JQA File No. : KL80160826
Issue Date : May 12, 2017

TEST REPORT

Applicant	:	OLYMPUS CORPORATION
Address	:	2951 Ishikawa-machi, Hachioji-shi, Tokyo 192-8507, Japan
Products	:	Smart Glasses
Model No.	:	EI-10
Serial No.	:	PP2-003, PP1-004
FCC ID	:	YSKK05
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15
Test Results	:	Passed
Date of Test	:	January 29 ~ March 13, 2017

ilac-MRA VLAC Lab Accreditation VLAC-001-2

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

- The test results in this test report was made by using the measuring instruments which are traceable to national standards of measurement in accordance with ISO/IEC 17025.
- 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

R - 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	:	OLYMPUS CORPORATION 2951 Ishikawa-machi, Hachioji-shi, Tokyo 192-8507, Japan
2.	Products	:	Smart Glasses
3.	Model No.	:	EI-10
4.	Serial No.	:	PP2-003, PP1-004
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	January, 2017
7.	Power Rating	:	3.7VDC
8.	Grounding	:	None
9.	Operating Frequency	:	2412 MHz (01CH) – 2462 MHz (11CH) : 802.11b/g/n HT20 2422 MHz (03CH) – 2452 MHz (09CH) : 802.11n HT40
10.	Max. RF Output Power	:	8.16 dBm (Measure Value of 802.11b) 14.52 dBm (Measure Value of 802.11g) 14.47 dBm (Measure Value of 802.11n HT20) 13.94 dBm (Measure Value of 802.11n HT40)
11.	Antenna Type	:	1/2λ Type Antenna (Integral)
12.	Antenna Gain	:	-3.0 dBi
13.	Category	:	DTS
14.	EUT Authorization	:	Certification
15.	Received Date of EUT	:	January 25, 2017

16. 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 ($1 \leq n \leq 11$)

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.

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

Tested by:

Yasuhisa Sakai
Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch

3 Test Procedure

Test Requirements : §15.247, §15.207 and §15.209

Test Procedure : ANSI C63.10–2013
Testing unlicensed wireless devices.

KDB 558074 D01
DTS Meas Guidance v04: April 5, 2017

KDB 414788 D01
Radiated Test Site v01: April 18, 2017

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, 2018)
VCCI Registration No.	:	A-0002 (Expiry date : March 30, 2018)
BSMI Registration No.	:	SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006 (Expiry date : September 14, 2019)
IC Registration No.	:	2079E-3, 2079E-4 (Expiry date : June 26, 2020)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI. (Expiry date : February 22, 2019)

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 Glasses	OLYMPUS	EI-10	PP2-003 *1 PP1-004 *2	YSKK05
B	AC Adapter	OLYMPUS	F-5AC-1	--	N/A
C	Headset	OLYMPUS	EI-HS1	--	N/A
D	Rechargeable Battery	OLYMPUS	WHB-001	--	N/A
E	Power Feeding Adapter	OLYMPUS	EI-PC1	--	N/A

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

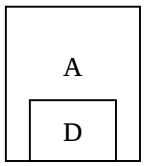
The auxiliary equipment used for testing :
None

Type of Cable:

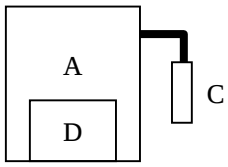
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Cord	--	--	NO	YES	1.2

6.2 Test Arrangement (Drawings)

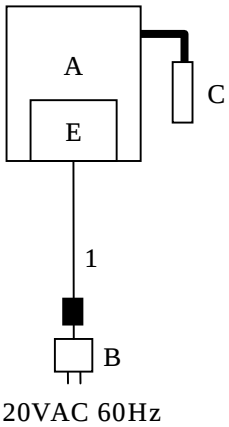
a) Single Unit



b) Headset used



c) AC Adapter used



■ : Ferrite Core

6.3 Operating Condition

Power Supply Voltage : 3.7VDC (for Battery)
120VAC 60Hz (for AC Adapter)

Operation Mode
The EUT is set with the test mode, the specification of the test mode is as followings.

Transmitting frequency : 2412 MHz (01CH) – 2462 MHz (11CH) 802.11b/g/n HT20
2422 MHz (03CH) – 2452 MHz (09CH) 802.11n HT40

Receiver frequency : 2412 MHz (01CH) – 2462 MHz (11CH)

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

Other Clock Frequency
1.5 GHz (CPU)

The tests were performed in the following worst condition.

Mode	Condition
802.11b	1 Mbps
802.11g	54 Mbps
802.11n HT20	MCS6 (58.5 Mbps)
802.11n HT40	MCS5 (108 Mbps)

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

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

The tests were performed using the following test program supplied by applicant;
- Software Name : Real Time Tuning Tool
- Software Version : Version 2.0.0.55
- Storage Location : Controller PC

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 15.205 Section 15.209	Section 7.9	Passed	-
RF Exposure	Section 15.247(i)	Section 7.10	Passed	

7.1 Channel Separation

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

Remarks : _____

7.2 Minimum Hopping Channel

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

Remarks : _____

7.3 Occupied Bandwidth

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

7.3.1 Test Results

For the standard, **R** - Passed £ - Failed £ - Not judged

99% Bandwidth				
802.11b	14.596 MHz	at	2462.0	MHz
802.11g	16.368 MHz	at	2412.0	MHz
802.11n HT20	17.535 MHz	at	2412.0	MHz
802.11n HT40	35.662 MHz	at	2437.0	MHz
6dB Bandwidth				
802.11b	10.093 MHz	at	2462.0	MHz
802.11g	15.980 MHz	at	2412.0	MHz
802.11n HT20	16.308 MHz	at	2412.0	MHz
802.11n HT40	35.078 MHz	at	2452.0	MHz

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : _____

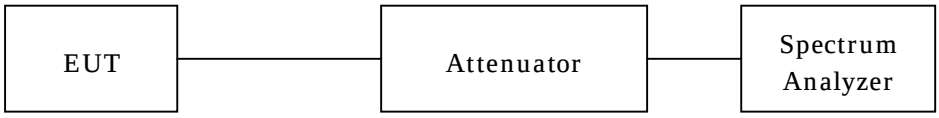
7.3.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2017/08/02
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2017/08/02

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

7.3.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

	WLAN	Bluetooth LE
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Span	30 MHz (for 20 MHz BW) 60 MHz (for 40 MHz BW)	3 MHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

7.3.4 Test Data

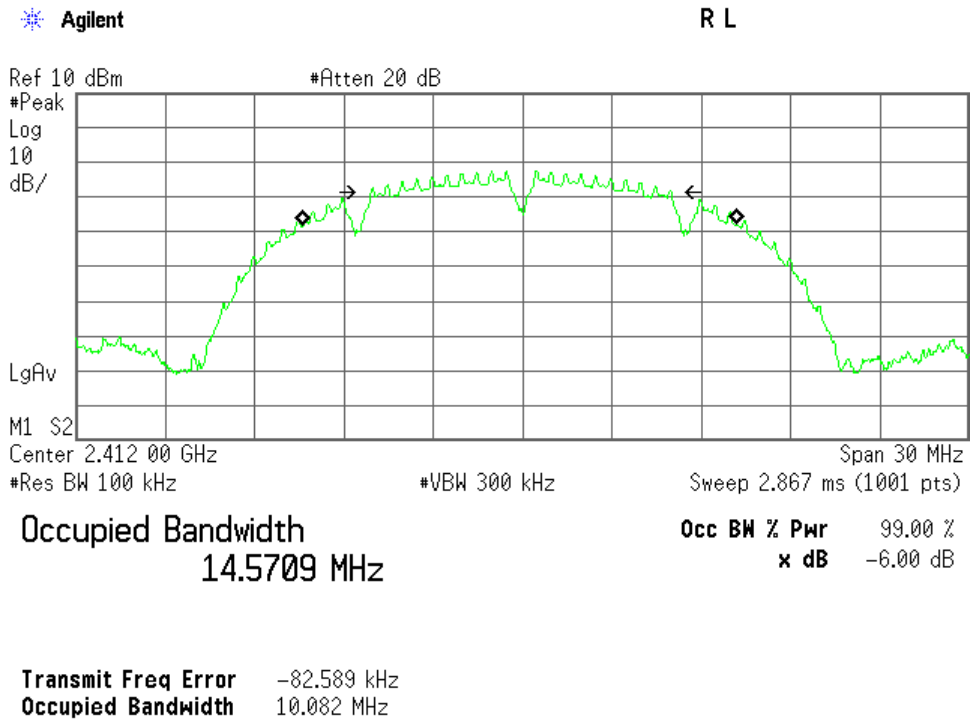
The resolution bandwidth was set to 100 kHz, -6dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

1) 802.11b

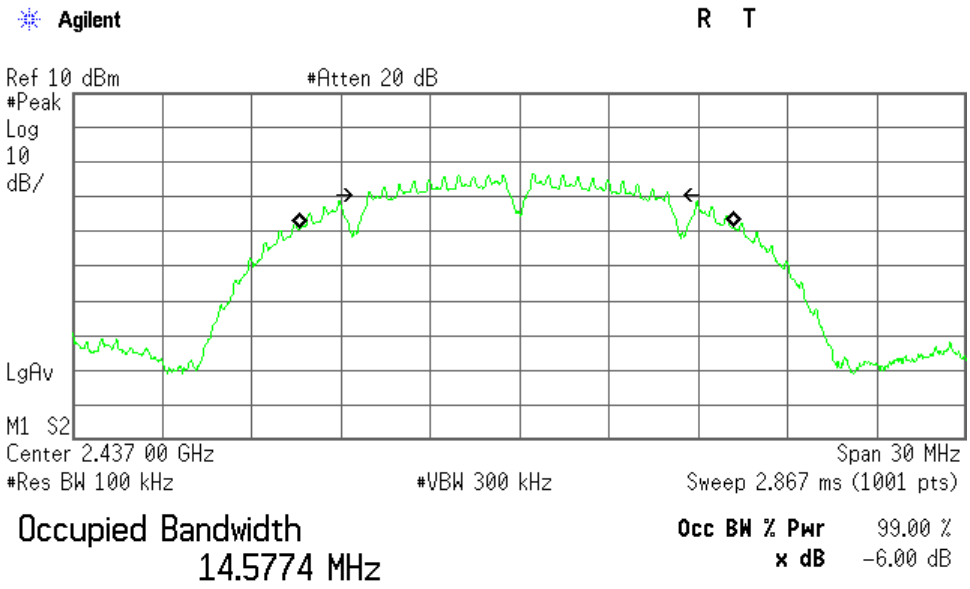
Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	14.571	10.082	500
06	2437.0	14.577	10.082	500
11	2462.0	14.596	10.093	500

Low Channel

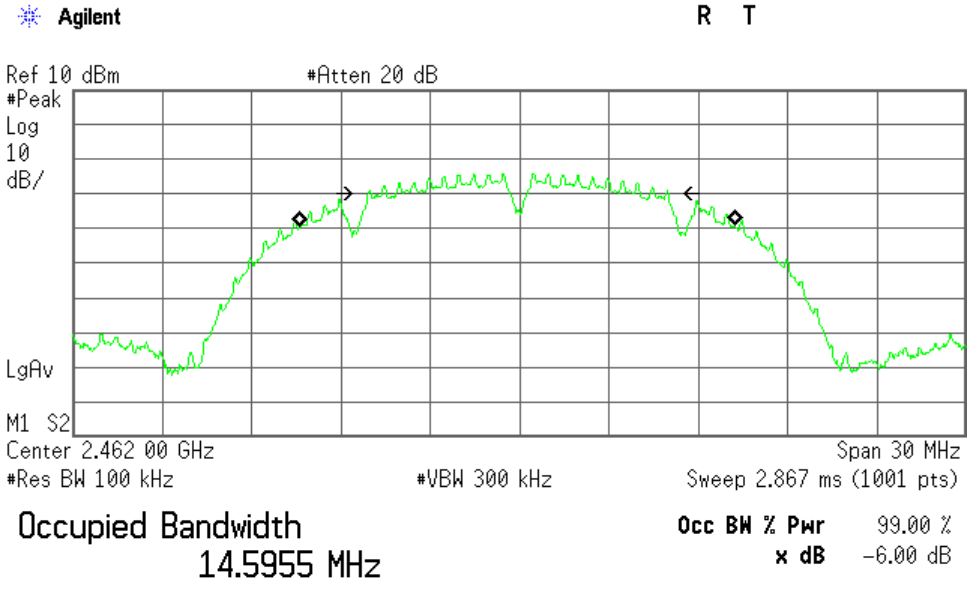


Middle Channel



Transmit Freq Error −87.061 kHz
Occupied Bandwidth 10.082 MHz

High Channel



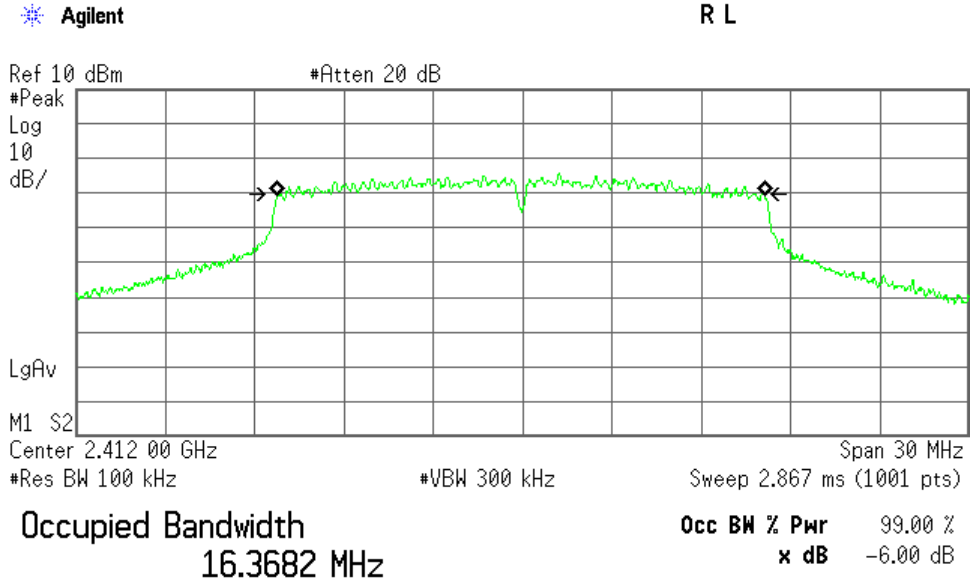
Transmit Freq Error −73.794 kHz
Occupied Bandwidth 10.093 MHz

2) 802.11g

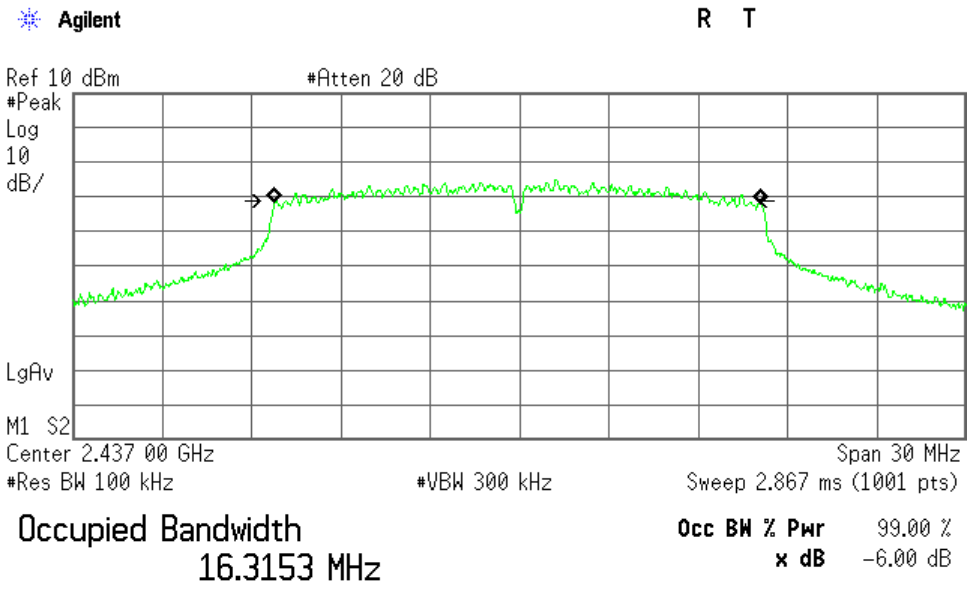
Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	16.368	15.980	500
06	2437.0	16.315	15.715	500
11	2462.0	16.324	15.686	500

Low Channel

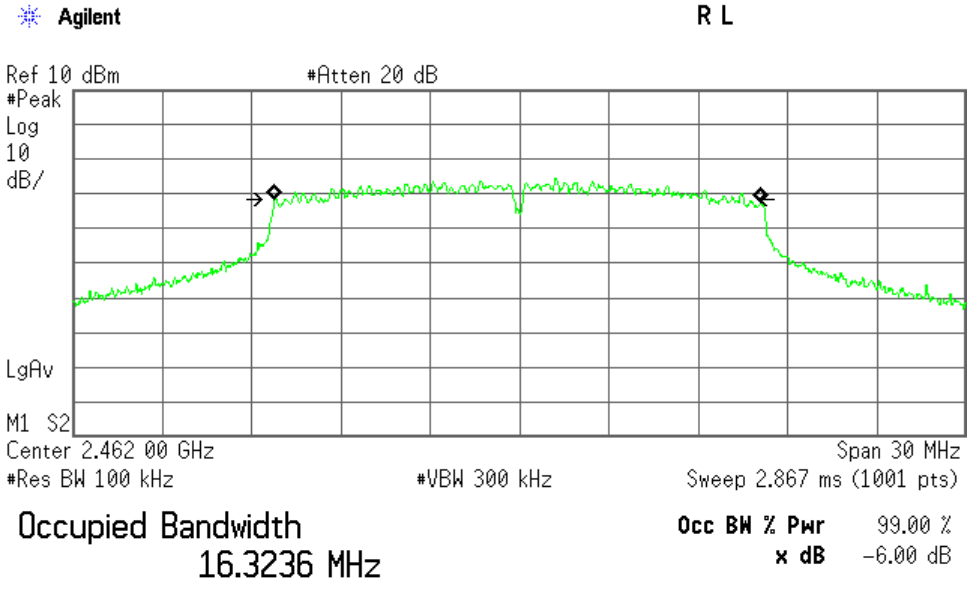


Middle Channel



Transmit Freq Error -52.237 kHz
Occupied Bandwidth 15.715 MHz

High Channel



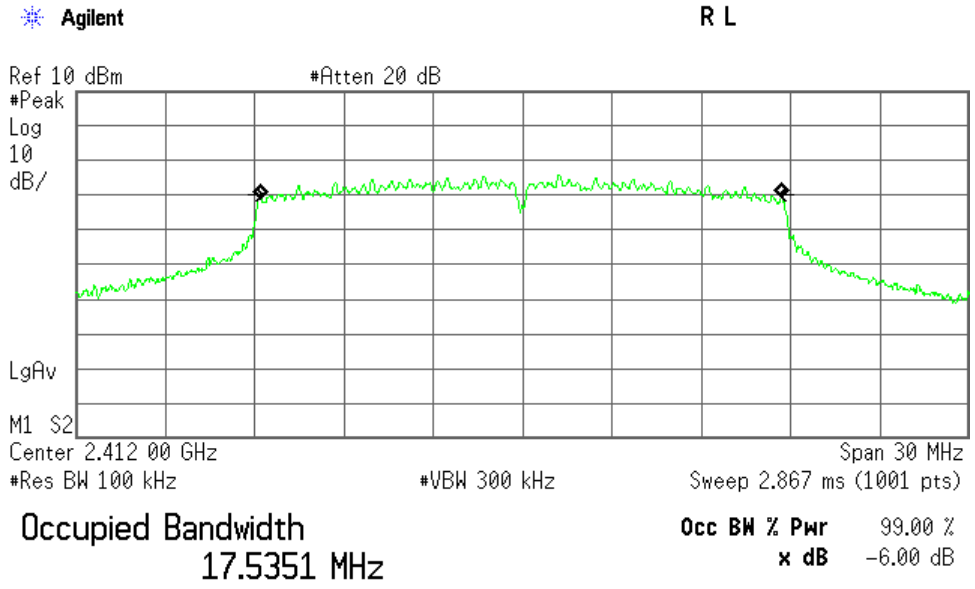
Transmit Freq Error -46.821 kHz
Occupied Bandwidth 15.686 MHz

3) 802.11n HT20

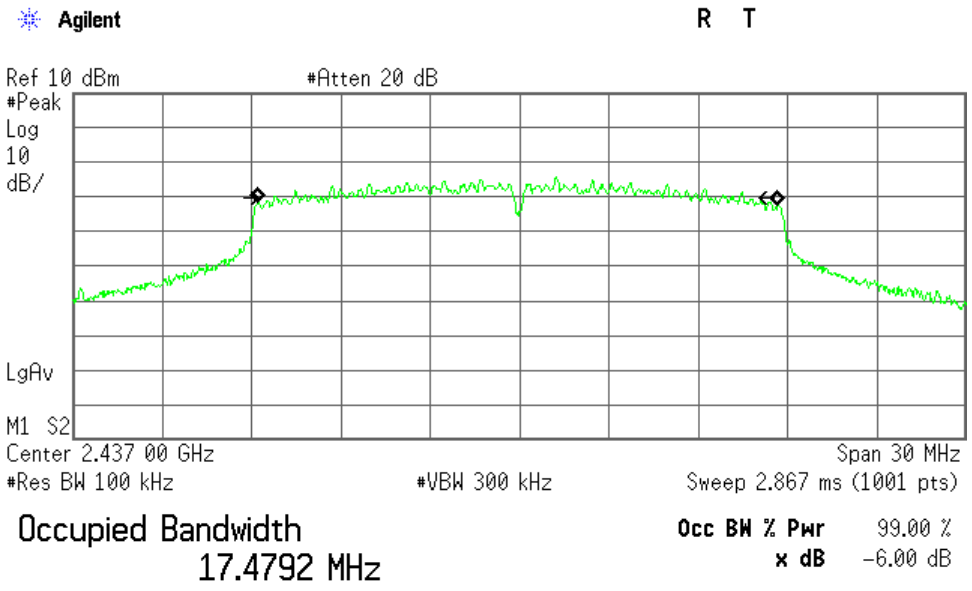
Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
01	2412.0	17.535	16.308	500
06	2437.0	17.479	15.758	500
11	2462.0	17.490	15.418	500

Low Channel

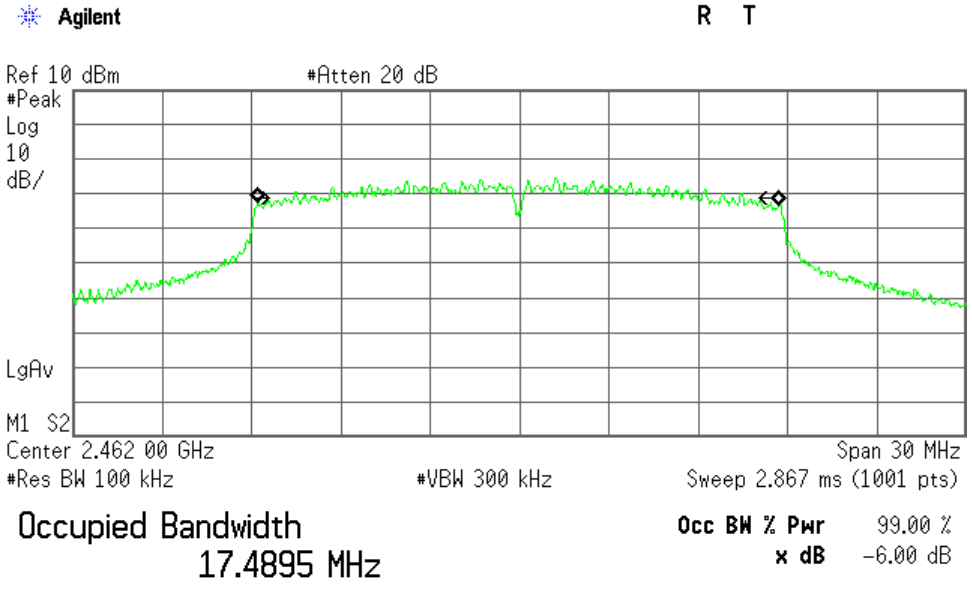


Middle Channel



Transmit Freq Error -56.060 kHz
Occupied Bandwidth 15.758 MHz

High Channel



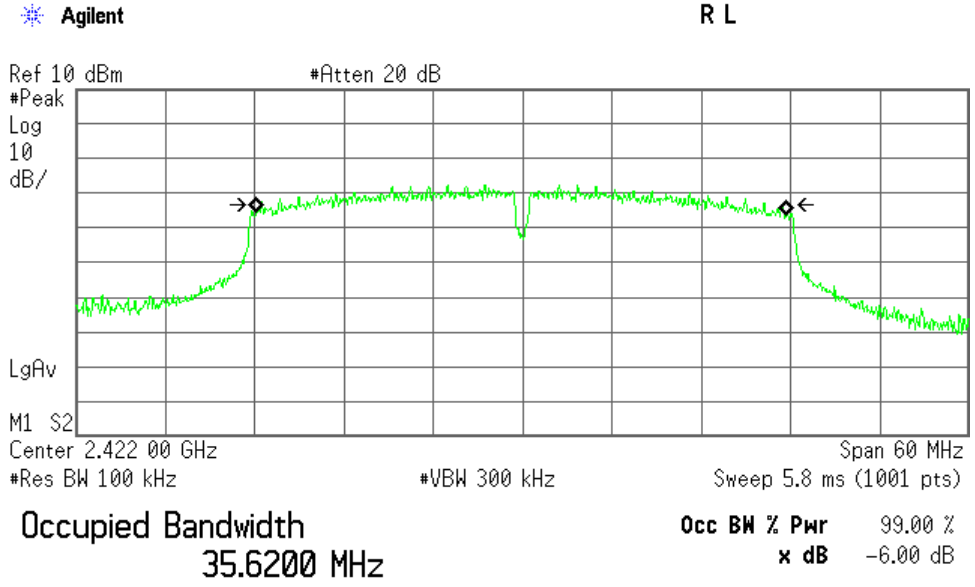
Transmit Freq Error -40.070 kHz
Occupied Bandwidth 15.418 MHz

4) 802.11n HT40

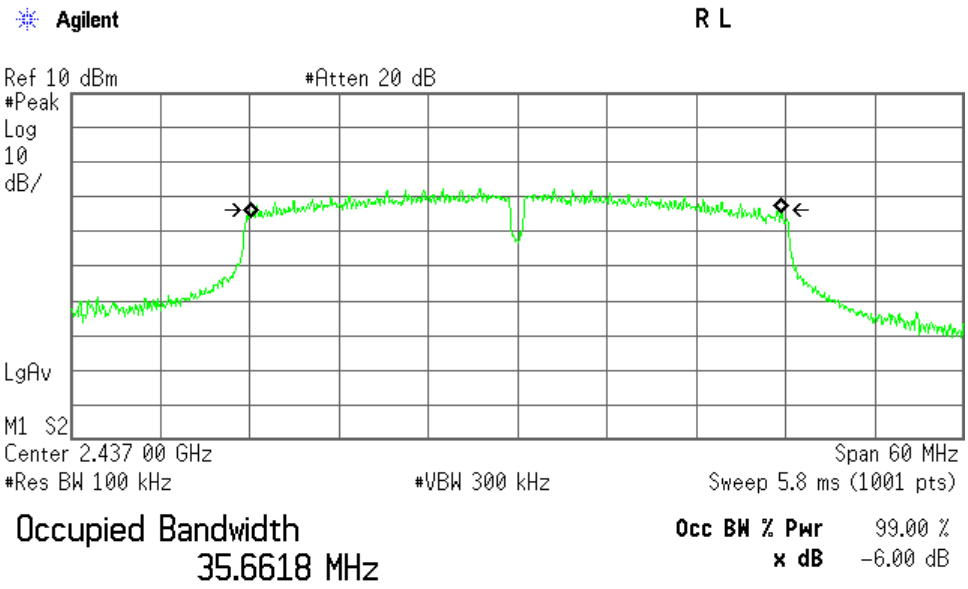
Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Channel	Frequency (MHz)	99% Bandwidth (MHz)	-6dBc Bandwidth (MHz)	Minimum -6dBc Bandwidth Limit (kHz)
03	2422.0	35.620	35.068	500
06	2437.0	35.662	35.053	500
09	2452.0	35.636	35.078	500

Low Channel

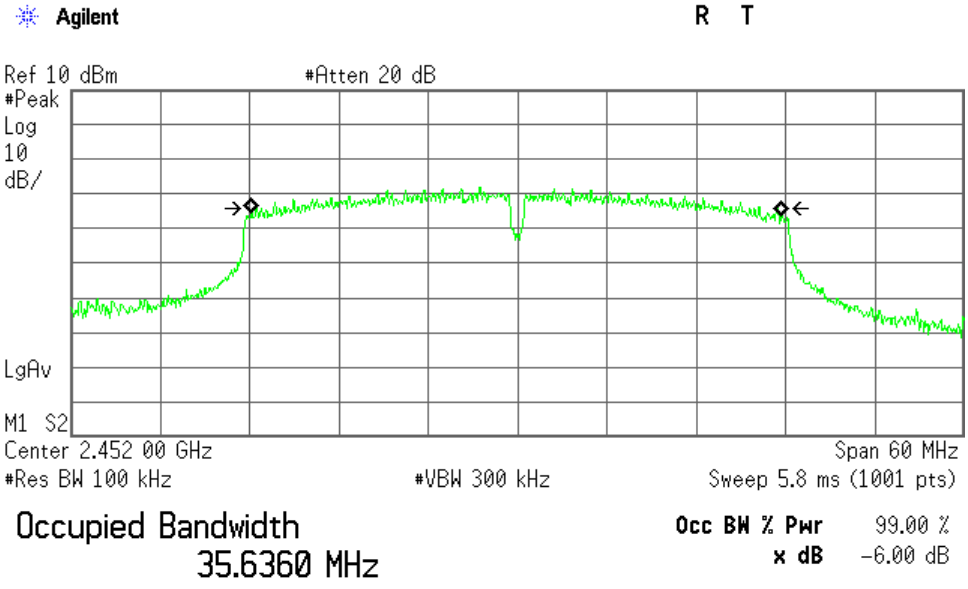


Middle Channel



Transmit Freq Error −104.297 kHz
Occupied Bandwidth 35.053 MHz

High Channel



Transmit Freq Error −88.143 kHz
Occupied Bandwidth 35.078 MHz

7.4 Dwell Time

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

Remarks : _____

7.5 Peak Output Power (Conduction)

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

7.5.1 Test Results

For the standard, R - Passed £ - Failed £ - Not judged

Peak Output Power

802.11b	8.16	dBm	at	2412.0	MHz
802.11g	14.52	dBm	at	2412.0	MHz
802.11n HT20	14.47	dBm	at	2412.0	MHz
802.11n HT40	13.94	dBm	at	2422.0	MHz

Uncertainty of Measurement Results ± 0.9 dB(2σ)

Remarks : _____

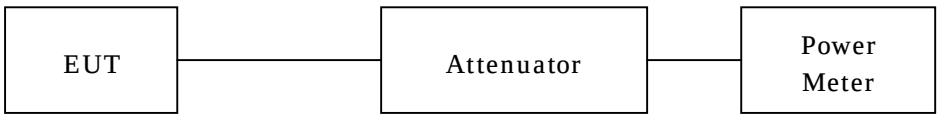
7.5.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Power Meter	ML2495A	1423001 (B-16)	Anritsu	2017/07/10
Power Sensor	MA2411B	1339136 (B-18)	Anritsu	2017/07/10
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2017/08/02

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

7.5.3 Test Method and Test Setup (Diagrammatic illustration)

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



7.5.4 Test Data

1) 802.11b

Test Date: January 29, 2017
Temp.: 23 °C, Humi: 43 %

Data Rate : 1Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	-1.88	8.16	6.55	30.00	+21.84
06	2437	10.04	-2.81	7.23	5.28	30.00	+22.77
11	2462	10.04	-3.49	6.55	4.52	30.00	+23.45

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

	Correction Factor	=	10.04 dB
+)	Meter Reading	=	-1.88 dBm
	Result	=	8.16 dBm = 6.55 mW

Minimum Margin: 30.00 - 8.16 = 21.84 (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]	Remarks
1Mbps	-2.81	*
2Mbps	-2.82	
5.5Mbps	-2.84	
11Mbps	-2.84	

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

2) 802.11g

Test Date: January 29, 2017
Temp.: 23 °C, Humi: 43 %

Data Rate : 54Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	4.48	14.52	28.31	30.00	+15.48
06	2437	10.04	3.43	13.47	22.23	30.00	+16.53
11	2462	10.04	2.82	12.86	19.32	30.00	+17.14

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

	Correction Factor	=	10.04 dB
+)	Meter Reading	=	4.48 dBm
	Result	=	14.52 dBm = 28.31 mW

Minimum Margin: 30.00 - 14.52 = 15.48 (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]	Remarks
6Mbps	1.60	
9Mbps	1.78	
12Mbps	1.79	
18Mbps	1.69	
24Mbps	3.27	
36Mbps	3.11	
48Mbps	3.02	
54Mbps	3.43	*

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

3) 802.11n HT20

Test Date: January 29, 2017
Temp.: 23 °C, Humi: 43 %

Data Rate : MCS6

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	4.43	14.47	27.99	30.00	+15.53
06	2437	10.04	3.59	13.63	23.07	30.00	+16.37
11	2462	10.04	2.71	12.75	18.84	30.00	+17.25

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

	Correction Factor	=	10.04 dB
+)	Meter Reading	=	4.43 dBm
	Result	=	14.47 dBm = 27.99 mW

Minimum Margin: 30.00 - 14.47 = 15.53 (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 06 **[MHz] 2437**

Rate	Meter Reading [dBm]	Remarks
MCS0	3.15	
MCS1	3.01	
MCS2	3.11	
MCS3	3.10	
MCS4	3.29	
MCS5	3.21	
MCS6	3.59	*
MCS7	3.25	

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

4) 802.11n HT40

Test Date: January 29, 2017
Temp.: 23 °C, Humi: 43 %

Data Rate : MCS5

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Output Power		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
03	2422	10.04	3.90	13.94	24.77	30.00	+16.06
06	2437	10.04	3.49	13.53	22.54	30.00	+16.47
09	2452	10.04	2.92	12.96	19.77	30.00	+17.04

Calculated result at 2422.000 MHz, as the worst point shown on underline:

	Correction Factor	=	10.04 dB
+)	Meter Reading	=	3.90 dBm
	Result	=	13.94 dBm = 24.77 mW

Minimum Margin: 30.00 - 13.94 = 16.06 (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]	Remarks
MCS0	3.05	
MCS1	3.28	
MCS2	3.11	
MCS3	3.23	
MCS4	3.32	
MCS5	3.49	*
MCS6	3.22	
MCS7	2.68	

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

7.6 Peak Power Density (Conduction)

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

7.6.1 Test Results

For the standard, **R** - Passed **£** - Failed **£** - Not judged

Peak Power Density

802.11b	-5.61	dBm	at	2412.0	MHz
802.11g	-8.77	dBm	at	2412.0	MHz
802.11n HT20	-7.76	dBm	at	2412.0	MHz
802.11n HT40	-11.94	dBm	at	2422.0	MHz

Uncertainty of Measurement Results ± 1.7 dB(2σ)

Remarks : _____

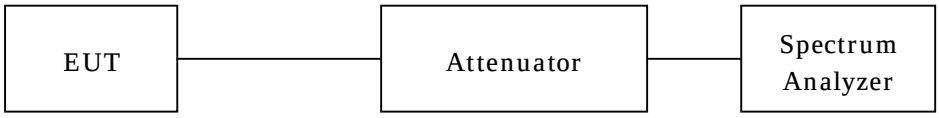
7.6.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2017/08/02
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2017/08/02

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

7.6.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



7.6.4 Test Data

1) 802.11b

Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Data Rate : 1Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	-15.65	-5.61	0.27	8.00	+13.61
06	2437	10.04	-15.79	-5.75	0.27	8.00	+13.75
11	2462	10.04	-16.62	-6.58	0.22	8.00	+14.58

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

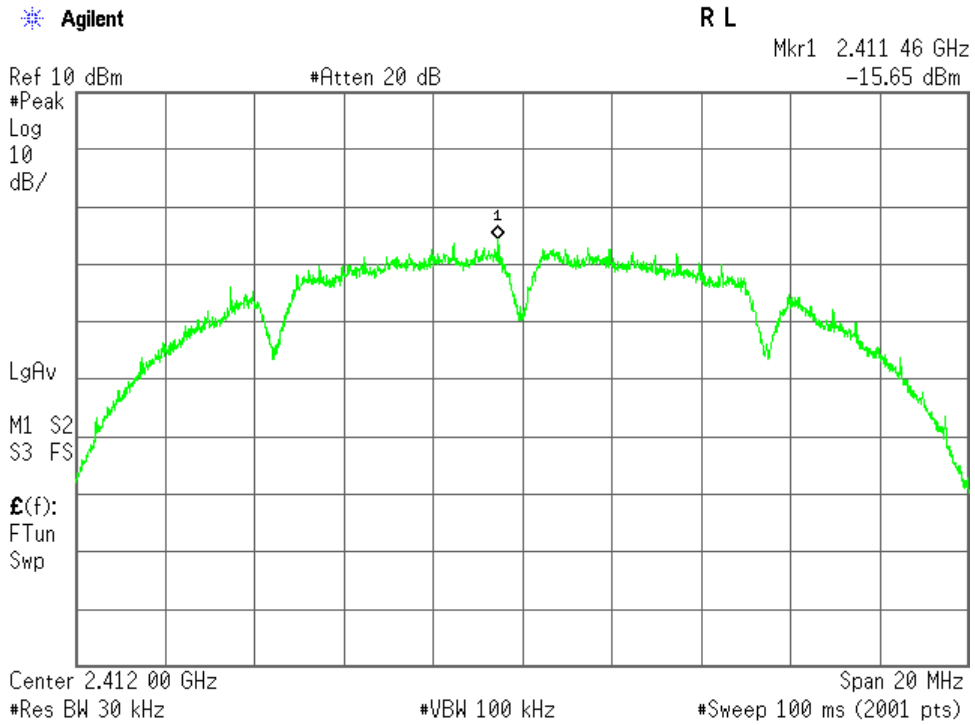
	Correction Factor	=	10.04 dB
+)	Meter Reading	=	-15.65 dBm
	Result	=	-5.61 dBm = 0.27 mW

Minimum Margin: 8.00 - -5.61 = 13.61 (dB)

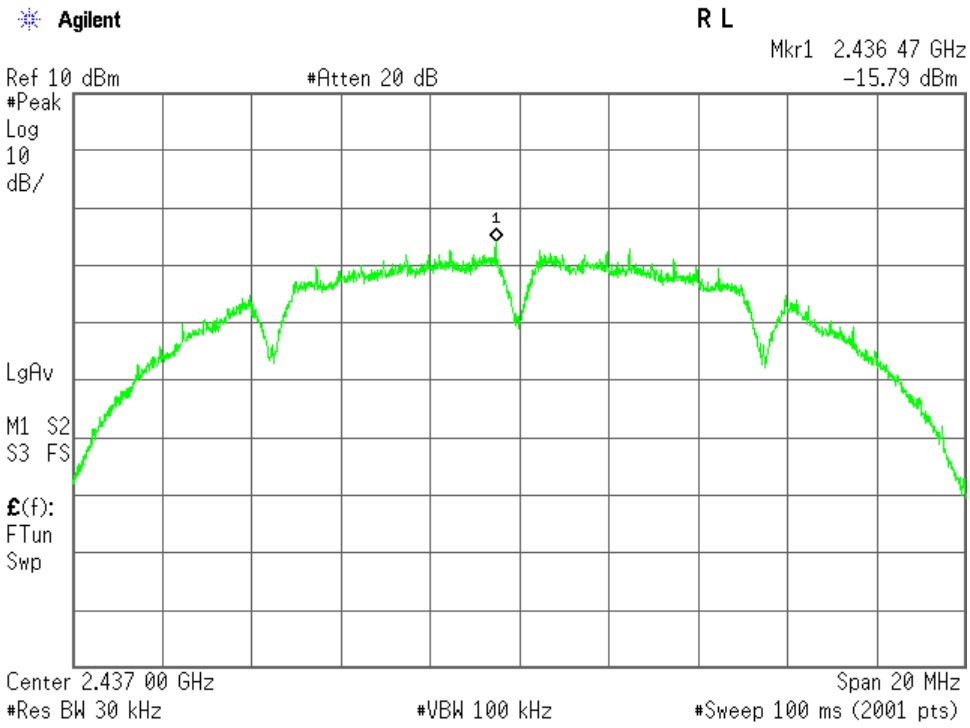
NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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

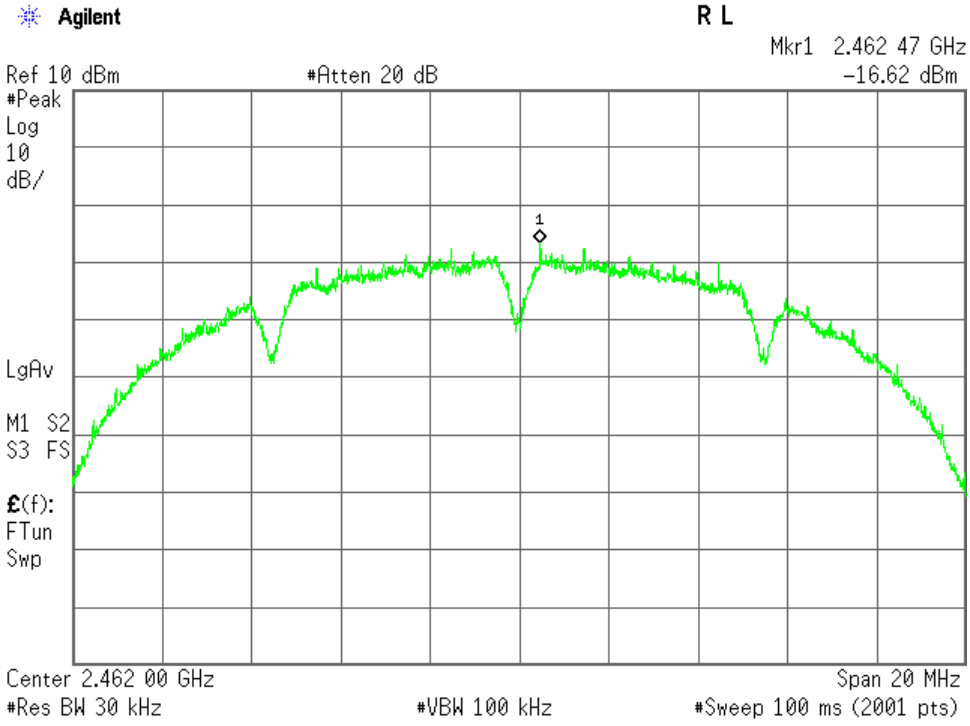
Low Channel



Middle Channel



High Channel



2) 802.11g

Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Data Rate : 54Mbps

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	-18.81	-8.77	0.13	8.00	+16.77
06	2437	10.04	-19.43	-9.39	0.12	8.00	+17.39
11	2462	10.04	-20.70	-10.66	0.09	8.00	+18.66

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

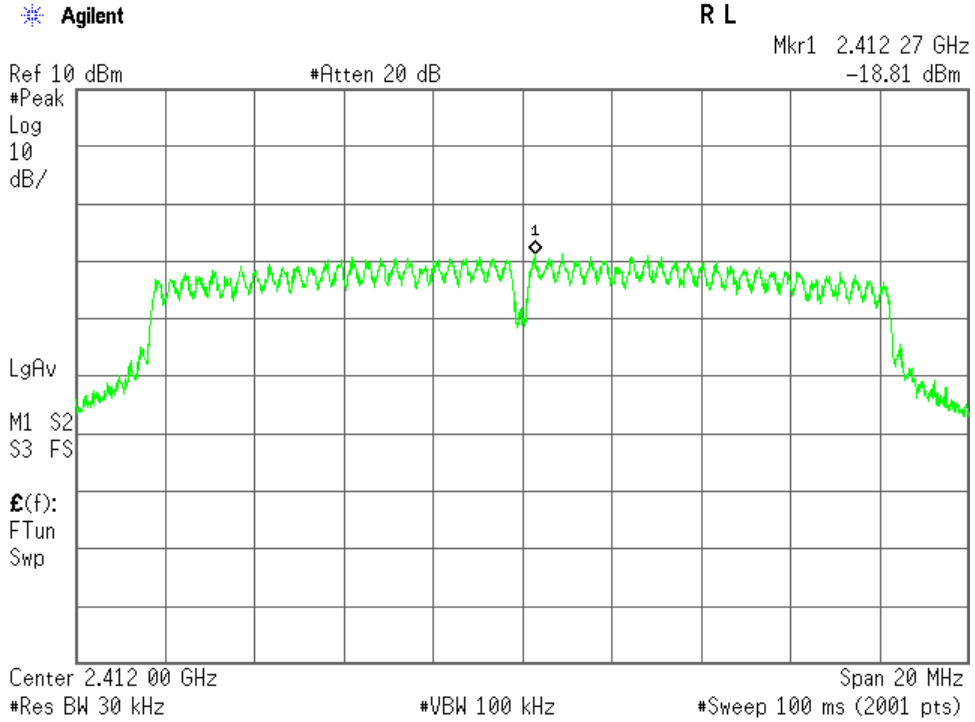
Correction Factor	=	10.04 dB	
+) Meter Reading	=	-18.81 dBm	
Result	=	-8.77 dBm	= 0.13 mW

Minimum Margin: 8.00 - -8.77 = 16.77 (dB)

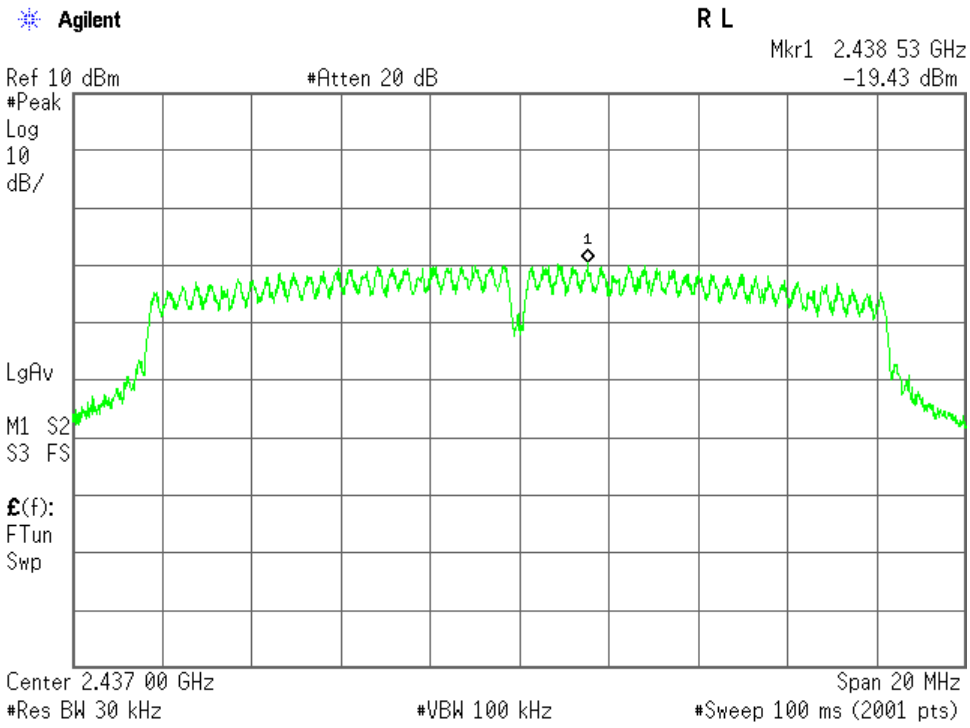
NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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

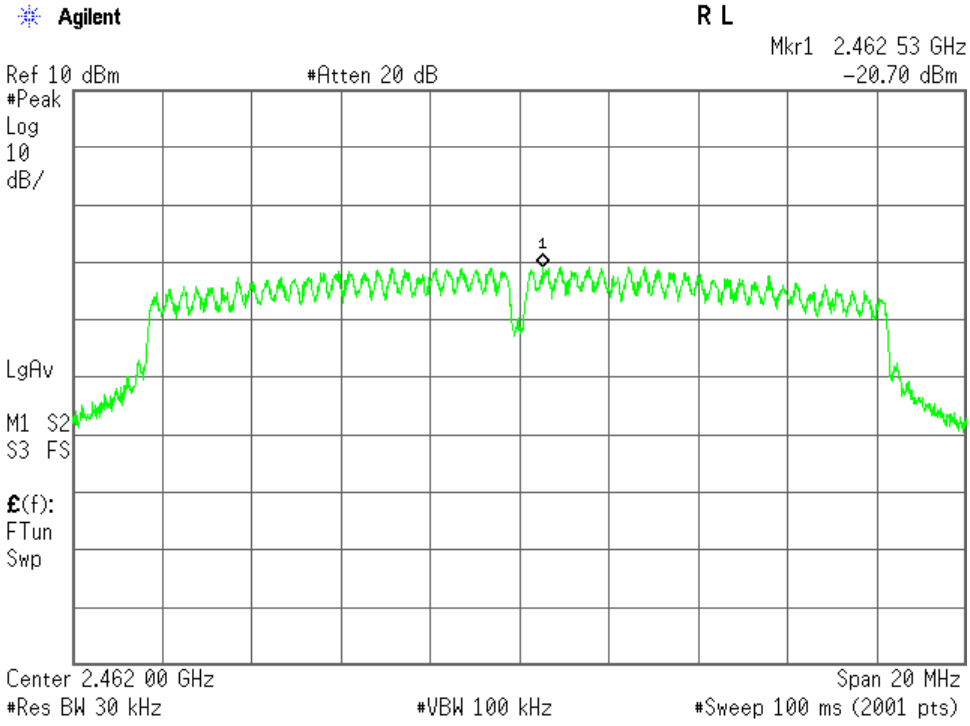
Low Channel



Middle Channel



High Channel



3) 802.11n HT20

Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Data Rate : MCS6

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
01	2412	10.04	-17.80	-7.76	0.17	8.00	+15.76
06	2437	10.04	-19.04	-9.00	0.13	8.00	+17.00
11	2462	10.04	-20.01	-9.97	0.10	8.00	+17.97

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

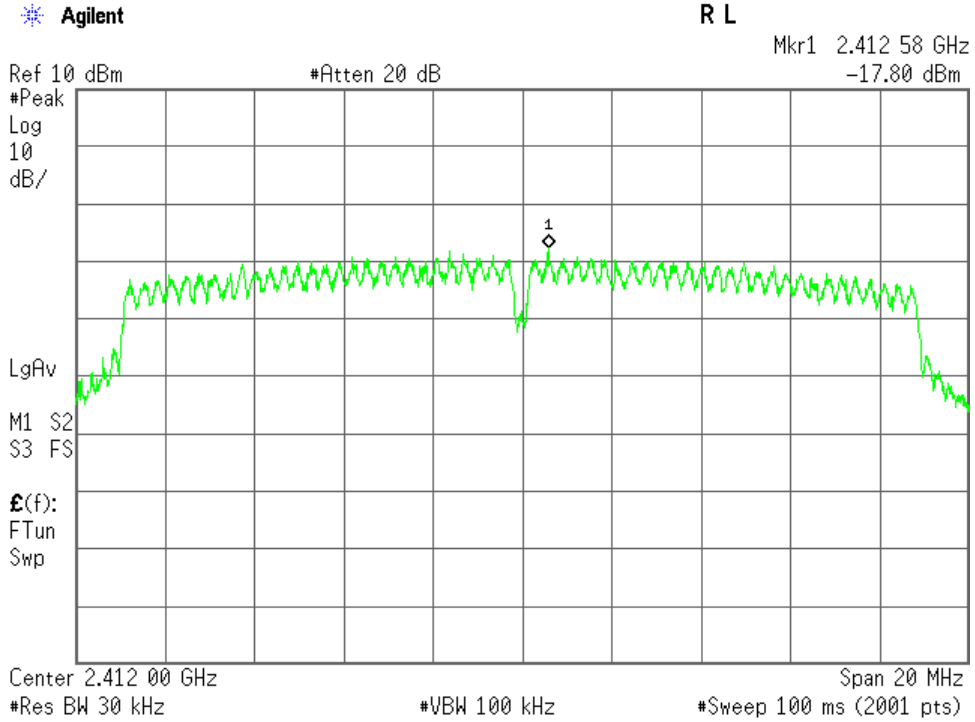
	Correction Factor	=	10.04 dB
+)	Meter Reading	=	-17.80 dBm
	Result	=	-7.76 dBm = 0.17 mW

Minimum Margin: 8.00 - -7.76 = 15.76 (dB)

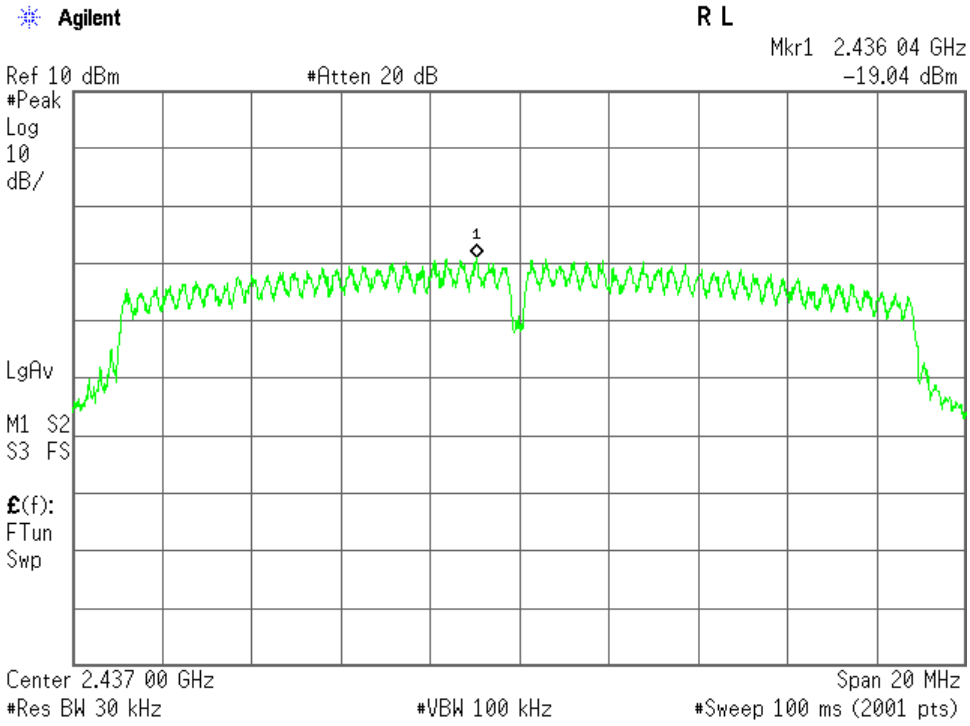
NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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

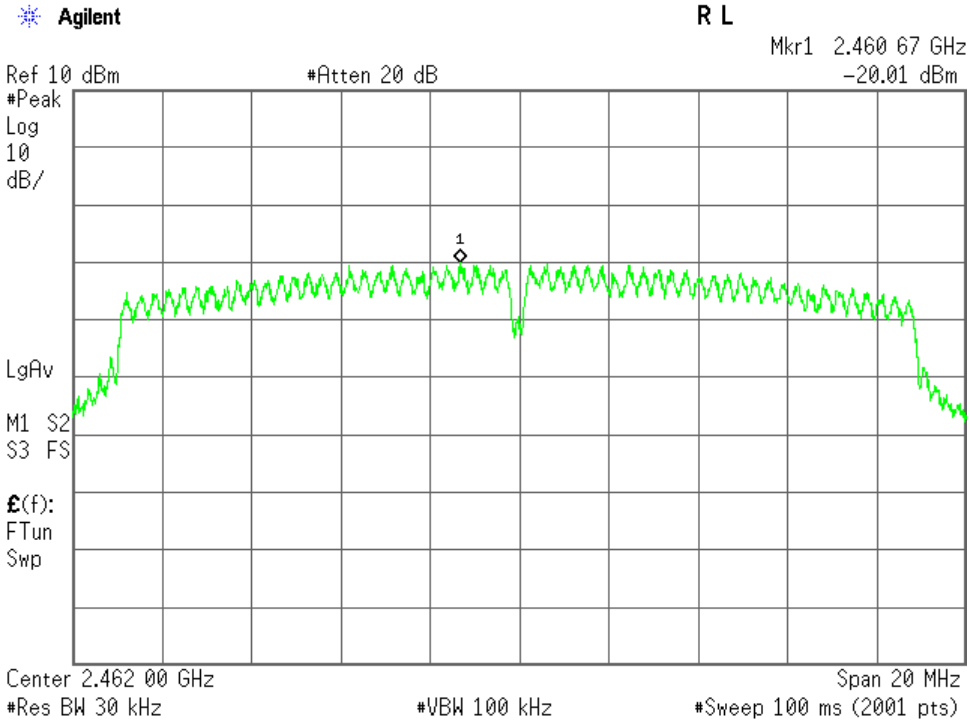
Low Channel



Middle Channel



High Channel



4) 802.11n HT40

Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

Data Rate : MCS5

Transmitting Frequency		Correction Factor	Meter Reading	Conducted Peak Power Density		Limits	Margin
CH	[MHz]	[dB]	[dBm]	[dBm]	[mW]	[dBm]	[dB]
03	2422	10.04	-21.98	-11.94	0.06	8.00	+19.94
06	2437	10.04	-22.58	-12.54	0.06	8.00	+20.54
09	2452	10.04	-22.80	-12.76	0.05	8.00	+20.76

Calculated result at 2422.000 MHz, as the worst point shown on underline:

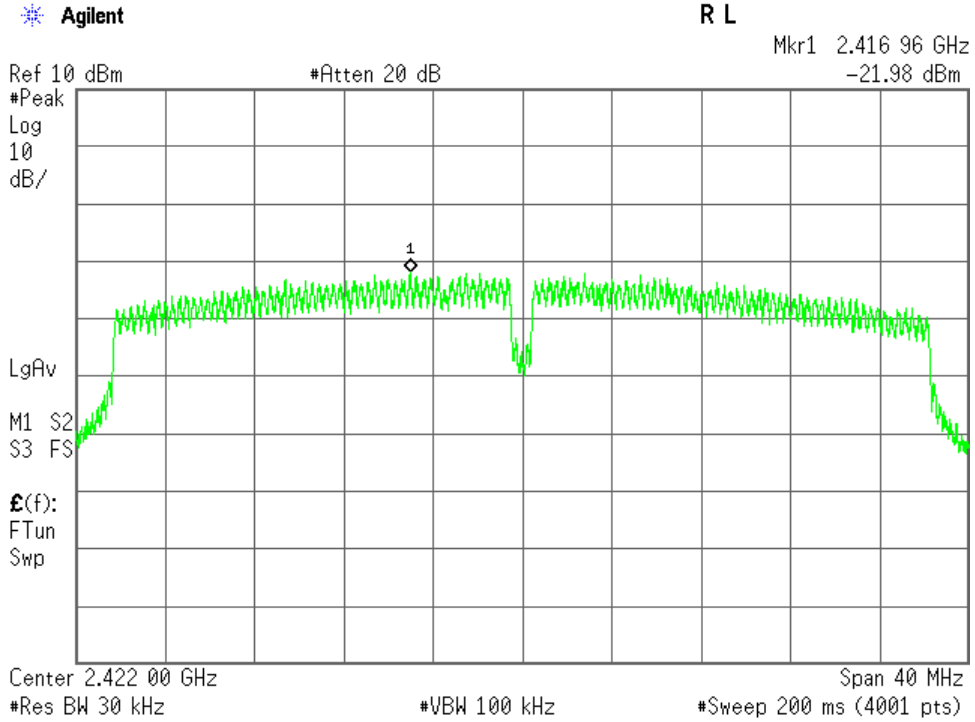
	Correction Factor	=	10.04 dB
+)	Meter Reading	=	-21.98 dBm
	Result	=	-11.94 dBm = 0.06 mW

Minimum Margin: 8.00 - -11.94 = 19.94 (dB)

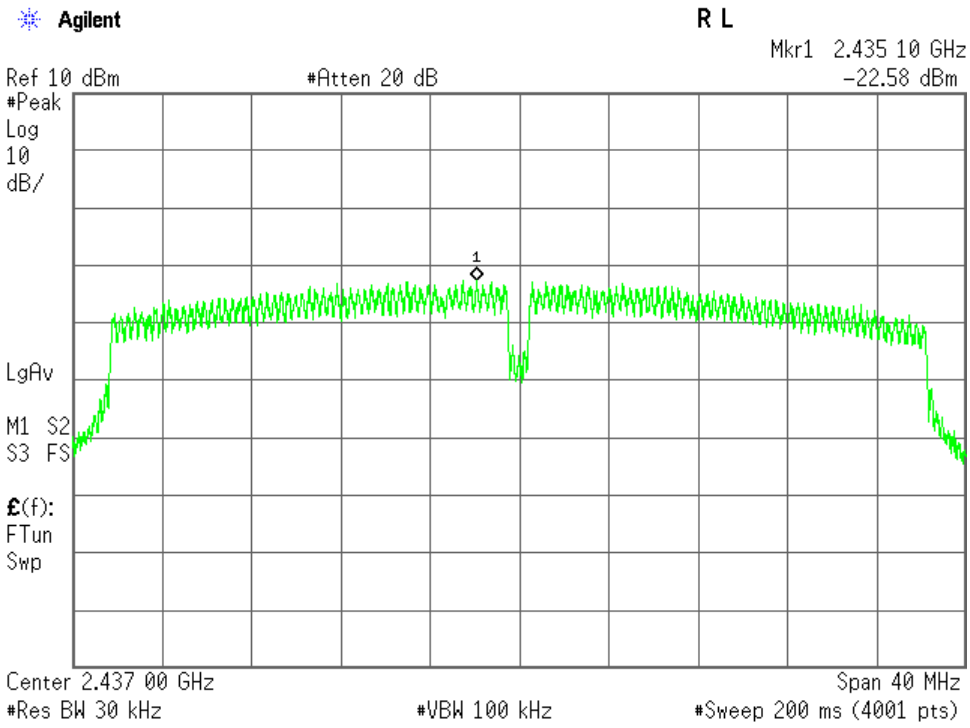
NOTES
1. The peak power density complied with the limit using 30 kHz resolution bandwidth of Spectrum Analyzer.
2. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
3. Setting of measuring instrument(s) :

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

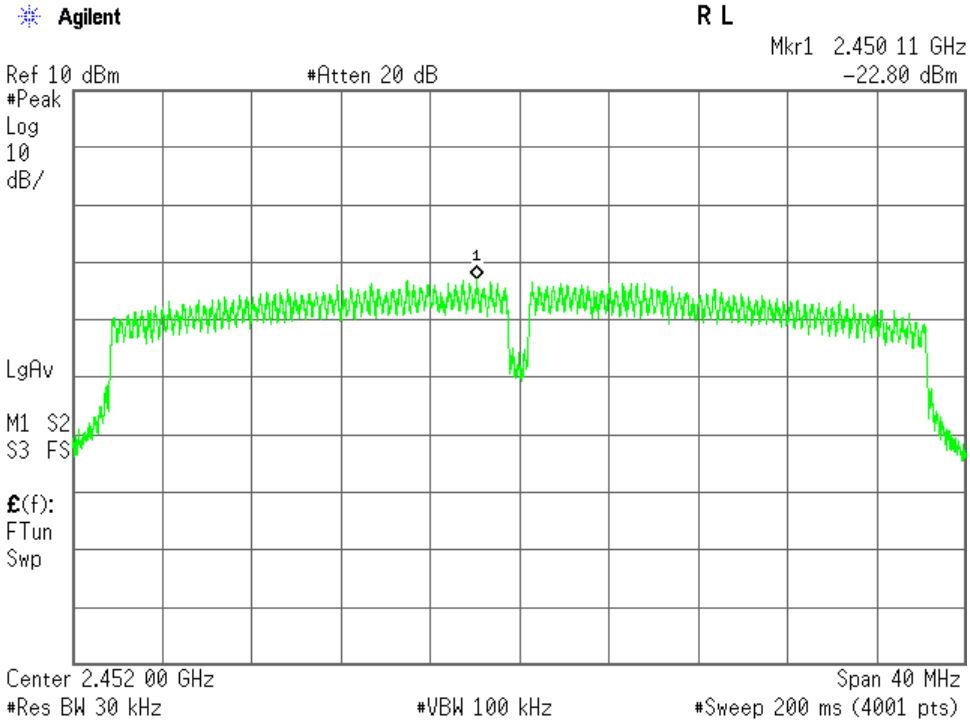
Low Channel



Middle Channel



High Channel



7.7 Spurious Emissions (Conduction)

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

7.7.1 Test Results

For the standard, **R** - Passed **£** - Failed **£** - Not judged

Uncertainty of Measurement Results

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

Remarks : _____

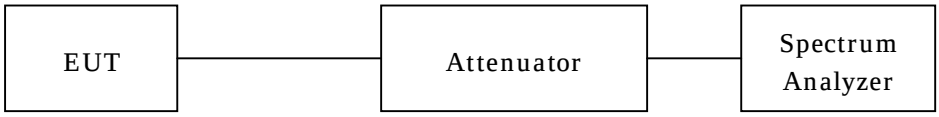
7.7.2 Test Instruments

Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2017/08/02
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2017/08/02

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

7.7.3 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

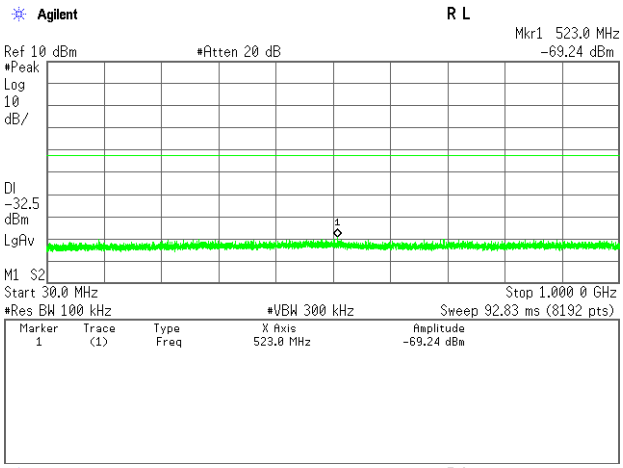
Frequency Range	30 MHz - 25 GHz	Band-Edge
Res. Bandwidth	100 kHz	100 kHz
Video Bandwidth	300 kHz	300 kHz
Sweep Time	AUTO	AUTO
Trace	Maxhold	Maxhold

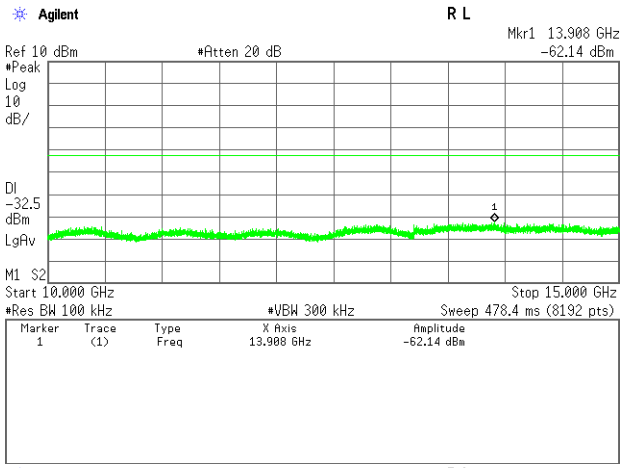
7.7.4 Test Data

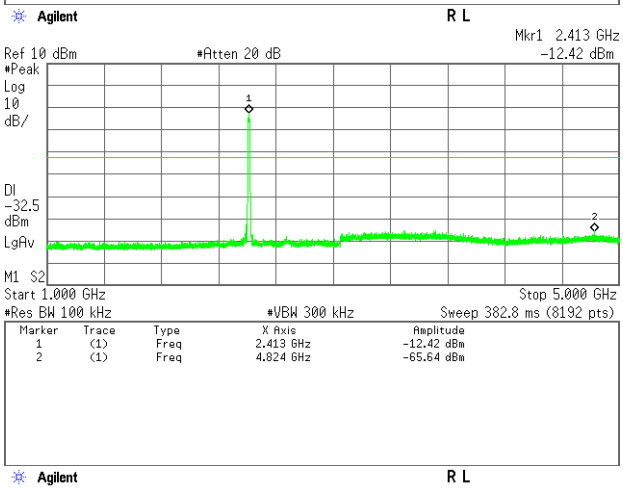
Test Date: February 21, 2017
Temp.: 24 °C, Humi: 39 %

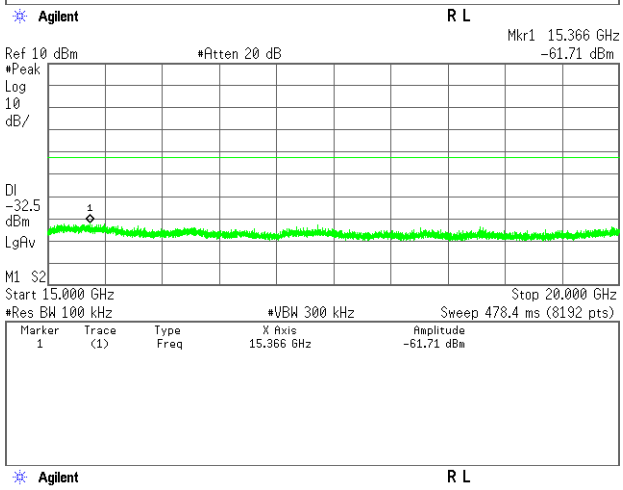
1) 802.11b

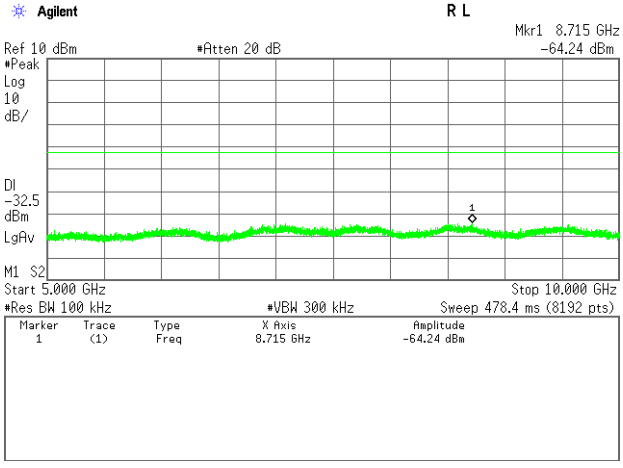
Low Channel

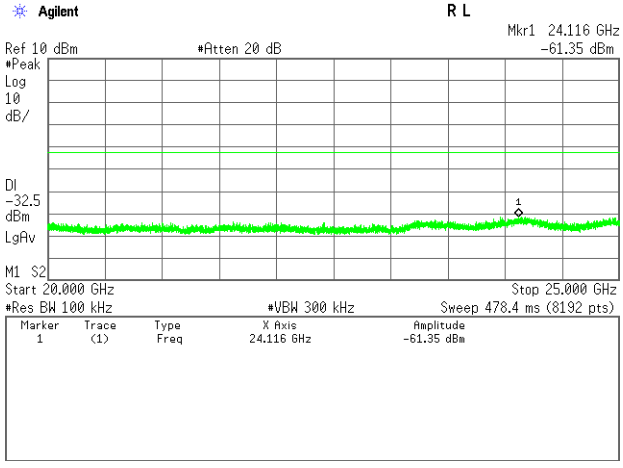




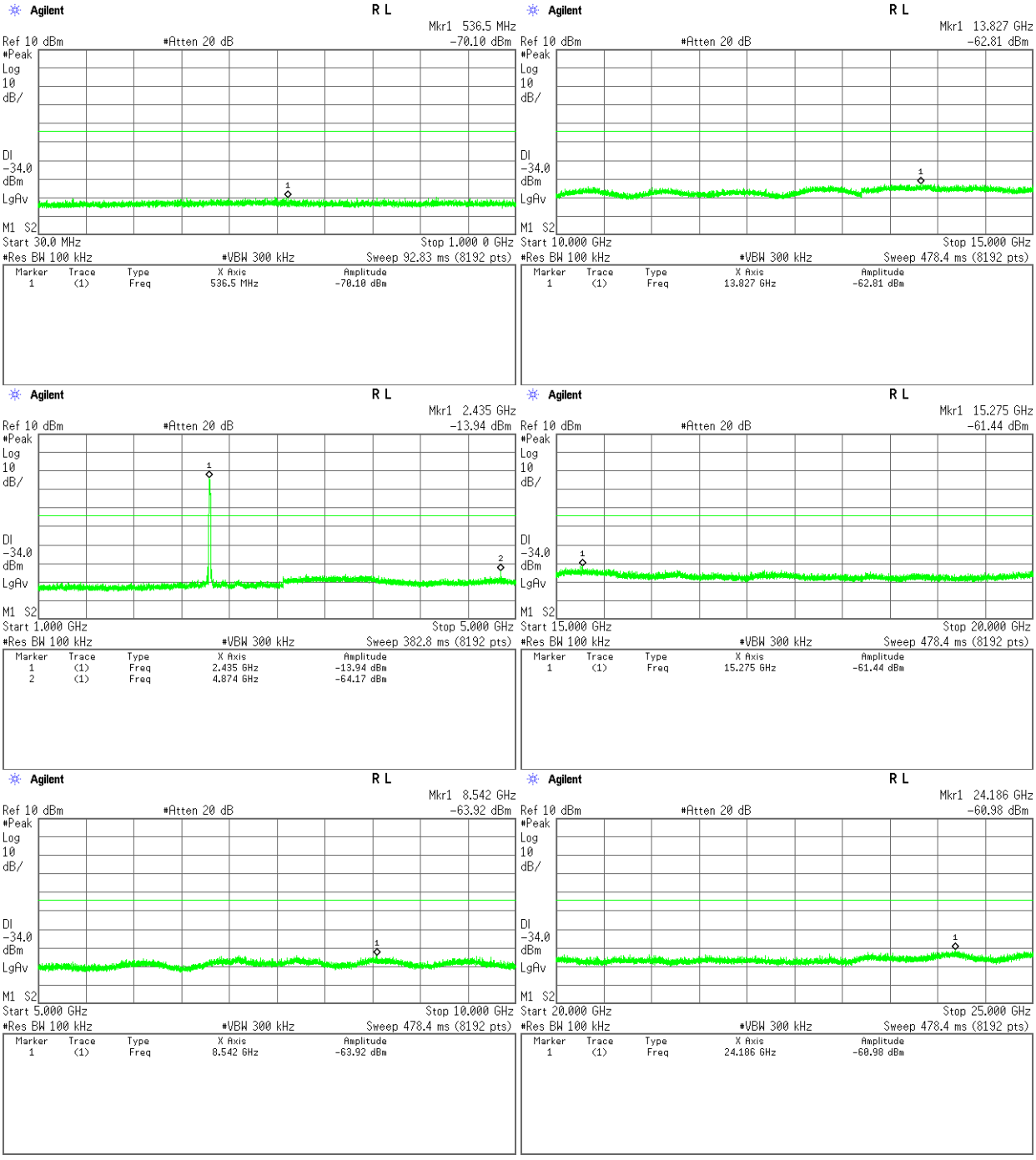




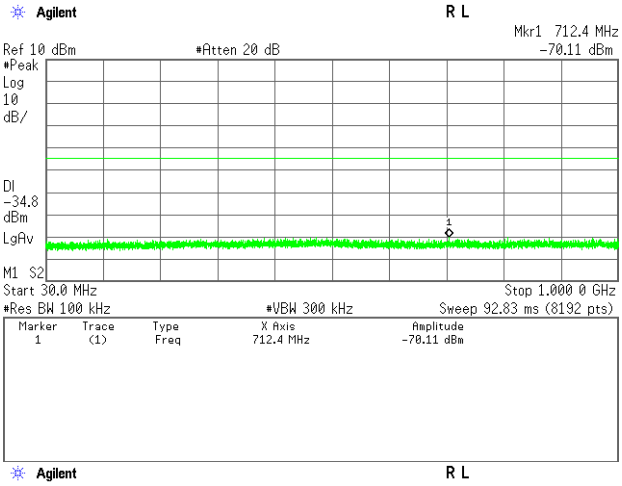


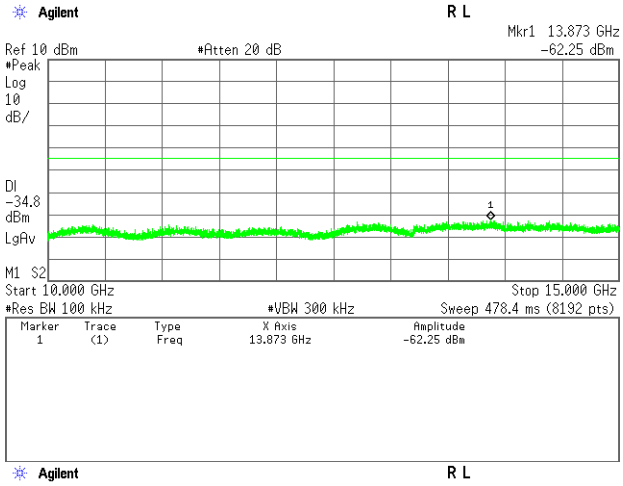


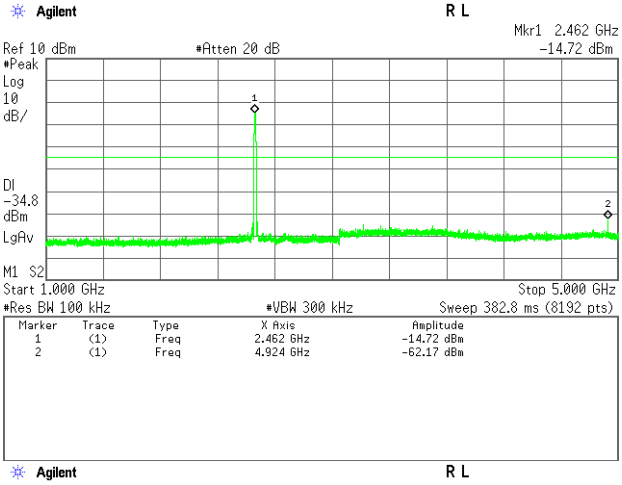
Middle Channel

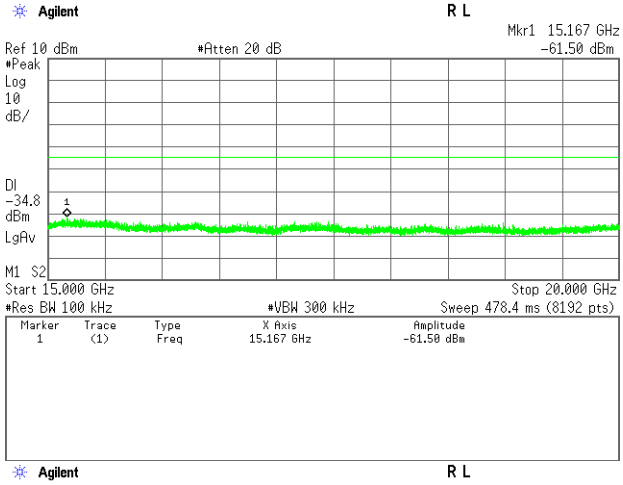


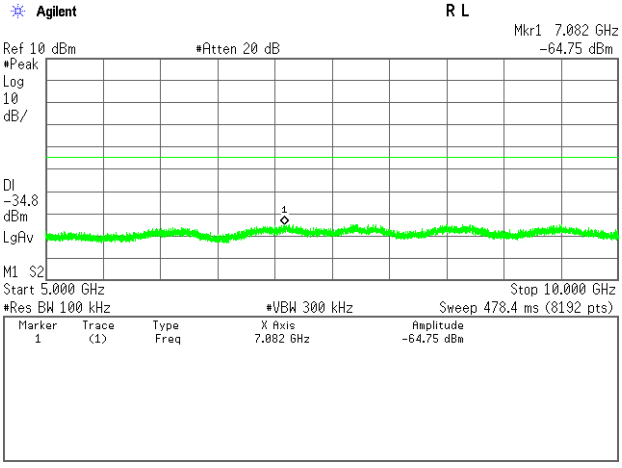
High Channel

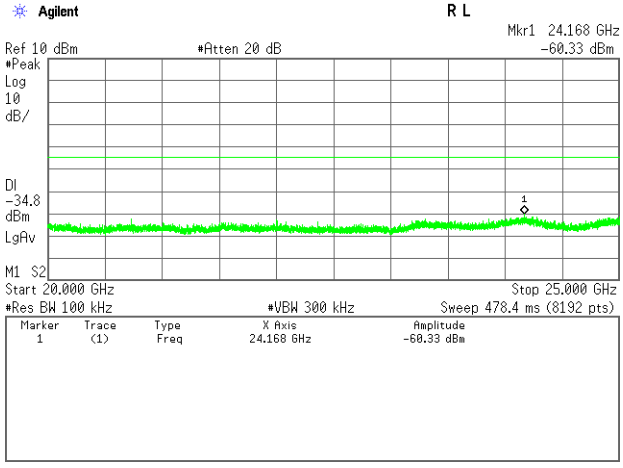






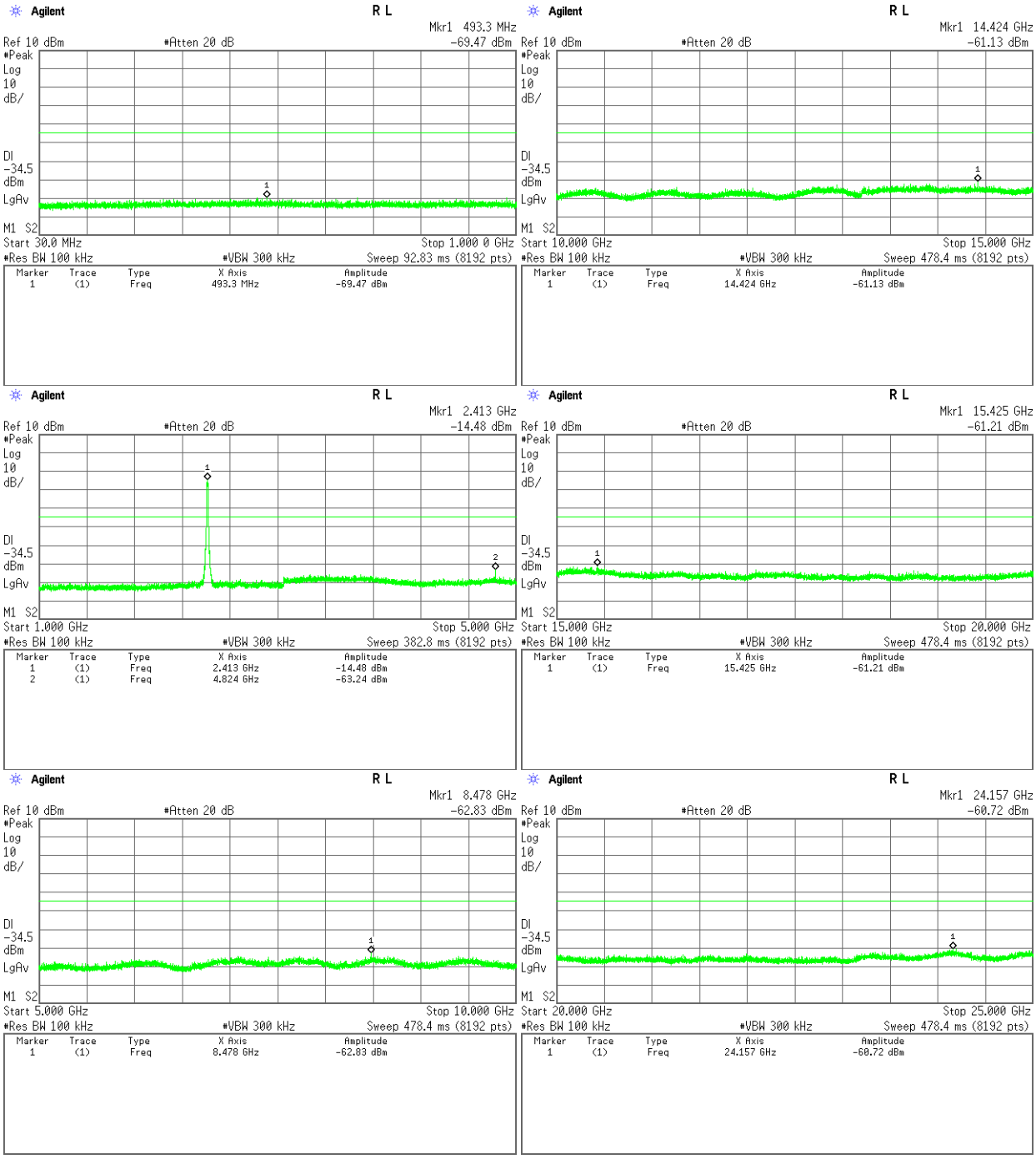




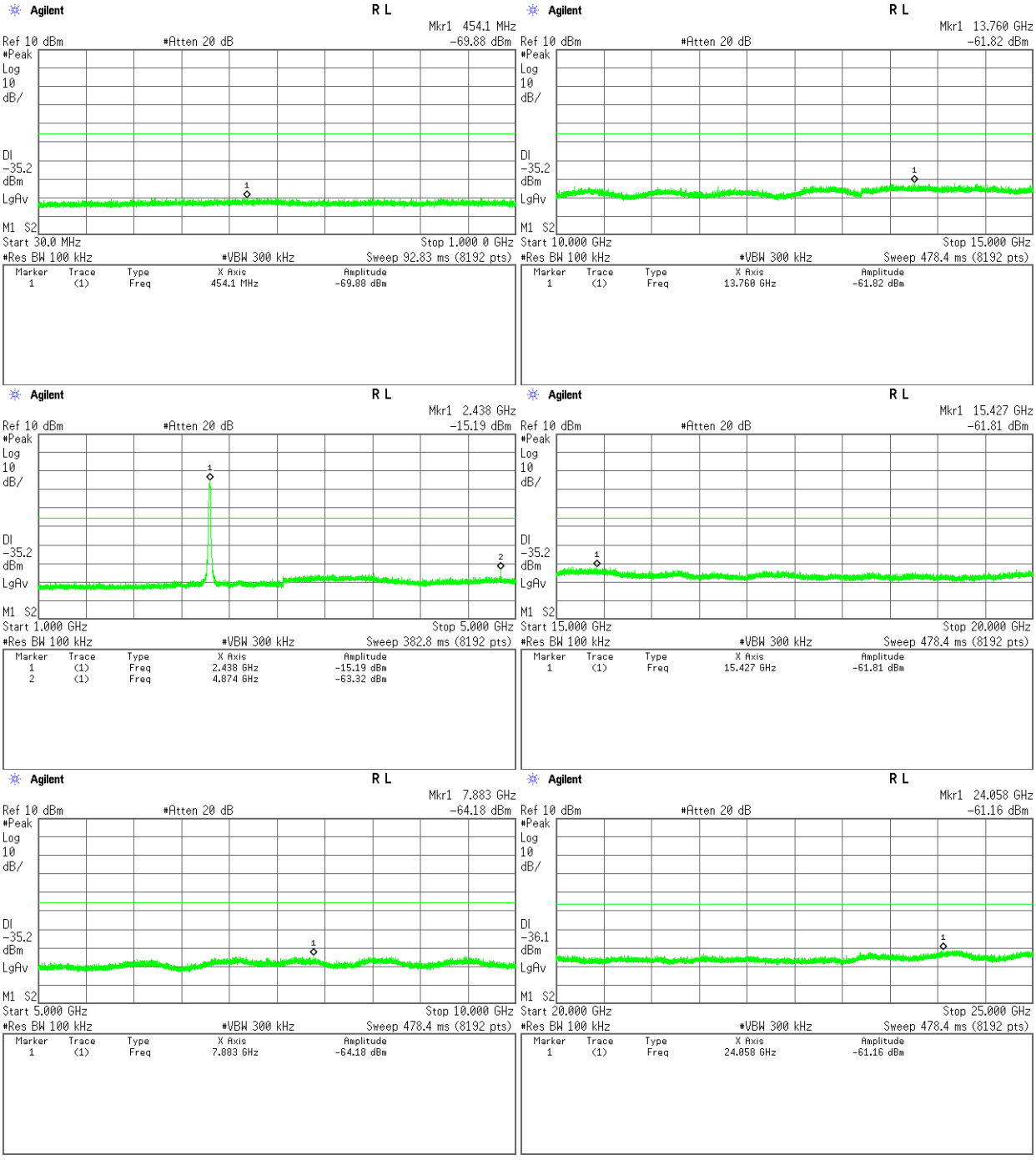


2) 802.11g

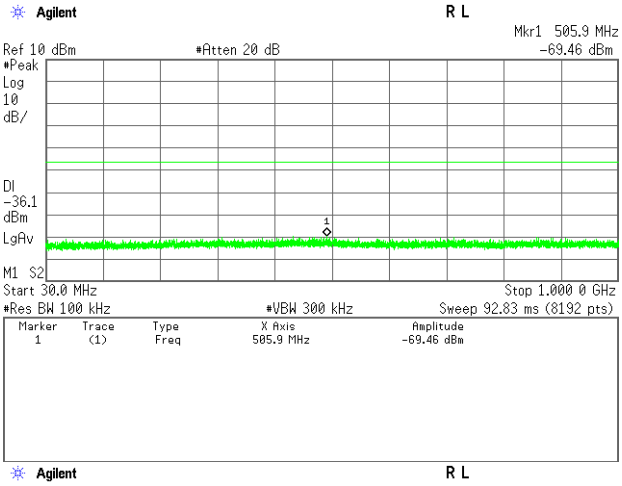
Low Channel

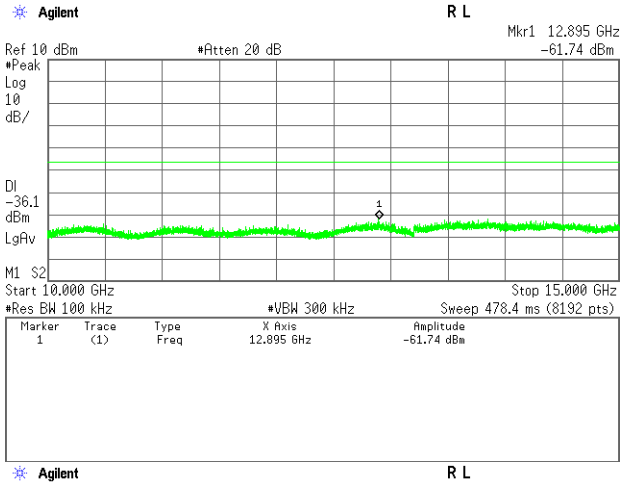


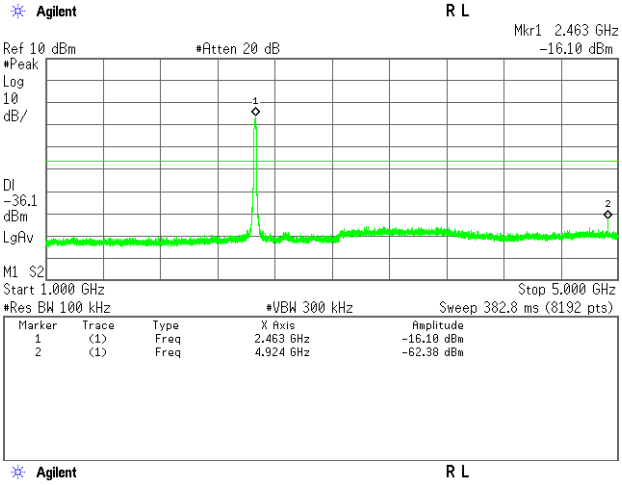
Middle Channel

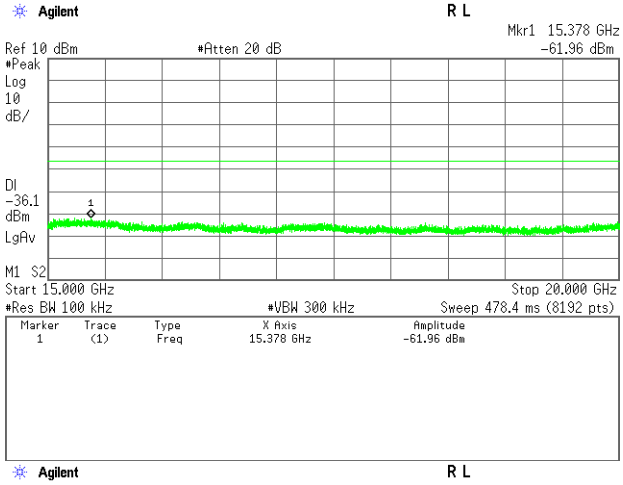


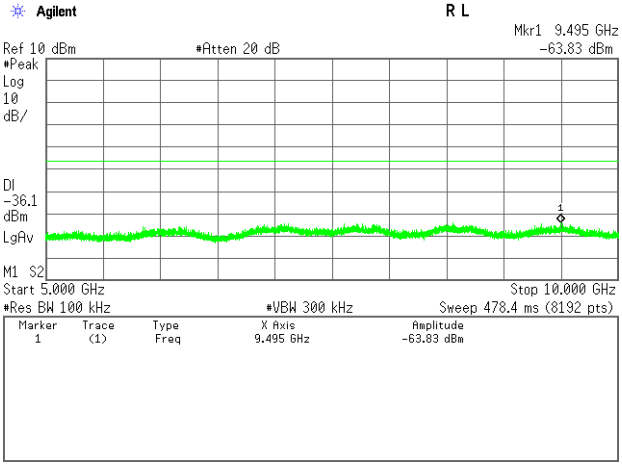
High Channel

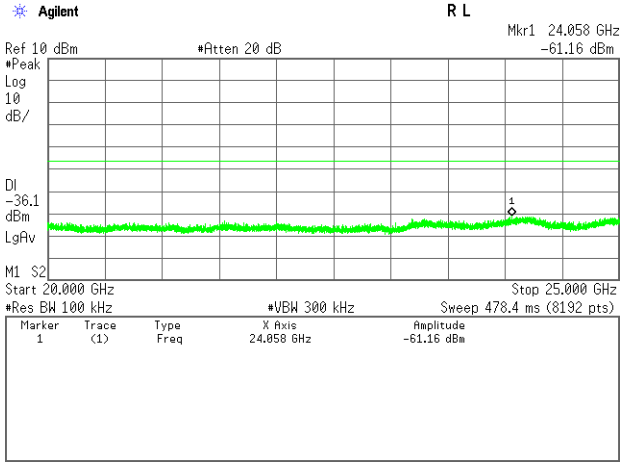






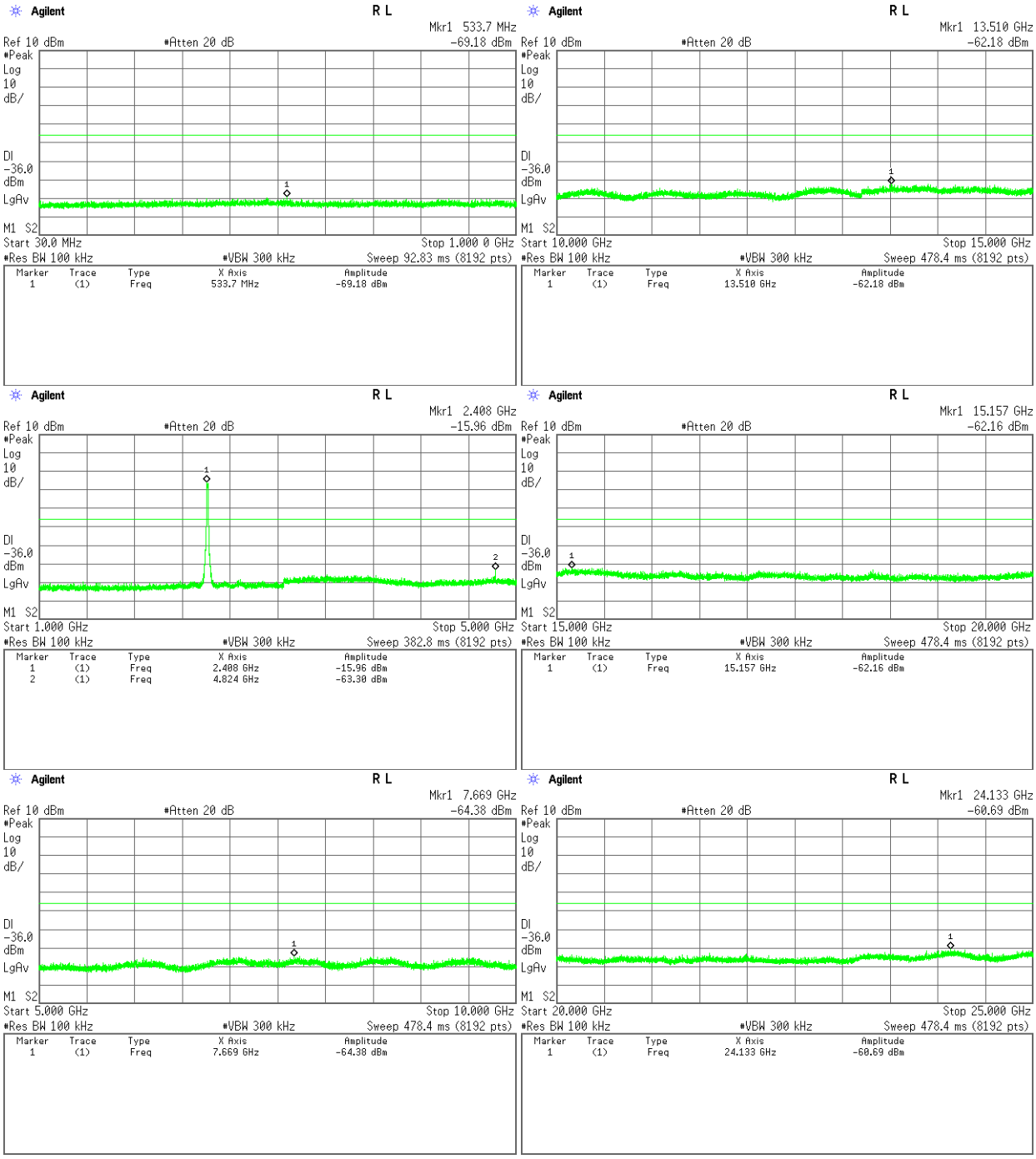




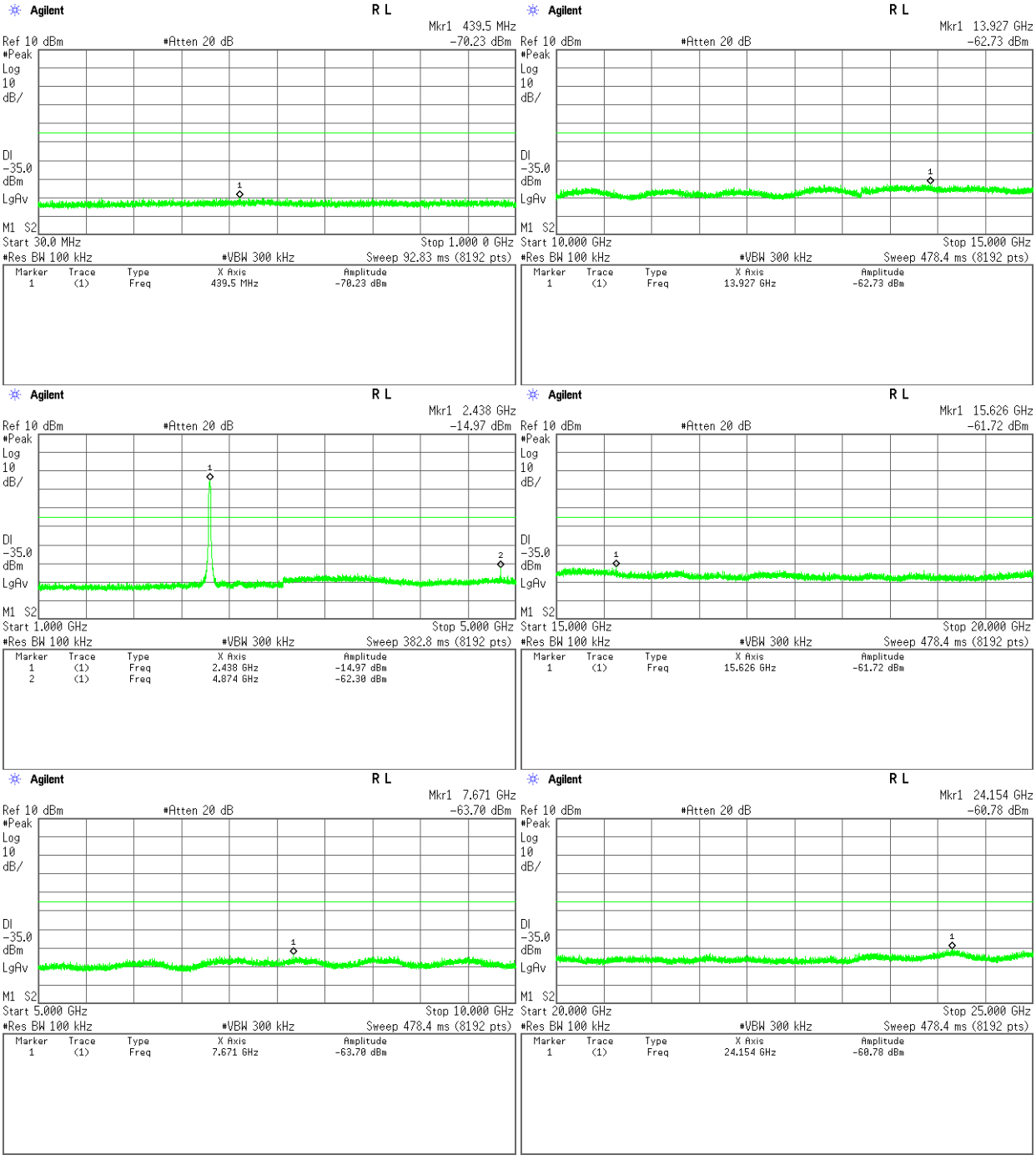


3) 802.11n HT20

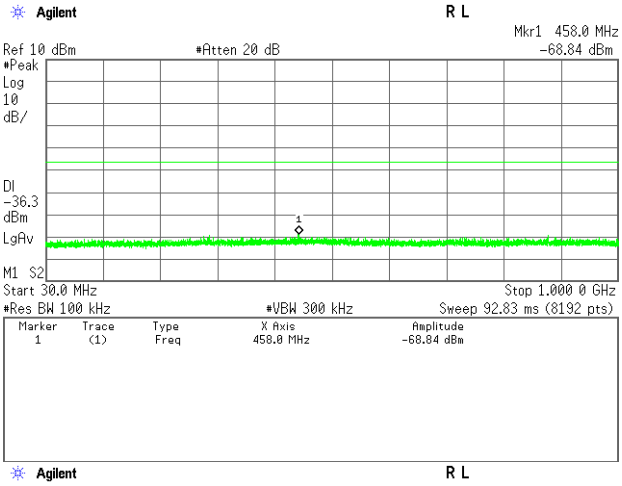
Low Channel

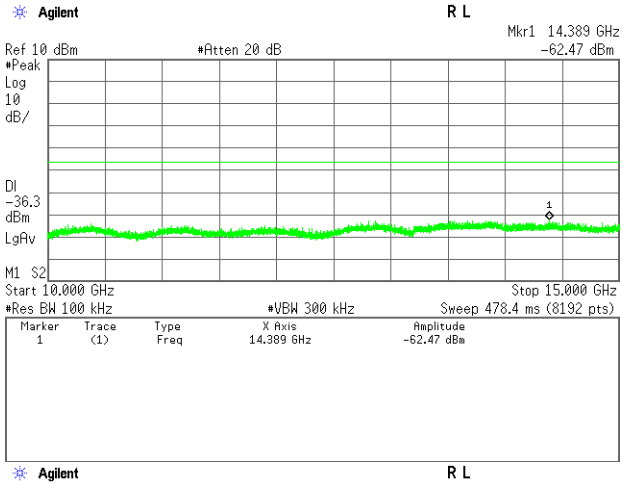


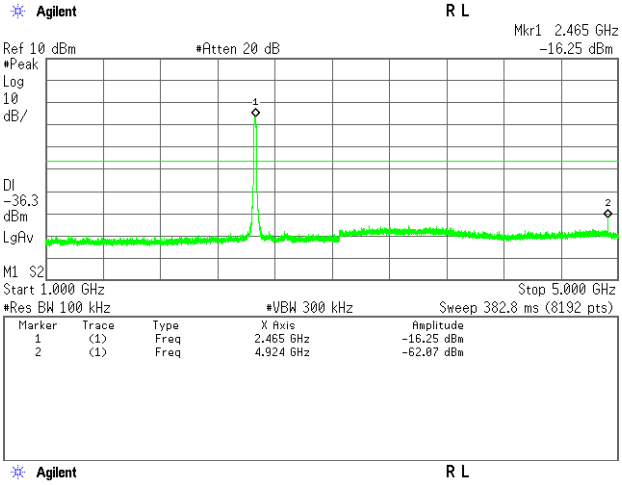
Middle Channel

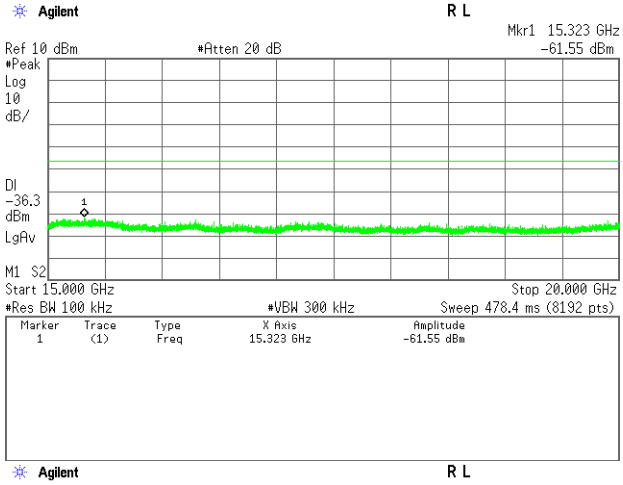


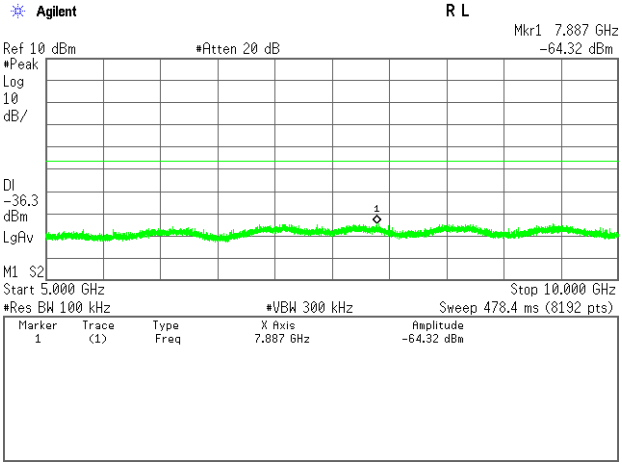
High Channel

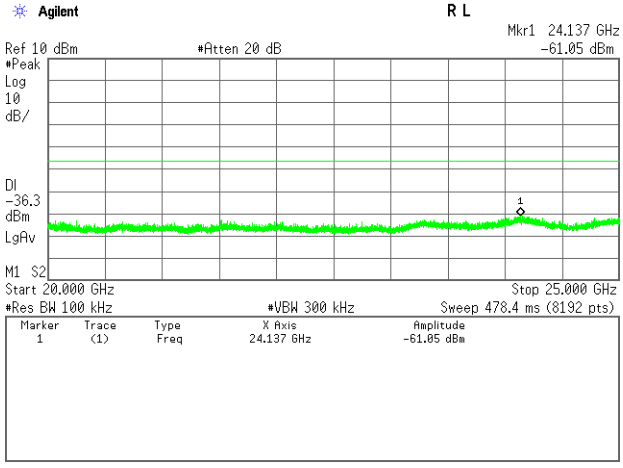






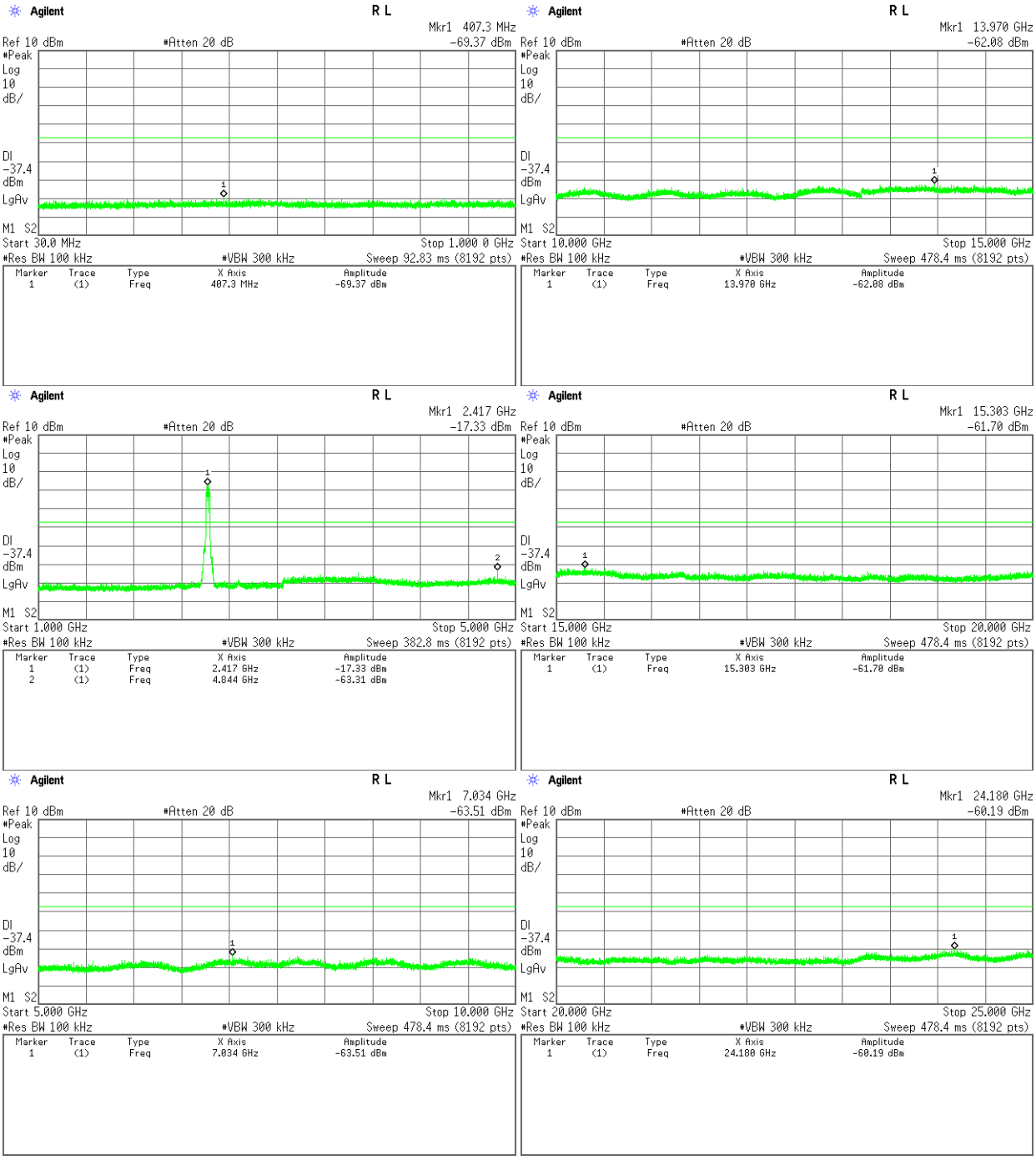




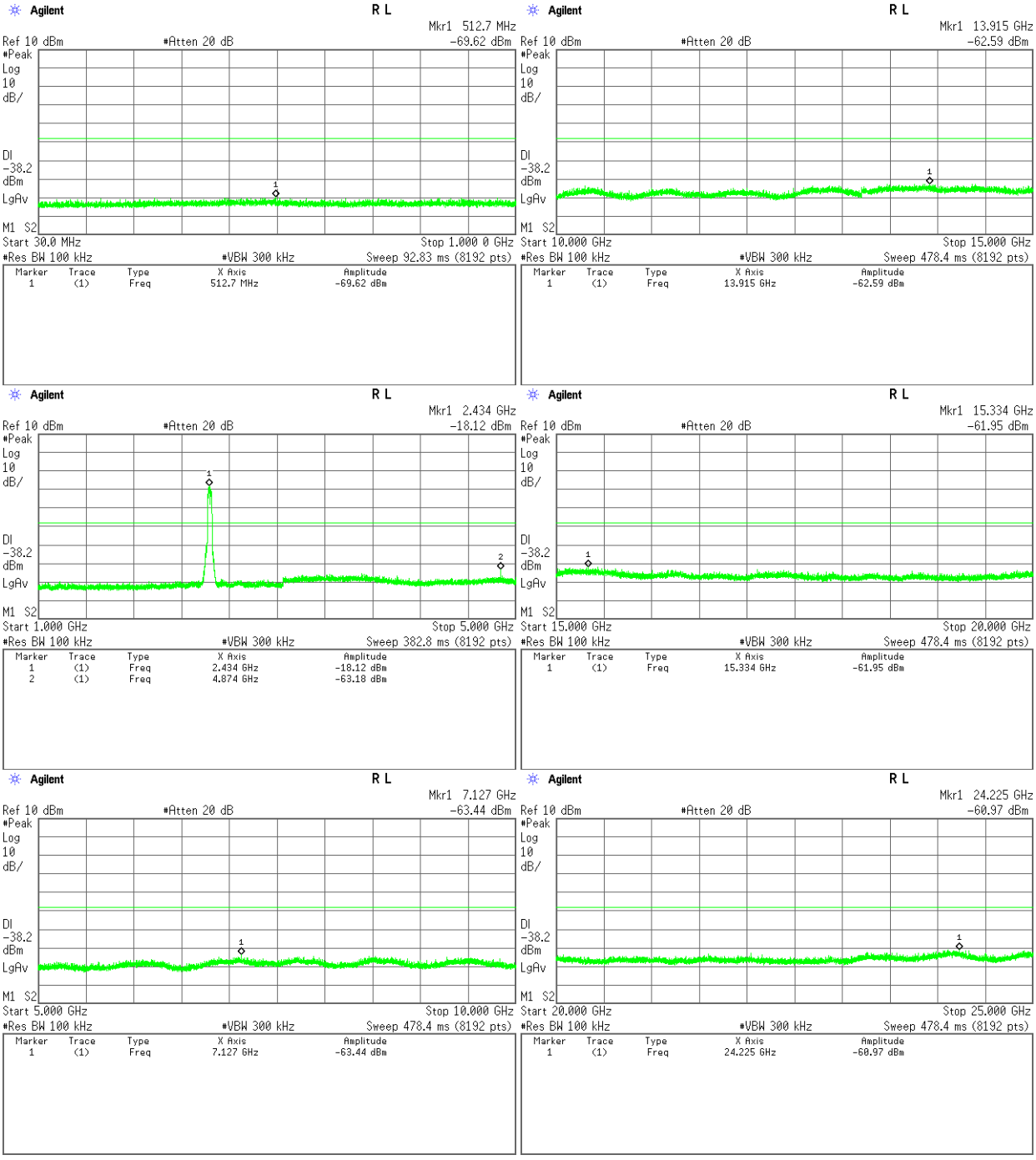


4) 802.11n HT40

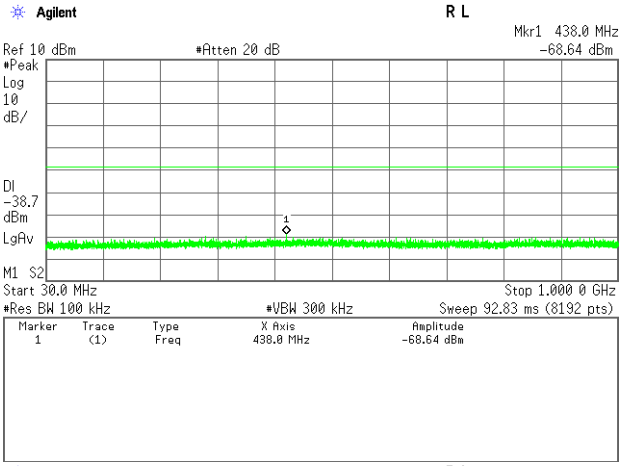
Low Channel

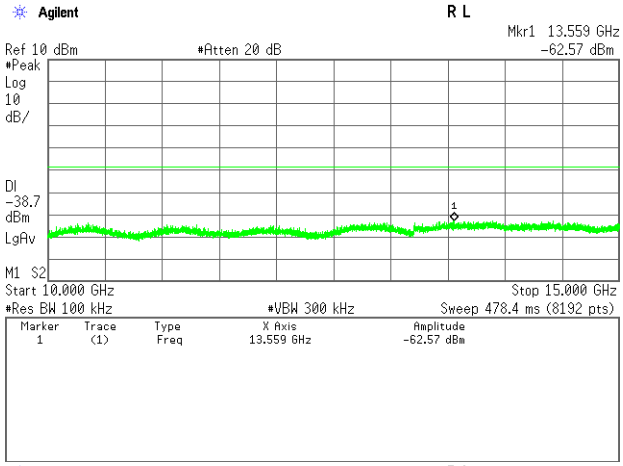


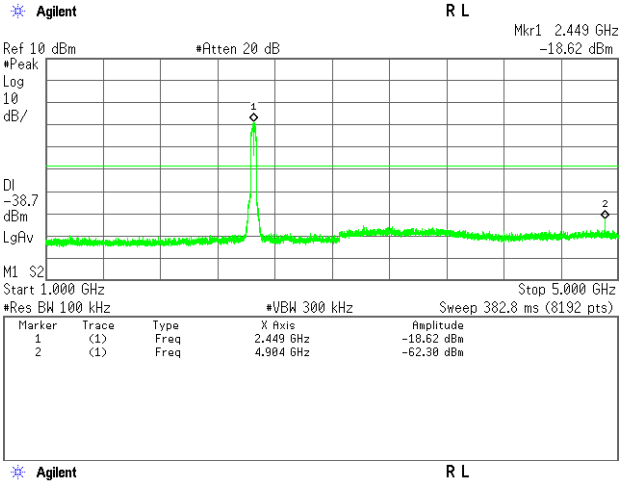
Middle Channel

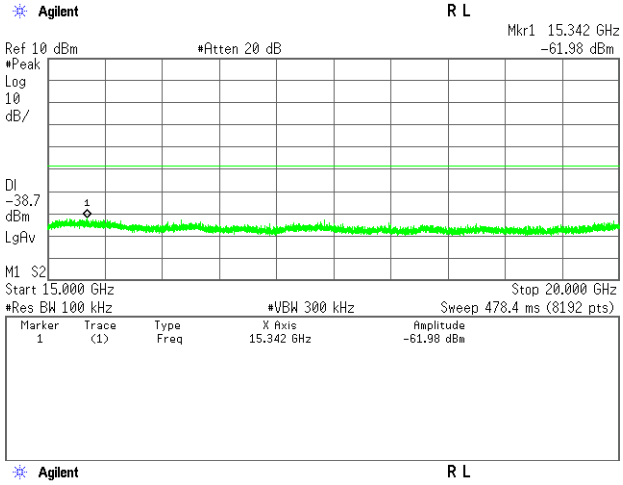


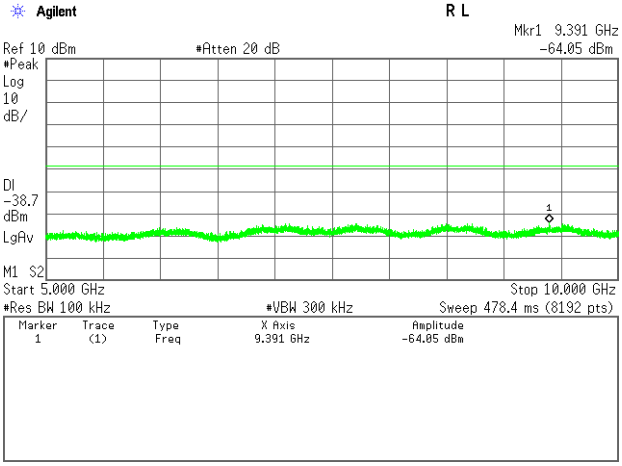
High Channel

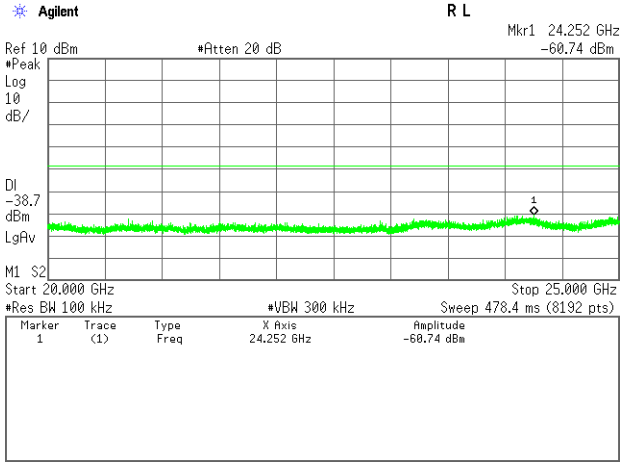










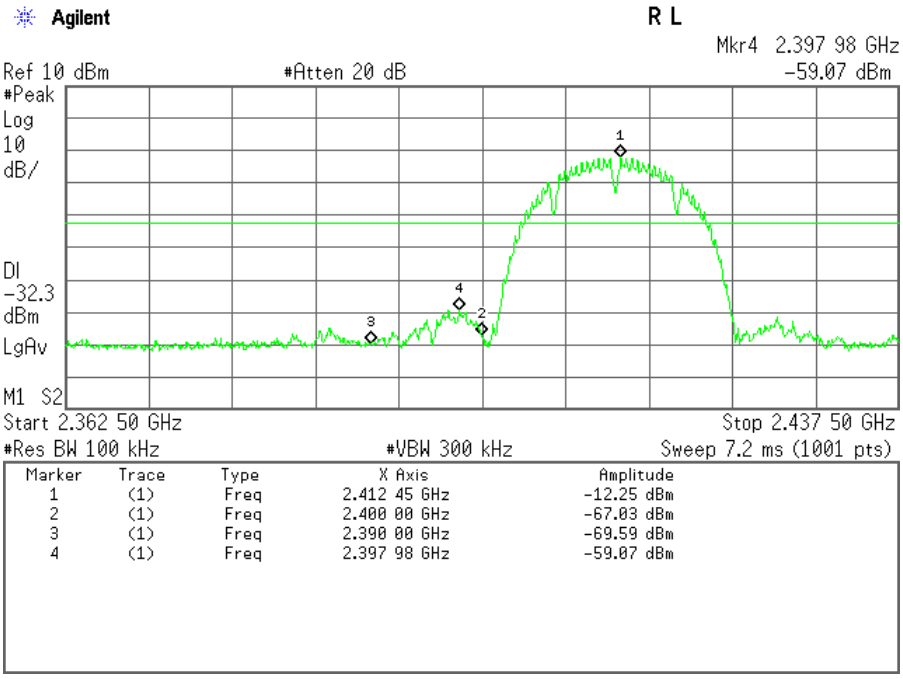


Band-Edge Emission

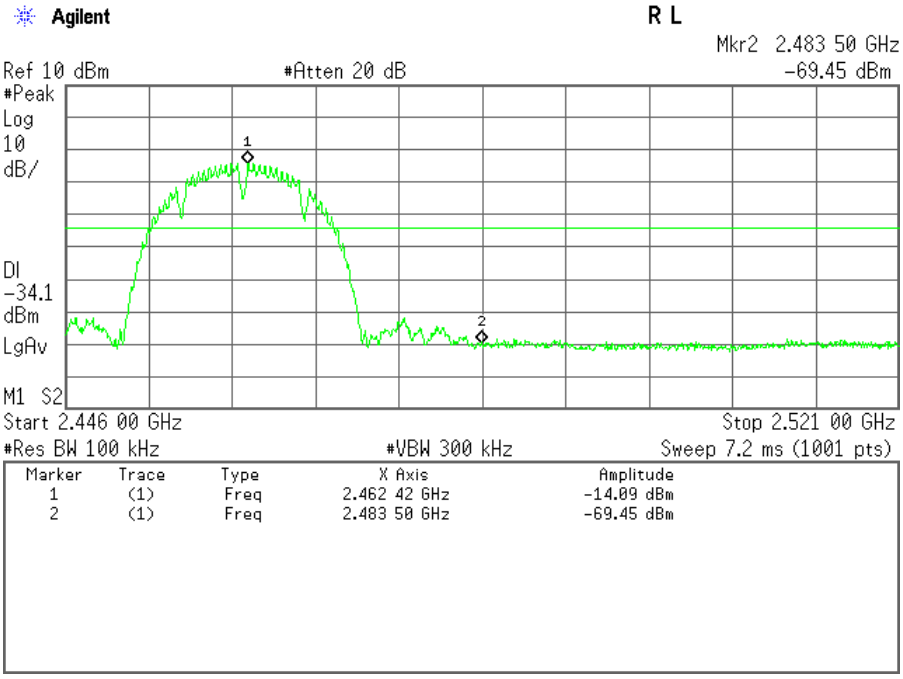
Test Date: February 21, 2017
Temp.: 24 °C, Humi: 39 %

1) 802.11b

Low Channel

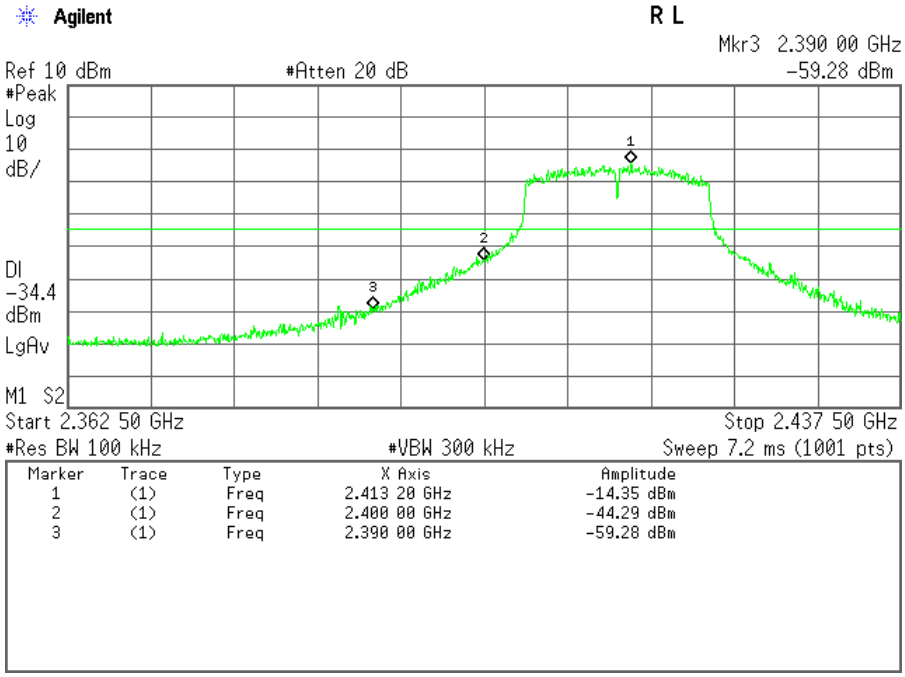


High Channel

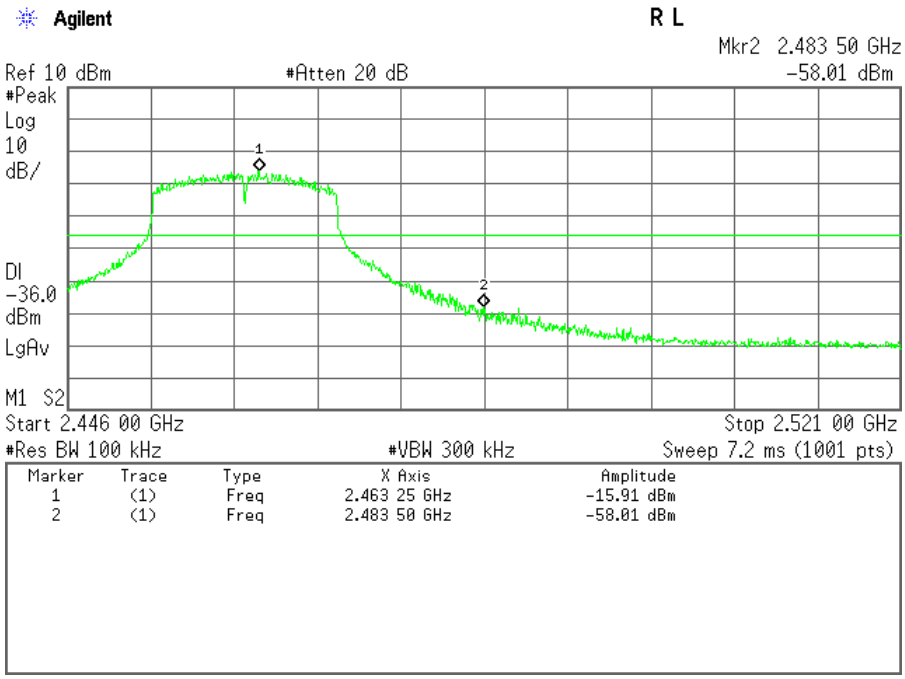


2) 802.11g

Low Channel

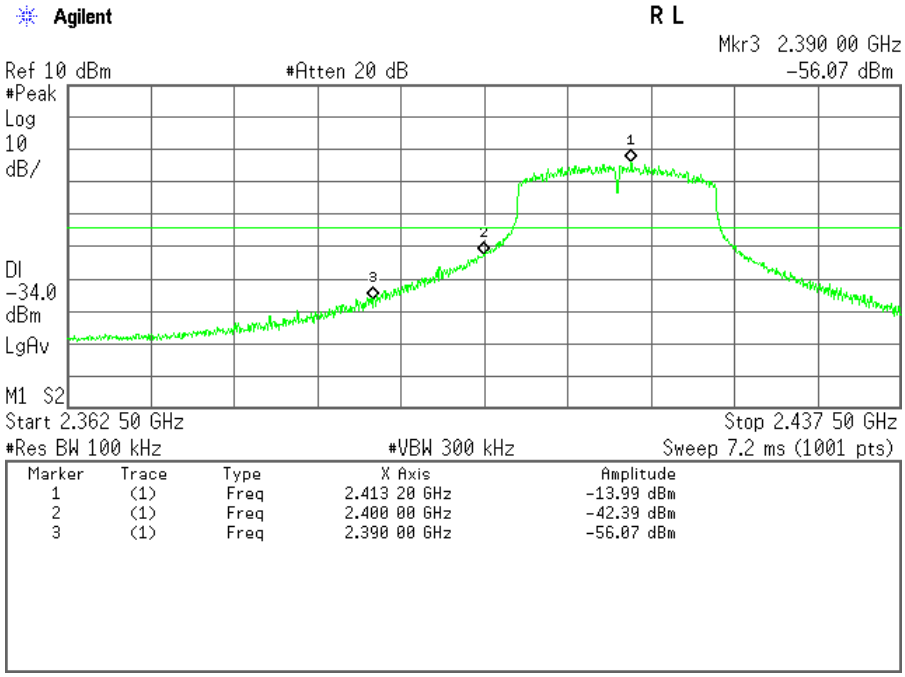


High Channel

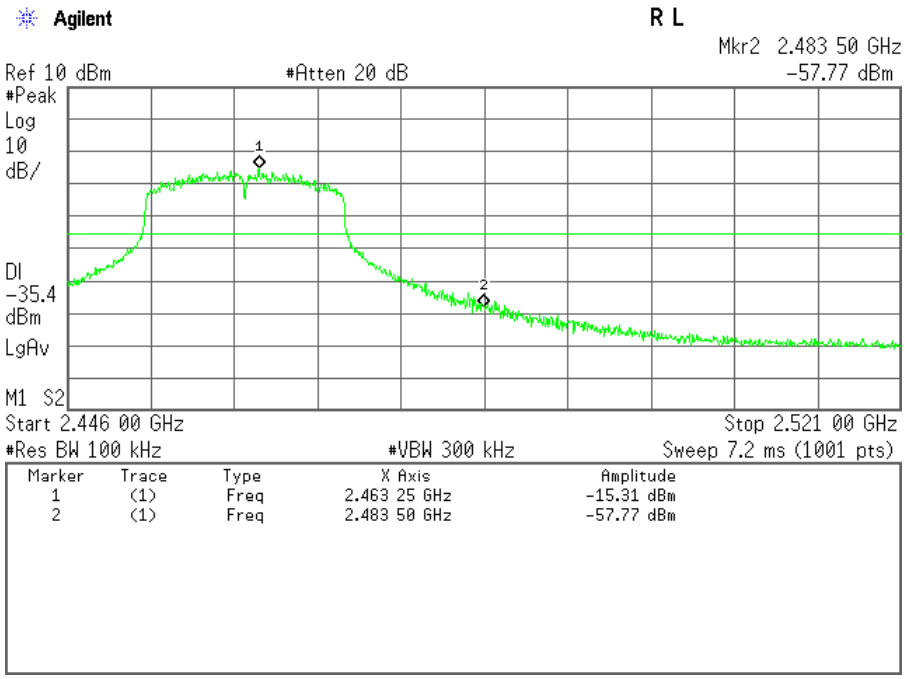


3) 802.11n HT20

Low Channel

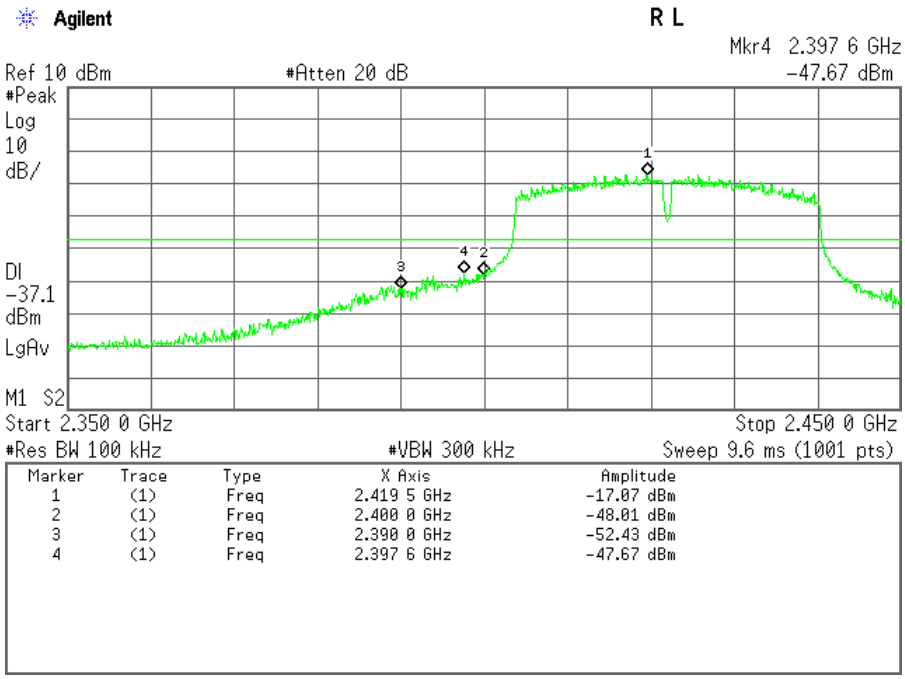


High Channel

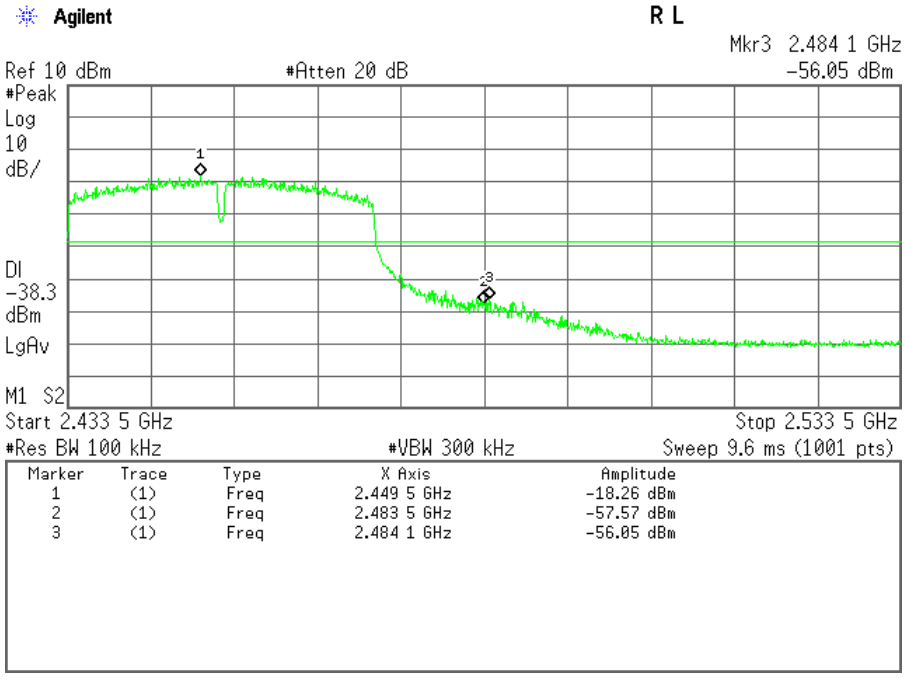


4) 802.11n HT40

Low Channel



High Channel



7.8 AC Powerline Conducted Emission

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

7.8.1 Test Results

For the standard, **R** - Passed **£** - Failed **£** - Not judged

Min. Limit Margin (Quasi-Peak) 14.0 dB at 0.618 MHz

Uncertainty of Measurement Results ± 2.6 dB(2σ)

Remarks : _____

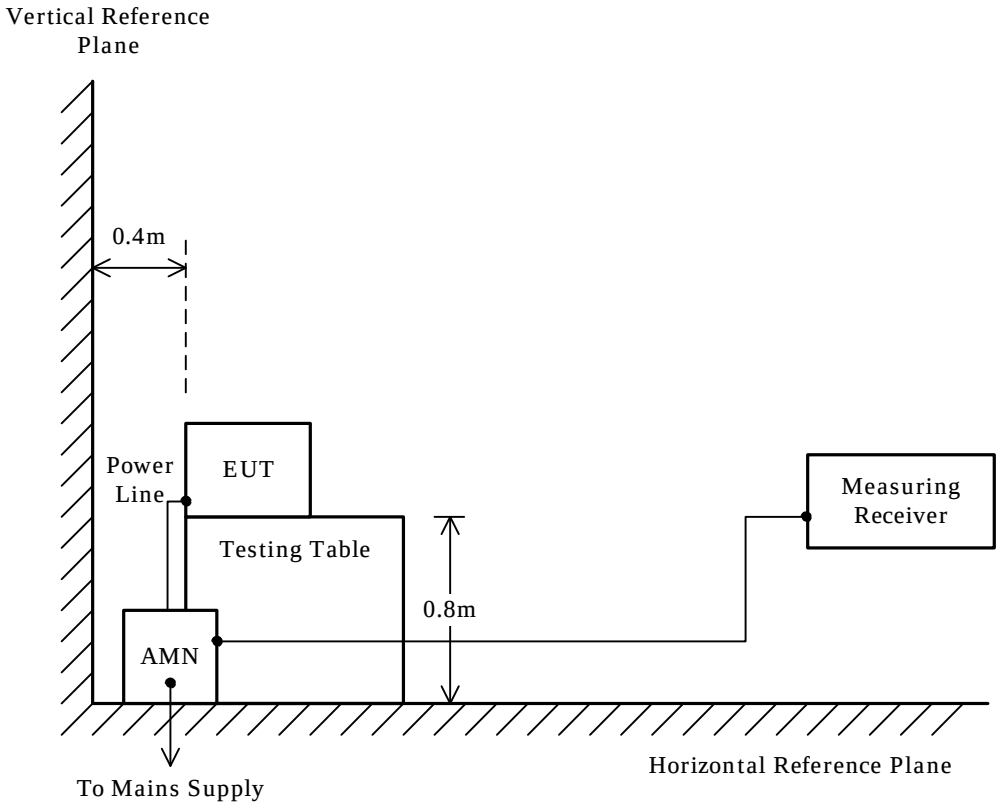
7.8.2 Test Instruments

Shielded Room S1				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESCI	100453 (A-42)	Rohde & Schwarz	2017/12/12
AMN (main)	KNW-407R	8-1832-1 (D-39)	Kyoritsu	2017/09/22
RF Cable	RG223/U	--- (H-7)	HUBER+SUHNER	2017/11/21

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

7.8.3 Test Method and Test Setup (Diagrammatic illustration)

The preliminary tests were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.
The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
This configurations was used for final tests.



NOTE
AMN : Artificial Mains Network

7.8.4 Test Data

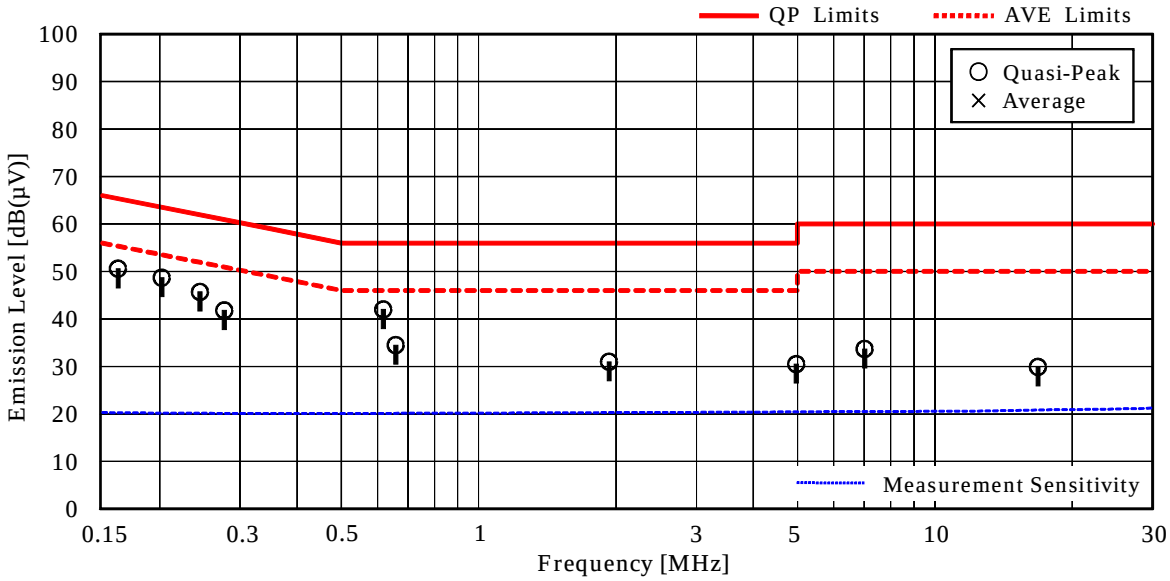
Mode of EUT : All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / 802.11b, 802.11g and 802.11n) has been listed.

Test voltage : 120VAC 60Hz

Test Date: March 13, 2017
Temp.: 20 °C, Humi.: 46 %

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
0.162	10.3	40.3	--	65.4	55.4	50.6	--	+14.8	--	-
0.202	10.2	38.5	--	63.5	53.5	48.7	--	+14.8	--	-
0.245	10.2	35.5	--	61.9	51.9	45.7	--	+16.2	--	-
0.277	10.2	31.6	--	60.9	50.9	41.8	--	+19.1	--	-
0.618	10.1	31.9	--	56.0	46.0	42.0	--	+14.0	--	-
0.658	10.1	24.4	--	56.0	46.0	34.5	--	+21.5	--	-
1.931	10.3	20.7	--	56.0	46.0	31.0	--	+25.0	--	-
4.967	10.4	20.1	--	56.0	46.0	30.5	--	+25.5	--	-
7.013	10.5	23.2	--	60.0	50.0	33.7	--	+26.3	--	-
16.821	10.9	19.0	--	60.0	50.0	29.9	--	+30.1	--	-



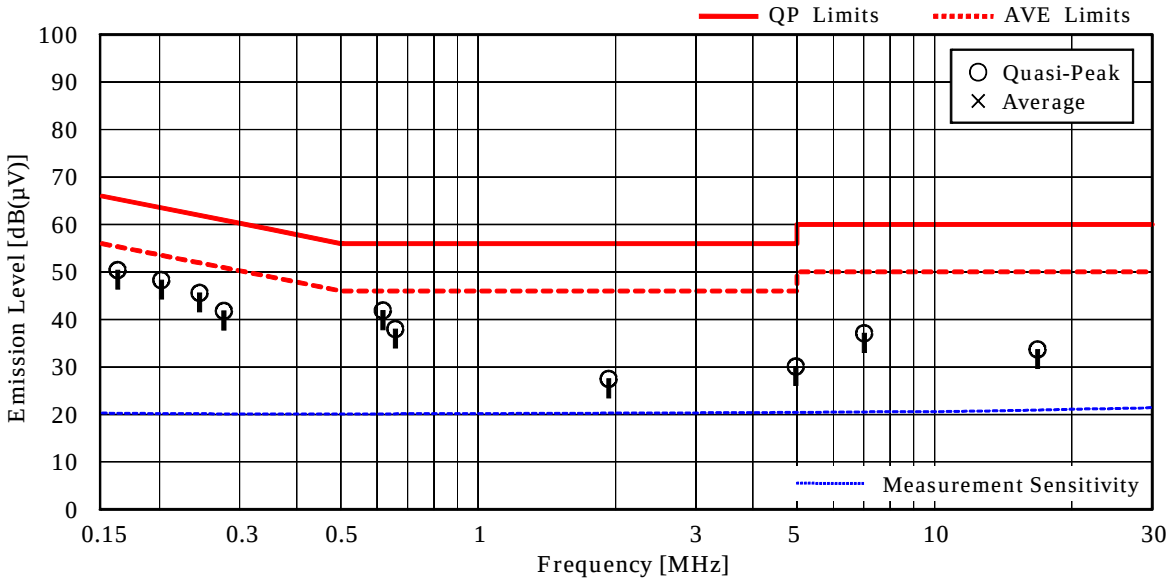
NOTES
1. The spectrum was checked from 150 kHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.618 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.1 + 31.9 = 42.0 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: March 13, 2017
Temp.: 20 °C, Humi.: 46 %

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
0.162	10.3	40.1	--	65.4	55.4	50.4	--	+15.0	--	-
0.202	10.2	38.1	--	63.5	53.5	48.3	--	+15.2	--	-
0.245	10.2	35.4	--	61.9	51.9	45.6	--	+16.3	--	-
0.277	10.2	31.6	--	60.9	50.9	41.8	--	+19.1	--	-
0.618	10.1	31.8	--	56.0	46.0	41.9	--	+14.1	--	-
0.658	10.1	27.9	--	56.0	46.0	38.0	--	+18.0	--	-
1.931	10.3	17.2	--	56.0	46.0	27.5	--	+28.5	--	-
4.967	10.4	19.7	--	56.0	46.0	30.1	--	+25.9	--	-
7.013	10.6	26.5	--	60.0	50.0	37.1	--	+22.9	--	-
16.821	11.0	22.7	--	60.0	50.0	33.7	--	+26.3	--	-



NOTES
1. The spectrum was checked from 150 kHz 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 0.618 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.1 + 31.8 = 41.9 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

7.9 Radiated Emission

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

7.9.1 Test Results

For the standard, **R** - Passed **£** - Failed **£** - Not judged

Min. Limit Margin (Average) 3.0 dB at 4874/4924 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 : Worst case : 802.11b 6ch/11ch (X-axis position)
The measurement result is within the range of measurement uncertainty.

7.9.2 Test Instruments

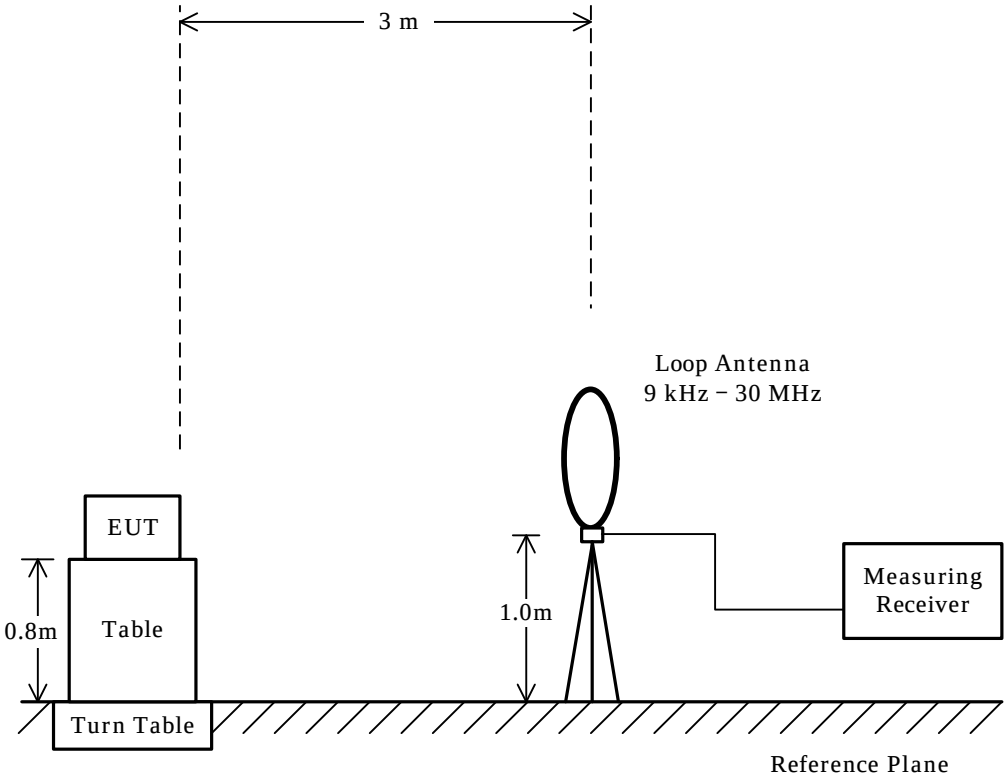
Anechoic Chamber A2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100070	Rohde & Schwarz	2018/01/11
Loop Antenna	HFH2-Z2	860605/030 (C-3)	Rohde & Schwarz	2017/08/01
Biconical Antenna	VHA9103/BBA9106	2355 (C-30)	Schwarzbeck	2017/05/18
Log-periodic Antenna	UHALP9108-A1	0694 (C-31)	Schwarzbeck	2017/05/18
Horn Antenna	91888-2	560 (C-40-1)	EATON	2017/06/12
Horn Antenna	91889-2	560 (C-40-2)	EATON	2017/06/12
Horn Antenna	3160-04	9903-1053 (C-55)	EMCO	2017/06/13
Horn Antenna	3160-05	9902-1061 (C-56)	EMCO	2017/06/13
Horn Antenna	3160-06	9712-1045 (C-57)	EMCO	2017/06/13
Horn Antenna	3160-07	9902-1113 (C-58)	EMCO	2017/06/13
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2017/06/13
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2017/06/15
Pre-Amplifier	310N	304573 (A-17)	SONOMA	2017/04/03
Pre-Amplifier	TPA0118-36	1010 (A-37)	TOYO	2017/05/17
Pre-Amplifier	RP1826G-45H	RP140121-11 (A-53)	EMCS	2017/06/15
Attenuator	54A-10	W5713 (D-29)	Weinschel	2017/08/02
Attenuator	2-10	BA6214 (D-79)	Weinschel	2017/11/21
Band Rejection Filter	BRM50701	029 (D-93)	MICRO-TRONICS	2018/02/14
RF Cable	RG213/U	--- (H-29)	HUBER+SUHNER	2017/08/01
RF Cable	S 10162 B-11 etc.	--- (H-4)	HUBER+SUHNER	2017/04/03
RF Cable	SUCOFLEX104	267479/4 (C-66)	HUBER+SUHNER	2018/01/10
RF Cable	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2018/01/10
RF Cable	SUCOFLEX102EA	3041/2EA (C-69)	HUBER+SUHNER	2018/01/10

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

7.9.3 Test Method and Test Setup (Diagrammatic illustration)

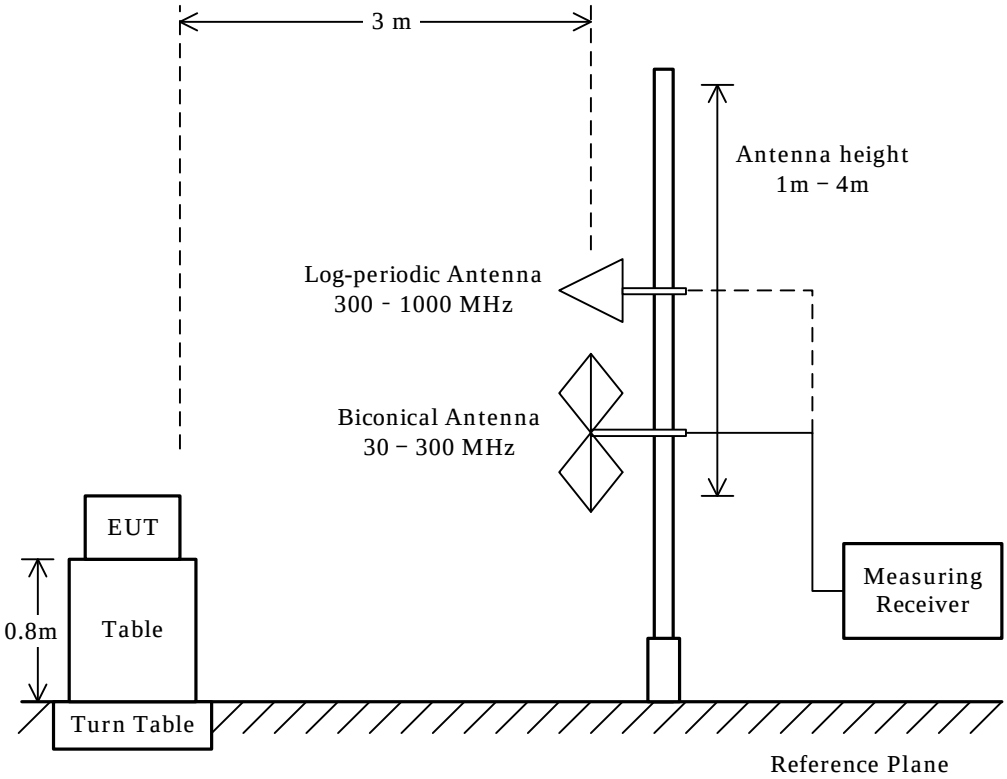
7.9.3.1 Radiated Emission 9 kHz – 30 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.
The EUT configuration (in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.
The measurement were performed about three antenna orientations (parallel, perpendicular, and ground-parallel).
According to KDB 414788, a used anechoic chamber were equivalent to those on an open fields site based on comparison measurements.
This configurations was used for the final tests.



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.



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.

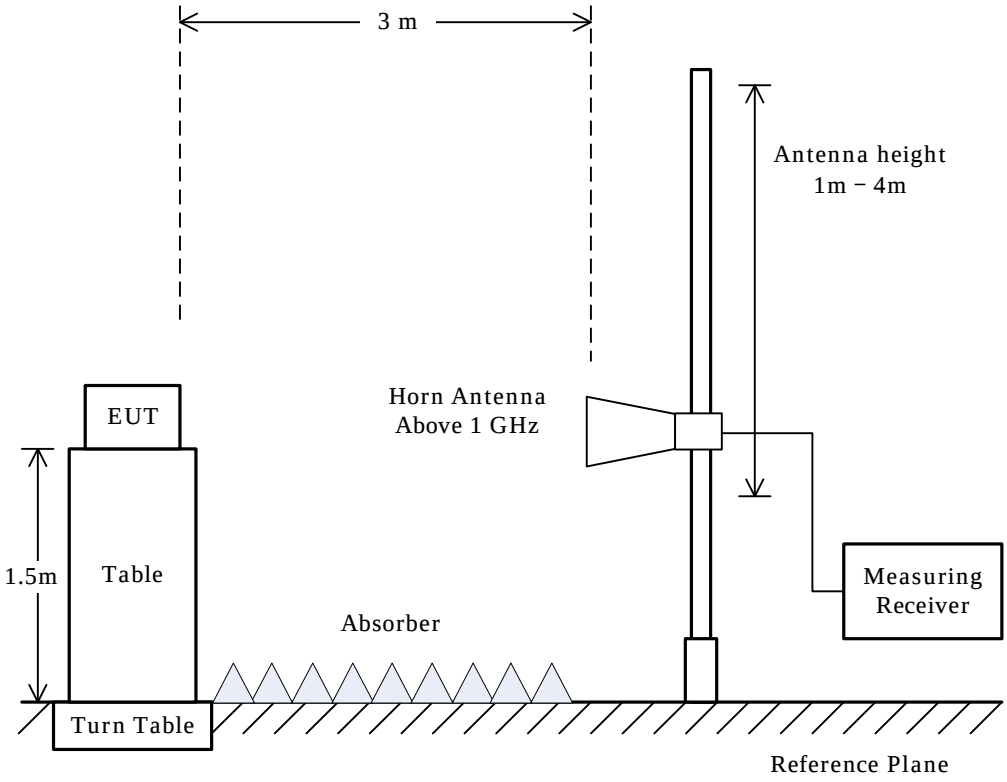
The setting of the measuring instruments are shown as follows:

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

*) T: Minimum transmission duration

Average (VBW) Setting:

Mode	Interval (msec)	Cycle (msec)	Duty cycle (%)	Burst on period(T) (msec)	Min. VBW(1/T) (kHz)	VBW Setting (kHz)
IEEE802.11b(1Mbps)	0.32	33.52	99.0%	33.20	0.03	0.05
IEEE802.11g(54Mbps)	0.40	1.03	61.5%	0.63	1.58	2.00
IEEE802.11n HT20(MCS6)	0.41	1.01	59.2%	0.60	1.68	2.00
IEEE802.11n HT40(MCS5)	0.40	0.75	46.3%	0.35	2.89	3.00



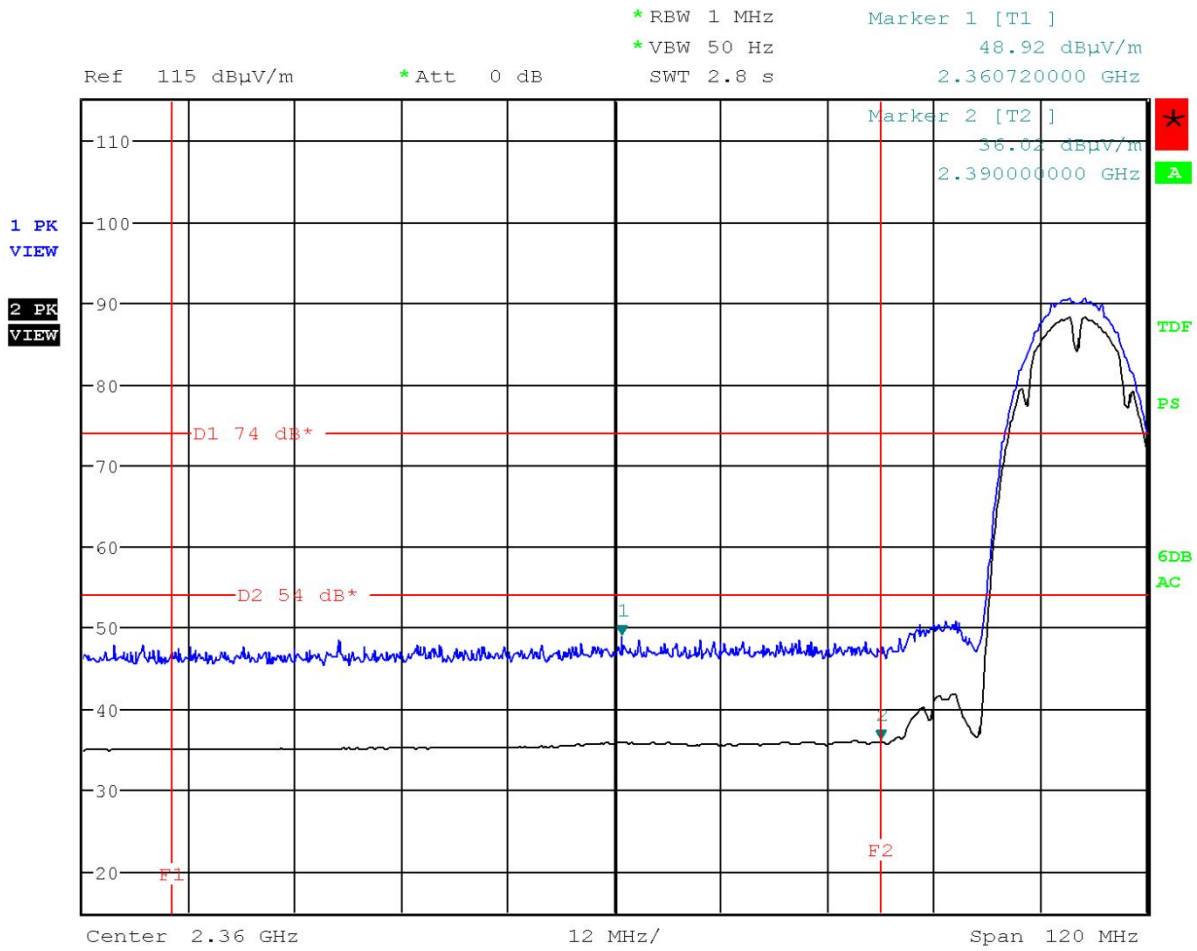
NOTE
When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

7.9.4 Test Data

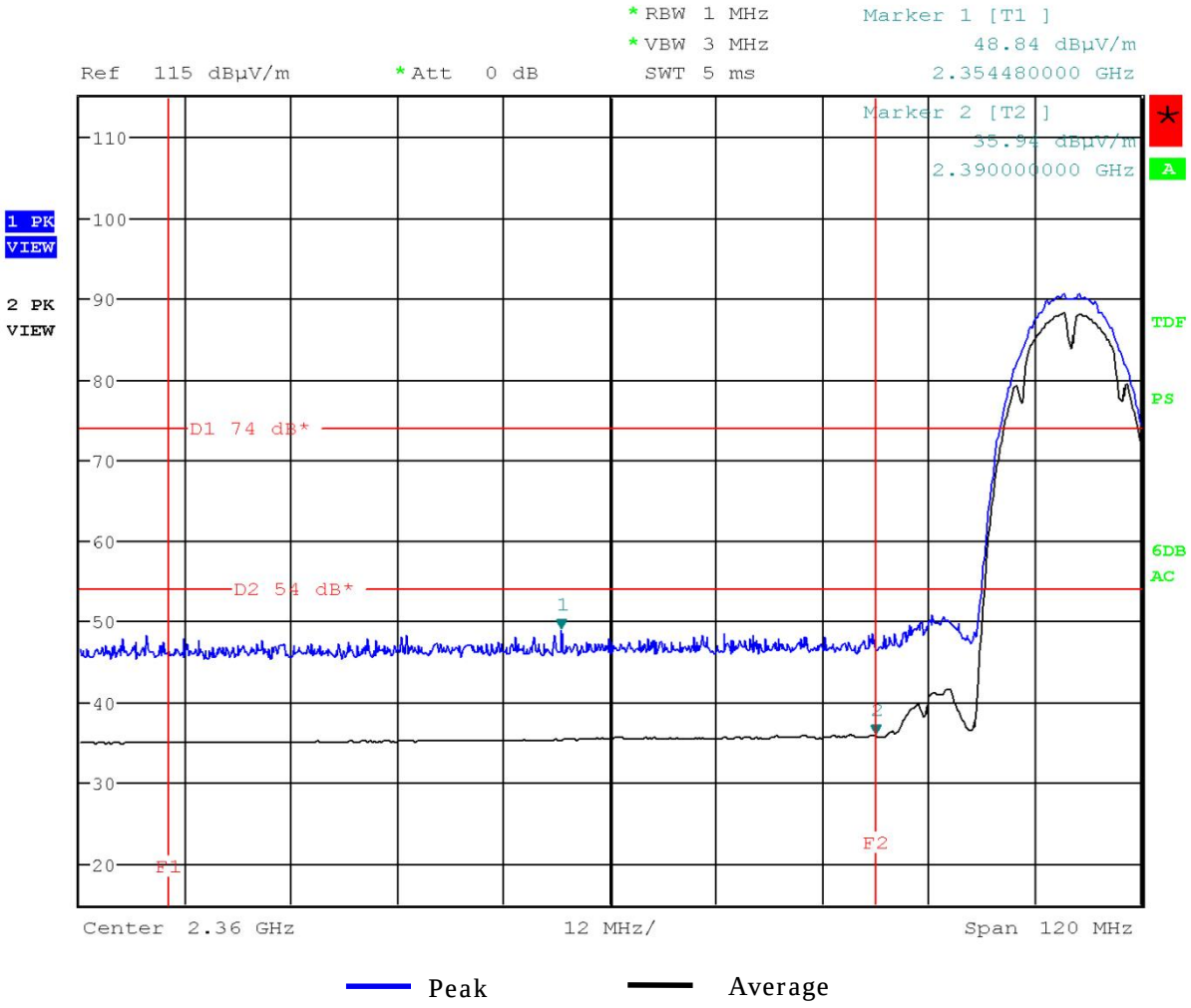
7.9.4.1 Band-edge Compliance

Test Date: February 7, 2017
Temp.: 23 °C, Humi: 48 %

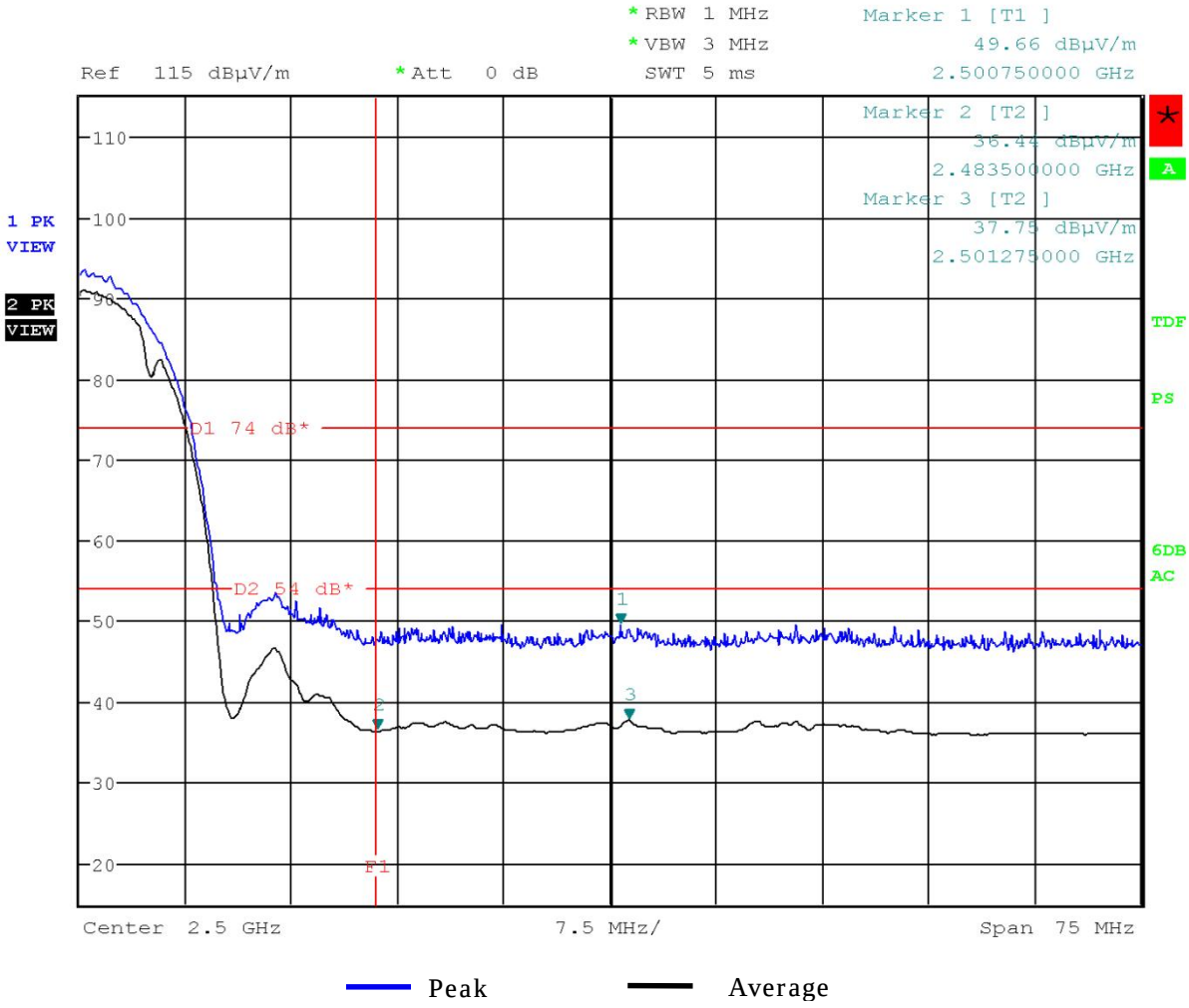
Mode of EUT : 1ch: 2412 MHz, (802.11b)
Antenna Polarization : Horizontal



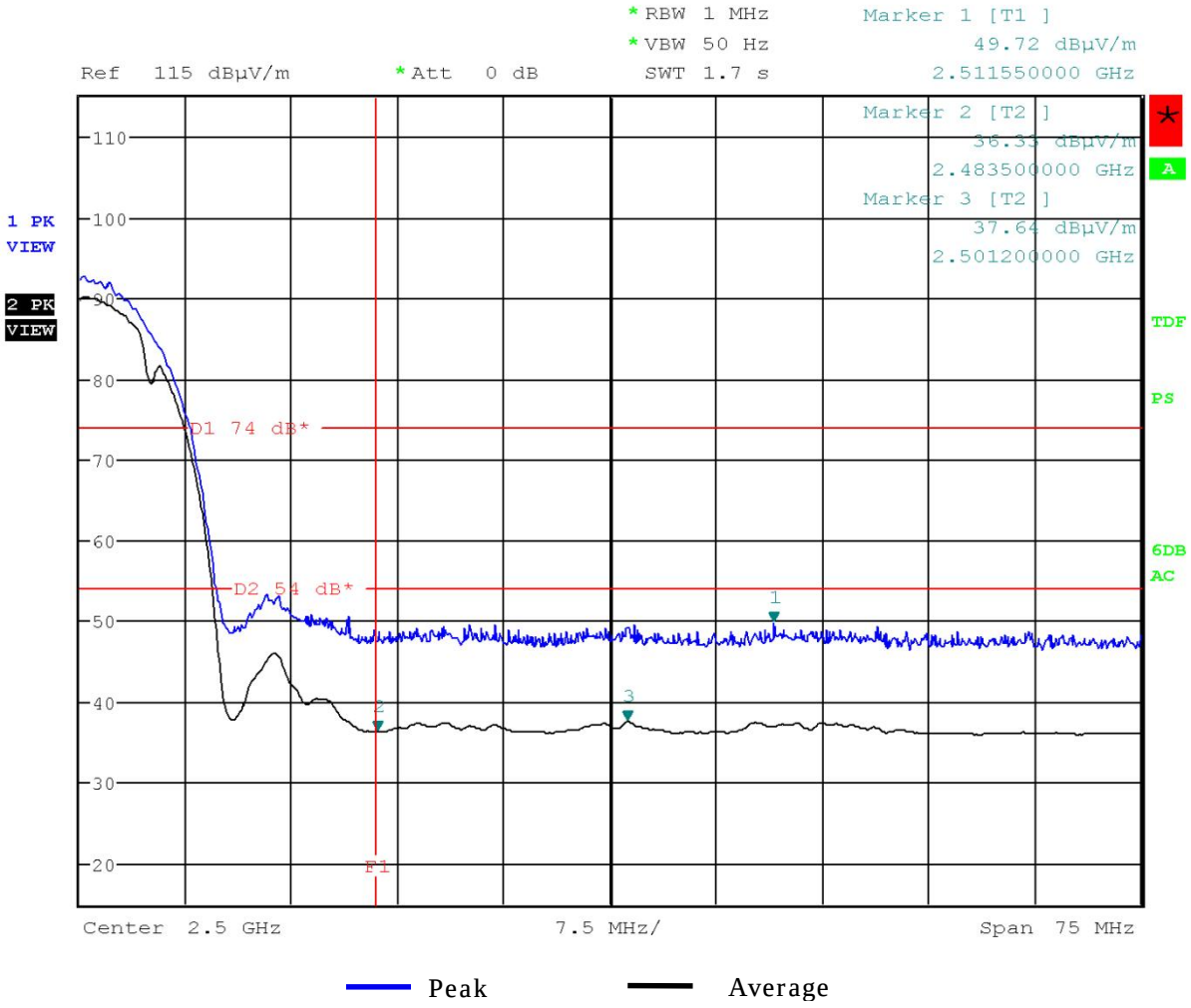
Mode of EUT : 1ch: 2412 MHz, (802.11b)
Antenna Polarization : Vertical



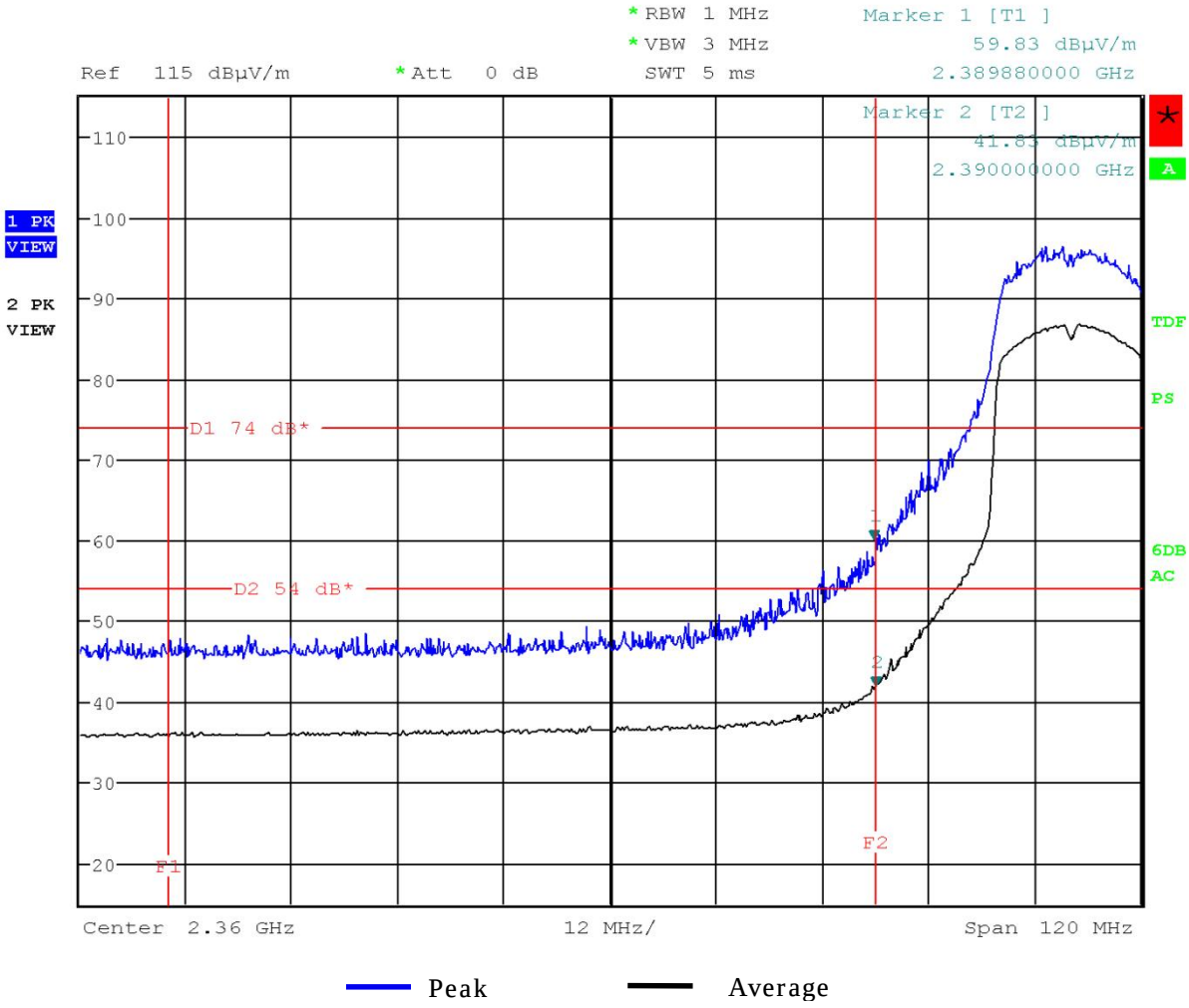
Mode of EUT : 11ch: 2462 MHz, (802.11b)
Antenna Polarization : Horizontal



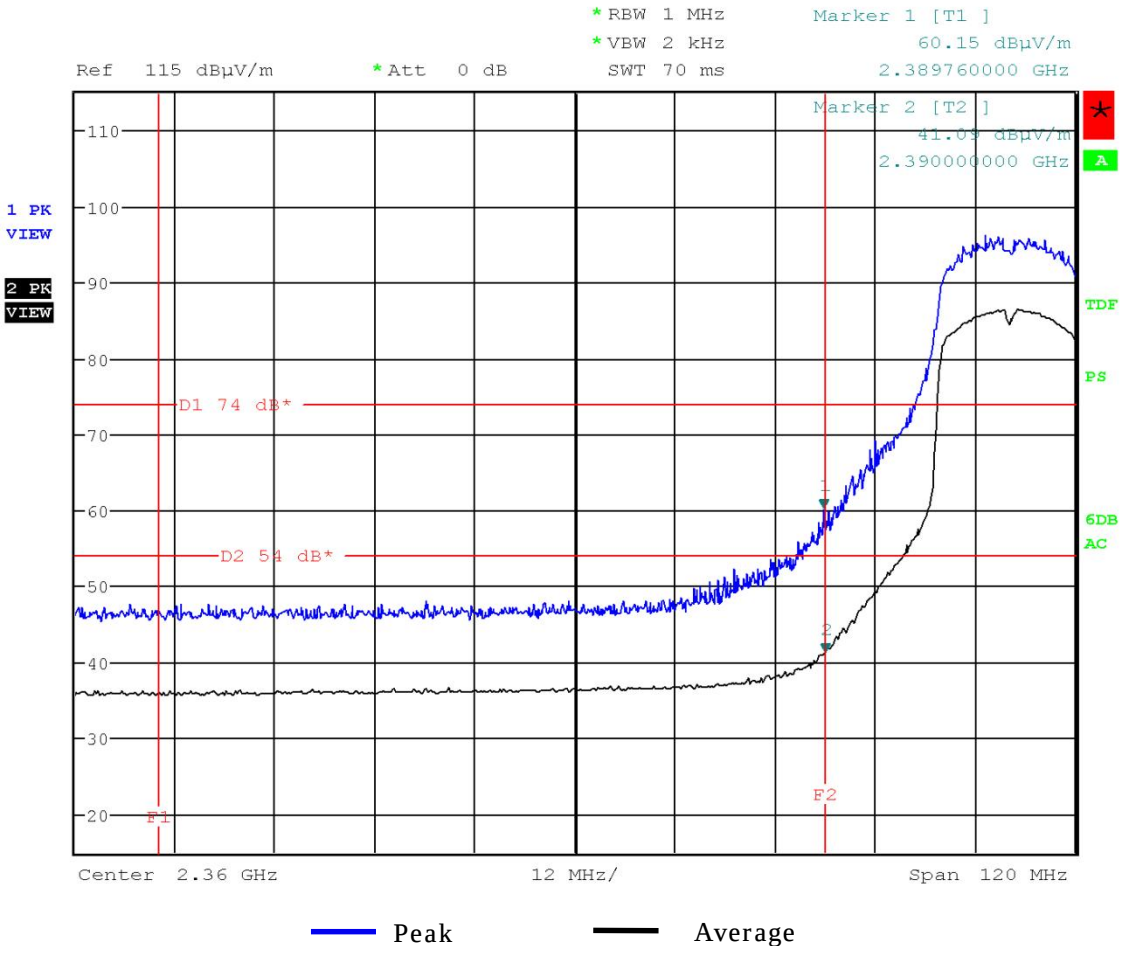
Mode of EUT : 11ch: 2462 MHz, (802.11b)
Antenna Polarization : Vertical



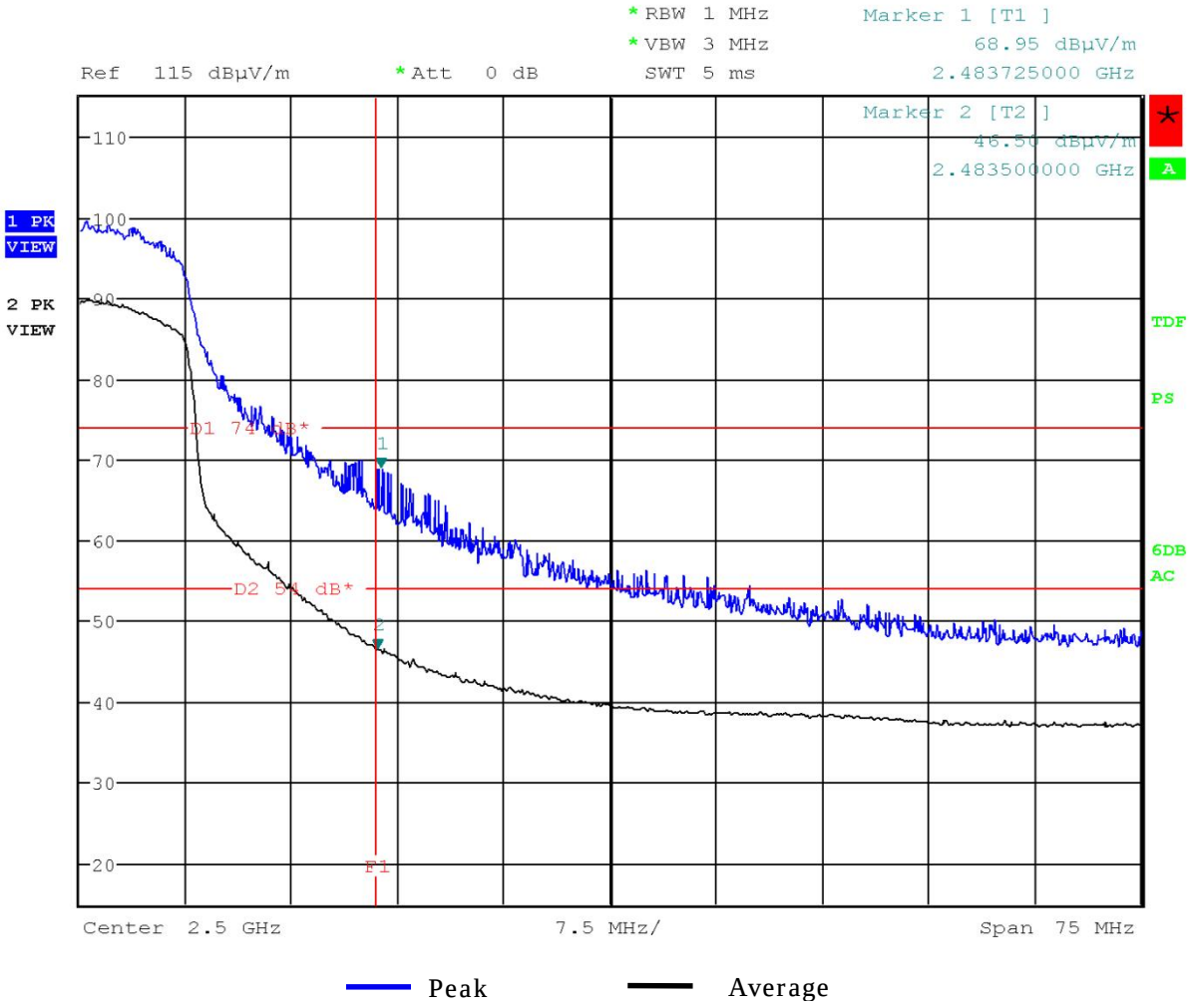
Mode of EUT : 1ch: 2412 MHz, (802.11g)
Antenna Polarization : Horizontal



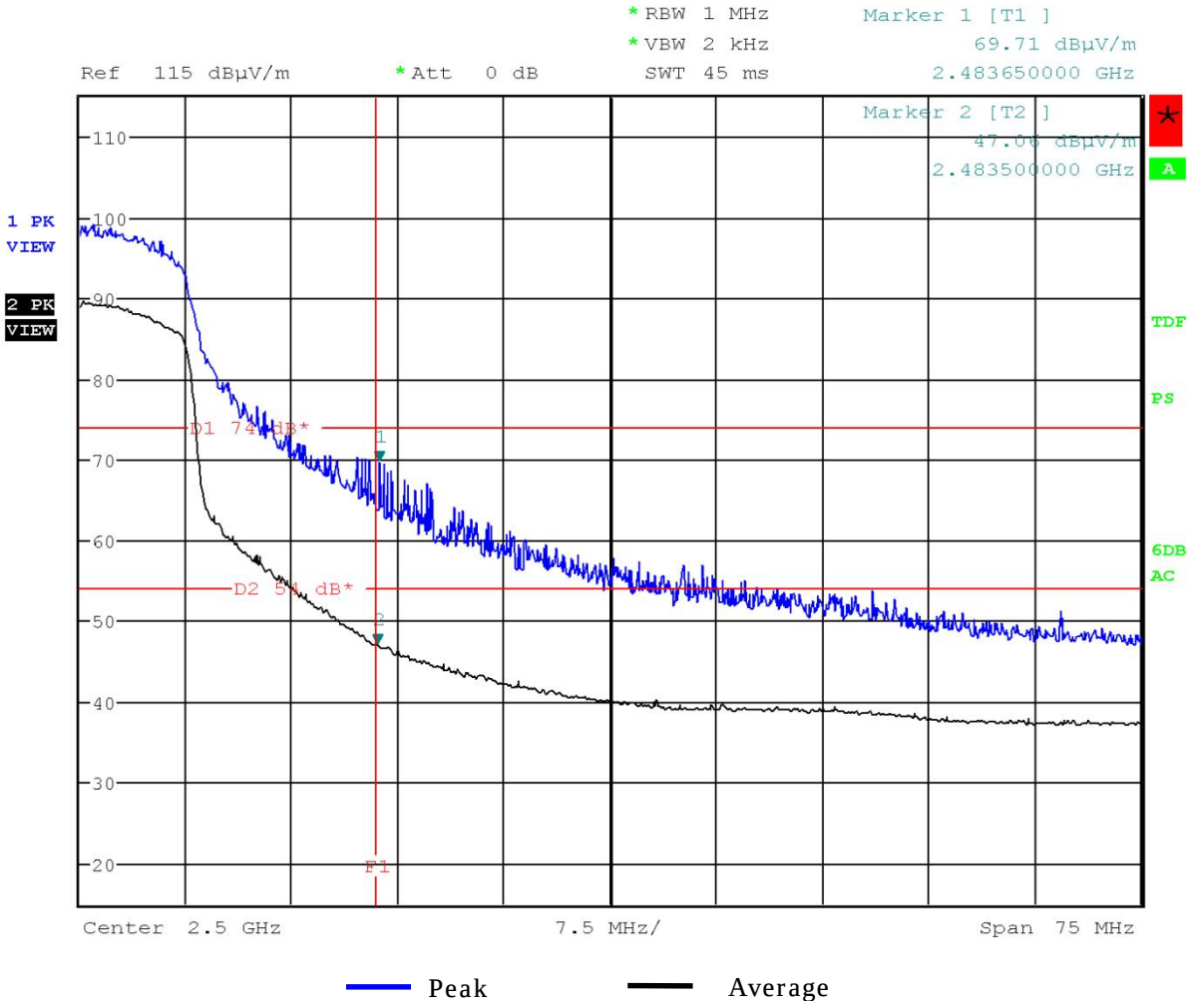
Mode of EUT : 1ch: 2412 MHz, (802.11g)
Antenna Polarization : Vertical



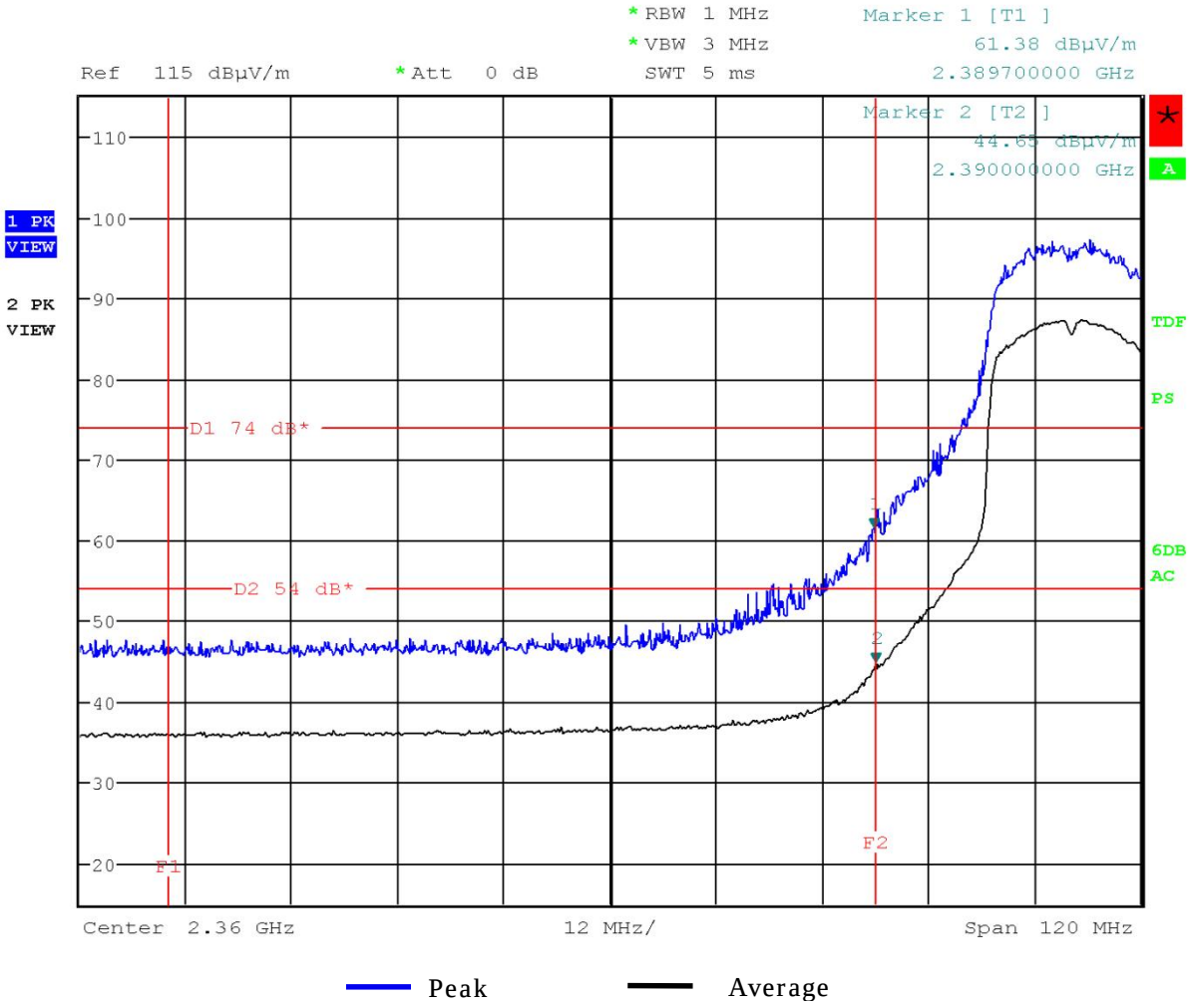
Mode of EUT : 11ch: 2462 MHz, (802.11g)
Antenna Polarization : Horizontal



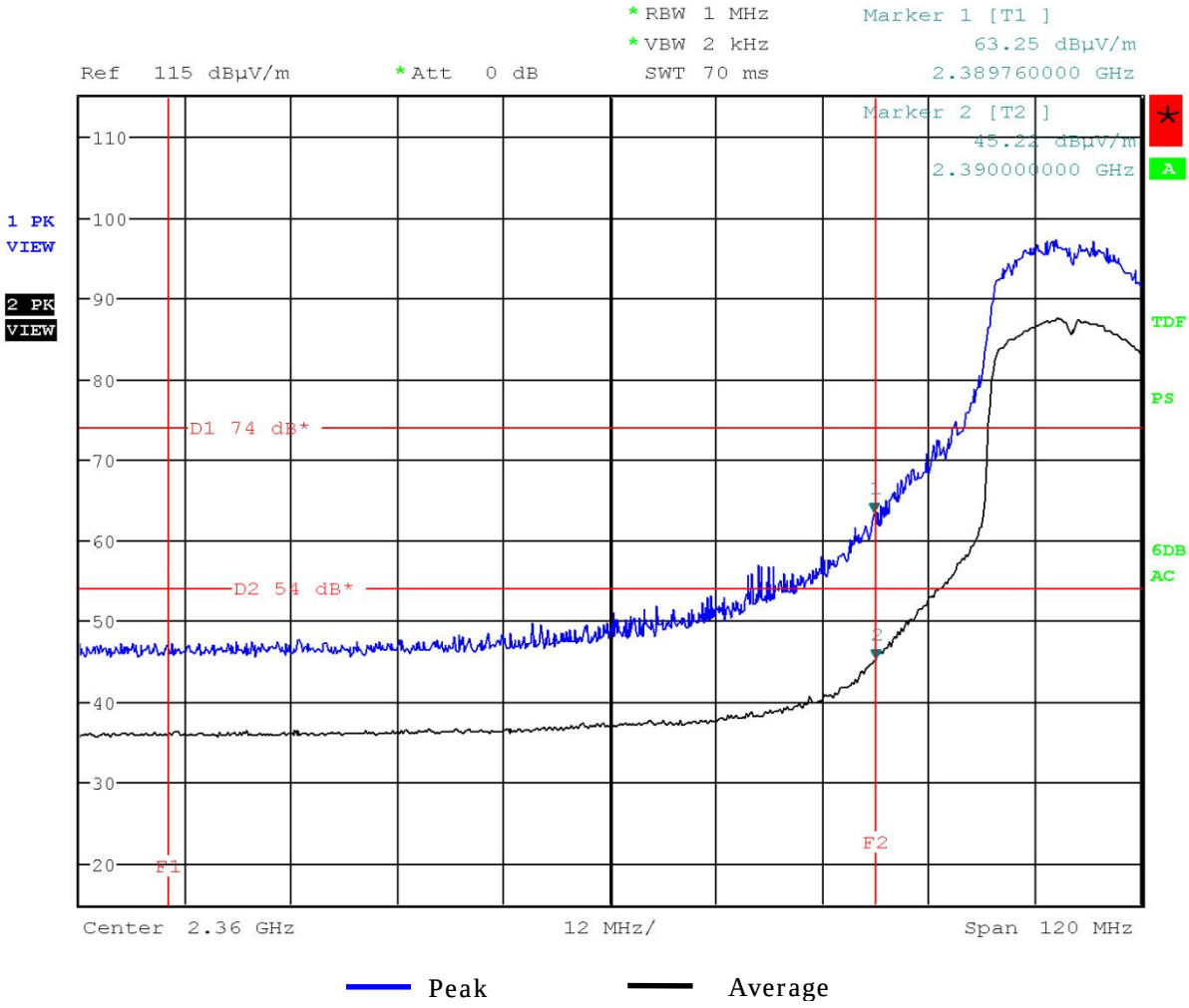
Mode of EUT : 11ch: 2462 MHz, (802.11g)
Antenna Polarization : Vertical



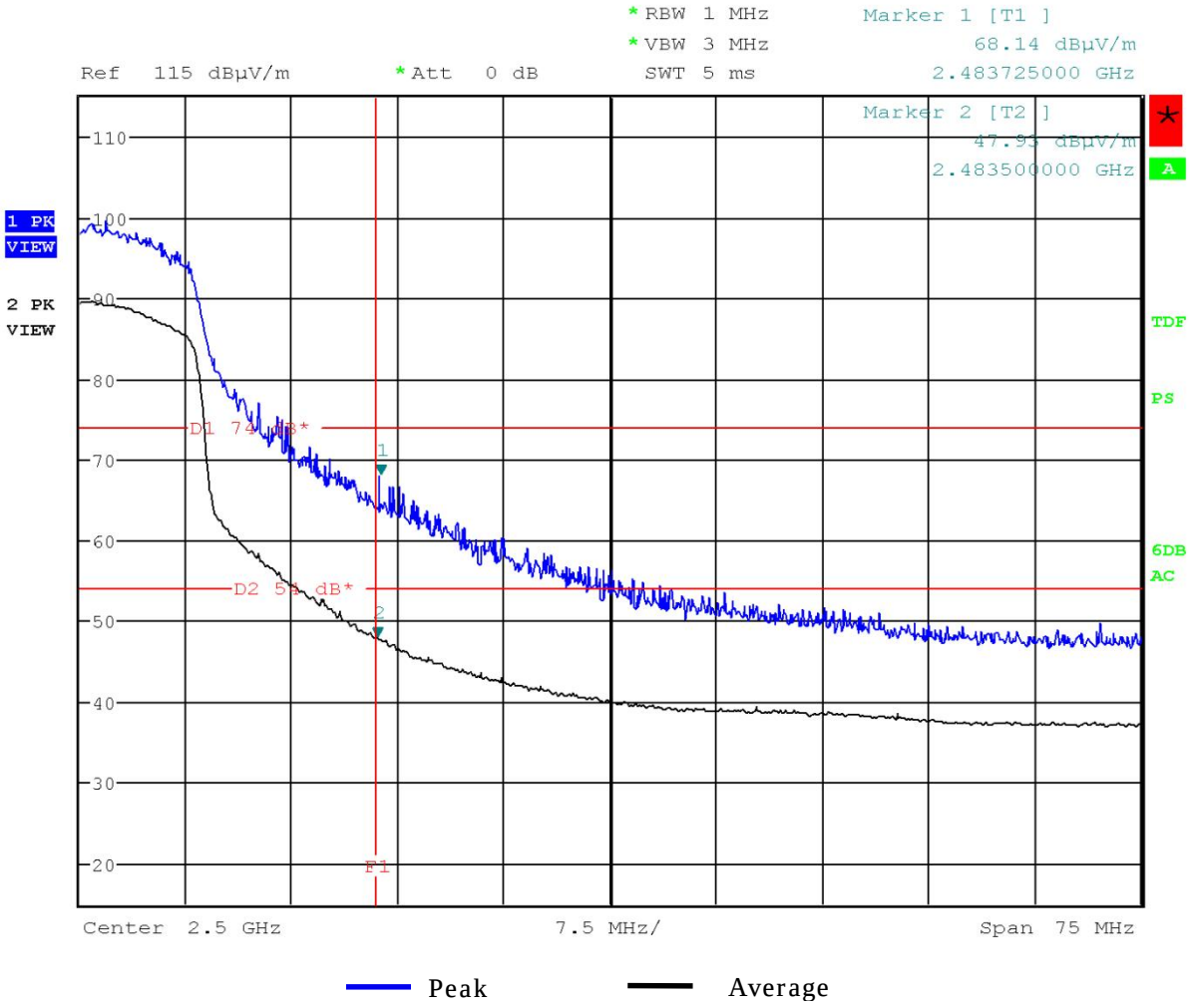
Mode of EUT : 1ch: 2412 MHz, (802.11n HT20)
Antenna Polarization : Horizontal



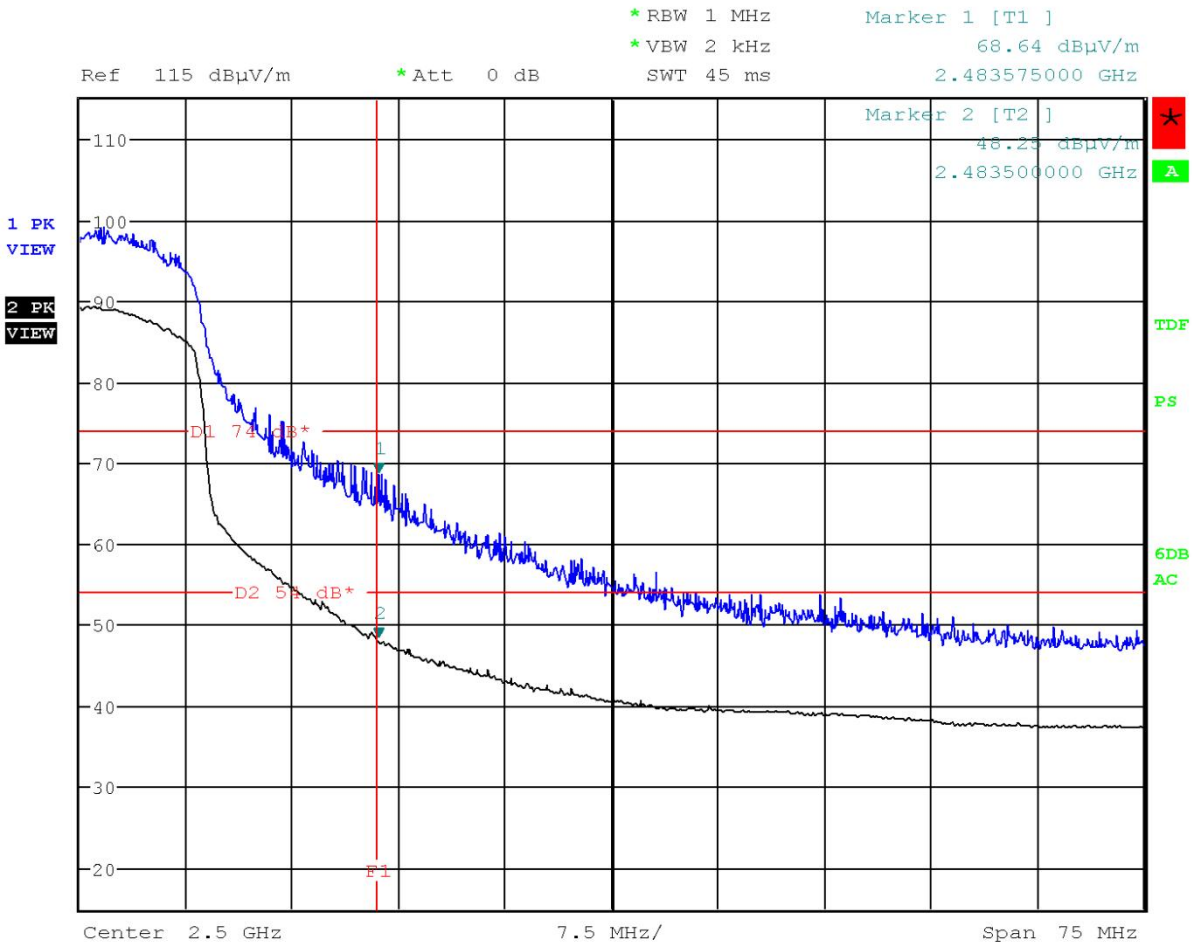
Mode of EUT : 1ch: 2412 MHz, (802.11n HT20)
Antenna Polarization : Vertical



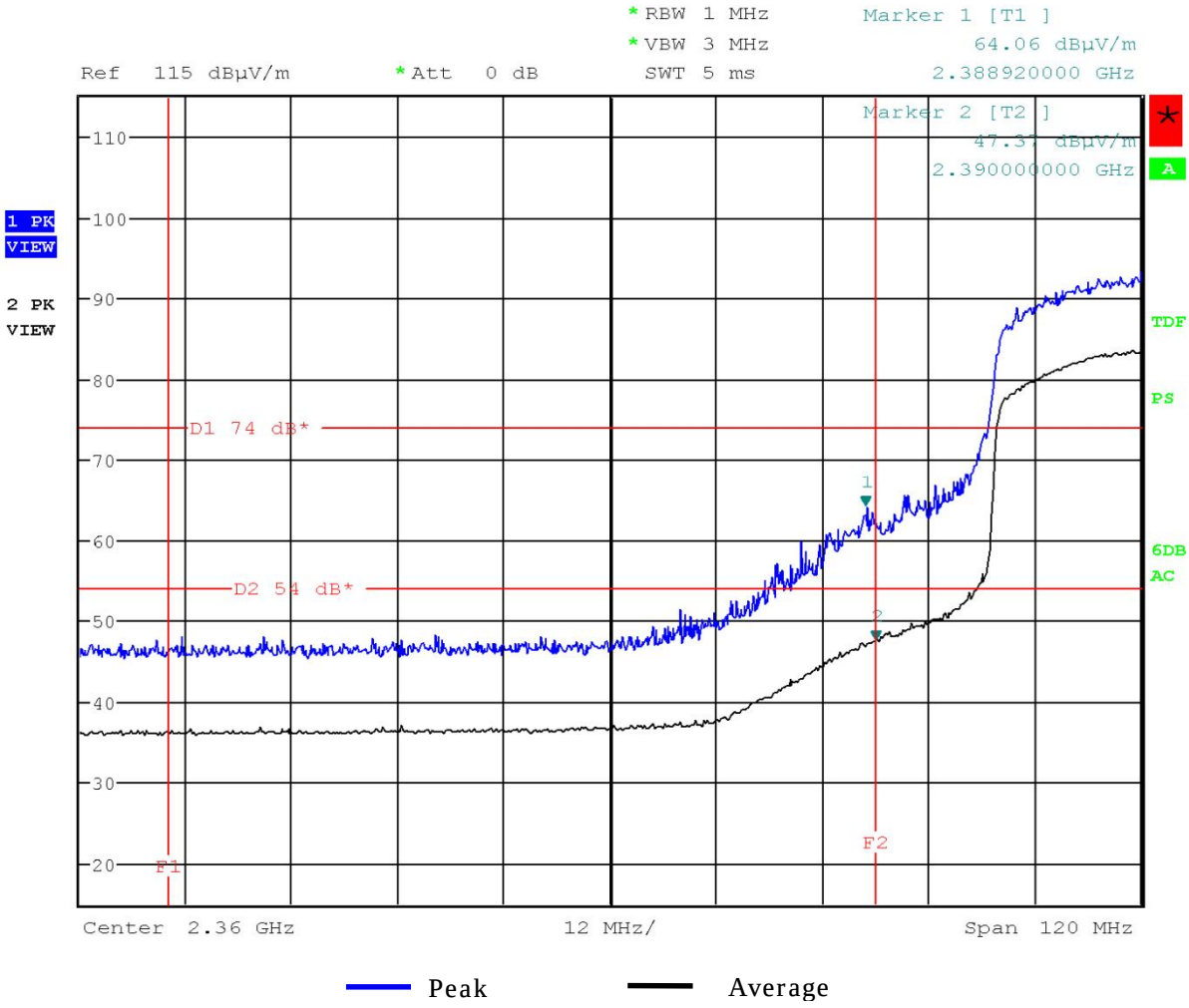
Mode of EUT : 11ch: 2462 MHz, (802.11n HT20)
Antenna Polarization : Horizontal



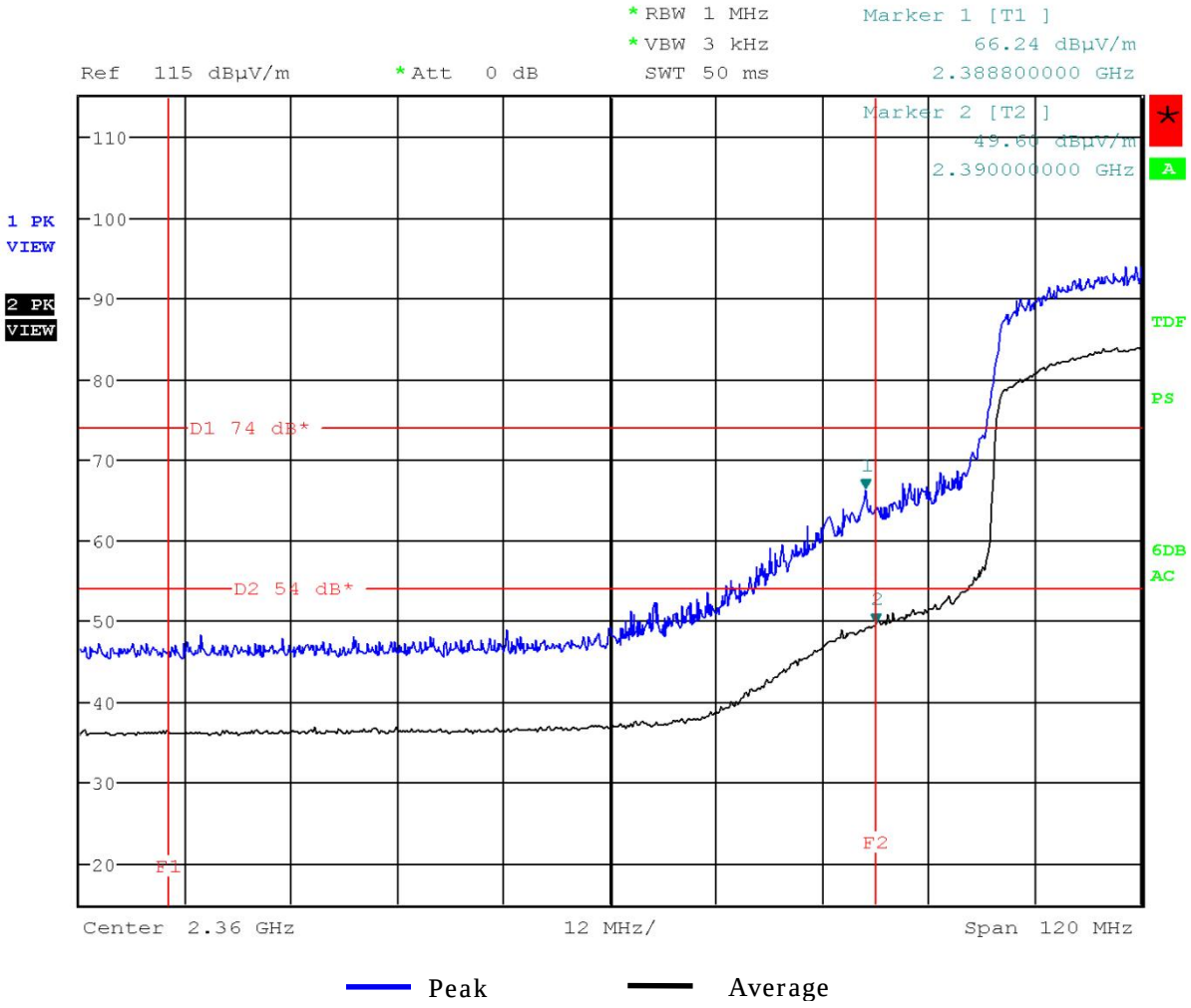
Mode of EUT : 11ch: 2462 MHz, (802.11n HT20)
Antenna Polarization : Vertical



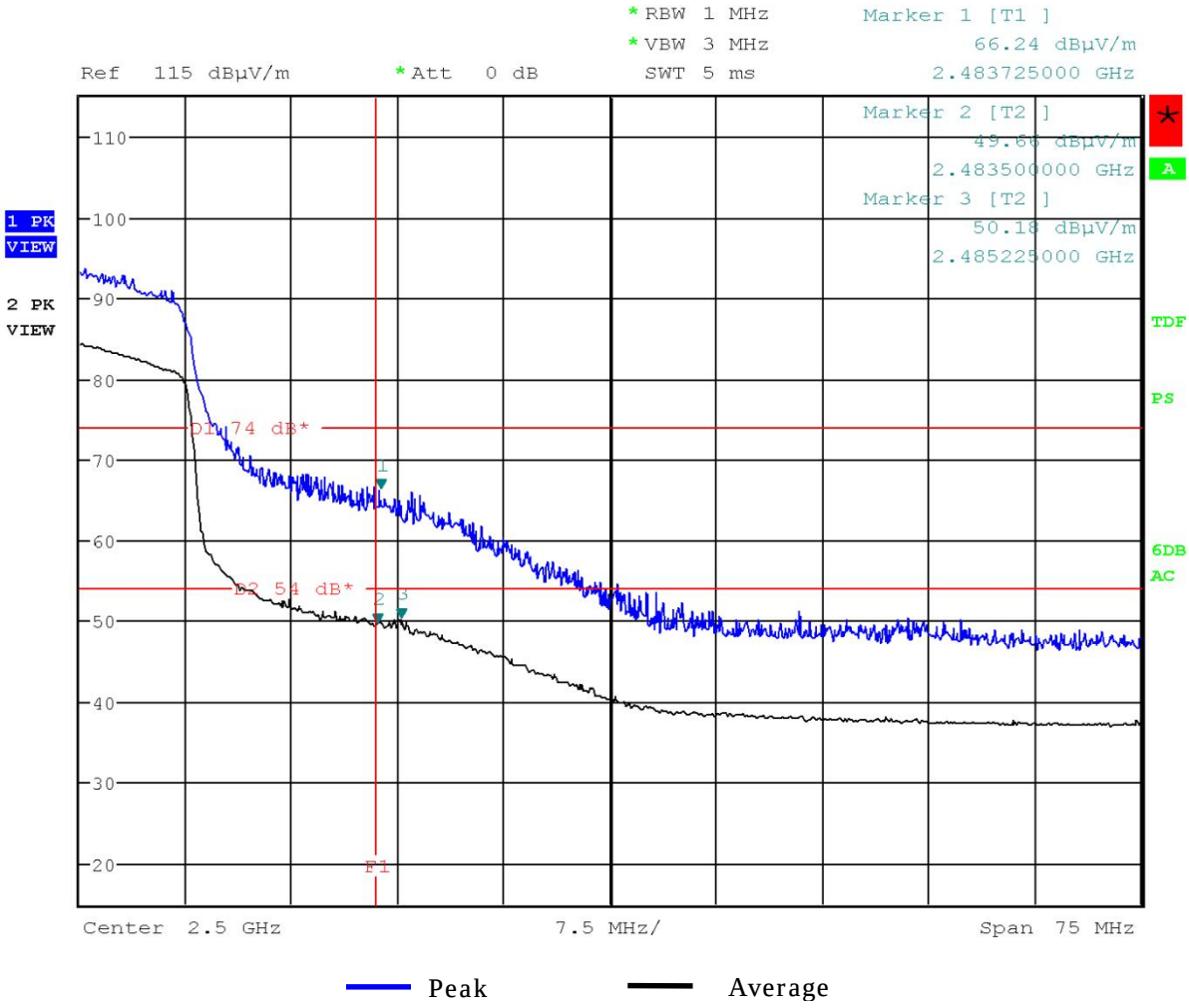
Mode of EUT : 3ch: 2422 MHz, (802.11n HT40)
Antenna Polarization : Horizontal



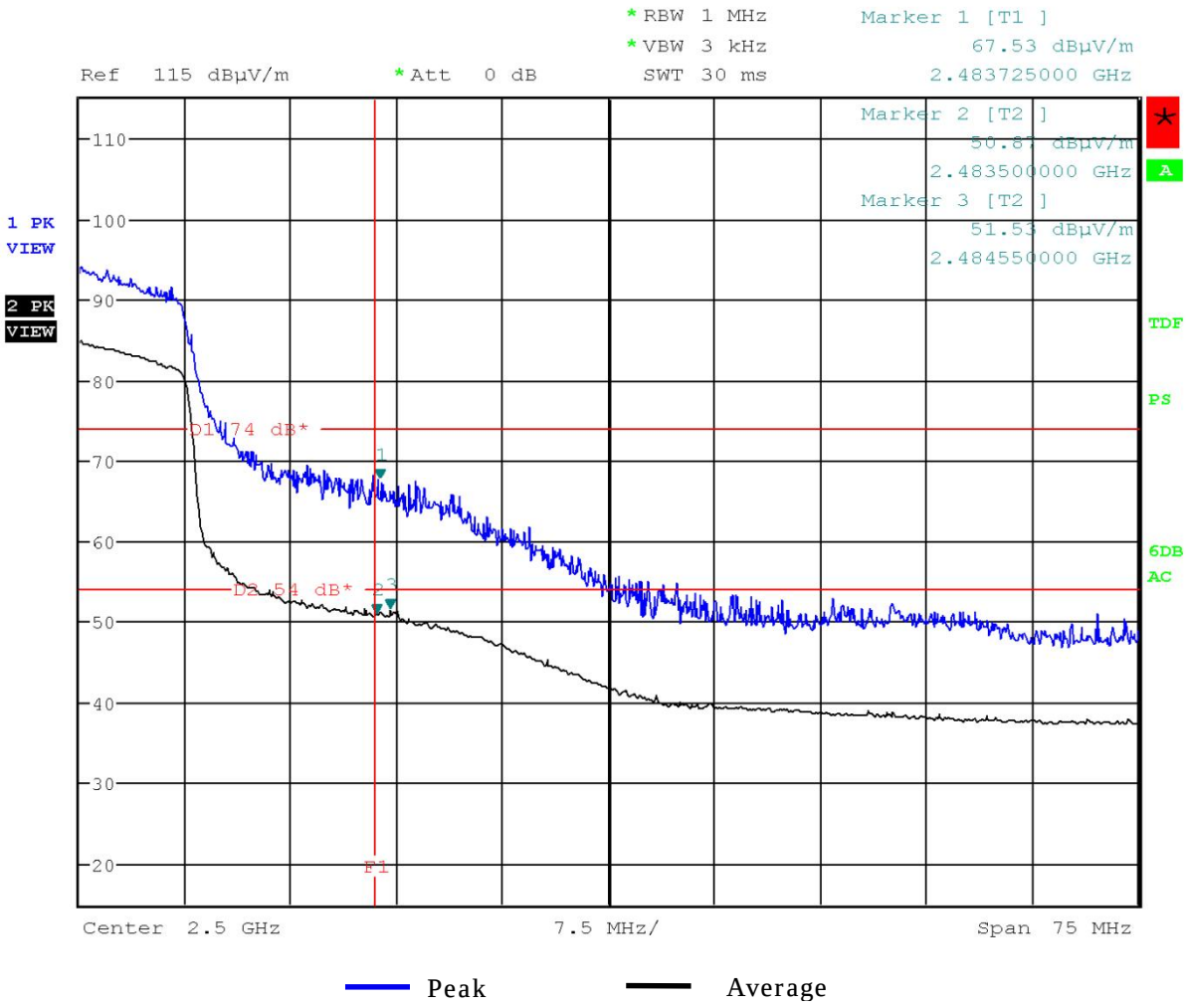
Mode of EUT : 3ch: 2422 MHz, (802.11n HT40)
Antenna Polarization : Vertical



Mode of EUT : 9ch: 2452 MHz, (802.11n HT40)
Antenna Polarization : Horizontal



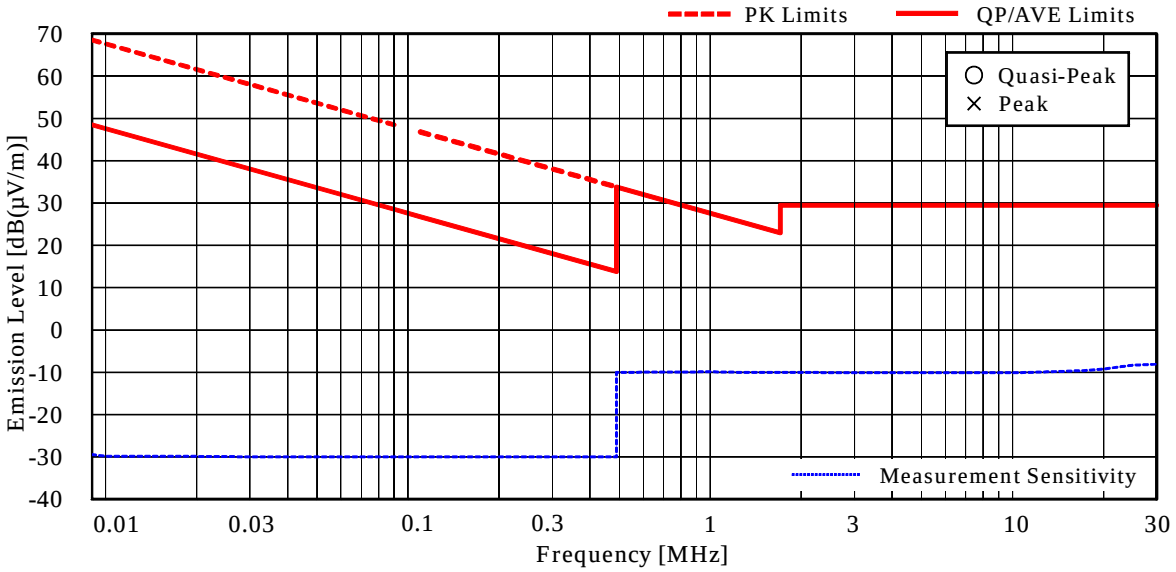
Mode of EUT : 9ch: 2452 MHz, (802.11n HT40)
Antenna Polarization : Vertical



7.9.4.2 Other Spurious Emission (9kHz – 30MHz)

Test Date: February 2, 2017
Temp.: 22 °C, Humi: 38 %

Mode of EUT : All modes have been investigated and the worst case mode has been listed.
Results : No spurious emissions in the range 20dB below the limit.



NOTES
1. Test Distance : 3 m (Specified Distance D [m] = 300 m (9 kHz - 490 kHz) / 30 m (490 kHz - 30 MHz))
2. The spectrum was checked from 9 kHz to 30 MHz.
3. The distance conversion factor (40dB/decade) is applied for the test result calculation.
4. PK : Peak Detector / QP : Quasi-Peak Detector / AVE : Average Detector
5. Test receiver setting(s) :
   PK/AVE 200 Hz (9 kHz - 90 kHz, 110 kHz - 150 kHz) / PK/AVE 9 kHz (150 kHz - 490 kHz)
   CISPR QP 200 Hz (90 kHz - 110 kHz) / CISPR QP 9 kHz (490 kHz - 30 MHz)
6. Since the average limit is met when using a peak detector , the results are deemed to meet both limits.

7.9.4.3 Other Spurious Emission (30MHz – 1000MHz)

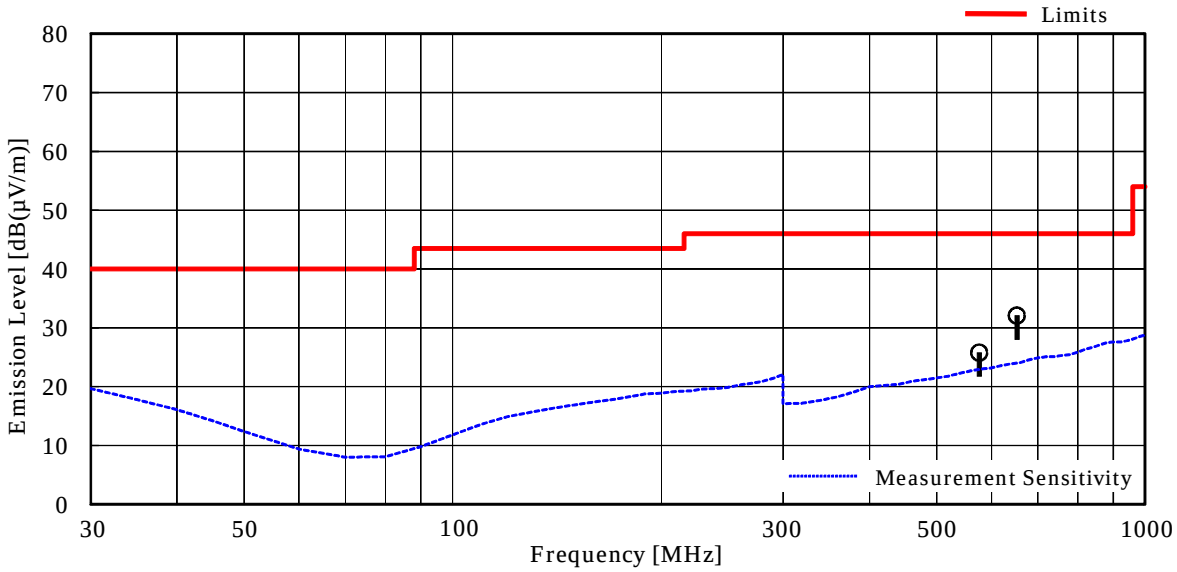
Mode of EUT : All modes have been investigated and the worst case mode for channel (06ch: 2437MHz / 802.11b, 802.11g and 802.11n) has been listed.

Test voltage : 3.7VDC

Test Date: February 2, 2017
Temp.: 22 °C, Humi: 38 %

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
575.99	18.8	4.2	2.8	46.0	25.8	+20.2	-
652.79	19.6	4.4	8.1	46.0	32.1	+13.9	-



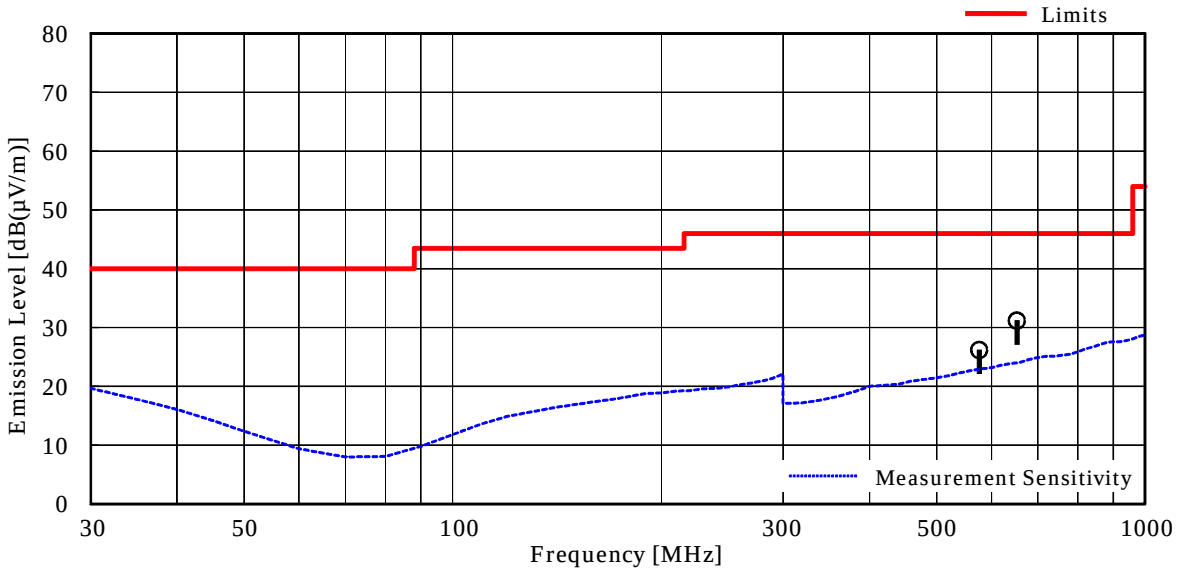
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 652.79 MHz, as the worst point shown on underline:
   Antenna Factor + Correction Factor + Meter Reading = 19.6 + 4.4 + 8.1 = 32.1 dB(μV/m)
   Antenna Height : 142 cm, Turntable Angle : 338 °
7. Test receiver setting(s) : CISPR QP 120 kHz [QP : Quasi-Peak]

Test voltage : 3.7VDC

Test Date: February 2, 2017
Temp.: 22 °C, Humi: 38 %

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
575.99	18.8	4.2	3.2	46.0	26.2	+19.8	-
652.79	19.6	4.4	7.2	46.0	31.2	+14.8	-



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 652.79 MHz, as the worst point shown on underline:
   Antenna Factor + Correction Factor + Meter Reading = 19.6 + 4.4 + 7.2 = 31.2 dB(μV/m)
   Antenna Height : 100 cm, Turntable Angle : 50 °
7. Test receiver setting(s) : CISPR QP 120 kHz [QP : Quasi-Peak]

7.9.4.4 Other Spurious Emission (above 1 GHz)

Mode of EUT : 802.11b

Test Date: February 4, 2017
Temp.: 24 °C, Humi: 52 %

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	27.0	-15.8	41.7	37.6	40.8	35.9	74.0	54.0	52.9	48.8	+ 5.2	
12060.0	33.4	-25.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 46.0	< 36.0	> +18.0	
14472.0	37.0	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.9	< 38.9	> +15.1	
19296.0	40.5	-43.0	52.2	47.7	53.2	49.3	74.0	54.0	50.7	46.8	+ 7.2	
Test condition : TX Middle Ch												
4874.0	27.0	-15.9	43.5	39.9	40.4	35.0	74.0	54.0	54.6	51.0	+ 3.0	
7311.0	29.9	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.8	< 41.8	> +12.2	
12185.0	33.3	-25.7	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.6	< 35.6	> +18.4	
19496.0	40.5	-43.0	52.5	48.4	53.3	49.6	74.0	54.0	50.8	47.1	+ 6.9	
Test condition : TX High Ch												
4924.0	27.0	-15.8	43.2	39.8	41.9	36.6	74.0	54.0	54.4	51.0	+ 3.0	
7386.0	29.8	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.7	< 41.7	> +12.3	
12310.0	33.3	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	
19696.0	40.5	-43.0	52.9	48.3	53.7	50.0	74.0	54.0	51.2	47.5	+ 6.5	
22158.0	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 4874.0 MHz, as the worst point shown on underline:

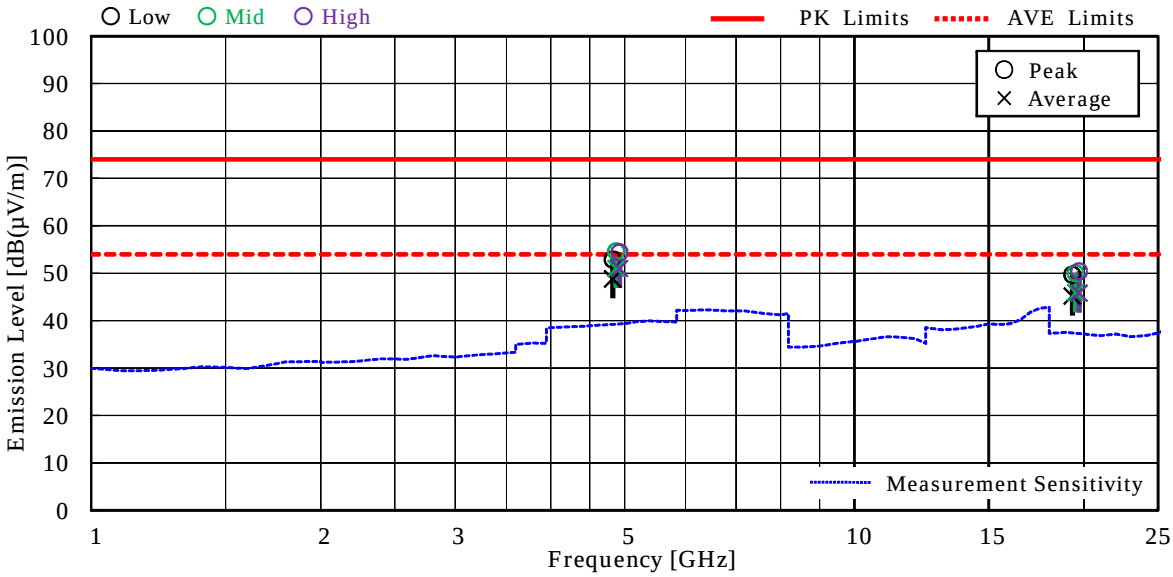
	Antenna Factor	=	27.0 dB(1/m)
	Corr. Factor	=	-15.9 dB
+)	Meter Reading	=	39.9 dB(μV)
	Result	=	51.0 dB(μV/m)

Minimum Margin: 54.0 - 51.0 = 3.0 (dB)

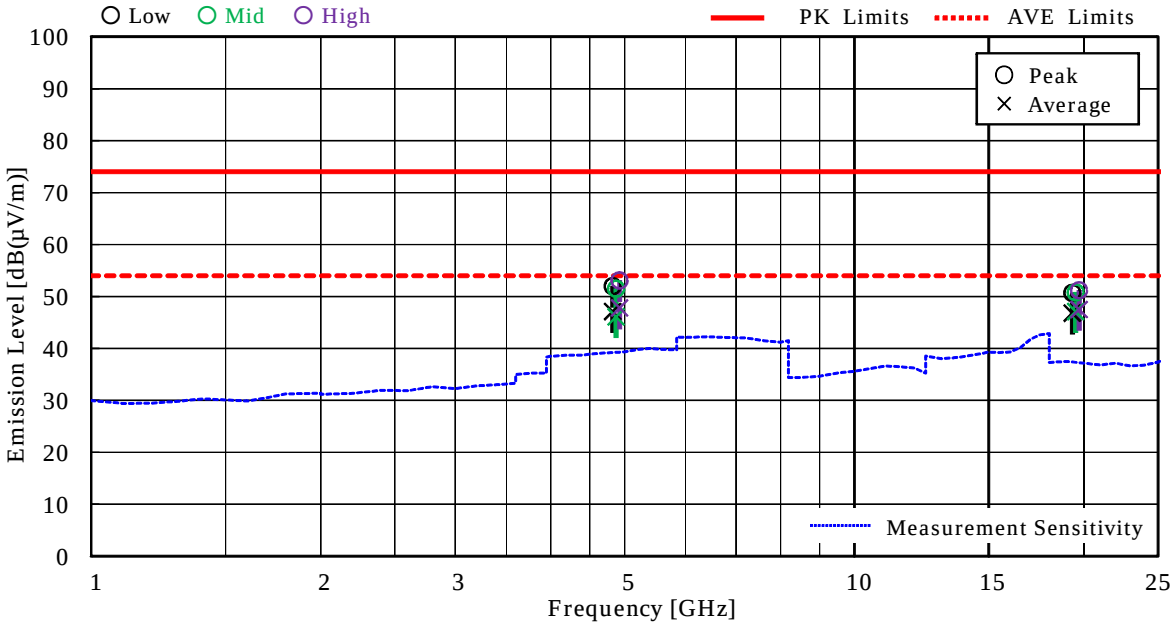
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB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

Mode of EUT : 802.11b

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : 802.11g

Test Date: February 4, 2017
Temp.: 24 °C, Humi: 52 %

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	27.0	-15.8	41.6	31.5	41.9	32.3	74.0	54.0	53.1	43.5	+10.5	-
12060.0	33.4	-25.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 46.0	< 36.0	> +18.0	-
14472.0	37.0	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.9	< 38.9	> +15.1	-
19296.0	40.5	-43.0	52.5	48.1	53.0	49.2	74.0	54.0	50.5	46.7	+ 7.3	-
Test condition : TX Middle Ch												
4874.0	27.0	-15.9	42.9	32.1	43.1	32.2	74.0	54.0	54.2	43.3	+10.7	-
7311.0	29.9	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.8	< 41.8	> +12.2	-
12185.0	33.3	-25.7	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.6	< 35.6	> +18.4	-
19496.0	40.5	-43.0	52.8	48.5	53.0	49.0	74.0	54.0	50.5	46.5	+ 7.5	-
Test condition : TX High Ch												
4924.0	27.0	-15.8	42.7	32.7	44.4	33.1	74.0	54.0	55.6	44.3	+ 9.7	-
7386.0	29.8	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.7	< 41.7	> +12.3	-
12310.0	33.3	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	-
19696.0	40.5	-43.0	52.8	49.0	54.3	51.1	74.0	54.0	51.8	48.6	+ 5.4	-
22158.0	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 19696.0 MHz, as the worst point shown on underline:

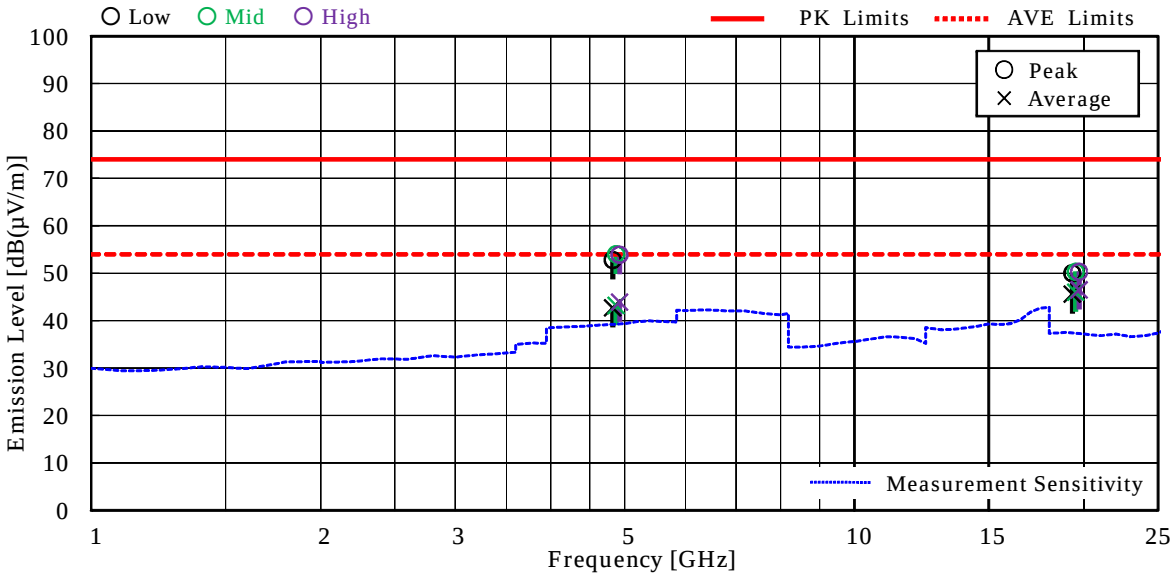
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.0 dB
+)	Meter Reading	=	51.1 dB(μV)
	Result	=	48.6 dB(μV/m)

Minimum Margin: 54.0 - 48.6 = 5.4 (dB)

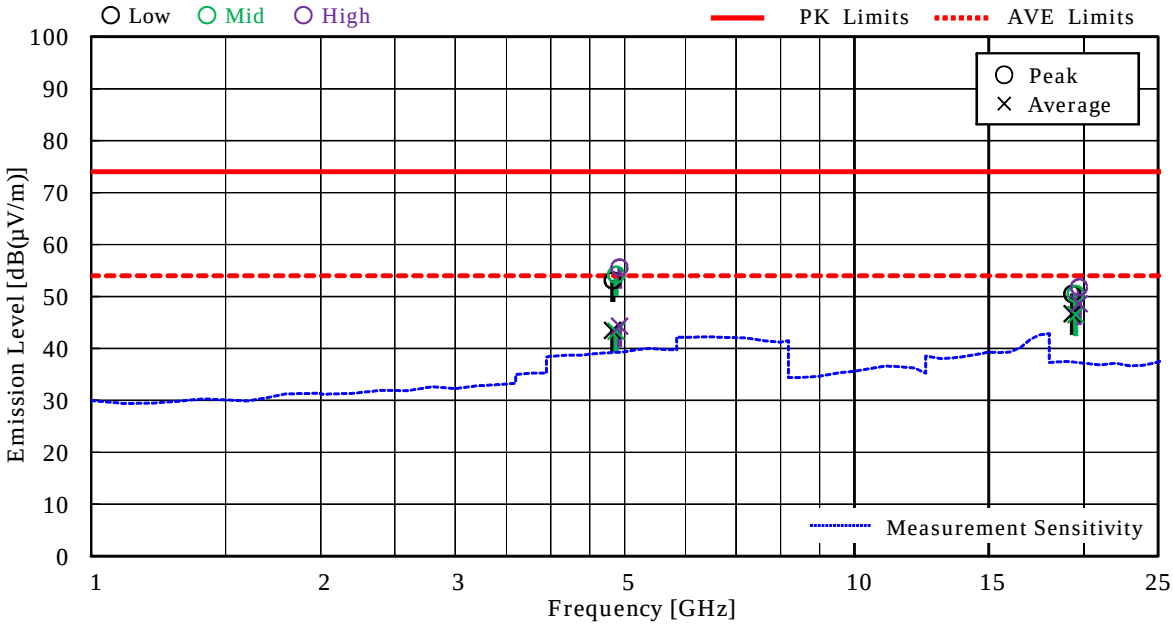
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB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

Mode of EUT : 802.11g

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : 802.11n HT20

Test Date: February 4, 2017
Temp.: 24 °C, Humi: 52 %

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	27.0	-15.8	41.7	31.9	42.3	32.2	74.0	54.0	53.5	43.4	+10.6	-
12060.0	33.4	-25.4	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 46.0	< 36.0	> +18.0	-
14472.0	37.0	-26.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 48.9	< 38.9	> +15.1	-
19296.0	40.5	-43.0	52.5	48.1	53.1	49.3	74.0	54.0	50.6	46.8	+ 7.2	-
Test condition : TX Middle Ch												
4874.0	27.0	-15.9	42.0	31.8	42.7	32.4	74.0	54.0	53.8	43.5	+10.5	-
7311.0	29.9	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.8	< 41.8	> +12.2	-
12185.0	33.3	-25.7	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.6	< 35.6	> +18.4	-
19496.0	40.5	-43.0	53.0	48.7	53.3	49.1	74.0	54.0	50.8	46.6	+ 7.4	-
Test condition : TX High Ch												
4924.0	27.0	-15.8	43.1	32.5	42.7	32.4	74.0	54.0	54.3	43.7	+10.3	-
7386.0	29.8	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.7	< 41.7	> +12.3	-
12310.0	33.3	-25.9	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.4	< 35.4	> +18.6	-
19696.0	40.5	-43.0	53.0	49.5	54.2	51.0	74.0	54.0	51.7	48.5	+ 5.5	-
22158.0	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 19696.0 MHz, as the worst point shown on underline:

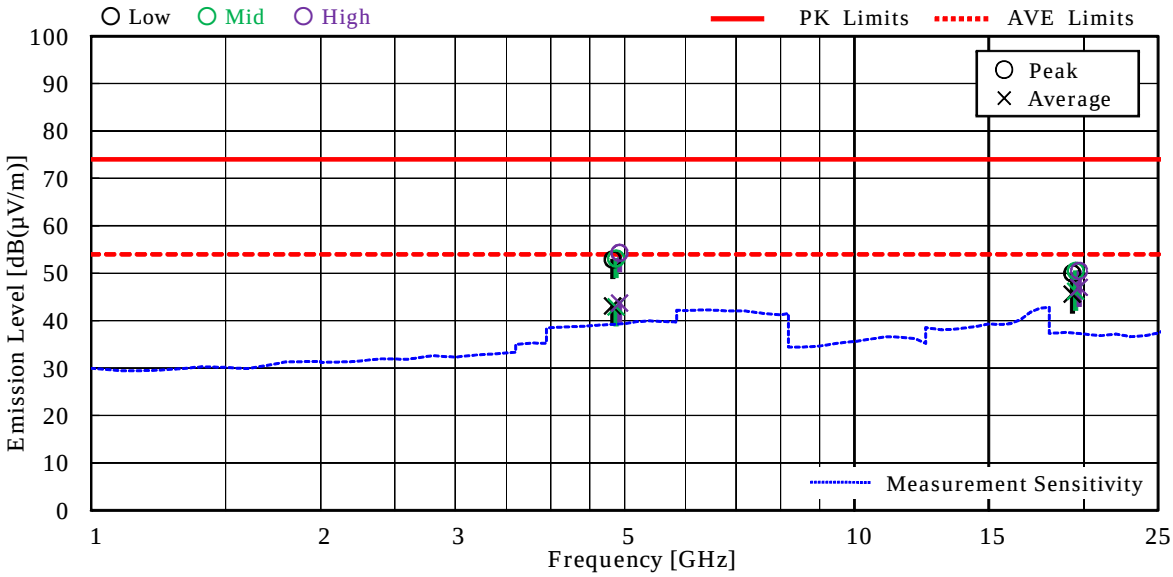
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.0 dB
+)	Meter Reading	=	51.0 dB(μV)
	Result	=	48.5 dB(μV/m)

Minimum Margin: 54.0 - 48.5 = 5.5 (dB)

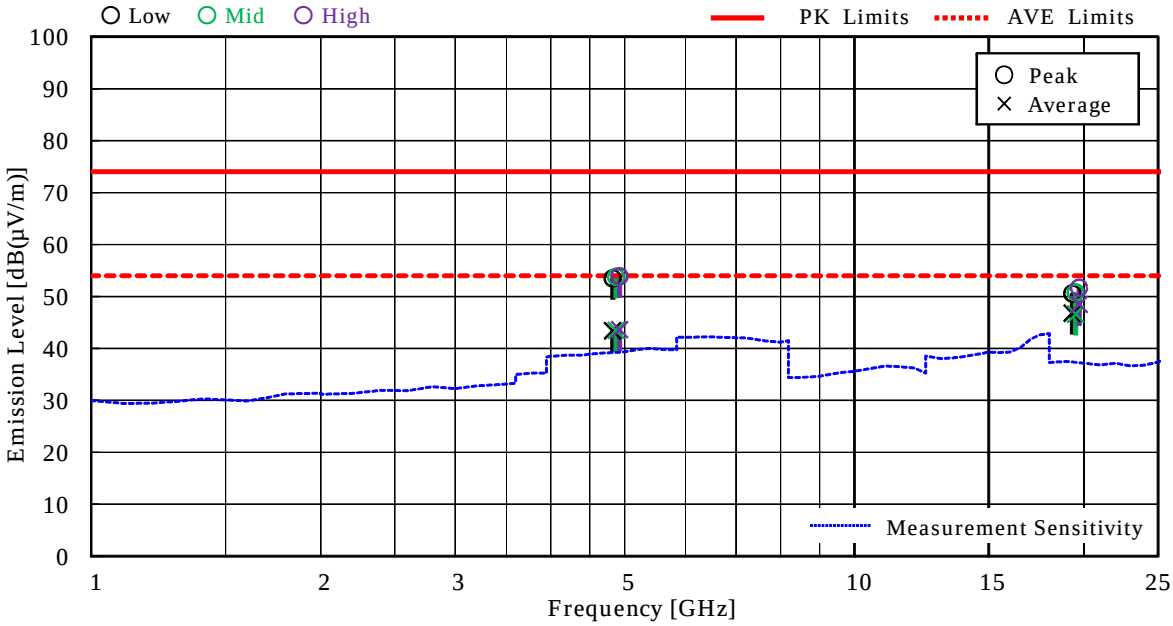
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB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

Mode of EUT : 802.11n HT20

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : 802.11n HT40

Test Date: February 4, 2017
Temp.: 24 °C, Humi: 52 %

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												
4844.0	27.0	-15.9	41.4	30.2	42.8	32.2	74.0	54.0	53.9	43.3	+10.7	
7266.0	29.9	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.8	< 41.8	> +12.2	
12110.0	33.4	-25.5	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.9	< 35.9	> +18.1	
19376.0	40.5	-43.0	53.0	50.0	52.0	48.7	74.0	54.0	50.5	47.5	+ 6.5	
Test condition : TX Middle Ch												
4874.0	27.0	-15.9	40.0	29.3	41.9	30.8	74.0	54.0	53.0	41.9	+12.1	
7311.0	29.9	-16.1	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.8	< 41.8	> +12.2	
12185.0	33.3	-25.7	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.6	< 35.6	> +18.4	
19496.0	40.5	-43.0	52.6	48.9	53.2	50.5	74.0	54.0	50.7	48.0	+ 6.0	
Test condition : TX High Ch												
4904.0	27.0	-15.8	39.7	29.6	39.5	29.3	74.0	54.0	50.9	40.8	+13.2	
7356.0	29.9	-16.2	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 51.7	< 41.7	> +12.3	
12260.0	33.3	-25.8	< 38.0	< 28.0	< 38.0	< 28.0	74.0	54.0	< 45.5	< 35.5	> +18.5	
19616.0	40.5	-43.0	53.0	48.8	53.8	50.5	74.0	54.0	51.3	48.0	+ 6.0	
22068.0	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 19496.0 MHz, as the worst point shown on underline:

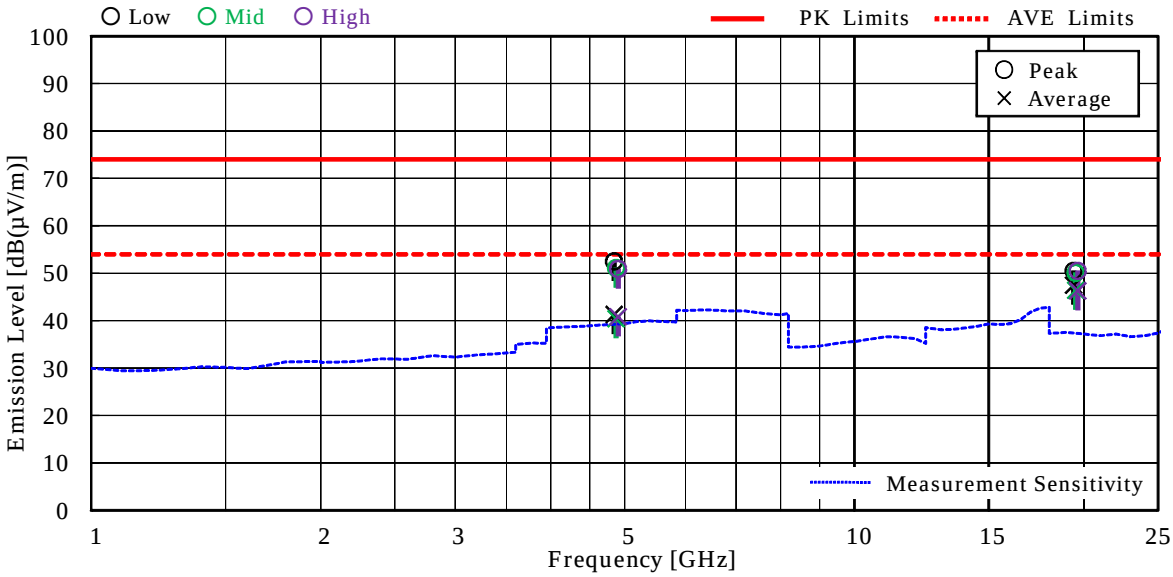
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.0 dB
+)	Meter Reading	=	50.5 dB(μV)
	Result	=	48.0 dB(μV/m)

Minimum Margin: 54.0 - 48.0 = 6.0 (dB)

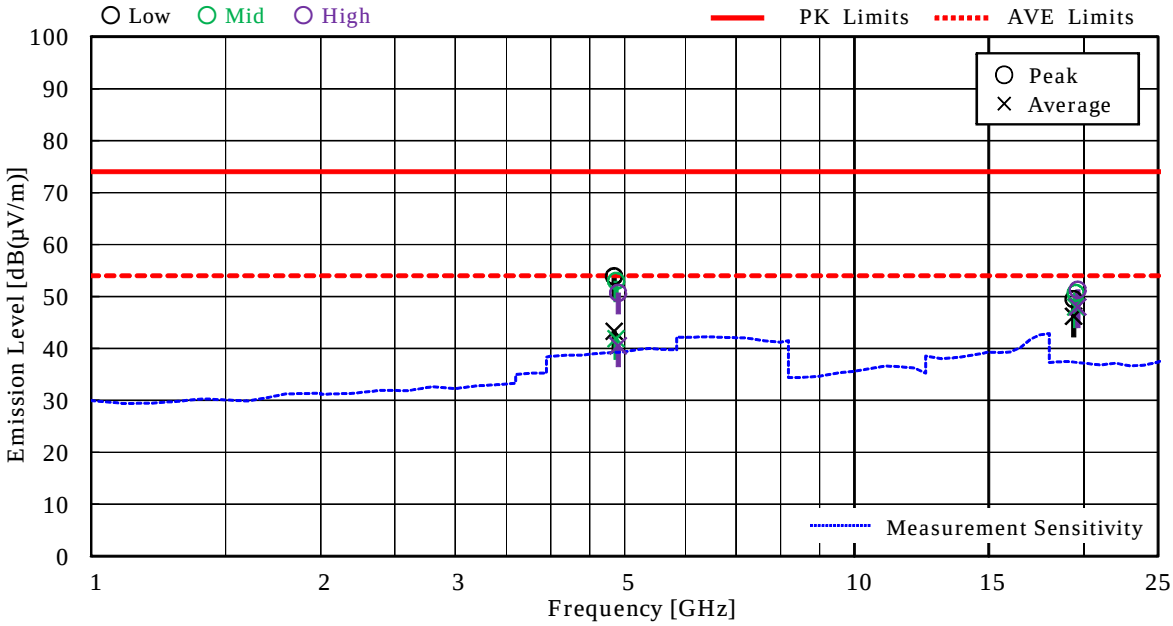
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB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

Mode of EUT : 802.11n HT40

Antenna Pole : Horizontal



Antenna Pole : Vertical



7.10 RF Exposure Considerations (KDB 447498 D01)

The 1 g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by;
[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1 g SAR and ≤ 7.5 for 10 g extremity SAR, where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison.
- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied.

Band	Freq. (MHz)	Max. Power		Distance (mm)	Threshold	Test Exclusion
		(dBm)	(mW)			
WLAN (DTS)	2462	8.0	6	< 5	1.9	YES
WLAN (U-NII)	5700	9.5	9	< 5	4.3	NO
Bluetooth	2480	6.0	4	< 5	1.3	YES

The minimum user separation distance was assumed to be 0 mm for the purpose of the SAR exclusion calculations.

Conclusion:
The device for WLAN (DTS) qualifies for the Standalone SAR test exclusion because the computed value is < 3.