporation	GN-1060	619CU007073B

#### Support Equipment(s):

	Item	Manufacturer	Model No.	Serial No.
B	Multifunctional Digital System	Toshiba TEC Corporation	Rep.	CHE000016
C	Laptop PC	TOSHIBA	PP410J0001G1	13513107
D	AC Adaptor	TOSHIBA	PA3262U-1ACA	0212A0005779G
E	Mouse	TOSHIBA	G83C0001Y110	LZE30201086

#### Connected cable(s):

No.	Item	Identification (Manu.e.t.c)	Shielded YES / NO	Ferrite Core YES / NO	Connector Type Shielded YES / NO	Length (m)
1	AC power cable	E166095	Yes	No	Yes	2.0
2	LAN cable	LD-CTX/BU3	No	No	No	3.0
3	DC power cable	TOSHIBA	No	No	No	1.8
4	AC power cable	TOSHIBA	No	No	No	1.5

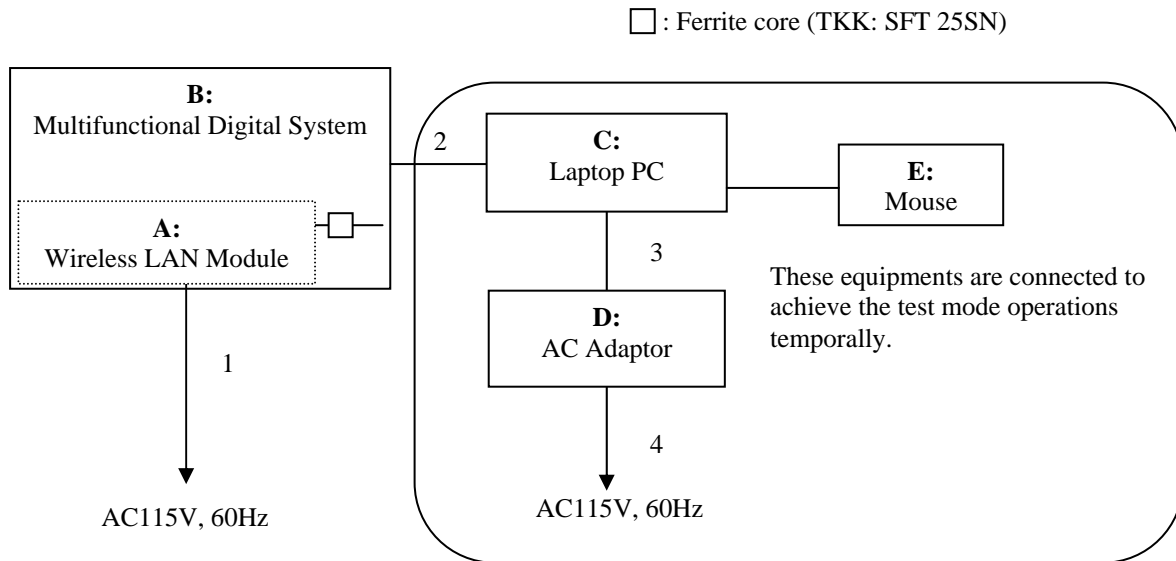
### 1.6.2 Operating condition:

#### Operating mode:

The EUT was tested under the following test mode prepared by the applicant:

- (1-1) IEEE 802.11b (Data rate: 1Mbps(worst)), Continuous transmission
- (1-2) IEEE 802.11g (Data rate: 6Mbps(worst)), Continuous transmission
- (1-3) draft IEEE 802.11n Standard-20MHz (Data rate: 6.5Mbps(worst)), Continuous transmission
- (1-4) draft IEEE 802.11n Standard-40MHz (Data rate: 13.5Mbps(worst)), Continuous transmission

### 1.6.3 Setup diagram of tested system:



### 1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

### 1.8 Deviation from the standard

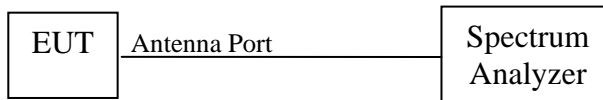
No deviations from the standards described in clause 1.2.

## 2 Test procedure and test data

### 2.1 Average output power

#### Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



#### Test procedure

The transmitter power is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the average power detection.

#### Limitation

There are no limitations.

#### Test equipment used (refer to List of utilized test equipment)

TA06	CL26				
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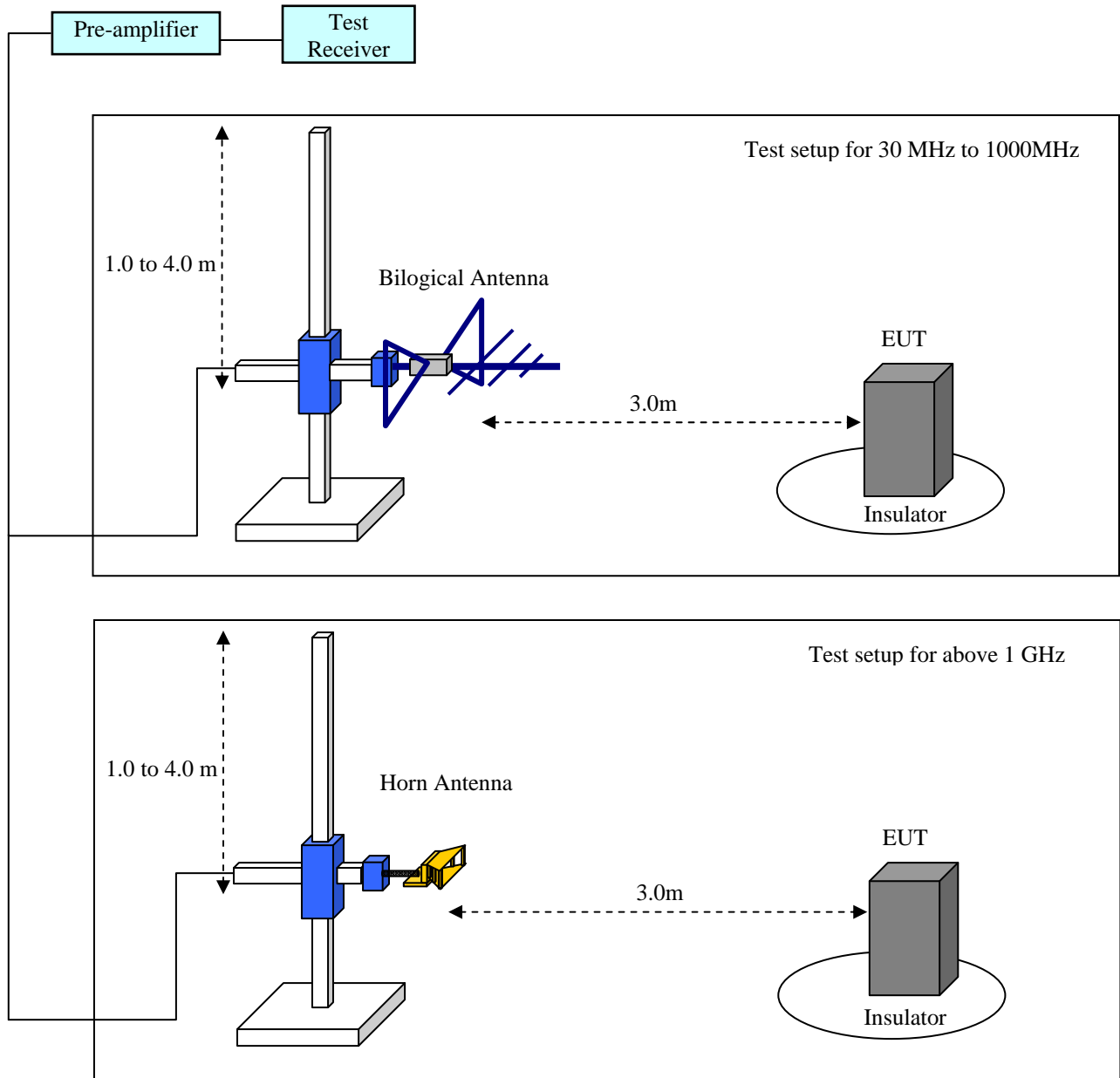
#### Test results

**Average output power is within 5% of the result of test report. (Report No. 81029005)**

## 2.2 Transmitter Radiated spurious emissions

### Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 “General requirements for EUT equipment arrangements and operation”, clause 8.2 and Annex H.3 “Radiated emission measurements setup”



### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 8.2. The EUT is placed on a non-conducted table which is 0.8m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level. In the frequency above 30 MHz, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. EUT is placed at three different orientations (X, Y and Z axis) in order to find the worst orientation. The spectrum analyzer and receiver is set to the followings;



Between 30 - 1000 MHz: RBW=100 kHz, VBW= 300 kHz  
 Final measurement is carried out with a receiver RBW of 120 kHz (QP)

Above 1000 MHz: Peak measurement- RBW=1 MHz, VBW= 1 MHz  
 Average measurement – RBW=1 MHz, VBW=10 Hz

**Applicable rule and limitation**

§15.205 restricted bands of operation

Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.490 - 0.510	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(1)

15.205(b) except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

15.209( a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

In the emission table above, the tighter limit applies at the band edges.  
 The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.  
 The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz.  
 Radiated emission limits in the above bands are based on measurements employing an average detector.

**Test results - Complied with requirement.**

## Test Data

### 2.2.1 Between 30 – 1000 MHz (Worst case)

Test equipment used (refer to List of utilized test equipment)

BA04	CL11	PR03	TR06
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Tested Date: 1 August, 2010

Temperature: 22 °C  
 Humidity: 51 %  
 Atmos. Press: 1008 hPa

### Wireless LAN Module (Applicable limitation: Class B)

Operating mode: Continuous Communication (IEEE 802.11b, 2437MHz: Worst configuration)

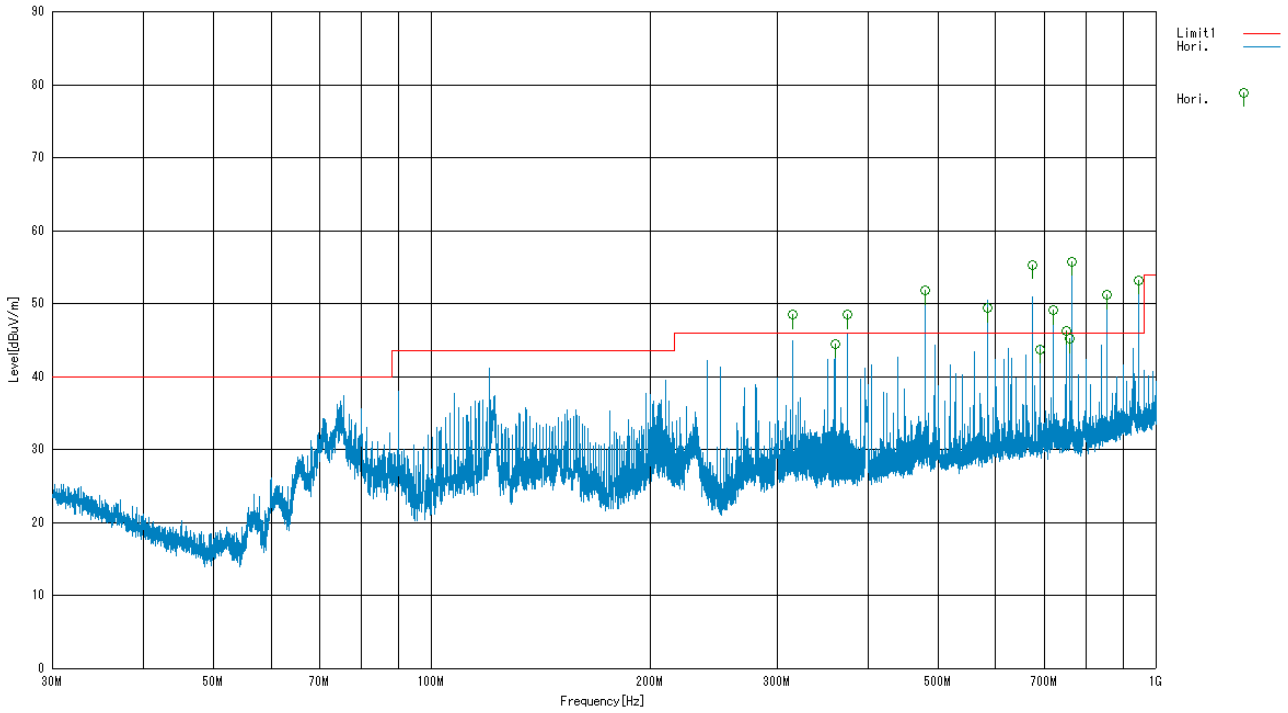
Measurement distance: 3 m

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Polarization
<b>1</b>	<b>79.996</b>	<b>52.1</b>	<b>7.1</b>	<b>7.7</b>	<b>29.7</b>	<b>37.2</b>	<b>40.0</b>	<b>2.8</b>	<b>Vert.</b>
<b>2</b>	<b>83.385</b>	<b>47.9</b>	<b>7.7</b>	<b>7.8</b>	<b>29.6</b>	<b>33.8</b>	<b>40.0</b>	<b>6.2</b>	<b>Vert.</b>
3	90.002	-	-	-	-	-	-	-	Vert.
4	314.606	-	-	-	-	-	-	-	Vert.
5	314.606	-	-	-	-	-	-	-	Hori.
<b>6</b>	<b>359.978</b>	<b>50.1</b>	<b>15.0</b>	<b>10.1</b>	<b>29.7</b>	<b>45.5</b>	<b>46.0</b>	<b>0.5</b>	<b>Vert.</b>
<b>7</b>	<b>359.992</b>	<b>49.1</b>	<b>15.0</b>	<b>10.1</b>	<b>29.7</b>	<b>44.5</b>	<b>46.0</b>	<b>1.5</b>	<b>Hori.</b>
8	374.991	-	-	-	-	-	-	-	Hori.
<b>9</b>	<b>390.023</b>	<b>48.8</b>	<b>15.6</b>	<b>10.3</b>	<b>29.8</b>	<b>44.9</b>	<b>46.0</b>	<b>1.1</b>	<b>Vert.</b>
10	480.000	-	-	-	-	-	-	-	Vert.
11	480.012	-	-	-	-	-	-	-	Hori.
12	560.008	-	-	-	-	-	-	-	Vert.
13	584.279	-	-	-	-	-	-	-	Hori.
14	584.281	-	-	-	-	-	-	-	Vert.
15	674.182	-	-	-	-	-	-	-	Hori.
16	674.182	-	-	-	-	-	-	-	Vert.
<b>17</b>	<b>690.004</b>	<b>41.9</b>	<b>19.4</b>	<b>12.1</b>	<b>29.7</b>	<b>43.7</b>	<b>46.0</b>	<b>2.3</b>	<b>Hori.</b>
18	720.005	-	-	-	-	-	-	-	Vert.
19	720.010	-	-	-	-	-	-	-	Hori.
20	749.998	-	-	-	-	-	-	-	Hori.
<b>21</b>	<b>760.021</b>	<b>42.7</b>	<b>19.7</b>	<b>12.4</b>	<b>29.6</b>	<b>45.2</b>	<b>46.0</b>	<b>0.8</b>	<b>Hori.</b>
22	764.071	-	-	-	-	-	-	-	Vert.
23	764.072	-	-	-	-	-	-	-	Hori.
24	799.999	-	-	-	-	-	-	-	Vert.
25	853.954	-	-	-	-	-	-	-	Hori.
26	853.959	-	-	-	-	-	-	-	Vert.
27	899.997	-	-	-	-	-	-	-	Vert.
28	930.015	-	-	-	-	-	-	-	Vert.
29	943.843	-	-	-	-	-	-	-	Hori.
30	943.854	-	-	-	-	-	-	-	Vert.
31	959.998	-	-	-	-	-	-	-	Vert.

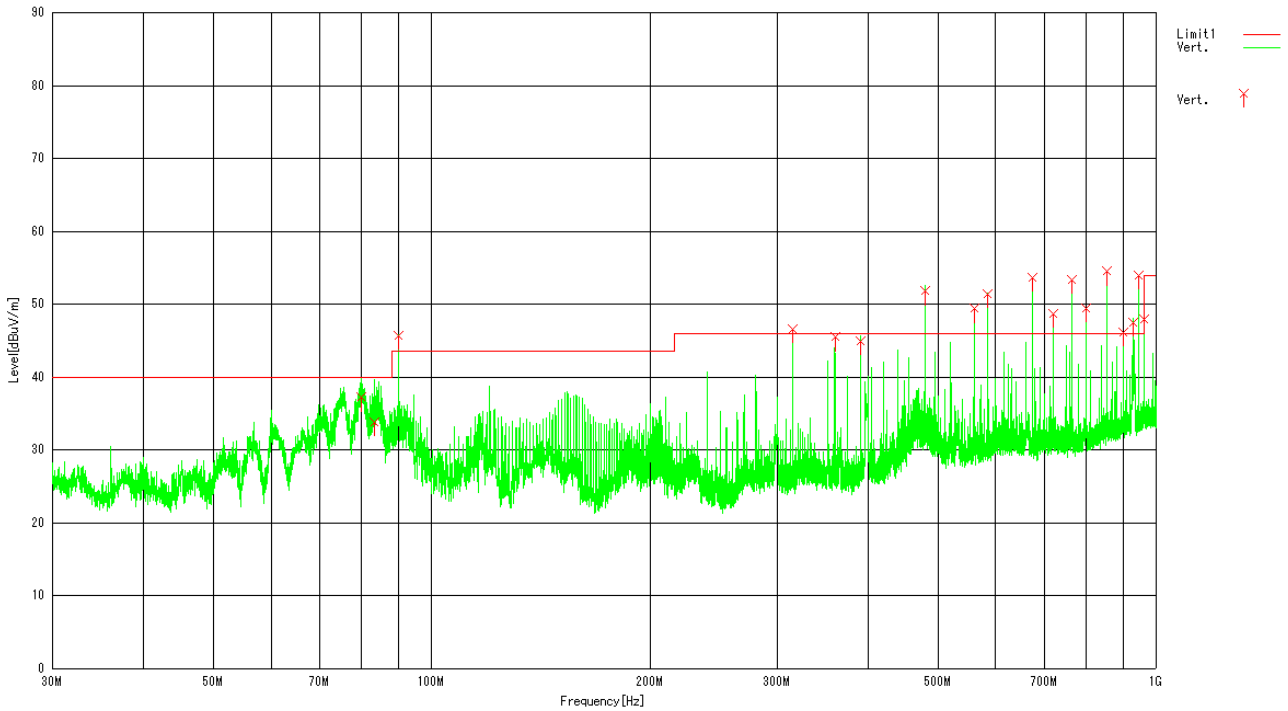
Note: Spurious emissions exceeded the limit is not caused by wireless LAN. Please refer to p.12 in this report.

## Graphical express of test result (30MHz-1000MHz)

Antenna polarization: Horizontal



Antenna polarization: Vertical



**Host Device: Multifunctional Digital System (Applicable limitation: Class A)**

Measurement distance: 3 m

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Polarization
1	79.996	52.7	7.1	7.7	29.7	37.8	49.5	11.7	Vert.
2	90.002	58.5	8.9	7.9	29.6	45.7	53.9	8.2	Vert.
3	314.606	54.5	13.9	9.8	29.7	48.5	56.9	8.4	Hori.
4	314.606	52.6	13.9	9.8	29.7	46.6	56.9	10.3	Vert.
5	359.978	49.9	15.0	10.1	29.7	45.3	56.9	11.6	Vert.
6	359.992	49.3	15.0	10.1	29.7	44.7	56.9	12.2	Hori.
7	374.991	52.8	15.3	10.2	29.8	48.5	56.9	8.4	Hori.
8	390.023	48.7	15.6	10.3	29.8	44.8	56.9	12.1	Vert.
9	480.000	53.3	17.3	11.0	29.8	51.8	56.9	5.1	Vert.
10	480.012	53.3	17.3	11.0	29.8	51.8	56.9	5.1	Hori.
11	560.008	49.3	18.5	11.4	29.8	49.4	56.9	7.5	Vert.
12	584.279	48.9	18.8	11.5	29.8	49.4	56.9	7.5	Hori.
13	584.281	50.9	18.8	11.5	29.8	51.4	56.9	5.5	Vert.
14	674.182	53.7	19.3	12.0	29.7	55.3	56.9	1.6	Hori.
15	674.182	52.1	19.3	12.0	29.7	53.7	56.9	3.2	Vert.
16	690.004	41.5	19.4	12.1	29.7	43.3	56.9	13.6	Hori.
17	720.005	46.7	19.5	12.2	29.7	48.7	56.9	8.2	Vert.
18	720.010	47.1	19.5	12.2	29.7	49.1	56.9	7.8	Hori.
19	749.998	43.8	19.7	12.4	29.6	46.3	56.9	10.6	Hori.
20	760.021	42.8	19.7	12.4	29.6	45.3	56.9	11.6	Hori.
21	764.071	50.9	19.7	12.4	29.6	53.4	56.9	3.5	Vert.
<b>22</b>	<b>764.072</b>	<b>53.3</b>	<b>19.7</b>	<b>12.4</b>	<b>29.6</b>	<b>55.8</b>	<b>56.9</b>	<b>1.1</b>	<b>Hori.</b>
23	799.999	46.6	19.9	12.6	29.6	49.5	56.9	7.4	Vert.
24	853.954	47.1	20.4	13.0	29.3	51.2	56.9	5.7	Hori.
25	853.959	50.4	20.4	13.0	29.3	54.5	56.9	2.4	Vert.
26	893.999	41.6	20.7	13.2	29.2	46.3	56.9	10.6	Vert.
27	899.997	41.3	20.8	13.2	29.1	46.2	56.9	10.7	Vert.
28	930.015	42.0	21.0	13.4	28.9	47.5	56.9	9.4	Vert.
29	943.843	47.6	21.0	13.4	28.8	53.2	56.9	3.7	Hori.
30	943.854	48.4	21.0	13.4	28.8	54.0	56.9	2.9	Vert.
31	959.998	42.1	21.1	13.5	28.7	48.0	56.9	8.9	Vert.

**Calculation method**

The Correction Factors and RESULT are calculated as followings.

$$\text{Correction Factor [dB/m]} = \text{FACTOR [dB/m]} + \text{LOSS [dB]} - \text{GAIN [dB]}$$

$$\text{RESULT [dBuV/m]} = \text{READING [dBuV]} + \text{Correction Factor [dB/m]}$$

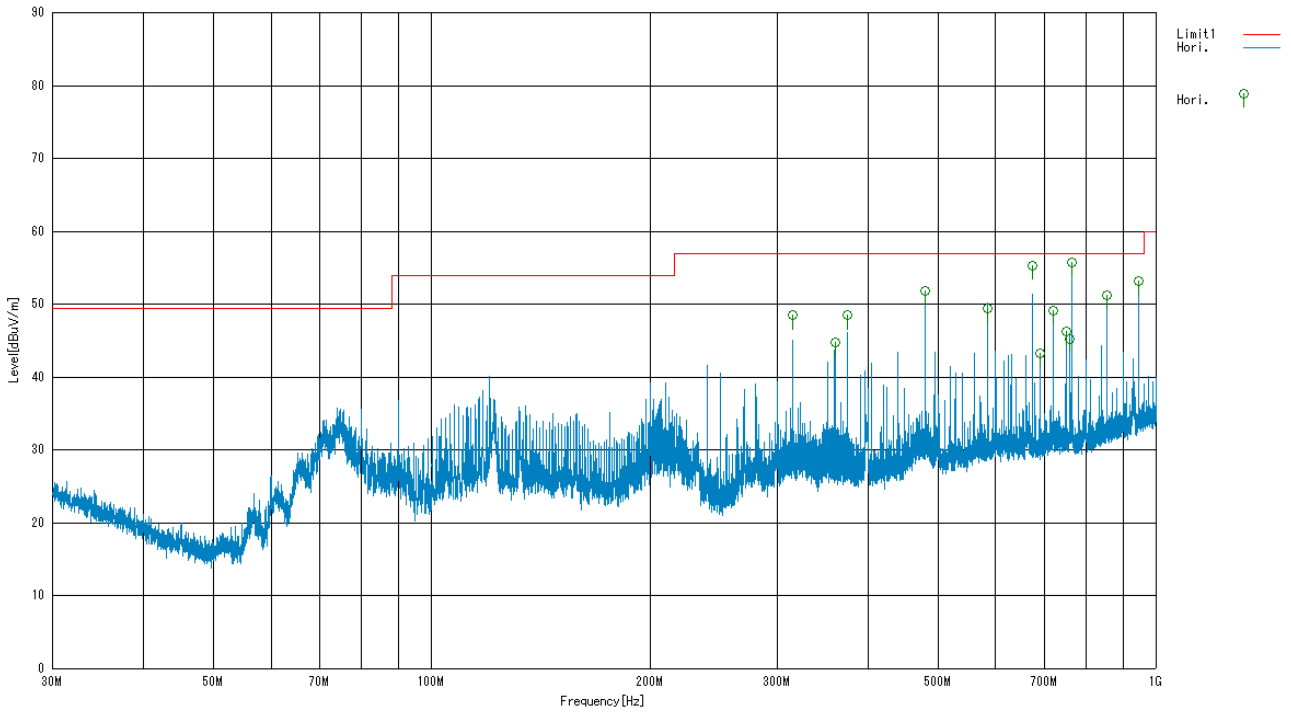
Sample calculation at 764.072 MHz horizontal result as follow:

$$\text{Result [dBuV/m]} = \text{Reading} + \text{C.F} = 53.3 + 19.7 + 12.4 - 29.6 = 55.8$$

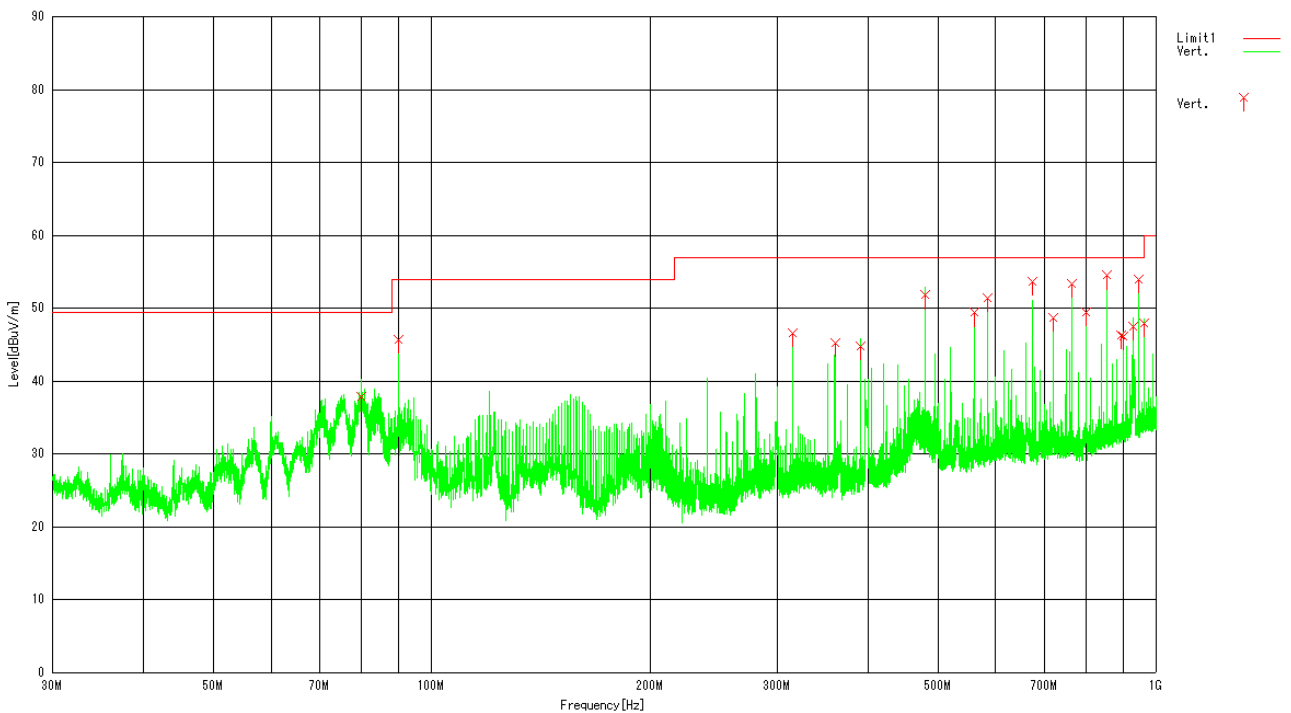
$$\text{Margin} = \text{Limit} - \text{Result} = 56.9 - 55.8 = 1.1 \text{ [dB]}$$

## Graphical express of test result (30MHz-1000MHz)

### Antenna polarization: Horizontal



### Antenna polarization: Vertical



## 2.2.2 Above 1000 MHz (Worst case)

Test equipment used (refer to List of utilized test equipment)

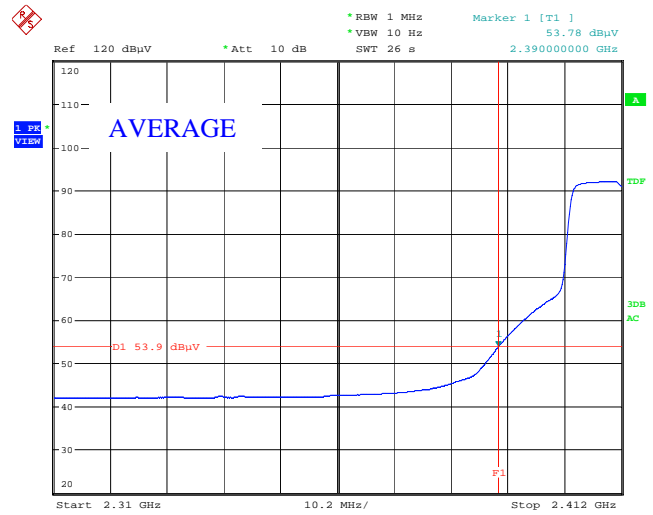
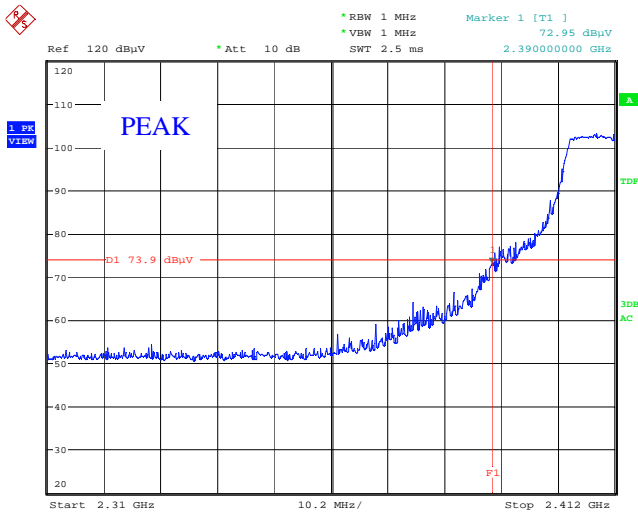
PR12	SH01	TR06	CL23	CL24	BRF2	HPF1	DH01	AC01
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Tested Date: 29 July, 2010

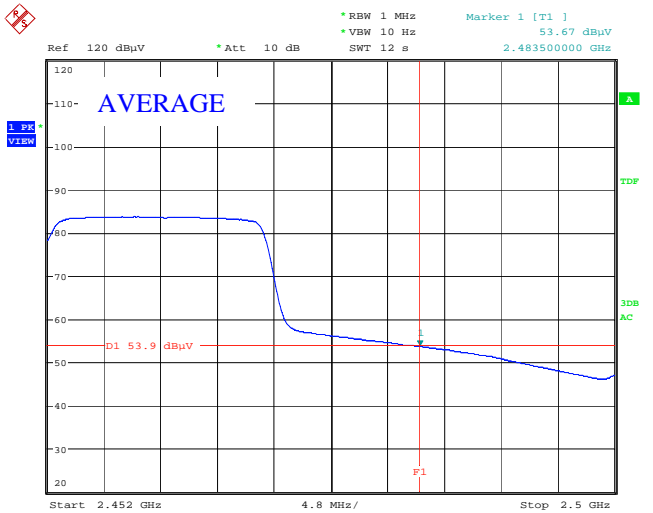
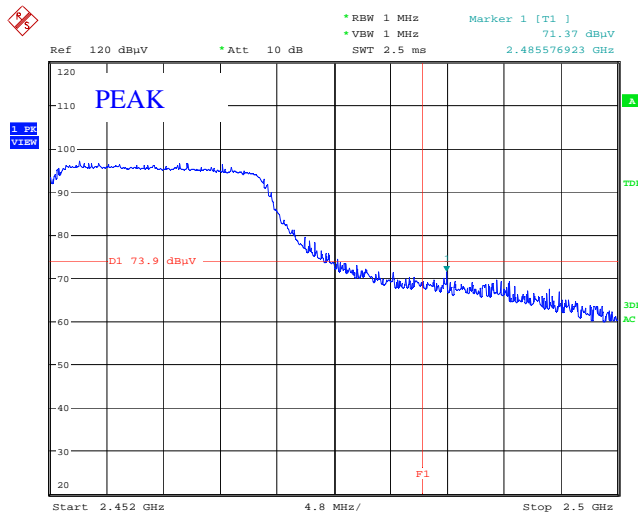
Temperature: 21 °C  
 Humidity: 51 %  
 Atmos. Press: 1010 hPa

### Restricted Band Edge (Worst case)

Low channel (IEEE 802.11n Standard-20MHz, Vertical (Worst Configuration))



High channel (IEEE 802.11n Standard-40MHz, Vertical (Worst Configuration))



**Harmonics and Spurious Emission above 1000 MHz (Worst case)**

Operating mode: Continuous Communication (IEEE 802.11b, 2437MHz: Worst configuration)

Measurement distance: 3 m

There are no spurious emissions other than listed below;

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		Polarization
		Peak [dBuV]	Ave [dBuV]		Peak [dBuV]	Ave [dBuV]	Peak [dBuV]	Ave [dBuV]	Peak [dB]	Ave [dB]	
<b>1</b>	<b>4873.981</b>	44.8	<b>35.6</b>	<b>2.5</b>	47.3	<b>38.1</b>	73.9	<b>53.9</b>	26.6	<b>15.8</b>	<b>Vert.</b>
2	17503.92	40.5	27.2	20.3	60.8	47.5	73.9	53.9	13.1	6.4	Vert.
3	17505.03	40.5	27.1	20.2	60.7	47.3	73.9	53.9	13.2	6.6	Hori.

Note: Measurement result at No.2, 3 is the worst floor noise level.

**Calculation method**

The Correction Factors and RESULT are calculated as followings.

$$\text{Correction Factor [dB/m]} = \text{FACTOR [dB/m]} + \text{LOSS [dB]} - \text{GAIN [dB]}$$

$$\text{RESULT [dBuV/m]} = \text{READING [dBuV]} + \text{Correction Factor [dB/m]}$$

Sample calculation at 4873.981 MHz vertical result as follow:

$$\text{Result [dBuV/m]} = \text{Reading} + \text{C.F} = 35.6 + 2.5 = 38.1$$

$$\text{Margin} = \text{Limit} - \text{Result} = 53.9 - 38.1 = 15.8 \text{ [dB]}$$

## 2.3 Transmitter AC power line conducted emissions

### Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 “General requirements for EUT equipment arrangements and operation” and Annex H.1 “AC power line conducted emission measurements setup”.

### Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 7, clause 13.1.3 and Annex H.2 “AC power line conducted emission measurements”.

Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.

Final ac power line conducted emission measurements were performed based on the exploratory tests.

The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.

When the measurement value is greater than average limitation the average detection measurements were performed.

### Applicable rule and limitation

§15.207 (a) AC power line conducted limits

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.

The lower limit applies at the band edges.

### Test equipment used (refer to List of utilized test equipment)

TR06	PL06	LN05	LN06	CL11
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**Test results - Complied with requirement.**



**Test Data**

Tested Date: 1 August, 2010

Temperature: 22 °C  
Humidity: 51 %  
Atmos. Press: 1008 hPa

Operating mode: Continuous Communication

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.195	40.6	36.8	10.4	51.0	47.2	63.8	53.8	12.8	6.6	Vb
<b>2</b>	<b>0.195</b>	42.7	<b>38.9</b>	<b>10.4</b>	53.1	<b>49.3</b>	63.8	<b>53.8</b>	10.7	<b>4.5</b>	<b>Va</b>
3	0.291	26.4	23.1	10.4	36.8	33.5	60.5	50.5	23.7	17.0	Va
4	0.292	25.5	23.5	10.4	35.9	33.9	60.5	50.5	24.6	16.6	Vb
5	6.929	30.6	28.1	10.7	41.3	38.8	60.0	50.0	18.7	11.2	Vb
6	6.993	30.7	28.4	10.7	41.4	39.1	60.0	50.0	18.6	10.9	Va
7	12.323	23.8	19.1	10.9	34.7	30.0	60.0	50.0	25.3	20.0	Va
8	12.424	24.4	19.8	10.9	35.3	30.7	60.0	50.0	24.7	19.3	Vb

The power line conducted emission voltage is calculated by adding the LISN factor and Cable loss attenuation from the measured reading. The calculation is as follows:

$$\text{Result} = \text{Reading} + \text{C. F}$$

where C.F = LISN Factor + Cable Loss [dB]

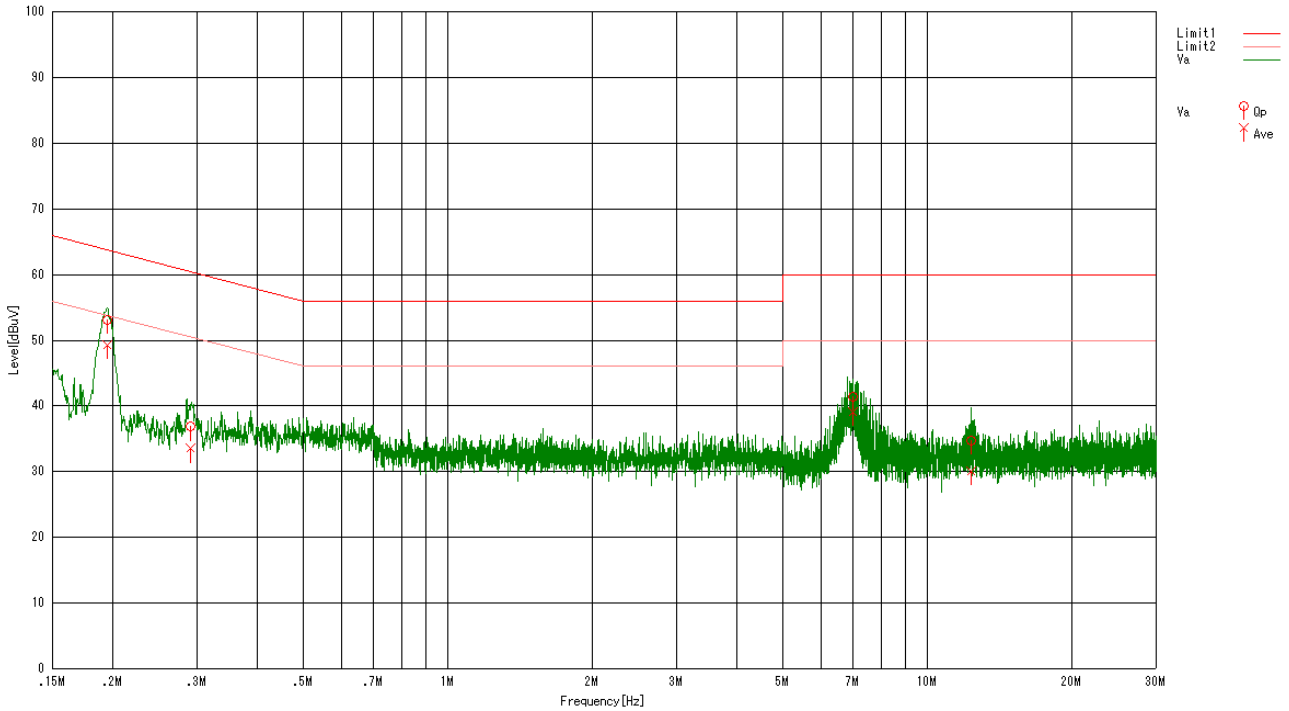
Sample calculation at 0.195 MHz AV result as follow:

$$\text{Result [dBuV]} = \text{Reading} + \text{C.F} = 38.9 + 10.4 = 49.3 \text{ [dBuV]}$$

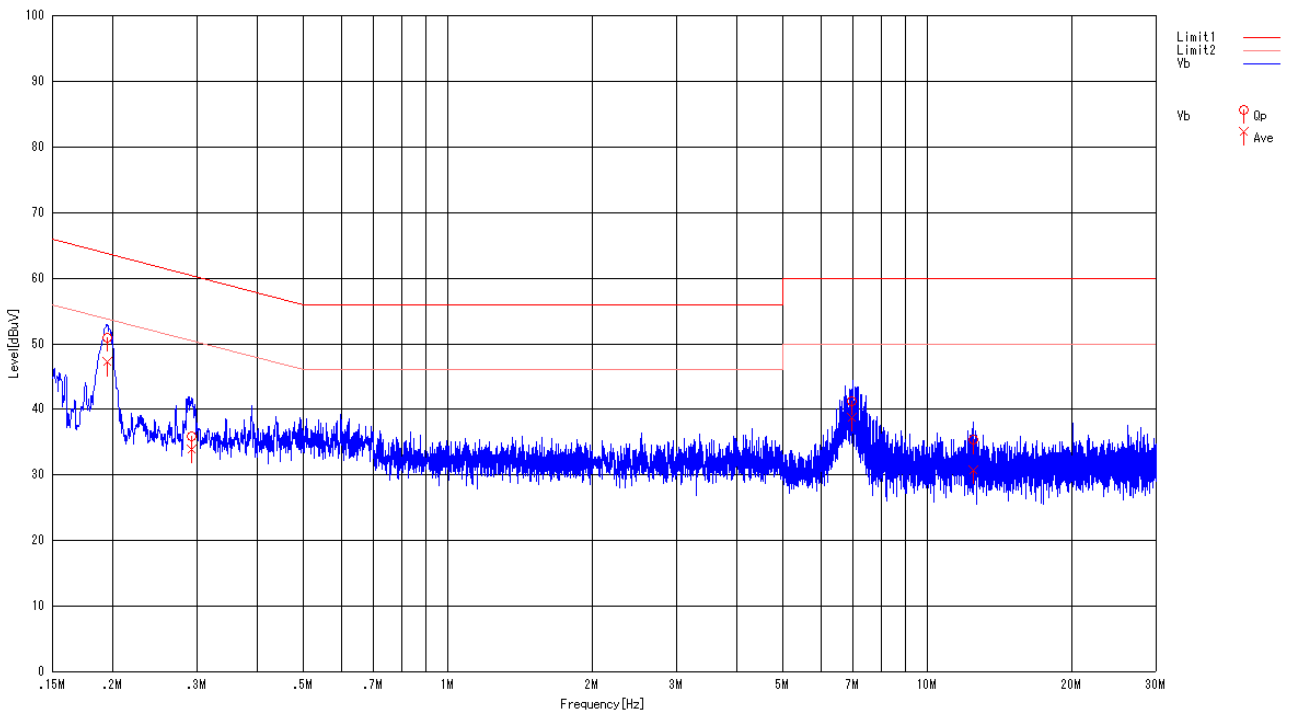
$$\text{Margin} = \text{Limit} - \text{Result} = 53.8 - 49.3 = 4.5 \text{ [dB]}$$

## Graphical express of test result (0.15 MHz-30MHz)

### AC Power line conducted emission. (Phase Va)



### AC Power line conducted emission. (Phase Vb)



## 2.4 Receiver Radiated spurious emissions

**Test setup - Same as clause 2.2**

**Test procedure - Same as clause 2.2**

### Applicable rule and limitation at 3m

§15.109 radiated emission limitation

Frequency (MHz)	Measurement Distance (m)	Field Strength (uV/m)	Field Strength (dBuV/m)
30 – 88	3	100	40.0
88 – 216	3	150	43.5
216 – 960	3	200	46.0
Above 960	3	500	53.9

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

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector.

**Test results - Complied with requirement.**

## 2.4.1 Between 30 – 1000 MHz (Worst case)

### Test equipment used (refer to List of utilized test equipment)

BA04	CL11	PR03	TR06
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### Test Data

Tested Date: 1 August, 2010

Temperature: 22 °C  
 Humidity: 51 %  
 Atmos. Press: 1008 hPa

Operating mode: Continuous Communication

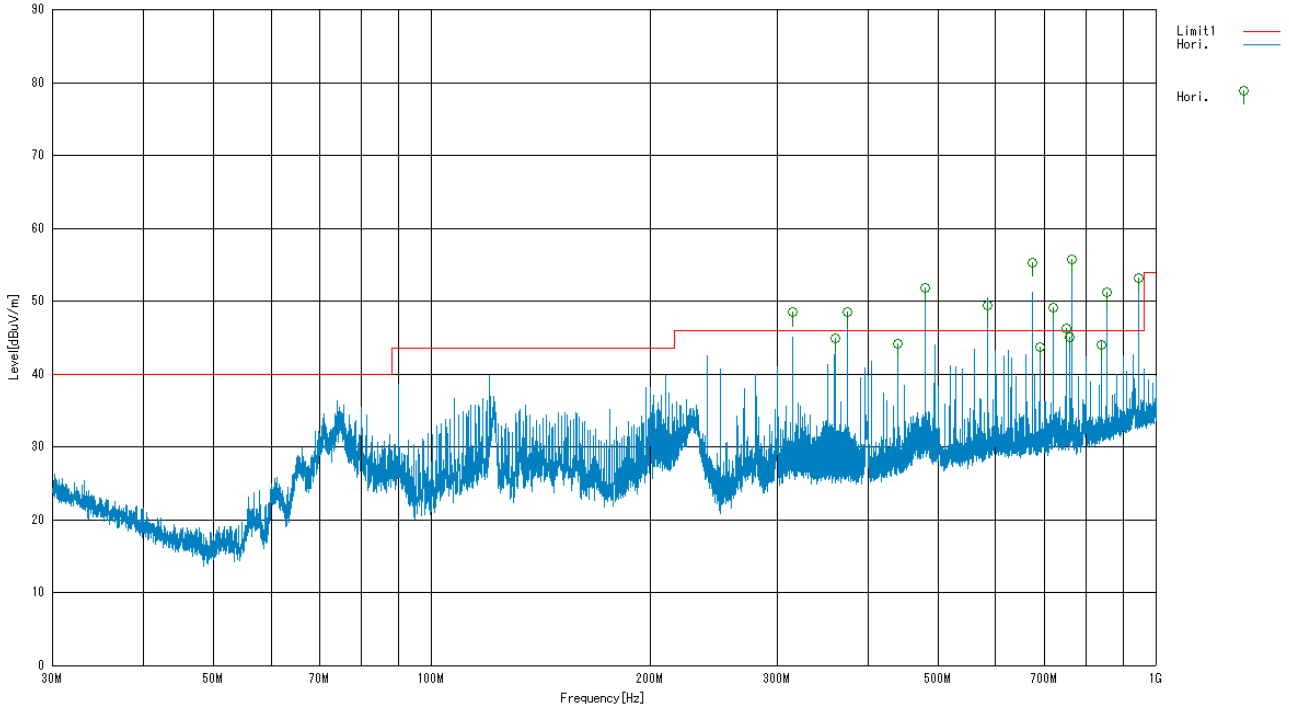
Measurement distance: 3 m

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Polarization
<b>1</b>	<b>79.963</b>	<b>50.8</b>	<b>7.1</b>	<b>7.7</b>	<b>29.7</b>	<b>35.9</b>	<b>40.0</b>	<b>4.1</b>	<b>Vert.</b>
<b>2</b>	<b>84.085</b>	<b>46.2</b>	<b>7.9</b>	<b>7.8</b>	<b>29.6</b>	<b>32.3</b>	<b>40.0</b>	<b>7.7</b>	<b>Vert.</b>
3	90.002	-	-	-	-	-	-	-	Vert.
4	314.606	-	-	-	-	-	-	-	Vert.
5	314.606	-	-	-	-	-	-	-	Hori.
<b>6</b>	<b>359.978</b>	<b>49.0</b>	<b>15.0</b>	<b>10.1</b>	<b>29.7</b>	<b>44.4</b>	<b>46.0</b>	<b>1.6</b>	<b>Vert.</b>
<b>7</b>	<b>359.992</b>	<b>49.5</b>	<b>15.0</b>	<b>10.1</b>	<b>29.7</b>	<b>44.9</b>	<b>46.0</b>	<b>1.1</b>	<b>Hori.</b>
8	374.991	-	-	-	-	-	-	-	Hori.
<b>9</b>	<b>390.023</b>	<b>49.0</b>	<b>15.6</b>	<b>10.3</b>	<b>29.8</b>	<b>45.1</b>	<b>46.0</b>	<b>0.9</b>	<b>Vert.</b>
<b>10</b>	<b>439.991</b>	<b>46.7</b>	<b>16.6</b>	<b>10.7</b>	<b>29.8</b>	<b>44.2</b>	<b>46.0</b>	<b>1.8</b>	<b>Hori.</b>
11	480.000	-	-	-	-	-	-	-	Vert.
12	480.012	-	-	-	-	-	-	-	Hori.
<b>13</b>	<b>520.008</b>	<b>46.2</b>	<b>17.9</b>	<b>11.2</b>	<b>29.8</b>	<b>45.5</b>	<b>46.0</b>	<b>0.5</b>	<b>Vert.</b>
14	560.008	-	-	-	-	-	-	-	Vert.
15	584.279	-	-	-	-	-	-	-	Hori.
16	584.281	-	-	-	-	-	-	-	Vert.
17	674.182	-	-	-	-	-	-	-	Hori.
18	674.182	-	-	-	-	-	-	-	Vert.
<b>19</b>	<b>690.004</b>	<b>41.9</b>	<b>19.4</b>	<b>12.1</b>	<b>29.7</b>	<b>43.7</b>	<b>46.0</b>	<b>2.3</b>	<b>Hori.</b>
20	720.005	-	-	-	-	-	-	-	Vert.
21	720.01	-	-	-	-	-	-	-	Hori.
22	749.998	-	-	-	-	-	-	-	Hori.
<b>23</b>	<b>760.021</b>	<b>42.6</b>	<b>19.7</b>	<b>12.4</b>	<b>29.6</b>	<b>45.1</b>	<b>46.0</b>	<b>0.9</b>	<b>Hori.</b>
24	764.071	-	-	-	-	-	-	-	Vert.
25	764.072	-	-	-	-	-	-	-	Hori.
26	799.999	-	-	-	-	-	-	-	Vert.
<b>27</b>	<b>839.99</b>	<b>40.2</b>	<b>20.3</b>	<b>12.9</b>	<b>29.4</b>	<b>44.0</b>	<b>46.0</b>	<b>2.0</b>	<b>Hori.</b>
<b>28</b>	<b>840.002</b>	<b>41.4</b>	<b>20.3</b>	<b>12.9</b>	<b>29.4</b>	<b>45.2</b>	<b>46.0</b>	<b>0.8</b>	<b>Vert.</b>
29	853.954	-	-	-	-	-	-	-	Hori.
30	853.959	-	-	-	-	-	-	-	Vert.
31	899.997	-	-	-	-	-	-	-	Vert.
32	930.015	-	-	-	-	-	-	-	Vert.
33	943.843	-	-	-	-	-	-	-	Hori.
34	943.854	-	-	-	-	-	-	-	Vert.
35	959.998	-	-	-	-	-	-	-	Vert.

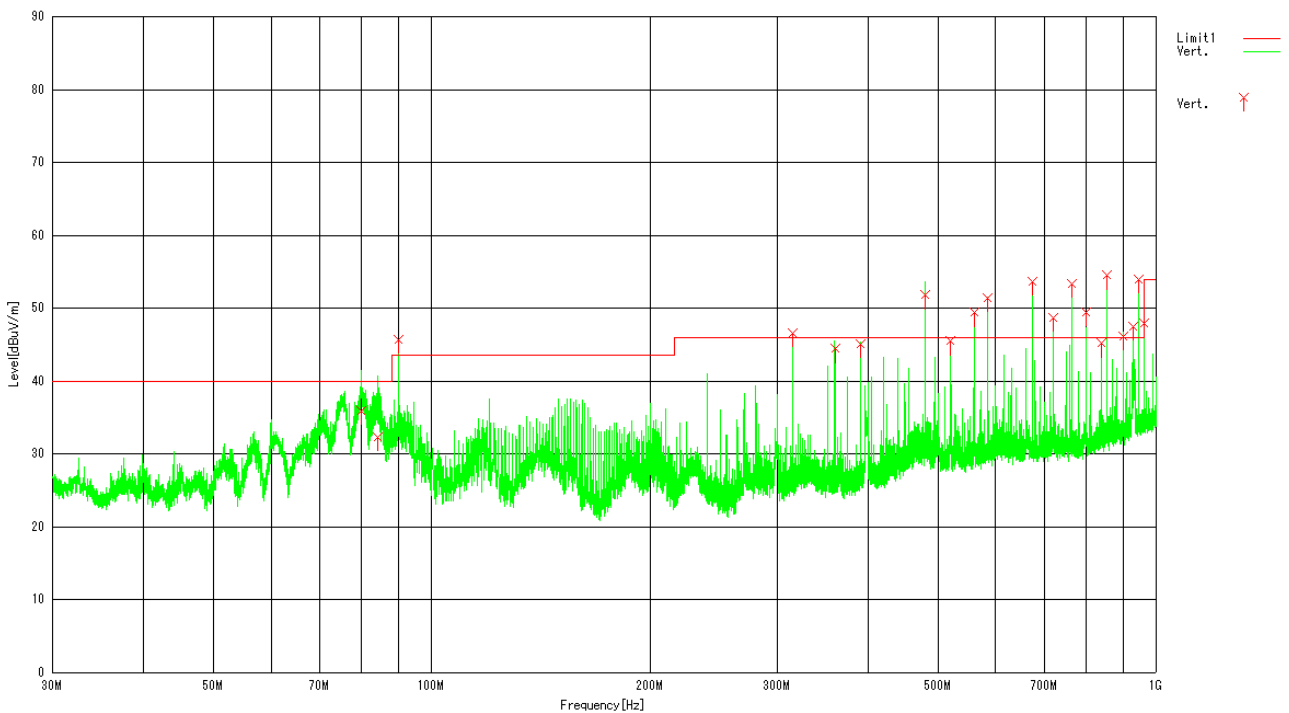
Note: Spurious emissions exceeded the limit is not caused by wireless LAN. Please refer to p.12 in this report.

## Graphical express of test result (30MHz-1000MHz)

### Antenna polarization: Horizontal



### Antenna polarization: Vertical



## 2.4.2 Above 1000 MHz (Worst case)

### Test equipment used (refer to List of utilized test equipment)

PR12	TR06	CL23	CL24	DH01		
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Tested Date: 30 July, 2010

Temperature: 22 °C  
Humidity: 54 %  
Atmos. Press: 1006 hPa

Operating mode: Receiving  
Measurement distance: 3 m

### Test Result

There are no spurious emissions greater than noise floor.

## 4 List of utilized test equipment/ calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC01(EM)	Anechoic Chamber (1st test room)	JSE	203397C	-	2010/04/10	2011/04/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2009/11/14	2010/11/30
BA04	Biological Antenna	SCHAFFNER	CA2855	2903	2010/01/19	2011/01/31
BRF2	Band Reject Filter (Bluetooth)	MICRO TRONICS	BRM50701	024	2010/04/22	2011/04/30
CL11	Antenna Cable for RE	RFT	-	-	2010/05/24	2011/05/31
CL23	RF Cable 0.5m	SUCOFLEX	SF104PE	48773/4PE	2010/06/15	2011/06/30
CL24	RF Cable 5.0m	SUCOFLEX	SF104PE	48775/4PE	2010/06/15	2011/06/30
CL26	RF Cable 2.0m	SUCOFLEX	SF104	274754/4	2010/06/15	2011/06/30
DH01	DRG Horn Antenna	A.H. Systems	SAS-571	785	2010/01/20	2012/01/31
LN05	LISN	Kyoritsu	KNW-407F	8-1773-2	2010/05/21	2011/05/31
HPF1	High Pass Filter (3500MHz)	TOKIMEC	TF323DCA	603	2010/06/15	2011/06/30
LN06	LISN	Kyoritsu	KNW-407F	8-1773-3	2010/05/27	2011/05/31
PL06	Pulse Limiter	PMM	PL-01	0000J10109	2010/01/13	2011/01/31
PR03	Pre. Amplifier	Anritsu	MH648A	M41984	2010/05/19	2011/05/31
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2010/01/25	2011/01/31
SH01	Standard Horn Antenna (18-26G)	A.H. Systems	SAS-572	208	2008/07/23	2011/07/22
TR06	Test Receiver (F/W : 3.93 SP2)	Rohde & Schwarz	ESU26	100002	2009/09/16	2010/09/30

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.