



## TEST REPORT

No. I18D00221-SRD04

*For*

**Client : Shanghai Sunmi Technology Co.,Ltd.**

**Production : Smart counter scale**

**Model Name : ACS-L2501, ACS-L2502, ACS-L2503**

**Brand Name : SUNMI**

**FCC ID : 2AH25S2**

**Hardware Version: V1.03**

**Software Version: MS64FF\_EQ000\_2EE0.075FE5C.9530762\_18091**

**4\_100\_V01\_T27,**

**MS64FH\_EQ000\_2EE0.484ED16.9530762\_18091**

**8\_100\_V01\_T09**

**Issued date: 2019-01-18**

## NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. KDB 789033 standard has not been approved by A2LA.
4. For the test results, the uncertainty of measurement is not taken into account when judging the compliance with specification, and the results of measurement or the average value of measurement results are taken as the criterion of the compliance with specification directly.

**Test Laboratory:**

East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: +86 21 63843300

FAX: +86 21 63843301

E-Mail: [welcome@ecit.org.cn](mailto:welcome@ecit.org.cn)

**Revision Version**

| Report Number   | Revision | Date       | Memo                            |
|-----------------|----------|------------|---------------------------------|
| I18D00221-SRD04 | 00       | 2019-01-18 | Initial creation of test report |

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## 1. Test Laboratory

### 1.1. Testing Location

|                     |                                                                                   |
|---------------------|-----------------------------------------------------------------------------------|
| Company Name:       | ECIT Shanghai, East China Institute of Telecommunications                         |
| Address:            | 7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China |
| Postal Code:        | 200001                                                                            |
| Telephone:          | (+86)-021-63843300                                                                |
| Fax:                | (+86)-021-63843301                                                                |
| FCC registration No | 958356                                                                            |

### 1.2. Testing Environment

|                     |           |
|---------------------|-----------|
| Normal Temperature: | 15°C-35°C |
| Relative Humidity:  | 20%-75%   |

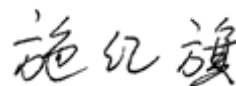
### 1.3. Project data

|                     |             |
|---------------------|-------------|
| Project Leader:     | Chen Minfei |
| Testing Start Date: | 2018-11-22  |
| Testing End Date:   | 2019-01-10  |

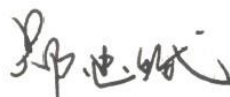
### 1.4. Signature



**Tang Tao**  
(Prepared this test report)



**Shi Hongqi**  
(Reviewed this test report)



**Zheng Zhongbin**  
(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

|              |                                           |
|--------------|-------------------------------------------|
| Company Name | Shanghai Sunmi Technology Co.,Ltd.        |
| Address      | 4 Place Amédée Bonnet, 69002 Lyon, France |
| Telephone    | 18721763396                               |
| Postcode     | 200433                                    |

### 2.2. Manufacturer Information

|              |                                           |
|--------------|-------------------------------------------|
| Company Name | Shanghai Sunmi Technology Co.,Ltd.        |
| Address      | 4 Place Amédée Bonnet, 69002 Lyon, France |
| Telephone    | 18721763396                               |
| Postcode     | 200433                                    |

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

|                                   |                                                              |
|-----------------------------------|--------------------------------------------------------------|
| EUT Description                   | Smart counter scale                                          |
| Model name                        | ACS-L2501, ACS-L2502, ACS-L2503                              |
| FCC ID                            | 2AH25S2                                                      |
| WLAN Frequency Range(5G)          | ISM Bands: 5150MHz-5250MHz                                   |
| GSM Frequency Band                | /                                                            |
| UMTS Frequency Band               | /                                                            |
| CDMA Frequency Band               | /                                                            |
| LTE Frequency Band                | /                                                            |
| Additional Communication Function | BT/BLE/2.4G WLAN 802.11 b/g/n20/n40/5G WLAN 802.11 a/n20/n40 |
| WLAN type of modulation           | OFDM                                                         |
| Extreme Temperature               | 0°C-+45°C                                                    |
| Nominal Voltage                   | 24V                                                          |
| Extreme High Voltage              | 25V                                                          |
| Extreme Low Voltage               | 23V                                                          |

Note: Photographs of EUT are shown in ANNEX A of this test report.

#### 3.2. Internal Identification of EUT used during the test

| EUT ID* | Model Name | SN or IMEI | HW Version | SW Version                                           | Date of receipt |
|---------|------------|------------|------------|------------------------------------------------------|-----------------|
| N05     | ACS-L2503  | /          | V1.03      | MS64FF_EQ000_2EE0.075FE5C.9530762_180914_100_V01_T27 | 2018-11-22      |
| N02     | ACS-L2503  | /          | V1.03      | MS64FF_EQ000_2EE0.075FE5C.9530762_180914_100_V01_T27 | 2018-11-22      |
| N03     | ACS-L2503  | /          | V1.03      | MS64FH_EQ000_2EE0.484ED16.9530762_180918_100_V01_T09 | 2018-11-22      |
| N01     | ACS-L2503  | /          | V1.03      | MS64FF_EQ000_2EE0.075FE5C.9530762_180914_100_V01_T27 | 2018-11-22      |

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

| AE ID* | Description | SN  |
|--------|-------------|-----|
| AE1    | RF cable    | --- |

\*AE ID: is used to identify the test sample in the lab internally.



## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference           | Title                                                                                                                                                                                                        | Version       |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| FCC Part15          | Title 47 of the Code of Federal Regulations; Chapter I<br>Part 15 - Radio frequency devices                                                                                                                  | 2018/10/<br>1 |
| ANSI 63.10          | Methods of Measurement of Radio-Noise Emissions from<br>Low-Voltage Electrical and Electronic Equipment in the<br>Range of 9 kHz to 40 GHz                                                                   | 2013          |
| UNII: KDB<br>789033 | Information Infrastructure (U-NII) Devices - Part 15,<br>Subpart E                                                                                                                                           | 2017          |
| KDB905462           | COMPLIANCE MEASUREMENT PROCEDURES FOR<br>UNLICENSED-NATIONAL INFORMATION<br>INFRASTRUCTURE DEVICES OPERATING IN THE<br>5250-5350 MHz AND 5470-5725 MHz BANDS<br>INCORPORATING DYNAMIC FREQUENCY<br>SELECTION | 2016          |

## 5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

| <b>SUMMARY OF MEASUREMENT RESULTS</b>   | <b>Sub-clause of Part15E</b> | <b>Verdict</b> |
|-----------------------------------------|------------------------------|----------------|
| Maximum Output Power                    | 15.407                       | <b>P</b>       |
| Power Spectral Density                  | 15.407                       | <b>P</b>       |
| Occupied 26dB Bandwidth                 | 15.403                       | <b>P</b>       |
| Band edge compliance                    | 15.407                       | <b>P</b>       |
| Transmitter spurious emissions radiated | 15.407                       | <b>P</b>       |
| Spurious emissions radiated < 30 MHz    | 15.407                       | <b>P</b>       |
| Spurious emissions conducted < 30 MHz   | 15.407                       | <b>P</b>       |
| Peak Excursion                          | 15.407                       | <b>P</b>       |
| Frequency Stability                     | 15.407                       | <b>NA</b>      |
| Transmit Power Control                  | 15.407                       | <b>NA</b>      |

Note: Please refer to section 6 for detail; please refer to Annex A in this test report for the detailed test results.

The following terms are used in the above table.

|    |                                                                                |
|----|--------------------------------------------------------------------------------|
| P  | Pass, the EUT complies with the essential requirements in the standard.        |
| NP | Not Perform, the test was not performed by ECIT.                               |
| NA | Not Applicable, the test was not applicable.                                   |
| F  | Fail, the EUT does not comply with the essential requirements in the standard. |

## Test Conditions

|      |                    |
|------|--------------------|
| Tnom | Normal temperature |
| Tmin | Low Temperature    |
| Tmax | High Temperature   |
| Vnom | Normal Voltage     |
| Vmin | Low Voltage        |
| Vmax | High Voltage       |
| Hnom | Norm Humidity      |
| Anom | Norm Air Pressure  |

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

|             |      |     |
|-------------|------|-----|
| Temperature | Tnom | 25℃ |
| Voltage     | Vnom | 24V |
| Humidity    | Hnom | 47% |

**5.1. Notes**

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

## 5.2. Statements

The ACS-L2501, ACS-L2502, ACS-L2503, supporting BT/BLE/WLAN, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

ECIT only performed test cases which identified with P/NM/NA/F results in Annex A.

Note: The project has three prototypes, ACS-L2501, ACS-L2502, ACS-L2503. The ACS-L2503 we tested all the test items, the other two we only tested worse case of RSE.

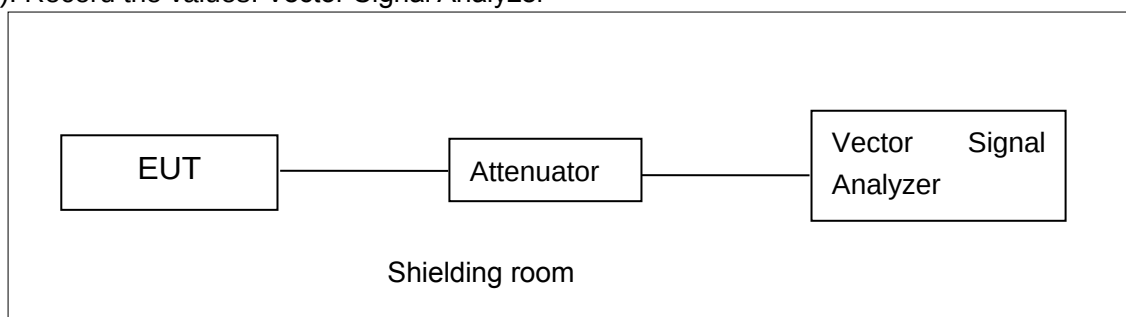
ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

## 6. Test result

### 6.1. Measurement Method

#### 6.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer

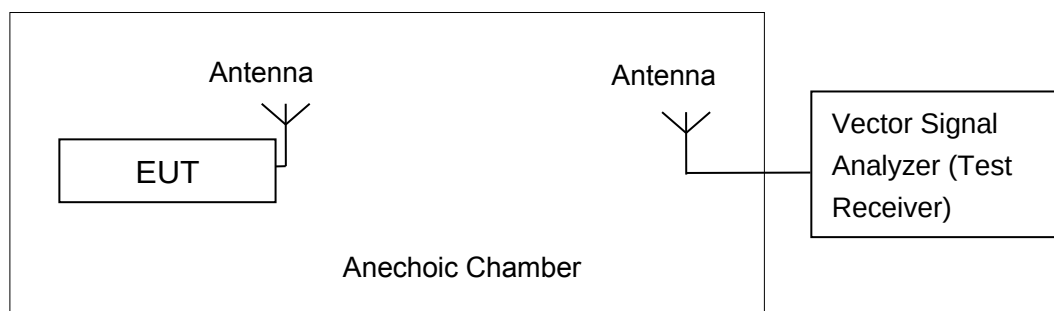


#### 6.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to KDB 789033

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

## 6.2. Maximum output Power

### Measurement Limit and Method:

| Standard               | Frequency (MHz) | Limit (dBm)        |
|------------------------|-----------------|--------------------|
| FCC CRF Part 15.407(a) | 5150MHz~5250MHz | 24dBm              |
|                        | 5250MHz~5350MHz | 24dBm or 11+10logB |
|                        | 5470MHz~5725MHz | 24dBm or 11+10logB |

Limit use the less value, and B is the 26dB bandwidth.

The measurement method SA-1 is made according to KDB 789033.

Set the spectrum analyzer in the following:

Detector: RMS.

RBW=1MHz.

VBW=3MHz.

Sweep time = AUTO.

Span:30MHz (for 20MHz); 50MHz (for 40MHz).

### Measurement Results:

#### 802.11a mode

##### U-NII-1

| Mode    | Data Rate(Mbps) | Teat Result(dBm) |         |         |
|---------|-----------------|------------------|---------|---------|
|         |                 | 5180MHz          | 5200MHz | 5240MHz |
| 802.11a | 6               | 14.37            | 13.93   | 13.59   |

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

#### 802.11n-HT20 mode

##### U-NII-1

| Mode           | Data Rate(Index) | Teat Result(dBm) |         |         |
|----------------|------------------|------------------|---------|---------|
|                |                  | 5180MHz          | 5200MHz | 5240MHz |
| 802.11n(20MHz) | MCS0             | 14.39            | 13.96   | 13.67   |

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

#### 802.11n-HT40 mode

##### U-NII-1

| Mode           | Data Rate(Index) | Teat Result(dBm) |   |         |
|----------------|------------------|------------------|---|---------|
|                |                  | 5190MHz          | / | 5230MHz |
| 802.11n(40MHz) | MCS0             | 14.94            | / | 14.39   |

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

### 6.3. Peak Power Spectral Density (conducted)

#### Measurement Limit:

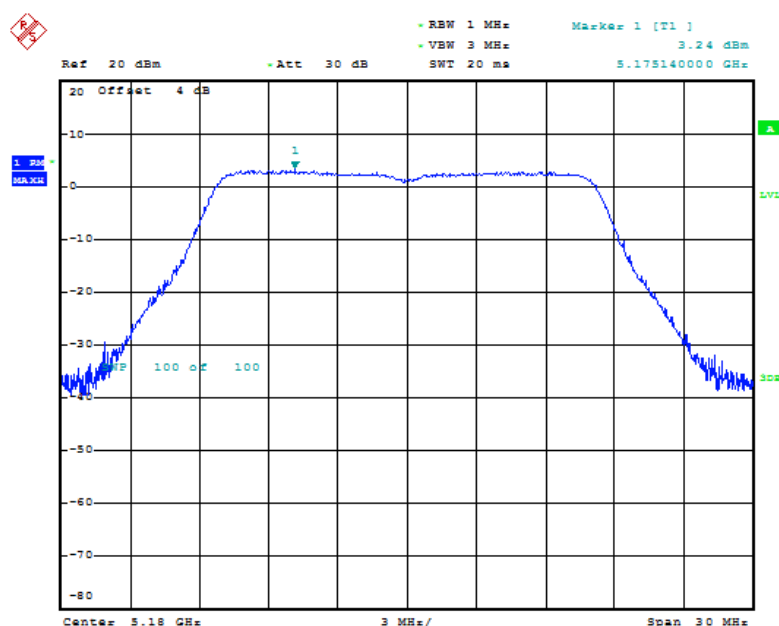
| Standard               | Frequency (MHz) | Limit (dBm/MHz) |
|------------------------|-----------------|-----------------|
| FCC CRF Part 15.407(a) | 5150MHz~5250MHz | 11              |
|                        | 5250MHz~5350MHz | 11              |
|                        | 5470MHz~5725MHz | 11              |

The output power measurement method SA-1 is made according to KDB 789033

#### Measurement Results:

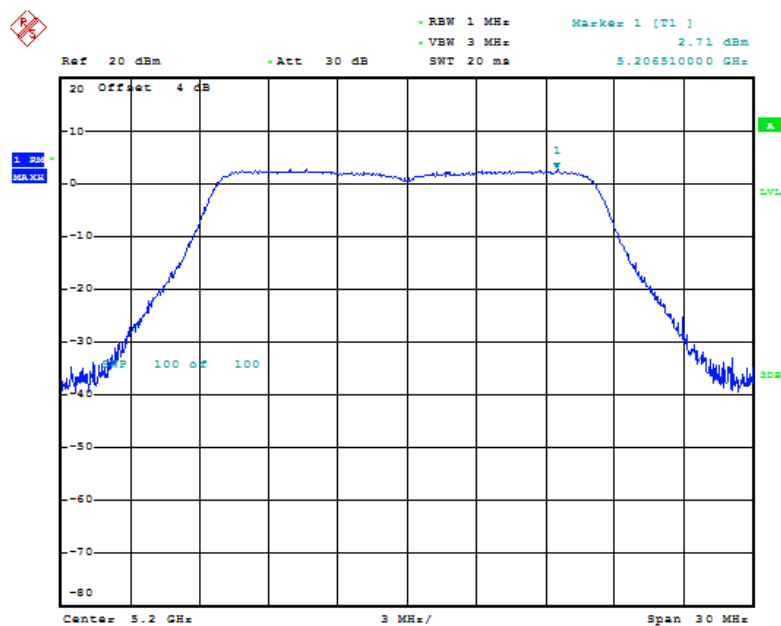
| Mode         | Channel  | Power Spectral Density (dBm/MHz) |       | Conclusion |
|--------------|----------|----------------------------------|-------|------------|
| 802.11a      | 5180 MHz | Fig.1                            | 3.822 | P          |
|              | 5200 MHz | Fig.2                            | 3.288 | P          |
|              | 5240 MHz | Fig.3                            | 3.077 | P          |
| 802.11n HT20 | 5180 MHz | Fig.4                            | 3.782 | P          |
|              | 5200 MHz | Fig.5                            | 2.889 | P          |
|              | 5240 MHz | Fig.6                            | 2.814 | P          |
| 802.11n HT40 | 5190 MHz | Fig.7                            | 1.263 | P          |
|              | 5230 MHz | Fig.8                            | 0.613 | P          |

#### Conclusion: PASS



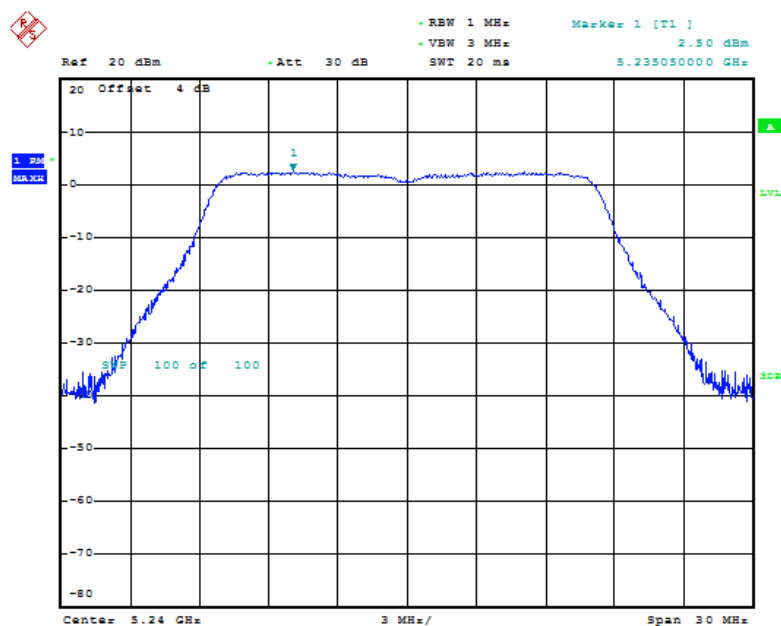
Date: 11.DEC.2018 13:49:11

**Fig. 1 Power Spectral Density (802.11a, 5180MHz)**



Date: 11.DEC.2018 13:51:19

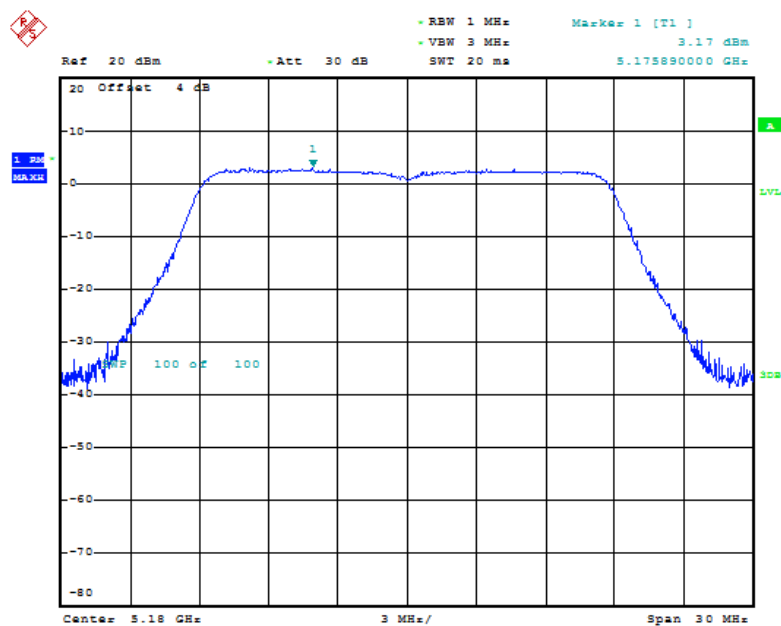
**Fig. 2 Power Spectral Density (802.11a, 5200MHz)**



Date: 11.DEC.2018 13:52:30

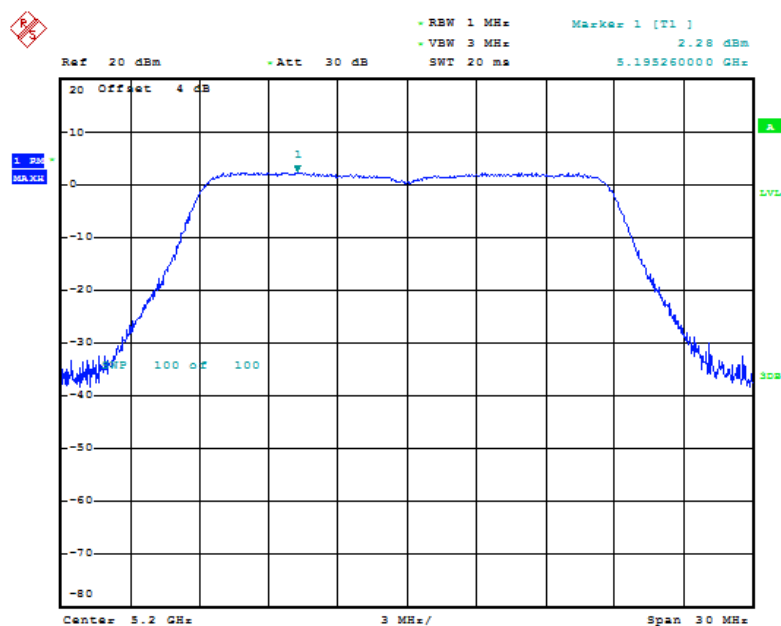
**Fig. 3 Power Spectral Density (802.11a, 5240MHz)**





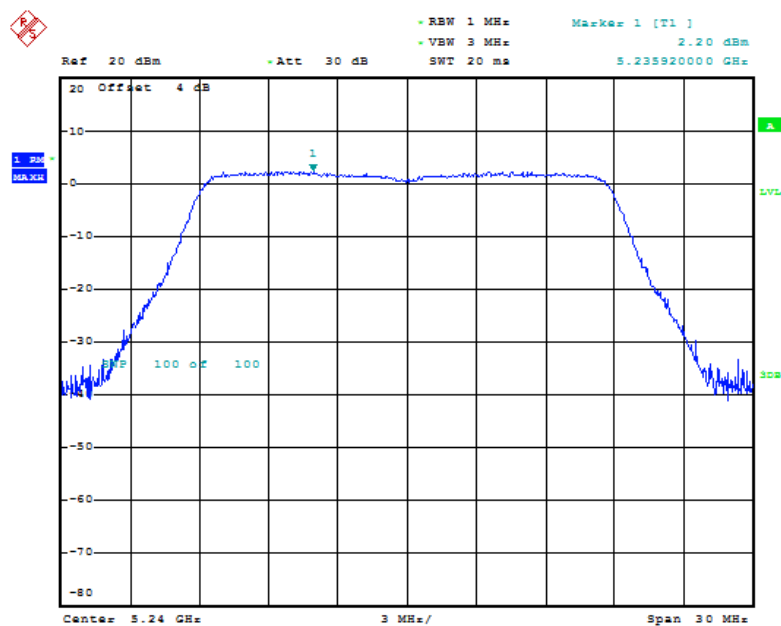
Date: 11.DEC.2018 13:54:19

**Fig. 4 Power Spectral Density (802.11n-HT20, 5180MHz)**



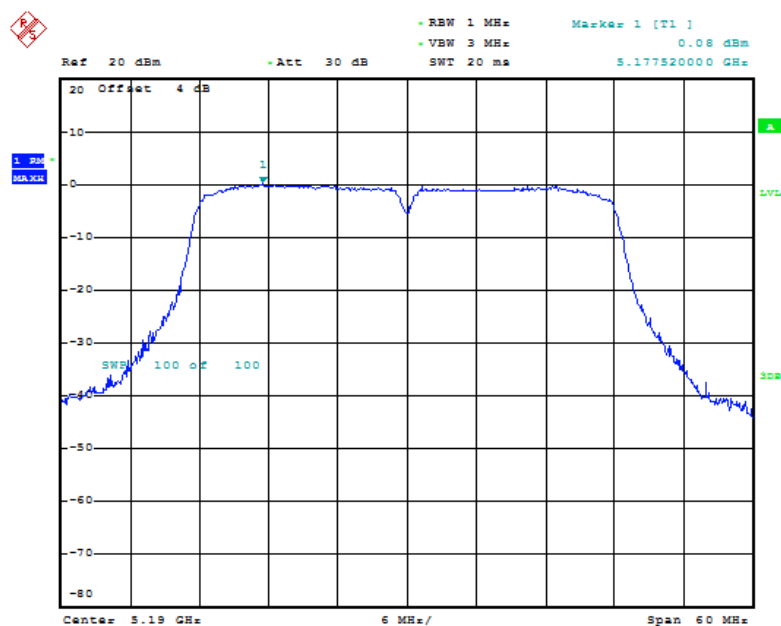
Date: 11.DEC.2018 13:55:13

**Fig. 5 Power Spectral Density (802.11n-HT20, 5200MHz)**



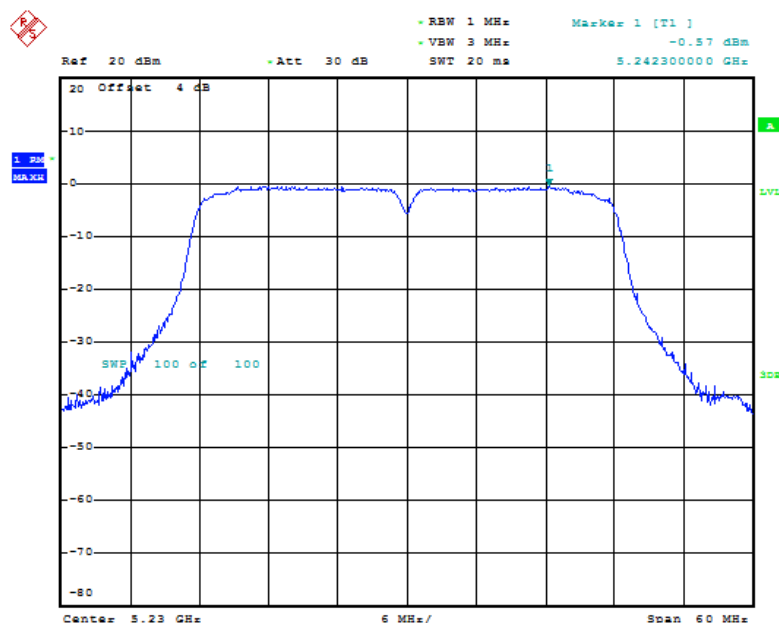
Date: 11.DEC.2018 13:56:08

**Fig. 6 Power Spectral Density (802.11n-HT20, 5240MHz)**



Date: 11.DEC.2018 13:57:16

**Fig. 7 Power Spectral Density (802.11n-HT40, 5190MHz)**



Date: 11.DEC.2018 13:58:34

**Fig. 8 Power Spectral Density (802.11n-HT40, 5230MHz)**

#### 6.4. Occupied 26dB Bandwidth(conducted)

##### Measurement Limit:

| Standard                   | Limit (MHz) |
|----------------------------|-------------|
| FCC 47 CFR Part 15.403 (i) | /           |

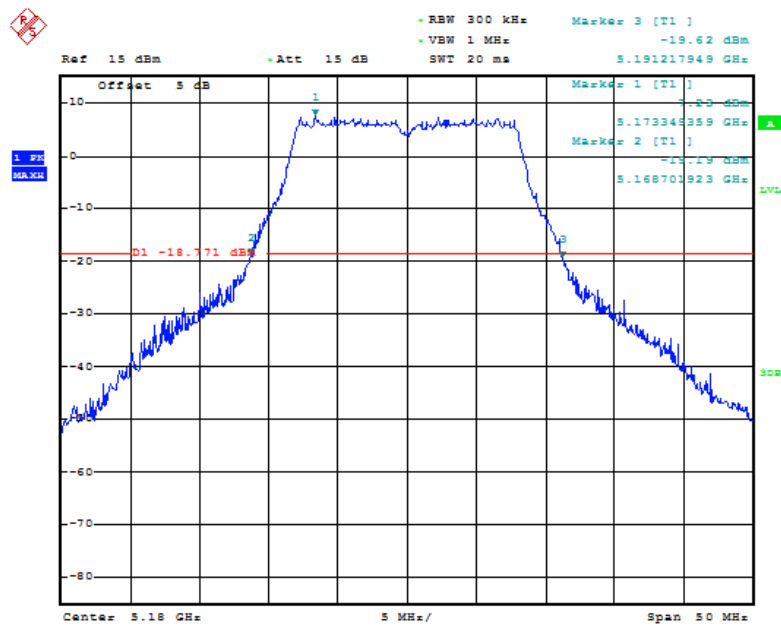
The measurement is made according to KDB 789033

##### Measurement Result:

| Mode            | Channel  | Occupied 26dB Bandwidth ( MHz) |       | conclusion |
|-----------------|----------|--------------------------------|-------|------------|
| 802.11a         | 5180 MHz | Fig.9                          | 22.52 | P          |
|                 | 5200 MHz | Fig.10                         | 22.76 | P          |
|                 | 5240 MHz | Fig.11                         | 22.6  | P          |
| 802.11n<br>HT20 | 5180 MHz | Fig.12                         | 22.84 | P          |
|                 | 5200 MHz | Fig.13                         | 23.24 | P          |
|                 | 5240 MHz | Fig.14                         | 22.84 | P          |
| 802.11n<br>HT40 | 5190 MHz | Fig.15                         | 43.94 | P          |
|                 | 5230 MHz | Fig.16                         | 44.14 | P          |

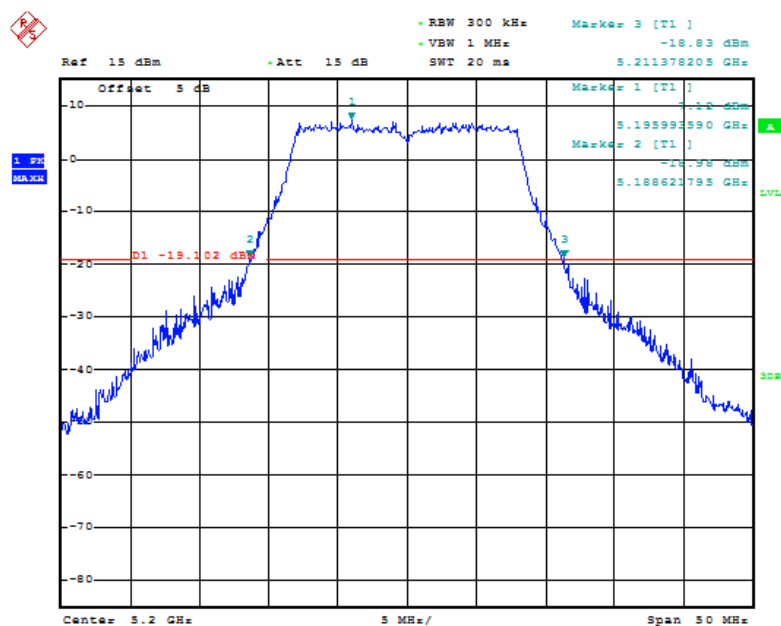
**Conclusion: PASS**

**Test graphs as below:**



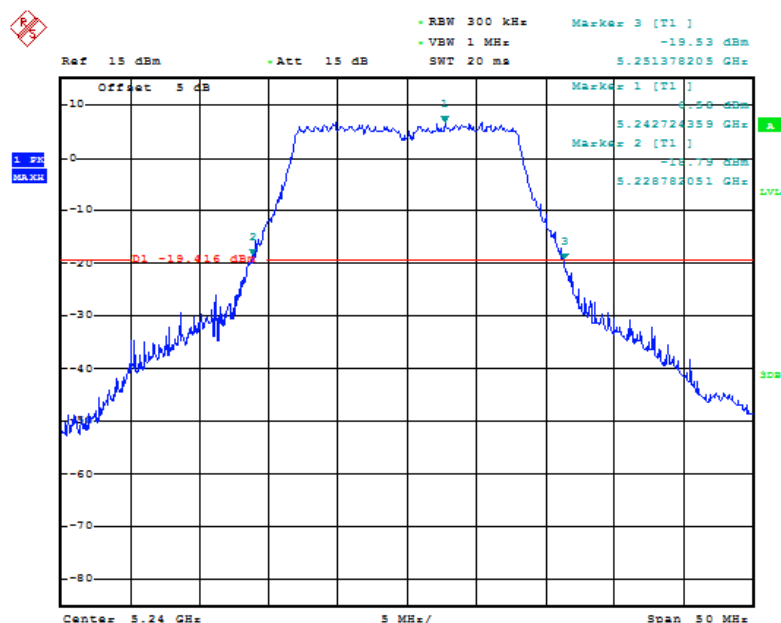
Date: 7.DEC.2018 12:40:28

**Fig. 9 Occupied 26dB Bandwidth (802.11a, 5180MHz)**



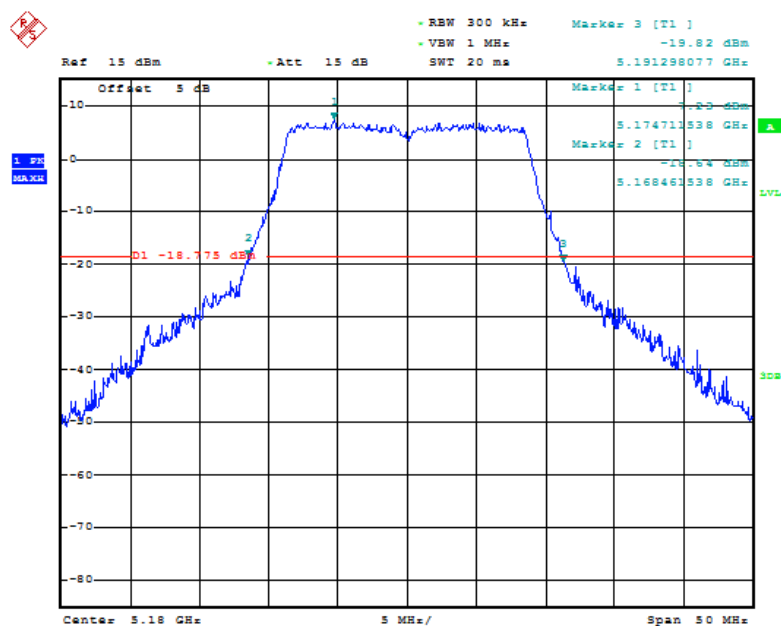
Date: 7.DEC.2018 12:42:23

**Fig. 10 Occupied 26dB Bandwidth (802.11a, 5200MHz)**



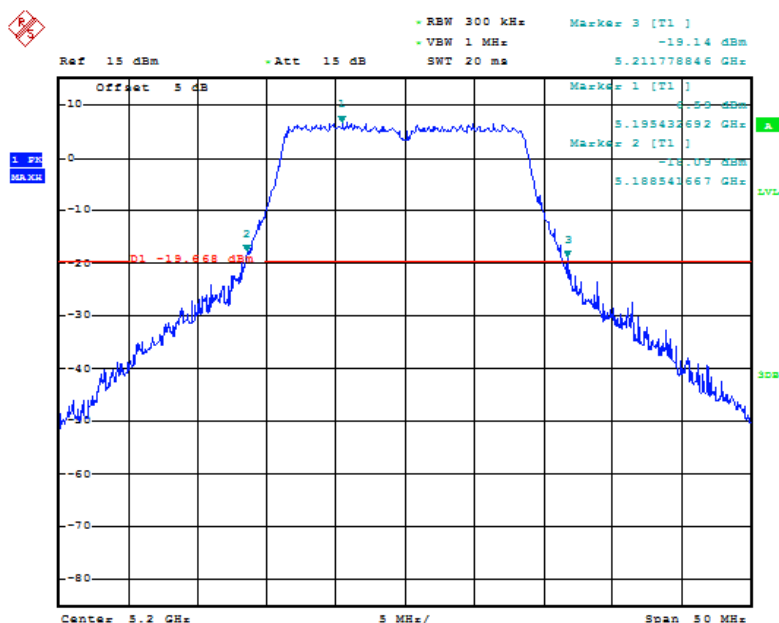
Date: 7.DEC.2018 12:43:06

Fig. 11 Occupied 26dB Bandwidth (802.11a, 5240MHz)



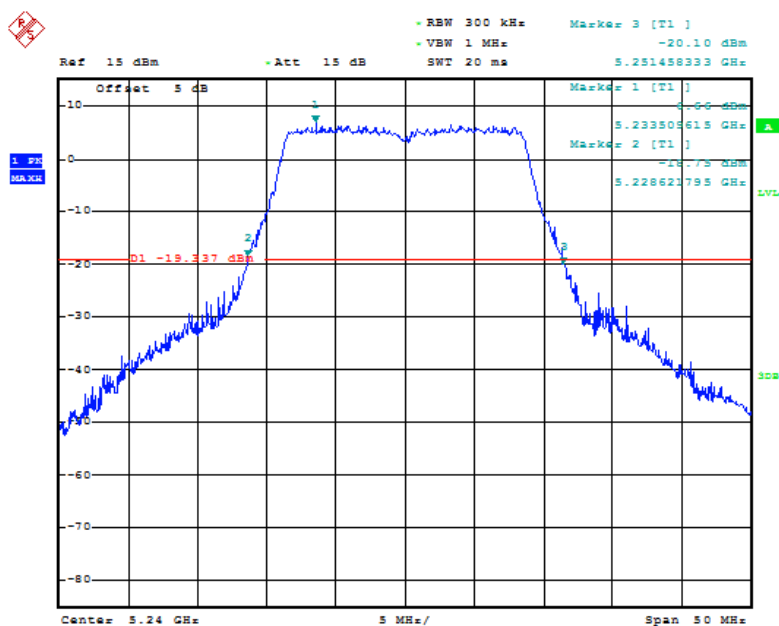
Date: 7.DEC.2018 12:44:13

Fig. 12 Occupied 26dB Bandwidth (802.11n-HT20, 5180MHz)



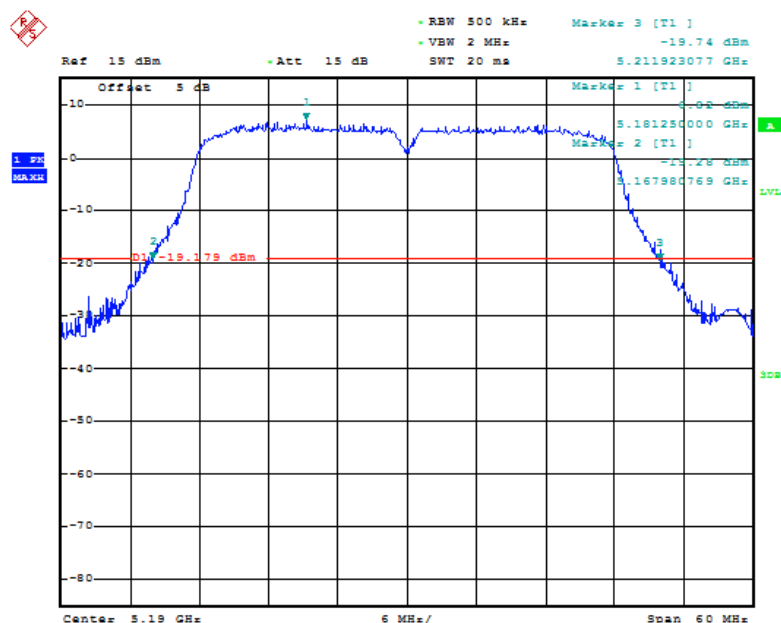
Date: 7.DEC.2018 12:45:17

**Fig. 13 Occupied 26dB Bandwidth (802.11n-HT20, 5200MHz)**



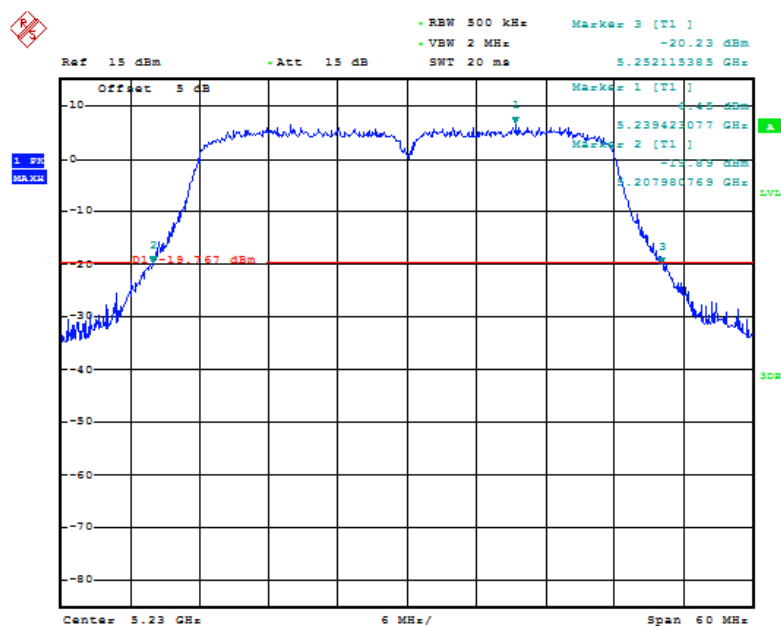
Date: 7.DEC.2018 12:46:02

**Fig. 14 Occupied 26dB Bandwidth (802.11n-HT20, 5240MHz)**



Date: 7.DEC.2018 12:47:01

**Fig. 15 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)**



Date: 7.DEC.2018 12:47:50

**Fig. 16 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)**

## 6.5. 99% Occupied Bandwidth(conducted)

### Measurement Limit:

| Standard                   | Limit (MHz) |
|----------------------------|-------------|
| FCC 47 CFR Part 15.407 (e) | /           |

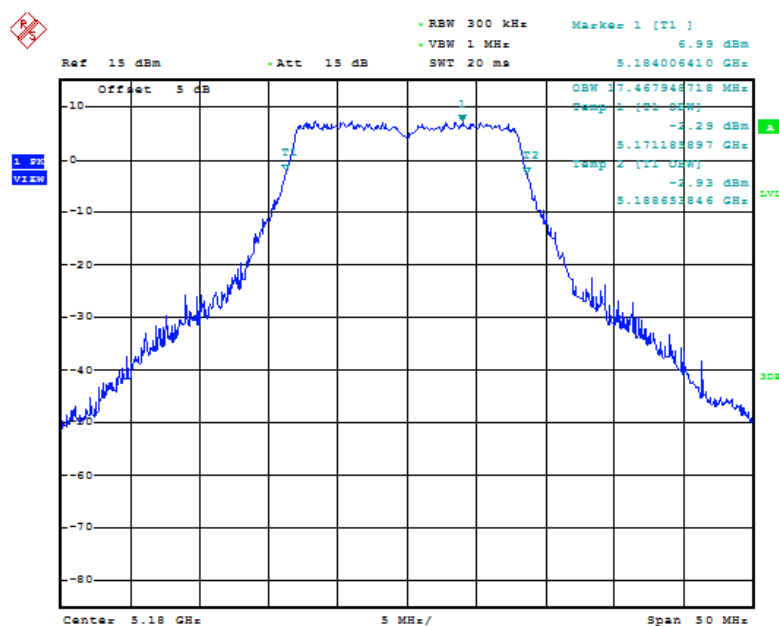
The measurement is made according to KDB 789033

### Measurement Result:

| Mode            | Channel  | 99% Occupied Bandwidth ( MHz) |       | conclusion |
|-----------------|----------|-------------------------------|-------|------------|
| 802.11a         | 5180 MHz | Fig.17                        | 22.52 | P          |
|                 | 5200 MHz | Fig.18                        | 22.76 | P          |
|                 | 5240 MHz | Fig.19                        | 22.6  | P          |
| 802.11n<br>HT20 | 5180 MHz | Fig.20                        | 22.84 | P          |
|                 | 5200 MHz | Fig.21                        | 23.24 | P          |
|                 | 5240 MHz | Fig.22                        | 22.84 | P          |
| 802.11n<br>HT40 | 5190 MHz | Fig.23                        | 43.94 | P          |
|                 | 5230 MHz | Fig.24                        | 44.14 | P          |

**Conclusion: PASS**

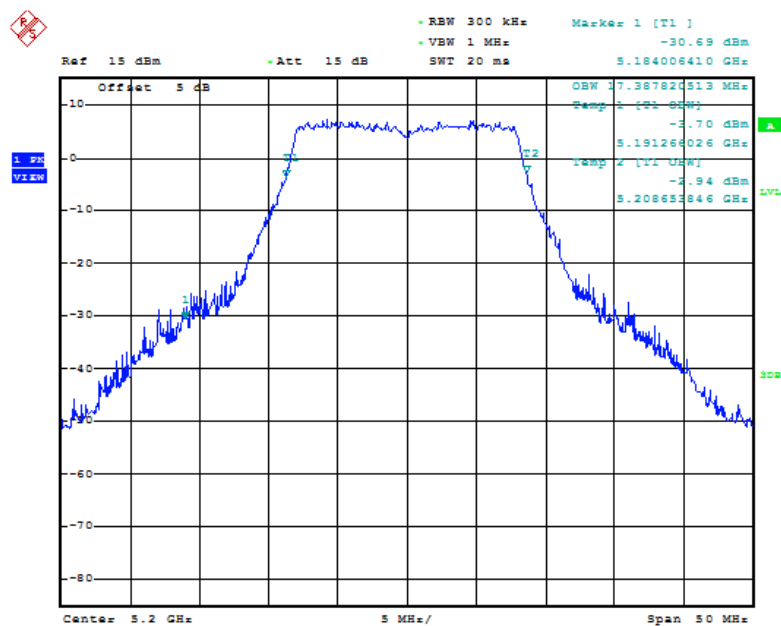
Test graphs as below:



Date: 7.DEC.2018 12:48:52

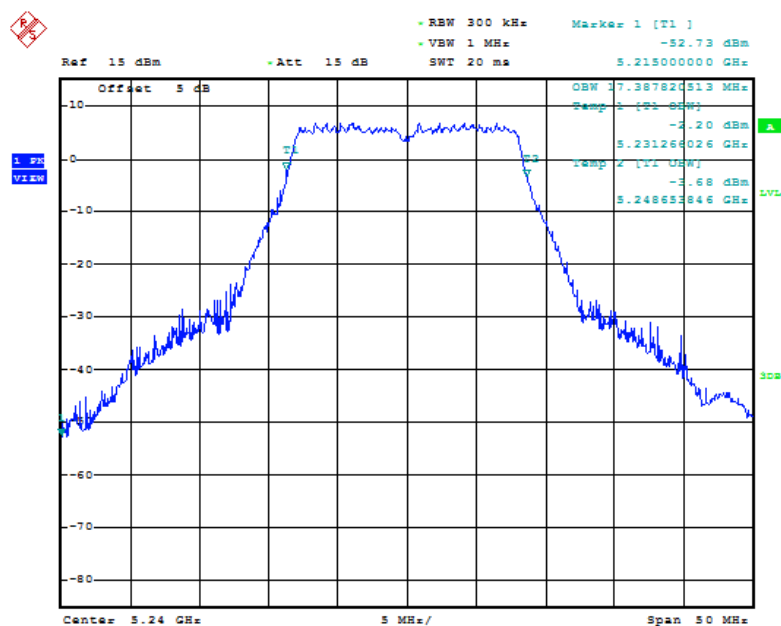
**Fig. 17 99% Occupied Bandwidth (802.11a, 5180MHz)**





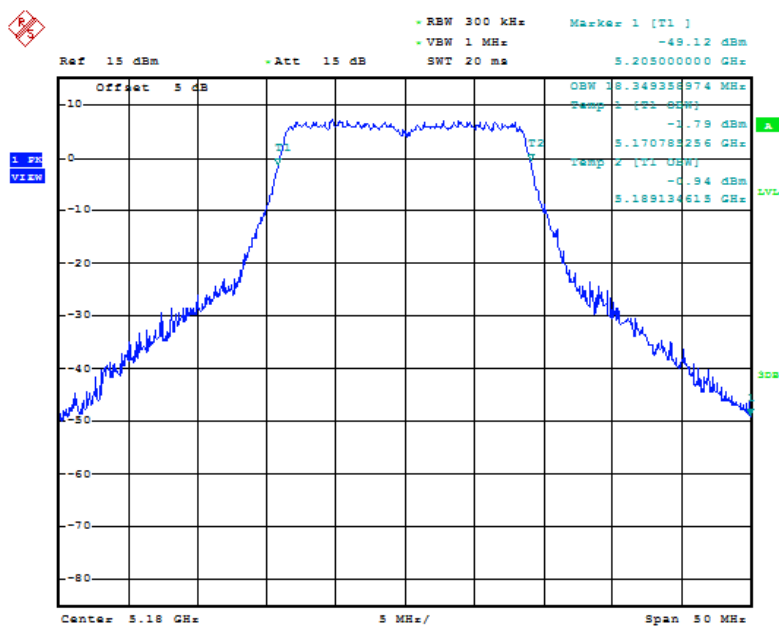
Date: 7.DEC.2018 12:49:50

**Fig. 18 99% Occupied Bandwidth (802.11a, 5200MHz)**



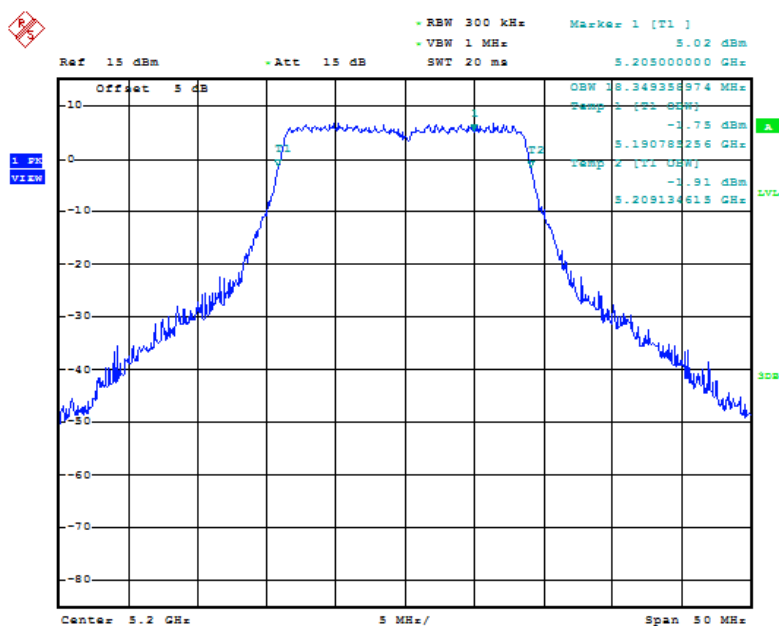
Date: 7.DEC.2018 12:51:36

**Fig. 19 99% Occupied Bandwidth (802.11a, 5240MHz)**



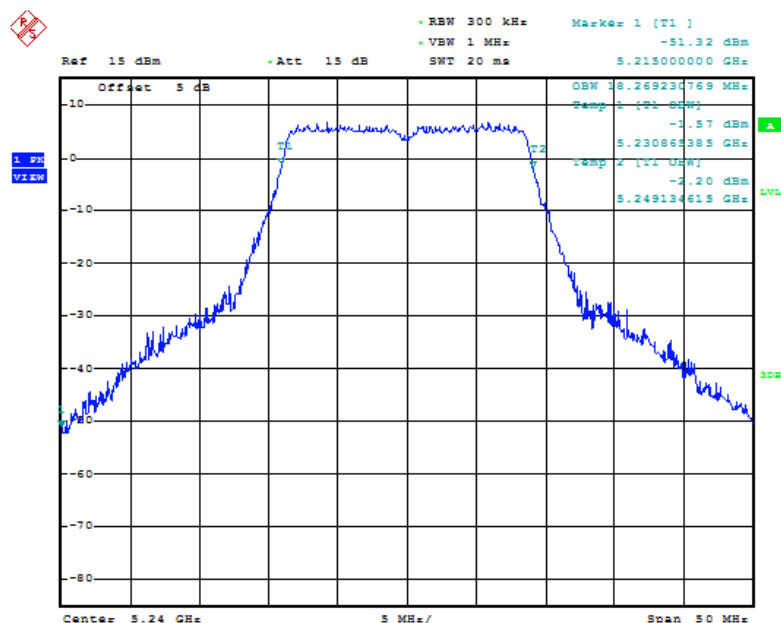
Date: 7.DEC.2018 12:53:01

Fig. 20 99% Occupied Bandwidth (802.11n-HT20, 5180MHz)



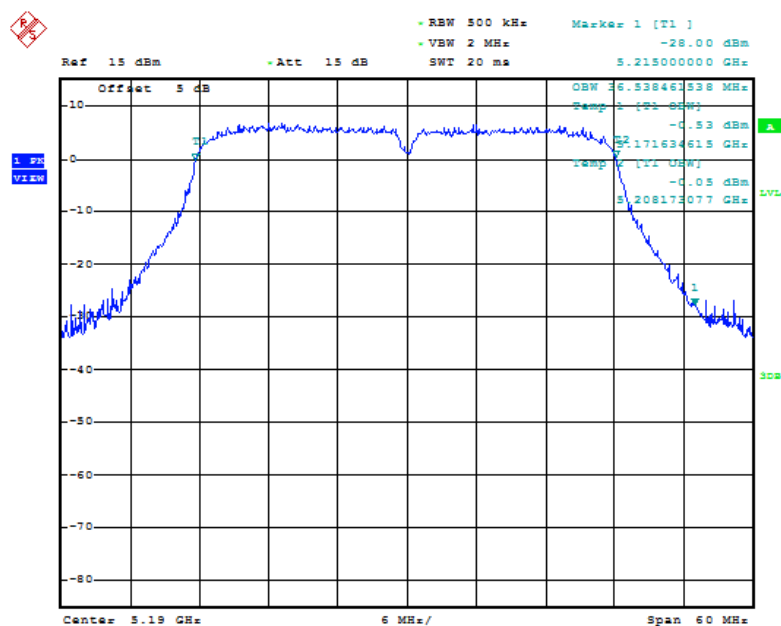
Date: 7.DEC.2018 12:54:29

Fig. 21 99% Occupied Bandwidth (802.11n-HT20, 5200MHz)



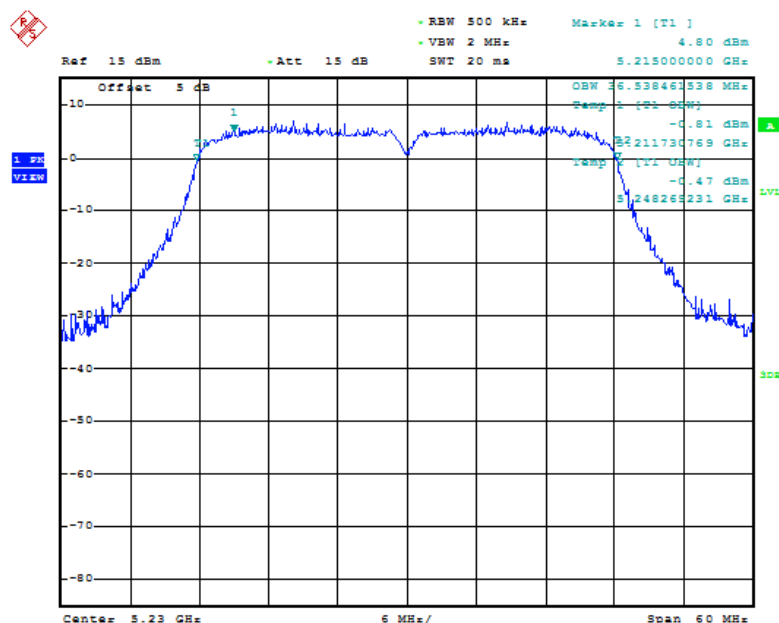
Date: 7.DEC.2018 12:55:59

Fig. 22 99% Occupied Bandwidth (802.11n-HT20, 5240MHz)



Date: 7.DEC.2018 12:57:47

Fig. 23 99% Occupied Bandwidth (802.11n-HT40, 5190MHz)



Date: 7.DEC.2018 12:58:52

Fig. 24 99% Occupied Bandwidth (802.11n-HT40, 5230MHz)

## 6.6. Band Edges Compliance

### 6.6.1 Band Edges - conducted

#### Measurement Limit:

| Standard               | Limit (dBm/MHz) |
|------------------------|-----------------|
| FCC 47 CFR Part 15.407 | < -27           |

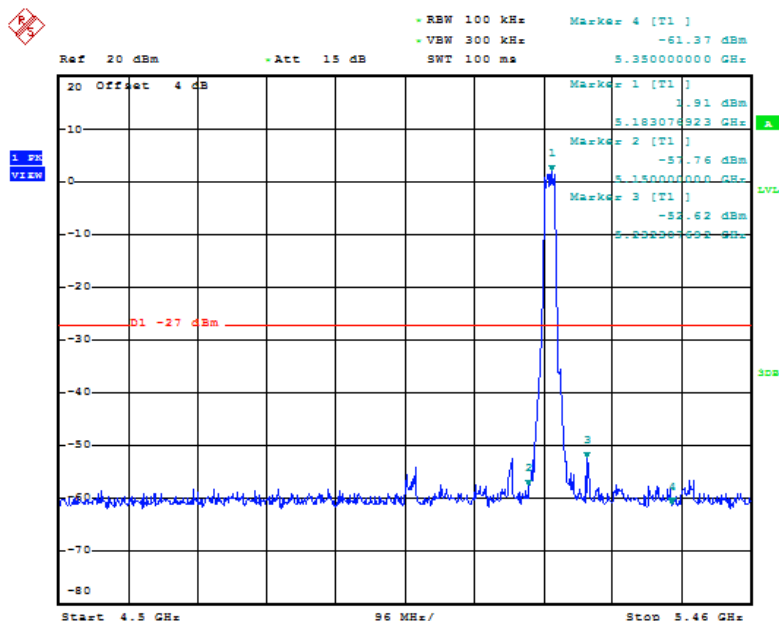
The measurement is made according to KDB 789033

#### Measurement Result:

| Mode            | Channel  | Test Results | Conclusion |
|-----------------|----------|--------------|------------|
| 802.11a         | 5180 MHz | Fig.25       | P          |
|                 | 5240 MHz | Fig.26       | P          |
| 802.11n<br>HT20 | 5180 MHz | Fig.27       | P          |
|                 | 5240 MHz | Fig.28       | P          |
| 802.11n<br>HT40 | 5190 MHz | Fig.29       | P          |
|                 | 5230 MHz | Fig.30       | P          |

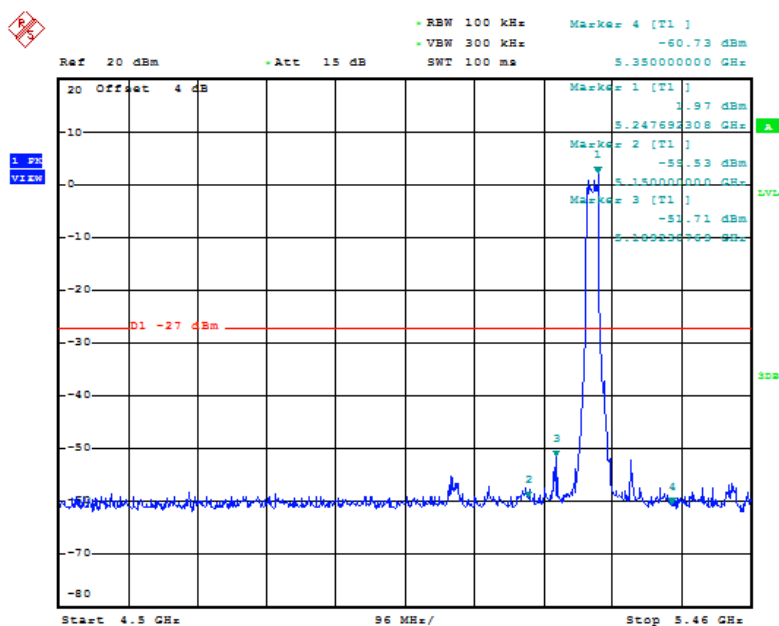
**Conclusion: PASS**

Test graphs as below:



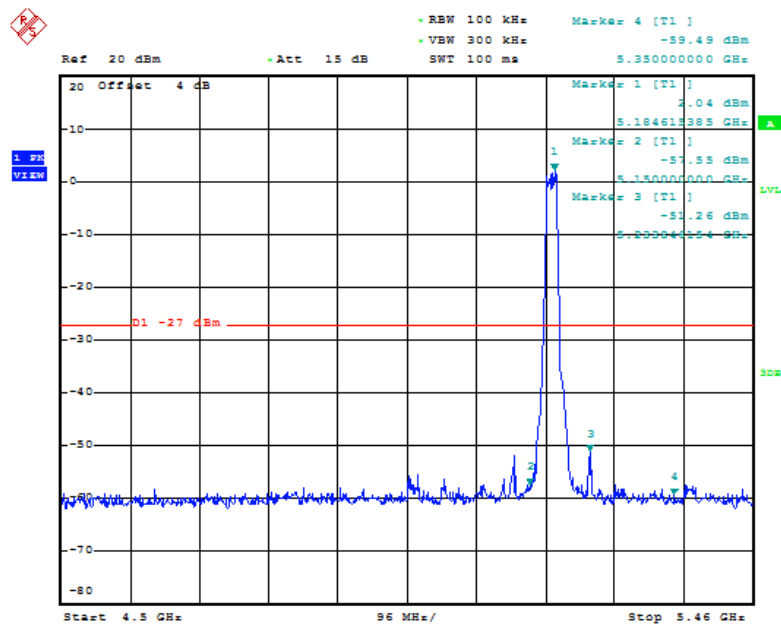
Date: 9.JAN.2019 11:15:03

**Fig. 25 Band Edges (802.11a, 5180MHz)**



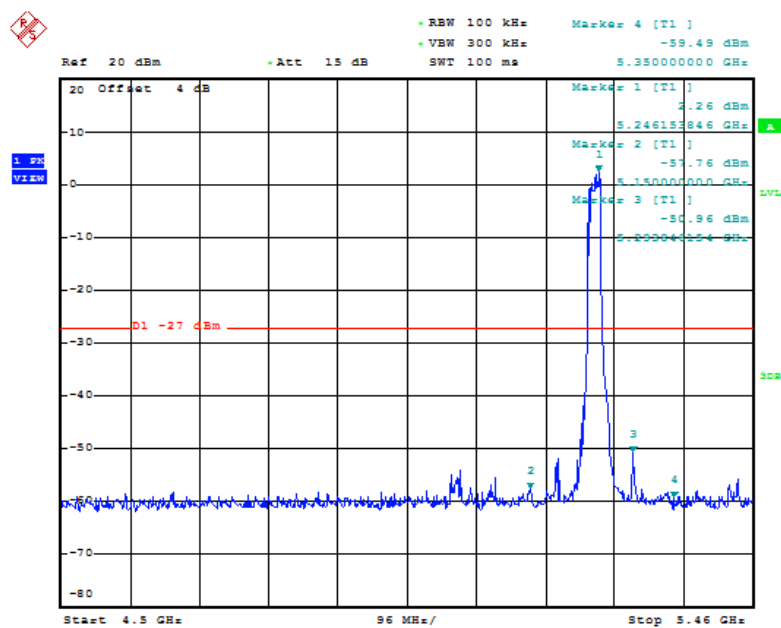
Date: 9.JAN.2019 11:21:36

**Fig. 26 Band Edges (802.11a, 5240MHz)**



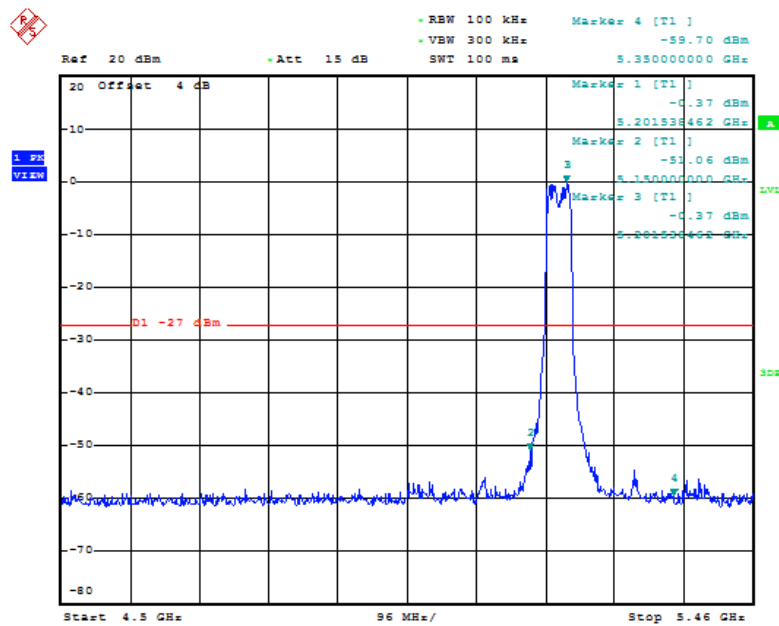
Date: 9.JAN.2019 12:05:07

**Fig. 27 Band Edges (802.11n-HT20, 5180MHz)**



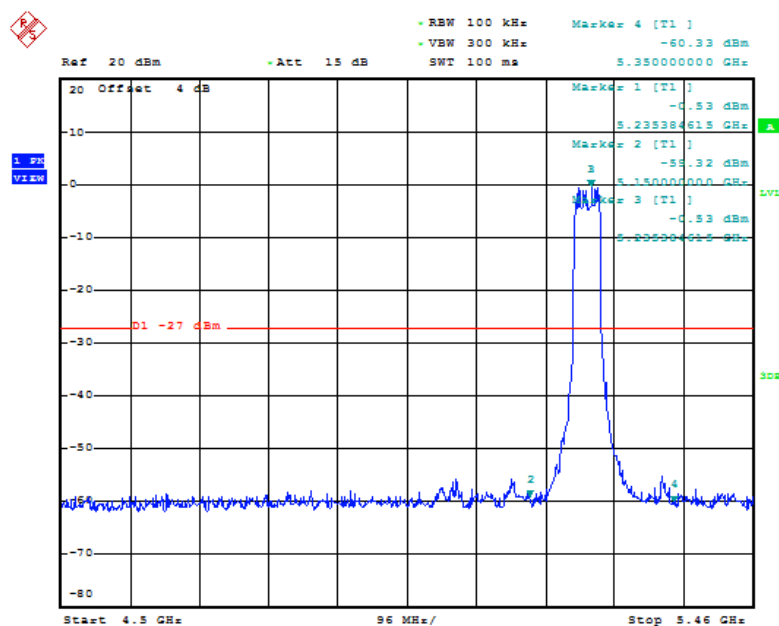
Date: 9.JAN.2019 12:14:40

**Fig. 28 Band Edges (802.11n-HT20, 5240MHz)**



Date: 9.JAN.2019 12:17:28

**Fig. 29 Band Edges (802.11n-HT40, 5190MHz)**



Date: 9.JAN.2019 12:20:05

**Fig. 30 Band Edges (802.11n-HT40, 5230MHz)**

**6.6.2 Band Edges - Radiated****Measurement Limit:**

| Standard               | Limit (dB $\mu$ V/m) |    |
|------------------------|----------------------|----|
|                        | Peak                 | 74 |
|                        | Average              | 54 |
| FCC 47 CFR Part 15.209 |                      |    |

The measurement is made according to KDB 789033.

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

**Measurement Result:****N02(ACS-L2503):**

| Mode            | Channel  | Test Results | Conclusion |
|-----------------|----------|--------------|------------|
| 802.11a         | 5180 MHz | Fig.31       | P          |
|                 | 5240 MHz | Fig.32       | P          |
| 802.11n<br>HT20 | 5180 MHz | Fig.33       | P          |
|                 | 5240 MHz | Fig.34       | P          |
| 802.11n<br>HT40 | 5190 MHz | Fig.35       | P          |
|                 | 5230 MHz | Fig.36       | P          |

**N02(ACS-L2501):**

| Mode    | Channel  | Test Results | Conclusion |
|---------|----------|--------------|------------|
| 802.11a | 5180 MHz | Fig.37       | P          |
|         | 5240 MHz | Fig.38       | P          |

**N02(ACS-L2502):**

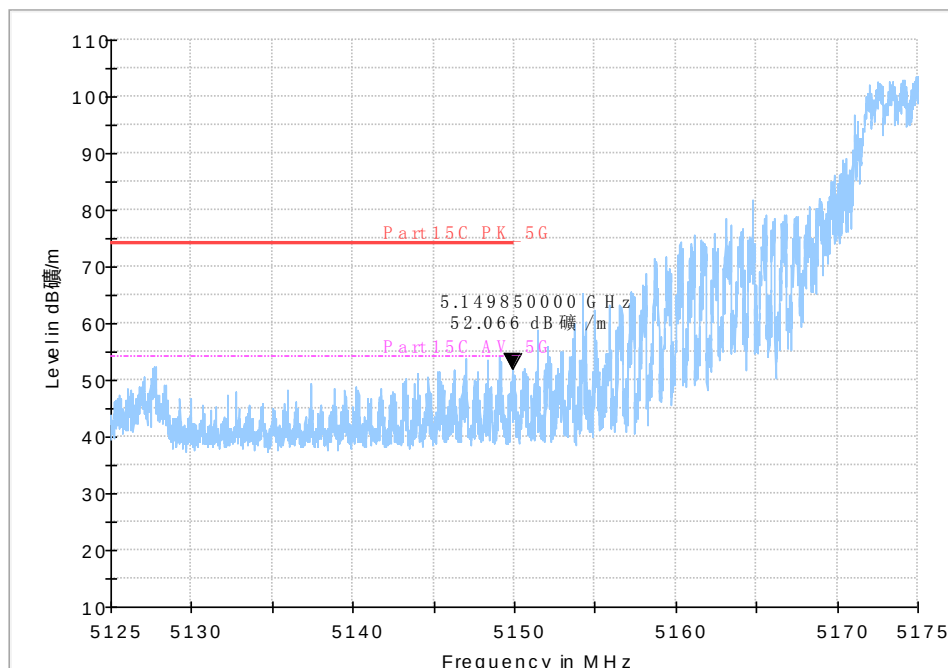
| Mode    | Channel  | Test Results | Conclusion |
|---------|----------|--------------|------------|
| 802.11a | 5180 MHz | Fig.39       | P          |
|         | 5240 MHz | Fig.40       | P          |

**Conclusion: PASS**

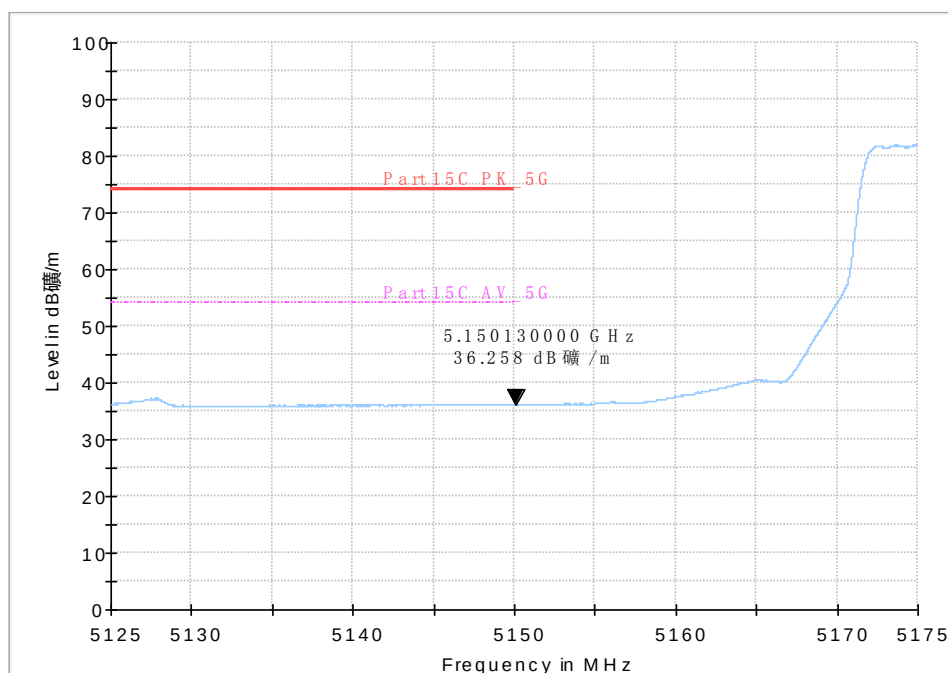
**Test graphs as below:**

**N02(ACS-L2503):**



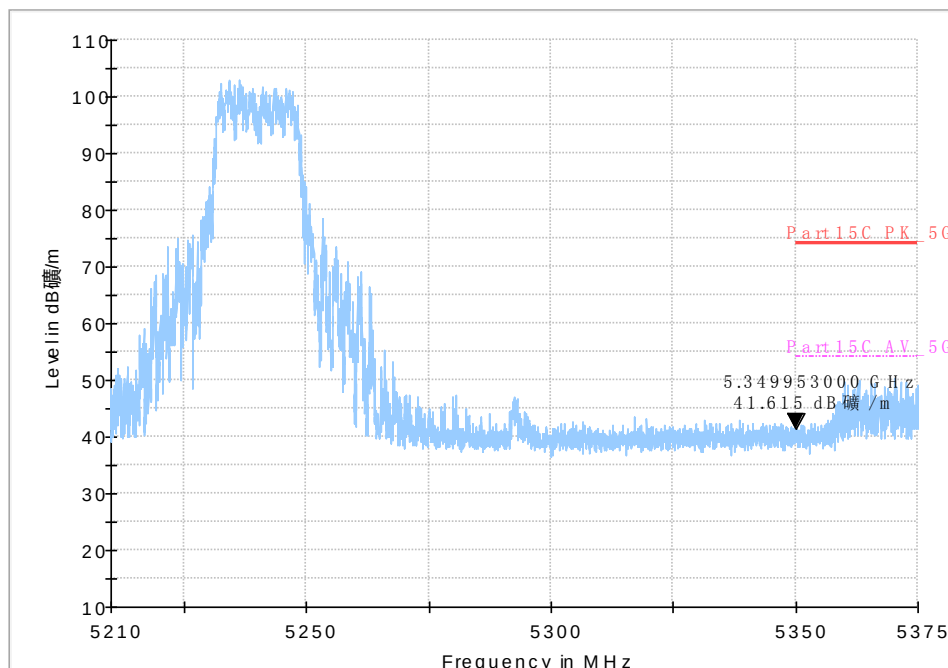


Peak

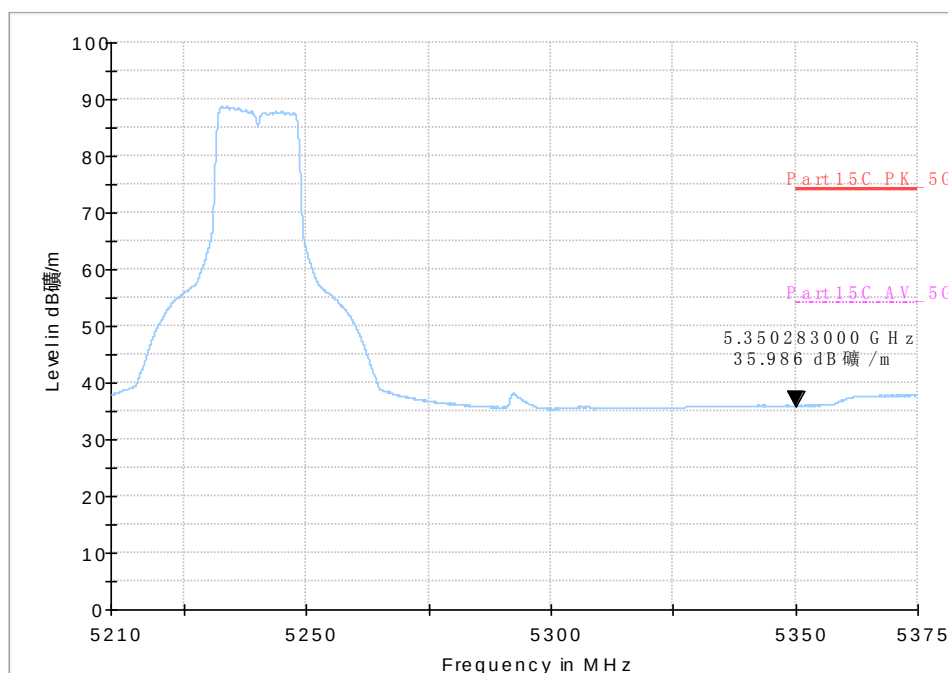


Average

Fig. 31 Band Edges (802.11a, 5180MHz)

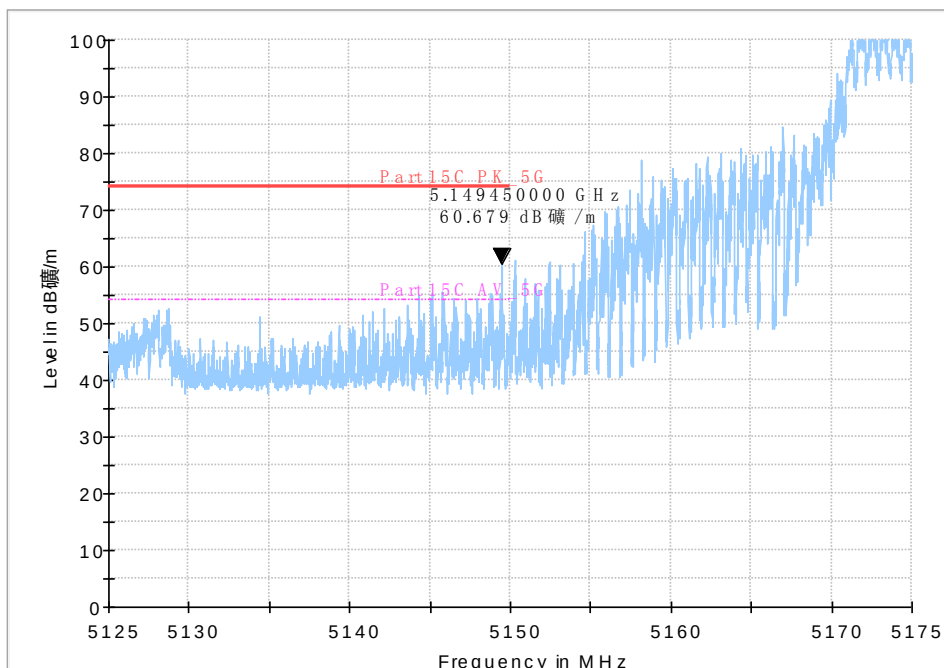


Peak

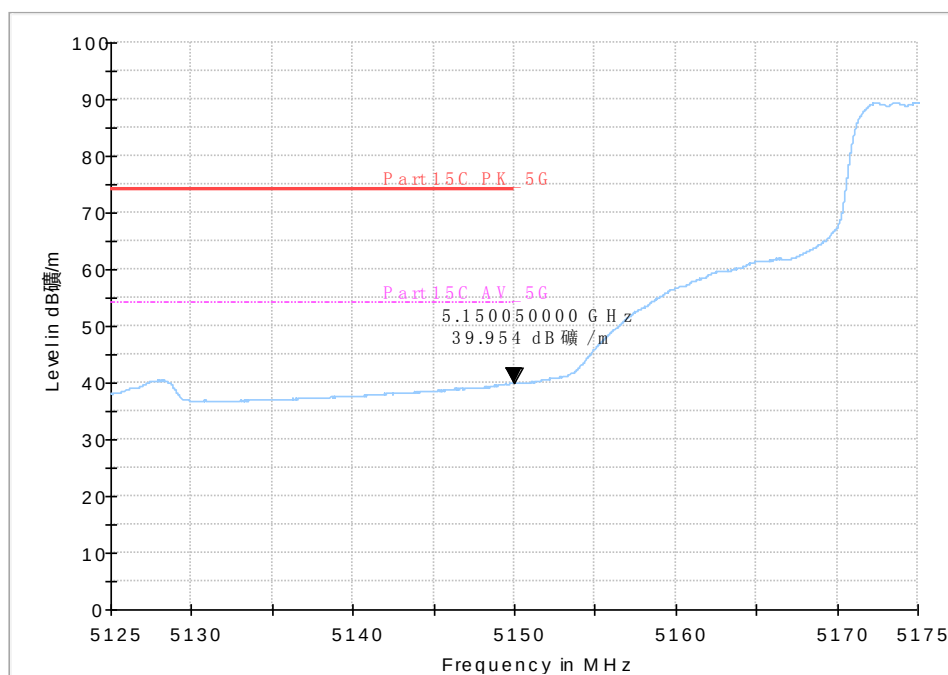


Average

Fig. 32 Band Edges (802.11a, 5240MHz)

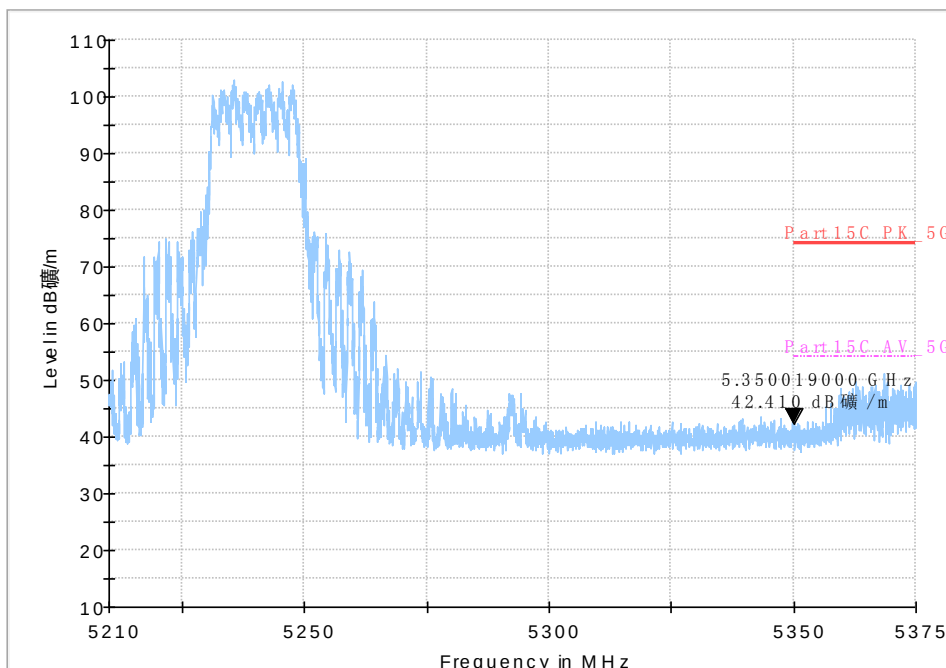


Peak

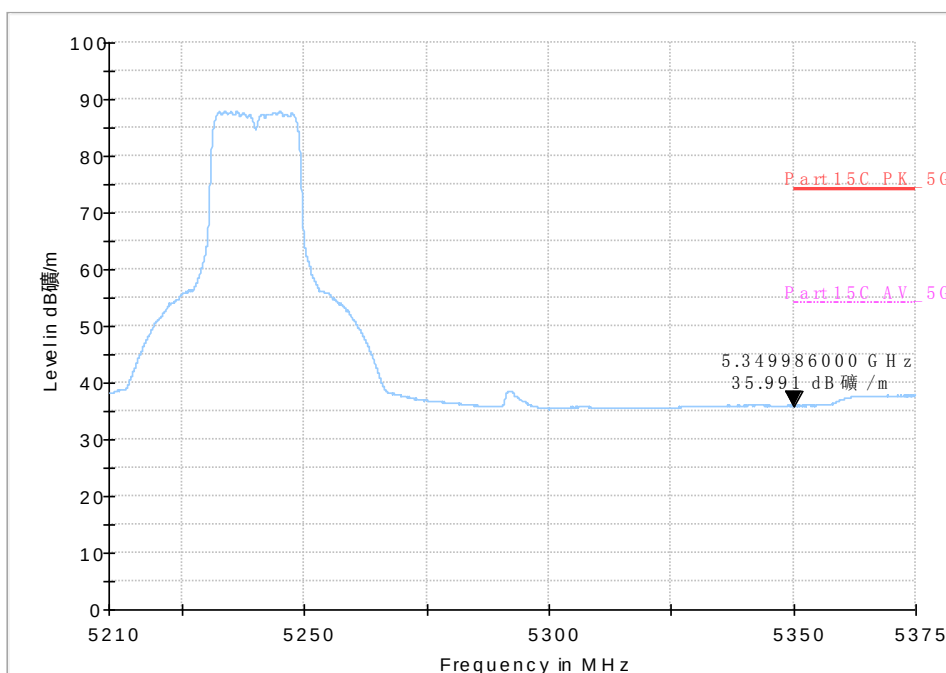


Average

Fig. 33 Band Edges (802.11n-HT20, 5180MHz)

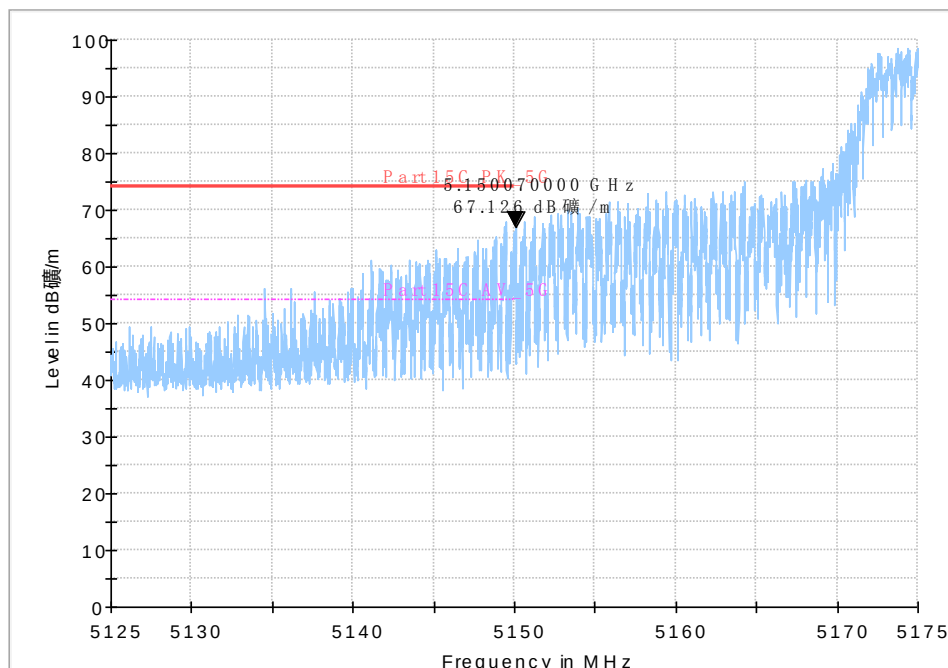


Peak

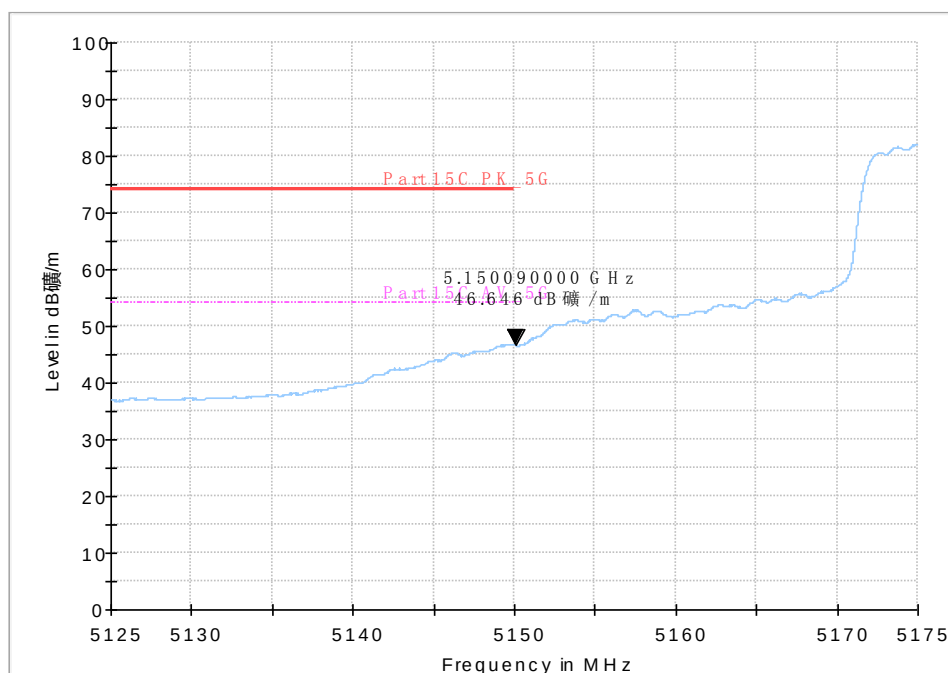


Average

Fig. 34 Band Edges (802.11n-HT20, 5240MHz)

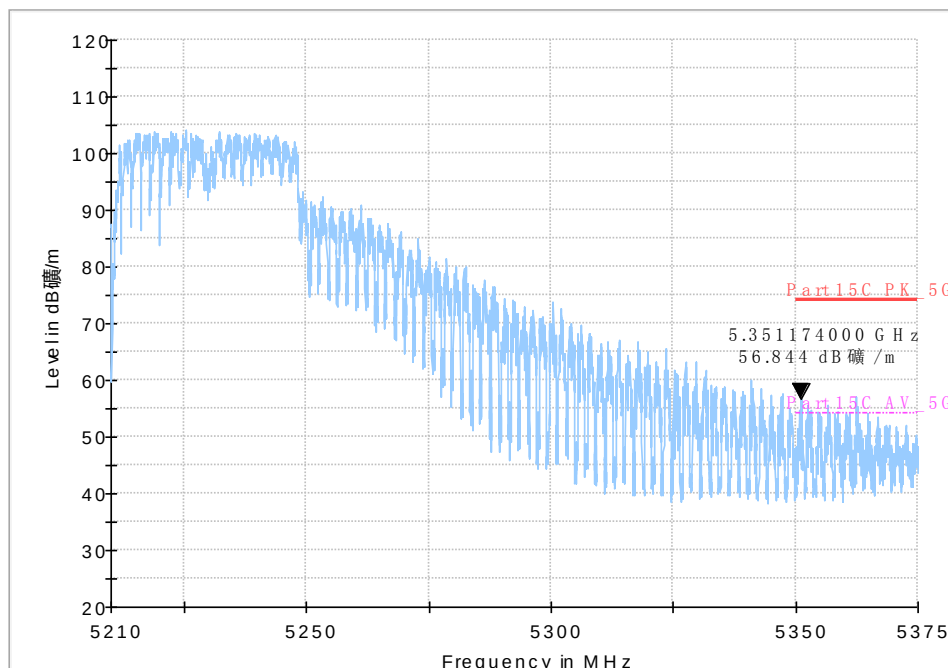


Peak

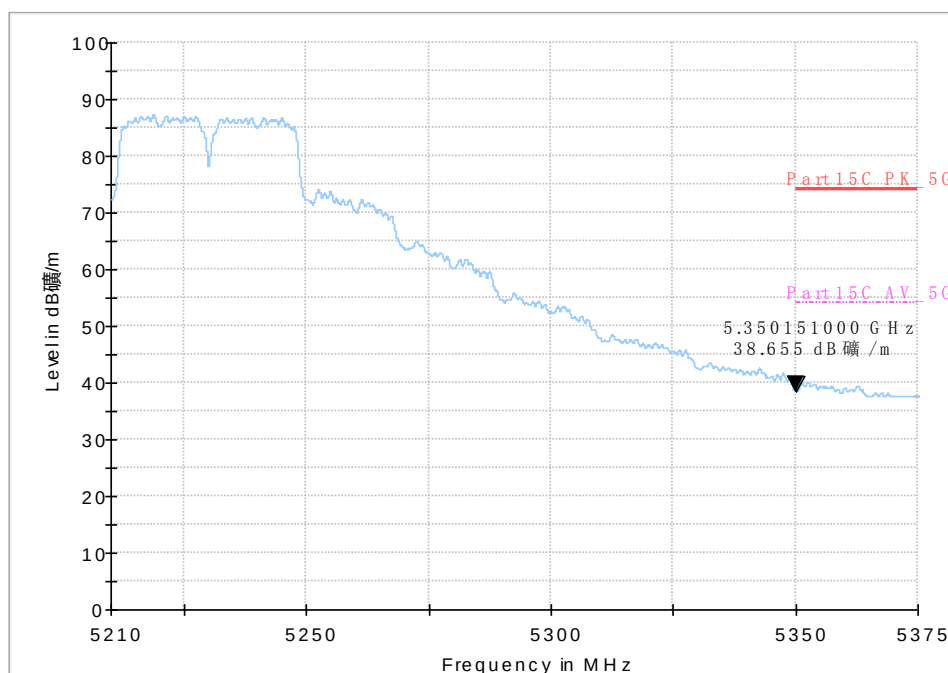


Average

Fig. 35 Band Edges (802.11n-HT40, 5190MHz)



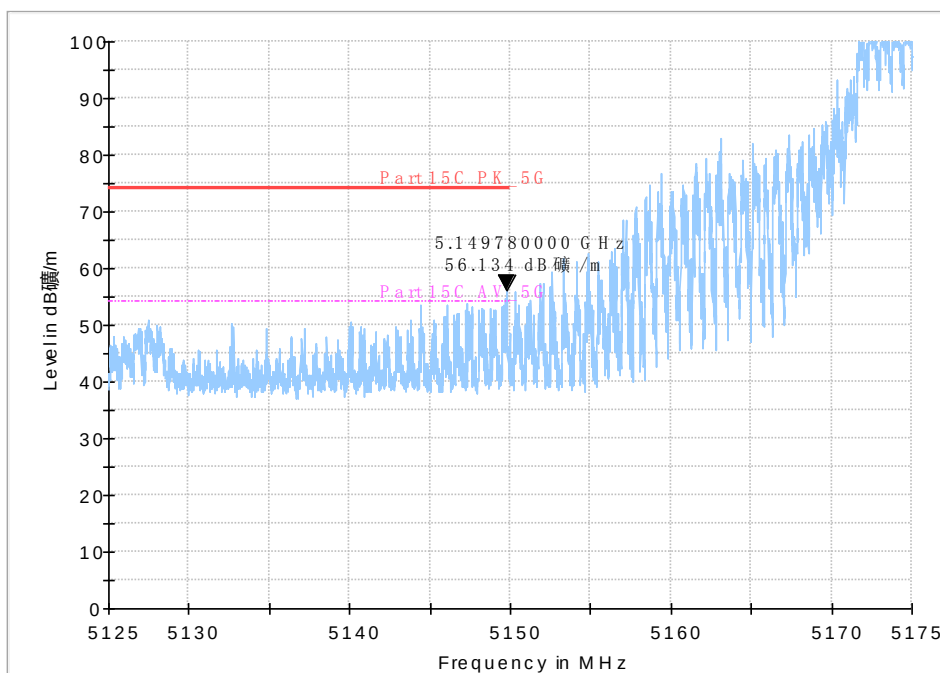
Peak



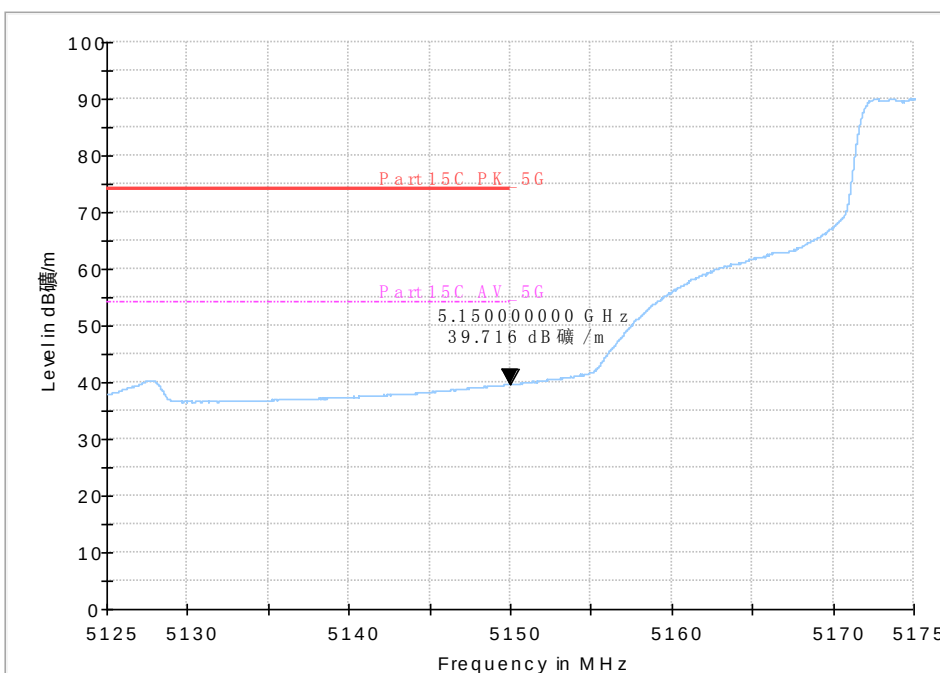
Average

Fig. 36 Band Edges (802.11n-HT40, 5230MHz)

N01(ACS-L2501):

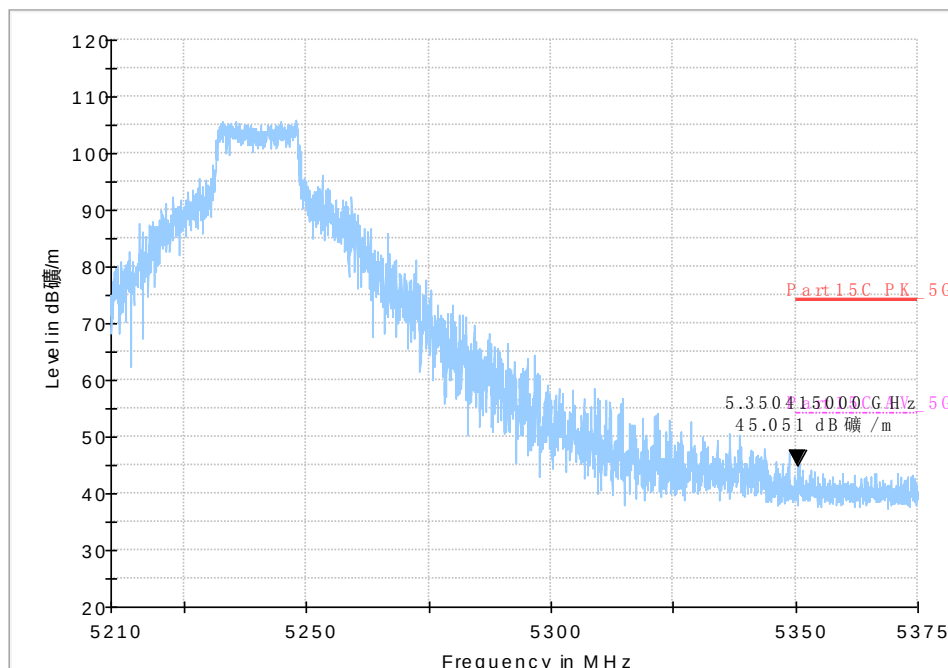


Peak

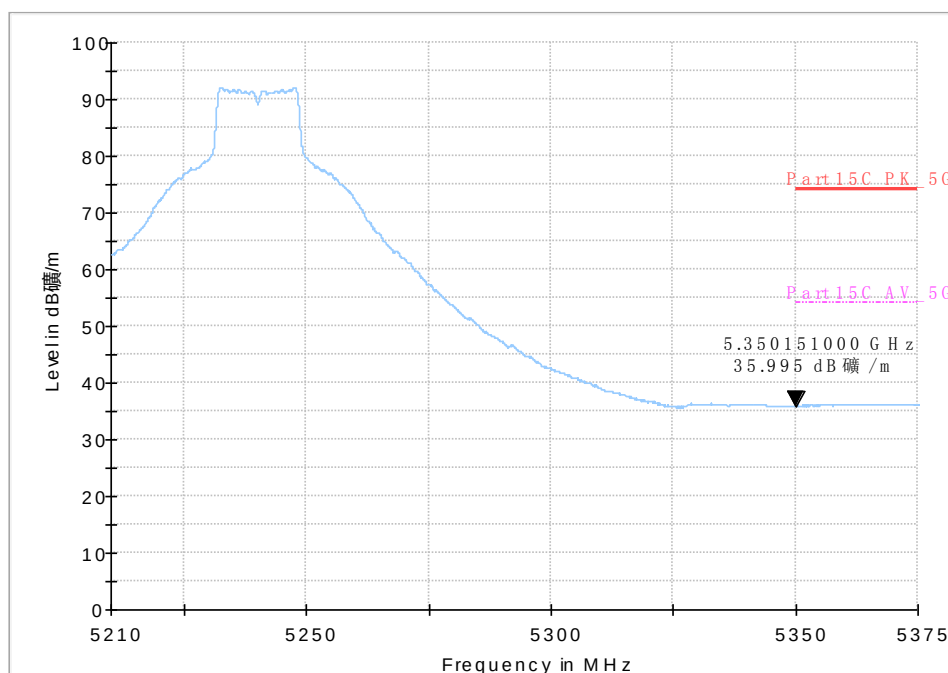


Average

Fig. 37 Band Edges (802.11a, 5180MHz)



Peak

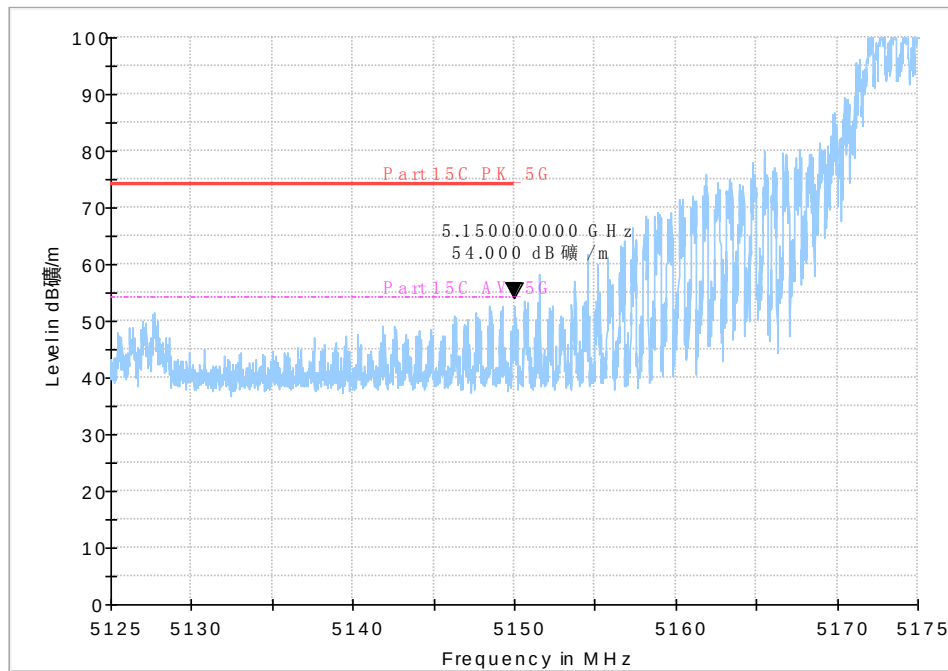


Average

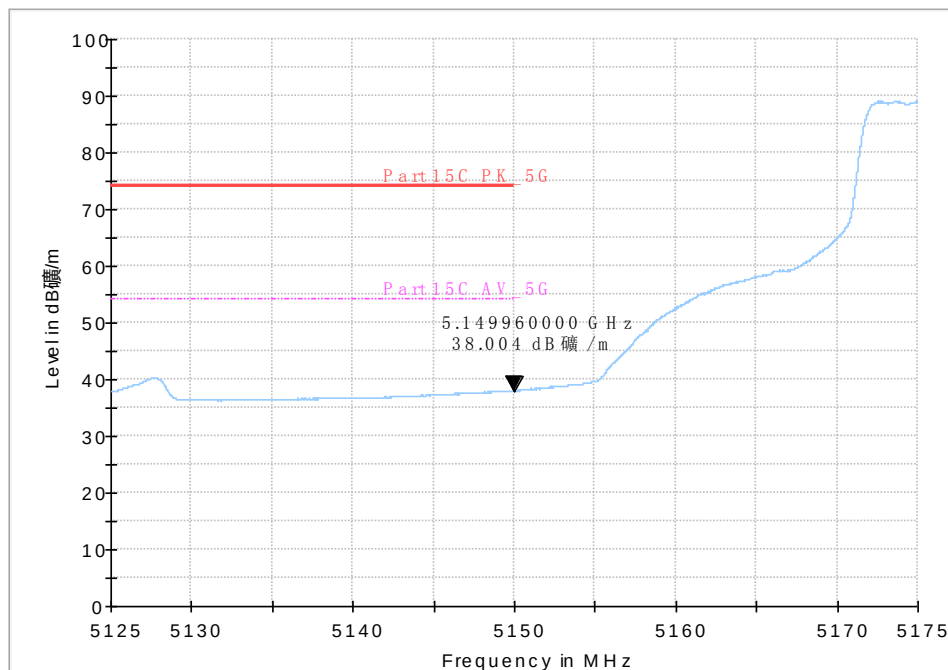
Fig. 38 Band Edges (802.11a, 5240MHz)



N03(ACS-L2502):

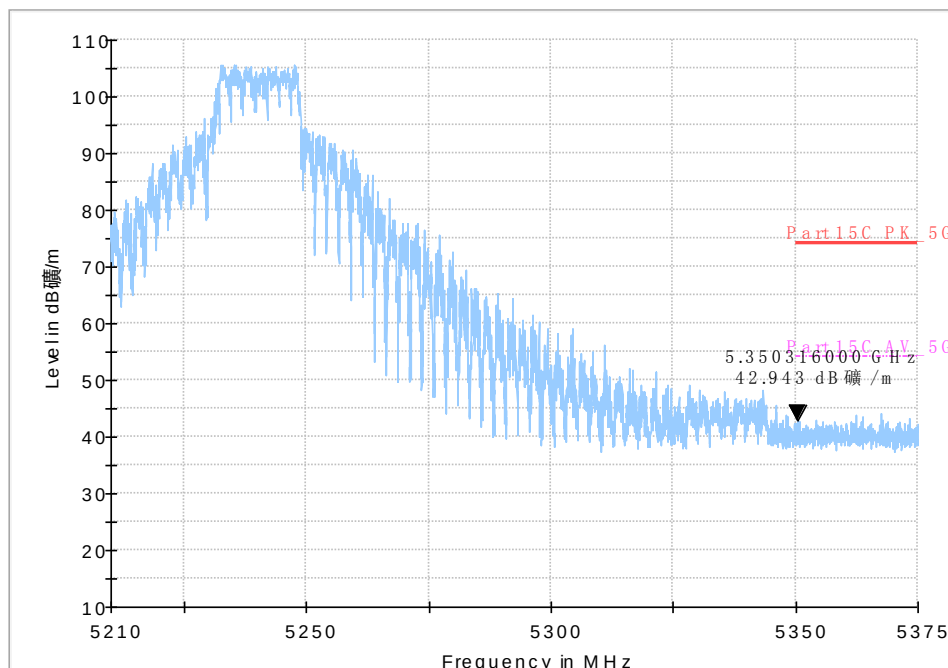


Peak

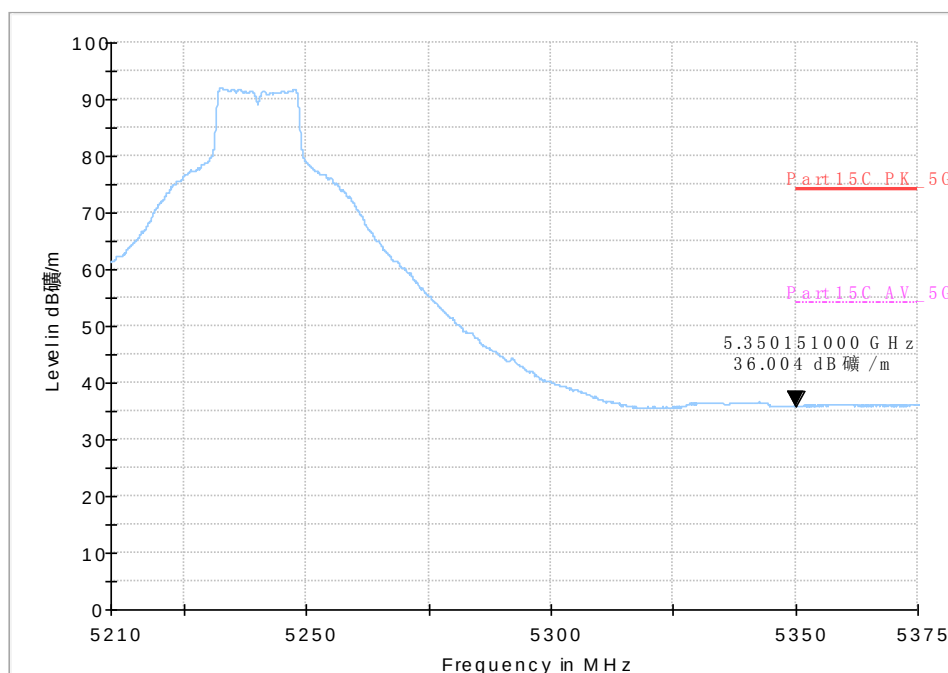


Average

Fig. 39 Band Edges (802.11a, 5180MHz)



Peak



Average

Fig. 40 Band Edges (802.11a, 5240MHz)

## 6.7. Transmitter Spurious Emission

### Measurement Limit:

| Standard               | Limit       |
|------------------------|-------------|
| FCC 47 CFR Part 15.407 | -27 dBm/MHz |

The measurement is made according to KDB 789033

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz(detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep= AUTO

### Limit in restricted band:

| Frequency of emission (MHz) | Field strength(dBμV/m) | Measurement distance(m) |
|-----------------------------|------------------------|-------------------------|
| 0.009-0.490                 | 129-94                 | 3                       |
| 0.490-1.705                 | 74-63                  | 3                       |
| 1.705-30                    | 70                     | 3                       |
| 30-88                       | 40.0                   | 3                       |
| 88-216                      | 43.5                   | 3                       |
| 216-960                     | 46.0                   | 3                       |
| Above 960                   | 54.0                   | 3                       |

Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m

Modulation type and data rate tested (Only worst case result is given below):

| Mode         | Data rate | Channel     |
|--------------|-----------|-------------|
| 802.11a      | 6Mbps     | 36(5180MHz) |
| 802.11n-HT20 | MCS0      | 36(5180MHz) |

|              |      |             |
|--------------|------|-------------|
| 802.11n-HT40 | MCS0 | 38(5190MHz) |
|--------------|------|-------------|

**Measurement Results:**
**N02(ACS-L2503):**
**802.11a mode**

| Mode    | Channel     | Frequency Range   | Test Results | Conclusion |
|---------|-------------|-------------------|--------------|------------|
| 802.11a | 36(5180MHz) | 30 MHz ~ 1 GHz    | Fig.41       | P          |
|         |             | 1 GHz ~ 8 GHz     | Fig.42       | P          |
|         |             | 8 GHz ~ 18 GHz    | Fig.43       | P          |
|         |             | 18 GHz ~ 26.5 GHz | Fig.44       | P          |
|         |             | 26.5 GHz ~ 40 GHz | Fig.45       | P          |

**802.11n-HT20 mode**

| Mode         | Channel     | Frequency Range   | Test Results | Conclusion |
|--------------|-------------|-------------------|--------------|------------|
| 802.11n-HT20 | 36(5180MHz) | 30 MHz ~ 1 GHz    | Fig.46       | P          |
|              |             | 1 GHz ~ 8 GHz     | Fig.47       | P          |
|              |             | 8 GHz ~ 18 GHz    | Fig.48       | P          |
|              |             | 18 GHz ~ 26.5 GHz | Fig.49       | P          |
|              |             | 26.5 GHz ~ 40 GHz | Fig.50       | P          |

**802.11n-HT40 mode**

| Mode            | Channel     | Frequency Range   | Test Results | Conclusion |
|-----------------|-------------|-------------------|--------------|------------|
| 802.11n<br>HT40 | 38(5190MHz) | 30 MHz ~ 1 GHz    | Fig.51       | P          |
|                 |             | 1 GHz ~ 8 GHz     | Fig.52       | P          |
|                 |             | 8 GHz ~ 18 GHz    | Fig.53       | P          |
|                 |             | 18 GHz ~ 26.5 GHz | Fig.54       | P          |
|                 |             | 26.5 GHz ~ 40 GHz | Fig.55       | P          |

**Radiated Spurious Emission (9kHz-30MHz)**

| Mode            | Channel     | Frequency Range | Test Results | Conclusion |
|-----------------|-------------|-----------------|--------------|------------|
| 802.11n<br>HT40 | 38(5190MHz) | 9kHz~30 MHz     | Fig.56       | P          |

**N02(ACS-L2503):**
**802.11a mode**

| Mode    | Channel     | Frequency Range   | Test Results | Conclusion |
|---------|-------------|-------------------|--------------|------------|
| 802.11a | 36(5180MHz) | 30 MHz ~ 1 GHz    | Fig.57       | P          |
|         |             | 1 GHz ~ 8 GHz     | Fig.58       | P          |
|         |             | 8 GHz ~ 18 GHz    | Fig.59       | P          |
|         |             | 18 GHz ~ 26.5 GHz | Fig.60       | P          |
|         |             | 26.5 GHz ~ 40 GHz | Fig.61       | P          |

**N02(ACS-L2503):**
**802.11a mode**

| Mode    | Channel     | Frequency Range   | Test Results | Conclusion |
|---------|-------------|-------------------|--------------|------------|
| 802.11a | 36(5180MHz) | 30 MHz ~ 1 GHz    | Fig.62       | P          |
|         |             | 1 GHz ~ 8 GHz     | Fig.63       | P          |
|         |             | 8 GHz ~ 18 GHz    | Fig.64       | P          |
|         |             | 18 GHz ~ 26.5 GHz | Fig.65       | P          |
|         |             | 26.5 GHz ~ 40 GHz | Fig.66       | P          |

**Conclusion: PASS**

**Note:**

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

$P_{Mea}$  is the field strength recorded from the instrument.

The measurement results are obtained as described below:

Result= $P_{Mea}+A_{Rpl}= P_{Mea}+Cable\ Loss+Antenna\ Factor$

**N02(ACS-L2503):**

**802.11a**

Channel 36 ( 30MHz ~1GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 36.0            | 25.16           | -21.7     | 46.86         | V        |
| 96.2            | 24.55           | -24.1     | 48.65         | H        |
| 192.3           | 29.56           | -24.6     | 54.16         | H        |
| 294.5           | 28.64           | -22       | 50.64         | H        |
| 318.6           | 28.63           | -21.2     | 49.83         | H        |
| 884.4           | 29.65           | -9.8      | 39.45         | V        |

Channel 36 ( 1GHz ~ 8GHz ) (Peak)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 2985.6          | 42.38           | -1.2      | 43.58         | V        |
| 5373.0          | 54.32           | 4.1       | 50.22         | H        |
| 5996.2          | 45.3            | 4.6       | 40.7          | V        |
| 6442.4          | 45.85           | 5.8       | 40.05         | H        |
| 7060.8          | 46.54           | 7.3       | 39.24         | V        |
| 7874.8          | 48.6            | 8.7       | 39.9          | H        |

Channel 36 ( 1GHz ~ 8GHz ) (Average)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 5373.0          | 37.43           | 4.1       | 33.33         | H        |

Channel 36 ( 8GHz ~ 18GHz ) (Peak)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 14838.4         | 54.27           | 20        | 34.27         | H        |
| 15279.2         | 55.42           | 20.7      | 34.72         | V        |
| 15939.2         | 55.38           | 22.1      | 33.28         | V        |
| 16657.2         | 55.15           | 23.3      | 31.85         | H        |
| 17230.0         | 56.06           | 24.2      | 31.86         | H        |
| 17645.2         | 57.28           | 24.4      | 32.88         | H        |

Channel 36 ( 8GHz ~ 18GHz )(Average)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 14838.4         | 42.25           | 20        | 22.25         | H        |
| 15279.2         | 42.35           | 20.7      | 21.65         | V        |
| 15939.2         | 43.46           | 22.1      | 21.36         | V        |
| 16657.2         | 43.43           | 23.3      | 20.13         | H        |
| 17230.0         | 44.24           | 24.2      | 20.04         | H        |
| 17645.2         | 44.59           | 24.4      | 20.19         | H        |

Channel 36 ( 18GHz ~ 26.5GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 19944.0         | 40.77           | -5        | 45.77         | V        |
| 20844.1         | 42.25           | -4.1      | 46.35         | H        |
| 22095.3         | 44.11           | -3.1      | 47.21         | H        |
| 23618.5         | 46.24           | -2.8      | 49.04         | V        |
| 24788.1         | 44.28           | -2.2      | 46.48         | H        |
| 26000.2         | 46.86           | -2        | 48.86         | H        |

Channel 36 ( 26.5GHz ~ 40GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 28299.6         | 43.36           | -0.8      | 44.16         | V        |
| 30821.4         | 46.3            | 0.3       | 46            | H        |
| 33977.6         | 46.35           | 1.5       | 44.85         | V        |
| 35832.6         | 46.09           | 1         | 45.09         | V        |
| 37522.8         | 46.1            | 1.1       | 45            | V        |
| 38960.5         | 50.02           | 4         | 46.02         | V        |

### 802.11n-HT20

Channel 36 ( 30MHz ~1GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
|-----------------|-----------------|-----------|---------------|----------|

|       |       |       |       |   |
|-------|-------|-------|-------|---|
| 34.5  | 21.49 | -22   | 43.49 | V |
| 95.9  | 24.9  | -24.2 | 49.1  | H |
| 246.0 | 26.97 | -23.2 | 50.17 | H |
| 477.8 | 28.74 | -17.5 | 46.24 | H |
| 748.8 | 33.28 | -12.2 | 45.48 | V |
| 884.7 | 28.66 | -10.3 | 38.96 | V |

Channel 36 ( 1GHz ~ 8GHz ) (Peak)

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 2990.8          | 45.41                 | -1.3      | 46.71               | H        |
| 5370.0          | 55.02                 | 4.1       | 50.92               | V        |
| 5998.8          | 45.23                 | 4.6       | 40.63               | V        |
| 6449.6          | 46.54                 | 5.9       | 40.64               | V        |
| 6638.4          | 46.88                 | 6.5       | 40.38               | H        |
| 7800.4          | 48.01                 | 8.5       | 39.51               | H        |

Channel 36 ( 1GHz ~ 8GHz )(Average)

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 5370.0          | 37.56                 | 4.1       | 33.46               | V        |

Channel 36 ( 8GHz ~ 18GHz ) (Peak)

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 15250.4         | 54.67                 | 20.7      | 33.97               | H        |
| 15768.8         | 55.32                 | 22        | 33.32               | V        |
| 16259.0         | 55.95                 | 22.5      | 33.45               | V        |
| 16851.8         | 55.89                 | 23.3      | 32.59               | V        |
| 16968.0         | 56.49                 | 23.6      | 32.89               | H        |
| 17586.8         | 56.66                 | 24.6      | 32.06               | V        |

Channel 36 ( 8GHz ~ 18GHz )(Average)

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
|-----------------|-----------------------|-----------|---------------------|----------|



|         |       |      |       |   |
|---------|-------|------|-------|---|
| 15250.4 | 42.42 | 20.7 | 21.72 | H |
| 15768.8 | 43.28 | 22   | 21.28 | V |
| 16259.0 | 43.49 | 22.5 | 20.99 | V |
| 16851.8 | 43.68 | 23.3 | 20.38 | V |
| 16968.0 | 44.58 | 23.6 | 20.98 | H |
| 17586.8 | 44.86 | 24.6 | 20.26 | V |

Channel 36 ( 18GHz ~ 26.5GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 19989.8         | 39.89                 | -4.9      | 44.79               | V        |
| 21090.6         | 41.37                 | -4.2      | 45.57               | H        |
| 22263.6         | 43.35                 | -3.1      | 46.45               | H        |
| 23512.2         | 44.76                 | -2.8      | 47.56               | V        |
| 24673.4         | 44.81                 | -2.3      | 47.11               | V        |
| 25639.0         | 46.75                 | -2.5      | 49.25               | V        |

Channel 36 ( 26.5GHz ~ 40GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 27905.4         | 46.24                 | -0.3      | 46.54               | V        |
| 30705.2         | 47.11                 | 0         | 47.11               | H        |
| 32799.1         | 43.11                 | 0.7       | 42.41               | V        |
| 34438.0         | 45.76                 | 1.2       | 44.56               | V        |
| 36823.4         | 47                    | 2.3       | 44.7                | V        |
| 38925.4         | 49.69                 | 3.8       | 45.89               | V        |

### 802.11n-HT40

Channel 38 ( 30MHz ~ 1GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 33.3            | 32.81                 | -22       | 54.81               | V        |
| 64.6            | 28.71                 | -23.6     | 52.31               | V        |
| 145.1           | 30.47                 | -27.9     | 58.37               | V        |

|       |       |       |       |   |
|-------|-------|-------|-------|---|
| 205.7 | 27.16 | -24.4 | 51.56 | H |
| 478.3 | 32.73 | -17.6 | 50.33 | V |
| 748.8 | 30.88 | -12.2 | 43.08 | H |

Channel 38 (1GHz ~ 8GHz ) ( Peak )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 2986.2          | 42.66           | -1.2      | 43.86         | H        |
| 4257.2          | 45.75           | 1.5       | 44.25         | H        |
| 5371.2          | 55.29           | 4.1       | 51.19         | H        |
| 5825.6          | 45.62           | 4.6       | 41.02         | V        |
| 5990.0          | 45.7            | 4.6       | 41.1          | H        |
| 7830.6          | 48.39           | 8.5       | 39.89         | V        |

Channel 38 (1GHz ~ 8GHz ) ( Average )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 5371.2          | 37.86           | 4.1       | 33.76         | H        |

Channel 38 (8GHz ~ 18GHz )( Peak )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 14796.0         | 53.81           | 20        | 33.81         | V        |
| 15847.4         | 55.25           | 21.9      | 33.35         | V        |
| 16624.2         | 56.09           | 23.1      | 32.99         | V        |
| 16842.0         | 55.63           | 23.3      | 32.33         | H        |
| 17564.6         | 57.42           | 24.6      | 32.82         | V        |
| 17945.4         | 57.41           | 24.7      | 32.71         | V        |

Channel 38 (8GHz ~ 18GHz )( Average )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 15847.4         | 43.02           | 21.9      | 21.12         | V        |
| 16624.2         | 43.48           | 23.1      | 20.38         | V        |
| 16842.0         | 43.68           | 23.3      | 20.38         | H        |

|         |       |      |       |   |
|---------|-------|------|-------|---|
| 17564.6 | 45.01 | 24.6 | 20.41 | V |
| 17945.4 | 45.01 | 24.7 | 20.31 | V |

Channel 38 (18GHz ~ 26.5GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 20774.4         | 42.09                 | -4.3      | 46.39               | H        |
| 21746.0         | 43.3                  | -3.4      | 46.7                | H        |
| 22989.5         | 45.06                 | -3        | 48.06               | V        |
| 23991.6         | 43.53                 | -2.8      | 46.33               | H        |
| 24915.6         | 45.33                 | -2.4      | 47.73               | V        |
| 25832.8         | 45.8                  | -2        | 47.8                | V        |

Channel 38 (26.5GHz ~ 40GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 28372.4         | 43.89                 | -1        | 44.89               | H        |
| 30685.0         | 45.06                 | 0         | 45.06               | H        |
| 33011.0         | 44.66                 | 1.1       | 43.56               | V        |
| 35069.8         | 46.79                 | -0.1      | 46.89               | H        |
| 36943.6         | 47.1                  | 1.7       | 45.4                | V        |
| 39037.4         | 49.8                  | 4.2       | 45.6                | V        |

**N02(ACS-L2503):**

**802.11a**

Channel 36 ( 30MHz ~1GHz )

| Frequency (MHz) | Result (dB $\mu$ V/m) | ARpl (dB) | PMea (dB $\mu$ V/m) | Polarity |
|-----------------|-----------------------|-----------|---------------------|----------|
| 34.0            | 25.17                 | -22       | 47.17               | V        |
| 36.3            | 22.07                 | -21.7     | 43.77               | V        |
| 87.1            | 20.44                 | -25.8     | 46.24               | H        |
| 153.7           | 28.62                 | -27.6     | 56.22               | H        |
| 240.0           | 32.82                 | -23.5     | 56.32               | V        |
| 662.2           | 32.22                 | -13.7     | 45.92               | H        |

## Channel 36 ( 1GHz ~ 8GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 5421.6          | 46.47           | 4.4       | 42.07         | H        |
| 5995.2          | 44.73           | 4.6       | 40.13         | V        |
| 6347.8          | 46.26           | 5.6       | 40.66         | V        |
| 7026.4          | 46.89           | 7.3       | 39.59         | V        |
| 7457.8          | 47.21           | 7.3       | 39.91         | V        |
| 7733.2          | 47.56           | 8.3       | 39.26         | H        |

## Channel 36 ( 8GHz ~ 18GHz ) (Peak)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 8965.6          | 48.12           | 10.2      | 37.92         | H        |
| 10639.6         | 50.34           | 13        | 37.34         | V        |
| 11834.2         | 50.87           | 15.1      | 35.77         | V        |
| 13453.2         | 53.96           | 17.8      | 36.16         | H        |
| 15533.2         | 58.94           | 21.2      | 37.74         | V        |
| 17572.0         | 57.12           | 24.6      | 32.52         | H        |

## Channel 36 ( 8GHz ~ 18GHz )(Average)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 15533.2         | 44.26           | 21.2      | 23.06         | V        |
| 17572.0         | 44.73           | 24.6      | 20.13         | H        |

## Channel 36 ( 18GHz ~ 26.5GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 20102.0         | 41.32           | -4.8      | 46.12         | H        |
| 21336.2         | 42.89           | -3.6      | 46.49         | H        |
| 22437.8         | 44.76           | -3.3      | 48.06         | H        |
| 23657.6         | 43.9            | -2.8      | 46.7          | H        |
| 24766.8         | 45.5            | -2.2      | 47.7          | H        |

|         |       |    |       |   |
|---------|-------|----|-------|---|
| 26064.0 | 46.63 | -2 | 48.63 | H |
|---------|-------|----|-------|---|

Channel 36 ( 26.5GHz ~ 40GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 28403.5         | 43.75           | -1.1      | 44.85         | H        |
| 31794.7         | 44.3            | 0.5       | 43.8          | H        |
| 34366.4         | 45.74           | 1.5       | 44.24         | V        |
| 35844.7         | 46.73           | 1         | 45.73         | V        |
| 36905.8         | 47.42           | 1.8       | 45.62         | H        |
| 39098.2         | 51.37           | 4.2       | 47.17         | H        |

**N02(ACS-L2503):**

**802.11a**

Channel 36 ( 30MHz ~1GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 33.8            | 21.7            | -22       | 43.7          | V        |
| 81.8            | 32.98           | -26.9     | 59.88         | H        |
| 114.4           | 31.65           | -24.7     | 56.35         | V        |
| 376.4           | 30.38           | -20       | 50.38         | V        |
| 652.3           | 34.19           | -13.7     | 47.89         | V        |
| 798.9           | 31.26           | -11.6     | 42.86         | V        |

Channel 36 ( 1GHz ~ 8GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 2993.0          | 42.52           | -1.3      | 43.82         | H        |
| 4995.2          | 47.54           | 2.2       | 45.34         | H        |
| 5378.8          | 49.48           | 4.1       | 45.38         | H        |
| 5796.4          | 45.84           | 4.6       | 41.24         | H        |
| 6556.2          | 47.18           | 6.2       | 40.98         | H        |
| 7214.2          | 46.09           | 7.3       | 38.79         | H        |

Channel 36 ( 8GHz ~ 18GHz ) (Peak)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 10365.8         | 49.95           | 12.5      | 37.45         | V        |
| 12393.0         | 52.44           | 16.2      | 36.24         | H        |
| 13781.4         | 53.74           | 18.8      | 34.94         | H        |
| 15036.6         | 54.57           | 20.4      | 34.17         | V        |
| 15428.2         | 54.89           | 21.1      | 33.79         | V        |
| 16994.0         | 57.04           | 23.7      | 33.34         | V        |

Channel 36 ( 8GHz ~ 18GHz )(Average)

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 15036.6         | 42.58           | 20.4      | 22.18         | V        |
| 15428.2         | 42.59           | 21.1      | 21.49         | V        |
| 16994.0         | 44.53           | 23.7      | 20.83         | V        |

Channel 36 ( 18GHz ~ 26.5GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 19028.5         | 39.77           | -5.5      | 45.27         | V        |
| 20589.1         | 40.94           | -4.4      | 45.34         | H        |
| 21689.8         | 43.18           | -3.4      | 46.58         | V        |
| 23067.7         | 44.24           | -3        | 47.24         | H        |
| 24369.9         | 44.38           | -2.8      | 47.18         | V        |
| 25556.5         | 45.56           | -2.7      | 48.26         | H        |

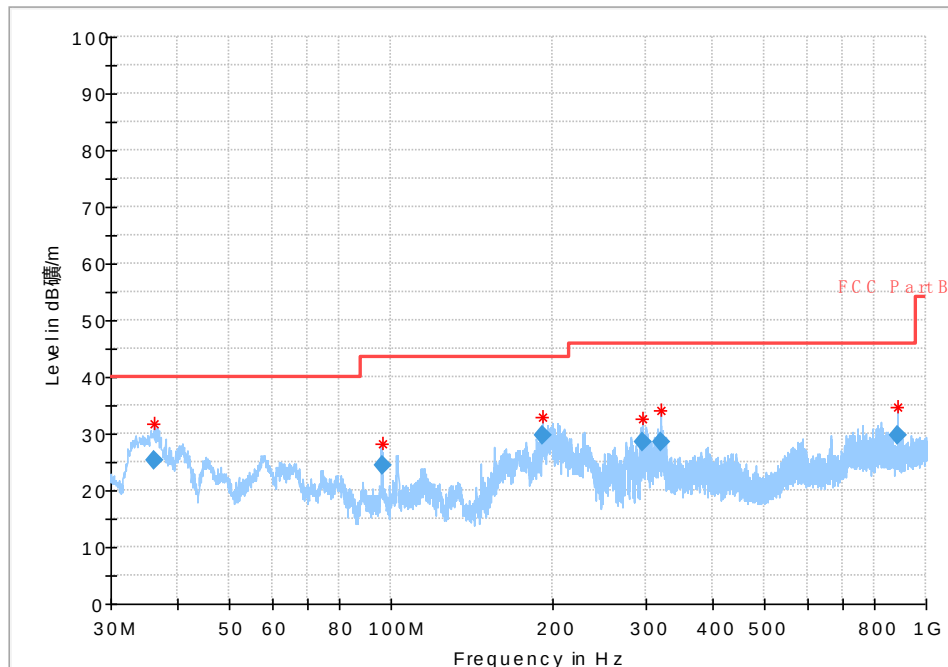
Channel 36 ( 26.5GHz ~ 40GHz )

| Frequency (MHz) | Result (dBμV/m) | ARpl (dB) | PMea (dBμV/m) | Polarity |
|-----------------|-----------------|-----------|---------------|----------|
| 27175.0         | 45.05           | -1        | 46.05         | V        |
| 30797.0         | 45.65           | 0.2       | 45.45         | H        |
| 33449.8         | 45.1            | 1.2       | 43.9          | H        |
| 35342.5         | 47.26           | 1.5       | 45.76         | H        |
| 36901.8         | 45.89           | 1.9       | 43.99         | H        |

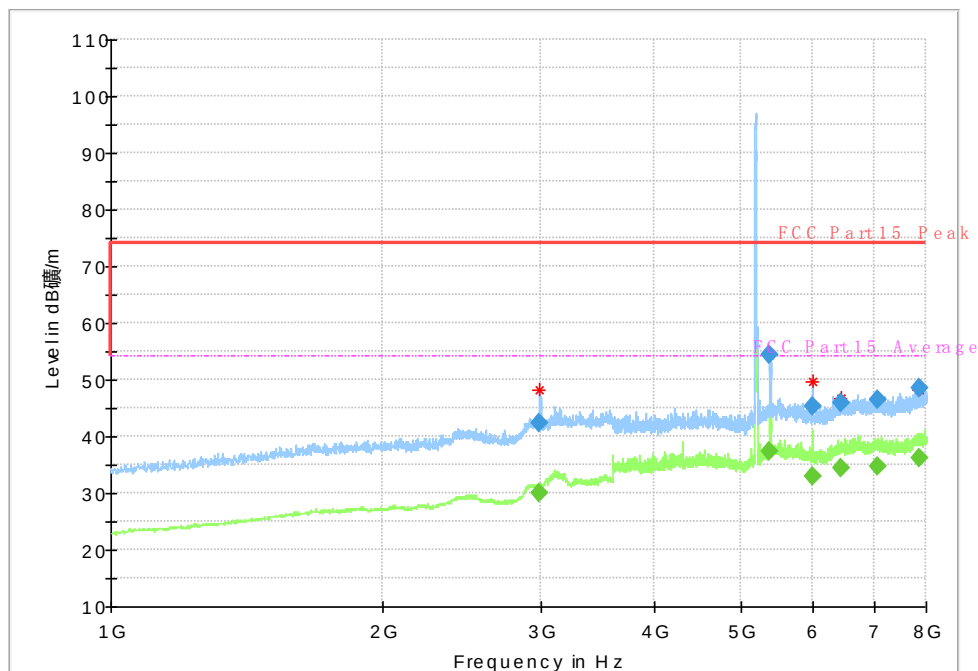
|         |       |     |       |   |
|---------|-------|-----|-------|---|
| 39778.6 | 52.19 | 5.3 | 46.89 | H |
|---------|-------|-----|-------|---|

Test graphs as below:

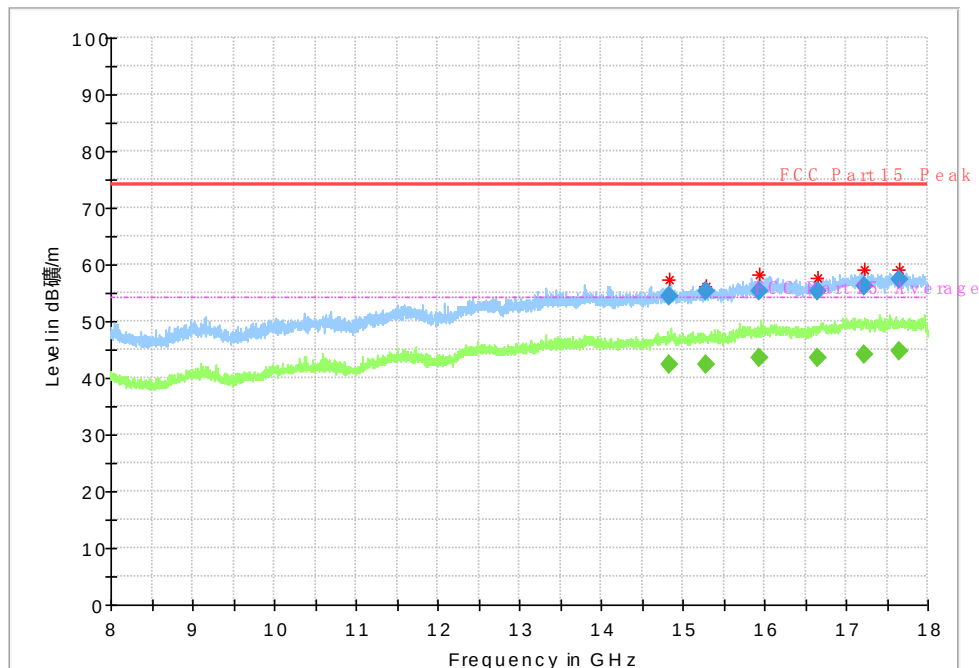
N02(ACS-L2503):



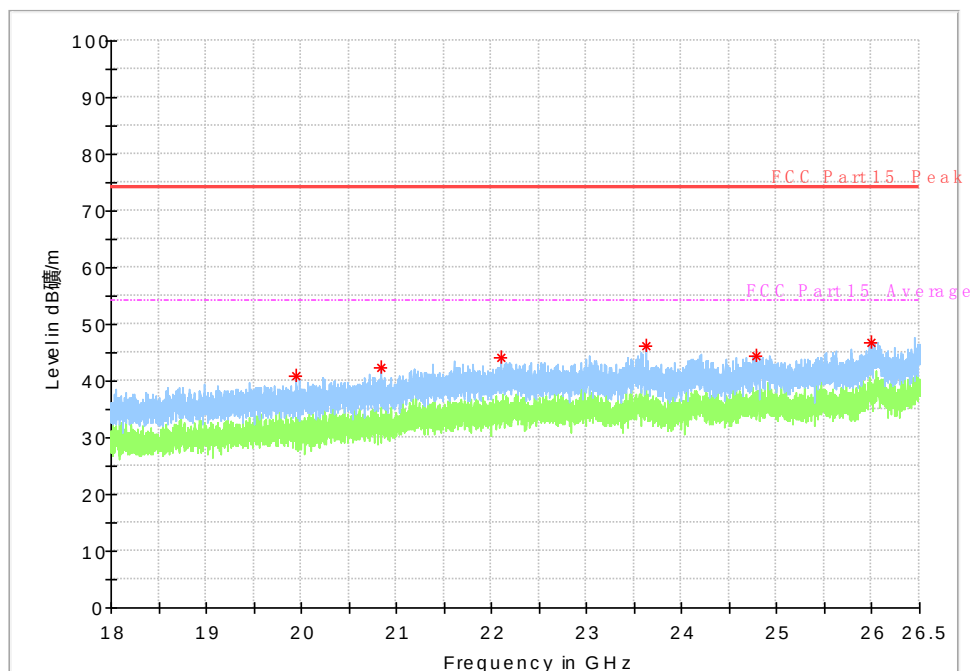
**Fig. 41 Radiated Spurious Emission (802.11a, ch36, 30 MHz-1 GHz)**



**Fig. 42 Radiated Spurious Emission (802.11a, ch36, 1 GHz-8 GHz)**

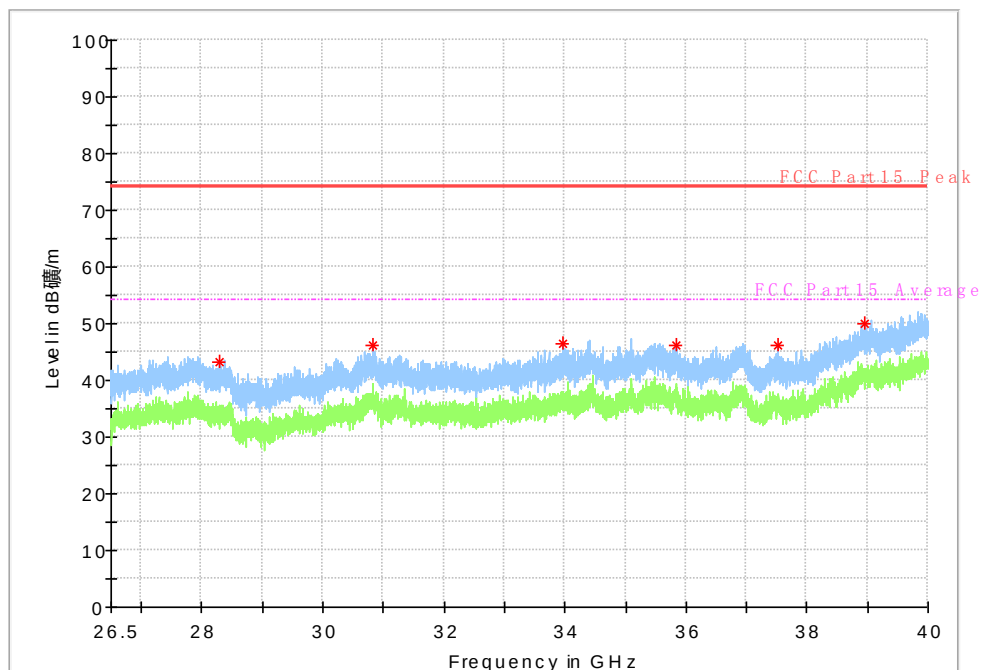


**Fig. 43 Radiated Spurious Emission (802.11a, ch36, 8 GHz-18 GHz)**

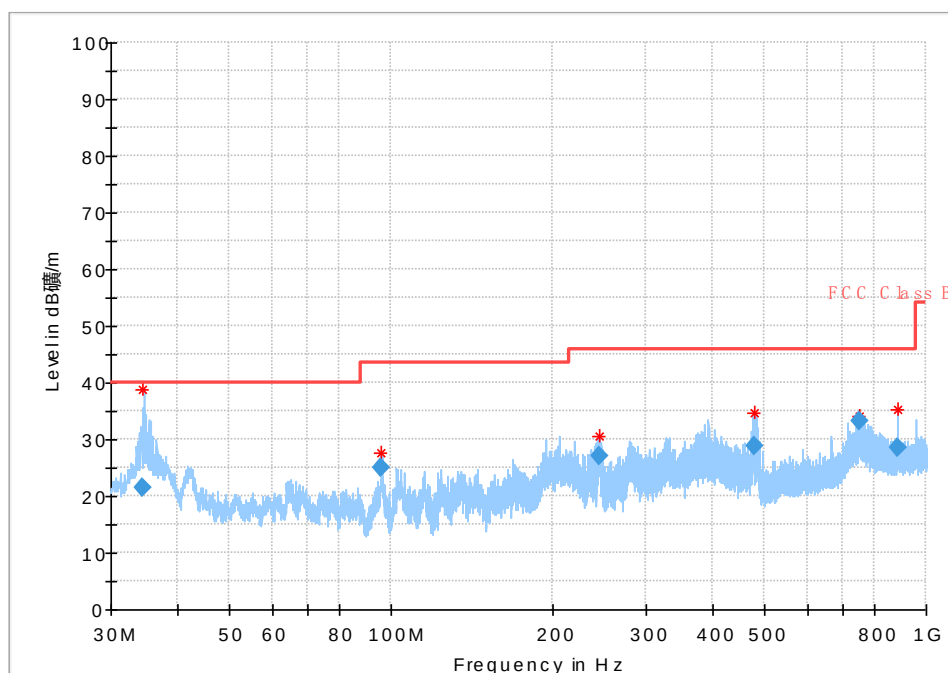


**Fig. 44 Radiated Spurious Emission (802.11a, ch36, 18 GHz-26.5 GHz)**

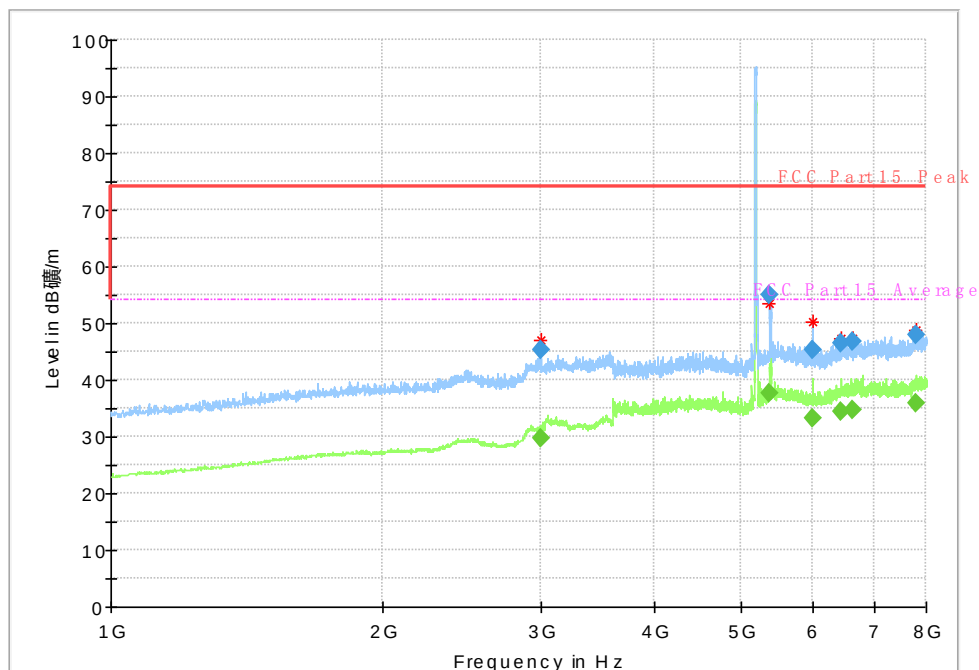




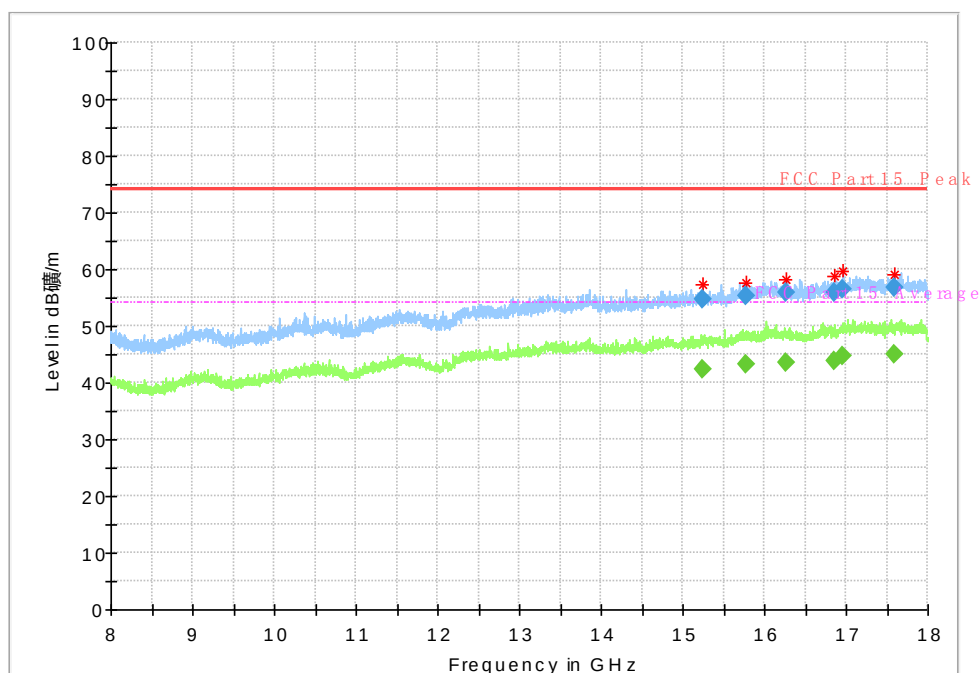
**Fig. 45 Radiated Spurious Emission (802.11a, ch36, 26.5 GHz-40 GHz)**



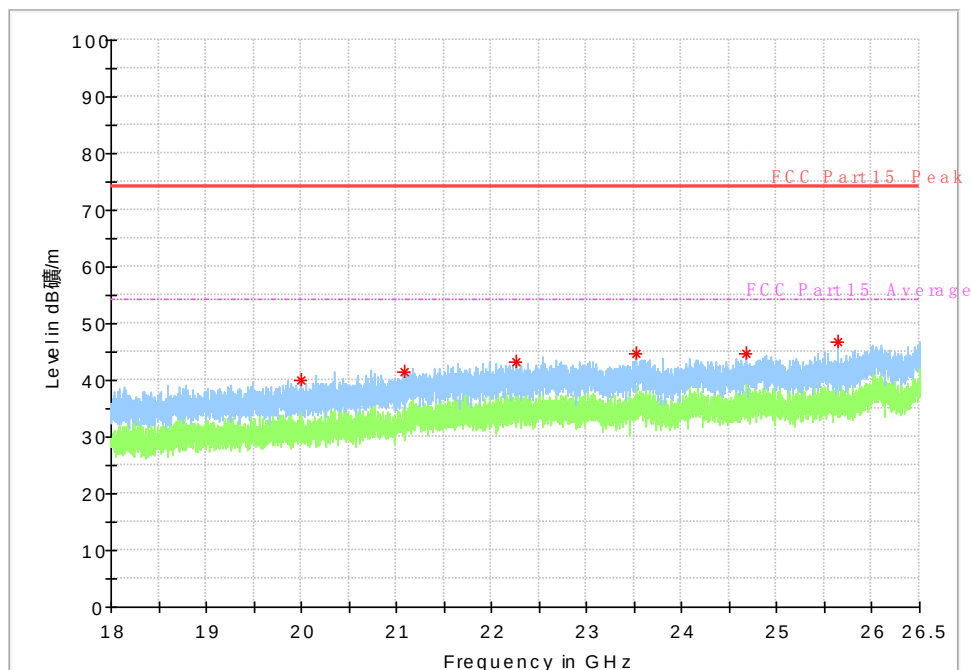
**Fig. 46 Radiated Spurious Emission (802.11n-HT20, ch36, 30 MHz-1 GHz)**



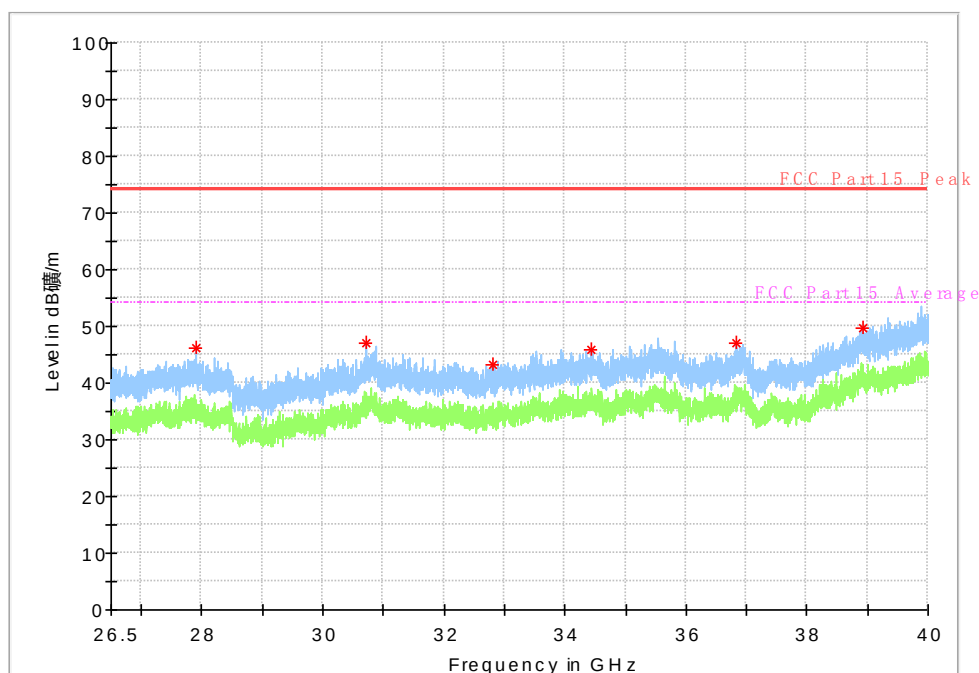
**Fig. 47 Radiated Spurious Emission (802.11n-HT20, ch36, 1 GHz-8 GHz)**



**Fig. 48 Radiated Spurious Emission (802.11n-HT20, ch36, 8 GHz-18 GHz)**



**Fig. 49 Radiated Spurious Emission (802.11n-HT20, ch36, 18 GHz-26.5 GHz)**



**Fig. 50 Radiated Spurious Emission (802.11n-HT20, ch36, 26.5 GHz-40 GHz)**

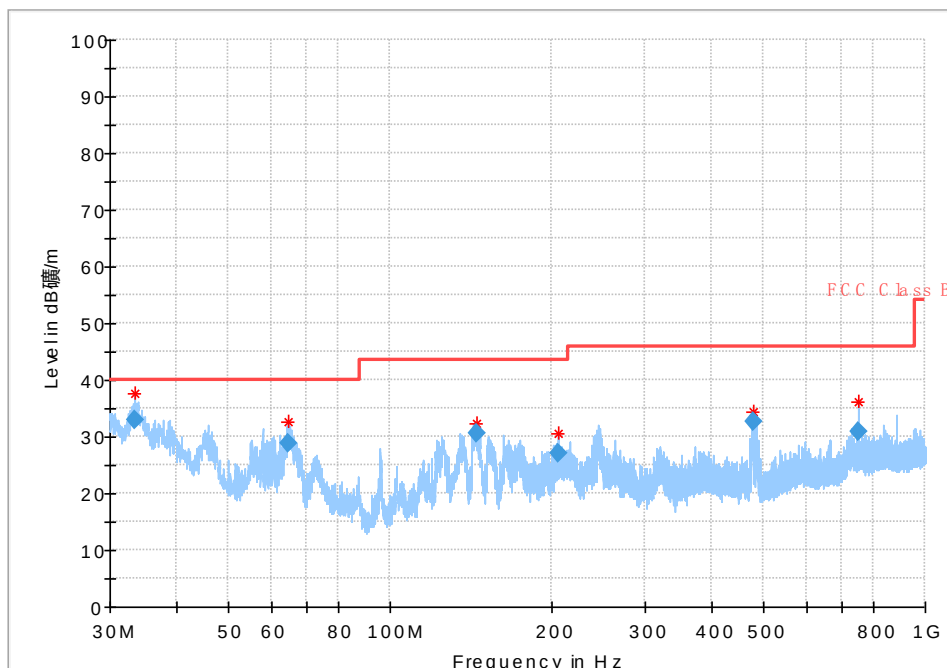


Fig. 51 Radiated Spurious Emission (802.11n-HT40, ch38, 30 MHz-1 GHz)

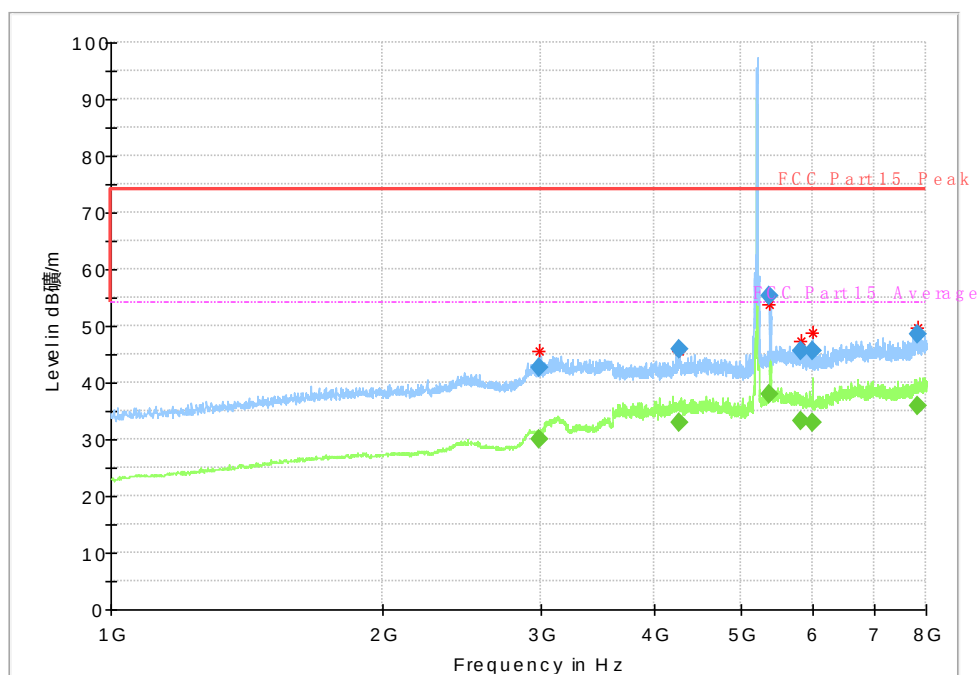
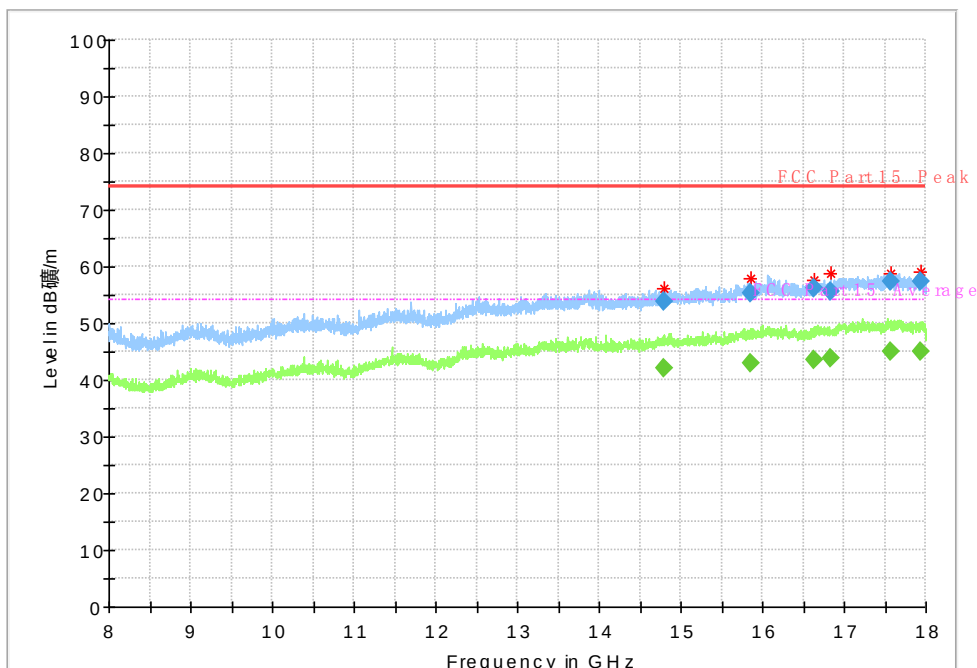
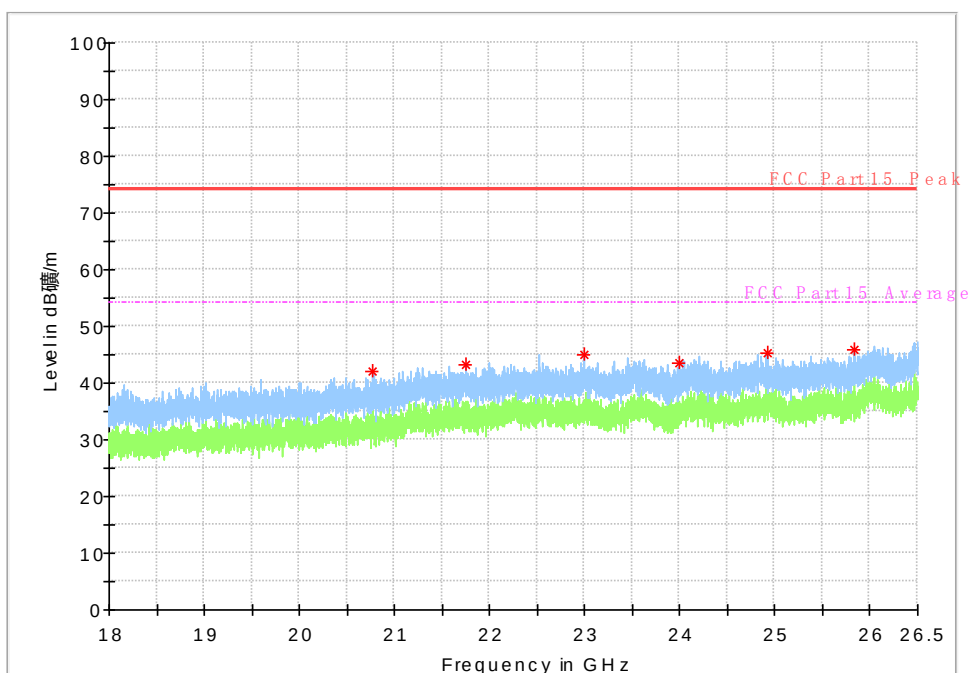


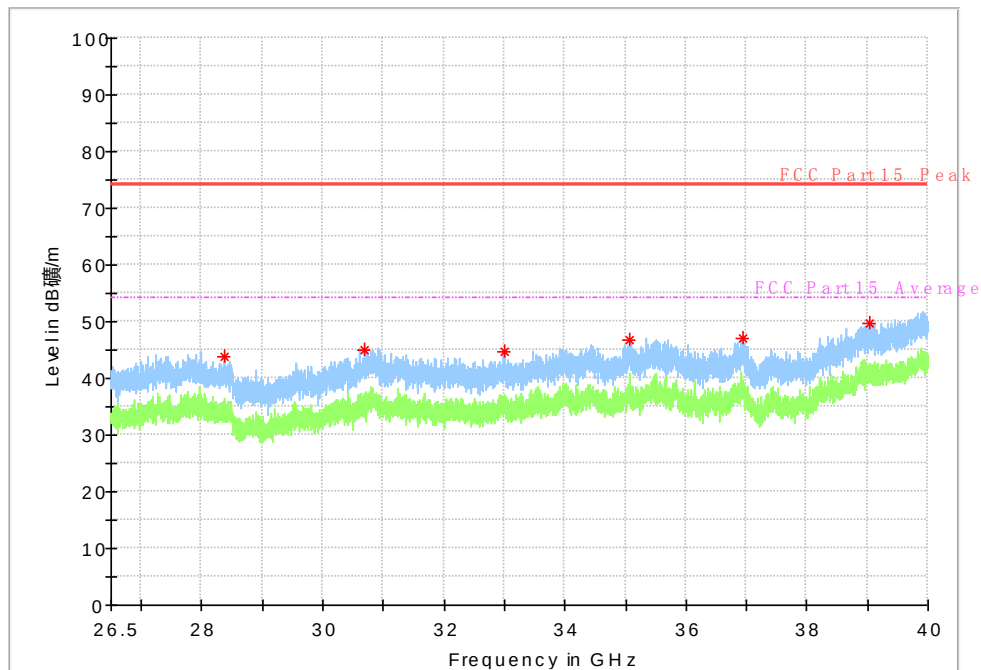
Fig. 52 Radiated Spurious Emission (802.11n-HT40, ch38, 1 GHz-8 GHz)



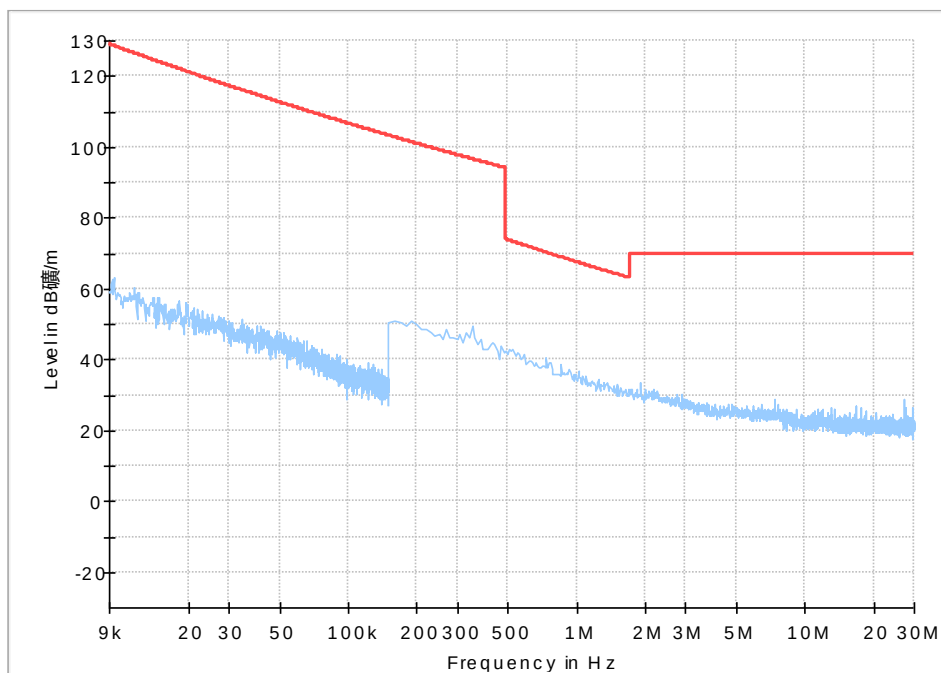
**Fig. 53 Radiated Spurious Emission (802.11n-HT40, ch38, 8 GHz-18 GHz)**



**Fig. 54 Radiated Spurious Emission (802.11n-HT40, ch38, 18 GHz-26.5 GHz)**

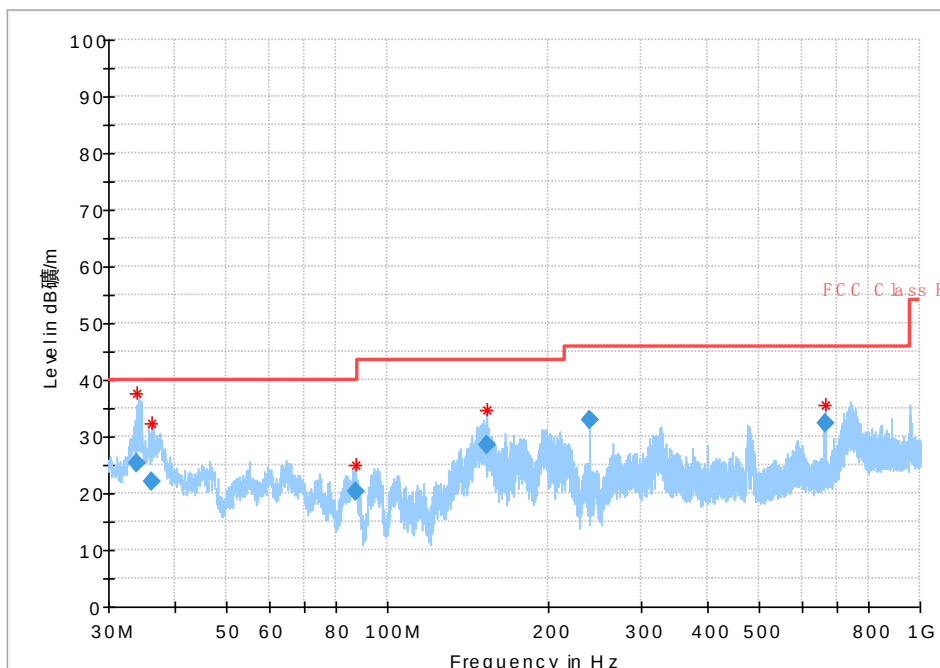


**Fig. 55 Radiated Spurious Emission (802.11n-HT40, ch38, 26.5 GHz-40 GHz)**

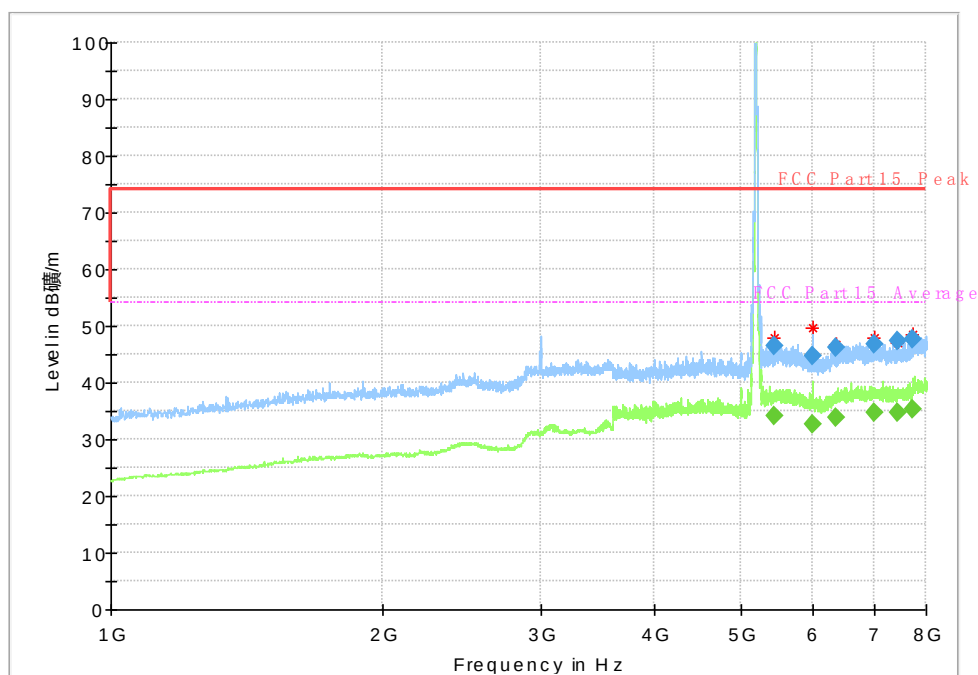


**Fig. 56 Radiated Spurious Emission (9kHz-30MHz)**

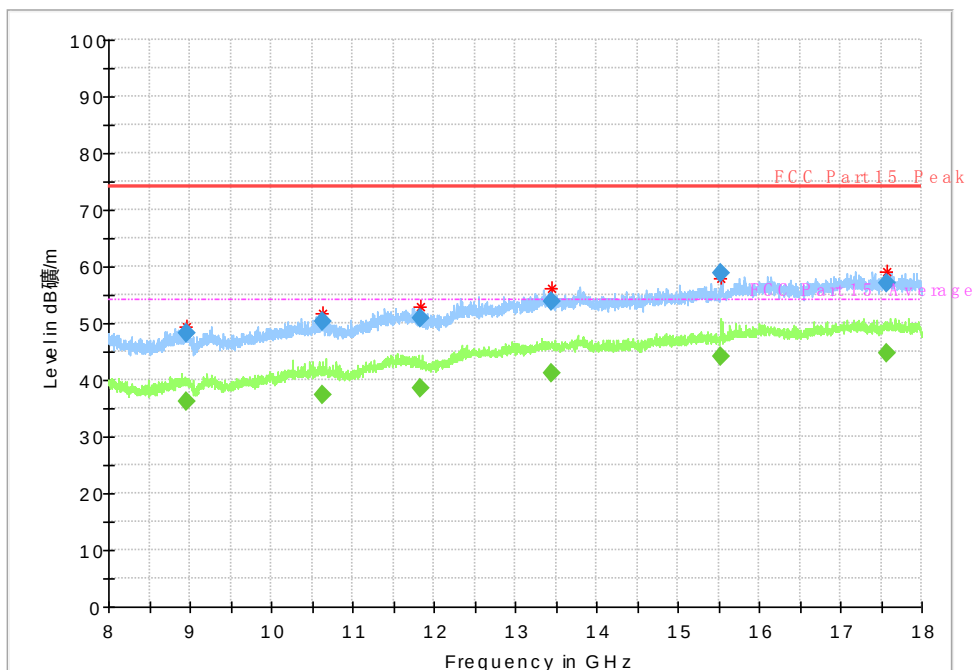
**N01(ACS-L2503):**



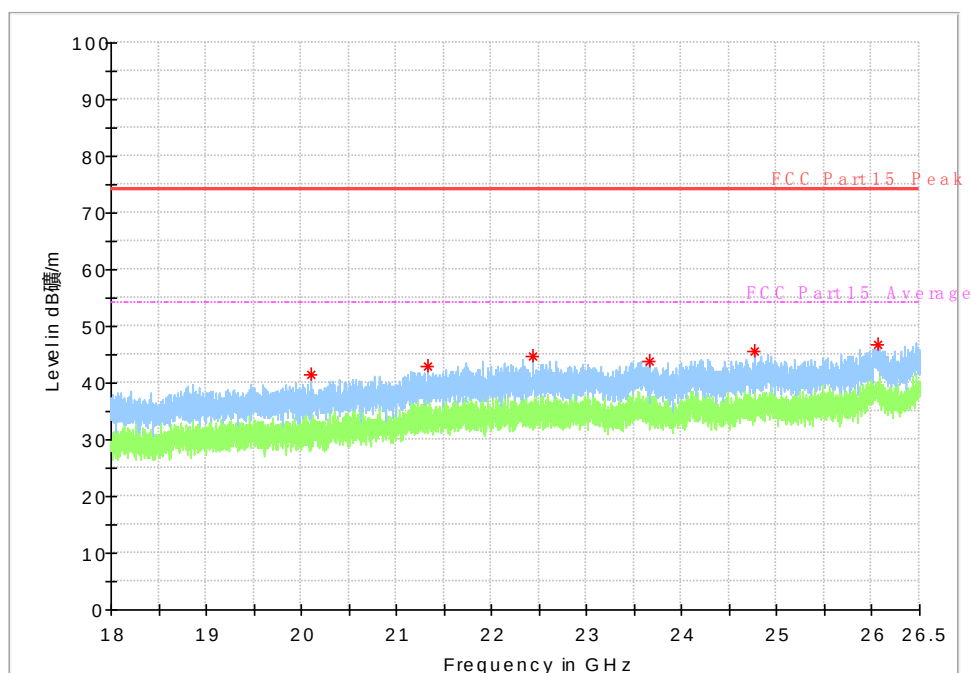
**Fig. 57 Radiated Spurious Emission (802.11a, ch36, 30 MHz-1 GHz)**



**Fig. 58 Radiated Spurious Emission (802.11a, ch36, 1 GHz-8 GHz)**

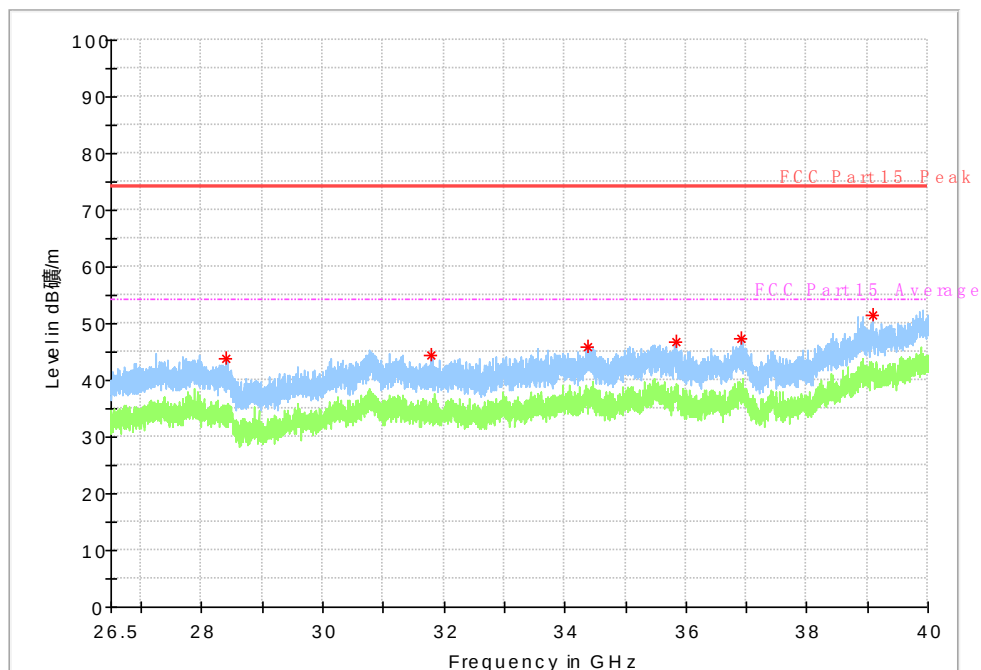


**Fig. 59 Radiated Spurious Emission (802.11a, ch36, 8 GHz-18 GHz)**

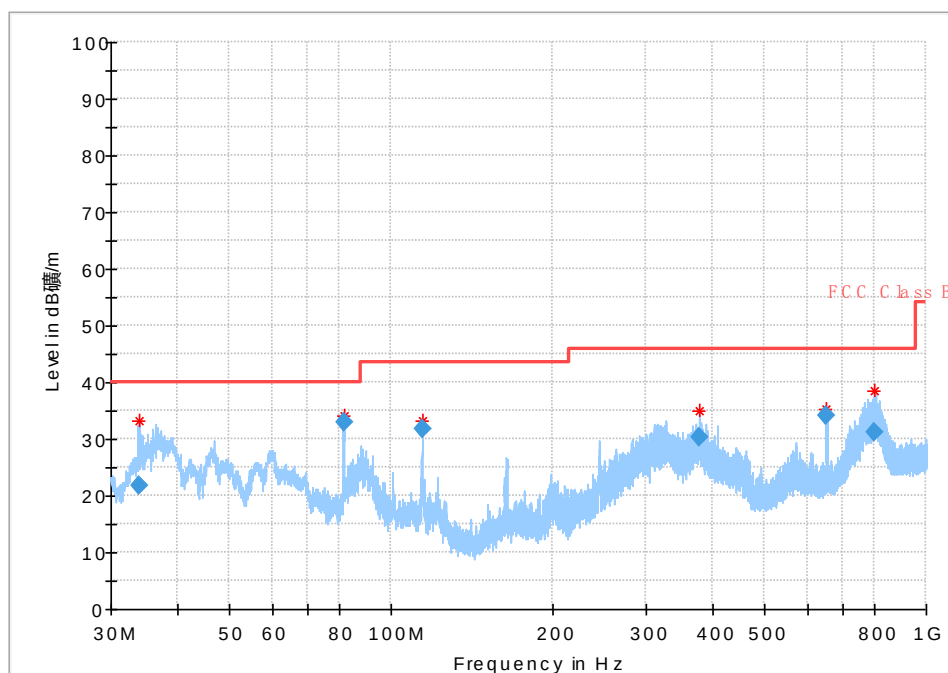


**Fig. 60 Radiated Spurious Emission (802.11a, ch36, 18 GHz-26.5 GHz)**

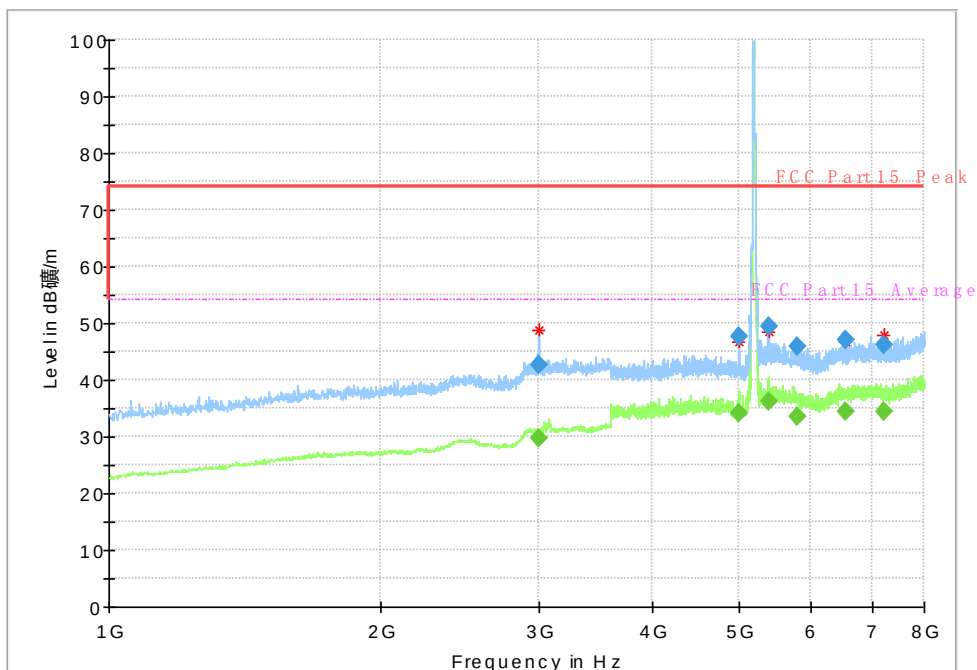




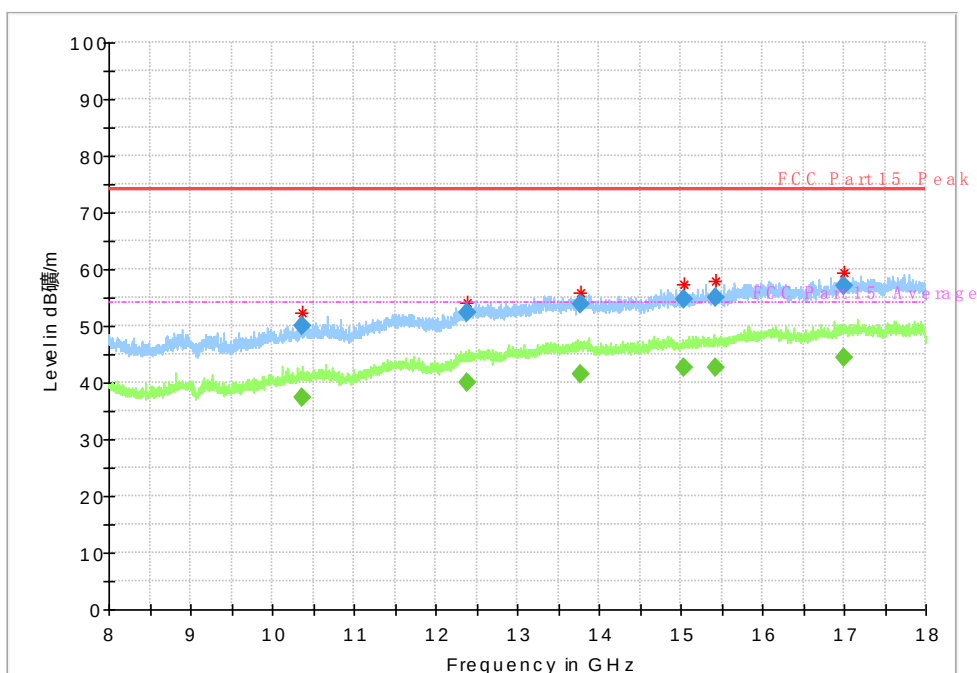
**Fig. 61 Radiated Spurious Emission (802.11a, ch36, 26.5 GHz-40 GHz)**  
N03(ACS-L2503):



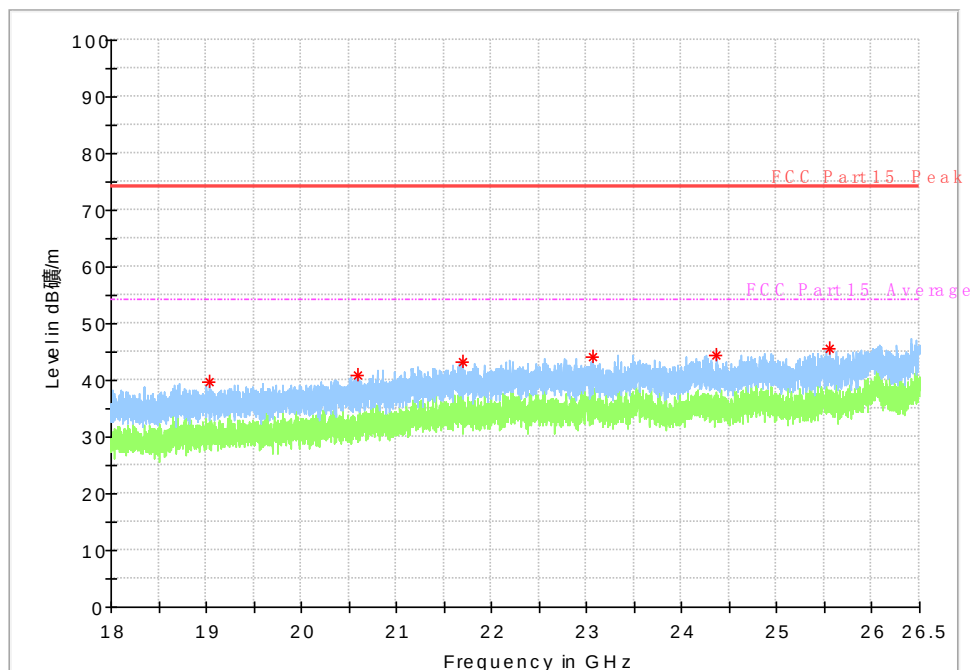
**Fig. 62 Radiated Spurious Emission (802.11a, ch36, 30 MHz-1 GHz)**



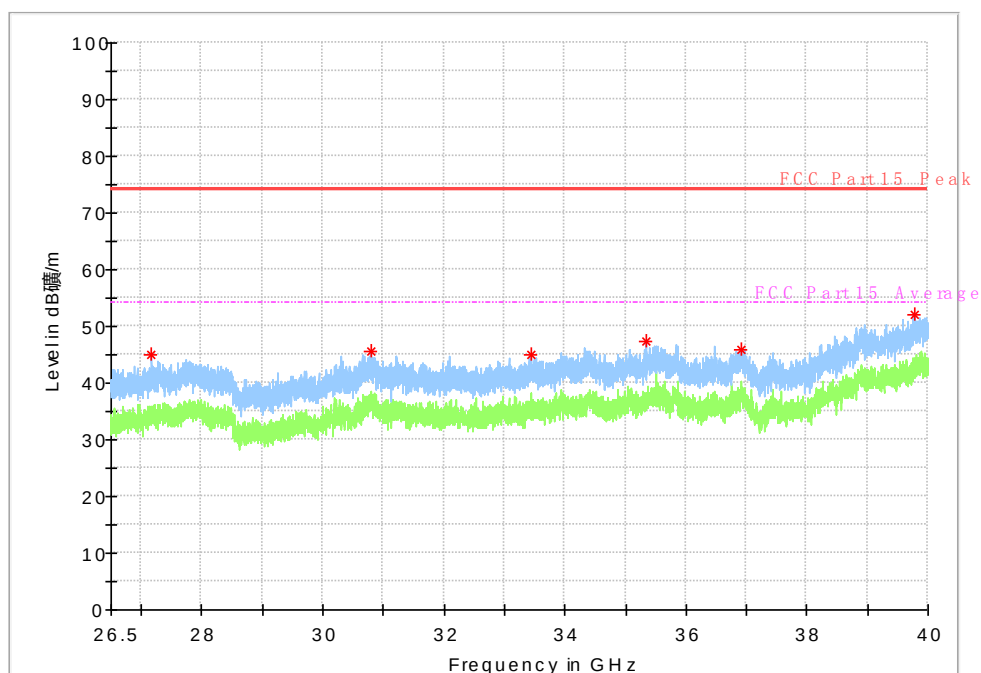
**Fig. 63 Radiated Spurious Emission (802.11a, ch36, 1 GHz-8 GHz)**



**Fig. 64 Radiated Spurious Emission (802.11a, ch36, 8 GHz-18 GHz)**



**Fig. 65 Radiated Spurious Emission (802.11a, ch36, 18 GHz-26.5 GHz)**



**Fig. 66 Radiated Spurious Emission (802.11a, ch36, 26.5 GHz-40 GHz)**

## 6.8. Conducted Emission (150kHz- 30MHz)

### Test Condition:

| Voltage (V) | Frequency (Hz) |
|-------------|----------------|
| 110         | 60             |

### Measurement Result and limit:

WLAN (Quasi-peak Limit)

| Frequency range<br>(MHz) | Quasi-peak<br>Limit (dBμV) | Result (dBμV) |      | Conclusion |
|--------------------------|----------------------------|---------------|------|------------|
|                          |                            | With charger  |      |            |
|                          |                            | 11a mode      | Idle |            |
| 0.15 to 0.5              | 66 to 56                   | Fig.67        |      | P          |
| 0.5 to 5                 | 56                         |               |      |            |
| 5 to 30                  | 60                         |               |      |            |

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

WLAN (Average Limit)

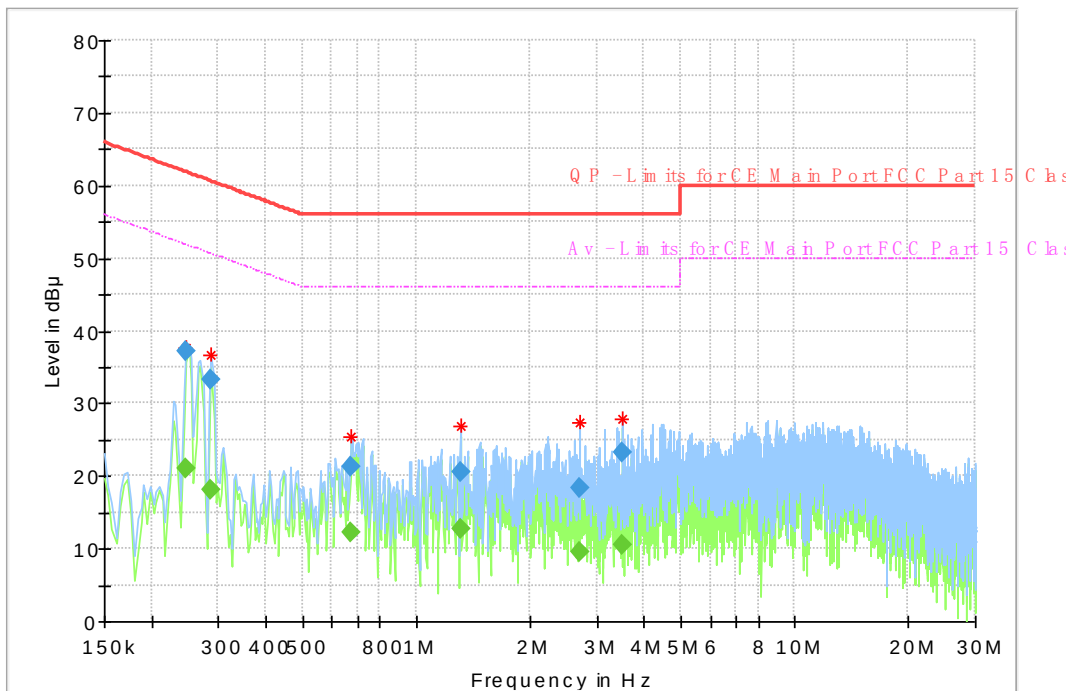
| Frequency range<br>(MHz) | Average Limit<br>(dBμV) | Result (dBμV) |      | Conclusion |
|--------------------------|-------------------------|---------------|------|------------|
|                          |                         | With charger  |      |            |
|                          |                         | 11a mode      | Idle |            |
| 0.15 to 0.5              | 56 to 46                | Fig.67        |      | P          |
| 0.5 to 5                 | 46                      |               |      |            |
| 5 to 30                  | 50                      |               |      |            |

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

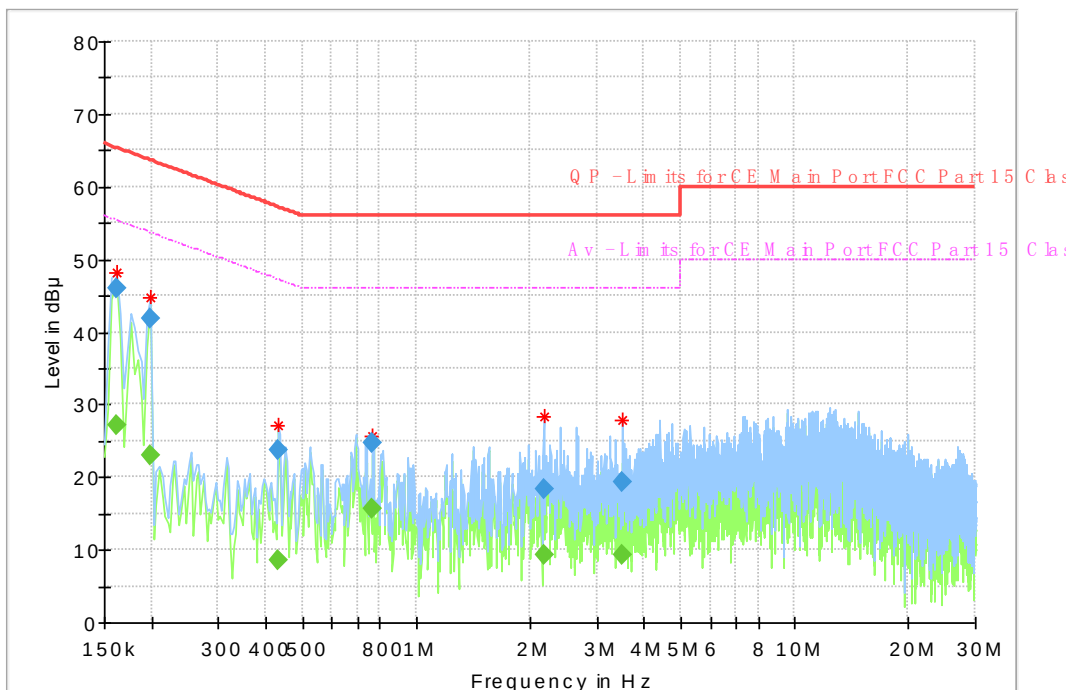
**Conclusion: PASS**

Test graphs as below:

### N02(ACS-L2503):



### N01(ACS-L2501):



N03(ACS-L2502):

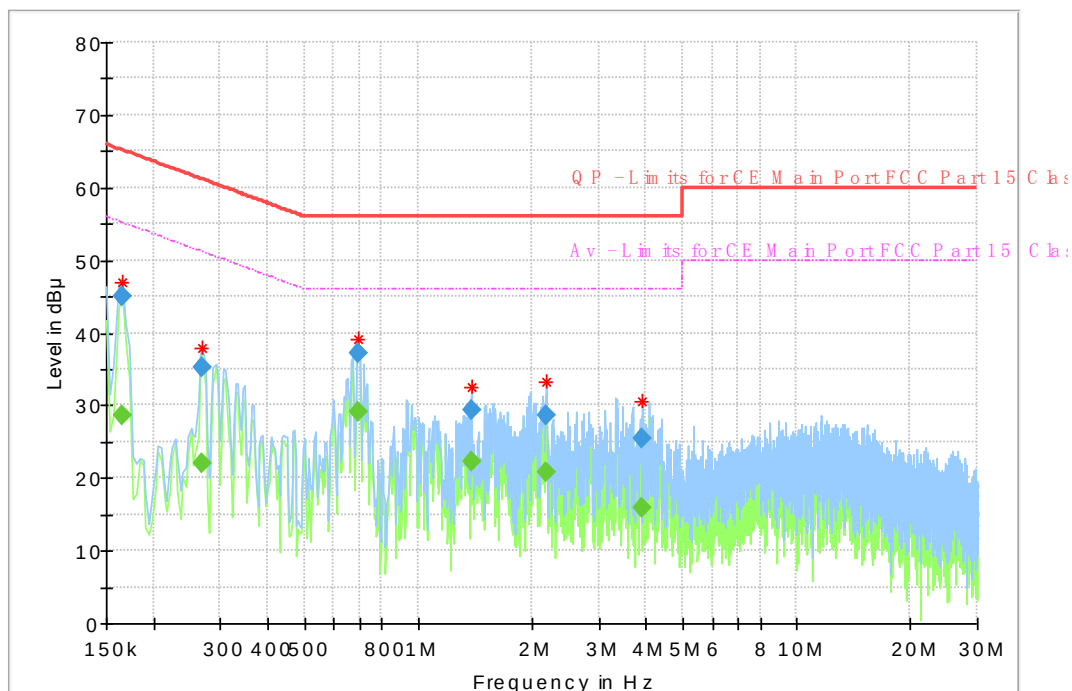


Fig. 67 Conducted Emission(802.11a, TX)

Measurement Result:

N02(ACS-L2503):

| Frequency (MHz) | Quasi Peak (dBμV) | Average (dBμV) | Limit (dBμV) | Marg in (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|--------------|--------------|-----------------|-----------------|------|--------|------------|
| 0.247013        | 37.18             | ---            | 61.86        | 24.6         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.247013        | ---               | 21.12          | 51.86        | 30.7         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.288056        | 33.37             | ---            | 60.58        | 27.2         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.288056        | ---               | 18.02          | 50.58        | 32.5         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.672375        | 21.40             | ---            | 56.00        | 34.6         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.672375        | ---               | 12.25          | 46.00        | 33.7         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 1.306688        | 20.44             | ---            | 56.00        | 35.5         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 1.306688        | ---               | 12.64          | 46.00        | 33.3         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.698444        | ---               | 9.53           | 46.00        | 36.4         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 2.698444        | 18.45             | ---            | 56.00        | 37.5         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.504394        | ---               | 10.43          | 46.00        | 35.5         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.504394        | 23.18             | ---            | 56.00        | 32.8         | 1000.0          | 9.000           | L1   | ON     | 9.7        |

**N01(ACS-L2501):**

| Frequency (MHz) | Quasi Peak (dBμV) | Average (dBμV) | Limit (dBμV) | Marg in (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|--------------|--------------|-----------------|-----------------|------|--------|------------|
| 0.161194        | ---               | 27.10          | 55.40        | 28.3         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.161194        | 46.02             | ---            | 65.40        | 19.3         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.198506        | ---               | 22.98          | 53.67        | 30.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.198506        | 41.95             | ---            | 63.67        | 21.7         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.433575        | ---               | 8.53           | 47.18        | 38.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.433575        | 23.72             | ---            | 57.18        | 33.4         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.765656        | 24.72             | ---            | 56.00        | 31.2         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.765656        | ---               | 15.66          | 46.00        | 30.3         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 2.168606        | 18.40             | ---            | 56.00        | 37.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 2.168606        | ---               | 9.25           | 46.00        | 36.7         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.500663        | ---               | 9.18           | 46.00        | 36.8         | 1000.0          | 9.000           | N    | ON     | 9.8        |
| 3.500663        | 19.35             | ---            | 56.00        | 36.6         | 1000.0          | 9.000           | N    | ON     | 9.8        |

**N03(ACS-L2502):**

| Frequency (MHz) | Quasi Peak (dBμV) | Average (dBμV) | Limit (dBμV) | Marg in (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | Filter | Corr. (dB) |
|-----------------|-------------------|----------------|--------------|--------------|-----------------|-----------------|------|--------|------------|
| 0.164925        | ---               | 28.67          | 55.21        | 26.5         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.164925        | 44.96             | ---            | 65.21        | 20.2         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.269400        | ---               | 21.94          | 51.14        | 29.2         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.269400        | 35.24             | ---            | 61.14        | 25.9         | 1000.0          | 9.000           | N    | ON     | 9.7        |
| 0.694763        | 37.31             | ---            | 56.00        | 18.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 0.694763        | ---               | 29.06          | 46.00        | 16.9         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 1.381313        | 29.39             | ---            | 56.00        | 26.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 1.381313        | ---               | 22.37          | 46.00        | 23.6         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 2.179800        | 28.73             | ---            | 56.00        | 27.2         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 2.179800        | ---               | 20.86          | 46.00        | 25.1         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.918563        | 25.51             | ---            | 56.00        | 30.4         | 1000.0          | 9.000           | L1   | ON     | 9.7        |
| 3.918563        | ---               | 15.86          | 46.00        | 30.1         | 1000.0          | 9.000           | L1   | ON     | 9.7        |

## **6.9. Frequency Stability**

Manufacturers ensured the EUT meet the requirement of frequency stability, such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

## **6.10. Power control**

A Transmission Power Control mechanism is not required for systems with an e.i.r.p. of less than 27dBm (500 mW).



## 7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

### Conducted test system

| No. | Equipment                            | Model    | Serial Number | Manufacturer  | Calibration date | Cal.interval |
|-----|--------------------------------------|----------|---------------|---------------|------------------|--------------|
| 1   | Vector Signal Analyzer               | FSQ40    | 200063        | Rohde&Schwarz | 2018-12-17       | 1 Year       |
| 2   | DC Power Supply                      | ZUP60-14 | LOC-220Z006   | TDL-Lambda    | 2018-05-11       | 1 Year       |
| 3   | Universal Radio Communication Tester | CMW50    | 104178        | R&S           | 2018-05-11       | 1 Year       |

### Radiated emission test system

| No. | Equipment                            | Model    | Serial Number | Manufacturer | Calibration date | Cal.interval |
|-----|--------------------------------------|----------|---------------|--------------|------------------|--------------|
| 1   | Universal Radio Communication Tester | CMU200   | 123123        | R&S          | 2018-05-11       | 1 Year       |
| 2   | EMI Test Receiver                    | ESU40    | 100307        | R&S          | 2018-05-11       | 1 Year       |
| 3   | TRILOG Broadband Antenna             | VULB9163 | VULB9163-515  | Schwarzbeck  | 2017-02-25       | 3 Year       |
| 4   | Double-ridged Waveguide Antenna      | ETS-3117 | 00135890      | ETS          | 2017-01-11       | 3 Year       |
| 5   | 2-Line V-Network                     | ENV216   | 101380        | R&S          | 2018-05-11       | 1 Year       |

|   |              |         |        |           |            |        |
|---|--------------|---------|--------|-----------|------------|--------|
| 6 | Loop Antenna | AL-130R | 121083 | COM-POWER | 2016-11-21 | 3 Year |
|---|--------------|---------|--------|-----------|------------|--------|

### Anechoic chamber

Fully anechoic chamber by Frankonia German.

## 8. Test Environment

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 20 %, Max. = 75 %   |
| Shielding effectiveness  | > 100 dB                   |
| Ground system resistance | < 0.5 Ω                    |

**Control room** did not exceed following limits along the EMC testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. =25 %, Max. = 75 %    |
| Shielding effectiveness  | > 100 dB                   |
| Electrical insulation    | > 10 kΩ                    |
| Ground system resistance | < 0.5 Ω                    |

**Fully-anechoic chamber1** (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

|                              |                                            |
|------------------------------|--------------------------------------------|
| Temperature                  | Min. = 15 °C, Max. = 35 °C                 |
| Relative humidity            | Min. = 25 %, Max. = 75 %                   |
| Shielding effectiveness      | > 100 dB                                   |
| Electrical insulation        | > 10 kΩ                                    |
| Ground system resistance     | < 0.5 Ω                                    |
| VSWR                         | Between 0 and 6 dB, from 1GHz to 18GHz     |
| Site Attenuation Deviation   | Between -4 and 4 dB,30MHz to 1GHz          |
| Uniformity of field strength | Between 0 and 6 dB, from 80MHz to 3000 MHz |

## 9. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in ECIT documents. The detailed measurement uncertainty to see the column, k=2

| Measurement Items                      | Range              | Confidence Level | Calculated Uncertainty |
|----------------------------------------|--------------------|------------------|------------------------|
| Peak Output Power-Conducted            | 2412MHz-2462MHz    | 95%              | $\pm 0.544\text{dB}$   |
| Peak Power Spectral Density            | 2412MHz-2462MHz    | 95%              | $\pm 0.544\text{dB}$   |
| Occupied 6dB Bandwidth                 | 2412MHz-2462MHz    | 95%              | $\pm 62.04\text{Hz}$   |
| Frequency Band Edges-Conducted         | 2412MHz-2462MHz    | 95%              | $\pm 0.544\text{dB}$   |
| Conducted Emission                     | 30MHz-2GHz         | 95%              | $\pm 0.90\text{dB}$    |
| Conducted Emission                     | 2GHz-3.6GHz        | 95%              | $\pm 0.88\text{dB}$    |
| Conducted Emission                     | 3.6GHz-8GHz        | 95%              | $\pm 0.96\text{dB}$    |
| Conducted Emission                     | 8GHz-20GHz         | 95%              | $\pm 0.94\text{dB}$    |
| Conducted Emission                     | 20GHz-22GHz        | 95%              | $\pm 0.88\text{dB}$    |
| Conducted Emission                     | 22GHz-26GHz        | 95%              | $\pm 0.86\text{dB}$    |
| Transmitter Spurious Emission-Radiated | 9KHz-30MHz         | 95%              | $\pm 5.66\text{dB}$    |
| Transmitter Spurious Emission-Radiated | 30MHz-1000MHz      | 95%              | $\pm 4.98\text{dB}$    |
| Transmitter Spurious Emission-Radiated | 1000MHz -18000MHz  | 95%              | $\pm 5.06\text{dB}$    |
| Transmitter Spurious Emission-Radiated | 18000MHz -40000MHz | 95%              | $\pm 5.20\text{dB}$    |
| AC Power line Conducted Emission       | 0.15MHz-30MHz      | 95%              | $\pm 3.66\text{ dB}$   |

## **ANNEX A. Detailed Test Results**

### **Annex A.1. Main Terms**

|            |                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------|
| Verdict    | Verdict of each test cases.                                                                                    |
| Test cases | Test cases identification number and description in ETSI EN 300 328 test specification and ETSI specification. |

### **Annex A.2. Terms used in Condition column**

|      |                    |
|------|--------------------|
| Tnom | Normal temperature |
| Tmin | Low Temperature    |
| Tmax | High Temperature   |
| Vnom | Normal Voltage     |
| Vmin | Low Voltage        |
| Vmax | High Voltage       |
| Hnom | Norm Humidity      |
| Anom | Norm Air Pressure  |

### **Annex A.3. Terms used in Verdict column**

|    |                                                                                |
|----|--------------------------------------------------------------------------------|
| P  | Pass, the EUT complies with the essential requirements in the standard.        |
| NM | Not measure, the test was not measured by ECIT.                                |
| NA | Not applicable, the test was not applicable.                                   |
| F  | Fail, the EUT does not comply with the essential requirements in the standard. |

### **Annex A.4. Terms used in Note column**

|          |                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------|
| EUT ID   | EUT ID (e.g N01, N02.....) is used to identify the EUT tested used for each test cases as specified in section 3 of this test report. |
| Lab Code | Lab code is used to identify the subcontracted lab if this test cases is performed in the subcontracted lab.                          |

Subcontracted test lab code: N/A

## ANNEX B. Accreditation Certificate



\*\*\*\*\*END OF REPORT\*\*\*\*\*