# FCC TEST REPORT

For

Shenzhen Lenkeng Technology Co., Ltd

Wireless Extender

Test Model: LKV398

Additional Model No.: LKV388AC, 388PRO, LKV688AC, LKV398AC, LKV688PRO, LKV398PRO, LKV388T, LKV388F

| | | |
|---|---|---|
| Prepared for | : | Shenzhen Lenkeng Technology Co., Ltd |
| Address | : | West 4F, Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen, 518049 China |
| Prepared by | : | Shenzhen LCS Compliance Testing Laboratory Ltd. |
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| Mail | : | webmaster@LCS-cert.com |
| Date of receipt of test sample | : | August 20, 2017 |
| Number of tested samples | : | 1 |
| Serial number | : | Prototype |
| Date of Test | : | August 20, 2017~October 09, 2017 |
| Date of Report | : | October 09, 2017 |

# FCC TEST REPORT
# FCC CFR 47 PART 15 E(15.407)

| | | |
|---|---|---|
| **Report Reference No. .....** | **:** | **LCS170726028AE** |
| Date of Issue ..... | : | October 09, 2017 |
| **Testing Laboratory Name ..... :** | | **Shenzhen LCS Compliance Testing Laboratory Ltd.** |
| Address ..... | : | 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China |
| Testing Location/ Procedure ..... | : | Full application of Harmonised standards ■<br>Partial application of Harmonised standards □<br>Other standard testing method □ |
| **Applicant's Name ..... :** | | **Shenzhen Lenkeng Technology Co., Ltd** |
| Address ..... | : | West 4F, Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen,518049 China |
| **Test Specification** | | |
| Standard ..... | : | FCC CFR 47 PART 15 E(15.407) |
| Test Report Form No. ..... | : | LCSEMC-1.0 |
| TRF Originator ..... | : | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Master TRF ..... | : | Dated 2011-03 |



| | | |
|---|---|---|
| **EUT Description. ..... :** | | **Wireless Extender** |
| Trade Mark..... | : | LENKENG |
| Model/ Type reference ..... | : | LKV398 |
| Ratings..... | : | It powered by an adapter.<br>Adapter parameters: Input: AC 100-240V 50/60Hz,<br>Output: 5.0⎓3.1A |
| Result ..... | : | **Positive** |

| **Compiled by:** | **Supervised by:** | **Approved by:** |
|---|---|---|
| Dick Su | Calvin Weng | Gavin Liang |
| Dick Su/ Administrators | Calvin Weng/ Technique principal | Gavin Liang/ Manager |

# FCC -- TEST REPORT

| | |
|---|---|
| **Test Report No. : LCS170726028AE** | October 09, 2017<br>Date of issue |

| | | |
|---|---|---|
| EUT..... | : | Wireless Extender |
| Type / Model..... | : | LKV398 |
| **Applicant.....** | **:** | **Shenzhen Lenkeng Technology Co., Ltd** |
| Address..... | : | West 4F, Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen,518049 China |
| Telephone..... | : | |
| Fax..... | : | |
| **Manufacturer.....** | **:** | **Shenzhen Lenkeng Technology Co., Ltd** |
| Address..... | : | West 4F, Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen,518049 China |
| Telephone..... | : | |
| Fax..... | : | |
| **Factory.....** | **:** | **Shenzhen Lenkeng Technology Co., Ltd** |
| Address..... | : | West 4F, Jinguangxia Culture&Tech Park, 3 Guangxia Road, Shenzhen,518049 China |
| Telephone..... | : | |
| Fax..... | : | |

| | |
|---|---|
| **Test Result:** | **Positive** |

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Revision History

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 00 | October 09, 2017 | Initial Issue | Gavin Liang |
| | | | |
| | | | |

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

| | | |
|---|---|---|
| EUT | : | Wireless Extender |
| Test Model | : | LKV398 |
| List Model No. | : | LKV398, LKV388AC, 388PRO, LKV688AC, LKV398AC, LKV688PRO, LKV398PRO, LKV388T, LKV388F |
| Model Declaration | : | PCB board, structure and internal of these model(s) are the same, So no additional models were tested. |
| Power Supply | : | It powered by an adapter.<br>Adapter parameters: Input: AC 100-240V 50/60Hz,<br>Output: 5.0⎓3.1A |
| Frequency Range | : | 5180.00-5240.00MHz/5745.00-5825.00MHz |
| Channel Number | : | 9 Channels for 20MHz Bandwidth<br>4 channels for 40MHz Bandwidth |
| Modulation Technology | : | 802.11a/n: OFDM |
| Data Rates | : | 1Gb/s |
| Antenna Type And Gain | : | External Antenna, 5.0dBi(Max.) |

## 1.2. Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|---|---|---|---|---|
| Mass Power Electronic Limited | AC ADAPTER | NBS24J050310HU | -- | -- |

## 1.3. External I/O Port

| I/O Port Description | Quantity | Cable |
|---|---|---|
| DC IN Port | 1 | N/A |
| HDMI Port | 1 | N/A |
| IR OUT Port | 1 | 1.0m |

## 1.4. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

## 1.5. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

## 1.6. Measurement Uncertainty

| Test Item | | Frequency Range | Uncertainty | Note |
|---|---|---|---|---|
| Radiation Uncertainty | : | 9KHz~30MHz | ±3.10dB | (1) |
| | | 30MHz~200MHz | ±2.96dB | (1) |
| | | 200MHz~1000MHz | ±3.10dB | (1) |
| | | 1GHz~26.5GHz | ±3.80dB | (1) |
| | | 26.5GHz~40GHz | ±3.90dB | (1) |
| Conduction Uncertainty | : | 150kHz~30MHz | ±1.63dB | (1) |
| Power disturbance | : | 30MHz~300MHz | ±1.60dB | (1) |

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.7. Description Of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:
OFDM : 1Gb/s, OFDM.

Bandwidth

| Bandwidth Mode | 20MHz | 40MHz | 80MHz |
|---|---|---|---|
| OFDM | ☑ | ☑ | ☐ |

Channel & Frequency:

| Frequency Band | Channel No. | Frequency(MHz) | Channel No. | Frequency(MHz) |
|---|---|---|---|---|
| 5180~5240MHz | 36 | 5180 | 44 | 5220 |
| | 38 | 5190 | 46 | 5230 |
| | 40 | 5200 | 48 | 5240 |
| | / | / | / | / |
| For 802.11a/n(HT20), Channel 36, 40 and 48 were tested.<br>For 802.11n(HT40), Channel 38 and 46 were tested. | | | | |
| 5745~5825MHz | 149 | 5745 | / | / |
| | 151 | 5755 | 159 | 5795 |
| | 153 | 5765 | 161 | 5805 |
| | 157 | 5785 | 165 | 5825 |
| For 802.11a/n(HT20), Channel 149, 157 and 165 were tested.<br>For 802.11n(HT40), Channel 151 and 159 were tested. | | | | |

# 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

## 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure 789033 D02 General UNII Test Procedures New Rules v01r03 and KDB 6622911 are required to be used for this kind of FCC 15.407 UII device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E

## 2.3. General Test Procedures

### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

### 2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

# 3. SYSTEM TEST CONFIGURATION

## 3.1. Justification

The system was configured for testing in a continuous transmit condition.

## 3.2. . EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (MP_Kit_SMART Tool) provided by application.

## 3.3. Special Accessories

| No. | Equipment | Manufacturer | Model No. | Serial No. | Length | shielded/ unshielded | Notes |
|---|---|---|---|---|---|---|---|
| 1 | PC | Lenovo | Ideapad | A131101550 | / | / | DOC |
| 2 | Power adapter | Lenovo | CPA-A090 | 36200414 | 1.00m | unshielded | DOC |

## 3.4. Block Diagram/Schematics

Please refer to the related document

## 3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

## 3.6. Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

| Applied Standard: FCC Part 15 Subpart E | | |
|---|---|---|
| FCC Rules | Description of Test | Result |
| §15.407(a) | Maximum Conducted Output Power | Compliant |
| §15.407(a) | Power Spectral Density | Compliant |
| §15.407(e) | 6dB & 26dB Bandwidth | Compliant |
| §15.407(b) | Radiated Emissions | Compliant |
| §15.407(b) | Band edge Emissions | Compliant |
| §15.407(g) | Frequency Stability | Note |
| §15.207(a) | Line Conducted Emissions | Compliant |
| §15.203 | Antenna Requirements | Compliant |
| §2.1093 | RF Exposure | Compliant |

Note: “N/A” is not applicable.

# 5. TEST RESULT

## 5.1. Frequency Stability

Note: The customer declared frequency stability is better than 20ppm which ensures that the signal remains in the allocated bands under all operational conditions stated in the user manual.

## 5.2. On Time and Duty Cycle

### 5.2.1. Standard Applicable

None; for reporting purpose only.

### 5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyse.

### 5.2.3. Test Procedures

1. Set the centre frequency of the spectrum analyse to the transmiting frequency;
2. Set the span=0MHz, RBW=8MHz, VBW=50MHz, Sweep time=5ms;
3. Detector = peak;
4. Trace mode = Single hold.

### 5.2.4. Test Setup Layout

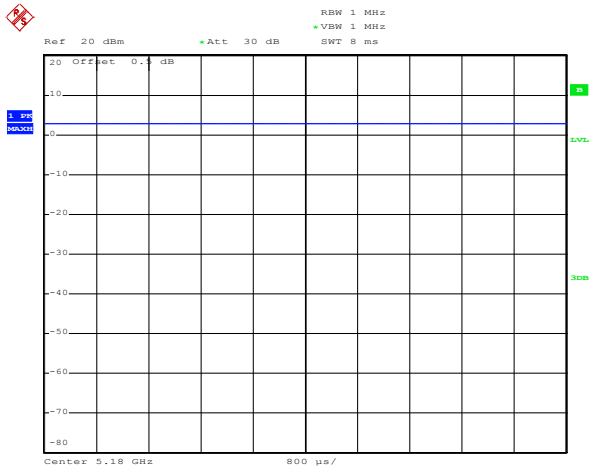

### 5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 5.2.6. Test result

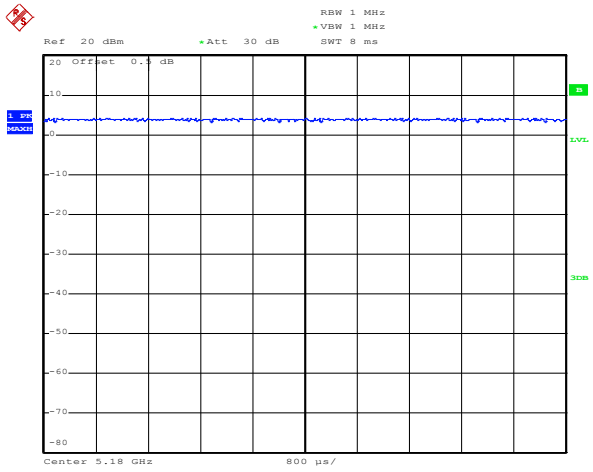
| Mode | On Time B (ms) | Period (ms) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | 1/B Minimum VBW(KHz) |
|---|---|---|---|---|---|---|
| 802.11a-5.2GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| 802.11n20-5.2GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| 802.11n40-5.2GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| 802.11a-5.8GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| 802.11n20-5.8GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| 802.11n40-5.8GHz | 5 | 5 | 1 | 100 | 0 | 0.01 |
| Note: Duty Cycle Correction Factor=10log(1/Duty cycle) | | | | | | |

## Test plot of On Time and Duty Cycle



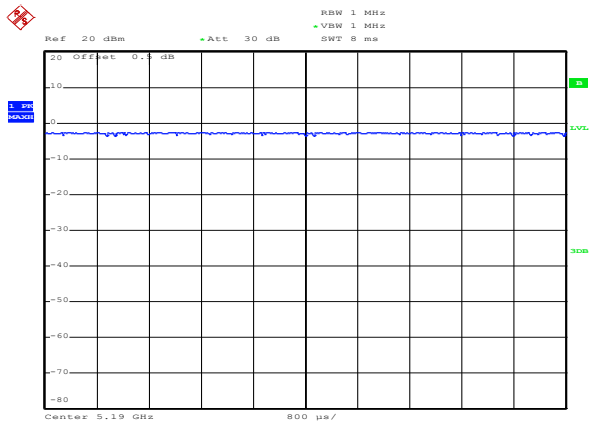

Date: 17.SEP.2017 20:32:30

a-5180MHz



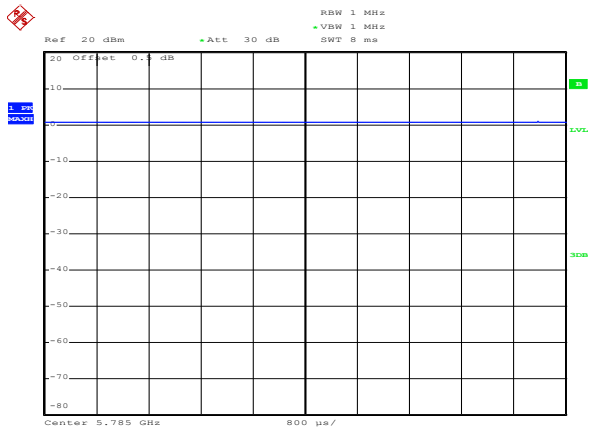

Date: 17.SEP.2017 20:33:41

n20-5180MHz



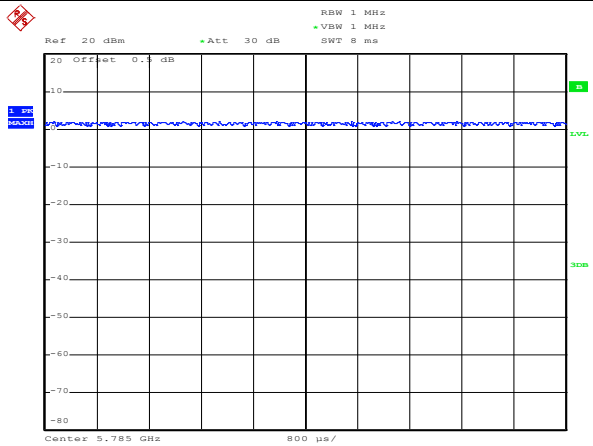

Date: 17.SEP.2017 20:34:16

n40-5190MHz



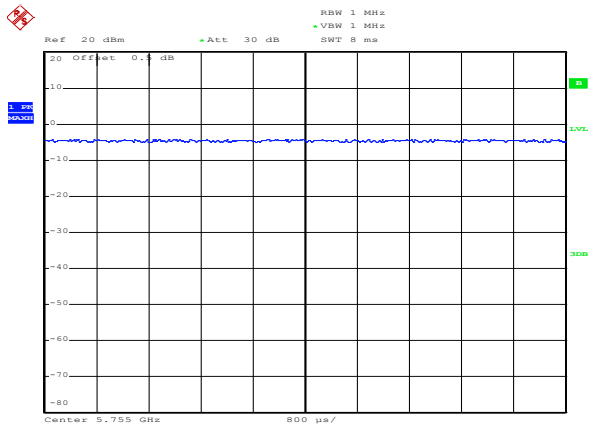

Date: 17.SEP.2017 21:37:18

a-5785MHz




Date: 17.SEP.2017 21:36:57

n20-5785MHz




Date: 17.SEP.2017 21:34:55

N40-5755MHz

## 5.3. Maximum Conducted Output Power Measurement

### 5.3.1. Standard Applicable

**For 5725~5850MHz**

According to §15.407(a)(1)(i), For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a)(1)(ii), For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

According to §15.407(a)(1)(iv), For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

According to §15.407(a)(3), For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

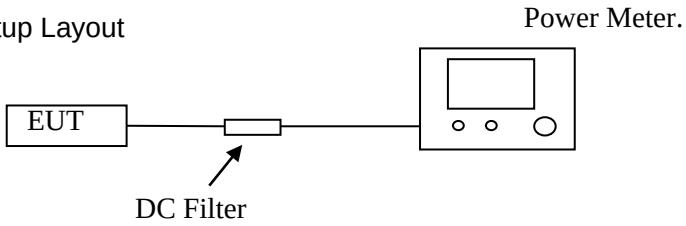
### 5.3.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the power meter.

### 5.3.3. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

### 5.3.4. Test Setup Layout




### 5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.3.6. Test Result of Maximum Conducted Output Power

| Temperature | 24.1℃ | Humidty | 58.1% |
|---|---|---|---|
| Test Engineer | Chaz Liu | Configurations | 802.11a/n |

| Test Mode | Channel | Frequency (MHz) | AVG Conducted Power(dBm) | Duty Cycle Factor (dB) | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 15.63 | 0 | 30.00 | Complies |
| | 40 | 5200 | 15.11 | 0 | 30.00 | Complies |
| | 48 | 5240 | 15.37 | 0 | 30.00 | Complies |
| 802.11n (HT20) | 36 | 5180 | 15.68 | 0 | 30.00 | Complies |
| | 40 | 5200 | 15.51 | 0 | 30.00 | Complies |
| | 48 | 5240 | 15.69 | 0 | 30.00 | Complies |
| 802.11n (HT40) | 38 | 5190 | 15.78 | 0 | 30.00 | Complies |
| | 46 | 5230 | 15.20 | 0 | 30.00 | Complies |

| Test Mode | Channel | Frequency (MHz) | AVG Conducted Power(dBm) | Duty Cycle Factor (dB) | Max. Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | 15.45 | 0 | 30.00 | Complies |
| | 157 | 5785 | 14.87 | 0 | 30.00 | Complies |
| | 165 | 5825 | 15.23 | 0 | 30.00 | Complies |
| 802.11n (HT20) | 149 | 5745 | 15.46 | 0 | 30.00 | Complies |
| | 157 | 5785 | 15.29 | 0 | 30.00 | Complies |
| | 165 | 5825 | 15.44 | 0 | 30.00 | Complies |
| 802.11n (HT40) | 151 | 5755 | 15.54 | 0 | 30.00 | Complies |
| | 159 | 5795 | 15.06 | 0 | 30.00 | Complies |

## 5.4. Power Spectral Density Measurement

### 5.4.1. Standard Applicable

According to §15.407(a)(1)(i), For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to §15.407(a)(1)(ii), For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

According to §15.407(a)(1)(iv), For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

According to §15.407(a)(3), For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz(or a narrower bandwidth) band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 5.4.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

### 5.4.3. Test Procedures

1). The transmitter was connected directly to a Spectrum Analyzer through a directional couple.

2). The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.

3). Set the RBW = 300kHz

4). Set the VBW ≥ 3*RBW

5). Span=Encompass the entire emissions bandwidth (EBW) of the signal

6). Detector = peak.

7). Sweep time = auto couple.

8). Trace mode = max hold.

9). Allow trace to fully stabilize.

10). Use the peak marker function to determine the maximum power level in any 1MHz band segment within the fundamental EBW.

### 5.4.4. Test Setup Layout


### 5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

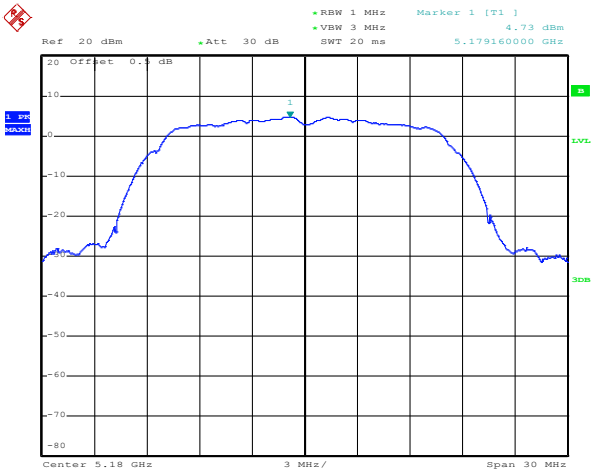
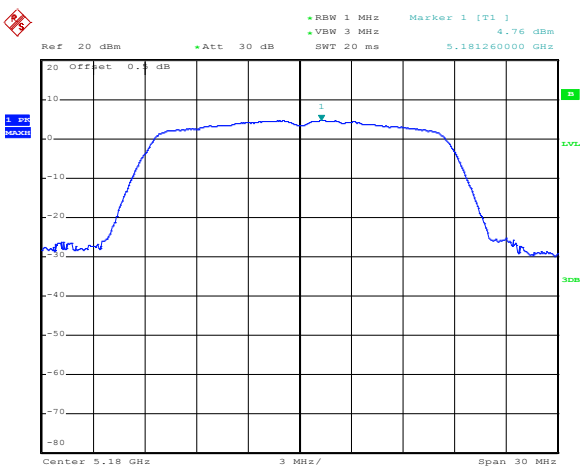
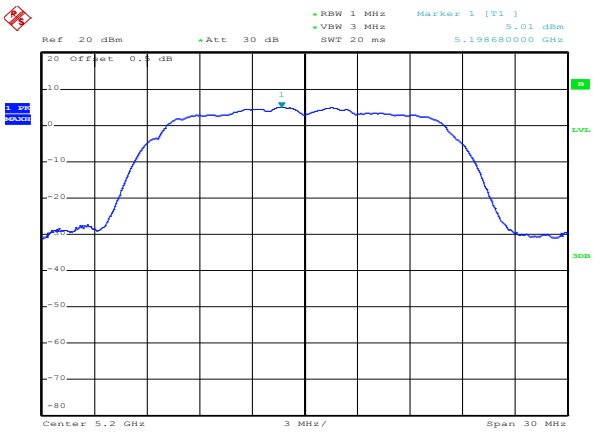
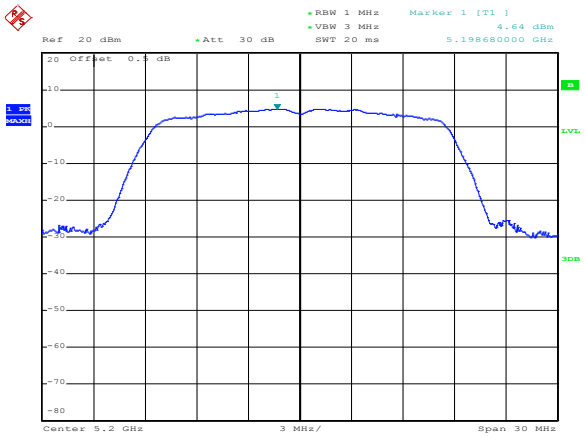
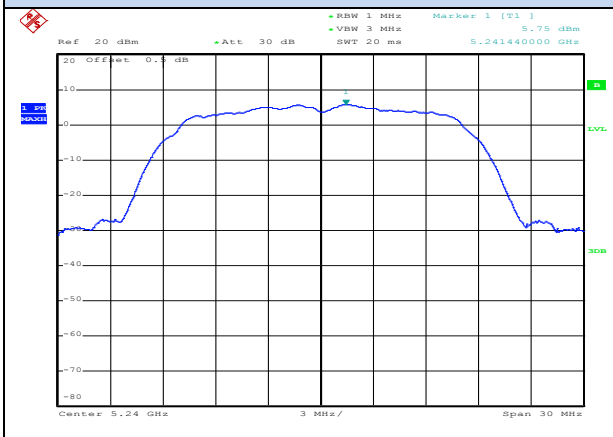
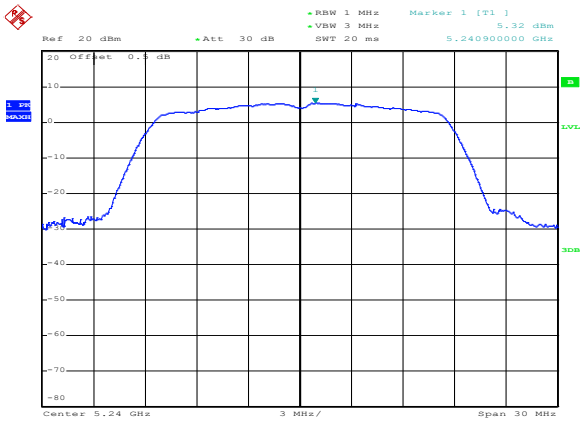
5.4.6. Test Result of Power Spectral Density

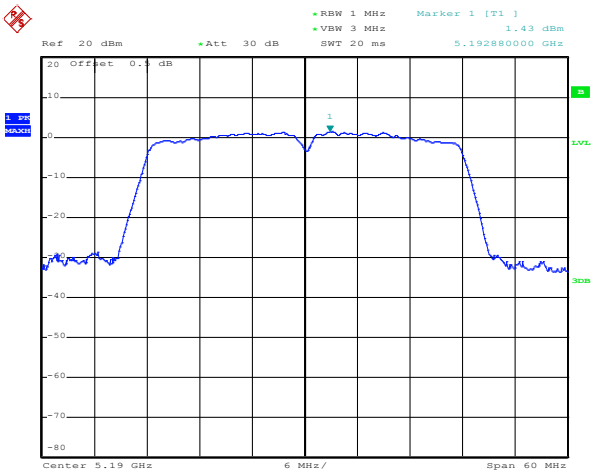
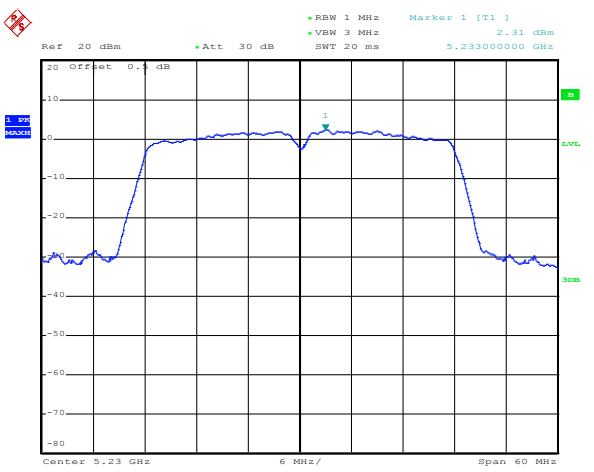
| Temperature | 24.1℃ | Humidity | 58.1% |
|---|---|---|---|
| Test Engineer | Chaz Liu | Configurations | 802.11a/n |

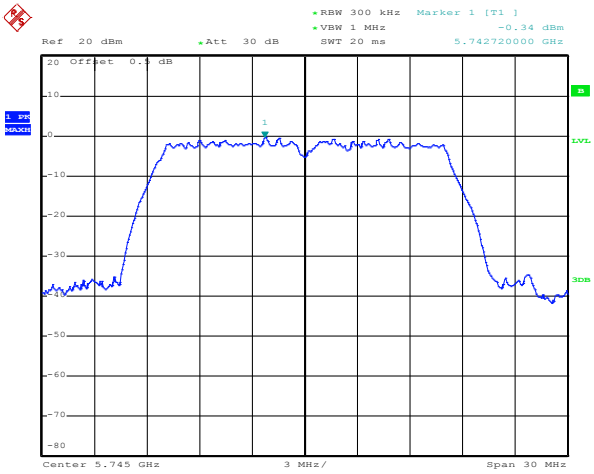
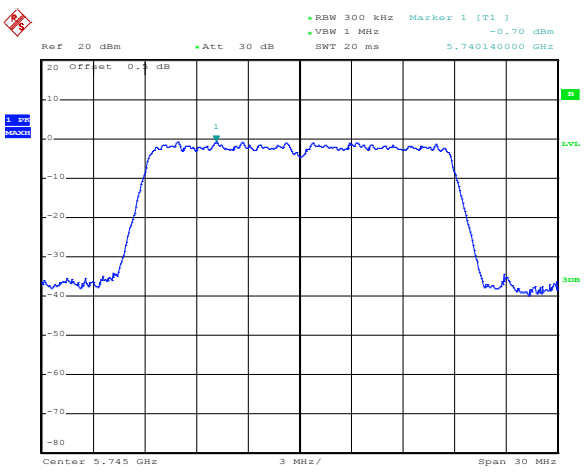
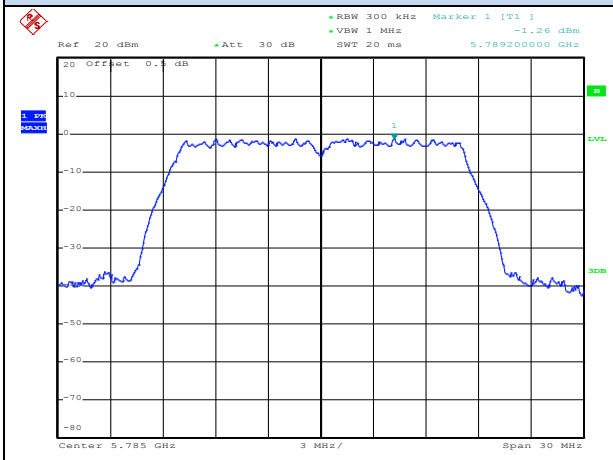
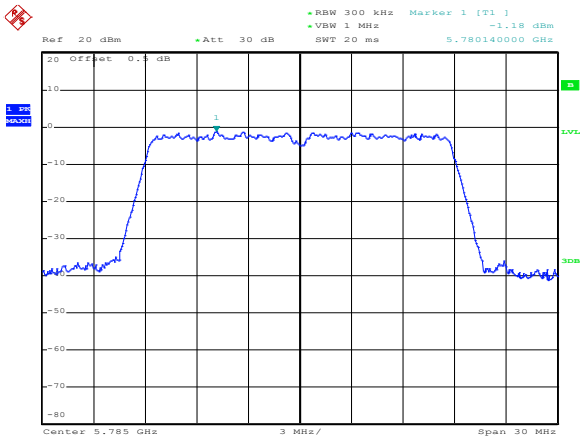
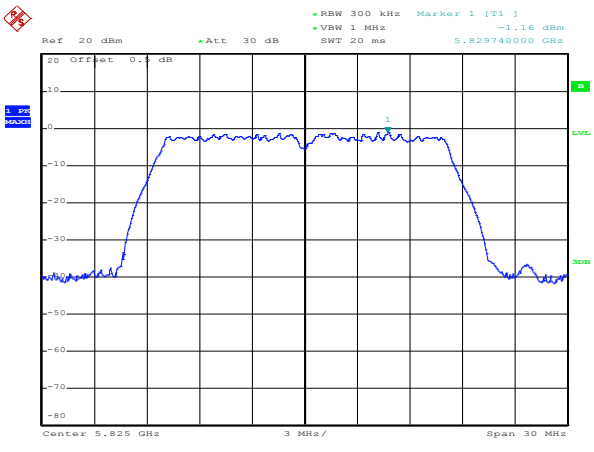
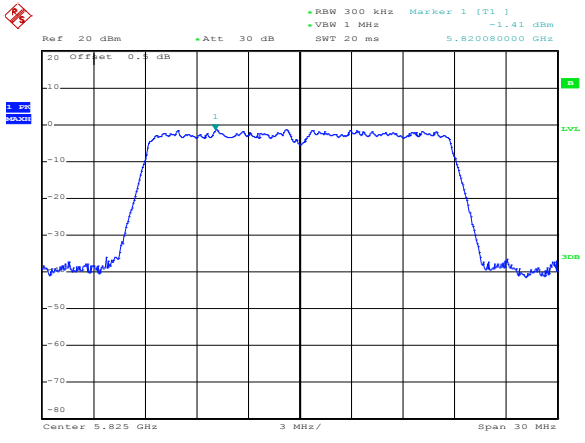
| Test Mode | Channel | Frequency (MHz) | Power Density | Duty cycle factor (dB) | Max. Limit (dBm/1MHz) | Result |
|---|---|---|---|---|---|---|
| 802.11a | 36 | 5180 | 4.73 | 0 | 17.00 | Complies |
| | 40 | 5200 | 5.01 | 0 | 17.00 | Complies |
| | 48 | 5240 | 5.75 | 0 | 17.00 | Complies |
| 802.11n (HT20) | 36 | 5180 | 4.76 | 0 | 17.00 | Complies |
| | 40 | 5200 | 4.64 | 0 | 17.00 | Complies |
| | 48 | 5240 | 5.32 | 0 | 17.00 | Complies |
| 802.11n (HT40) | 38 | 5190 | 1.43 | 0 | 17.00 | Complies |
| | 46 | 5230 | 2.31 | 0 | 17.00 | Complies |

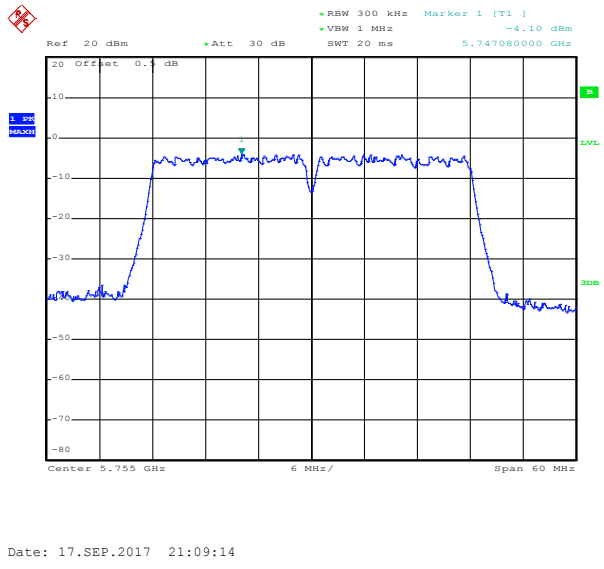
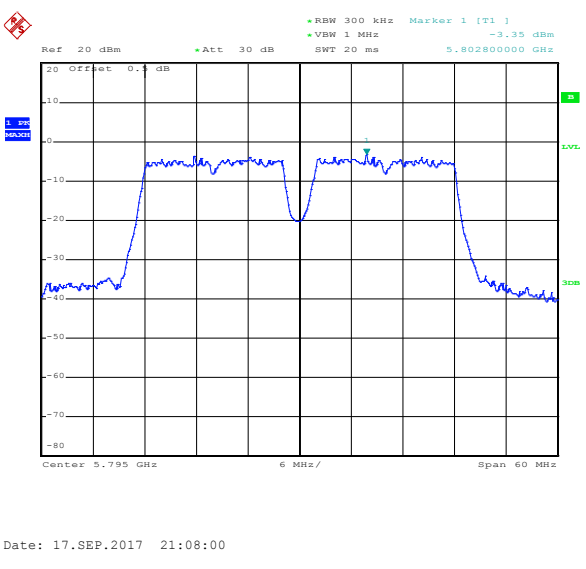
| Test Mode | Channel | Frequency (MHz) | Power Density (dBm/300kHz) | BW correction factor (dB) | Duty cycle factor (dB) | Max. Limit (dBm/500kHz) | Result |
|---|---|---|---|---|---|---|---|
| 802.11a | 149 | 5745 | -0.34 | 2.218 | 0 | 30.00 | Complies |
| | 157 | 5785 | -1.26 | 2.218 | 0 | 30.00 | Complies |
| | 165 | 5825 | -1.16 | 2.218 | 0 | 30.00 | Complies |
| 802.11n (HT20) | 149 | 5745 | -0.70 | 2.218 | 0 | 30.00 | Complies |
| | 157 | 5785 | -1.18 | 2.218 | 0 | 30.00 | Complies |
| | 165 | 5825 | -1.41 | 2.218 | 0 | 30.00 | Complies |
| 802.11n (HT40) | 151 | 5755 | -4.10 | 2.218 | 0 | 30.00 | Complies |
| | 159 | 5795 | -3.35 | 2.218 | 0 | 30.00 | Complies |

Note: BW correction factor = 10log(500kHz/RBW) = 10 log(500kHz/300KHz)

| Test plot of Power Spectral Density (5180~5240MHz Band) | |
|---|---|
|  <br>Date: 17.SEP.2017 18:53:08 |  <br>Date: 17.SEP.2017 18:52:42 |
| 802.11a-5180MHz | 802.11n20-5180MHz |
|  <br>Date: 17.SEP.2017 18:51:01 |  <br>Date: 17.SEP.2017 18:51:38 |
| 802.11a-5200MHz | 802.11n20-5200MHz |
|  <br>Date: 17.SEP.2017 18:48:37 |  <br>Date: 17.SEP.2017 18:48:15 |
| 802.11a-5240MHz | 802.11n20-5240MHz |

| Test plot of Power Spectral Density (5180~5240MHz Band) | |
|---|---|
|  <br>Date: 17.SEP.2017 18:53:44 |  <br>Date: 17.SEP.2017 18:55:22 |
| 802.11n40-5190MHz | 802.11n40-5230MHz |

| Test plot of Power Spectral Density (5745~5825MHz Band) | |
|---|---|
|  <br>Date: 17.SEP.2017 21:10:54 |  <br>Date: 17.SEP.2017 21:10:30 |
| 802.11a-5745MHz | 802.11n20-5745MHz |
|  <br>Date: 17.SEP.2017 21:11:29 |  <br>Date: 17.SEP.2017 21:11:51 |
| 802.11a-5785MHz | 802.11n20-5785MHz |
|  <br>Date: 17.SEP.2017 21:13:24 |  <br>Date: 17.SEP.2017 21:12:59 |
| 802.11a-5825MHz | 802.11n20-5825MHz |

| Test plot of Power Spectral Density (5745~5825MHz Band) | |
|---|---|
|  |  |
| 802.11n40-5755MHz | 802.11n40-5795MHz |

## 5.5. 6dB & 26dB Occupied Bandwidth Measurement

### 5.5.1. Standard Applicable

According to §15.407(e): Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

There is no restriction limits for 26dB & 99% occupied bandwidth, report only for reference.

### 5.5.2. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

| **6dB Bandwidth Measurement (Only For 5745~5825MHz Band)** | |
|---|---|
| Spectrum Parameter | Setting |
| Attenuation | Auto |
| RBW | 100KHz |
| VBW | ≥ 3 x RBW |
| Detector | Peak |
| Trace | Max Hold |

| **26dB & 99%Bandwidth Measurement (Only For 5180~5240MHz Band)** | |
|---|---|
| Spectrum Parameter | Setting |
| Attenuation | Auto |
| RBW | approximately 1% of the emission bandwidth |
| VBW | ≥ RBW |
| Detector | Peak |
| Trace | Max Hold |

### 5.5.3. Test Procedures

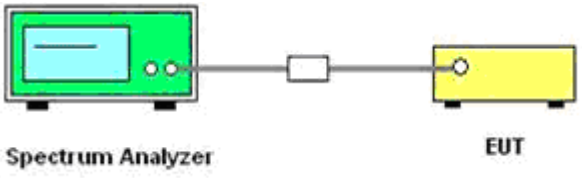
1) The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

2) The resolution bandwidth and the video bandwidth were set according to KDB 789033 D02 General UNII Test Procedures New Rules v01r04

3) For 5745~5825MHz Band, Measured the maximum width of the emission that is 6dB down from the peak of the emission.

4) For 5180~5240MHz Band, Measured the maximum width of the emission that is 26dB down from the peak of the emission. Record the 26dB & 99% Bandwidth.

### 5.5.4. Test Setup Layout




### 5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.5.6. Test Result of 6dB & 26dB Occupied Bandwidth

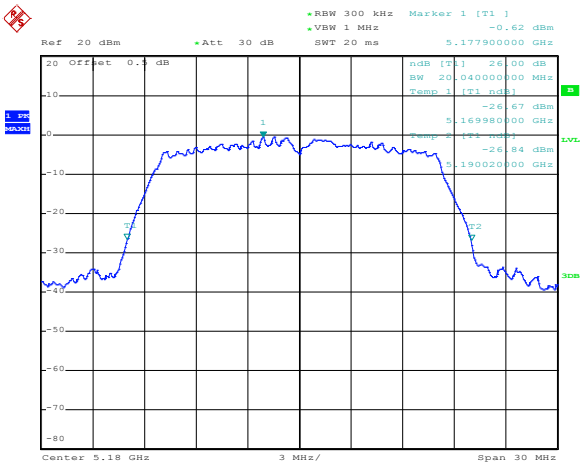
| Temperature | 24.1℃ | Humidity | 58.1% |
|---|---|---|---|
| Test Engineer | Chaz Liu | Configurations | 802.11a/n |

| Test Mode | Channel | Frequency (MHz) | 26dB BW (MHz) | Limit (kHz) |
|---|---|---|---|---|
| 802.11a | 36 | 5180 | 20.04 | Non-specified |
| | 40 | 5200 | 19.80 | |
| | 48 | 5240 | 19.80 | |
| 802.11n(HT20) | 36 | 5180 | 19.98 | |
| | 40 | 5200 | 19.98 | |
| | 48 | 5240 | 19.98 | |
| 802.11n(HT40) | 38 | 5190 | 39.84 | |
| | 46 | 5230 | 39.84 | |

| Test Mode | Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) |
|---|---|---|---|---|
| 802.11a | 149 | 5745 | 16.68 | ≥500 |
| | 157 | 5785 | 16.68 | ≥500 |
| | 165 | 5825 | 16.68 | ≥500 |
| 802.11n(HT20) | 149 | 5745 | 17.88 | ≥500 |
| | 157 | 5785 | 17.88 | ≥500 |
| | 165 | 5825 | 17.88 | ≥500 |
| 802.11n(HT40) | 151 | 5755 | 36.72 | ≥500 |
| | 159 | 5795 | 36.60 | ≥500 |

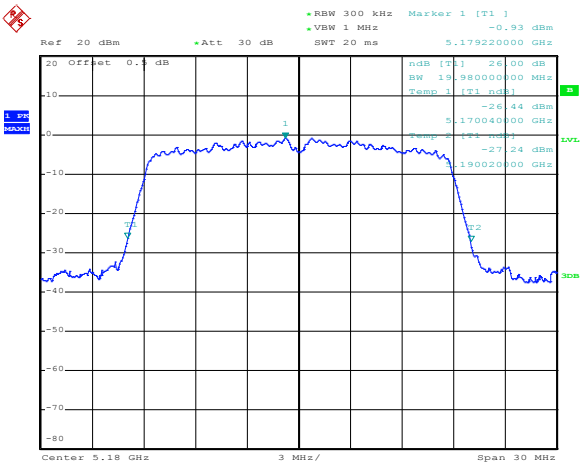
*Note: only recorded the worst case data in the test report.*

## Test plot of 26dB Occupied Bandwidth



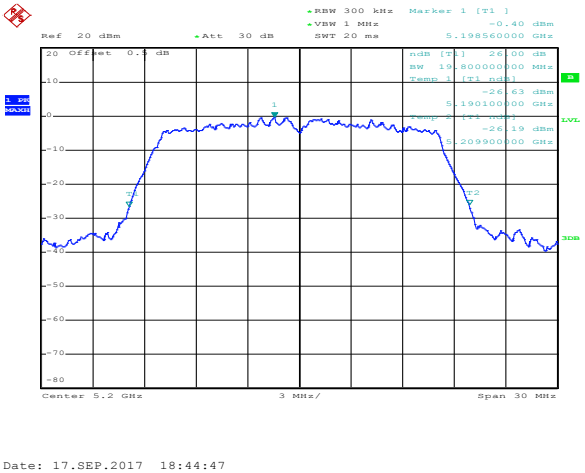

Date: 17.SEP.2017 18:42:22

802.11a-5180MHz



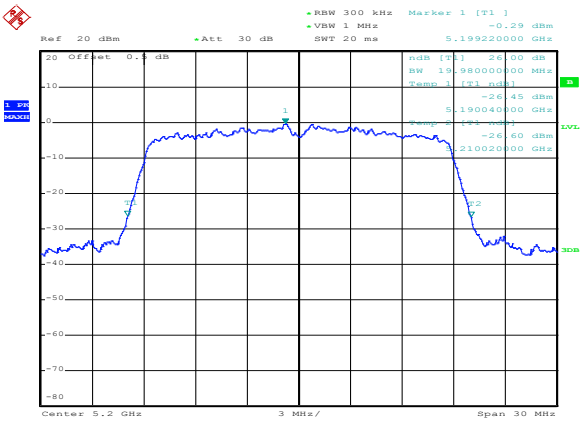

Date: 17.SEP.2017 18:42:57

802.11n20-5180MHz



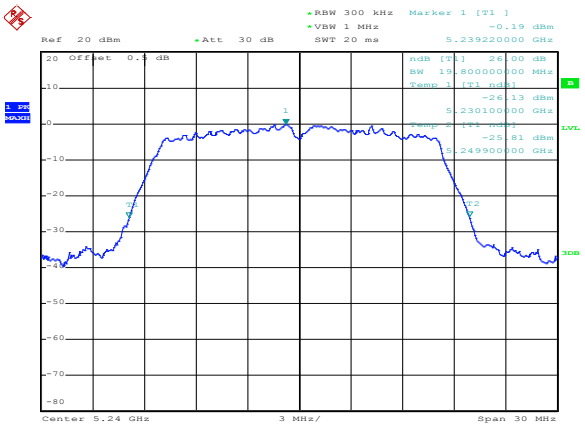

Date: 17.SEP.2017 18:44:47

802.11a-5220MHz



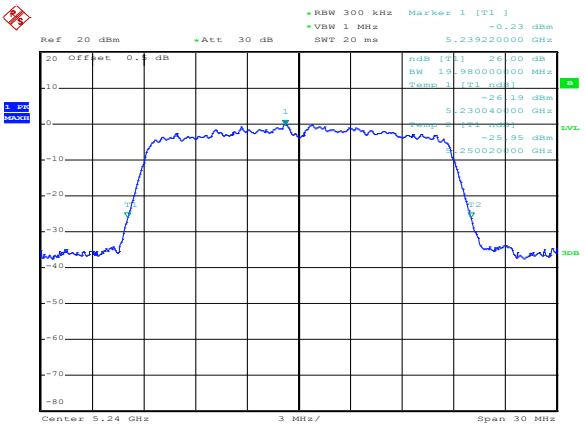

Date: 17.SEP.2017 18:44:17

802.11n20-5220MHz



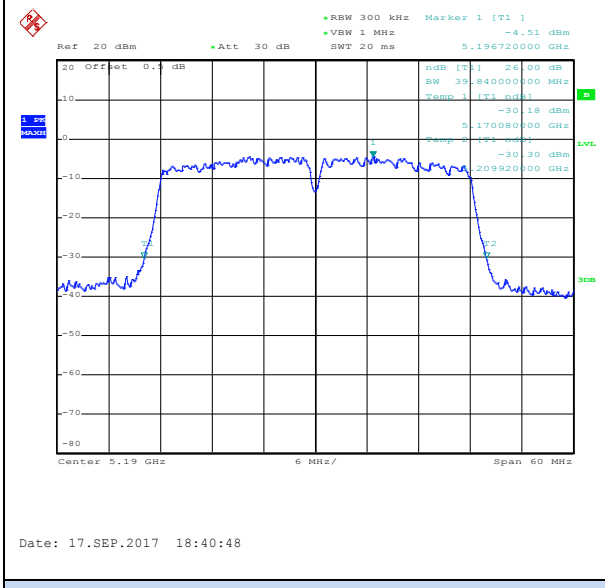
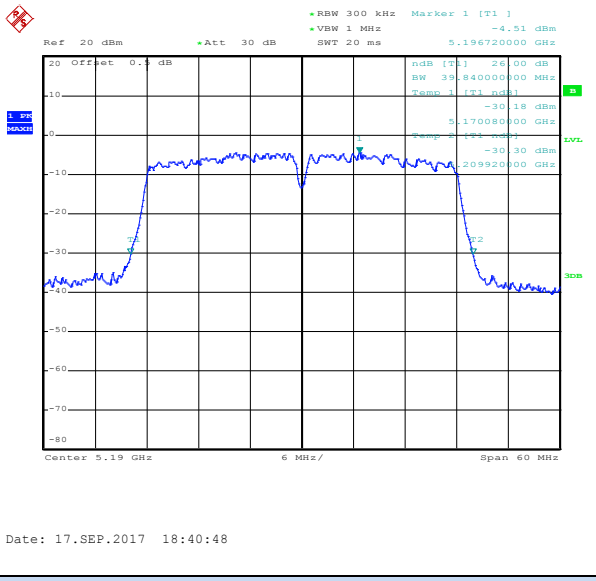

Date: 17.SEP.2017 18:45:25

802.11a-5240MHz

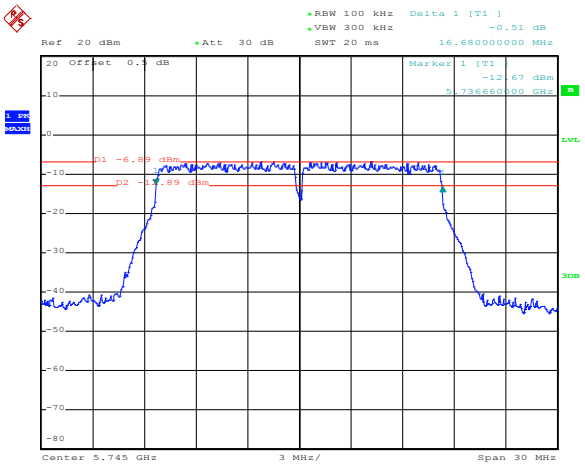



Date: 17.SEP.2017 18:45:55

802.11n20-5240MHz

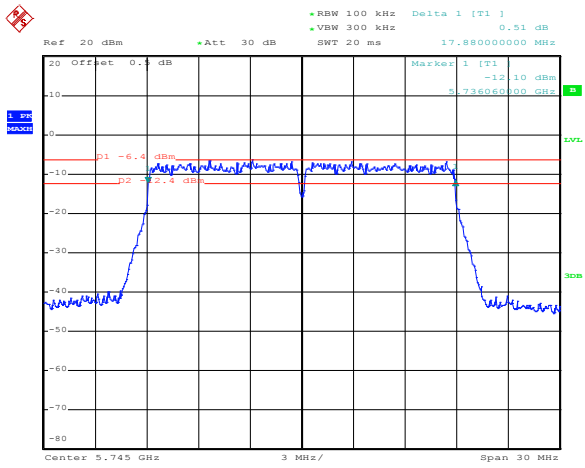
| Test plot of 26dB Occupied Bandwidth | |
|---|---|
|  |  |
| 802.11n40-5190MHz | 802.11n40-5230MHz |

## Test plot of 6dB Occupied Bandwidth



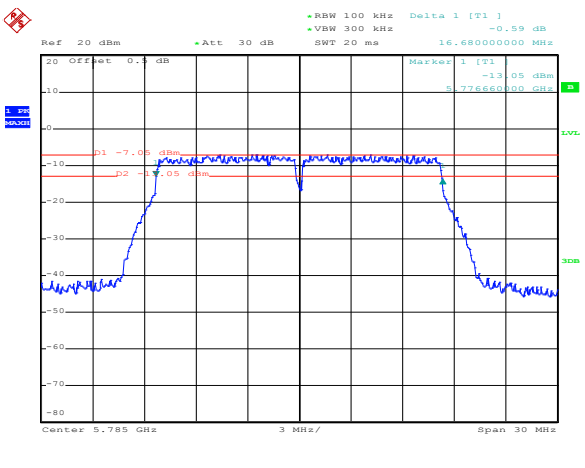

Date: 17.SEP.2017 20:50:36

802.11a-5745MHz



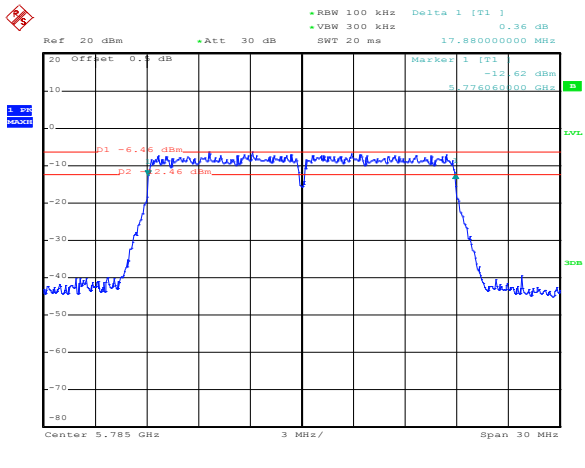

Date: 17.SEP.2017 20:51:46

802.11n20-5745MHz



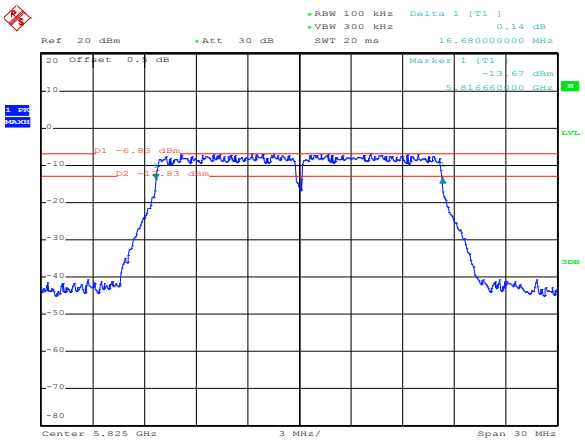

Date: 17.SEP.2017 20:55:08

802.11a-5785MHz



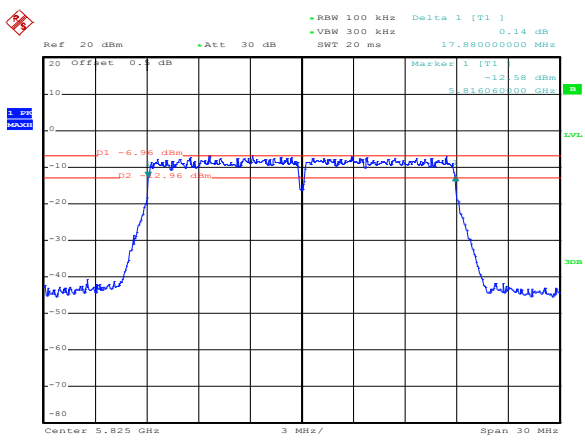

Date: 17.SEP.2017 20:54:07

802.11n20-5785MHz



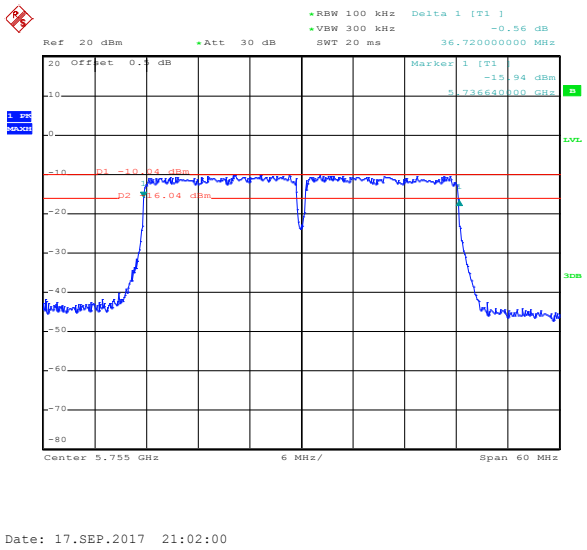
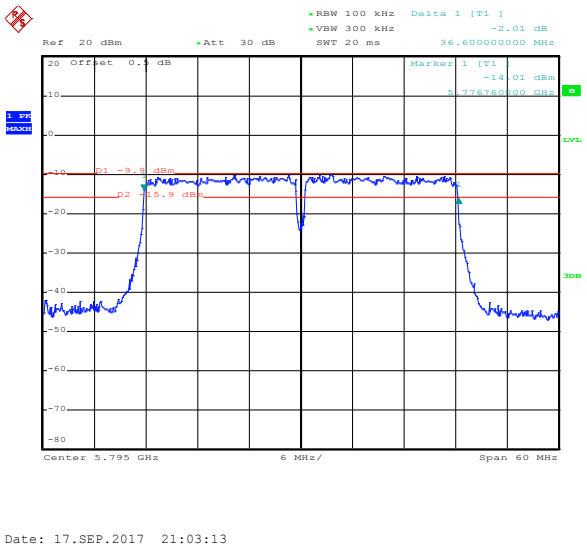

Date: 17.SEP.2017 20:56:24

802.11a-5825MHz




Date: 17.SEP.2017 20:59:03

802.11n20-5825MHz

| Test plot of 6dB Occupied Bandwidth | |
|---|---|
|  |  |
| 802.11n40-5755MHz | 802.11n40-5795MHz |

## 5.6. Radiated Emissions Measurement

### 5.6.1. Standard Applicable

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| \1\ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293. | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (\2\) |
| 13.36-13.41 | | | |

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz (68.2dBuV/m at 3m).

For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of −27 dBm/MHz(68.2dBuV/m at 3m) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz(105.2dBuV/m at 3m) at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6(110.8dBuV/m at 3m) dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz(122.2dBuV/m at 3m) at the band edge.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

5.6.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 100kHz for QP |

5.6.3. Test Procedures

**1) Sequence of testing 9 kHz to 30 MHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

**Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

**2) Sequence of testing 30 MHz to 1 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**3) Sequence of testing 1 GHz to 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

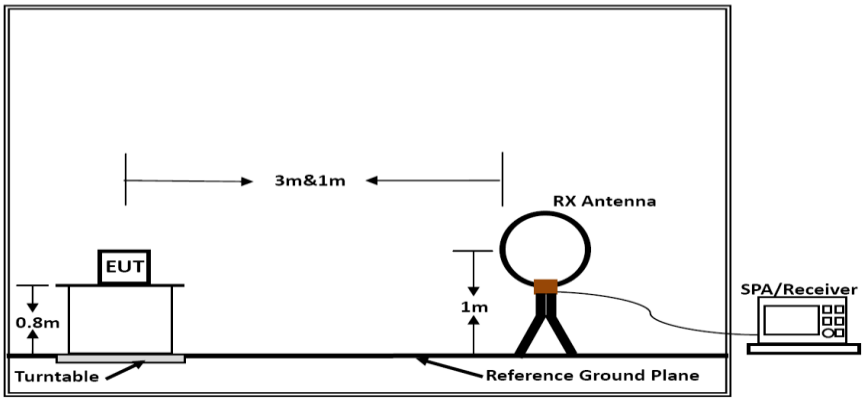
**Final measurement:**

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

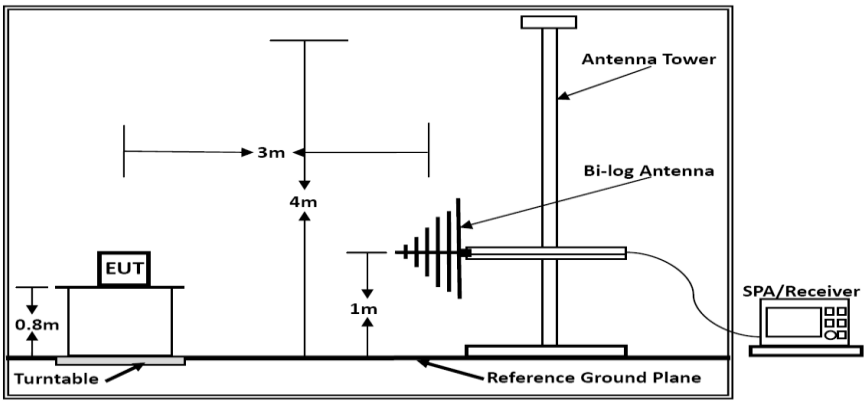
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

5.6.4. Test Setup Layout

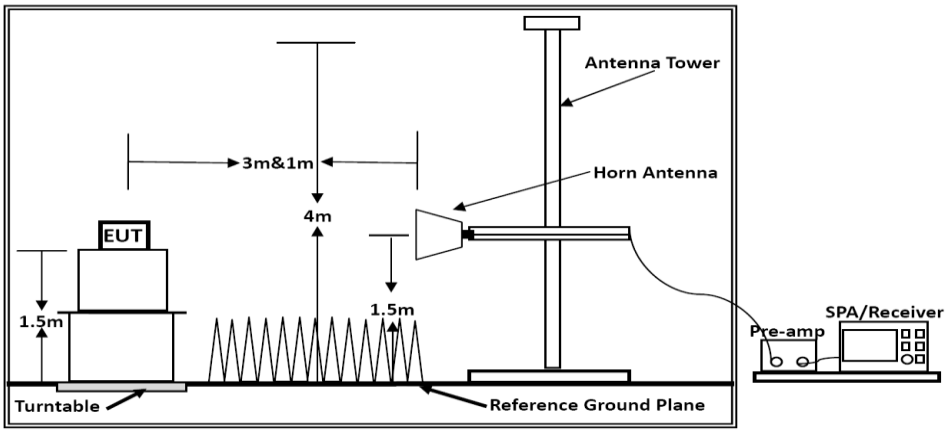
For radiated emissions below 30MHz




Below 30MHz




Below 1GHz




Above 1GHz

Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.6.6. Results of Radiated Emissions (9kHz~30MHz)

| Temperature | 24.1℃ | Humidty | 58.1% |
|---|---|---|---|
| Test Engineer | Chaz Liu | Configurations | 802.11a/n |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

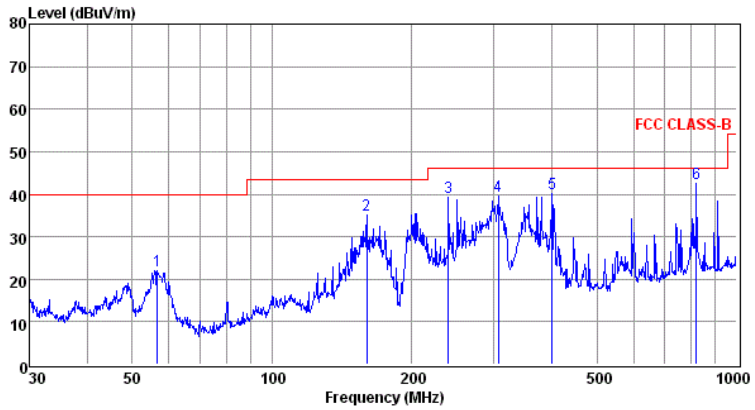
Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

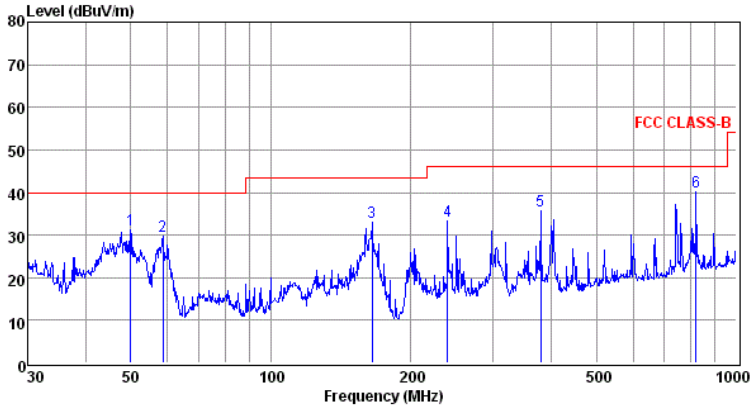
5.5.7. Results of Radiated Emissions (30MHz~1GHz)




Env./Ins: 24℃/56%
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 56.59 | 8.64 | 0.47 | 12.91 | 22.02 | 40.00 | -17.98 | QP |
| 2 | 159.78 | 25.82 | 0.75 | 8.66 | 35.23 | 43.50 | -8.27 | QP |
| 3 | 239.99 | 26.22 | 1.01 | 12.09 | 39.32 | 46.00 | -6.68 | QP |
| 4 | 306.75 | 25.21 | 1.05 | 13.15 | 39.41 | 46.00 | -6.59 | QP |
| 5 | 400.43 | 23.82 | 1.20 | 15.07 | 40.09 | 46.00 | -5.91 | QP |
| 6 | 818.83 | 20.70 | 1.67 | 20.25 | 42.62 | 46.00 | -3.38 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported




Env./Ins: 24℃/56%
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 49.88 | 17.56 | 0.54 | 13.26 | 31.36 | 40.00 | -8.64 | QP |
| 2 | 58.61 | 16.54 | 0.49 | 12.78 | 29.81 | 40.00 | -10.19 | QP |
| 3 | 164.91 | 23.44 | 0.86 | 8.82 | 33.12 | 43.50 | -10.38 | QP |
| 4 | 239.99 | 20.26 | 1.01 | 12.09 | 33.36 | 46.00 | -12.64 | QP |
| 5 | 379.91 | 19.77 | 1.18 | 14.59 | 35.54 | 46.00 | -10.46 | QP |
| 6 | 818.83 | 18.09 | 1.67 | 20.25 | 40.01 | 46.00 | -5.99 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Note:

Pre-scan all mode and recorded the worst case results in this report (802.11a-5785MHz).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.6.8. Results for Radiated Emissions (Above 1GHz)

802.11a / Channel 36

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | 45.61 | 33.21 | 35.82 | 9.52 | 52.52 | 68.20 | -15.68 | Peak | Horizontal |
| 10.36 | 34.85 | 33.21 | 35.82 | 9.52 | 41.76 | 54.00 | -12.24 | Average | Horizontal |
| 10.36 | 46.53 | 32.82 | 35.82 | 9.52 | 53.05 | 68.20 | -15.15 | Peak | Vertical |
| 10.36 | 35.22 | 32.82 | 35.82 | 9.52 | 41.74 | 54.00 | -12.26 | Average | Vertical |

802.11a / Channel 44

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.44 | 46.12 | 33.21 | 35.82 | 9.52 | 53.03 | 68.20 | -15.17 | Peak | Horizontal |
| 10.44 | 35.31 | 33.21 | 35.82 | 9.52 | 42.22 | 54.00 | -11.78 | Average | Horizontal |
| 10.44 | 46.96 | 32.82 | 35.82 | 9.52 | 53.48 | 68.20 | -14.72 | Peak | Vertical |
| 10.44 | 35.56 | 32.82 | 35.82 | 9.52 | 42.08 | 54.00 | -11.92 | Average | Vertical |

802.11a / Channel 48

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.48 | 46.43 | 33.21 | 35.82 | 9.52 | 53.34 | 68.20 | -14.86 | Peak | Horizontal |
| 10.48 | 35.79 | 33.21 | 35.82 | 9.52 | 42.70 | 54.00 | -11.30 | Average | Horizontal |
| 10.48 | 47.80 | 32.82 | 35.82 | 9.52 | 54.32 | 68.20 | -13.88 | Peak | Vertical |
| 10.48 | 36.09 | 32.82 | 35.82 | 9.52 | 42.61 | 54.00 | -11.39 | Average | Vertical |

802.11n(HT20) / Channel 36

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.36 | 45.24 | 33.21 | 35.82 | 9.52 | 52.15 | 68.20 | -16.05 | Peak | Horizontal |
| 10.36 | 34.44 | 33.21 | 35.82 | 9.52 | 41.35 | 54.00 | -12.65 | Average | Horizontal |
| 10.36 | 46.50 | 32.82 | 35.82 | 9.52 | 53.02 | 68.20 | -15.18 | Peak | Vertical |
| 10.36 | 34.72 | 32.82 | 35.82 | 9.52 | 41.24 | 54.00 | -12.76 | Average | Vertical |

802.11n(HT20) / Channel 44

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.44 | 46.24 | 33.21 | 35.82 | 9.52 | 53.15 | 68.20 | -15.05 | Peak | Horizontal |
| 10.44 | 35.38 | 33.21 | 35.82 | 9.52 | 42.29 | 54.00 | -11.71 | Average | Horizontal |
| 10.44 | 47.46 | 32.82 | 35.82 | 9.52 | 53.98 | 68.20 | -14.22 | Peak | Vertical |
| 10.44 | 35.81 | 32.82 | 35.82 | 9.52 | 42.33 | 54.00 | -11.67 | Average | Vertical |

802.11n(HT20) / Channel 48

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.48 | 45.95 | 33.21 | 35.82 | 9.52 | 52.86 | 68.20 | -15.34 | Peak | Horizontal |
| 10.48 | 35.04 | 33.21 | 35.82 | 9.52 | 41.95 | 54.00 | -12.05 | Average | Horizontal |
| 10.48 | 47.00 | 32.82 | 35.82 | 9.52 | 53.52 | 68.20 | -14.68 | Peak | Vertical |
| 10.48 | 35.75 | 32.82 | 35.82 | 9.52 | 42.27 | 54.00 | -11.73 | Average | Vertical |

802.11n(HT40) / Channel 38

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.38 | 45.37 | 33.21 | 35.82 | 9.52 | 52.28 | 68.20 | -15.92 | Peak | Horizontal |
| 10.38 | 34.61 | 33.21 | 35.82 | 9.52 | 41.52 | 54.00 | -12.48 | Average | Horizontal |
| 10.38 | 46.49 | 32.82 | 35.82 | 9.52 | 53.01 | 68.20 | -15.19 | Peak | Vertical |
| 10.38 | 34.92 | 32.82 | 35.82 | 9.52 | 41.44 | 54.00 | -12.56 | Average | Vertical |

802.11n(HT40) / Channel 46

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 10.46 | 45.61 | 33.21 | 35.82 | 9.52 | 52.52 | 68.20 | -15.68 | Peak | Horizontal |
| 10.46 | 35.12 | 33.21 | 35.82 | 9.52 | 42.03 | 54.00 | -11.97 | Average | Horizontal |
| 10.46 | 47.17 | 32.82 | 35.82 | 9.52 | 53.69 | 68.20 | -14.51 | Peak | Vertical |
| 10.46 | 35.69 | 32.82 | 35.82 | 9.52 | 42.21 | 54.00 | -11.79 | Average | Vertical |

802.11a / Channel 149

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.490 | 47.06 | 33.92 | 36.09 | 10.26 | 55.15 | 68.20 | -13.05 | Peak | Horizontal |
| 11.490 | 36.52 | 33.92 | 36.09 | 10.26 | 44.61 | 54.00 | -9.39 | Average | Horizontal |
| 11.490 | 48.25 | 33.99 | 35.99 | 10.26 | 56.51 | 68.20 | -11.69 | Peak | Vertical |
| 11.490 | 36.69 | 33.99 | 35.99 | 10.26 | 44.95 | 54.00 | -9.05 | Average | Vertical |

802.11a / Channel 157

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.570 | 46.70 | 33.92 | 36.09 | 10.26 | 54.79 | 68.20 | -13.41 | Peak | Horizontal |
| 11.570 | 35.85 | 33.92 | 36.09 | 10.26 | 43.94 | 54.00 | -10.06 | Average | Horizontal |
| 11.570 | 47.89 | 33.99 | 35.99 | 10.26 | 56.15 | 68.20 | -12.05 | Peak | Vertical |
| 11.570 | 36.51 | 33.99 | 35.99 | 10.26 | 44.77 | 54.00 | -9.23 | Average | Vertical |

802.11a / Channel 165

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.650 | 46.53 | 33.92 | 36.09 | 10.26 | 54.62 | 68.20 | -13.58 | Peak | Horizontal |
| 11.650 | 35.85 | 33.92 | 36.09 | 10.26 | 43.94 | 54.00 | -10.06 | Average | Horizontal |
| 11.650 | 47.47 | 33.99 | 35.99 | 10.26 | 55.73 | 68.20 | -12.47 | Peak | Vertical |
| 11.650 | 36.04 | 33.99 | 35.99 | 10.26 | 44.30 | 54.00 | -9.70 | Average | Vertical |

802.11n(HT20) / Channel 149

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.490 | 46.91 | 33.92 | 36.09 | 10.26 | 55.00 | 68.20 | -13.20 | Peak | Horizontal |
| 11.490 | 36.00 | 33.92 | 36.09 | 10.26 | 44.09 | 54.00 | -9.91 | Average | Horizontal |
| 11.490 | 47.84 | 33.99 | 35.99 | 10.26 | 56.10 | 68.20 | -12.10 | Peak | Vertical |
| 11.490 | 36.70 | 33.99 | 35.99 | 10.26 | 44.96 | 54.00 | -9.04 | Average | Vertical |

802.11n(HT20) / Channel 157

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.570 | 47.10 | 33.92 | 36.09 | 10.26 | 55.19 | 68.20 | -13.01 | Peak | Horizontal |
| 11.570 | 36.40 | 33.92 | 36.09 | 10.26 | 44.49 | 54.00 | -9.51 | Average | Horizontal |
| 11.570 | 47.96 | 33.99 | 35.99 | 10.26 | 56.22 | 68.20 | -11.98 | Peak | Vertical |
| 11.570 | 36.75 | 33.99 | 35.99 | 10.26 | 45.01 | 54.00 | -8.99 | Average | Vertical |

802.11n(HT20) / Channel 165

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.650 | 46.46 | 33.92 | 36.09 | 10.26 | 54.55 | 68.20 | -13.65 | Peak | Horizontal |
| 11.650 | 36.01 | 33.92 | 36.09 | 10.26 | 44.10 | 54.00 | -9.90 | Average | Horizontal |
| 11.650 | 47.63 | 33.99 | 35.99 | 10.26 | 55.89 | 68.20 | -12.31 | Peak | Vertical |
| 11.650 | 36.37 | 33.99 | 35.99 | 10.26 | 44.63 | 54.00 | -9.37 | Average | Vertical |

802.11n(HT40) / Channel 151

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.510 | 49.87 | 33.92 | 36.09 | 10.26 | 57.96 | 68.20 | -10.24 | Peak | Horizontal |
| 11.510 | 39.05 | 33.92 | 36.09 | 10.26 | 47.14 | 54.00 | -6.86 | Average | Horizontal |
| 11.510 | 50.78 | 33.99 | 35.99 | 10.26 | 59.04 | 68.20 | -9.16 | Peak | Vertical |
| 11.510 | 39.56 | 33.99 | 35.99 | 10.26 | 47.82 | 54.00 | -6.18 | Average | Vertical |

802.11n(HT40) / Channel 159

| Freq. GHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|---|---|---|---|---|---|---|---|---|---|
| 11.590 | 49.49 | 33.92 | 36.09 | 10.26 | 57.58 | 68.20 | -10.62 | Peak | Horizontal |
| 11.590 | 38.92 | 33.92 | 36.09 | 10.26 | 47.01 | 54.00 | -6.99 | Average | Horizontal |
| 11.590 | 50.60 | 33.99 | 35.99 | 10.26 | 58.86 | 68.20 | -9.34 | Peak | Vertical |
| 11.590 | 39.42 | 33.99 | 35.99 | 10.26 | 47.68 | 54.00 | -6.32 | Average | Vertical |

Notes:

1). Measuring frequencies from 9k~40GHz, No emission found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9k~40GHz were made with an instrument using Peak detector mode.
3). Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.6.9. Results for Band Edge Emissions

| 802.11a | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
| 4500.000 | -43.18 | 5.00 | 0.000 | 57.080 | Peak | 74.00 | PASS |
| 5150.000 | -41.68 | 5.00 | 0.000 | 58.580 | Peak | 74.00 | PASS |
| 5350.000 | -43.84 | 5.00 | 0.000 | 56.420 | Peak | 74.00 | PASS |
| 5460.000 | -42.77 | 5.00 | 0.000 | 57.490 | Peak | 74.00 | PASS |
| 4500.000 | -53.93 | 5.00 | 0.000 | 46.330 | AV | 54.00 | PASS |
| 5150.000 | -53.45 | 5.00 | 0.000 | 46.810 | AV | 54.00 | PASS |
| 5350.000 | -55.31 | 5.00 | 0.000 | 44.950 | AV | 54.00 | PASS |
| 5460.000 | -54.16 | 5.00 | 0.000 | 46.100 | AV | 54.00 | PASS |

| 802.11n20 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
| 4500.000 | -44.21 | 5.00 | 0.000 | 56.050 | Peak | 74.00 | PASS |
| 5150.000 | -42.18 | 5.00 | 0.000 | 58.080 | Peak | 74.00 | PASS |
| 5350.000 | -44.12 | 5.00 | 0.000 | 56.140 | Peak | 74.00 | PASS |
| 5460.000 | -42.76 | 5.00 | 0.000 | 57.500 | Peak | 74.00 | PASS |
| 4500.000 | -53.92 | 5.00 | 0.000 | 46.340 | AV | 54.00 | PASS |
| 5150.000 | -53.47 | 5.00 | 0.000 | 46.790 | AV | 54.00 | PASS |
| 5350.000 | -54.62 | 5.00 | 0.000 | 45.640 | AV | 54.00 | PASS |
| 5460.000 | -54.09 | 5.00 | 0.000 | 46.170 | AV | 54.00 | PASS |

| 802.11n40 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Ground Reflection Factor (dB) | Covert Radiated E Level At 3m (dBuV/m) | Detector | Limit (dBuV/m) | Verdict |
| 4500.000 | -42.41 | 5.00 | 0.000 | 57.850 | Peak | 74.00 | PASS |
| 5150.000 | -36.61 | 5.00 | 0.000 | 63.650 | Peak | 74.00 | PASS |
| 5350.000 | -44.15 | 5.00 | 0.000 | 56.110 | Peak | 74.00 | PASS |
| 5460.000 | -43.66 | 5.00 | 0.000 | 56.600 | Peak | 74.00 | PASS |
| 4500.000 | -53.89 | 5.00 | 0.000 | 46.370 | AV | 54.00 | PASS |
| 5150.000 | -48.20 | 5.00 | 0.000 | 52.060 | AV | 54.00 | PASS |
| 5350.000 | -54.70 | 5.00 | 0.000 | 45.560 | AV | 54.00 | PASS |
| 5460.000 | -54.09 | 5.00 | 0.000 | 46.170 | AV | 54.00 | PASS |

| ***IEEE 802.11a*** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP (dBm/1MHz) | Detector | Limit (dBm/1MHz) | Verdict |
| 5650.000 | -42.64 | 5.00 | -37.64 | Peak | -27.000 | PASS |
| 5700.000 | -41.01 | 5.00 | -36.01 | Peak | 10.000 | PASS |
| 5720.000 | -41.18 | 5.00 | -36.18 | Peak | 15.600 | PASS |
| 5725.000 | -35.43 | 5.00 | -30.43 | Peak | 27.000 | PASS |
| 5850.000 | -42.15 | 5.00 | -37.15 | Peak | 27.000 | PASS |
| 5855.000 | -42.93 | 5.00 | -37.93 | Peak | 15.600 | PASS |
| 5875.000 | -41.97 | 5.00 | -36.97 | Peak | -37.000 | PASS |
| 5925.000 | -43.52 | 5.00 | -38.52 | Peak | -27.000 | PASS |

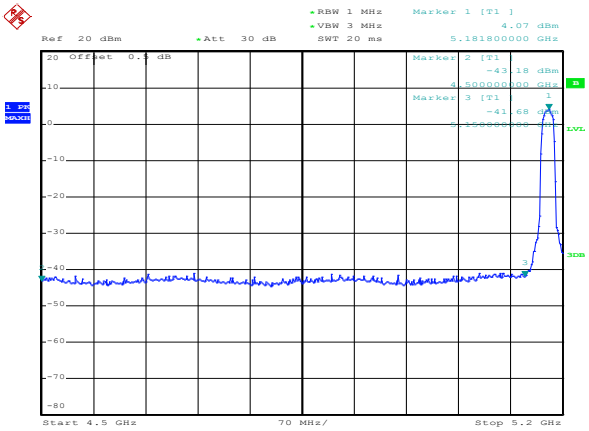
| **802.11n20** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP (dBm/1MHz) | Detector | Limit (dBm/1MHz) | Verdict |
| 5650.000 | -43.36 | 5.00 | -38.36 | Peak | -27.000 | PASS |
| 5700.000 | -43.28 | 5.00 | -38.28 | Peak | 10.000 | PASS |
| 5720.000 | -41.22 | 5.00 | -36.22 | Peak | 15.600 | PASS |
| 5725.000 | -35.03 | 5.00 | -30.03 | Peak | 27.000 | PASS |
| 5850.000 | -41.30 | 5.00 | -36.3 | Peak | 27.000 | PASS |
| 5855.000 | -41.37 | 5.00 | -36.37 | Peak | 15.600 | PASS |
| 5875.000 | -41.99 | 5.00 | -36.99 | Peak | -37.000 | PASS |
| 5925.000 | -43.64 | 5.00 | -38.64 | Peak | -27.000 | PASS |

| **802.11n40** | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP (dBm/1MHz) | Detector | Limit (dBm/1MHz) | Verdict |
| 5650.000 | -42.14 | 5.00 | -37.14 | Peak | -27.000 | PASS |
| 5700.000 | -41.38 | 5.00 | -36.38 | Peak | 10.000 | PASS |
| 5720.000 | -35.77 | 5.00 | -30.77 | Peak | 15.600 | PASS |
| 5725.000 | -33.43 | 5.00 | -28.43 | Peak | 27.000 | PASS |
| 5850.000 | -43.19 | 5.00 | -38.19 | Peak | 27.000 | PASS |
| 5855.000 | -42.71 | 5.00 | -37.71 | Peak | 15.600 | PASS |
| 5875.000 | -44.00 | 5.00 | -39.00 | Peak | -37.000 | PASS |
| 5925.000 | -44.98 | 5.00 | -39.98 | Peak | -27.000 | PASS |

Note:

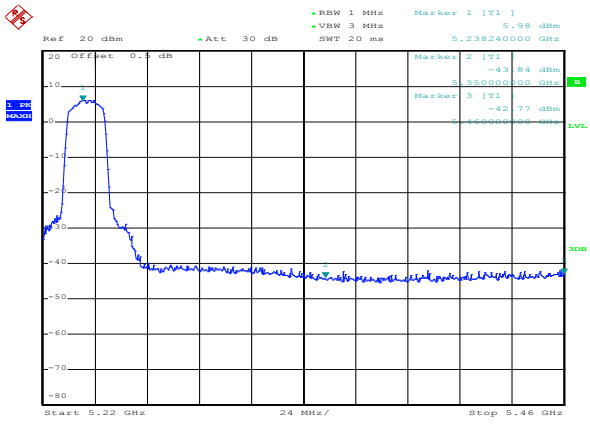
1. *Measured unwanted emission at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *E.I.R.P = Conducted power + Directional Gain*
4. *Please refer to following test plots;*

## Test plot of Band Edge and Restricted band Emissions



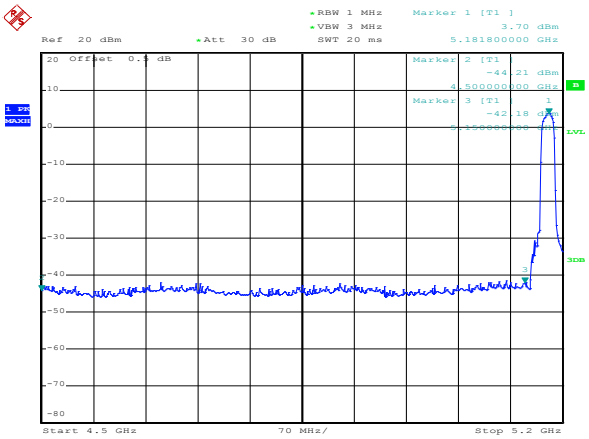

Date: 17.SEP.2017 18:58:10

802.11a-5180MHz-Lower-PK



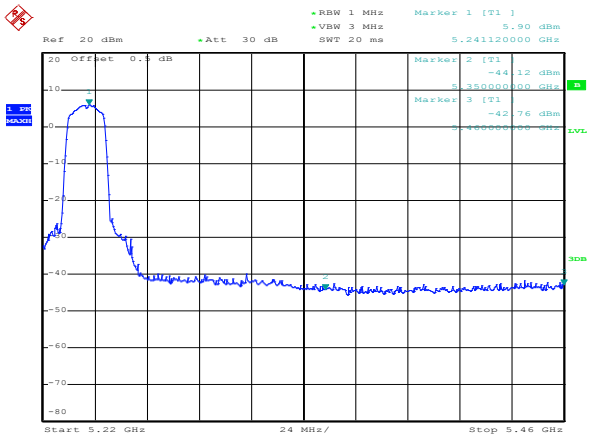

Date: 17.SEP.2017 20:09:14

802.11a-5240MHz-Upper-PK



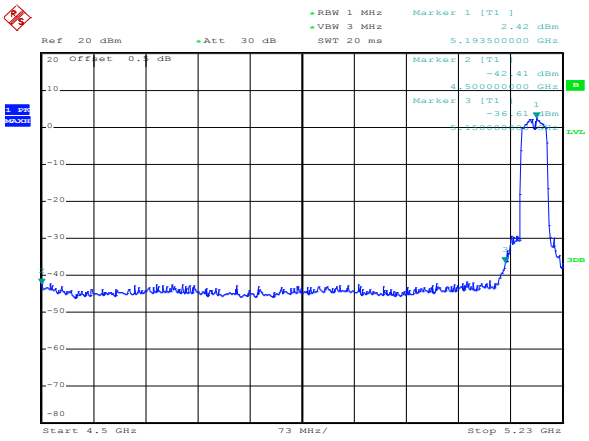

Date: 17.SEP.2017 19:05:40

802.11n20-5180MHz-Lower-PK



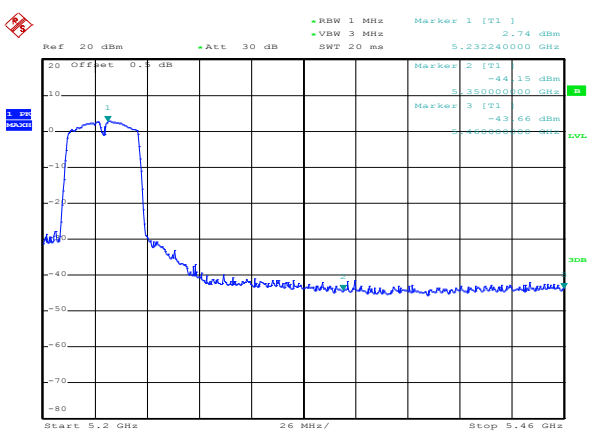

Date: 17.SEP.2017 20:12:56

802.11n20-5240MHz-Upper-PK



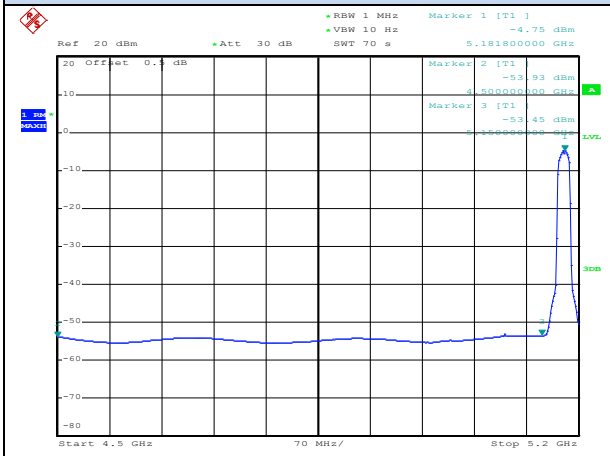
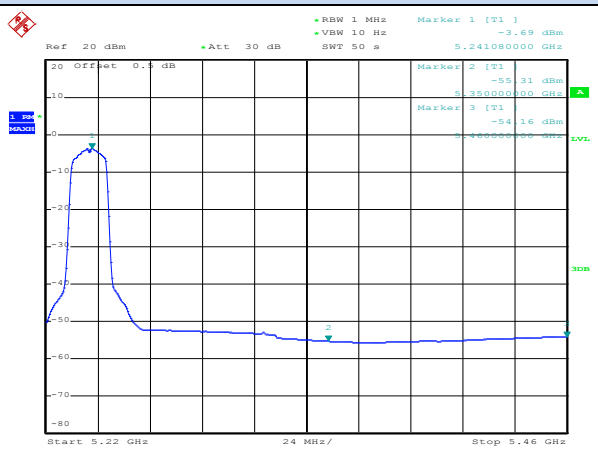
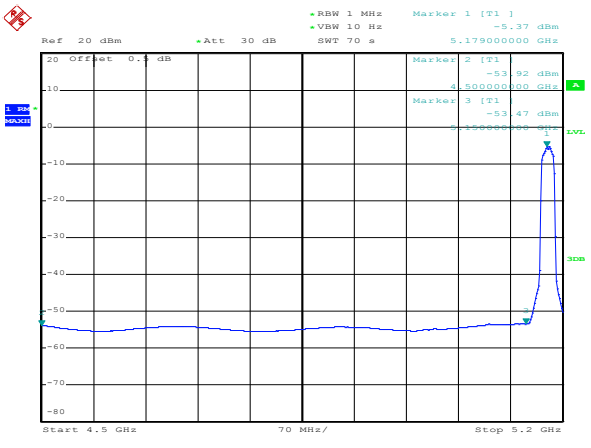
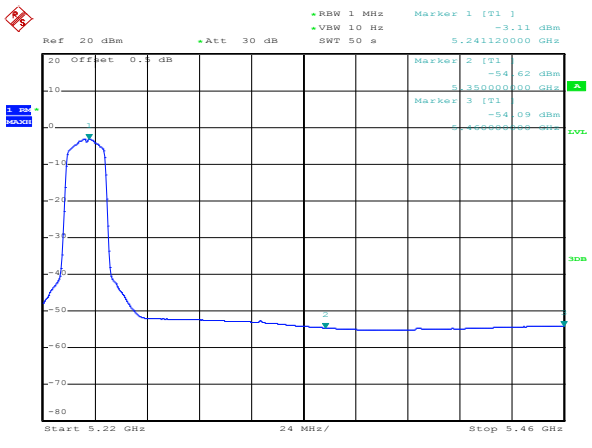
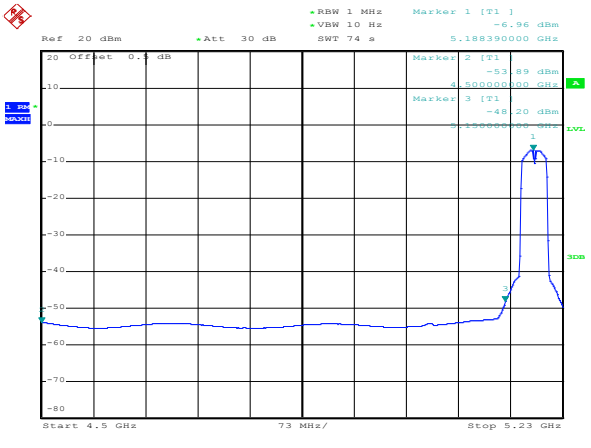
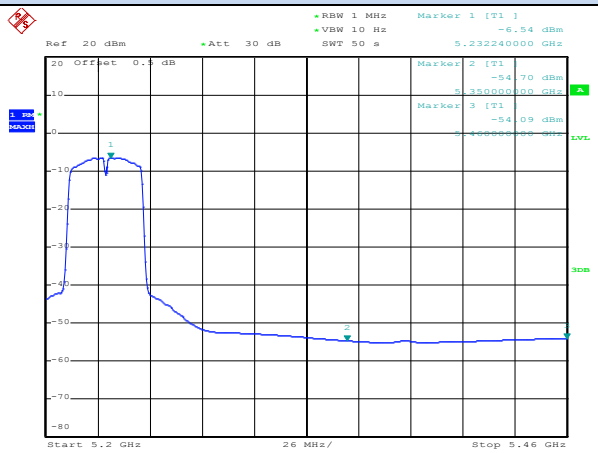

Date: 17.SEP.2017 20:24:16

802.11n40-5190MHz-Lower-PK

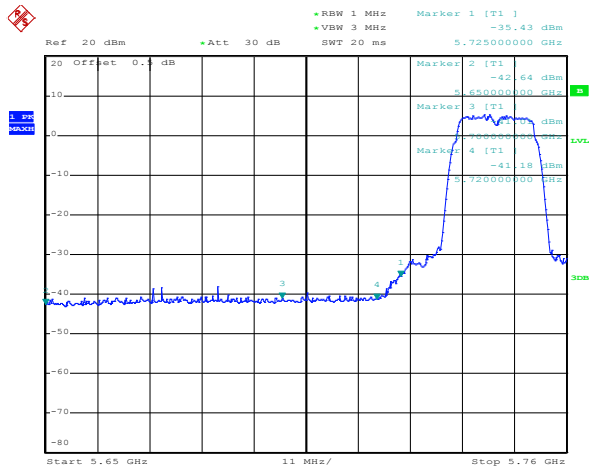



Date: 17.SEP.2017 20:26:23

802.11n40-5230MHz-Upper-PK

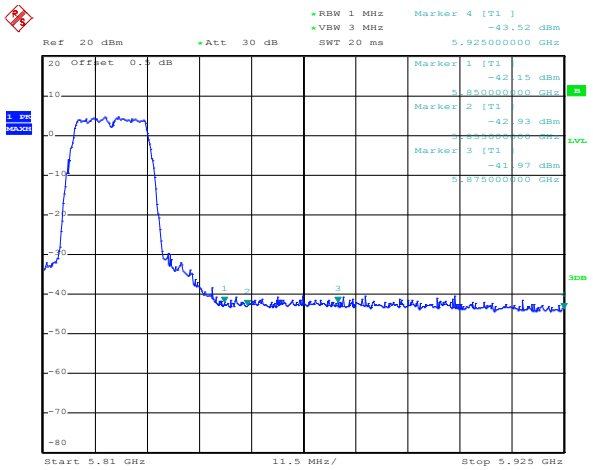
| Test plot of Band Edge and Restricted band Emissions | |
|---|---|
|  |  |
| Date: 17.SEP.2017 19:00:34 | Date: 17.SEP.2017 19:49:16 |
| 802.11a-5180MHz-Lower-AV | 802.11a-5240MHz-Upper-AV |
|  |  |
| Date: 17.SEP.2017 19:05:21 | Date: 17.SEP.2017 20:11:55 |
| 802.11n20-5180MHz-Lower-AV | 802.11n20-5240MHz-Upper-AV |
|  |  |
| Date: 17.SEP.2017 20:24:01 | Date: 17.SEP.2017 20:28:03 |
| 802.11n40-5190MHz-Lower-AV | 802.11n40-5230MHz-Upper-AV |

## Test plot of Band Edge and Restricted band Emissions



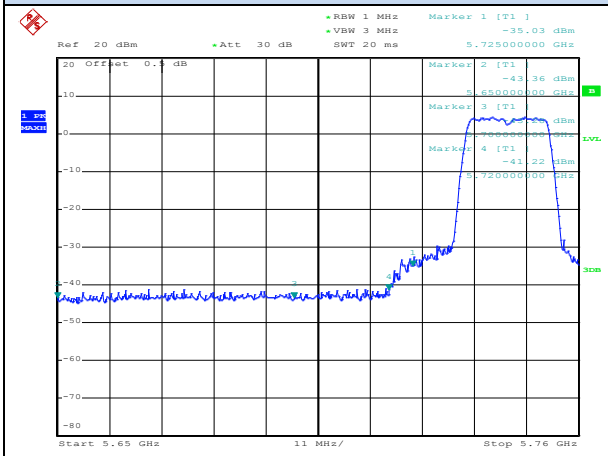

Date: 17.SEP.2017 21:15:55

802.11a-5745MHz-Lower-PK



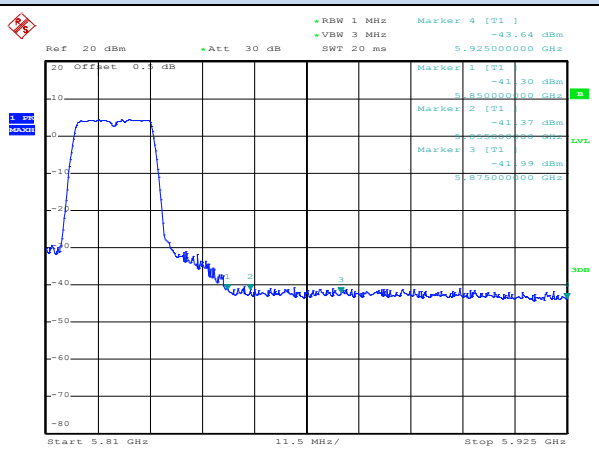

Date: 17.SEP.2017 21:24:45

802.11a-5825MHz-Upper-PK



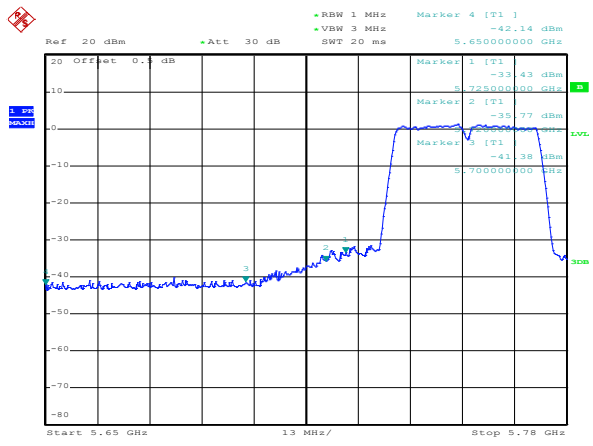

Date: 17.SEP.2017 21:18:30

802.11n20-5745MHz-Lower-PK



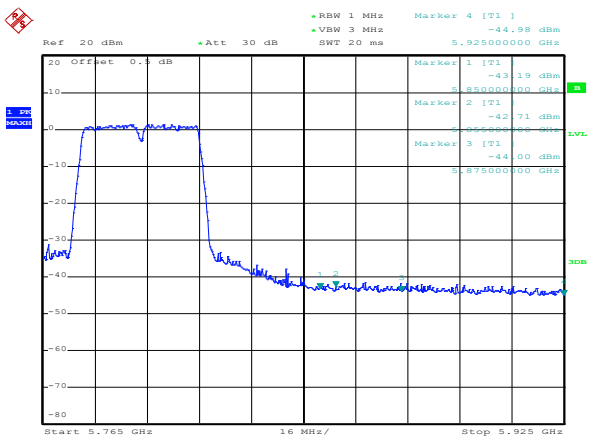

Date: 17.SEP.2017 21:24:20

802.11n20-5825MHz-Upper-PK




Date: 17.SEP.2017 21:29:01

802.11n40-5755MHz-Lower-PK




Date: 17.SEP.2017 21:32:48

802.11n40-5795MHz-Upper-PK

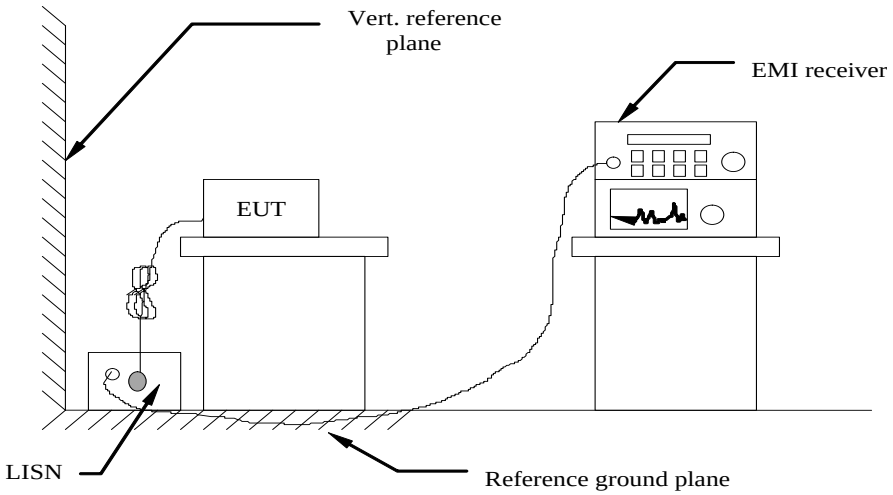
## 5.7. Power line conducted emissions

### 5.7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

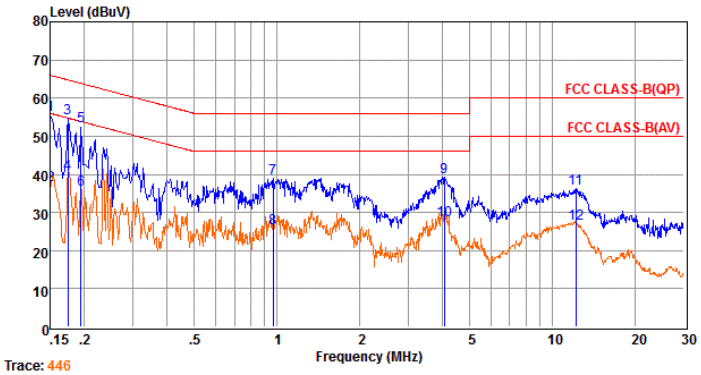
### 5.7.2 Block Diagram of Test Setup




### 5.7.3 Test Results

**PASS.**

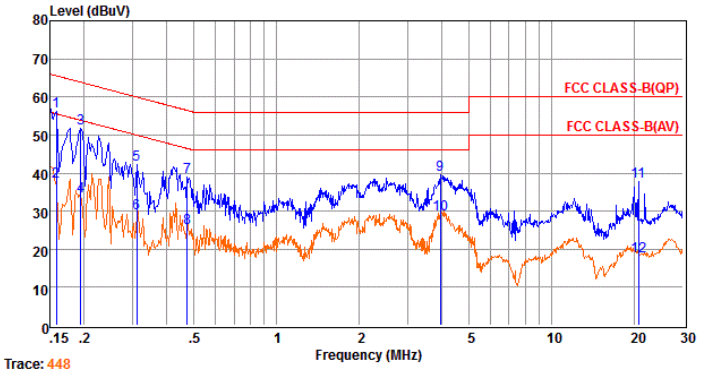
***Test result for AC 120V/60Hz***




Trace: 446
Env. Ins: 24*/56%
Pol: NEUTRAL

| | Freq | Reading | LISNFac | CabLos | Aux2Fac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dB | dBuV | dBuV | dB |
| 1 | 0.15 | 35.81 | 9.70 | 0.02 | 10.00 | 55.53 | 66.00 | -10.47 | QP |
| 2 | 0.15 | 17.36 | 9.70 | 0.02 | 10.00 | 37.08 | 65.99 | -28.91 | Average |
| 3 | 0.17 | 35.00 | 9.64 | 0.02 | 10.00 | 54.66 | 64.77 | -10.11 | QP |
| 4 | 0.17 | 20.42 | 9.64 | 0.02 | 10.00 | 40.08 | 64.76 | -24.68 | Average |
| 5 | 0.19 | 33.13 | 9.60 | 0.02 | 10.00 | 52.75 | 63.84 | -11.09 | QP |
| 6 | 0.19 | 16.29 | 9.60 | 0.02 | 10.00 | 35.91 | 63.84 | -27.93 | Average |
| 7 | 0.97 | 19.43 | 9.63 | 0.05 | 10.00 | 39.11 | 56.00 | -16.89 | QP |
| 8 | 0.97 | 6.16 | 9.63 | 0.05 | 10.00 | 25.84 | 56.00 | -30.16 | Average |
| 9 | 4.05 | 19.47 | 9.65 | 0.06 | 10.00 | 39.18 | 56.00 | -16.82 | QP |
| 10 | 4.05 | 8.34 | 9.65 | 0.06 | 10.00 | 28.05 | 56.00 | -27.95 | Average |
| 11 | 12.19 | 16.56 | 9.73 | 0.09 | 10.00 | 36.38 | 60.00 | -23.62 | QP |
| 12 | 12.19 | 7.36 | 9.73 | 0.09 | 10.00 | 27.18 | 60.00 | -32.82 | Average |

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.




Trace: 448
Env. Ins: 24*/56%
Pol: LINE

| | Freq | Reading | LISNFac | CabLos | Aux2Fac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dB | dBuV | dBuV | dB |
| 1 | 0.16 | 36.73 | 9.58 | 0.02 | 10.00 | 56.33 | 65.56 | -9.23 | QP |
| 2 | 0.16 | 18.18 | 9.58 | 0.02 | 10.00 | 37.78 | 65.55 | -27.77 | Average |
| 3 | 0.19 | 32.08 | 9.62 | 0.02 | 10.00 | 51.72 | 63.84 | -12.12 | QP |
| 4 | 0.19 | 14.19 | 9.62 | 0.02 | 10.00 | 33.83 | 63.84 | -30.01 | Average |
| 5 | 0.31 | 22.42 | 9.63 | 0.03 | 10.00 | 42.08 | 59.97 | -17.89 | QP |
| 6 | 0.31 | 9.66 | 9.63 | 0.03 | 10.00 | 29.32 | 59.97 | -30.65 | Average |
| 7 | 0.47 | 19.18 | 9.62 | 0.04 | 10.00 | 38.84 | 56.45 | -17.61 | QP |
| 8 | 0.47 | 5.97 | 9.62 | 0.04 | 10.00 | 25.63 | 56.45 | -30.82 | Average |
| 9 | 3.94 | 19.82 | 9.65 | 0.06 | 10.00 | 39.53 | 56.00 | -16.47 | QP |
| 10 | 3.94 | 9.52 | 9.65 | 0.06 | 10.00 | 29.23 | 56.00 | -26.77 | Average |
| 11 | 20.70 | 18.05 | 9.74 | 0.12 | 10.00 | 37.91 | 60.00 | -22.09 | QP |
| 12 | 20.70 | -1.81 | 9.74 | 0.12 | 10.00 | 18.05 | 60.00 | -41.95 | Average |

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Note:

1, Pre-scan all modes and recorded the worst case(TX at 802.11a 5.785GHz) result in this report.

2, Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worst case.

## 5.8. Antenna Requirements

### 5.8.1 Standard Applicable

According to antenna requirement of §15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### 5.8.2 Antenna Connected Construction

#### 5.8.2.1. Standard Applicable

According to § 15.203 & RSS-Gen, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### 5.8.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 5.0dBi, and the antenna is an External Antenna connect to the R-SMA antenna connect port and no consideration of replacement. Please see EUT photo for details.

Test results:

| $T_{nom}$ | $V_{nom}$ | Lowest Channel 5180 MHz | Middle Channel 5200 MHz | Highest Channel 5240 MHz |
|---|---|---|---|---|
| Conducted power [dBm] Measured with 802.11a modulation | | 15.63 | 15.11 | 15.37 |
| Radiated power [dBm] Measured with 802.11a modulation | | 20.5 | 20.01 | 20.01 |
| Gain [dBi] Calculated | | 4.87 | 4.90 | 4.65 |
| Measurement uncertainty | | | ± 1.6 dB (cond.) / ± 3.8 dB (rad.) | |

| $T_{nom}$ | $V_{nom}$ | Lowest Channel 5745 MHz | Middle Channel 5785 MHz | Highest Channel 5825 MHz |
|---|---|---|---|---|
| Conducted power [dBm] Measured with 802.11a modulation | | 15.45 | 14.87 | 15.23 |
| Radiated power [dBm] Measured with 802.11a modulation | | 20.24 | 19.44 | 19.74 |
| Gain [dBi] Calculated | | 4.79 | 4.57 | 4.51 |
| Measurement uncertainty | | | ± 1.6 dB (cond.) / ± 3.8 dB (rad.) | |

5.8.2.3. Conclusion: Compliance.

# 6. LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacture | Model No. | Serial No. | Characteristics | Cal Due Date |
|---|---|---|---|---|---|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | Jun 17, 2018 |
| Signal analyzer | Agilent | E4448A(External mixers to 40GHz) | US44300469 | 9kHz~40GHz | Jul 15, 2018 |
| LISN | MESS Tec | NNB-2/16Z | 99079 | 9KHz-30MHz | Jun 17, 2018 |
| LISN | EMCO | 3819/2NM | 9703-1839 | 9KHz-30MHz | Jun 17, 2018 |
| RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9KHz-30MHz | Jun 17, 2018 |
| ISN | SCHAFFNE | ISN ST08 | 21653 | 9KHz-30MHz | Jun 17, 2018 |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30M-18GHz | Jun 17, 2018 |
| Amplifier | SCHAFFNE | COA9231A | 18667 | 9kHz-2GHzz | Apr 17, 2018 |
| Amplifier | Agilent | 8449B | 3008A021 | 1GHz-26.5GHz | Apr 17, 2018 |
| Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 26.5GHz-40GHz | Apr 17, 2018 |
| Loop Antenna | R&S | HFH2-Z2 | 860004/00 | 9k-30MHz | Apr 17, 2018 |
| By-log Antenna | SCHWARZB | VULB9163 | 9163-470 | 30MHz-1GHz | Apr 17, 2018 |
| Horn Antenna | EMCO | 3115 | 6741 | 1GHz-18GHz | Apr 17, 2018 |
| Horn Antenna | SCHWARZB | BBHA9170 | BBHA9170 | 15GHz-40GHz | Apr 17, 2018 |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz-1GHz | Jun 17, 2018 |
| RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-H | 1GHz-40GHz | Jun 17, 2018 |
| Power Meter | R&S | NRVS | 100444 | DC-40GHz | Jun 17, 2018 |
| Power Sensor | R&S | NRV-Z51 | 100458 | DC-30GHz | Jun 17, 2018 |
| Power Sensor | R&S | NRV-Z32 | 10057 | 30MHz-6GHz | Jun 17, 2018 |
| AC Power Source | HPC | HPA-500E | HPA-9100 | AC 0~300V | Jun 17, 2018 |
| DC power Soure | GW | GPC-6030D | C671845 | DC 1V-60V | Jun 17, 2018 |
| Temp. and Humidigy Chamber | Giant Force | GTH-225-20-S | MAB0103-00 | N/A | Jun 17, 2018 |
| RF CABLE-1m | JYE Bao | RG142 | CB034-1m | 20MHz-7GHz | Jun 17, 2018 |
| RF CABLE-2m | JYE Bao | RG142 | CB035-2m | 20MHz-1GHz | Jun 17, 2018 |
| Signal Generator | R&S | SMR40 | 10016 | 10MHz~40GHz | Jul 15, 2018 |
| Universal Radio Communication Tester | R&S | CMU200 | 112012 | N/A | Oct 26, 2017 |
| Wideband Radia Communication Tester | R&S | CMW500 | 1201.0002K50 | N/A | Nov 18, 2017 |
| MXG Vector Signal Generator | Agilent | N5182A | MY47071151 | 250KHz~6GHz | Oct 26, 2017 |
| MXG Vector Signal Generator | Agilent | E4438C | MY42081396 | 250KHz~6GHz | Oct 26, 2017 |
| PSG Analog Signal Generator | Agilent | N8257D | MY46520521 | 250KHz~20GHz | Nov 18, 2017 |
| MXA Signal Analyzer | Agilent | N9020A | MY50510140 | 10Hz~26.5GHz | Oct 26, 2017 |
| DC Power Supply | Agilent | E3642A | / | 0-8V,5A/0-20V,2 | May 19, 2018 |
| RF Control Unit | Tonscend | JS0806-1 | / | / | Nov 18, 2017 |
| LTE Test Software | Tonscend | JS1120-1 | / | Version: 2.5.7.0 | N/A |
| X-series USB Peak and Average Power Sensor Agilent | Agilent | U2021XA | MY54080022 | / | Oct 26, 2017 |

| | | | | | |
|---|---|---|---|---|---|
| 4 Ch.Simultaneous Sampling 14 Bits 2 MS/s | Agilent | U2531A | MY54080016 | / | Oct 26, 2017 |
| Test Software | Ascentest | AT890-SW | 20141230 | Version: | N/A |
| Splitter/Combiner(Qty: 2) | Mini-Circuits | ZAPD-50W 4.2-6.0 GHz | NN256400424 | / | Oct 26, 2017 |
| Splitter/Combine(Qty: 2) | MCLI | PS3-7 | 4463/4464 | / | Oct 26, 2017 |
| ATT (Qty: 1) | Mini-Circuits | VAT-30+ | 30912 | / | Oct 26, 2017 |

# 7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

# 8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

# 9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

**----------THE END OF REPORT----------**