JQA File No. : KL80130662

Issue Date : March 24, 2014

TEST REPORT

Applicant	:	Sharp Corporation, Communication Systems Division
Address	:	2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, JAPAN
Products	:	Cellular Phone
Model No.	:	SH-04F
SERIAL NO.	:	004401115065316 004401115065381
FCC ID	:	APYHRO00207
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15
Test Results	:	**Passed**
Date of Test	:	March 7 ~14, 2014

ilac-MRA VLAC Lab Accreditation VLAC-001-2

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.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
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- 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
AE : Associated Equipment
N/A : Not Applicable
N/T : Not Tested
EMC : Electromagnetic Compatibility
EMI : Electromagnetic Interference
EMS : Electromagnetic Susceptibility

☒ - 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 Division 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, JAPAN
2.	Products	:	Cellular Phone
3.	Model No.	:	SH-04F
4.	Serial No.	:	004401115065316
		:	004401115065381
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	February, 2014
7.	Power Rating	:	4.0VDC (Lithium-ion Battery UBATIA242AFN1 3300mAh)
8.	EUT Grounding	:	None
9.	Transmitting Frequency	:	WLAN: 2412.0 MHz(01CH) –2462.0MHz(11CH)
		:	Bluetooth LE: 2402.0 MHz(00CH) – 2480.0MHz(39CH)
10.	Receiving Frequency	:	WLAN: 2412.0 MHz(01CH) –2462.0MHz(11CH)
		:	Bluetooth LE: 2402.0 MHz(00CH) – 2480.0MHz(39CH)
11.	Max. RF Output Power	:	16.03dBm(Measure Value of IEEE802.11b)
		:	22.32dBm(Measure Value of IEEE802.11g)
		:	22.39dBm(Measure Value of IEEE802.11n)
		:	5.03dBm(Measure Value of Bluetooth LE)
12.	Category	:	DTS
13.	EUT Authorization	:	Certification
14.	Received Date of EUT	:	March 4, 2014

15. Channel Plan

WLAN:
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 ($1 \leq n \leq 11$)

Bluetooth Low Energy Mode:
The carrier spacing is 2 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) = 2402.0 + 2*n
Receiving Frequency (in MHz) = 2402.0 + 2*n
where, n : channel number ($0 \leq n \leq 39$)

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:

S. Kino

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

Tested by:

Shigeru Osawa

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, ANSI C63.10–2009

The tests were performed with reference to FCC KDB 558074 D01 DTS Meas Guidance v03r01, released April 9, 2013. 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-R1/R2-E-6006, SL2-A1-E-6006 (Expiry date : September 14, 2016)
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, 2016)

6 Details of the Equipment Under Test

6.1 Operating Condition

Transmitting/Receiving

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

Bluetooth Low Energy Mode(Bluetooth 4.0 + EDR + LE):
Transmitting frequency : 2402.0 MHz(0CH) – 2480.0 MHz(39CH)
Receiver frequency : 2402.0 MHz(0CH) – 2480.0 MHz(39CH)

Modulation Type
1. 802.11b : DSSS
2. 802.11g : OFDM
3. 802.11n : OFDM
4. LE Packet (Modulation Type : GFSK)

Other Clock Frequency
32.768 kHz, 19.2 MHz, 27 MHz, 27.12 MHz, 48 MHz

The tests were performed in the following worst condition.

Mode	Condition
IEEE802.11b	11 Mbps
IEEE802.11g	54 Mbps
IEEE802.11n	MCS7 (65 Mbps)

Note: The worst condition was determined based on the test result of Maximum Peak Output Power(Mid channel).

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-04F	004401115065316*1) 004401115065381*2)	APYHRO00207
B	AC Adapter	Fujitsu Corporation	04	WDA	N/A
C	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

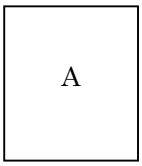
The auxiliary equipment used for testing :
None

Type of Cable:

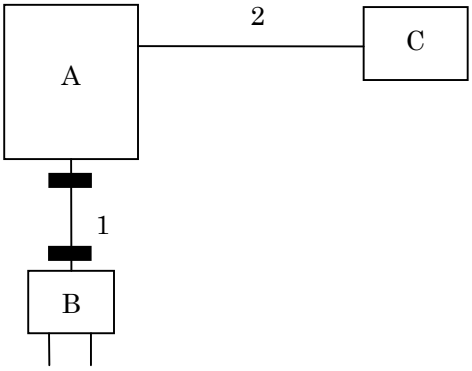
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	USB conversion cable	--	--	NO	YES	1.1
2	Handsfree Cable	--	--	NO	NO	1.5

6.3 Test Arrangement (Drawings)

a) Single Unit

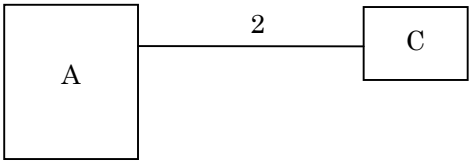


b) AC Adapter used



120VAC 60Hz

c) Handsfree used



▌ : Ferrite Core

7 Details of the Test Item

7.0 Summary of the Test Results

Test Item	FCC Specification	Reference of the Test Report	Results	Remarks
Channel Separation	Section 15.247(a)(1)	-		-
Minimum Hopping Channel	Section 15.247(a)(1)(iii)	-	-	-
Occupied Bandwidth	Section 15.247(a)(2)	Section 7.3	Passed	-
Dwell Time	Section 15.247(a)(1)(iii)	-	-	-
Peak Output Power (Conduction)	Section 15.247(b)(3)	Section 7.5	Passed	-
Peak Power Density (Conduction)	Section 15.247(e)	Section 7.6	Passed	-
Spurious Emissions (Conduction)	Section 15.247(d)	Section 7.7	Passed	-
AC Powerline Conducted Emission	Section 15.207	Section 7.8	Passed	-
Radiated Emission	Section 15.247(d)	Section 7.9	Passed	-

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	12.888	MHz	at	2462.0	MHz
The 99% Bandwidth of IEEE802.11g is	16.473	MHz	at	2437.0	MHz
The 99% Bandwidth of IEEE802.11n is	17.664	MHz	at	2437.0	MHz
The 99% Bandwidth of Bluetooth LE is	1065.5	kHz	at	2440.0	MHz
The 6dB Bandwidth of IEEE802.11b is	8.305	MHz	at	2412.0	MHz
The 6dB Bandwidth of IEEE802.11g is	16.518	MHz	at	2462.0	MHz
The 6dB Bandwidth of IEEE802.11n is	17.712	MHz	at	2462.0	MHz
The 6dB Bandwidth of Bluetooth LE is	652.8	kHz	at	2402.0	MHz
Uncertainty of Measurement Results				+/-0.9	%(2σ)

Remarks : _____

7.3.2 Test Site and Instruments

7.3.2.1 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

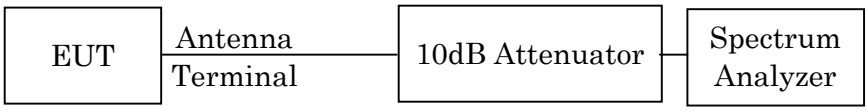
☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

7.3.2.2 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2013/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2013/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2013/7	1 Year

7.3.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

	WLAN	Bluetooth
Res. Bandwidth	100 kHz	30 kHz
Video Bandwidth	300 kHz	100 kHz
Span	30 MHz	3 MHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.3.4 Test Data

Mode of EUT : WLAN

Test Date : March 8, 2014
Temp.:21°C, Humi:25%

The resolution bandwidth was set to 100 kHz, -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

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	12.739	8.305	500
06	2437.0	12.849	8.049	500
11	2462.0	12.888	8.296	500

B) IEEE 802.11g

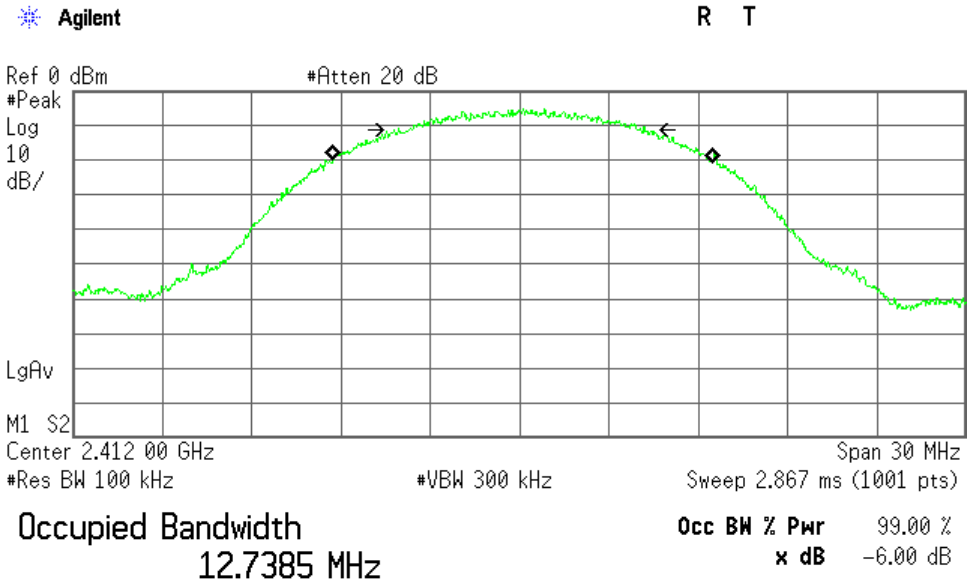
Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	16.438	16.488	500
06	2437.0	16.473	16.503	500
11	2462.0	16.470	16.518	500

C) IEEE 802.11n

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	17.620	17.692	500
06	2437.0	17.664	17.694	500
11	2462.0	17.659	17.712	500

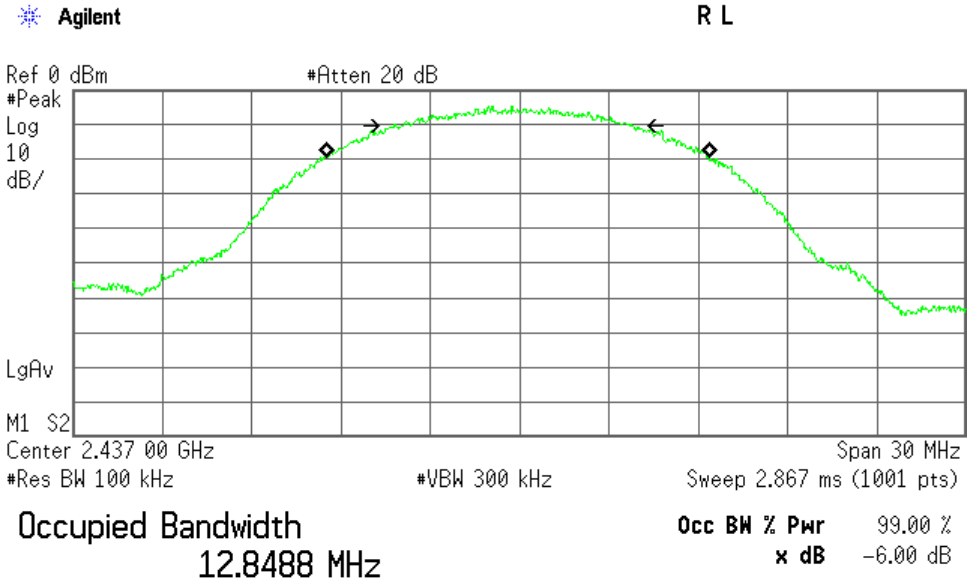
A) IEEE 802.11b

Low Channel



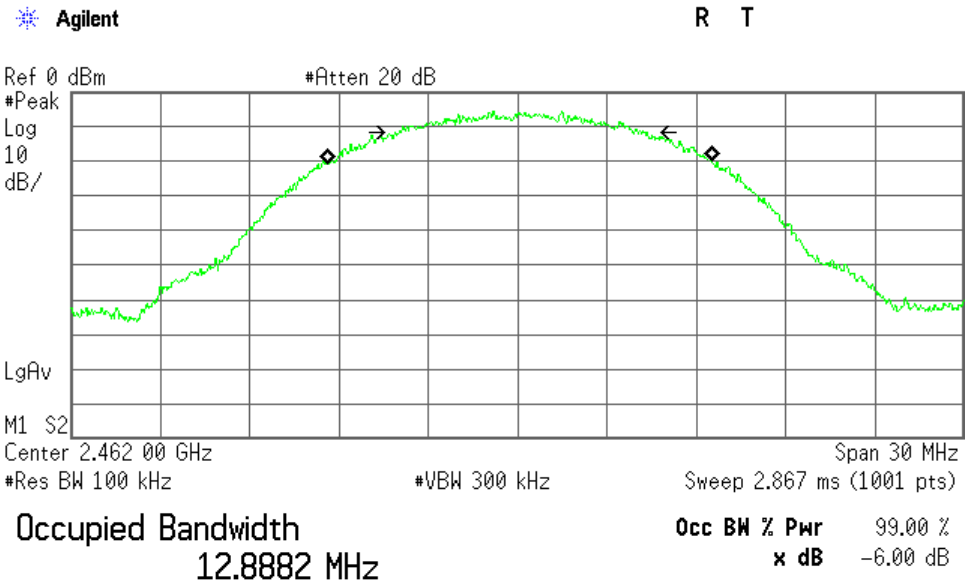
Transmit Freq Error	112.605 kHz
Occupied Bandwidth	8.305 MHz

Middle Channel



Transmit Freq Error	-69.521 kHz
Occupied Bandwidth	8.049 MHz

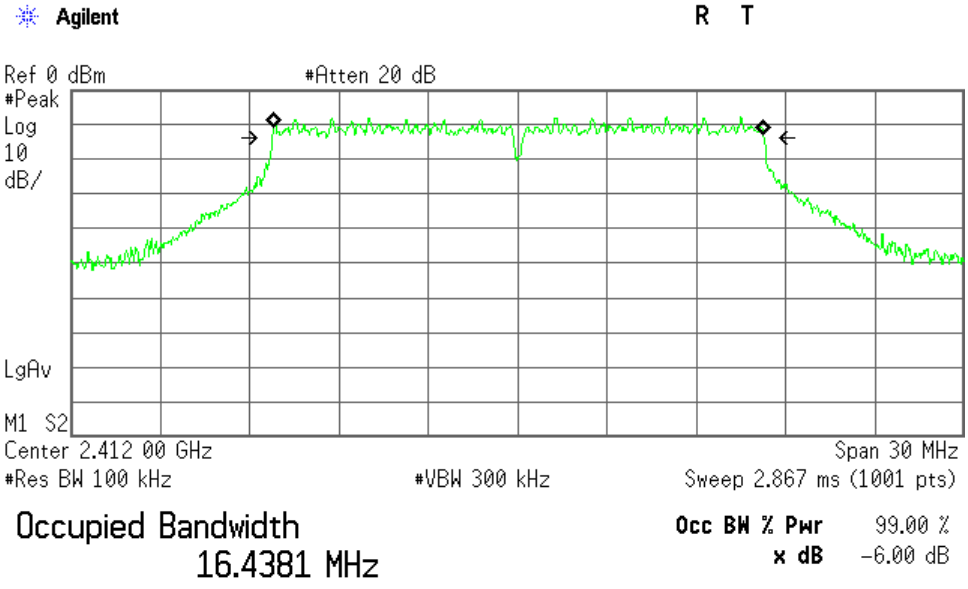
High Channel



Transmit Freq Error	63.991 kHz
Occupied Bandwidth	8.296 MHz

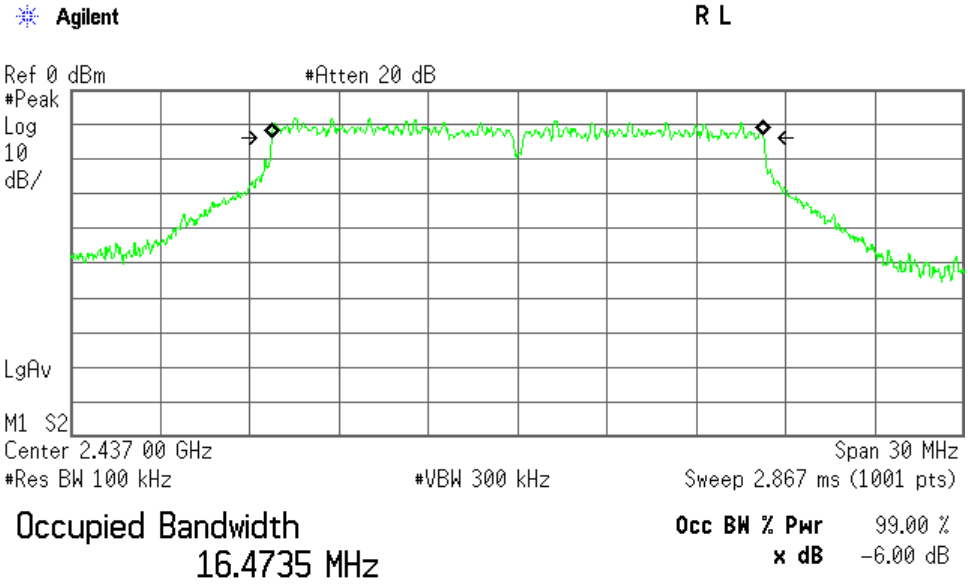
B) IEEE 802.11g

Low Channel



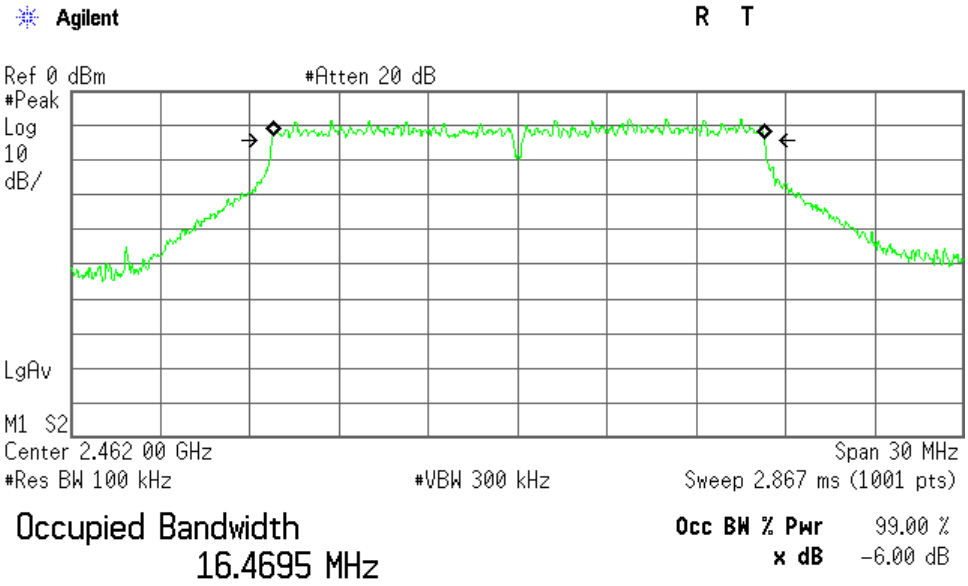
Transmit Freq Error	30.916 kHz
Occupied Bandwidth	16.488 MHz

Middle Channel



Transmit Freq Error	-3.423 kHz
Occupied Bandwidth	16.503 MHz

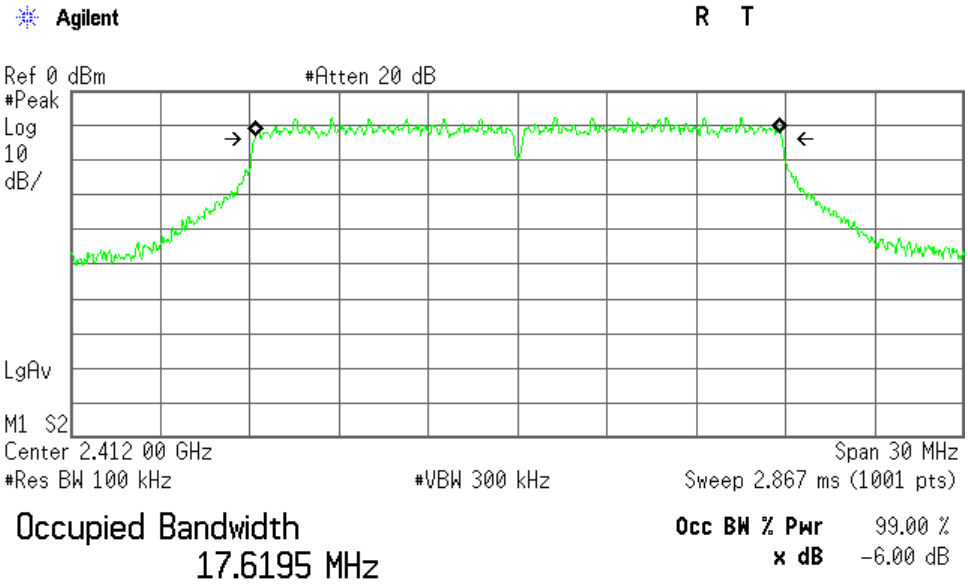
High Channel



Transmit Freq Error	35.519 kHz
Occupied Bandwidth	16.518 MHz

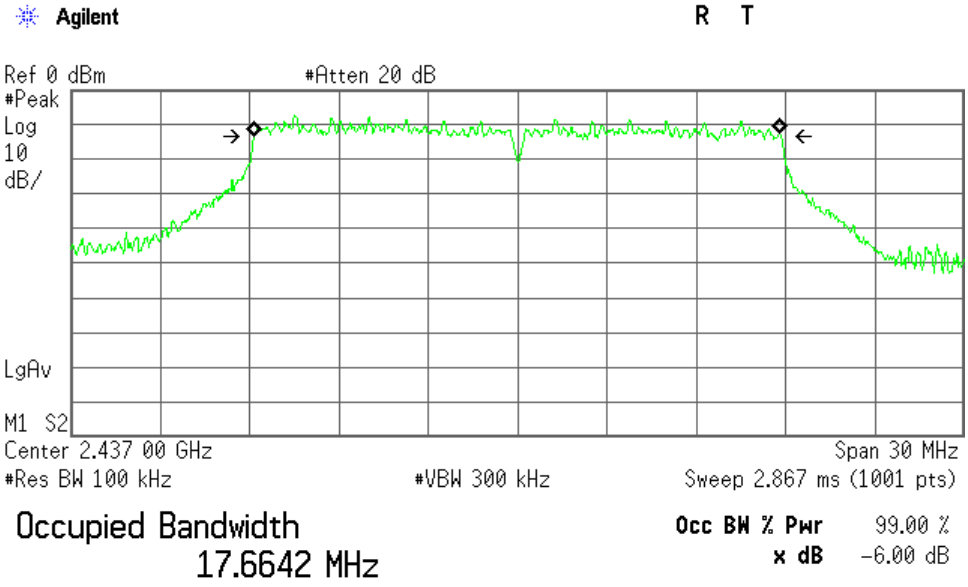
C) IEEE 802.11n

Low Channel



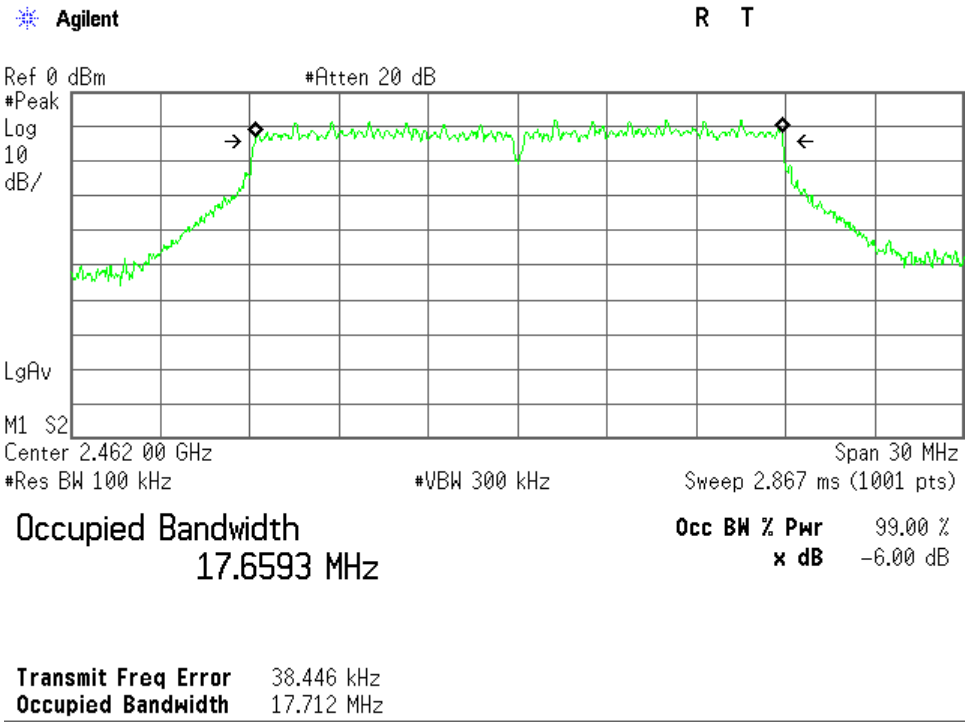
Transmit Freq Error	20.962 kHz
Occupied Bandwidth	17.692 MHz

Middle Channel



Transmit Freq Error	-7.419 kHz
Occupied Bandwidth	17.694 MHz

High Channel



Transmit Freq Error	38.446 kHz
Occupied Bandwidth	17.712 MHz

Mode of EUT : Bluetooth Low Energy

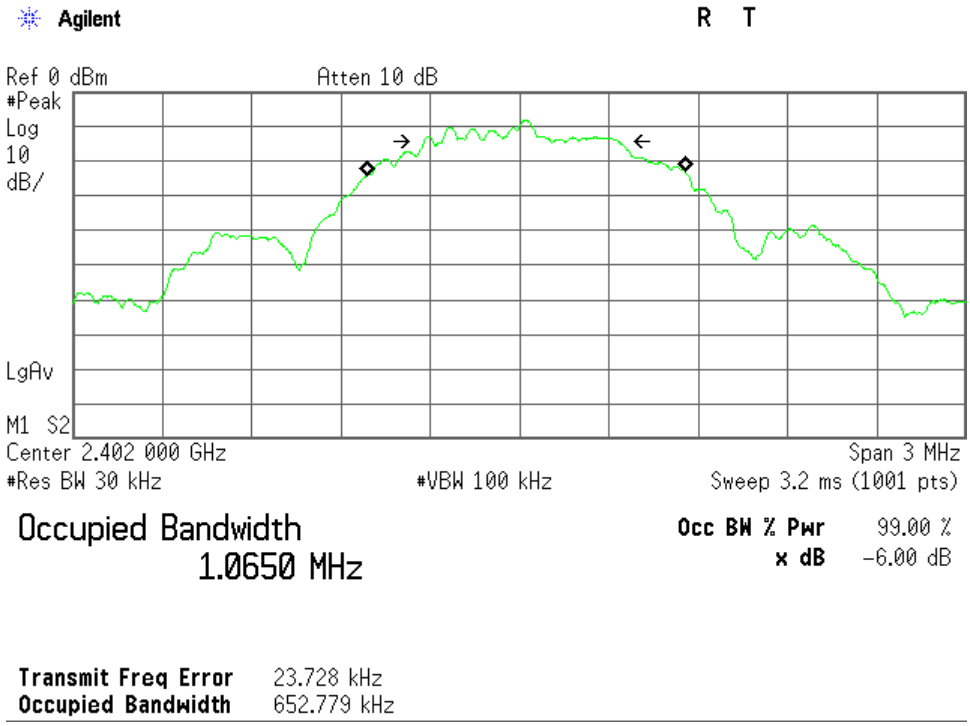
Test Date : March 11, 2014
Temp.:21°C, Humi:23%

The resolution bandwidth was set to about 1% 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.

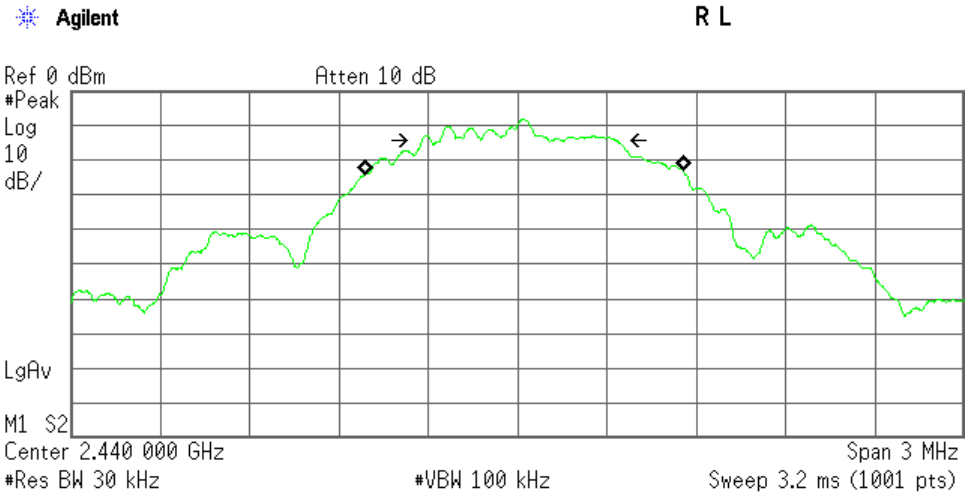
1)Packet Setting : LE (Modulation type : GFSK)

Channel	Frequency (MHz)	99% Bandwidth (kHz)	-6dBc Bandwidth (kHz)	Minimum -6dBc Bandwidth Limit (kHz)
00	2402.0	1065.0	652.8	500
19	2440.0	1065.5	652.3	500
39	2480.0	1065.5	649.9	500

1)Packet Setting : LE (Modulation type : GFSK)
Low Channel

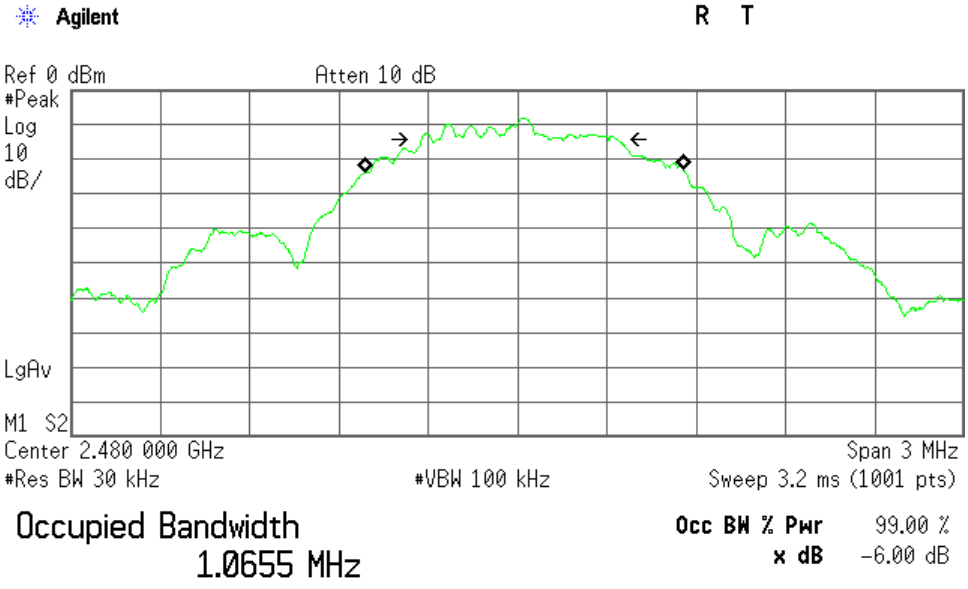


Middle Channel



Transmit Freq Error	23.306 kHz
Occupied Bandwidth	652.274 kHz

High Channel



Transmit Freq Error	22.850 kHz
Occupied Bandwidth	649.910 kHz

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	16.03	dBm	at	2412.0	MHz
Peak Output Power of IEEE802.11g is	22.32	dBm	at	2412/2437	MHz
Peak Output Power of IEEE802.11n is	22.39	dBm	at	2437.0	MHz
Peak Output Power of Bluetooth LE is	5.03	dBm	at	2480.0	MHz

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

Remarks : _____

7.5.2 Test Site and Instruments

7.5.2.1 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

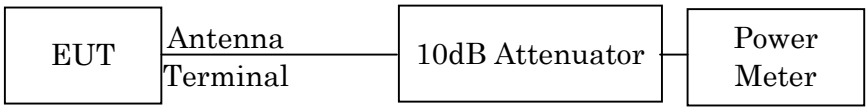
☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

7.5.2.2 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Power Meter	N1911A	Agilent	B-63	2013/7	1 Year
Power Sensor	N1921A	Agilent	B-64	2013/7	1 Year
Attenuator	54A-10	Weinschel	D-28	2013/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2013/7	1 Year

7.5.3 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.



7.5.4 Test Data

1) IEEE 802.11b

Test Date: March 7, 2014
Temp.: 21 °C, Humi: 26 %

Data Rate : 11Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	6.08	16.03	40.09	30.00	+13.97
06	2437	9.96	5.85	15.81	38.11	30.00	+14.19
11	2462	9.96	5.50	15.46	35.16	30.00	+14.54

Calculated result at 2412.000 MHz, as the worst point shown on underline:

	Correction Factor	=	9.95 dB
+)	Meter Reading	=	6.08 dBm
	Result	=	16.03 dBm = 40.09 mW

Minimum Margin: 30.00 - 16.03 = 13.97 (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	Video B.W.
Peak	OFF

CH	[MHz]
06	2437

Rate	Meter Reading [dBm]	Remark
1Mbps	5.77	
2Mbps	5.45	
5.5Mbps	5.51	
11Mbps	5.85	*

* : Worst Rate
All comparison were performed on the same measurement condition.

2) IEEE 802.11g

Test Date: March 7, 2014
Temp.: 21 °C, Humi: 26 %

Data Rate : 54Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	12.37	22.32	170.61	30.00	+ 7.68
06	2437	9.96	12.36	22.32	170.61	30.00	+ 7.68
11	2462	9.96	12.16	22.12	162.93	30.00	+ 7.88

Calculated result at 2412.000 MHz, as the worst point shown on underline:

	Correction Factor	=	9.95 dB
+)	Meter Reading	=	12.37 dBm
	Result	=	22.32 dBm = 170.61 mW

Minimum Margin: 30.00 - 22.32 = 7.68 (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	Video B.W.
Peak	OFF

CH	[MHz]
06	2437

Rate	Meter Reading [dBm]	Remark
6Mbps	12.02	
9Mbps	12.21	
12Mbps	12.01	
18Mbps	12.21	
24Mbps	11.97	
36Mbps	12.02	
48Mbps	12.29	
54Mbps	12.36	*

* : Worst Rate
All comparison were performed on the same measurement condition.

3) IEEE 802.11n

Test Date: March 7, 2014
Temp.: 21 °C, Humi: 26 %

Data Rate : MCS7(65Mbps)

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	12.43	22.38	172.98	30.00	+ 7.62
06	2437	9.96	12.43	22.39	173.38	30.00	+ 7.61
11	2462	9.96	11.99	21.95	156.68	30.00	+ 8.05

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

	Correction Factor	=	9.96 dB
+)	Meter Reading	=	12.43 dBm
	Result	=	22.39 dBm = 173.38 mW

Minimum Margin: 30.00 - 22.39 = 7.61 (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	Video B.W.
Peak	OFF

CH	[MHz]
06	2437

Rate	Meter Reading [dBm]	Remark
MCS0(6.5Mbps)	12.03	
MCS1(13Mbps)	12.14	
MCS2(19.5Mbps)	11.98	
MCS3(26Mbps)	12.12	
MCS4(39Mbps)	11.93	
MCS5(52Mbps)	12.10	
MCS6(58.5Mbps)	12.14	
MCS7(65Mbps)	12.43	*

* : Worst Rate
All comparison were performed on the same measurement condition.

4) Bluetooth LE(Modulation type : GFSK)

Test Date: March 11, 2014
Temp.: 21 °C, Humi: 23 %

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	9.95	-5.19	4.76	2.99	30.00	+25.24
19	2440	9.96	-5.19	4.77	3.00	30.00	+25.23
39	2480	9.96	-4.93	5.03	3.18	30.00	+24.97

Calculated result at 2480.000 MHz, as the worst point shown on underline:

	Correction Factor	=	9.96 dB
+)	Meter Reading	=	-4.93 dBm
	Result	=	5.03 dBm = 3.18 mW

Minimum Margin: 30.00 - 5.03 = 24.97 (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	Video B.W.
Peak	Off

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	-9.51	dBm	at	2437.0	MHz
Peak Power Density of IEEE802.11g is	-12.00	dBm	at	2412.0	MHz
Peak Power Density of IEEE802.11n is	-11.80	dBm	at	2412.0	MHz
Peak Power Density of Bluetooth LE is	-8.28	dBm	at	2480.0	MHz

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

Remarks :

7.6.2 Test Site and Instruments

7.6.2.1 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

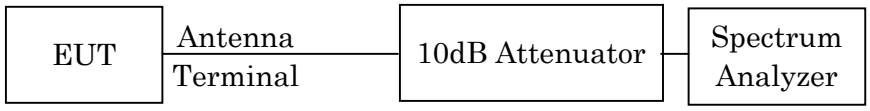
☐ - Anechoic chamber (A1)	☐ - Measurement room (M1)
☐ - Measurement room (M2)	☐ - Measurement room (M3)
☐ - Shielded room (S1)	☐ - Shielded room (S2)
☐ - Shielded room (S3)	☒ - Shielded room (S4)

7.6.2.2 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2013/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2013/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2013/7	1 Year

7.6.3 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.



7.6.4 Test Data

1) IEEE 802.11b

Test Date: March 8, 2014
Temp.: 21 °C, Humi: 25 %

Data Rate : 11Mbps

Transmitting Frequency		Correction Factor	BWCF	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	-10.00	-10.10	-10.15	0.10	8.00	+18.15
06	2437	9.96	-10.00	-9.47	-9.51	0.11	8.00	+17.51
11	2462	9.96	-10.00	-9.93	-9.97	0.10	8.00	+17.97

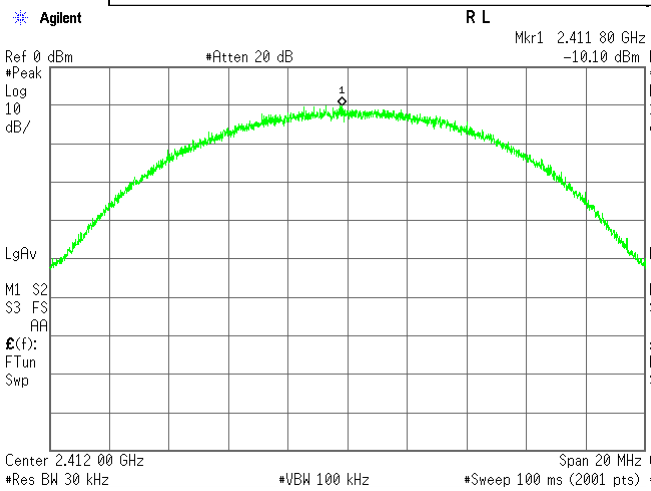
Calculated result at 2437.000 MHz, as the worst point shown on underline:

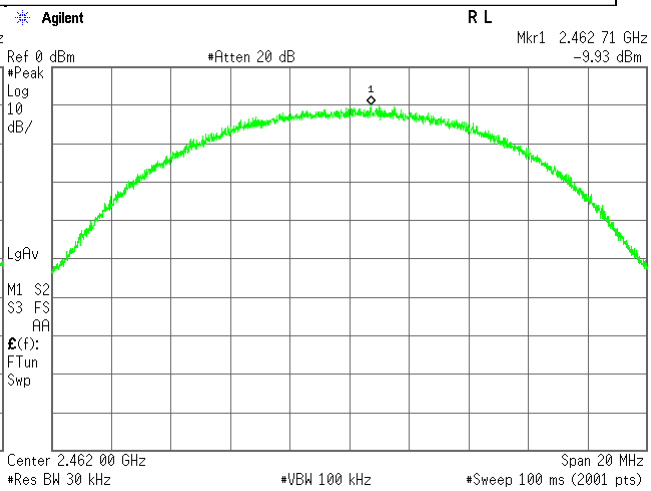
Correction Factor	=	9.96	dB
BWCF	=	-10.00	dB
+) Meter Reading	=	-9.47	dBm
Result	=	-9.51	dBm = 0.11 mW

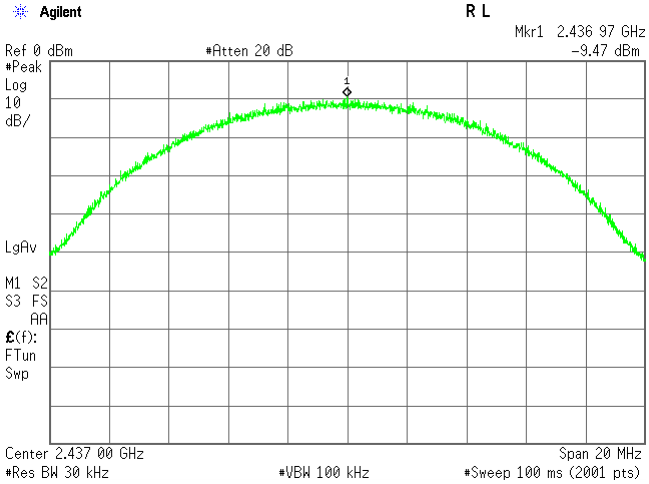
Minimum Margin: 8.00 - -9.51 = 17.51 (dB)

NOTES
1. The peak power density complied with the limit without BWCF.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. BWCF(bandwidth correction factor) = 10 log (3 kHz/30 kHz) = -10.0 dB
4. Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz







2) IEEE 802.11g

Test Date: March 8, 2014
Temp.: 21 °C, Humi: 25 %

Data Rate : 54Mbps

Transmitting Frequency		Correction Factor	BWCF	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	-10.00	-11.95	-12.00	0.06	8.00	+20.00
06	2437	9.96	-10.00	-12.86	-12.90	0.05	8.00	+20.90
11	2462	9.96	-10.00	-12.43	-12.47	0.06	8.00	+20.47

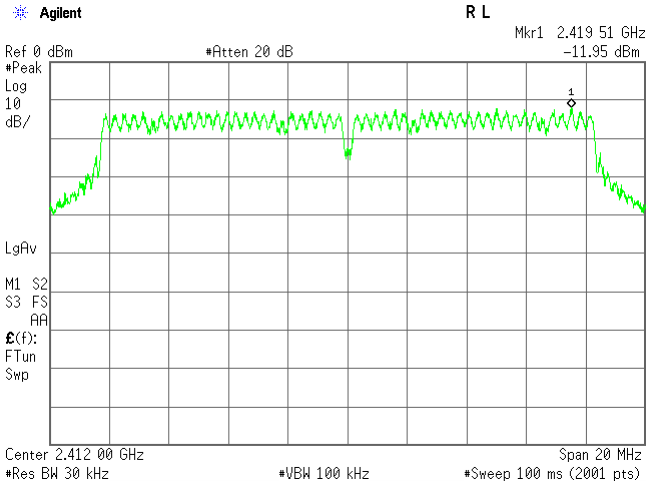
Calculated result at 2412.000 MHz, as the worst point shown on underline:

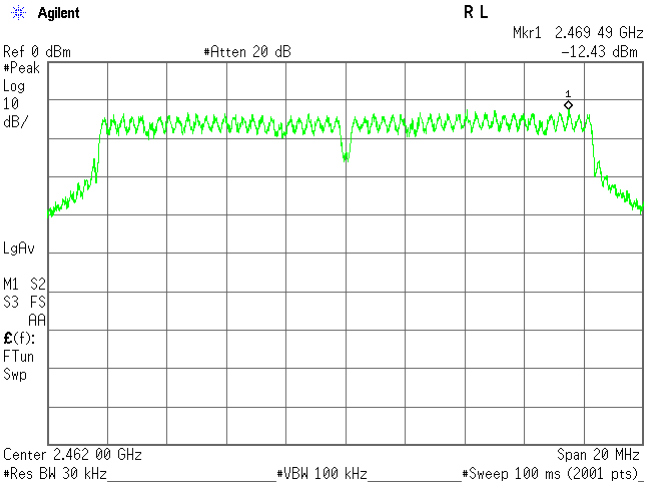
Correction Factor	=	9.95	dB
BWCF	=	-10.00	dB
+) Meter Reading	=	-11.95	dBm
Result	=	-12.00	dBm = 0.06 mW

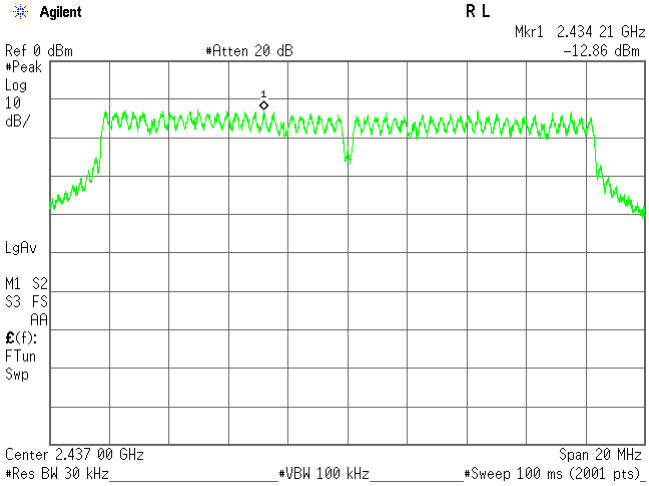
Minimum Margin: 8.00 - -12.00 = 20.00 (dB)

NOTES
1. The peak power density complied with the limit without BWCF.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. BWCF(bandwidth correction factor) = 10 log (3 kHz/30 kHz) = -10.0 dB
4. Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz







3) IEEE 802.11n

Test Date: March 8, 2014
Temp.: 21 °C, Humi: 25 %

Data Rate : MCS7(65Mbps)

Transmitting Frequency		Correction Factor	BWCF	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.95	-10.00	-11.75	-11.80	0.07	8.00	+19.80
06	2437	9.96	-10.00	-12.46	-12.50	0.06	8.00	+20.50
11	2462	9.96	-10.00	-12.33	-12.37	0.06	8.00	+20.37

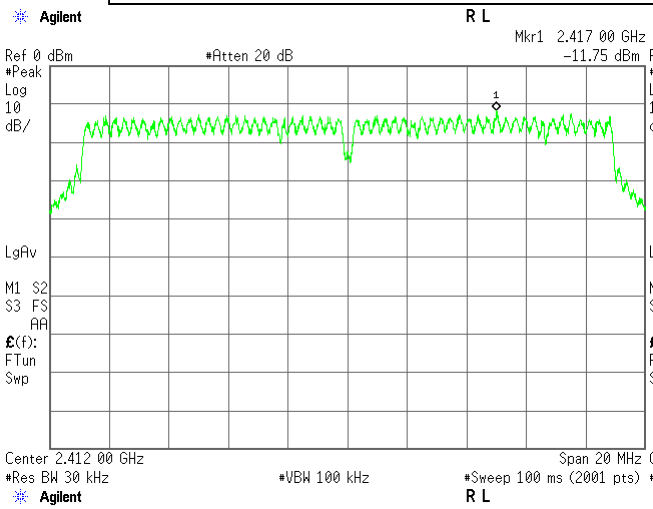
Calculated result at 2412.000 MHz, as the worst point shown on underline:

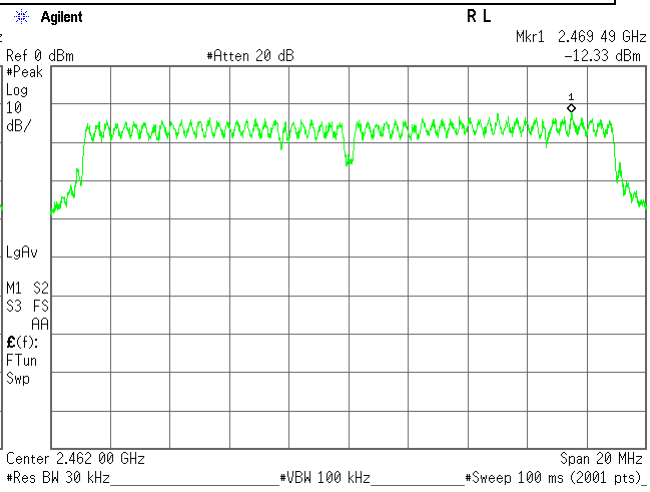
Correction Factor	=	9.95	dB
BWCF	=	-10.00	dB
+) Meter Reading	=	-11.75	dBm
Result	=	-11.80	dBm = 0.07 mW

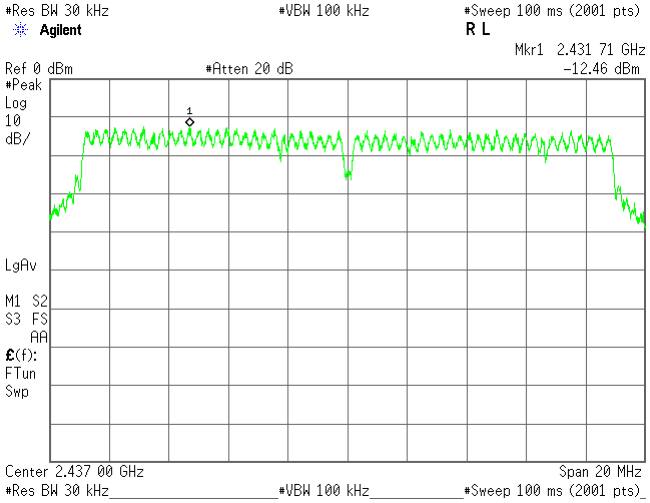
Minimum Margin: 8.00 - -11.80 = 19.80 (dB)

NOTES
1. The peak power density complied with the limit without BWCF.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. BWCF(bandwidth correction factor) = 10 log (3 kHz/30 kHz) = -10.0 dB
4. Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz







4) Bluetooth LE(Modulation type : GFSK)

Test Date: March 11, 2014
Temp.: 21 °C, Humi: 23 %

Transmitting Frequency		Correction Factor	BWCF	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	9.95	-10.00	-8.51	-8.56	0.14	8.00	+16.56
19	2440	9.96	-10.00	-8.50	-8.54	0.14	8.00	+16.54
39	2480	9.96	-10.00	-8.24	-8.28	0.15	8.00	+16.28

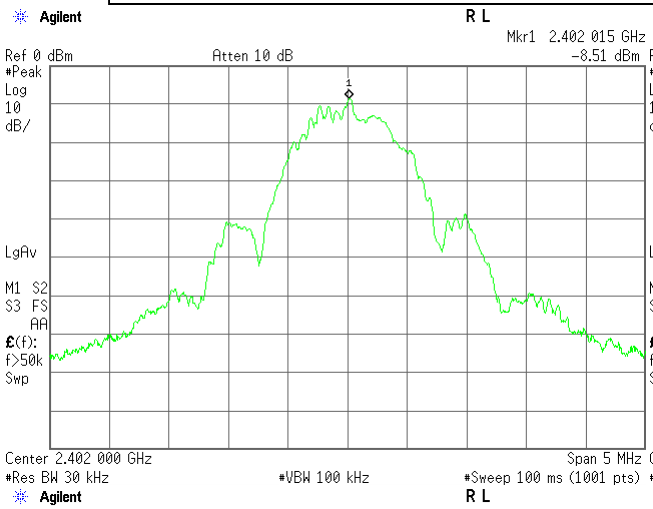
Calculated result at 2480.000 MHz, as the worst point shown on underline:

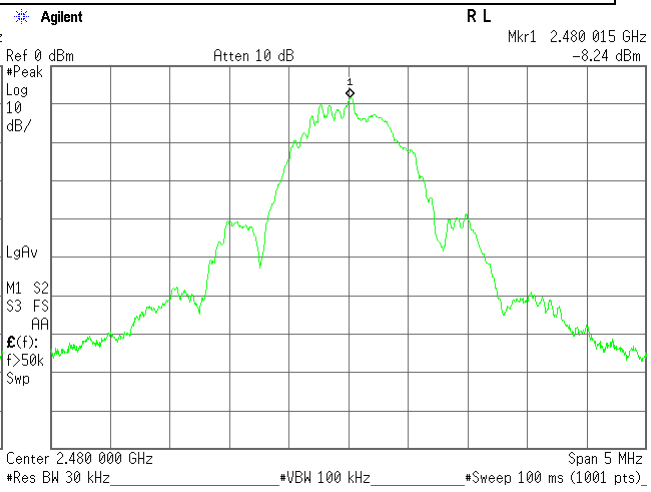
Correction Factor	=	9.96	dB
BWCF	=	-10.00	dB
+) Meter Reading	=	-8.24	dBm
Result	=	-8.28	dBm = 0.15 mW

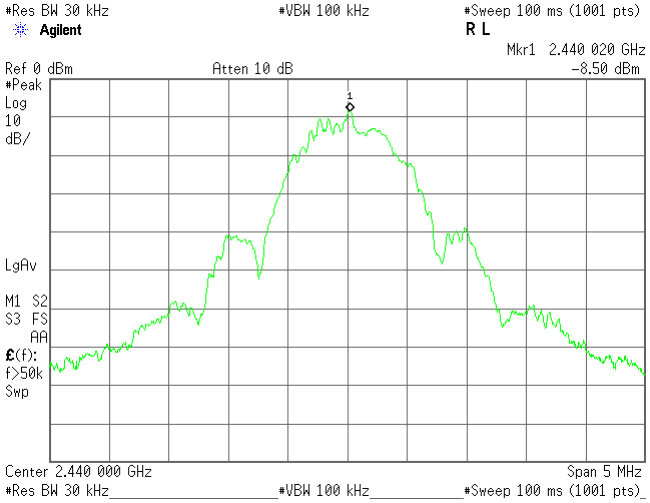
Minimum Margin: 8.00 - -8.28 = 16.28 (dB)

NOTES
1. The peak power density complied with the limit without BWCF.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. BWCF(bandwidth correction factor) = 10 log (3 kHz/30 kHz) = -10.0 dB
4. Setting of measuring instrument(s) :

Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz







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	+/-1.0	dB(2σ)
1GHz – 18GHz	+/-1.2	dB(2σ)
18GHz – 40GHz	+/-1.6	dB(2σ)

Remarks : _____

7.7.2 Test Site and Instruments

7.7.2.1 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

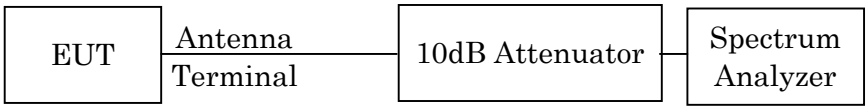
☐ - Anechoic chamber (A1)	☐ - Measurement room (M1)
☐ - Measurement room (M2)	☐ - Measurement room (M3)
☐ - Shielded room (S1)	☐ - Shielded room (S2)
☐ - Shielded room (S3)	☒ - Shielded room (S4)

7.7.2.2 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Spectrum Analyzer	E4446A	Agilent	A-39	2013/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2013/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2013/7	1 Year

7.7.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

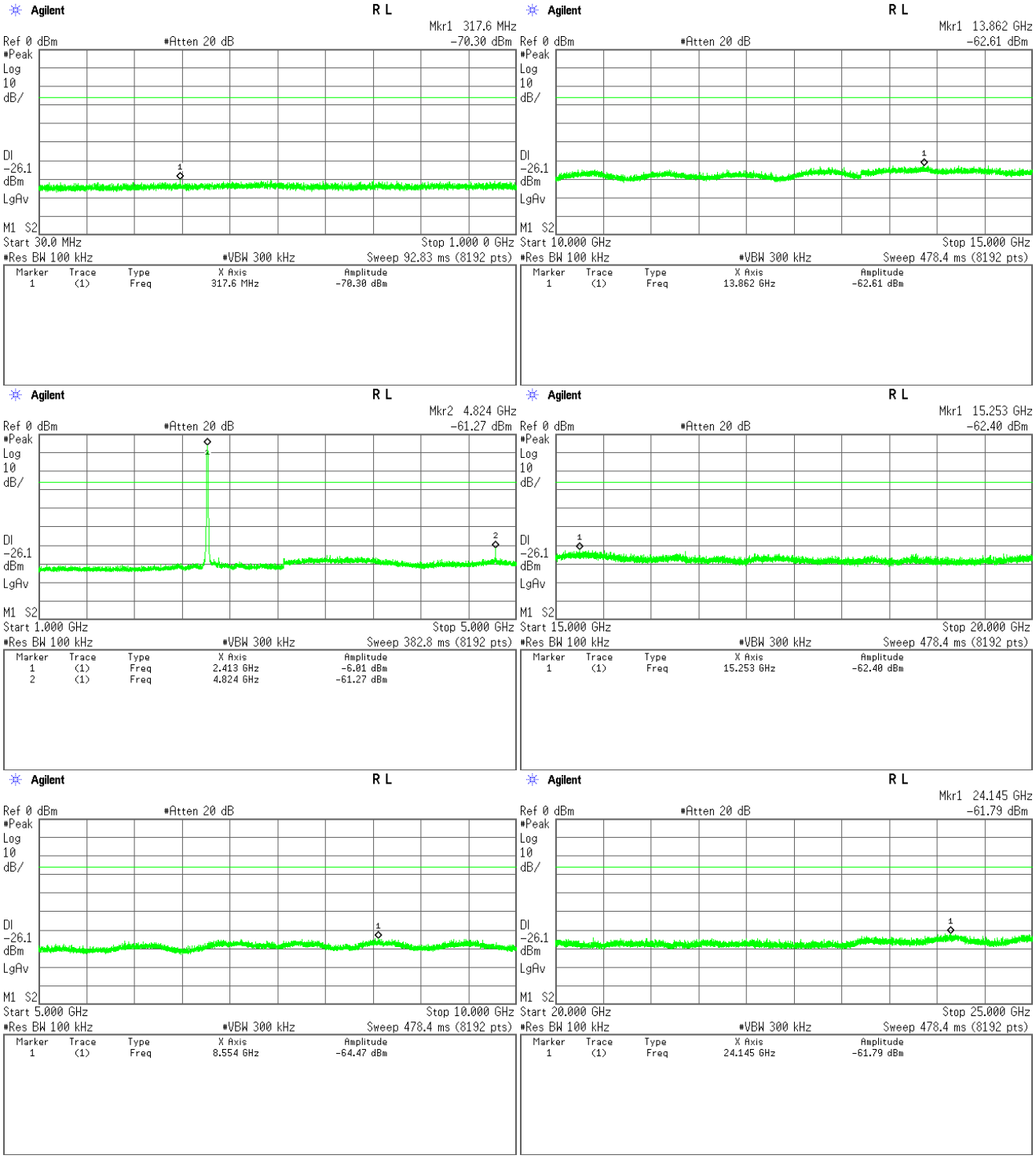
Frequency Range	30 MHz - 25 GHz	Band-Edge
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.7.4 Test Data

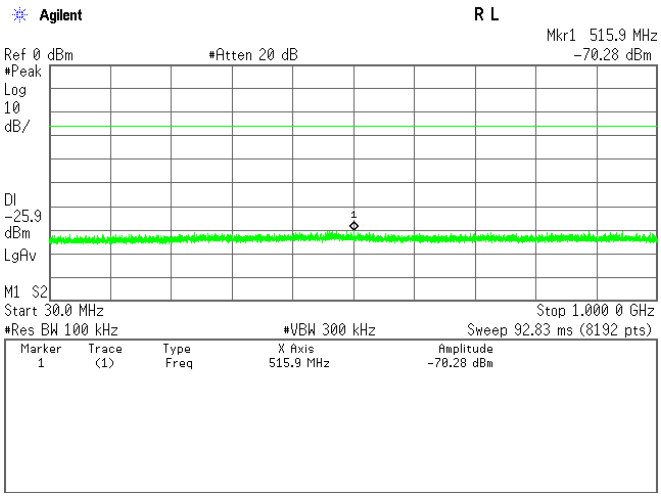
Test Date : March 8, 2014
Temp.:21°C, Humi:25%

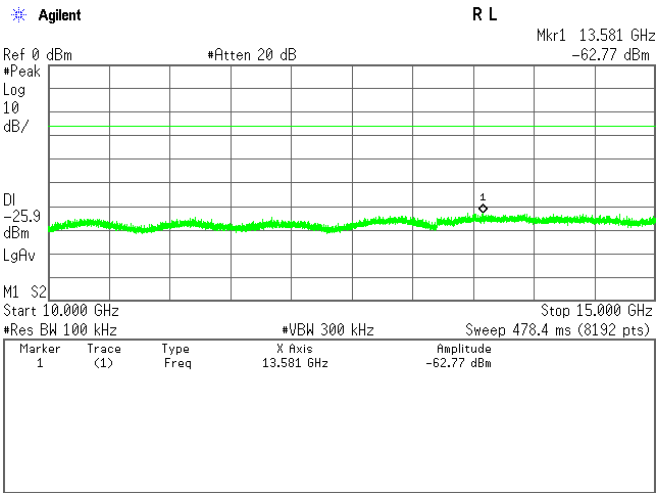
1) IEEE 802.11b

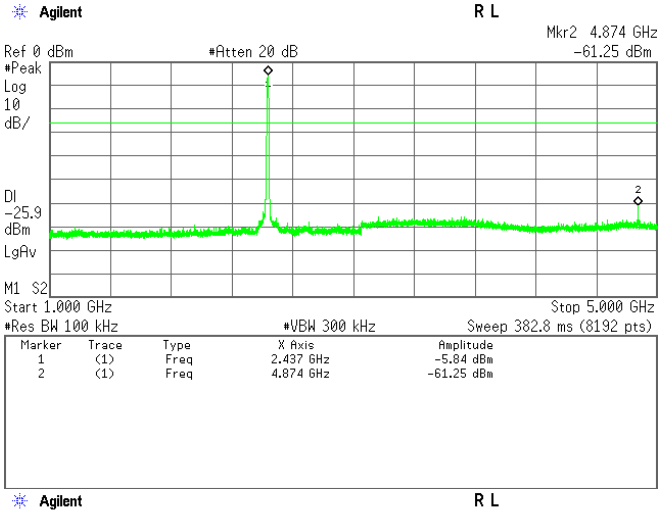
Low Channel

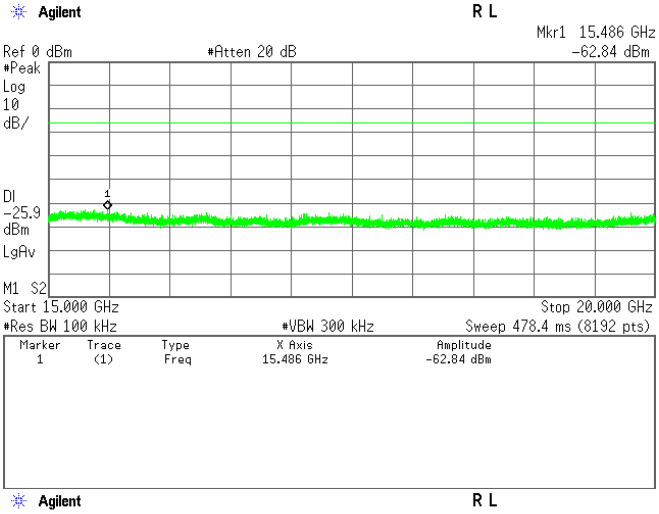


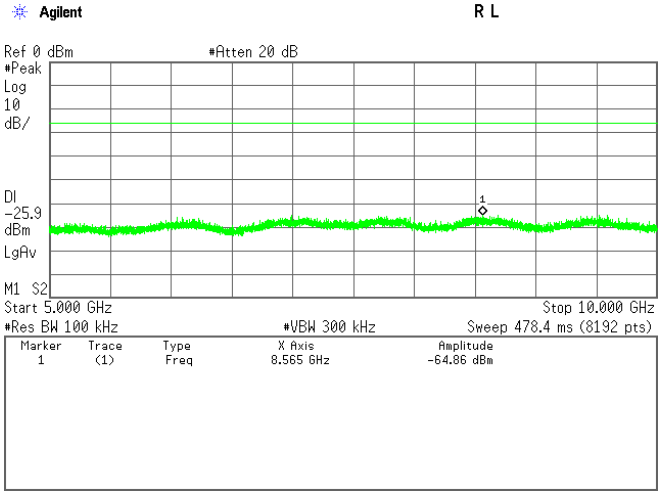
Middle Channel

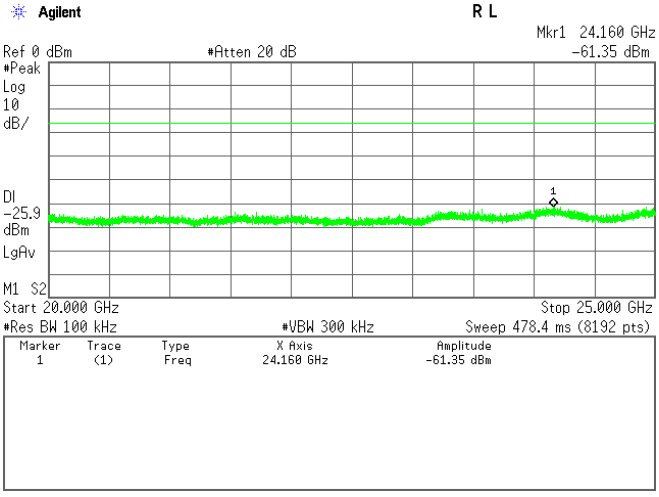




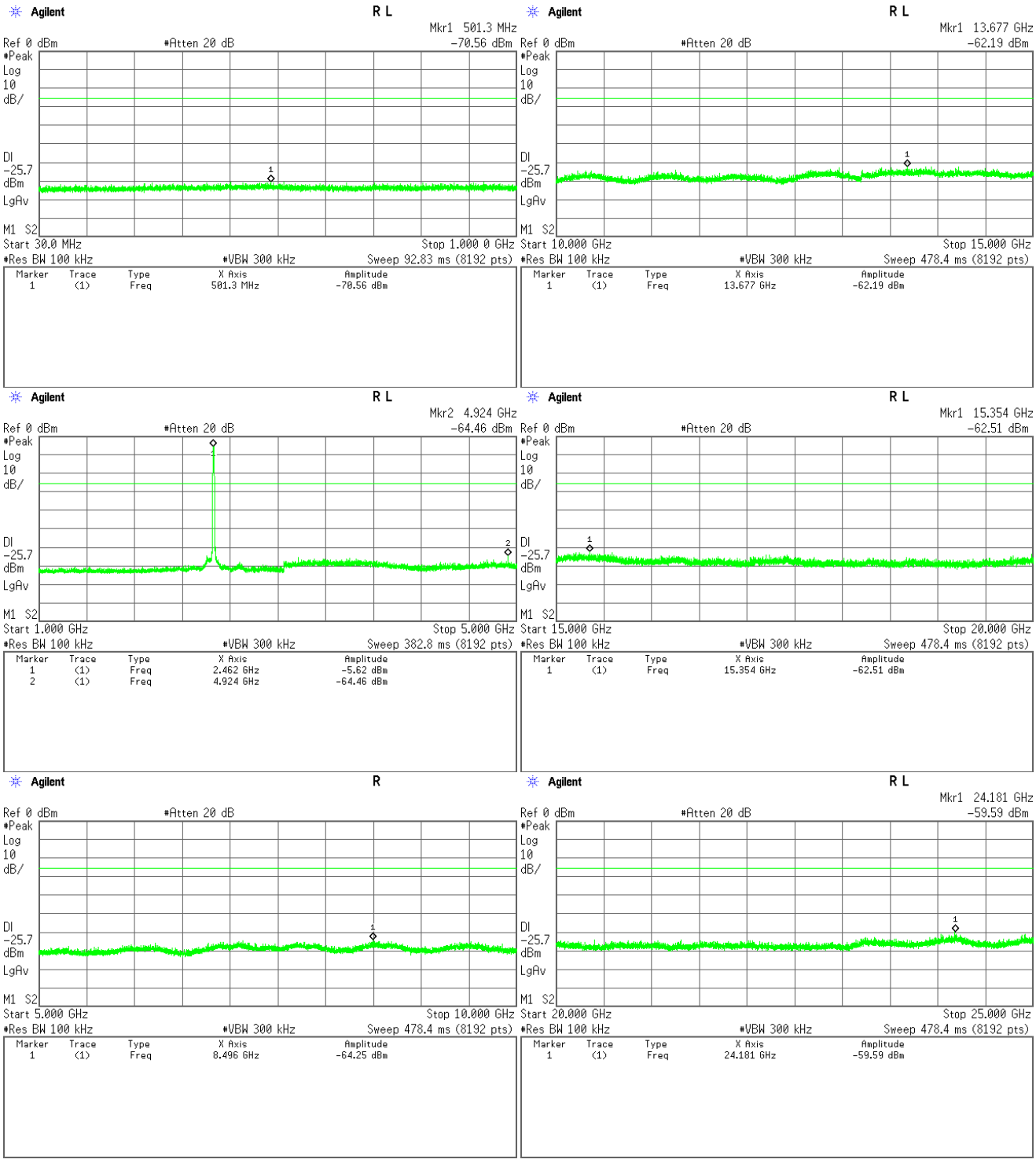






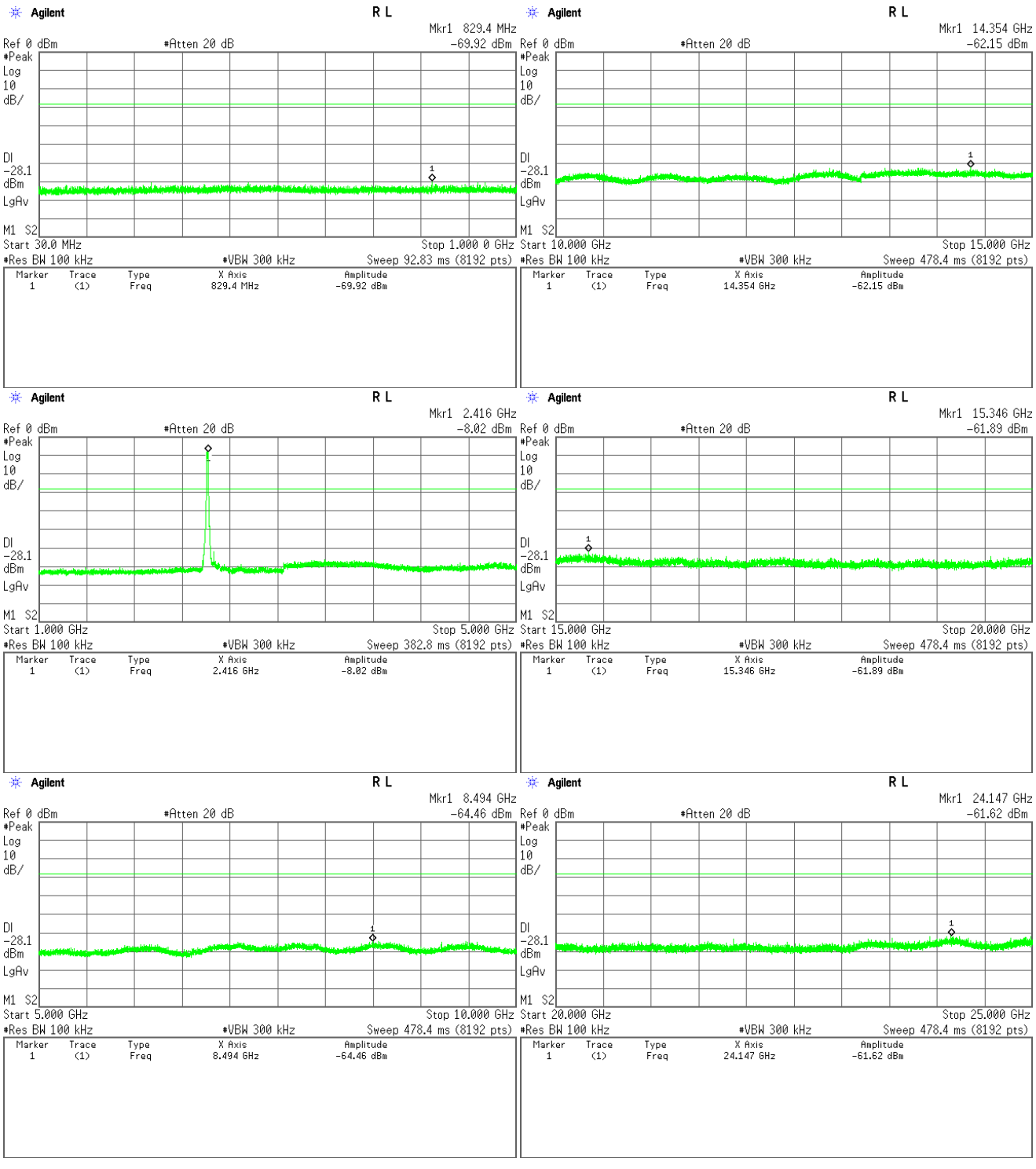


High Channel

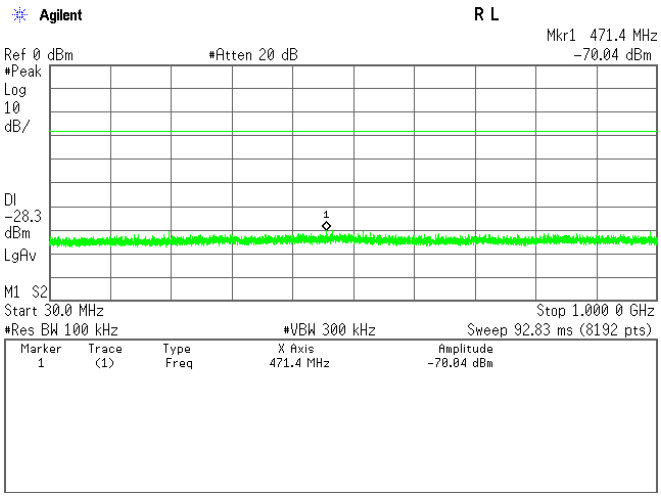


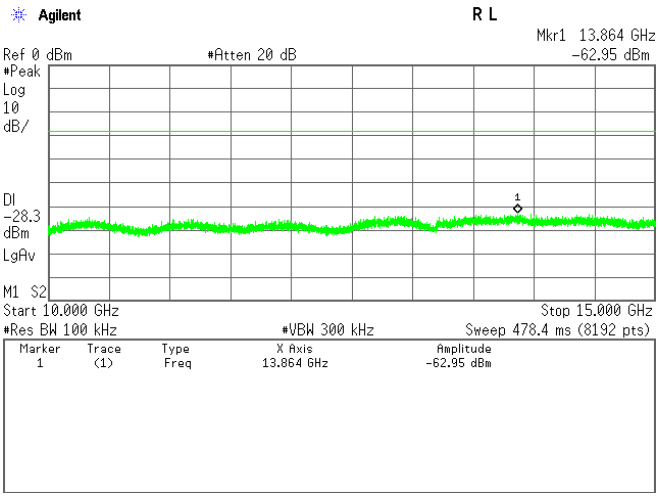
2) IEEE 802.11g

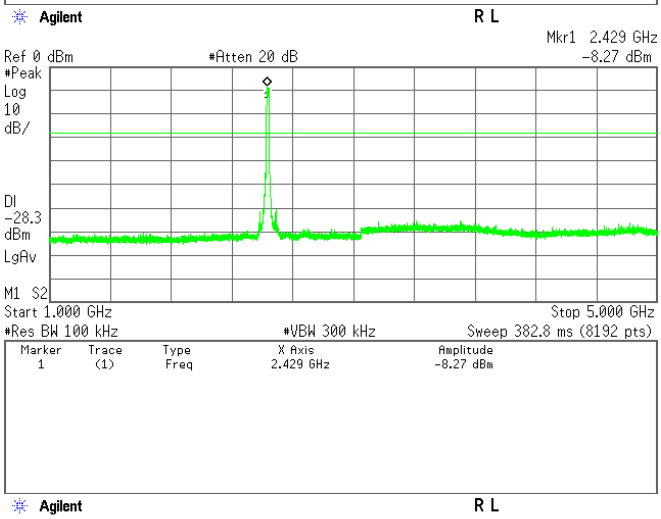
Low Channel

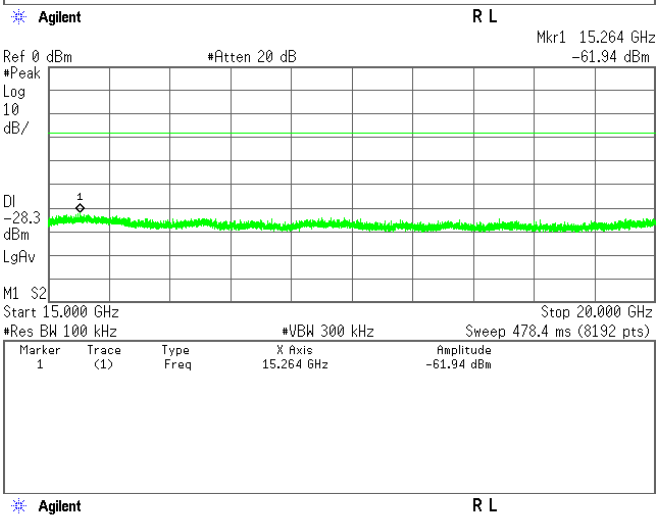


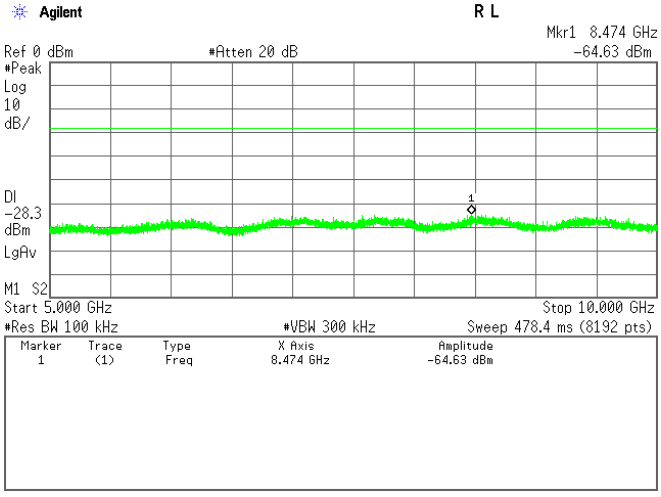
Middle channel

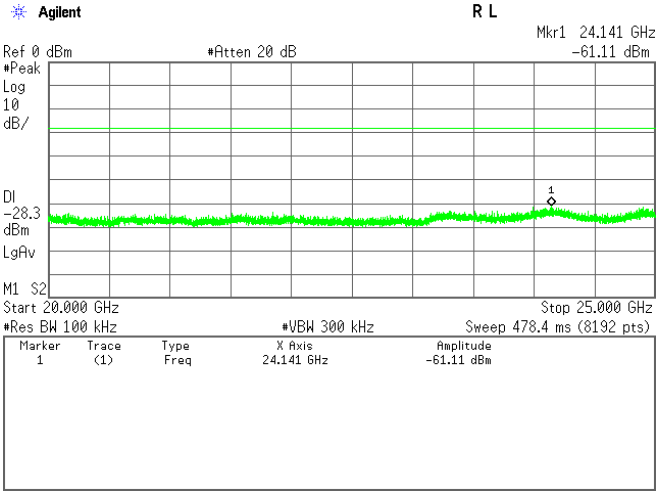




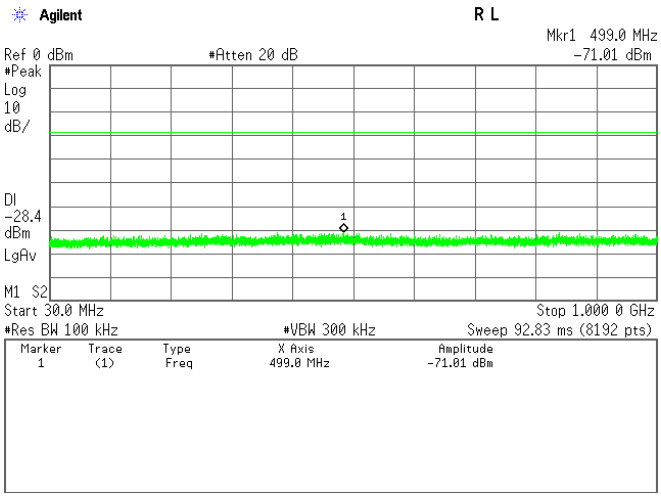


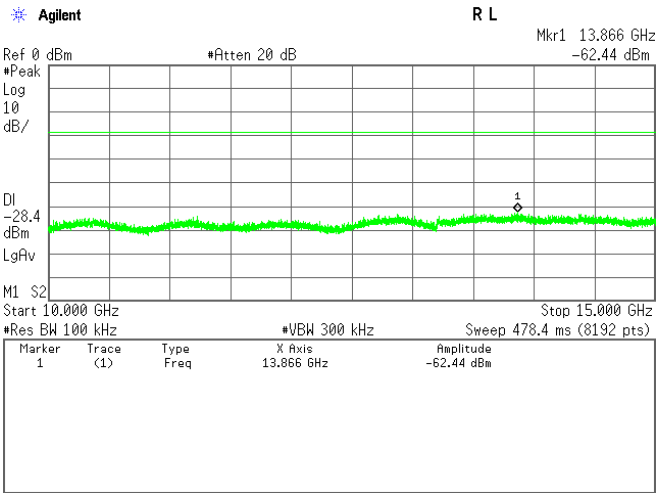


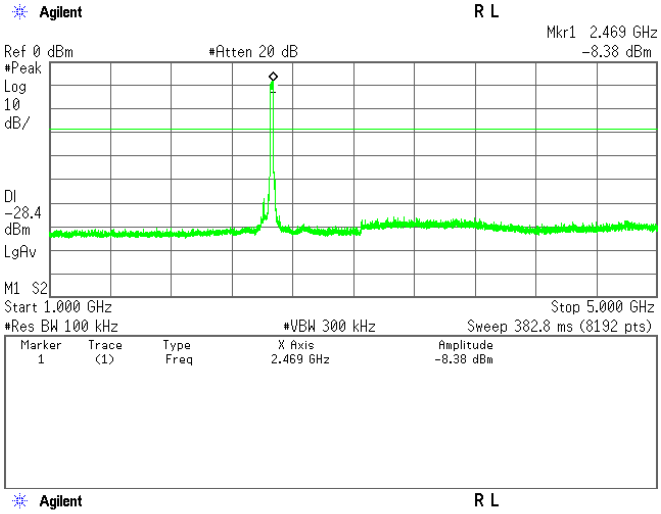


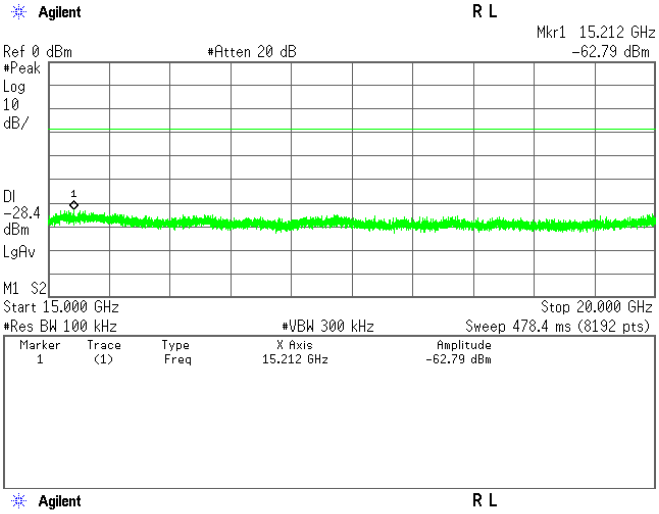


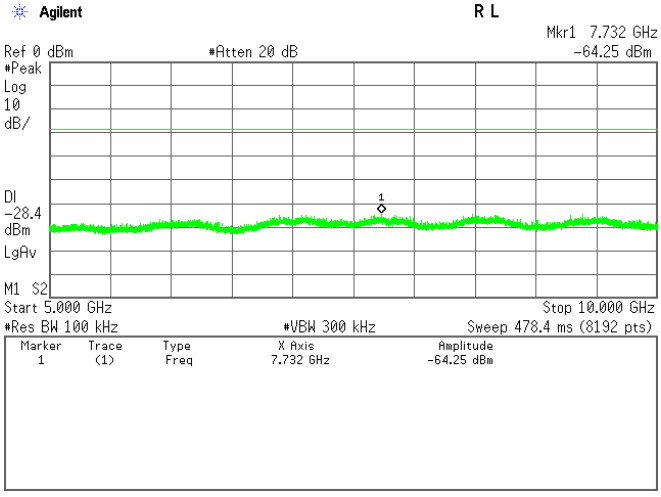
High Channel

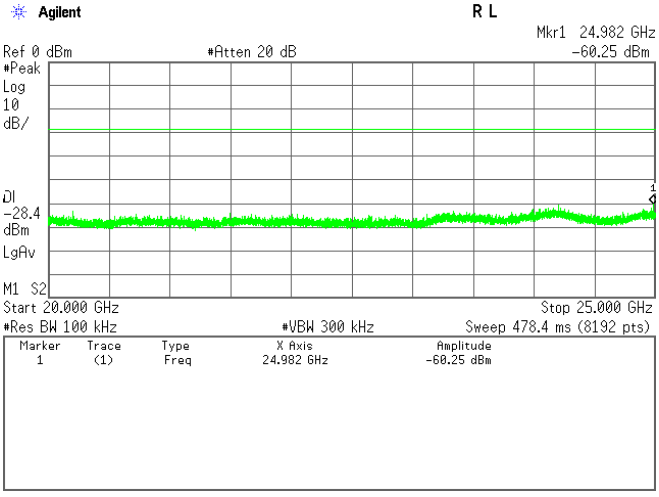






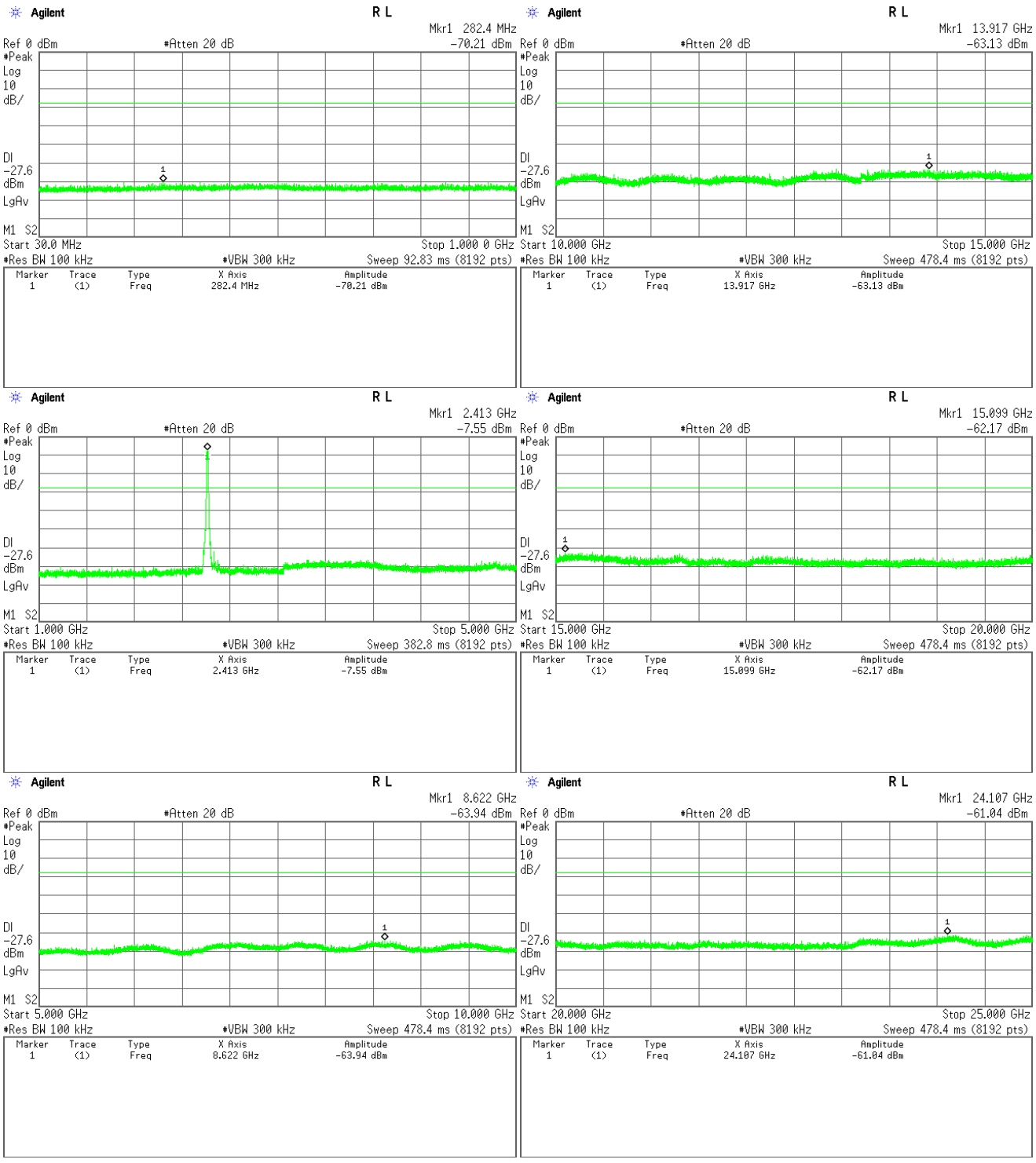




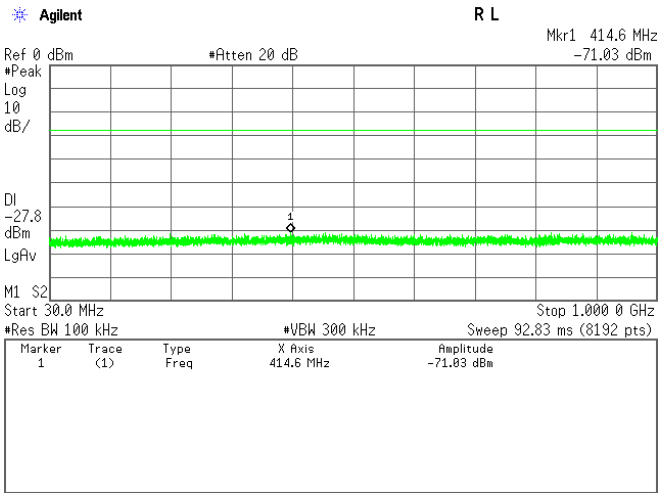


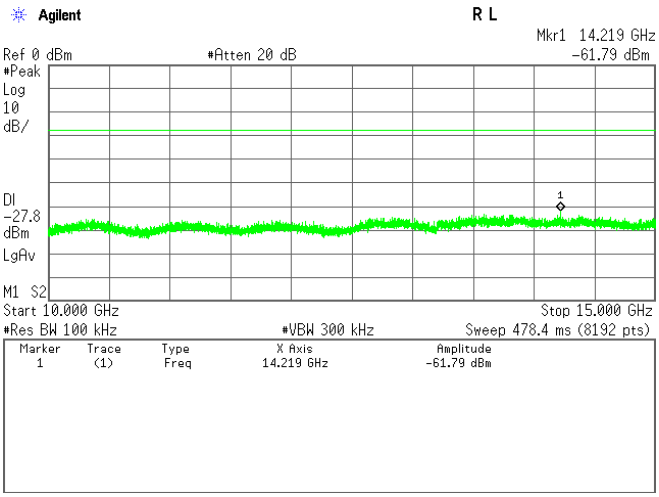
3) IEEE 802.11n

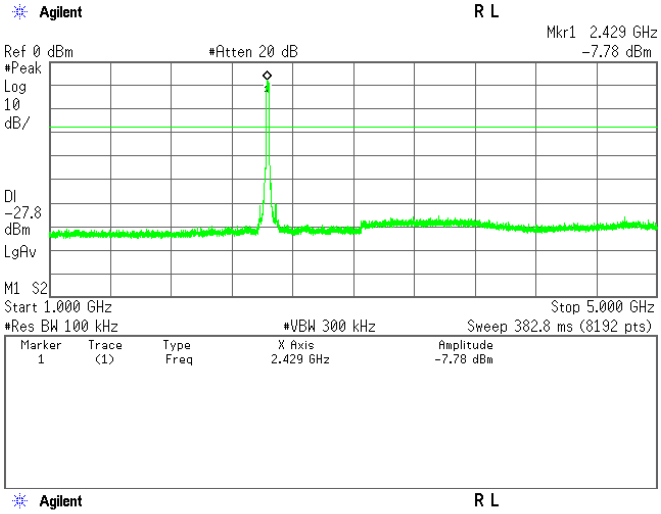
Low Channel

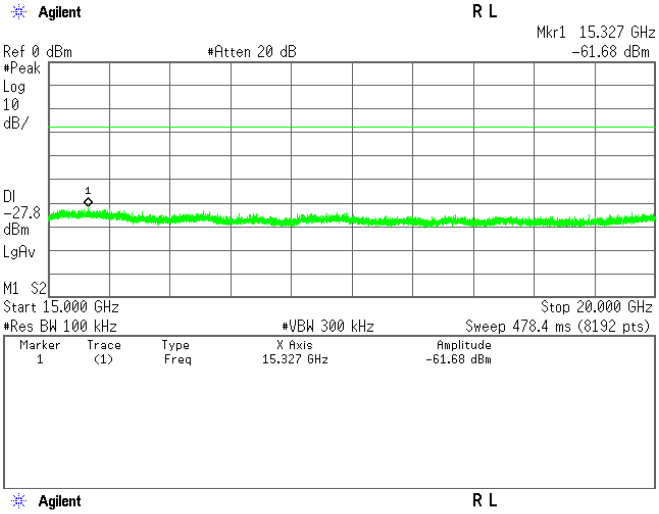


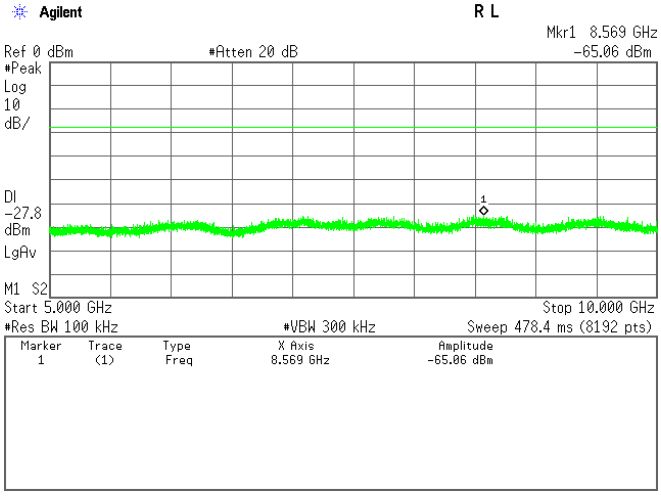
Middle Channel

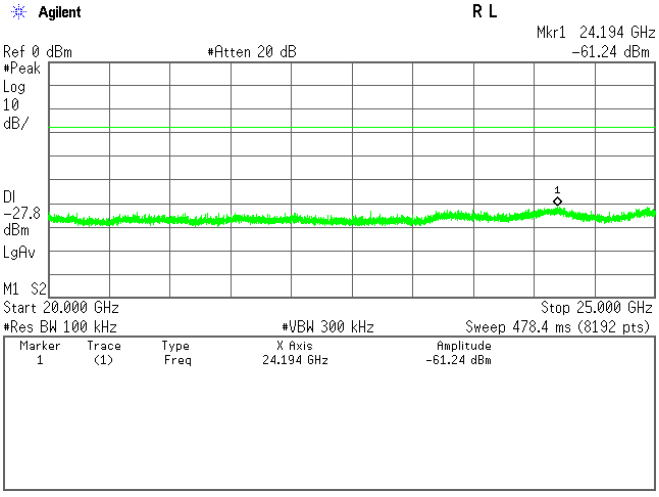




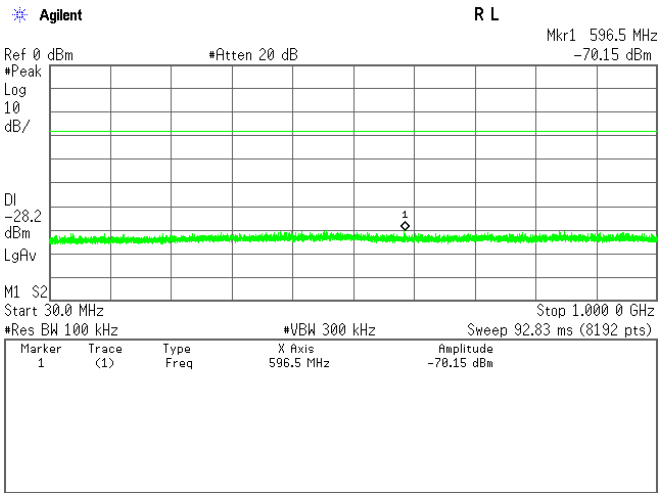


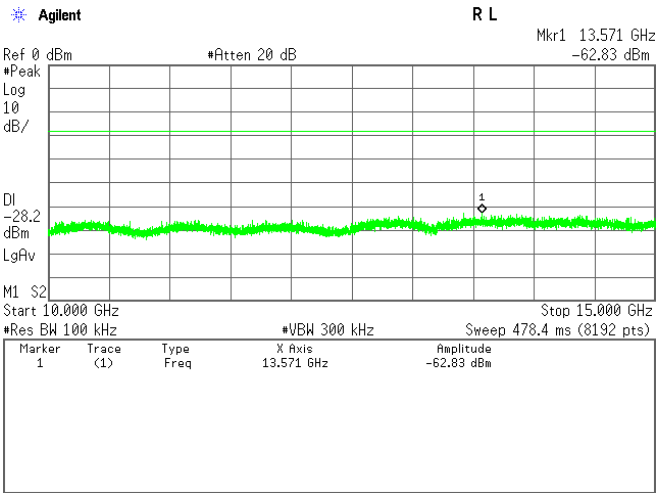


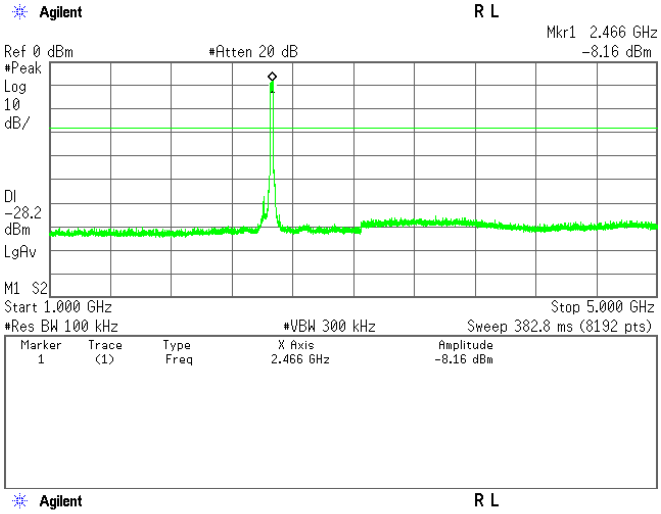


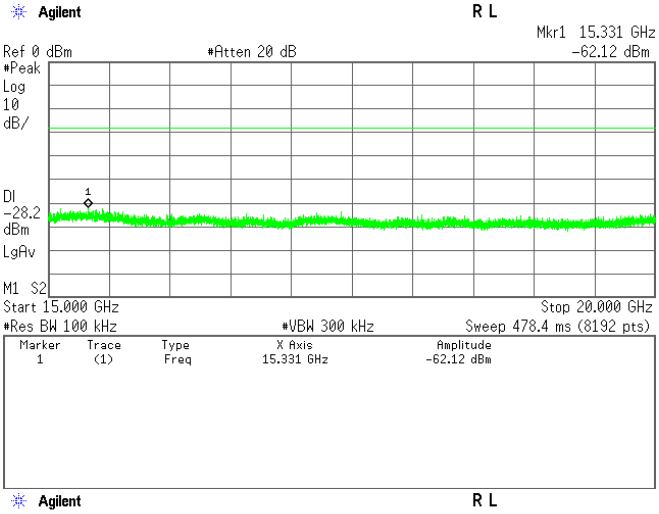


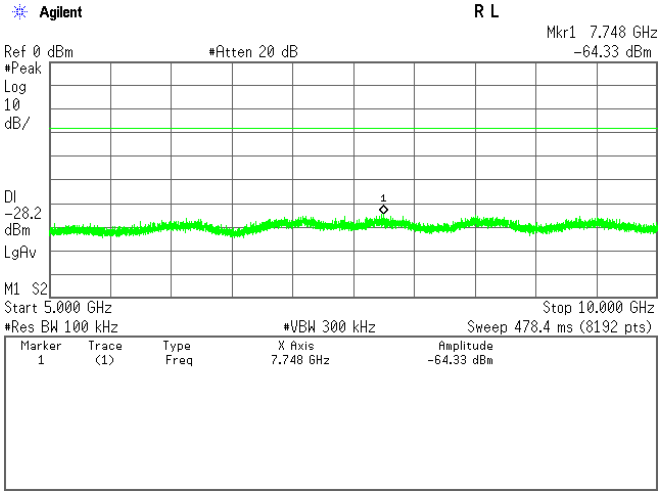
High Channel

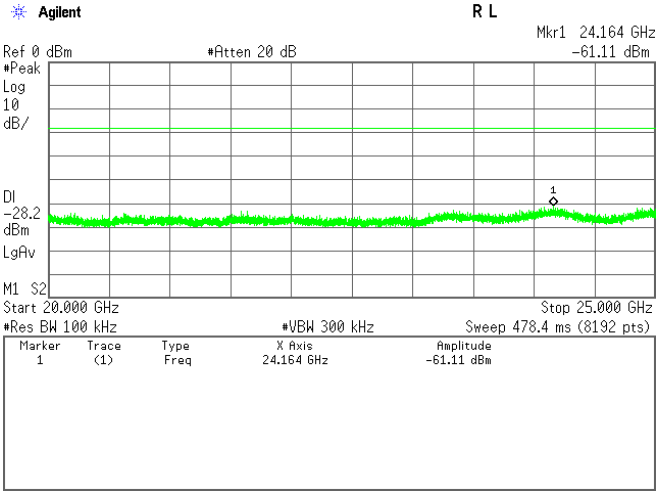






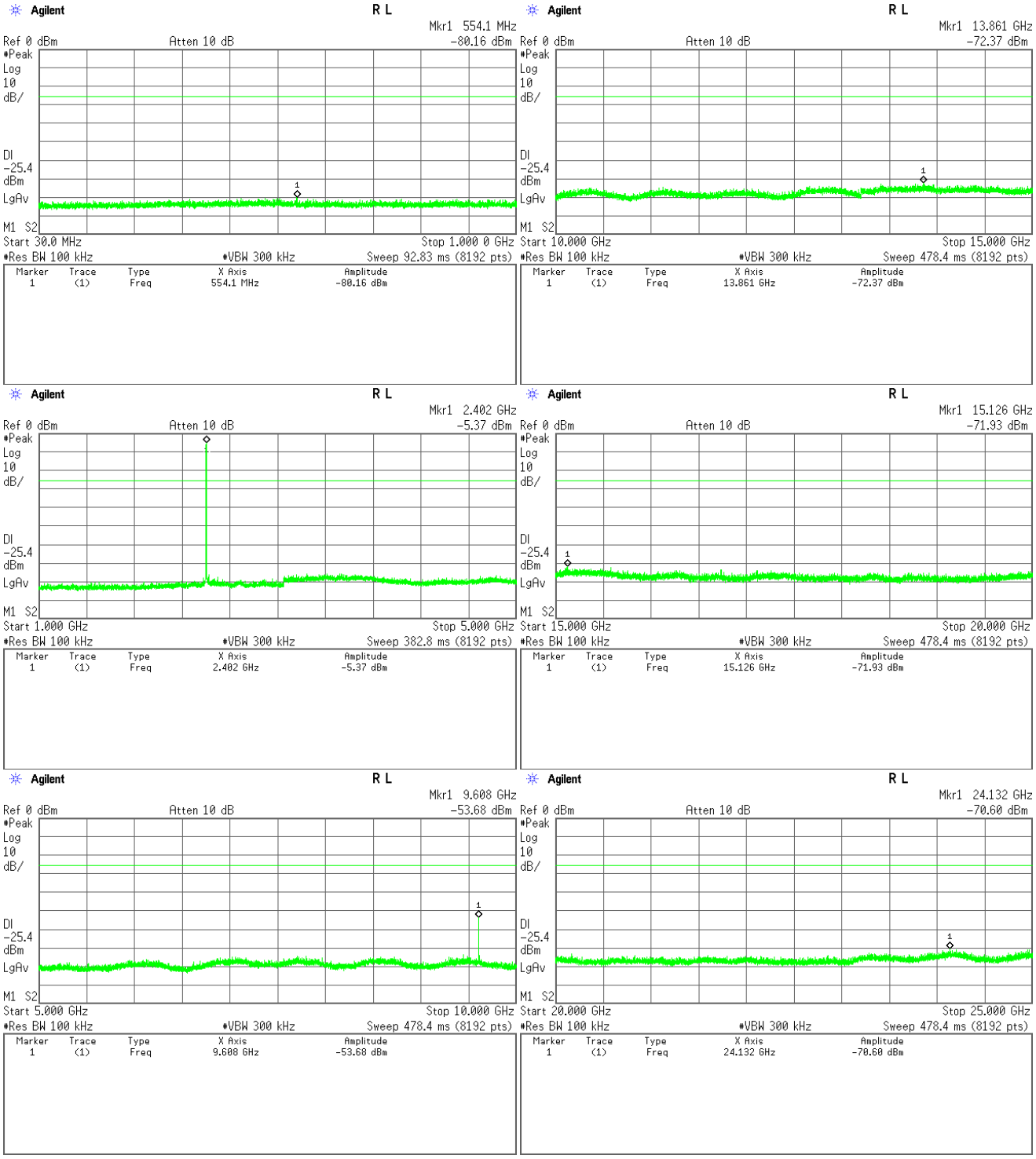




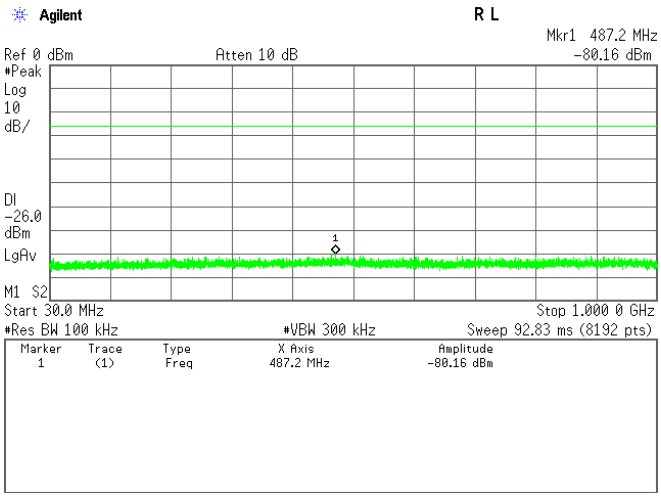


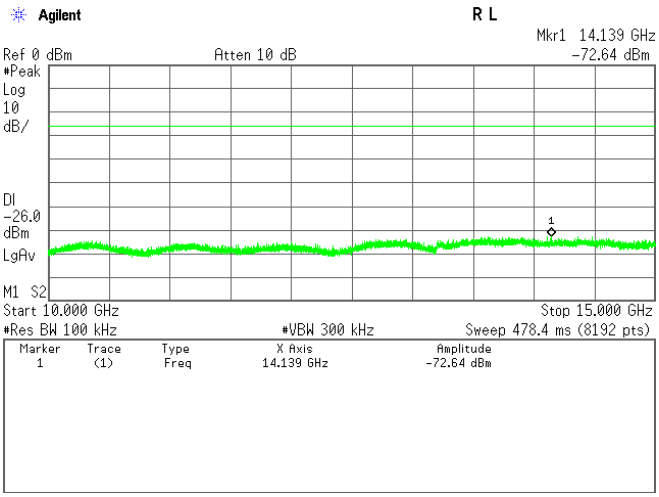
4) Bluetooth Low Energy

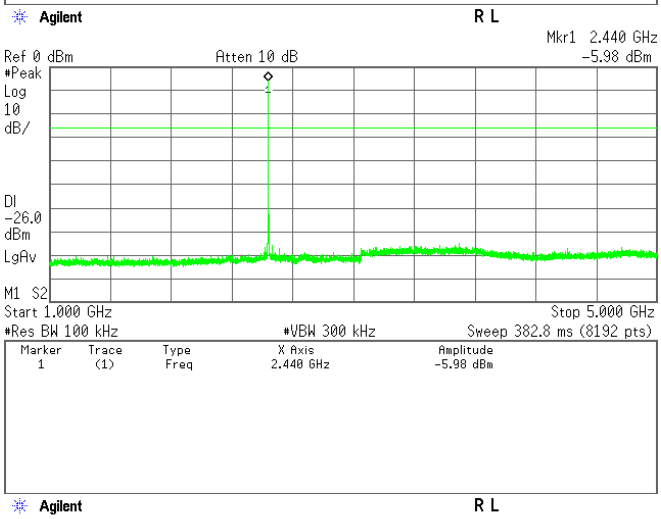
Low Channel

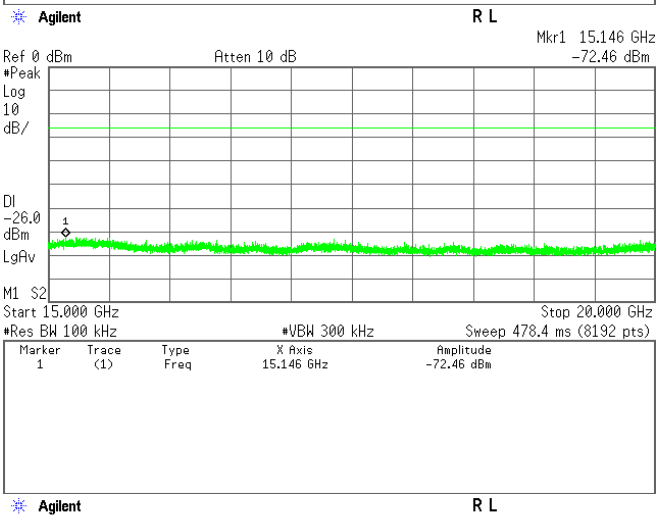


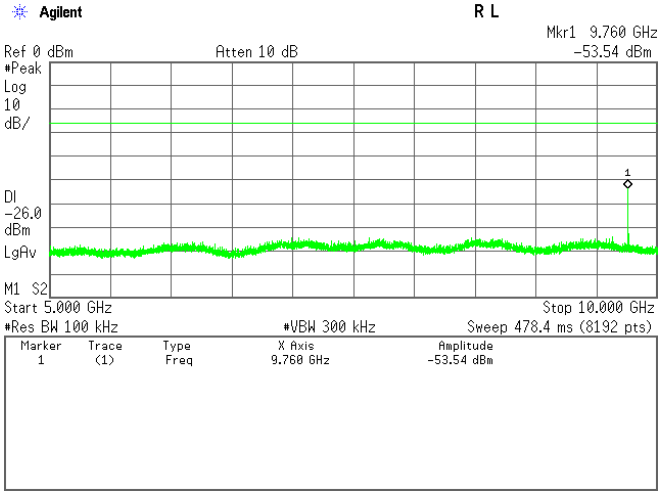
Middle Channel

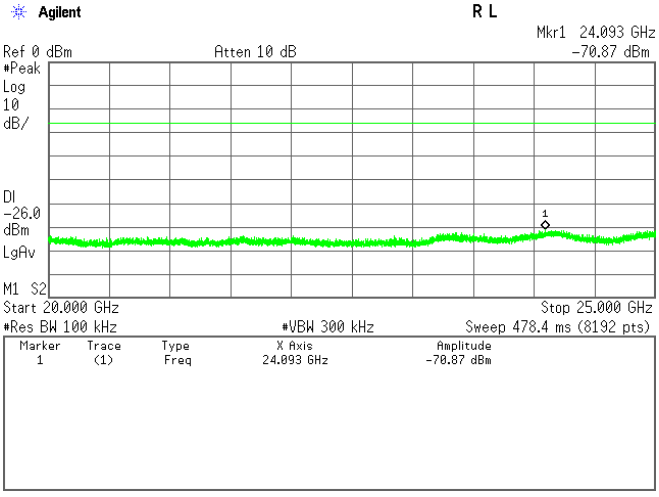




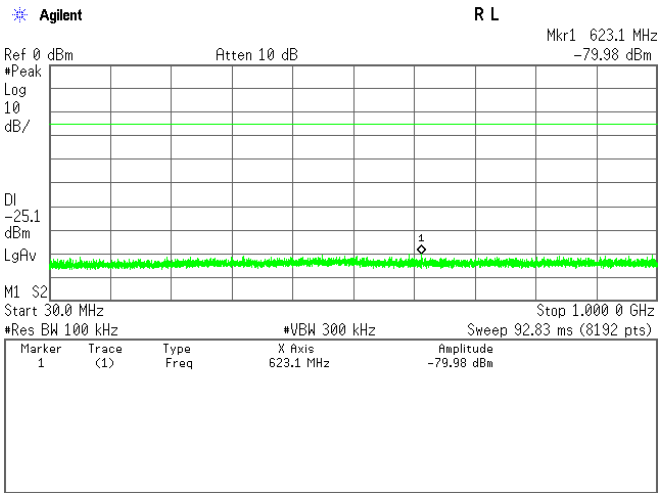


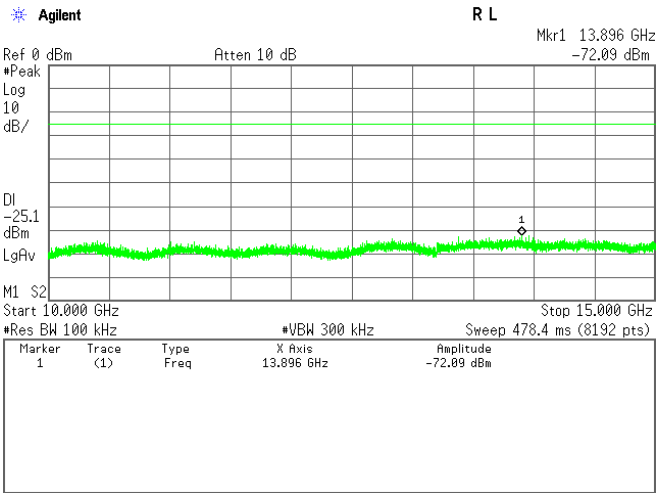


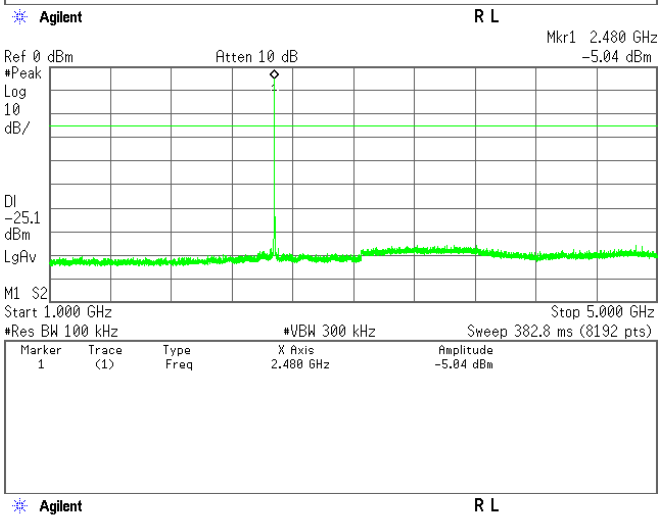


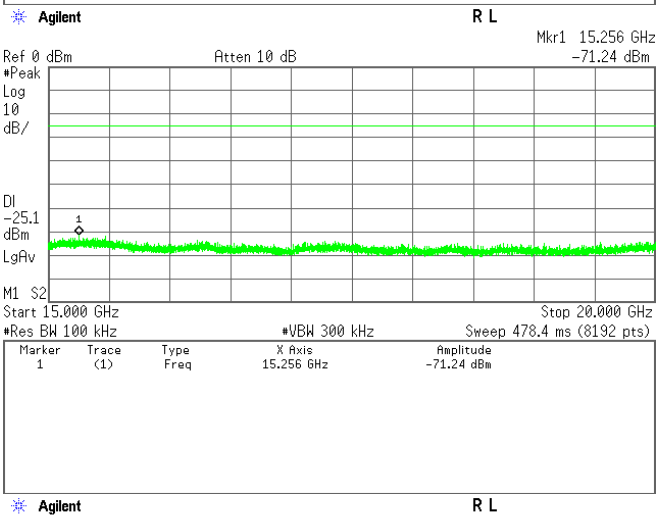


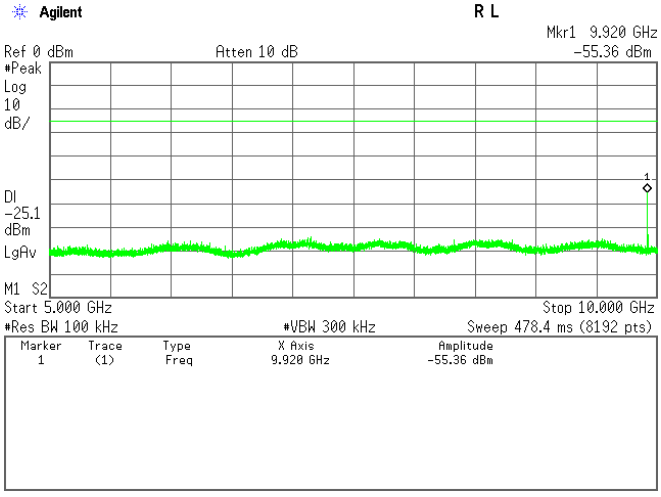
High Channel

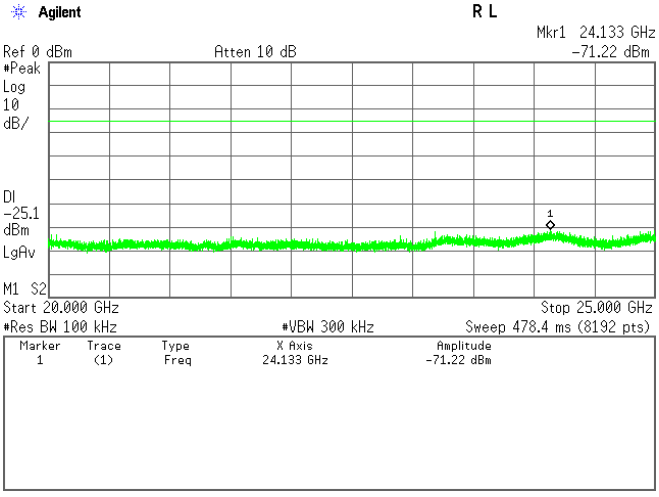








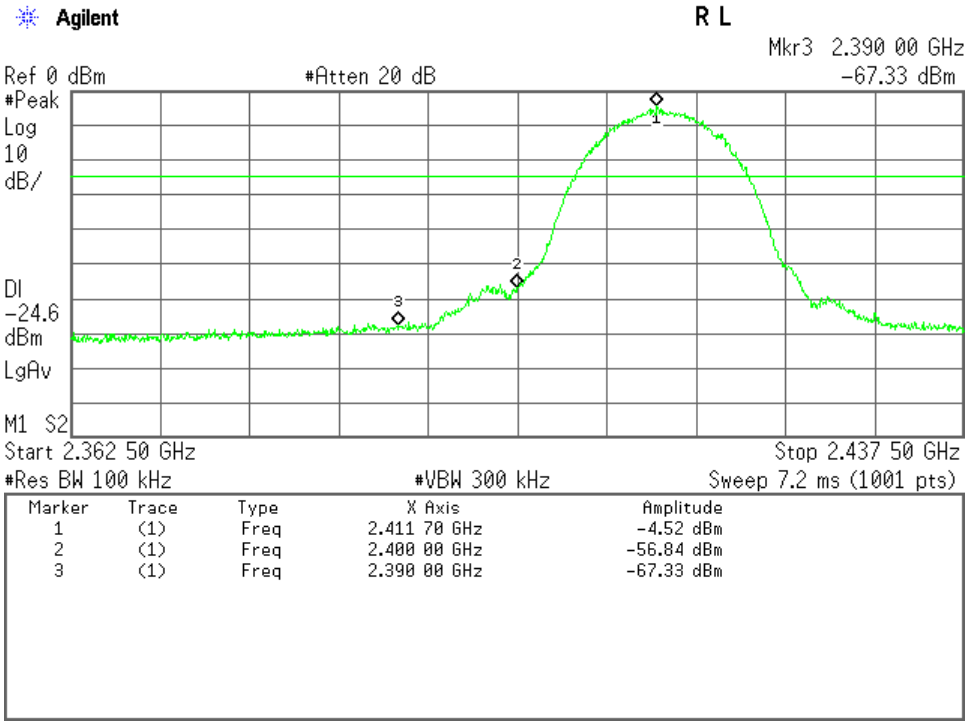




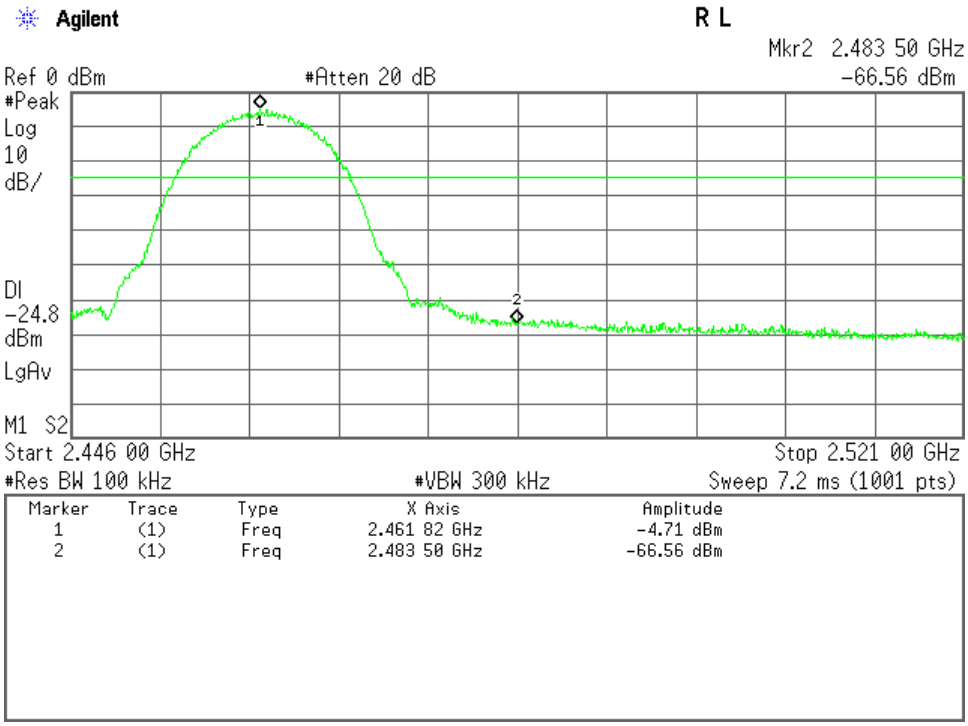
Band-Edge Emission

1) IEEE 802.11b

Low Channel

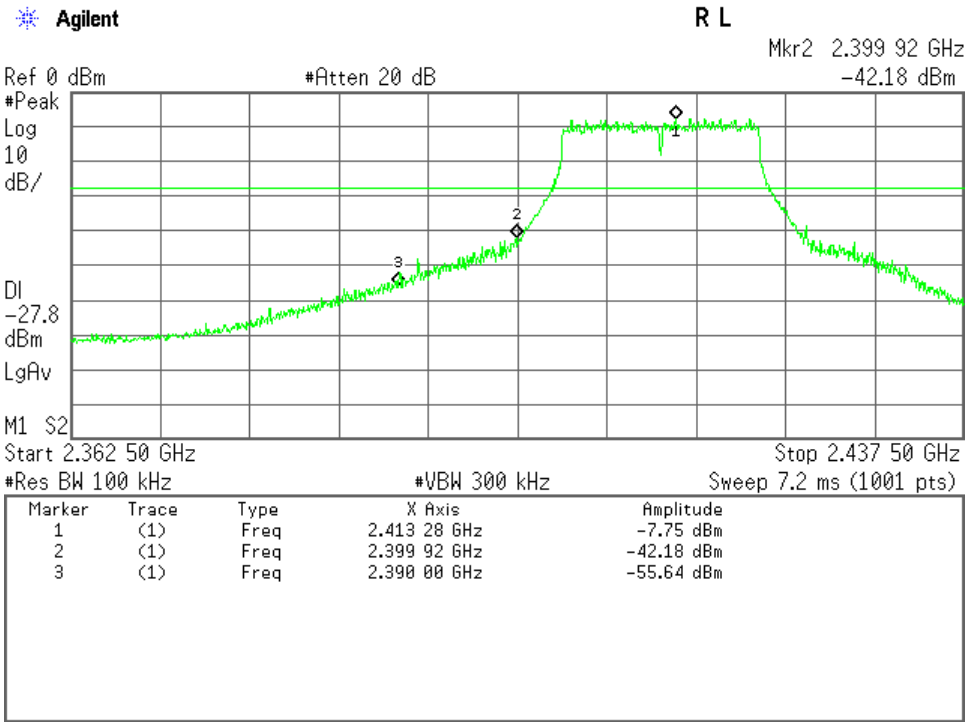


High Channel

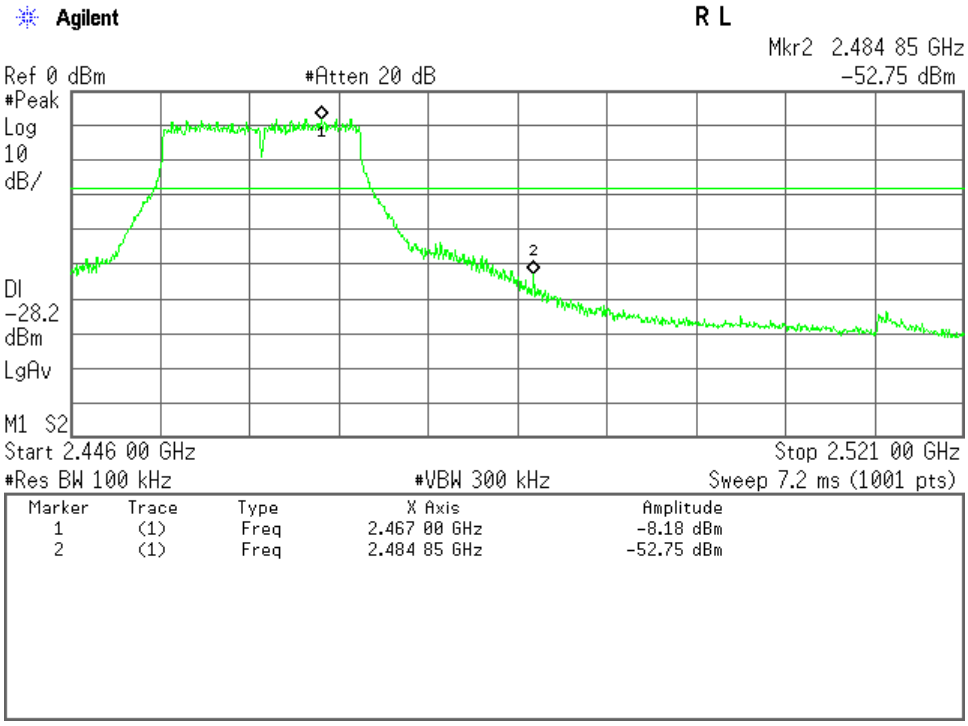


2) IEEE 802.11g

Low Channel

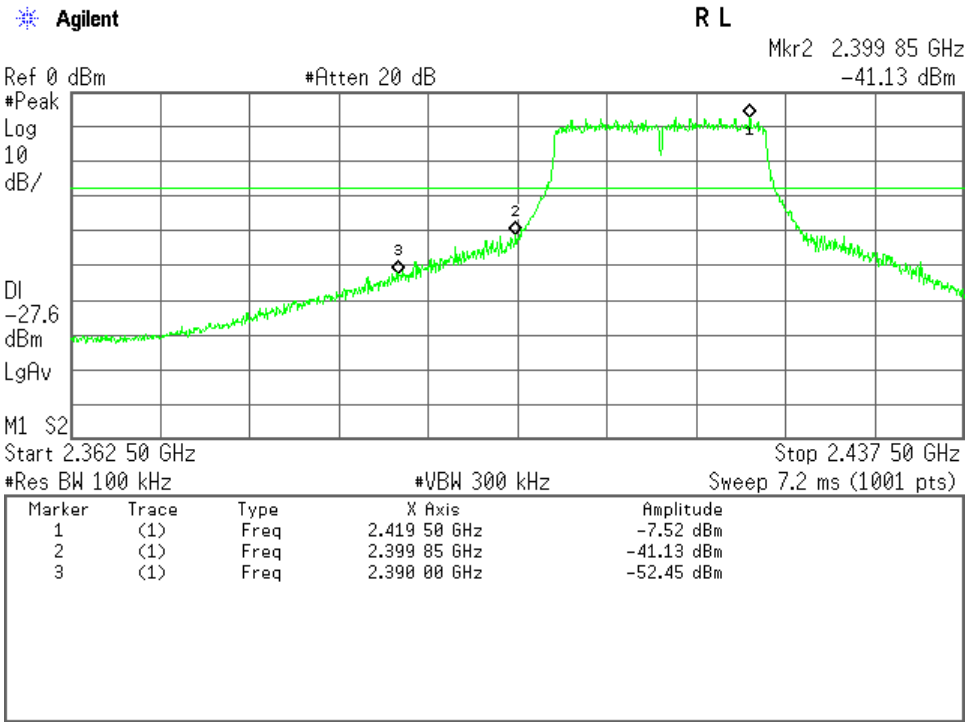


High Channel

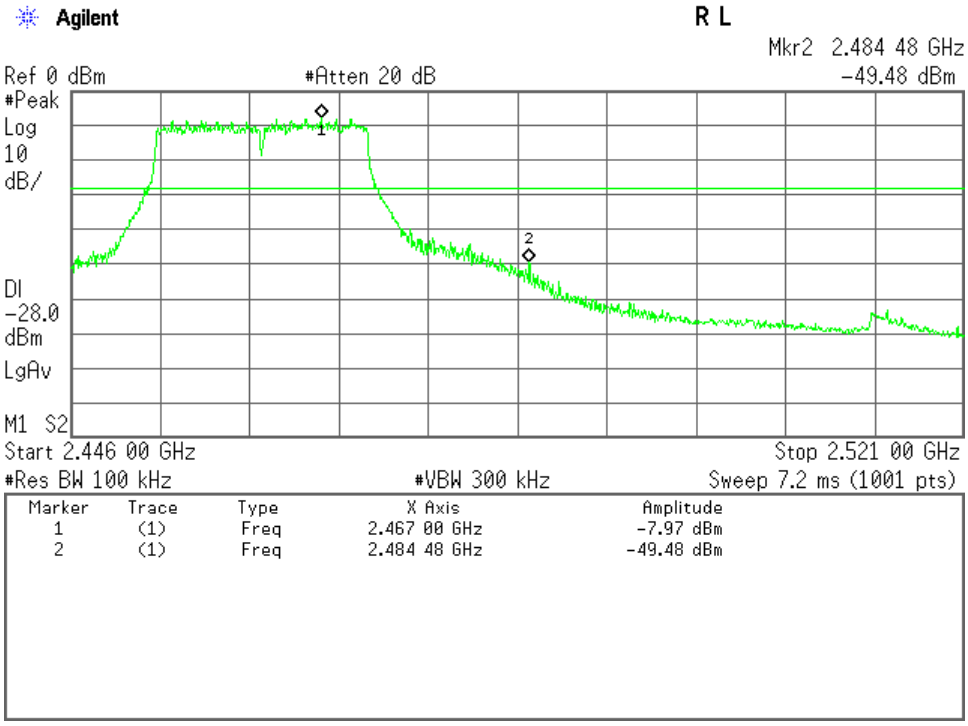


3) IEEE 802.11n

Low Channel

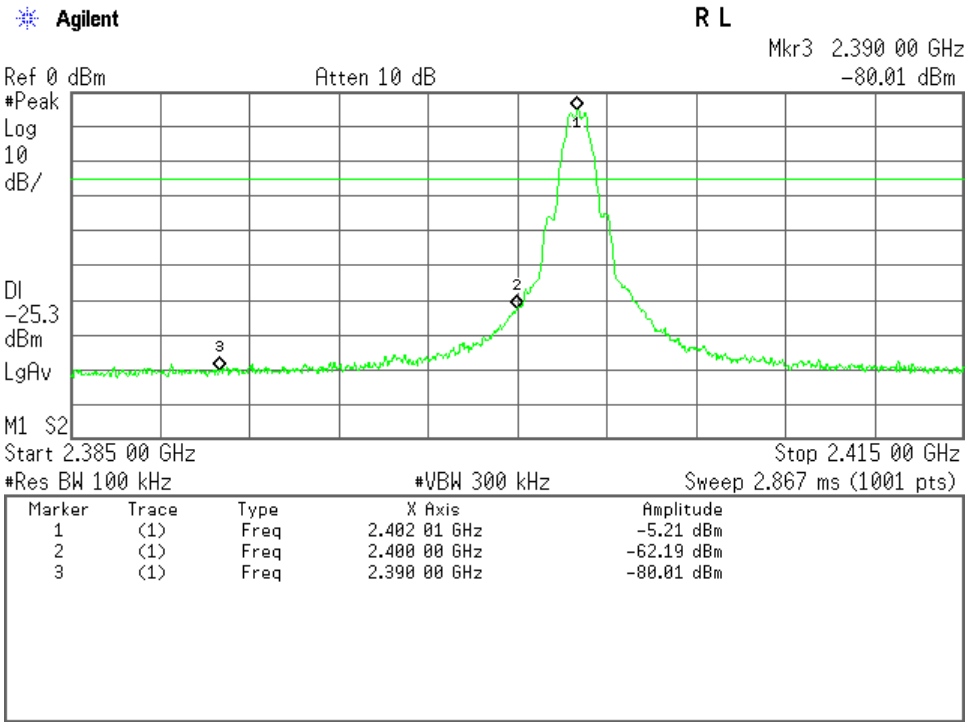


High Channel

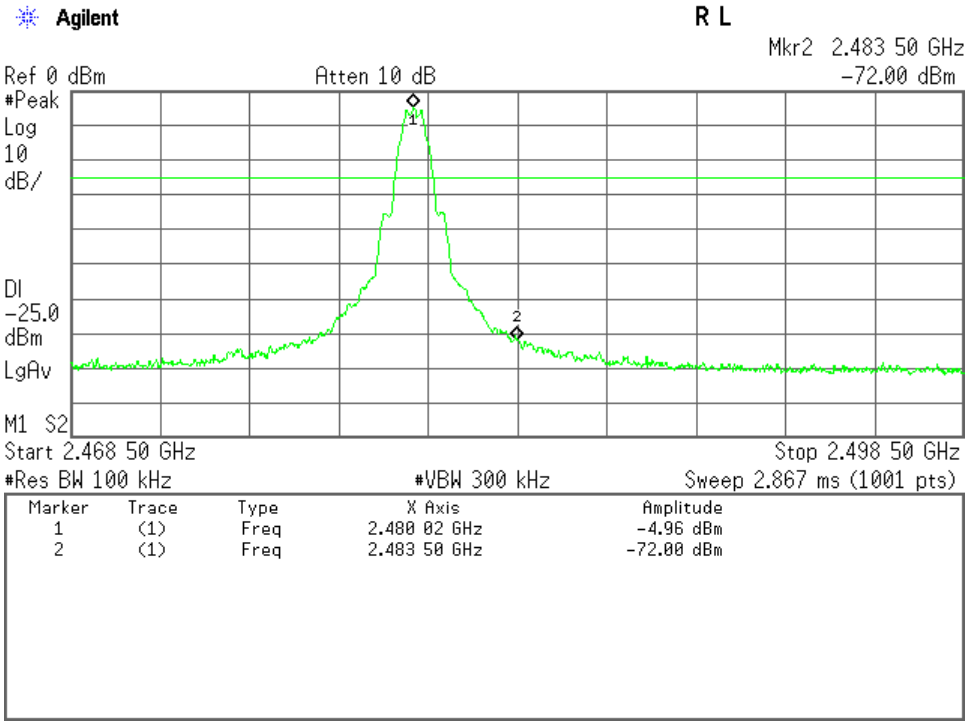


4) Bluetooth Low Energy

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) 9.7 dB at 2.83 MHz

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

Remarks : Bluetooth LE mode

7.8.2 Test Site and Instruments

7.8.2.1 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)

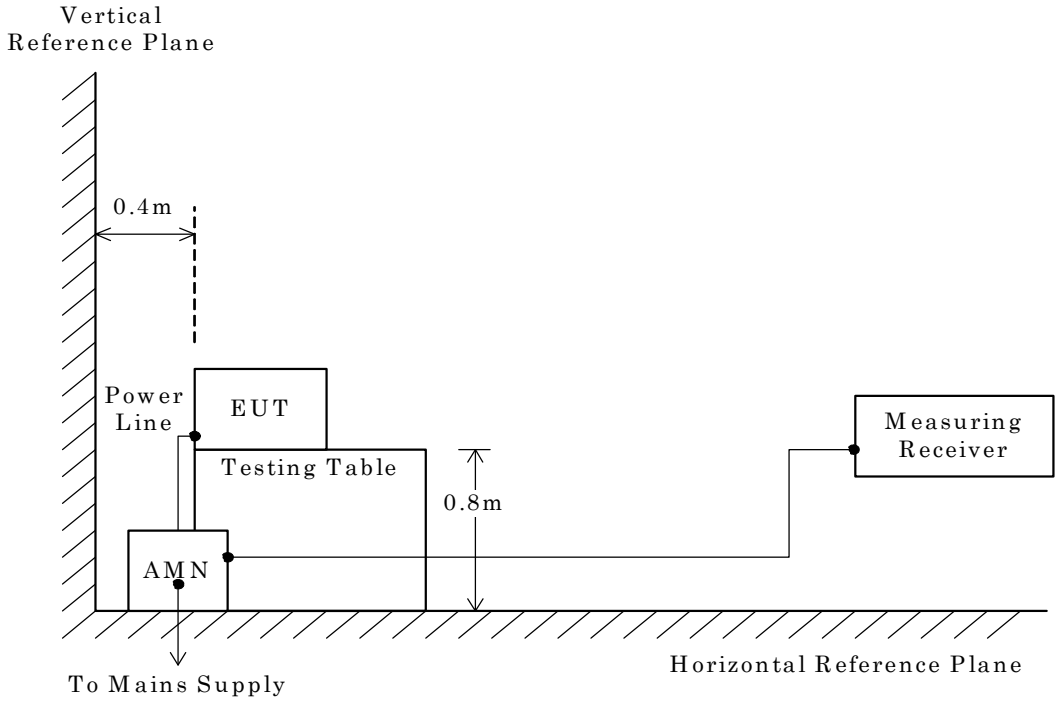
7.8.2.2 Test Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Test Receiver	ESU 26	Rohde & Schwarz	A-6	2013/4	1 Year
AMN (main)	KNW-407R	Kyoritsu	D-39	2013/9	1 Year
RF Cable	RG223/U	SUHNER	H-7	2013/11	1 Year

7.8.3 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 –



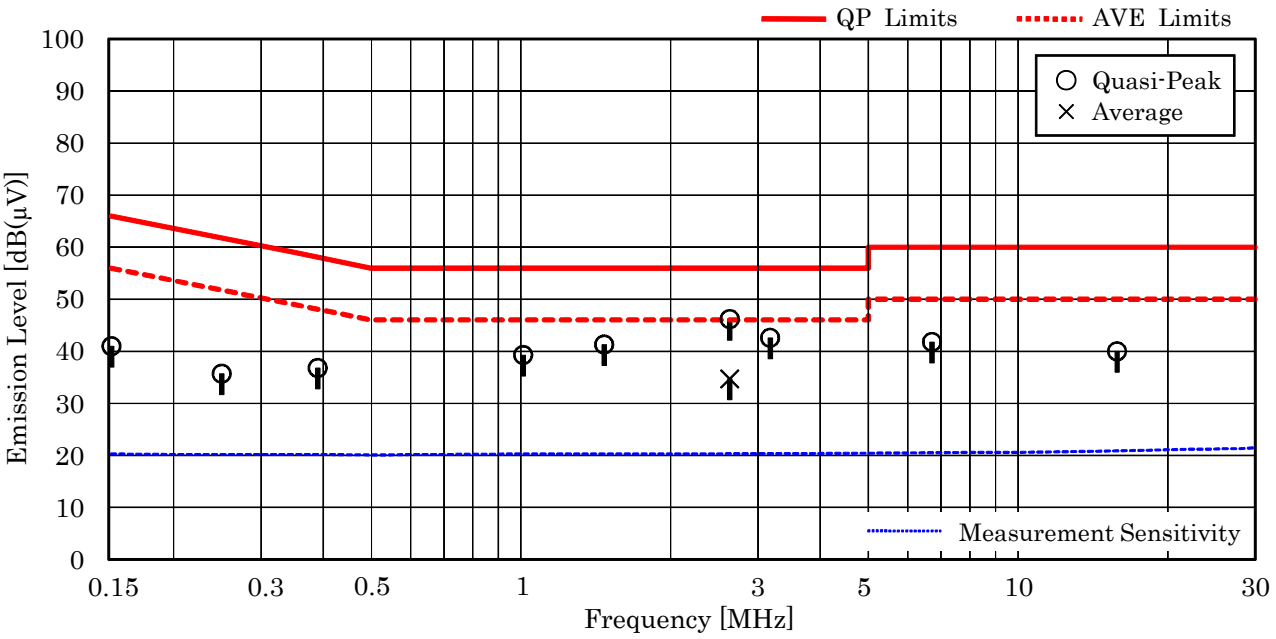
NOTE
AMN : Artificial Mains Network

7.8.4 Test Data

1) Mode of EUT : (WLAN) 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: March 14, 2014
Temp.: 20 °C, Humi.: 39 %

Frequency	Corr. Factor	Meter Readings [dB(μV)] VA		VB		Limits [dB(μV)]		Results [dB(μV)]		Margin	Remarks
[MHz]	[dB]	QP	AVE	QP	AVE	QP	AVE	QP	AVE	[dB]	
0.15	10.3	30.7	--	27.0	--	66.0	56.0	41.0	--	+25.0	-
0.25	10.2	24.1	--	25.5	--	61.8	51.8	35.7	--	+26.1	-
0.39	10.2	20.9	--	26.6	--	58.1	48.1	36.8	--	+21.3	-
1.01	10.3	29.0	--	24.5	--	56.0	46.0	39.3	--	+16.7	-
1.47	10.3	31.0	--	24.7	--	56.0	46.0	41.3	--	+14.7	-
2.63	10.3	35.9	24.4	33.5	18.9	56.0	46.0	46.2	34.7	+ 9.8	-
3.17	10.3	32.3	--	27.9	--	56.0	46.0	42.6	--	+13.4	-
6.71	10.5	28.3	--	31.3	--	60.0	50.0	41.8	--	+18.2	-
15.81	10.8	29.1	--	29.2	--	60.0	50.0	40.0	--	+20.0	-

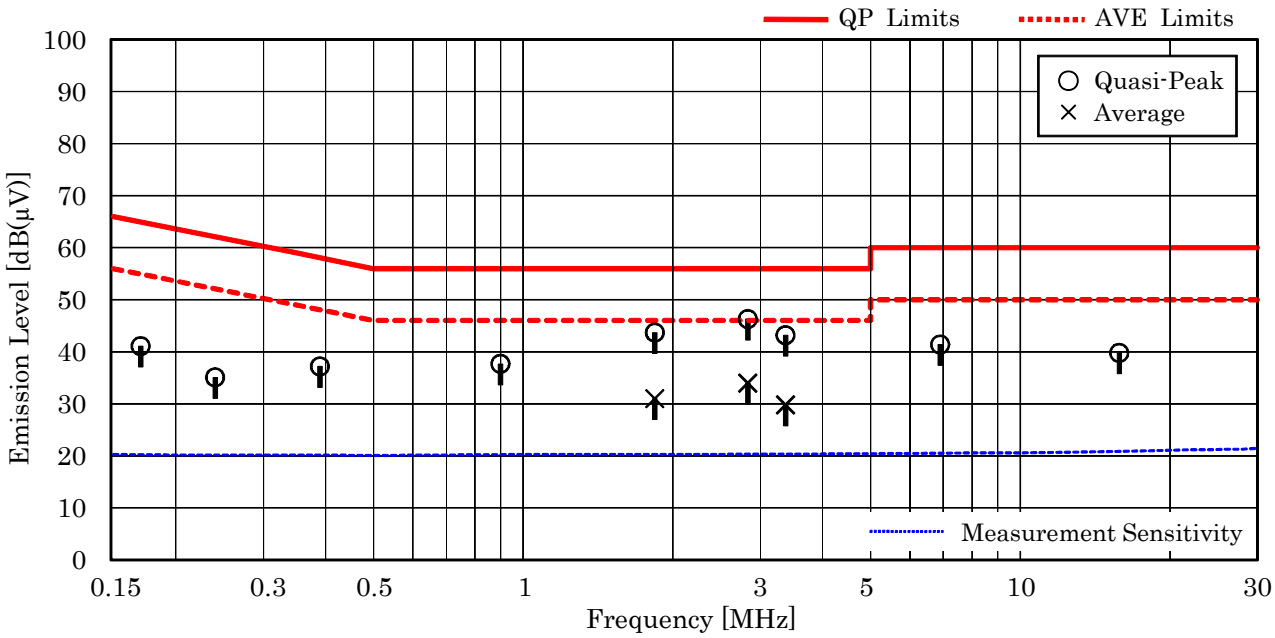


NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 2.63 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading = 10.3 + 35.9 = 46.2 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

2) Mode of EUT : Bluetooth Low Energy

Test Date: March 14, 2014
Temp.: 20 °C, Humi.: 39 %

Frequency	Corr. Factor	Meter Readings [dB(μV)] VA		VB		Limits [dB(μV)]		Results [dB(μV)]		Margin	Remarks
[MHz]	[dB]	QP	AVE	QP	AVE	QP	AVE	QP	AVE	[dB]	
0.17	10.3	30.8	--	29.4	--	65.0	55.0	41.1	--	+23.9	-
0.24	10.2	22.9	--	24.9	--	62.1	52.1	35.1	--	+27.0	-
0.39	10.2	22.5	--	27.0	--	58.1	48.1	37.2	--	+20.9	-
0.90	10.3	27.4	--	25.3	--	56.0	46.0	37.7	--	+18.3	-
1.84	10.3	33.4	20.7	27.0	--	56.0	46.0	43.7	31.0	+12.3	-
2.83	10.3	36.0	23.7	32.0	--	56.0	46.0	46.3	34.0	+ 9.7	-
3.37	10.3	32.9	19.5	29.7	--	56.0	46.0	43.2	29.8	+12.8	-
6.90	10.5	27.6	--	30.9	--	60.0	50.0	41.4	--	+18.6	-
15.81	10.8	27.5	--	29.0	--	60.0	50.0	39.8	--	+20.2	-



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 2.83 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading = 10.3 + 36.0 = 46.3 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) 5.2 dB at 2483.5 MHz

Uncertainty of Measurement Results

9 kHz – 30 MHz	+/-1.9	dB(2σ)
30 MHz – 300 MHz	+/-4.3	dB(2σ)
300 MHz – 1000 MHz	+/-5.4	dB(2σ)
1 GHz – 6 GHz	+/-4.6	dB(2σ)
6 GHz – 18 GHz	+/-5.2	dB(2σ)
18 GHz – 40 GHz	+/-5.4	dB(2σ)

Remarks : IEEE802.11n mode.

7.9.2 Test Site and Instruments

7.9.2.1 Test Site

KITA-KANSAI Testing Center SAITO EMC Branch

☐ - Anechoic chamber A1 ☒ - Anechoic chamber A2

7.9.2.2 Test Instruments

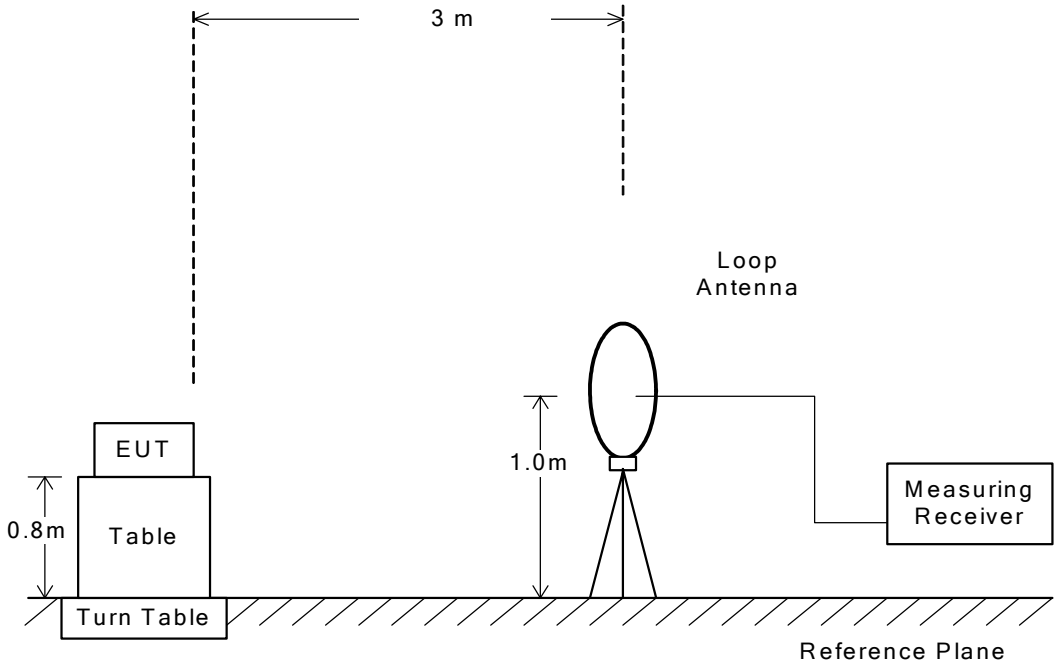
Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Test Receiver	ESU 26	Rohde & Schwarz	A-6	2013/4	1 Year
Loop Antenna	HFH2-Z2	Rohde & Schwarz	C-2	2013/8	1 Year
RF Cable	RG213/U	SUHNER	H-28	2013/8	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	C-30	2013/5	1 Year
Log-periodic Antenna	UHALP9108-A1	Schwarzbeck	C-31	2013/5	1 Year
RF Cable	S 10162 B-11 etc.	SUHNER	H-4	2013/4	1 Year
Site Attenuation	--	----	H-15	2014/1	1 Year
Pre-Amplifier	WJ-6882-824	Watkins Johnson	A-21	2014/1	1 Year
Pre-Amplifier	WJ-6611-513	Watkins Johnson	A-23	2014/1	1 Year
Pre-Amplifier	BZ1840LD1	B&Z	A-29	2014/1	1 Year
Pre-Amplifier	DBL-0618N515	DBS Microwave	A-33	2014/1	1 Year
Horn Antenna	91888-2	EATON	C-41-1	2013/6	1 Year
Horn Antenna	91889-2	EATON	C-41-2	2013/6	1 Year
Horn Antenna	3160-04	EMCO	C-55	2013/7	1 Year
Horn Antenna	3160-05	EMCO	C-56	2013/7	1 Year
Horn Antenna	3160-06	EMCO	C-57	2013/7	1 Year
Horn Antenna	3160-07	EMCO	C-58	2013/7	1 Year
Horn Antenna	3160-08	EMCO	C-59	2013/7	1 Year
Horn Antenna	3160-09	EMCO	C-48	2013/7	1 Year
Attenuator	54A-10	Weinschel	D-29	2013/9	1 Year
Attenuator	2-10	Weinschel	D-79	2013/11	1 Year
Band Rejection Filter	BRM50701	MICRO-TRONICS	D-93	2014/2	1 Year
RF Cable	SUCOFLEX102E	HUBER+SUHNER	C-75	2014/2	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-66	2014/1	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-67	2014/1	1 Year
RF Cable	SUCOFLEX102EA	SUHNER	C-69	2014/2	1 Year
SVSWR	--	----	H-19	2013/9	1 Year
Pre-Amplifier	310N	SONOMA	A-17	2013/4	1 Year

7.9.3 Test Method and Test Setup (Diagrammatic illustration)

7.9.3.1 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.

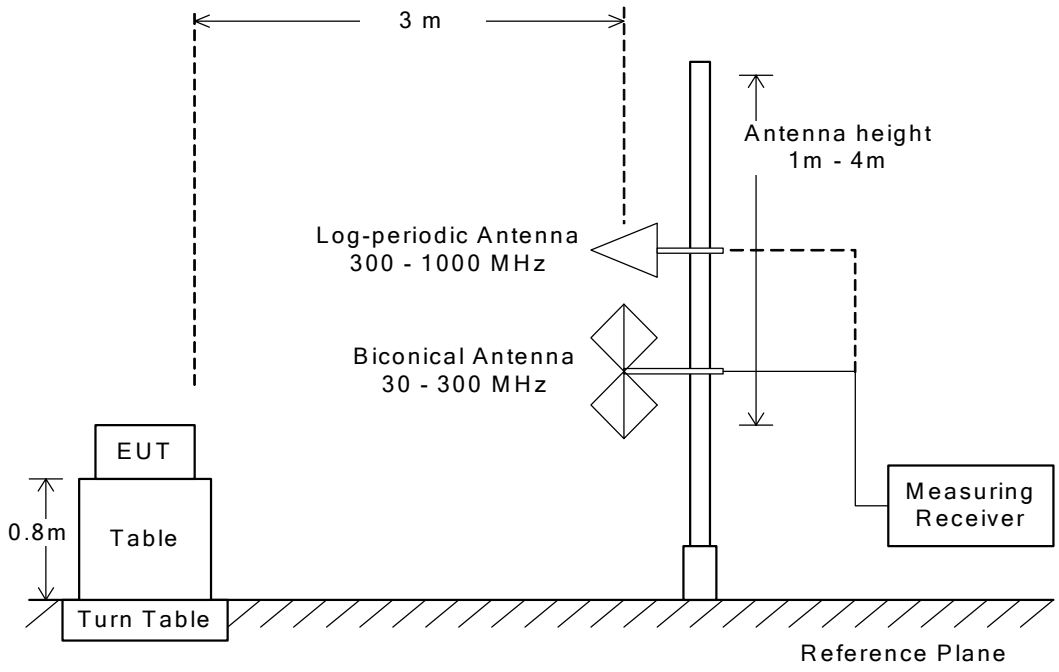
– Side View –



7.9.3.2 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 –



7.9.3.3 Radiated Emission above 1 GHz

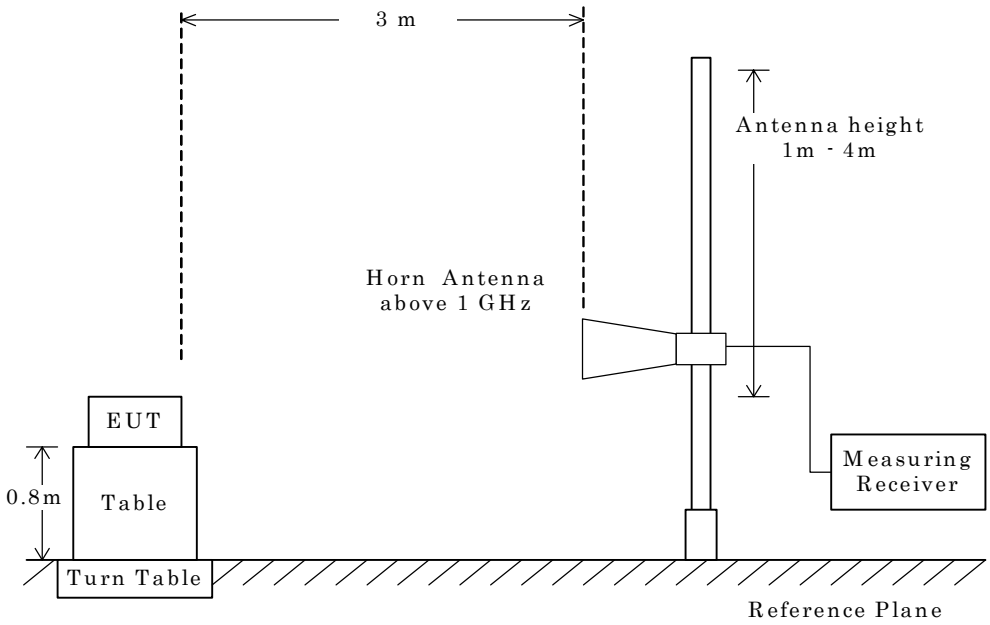
The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.
The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.
This configurations was used for the final tests.

The setting of the measuring instruments are shown as follows:

Type	Peak	Average
Detector Function	Peak	RMS
Res. Bandwidth	1 MHz	1 MHz
Video Bandwidth	3 MHz	≥ 1/T *1)
Sweep Time	AUTO	AUTO
Trace	Max Hold	Max Hold

Note: 1. T: Minimum transmission duration

– Side View –



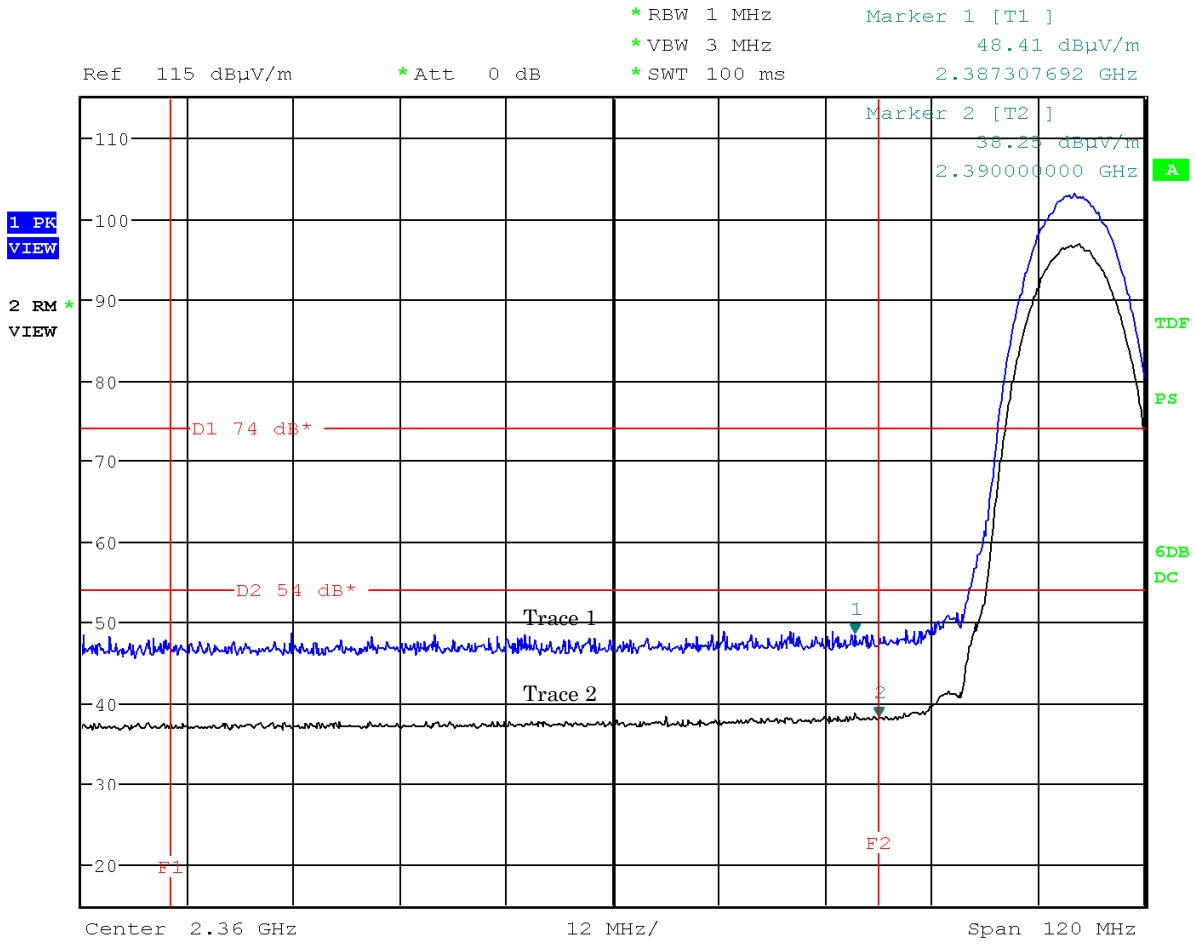
NOTE
The antenna height is scanned depending on the EUT's size and mounting height.

7.9.4 Test Data

7.9.4.1 Band-edge Compliance

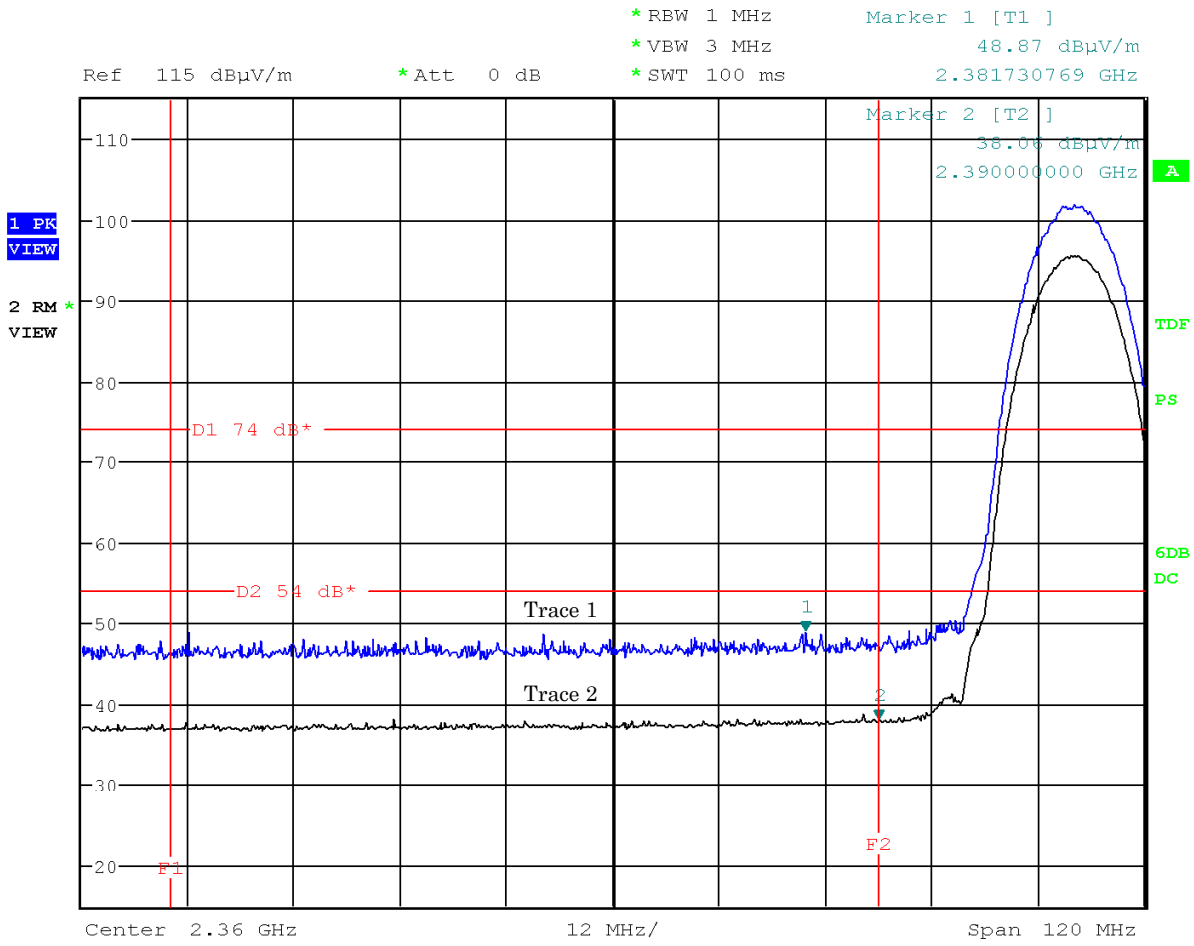
Test Date : March 7, 2014
Temp.:18°C, Humi:35%

Mode of EUT : TX(1ch: 2412 MHz, (IEEE 802.11b))
Antenna Polarization : Horizontal



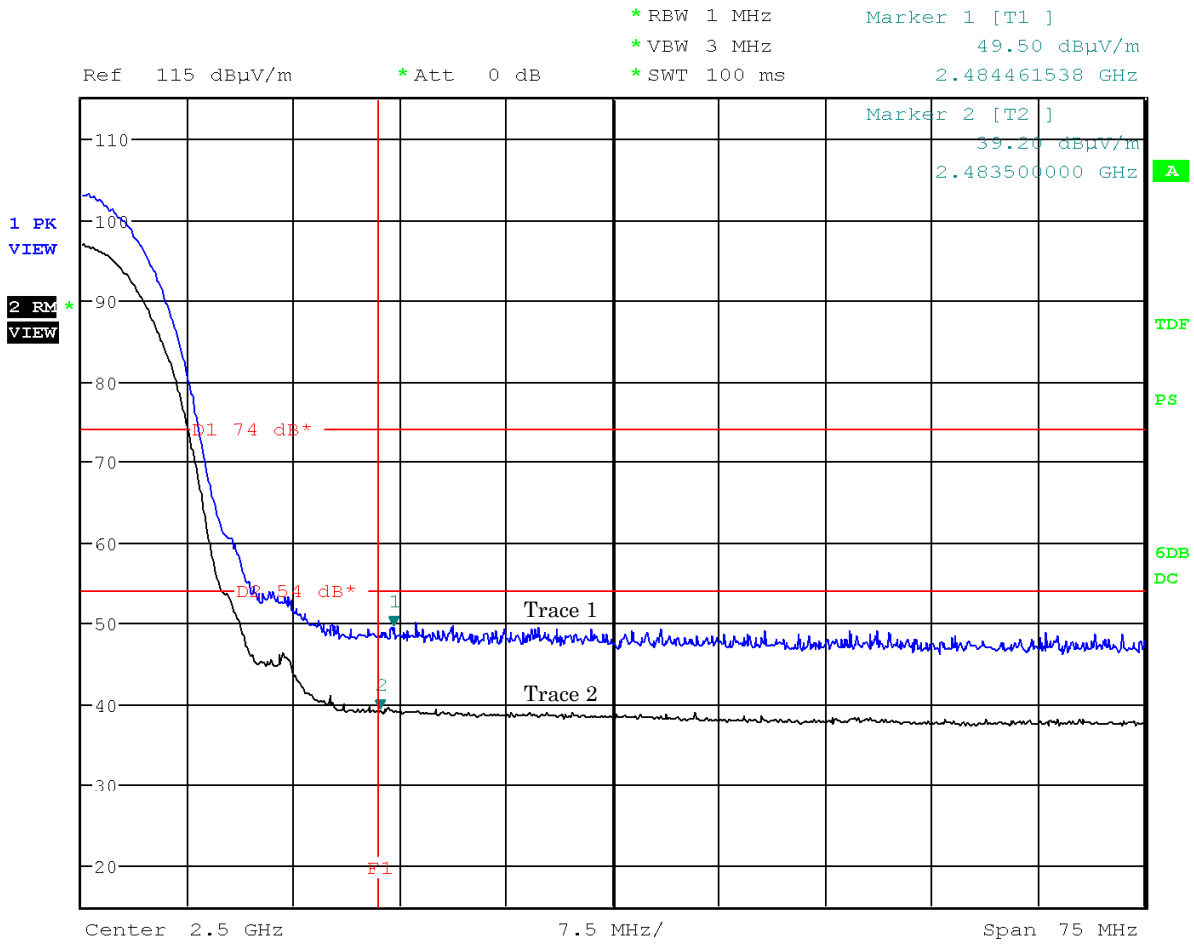
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, (IEEE 802.11b))
Antenna Polarization : Vertical



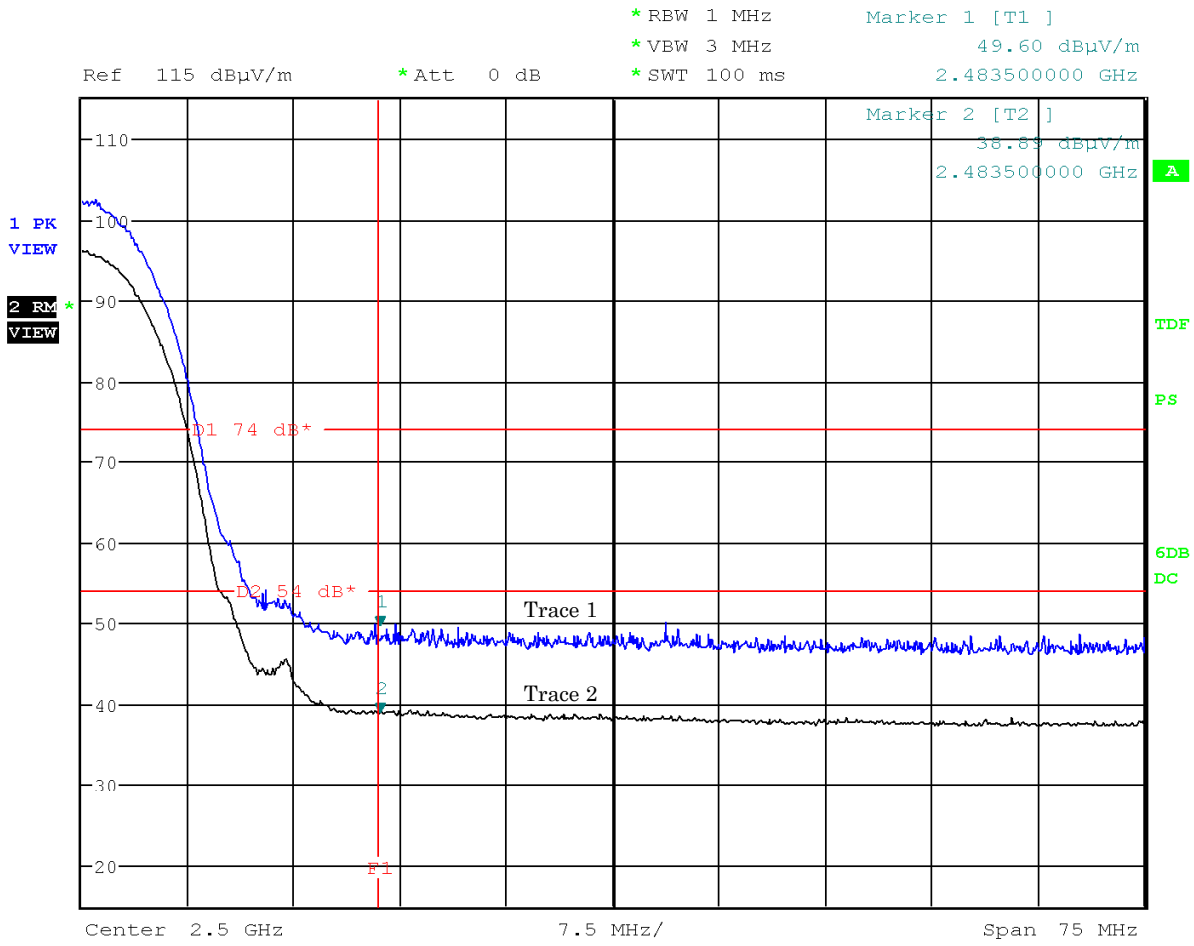
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Horizontal



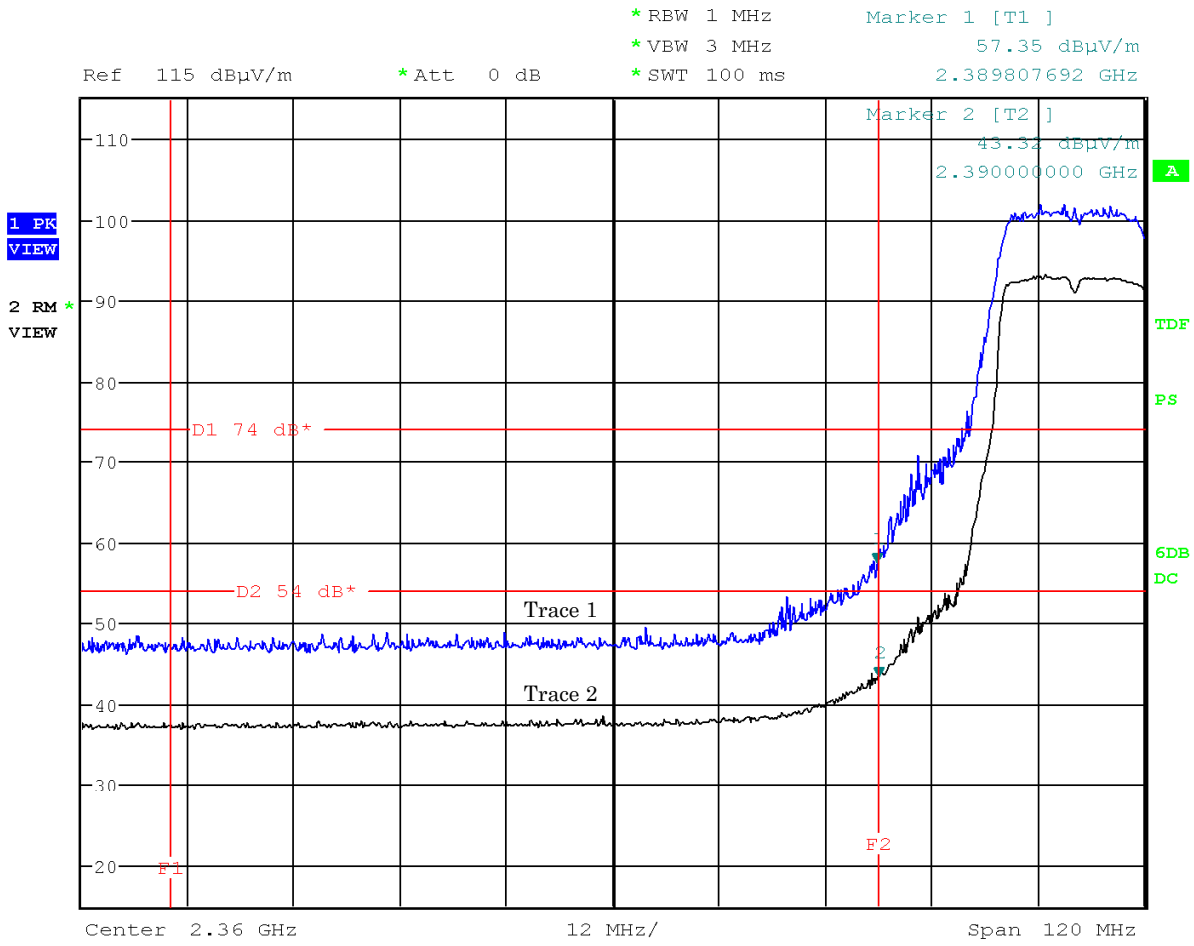
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Vertical



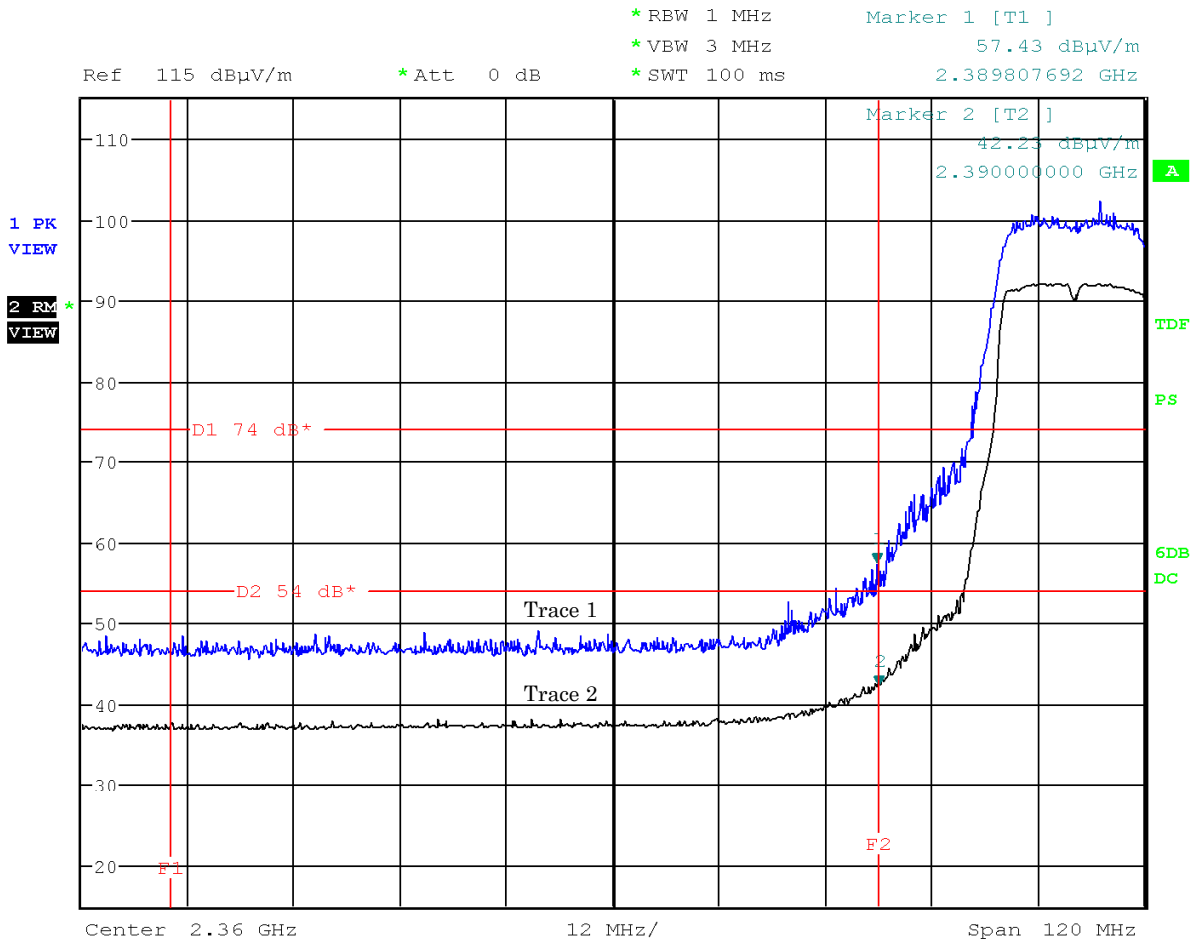
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, (IEEE 802.11g))
Antenna Polarization : Horizontal



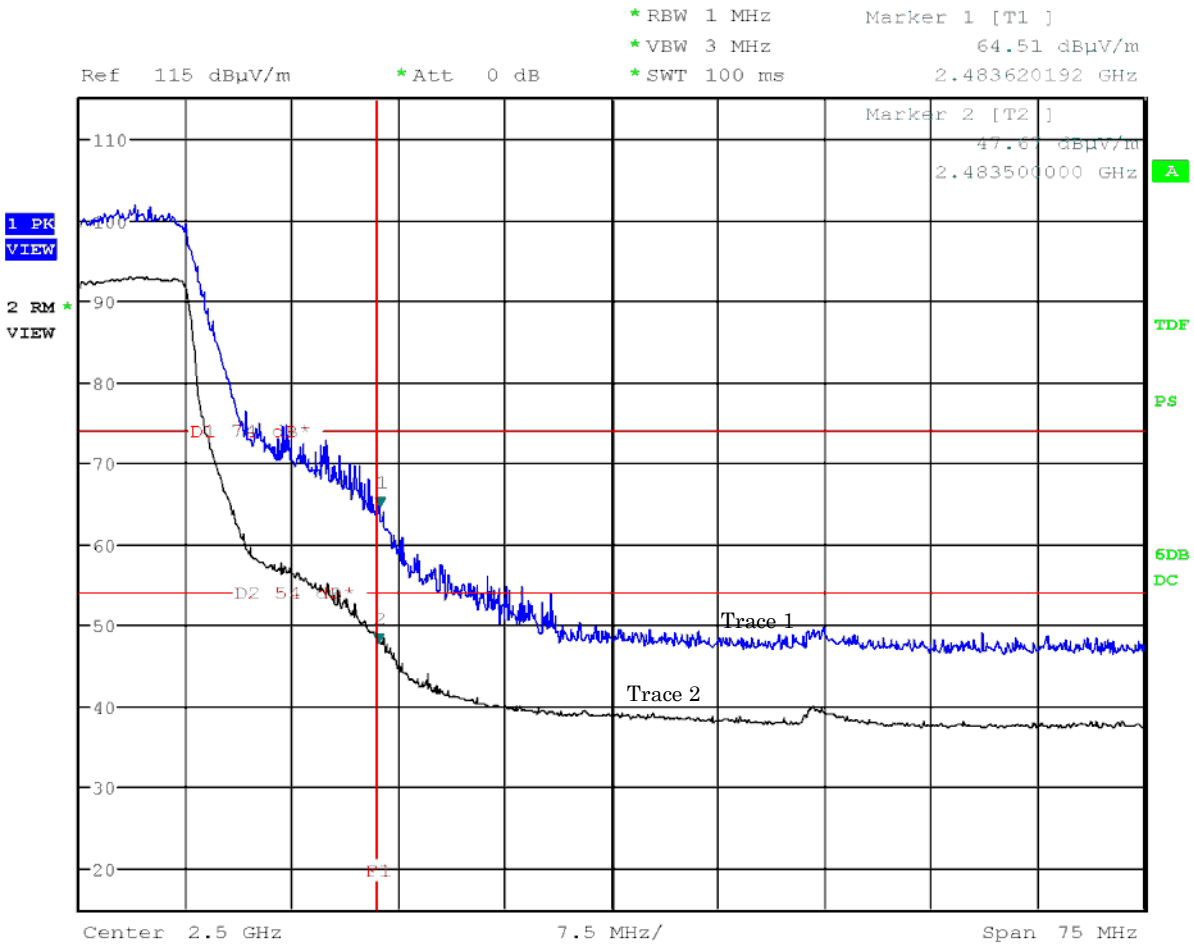
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



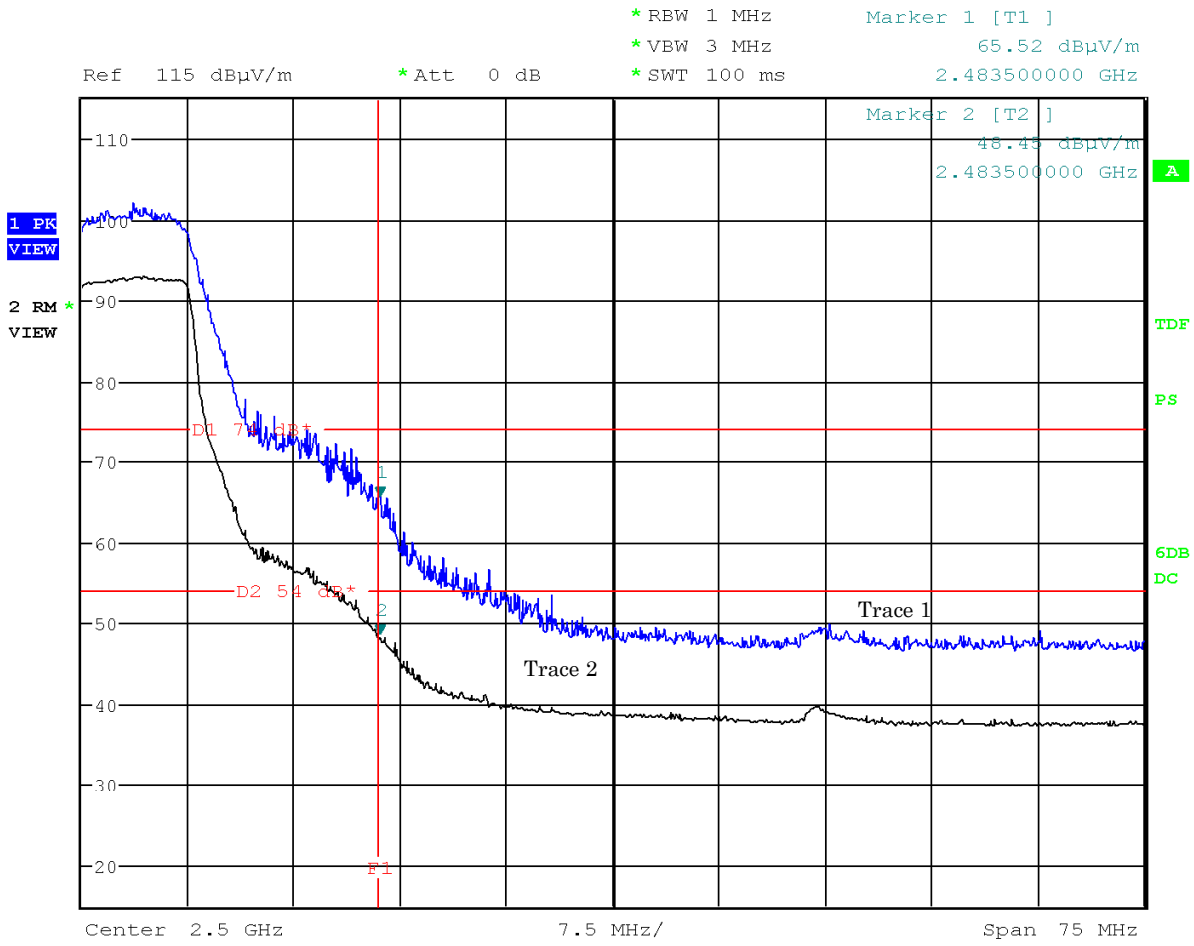
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Horizontal



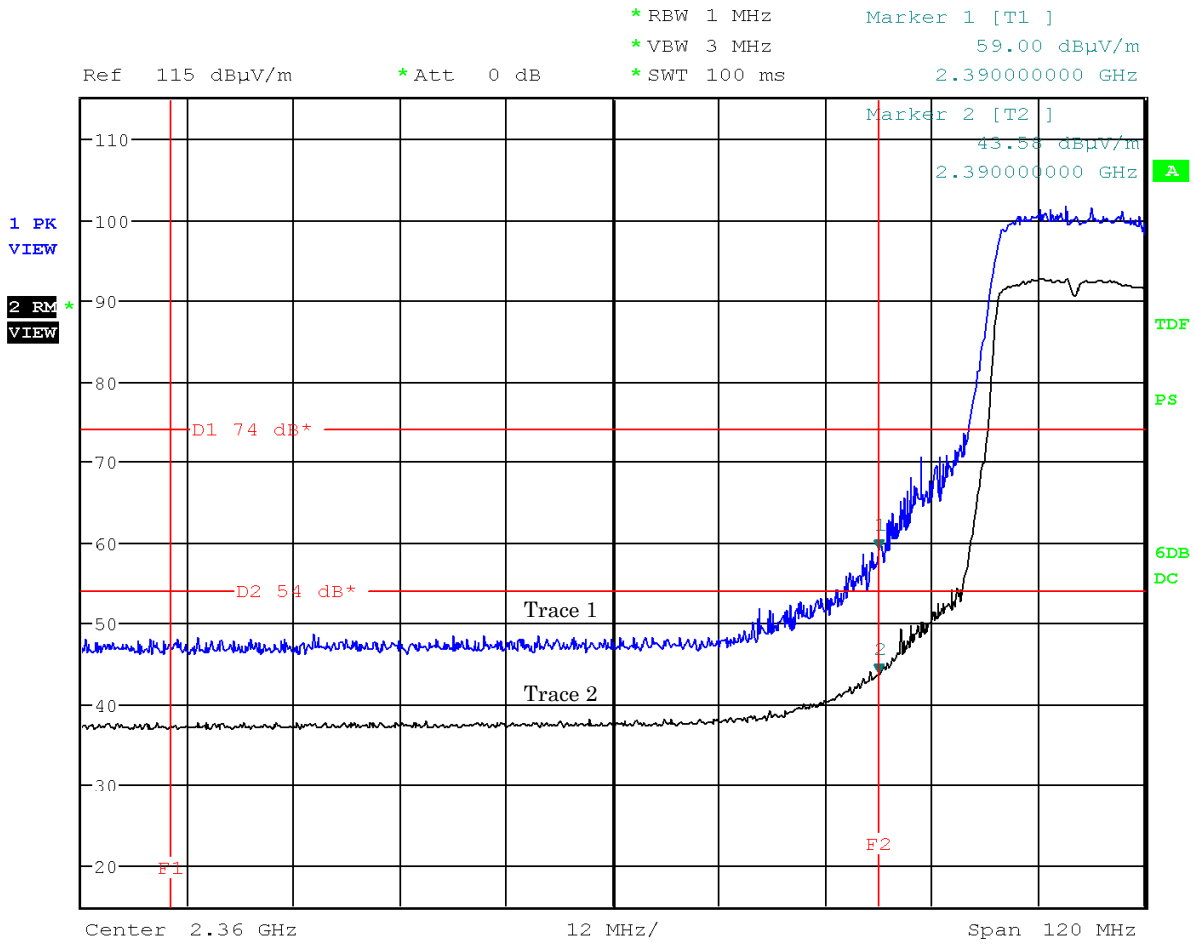
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Vertical



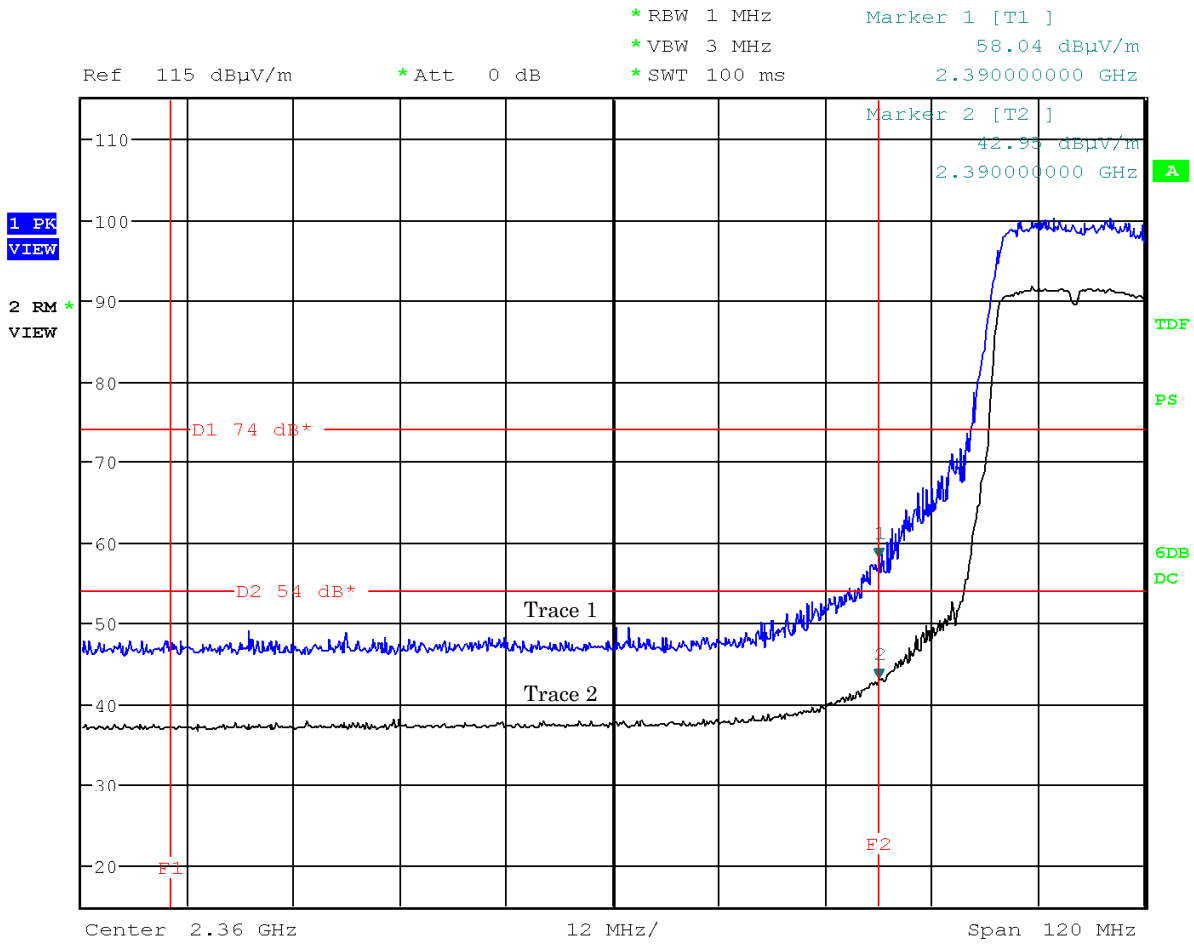
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, (IEEE 802.11n))
Antenna Polarization : Horizontal



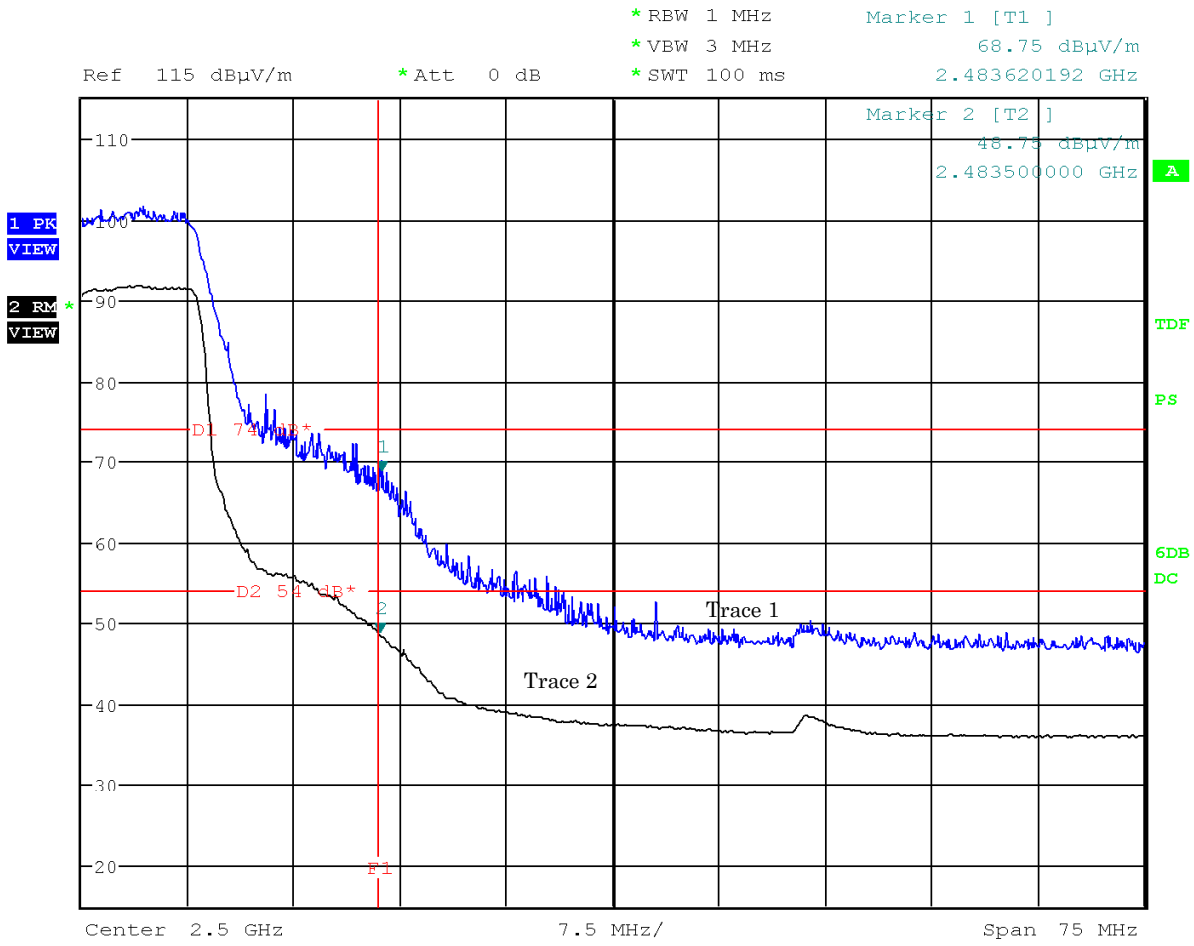
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(1ch: 2412 MHz, (IEEE 802.11n))
Antenna Polarization : Vertical



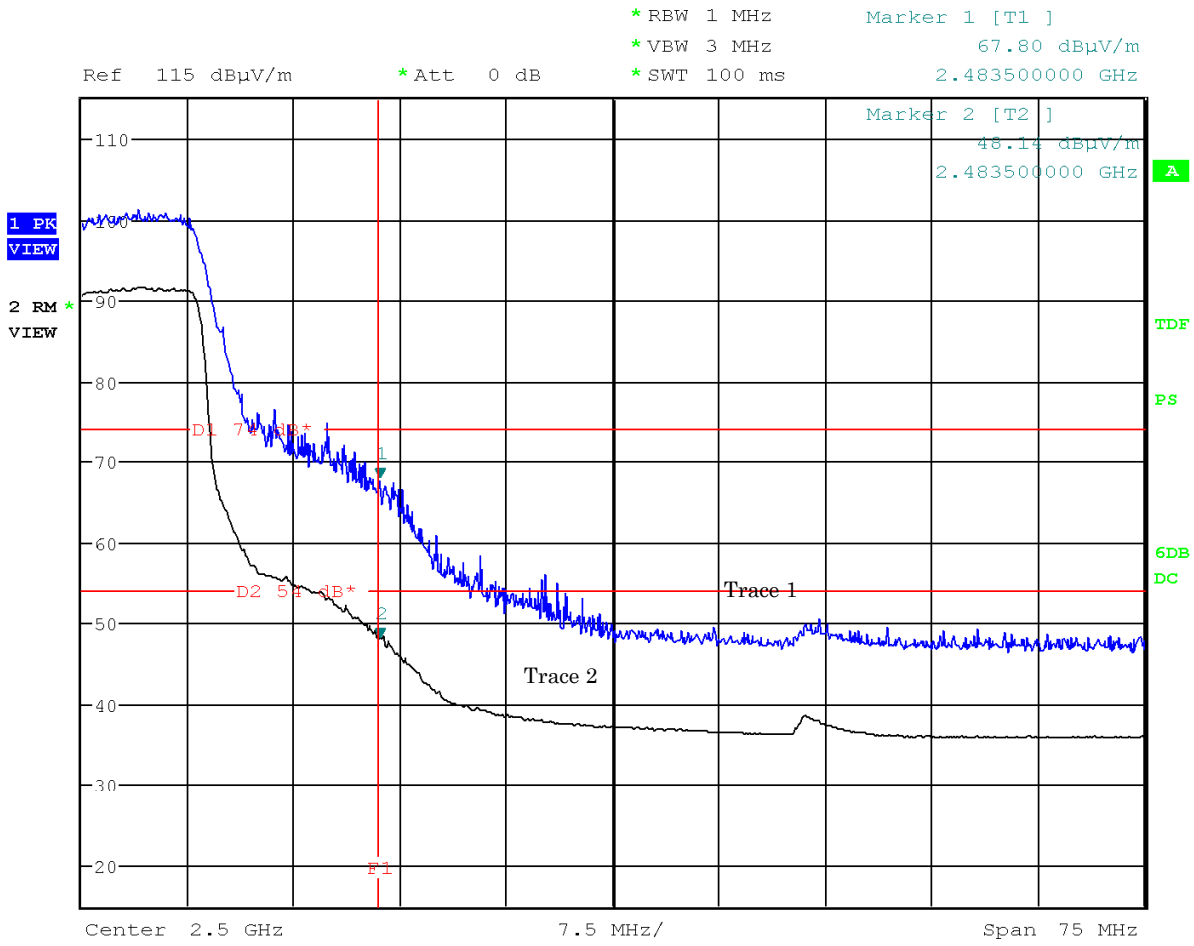
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Horizontal



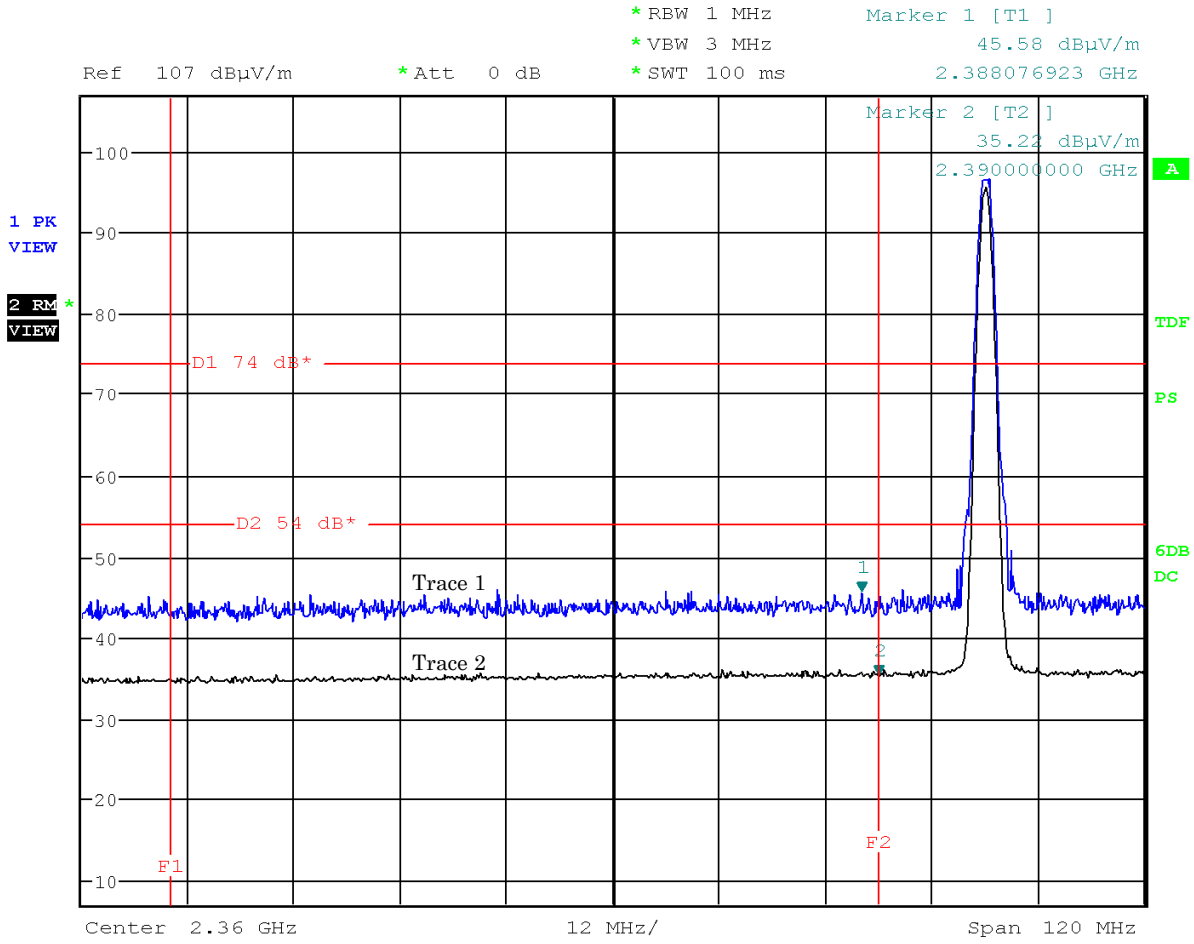
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX(11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Vertical



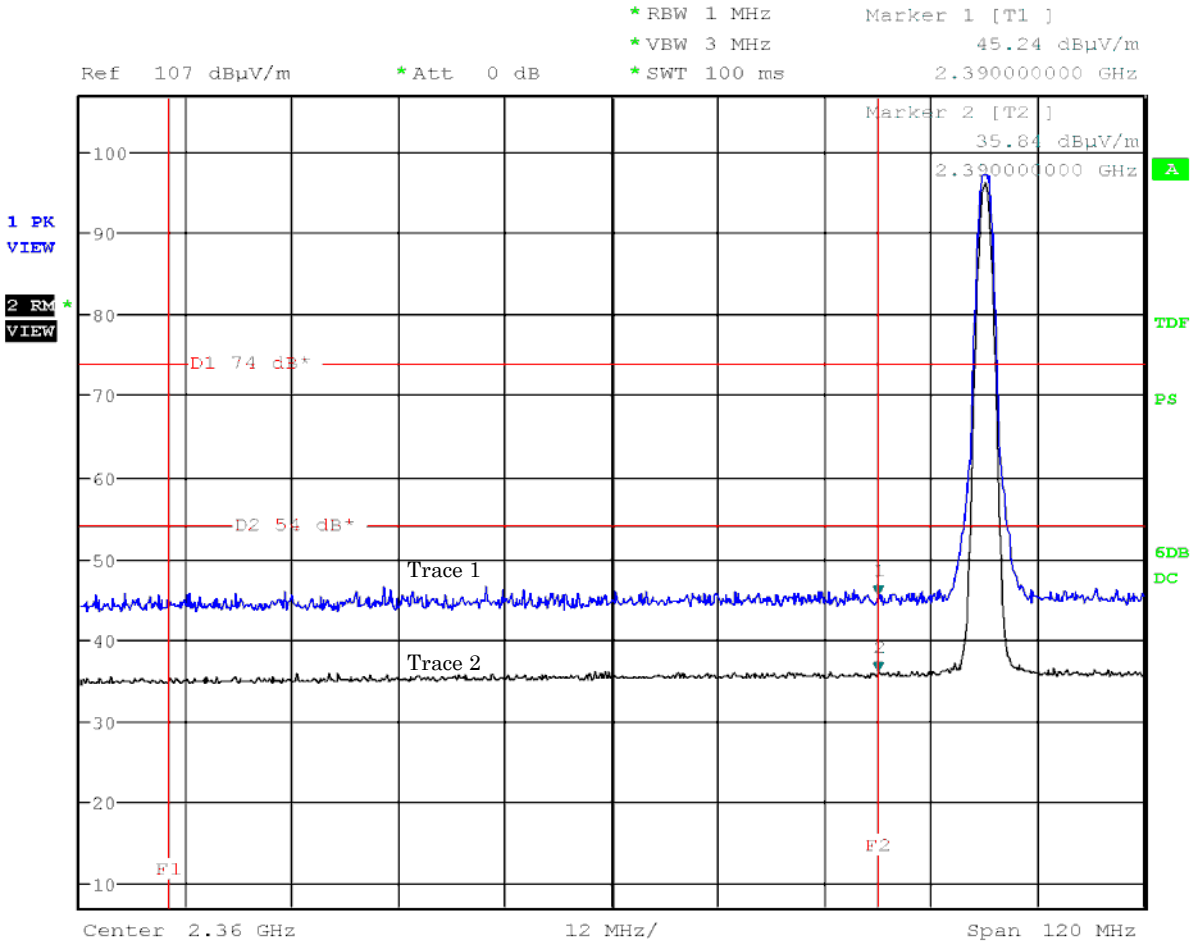
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Bluetooth Low Energy, Hopping off (0ch: 2402 MHz)
Antenna Polarization : Horizontal



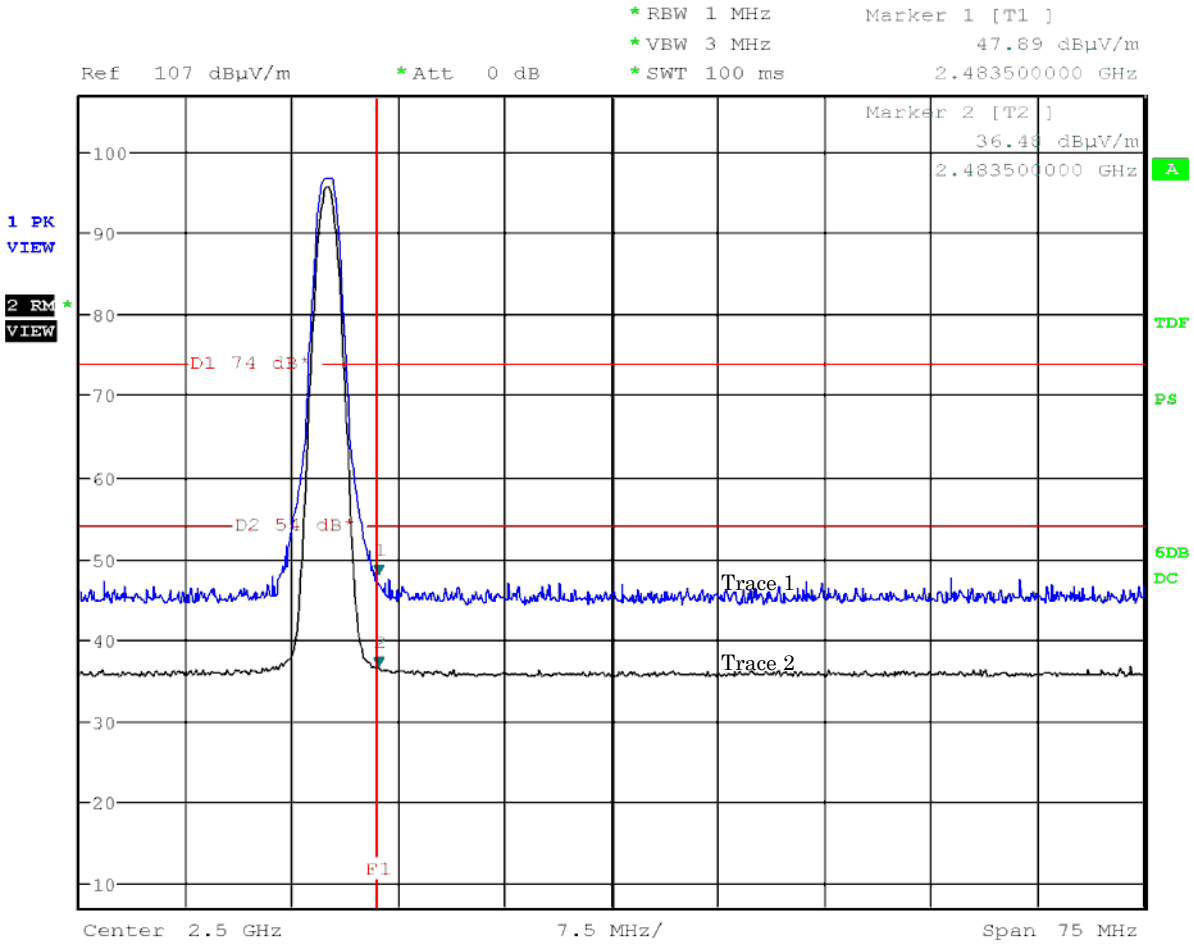
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Bluetooth Low Energy, Hopping off (0ch: 2402 MHz)
Antenna Polarization : Vertical



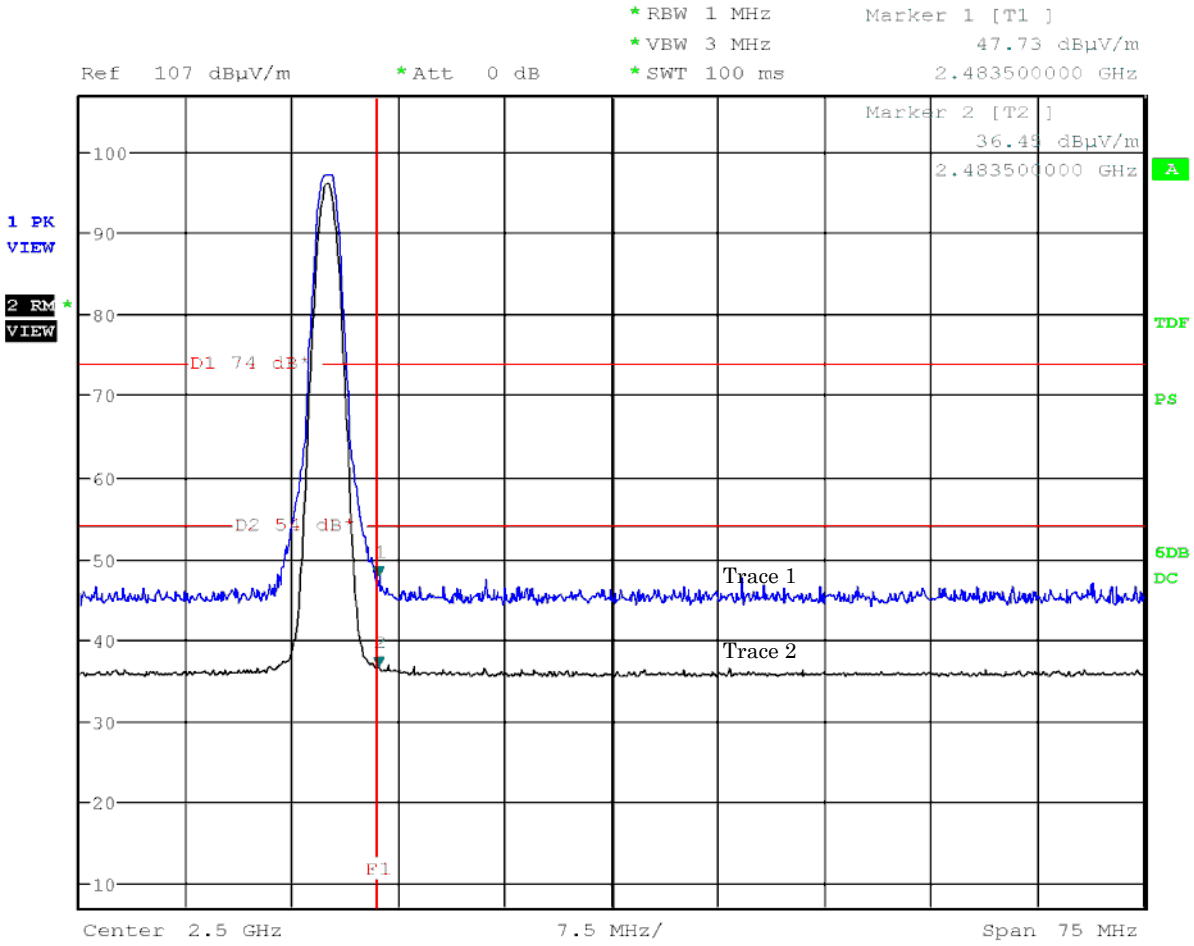
Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Bluetooth Low Energy, Hopping off (78ch: 2480 MHz)
Antenna Polarization : Horizontal



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

Mode of EUT : Bluetooth Low Energy, Hopping off (78ch: 2480 MHz)
Antenna Polarization : Vertical



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

7.9.4.2 Other Spurious Emission (9kHz – 30MHz)

Test Date : March 13, 2014
Temp.:20°C, Humi:47%

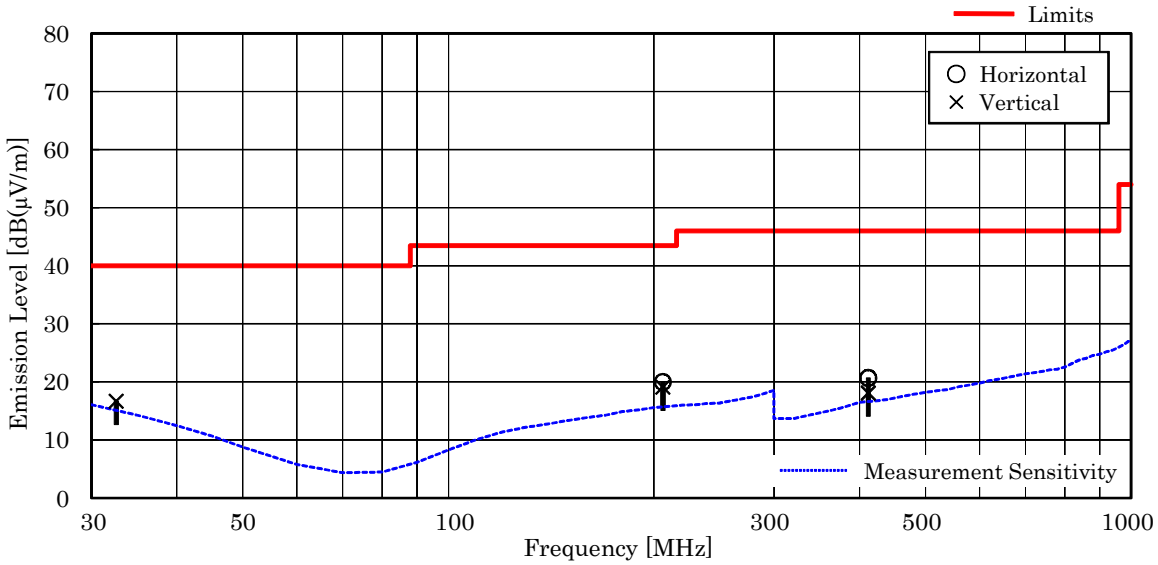
Mode of EUT : WLAN/Bluetooth LE
Results : No spurious emissions in the range 20dB below the limit.

7.9.4.3 Other Spurious Emission (30MHz – 1000MHz)

Mode of EUT : (WLAN) 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: March 13, 2014
Temp.: 20 °C, Humi: 47 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Cable Loss [dB]	Meter Readings [dB(μV)] Hori.	Vert.	Limits [dB(μV/m)]	Results [dB(μV/m)] Hori.	Vert.	Margin [dB]	Remarks
32.6	17.8	-27.6	< 25.0	26.5	40.0	< 15.2	16.7	+23.3	-
206.1	16.6	-26.0	29.4	28.5	43.5	20.0	19.1	+23.5	-
412.2	16.4	-24.8	29.1	26.5	46.0	20.7	18.1	+25.3	-

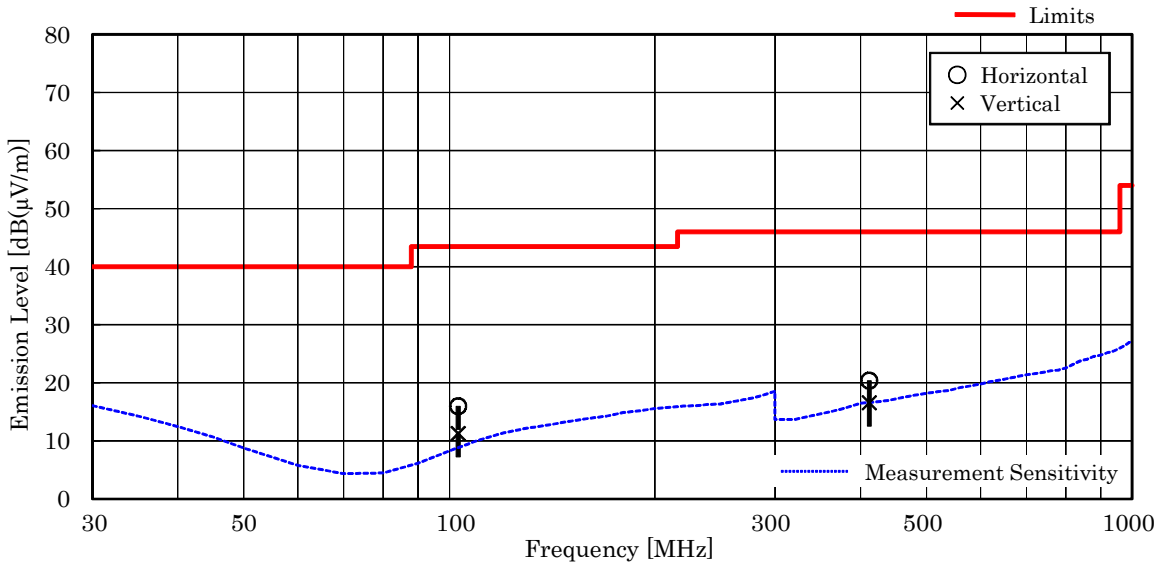


NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. Calculated result at 32.6 MHz, as the worst point shown on underline:
   Antenna Factor + Cable Loss + Meter Reading = 17.8 + -27.6 + 26.5 = 16.7 dB(μV/m)
6. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Mode of EUT : Bluetooth Low Energy

Test Date: March 13, 2014
Temp.: 20 °C, Humi: 47 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Cable Loss [dB]	Meter Readings [dB(μV)] Hori.	Meter Readings [dB(μV)] Vert.	Limits [dB(μV/m)]	Results [dB(μV/m)] Hori.	Results [dB(μV/m)] Vert.	Margin [dB]	Remarks
103.0	10.6	-26.8	32.2	27.5	43.5	16.0	11.3	+27.5	-
412.2	16.4	-24.8	28.8	25.0	46.0	20.4	16.6	+25.6	-



NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. Calculated result at 412.2 MHz, as the worst point shown on underline:
   Antenna Factor + Cable Loss + Meter Reading = 16.4 + -24.8 + 28.8 = 20.4 dB(μV/m)
6. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

7.9.4.4 Other Spurious Emission (Above 1000MHz)

7.9.4.4.1 Mode of TX

7.9.4.4.1.1 IEEE802.11b

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Meter Readings [dB(μV)] Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.2	-20.9	41.3	33.4	41.2	33.8	74.0	54.0	47.6	40.1	+13.9	
12060.0	33.7	-27.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19296.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX Middle Ch												
4874.0	27.2	-21.1	42.1	34.0	42.4	35.1	74.0	54.0	48.5	41.2	+12.8	
7311.0	30.0	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19496.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX High Ch												
4924.0	27.2	-21.2	41.7	32.0	41.2	32.6	74.0	54.0	47.7	38.6	+15.4	
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12310.0	33.5	-26.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.8	< 36.8	> +17.2	
19696.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
22158.0	40.6	-21.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 57.3	< 47.3	> + 6.7	

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

	Antenna Factor	=	40.6 dB(1/m)
	Corr. Factor	=	-21.3 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<47.3 dB(μV/m)

Minimum Margin: 54.0 - <47.3 = >6.7 (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 : RMS Detector

7.9.4.4.1.2 IEEE802.11g

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.2	-20.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.3	< 36.3	> +17.7	
12060.0	33.7	-27.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19296.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX Middle Ch												
4874.0	27.2	-21.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	
7311.0	30.0	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19496.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX High Ch												
4924.0	27.2	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12310.0	33.5	-26.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.8	< 36.8	> +17.2	
19696.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
22158.0	40.6	-21.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 57.3	< 47.3	> + 6.7	

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

	Antenna Factor	=	40.6 dB(1/m)
	Corr. Factor	=	-21.3 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<47.3 dB(μV/m)

Minimum Margin: 54.0 - <47.3 = >6.7 (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 : RMS Detector

7.9.4.4.1.3 IEEE802.11n

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx Low Ch												
4824.0	27.2	-20.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.3	< 36.3	> +17.7	
12060.0	33.7	-27.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19296.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX Middle Ch												
4874.0	27.2	-21.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	
7311.0	30.0	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12185.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19496.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX High Ch												
4924.0	27.2	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	
7386.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12310.0	33.5	-26.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.8	< 36.8	> +17.2	
19696.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
22158.0	40.6	-21.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 57.3	< 47.3	> + 6.7	

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

	Antenna Factor	=	40.6 dB(1/m)
	Corr. Factor	=	-21.3 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<47.3 dB(μV/m)

Minimum Margin: 54.0 - <47.3 = >6.7 (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 : RMS Detector

7.9.4.4.1.4 Bluetooth Low Energy

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)] Horizontal PK	Horizontal AVE	Vertical PK	Vertical AVE	Limits [dB(μV/m)] PK	Limits AVE	Results [dB(μV/m)] PK	Results AVE	Margin [dB]	Remarks
Test condition : Tx Low Ch												
4804.0	27.2	-20.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.3	< 36.3	> +17.7	
12010.0	33.7	-27.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19216.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX Middle Ch												
4880.0	27.2	-21.1	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.1	< 36.1	> +17.9	
7320.0	30.0	-19.6	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12200.0	33.5	-26.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
19520.0	40.5	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.3	< 46.3	> + 7.7	
Test condition : TX High Ch												
4960.0	27.2	-21.2	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 46.0	< 36.0	> +18.0	
7440.0	29.9	-19.5	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.4	< 40.4	> +13.6	
12400.0	33.6	-26.6	< 40.0	< 30.0	40.0	< 30.0	74.0	54.0	< 47.0	< 37.0	> +17.0	
19840.0	40.4	-22.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 56.2	< 46.2	> + 7.8	
22320.0	40.6	-21.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 57.4	< 47.4	> + 6.6	

Calculated result at 22320.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.6 dB(1/m)
	Corr. Factor	=	-21.2 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<47.4 dB(μV/m)

Minimum Margin: 54.0 - <47.4 = >6.6 (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

7.9.4.4.2 Mode of RX (WLAN)

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(μV)] Horizontal PK	Horizontal AVE	Vertical PK	Vertical AVE	Limits [dB(μV/m)] PK	Limits AVE	Results [dB(μV/m)] PK	Results AVE	Margin [dB]	Remarks
Test condition : RX Middle Ch												
2437.0	21.6	-21.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 39.9	< 29.9	> +24.1	
4874.0	27.2	-21.4	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
7311.0	30.0	-19.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.1	< 40.1	> +13.9	

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

	Antenna Factor	=	27.2 dB(1/m)
	Corr. Factor	=	-21.4 dB
+)	Meter Reading	=	<30.0 dB(μV)
	Result	=	<35.8 dB(μV/m)

Minimum Margin: 54.0 - <35.8 = >13.9 (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 : RMS Detector

7.9.4.4.3 Mode of RX (Bluetooth Low Energy)

Test Date: March 8, 2014
Temp.: 20 °C, Humi: 31 %

Frequency [MHz]	Antenna Factor [dB(1/m)]	Corr. Factor [dB]	Meter Readings [dB(µV)] Horizontal PK	Horizontal AVE	Vertical PK	Vertical AVE	Limits [dB(µV/m)] PK	Limits AVE	Results [dB(µV/m)] PK	Results AVE	Margin [dB]	Remarks
Test condition : RX Middle Ch												
2440.0	21.6	-21.7	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 39.9	< 29.9	> +24.1	
4880.0	27.2	-21.4	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
7320.0	30.0	-19.9	< 40.0	< 30.0	< 40.0	< 30.0	74.0	54.0	< 50.1	< 40.1	> +13.9	

Calculated result at 7320.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	30.0 dB(1/m)
	Corr. Factor	=	-19.9 dB
+)	Meter Reading	=	<30.0 dB(µV)
	Result	=	<40.1 dB(µV/m)

Minimum Margin: 54.0 - <40.1 = >13.9 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 7.5 GHz .
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 : RMS Detector