JQA File No. : KL80150485S
Issue Date : January 28, 2016

TEST REPORT

Applicant	:	WESTUNITIS CO., LTD.
Address	:	29F Grand Front Osaka Tower-A , 4-20 Ofukacho, Kita-ku, Osaka, Japan,530-0011
Products	:	InfoLinker
Model No.	:	WUZ-01B-NB01
Serial No.	:	501550014 501550016
FCC ID	:	2AFRZWUZ-01B-NB01
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15
Test Results	:	**Passed**
Date of Test	:	November 18 ~ December 14, 2015

ilac-MRA VLAC Lab Accreditation VLAC-001-2

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

- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.
- VLAC does not approve, certify or warrant the product by this test report.

TABLE OF CONTENTS

DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT

EUT : Equipment Under Test
AE : Associated Equipment
N/A : Not Applicable
N/T : Not Tested
EMC : Electromagnetic Compatibility
EMI : Electromagnetic Interference
EMS : Electromagnetic Susceptibility

☑ - indicates that the listed condition, standard or equipment is applicable for this report.
☐ - indicates that the listed condition, standard or equipment is not applicable for this report.

1 Description of the Equipment Under Test

1.	Manufacturer	:	WESTUNITIS CO., LTD. 29F Grand Front Osaka Tower-A , 4-20 Ofukacho, Kita-ku, Osaka, Japan,530-0011
2.	Products	:	InfoLinker
3.	Model No.	:	WUZ-01B-NB01
4.	Serial No.	:	501550014 501550016
5.	Product Type	:	Mass Production
6.	Date of Manufacture	:	June, 2015
7.	Power Rating	:	3.7VDC (Lithium-ion Battery WHB-001 300mAh) 5.0VDC (USB)
8.	Grounding	:	None
9.	Operating Frequency	: :	5180.0 MHz(36CH) –5320.0MHz(64CH): IEEE802.11a/n HT20 5190.0 MHz(38CH) –5310.0MHz(62CH): IEEE802.11n HT40
10.	Modulation	:	OFDM
11.	Antenna Type	:	1/2 λ 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	:	September 9, 2015

2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations 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.

☑ - 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:

Takeshi Choda
Assistant 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 v01: June 6, 2014

KDB 905462 D02
UNII DFS Compliance Procedures New Rules v01r02: May 15, 2015

KDB 447498
RF exposure and equipment authorization requirements

4 Test Location

Japan Quality Assurance Organization (JQA)
KITA-KANSAI Testing Center
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

5 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center SAITO EMC Branch is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : March 30, 2016)
VCCI Registration No. : A-0002 (Expiry date : March 30, 2016)
BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006 (Expiry date : September 14, 2016)
IC Registration No. : 2079E-3, 2079E-4 (Expiry date : July 16, 2017)

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

6 Description of Test Setup

6.1 Test Configuration

The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	InfoLinker	WESTUNITIS	WUZ-01B-NB01	501550014 *1) 501550016 *2)	2AFRZWUZ-01B-NB01
B	Li-ion Battery	WESTUNITIS	WHB-001	--	N/A

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

*2) Used for DFS Measurement

The auxiliary equipment used for testing :

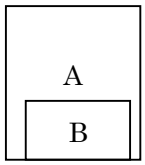
	Item	Manufacturer	Model No.	Serial No.	FCC ID
C	Earphone	--	--	--	N/A
D	Note PC	Fujitsu	FMV A 05010P	CP660964-01	None
E	AC Adapter (for PC)	Fujitsu	ADP-65JH AB	CP500588-01	N/A
F	Mouse	Hewlett Packard	M-UAE96	265986-011	N/A
G	Access Point	Cisco	AIR-CAP3702E-A-K9	FJC1928F02H	LDK102087
H	AC Adapter (for AP)	Cisco	EADP-18MB B	DAB1925M1RG	N/A

Type of Cable:

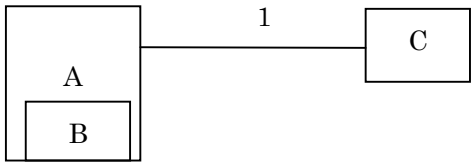
No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	Earphone cable	--	--	NO	NO	1.2
2	USB Cable1	--	YES	YES	NO	1.2
3	USB Cable2	--	YES	YES	NO	1.8
4	DC Cable	--	--	NO	YES	1.8
5	AC Cable	--	--	NO	NO	1.0
6	DC Cable	--	--	NO	YES	1.8
7	AC Cable	--	--	NO	NO	1.8

6.2 Test Arrangement (Drawings)

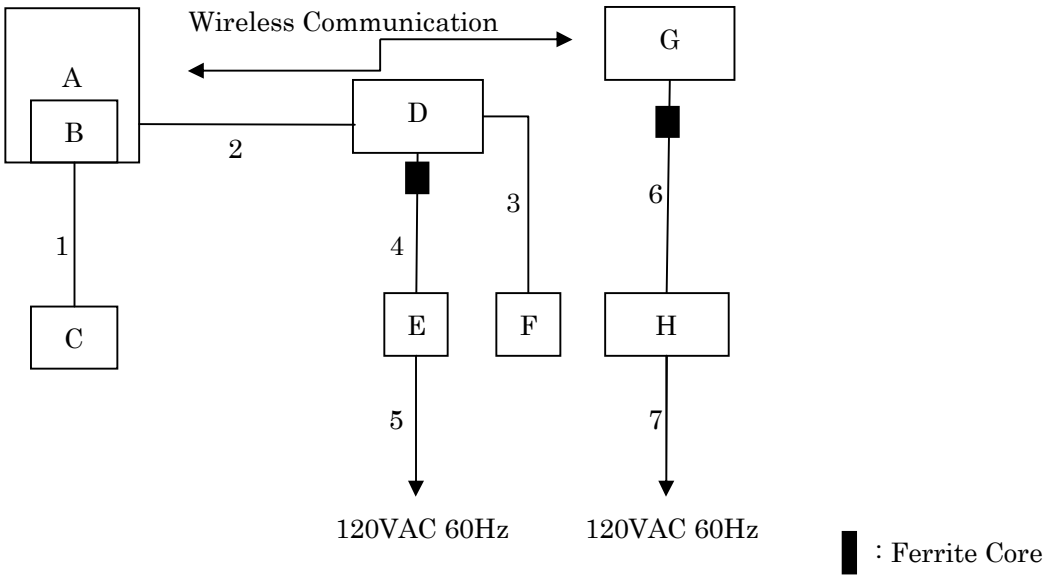
a) Single Unit



b) Earphone used



c) Wireless LAN Tx and USB Charging



6.3 Operating Condition

Power Supply Voltage : 3.7VDC (for Battery)
5.0VDC (for USB)

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

Transmitting frequency : 5180.0 MHz(36CH) –5320.0MHz(64CH): IEEE802.11a/n HT20
: 5190.0 MHz(38CH) –5310.0MHz(62CH): IEEE802.11n HT40

Receiver frequency : 5180.0 MHz(36CH) – 5320.0 MHz(64CH)

Modulation Type
1. 802.11a : OFDM
2. 802.11n HT20 : OFDM
3. 802.11n HT40 : OFDM

Other Clock Frequency
1.5GHz (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 test were carried out 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
Frequency(MHz)	5180	5220	5240	5260	5280	5320
Power(dBm)	4.91	5.13	4.85	4.39	4.43	4.89

The TX rate 6Mbps was maximum case.

802.11n HT20

Channel	36	44	48	52	56	64
Frequency(MHz)	5180	5220	5240	5260	5280	5320
Power(dBm)	5.48	5.10	5.18	4.61	4.84	4.97

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

802.11n HT40

Channel	38	46	54	62
Frequency(MHz)	5190	5230	5270	5310
Power(dBm)	4.89	4.69	4.09	4.21

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

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 1.11	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 mobile and portable client device
Peak Power Spectral Density	Section 15.407(a)(1)(iv), (2),(3)	Section 7.3	Passed	For mobile and portable 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	-
SAR Test Exclusion	Section 15.407(f)	Section 7.8	Passed	-

7.1 26dB Bandwidth

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

7.1.1 Test Results

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

Uncertainty of Measurement Results ± 0.9 %(2σ)

Remarks : Reporting Purpose (No limitation applied)

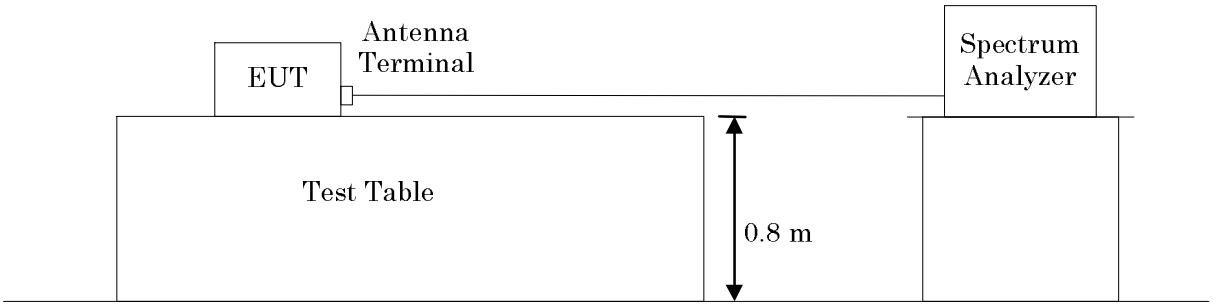
7.1.2 Test Instruments

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

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

7.1.3 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

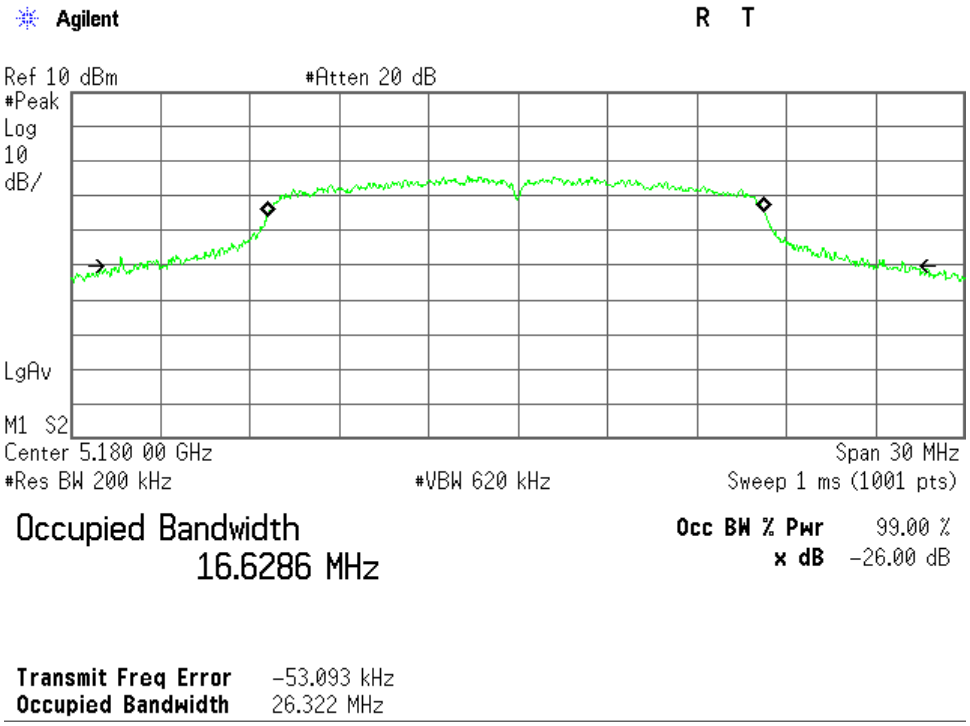
Test Date :November 24, 2015
Temp.: 19°C, Humi: 46%

7.1.4.1 802.11a 26dB/ 99% OBW

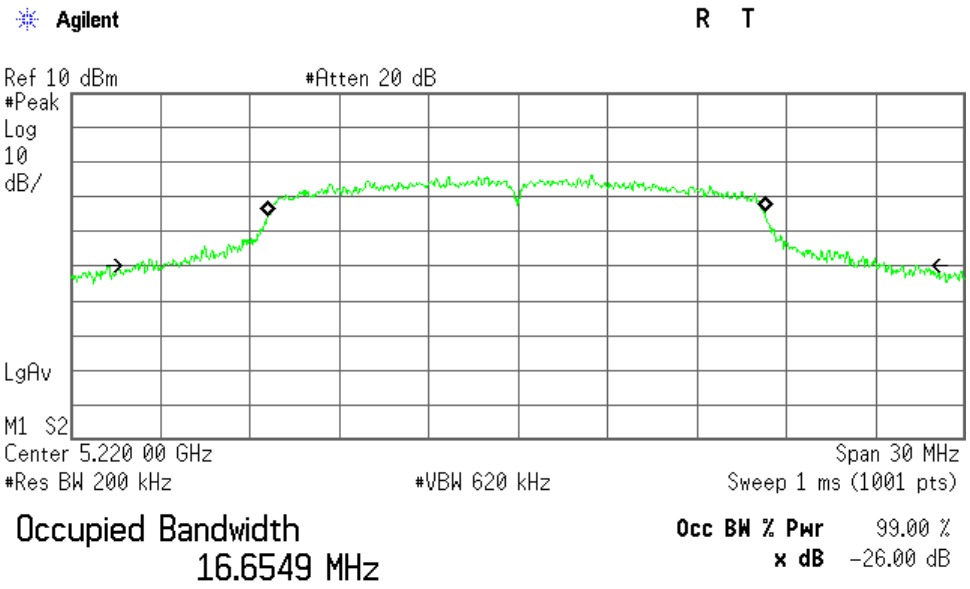
Mode of EUT: TX 802.11a
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	26dB OBW (MHz)	99% OBW (MHz)
36	5180	26.322	16.629
44	5220	26.214	16.655
48	5240	26.835	16.667
52	5260	26.439	16.605
56	5280	25.890	16.580
64	5320	24.843	16.552

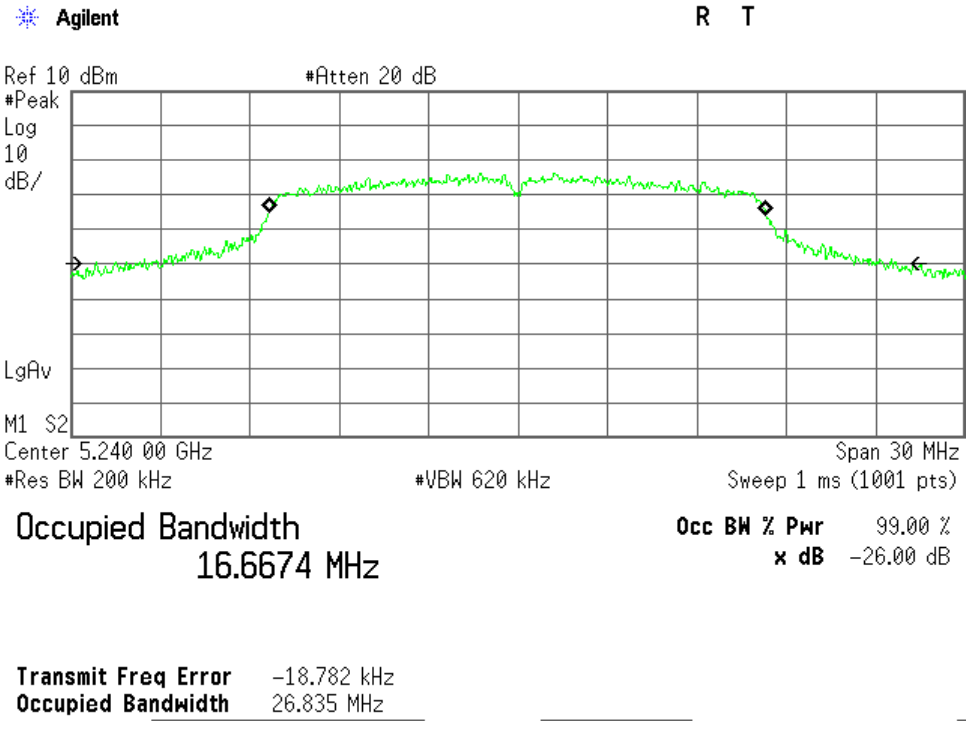
802.11a 36ch (5180 MHz)



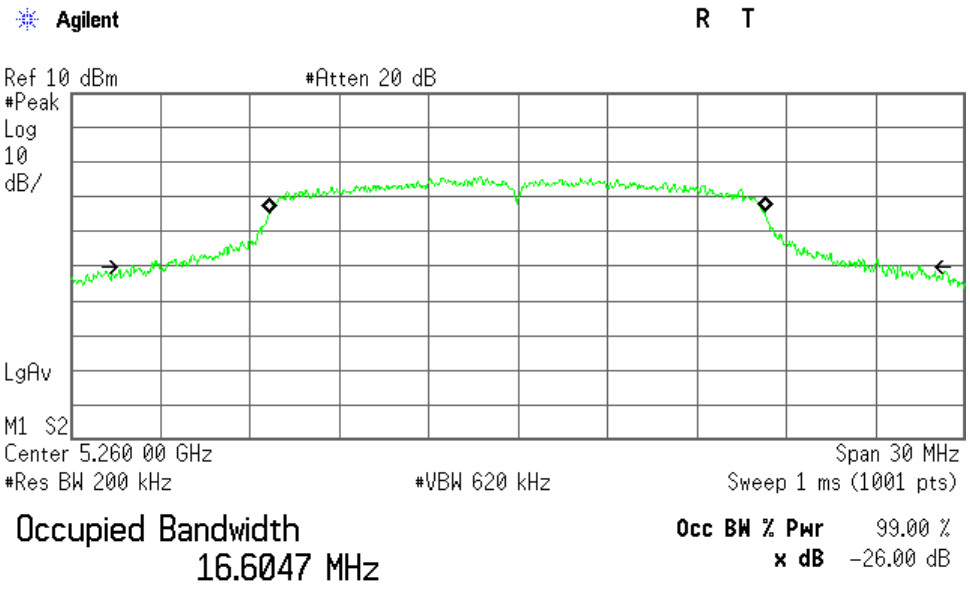
802.11a 44ch (5220 MHz)



802.11a 48ch (5240 MHz)

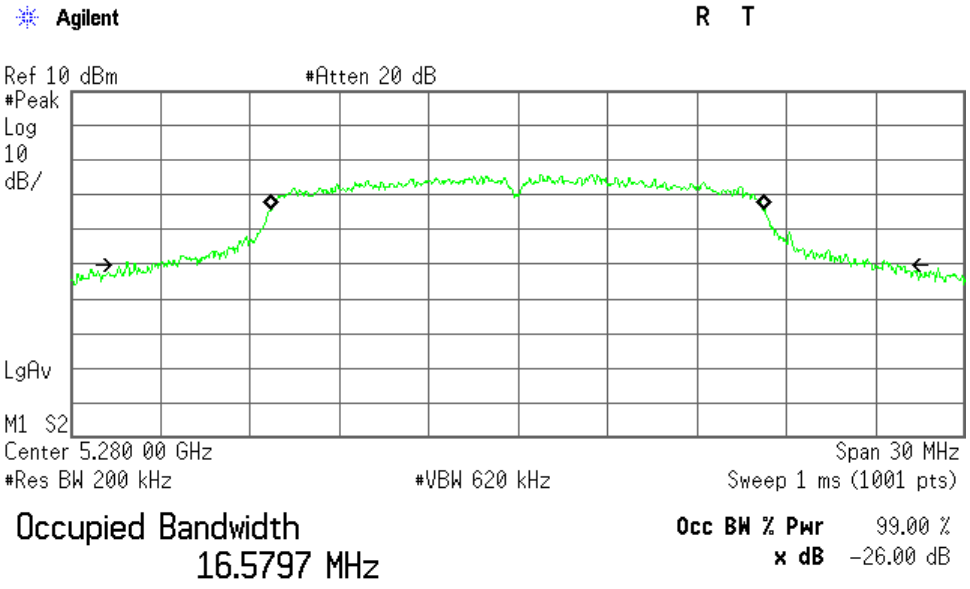


802.11a 52ch (5260 MHz)



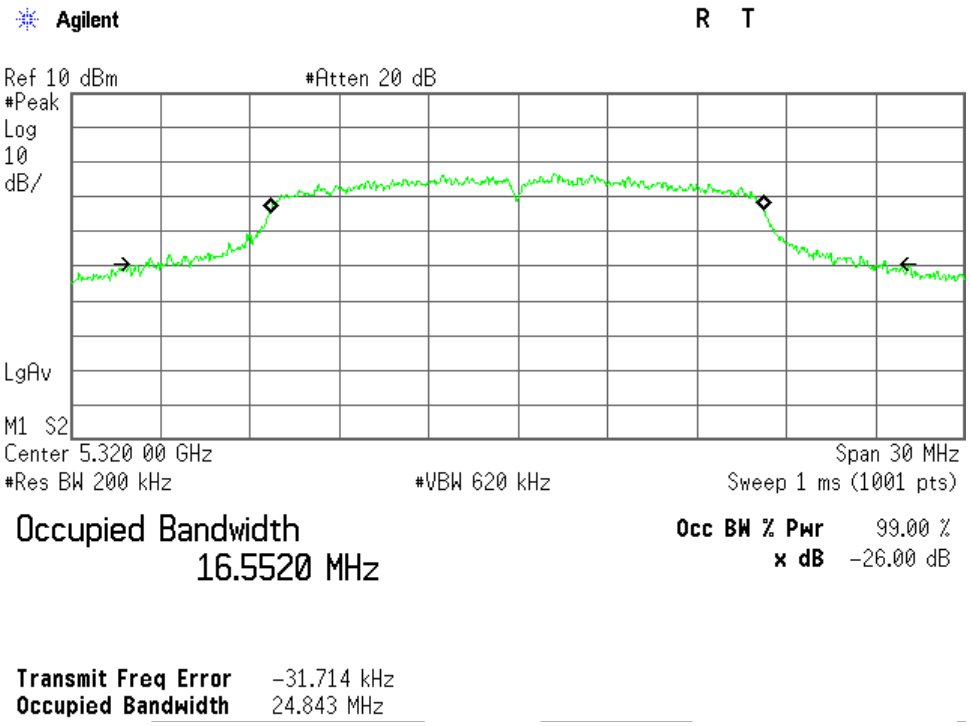
Transmit Freq Error -32.087 kHz
Occupied Bandwidth 26.439 MHz

802.11a 56ch (5280 MHz)



Transmit Freq Error -27.429 kHz
Occupied Bandwidth 25.890 MHz

802.11a 64ch (5320 MHz)

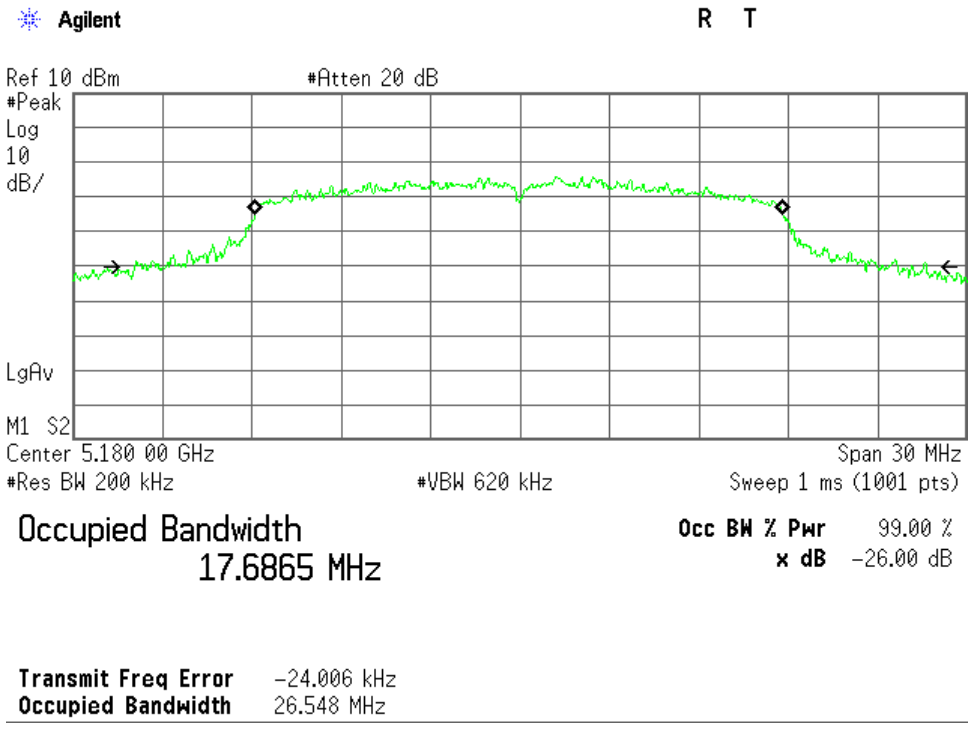


7.1.4.2 802.11n HT20 26dB/ 99% OBW

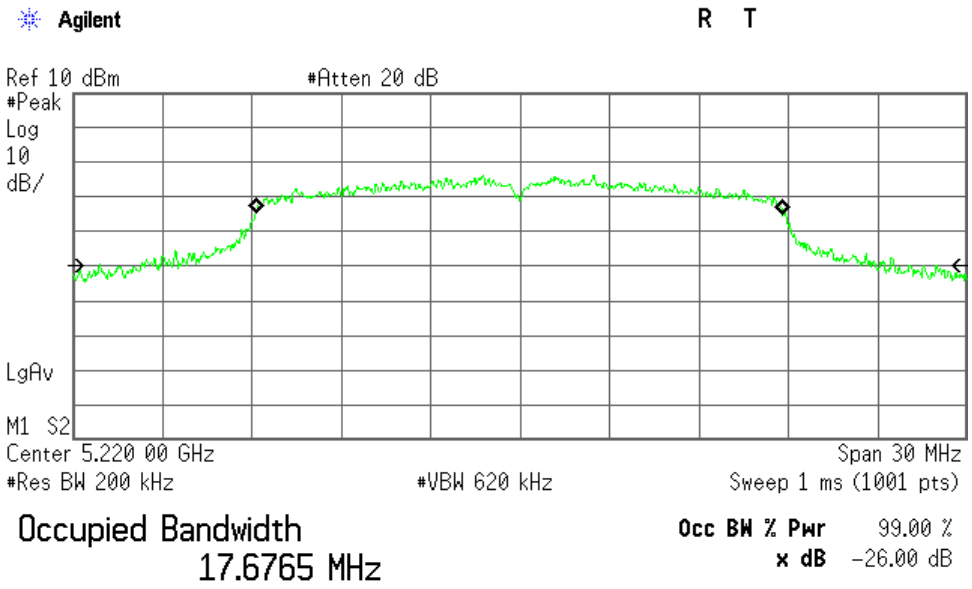
Mode of EUT: Tx 802.11n(20 MHz)
Test Port: Temporary antenna connector

Channel	Frequency	26dB OBW	99% OBW
	(MHz)	(MHz)	(MHz)
36	5180	26.548	17.687
44	5220	28.108	17.677
48	5240	27.287	17.731
52	5260	27.058	17.673
56	5280	27.205	17.763
64	5320	26.360	17.642

802.11n HT20 36ch (5180 MHz)

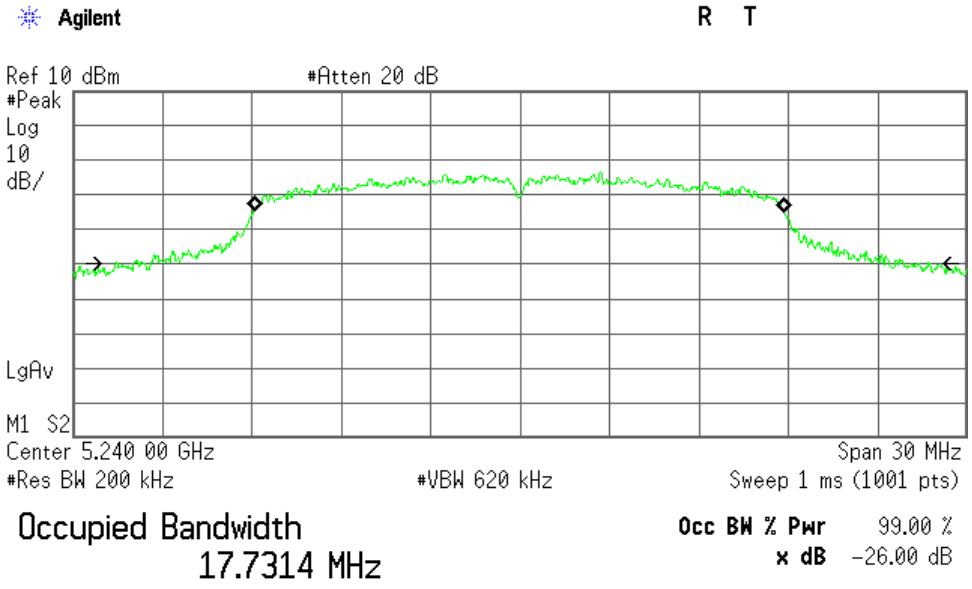


802.11n HT20 44ch (5220 MHz)



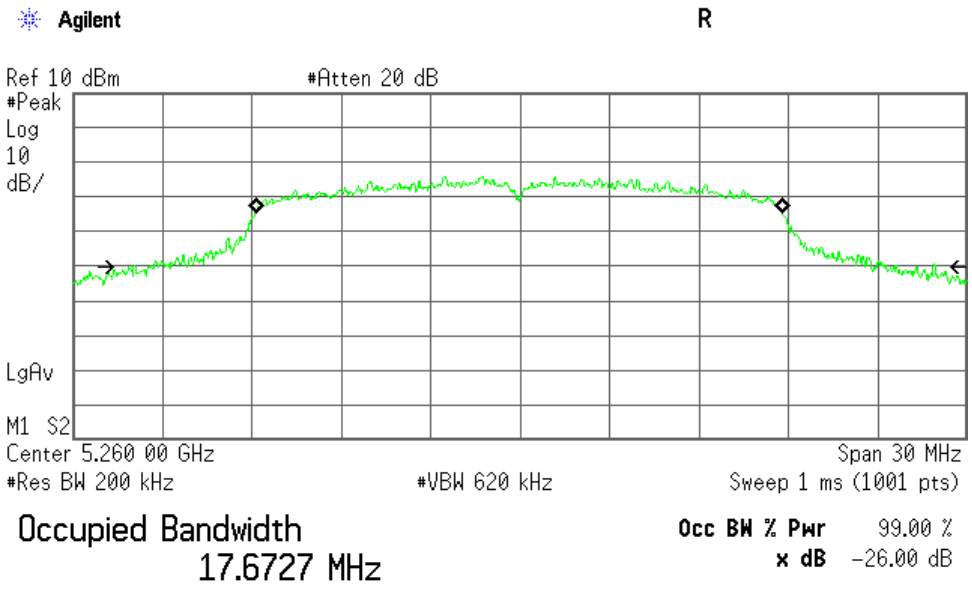
Transmit Freq Error −21.006 kHz
Occupied Bandwidth 28.108 MHz

802.11n HT20 48ch (5240 MHz)

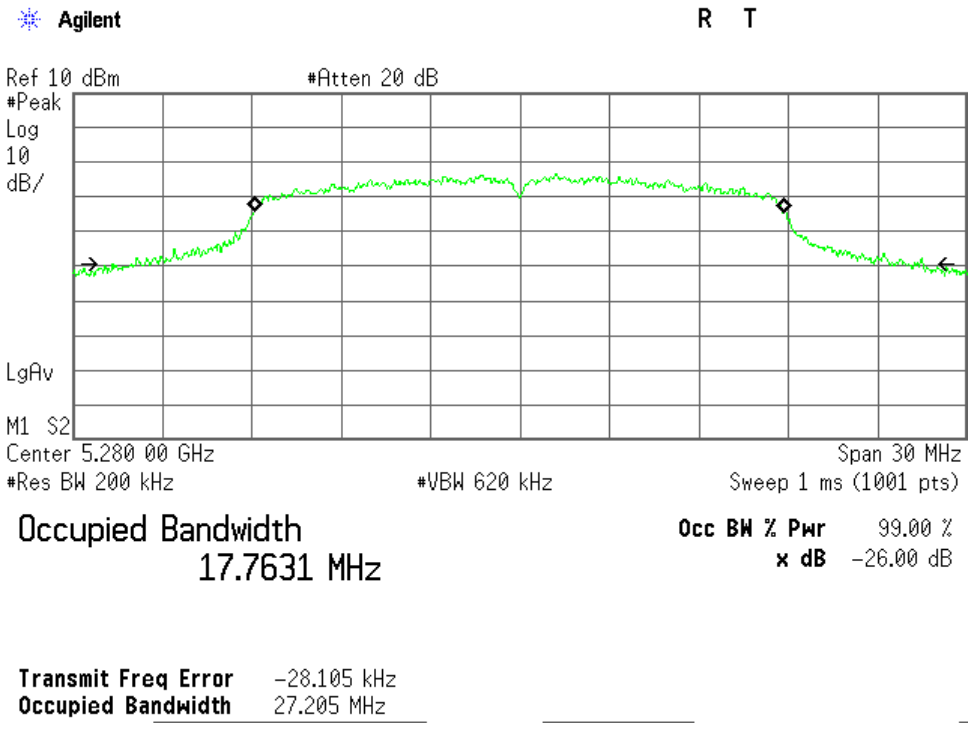


Transmit Freq Error −30.450 kHz
Occupied Bandwidth 27.287 MHz

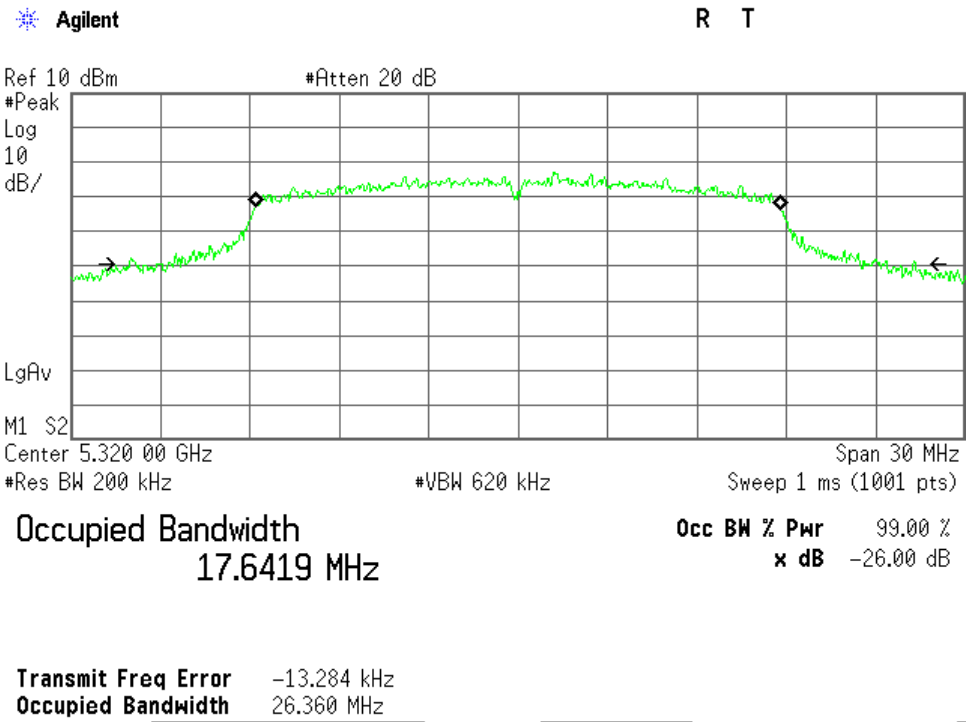
802.11n HT20 52ch (5260 MHz)



802.11n HT20 56ch (5280 MHz)



802.11n HT20 64ch (5320 MHz)



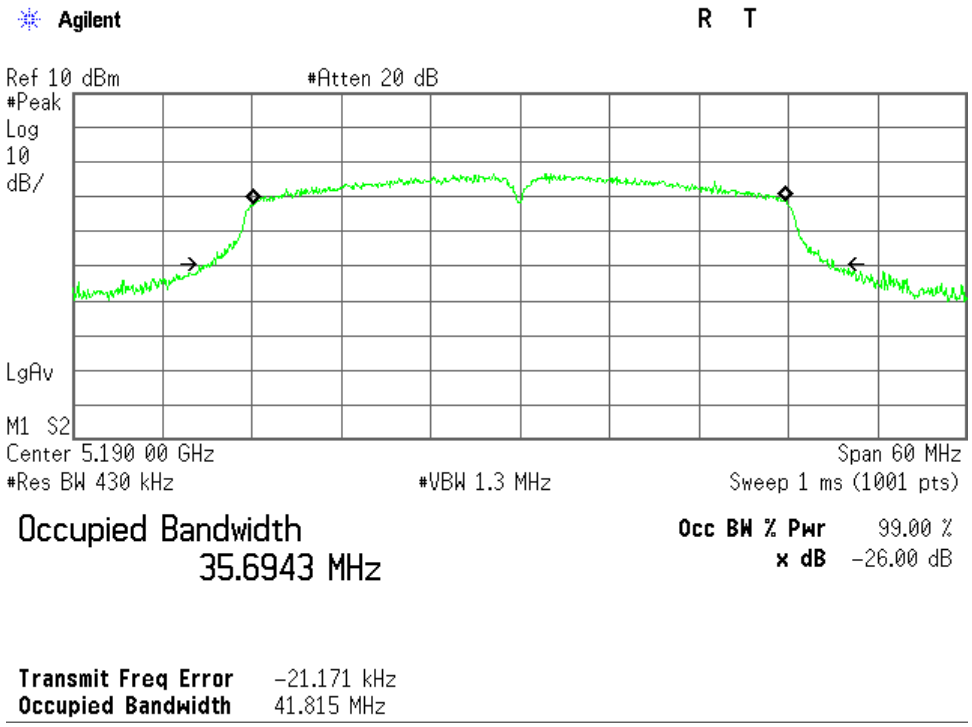
7.1.4.3 802.11n (40 MHz BW) 26dB/ 99% OBW

Mode of EUT: Tx 802.11n(40 MHz)

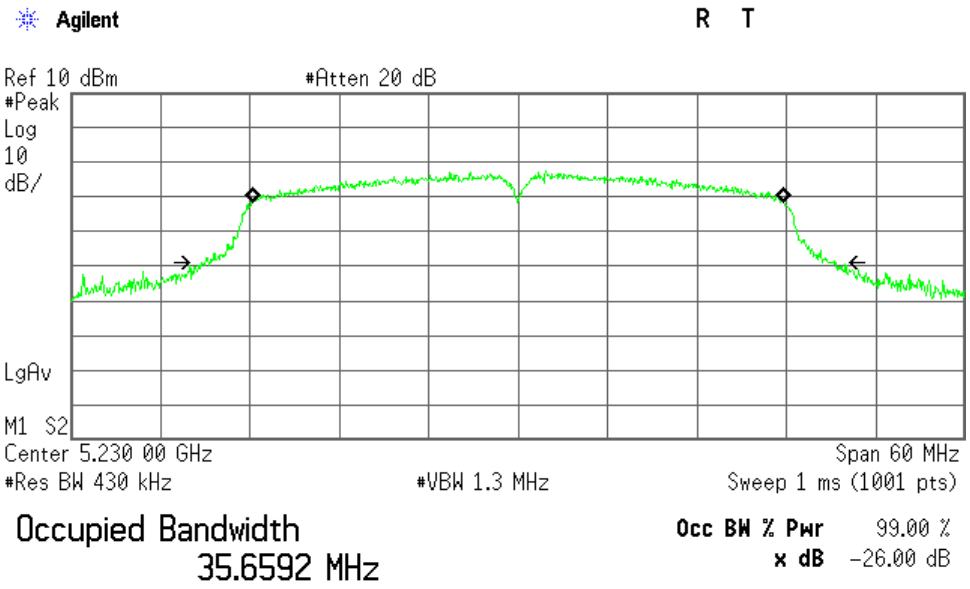
Test Port: Temporary antenna connector

Channel	Frequency (MHz)	26dB OBW (MHz)	99% OBW (MHz)
38	5190	41.815	35.694
46	5230	42.167	35.659
54	5270	41.452	35.642
62	5310	41.753	35.559

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

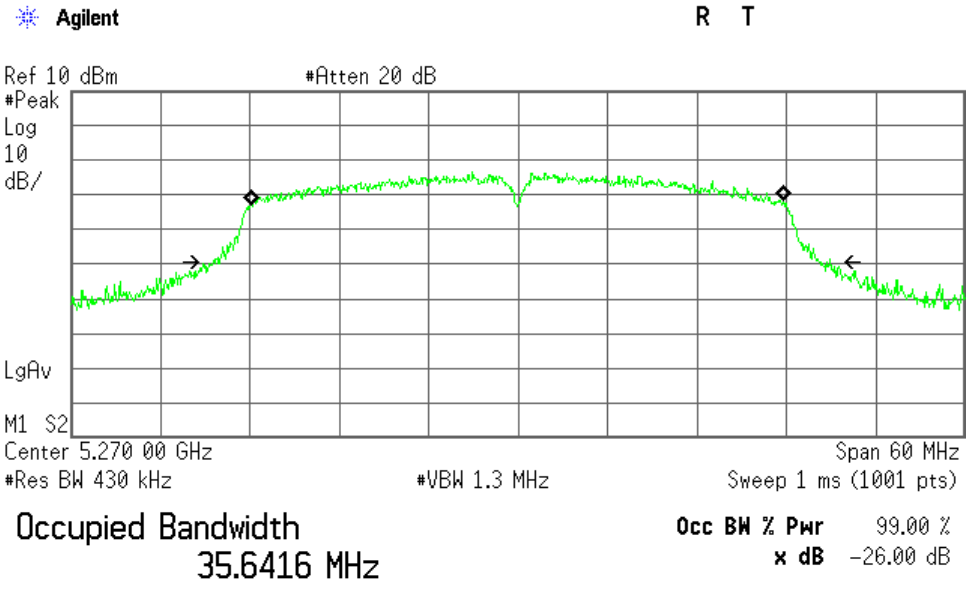


802.11n (40 MHz) 46ch (5230 MHz)



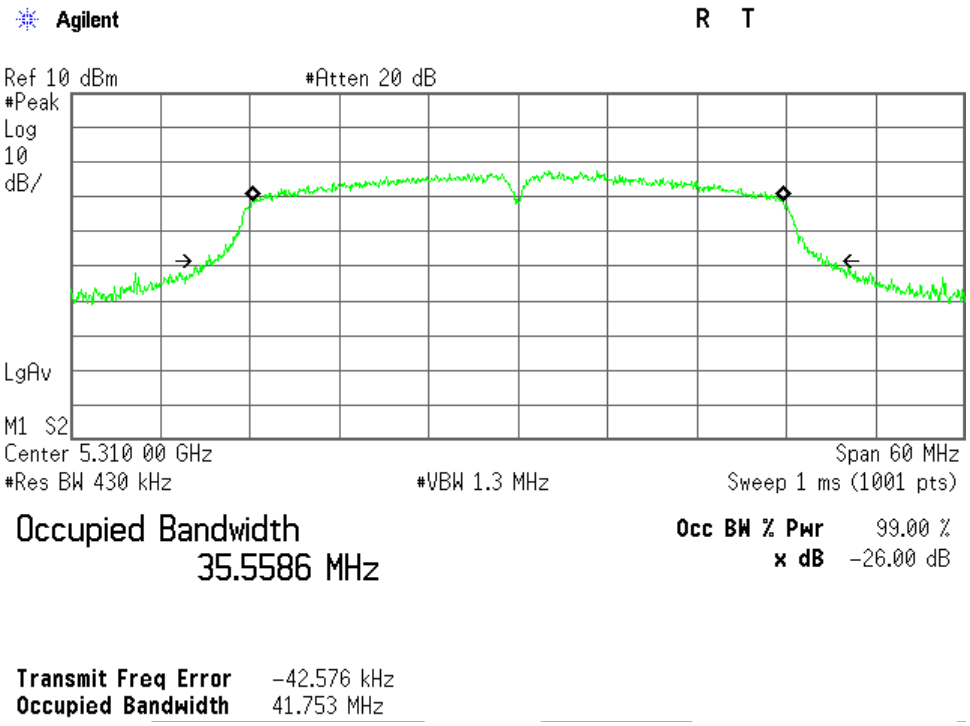
Transmit Freq Error −17.387 kHz
Occupied Bandwidth 42.167 MHz

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



Transmit Freq Error −30.065 kHz
Occupied Bandwidth 41.452 MHz

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



7.2 Maximum Conducted Output Power

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

7.2.1 Test Results

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

Min. Limit Margin 18.52 dB at 5180.0 MHz

Remarks : Worst case is 802.11n HT20, channel 36.

Max Output Power 5.48 dBm at 5180.0 MHz

Remarks : Worst case is 802.11n HT20, channel 36.

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	2016/07/16
Power Sensor	MA2411B	1339136 (B-18)	Anritsu	2016/07/16
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16

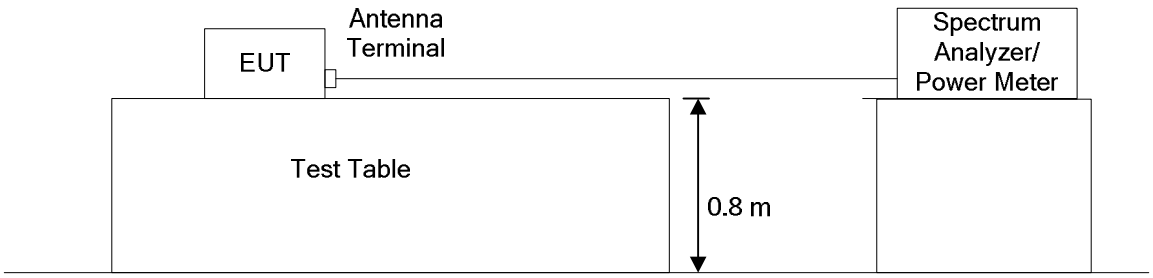
NOTE : The calibration interval of the above test instruments is 12 months.

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 :November 18, 2015
Temp.: 21°C, Humi: 71%

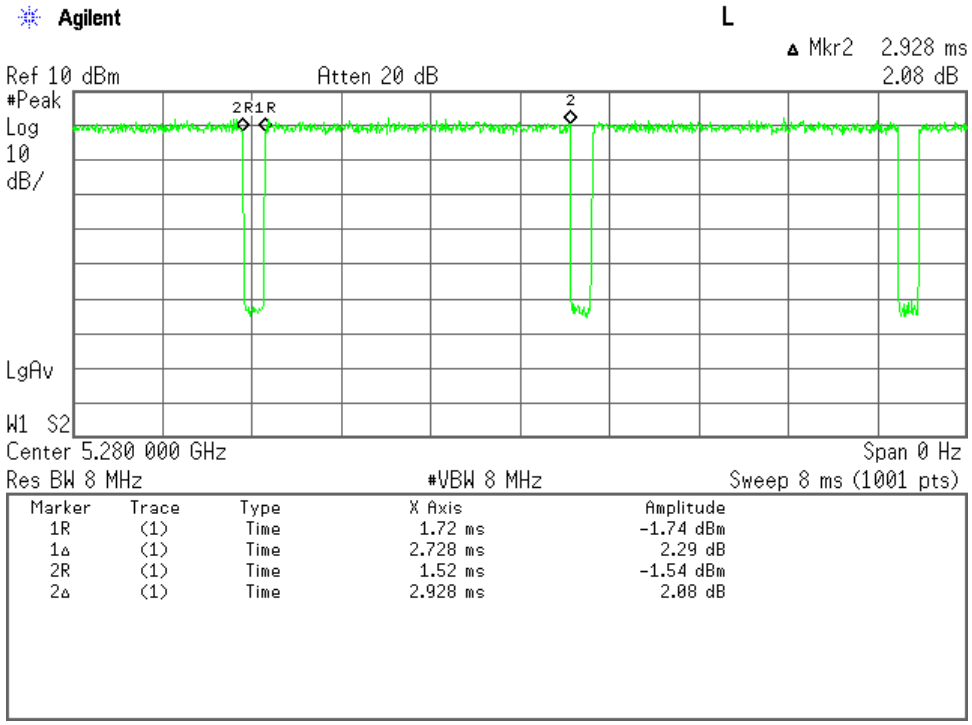
7.2.4.1 802.11a Maximum conducted output power

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

Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	Power (dBm)	EBW (MHz)	Limit (dBm)	Margin (dB)
36	5180	9.98	-5.07	4.91	26.322	24.00	19.09
44	5220	9.98	-4.85	5.13	26.214	24.00	18.87
48	5240	9.98	-5.13	4.85	26.835	24.00	19.15
52	5260	9.98	-5.59	4.39	26.439	24.00	19.61
56	5280	9.98	-5.55	4.43	25.890	24.00	19.57
64	5320	9.99	-5.10	4.89	24.843	24.00	19.11

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)
Power = Correction Factor + Meter Reading = 9.98 + (-5.07) = 4.91 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11a/ TX rate 6 Mbps is 0.31 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 24 dBm(250 mW).
Frequency range 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz Limitation is lesser of 24 dBm(250 mW) or 11 dBm + 10log EBW.

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period))= 10 log (2928 / 2728) = 0.31 dB

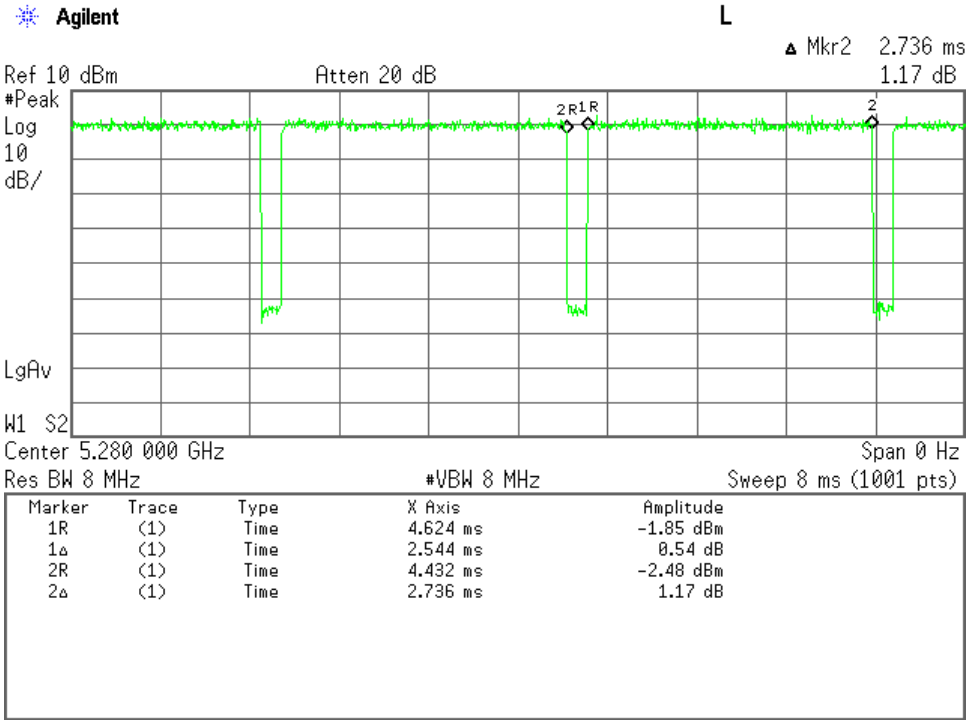
7.2.4.2 802.11n HT20 Maximum conducted output power

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

Channel	Frequency	Correction	Meter	Power	EBW	Limit	Margin
	(MHz)	Factor(dB)	Reading(dBm)	(dBm)	(MHz)	(dBm)	(dB)
36	5180	9.99	-4.51	5.48	26.548	24.00	18.52
44	5220	9.99	-4.89	5.10	28.108	24.00	18.90
48	5240	9.99	-4.81	5.18	27.287	24.00	18.82
52	5260	9.99	-5.38	4.61	27.058	24.00	19.39
56	5280	9.99	-5.15	4.84	27.205	24.00	19.16
64	5320	10.00	-5.03	4.97	26.360	24.00	19.03

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)
Power = Correction Factor + Meter Reading = 9.99 + (-4.51) = 5.48 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n HT20 / TX rate 6.5 Mbps is 0.32 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 24 dBm(250 mW).
Frequency range 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz Limitation is lesser of 24 dBm(250 mW) or 11 dBm + 10log EBW.

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period))= 10 log (2736 / 2544) = 0.32 dB

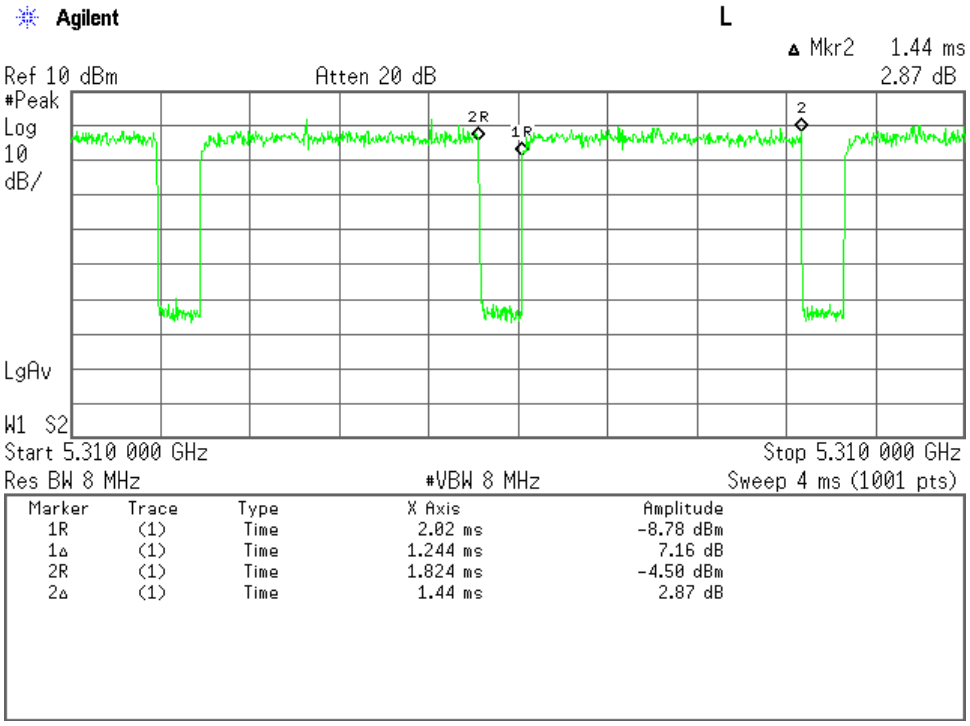
7.2.4.3 802.11n (40 MHz BW) Maximum conducted output power

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)	EBW (MHz)	Limit (dBm)	Margin (dB)
38	5190	10.31	-5.42	4.89	41.815	24.00	19.11
46	5230	10.31	-5.62	4.69	42.167	24.00	19.31
54	5270	10.31	-6.22	4.09	41.452	24.00	19.91
62	5310	10.32	-6.11	4.21	41.753	24.00	19.79

The test results (Power) is calculated as follows;
For 38 channel (5190 MHz)
Power = Correction Factor + Meter Reading = 10.31 + (-5.42) = 4.89 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n(40 MHz BW) / TX rate 13.5 Mbps is 0.64 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 24 dBm(250 mW).
Frequency range 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz Limitation is lesser of 24 dBm(250 mW) or 11 dBm + 10log EBW.

Duty Cycle Plot



Duty Factor = 10 log ((Duty Cycle)/(Burst On-period))= 10 log (1440 / 1244) = 0.64 dB

7.3 Peak Power Spectral Density

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

7.3.1 Test Results

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

Min. Limit Margin 15.16 dB at 5320.0 MHz

Uncertainty of Measurement Results ± 1.7 dB(2σ)

Remarks : Worst case is 802.11n HT20 channel 64.

7.3.2 Test Instruments

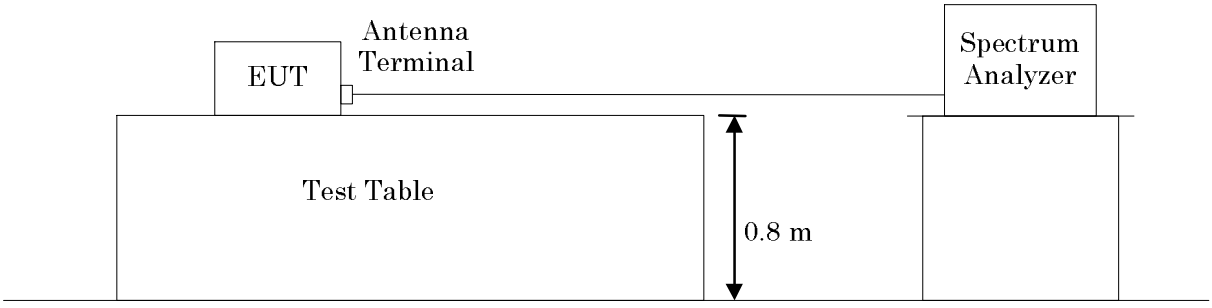
Shielded Room S4				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Attenuator	54A-10	W5675 (D-28)	Weinschel	2016/08/16
RF Cable	SUCOFLEX102	14253/2 (C-52)	HUBER+SUHNER	2016/08/16

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

7.3.3 Test Method and Test Setup (Diagrammatic illustration)

The 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 :November 24, 2015
Temp.: 19°C, Humi: 47%

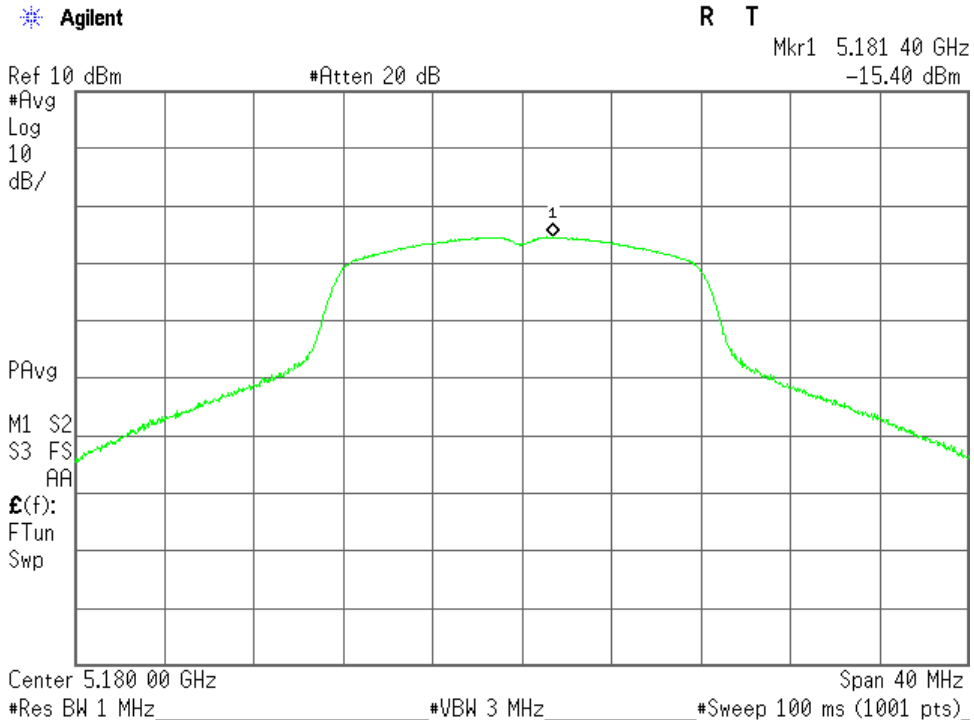
7.3.4.1 802.11a Peak power spectral density

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

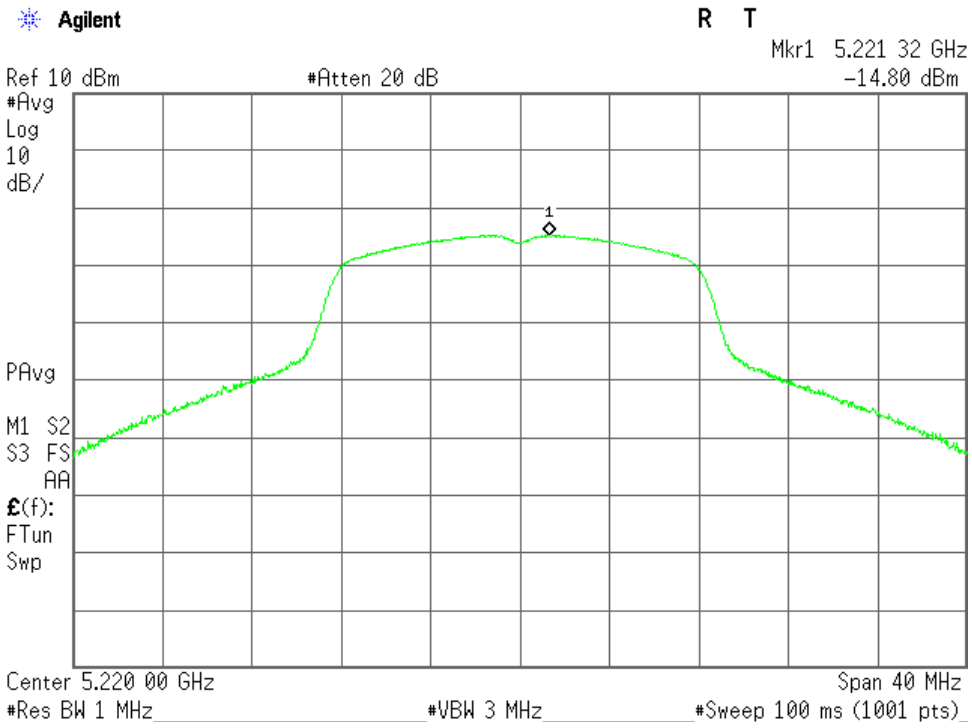
Channel	Frequency	Correction	Meter	PPSD	Limit	Margin
	(MHz)	Factor(dB)	Reading(dBm)	(dBm)	(dBm)	(dB)
36	5180	10.16	-15.40	-5.24	11.00	16.24
44	5220	10.16	-14.80	-4.64	11.00	15.64
48	5240	10.16	-14.53	-4.37	11.00	15.37
52	5260	10.16	-14.80	-4.64	11.00	15.64
56	5280	10.16	-14.81	-4.65	11.00	15.65
64	5320	10.18	-14.36	-4.18	11.00	15.18

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.16 + (-15.40) = -5.24 dBm
Correction Factor = cable loss + 10 dB attenuator

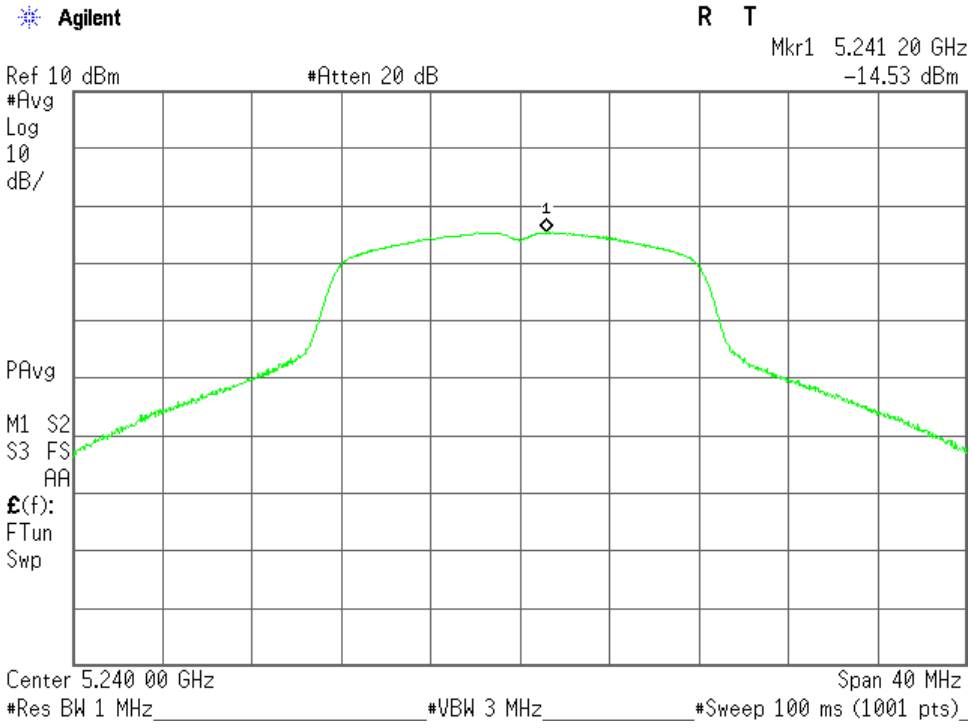
802.11a 36ch (5180 MHz)



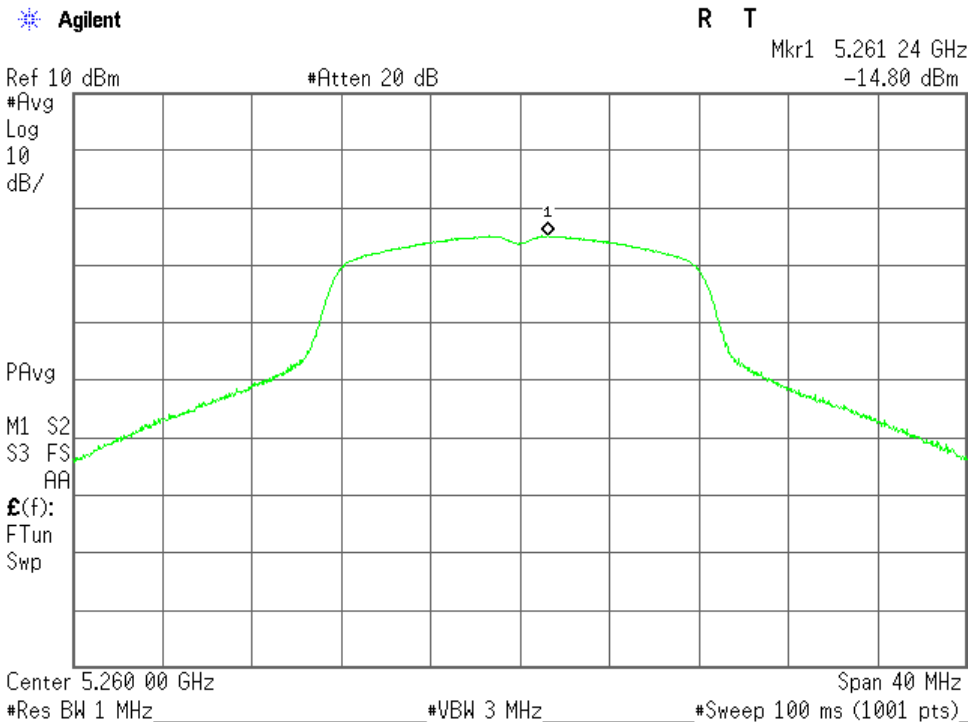
802.11a 44ch (5220 MHz)



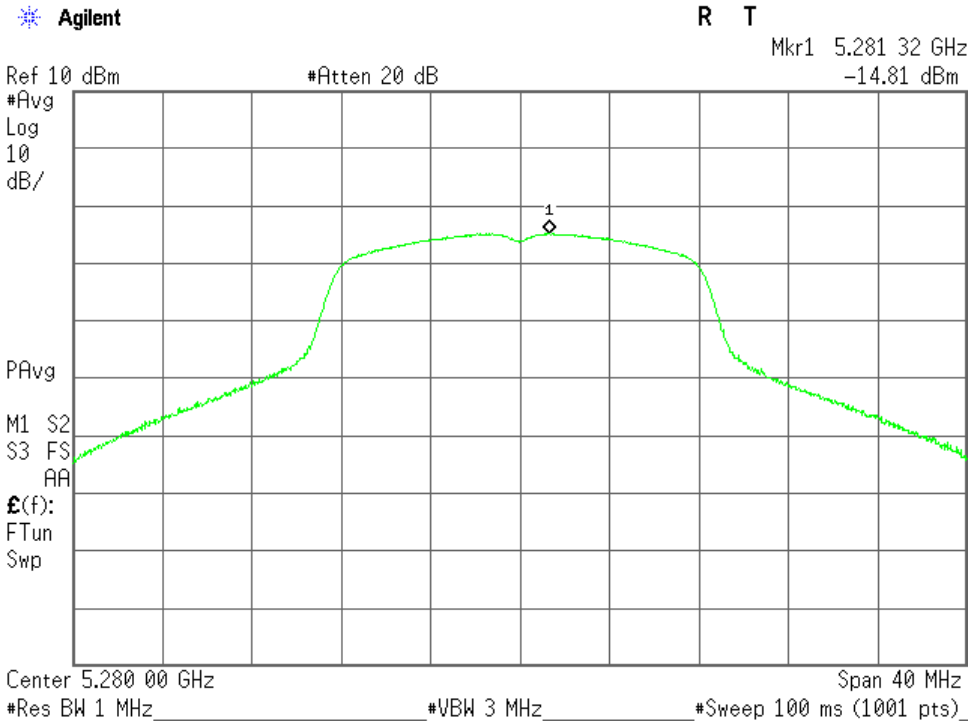
802.11a 48ch (5240 MHz)



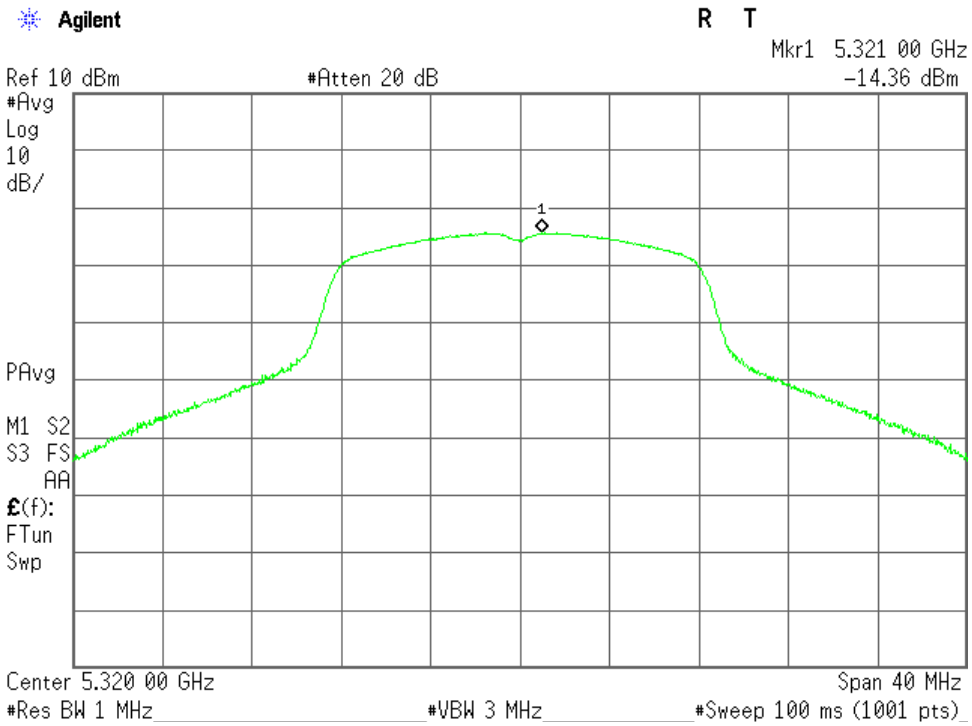
802.11a 52ch (5260 MHz)



802.11a 56ch (5280 MHz)



802.11a 64ch (5320 MHz)



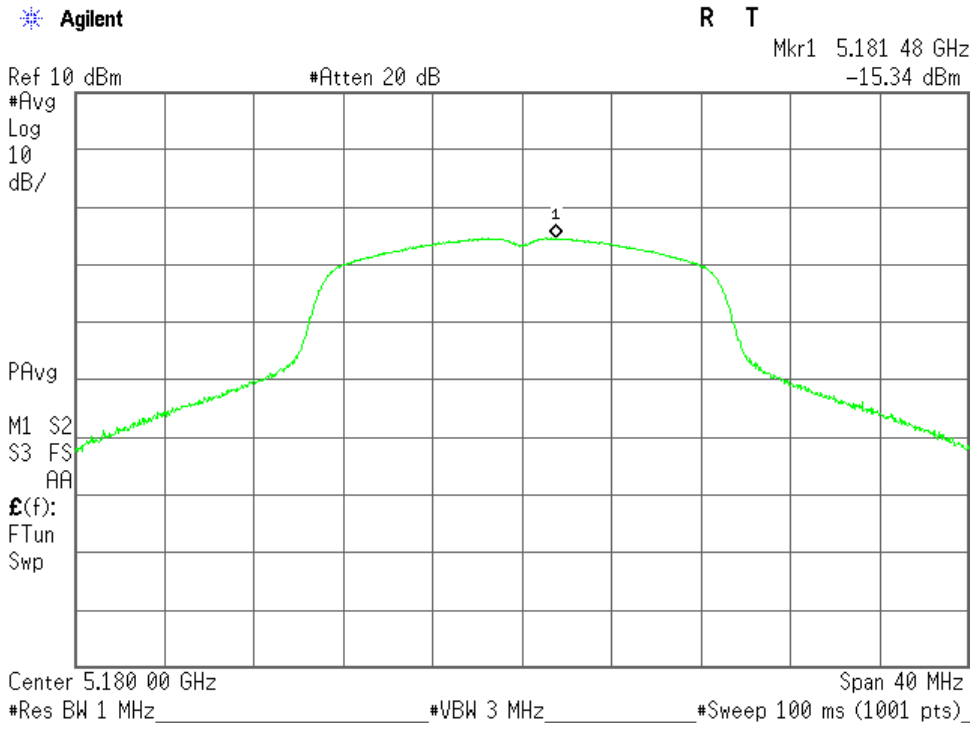
7.3.4.2 802.11n HT20 Peak power spectral density

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

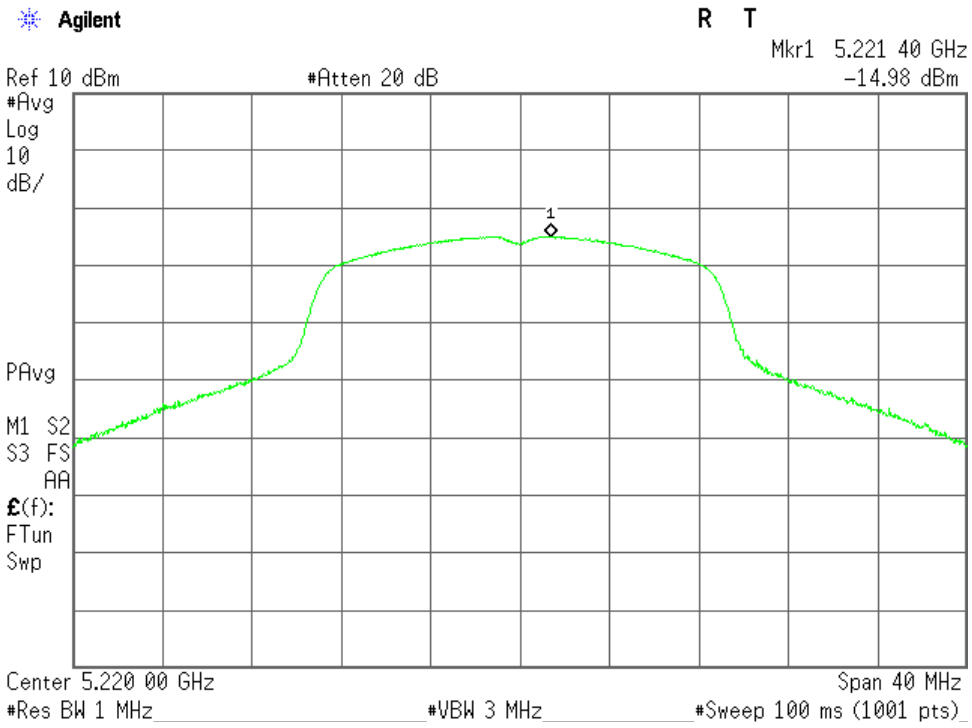
Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	PPSD (dBm)	Limit (dBm)	Margin (dB)
36	5180	10.16	-15.34	-5.18	11.00	16.18
44	5220	10.16	-14.98	-4.82	11.00	15.82
48	5240	10.16	-15.00	-4.84	11.00	15.84
52	5260	10.16	-15.12	-4.96	11.00	15.96
56	5280	10.16	-14.76	-4.60	11.00	15.60
64	5320	10.18	-14.34	-4.16	11.00	15.16

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.16 + (-15.34) = -5.18 dBm
Correction Factor = cable loss + 10 dB attenuator

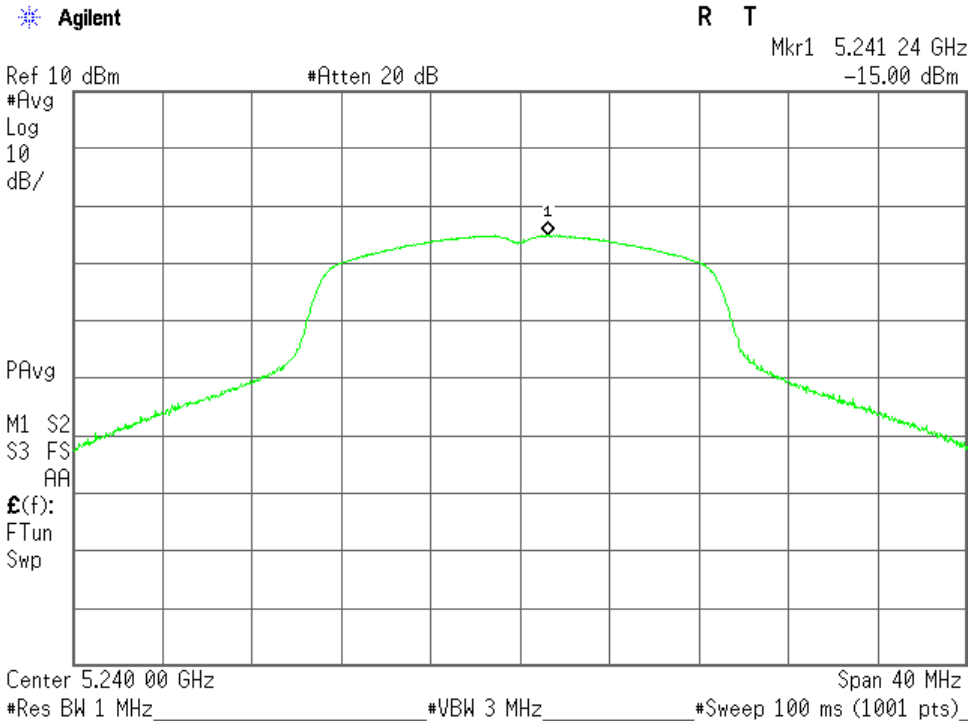
802.11n HT20 36ch (5180 MHz)



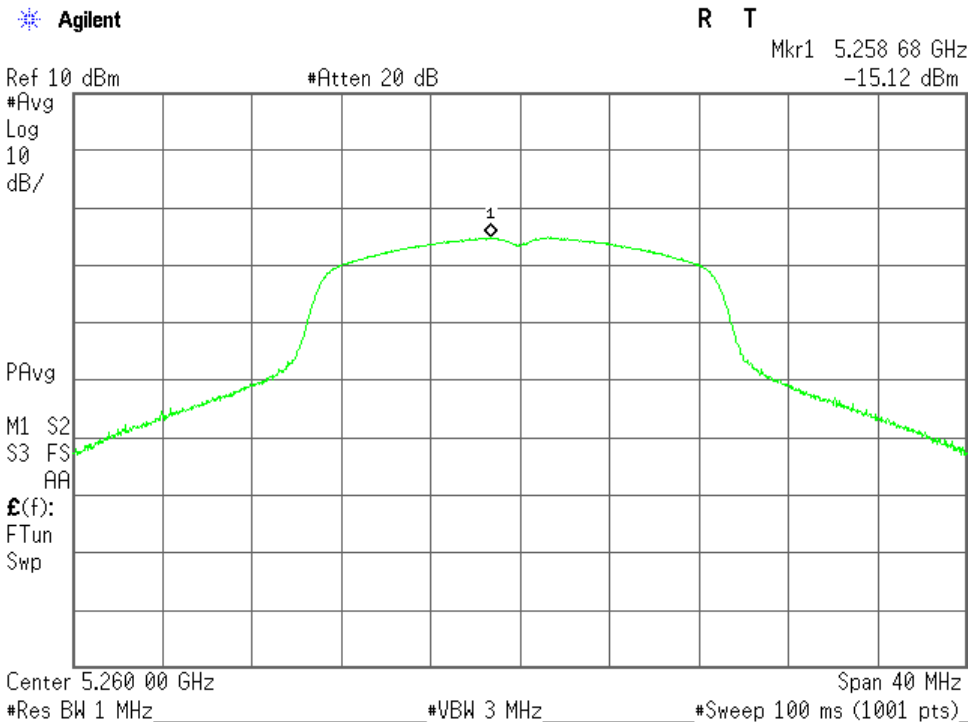
802.11n HT20 44ch (5220 MHz)



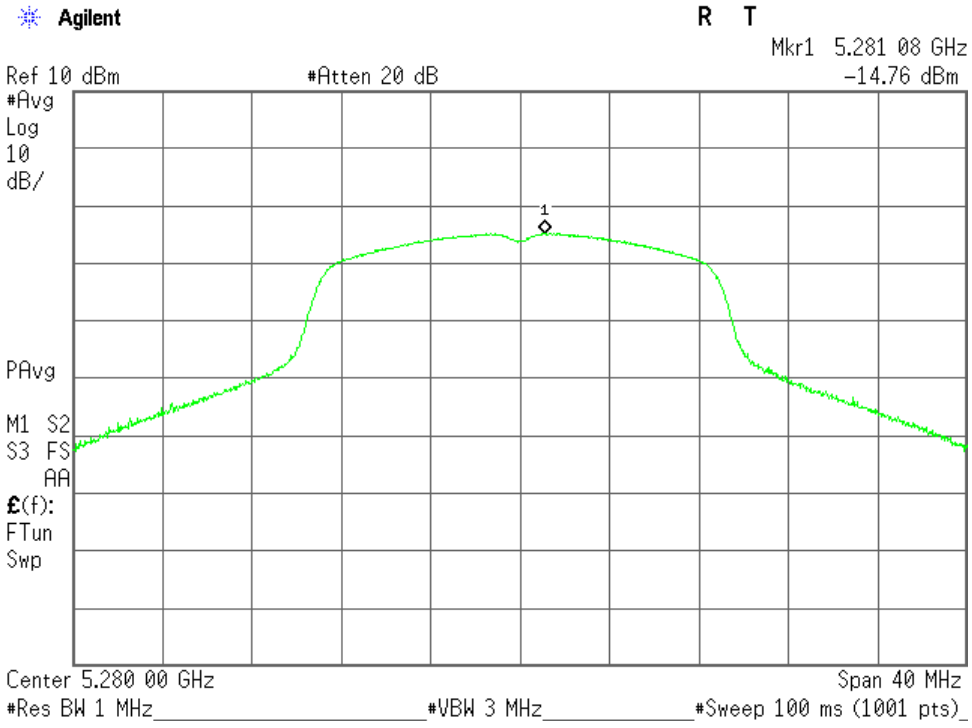
802.11n HT20 48ch (5240 MHz)



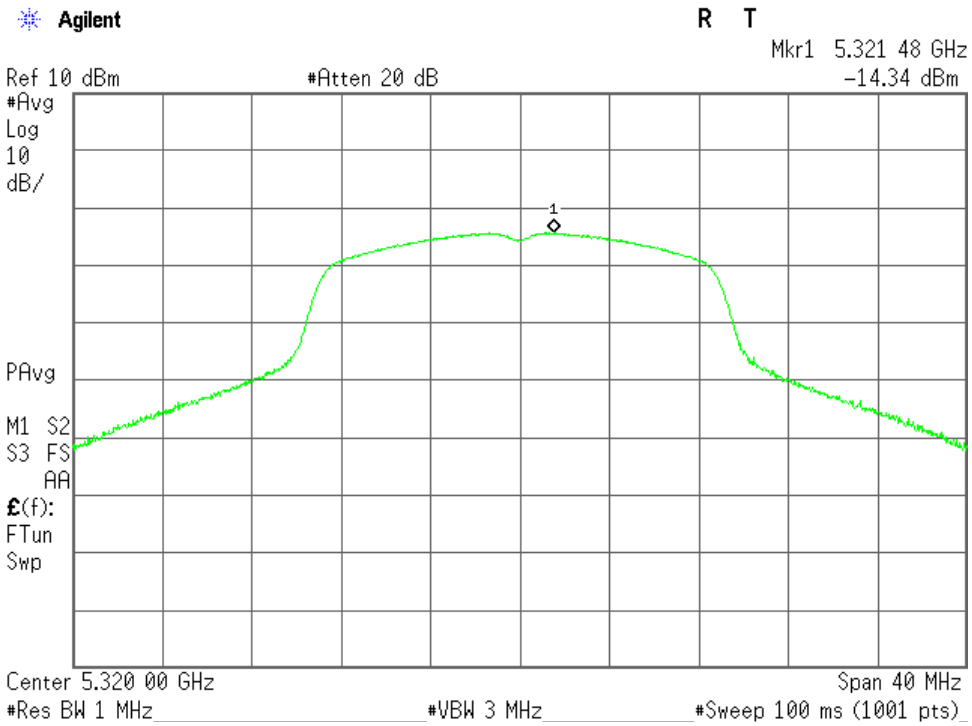
802.11n HT20 52ch (5260 MHz)



802.11n HT20 56ch (5280 MHz)



802.11n HT20 64ch (5320 MHz)



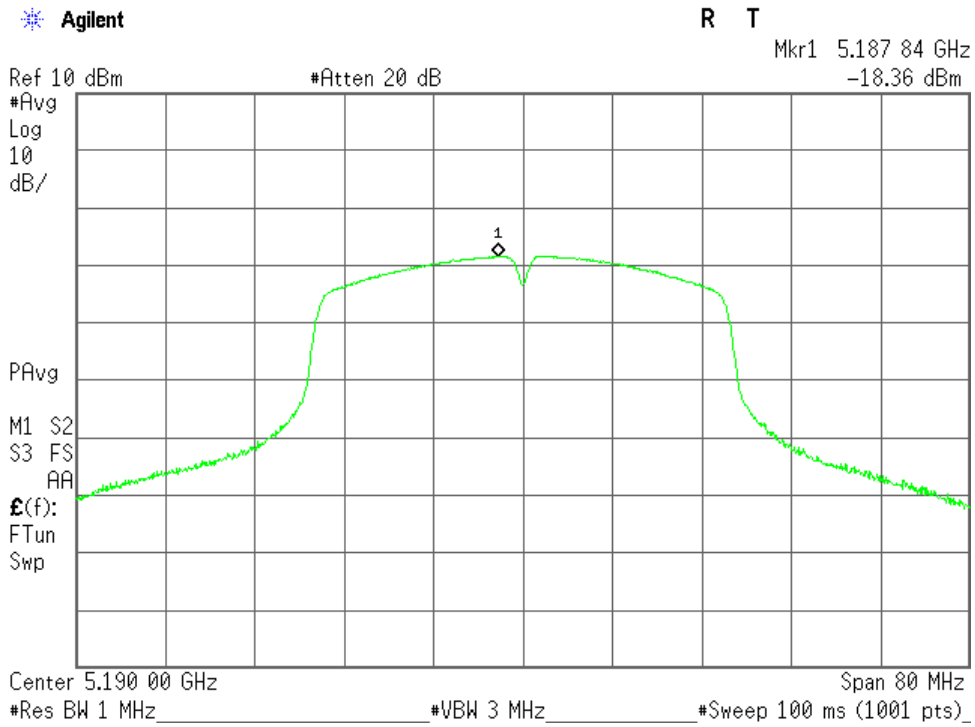
7.3.4.3 802.11n (40 MHz BW) Peak power spectral density

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

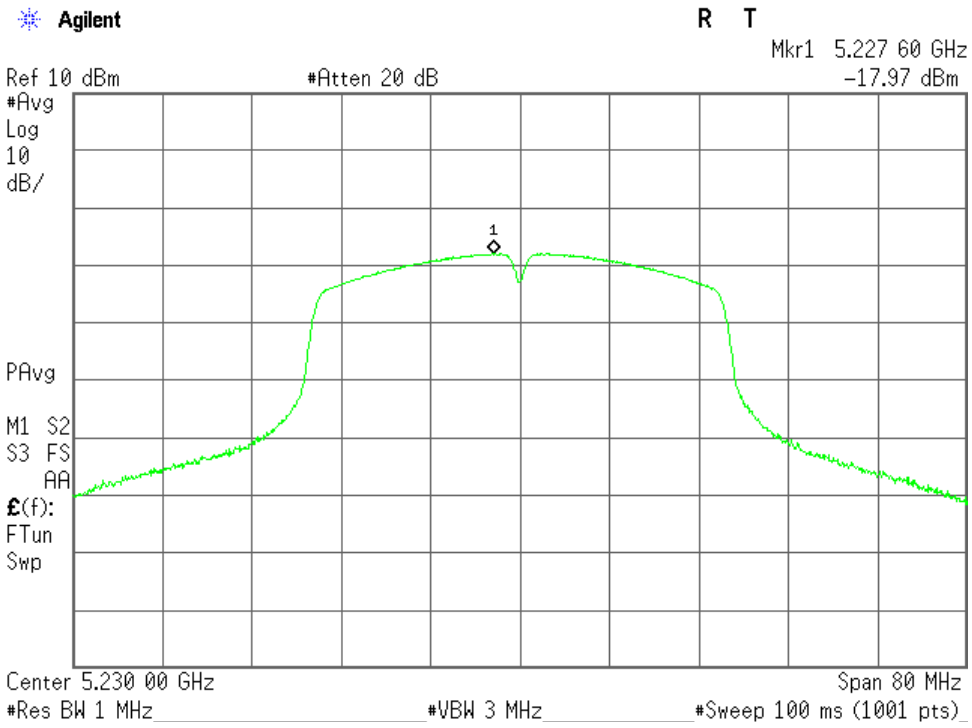
Channel	Frequency (MHz)	Correction Factor(dB)	Meter Reading(dBm)	PPSD (dBm)	Limit (dBm)	Margin (dB)
38	5190	10.16	-18.36	-8.20	11.00	19.20
46	5230	10.16	-17.97	-7.81	11.00	18.81
54	5270	10.16	-18.16	-8.00	11.00	19.00
62	5310	10.18	-17.59	-7.41	11.00	18.41

The test results (PPSD) is calculated as follows;
For 38 channel (5190 MHz)
PPSD = Correction Factor + Meter Reading = 10.16 + (-18.36) = -8.20 dBm
Correction Factor = cable loss + 10 dB attenuator

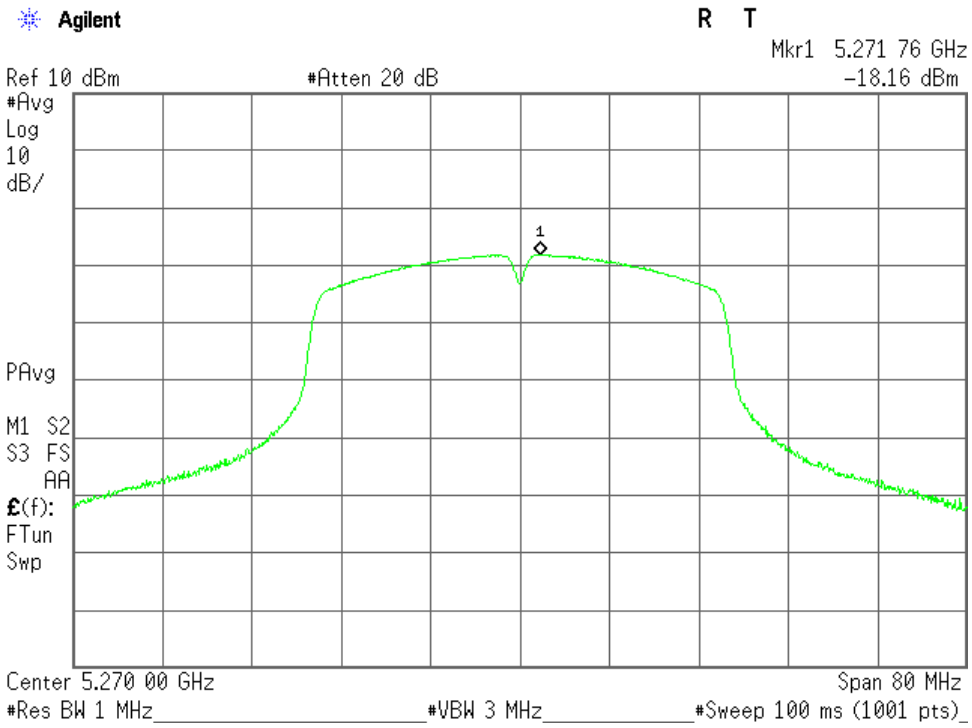
802.11n (40 MHz BW) 38ch (5190 MHz)



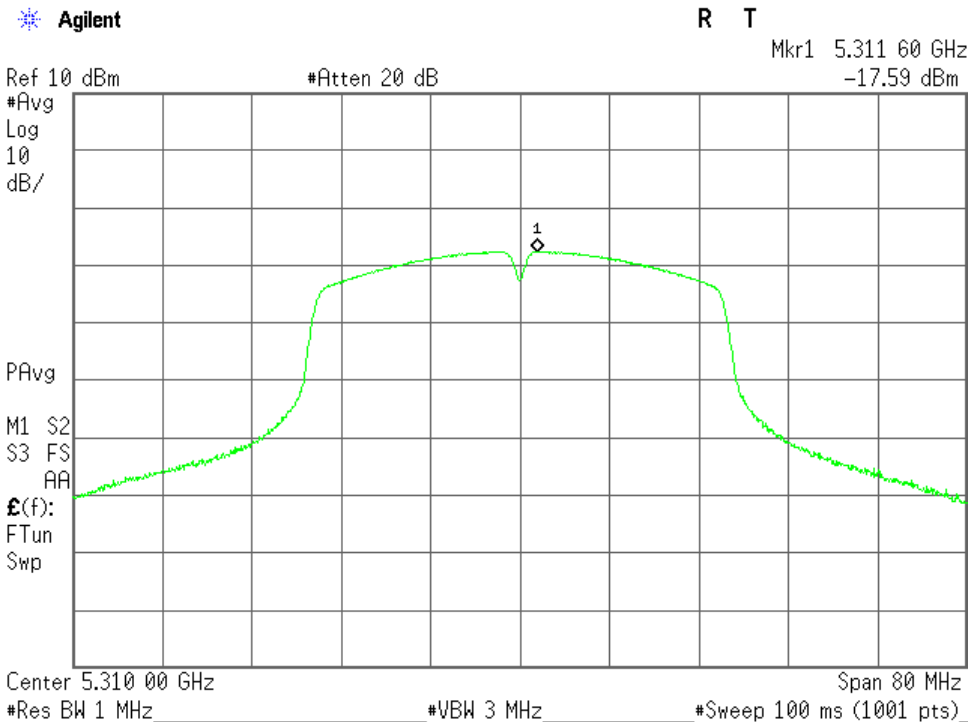
802.11n (40 MHz BW) 46ch (5230 MHz)



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



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



7.4 Peak Excursion

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

Remarks : _____

7.5 AC Powerline Conducted Emission

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

7.5.1 Test Results

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

Min. Limit Margin (Quasi-Peak) 22.3 dB at 0.700 MHz

Uncertainty of Measurement Results ± 2.6 dB(2σ)

Remarks : _____

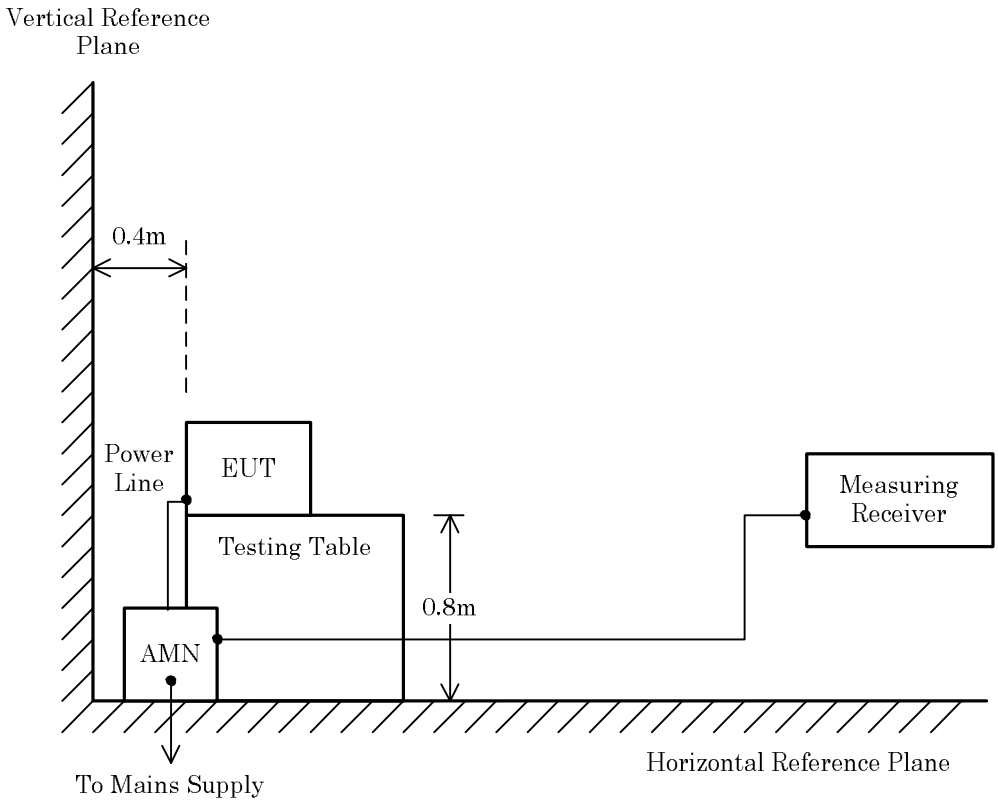
7.5.2 Test Instruments

Shielded Room S1				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
AMN (main)	KNW-407FR	8-2019-1 (D-103)	Kyoritsu	2016/10/15
RF Cable	RG223/U	--- (H-9)	HUBER+SUHNER	2016/07/09

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

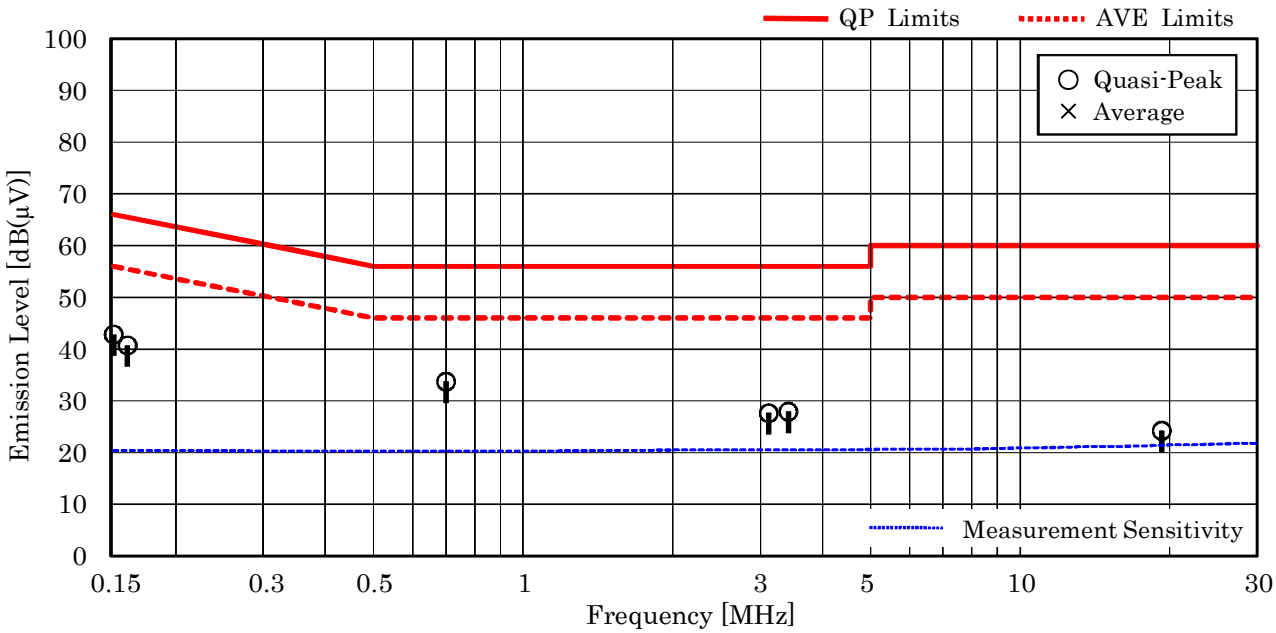
7.5.4 Test Data

Test voltage : 120VAC 60Hz

Test Date: December 2, 2015
Temp.: 20 °C, Humi.: 44 %

Measured phase : L1

Frequency [MHz]	Corr. Factor [dB]	Meter Readings [dB(μV)] QP	AVE	Limits [dB(μV)] QP	AVE	Results [dB(μV)] QP	AVE	Margin [dB] QP	AVE	Remarks
0.150	10.4	32.4	--	66.0	56.0	42.8	--	+23.2	--	-
0.160	10.3	30.4	--	65.5	55.5	40.7	--	+24.8	--	-
0.700	10.3	23.4	--	56.0	46.0	33.7	--	+22.3	--	-
3.121	10.5	17.1	--	56.0	46.0	27.6	--	+28.4	--	-
3.418	10.5	17.4	--	56.0	46.0	27.9	--	+28.1	--	-
19.291	11.4	12.8	--	60.0	50.0	24.2	--	+35.8	--	-



NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.700 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.3 + 23.4 = 33.7 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

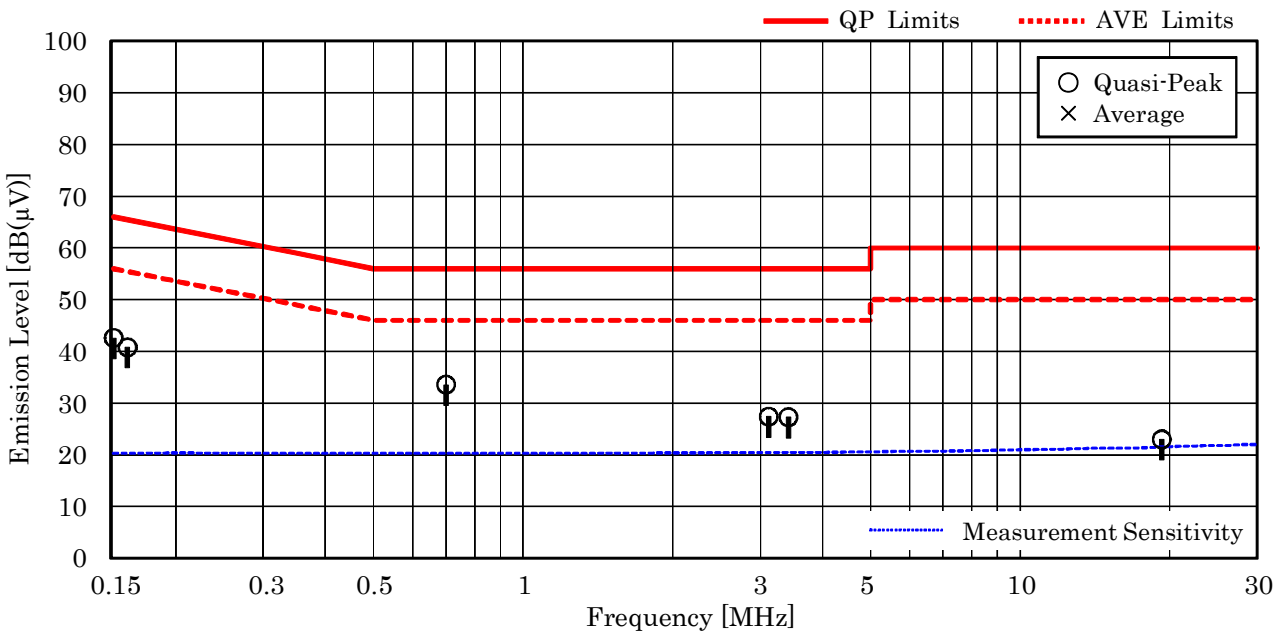
Mode of EUT : All modes have been investigated and the worst case mode for channel (36ch: 5180MHz / IEEE 802.11a) has been listed.

Test voltage : 120VAC 60Hz

Test Date: December 2, 2015
Temp.: 20 °C, Humi.: 44 %

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
0.150	10.3	32.3	--	66.0	56.0	42.6	--	+23.4	--	-
0.160	10.3	30.5	--	65.5	55.5	40.8	--	+24.7	--	-
0.700	10.3	23.3	--	56.0	46.0	33.6	--	+22.4	--	-
3.121	10.5	16.9	--	56.0	46.0	27.4	--	+28.6	--	-
3.418	10.5	16.8	--	56.0	46.0	27.3	--	+28.7	--	-
19.291	11.5	11.5	--	60.0	50.0	23.0	--	+37.0	--	-



NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 0.700 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading (QP) = 10.3 + 23.3 = 33.6 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, ☑ - Applicable [☑ - Tested. ☐ - Not tested by applicant request.]
☐ - Not Applicable

7.6.1 Test Results

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

Min. Limit Margin (Average) 6.87 dB at 5150.0 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 is 802.11n(40MHz BW) channel 38 (Z axis position) at 5150.0MHz.

7.6.2 Test Instruments

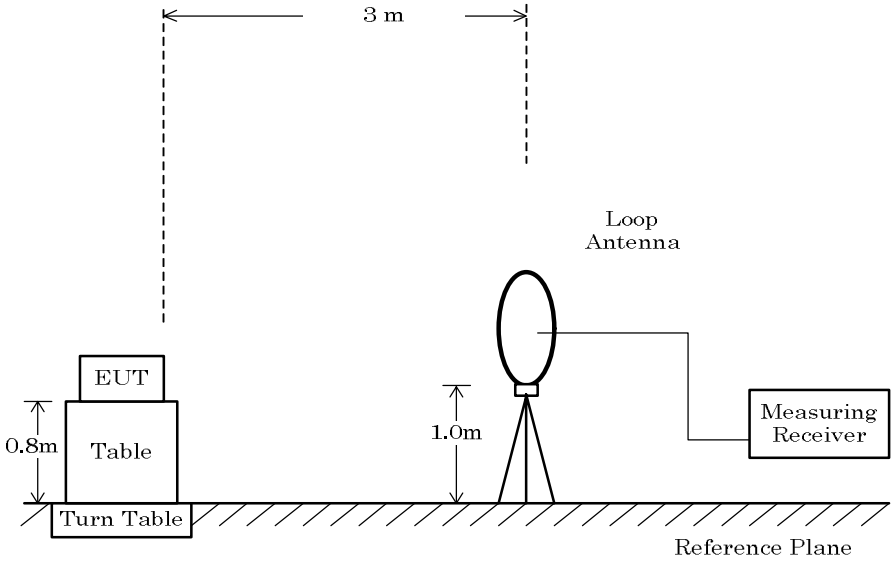
Anechoic Chamber A2				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Test Receiver	ESU 26	100170 (A-6)	Rohde & Schwarz	2016/04/25
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Loop Antenna	HFH2-Z2	872096/25 (C-2)	Rohde & Schwarz	2016/07/26
RF Cable	RG213/U	--- (H-28)	HUBER+SUHNER	2016/07/26
Pre-Amplifier	310N	304573 (A-17)	SONOMA	2016/04/15
Biconical Antenna	VHA9103/BBA9106	2355 (C-30)	Schwarzbeck	2016/05/24
Log-periodic Antenna	UHALP9108-A1	0694 (C-31)	Schwarzbeck	2016/05/24
RF Cable	S 10162 B-11 etc.	--- (H-4)	HUBER+SUHNER	2016/04/15
Site Attenuation	--	--- (H-15)	----	2016/01/05
Pre-Amplifier	TPA0118-36	1010 (A-37)	TOYO	2016/05/11
Double-Ridge Guide Horn Antenna	TR17206	73370006 (C-29)	ADVANTEST	2016/06/23
Horn Antenna	91888-2	562 (C-41-1)	EATON	2016/06/16
Horn Antenna	91889-2	568 (C-41-2)	EATON	2016/06/16
Horn Antenna	3160-04	9903-1053 (C-55)	EMCO	2016/06/29
Horn Antenna	3160-05	9902-1061 (C-56)	EMCO	2016/06/29
Horn Antenna	3160-06	9712-1045 (C-57)	EMCO	2016/06/29
Horn Antenna	3160-07	9902-1113 (C-58)	EMCO	2016/06/29
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2016/06/29
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2016/06/28
Horn Antenna	3160-10	9808-1072 (C-49)	EMCO	2016/06/28
Attenuator	54A-10	W5713 (D-29)	Weinschel	2016/08/16
RF Cable	SUCOFLEX104	267479/4 (C-66)	HUBER+SUHNER	2016/01/19
RF Cable	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2016/01/19
RF Cable	SUCOFLEX102EA	3041/2EA (C-69)	HUBER+SUHNER	2016/01/19
Band Rejection Filter	BRM50716	063 (D-53)	Micro Tronics	2016/06/28
SVSWR	--	--- (H-19)	----	2016/02/27

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

7.6.3 Test Method and Test Setup (Diagrammatic illustration)

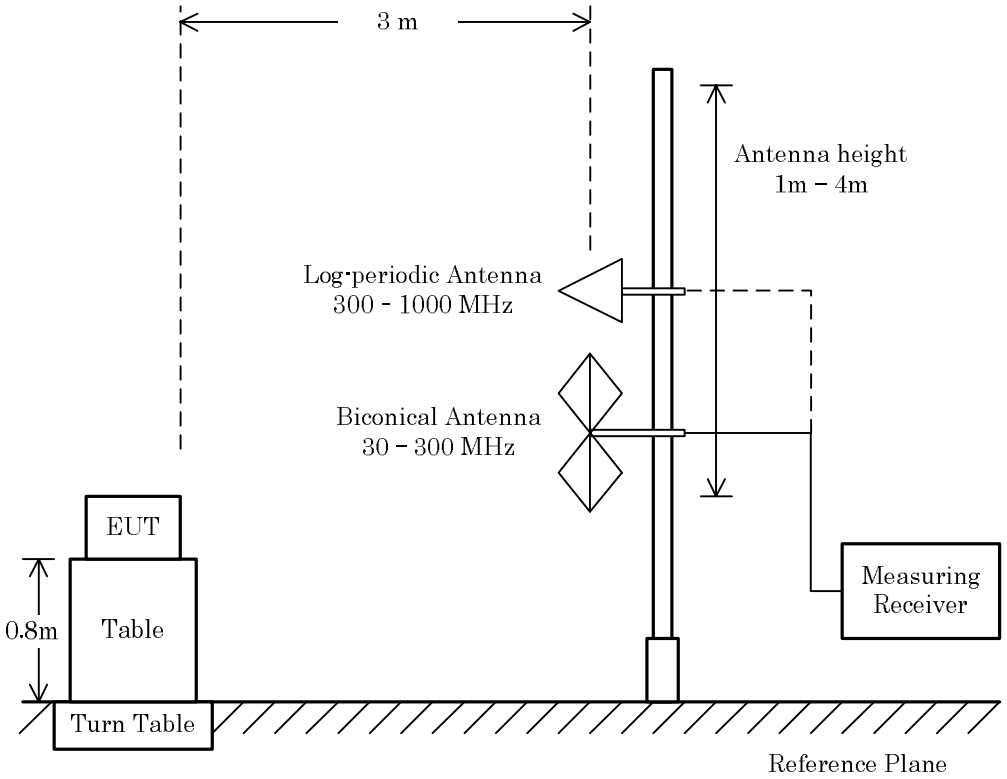
7.6.3.1 Radiated Emission 9 kHz – 30 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.
The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
The measurement were performed about three antenna orientations (parallel, perpendicular, and ground-parallel).
This configurations was used for the final tests.



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, 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:

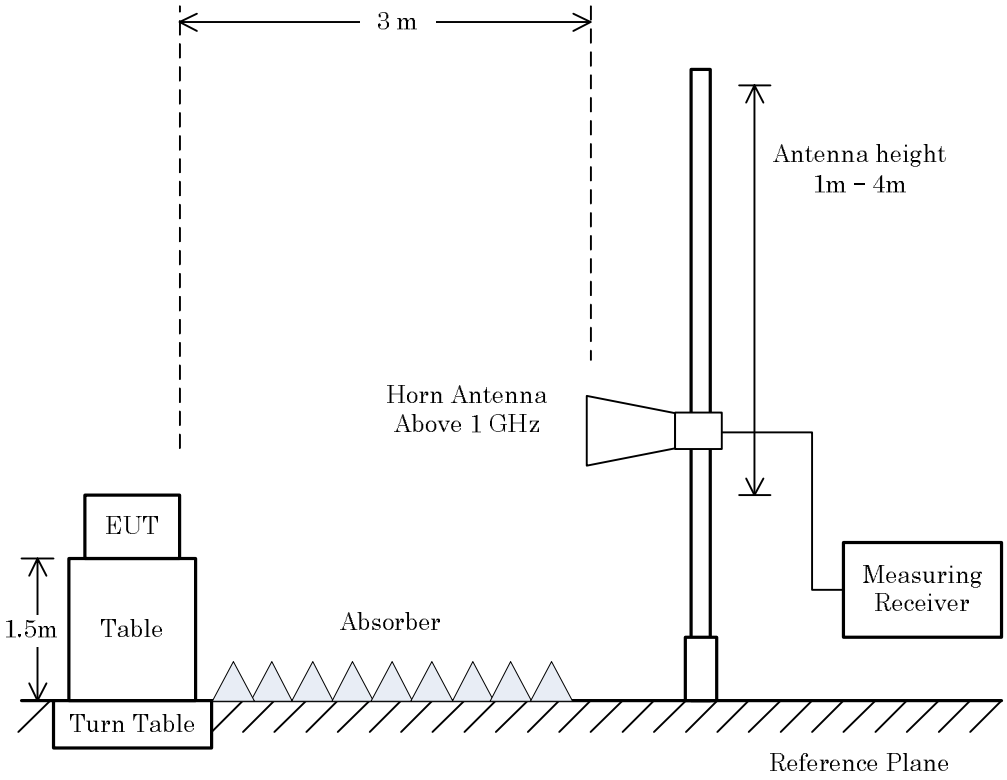
Type	Peak	Average
Detector Function	Peak	Peak
Res. Bandwidth	1 MHz	1 MHz
Video Bandwidth	3 MHz	≥ 1/T *1)
Video Filtering	Linear Voltage	Linear Voltage
Sweep Time	AUTO	AUTO
Trace	Max Hold	Max Hold

Note: 1. T: Minimum transmission duration

Average (VBW) Setting:

Mode	Interval	Cycle	Duty cycle	Burst on period(T)	Min. VBW(1/T)	VBW Setting
	(msec)	(msec)	(%)	(msec)	(kHz)	(kHz))
IEEE802.11a	0.200	2.928	93.2%	2.73	0.37	0.50
IEEE802.11n(HT20)	0.192	2.736	93.0%	2.54	0.39	0.50
IEEE802.11n(HT40)	0.196	1.440	86.4%	1.24	0.80	1.00

– Side View –



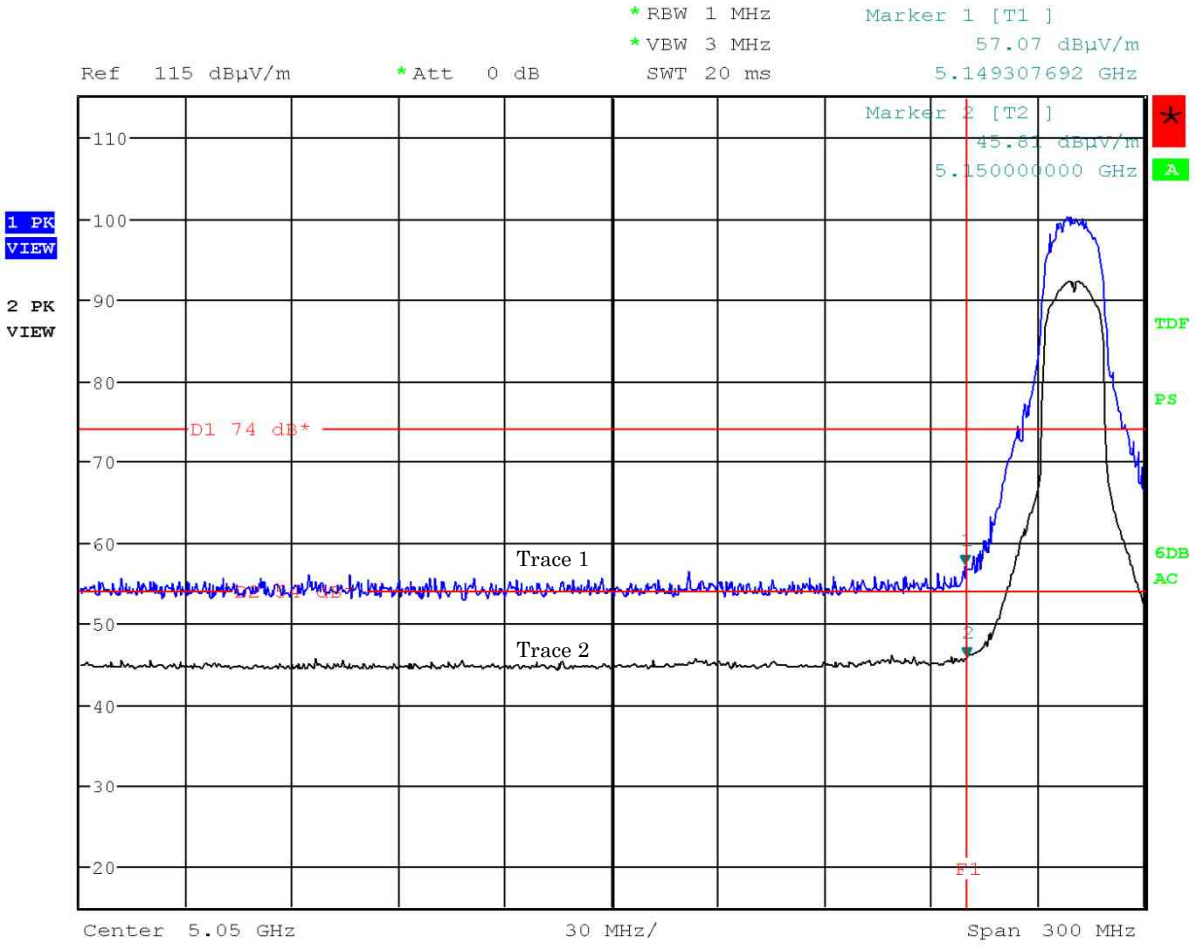
NOTE
When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

7.6.4 Test Data

7.6.4.1 Radiated Band Edge

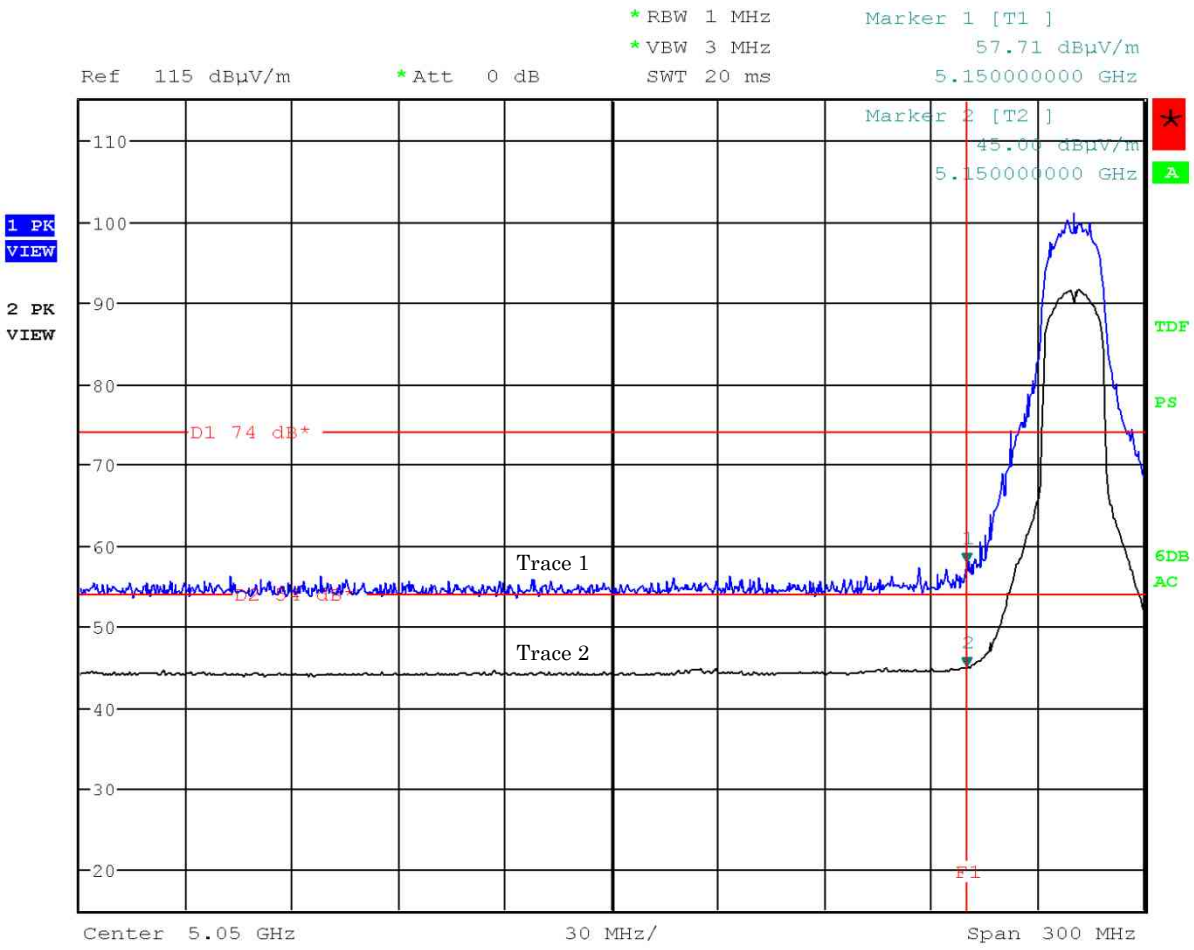
Test Date :November 20, 2015
Temp.:21°C, Humi:44%

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



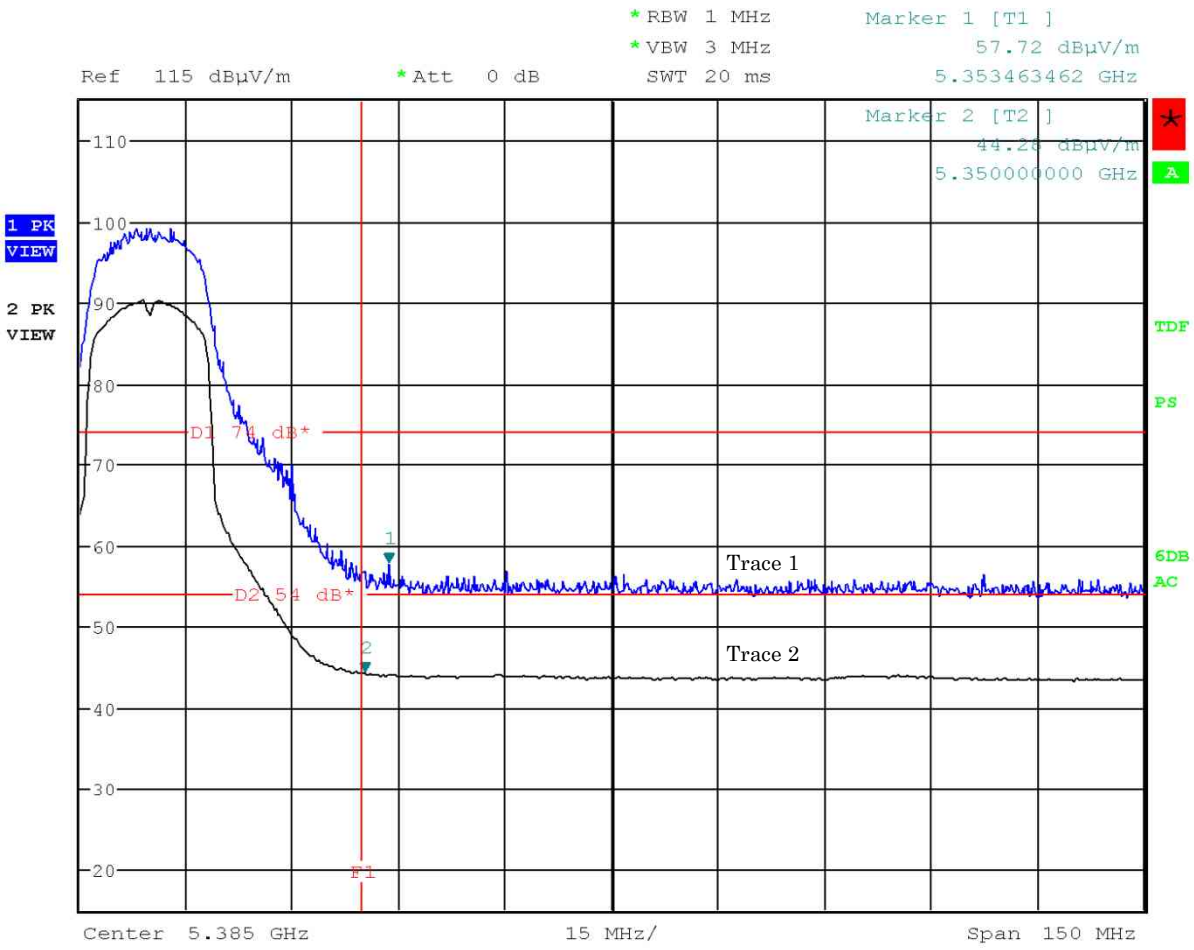
Note: The trace 1 is Peak . The trace 2 is Average.

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



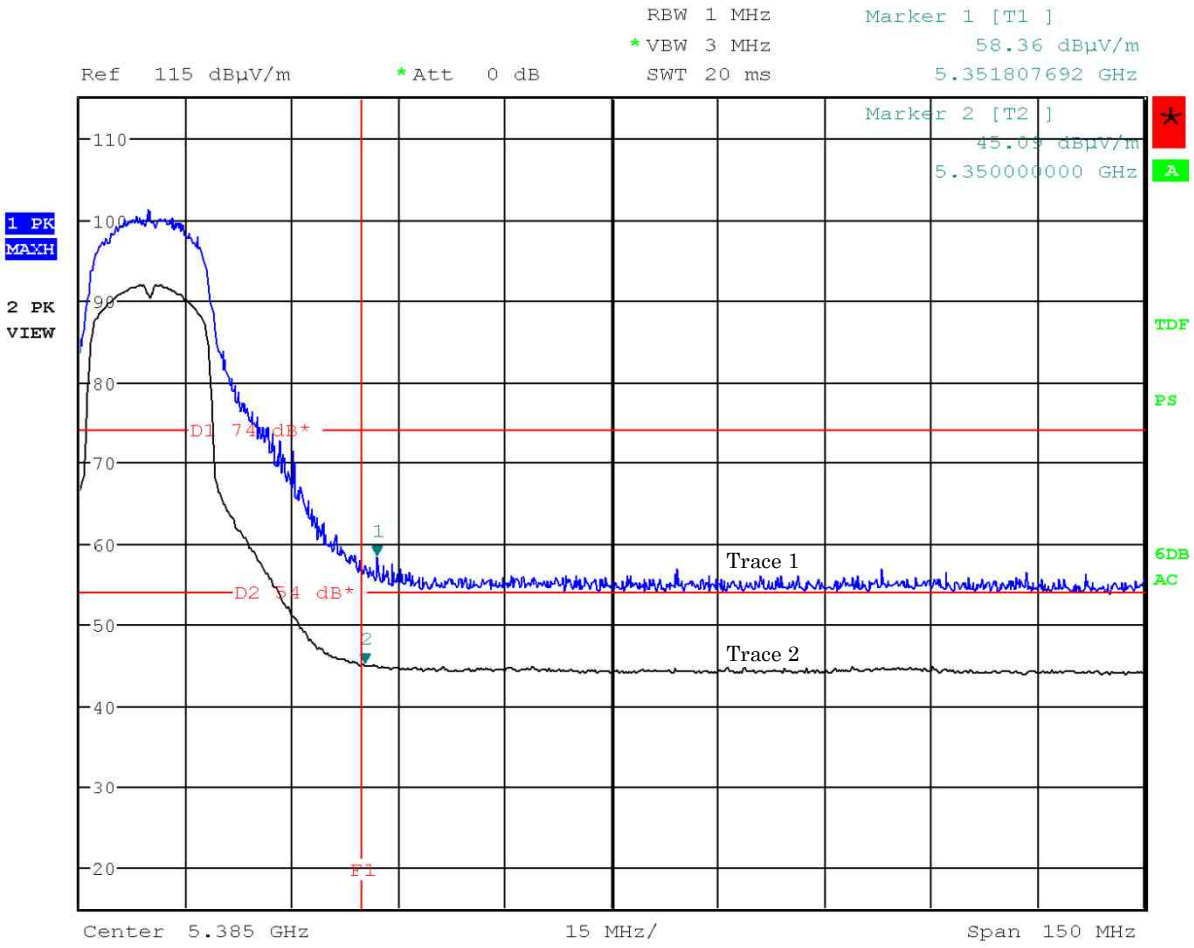
Note: The trace 1 is Peak . The trace 2 is Average.

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



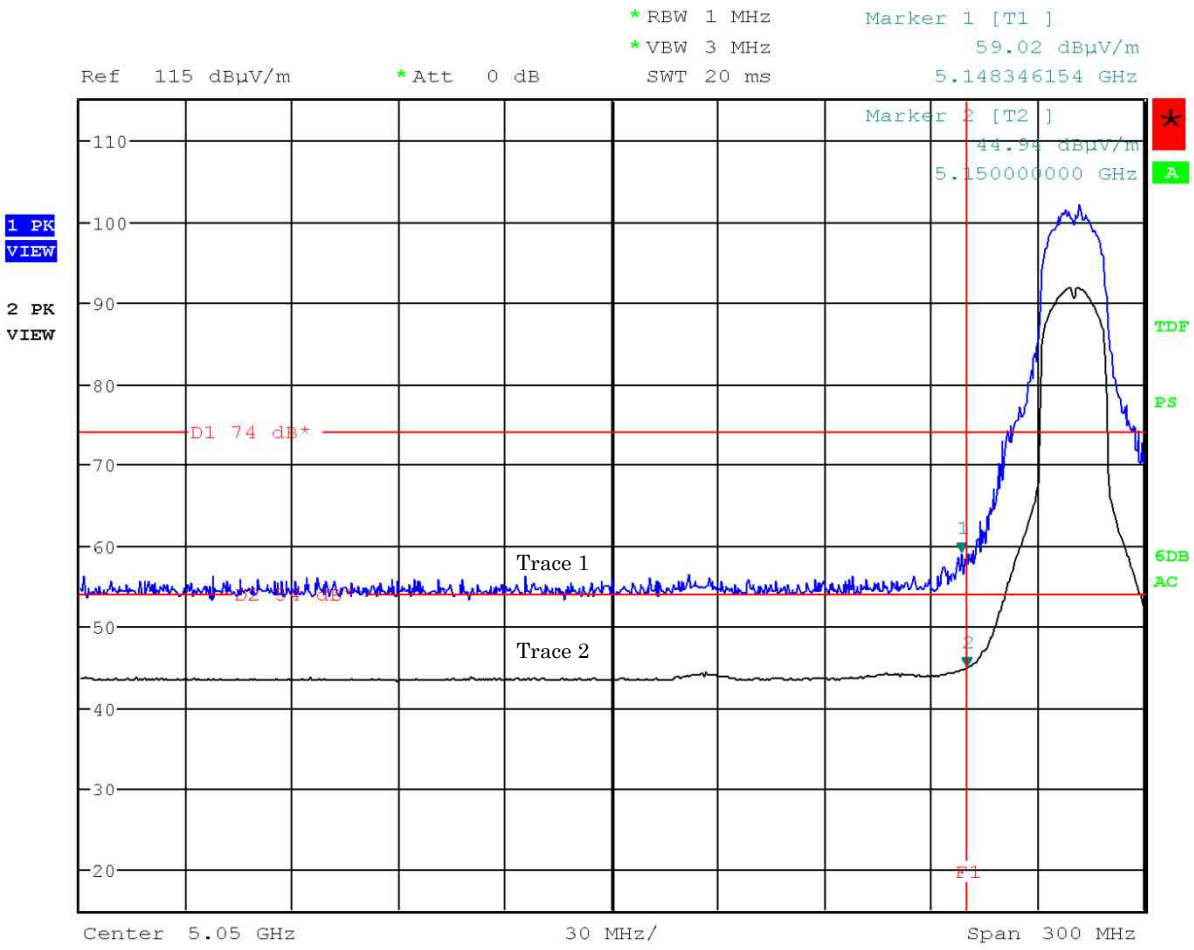
Note: The trace 1 is Peak . The trace 2 is Average.

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



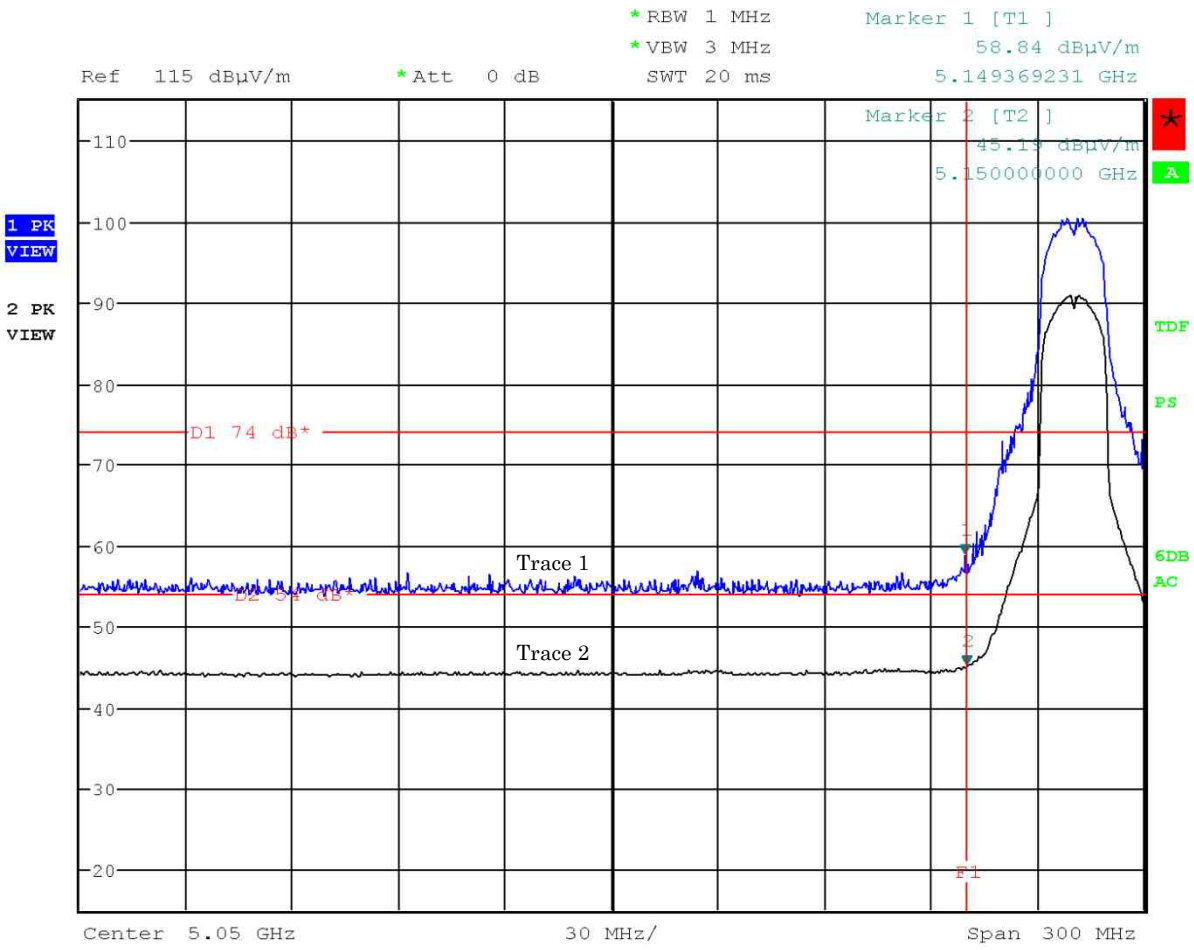
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : TX mode (802.11n HT20, 36ch: 5180 MHz)
Antenna Polarization : Horizontal



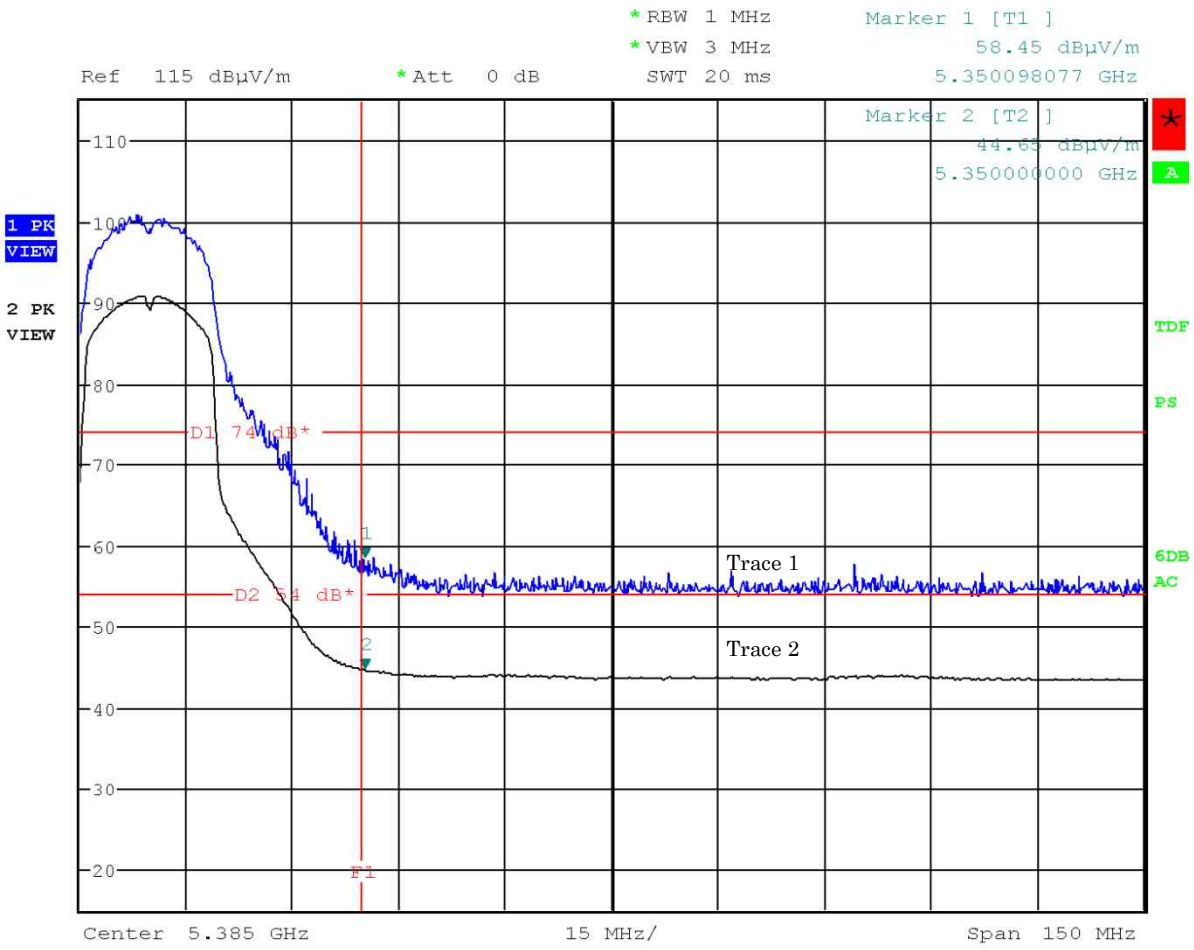
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : TX mode (802.11n HT20, 36ch: 5180 MHz)
Antenna Polarization : Vertical



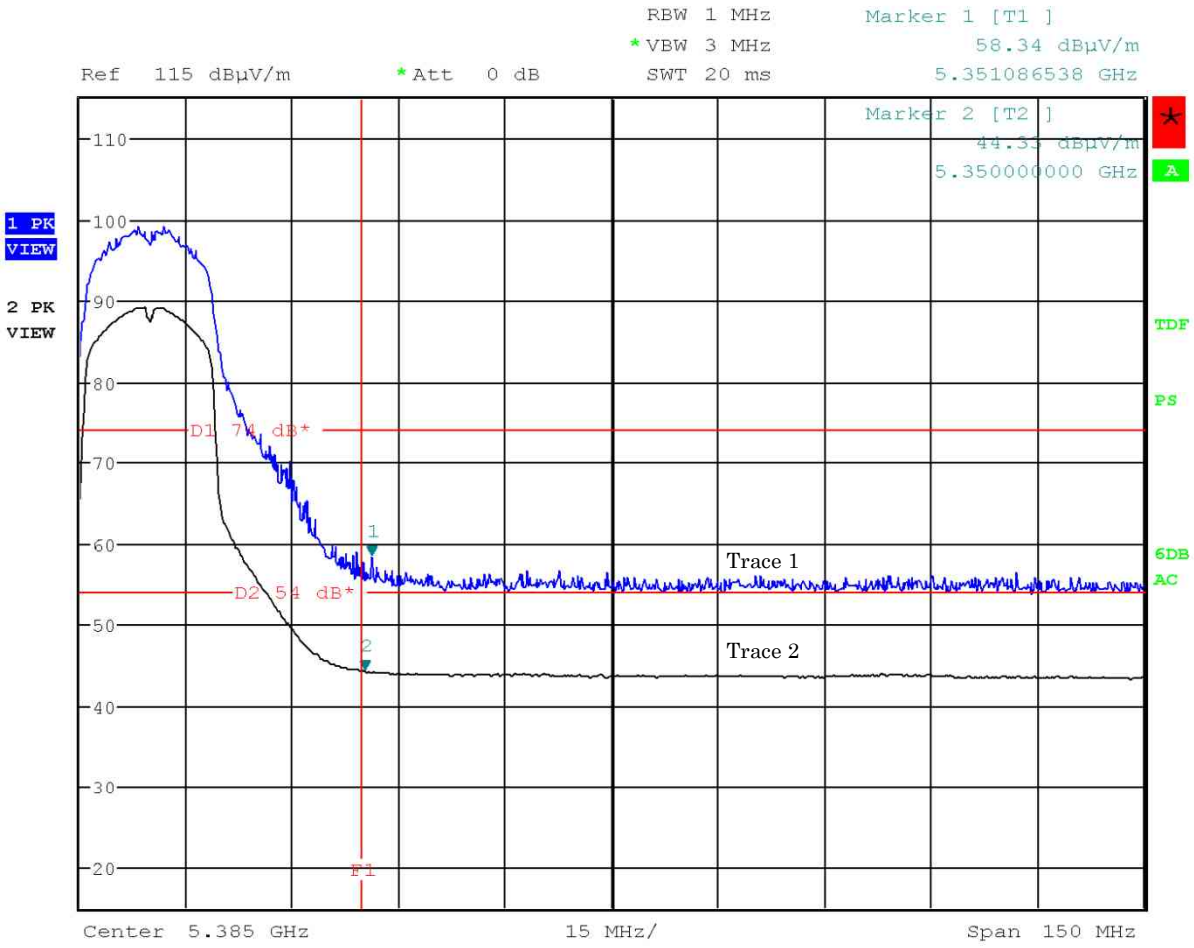
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : TX mode (802.11n HT20, 64ch: 5320 MHz)
Antenna Polarization : Horizontal



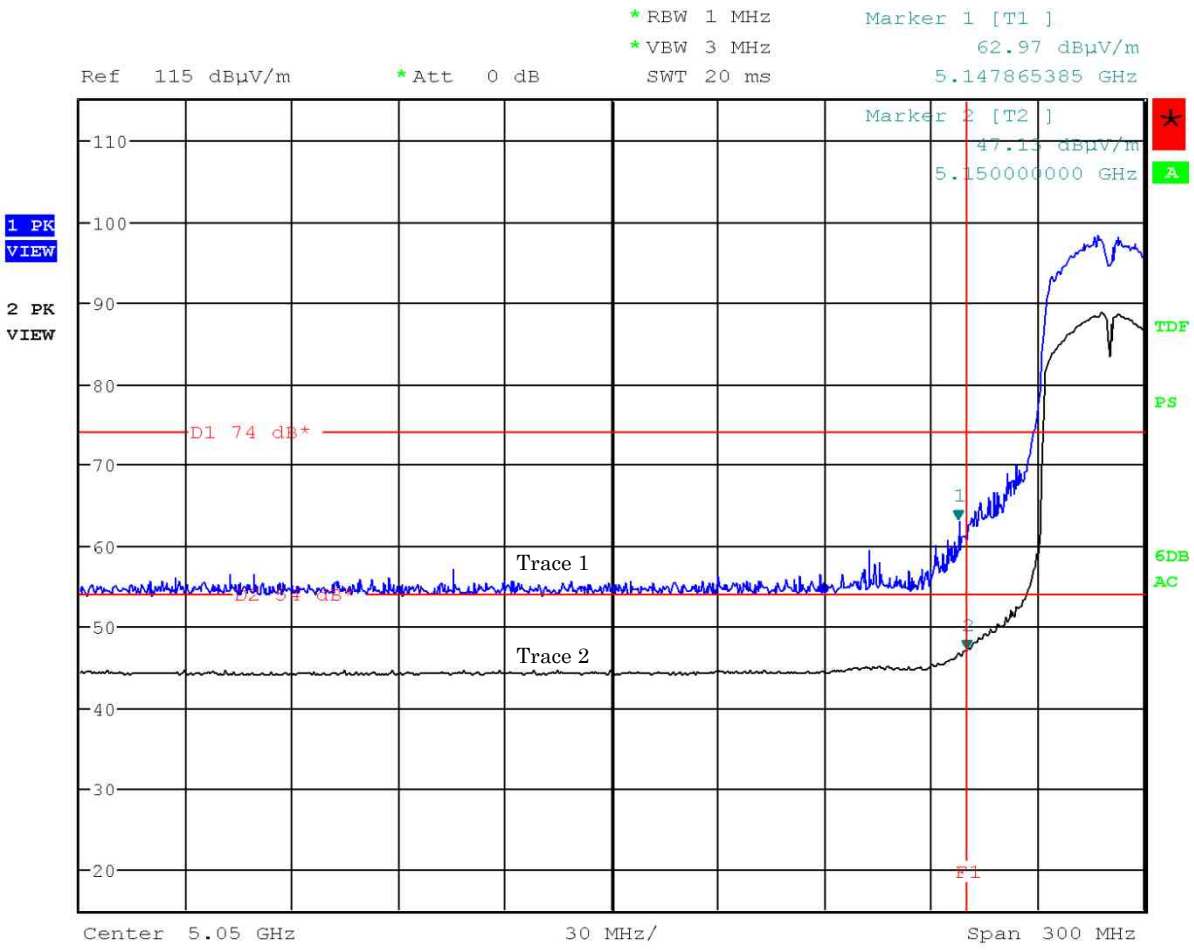
Note: The trace 1 is Peak . The trace 2 is Average.

Mode of EUT : TX mode (802.11n HT20, 64ch: 5320 MHz)
Antenna Polarization : Vertical



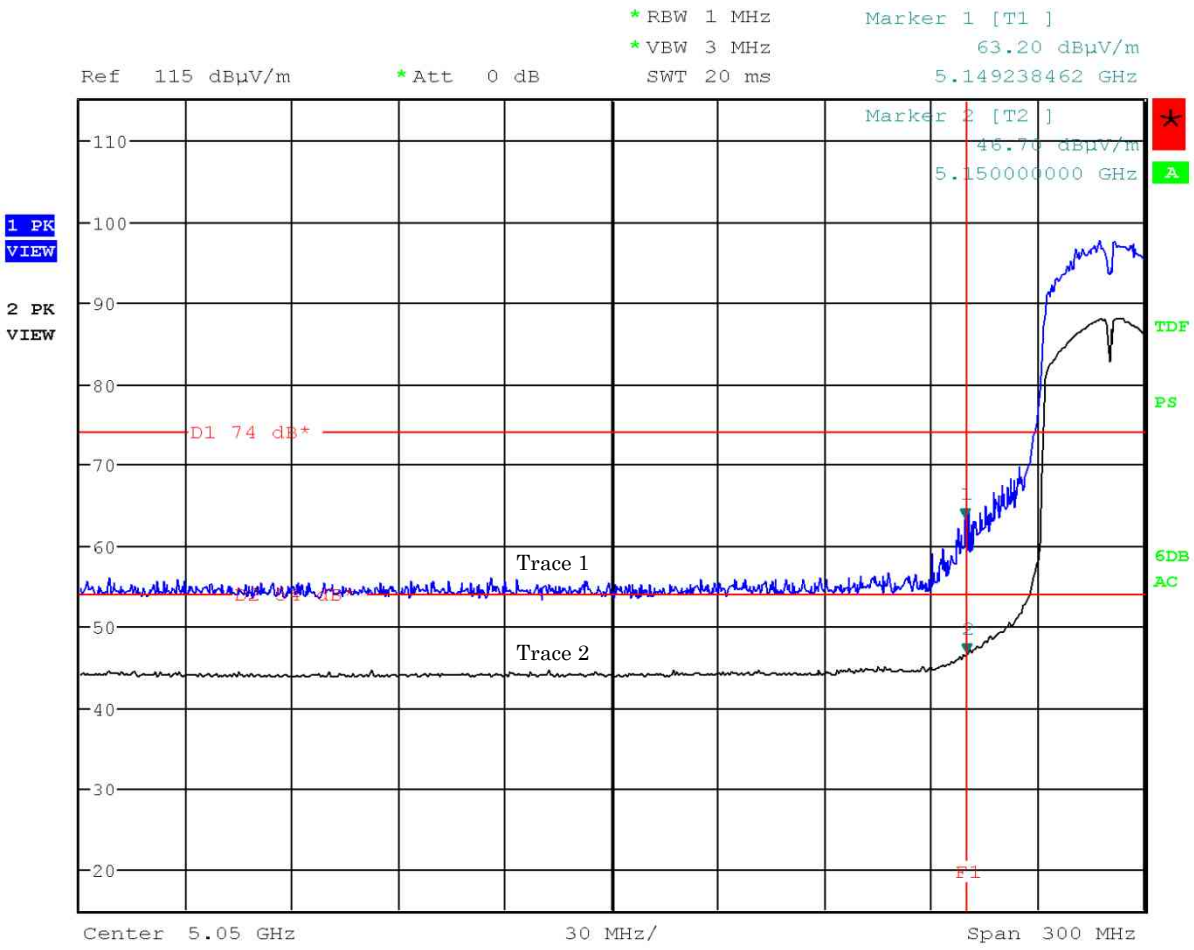
Note: The trace 1 is Peak . The trace 2 is Average.

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



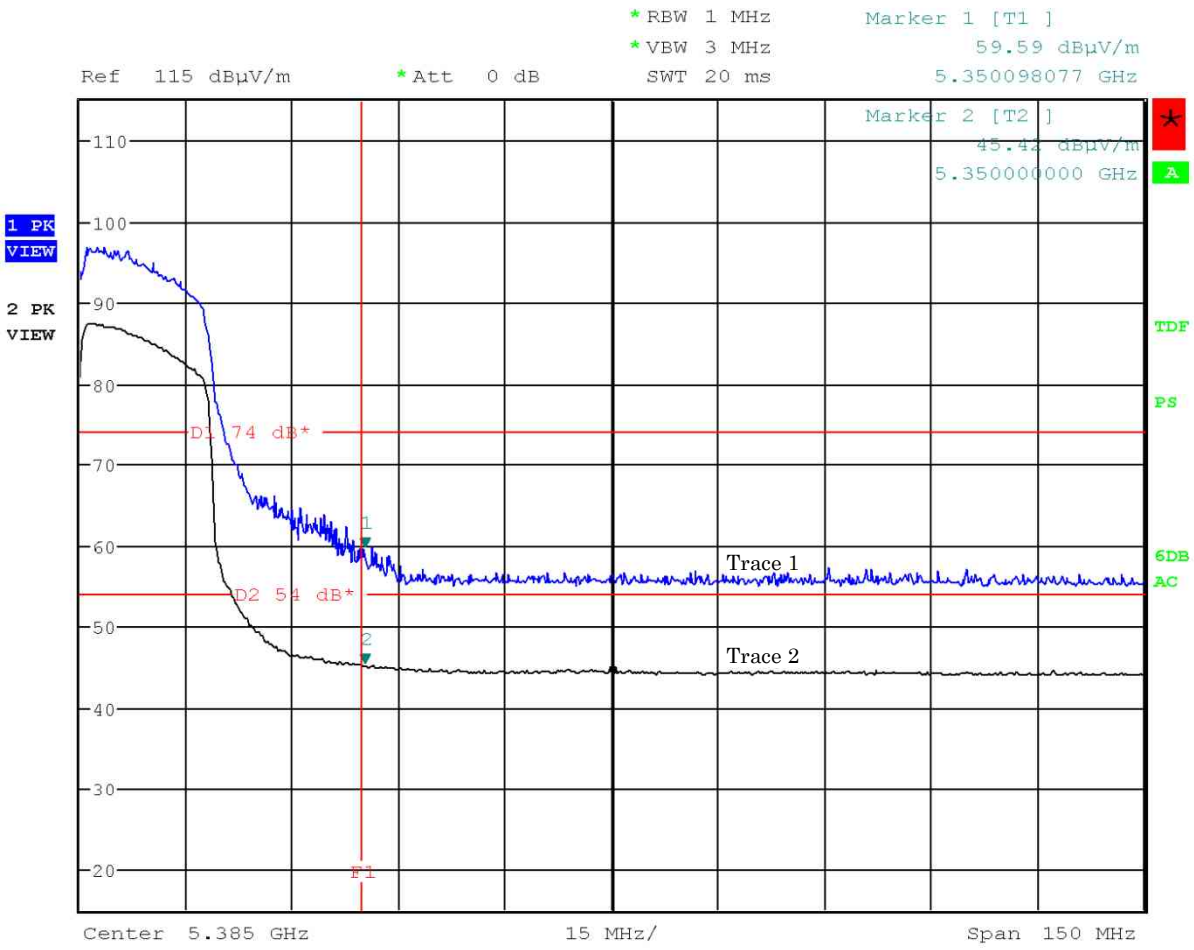
Note: The trace 1 is Peak . The trace 2 is Average.

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



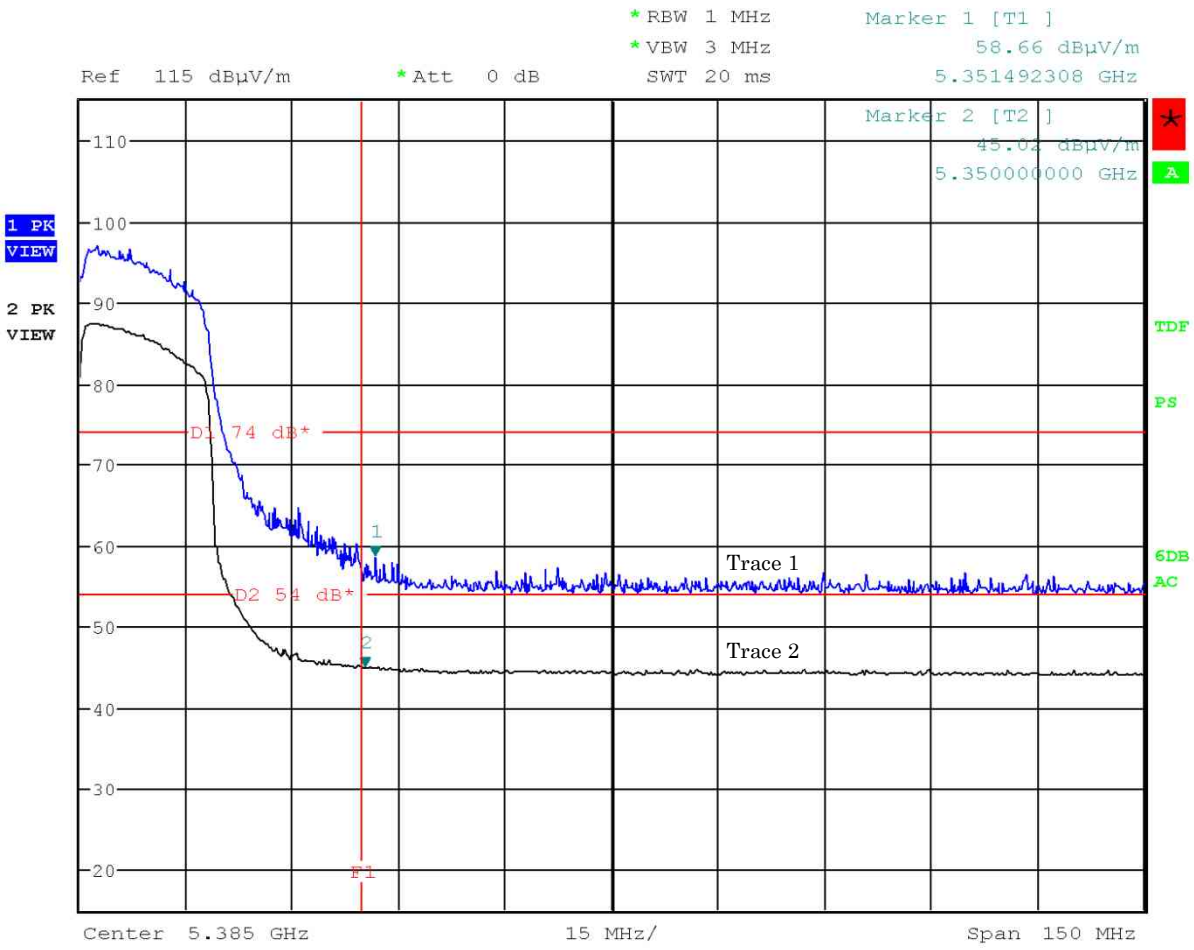
Note: The trace 1 is Peak . The trace 2 is Average.

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



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

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



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

7.6.4.2 Unwanted Radiated Emission 9 kHz – 30 MHz

Test Date :November 30, 2015
Temp.:19°C, Humi:54%

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.

7.6.4.3 Unwanted Radiated Emission 30 MHz – 1000 MHz

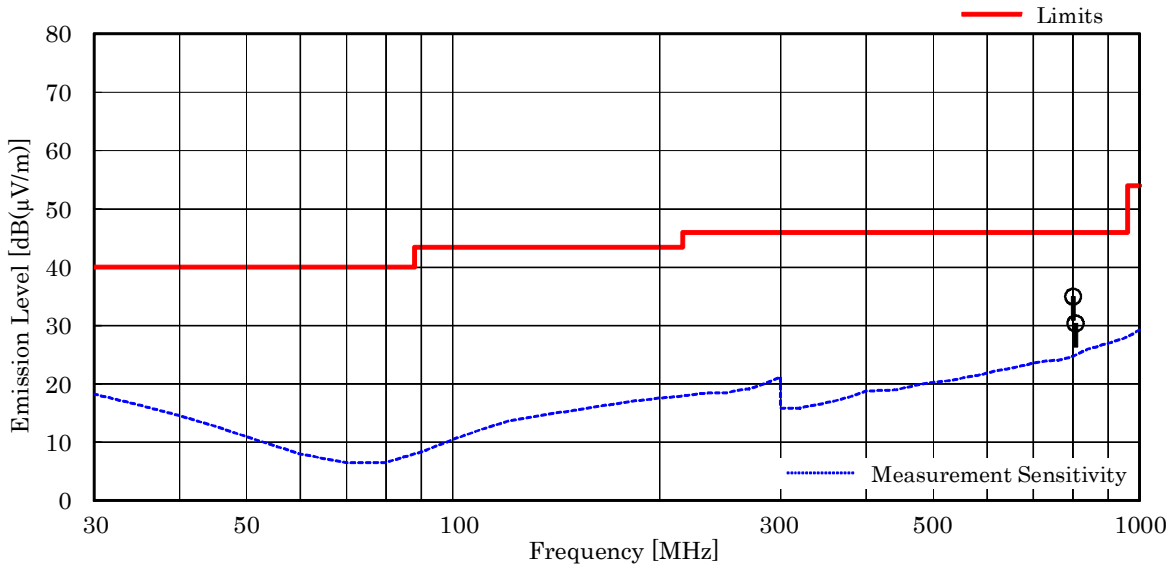
Mode of EUT : All modes have been investigated and the worst case mode for channel (36ch: 5180MHz / IEEE802.11a) has been listed.

Test voltage : 120VAC 60Hz

Test Date: November 30, 2015
Temp.: 19 °C, Humi: 54 %

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
799.99	20.7	-22.9	37.2	46.0	35.0	+11.0	-
806.39	20.8	-22.9	32.5	46.0	30.4	+15.6	-



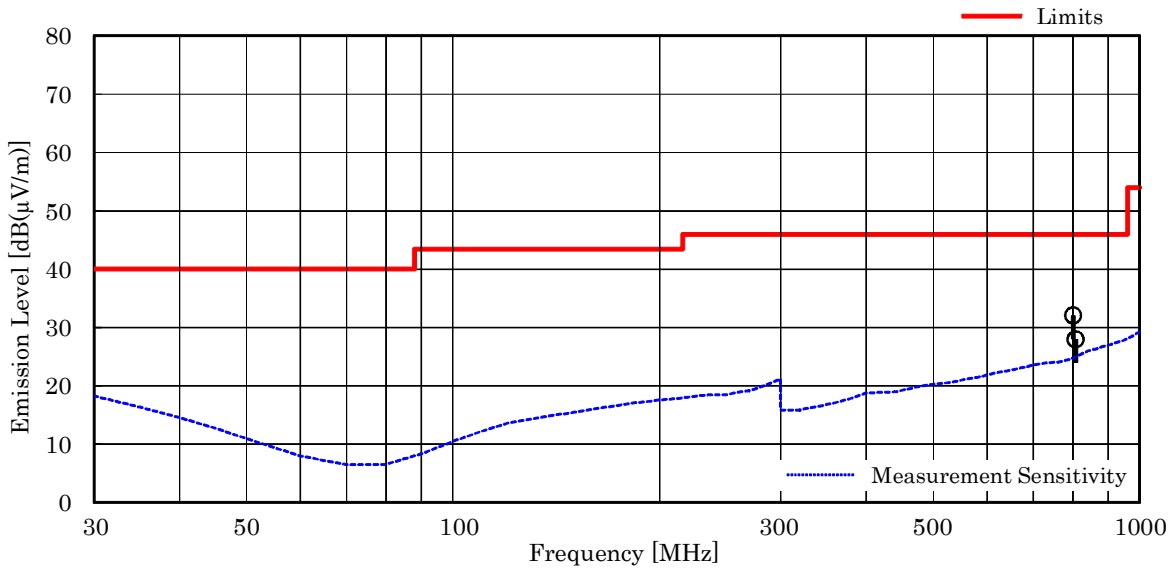
NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The correction factor is composed of cable loss, pad attenuation and/or amplifier gain.
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. Calculated result at 799.99 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 20.7 + (-22.9) + 37.2 = 35.0 dB(μV/m)
   Antenna Height : 1.06 m, Turntable Angle : 159 °
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

Test voltage : 120VAC 60Hz

Test Date: November 30, 2015
Temp.: 19 °C, Humi: 54 %

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
799.99	20.7	-22.9	34.3	46.0	32.1	+13.9	-
806.39	20.8	-22.9	30.1	46.0	28.0	+18.0	-



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 799.99 MHz, as the worst point shown on underline:
   Antenna Factor + Coorection Factor + Meter Reading = 20.7 + (-22.9) + 34.3 = 32.1 dB(μV/m)
   Antenna Height : 1.22 m, Turntable Angle : 142 °
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: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 36 Ch												
10360.0	38.3	-34.8	43.1	34.1	42.2	33.7	74.0	54.0	46.6	37.6	+16.4	
15540.0	37.7	-35.8	46.3	31.3	45.4	30.8	74.0	54.0	48.2	33.2	+20.8	
20720.0	40.2	-43.1	54.4	47.6	54.0	48.6	74.0	54.0	51.5	45.7	+ 8.3	
25900.0	40.8	-41.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
31080.0	43.9	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.4	< 29.4	> +24.6	
36260.0	44.2	-48.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
Test condition : Tx 44 Ch												
10440.0	38.3	-34.8	44.4	35.4	49.9	32.4	74.0	54.0	53.4	38.9	+15.1	
15660.0	37.5	-35.8	45.2	29.9	45.2	31.3	74.0	54.0	46.9	33.0	+21.0	
20880.0	40.3	-43.1	52.6	45.4	52.6	46.2	74.0	54.0	49.8	43.4	+10.6	
26100.0	40.7	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
31320.0	43.8	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36540.0	44.4	-48.0	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.4	< 36.4	> +17.6	
Test condition : Tx 48 Ch												
10480.0	38.2	-34.7	43.2	34.5	42.2	33.7	74.0	54.0	46.7	38.0	+16.0	
15720.0	37.4	-35.8	45.1	30.5	45.3	30.7	74.0	54.0	46.9	32.3	+21.7	
20960.0	40.3	-43.1	53.3	45.7	52.7	45.9	74.0	54.0	50.5	43.1	+10.9	
26200.0	40.7	-41.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.1	< 39.1	> +14.9	
31440.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
36680.0	44.5	-48.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.4	< 36.4	> +17.6	

Calculated result at 20720.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.2 dB(1/m)
	Corr. Factor	=	-43.1 dB
+)	Meter Reading	=	48.6 dB(μV)
	Result	=	45.7 dB(μV/m)

Minimum Margin: 54.0 - 45.7 = 8.3 (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)

Test Date: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Meter Readings [dB(μV)] Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 52 Ch												
10520.0	38.2	-34.7	44.6	36.1	44.6	35.8	74.0	54.0	48.1	39.6	+14.4	
15780.0	37.5	-35.7	44.5	29.3	43.4	28.5	74.0	54.0	46.3	31.1	+22.9	
21040.0	40.3	-43.2	52.9	45.4	53.0	46.6	74.0	54.0	50.1	43.7	+10.3	
26300.0	40.7	-41.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
31560.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
36820.0	44.5	-47.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.8	< 36.8	> +17.2	
Test condition : Tx 56 Ch												
10560.0	38.2	-34.6	44.6	36.1	44.6	35.8	74.0	54.0	48.2	39.7	+14.3	
15840.0	37.6	-35.7	44.5	29.3	43.4	28.5	74.0	54.0	46.4	31.2	+22.8	
21120.0	40.3	-43.2	52.9	45.4	53.0	46.6	74.0	54.0	50.1	43.7	+10.3	
26400.0	40.6	-41.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
31680.0	43.8	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36960.0	44.4	-47.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
Test condition : Tx 64 Ch												
10640.0	38.3	-34.5	44.1	35.5	42.7	34.6	74.0	54.0	47.9	39.3	+14.7	
15960.0	37.8	-35.7	44.2	29.4	42.4	28.0	74.0	54.0	46.3	31.5	+22.5	
21280.0	40.4	-43.3	53.6	46.6	51.9	44.7	74.0	54.0	50.7	43.7	+10.3	
26600.0	43.4	-60.2	< 58.0	< 48.0	< 58.0	< 48.0	74.0	54.0	< 41.2	< 31.2	> +22.8	
31920.0	43.7	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
37240.0	44.3	-47.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.9	< 36.9	> +17.1	

Calculated result at 21280.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.4 dB(1/m)
	Corr. Factor	=	-43.3 dB
+)	Meter Reading	=	46.6 dB(μV)
	Result	=	43.7 dB(μV/m)

Minimum Margin: 54.0 - 43.7 = 10.3 (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 HT20, 5150 - 5250 MHz Band)

Test Date: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 36 Ch												
10360.0	38.3	-34.8	43.1	34.1	42.2	33.7	74.0	54.0	46.6	37.6	+16.4	
15540.0	37.7	-35.8	46.3	31.3	45.4	30.8	74.0	54.0	48.2	33.2	+20.8	
20720.0	40.2	-43.1	54.4	47.6	54.0	48.6	74.0	54.0	51.5	45.7	+ 8.3	
25900.0	40.8	-41.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
31080.0	43.9	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.4	< 29.4	> +24.6	
36260.0	44.2	-48.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 45.7	< 35.7	> +18.3	
Test condition : Tx 44 Ch												
10440.0	38.3	-34.8	44.4	35.4	49.9	32.4	74.0	54.0	53.4	38.9	+15.1	
15660.0	37.5	-35.8	45.2	29.9	45.2	31.3	74.0	54.0	46.9	33.0	+21.0	
20880.0	40.3	-43.1	52.6	45.4	52.6	46.2	74.0	54.0	49.8	43.4	+10.6	
26100.0	40.7	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
31320.0	43.8	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36540.0	44.4	-48.0	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.4	< 36.4	> +17.6	
Test condition : Tx 48 Ch												
10480.0	38.2	-34.7	43.2	34.5	42.2	33.7	74.0	54.0	46.7	38.0	+16.0	
15720.0	37.4	-35.8	45.1	30.5	45.3	30.7	74.0	54.0	46.9	32.3	+21.7	
20960.0	40.3	-43.1	53.3	45.7	52.7	45.9	74.0	54.0	50.5	43.1	+10.9	
26200.0	40.7	-41.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.1	< 39.1	> +14.9	
31440.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
36680.0	44.5	-48.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.4	< 36.4	> +17.6	

Calculated result at 20720.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.2 dB(1/m)
	Corr. Factor	=	-43.1 dB
+)	Meter Reading	=	48.6 dB(μV)
	Result	=	45.7 dB(μV/m)

Minimum Margin: 54.0 - 45.7 = 8.3 (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 HT20, 5250 – 5350 MHz Band)

Test Date: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 52 Ch												
10520.0	38.2	-34.7	44.6	36.1	44.6	35.8	74.0	54.0	48.1	39.6	+14.4	
15780.0	37.5	-35.7	44.5	29.3	43.4	28.5	74.0	54.0	46.3	31.1	+22.9	
21040.0	40.3	-43.2	52.9	45.4	53.0	46.6	74.0	54.0	50.1	43.7	+10.3	
26300.0	40.7	-41.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
31560.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
36820.0	44.5	-47.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.8	< 36.8	> +17.2	
Test condition : Tx 56 Ch												
10560.0	38.2	-34.6	44.6	36.1	44.6	35.8	74.0	54.0	48.2	39.7	+14.3	
15840.0	37.6	-35.7	44.5	29.3	43.4	28.5	74.0	54.0	46.4	31.2	+22.8	
21120.0	40.3	-43.2	52.9	45.4	53.0	46.6	74.0	54.0	50.1	43.7	+10.3	
26400.0	40.6	-41.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.2	< 39.2	> +14.8	
31680.0	43.8	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36960.0	44.4	-47.8	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.6	< 36.6	> +17.4	
Test condition : Tx 64 Ch												
10640.0	38.3	-34.5	44.1	35.5	42.7	34.6	74.0	54.0	47.9	39.3	+14.7	
15960.0	37.8	-35.7	44.2	29.4	42.4	28.0	74.0	54.0	46.3	31.5	+22.5	
21280.0	40.4	-43.3	53.6	46.6	51.9	44.7	74.0	54.0	50.7	43.7	+10.3	
26600.0	43.4	-60.2	< 58.0	< 48.0	< 58.0	< 48.0	74.0	54.0	< 41.2	< 31.2	> +22.8	
31920.0	43.7	-54.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
37240.0	44.3	-47.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.9	< 36.9	> +17.1	

Calculated result at 21280.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.4 dB(1/m)
	Corr. Factor	=	-43.3 dB
+)	Meter Reading	=	46.6 dB(μV)
	Result	=	43.7 dB(μV/m)

Minimum Margin: 54.0 - 43.7 = 10.3 (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 HT40, 5150 - 5250 MHz Band)

Test Date: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Meter Readings [dB(μV)] Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 38 Ch												
10380.0	38.3	-34.8	41.8	32.7	41.1	32.2	74.0	54.0	45.3	36.2	+17.8	
15570.0	37.7	-35.8	45.9	30.2	44.6	28.6	74.0	54.0	47.8	32.1	+21.9	
20760.0	40.2	-43.0	52.1	45.3	52.6	46.1	74.0	54.0	49.8	43.3	+10.7	
25950.0	40.8	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.1	< 39.1	> +14.9	
31140.0	43.9	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36330.0	44.2	-48.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 45.8	< 35.8	> +18.2	
Test condition : Tx 46 Ch												
10460.0	38.2	-34.7	41.6	32.7	40.4	31.8	74.0	54.0	45.1	36.2	+17.8	
15690.0	37.4	-35.8	43.6	29.3	43.1	29.1	74.0	54.0	45.2	30.9	+23.1	
20920.0	40.3	-43.1	51.7	44.1	50.9	43.6	74.0	54.0	48.9	41.3	+12.7	
26150.0	40.7	-41.7	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.0	< 39.0	> +15.0	
31380.0	43.9	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.3	< 29.3	> +24.7	
36610.0	44.4	-48.1	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.3	< 36.3	> +17.7	

Calculated result at 20760.0 MHz, as the worst point shown on underline:

	Antenna Factor	=	40.2 dB(1/m)
	Corr. Factor	=	-43.0 dB
+)	Meter Reading	=	46.1 dB(μV)
	Result	=	43.3 dB(μV/m)

Minimum Margin: 54.0 - 43.3 = 10.7 (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 HT40, 5250 – 5350 MHz Band)

Test Date: November 27, 2015
Temp.: 23 °C, Humi: 31 %

Frequency	Antenna Factor	Corr. Factor	Meter Readings [dB(μV)] Horizontal		Meter Readings [dB(μV)] Vertical		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]	Remarks
[MHz]	[dB(1/m)]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE		
Test condition : Tx 54 Ch												
10540.0	38.2	-34.7	43.1	34.5	42.9	33.9	74.0	54.0	46.6	38.0	+16.0	
15810.0	37.5	-35.7	42.6	28.6	41.1	28.2	74.0	54.0	44.4	30.4	+23.6	
21080.0	40.3	-43.2	51.3	43.9	51.8	45.2	74.0	54.0	48.9	42.3	+11.7	
26350.0	40.6	-41.5	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 49.1	< 39.1	> +14.9	
31620.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
36890.0	44.5	-48.0	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 46.5	< 36.5	> +17.5	
Test condition : Tx 62 Ch												
10620.0	33.4	-34.5	40.9	31.9	39.5	30.3	74.0	54.0	39.8	30.8	+23.2	
15930.0	37.3	-35.7	40.1	27.8	40.5	28.1	74.0	54.0	42.1	29.7	+24.3	
21240.0	40.3	-43.2	51.7	45.8	51.0	45.6	74.0	54.0	48.8	42.9	+11.1	
26550.0	43.5	-60.4	< 58.0	< 48.0	< 58.0	< 48.0	74.0	54.0	< 41.1	< 31.1	> +22.9	
31860.0	43.8	-54.6	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 39.2	< 29.2	> +24.8	
37170.0	44.4	-47.4	< 50.0	< 40.0	< 50.0	< 40.0	74.0	54.0	< 47.0	< 37.0	> +17.0	

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

	Antenna Factor	=	40.3 dB(1/m)
	Corr. Factor	=	-43.2 dB
+)	Meter Reading	=	45.8 dB(μV)
	Result	=	42.9 dB(μV/m)

Minimum Margin: 54.0 - 42.9 = 11.1 (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 - 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

7.7 Dynamic Frequency Selection

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

7.7.1 Test Results

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

7.7.1.1 Channel Moving Time (Limit : < 10 sec.)

802.11n HT20	0.094	sec.	at	5280	MHz
802.11n HT40	0.068	sec.	at	5310	MHz

7.7.1.2 Channel Closing Transmission Time (Limit : < 60 msec.)

802.11n HT20	0	msec.	at	5280	MHz
802.11n HT40	0	msec.	at	5310	MHz

7.7.1.3 Non-occupancy Period (Limit : ≥ 30 min.)

802.11n HT20	> 30	min.	at	5280	MHz
802.11n HT40	> 30	min.	at	5310	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

Shielded Room S1				
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Cal. Due**
Spectrum Analyzer	E4446A	US44300388 (A-39)	Agilent	2016/08/11
Signal Generator	MG3710A	6201171711 (B-41)	Anritsu	2016/08/13
Horn Antenna(*1)	3160-05	9902-1061 (C-56)	EMCO	2016/06/29
Double-Ridge Guide Horn Antenna(*2)	TR17206	73370006 (C-29)	ADVANTEST	2016/06/23
RF Cable(*1)	SUCOFLEX104	267414/4 (C-67)	HUBER+SUHNER	2016/01/19
RF Cable(*2)	SUCOFLEX102E	6683/2E (C-70)	HUBER+SUHNER	2016/11/19

(*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. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 4: 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.

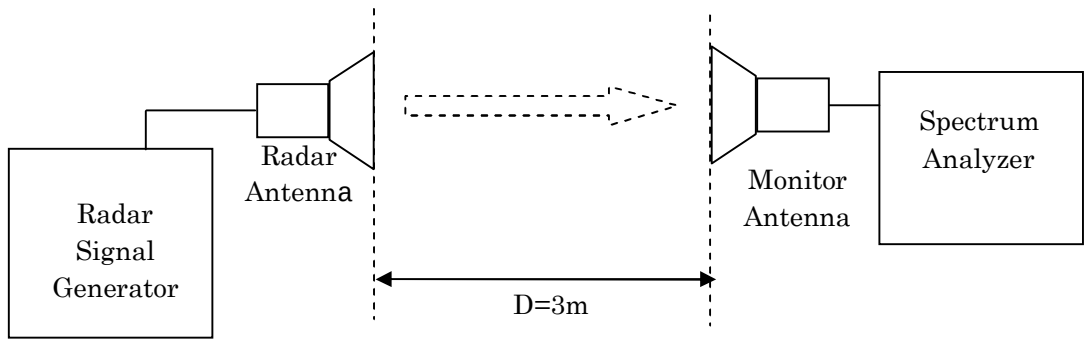
Frequency Hopping Radar Test Waveform

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

Radiated Calibration Setup Diagram

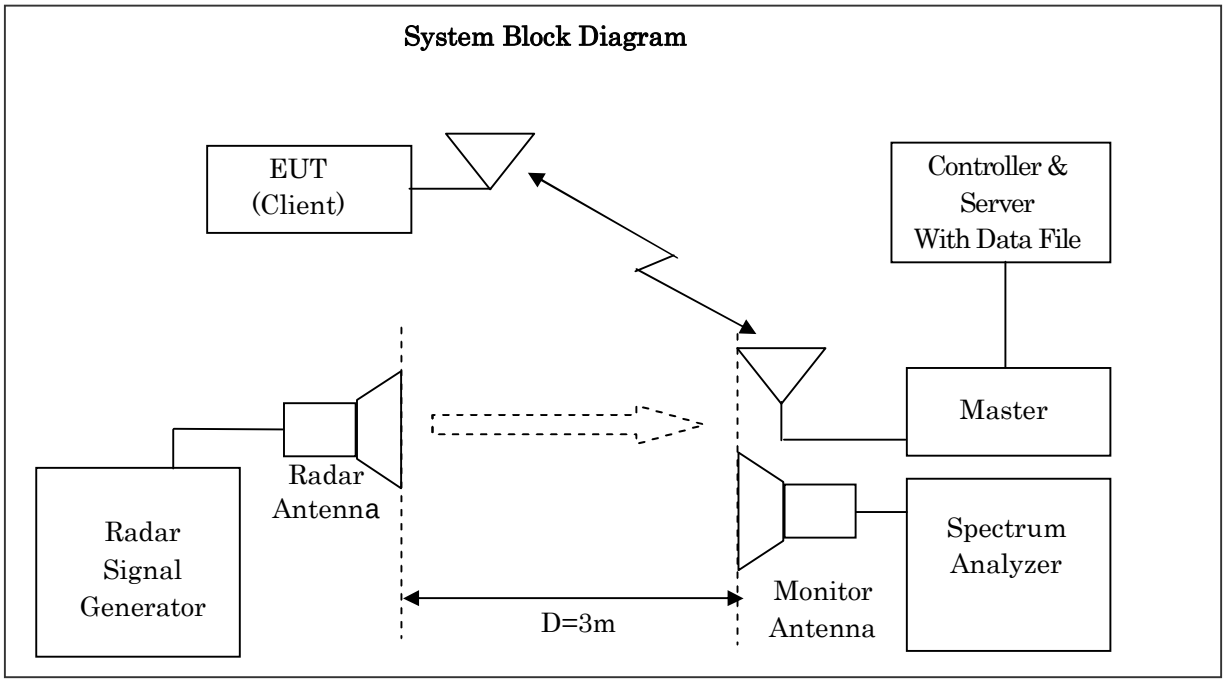


The EUT is the client device without radar detection, then master device is a RDD. Therefore the radar test signal level is set at the Radar Detection Threshold Level of master device.
The Radar Detection Threshold Level is employed -64dBm + 1dB = -63 dBm at the antenna port.
Where the antenna gain of 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
Span: Zero Span(Time Domain)
RBW/VBW: 3 MHz
Detection: 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
Wireless Access Point	Cisco	AIR-CAP3702E-A-K9	FJC1928F02H	LDK102087
PC(Controller/Server)	Note PC	Fujitsu	FMV A 05010P	None

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
Operating Mode of EUT	Client(Slave) Device without Radar Detection
FCC ID for Master Device(*1)	LDK102087 (Antenna Gain: 4.0 dBi)
Antenna Type of EUT	1/2 λ Type Antenna (Integral)
Highest Power Level(EIRP)/ Antenna Gain of EUT	802.11a: 6.0 dBm Max. 802.11n(20/40 MHz BW): 6.0 dBm Max. Antenna Gain: 0.5 dBi
System Architecture	IEEE802.11 a/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)

(*1) 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:

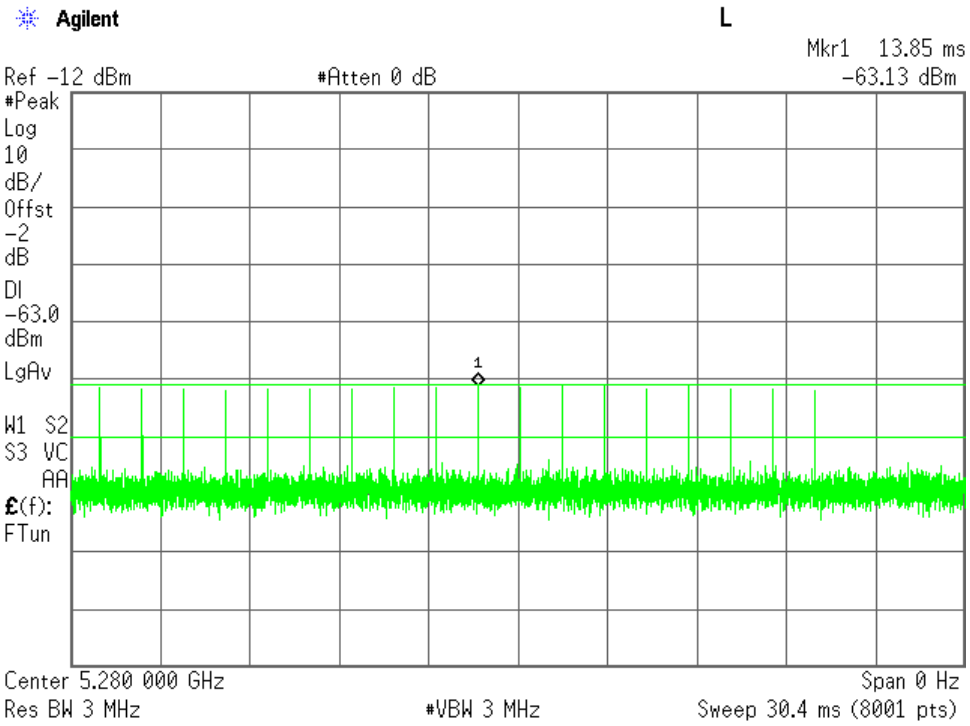
There is no deviation from FCC Rule and KDB905462 D02.

7.7.4 Test Data

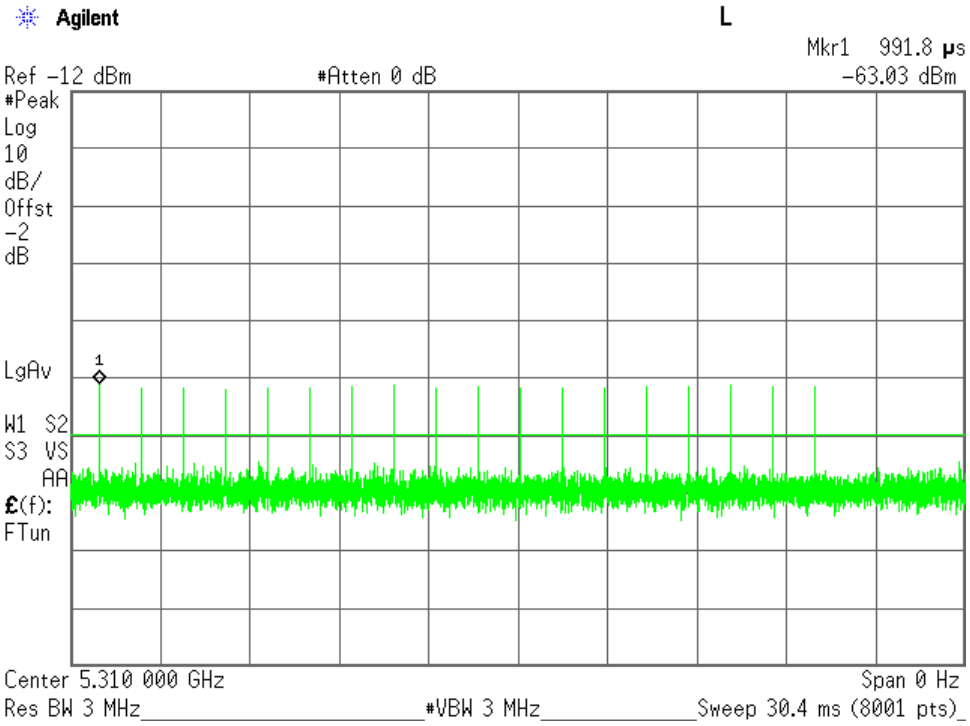
Test Date :December 14, 2015
Temp.: 22°C, Humi: 48%

7.7.4.1 Radar Waveform Calibration Results (Type 0 Short Pulse)

5280 MHz

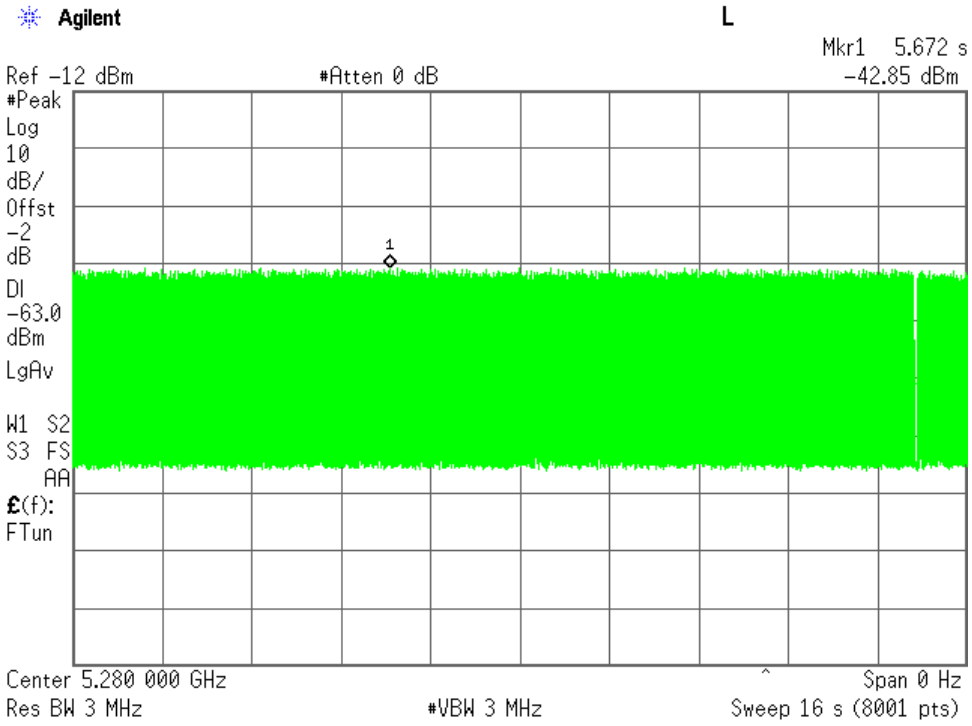


5310 MHz

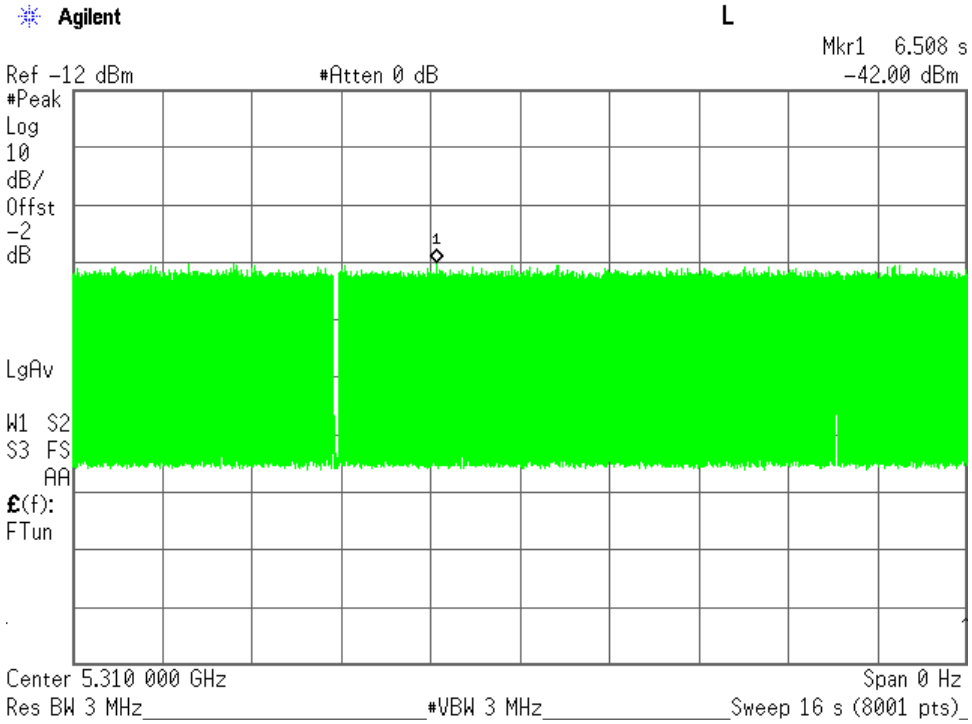


7.7.4.2 EUT (Slave) Traffic Plots

IEEE802.11a BW, 5280 MHz

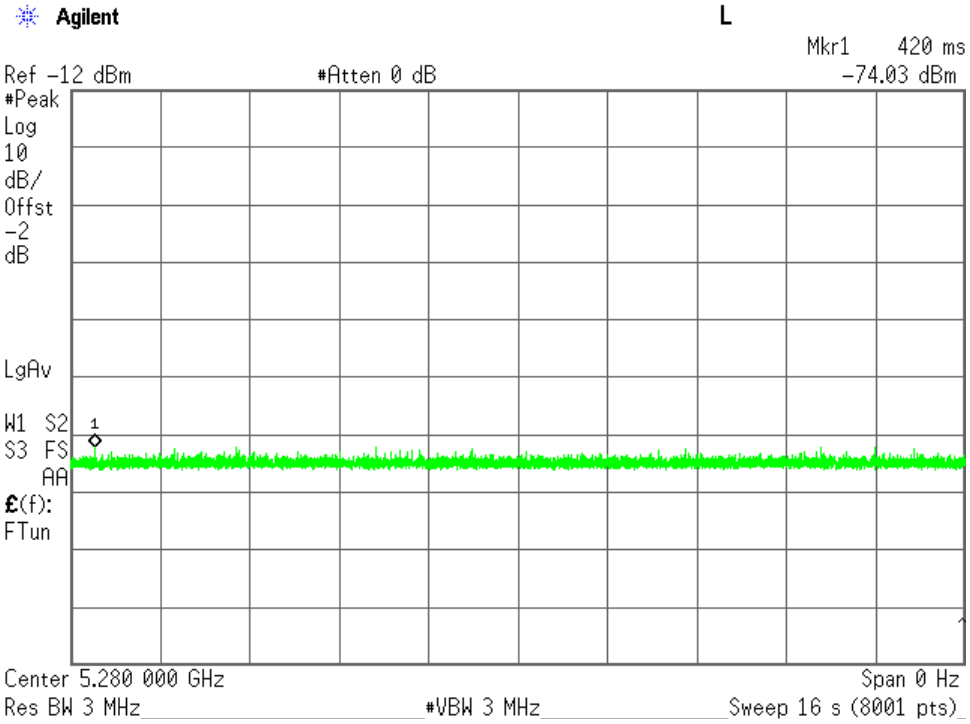


IEEE802.11n HT40 BW, 5310 MHz

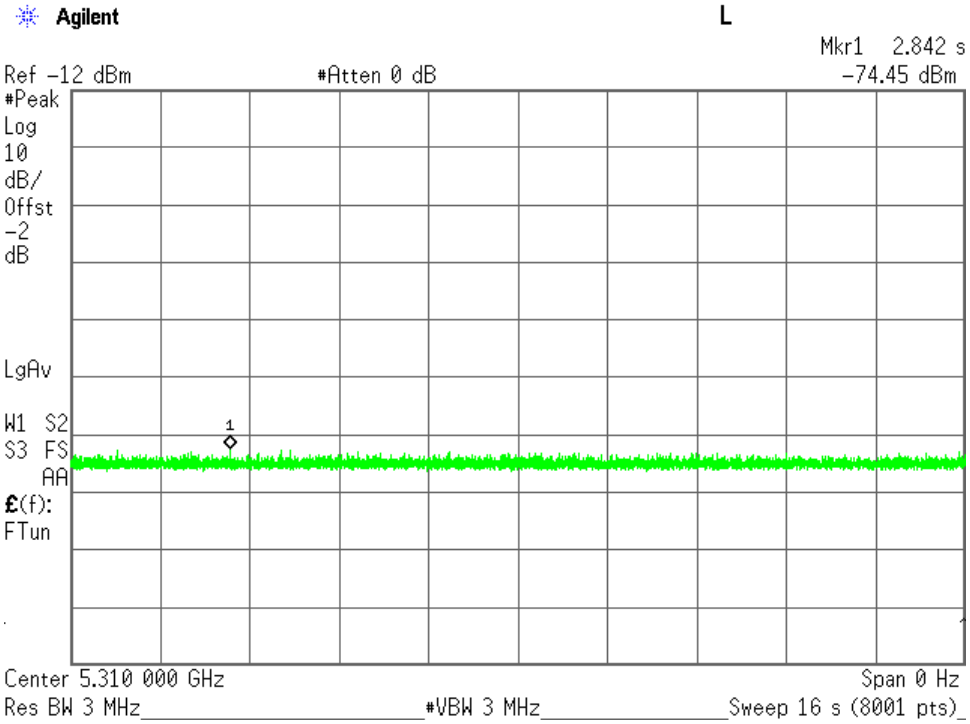


7.7.4.3 No Traffic (Noise Floor) Plots

5280 MHz



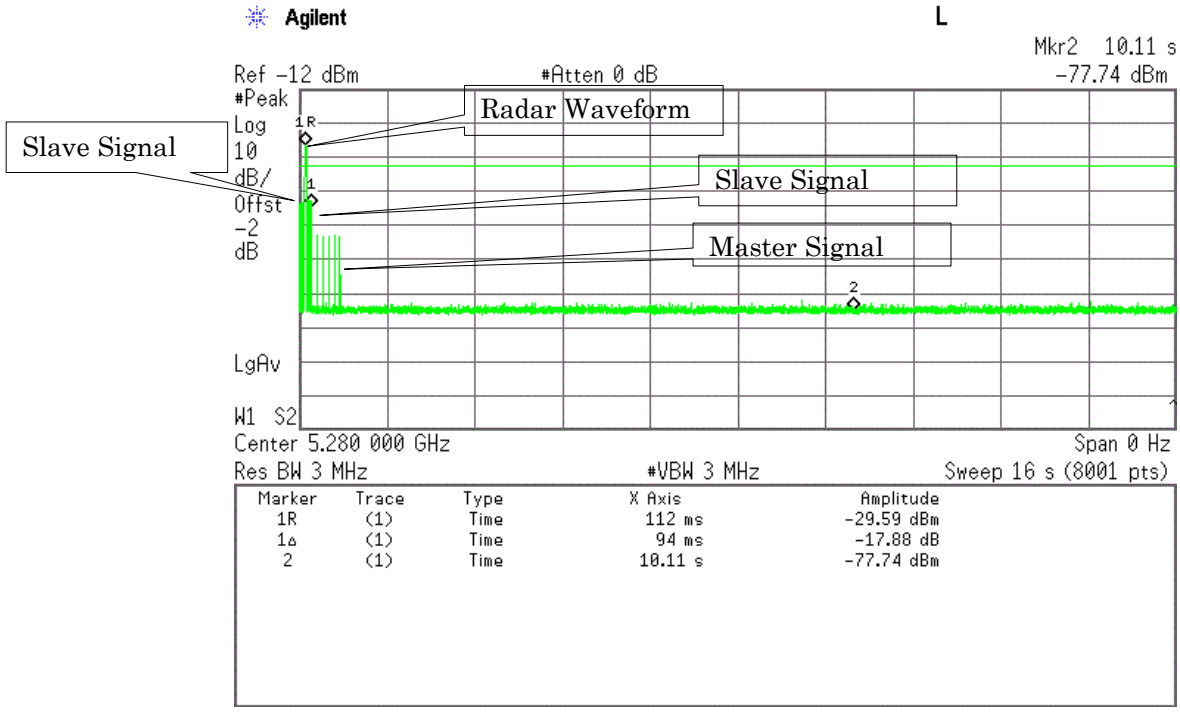
5310 MHz



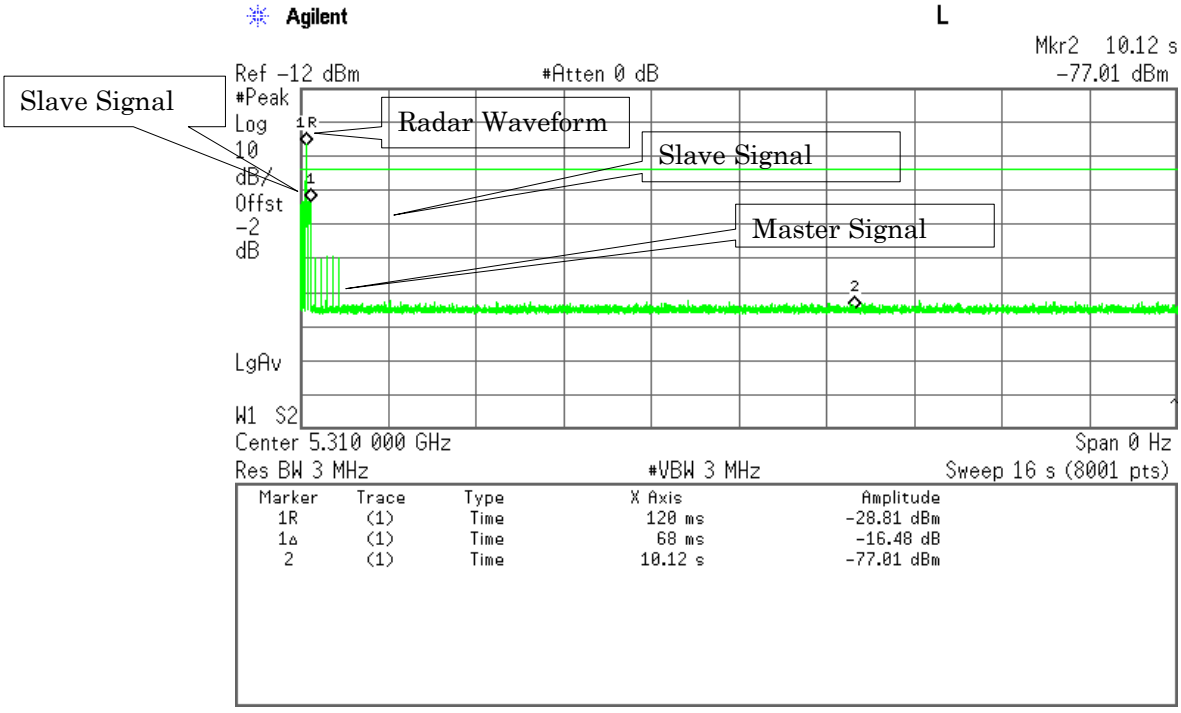
7.7.4.4 Channel Move Time

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.56 (5280MHz)/ 20 MHz BW, 802.11n CH.62(5310 MHz)/ 40 MHz BW.

Channel Move Time Plots for 20 MHz BW, 5280 MHz



Channel Move Time Plots for 40 MHz BW, 5310 MHz



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

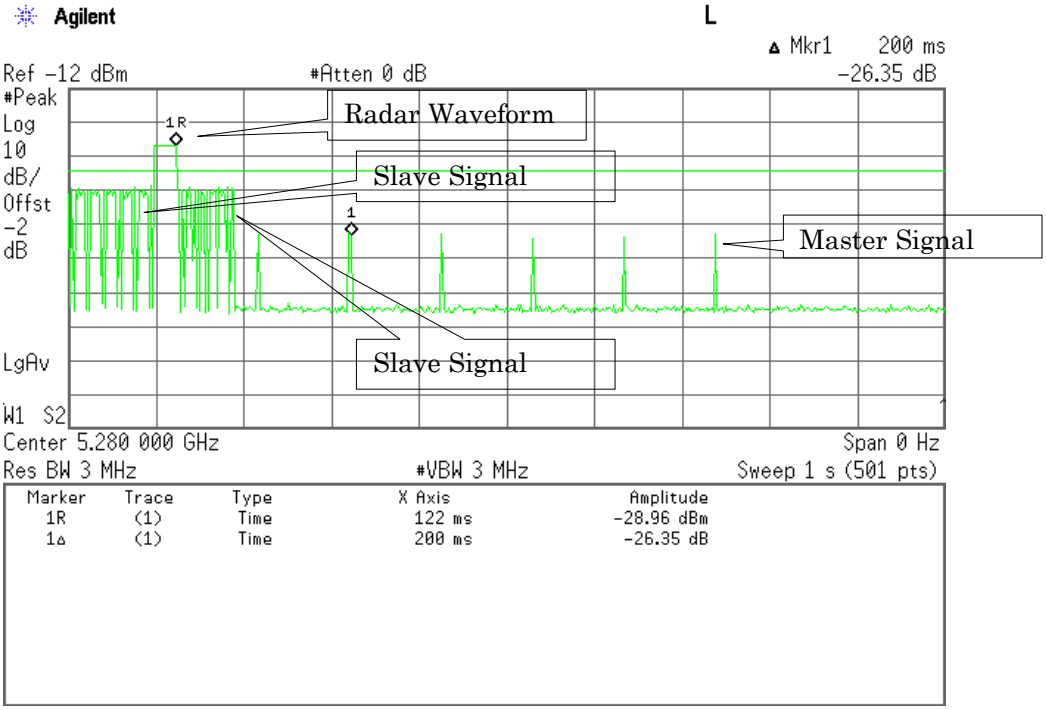
The observation period over which the aggregate transmission time is calculated begins at (the reference marker + 200 msec.) and end on earlier than (the reference marker + 10 sec.).
The measurements are carried out 802.11a CH.56 (5280MHz)/ 20 MHz BW, 802.11n HT40 CH.62(5310 MHz)/ 40 MHz BW.

Test Results

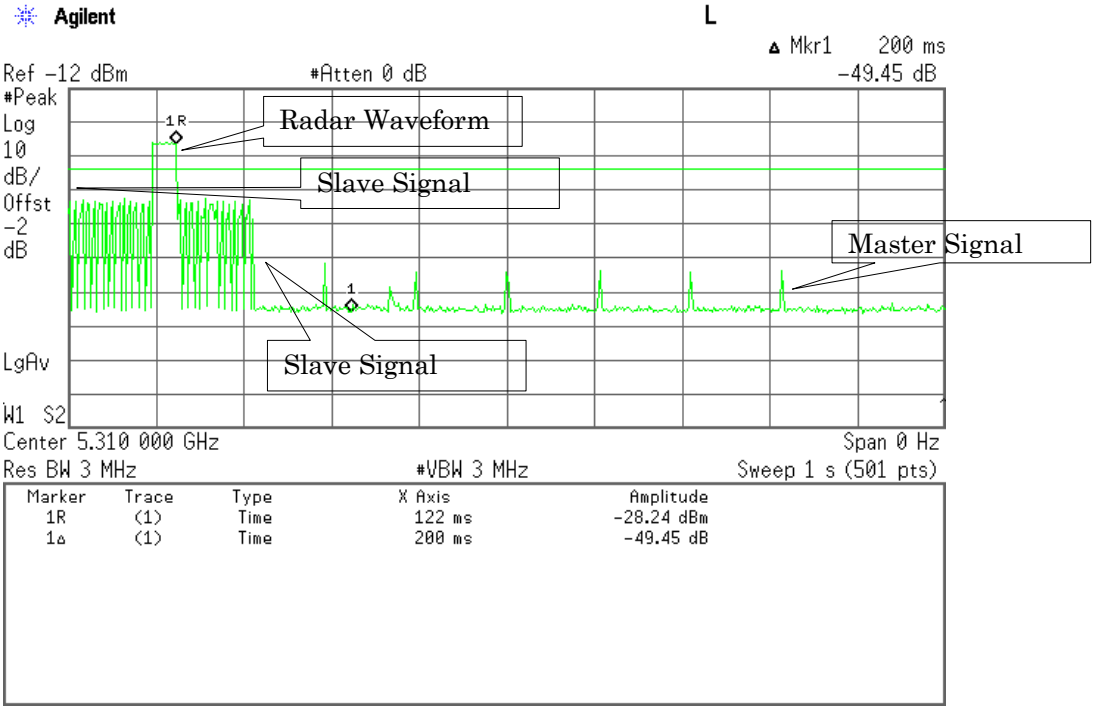
Channel	Frequency	Mode	Sweep Time(**S**)	(**B**)	(**N**)	Channel Closing
	(MHz)		(msec)			Time (msec)
56	5280	20 MHz BW	1000	500	0	0
62	5310	40 MHz BW	1000	500	0	0

The test result (Channel Closing Time) is calculated as follows;
For 56 channel (5280 MHz)
Channel Closing Time = **D** * **N** = **S** / **B** * **N** = 1000 / 500 * 0 = 0 msec.

Channel Closing Transmission Time Plots for 20 MHz BW, 5280 MHz



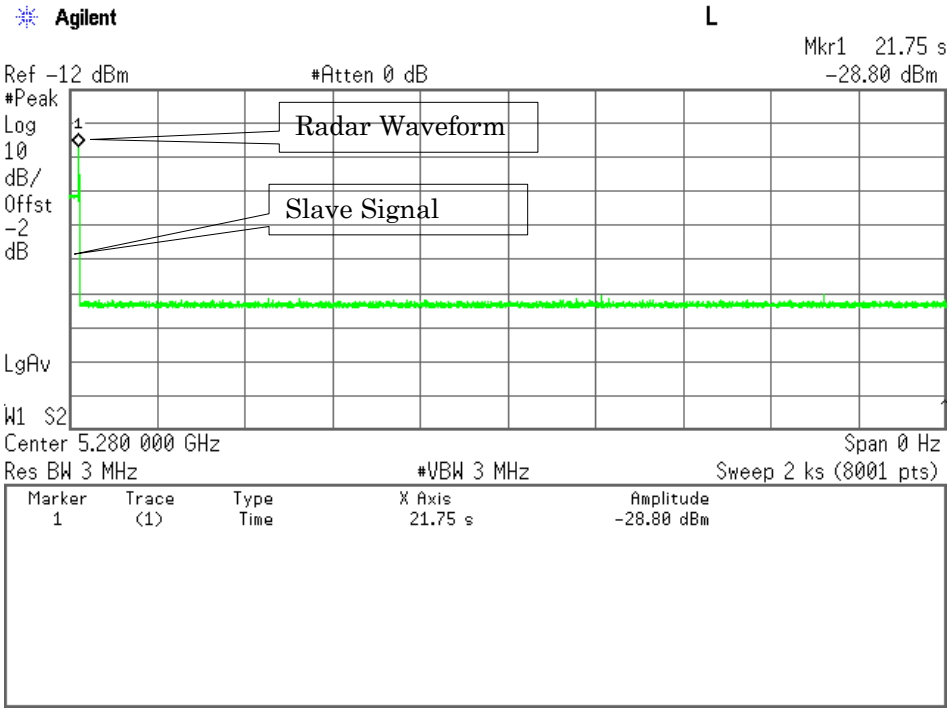
Channel Closing Transmission Time Plots for 40 MHz BW, 5310 MHz



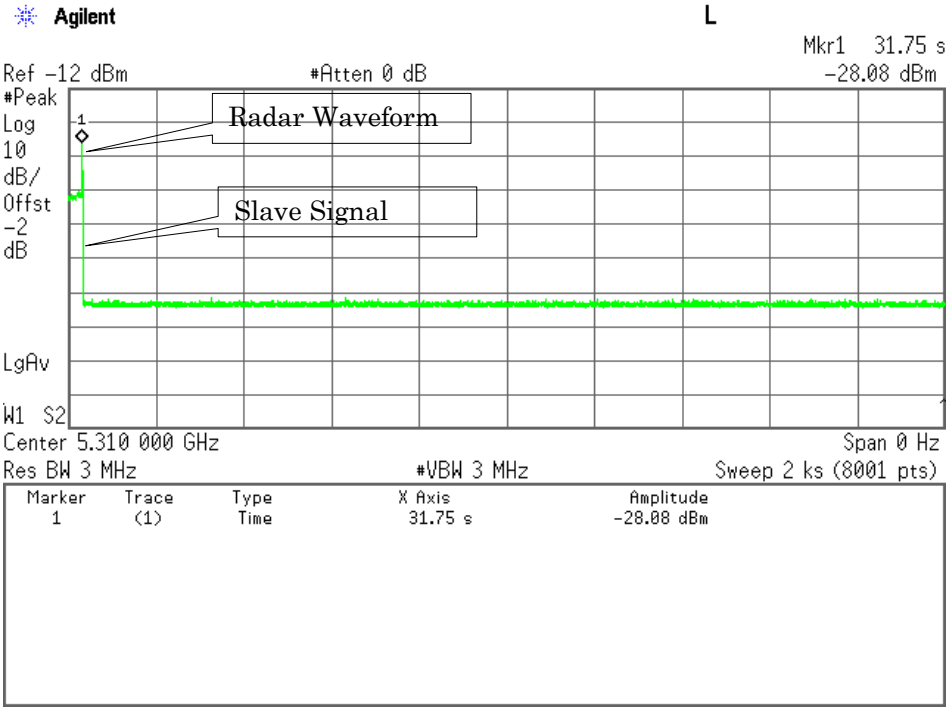
7.7.4.6 Non-Occupancy Period

During the 30 minutes observation time, EUT did not make any transmissions on a channel.
The measurements are carried out 802.11n CH.56 (5280MHz)/ 20 MHz BW, 802.11n CH.62(5310 MHz)/ 40 MHz BW.

Non-Occupancy Period Plots for
20 MHz BW, 5280 MHz



40 MHz BW, 5310 MHz



7.8 SAR Test Exclusion

7.8.1 Maximum Output Power (Average)

Band	Mode	Data Rate	Ch#	Frequency (MHz)	Average Power (dBm)	
					Measured	Spec. Max.
5.2 GHz (UNII 1)	802.11a	6 Mbps	36	5180	5.40	6.0
			44	5220	5.62	
			48	5240	5.34	
	802.11n [HT20]	MCS 0	36	5180	5.97	6.0
			44	5220	5.59	
			48	5240	5.67	
	802.11n [HT40]	MCS 0	38	5190	5.38	6.0
			46	5230	5.18	
5.3 GHz (UNII 2)	802.11a	6 Mbps	52	5260	4.88	6.0
			60	5300	5.04	
			64	5320	5.39	
	802.11n [HT20]	MCS 0	52	5260	5.10	6.0
			60	5300	5.33	
			64	5320	5.47	
	802.11n [HT40]	MCS 0	54	5270	4.58	6.0
			62	5310	4.71	

Note(s):
Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units. (802.11a/n OFDM configurations are considered separately.)

- When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
- When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.

7.8.2 Standalone SAR Test Exclusion 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*)] · [√f $_{(GHz)}$] ≤ 3.0, 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.

SAR exclusion calculations for antenna ≤ 50 mm from the user

Band	Freq. (MHz)	Max. Power		Distance (mm)	Threshold	Test Exclusion
		(dBm)	(mW)			
WLAN (U-NII)	5320	6.0	4	< 5	1.8	YES

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

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