

TEST REPORT

Applicant : Sharp Corporation, Communication Systems Group
Address : 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, JAPAN

Products : Cellular Phone
Model No. : SH-02E
SERIAL NO. : 004401114215201
004401114215383

FCC ID : APYHRO00180

Test Standard : CFR 47 FCC Rules and Regulations Part 15

Test Results : **Passed**

Date of Test : October 9 ~ 17, 2012



A handwritten signature in black ink, appearing to read 'K. Shibata', is written over a horizontal line.

Kousei Shibata
Manager
Japan Quality Assurance Organization
KITA-KANSAI Testing Center
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

-
- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.
 - The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
 - The test results presented in this report relate only to the offered test sample.
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 - This test report shall not be reproduced except in full without the written approval of JQA.
 - VLAC does not approve, certify or warrant the product by this test report.

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DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT**EUT** : Equipment Under Test**EMC** : Electromagnetic Compatibility**AE** : Associated Equipment**EMI** : Electromagnetic Interference**N/A** : Not Applicable**EMS** : Electromagnetic Susceptibility**N/T** : Not Tested - indicates that the listed condition, standard or equipment is applicable for this report. - indicates that the listed condition, standard or equipment is not applicable for this report.

1 Description of the Equipment Under Test

1. Manufacturer : Sharp Corporation, Communication Systems Group
2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, JAPAN
2. Products : Cellular Phone
3. Model No. : SH-02E
4. Serial No. : 004401114215201
: 004401114215383
5. Product Type : Pre-production
6. Date of Manufacture : September, 2012
7. Power Rating : 4.0VDC (Internal Lithium-ion Battery 2320mAh)
8. EUT Grounding : None
9. Transmitting Frequency : 2412.0 MHz(01CH) –2462.0MHz(11CH)
10. Receiving Frequency : 2412.0 MHz(01CH) –2462.0MHz(11CH)
11. Max. RF Output Power : 19.58dBm(Measure Value of IEEE802.11b)
: 21.61dBm(Measure Value of IEEE802.11g)
: 20.04dBm(Measure Value of IEEE802.11n)
12. Category : DTS
13. EUT Authorization : Certification
14. Received Date of EUT : October 5, 2012

15. Channel Plan

The carrier spacing is 5 MHz.

The carrier frequency is designated by the absolute frequency channel number (ARFCN).

The carrier frequency is expressed in the equation shown as follows:

Transmitting Frequency (in MHz) = $2407.0 + 5*n$

Receiving Frequency (in MHz) = $2407.0 + 5*n$

where, n : channel number ($1 \leq n \leq 11$)

2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations Part 15
Subpart C – Intentional Radiators

The EUT described in clause 1 was tested according to the applied standard shown above.
Details of the test configuration is shown in clause 6.

The conclusion for the test items of which are required by the applied standard is indicated under the test result.

- The test result was **passed** for the test requirements of the applied standard.
- The test result was **failed** for the test requirements of the applied standard.
- The test result was **not judged** the test requirements of the applied standard.

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- No deviations were employed from the applied standard.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by:

Tested by:



Shigeru Kinoshita
Deputy Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch



Shigeru Osawa
Deputy Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch

3 Test Procedure

Test Requirements : §15.247, §15.207 and §15.209

Test Procedure : ANSI C63.4-2003

The tests were performed with reference to FCC KDB 558074 D01 DTS Meas Guidance, released October 4, 2012. The test set-up was made in accordance to the general provisions of ANSI C63.4-2003.

4 Test Location

Japan Quality Assurance Organization (JQA)
KITA-KANSAI Testing Center
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

5 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center SAITO EMC Branch is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : March 30, 2014)
VCCI Registration No. : A-0002 (Expiry date : March 30, 2014)
BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-AI-E-6006
(Expiry date : September 14, 2013)
IC Registration No. : 2079E-3, 2079E-4 (Expiry date : July 20, 2014)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI.
(Expiry date : February 22, 2013)

6 Details of the Equipment Under Test

6.1 Operating Condition

Transmitting/Receiving

Transmitting frequency : 2412.0 MHz(1CH) – 2462.0 MHz(11CH)

Receiver frequency : 2412.0 MHz(1CH) – 2462.0 MHz(11CH)

Modulation Type

1. 802.11b : DSSS
2. 802.11g : OFDM
3. 802.11n : OFDM

Other Clock Frequency

32.768 kHz, 19.2 MHz, 27 MHz, 27.12 MHz, 37.4 MHz

The EUT was rotated through three orthogonal axis (X, Y and Z axis) in radiated measurement.
The EUT with temporary antenna port was used in conducted measurement.

6.2 Test Configuration

The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	Cellular Phone	Sharp	SH-02E	0044011142 15201*1) 0044011142 15383*2)	APYHRO00180
B	AC Adapter for Global use	NTT DoCoMo	MAS-BH0008 -A 002	--	N/A
C	USB conversion cable	Sharp	SH-02E(Optional)	--	N/A
D	Stereo Handsfree	Sharp	SHLDL1	--	N/A

*1) Used for AC Powerline Conducted Emission and Field Strength of Spurious Emission

*2) Used for Antenna Conducted Emission

The auxiliary equipment used for testing :

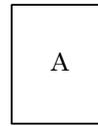
None

Type of Cable:

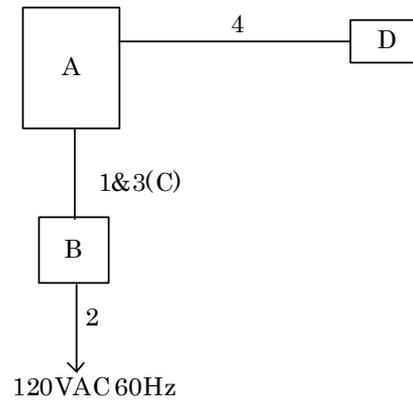
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Power Cord	--	--	NO	NO	1.5
2	AC Power Cord	--	--	NO	NO	0.5
3	USB conversion cable	--	--	NO	NO	0.1
4	Handsfree Cable	--	NO	--	NO	1.5

6.3 Test Arrangement (Drawings)

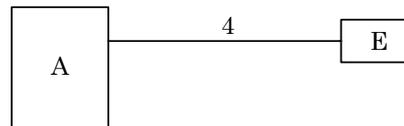
a) Single Unit



b) AC Adapter used



c) Stereo Earphone used



7 Details of the Test Item

7.1 Channel Separation

For the requirements, - Applicable [- Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - **Passed** - **Failed** - **Not judged**

7.2 Minimum Hopping Channel

For the requirements, - Applicable [- Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - **Passed** - **Failed** - **Not judged**

7.3 Occupied Bandwidth

For the requirements, - Applicable [- Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - **Passed** - **Failed** - **Not judged**

7.3.1 Worst Point and Measurement Uncertainty

The 99% Bandwidth of IEEE802.11b is	<u>13.961</u> MHz	at	<u>2437.0</u> MHz
The 99% Bandwidth of IEEE802.11g is	<u>16.490</u> MHz	at	<u>2412.0</u> MHz
The 99% Bandwidth of IEEE802.11n is	<u>17.541</u> MHz	at	<u>2437.0</u> MHz

The 6dB Bandwidth of IEEE802.11b is	<u>9.138</u> MHz	at	<u>2462.0</u> MHz
The 6dB Bandwidth of IEEE802.11g is	<u>16.026</u> MHz	at	<u>2412.0</u> MHz
The 6dB Bandwidth of IEEE802.11n is	<u>17.476</u> MHz	at	<u>2412.0</u> MHz

Uncertainty of Measurement Results +/-0.9 %(2σ)

Remarks : _____

7.3.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

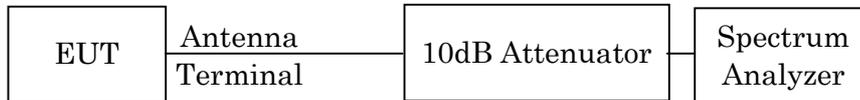
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<input type="checkbox"/> - Measurement room (M2)	<input type="checkbox"/> - Measurement room (M3)
<input type="checkbox"/> - Shielded room (S1)	<input type="checkbox"/> - Shielded room (S2)
<input type="checkbox"/> - Shielded room (S3)	<input checked="" type="checkbox"/> - Shielded room (S4)

7.3.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2012/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2012/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2012/7	1 Year

7.3.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

Res. Bandwidth	300 kHz
Video Bandwidth	1 MHz
Span	30 MHz
Sweep Time	AUTO
Trace	Maxhold

7.3.5 Test Data

Test Date : October 11, 2012

Temp.:26°C, Humi:52%

The resolution bandwidth was set to 1 - 5 % of emission bandwidth, -6dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

A) IEEE 802.11b

1)Data Rate : 1Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	13.930	9.120
06	2437.0	13.961	9.130
11	2462.0	13.955	9.138

2)Data Rate : 2Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	13.905	8.170
06	2437.0	13.951	8.169
11	2462.0	13.938	8.846

3)Data Rate : 5.5Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	13.644	8.687
06	2437.0	13.637	8.379
11	2462.0	13.639	8.513

4)Data Rate : 11Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	13.652	8.605
06	2437.0	13.687	8.994
11	2462.0	13.738	8.912

B) IEEE 802.11g

1) Data Rate : 6Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	16.490	16.026
06	2437.0	16.463	16.025
11	2462.0	16.487	15.846

2) Data Rate : 54Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	16.436	15.993
06	2437.0	16.415	15.986
11	2462.0	16.429	15.456

C) IEEE 802.11n

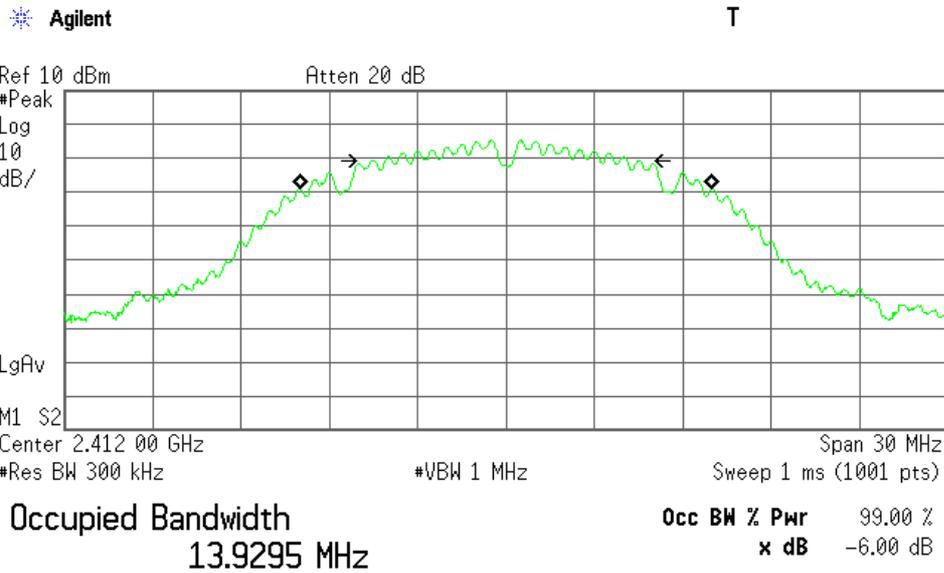
1) Data Rate : 6.5Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	17.485	17.313
06	2437.0	17.485	17.346
11	2462.0	17.483	17.377

2) Data Rate : 65Mbps

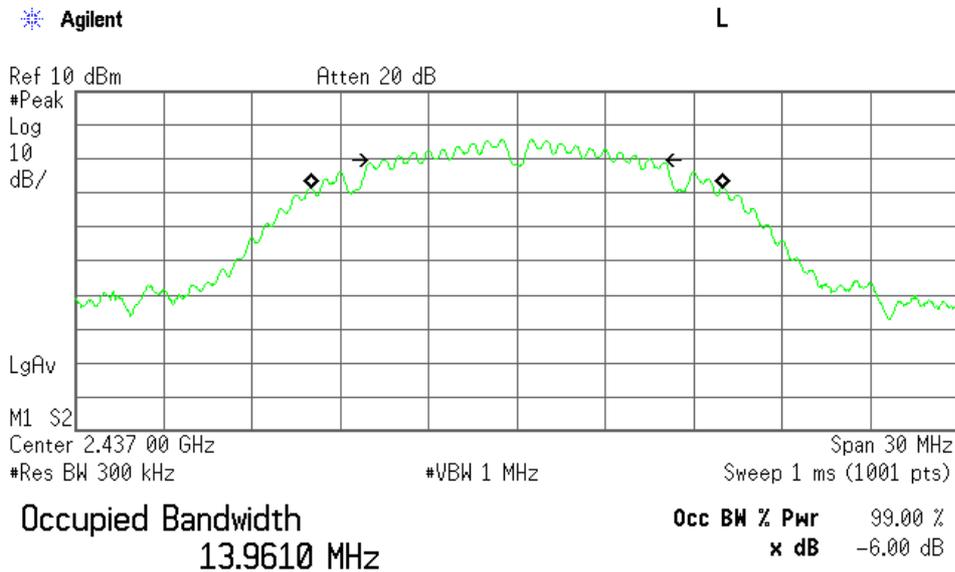
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)
01	2412.0	17.535	17.476
06	2437.0	17.541	17.413
11	2462.0	17.516	17.365

1)Data Rate : 1Mbps(IEEE 802.11b)
Low Channel



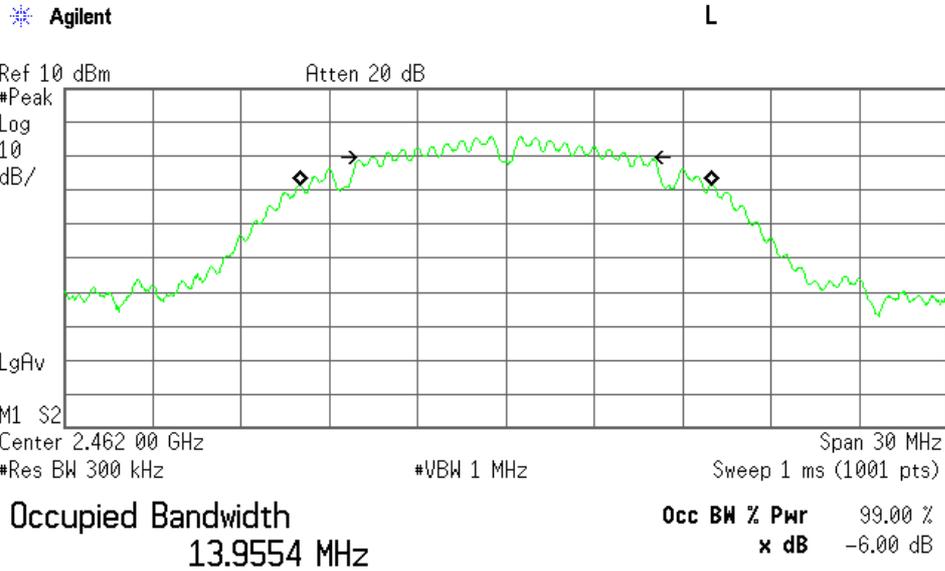
Transmit Freq Error 2.786 kHz
x dB Bandwidth 9.120 MHz

Middle Channel



Transmit Freq Error -3.324 kHz
x dB Bandwidth 9.130 MHz

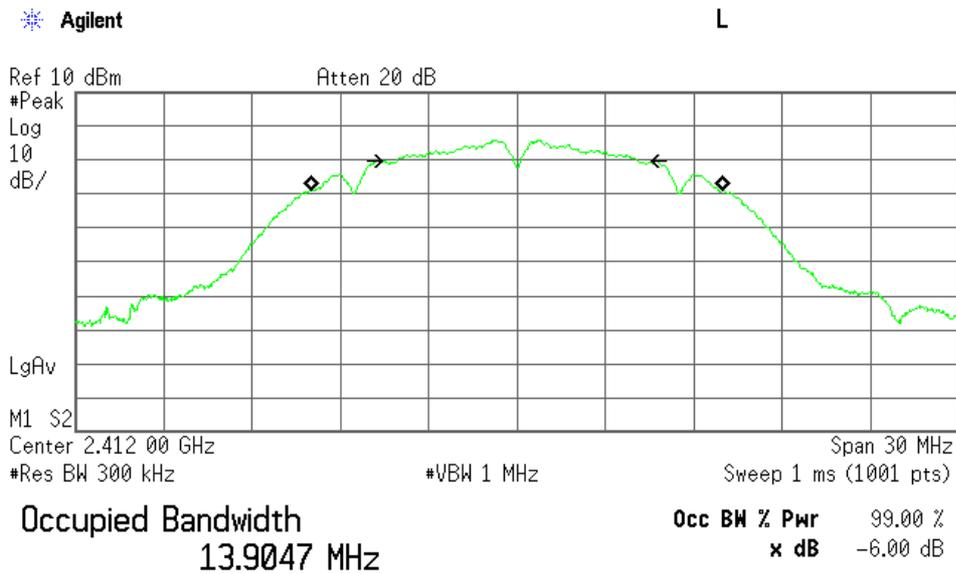
High Channel



Transmit Freq Error 786.901 Hz
x dB Bandwidth 9.138 MHz

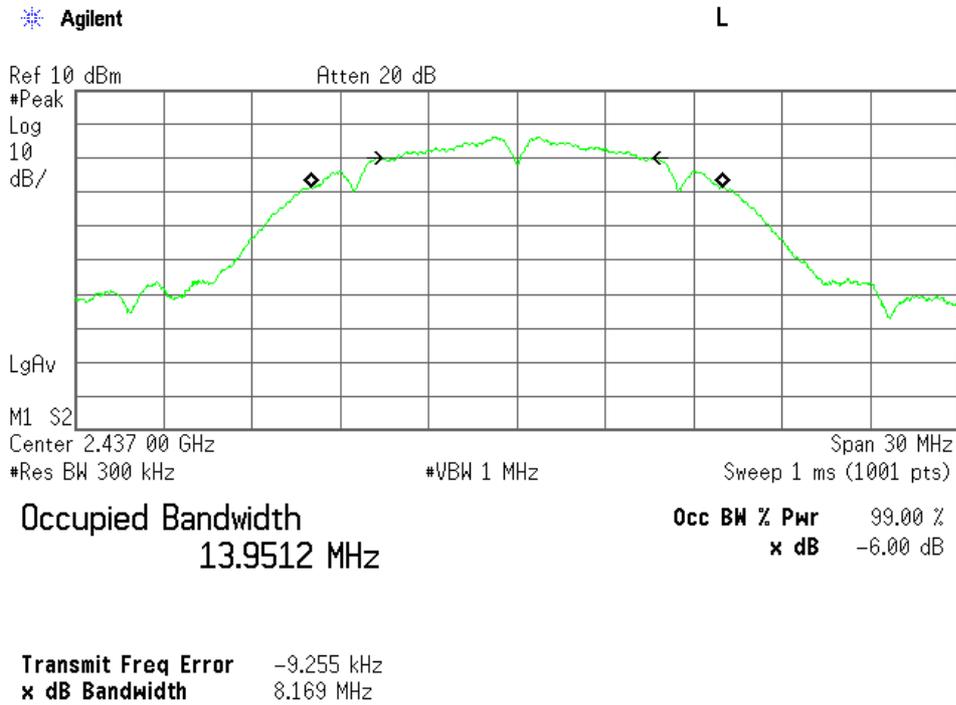
2) Data Rate : 2Mbps(IEEE 802.11b)

Low Channel

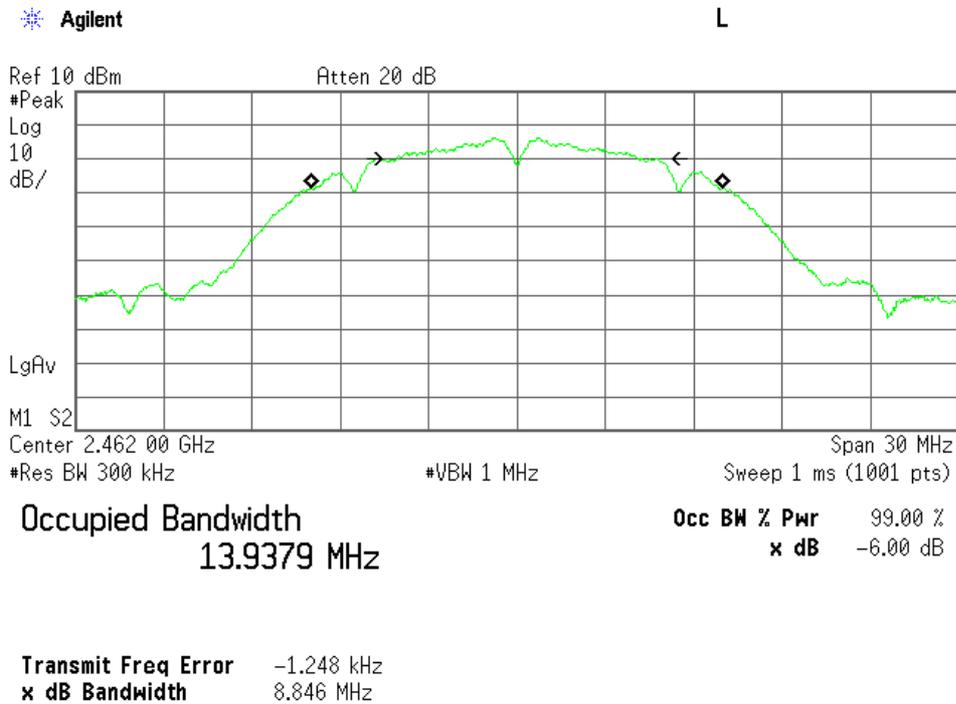


Transmit Freq Error 528.740 Hz
x dB Bandwidth 8.170 MHz

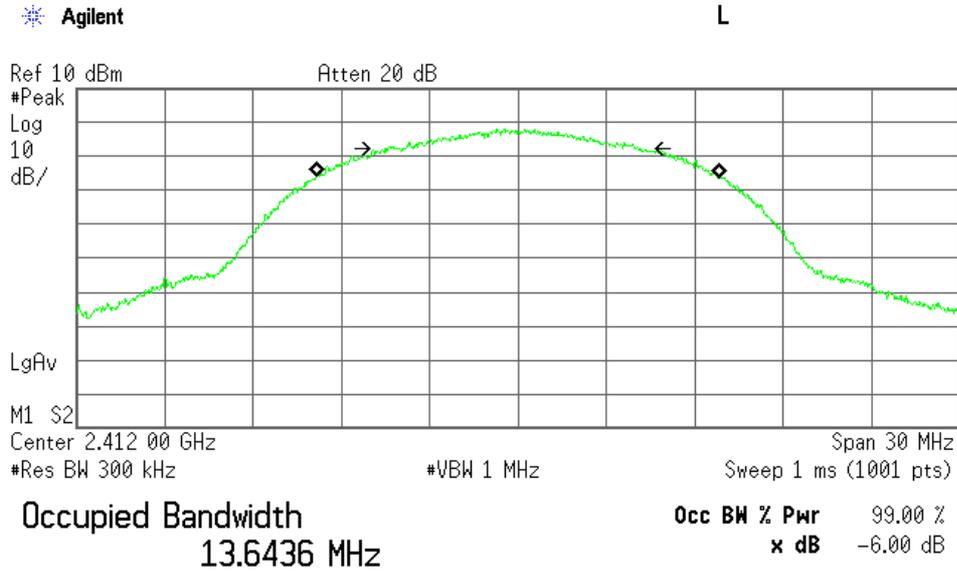
Middle Channel



High Channel

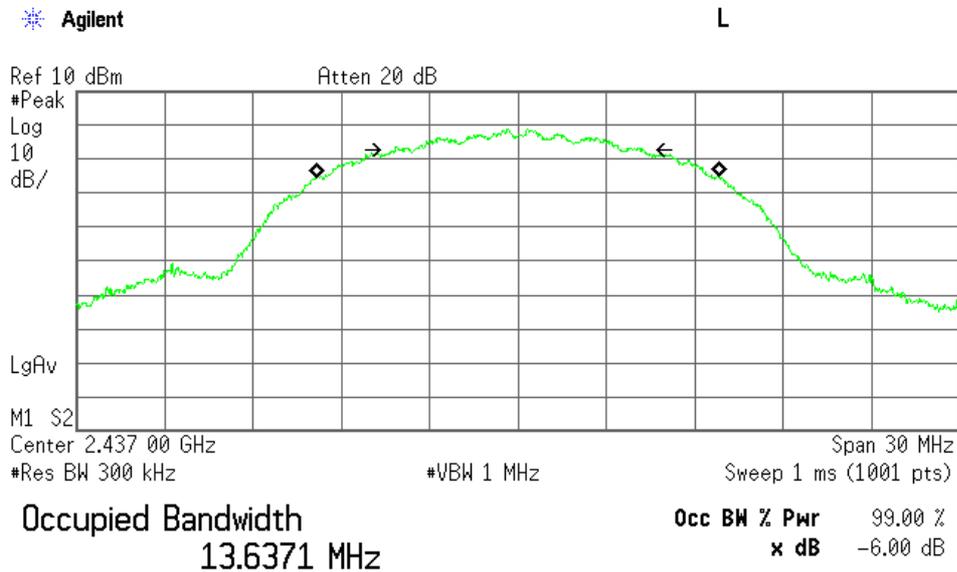


3)Data Rate : 5.5Mbps(IEEE 802.11b)
Low Channel



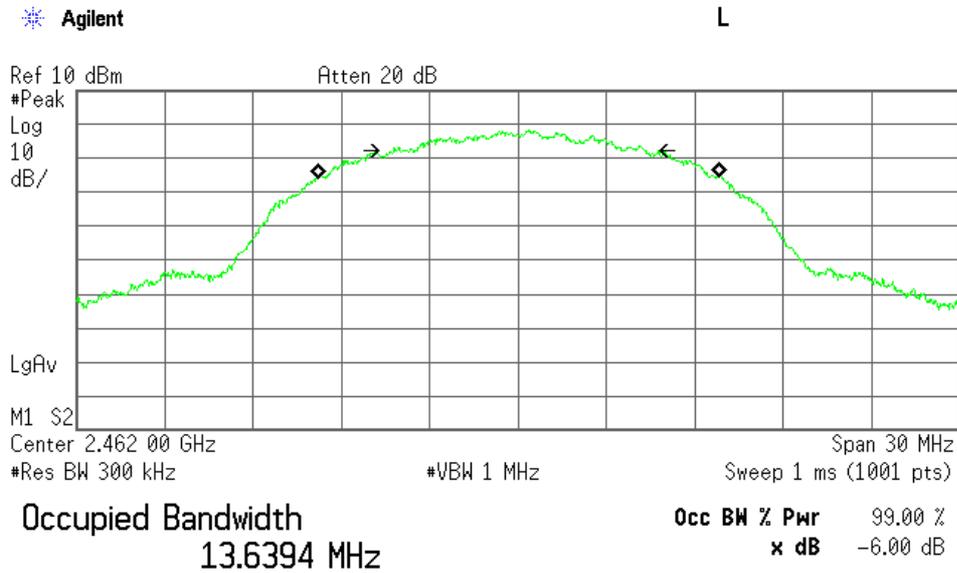
Transmit Freq Error 14.165 kHz
x dB Bandwidth 8.687 MHz

Middle Channel



Transmit Freq Error -2.238 kHz
x dB Bandwidth 8.379 MHz

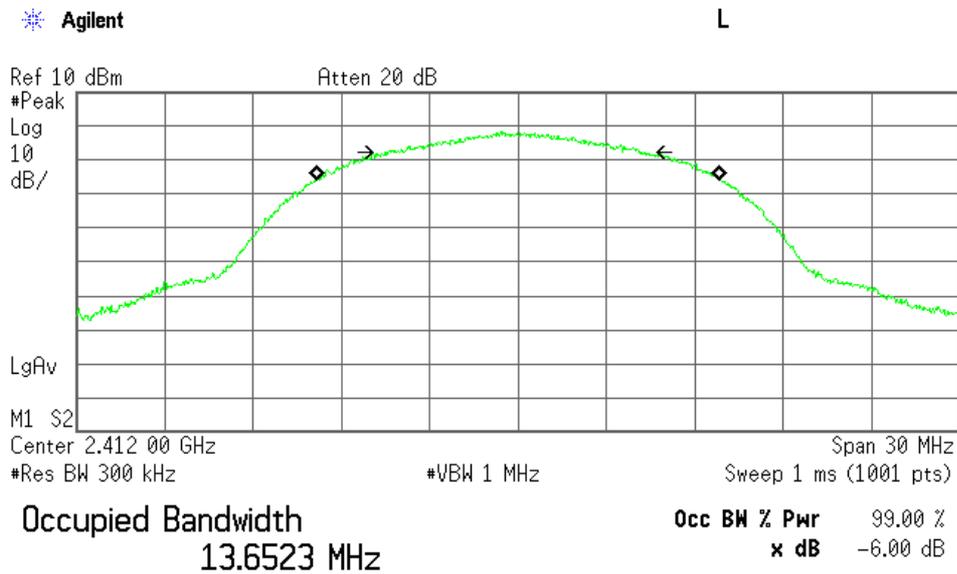
High Channel



Transmit Freq Error 26.414 kHz
x dB Bandwidth 8.513 MHz

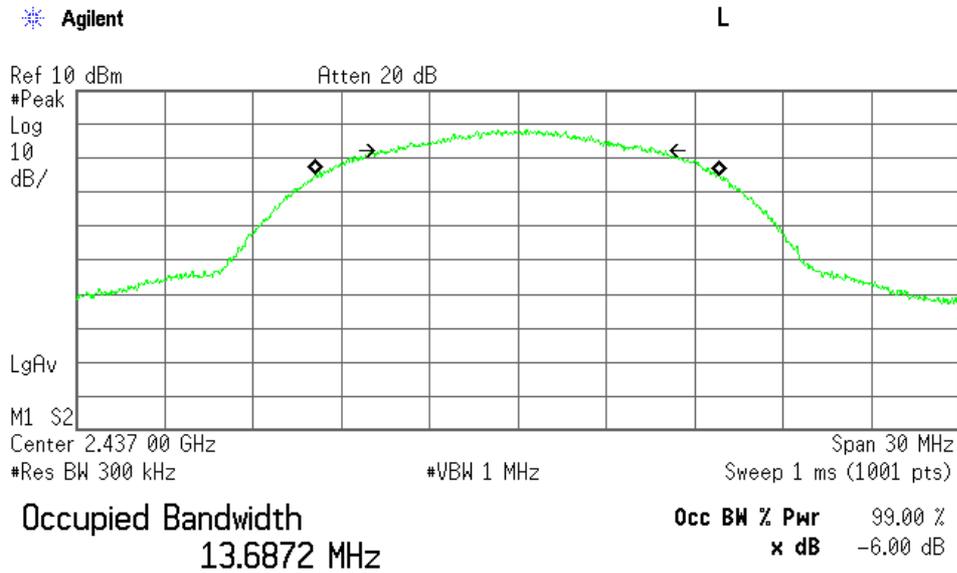
4)Data Rate : 11Mbps(IEEE 802.11b)

Low Channel



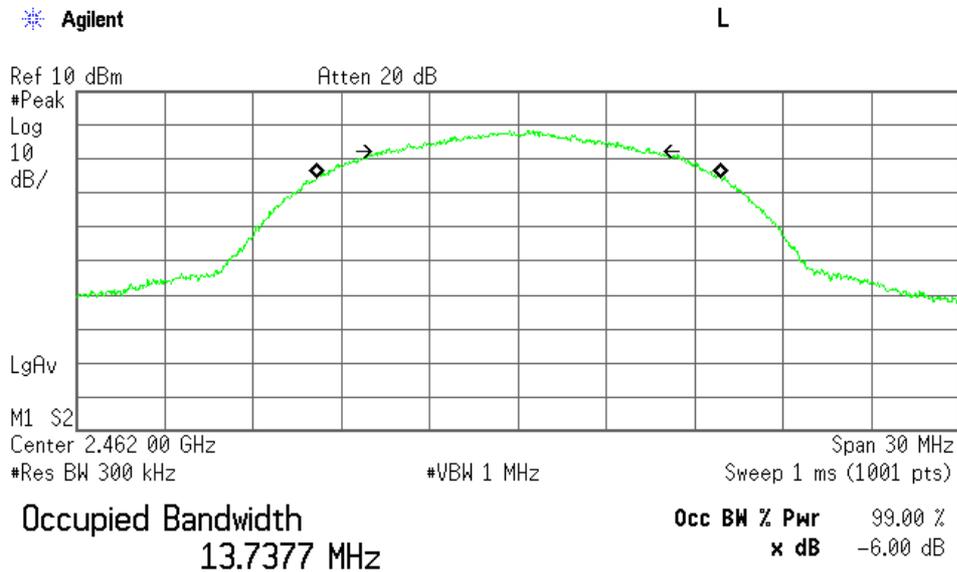
Transmit Freq Error 18.478 kHz
x dB Bandwidth 8.605 MHz

Middle Channel



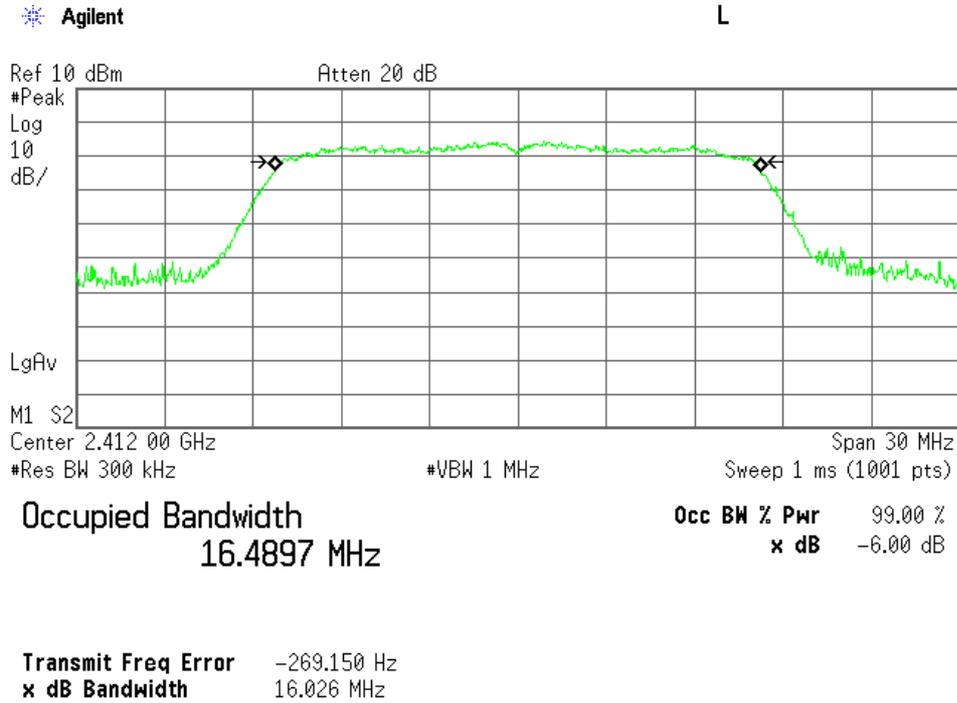
Transmit Freq Error -12.164 kHz
x dB Bandwidth 8.994 MHz

High Channel

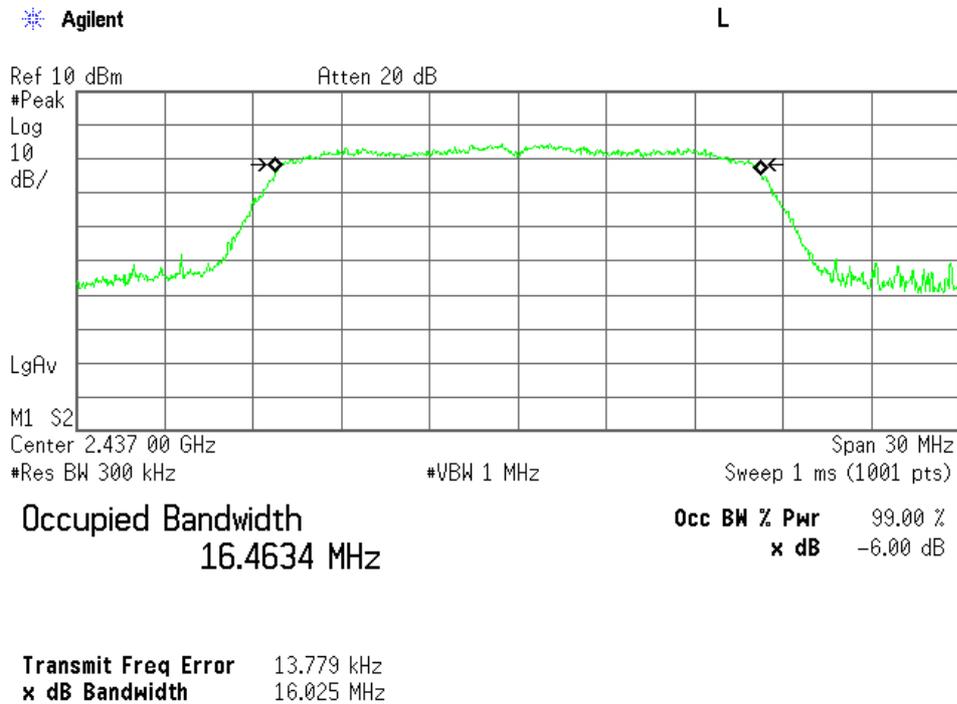


Transmit Freq Error 20.570 kHz
x dB Bandwidth 8.912 MHz

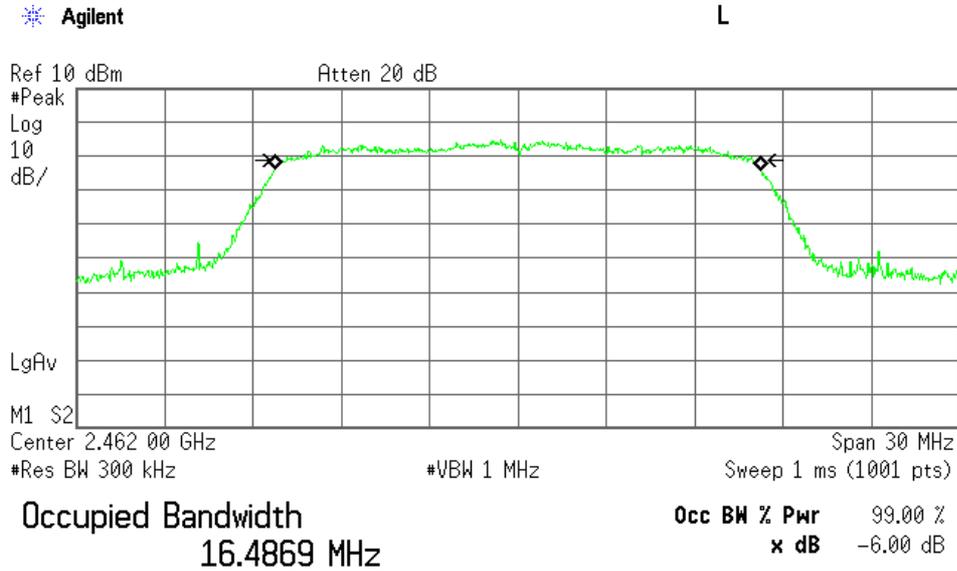
5)Data Rate : 6Mbps(IEEE 802.11g)
 Low Channel



Middle Channel



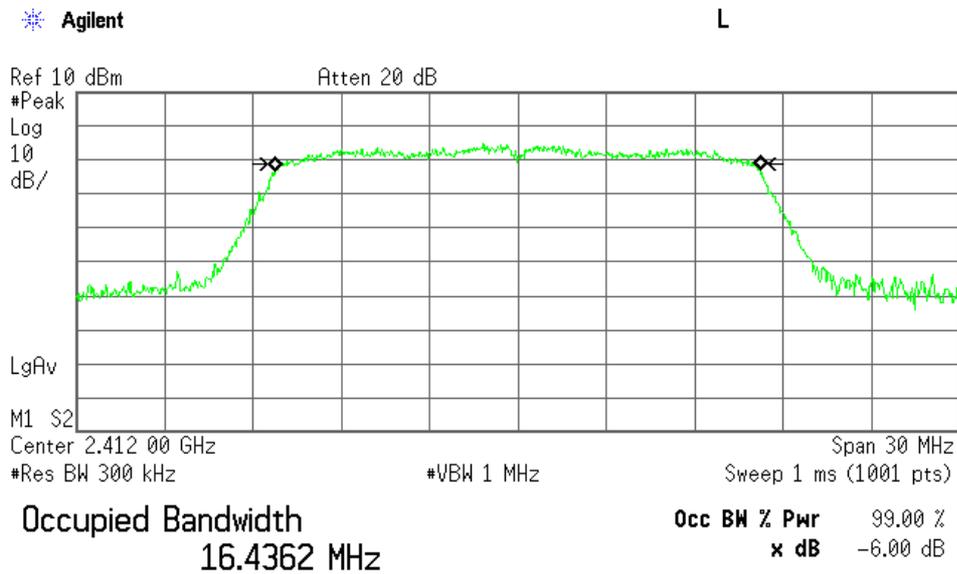
High Channel



Transmit Freq Error 6.988 kHz
x dB Bandwidth 15.846 MHz

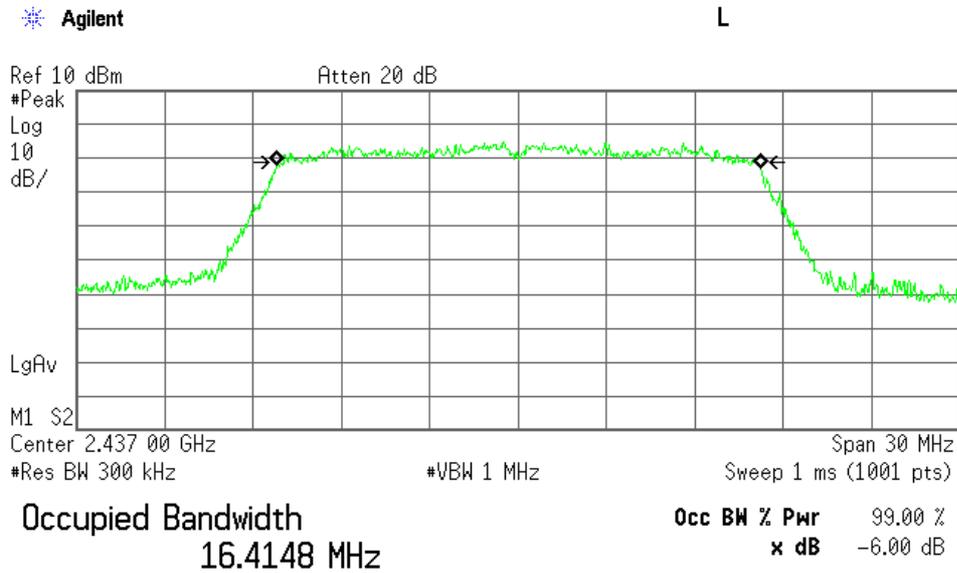
6) Data Rate : 54Mbps(IEEE 802.11g)

Low Channel



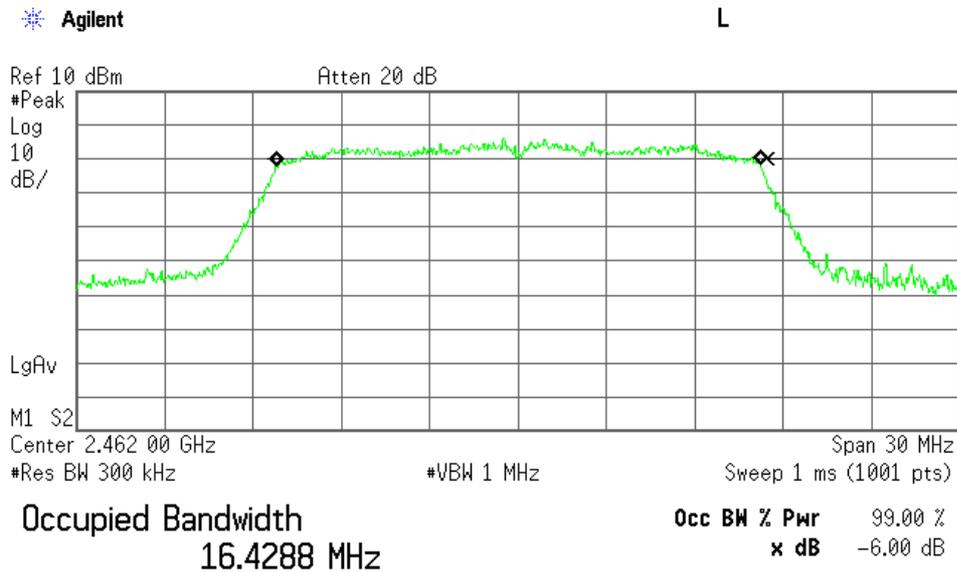
Transmit Freq Error -8.598 kHz
x dB Bandwidth 15.993 MHz

Middle Channel



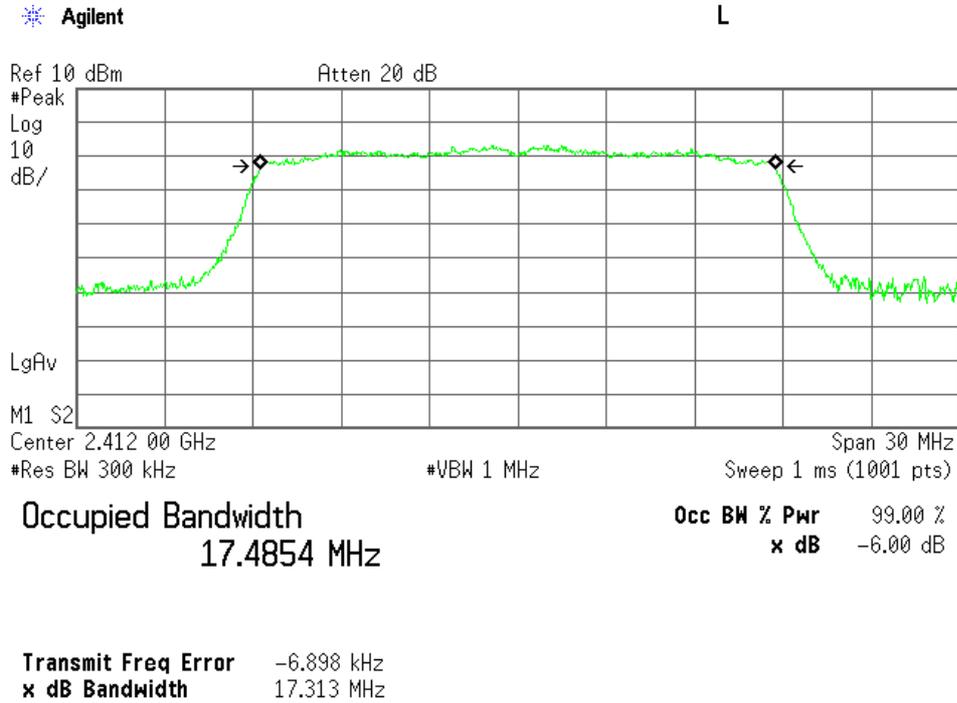
Transmit Freq Error 14.985 kHz
x dB Bandwidth 15.986 MHz

High Channel

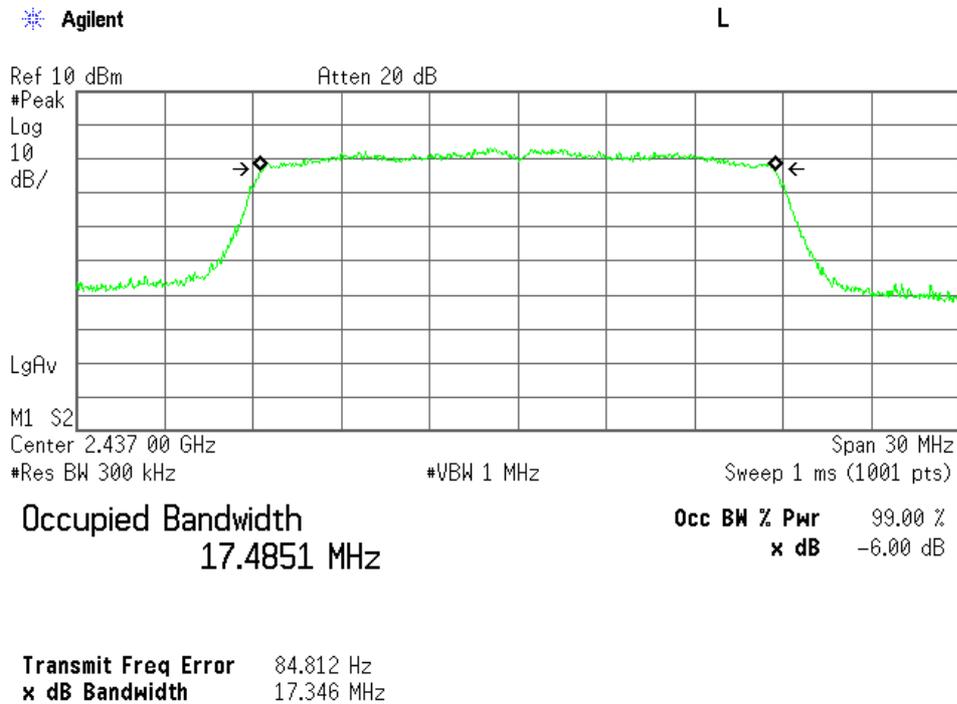


Transmit Freq Error 17.117 kHz
x dB Bandwidth 15.456 MHz

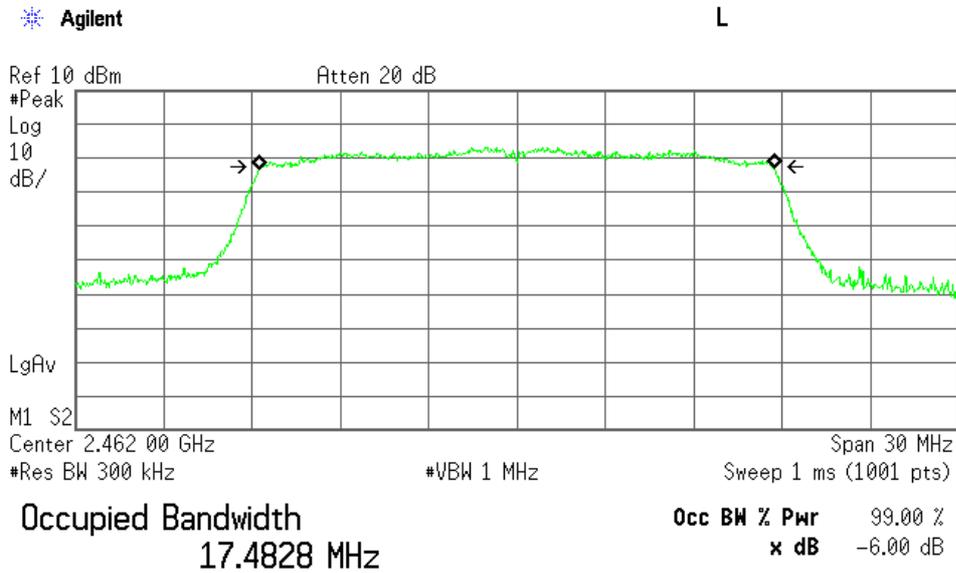
7)Data Rate : 6.5Mbps(IEEE 802.11n)
Low Channel



Middle Channel



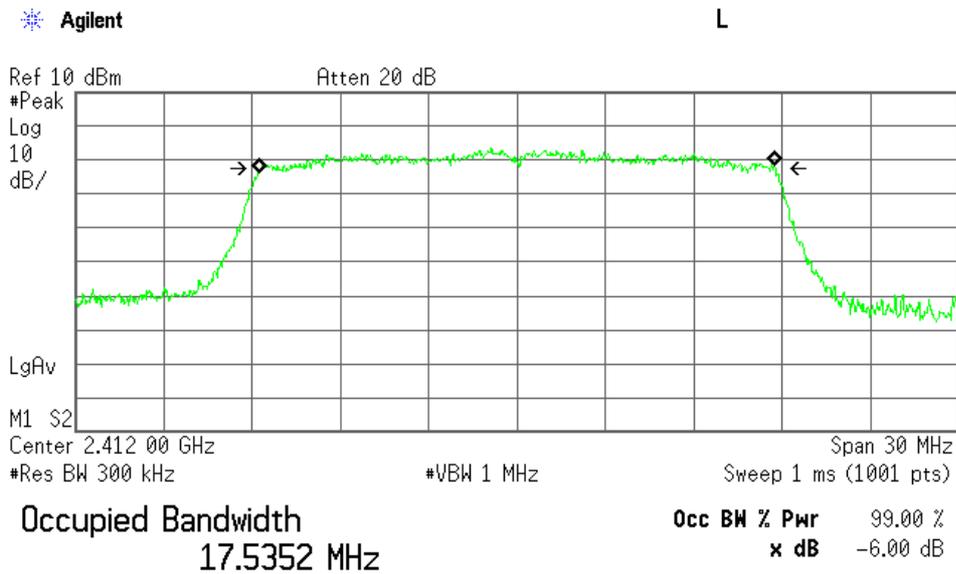
High Channel



Transmit Freq Error -2.327 kHz
x dB Bandwidth 17.377 MHz

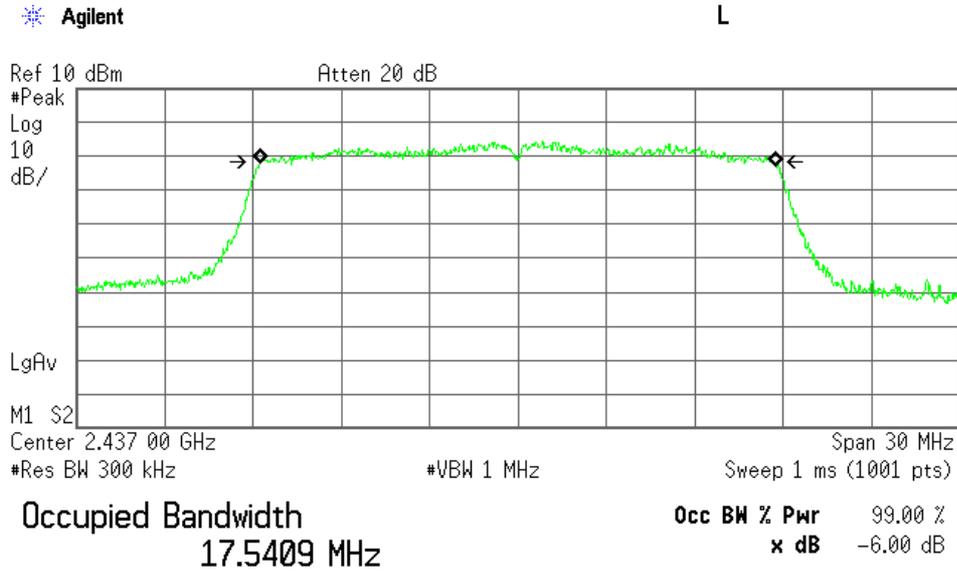
8)Data Rate : 65Mbps(IEEE 802.11n)

Low Channel



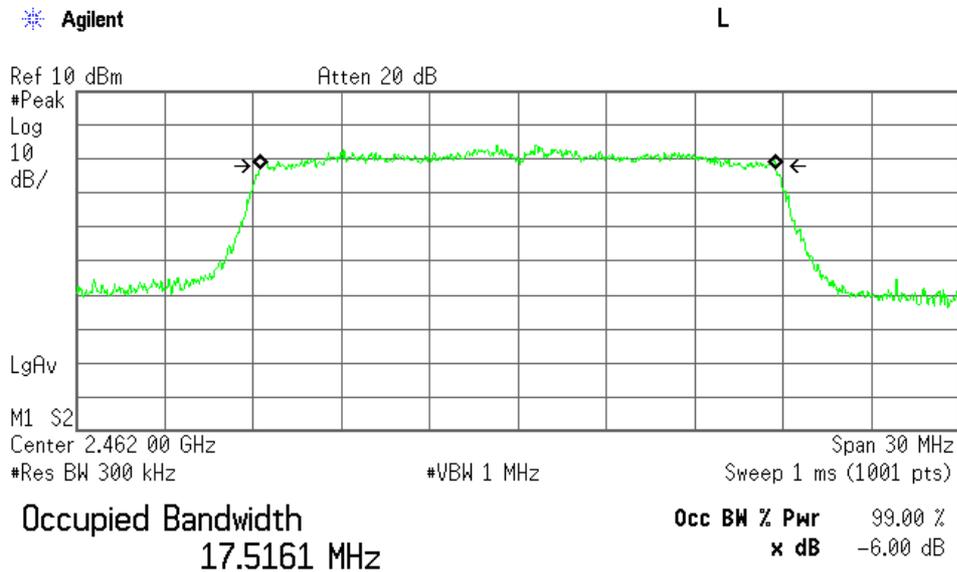
Transmit Freq Error 718.278 Hz
x dB Bandwidth 17.476 MHz

Middle Channel



Transmit Freq Error 1.673 kHz
x dB Bandwidth 17.413 MHz

High Channel



Transmit Freq Error -756.690 Hz
x dB Bandwidth 17.365 MHz

7.4 Dwell Time

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.5 Peak Output Power(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.5.1 Worst Point and Measurement Uncertainty

Peak Output Power of IEEE802.11b is	<u>19.58</u>	dBm	at	<u>2462.0</u>	MHz
Peak Output Power of IEEE802.11g is	<u>21.61</u>	dBm	at	<u>2462.0</u>	MHz
Peak Output Power of IEEE802.11n is	<u>20.04</u>	dBm	at	<u>2462.0</u>	MHz

Uncertainty of Measurement Results at Amplitude +/-1.2 dB(2 σ)

Remarks : _____

7.5.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

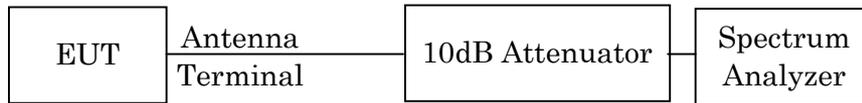
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<input type="checkbox"/> - Measurement room (M2)	<input type="checkbox"/> - Measurement room (M3)
<input type="checkbox"/> - Shielded room (S1)	<input type="checkbox"/> - Shielded room (S2)
<input type="checkbox"/> - Shielded room (S3)	<input checked="" type="checkbox"/> - Shielded room (S4)

7.5.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Power Meter	N1911A	Agilent	B-63	2012/7	1 Year
Power Sensor	N1921A	Agilent	B-64	2012/7	1 Year
Attenuator	54A-10	Weinschel	D-28	2012/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2012/7	1 Year

7.5.4 Test Method and Test Setup (Diagrammatic illustration)

The Conducted RF Power Output was measured with a power meter, one 10dB attenuator and a short, low loss cable.



7.5.5 Test Data

1) Data Rate : 1Mbps(IEEE 802.11b)

Test Date: October 11, 2012
 Temp.: 26 °C. Humi: 52 %

Data Rate : 1Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
				[dBm]	[mW]		
01	2412	9.89	5.44	15.33	34.12	30.00	+14.67
06	2437	9.89	5.76	15.65	36.73	30.00	+14.35
11	2462	9.89	5.86	15.75	37.58	30.00	+14.25

Calculated result at 2462.000 MHz, as the worst point shown on underline:

Correction Factor	=	9.89 dB
+) Meter Reading	=	5.86 dBm
Result	=	15.75 dBm = 37.58 mW

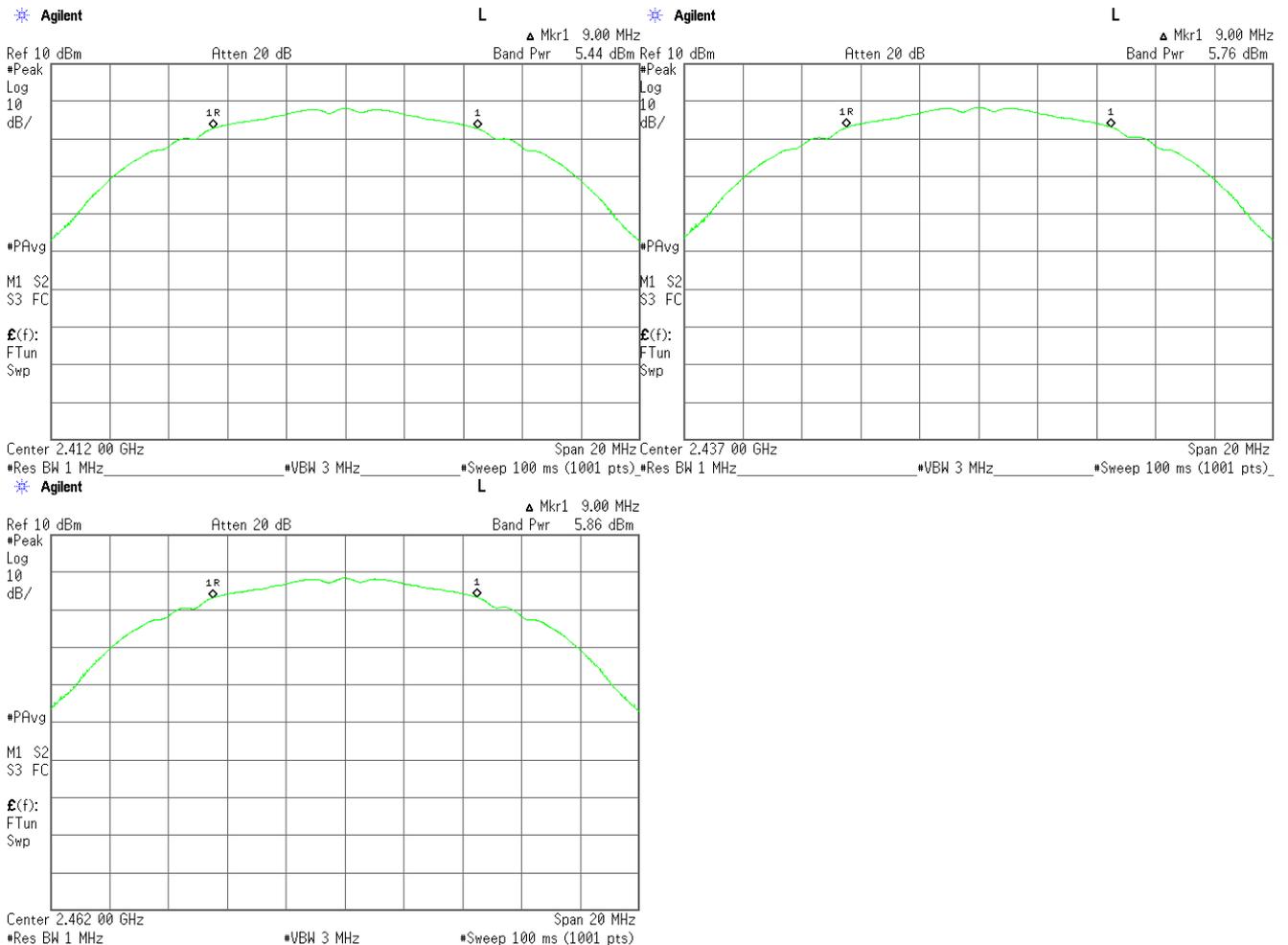
Minimum Margin: 30.00 - 15.75 = 14.25 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



2) Data Rate : 2Mbps(IEEE 802.11b)

Test Date: October 11, 2012

Temp.: 26 °C. Humi: 52 %

Data Rate : 2Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
				[dBm]	[mW]		
01	2412	9.89	5.75	15.64	36.64	30.00	+14.36
06	2437	9.89	6.12	16.01	39.90	30.00	+13.99
11	2462	9.89	6.18	16.07	40.46	30.00	+13.93

Calculated result at 2462.000 MHz, as the worst point shown on underline:

Correction Factor	=	9.89 dB
+) Meter Reading	=	6.18 dBm
Result	=	16.07 dBm = 40.46 mW

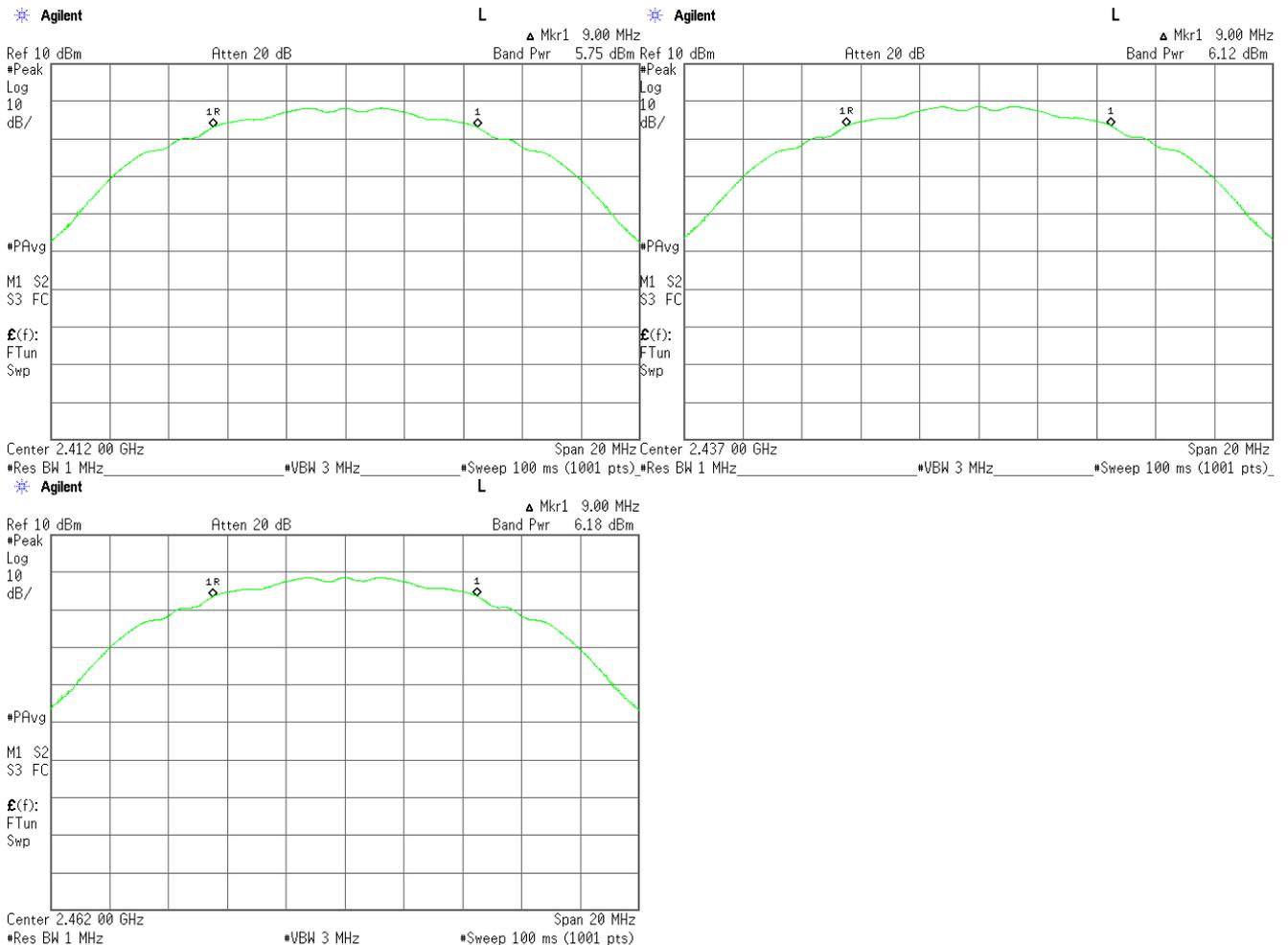
Minimum Margin: 30.00 - 16.07 = 13.93 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



3)Data Rate : 5.5Mbps(IEEE 802.11b)

Test Date: October 11, 2012
Temp.: 26 °C, Humi: 52 %

Data Rate : 5.5Mbps

CH	Transmitting Frequency		Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
	[MHz]	[MHz]			[dBm]	[mW]		
01	2412		9.89	7.25	17.14	51.76	30.00	+12.86
06	2437		9.89	7.17	17.06	50.82	30.00	+12.94
11	2462		9.89	7.76	17.65	58.21	30.00	+12.35

Calculated result at 2462.000 MHz, as the worst point shown on underline:

$$\begin{aligned}
 &\text{Correction Factor} &= & 9.89 \text{ dB} \\
 +) &\text{Meter Reading} &= & 7.76 \text{ dBm} \\
 \hline
 &\text{Result} &= & 17.65 \text{ dBm} = 58.21 \text{ mW}
 \end{aligned}$$

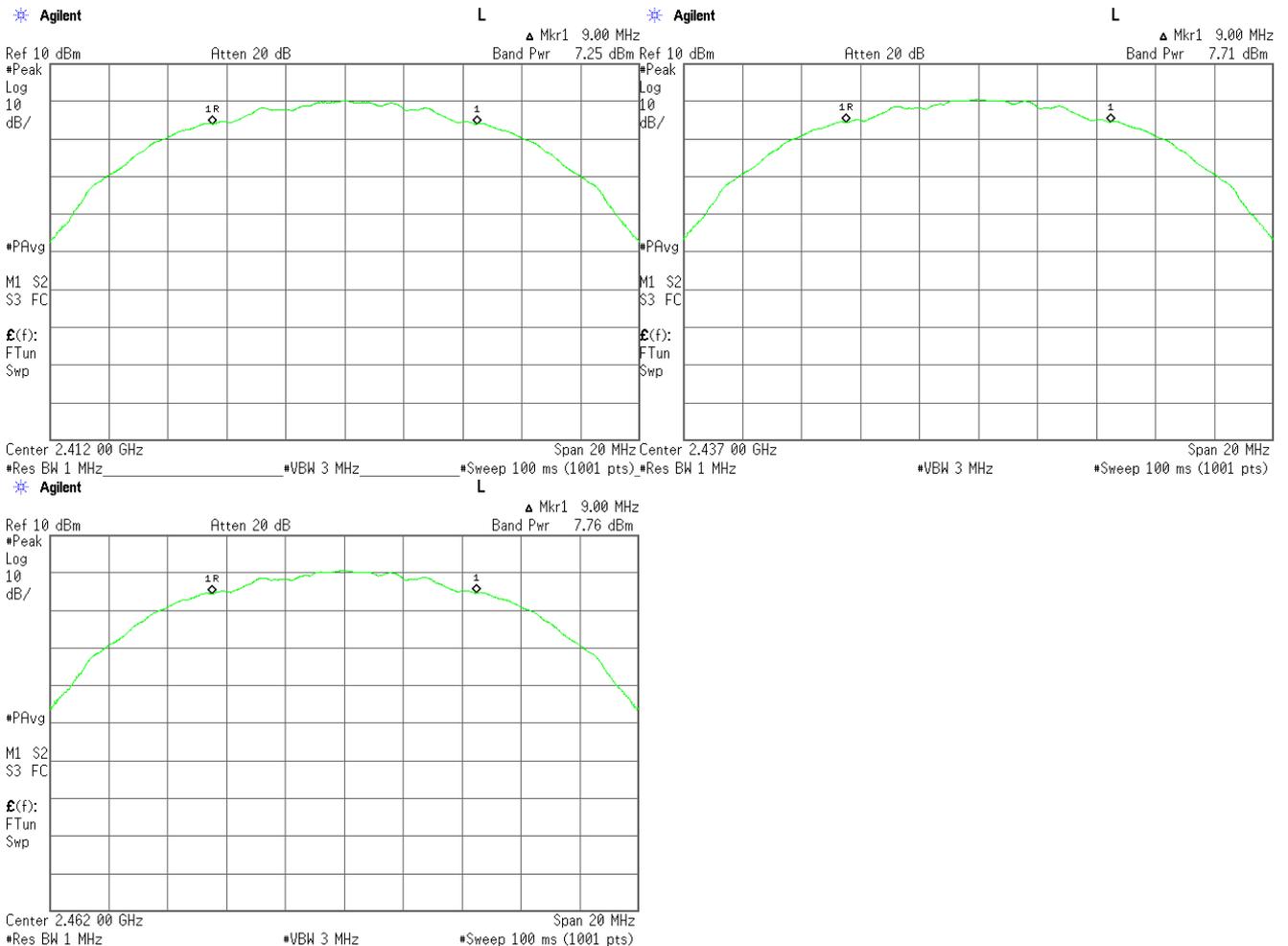
Minimum Margin: 30.00 - 17.65 = 12.35 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



4)Data Rate : 11Mbps(IEEE 802.11b)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

Data Rate : 11Mbps

CH	Transmitting Frequency		Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
	[MHz]	[MHz]			[dBm]	[mW]		
01	2412		9.89	9.21	19.10	81.28	30.00	+10.90
06	2437		9.89	9.54	19.43	87.70	30.00	+10.57
11	2462		9.89	9.69	19.58	90.78	30.00	+10.42

Calculated result at 2462.000 MHz, as the worst point shown on underline:

$$\begin{array}{rcl}
 \text{Correction Factor} & = & 9.89 \text{ dB} \\
 +) \text{ Meter Reading} & = & 9.69 \text{ dBm} \\
 \hline
 \text{Result} & = & 19.58 \text{ dBm} = 90.78 \text{ mW}
 \end{array}$$

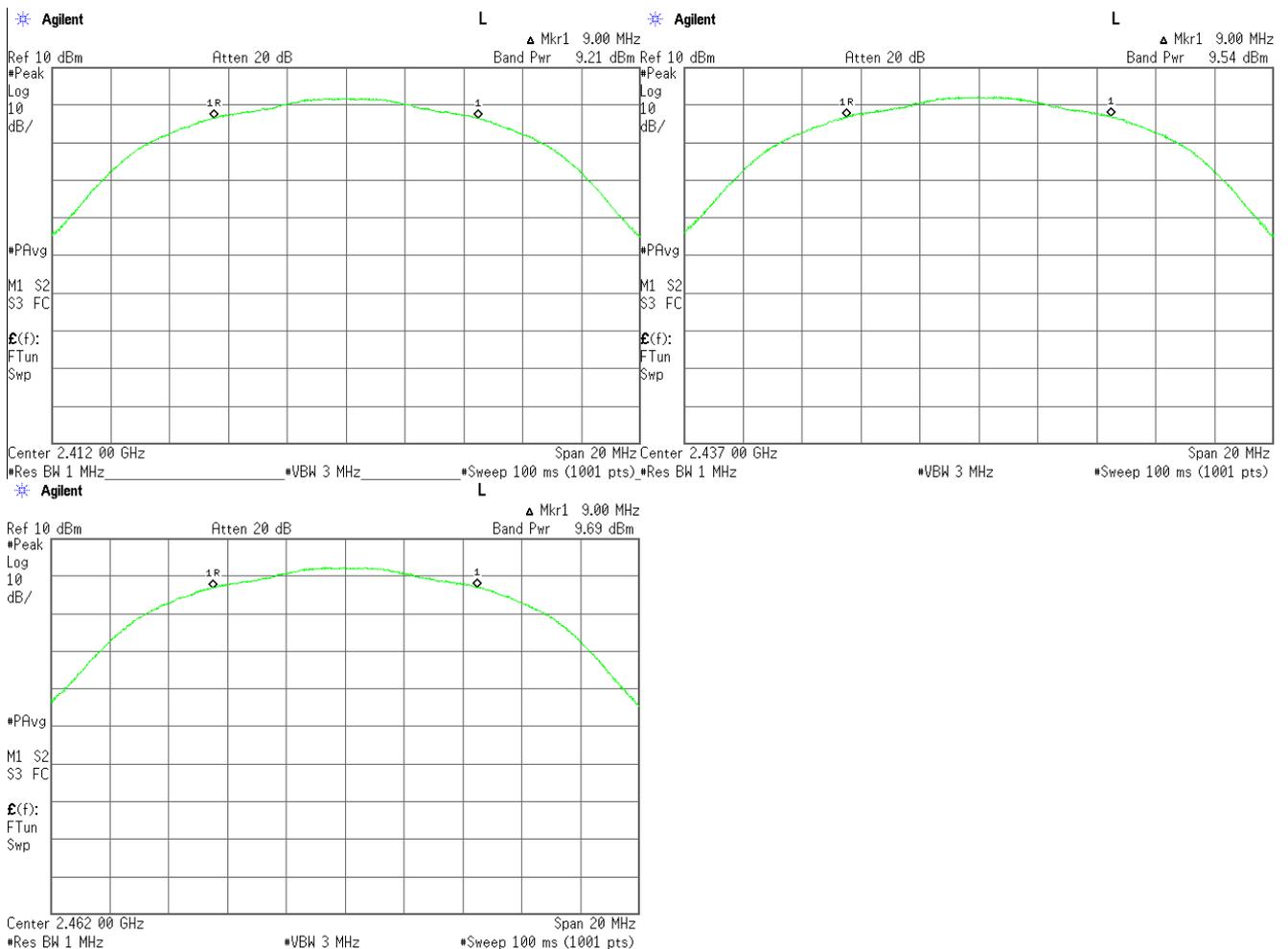
Minimum Margin: 30.00 - 19.58 = 10.42 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



5)Data Rate : 6Mbps(IEEE 802.11g)

Data Rate : 6Mbps

Test Date: October 11, 2012

Temp.: 26 °C, Humi: 52 %

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
				[dBm]	[mW]		
01	2412	9.89	10.61	20.50	112.20	30.00	+ 9.50
06	2437	9.89	10.69	20.58	114.29	30.00	+ 9.42
11	2462	9.89	11.13	21.02	126.47	30.00	+ 8.98

Calculated result at 2462.000 MHz, as the worst point shown on underline:

Correction Factor	=	9.89 dB
+) Meter Reading	=	11.13 dBm
Result	=	21.02 dBm = 126.47 mW

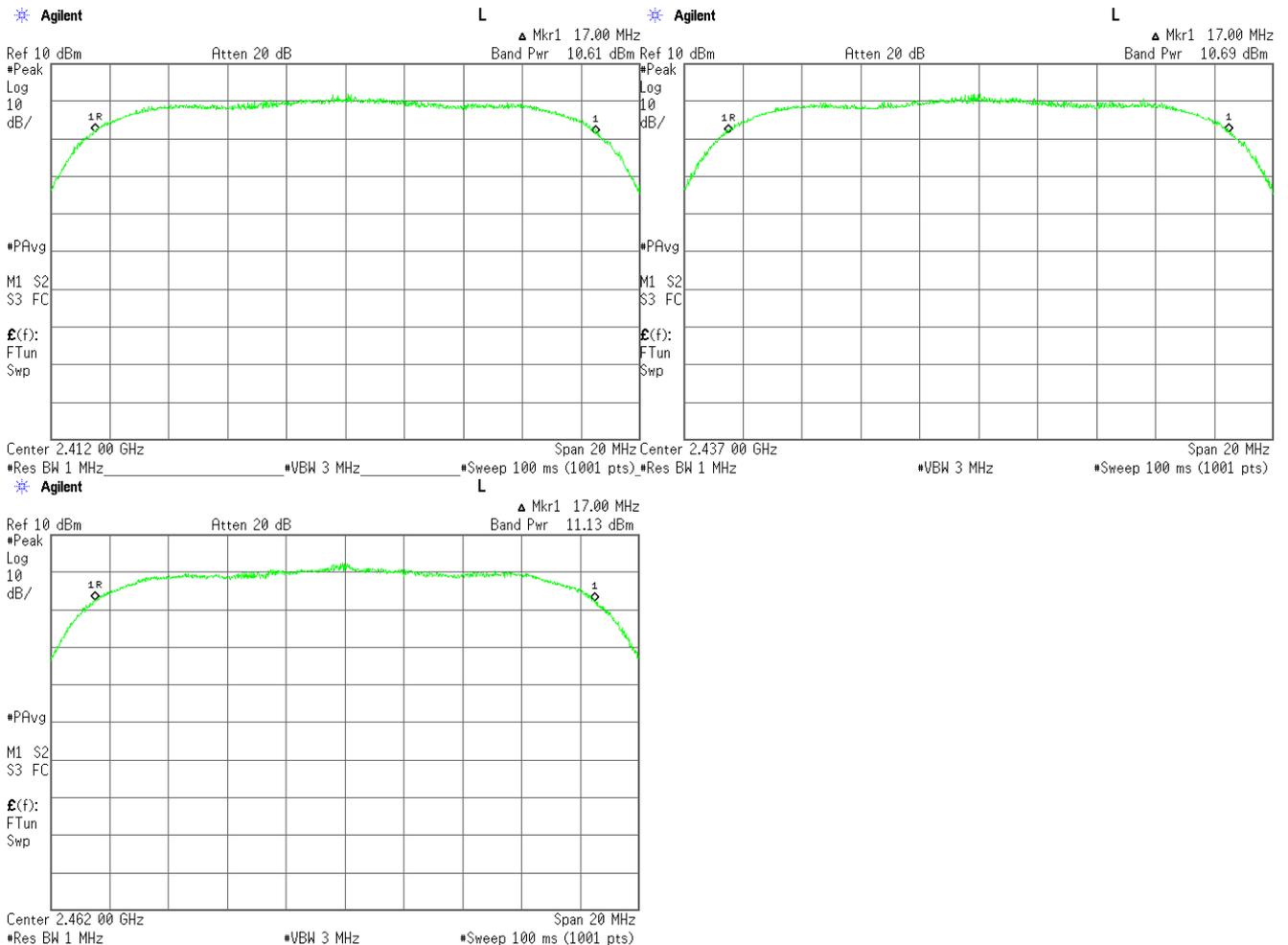
Minimum Margin: 30.00 - 21.02 = 8.98 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



6) Data Rate : 54Mbps(IEEE 802.11g)

Test Date: October 11, 2012
Temp.: 26 °C, Humi: 52 %

Data Rate : 54Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
				[dBm]	[mW]		
01	2412	9.89	11.71	21.60	144.54	30.00	+ 8.40
06	2437	9.89	11.42	21.31	135.21	30.00	+ 8.69
11	2462	9.89	11.72	21.61	144.88	30.00	+ 8.39

Calculated result at 2462.000 MHz, as the worst point shown on underline:

Correction Factor	=	9.89 dB
+) Meter Reading	=	11.72 dBm
Result	=	21.61 dBm = 144.88 mW

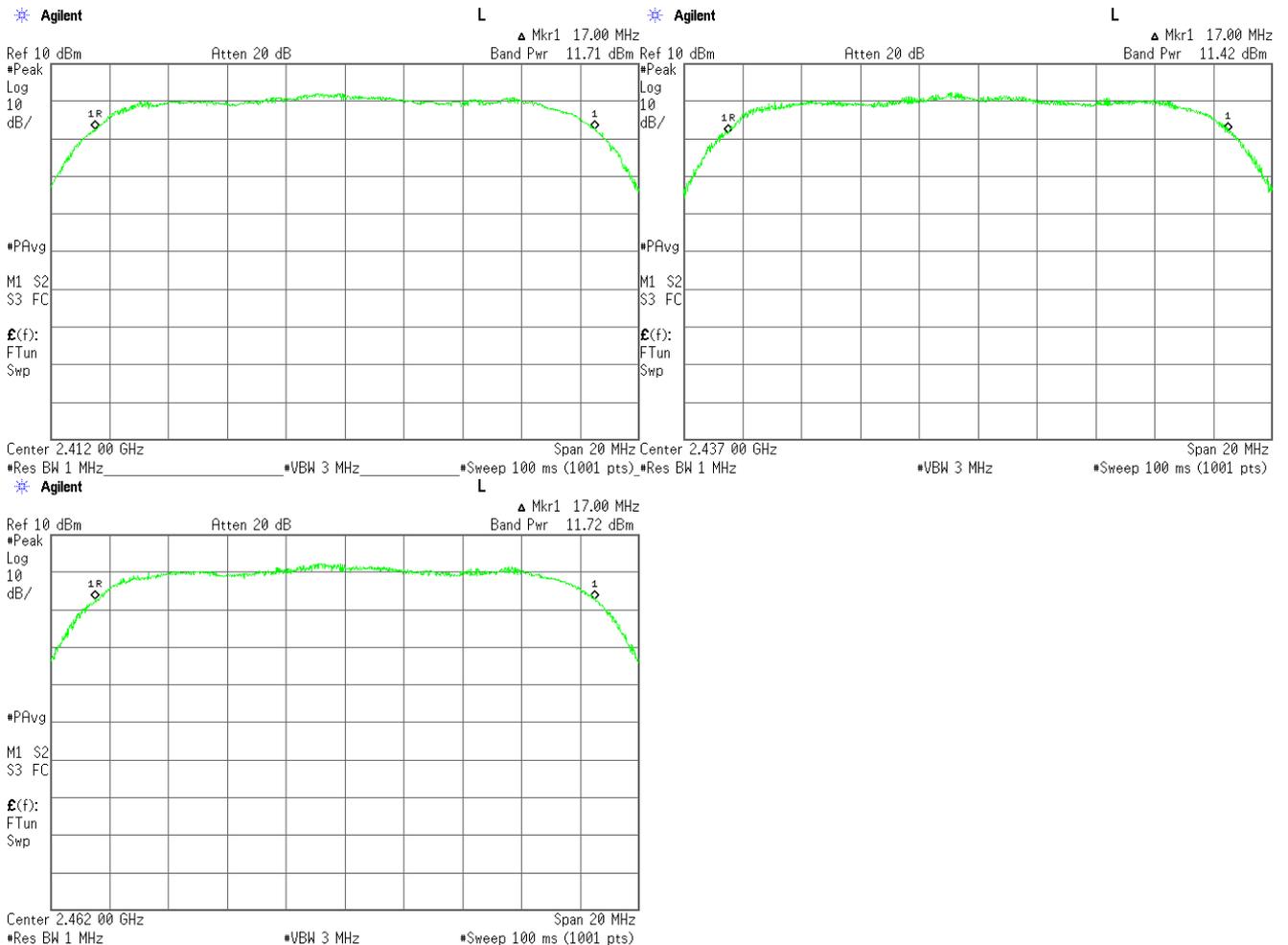
Minimum Margin: 30.00 - 21.61 = 8.39 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



7)Data Rate : 6.5Mbps(IEEE 802.11n)

Test Date: October 11, 2012
Temp.: 26 °C, Humi: 52 %

Data Rate : 6.5Mbps

CH	Transmitting Frequency		Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
	[MHz]	[MHz]			[dBm]	[mW]		
01	2412		9.89	9.08	18.97	78.89	30.00	+11.03
06	2437		9.89	9.46	19.35	86.10	30.00	+10.65
11	2462		9.89	9.67	19.56	90.36	30.00	+10.44

Calculated result at 2462.000 MHz, as the worst point shown on underline:

$$\begin{aligned}
 &\text{Correction Factor} &= &9.89 \text{ dB} \\
 +) &\text{Meter Reading} &= &9.67 \text{ dBm} \\
 \hline
 &\text{Result} &= &19.56 \text{ dBm} = 90.36 \text{ mW}
 \end{aligned}$$

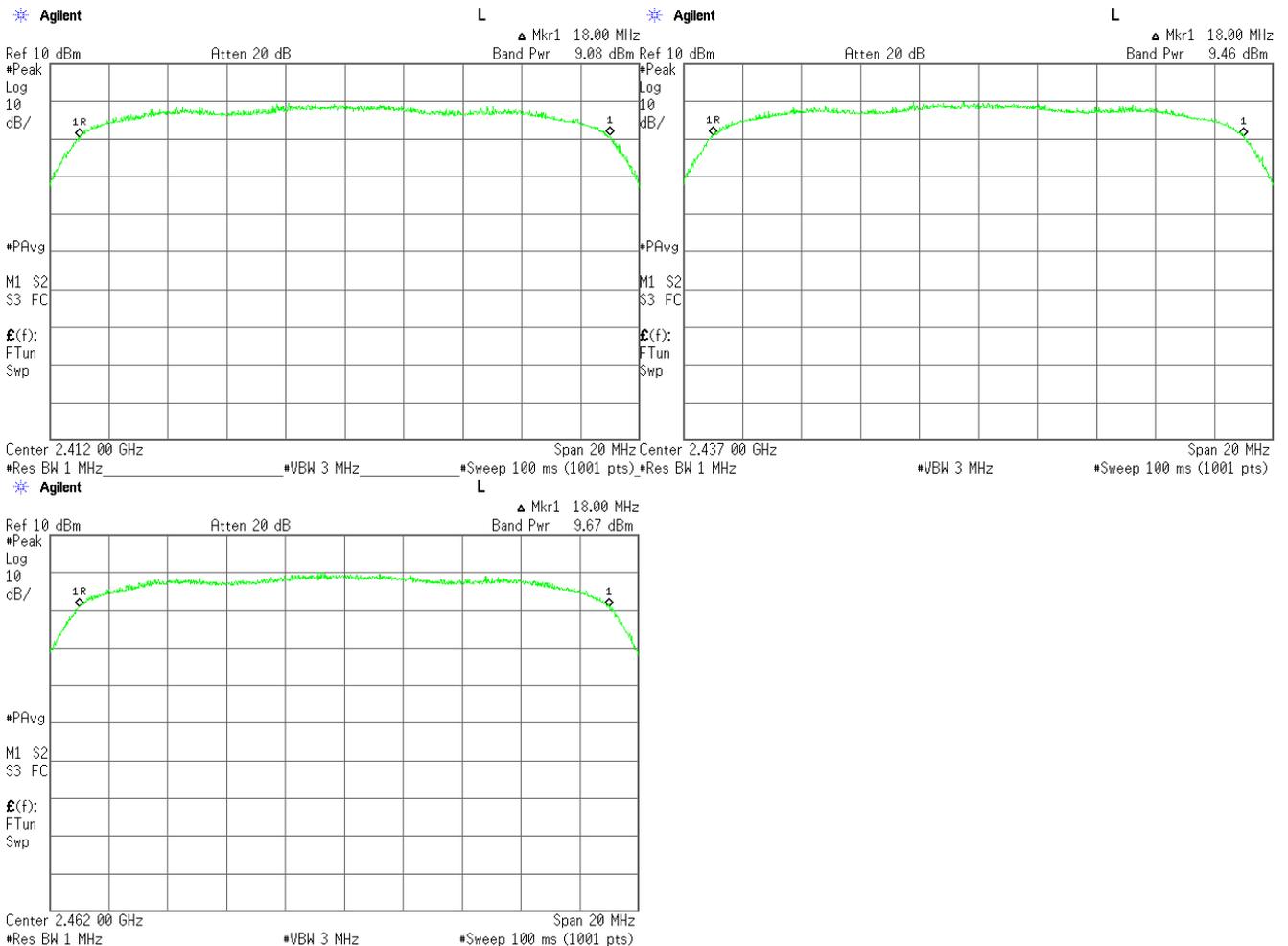
Minimum Margin: 30.00 - 19.56 = 10.44 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



8) Data Rate : 65Mbps(IEEE 802.11n)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

Data Rate : 65Mbps

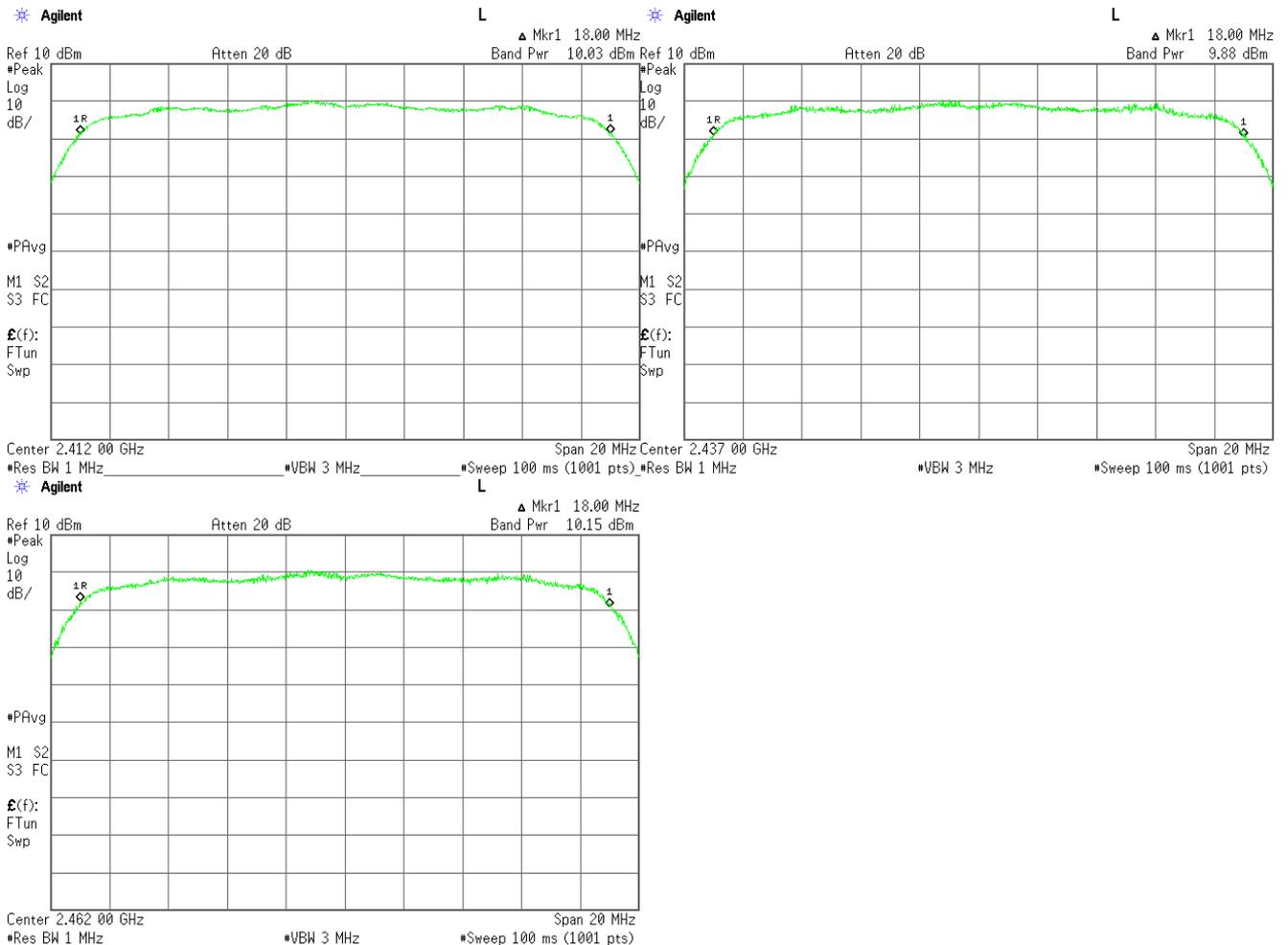
CH	Transmitting Frequency		Correction Factor [dB]	Meter Reading [dBm]	Conducted Peak Output Power		Limits [dBm]	Margin [dB]
	[MHz]	[MHz]			[dBm]	[mW]		
01	2412		9.89	10.03	19.92	98.17	30.00	+10.08
06	2437		9.89	9.88	19.77	94.84	30.00	+10.23
11	2462		9.89	10.15	20.04	100.93	30.00	+ 9.96

Calculated result at 2462.000 MHz, as the worst point shown on underline:
 Correction Factor = 9.89 dB
 +) Meter Reading = 10.15 dBm
 Result = 20.04 dBm = 100.93 mW
 Minimum Margin: 30.00 - 20.04 = 9.96 (dB)

NOTES
 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
 2. Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	1MHz	3MHz

The band power function was used.



7.6 Peak Power Density(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.6.1 Worst Point and Measurement Uncertainty

Peak Power Density of IEEE802.11b is	<u>-9.25</u>	dBm	at	<u>2462.0</u>	MHz
Peak Power Density of IEEE802.11g is	<u>-12.65</u>	dBm	at	<u>2462.0</u>	MHz
Peak Power Density of IEEE802.11n is	<u>-13.86</u>	dBm	at	<u>2437.0</u>	MHz

Uncertainty of Measurement Results at Amplitude +/-1.2 dB(2 σ)

Remarks : _____

7.6.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

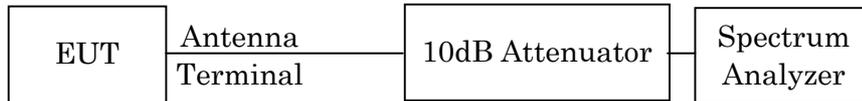
<input type="checkbox"/> - Anechoic chamber (A1)	<input type="checkbox"/> - Measurement room (M1)
<input type="checkbox"/> - Measurement room (M2)	<input type="checkbox"/> - Measurement room (M3)
<input type="checkbox"/> - Shielded room (S1)	<input type="checkbox"/> - Shielded room (S2)
<input type="checkbox"/> - Shielded room (S3)	<input checked="" type="checkbox"/> - Shielded room (S4)

7.6.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2012/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2012/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2012/7	1 Year

7.6.4 Test Method and Test Setup (Diagrammatic illustration)

The Conducted RF Power Output was measured with a power meter, one 10dB attenuator and a short, low loss cable.



7.6.5 Test Data

1) Data Rate : 1Mbps(IEEE 802.11b)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

Data Rate : 1Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-4.86	-10.17	0.10	8.00	+18.17
06	2437	9.89	-15.20	-4.45	-9.76	0.11	8.00	+17.76
11	2462	9.89	-15.20	-4.55	-9.86	0.10	8.00	+17.86

Calculated result at 2437.000 MHz, as the worst point shown on underline:

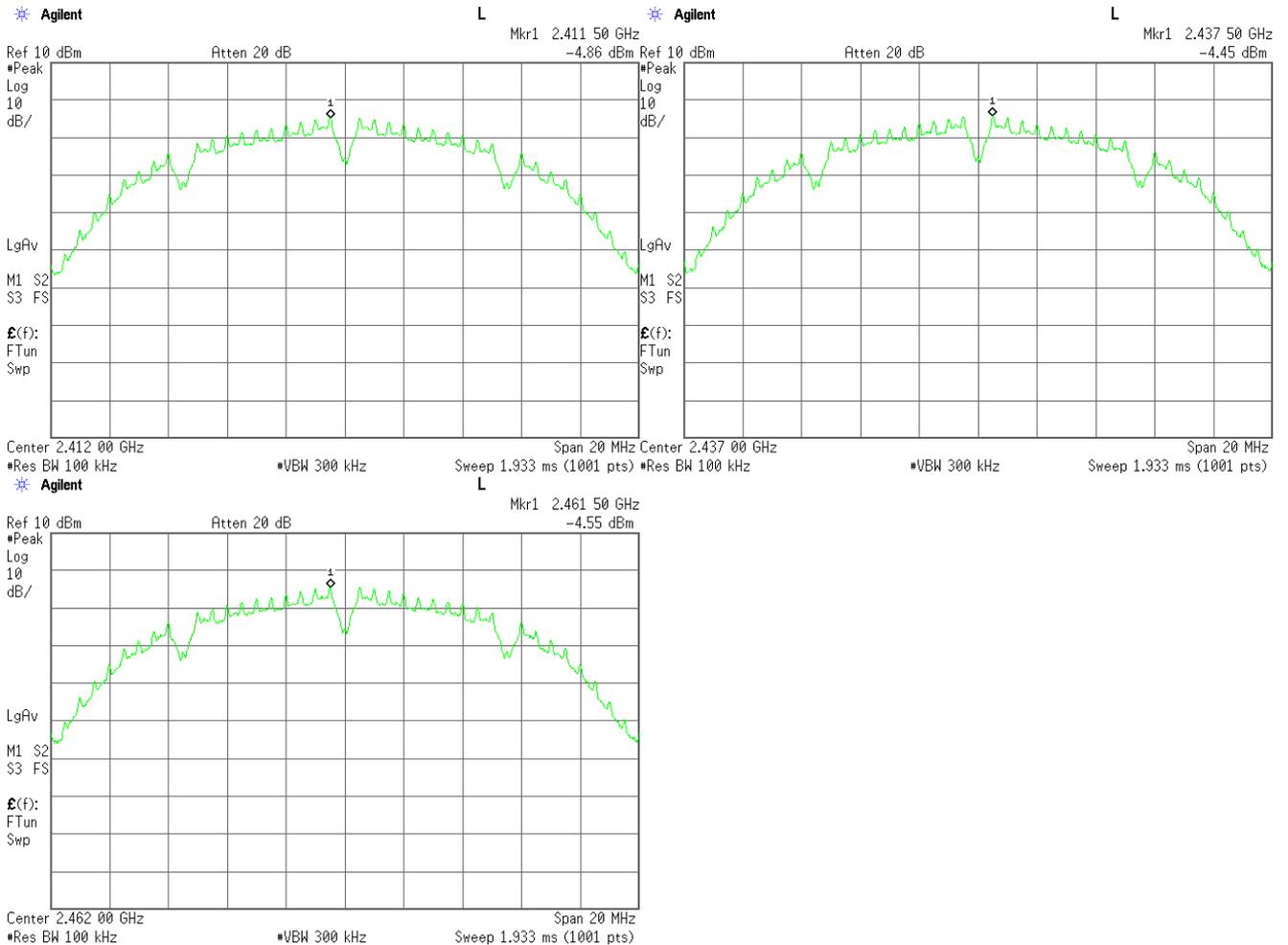
Correction Factor	=	9.89 dB
BWCF	=	-15.20 dB
+) Meter Reading	=	-4.45 dBm
Result	=	-9.76 dBm = 0.11 mW

Minimum Margin: 8.00 - -9.76 = 17.76 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- BWCF(bandwidth correction factor) = $10 \log(3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



2)Data Rate : 2Mbps(IEEE 802.11b)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

Data Rate : 2Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-4.78	-10.09	0.10	8.00	+18.09
06	2437	9.89	-15.20	-3.98	-9.29	0.12	8.00	+17.29
11	2462	9.89	-15.20	-4.57	-9.88	0.10	8.00	+17.88

Calculated result at 2437.000 MHz, as the worst point shown on underline:

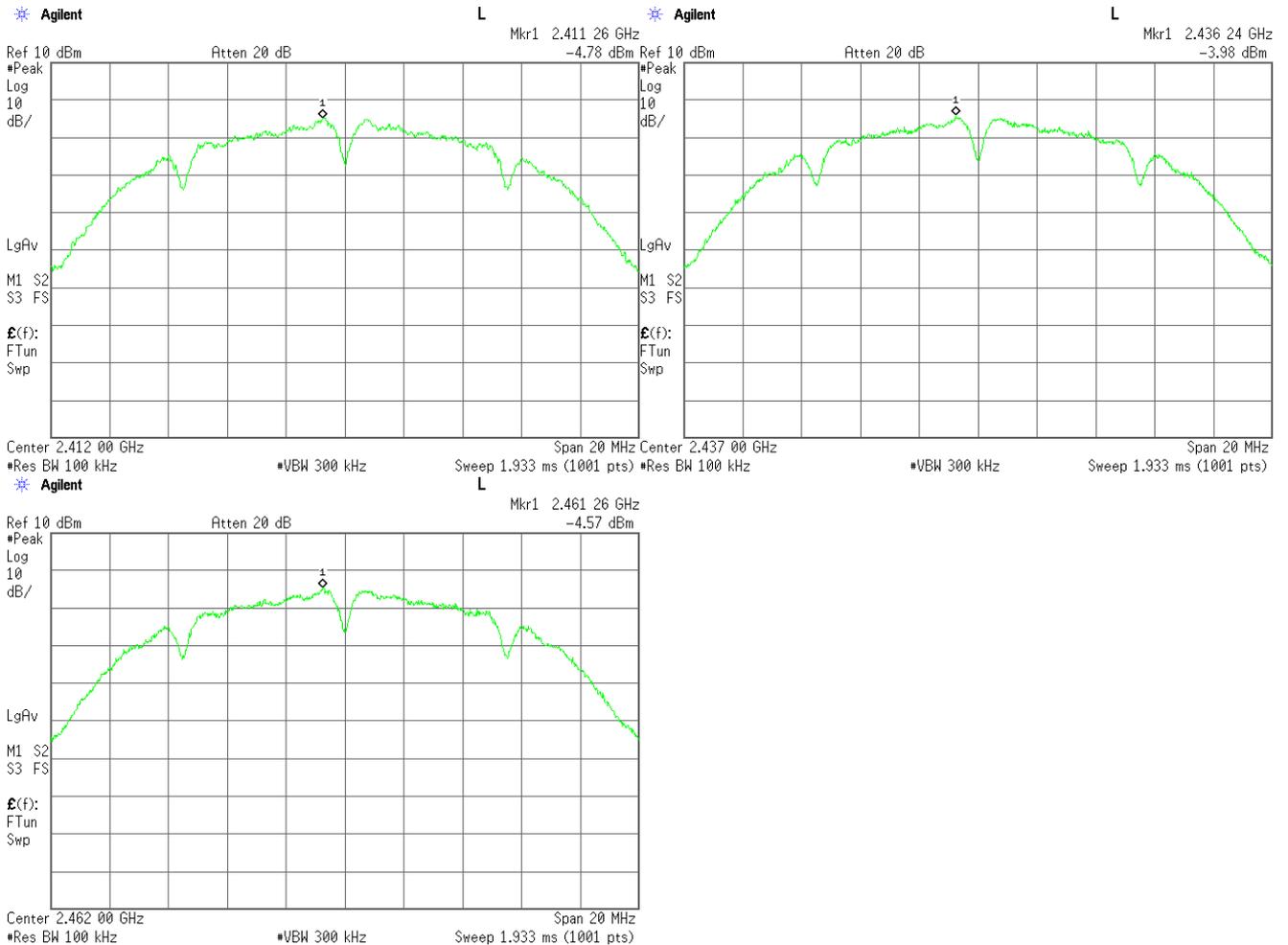
Correction Factor	=	9.89 dB
BWCF	=	-15.20 dB
+) Meter Reading	=	-3.98 dBm
Result	=	-9.29 dBm = 0.12 mW

Minimum Margin: 8.00 - -9.29 = 17.29 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



3)Data Rate : 5.5Mbps(IEEE 802.11b)

Test Date: October 11, 2012
Temp.: 26 °C, Humi: 52 %

Data Rate : 5.5Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-4.37	-9.68	0.11	8.00	+17.68
06	2437	9.89	-15.20	-4.00	-9.31	0.12	8.00	+17.31
11	2462	9.89	-15.20	-3.94	-9.25	0.12	8.00	+17.25

Calculated result at 2462.000 MHz, as the worst point shown on underline:

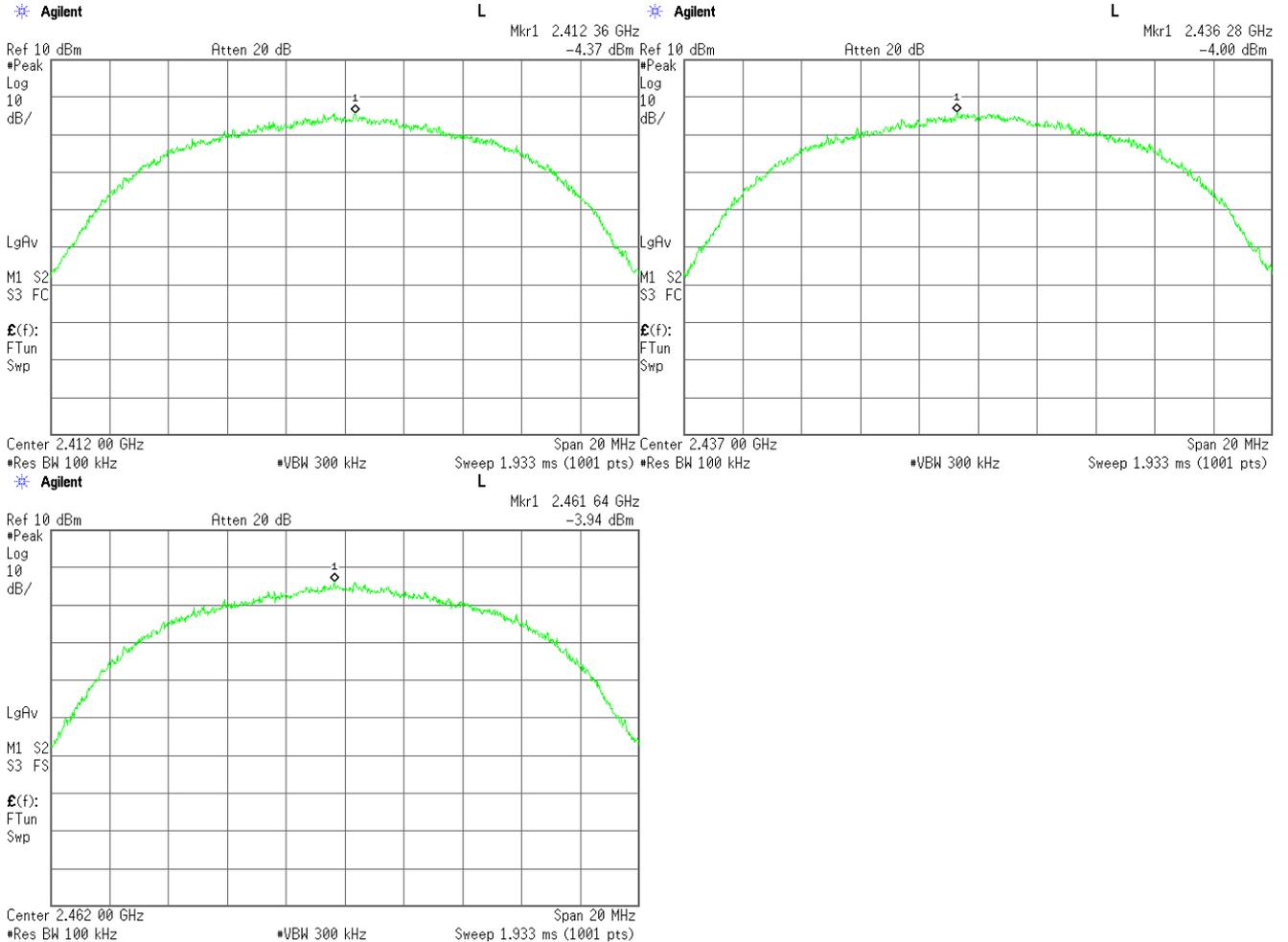
Correction Factor	=	9.89 dB
BWCF	=	-15.20 dB
+) Meter Reading	=	-3.94 dBm
Result	=	-9.25 dBm = 0.12 mW

Minimum Margin: 8.00 - -9.25 = 17.25 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



4)Data Rate : 11Mbps(IEEE 802.11b)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

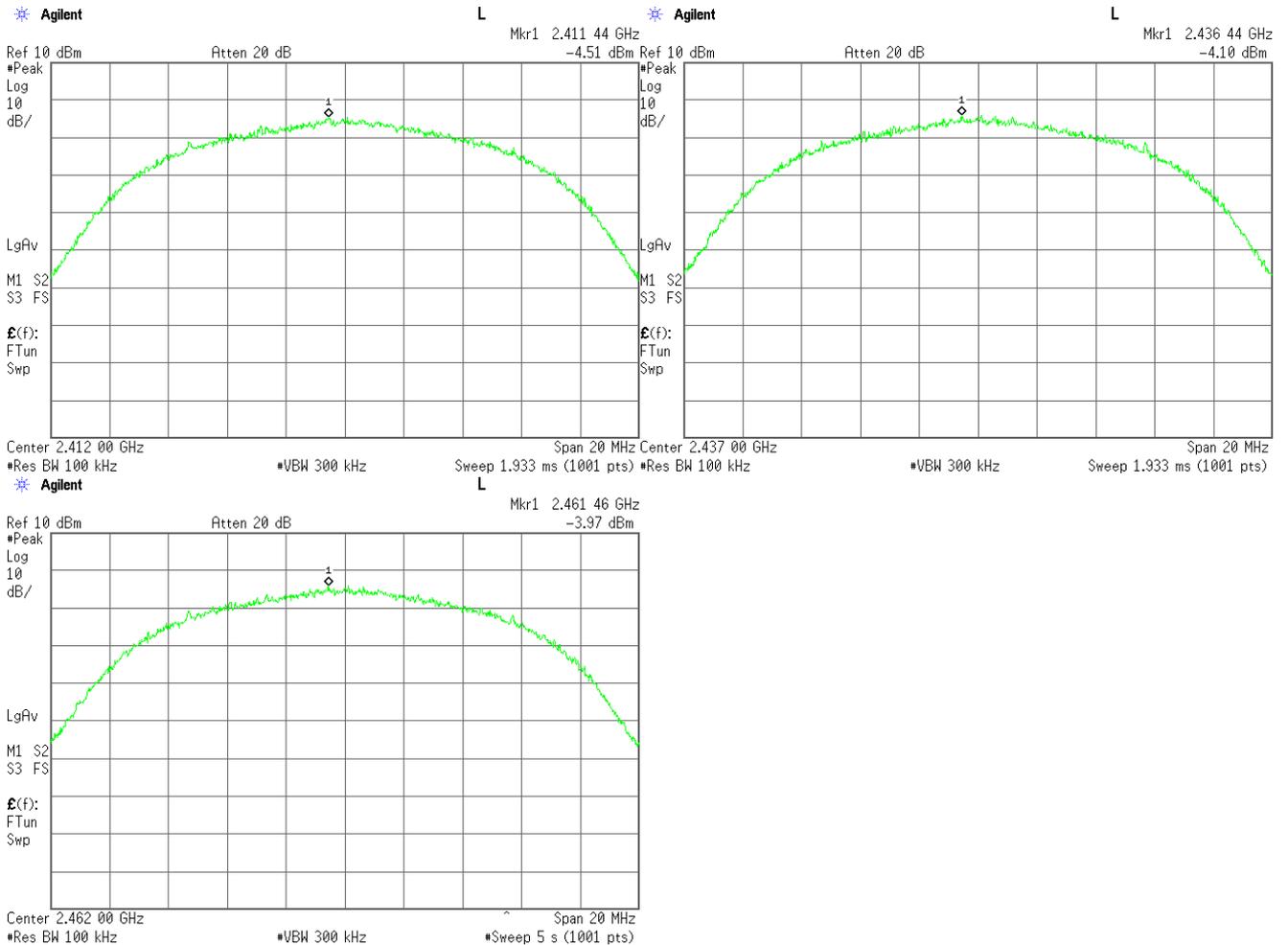
Data Rate : 11Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-4.51	-9.82	0.10	8.00	+17.82
06	2437	9.89	-15.20	-4.10	-9.41	0.11	8.00	+17.41
11	2462	9.89	-15.20	-3.97	-9.28	0.12	8.00	+17.28

Calculated result at 2462.000 MHz, as the worst point shown on underline:
 Correction Factor = 9.89 dB
 BWCF = -15.20 dB
 +) Meter Reading = -3.97 dBm
 Result = -9.28 dBm = 0.12 mW
 Minimum Margin: 8.00 - -9.28 = 17.28 (dB)

NOTES
 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
 2. BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
 3. Setting of measuring instrument(s):

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



5) Data Rate : 6Mbps(IEEE 802.11g)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

Data Rate : 6Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-8.29	-13.60	0.04	8.00	+21.60
06	2437	9.89	-15.20	-7.48	-12.79	0.05	8.00	+20.79
11	2462	9.89	-15.20	-7.81	-13.12	0.05	8.00	+21.12

Calculated result at 2437.000 MHz, as the worst point shown on underline:

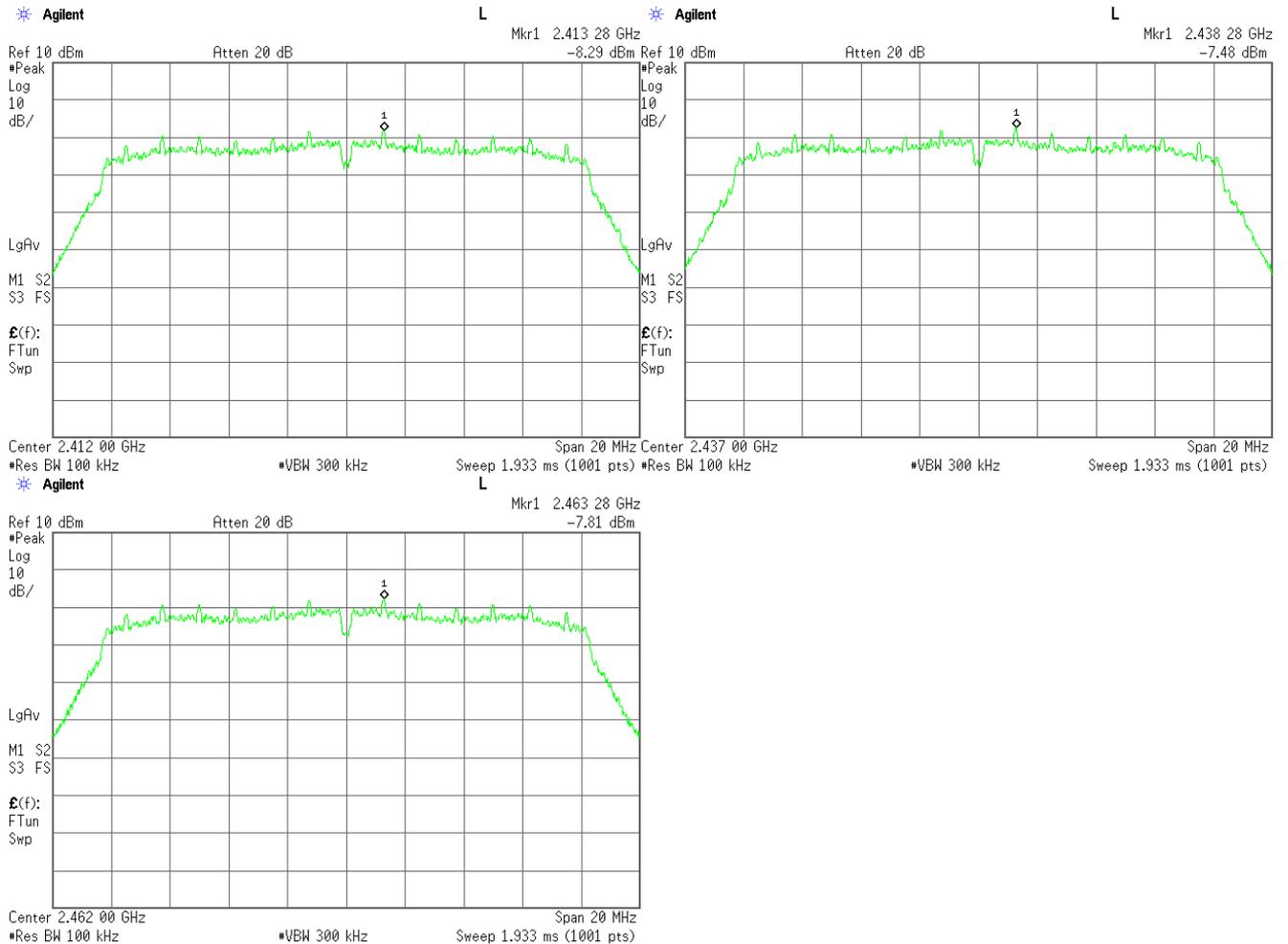
Correction Factor	=	9.89 dB
BWCF	=	-15.20 dB
+) Meter Reading	=	-7.48 dBm
Result	=	-12.79 dBm = 0.05 mW

Minimum Margin: 8.00 - -12.79 = 20.79 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
- Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



6) Data Rate : 54Mbps(IEEE 802.11g)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

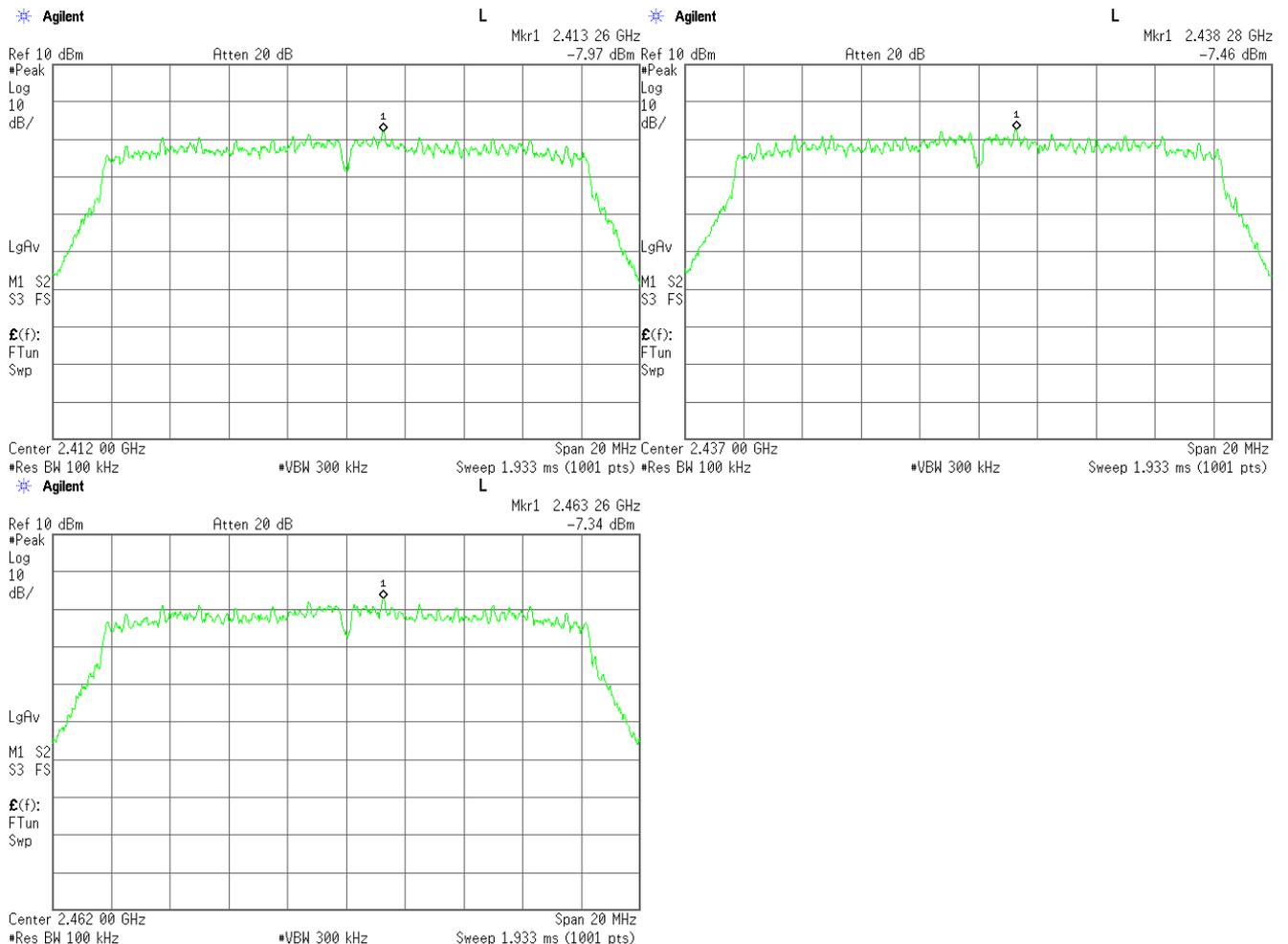
Data Rate : 54Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm] [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-7.97	-13.28 0.05	8.00	+21.28
06	2437	9.89	-15.20	-7.46	-12.77 0.05	8.00	+20.77
11	2462	9.89	-15.20	-7.34	-12.65 0.05	8.00	+20.65

Calculated result at 2462.000 MHz, as the worst point shown on underline:
 Correction Factor = 9.89 dB
 BWCF = -15.20 dB
 +) Meter Reading = -7.34 dBm
 Result = -12.65 dBm = 0.05 mW
 Minimum Margin: 8.00 - -12.65 = 20.65 (dB)

NOTES
 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
 2. BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
 3. Setting of measuring instrument(s):

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



7)Data Rate : 6.5Mbps(IEEE 802.11n)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

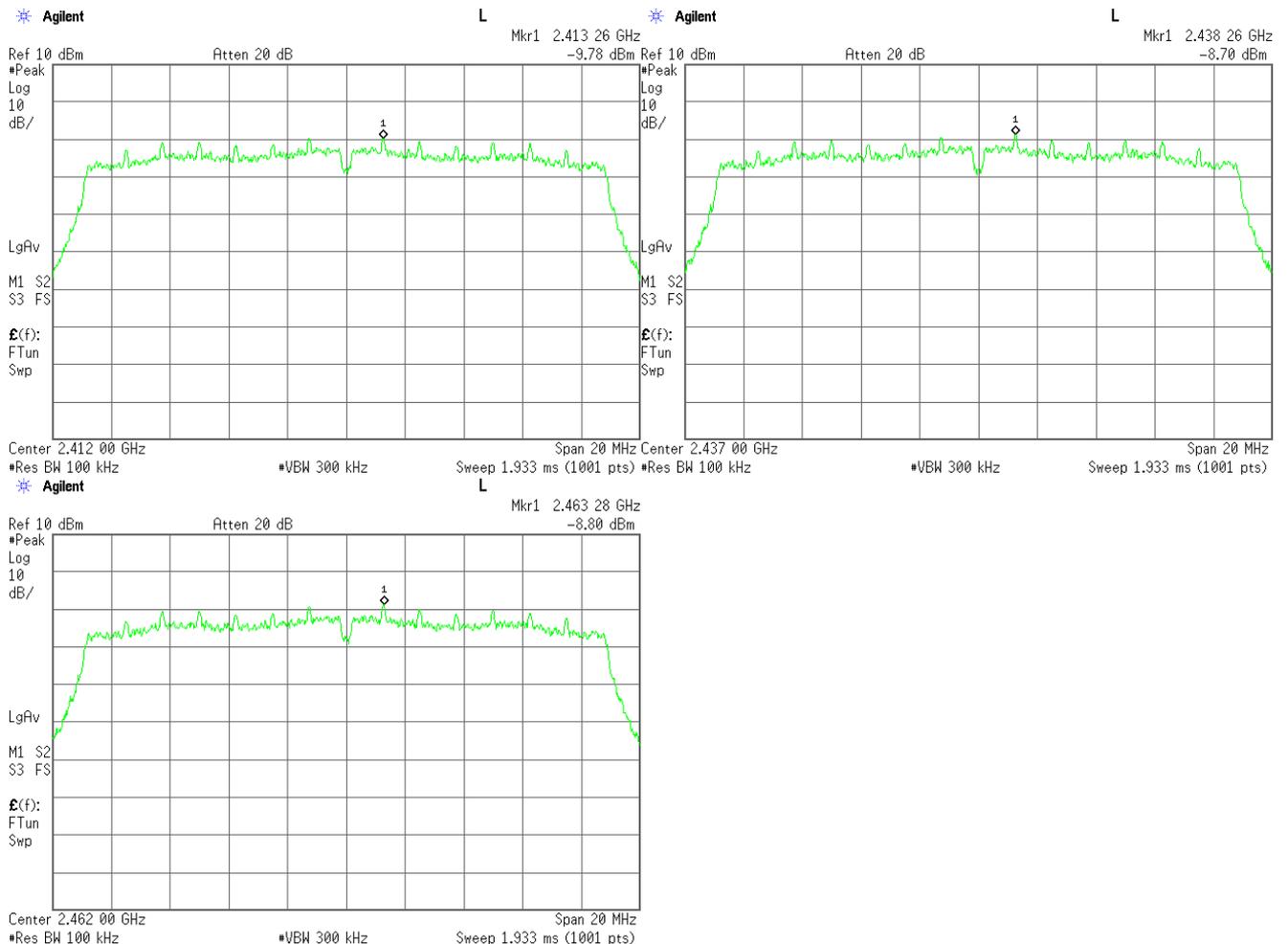
Data Rate : 6.5Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-9.78	-15.09	0.03	8.00	+23.09
06	2437	9.89	-15.20	-8.70	-14.01	0.04	8.00	+22.01
11	2462	9.89	-15.20	-8.80	-14.11	0.04	8.00	+22.11

Calculated result at 2437.000 MHz, as the worst point shown on underline:
 Correction Factor = 9.89 dB
 BWCF = -15.20 dB
 +) Meter Reading = -8.70 dBm
 Result = -14.01 dBm = 0.04 mW
 Minimum Margin: 8.00 - -14.01 = 22.01 (dB)

NOTES
 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
 2. BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
 3. Setting of measuring instrument(s):

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



8) Data Rate : 65Mbps(IEEE 802.11n)

Test Date: October 11, 2012
 Temp.: 26 °C, Humi: 52 %

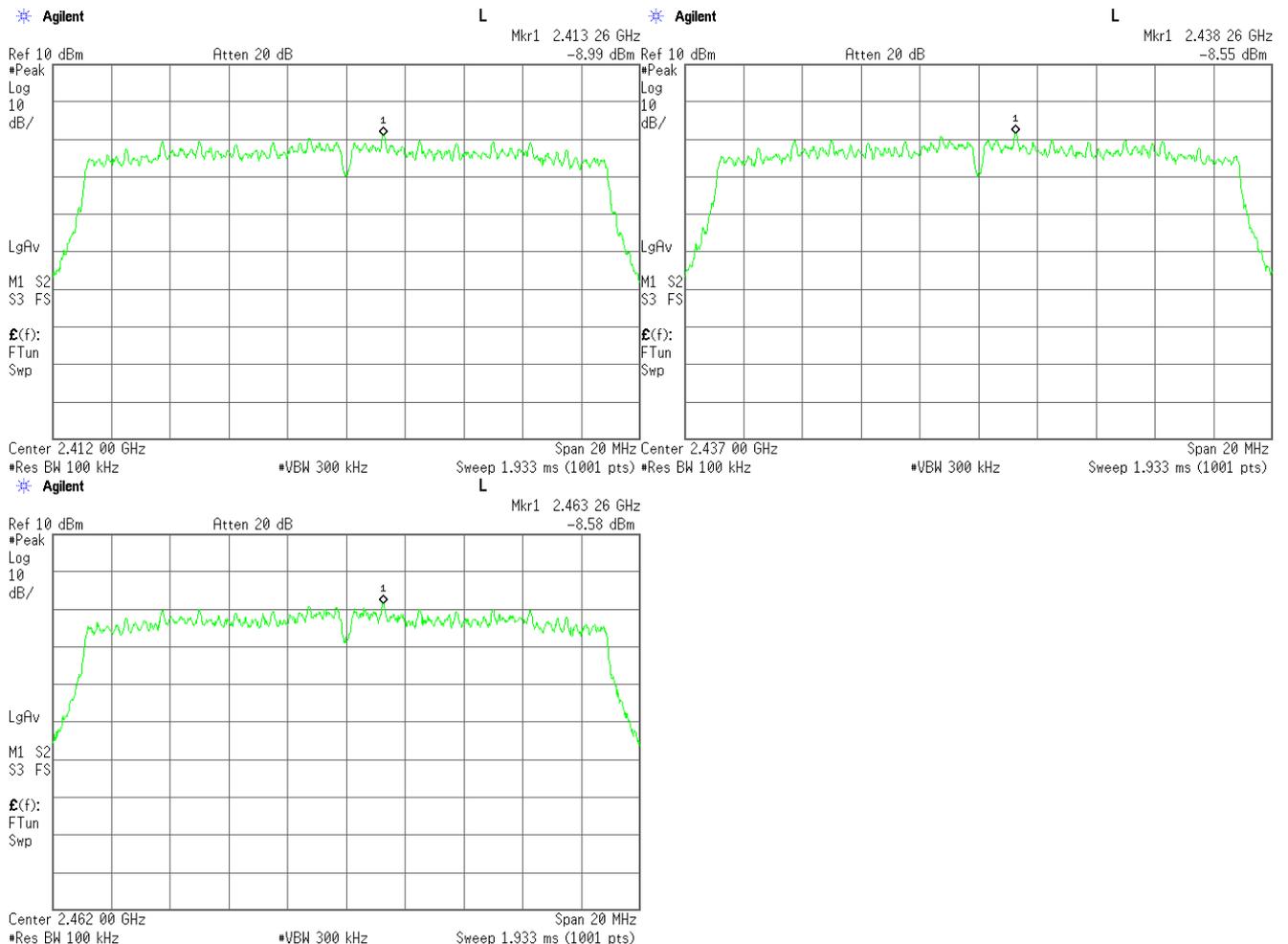
Data Rate : 65Mbps

CH	Transmitting Frequency [MHz]	Correction Factor [dB]	BWCF [dB]	Meter Reading [dBm]	Conducted Peak Power Density [dBm]	Conducted Peak Power Density [mW]	Limits [dBm]	Margin [dB]
01	2412	9.89	-15.20	-8.99	-14.30	0.04	8.00	+22.30
06	2437	9.89	-15.20	-8.55	-13.86	0.04	8.00	+21.86
11	2462	9.89	-15.20	-8.58	-13.89	0.04	8.00	+21.89

Calculated result at 2437.000 MHz, as the worst point shown on underline:
 Correction Factor = 9.89 dB
 BWCF = -15.20 dB
 +) Meter Reading = -8.55 dBm
 Result = -13.86 dBm = 0.04 mW
 Minimum Margin: 8.00 - -13.86 = 21.86 (dB)

NOTES
 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
 2. BWCF(bandwidth correction factor) = 10 log (3 kHz/100 kHz) = -15.2 dB
 3. Setting of measuring instrument(s):

Detector Function	RES B.W.	Video B.W.
Peak	100kHz	300kHz



7.7 Spurious Emissions(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.7.1 Worst Point and Measurement Uncertainty

Uncertainty of Measurement Results	9 kHz – 1GHz	<u>+/-1.0</u>	dB(2 σ)
	1GHz – 18GHz	<u>+/-1.2</u>	dB(2 σ)
	18GHz – 40GHz	<u>+/-1.6</u>	dB(2 σ)

Remarks : _____

7.7.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

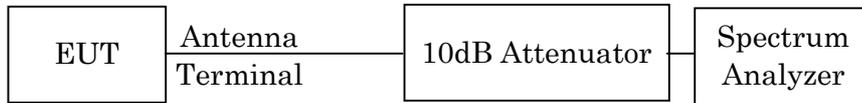
<input type="checkbox"/> - Anechoic chamber (A1)	<input type="checkbox"/> - Measurement room (M1)
<input type="checkbox"/> - Measurement room (M2)	<input type="checkbox"/> - Measurement room (M3)
<input type="checkbox"/> - Shielded room (S1)	<input type="checkbox"/> - Shielded room (S2)
<input type="checkbox"/> - Shielded room (S3)	<input checked="" type="checkbox"/> - Shielded room (S4)

7.7.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2012/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2012/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2012/7	1 Year

7.7.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

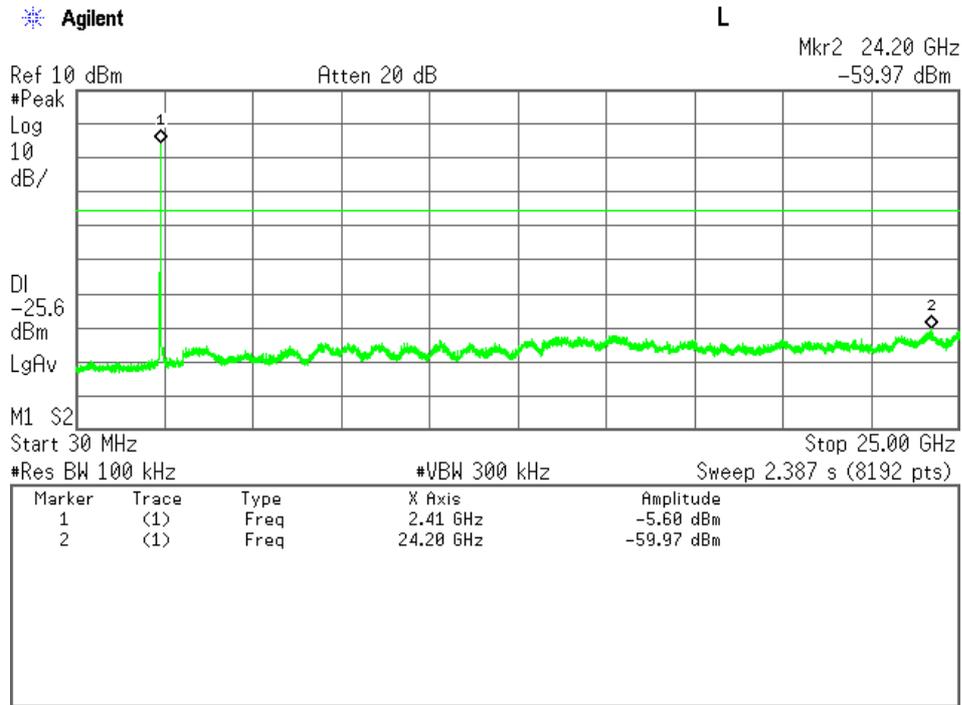
Frequency Range	30 MHz - 25 GHz	Band-Edge
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.7.5 Test Data

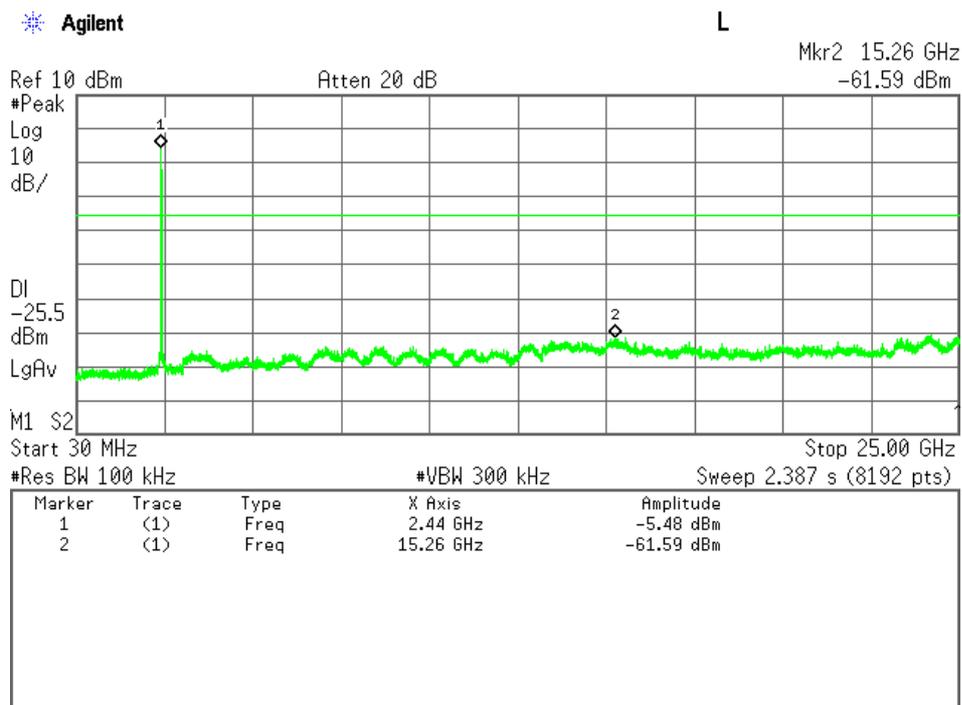
Test Date : October 11, 2012

Temp.:26°C, Humi:52%

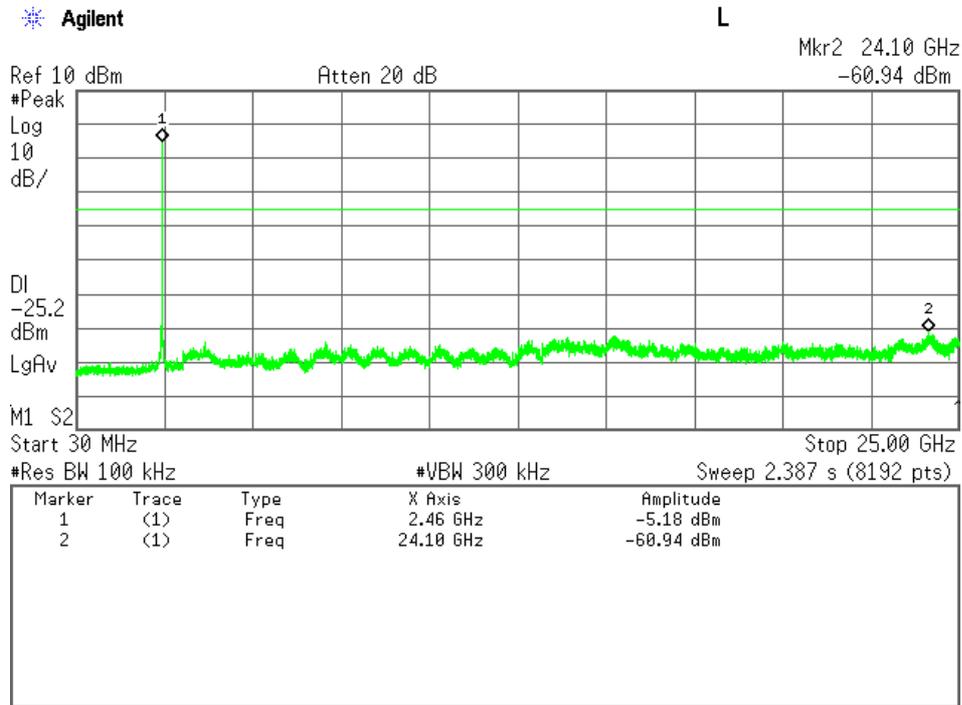
1)Data Rate : 1Mbps(IEEE 802.11b)
Low Channel



Middle Channel

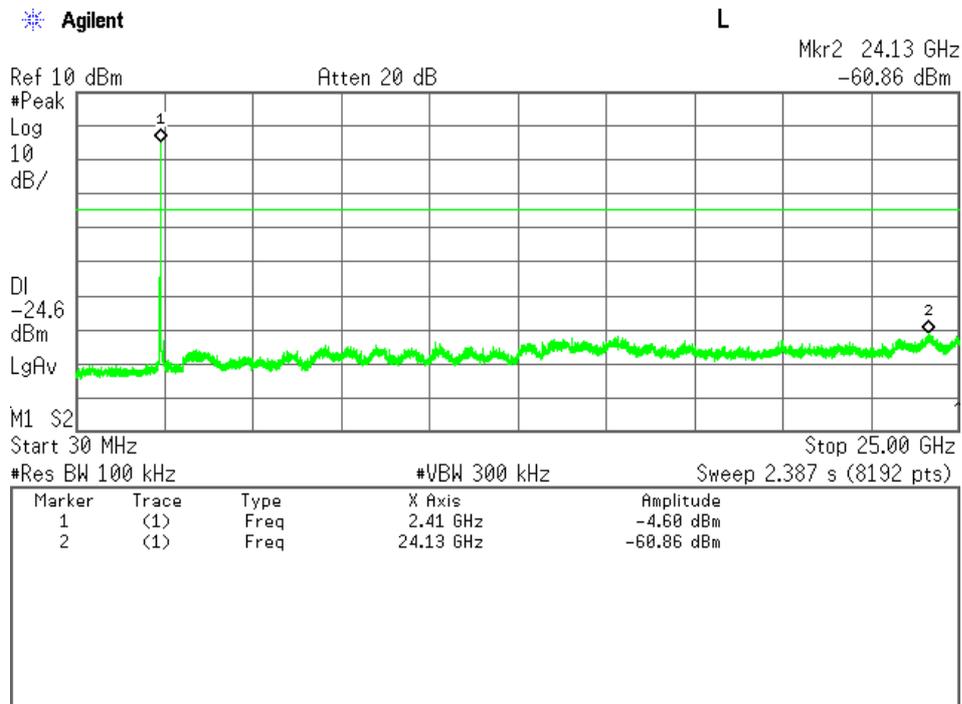


High Channel

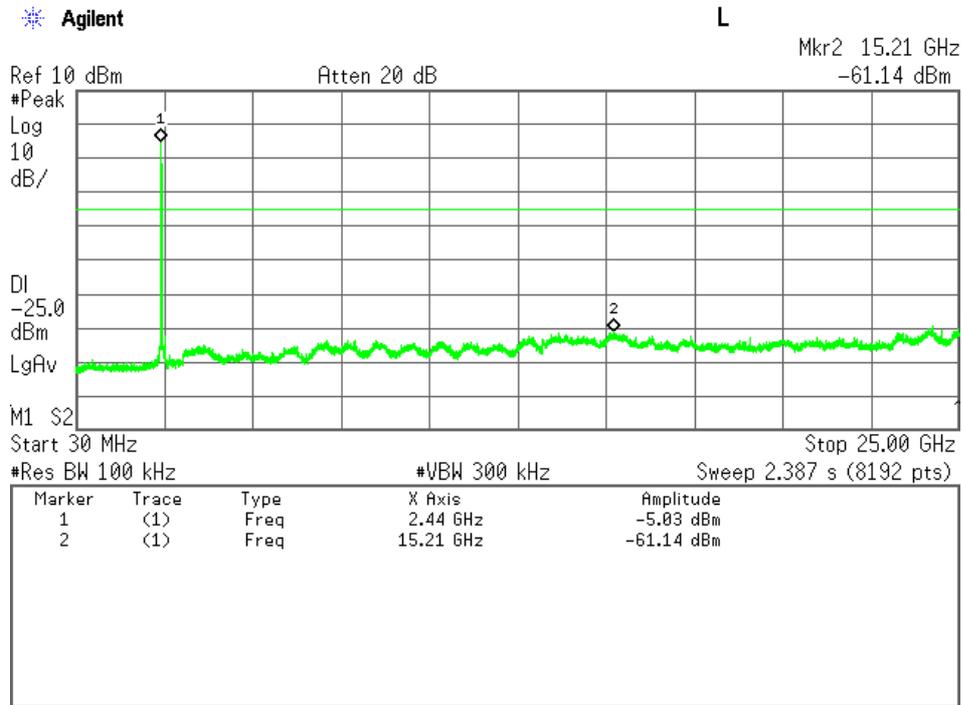


2)Data Rate : 11Mbps(IEEE 802.11b)

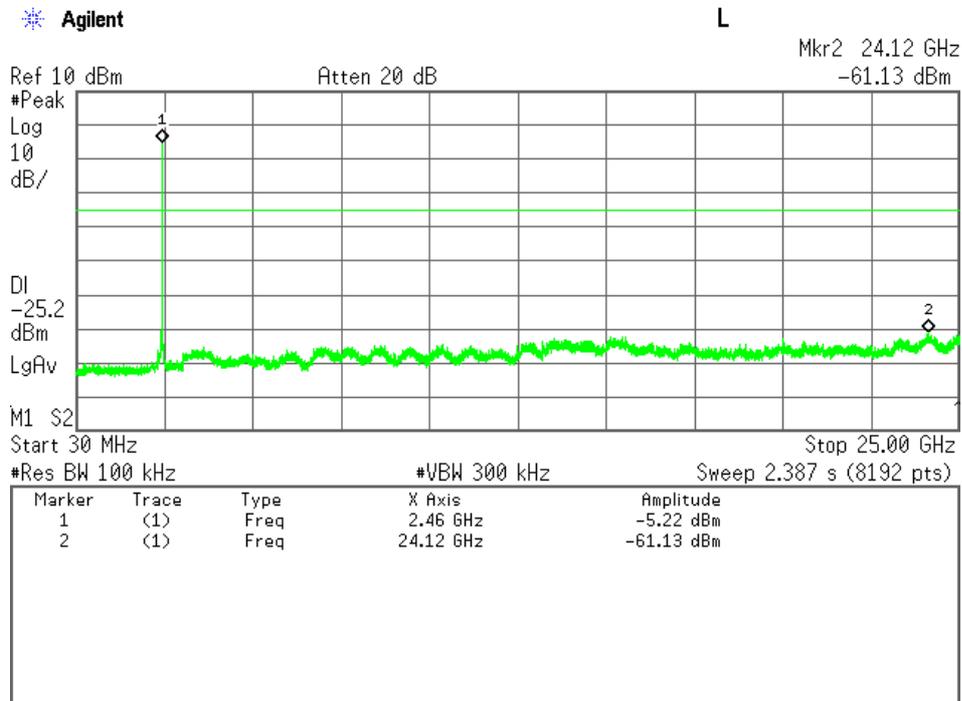
Low Channel



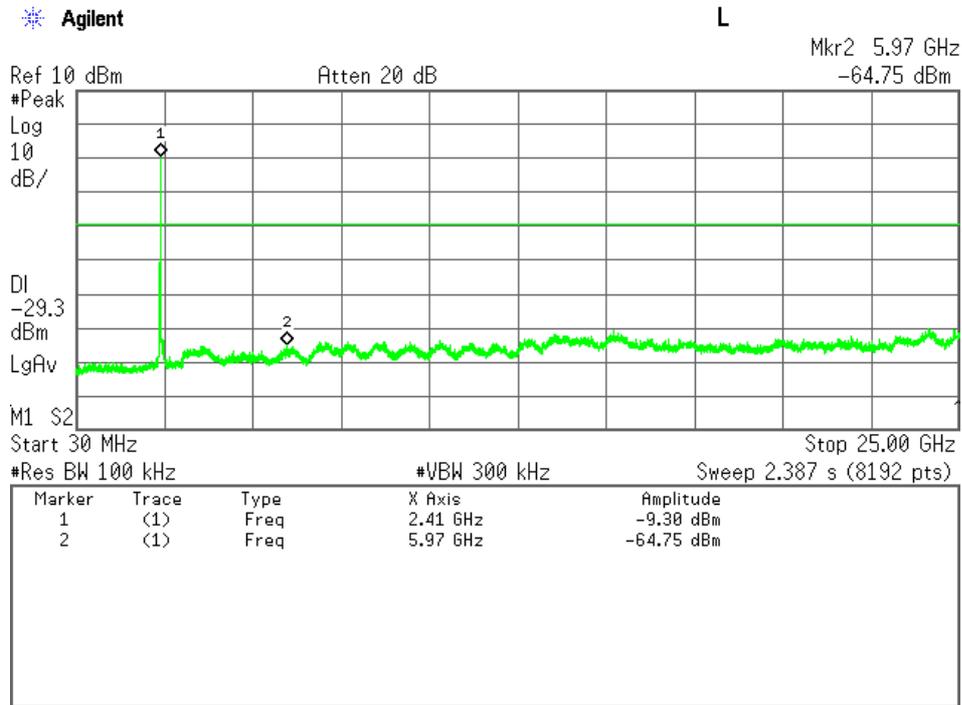
Middle Channel



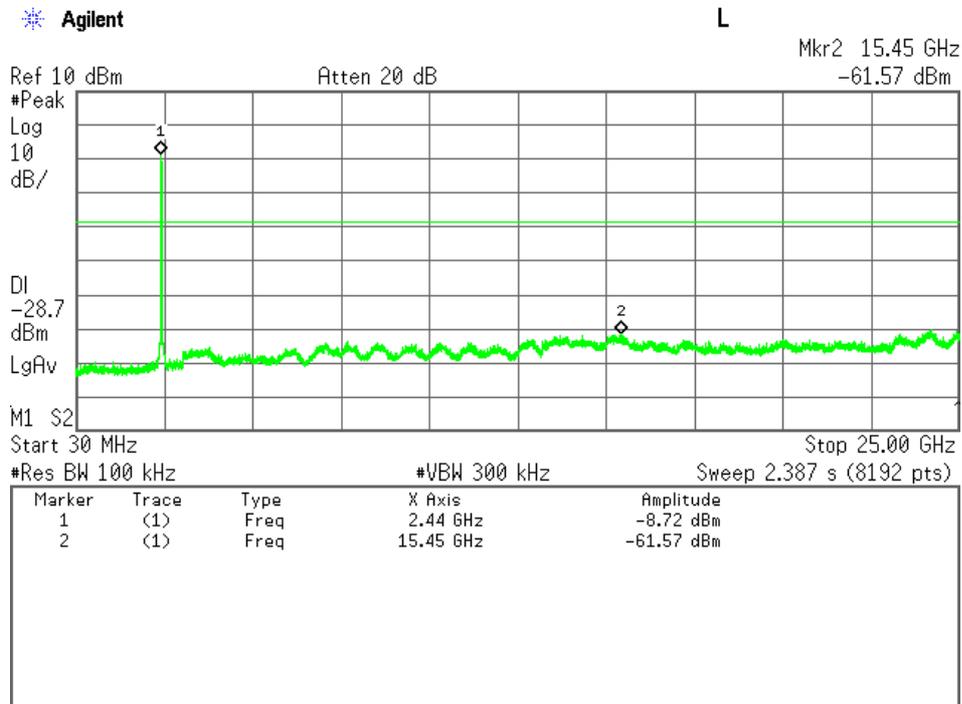
High Channel



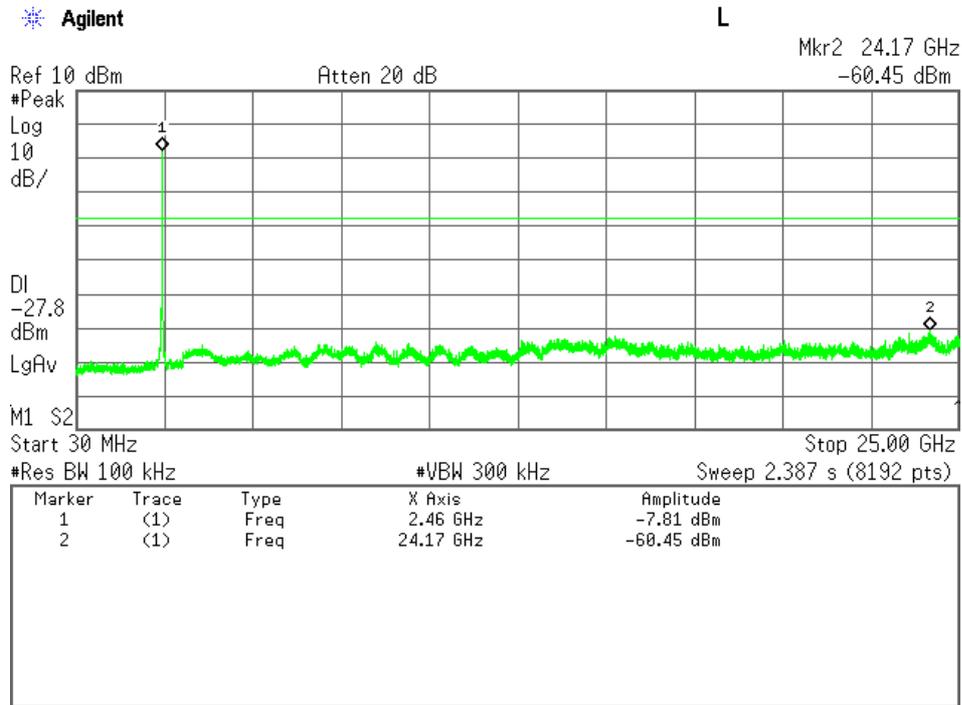
3)Data Rate : 6Mbps(IEEE 802.11g)
Low Channel



Middle Channel

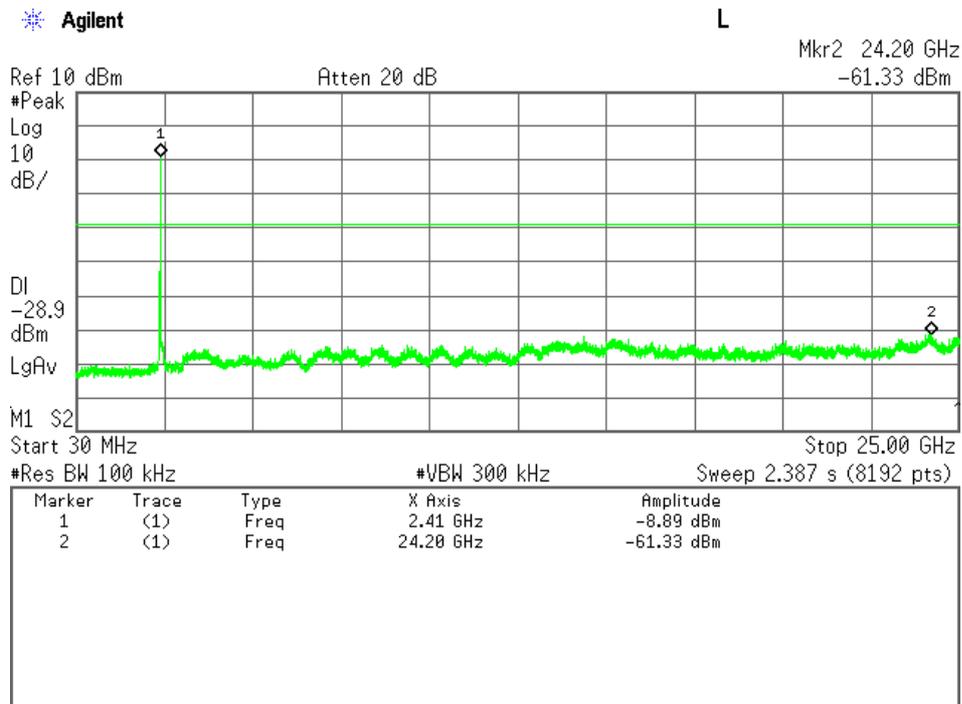


High Channel

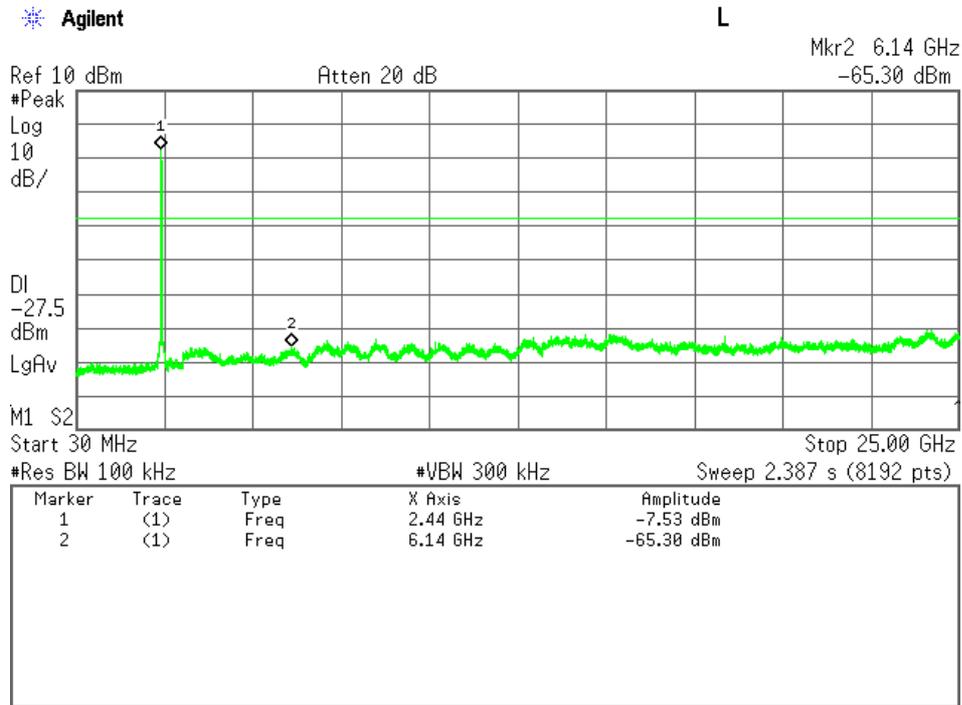


4)Data Rate : 54Mbps(IEEE 802.11g)

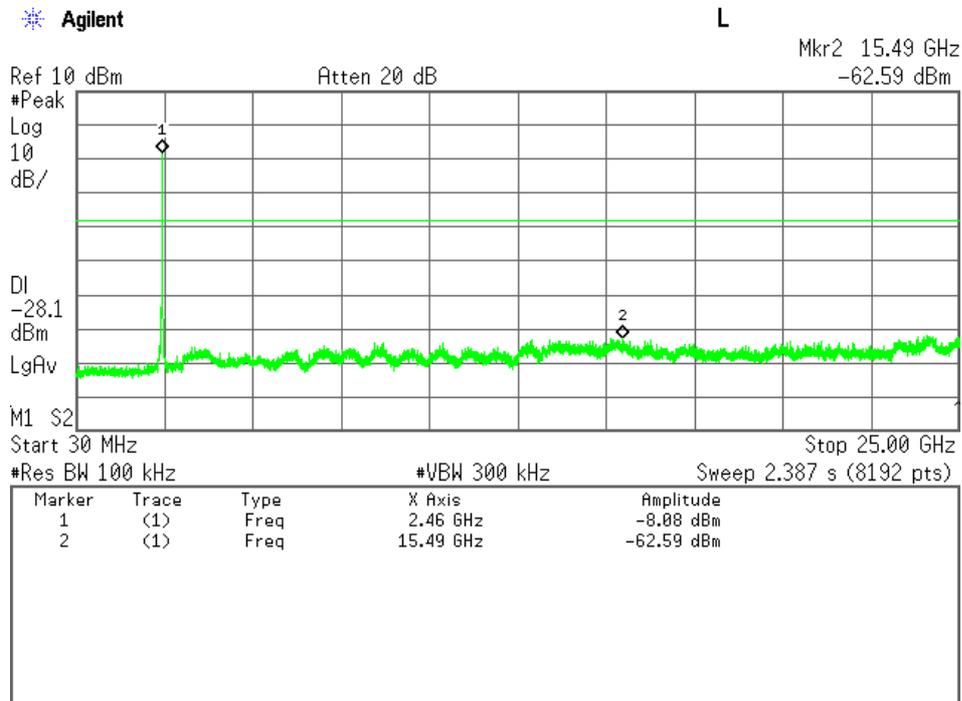
Low Channel



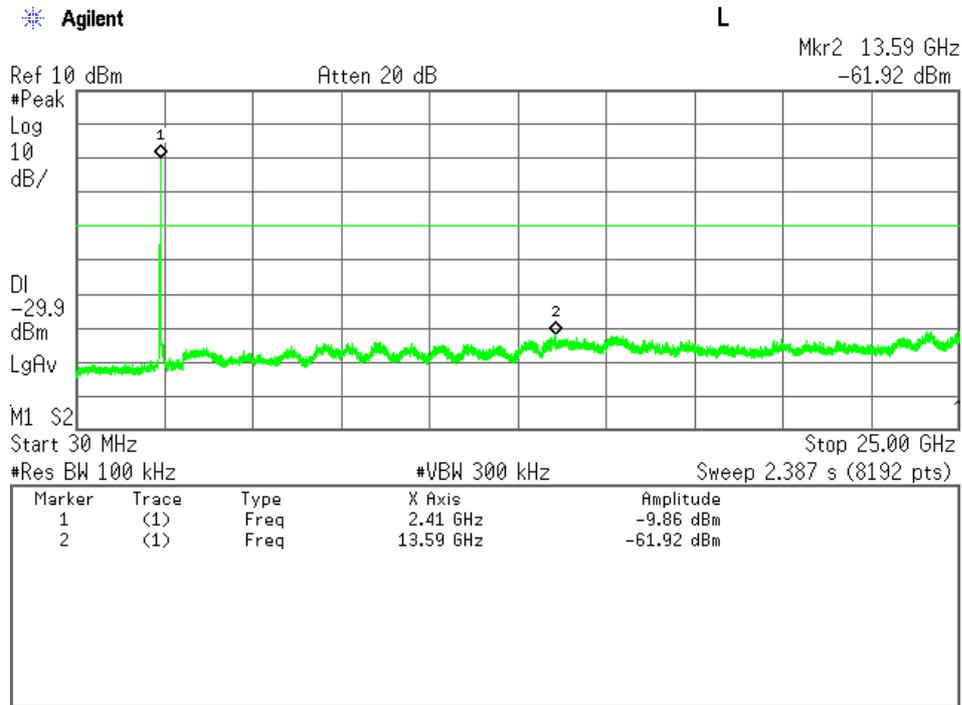
Middle Channel



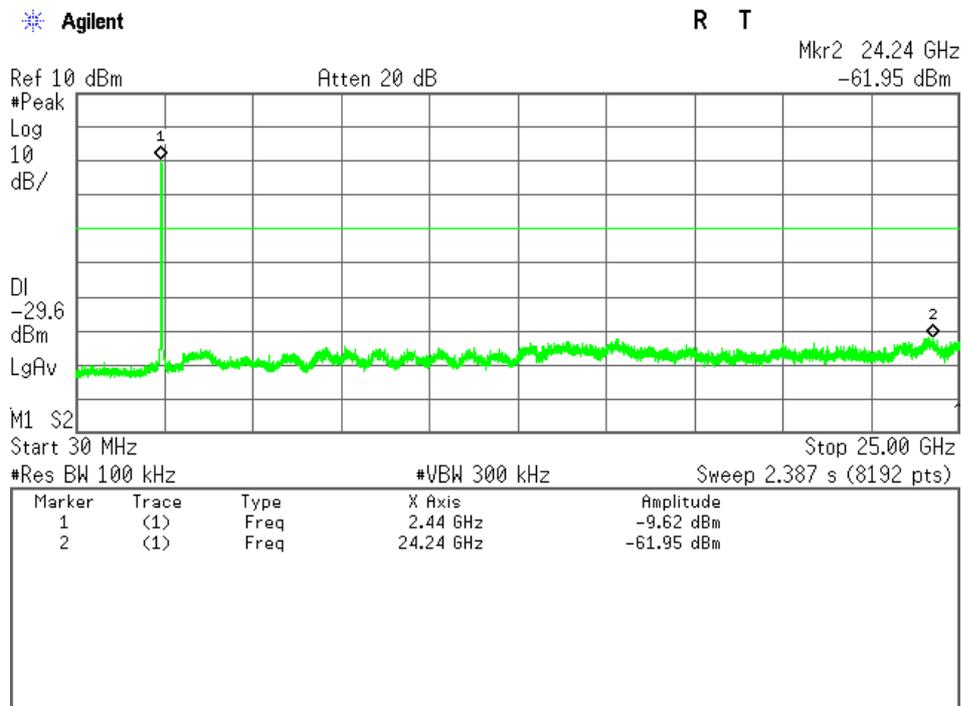
High Channel



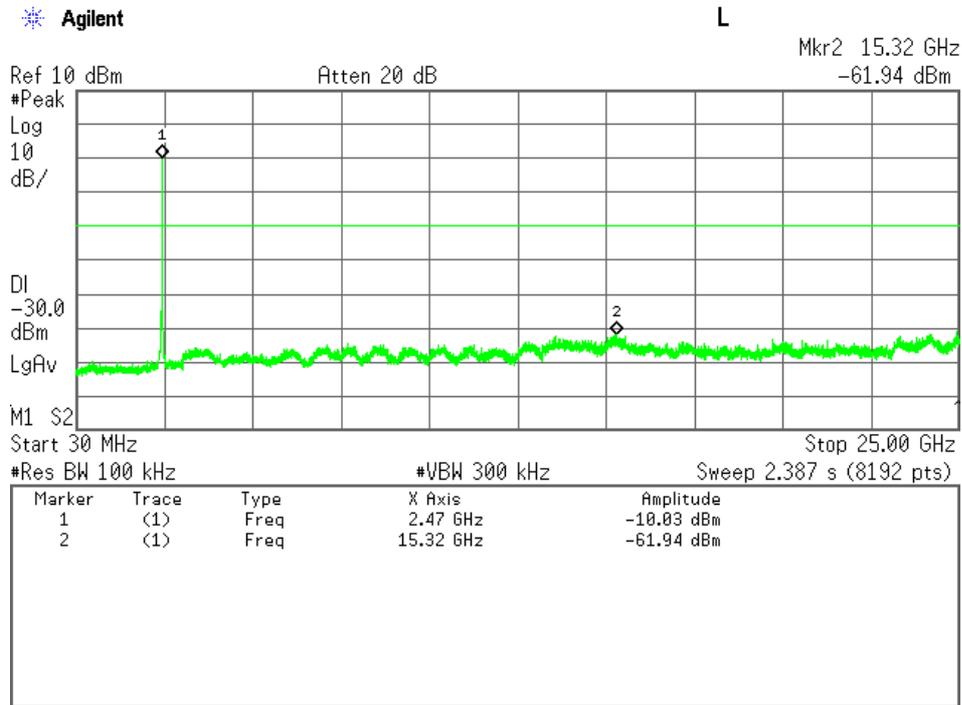
5)Data Rate : 6.5Mbps(IEEE 802.11n)
Low Channel



Middle Channel

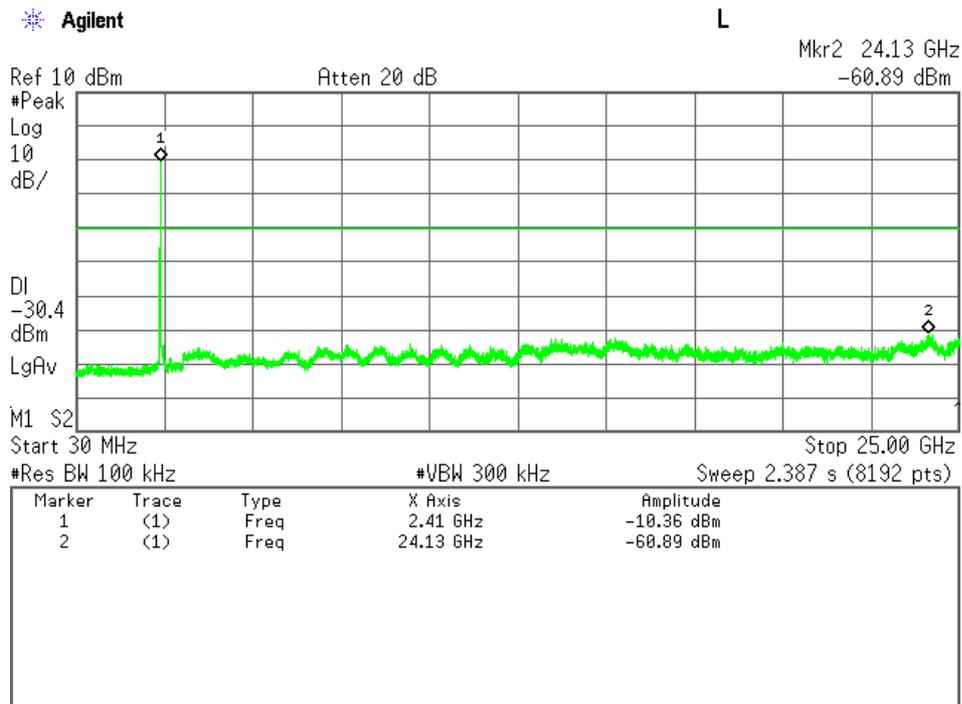


High Channel

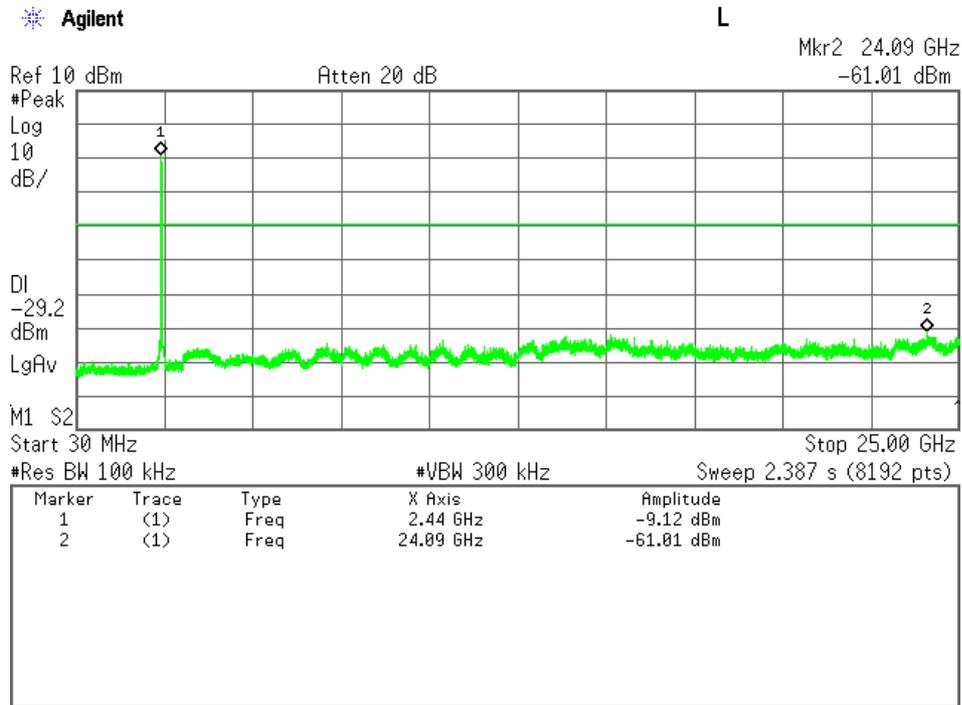


6)Data Rate : 65Mbps(IEEE 802.11n)

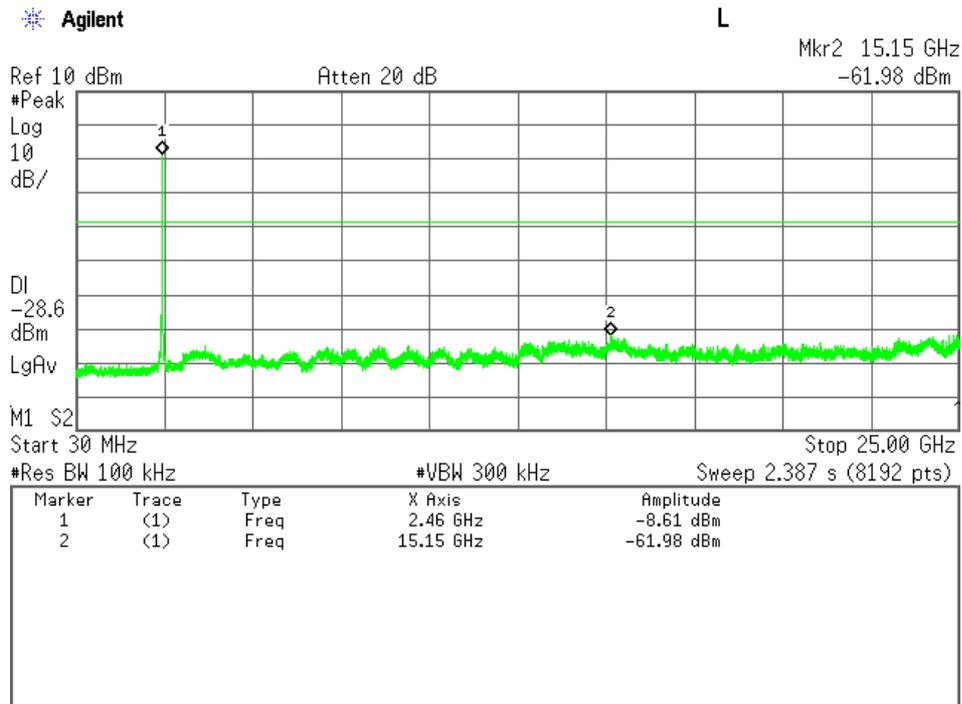
Low Channel



Middle Channel

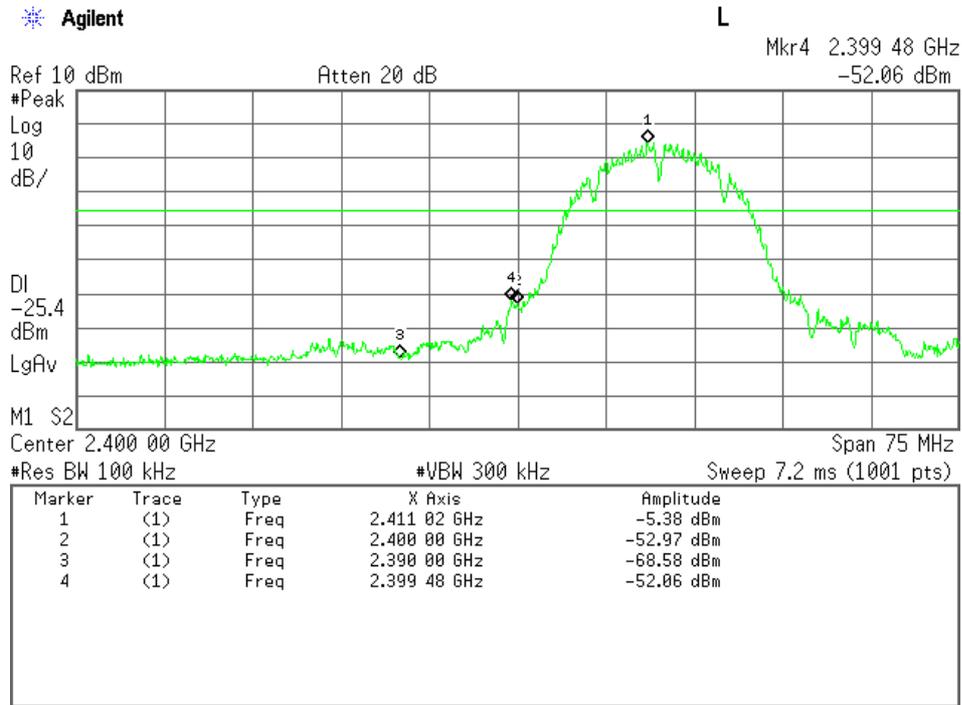


High Channel

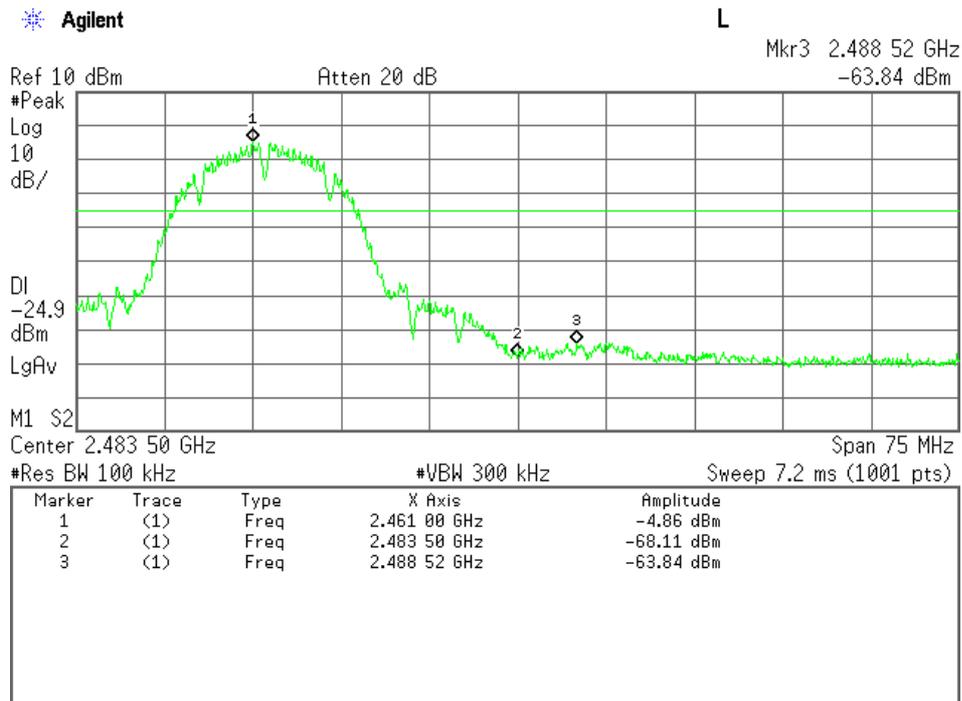


Band-Edge Emission

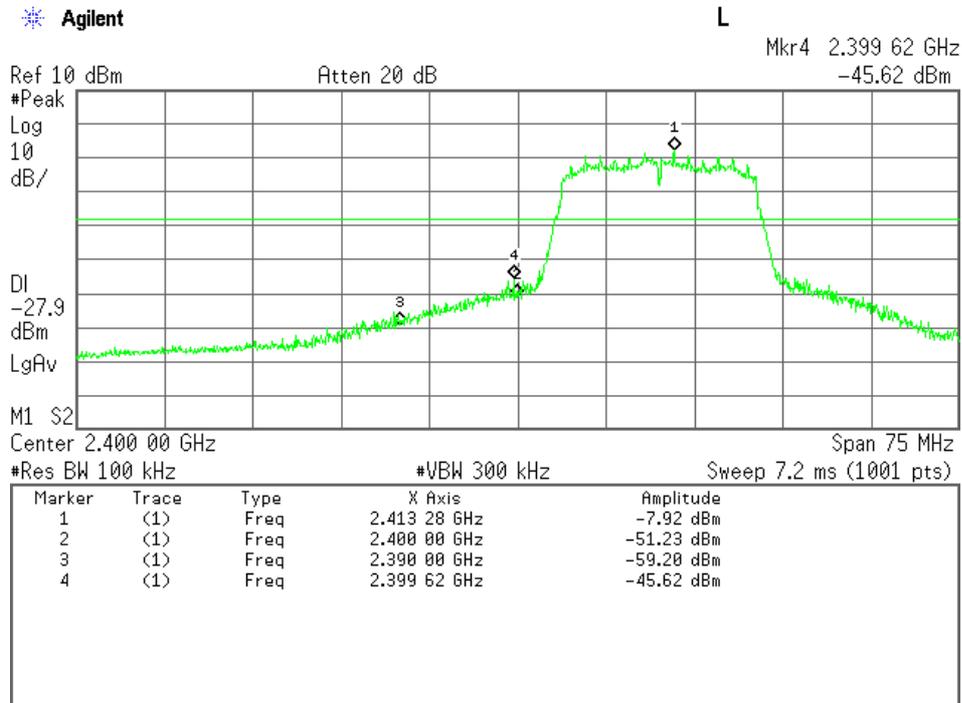
1) Data Rate : 1Mbps(IEEE 802.11b)
Low Channel



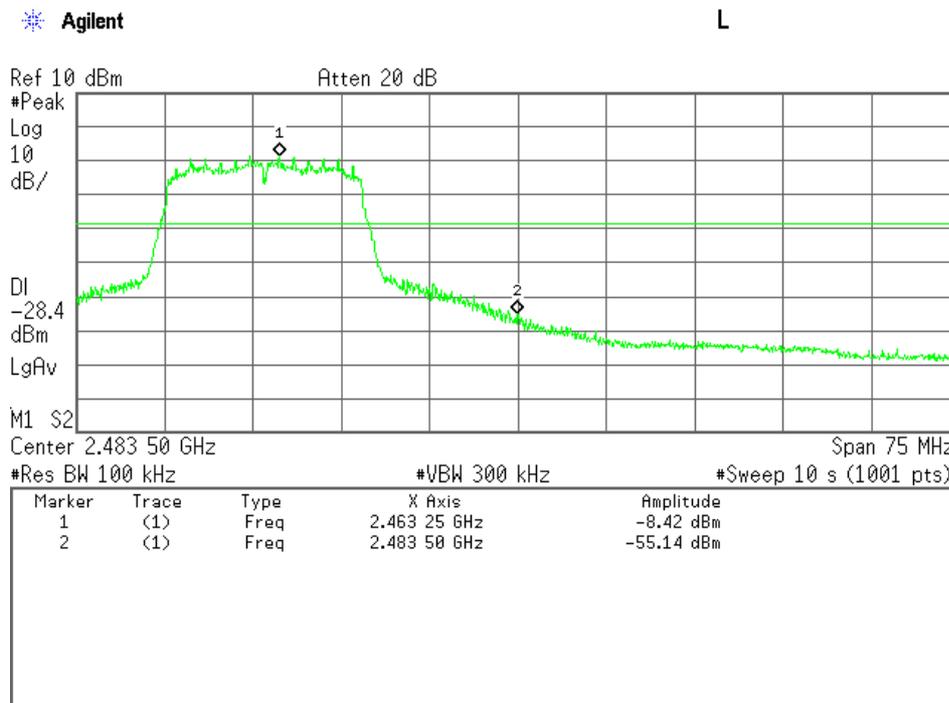
High Channel



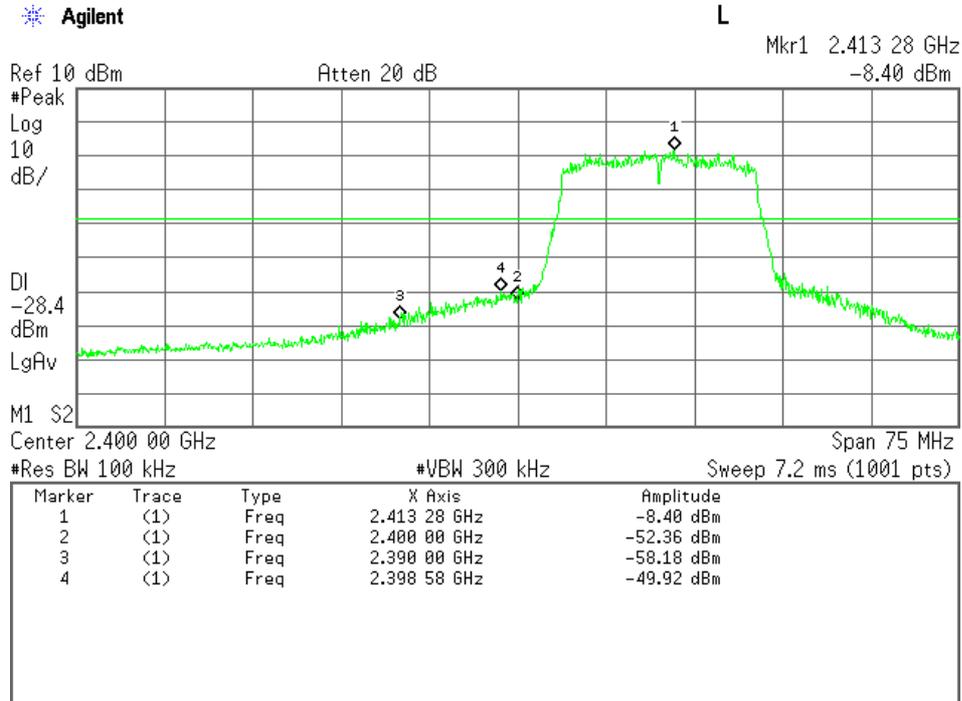
3)Data Rate : 6Mbps(IEEE 802.11g) Low Channel



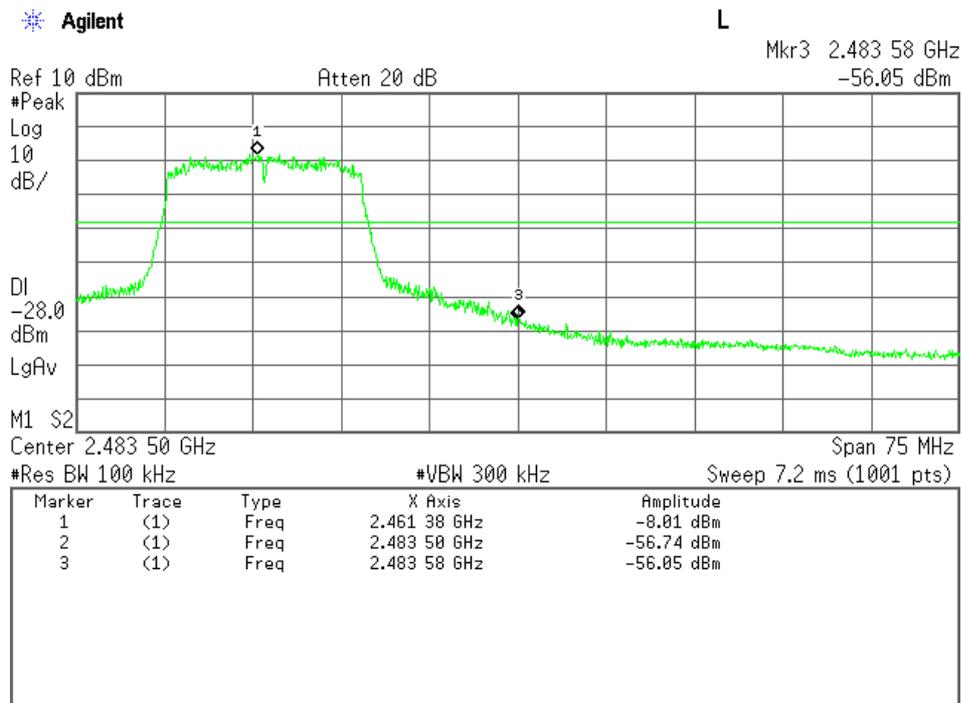
High Channel



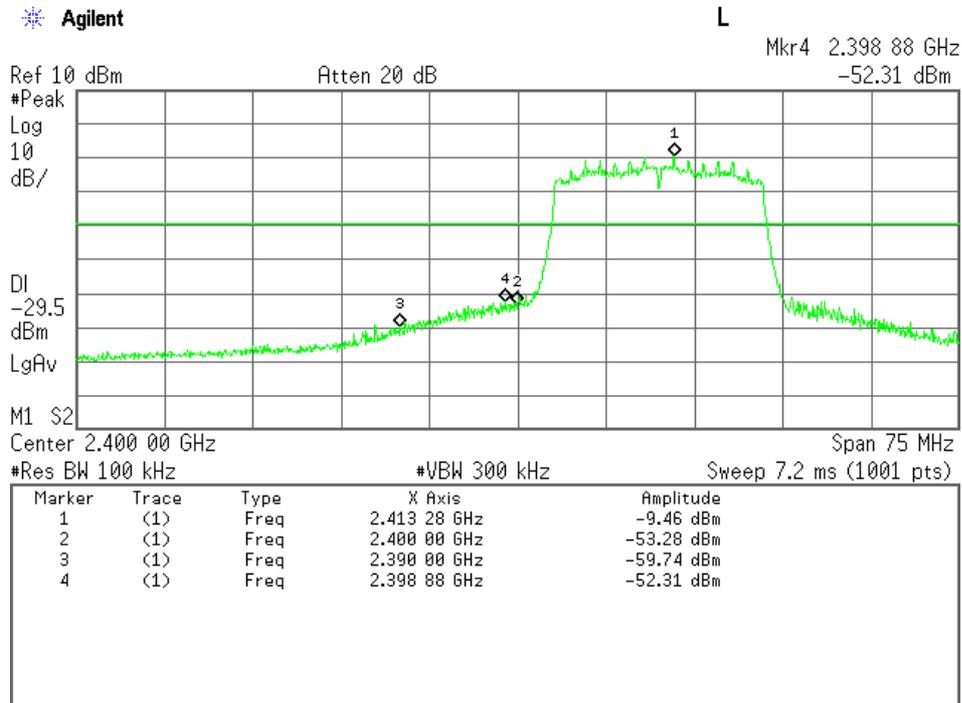
4)Data Rate : 54Mbps(IEEE 802.11g)
Low Channel



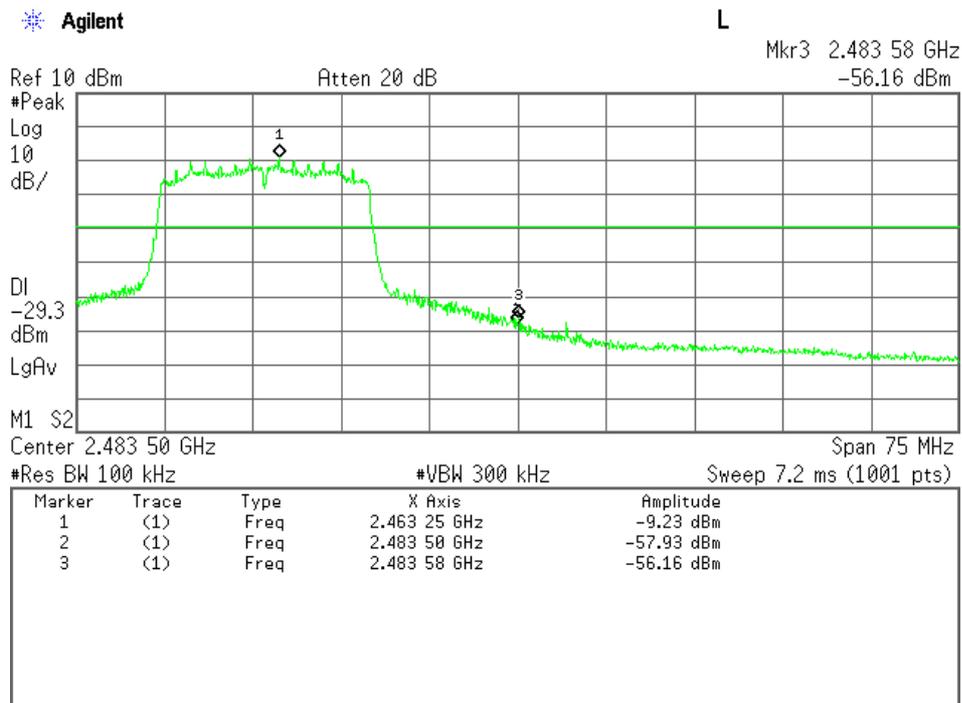
High Channel



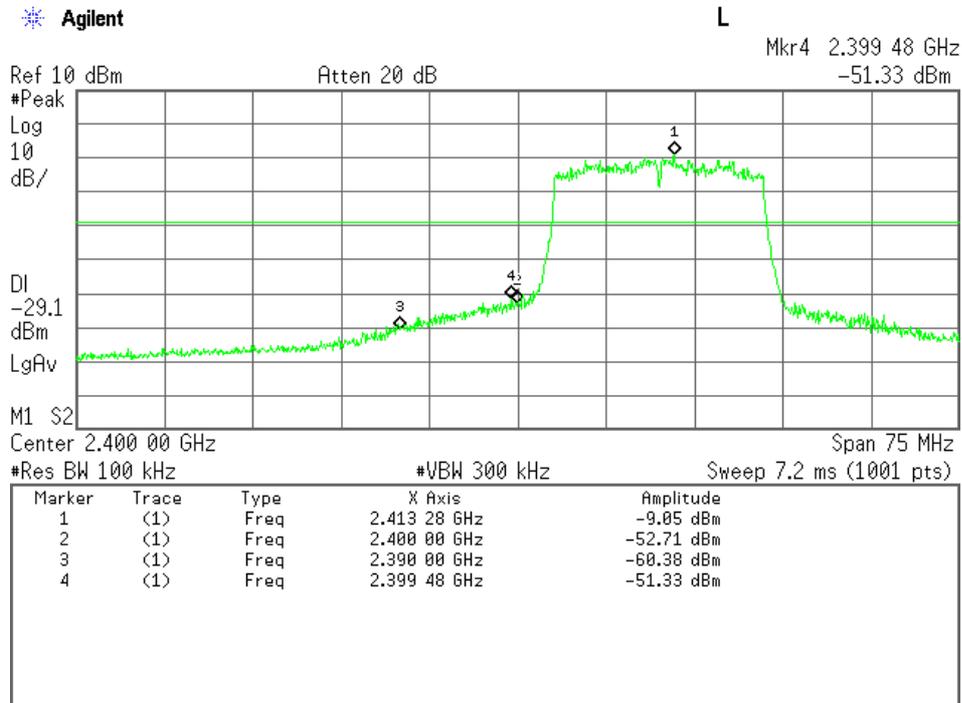
5)Data Rate : 6.5Mbps(IEEE 802.11n)
Low Channel



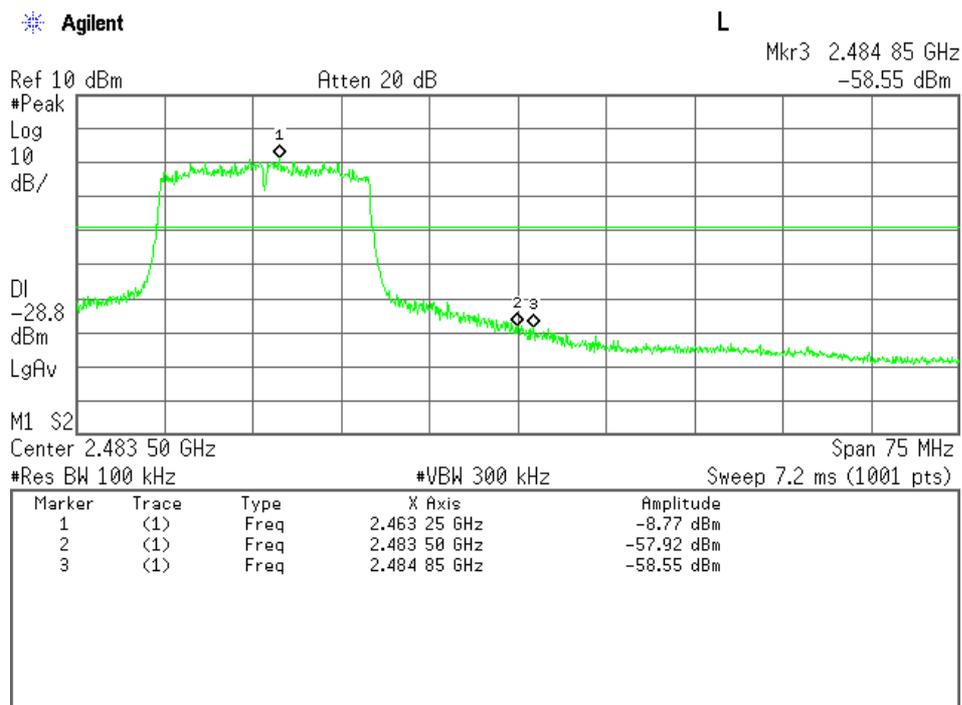
High Channel



6)Data Rate : 65Mbps(IEEE 802.11n)
Low Channel



High Channel



7.8 AC Powerline Conducted Emission

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.8.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Quasi-Peak) _____ 7.9 _____ dB at _____ 1.86 _____ MHz

Uncertainty of Measurement Results _____ +/-2.7 _____ dB(2 σ)

Remarks : _____

7.8.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO - Anechoic chamber (A1) - Measurement room (M1)
 - Measurement room (M2) - Measurement room (M3)
 - Shielded room (S1) - Shielded room (S2)
 - Shielded room (S3) - Shielded room (S4)

7.8.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Test Receiver	ESU 26	Rohde & Schwarz	A-6	2012/4	1 Year
AMN (main)	KNW-407R	Kyoritsu	D-39	2012/9	1 Year
RF Cable	RG223/U	SUHNER	H-9	2012/7	1 Year

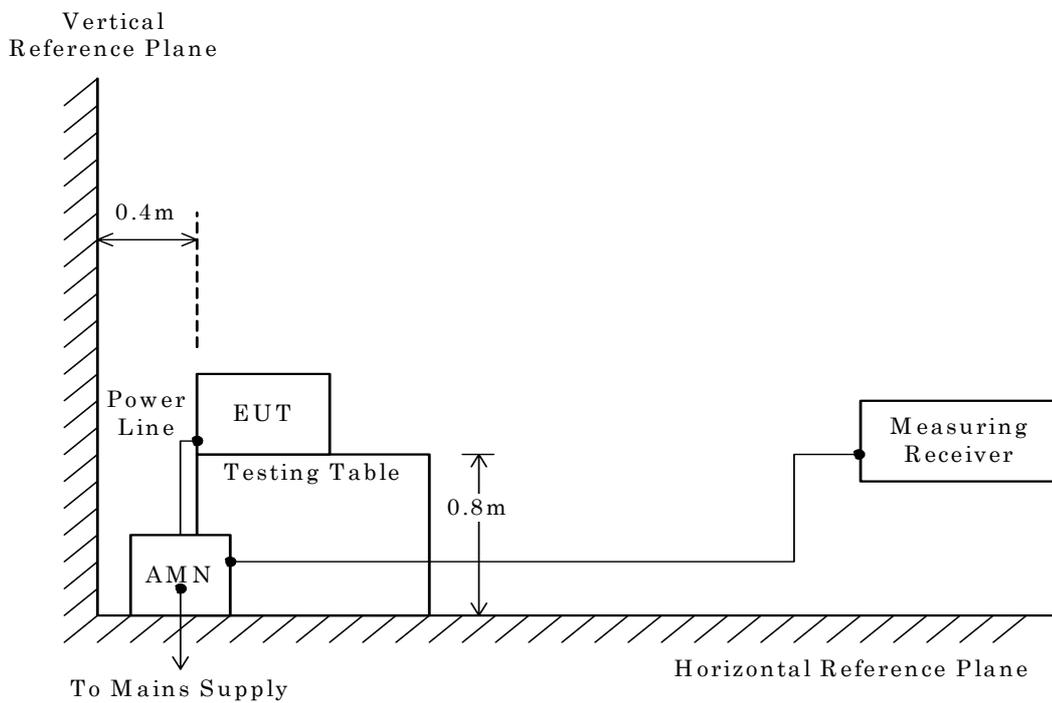
7.8.4 Test Method and Test Setup (Diagrammatic illustration)

The preliminary tests were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for final tests.

– Side View –



NOTE

AMN : Artificial Mains Network

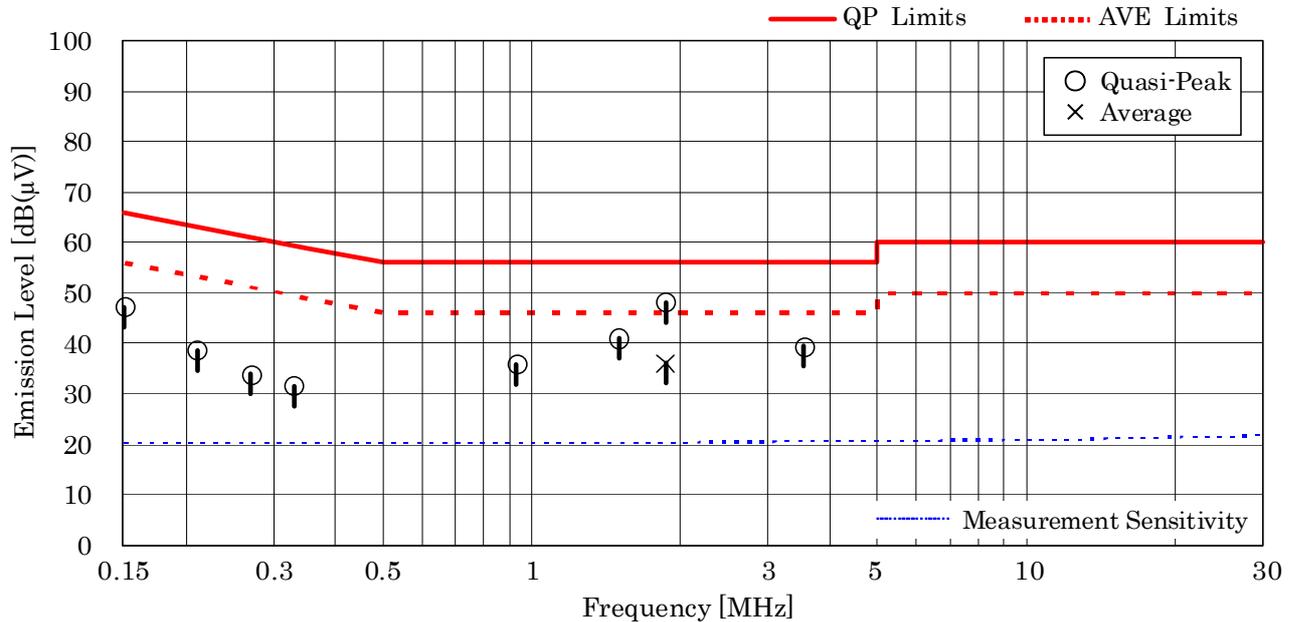
7.8.5 Test Data

Mode of EUT : All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / IEEE 802.11b, IEEE 802.11g and IEEE 802.11n) has been listed.

Test Date: October 17, 2012

Temp.: 25 °C, Humi.: 62 %

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)]				Limits [dB(μV)]		Results [dB(μV)]		Margin [dB]	Remarks
		VA QP	VA AVE	VB QP	VB AVE	QP	AVE	QP	AVE		
0.15	10.3	36.9	--	36.5	--	66.0	56.0	47.2	--	+18.8	-
0.21	10.3	28.1	--	28.3	--	63.2	53.2	38.6	--	+24.6	-
0.27	10.3	23.3	--	23.6	--	61.1	51.1	33.9	--	+27.2	-
0.33	10.3	20.2	--	21.3	--	59.5	49.5	31.6	--	+27.9	-
0.93	10.3	25.5	--	23.4	--	56.0	46.0	35.8	--	+20.2	-
1.50	10.3	30.6	--	30.7	--	56.0	46.0	41.0	--	+15.0	-
1.86	10.4	37.7	25.7	37.3	25.2	56.0	46.0	48.1	36.1	+ 7.9	-
3.55	10.4	29.0	--	27.6	--	56.0	46.0	39.4	--	+16.6	-



NOTES

1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 1.86 MHz, as the worst point shown on underline:
Correction Factor + Meter Reading = 10.4 + 37.7 = 48.1 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

7.9 Radiated Emission

The requirements are - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

- Passed - Failed - Not judged

7.9.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Average) >5.3 dB at 22158.0 MHz

Uncertainty of Measurement Results	9 kHz – 30 MHz	<u>+/-1.9</u>	dB(2 σ)
	30 MHz – 300 MHz	<u>+/-4.3</u>	dB(2 σ)
	300 MHz – 1000 MHz	<u>+/-5.4</u>	dB(2 σ)
	1 GHz – 6 GHz	<u>+/-4.6</u>	dB(2 σ)
	6 GHz – 18 GHz	<u>+/-5.2</u>	dB(2 σ)
	18 GHz – 40 GHz	<u>+/-5.4</u>	dB(2 σ)

Remarks : _____

7.9.2 Test Site

KITA-KANSAI Testing Center SAITO EMC Branch

- Anechoic chamber A1

- Anechoic chamber A2

7.9.3 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Test Receiver	ESU26	Rohde & Schwarz	A-6	2012/4	1 Year
Loop Antenna	HFH2-Z2	Rohde & Schwarz	C-2	2012/8	1 Year
RF Cable	RG213/U	SUHNER	H-28	2012/8	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	C-30	2012/5	1 Year
Log-periodic Antenna	UHALP9108-A1	Schwarzbeck	C-31	2012/5	1 Year
RF Cable	S 10162 B-11 etc.	SUHNER	H-4	2012/3	1 Year
Site Attenuation	--	----	H-15	2012/2	1 Year
Pre-Amplifier	WJ-6882-824	Watkins Johnson	A-21	2012/1	1 Year
Pre-Amplifier	WJ-6611-513	Watkins Johnson	A-23	2012/1	1 Year
Pre-Amplifier	BZ1840LD1	B&Z	A-29	2012/1	1 Year
Pre-Amplifier	DBL-0618N515	DBS Microwave	A-33	2012/1	1 Year
Horn Antenna	91888-2	EATON	C-41-1	2012/6	1 Year
Horn Antenna	91889-2	EATON	C-41-2	2012/6	1 Year
Horn Antenna	3160-04	EMCO	C-55	2011/6	2 Years
Horn Antenna	3160-05	EMCO	C-56	2011/6	2 Years
Horn Antenna	3160-06	EMCO	C-57	2011/6	2 Years
Horn Antenna	3160-07	EMCO	C-58	2011/6	2 Years
Horn Antenna	3160-08	EMCO	C-59	2011/6	2 Years
Horn Antenna	3160-09	EMCO	C-48	2011/6	2 Years
Attenuator	54A-10	Weinschel	D-29	2012/9	1 Year
Attenuator	2-10	Weinschel	D-79	2011/11	1 Year
Band Rejection Filter	BRM50701	MICRO-TRONICS	D-93	2012/2	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2012/7	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-66	2012/1	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-67	2012/1	1 Year
RF Cable	SUCOFLEX102EA	SUHNER	C-69	2012/1	1 Year
SVSWR	--	----	H-19	2012/2	1 Year

7.9.4 Test Method and Test Setup (Diagrammatic illustration)

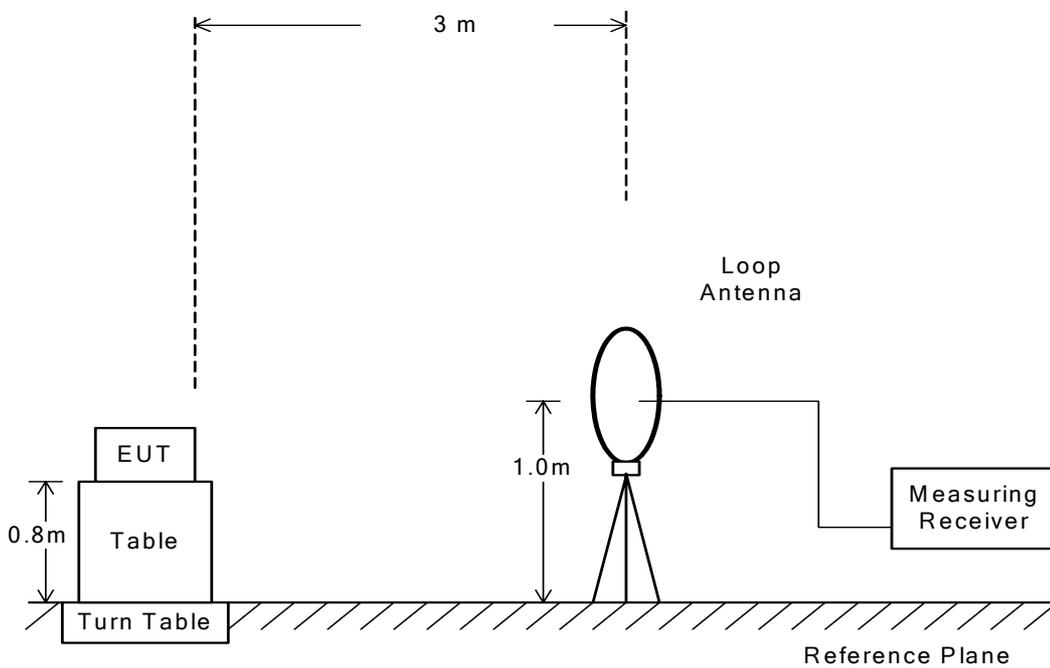
7.9.4.1 Radiated Emission 9 kHz – 30 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



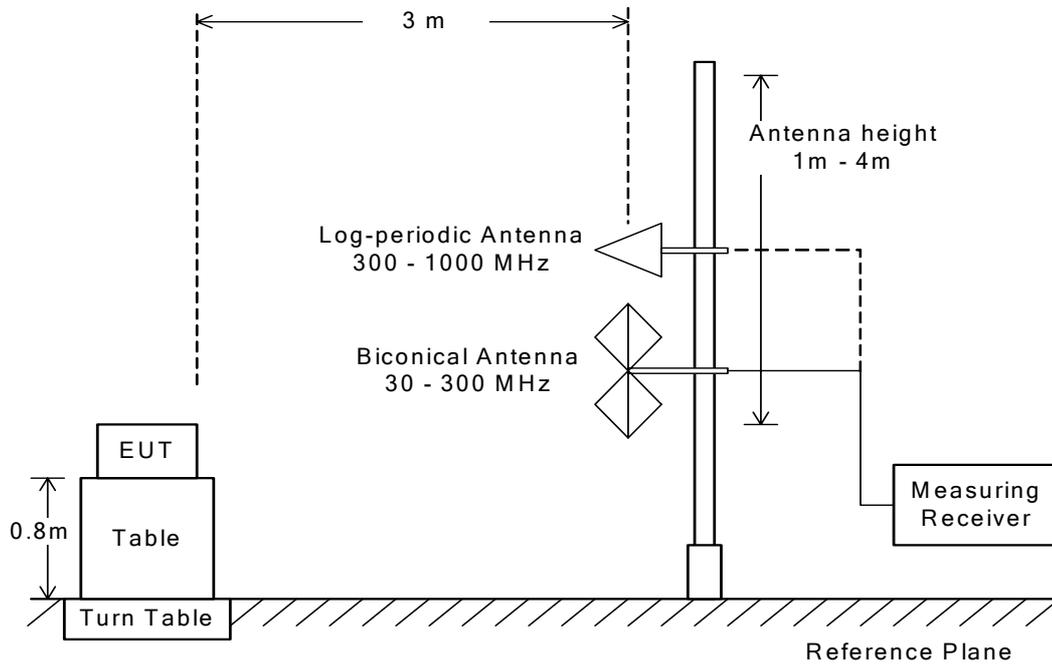
7.9.4.2 Radiated Emission 30 MHz – 1000 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



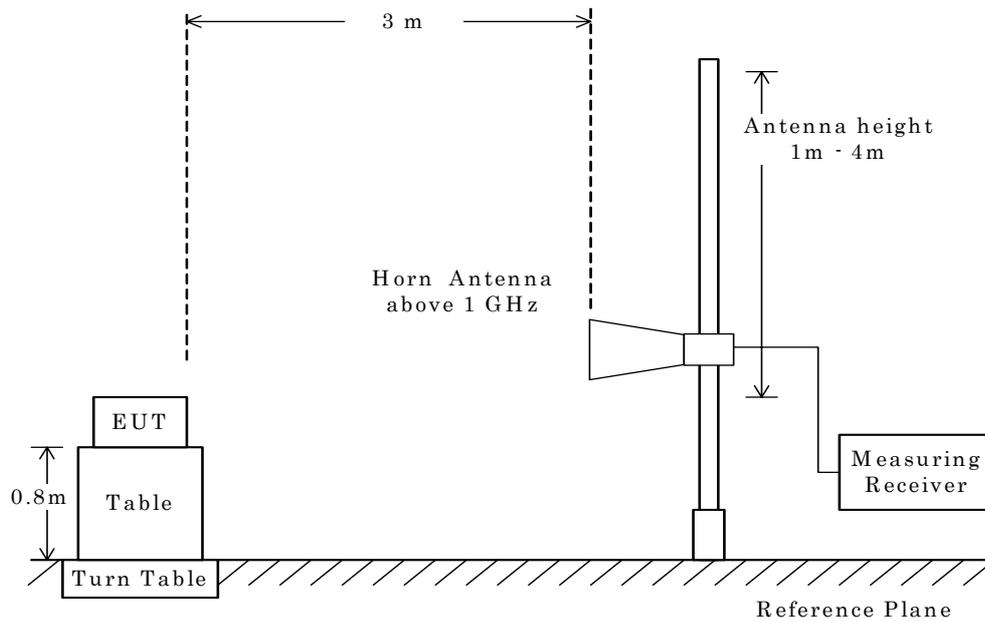
7.9.4.3 Radiated Emission above 1 GHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



NOTE

The antenna height is scanned depending on the EUT's size and mounting height.

7.9.5 Test Data

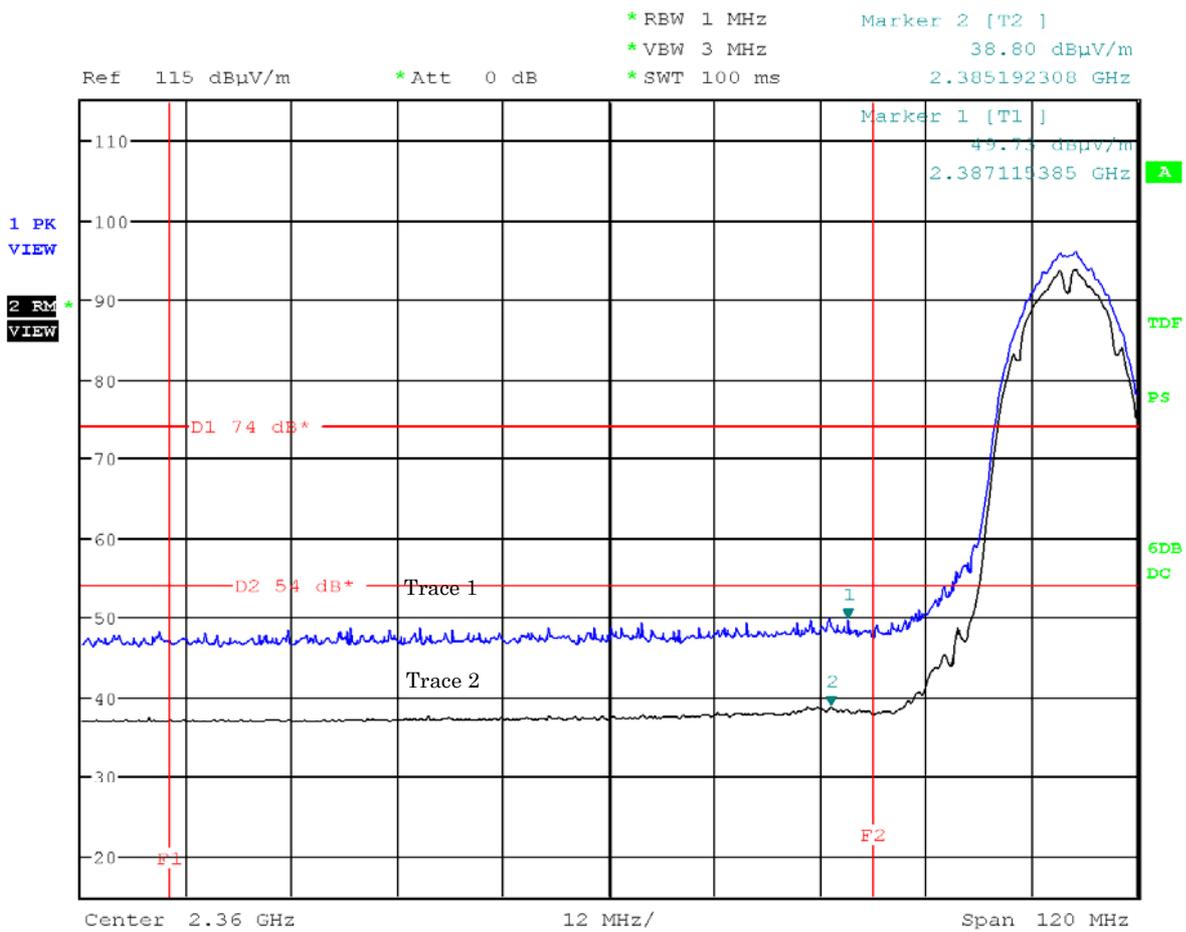
7.9.5.1 Band-edge Compliance

Test Date : October 15, 2012

Temp.:22°C, Humi:54%

Mode of EUT : TX(1ch: 2412 MHz, data rate : 1Mbps(IEEE 802.11b))

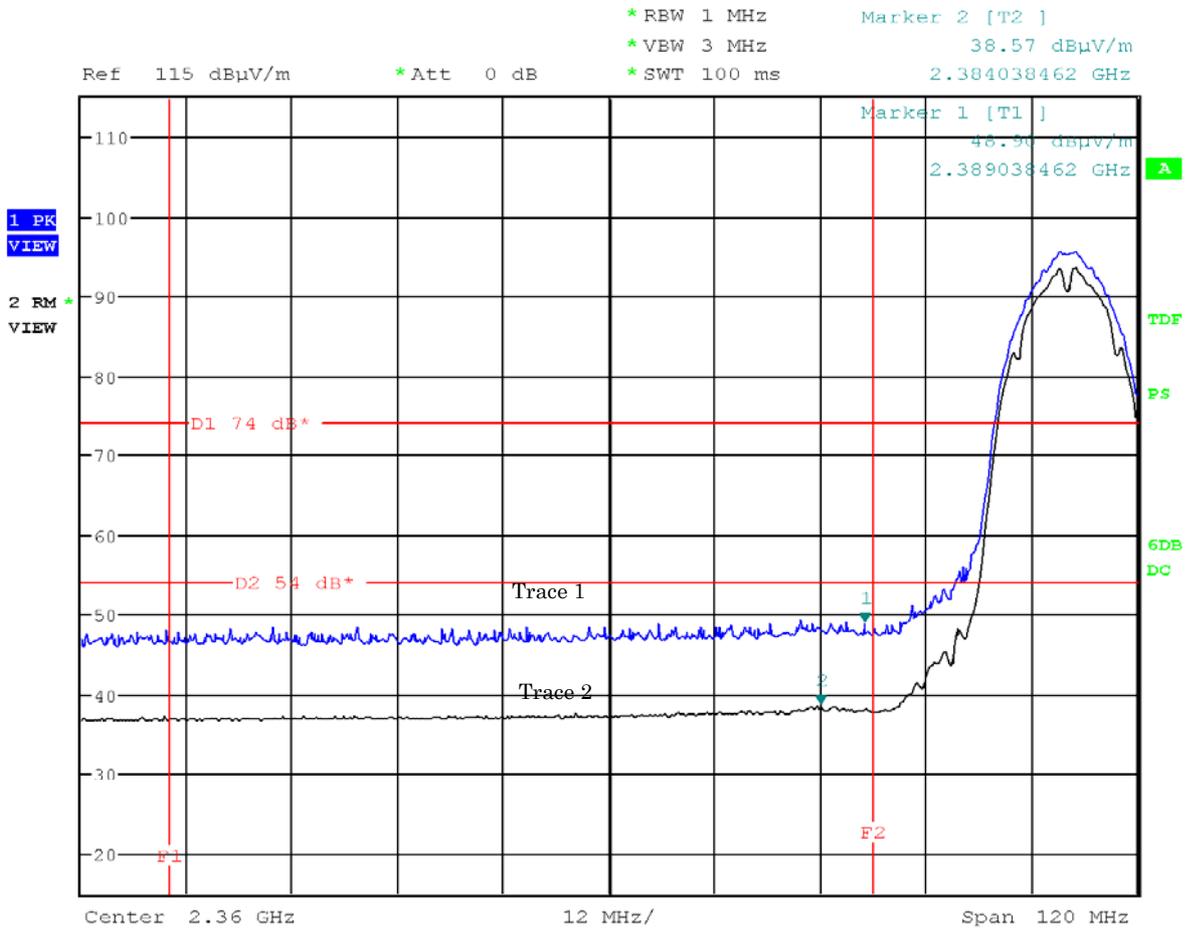
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 1Mbps(IEEE 802.11b))

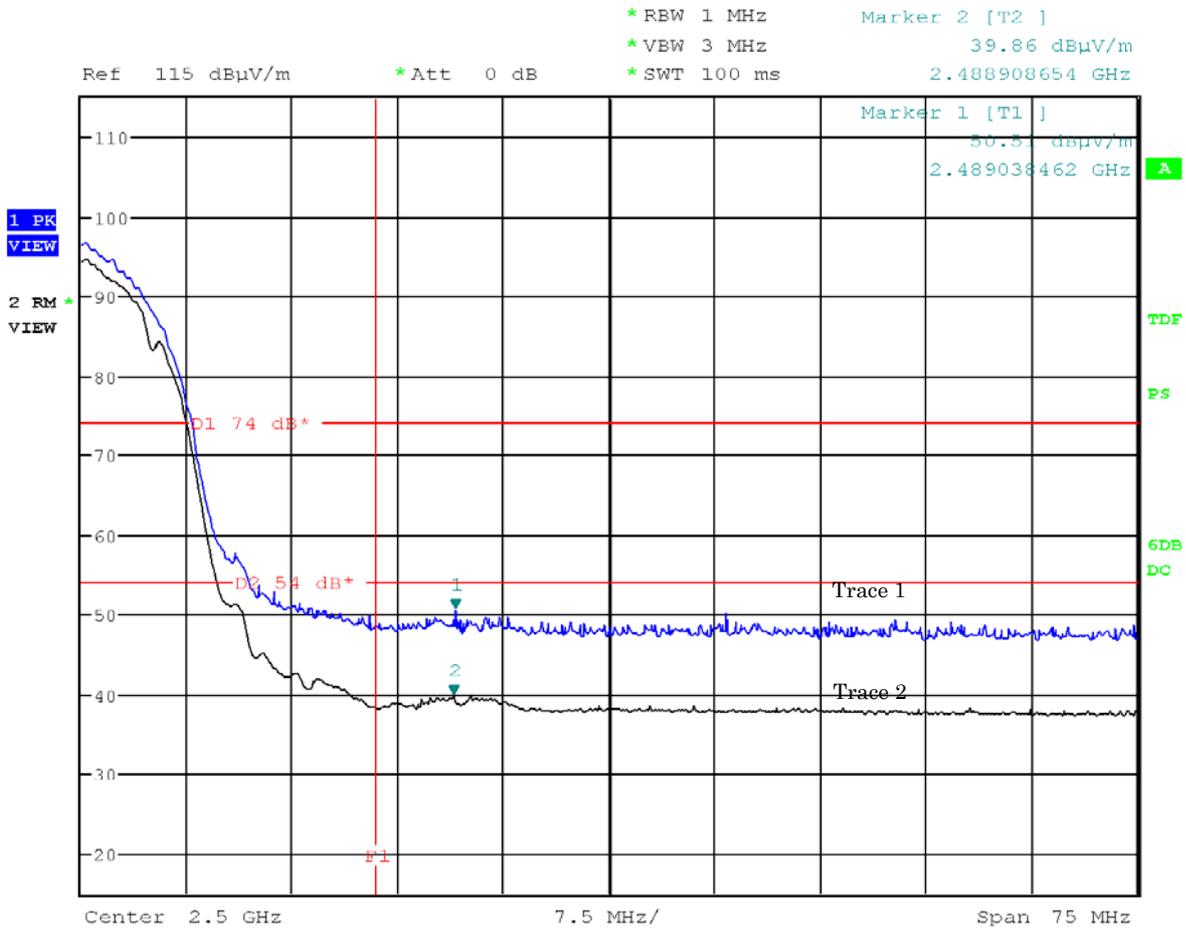
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 1Mbps(IEEE 802.11b))

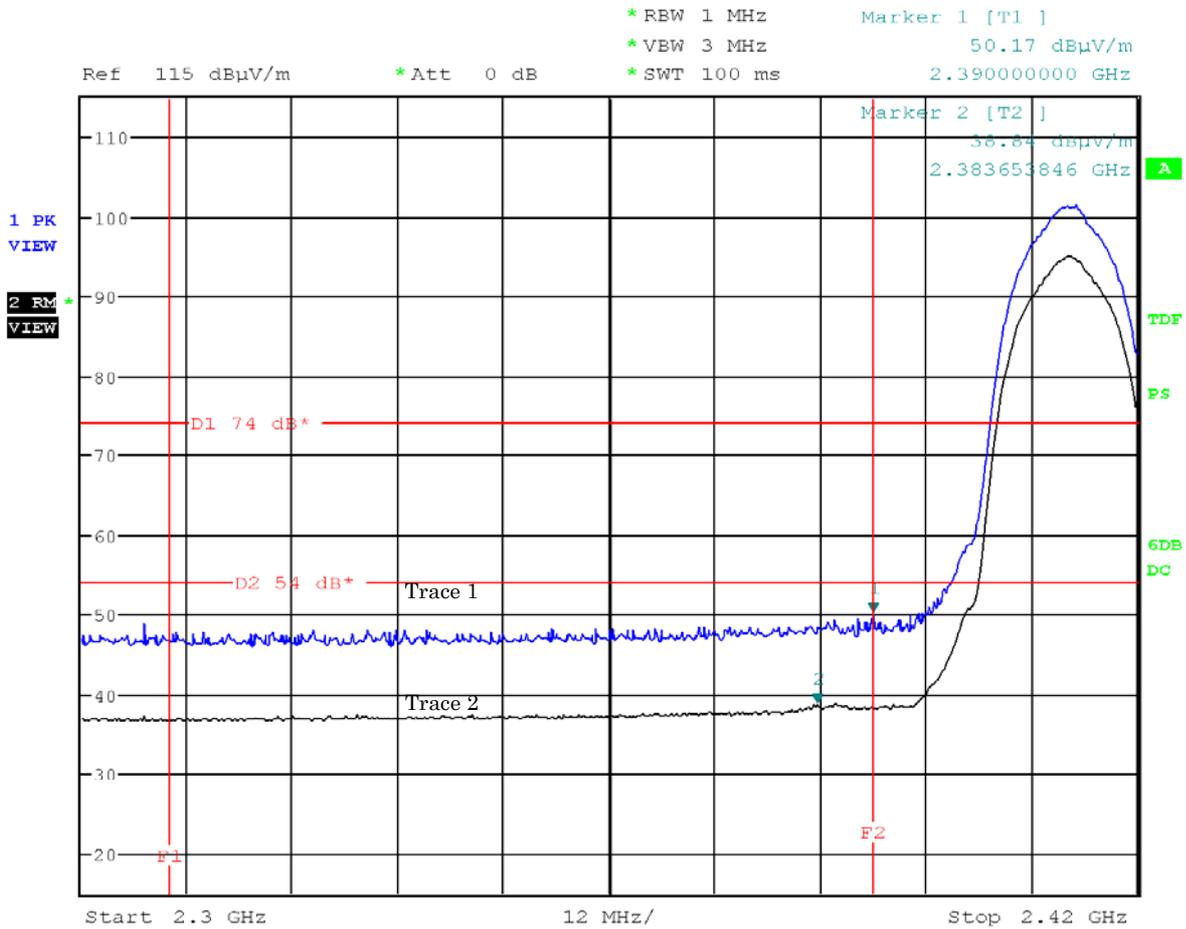
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 11Mbps(IEEE 802.11b))

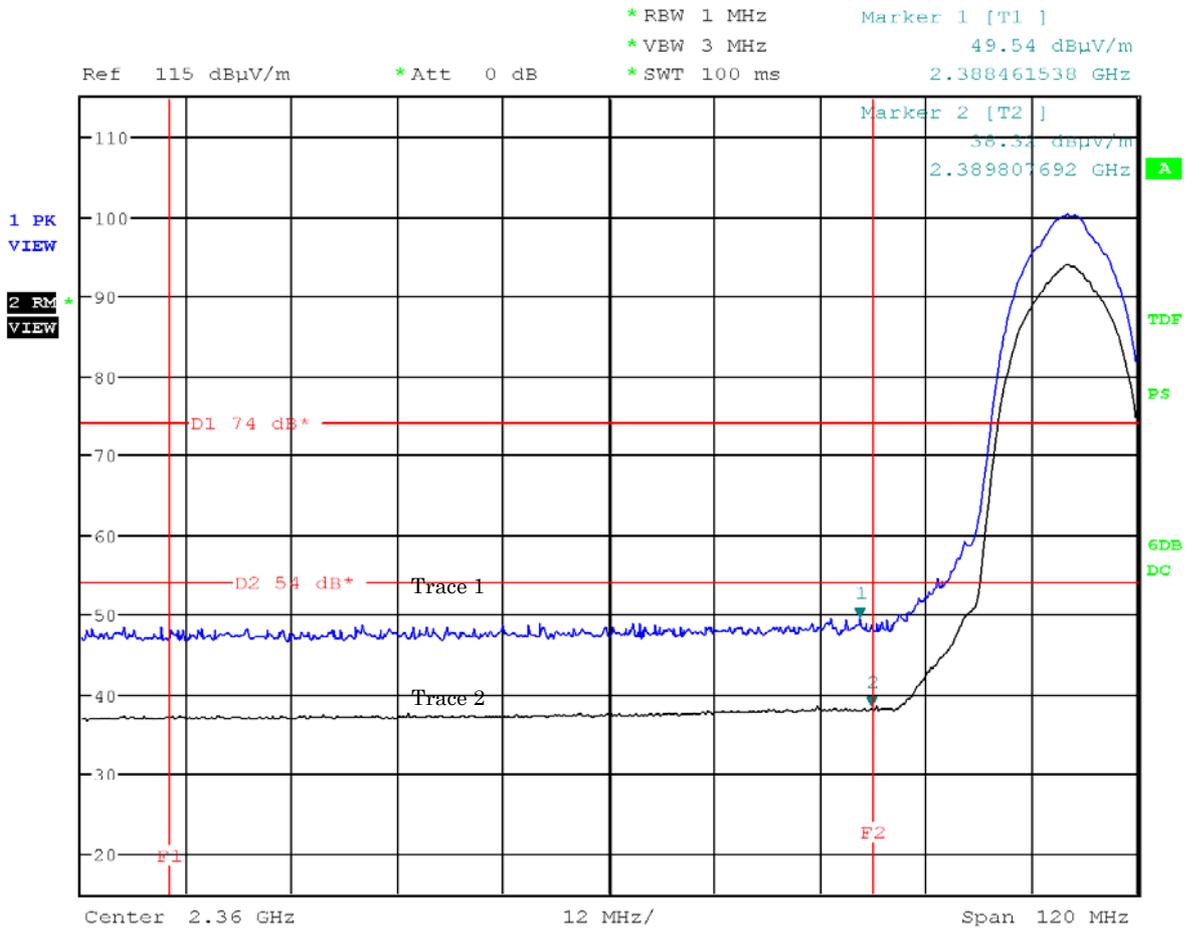
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 11Mbps(IEEE 802.11b))

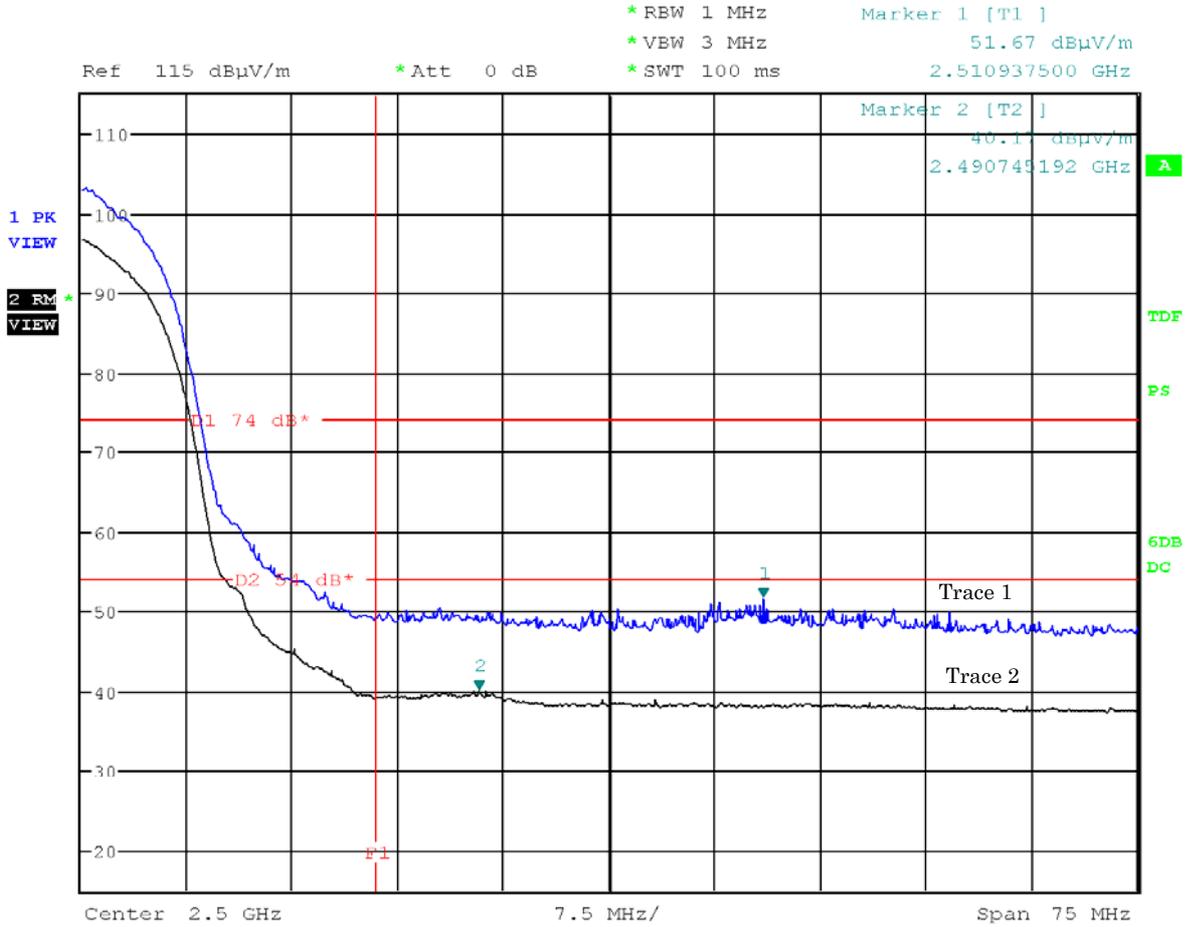
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 11Mbps(IEEE 802.11b))

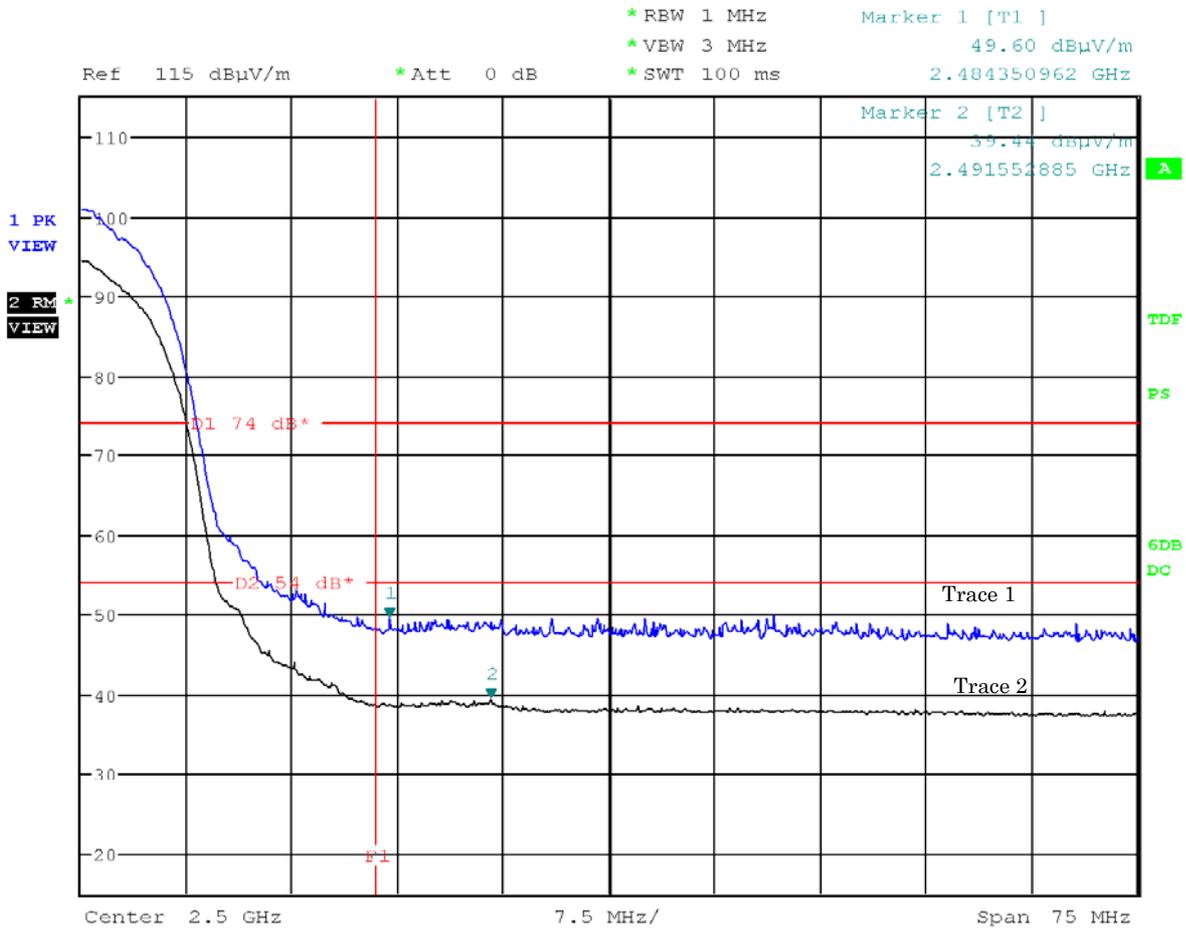
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 11Mbps(IEEE 802.11b))

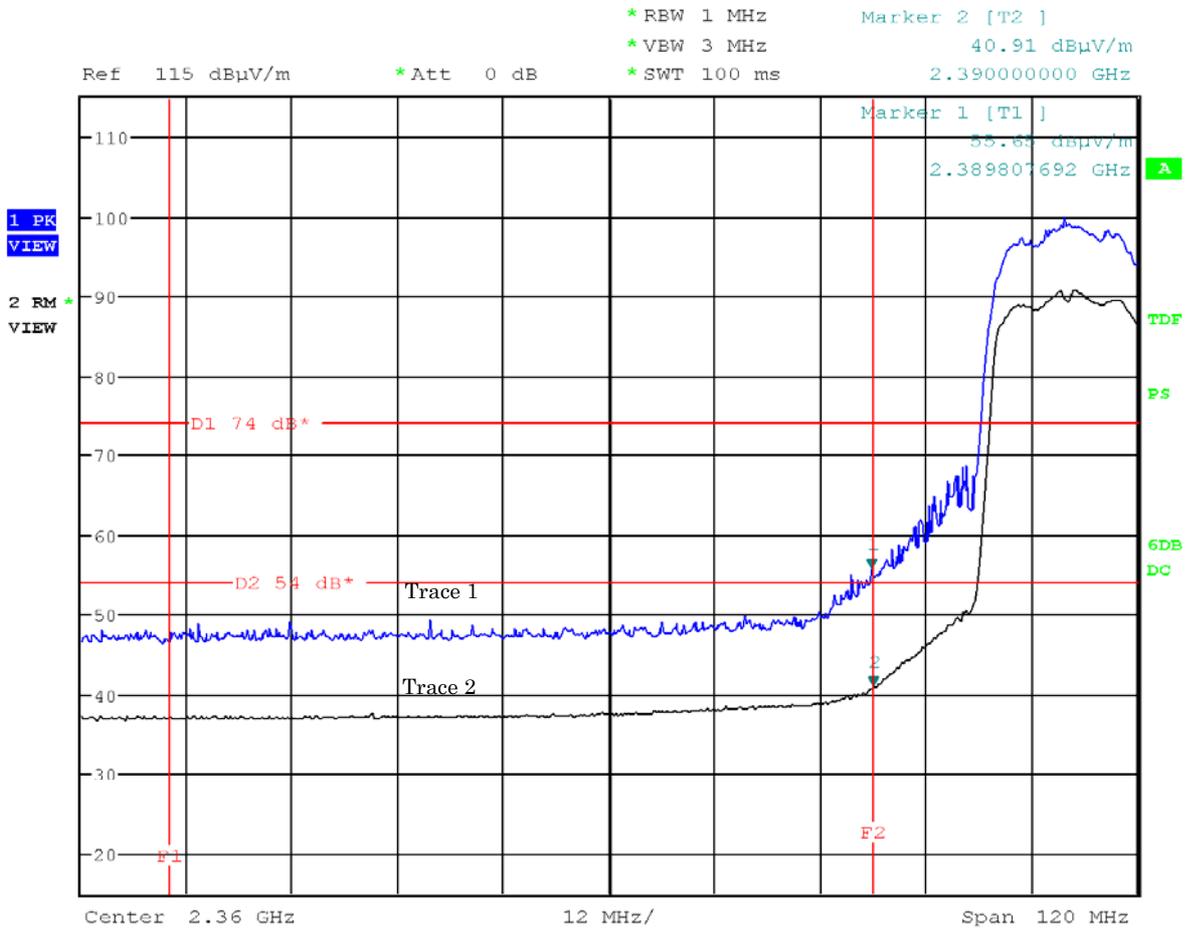
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

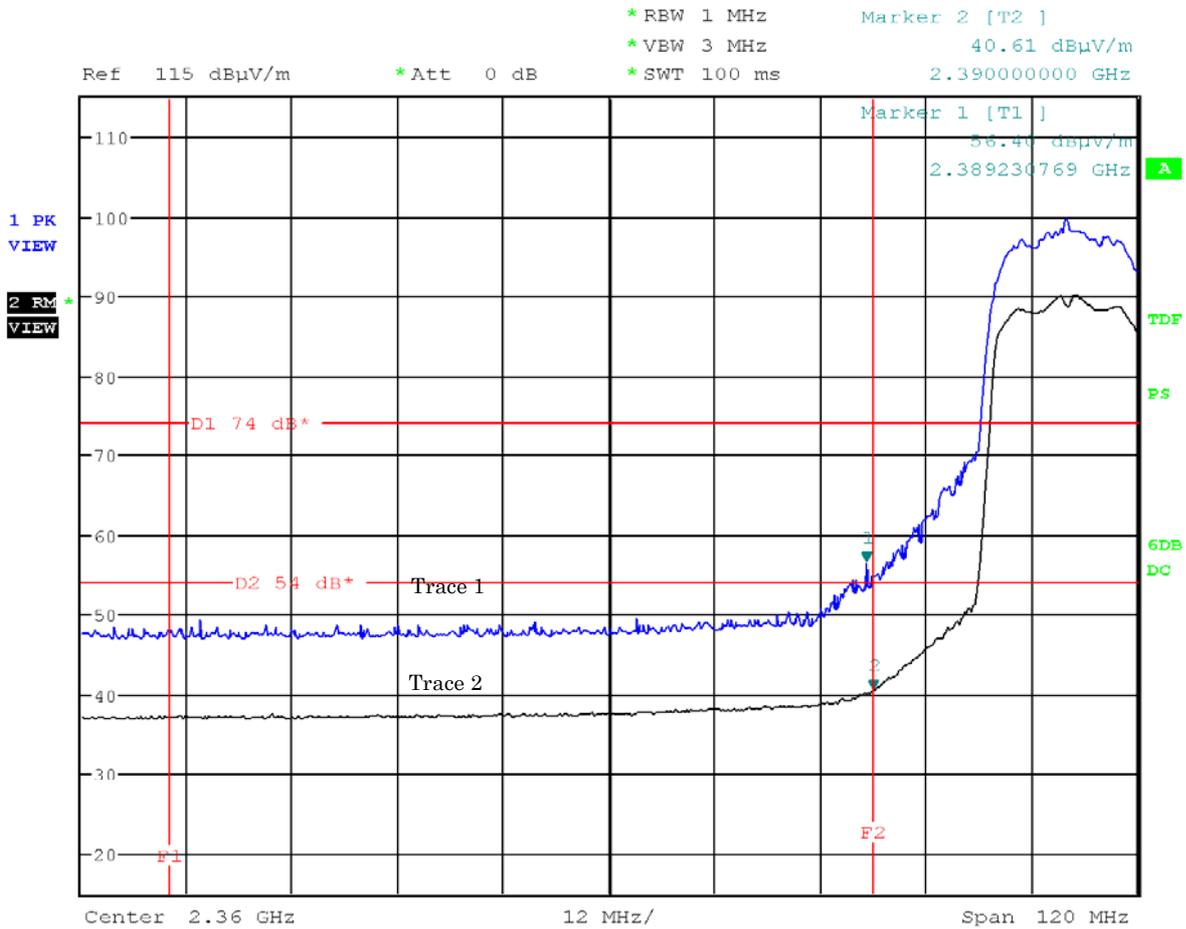
Mode of EUT : TX(1ch: 2412 MHz, data rate : 6Mbps(IEEE 802.11g))

Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

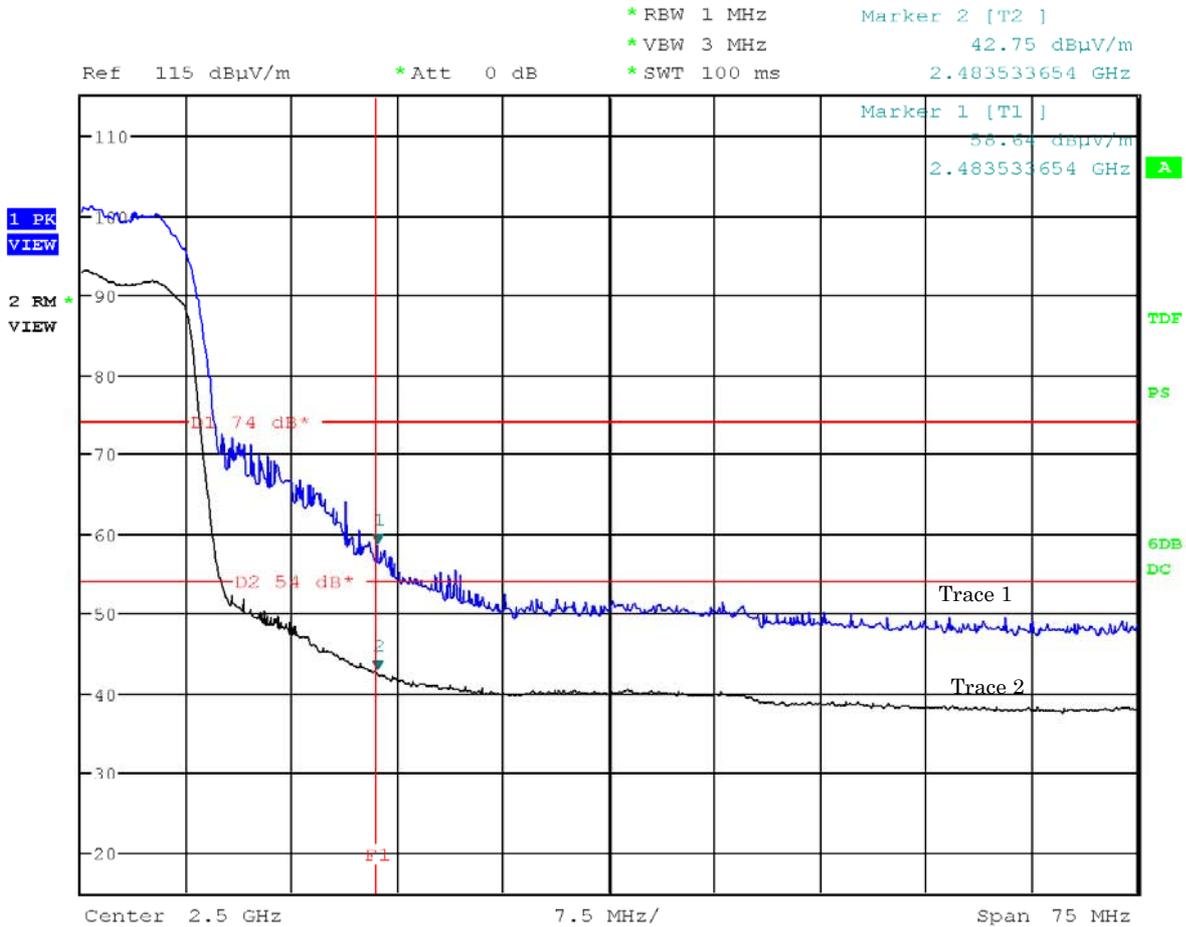
Mode of EUT : TX(1ch: 2412 MHz, data rate : 6Mbps(IEEE 802.11g))
 Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 6Mbps(IEEE 802.11g))

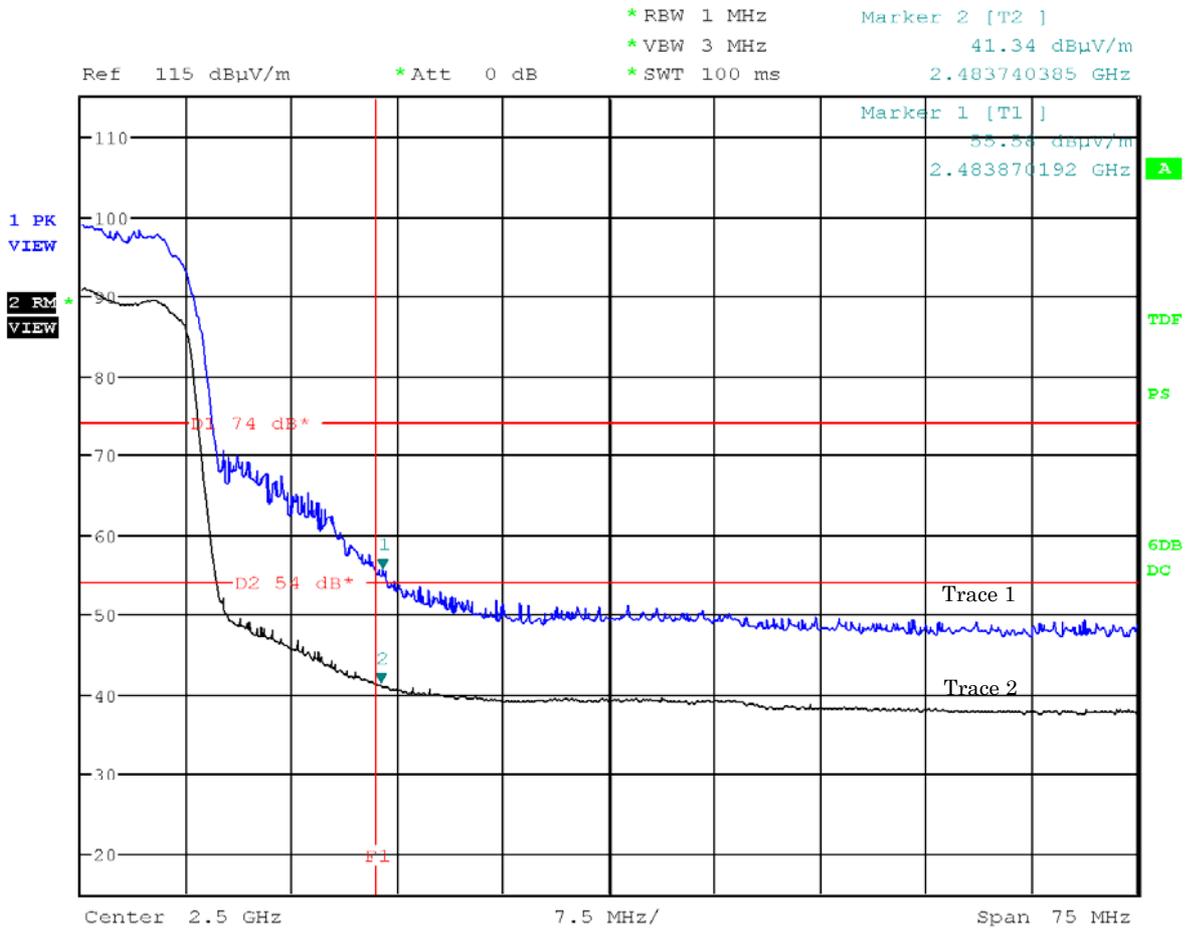
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 6Mbps(IEEE 802.11g))

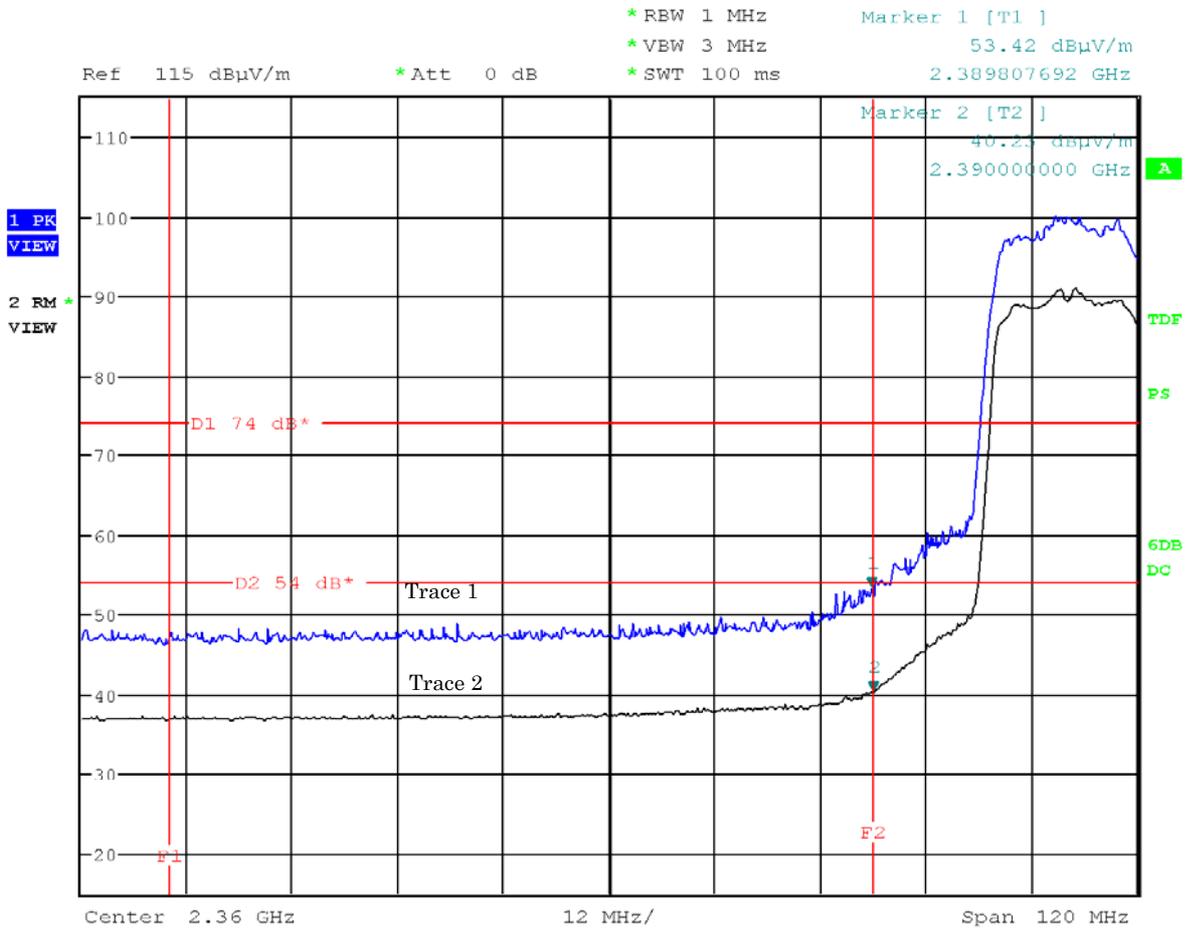
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 54Mbps(IEEE 802.11g))

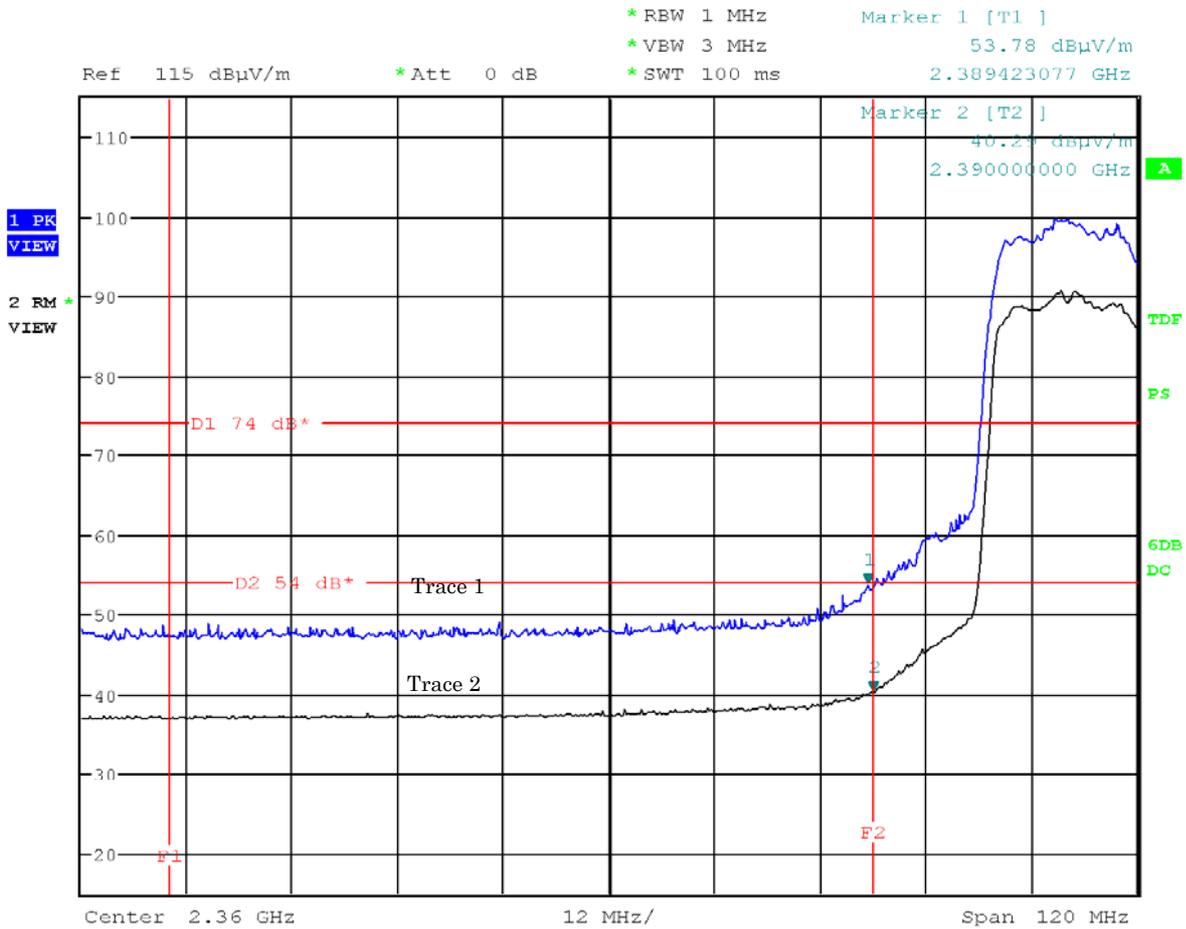
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 54Mbps(IEEE 802.11g))

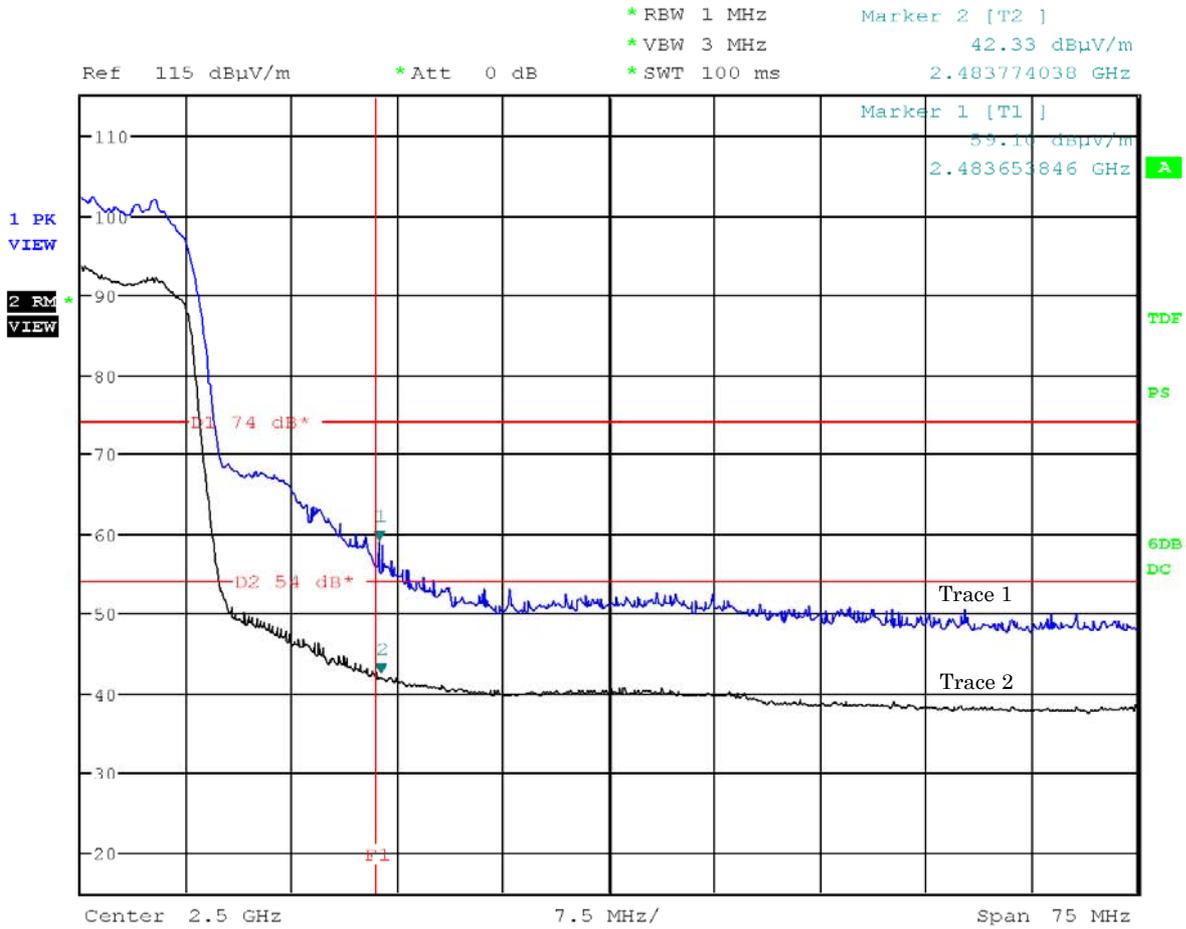
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 54Mbps(IEEE 802.11g))

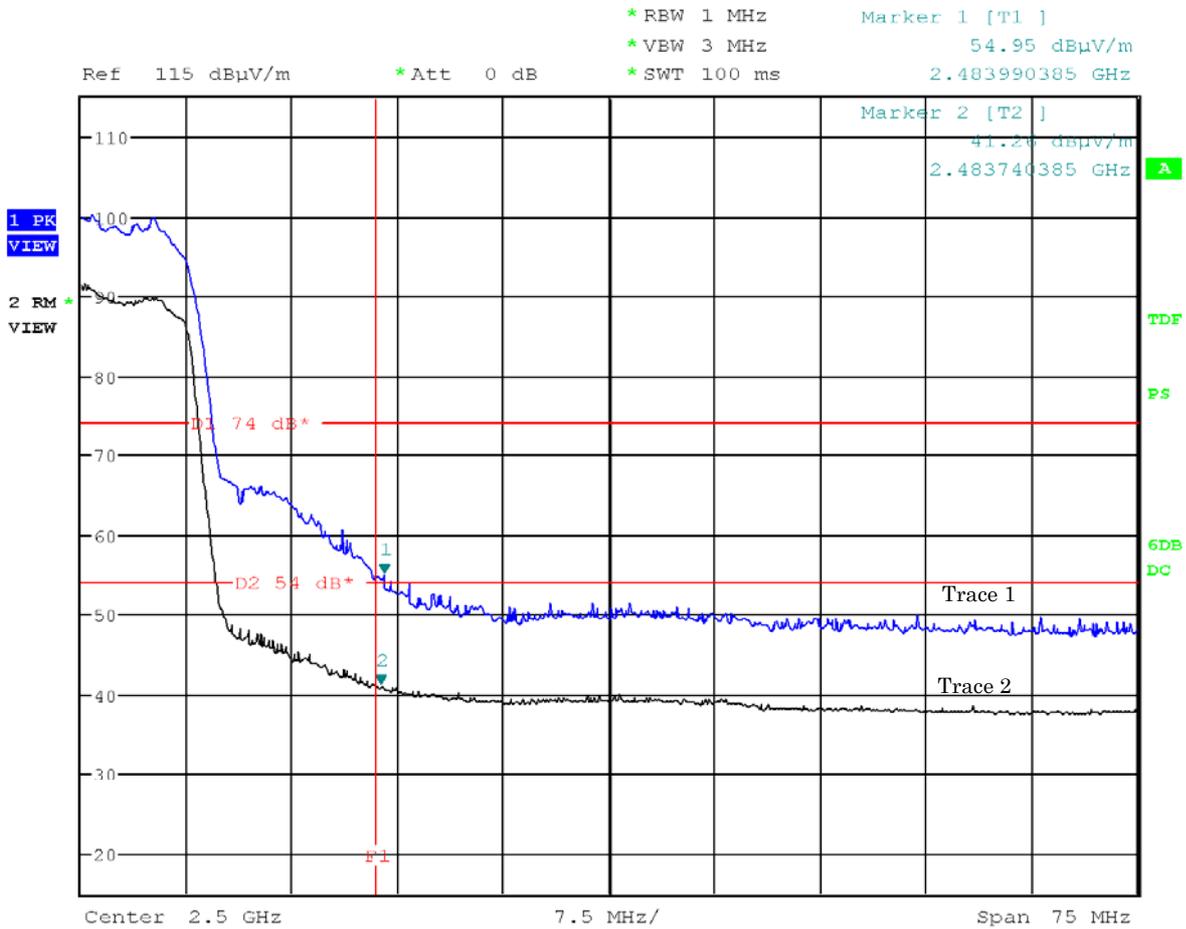
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 54Mbps(IEEE 802.11g))

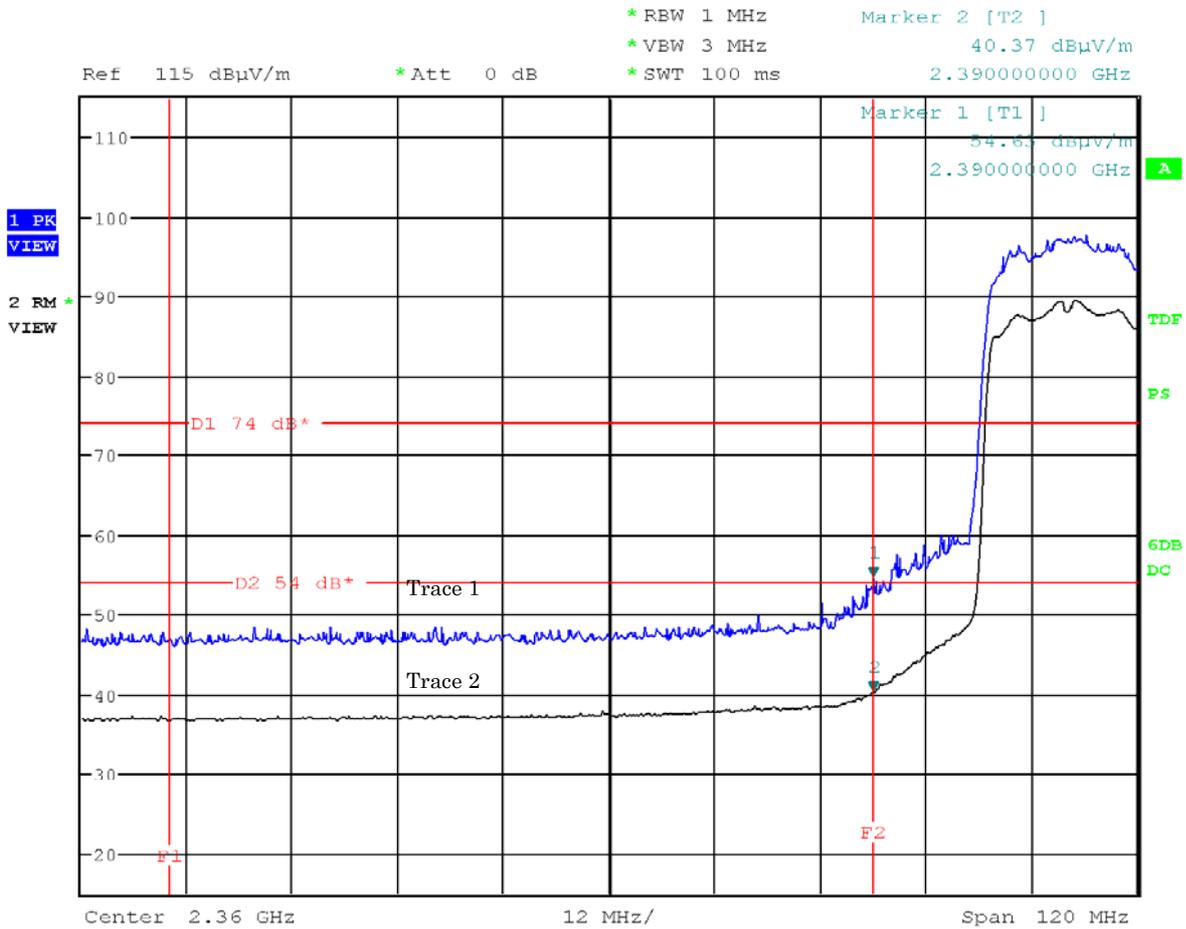
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 6.5Mbps(IEEE 802.11n))

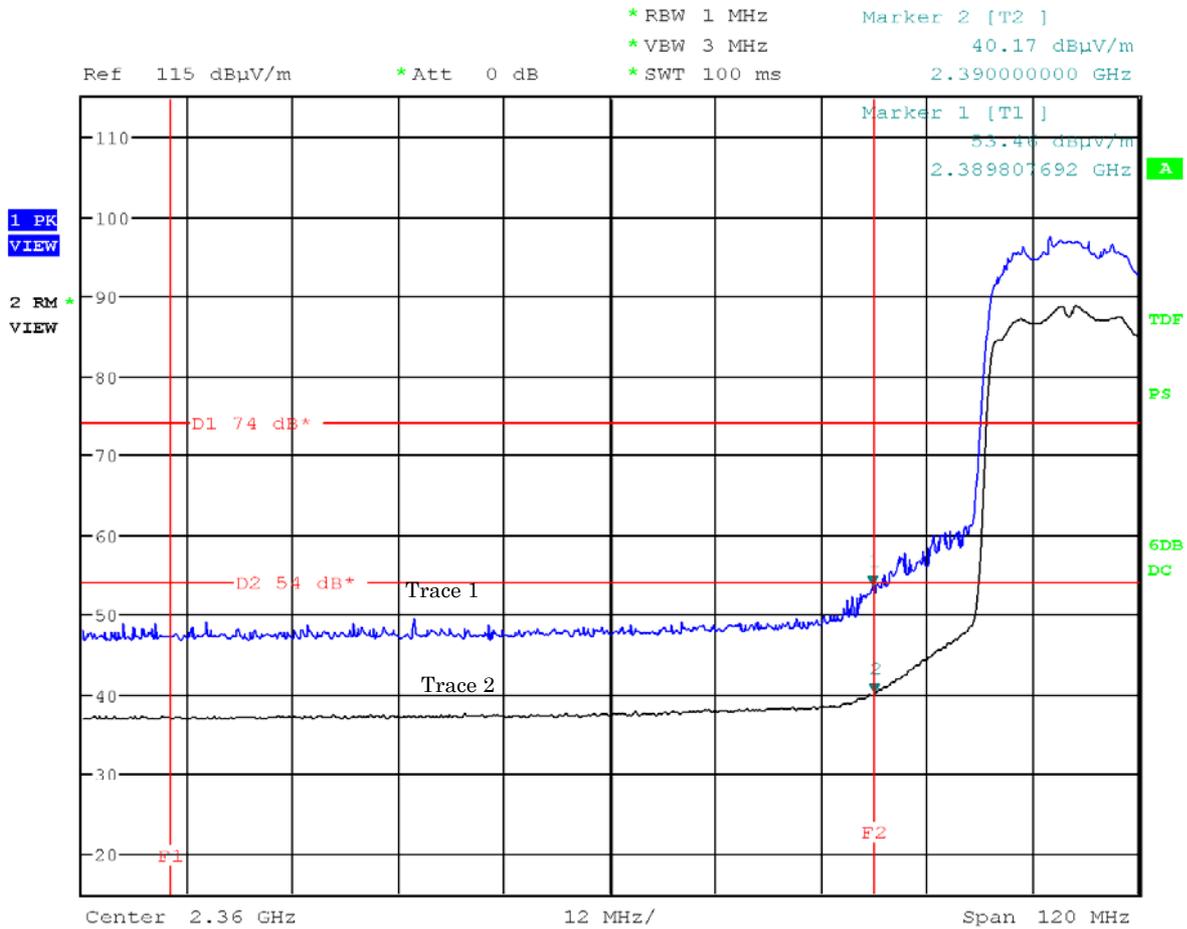
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 6.5Mbps(IEEE 802.11n))

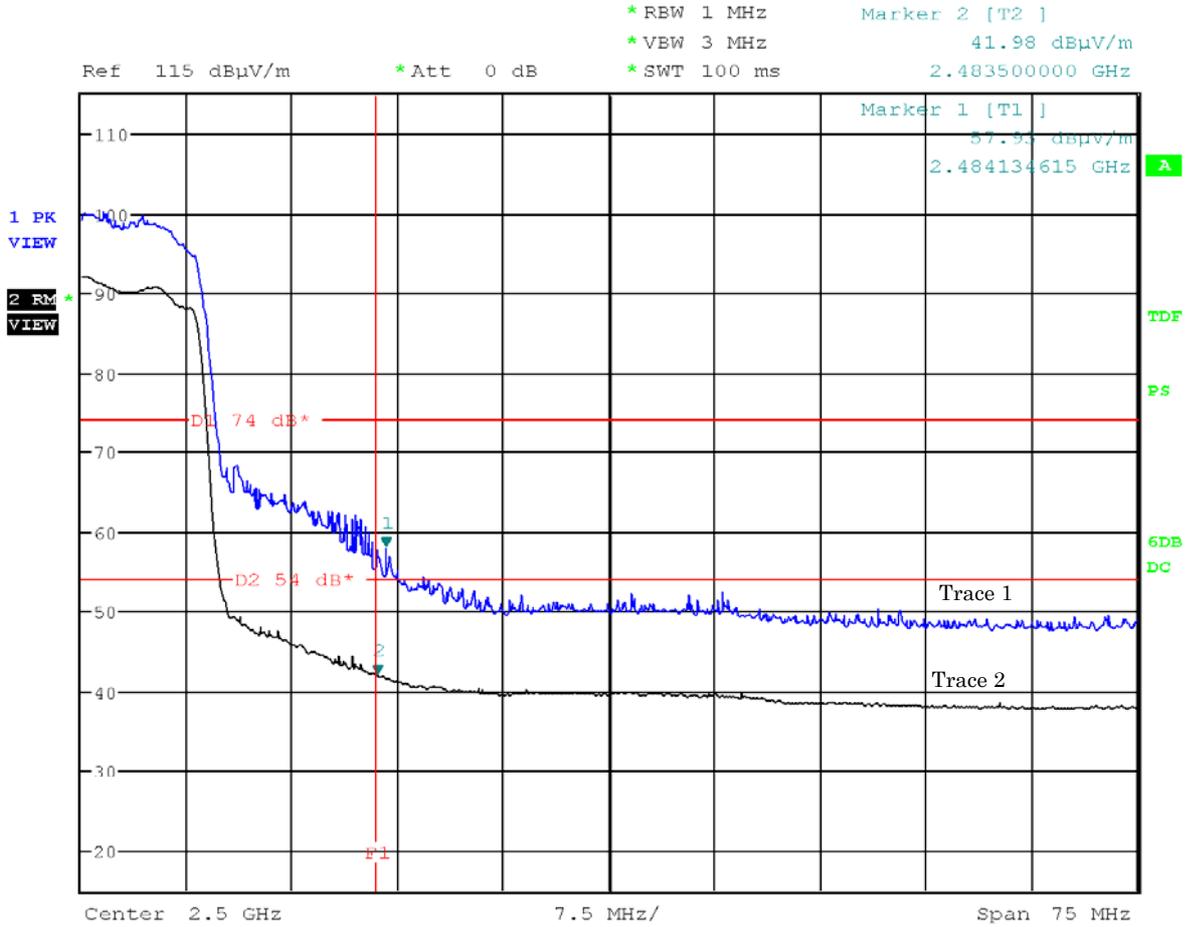
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 6.5Mbps(IEEE 802.11n))

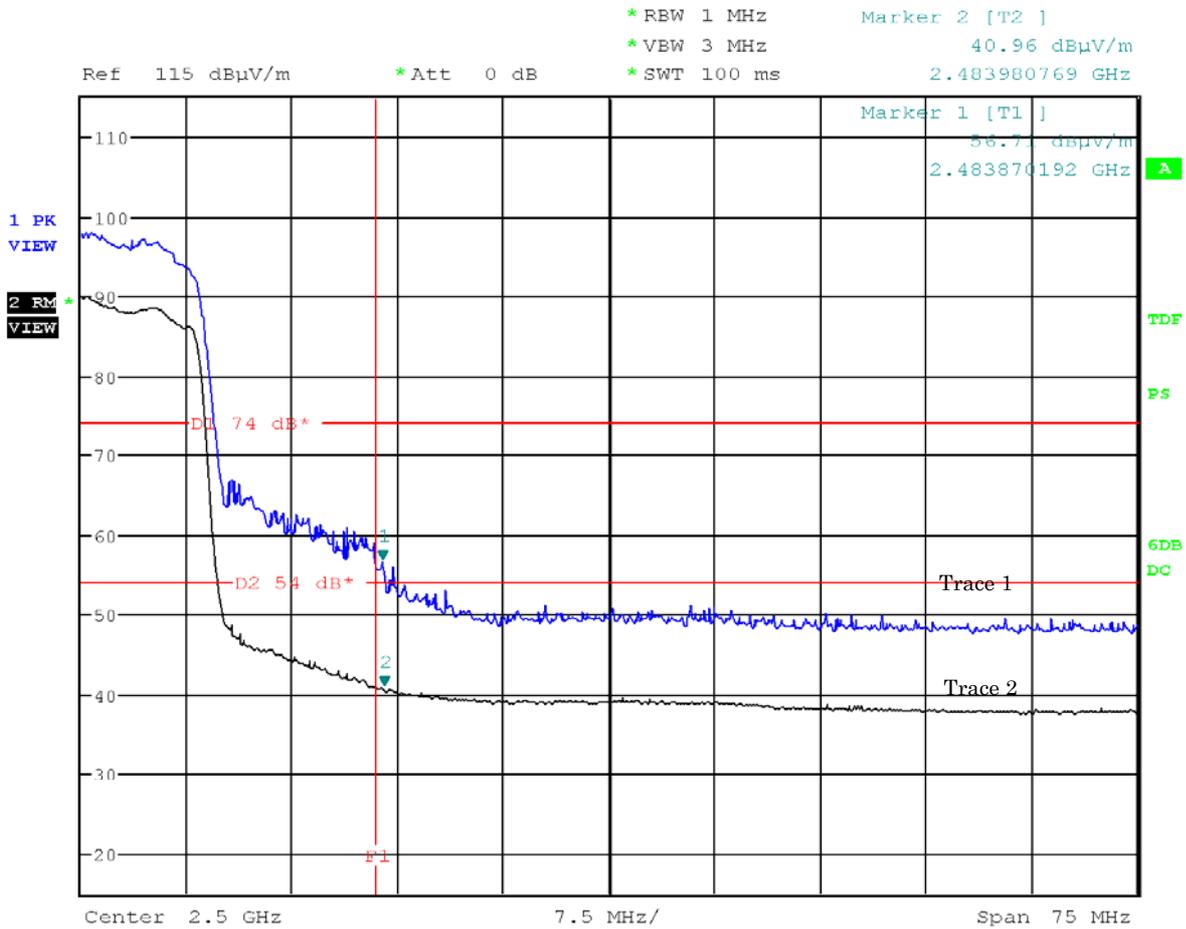
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 6.5Mbps(IEEE 802.11n))

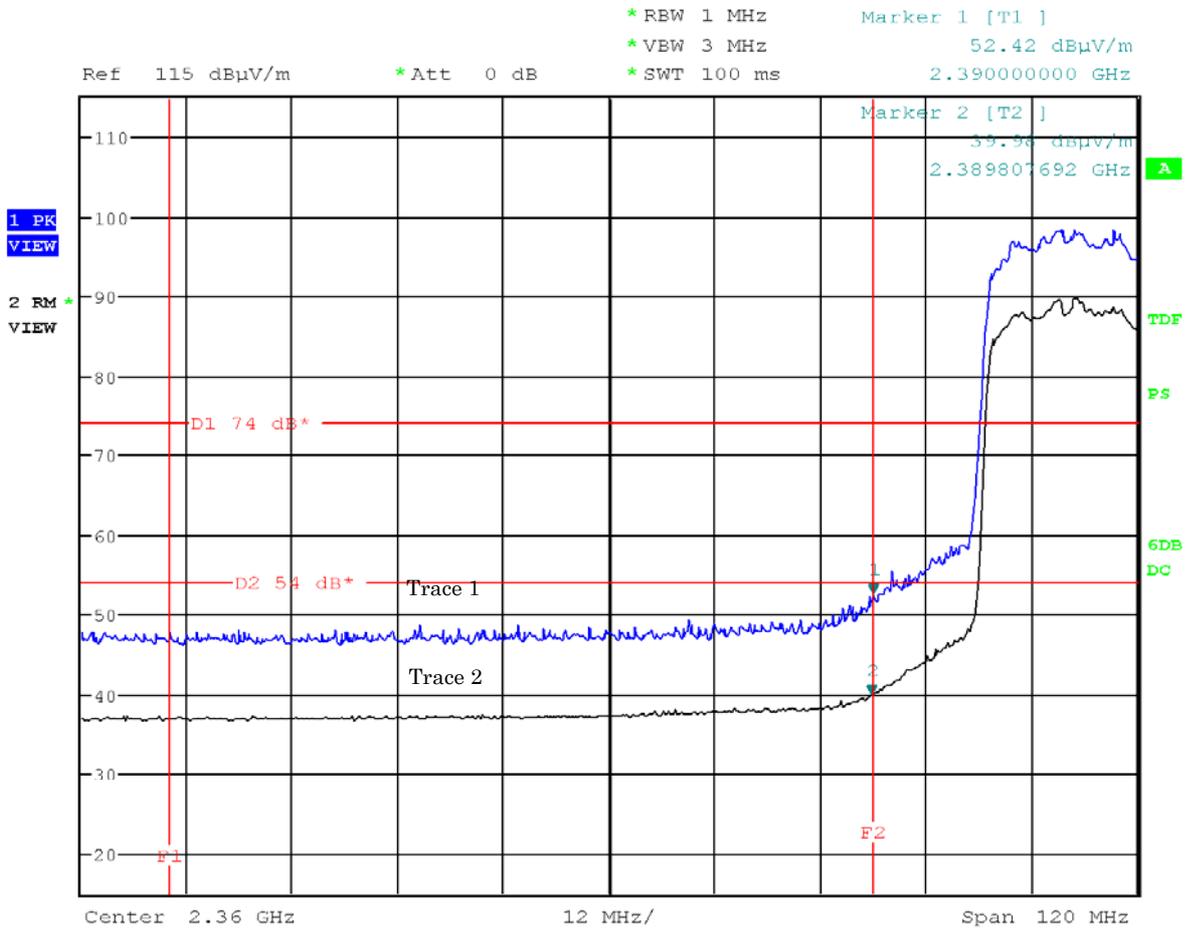
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 65Mbps(IEEE 802.11n))

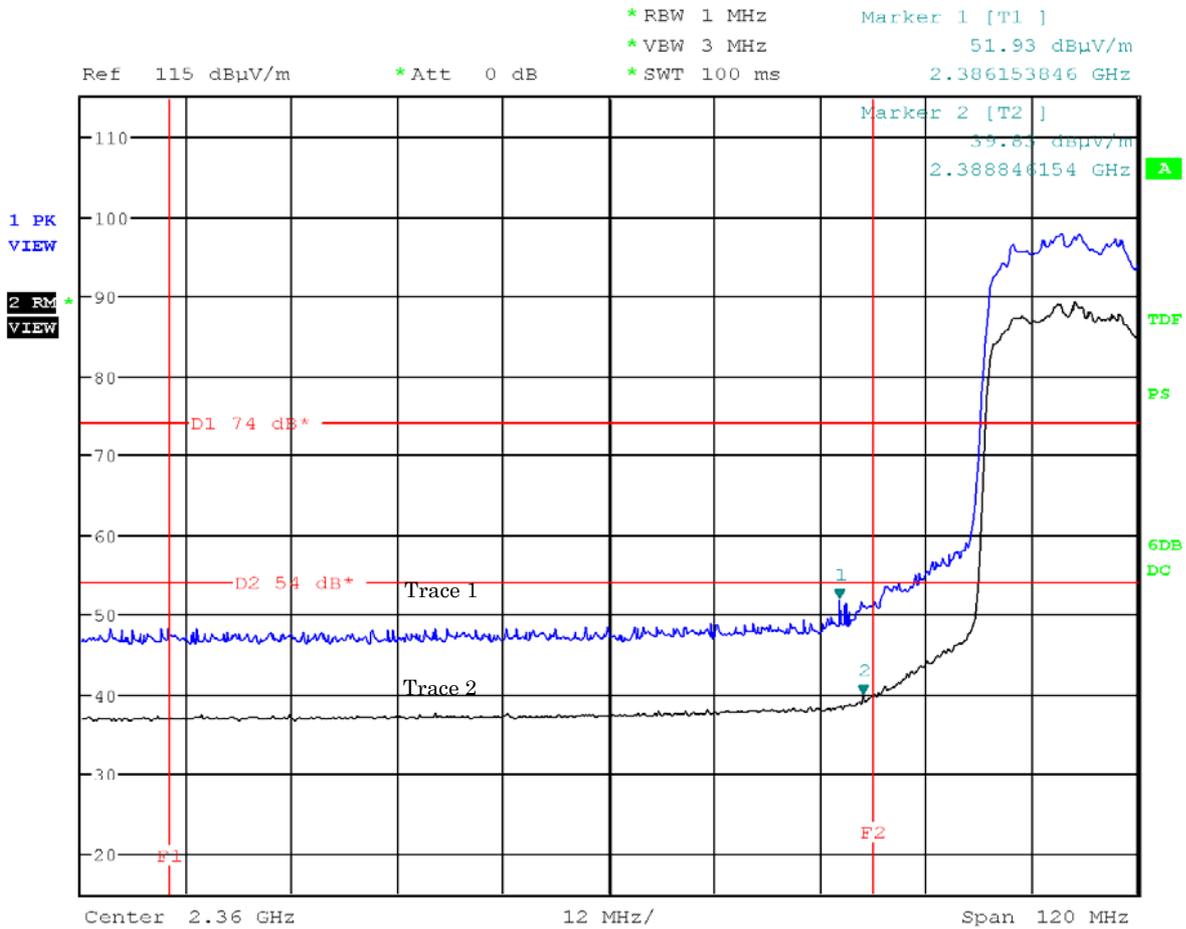
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, data rate : 65Mbps(IEEE 802.11n))

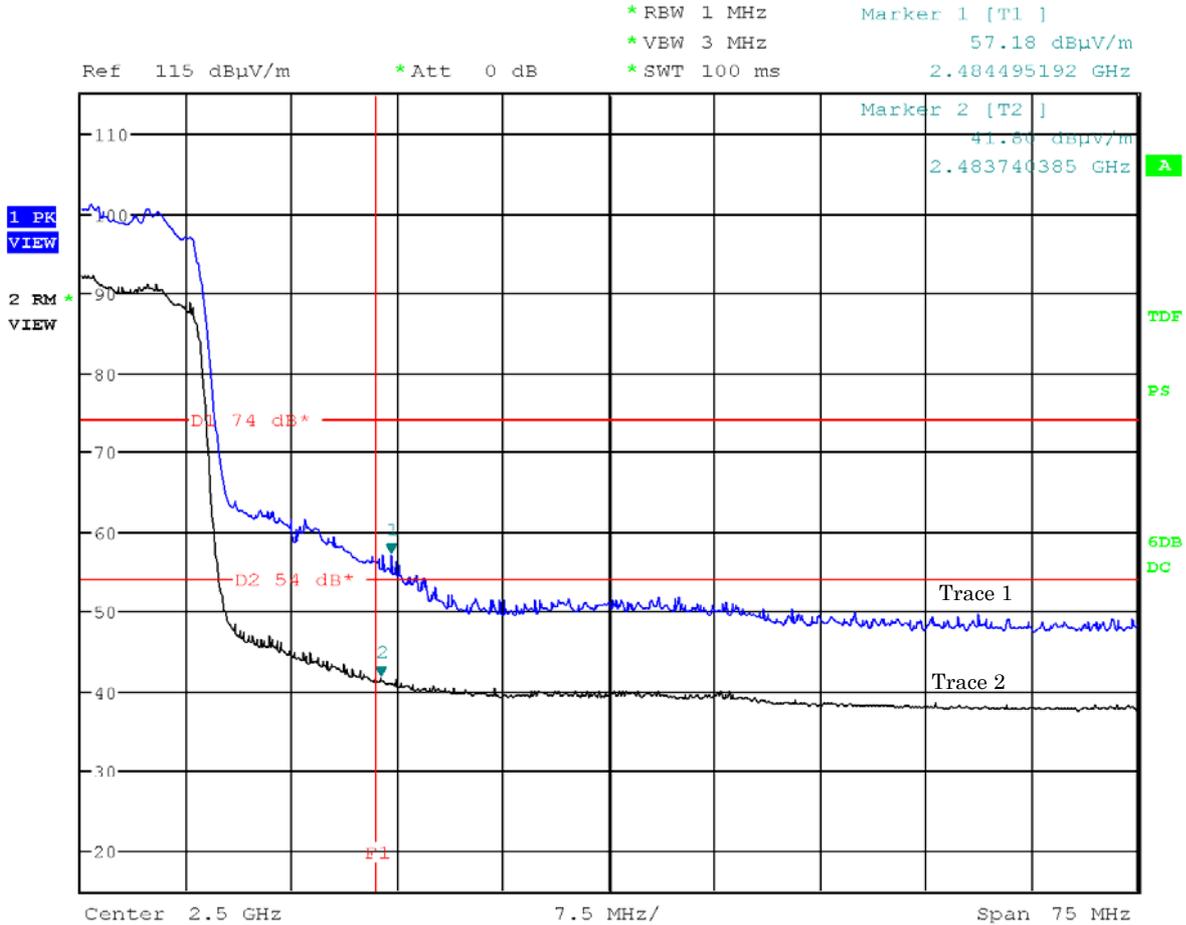
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 65Mbps(IEEE 802.11n))

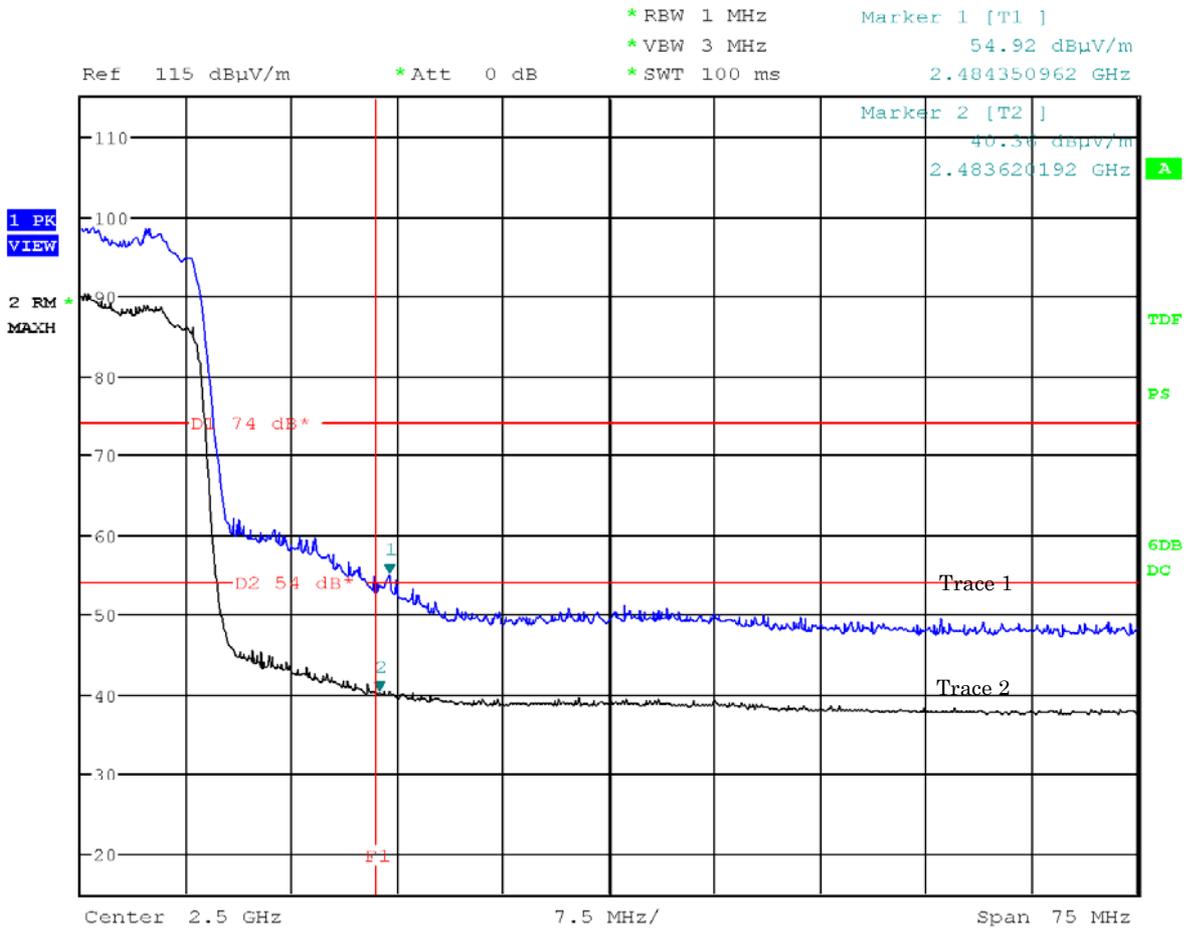
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, data rate : 65Mbps(IEEE 802.11n))

Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

7.9.5.2 Other Spurious Emission (9kHz – 30MHz)

Test Date : October 9, 2012

Temp.:23°C, Humi:54%

Mode of EUT : All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / IEEE802.11b, IEEE802.11g and IEEE802.11n) has been listed.

Results : No spurious emissions in the range 20dB below the limit.

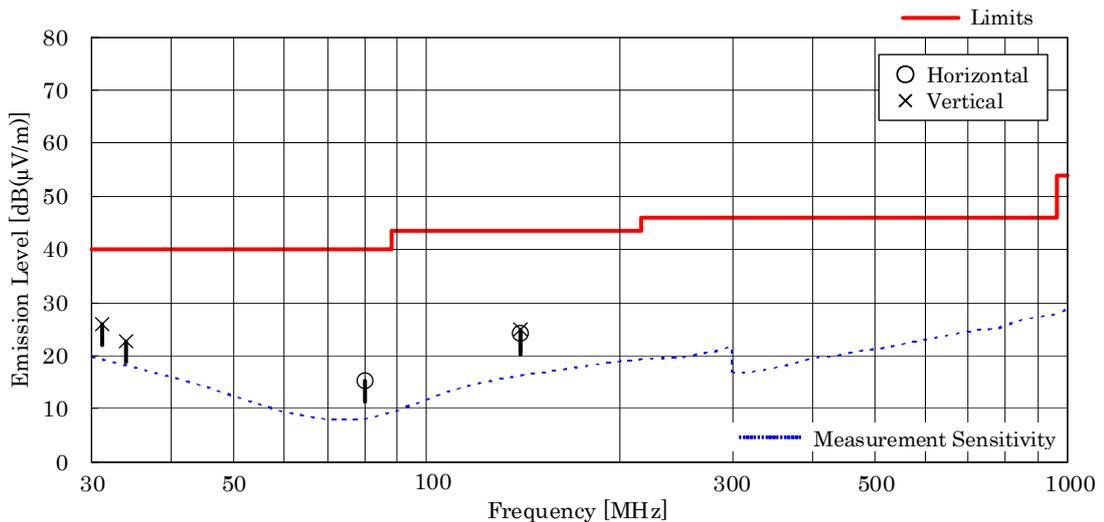
7.9.5.3 Other Spurious Emission (30MHz – 1000MHz)

Mode of EUT : All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / IEEE802.11b, IEEE802.11g and IEEE802.11n) has been listed.

Test Date: October 9, 2012

Temp.: 23 °C, Humi: 54 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Cable Loss [dB]	Meter Readings [dB(μV)]		Limits [dB(μV/m)]	Results [dB(μV/m)]		Margin [dB]	Remarks
			Hori.	Vert.		Hori.	Vert.		
31.1	18.4	0.9	< 0.0	6.7	40.0	< 19.3	26.0	+14.0	-
33.9	17.2	0.9	< 0.0	4.6	40.0	< 18.1	22.7	+17.3	-
80.1	6.6	1.4	7.3	< 0.0	40.0	15.3	< 8.0	+24.7	-
140.1	14.3	1.9	8.0	8.7	43.5	24.2	24.9	+18.6	-



NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The cable factor is consist of several combination conductor cables.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 31.1 MHz, as the worst point shown on underline:
Antenna Factor + Cable Loss + Meter Reading = 18.4 + 0.9 + 6.7 = 26.0 dB(μV/m)
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

7.9.5.4 Other Spurious Emission (Above 1000MHz)

7.9.5.4.1 Mode of TX

7.9.5.4.1.1 IEEE802.11b

Test Date: October 16, 2012

Temp.: 24 °C, Humi: 43 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)]				Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
			Horizontal		Vertical		PK	AVE	PK	AVE		
			PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
12060.0	33.6	-27.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.4	< 36.4	> +17.6	A/B
19296.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
Test condition : TX Middle Ch												
4874.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
7311.0	29.9	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.3	< 40.3	> +13.7	A/B
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	A/B
19496.0	40.2	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.5	< 47.5	> + 6.5	A/B
Test condition : TX High Ch												
4924.0	27.3	-21.3	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	A/B
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	A/B
12310.0	33.5	-26.8	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.7	< 36.7	> +17.3	A/B
19696.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
22158.0	40.3	-21.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 58.6	< 48.6	> + 5.4	A/B

Calculated result at 22158.0 MHz, as the worst point shown on underline:

Antenna Factor	=	40.3 dB(1/m)
Corr. Factor	=	-21.7 dB
+) Meter Reading	=	<30.0 dB(μV)
Result	=	<48.6 dB(μV/m)

Minimum Margin: 54.0 - <48.6 = >5.4 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
 - Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
 - Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
 - Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

	Detector Function	Resolution B.W.	Video B.W.	Sweep Time
A	Peak	1 MHz	3 MHz	AUTO
B	RMS	1 MHz	3 MHz	AUTO

7.9.5.4.1.2 IEEE802.11g

Test Date: October 16, 2012

Temp.: 24 °C, Humi: 43 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)]				Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
			Horizontal		Vertical		PK	AVE	PK	AVE		
			PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
12060.0	33.6	-27.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.4	< 36.4	> +17.6	A/B
19296.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
Test condition : TX Middle Ch												
4874.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
7311.0	29.9	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.3	< 40.3	> +13.7	A/B
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	A/B
19496.0	40.2	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.5	< 47.5	> + 6.5	A/B
Test condition : TX High Ch												
4924.0	27.3	-21.3	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	A/B
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	A/B
12310.0	33.5	-26.8	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.7	< 36.7	> +17.3	A/B
19696.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
22158.0	40.3	-21.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 58.6	< 48.6	> + 5.4	A/B

Calculated result at 22158.0 MHz, as the worst point shown on underline:

Antenna Factor	=	40.3 dB(1/m)
Corr. Factor	=	-21.7 dB
+) Meter Reading	=	<30.0 dB(μV)
Result	=	<48.6 dB(μV/m)

Minimum Margin: 54.0 - <48.6 = >5.4 (dB)

NOTES

- Test Distance : 3 m
- The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
- The correction factor is shown as follows:
 - Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
 - Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
 - Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- PK : Peak Detector / AVE : Average Detector
- Setting of measuring instrument(s) :

	Detector Function	Resolution B.W.	Video B.W.	Sweep Time
A	Peak	1 MHz	3 MHz	AUTO
B	RMS	1 MHz	3 MHz	AUTO

7.9.5.4.1.3 IEEE802.11n

Test Date: October 16, 2012

Temp.: 24 °C, Humi: 43 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)]				Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
			Horizontal		Vertical		PK	AVE	PK	AVE		
			PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
12060.0	33.6	-27.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.4	< 36.4	> +17.6	A/B
19296.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
Test condition : TX Middle Ch												
4874.0	27.3	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	A/B
7311.0	29.9	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.3	< 40.3	> +13.7	A/B
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	A/B
19496.0	40.2	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.5	< 47.5	> + 6.5	A/B
Test condition : TX High Ch												
4924.0	27.3	-21.3	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	A/B
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	A/B
12310.0	33.5	-26.8	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.7	< 36.7	> +17.3	A/B
19696.0	40.3	-22.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 57.6	< 47.6	> + 6.4	A/B
22158.0	40.3	-21.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 58.6	< 48.6	> + 5.4	A/B

Calculated result at 22158.0 MHz, as the worst point shown on underline:

Antenna Factor = 40.3 dB(1/m)
 Corr. Factor = -21.7 dB
 +) Meter Reading = <30.0 dB(μV)
 Result = <48.6 dB(μV/m)

Minimum Margin: 54.0 - <48.6 = >5.4 (dB)

NOTES

- Test Distance : 3 m
- The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
- The correction factor is shown as follows:
 Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
 Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
 Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
- The symbol of "<" means "or less".
- The symbol of ">" means "more than".
- PK : Peak Detector / AVE : Average Detector
- Setting of measuring instrument(s) :

	Detector Function	Resolution B.W.	Video B.W.	Sweep Time
A	Peak	1 MHz	3 MHz	AUTO
B	RMS	1 MHz	3 MHz	AUTO

7.9.5.4.2 Mode of RX

Test Date: October 16, 2012

Temp.: 24 °C, Humi: 43 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)]				Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
			Horizontal		Vertical		PK	AVE	PK	AVE		
			PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : RX Middle Ch												
2437.0	21.3	-21.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 39.4	< 29.4	> +24.6	A/B
4874.0	27.3	-21.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 45.8	< 35.8	> +18.2	A/B
7311.0	29.9	-19.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.0	< 40.0	> +14.0	A/B

Calculated result at 4874.0 MHz, as the worst point shown on underline:

Antenna Factor = 27.3 dB(1/m)

Corr. Factor = -21.5 dB

+) Meter Reading = <30.0 dB(μV)

Result = <35.8 dB(μV/m)

Minimum Margin: 54.0 - <35.8 = >14.0 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

	Detector Function	Resolution B.W.	Video B.W.	Sweep Time
A	Peak	1 MHz	3 MHz	AUTO
B	RMS	1 MHz	3 MHz	AUTO