JQA File No. : KL80150534
Issue Date : November 13, 2015

TEST REPORT

Applicant	:	SHARP CORPORATION, Consumer Electronics Company, Communication Systems Division
Address	:	2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, Japan
Products	:	Smart Phone
Model No.	:	HR229
Serial No.	:	004401115636231 004401115636215, 004401115636223
FCC ID	:	APYHRO00229
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15
Test Results	:	**Passed**
Date of Test	:	October 21 ~ October 30, 2015

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.
- 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.

TABLE OF CONTENTS

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, Consumer Electronics Company, Communication Systems Division 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, Japan
2.	Products	:	Smart Phone
3.	Model No.	:	HR229
4.	Serial No.	:	004401115636231 004401115636215, 004401115636223
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	September, 2015
7.	Power Rating	:	4.0VDC (Lithium-ion Battery 1UAF375986Z 2810mAh)
8.	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	: : : :	16.67 dBm(Measure Value of IEEE802.11b) 20.58 dBm(Measure Value of IEEE802.11g) 20.92 dBm(Measure Value of IEEE802.11n) 5.09 dBm(Measure Value of Bluetooth LE)
12.	Antenna Type	:	Inverted-L Type Antenna (Integral)
13.	Antenna Gain	:	0 dBi
14.	Category	:	DTS
15.	EUT Authorization	:	Certification
16.	Received Date of EUT	:	October 20, 2015

17. 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:

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

Tested by:

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 C63.10–2013
Testing unlicensed wireless devices.

KDB 558074 D01
DTS Meas Guidance v03r03: June 9, 2015.

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, 2016)
VCCI Registration No.	:	A-0002 (Expiry date : March 30, 2016)
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 16, 2017)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI. (Expiry date : February 22, 2016)

6 Description of Test Setup

6.1 Test Configuration

The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	Smart Phone	Sharp	HR229	004401115636231 *1) 004401115636215 *2) 004401115636223 *3)	APYHRO00229
B	AC Adapter	Hosiden	04	HS-SKA	N/A
C	Earphone	Softbank Mobile	ZTCAA1	--	N/A

*1) Used for AC Powerline Conducted Emission and Field Strength of Spurious Emission.
*2) Used for Antenna Conducted Emission of IEEE802.11.
*3) Used for Antenna Conducted Emission of Bluetooth LE.

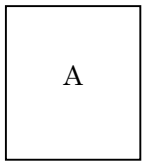
The auxiliary equipment used for testing :
None

Type of Cable:

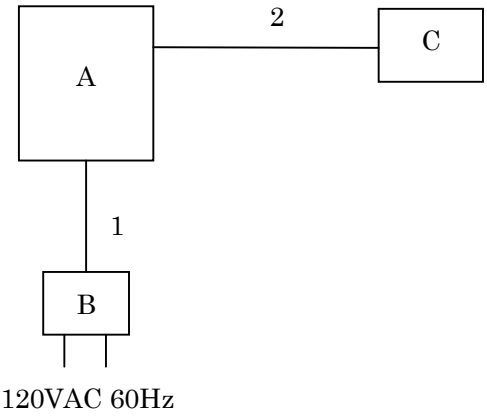
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	USB conversion cable	--	--	NO	NO	1.5
2	Earphone Cable	--	--	NO	NO	0.5

6.2 Test Arrangement (Drawings)

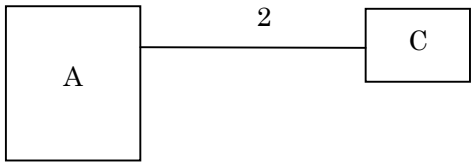
a) Single Unit



b) AC Adapter used



c) Earphone used



6.3 Operating Condition

Power Supply Voltage : 4.0 VDC (for Battery)
120 VAC, 60 Hz (For AC Adapter)

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
19.2MHz, 48MHz, 12MHz, 27.12MHz

The tests were performed in the following worst condition.

Mode	Condition
IEEE802.11b	11 Mbps
IEEE802.11g	24 Mbps
IEEE802.11n	MCS4 (39 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.

The test were carried out using the following test program supplied by applicant;
- Software Name: HR229_WLAN_BT Manual test mode operation_ver0.3
- Software Version: Version 0.3
- Storage Location: Controller PC(supplied by applicant)

7 Test Requirements

7.0 Summary of the Test Results

Test Item	FCC Specification	Reference of the Test Report	Results	Remarks
Antenna Requirement	Section 15.203	Section 1.12	Passed	-
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

Remarks : _____

7.2 Minimum Hopping Channel

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

Remarks : _____

7.3 Occupied Bandwidth

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

7.3.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

The 99% Bandwidth of IEEE802.11b is	12.918	MHz	at	2462.0	MHz
The 99% Bandwidth of IEEE802.11g is	16.452	MHz	at	2412.0	MHz
The 99% Bandwidth of IEEE802.11n is	17.641	MHz	at	2462.0	MHz
The 99% Bandwidth of Bluetooth LE is	1098.2	kHz	at	2440.0	MHz
The 6dB Bandwidth of IEEE802.11b is	7.903	MHz	at	2462.0	MHz
The 6dB Bandwidth of IEEE802.11g is	16.521	MHz	at	2412.0	MHz
The 6dB Bandwidth of IEEE802.11n is	17.738	MHz	at	2437.0	MHz
The 6dB Bandwidth of Bluetooth LE is	676.1	kHz	at	2480.0	MHz
Uncertainty of Measurement Results				± 0.9	%(2σ)

Remarks : _____

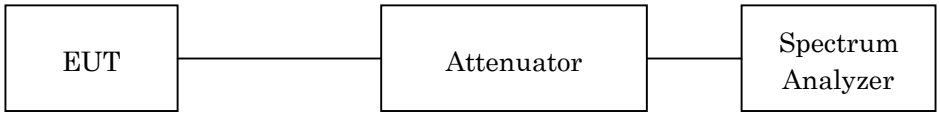
7.3.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

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	100 kHz
Video Bandwidth	300 kHz	300 kHz
Span	30 MHz	3 MHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.3.4 Test Data

Mode of EUT : WLAN

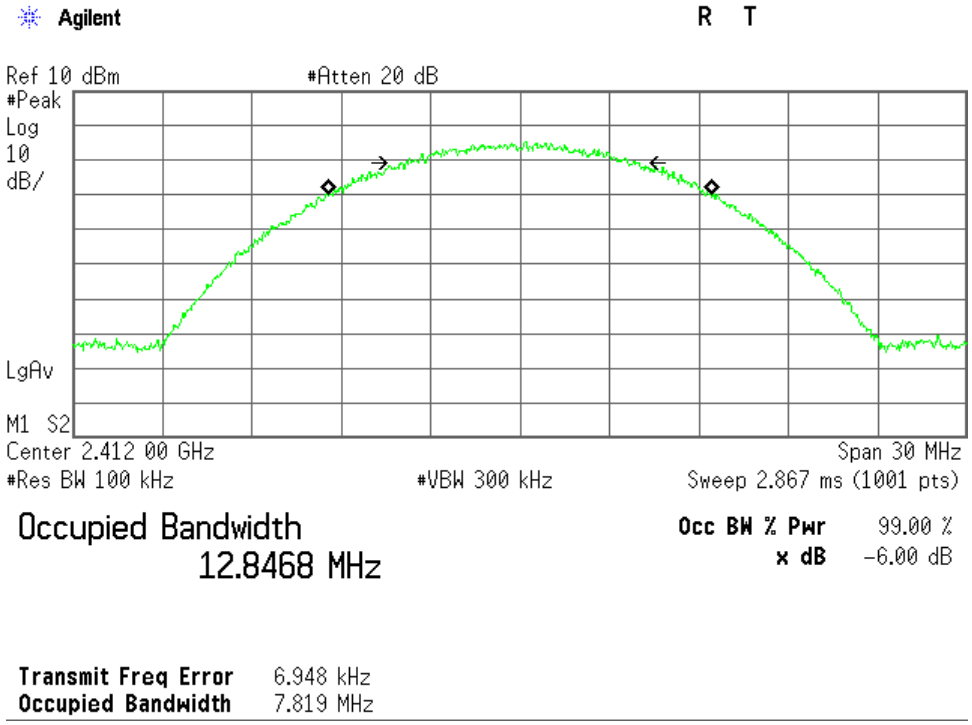
Test Date : October 22, 2015
Temp.:25°C, Humi:50%

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.

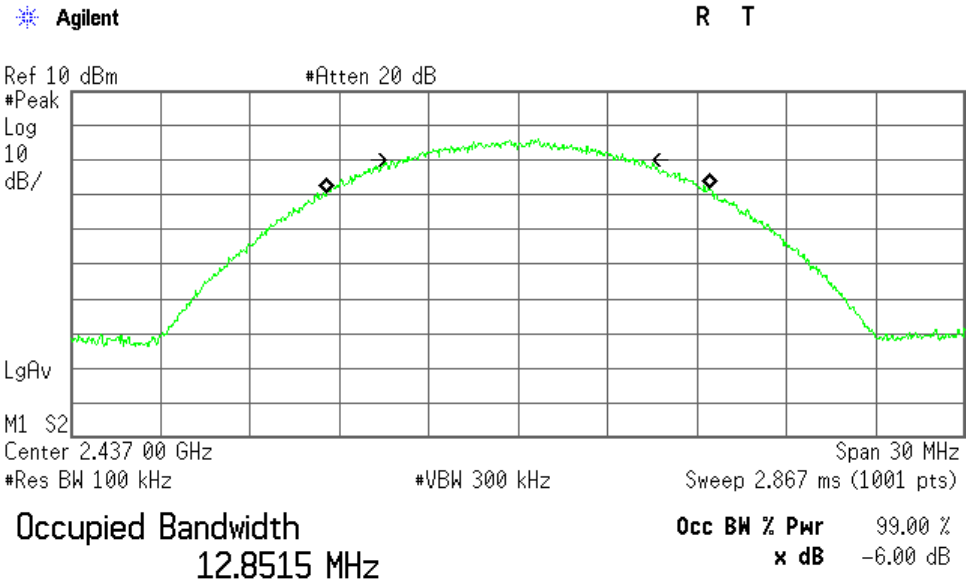
A) IEEE 802.11b

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	12.847	7.819	500
06	2437.0	12.852	7.893	500
11	2462.0	12.918	7.903	500

Low Channel

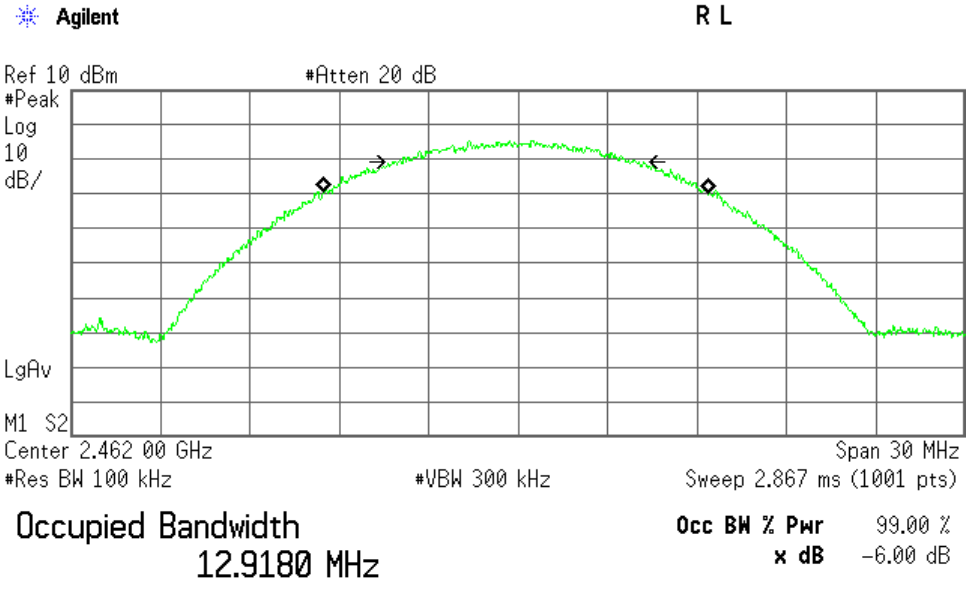


Middle Channel



Transmit Freq Error	15.011 kHz
Occupied Bandwidth	7.893 MHz

High Channel

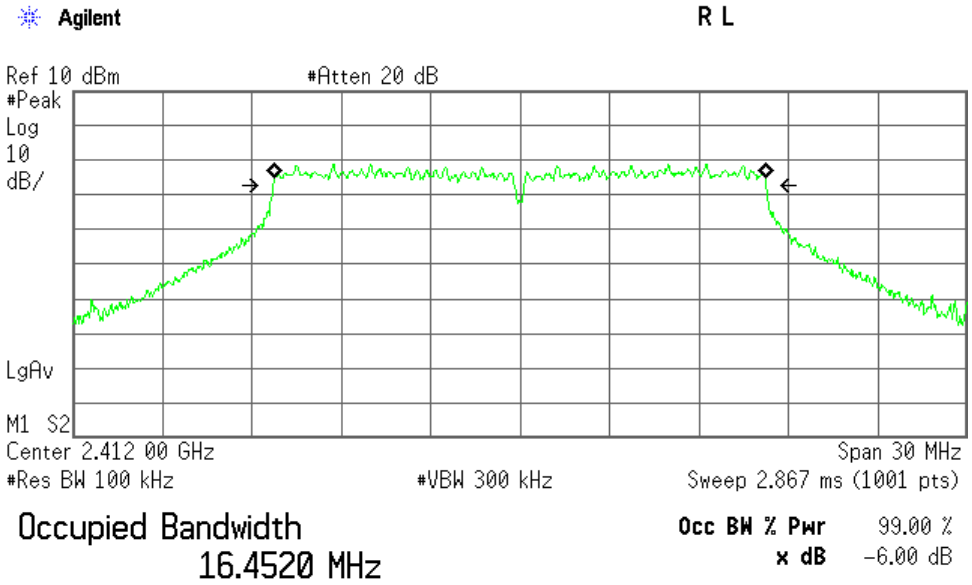


Transmit Freq Error	-56.095 kHz
Occupied Bandwidth	7.903 MHz

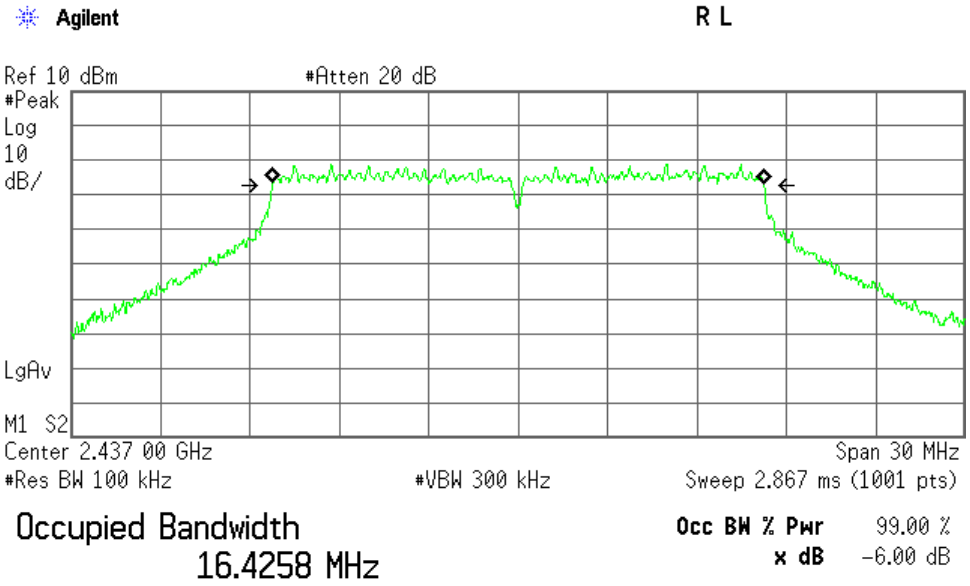
B) IEEE 802.11g

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	16.452	16.521	500
06	2437.0	16.426	16.454	500
11	2462.0	16.443	16.495	500

Low Channel

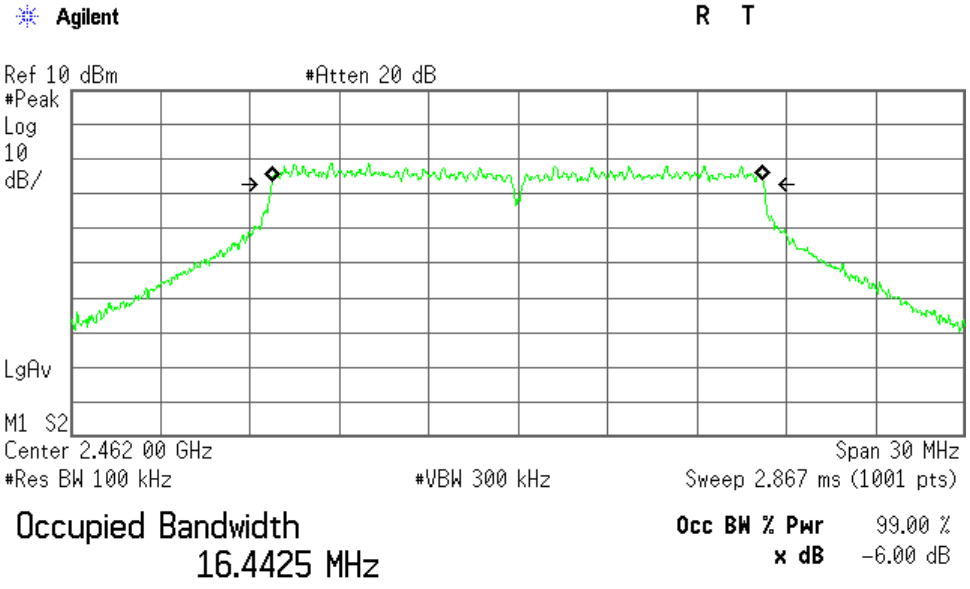


Middle Channel



Transmit Freq Error	-4.625 kHz
Occupied Bandwidth	16.454 MHz

High Channel

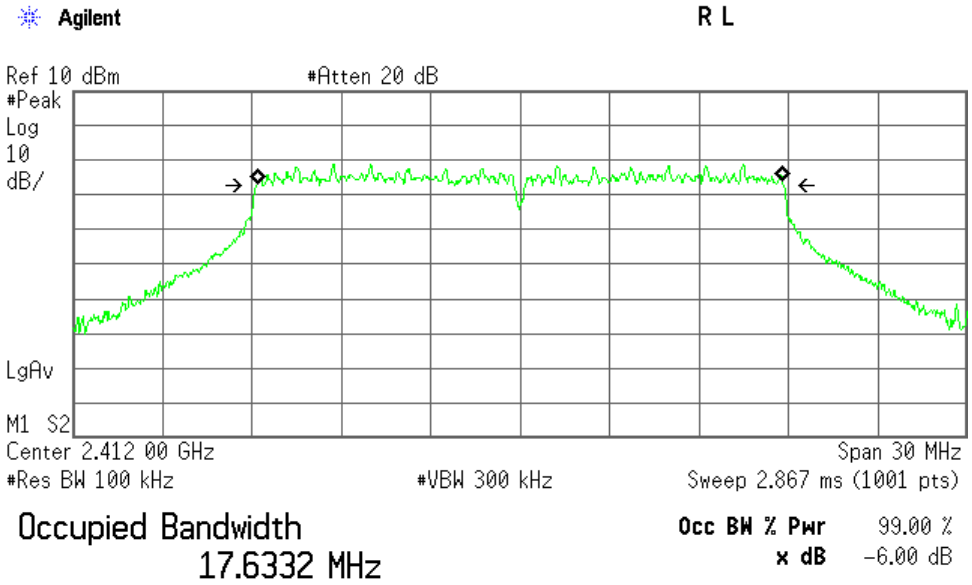


Transmit Freq Error	-21.534 kHz
Occupied Bandwidth	16.495 MHz

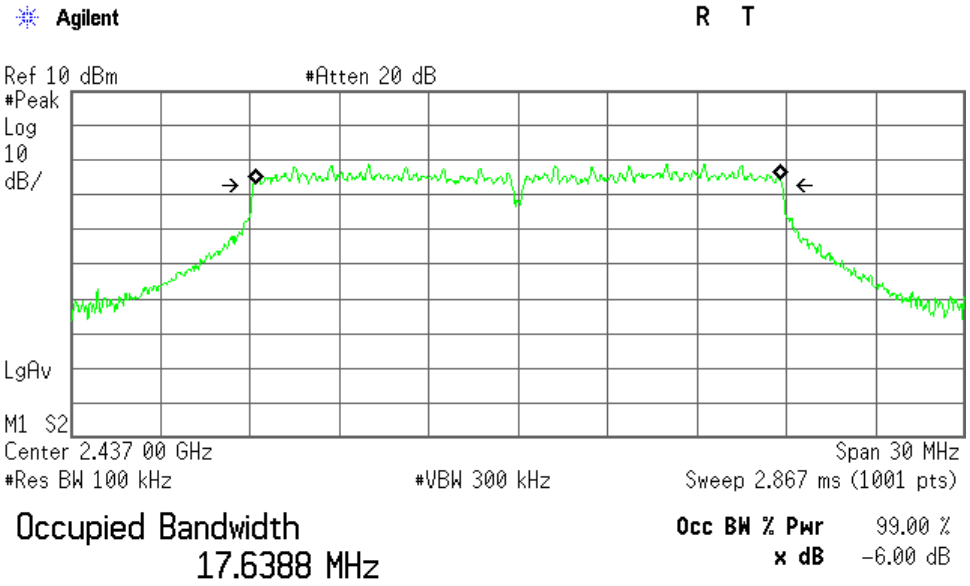
C) IEEE 802.11n

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	17.633	17.710	500
06	2437.0	17.639	17.738	500
11	2462.0	17.641	17.718	500

Low Channel

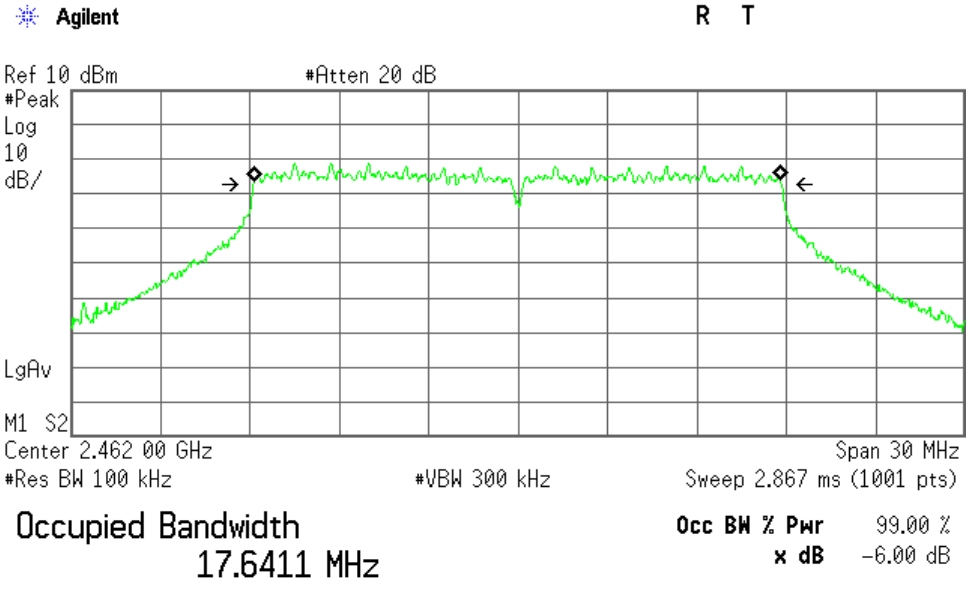


Middle Channel



Transmit Freq Error	-5.935 kHz
Occupied Bandwidth	17.738 MHz

High Channel



Transmit Freq Error	-21.602 kHz
Occupied Bandwidth	17.718 MHz

Mode of EUT : Bluetooth Low Energy

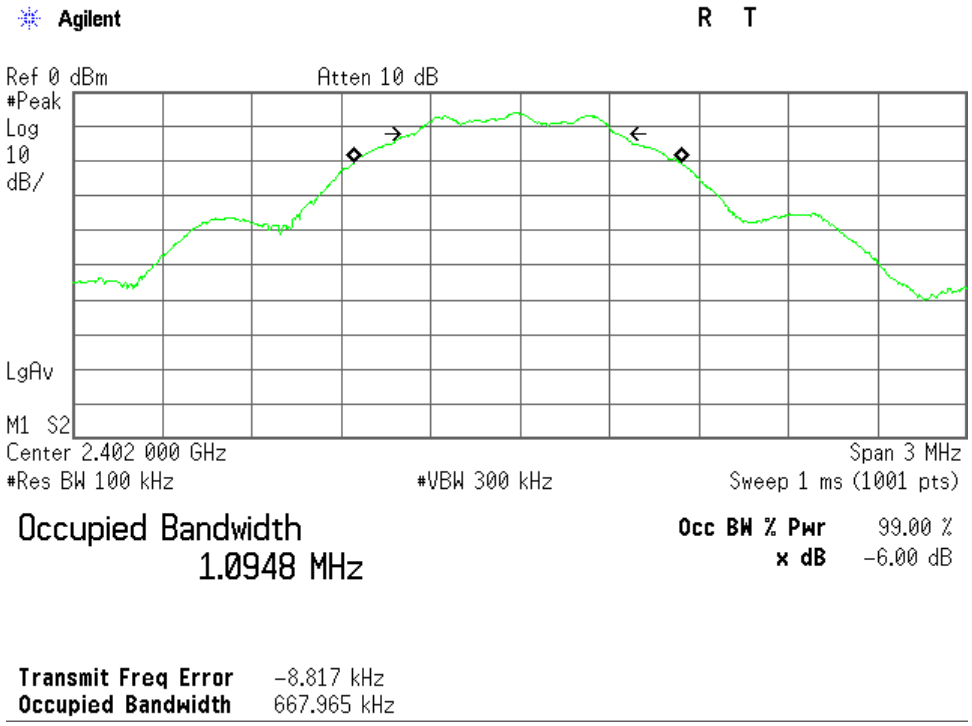
Test Date : October 22, 2015
Temp.:25°C, Humi:50%

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.

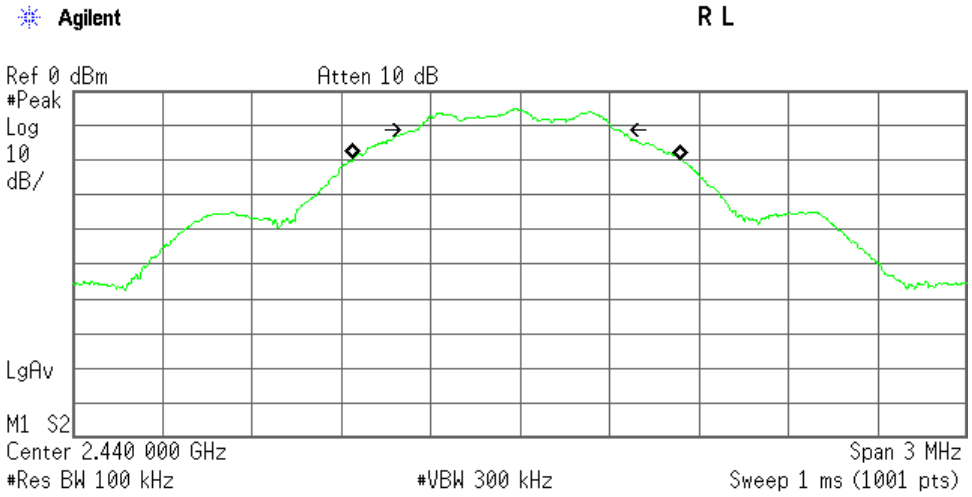
1)Packet Setting : LE (Modulation type : GFSK)

Channel	Frequency (MHz)	99% Bandwidth (kHz)	-6dBc Bandwidth (kHz)	Minimum -6dBc Bandwidth Limit (kHz)
00	2402.0	1094.8	668.0	500
19	2440.0	1098.2	672.9	500
39	2480.0	1097.1	676.1	500

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

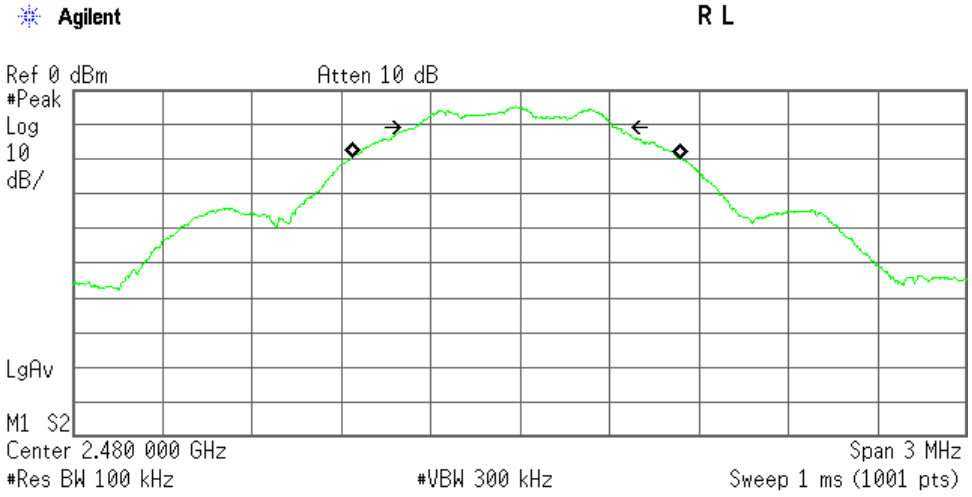


Middle Channel



Transmit Freq Error	-10.925 kHz
Occupied Bandwidth	672.929 kHz

High Channel



Transmit Freq Error	-12.566 kHz
Occupied Bandwidth	676.054 kHz

7.4 Dwell Time

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

Remarks : _____

7.5 Peak Output Power(Conduction)

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

7.5.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

Peak Output Power of IEEE802.11b is	16.67	dBm	at	2437.0	MHz
Peak Output Power of IEEE802.11g is	20.58	dBm	at	2412.0	MHz
Peak Output Power of IEEE802.11n is	20.92	dBm	at	2412.0	MHz
Peak Output Power of Bluetooth LE is	5.09	dBm	at	2480.0	MHz

Uncertainty of Measurement Results ± 0.9 dB(2σ)

Remarks : _____

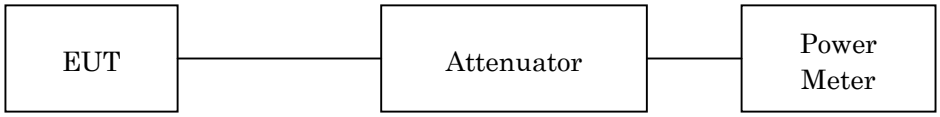
7.5.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Power Meter	N1911A	GB45100291 (B-63)	Agilent	2016/07/16
Power Sensor	N1921A	US44510470 (B-64)	Agilent	2016/07/16
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

7.5.3 Test Method and Test Setup (Diagrammatic illustration)

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



7.5.4 Test Data

1) IEEE 802.11b

Test Date: October 21, 2015
Temp.: 25 °C, Humi: 49 %

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	9.97	6.24	16.21	41.78	30.00	+13.79
06	2437	9.99	6.68	16.67	46.45	30.00	+13.33
11	2462	9.99	6.22	16.21	41.78	30.00	+13.79

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

	Correction Factor	=	9.99 dB
+)	Meter Reading	=	6.68 dBm
	Result	=	16.67 dBm = 46.45 mW

Minimum Margin: 30.00 - 16.67 = 13.33 (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	6.63	
2Mbps	6.65	
5.5Mbps	6.57	
11Mbps	6.68	*

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

2) IEEE 802.11g

Test Date: October 21, 2015
Temp.: 25 °C, Humi: 49 %

Data Rate : 24Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.97	10.61	20.58	114.29	30.00	+ 9.42
06	2437	9.99	10.44	20.43	110.41	30.00	+ 9.57
11	2462	9.99	10.23	20.22	105.20	30.00	+ 9.78

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

	Correction Factor	=	9.97 dB
+)	Meter Reading	=	10.61 dBm
	Result	=	20.58 dBm = 114.29 mW

Minimum Margin: 30.00 - 20.58 = 9.42 (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	6.48	
9Mbps	6.28	
12Mbps	6.67	
18Mbps	6.49	
24Mbps	10.44	*
36Mbps	10.30	
48Mbps	10.43	
54Mbps	10.28	

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

3) IEEE 802.11n

Test Date: October 21, 2015
Temp.: 25 °C, Humi: 49 %

Data Rate : MCS4

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.97	10.95	20.92	123.59	30.00	+ 9.08
06	2437	9.99	10.85	20.84	121.34	30.00	+ 9.16
11	2462	9.99	10.68	20.67	116.68	30.00	+ 9.33

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

	Correction Factor	=	9.97 dB
+)	Meter Reading	=	10.95 dBm
	Result	=	20.92 dBm = 123.59 mW

Minimum Margin: 30.00 - 20.92 = 9.08 (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	6.47	
MCS1	6.50	
MCS2	6.37	
MCS3	10.26	
MCS4	10.85	*
MCS5	10.32	
MCS6	10.33	
MCS7	10.30	

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

4) Bluetooth LE(Modulation type : GFSK)

Test Date: October 22, 2015
Temp.: 25 °C, Humi: 50 %

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	9.97	-5.97	4.00	2.51	30.00	+26.00
19	2440	9.99	-5.24	4.75	2.99	30.00	+25.25
39	2480	9.99	-4.90	5.09	3.23	30.00	+24.91

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

	Correction Factor	=	9.99 dB
+)	Meter Reading	=	-4.90 dBm
	Result	=	5.09 dBm = 3.23 mW

Minimum Margin: 30.00 - 5.09 = 24.91 (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

7.6.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

Peak Power Density of IEEE802.11b is	1.09	dBm	at	2437.0	MHz
Peak Power Density of IEEE802.11g is	-5.52	dBm	at	2437.0	MHz
Peak Power Density of IEEE802.11n is	-5.83	dBm	at	2412.0	MHz
Peak Power Density of Bluetooth LE is	4.43	dBm	at	2480.0	MHz

Uncertainty of Measurement Results ± 1.7 dB(2σ)

Remarks : _____

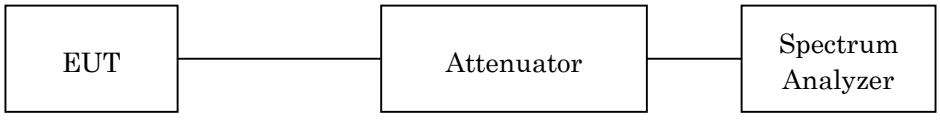
7.6.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

7.6.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



7.6.4 Test Data

1) IEEE 802.11b

Test Date: October 22, 2015
Temp.: 25 °C, Humi: 50 %

Data Rate : 11Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.97	-9.30	0.67	1.17	8.00	+ 7.33
06	2437	9.99	-8.90	1.09	1.29	8.00	+ 6.91
11	2462	9.99	-9.25	0.74	1.19	8.00	+ 7.26

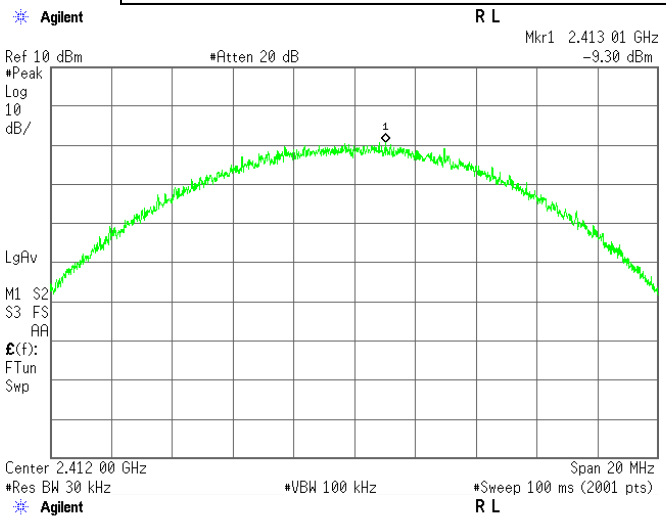
Calculated result at 2437.000 MHz, as the worst point shown on underline:

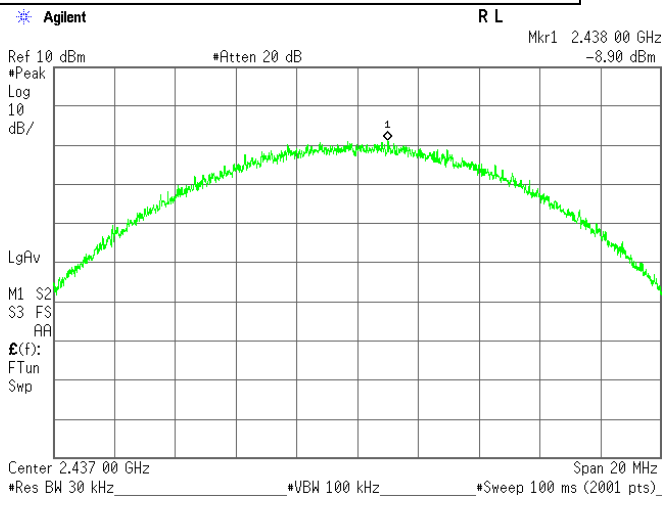
	Correction Factor	=	9.99 dB
+)	Meter Reading	=	-8.90 dBm
	Result	=	1.09 dBm = 1.29 mW

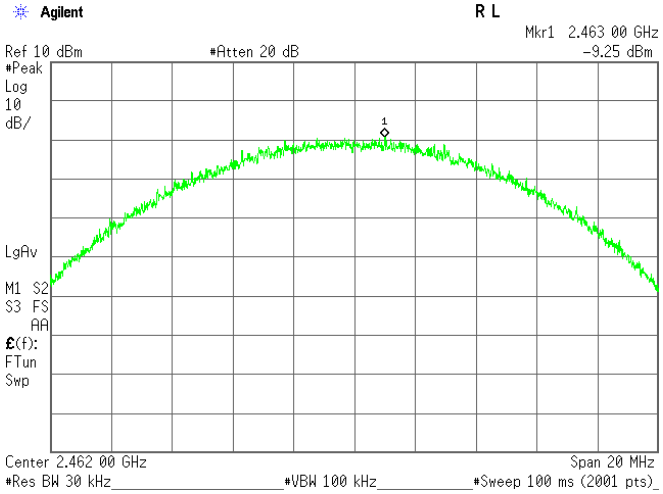
Minimum Margin: 8.00 - 1.09 = 6.91 (dB)

NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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







2) IEEE 802.11g

Test Date: October 22, 2015
Temp.: 25 °C, Humi: 50 %

Data Rate : 24Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.97	-15.63	-5.66	0.27	8.00	+13.66
06	2437	9.99	-15.51	-5.52	0.28	8.00	+13.52
11	2462	9.99	-15.59	-5.60	0.28	8.00	+13.60

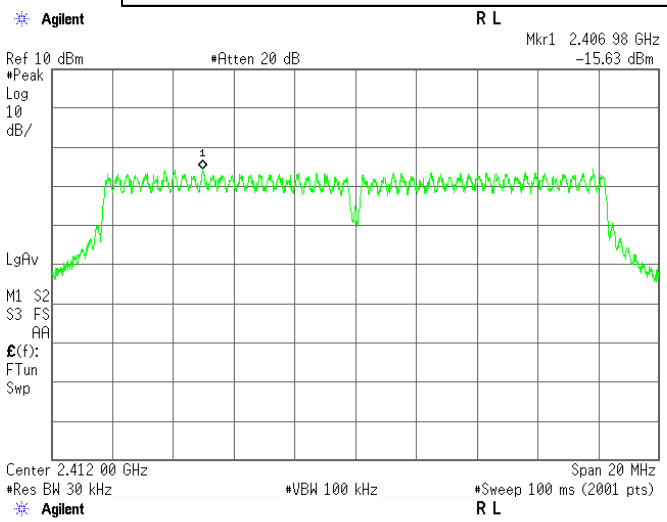
Calculated result at 2437.000 MHz, as the worst point shown on underline:

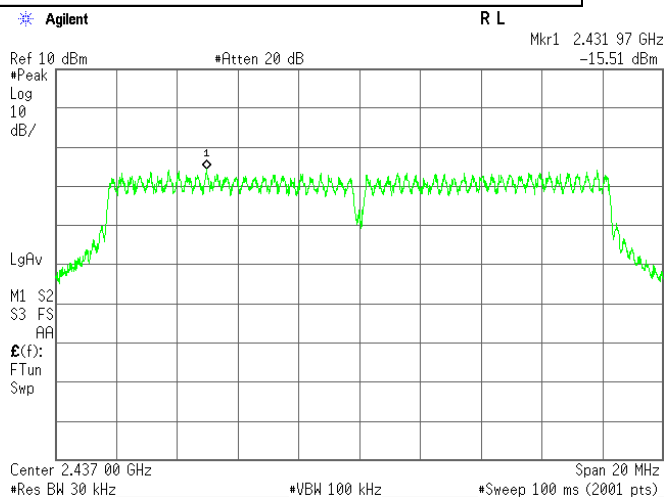
Correction Factor	=	9.99 dB
+) Meter Reading	=	-15.51 dBm
Result	=	-5.52 dBm = 0.28 mW

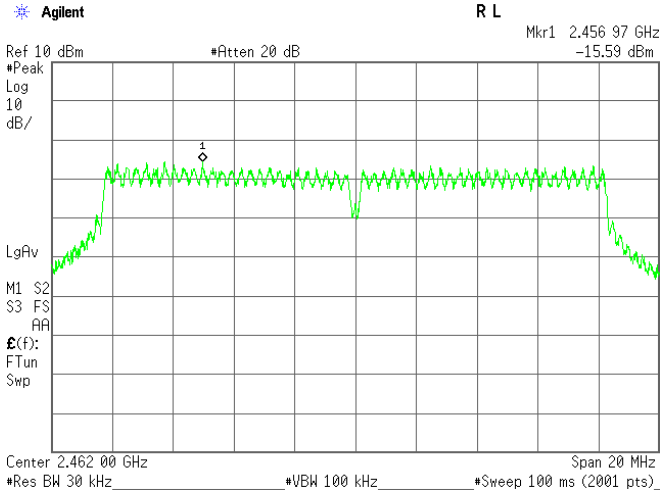
Minimum Margin: 8.00 - -5.52 = 13.52 (dB)

NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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







3) IEEE 802.11n

Test Date: October 22, 2015
Temp.: 25 °C, Humi: 50 %

Data Rate : MCS4

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	9.97	-15.80	-5.83	0.26	8.00	+13.83
06	2437	9.99	-15.90	-5.91	0.26	8.00	+13.91
11	2462	9.99	-16.57	-6.58	0.22	8.00	+14.58

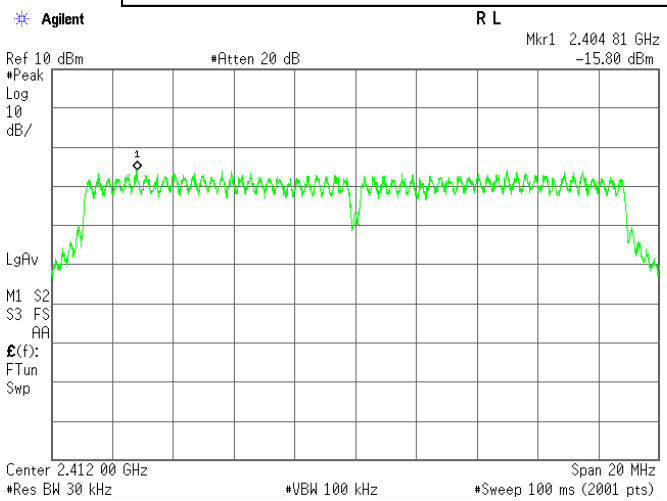
Calculated result at 2412.000 MHz, as the worst point shown on underline:

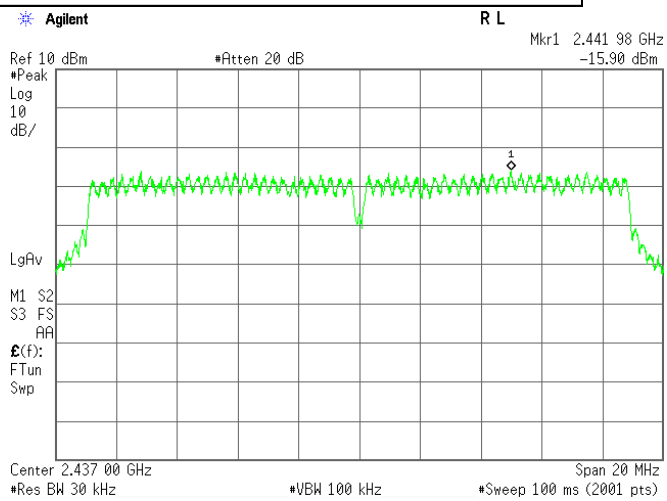
Correction Factor	=	9.97 dB
+) Meter Reading	=	-15.80 dBm
Result	=	-5.83 dBm = 0.26 mW

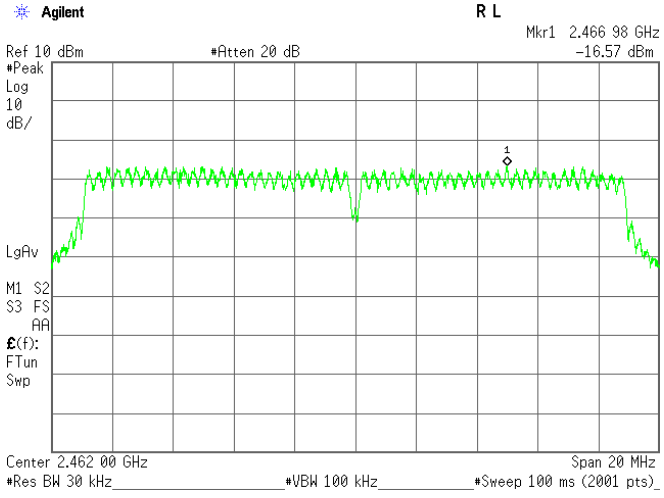
Minimum Margin: 8.00 - -5.83 = 13.83 (dB)

NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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







4) Bluetooth LE(Modulation type : GFSK)

Test Date: October 22, 2015
Temp.: 25 °C, Humi: 50 %

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	9.97	-6.74	3.23	2.10	8.00	+ 4.77
19	2440	9.99	-5.99	4.00	2.51	8.00	+ 4.00
39	2480	9.99	-5.56	4.43	2.77	8.00	+ 3.57

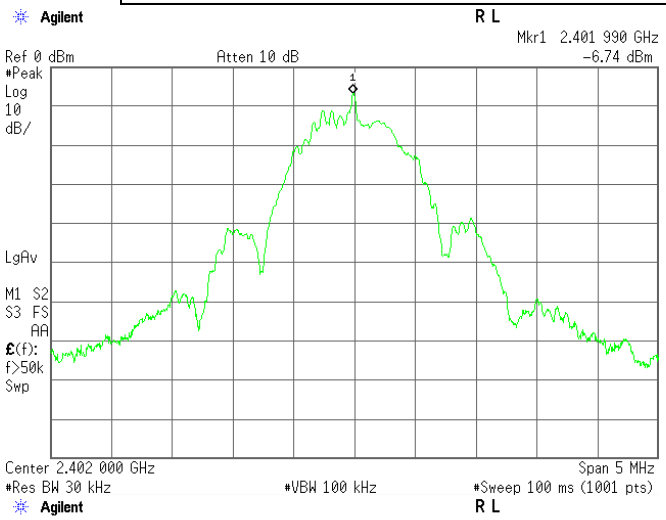
Calculated result at 2480.000 MHz, as the worst point shown on underline:

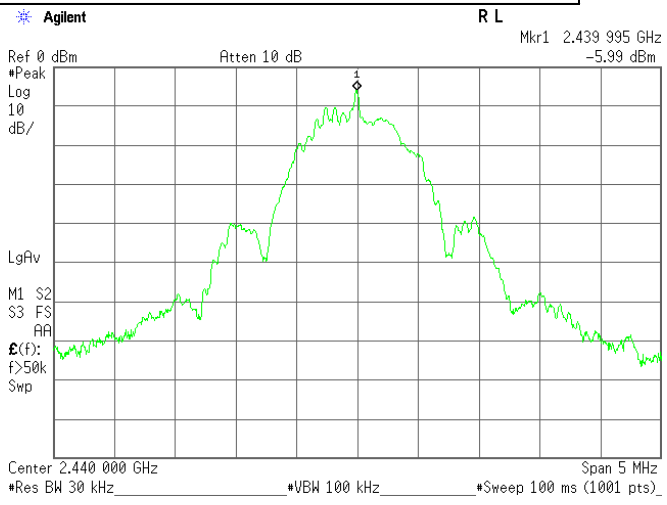
Correction Factor	=	9.99 dB	
+) Meter Reading	=	-5.56 dBm	
Result	=	4.43 dBm	= 2.77 mW

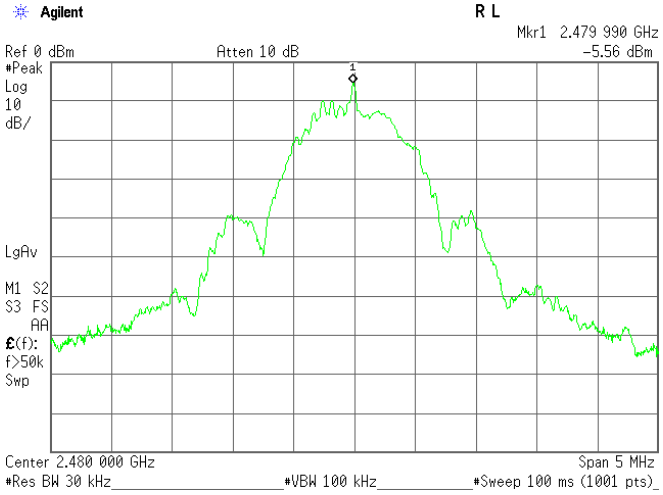
Minimum Margin: 8.00 - 4.43 = 3.57 (dB)

NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. 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

7.7.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

Uncertainty of Measurement Results

9 kHz – 1 GHz	± 1.4	dB(2σ)
1 GHz – 18 GHz	± 1.7	dB(2σ)
18 GHz – 40 GHz	± 2.3	dB(2σ)

Remarks : _____

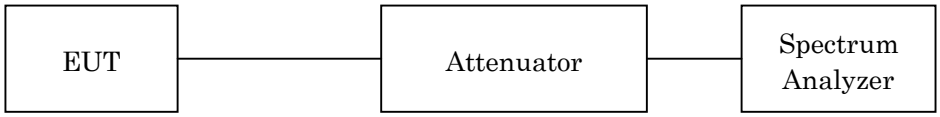
7.7.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

NOTE : The calibration interval of the above test instruments is 12 months.

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:

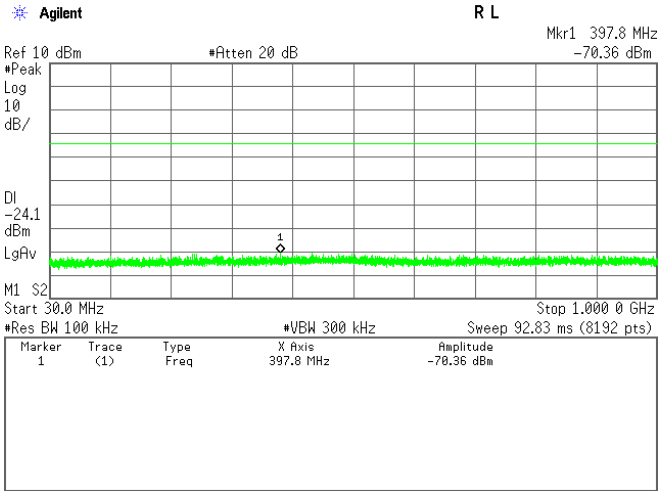
Frequency Range	30 MHz - 25 GHz	Band-Edge
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

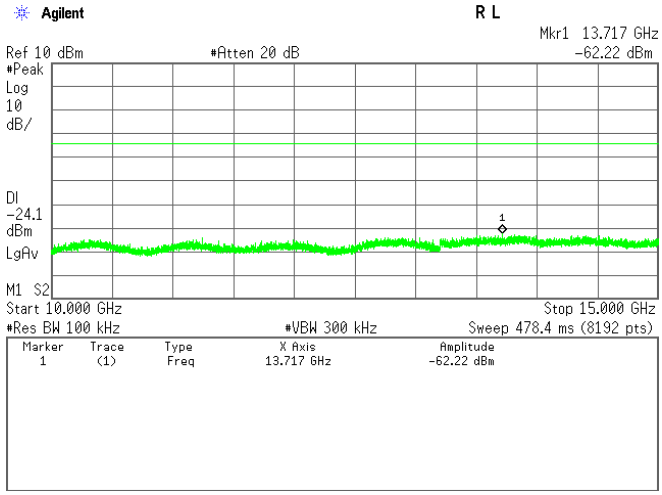
7.7.4 Test Data

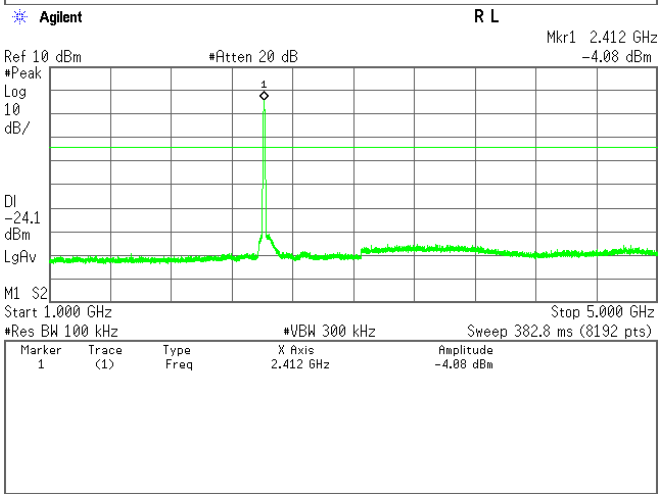
Test Date : October 22, 2015
Temp.:25°C, Humi:50%

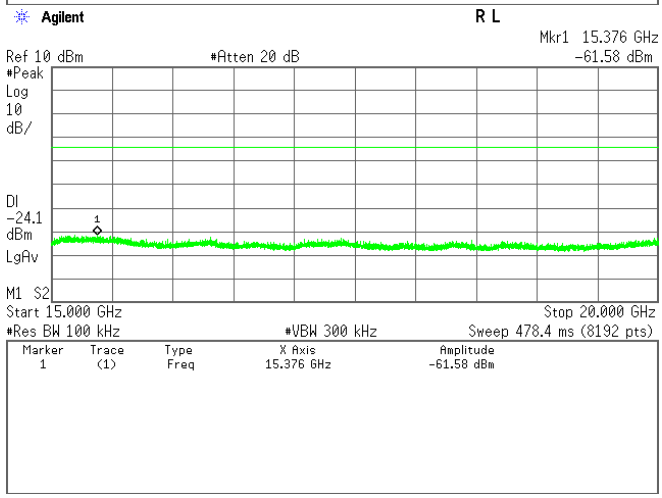
1) IEEE 802.11b

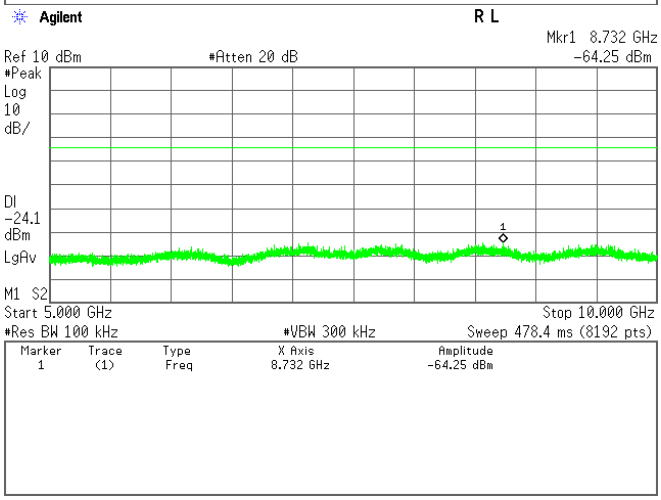
Low Channel

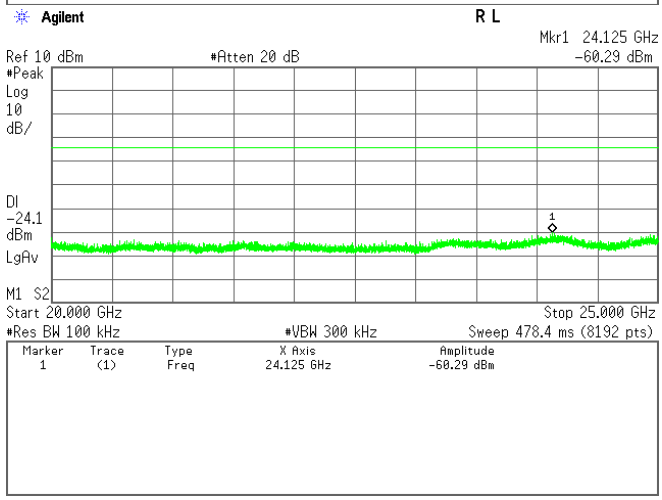




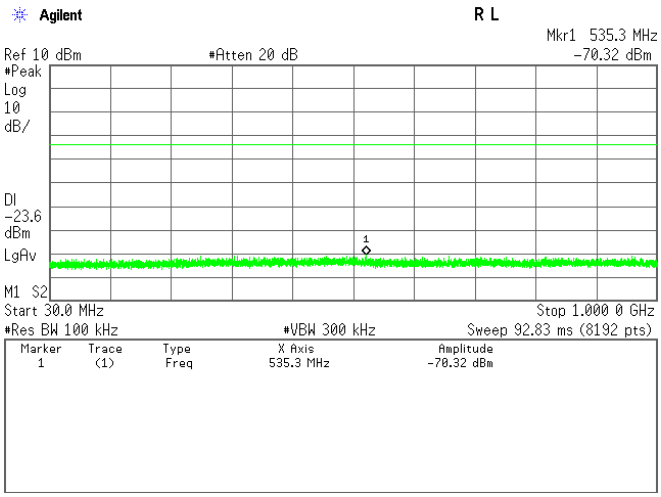


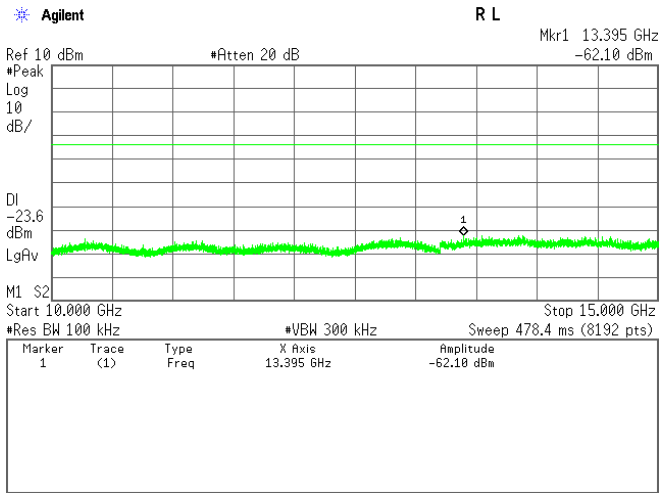


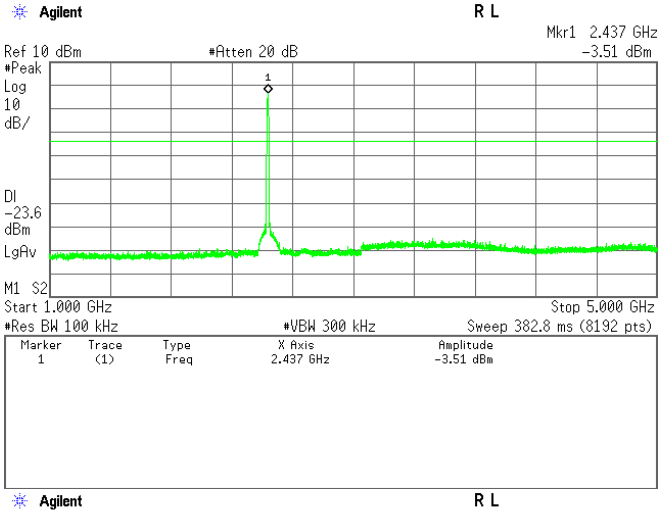


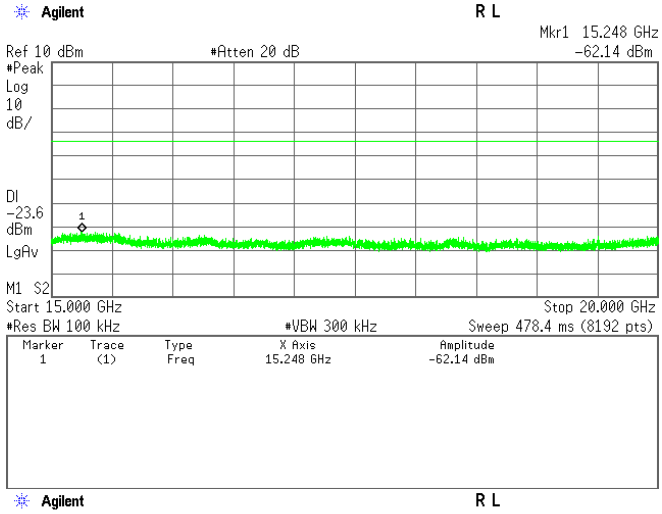


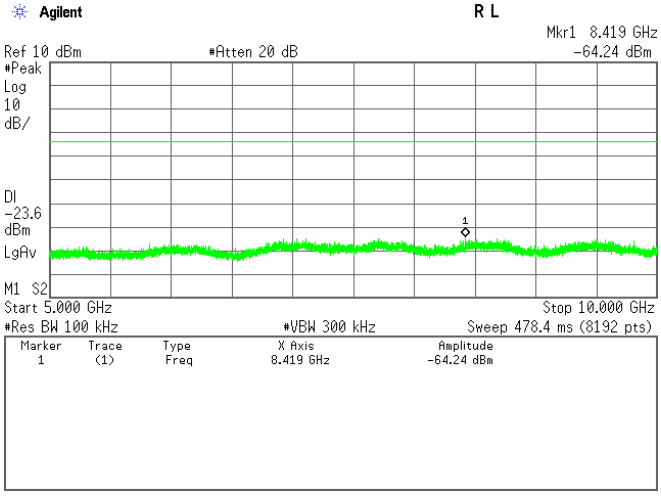
Middle Channel

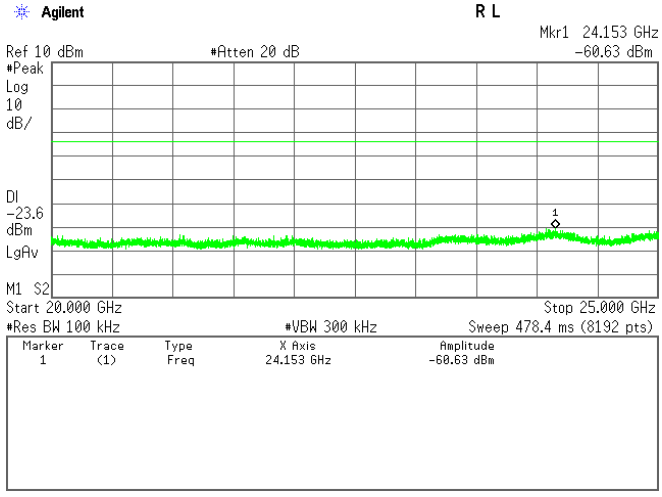




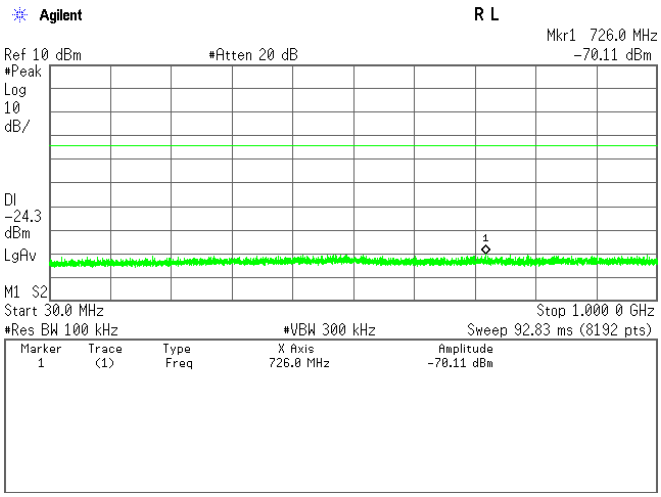


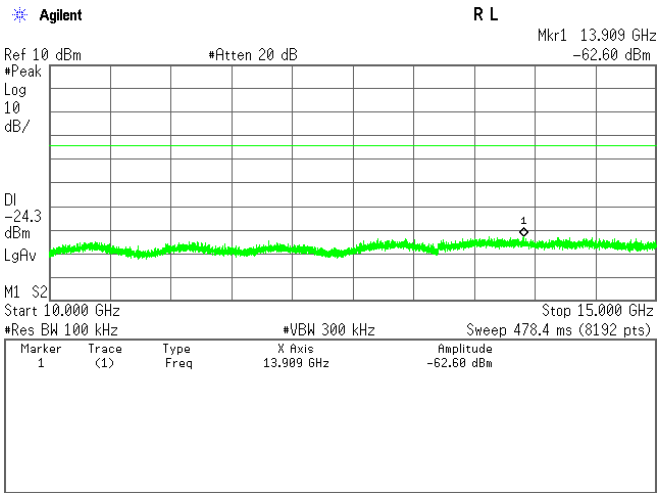


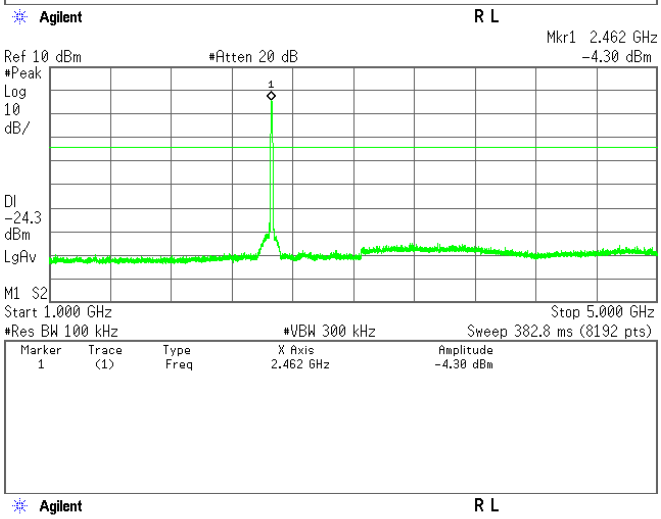


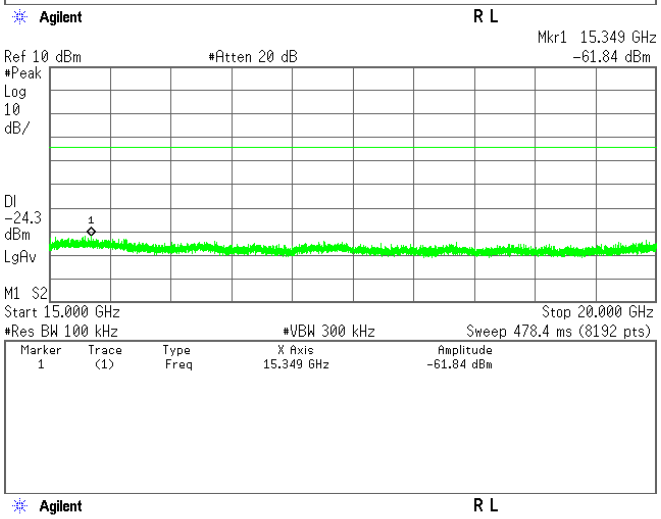


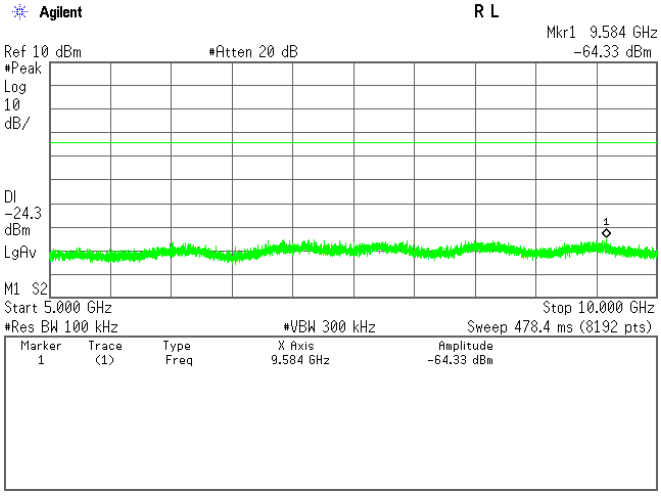
High Channel

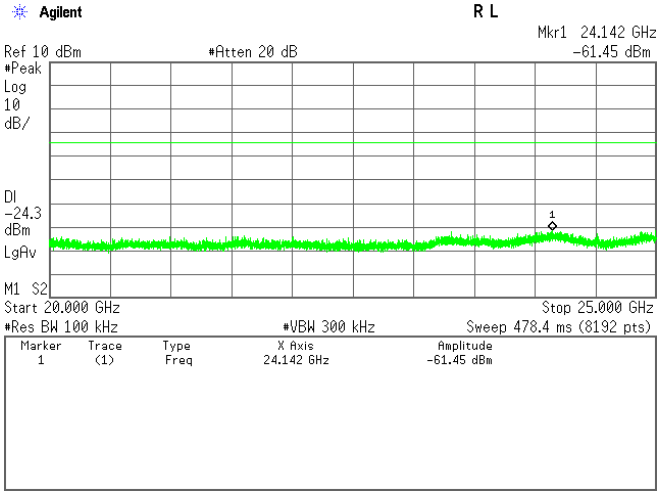






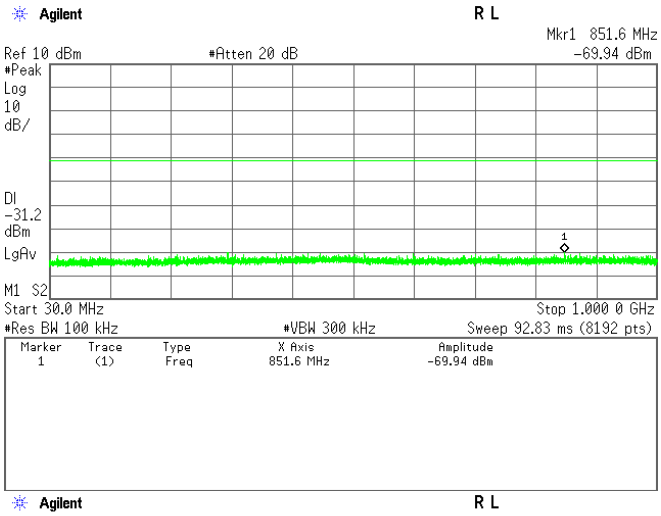


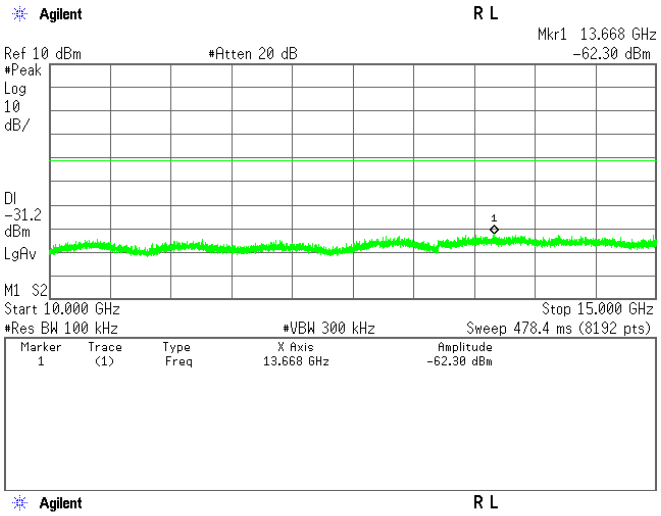


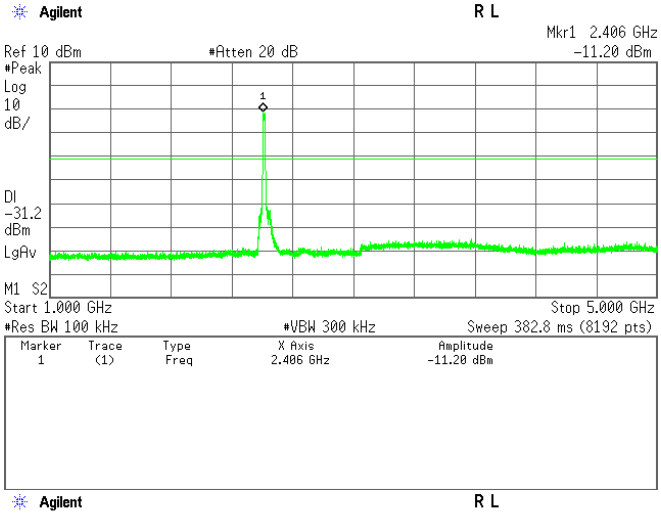


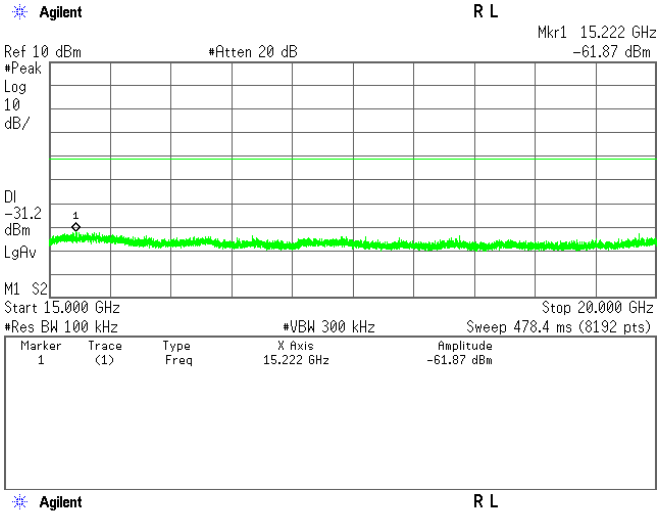
2) IEEE 802.11g

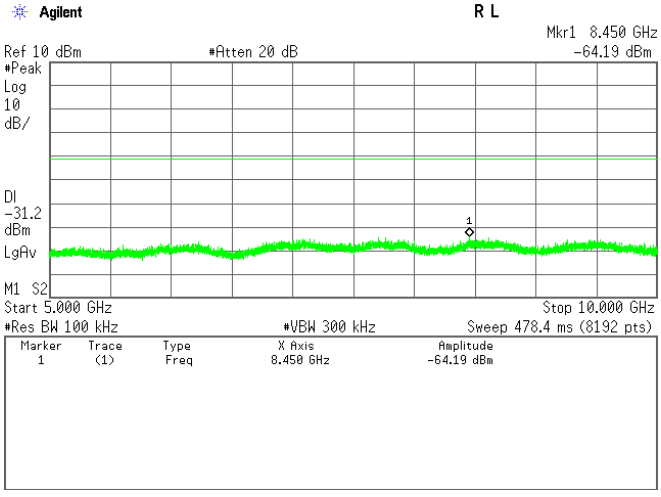
Low Channel

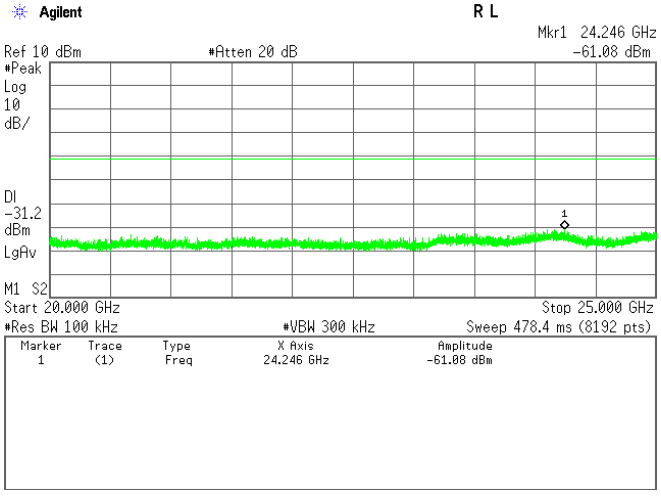




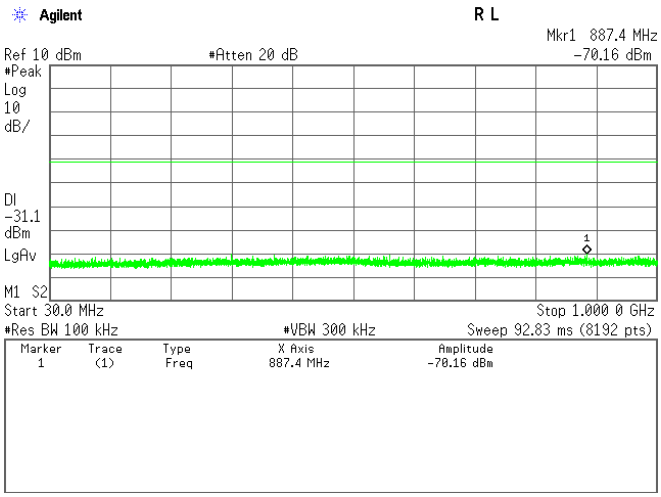


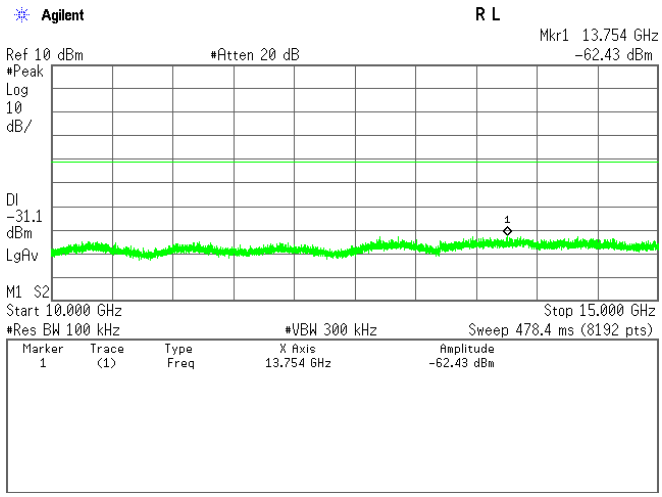


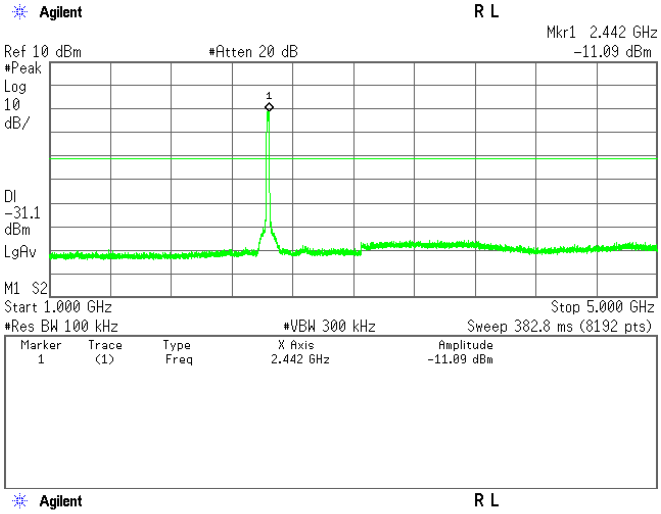


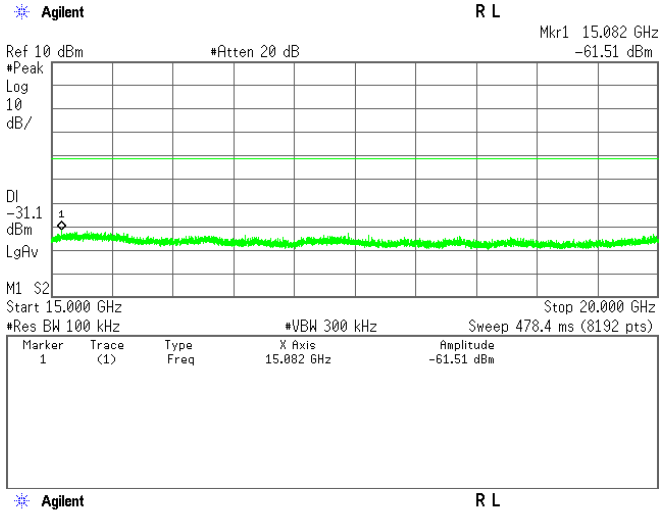


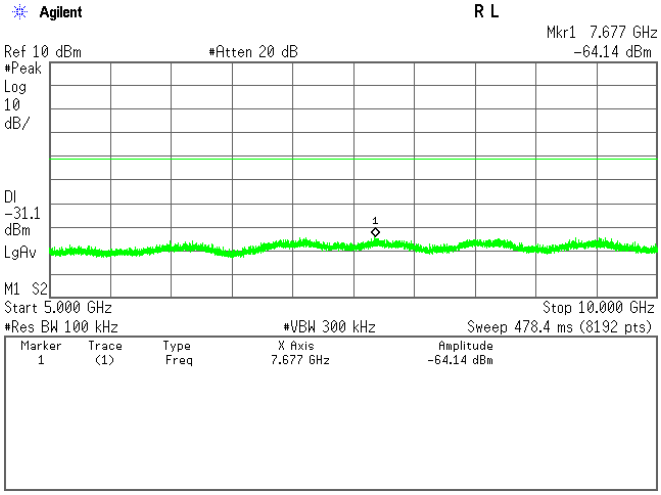
Middle channel

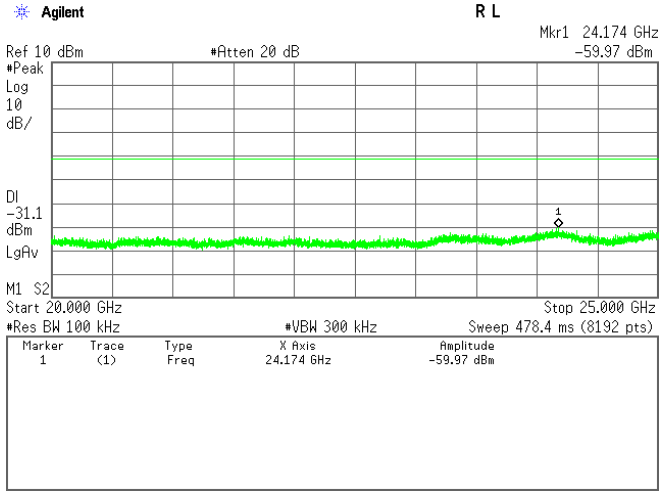




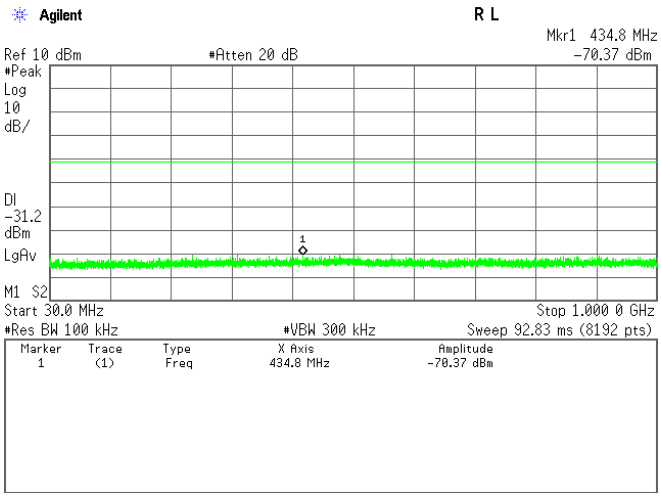


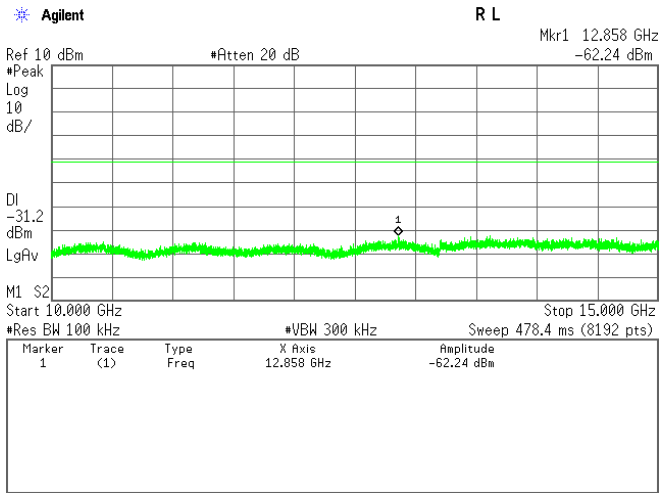


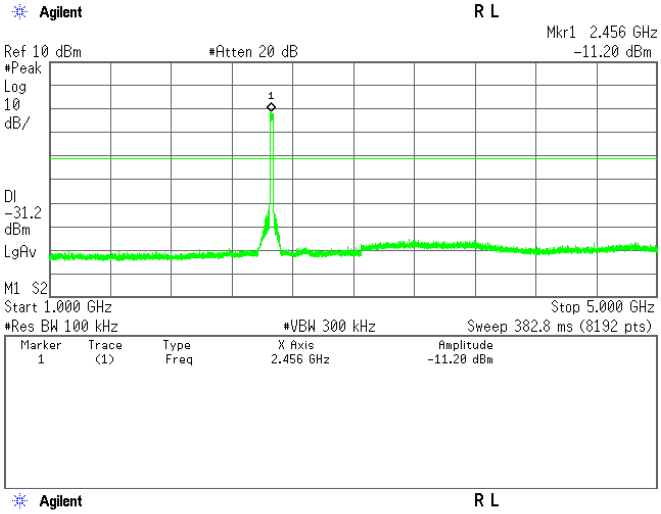


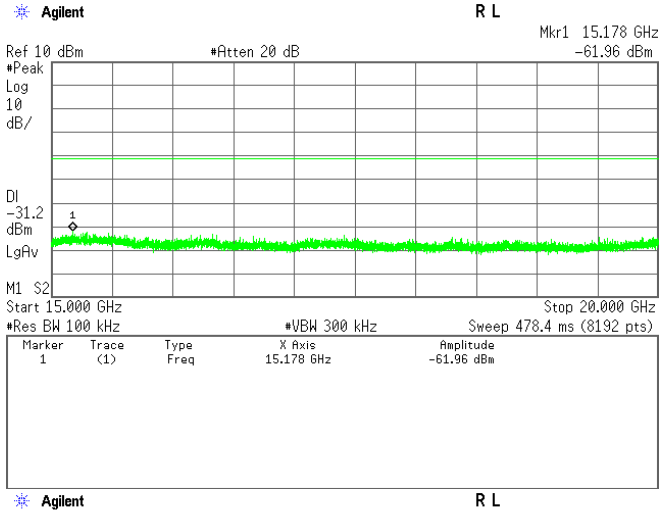


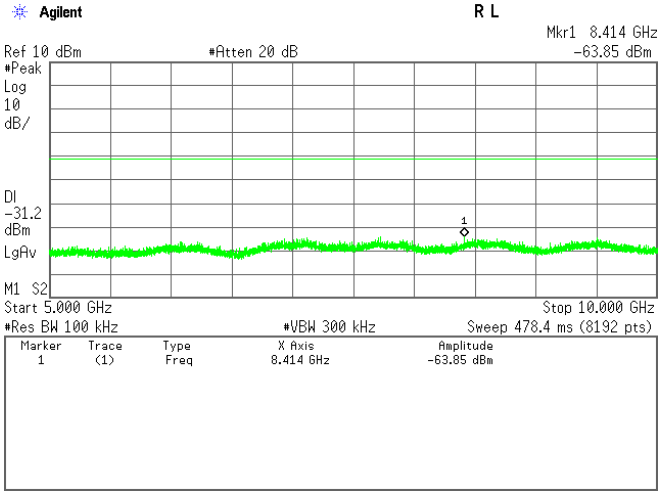
High Channel

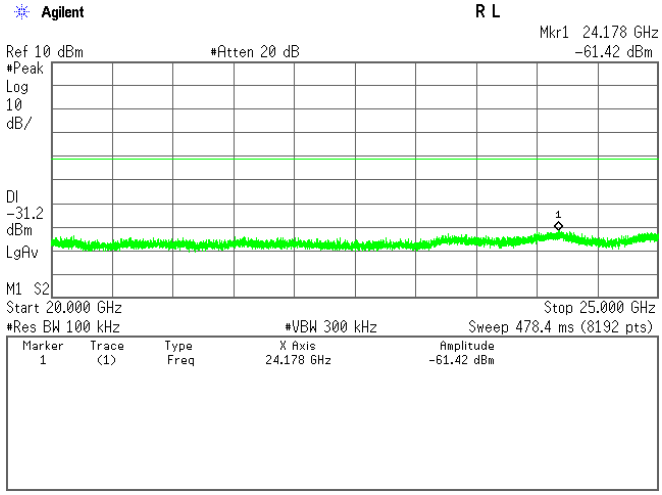






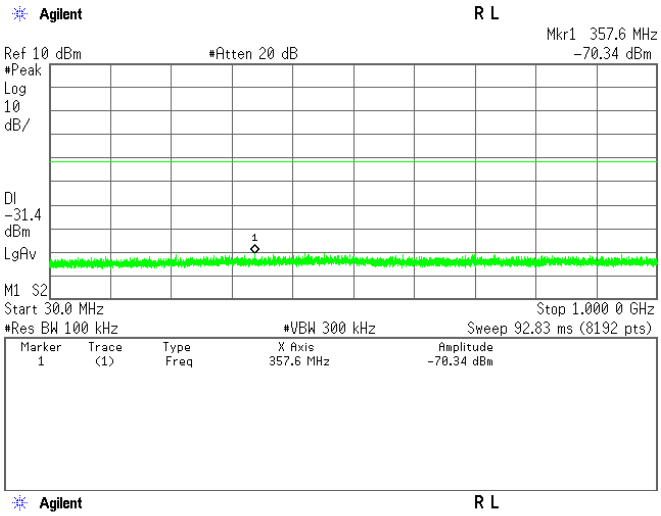


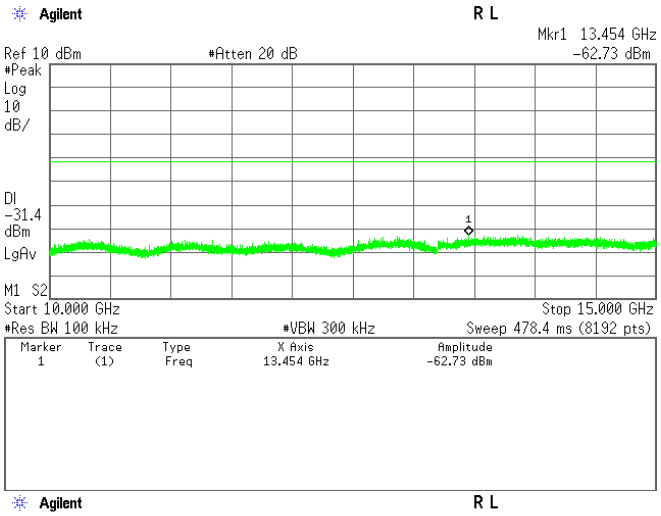


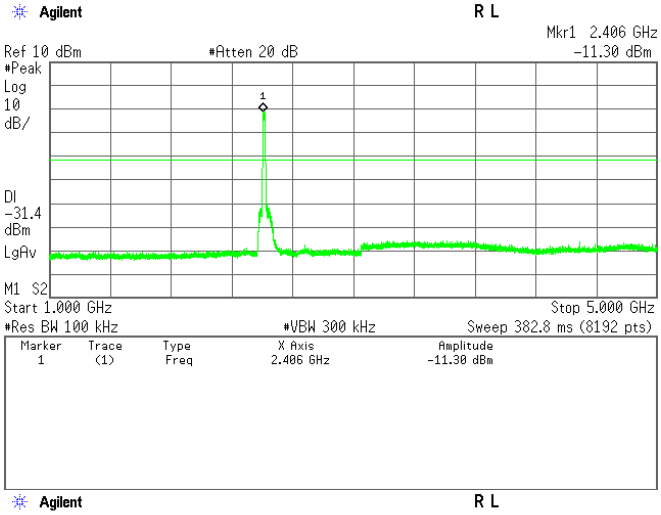


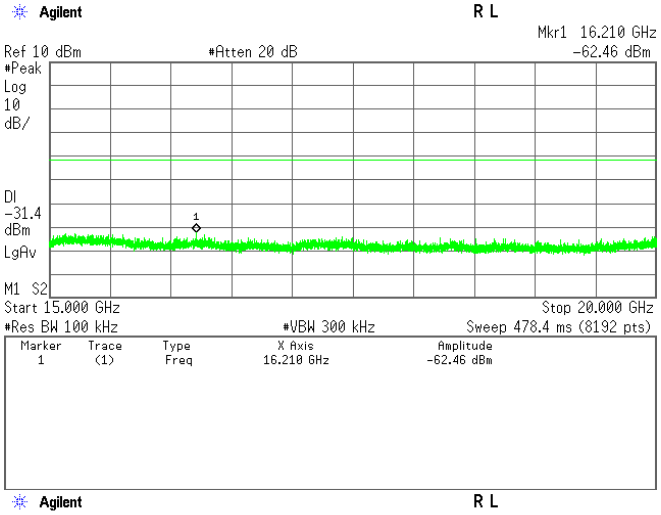
3) IEEE 802.11n

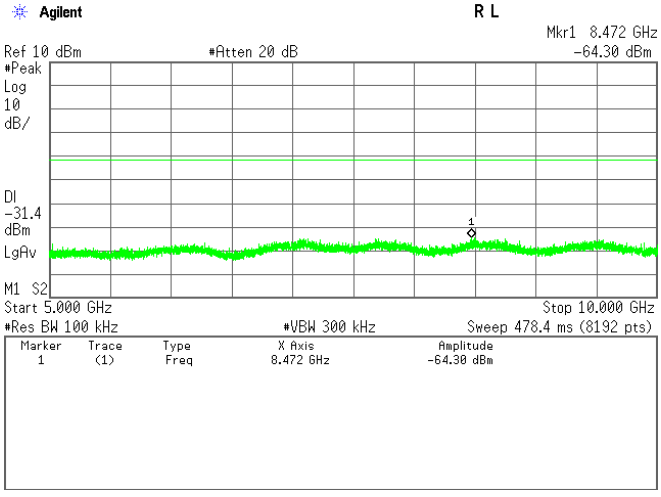
Low Channel

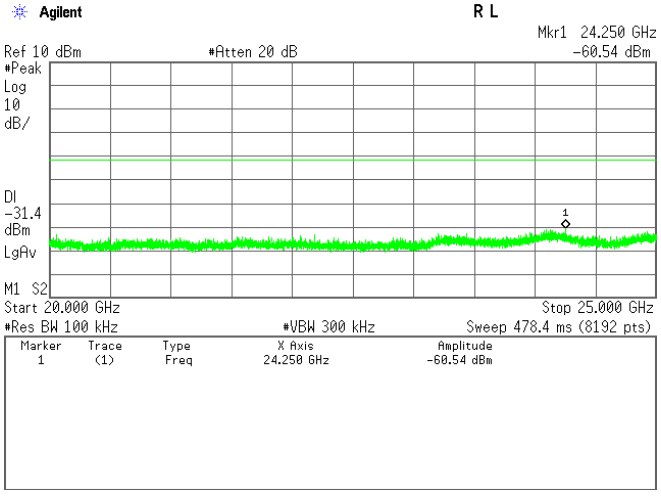




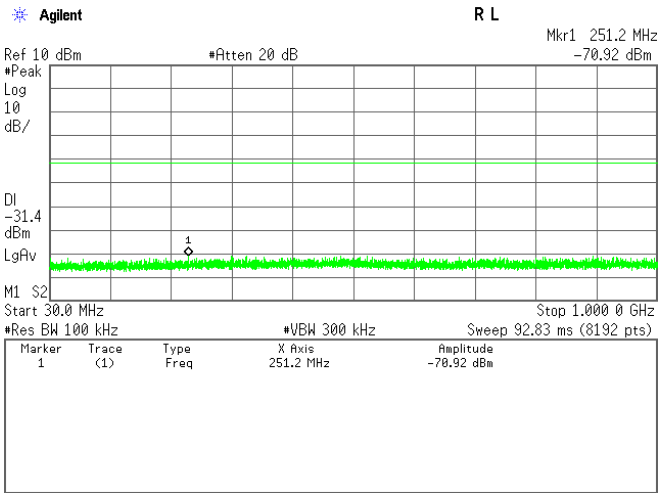


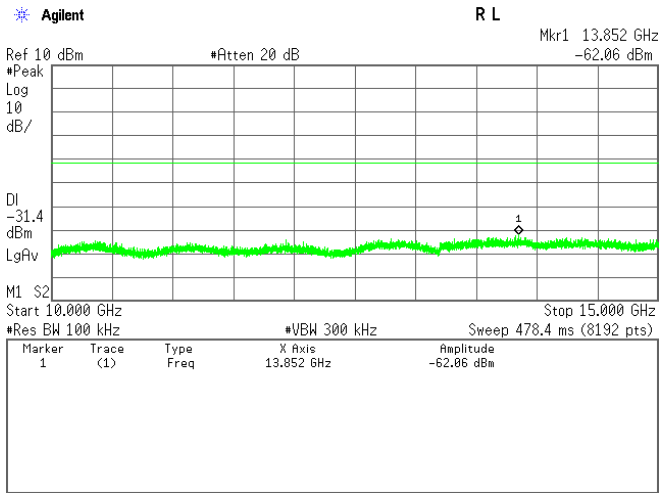


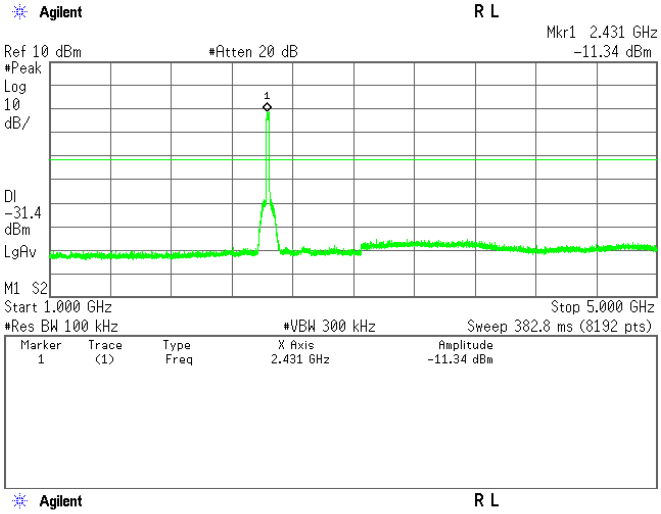


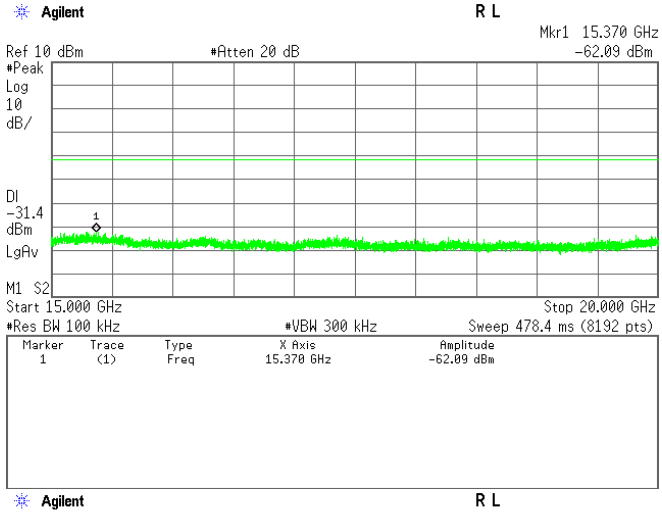


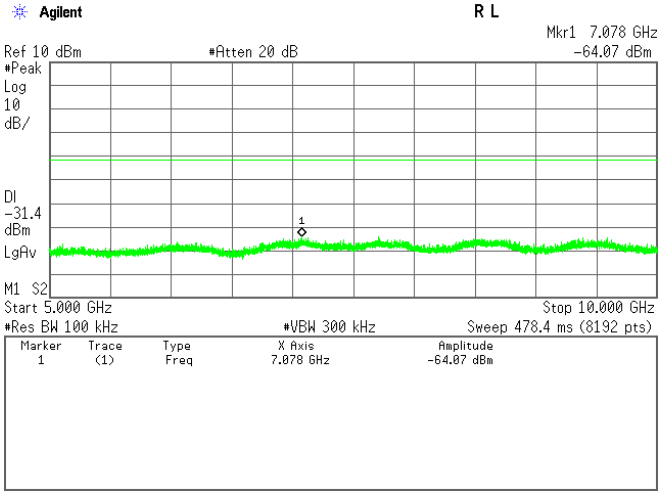
Middle Channel

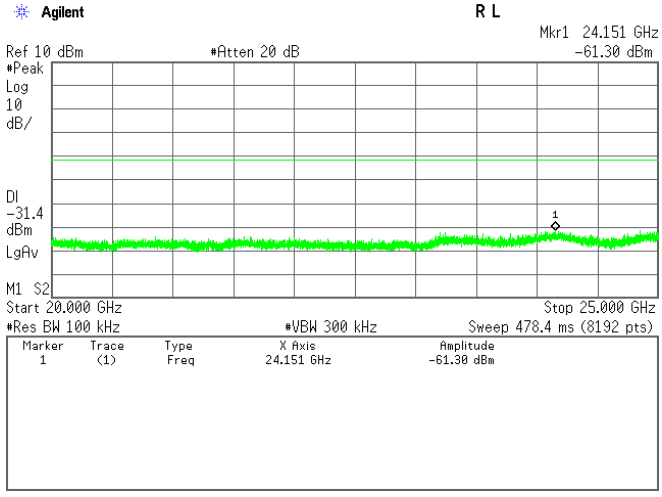




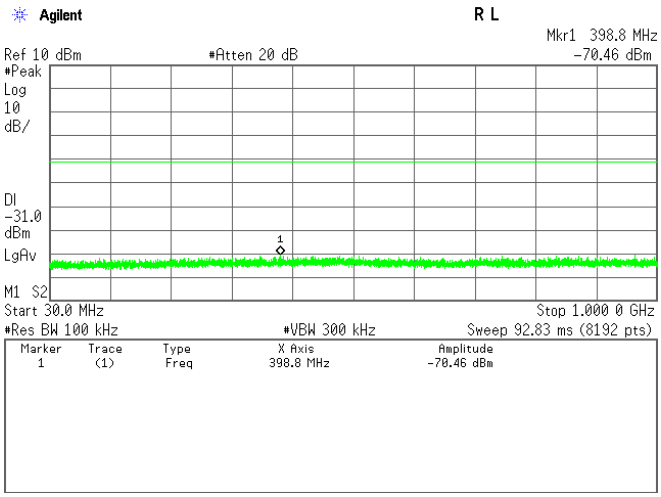


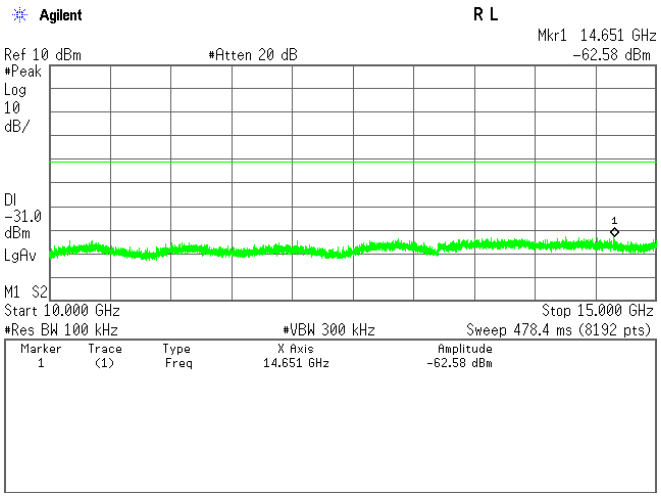


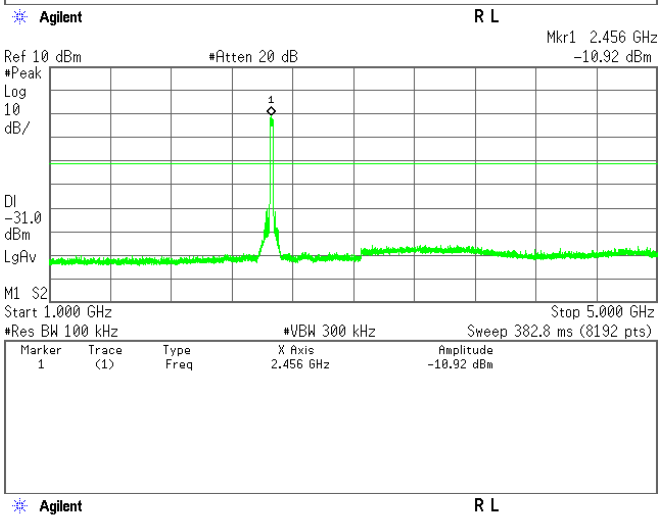


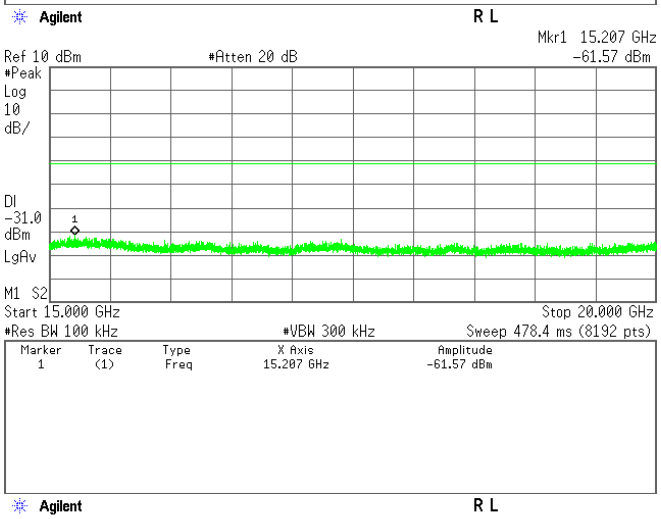


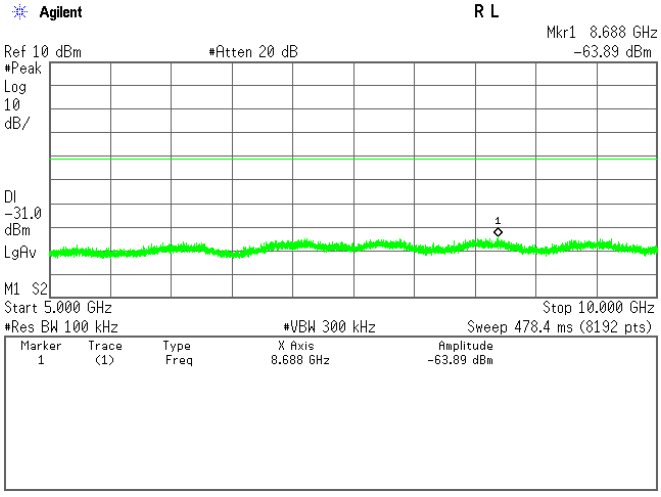
High Channel

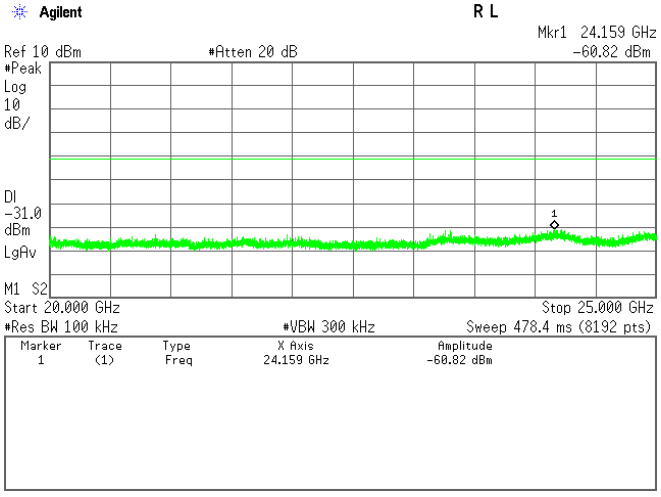






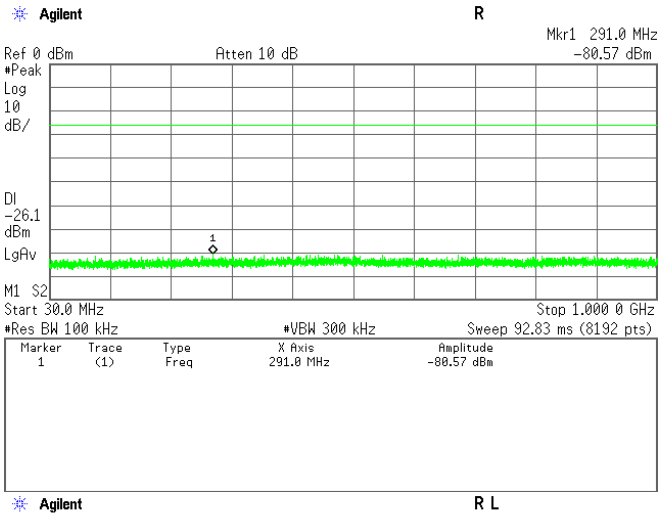


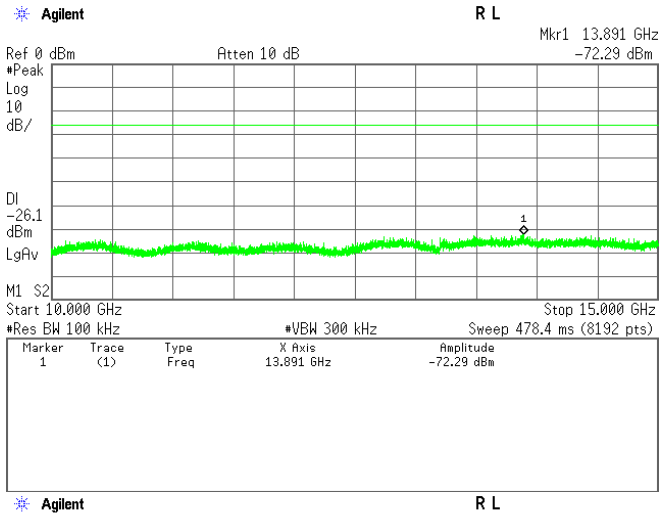


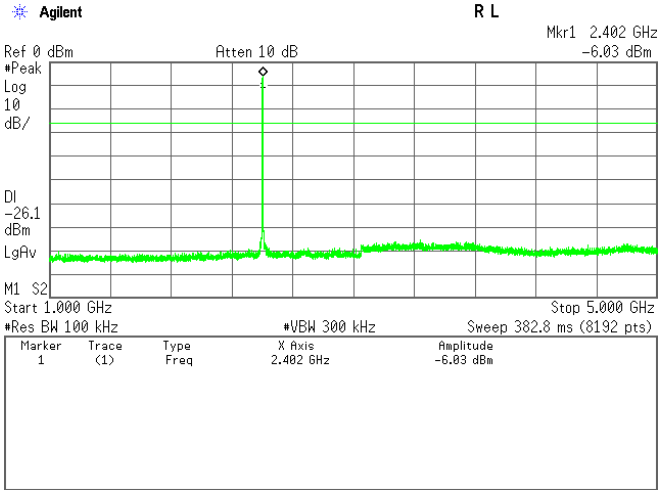


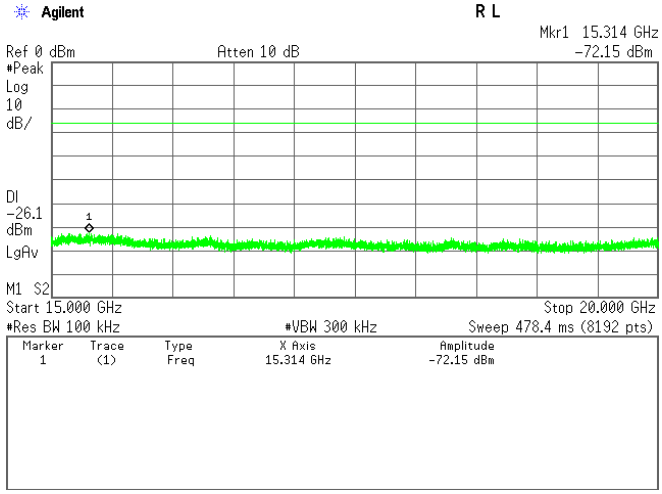
4) Bluetooth Low Energy

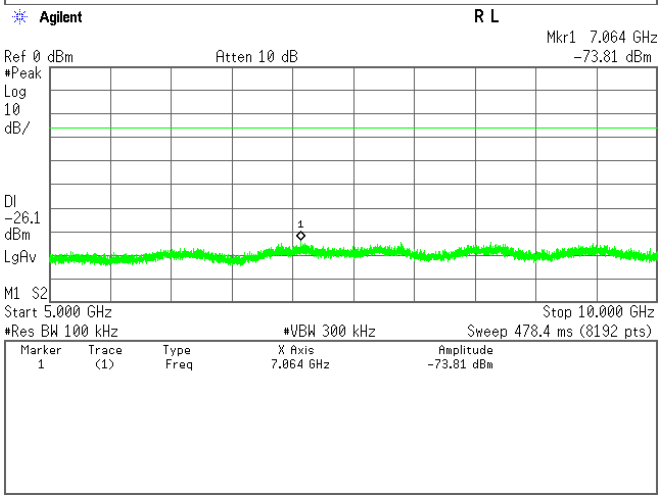
Low Channel

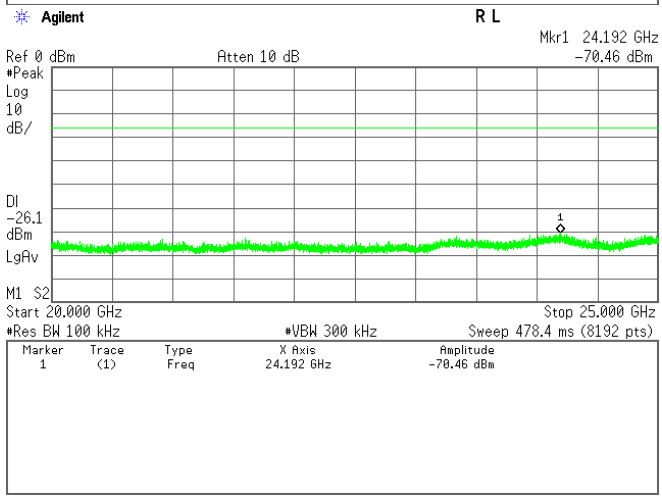




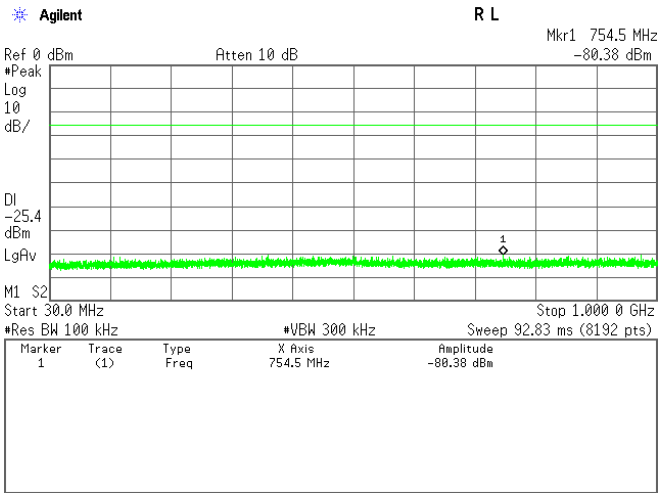


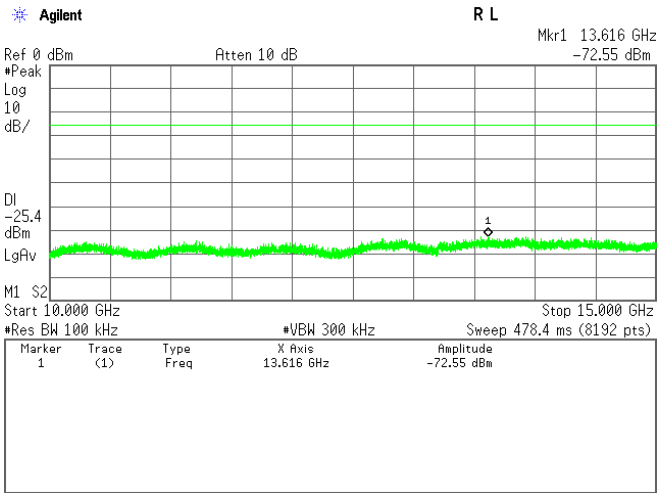


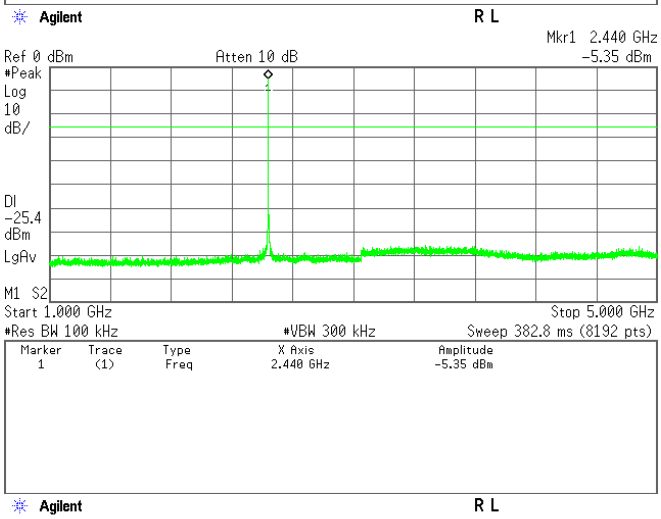


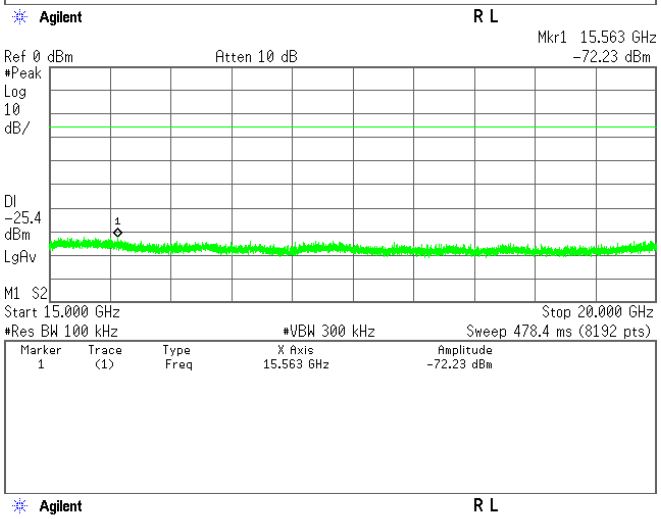


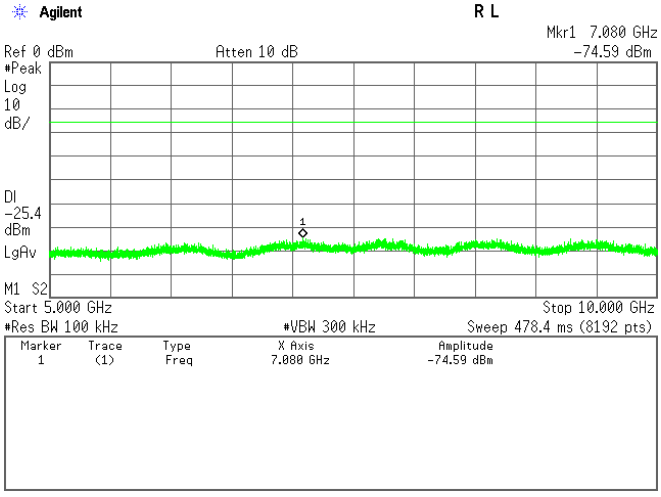
Middle Channel

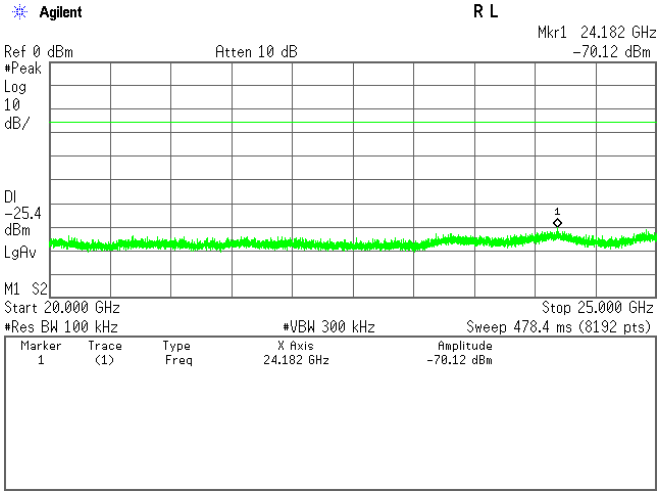




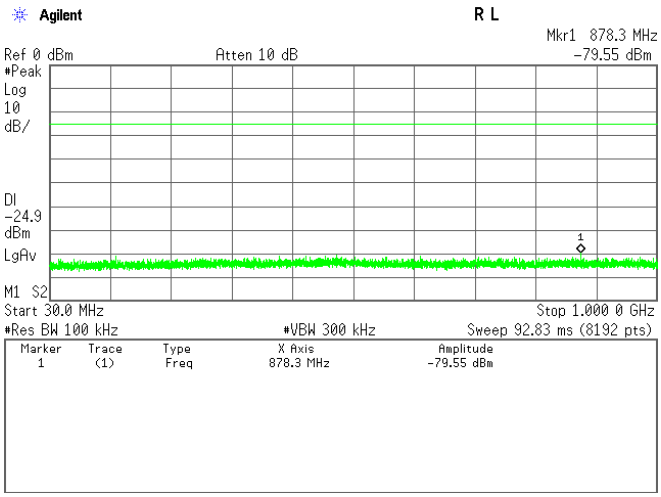


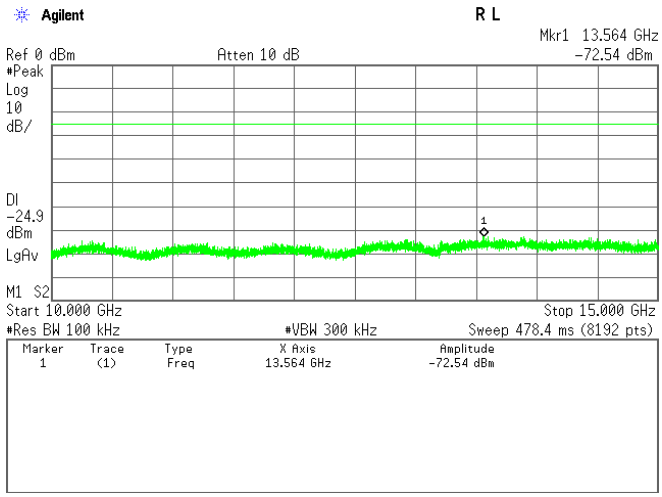


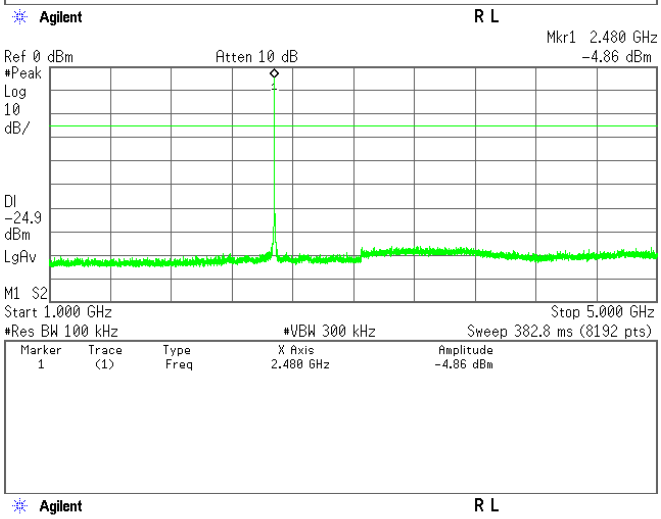


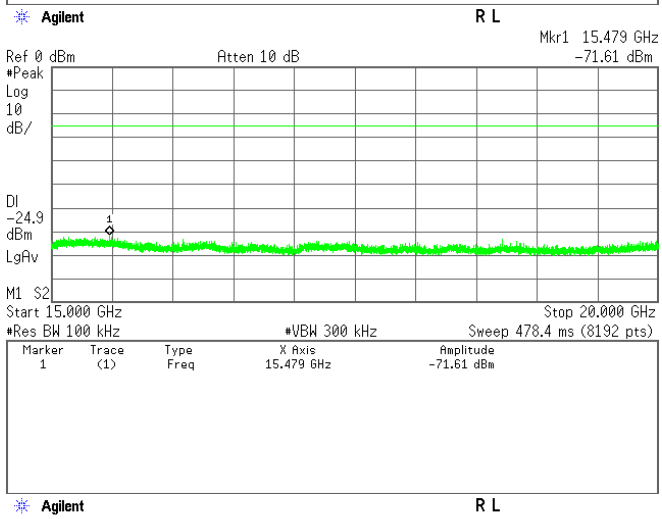


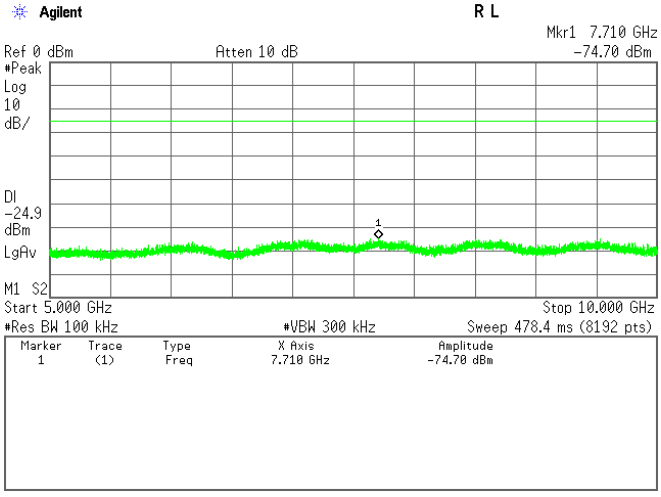
High Channel

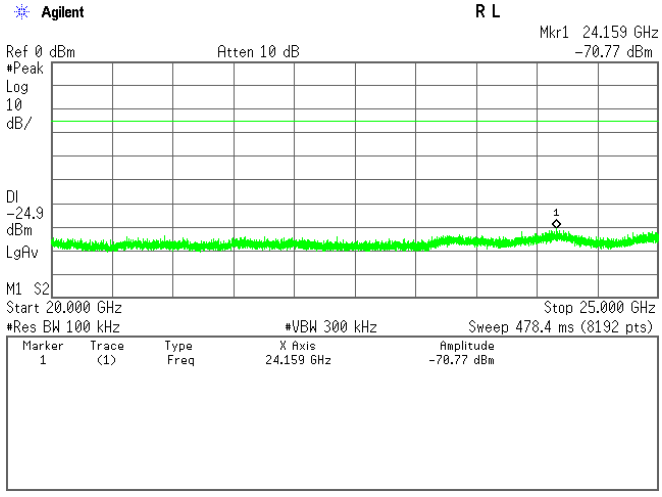










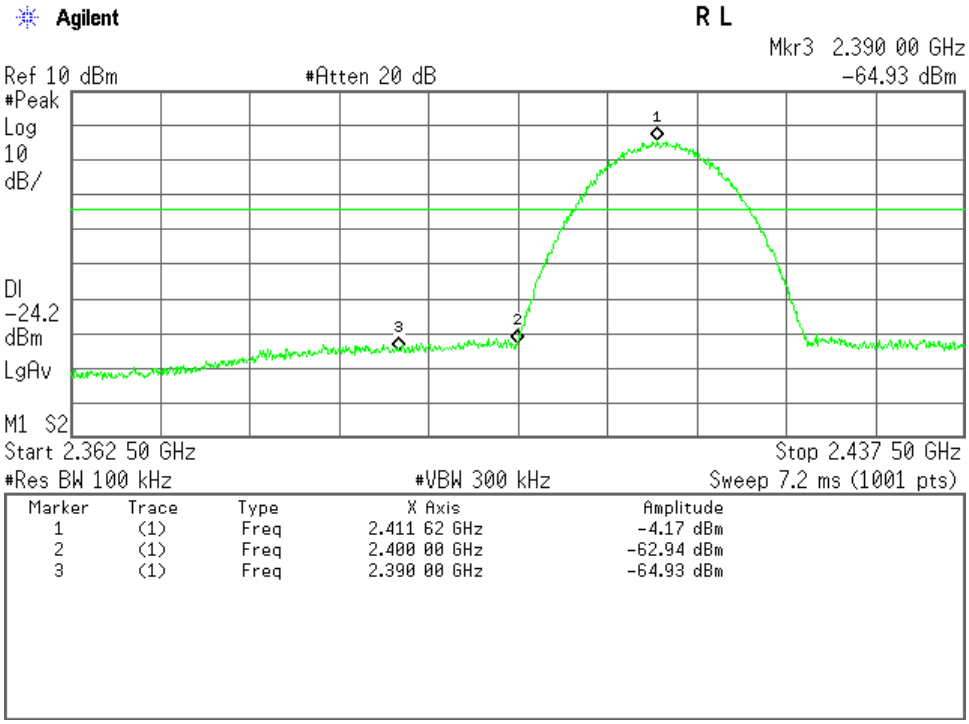


Band-Edge Emission

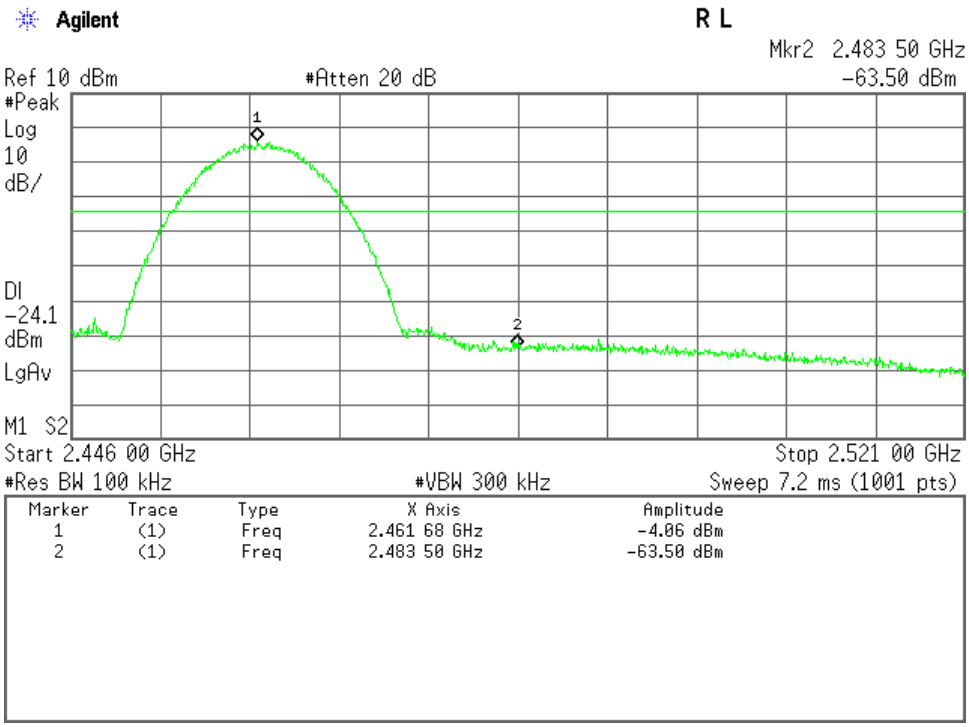
Test Date : October 22, 2015
Temp.:25°C, Humi:50%

1) IEEE 802.11b

Low Channel

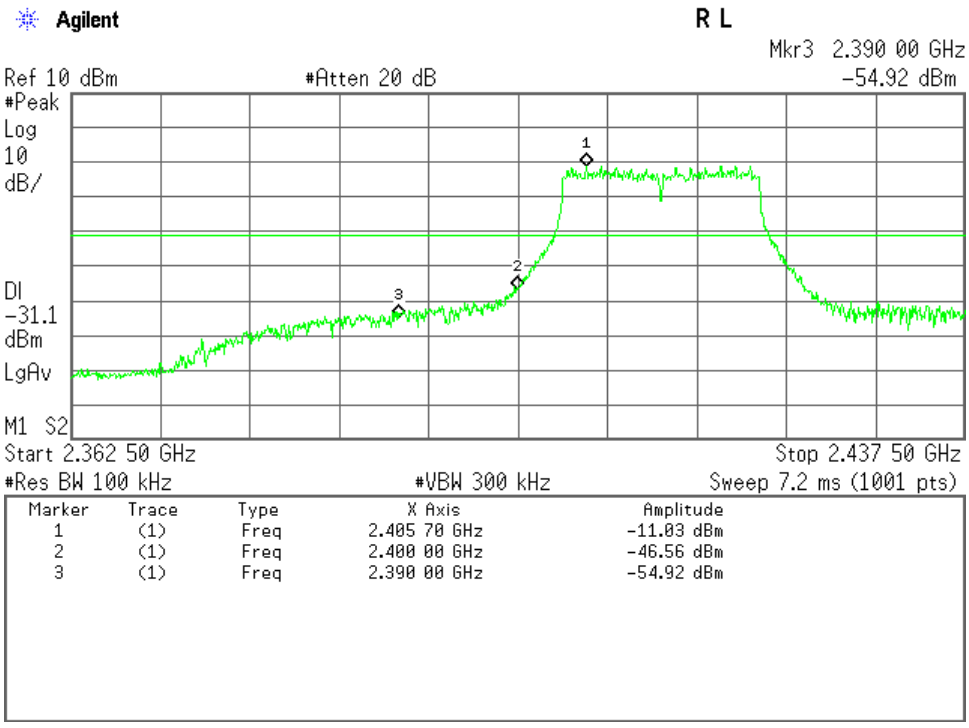


High Channel

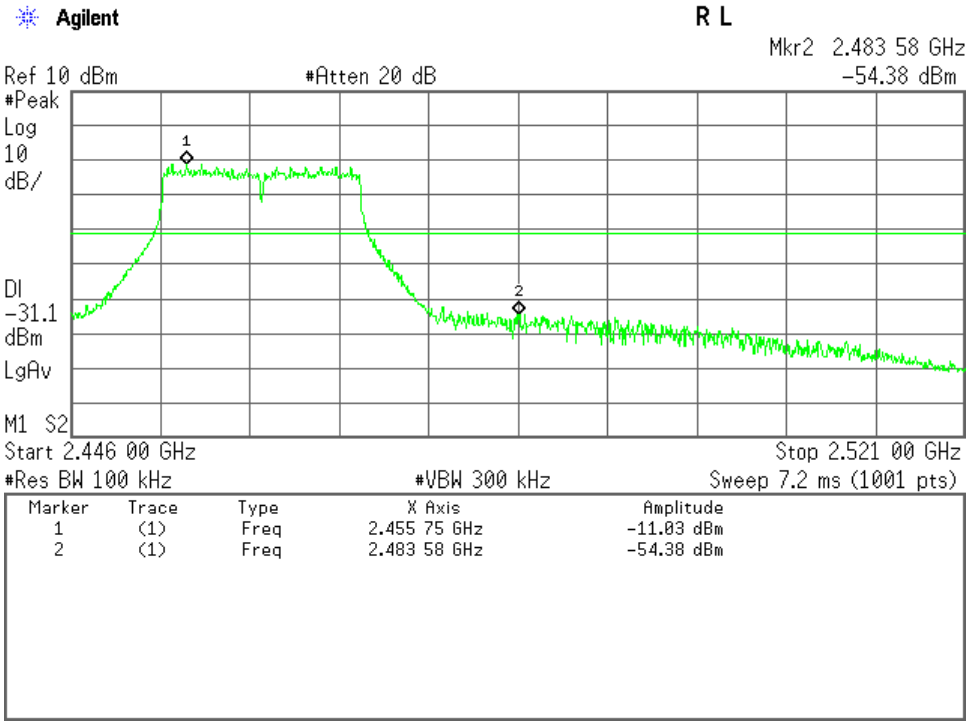


2) IEEE 802.11g

Low Channel

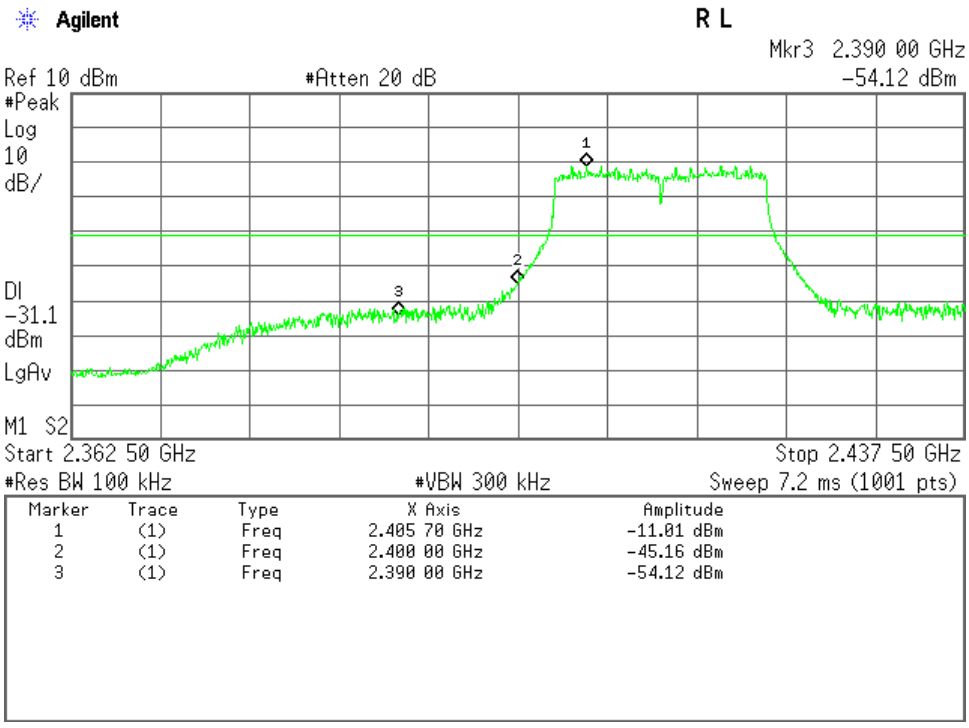


High Channel

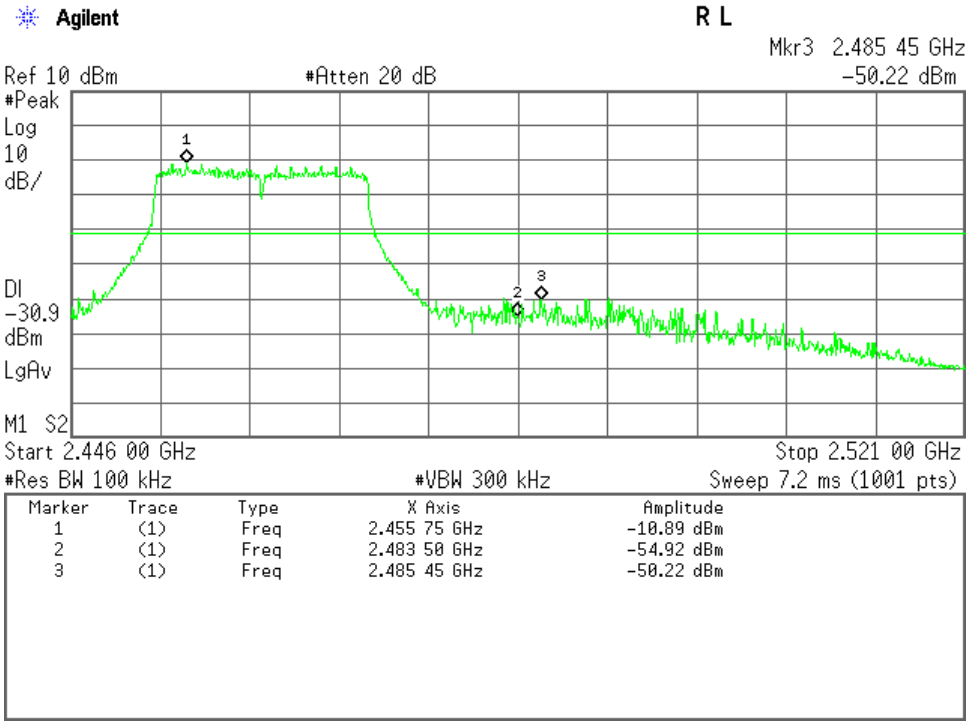


3) IEEE 802.11n

Low Channel

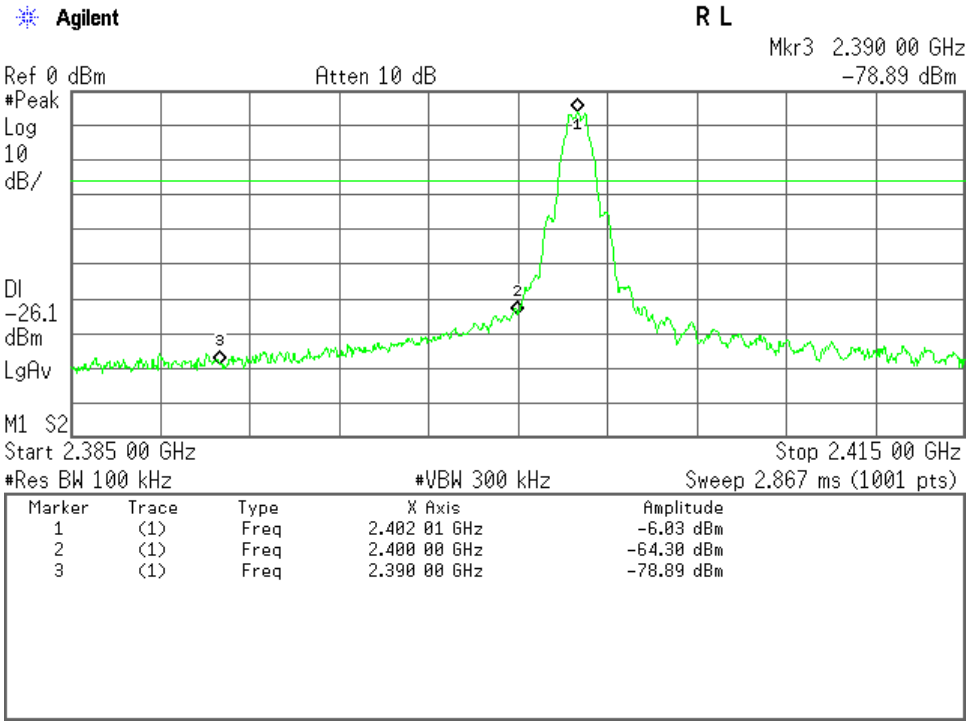


High Channel

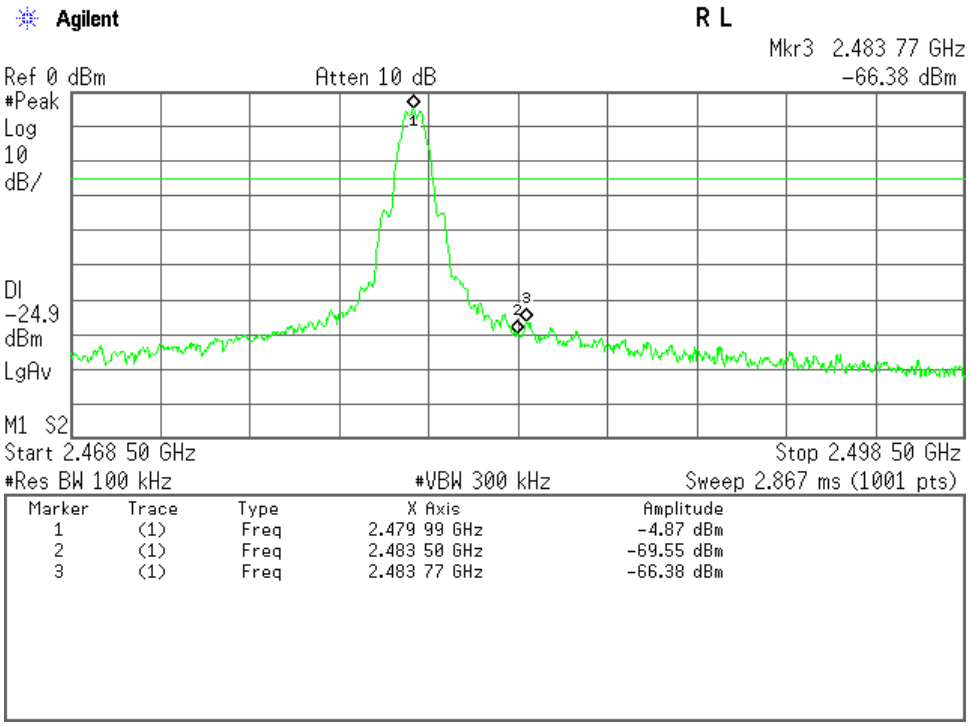


4) Bluetooth Low Energy

Low Channel



High Channel



7.8 AC Powerline Conducted Emission

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

7.8.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

Min. Limit Margin (Quasi-Peak) 12.8 dB at 0.198 MHz

Uncertainty of Measurement Results ± 2.6 dB(2σ)

Remarks : Bluetooth Low Energy mode

7.8.2 Test Instruments

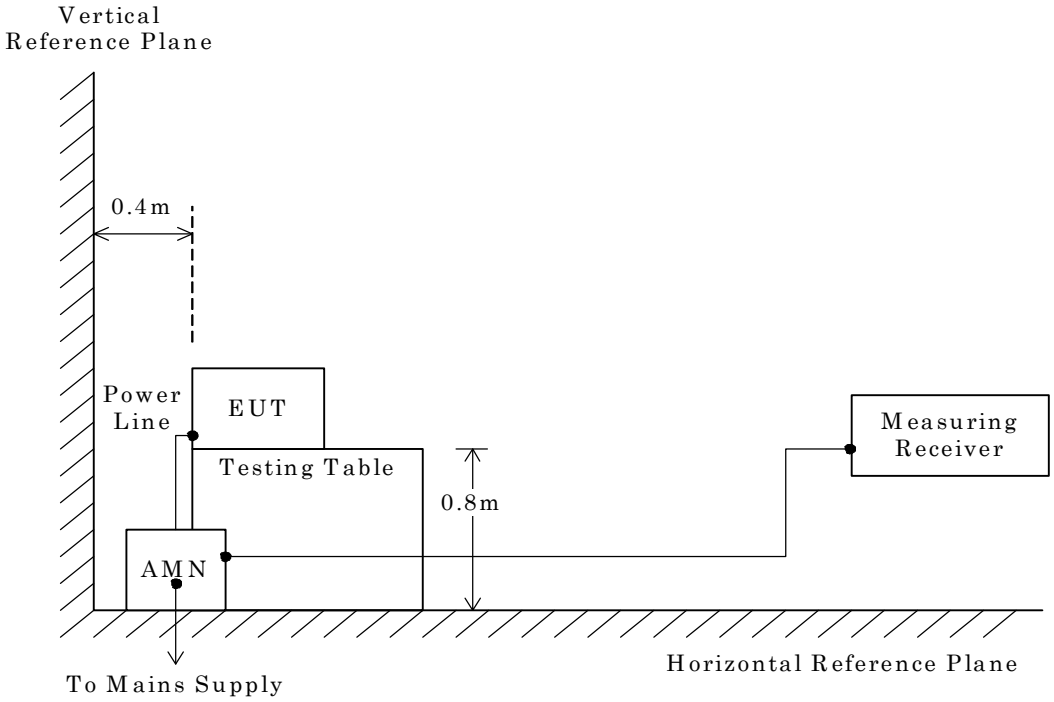
Measurement Room M2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
AMN (main)	ESH3-Z5	893045/007 (D-12)	Rohde & Schwarz	2016/08/27
RF Cable	RG223/U	--- (H-9)	HUBER+SUHNER	2016/07/09

NOTE : The calibration interval of the above test instruments is 12 months.

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

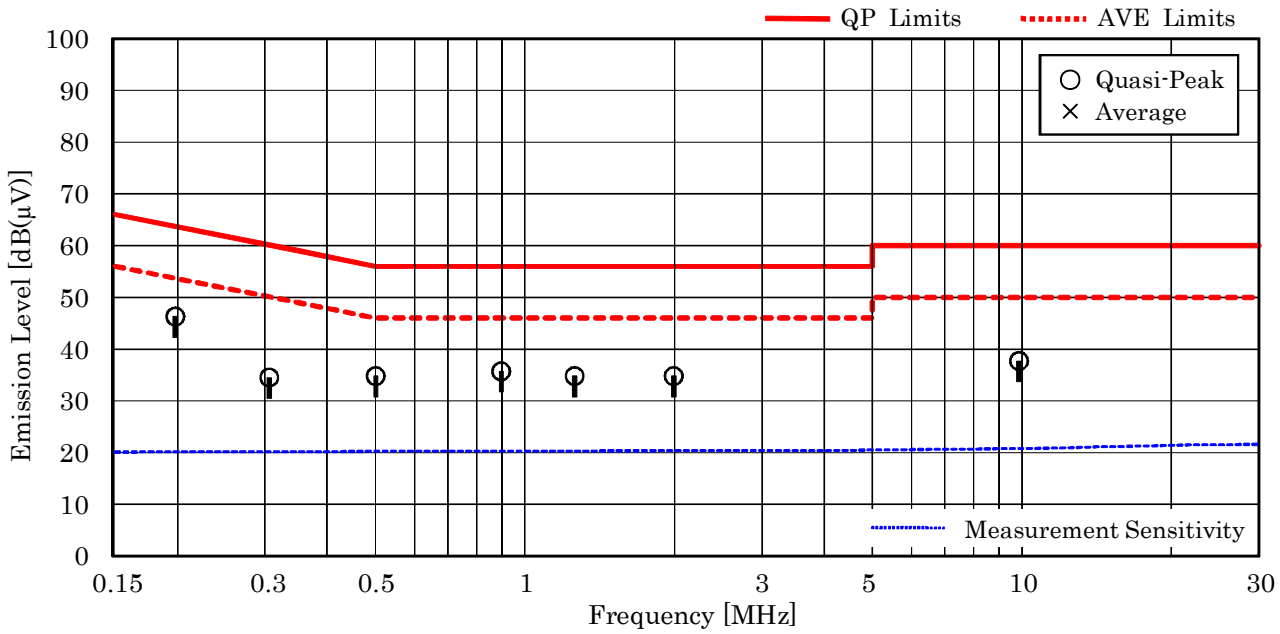
1) Mode of EUT : (WLAN) All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / IEEE 802.11b, IEEE 802.11g and IEEE 802.11n) has been listed.

Test voltage : 120VAC 60Hz

Test Date: October 30, 2015
Temp.: 21 °C, Humi.: 43 %

Measured phase : L1

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)] QP	AVE	Limits [dB(μV)] QP	AVE	Results [dB(μV)] QP	AVE	Margin [dB] QP	AVE	Remarks
0.198	10.2	36.1	--	63.7	53.7	46.3	--	+17.4	--	-
0.306	10.3	24.2	--	60.1	50.1	34.5	--	+25.6	--	-
0.501	10.3	24.5	--	56.0	46.0	34.8	--	+21.2	--	-
0.896	10.3	25.4	--	56.0	46.0	35.7	--	+20.3	--	-
1.259	10.3	24.5	--	56.0	46.0	34.8	--	+21.2	--	-
1.992	10.4	24.4	--	56.0	46.0	34.8	--	+21.2	--	-
9.874	10.8	26.9	--	60.0	50.0	37.7	--	+22.3	--	-



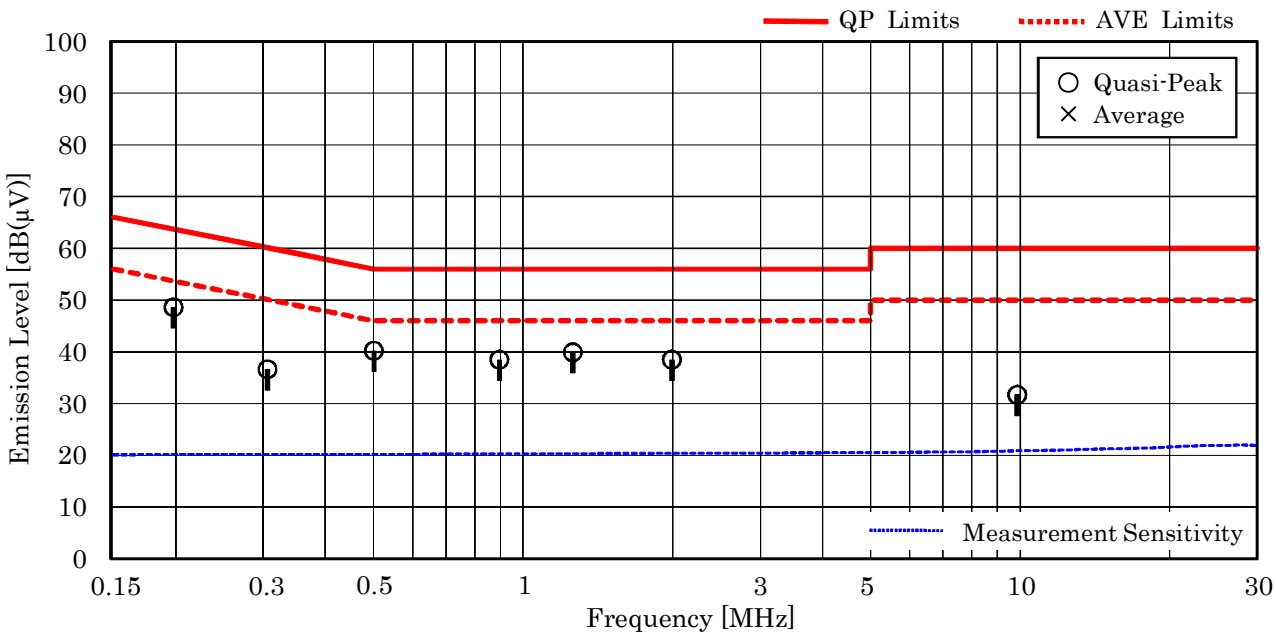
NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.198 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.2 + 36.1 = 46.3 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

Test voltage : 120VAC 60Hz

Test Date: October 30, 2015
Temp.: 21 °C, Humi.: 43 %

Measured phase : L2

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)] QP	AVE	Limits [dB(μV)] QP	AVE	Results [dB(μV)] QP	AVE	Margin [dB] QP	AVE	Remarks
0.198	10.2	38.4	--	63.7	53.7	48.6	--	+15.1	--	-
0.306	10.3	26.3	--	60.1	50.1	36.6	--	+23.5	--	-
0.501	10.2	30.0	--	56.0	46.0	40.2	--	+15.8	--	-
0.896	10.3	28.2	--	56.0	46.0	38.5	--	+17.5	--	-
1.259	10.3	29.6	--	56.0	46.0	39.9	--	+16.1	--	-
1.992	10.4	28.1	--	56.0	46.0	38.5	--	+17.5	--	-
9.874	10.9	20.8	--	60.0	50.0	31.7	--	+28.3	--	-



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 0.198 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.2 + 38.4 = 48.6 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

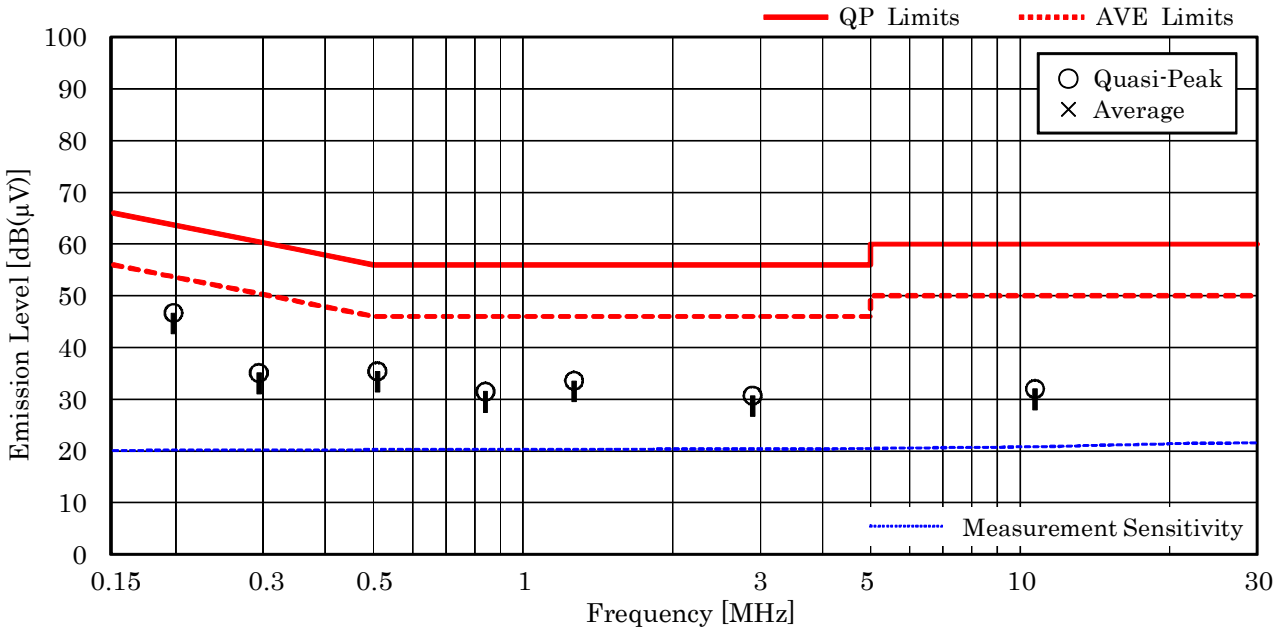
2) Mode of EUT : Bluetooth Low Energy

Test voltage : 120VAC 60Hz

Test Date: October 30, 2015
Temp.: 21 °C, Humi.: 43 %

Measured phase : L1

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)] QP	AVE	Limits [dB(μV)] QP	AVE	Results [dB(μV)] QP	AVE	Margin [dB] QP	AVE	Remarks
0.198	10.2	36.5	--	63.7	53.7	46.7	--	+17.0	--	-
0.294	10.2	24.9	--	60.4	50.4	35.1	--	+25.3	--	-
0.509	10.3	25.1	--	56.0	46.0	35.4	--	+20.6	--	-
0.840	10.3	21.2	--	56.0	46.0	31.5	--	+24.5	--	-
1.266	10.3	23.3	--	56.0	46.0	33.6	--	+22.4	--	-
2.895	10.4	20.3	--	56.0	46.0	30.7	--	+25.3	--	-
10.721	10.9	21.1	--	60.0	50.0	32.0	--	+28.0	--	-



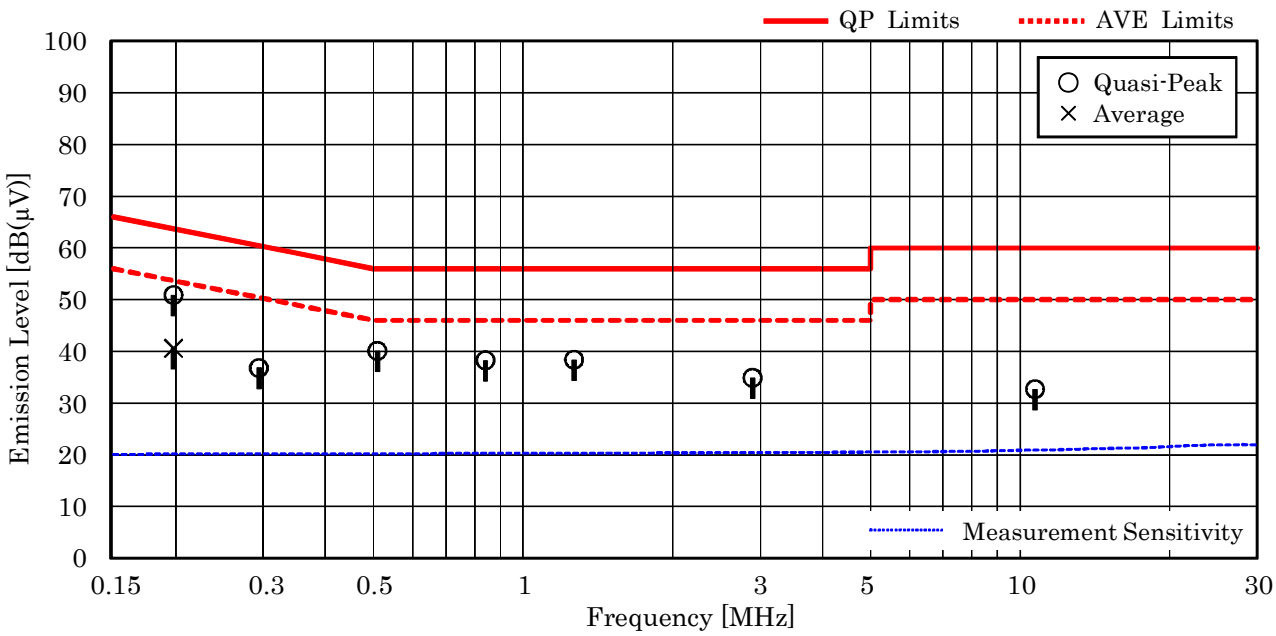
NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.198 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.2 + 36.5 = 46.7 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

Test voltage : 120VAC 60Hz

Test Date: October 30, 2015
Temp.: 21 °C, Humi.: 43 %

Measured phase : L2

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)] QP	AVE	Limits [dB(μV)] QP	AVE	Results [dB(μV)] QP	AVE	Margin [dB] QP	AVE	Remarks
0.198	10.2	40.7	30.4	63.7	53.7	50.9	40.6	+12.8	+13.1	-
0.294	10.2	26.6	--	60.4	50.4	36.8	--	+23.6	--	-
0.509	10.2	29.9	--	56.0	46.0	40.1	--	+15.9	--	-
0.840	10.3	28.0	--	56.0	46.0	38.3	--	+17.7	--	-
1.266	10.3	28.1	--	56.0	46.0	38.4	--	+17.6	--	-
2.895	10.4	24.5	--	56.0	46.0	34.9	--	+21.1	--	-
10.721	10.9	21.8	--	60.0	50.0	32.7	--	+27.3	--	-



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 0.198 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.2 + 40.7 = 50.9 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

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

7.9.1 Test Results

For the standard, ☑ - **Passed** ☐ - **Failed** ☐ - **Not judged**

Min. Limit Margin (Peak) 6.7 dB at 2491.4 MHz

Uncertainty of Measurement Results

9 kHz – 30 MHz	± 3.0	dB(2σ)
30 MHz – 300 MHz	± 3.8	dB(2σ)
300 MHz – 1000 MHz	± 4.8	dB(2σ)
1 GHz – 6 GHz	± 4.7	dB(2σ)
6 GHz – 18 GHz	± 4.6	dB(2σ)
18 GHz – 40 GHz	± 5.5	dB(2σ)

Remarks : IEEE802.11n mode, Y axis position.

7.9.2 Test Instruments

Anechoic Chamber A2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
Loop Antenna	HFH2-Z2	872096/25 (C-2)	Rohde & Schwarz	2016/07/26
RF Cable	RG213/U	--- (H-28)	HUBER+SUHNER	2016/07/26
Pre-Amplifier	310N	304573 (A-17)	SONOMA	2016/04/15
Biconical Antenna	VHA9103/BBA9106	2355 (C-30)	Schwarzbeck	2016/05/24
Log-periodic Antenna	UHALP9108-A1	0694 (C-31)	Schwarzbeck	2016/05/24
RF Cable	S 10162 B-11 etc.	--- (H-4)	HUBER+SUHNER	2016/04/15
Site Attenuation	--	--- (H-15)	----	2016/01/05
Pre-Amplifier	TPA0118-36	1010 (A-37)	TOYO	2016/05/11
Horn Antenna	91888-2	562 (C-41-1)	EATON	2016/06/16
Horn Antenna	91889-2	568 (C-41-2)	EATON	2016/06/16
Horn Antenna	3160-04	9903-1053 (C-55)	EMCO	2016/06/29
Horn Antenna	3160-05	9902-1061 (C-56)	EMCO	2016/06/29
Horn Antenna	3160-06	9712-1045 (C-57)	EMCO	2016/06/29
Horn Antenna	3160-07	9902-1113 (C-58)	EMCO	2016/06/29
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2016/06/29
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2016/06/28
Attenuator	54A-10	W5713 (D-29)	Weinschel	2016/08/16
Attenuator	2-10	BA6214 (D-79)	Weinschel	2015/11/18
RF Cable	SUCOFLEX104	267479/4 (C-66)	HUBER+SUHNER	2016/01/19
RF Cable	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2016/01/19
RF Cable	SUCOFLEX102EA	3041/2EA (C-69)	HUBER+SUHNER	2016/01/19
Band Rejection Filter	BRM50701	029 (D-93)	MICRO-TRONICS	2016/02/08
SVSWR	--	--- (H-19)	----	2016/02/27

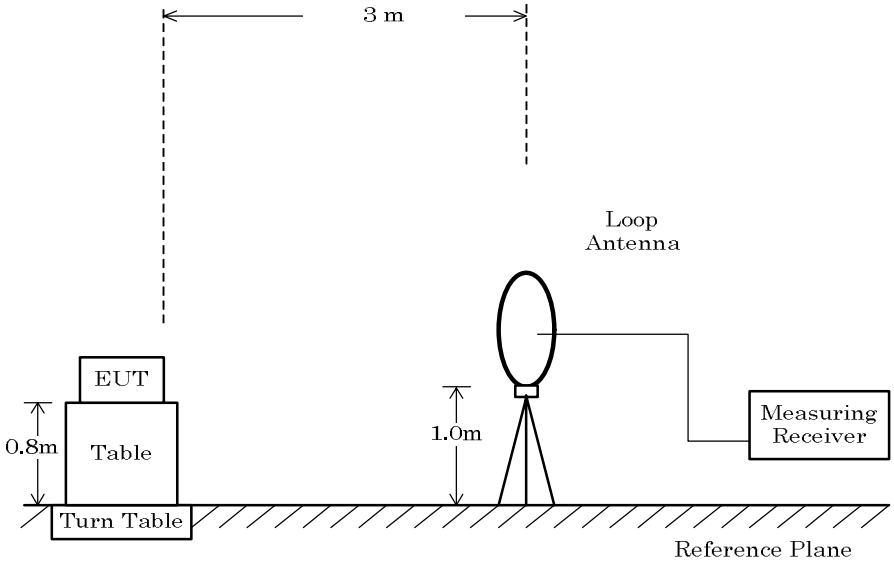
NOTE : The calibration interval of the above test instruments is 12 months.

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.
The measurement were performed about three antenna orientations (parallel, perpendicular, and ground-parallel).
This configurations was used for the final tests.

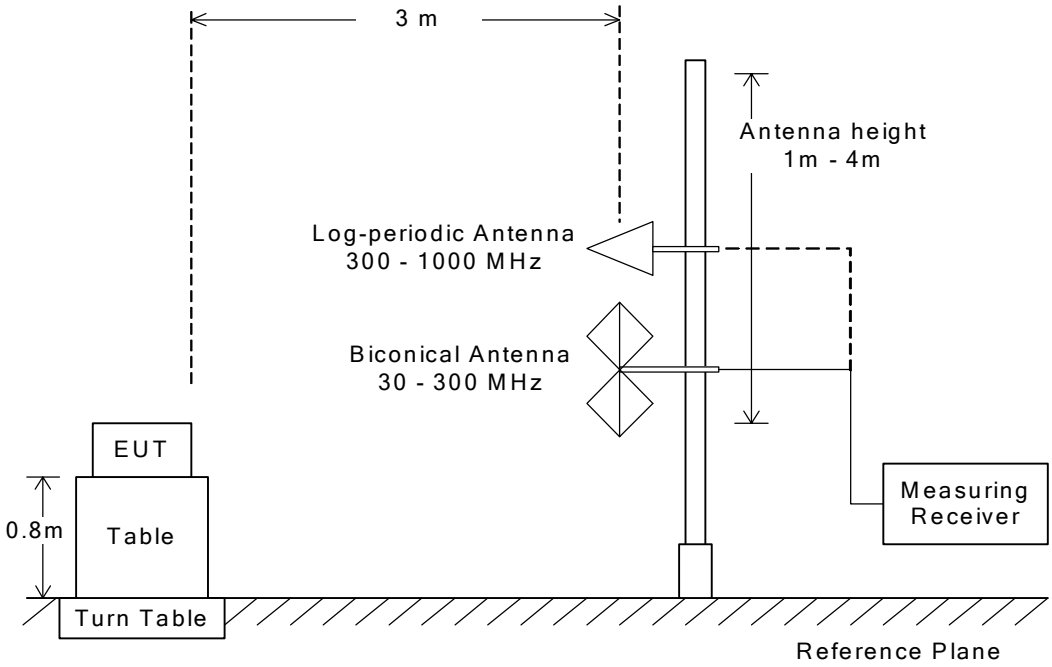
– Side View –



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:

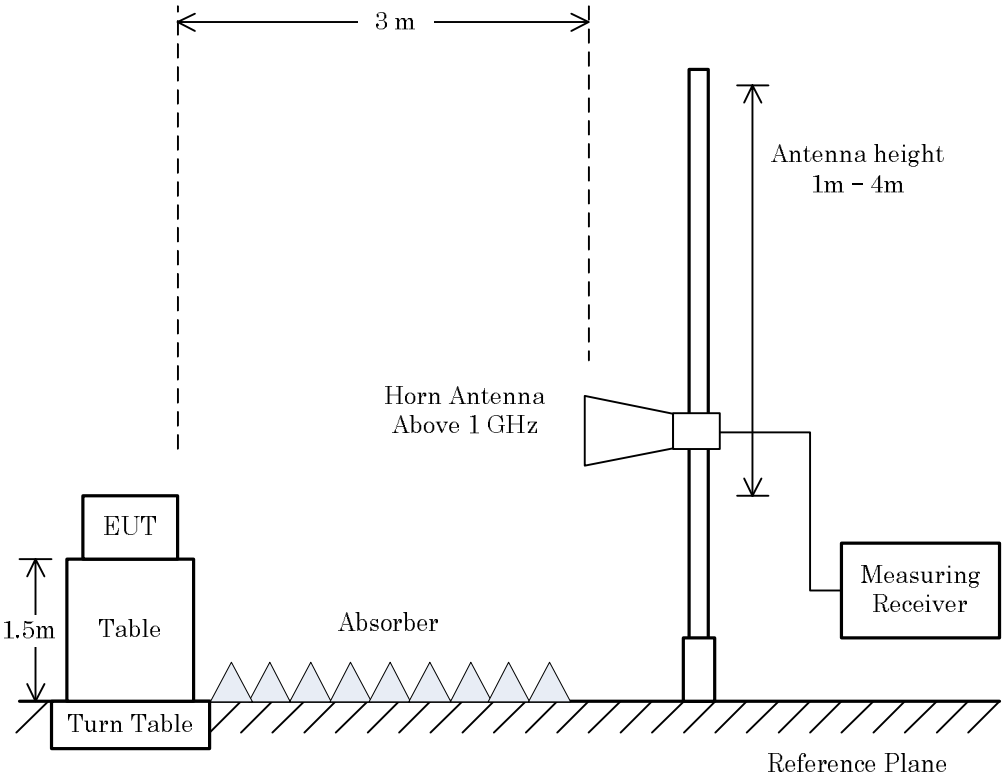
Type	Peak	Average
Detector Function	Peak	Peak
Res. Bandwidth	1 MHz	1 MHz
Video Bandwidth	3 MHz	≥ 1/T *1)
Video Filtering	Linear Voltage	Linear Voltage
Sweep Time	AUTO	AUTO
Trace	Max Hold	Max Hold

Note: 1. T: Minimum transmission duration

Average (VBW) Setting:

Mode	Interval (msec)	Cycle (msec)	Duty cycle (%)	Burst on period(T) (msec)	Min. VBW(1/T) (kHz)	VBW Setting (kHz)
IEEE802.11b(11Mbps)	0.10	1.39	92.8%	1.29	0.78	1.00
IEEE802.11g(24Mbps)	0.11	0.63	82.5%	0.52	1.92	2.00
IEEE802.11n(39Mbps(MCS4))	0.11	0.45	75.6%	0.34	2.94	3.00
Bluetooth LE	0.22	0.63	65.1%	0.41	2.44	3.00

– Side View –



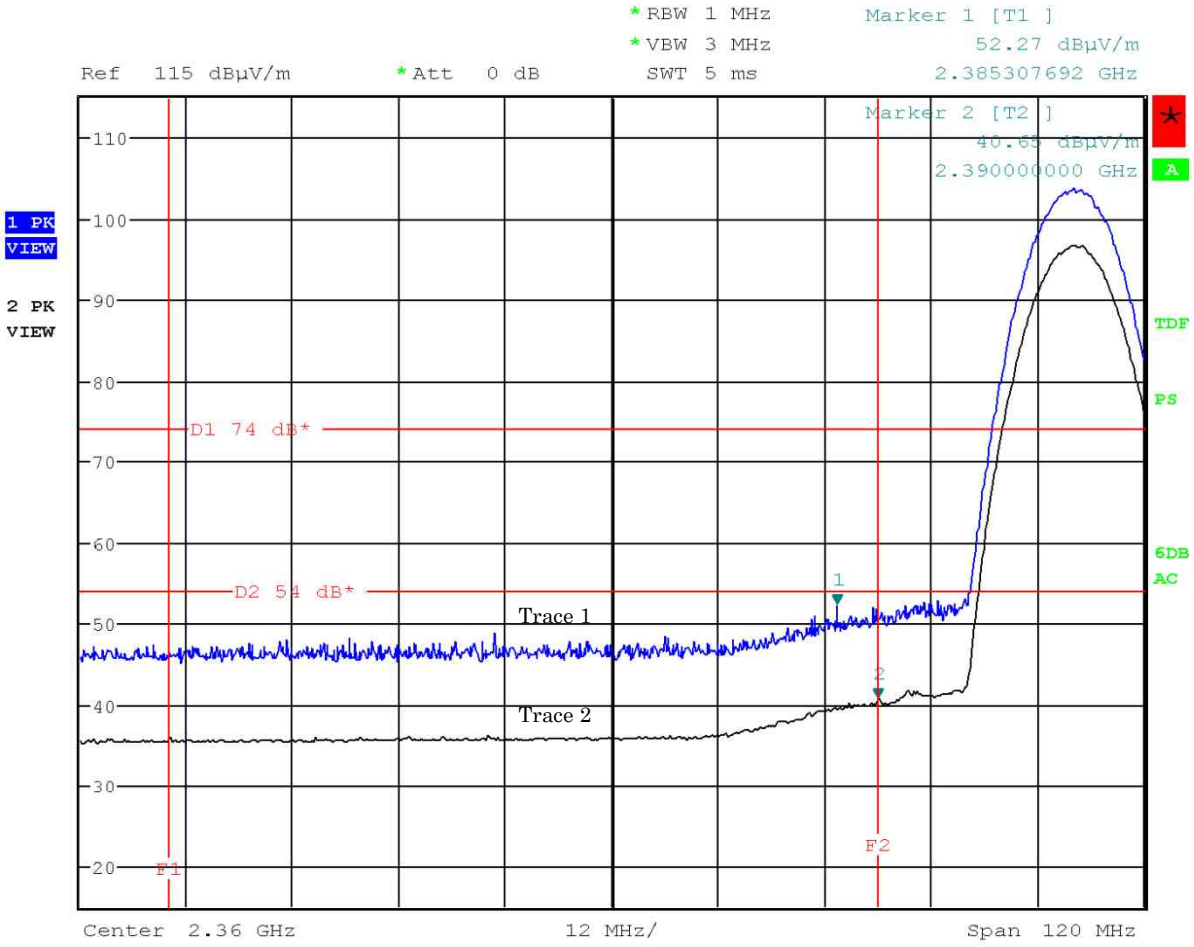
NOTE
When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

7.9.4 Test Data

7.9.4.1 Band-edge Compliance

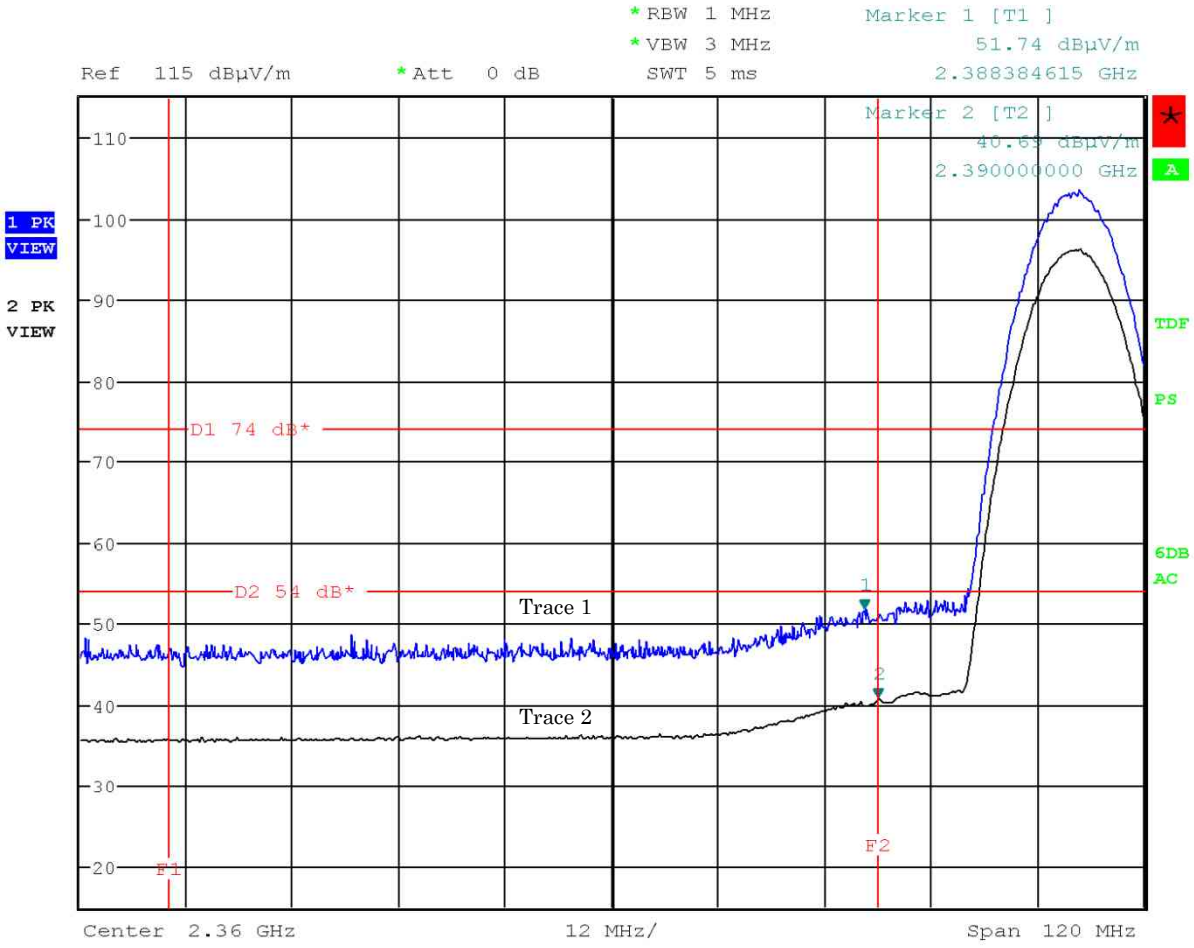
Test Date : October 26, 2015
Temp.:22°C, Humi:35%

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



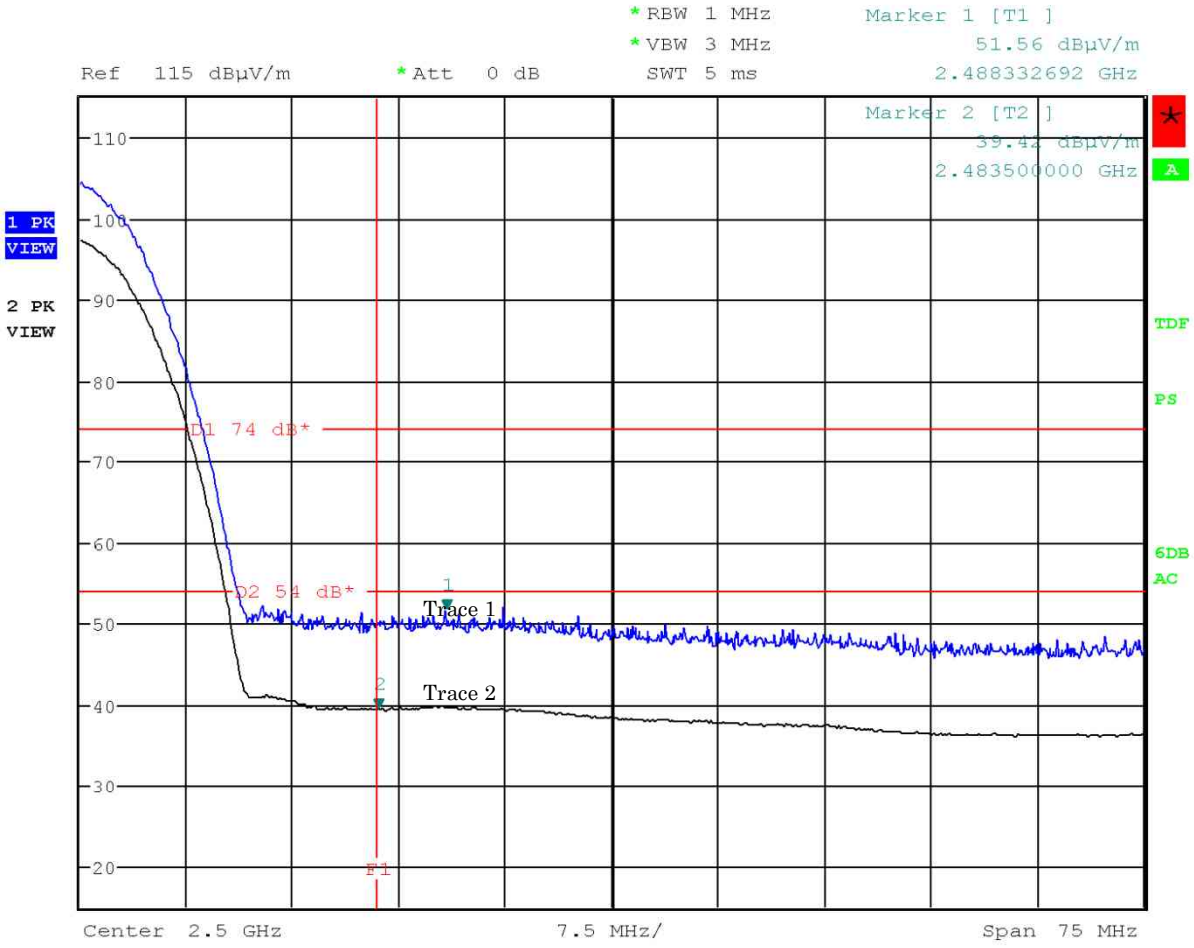
Note: The trace 1 is Peak . The trace 2 is Average.

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



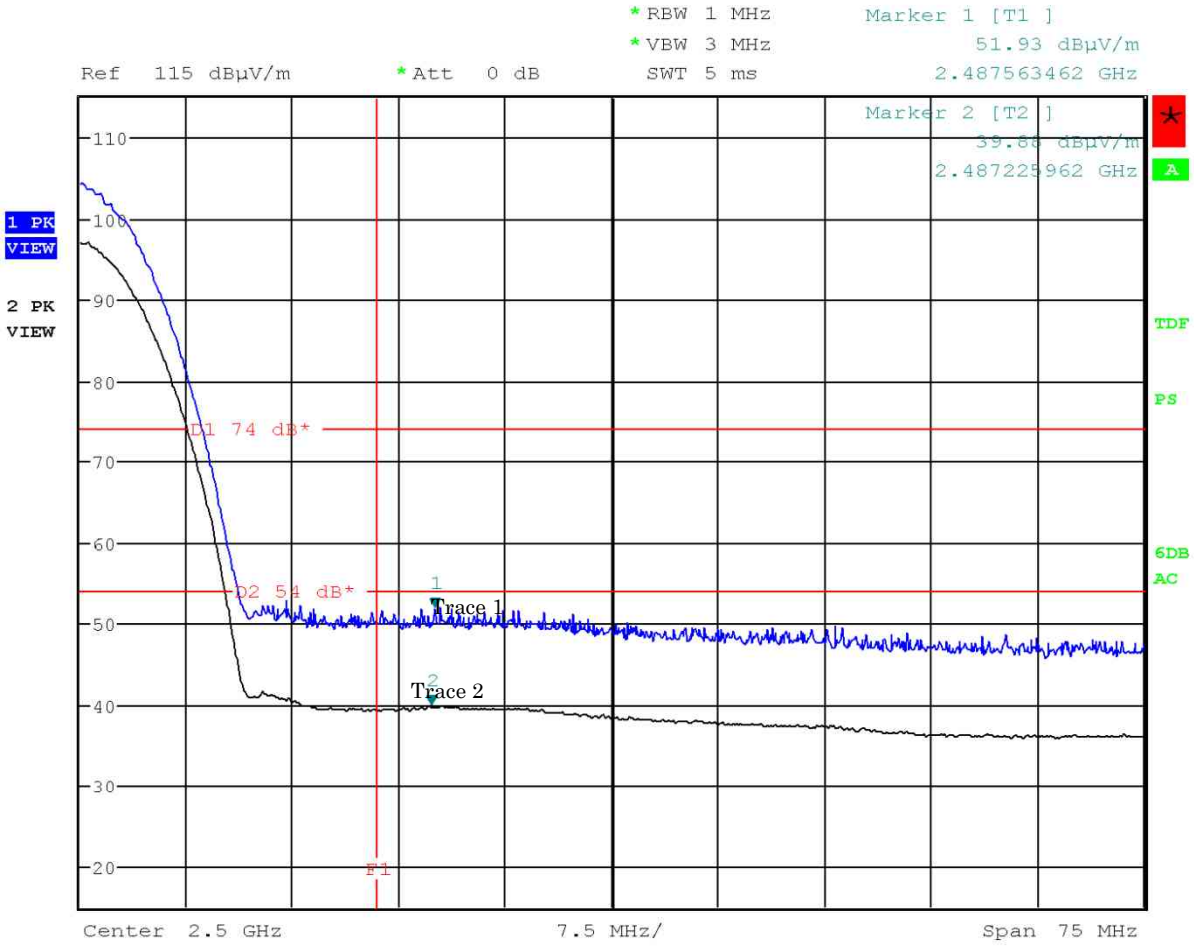
Note: The trace 1 is Peak . The trace 2 is Average.

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



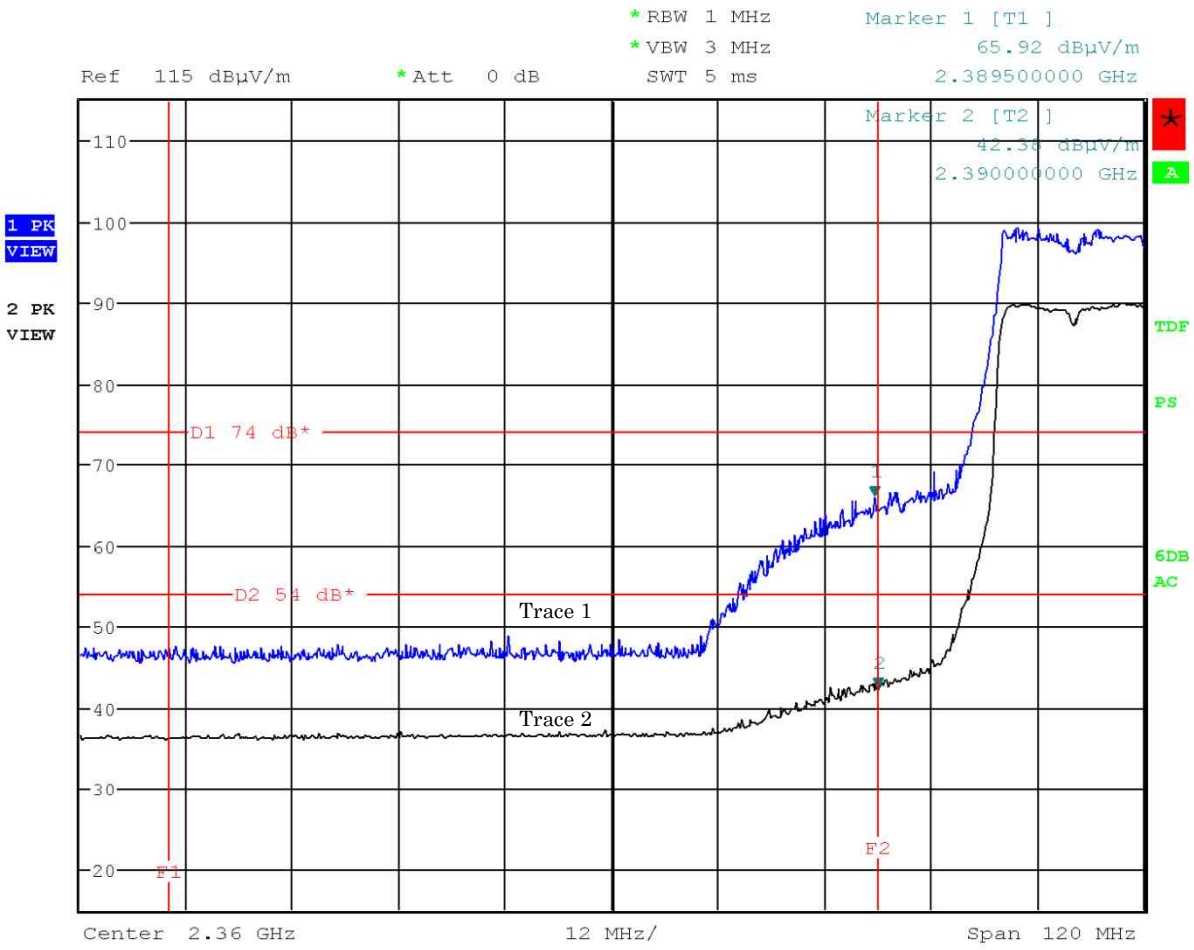
Note: The trace 1 is Peak . The trace 2 is Average.

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



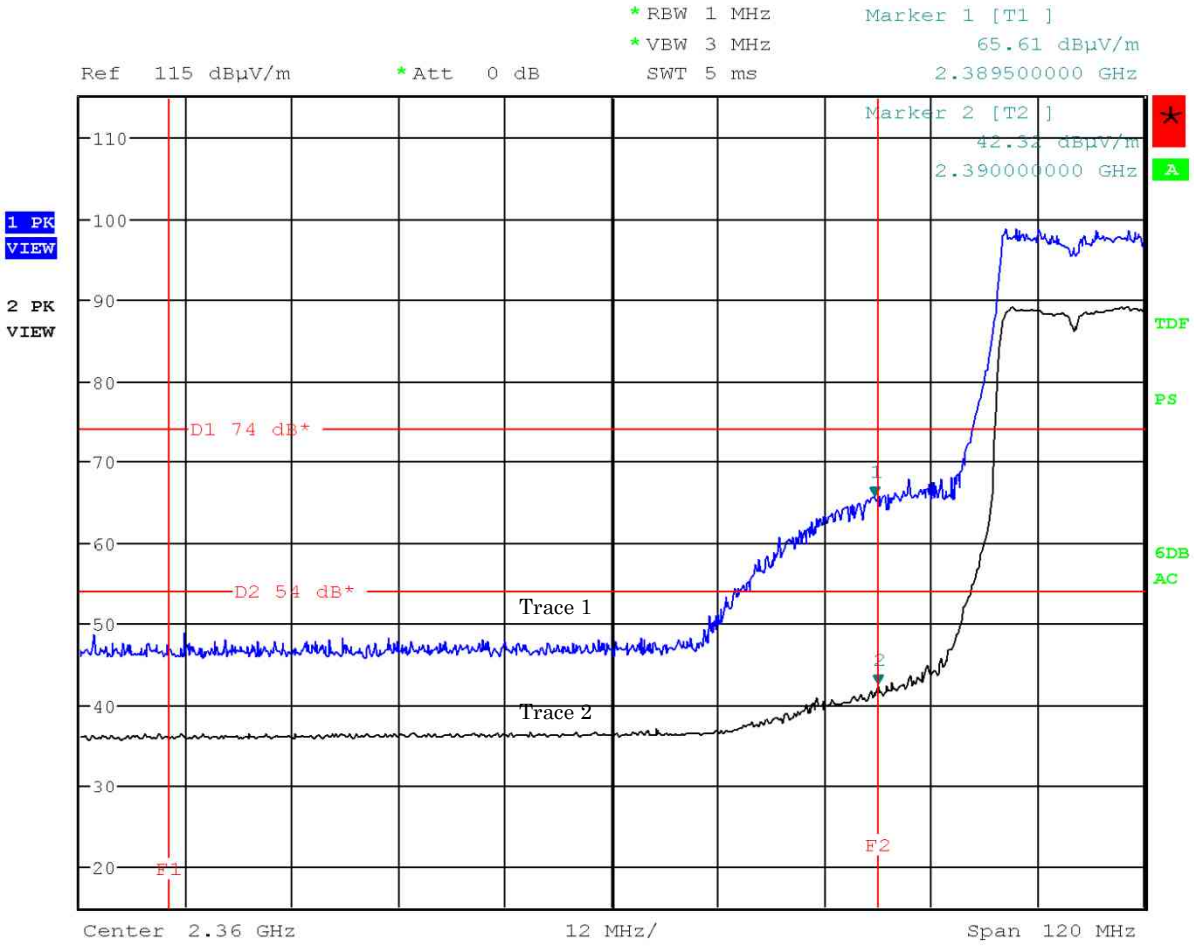
Note: The trace 1 is Peak . The trace 2 is Average.

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



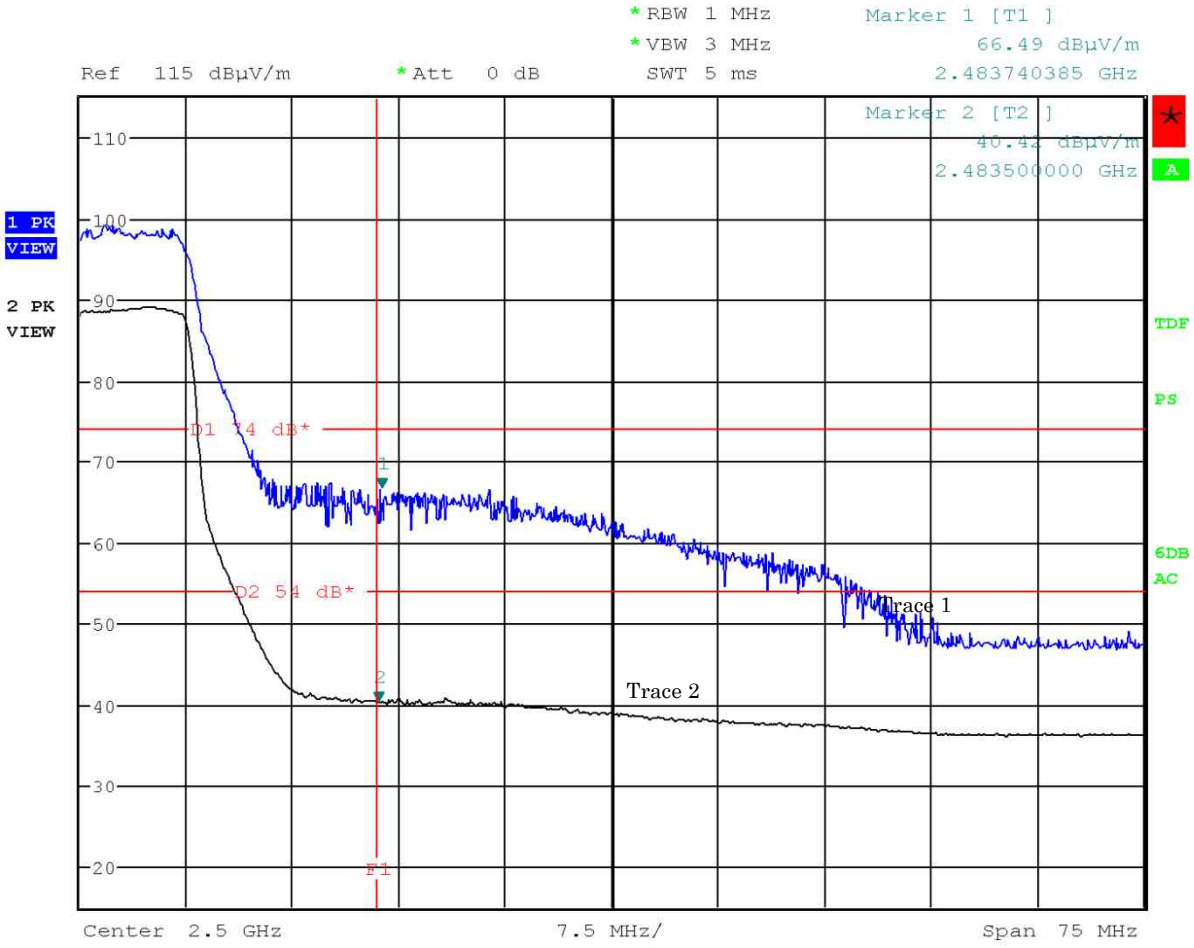
Note: The trace 1 is Peak . The trace 2 is Average.

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



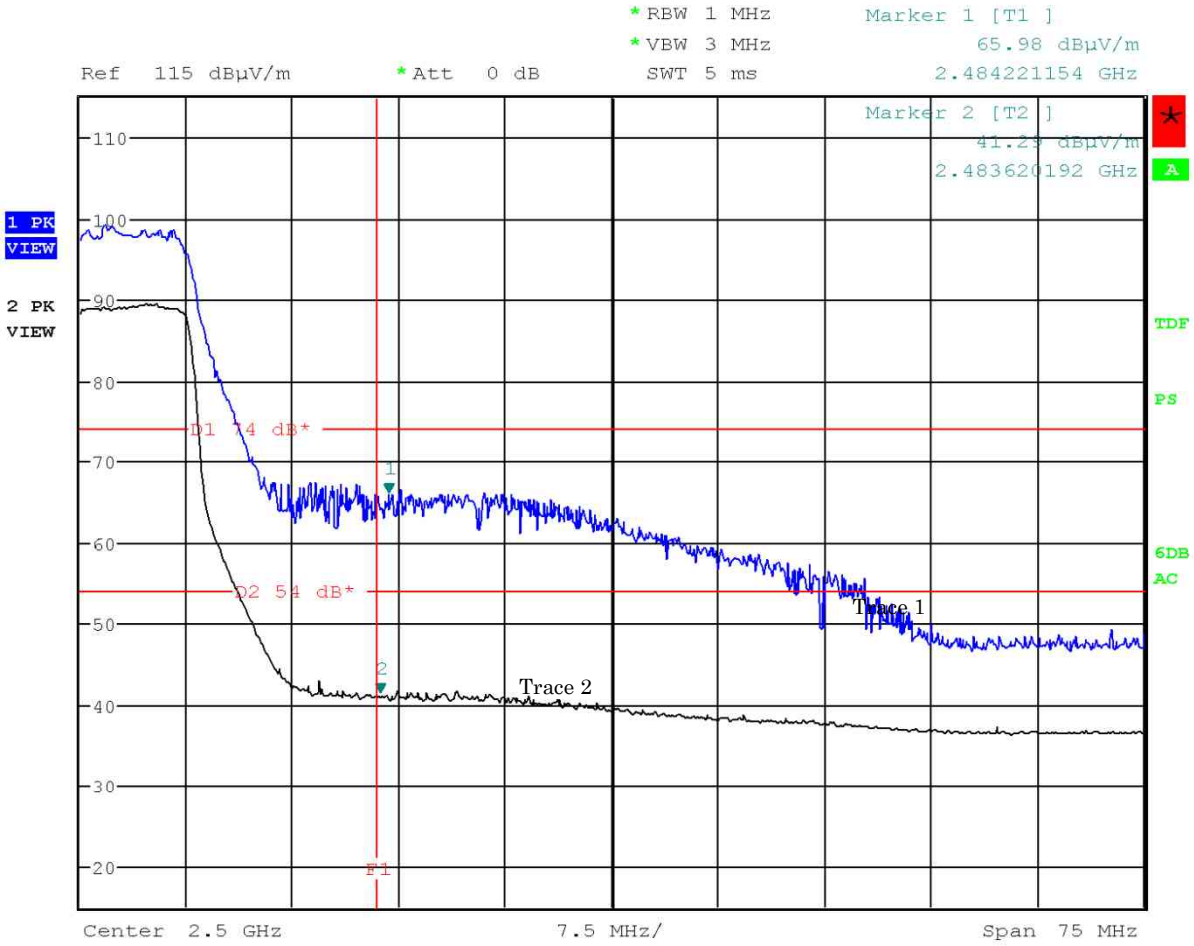
Note: The trace 1 is Peak . The trace 2 is Average.

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



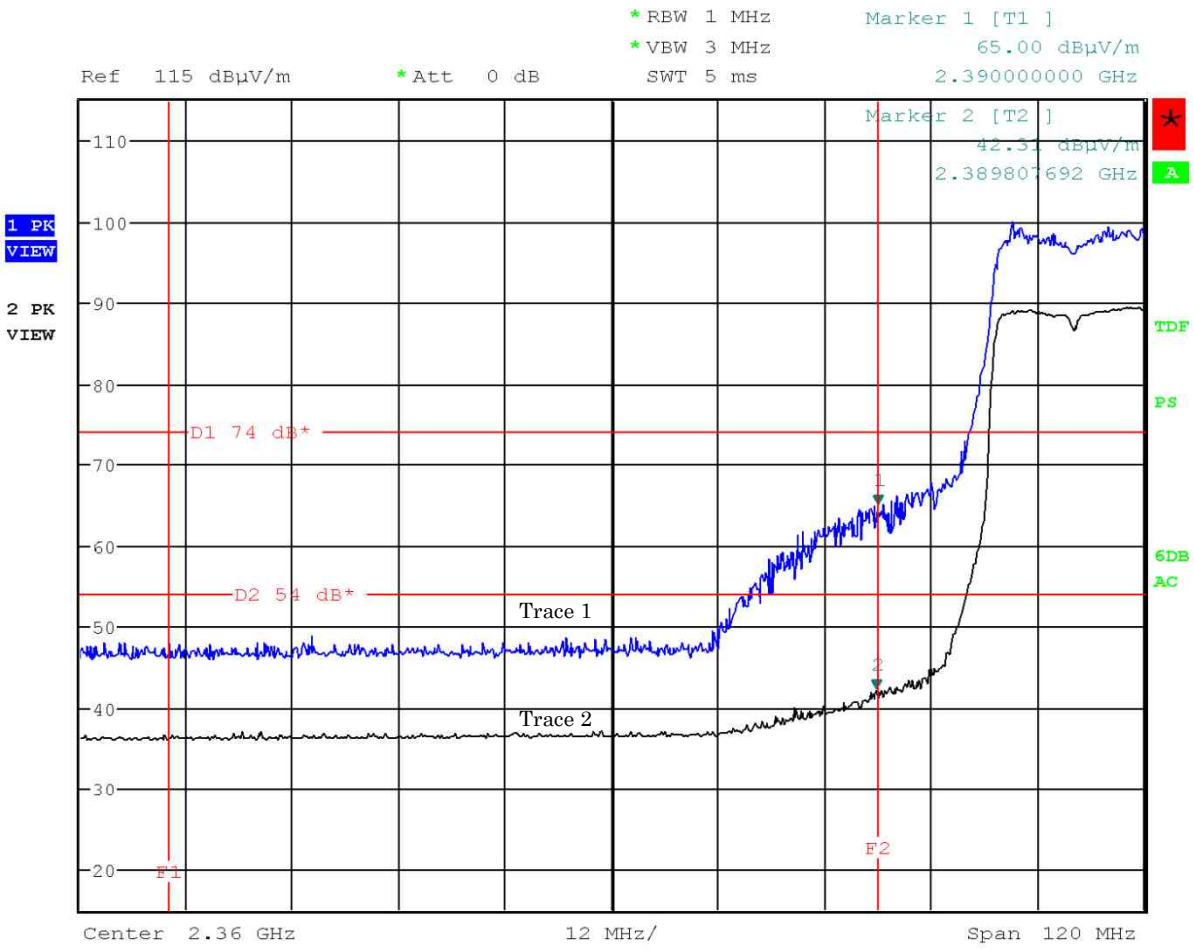
Note: The trace 1 is Peak . The trace 2 is Average.

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



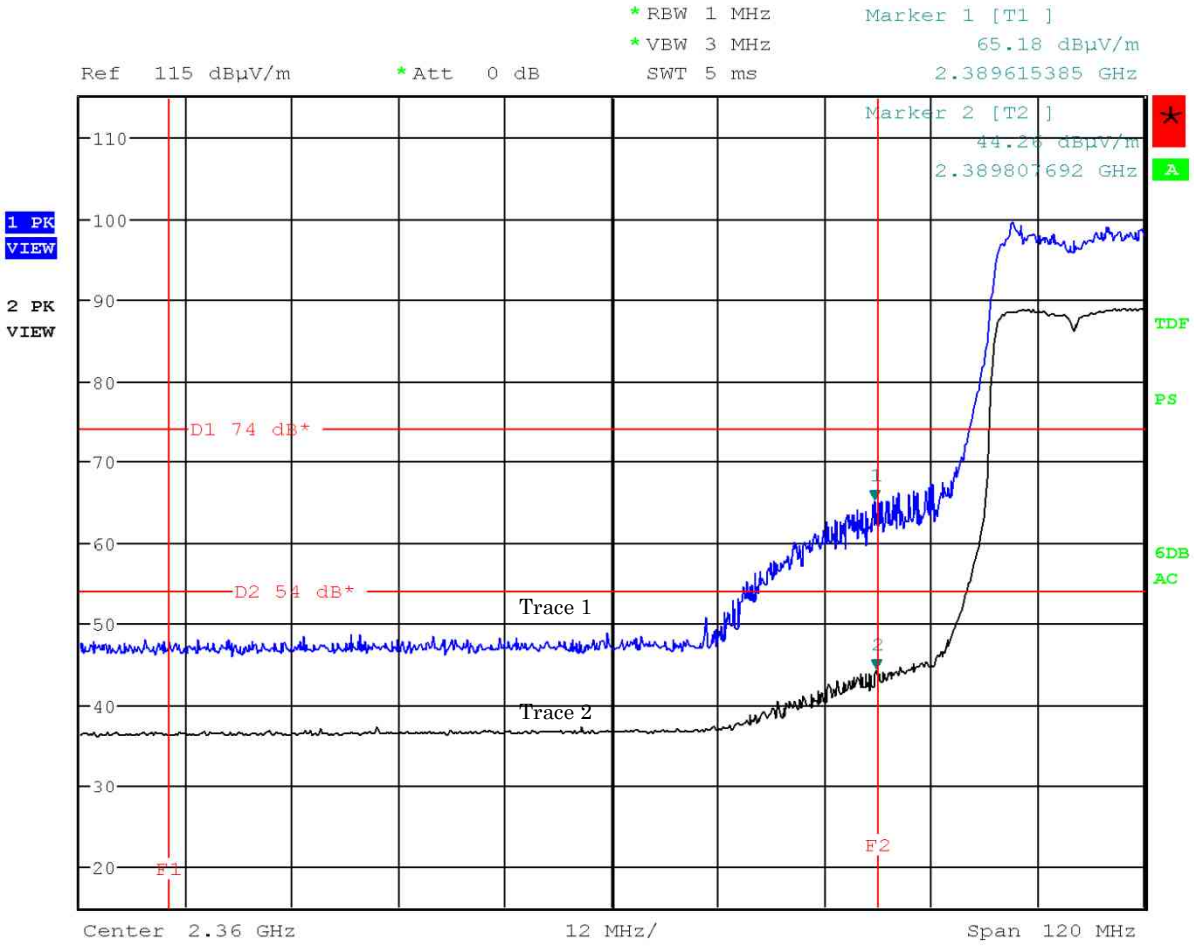
Note: The trace 1 is Peak . The trace 2 is Average.

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



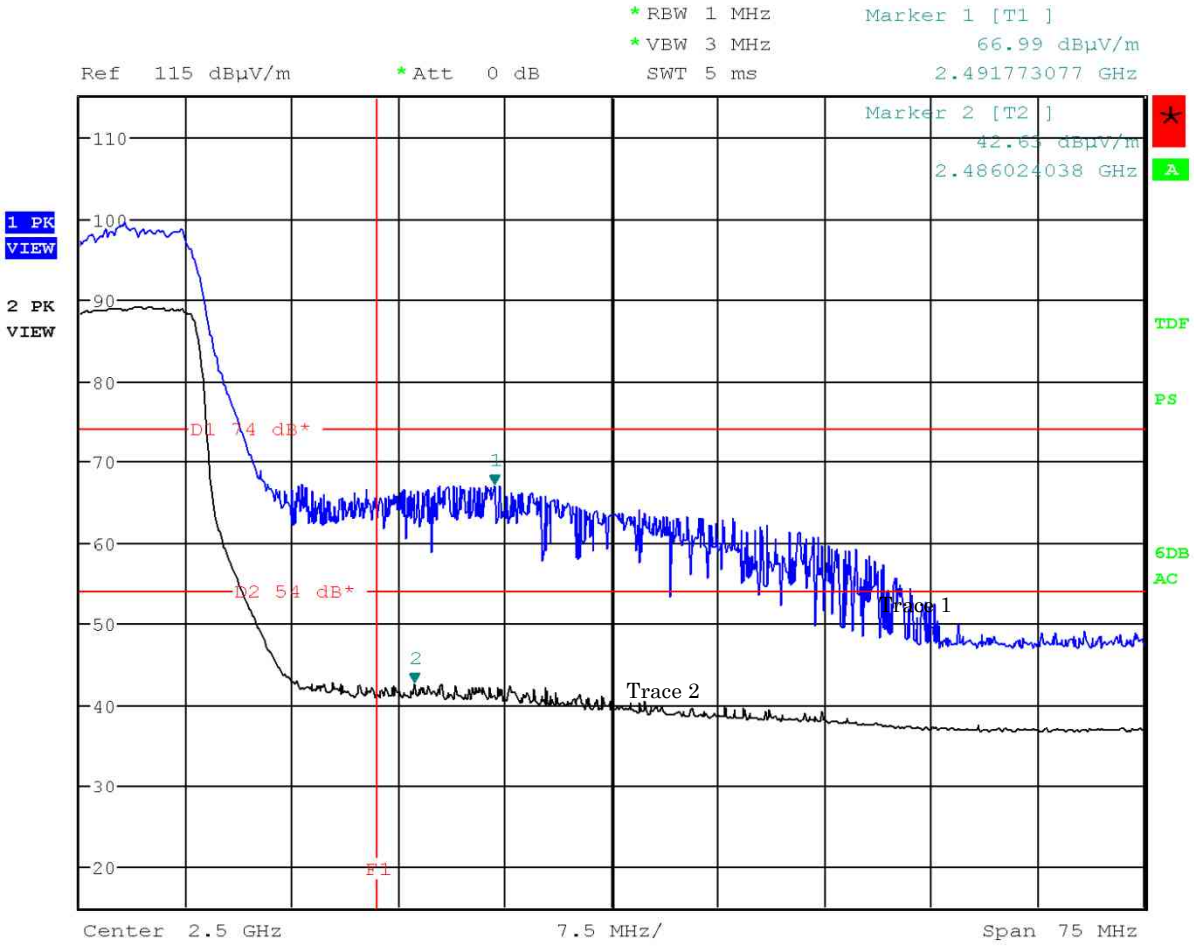
Note: The trace 1 is Peak . The trace 2 is Average.

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



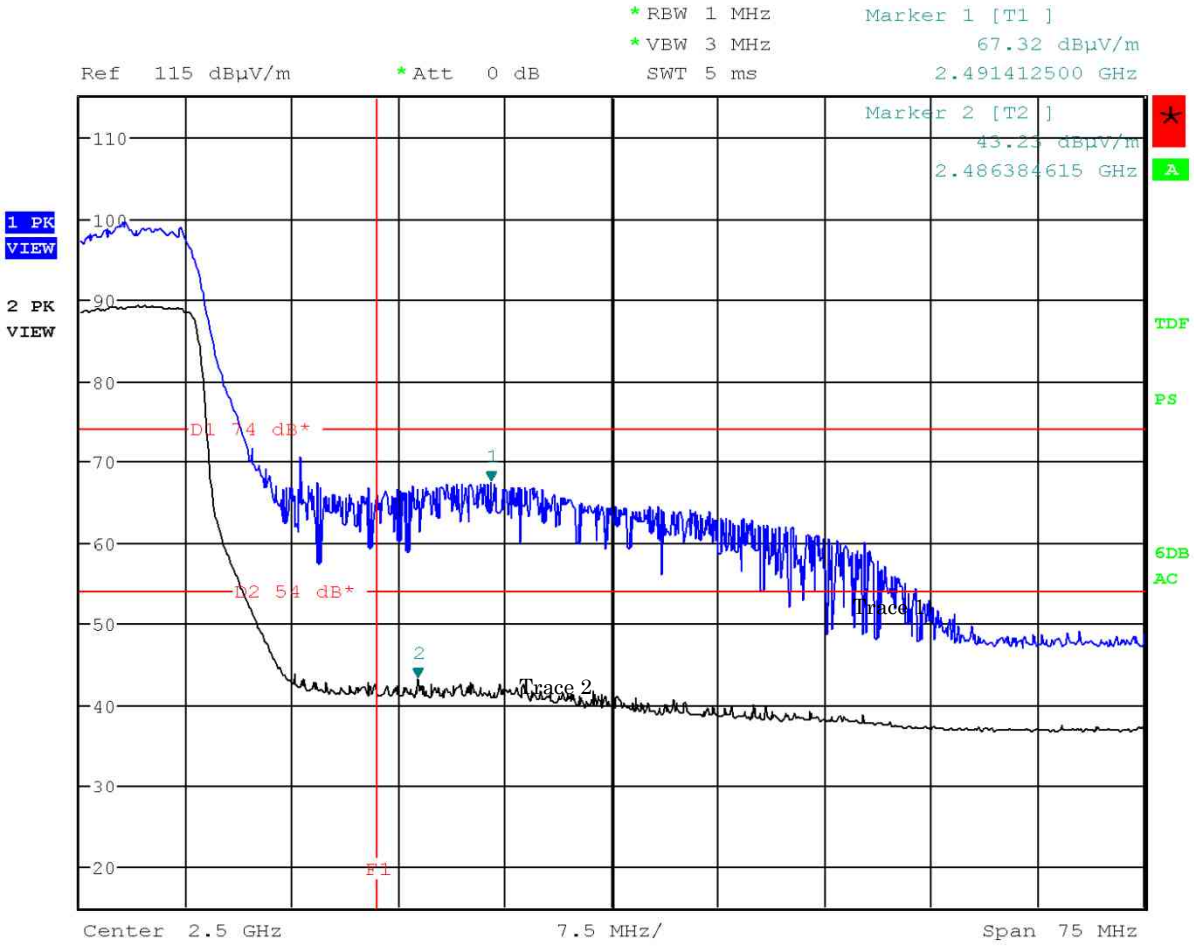
Note: The trace 1 is Peak . The trace 2 is Average.

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



Note: The trace 1 is Peak . The trace 2 is Average.

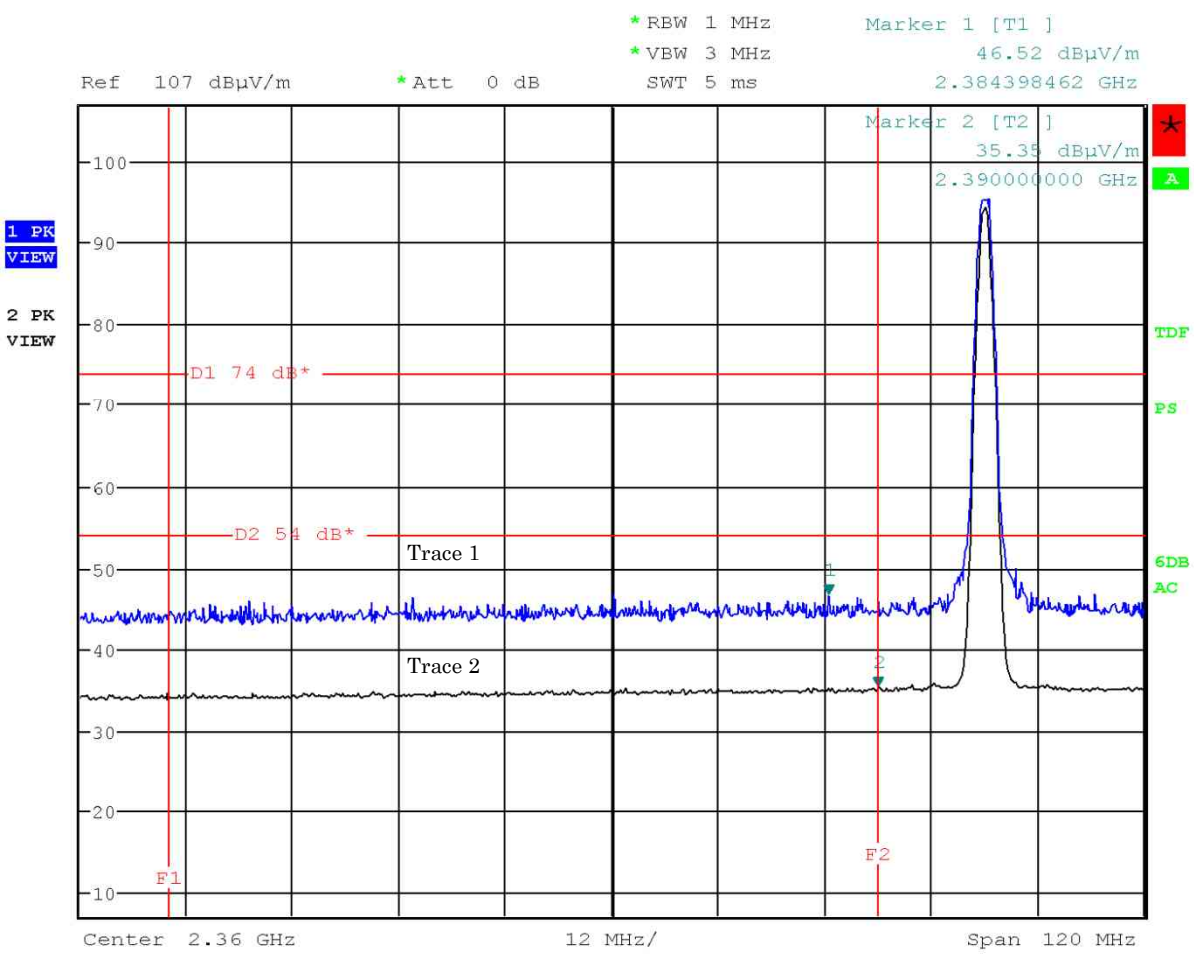
Mode of EUT : 11ch: 2462 MHz, (IEEE 802.11n)
Antenna Polarization : Vertical



Note: The trace 1 is Peak . The trace 2 is Average.

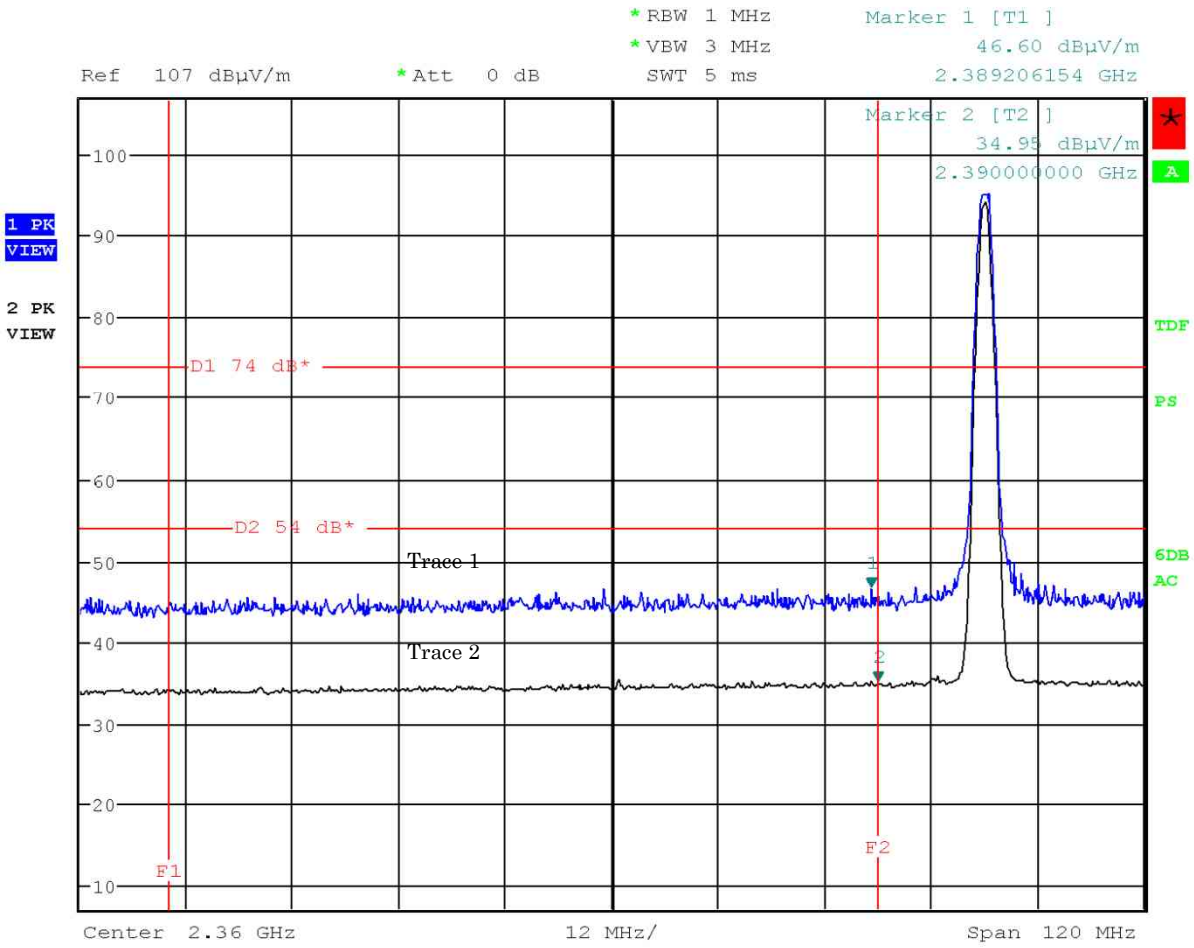
Test Date : October 26, 2015
Temp.:22°C, Humi:35%

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



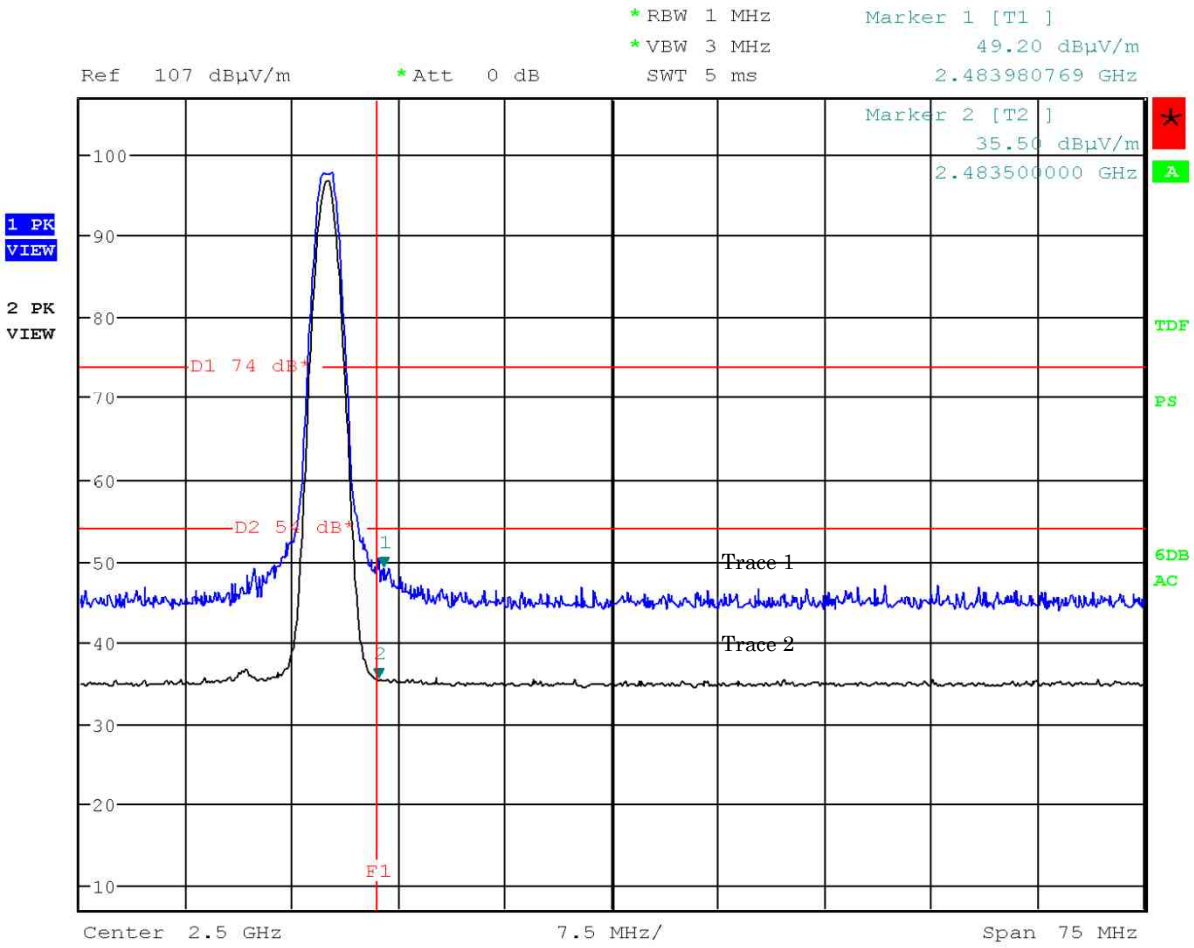
Note: The trace 1 is Peak . The trace 2 is Average.

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



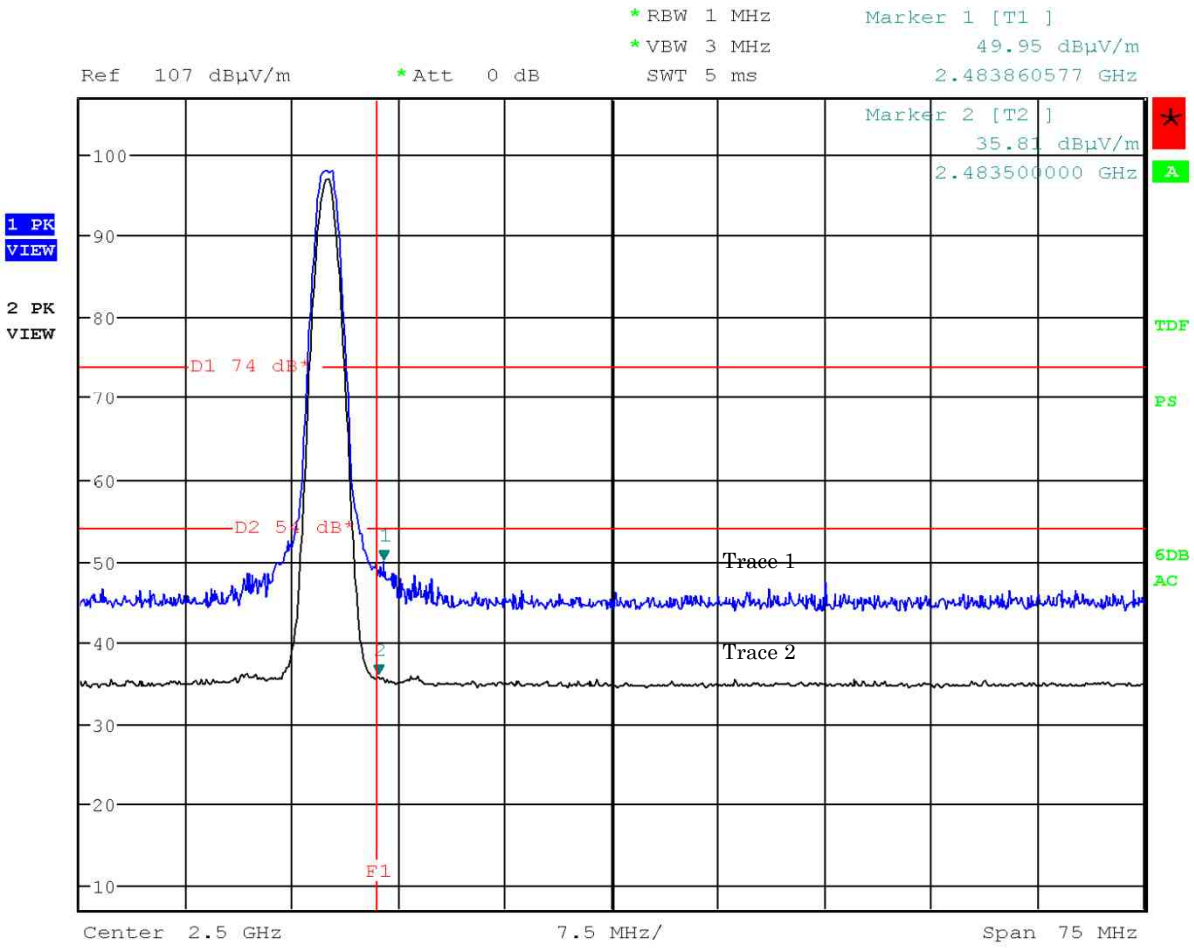
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : Bluetooth Low Energy, Hopping off (39ch: 2480 MHz)
Antenna Polarization : Horizontal



Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : Bluetooth Low Energy, Hopping off (39ch: 2480 MHz)
Antenna Polarization : Vertical



Note: The trace 1 is Peak . The trace 2 is Average.

7.9.4.2 Other Spurious Emission (9kHz – 30MHz)

Test Date : October 28, 2015
Temp.:23°C, Humi:55%

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

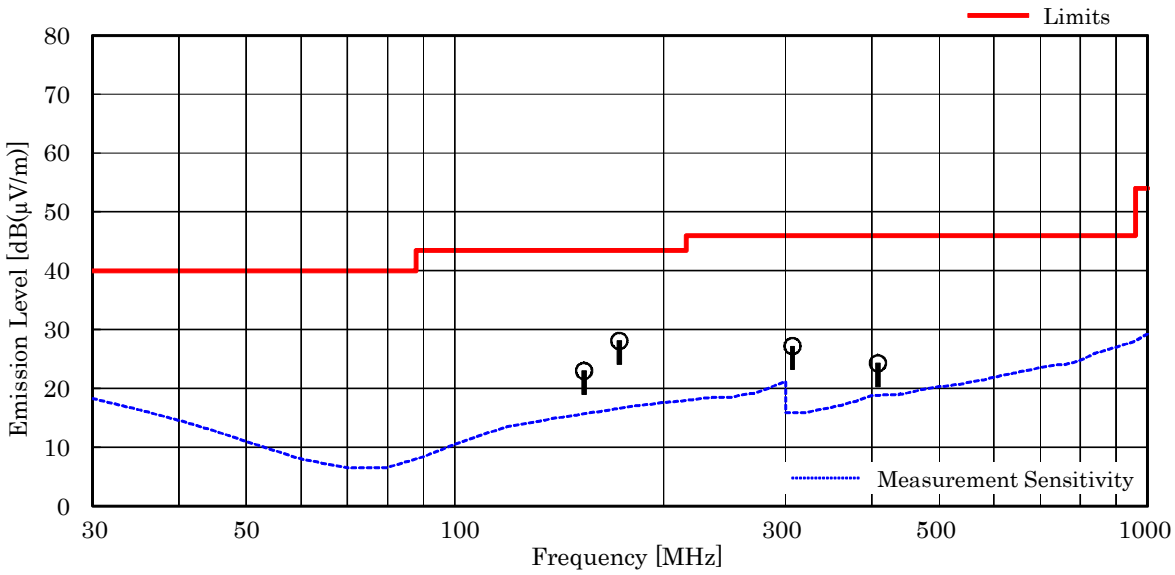
7.9.4.3 Other Spurious Emission (30MHz – 1000MHz)

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: October 28, 2015
Temp.: 23 °C, Humi: 55 %

Antenna pole : Horizontal

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
31.62	18.1	-27.5	< 27.0	40.0	< 17.6	> +22.4	-
153.60	14.8	-26.2	34.4	43.5	23.0	+20.5	-
172.80	15.6	-26.0	38.5	43.5	28.1	+15.4	-
307.20	14.0	-25.2	38.4	46.0	27.2	+18.8	-
408.00	16.5	-24.6	32.4	46.0	24.3	+21.7	-

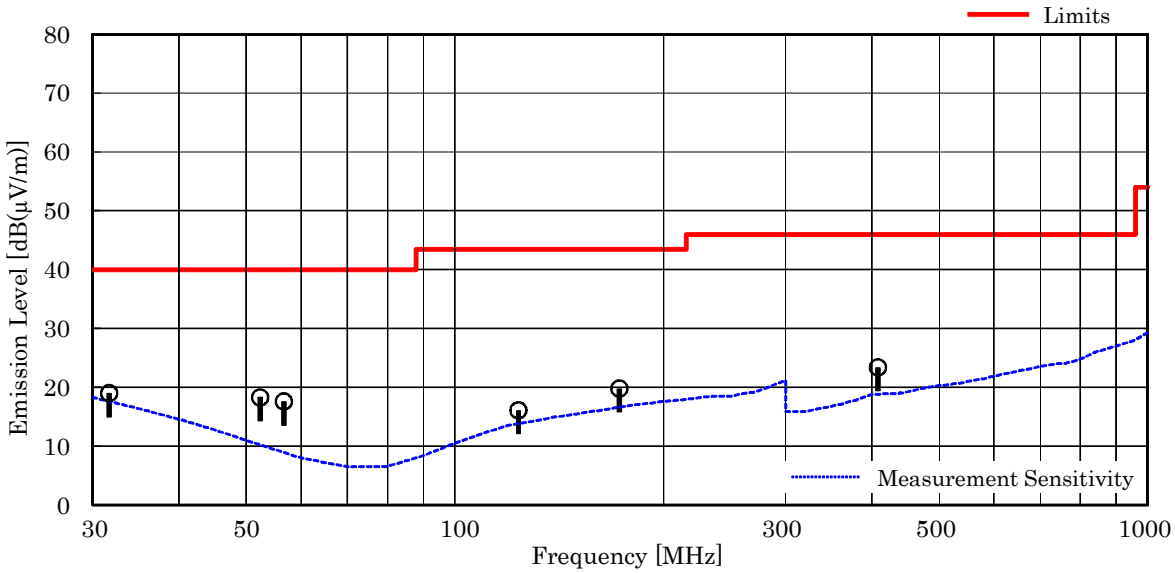


NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 172.80 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 15.6 + (-26.0) + 38.5 = 28.1 dB(μV/m)
   Antenna Height : 1.79 m, Turntable Angle : 107 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Test Date: October 28, 2015
Temp.: 23 °C, Humi: 55 %

Antenna pole : Vertical

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
31.69	18.1	-27.5	28.4	40.0	19.0	+21.0	-
52.35	10.4	-27.2	35.1	40.0	18.3	+21.7	-
56.66	9.0	-27.1	35.7	40.0	17.6	+22.4	-
123.56	13.3	-26.4	29.2	43.5	16.1	+27.4	-
172.80	15.6	-26.0	30.2	43.5	19.8	+23.7	-
408.00	16.5	-24.6	31.5	46.0	23.4	+22.6	-



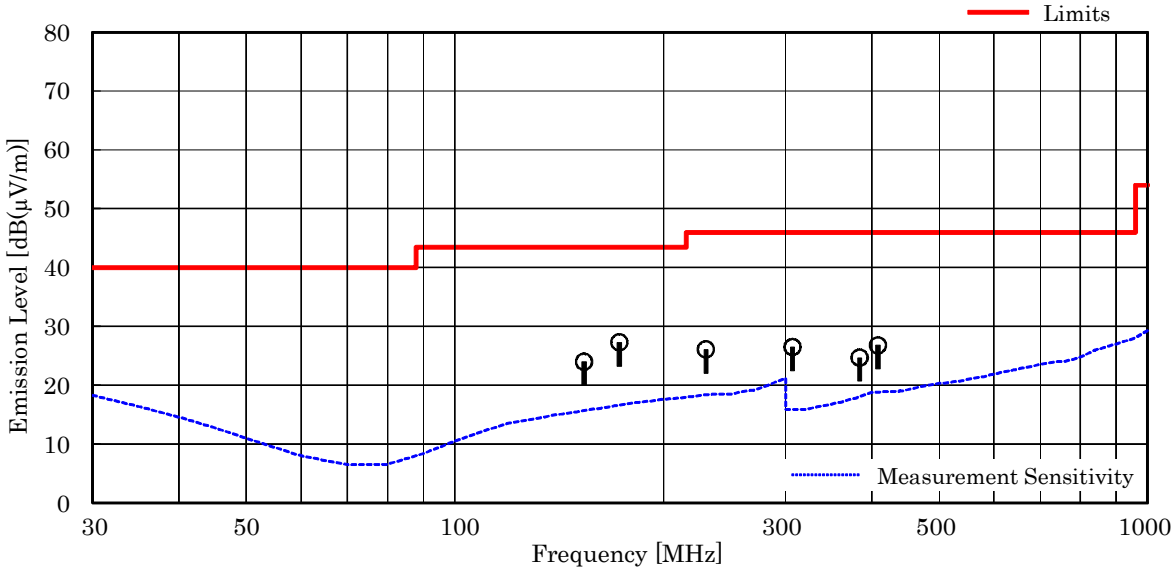
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 31.69 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 18.1 + (-27.5) + 28.4 = 19.0 dB(μV/m)
   Antenna Height : 0.00 m, Turntable Angle : 0 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Mode of EUT : Bluetooth Low Energy

Test Date: October 28, 2015
Temp.: 23 °C, Humi: 55 %

Antenna pole : Horizontal

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
153.60	14.8	-26.2	35.4	43.5	24.0	+19.5	-
172.80	15.6	-26.0	37.7	43.5	27.3	+16.2	-
230.40	17.0	-25.6	34.7	46.0	26.1	+19.9	-
307.20	14.0	-25.2	37.7	46.0	26.5	+19.5	-
384.00	15.8	-24.7	33.6	46.0	24.7	+21.3	-
408.00	16.5	-24.6	34.9	46.0	26.8	+19.2	-

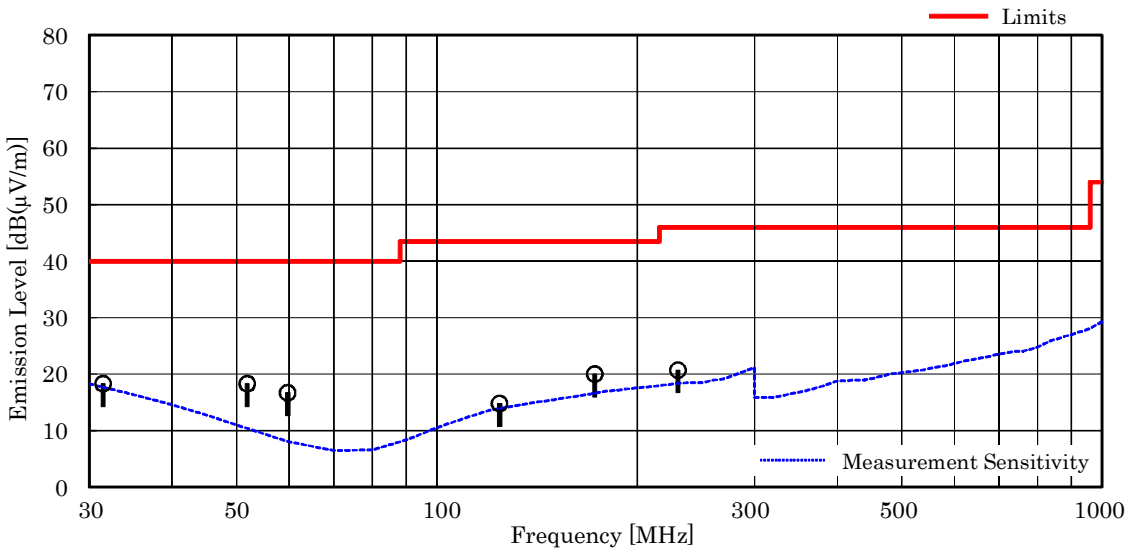


NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 172.80 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 15.6 + (-26.0) + 37.7 = 27.3 dB(μV/m)
   Antenna Height : 1.80 m, Turntable Angle : 114 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Test Date: October 28, 2015
Temp.: 23 °C, Humi: 55 %

Antenna pole : Vertical

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
31.49	18.2	-27.5	27.6	40.0	18.3	+21.7	-
51.89	10.5	-27.2	35.0	40.0	18.3	+21.7	-
59.67	8.2	-27.1	35.6	40.0	16.7	+23.3	-
124.25	13.3	-26.4	27.9	43.5	14.8	+28.7	-
172.80	15.6	-26.0	30.4	43.5	20.0	+23.5	-
230.40	17.0	-25.6	29.3	46.0	20.7	+25.3	-



NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 51.89 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 10.5 + (-27.2) + 35.0 = 18.3 dB(μV/m)
   Antenna Height : 1.00 m, Turntable Angle : 182 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

7.9.4.4 Other Spurious Emission (Above 1000MHz)

Mode of EUT : IEEE802.11b

Test Date: October 26, 2015
Temp.: 22 °C, Humi: 35 %

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	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
12060.0	33.6	-25.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
14472.0	37.0	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.6	< 38.6	> +15.4	
19296.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX Middle Ch												
4874.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7311.0	29.9	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.4	< 41.4	> +12.6	
12185.0	33.5	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	
19496.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX High Ch												
4924.0	27.3	-15.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.4	< 39.4	> +14.6	
7386.0	29.8	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.3	< 41.3	> +12.7	
12310.0	33.4	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.0	< 35.0	> +19.0	
19696.0	40.5	-42.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.8	< 37.8	> +16.2	
22158.0	40.6	-43.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.5	< 37.5	> +16.5	

Calculated result at 7311.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	29.9 dB(1/m)
	Corr. Factor	=	-16.5 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.4 dB(μV/m)

Minimum Margin: 54.0 - <41.4 = >12.6 (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 / AVE : Average

Mode of EUT : IEEE802.11g

Test Date: October 26, 2015
Temp.: 22 °C, Humi: 35 %

Frequency	Antenna Factor	Corr. Factor	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
[MHz]	[dB(1/m)]	[dB]										
Test condition : Tx Low Ch												
4824.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
12060.0	33.6	-25.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
14472.0	37.0	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.6	< 38.6	> +15.4	
19296.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX Middle Ch												
4874.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7311.0	29.9	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.4	< 41.4	> +12.6	
12185.0	33.5	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	
19496.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX High Ch												
4924.0	27.3	-15.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.4	< 39.4	> +14.6	
7386.0	29.8	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.3	< 41.3	> +12.7	
12310.0	33.4	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.0	< 35.0	> +19.0	
19696.0	40.5	-42.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.8	< 37.8	> +16.2	
22158.0	40.6	-43.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.5	< 37.5	> +16.5	

Calculated result at 7311.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	29.9 dB(1/m)
	Corr. Factor	=	-16.5 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.4 dB(μV/m)

Minimum Margin: 54.0 - <41.4 = >12.6 (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 / AVE : Average

Mode of EUT : IEEE802.11n

Test Date: October 26, 2015
Temp.: 22 °C, Humi: 35 %

Frequency	Antenna Factor	Corr. Factor	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
[MHz]	[dB(1/m)]	[dB]										
Test condition : Tx Low Ch												
4824.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
12060.0	33.6	-25.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
14472.0	37.0	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.6	< 38.6	> +15.4	
19296.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX Middle Ch												
4874.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7311.0	29.9	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.4	< 41.4	> +12.6	
12185.0	33.5	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	
19496.0	40.5	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.9	< 37.9	> +16.1	
Test condition : TX High Ch												
4924.0	27.3	-15.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.4	< 39.4	> +14.6	
7386.0	29.8	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.3	< 41.3	> +12.7	
12310.0	33.4	-26.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.0	< 35.0	> +19.0	
19696.0	40.5	-42.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.8	< 37.8	> +16.2	
22158.0	40.6	-43.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.5	< 37.5	> +16.5	

Calculated result at 7311.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	29.9 dB(1/m)
	Corr. Factor	=	-16.5 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.4 dB(μV/m)

Minimum Margin: 54.0 - <41.4 = >12.6 (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 / AVE : Average

Mode of EUT : Bluetooth Low Energy

Test Date: October 26, 2015
Temp.: 22 °C, Humi: 35 %

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												
4804.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
12010.0	33.6	-25.7	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.9	< 35.9	> +18.1	
19216.0	40.5	-42.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.8	< 37.8	> +16.2	
Test condition : TX Middle Ch												
4880.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7320.0	29.9	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.4	< 41.4	> +12.6	
12200.0	33.5	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	
19520.0	40.4	-42.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.8	< 37.8	> +16.2	
Test condition : TX High Ch												
4960.0	27.3	-15.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.4	< 39.4	> +14.6	
7440.0	29.8	-16.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.3	< 41.3	> +12.7	
12400.0	33.6	-26.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.1	< 35.1	> +18.9	
19840.0	40.4	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22320.0	40.6	-43.2	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.4	< 37.4	> +16.6	

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

	Antenna Factor	=	29.9 dB(1/m)
	Corr. Factor	=	-16.5 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.4 dB(μV/m)

Minimum Margin: 54.0 - <41.4 = >12.6 (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 / AVE : Average