JQA File No. : KL80150046R
Issue Date : May 27, 2015

TEST REPORT

Applicant	:	Sharp Corporation, Communication Systems Division
Address	:	2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, Japan
Products	:	Smart Phone
Model No.	:	404SH
SERIAL NO.	:	004401/11/549795/6 004401/11/549865/7
FCC ID	:	APYHRO00220
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15
Test Results	:	**Passed**
Date of Test	:	April 21 ~ May 7, 2015

ilac-MRA VLAC Lab Accreditation VLAC-001-2

Kousei Shibata
Manager
Japan Quality Assurance Organization
KITA-KANSAI Testing Center
SAITO EMC Branch
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- 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.

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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	:	Smart Phone
3.	Model No.	:	404SH
4.	Serial No.	:	004401/11/549795/6
		:	004401/11/549865/7
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	February, 2015
7.	Power Rating	:	4.0VDC (Lithium-ion Battery UBATIA258AFN1 3000mAh)
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	:	19.81 dBm(Measure Value of IEEE802.11b)
		:	22.99 dBm(Measure Value of IEEE802.11g)
		:	23.08 dBm(Measure Value of IEEE802.11n)
		:	5.17 dBm(Measure Value of Bluetooth LE)
12.	Antenna Type	:	Inverted-L Type Antenna (Integral)
13.	Antenna Gain	:	0 dBi (Main/Sub)
14.	Category	:	DTS
15.	EUT Authorization	:	Certification
16.	Received Date of EUT	:	April 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 C63.10–2009
Testing unlicensed wireless devices.

KDB 558074 D01
DTS Meas Guidance v03r02: June 5, 2014.

KDB 662911 D01
Multiple Transmitter Output v02r01: October 31, 2013

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	404SH	004401/11/549795/6*1) 004401/11/549865/7*2)	APYHRO00220
B	AC Adapter	Sharp	SHCEJ1	--	N/A
C	Earphone	Softbank Mobile	ZTCAA1	--	N/A
D	DTV Antenna	Sharp	--	--	N/A

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

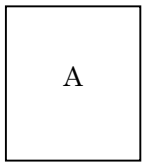
The auxiliary equipment used for testing :
None

Type of Cable:

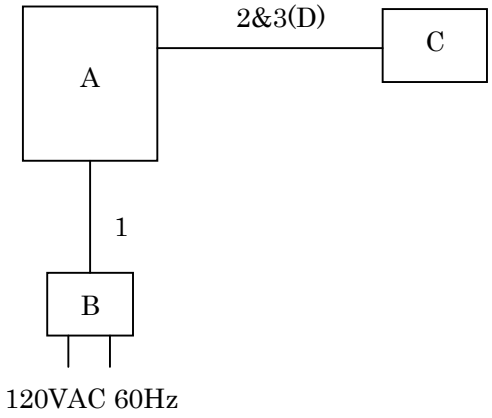
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Power Cord	--	--	NO	NO	1.5
2	Earphone Cable	--	--	NO	NO	0.5
3	DTV Antenna Cable	--	--	NO	NO	0.1

6.2 Test Arrangement (Drawings)

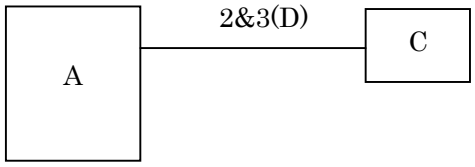
a) Single Unit



b) AC Adapter used



c) Earphone used



6.3 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)

The equipment has two antennas(Main Antenna[ANT0]/Sub Antenna[ANT1]) in the WLAN mode, and uses the MIMO technology.
This equipment works in 1TX(Main) and 2TX(Main+Sub) mode.
Therefore, the radiated emission tests were carried out in the following mode.
a) 1TX (Main)
b) 2TX (Main+Sub)
In 1TX mode and 2TX mode, the output level in each antenna is the same.

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	MCS3 (26 Mbps)

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

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.

DIRECTIONAL ANTENNA GAIN

For Power: The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

ANT0 Antenna Gain [dBi]	ANT1 Antenna Gain [dBi]	Uncorrelated Chains Directional Gain [dBi]
0.00	0.00	0.00

For PSD: The TX chains are correlated. The directional gain is:

ANT0 Antenna Gain [dBi]	ANT1 Antenna Gain [dBi]	Correlated Chains Directional Gain [dBi]
0.00	0.00	3.01

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

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	12.988	MHz	at	2437.0	MHz
The 99% Bandwidth of IEEE802.11g is	16.449	MHz	at	2437.0	MHz
The 99% Bandwidth of IEEE802.11n is	17.659	MHz	at	2462.0	MHz
The 99% Bandwidth of Bluetooth LE is	1096.7	kHz	at	2402.0	MHz
The 6dB Bandwidth of IEEE802.11b is	8.159	MHz	at	2437.0	MHz
The 6dB Bandwidth of IEEE802.11g is	16.517	MHz	at	2437.0	MHz
The 6dB Bandwidth of IEEE802.11n is	17.732	MHz	at	2437.0	MHz
The 6dB Bandwidth of Bluetooth LE is	675.0	kHz	at	2440.0	MHz
Uncertainty of Measurement Results				+/-0.9	%(2σ)

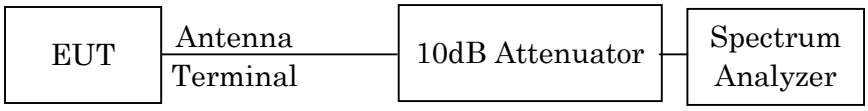
Remarks : _____

7.3.2 Test Instruments

Shielded Room S4					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Spectrum Analyzer	E4446A	Agilent	A-39	2014/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2014/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2014/8	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	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

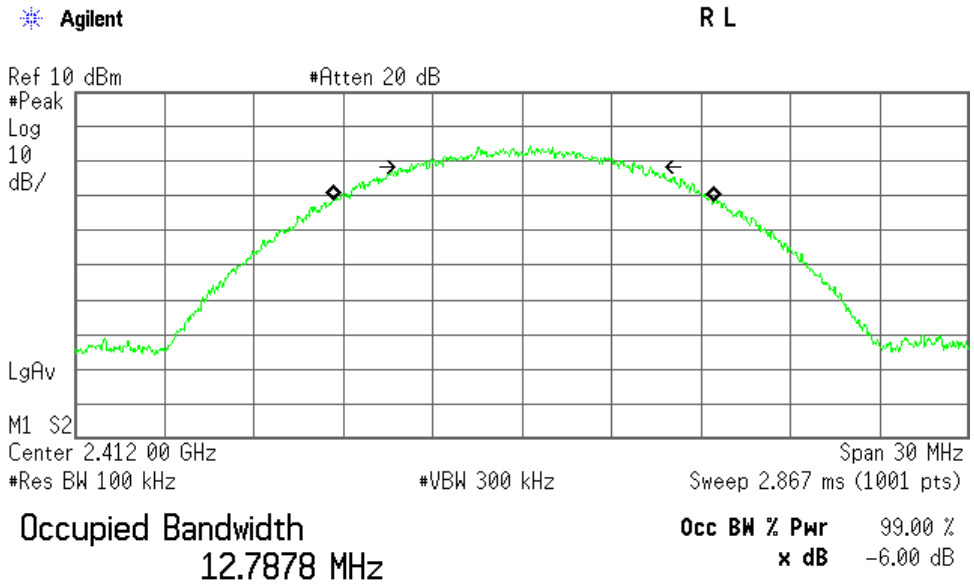
Test Date : April 23, 2015
Temp.:24°C, Humi:30%

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.

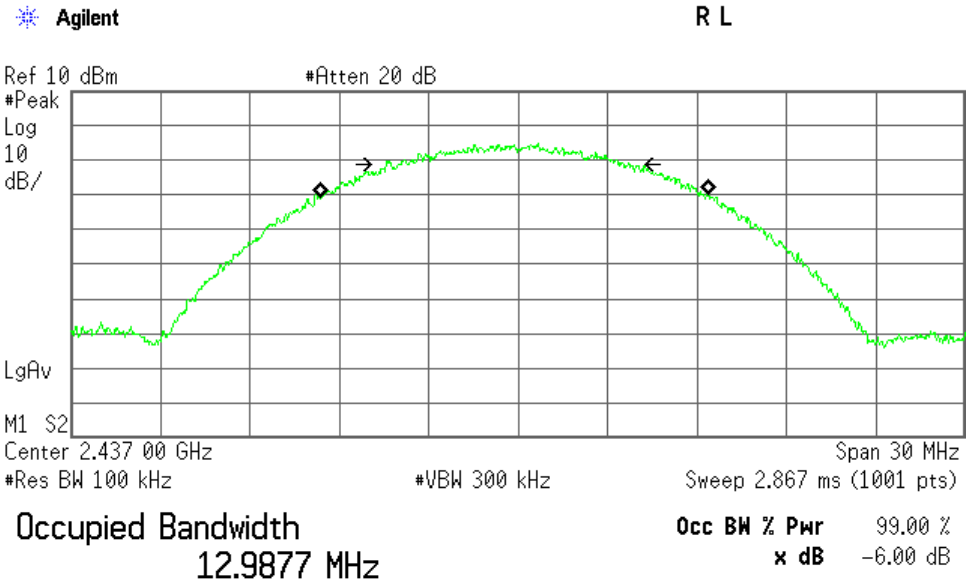
A) IEEE 802.11b
1) Main Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	12.788	8.068	500
06	2437.0	12.988	8.159	500
11	2462.0	12.872	7.863	500

Low Channel

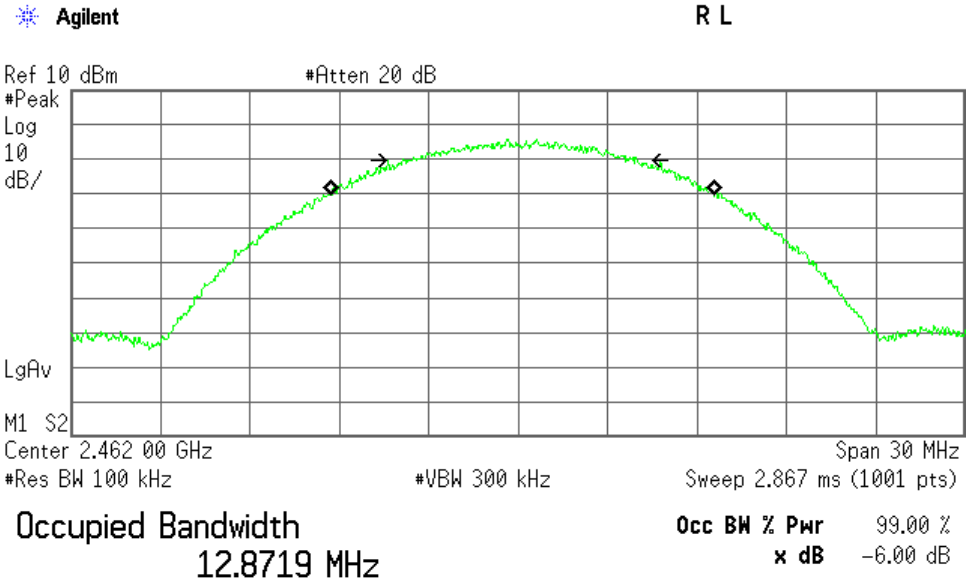


Middle Channel



Transmit Freq Error	-126.793 kHz
Occupied Bandwidth	8.159 MHz

High Channel

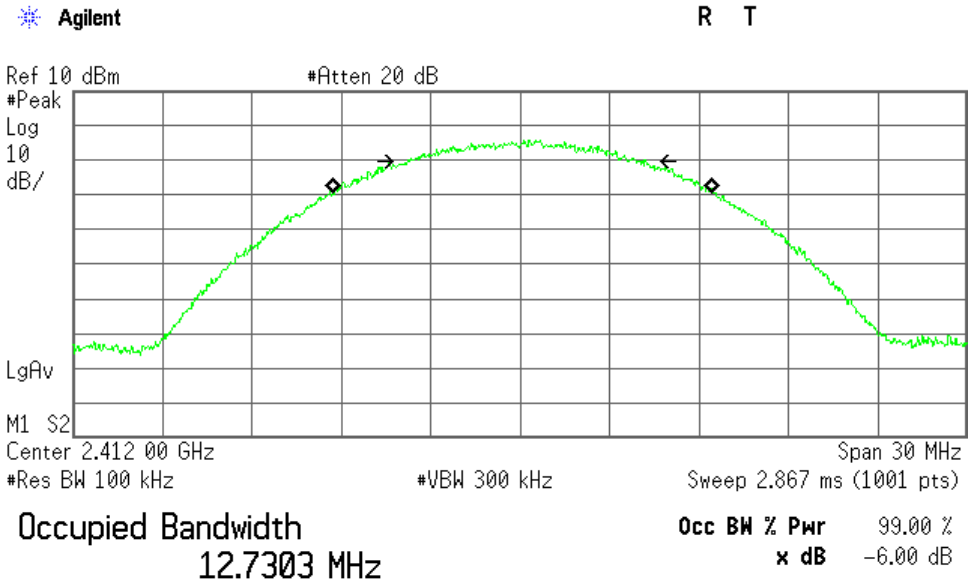


Transmit Freq Error	125.046 kHz
Occupied Bandwidth	7.863 MHz

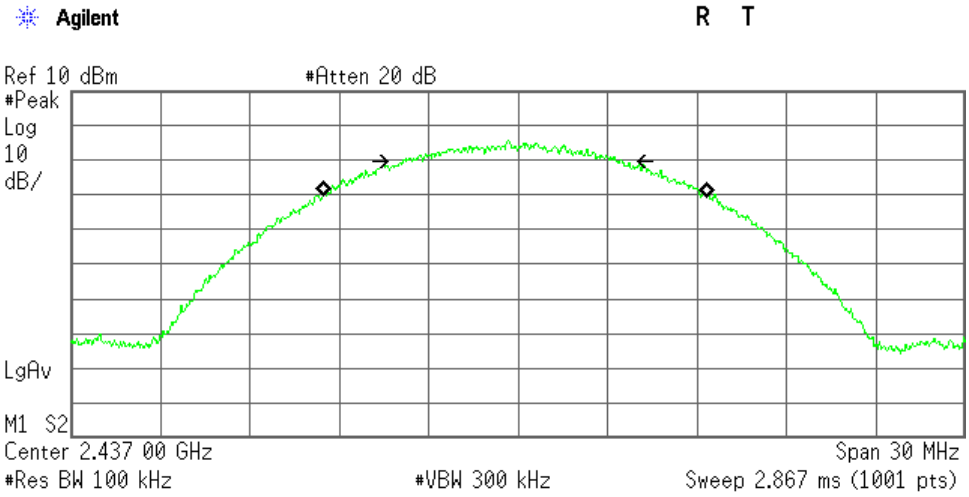
2) Sub Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	12.730	8.018	500
06	2437.0	12.888	7.335	500
11	2462.0	12.829	7.796	500

Low Channel

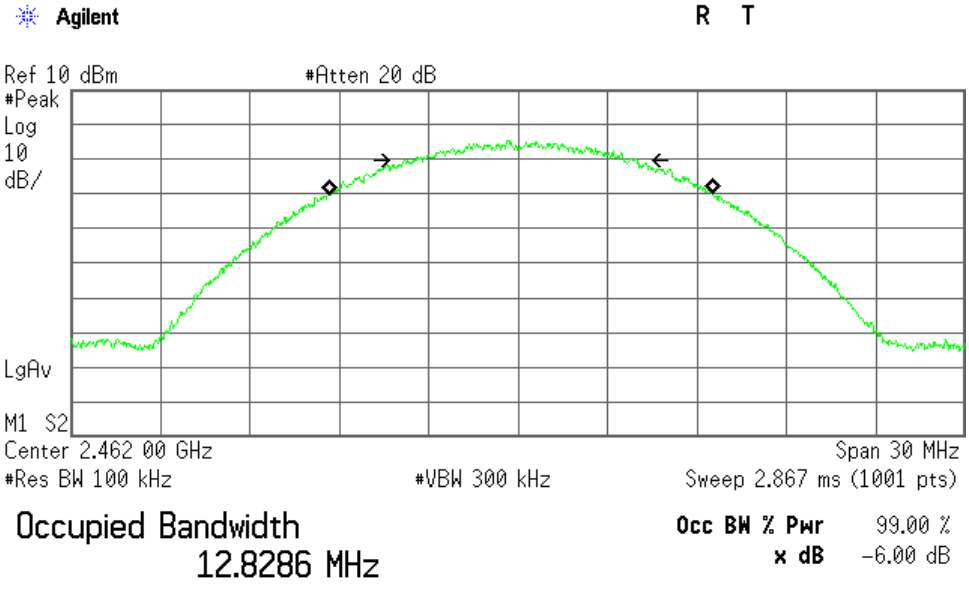


Middle Channel



Transmit Freq Error	-105.650 kHz
Occupied Bandwidth	7.335 MHz

High Channel



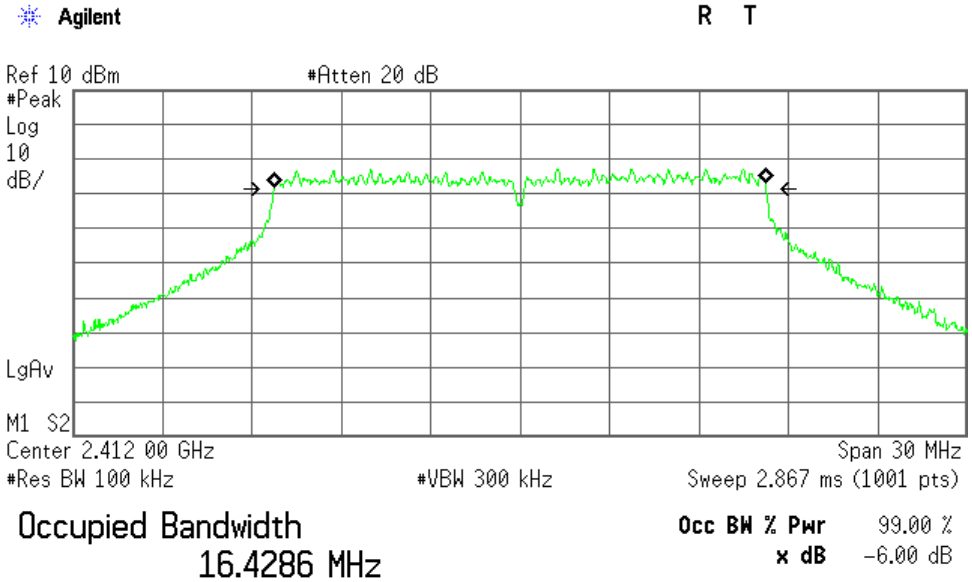
Transmit Freq Error	89.228 kHz
Occupied Bandwidth	7.796 MHz

B) IEEE 802.11g

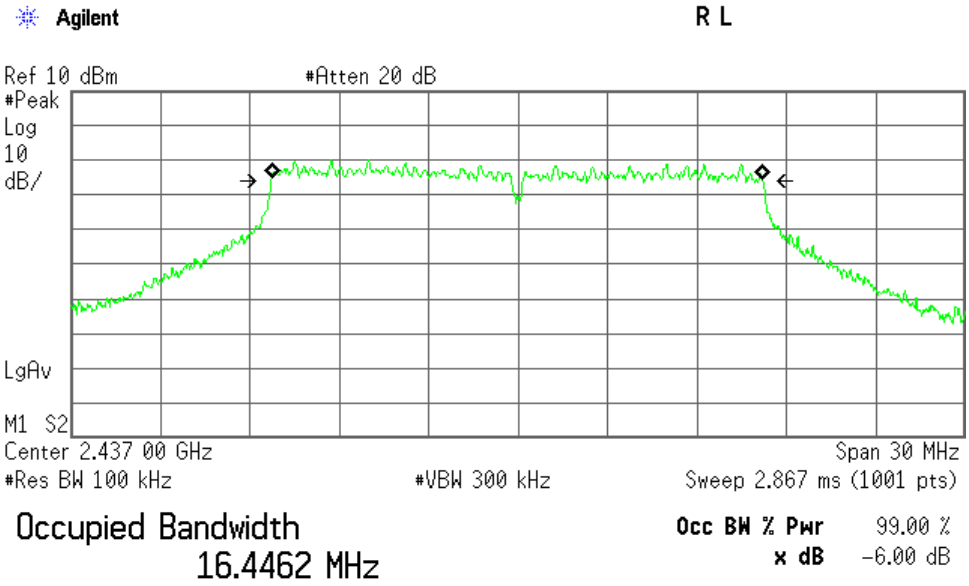
1) Main Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	16.429	16.502	500
06	2437.0	16.446	16.492	500
11	2462.0	16.441	16.474	500

Low Channel

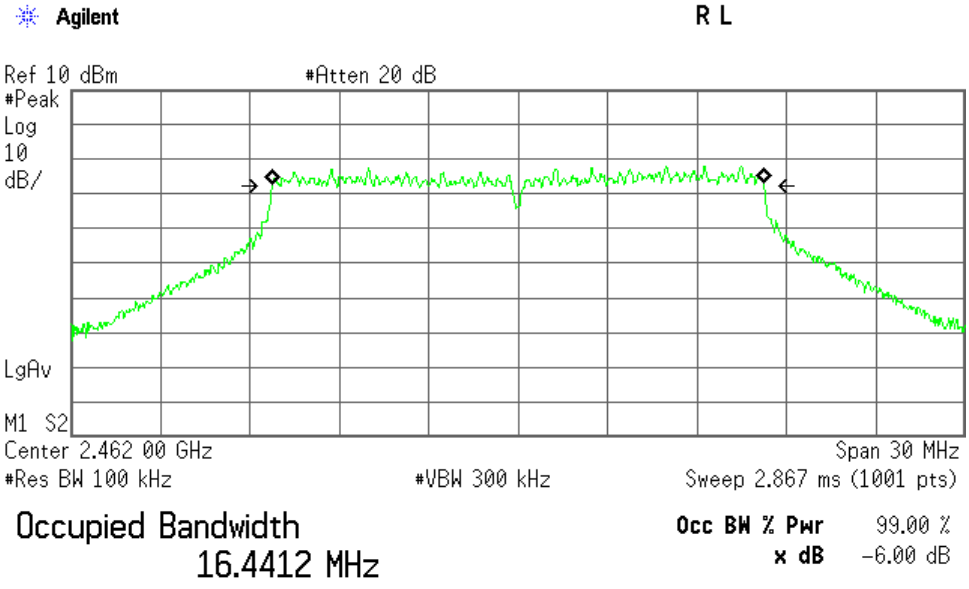


Middle Channel



Transmit Freq Error	-36.098 kHz
Occupied Bandwidth	16.492 MHz

High Channel

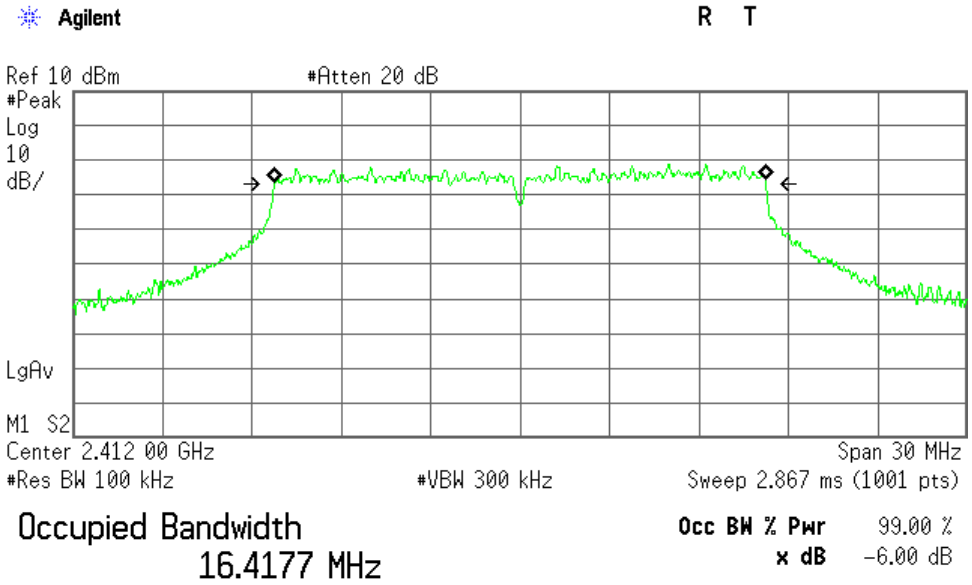


Transmit Freq Error	7.546 kHz
Occupied Bandwidth	16.474 MHz

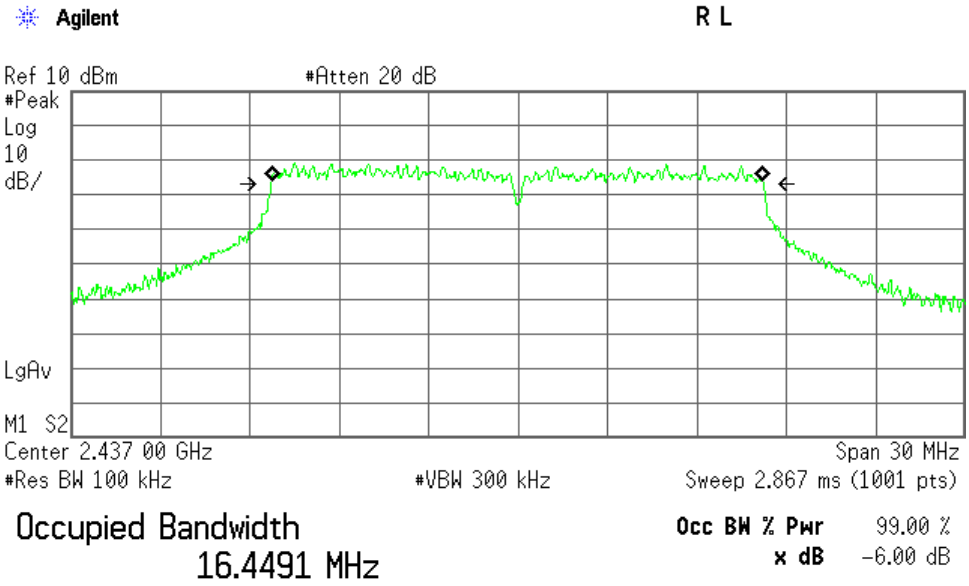
2) Sub Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	16.418	16.460	500
06	2437.0	16.449	16.517	500
11	2462.0	16.436	16.492	500

Low Channel

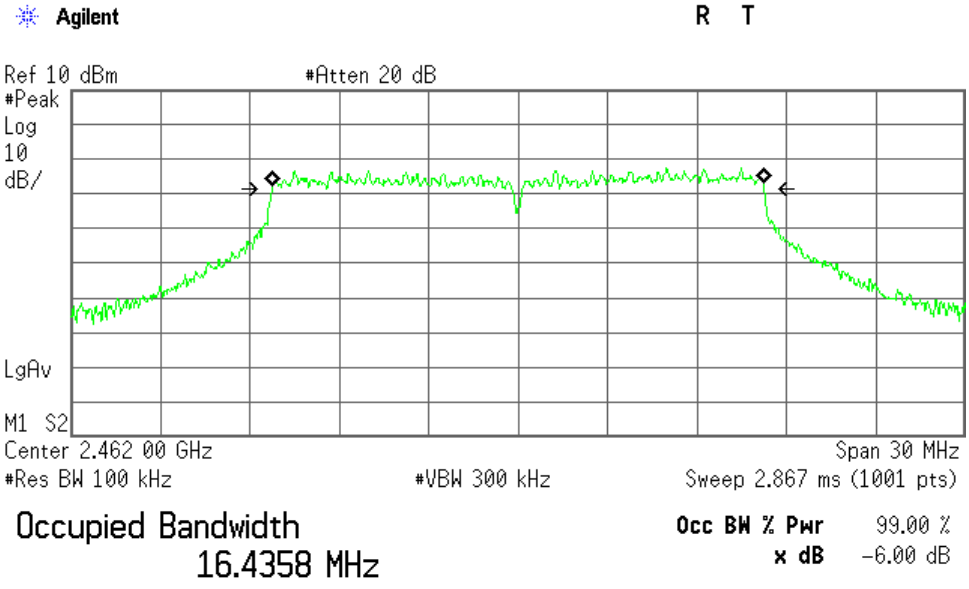


Middle Channel



Transmit Freq Error	-37.083 kHz
Occupied Bandwidth	16.517 MHz

High Channel



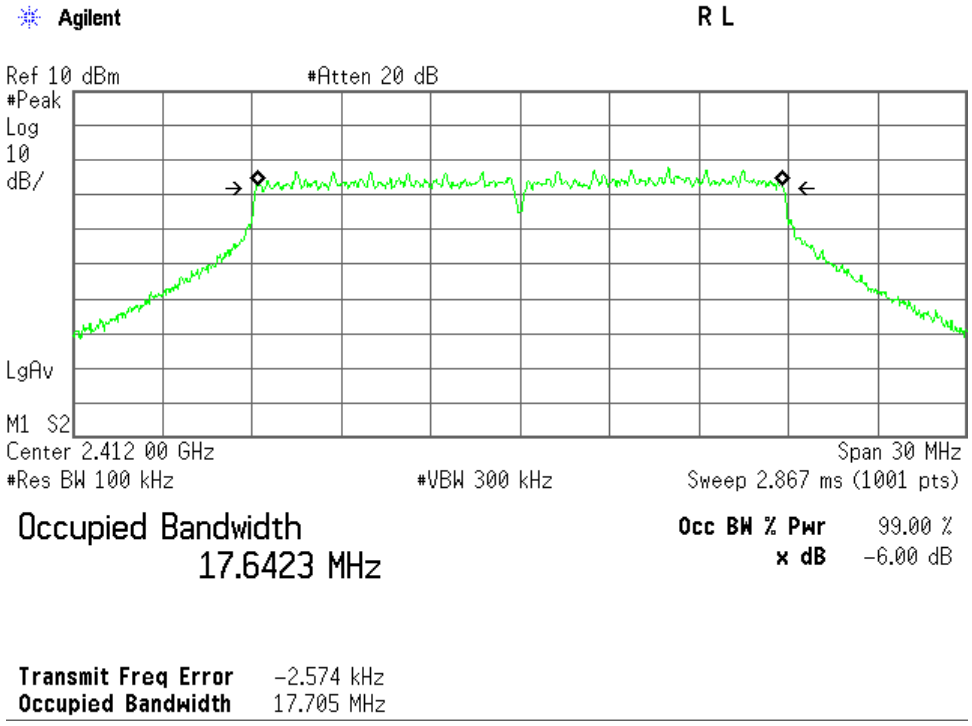
Transmit Freq Error	3.429 kHz
Occupied Bandwidth	16.492 MHz

C) IEEE 802.11n

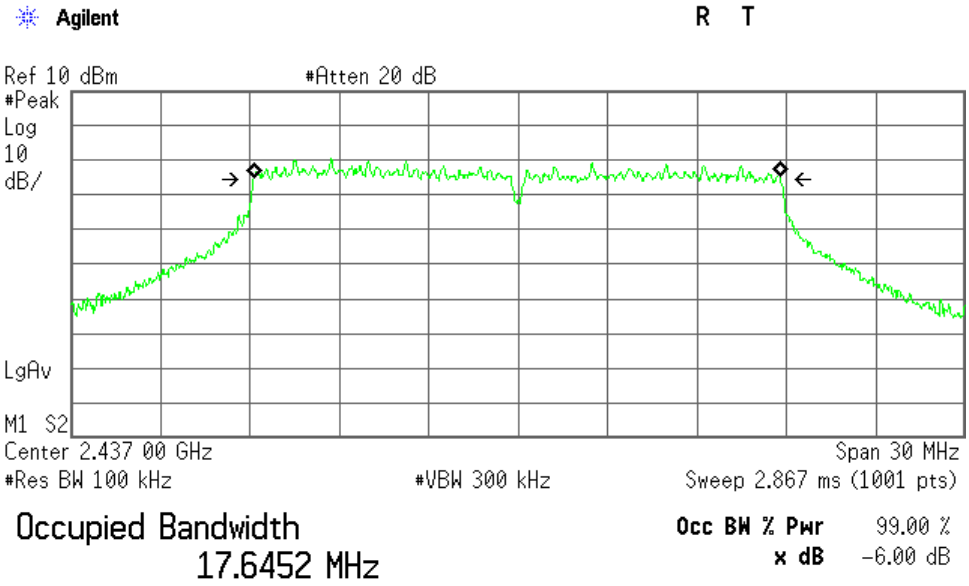
1) Main Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	17.642	17.705	500
06	2437.0	17.645	17.670	500
11	2462.0	17.647	17.708	500

Low Channel

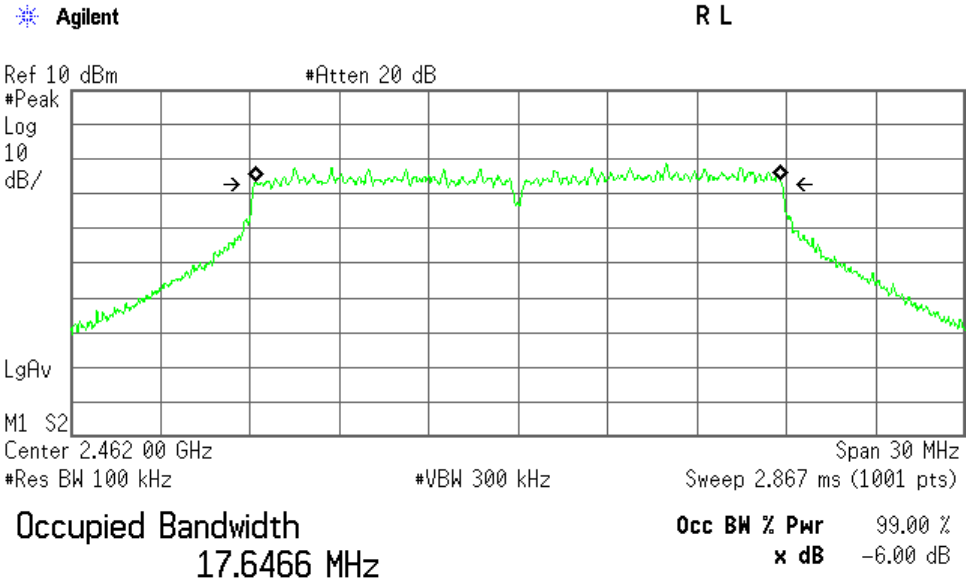


Middle Channel



Transmit Freq Error	-31.935 kHz
Occupied Bandwidth	17.670 MHz

High Channel

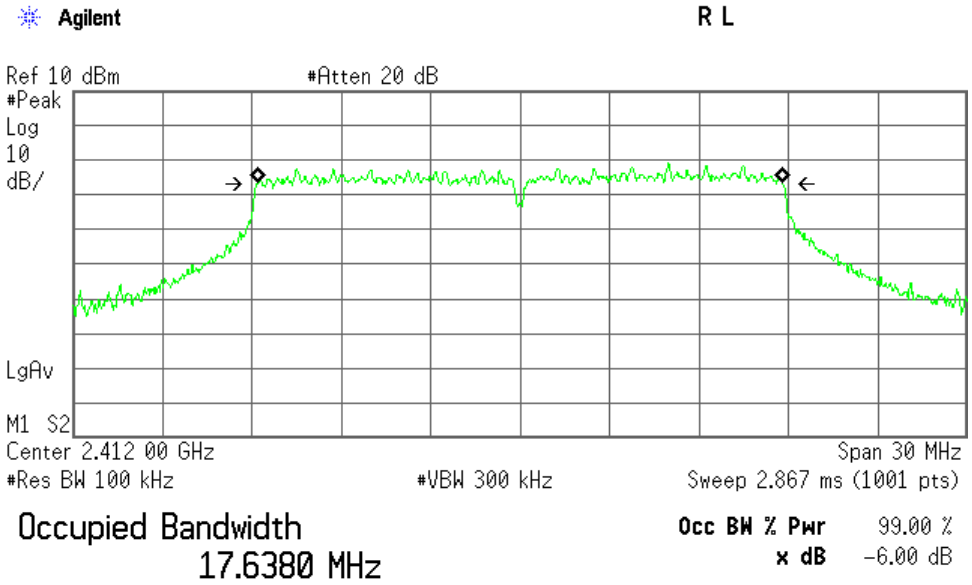


Transmit Freq Error	1.762 kHz
Occupied Bandwidth	17.708 MHz

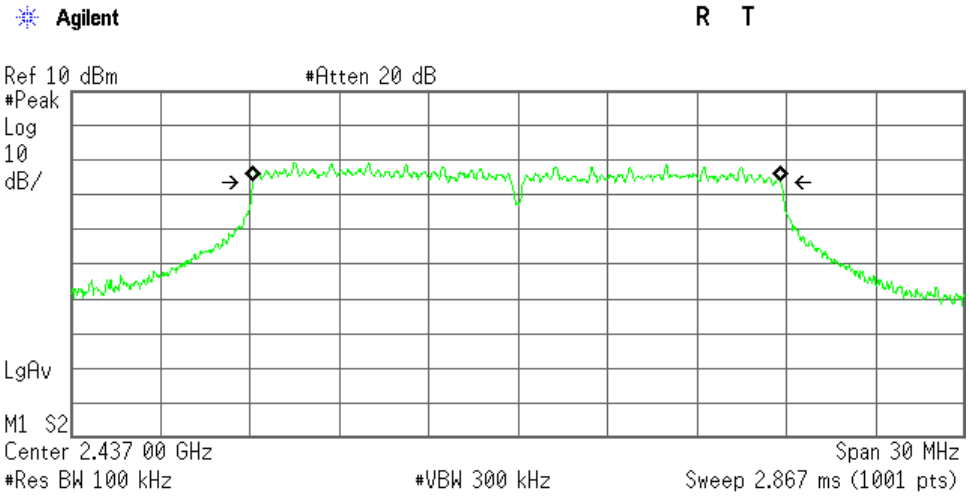
2) Sub Antenna

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	17.638	17.681	500
06	2437.0	17.658	17.732	500
11	2462.0	17.659	17.726	500

Low Channel

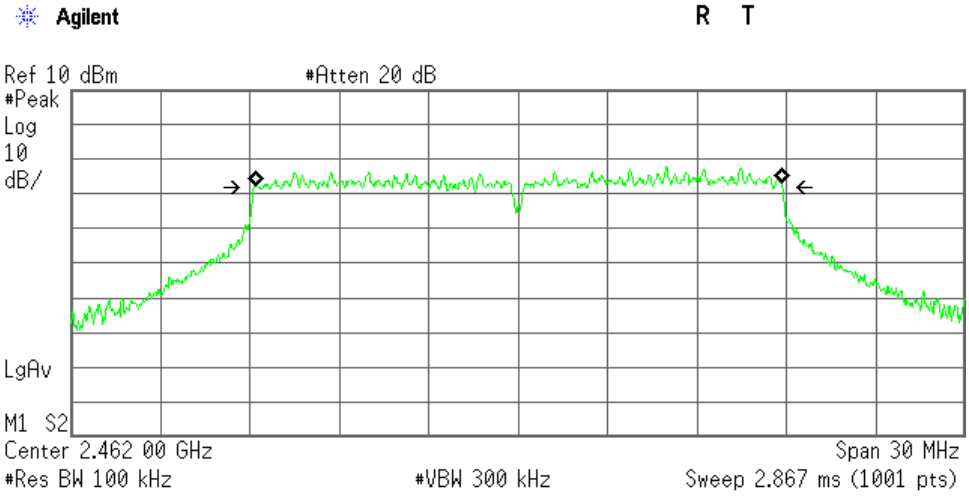


Middle Channel



Transmit Freq Error	-36.252 kHz
Occupied Bandwidth	17.732 MHz

High Channel



Transmit Freq Error	7.883 kHz
Occupied Bandwidth	17.726 MHz

Mode of EUT : Bluetooth Low Energy

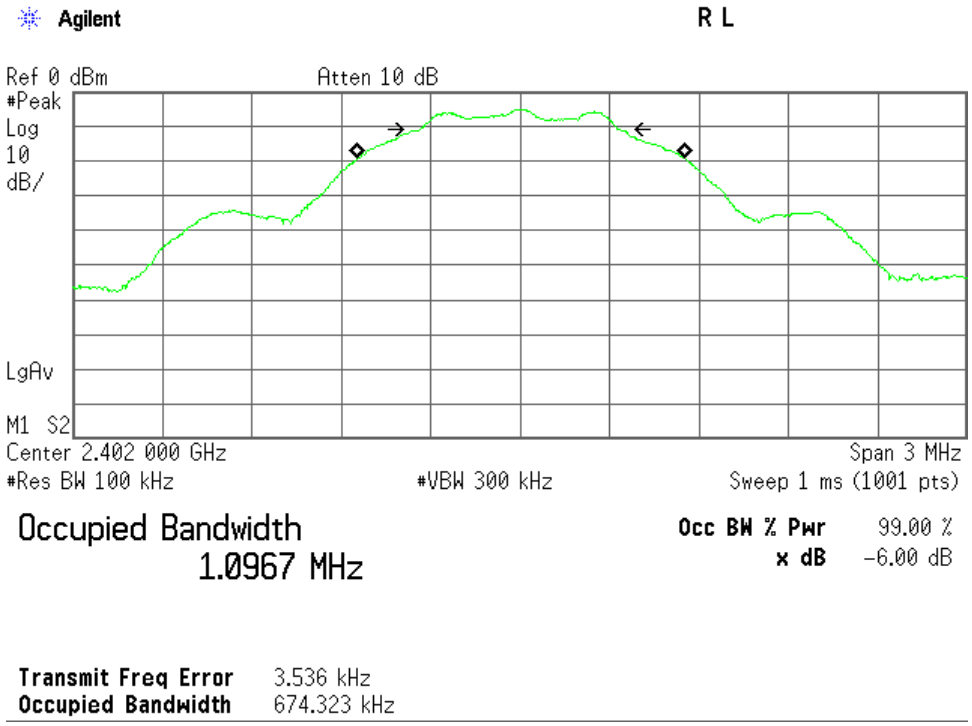
Test Date : May 4, 2015
Temp.:25°C, Humi:64%

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.

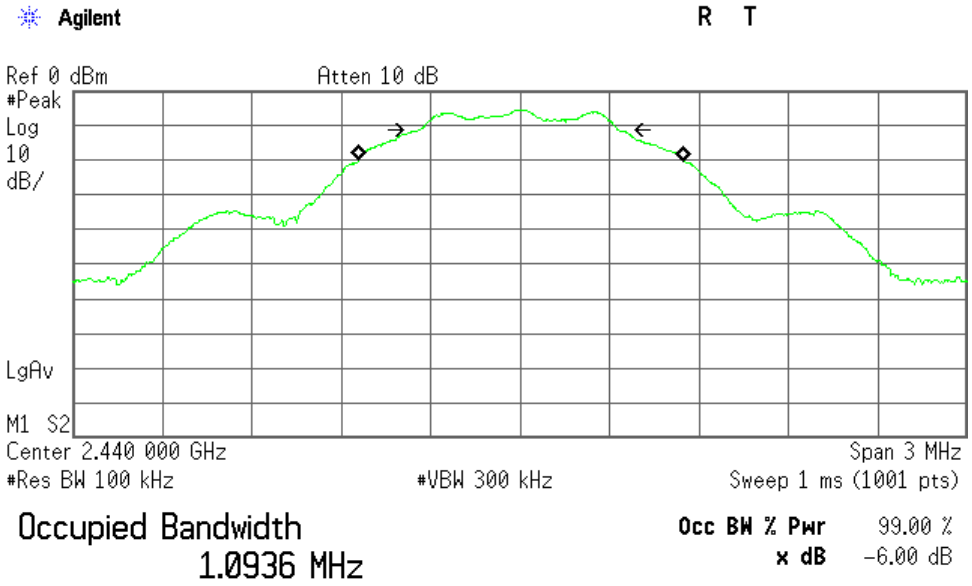
1)Packet Setting : LE (Modulation type : GFSK)

Channel	Frequency (MHz)	99% Bandwidth (kHz)	-6dBc Bandwidth (kHz)	Minimum -6dBc Bandwidth Limit (kHz)
00	2402.0	1096.7	674.3	500
19	2440.0	1093.6	675.0	500
39	2480.0	1096.2	670.3	500

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

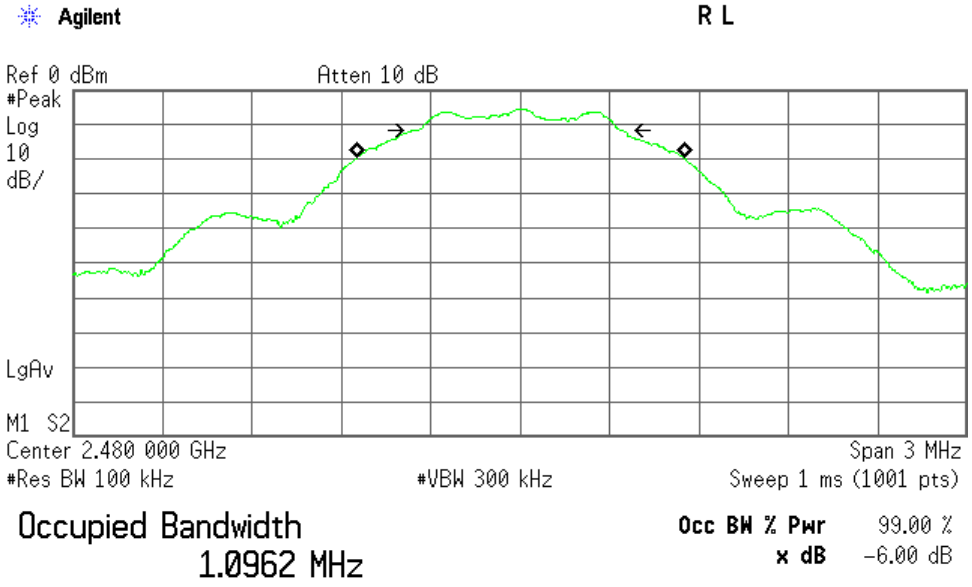


Middle Channel



Transmit Freq Error	3.148 kHz
Occupied Bandwidth	674.985 kHz

High Channel



Transmit Freq Error	3.140 kHz
Occupied Bandwidth	670.334 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	19.81	dBm	at	2437.0	MHz
Peak Output Power of IEEE802.11g is	22.99	dBm	at	2437.0	MHz
Peak Output Power of IEEE802.11n is	23.08	dBm	at	2437.0	MHz
Peak Output Power of Bluetooth LE is	5.17	dBm	at	2402.0	MHz

Uncertainty of Measurement Results at Amplitude +/-0.9 dB(2σ)

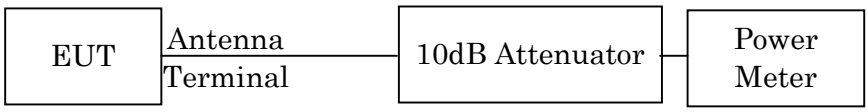
Remarks :

7.5.2 Test Instruments

Shielded Room S4					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Power Meter	N1911A	Agilent	B-63	2014/7	1 Year
Power Sensor	N1921A	Agilent	B-64	2014/7	1 Year
Attenuator	54A-10	Weinschel	D-28	2014/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2014/8	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: April 21, 2015
Temp.: 22 °C, Humi: 43 %

Data Rate : 11Mbps

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	5.17	6.48	8.88	18.89	77.45	30.00	+11.11
06	2437	10.01	5.51	7.78	9.80	19.81	95.72	30.00	+10.19
11	2462	10.01	6.82	6.71	9.78	19.79	95.28	30.00	+10.21

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

	Correction Facto	=	10.01 dB
+)	Meter Reading	=	9.80 dBm
	Result	=	19.81 dBm = 95.72 mW

Minimum Margin: 30.00 - 19.81 = 10.19 (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	5.44	
2Mbps	5.48	
5.5Mbps	5.41	
11Mbps	5.51	*

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

2) IEEE 802.11g

Test Date: April 21, 2015
Temp.: 22 °C, Humi: 43 %

Data Rate : 24Mbps

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	9.87	7.94	12.02	22.03	159.59	30.00	+ 7.97
06	2437	10.01	10.86	8.86	12.98	22.99	199.07	30.00	+ 7.01
11	2462	10.01	9.52	8.99	12.27	22.28	169.04	30.00	+ 7.72

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

	Correction Facto	=	10.01 dB
+)	Meter Reading	=	12.98 dBm
	Result	=	22.99 dBm = 199.07 mW

Minimum Margin: 30.00 - 22.99 = 7.01 (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	7.19	
9Mbps	7.08	
12Mbps	7.30	
18Mbps	7.08	
24Mbps	10.86	*
36Mbps	10.66	
48Mbps	10.71	
54Mbps	10.22	

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

3) IEEE 802.11n

Test Date: April 21, 2015
Temp.: 22 °C, Humi: 43 %

Data Rate : MCS3(26Mbps)

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	9.36	7.91	11.71	21.72	148.59	30.00	+ 8.28
06	2437	10.01	11.14	8.61	13.07	23.08	203.24	30.00	+ 6.92
11	2462	10.01	9.26	8.90	12.09	22.10	162.18	30.00	+ 7.90

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

	Correction Facto	=	10.01 dB
+)	Meter Reading	=	13.07 dBm
	Result	=	23.08 dBm = 203.24 mW

Minimum Margin: 30.00 - 23.08 = 6.92 (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)	7.22	
MCS1(13Mbps)	7.22	
MCS2(19.5Mbps)	6.96	
MCS3(26Mbps)	11.14	*
MCS4(39Mbps)	10.88	
MCS5(52Mbps)	10.90	
MCS6(58.5Mbps)	10.45	
MCS7(65Mbps)	10.86	

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

4) Bluetooth LE(Modulation type : GFSK)

Test Date: May 4, 2015
Temp.: 25 °C, Humi: 64 %

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	10.01	-4.84	5.17	3.29	30.00	+24.83
19	2440	10.01	-5.22	4.79	3.01	30.00	+25.21
39	2480	10.01	-5.34	4.67	2.93	30.00	+25.33

Calculated result at 2402.000 MHz, as the worst point shown on underline:

	Correction Factor	=	10.01 dB
+)	Meter Reading	=	-4.84 dBm
	Result	=	5.17 dBm = 3.29 mW

Minimum Margin: 30.00 - 5.17 = 24.83 (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	3.56	dBm	at	2462.0	MHz
Peak Power Density of IEEE802.11g is	-1.35	dBm	at	2437.0	MHz
Peak Power Density of IEEE802.11n is	-1.96	dBm	at	2437.0	MHz
Peak Power Density of Bluetooth LE is	4.36	dBm	at	2402.0	MHz

Uncertainty of Measurement Results at Amplitude +/-1.7 dB(2σ)

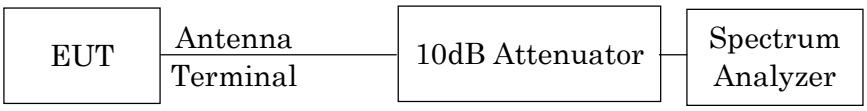
Remarks : _____

7.6.2 Test Instruments

Shielded Room S4					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Spectrum Analyzer	E4446A	Agilent	A-39	2014/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2014/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2014/8	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: April 23, 2015
Temp.: 24 °C, Humi: 30 %

Data Rate : 11Mbps

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	-10.17	-8.86	-6.46	3.55	2.26	8.00	+ 4.45
06	2437	10.01	-9.99	-9.47	-6.71	3.30	2.14	8.00	+ 4.70
11	2462	10.01	-9.42	-9.49	-6.45	3.56	2.27	8.00	+ 4.44

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

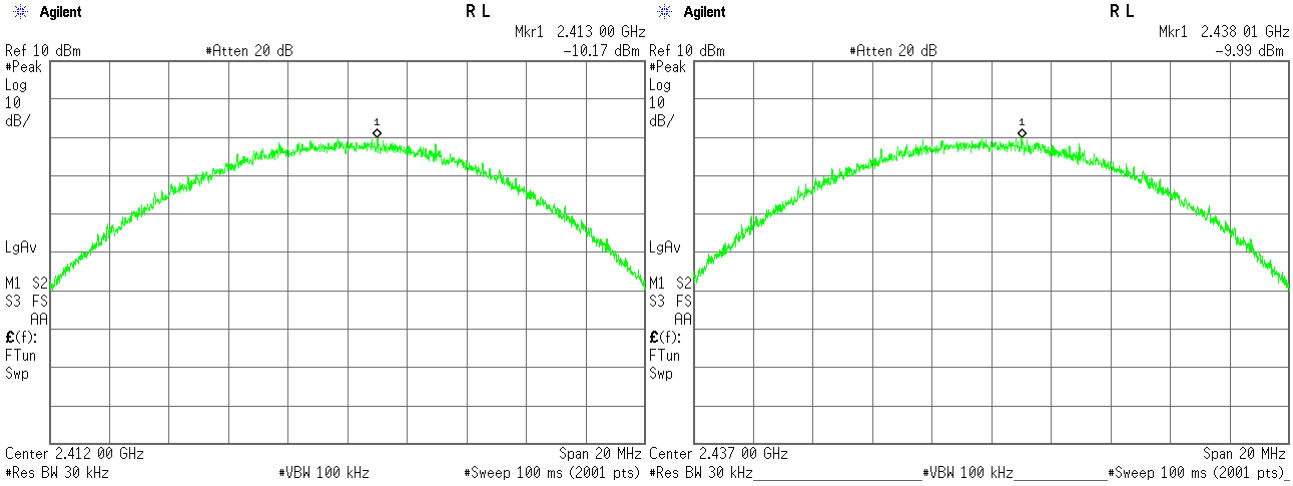
	Correction Facto	=	10.01 dB
+)	Meter Reading	=	-6.45 dBm
	Result	=	3.56 dBm = 2.27 mW

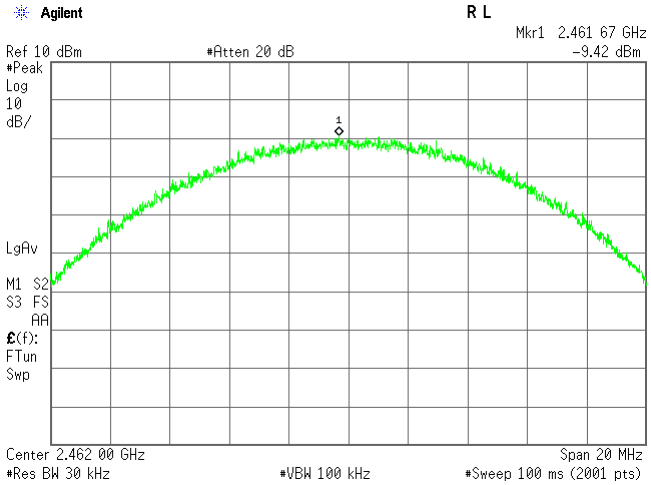
Minimum Margin: 8.00 - 3.56 = 4.44 (dB)

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) :

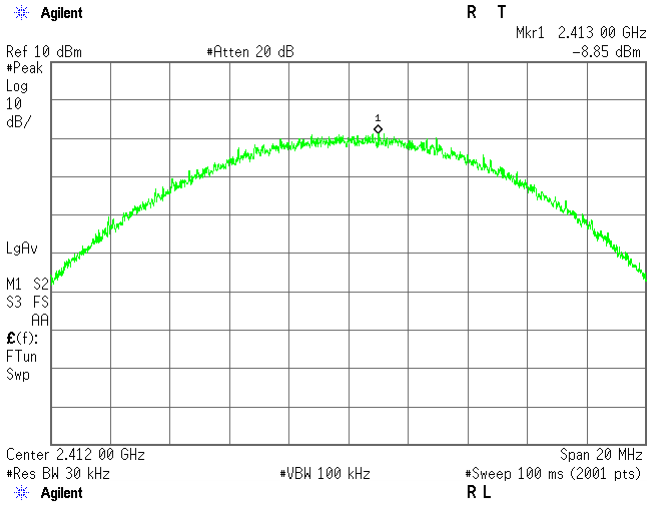
Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz

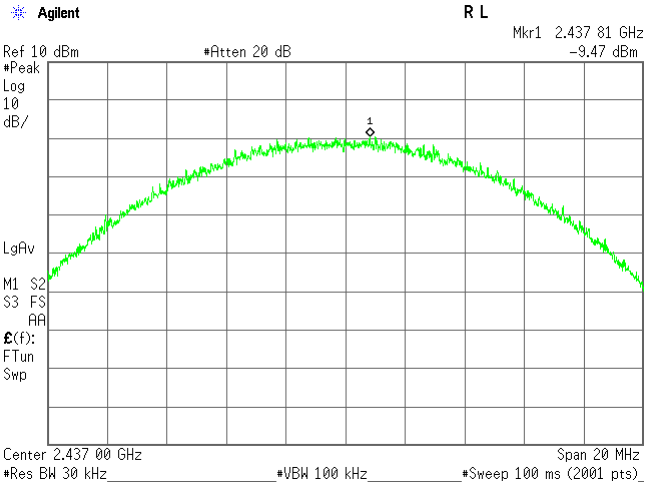
a) Main Antenna (ANT0)

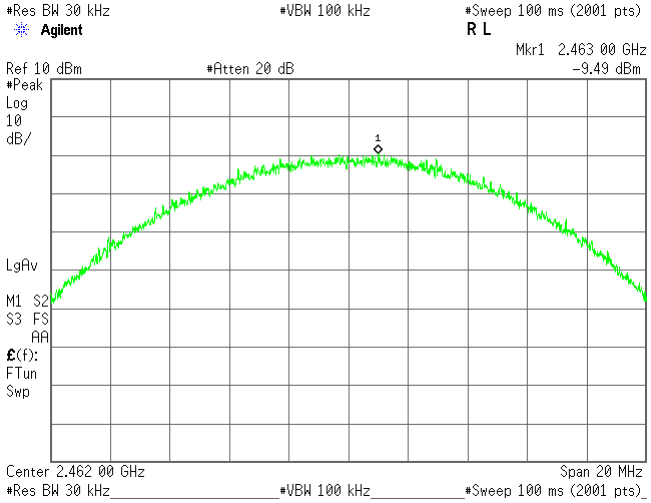




b) Sub Antenna (ANT1)







2) IEEE 802.11g

Test Date: April 23, 2015
Temp.: 24 °C, Humi: 30 %

Data Rate : 24Mbps

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	-17.02	-15.16	-12.98	-2.97	0.50	8.00	+10.97
06	2437	10.01	-14.20	-14.55	-11.36	-1.35	0.73	8.00	+ 9.35
11	2462	10.01	-16.43	-16.75	-13.58	-3.57	0.44	8.00	+11.57

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

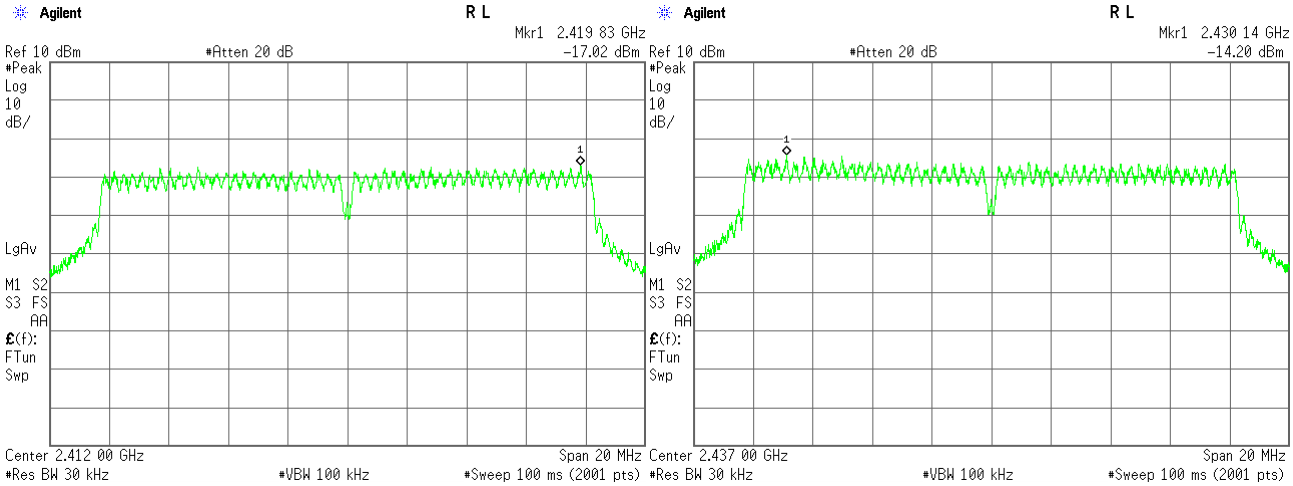
	Correction Facto	=	10.01 dB
+)	Meter Reading	=	-11.36 dBm
	Result	=	-1.35 dBm = 0.73 mW

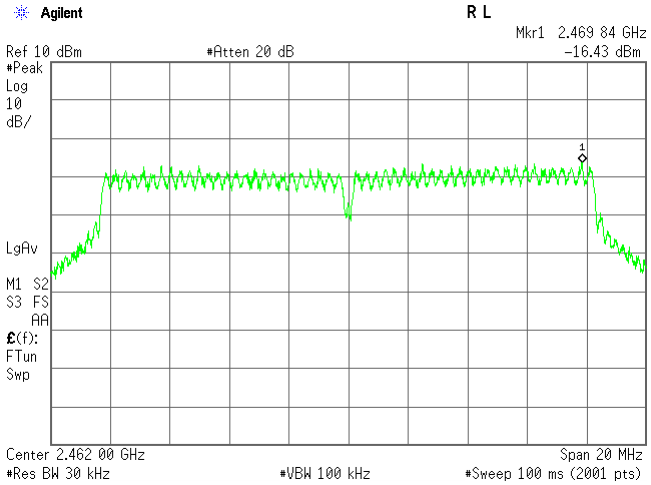
Minimum Margin: 8.00 - -1.35 = 9.35 (dB)

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) :

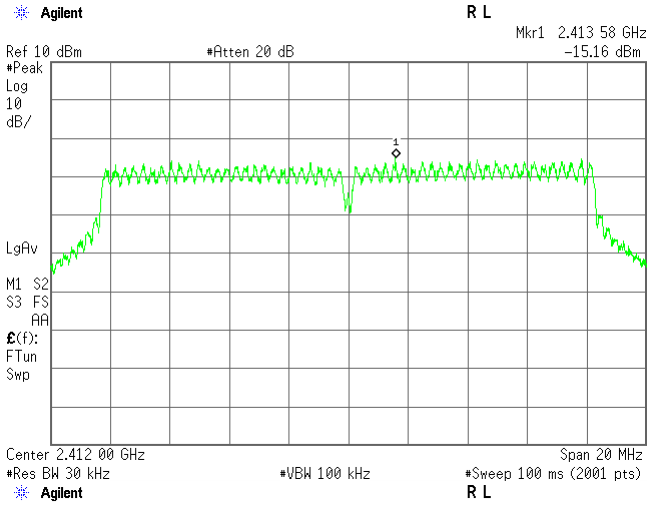
Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz

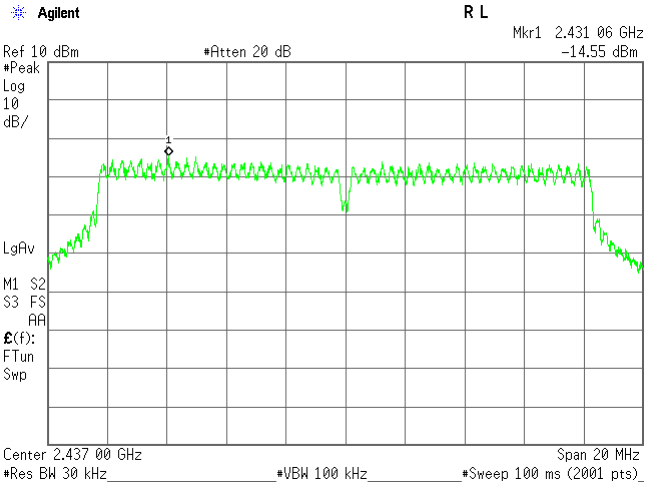
a) Main Antenna (ANT0)

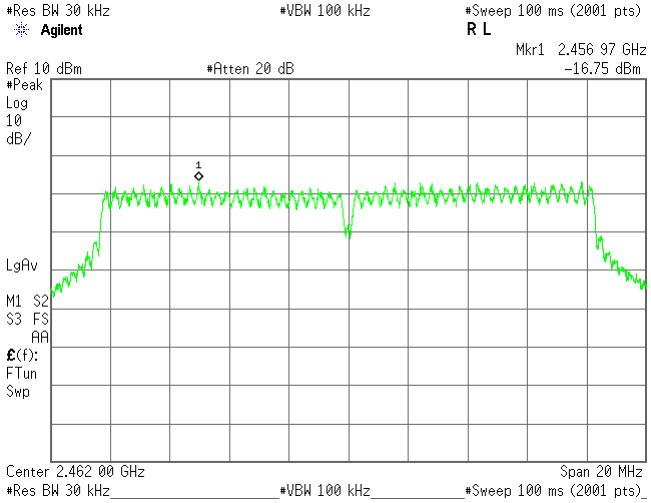




b) Sub Antenna (ANT1)







3) IEEE 802.11n

Test Date: April 23, 2015
Temp.: 24 °C, Humi: 30 %

Data Rate : MCS3(26Mbps)

Transmitting Frequency		Correction Factor	Meter Reading ANT0	Meter Reading ANT1	Meter Reading Total	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.01	-16.96	-16.05	-13.47	-3.46	0.45	8.00	+11.46
06	2437	10.01	-14.70	-15.29	-11.97	-1.96	0.64	8.00	+ 9.96
11	2462	10.01	-15.88	-17.02	-13.40	-3.39	0.46	8.00	+11.39

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

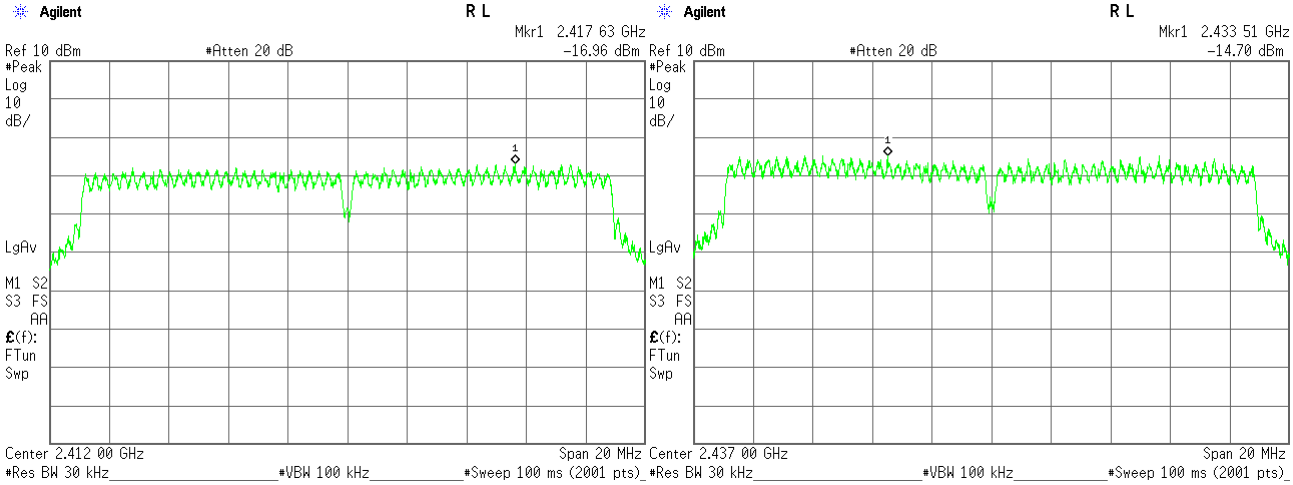
	Correction Facto	=	10.01 dB
+)	Meter Reading	=	-11.97 dBm
	Result	=	-1.96 dBm = 0.64 mW

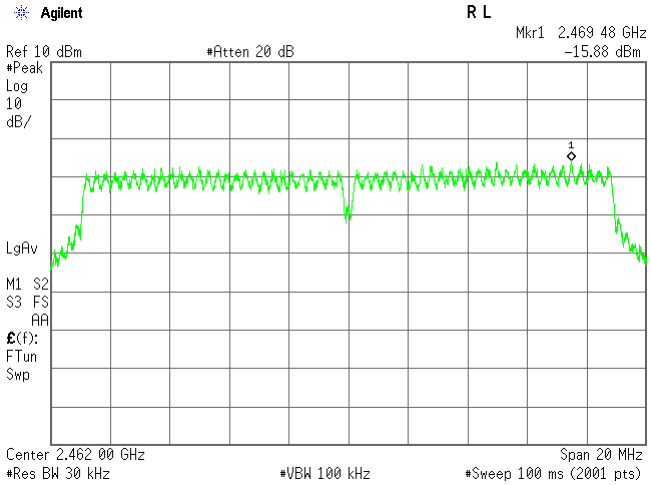
Minimum Margin: 8.00 - -1.96 = 9.96 (dB)

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) :

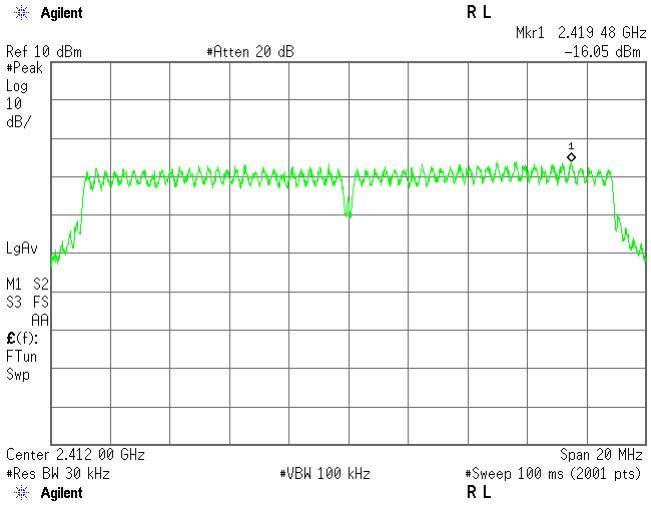
Detector Function	RES B.W.	Video B.W.
Peak	30kHz	100kHz

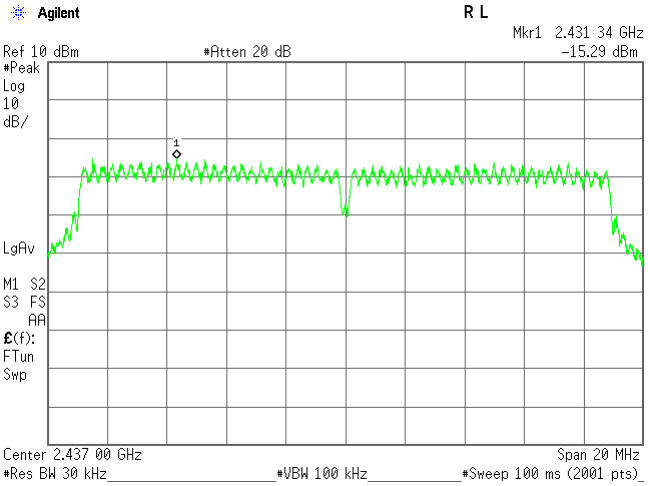
a) Main Antenna (ANT0)

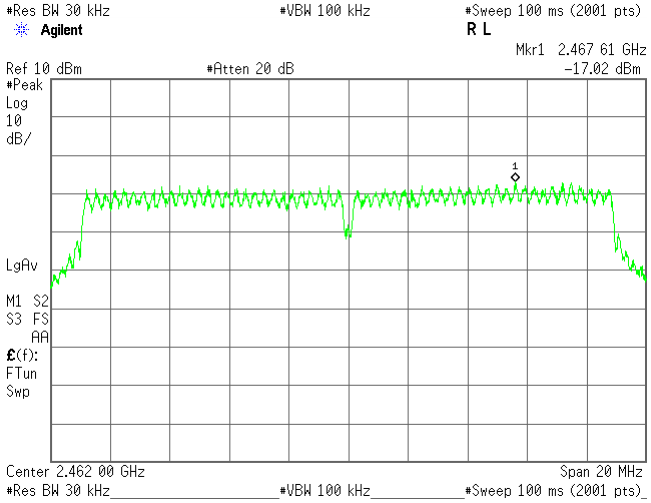




b) Sub Antenna (ANT1)







4) Bluetooth LE(Modulation type : GFSK)

Test Date: May 4, 2015
Temp.: 25 °C, Humi: 64 %

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
00	2402	10.01	-5.65	4.36	2.73	8.00	+ 3.64
19	2440	10.01	-6.03	3.98	2.50	8.00	+ 4.02
39	2480	10.01	-6.15	3.86	2.43	8.00	+ 4.14

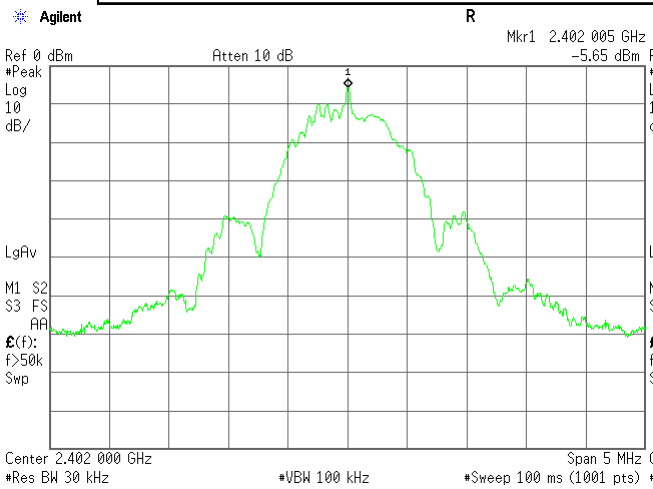
Calculated result at 2402.000 MHz, as the worst point shown on underline:

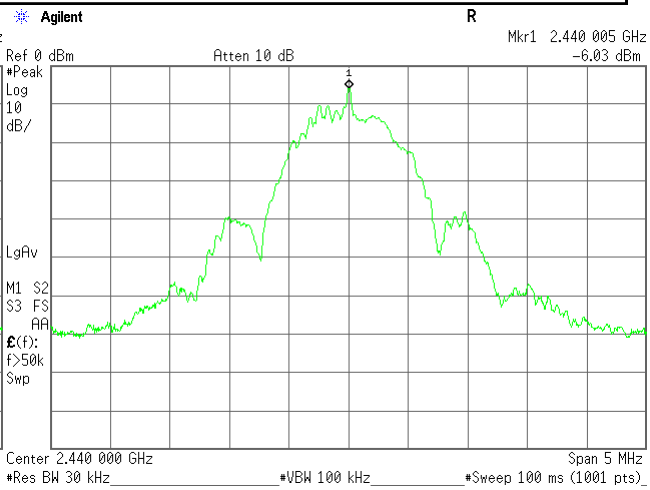
	Correction Factor	=	10.01 dB
+)	Meter Reading	=	-5.65 dBm
	Result	=	4.36 dBm = 2.73 mW

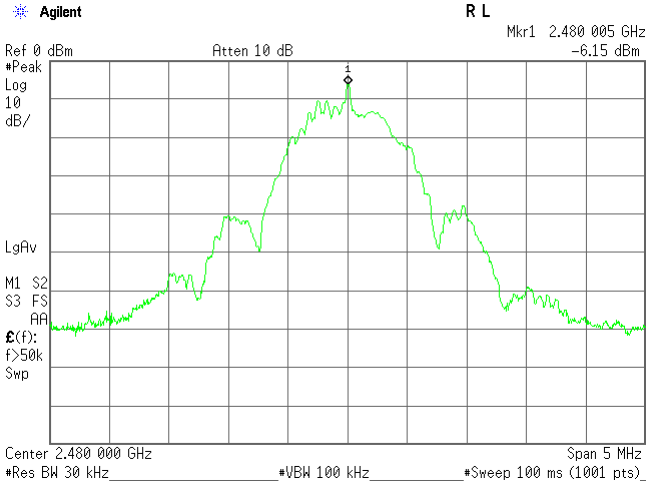
Minimum Margin: 8.00 - 4.36 = 3.64 (dB)

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

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

7.7.1 Worst Point and Measurement Uncertainty

Uncertainty of Measurement Results

9 kHz – 1GHz	+/-1.4	dB(2σ)
1GHz – 18GHz	+/-1.7	dB(2σ)
18GHz – 40GHz	+/-2.3	dB(2σ)

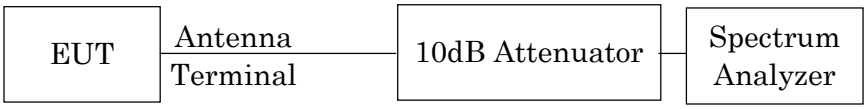
Remarks : _____

7.7.2 Test Instruments

Shielded Room S4					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Spectrum Analyzer	E4446A	Agilent	A-39	2014/9	1 Year
Attenuator	54A-10	Weinschel	D-28	2014/9	1 Year
RF Cable	SUCOFLEX102	SUHNER	C-52	2014/8	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:

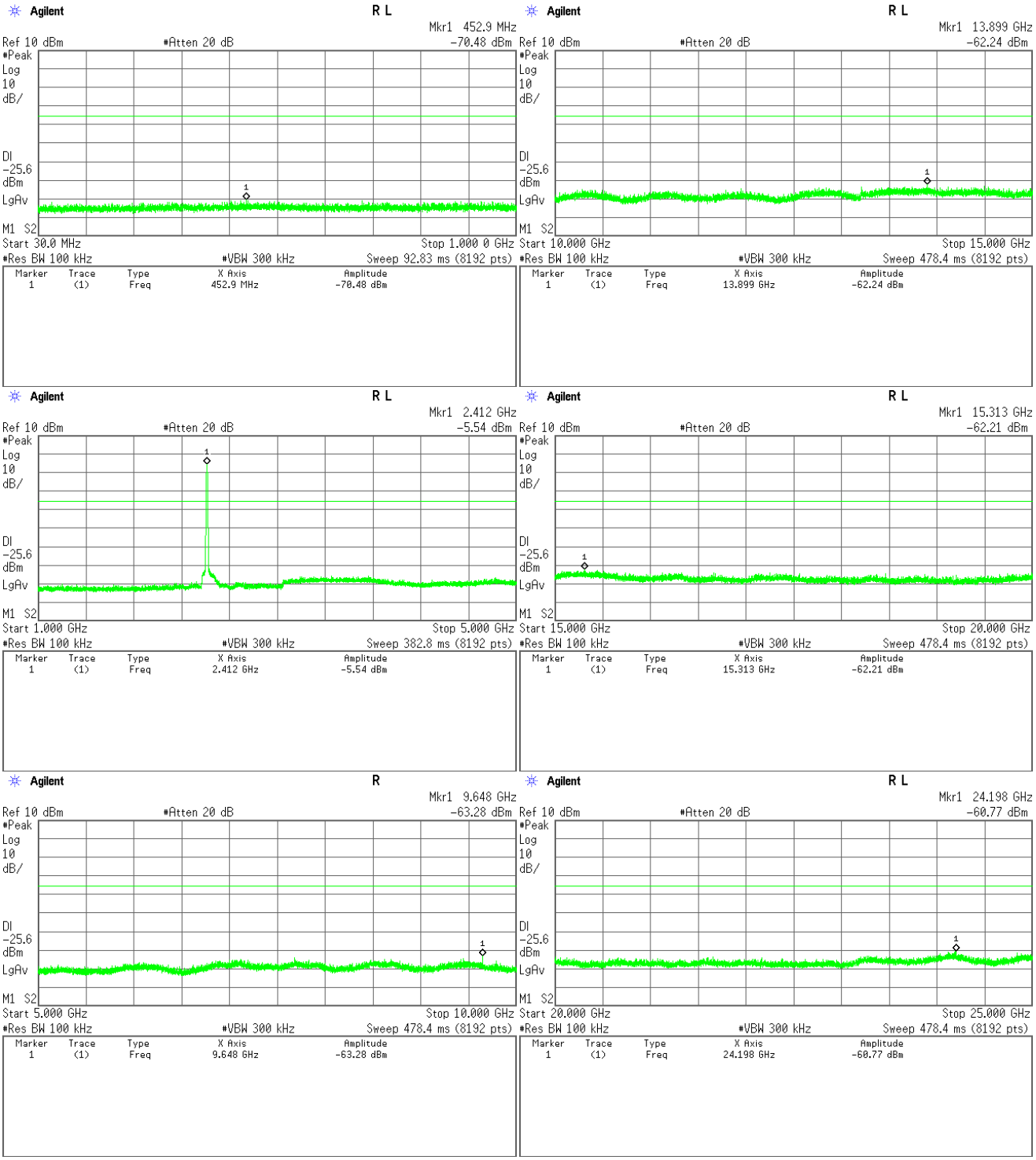
Frequency Range	30 MHz - 25 GHz	Band-Edge
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.7.4 Test Data

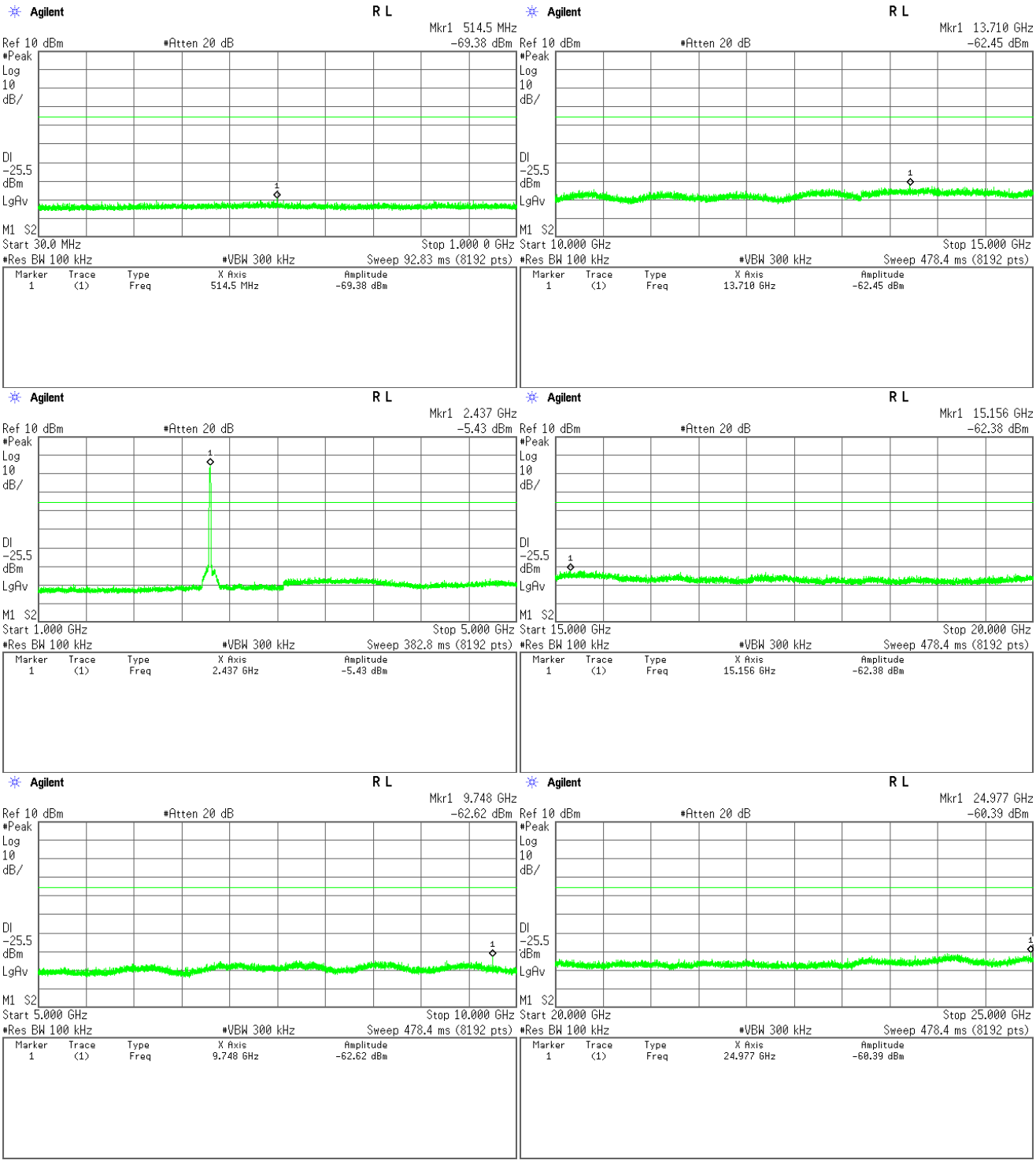
Test Date : April 23, 2015
Temp.:24°C, Humi:30%

1-1) IEEE 802.11b (Main Antenna)

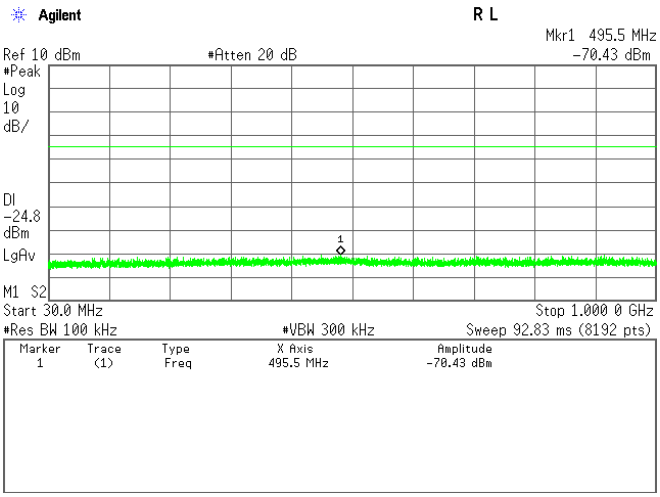
Low Channel

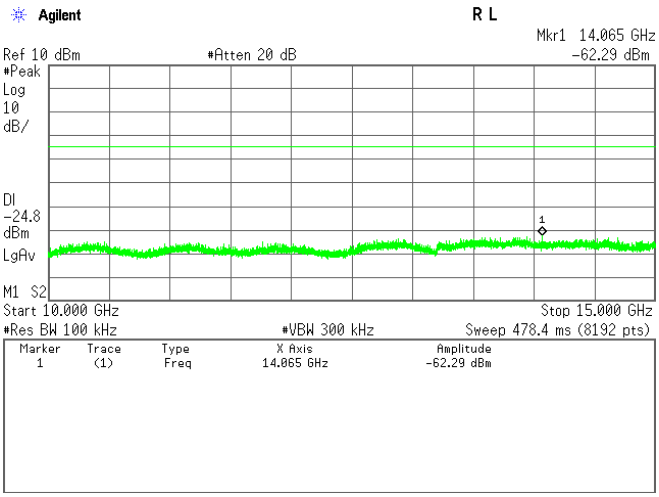


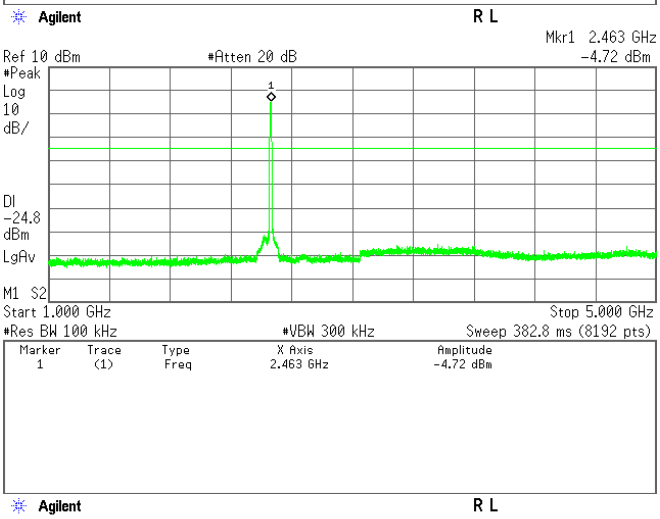
Middle Channel

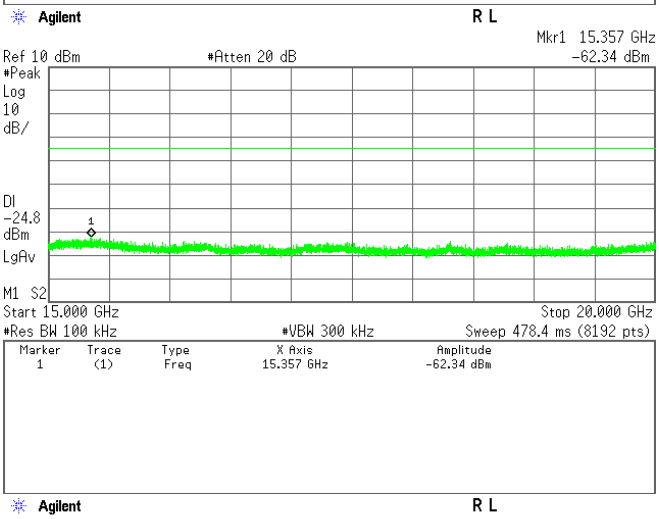


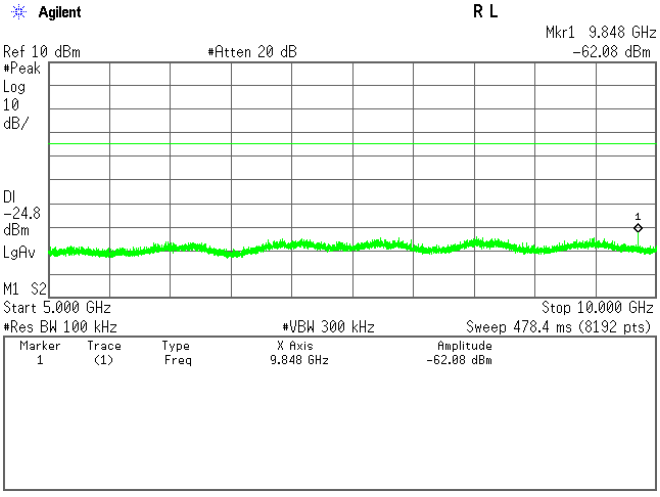
High Channel

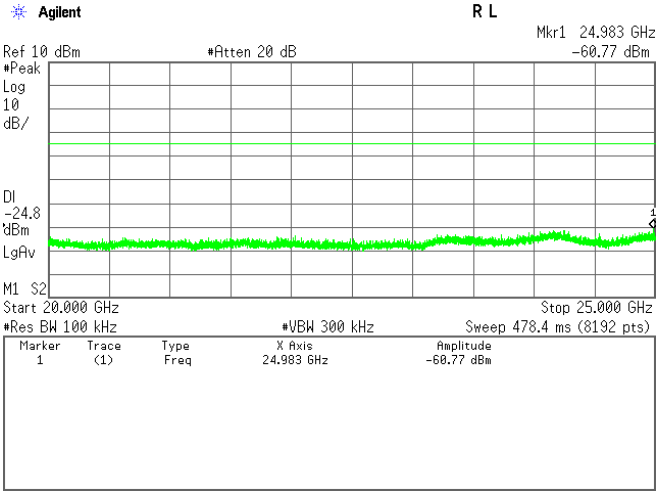






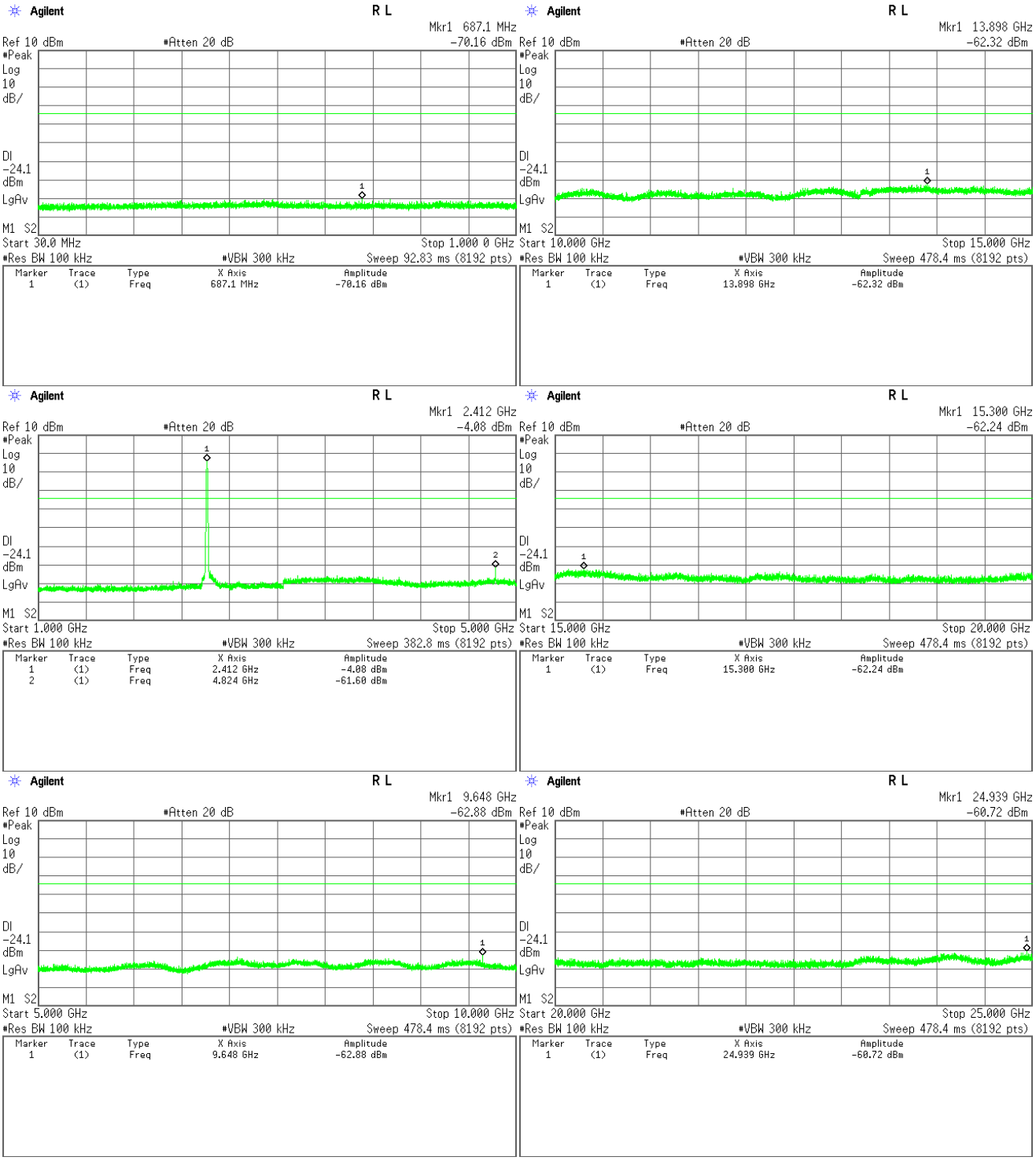




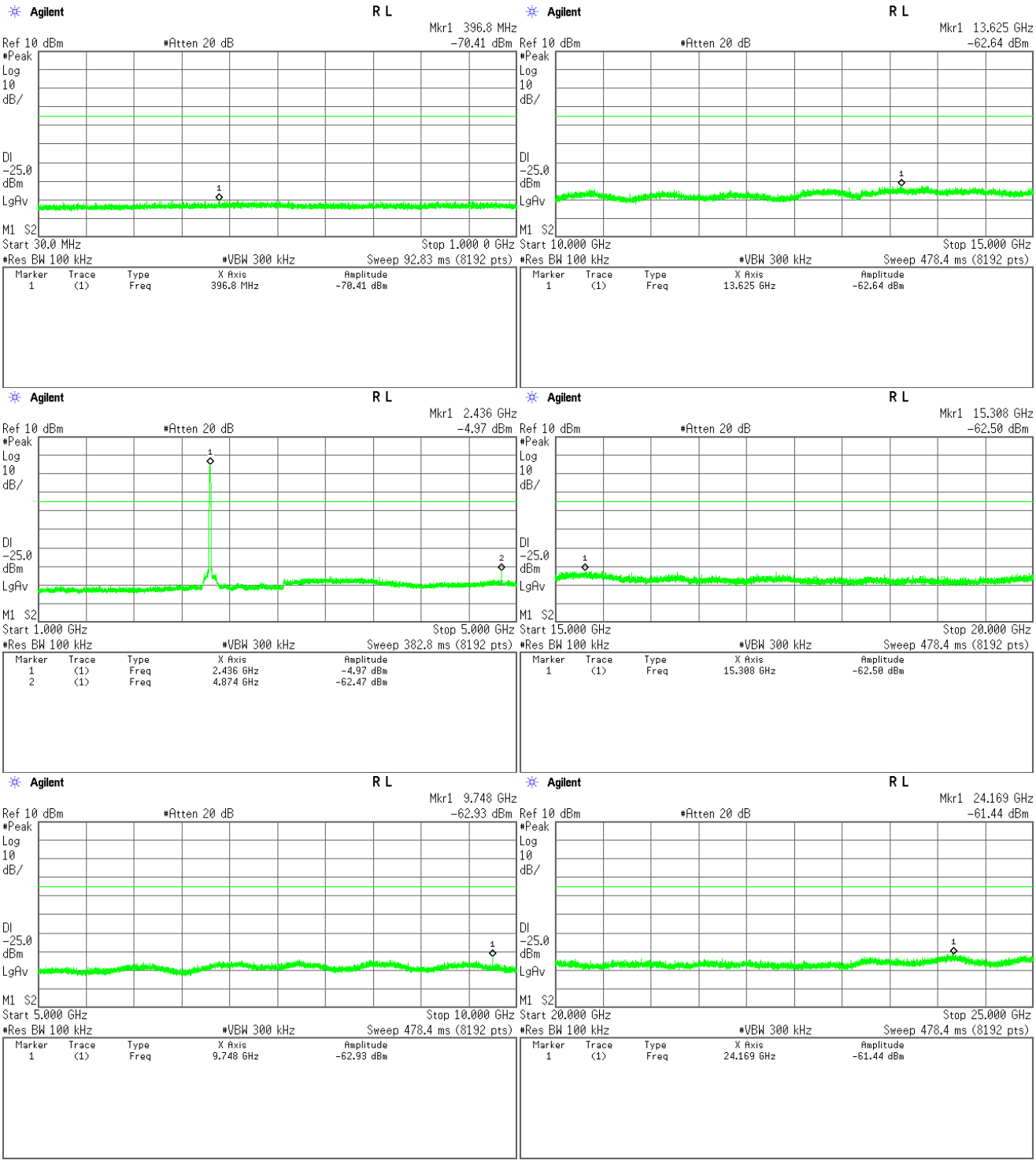


1-2) IEEE 802.11b (Sub Antenna)

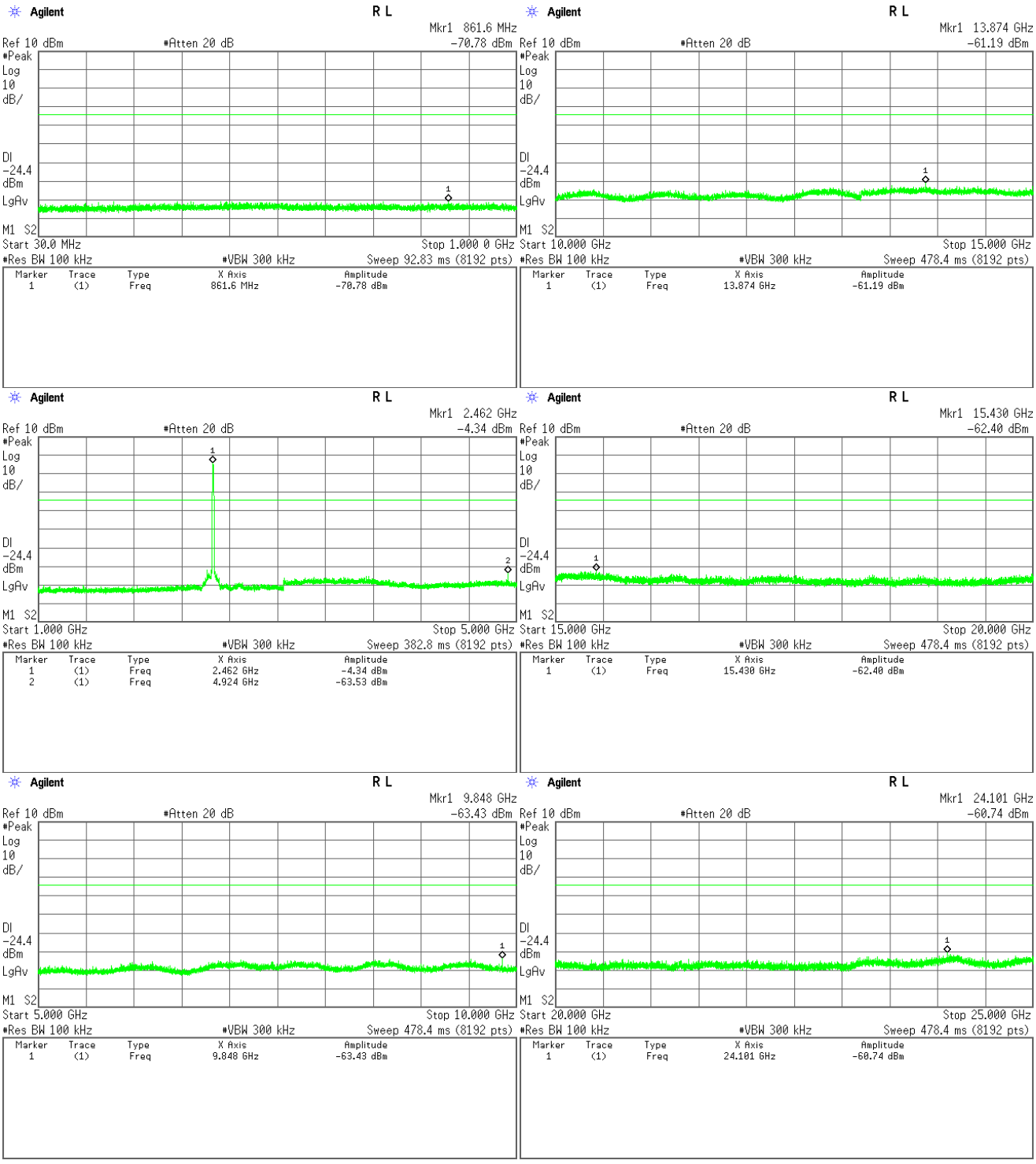
Low Channel



Middle Channel

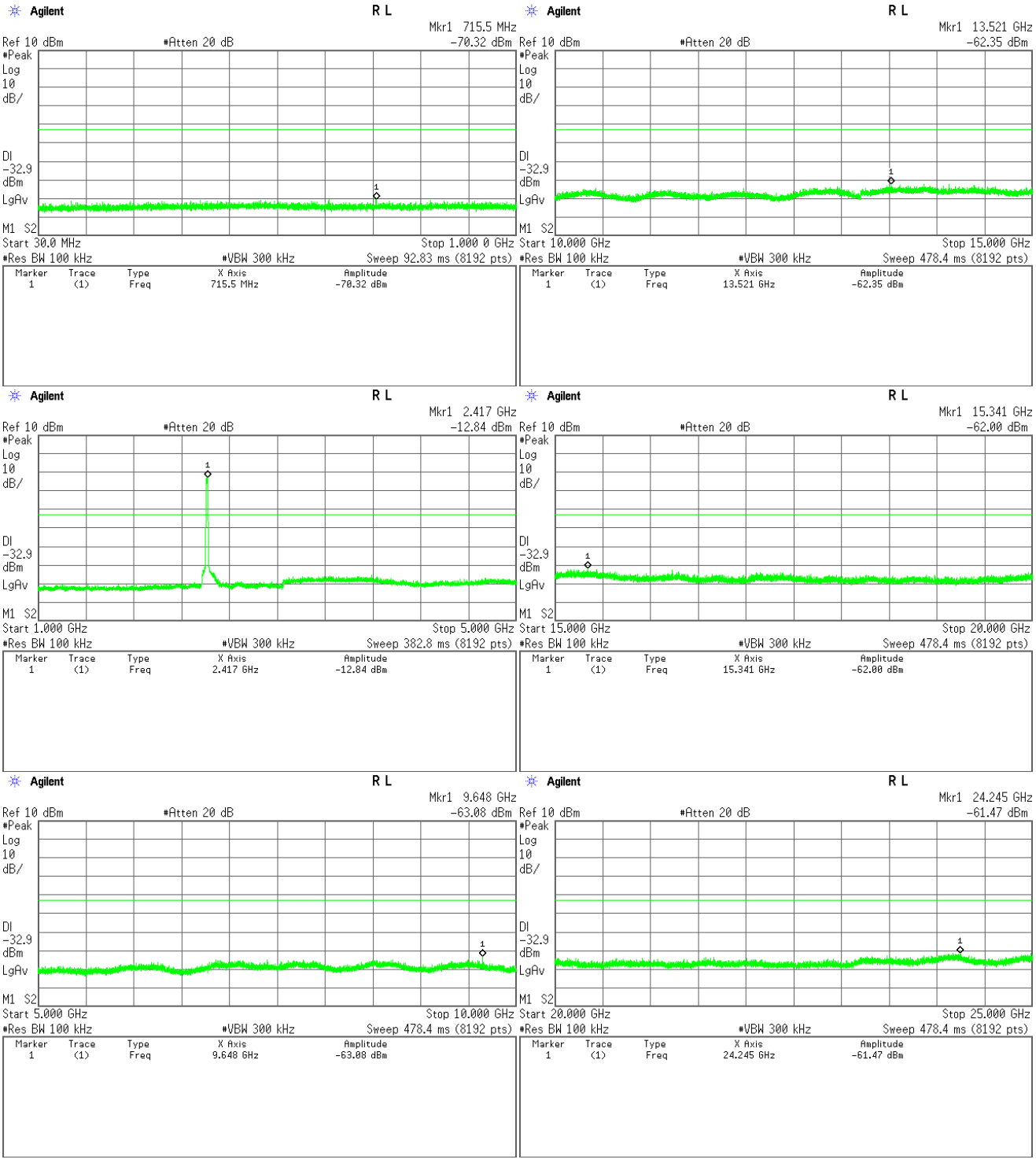


High Channel

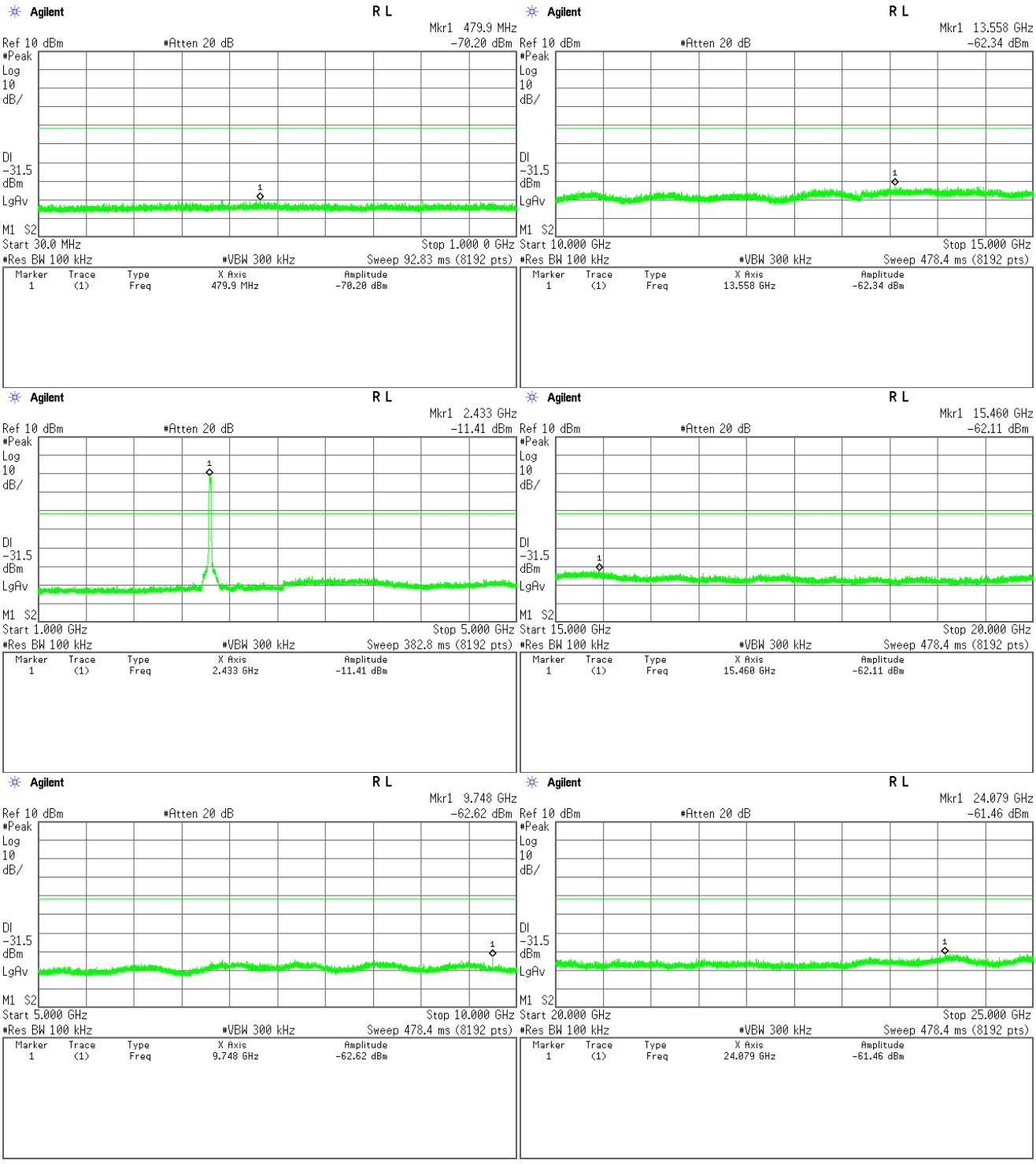


2-1) IEEE 802.11g (Main Antenna)

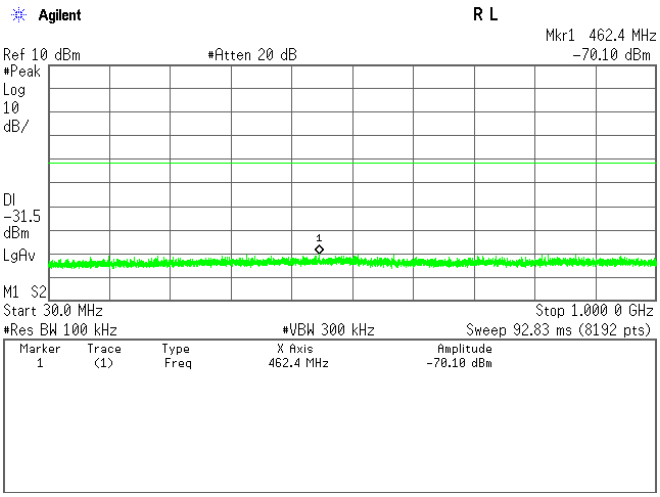
Low Channel

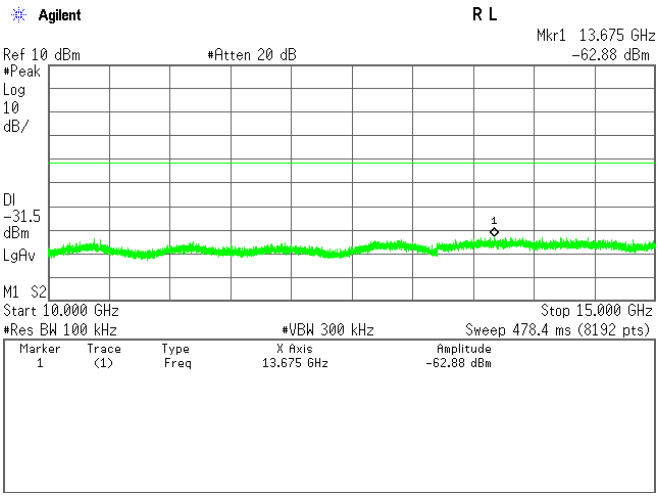


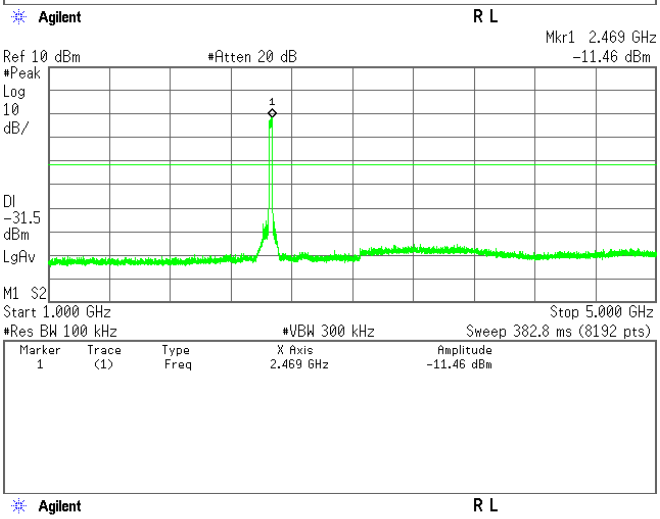
Middle channel

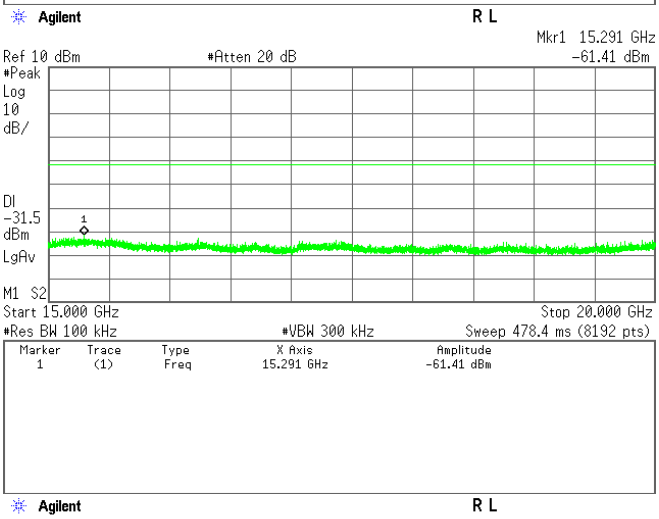


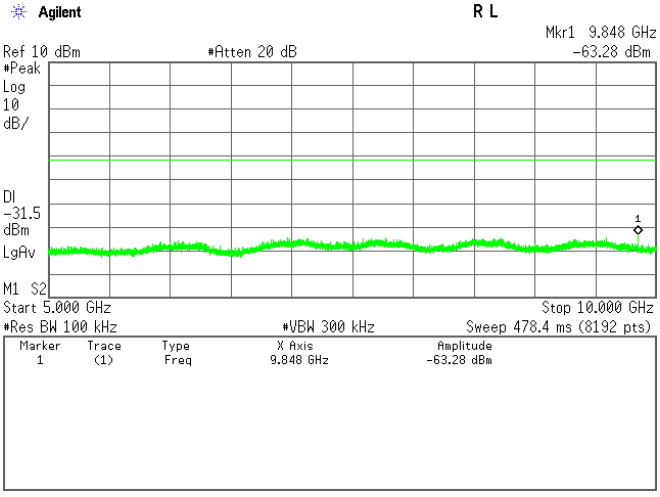
High Channel

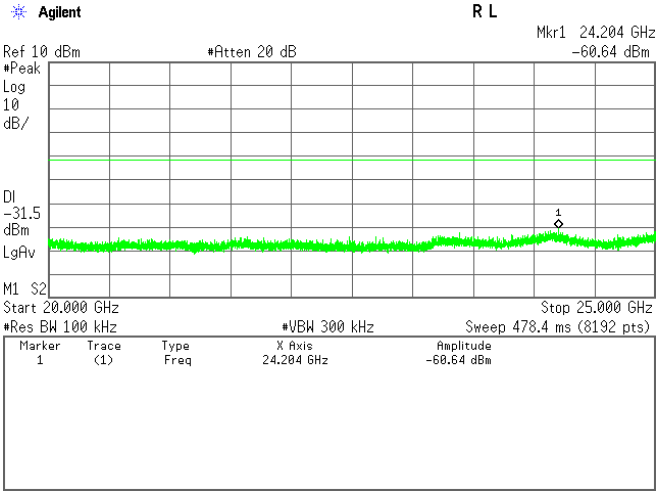






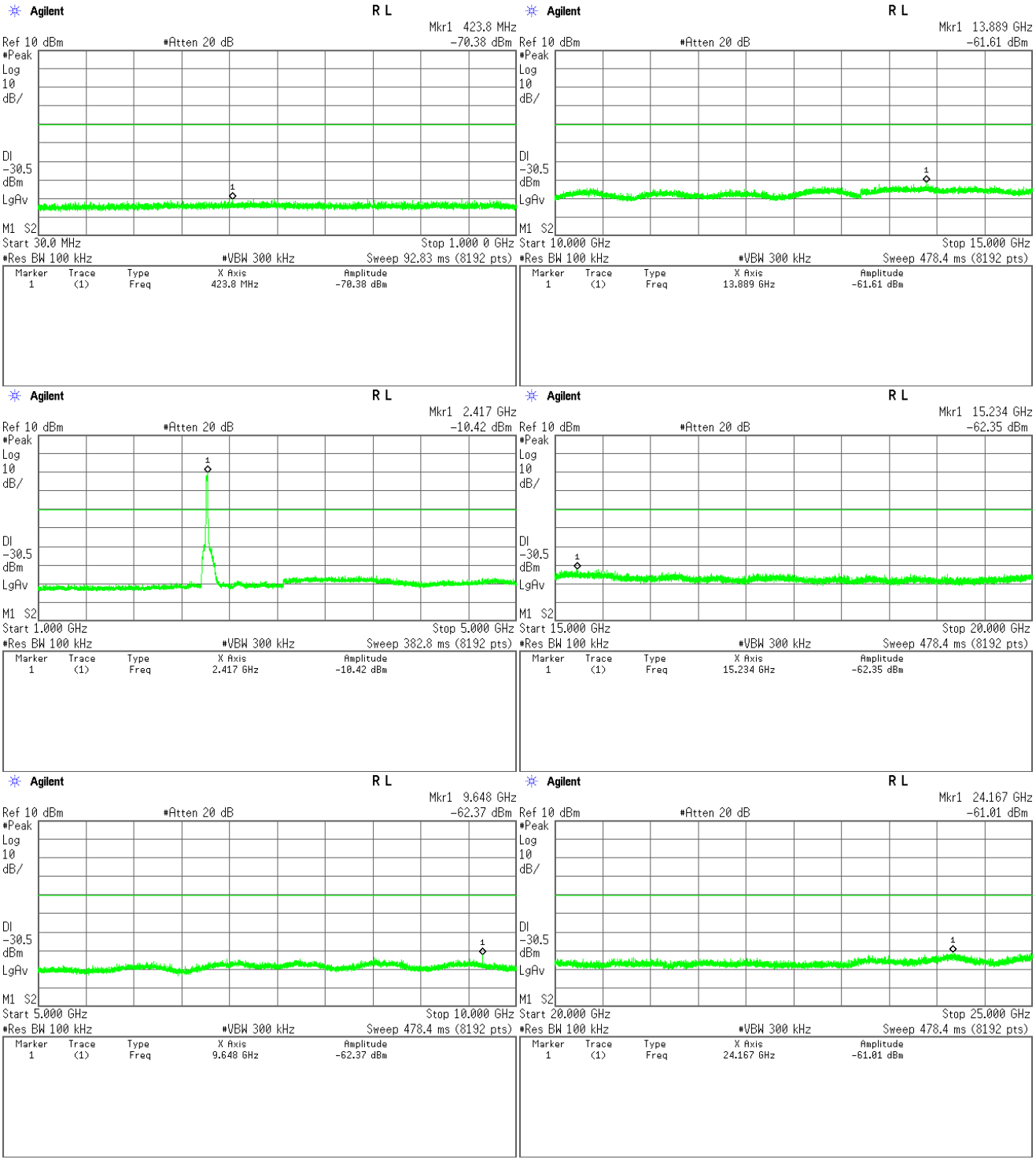




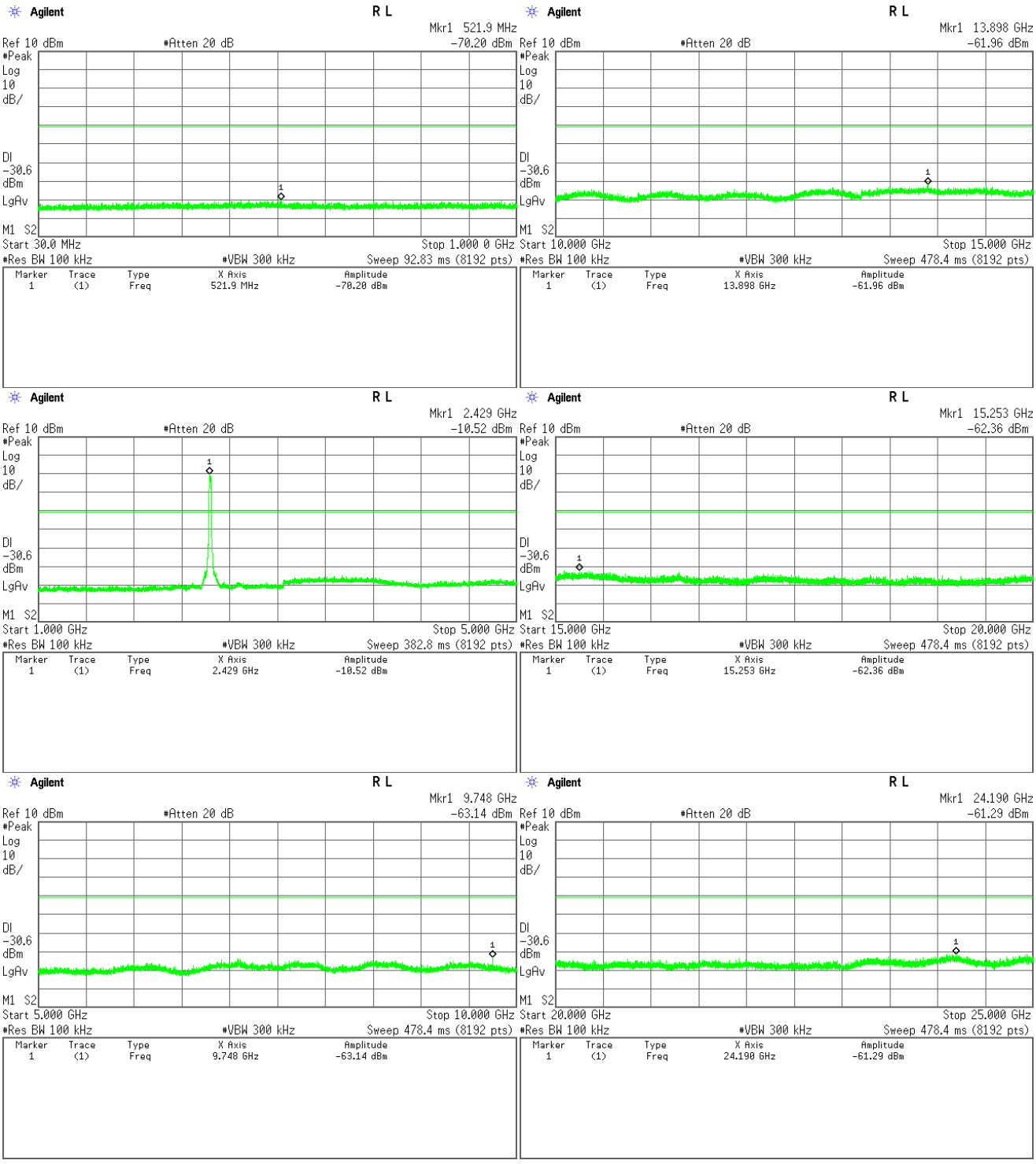


2-2) IEEE 802.11g (Sub Antenna)

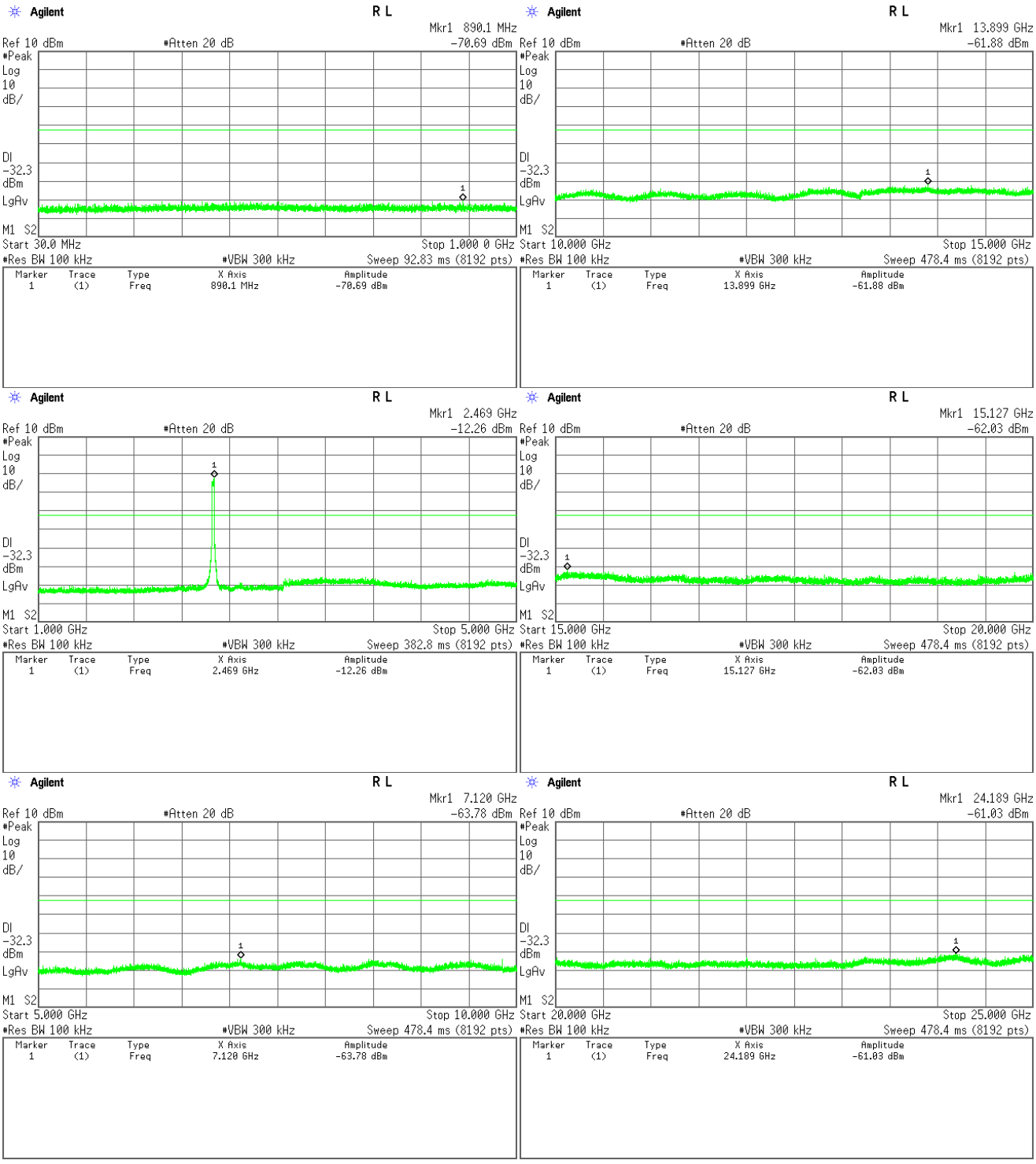
Low Channel



Middle channel

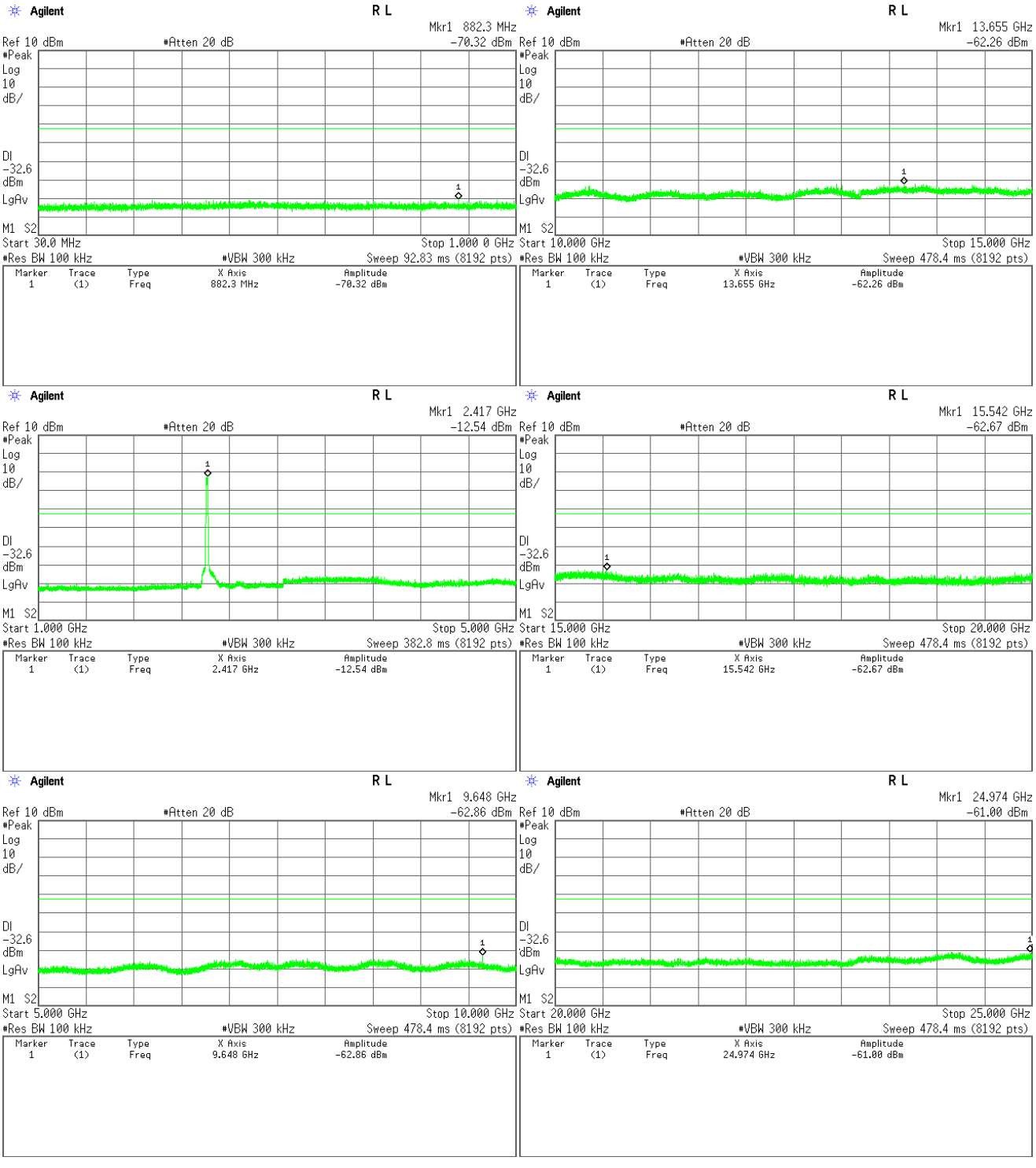


High Channel

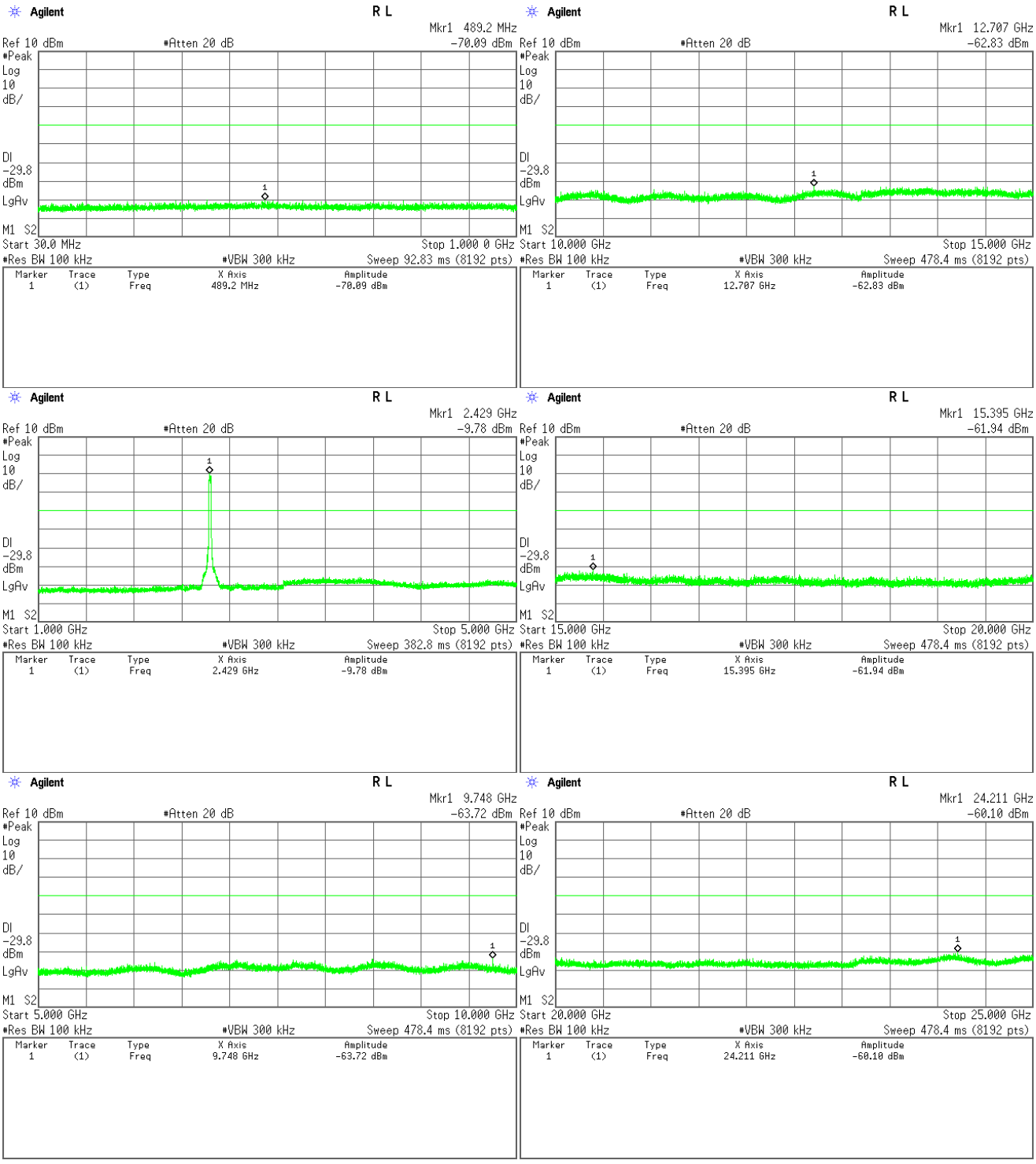


3-1) IEEE 802.11n (Main Antenna)

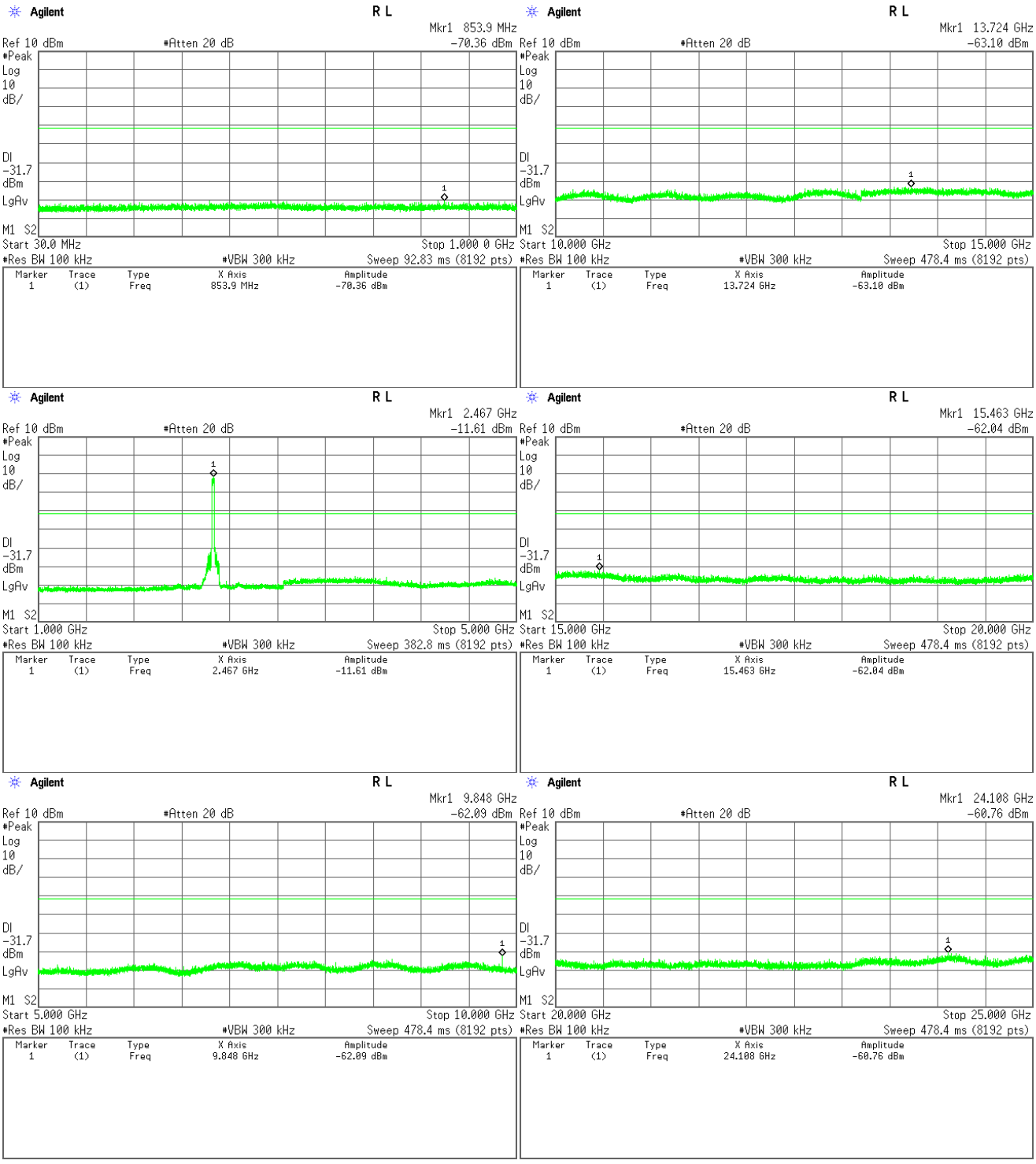
Low Channel



Middle Channel

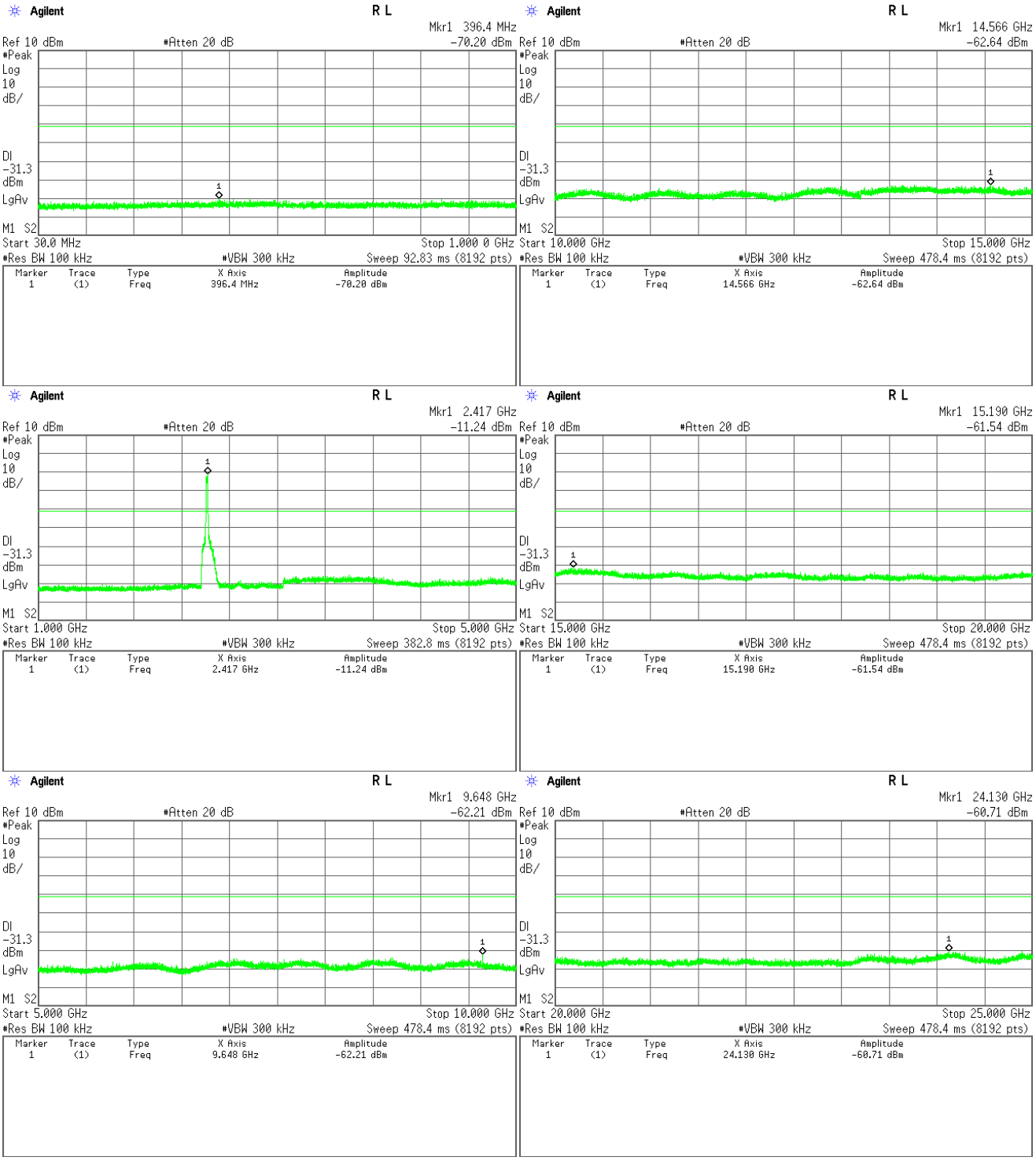


High Channel

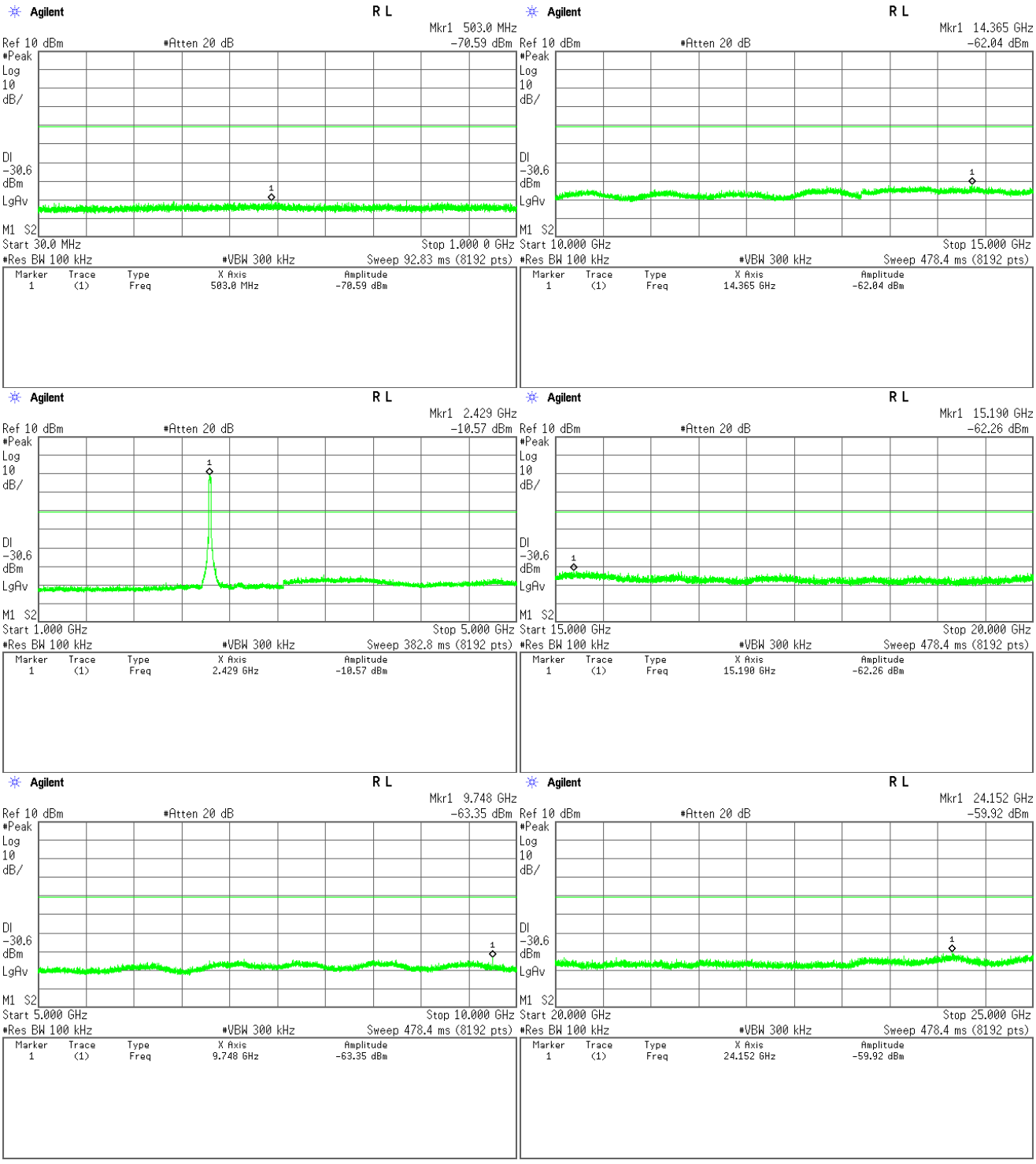


3-2) IEEE 802.11n (Sub Antenna)

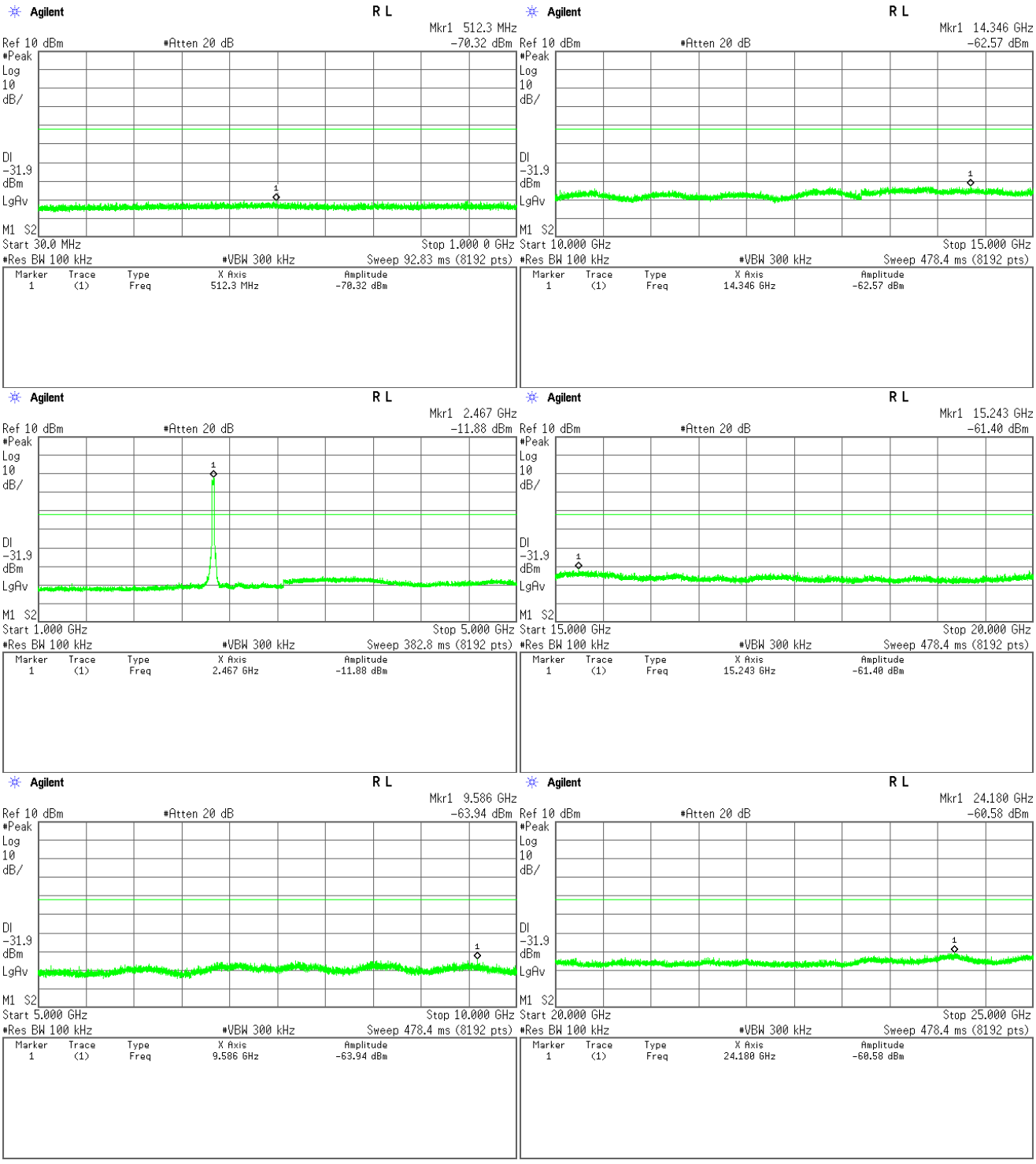
Low Channel



Middle Channel

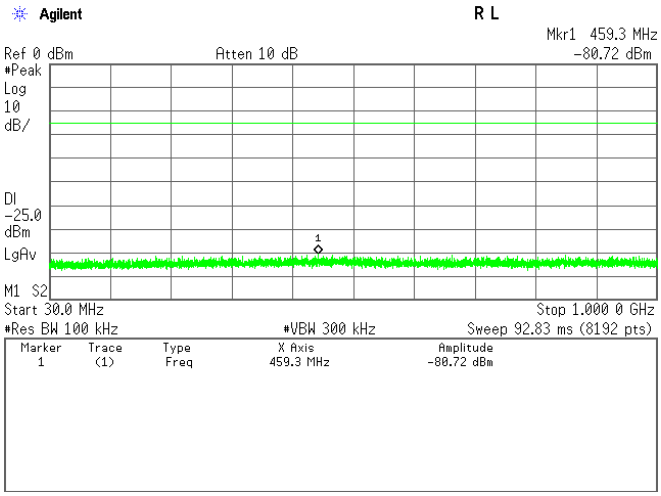


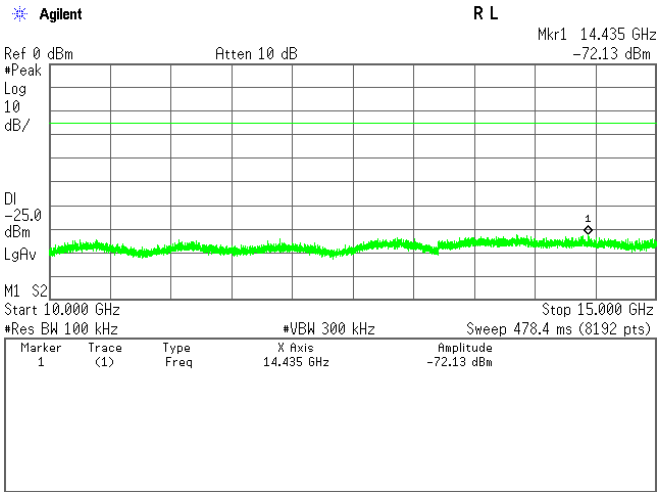
High Channel

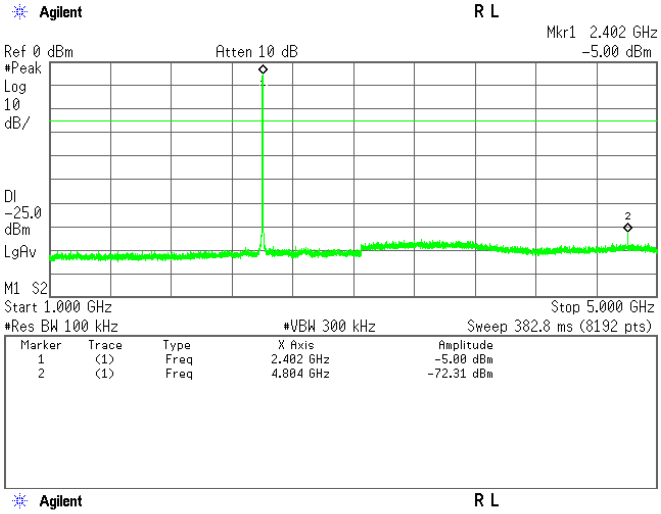


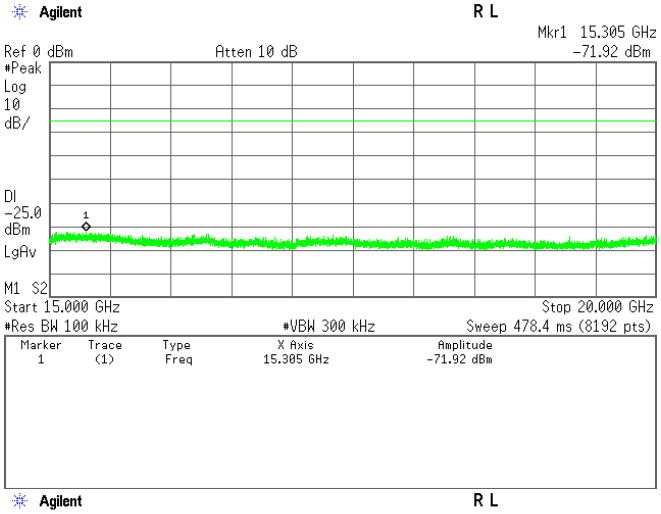
4) Bluetooth Low Energy

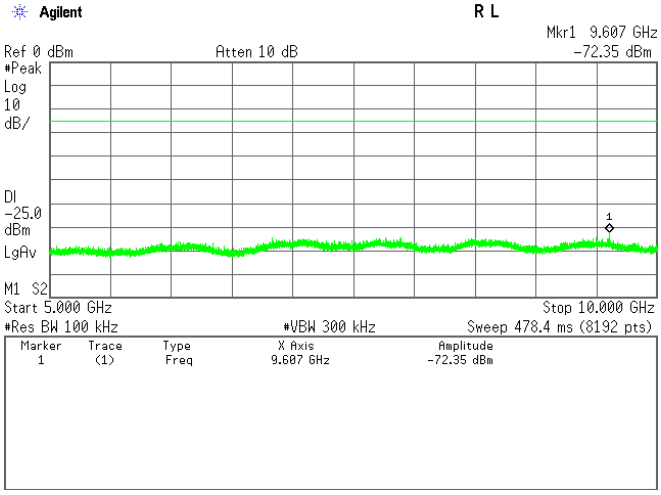
Low Channel

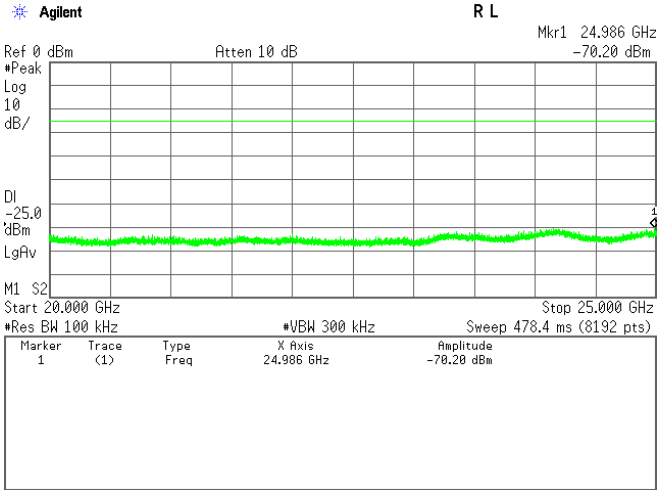




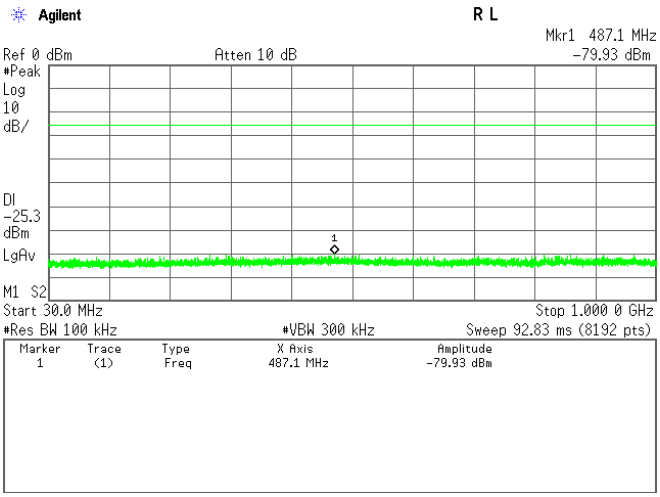


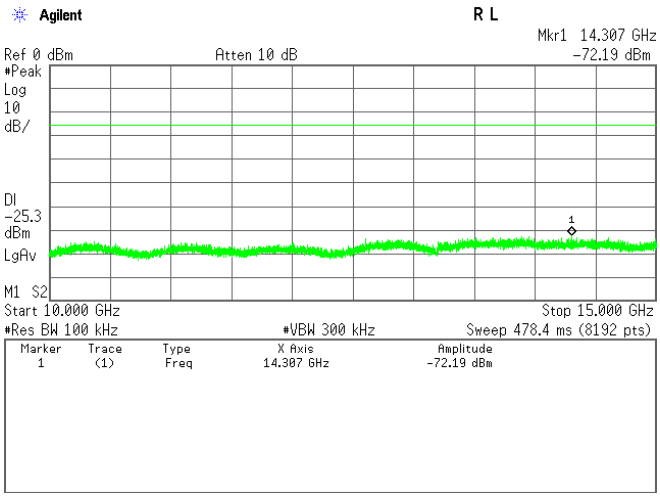


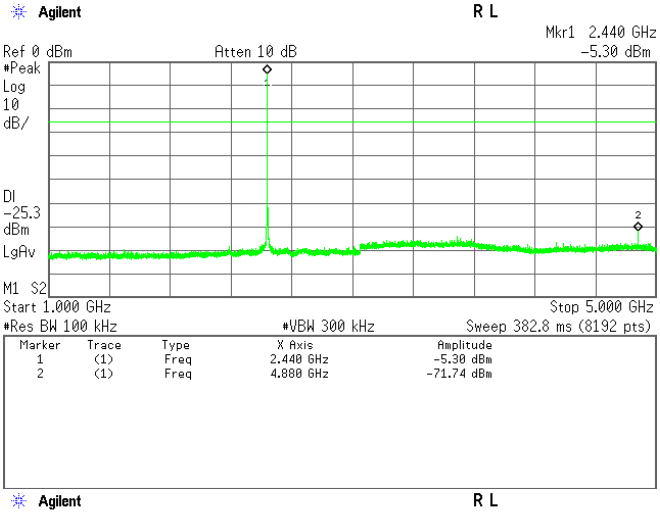


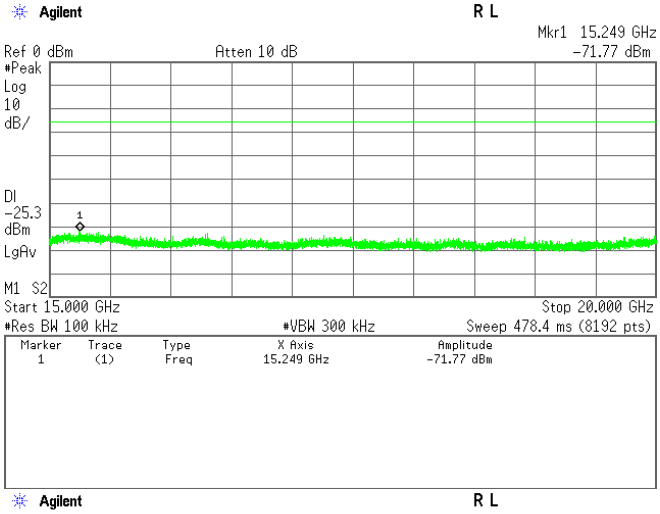


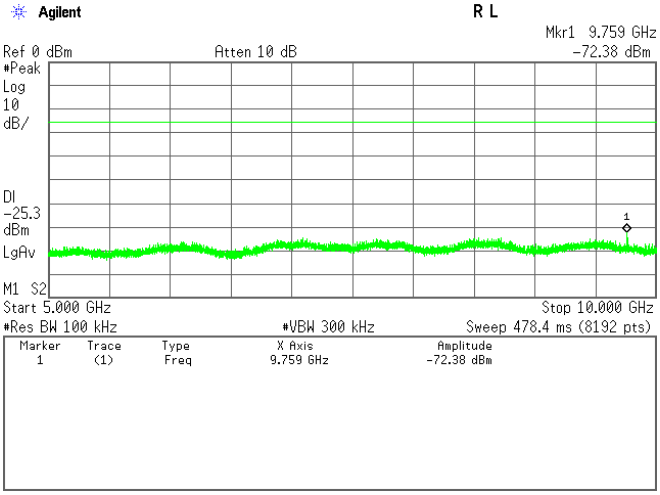
Middle Channel

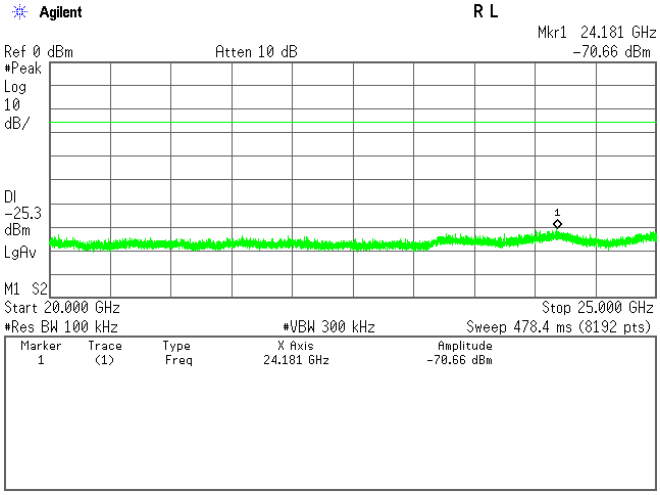




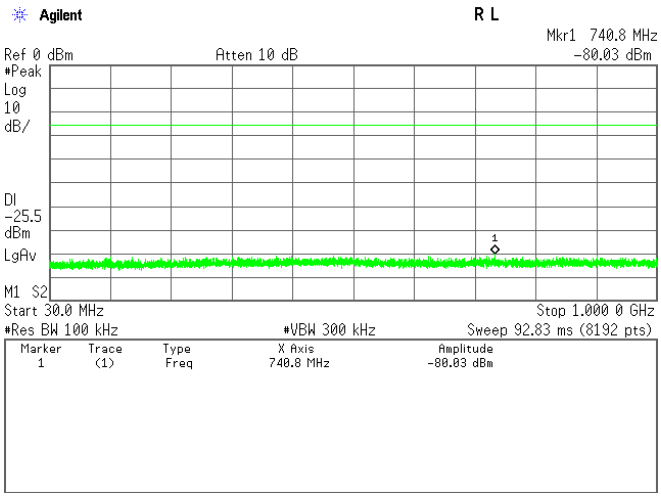


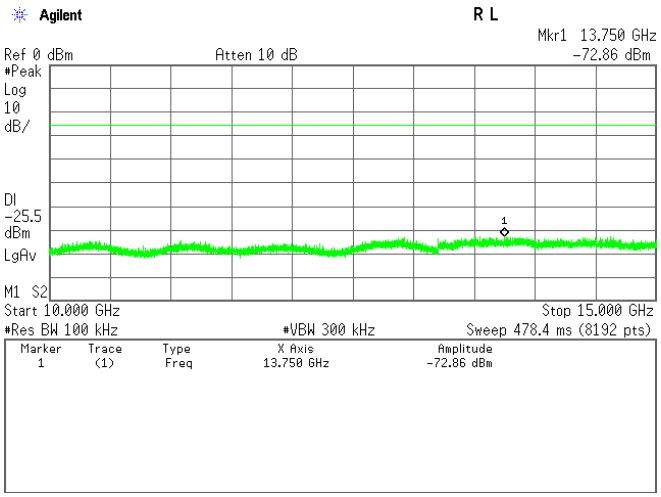


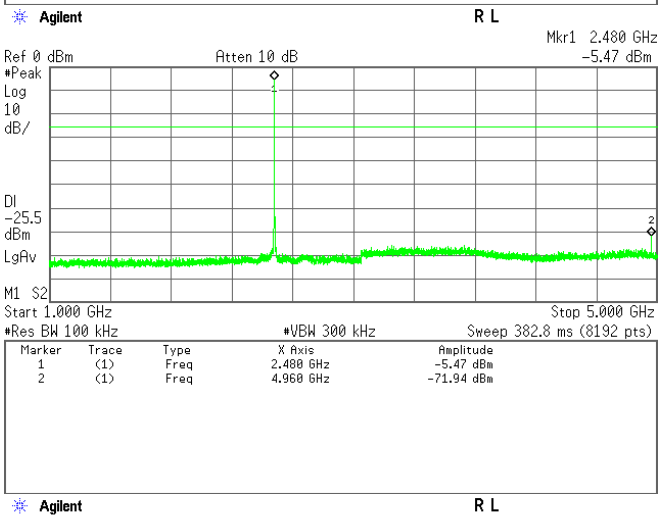


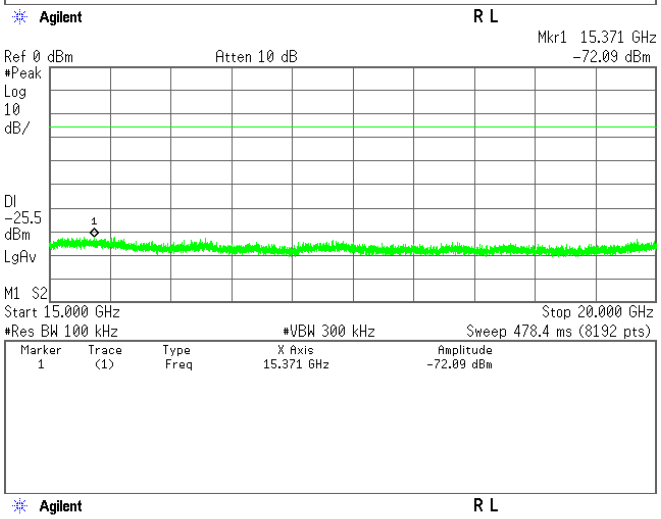


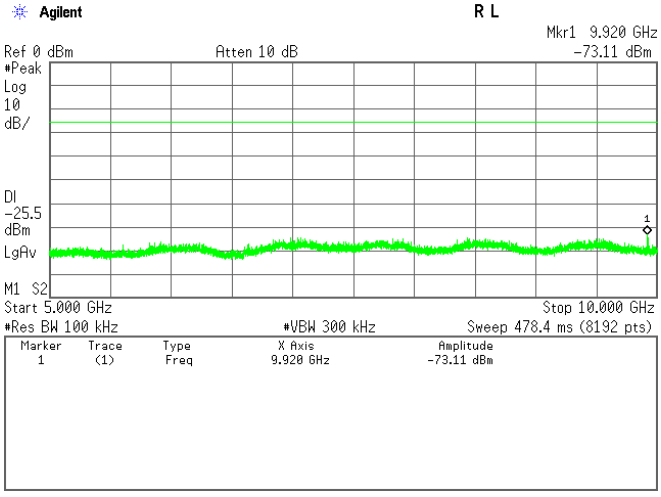
High Channel

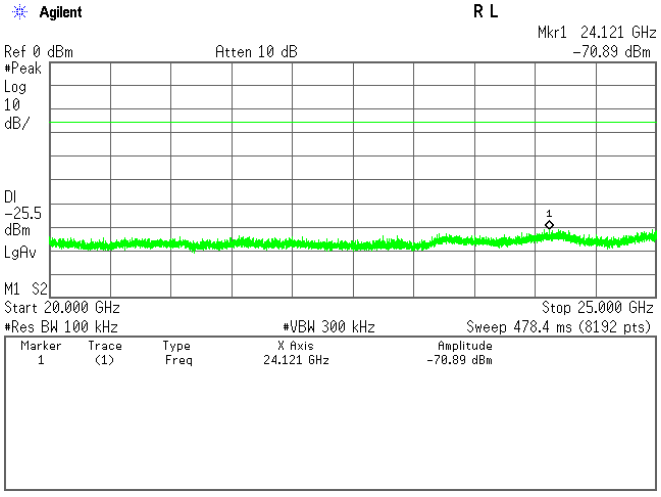










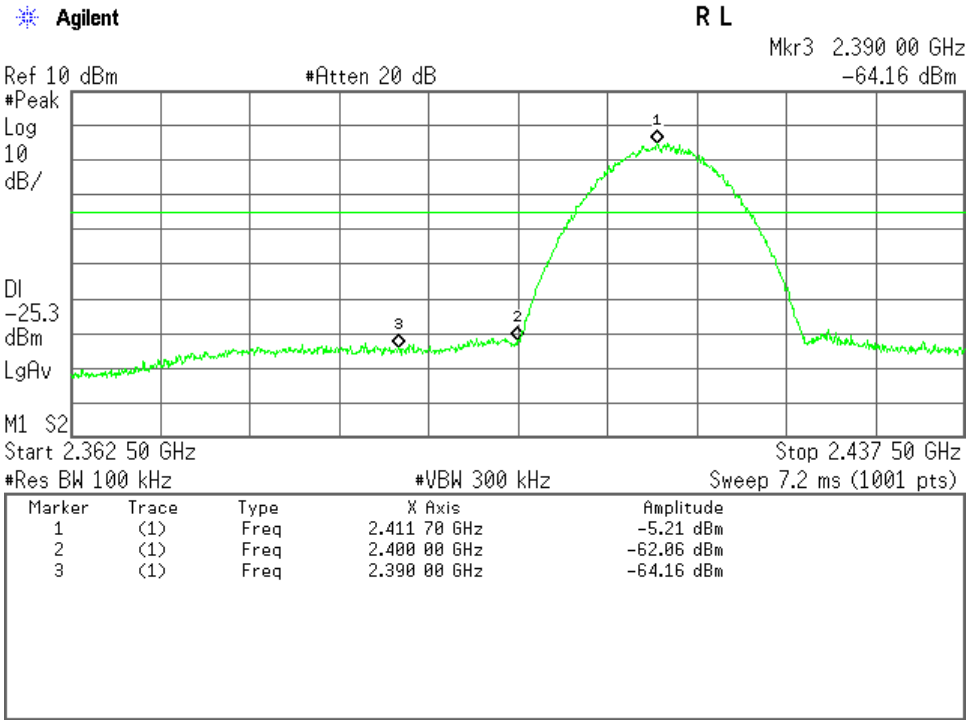


Band-Edge Emission

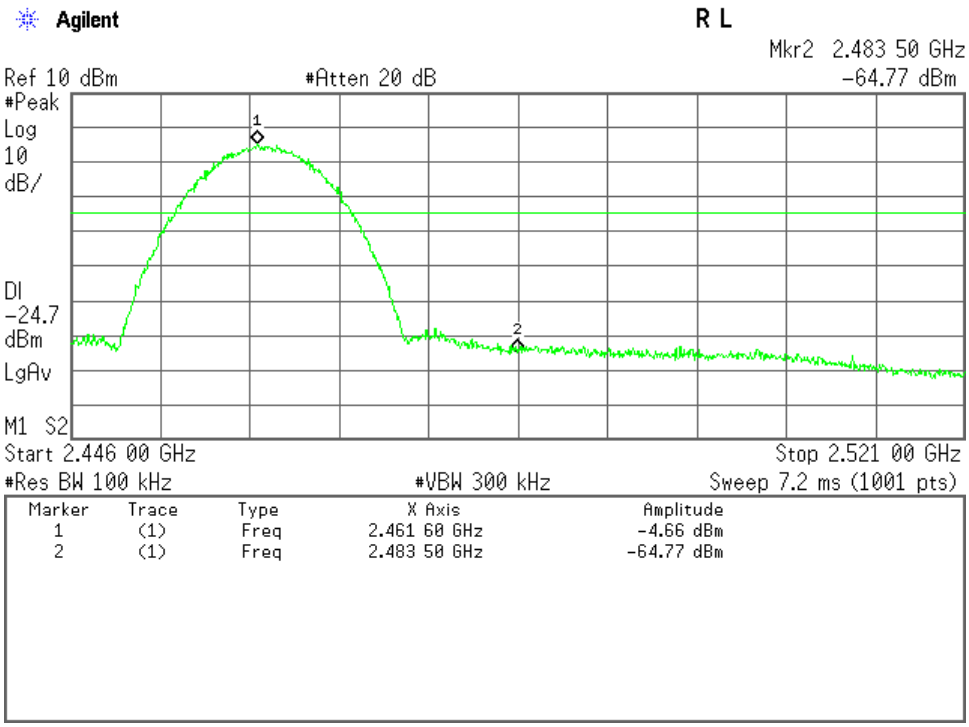
Test Date : April 23, 2015
Temp.:24°C, Humi:30%

1-1) IEEE 802.11b (Main Antenna)

Low Channel

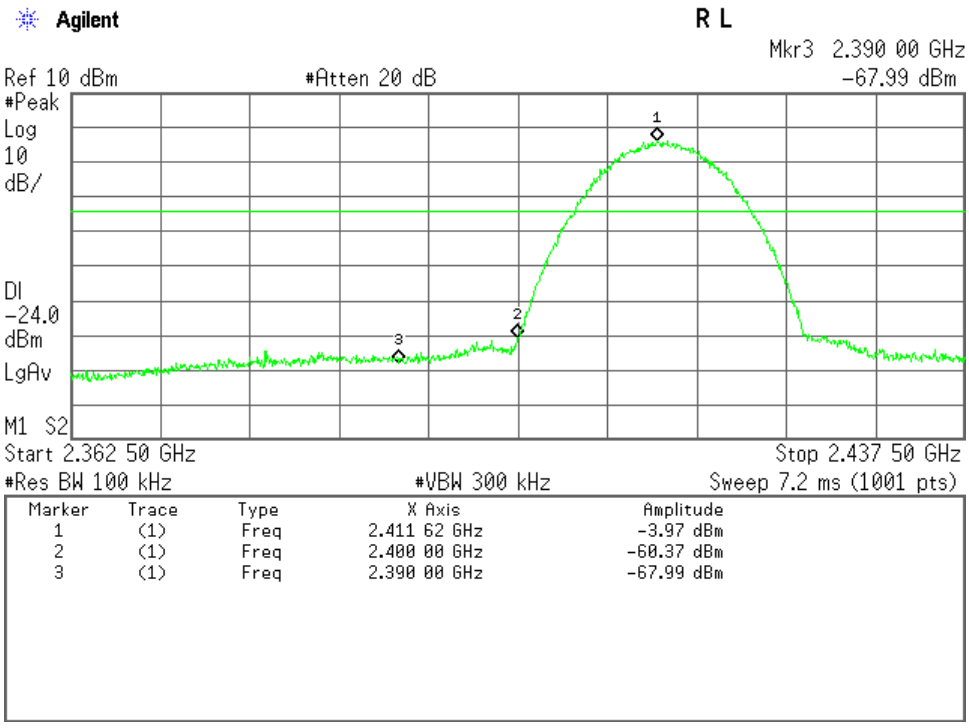


High Channel

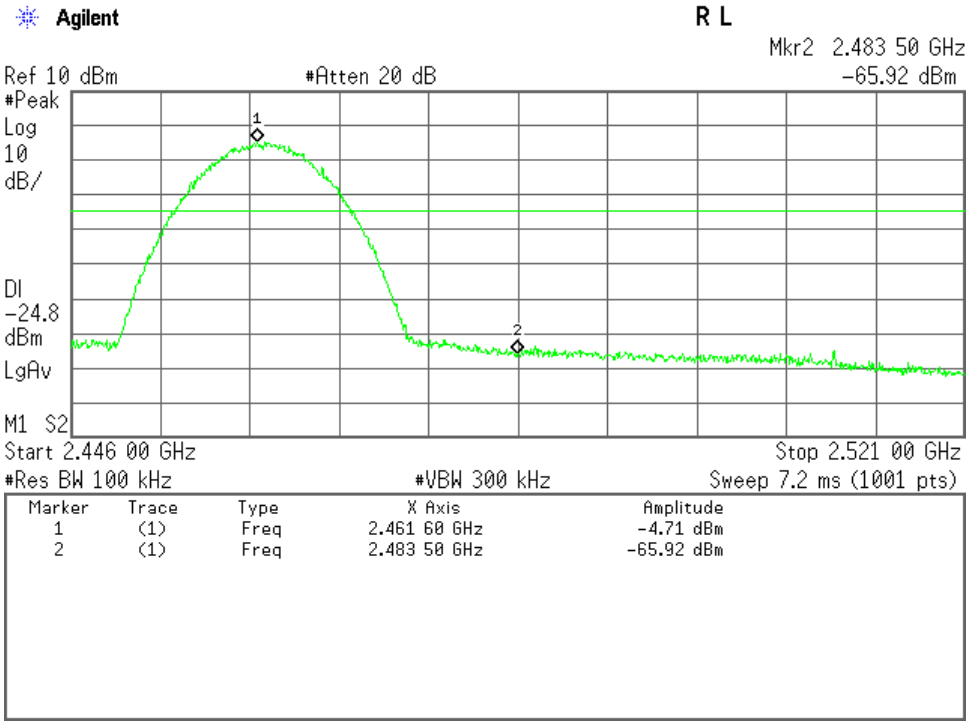


1-2) IEEE 802.11b (Sub Antenna)

Low Channel

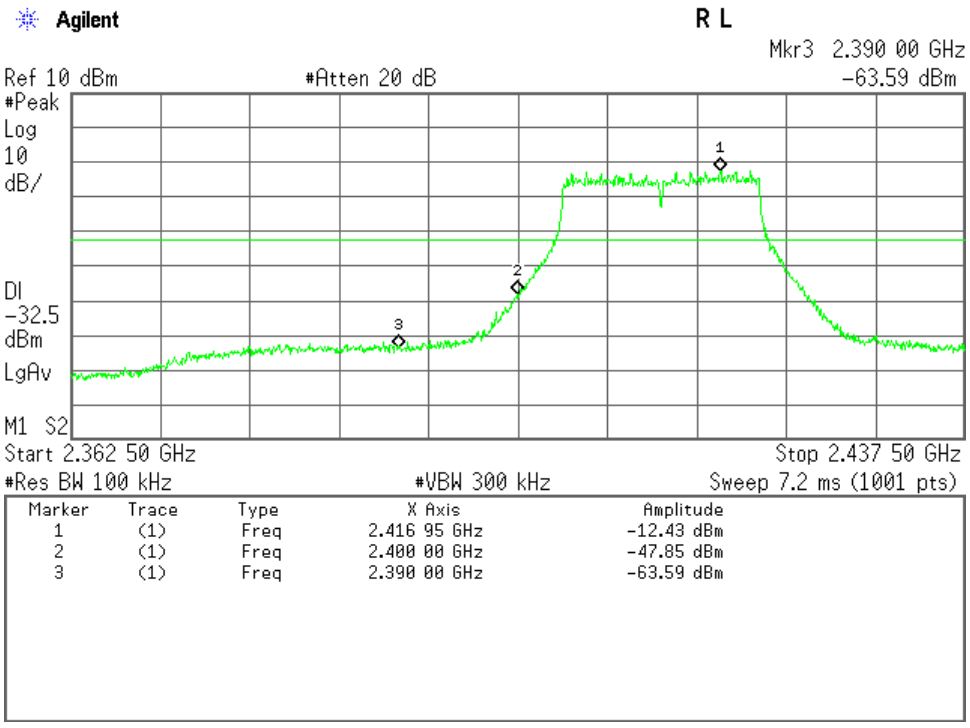


High Channel

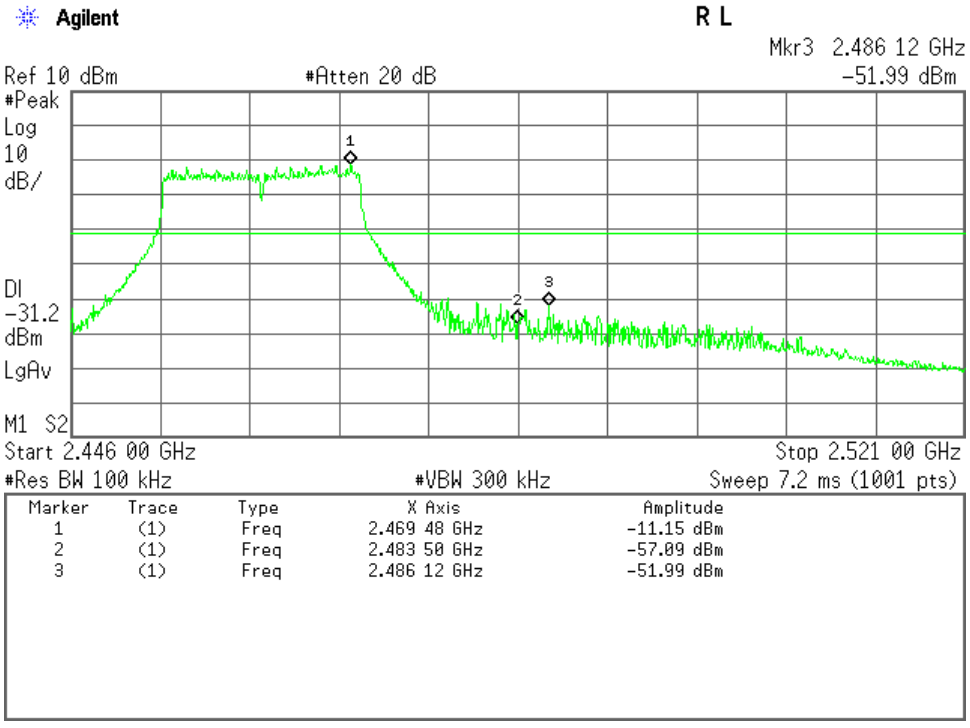


2-1) IEEE 802.11g (Main Antenna)

Low Channel

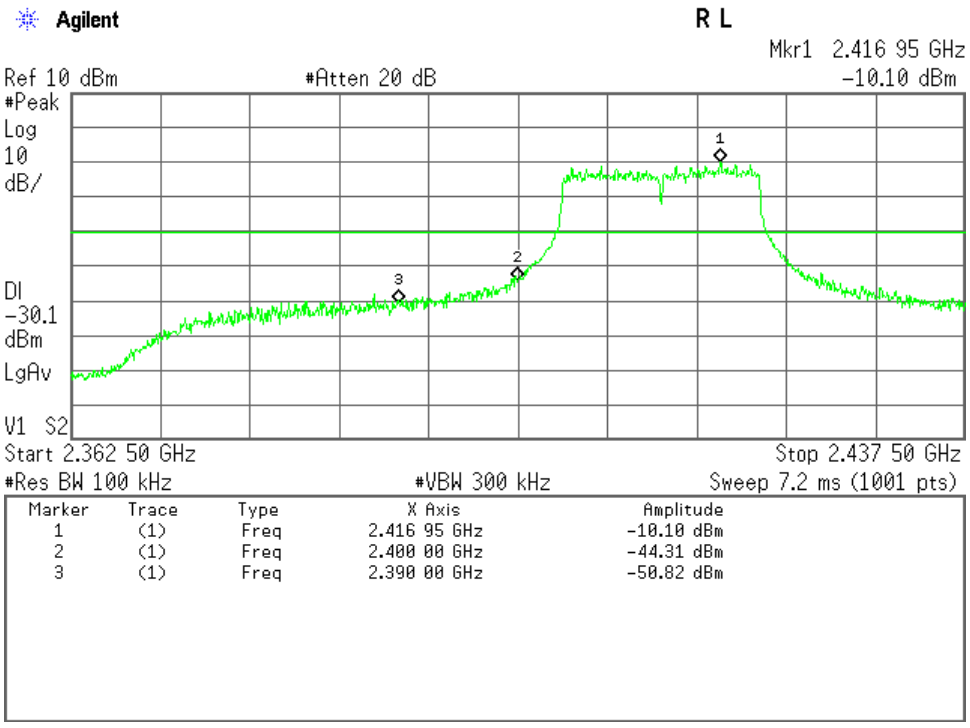


High Channel

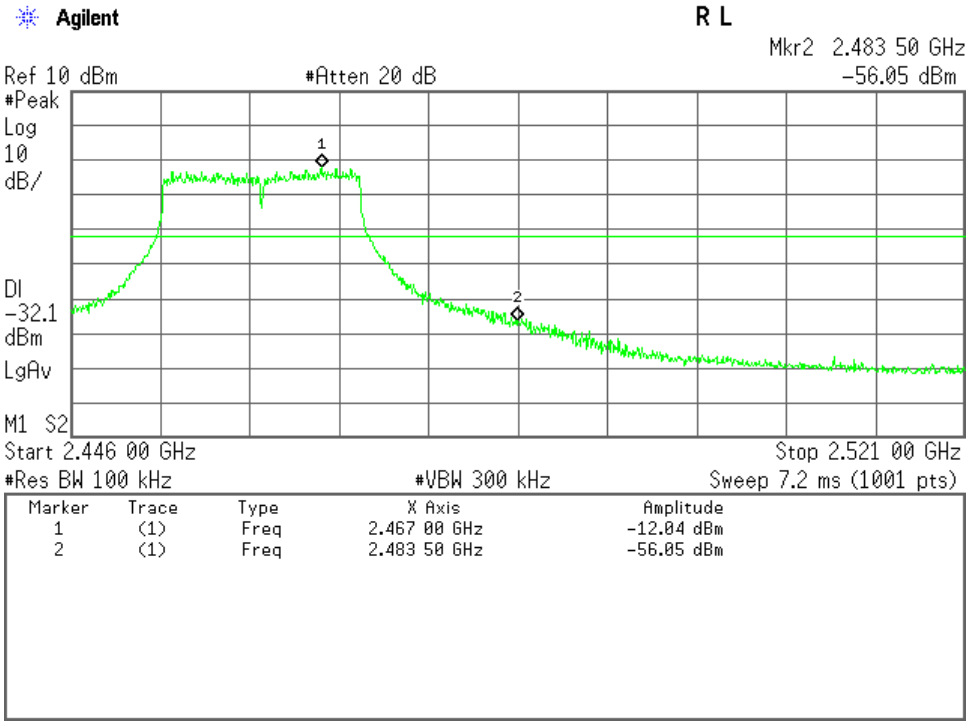


2-2) IEEE 802.11g (Sub Antenna)

Low Channel

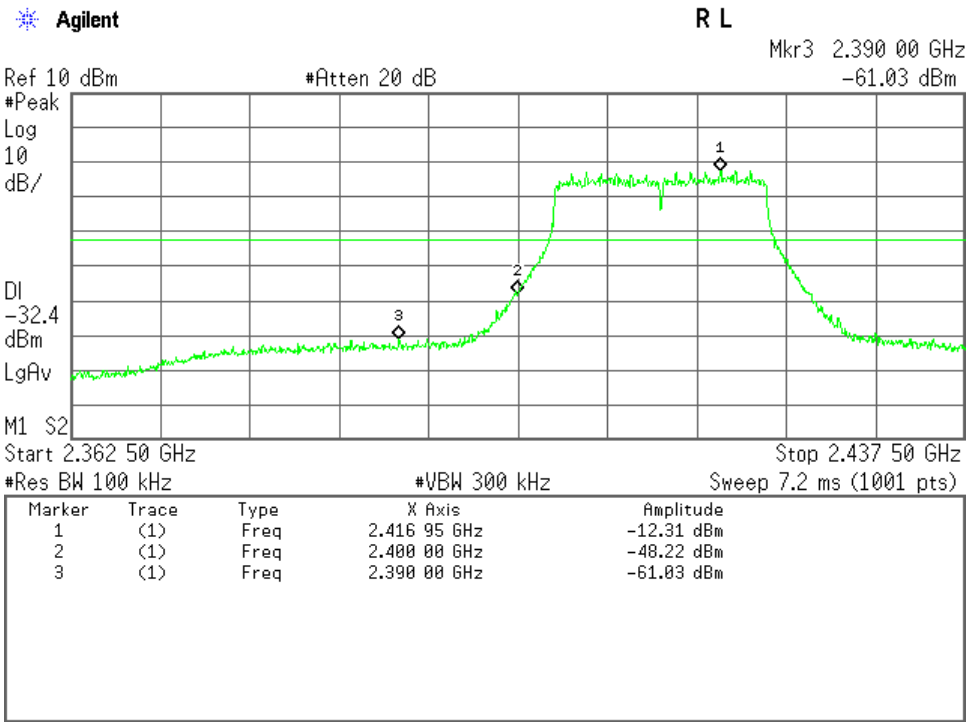


High Channel

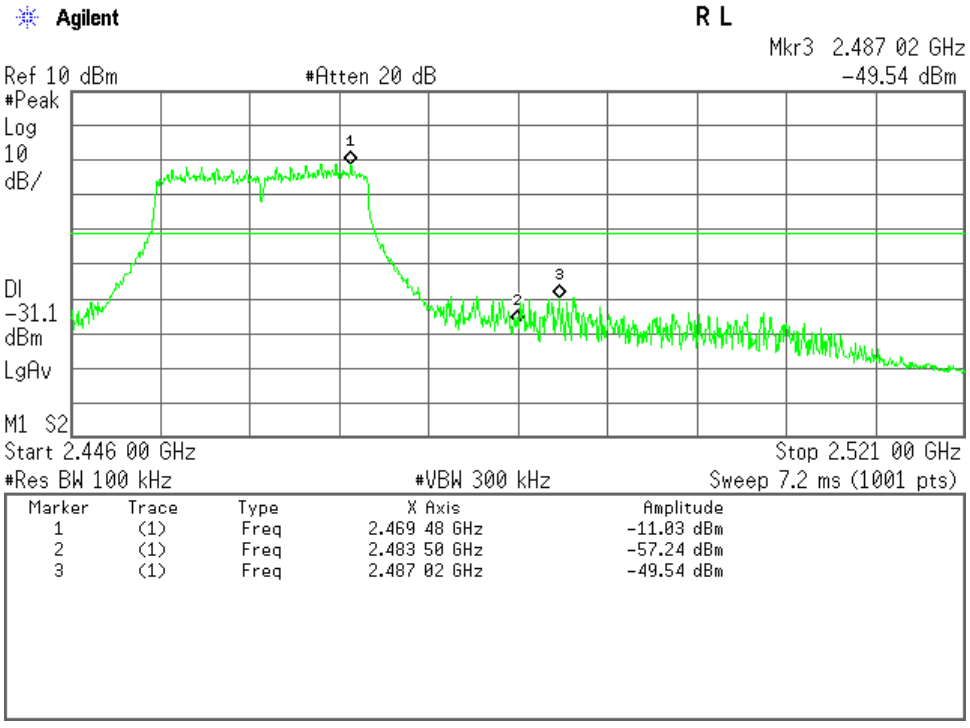


3-1) IEEE 802.11n (Main Antenna)

Low Channel

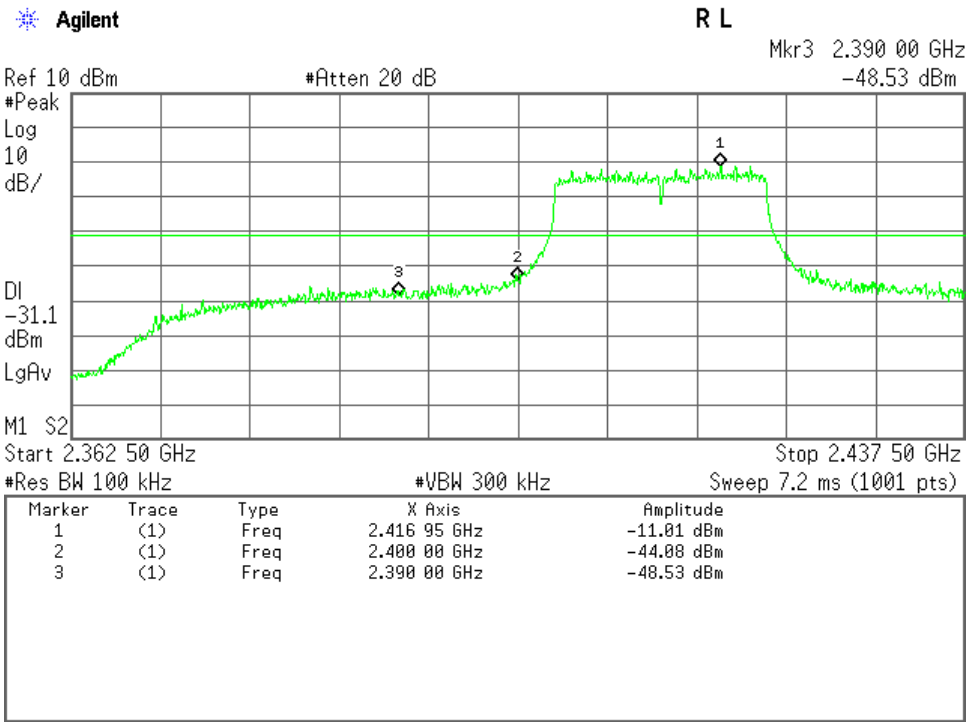


High Channel

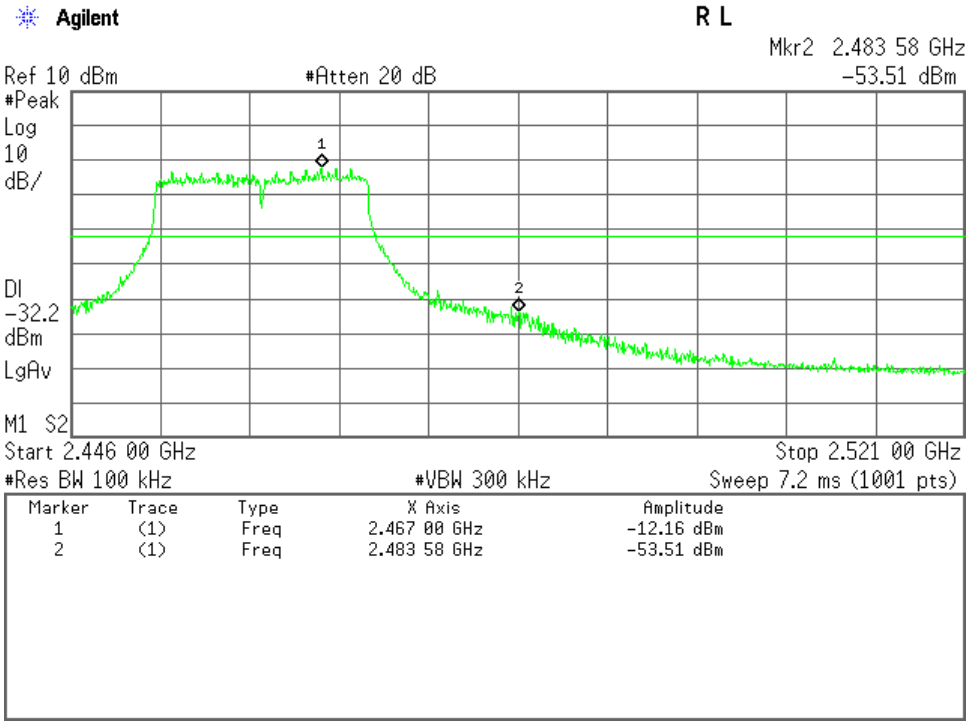


3-2) IEEE 802.11n (Sub Antenna)

Low Channel

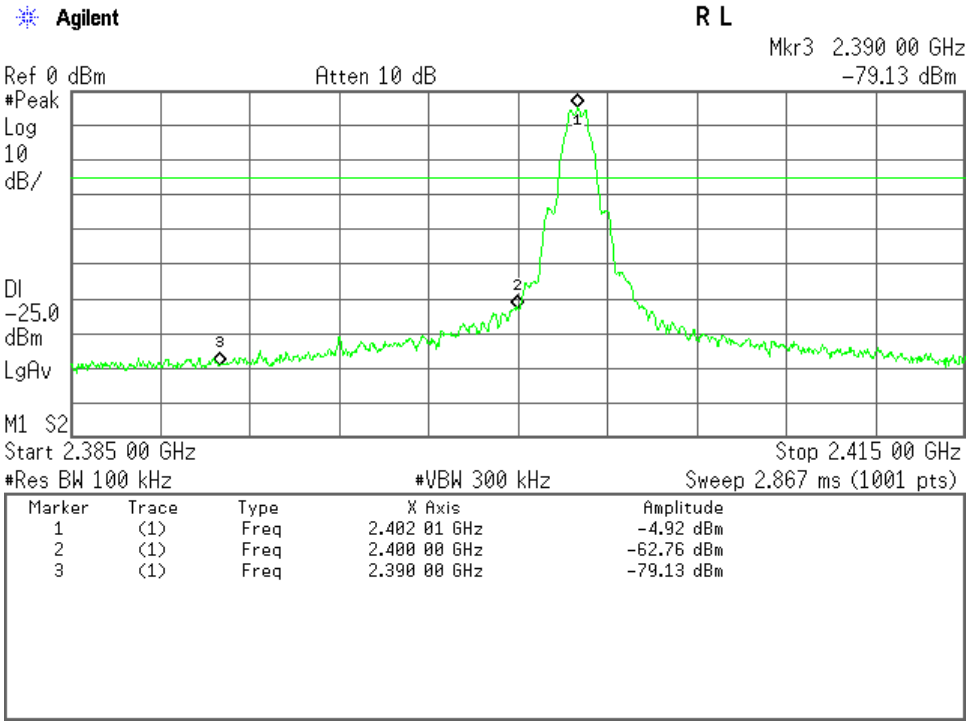


High Channel

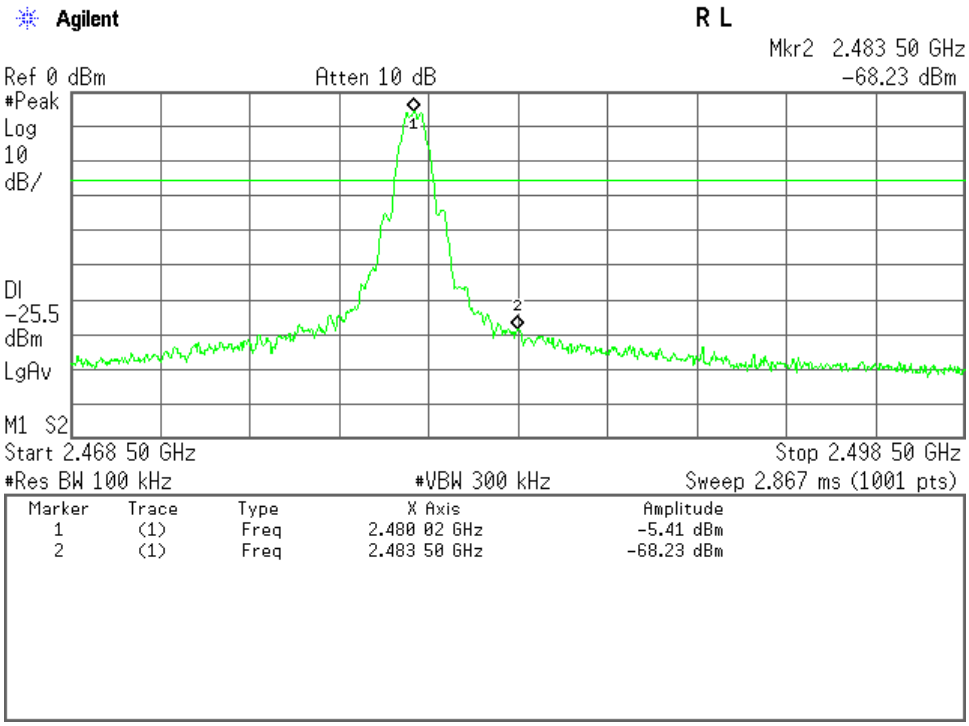


4) Bluetooth Low Energy

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) 9.9 dB at 0.60 MHz

Uncertainty of Measurement Results +/-2.6 dB(2σ)

Remarks : Bluetooth mode

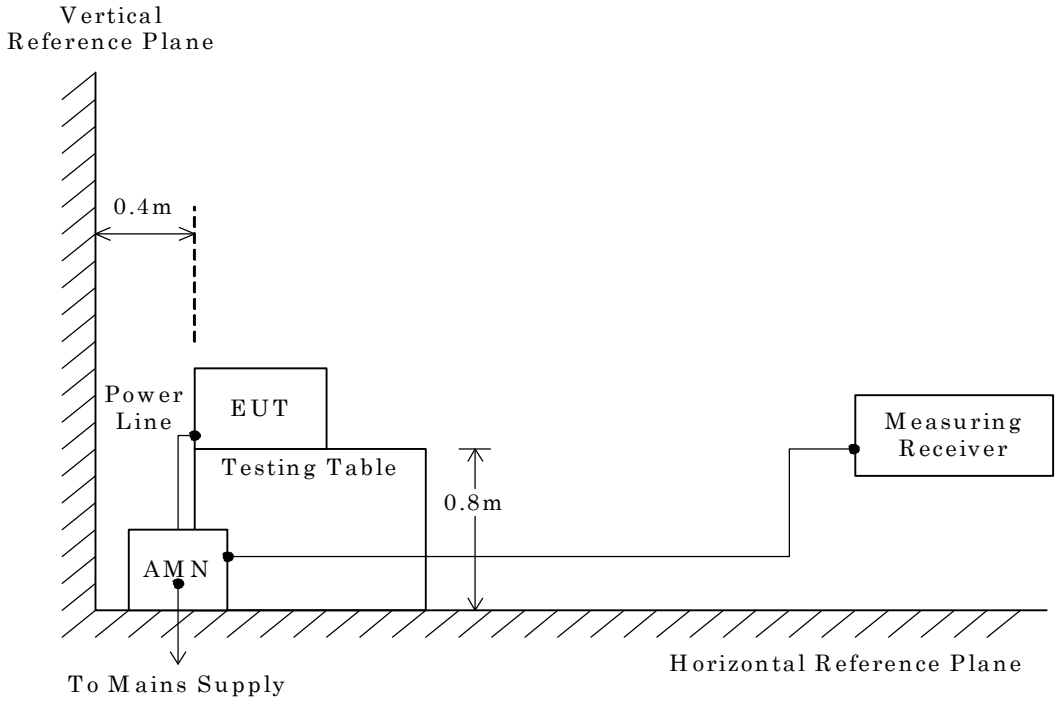
7.8.2 Test Instruments

Measurement Room M2					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Test Receiver	ESU 26	Rohde & Schwarz	A-6	2015/4	1 Year
AMN (main)	KNW-407R	Kyoritsu	D-39	2014/9	1 Year
RF Cable	RG223/U	SUHNER	H-34	2014/6	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

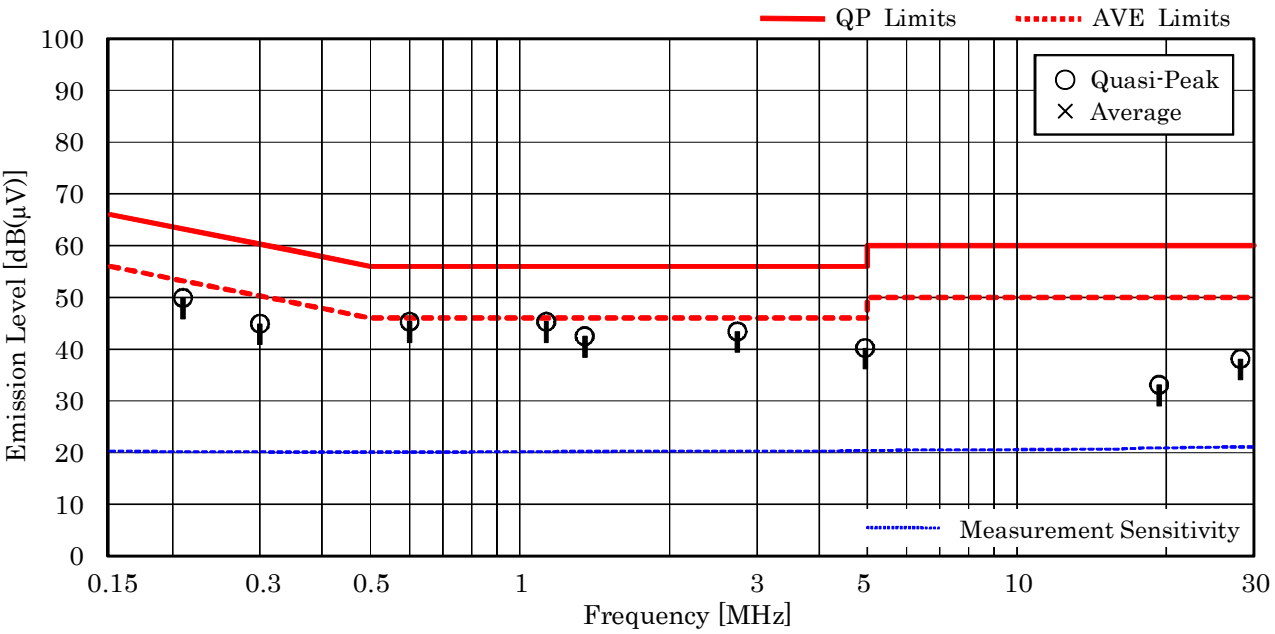
1) Mode of EUT : (WLAN) All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / IEEE 802.11b, IEEE 802.11g and IEEE 802.11n) has been listed.

Test voltage : 120VAC 60Hz

Test Date: May 7, 2015
Temp.: 21 °C, Humi.: 55 %

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
0.210	10.2	39.7	--	63.2	53.2	49.9	--	+13.3	--	-
0.300	10.1	34.8	--	60.2	50.2	44.9	--	+15.3	--	-
0.600	10.1	35.2	--	56.0	46.0	45.3	--	+10.7	--	-
1.130	10.2	35.1	--	56.0	46.0	45.3	--	+10.7	--	-
1.350	10.3	32.2	--	56.0	46.0	42.5	--	+13.5	--	-
2.740	10.3	33.1	--	56.0	46.0	43.4	--	+12.6	--	-
4.950	10.4	29.8	--	56.0	46.0	40.2	--	+15.8	--	-
19.330	10.9	22.2	--	60.0	50.0	33.1	--	+26.9	--	-
28.170	11.1	27.0	--	60.0	50.0	38.1	--	+21.9	--	-



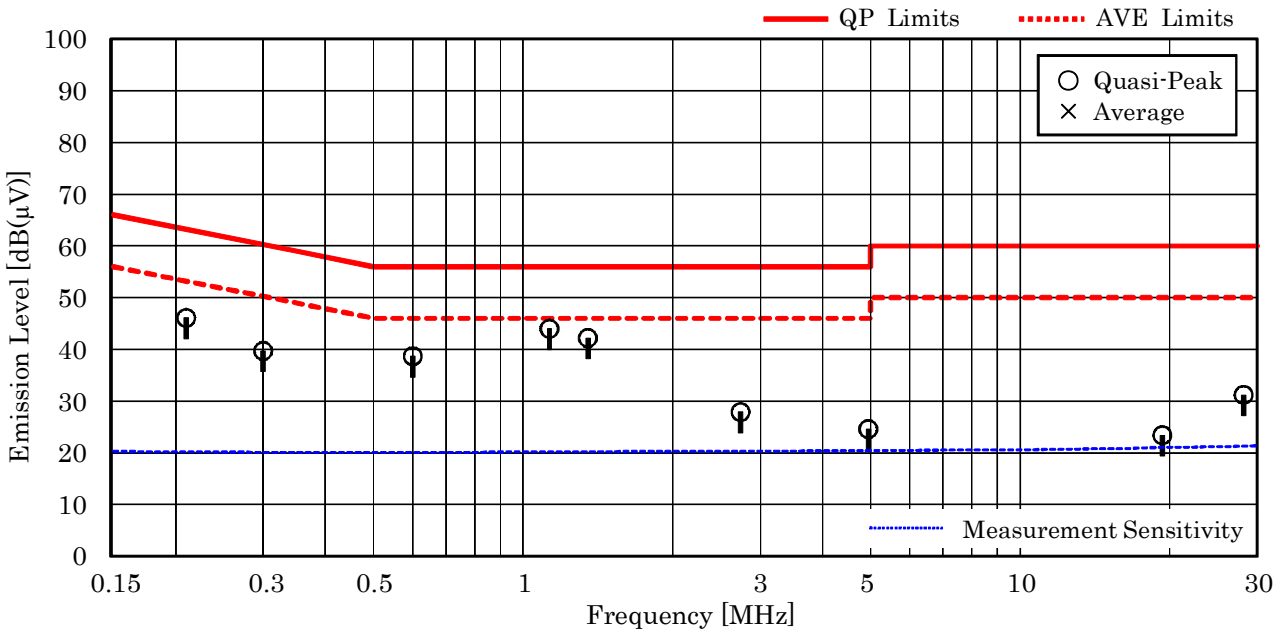
NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.600 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.1 + 35.2 = 45.3 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: May 7, 2015
Temp.: 21 °C, Humi.: 55 %

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
0.210	10.2	35.9	--	63.2	53.2	46.1	--	+17.1	--	-
0.300	10.1	29.6	--	60.2	50.2	39.7	--	+20.5	--	-
0.600	10.1	28.6	--	56.0	46.0	38.7	--	+17.3	--	-
1.130	10.3	33.7	--	56.0	46.0	44.0	--	+12.0	--	-
1.350	10.3	31.9	--	56.0	46.0	42.2	--	+13.8	--	-
2.740	10.3	17.6	--	56.0	46.0	27.9	--	+28.1	--	-
4.950	10.4	14.2	--	56.0	46.0	24.6	--	+31.4	--	-
19.330	11.0	12.4	--	60.0	50.0	23.4	--	+36.6	--	-
28.170	11.3	19.9	--	60.0	50.0	31.2	--	+28.8	--	-



NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 1.130 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.3 + 33.7 = 44.0 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

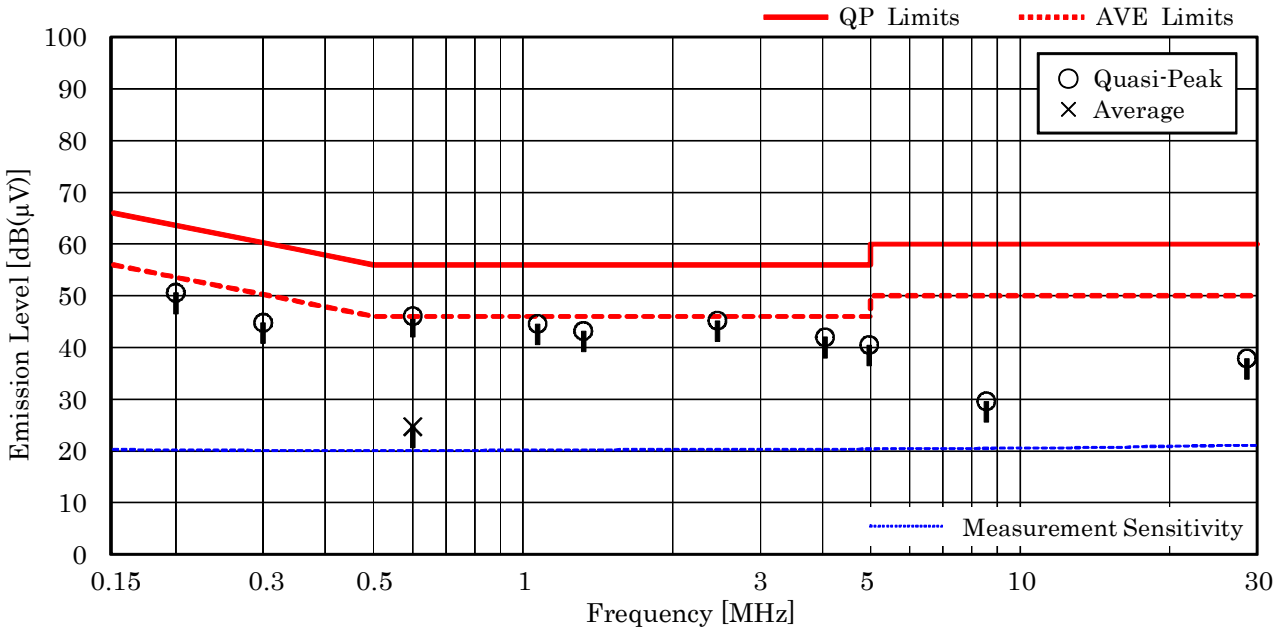
2) Mode of EUT : Bluetooth Low Energy

Test voltage : 120VAC 60Hz

Test Date: May 7, 2015
Temp.: 21 °C, Humi.: 55 %

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
0.200	10.2	40.4	--	63.6	53.6	50.6	--	+13.0	--	-
0.300	10.1	34.7	--	60.2	50.2	44.8	--	+15.4	--	-
0.600	10.1	36.0	14.6	56.0	46.0	46.1	24.7	+ 9.9	+21.3	-
1.070	10.2	34.4	--	56.0	46.0	44.6	--	+11.4	--	-
1.322	10.3	32.9	--	56.0	46.0	43.2	--	+12.8	--	-
2.460	10.3	34.9	--	56.0	46.0	45.2	--	+10.8	--	-
4.050	10.3	31.7	--	56.0	46.0	42.0	--	+14.0	--	-
4.970	10.4	30.1	--	56.0	46.0	40.5	--	+15.5	--	-
8.550	10.5	19.1	--	60.0	50.0	29.6	--	+30.4	--	-
28.600	11.1	26.8	--	60.0	50.0	37.9	--	+22.1	--	-



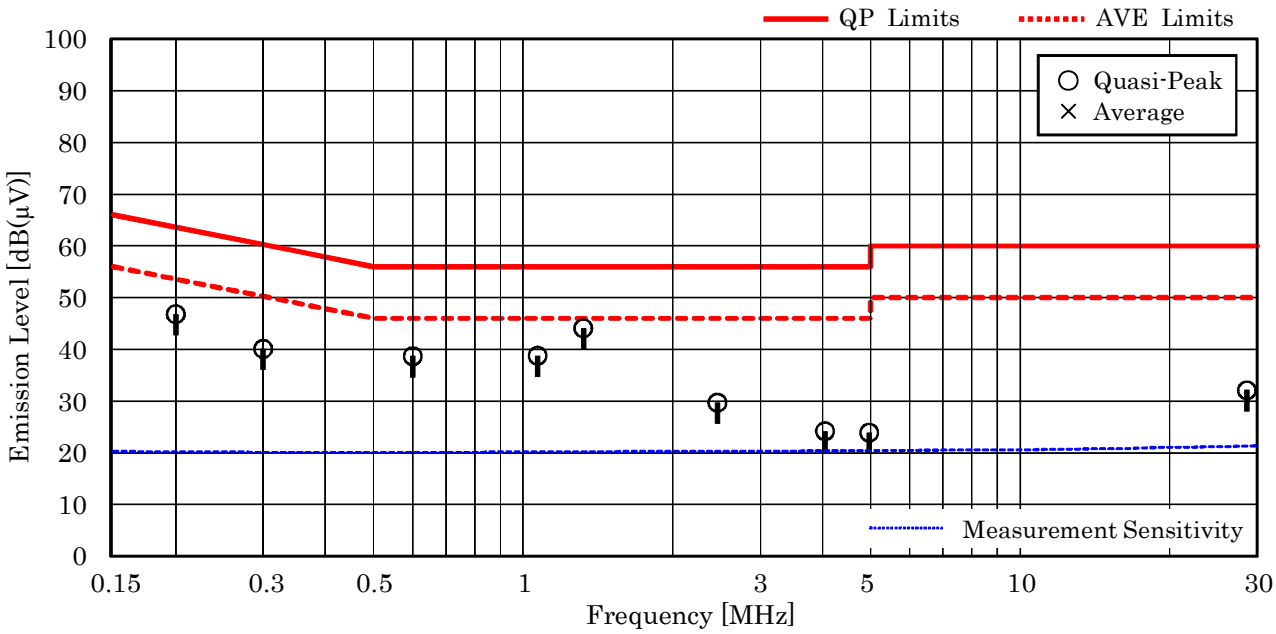
NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.600 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.1 + 36.0 = 46.1 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: May 7, 2015
Temp.: 21 °C, Humi.: 55 %

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
0.200	10.2	36.6	--	63.6	53.6	46.8	--	+16.8	--	-
0.300	10.1	30.0	--	60.2	50.2	40.1	--	+20.1	--	-
0.600	10.1	28.6	--	56.0	46.0	38.7	--	+17.3	--	-
1.070	10.3	28.5	--	56.0	46.0	38.8	--	+17.2	--	-
1.322	10.3	33.8	--	56.0	46.0	44.1	--	+11.9	--	-
2.460	10.3	19.4	--	56.0	46.0	29.7	--	+26.3	--	-
4.050	10.4	13.8	--	56.0	46.0	24.2	--	+31.8	--	-
4.970	10.4	13.5	--	56.0	46.0	23.9	--	+32.1	--	-
28.600	11.3	20.8	--	60.0	50.0	32.1	--	+27.9	--	-



NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 1.322 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.3 + 33.8 = 44.1 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

7.9 Radiated Emission

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

☒ - **Passed** ☐ - **Failed** ☐ - **Not judged**

7.9.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Average) 13.8 dB at 2483.5 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, Z axis position.

7.9.2 Test Instruments

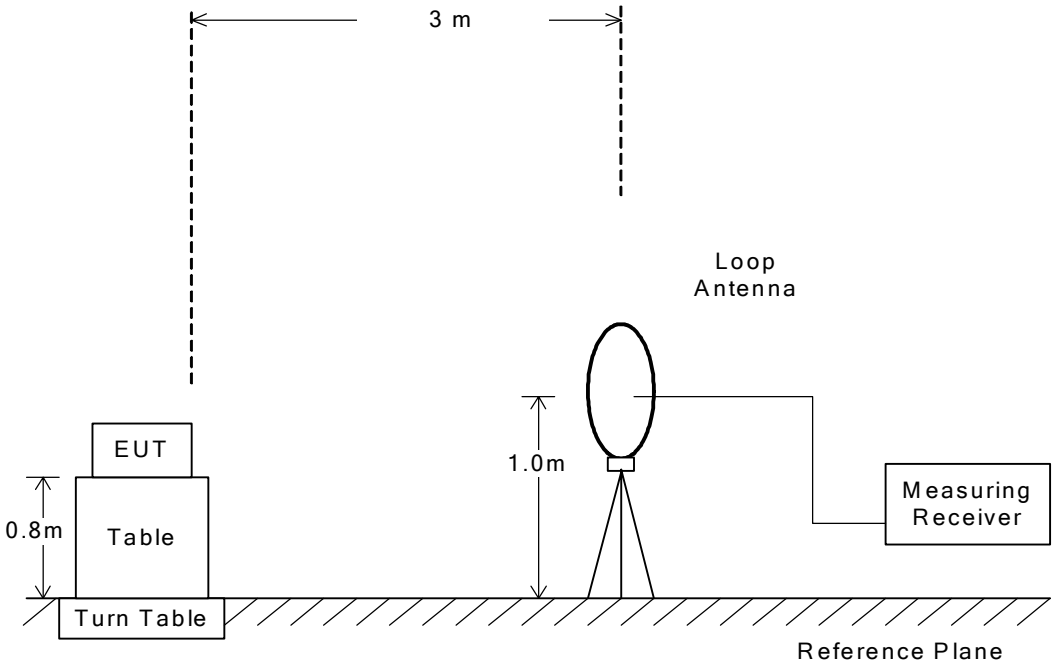
Anechoic Chamber A2					
Type	**Model**	**Manufacturer**	**ID No.**	**Last Cal.**	**Interval**
Test Receiver	ESU 26	Rohde & Schwarz	A-6	2015/4	1 Year
Loop Antenna	HFH2-Z2	Rohde & Schwarz	C-2	2014/8	1 Year
RF Cable	RG213/U	SUHNER	H-28	2014/8	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	C-30	2014/5	1 Year
Log-periodic Antenna	UHALP9108-A1	Schwarzbeck	C-31	2014/5	1 Year
RF Cable	S 10162 B-11 etc.	SUHNER	H-4	2015/4	1 Year
Site Attenuation	--	----	H-15	2015/1	1 Year
Pre-Amplifier	TPA0118-36	TOYO	A-37	2014/5	1 Year
Pre-Amplifier	RP1826G-45H	EMCS	A-53	2014/7	1 Year
Horn Antenna	91888-2	EATON	C-41-1	2014/7	1 Year
Horn Antenna	91889-2	EATON	C-41-2	2014/7	1 Year
Horn Antenna	3160-04	EMCO	C-55	2014/6	1 Year
Horn Antenna	3160-05	EMCO	C-56	2014/6	1 Year
Horn Antenna	3160-06	EMCO	C-57	2014/6	1 Year
Horn Antenna	3160-07	EMCO	C-58	2014/6	1 Year
Horn Antenna	3160-08	EMCO	C-59	2014/6	1 Year
Horn Antenna	3160-09	EMCO	C-48	2014/7	1 Year
Attenuator	54A-10	Weinschel	D-29	2014/9	1 Year
Attenuator	2-10	Weinschel	D-79	2014/11	1 Year
Band Rejection Filter	BRM50701	MICRO-TRONICS	D-93	2015/2	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-66	2015/1	1 Year
RF Cable	SUCOFLEX104	SUHNER	C-67	2015/1	1 Year
RF Cable	SUCOFLEX102EA	SUHNER	C-69	2015/1	1 Year
SVSWR	--	----	H-19	2015/2	1 Year
Pre-Amplifier	310N	SONOMA	A-17	2015/4	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.

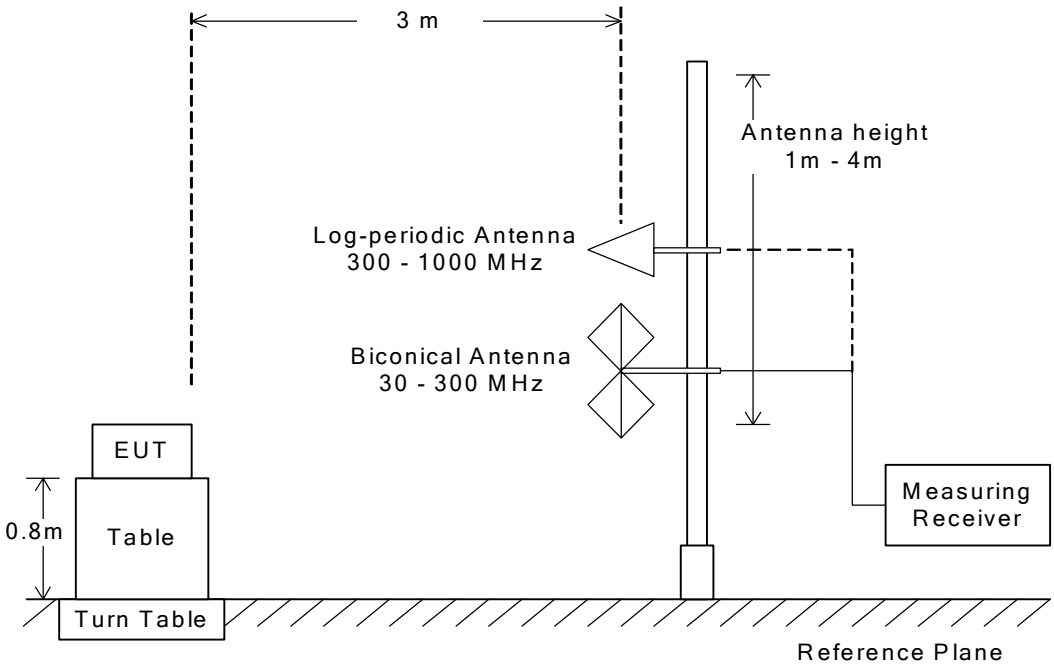
– Side View –



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:

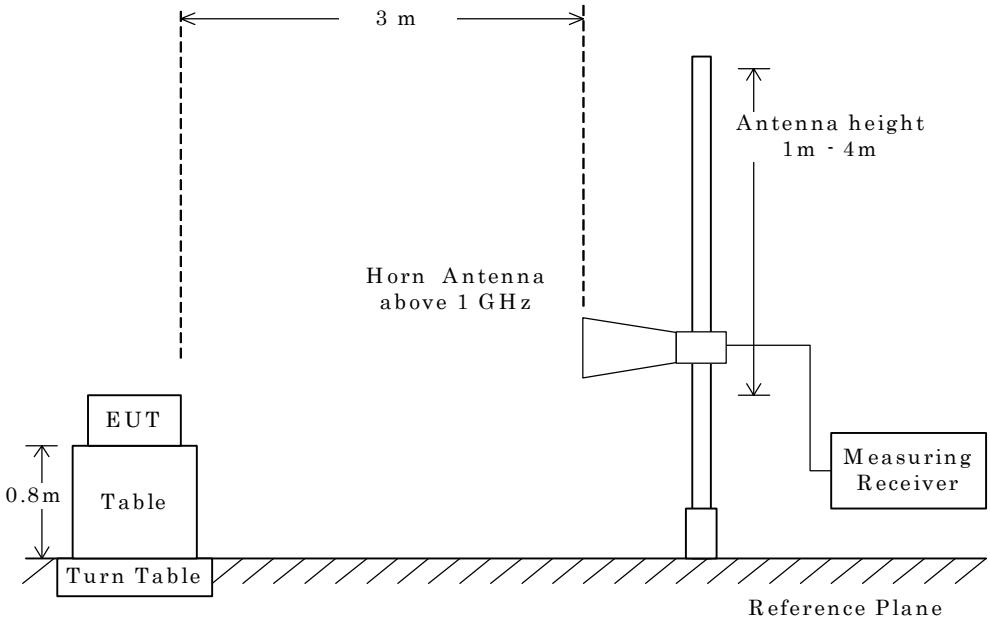
Type	Peak	Average
Detector Function	Peak	Peak
Res. Bandwidth	1 MHz	1 MHz
Video Bandwidth	3 MHz	≥ 1/T *1)
Video Filtering	Linear Voltage	Linear Voltage
Sweep Time	AUTO	AUTO
Trace	Max Hold	Max Hold

Note: 1. T: Minimum transmission duration

Average (VBW) Setting:

Mode	Interval	Cycle	Duty cycle	Burst on period(T)	Min. VBW(1/T)	VBW Setting
	(msec)	(msec)	(%)	(msec)	(kHz)	(kHz))
IEEE802.11b(11Mbps)	0.10	1.38	92.8%	1.28	0.78	1.00
IEEE802.11g(24Mbps)	0.11	0.63	82.5%	0.52	1.92	2.00
IEEE802.11n(26(MCS3))	0.10	0.60	83.3%	0.50	2.00	3.00
Bluetooth LE	0.22	0.63	65.1%	0.41	2.44	3.00

– Side View –



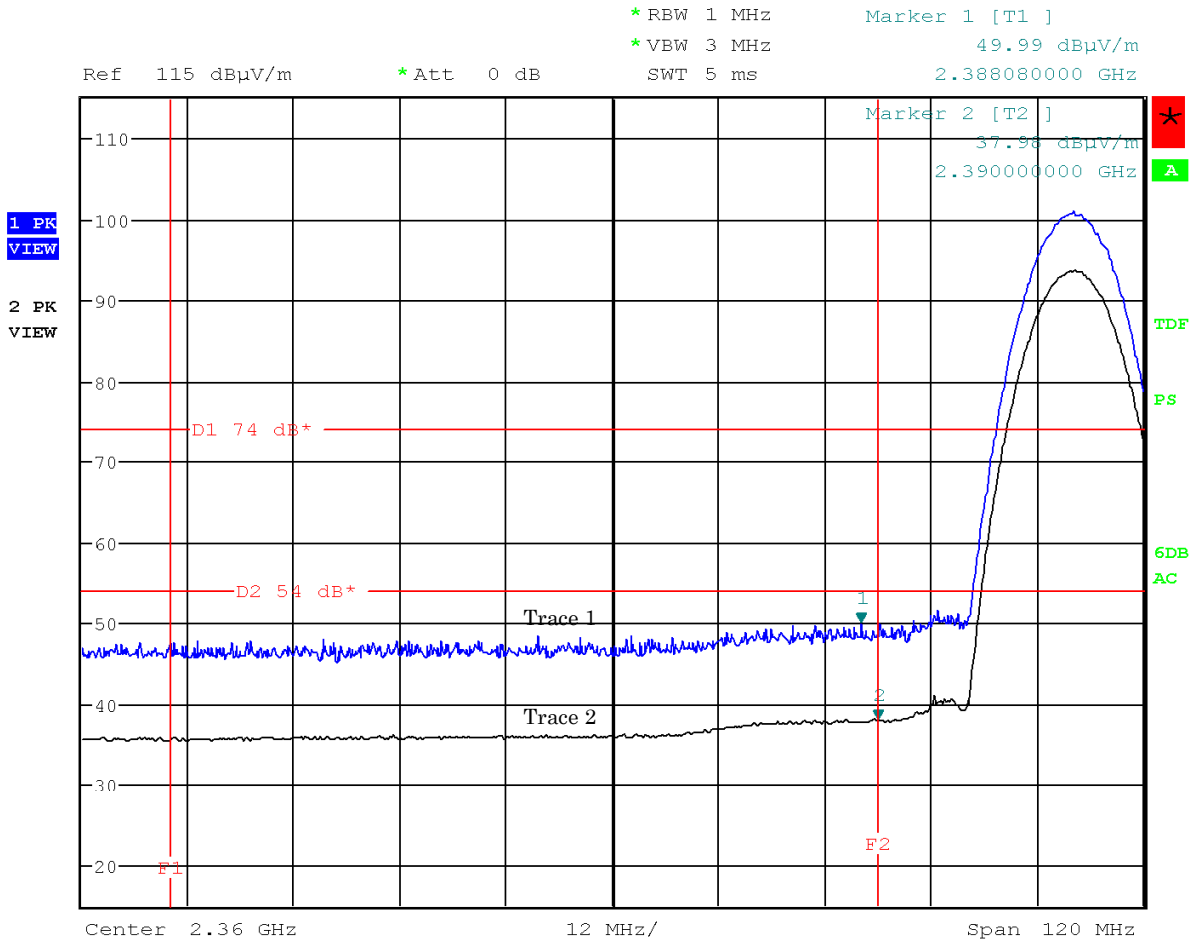
NOTE
The antenna height is scanned depending on the EUT's size and mounting height.

7.9.4 Test Data

7.9.4.1 Band-edge Compliance

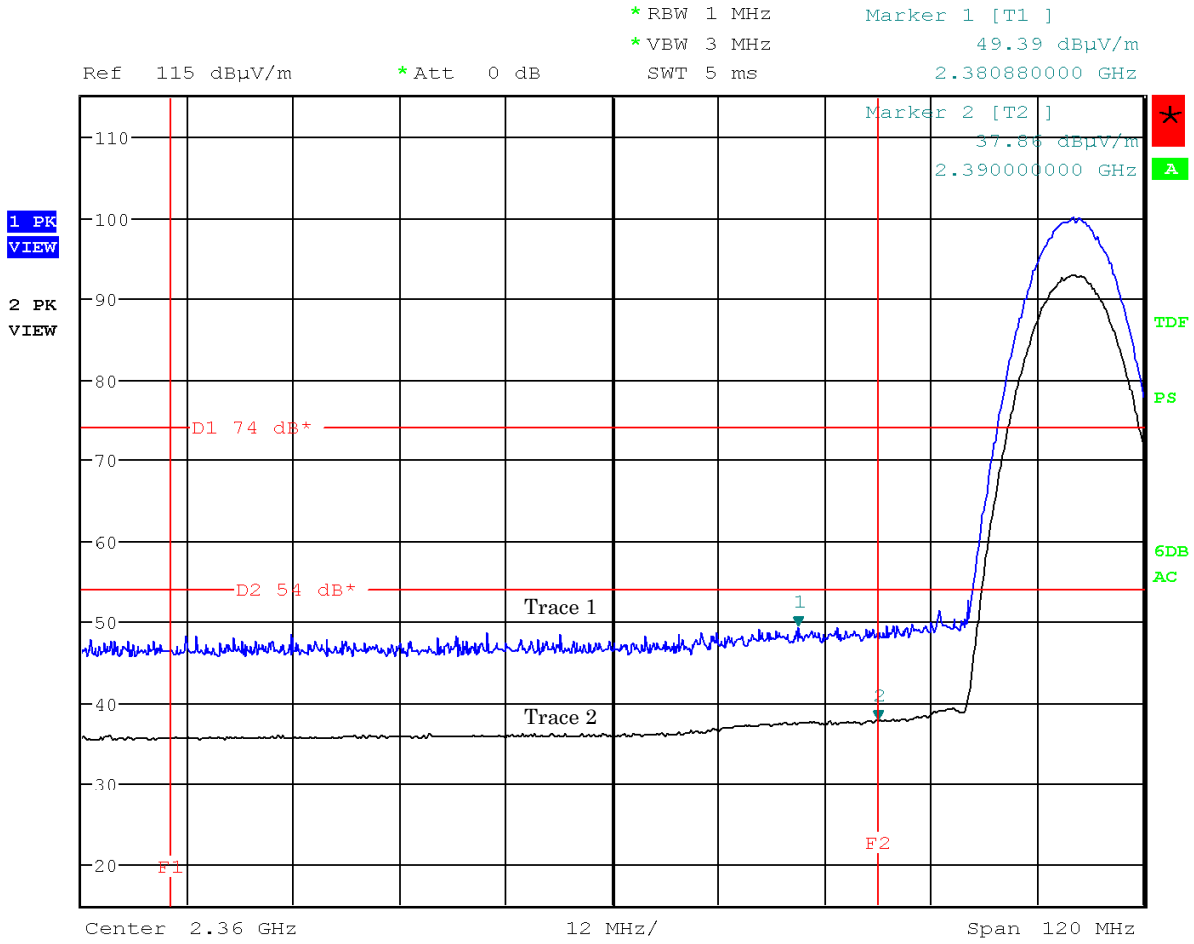
Test Date : April 22, 2015
Temp.:24°C, Humi:45%

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



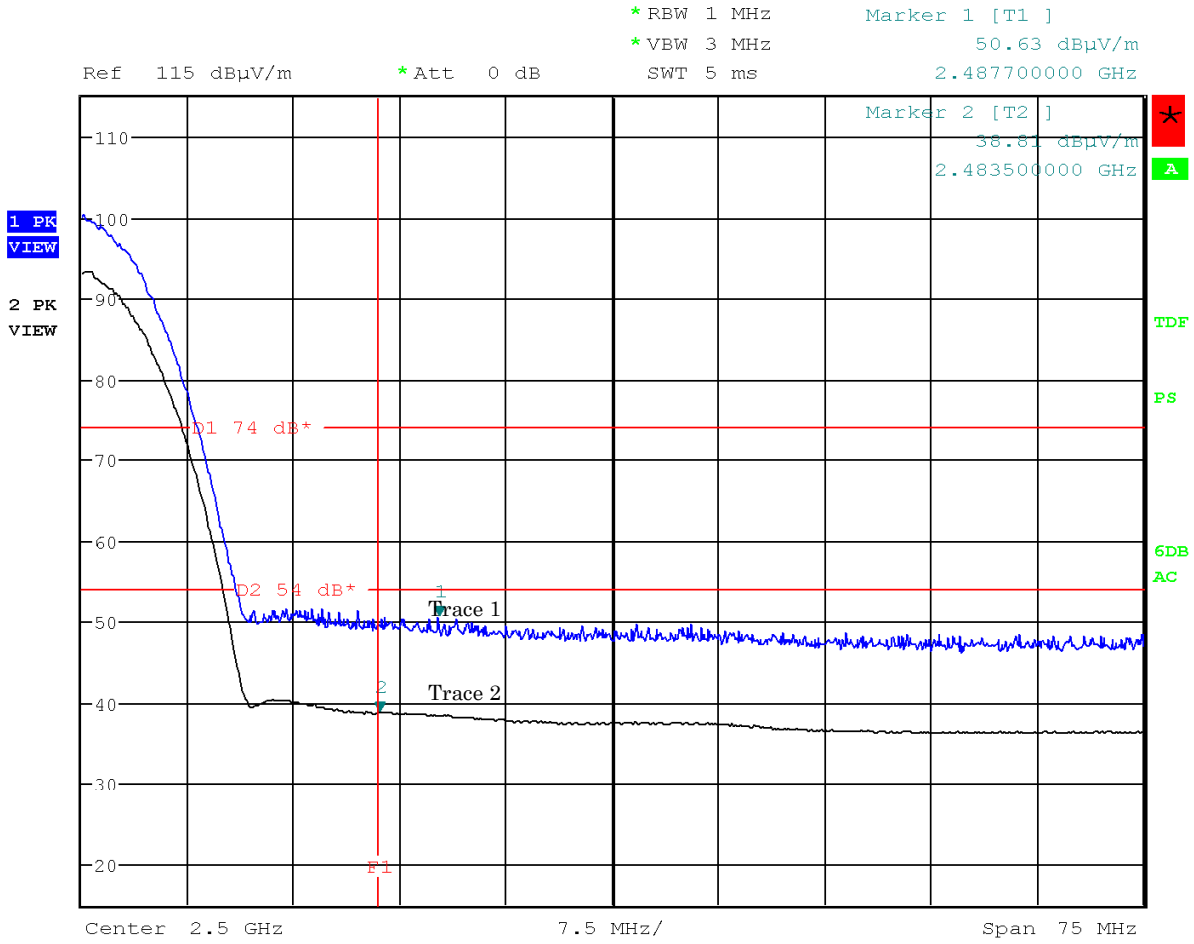
Note: The trace 1 is Peak . The trace 2 is Average.

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



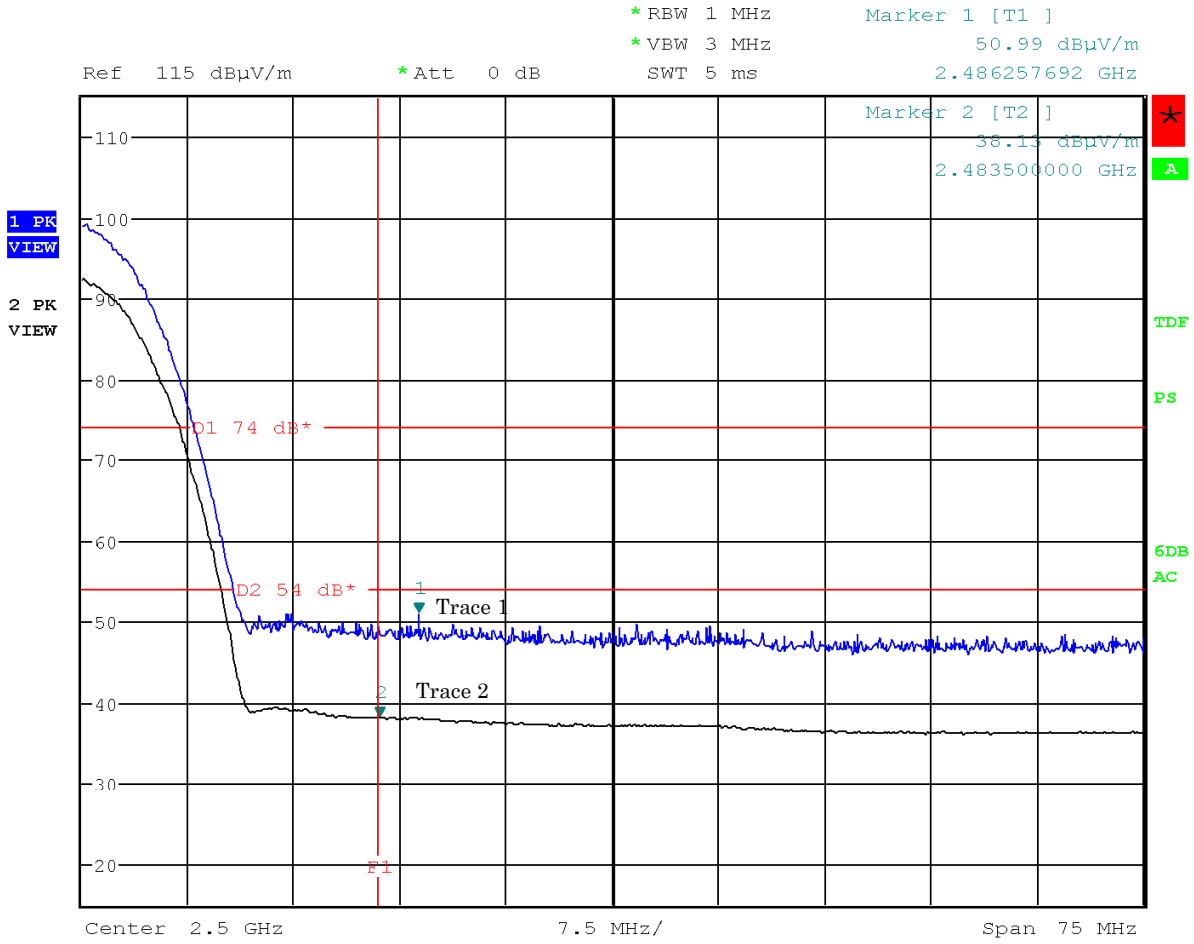
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Horizontal



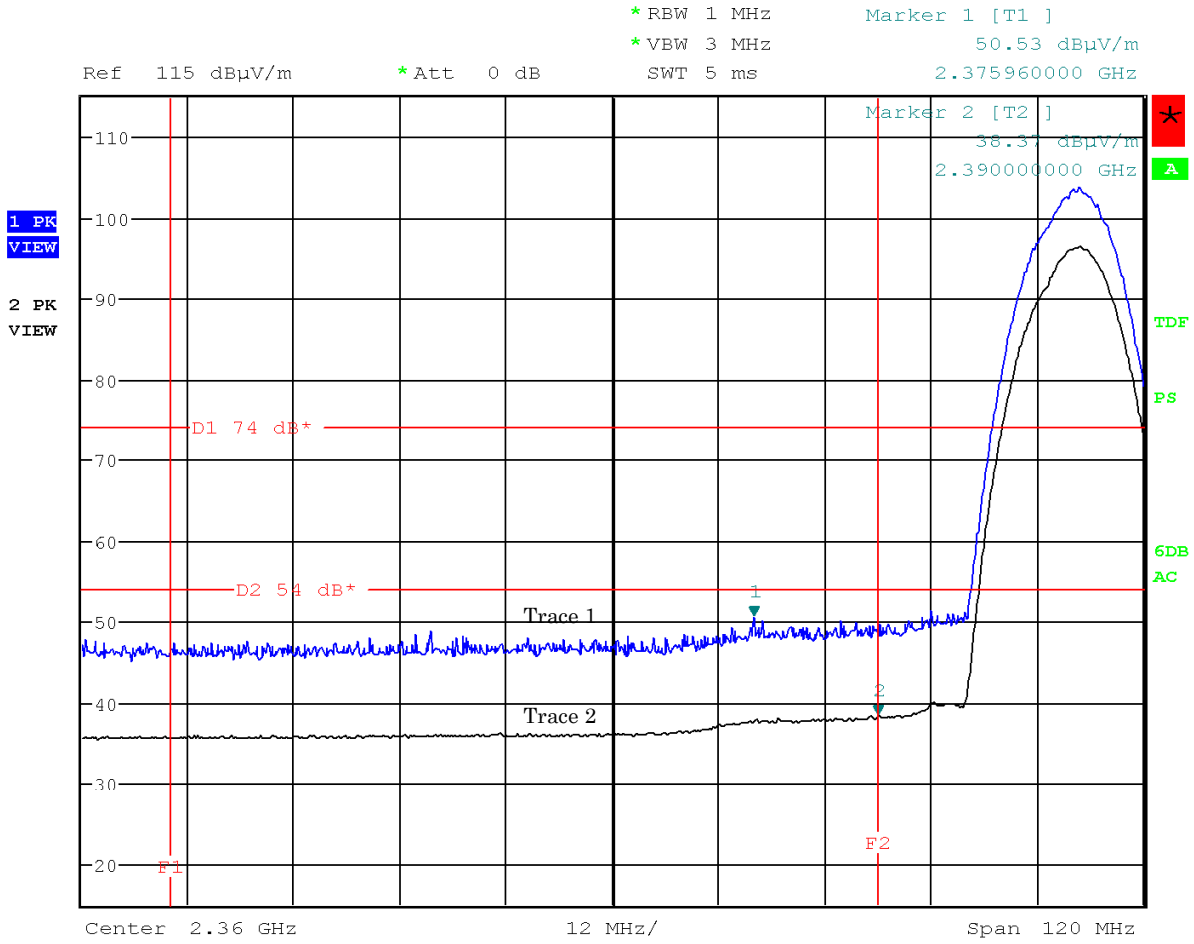
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Vertical



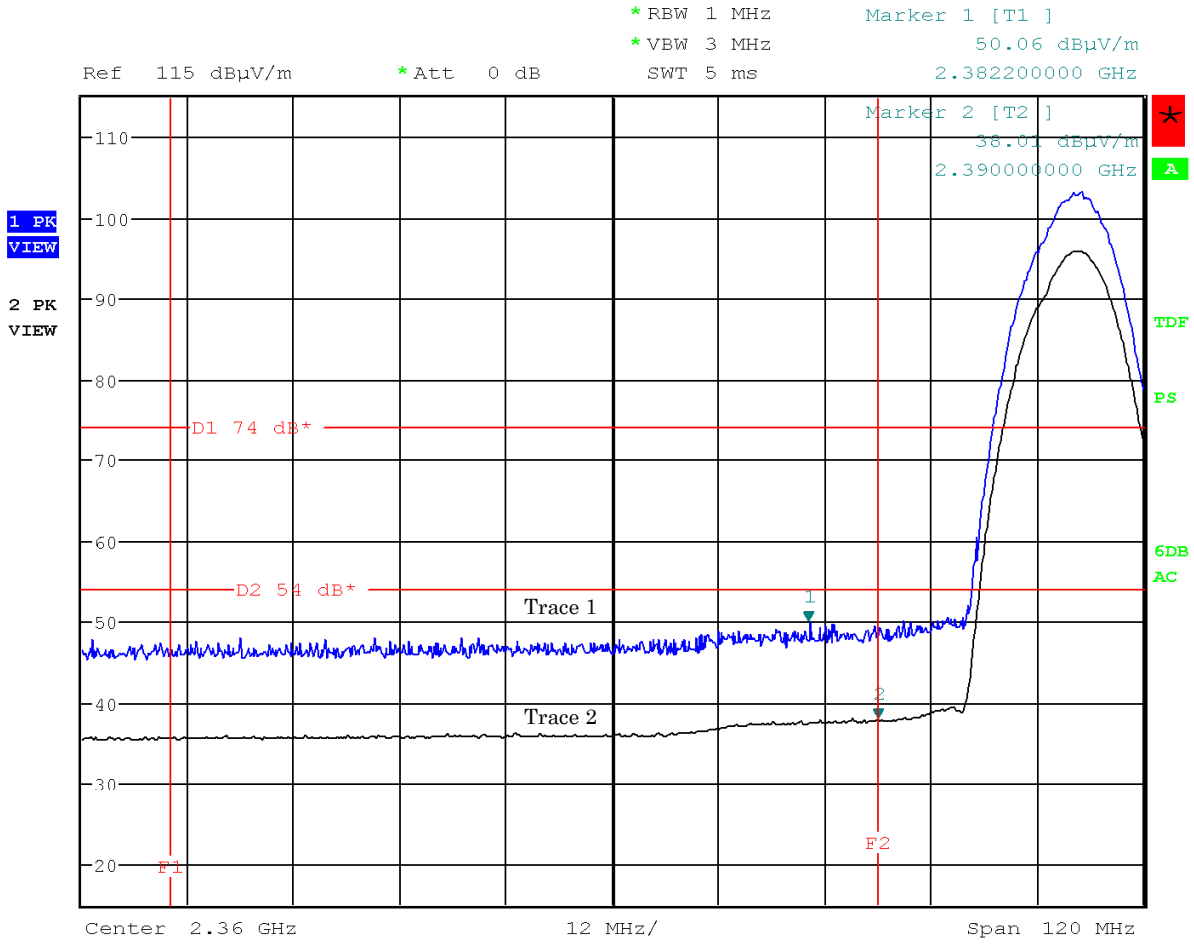
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11b))
Antenna Polarization : Horizontal



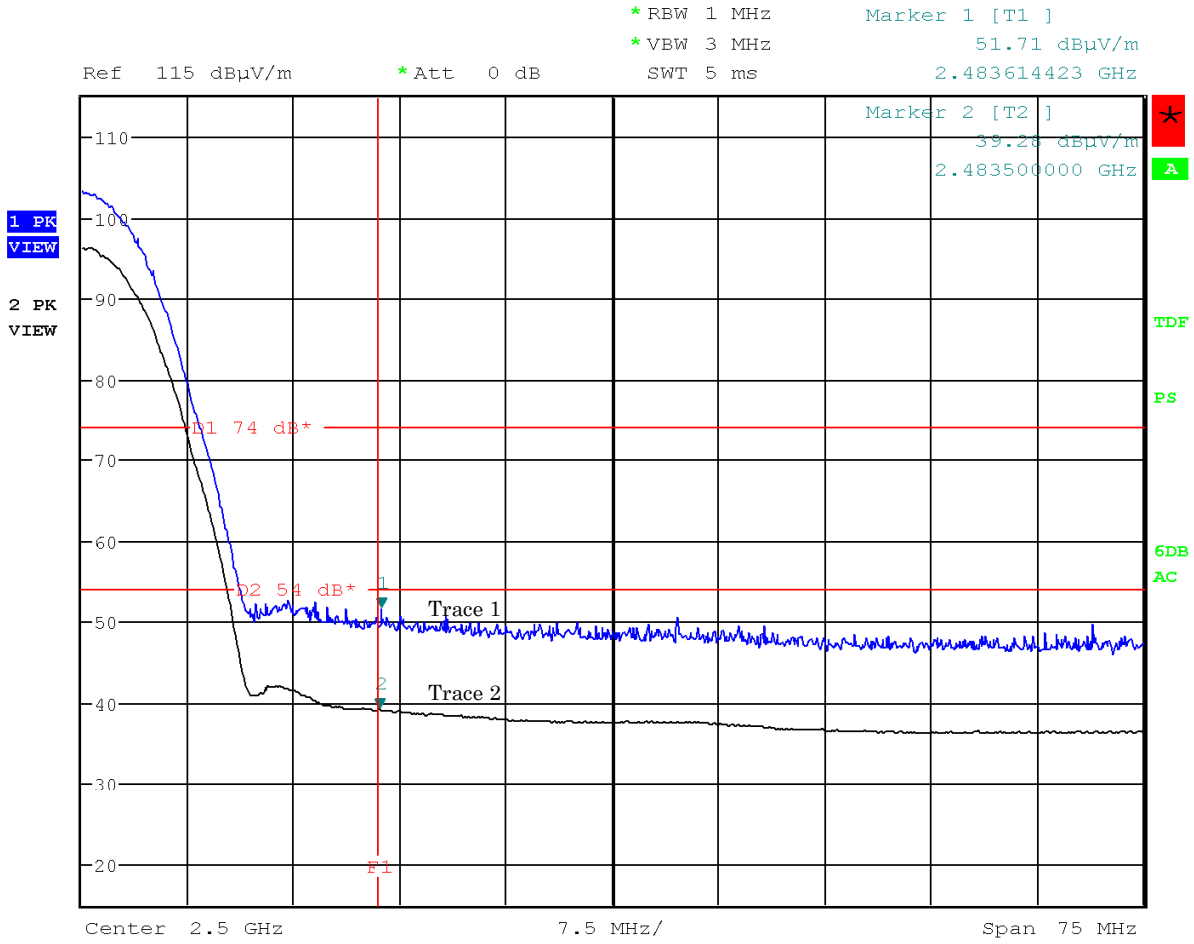
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11b))
Antenna Polarization : Vertical



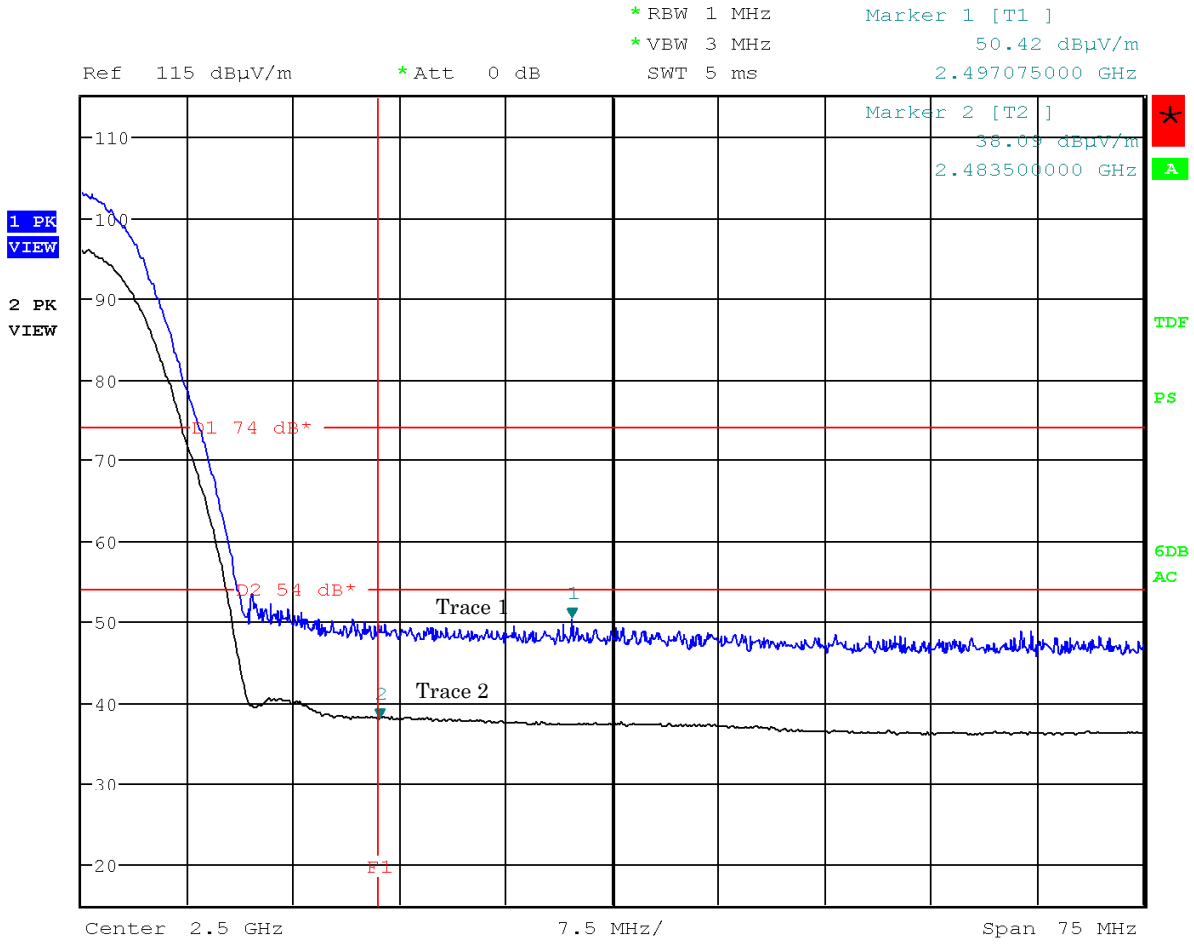
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Horizontal



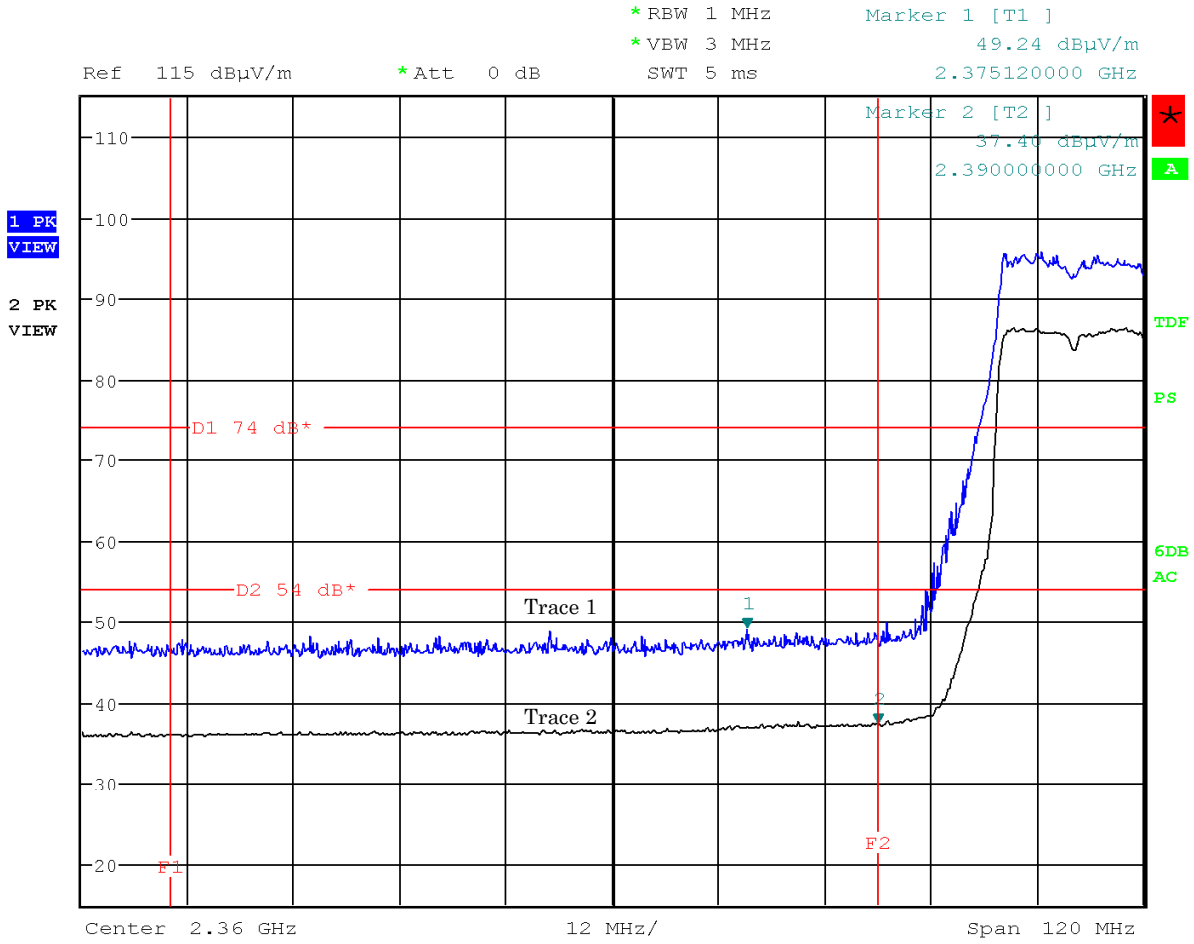
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11b))
Antenna Polarization : Vertical



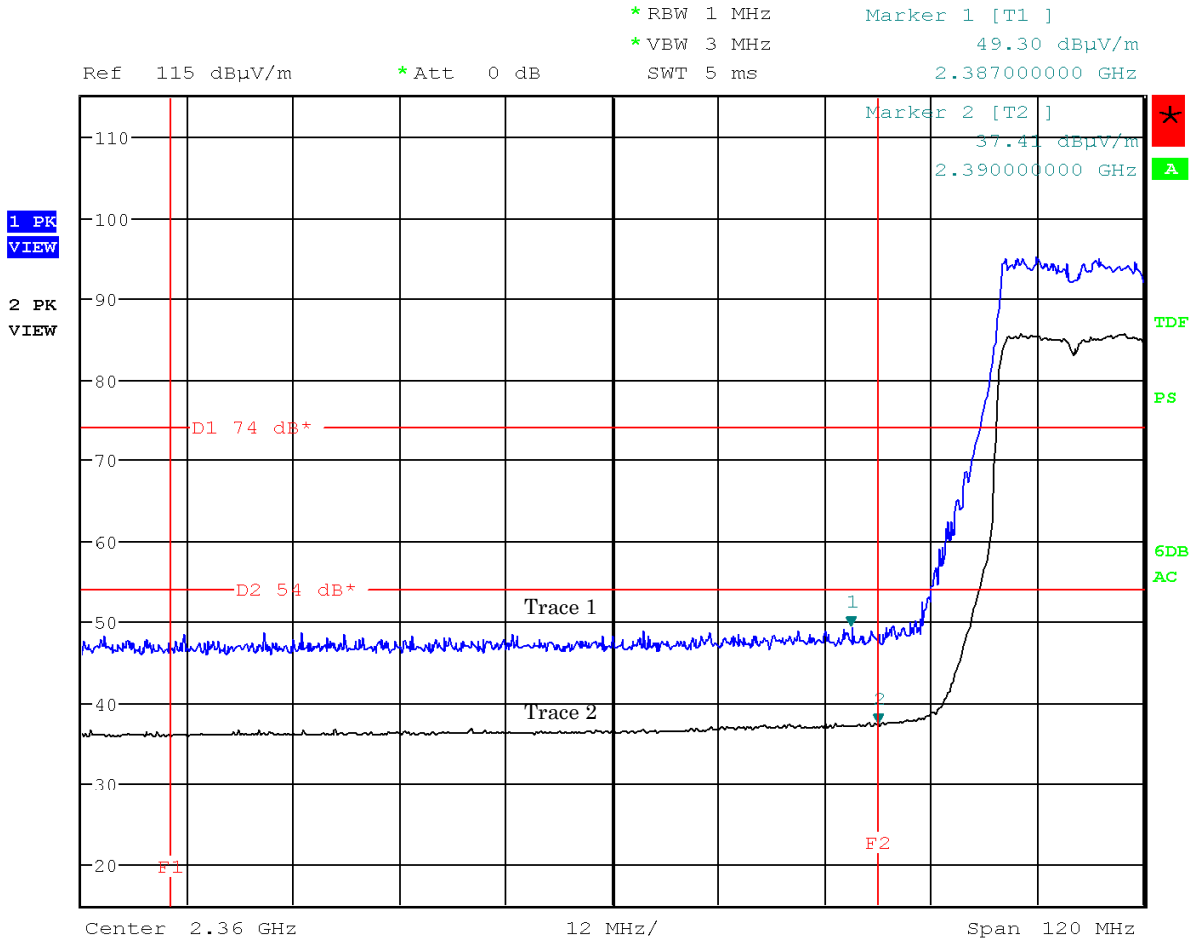
Note: The trace 1 is Peak . The trace 2 is Average.

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



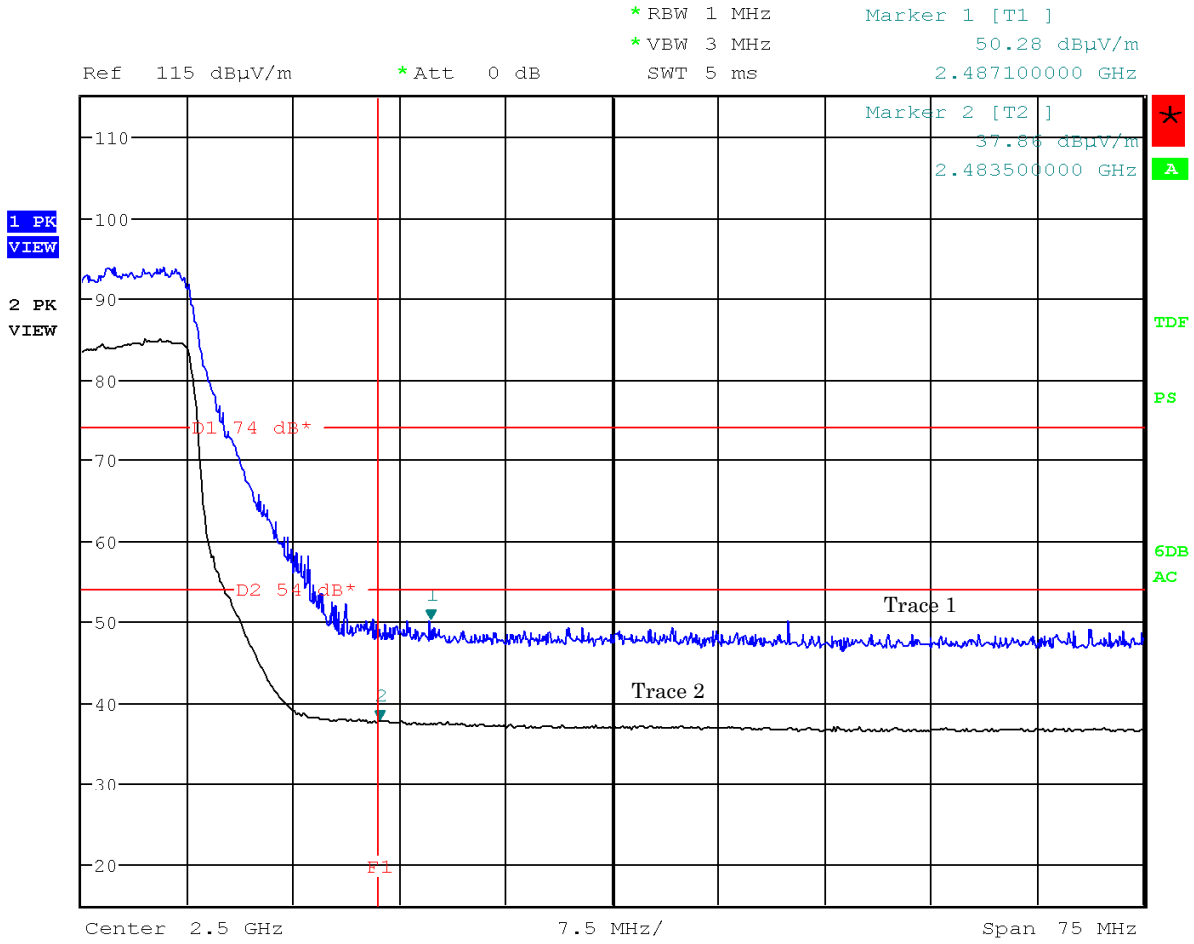
Note: The trace 1 is Peak . The trace 2 is Average.

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



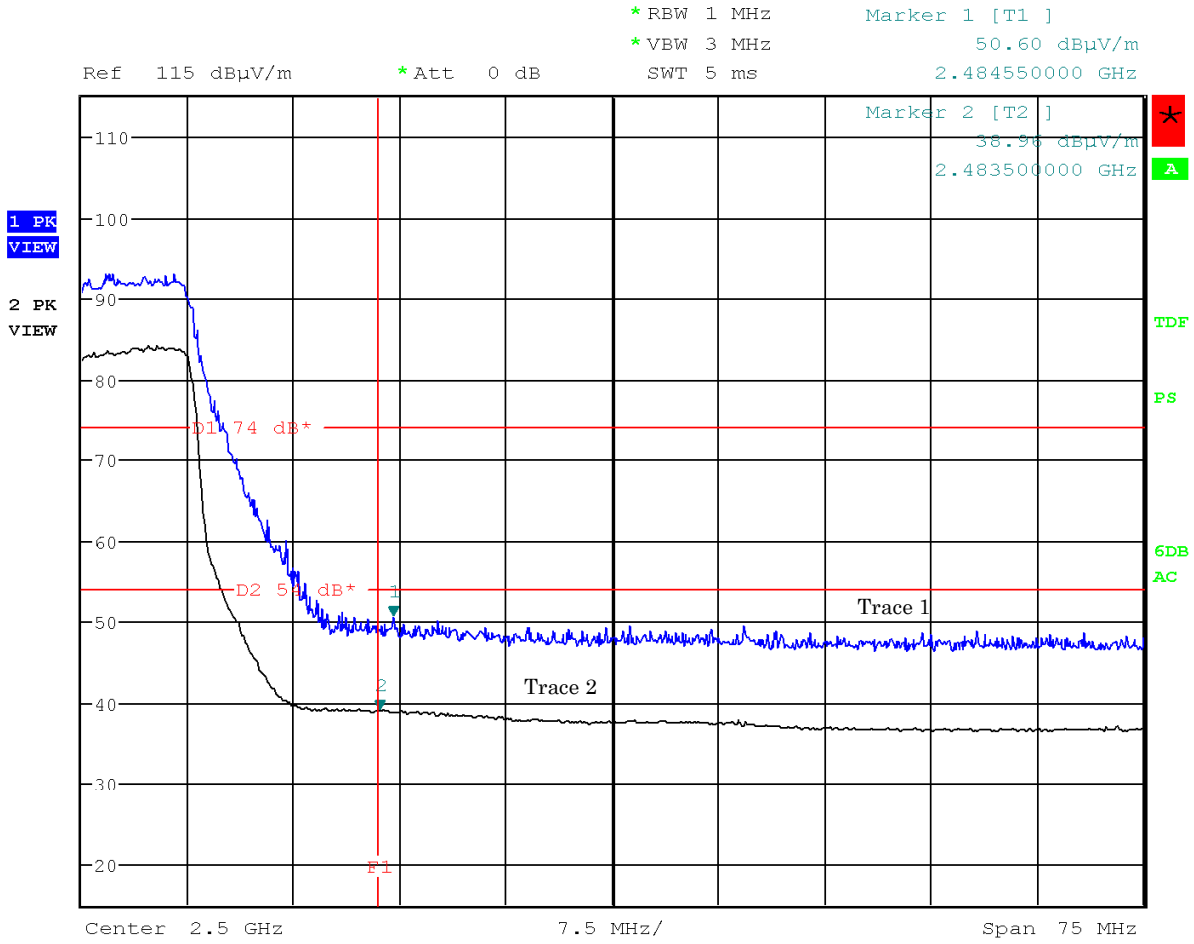
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Horizontal



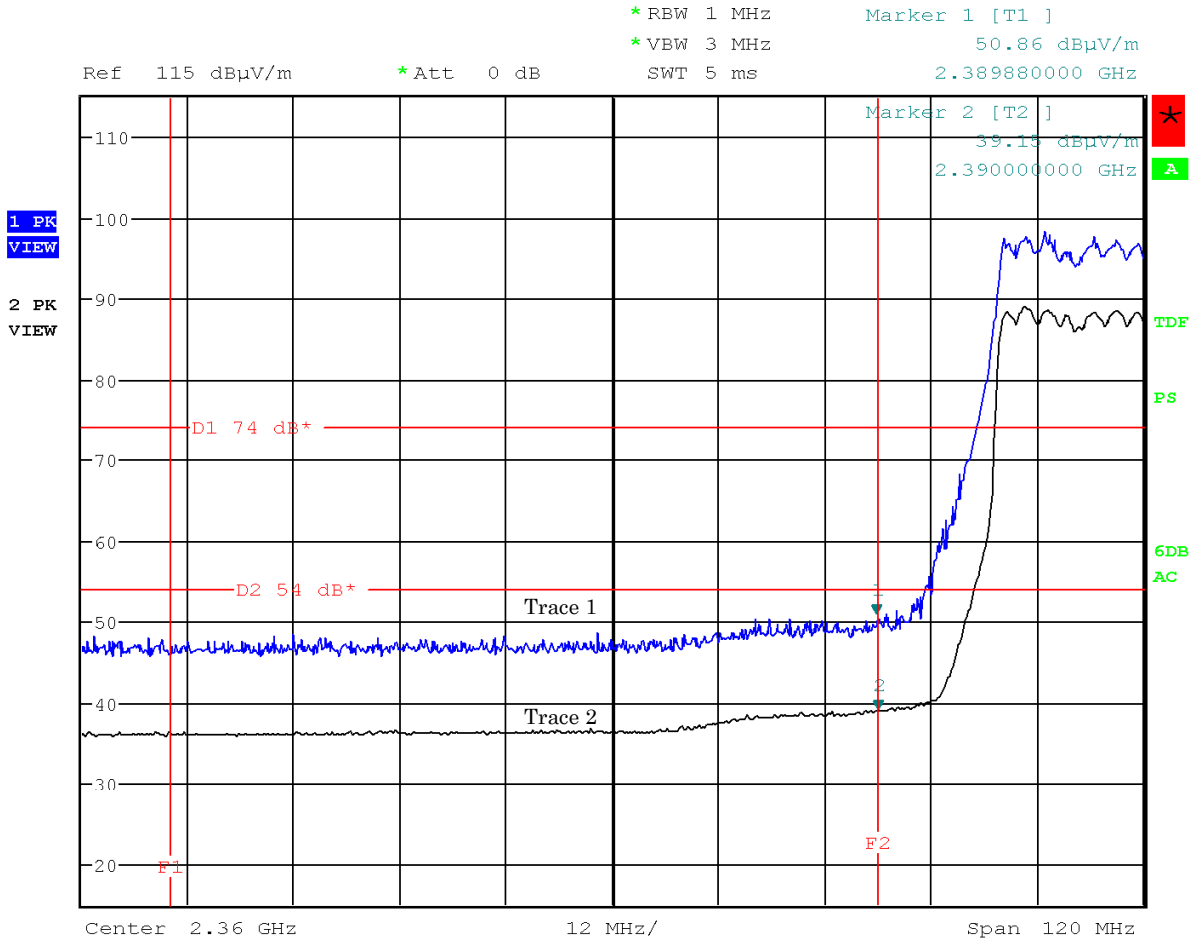
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Vertical



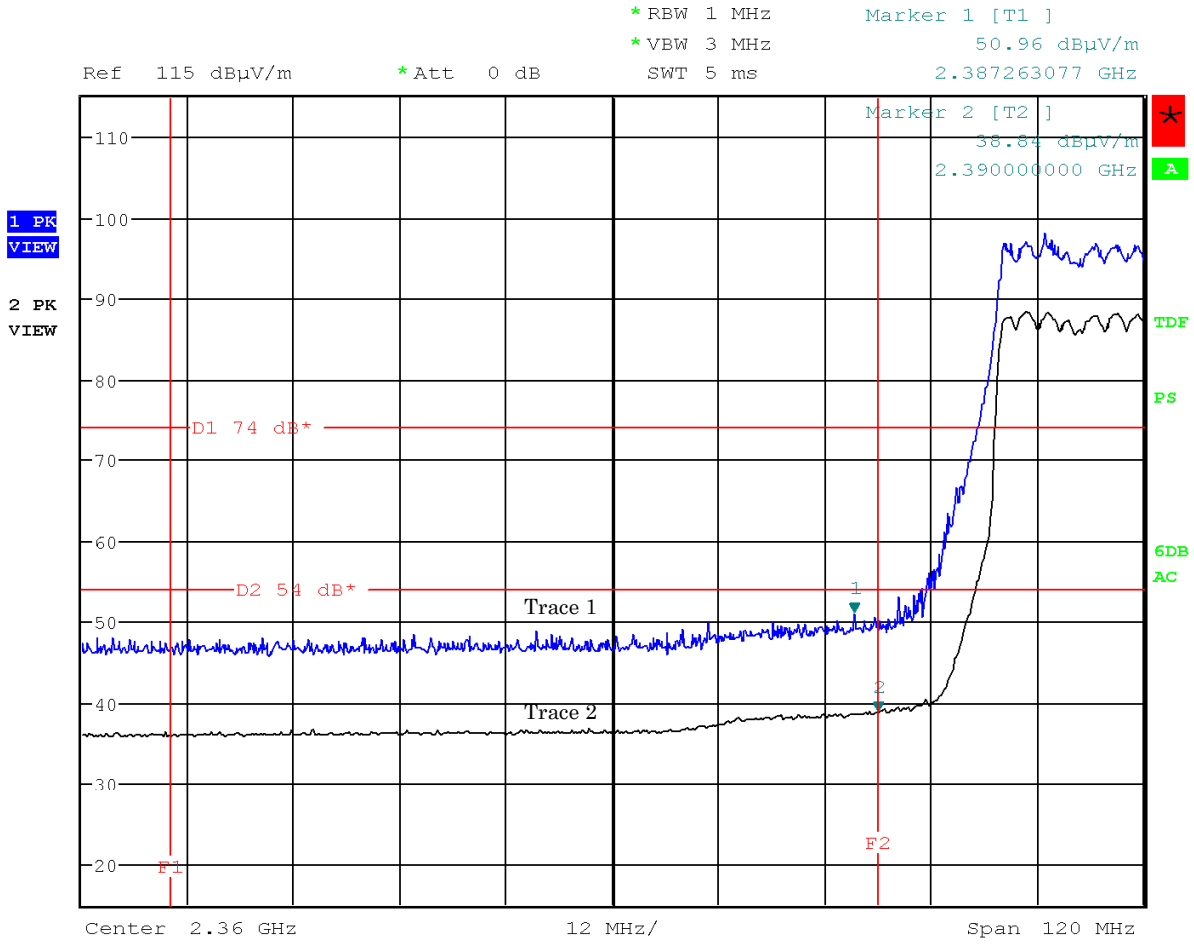
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11g))
Antenna Polarization : Horizontal



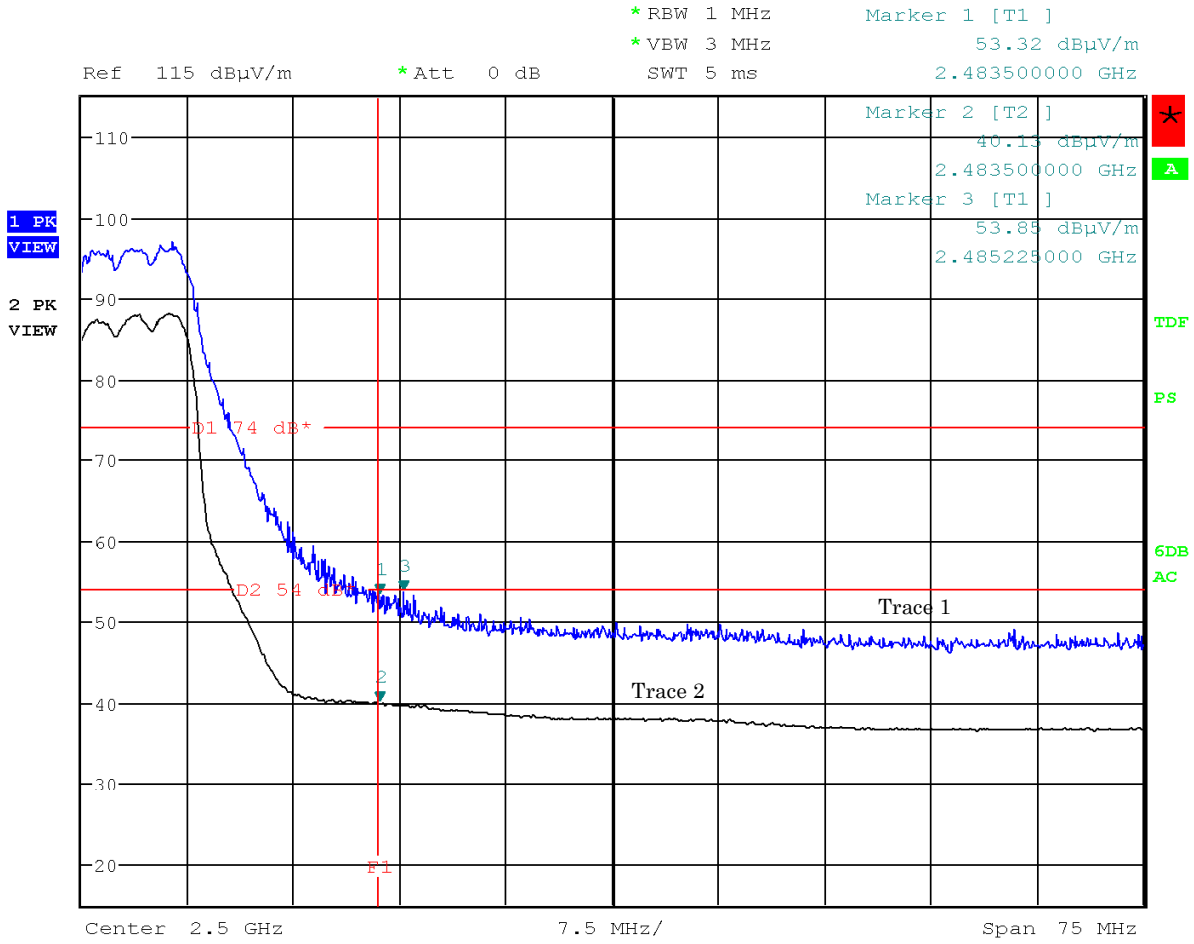
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11g))
Antenna Polarization : Vertical



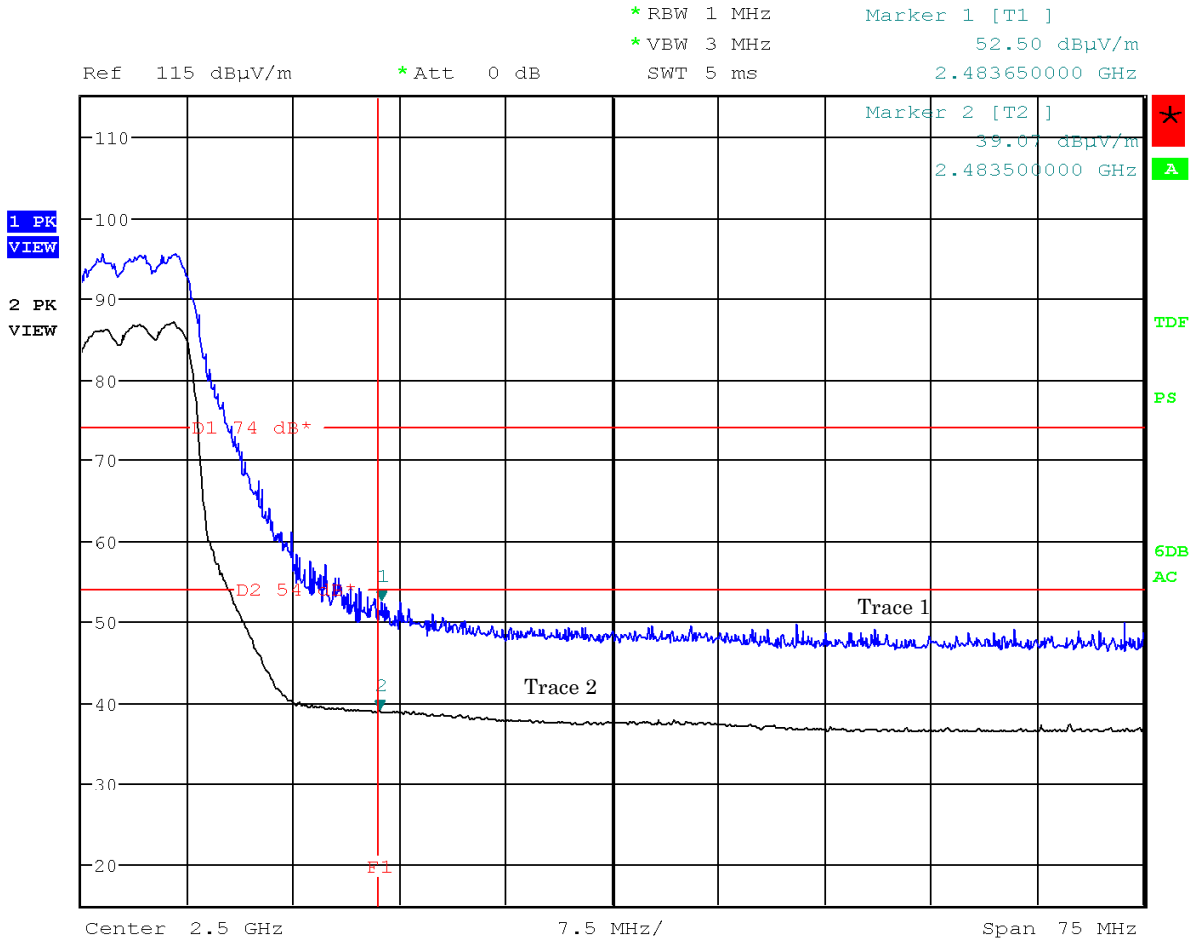
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Horizontal



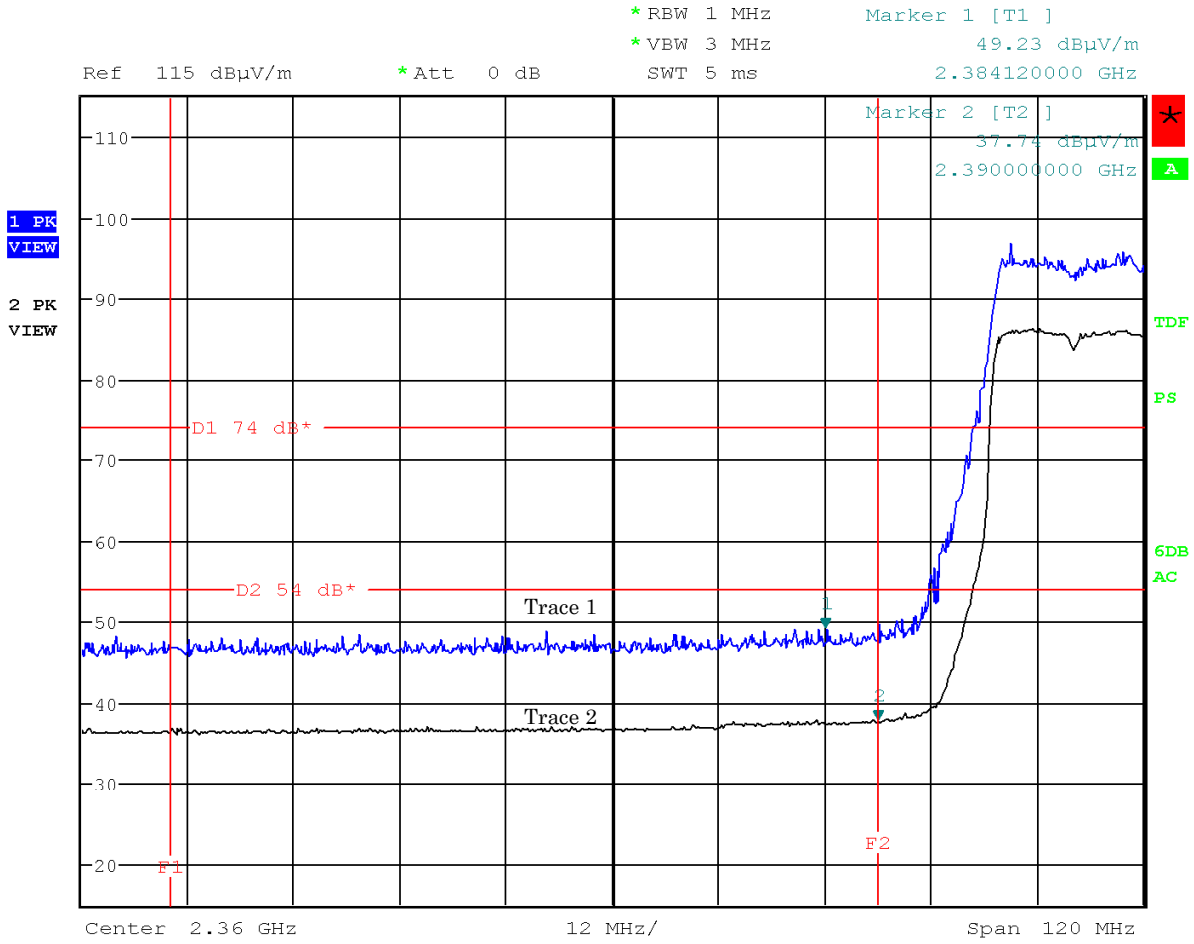
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11g))
Antenna Polarization : Vertical



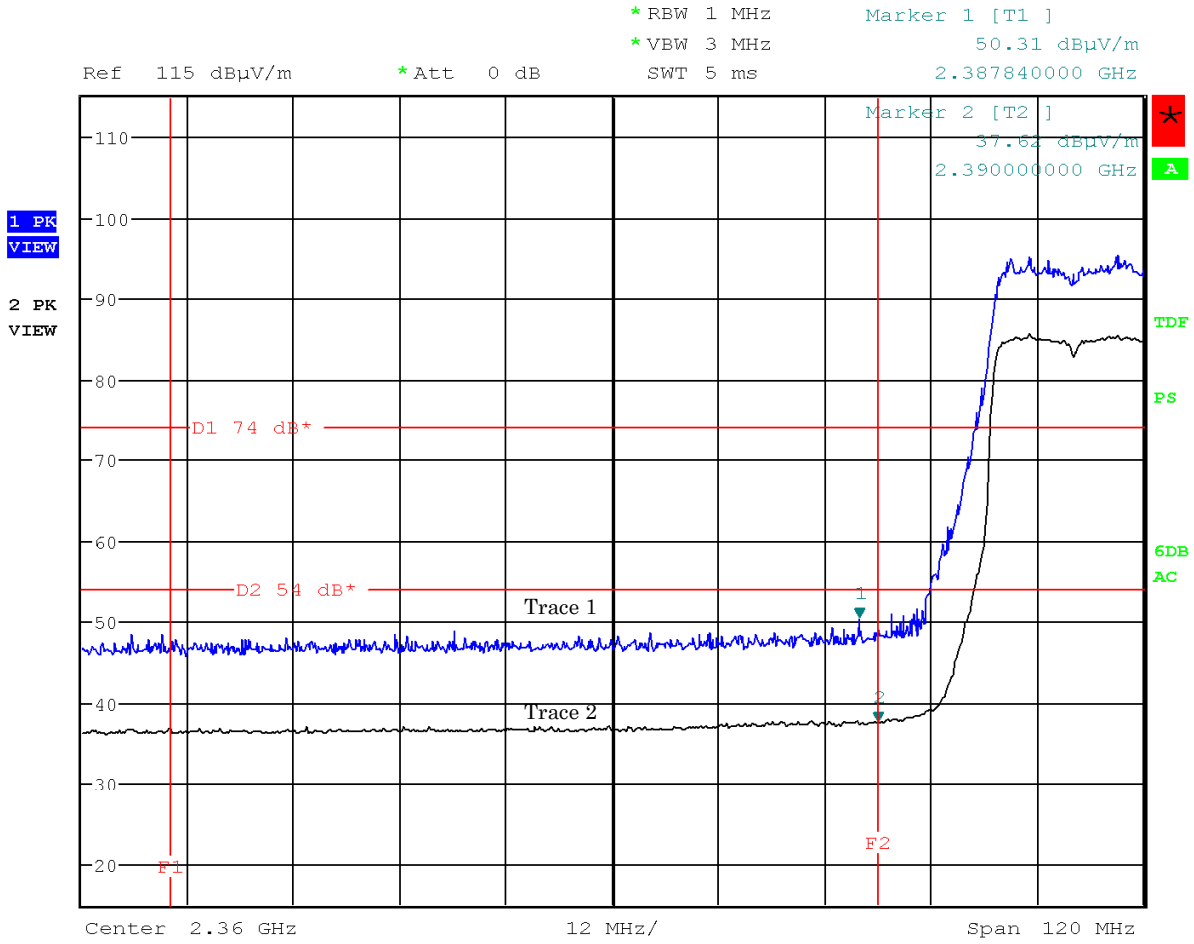
Note: The trace 1 is Peak . The trace 2 is Average.

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



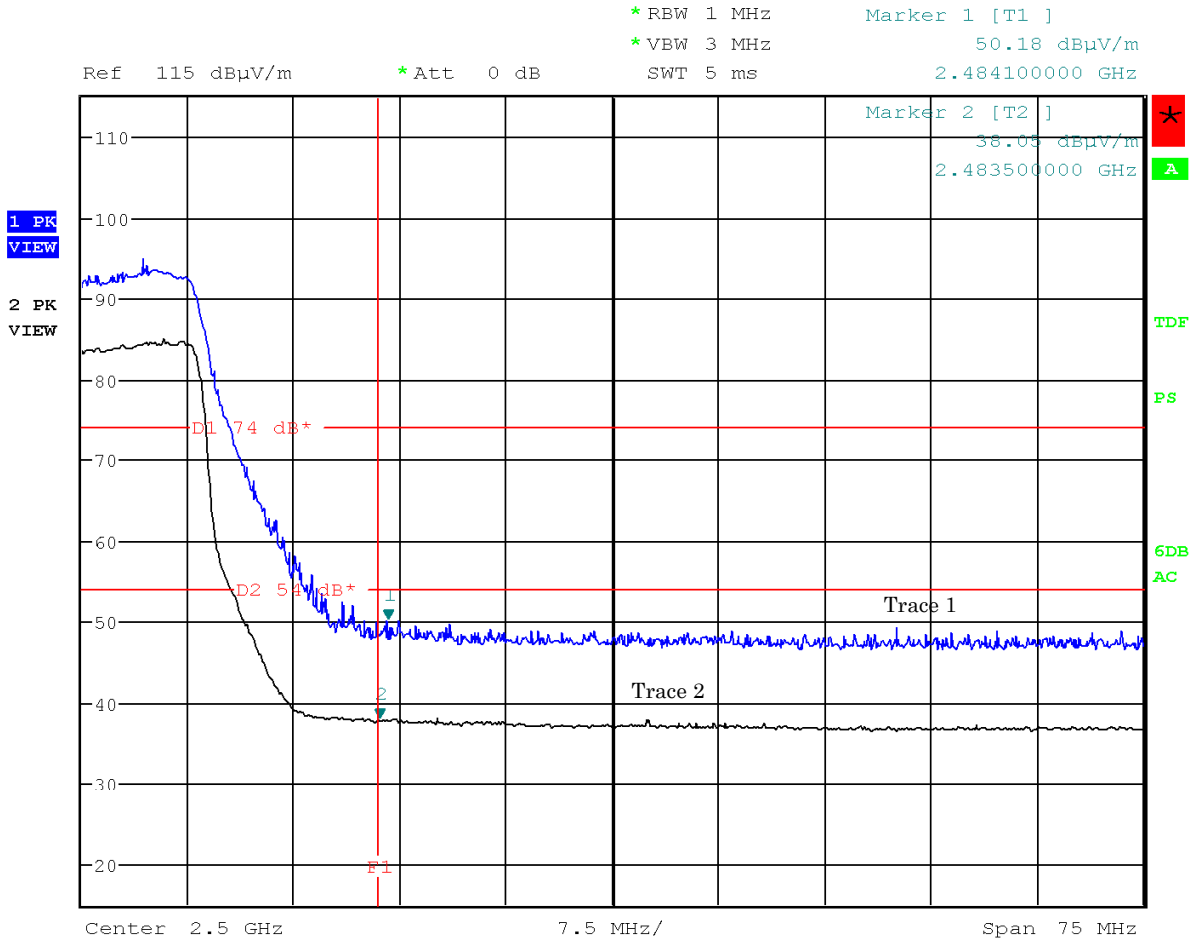
Note: The trace 1 is Peak . The trace 2 is Average.

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



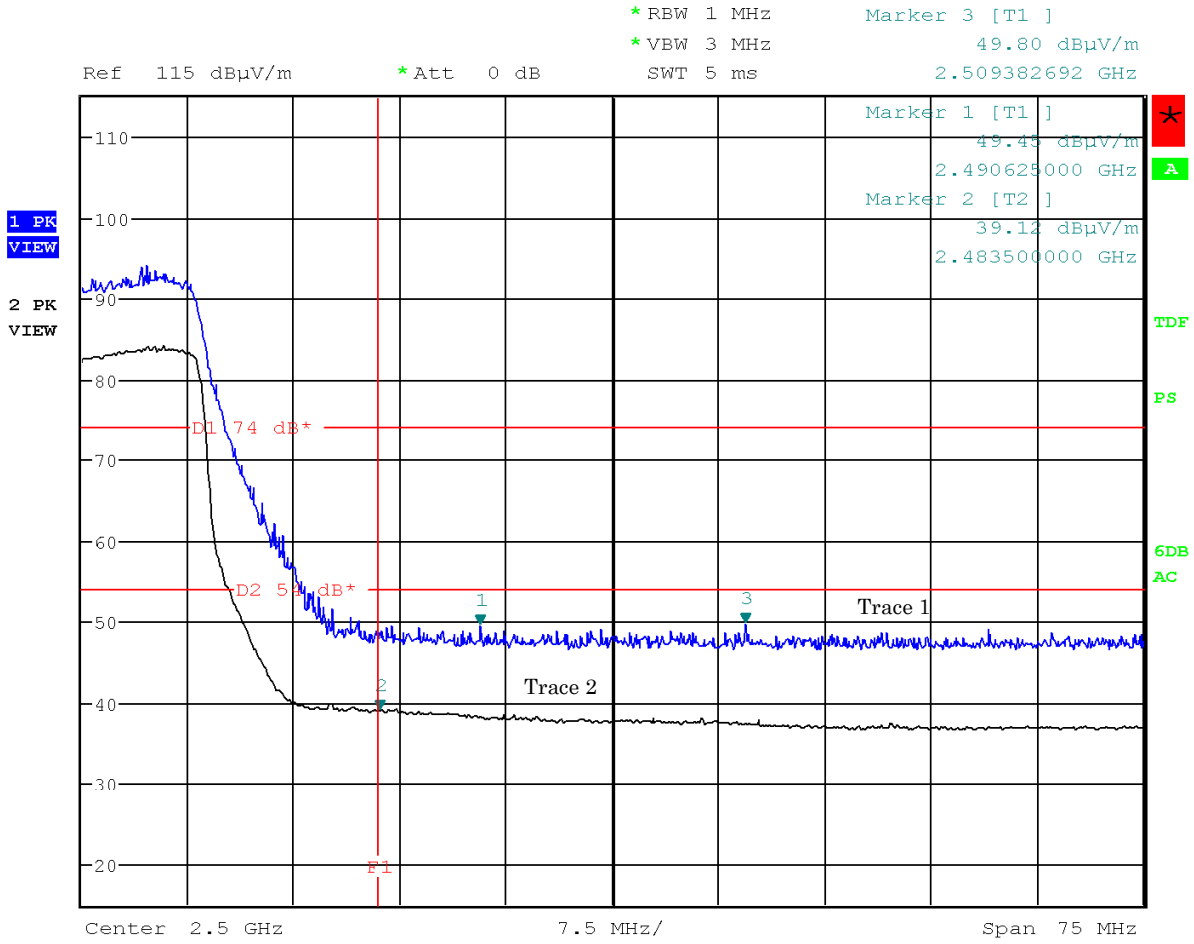
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Horizontal



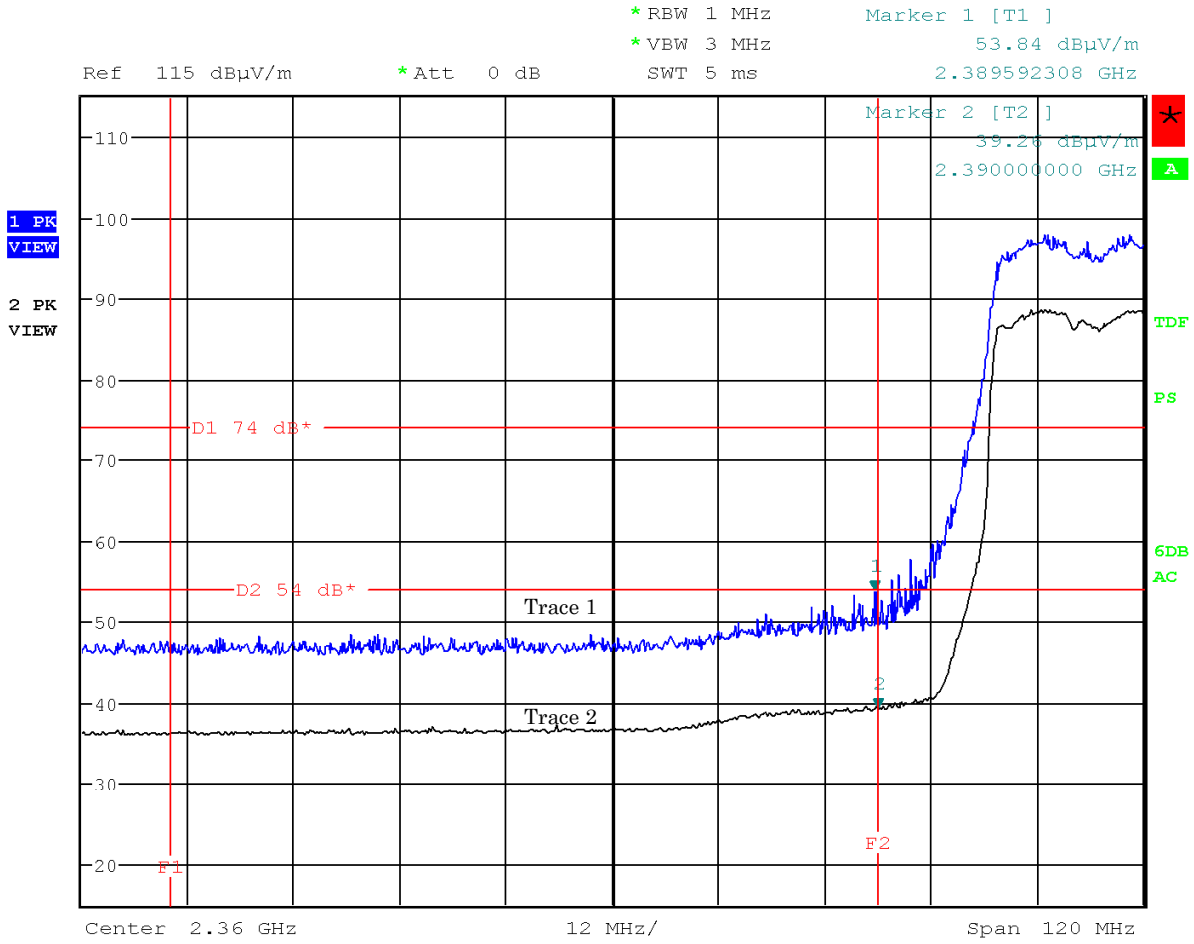
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 1TX: Main (11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Vertical



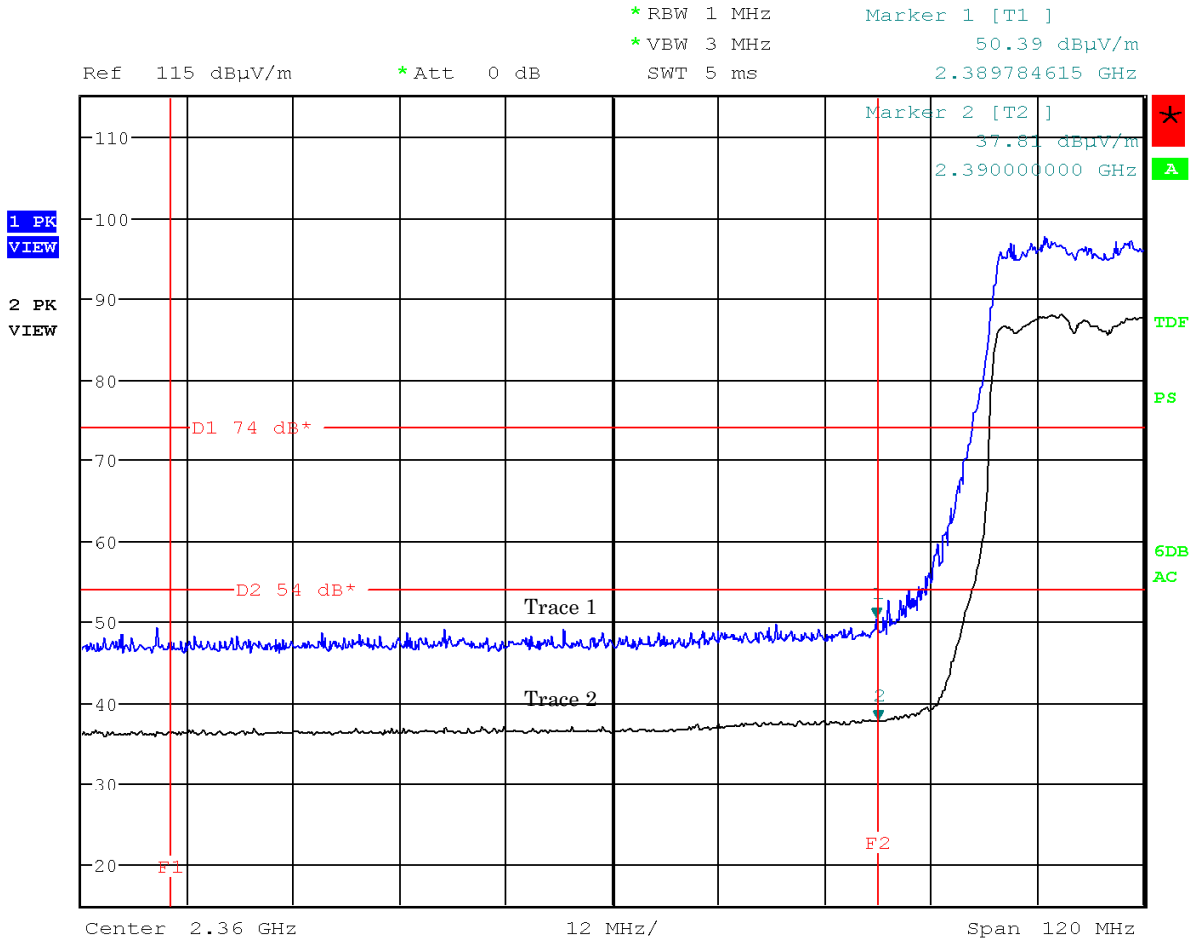
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11n))
Antenna Polarization : Horizontal



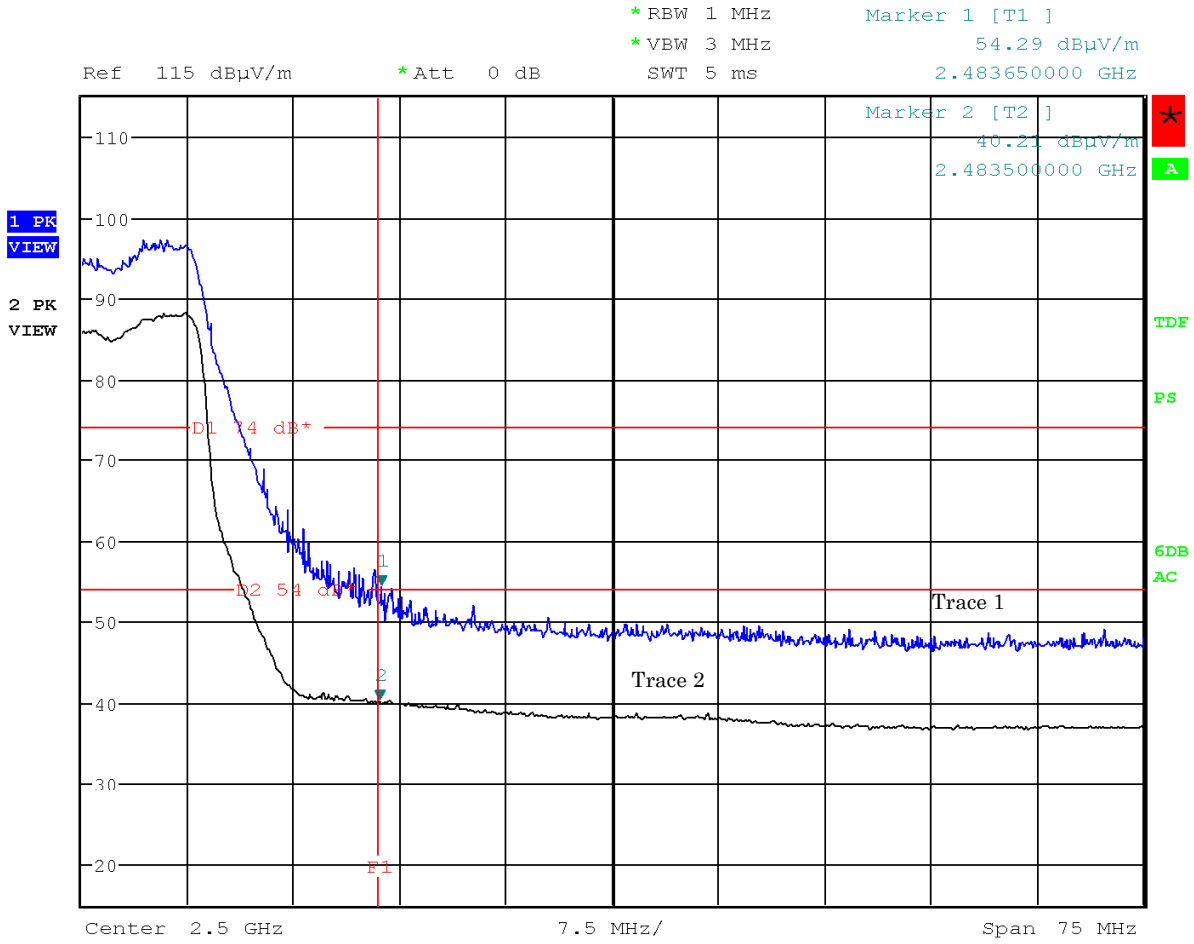
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (1ch: 2412 MHz, (IEEE 802.11n))
Antenna Polarization : Vertical



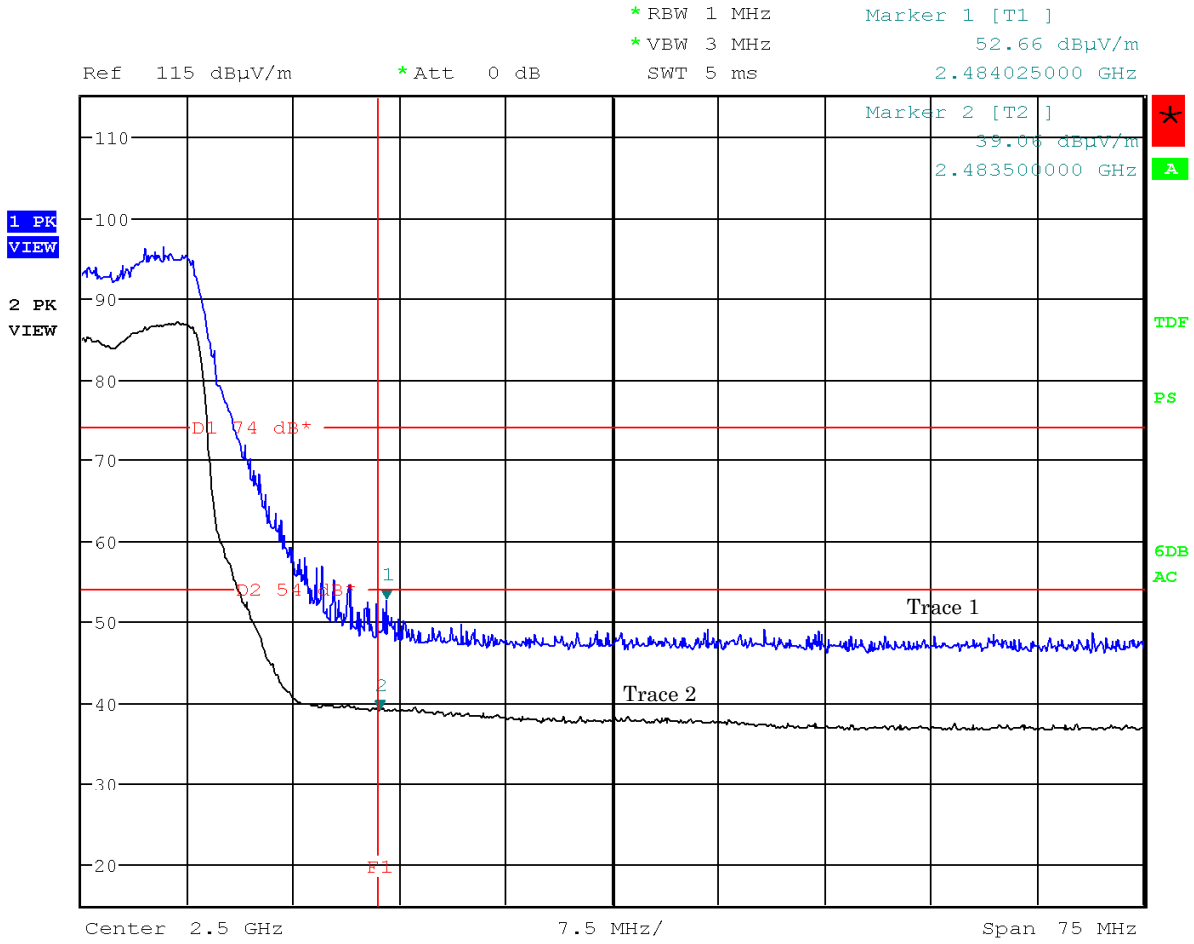
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Horizontal



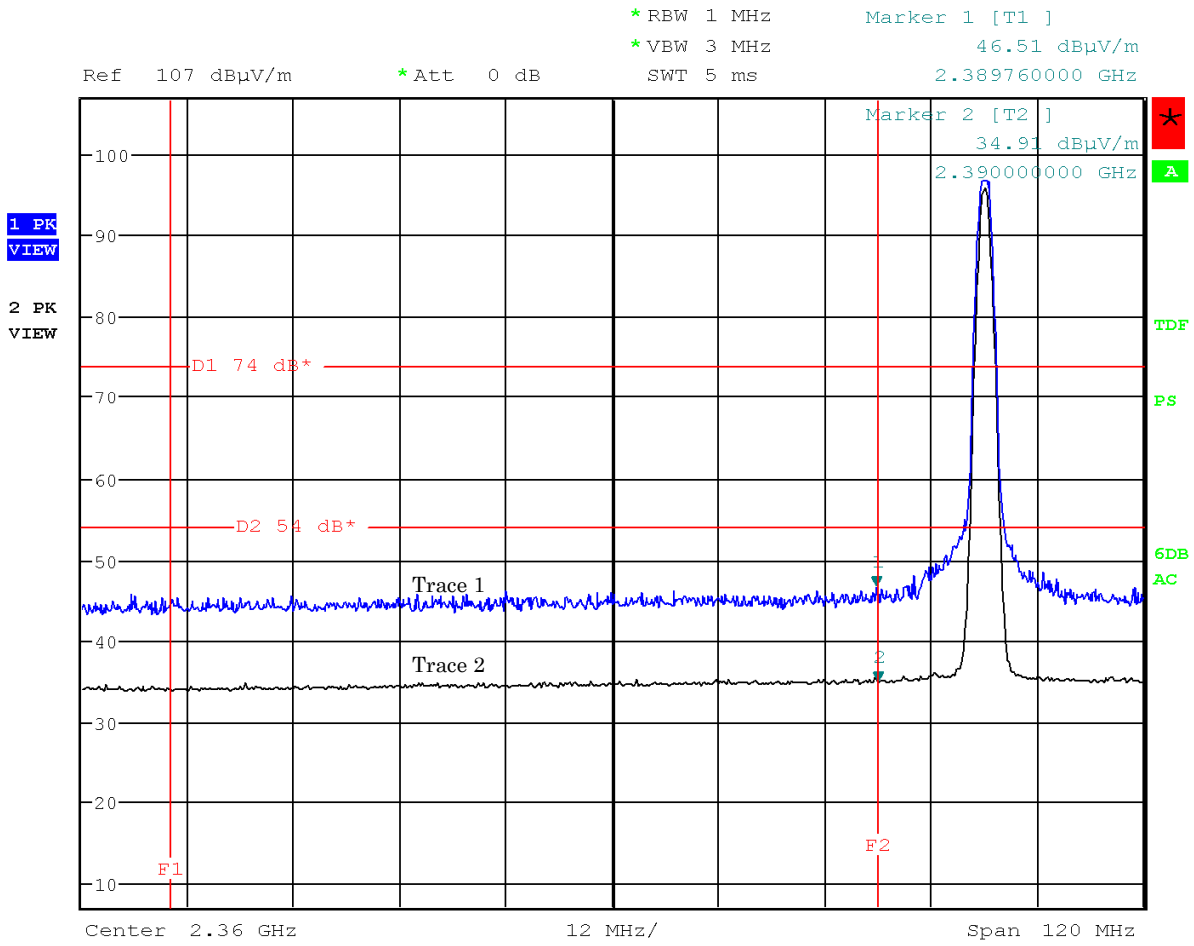
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : 2TX: Main+Sub (11ch: 2462 MHz, (IEEE 802.11n))
Antenna Polarization : Vertical



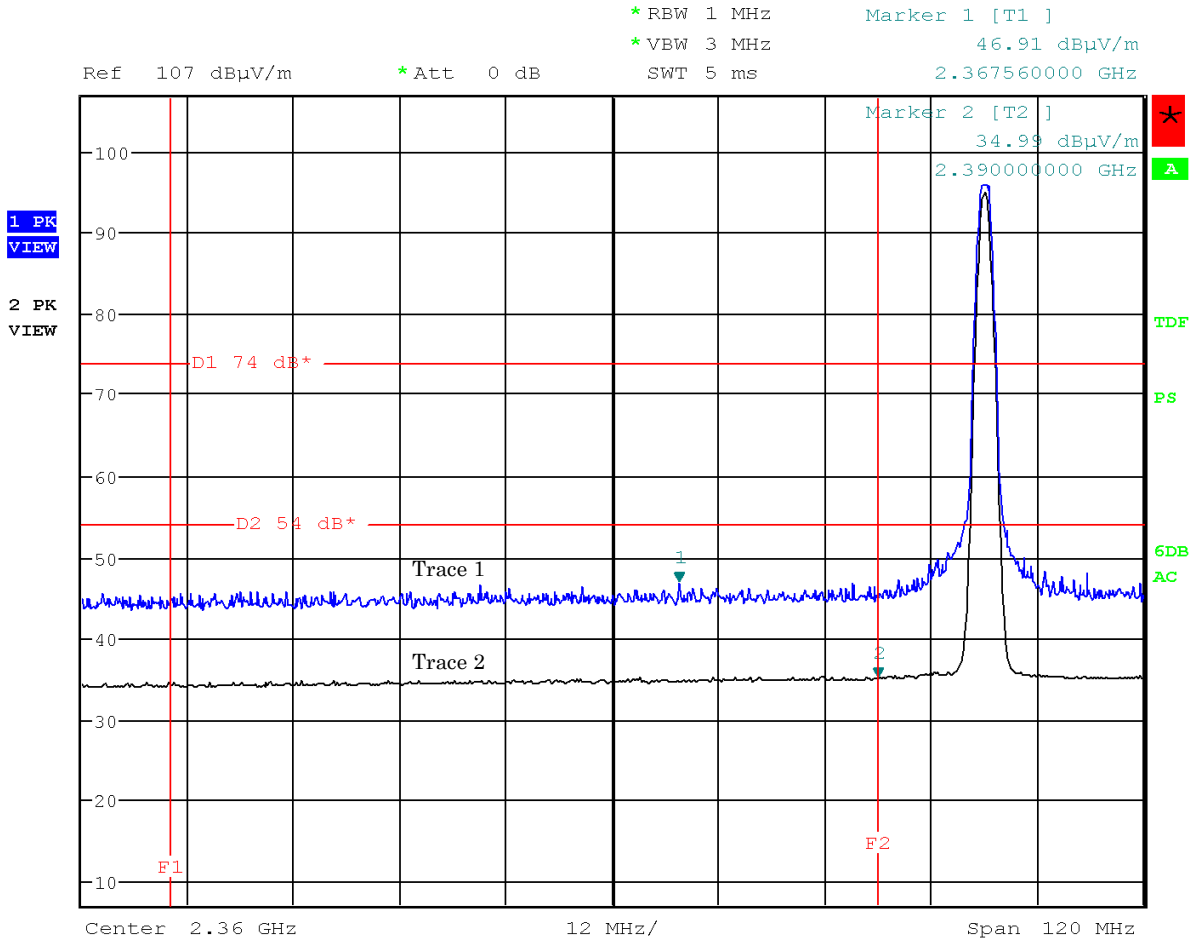
Note: The trace 1 is Peak . The trace 2 is Average.

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



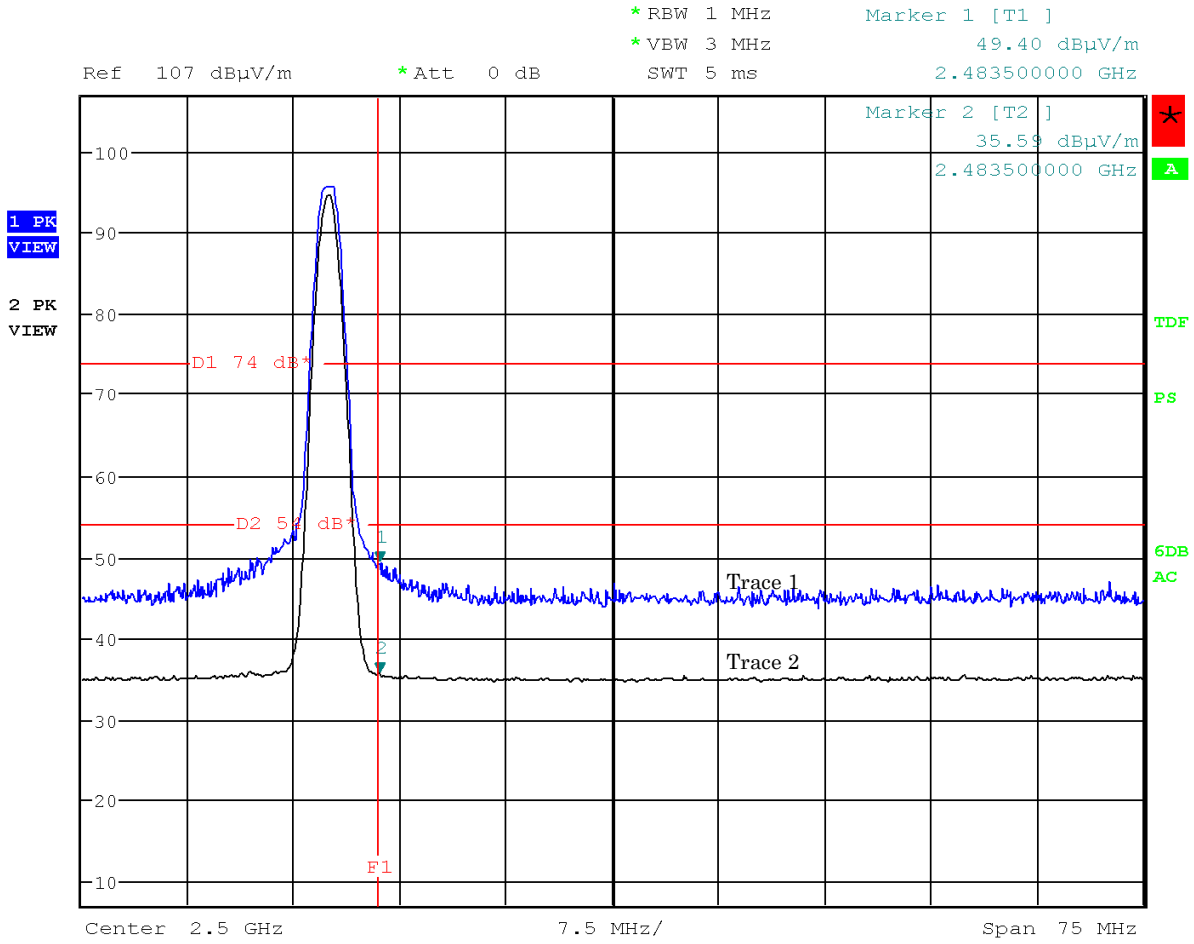
Note: The trace 1 is Peak . The trace 2 is Average.

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



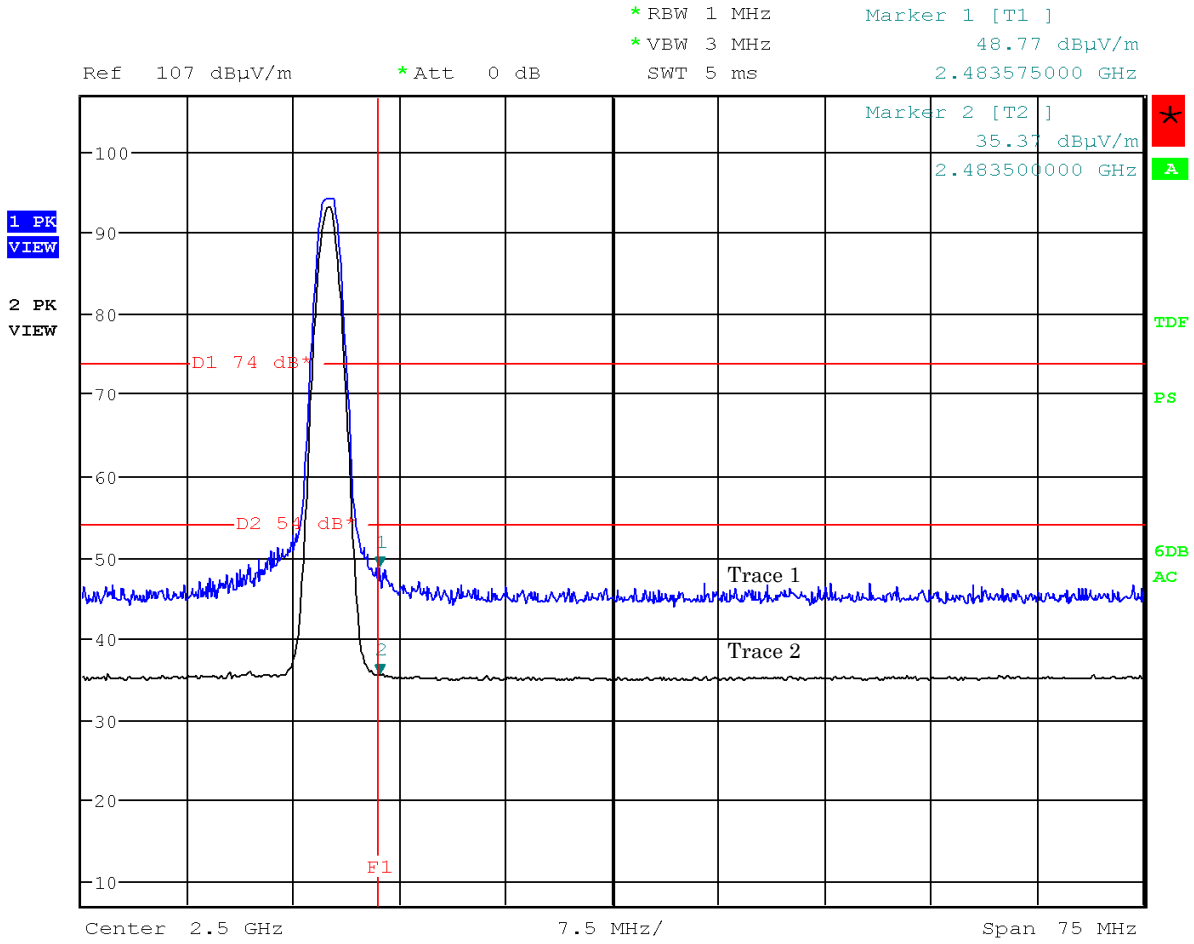
Note: The trace 1 is Peak . The trace 2 is Average.

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 : April 30, 2015
Temp.:22°C, Humi:48%

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

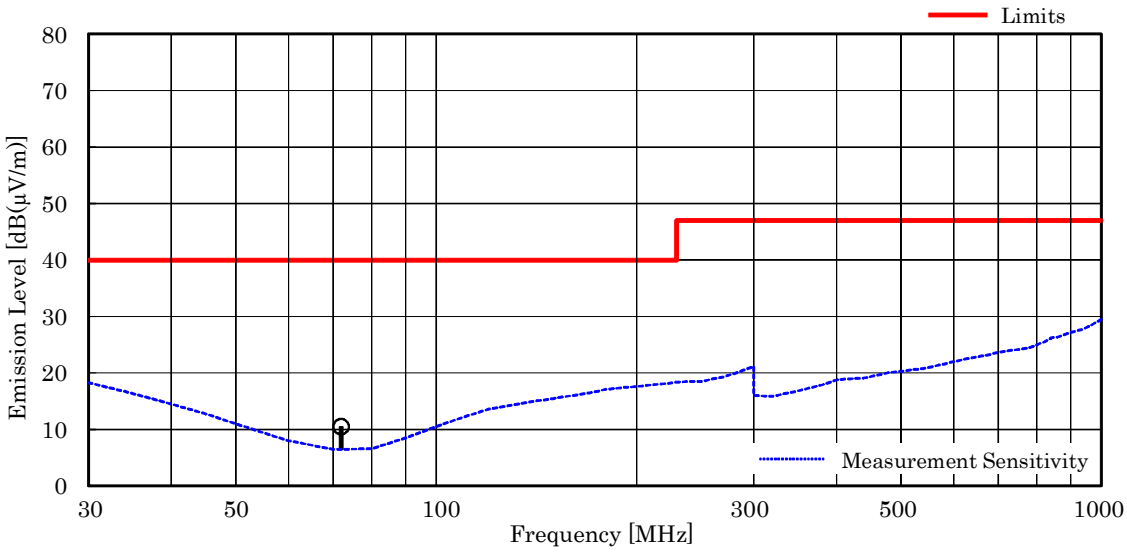
7.9.4.3 Other Spurious Emission (30MHz – 1000MHz)

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: April 30, 2015
Temp.: 22 °C, Humi: 48 %

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
71.94	6.4	-27.0	31.1	40.0	10.5	+29.5	-

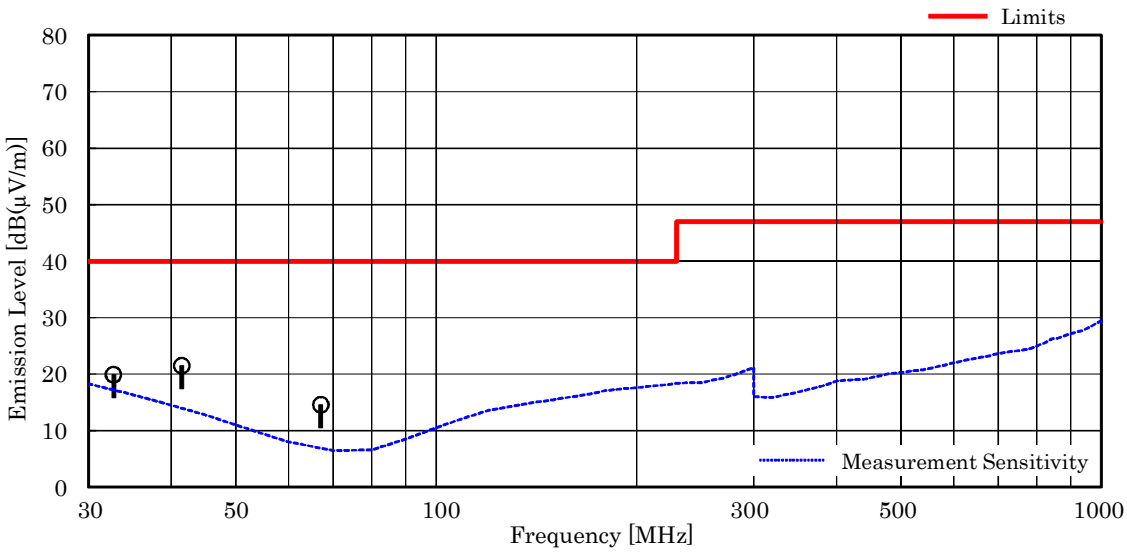


NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 71.94 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 6.4 + (-27.0) + 31.1 = 10.5 dB(μV/m)
   Antenna Height : 2.50 m, Turntable Angle : 261 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Test Date: April 30, 2015
Temp.: 22 °C, Humi: 48 %

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
32.73	17.7	-27.5	29.7	40.0	19.9	+20.1	-
41.46	14.4	-27.3	34.4	40.0	21.5	+18.5	-
67.12	6.8	-27.0	34.8	40.0	14.6	+25.4	-



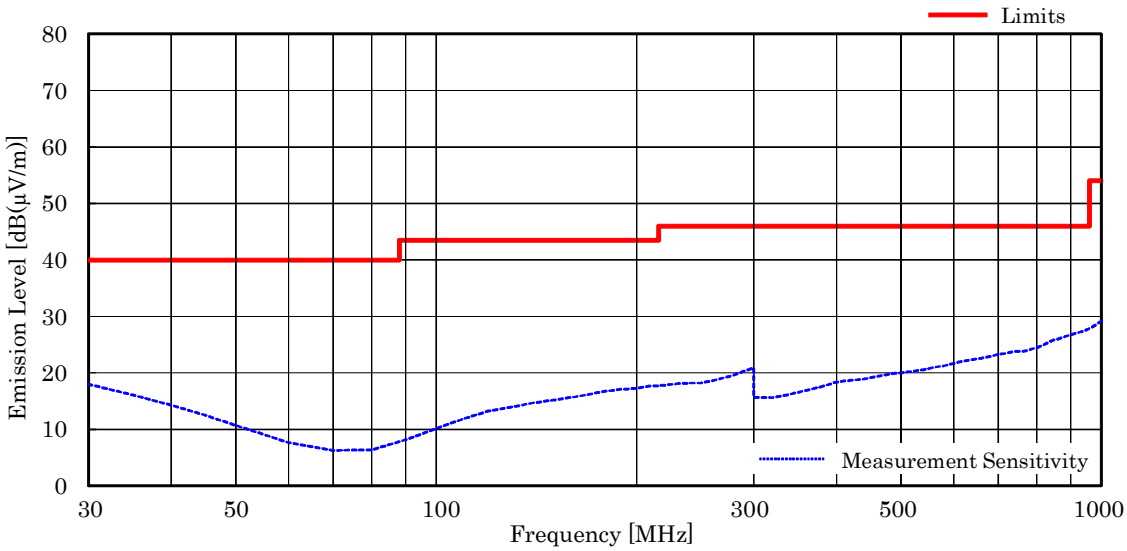
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 41.46 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 14.4 + (-27.3) + 34.4 = 21.5 dB(μV/m)
   Antenna Height : 1.00 m, Turntable Angle : 188 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Mode of EUT : Bluetooth Low Energy

Test Date: April 30, 2015
Temp.: 22 °C, Humi: 48 %

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
70.87	6.4	-27.0	< 27.0	40.0	< 6.4	> +33.6	-

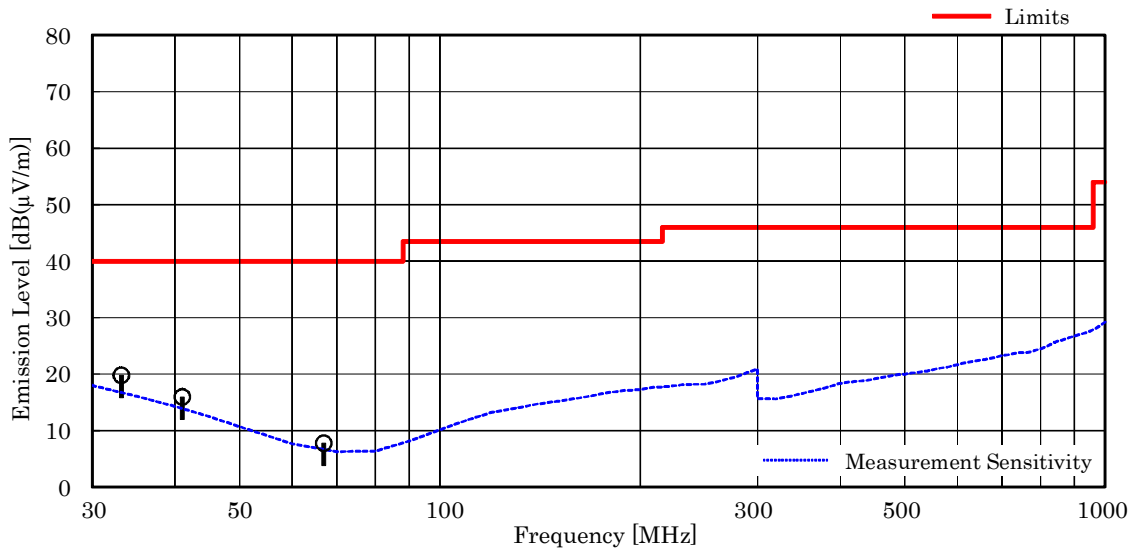


NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 70.87 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 6.4 + (-27.0) + <27.0 = <6.4 dB(μV/m)
   Antenna Height : 2.73 m, Turntable Angle : 242 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Test Date: April 30, 2015
Temp.: 22 °C, Humi: 48 %

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
33.19	17.5	-27.5	29.8	40.0	19.8	+20.2	-
41.00	14.6	-27.3	28.7	40.0	16.0	+24.0	-
66.91	6.9	-27.0	27.9	40.0	7.8	+32.2	-



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 33.19 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 17.5 + (-27.5) + 29.8 = 19.8 dB(μV/m)
   Antenna Height : 1.00 m, Turntable Angle : 195 °
7. 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

a) 1TX (Main)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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												
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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

b) 2TX (Main+Sub)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

7.9.4.4.1.2 IEEE802.11g

a) 1TX (Main)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

b) 2TX (Main+Sub)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

7.9.4.4.1.3 IEEE802.11n

a) 1TX (Main)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

b) 2TX (Main+Sub)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
19296.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX Middle Ch												
4874.0	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
7311.0	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12185.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19496.0	40.5	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.7	< 37.7	> +16.3	
Test condition : TX High Ch												
4924.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7386.0	29.8	-16.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.9	< 40.9	> +13.1	
12310.0	33.4	-26.6	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.8	< 34.8	> +19.2	
19696.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
22158.0	40.6	-43.3	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.3	< 37.3	> +16.7	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

7.9.4.4.1.4 Bluetooth Low Energy

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	27.3	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
12010.0	33.7	-25.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.9	< 35.9	> +18.1	
19216.0	40.5	-42.9	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
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	29.8	-16.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.0	< 41.0	> +13.0	
12200.0	33.5	-26.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.2	< 35.2	> +18.8	
19520.0	40.4	-42.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.6	< 37.6	> +16.4	
Test condition : TX High Ch												
4960.0	27.3	-16.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.3	< 39.3	> +14.7	
7440.0	29.8	-17.0	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.8	< 40.8	> +13.2	
12400.0	33.5	-26.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 44.7	< 34.7	> +19.3	
19840.0	40.4	-43.0	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.4	< 37.4	> +16.6	
22320.0	40.6	-43.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.2	< 37.2	> +16.8	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-16.8 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<41.0 dB(μV/m)

Minimum Margin: 54.0 - <41.0 = >13.0 (dB)

NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   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

7.9.4.4.2 Mode of RX (WLAN)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	21.5	-18.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 40.7	< 30.7	> +23.3	
4874.0	27.3	-16.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.9	< 38.9	> +15.1	
7311.0	29.8	-17.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.7	< 40.7	> +13.3	

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

	Antenna Factor	=	27.3 dB(1/m)
	Corr. Factor	=	-16.4 dB
+)	Meter Reading	=	<28.0 dB(μV)
	Result	=	<38.9 dB(μV/m)

Minimum Margin: 54.0 - <38.9 = >13.3 (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 / AVE : Average

7.9.4.4.3 Mode of RX (Bluetooth Low Energy)

Test Date: April 24, 2015
Temp.: 25 °C, Humi: 54 %

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	21.5	-18.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 40.7	< 30.7	> +23.3	
4880.0	27.3	-16.3	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
7320.0	29.8	-17.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 50.7	< 40.7	> +13.3	

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

	Antenna Factor	=	29.8 dB(1/m)
	Corr. Factor	=	-17.1 dB
+)	Meter Reading	=	<28.0 dB(µV)
	Result	=	<40.7 dB(µV/m)

Minimum Margin: 54.0 - <40.7 = >13.3 (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 / AVE : Average