**JQA File No.** : KL80130571
**Issue Date** : December 27, 2013

# TEST REPORT

| | | |
|---|---|---|
| **Applicant** | : | Sharp Corporation, Communication Systems Division |
| **Address** | : | 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, JAPAN |
| **Products** | : | Cellular Phone |
| **Model No.** | : | 303SH |
| **SERIAL NO.** | : | 004401/11/502634/2<br>004401/11/502521/1<br>004401/11/502520/3 |
| **FCC ID** | : | APYHRO00203 |
| **Test Standard** | : | CFR 47 FCC Rules and Regulations Part 15 |
| **Test Results** | : | **Passed** |
| **Date of Test** | : | December 9 ~17, 2013 |

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

Lab Accreditation
VLAC-001-2

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

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## DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT

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

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

## 1 Description of the Equipment Under Test

| | | | |
|---|---|---|---|
| 1. | Manufacturer | : | Sharp Corporation, Communication Systems Division<br>2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima, 739-0192, JAPAN |
| 2. | Products | : | Cellular Phone |
| 3. | Model No. | : | 303SH |
| 4. | Serial No. | : | 004401/11/502634/2<br>004401/11/502521/1<br>004401/11/502520/3 |
| 5. | Product Type | : | Pre-production |
| 6. | Date of Manufacture | : | November, 2013 |
| 7. | Power Rating | : | 4.0VDC (Lithium-ion Battery UBATIA235AFN1 2120mAh) |
| 8. | EUT Grounding | : | None |
| 9. | Operating Frequency | : | 5180.0 MHz(36CH) –5700.0MHz(140CH): IEEE802.11a/n/ac(20MHz)<br>5190.0 MHz(38CH) –5670.0MHz(134CH): IEEE802.11n/ac(40MHz)<br>5210.0 MHz(42CH) –5530.0MHz(106CH): IEEE802.11n/ac(80MHz) |
| 10. | Modulation | : | OFDM |
| 11. | Antenna type | : | Inverted-L Type Antenna |
| 12. | Category | : | Spread Spectrum Transmitter(OFDM)/UNII* |
| 13. | EUT Authorization | : | Certification |
| 14. | Received Date of EUT | : | December 6, 2013 |

*The EUT does not apply any emission testing as specified in FCC KDB 644545 (D02 and D01), Because it has no function shown in the(KDB) guidance.

## 2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations Part 15 – Radio Frequency Devices
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:

S. Kino

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

Tested by:

Shigeru Osawa

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

## 3 Test Procedure

The tests documented in this report were performed in accordance with
CFR 47 FCC Rules and Regulations Part 15
Subpart E – Unlicensed National Information Infrastructure Devices

ANSI C63.4–2003
The test set-up was made in accordance to the general provisions of ANSI C63.4-2003.

ANSI C63.10–2009
Testing unlicensed wireless devices.

KDB 789033 D01
General UNII Test Procedures v01r03: April 8, 2013

FCC 06-96
Compliance measurement procedures for Unlicensed National Information Infrastructure Devices

## 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, 2014) |
| VCCI Registration No. | : | A-0002 (Expiry date : March 30, 2014) |
| 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 20, 2014) |

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

# 6 Details of the Equipment Under Test

## 6.1 Operating Condition

Test Voltage : 4.0VDC (Internal Lithium-ion Battery UBATIA235AFN1 2120mAh)

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) –5700.0MHz(140CH): IEEE802.11a/n/ac(20MHz)
: 5190.0 MHz(38CH) –5670.0MHz(134CH): IEEE802.11n/ac(40MHz)
: 5210.0 MHz(42CH) –5530.0MHz(106CH): IEEE802.11ac(80MHz)

Receiver frequency : 5180.0 MHz(36CH) – 5700.0 MHz(140CH)

Modulation Type
1. 802.11a : OFDM
2. 802.11n/ac(20MHz) : OFDM
3. 802.11n/ac(40MHz) : OFDM
3. 802.11ac(80MHz) : OFDM

Other Clock Frequency
32.768 kHz, 19.2 MHz, 24 MHz, 27 MHz, 27.12 MHz, 48 MHz

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.

## 6.2 Test Configuration

The equipment under test (EUT) consists of :

| | Item | Manufacturer | Model No. | Serial No. | FCC ID |
|---|---|---|---|---|---|
| A | Cellular Phone | Sharp | 303SH | 004401/11/502634/2*1)<br>004401/11/502521/1*2)<br>004401/11/502520/3*3) | APYHRO00203 |
| B | AC Adapter | Sharp | ZTDAA1 | -- | N/A |
| C | Earphone | Softbank Mobile | ZTCAA1 | -- | N/A |

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

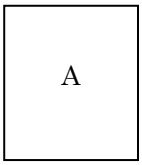
The auxiliary equipment used for testing :
None

Type of Cable:

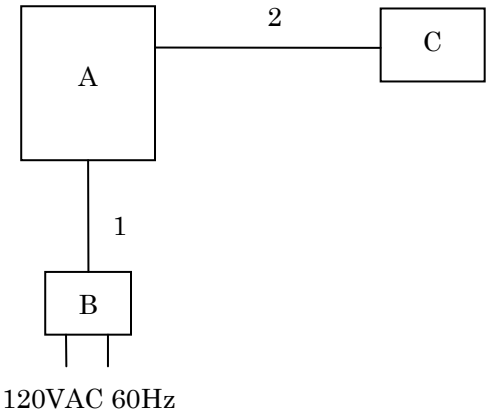
| No. | Description | Identification (Manu. etc.) | Connector Shielded | Cable Shielded | Ferrite Core | Length (m) |
|---|---|---|---|---|---|---|
| 1 | DC Power Cable (Including USB conversion cable) | -- | -- | NO | NO | 1.6 |
| 2 | Earphone Cable | -- | -- | NO | NO | 0.5 |

### 6.3 Test Arrangement (Drawings)

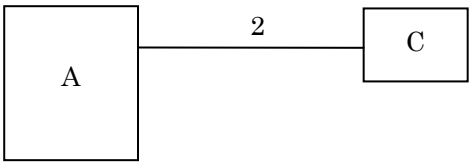
a) Single Unit




b) AC Adapter used




c) Earphone used



## 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) | 10.71 | 10.53 | 10.70 | 10.77 | 10.69 | 10.87 | 10.35 | 10.63 | 10.57 |

The TX rate 6Mbps was maximum case.(MCS0)

**802.11n (20MHz)**

| Channel | 36 | 44 | 48 | 52 | 56 | 64 | 100 | 116 | 140 |
|---|---|---|---|---|---|---|---|---|---|
| Frequency(MHz) | 5180 | 5220 | 5240 | 5260 | 5280 | 5320 | 5500 | 5580 | 5700 |
| Power(dBm) | 10.73 | 10.53 | 10.96 | 10.71 | 10.82 | 10.82 | 10.53 | 10.59 | 10.64 |

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

**802.11n (40MHz)**

| Channel | 38 | 46 | 54 | 62 | 102 | 134 |
|---|---|---|---|---|---|---|
| Frequency(MHz) | 5190 | 5230 | 5270 | 5310 | 5510 | 5670 |
| Power(dBm) | 10.78 | 10.67 | 10.76 | 10.82 | 10.55 | 10.59 |

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

**802.11ac(80MHz)**

| Channel | 42 | 58 | 106 |
|---|---|---|---|
| Frequency(MHz) | 5210 | 5290 | 5530 |
| Power(dBm) | 10.97 | 10.92 | 10.89 |

The TX rate 29.3Mbps was maximum case.(MCS0)

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

# 7 Details of the Test Item

## 7.0 Summary of the Test Results

| Test Item | FCC Specification | Reference of the Test Report | Results | Remarks |
|---|---|---|---|---|
| 26dB Bandwidth | Section 15.407(a)(1)(2)(3) | Section 7.1 | - | - |
| Maximum Conducted Output Power | Section 15.407(a)(1)(2)(3) | Section 7.2 | Passed | - |
| Peak Power Spectral Density | Section 15.407(a)(1)(2)(3) | Section 7.3 | Passed | - |
| Peak Excursion | Section 15.407(a)(6) | Section 7.4 | Passed | - |
| AC Powerline Conducted Emission | Section 15.407(b)(6)<br>Section 15.207 | Section 7.5 | Passed | - |
| Unwanted Radiated Emission | Section 15.407(b)<br>Section 15.205<br>Section 15.209 | Section 7.6 | Passed | - |
| Dynamic Frequency Selection | Section 15.407(h)(2) | Section 7.7 | Passed | - |

## 7.1 26dB Bandwidth

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

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

### 7.1.1 Worst Point and Measurement Uncertainty

Reporting Purpose (No limitation applied)

Uncertainty of Measurement Results +/- 0.9 %

Remarks : _____

### 7.1.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

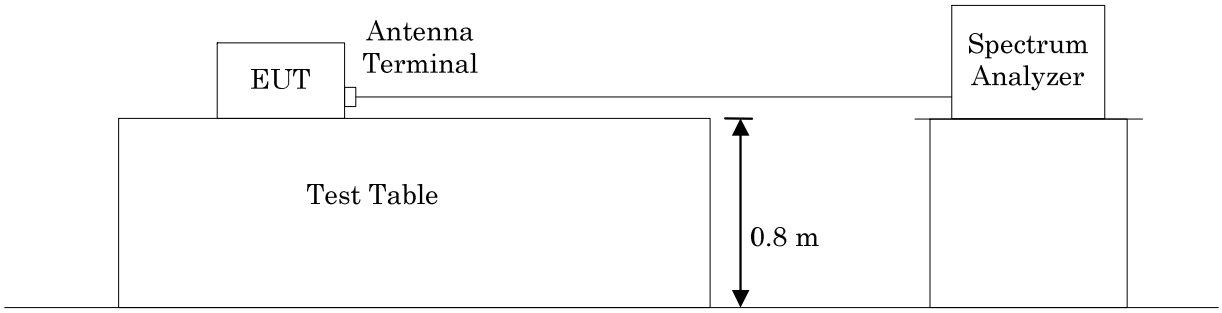
### 7.1.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2013/7 | 1 Year |
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2013/9 | 1 Year |

### 7.1.4 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 D01 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.

(referred documentation is No. G70364M)



### 7.1.5 Test Data

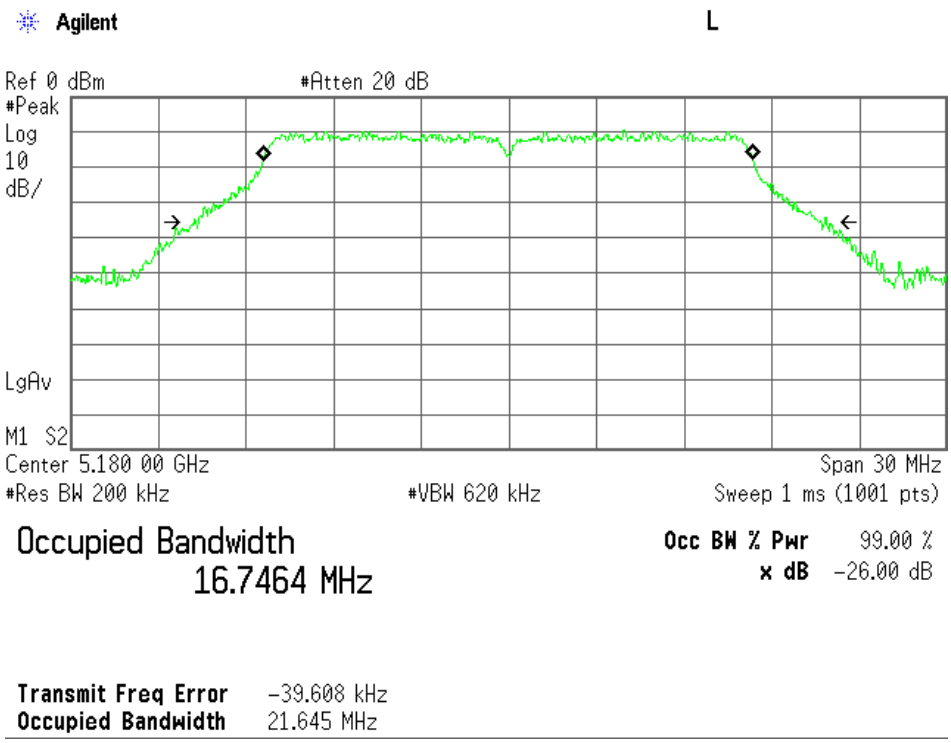
#### 7.1.5.1 802.11a 26dB/ 99% OBW data

Test Date : December 10, 2013
Temp.: 22°C, Humi: 45%

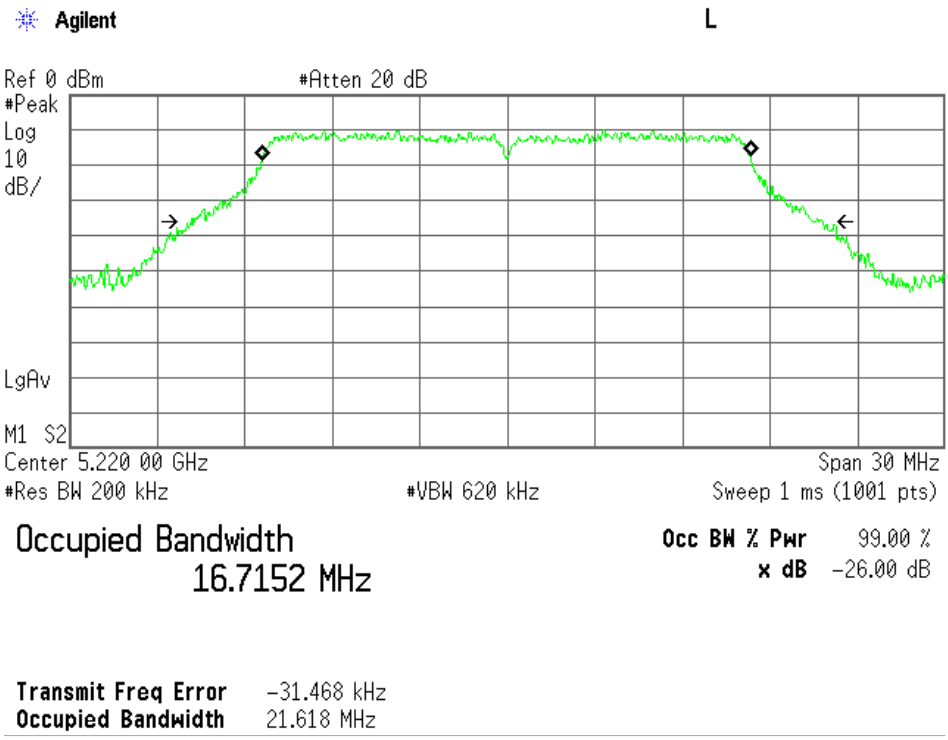
Mode of EUT: TX 802.11a
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | 26dB OBW (MHz) | 99% OBW (MHz) |
|---|---|---|---|
| 36 | 5180 | 21.645 | 16.746 |
| 44 | 5220 | 21.618 | 16.715 |
| 48 | 5240 | 21.454 | 16.724 |
| 52 | 5260 | 21.876 | 16.743 |
| 56 | 5280 | 21.839 | 16.755 |
| 64 | 5320 | 21.701 | 16.737 |
| 100 | 5500 | 21.580 | 16.725 |
| 116 | 5580 | 21.558 | 16.733 |
| 140 | 5700 | 21.571 | 16.723 |

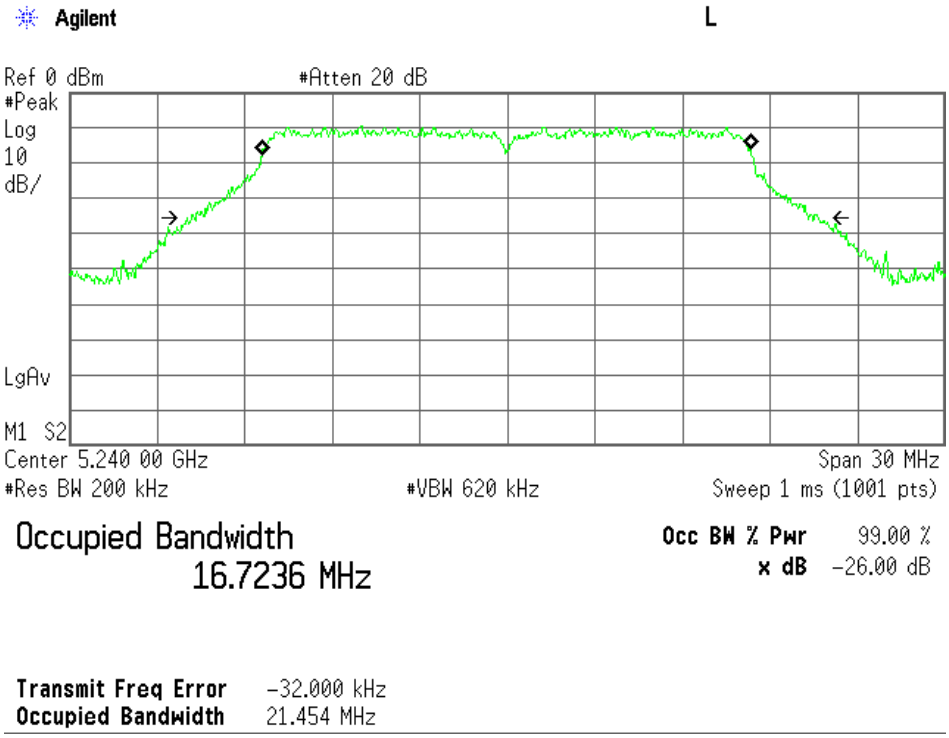
802.11a 36ch (5180 MHz)



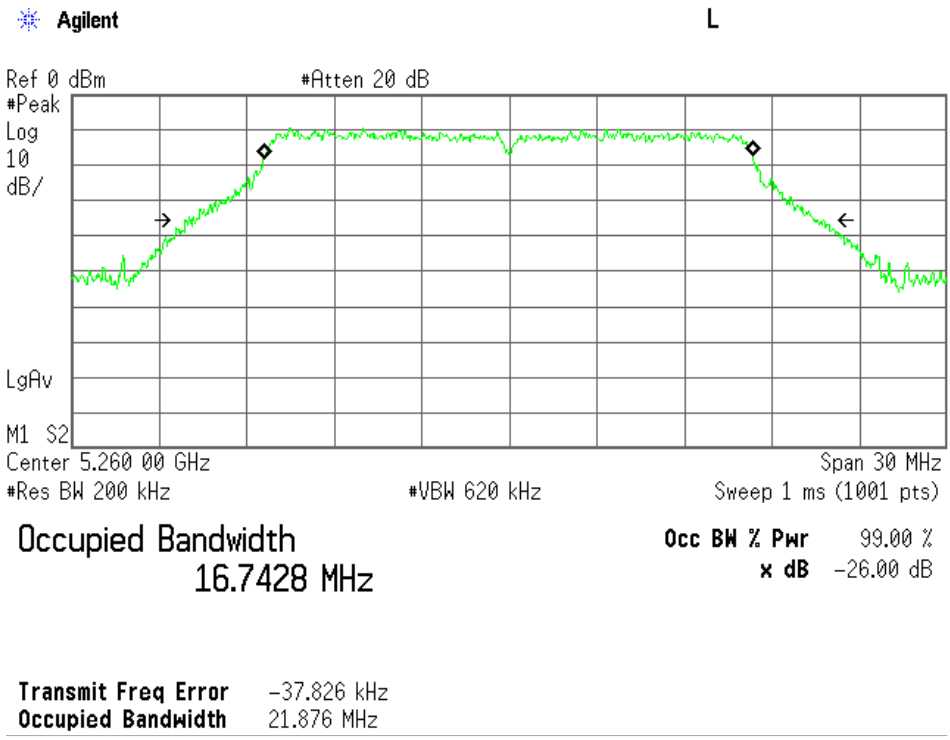
802.11a 44ch (5220 MHz)



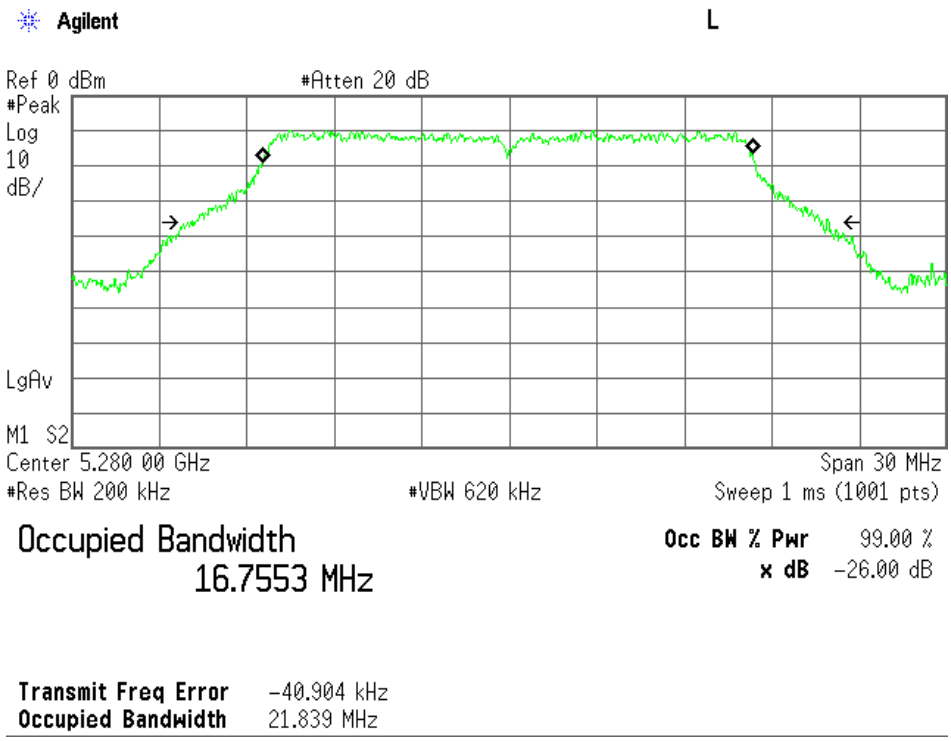

802.11a 48ch (5240 MHz)



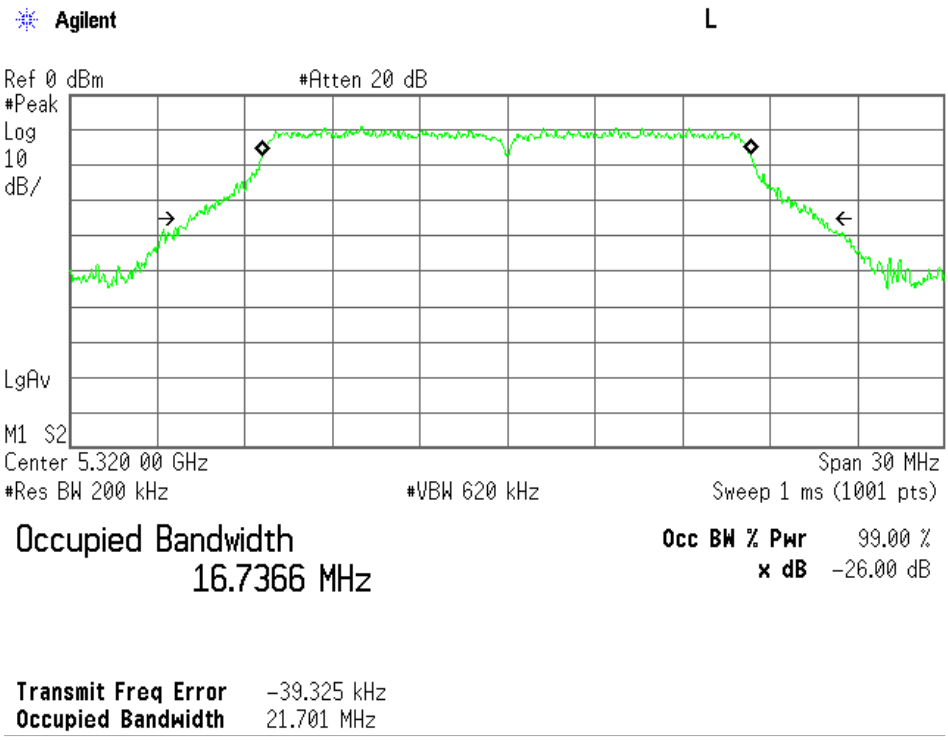
802.11a 52ch (5260 MHz)



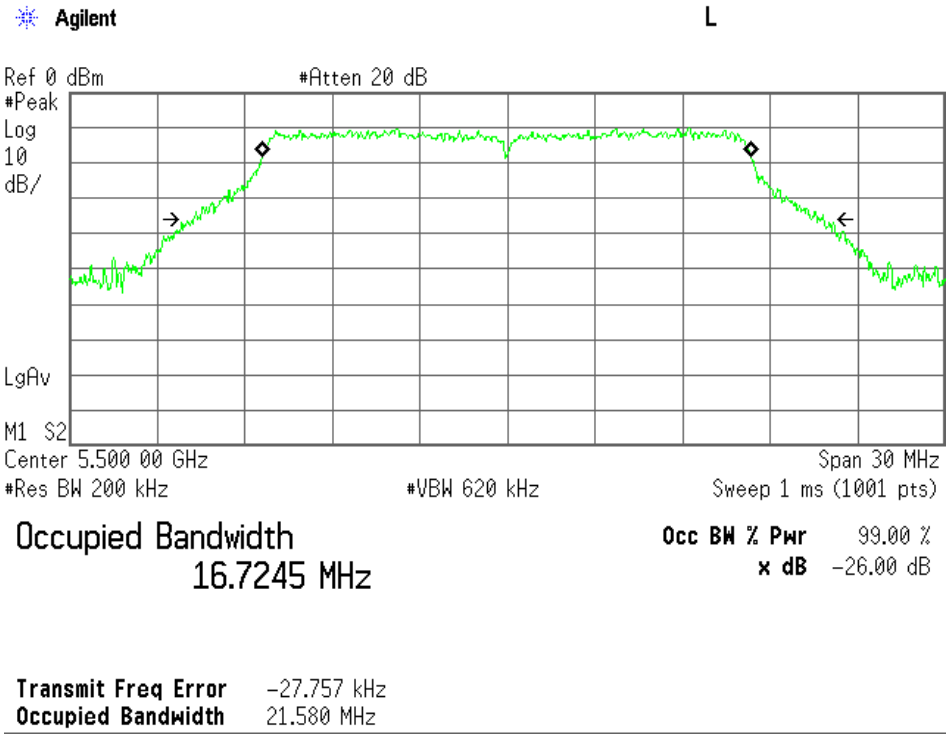

802.11a 56ch (5280 MHz)



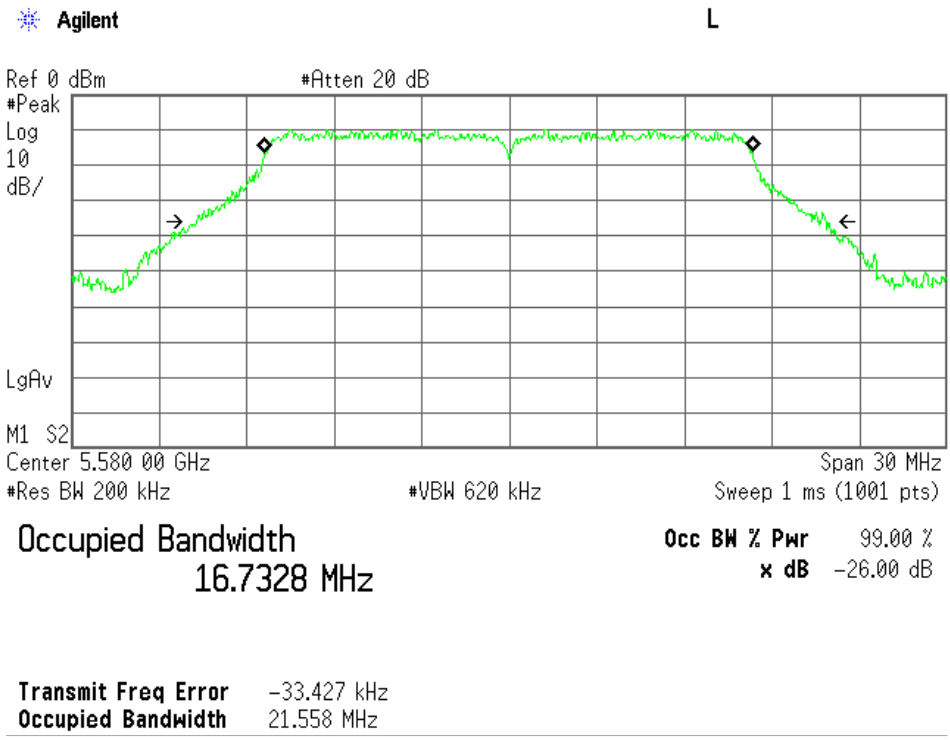
802.11a 64ch (5320 MHz)



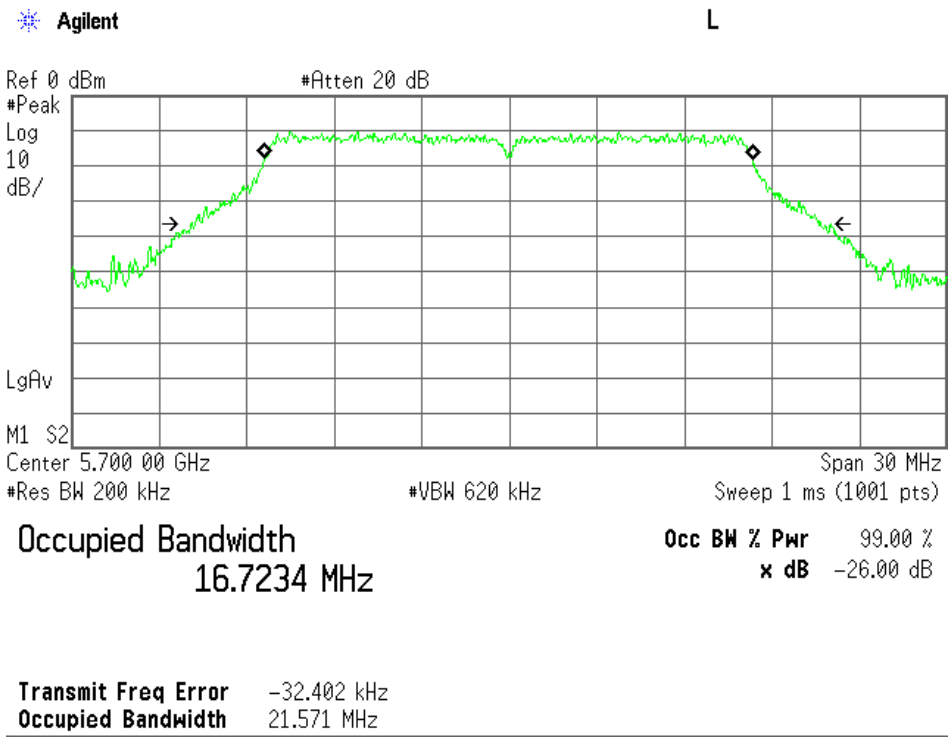

802.11a 100ch (5500 MHz)



802.11a 116ch (5580 MHz)




802.11a 140ch (5700 MHz)

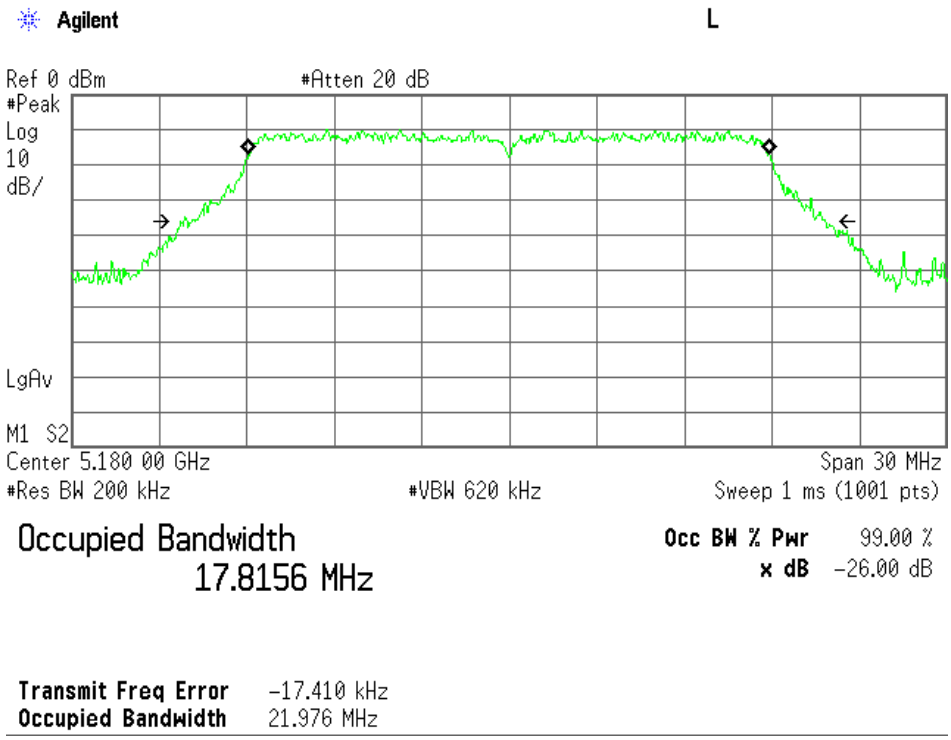


### 7.1.5.2 802.11n (20 MHz) 26dB/ 99% OBW data

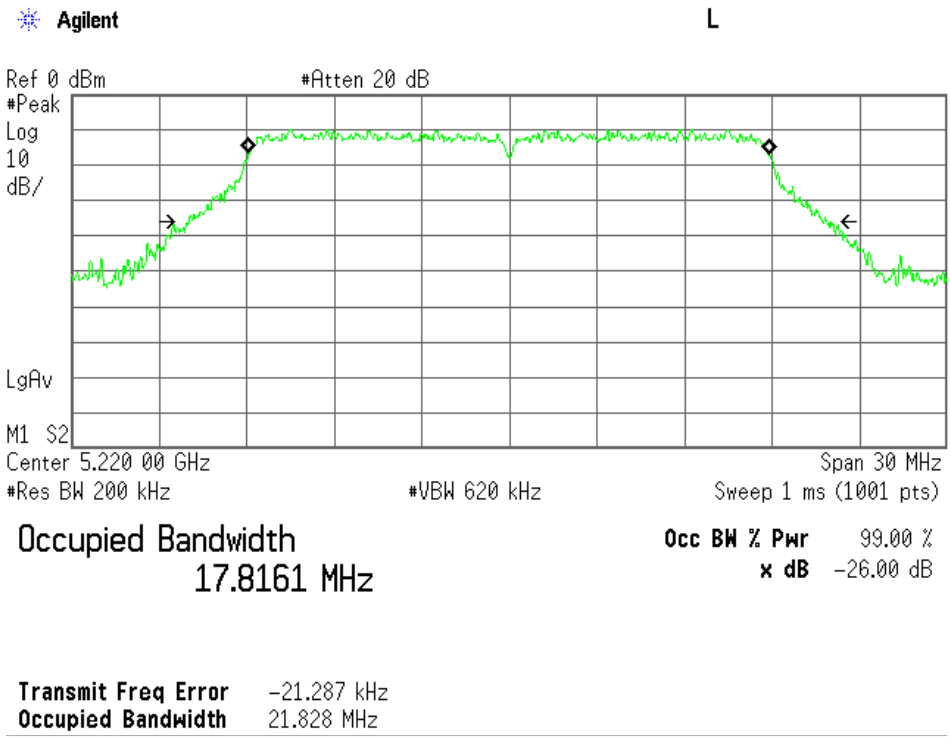
Mode of EUT: Tx 802.11n(20 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | 26dB OBW (MHz) | 99% OBW (MHz) |
|---|---|---|---|
| 36 | 5180 | 21.976 | 17.816 |
| 44 | 5220 | 21.828 | 17.816 |
| 48 | 5240 | 22.135 | 17.794 |
| 52 | 5260 | 21.840 | 17.839 |
| 56 | 5280 | 22.022 | 17.825 |
| 64 | 5320 | 22.033 | 17.832 |
| 100 | 5500 | 22.348 | 17.822 |
| 116 | 5580 | 22.267 | 17.808 |
| 140 | 5700 | 22.116 | 17.815 |

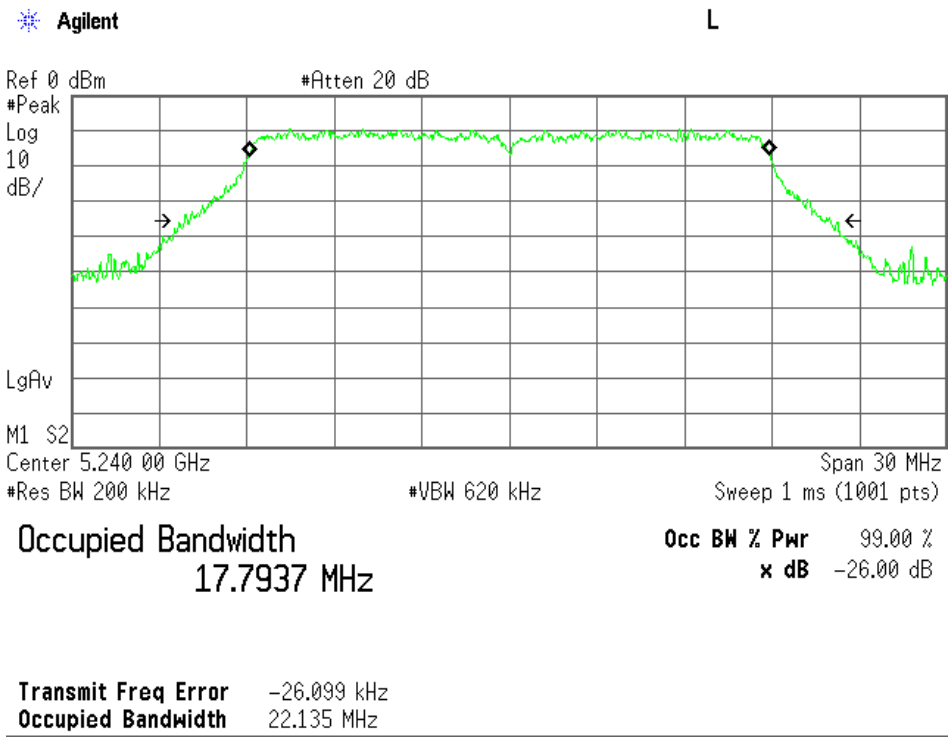
802.11n (20 MHz) 36ch (5180 MHz)



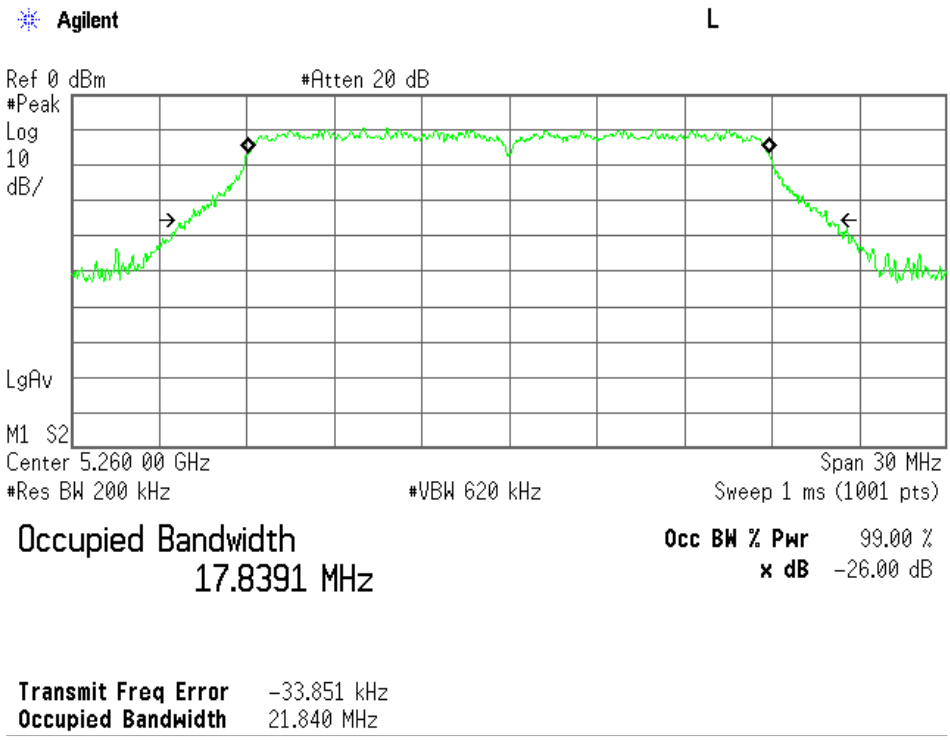
802.11n (20 MHz) 44ch (5220 MHz)



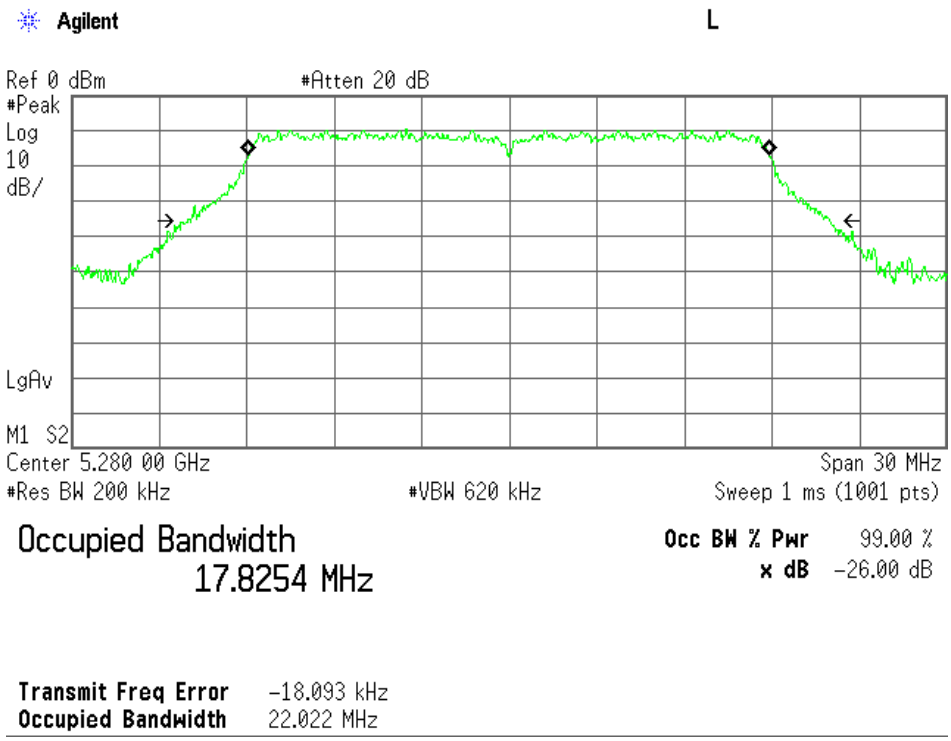

802.11n (20 MHz) 48ch (5240 MHz)



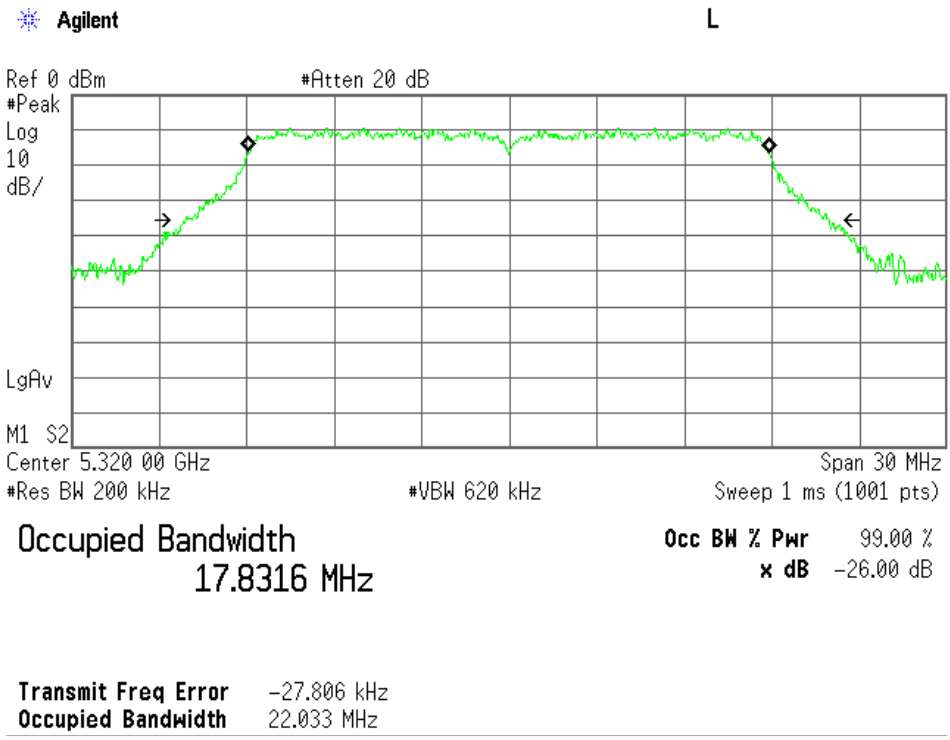
802.11n (20 MHz) 52ch (5260 MHz)



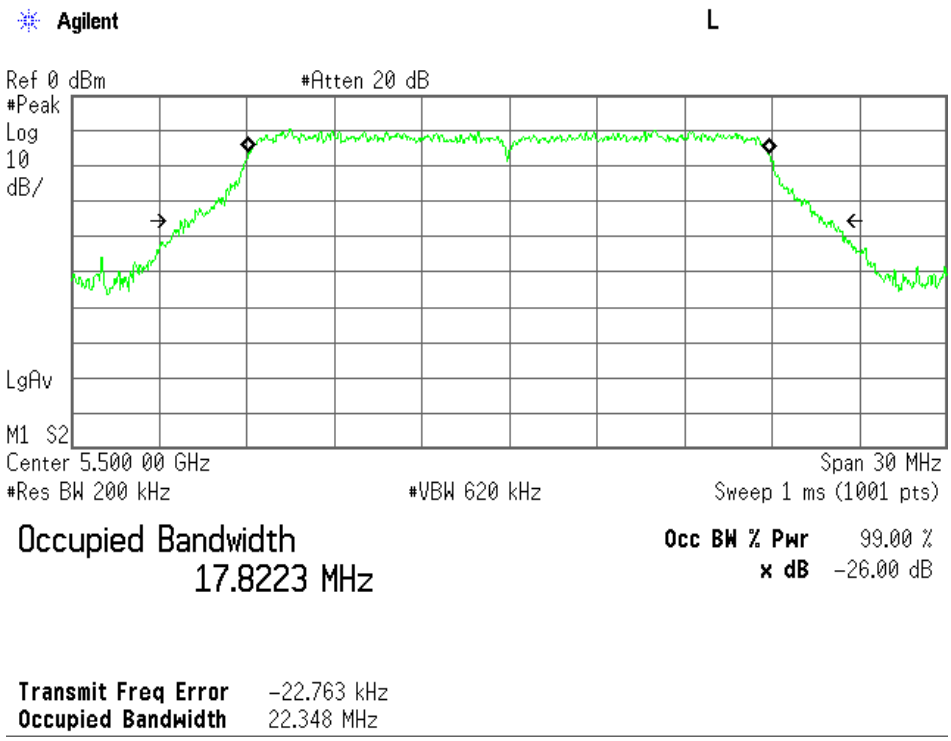

802.11n (20 MHz) 56ch (5280 MHz)



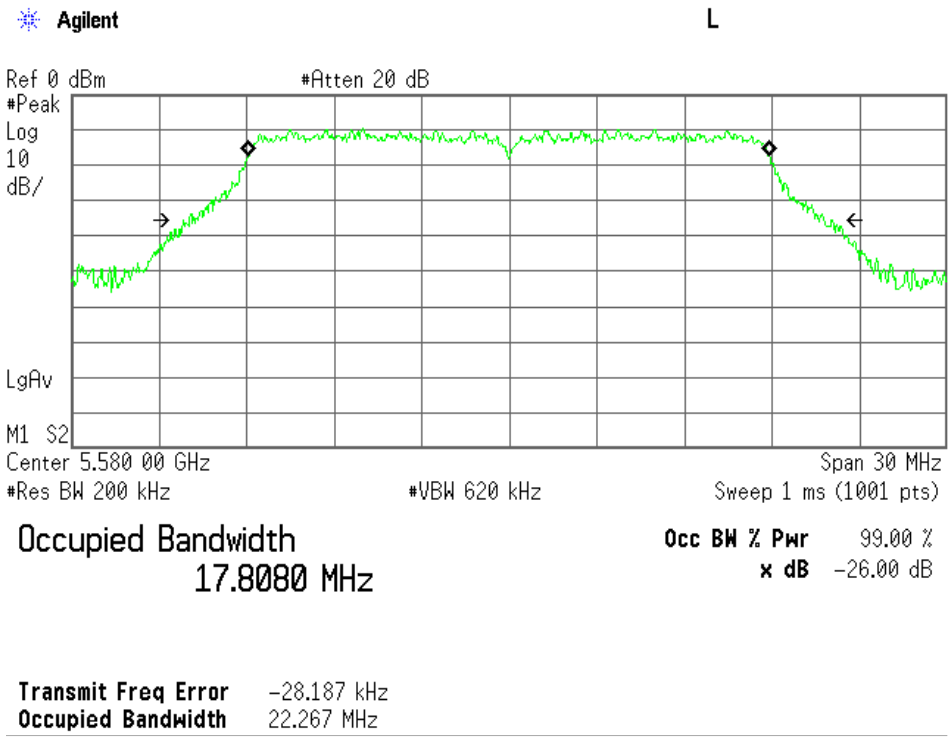
802.11n (20 MHz) 64ch (5320 MHz)



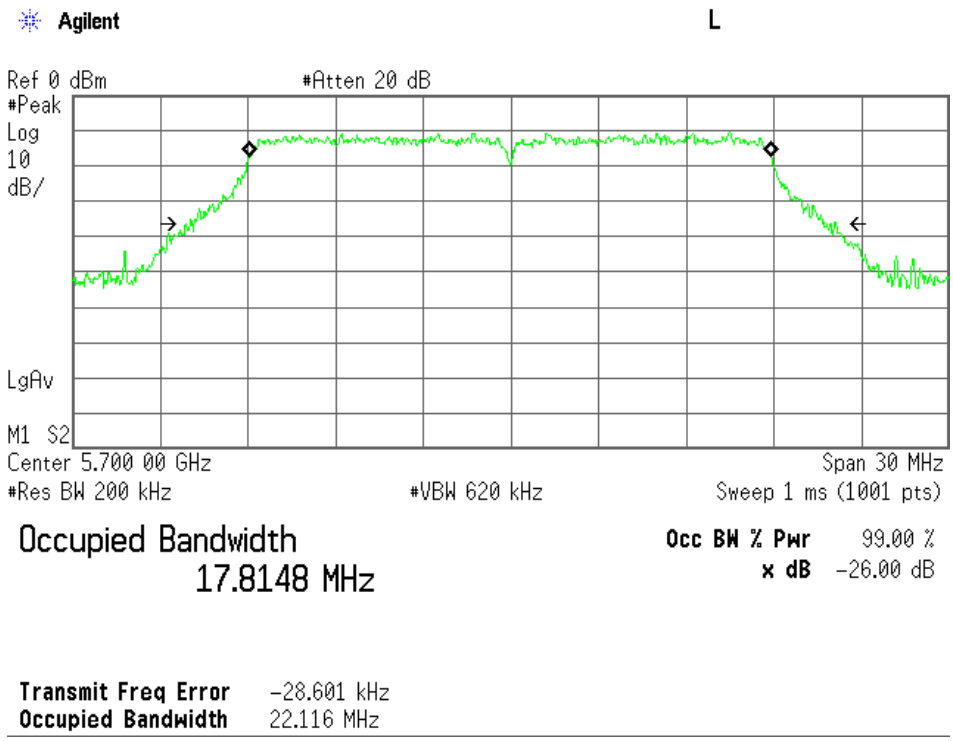

802.11n (20 MHz) 100ch (5500 MHz)



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




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

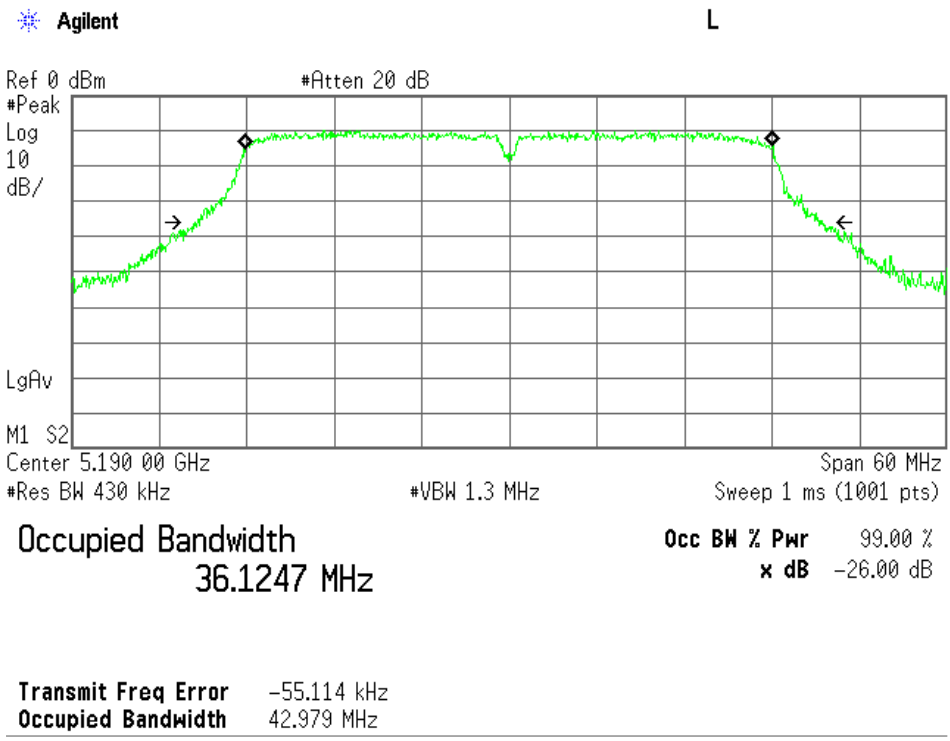


### 7.1.5.3 802.11n (40 MHz) 26dB/ 99% OBW data

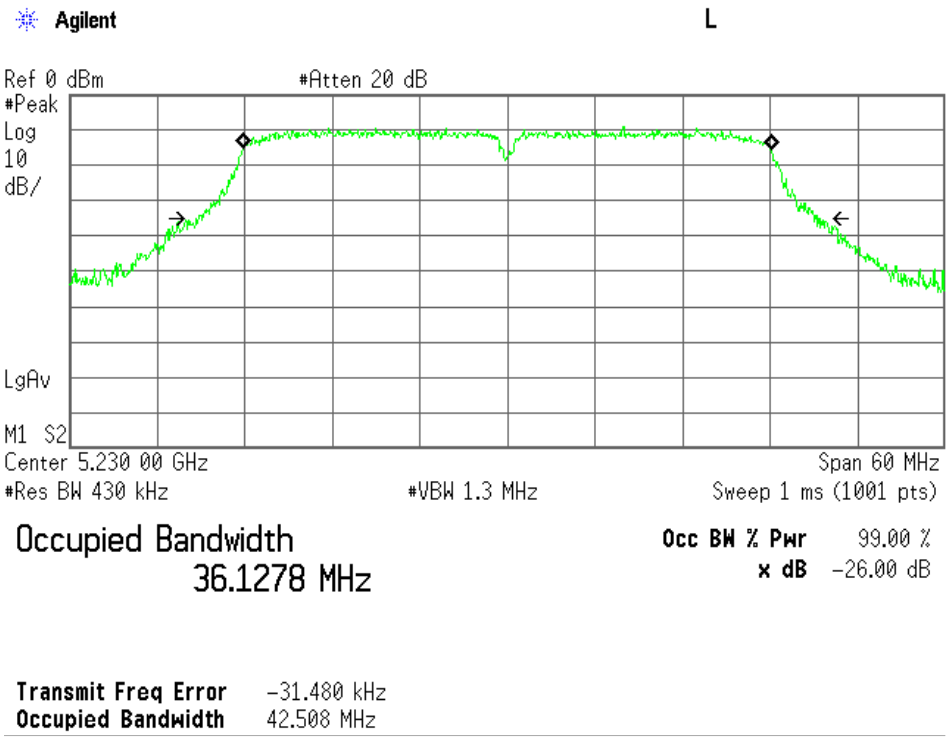
Mode of EUT: Tx 802.11n(40 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | 26dB OBW (MHz) | 99% OBW (MHz) |
|---|---|---|---|
| 38 | 5190 | 42.979 | 36.125 |
| 46 | 5230 | 42.508 | 36.128 |
| 54 | 5270 | 43.158 | 36.133 |
| 62 | 5310 | 42.833 | 36.159 |
| 102 | 5510 | 43.170 | 36.156 |
| 134 | 5670 | 43.196 | 36.155 |

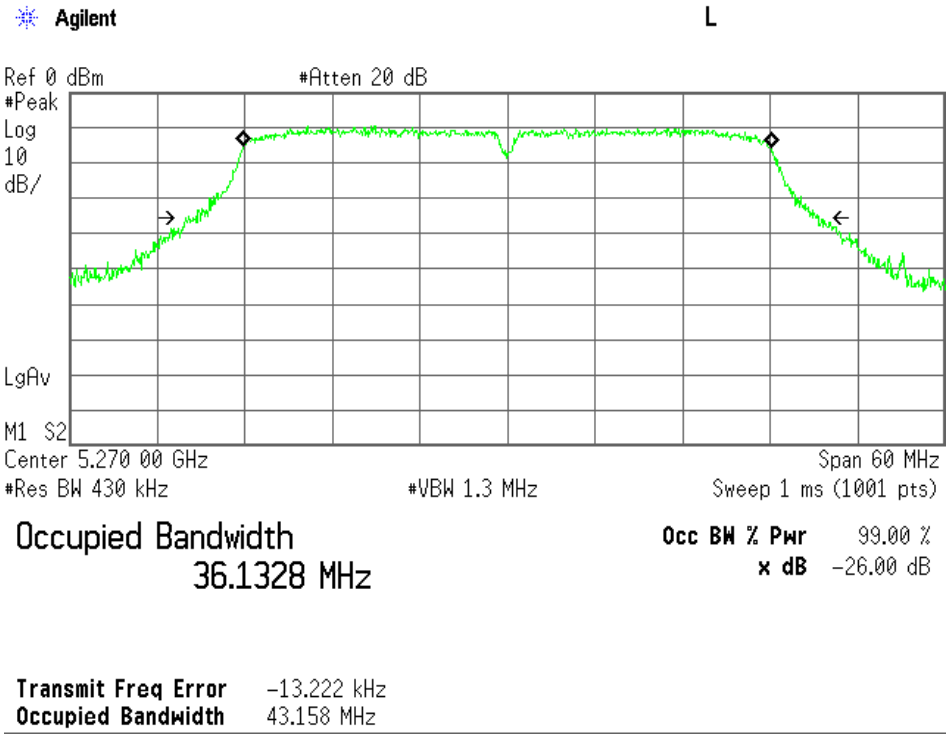
802.11n (40 MHz) 38ch (5190 MHz)



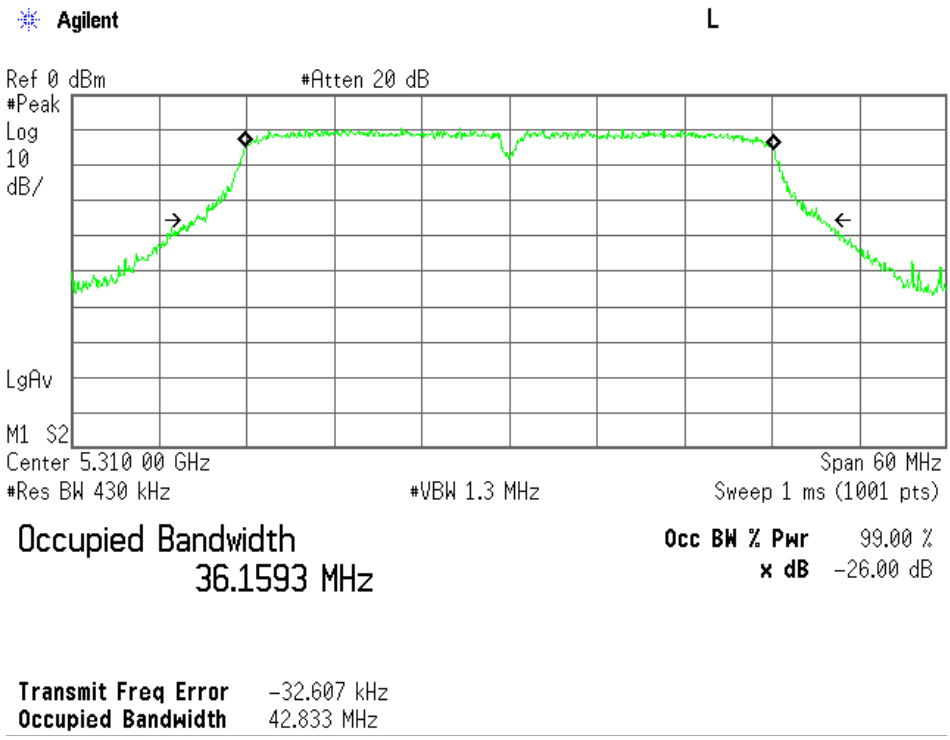
802.11n (40 MHz) 46ch (5230 MHz)



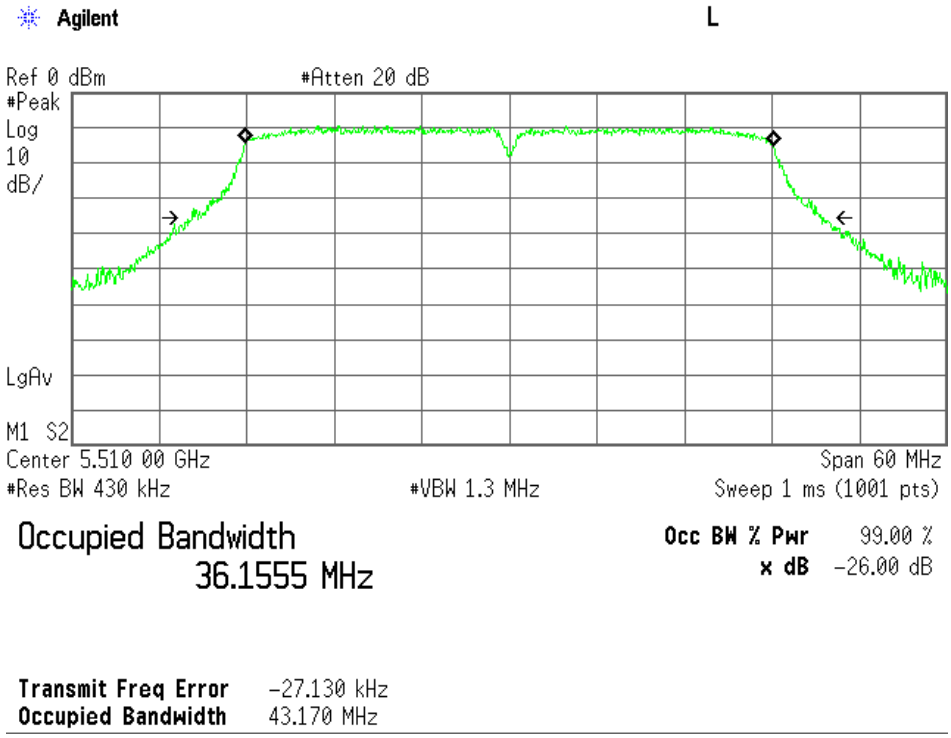

802.11n (40 MHz) 54ch (5270 MHz)



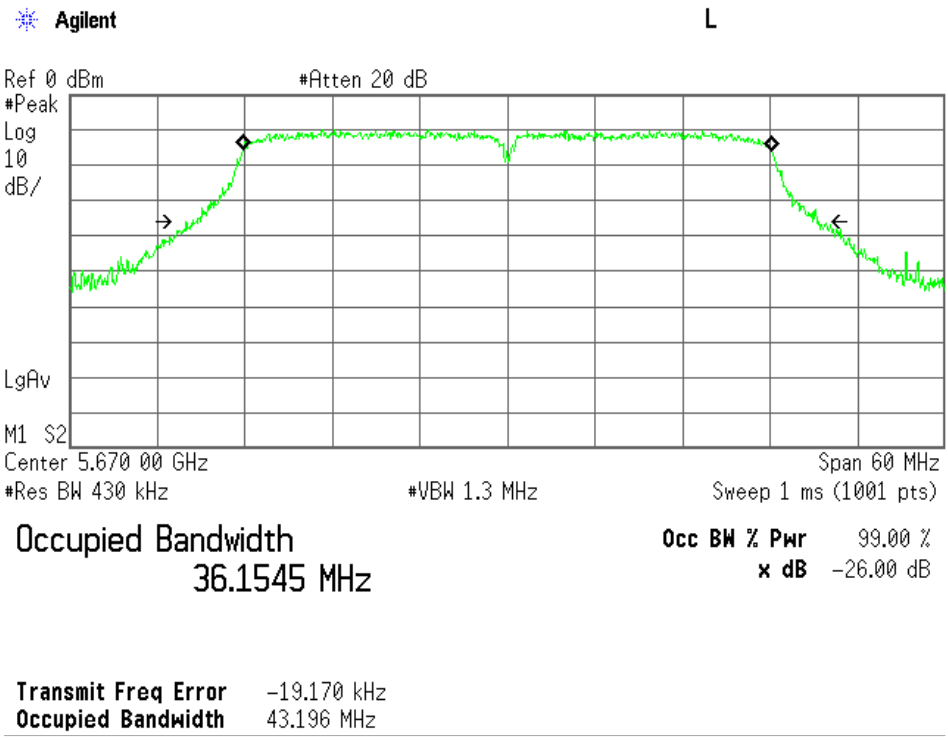
802.11n (40 MHz) 62ch (5310 MHz)




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



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

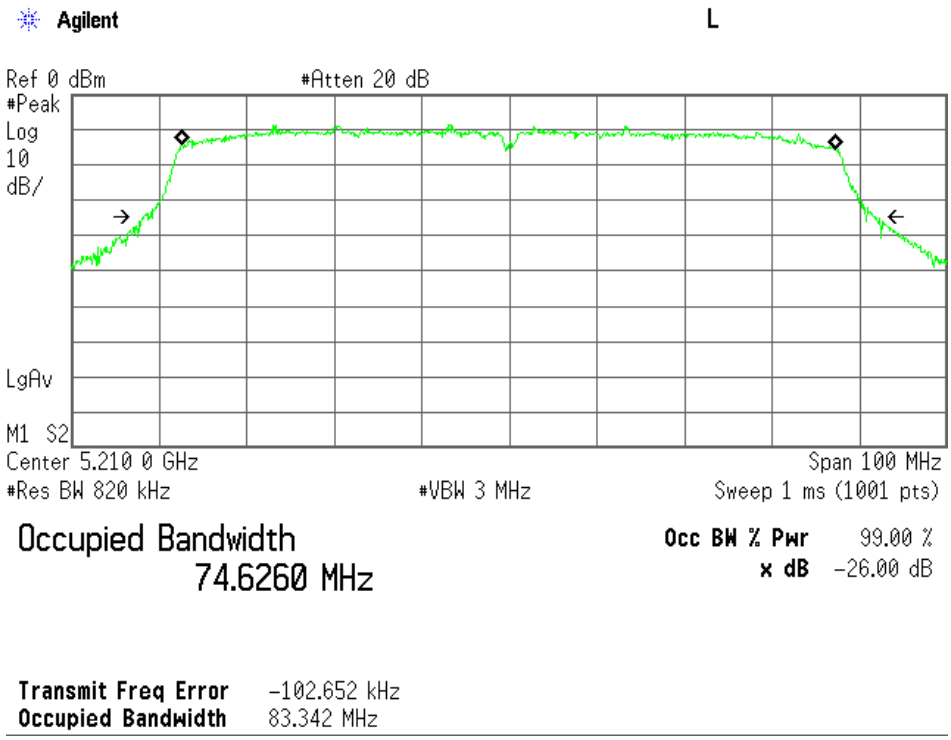


### 7.1.5.4 802.11ac (80 MHz) 26dB/ 99% OBW data

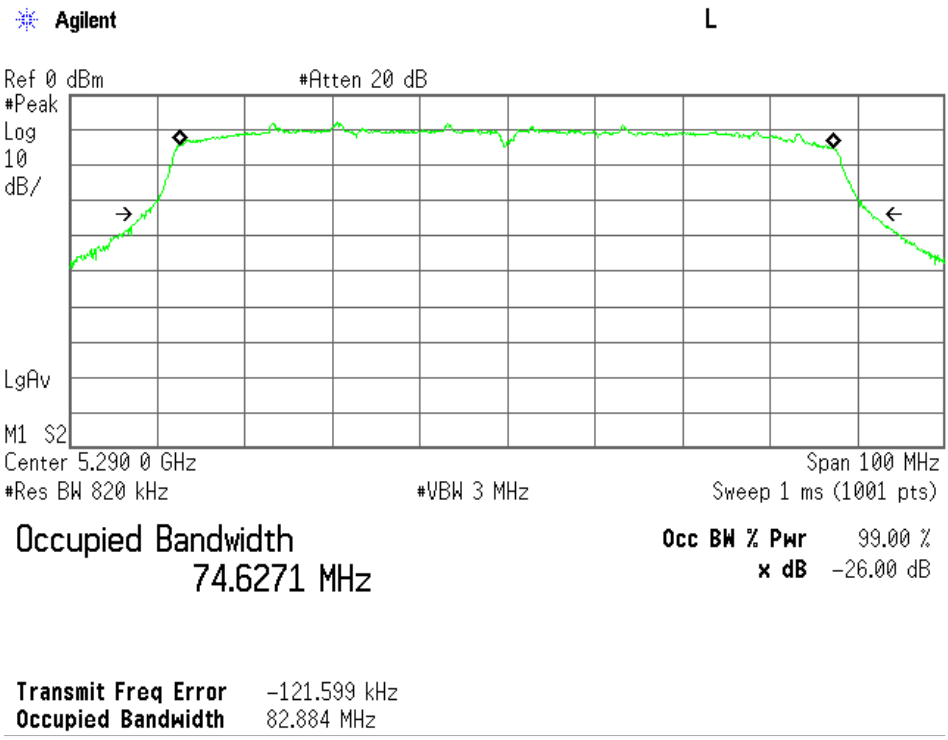
Mode of EUT: Tx 802.11ac(80 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency | 26dB OBW | 99% OBW |
|---|---|---|---|
| | (MHz) | (MHz) | (MHz) |
| 42 | 5210 | 83.342 | 74.626 |
| 58 | 5290 | 82.884 | 74.627 |
| 106 | 5530 | 83.294 | 74.594 |

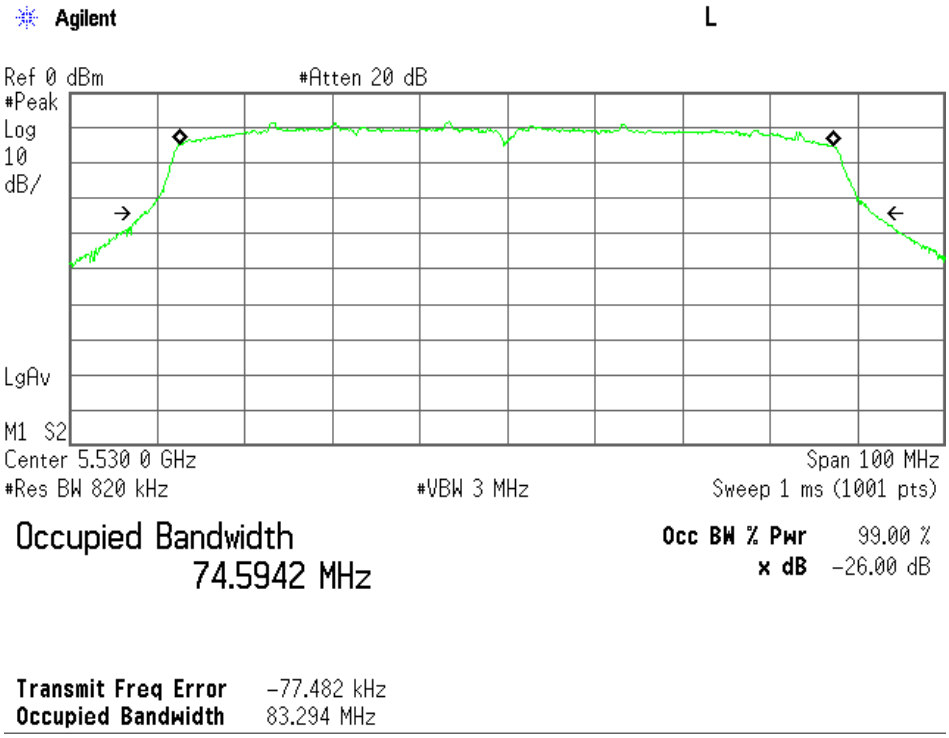
802.11ac (80 MHz) 42ch (5210 MHz)



802.11ac (80 MHz) 58ch (5290 MHz)




802.11ac (80 MHz) 106ch (5530 MHz)



## 7.2 Maximum Conducted Output Power

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

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

### 7.2.1 Worst Point and Measurement Uncertainty

Min. Limit Margin 6.03 dB at 5210.0 MHz

Remarks : Worst case is 802.11ac (80MHz BW) channel 42.

Max Output Power 10.97 dBm at 5210.0 MHz

Remarks : Worst case is 802.11ac (80MHz BW) channel 42.

Uncertainty of Measurement Results +/- 0.8 dB

### 7.2.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

### 7.2.3 Test Instruments

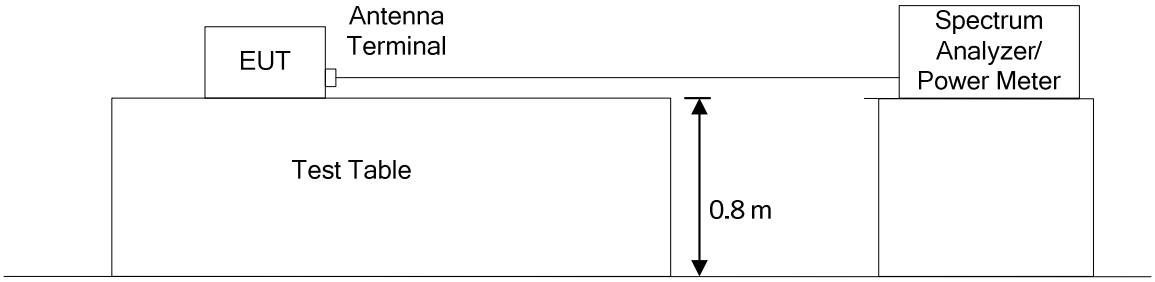
| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2013/7 | 1 Year |
| Power Mater | ML2495A | Anritsu | 210 | 2012/12 | 1 Year |
| Pulse Power Sensor | MA2411B | Anritsu | 212 | 2012/12 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2013/9 | 1 Year |
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |

### 7.2.4 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 listed above in accordance with KDB 789033 D01 Method (C) (4) "Measurement using an RF average power meter".

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 D01 Method B) (2) as follows;
Span: Zero/ RBW: 5 MHz/ VBW ≥ 5 MHz/ Sweep: Auto/ Detector: Peak

(referred documentation is No. G70364M)



### 7.2.5 Test Data

#### 7.2.5.1 802.11a Maximum conducted output power data

Test Date : December 9, 2013
Temp.: 22°C, Humi: 33%

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 | 10.40 | 0.31 | 10.71 | 21.645 | 17.00 | 6.29 |
| 44 | 5220 | 10.41 | 0.12 | 10.53 | 21.618 | 17.00 | 6.47 |
| 48 | 5240 | 10.41 | 0.29 | 10.70 | 21.454 | 17.00 | 6.30 |
| 52 | 5260 | 10.42 | 0.35 | 10.77 | 21.876 | 24.00 | 13.23 |
| 56 | 5280 | 10.42 | 0.27 | 10.69 | 21.839 | 24.00 | 13.31 |
| 64 | 5320 | 10.42 | 0.45 | 10.87 | 21.701 | 24.00 | 13.13 |
| 100 | 5500 | 10.43 | -0.08 | 10.35 | 21.580 | 24.00 | 13.65 |
| 116 | 5580 | 10.43 | 0.20 | 10.63 | 21.558 | 24.00 | 13.37 |
| 140 | 5700 | 10.45 | 0.12 | 10.57 | 21.571 | 24.00 | 13.43 |

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)
Power = Correction Factor + Meter Reading = 10.40 + (0.31) = 10.71 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11a/ TX rate 6 Mbps is 0.06 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 17 dBm(50 mW) or 4 dBm + 10log EBW.
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.

#### 7.2.5.2 802.11n (20 MHz) Maximum conducted output power data

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) | EBW (MHz) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 36 | 5180 | 10.40 | 0.33 | 10.73 | 21.976 | 17.00 | 6.27 |
| 44 | 5220 | 10.41 | 0.12 | 10.53 | 21.828 | 17.00 | 6.47 |
| 48 | 5240 | 10.41 | 0.55 | 10.96 | 22.135 | 17.00 | 6.04 |
| 52 | 5260 | 10.42 | 0.29 | 10.71 | 21.840 | 24.00 | 13.29 |
| 56 | 5280 | 10.42 | 0.40 | 10.82 | 22.022 | 24.00 | 13.18 |
| 64 | 5320 | 10.42 | 0.40 | 10.82 | 22.033 | 24.00 | 13.18 |
| 100 | 5500 | 10.43 | 0.10 | 10.53 | 22.348 | 24.00 | 13.47 |
| 116 | 5580 | 10.43 | 0.16 | 10.59 | 22.267 | 24.00 | 13.41 |
| 140 | 5700 | 10.45 | 0.19 | 10.64 | 22.116 | 24.00 | 13.36 |

The test results (Power) is calculated as follows;
For 36 channel (5180 MHz)
Power = Correction Factor + Meter Reading = 10.40 + (0.33) = 10.73 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n(20 MHz) / TX rate 6.5 Mbps is 0.06 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 17 dBm(50 mW) or 4 dBm + 10log EBW.
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.

### 7.2.5.3 802.11n (40 MHz) Maximum conducted output power data

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 | 10.47 | 0.31 | 10.78 | 42.979 | 17.00 | 6.22 |
| 46 | 5230 | 10.48 | 0.19 | 10.67 | 42.508 | 17.00 | 6.33 |
| 54 | 5270 | 10.49 | 0.27 | 10.76 | 43.158 | 24.00 | 13.24 |
| 62 | 5310 | 10.49 | 0.33 | 10.82 | 42.833 | 24.00 | 13.18 |
| 102 | 5510 | 10.50 | 0.05 | 10.55 | 43.170 | 24.00 | 13.45 |
| 134 | 5670 | 10.52 | 0.07 | 10.59 | 43.196 | 24.00 | 13.41 |

The test results (Power) is calculated as follows;
For 38 channel (5190 MHz)
Power = Correction Factor + Meter Reading = 10.47 + (0.31) = 10.78 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n(40 MHz) / TX rate 13.5 Mbps is 0.13 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 17 dBm(50 mW) or 4 dBm + 10log EBW.
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.

### 7.2.5.4 802.11ac (80 MHz) Maximum conducted output power data

Mode of EUT: Tx Mode (802.11ac: 80 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | Correction Factor(dB) | Meter Reading(dBm) | Power (dBm) | EBW (MHz) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 42 | 5210 | 10.68 | 0.29 | 10.97 | 83.342 | 17.00 | 6.03 |
| 58 | 5290 | 10.70 | 0.22 | 10.92 | 82.884 | 24.00 | 13.08 |
| 106 | 5530 | 10.71 | 0.18 | 10.89 | 83.294 | 24.00 | 13.11 |

The test results (Power) is calculated as follows;
For 38 channel (5210 MHz)
Power = Correction Factor + Meter Reading = 10.68 + (0.29) = 10.97 dBm
Correction Factor = cable loss + 10 dB attenuator + Duty Factor
Duty Factor at 802.11n(40 MHz) / TX rate 13.5 Mbps is 0.34 dB
Frequency range 5150 MHz to 5250 MHz Limitation is lesser of 17 dBm(50 mW) or 4 dBm + 10log EBW.
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.

## 7.3 Peak Power Spectral Density

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

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

### 7.3.1 Worst Point and Measurement Uncertainty

Min. Limit Margin 3.82 dB at 5240.0 MHz

Uncertainty of Measurement Results +/- 1.2 dB

Remarks : Worst case is 802.11a channel 48.

### 7.3.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

### 7.3.3 Test Instruments

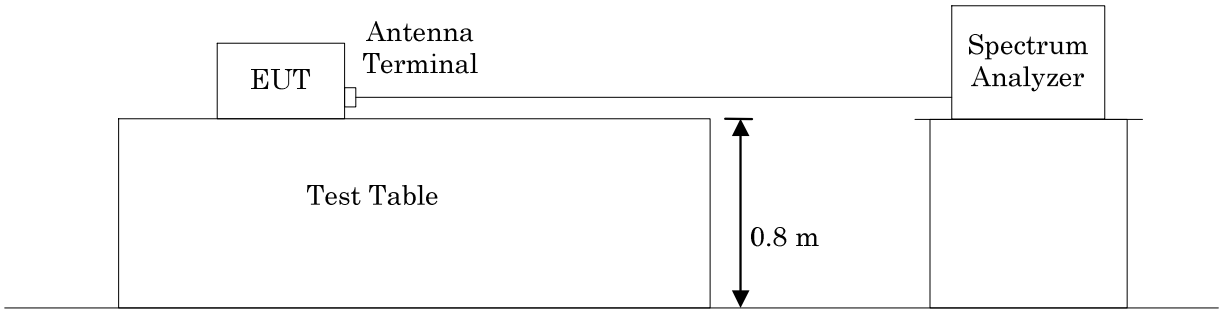
| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2013/7 | 1 Year |
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2013/9 | 1 Year |

### 7.3.4 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 D01 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.

(referred documentation is No. G70364M)



### 7.3.5 Test Data

#### 7.3.5.1 802.11a Peak power spectral density data

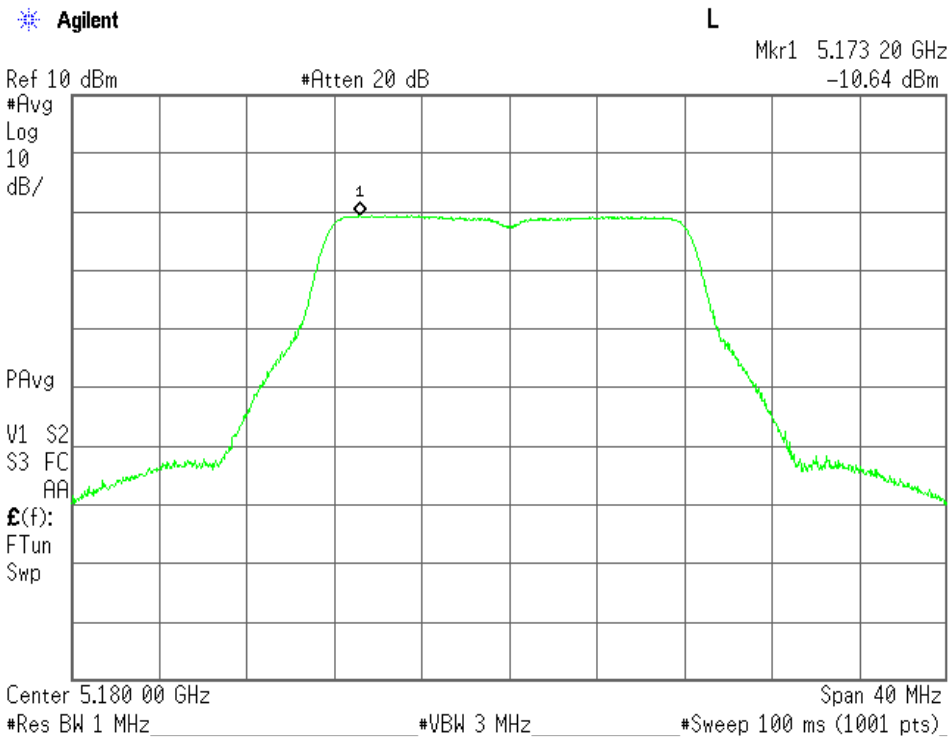
Test Date : December 10, 2013
Temp.: 22°C, Humi: 45%

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

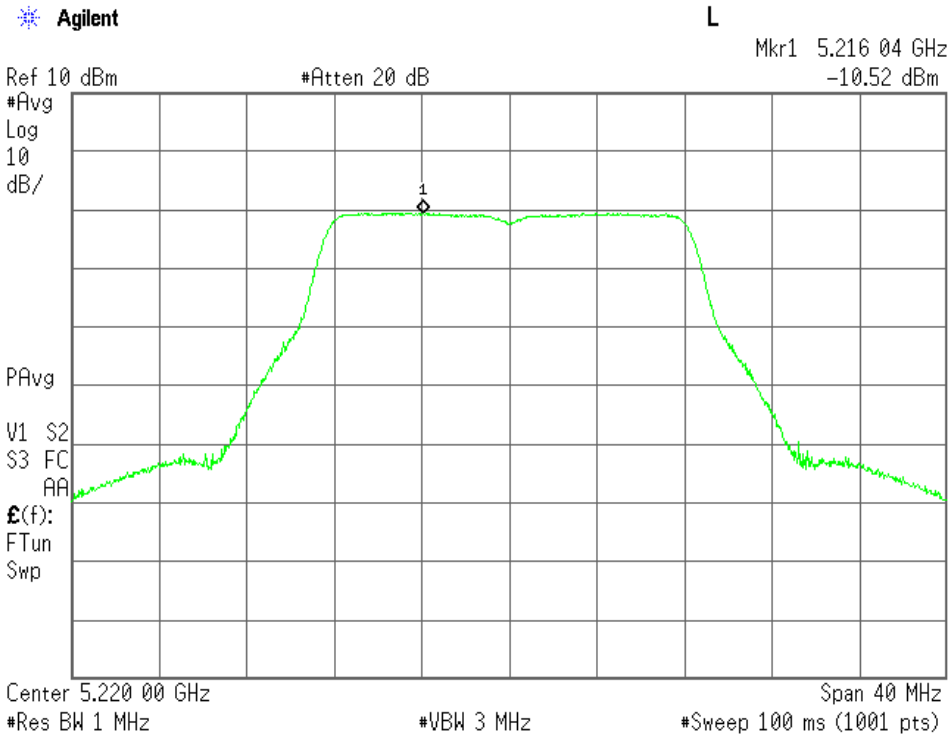
| Channel | Frequency (MHz) | Correction Factor(dB) | Meter Reading(dBm) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| 36 | 5180 | 10.34 | -10.64 | -0.30 | 4.00 | 4.30 |
| 44 | 5220 | 10.35 | -10.52 | -0.17 | 4.00 | 4.17 |
| 48 | 5240 | 10.35 | -10.17 | 0.18 | 4.00 | 3.82 |
| 52 | 5260 | 10.36 | -10.80 | -0.44 | 11.00 | 11.44 |
| 56 | 5280 | 10.36 | -10.51 | -0.15 | 11.00 | 11.15 |
| 64 | 5320 | 10.36 | -10.10 | 0.26 | 11.00 | 10.74 |
| 100 | 5500 | 10.37 | -10.41 | -0.04 | 11.00 | 11.04 |
| 116 | 5580 | 10.37 | -10.52 | -0.15 | 11.00 | 11.15 |
| 140 | 5700 | 10.39 | -10.90 | -0.51 | 11.00 | 11.51 |

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.34 + (-10.64) = -0.30 dBm
Correction Factor = cable loss + 10 dB attenuator

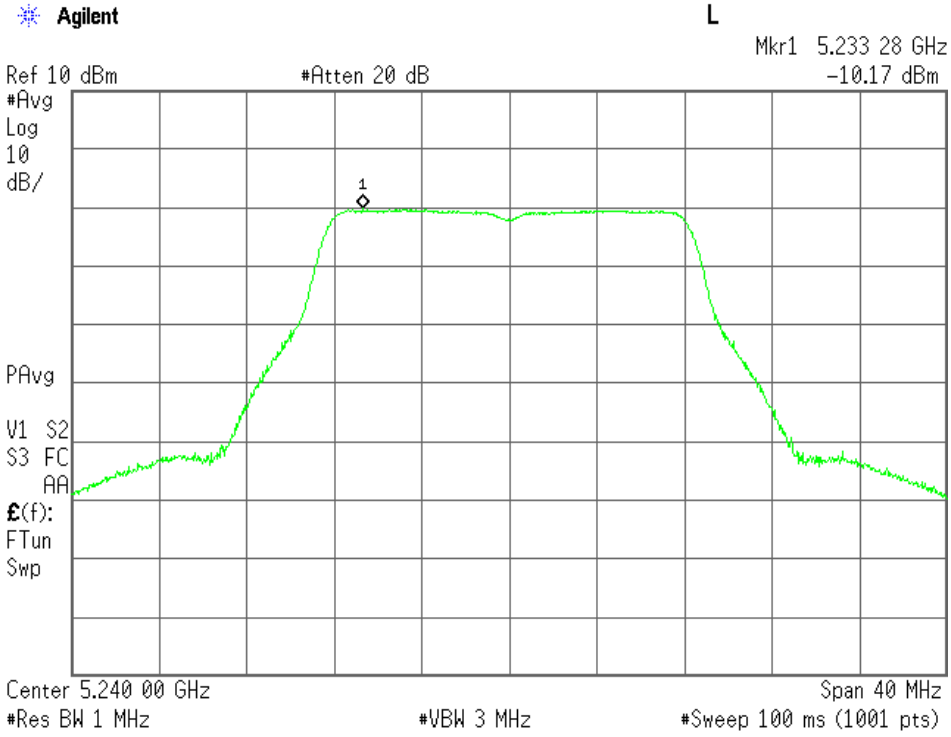
802.11a 36ch (5180 MHz)



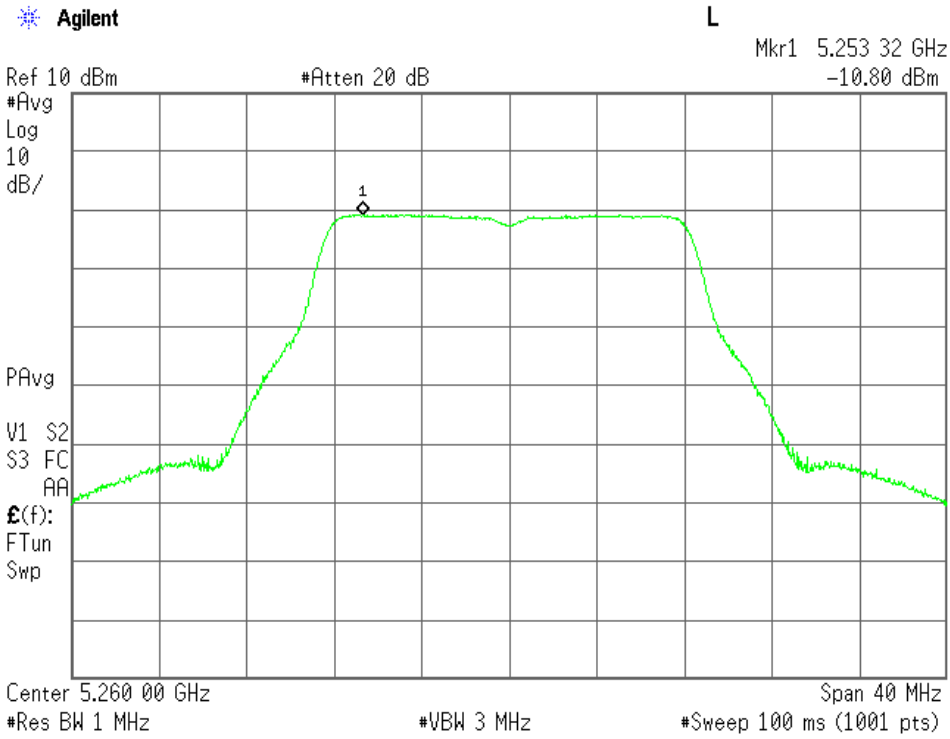
802.11a 44ch (5220 MHz)



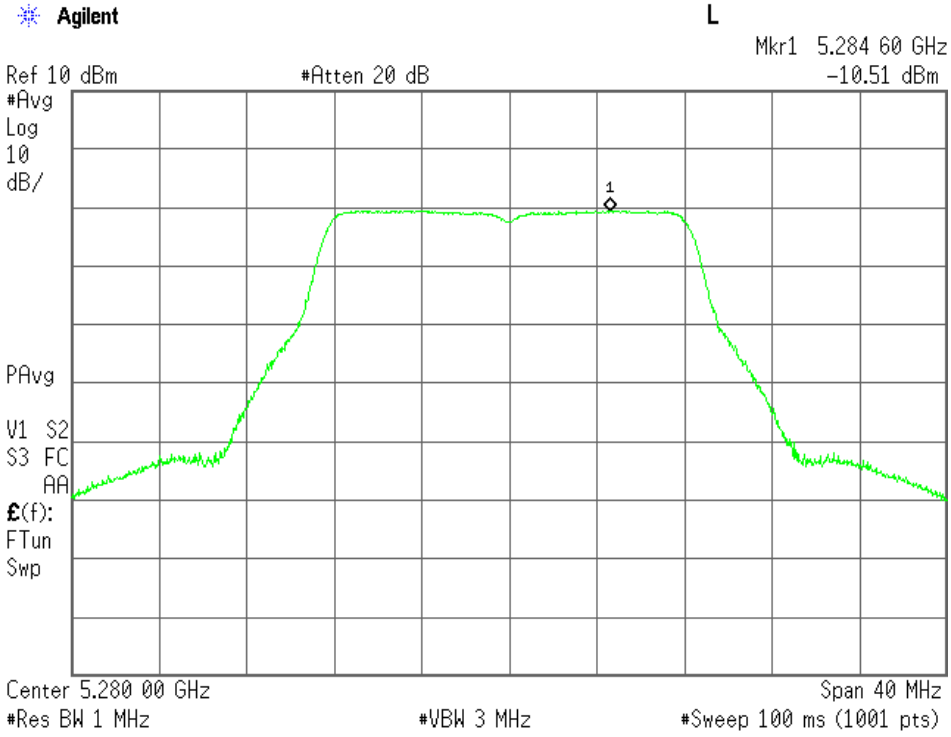

802.11a 48ch (5240 MHz)



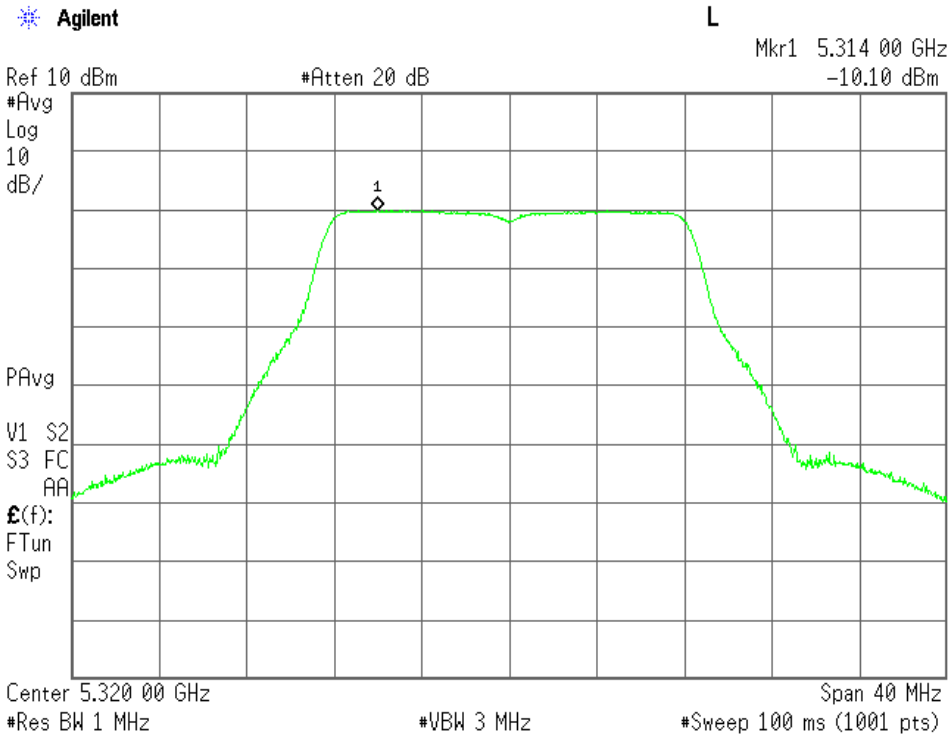
802.11a 52ch (5260 MHz)



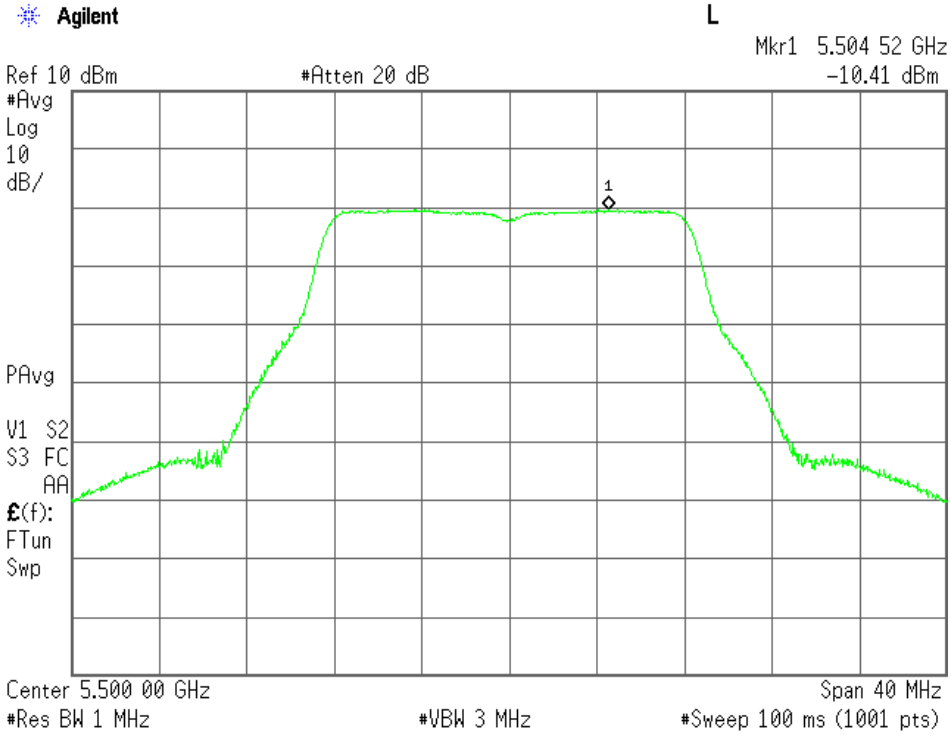

802.11a 56ch (5280 MHz)



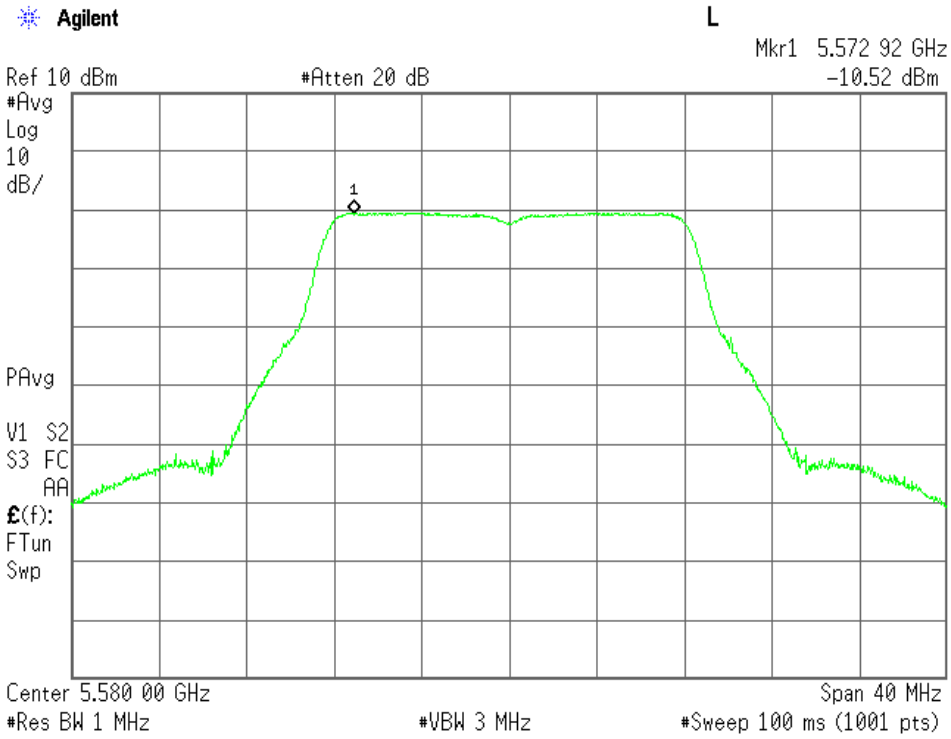
802.11a 64ch (5320 MHz)



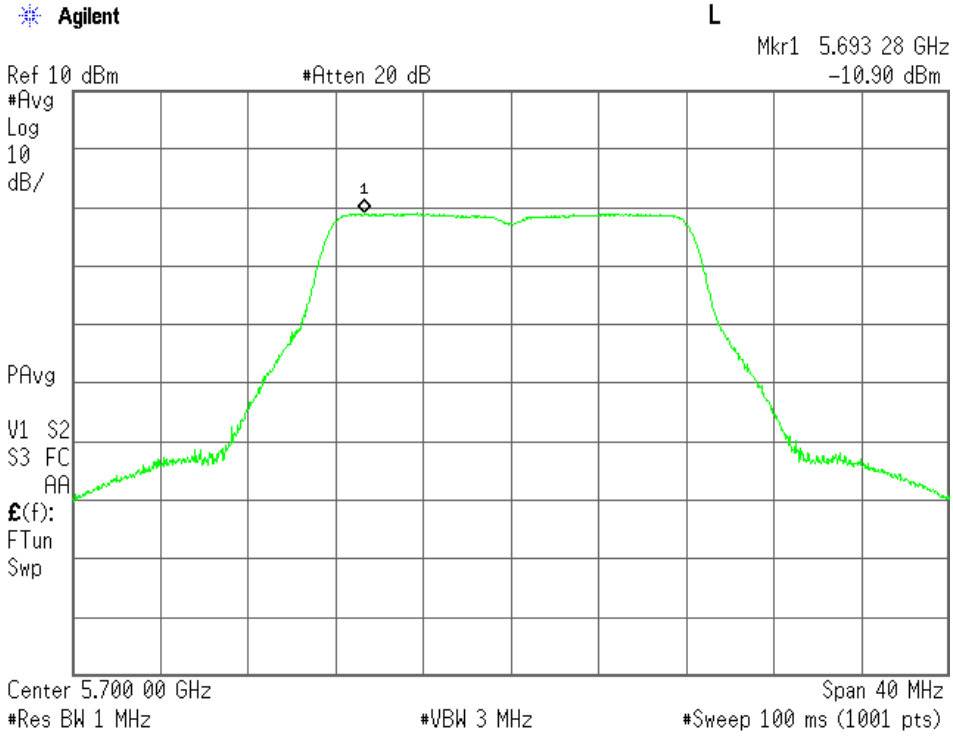

802.11a 100ch (5500 MHz)



802.11a 116ch (5580 MHz)




802.11a 140ch (5700 MHz)



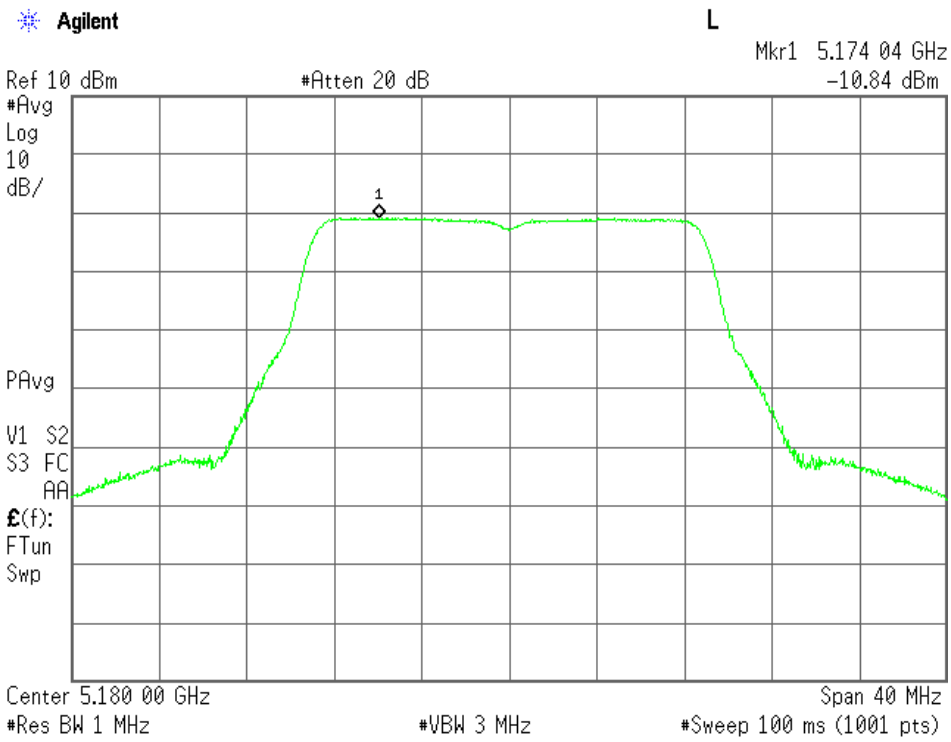
### 7.3.5.2 802.11n (20 MHz) Peak power spectral density data

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

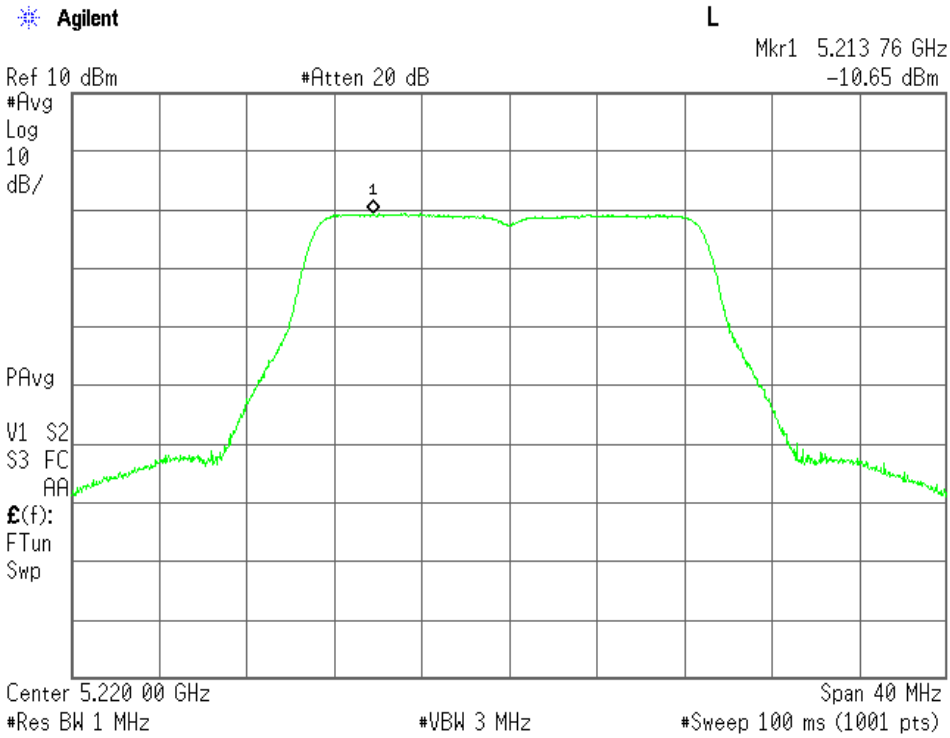
| Channel | Frequency (MHz) | Correction Factor(dB) | Meter Reading(dBm) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| 36 | 5180 | 10.34 | -10.84 | -0.50 | 4.00 | 4.50 |
| 44 | 5220 | 10.35 | -10.65 | -0.30 | 4.00 | 4.30 |
| 48 | 5240 | 10.35 | -10.67 | -0.32 | 4.00 | 4.32 |
| 52 | 5260 | 10.36 | -10.78 | -0.42 | 11.00 | 11.42 |
| 56 | 5280 | 10.36 | -10.60 | -0.24 | 11.00 | 11.24 |
| 64 | 5320 | 10.36 | -10.60 | -0.24 | 11.00 | 11.24 |
| 100 | 5500 | 10.37 | -10.82 | -0.45 | 11.00 | 11.45 |
| 116 | 5580 | 10.37 | -10.70 | -0.33 | 11.00 | 11.33 |
| 140 | 5700 | 10.39 | -11.24 | -0.85 | 11.00 | 11.85 |

The test results (PPSD) is calculated as follows;
For 36 channel (5180 MHz)
PPSD = Correction Factor + Meter Reading = 10.34 + (-10.84) = -0.50 dBm
Correction Factor = cable loss + 10 dB attenuator

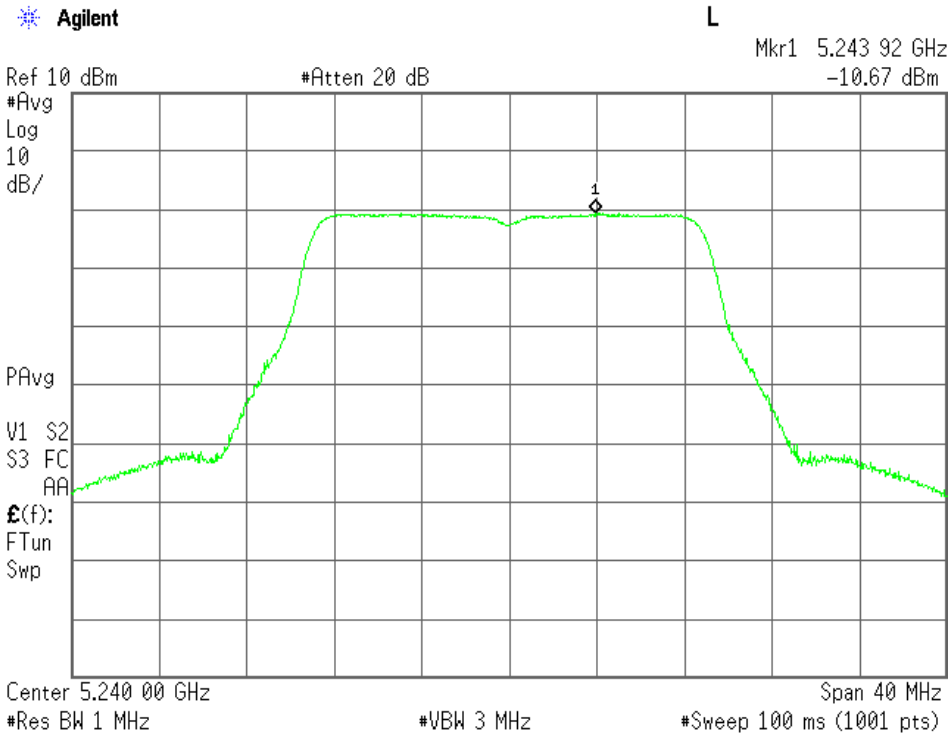
802.11n (20 MHz) 36ch (5180 MHz)



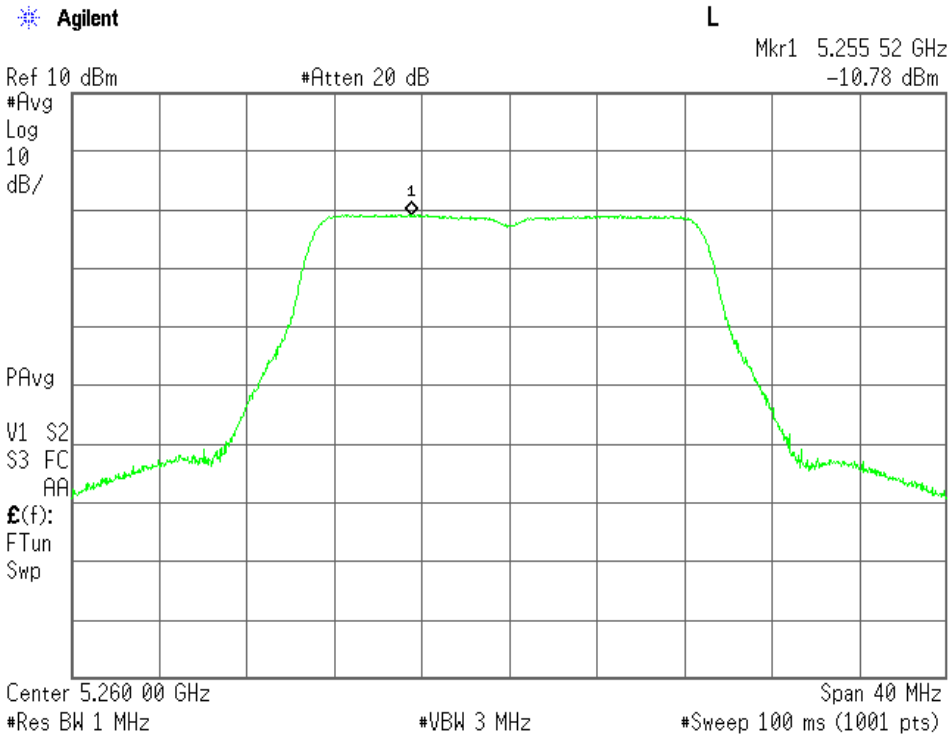
802.11n (20 MHz) 44ch (5220 MHz)



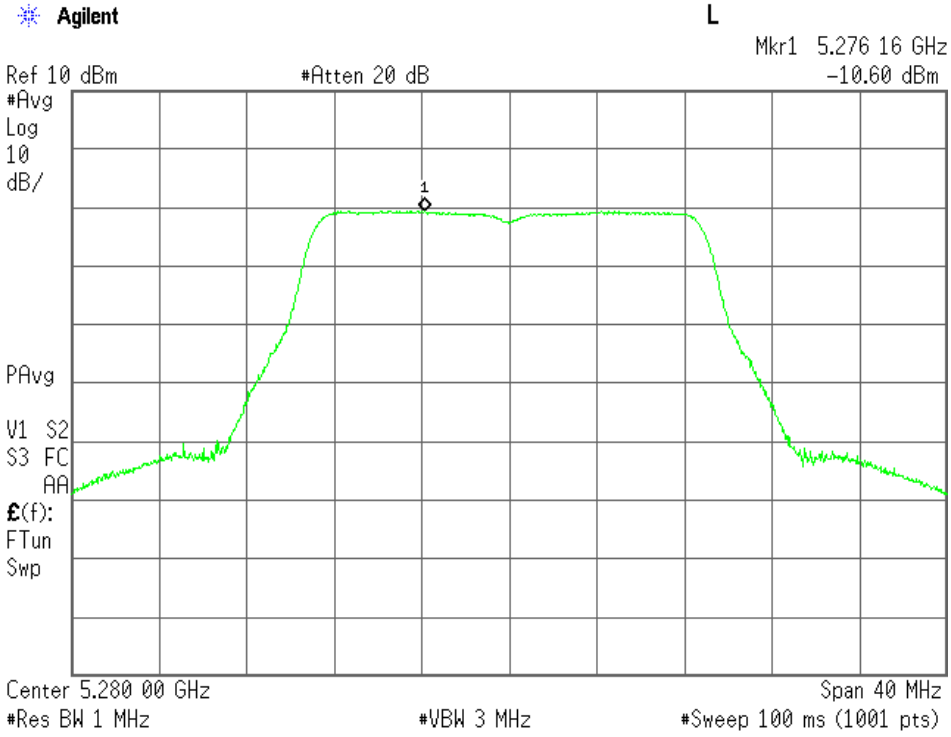

802.11n (20 MHz) 48ch (5240 MHz)



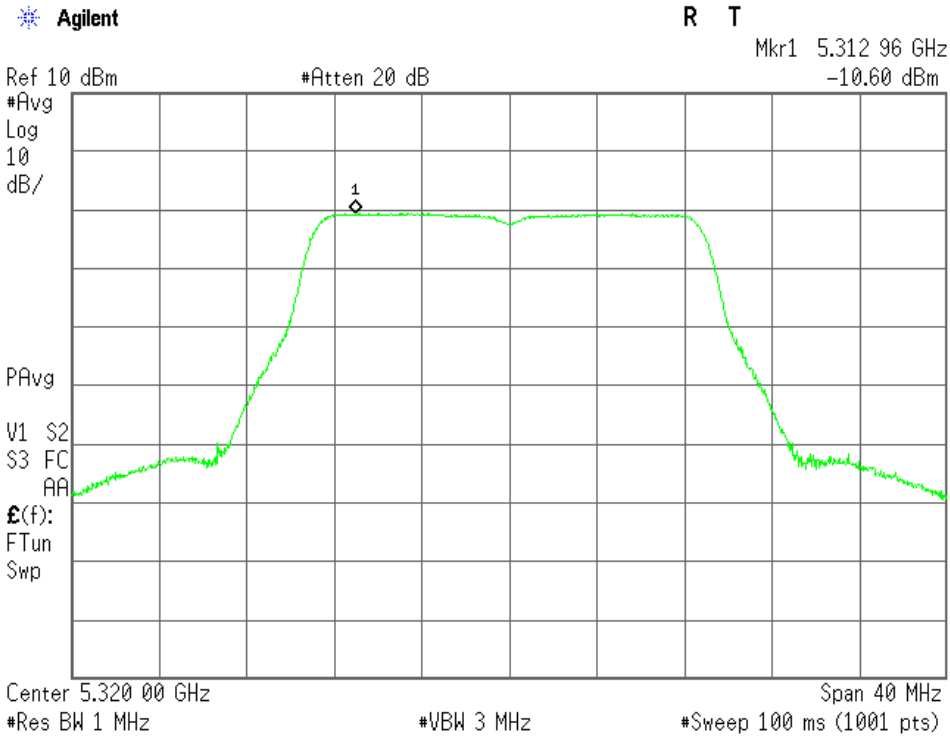
802.11n (20 MHz) 52ch (5260 MHz)



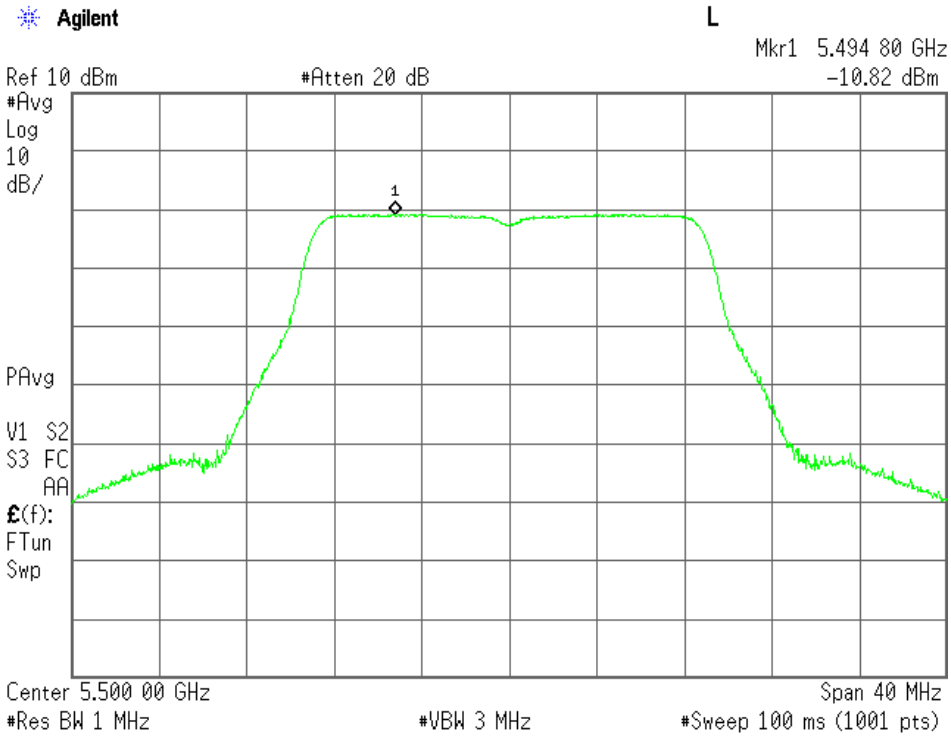

802.11n (20 MHz) 56ch (5280 MHz)



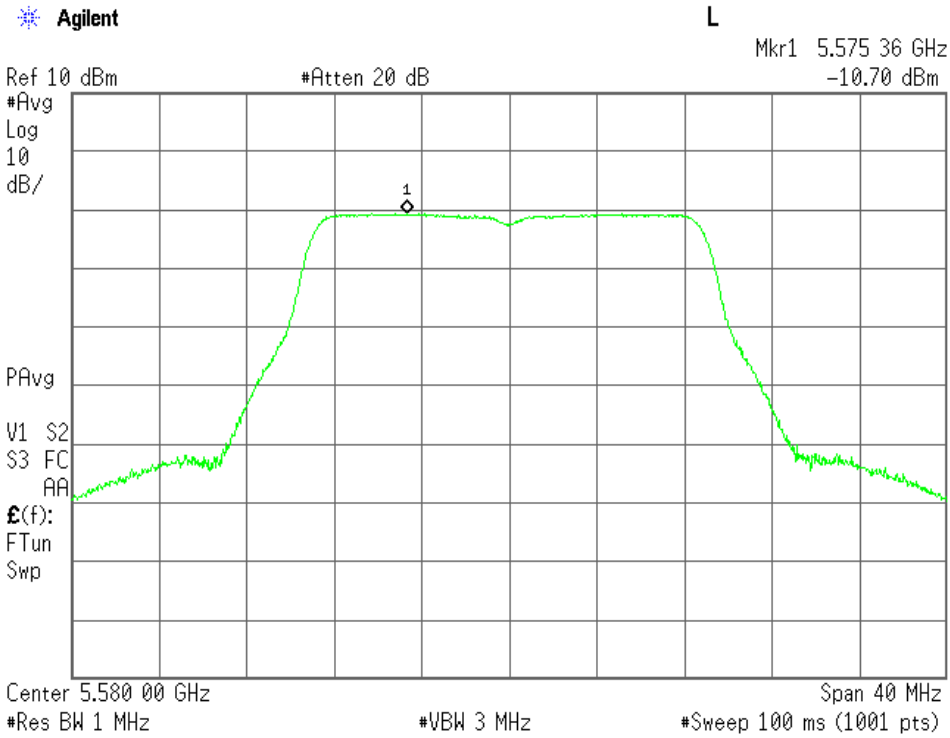
802.11n (20 MHz) 64ch (5320 MHz)



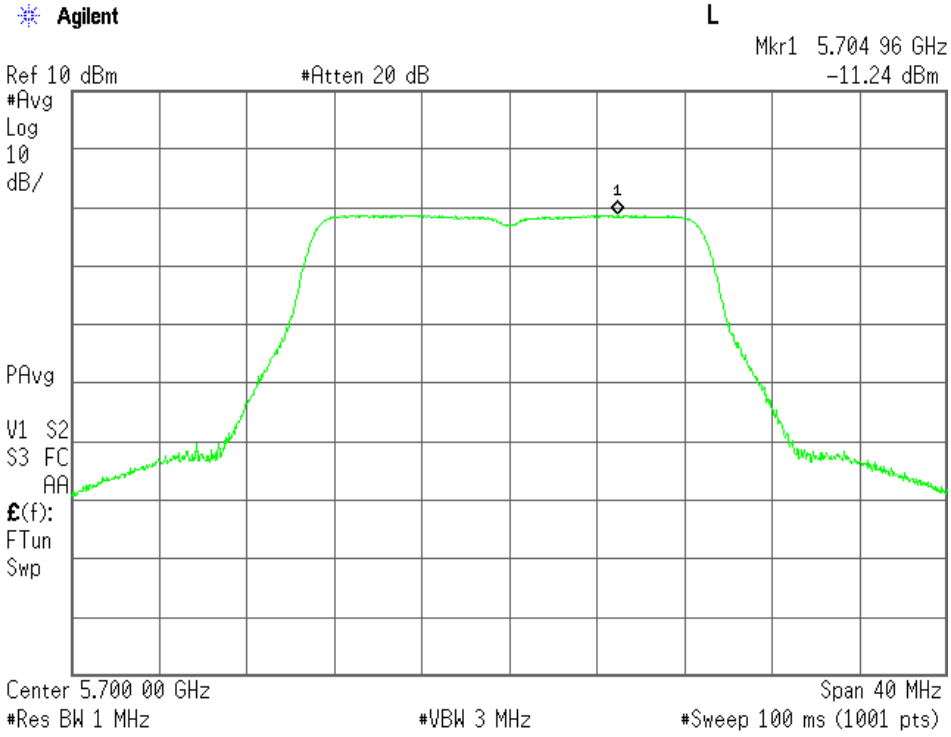

802.11n (20 MHz) 100ch (5500 MHz)



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




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



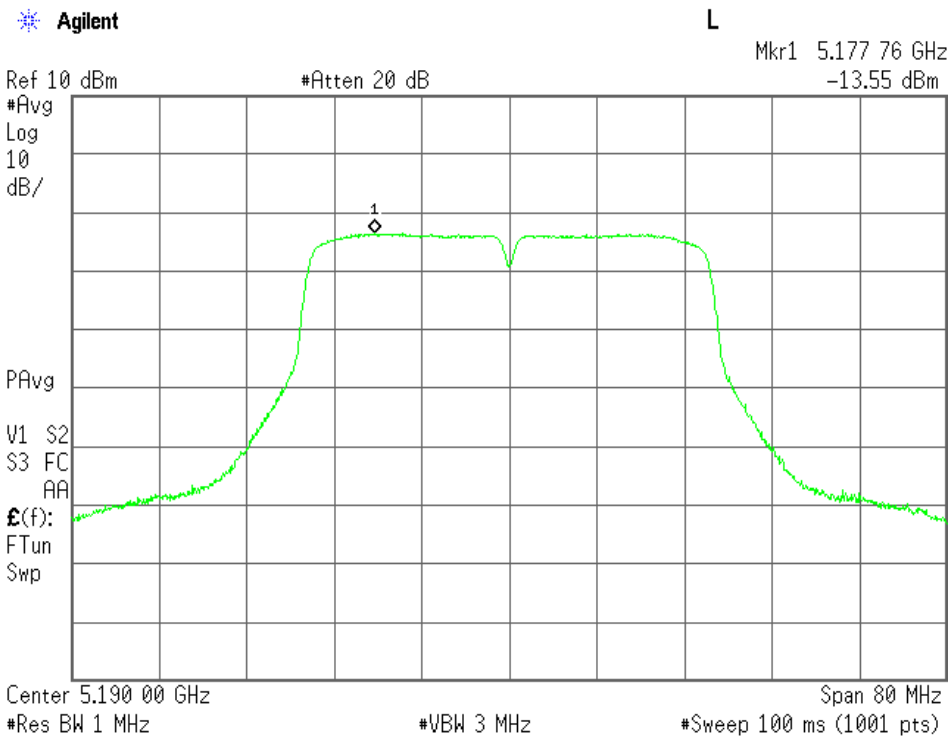
### 7.3.5.3 802.11n (40 MHz) Peak power spectral density data

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

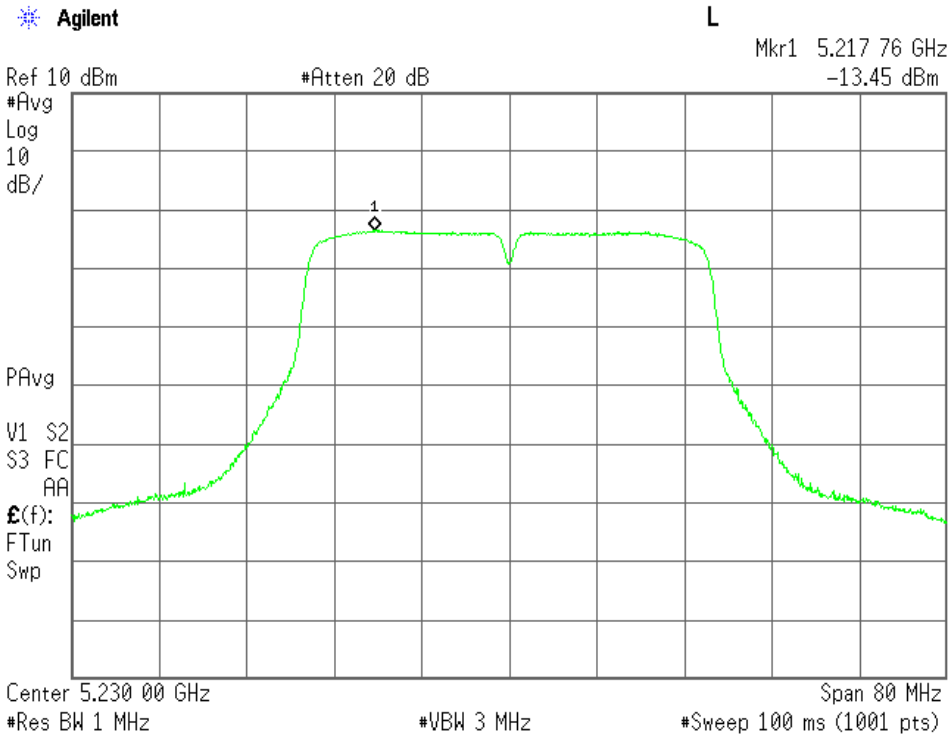
| Channel | Frequency (MHz) | Correction Factor(dB) | Meter Reading(dBm) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| 38 | 5190 | 10.34 | -13.55 | -3.21 | 4.00 | 7.21 |
| 46 | 5230 | 10.35 | -13.45 | -3.10 | 4.00 | 7.10 |
| 54 | 5270 | 10.36 | -13.16 | -2.80 | 11.00 | 13.80 |
| 62 | 5310 | 10.36 | -13.17 | -2.81 | 11.00 | 13.81 |
| 102 | 5510 | 10.37 | -13.42 | -3.05 | 11.00 | 14.05 |
| 134 | 5670 | 10.39 | -14.08 | -3.69 | 11.00 | 14.69 |

The test results (PPSD) is calculated as follows;
For 38 channel (5190 MHz)
PPSD = Correction Factor + Meter Reading = 10.34 + (-13.55) = -3.21 dBm
Correction Factor = cable loss + 10 dB attenuator

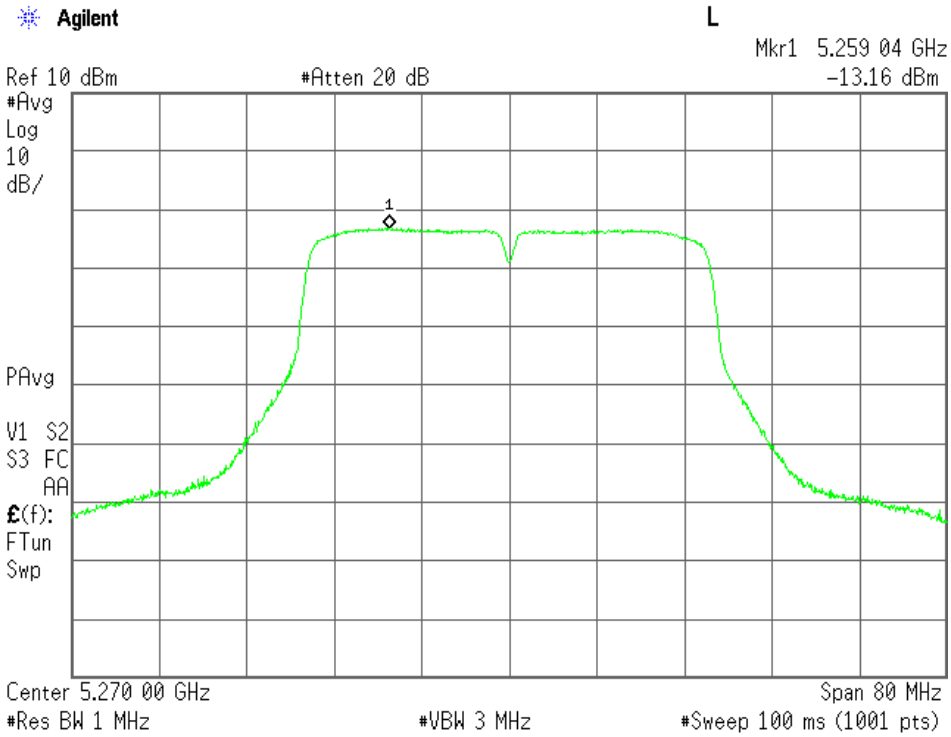
802.11n (40 MHz) 38ch (5190 MHz)



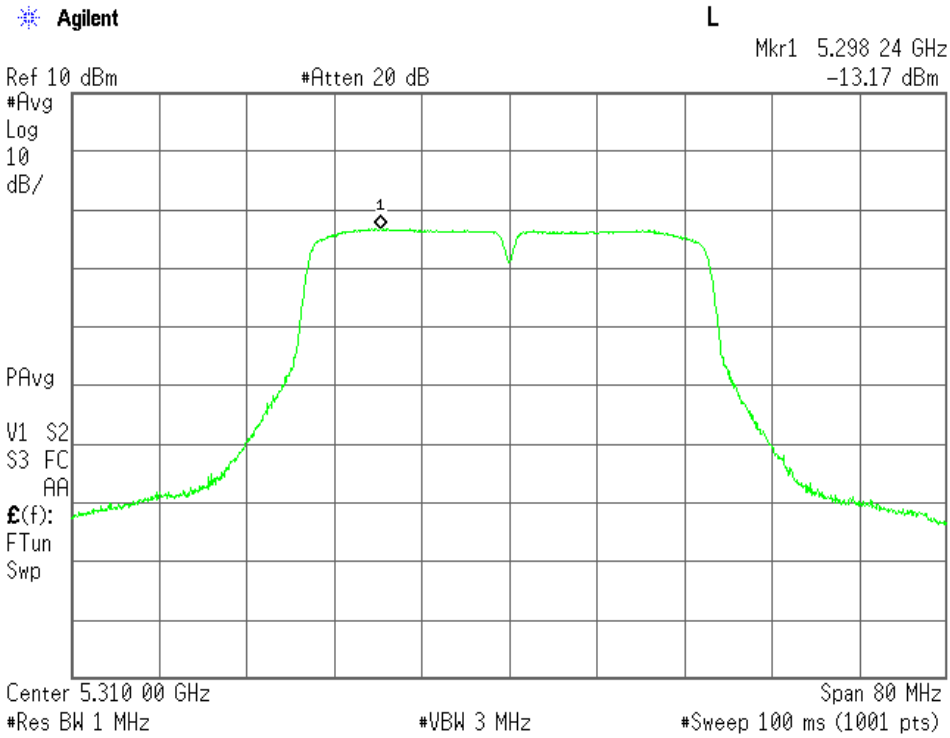
802.11n (40 MHz) 46ch (5230 MHz)



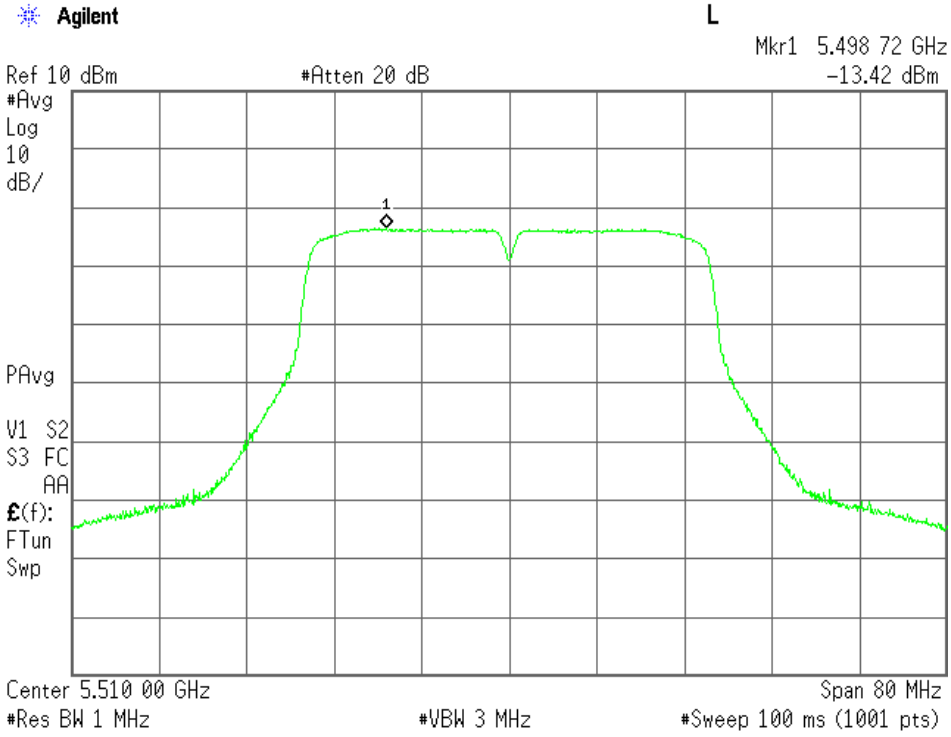

802.11n (40 MHz) 54ch (5270 MHz)



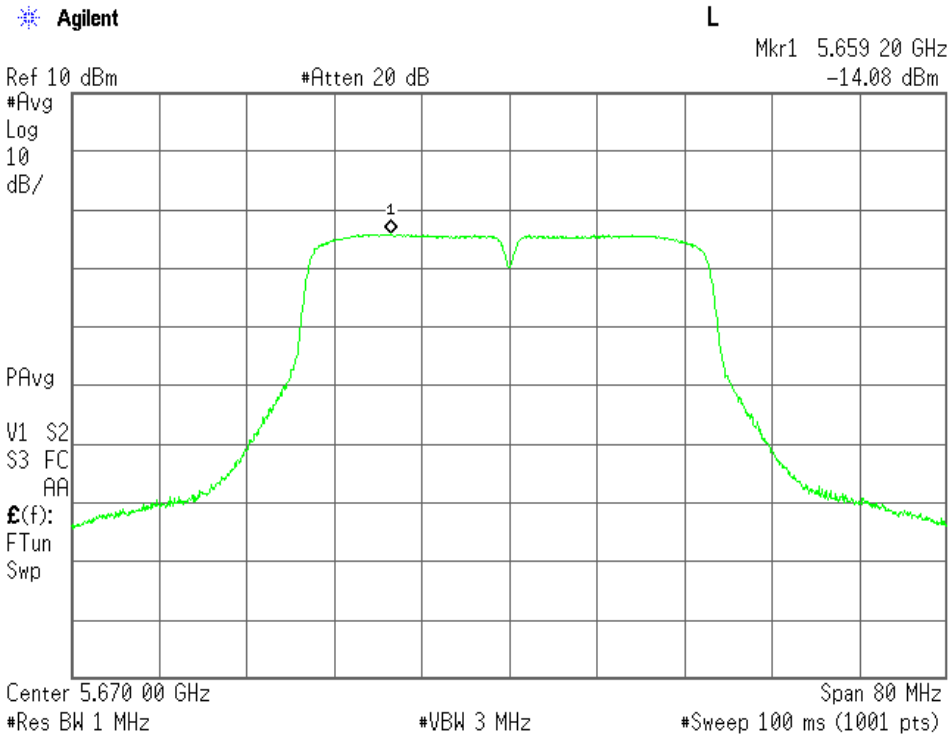
802.11n (40 MHz) 62ch (5310 MHz)




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



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



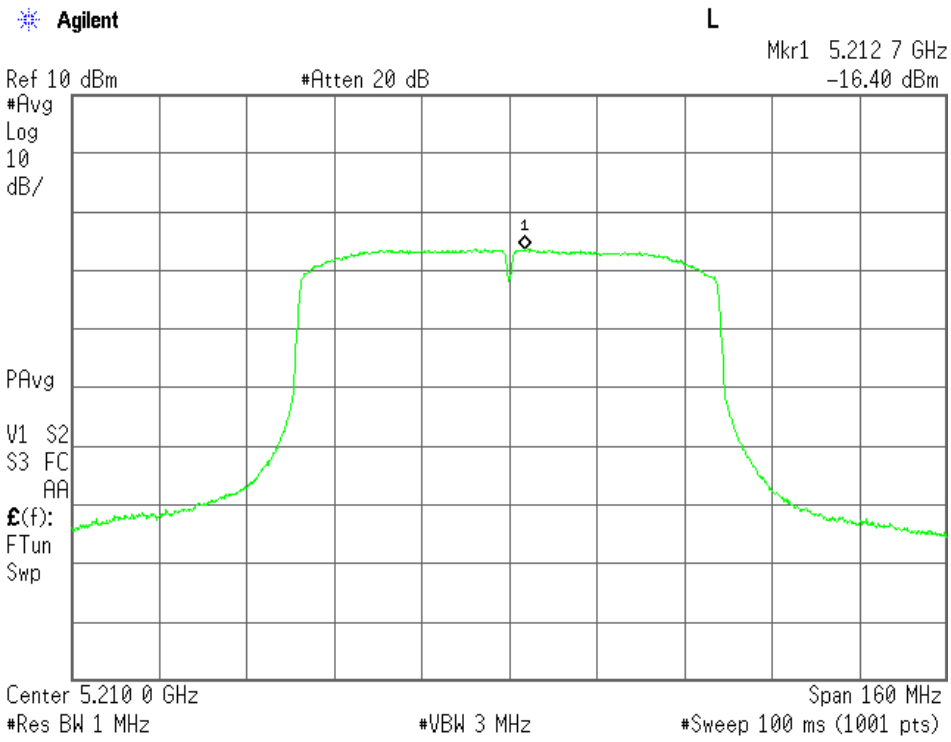
### 7.3.5.4 802.11ac (80 MHz) Peak power spectral density data

Mode of EUT: Tx Mode (802.11ac: 80 MHz)
Test Port: Temporary antenna connector

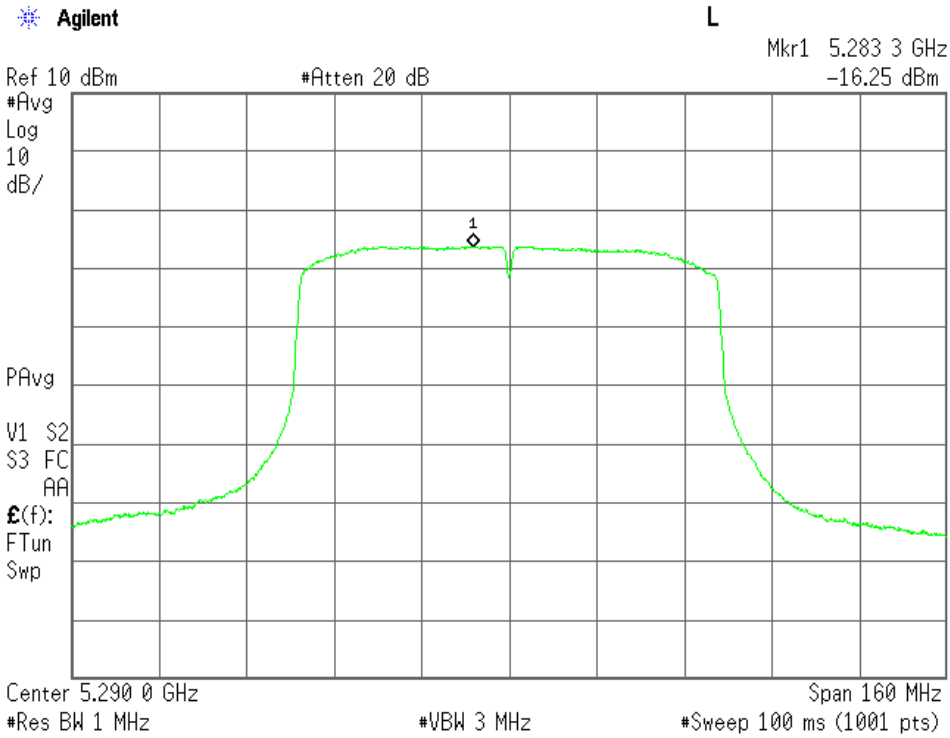
| Channel | Frequency (MHz) | Correction Factor(dB) | Meter Reading(dBm) | PPSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|
| 42 | 5210 | 10.34 | -16.40 | -6.06 | 4.00 | 10.06 |
| 58 | 5290 | 10.36 | -16.25 | -5.89 | 11.00 | 16.89 |
| 106 | 5530 | 10.37 | -15.97 | -5.60 | 11.00 | 16.60 |

The test results (PPSD) is calculated as follows;
For 38 channel (5210 MHz)
PPSD = Correction Factor + Meter Reading = 10.34 + (-16.40) = -6.06 dBm
Correction Factor = cable loss + 10 dB attenuator

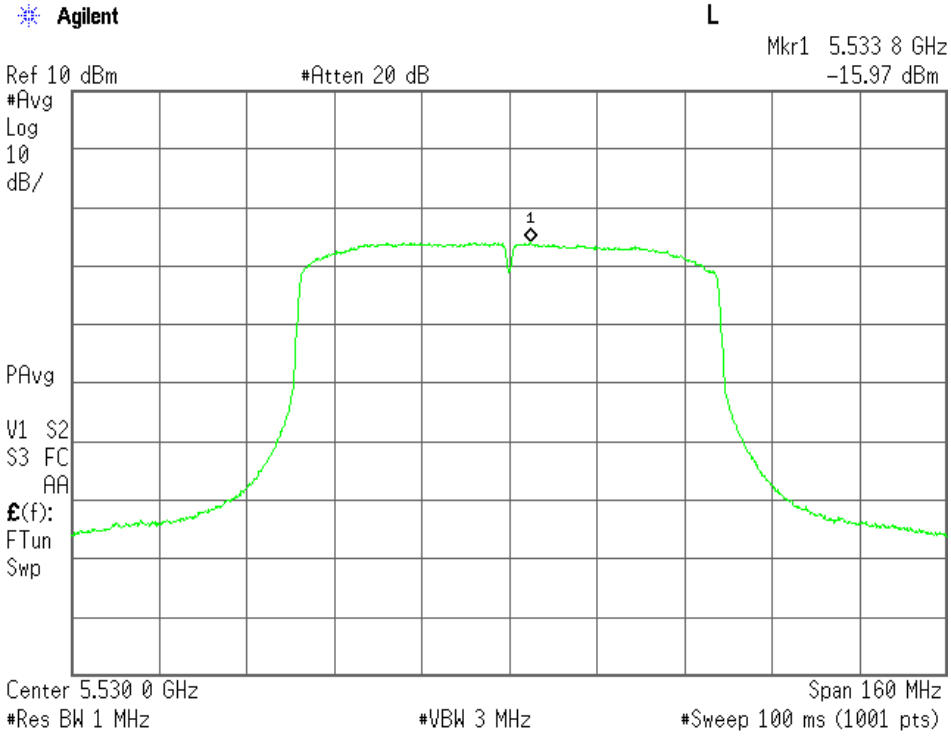
802.11ac (80 MHz) 42ch (5210 MHz)



802.11ac (80 MHz) 58ch (5290 MHz)




802.11ac (80 MHz) 106ch (5530 MHz)



## 7.4 Peak Excursion

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

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

### 7.4.1 Worst Point and Measurement Uncertainty

Min. Limit Margin 3.06 dB at 5280.0 MHz

Uncertainty of Measurement Results +/- 1.2 dB

Remarks : Worst case is 802.11n/ac(20MHz) 16-QAM

### 7.4.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

### 7.4.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2013/7 | 1 Year |
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2013/9 | 1 Year |

### 7.4.4 Test Method and Test Setup (Diagrammatic illustration)

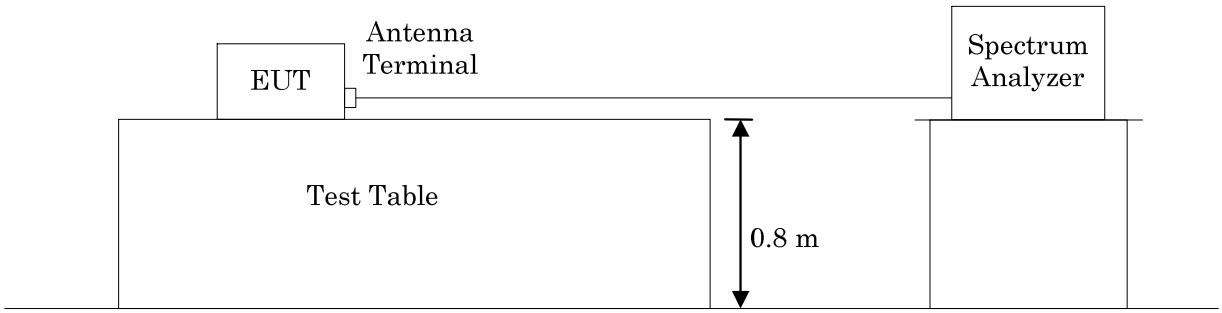
The peak excursion measurements were carried out connecting to the spectrum analyzer. The test was performed in accordance with KDB 789033 D01 as follows;.

Sweep 1)
Span: encompass the EBW/ RBW: 1 MHz/ VBW ≥ 3 MHz/ Sweep: Auto/
Detector: Peak/ Trace: Max Hold until trace stabilizes
The peak marker function in the analyzer was use for finding the peak point(1)

Sweep 2) Same PPSD measurement
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(2).

(Peak excursion) = peak point(1) - peak point(2)

(referred documentation is No. G70364M)



### 7.4.5 Test Data

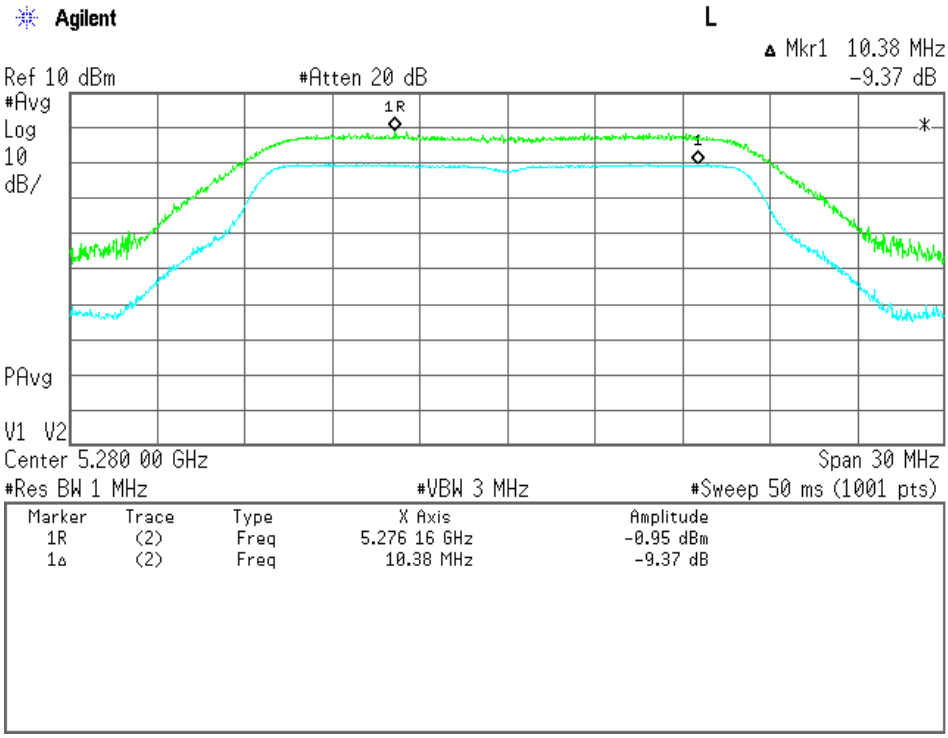
#### 7.4.5.1 802.11a Peak excursion data

Test Date : December 10, 2013
Temp.: 22°C, Humi: 45%

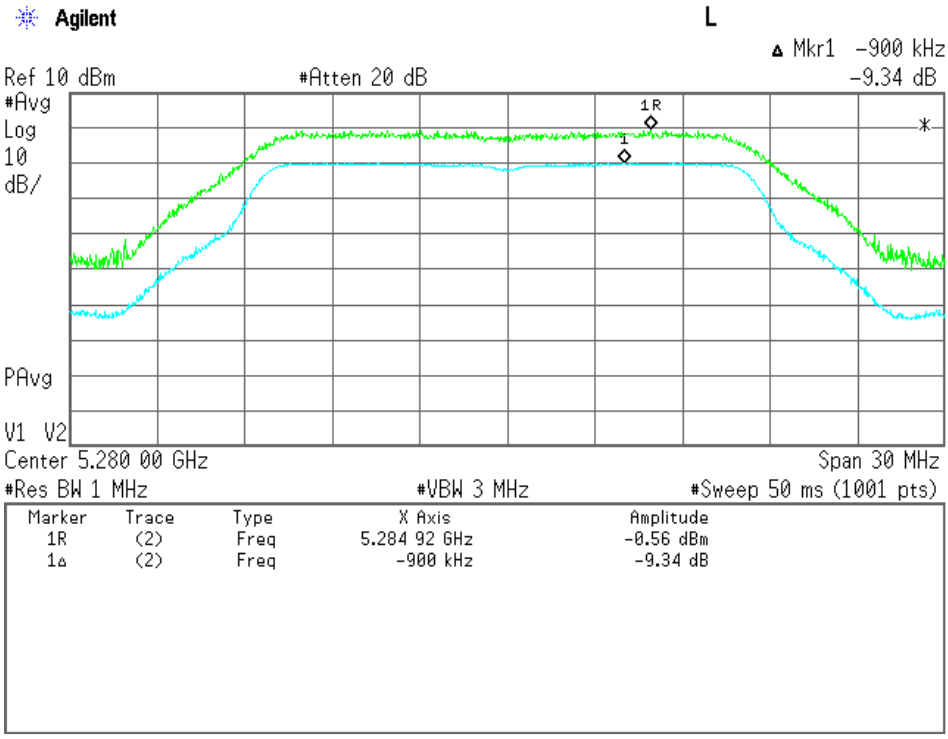
Mode of EUT: Tx Mode (802.11a)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | Modulation Type | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|
| 56 | 5280 | BPSK | 9.37 | 13 | 3.63 |
| 56 | 5280 | QPSK | 9.34 | 13 | 3.66 |
| 56 | 5280 | 16-QAM | 9.50 | 13 | 3.50 |
| 56 | 5280 | 64-QAM | 9.56 | 13 | 3.44 |

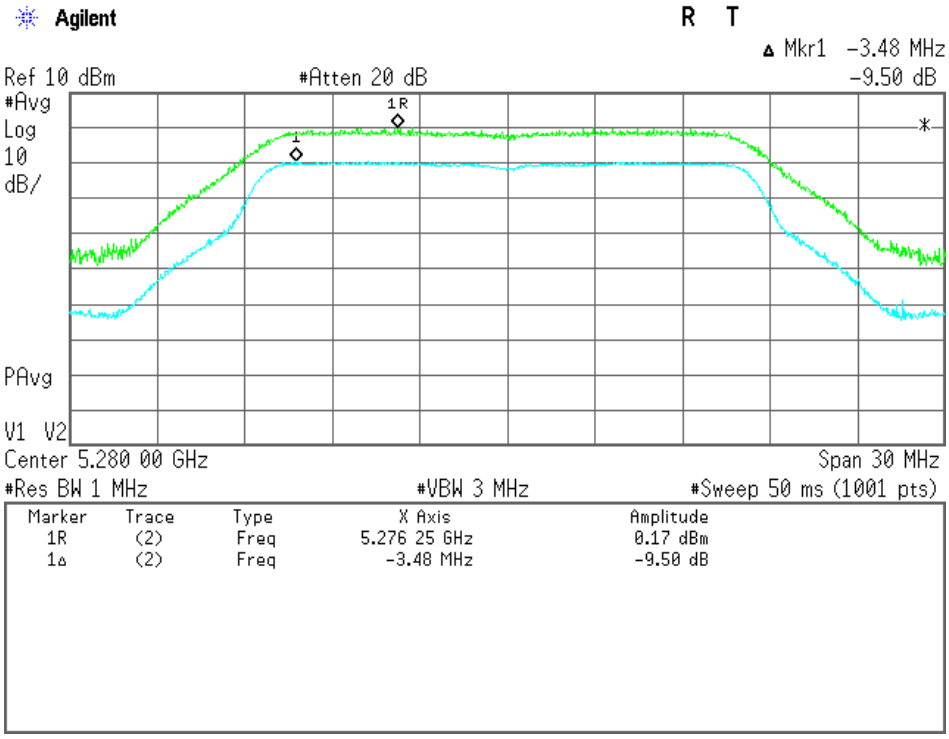
802.11a 56ch (5280 MHz) BPSK



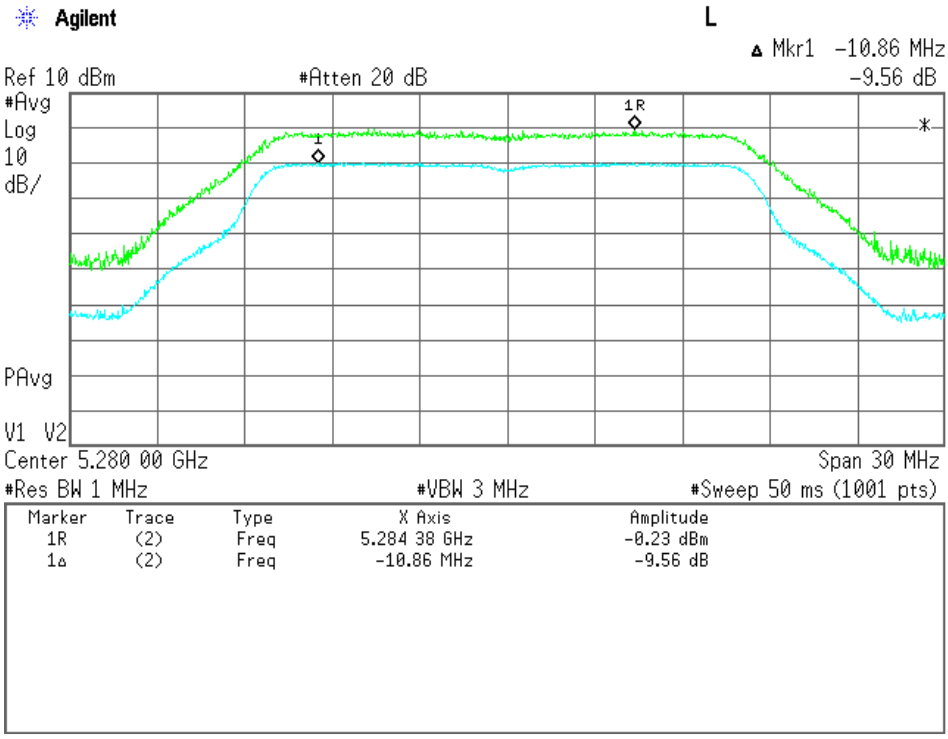
802.11a 56ch (5280 MHz) QPSK




802.11a 56ch (5280 MHz) 16-QAM



802.11a 56ch (5280 MHz) 64-QAM

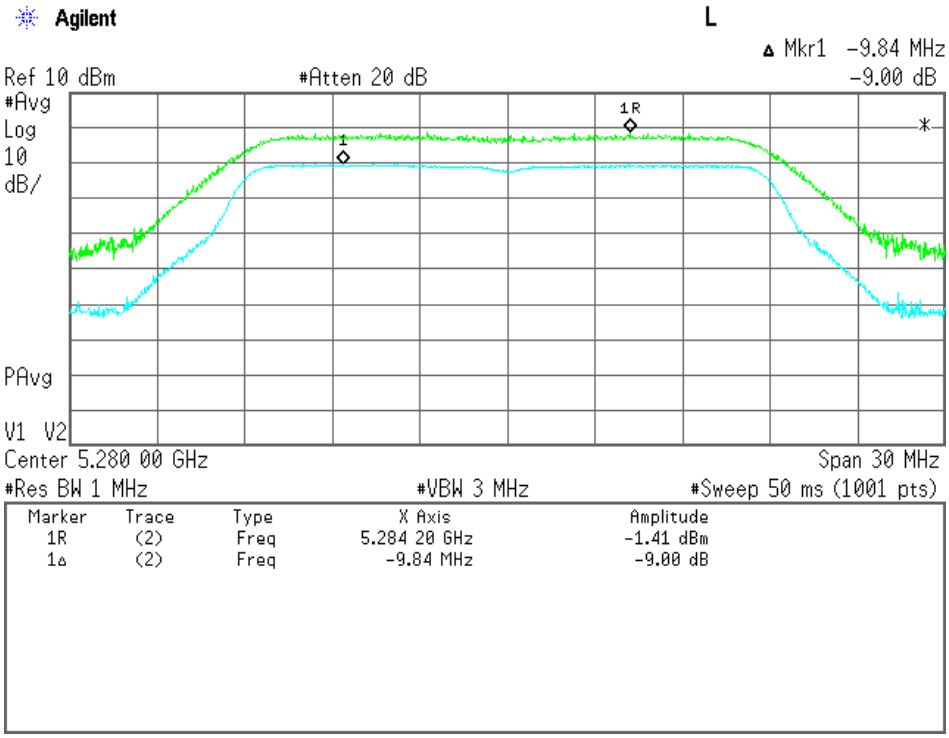


### 7.4.5.2 802.11n/ac (20 MHz) Peak excursion data

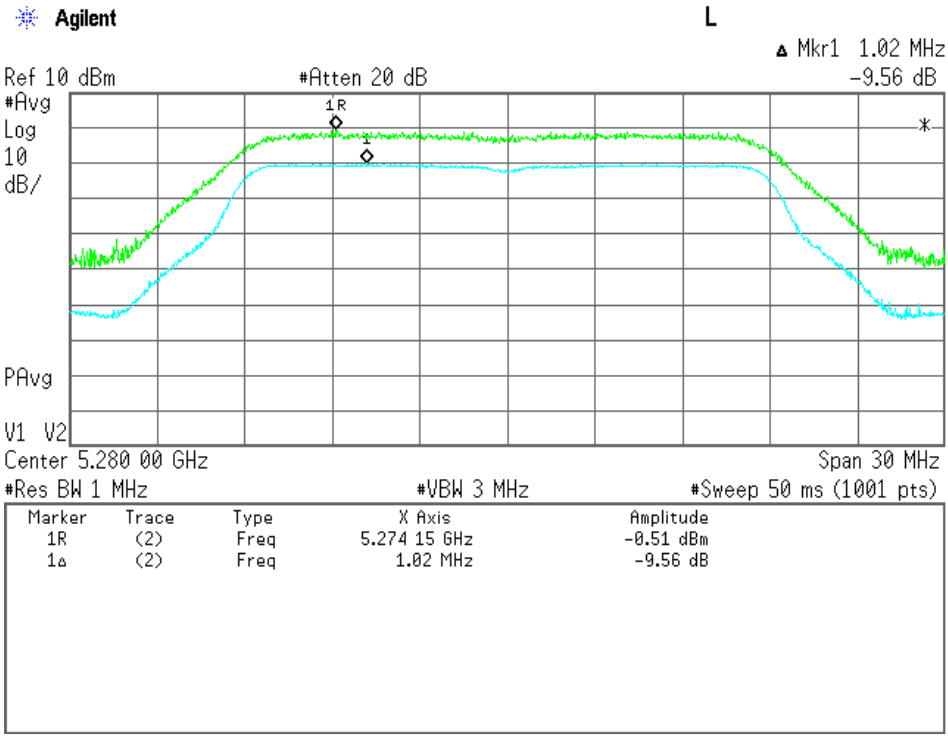
Mode of EUT: Tx Mode (802.11n/ac: 20 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | Modulation Type | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|
| 56 | 5280 | BPSK | 9.00 | 13 | 4.00 |
| 56 | 5280 | QPSK | 9.56 | 13 | 3.44 |
| 56 | 5280 | 16-QAM | 9.94 | 13 | 3.06 |
| 56 | 5280 | 64-QAM | 9.60 | 13 | 3.40 |
| 56 | 5280 | 256-QAM | 7.05 | 13 | 5.95 |

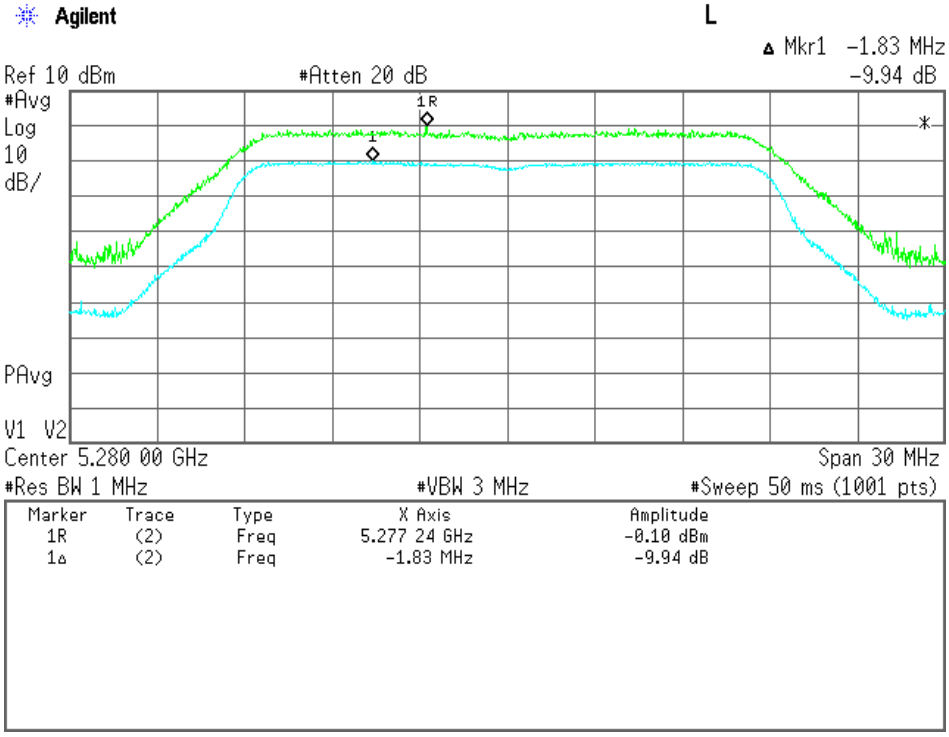
802.11n/ac 56ch (5280 MHz) BPSK



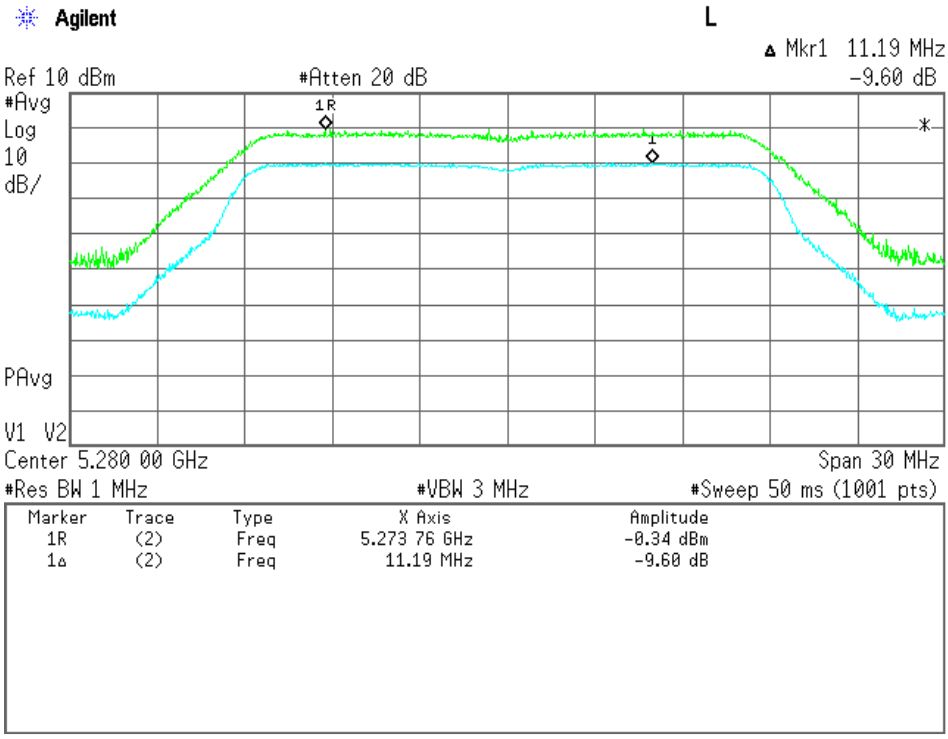
802.11n/ac 56ch (5280 MHz) QPSK



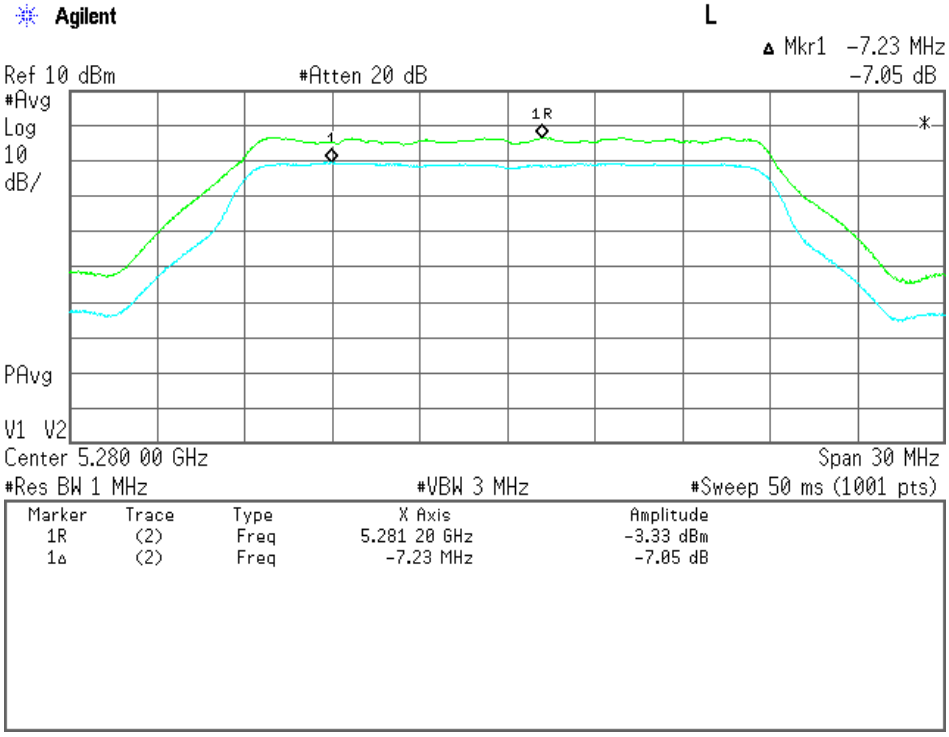

802.11n/ac 56ch (5280 MHz) 16-QAM



802.11n/ac 56ch (5280 MHz) 64-QAM




802.11ac 56ch (5280 MHz) 256-QAM

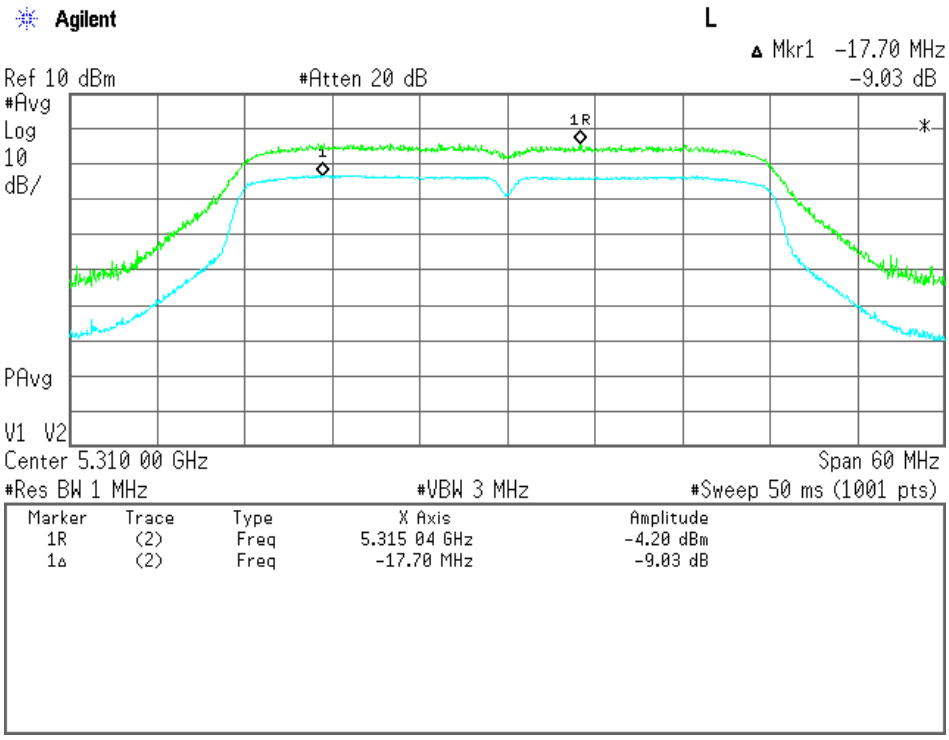


### 7.4.5.3 802.11n/ac (40 MHz) Peak excursion data

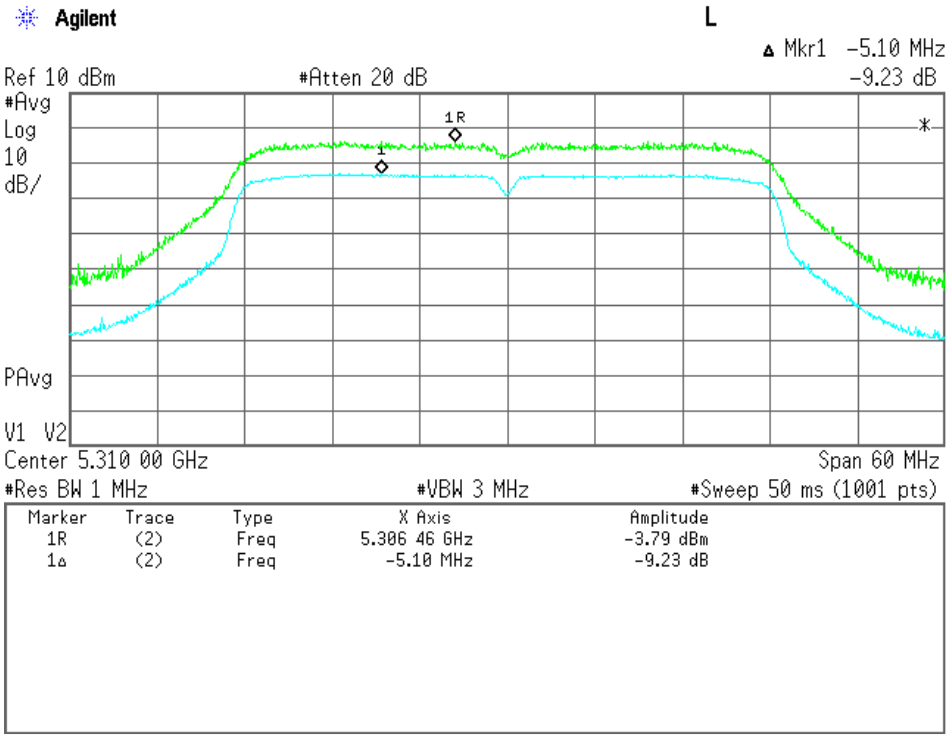
Mode of EUT: Tx Mode (802.11n/ac: 40 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency (MHz) | Modulation Type | Peak Excursion (dB) | Limit (dB) | Margin (dB) |
|---|---|---|---|---|---|
| 62 | 5310 | BPSK | 9.03 | 13 | 3.97 |
| 62 | 5310 | QPSK | 9.23 | 13 | 3.77 |
| 62 | 5310 | 16-QAM | 9.21 | 13 | 3.79 |
| 62 | 5310 | 64-QAM | 9.06 | 13 | 3.94 |
| 62 | 5310 | 256-QAM | 8.06 | 13 | 4.94 |

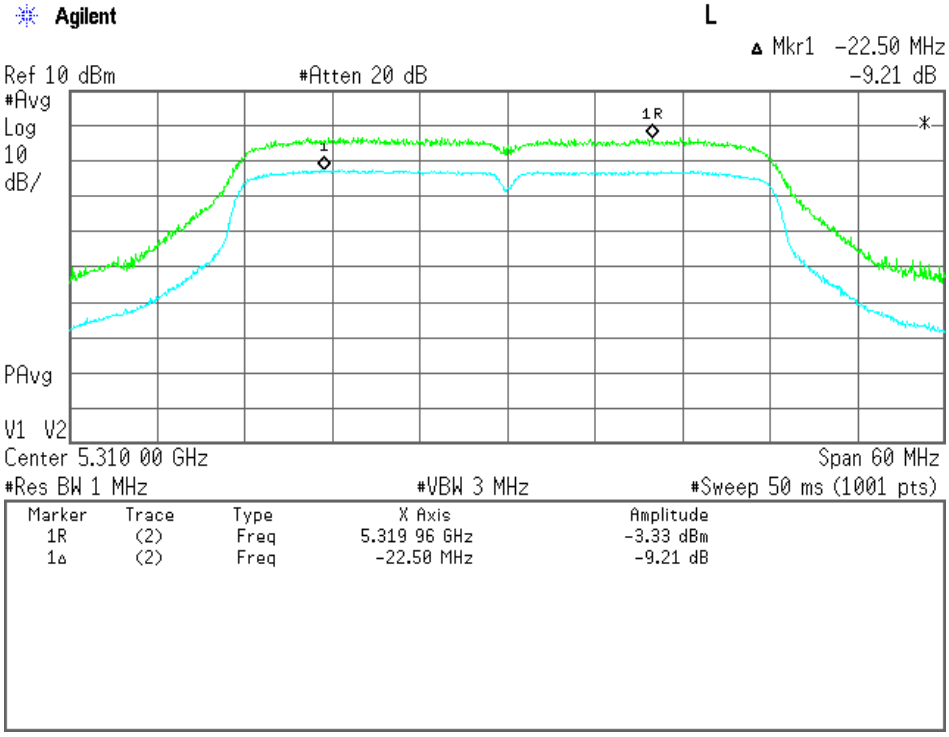
802.11n/ac 62ch (5310 MHz) BPSK



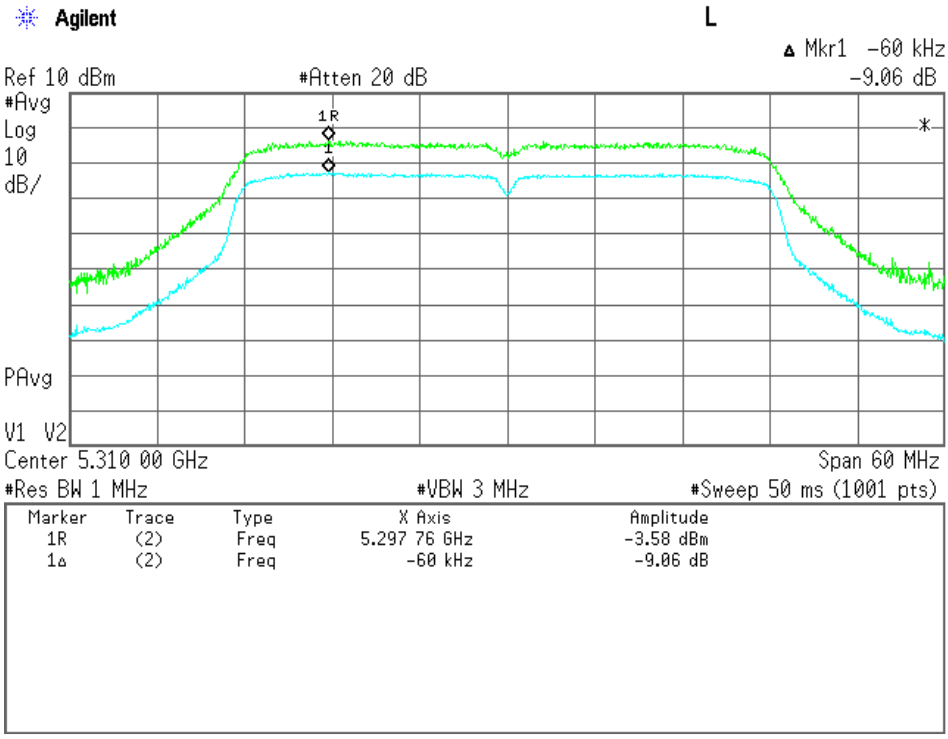
802.11n/ac 62ch (5310 MHz) QPSK



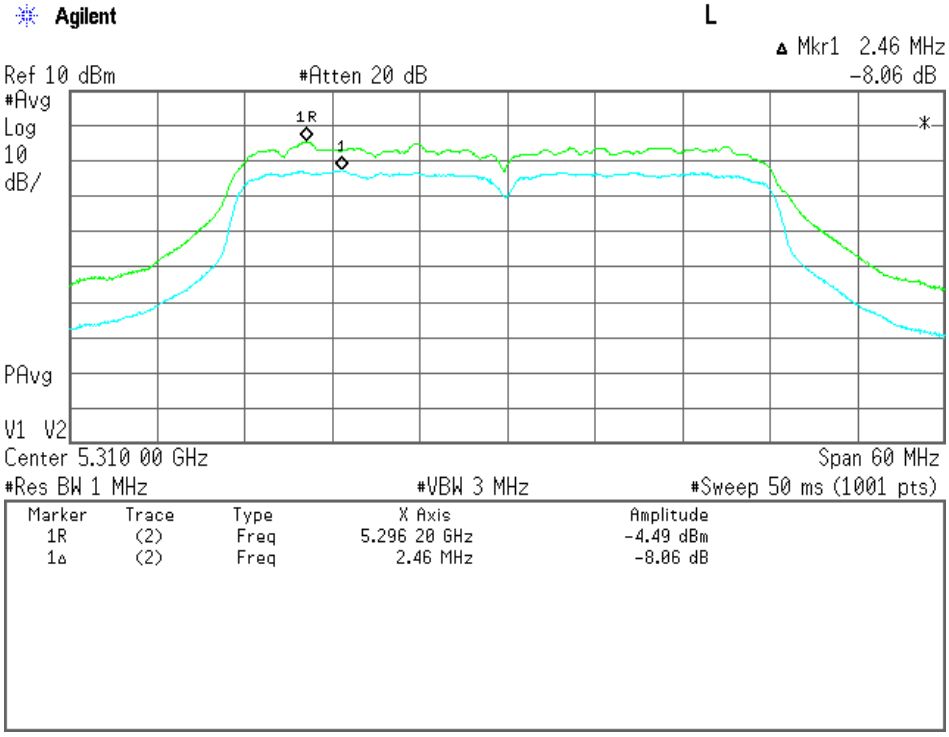

802.11n/ac 62ch (5310 MHz) 16-QAM



802.11n/ac 62ch (5310 MHz) 64-QAM




802.11ac 62ch (5310 MHz) 256-QAM

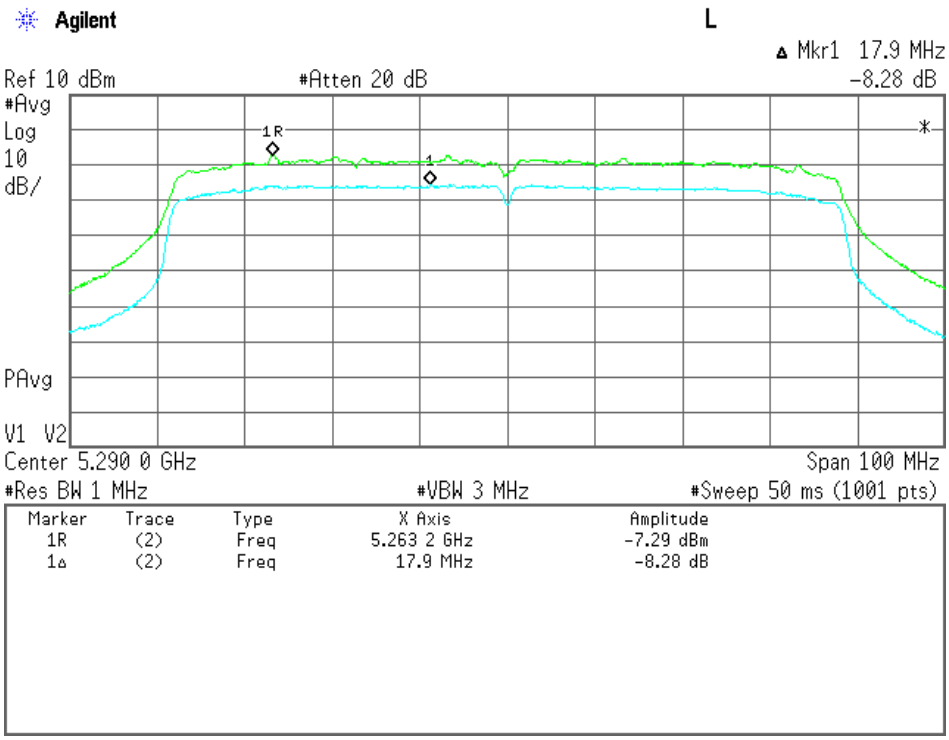


### 7.4.5.4 802.11ac (80 MHz) Peak excursion data

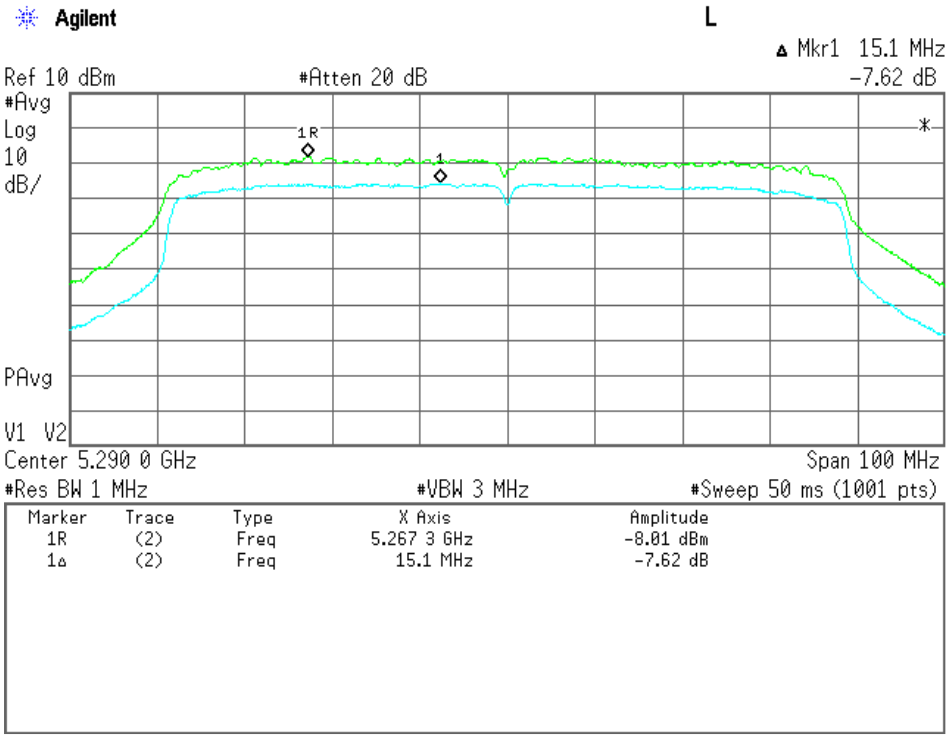
Mode of EUT: Tx Mode (802.11ac: 80 MHz)
Test Port: Temporary antenna connector

| Channel | Frequency | Modulation | Peak Excursion | Limit | Margin |
|---|---|---|---|---|---|
| | (MHz) | Type | (dB) | (dB) | (dB) |
| 58 | 5290 | BPSK | 8.28 | 13 | 4.72 |
| 58 | 5290 | QPSK | 7.62 | 13 | 5.38 |
| 58 | 5290 | 16-QAM | 7.54 | 13 | 5.46 |
| 58 | 5290 | 64-QAM | 7.82 | 13 | 5.18 |
| 58 | 5290 | 256-QAM | 9.02 | 13 | 3.98 |

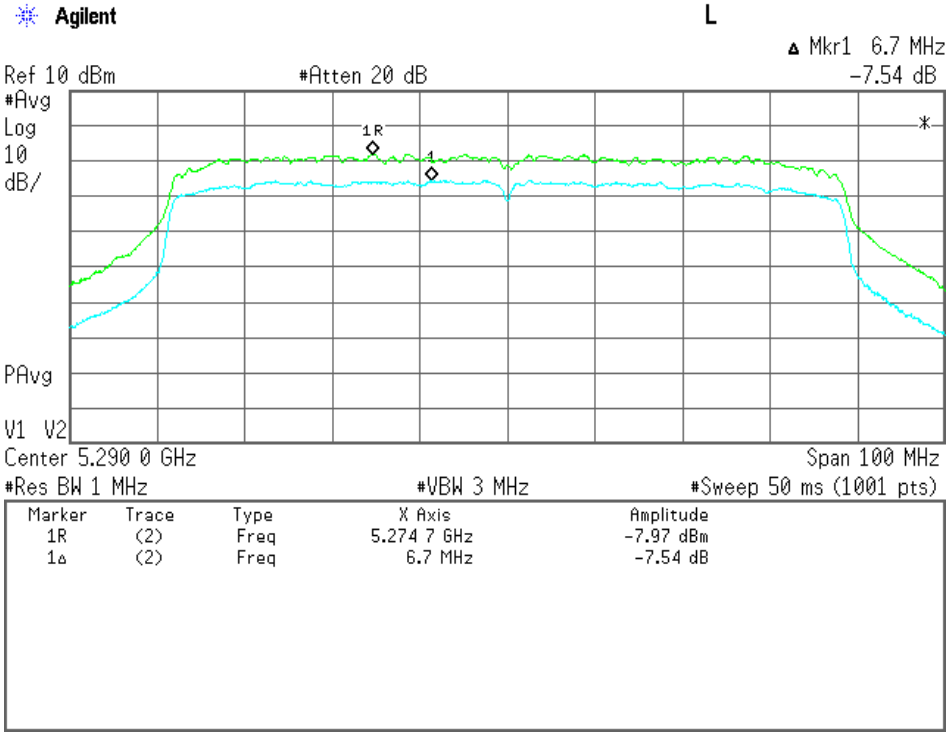
802.11ac 58ch (5290 MHz) BPSK



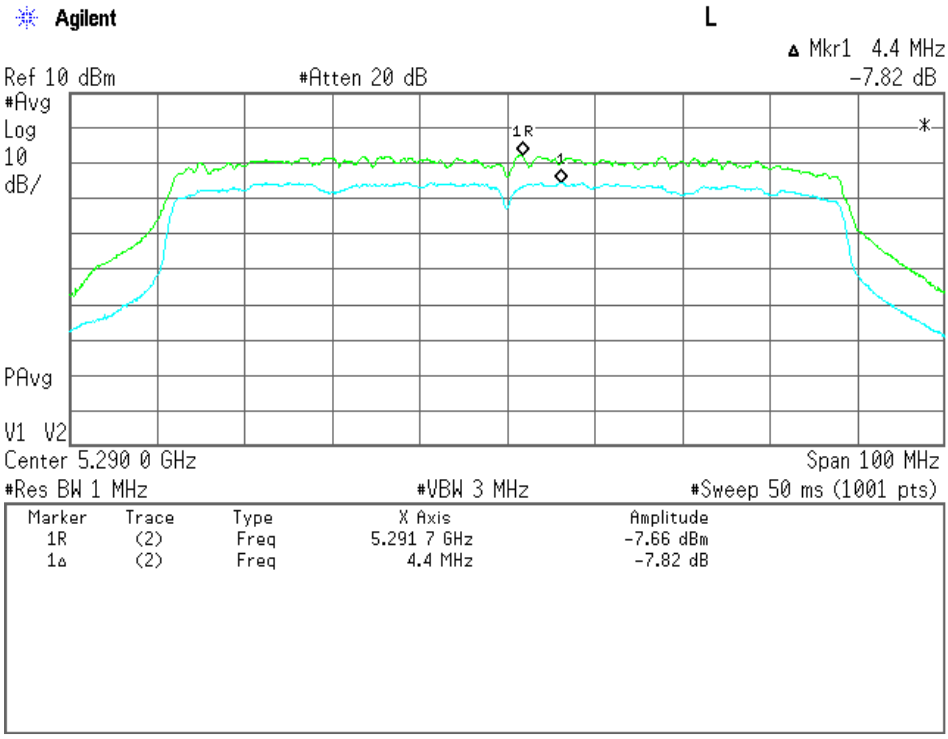
802.11ac 58ch (5290 MHz) QPSK



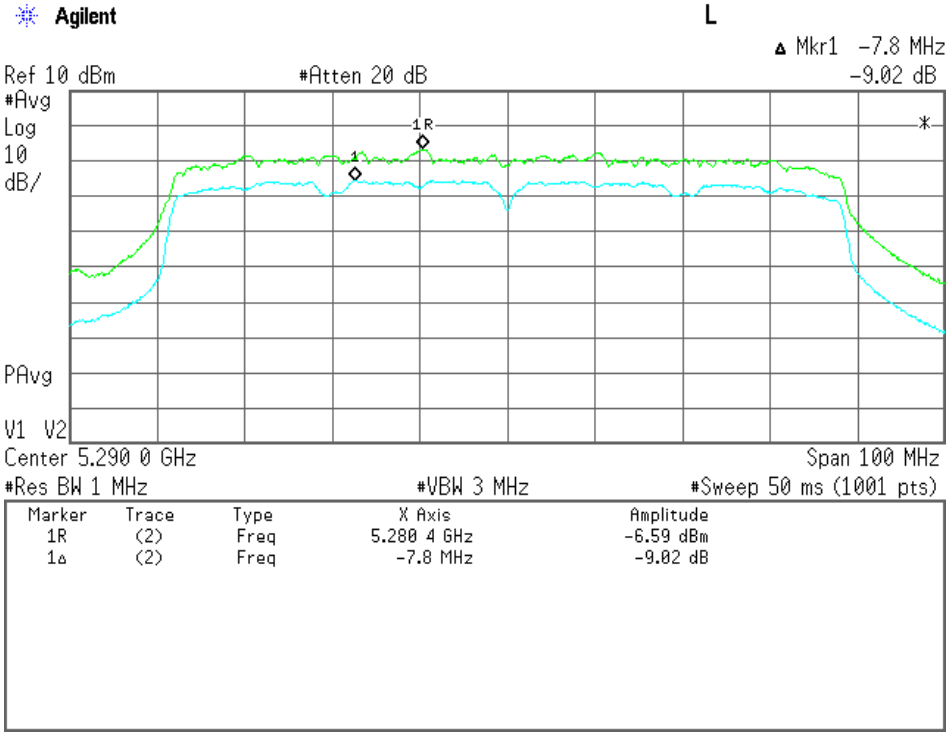

802.11ac 58ch (5290 MHz) 16-QAM



802.11ac 58ch (5290 MHz) 64-QAM




802.11ac 58ch (5290 MHz) 256-QAM



## 7.5 AC Powerline Conducted Emission

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

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

### 7.5.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Quasi-Peak) 15.3 dB at 1.86 MHz

Uncertainty of Measurement Results +/-2.7 dB(2σ)

Remarks : _____

### 7.5.2 Test Site

KITA-KANSAI Testing Center SAITO EMC Branch

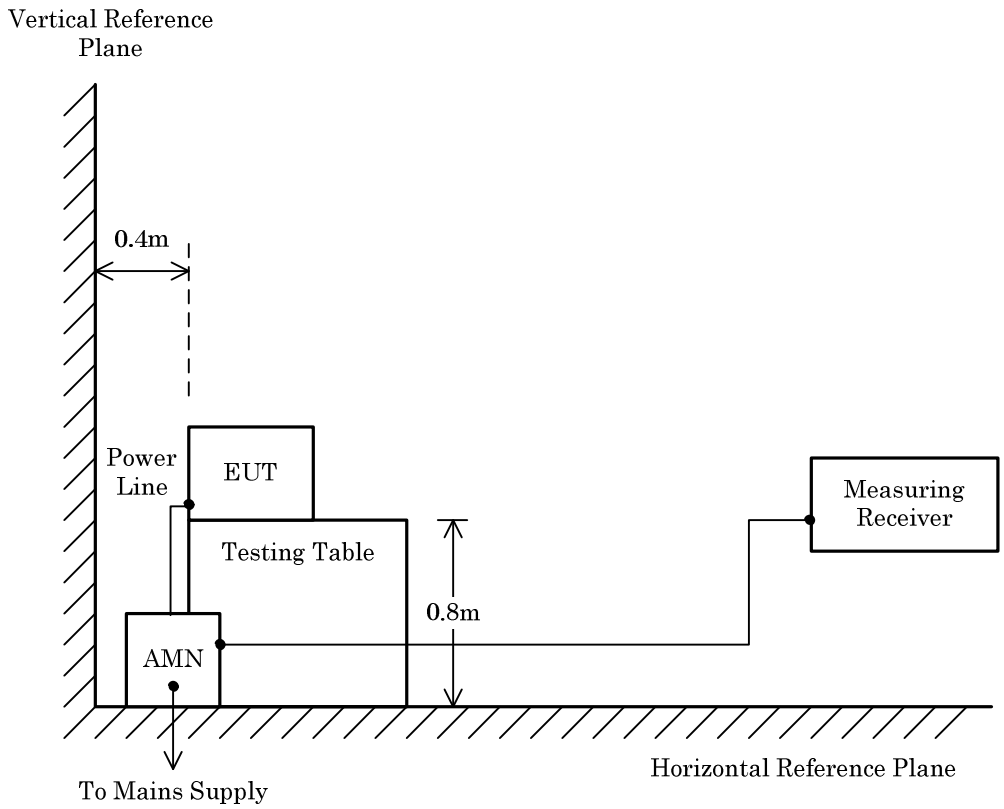
☐ - Anechoic chamber A1
☒ - Measurement room M2
☐ - Shielded room S1
☐ - KITA-KANSAI Shielded room
☐ - Measurement room M1
☐ - Measurement room M3
☐ - Shielded room S2
☐ - KITA-KANSAI Anechoic chamber

### 7.5.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| Test Receiver | ESU 26 | Rohde & Schwarz | A-6 | 2013/4 | 1 Year |
| AMN (main) | KNW-407FR | Kyoritsu | D-103 | 2013/10 | 1 Year |
| RF Cable | RG223/U | SUHNER | H-35 | 2013/6 | 1 Year |

### 7.5.4 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.
(Reference divisional instruction No. G703649)



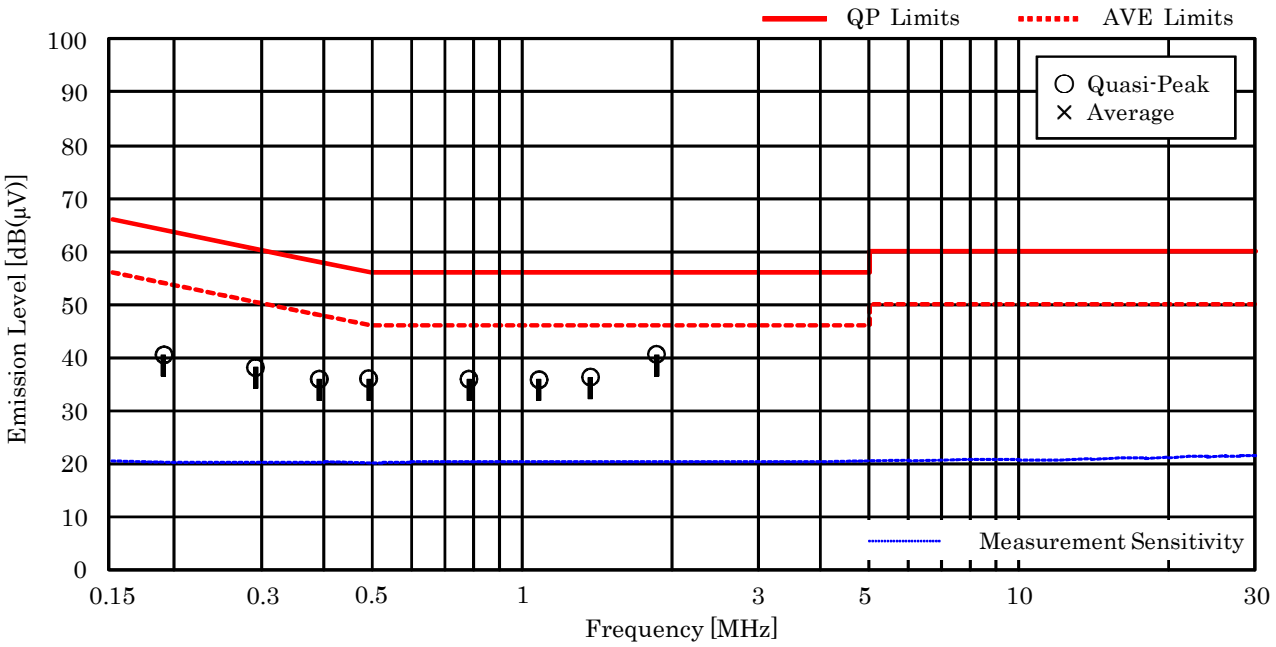

NOTE
AMN : Artificial Mains Network

### 7.5.5 Test Data

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

Test Date: December 14, 2013
Temp.: 20 °C, Humi.: 31 %

| Frequency [MHz] | Corr. Factor [dB] | Meter Readings [dB(μV)] VA QP | VA AVE | VB QP | VB AVE | Limits [dB(μV)] QP | Limits AVE | Results [dB(μV)] QP | Results AVE | Margin [dB] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.19 | 10.2 | 30.2 | -- | 30.4 | -- | 64.0 | 54.0 | 40.6 | -- | +23.4 | - |
| 0.29 | 10.2 | 25.5 | -- | 28.0 | -- | 60.5 | 50.5 | 38.2 | -- | +22.3 | - |
| 0.39 | 10.2 | 21.1 | -- | 25.8 | -- | 58.1 | 48.1 | 36.0 | -- | +22.1 | - |
| 0.49 | 10.1 | 21.3 | -- | 26.0 | -- | 56.2 | 46.2 | 36.1 | -- | +20.1 | - |
| 0.78 | 10.3 | 18.9 | -- | 25.7 | -- | 56.0 | 46.0 | 36.0 | -- | +20.0 | - |
| 1.08 | 10.3 | 21.5 | -- | 25.6 | -- | 56.0 | 46.0 | 35.9 | -- | +20.1 | - |
| 1.37 | 10.3 | 23.1 | -- | 26.1 | -- | 56.0 | 46.0 | 36.4 | -- | +19.6 | - |
| 1.86 | 10.3 | 30.4 | -- | 25.8 | -- | 56.0 | 46.0 | 40.7 | -- | +15.3 | - |




NOTES
1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 1.86 MHz, as the worst point shown on underline:
   Correction Factor + Meter Reading = 10.3 + 30.4 = 40.7 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

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

### 7.6.1 Worst Point and Measurement Uncertainty

| | | | | | |
|---|---|---|---|---|---|
| Min. Limit Margin (Average) | >4.0 | dB | at | 39690.0 | MHz |
| Uncertainty of Measurement Results | 9 kHz – 30 MHz | | | +/-1.9 | dB(2σ) |
| | 30 MHz – 300 MHz | | | +/-4.3 | dB(2σ) |
| | 300 MHz – 1000 MHz | | | +/-5.4 | dB(2σ) |
| | 1 GHz – 6 GHz | | | +/-4.6 | dB(2σ) |
| | 6 GHz – 18 GHz | | | +/-5.2 | dB(2σ) |
| | 18 GHz – 40 GHz | | | +/-5.4 | dB(2σ) |
| Test Distance | 9 kHz – 26 GHz | | | 3 | m |
| Test Distance | 26 GHz – 40 GHz | | | 1 | m |

Remarks : Remarks : Worst case is 802.11n(40 MHz BW) channel 134. The measurement result is within the range of measurement uncertainty.

### 7.6.2 Test Site

KITA-KANSAI Testing Center SAITO EMC Branch

☐ - Anechoic chamber A1 ☒ - Anechoic chamber A2

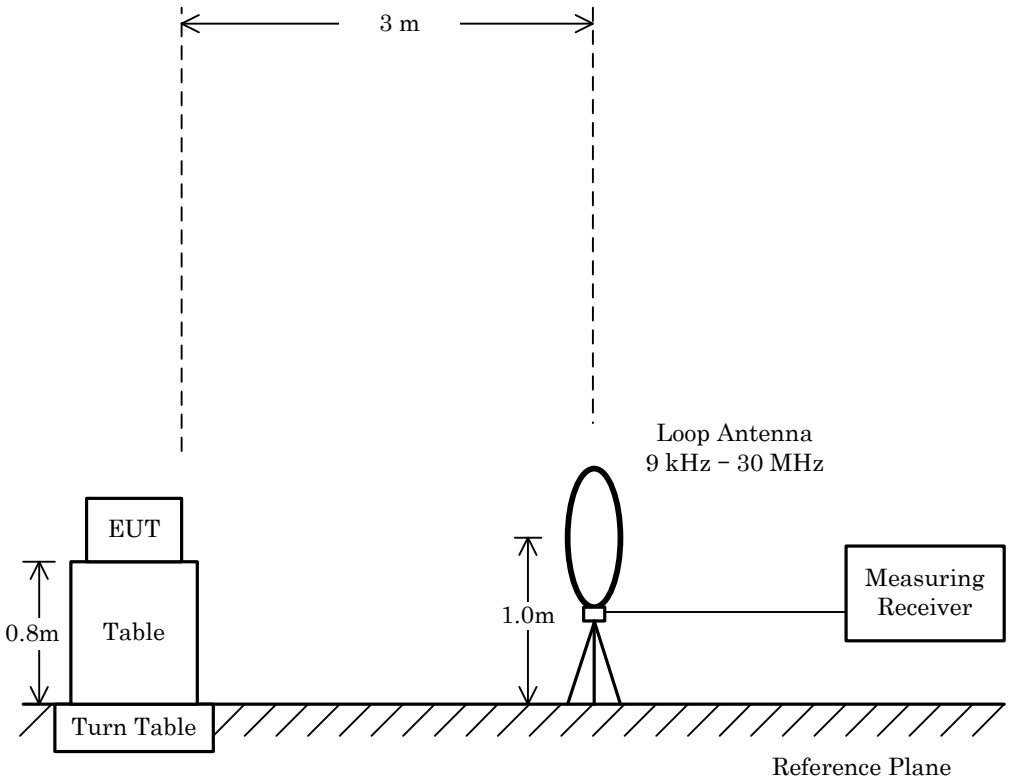
### 7.6.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| Test Receiver | ESU 26 | Rohde & Schwarz | A-6 | 2013/4 | 1 Year |
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |
| Loop Antenna | HFH2-Z2 | Rohde & Schwarz | C-2 | 2013/8 | 1 Year |
| RF Cable | RG213/U | SUHNER | H-28 | 2013/8 | 1 Year |
| Biconical Antenna | VHA9103/BBA9106 | Schwarzbeck | C-30 | 2013/5 | 1 Year |
| Log-periodic Antenna | UHALP9108-A1 | Schwarzbeck | C-31 | 2013/5 | 1 Year |
| RF Cable | S 10162 B-11 etc. | SUHNER | H-4 | 2013/4 | 1 Year |
| Site Attenuation | -- | ---- | H-15 | 2013/2 | 1 Year |
| Pre-Amplifier | WJ-6882-824 | Watkins Johnson | A-21 | 2013/2 | 1 Year |
| Pre-Amplifier | WJ-6611-513 | Watkins Johnson | A-23 | 2013/2 | 1 Year |
| Pre-Amplifier | BZ1840LD1 | B&Z | A-29 | 2013/2 | 1 Year |
| Pre-Amplifier | DBL-0618N515 | DBS Microwave | A-33 | 2013/2 | 1 Year |
| Horn Antenna | 91888-2 | EATON | C-41-1 | 2013/6 | 1 Year |
| Horn Antenna | 91889-2 | EATON | C-41-2 | 2013/6 | 1 Year |
| Horn Antenna | 3160-04 | EMCO | C-55 | 2013/7 | 1 Year |
| Horn Antenna | 3160-05 | EMCO | C-56 | 2013/7 | 1 Year |
| Horn Antenna | 3160-06 | EMCO | C-57 | 2013/7 | 1 Year |
| Horn Antenna | 3160-07 | EMCO | C-58 | 2013/7 | 1 Year |
| Horn Antenna | 3160-08 | EMCO | C-59 | 2013/7 | 1 Year |
| Horn Antenna | 3160-09 | EMCO | C-48 | 2013/7 | 1 Year |
| Horn Antenna | 3160-10 | EMCO | C-49 | 2013/7 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-29 | 2013/9 | 1 Year |
| Attenuator | 2-10 | Weinschel | D-79 | 2013/11 | 1 Year |
| RF Cable | SUCOFLEX102E | SUHNER | C-75 | 2013/2 | 1 Year |
| RF Cable | SUCOFLEX104 | SUHNER | C-66 | 2013/2 | 1 Year |
| RF Cable | SUCOFLEX104 | SUHNER | C-67 | 2013/2 | 1 Year |
| RF Cable | SUCOFLEX102EA | SUHNER | C-69 | 2013/2 | 1 Year |
| SVSWR | -- | ---- | H-19 | 2013/2 | 1 Year |
| High Pass Filter | HPM13900 | MICRO-TRONICS | D-95 | 2013/2 | 1 Year |
| Pre-Amplifier | 310N | SONOMA | A-17 | 2013/4 | 1 Year |

### 7.6.4 Test Method and Test Setup (Diagrammatic illustration)

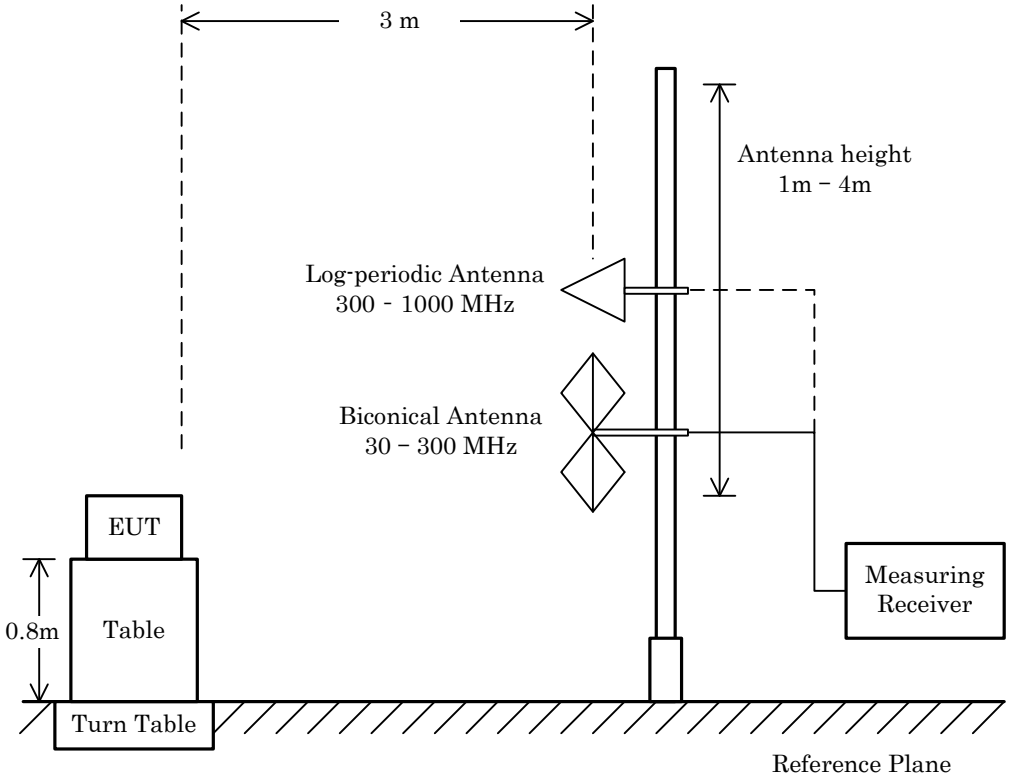
#### 7.5.4.1 Radiated Emission 9 kHz – 30 MHz

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.
This configurations was used for the final tests.
(Reference divisional instruction No. G70364B)



### 7.5.4.2 Radiated Emission 30 MHz – 1000 MHz

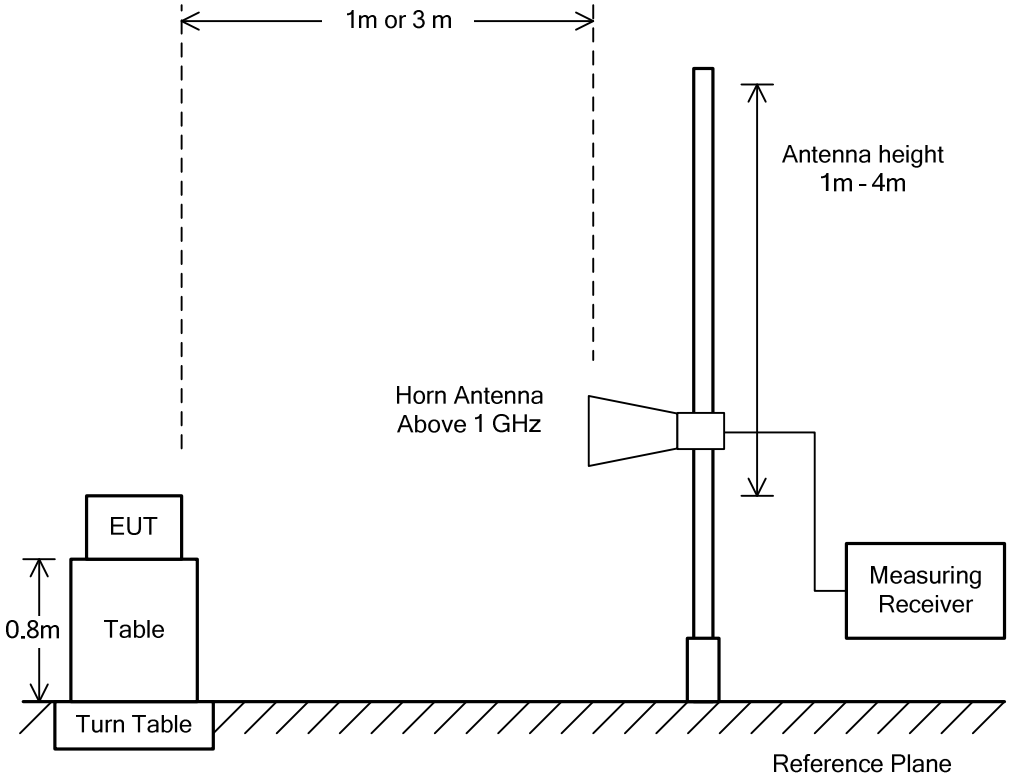
The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.
The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
This configurations was used for the final tests.
(Reference divisional instruction No. G70364B)



### 7.5.4.3 Radiated Emission Above 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.
The average unwanted emissions measurements were performed in accordance with KDB 789033 D01 Method AD described in (G) (6) in this document.

(Reference divisional instruction No. G70364C)



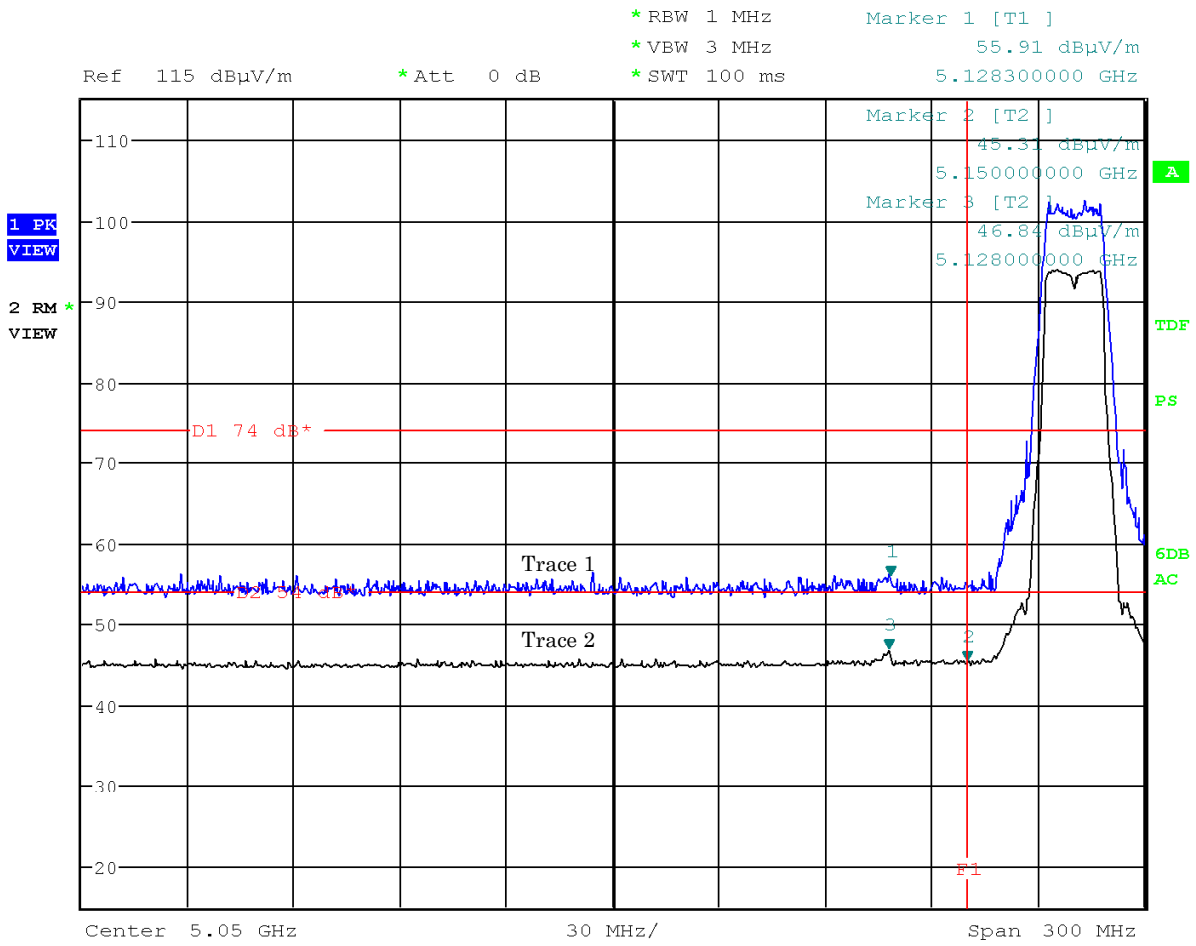

NOTE
The antenna height is scanned depending on the EUT's size and mounting height.

### 7.6.5 Test Data

#### 7.6.5.1 Radiated Band Edge

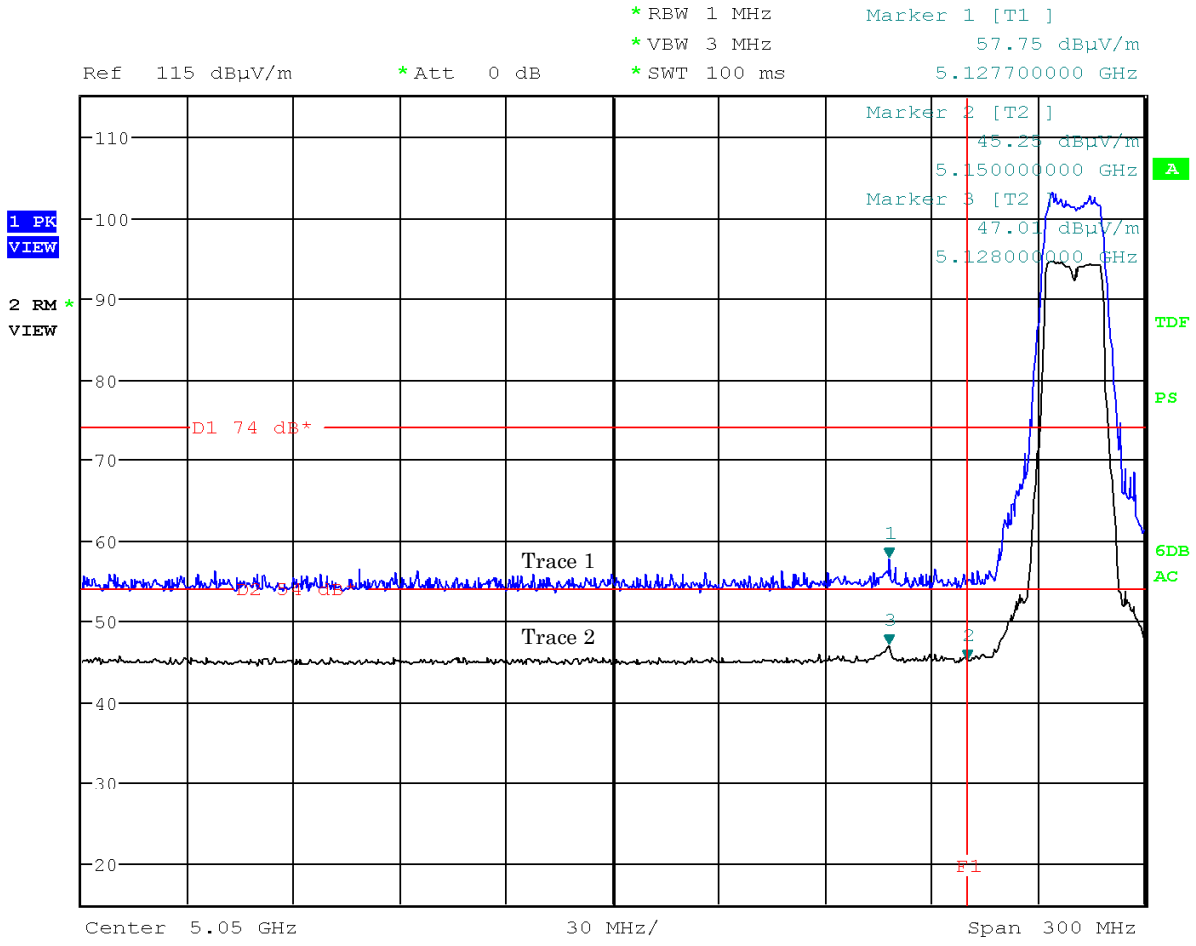
Test Date : December 12, 2013
Temp.:22°C, Humi:33%

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



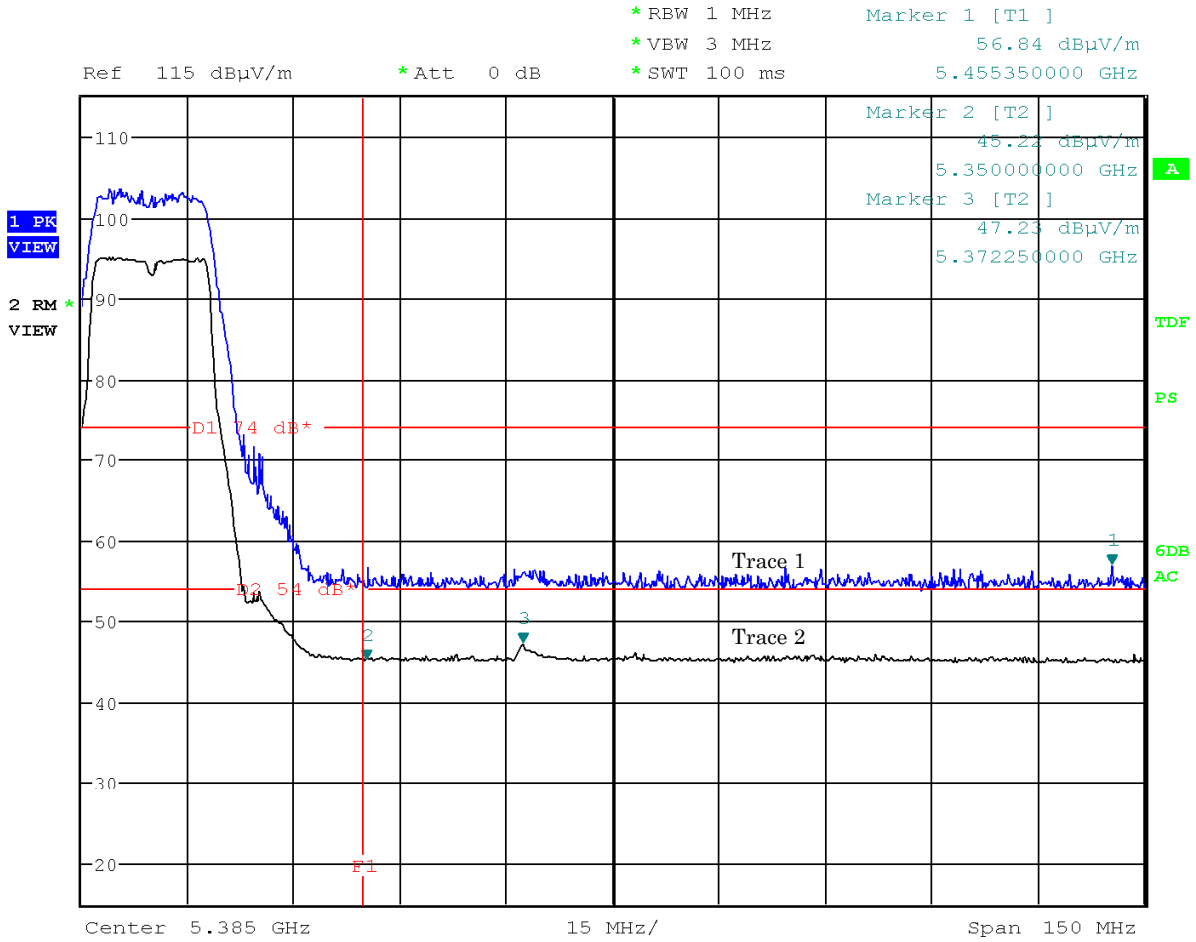

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



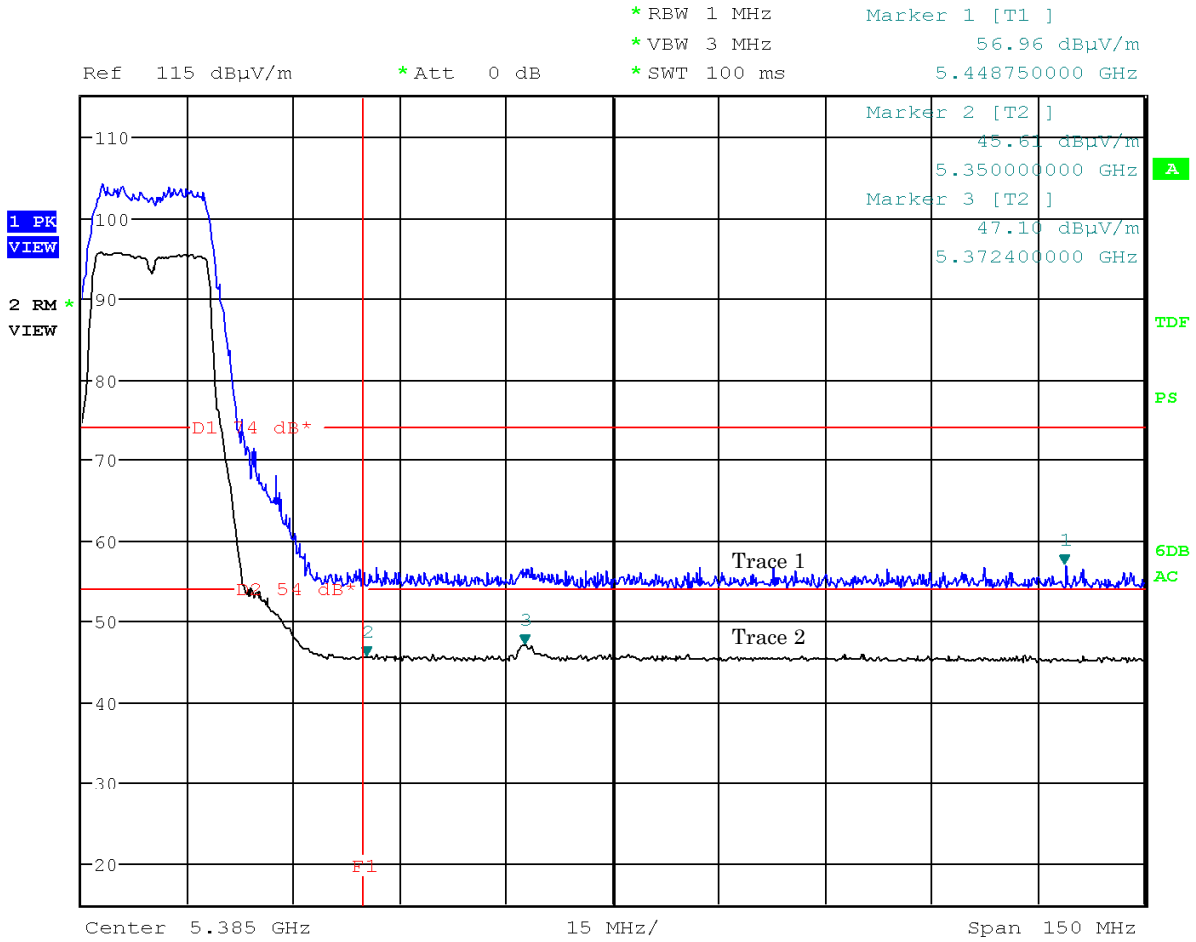

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



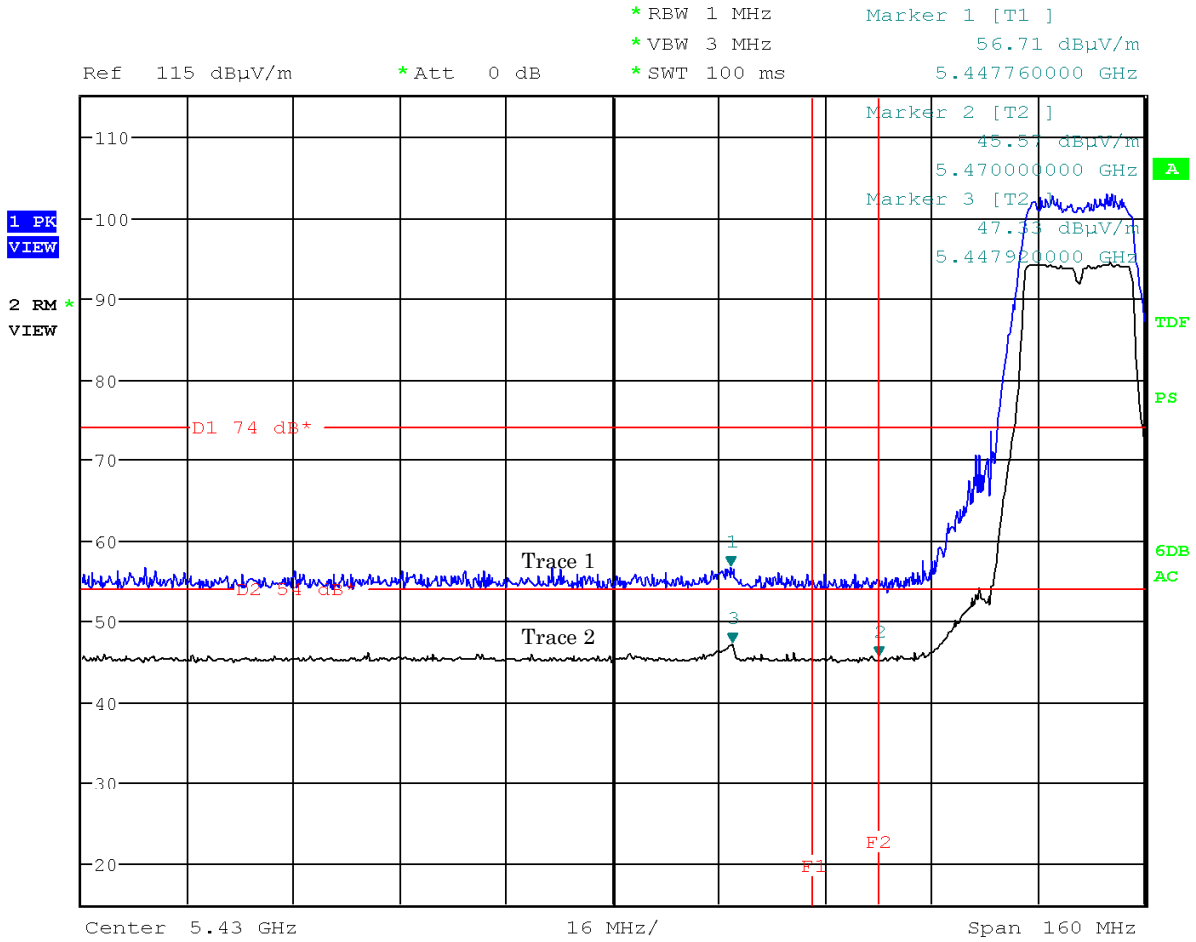

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



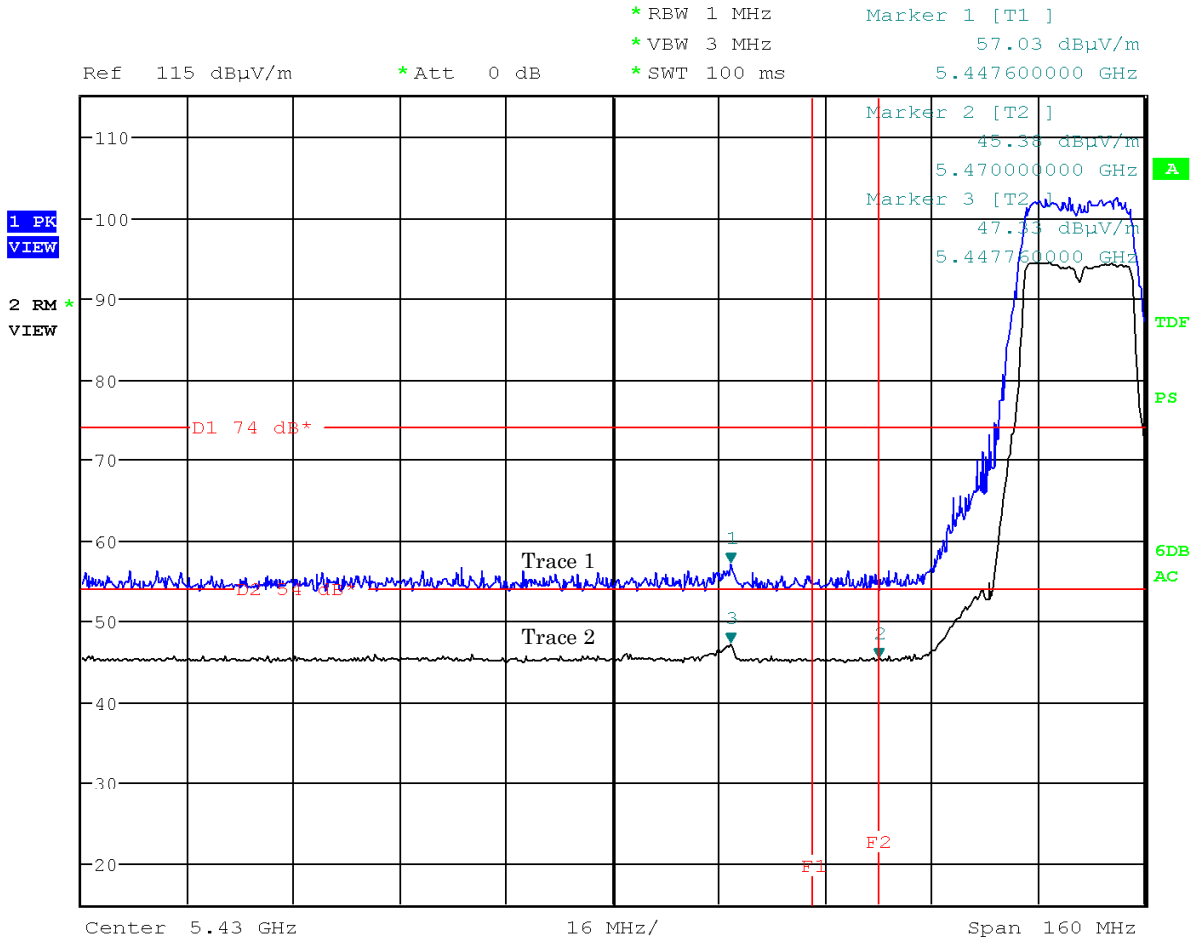

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



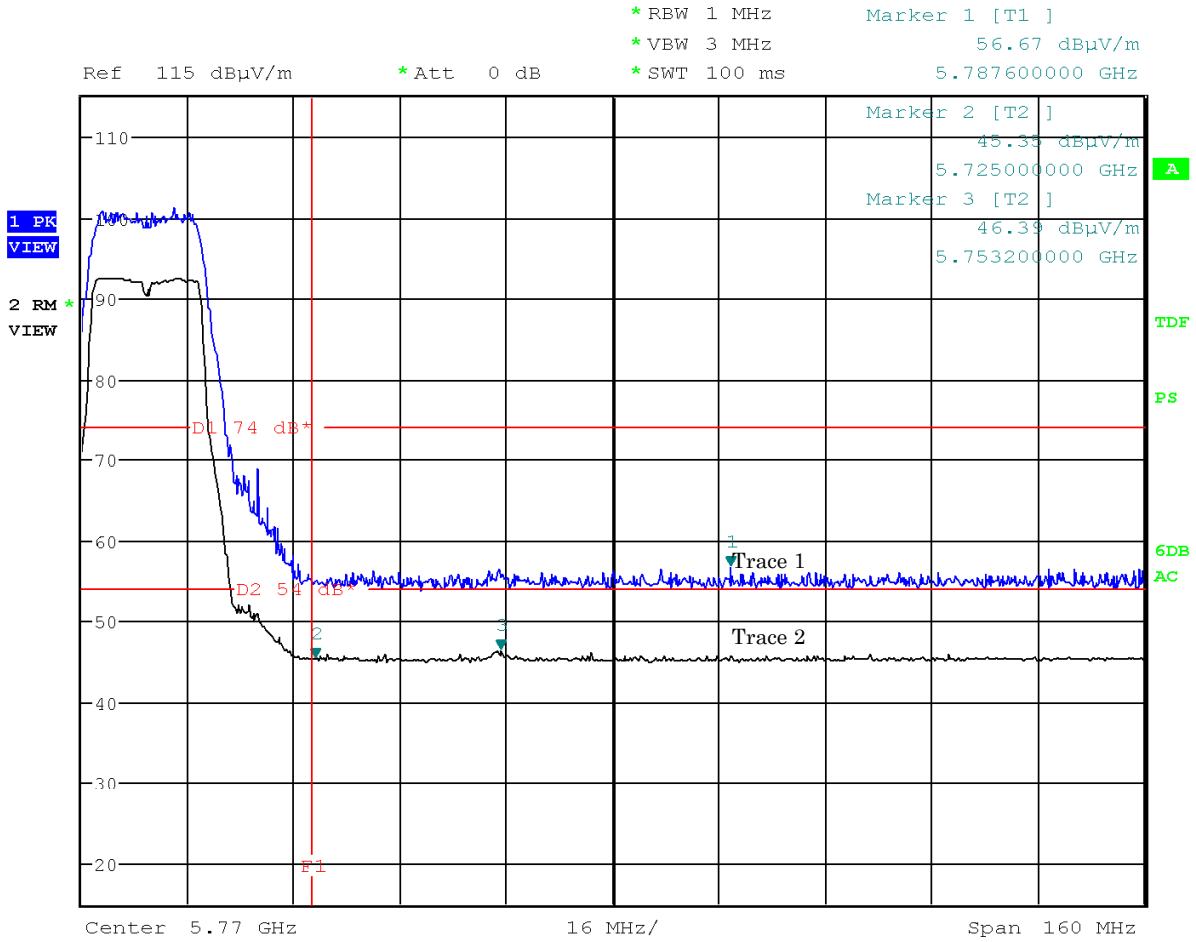

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



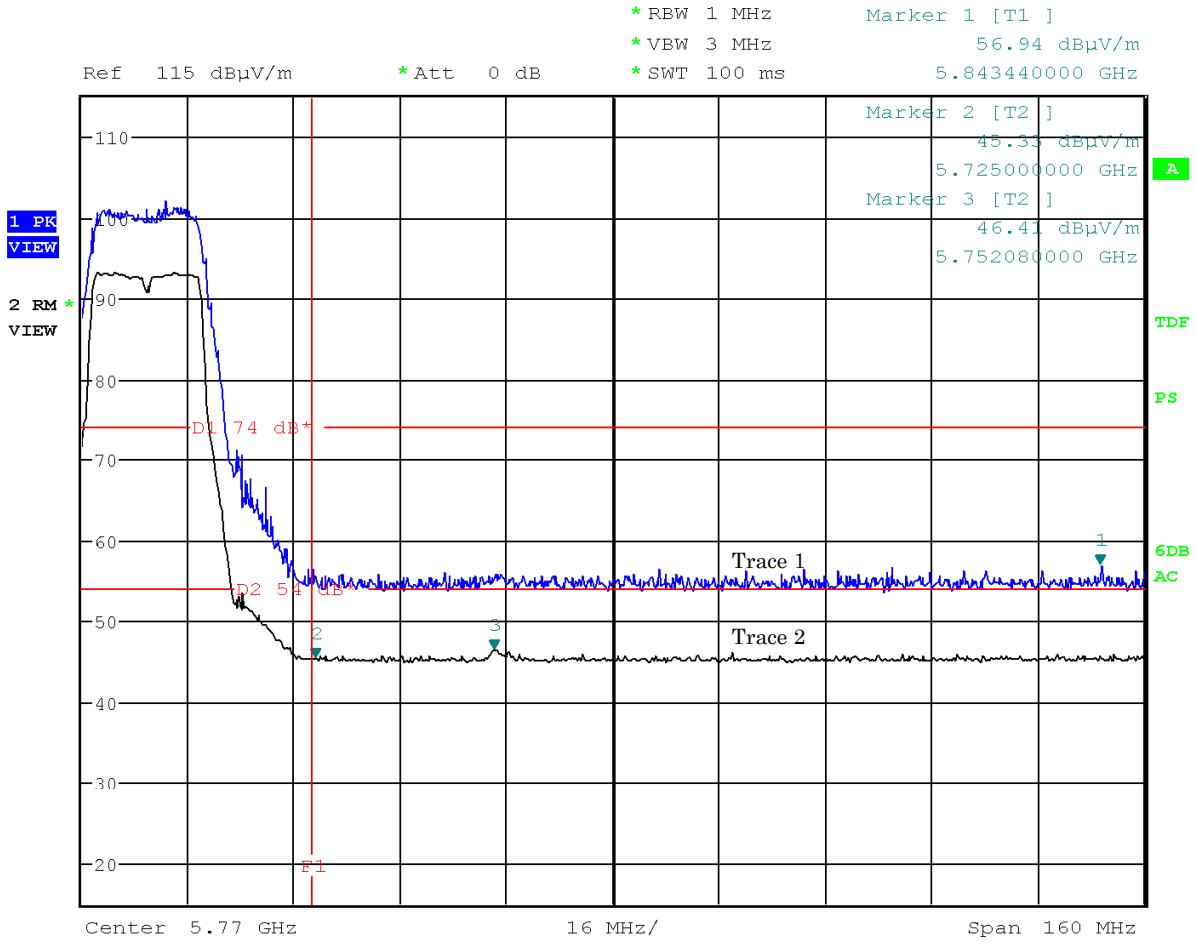

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



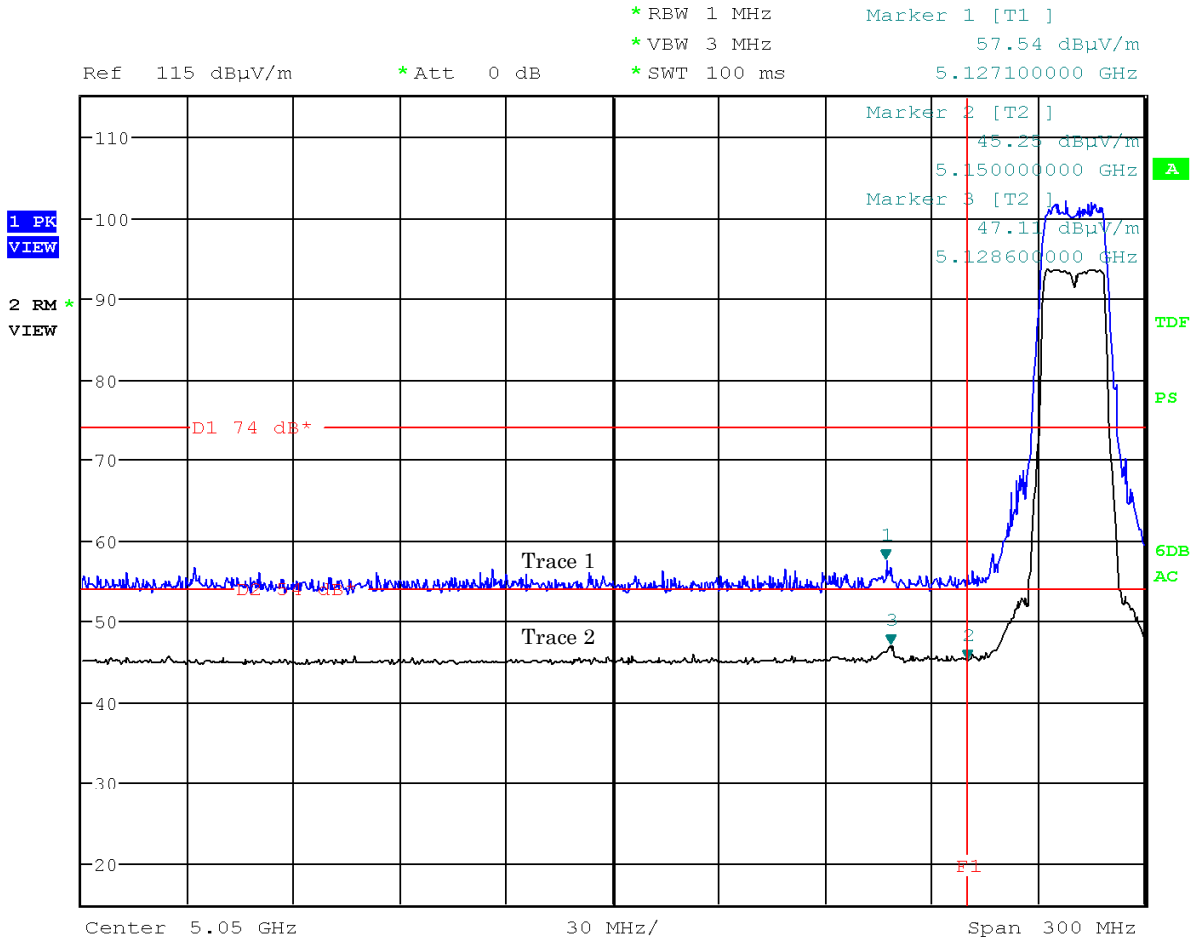

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



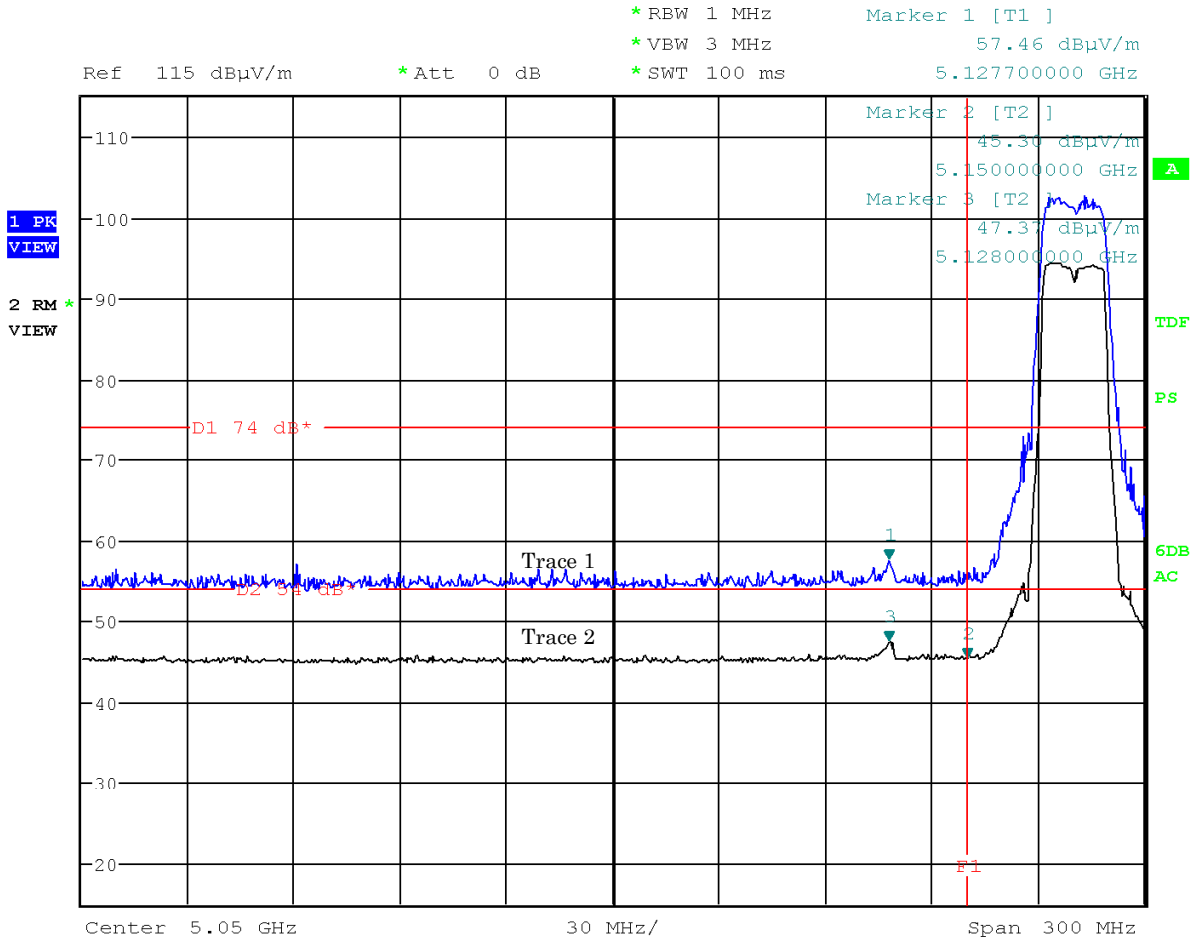

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



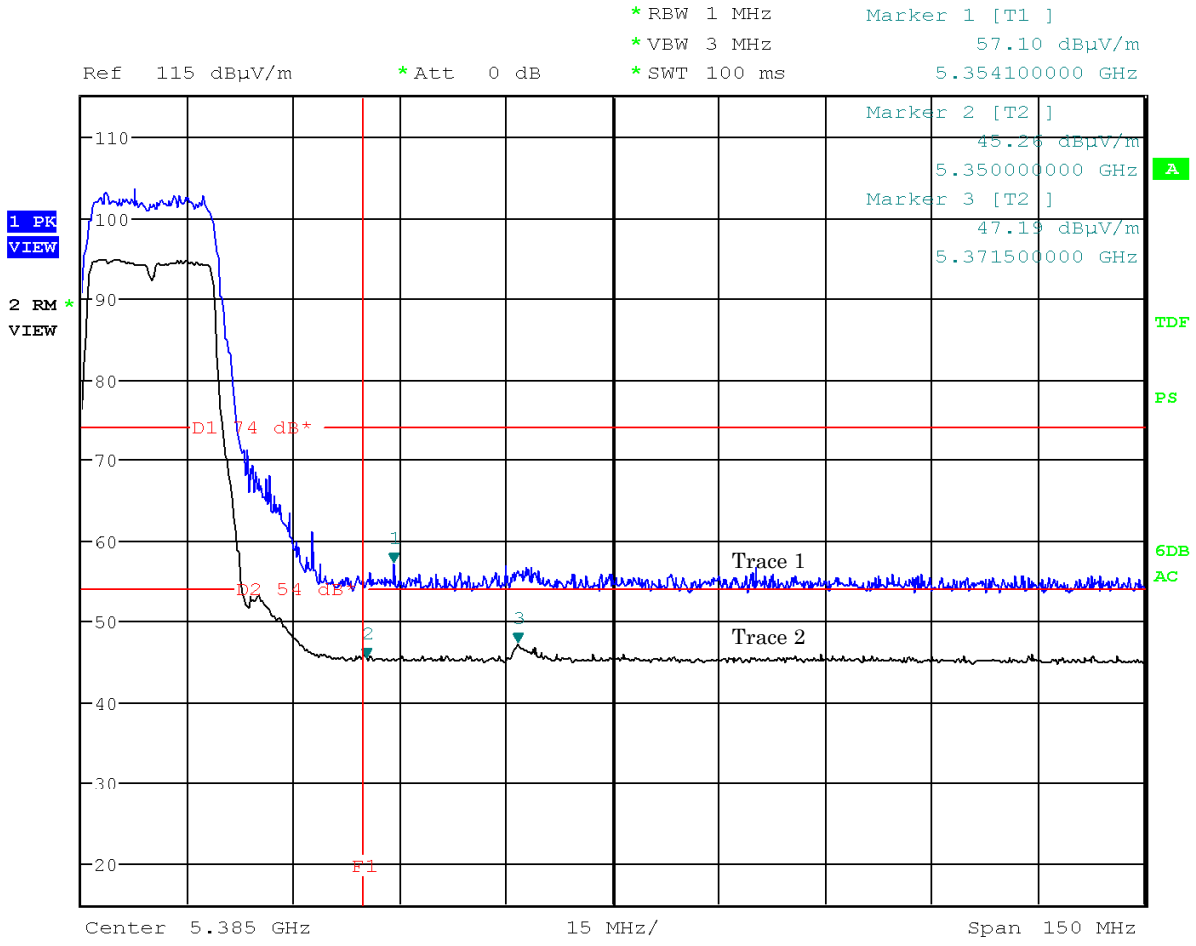

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



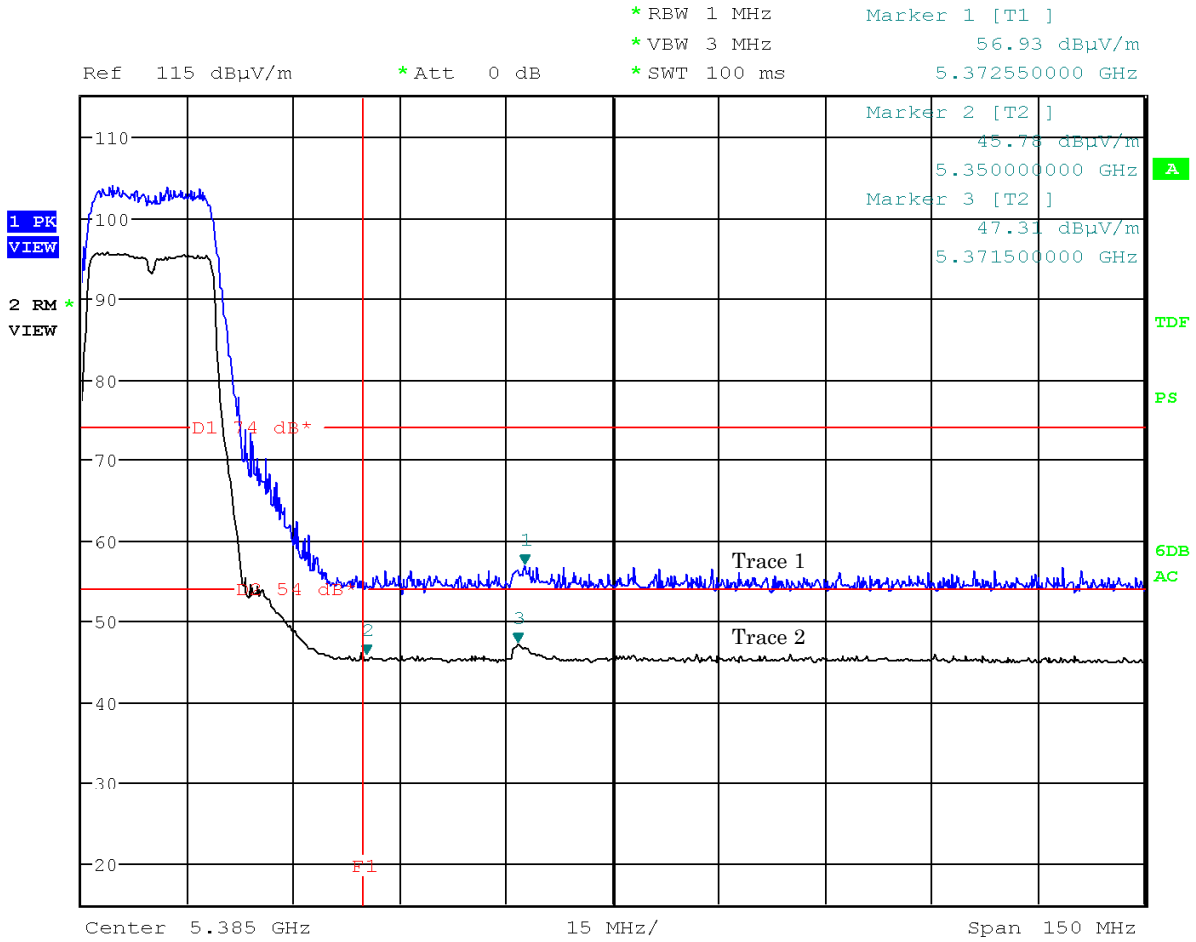

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



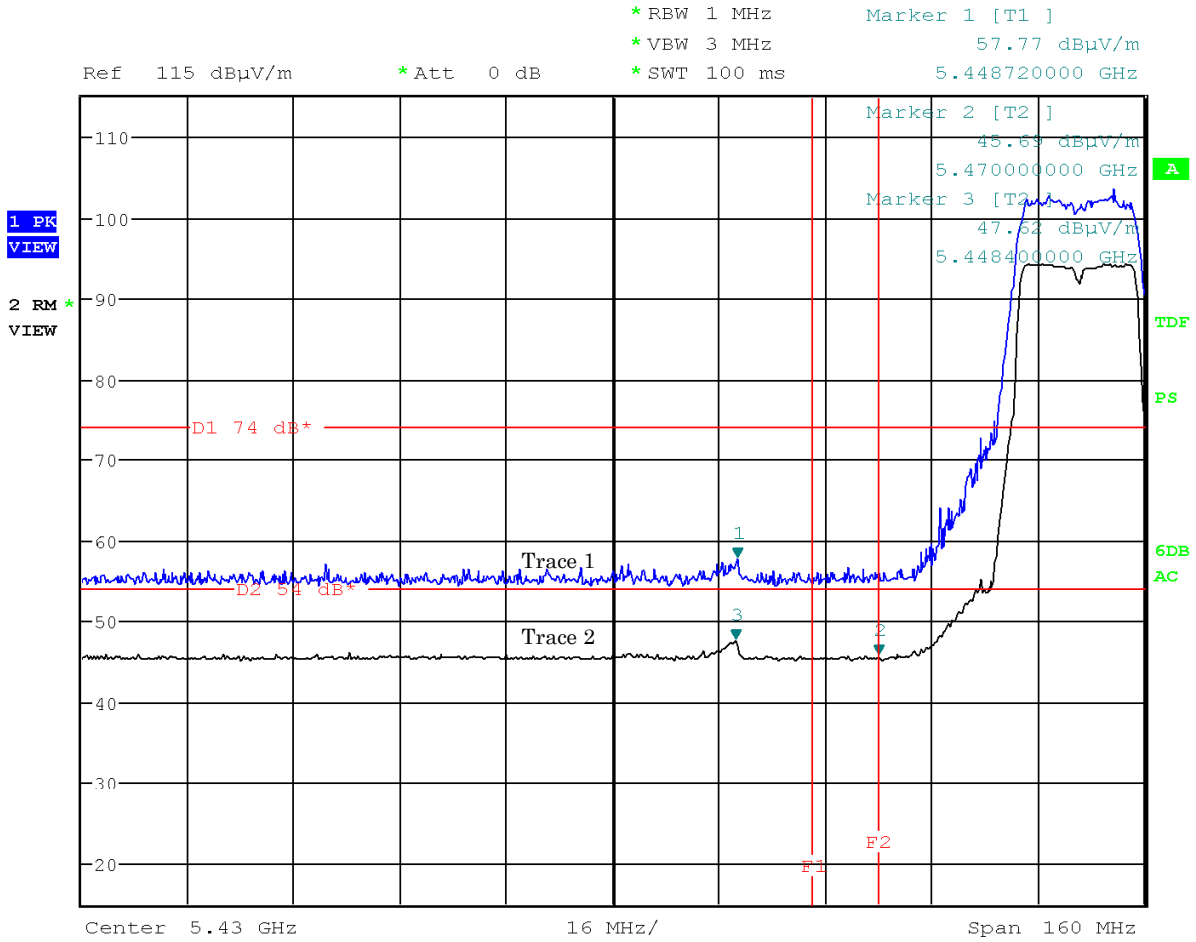

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



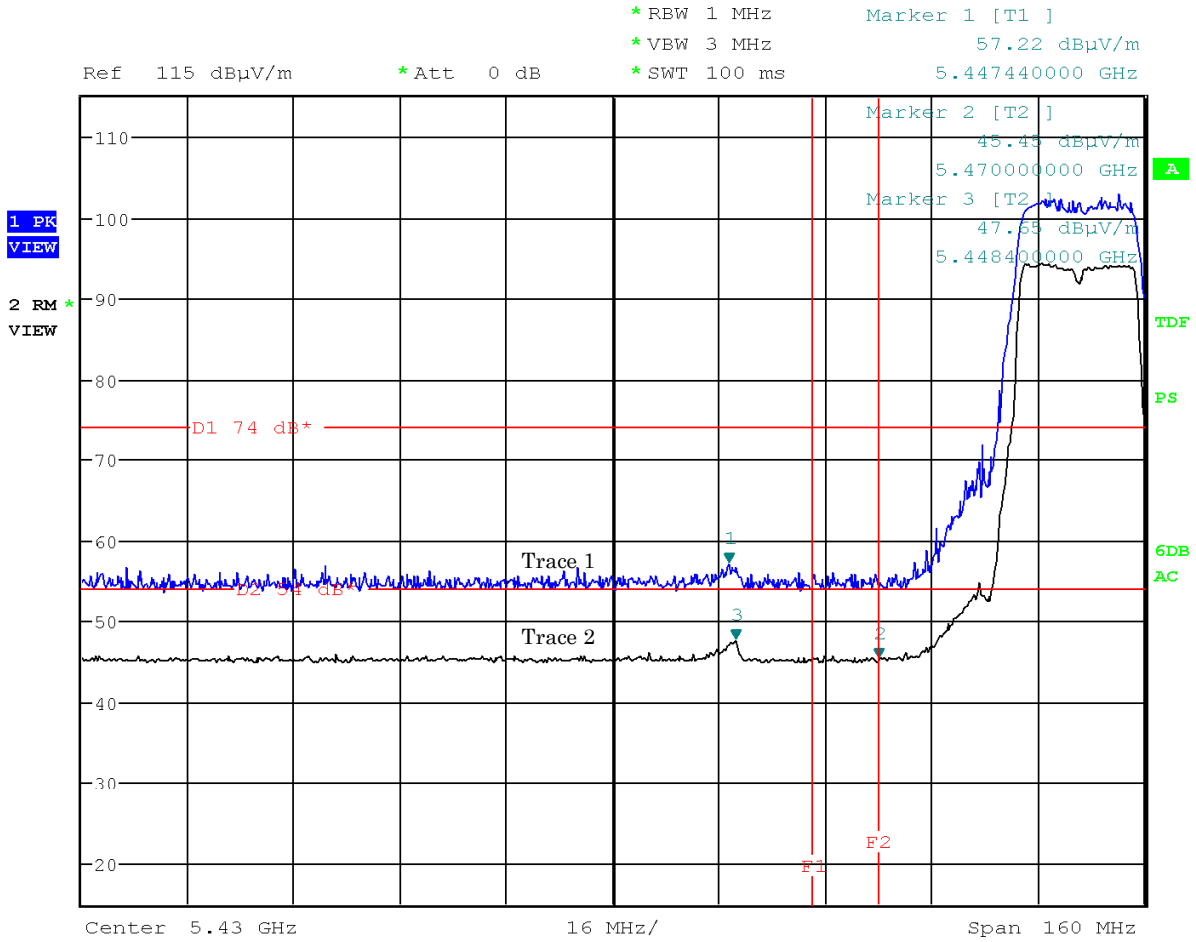

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



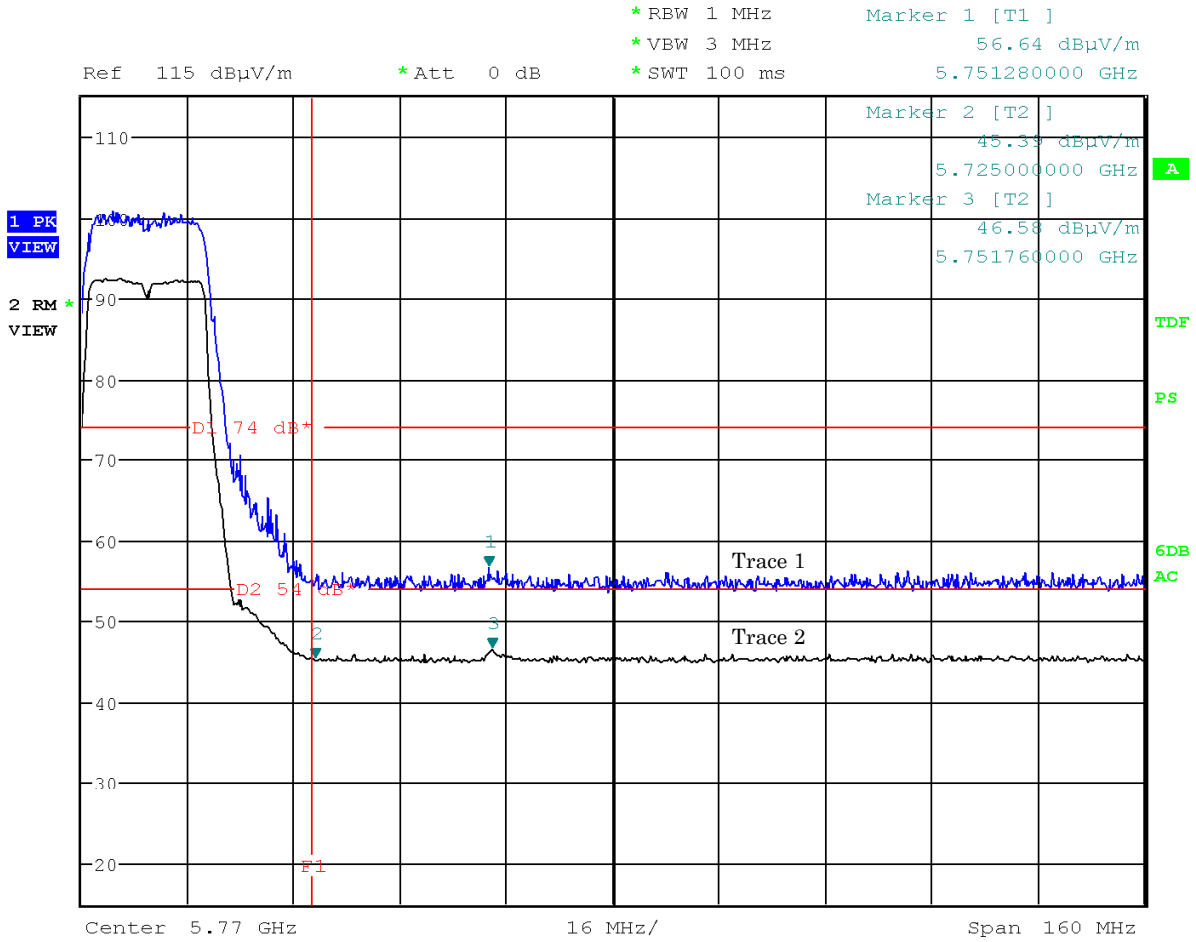

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



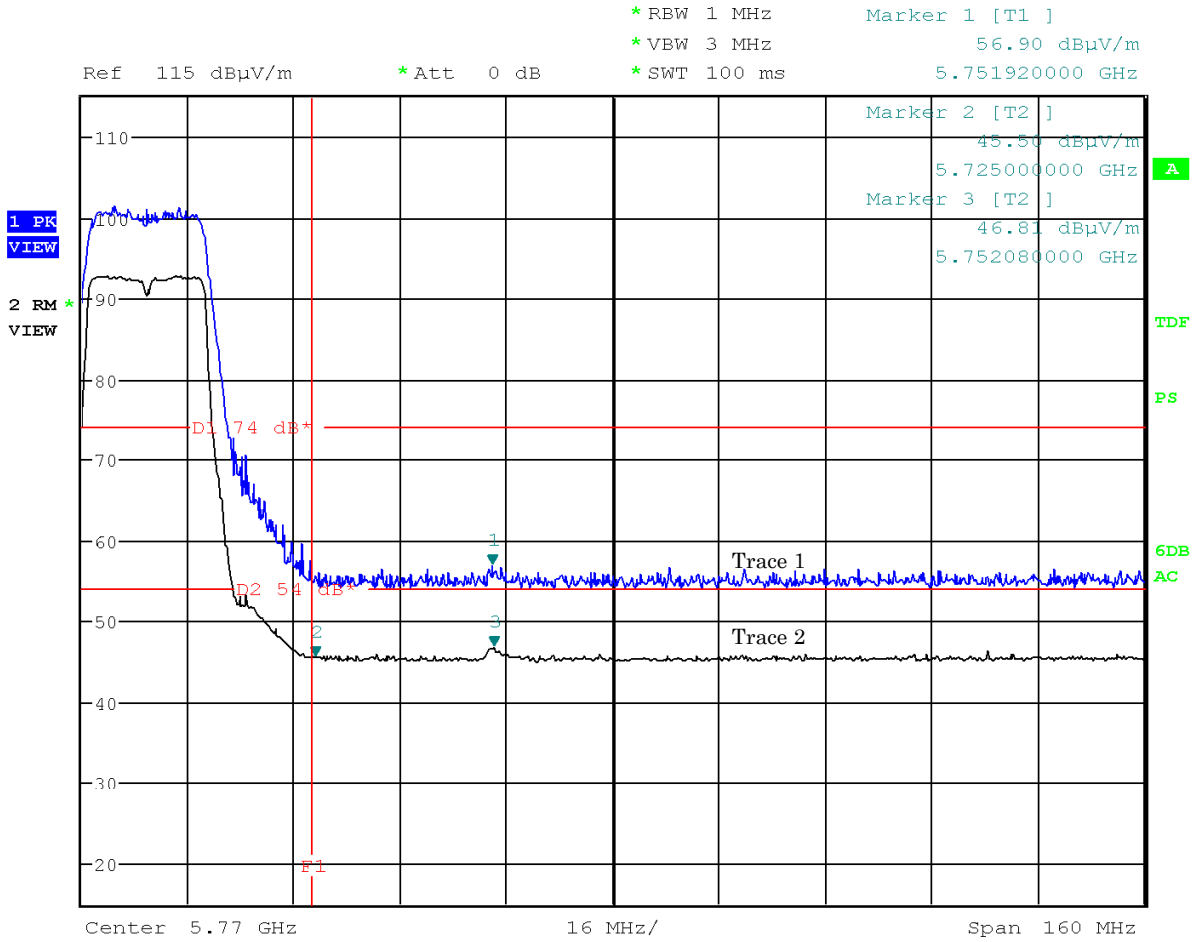

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



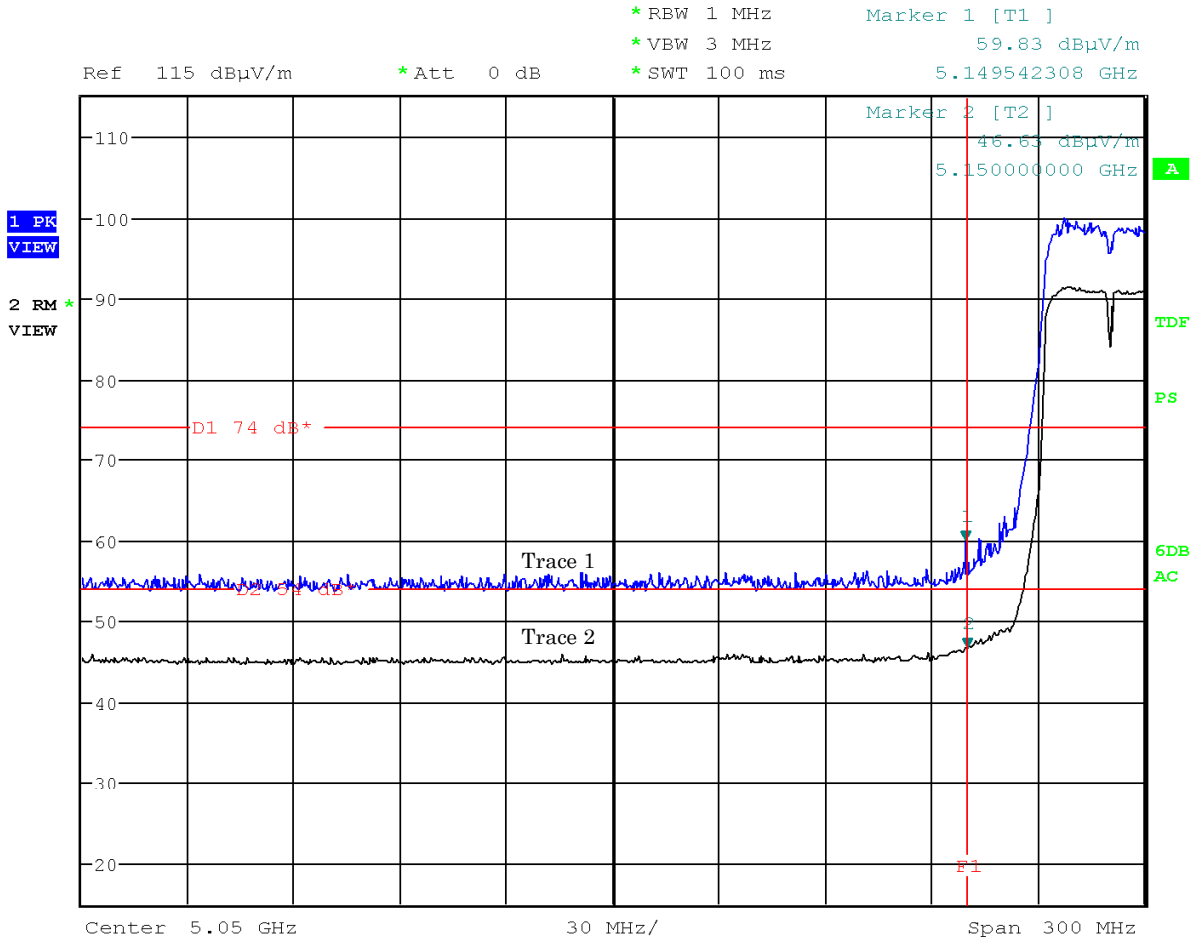

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



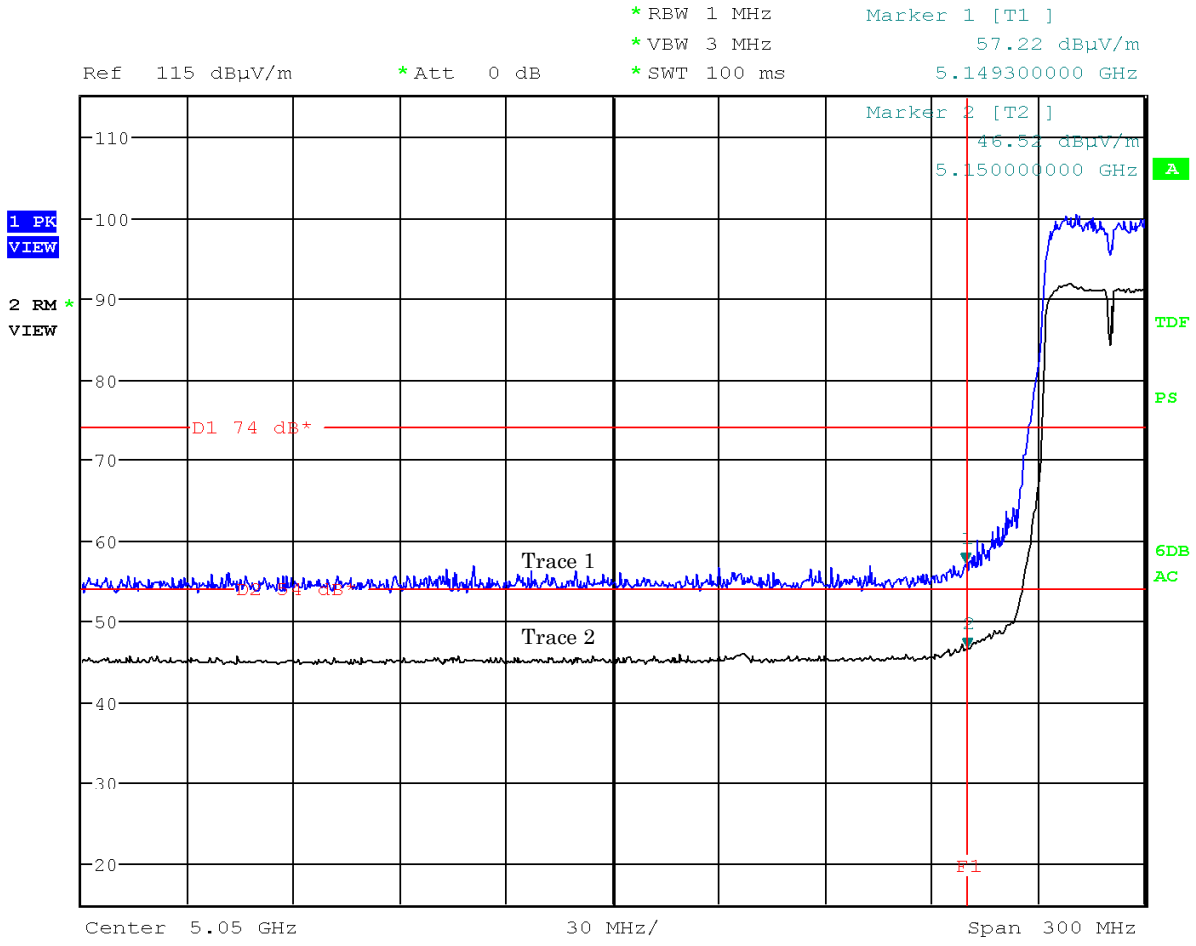

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



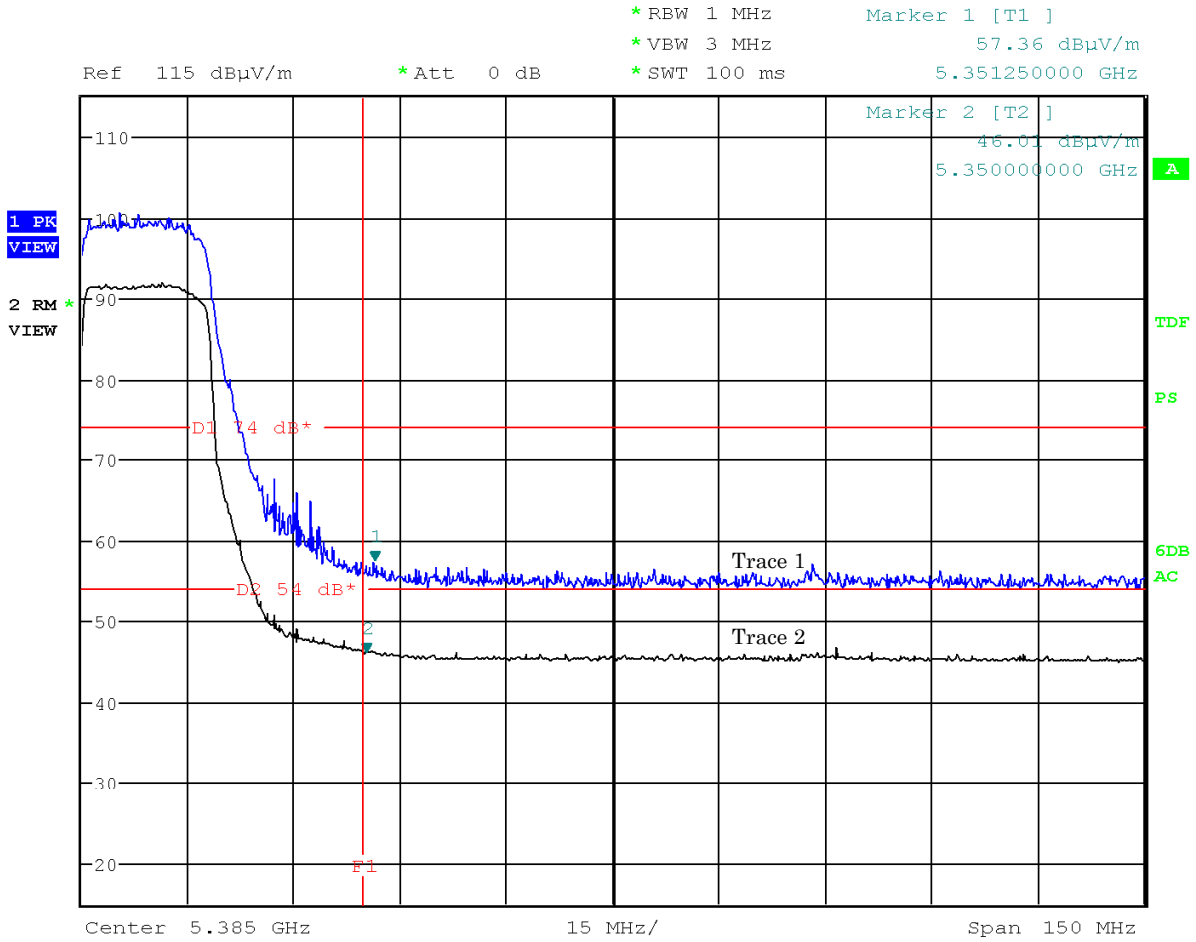

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



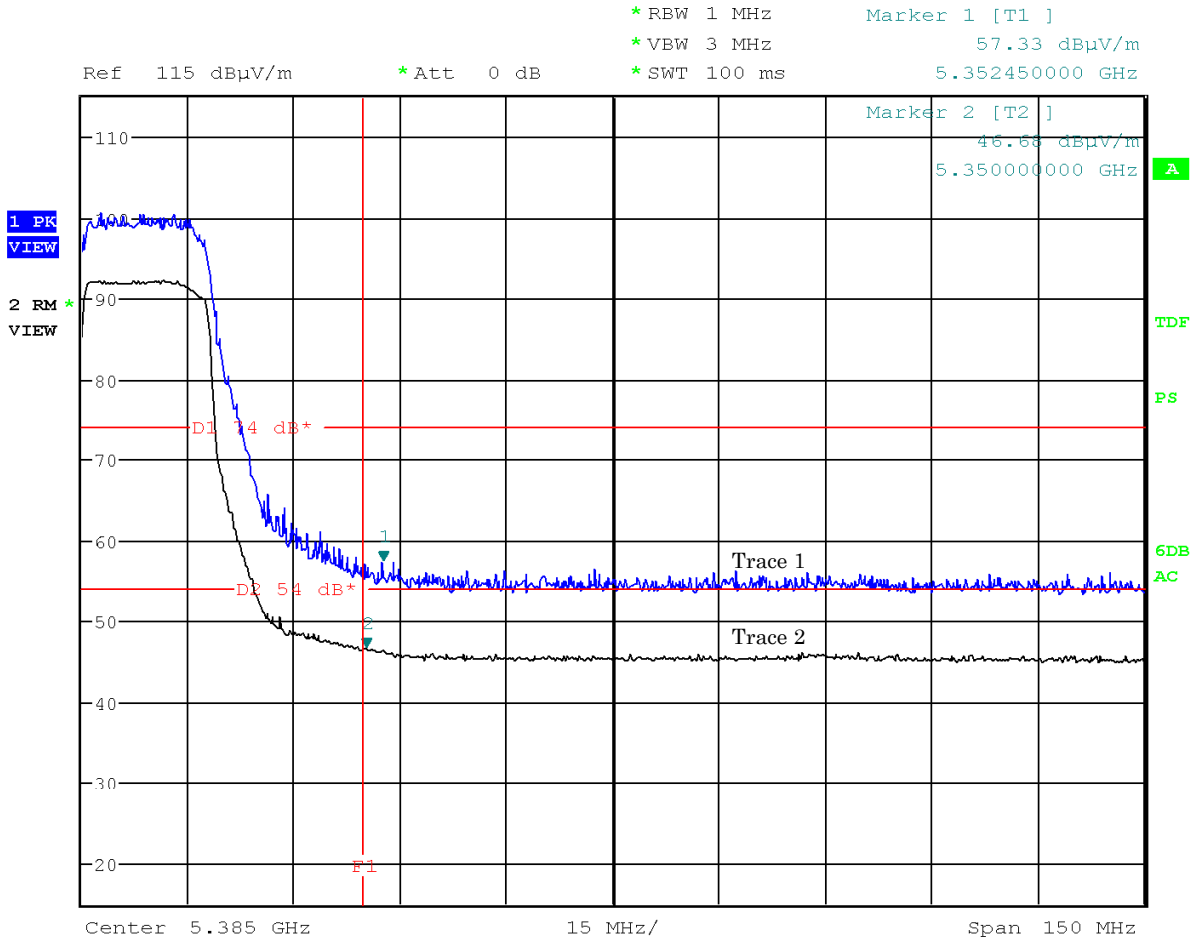

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



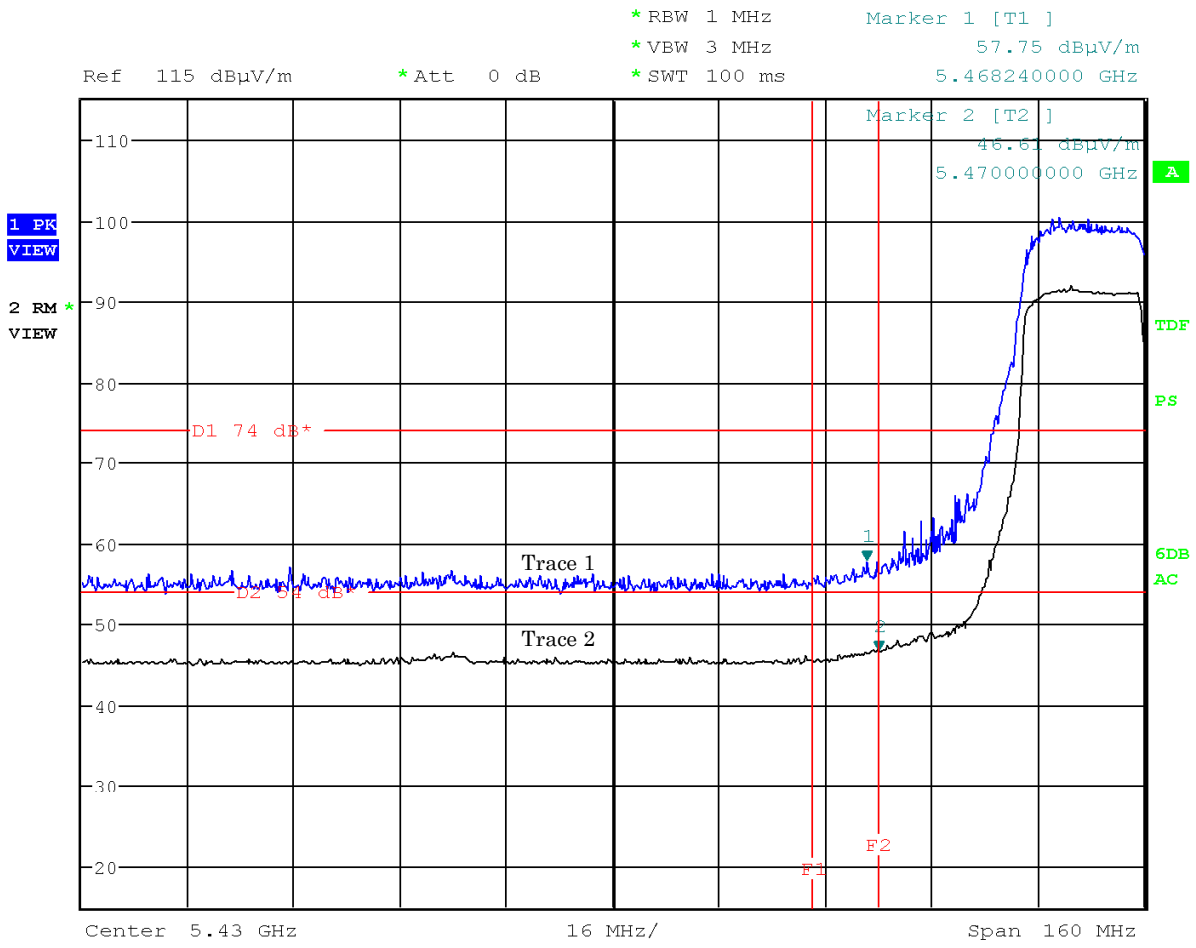

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



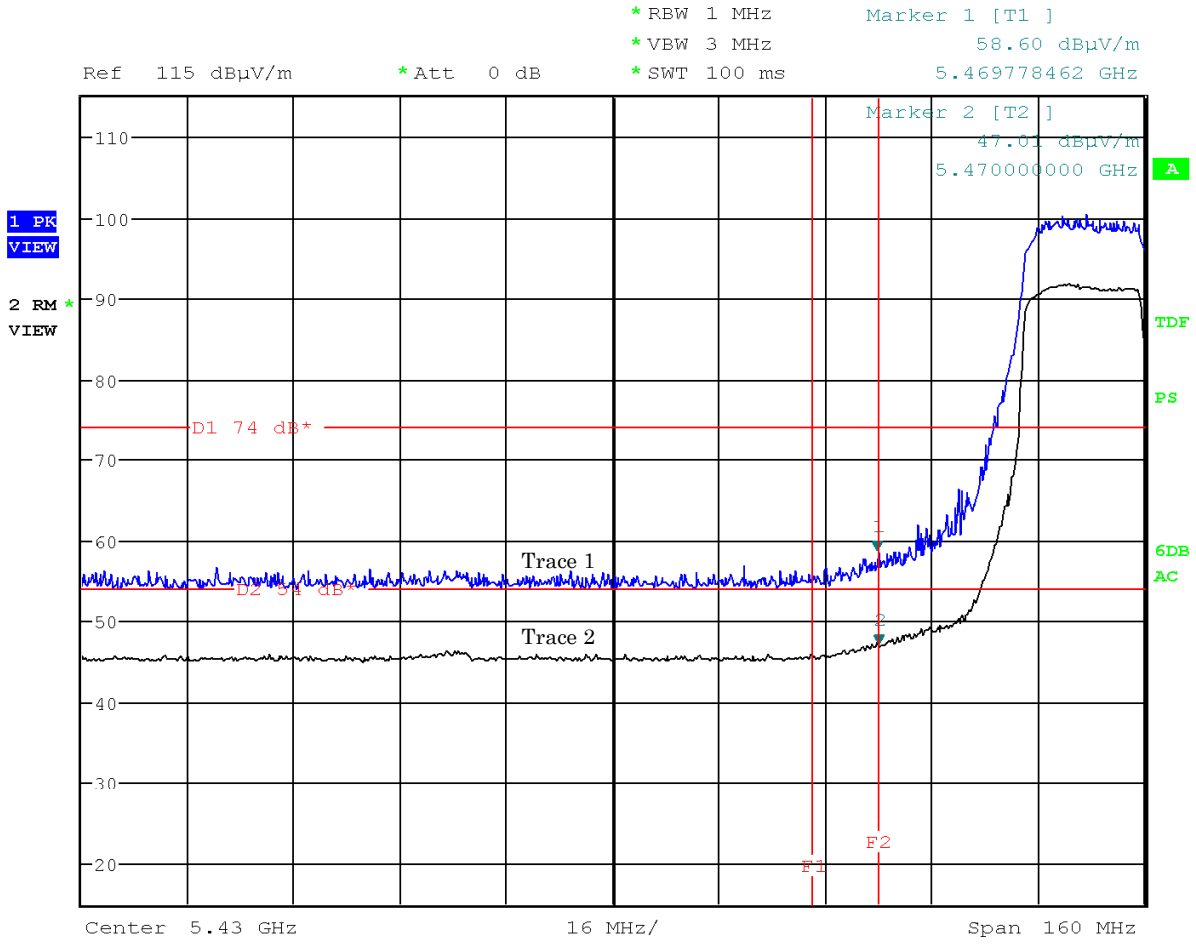

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



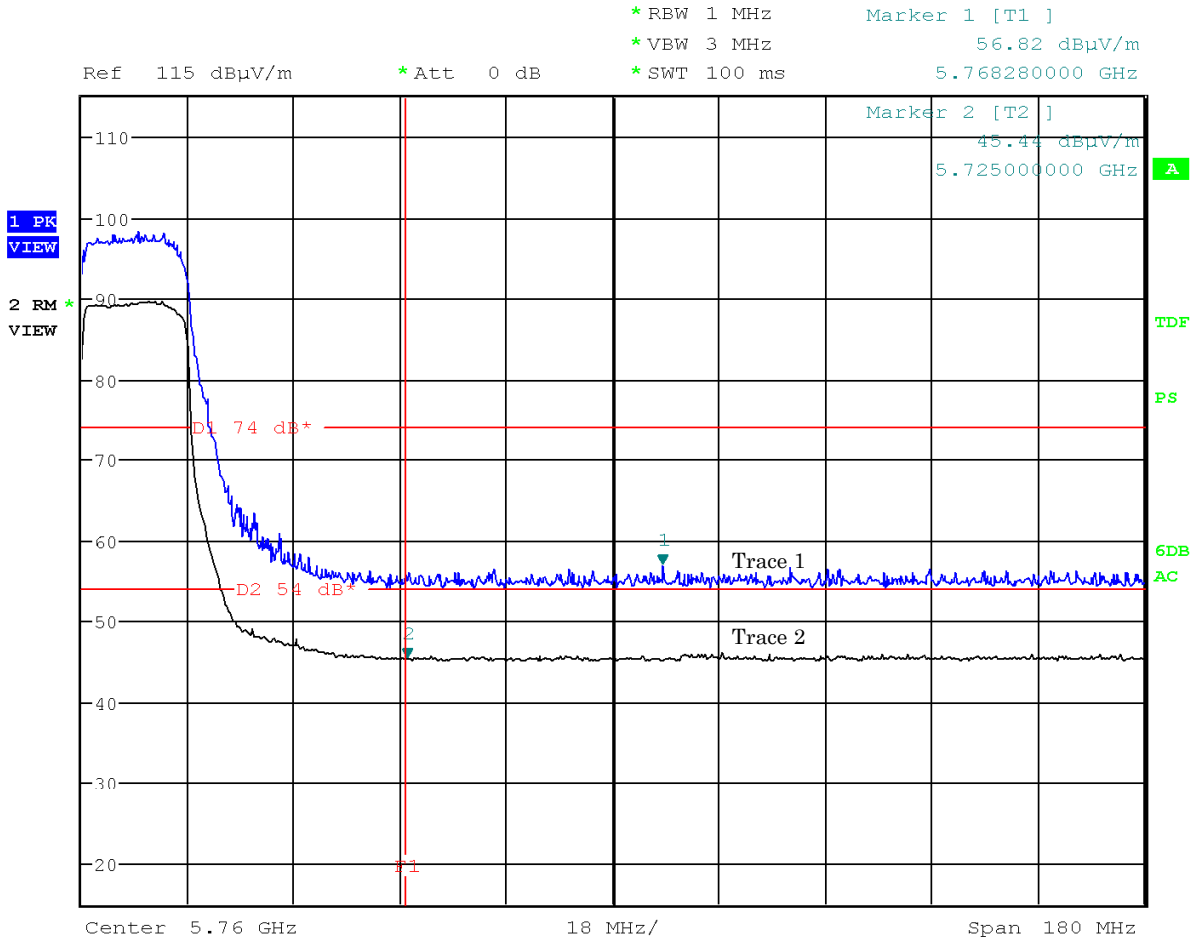

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



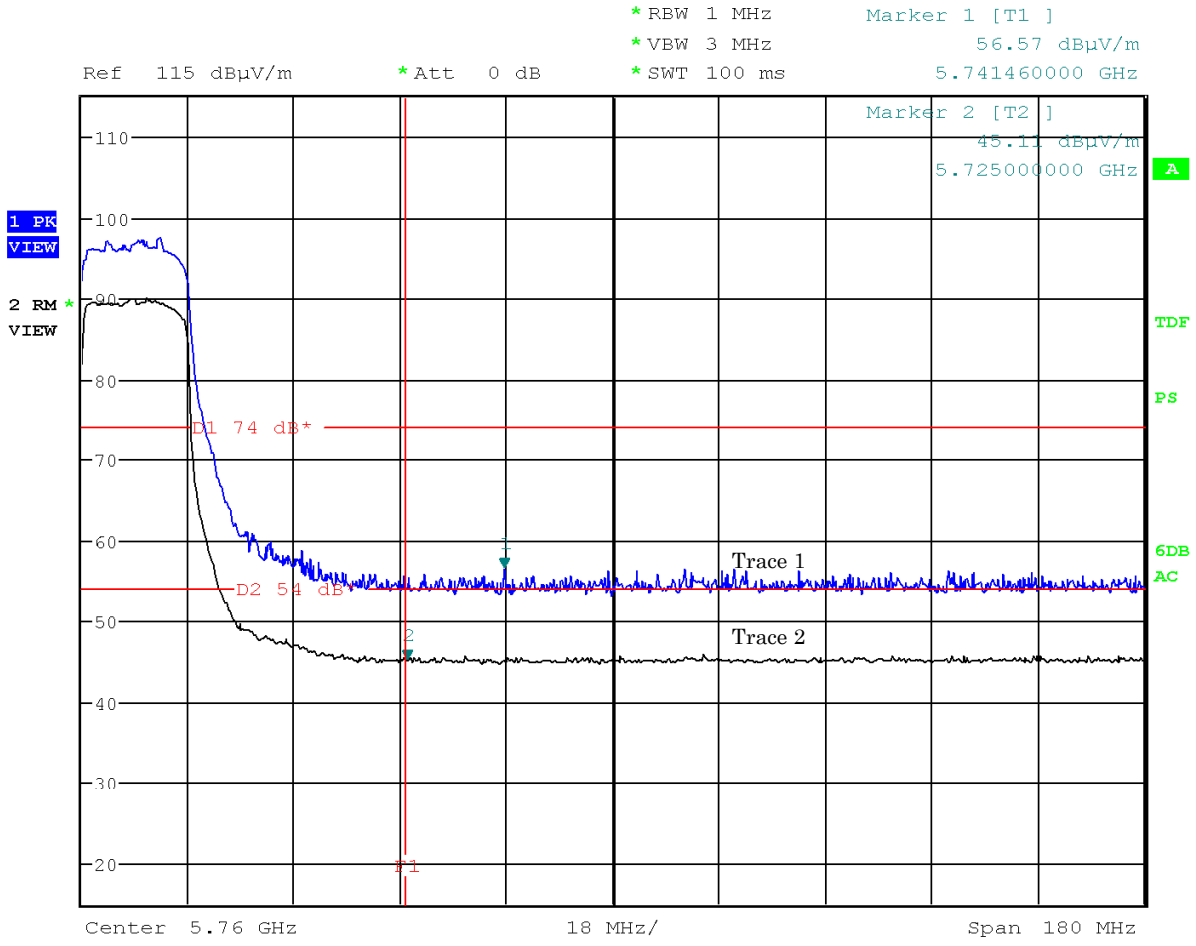

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



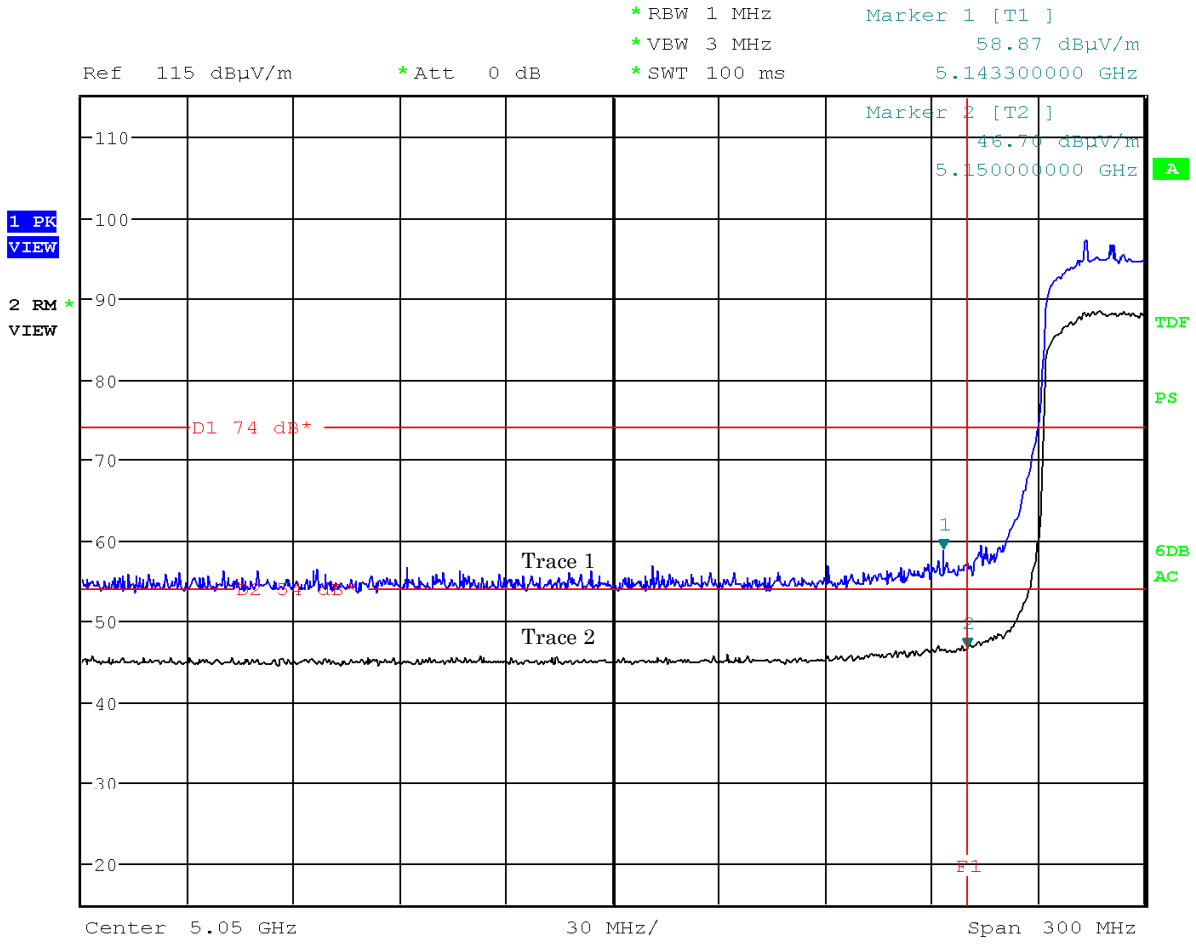

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

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



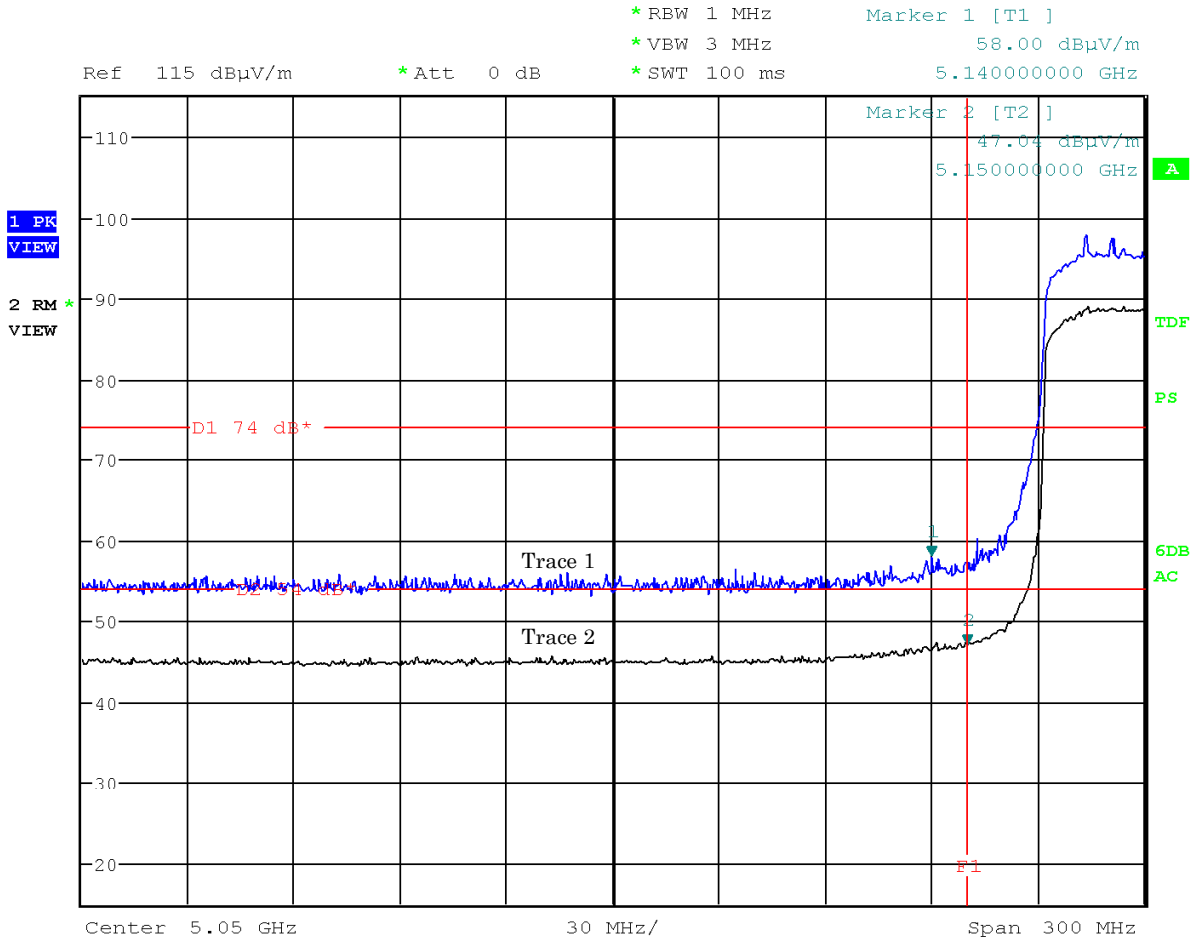

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 42ch: 5210 MHz)
Antenna Polarization : Horizontal



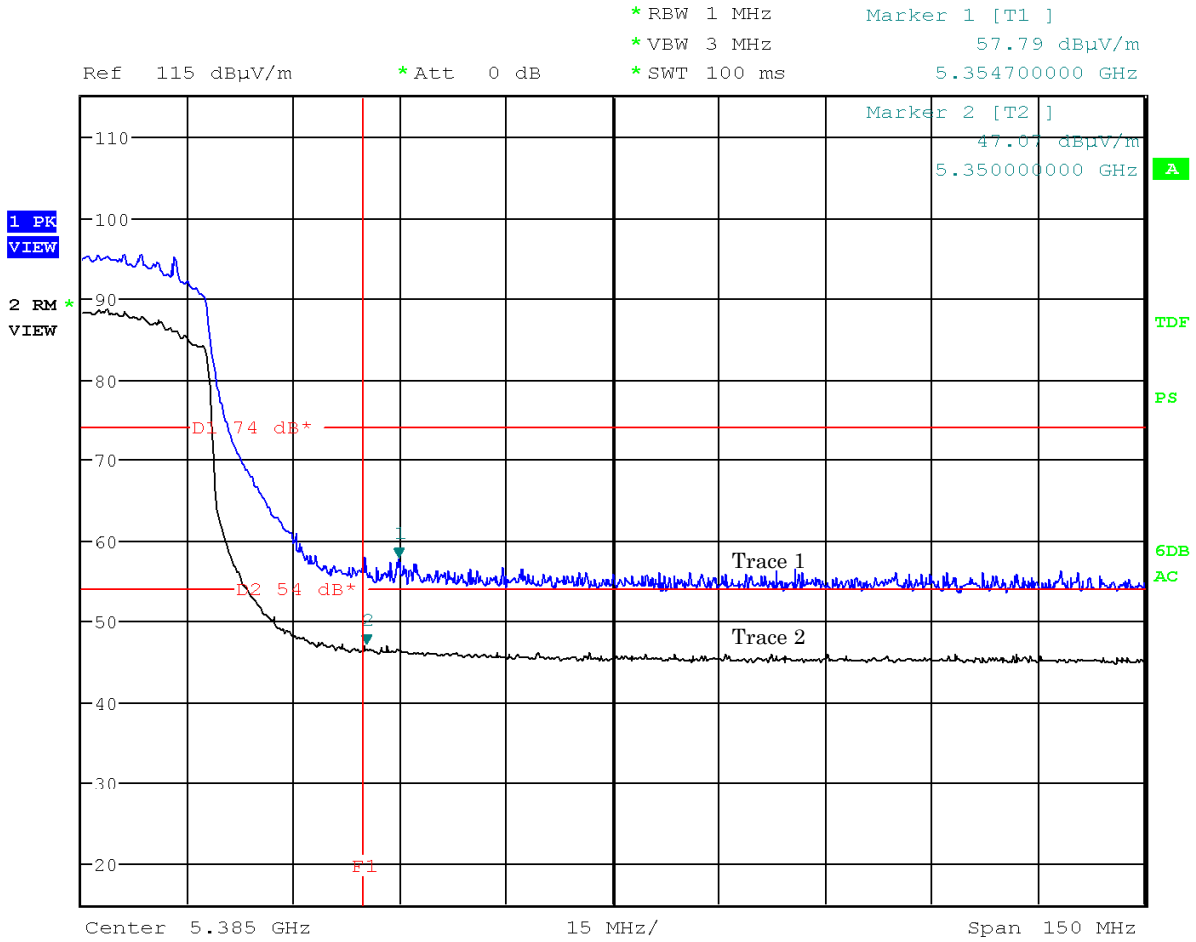

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 42ch: 5210 MHz)
Antenna Polarization : Vertical



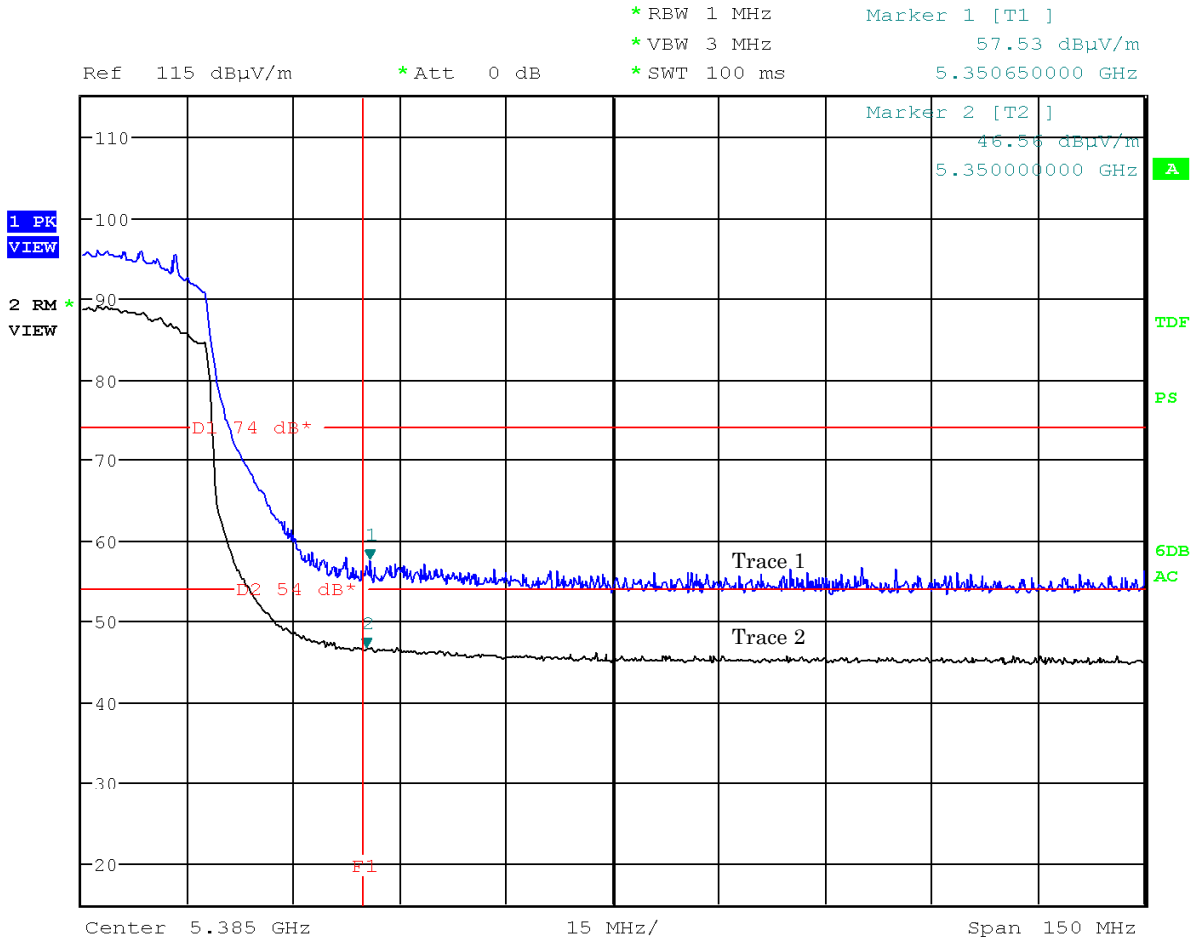

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 58ch: 5290 MHz)
Antenna Polarization : Horizontal



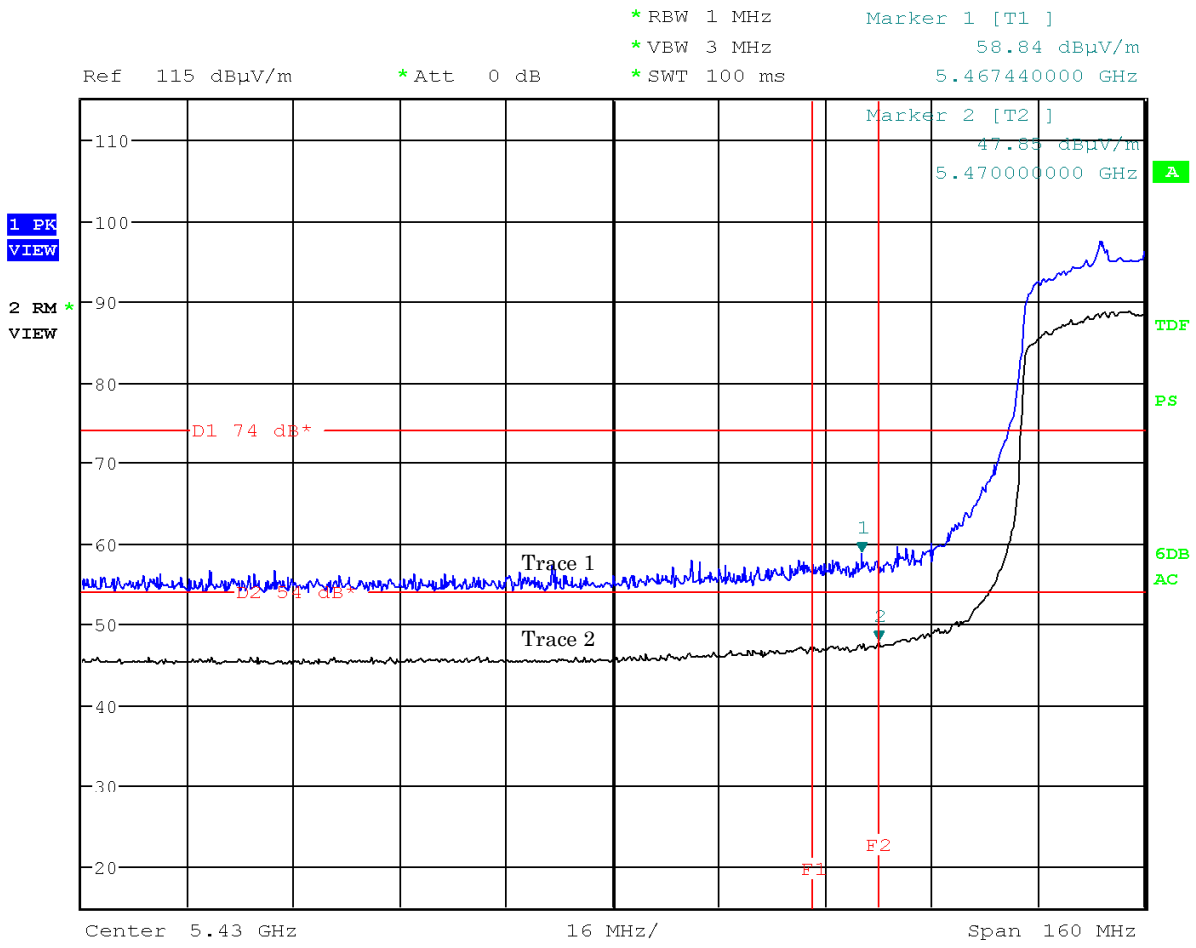

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 58ch: 5290 MHz)
Antenna Polarization : Vertical



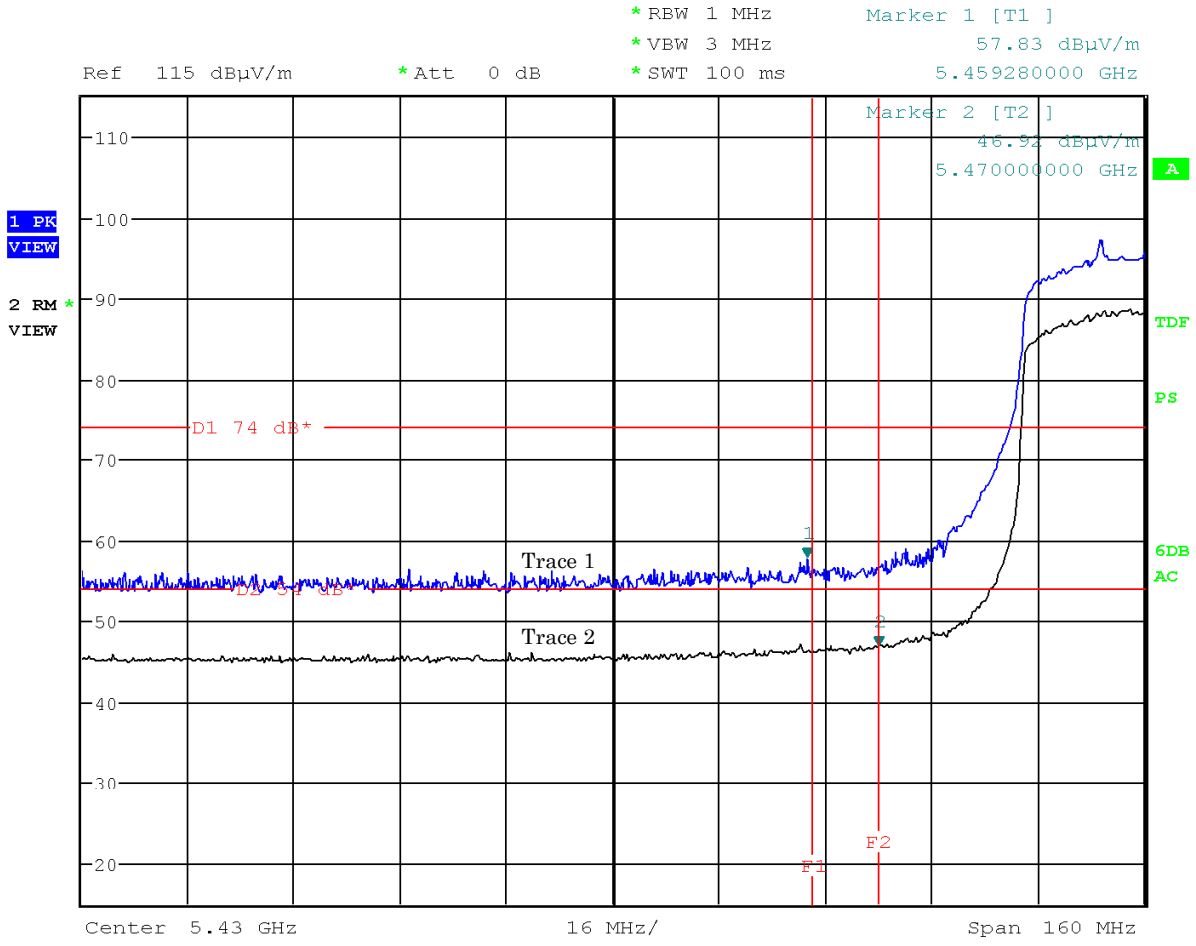

Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 106ch: 5530 MHz)
Antenna Polarization : Horizontal




Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : TX mode ( 802.11ac: 80 MHz, 106ch: 5530 MHz)
Antenna Polarization : Vertical




Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

### 7.6.5.2 Unwanted Radiated Emission 9 kHz – 30 MHz

Test Date : December 16, 2013
Temp.:21°C, Humi:36%

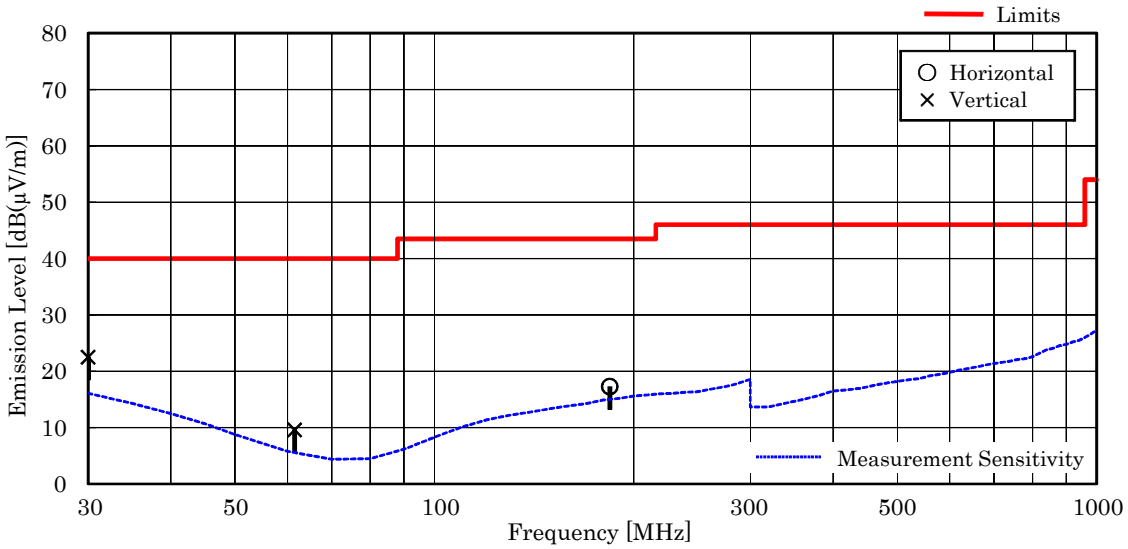
Mode of EUT : All mode have been investigated in accordance with clause 6.4 in this report.
Results : No spurious emissions in the range 20dB below the limit.

### 7.6.5.3 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 Date: December 16, 2013
Temp.: 21 °C, Humi: 36 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Cable Loss [dB] | Meter Readings [dB(μV)] Hori. | Meter Readings [dB(μV)] Vert. | Limits [dB(μV/m)] | Results [dB(μV/m)] Hori. | Results [dB(μV/m)] Vert. | Margin [dB] | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 30.0 | 18.8 | -27.7 | < 25.0 | 31.4 | 40.0 | < 16.1 | 22.5 | +17.5 | - |
| 61.5 | 7.9 | -27.2 | < 25.0 | 28.9 | 40.0 | < 5.7 | 9.6 | +30.4 | - |
| 184.0 | 16.1 | -26.1 | 27.3 | < 25.0 | 43.5 | 17.3 | < 15.0 | +26.2 | - |




NOTES
1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. Calculated result at 30.0 MHz, as the worst point shown on underline:
   Antenna Factor + Cable Loss + Meter Reading = 18.8 + -27.7 + 31.4 = 22.5 dB(μV/m)
6. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

### 7.6.5.4 Unwanted Radiated Emission( Above 1 GHz)

### 7.6.5.4.1 Mode of TX

### 7.6.5.4.1.1 802.11a Radiated Emission Above 1 GHz data

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10360.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 15540.0 | 36.5 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.1 | < 40.1 | > +13.9 | A/B |
| 20720.0 | 40.2 | -21.7 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.5 | < 46.5 | > + 7.5 | A/B |
| 25900.0 | 40.8 | -20.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 58.3 | < 48.3 | > + 5.7 | A/B |
| 31080.0 | 43.9 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 36260.0 | 44.2 | -28.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.6 | < 48.6 | > + 5.4 | A/B |
| **Test condition : Tx 44 Ch** | | | | | | | | | | | | |
| 10440.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15660.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20880.0 | 40.3 | -21.6 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.7 | < 46.7 | > + 7.3 | A/B |
| 26100.0 | 40.7 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31320.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36540.0 | 44.4 | -28.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.9 | < 48.9 | > + 5.1 | A/B |
| **Test condition : Tx 48 Ch** | | | | | | | | | | | | |
| 10480.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15720.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20960.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26200.0 | 40.7 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31440.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36680.0 | 44.5 | -28.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.0 | < 49.0 | > + 5.0 | A/B |

Calculated result at 36680.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.5 dB(1/m) |
| | Corr. Factor | = | -28.5 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.0 dB(μV/m) |

Minimum Margin: 54.0 - <49.0 = >5.0 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10520.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15780.0 | 36.4 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.9 | < 39.9 | > +14.1 | A/B |
| 21040.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26300.0 | 40.7 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.9 | < 38.9 | > +15.1 | A/B |
| 31560.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36820.0 | 44.5 | -28.4 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.1 | < 49.1 | > + 4.9 | A/B |
| **Test condition : Tx 56 Ch** | | | | | | | | | | | | |
| 10560.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15840.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21120.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26400.0 | 40.6 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31680.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36960.0 | 44.4 | -28.2 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.2 | < 49.2 | > + 4.8 | A/B |
| **Test condition : Tx 64 Ch** | | | | | | | | | | | | |
| 10640.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 15960.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21280.0 | 40.4 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.9 | < 46.9 | > + 7.1 | A/B |
| 26600.0 | 43.4 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.5 | < 41.5 | > +12.5 | A/B |
| 31920.0 | 43.8 | -29.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 37240.0 | 44.3 | -28.0 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.3 | < 49.3 | > + 4.7 | A/B |

Calculated result at 37240.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -28.0 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.3 dB(μV/m) |

Minimum Margin: 54.0 - <49.3 = >4.7 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 11000.0 | 33.5 | -26.0 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.5 | < 37.5 | > +16.5 | A/B |
| 16500.0 | 36.2 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 22000.0 | 40.5 | -21.3 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.2 | < 47.2 | > + 6.8 | A/B |
| 27500.0 | 43.9 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 52.0 | < 42.0 | > +12.0 | A/B |
| 33000.0 | 44.0 | -29.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.3 | < 44.3 | > + 9.7 | A/B |
| 38500.0 | 44.3 | -27.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.7 | < 49.7 | > + 4.3 | A/B |
| **Test condition : Tx 116 Ch** | | | | | | | | | | | | |
| 11160.0 | 33.4 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.2 | < 37.2 | > +16.8 | A/B |
| 16740.0 | 36.1 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.9 | < 39.9 | > +14.1 | A/B |
| 22320.0 | 40.6 | -21.1 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| 27900.0 | 43.8 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.8 | < 41.8 | > +12.2 | A/B |
| 33480.0 | 44.0 | -29.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.4 | < 44.4 | > + 9.6 | A/B |
| 39060.0 | 44.3 | -27.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.8 | < 49.8 | > + 4.2 | A/B |
| **Test condition : Tx 140 Ch** | | | | | | | | | | | | |
| 11400.0 | 33.3 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.1 | < 37.1 | > +16.9 | A/B |
| 17100.0 | 35.9 | -26.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.6 | < 39.6 | > +14.4 | A/B |
| 22800.0 | 40.5 | -21.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| 28500.0 | 43.8 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.8 | < 41.8 | > +12.2 | A/B |
| 34200.0 | 44.0 | -29.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.7 | < 44.7 | > + 9.3 | A/B |
| 39900.0 | 44.6 | -27.8 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.8 | < 49.8 | > + 4.2 | A/B |

Calculated result at 39060.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -27.5 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.8 dB(μV/m) |

Minimum Margin: 54.0 - <49.8 = >4.2 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

### 7.6.5.4.1.2 802.11n ( 20 MHz) Radiated Emission Above 1 GHz data

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10360.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 15540.0 | 36.5 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.1 | < 40.1 | > +13.9 | A/B |
| 20720.0 | 40.2 | -21.7 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.5 | < 46.5 | > + 7.5 | A/B |
| 25900.0 | 40.8 | -20.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 58.3 | < 48.3 | > + 5.7 | A/B |
| 31080.0 | 43.9 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 36260.0 | 44.2 | -28.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.6 | < 48.6 | > + 5.4 | A/B |
| **Test condition : Tx 44 Ch** | | | | | | | | | | | | |
| 10440.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15660.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20880.0 | 40.3 | -21.6 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.7 | < 46.7 | > + 7.3 | A/B |
| 26100.0 | 40.7 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31320.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36540.0 | 44.4 | -28.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.9 | < 48.9 | > + 5.1 | A/B |
| **Test condition : Tx 48 Ch** | | | | | | | | | | | | |
| 10480.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15720.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20960.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26200.0 | 40.7 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31440.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36680.0 | 44.5 | -28.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.0 | < 49.0 | > + 5.0 | A/B |

Calculated result at 36680.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.5 dB(1/m) |
| | Corr. Factor | = | -28.5 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.0 dB(μV/m) |

Minimum Margin: 54.0 - <49.0 = >5.0 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10520.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15780.0 | 36.4 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.9 | < 39.9 | > +14.1 | A/B |
| 21040.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26300.0 | 40.7 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.9 | < 38.9 | > +15.1 | A/B |
| 31560.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36820.0 | 44.5 | -28.4 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.1 | < 49.1 | > + 4.9 | A/B |
| **Test condition : Tx 56 Ch** | | | | | | | | | | | | |
| 10560.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15840.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21120.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26400.0 | 40.6 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31680.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36960.0 | 44.4 | -28.2 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.2 | < 49.2 | > + 4.8 | A/B |
| **Test condition : Tx 64 Ch** | | | | | | | | | | | | |
| 10640.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 15960.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21280.0 | 40.4 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.9 | < 46.9 | > + 7.1 | A/B |
| 26600.0 | 43.4 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.5 | < 41.5 | > +12.5 | A/B |
| 31920.0 | 43.8 | -29.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 37240.0 | 44.3 | -28.0 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.3 | < 49.3 | > + 4.7 | A/B |

Calculated result at 37240.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -28.0 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.3 dB(μV/m) |

Minimum Margin: 54.0 - <49.3 = >4.7 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 11000.0 | 33.5 | -26.0 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.5 | < 37.5 | > +16.5 | A/B |
| 16500.0 | 36.2 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 22000.0 | 40.5 | -21.3 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.2 | < 47.2 | > + 6.8 | A/B |
| 27500.0 | 43.9 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 52.0 | < 42.0 | > +12.0 | A/B |
| 33000.0 | 44.0 | -29.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.3 | < 44.3 | > + 9.7 | A/B |
| 38500.0 | 44.3 | -27.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.7 | < 49.7 | > + 4.3 | A/B |
| **Test condition : Tx 116 Ch** | | | | | | | | | | | | |
| 11160.0 | 33.4 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.2 | < 37.2 | > +16.8 | A/B |
| 16740.0 | 36.1 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.9 | < 39.9 | > +14.1 | A/B |
| 22320.0 | 40.6 | -21.1 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| 27900.0 | 43.8 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.8 | < 41.8 | > +12.2 | A/B |
| 33480.0 | 44.0 | -29.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.4 | < 44.4 | > + 9.6 | A/B |
| 39060.0 | 44.3 | -27.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.8 | < 49.8 | > + 4.2 | A/B |
| **Test condition : Tx 140 Ch** | | | | | | | | | | | | |
| 11400.0 | 33.3 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.1 | < 37.1 | > +16.9 | A/B |
| 17100.0 | 35.9 | -26.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.6 | < 39.6 | > +14.4 | A/B |
| 22800.0 | 40.5 | -21.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| 28500.0 | 43.8 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.8 | < 41.8 | > +12.2 | A/B |
| 34200.0 | 44.0 | -29.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.7 | < 44.7 | > + 9.3 | A/B |
| 39900.0 | 44.6 | -27.8 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.8 | < 49.8 | > + 4.2 | A/B |

Calculated result at 39060.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -27.5 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.8 dB(μV/m) |

Minimum Margin: 54.0 - <49.8 = >4.2 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

### 7.6.5.4.1.3 802.11n ( 40 MHz) Radiated Emission Above 1 GHz data

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10380.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 15570.0 | 36.5 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.1 | < 40.1 | > +13.9 | A/B |
| 20760.0 | 40.2 | -21.7 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.5 | < 46.5 | > + 7.5 | A/B |
| 25950.0 | 40.8 | -20.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 58.3 | < 48.3 | > + 5.7 | A/B |
| 31140.0 | 43.9 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 36330.0 | 44.2 | -28.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.6 | < 48.6 | > + 5.4 | A/B |
| **Test condition : Tx 46 Ch** | | | | | | | | | | | | |
| 10460.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15690.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20920.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26150.0 | 40.7 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31380.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36610.0 | 44.4 | -28.5 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.9 | < 48.9 | > + 5.1 | A/B |

Calculated result at 36610.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.4 dB(1/m) |
| | Corr. Factor | = | -28.5 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <48.9 dB(μV/m) |

Minimum Margin: 54.0 - <48.9 = >5.1 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 10540.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15810.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21080.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26350.0 | 40.6 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31620.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36890.0 | 44.5 | -28.3 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.2 | < 49.2 | > + 4.8 | A/B |
| **Test condition : Tx 62 Ch** | | | | | | | | | | | | |
| 10620.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15930.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21240.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26550.0 | 43.5 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.7 | < 41.7 | > +12.3 | A/B |
| 31860.0 | 43.8 | -29.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.0 | < 44.0 | > +10.0 | A/B |
| 37170.0 | 44.4 | -28.1 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.3 | < 49.3 | > + 4.7 | A/B |

Calculated result at 37170.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.4 dB(1/m) |
| | Corr. Factor | = | -28.1 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.3 dB(μV/m) |

Minimum Margin: 54.0 - <49.3 = >4.7 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

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

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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** | | | | | | | | | | | | |
| 11020.0 | 33.5 | -26.0 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.5 | < 37.5 | > +16.5 | A/B |
| 16530.0 | 36.1 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.7 | < 39.7 | > +14.3 | A/B |
| 22040.0 | 40.5 | -21.2 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.3 | < 47.3 | > + 6.7 | A/B |
| 27550.0 | 43.8 | -29.9 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.9 | < 41.9 | > +12.1 | A/B |
| 33060.0 | 44.0 | -29.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.3 | < 44.3 | > + 9.7 | A/B |
| 38570.0 | 44.3 | -27.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.7 | < 49.7 | > + 4.3 | A/B |
| **Test condition : Tx 134 Ch** | | | | | | | | | | | | |
| 11340.0 | 33.3 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.1 | < 37.1 | > +16.9 | A/B |
| 17010.0 | 36.0 | -26.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 22680.0 | 40.5 | -21.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| 28350.0 | 43.8 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.8 | < 41.8 | > +12.2 | A/B |
| 34020.0 | 44.0 | -29.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.7 | < 44.7 | > + 9.3 | A/B |
| 39690.0 | 44.7 | -27.7 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 60.0 | < 50.0 | > + 4.0 | A/B |

Calculated result at 39690.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.7 dB(1/m) |
| | Corr. Factor | = | -27.7 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <50.0 dB(μV/m) |

Minimum Margin: 54.0 - <50.0 = >4.0 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

### 7.6.5.4.1.4 802.11ac ( 80 MHz) Radiated Emission Above 1 GHz data

Mode of EUT : TX mode (802.11ac: 80 MHz, 5150 - 5250 MHz Band)

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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 42 Ch** | | | | | | | | | | | | |
| 10420.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15630.0 | 36.5 | -26.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |
| 20840.0 | 40.3 | -21.6 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.7 | < 46.7 | > + 7.3 | A/B |
| 26050.0 | 40.7 | -20.4 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 58.3 | < 48.3 | > + 5.7 | A/B |
| 31260.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 36470.0 | 44.3 | -28.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 58.7 | < 48.7 | > + 5.3 | A/B |

Calculated result at 36470.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -28.6 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <48.7 dB(μV/m) |

Minimum Margin: 54.0 - <48.7 = >5.3 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

Mode of EUT : TX mode (802.11ac: 80 MHz, 5250 – 5350 MHz Band)

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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 58 Ch** | | | | | | | | | | | | |
| 10580.0 | 33.4 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.3 | < 37.3 | > +16.7 | A/B |
| 15870.0 | 36.4 | -26.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.8 | < 39.8 | > +14.2 | A/B |
| 21160.0 | 40.3 | -21.5 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 56.8 | < 46.8 | > + 7.2 | A/B |
| 26450.0 | 40.6 | -29.8 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 48.8 | < 38.8 | > +15.2 | A/B |
| 31740.0 | 43.8 | -29.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 53.9 | < 43.9 | > +10.1 | A/B |
| 37030.0 | 44.4 | -28.2 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.2 | < 49.2 | > + 4.8 | A/B |

Calculated result at 37030.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.4 dB(1/m) |
| | Corr. Factor | = | -28.2 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.2 dB(μV/m) |

Minimum Margin: 54.0 - <49.2 = >4.8 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

Mode of EUT : TX mode (802.11ac: 80 MHz, 5470 – 5725 MHz Band)

Test Date: December 13, 2013
Temp.: 20 °C, Humi: 38 %

| 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 106 Ch** | | | | | | | | | | | | |
| 11060.0 | 33.5 | -26.1 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 47.4 | < 37.4 | > +16.6 | A/B |
| 16590.0 | 36.1 | -26.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 49.7 | < 39.7 | > +14.3 | A/B |
| 22120.0 | 40.6 | -21.2 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 57.4 | < 47.4 | > + 6.6 | A/B |
| 27650.0 | 43.7 | -30.0 | < 38.0 | < 28.0 | < 38.0 | < 28.0 | 74.0 | 54.0 | < 51.7 | < 41.7 | > +12.3 | A/B |
| 33180.0 | 44.0 | -29.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 54.3 | < 44.3 | > + 9.7 | A/B |
| 38710.0 | 44.3 | -27.6 | < 43.0 | < 33.0 | < 43.0 | < 33.0 | 74.0 | 54.0 | < 59.7 | < 49.7 | > + 4.3 | A/B |

Calculated result at 38710.0 MHz, as the worst point shown on underline:

| | | | |
|---|---|---|---|
| | Antenna Factor | = | 44.3 dB(1/m) |
| | Corr. Factor | = | -27.6 dB |
| + ) | Meter Reading | = | <33.0 dB(μV) |
| | Result | = | <49.7 dB(μV/m) |

Minimum Margin: 54.0 - <49.7 = >4.3 (dB)

NOTES
1. Test Distance : 3 m (1 GHz to 26 GHz) / 1m (26 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 - 26GHz)
   Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain - Distance Factor [dB] (over 26GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|---|---|---|---|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

## 7.7 Dynamic Frequency Selection

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

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

### 7.7.1 Test Result and Measurement Uncertainty

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

| | | | | |
|---|---|---|---|---|
| 802.11n 20 MHz | 0.016 | sec. | at | 5500 MHz |
| 802.11n 40 MHz | 0.010 | sec. | at | 5510 MHz |

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

| | | | | |
|---|---|---|---|---|
| 802.11n 20 MHz | 0.000 | msec. | at | 5500 MHz |
| 802.11n 40 MHz | 0.000 | msec. | at | 5510 MHz |

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

| | | | | |
|---|---|---|---|---|
| 802.11n 20 MHz | > 30 | min. | at | 5500 MHz |
| 802.11n 40 MHz | > 30 | min. | at | 5510 MHz |

Uncertainty of Measurement Results +/- 0.6 %

Remarks : The EUT is a client without radar detection therefore applicable requirements are only the above. Test was performed using a radar type 1. The Master device does not have capability of operating at 80MHz Channel BW, therefore tests were performed with the operating mode of 20MHz/40MHz BW. (Refer to the KDB publication 848637.)

### 7.7.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

☐ - Anechoic chamber (A1) ☐ - Measurement room (M1)
☐ - Measurement room (M2) ☐ - Measurement room (M3)
☐ - Shielded room (S1) ☐ - Shielded room (S2)
☐ - Shielded room (S3) ☒ - Shielded room (S4)

### 7.7.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2013/9 | 1 Year |
| Vector Signal Generator | MG3710A | Anritsu | B41 | 2013/9 | 1 Year |
| Horn Antenna(*1) | 3160-05 | EMCO | C-56 | 2013/7 | 1 Year |
| Double-Ridge Guide Horn Antenna(*2) | TR17206 | ADVANTEST | C-29 | 2013/6 | 1 Year |
| RF Cable(*1) | SUCOFLEX104 | SUHNER | C-67 | 2013/1 | 1 Year |
| RF Cable(*2) | SUCOFLEX102E | SUHNER | C-70 | 2013/11 | 1 Year |

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

### 7.7.4 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 FCC 06-96 Appendix " COMPLIANCE MEASUREMENT PROCEDURES FOR UNII DEVICES OPERATIONG IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

#### 7.7.4.1 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 and 2) |
|---|---|
| ≥ 200 milliwatt | -64 dBm |
| < 200 milliwatt | -62 dBm |
| Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.<br>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. | |

**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 80% of the U-NII 99% transmission power bandwidth. (See Note 3.) |

**Note 1:** The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short Pulse Radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
- For the Long Pulse Radar Test Signal this instant is the end of the 12 second period defining the Radar Waveform.

**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 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

### 7.7.4.2 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 |
|---|---|---|---|---|---|
| 1 | 1 | 1428 | 18 | 60% | 30 |
| 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 |

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. For Short Pulse Radar Type 1, 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.

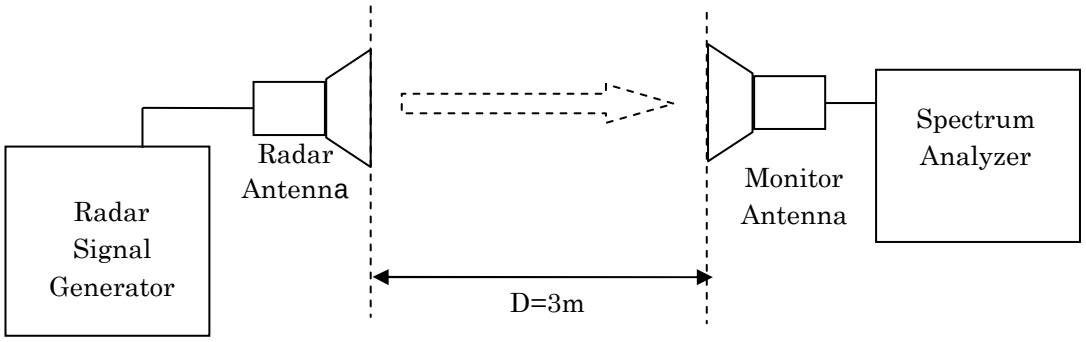
**Frequency Hopping Radar Test Waveform**

| 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.

### 7.7.4.3 Rader Waveform Calibration

**Radiated Calibration Setup Diagram**

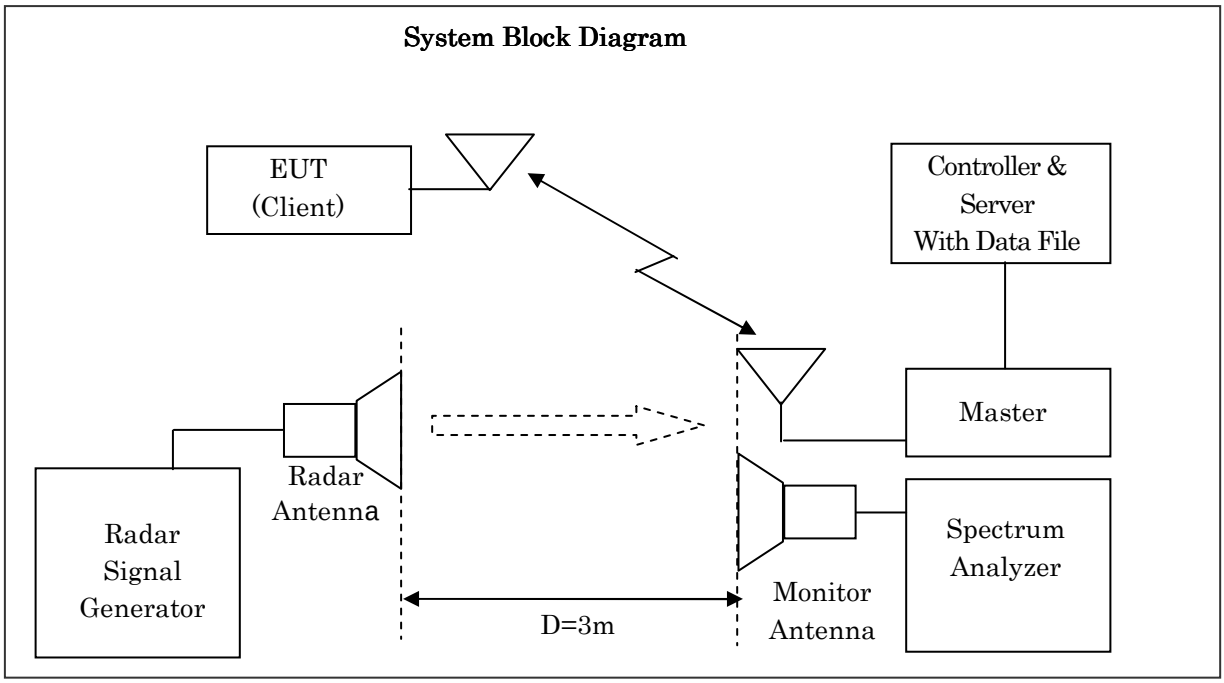



The EUT is the client device without radar detection, then master device is a RDD. Therefore the radar test signal level is set at the Radar Detection Threshold Level of master device.
The Radar Detection Threshold Level is employed -64dBm + 1dB = -63 dBm at the antenna port.
Where the antenna gain of 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 7.7.5.1 in this report.

### 7.7.4.4 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-AP1042N-A-K9 | FTX1637E2NC | LDK102070 |
| AC Adaptor for AP | Cisco | AA2548L | ALD0516GFDA | N/A |
| PC(Controller/Server) | HP Compaq | D330 uT | JPA42500TB | 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 saver(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.

The spectrum analyzer plots of the slave(EUT) data traffic plot is attached in clause 7.7.5.2 and tne nominal noise floor plots is attached in clause 7.7.5.3 in this report.

### 7.7.4.5 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(*1) | LDK102070 (Antenna Gain: 3.0 dBi) |
| Antenna Type of EUT | Inverted-L Type Antenna |
| Highest Power Level(EIRP)/<br>Antenna Gain of EUT | 802.11a/n/ac 12.0 dBm Max.<br>802.11n/ac(40 MHz BW) 12.0 dBm Max.<br>802.11ac(80 MHz) 12.0 dBm Max.<br>Antenna Gain: 0 dBi |
| System Architecture | IEEE802.11 a/n/ac, 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 grater than 20dBm(EIRP), then the interference threshold level is employed -64 dBm. After correction for procedural adjustments, the radiated threshold level at the master device is -64 + 1 – 3 dBi(Master antenna Gain) = -66 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 |

| IEEE802.11 ac | | | |
|---|---|---|---|
| Modulation | Data Rate(Mbps) Channel Bandwidth(MHz) | | |
| | 20 | 40 | 80 |
| BPSK | 6.5 | 13.5 | 29.3 |
| QPSK | 13.0 | 27.0 | 58.5 |
| QPSK | 19.5 | 40.5 | 87.8 |
| 16-QAM | 26.0 | 54.0 | 117.0 |
| 16-QAM | 39.0 | 81.0 | 175.5 |
| 64-QAM | 52.0 | 108.0 | 234.0 |
| 64-QAM | 58.5 | 121.5 | 263.3 |
| 64-QAM | 65.0 | 135.0 | 292.5 |
| 256-QAM | 78.0 | 162.0 | 351.0 |
| 256-QAM | N/A | 180.0 | 390.0 |

### 7.7.4.6 Deviation to the procedures and equipment from the standards:

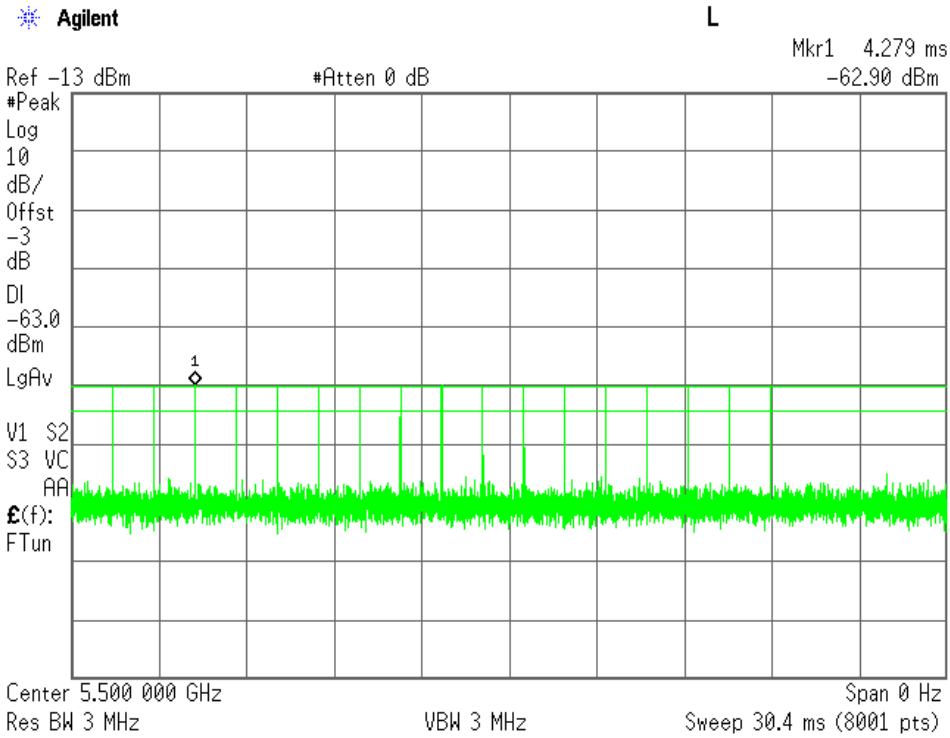
There is no deviation from FCC Rule and FCC 06-96.

### 7.7.5 Test Data

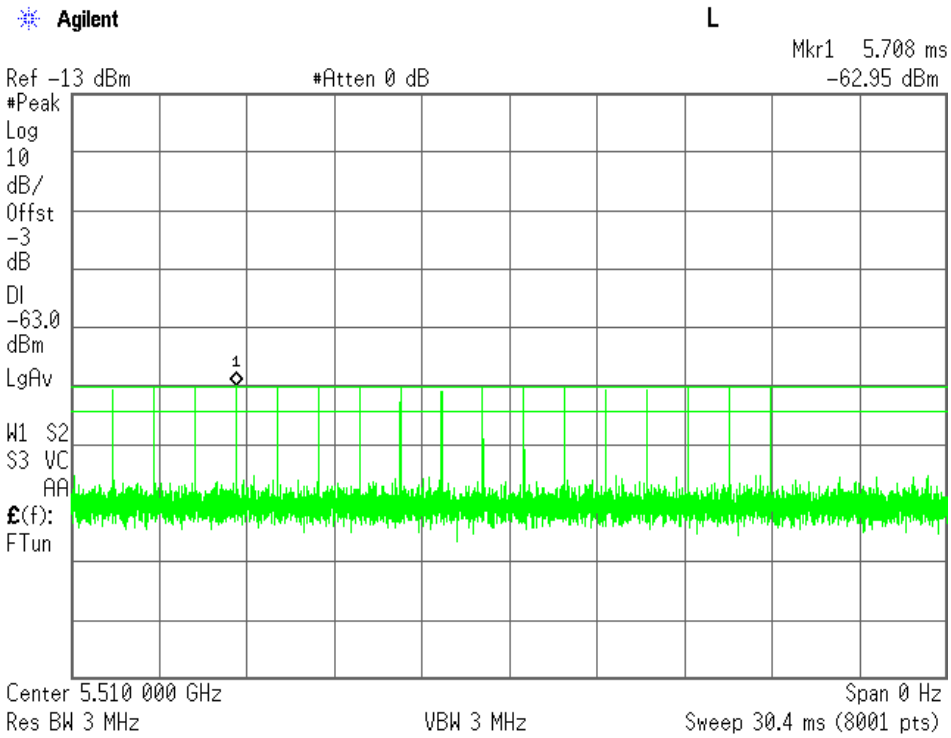
Test Date : December 17, 2013
Temp.: 21°C, Humi: 32%

#### 7.7.5.1 Radar Waveform Calibration Results (Type 1 Short Pulse)

**5500 MHz**

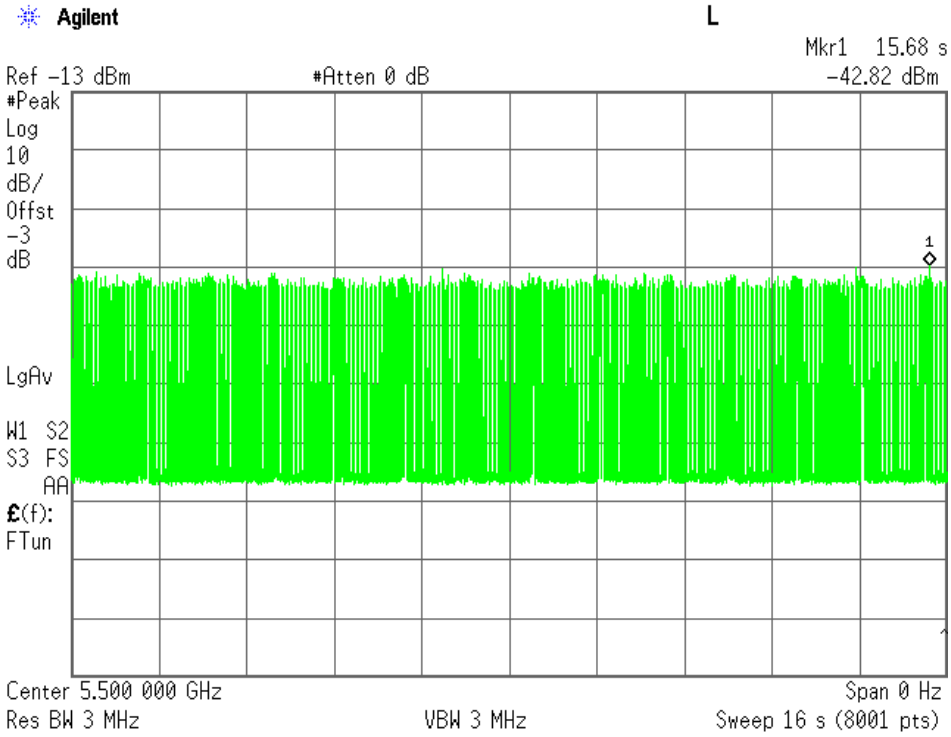



**5510 MHz**

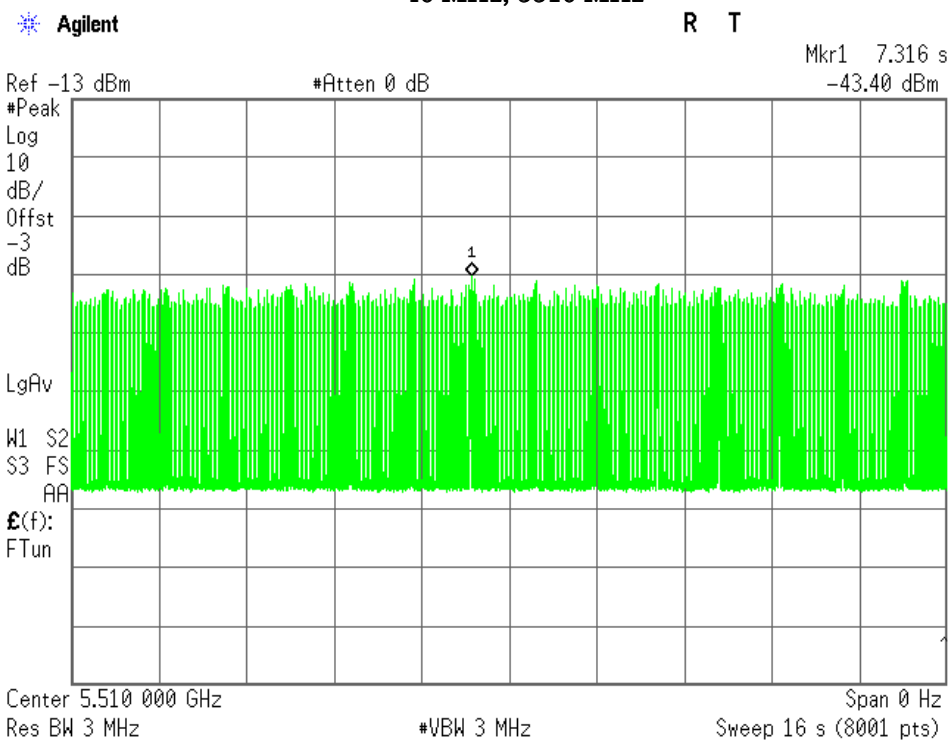


### 7.7.5.2 EUT (Slave) Traffic Plots

**20 MHz, 5500 MHz**

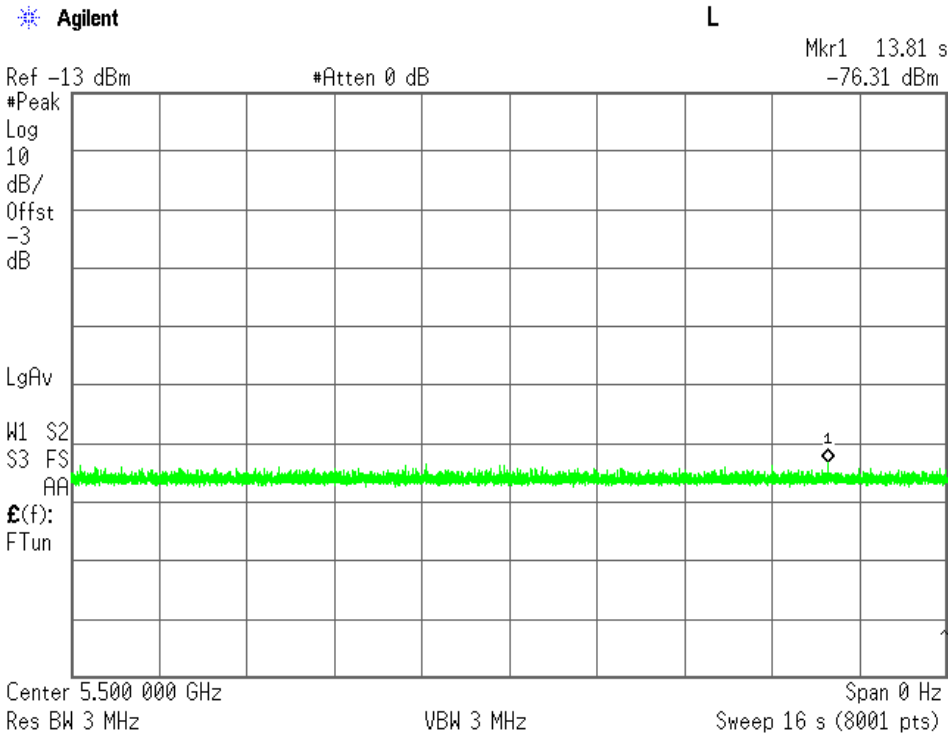



**40 MHz, 5510 MHz**

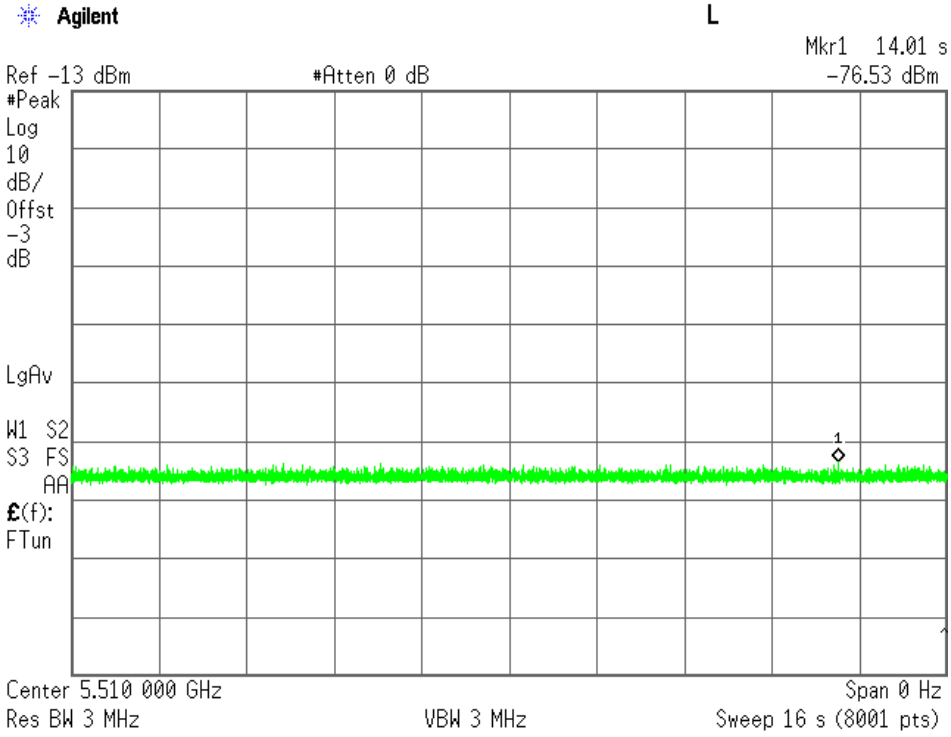


### 7.7.5.3 No Traffic (Noise Floor) Plots

**5500 MHz**



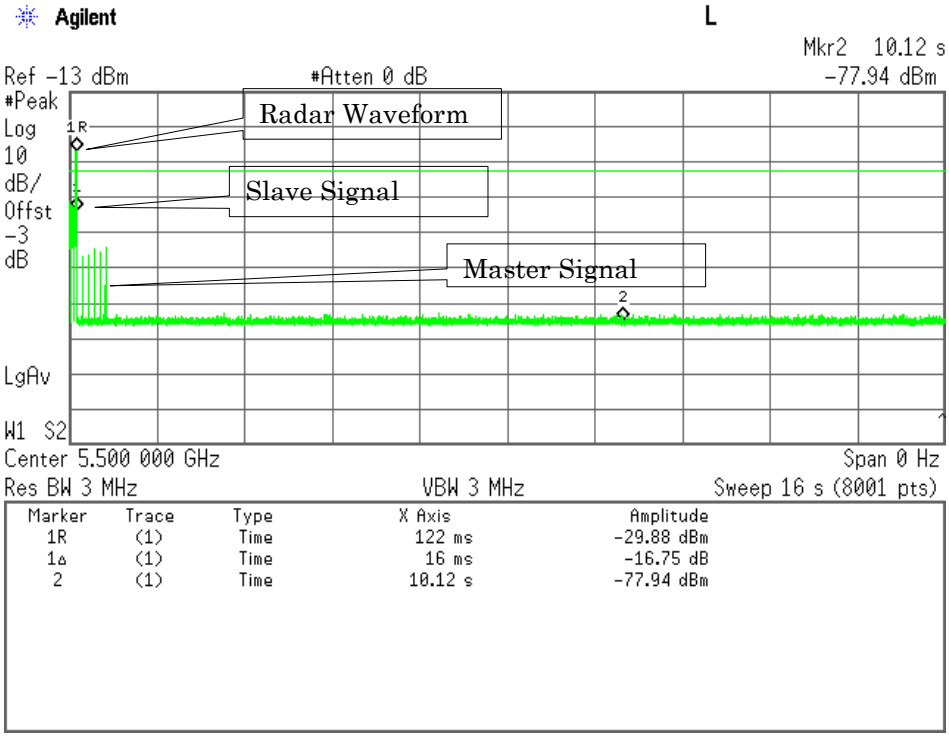

**5510 MHz**



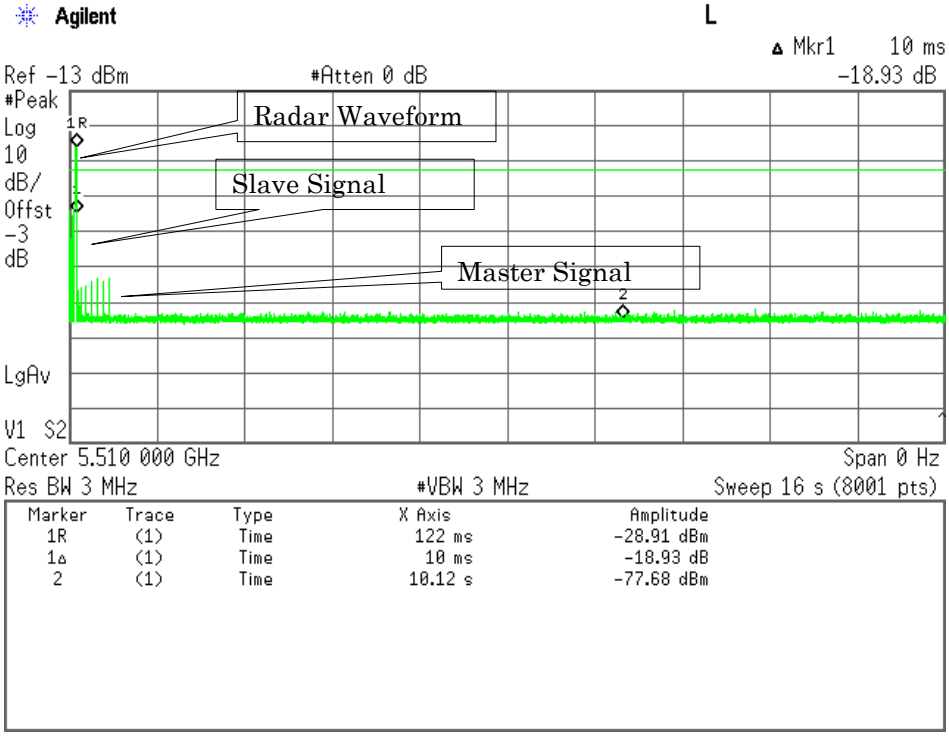
### 7.7.5.4 Channel Move Time

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 802.11 n CH.100 (5500MHz)/ 20 MHz and CH.102(5510 MHz)/ 40 MHz.

**Channel Move Time Plots for 20 MHz, 5500 MHz**




**Channel Move Time Plots for 40 MHz, 5510 MHz**



### 7.7.5.5 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**

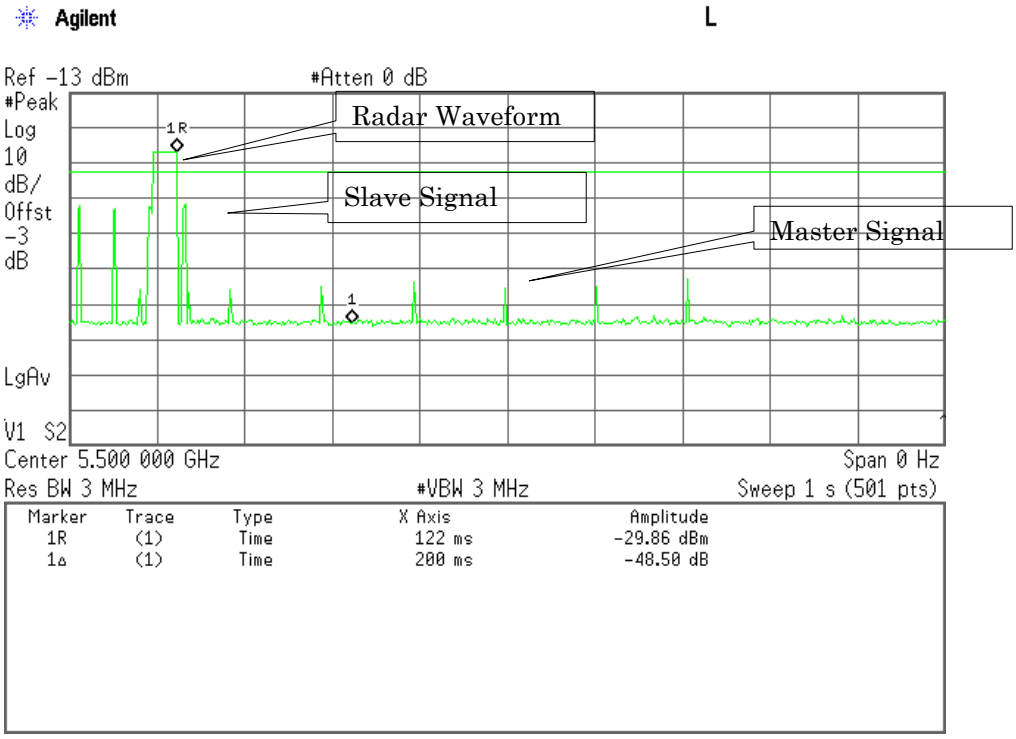
The observation period over which the aggregate transmission time is calculated begins at (the reference marker + 200 msec.) and end on earlier than (the reference marker + 10 sec.).
The measurements are carried out 802.11 n CH.100 (5500MHz)/ 20 MHz and CH.102(5510 MHz)/ 40 MHz.

Test Results

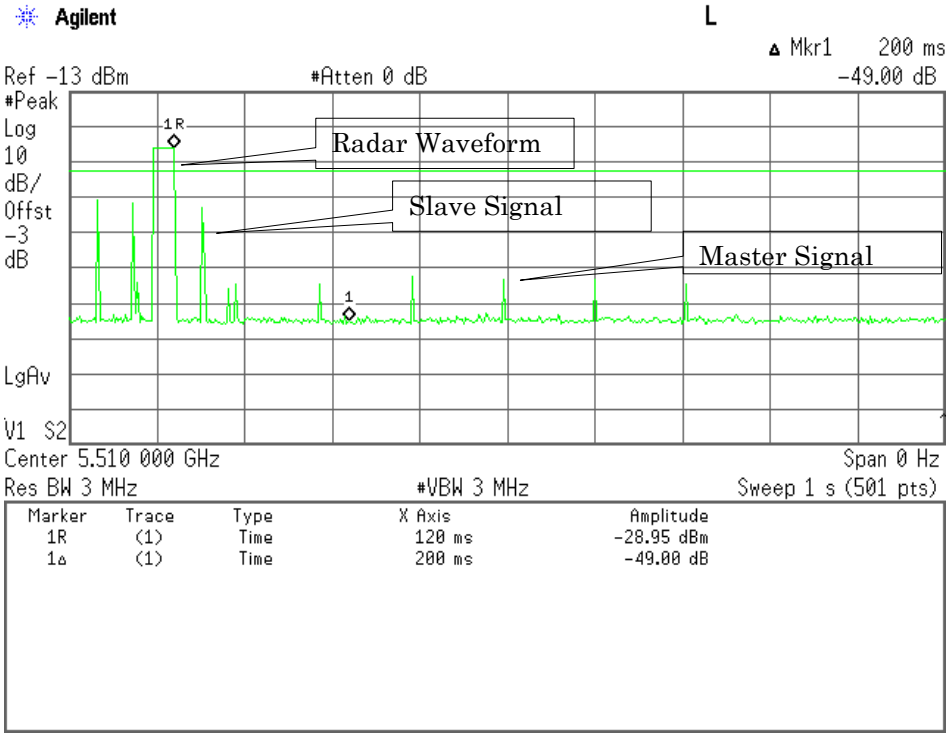
| Channel | Frequency (MHz) | Mode | Sweep Time(**S**) (msec) | (**B**) | (**N**) | Channel Closing Time (msec) |
|---|---|---|---|---|---|---|
| 100 | 5500 | 20 MHz BW | 1000 | 500 | 0 | 0 |
| 140 | 5510 | 40 MHz BW | 1000 | 500 | 0 | 0 |

The test result (Channel Closing Time) is calculated as follows;
For 100 channel (5500 MHz)
Channel Closing Time = **D** * **N** = **S** / **B** * **N** = 1000 / 500 * 0 = 0 msec

**Channel Closing Transmission Time Plots for 20 MHz, 5500 MHz**



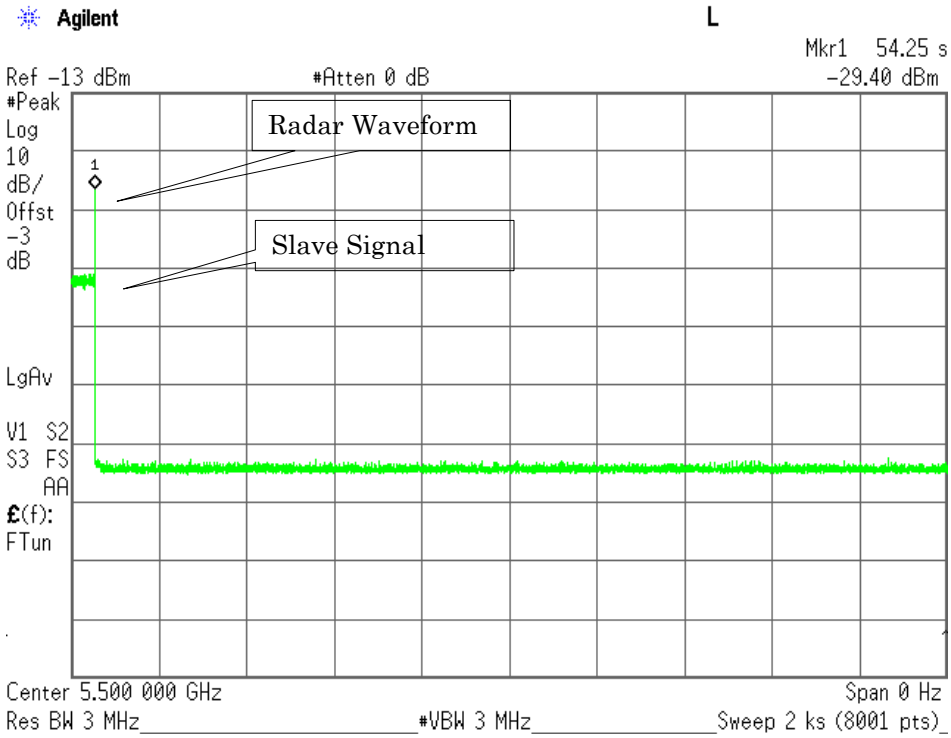

**Channel Closing Transmission Time Plots for 40 MHz, 5510 MHz**

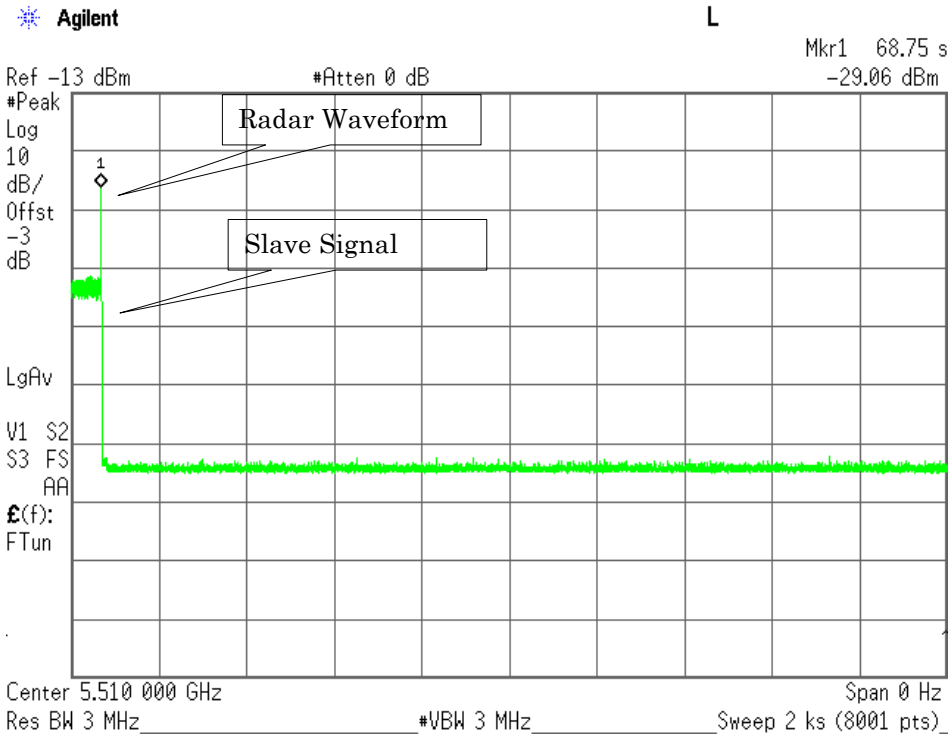


### 7.7.5.6 Non-Occupancy Period

During the 30 minutes observation time, EUT did not make any transmissions on a channel.
The measurements are carried out 802.11 n CH.100 (5500MHz)/ 20 MHz and CH.102(5510 MHz)/ 40 MHz.

**Non-Occupancy Period Plots for 20 MHz, 5500 MHz**




**40 MHz, 5510 MHz**