JQA File No. : KL80160827
Issue Date : July 16, 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, PP1-018
FCC ID	:	YSKK05
Test Standard	:	FCC Rules and Regulations Title 47 CFR Part 15
Test Results	:	Passed
Date of Test	:	January 30 ~ July 3, 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, PP1-018
5.	Product Type	:	Pre-production
6.	Date of Manufacture	:	January, 2017
7.	Power Rating	:	3.7VDC
8.	Grounding	:	None
9.	Operating Frequency	:	5180 MHz (36CH) – 5700 MHz (140CH) : 802.11a/n (20 MHz) 5190 MHz (38CH) – 5670 MHz (134CH) : 802.11n (40 MHz)
10.	Modulation	:	OFDM
11.	Antenna Type	:	1/2λ Type Antenna (Integral)
12.	Antenna Gain	:	0.5 dBi
13.	Category	:	Spread Spectrum Transmitter (OFDM)/UNII
14.	EUT Authorization	:	Certification
15.	Received Date of EUT	:	January 25, 2017

2 Summary of Test Results

Applied Standard : FCC Rules and Regulations Title 47 CFR Part 15
Subpart E – Unlicensed National Information Infrastructure Devices

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 : CFR 47 FCC Rules and Regulations Part 15
Subpart E – Unlicensed National Information Infrastructure Devices

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

KDB 789033 D02
General UNII Test Procedures New Rules v01r03: August 22, 2016

KDB 905462 D02
UNII DFS Compliance Procedures New Rules v02: April 8, 2016

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 PP1-018 *3	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
*3) Used for DFS Measurement

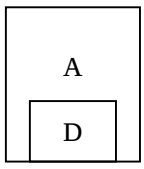
The auxiliary equipment used for testing :
None

Type of Cable:

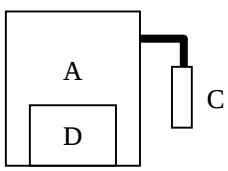
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Cord	--	--	NO	YES	1.2

6.2 Test Arrangement (Drawings)

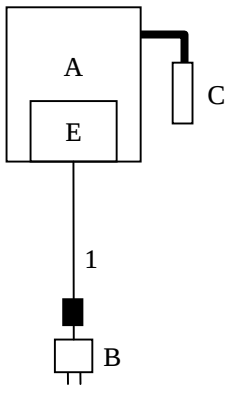
a) Single Unit



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 : 5180 MHz (36CH) – 5700 MHz (140CH) 802.11a/n (20 MHz)
5190 MHz (38CH) – 5670 MHz (134CH) 802.11n (40 MHz)

Receiver frequency : 5180 MHz (36CH) – 5700 MHz (140CH)

Modulation Type
1. 802.11a : OFDM
2. 802.11n : OFDM

Other Clock Frequency
1.5 GHz (CPU)

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

6.4 Maximum Output Power

The preliminary maximum peak conducted output power measurements were performed each TX rate and maximum value are listed as followings.

802.11a

Channel	36	44	48	52	56	64	100	116	140
Frequency(MHz)	5180	5220	5240	5260	5280	5320	5500	5580	5700
Power(dBm)	4.59	4.23	4.00	3.44	3.53	3.61	5.10	6.06	8.00

The TX rate 6 Mbps was maximum case.

802.11n (20MHz BW)

Channel	36	44	48	52	56	64	100	116	140
Frequency(MHz)	5180	5220	5240	5260	5280	5320	5500	5580	5700
Power(dBm)	4.72	4.36	4.09	3.54	3.61	3.73	5.27	6.24	8.19

The TX rate 6.5 Mbps (MCS0) was maximum case.

802.11n (40MHz BW)

Channel	38	46	54	62	102	134
Frequency(MHz)	5190	5230	5270	5310	5510	5670
Power(dBm)	4.12	3.80	3.11	3.23	5.38	8.37

The TX rate 13.5 Mbps (MCS0) was maximum case.

All test cases were performed to the highest RF output power data rate listed above.

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	-
26dB Bandwidth	Section 15.407(2)(3)	Section 7.1	-	-
Maximum Conducted Output Power	Section 15.407(a)(1)(iv), (2),(3)	Section 7.2	Passed	For client device
Peak Power Spectral Density	Section 15.407(a)(1)(iv), (2),(3)	Section 7.3	Passed	For client device
Peak Excursion	--	Section 7.4	N/A	-
AC Powerline Conducted Emission	Section 15.407(b)(6) Section 15.207	Section 7.5	Passed	-
Unwanted Radiated Emission	Section 15.407(b) Section 15.205 Section 15.209	Section 7.6	Passed	-
Dynamic Frequency Selection	Section 15.407(h)(2)	Section 7.7	Passed	-
RF Exposure	Section 15.407(f)	Section 7.8	Passed	

7.1 26dB Bandwidth

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

7.1.1 Test Results

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

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : Reporting Purpose (No limitation applied)

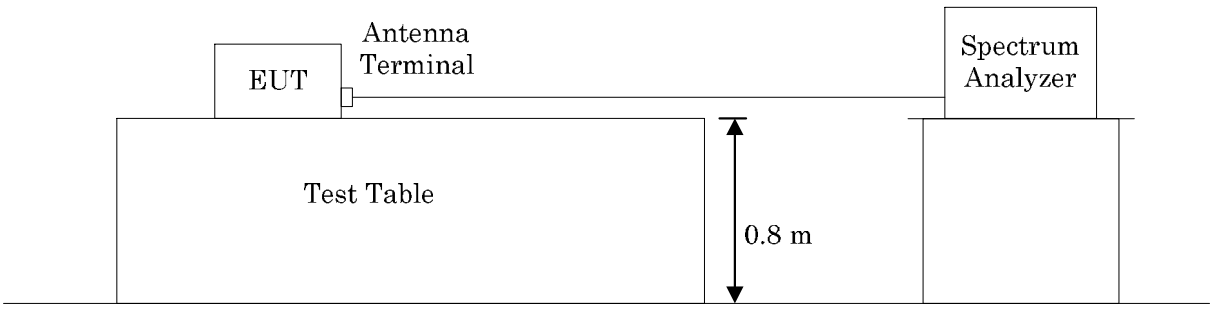
7.1.2 Test Instruments

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.

7.1.3 Test Method and Test Setup (Diagrammatic illustration)

The occupied bandwidth measurements were carried out connecting to the spectrum analyzer.
The spectrum analyzer was set in accordance with KDB 789033 D02 as follows;.
The RBW was set approximately 1% of the emission bandwidth.
Set the VBW > RBW., Detector = Peak, and Trace mode = max hold.
The bandwidth function in the analyzer was used.



7.1.4 Test Data

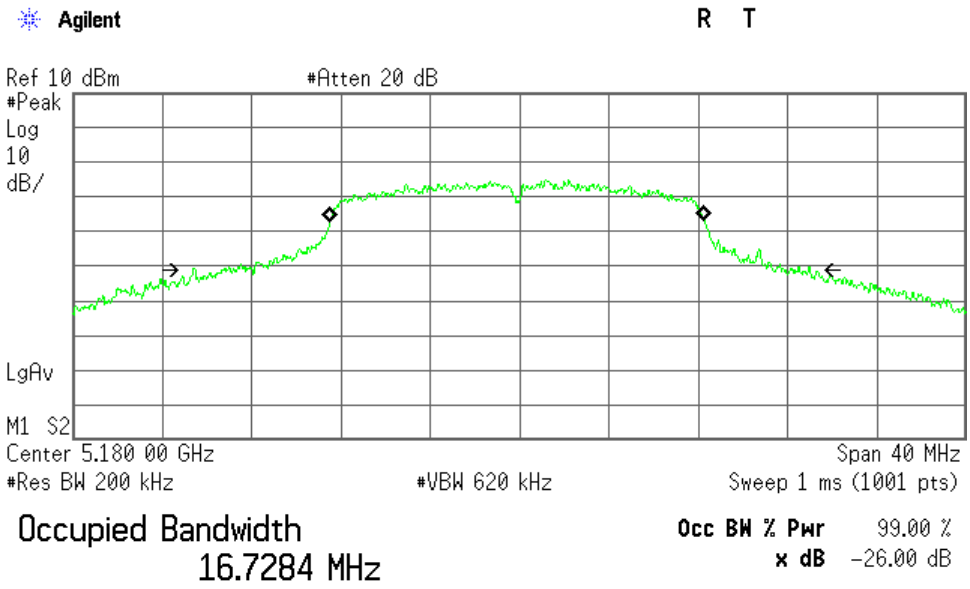
Test Date: February 22, 2017
Temp.: 22 °C, Humi: 35 %

7.1.4.1 802.11a 26dB / 99% OBW

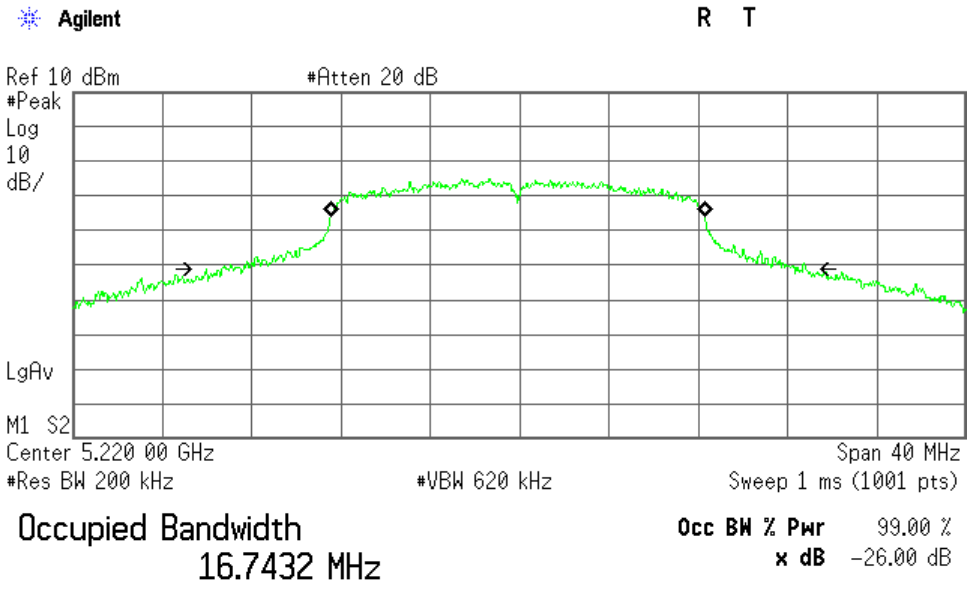
Mode of EUT: TX 802.11a
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	26dB OBW (MHz)	99% OBW (MHz)
36	5180	27.649	16.728
44	5220	26.862	16.743
48	5240	26.826	16.858
52	5260	27.005	16.679
56	5280	25.576	16.651
64	5320	25.628	16.632
100	5500	22.434	16.441
116	5580	22.244	16.446
140	5700	22.264	16.486

802.11a 36ch (5180 MHz)

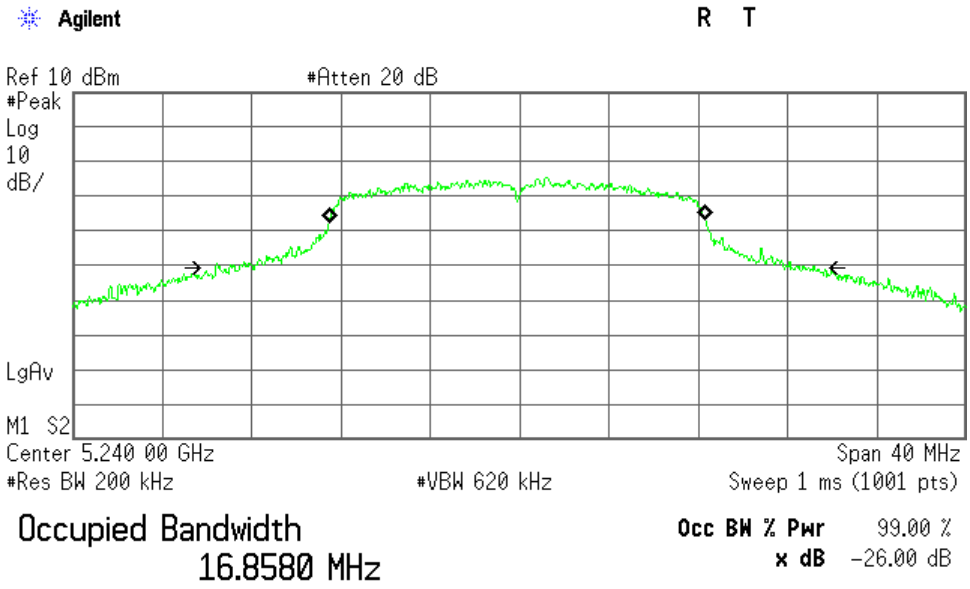


802.11a 44ch (5220 MHz)



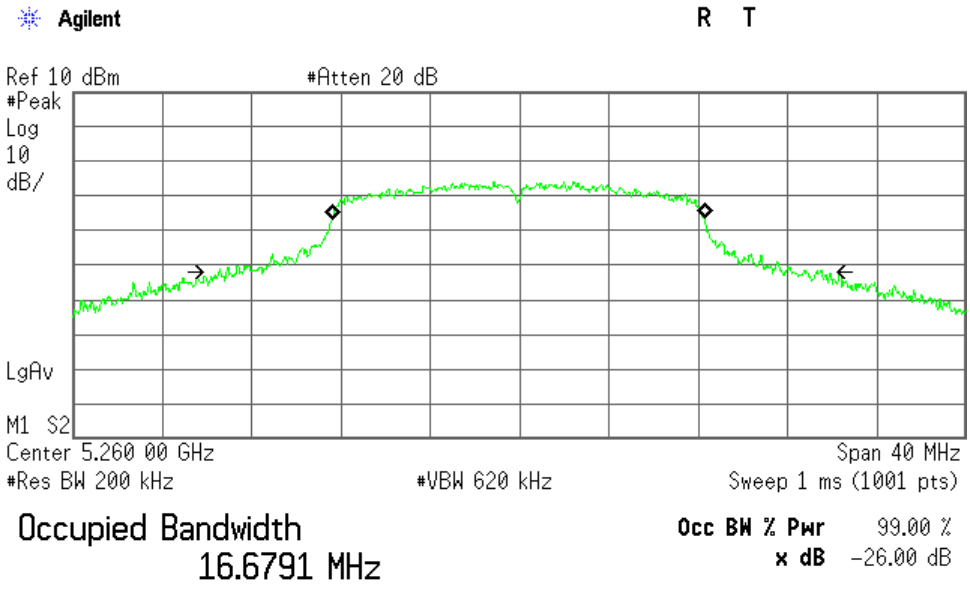
Transmit Freq Error -86.594 kHz
Occupied Bandwidth 26.862 MHz

802.11a 48ch (5240 MHz)



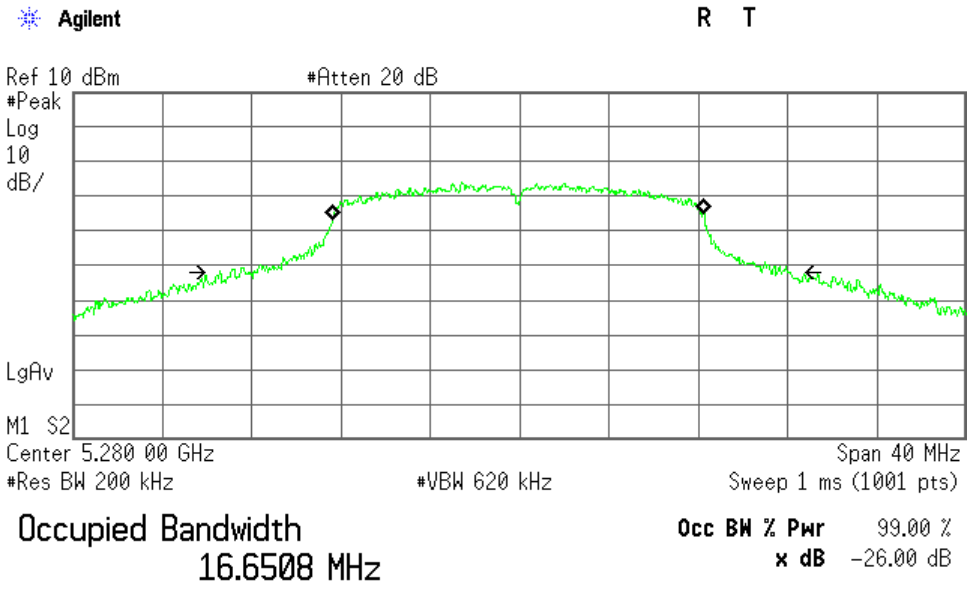
Transmit Freq Error -99.507 kHz
Occupied Bandwidth 26.826 MHz

802.11a 52ch (5260 MHz)



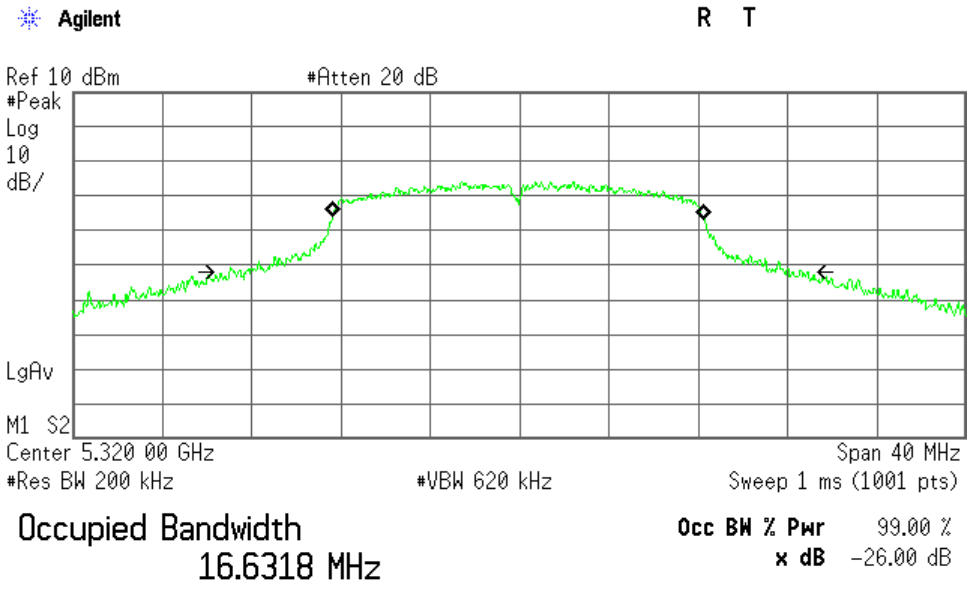
Transmit Freq Error -78.327 kHz
Occupied Bandwidth 27.005 MHz

802.11a 56ch (5280 MHz)



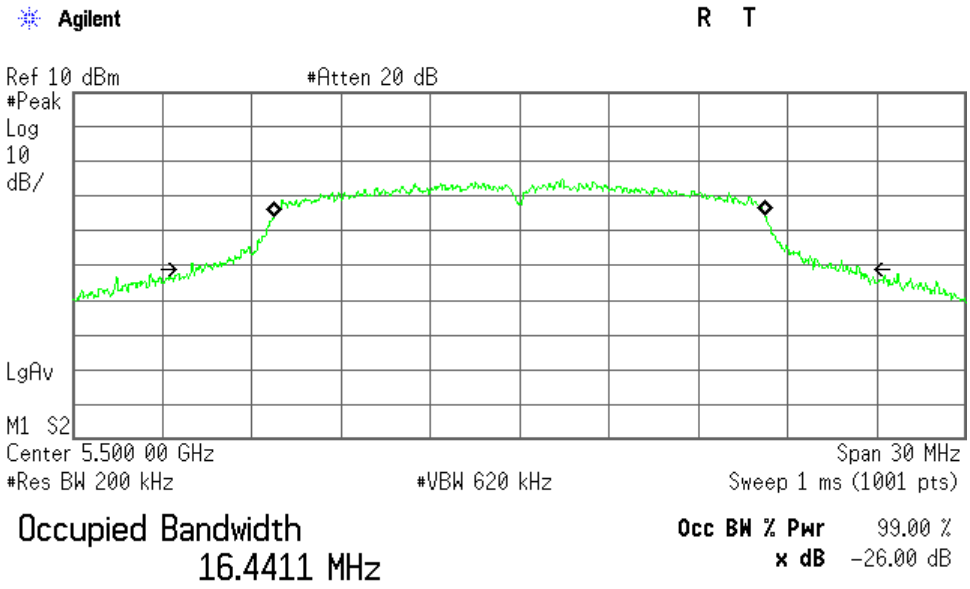
Transmit Freq Error -71.502 kHz
Occupied Bandwidth 25.576 MHz

802.11a 64ch (5320 MHz)



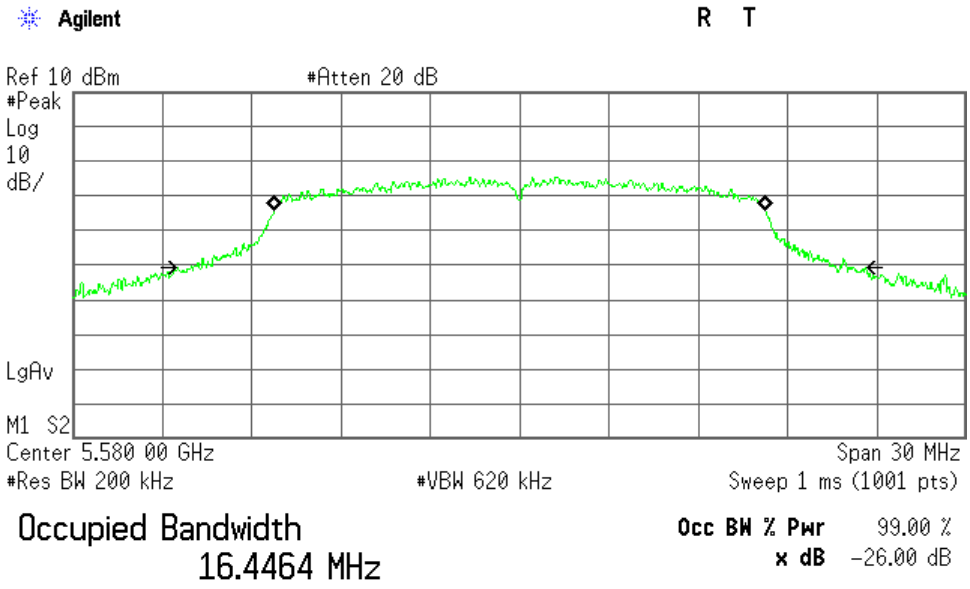
Transmit Freq Error -83.160 kHz
Occupied Bandwidth 25.628 MHz

802.11a 100ch (5500 MHz)



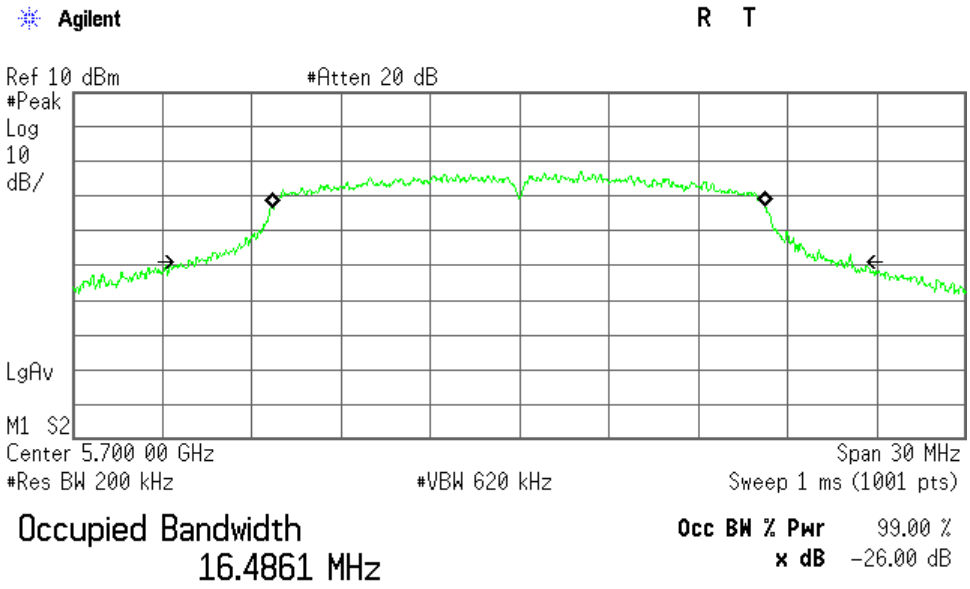
Transmit Freq Error -9.666 kHz
Occupied Bandwidth 22.434 MHz

802.11a 116ch (5580 MHz)



Transmit Freq Error -2.134 kHz
Occupied Bandwidth 22.244 MHz

802.11a 140ch (5570 MHz)



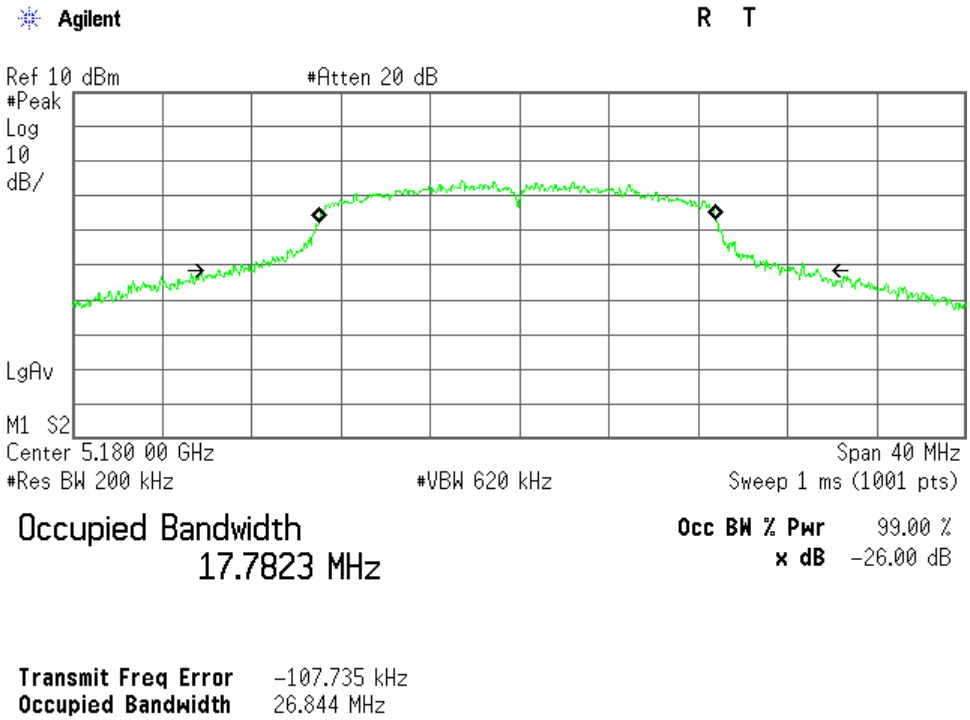
Transmit Freq Error -31.655 kHz
Occupied Bandwidth 22.264 MHz

7.1.4.2 802.11n (20 MHz BW) 26dB / 99% OBW

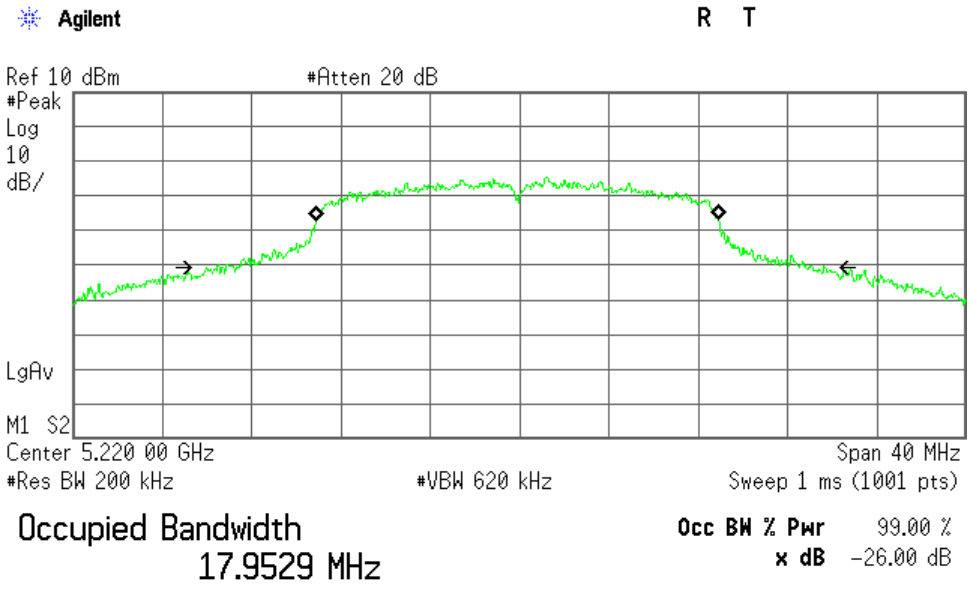
Mode of EUT: Tx 802.11n(20 MHz)
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	26dB OBW (MHz)	99% OBW (MHz)
36	5180	26.844	17.782
44	5220	27.705	17.953
48	5240	27.953	17.843
52	5260	26.258	17.753
56	5280	27.713	17.777
64	5320	27.546	17.775
100	5500	23.520	17.557
116	5580	23.060	17.545
140	5700	23.867	17.563

802.11n (20 MHz) 36ch (5180 MHz)

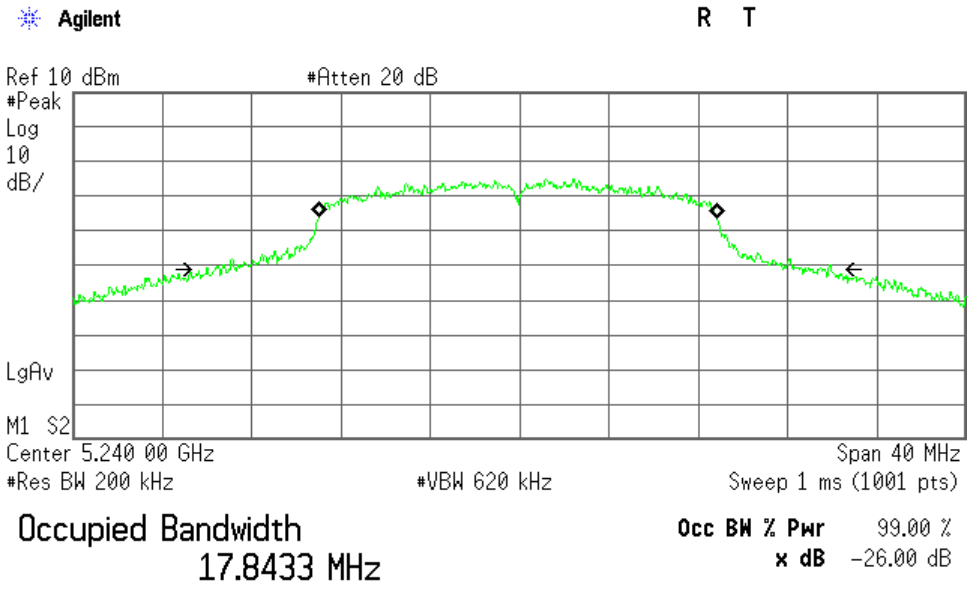


802.11n (20 MHz) 44ch (5220 MHz)



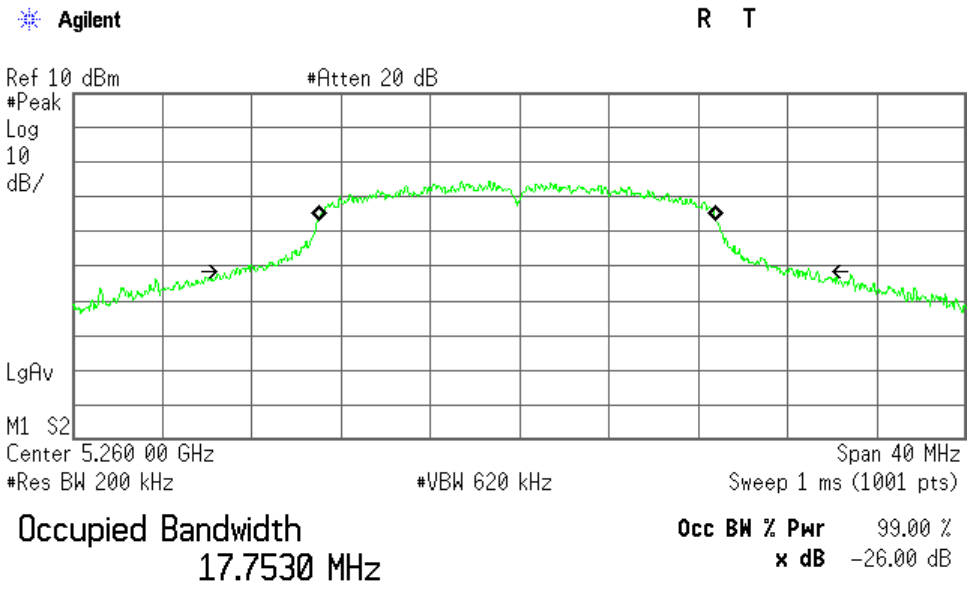
Transmit Freq Error -91.944 kHz
Occupied Bandwidth 27.705 MHz

802.11n (20 MHz) 48ch (5240 MHz)



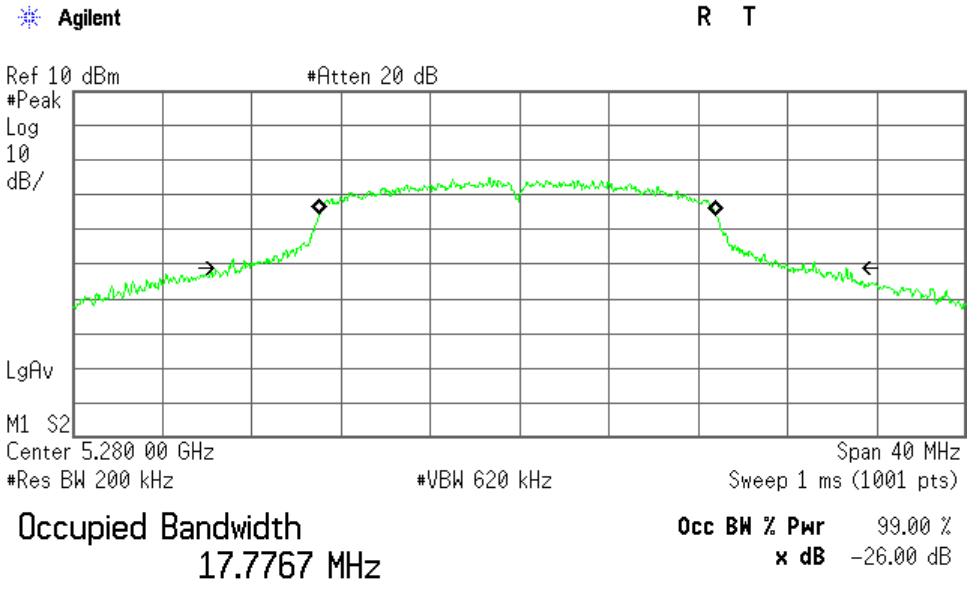
Transmit Freq Error -86.951 kHz
Occupied Bandwidth 27.953 MHz

802.11n (20 MHz) 52ch (5260 MHz)



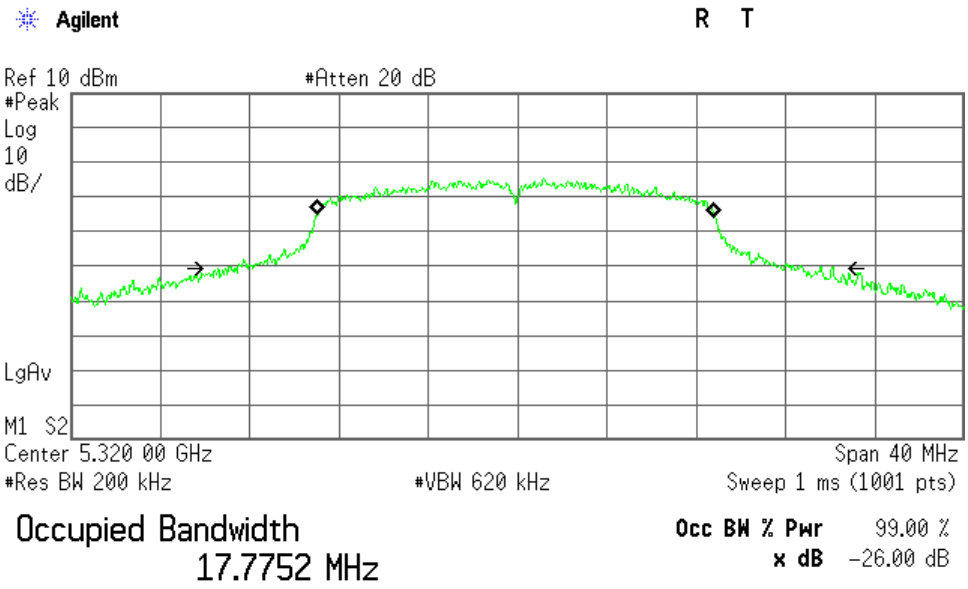
Transmit Freq Error −87.355 kHz
Occupied Bandwidth 26.258 MHz

802.11n (20 MHz) 56ch (5280 MHz)



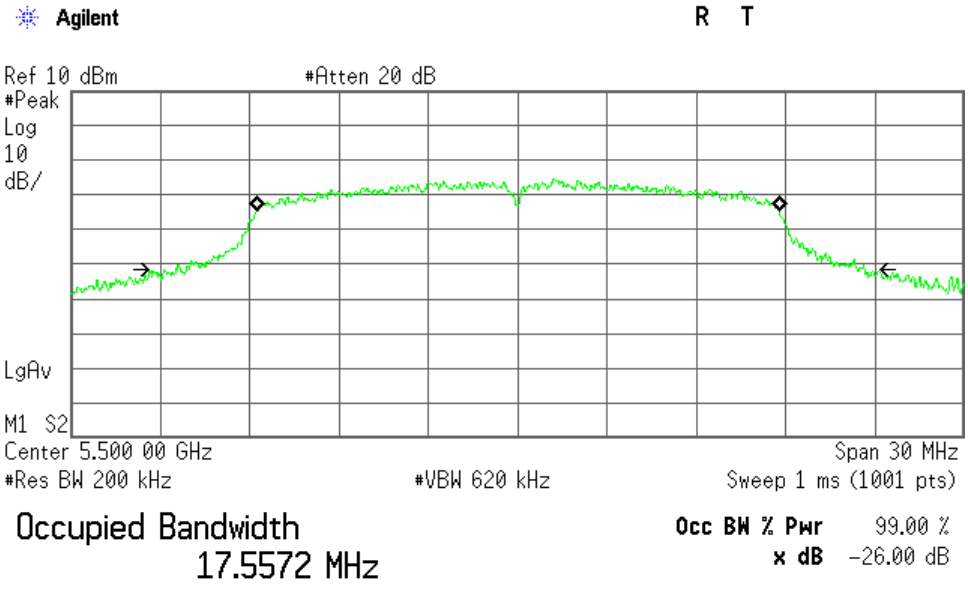
Transmit Freq Error −75.856 kHz
Occupied Bandwidth 27.713 MHz

802.11n (20 MHz) 64ch (5320 MHz)



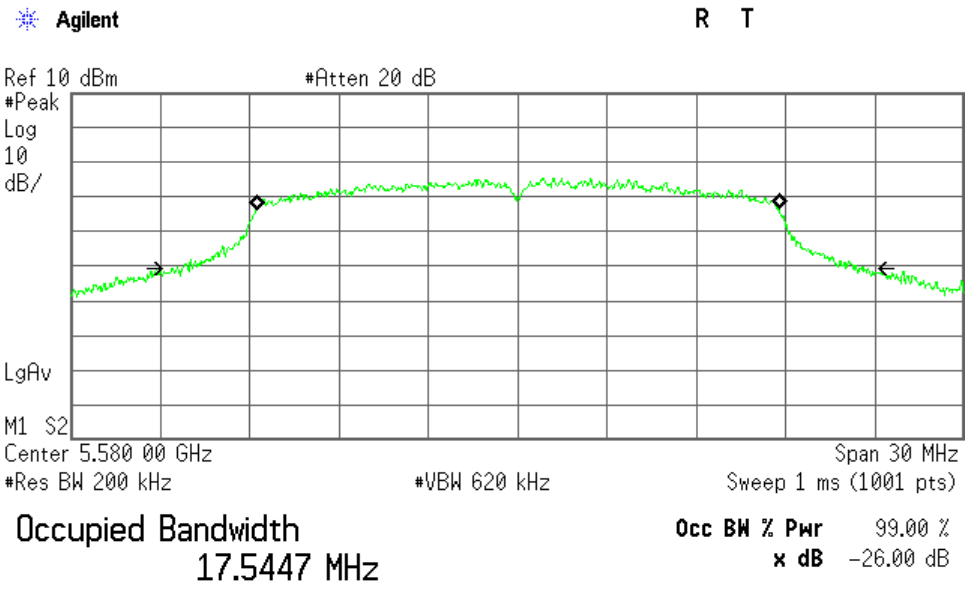
Transmit Freq Error -91.047 kHz
Occupied Bandwidth 27.546 MHz

802.11n (20 MHz) 100ch (5500 MHz)



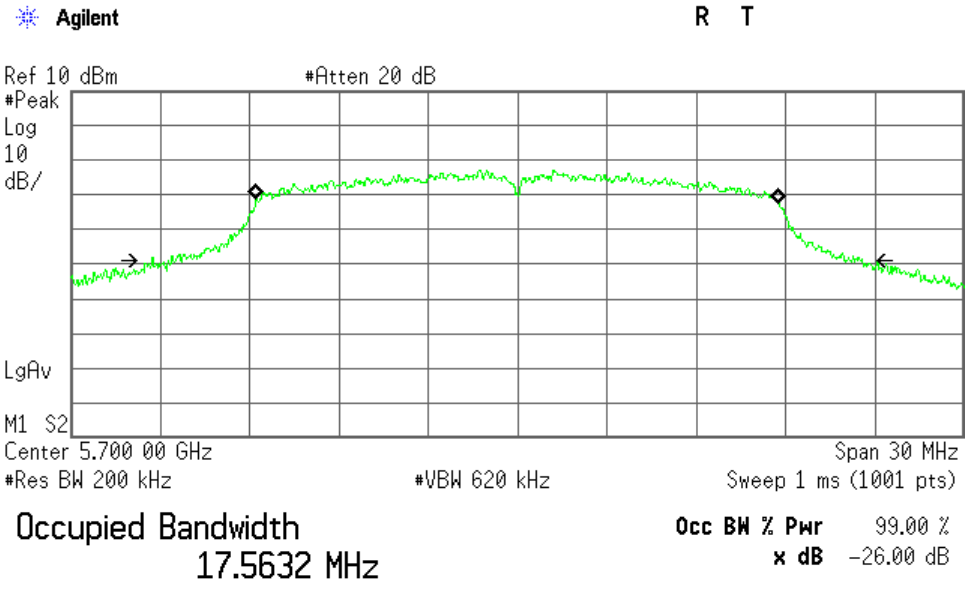
Transmit Freq Error 4.033 kHz
Occupied Bandwidth 23.520 MHz

802.11n (20 MHz) 116ch (5580 MHz)



Transmit Freq Error 4.853 kHz
Occupied Bandwidth 23.060 MHz

802.11n (20 MHz) 140ch (5700 MHz)



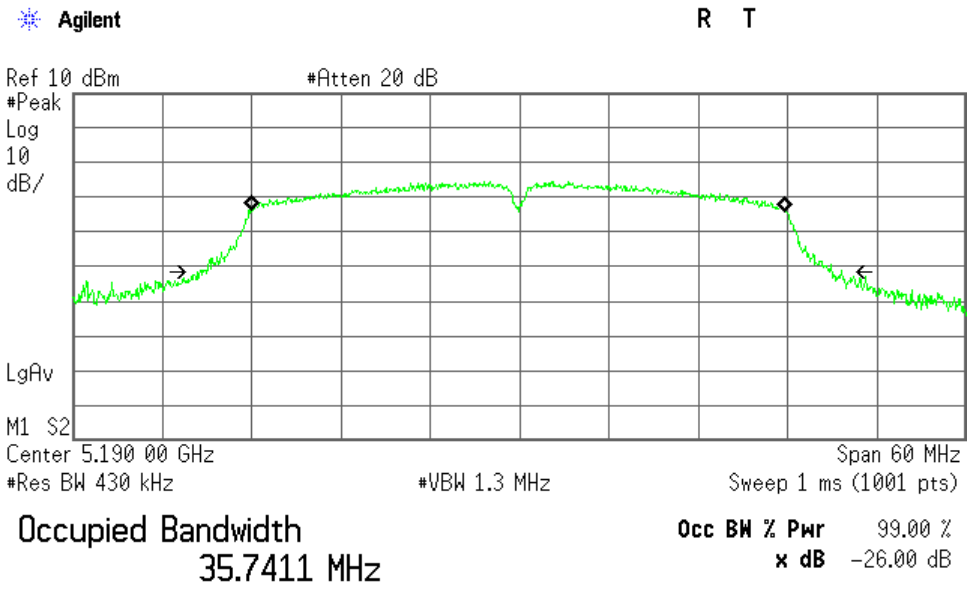
Transmit Freq Error -13.313 kHz
Occupied Bandwidth 23.867 MHz

7.1.4.3 802.11n (40 MHz BW) 26dB / 99% OBW

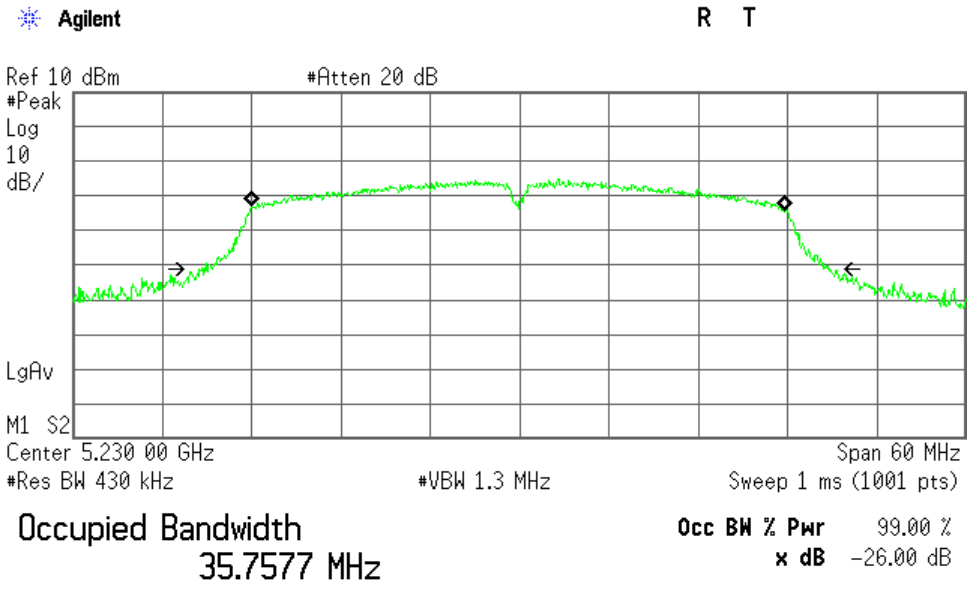
Mode of EUT: Tx 802.11n(40 MHz)
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	26dB OBW (MHz)	99% OBW (MHz)
38	5190	43.057	35.741
46	5230	42.291	35.758
54	5270	42.627	35.766
62	5310	44.063	35.800
102	5510	42.503	35.752
134	5670	43.525	35.805

802.11n (40 MHz) 38ch (5190 MHz)

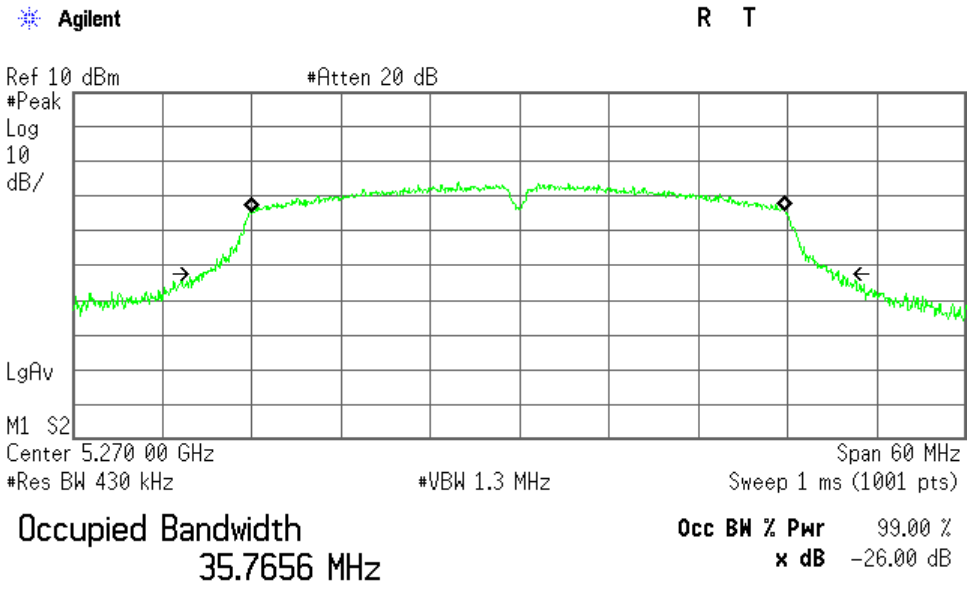


802.11n (40 MHz) 46ch (5230 MHz)



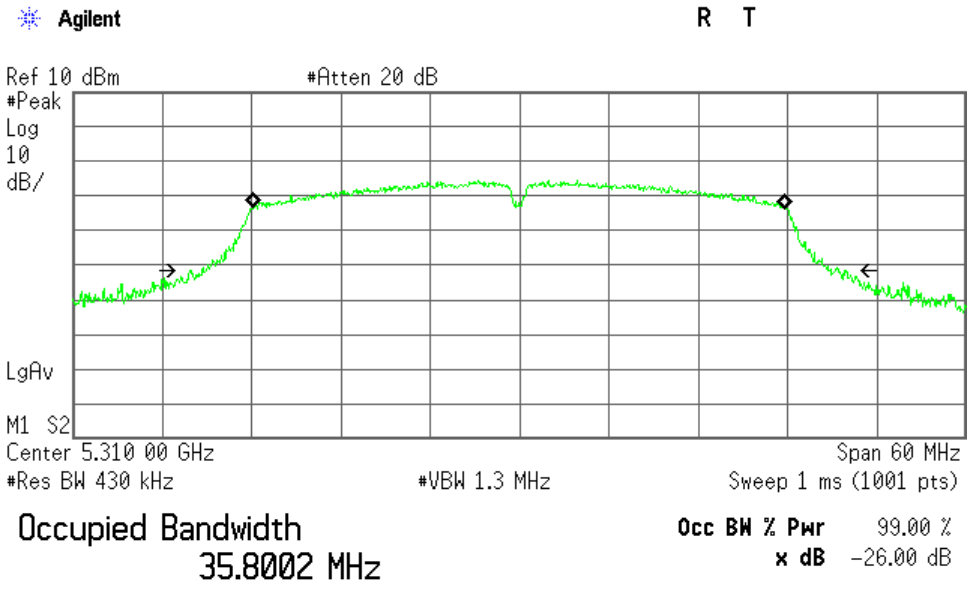
Transmit Freq Error −99.372 kHz
Occupied Bandwidth 42.291 MHz

802.11n (40 MHz) 54ch (5270 MHz)



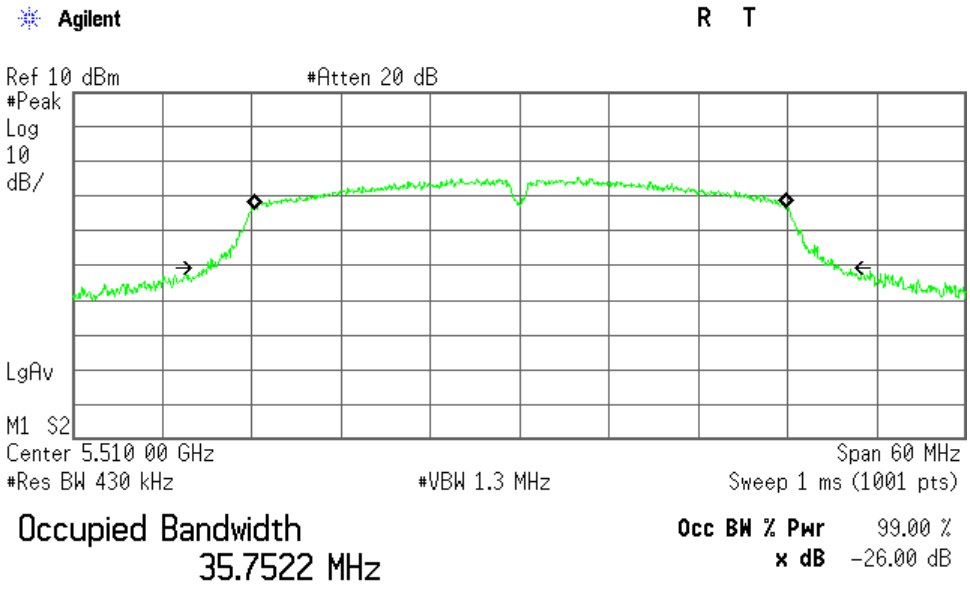
Transmit Freq Error −90.444 kHz
Occupied Bandwidth 42.627 MHz

802.11n (40 MHz) 62ch (5310 MHz)



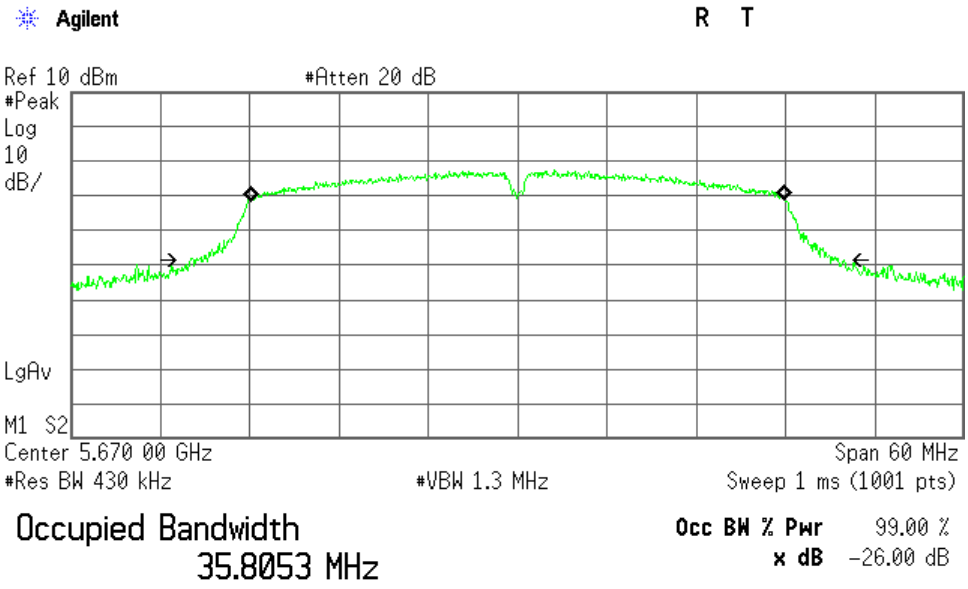
Transmit Freq Error −56.789 kHz
Occupied Bandwidth 44.063 MHz

802.11n (40 MHz) 102ch (5510 MHz)



Transmit Freq Error 40.315 kHz
Occupied Bandwidth 42.503 MHz

802.11n (40 MHz) 134ch (5670 MHz)



Transmit Freq Error	−2.808 kHz
Occupied Bandwidth	43.525 MHz

7.2 Maximum Conducted Output Power

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

7.2.1 Test Results

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

Min. Limit Margin 15.63 dB at 5670.0 MHz

Remarks : Worst case : 802.11n (40 MHz BW) 134ch

Max Output Power 8.37 dB at 5670.0 MHz

Remarks : Worst case : 802.11n (40 MHz BW) 134ch

Uncertainty of Measurement Results ± 0.9 dB(2σ)

7.2.2 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
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2017/08/02
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02

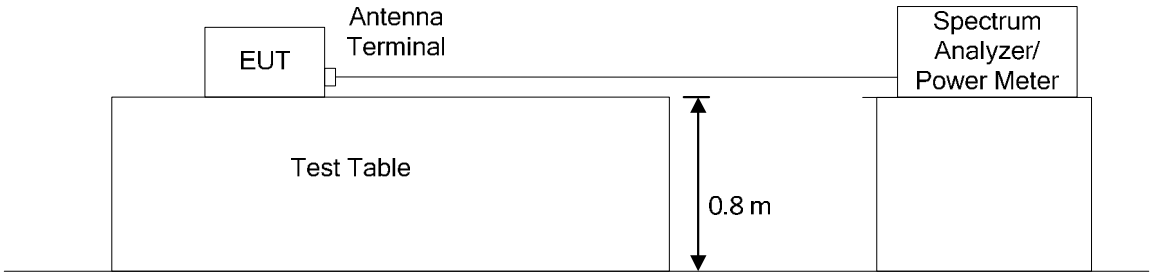
NOTE : The calibration interval of the above test instruments is 12 months.

7.2.3 Test Method and Test Setup (Diagrammatic illustration)

The maximum conducted output power measurements were carried out connecting to the power meter and the pulse power sensor or spectrum analyzer listed above.

Measurement Method:
1) WLAN 20 MHz/40 MHz BW mode
   KDB 789033 D02 E.3.a) Method PM (Measurement using an RF average power meter)
2) WLAN 80 MHz BW mode
   KDB 789033 D02 E.2.d) Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction)

The EUT transmits non-continuously therefore the duty cycle measurements were performed.
The measurements of duty cycle and transmission duration were performed connecting to the spectrum analyzer in accordance with KDB 789033 D02 Method B.2. as follows;
Span: Zero / RBW: 8 MHz / VBW ≥ 8 MHz / Sweep: Auto / Detector: Peak



7.2.4 Test Data

Test Date: January 30, 2017
Temp.: 23 °C, Humi: 43 %

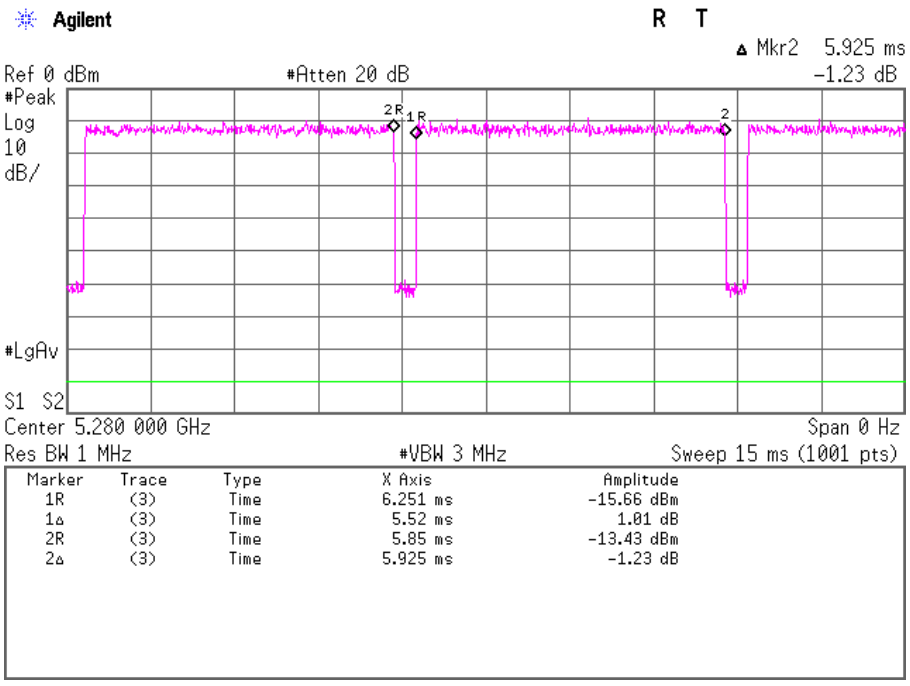
7.2.4.1 802.11a Maximum conducted output power

Mode of EUT: Tx Mode (802.11a)
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	Power (dBm)	26dB EBW (MHz)	Limit (dBm)	Margin (dB)
36	5180	10.59	-6.00	4.59	27.649	24.00	19.41
44	5220	10.59	-6.36	4.23	26.862	24.00	19.77
48	5240	10.59	-6.59	4.00	26.826	24.00	20.00
52	5260	10.59	-7.15	3.44	27.005	24.00	20.56
56	5280	10.60	-7.07	3.53	25.576	24.00	20.47
64	5320	10.61	-7.00	3.61	25.628	24.00	20.39
100	5500	10.62	-5.52	5.10	22.434	24.00	18.90
116	5580	10.62	-4.56	6.06	22.244	24.00	17.94
140	5700	10.64	-2.64	8.00	22.264	24.00	16.00

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)
Power = Correction Factor + Meter Reading = 10.59 + (-6.00) = 4.59 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11a / TX rate 6 Mbps is 0.31 dB
Limitation is lesser of the following:
5150 MHz to 5250 MHz : 24 dBm (250 mW)
5250 MHz to 5350 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less
5470 MHz to 5725 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period)) = 10 log (5925/5520) = 0.31 dB

7.2.4.2 802.11n (20 MHz BW) Maximum conducted output power

Mode of EUT: Tx Mode (802.11n: 20 MHz)
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	Power (dBm)	26dB EBW (MHz)	Limit (dBm)	Margin (dB)
36	5180	10.61	-5.89	4.72	26.844	24.00	19.28
44	5220	10.61	-6.25	4.36	27.705	24.00	19.64
48	5240	10.61	-6.52	4.09	27.953	24.00	19.91
52	5260	10.61	-7.07	3.54	26.258	24.00	20.46
56	5280	10.62	-7.01	3.61	27.713	24.00	20.39
64	5320	10.63	-6.90	3.73	27.546	24.00	20.27
100	5500	10.64	-5.37	5.27	23.520	24.00	18.73
116	5580	10.64	-4.40	6.24	23.060	24.00	17.76
140	5700	10.66	-2.47	8.19	23.867	24.00	15.81

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)

Power = Correction Factor + Meter Reading = 10.61 + (-5.89) = 4.72 dBm

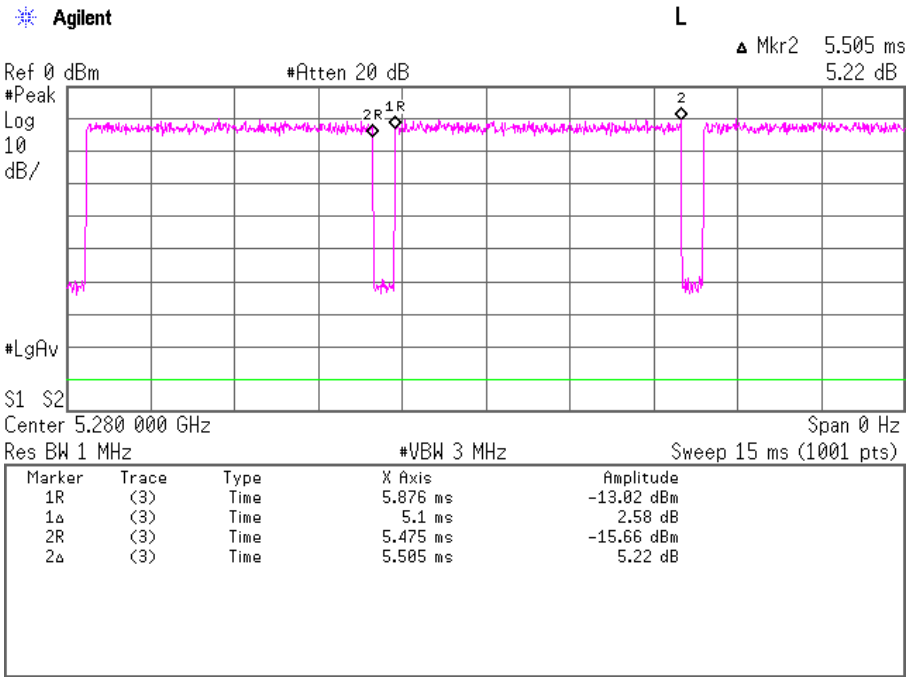
Correction Factor = cable loss + 10 dB attenuator + Duty Factor

Duty Factor at 802.11n / TX rate 6.5 Mbps (MCS0) is 0.33 dB

Limitation is lesser of the following:

5150 MHz to 5250 MHz : 24 dBm (250 mW)
5250 MHz to 5350 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less
5470 MHz to 5725 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period)) = 10 log (5505/5100) = 0.33 dB

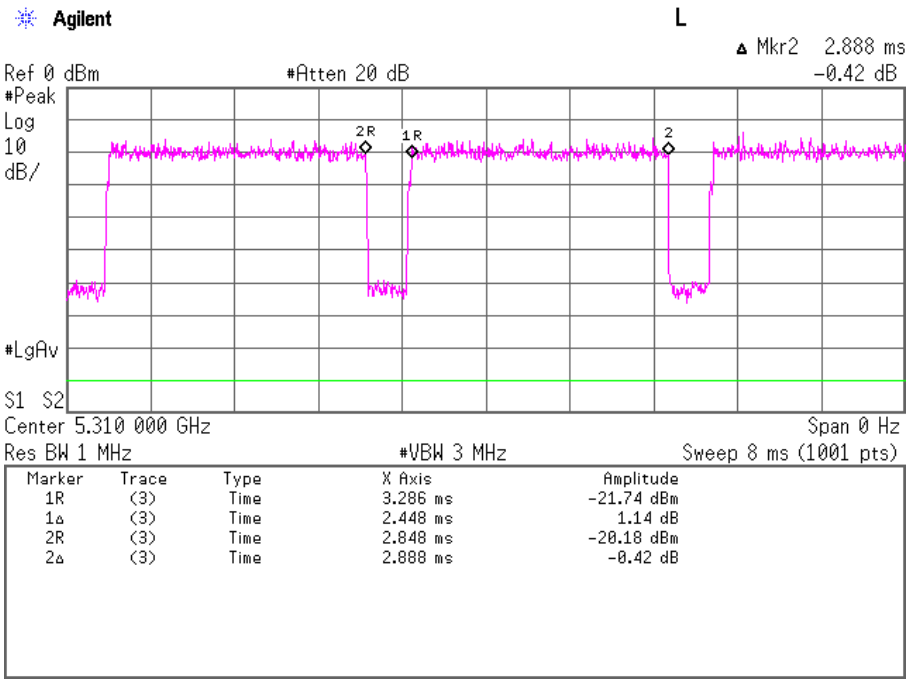
7.2.4.3 802.11n (40 MHz BW) Maximum conducted output power

Mode of EUT: Tx Mode (802.11n: 40 MHz)
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	Power (dBm)	26dB EBW (MHz)	Limit (dBm)	Margin (dB)
38	5190	11.00	-6.88	4.12	43.057	24.00	19.88
46	5230	11.00	-7.20	3.80	42.291	24.00	20.20
54	5270	11.00	-7.89	3.11	42.627	24.00	20.89
62	5310	11.02	-7.79	3.23	44.063	24.00	20.77
102	5510	11.03	-5.65	5.38	42.503	24.00	18.62
134	5670	11.04	-2.67	8.37	43.525	24.00	15.63

The test results (Power) is calculated as follows;
For 38 channel (5190 MHz)
Power = Correction Factor + Meter Reading = 11.00 + (-6.88) = 4.12 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n / TX rate 13.5 Mbps (MCS0) is 0.72 dB
Limitation is lesser of the following:
5150 MHz to 5250 MHz : 24 dBm (250 mW)
5250 MHz to 5350 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less
5470 MHz to 5725 MHz : 24 dBm (250 mW) or 11 dBm + 10 log EBW, whichever is less

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period)) = 10 log (2888/2448) = 0.72 dB

7.3 Peak Power Spectral Density

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

Min. Limit Margin 14.46 dB at 5700.0 MHz

Uncertainty of Measurement Results ± 1.7 dB(2σ)

Remarks : Worst case is 802.11n (20 MHz) channel 140.

7.3.2 Test Instruments

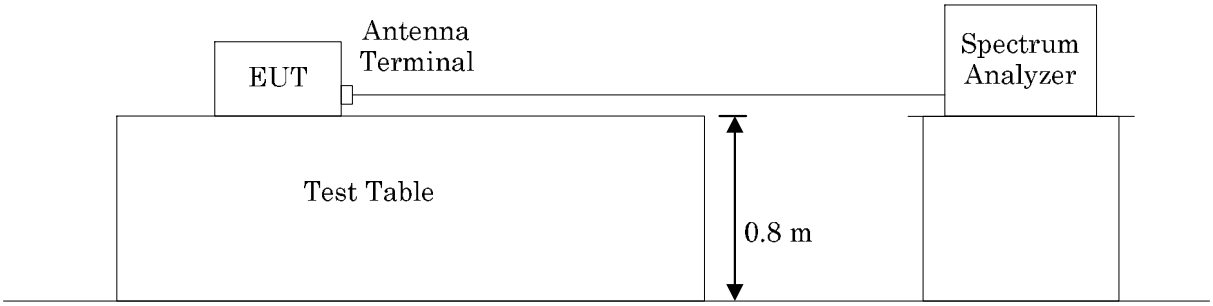
Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2017/08/02
Attenuator	54A-10	W5675 (D-28)	Weinschel	2017/08/02
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2017/08/02

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

7.3.3 Test Method and Test Setup (Diagrammatic illustration)

The peak power spectral density measurements were carried out connecting to the spectrum analyzer. The EUT transmits non-continuously therefore the spectrum analyzer was set in accordance with KDB 789033 D02 Method SA-3 as follows;.

Span: encompass the EBW / RBW: 1 MHz / VBW ≥ 3 MHz /
Sweep: Time: 100 msec.(enough to be short) / Number Sweep Points: 1001 pts. (≥2 × Span/RBW) /
Detector: RMS (power averaging) / Trace Mode: Max. Hold
The peak marker function in the analyzer was use for finding the peak point.



7.3.4 Test Data

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

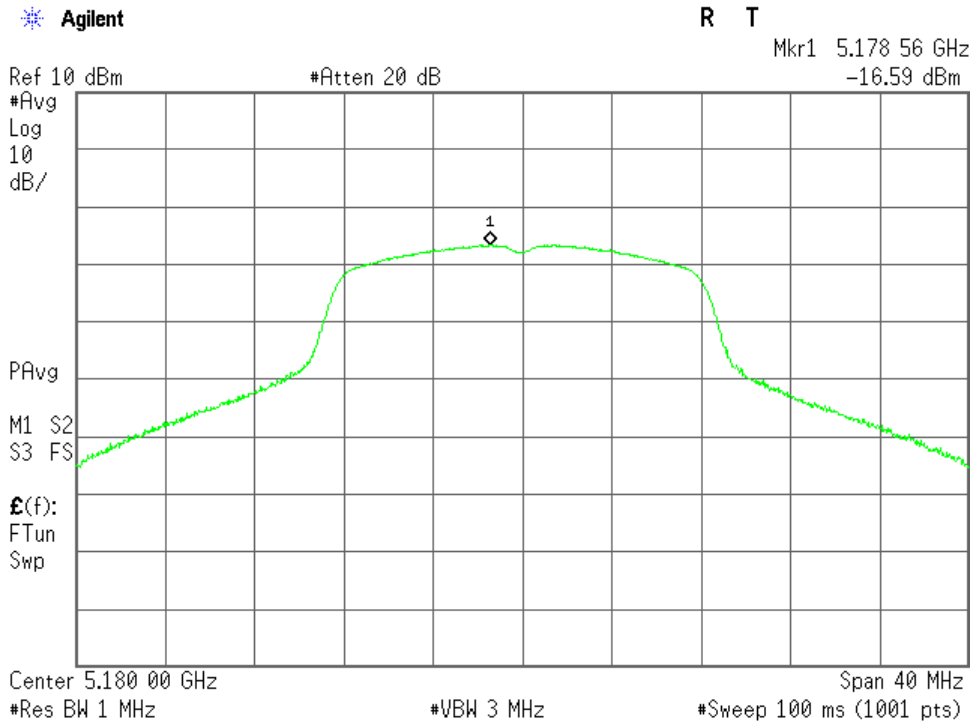
7.3.4.1 802.11a Peak power spectral density

Mode of EUT: Tx Mode (802.11a)
Test Port: Temporary antenna connector

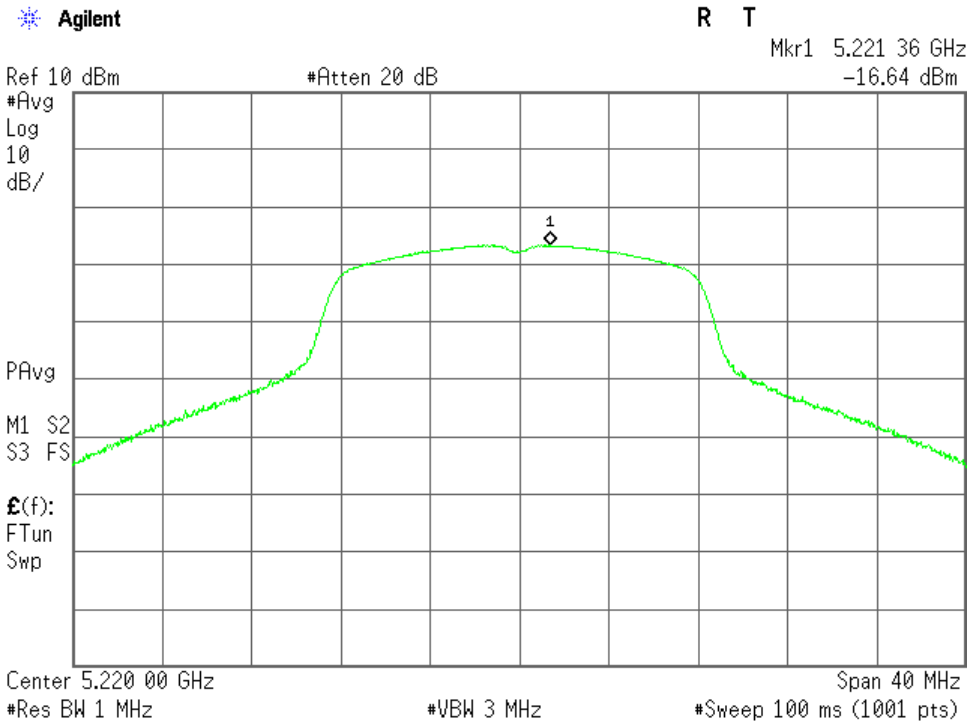
Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	PPSD (dBm)	Limit (dBm)	Margin (dB)
36	5180	10.28	-16.59	-6.31	11.00	17.31
44	5220	10.28	-16.64	-6.36	11.00	17.36
48	5240	10.28	-16.11	-5.83	11.00	16.83
52	5260	10.28	-16.49	-6.21	11.00	17.21
56	5280	10.29	-16.38	-6.09	11.00	17.09
64	5320	10.30	-16.12	-5.82	11.00	16.82
100	5500	10.31	-16.29	-5.98	11.00	16.98
116	5580	10.31	-15.57	-5.26	11.00	16.26
140	5700	10.33	-14.35	-4.02	11.00	15.02

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.28 + (-16.59) = -6.31 dBm
Correction Factor = cable loss + 10 dB attenuator

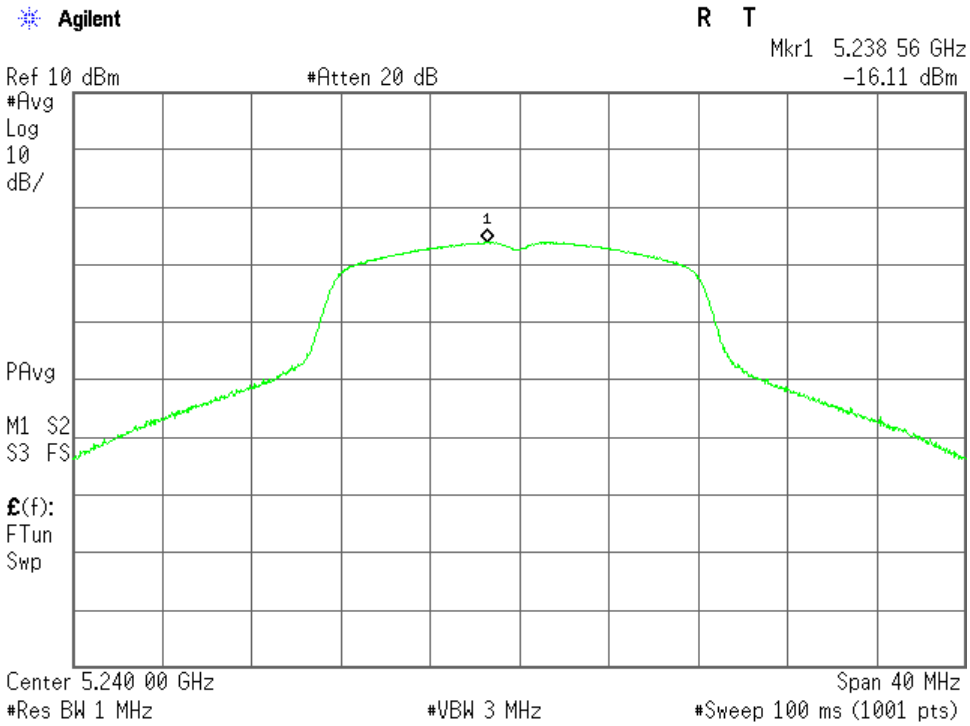
802.11a 36ch (5180 MHz)



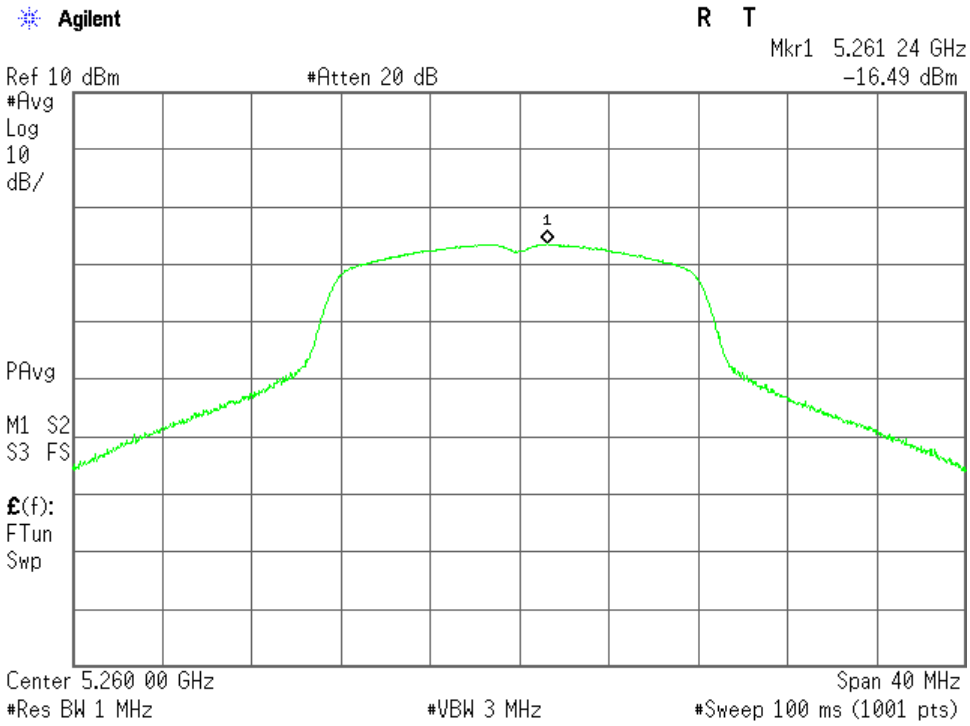
802.11a 44ch (5220 MHz)



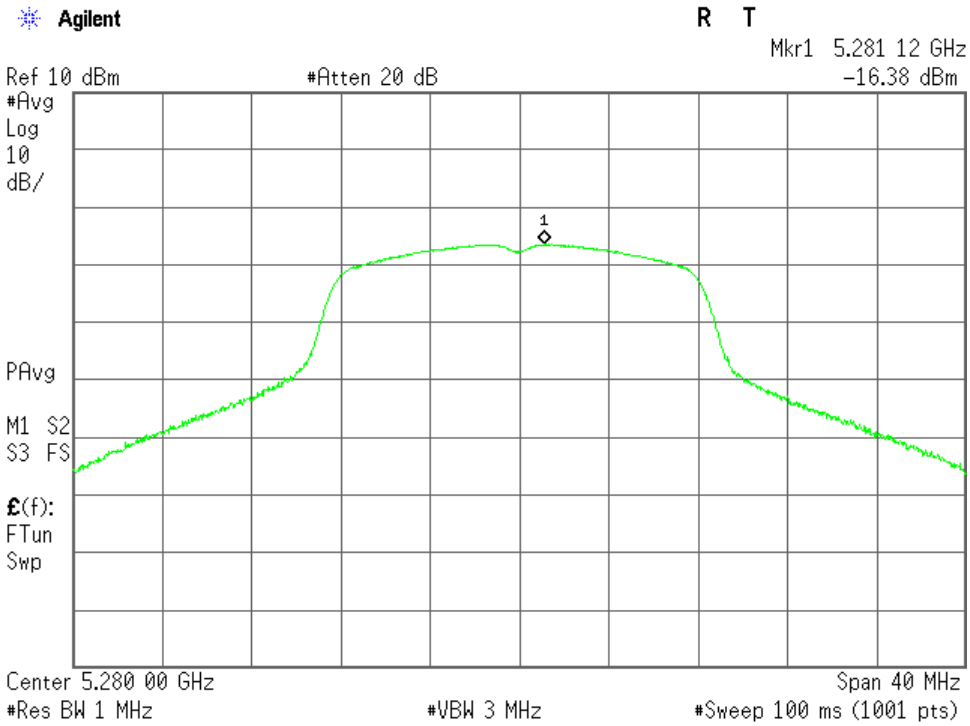
802.11a 48ch (5240 MHz)



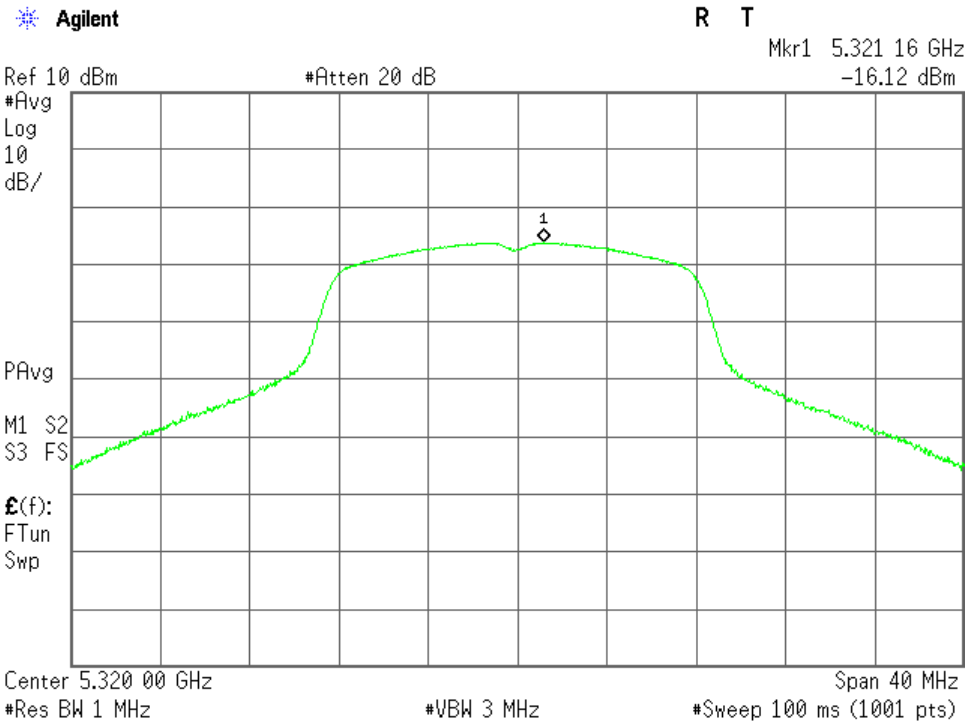
802.11a 52ch (5260 MHz)



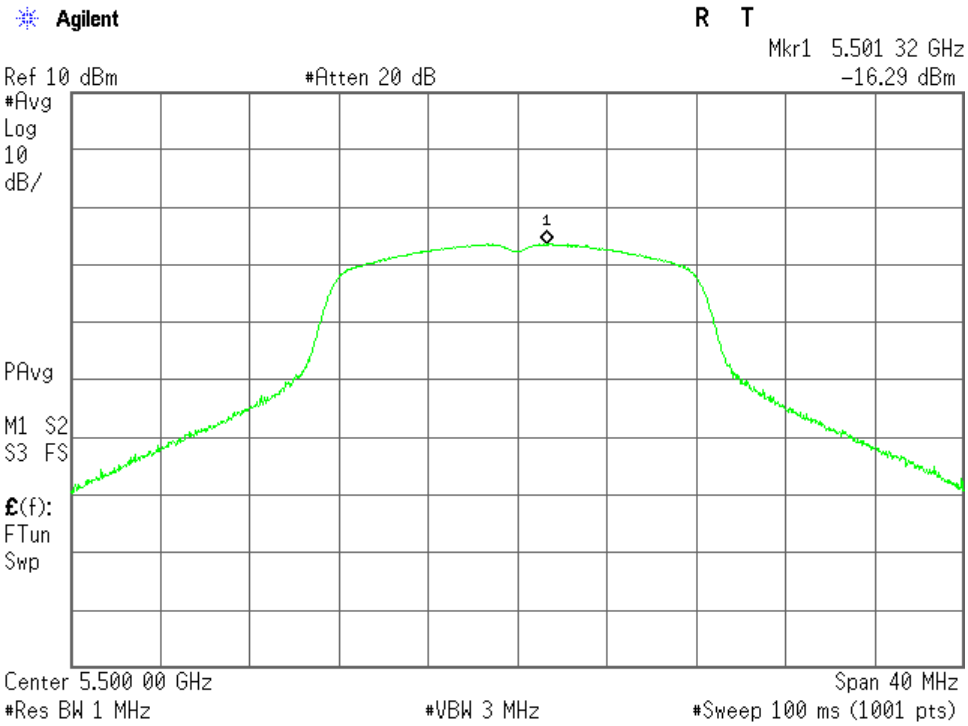
802.11a 56ch (5280 MHz)



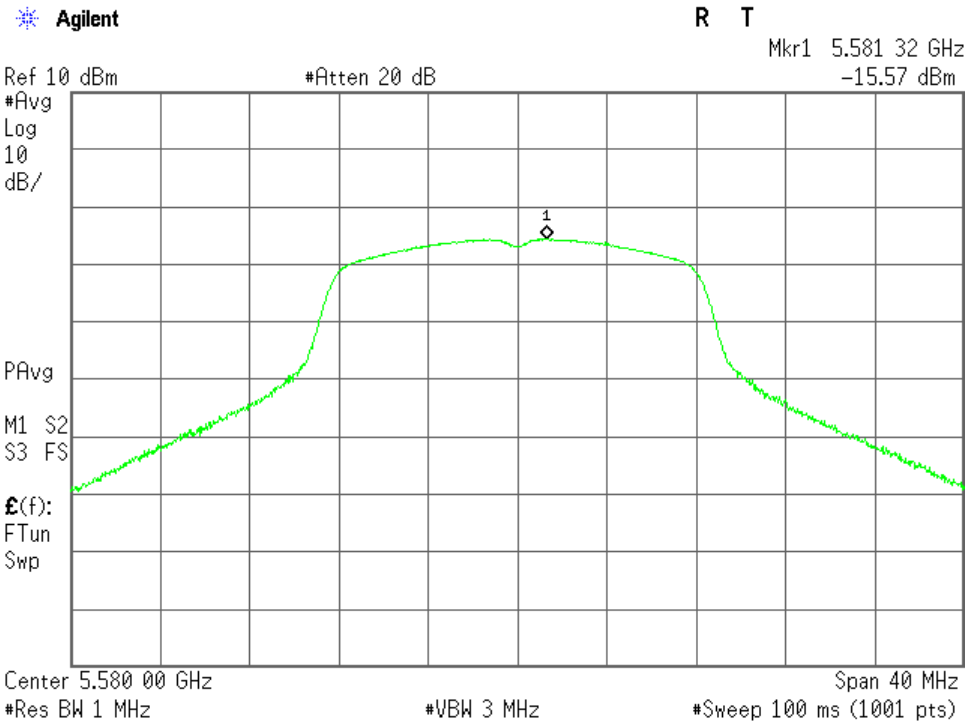
802.11a 64ch (5320 MHz)



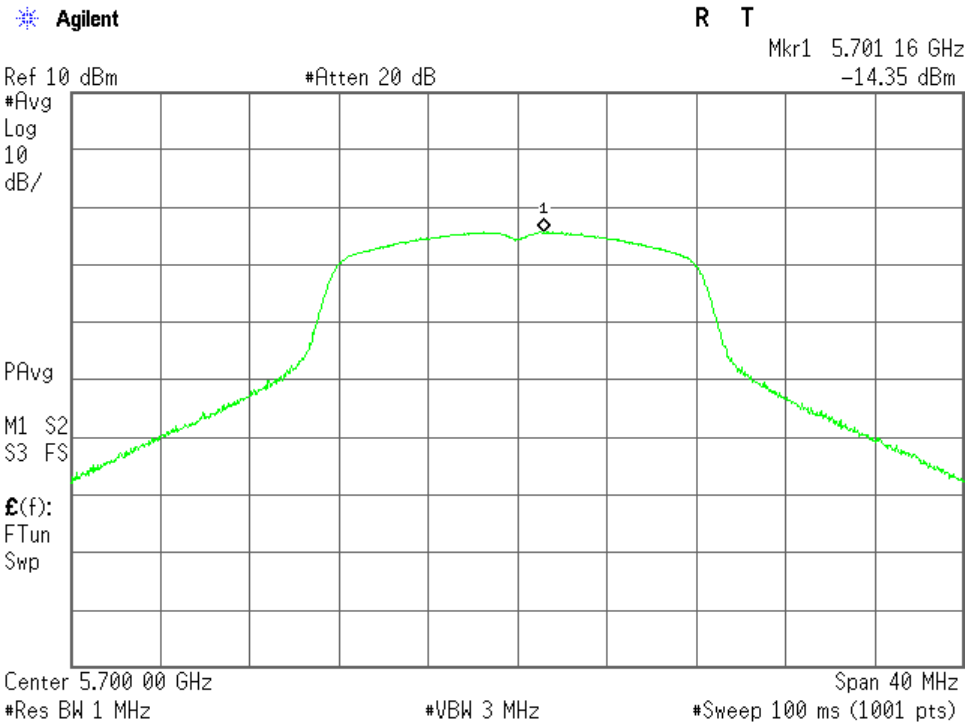
802.11a 100ch (5500 MHz)



802.11a 116ch (5580 MHz)



802.11a 140ch (5700 MHz)



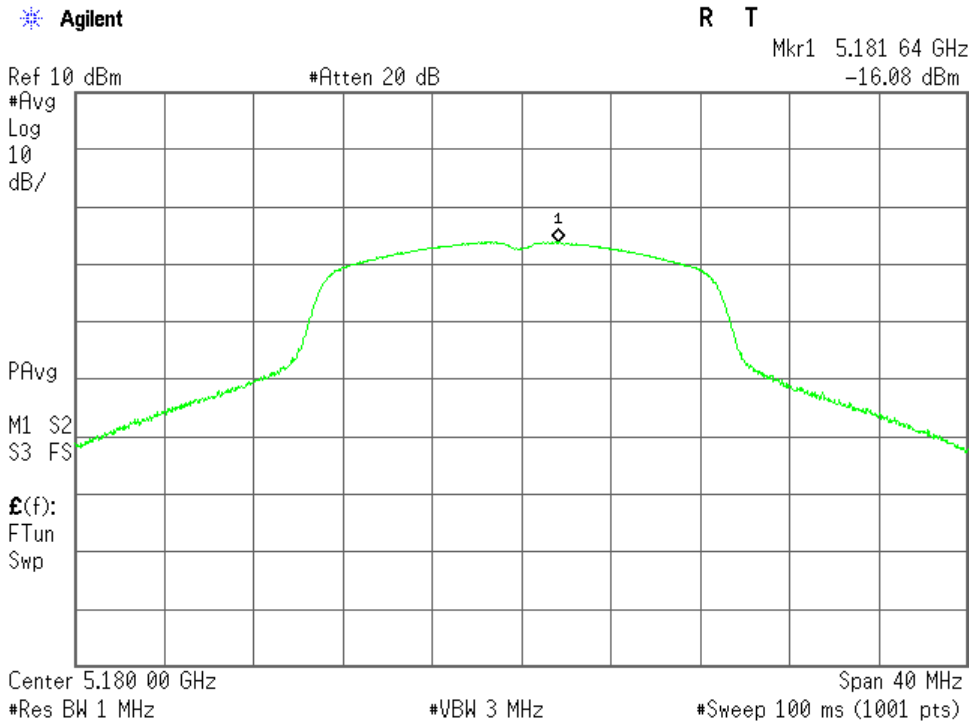
7.3.4.2 802.11n (20 MHz BW) Peak power spectral density

Mode of EUT: Tx Mode (802.11n: 20 MHz)
Test Port: Temporary antenna connector

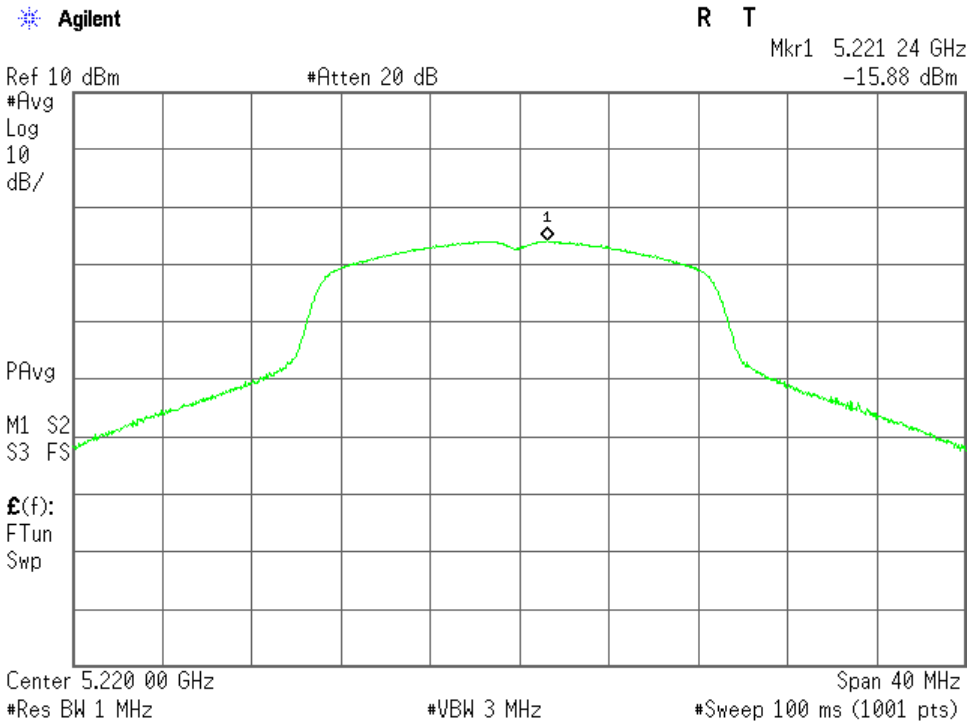
Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	PPSD (dBm)	Limit (dBm)	Margin (dB)
36	5180	10.28	-16.08	-5.80	11.00	16.80
44	5220	10.28	-15.88	-5.60	11.00	16.60
48	5240	10.28	-15.75	-5.47	11.00	16.47
52	5260	10.28	-16.54	-6.26	11.00	17.26
56	5280	10.29	-16.66	-6.37	11.00	17.37
64	5320	10.30	-16.27	-5.97	11.00	16.97
100	5500	10.31	-16.30	-5.99	11.00	16.99
116	5580	10.31	-15.35	-5.04	11.00	16.04
140	5700	10.33	-13.79	-3.46	11.00	14.46

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.28 + (-16.08) = -5.80 dBm
Correction Factor = cable loss + 10 dB attenuator

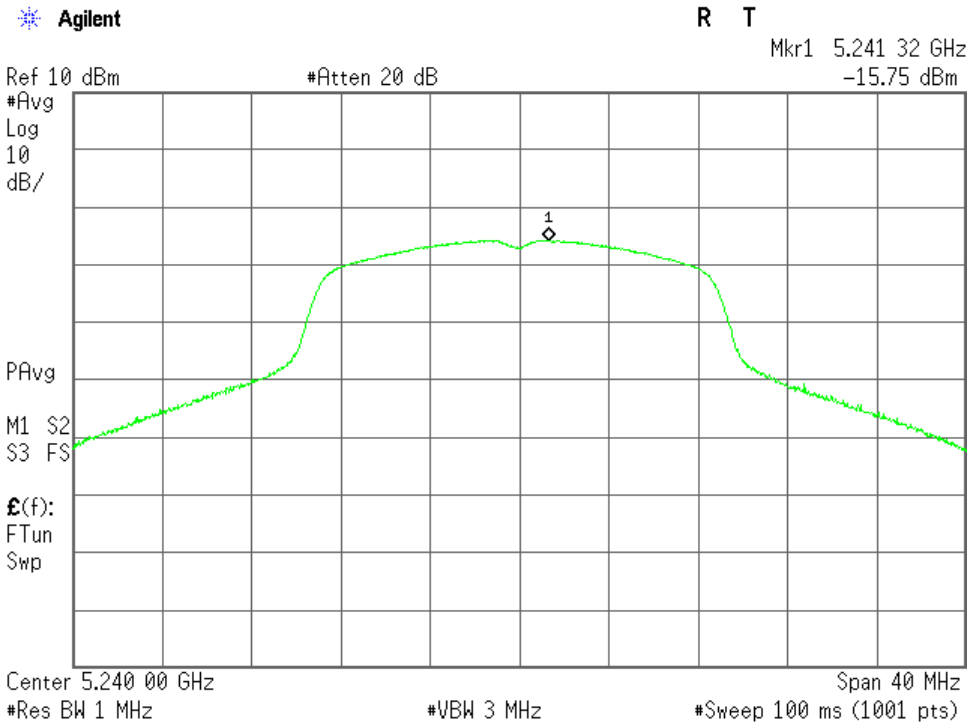
802.11n (20 MHz BW) 36ch (5180 MHz)



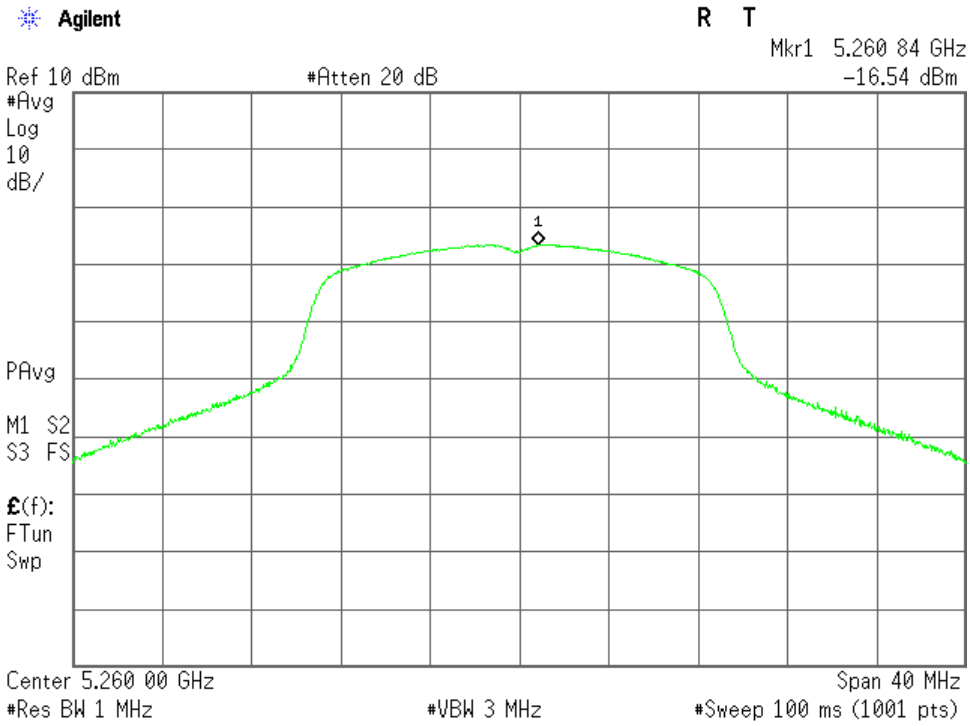
802.11n (20 MHz BW) 44ch (5220 MHz)



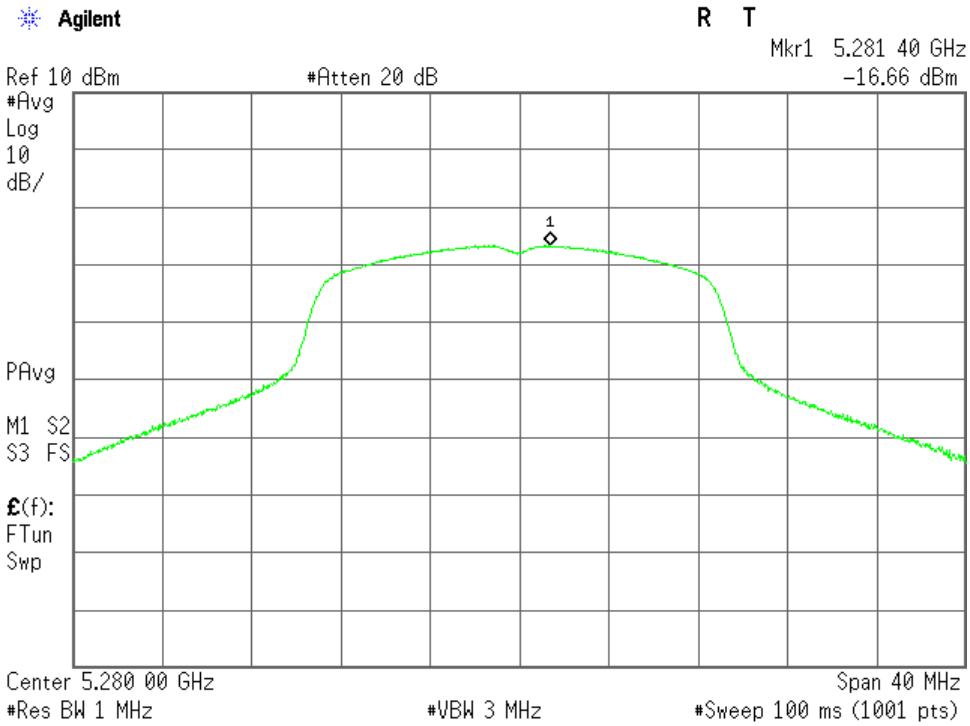
802.11n (20 MHz BW) 48ch (5240 MHz)



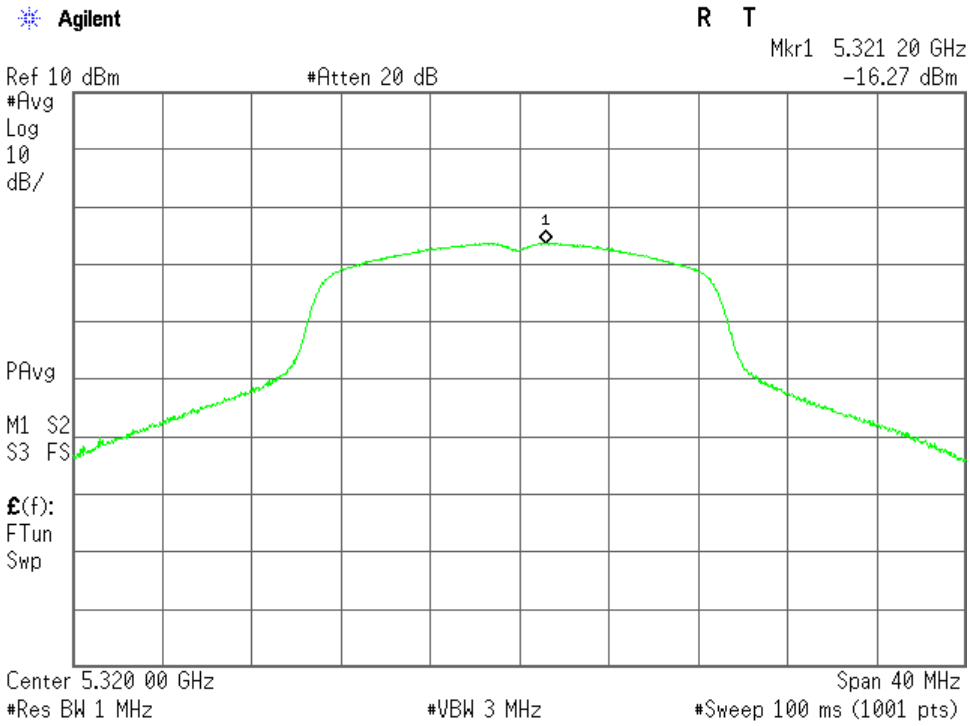
802.11n (20 MHz BW) 52ch (5260 MHz)



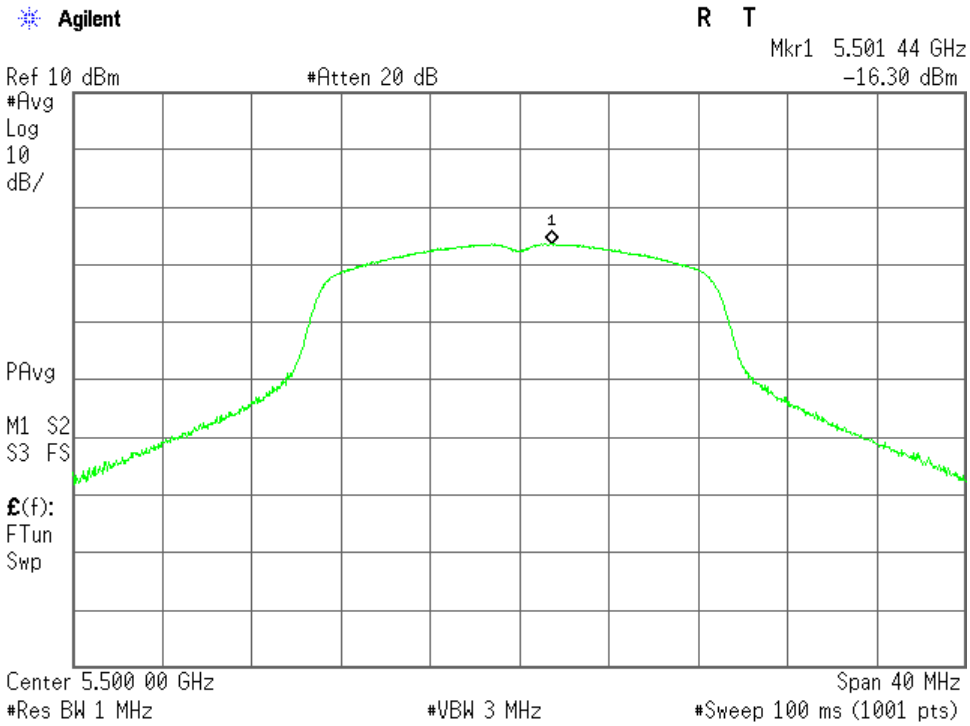
802.11n (20 MHz BW) 56ch (5280 MHz)



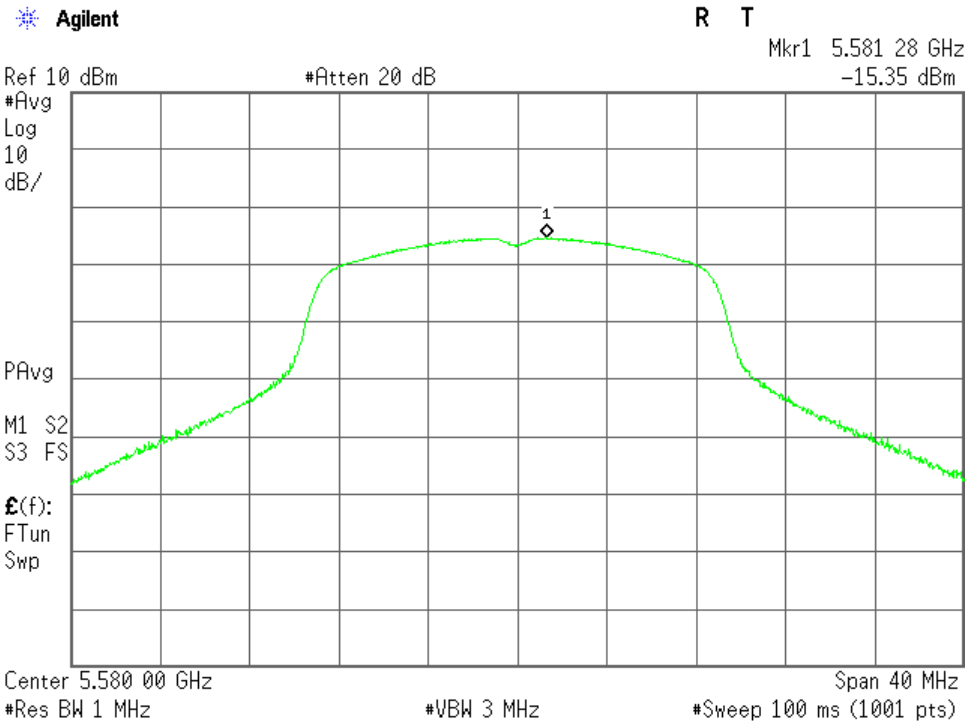
802.11n (20 MHz BW) 64ch (5320 MHz)



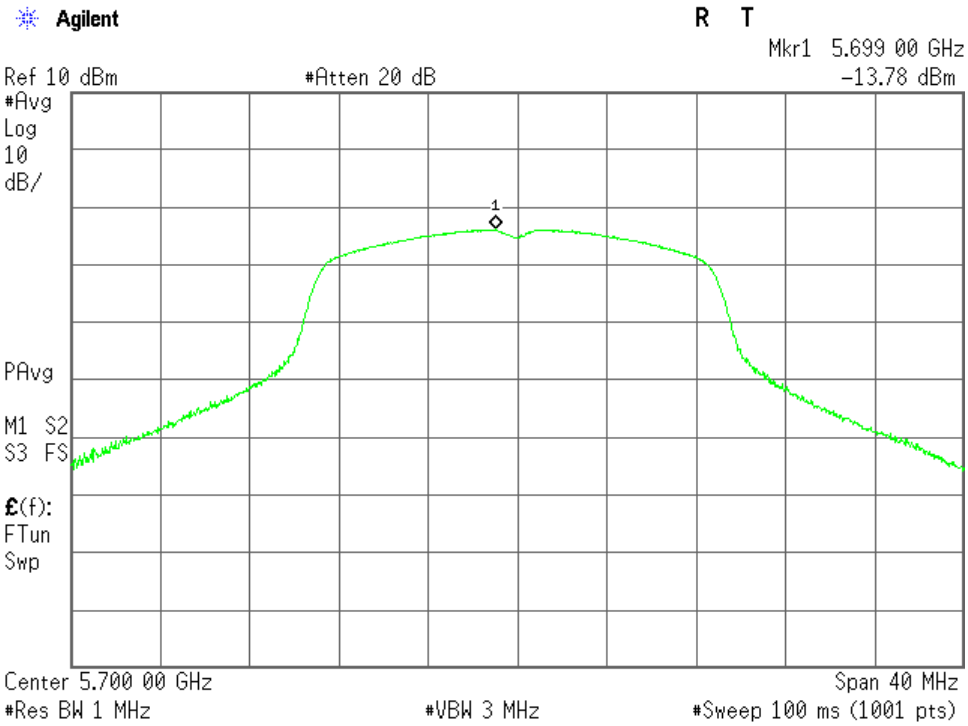
802.11n (20 MHz BW) 100ch (5500 MHz)



802.11n (20 MHz BW) 116ch (5580 MHz)



802.11n (20 MHz BW) 140ch (5700 MHz)



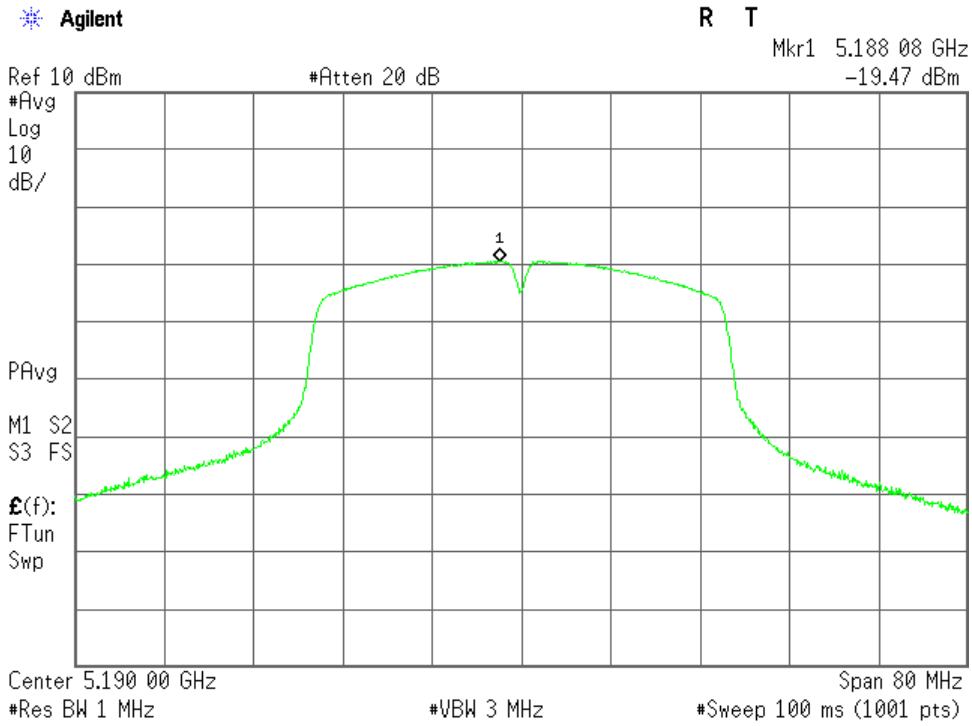
7.3.4.3 802.11n (40 MHz BW) Peak power spectral density

Mode of EUT: Tx Mode (802.11n: 40 MHz)
Test Port: Temporary antenna connector

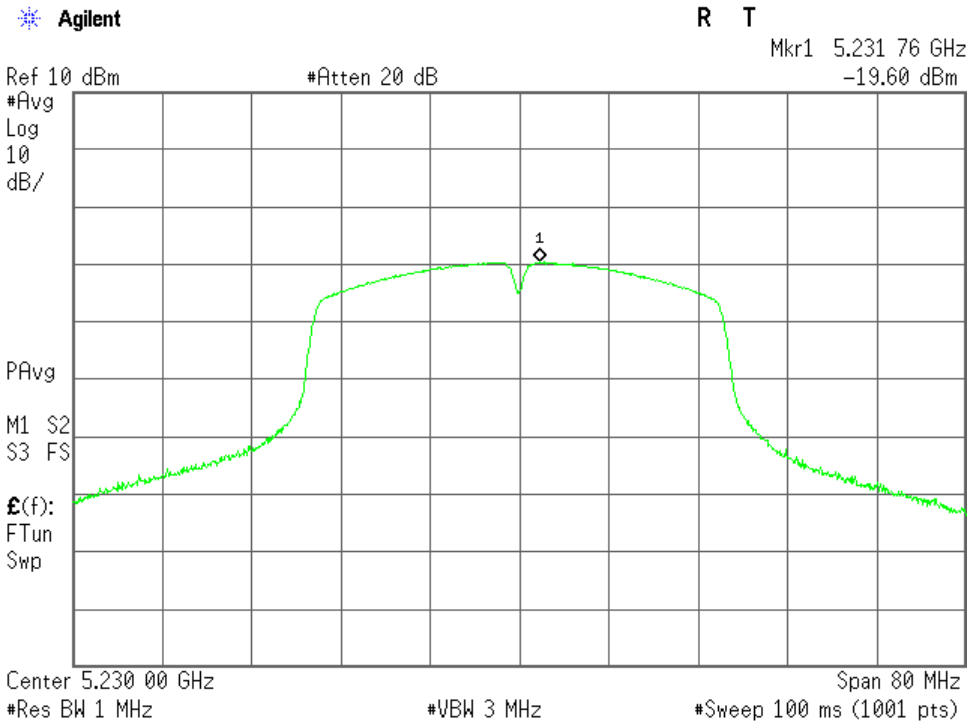
Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	PPSD (dBm)	Limit (dBm)	Margin (dB)
38	5190	10.28	-19.47	-9.19	11.00	20.19
46	5230	10.28	-19.60	-9.32	11.00	20.32
54	5270	10.28	-20.36	-10.08	11.00	21.08
62	5310	10.30	-19.28	-8.98	11.00	19.98
102	5510	10.31	-18.75	-8.44	11.00	19.44
134	5670	10.32	-16.77	-6.45	11.00	17.45

The test results (PPSD) is calculated as follows;
For 38 channel (5190 MHz)
PPSD = Correction Factor + Meter Reading = 10.28 + (-19.47) = -9.19 dBm
Correction Factor = cable loss + 10 dB attenuator

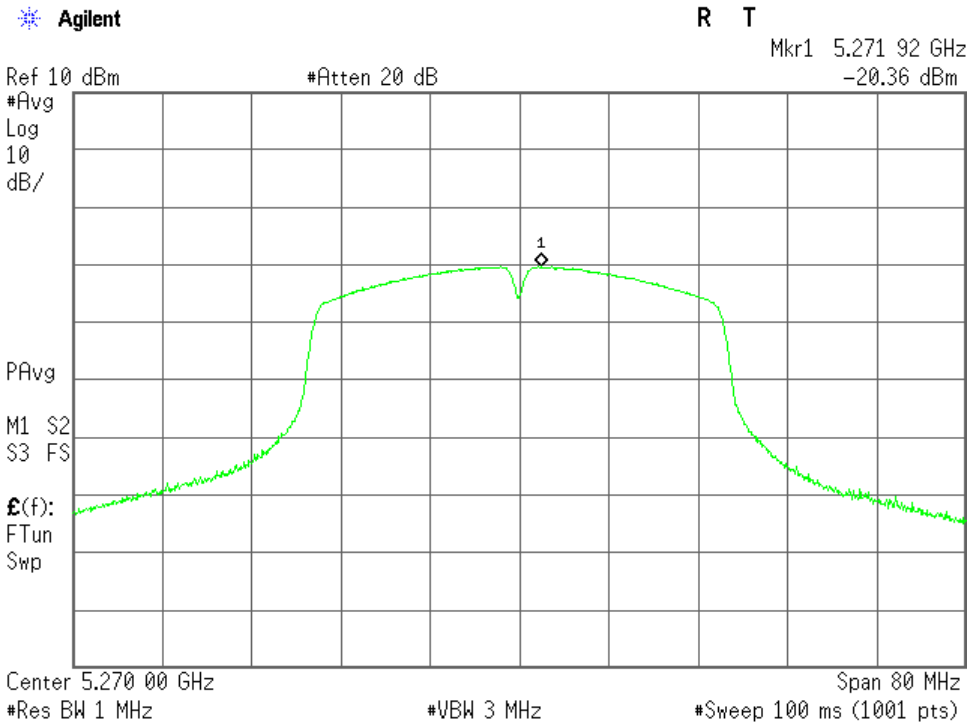
802.11n (40 MHz BW) 38ch (5190 MHz)



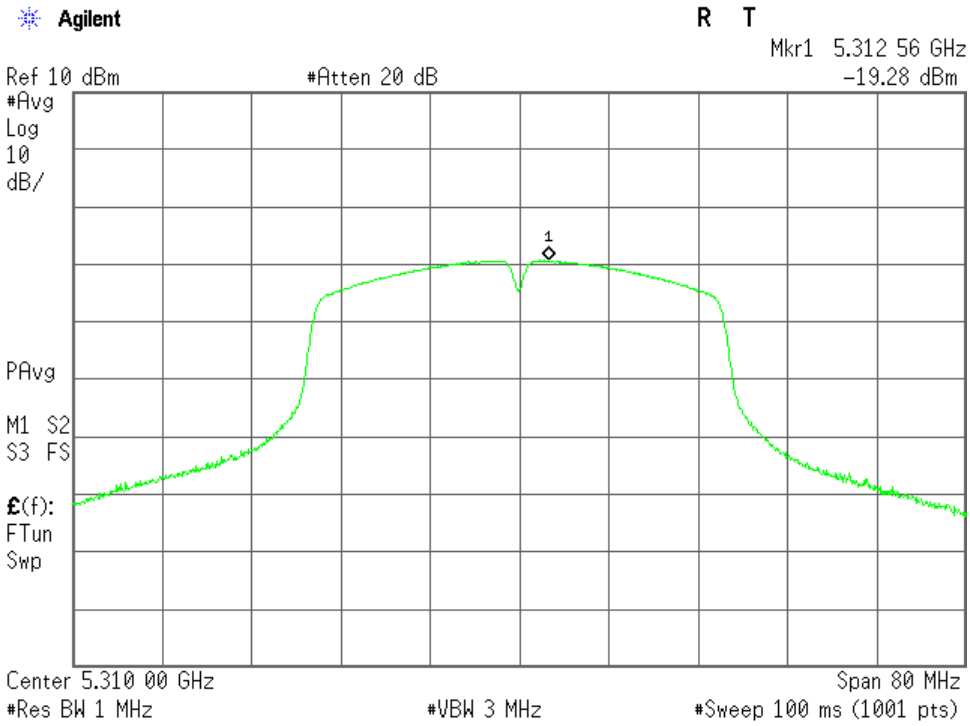
802.11n (40 MHz BW) 46ch (5230 MHz)



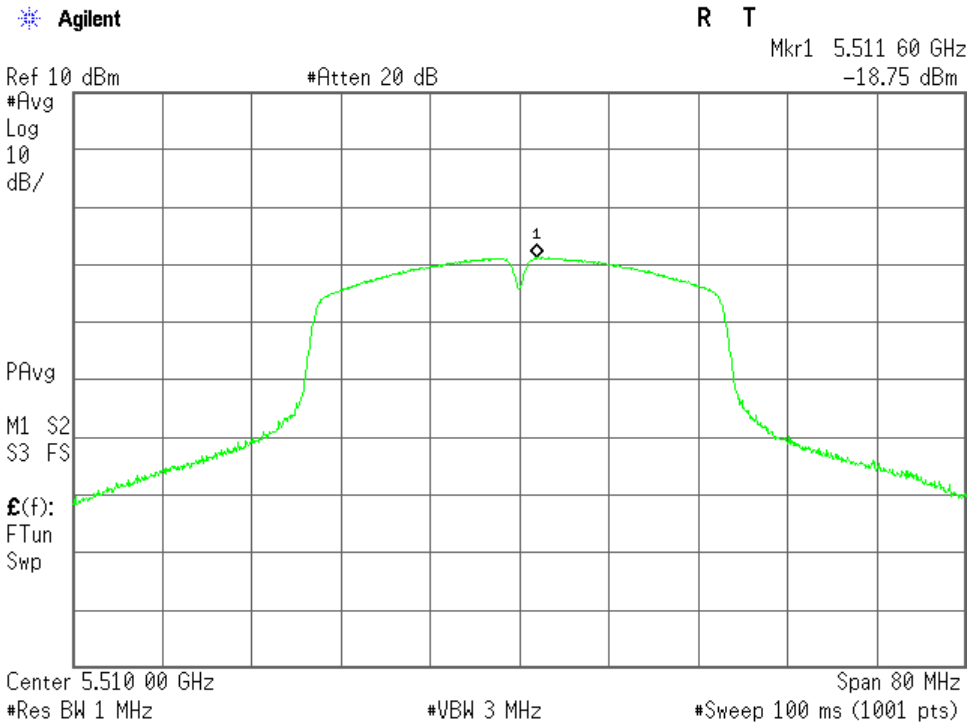
802.11n (40 MHz BW) 54ch (5270 MHz)



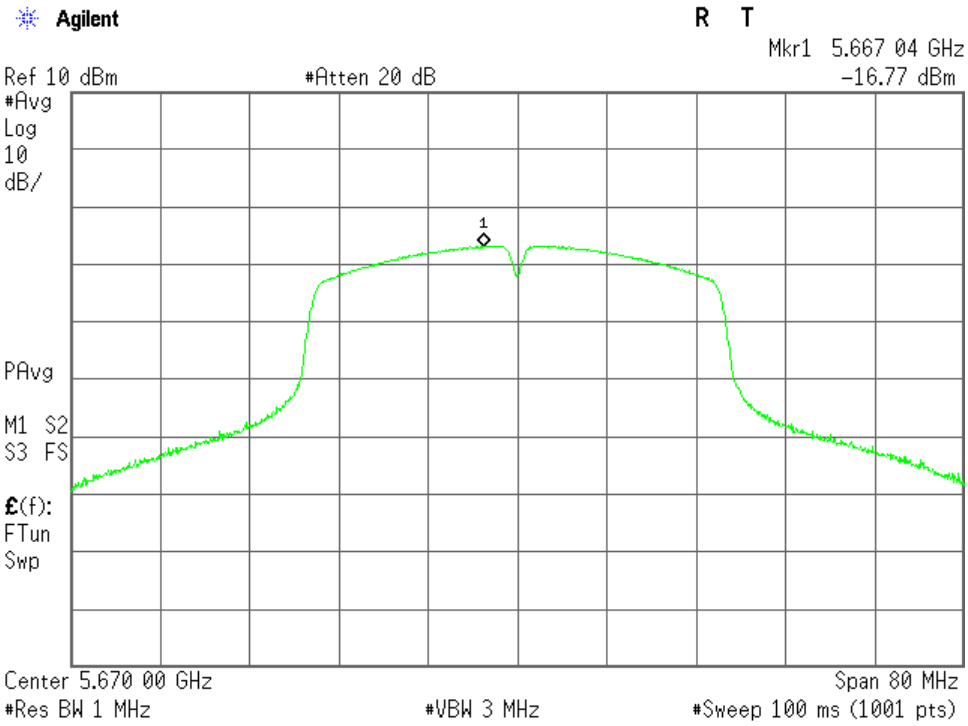
802.11n (40 MHz BW) 62ch (5310 MHz)



802.11n (40 MHz BW) 102ch (5510 MHz)



802.11n (40 MHz BW) 134ch (5670 MHz)



7.4 Peak Excursion

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

Remarks : _____

7.5 AC Powerline Conducted Emission

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

Min. Limit Margin (Quasi-Peak) 14.1 dB at 0.614 MHz

Uncertainty of Measurement Results ± 2.6 dB(2σ)

Remarks : _____

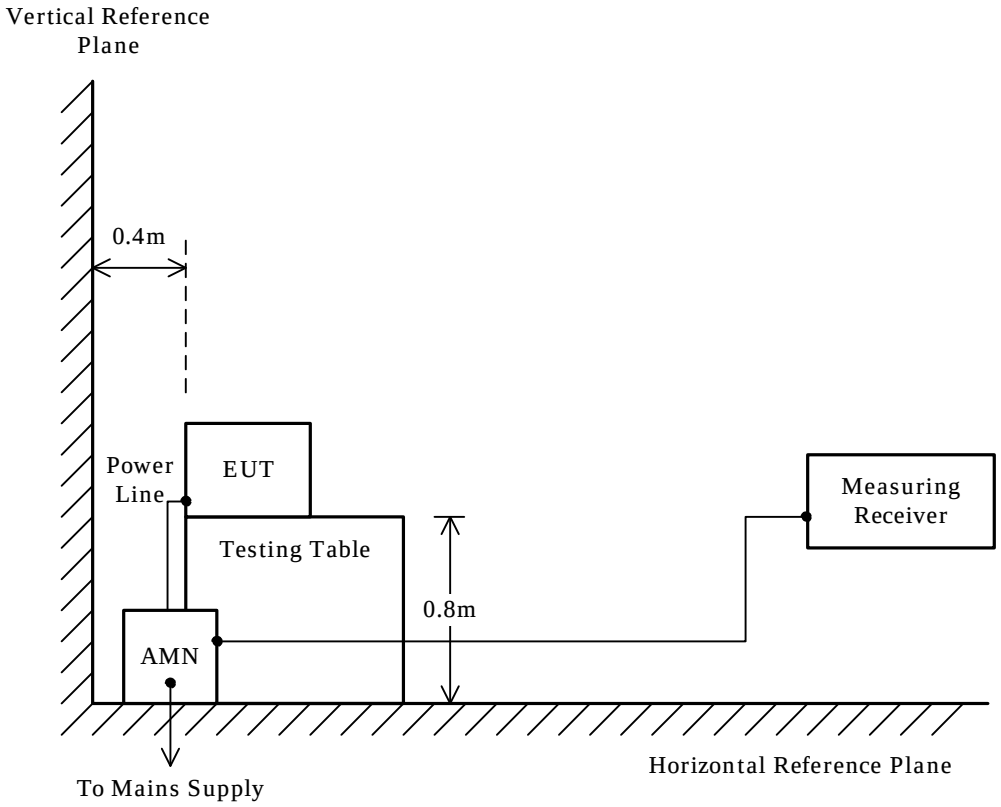
7.5.2 Test Instruments

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.

7.5.3 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

7.5.4 Test Data

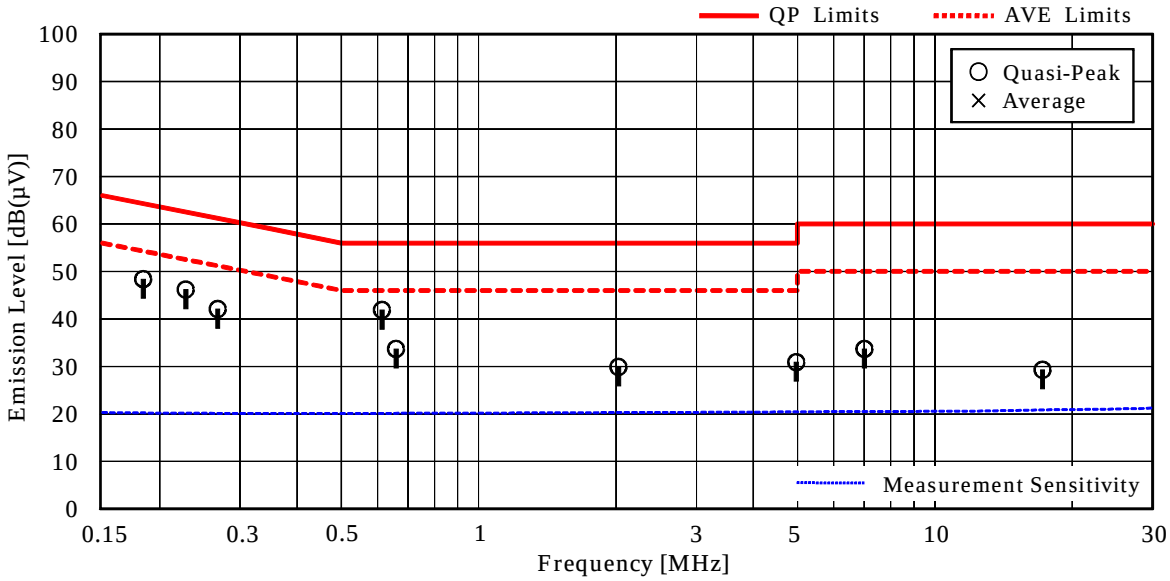
Mode of EUT : All modes have been investigated and the worst case mode for channel (36ch: 5180MHz / 802.11a and 802.11n) has been listed.

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	Meter Readings [dB(μV)] AVE	Limits [dB(μV)] QP	Limits [dB(μV)] AVE	Results [dB(μV)] QP	Results [dB(μV)] AVE	Margin [dB] QP	Margin [dB] AVE	Remarks
0.184	10.2	38.2	--	64.3	54.3	48.4	--	+15.9	--	-
0.228	10.2	36.0	--	62.5	52.5	46.2	--	+16.3	--	-
0.268	10.2	31.9	--	61.2	51.2	42.1	--	+19.1	--	-
0.614	10.1	31.8	--	56.0	46.0	41.9	--	+14.1	--	-
0.659	10.1	23.6	--	56.0	46.0	33.7	--	+22.3	--	-
2.025	10.3	19.6	--	56.0	46.0	29.9	--	+26.1	--	-
4.969	10.4	20.5	--	56.0	46.0	30.9	--	+25.1	--	-
7.009	10.5	23.2	--	60.0	50.0	33.7	--	+26.3	--	-
17.218	10.9	18.4	--	60.0	50.0	29.3	--	+30.7	--	-



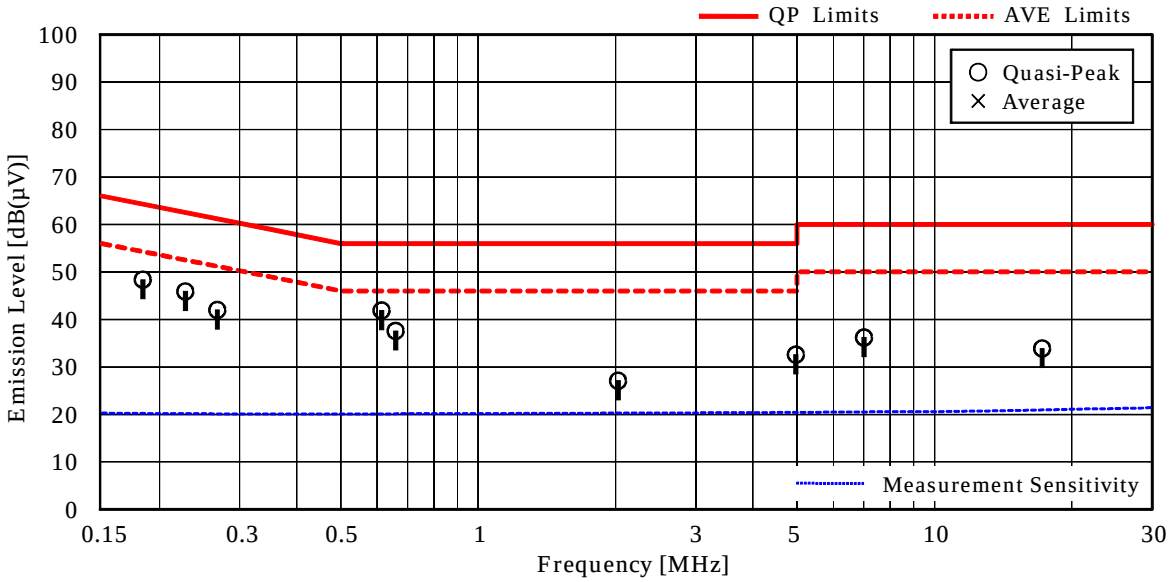
NOTES
1. The spectrum was checked from 150 kHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.614 MHz, as the 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

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
0.184	10.2	38.2	--	64.3	54.3	48.4	--	+15.9	--	-
0.228	10.2	35.7	--	62.5	52.5	45.9	--	+16.6	--	-
0.268	10.2	31.8	--	61.2	51.2	42.0	--	+19.2	--	-
0.614	10.1	31.8	--	56.0	46.0	41.9	--	+14.1	--	-
0.659	10.1	27.5	--	56.0	46.0	37.6	--	+18.4	--	-
2.025	10.3	16.8	--	56.0	46.0	27.1	--	+28.9	--	-
4.969	10.4	22.2	--	56.0	46.0	32.6	--	+23.4	--	-
7.009	10.6	25.6	--	60.0	50.0	36.2	--	+23.8	--	-
17.218	11.0	22.9	--	60.0	50.0	33.9	--	+26.1	--	-



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 0.614 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

7.6 Unwanted Radiated Emission

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

Min. Limit Margin (Average) 0.1 dB at 22800.0 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)
Test Distance	9 kHz – 26.5 GHz	3	m
	26.5 GHz – 40 GHz	1	m

Remarks : Worst case : 802.11a 140ch (Y axis position)
The measurement result is within the range of measurement uncertainty.

7.6.2 Test Instruments

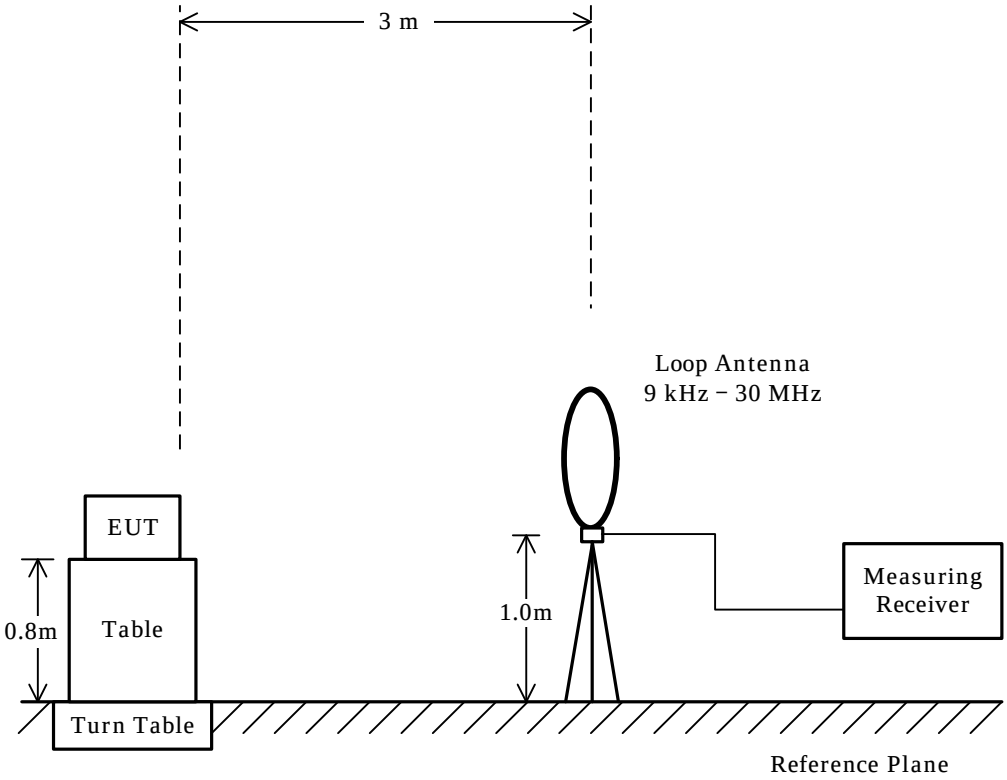
Anechoic Chamber A2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100070	Rohde & Schwarz	2018/01/11
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2018/03/30
Loop Antenna	HFH2-Z2	860605/030 (C-3)	Rohde & Schwarz	2017/08/01
Biconical Antenna	VHA9103/BBA9106	2355 (C-30)	Schwarzbeck	2018/05/23
Log-periodic Antenna	UHALP9108-A1	0694 (C-31)	Schwarzbeck	2018/05/23
Horn Antenna	91888-2	560 (C-40-1)	EATON	2018/06/18
Horn Antenna	91889-2	560 (C-40-2)	EATON	2018/06/18
Horn Antenna	3160-04	9903-1053 (C-55)	EMCO	2018/06/19
Horn Antenna	3160-05	9902-1061 (C-56)	EMCO	2018/06/19
Horn Antenna	3160-06	9712-1045 (C-57)	EMCO	2018/06/19
Horn Antenna	3160-07	9902-1113 (C-58)	EMCO	2018/06/19
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2018/06/19
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2018/06/21
Horn Antenna	3160-10	9808-1072 (C-49)	EMCO	2018/06/21
Pre-Amplifier	310N	304573 (A-17)	SONOMA	2018/04/02
Pre-Amplifier	TPA0118-36	1010 (A-37)	TOYO	2018/05/14
Pre-Amplifier	RP1826G-45H	RP140121-11 (A-53)	EMCS	2018/06/21
Pre-Amplifier	RP2640G-ERZ	RP140121-21 (A-54)	EMCS	2018/06/21
Attenuator	54A-10	W5713 (D-29)	Weinschel	2017/08/02
Attenuator	2-10	BA6214 (D-79)	Weinschel	2017/11/21
Band Rejection Filter	BRM50716	063 (D-53)	MICRO-TRONICS	2017/07/11
RF Cable	RG213/U	--- (H-29)	HUBER+SUHNER	2017/08/01
RF Cable	S 10162 B-11 etc.	--- (H-4)	HUBER+SUHNER	2018/04/02
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.

7.6.3 Test Method and Test Setup (Diagrammatic illustration)

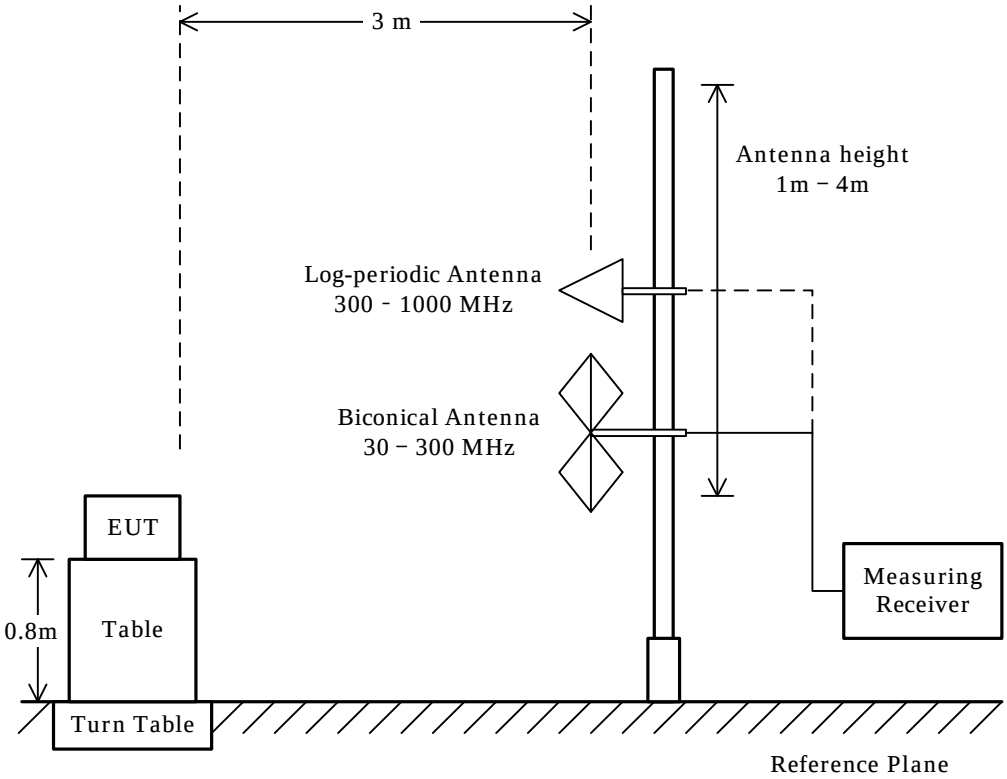
7.6.3.1 Radiated Emission 9 kHz – 30 MHz

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.



7.6.3.2 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.



7.6.3.3 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 average unwanted emissions measurements were performed in accordance with KDB 789033 D02 Method VB described in G.6.d) in this document.

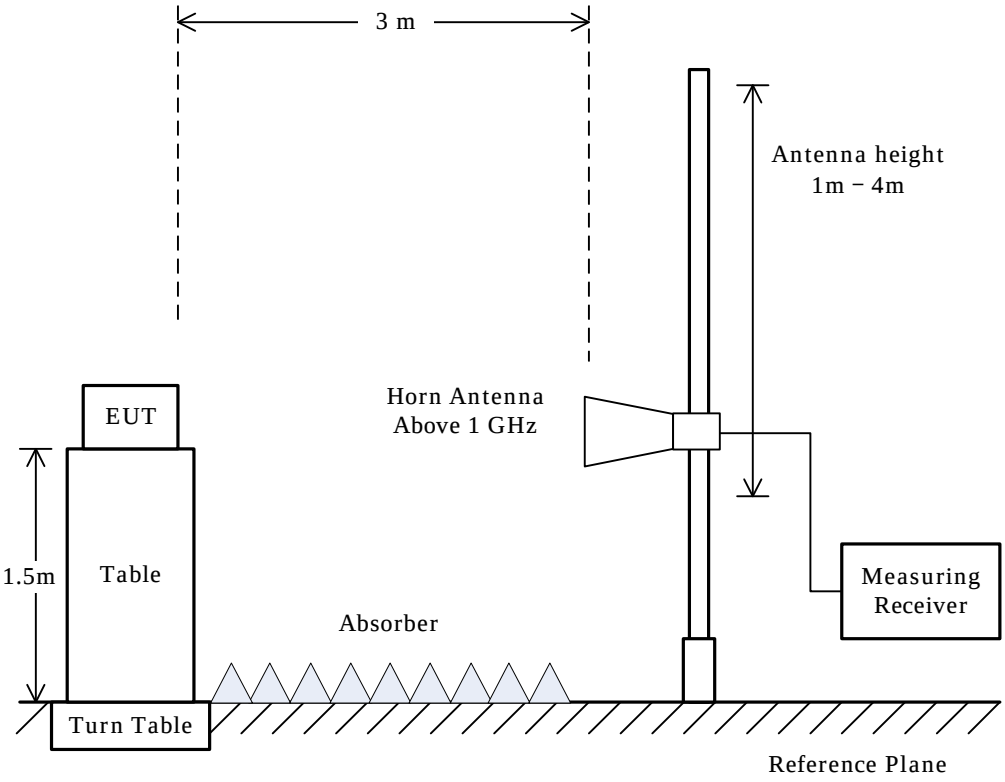
The setting of the measuring instruments are shown as follows:

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))
IEEE802.11a	0.405	5.925	93.2%	5.52	0.18	0.20
IEEE802.11n(HT20)	0.405	5.505	92.6%	5.10	0.20	0.30
IEEE802.11n(HT40)	0.440	2.888	84.8%	2.45	0.41	0.50



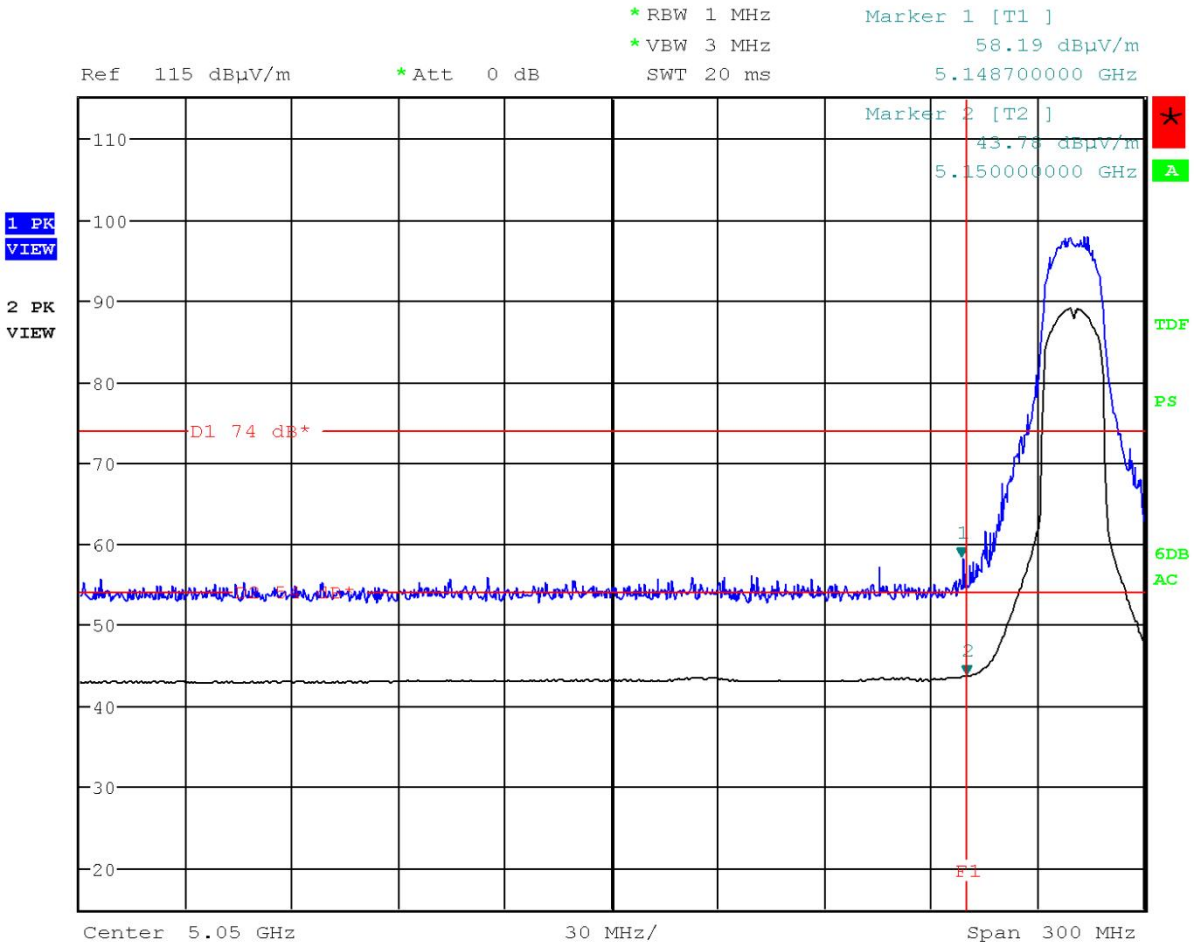
NOTE
When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

7.6.4 Test Data

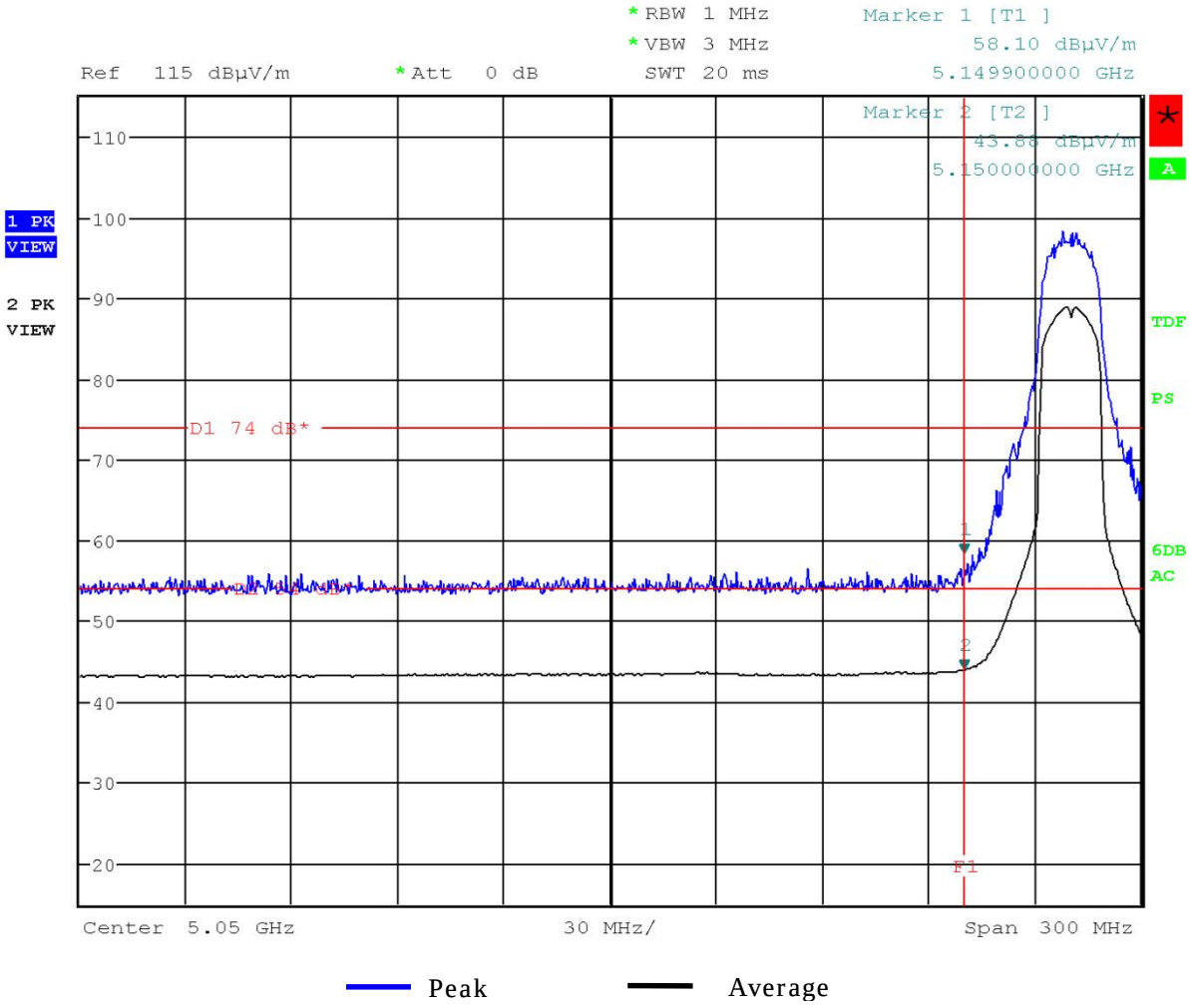
7.6.4.1 Band-edge Compliance

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

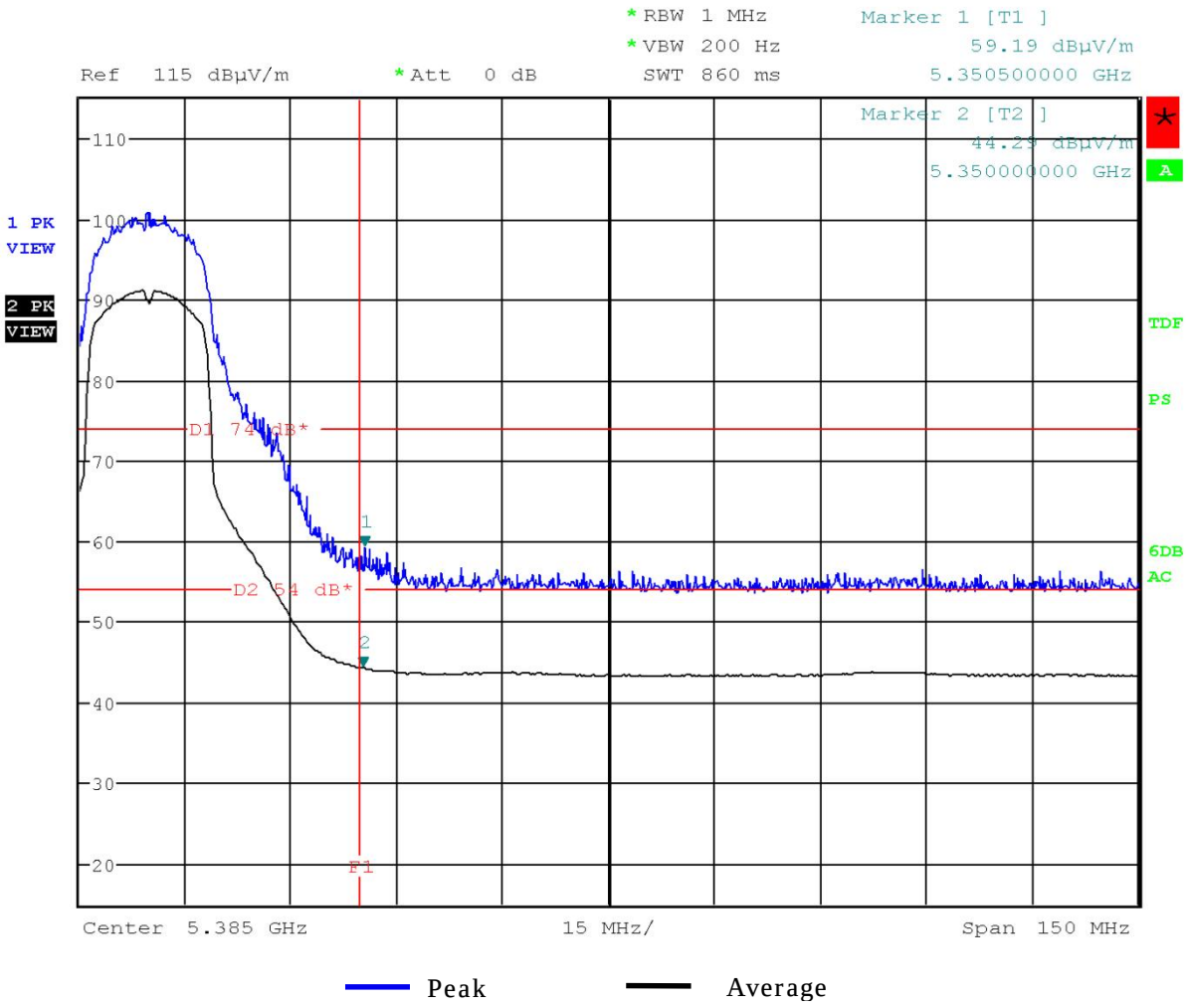
Mode of EUT : TX mode (802.11a, 36ch: 5180 MHz)
Antenna Polarization : Horizontal



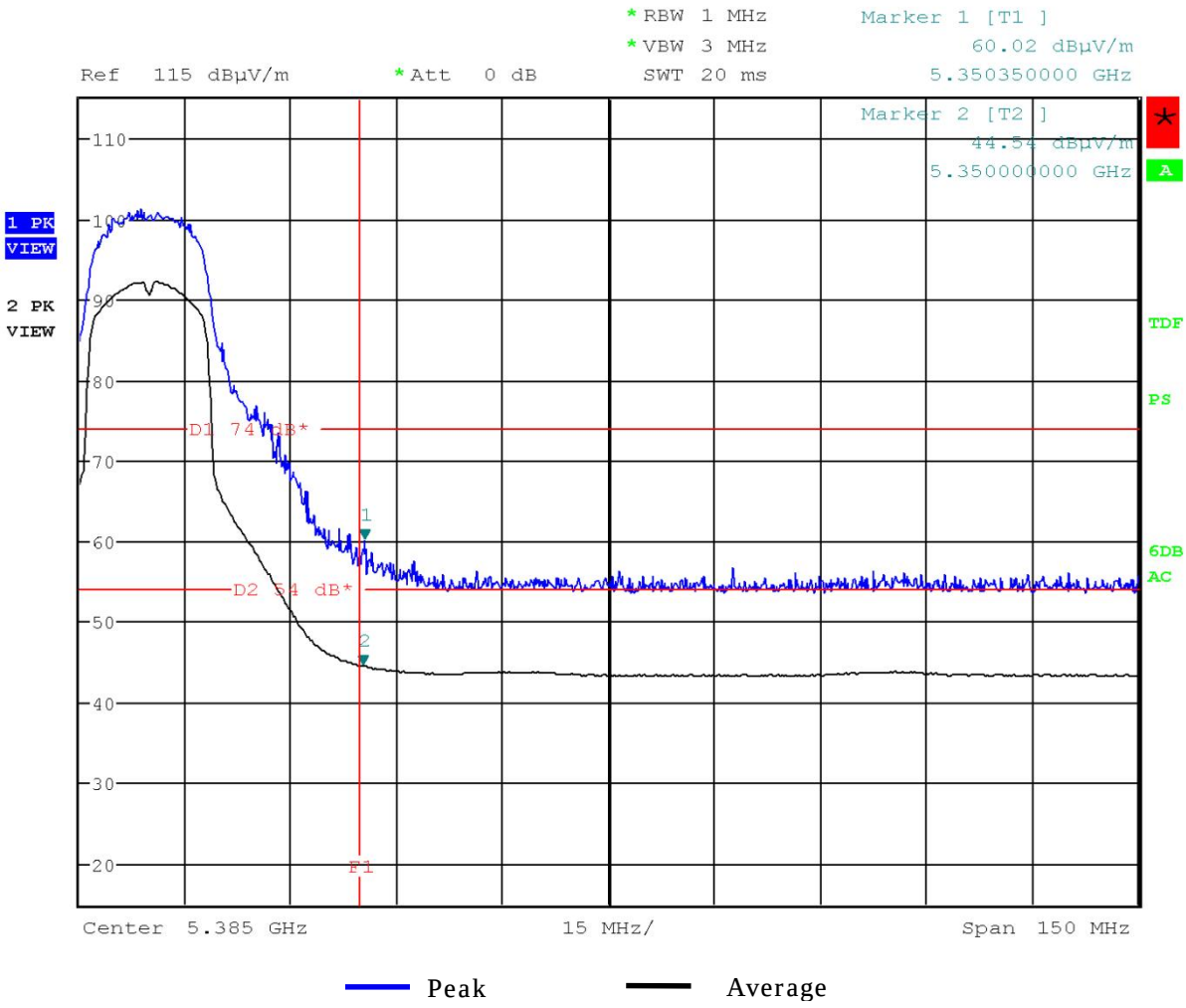
Mode of EUT : TX mode (802.11a, 36ch: 5180 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11a, 64ch: 5320 MHz)
Antenna Polarization : Horizontal

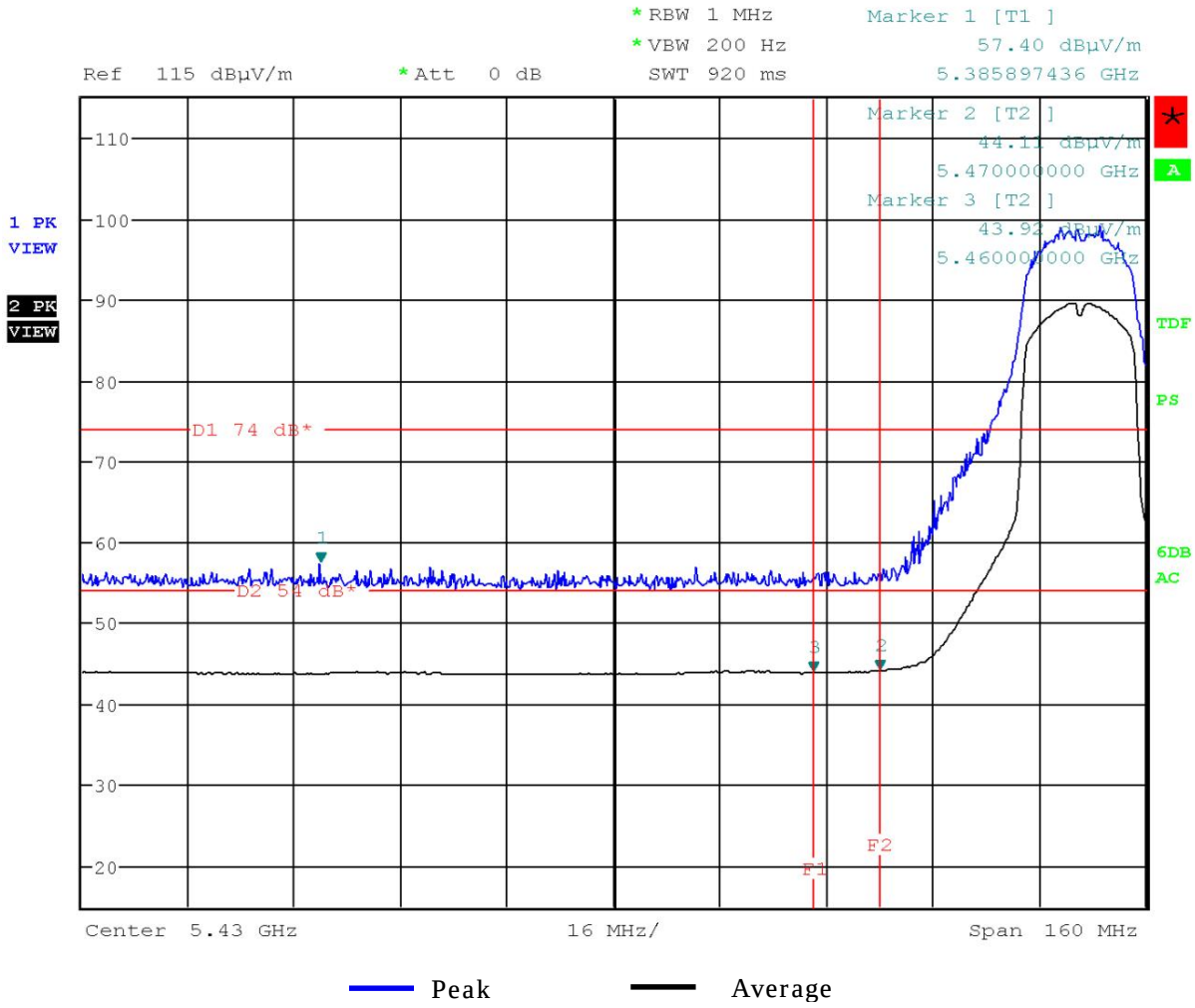


Mode of EUT : TX mode (802.11a, 64ch: 5320 MHz)
Antenna Polarization : Vertical

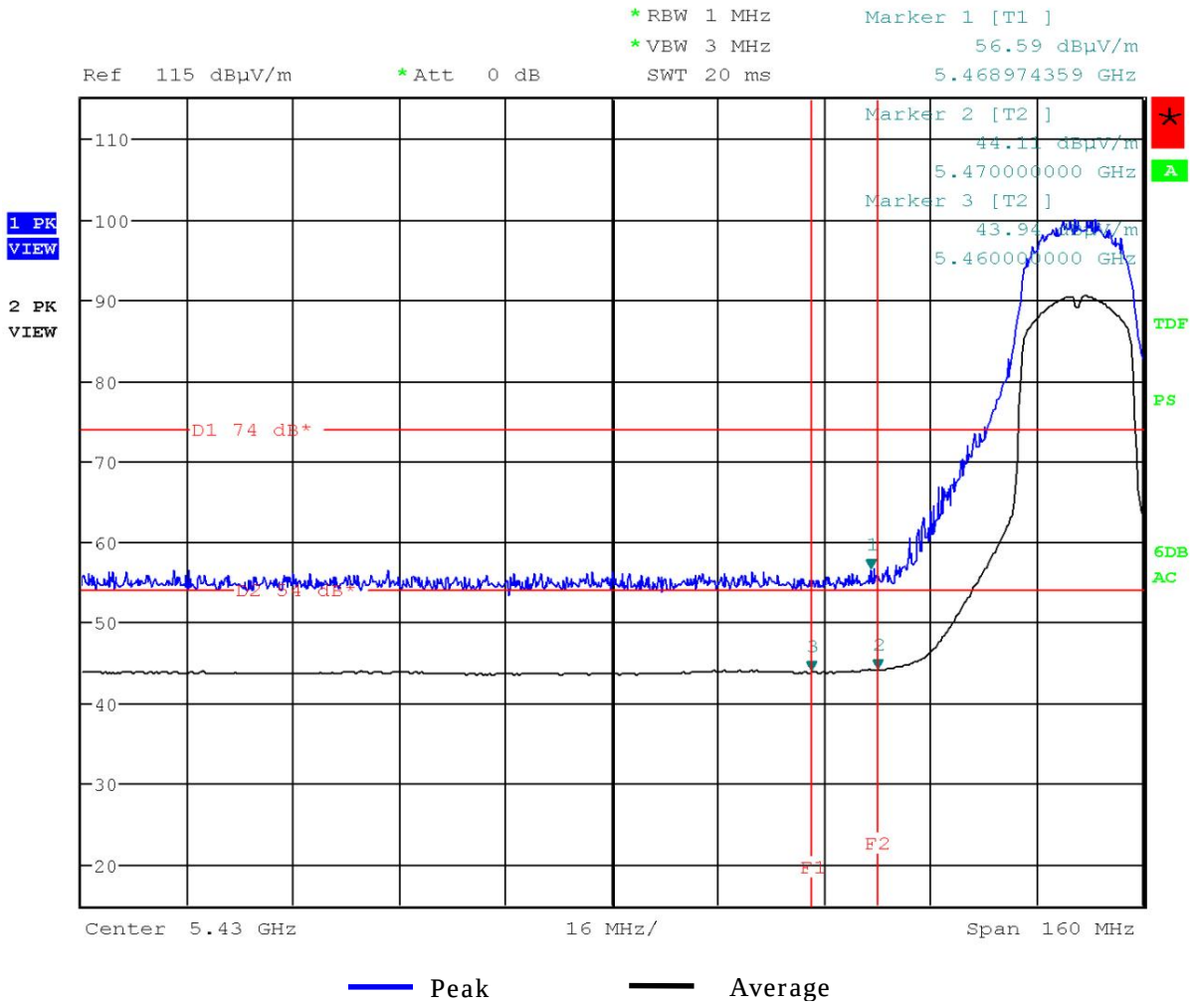


Test Date: June 21, 2017
Temp.: 24 °C, Humi: 70 %

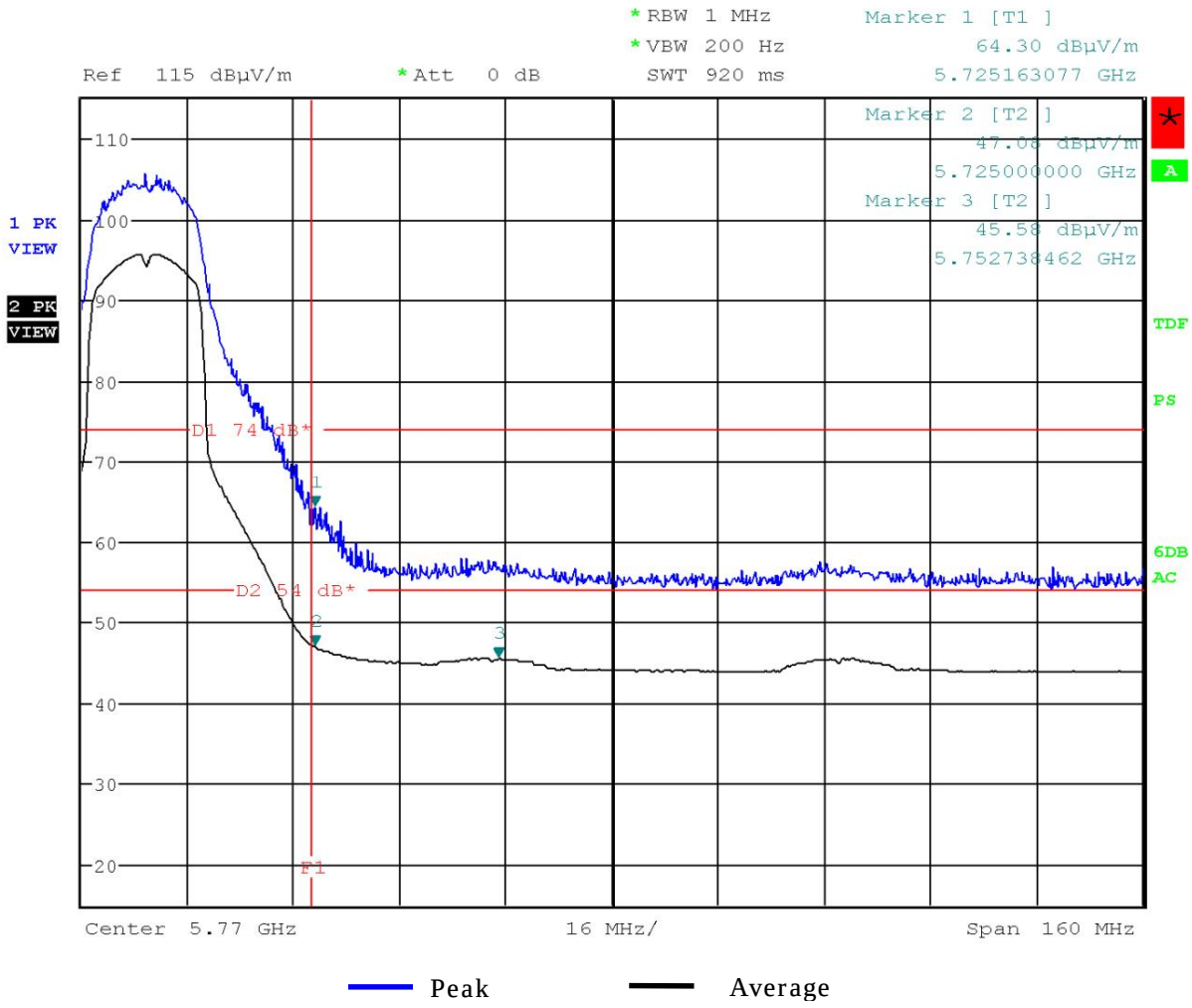
Mode of EUT : TX mode (802.11a, 100ch: 5500 MHz)
Antenna Polarization : Horizontal



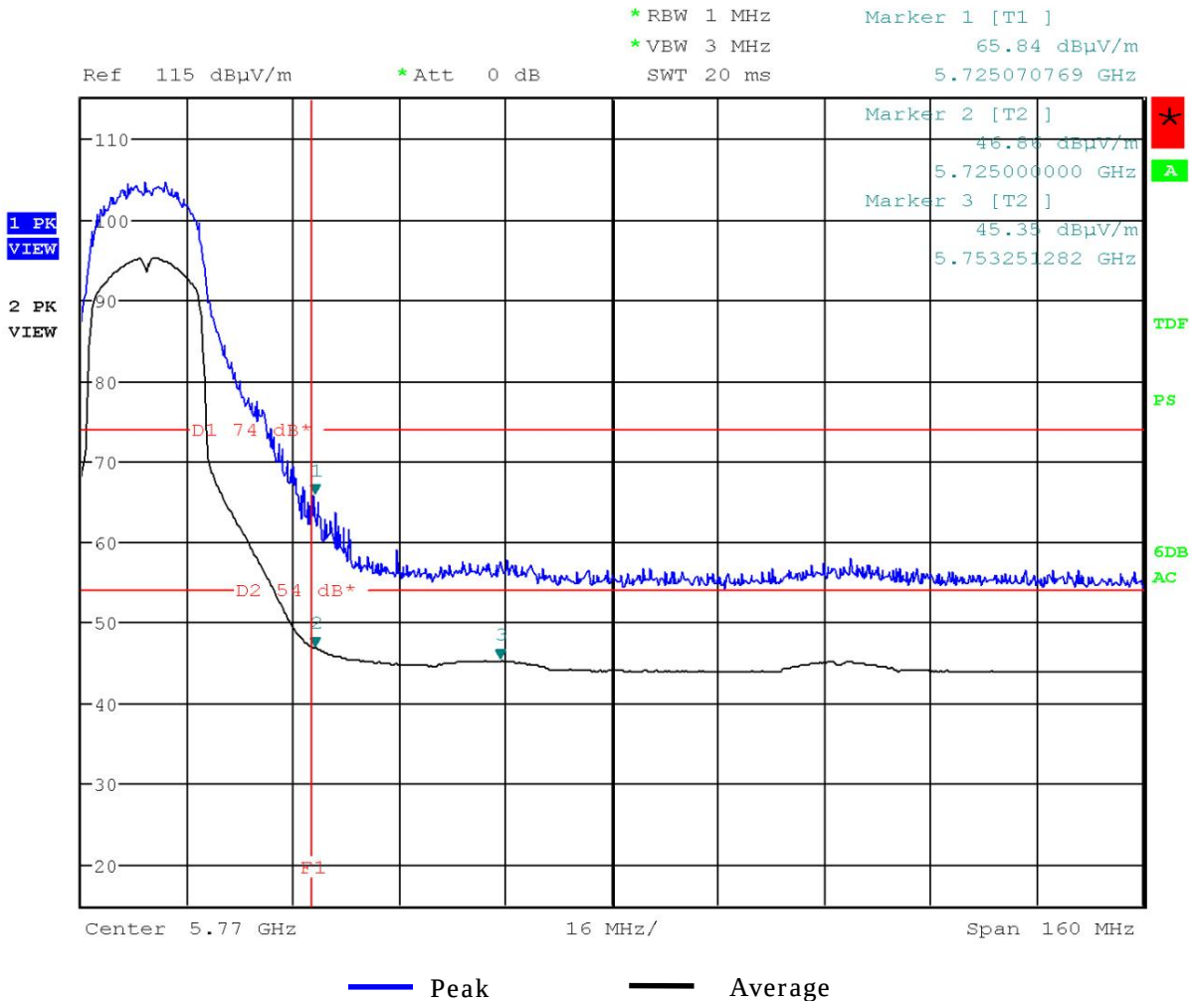
Mode of EUT : TX mode (802.11a, 100ch: 5500 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11a, 140ch: 5700 MHz)
Antenna Polarization : Horizontal

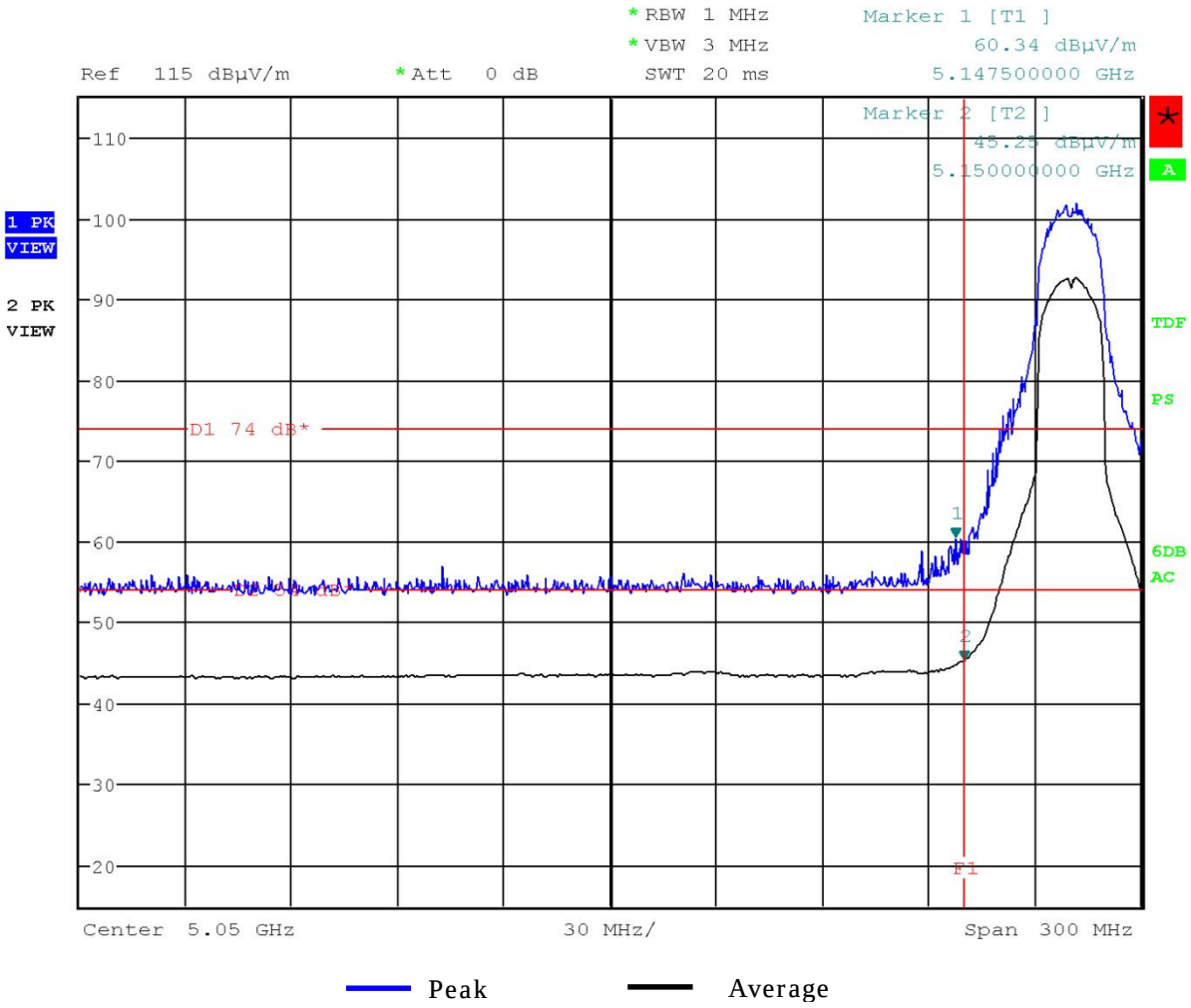


Mode of EUT : TX mode (802.11a, 140ch: 5700 MHz)
Antenna Polarization : Vertical

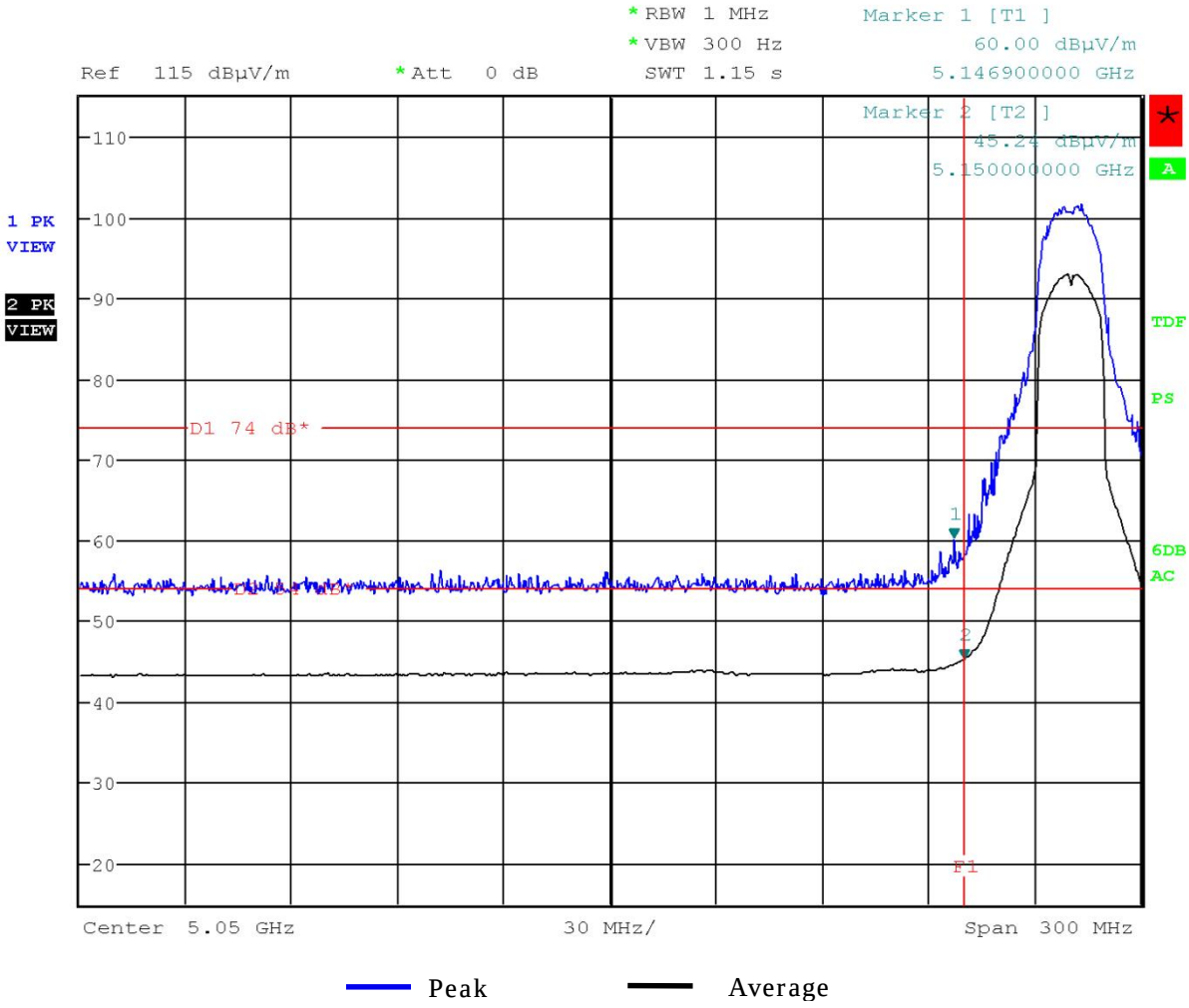


Test Date: February 7, 2017
Temp.: 23 °C, Humi: 48 %

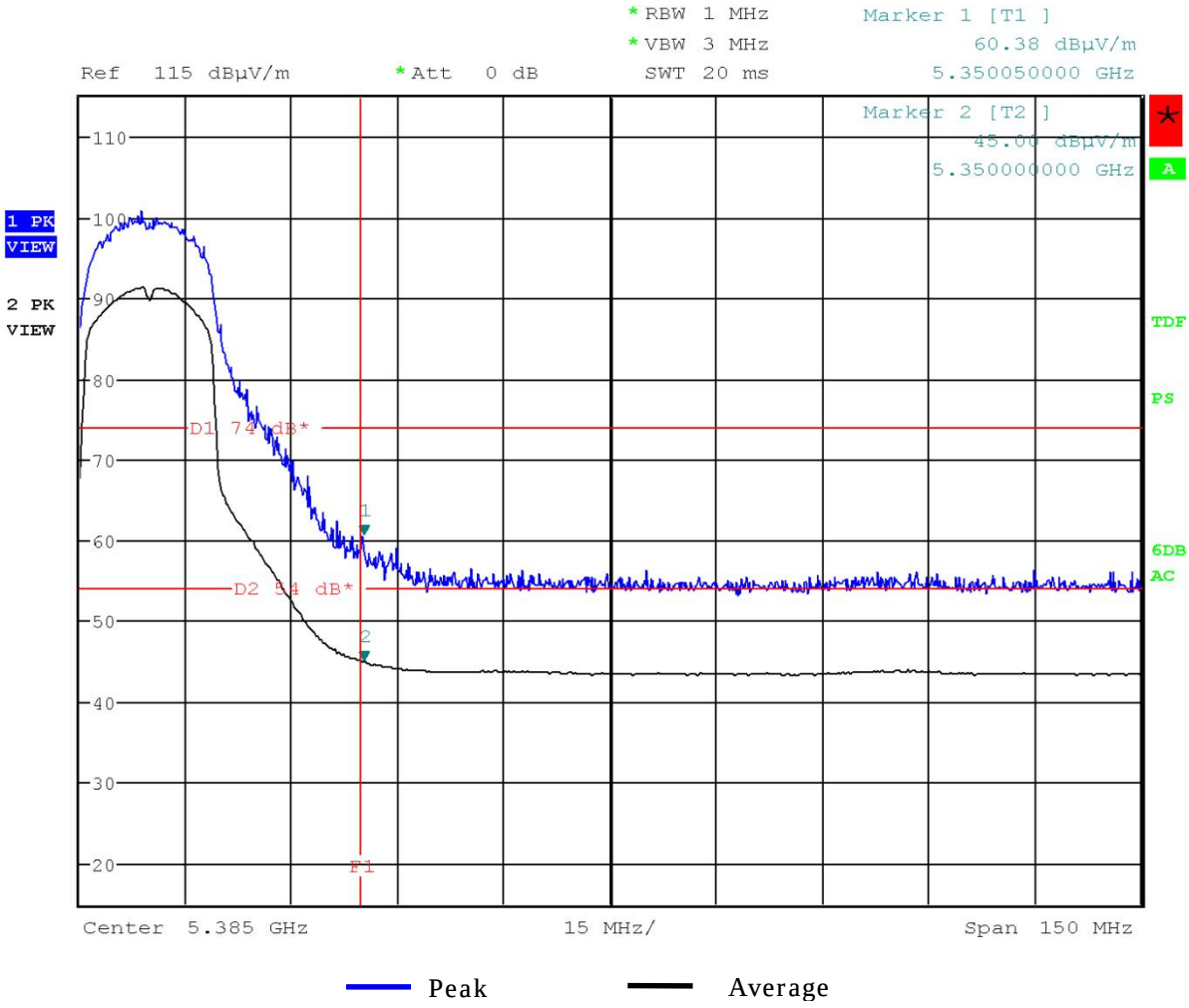
Mode of EUT : TX mode (802.11n (20 MHz BW), 36ch: 5180 MHz)
Antenna Polarization : Horizontal



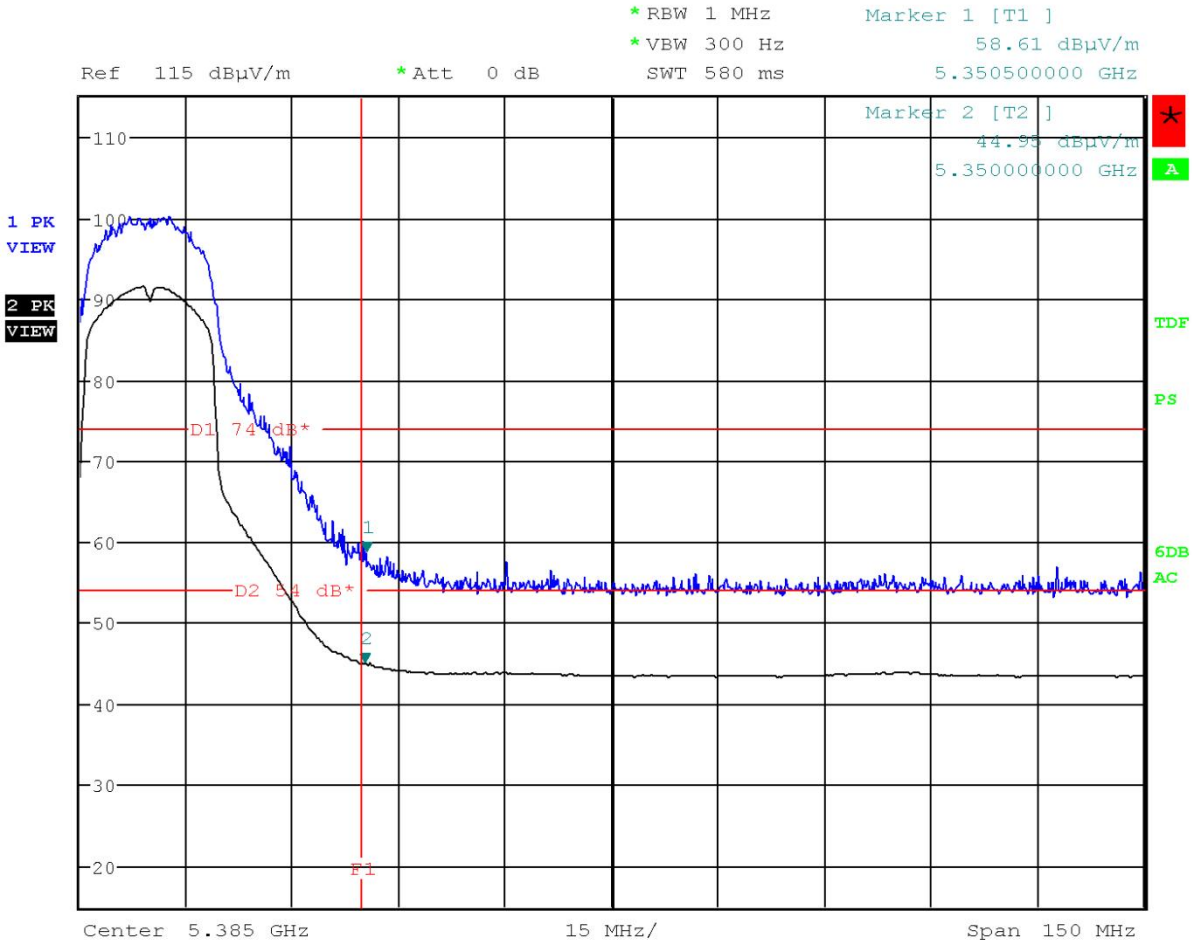
Mode of EUT : TX mode (802.11n (20 MHz BW), 36ch: 5180 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11n (20 MHz BW), 64ch: 5320 MHz)
Antenna Polarization : Horizontal

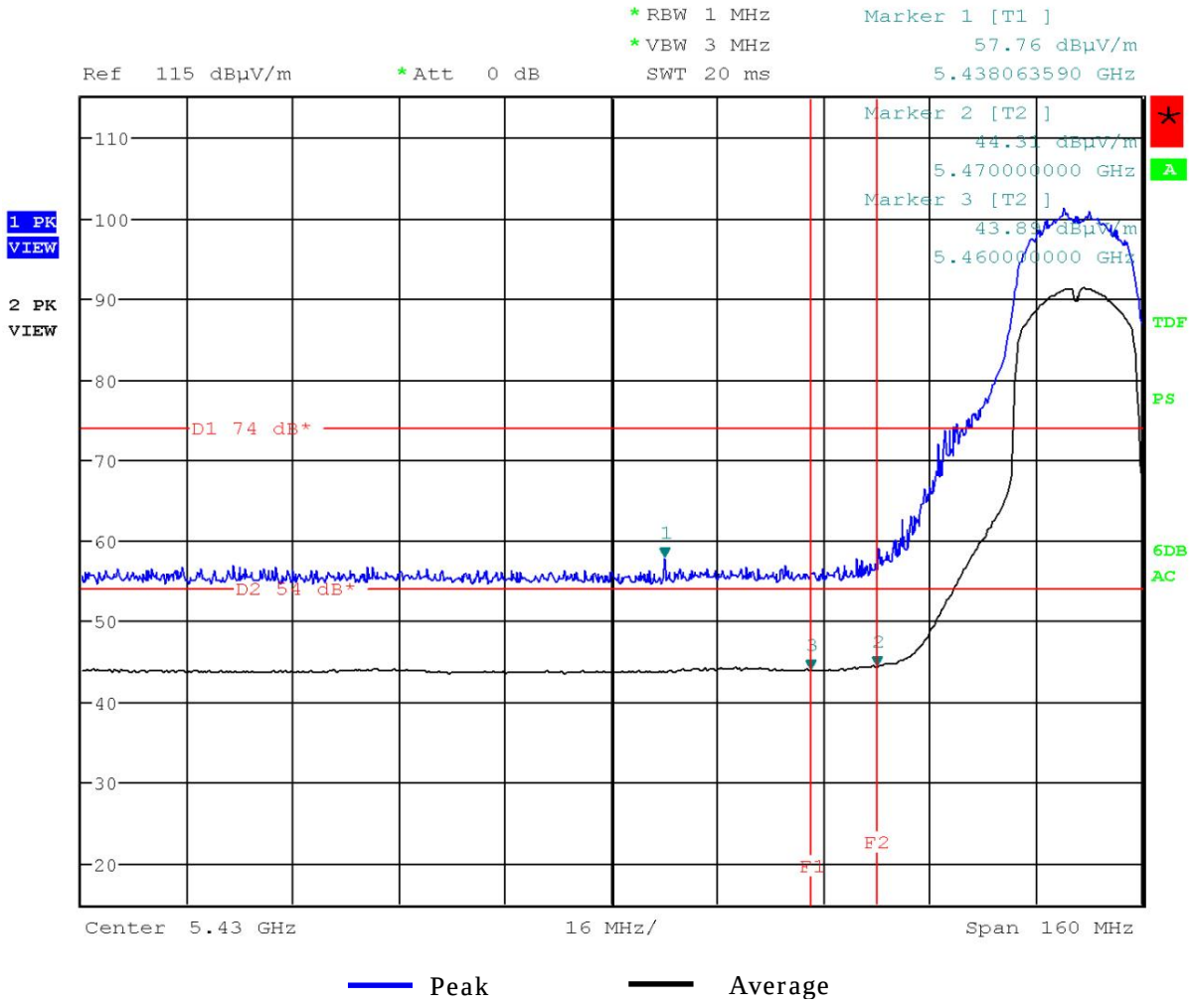


Mode of EUT : TX mode (802.11n (20 MHz BW), 64ch: 5320 MHz)
Antenna Polarization : Vertical

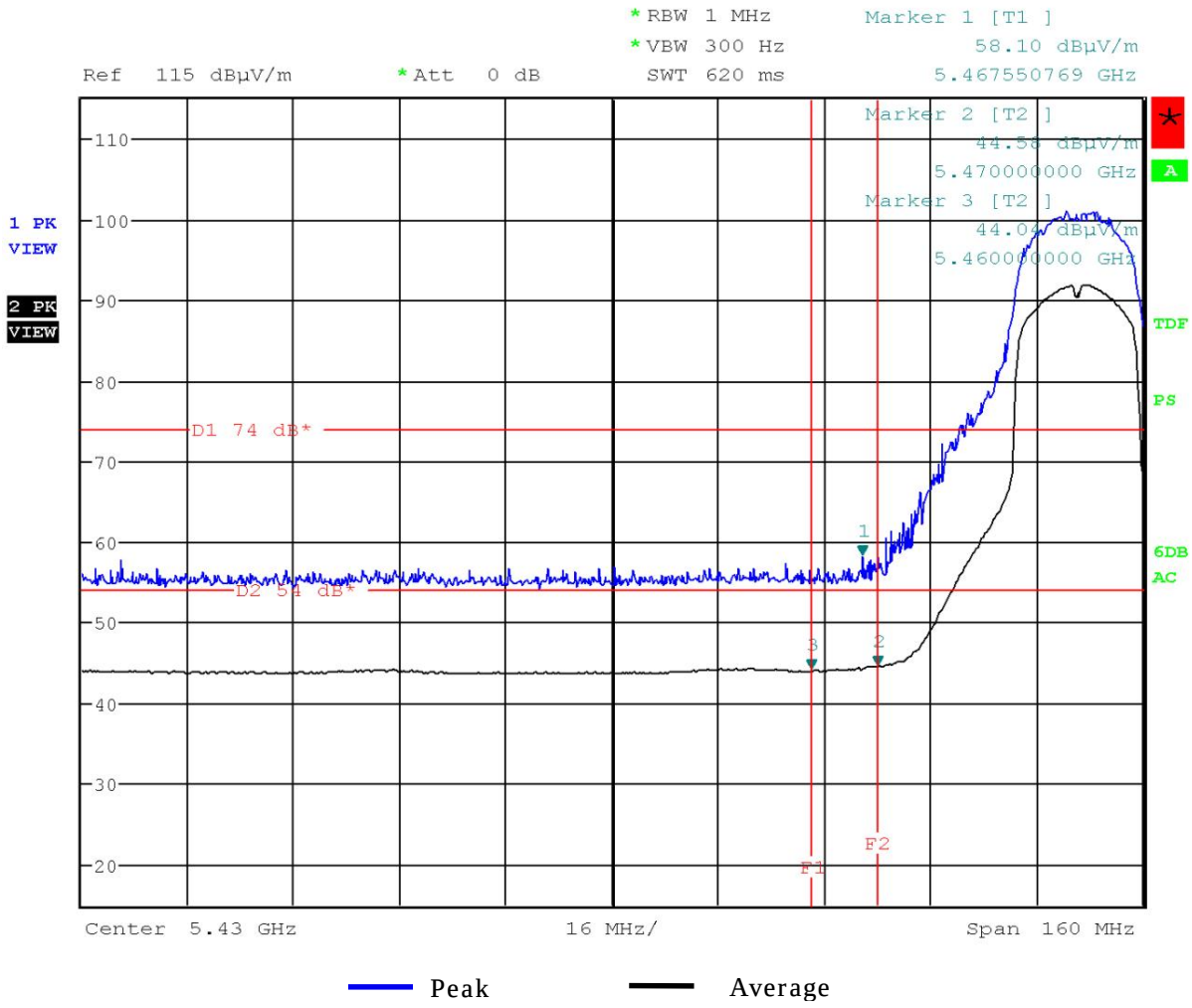


Test Date: June 21, 2017
Temp.: 24 °C, Humi: 70 %

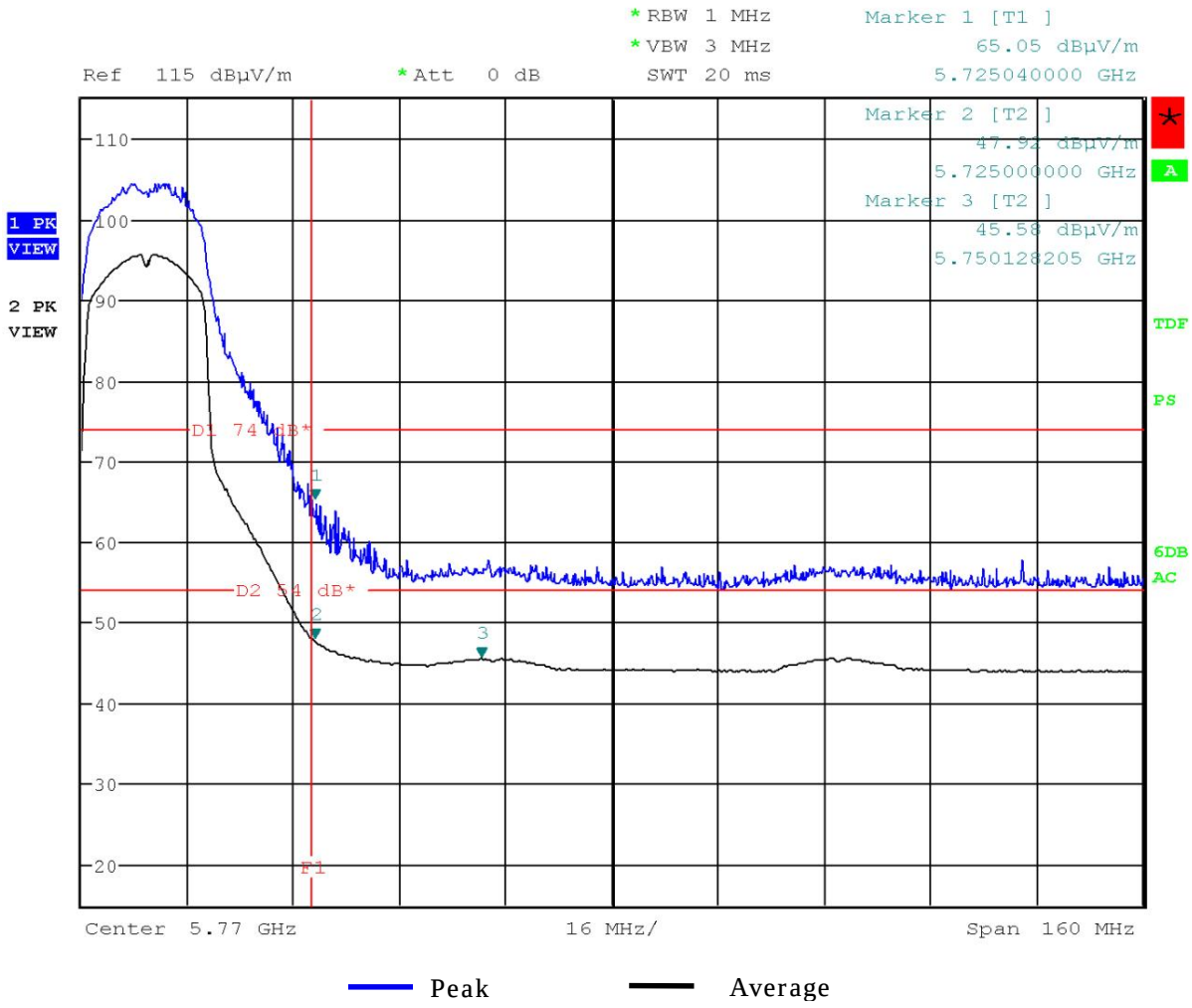
Mode of EUT : TX mode (802.11n (20 MHz BW), 100ch: 5500 MHz)
Antenna Polarization : Horizontal



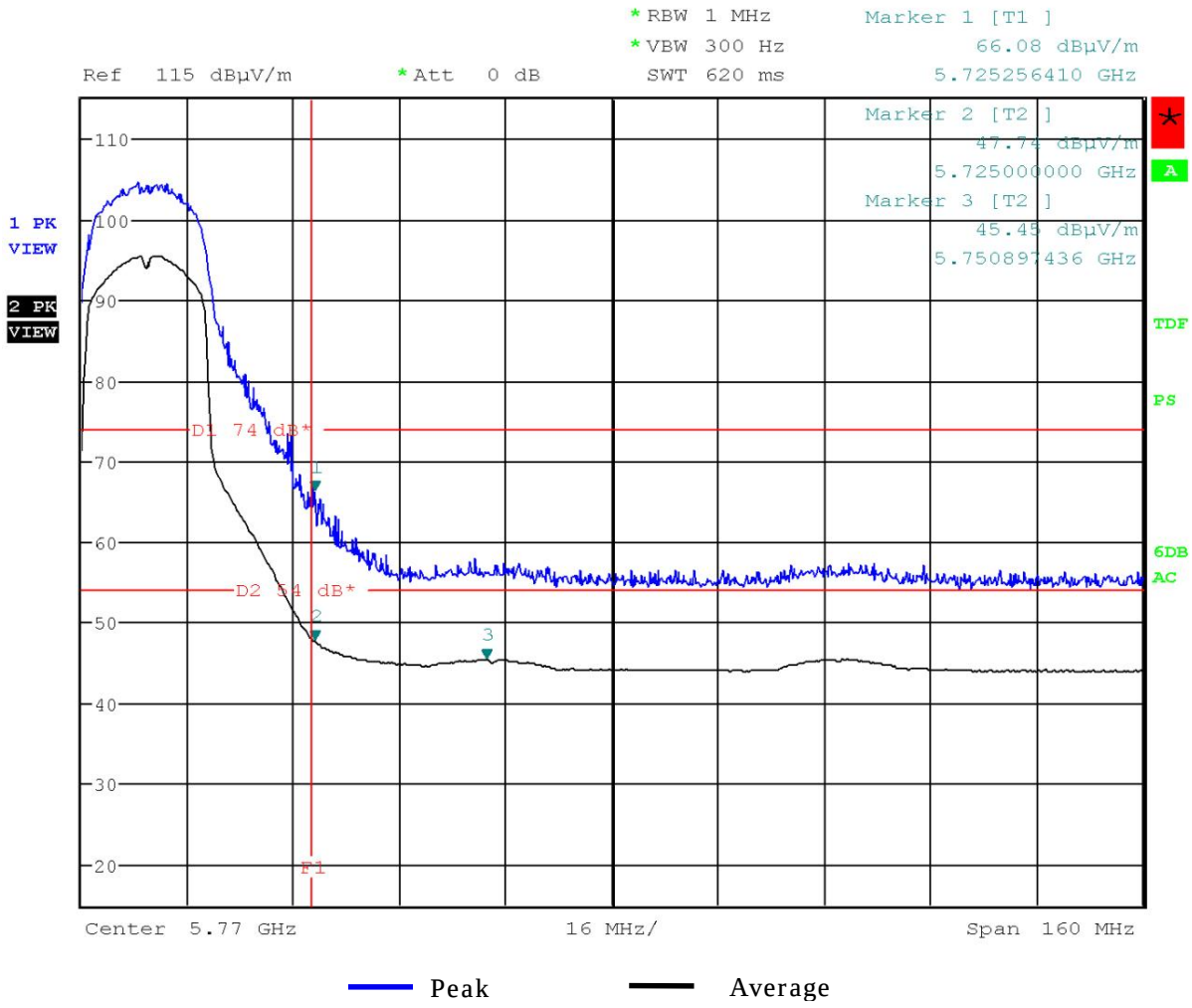
Mode of EUT : TX mode (802.11n (20 MHz BW), 100ch: 5500 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11n (20 MHz BW), 140ch: 5700 MHz)
Antenna Polarization : Horizontal

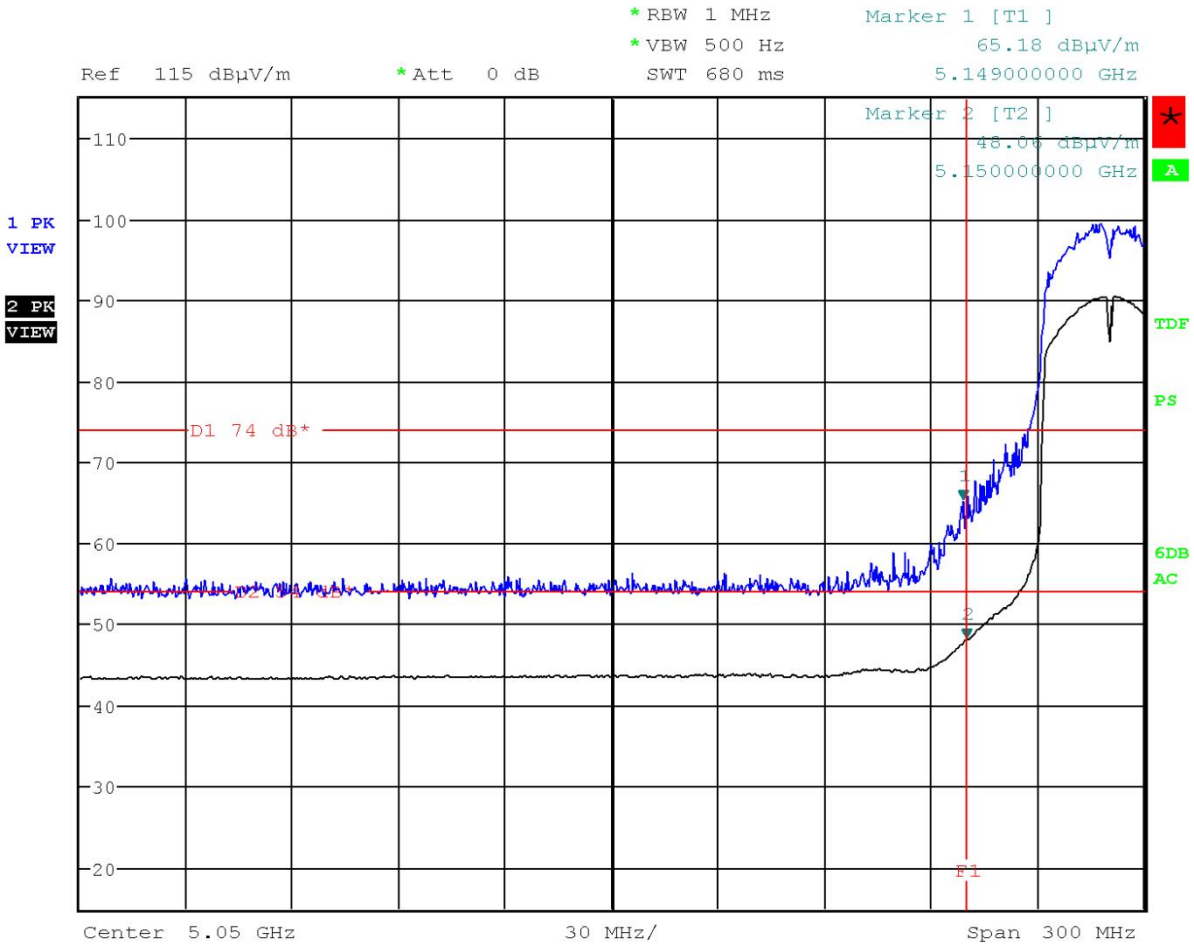


Mode of EUT : TX mode (802.11n (20 MHz BW), 140ch: 5700 MHz)
Antenna Polarization : Vertical

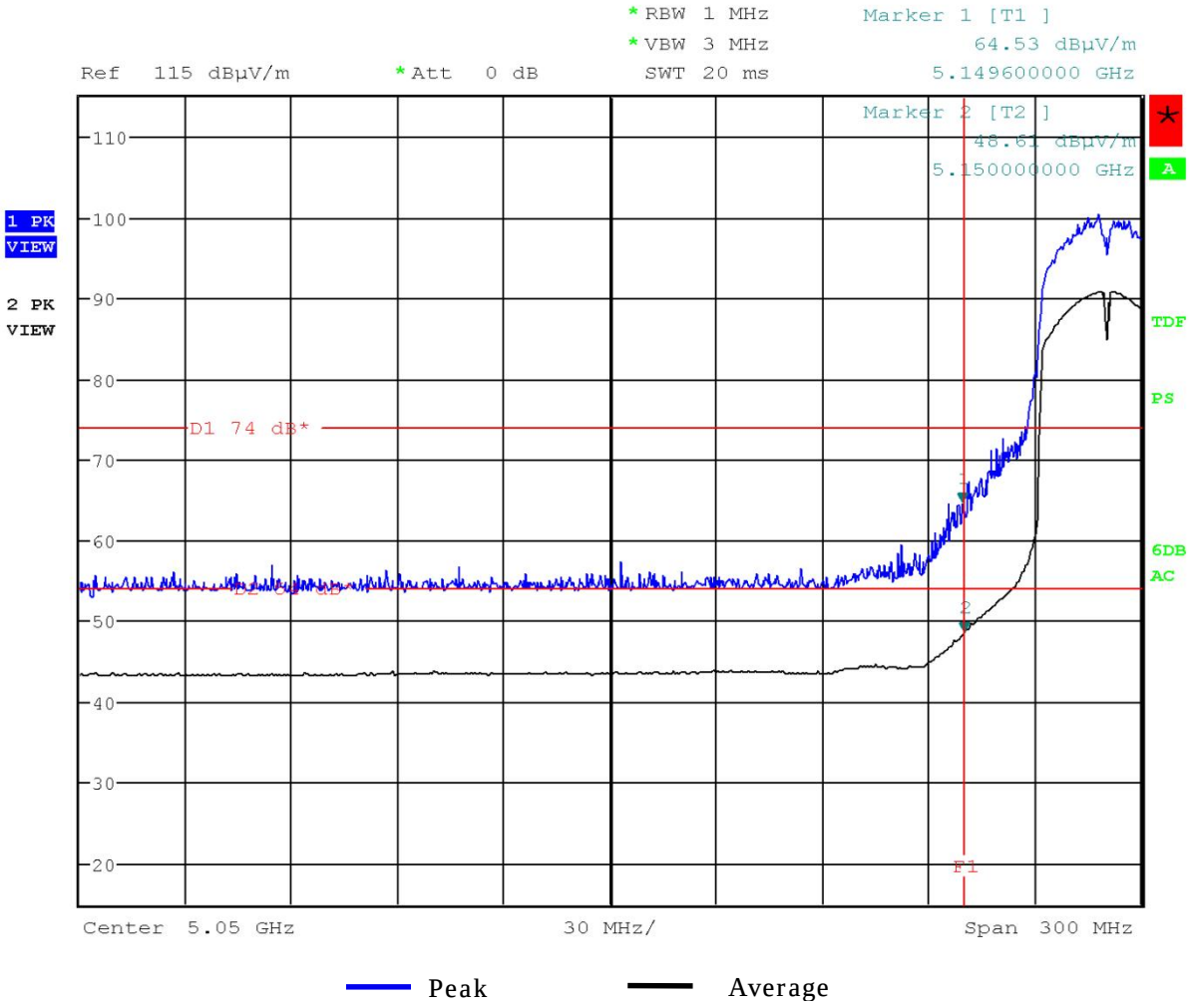


Test Date: February 7, 2017
Temp.: 23 °C, Humi: 48 %

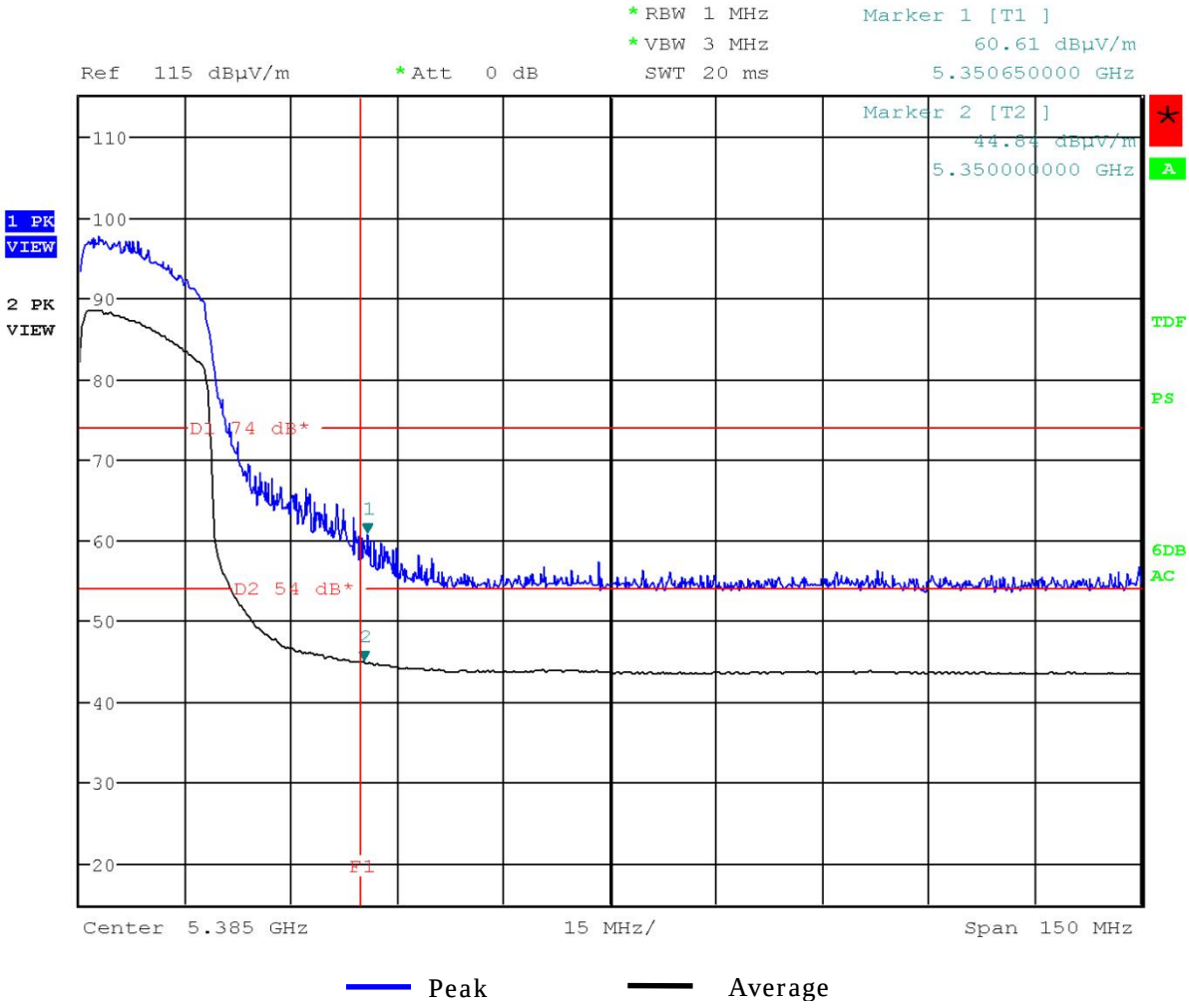
Mode of EUT : TX mode (802.11n (40 MHz BW), 38ch: 5190 MHz)
Antenna Polarization : Horizontal



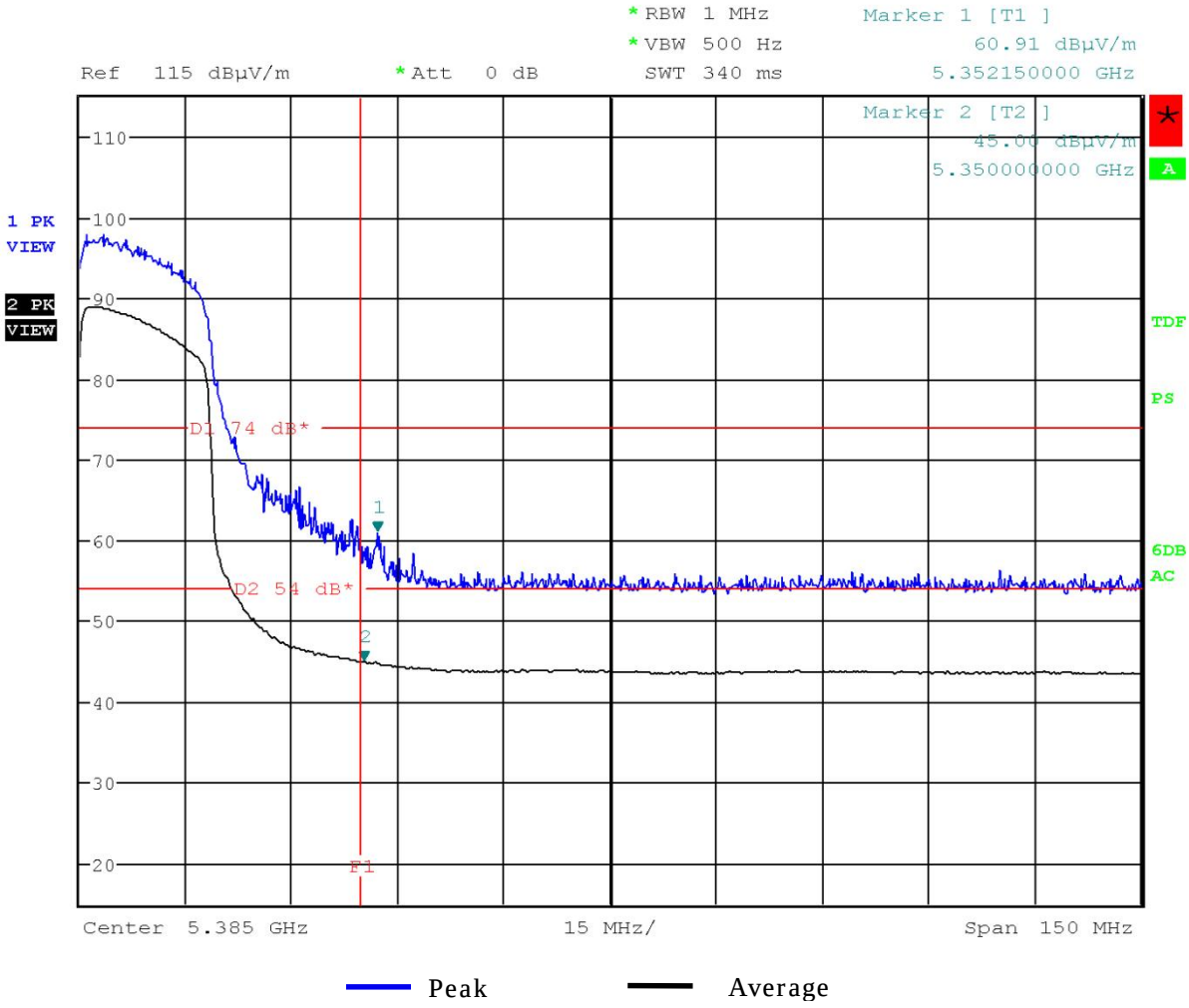
Mode of EUT : TX mode (802.11n (40 MHz BW), 38ch: 5190 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11n (40 MHz BW), 62ch: 5310 MHz)
Antenna Polarization : Horizontal

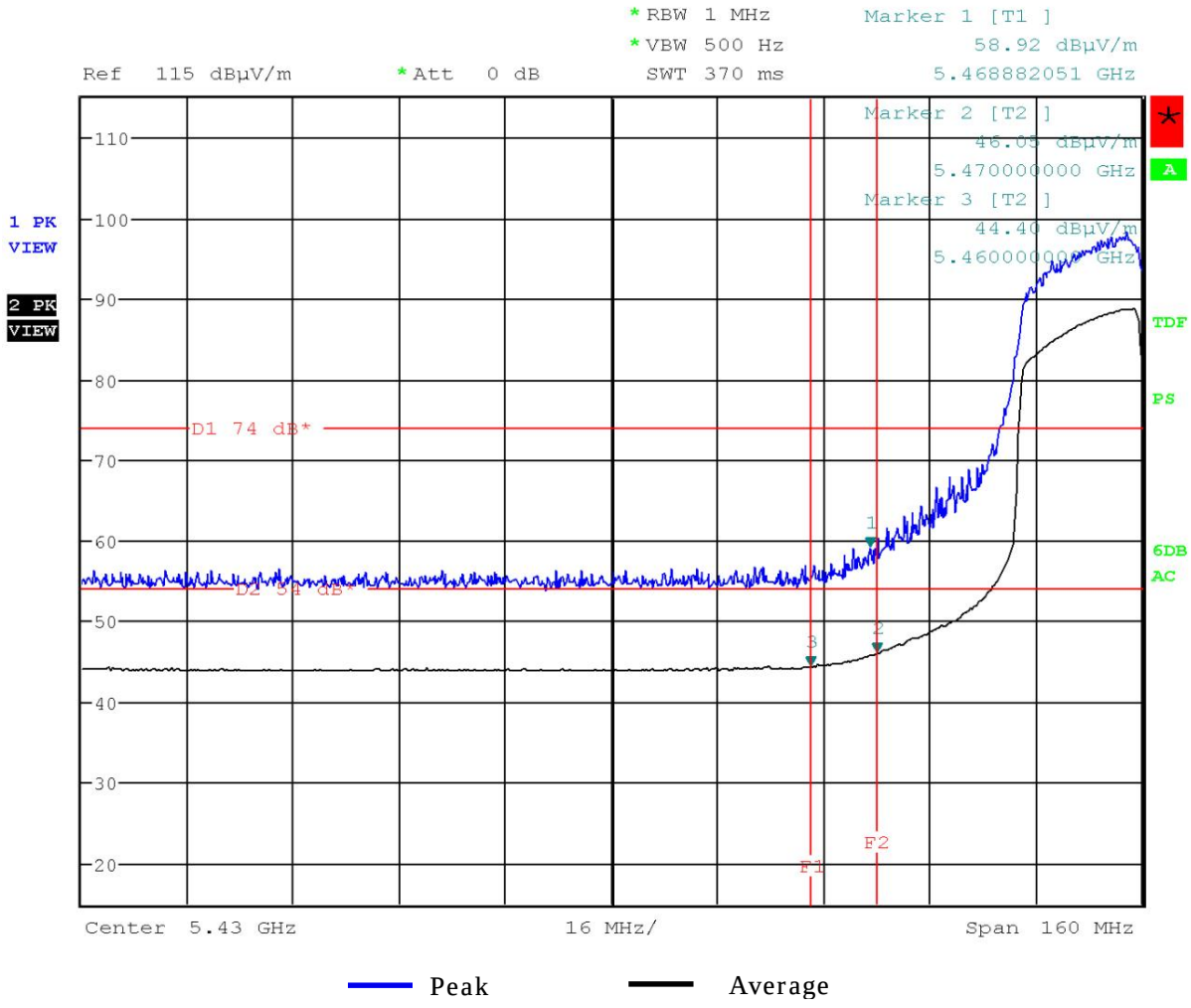


Mode of EUT : TX mode (802.11n (40 MHz BW), 62ch: 5310 MHz)
Antenna Polarization : Vertical

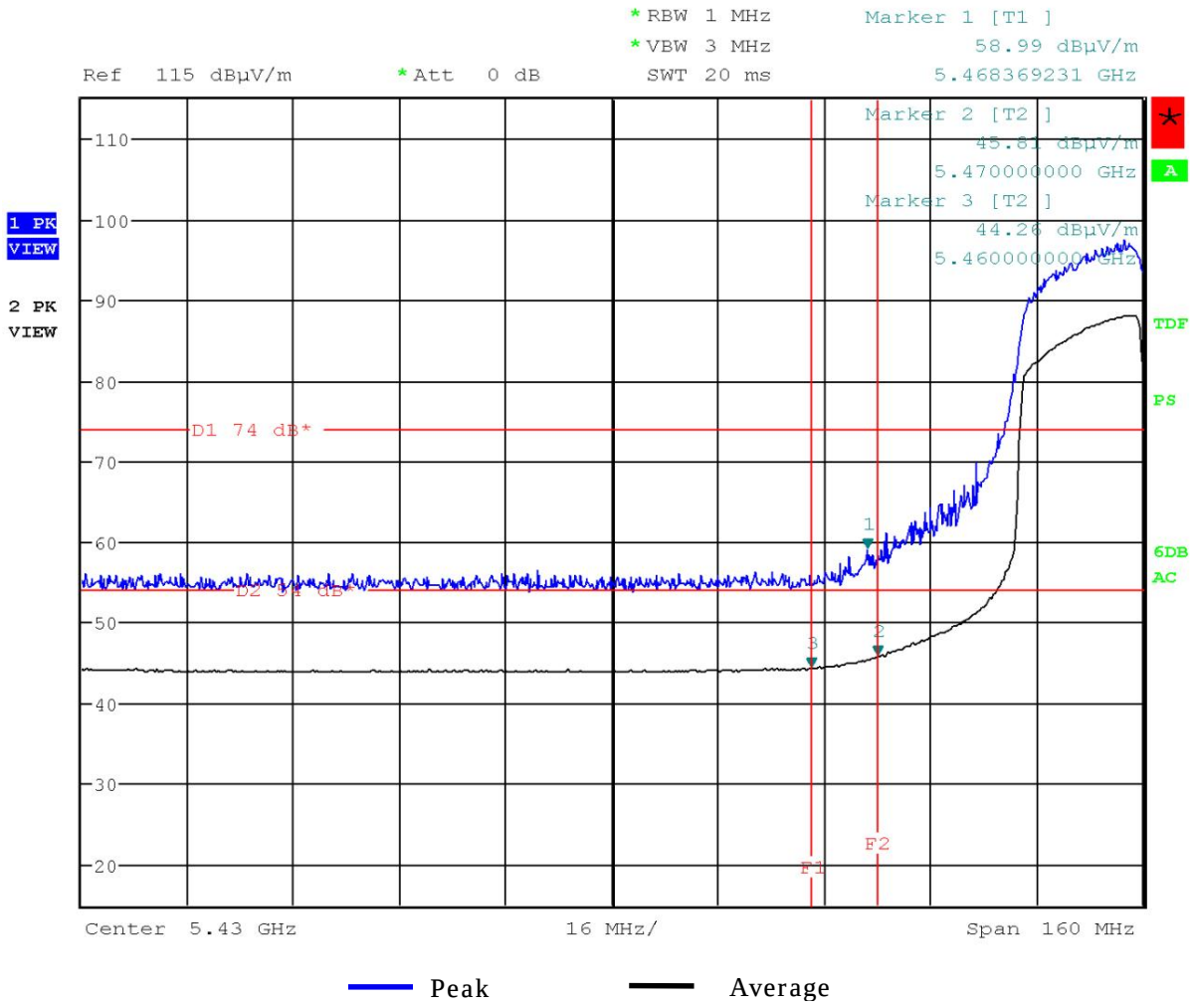


Test Date: June 21, 2017
Temp.: 24 °C, Humi: 70 %

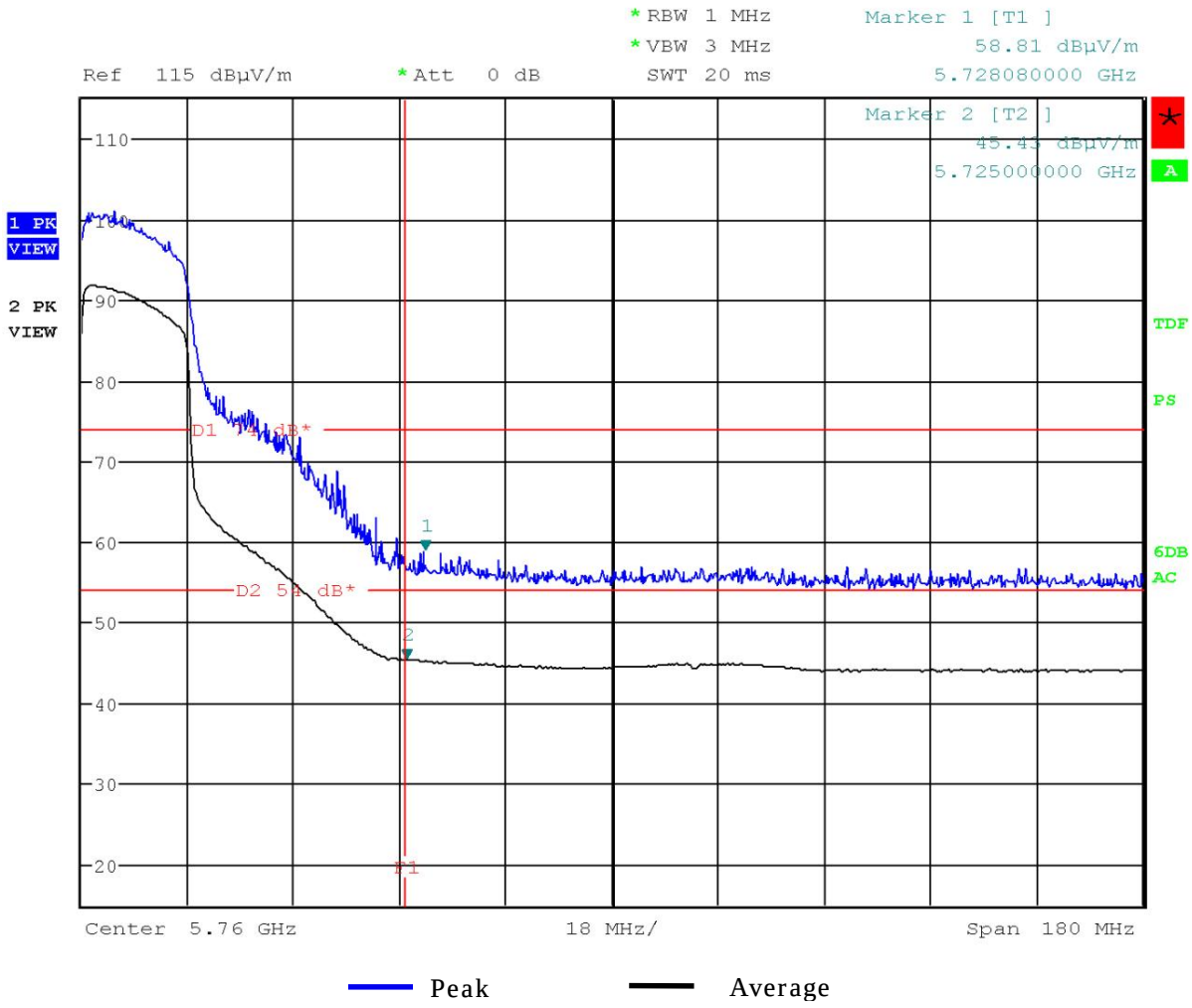
Mode of EUT : TX mode (802.11n (40 MHz BW), 102ch: 5510 MHz)
Antenna Polarization : Horizontal



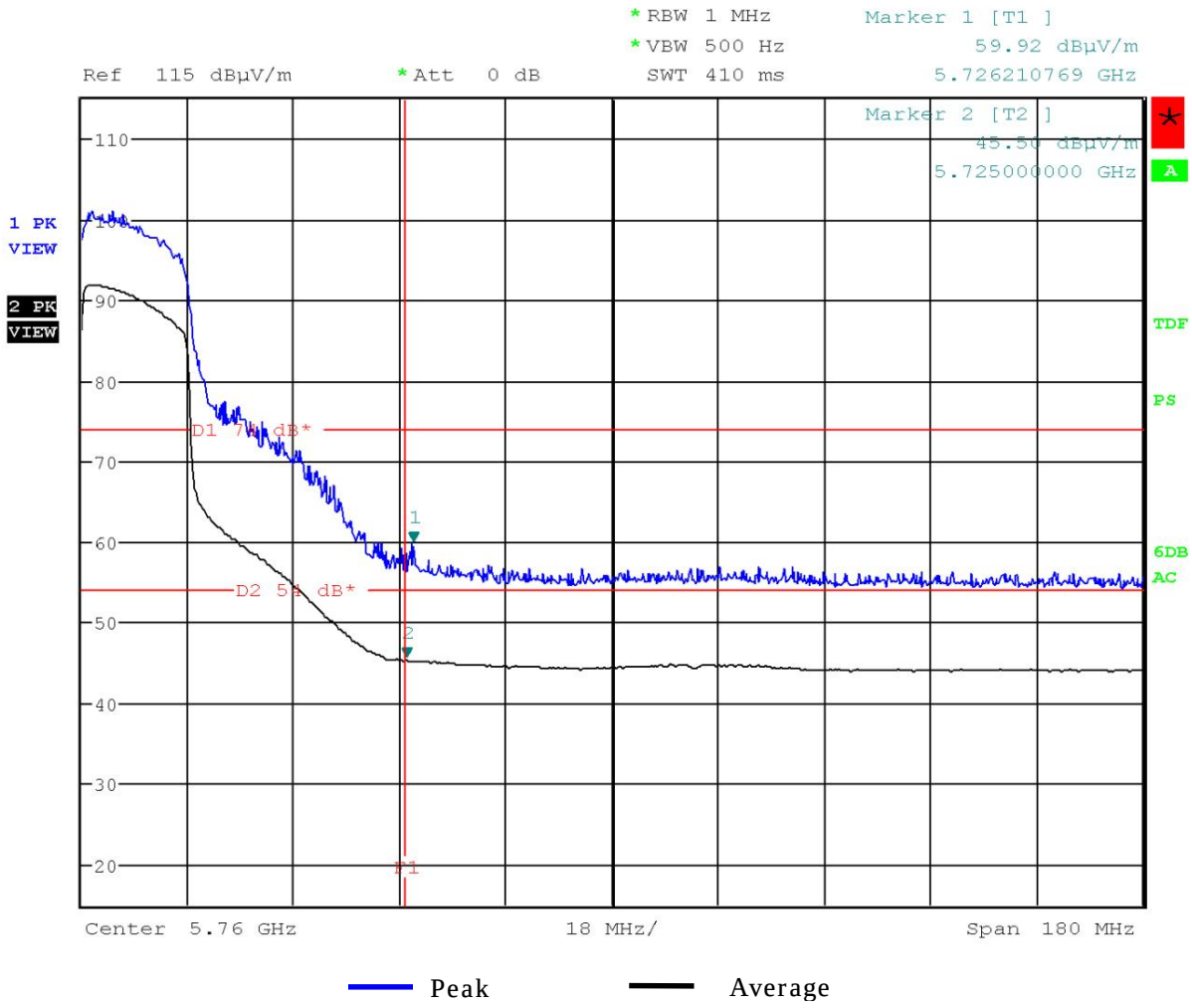
Mode of EUT : TX mode (802.11n (40 MHz BW), 102ch: 5510 MHz)
Antenna Polarization : Vertical



Mode of EUT : TX mode (802.11n (40 MHz BW), 134ch: 5670 MHz)
Antenna Polarization : Horizontal



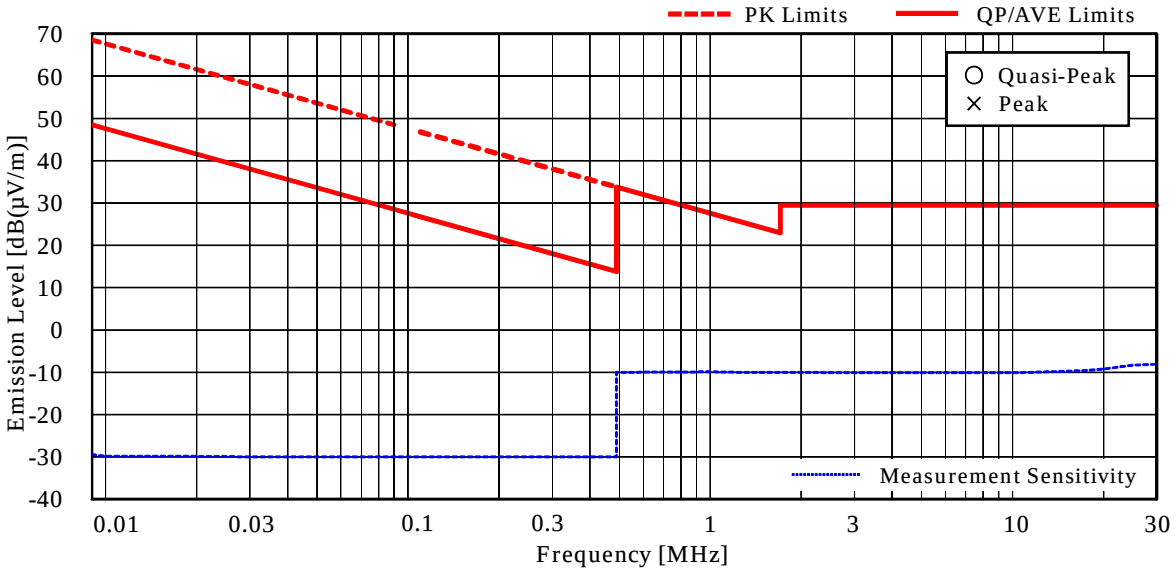
Mode of EUT : TX mode (802.11n (40 MHz BW), 134ch: 5670 MHz)
Antenna Polarization : Vertical



7.6.4.2 Unwanted Radiated Emission 9 kHz – 30 MHz

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

Mode of EUT : All mode have been investigated in accordance with clause 6.3 in this report.
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.

7.6.4.3 Unwanted Radiated Emission 30 MHz – 1000 MHz

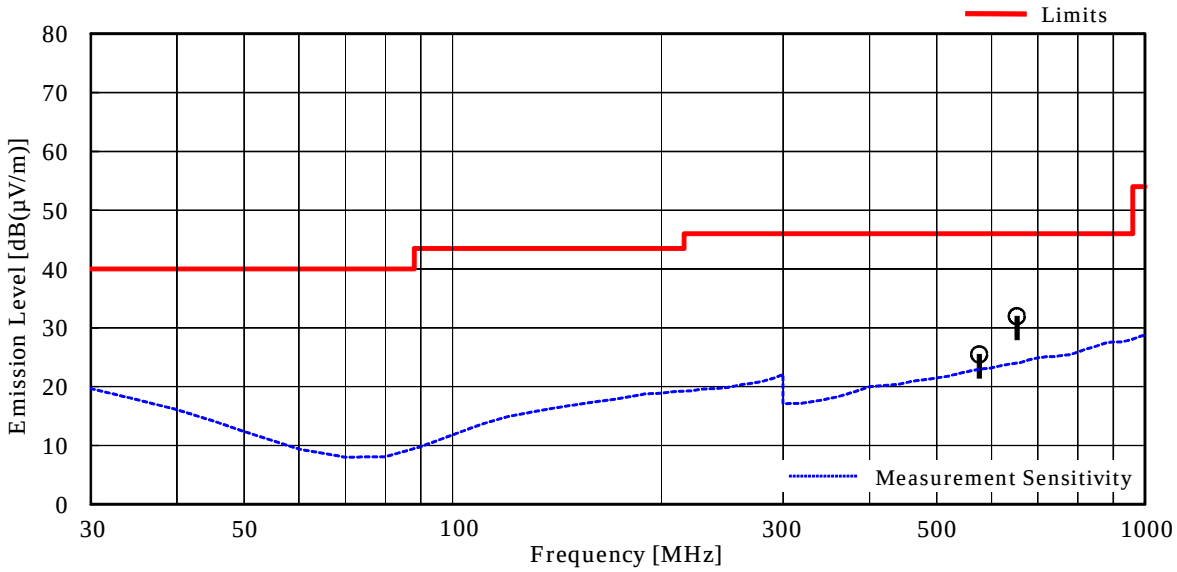
Mode of EUT : All modes have been investigated and the worst case mode for channel (36ch: 5180MHz / 802.11a and 802.11n) has been listed.

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	2.5	46.0	25.5	+20.5	-
652.79	19.6	4.4	8.0	46.0	32.0	+14.0	-



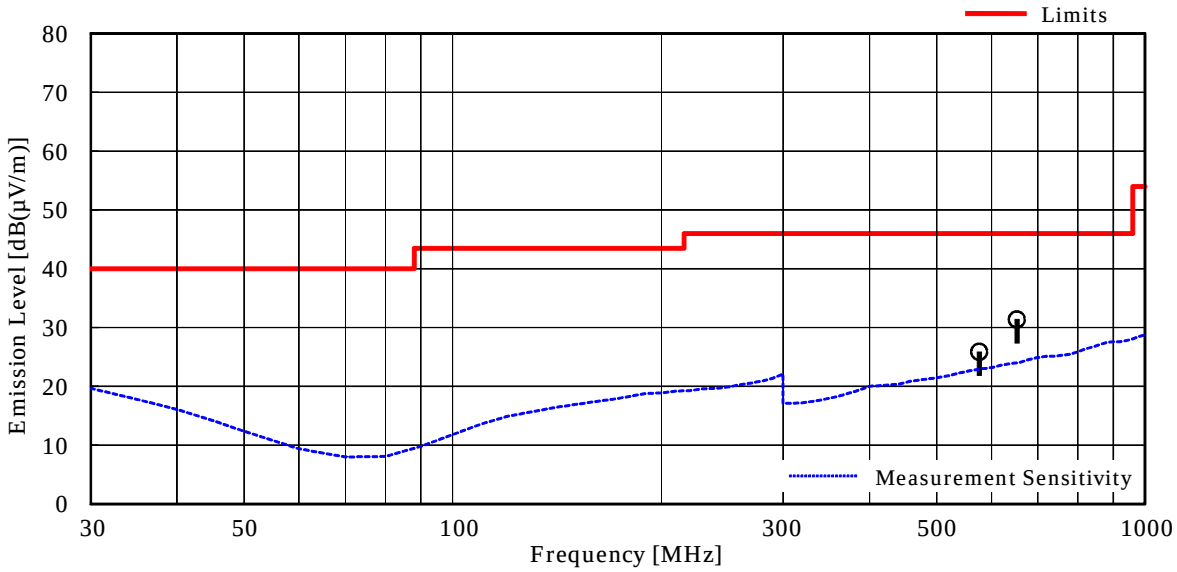
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 652.79 MHz, as the worst point shown on underline:
   Antenna Factor + Correction Factor + Meter Reading = 19.6 + 4.4 + 8.0 = 32.0 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	2.9	46.0	25.9	+20.1	-
652.79	19.6	4.4	7.4	46.0	31.4	+14.6	-



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 652.79 MHz, as the worst point shown on underline:
   Antenna Factor + Correction Factor + Meter Reading = 19.6 + 4.4 + 7.4 = 31.4 dB(μV/m)
   Antenna Height : 100 cm, Turntable Angle : 50 °
7. Test receiver setting(s) : CISPR QP 120 kHz [QP : Quasi-Peak]

7.6.4.4 Unwanted Radiated Emission above 1 GHz

Mode of EUT : TX mode (802.11a, 5150 - 5250 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 36 Ch												
6906.7	29.9	-15.2	44.3	39.6	44.0	39.2	68.2	-	59.0	54.3	+ 9.2	
10360.0	33.2	-24.6	49.9	41.4	49.8	41.2	68.2	-	58.5	50.0	+ 9.7	
15540.0	37.3	-25.4	48.6	32.8	48.2	31.7	74.0	54.0	60.5	44.7	+ 9.3	
20720.0	40.2	-43.3	54.4	51.3	56.4	53.3	74.0	54.0	53.3	50.2	+ 3.8	
25900.0	40.8	-42.4	51.0	44.6	50.7	44.4	68.2	-	49.4	43.0	+18.8	
31080.0	43.9	-54.6	50.8	46.4	51.5	46.7	68.2	-	40.8	36.0	+27.4	
36260.0	44.2	-48.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 45.6	< 35.6	> +22.6	
Test condition : Tx 44 Ch												
6960.0	29.9	-15.3	42.5	38.2	42.1	37.0	68.2	-	57.1	52.8	+11.1	
10440.0	33.2	-24.6	49.3	40.6	49.8	41.2	68.2	-	58.4	49.8	+ 9.8	
15660.0	37.3	-25.4	48.4	32.4	47.9	32.2	74.0	54.0	60.3	44.3	+ 9.7	
20880.0	40.3	-43.5	56.3	53.0	57.0	54.5	74.0	54.0	53.8	51.3	+ 2.7	
26100.0	40.7	-42.1	51.8	45.9	52.4	46.8	68.2	-	51.0	45.4	+17.2	
31320.0	43.8	-54.7	53.8	48.4	54.2	49.7	74.0	54.0	43.3	38.8	+15.2	
36540.0	44.4	-48.4	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.0	< 36.0	> +22.2	
Test condition : Tx 48 Ch												
6986.7	29.9	-15.3	42.1	37.5	41.4	35.6	68.2	-	56.7	52.1	+11.5	
10480.0	33.2	-24.5	48.8	39.2	48.7	39.3	68.2	-	57.5	48.0	+10.7	
15720.0	37.4	-25.4	47.9	31.5	46.4	30.4	74.0	54.0	59.9	43.5	+10.5	
20960.0	40.3	-43.4	55.3	52.8	55.9	53.3	74.0	54.0	52.8	50.2	+ 3.8	
26200.0	40.7	-42.1	50.5	44.8	50.7	45.0	68.2	-	49.3	43.6	+18.9	
31440.0	43.8	-54.7	54.2	49.2	54.5	50.0	74.0	54.0	43.6	39.1	+14.9	
36680.0	44.5	-48.2	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.3	< 36.3	> +21.9	

Calculated result at 20880.0 MHz, as the worst point shown on underline:

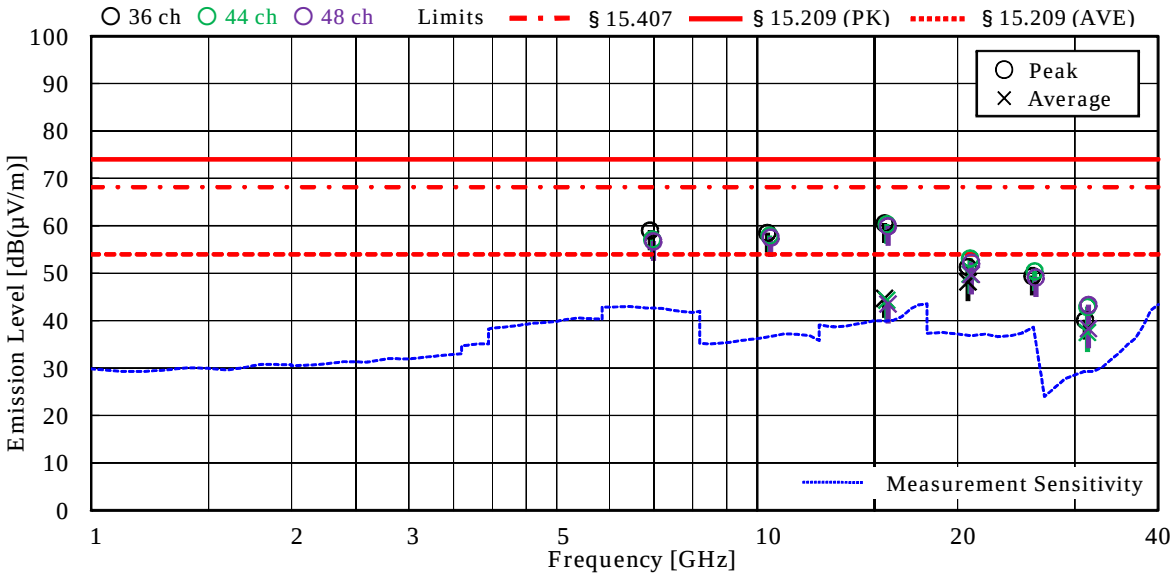
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.5 dB
+)	Meter Reading	=	54.5 dB(μV)
	Result	=	51.3 dB(μV/m)

Minimum Margin: 54.0 - 51.3 = 2.7 (dB)

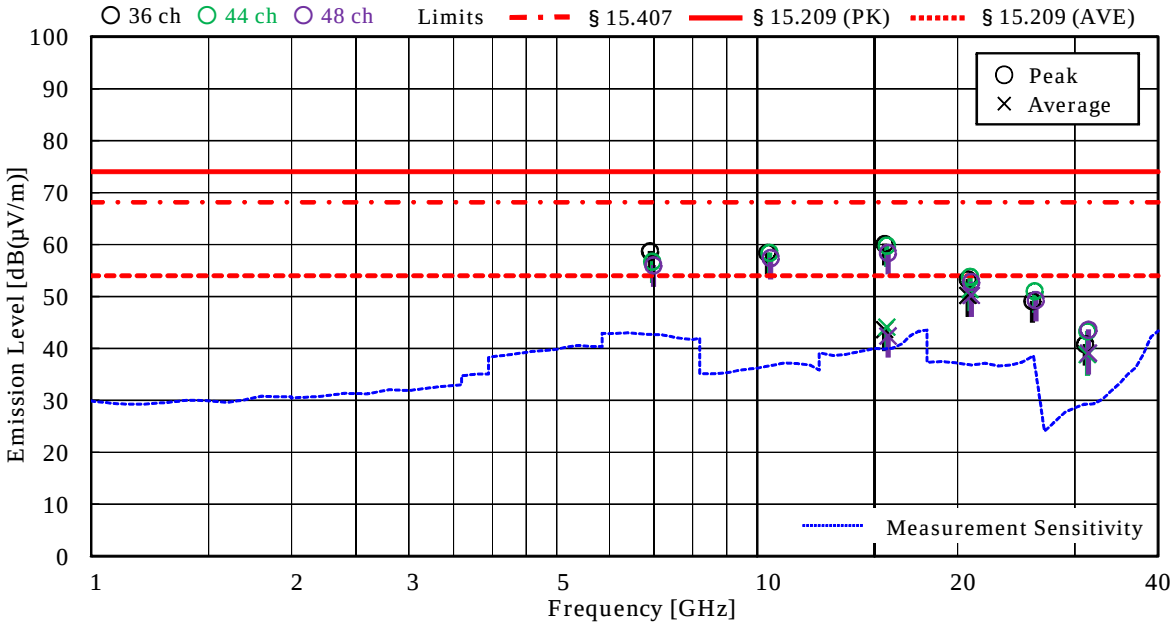
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11a, 5150 - 5250 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11a, 5250 – 5350 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 52 Ch												
7013.3	29.9	-15.2	40.0	34.4	41.1	35.7	68.2	-	55.8	50.4	+12.4	
10520.0	33.2	-24.5	50.6	40.7	49.1	39.5	68.2	-	59.3	49.4	+ 8.9	
15780.0	37.3	-25.4	45.7	30.1	45.8	30.1	74.0	54.0	57.7	42.0	+12.0	
21040.0	40.3	-43.4	55.6	53.0	56.7	54.4	74.0	54.0	53.6	51.3	+ 2.7	
26300.0	40.7	-42.0	50.1	43.8	50.4	44.2	68.2	-	49.1	42.9	+19.1	
31560.0	43.8	-54.8	53.8	49.8	54.6	50.2	74.0	54.0	43.6	39.2	+14.8	
36820.0	44.5	-48.3	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.2	< 36.2	> +22.0	
Test condition : Tx 56 Ch												
7040.0	29.9	-15.3	40.3	33.9	40.8	35.3	68.2	-	55.4	49.9	+12.8	
10560.0	33.2	-24.5	48.6	40.0	48.2	38.5	68.2	-	57.3	48.7	+10.9	
15840.0	37.4	-25.4	44.6	29.7	43.4	28.1	74.0	54.0	56.6	41.7	+12.3	
21120.0	40.3	-43.6	55.9	53.4	56.8	54.5	74.0	54.0	53.5	51.2	+ 2.8	
26400.0	40.6	-42.0	51.0	44.2	52.0	45.2	68.2	-	50.6	43.8	+17.6	
31680.0	43.8	-54.8	55.0	50.3	55.2	50.8	74.0	54.0	44.2	39.8	+14.2	
36960.0	44.4	-48.1	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.3	< 36.3	> +21.9	
Test condition : Tx 64 Ch												
7093.3	30.0	-15.3	38.6	30.8	39.8	33.6	68.2	-	54.5	48.3	+13.7	
10640.0	33.2	-24.4	50.9	41.0	48.5	38.7	74.0	54.0	59.7	49.8	+ 4.2	
15960.0	37.4	-25.3	43.8	29.3	43.9	29.3	74.0	54.0	56.0	41.4	+12.6	
21280.0	40.4	-43.6	55.1	52.1	56.4	54.2	74.0	54.0	53.2	51.0	+ 3.0	
26600.0	43.4	-60.6	66.8	62.9	67.8	63.9	68.2	-	50.6	46.7	+17.6	
31920.0	43.7	-54.5	54.2	50.2	54.5	50.3	68.2	-	43.7	39.5	+24.5	
37240.0	44.3	-47.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.7	< 36.7	> +21.5	

Calculated result at 21040.0 MHz, as the worst point shown on underline:

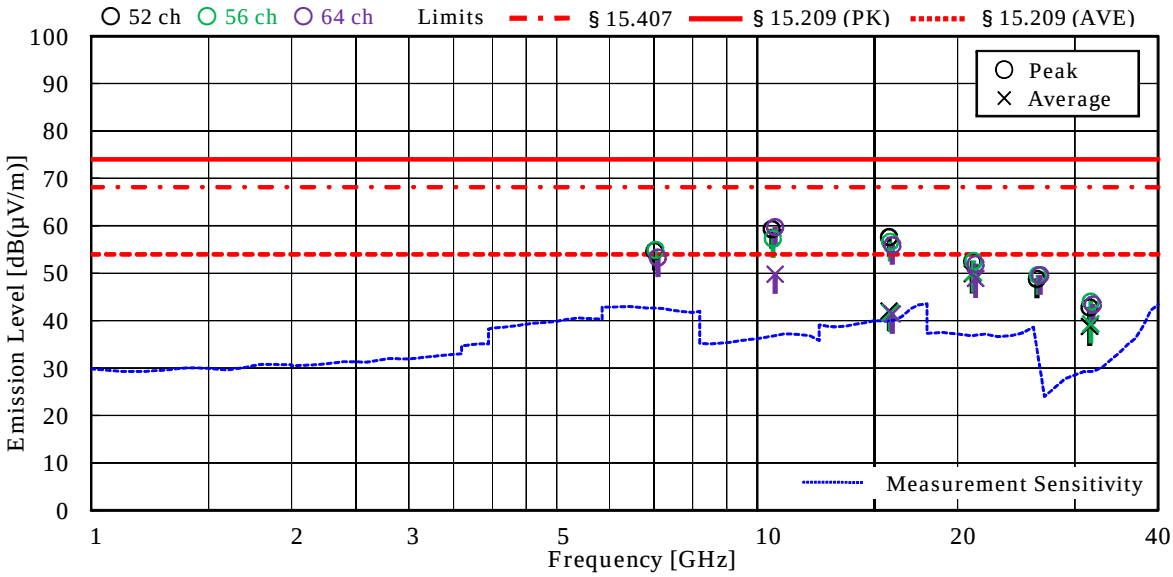
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.4 dB
+)	Meter Reading	=	54.4 dB(μV)
	Result	=	51.3 dB(μV/m)

Minimum Margin: 54.0 - 51.3 = 2.7 (dB)

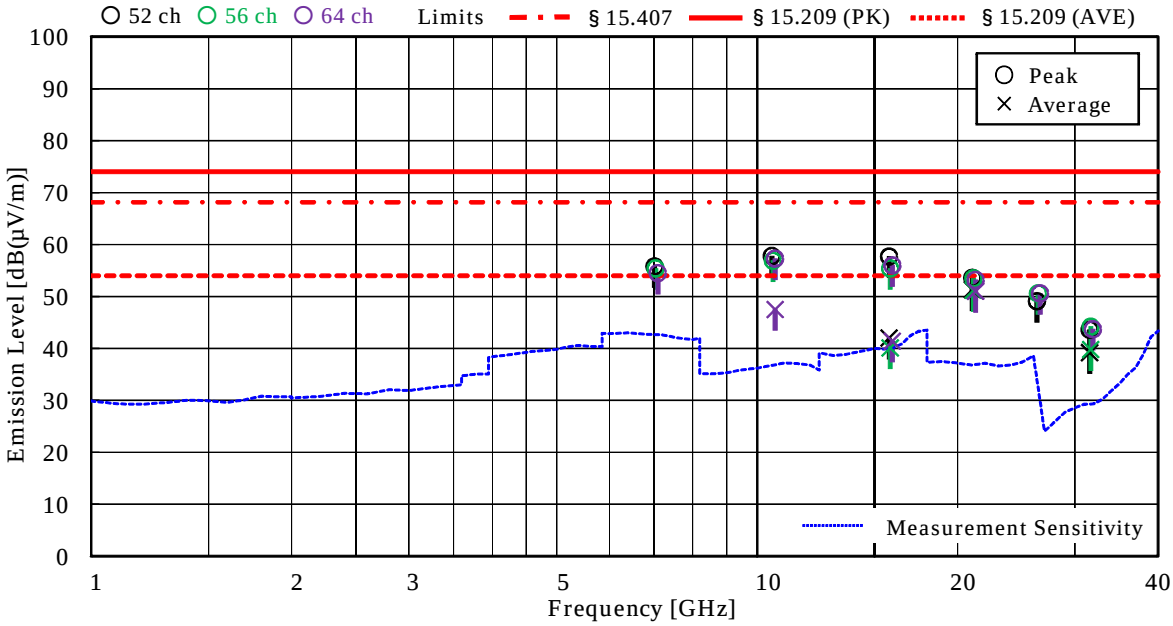
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of “<” means “or less”.
5. The symbol of “>” means “more than”.
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11a, 5250 - 5350 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11a, 5470 – 5725 MHz Band)

Test Date: July 3, 2017
Temp.: 24 °C, Humi: 65 %

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 100 Ch												
7333.3	29.9	-15.7	40.4	35.3	40.4	35.3	74.0	54.0	54.6	49.5	+ 4.5	-
11000.0	33.3	-24.2	48.2	42.3	48.0	42.1	74.0	54.0	57.3	51.4	+ 2.6	-
16500.0	37.5	-24.5	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 51.0	< 41.0	> +17.2	-
22000.0	40.5	-43.3	59.7	56.7	59.9	56.8	68.2	-	57.1	54.0	+11.1	-
27500.0	43.9	-58.9	66.3	63.0	65.9	62.3	68.2	-	51.3	48.0	+16.9	-
33000.0	44.0	-53.8	57.3	53.0	56.8	52.5	68.2	-	47.5	43.2	+20.7	-
38500.0	44.3	-43.9	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 50.4	< 40.4	> +17.8	-
Test condition : Tx 116 Ch												
7440.0	29.8	-15.7	40.4	35.6	40.4	35.5	74.0	54.0	54.5	49.7	+ 4.3	-
11160.0	33.2	-24.0	49.6	43.1	49.4	43.0	74.0	54.0	58.8	52.3	+ 1.7	-
16740.0	37.6	-23.9	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 51.7	< 41.7	> +16.5	-
22320.0	40.6	-43.5	59.8	56.7	59.9	56.7	74.0	54.0	57.0	53.8	+ 0.2	-
27900.0	43.8	-58.0	66.9	64.4	66.2	63.9	68.2	-	52.7	50.2	+15.5	-
33480.0	44.0	-53.3	55.4	49.0	55.0	48.7	68.2	-	46.1	39.7	+22.1	-
39060.0	44.3	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 52.6	< 42.6	> +11.4	-
Test condition : Tx 140 Ch												
7600.0	29.8	-15.9	39.9	34.9	39.5	34.3	74.0	54.0	53.8	48.8	+ 5.2	-
11400.0	33.1	-24.0	48.2	40.6	47.9	40.4	74.0	54.0	57.3	49.7	+ 4.3	-
17100.0	38.0	-23.0	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 53.0	< 43.0	> +15.2	-
22800.0	40.5	-43.8	60.1	57.1	60.3	57.2	74.0	54.0	57.0	53.9	+ 0.1	-
28500.0	43.8	-56.7	66.4	63.0	65.8	62.3	68.2	-	53.5	50.1	+14.7	-
34200.0	44.0	-51.6	52.4	46.7	52.0	46.2	68.2	-	44.8	39.1	+23.4	-
39900.0	44.6	-41.2	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 53.4	< 43.4	> +10.6	-

Calculated result at 22800.0 MHz, as the worst point shown on underline:

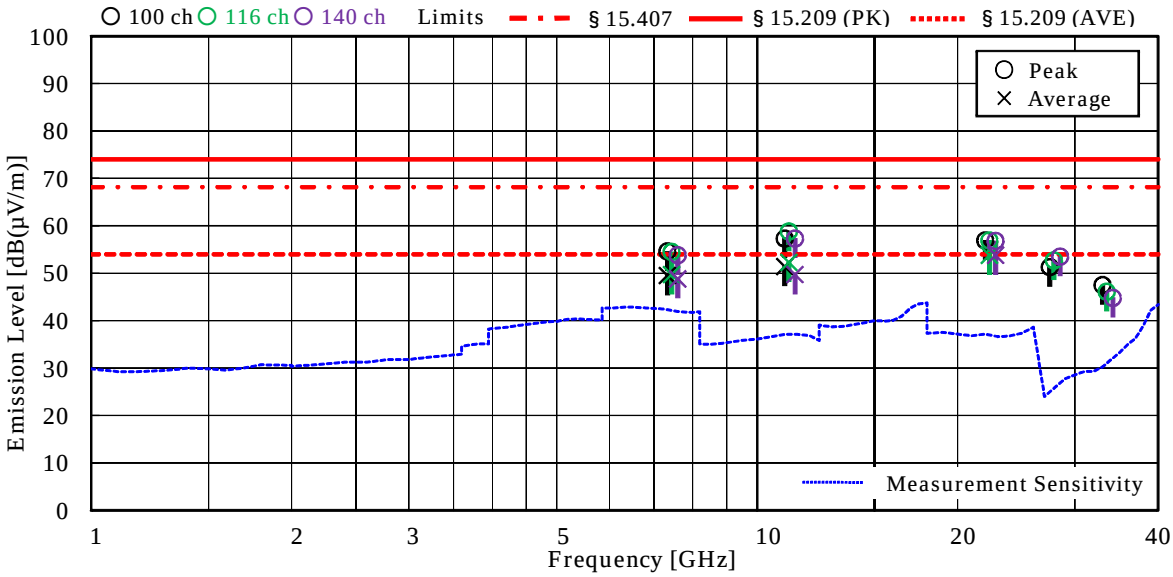
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.8 dB
+)	Meter Reading	=	57.2 dB(μV)
	Result	=	53.9 dB(μV/m)

Minimum Margin: 54.0 - 53.9 = 0.1 (dB)

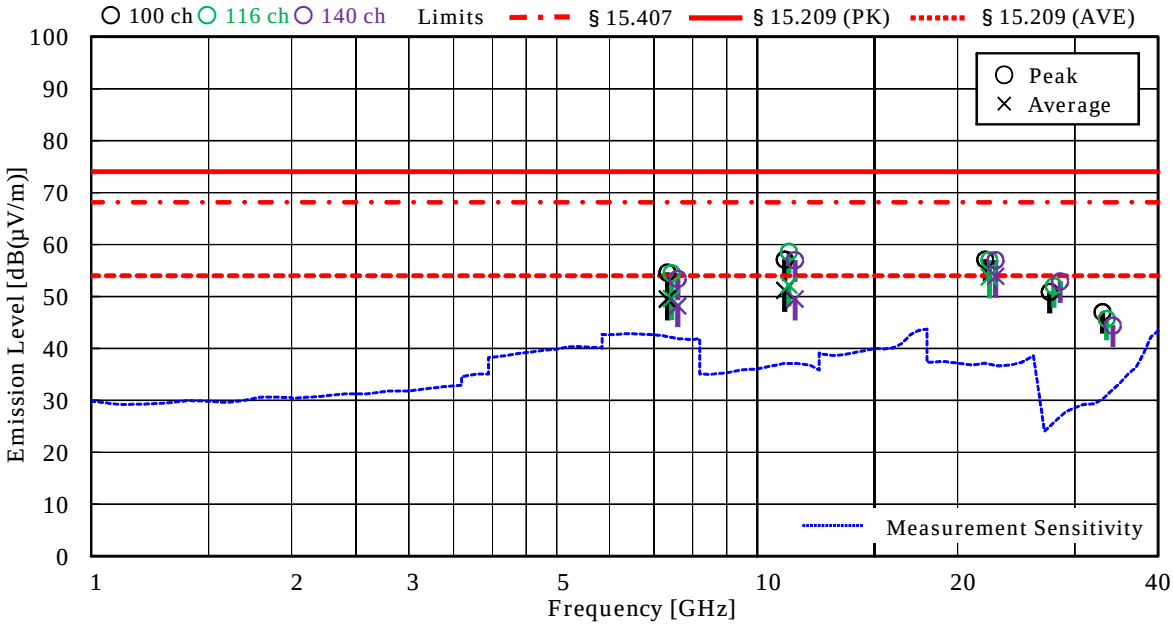
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 8.2 GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (8.2 - 18.0 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18.0 - 26.5 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11a, 5470 - 5725 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 20 MHz BW, 5150 - 5250 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 36 Ch												
6906.7	29.9	-15.2	43.9	39.5	43.1	39.1	68.2	-	58.6	54.2	+ 9.6	
10360.0	33.2	-24.6	49.6	41.3	49.1	40.8	68.2	-	58.2	49.9	+10.0	
15540.0	37.3	-25.4	48.4	33.2	47.8	32.3	74.0	54.0	60.3	45.1	+ 8.9	
20720.0	40.2	-43.3	54.4	51.3	56.4	53.3	74.0	54.0	53.3	50.2	+ 3.8	
25900.0	40.8	-42.4	51.0	44.6	50.7	44.4	68.2	-	49.4	43.0	+18.8	
31080.0	43.9	-54.6	50.8	46.4	51.5	46.7	68.2	-	40.8	36.0	+27.4	
36260.0	44.2	-48.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 45.6	< 35.6	> +22.6	
Test condition : Tx 44 Ch												
6960.0	29.9	-15.3	42.3	38.0	42.0	37.1	68.2	-	56.9	52.6	+11.3	
10440.0	33.2	-24.6	49.2	40.8	49.4	40.8	68.2	-	58.0	49.4	+10.2	
15660.0	37.3	-25.4	48.4	32.8	48.5	33.1	74.0	54.0	60.4	45.0	+ 9.0	
20880.0	40.3	-43.5	56.3	53.0	57.0	54.5	74.0	54.0	53.8	51.3	+ 2.7	
26100.0	40.7	-42.1	51.8	45.9	52.4	46.8	68.2	-	51.0	45.4	+17.2	
31320.0	43.8	-54.7	53.8	48.4	54.2	49.7	74.0	54.0	43.3	38.8	+15.2	
36540.0	44.4	-48.4	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.0	< 36.0	> +22.2	
Test condition : Tx 48 Ch												
6986.7	29.9	-15.3	42.0	37.5	41.4	35.7	68.2	-	56.6	52.1	+11.6	
10480.0	33.2	-24.5	47.9	38.7	48.2	38.7	68.2	-	56.9	47.4	+11.3	
15720.0	37.4	-25.4	46.5	31.6	46.0	30.2	74.0	54.0	58.5	43.6	+10.4	
20960.0	40.3	-43.4	55.3	52.8	55.9	53.3	74.0	54.0	52.8	50.2	+ 3.8	
26200.0	40.7	-42.1	50.5	44.8	50.7	45.0	68.2	-	49.3	43.6	+18.9	
31440.0	43.8	-54.7	54.2	49.2	54.5	50.0	74.0	54.0	43.6	39.1	+14.9	
36680.0	44.5	-48.2	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.3	< 36.3	> +21.9	

Calculated result at 20880.0 MHz, as the worst point shown on underline:

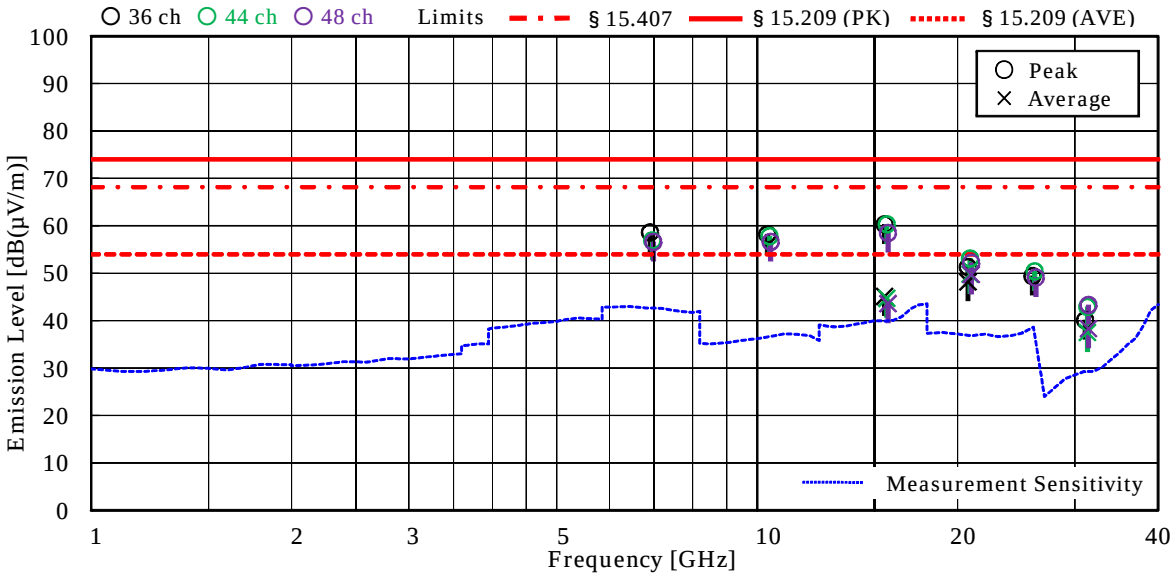
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.5 dB
+)	Meter Reading	=	54.5 dB(μV)
	Result	=	51.3 dB(μV/m)

Minimum Margin: 54.0 - 51.3 = 2.7 (dB)

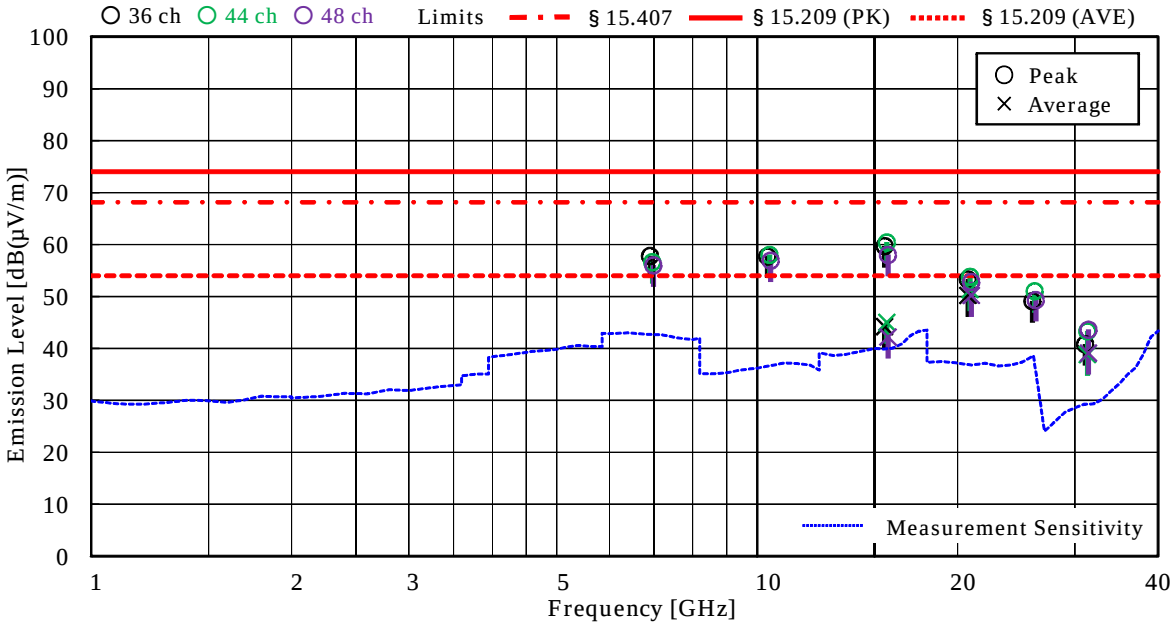
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 20 MHz BW, 5150 - 5250 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 20 MHz BW, 5250 – 5350 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 52 Ch												
7013.3	29.9	-15.2	40.5	34.7	40.7	35.2	68.2	-	55.4	49.9	+12.8	
10520.0	33.2	-24.5	49.8	40.3	49.2	39.8	68.2	-	58.5	49.0	+ 9.7	
15780.0	37.3	-25.4	44.2	29.8	44.9	29.6	74.0	54.0	56.8	41.7	+12.3	
21040.0	40.3	-43.4	55.6	53.0	56.7	54.4	74.0	54.0	53.6	51.3	+ 2.7	
26300.0	40.7	-42.0	50.1	43.8	50.4	44.2	68.2	-	49.1	42.9	+19.1	
31560.0	43.8	-54.8	53.8	49.8	54.6	50.2	74.0	54.0	43.6	39.2	+14.8	
36820.0	44.5	-48.3	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.2	< 36.2	> +22.0	
Test condition : Tx 56 Ch												
7040.0	29.9	-15.3	40.7	34.6	40.9	35.6	68.2	-	55.5	50.2	+12.7	
10560.0	33.2	-24.5	48.3	39.7	47.2	38.0	68.2	-	57.0	48.4	+11.2	
15840.0	37.4	-25.4	45.7	30.2	44.4	29.0	74.0	54.0	57.7	42.2	+11.8	
21120.0	40.3	-43.6	55.9	53.4	56.8	54.5	74.0	54.0	53.5	51.2	+ 2.8	
26400.0	40.6	-42.0	51.0	44.2	52.0	45.2	68.2	-	50.6	43.8	+17.6	
31680.0	43.8	-54.8	55.0	50.3	55.2	50.8	74.0	54.0	44.2	39.8	+14.2	
36960.0	44.4	-48.1	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.3	< 36.3	> +21.9	
Test condition : Tx 64 Ch												
7093.3	30.0	-15.3	38.6	31.2	39.0	32.5	68.2	-	53.7	47.2	+14.5	
10640.0	33.2	-24.4	49.9	39.5	49.3	38.9	74.0	54.0	58.7	48.3	+ 5.7	
15960.0	37.4	-25.3	46.5	30.4	44.6	29.6	74.0	54.0	58.6	42.5	+11.5	
21280.0	40.4	-43.6	55.1	52.1	56.4	54.2	74.0	54.0	53.2	51.0	+ 3.0	
26600.0	43.4	-60.6	66.8	62.9	67.8	63.9	68.2	-	50.6	46.7	+17.6	
31920.0	43.7	-54.5	54.2	50.2	54.5	50.3	68.2	-	43.7	39.5	+24.5	
37240.0	44.3	-47.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.7	< 36.7	> +21.5	

Calculated result at 21040.0 MHz, as the worst point shown on underline:

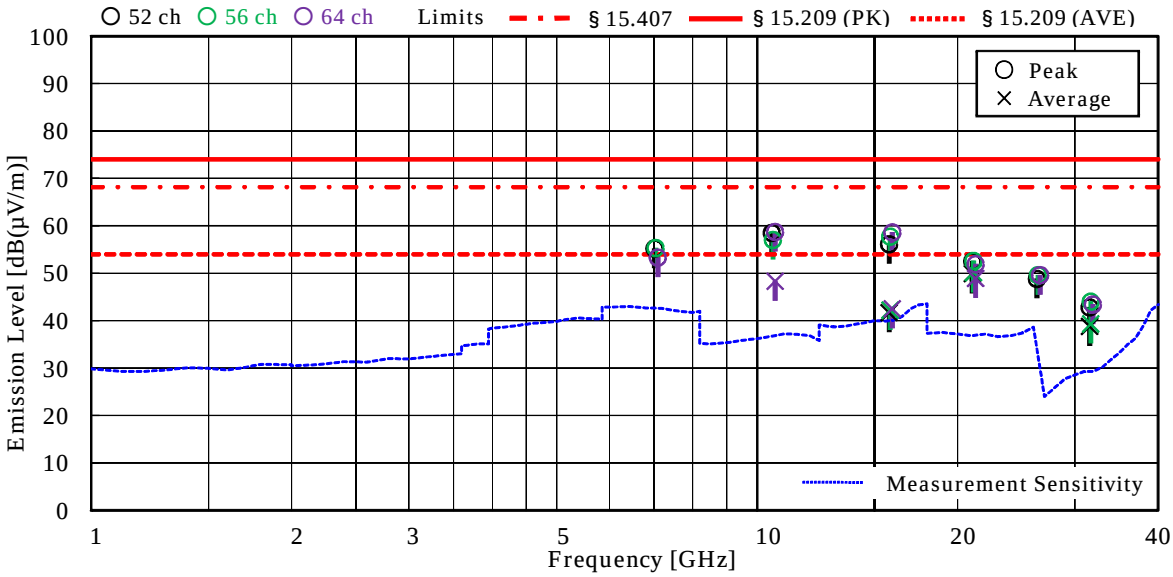
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.4 dB
+)	Meter Reading	=	54.4 dB(μV)
	Result	=	51.3 dB(μV/m)

Minimum Margin: 54.0 - 51.3 = 2.7 (dB)

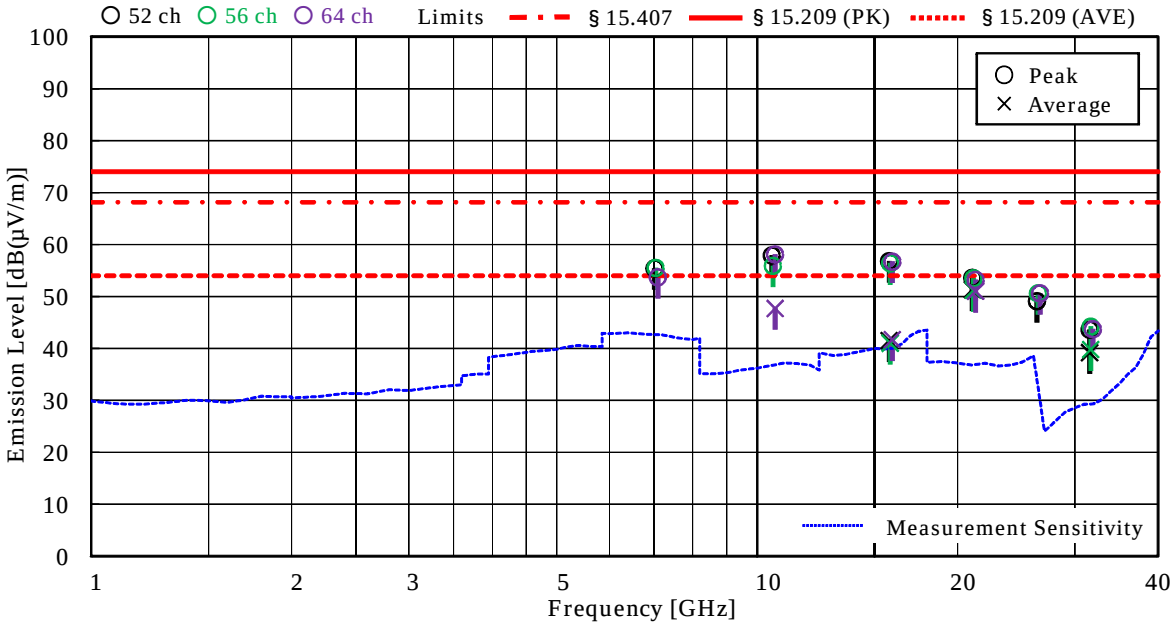
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 20 MHz BW, 5250 - 5350 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 20 MHz BW, 5470 – 5725 MHz Band)

Test Date: July 3, 2017
Temp.: 24 °C, Humi: 65 %

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 100 Ch												
7333.3	29.9	-15.7	40.4	35.3	40.4	35.3	74.0	54.0	54.6	49.5	+ 4.5	-
11000.0	33.3	-24.2	48.3	42.4	48.2	42.3	74.0	54.0	57.4	51.5	+ 2.5	-
16500.0	37.5	-24.5	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 51.0	< 41.0	> +17.2	-
22000.0	40.5	-43.3	59.7	56.7	59.9	56.8	68.2	-	57.1	54.0	+11.1	-
27500.0	43.9	-58.9	66.3	63.0	65.9	62.3	68.2	-	51.3	48.0	+16.9	-
33000.0	44.0	-53.8	57.3	53.0	56.8	52.5	68.2	-	47.5	43.2	+20.7	-
38500.0	44.3	-43.9	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 50.4	< 40.4	> +17.8	-
Test condition : Tx 116 Ch												
7440.0	29.8	-15.7	40.4	35.6	40.4	35.5	74.0	54.0	54.5	49.7	+ 4.3	-
11160.0	33.2	-24.0	49.5	43.3	49.2	43.1	74.0	54.0	58.7	52.5	+ 1.5	-
16740.0	37.6	-23.9	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 51.7	< 41.7	> +16.5	-
22320.0	40.6	-43.5	59.8	56.7	59.9	56.7	74.0	54.0	57.0	53.8	+ 0.2	-
27900.0	43.8	-58.0	66.9	64.4	66.2	63.9	68.2	-	52.7	50.2	+15.5	-
33480.0	44.0	-53.3	55.4	49.0	55.0	48.7	68.2	-	46.1	39.7	+22.1	-
39060.0	44.3	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 52.6	< 42.6	> +11.4	-
Test condition : Tx 140 Ch												
7600.0	29.8	-15.9	39.9	34.9	39.5	34.3	74.0	54.0	53.8	48.8	+ 5.2	-
11400.0	33.1	-24.0	48.9	41.2	48.5	41.0	74.0	54.0	58.0	50.3	+ 3.7	-
17100.0	38.0	-23.0	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 53.0	< 43.0	> +15.2	-
22800.0	40.5	-43.8	60.1	57.1	60.3	57.2	74.0	54.0	57.0	53.9	+ 0.1	-
28500.0	43.8	-56.7	66.4	63.0	65.8	62.3	68.2	-	53.5	50.1	+14.7	-
34200.0	44.0	-51.6	52.4	46.7	52.0	46.2	68.2	-	44.8	39.1	+23.4	-
39900.0	44.6	-41.2	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 53.4	< 43.4	> +10.6	-

Calculated result at 22800.0 MHz, as the worst point shown on underline:

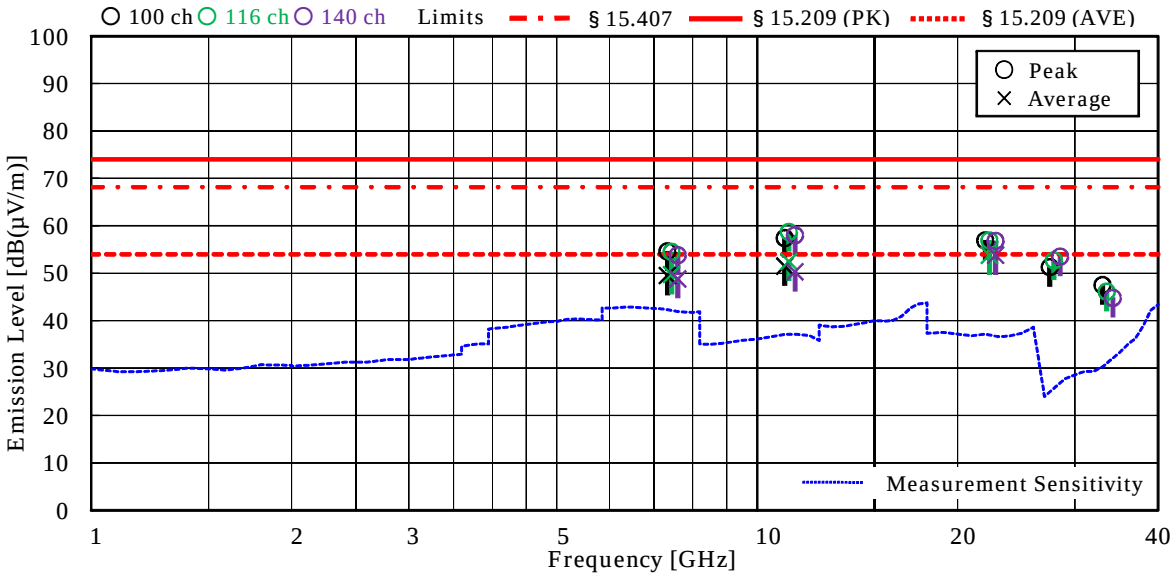
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.8 dB
+)	Meter Reading	=	57.2 dB(μV)
	Result	=	53.9 dB(μV/m)

Minimum Margin: 54.0 - 53.9 = 0.1 (dB)

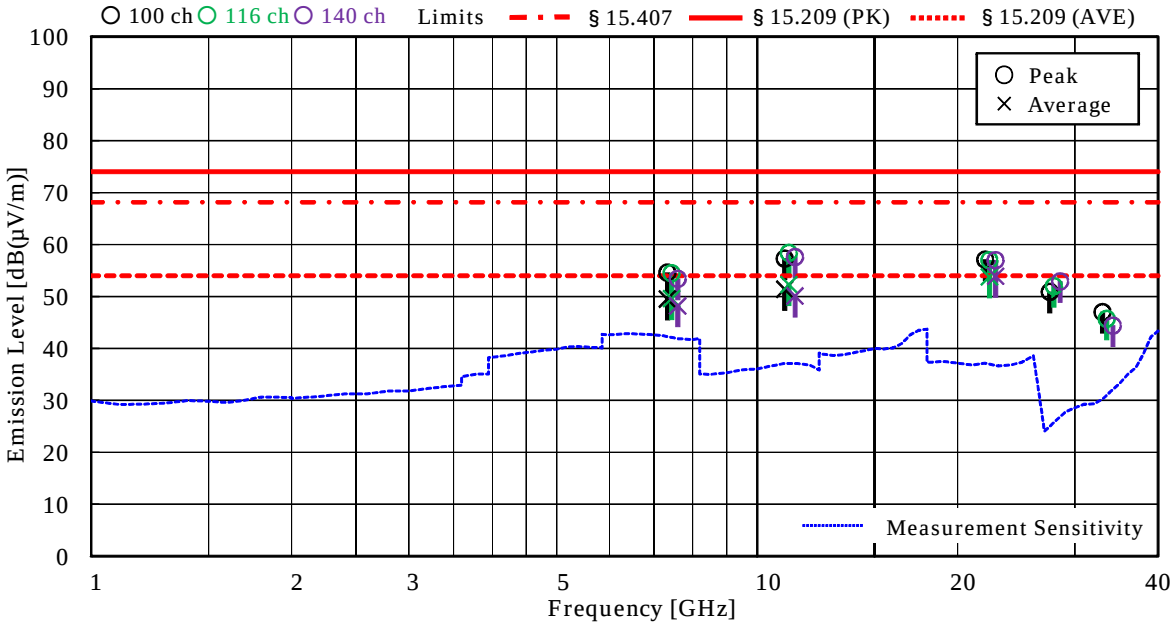
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 8.2 GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (8.2 - 18.0 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18.0 - 26.5 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 20 MHz BW, 5470 - 5725 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 40 MHz BW, 5150 - 5250 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 38 Ch												
6920.0	29.9	-15.3	45.3	42.5	43.8	40.7	68.2	-	59.9	57.1	+ 8.3	-
10380.0	33.2	-24.6	47.0	41.7	47.5	42.3	68.2	-	56.1	50.9	+12.1	-
15570.0	37.3	-25.4	44.9	28.4	44.7	28.2	74.0	54.0	56.8	40.3	+13.7	-
20760.0	40.2	-43.4	54.8	51.5	55.9	52.9	74.0	54.0	52.7	49.7	+ 4.3	-
25950.0	40.8	-42.4	51.0	45.5	51.4	46.7	68.2	-	49.8	45.1	+18.4	-
31140.0	43.9	-54.5	50.9	46.4	51.6	46.9	68.2	-	41.0	36.3	+27.2	-
36330.0	44.2	-48.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 45.6	< 35.6	> +22.6	-
Test condition : Tx 46 Ch												
6973.4	29.9	-15.3	44.7	41.3	44.3	41.0	68.2	-	59.3	55.9	+ 8.9	-
10460.0	33.2	-24.6	46.4	40.6	47.3	41.5	68.2	-	55.9	50.1	+12.3	-
15690.0	37.4	-25.4	44.1	28.5	40.4	< 28.0	74.0	54.0	56.1	40.5	+13.5	-
20920.0	40.3	-43.4	55.8	53.0	56.7	54.5	74.0	54.0	53.6	51.4	+ 2.6	-
26150.0	40.7	-42.2	50.2	45.1	50.7	46.1	68.2	-	49.2	44.6	+19.0	-
31380.0	43.9	-54.6	53.4	48.2	54.1	49.5	74.0	54.0	43.4	38.8	+15.2	-
36610.0	44.4	-48.2	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.2	< 36.2	> +22.0	-

Calculated result at 20920.0 MHz, as the worst point shown on underline:

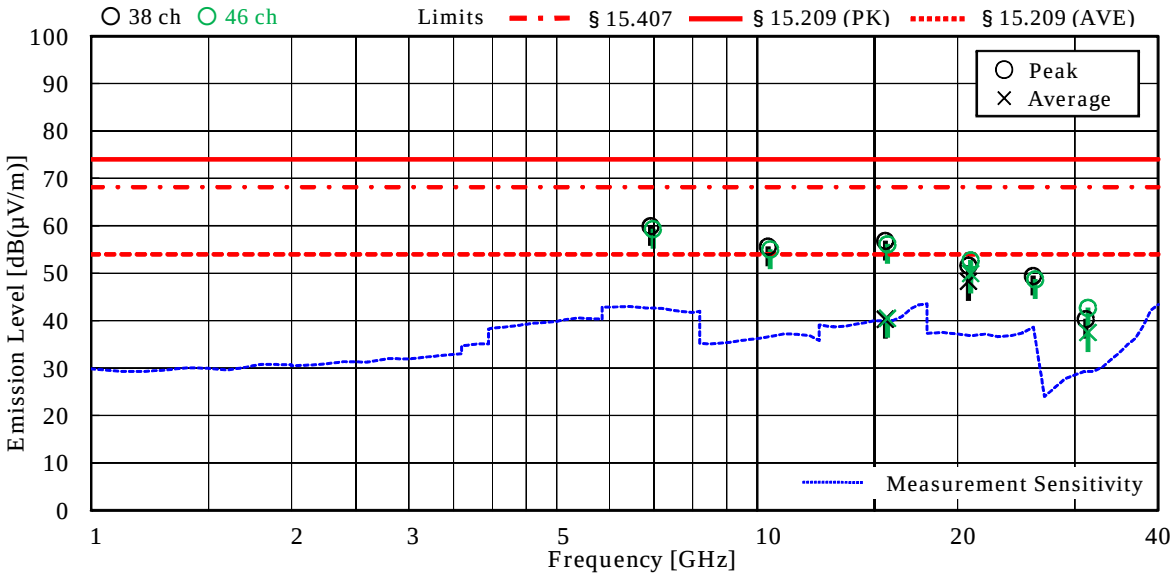
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.4 dB
+)	Meter Reading	=	54.5 dB(μV)
	Result	=	51.4 dB(μV/m)

Minimum Margin: 54.0 - 51.4 = 2.6 (dB)

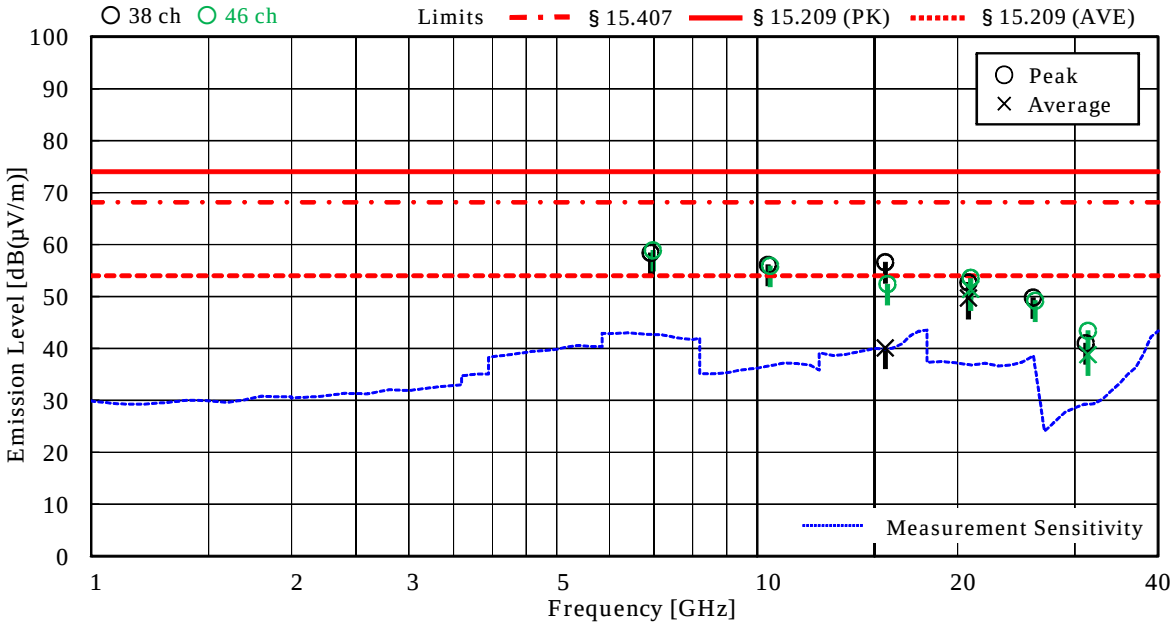
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of “<” means “or less”.
5. The symbol of “>” means “more than”.
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 40 MHz BW, 5150 - 5250 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 40 MHz BW, 5250 – 5350 MHz Band)

Test Date: February 6, 2017
Temp.: 24 °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 54 Ch												
7026.7	29.9	-15.3	42.3	38.2	42.6	38.4	68.2	-	57.2	53.0	+11.0	
10540.0	33.2	-24.5	44.7	39.4	44.6	39.4	68.2	-	53.4	48.1	+14.8	
15810.0	37.4	-25.4	40.4	< 28.0	38.7	< 28.0	74.0	54.0	52.4	< 40.0	> +14.0	
21080.0	40.3	-43.5	55.9	53.4	56.7	54.3	74.0	54.0	53.5	51.1	+ 2.9	
26350.0	40.6	-41.9	51.8	47.3	50.4	45.4	68.2	-	50.5	46.0	+17.7	
31620.0	43.8	-54.8	53.8	50.0	54.9	50.4	74.0	54.0	43.9	39.4	+14.6	
36890.0	44.5	-48.3	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.2	< 36.2	> +22.0	
Test condition : Tx 62 Ch												
7080.0	30.0	-15.3	39.9	34.5	40.9	35.9	68.2	-	55.6	50.6	+12.6	
10620.0	33.2	-24.4	44.2	37.7	44.3	38.5	74.0	54.0	53.1	47.3	+ 6.7	
15930.0	37.4	-25.3	40.4	< 28.0	39.7	< 28.0	74.0	54.0	52.5	< 40.1	> +13.9	
21240.0	40.3	-43.5	54.6	52.7	56.7	54.5	74.0	54.0	53.5	51.3	+ 2.7	
26550.0	43.5	-60.6	66.3	63.2	67.3	64.0	68.2	-	50.2	46.9	+18.0	
31860.0	43.8	-54.7	54.2	50.8	55.3	52.0	68.2	-	44.4	41.1	+23.8	
37170.0	44.4	-47.8	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 46.6	< 36.6	> +21.6	

Calculated result at 21240.0 MHz, as the worst point shown on underline:

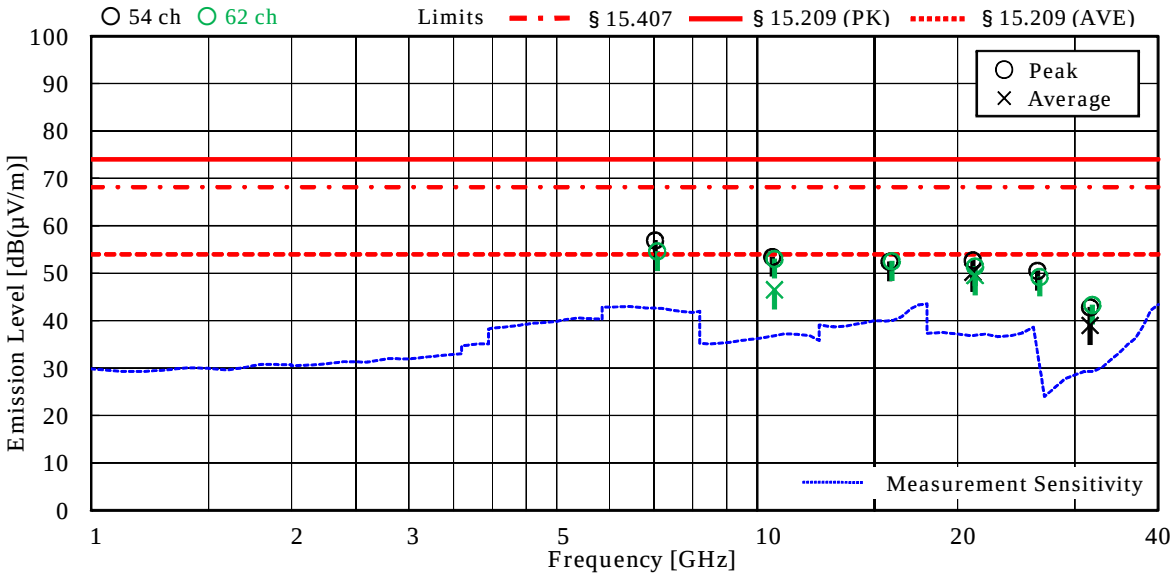
	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.5 dB
+)	Meter Reading	=	54.5 dB(μV)
	Result	=	51.3 dB(μV/m)

Minimum Margin: 54.0 - 51.3 = 2.7 (dB)

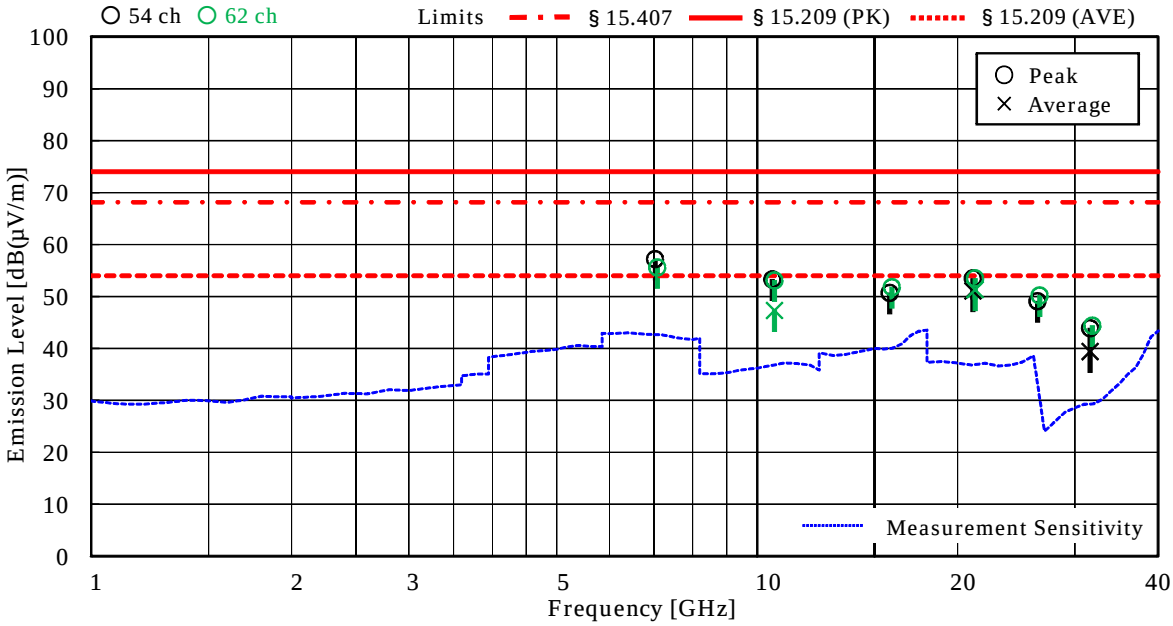
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18 - 26.5GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 40 MHz BW, 5250 - 5350 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



Mode of EUT : TX mode (802.11n: 40 MHz BW, 5470 – 5725 MHz Band)

Test Date: July 3, 2017
Temp.: 24 °C, Humi: 65 %

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 102 Ch												
7346.7	29.9	-15.7	41.0	36.3	41.3	36.5	74.0	54.0	55.5	50.7	+ 3.3	-
11020.0	33.3	-24.2	48.3	43.1	48.1	42.9	74.0	54.0	57.4	52.2	+ 1.8	-
16530.0	37.5	-24.4	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 51.1	< 41.1	> +17.1	-
22040.0	40.5	-43.3	59.6	56.5	59.8	56.7	74.0	54.0	57.0	53.9	+ 0.1	-
27550.0	43.8	-58.8	66.3	63.0	65.9	62.4	68.2	-	51.3	48.0	+16.9	-
33060.0	44.0	-53.6	57.0	52.9	56.6	52.4	68.2	-	47.4	43.3	+20.8	-
38570.0	44.3	-43.6	< 50.0	< 40.0	< 50.0	< 40.0	68.2	-	< 50.7	< 40.7	> +17.5	-
Test condition : Tx 134 Ch												
7560.0	29.8	-15.9	40.2	35.0	40.1	34.9	74.0	54.0	54.1	48.9	+ 5.1	-
11340.0	33.1	-24.0	46.9	41.3	46.5	41.0	74.0	54.0	56.0	50.4	+ 3.6	-
17010.0	37.9	-23.2	< 38.0	< 28.0	< 38.0	< 28.0	68.2	-	< 52.7	< 42.7	> +15.5	-
22680.0	40.5	-43.6	59.7	56.5	59.9	56.8	74.0	54.0	56.8	53.7	+ 0.3	-
28350.0	43.8	-57.0	66.3	62.8	65.9	62.5	68.2	-	53.1	49.6	+15.1	-
34020.0	44.0	-52.1	53.0	46.7	52.5	46.5	68.2	-	44.9	38.6	+23.3	-
39690.0	44.7	-41.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 53.1	< 43.1	> +10.9	-

Calculated result at 22040.0 MHz, as the worst point shown on underline:

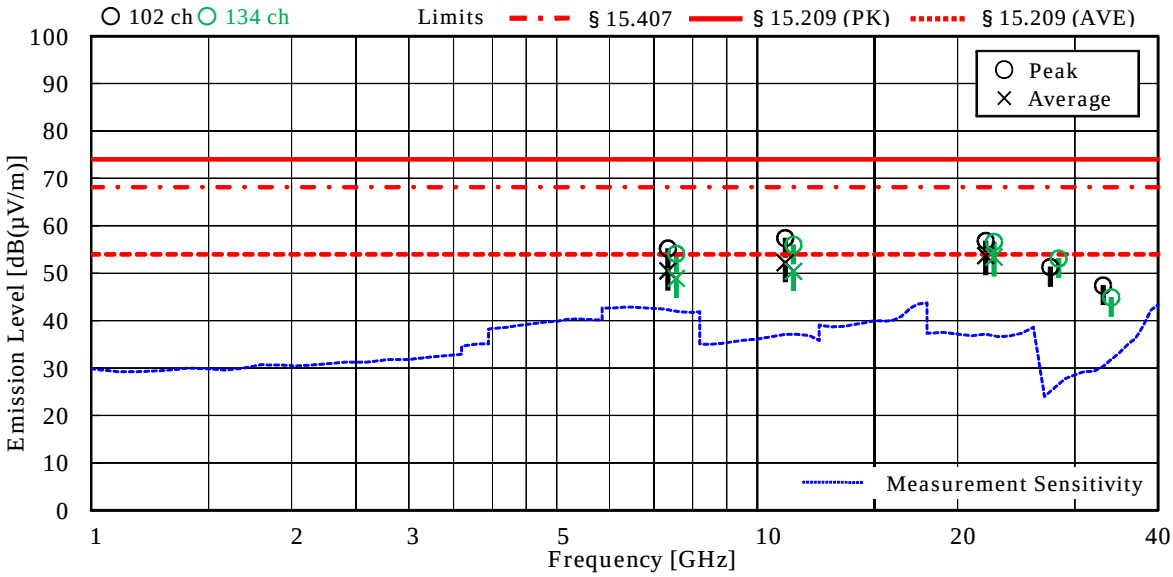
	Antenna Factor	=	40.5 dB(1/m)
	Corr. Factor	=	-43.3 dB
+)	Meter Reading	=	56.7 dB(μV)
	Result	=	53.9 dB(μV/m)

Minimum Margin: 54.0 - 53.9 = 0.1 (dB)

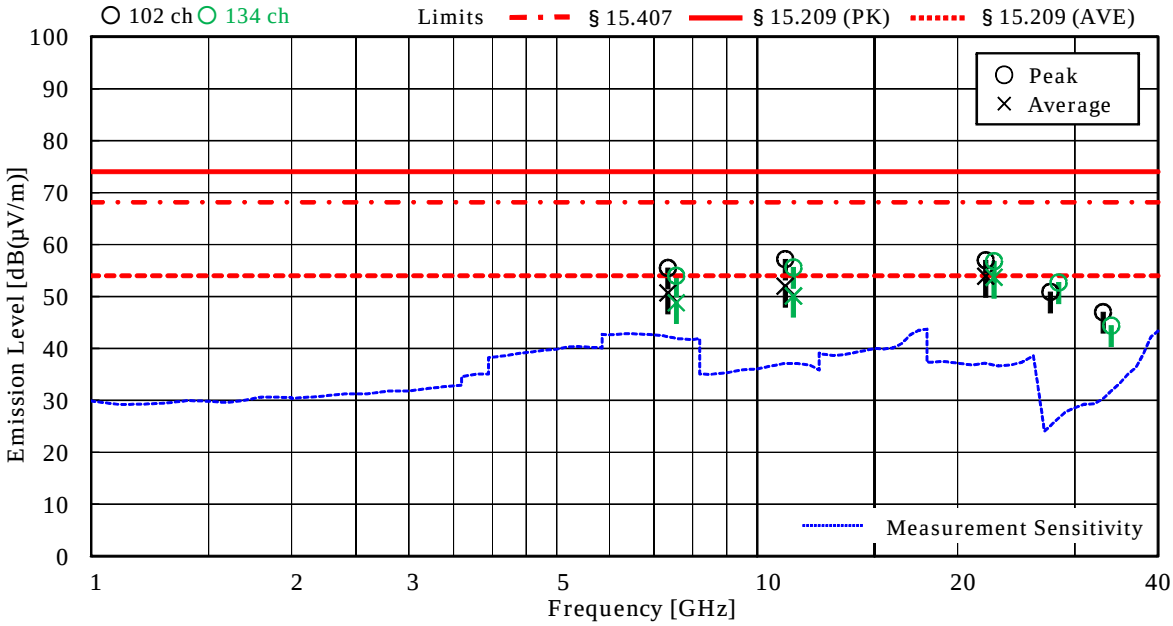
NOTES
1. Test Distance : 3 m (1 GHz to 26.5 GHz) / 1m (26.5 GHz to 40 GHz)
2. The spectrum was checked from 1 GHz to 40 GHz.
3. The correction factor is shown as follows:
   Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 8.2 GHz)
   Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (8.2 - 18.0 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (18.0 - 26.5 GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26.5 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak / AVE : Average

Mode of EUT : TX mode (802.11n: 40 MHz BW, 5470 - 5725 MHz Band)

Antenna Pole : Horizontal



Antenna Pole : Vertical



7.7 Dynamic Frequency Selection (DFS)

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

Channel Move Time (Limit : < 10 sec.)
802.11n (40 MHz BW) 54.0 msec. at 5310.0 MHz

Channel Closing Transmission Time (Limit : < 60 msec.)
802.11n (40 MHz BW) 0.0 msec. at 5310.0 MHz

Non-occupancy Period (Limit : ≥ 30 min.)
802.11n (40 MHz BW) > 30 min. at 5310.0 MHz

Uncertainty of Measurement Results 0.6 %B(2σ)

Remarks : The EUT is a client without radar detection therefore applicable requirements are only the above. Test was performed using a radar type 0.

7.7.2 Test Instruments

Anechoic Chamber A2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2017/04/27
Signal Generator	MG3710A	6201171711 (B-41)	Anritsu	2017/11/06
Horn Antenna (*2)	3160-05	9902-1061 (C-56)	EMCO	2017/06/13
Double-Ridge Guide Horn Antenna (*2)	TR17206	73370006 (C-29)	ADVANTEST	2017/06/13
RF Cable (*2)	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2018/01/10
RF Cable (*1)	SUCOFLEX102E	6683/2E (C-70)	HUBER+SUHNER	2017/11/21

(*1) Radar Antenna and the cable
(*2) Monitor Antenna and the cable

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

7.7.3 Test Method and Test Setup (Diagrammatic illustration)

The Dynamic Frequency Selection(DFS) measurements were carried out in accordance with FCC Part 15.407(h) and KDB905462 D02 UNII DFS Compliance Procedures New Rules “COMPLIANCE MEASUREMENT PROCEDURES FOR UNII DEVICES OPERATIONG IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION”.

7.7.3.1 DFS Detection Threshold and DFS Response Requirement

DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2 and 3)
≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1 : This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2 : Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3 : EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

DFS Response Requirement Values

Parameter	Value
Non-Occupancy Period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds (See Note 1.)
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. (See Notes 1 and 2.)
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. (See Note 3.)
Note 1 : Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2 : The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3 : During the U-NII Detection Bandwidth detection test, radar type 0 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

7.7.3.2 Radar Test Waveforms

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note1	See Note1
1	1	See KDB905462 D02		60%	40
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1 : Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. For Short Pulse Radar Type 0, the same waveform is used a minimum of 30 times. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. The aggregate is the average of the percentage of successful detections of Short Pulse Radar Types 1-4.

Long Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms. Each waveform is defined as follows:

1) The transmission period for the Long Pulse Radar test signal is 12 seconds.
2) There are a total of 8 to 20 Bursts in the 12 second period, with the number of Bursts being randomly chosen. This number is Burst_Count.
3) Each Burst consists of 1 to 3 pulses, with the number of pulses being randomly chosen. Each Burst within the 12 second sequence may have a different number of pulses.
4) The pulse width is between 50 and 100 microseconds, with the pulse width being randomly chosen. Each pulse within a Burst will have the same pulse width. Pulses in different Bursts may have different pulse widths.
5) Each pulse has a linear frequency modulated chirp between 5 and 20 MHz, with the chirp width being randomly chosen. Each pulse within a Burst will have the same chirp width. Pulses in different Bursts may have different chirp widths. The chirp is centered on the pulse. For example, with a radar frequency of 5300 MHz and a 20 MHz chirped signal, the chirp starts at 5290 MHz and ends at 5310 MHz.
6) If more than one pulse is present in a Burst, the time between the pulses will be between 1000 and 2000 microseconds, with the time being randomly chosen. If three pulses are present in a Burst, the random time interval between the first and second pulses is chosen independently of the random time interval between the second and third pulses.
7) The 12 second transmission period is divided into even intervals. The number of intervals is equal to Burst_Count. Each interval is of length (12,000,000 / Burst_Count) microseconds. Each interval contains one Burst. The start time for the Burst, relative to the beginning of the interval, is between 1 and [(12,000,000 / Burst_Count) – (Total Burst Length) + (One Random PRI Interval)] microseconds, with the start time being randomly chosen. The step interval for the start time is 1 microsecond. The start time for each Burst is chosen independently.

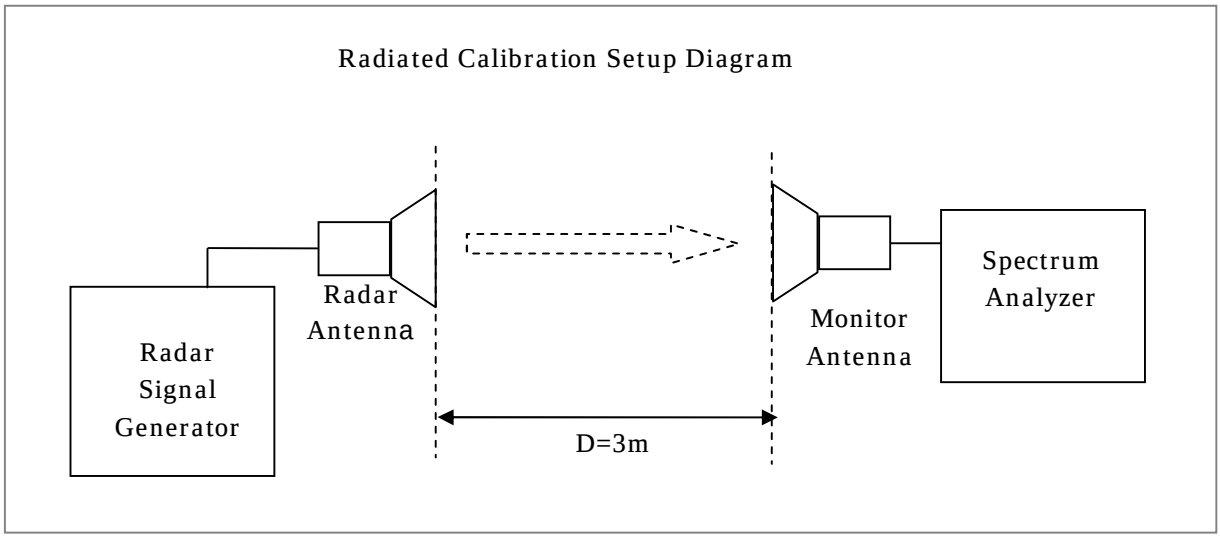
Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each waveform. The hopping sequence is different for each waveform and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250 – 5724 MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

7.7.3.3 Rader Waveform Calibration

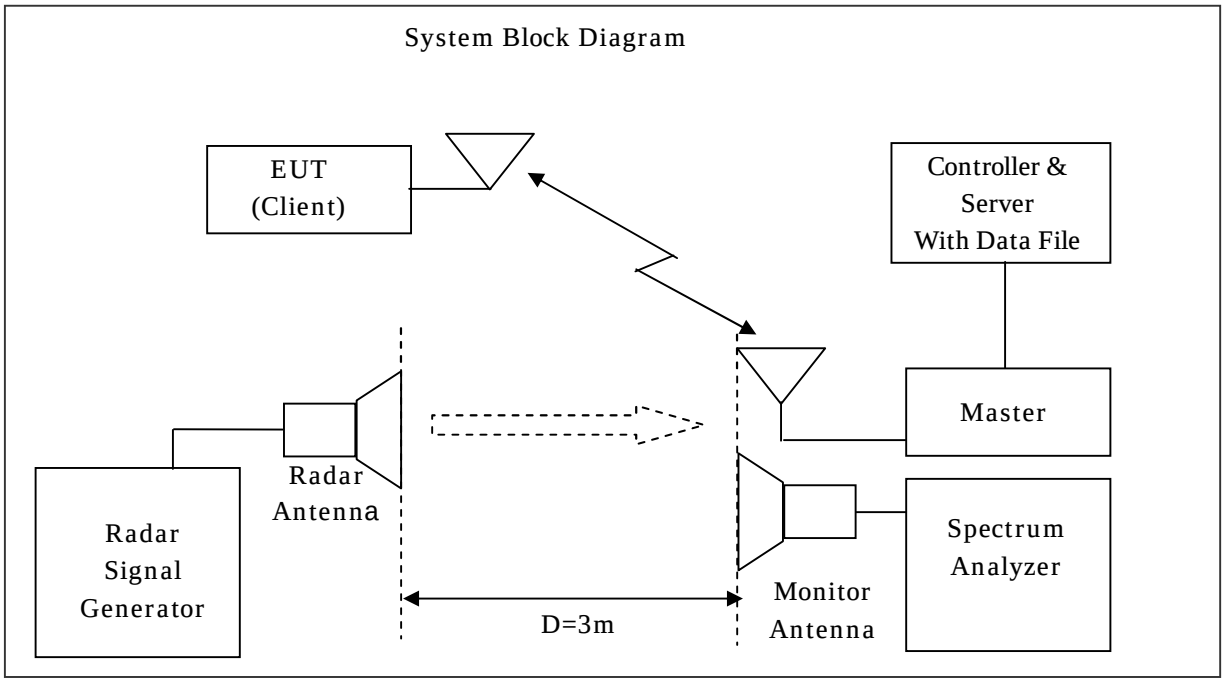


The EUT is the client device without radar detection, then master device is a RDD. Therefore the radar test signal level is set at the Radar Detection Threshold Level of master device.
The Radar Detection Threshold Level is employed -64 dBm + 1dB = -63 dBm at the antenna port.
Where the antenna gain of master device is X dBi then the threshold level is corrected as “-63 - X” dBm (Rated output power and Antenna Gain of the master device is described in EUT Description).
The spectrum analyzer is connected to the monitor antenna via a coaxial cable. The antenna is set vertical polarization for testing. The reference level offset of a spectrum analyzer set to “Monitoring Antenna Gain – Cable loss”. The Radar Signal Generator is set to CW output mode and the signal level is adjusted to “-63 - X” dBm on the spectrum analyze setting as below;

- Frequency : Radar Signal Frequency
- Frequency Span : Zero Span (Time Domain)
- Resolution Bandwidth : 3 MHz
- Video Bandwidth : 3 MHz
- Detector Mode : Peak

The spectrum analyzer plots of the calibrated radar waveform on the Channel frequency is attached in clause 7.7.4.1 in this report.

7.7.3.4 Test Setup and Operation Radiated Method



Support Equipment: The following support equipment was used for in this DFS testing

Item	Manufacturer	Model No.	Serial No.	FCC ID
Access Point	Cisco	AIR-CAP3720E-A-K9	FJC1928F02H	LDK102087
PC (Server)	DELL	Vostro 3558	49N6DC2	N/A (DoC)

Used Test File and Displayed Traffic Level Adjustment:
The test is performed with the designated MPEG test file that is streamed from the access point to the client in full motion video mode using the media player with the V2.61 Codec package. This file is used by IP and Frame based systems for loading the test channel during the In-service compliance testing of the U-NII device.
By control PC, the radio link is established between the master and slave and the test file in sever (PC) is streamed via master (access point) to generate WLAN traffic.
The monitoring antenna is adjusted so that the WLAN traffic level on the spectrum analyzer is lower than the radar detection threshold level (Channel loading was over 17 %).

The spectrum analyzer plots of the slave (EUT) data traffic plot is attached in clause 7.7.4.2 and the nominal noise floor plots is attached in clause 7.7.4.3 in this report.

7.7.3.5 Description of EUT

Item	Specification
Operating Frequency (MHz)	5150 to 5250 / 5250 to 5350 / 5470 to 5725
Operating Mode of EUT	Client (Slave) Device without Radar Detection
FCC ID for Master Device (*)	LDK102087 (Antenna Gain: 4.0 dBi)
Antenna Type of EUT	1/2λ Type Antenna (Integral)
Highest Power Level (EIRP) / Antenna Gain of EUT	802.11a: 10.0 dBm Max. 802.11n (20/40 MHz BW): 10.0 dBm Max. Antenna Gain: 0.5 dBi
System Architecture	IEEE 802.11a/n, IP based system
TPC Description	N/A (Not Required EIRP below 500 mW)
Data Rate/ Channel Bandwidth	Refer below table.
Power-on Cycle	N/A (No Channel Availability Check Function)

*) The rated output power of the master device is greater than 23dBm (EIRP), then the interference threshold level is employed -64 dBm. After correction for procedural adjustments, the radiated threshold level at the master device are;
-64 + 1 - 4 dBi (Master antenna Gain) = -67 dBm

Data Rate/ Channel Bandwidth

IEEE802.11 a			IEEE802.11 n		
Modulation	Data Rate (Mbps)	Channel Bandwidth (MHz)	Modulation	Data Rate(Mbps) Channel Bandwidth(MHz) 20	40
BPSK	6	20	BPSK	6.5	13.5
BPSK	9	20	QPSK	13.0	27.0
QPSK	12	20	QPSK	19.5	40.5
QPSK	18	20	16-QAM	26.0	54.0
16-QAM	24	20	16-QAM	39.0	81.0
16-QAM	36	20	64-QAM	52.0	108.0
64-QAM	48	20	64-QAM	58.5	121.5
64-QAM	54	20	64-QAM	65.0	135.0

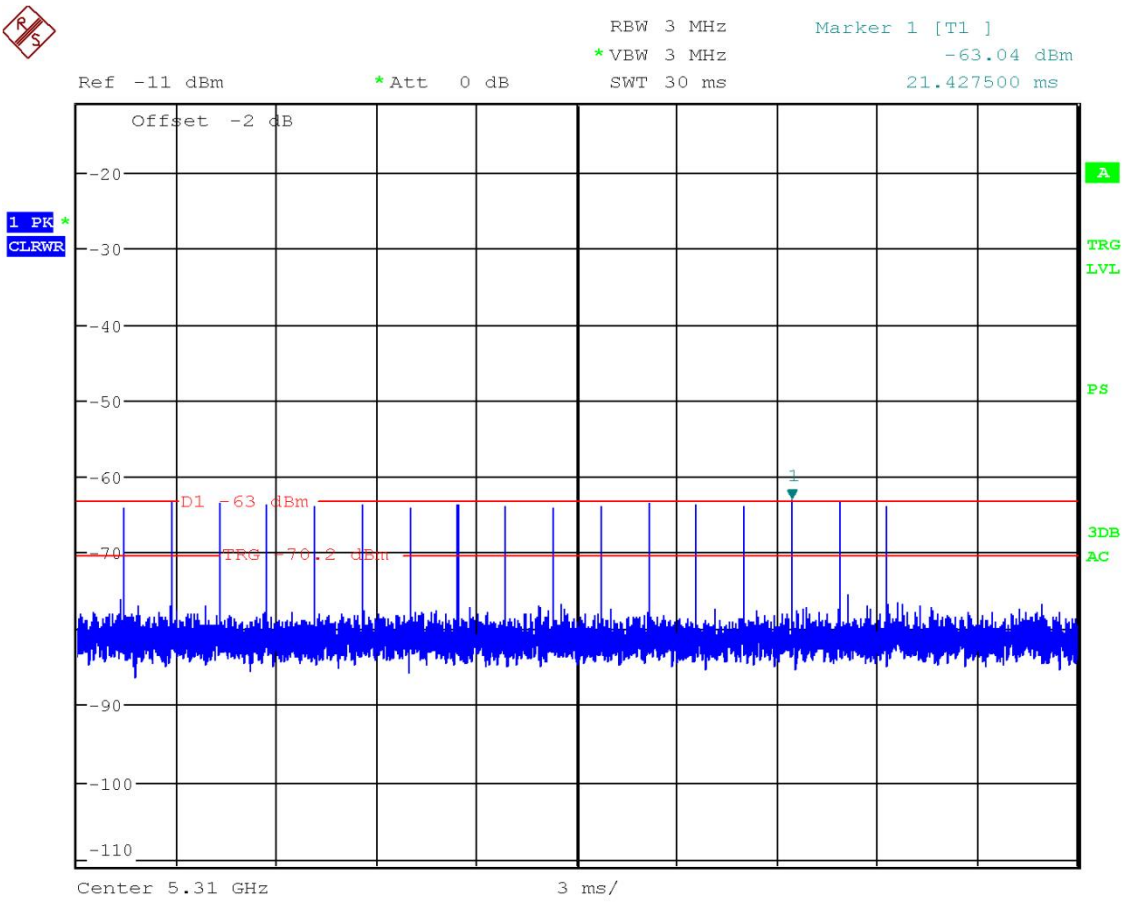
7.7.3.6 Deviation to the procedures and equipment from the standards

There is no deviation from FCC Rule and KDB905462 D02.

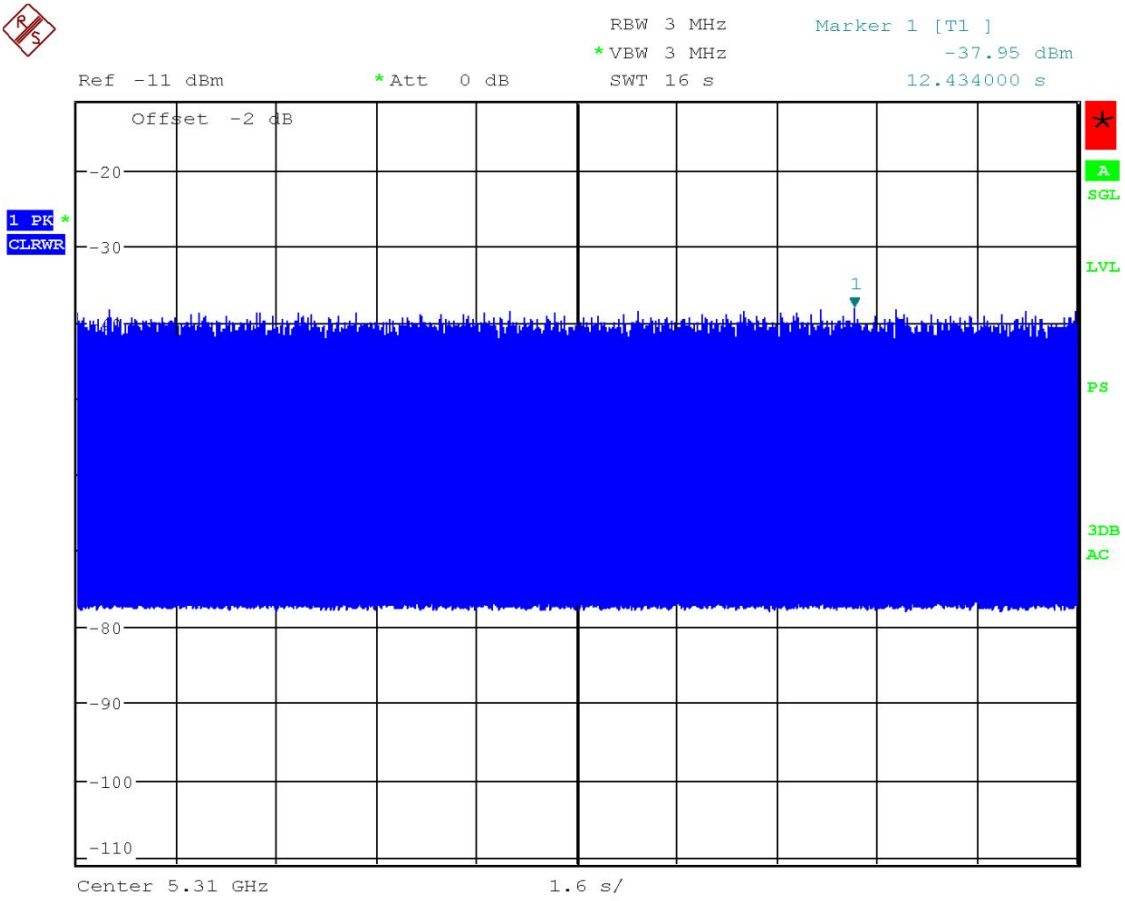
7.7.4 Test Data

Test Date: March 27, 2017
Temp.: 22 °C, Humi: 41 %

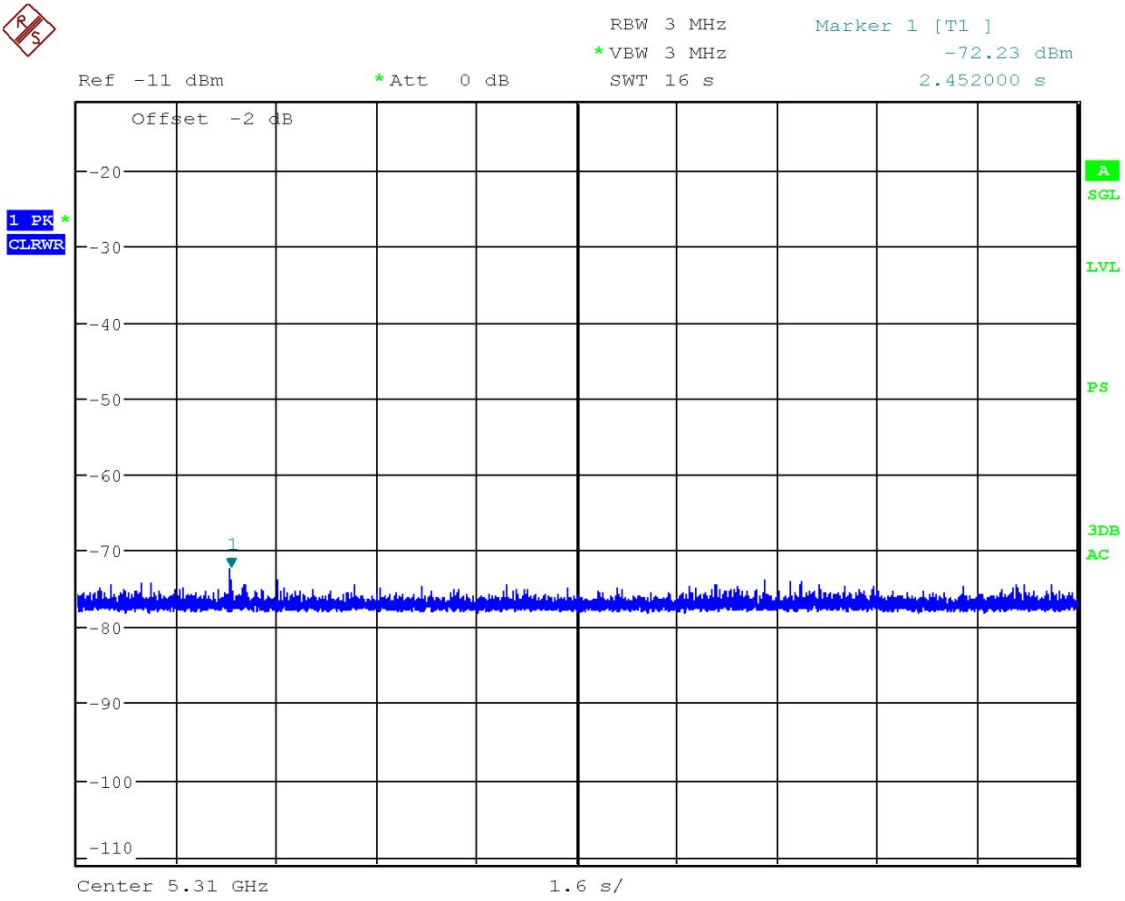
7.7.4.1 Radar Waveform Calibration Results (Type 0 Short Pulse)



7.7.4.2 EUT (Slave) Traffic Plots

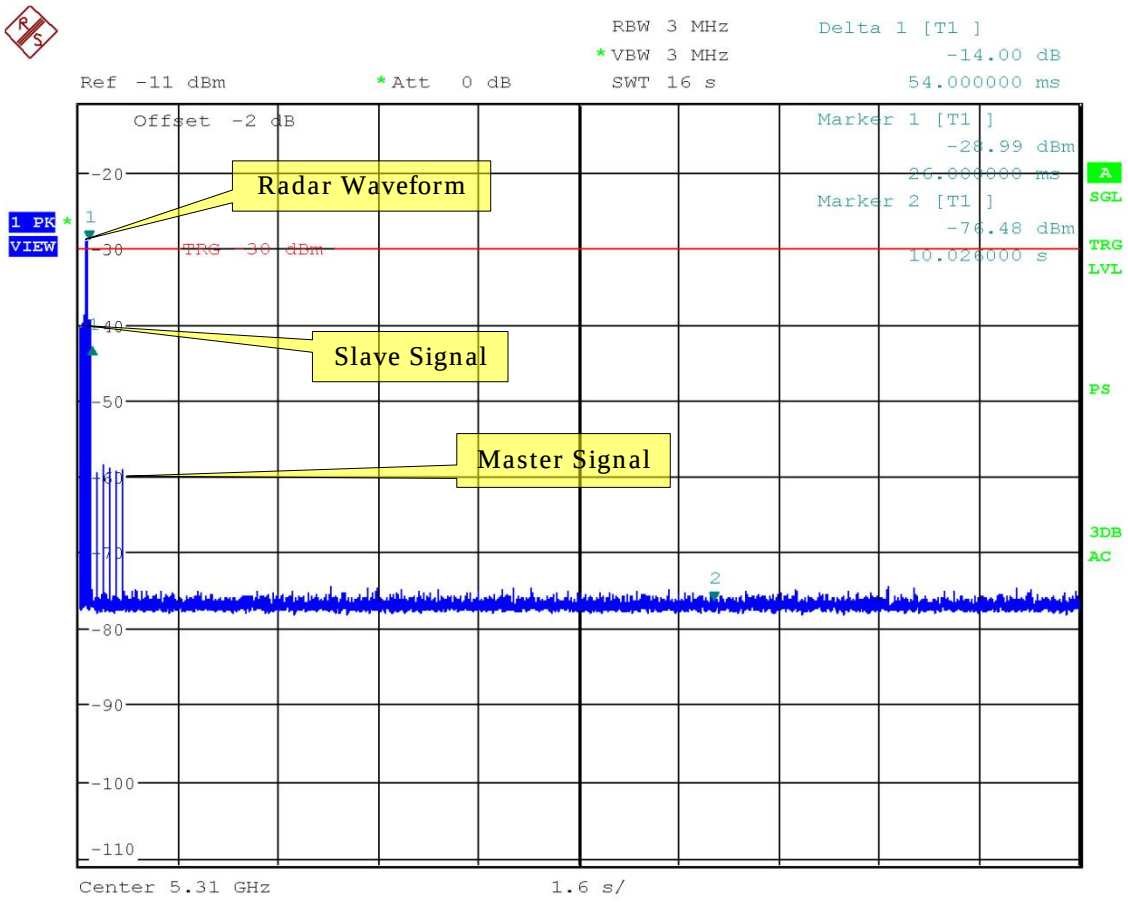


7.7.4.3 No Traffic (Noise Floor) Plots



7.7.4.4 Channel Move Time

The channel move time is measured using delta-marker function of the spectrum analyzer. The reference marker is adjusted at the end of radar pulse and the delta marker is adjusted at the end the WLAN transmission. The displayed delta value is the result of move time. It shall be within the 10 seconds.
The measurements are carried out 802.11n CH.62 (5310MHz) / 40 MHz BW.



7.7.4.5 Channel Closing Transmission Time

The aggregate channel closing transmission time is calculated as follows;
D is the dwell time per spectrum analyzer sampling bin.
S is the sweep time.
B is the number of spectrum analyzer sampling bin.
N is the number of spectrum analyzer sampling bins showing a UNII transmission (intermittent control signal).

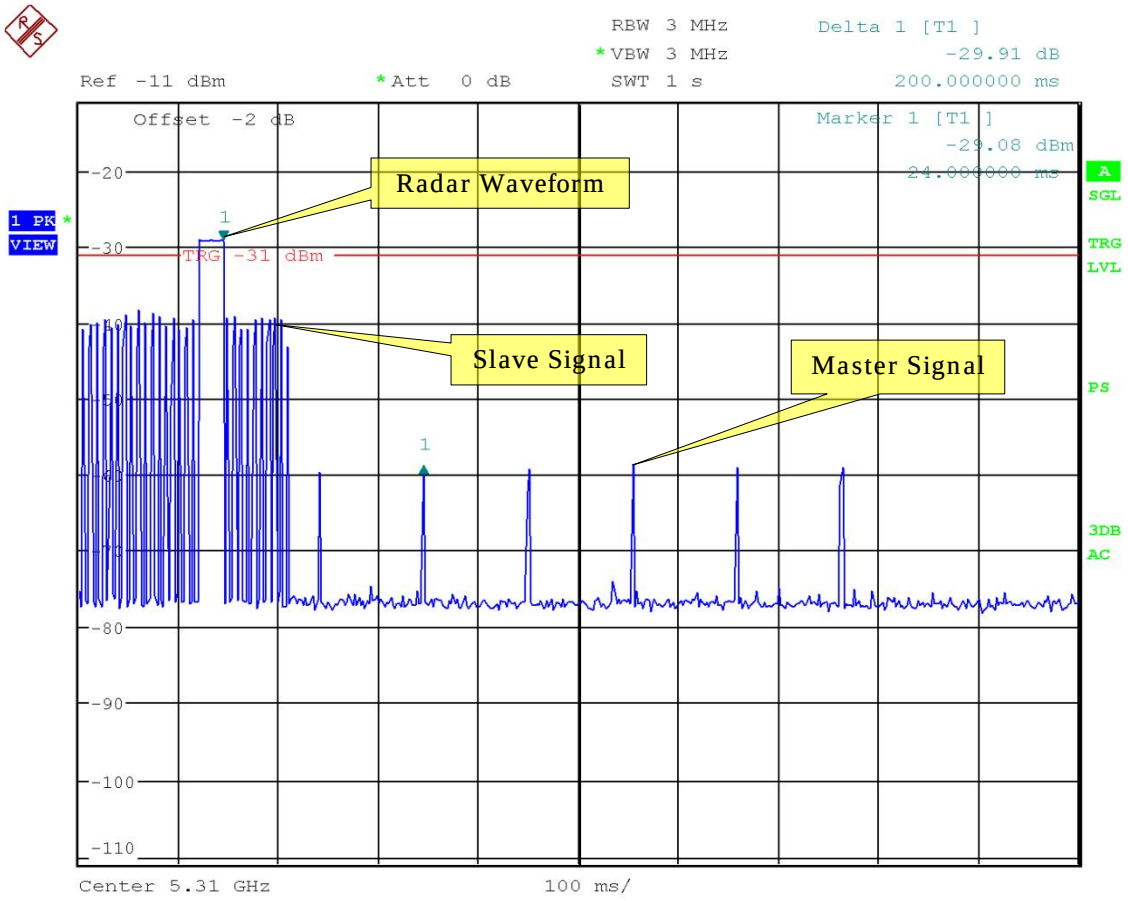
Channel Closing Time = D × N = S / B × N

The observation period over which the aggregate transmission time is calculated begins at (the reference marker + 200 msec.) and end on earlier than (the reference marker + 10 sec.).
The measurements are carried out 802.11n CH.62 (5310MHz) / 40 MHz BW.

Test Results

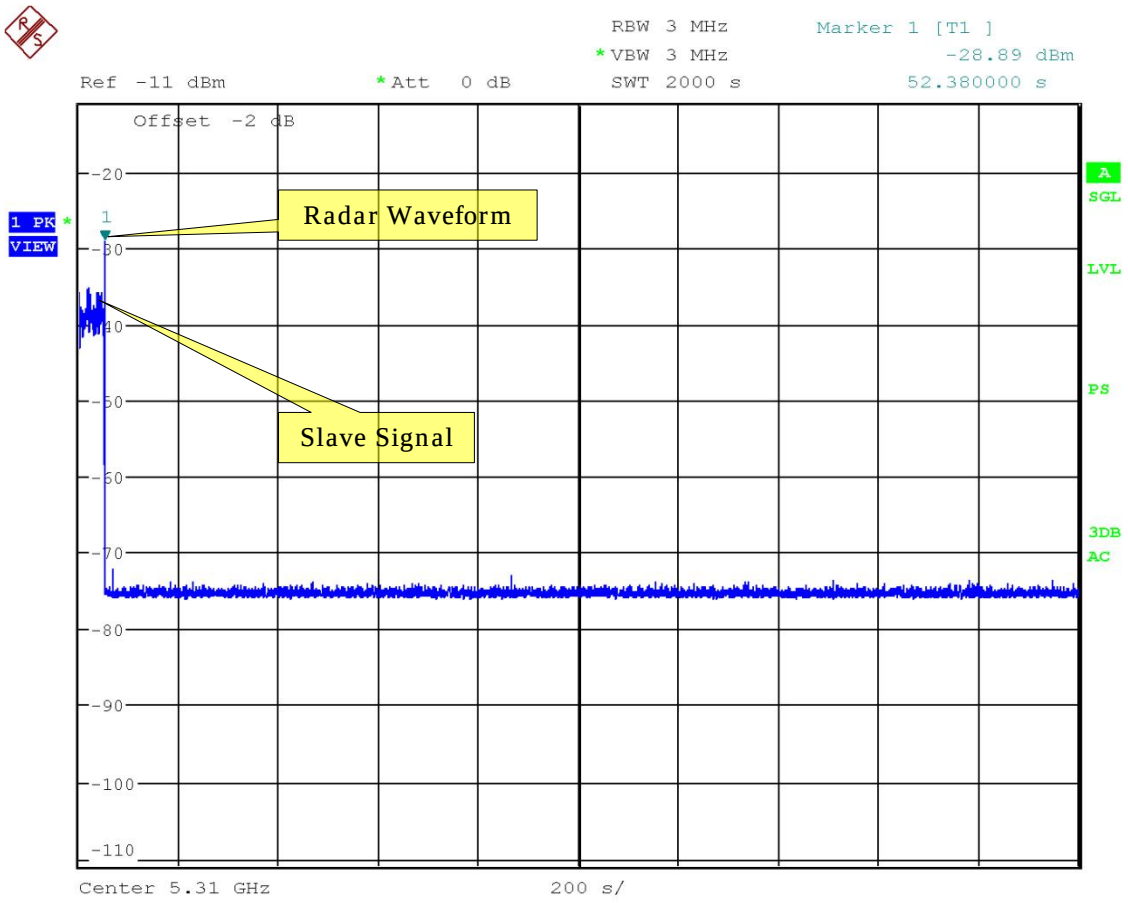
Channel	Frequency (MHz)	Mode	Sweep Time(S) (msec)	(B)	(N)	Channel Closing Time (msec)
62	5310	40 MHz BW	1000	500	0	0

The test result (Channel Closing Time) is calculated as follows;
Channel Closing Time = D × N = S / B × N = 1000 / 500 × 0 = 0 msec.



7.7.4.6 Non-Occupancy Period

During the 30 minutes observation time, EUT did not make any transmissions on a channel.
The measurements are carried out 802.11n CH.62 (5310MHz) / 40 MHz BW.



7.8 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 (U-NII) band does not qualify for the Standalone SAR test exclusion because threshold value is > 3, then the SAR testing is required.