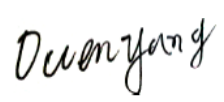


# Test Report of FCC CFR 47 Part 15 Subpart E

## On Behalf of

**Shenzhen Raysgem Electronic Science and Technology Co., LTD**  
4/5F, Bldg 2, BaoNan Rd. Industrial Park, Nanyue Communities, LongGang,  
Shenzhen, China

|                 |                                                                                                                                                                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:   | <b>LOONA</b>                                                                                                                                                                                                                                                                        |
| Model/Type No.: | <b>RC133N1, RC133N1S, RC133N2, RC133N2S</b>                                                                                                                                                                                                                                         |
| FCC ID Number:  | <b>FCC ID: 2AM99-RC133N</b>                                                                                                                                                                                                                                                         |
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| Report Number:  | <b>HCT17GR186E-3</b>                                                                                                                                                                                                                                                                |
| Tested Date:    | <b>June 20~July 07, 2017</b>                                                                                                                                                                                                                                                        |
| Issued Date:    | <b>July 07, 2017</b>                                                                                                                                                                                                                                                                |
| Tested By:      | <b>John Zeng/</b>                                                                                                                                                                                |

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# 1. GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

### Client Information

|                          |                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------|
| Applicant:               | Shenzhen Raysgem Electronic Science and Technology Co., LTD                             |
| Address of Applicant:    | 4/5F, Bldg 2, BaoNan Rd. Industrial Park, Nanyue Communities, LongGang, Shenzhen, China |
| Manufacturer:            | Shenzhen Raysgem Electronic Science and Technology Co., LTD                             |
| Address of Manufacturer: | 4/5F, Bldg 2, BaoNan Rd. Industrial Park, Nanyue Communities, LongGang, Shenzhen, China |

### General Description of E.U.T

| Items                                         | Description                                                                                               |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| EUT Description:                              | LOONA                                                                                                     |
| Model No.:                                    | RC133N1                                                                                                   |
| Brand Name:                                   | LOONA                                                                                                     |
| Supplementary Model:                          | RC133N1S, RC133N2, RC133N2S                                                                               |
| Operation Frequency:                          | For 802.11a/n HT20: 5150~5250MHz, 5725~5825MHz                                                            |
| Channel numbers:                              | 802.11a/802.11n HT20: 9 Channels                                                                          |
| Channel separation:                           | 802.11a/802.11n HT20:20MHz                                                                                |
| Modulation technology:<br>(IEEE 802.11a)      | BPSK,QPSK,16-QAM,64-QAM                                                                                   |
| Modulation technology:<br>(IEEE 802.11n HT20) | BPSK,QPSK,16-QAM,64-QAM                                                                                   |
| Data speed<br>(IEEE 802.11a):                 | 6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps                                                     |
| Data speed (IEEE<br>802.11n HT20):            | MCS0: 6.5Mbps,MCS1:13Mbps,MCS2:19.5Mbps,MCS3:26Mbps,<br>MCS4:39Mbps,MCS5:52Mbps,MCS6:58.5Mbps,MCS7:65Mbps |
| Antenna Type:                                 | Internal Antenna                                                                                          |
| Antenna Gain:                                 | 2dBi                                                                                                      |
| Adapter Information:                          | Adapter :<br><br>Input: AC 100V~240V, 50/60Hz, 1.2A<br><br>Output: DC 12V, 3A                             |

Remark: \* The test data gathered are from the production sample provided by the manufacturer.

\* All models are with same structure,performance and parameters. Differences are limited to appearance and color.

## Operation Frequency:

| UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) |      |
|--------------------------------------------------------|------|
| CHANNEL                                                | MHz  |
| 36                                                     | 5180 |
| 40                                                     | 5200 |
| 44                                                     | 5220 |
| 48                                                     | 5240 |
| 149                                                    | 5745 |
| 153                                                    | 5765 |
| 157                                                    | 5785 |
| 161                                                    | 5805 |
| 165                                                    | 5825 |

Remark:

The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

## Channel Selection for Test:

802.11a/802.11n HT20

| Channel             | Frequency | Frequency |
|---------------------|-----------|-----------|
| The lowest channel  | 5180MHz   | 5745MHz   |
| The middle channel  | 5220MHz   | 5785MHz   |
| The Highest channel | 5240MHz   | 5825MHz   |

## Duty Cycle:

The duty cycle declared by the manufactory is > 99%

## 1.2 Test Standards

The tests were performed based on the Electromagnetic Interference (EMI) tests performed on the EUT. Both conducted and radiated testing were performed according to the procedures in ANSI C63.10-2013 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, and section 15.203, 15.207, 15.209 and 15.407 rules and the FCC publication KDB789033, KDB662911, KDB558074 of Guidance on Measurements for Digital Transmission Systems (47 CFR 15.407) .

## 1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

## FCC – Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

**IC Registration No.: 9618B**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

## 2. SYSTEM TEST CONFIGURATION

### 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 calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

Support equipments or special accessories in test configuration:

| AUX Description: | Manufacturer | Model No. | Certificate | CABLE                                                            |
|------------------|--------------|-----------|-------------|------------------------------------------------------------------|
| Host Computer    | Dell         | 78MD82X   | CE, FCC     | 1.5m Unshielded Power Cord                                       |
| Monitor          | Dell         | E178Pc    | CE, FCC     | 1.5m Unshielded Power Cord<br>1.8m shielded data Cable with core |
| Keyboard         | Dell         | L100      | CE, FCC     | 1.8m shielded data Cable with core                               |
| Mouse            | Dell         | OCJ339    | CE, FCC     | 1.8m shielded data Cable with core                               |

### 2.3 General Test Procedures

**Conducted Emissions :** The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

**Radiated Emissions:** The EUT is placed on a turntable, 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 13.1.4.1 of ANSI C63.10-2013

### 2.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                     | Uncertainty |
|-------------------------------|-------------|
| Power Line Conducted Emission | +/- 2.3 dB  |
| Radiated Emission             | +/- 3.4 dB  |

Uncertainty figures are valid to a confidence level of 95%.

## 2.5 List of Measuring Equipments Used

Test equipments list of Shenzhen CTL Testing Technology Co., Ltd.

| No. | Equipment                     | Manufacturer    | Model No.  | S/N        | Last Calculator | Due Calculator |
|-----|-------------------------------|-----------------|------------|------------|-----------------|----------------|
| 1   | EMI Test Receiver             | R&S             | ESCI       | 100687     | 2016-7-25       | 2017-7-24      |
| 2   | EMI Test Receiver             | R&S             | ESPI       | 100097     | 2016-10-1       | 2017-10-31     |
| 3   | Amplifier                     | HP              | 8447D      | 1937A02492 | 2016-7-25       | 2017-7-24      |
| 4   | TRILOG Broadband Test-Antenna | SCHWARZBECK     | VULB9163   | 9163-324   | 2016-7-25       | 2017-7-24      |
| 5   | RF POWER AMPLIFIER            | FRANKONIA       | FLL-75     | 1020A1109  | 2016-7-25       | 2017-7-24      |
| 6   | 6DB Attenuator                | FRANKONIA       | N/A        | 1001698    | 2016-7-25       | 2017-7-24      |
| 7   | 10dB attenuator               | ELECTRO-METRICS | EM-7600    | 836        | 2016-7-25       | 2017-7-24      |
| 8   | Spectrum Analyzer             | R&S             | FSP        | 100397     | 2016-10-1       | 2017-10-31     |
| 9   | Broadband preamplifier        | SCHWARZBECK     | BBV9718    | 9718-182   | 2016-7-25       | 2017-7-24      |
| 10  | Power Sensor                  | Anritsu         | ML2438A    | 1241002    | 2016-7-25       | 2017-7-24      |
| 11  | Power Sensor                  | Anritsu         | MA2411B    | 1207366    | 2016-7-25       | 2017-7-24      |
| 12  | Horn Antenna                  | SCHWARZBECK     | BBHA 9120D | 0437       | 2016-7-25       | 2017-7-24      |
| 13  | Horn Antenna                  | SCHWARZBECK     | BBHA9170   | 0483       | 2016-7-25       | 2017-7-24      |

### 3. SUMMARY OF TEST RESULTS

| FCC Rules      | Description of Test                      | Test Limit                                                                     | Result |
|----------------|------------------------------------------|--------------------------------------------------------------------------------|--------|
| N/A            | Duty Cycle                               | >99%                                                                           | Pass   |
| FCC §15.407(a) | 26dB Bandwidth                           | N/A                                                                            | N/A    |
| FCC §15.407(e) | 6dB Bandwidth                            | ≥ 500kHz                                                                       | Pass   |
| FCC §15.407(a) | Maximum Conducted Output Power           | < 30 dBm                                                                       | Pass   |
| FCC §15.407(a) | Power Spectral Density                   | < 11 dBm/MHz<br>< 30 dBm/MHz                                                   | Pass   |
| FCC §15.407(b) | Band Edges Measurement                   | < -27dBm/MHz EIRP<br>< -17dBm/MHz EIRP                                         | Pass   |
| FCC §15.407(g) | Frequency Stability                      | within the band of operation                                                   | Pass   |
| FCC §15.209(a) | Radiated Undesirable Emission            | Emissions in restricted bands must meet the radiated limits detailed in 15.209 | Pass   |
| FCC §15.407(b) | Conducted Undesirable Emission           | < -27dBm/MHz                                                                   | Pass   |
| FCC §15.207(a) | AC Conducted Emissions<br>150kHz – 30MHz | < FCC 15.207 limits                                                            | Pass   |

## 4. THE MAXIMUM E.I.R.P & MAXIMUM CONDUCTED OUTPUT POWER

### 4.1 Test Limit

According to §15.407(a),

- 1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1W . The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- 2) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W

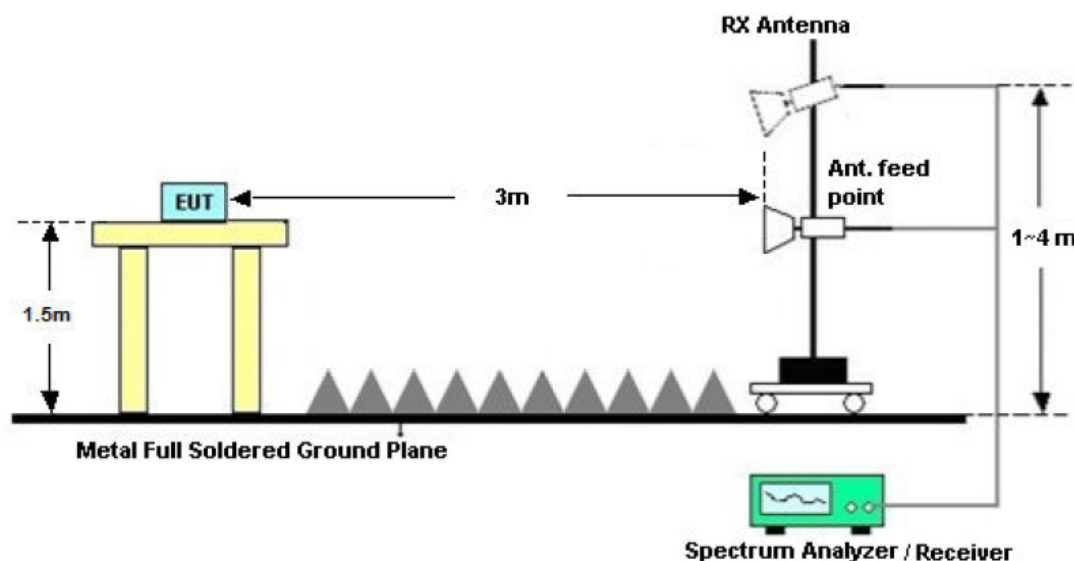
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.15-5.25GHz: Limit (dBm) = 30dBm.

5.725-5.85GHz: Limit (dBm) = 30dBm.

Test procedure used is KDB 789033 D02v01 - Section E) 3) b) Method PM-G

### 4.2 Radiation measurement Test Configuration



### 4.3. Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

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

Above 1GHz:

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

(b) AVERAGE:RBW=1MHz

duty cycle  $\geq 98\%$ , set VBW  $\leq$  RBW/100 but not less than 10 Hz.

duty cycle  $< 98\%$ , set VBW  $\geq 1/T$

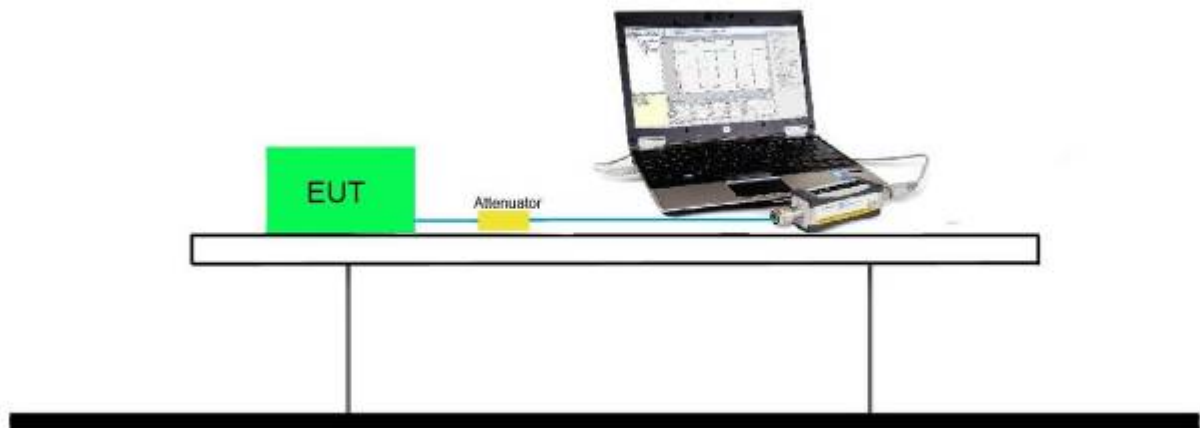
Sweep=AUTO

7. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

8. Repeat above procedures until the measurements for all frequencies are complete.

#### 4.4 Conduction measurement Test Configuration

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.



#### 4.5 Test Results

No non-compliance noted

**Test Data (E.I.R.P)**

5180-5240MHz

| Mode         | Test CH | Antenna Pol | EIRP (dBm) | Limit (dBm) | Result |
|--------------|---------|-------------|------------|-------------|--------|
| 802.11a      | Low     | V           | 11.78      | 21.00       | Pass   |
|              |         | H           | 11.69      |             |        |
|              | Mid     | V           | 10.22      | 21.00       | Pass   |
|              |         | H           | 10.69      |             |        |
|              | High    | V           | 11.96      | 21.00       | Pass   |
|              |         | H           | 11.59      |             |        |
| 802.11n HT20 | Low     | V           | 9.96       | 21.00       | Pass   |
|              |         | H           | 9.87       |             |        |
|              | Mid     | V           | 8.65       | 21.00       | Pass   |
|              |         | H           | 9.00       |             |        |
|              | High    | V           | 9.97       | 21.00       | Pass   |
|              |         | H           | 9.87       |             |        |

**Test Data (Output Power )**

5180-5240MHz

| Mode         | Test CH | Average power (dBm) | Limit (dBm) | Result |
|--------------|---------|---------------------|-------------|--------|
| 802.11a      | Low     | 12.00               | 30.00       | Pass   |
|              | Mid     | 11.94               | 30.00       | Pass   |
|              | High    | 12.08               | 30.00       | Pass   |
| 802.11n HT20 | Low     | 12.56               | 30.00       | Pass   |
|              | Mid     | 11.55               | 30.00       | Pass   |
|              | High    | 10.01               | 30.00       | Pass   |

5745-5825MHz

| Mode         | Test CH | Average power (dBm) | Limit (dBm) | Result |
|--------------|---------|---------------------|-------------|--------|
| 802.11a      | Low     | 11.41               | 30.00       | Pass   |
|              | Mid     | 11.66               | 30.00       | Pass   |
|              | High    | 12.55               | 30.00       | Pass   |
| 802.11n HT20 | Low     | 10.78               | 30.00       | Pass   |
|              | Mid     | 9.64                | 30.00       | Pass   |
|              | High    | 10.54               | 30.00       | Pass   |

## 5. PEAK POWER SPECTRAL DENSITY

### 5.1 Test Limit

According to §15.407(a)

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. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.15-5.25 GHz: Limit (dBm/MHz) = 11dBm/MHz.

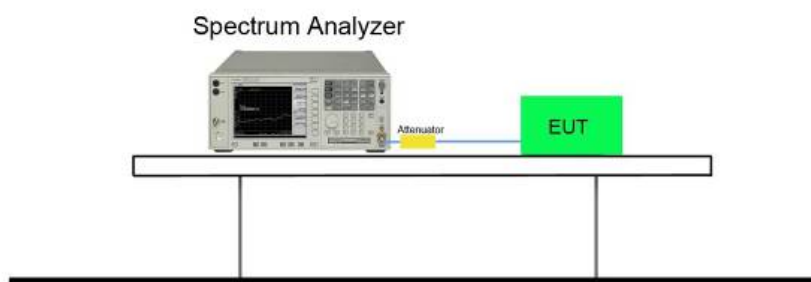
5.725-5.85 GHz Limit (dBm/500kHz) = 30dBm/500kHz.

Test procedure used is KDB 789033 D02v01 - Section F

### 5.2 Test Procedure

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points  $\geq 2 \times (\text{span} / \text{RBW})$
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value
10. Add  $10 \cdot \log(1/x)$ , where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add  $10 \cdot \log(1/0.25) = 6 \text{ dB}$  if the duty cycle is 25%.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor  $10 \cdot \log(500\text{kHz}/100\text{kHz}) = 6.99 \text{ dB}$  to the measured result.

### 5.3 Test Setup



### 5.4 Test Results

No non-compliance noted

## Test Data

5180-5240MHz

| Mode         | Test CH | PSD (dBm) | Limit (dBm) | Result |
|--------------|---------|-----------|-------------|--------|
| 802.11a      | Lowest  | 6.10      | 11          | Pass   |
|              | Middle  | 6.65      | 11          | Pass   |
|              | Highest | 7.59      | 11          | Pass   |
| 802.11n HT20 | Lowest  | 5.61      | 11          | Pass   |
|              | Middle  | 5.93      | 11          | Pass   |
|              | Highest | 5.71      | 11          | Pass   |

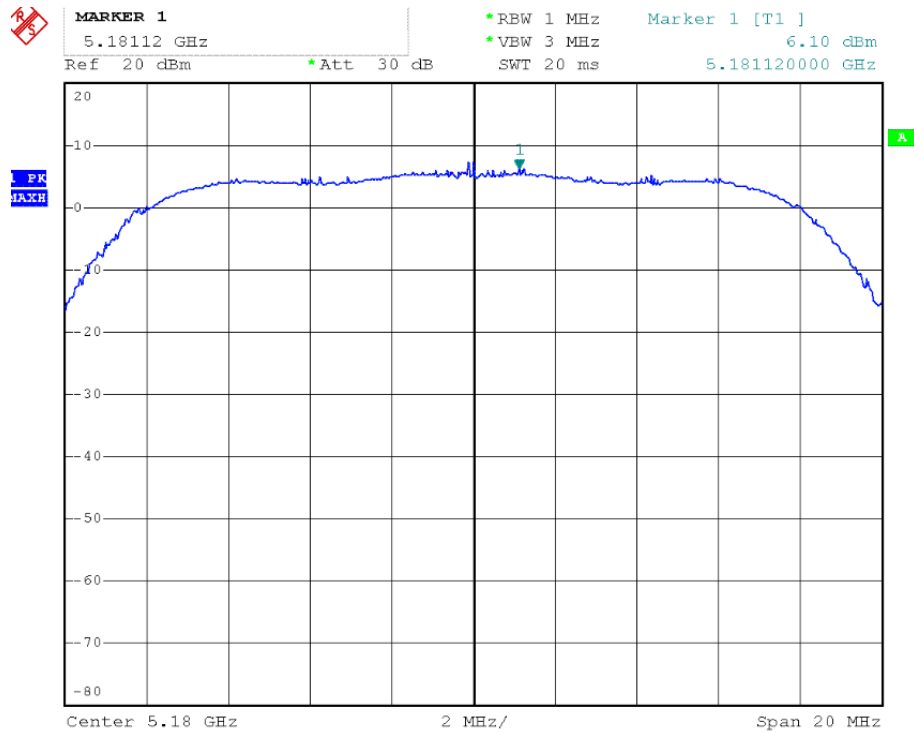
5745MHz-5825MHz

| Mode         | Test CH | PSD Reading Base on 100kHz (dBm) | Correction factor (dB) | Corrected Data (dBm) | Limit Base on 500kHz (dBm) | Result |
|--------------|---------|----------------------------------|------------------------|----------------------|----------------------------|--------|
| 802.11a      | Lowest  | -1.17                            | 6.99                   | 5.82                 | 30                         | Pass   |
|              | Middle  | -1.41                            | 6.99                   | 5.58                 | 30                         | Pass   |
|              | Highest | -1.66                            | 6.99                   | 5.33                 | 30                         | Pass   |
| 802.11n HT20 | Lowest  | -1.94                            | 6.99                   | 5.05                 | 30                         | Pass   |
|              | Middle  | -2.30                            | 6.99                   | 4.69                 | 30                         | Pass   |
|              | Highest | -2.56                            | 6.99                   | 4.43                 | 30                         | Pass   |

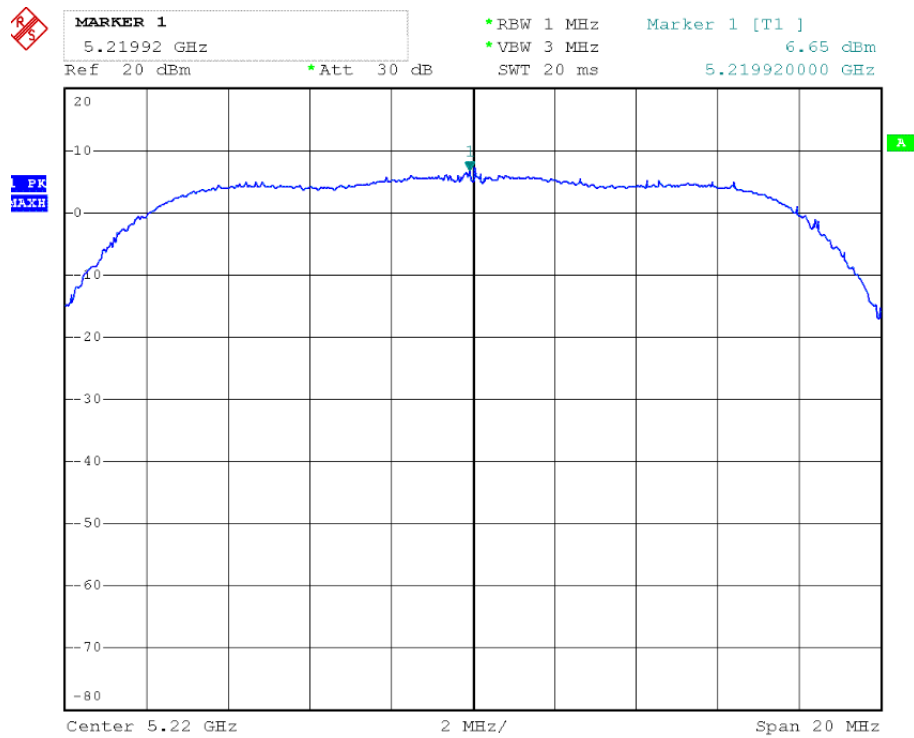
Note: When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor  $10 \cdot \log(500\text{kHz}/100\text{kHz}) = 6.99 \text{ dB}$  to the measured result.

# IEEE 802.11a mode /5180 ~ 5240MHz

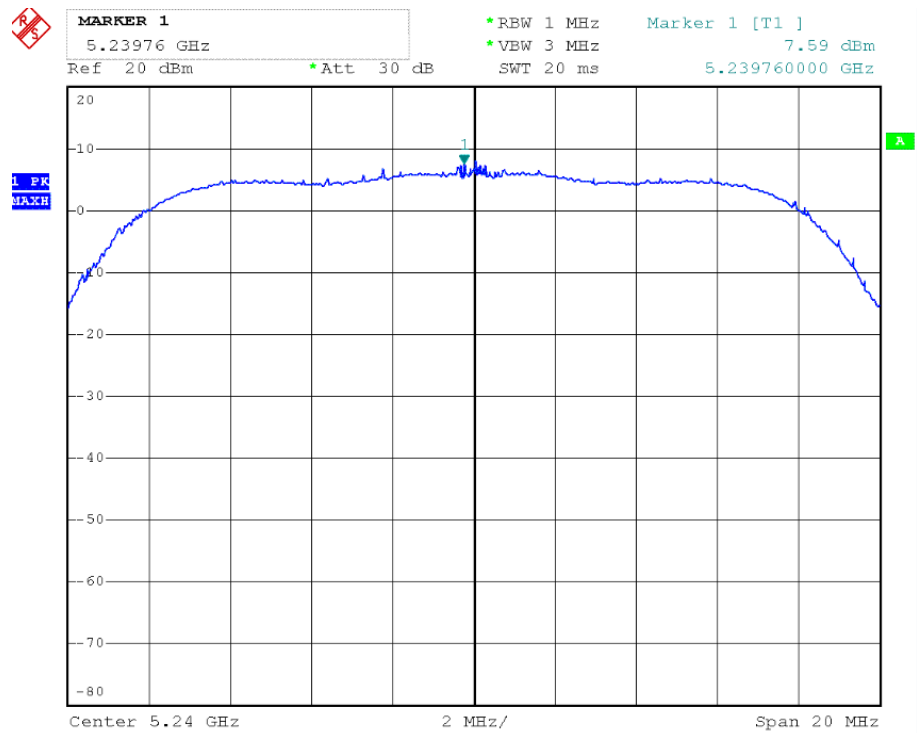
## CH Low



## CH Mid

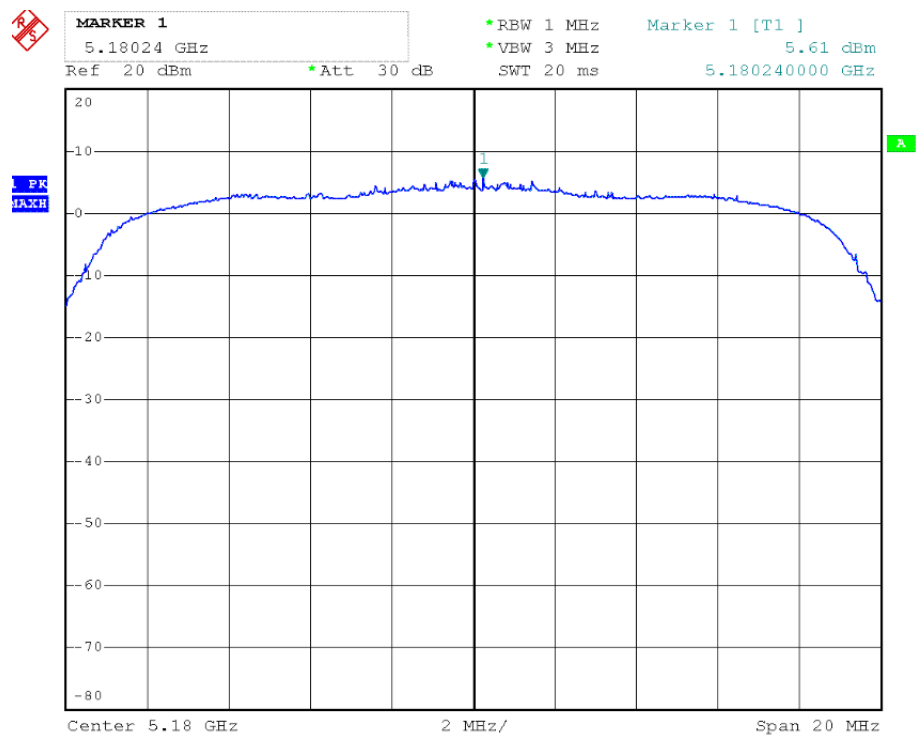


CH High

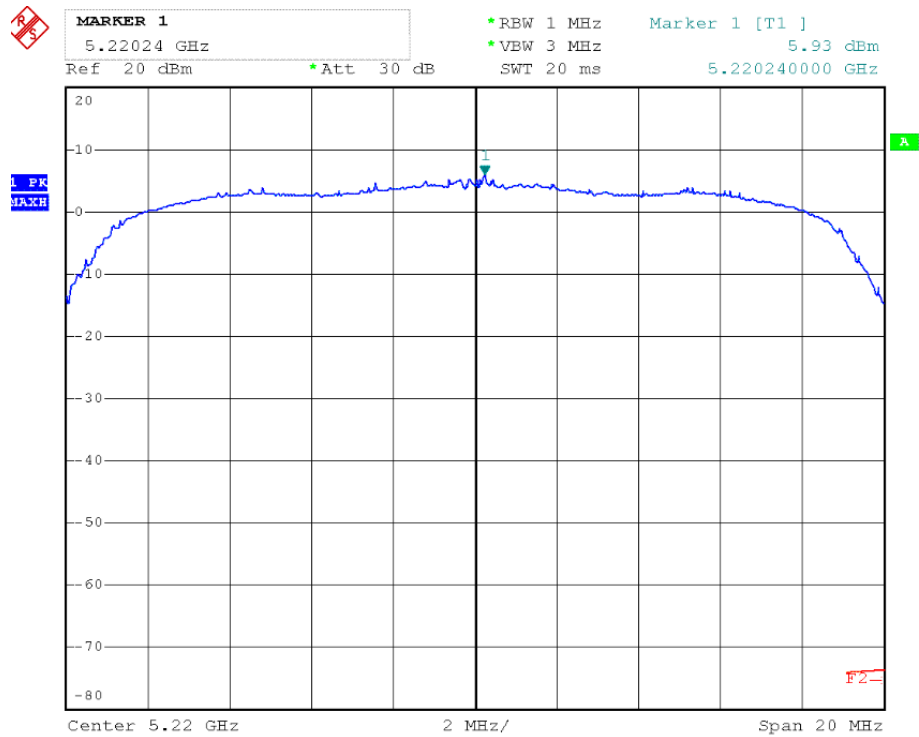


IEEE 802.11n HT20 MHz Channel mode / 5180 ~ 5240MHz

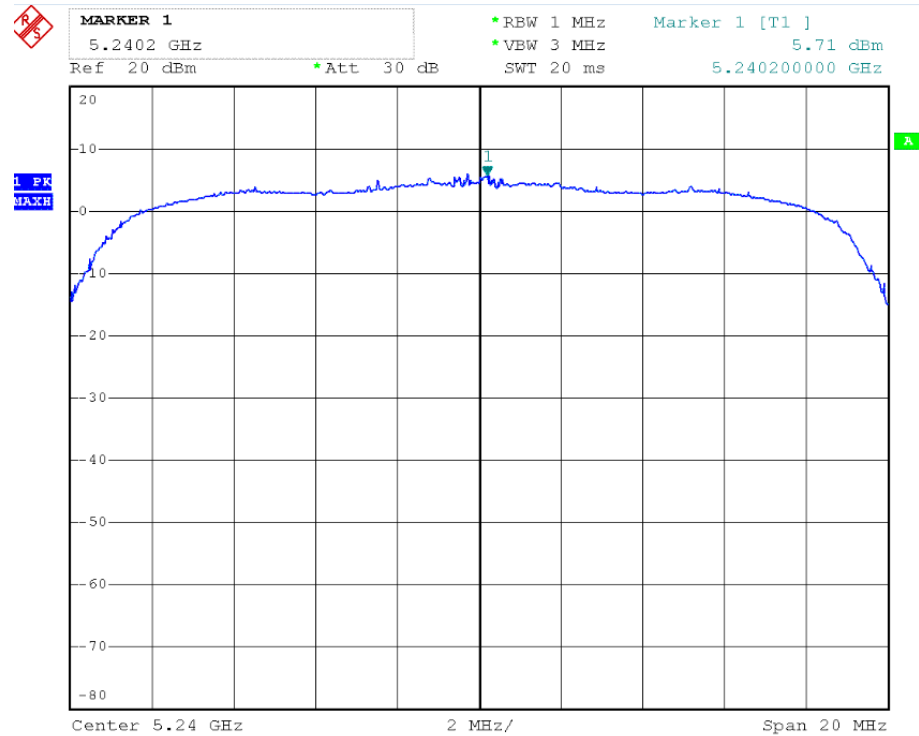
CH Low



## CH Mid

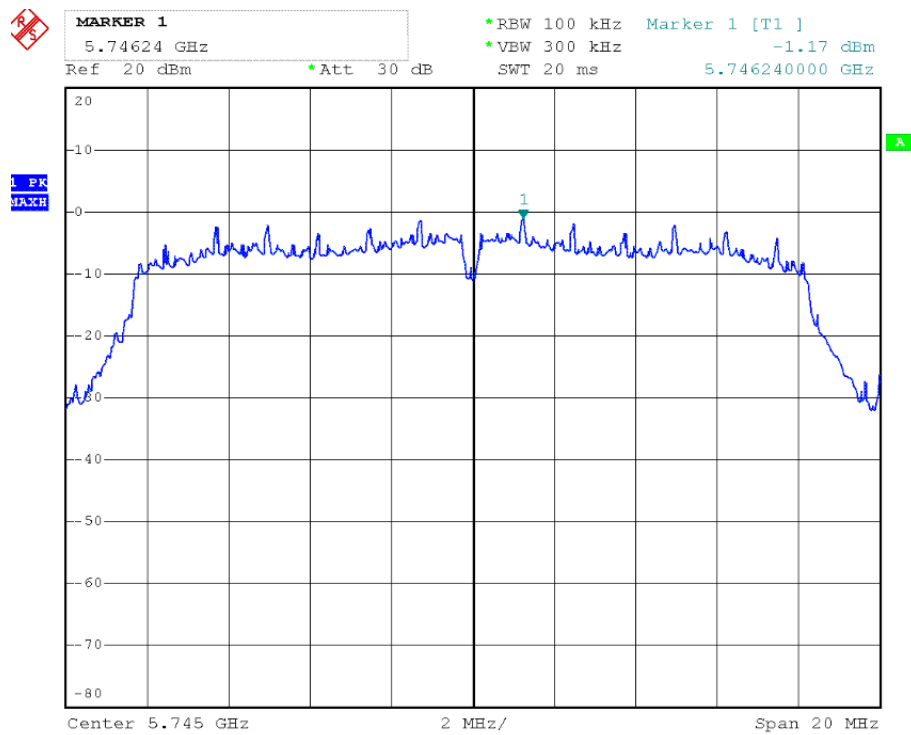


## CH High

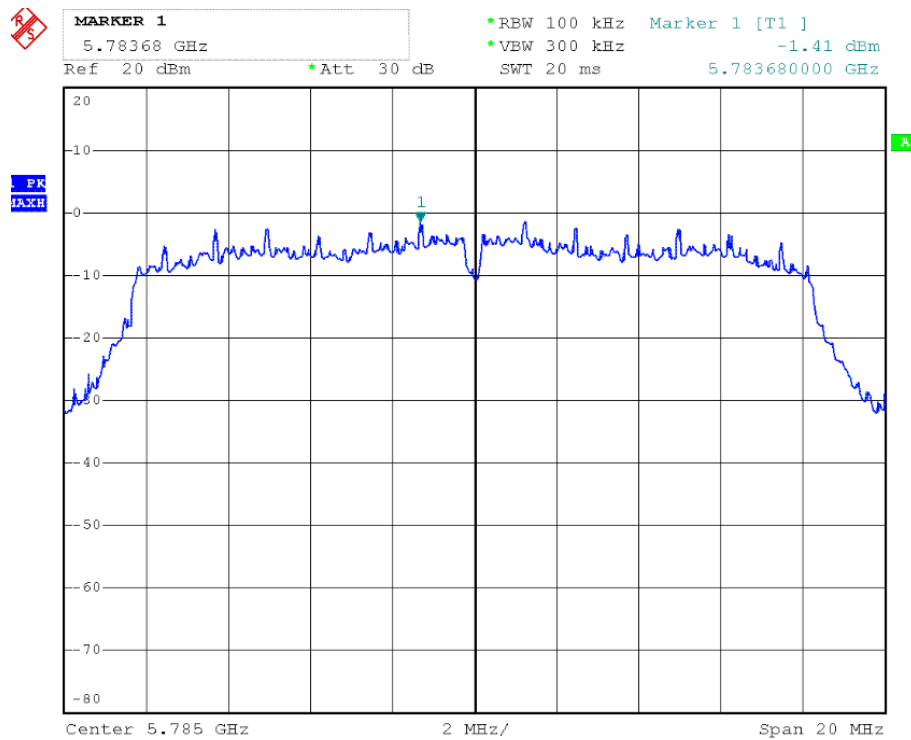


IEEE 802.11a mode / 5745 ~ 5825MHz

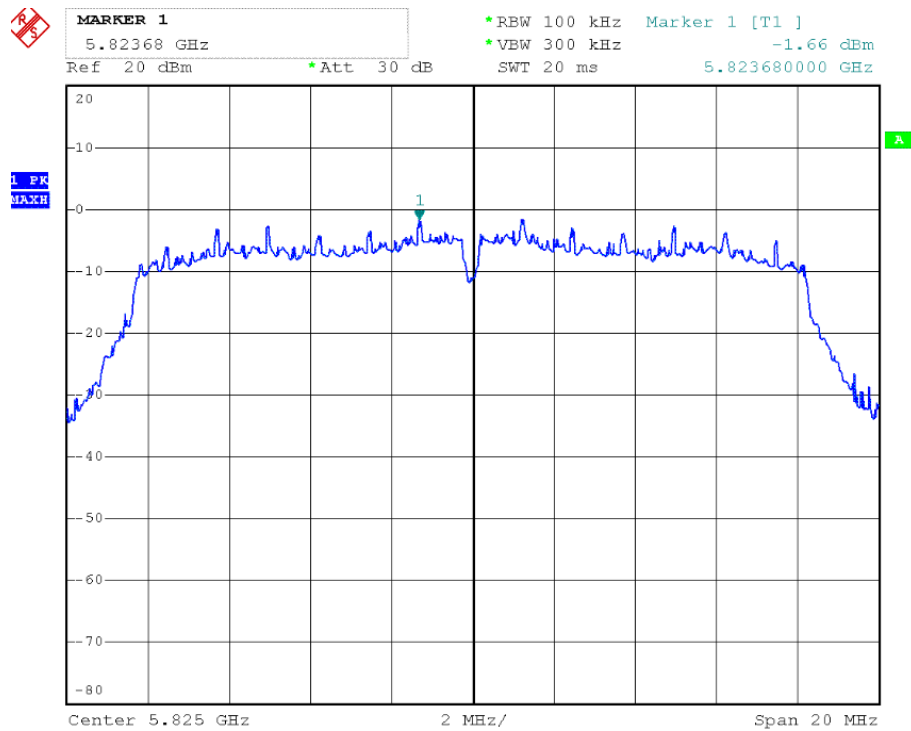
CH Low



CH Mid

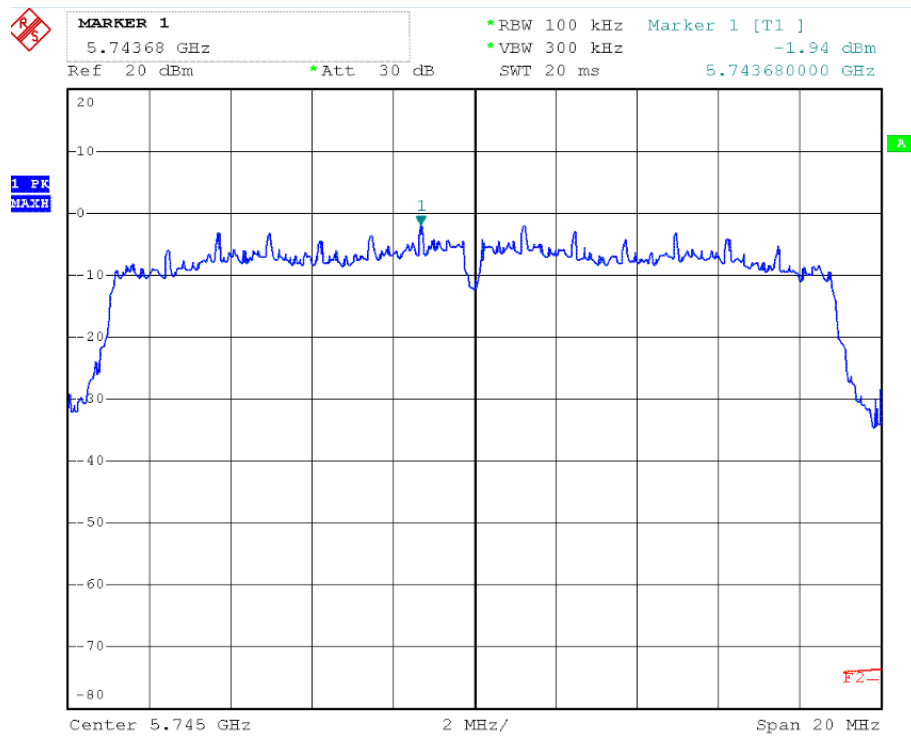


## CH High

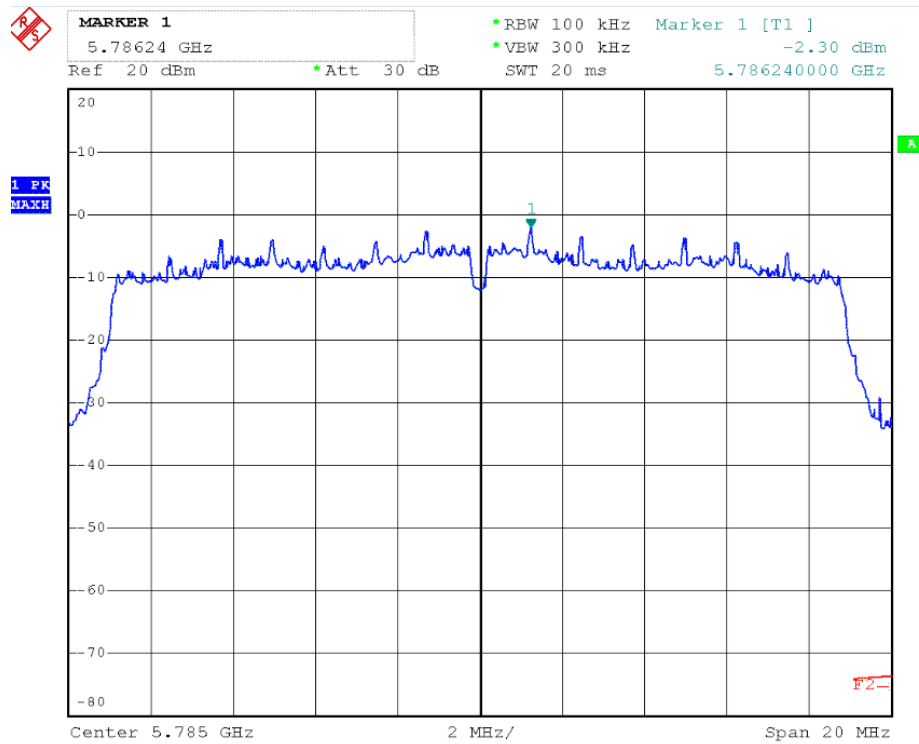


## IEEE 802.11n HT20 MHz Channel mode / 5745 ~ 5825MHz

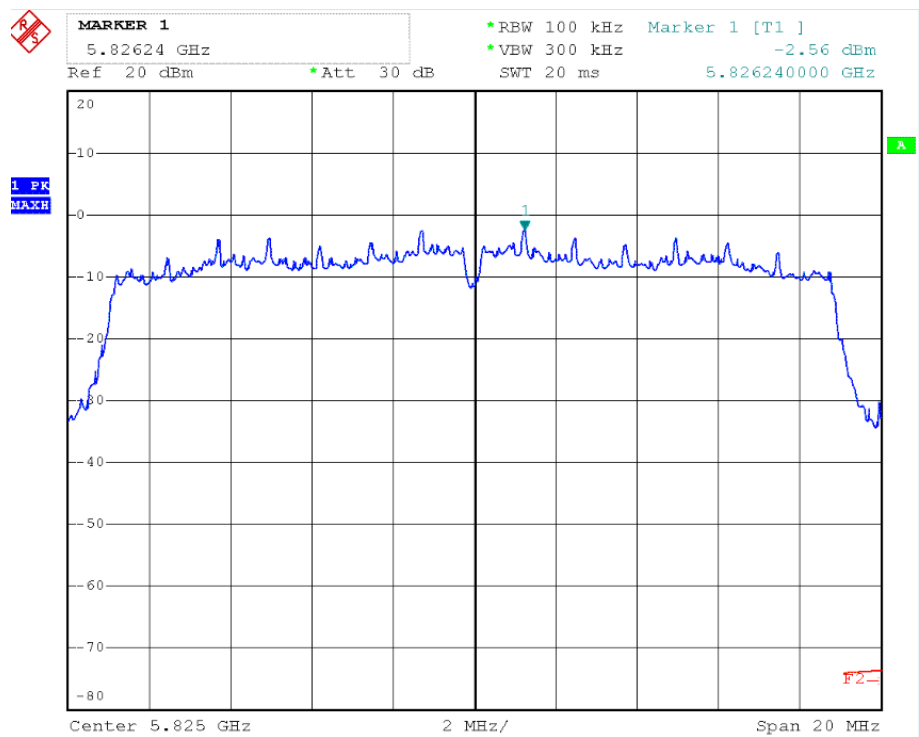
## CH Low



## CH Mid



## CH High



## 6. 6dB Bandwidth Measurement

### 6.1 Test Limit

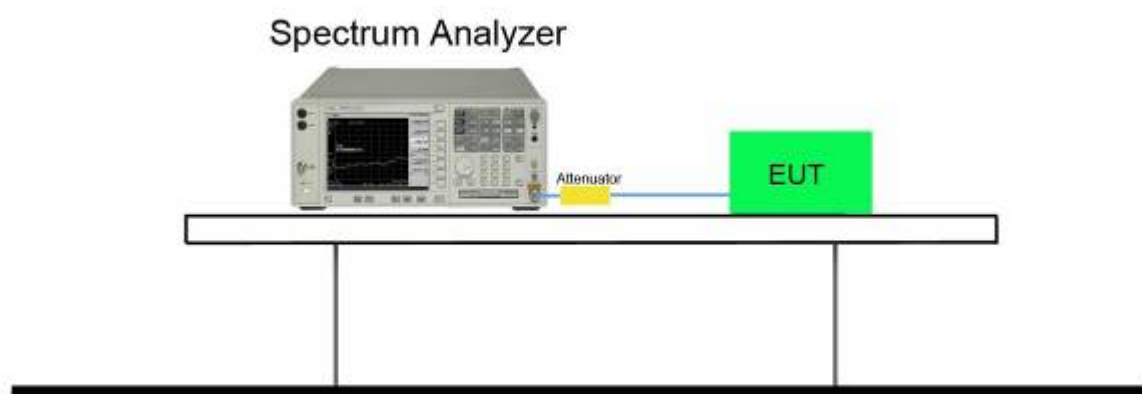
The minimum 6dB bandwidth shall be at least 500 kHz.

Test procedure used is KDB 789033 D02v01 – Section C.2

### 6.2 Test Procedure

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 6.3 Test Setup



### 6.4 Test Results

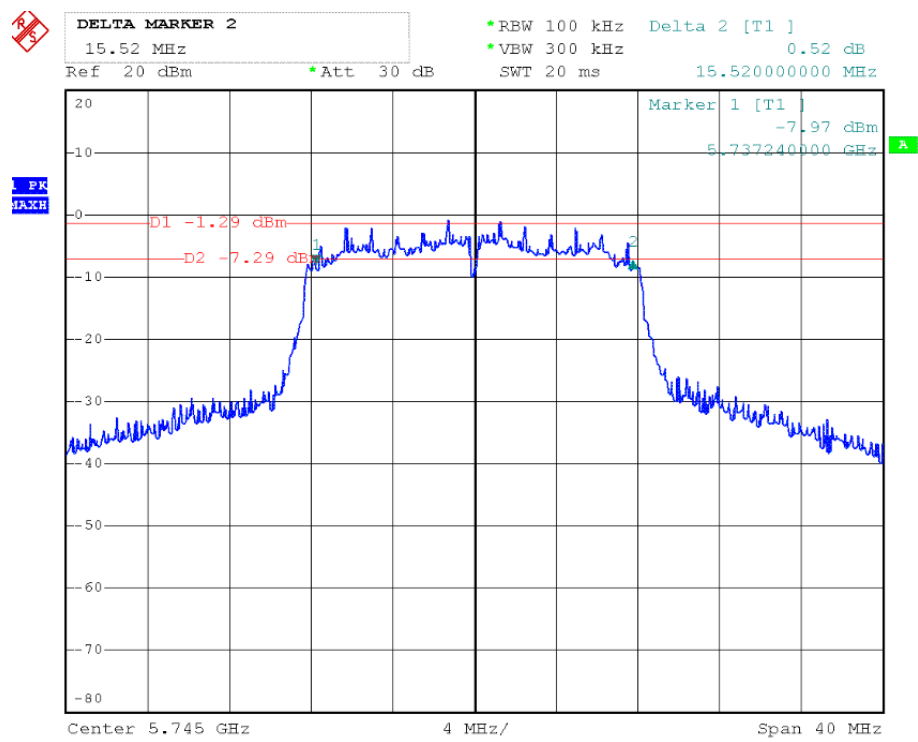
No non-compliance noted.

### Test Data

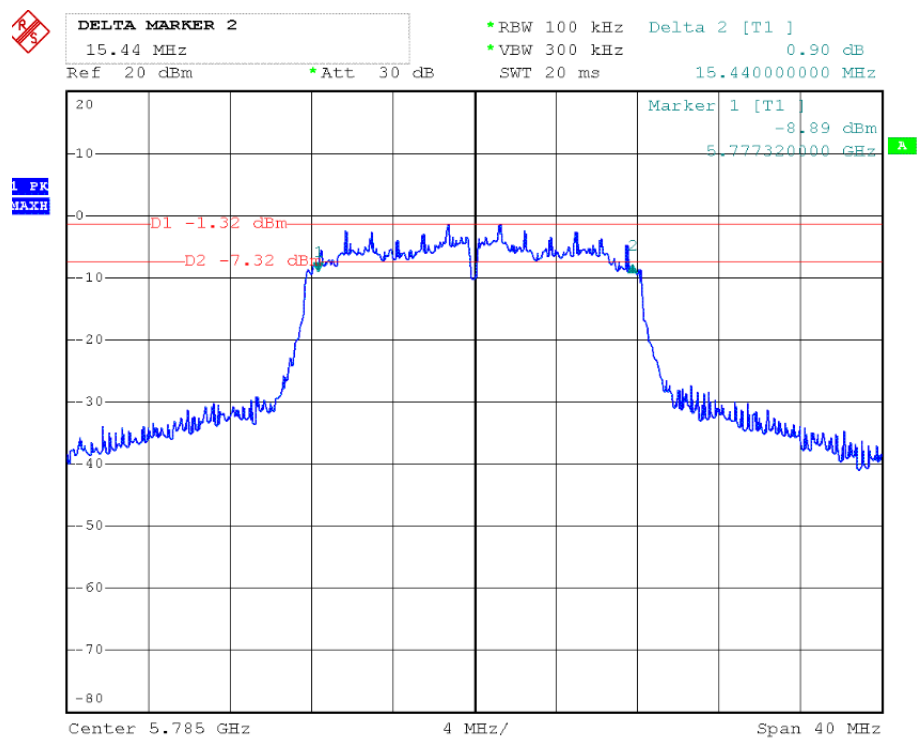
| Test CH | 6dB Bandwidth (MHz) |              | Limit(kHz) | Result |
|---------|---------------------|--------------|------------|--------|
|         | 802.11a             | 802.11n HT20 |            |        |
| Lowest  | 15.52               | 16.24        | >500       | Pass   |
| Middle  | 15.44               | 16.08        |            |        |
| Highest | 15.28               | 16.16        |            |        |

Test Plot

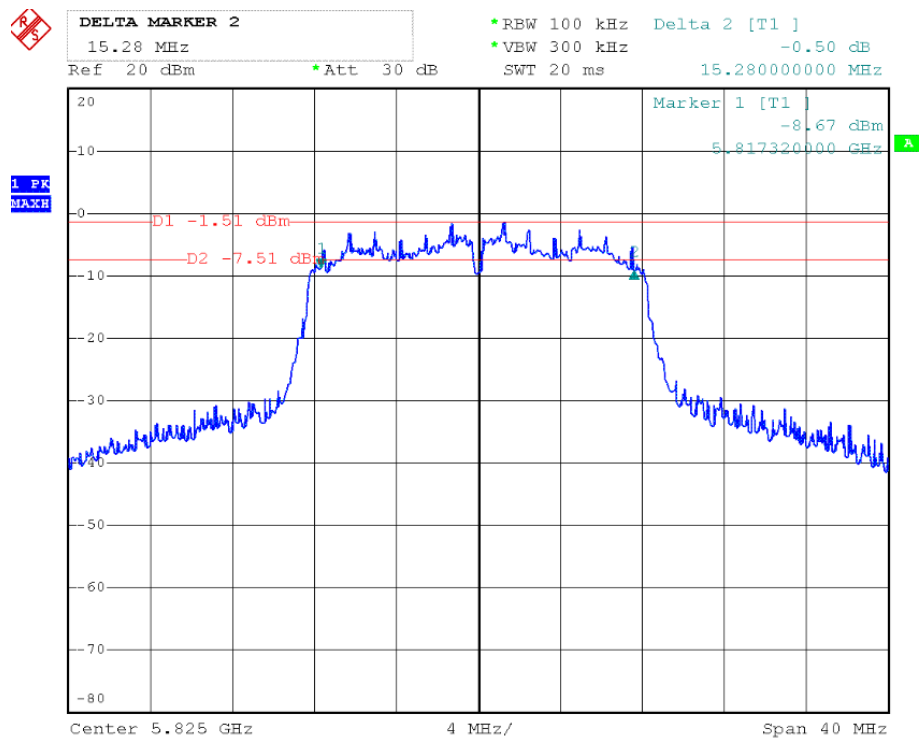
6dB BANDWIDTH ( 802.11a MODE CH Low 5745MHz)



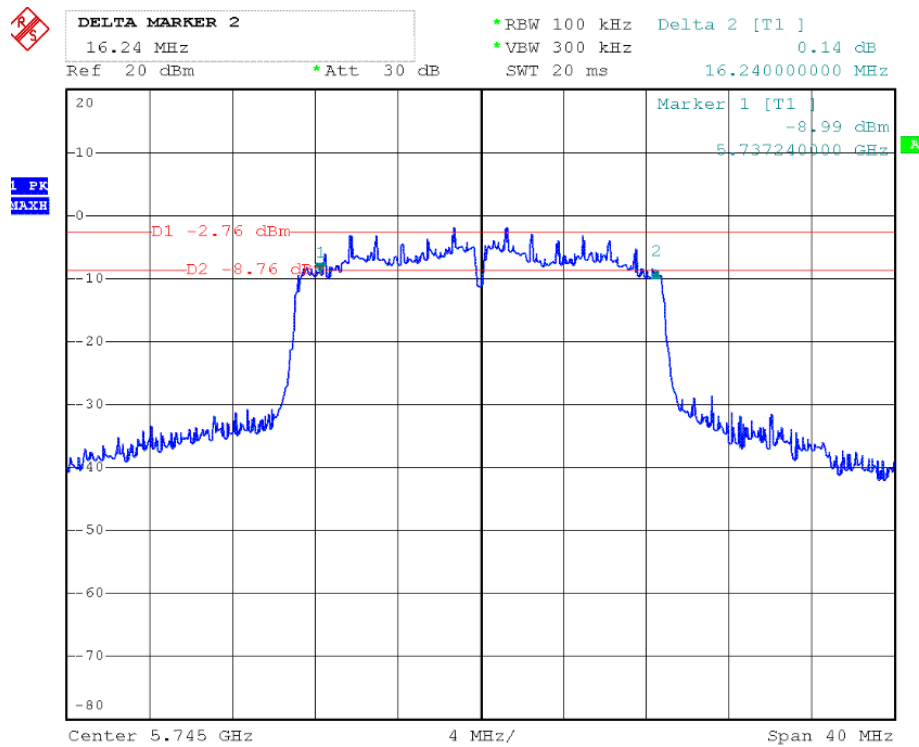
6dB BANDWIDTH ( 802.11a MODE CH Mid 5785MHz)



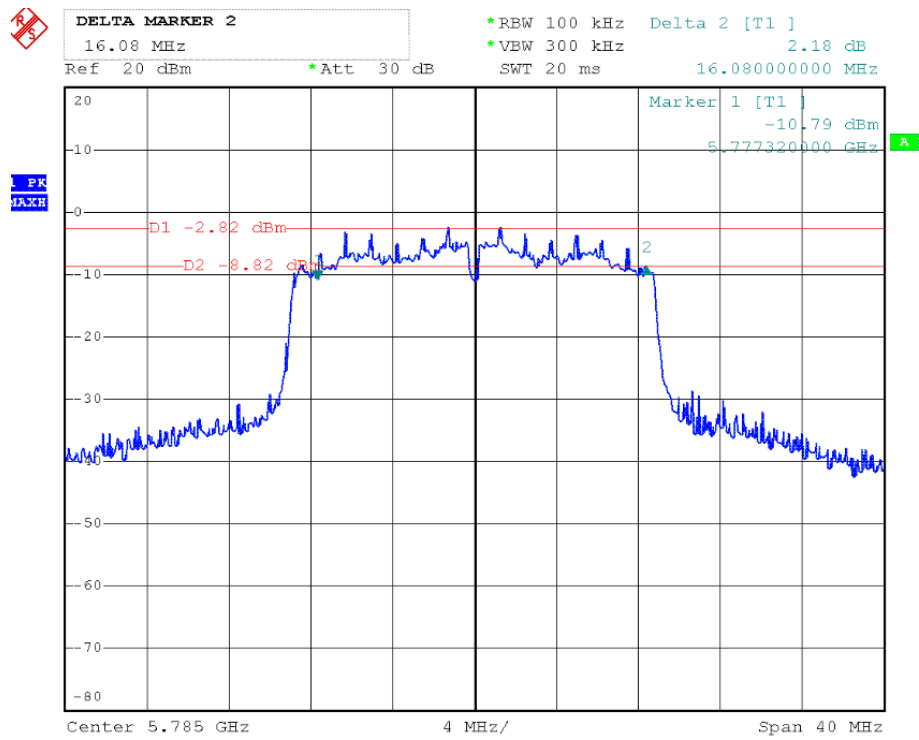
# 6dB BANDWIDTH ( 802.11a MODE CH High 5825MHz)



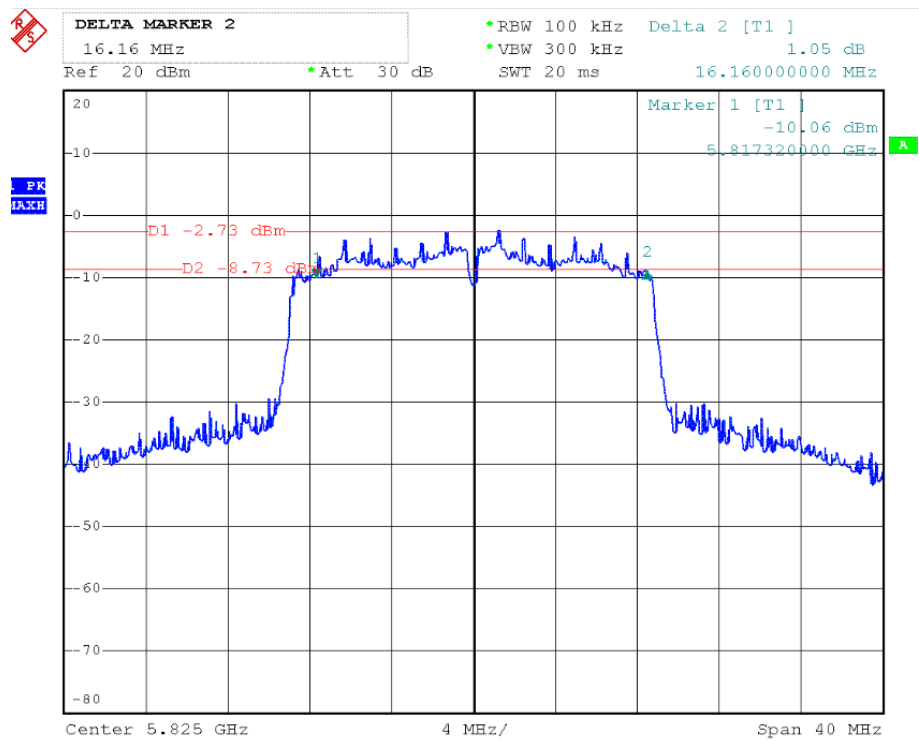
# 6dB BANDWIDTH ( 802.11n HT20 MODE CH Low 5745MHz)



# 6dB BANDWIDTH ( 802.11n HT20 MODE CH Mid 5785MHz)



# 6dB BANDWIDTH ( 802.11n HT20 MODE CH High 5825MHz)



## 7. TRANSMITTER UNDESIRABLE EMISSION AND BAND EDGE EMISSIONS

### 7.1 Test Limit

(1) For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) as below table.

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 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     | ( <sup>2</sup> ) |

| FCC Part 15 Subpart C Paragraph 15.209 |                         |                               |
|----------------------------------------|-------------------------|-------------------------------|
| Frequency<br>[MHz]                     | Field Strength<br>[V/m] | Measured Distance<br>[Meters] |
| 0.009 – 0.490                          | 2400/F (kHz)            | 300                           |
| 0.490 – 1.705                          | 24000/F (kHz)           | 30                            |
| 1.705 - 30                             | 30                      | 30                            |
| 30 - 88                                | 100                     | 3                             |
| 88 - 216                               | 150                     | 3                             |
| 216 - 960                              | 200                     | 3                             |
| Above 960                              | 500                     | 3                             |

(2) For 15.407(b) requirement:

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.

For transmitters operating in the 5.25-5.35 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.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz 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 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 at the band edge.

As below table:

| Un-restricted band emissions above 1GHz Limit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Limit                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5.15 - 5.25 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | e.i.r.p. -27 dBm [68.2 dBuV/m@3m]                                                                                                                                                                                                                                                                                                                                                                                               |
| 5.25 - 5.35 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | e.i.r.p. -27 dBm [68.2 dBuV/m@3m]                                                                                                                                                                                                                                                                                                                                                                                               |
| 5.47 - 5.725 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | e.i.r.p. -27 dBm [68.2 dBuV/m@3m]                                                                                                                                                                                                                                                                                                                                                                                               |
| 5.725 - 5.850 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz 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 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 at the band edge. |
| Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). |                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## 7.2 Radiated Test Configuration

Test procedure used is KDB 789033 D02v01 – Section G

Quasi-Peak Measurements below 1GHz:

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz.

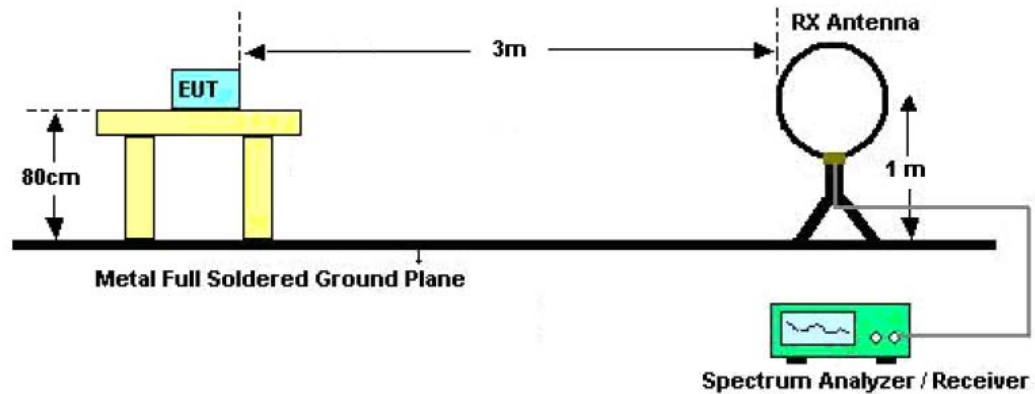
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method AD):

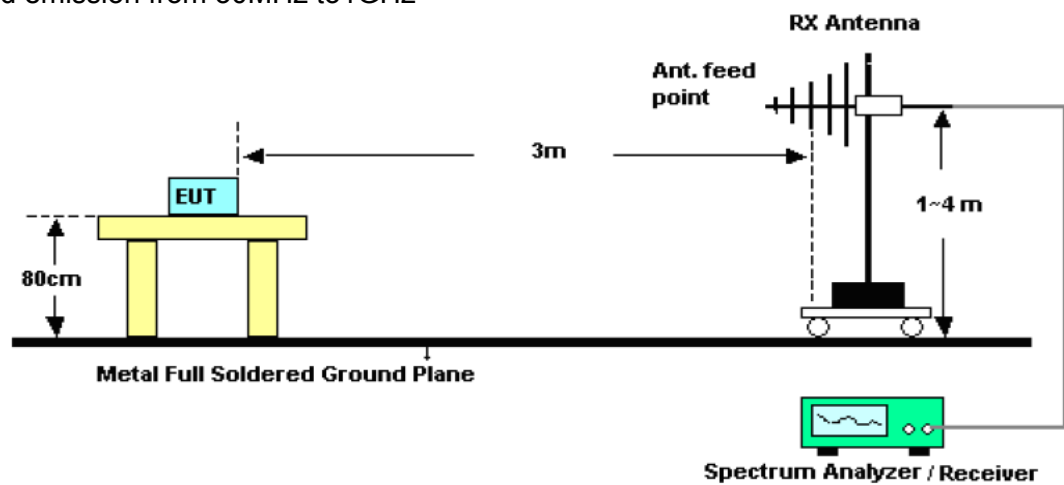
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be  $> 2 \times \text{span}/\text{RBW}$ )
6. Sweep time = auto
7. Trace was averaged over at 100 sweeps

### 7.3 Radiated Test Setup

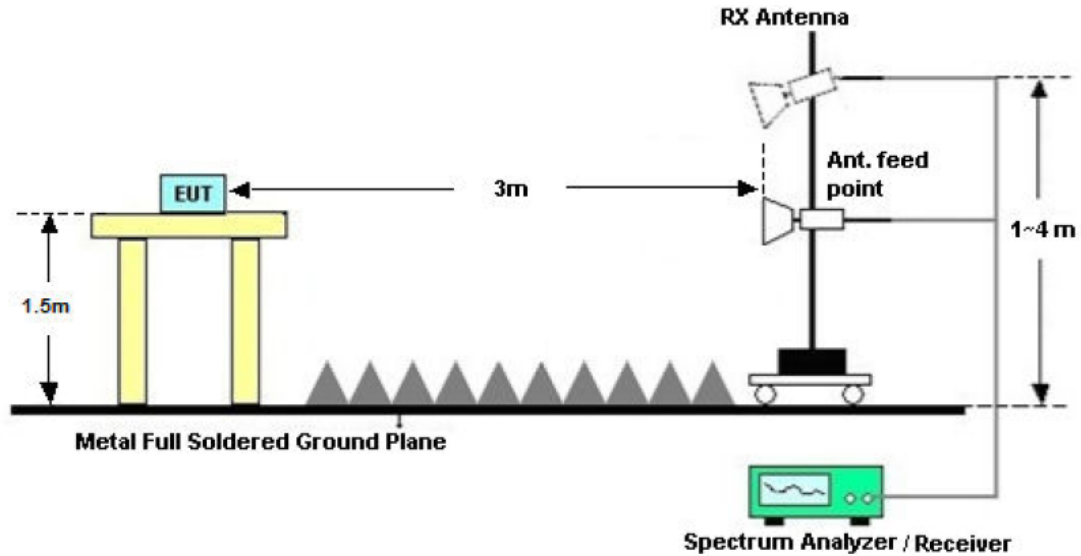
For radiated emission below 30MHz



For radiated emission from 30MHz to 1GHz



For radiated emission from above 1GHz



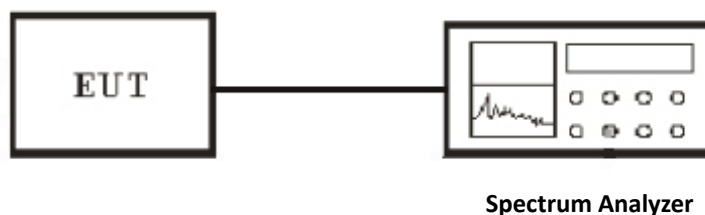
## 7.4 Conducted Test Configuration

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

## 7.5 Conducted Test Setup



## 7.6 Test Result

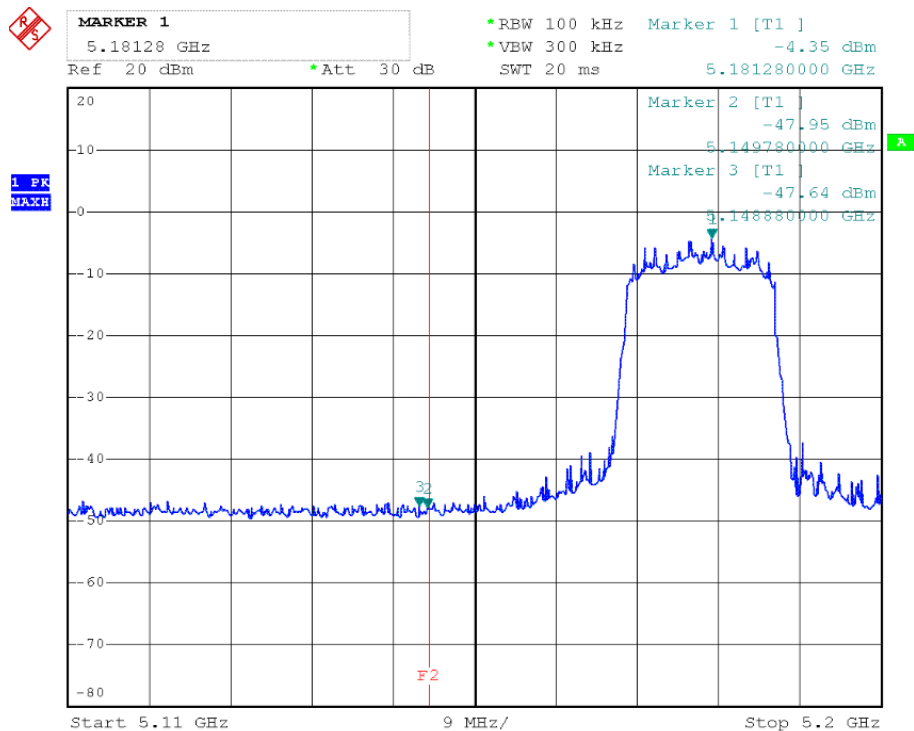
Note:

1. We test all modes, and chose the worst data for the report.
2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode;
3. Worst-case radiated emission below 1GHz is IEEE 802.11a TX (CH Low:5180MHz, Middle:5220MHz, High:5240MHz) mode.
4. Worst-case radiated emission above 1GHz is IEEE 802.11n HT20 TX (CH Low:5745MHz, Middle:5785MHz, High:5825MHz) mode.

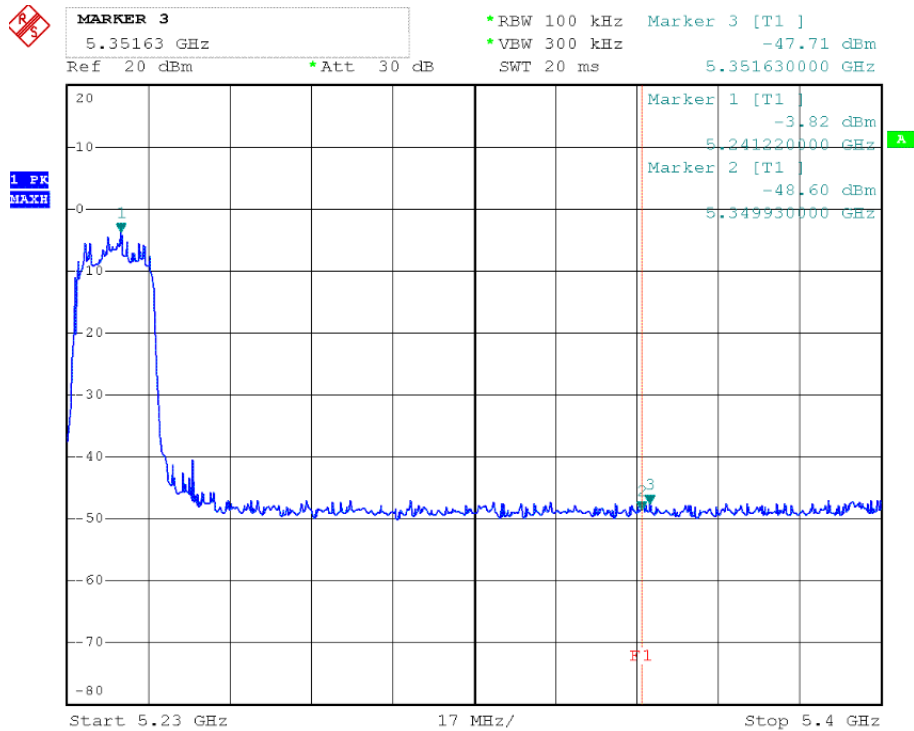
## Conducted Band Edges Test Result

5150-5250MHz:

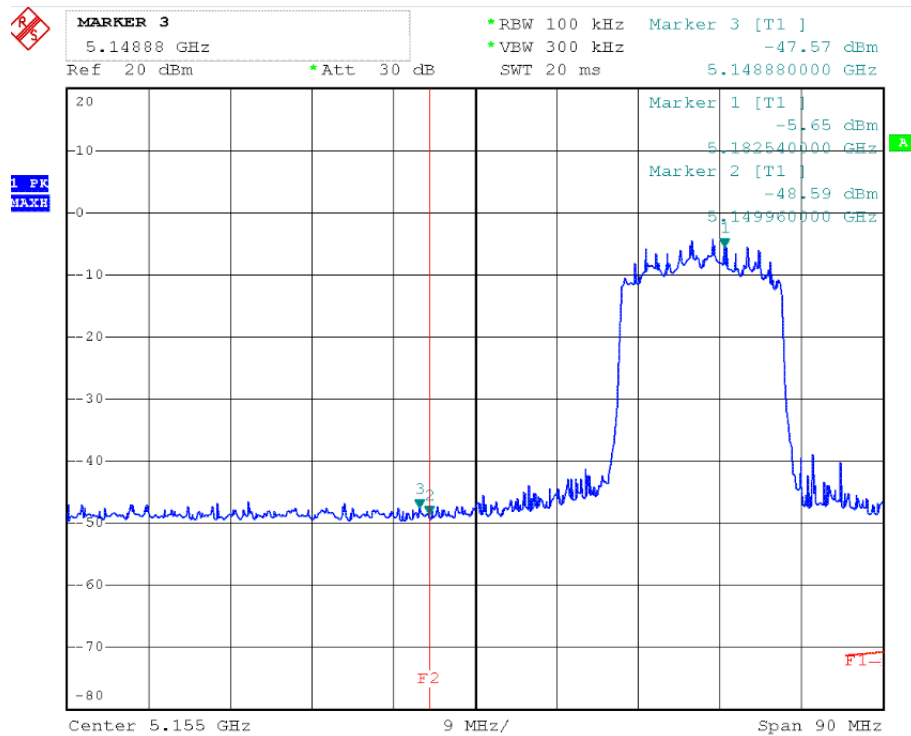
Band Edges (IEEE 802.11a mode / 5180 MHz)



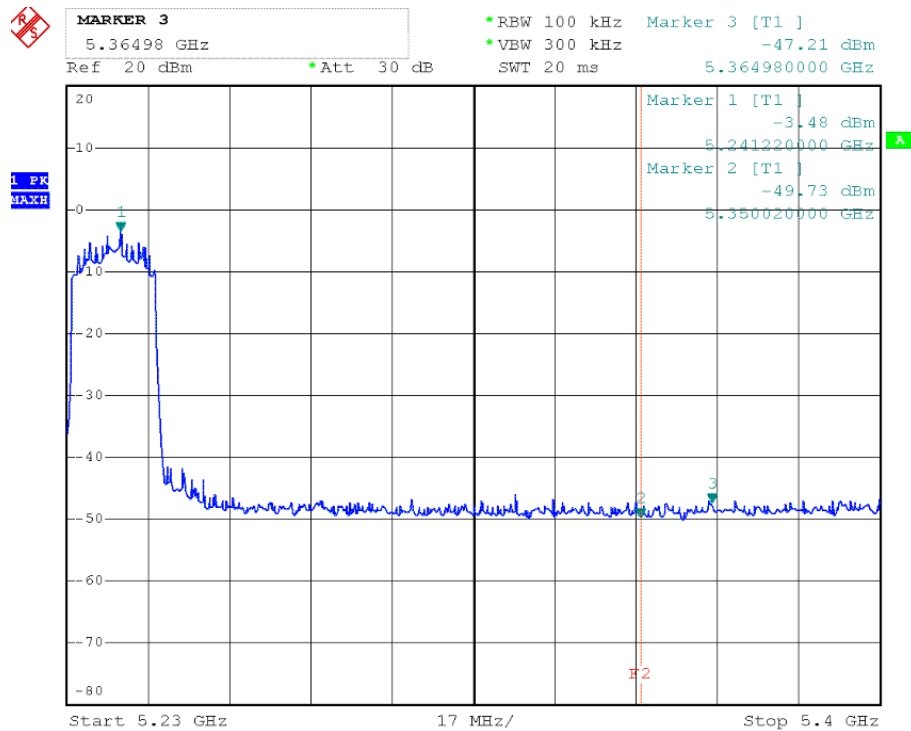
Band Edges (IEEE 802.11a mode / 5240 MHz)



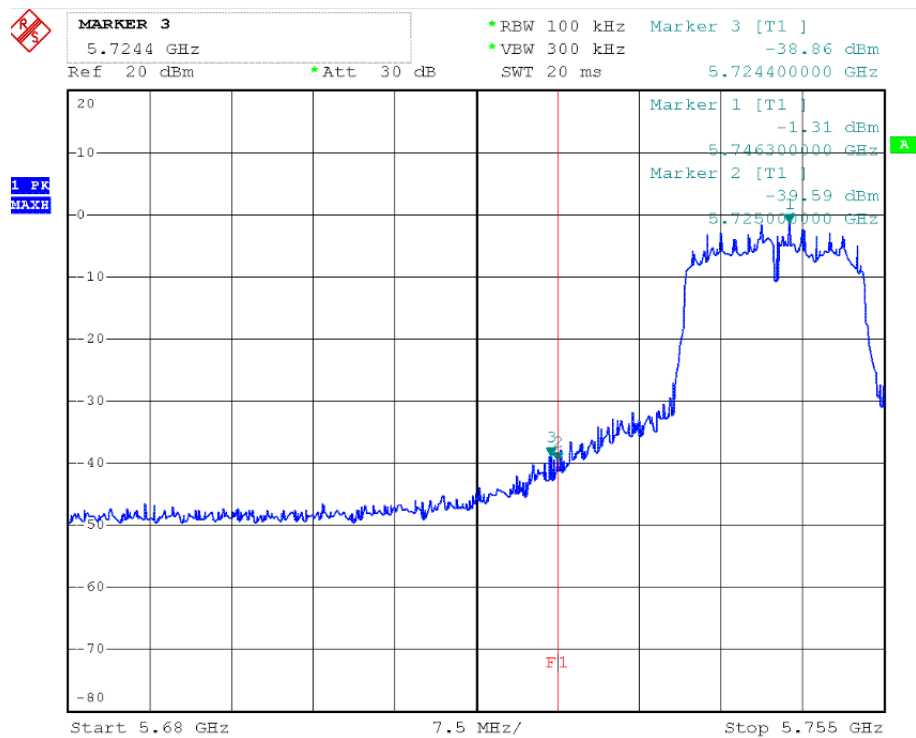
## Band Edges (IEEE 802.11n HT20 mode / 5180 MHz)



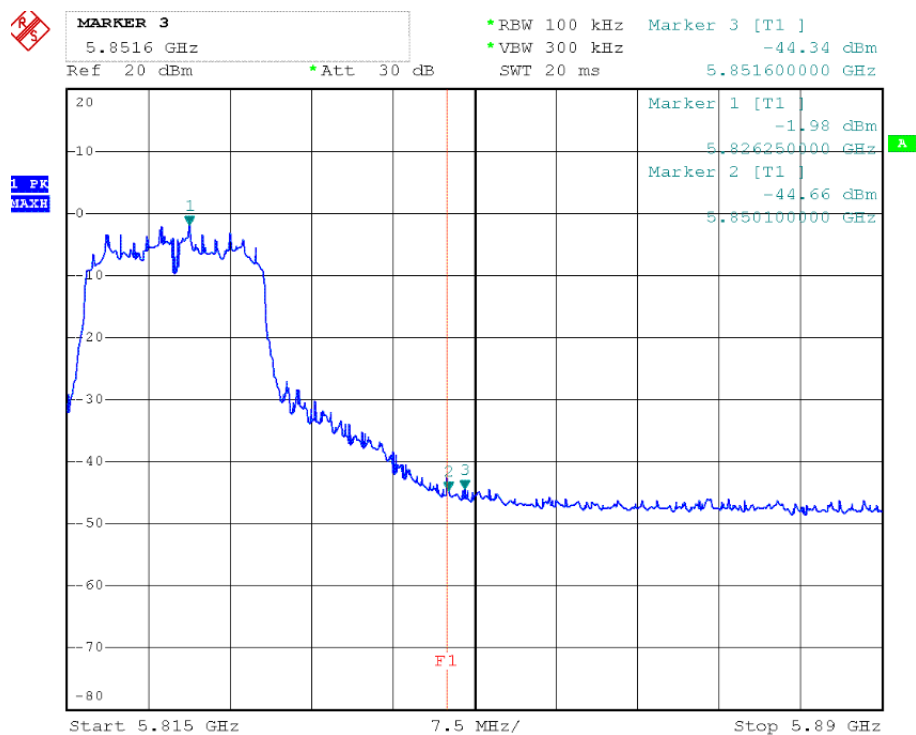
## Band Edges (IEEE 802.11n HT20 mode / 5240 MHz)



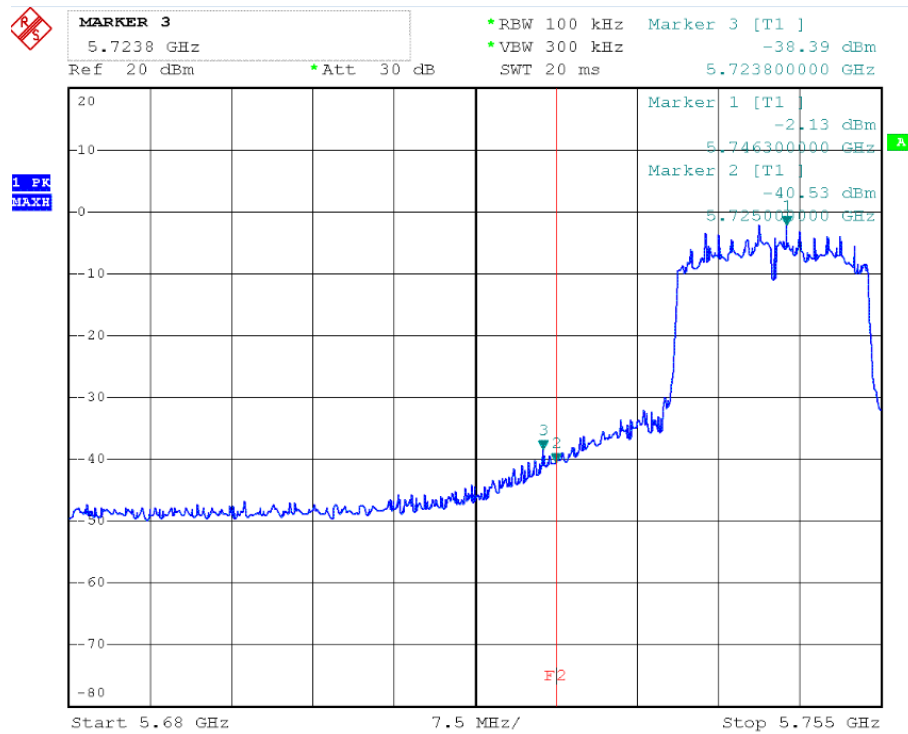
5725-5850MHz:  
Band Edges (IEEE 802.11a mode / 5745 MHz)



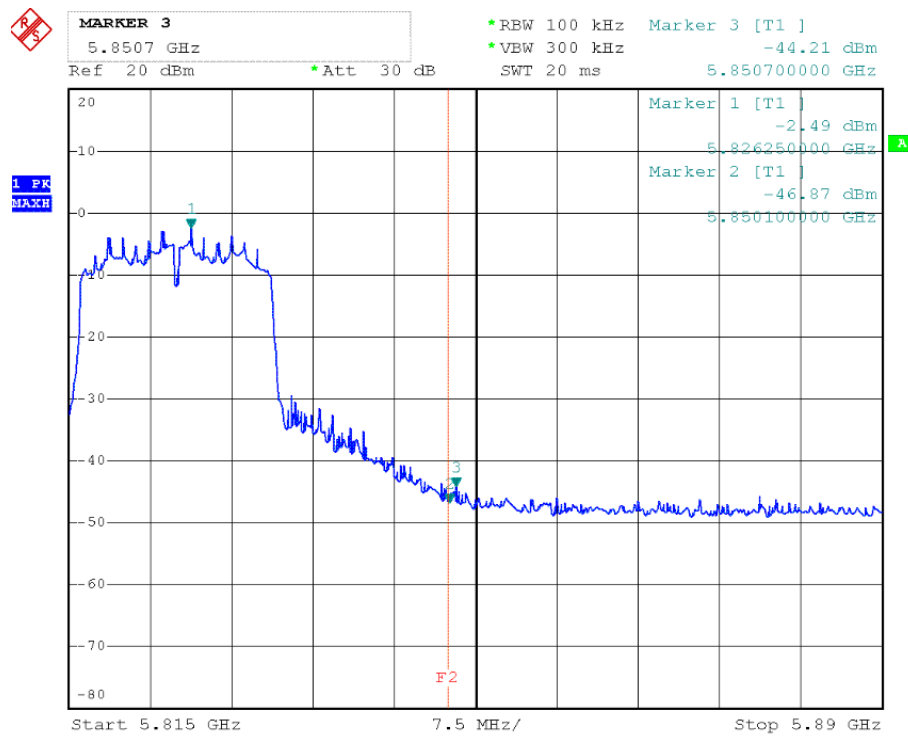
Band Edges (IEEE 802.11a mode / 5825 MHz)



## Band Edges (IEEE 802.11n HT20 mode / 5745 MHz)

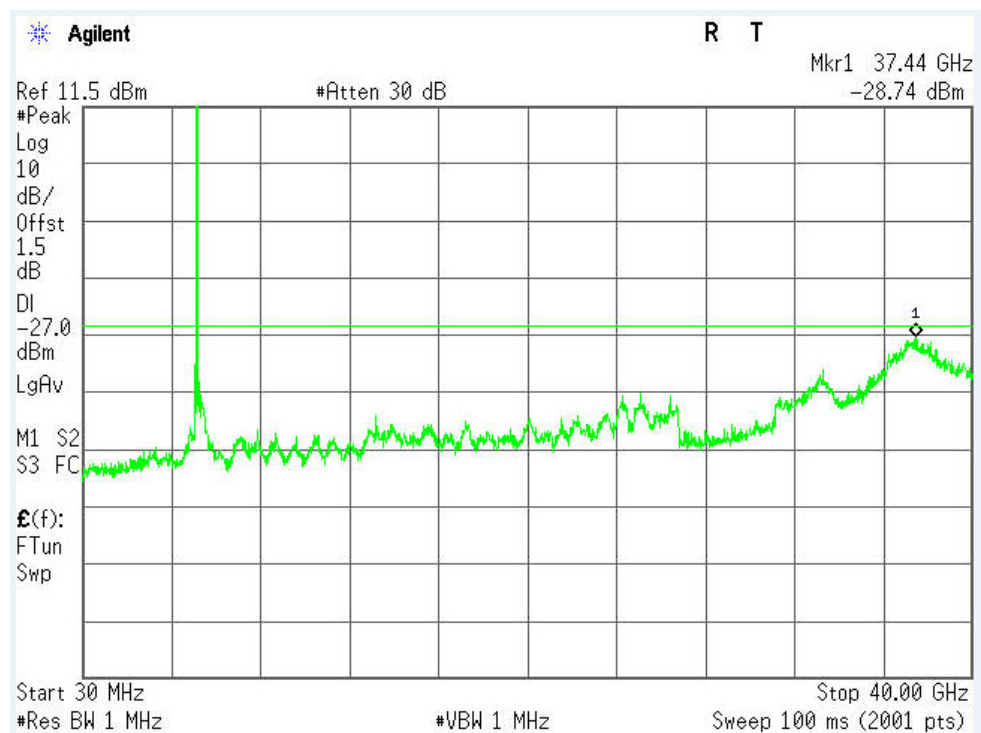


## Band Edges (IEEE 802.11n HT20 mode / 5825 MHz)

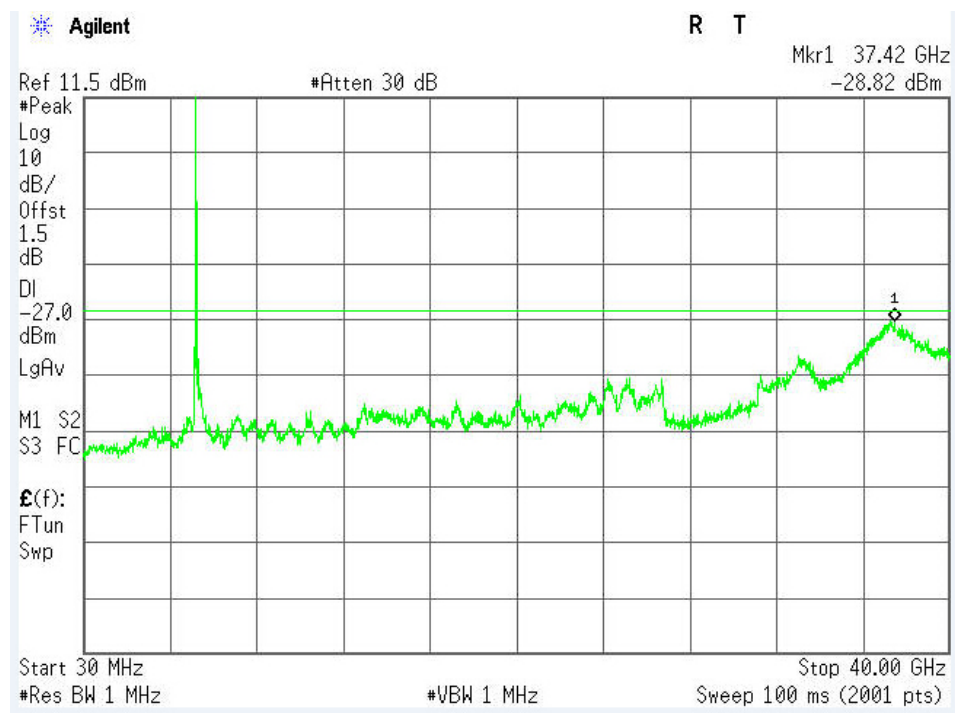


## Conducted Undesirable Emission Test Result

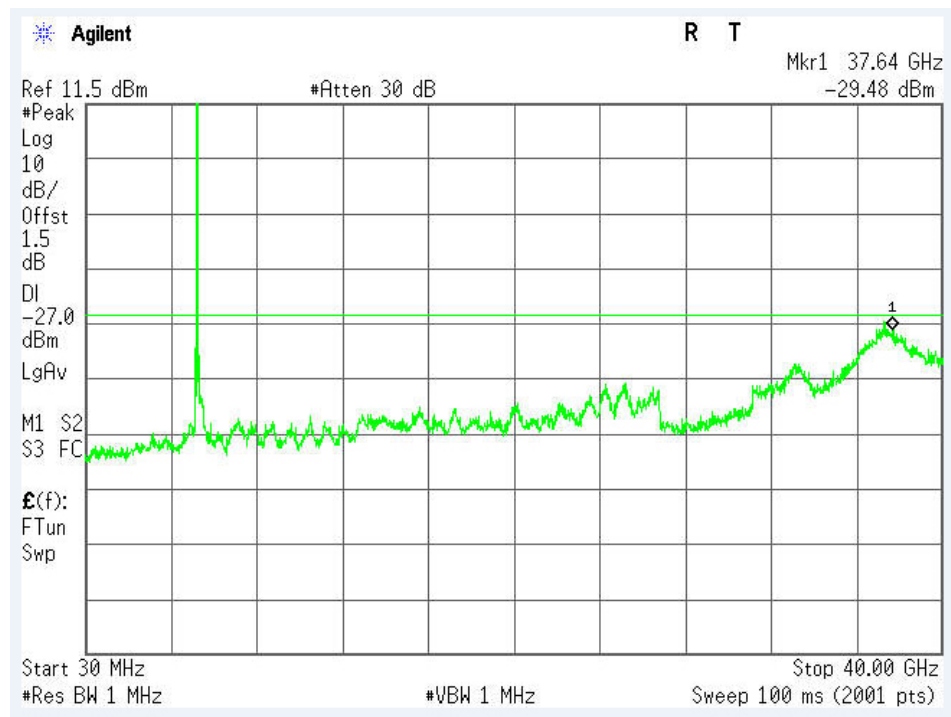
IEEE 802.11a (5180 ~ 5240MHz)  
CH Low



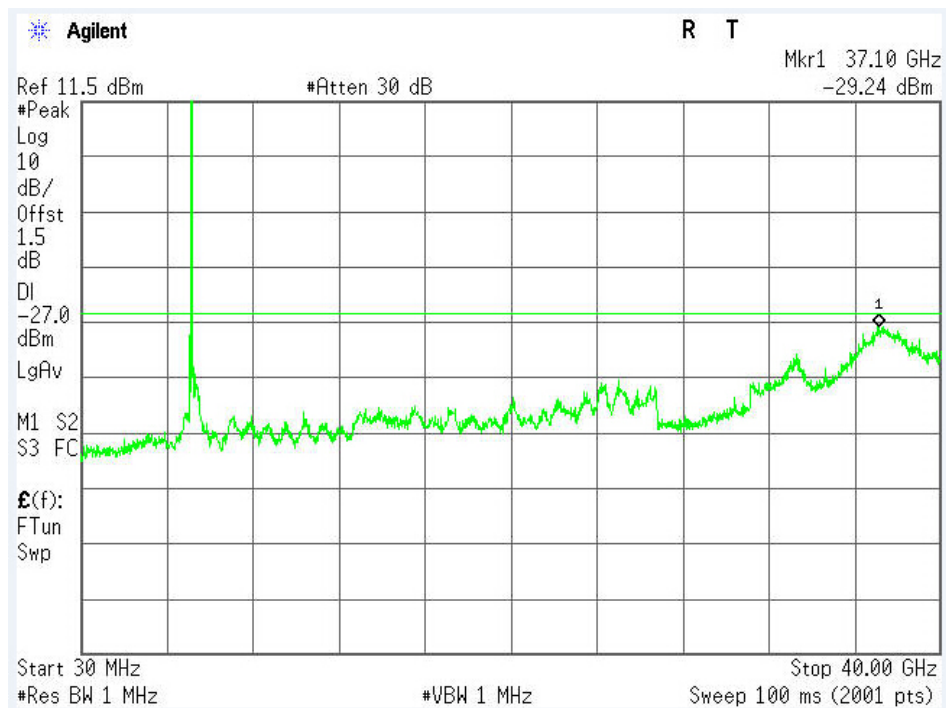
CH Mid



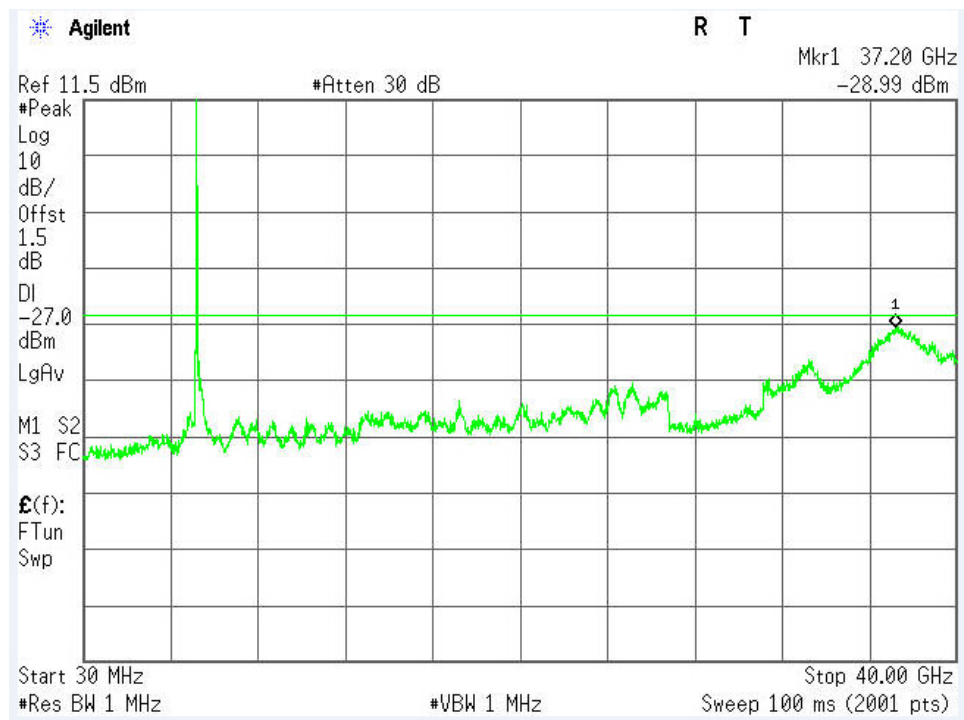
CH High



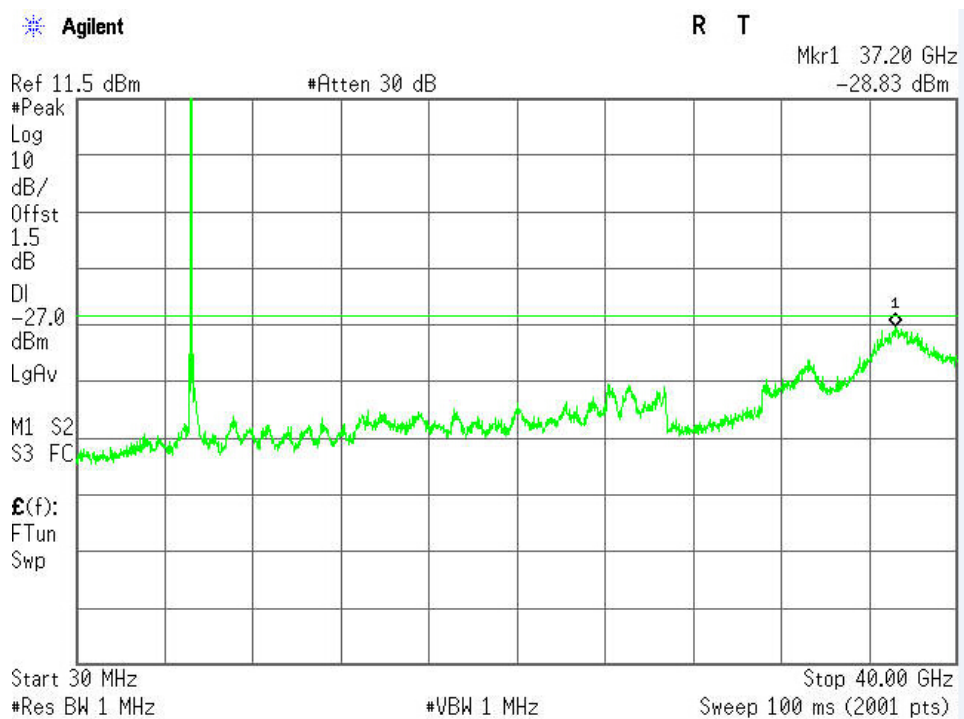
IEEE 802.11n HT20 (5180 ~ 5240MHz)  
CH Low



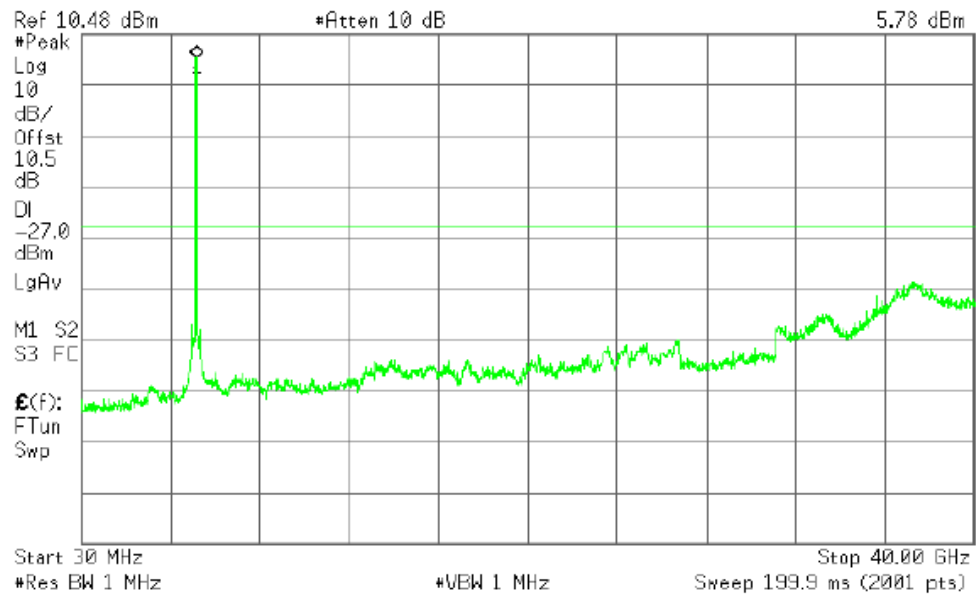
## CH Mid



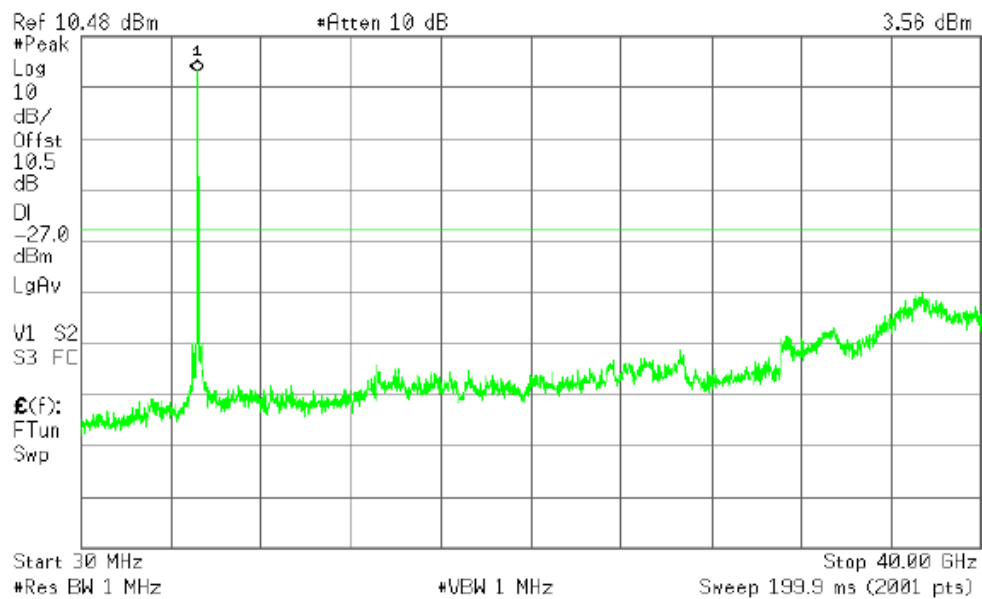
## CH High



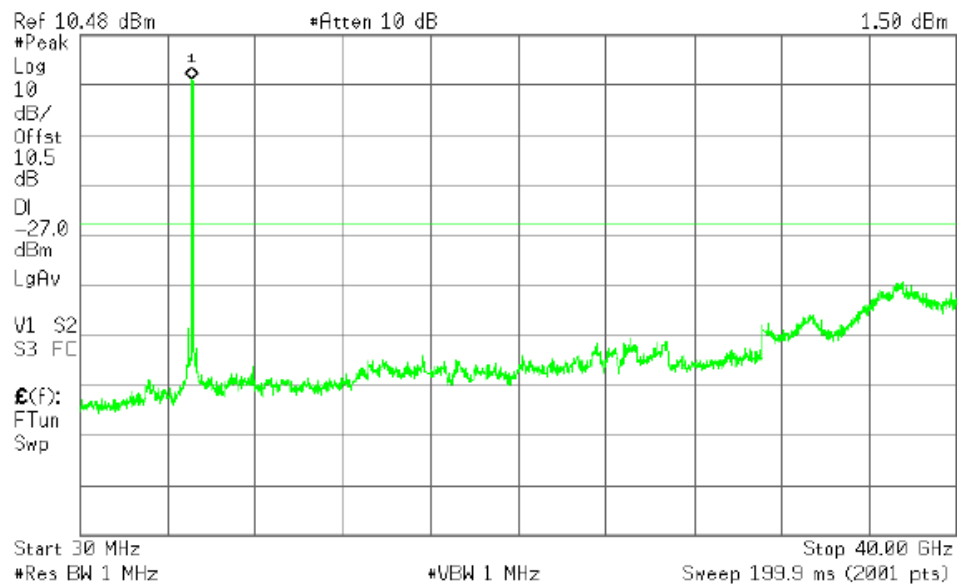
IEEE 802.11a (5745 ~ 5825MHz)  
CH Low



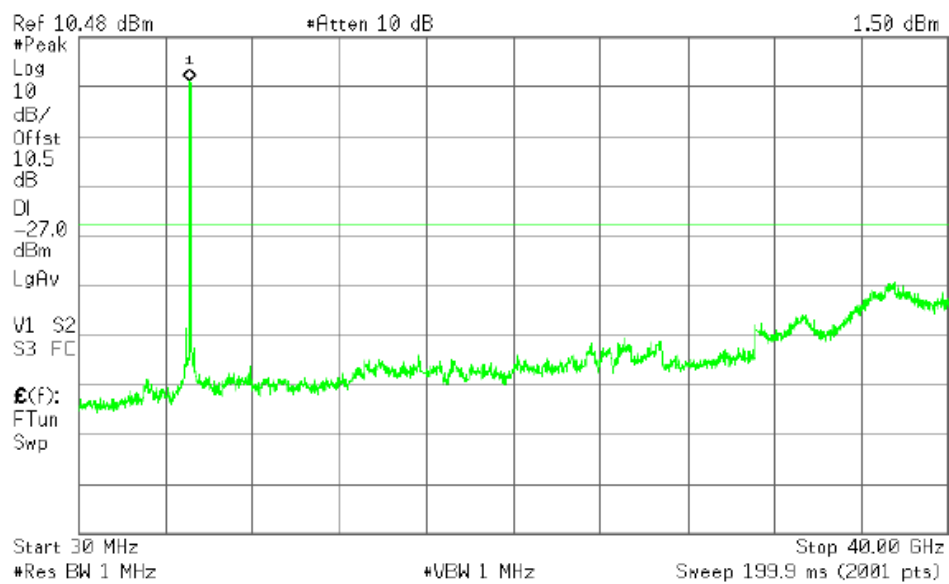
CH Mid



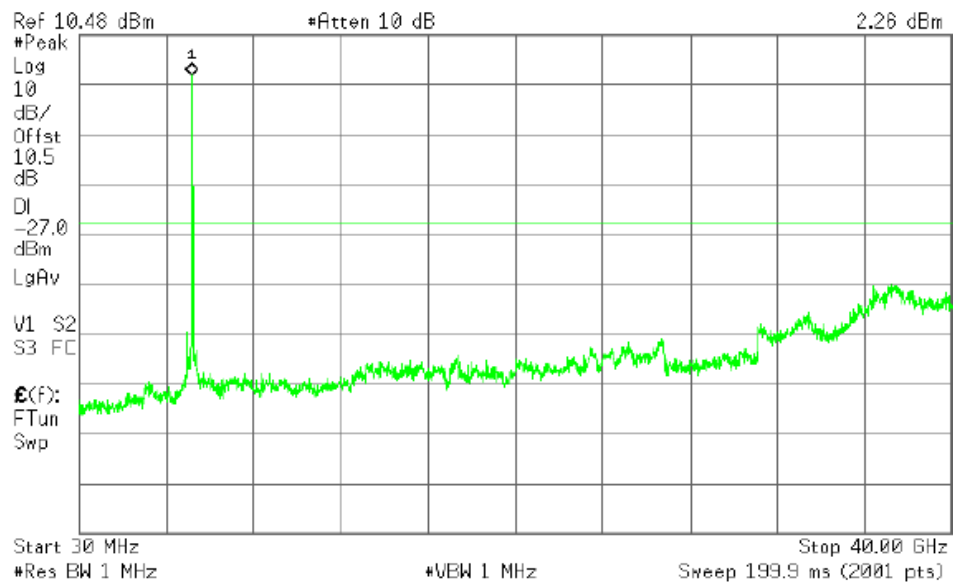
CH High



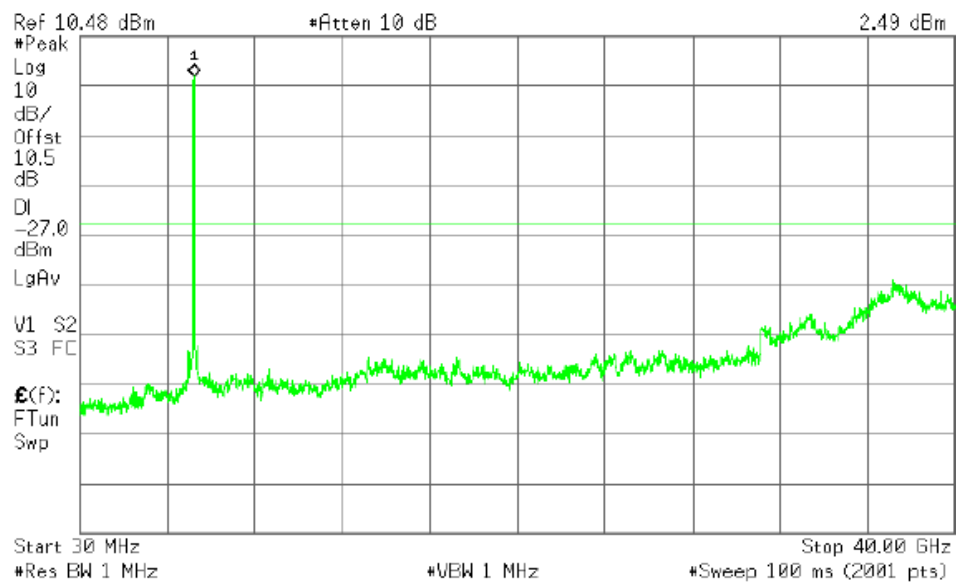
IEEE 802.11n HT20 (5745 ~ 5825MHz)  
CH Low



## CH Mid



## CH High

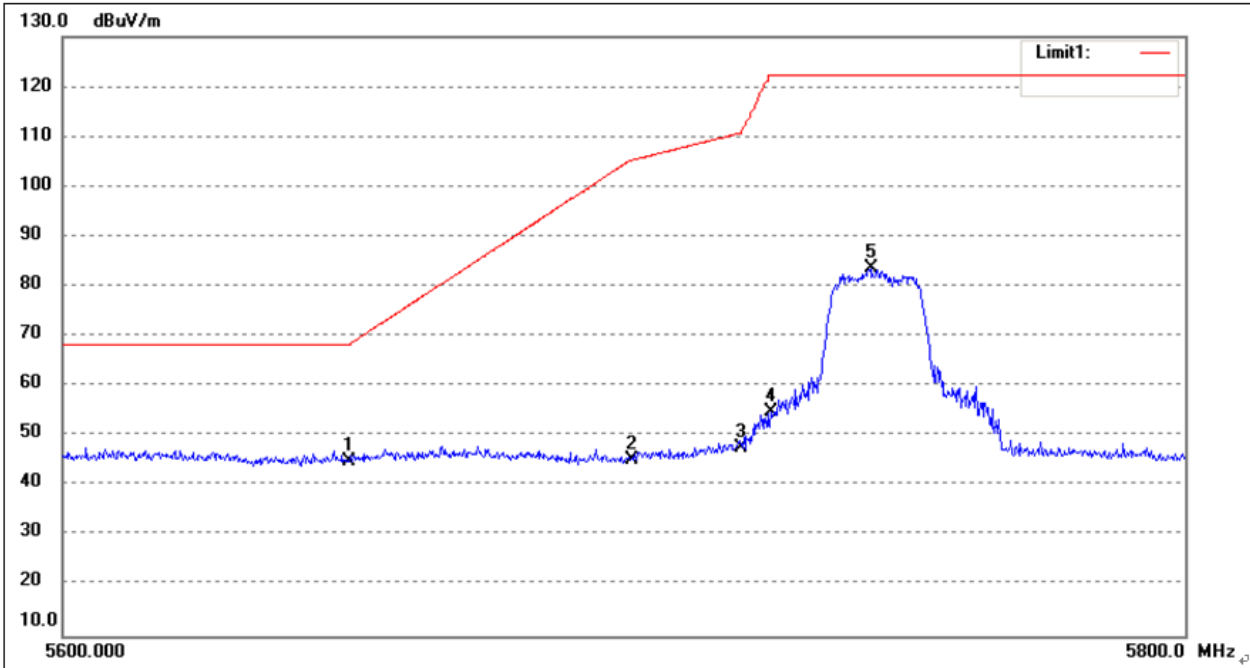


Radiated Band Edges and Undesirable Emission Test Result

IEEE 802.11a CH Low

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH) : 50~54                  | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5745 |

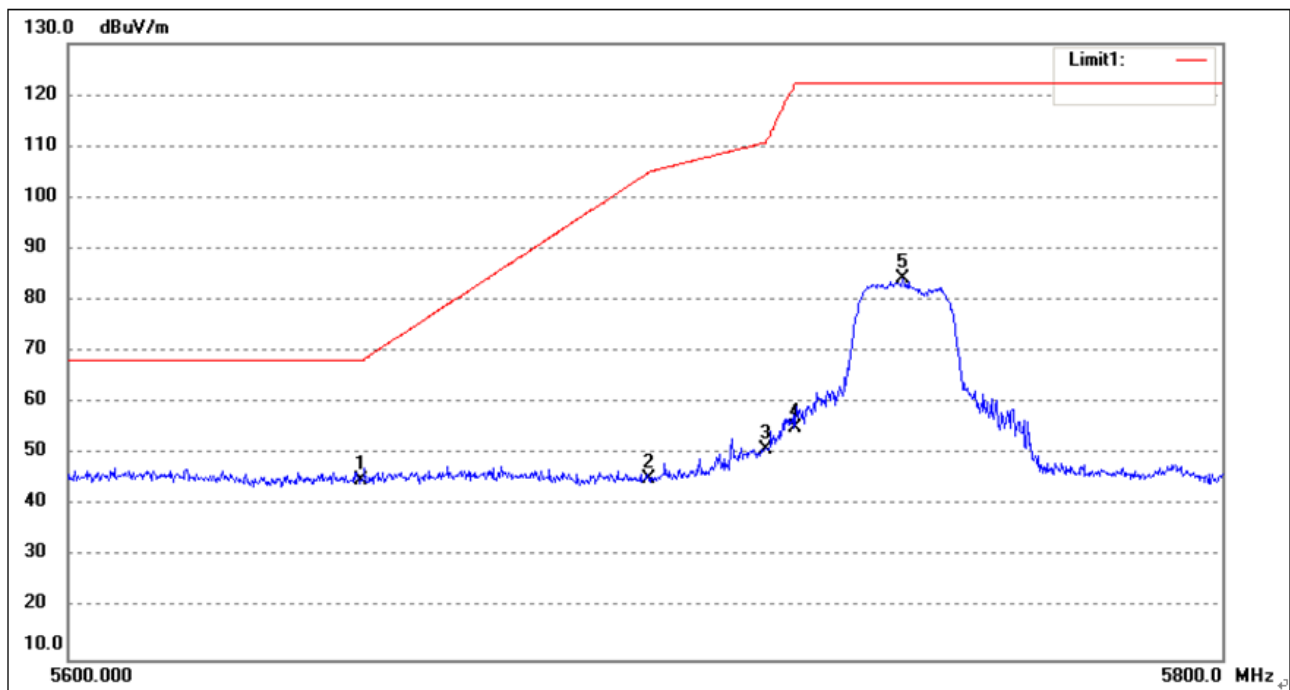
Polarization: Horizontal



| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5650.137  | 44.90    | 0.04    | 44.94    | 68.30    | -23.36 | peak   |
| 2   | 5700.323  | 45.23    | 0.13    | 45.36    | 105.29   | -59.93 | peak   |
| 3   | 5720.361  | 47.33    | 0.18    | 47.51    | 111.62   | -64.11 | peak   |
| 4   | 5725.382  | 54.61    | 0.19    | 54.80    | 122.20   | -67.40 | peak   |
| 5   | 5743.291  | 83.29    | 0.24    | 83.53    | 122.20   | -38.67 | peak   |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH ) : 50~54                 | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5745 |

Polarization: Vertical

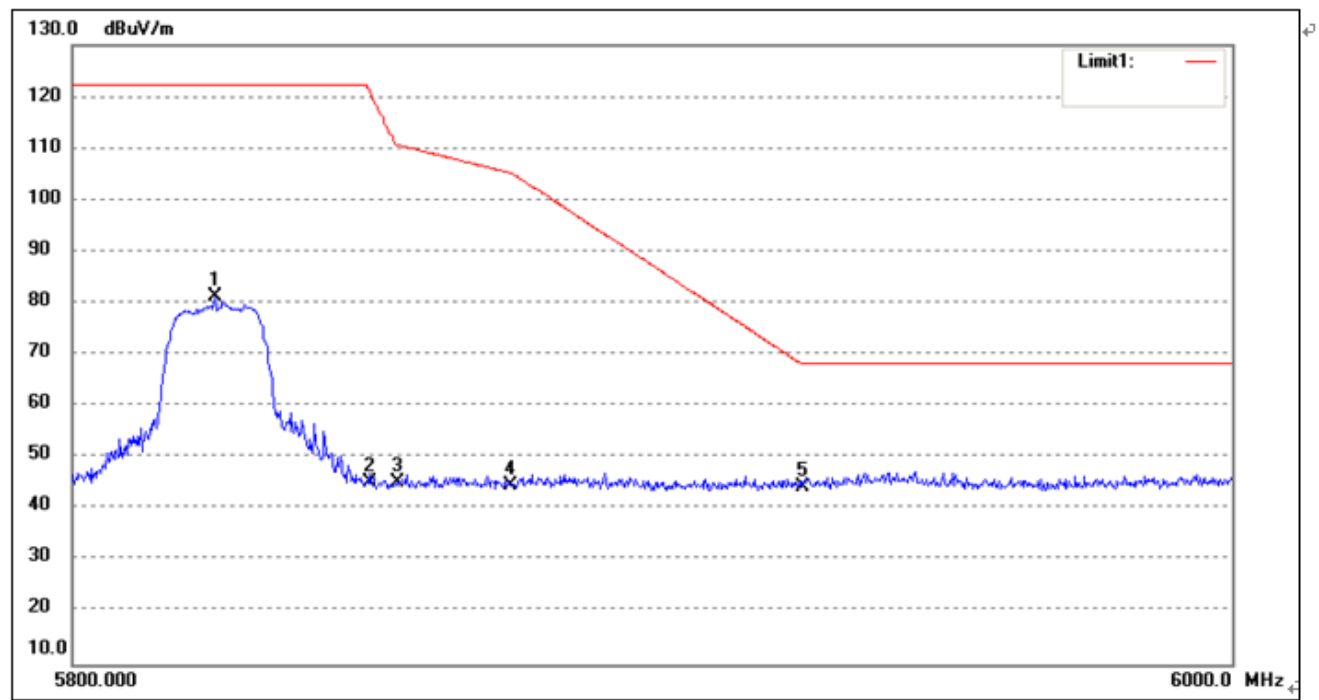


| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5650.335  | 44.93    | 0.04    | 44.97    | 68.45    | -23.48 | peak   |
| 2   | 5699.723  | 45.07    | 0.13    | 45.20    | 105.00   | -59.80 | peak   |
| 3   | 5720.361  | 50.77    | 0.18    | 50.95    | 111.62   | -60.67 | peak   |
| 4   | 5724.980  | 55.02    | 0.19    | 55.21    | 122.15   | -66.94 | peak   |
| 5   | 5743.895  | 83.88    | 0.24    | 84.12    | 122.20   | -38.08 | peak   |

IEEE 802.11a CH High

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH) : 50~54                  | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5825 |

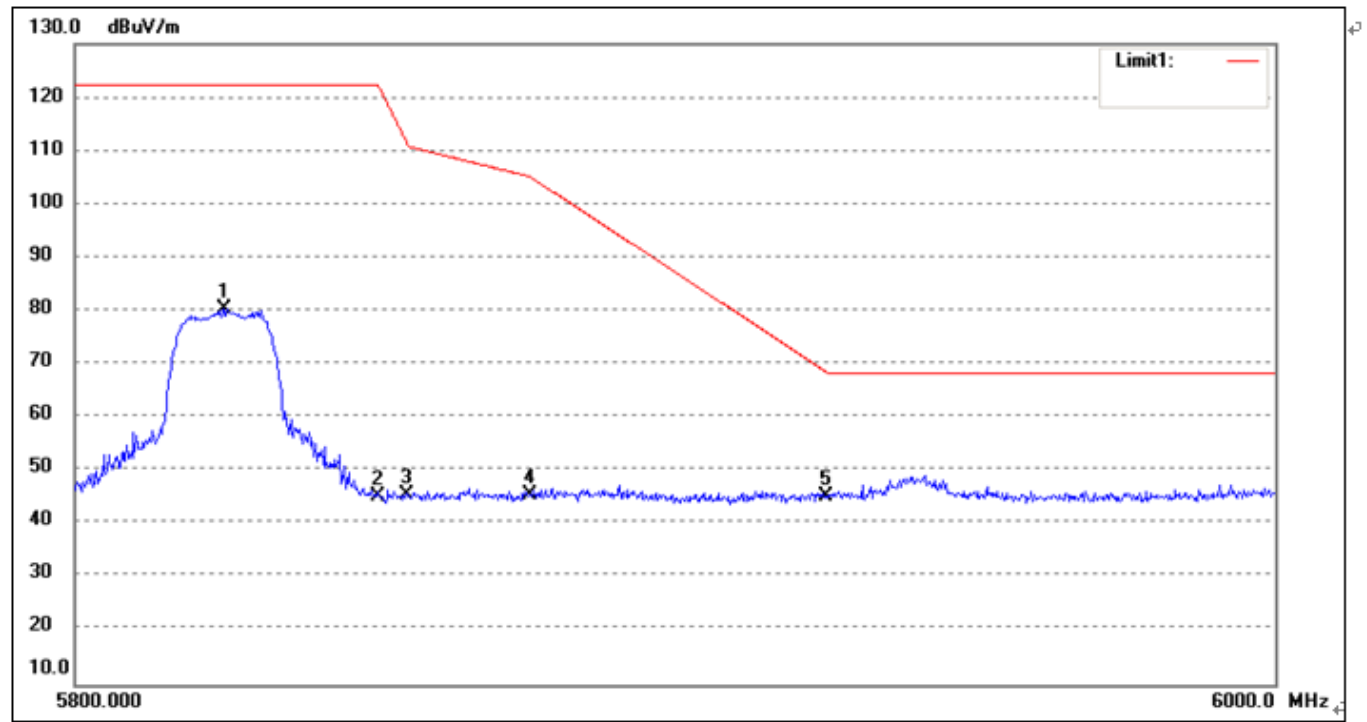
Polarization: Horizontal



| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5824.236  | 80.86    | 0.45    | 81.31    | 122.20   | -40.89 | peak   |
| 2   | 5850.358  | 44.67    | 0.51    | 45.18    | 121.38   | -76.20 | peak   |
| 3   | 5855.715  | 44.63    | 0.53    | 45.16    | 110.60   | -65.44 | peak   |
| 4   | 5874.804  | 44.05    | 0.58    | 44.63    | 105.25   | -60.62 | peak   |
| 5   | 5925.008  | 43.62    | 0.70    | 44.32    | 68.20    | -23.88 | peak   |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH ) : 50~54                 | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5825 |

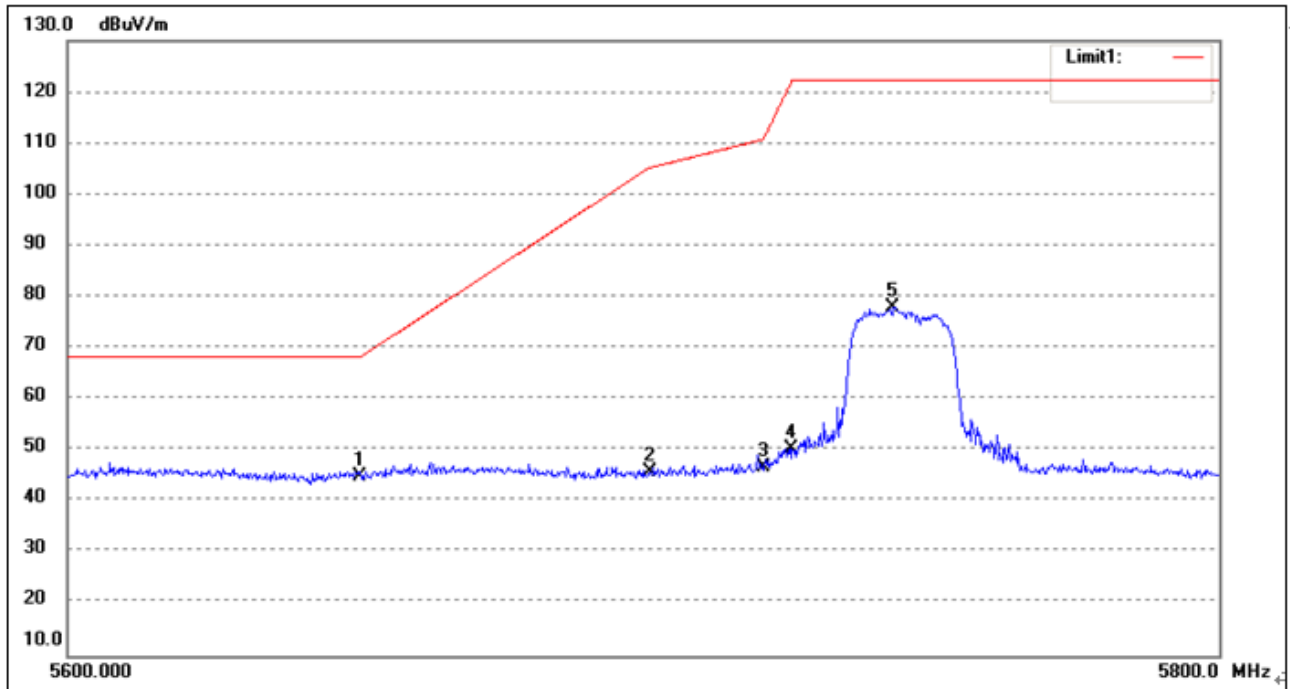
Polarization: Vertical



| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5824.433  | 80.04    | 0.45    | 80.49    | 122.20   | -41.71 | peak   |
| 2   | 5850.159  | 44.89    | 0.51    | 45.40    | 121.84   | -76.44 | peak   |
| 3   | 5854.921  | 44.90    | 0.53    | 45.43    | 110.98   | -65.55 | peak   |
| 4   | 5875.003  | 44.87    | 0.58    | 45.45    | 105.20   | -59.75 | peak   |
| 5   | 5924.405  | 44.68    | 0.70    | 45.38    | 68.64    | -23.26 | peak   |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH) : 50~54                  | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5745 |

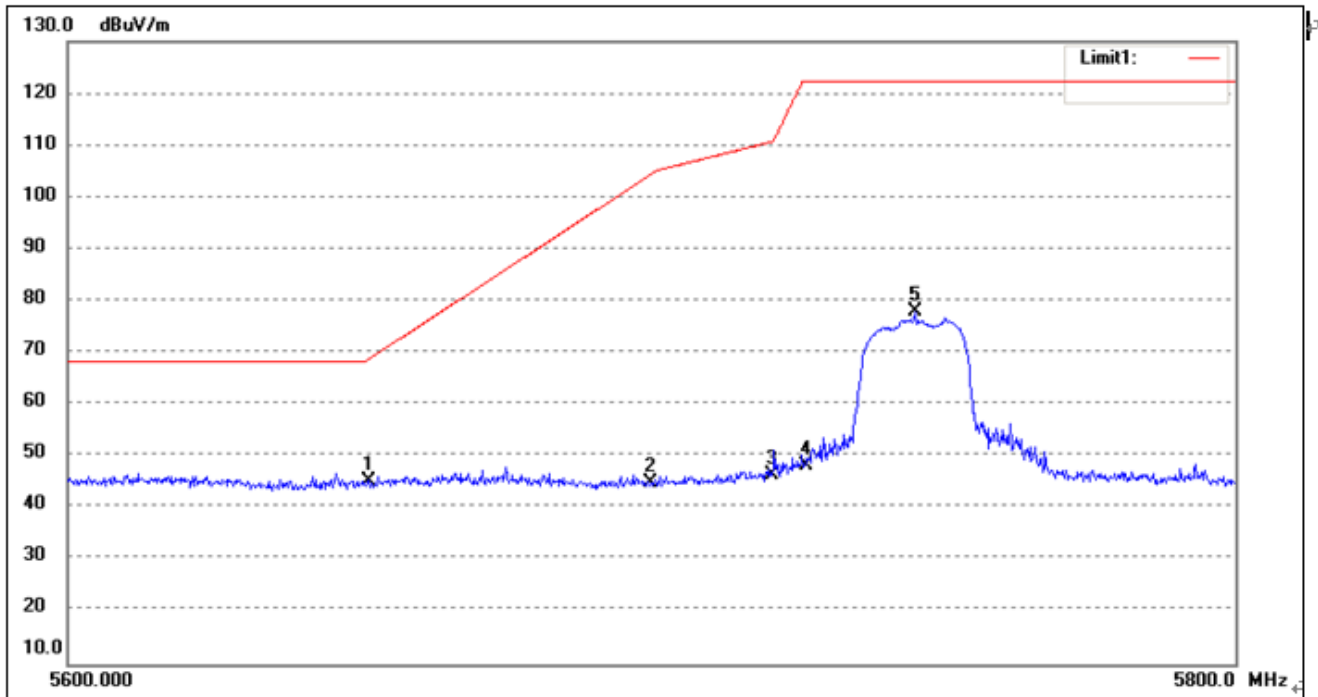
Polarization: Horizontal



| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5650.335  | 44.79    | 0.04    | 44.83    | 68.45    | -23.62 | peak   |
| 2   | 5700.323  | 45.59    | 0.13    | 45.72    | 105.29   | -59.57 | peak   |
| 3   | 5720.160  | 46.48    | 0.18    | 46.66    | 111.16   | -64.50 | peak   |
| 4   | 5724.980  | 50.05    | 0.19    | 50.24    | 122.15   | -71.91 | peak   |
| 5   | 5742.686  | 77.76    | 0.24    | 78.00    | 122.20   | -44.20 | peak   |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH ) : 50~54                 | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5745 |

Polarization: Vertical

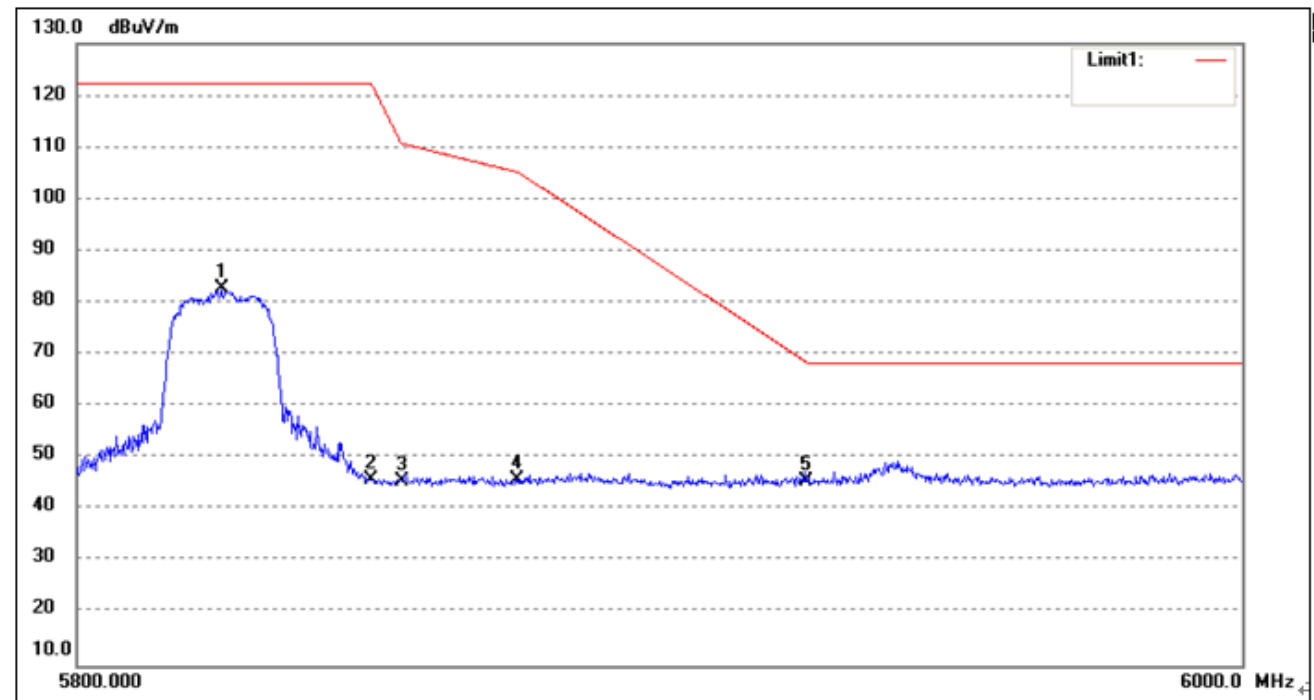


| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5650.732  | 45.36    | 0.04    | 45.40    | 68.74    | -23.34 | peak   |
| 2   | 5698.923  | 44.90    | 0.13    | 45.03    | 104.40   | -59.37 | peak   |
| 3   | 5719.759  | 46.20    | 0.18    | 46.38    | 110.73   | -64.35 | peak   |
| 4   | 5725.382  | 48.07    | 0.19    | 48.26    | 122.20   | -73.94 | peak   |
| 5   | 5744.500  | 77.57    | 0.24    | 77.81    | 122.20   | -44.39 | peak   |

# IEEE 802.11n CH High

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH) : 50~54                  | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5825 |

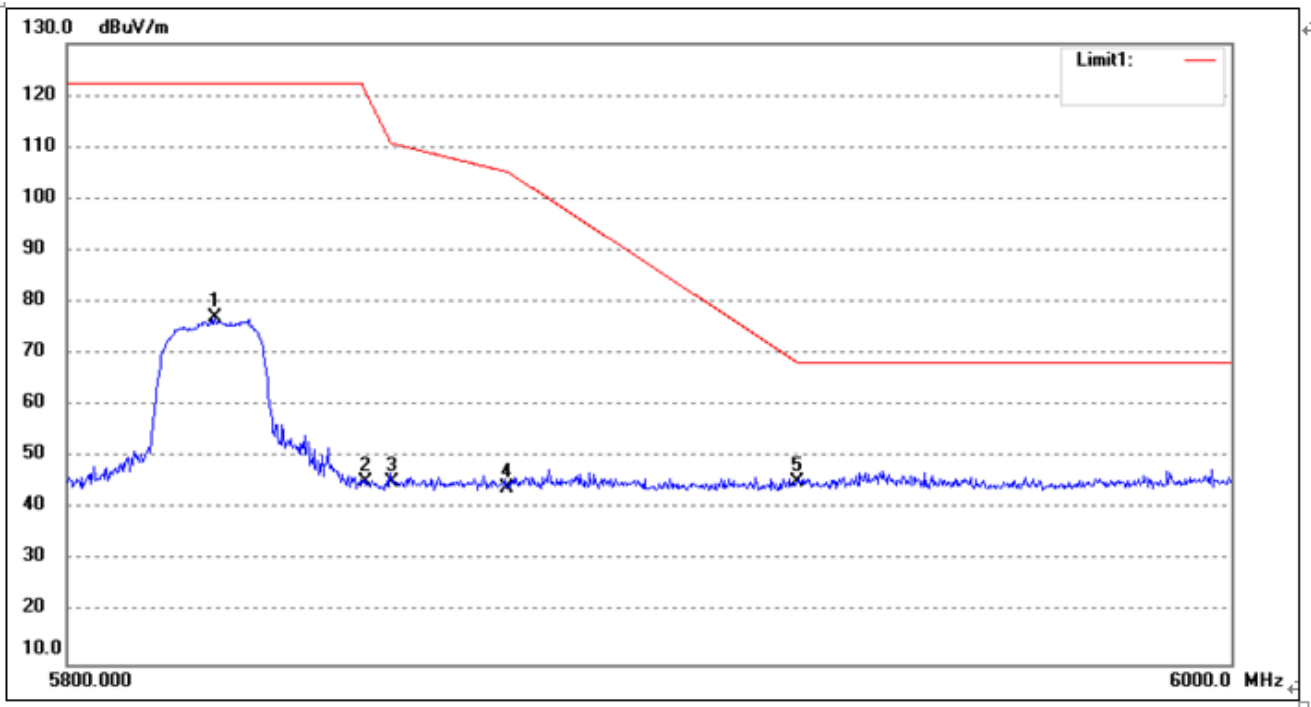
Polarization: Horizontal



| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5824.433  | 82.29    | 0.45    | 82.74    | 122.20   | -39.46 | peak   |
| 2   | 5850.159  | 45.38    | 0.51    | 45.89    | 121.84   | -75.95 | peak   |
| 3   | 5855.120  | 45.15    | 0.53    | 45.68    | 110.77   | -65.09 | peak   |
| 4   | 5874.804  | 45.24    | 0.58    | 45.82    | 105.25   | -59.43 | peak   |
| 5   | 5924.405  | 44.97    | 0.70    | 45.67    | 68.64    | -22.97 | peak   |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Temperature ( °C ) : 22~23              | EUT: LOONA                 |
| Humidity (%RH ) : 50~54                 | M/N: RC133N1               |
| Barometric Pressure ( mbar ) : 950~1000 | Test Frequency (MHz) :5825 |

Polarization: Vertical



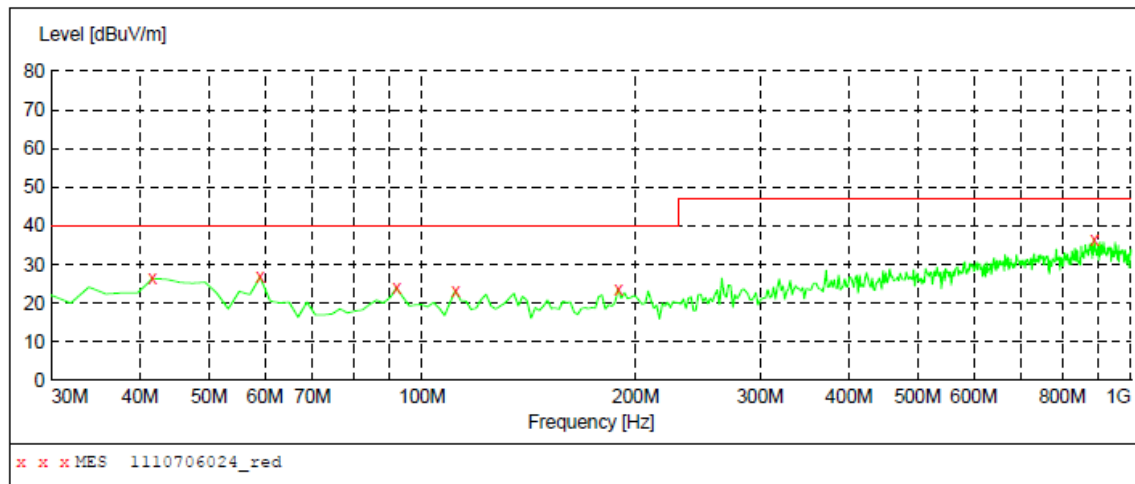
| No. | Frequency | Reading  | Correct | Result   | Limit    | Margin | Remark |
|-----|-----------|----------|---------|----------|----------|--------|--------|
|     | (MHz)     | (dBuV/m) | dB/m    | (dBuV/m) | (dBuV/m) | (dB)   |        |
| 1   | 5825.026  | 76.74    | 0.45    | 77.19    | 122.20   | -45.01 | peak   |
| 2   | 5850.358  | 44.79    | 0.51    | 45.30    | 121.38   | -76.08 | peak   |
| 3   | 5855.120  | 44.86    | 0.53    | 45.39    | 110.77   | -65.38 | peak   |
| 4   | 5874.804  | 43.52    | 0.58    | 44.10    | 105.25   | -61.15 | peak   |
| 5   | 5924.606  | 44.51    | 0.70    | 45.21    | 68.49    | -23.28 | peak   |

## Transmitter Radiated Undesirable Emissions (Below 1GHz)

|                                                                                                                                                                                                                                                                 |                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                                                                                                                                      | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                                                                                                                          | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                                                                                                                                         | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5825                                                                                                                                                                                                                                      | Polarization: Vertical                       |
| <b>Note:</b><br>1. We test all modes, and chose the worst data for the report.<br>2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode.<br>3. Worst-case radiated emission below 1GHz is IEEE 802 11a TX (CH Low:5825MHz) mode. |                                              |

### SWEEP TABLE: "test (30M-1G)"

| Short Description: |           | Field Strength |         |         |            |
|--------------------|-----------|----------------|---------|---------|------------|
| Start              | Stop      | Detector       | Meas.   | IF      | Transducer |
| Frequency          | Frequency |                | Time    | Bandw.  |            |
| 30.0 MHz           | 1.0 GHz   | MaxPeak        | Coupled | 100 kHz | 9163-2015  |



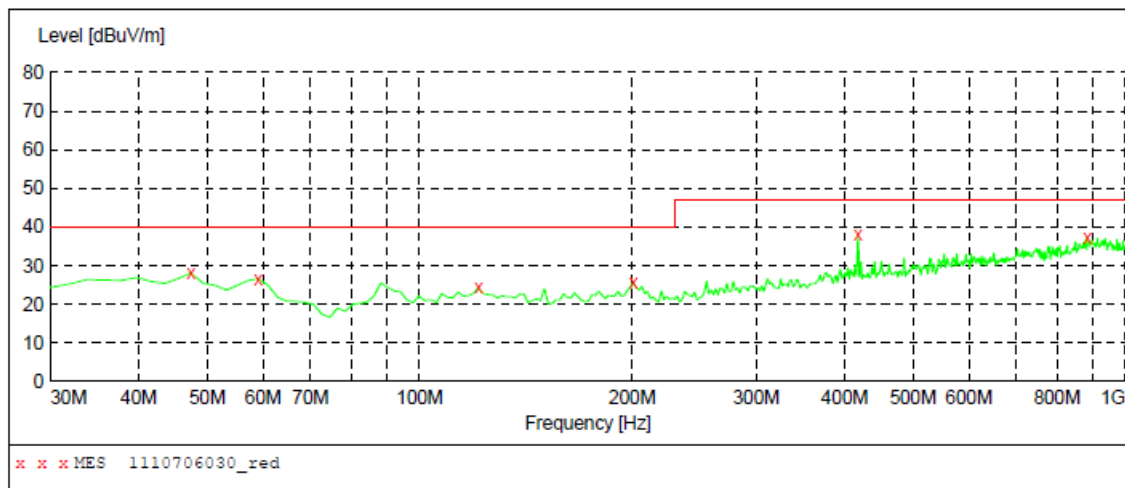
### MEASUREMENT RESULT: "1110706024\_red"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 41.640000        | 26.30           | 15.4         | 40.0            | 13.7         | ---  | 100.0        | 0.00           | VERTICAL     |
| 59.100000        | 26.70           | 15.7         | 40.0            | 13.3         | ---  | 100.0        | 0.00           | VERTICAL     |
| 92.080000        | 24.00           | 14.0         | 40.0            | 16.0         | ---  | 100.0        | 0.00           | VERTICAL     |
| 111.480000       | 23.20           | 12.5         | 40.0            | 16.8         | ---  | 100.0        | 0.00           | VERTICAL     |
| 189.080000       | 23.60           | 13.4         | 40.0            | 16.4         | ---  | 100.0        | 0.00           | VERTICAL     |
| 887.480000       | 36.50           | 25.5         | 47.0            | 10.5         | ---  | 100.0        | 0.00           | VERTICAL     |

|                                                                                                                                                                                                                                                          |                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                                                                                                                               | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                                                                                                                   | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                                                                                                                                  | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5825                                                                                                                                                                                                                               | Polarization: Horizontal                     |
| Note:<br>1. We test all modes, and chose the worst data for the report.<br>2. Worst-case radiated emission below 30MHz is IEEE 802 11a TX (CH Low:5825MHz) mode.<br>3. Worst-case radiated emission below 1GHz is IEEE 802 11a TX (CH Low:5825MHz) mode. |                                              |

***SWEEP TABLE: "test (30M-1G)"***

| Short Description:  | Field Strength                    |
|---------------------|-----------------------------------|
| Start Stop          | Detector Meas. IF Transducer      |
| Frequency Frequency | Time Bandw.                       |
| 30.0 MHz 1.0 GHz    | MaxPeak Coupled 100 kHz 9163-2015 |



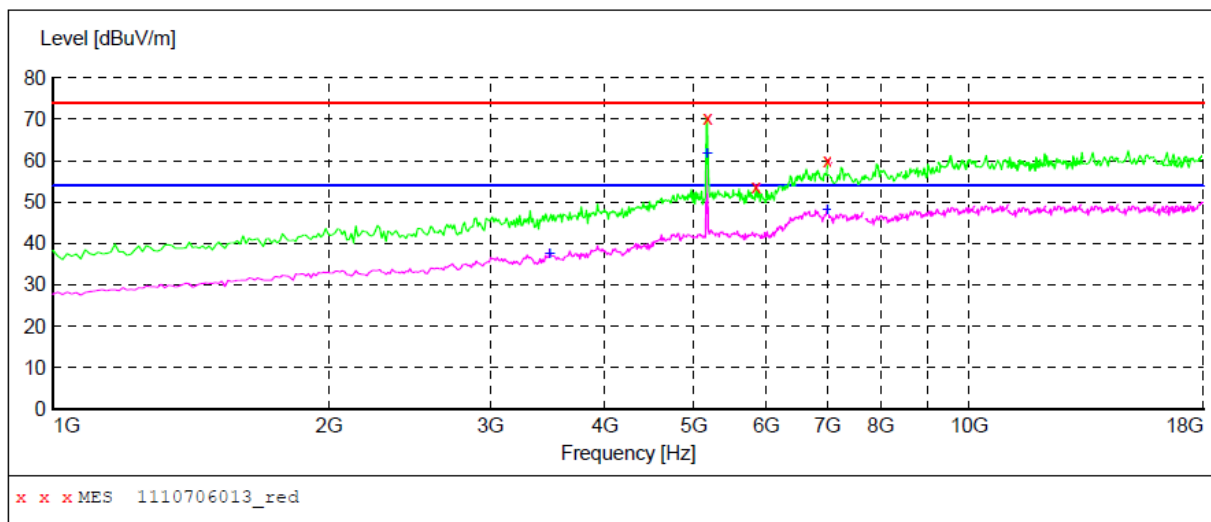
***MEASUREMENT RESULT: "1110706030\_red"***

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 47.460000        | 28.10           | 16.7         | 40.0            | 11.9         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 59.100000        | 26.60           | 15.7         | 40.0            | 13.4         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 121.180000       | 24.20           | 13.2         | 40.0            | 15.8         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 200.720000       | 25.60           | 14.0         | 40.0            | 14.4         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 418.000000       | 38.00           | 18.2         | 47.0            | 9.0          | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 883.600000       | 37.30           | 25.4         | 47.0            | 9.7          | ---  | 100.0        | 0.00           | HORIZONTAL   |

## Transmitter Radiated Undesirable Emissions (Above 1GHz)

Worst-case radiated emission of IEEE 802.11a mode

|                                                                                                                                                       |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                            | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                               | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5240                                                                                                                            | Polarization: Horizontal                     |
| Note:<br>1. We test all modes, and chose the worst data for the report.<br>2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5240MHz). |                                              |

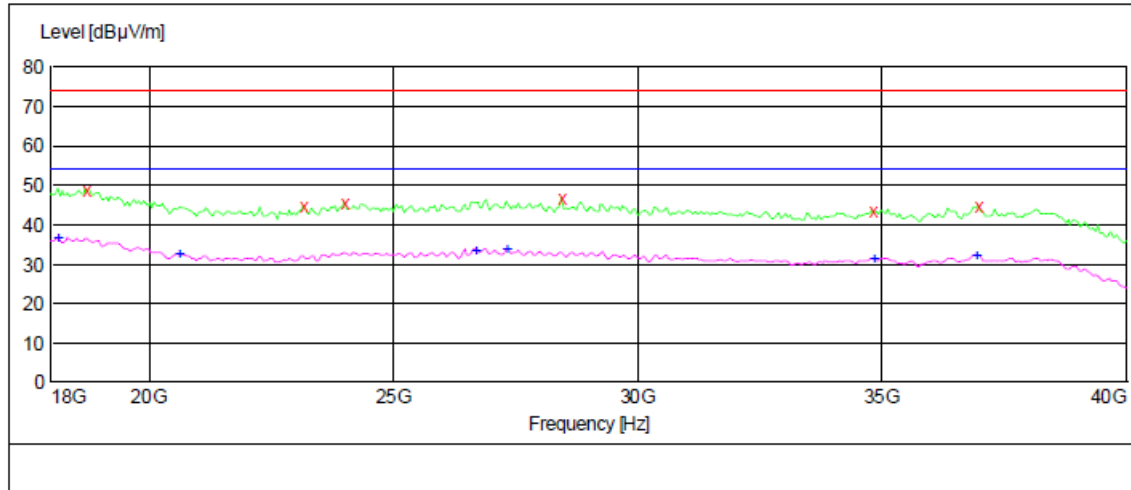


### MEASUREMENT RESULT: "1110706013\_red"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 5241.000000      | 70.30           | 12.7         | 74.0            | 3.7          | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 5848.000000      | 53.50           | 13.0         | 74.0            | 20.5         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 7000.000000      | 59.80           | 20.3         | 74.0            | 14.2         | ---  | 150.0        | 0.00           | HORIZONTAL   |

### MEASUREMENT RESULT: "1110706013\_red2"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 3484.000000      | 37.50           | 4.6          | 53.9            | 16.4         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 5241.000000      | 61.50           | 12.7         | 53.9            | -7.6         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 7000.000000      | 48.20           | 20.3         | 53.9            | 5.7          | ---  | 150.0        | 0.00           | HORIZONTAL   |



**MEASUREMENT RESULT: "HC170625002\_red"**

6/25/2017 3:52PM

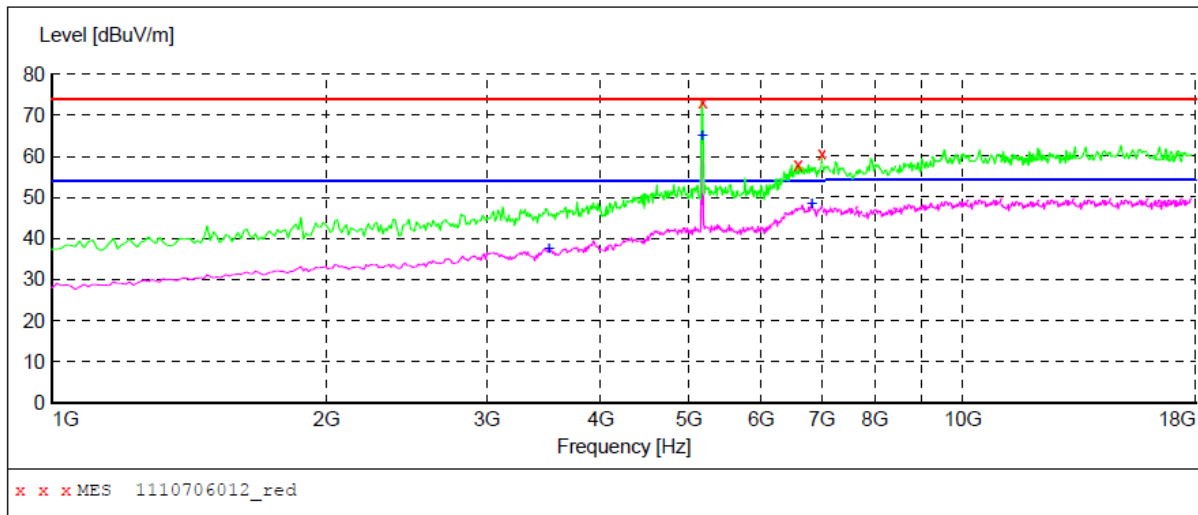
| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18705.410822     | 49.20           | -22.4        | 74.0            | 24.8         | ---  | 100.0        | 294.00         | HORIZONTAL   |
| 23158.316633     | 44.80           | -24.2        | 74.0            | 29.2         | ---  | 100.0        | 13.00          | HORIZONTAL   |
| 23995.991984     | 45.70           | -22.8        | 74.0            | 28.3         | ---  | 100.0        | 328.00         | HORIZONTAL   |
| 28448.897796     | 46.70           | -20.3        | 74.0            | 27.3         | ---  | 100.0        | 244.00         | HORIZONTAL   |
| 34797.595190     | 43.70           | -13.8        | 74.0            | 30.3         | ---  | 100.0        | 351.00         | HORIZONTAL   |
| 36957.915832     | 44.80           | -12.8        | 74.0            | 29.2         | ---  | 100.0        | 163.00         | HORIZONTAL   |

**MEASUREMENT RESULT: "HC170625002\_red2"**

6/25/2017 3:52PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18132.264529     | 36.80           | -19.8        | 54.0            | 17.2         | ---  | 100.0        | 121.00         | HORIZONTAL   |
| 20601.202405     | 32.50           | -26.7        | 54.0            | 21.5         | ---  | 100.0        | 96.00          | HORIZONTAL   |
| 26685.370741     | 33.70           | -21.4        | 54.0            | 20.3         | ---  | 100.0        | 129.00         | HORIZONTAL   |
| 27302.605210     | 33.80           | -21.0        | 54.0            | 20.2         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 34841.683367     | 31.50           | -13.7        | 54.0            | 22.5         | ---  | 100.0        | 187.00         | HORIZONTAL   |
| 36913.827655     | 32.30           | -12.8        | 54.0            | 21.7         | ---  | 100.0        | 104.00         | HORIZONTAL   |

|                                                                                                                                                       |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                            | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                               | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5240                                                                                                                            | Polarization: Vertical                       |
| Note:<br>1. We test all modes, and chose the worst data for the report.<br>2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5240MHz). |                                              |

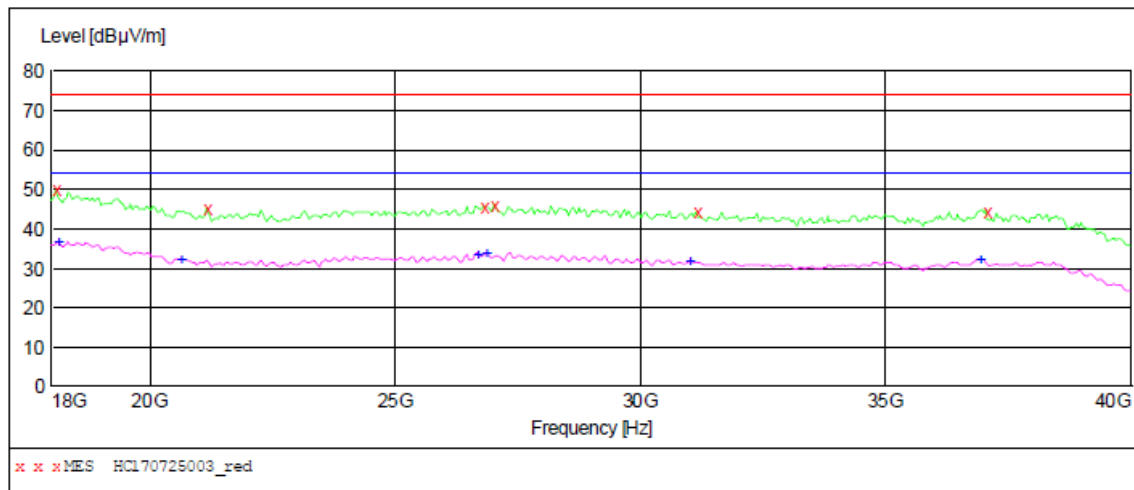


**MEASUREMENT RESULT: "1110706012\_red"**

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 5241.000000      | 73.20           | 12.7         | 74.0            | 0.8          | ---  | 150.0        | 0.00           | VERTICAL     |
| 6592.000000      | 58.00           | 18.9         | 74.0            | 16.0         | ---  | 150.0        | 0.00           | VERTICAL     |
| 7000.000000      | 60.50           | 20.3         | 74.0            | 13.5         | ---  | 150.0        | 0.00           | VERTICAL     |

**MEASUREMENT RESULT: "1110706012\_red2"**

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 3508.000000      | 37.40           | 4.7          | 53.9            | 16.5         | ---  | 150.0        | 0.00           | VERTICAL     |
| 5241.000000      | 64.80           | 12.7         | 53.9            | -10.9        | ---  | 150.0        | 0.00           | VERTICAL     |
| 6820.000000      | 48.40           | 19.7         | 53.9            | 5.5          | ---  | 150.0        | 0.00           | VERTICAL     |



# **MEASUREMENT RESULT: "HC170725003\_red"**

7/25/2017 3:54PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18088.176353     | 49.90           | -19.6        | 74.0            | 24.1         | ---  | 100.0        | 318.00         | HORIZONTAL   |
| 21174.348697     | 45.30           | -26.7        | 74.0            | 28.7         | ---  | 100.0        | 57.00          | HORIZONTAL   |
| 26817.635271     | 45.70           | -21.3        | 74.0            | 28.3         | ---  | 100.0        | 348.00         | HORIZONTAL   |
| 27038.076152     | 46.20           | -21.0        | 74.0            | 27.8         | ---  | 100.0        | 197.00         | HORIZONTAL   |
| 31138.276553     | 44.30           | -18.1        | 74.0            | 29.7         | ---  | 100.0        | 278.00         | HORIZONTAL   |
| 37046.092184     | 44.60           | -12.7        | 74.0            | 29.4         | ---  | 100.0        | 41.00          | HORIZONTAL   |

# **MEASUREMENT RESULT: "HC170725003\_red2"**

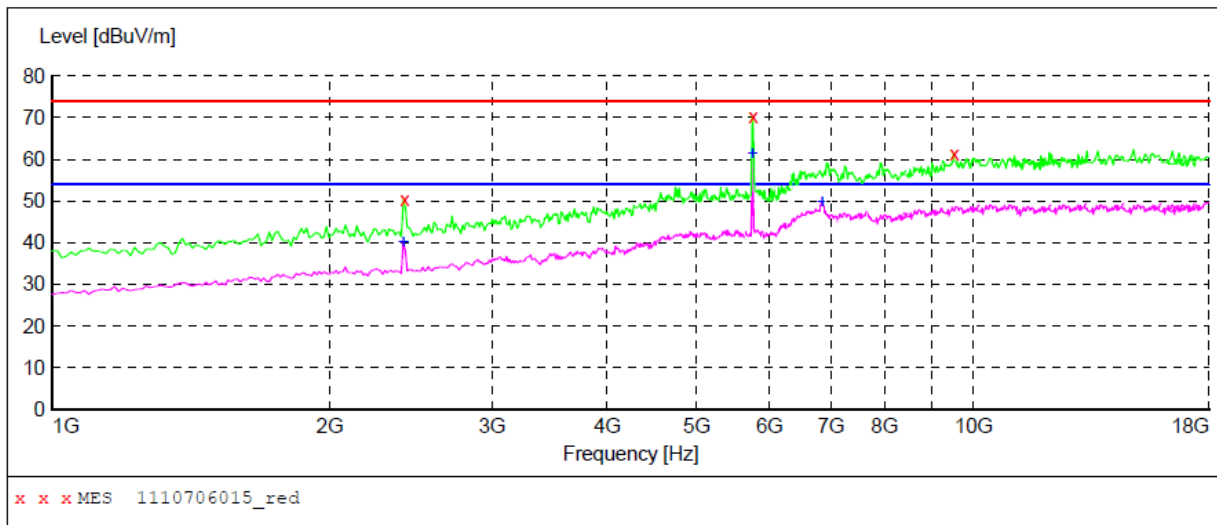
7/25/2017 3:54PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18132.264529     | 36.60           | -19.8        | 54.0            | 17.4         | ---  | 100.0        | 57.00          | HORIZONTAL   |
| 20645.290581     | 32.40           | -26.7        | 54.0            | 21.6         | ---  | 100.0        | 164.00         | HORIZONTAL   |
| 26685.370741     | 33.60           | -21.4        | 54.0            | 20.4         | ---  | 100.0        | 82.00          | HORIZONTAL   |
| 26861.723447     | 33.80           | -21.2        | 54.0            | 20.2         | ---  | 100.0        | 238.00         | HORIZONTAL   |
| 31006.012024     | 31.70           | -18.2        | 54.0            | 22.3         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 36913.827655     | 32.40           | -12.8        | 54.0            | 21.6         | ---  | 100.0        | 214.00         | HORIZONTAL   |

## Transmitter Radiated Undesirable Emissions (Above 1GHz)

Worst-case radiated emission of IEEE 802.11n HT 20 mode

|                                                                                                                                                       |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                            | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                               | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5745                                                                                                                            | Polarization: Horizontal                     |
| Note:<br>1. We test all modes, and chose the worst data for the report.<br>2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5745MHz). |                                              |

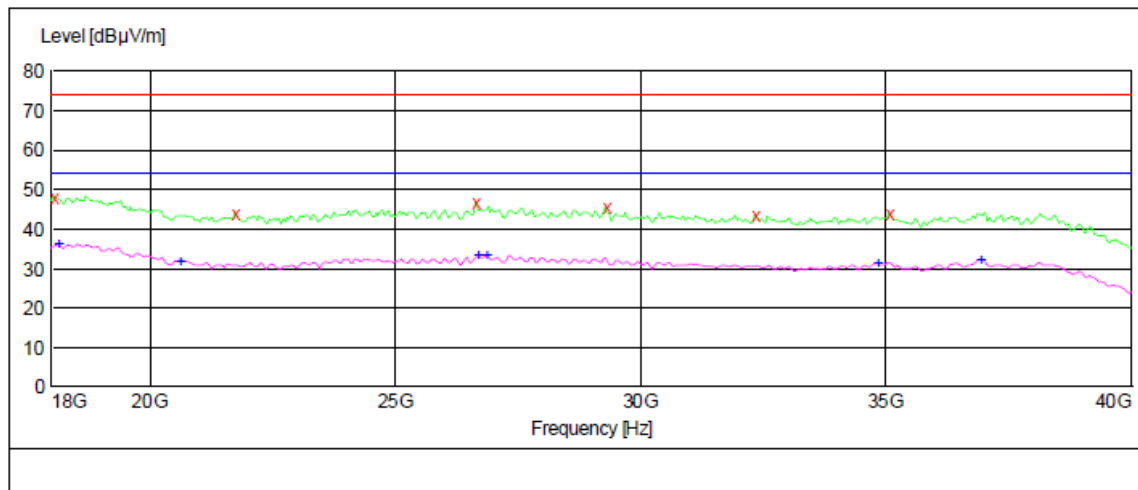


### MEASUREMENT RESULT: "1110706015\_red"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 2404.000000      | 50.30           | 12.7         | 74.0            | 23.7         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 5745.000000      | 70.40           | 13.0         | 74.0            | 3.6          | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 9628.000000      | 60.80           | 24.0         | 74.0            | 13.2         | ---  | 150.0        | 0.00           | HORIZONTAL   |

### MEASUREMENT RESULT: "1110706015\_red2"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 2404.000000      | 40.20           | 1.9          | 53.9            | 13.7         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 5745.000000      | 61.30           | 12.7         | 53.9            | -7.4         | ---  | 150.0        | 0.00           | HORIZONTAL   |
| 6820.000000      | 49.80           | 19.7         | 53.9            | 5.1          | ---  | 150.0        | 0.00           | HORIZONTAL   |



**MEASUREMENT RESULT: "HC170625014\_red"**

6/25/2017 4:36PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18044.088176     | 48.30           | -19.4        | 74.0            | 25.7         | ---  | 100.0        | 332.00         | HORIZONTAL   |
| 21747.494990     | 44.10           | -26.0        | 74.0            | 29.9         | ---  | 100.0        | 360.00         | HORIZONTAL   |
| 26641.282565     | 47.00           | -21.5        | 74.0            | 27.0         | ---  | 100.0        | 356.00         | HORIZONTAL   |
| 29286.573146     | 45.70           | -19.5        | 74.0            | 28.3         | ---  | 100.0        | 167.00         | HORIZONTAL   |
| 32328.657315     | 43.80           | -17.1        | 74.0            | 30.2         | ---  | 100.0        | 241.00         | HORIZONTAL   |
| 35062.124248     | 44.10           | -13.4        | 74.0            | 29.9         | ---  | 100.0        | 83.00          | HORIZONTAL   |

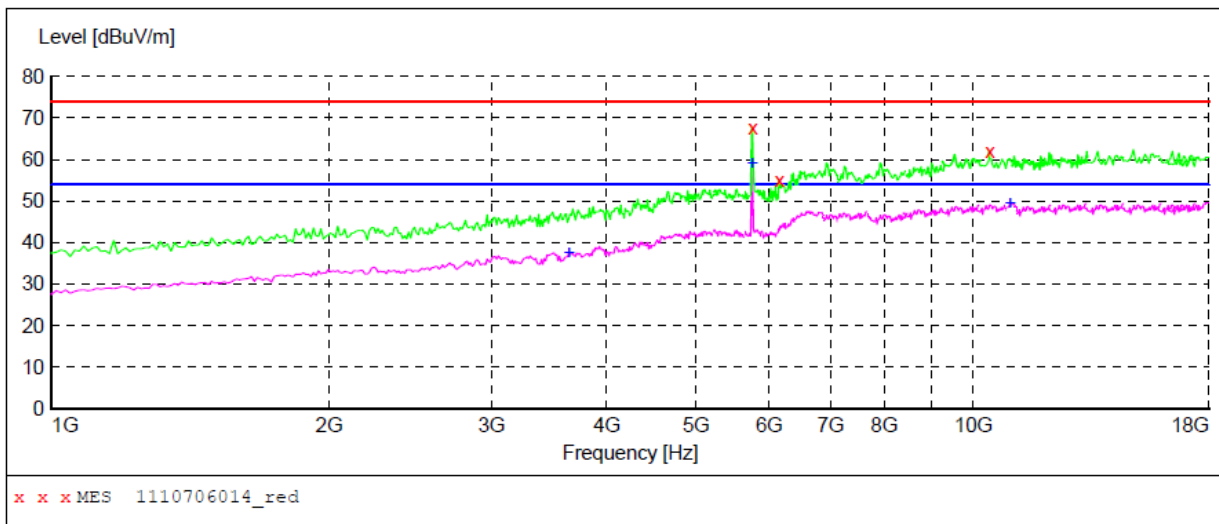
**MEASUREMENT RESULT: "HC170625014\_red2"**

6/25/2017 4:36PM

| Frequency<br>MHz | Level<br>dBμV/m | Transd<br>dB | Limit<br>dBμV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18132.264529     | 36.30           | -19.8        | 54.0            | 17.7         | ---  | 100.0        | 207.00         | HORIZONTAL   |
| 20601.202405     | 32.00           | -26.7        | 54.0            | 22.0         | ---  | 100.0        | 0.00           | HORIZONTAL   |
| 26685.370741     | 33.10           | -21.4        | 54.0            | 20.9         | ---  | 100.0        | 142.00         | HORIZONTAL   |
| 26861.723447     | 33.20           | -21.2        | 54.0            | 20.8         | ---  | 100.0        | 167.00         | HORIZONTAL   |
| 34841.683367     | 31.40           | -13.7        | 54.0            | 22.6         | ---  | 100.0        | 332.00         | HORIZONTAL   |
| 36913.827655     | 32.20           | -12.8        | 54.0            | 21.8         | ---  | 100.0        | 249.00         | HORIZONTAL   |

# Worst-case radiated emission of IEEE 802.11n HT 20 mode

|                                                                                                                                                       |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Temperature ( °C ) : 22~23                                                                                                                            | EUT: LOONA                                   |
| Humidity (%RH) : 50~54                                                                                                                                | M/N: RC133N1                                 |
| Barometric Pressure ( mbar ) : 950~1000                                                                                                               | Operation Condition: Continuous transmitting |
| Test Frequency (MHz) :5745                                                                                                                            | Polarization: Vertical                       |
| Note:<br>1. We test all modes, and chose the worst data for the report.<br>2.Worst-case radiated emission above 1GHz for IEEE 802.11a mode (5745MHz). |                                              |

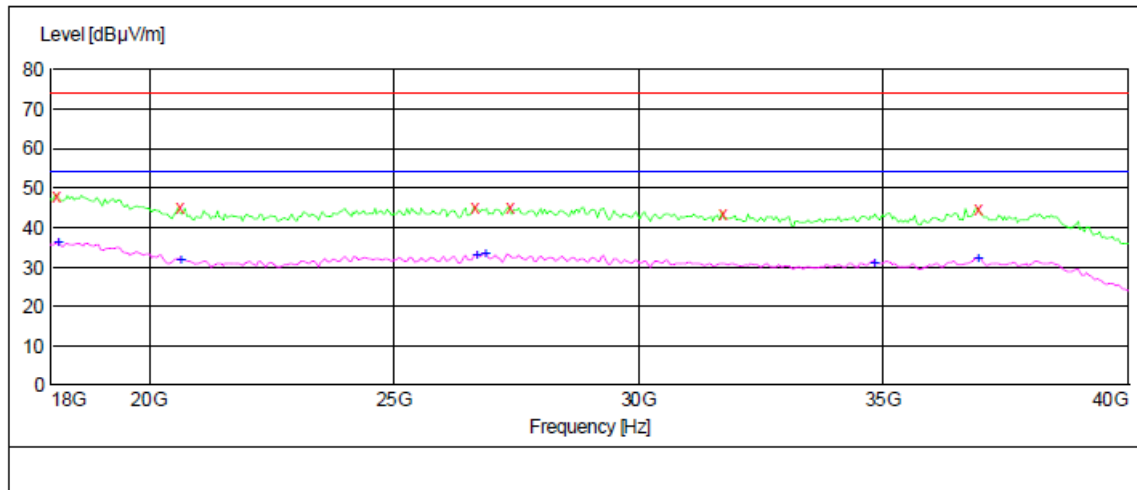


## MEASUREMENT RESULT: "1110706014\_red"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 5746.000000      | 67.70           | 12.7         | 74.0            | 6.3          | ---  | 150.0        | 0.00           | VERTICAL     |
| 6260.000000      | 55.10           | 14.8         | 74.0            | 18.9         | ---  | 150.0        | 0.00           | VERTICAL     |
| 10564.000000     | 61.60           | 22.1         | 74.0            | 12.4         | ---  | 150.0        | 0.00           | VERTICAL     |

## MEASUREMENT RESULT: "1110706014\_red2"

| Frequency<br>MHz | Level<br>dBuV/m | Transd<br>dB | Limit<br>dBuV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 3640.000000      | 37.50           | 5.6          | 53.9            | 16.4         | ---  | 150.0        | 0.00           | VERTICAL     |
| 5746.000000      | 59.10           | 12.5         | 53.9            | -5.2         | ---  | 150.0        | 0.00           | VERTICAL     |
| 10920.000000     | 49.30           | 19.7         | 53.9            | 4.6          | ---  | 150.0        | 0.00           | VERTICAL     |



**MEASUREMENT RESULT: "HC170625013\_red"**

6/25/2017 4:34PM

| Frequency<br>MHz | Level<br>dBµV/m | Transd<br>dB | Limit<br>dBµV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18088.176353     | 48.40           | -19.6        | 74.0            | 25.6         | ---  | 100.0        | 256.00         | VERTICAL     |
| 20601.202405     | 45.00           | -26.7        | 74.0            | 29.0         | ---  | 100.0        | 6.00           | VERTICAL     |
| 26641.282565     | 45.00           | -21.5        | 74.0            | 29.0         | ---  | 100.0        | 65.00          | VERTICAL     |
| 27346.693387     | 45.20           | -21.0        | 74.0            | 28.8         | ---  | 100.0        | 272.00         | VERTICAL     |
| 31711.422846     | 43.80           | -17.6        | 74.0            | 30.2         | ---  | 100.0        | 206.00         | VERTICAL     |
| 36913.827655     | 44.90           | -12.8        | 74.0            | 29.1         | ---  | 100.0        | 6.00           | VERTICAL     |

**MEASUREMENT RESULT: "HC170625013\_red2"**

6/25/2017 4:34PM

| Frequency<br>MHz | Level<br>dBµV/m | Transd<br>dB | Limit<br>dBµV/m | Margin<br>dB | Det. | Height<br>cm | Azimuth<br>deg | Polarization |
|------------------|-----------------|--------------|-----------------|--------------|------|--------------|----------------|--------------|
| 18132.264529     | 36.30           | -19.8        | 54.0            | 17.7         | ---  | 100.0        | 15.00          | VERTICAL     |
| 20645.290581     | 32.00           | -26.7        | 54.0            | 22.0         | ---  | 100.0        | 297.00         | VERTICAL     |
| 26685.370741     | 33.00           | -21.4        | 54.0            | 21.0         | ---  | 100.0        | 256.00         | VERTICAL     |
| 26861.723447     | 33.40           | -21.2        | 54.0            | 20.6         | ---  | 100.0        | 305.00         | VERTICAL     |
| 34797.595190     | 31.20           | -13.8        | 54.0            | 22.8         | ---  | 100.0        | 6.00           | VERTICAL     |
| 36913.827655     | 32.10           | -12.8        | 54.0            | 21.9         | ---  | 100.0        | 330.00         | VERTICAL     |

## 8. POWER LINE CONDUCTED EMISSIONS

### 8.1 Test Limit

| FCC Part 15 Subpart C Paragraph 15.207 |                 |                 |
|----------------------------------------|-----------------|-----------------|
| Frequency(MHz)                         | QP (dB $\mu$ V) | AV (dB $\mu$ V) |
| 0.15 - 0.50                            | 66 - 56         | 56 – 46         |
| 0.50 - 5.0                             | 56              | 46              |
| 5.0 - 30                               | 60              | 50              |

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

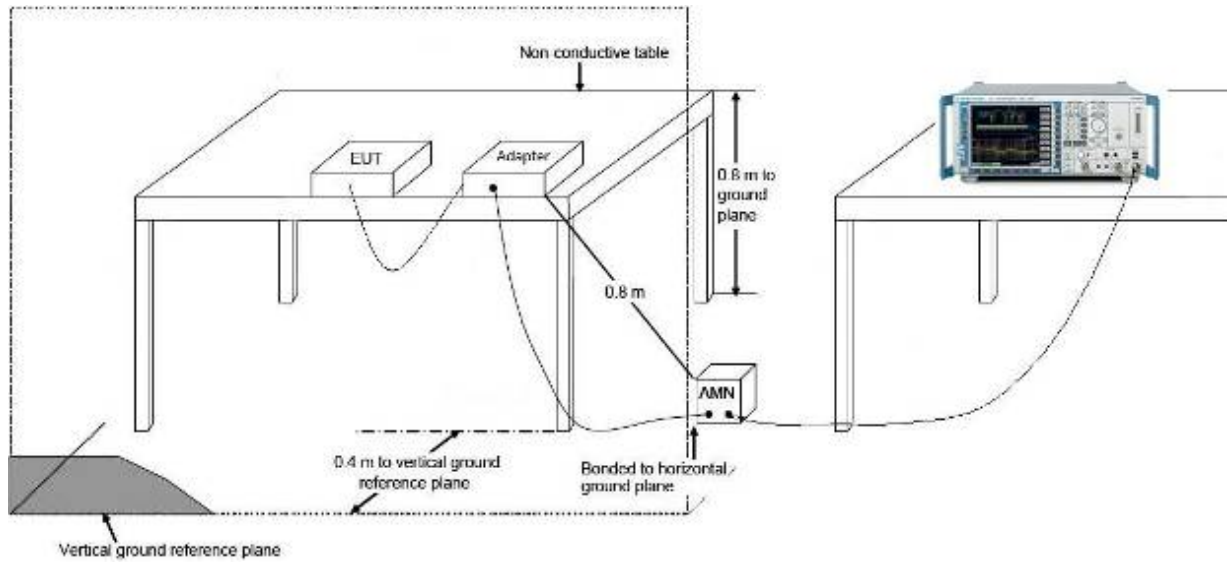
### 8.2 Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB 789033 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

### 8.3 Test Setup



### 8.4 Test Result

No non-compliance noted.

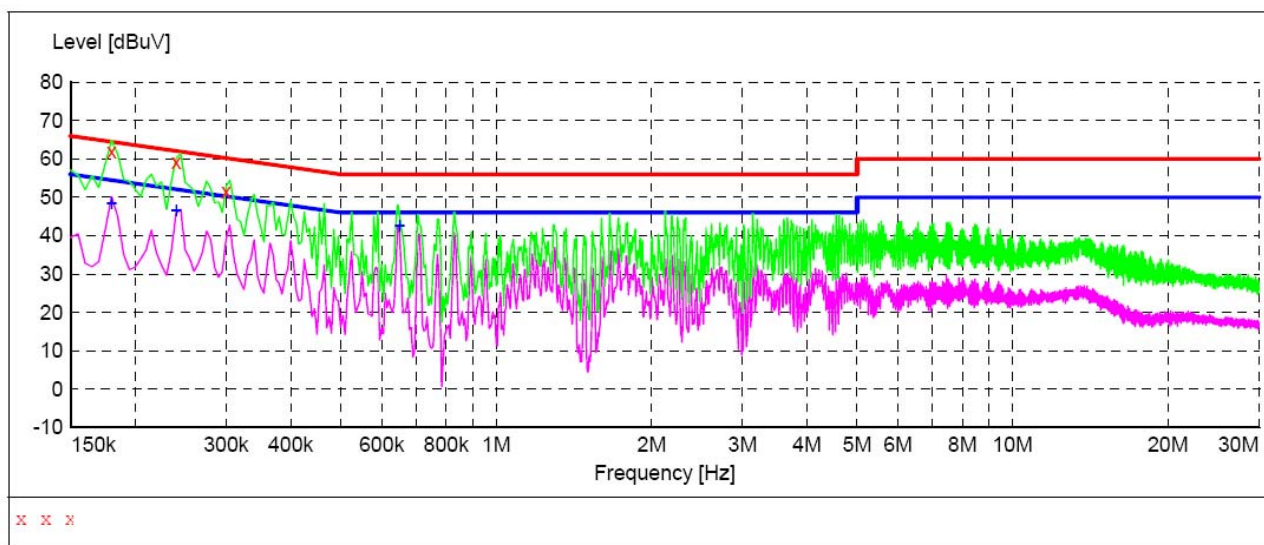
## Test Plot

Conducted Emission:

EUT: LOONA  
M/N: RC133N1  
Operating Condition: Tx Mode  
Test Site: Shielded Room  
Operator: Yang  
Test Specification: AC 120V/60Hz  
Comment: L Line

### SCAN TABLE: "Voltage (150K-30M) FIN"

Short Description: 150K-30M Voltage



### MEASUREMENT RESULT:

| Frequency<br>MHz | Level<br>dBuV | Transd<br>dB | Limit<br>dBuV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.180000         | 61.90         | 12.0         | 65            | 2.6          | QP       | L1   | GND |
| 0.240000         | 59.00         | 13.6         | 62            | 3.1          | QP       | L1   | GND |
| 0.300000         | 51.50         | 11.0         | 60            | 8.7          | QP       | L1   | GND |

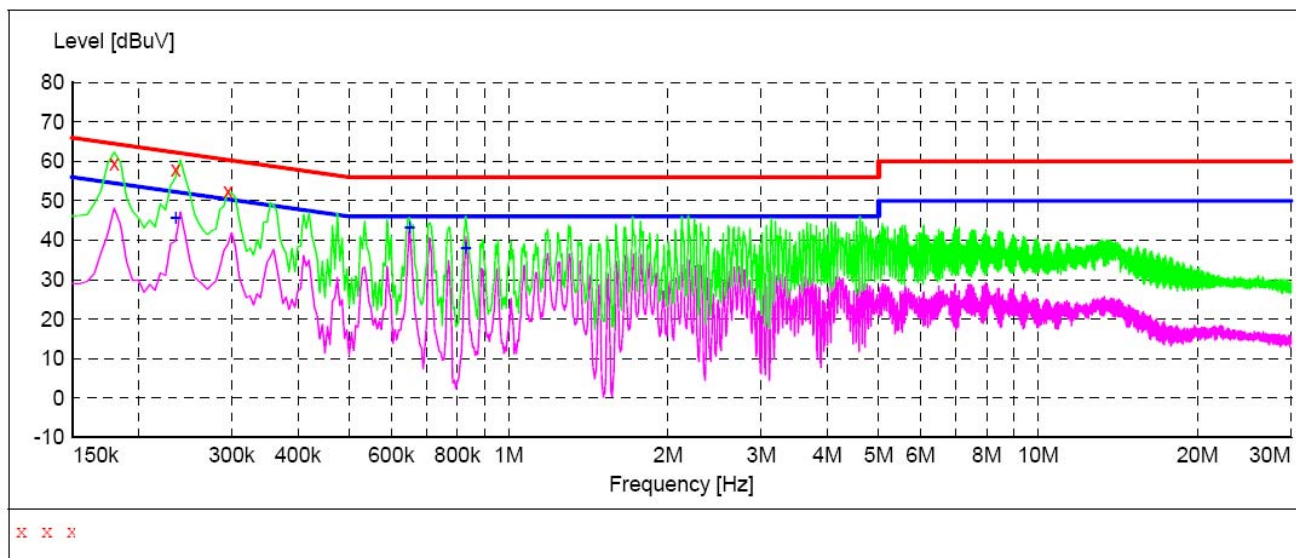
### MEASUREMENT RESULT:

| Frequency<br>MHz | Level<br>dBuV | Transd<br>dB | Limit<br>dBuV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.180000         | 48.30         | 12.0         | 55            | 6.2          | AV       | L1   | GND |
| 0.240000         | 46.60         | 13.6         | 52            | 5.5          | AV       | L1   | GND |
| 0.650000         | 42.70         | 10.4         | 46            | 3.3          | AV       | L1   | GND |

Conducted Emission:  
EUT: LOONA  
M/N: RC133N1  
Operating Condition: Tx Mode  
Test Site: Shielded Room  
Operator: Yang  
Test Specification: AC 120V/60Hz  
Comment: N Line

**SCAN TABLE: "Voltage (150K-30M) FIN"**

Short Description: 150K-30M Voltage



**MEASUREMENT RESULT:**

| Frequency<br>MHz | Level<br>dBuV | Transd<br>dB | Limit<br>dBuV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.180000         | 59.40         | 12.0         | 65            | 5.1          | QP       | N    | GND |
| 0.235000         | 58.00         | 13.4         | 62            | 4.3          | QP       | N    | GND |
| 0.295000         | 52.40         | 11.2         | 60            | 8.0          | QP       | N    | GND |

**MEASUREMENT RESULT:**

| Frequency<br>MHz | Level<br>dBuV | Transd<br>dB | Limit<br>dBuV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.235000         | 45.80         | 13.4         | 52            | 6.5          | AV       | N    | GND |
| 0.650000         | 43.10         | 10.4         | 46            | 2.9          | AV       | N    | GND |
| 0.830000         | 38.10         | 10.3         | 46            | 7.9          | AV       | N    | GND |

## 9. FREQUENCY STABILITY

### 9.1 Test Limit

Manufacturers of U-NII devices are responsible for ensuring 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.

### 9.2 Test Procedure

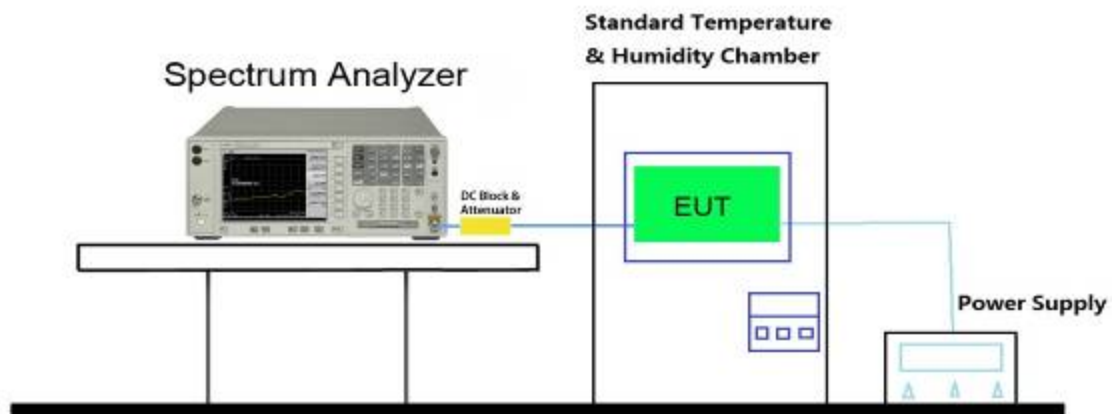
Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

### 9.3 Test Setup



## 9.4 Test Result

5150-5250MHz

802.11a mode:

| Reference Frequency(Middle Channel): 5240 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | MCF (Hz)                            | Error (ppm) |
| 50                                            | 120                  | 121                                 | 0.0231      |
| 40                                            | 120                  | 118                                 | 0.0225      |
| 30                                            | 120                  | 116                                 | 0.0221      |
| 20                                            | 120                  | 124                                 | 0.0237      |
| 10                                            | 120                  | 136                                 | 0.0260      |
| 0                                             | 120                  | 141                                 | 0.0269      |
| -10                                           | 120                  | 133                                 | 0.0254      |
| -20                                           | 120                  | 128                                 | 0.0244      |
| -30                                           | 120                  | 144                                 | 0.0275      |

802.11n HT20 mode:

| Reference Frequency(Middle Channel): 5240 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | MCF (Hz)                            | Error (ppm) |
| 50                                            | 120                  | 141                                 | 0.0269      |
| 40                                            | 120                  | 128                                 | 0.0244      |
| 30                                            | 120                  | 124                                 | 0.0237      |
| 20                                            | 120                  | 154                                 | 0.0294      |
| 10                                            | 120                  | 114                                 | 0.0218      |
| 0                                             | 120                  | 134                                 | 0.0256      |
| -10                                           | 120                  | 147                                 | 0.0281      |
| -20                                           | 120                  | 118                                 | 0.0225      |
| -30                                           | 120                  | 126                                 | 0.0240      |

5725-5850MHz  
802.11a mode:

| Reference Frequency(Middle Channel): 5785MHz |                      |                                     |             |
|----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                 | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                              |                      | MCF (Hz)                            | Error (ppm) |
| 50                                           | 120                  | 118                                 | 0.0338      |
| 40                                           | 120                  | 124                                 | 0.0349      |
| 30                                           | 120                  | 134                                 | 0.0367      |
| 20                                           | 120                  | 125                                 | 0.0351      |
| 10                                           | 120                  | 116                                 | 0.0335      |
| 0                                            | 120                  | 147                                 | 0.0390      |
| -10                                          | 120                  | 157                                 | 0.0407      |
| -20                                          | 120                  | 184                                 | 0.0455      |
| -30                                          | 120                  | 164                                 | 0.0420      |

802.11n HT20 mode:

| Reference Frequency(Middle Channel): 5785MHz |                      |                                     |             |
|----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                 | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                              |                      | MCF (Hz)                            | Error (ppm) |
| 50                                           | 120                  | 117                                 | 0.0227      |
| 40                                           | 120                  | 127                                 | 0.0244      |
| 30                                           | 120                  | 145                                 | 0.0276      |
| 20                                           | 120                  | 154                                 | 0.0292      |
| 10                                           | 120                  | 165                                 | 0.0312      |
| 0                                            | 120                  | 185                                 | 0.0347      |
| -10                                          | 120                  | 154                                 | 0.0292      |
| -20                                          | 120                  | 181                                 | 0.0340      |
| -30                                          | 120                  | 157                                 | 0.0297      |

Frequency Stability Versus Input Voltage is:

5150-5250MHz

802.11a mode:

| Reference Frequency(Middle Channel): 5240 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | Frequency (Hz)                      | Error (ppm) |
| 20                                            | 102                  | 139                                 | 0.0265      |
|                                               | 120                  | 136                                 | 0.0260      |
|                                               | 138                  | 133                                 | 0.0254      |

802.11n HT20 mode:

| Reference Frequency(Middle Channel): 5240 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | Frequency (Hz)                      | Error (ppm) |
| 20                                            | 102                  | 145                                 | 0.0277      |
|                                               | 120                  | 148                                 | 0.0282      |
|                                               | 138                  | 152                                 | 0.0290      |

5725-5850MHz

802.11a mode:

| Reference Frequency(Middle Channel): 5785 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | Frequency (Hz)                      | Error (ppm) |
| 20                                            | 102                  | 147                                 | 0.0270      |
|                                               | 120                  | 154                                 | 0.0306      |
|                                               | 138                  | 186                                 | 0.0367      |

802.11n HT20 mode:

| Reference Frequency(Middle Channel): 5785 MHz |                      |                                     |             |
|-----------------------------------------------|----------------------|-------------------------------------|-------------|
| Environment Temperature (°C)                  | Power Supplied (VAC) | Frequency Measure with Time Elapsed |             |
|                                               |                      | Frequency (Hz)                      | Error (ppm) |
| 20                                            | 102                  | 184                                 | 0.0335      |
|                                               | 120                  | 149                                 | 0.0296      |
|                                               | 138                  | 158                                 | 0.0313      |

...End of Report...