

FCC PART 15C REPORT FOR CERTIFICATION  
On Behalf of

CTOUCH Europe B.V.

WIFI MODULE

Model Number: 00WIMRA

FCC ID: 2APQQ-00WIMRA

|               |                                                                     |
|---------------|---------------------------------------------------------------------|
| Prepared for: | CTOUCH Europe B.V.                                                  |
|               | Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands                 |
|               |                                                                     |
| Prepared By:  | EST Technology Co., Ltd.                                            |
|               | Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China |
|               | Tel: 86-769-83081888-808                                            |

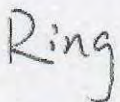
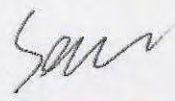
|                 |                             |
|-----------------|-----------------------------|
| Report Number:  | ESTE-R2003052               |
| Date of Test:   | Dec. 23, 2019-Mar. 11, 2020 |
| Date of Report: | Mar. 16, 2020               |

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**EST Technology Co., Ltd.**

|                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                       |                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Applicant:</b>                                                                                                                                                                                 | CTOUCH Europe B.V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                       |                             |
| <b>Address:</b>                                                                                                                                                                                   | Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                       |                             |
| <b>Manufacturer:</b>                                                                                                                                                                              | CTOUCH Europe B.V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                       |                             |
| <b>Address:</b>                                                                                                                                                                                   | Achtseweg Zuid 153R, 5651 GW Eindhoven, Netherlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                       |                             |
| <b>E.U.T:</b>                                                                                                                                                                                     | WIFI MODULE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                       |                             |
| <b>Model Number:</b>                                                                                                                                                                              | 00WIMRA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                       |                             |
| <b>Power Supply:</b>                                                                                                                                                                              | DC 5V From PC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                       |                             |
| <b>Trade Name:</b>                                                                                                                                                                                | CTOUCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Serial No.:</b>                                                                                                    | -----                       |
| <b>Date of Receipt:</b>                                                                                                                                                                           | Dec. 23, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Date of Test:</b>                                                                                                  | Dec. 23, 2019-Mar. 11, 2020 |
| <b>Test Specification:</b>                                                                                                                                                                        | FCC Part 15 Subpart C (15.247)<br>ANSI C63.10:2013<br>FCC KDB 558074 D01 15.247 Meas Guidance v05r02<br>FCC KDB 662911 D01 Multiple Transmitter Output v02r01                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                       |                             |
| <b>Test Result:</b>                                                                                                                                                                               | <p>The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements.</p> <p>This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd.</p> |                                                                                                                       |                             |
| <b>Prepared by:</b>                                                                                                                                                                               | <b>Reviewed by:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Date:</b> Mar. 16, 2020                                                                                            |                             |
| <br>_____<br>Ring / Assistant                                                                                  | <br>_____<br>Seven / Engineer                                                                                                                                                                                                                                                                                                                                                                                                                              | <br>_____<br>Iceman Hu / Manager |                             |
| <b>Other Aspects:</b>                                                                                                                                                                             | None.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                       |                             |
| Abbreviations: OK/P=passed    fail/F=failed    n.a/N=not applicable    E.U.T=equipment under tested                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                       |                             |
| This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                       |                             |

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

|                         |   |                                                                                                                                               |
|-------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name            | : | WIFI MODULE                                                                                                                                   |
| Model Number            | : | 00WIMRA                                                                                                                                       |
| Software Version        | : | N/A                                                                                                                                           |
| Hardware Version        | : | N/A                                                                                                                                           |
| Operation frequency     | : | 2412MHz~2462MHz<br>2422MHz~2452MHz                                                                                                            |
| Number of channel       | : | 802.11b: 11 Channels<br>802.11g: 11 Channels<br>802.11n HT20: 11 Channels<br>802.11n HT40: 7 Channels                                         |
| Max Output Power (PEAK) | : | IEEE 802.11b: 15.97dBm<br>IEEE 802.11g: 19.29dBm<br>IEEE 802.11n HT20: 20.52dBm<br>802.11n HT40: 19.78dBm                                     |
| Modulation Type         | : | IEEE 802.11b mode: DSSS(CCK,QPSK, BPSK)<br>IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM)<br>IEEE 802.11n mode: OFDM (BPSK/QPSK/16QAM/64QAM) |
| Sample Type             | : | Prototype production                                                                                                                          |

Note:

For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

### 1.2. Antenna Information

| Ant No. | Brand | Model Name | Antenna Type     | Connector | Gain (dBi) |
|---------|-------|------------|------------------|-----------|------------|
| 1       | -     | -          | External antenna | -         | 2          |
| 2       | -     | -          | External antenna | -         | 2          |

Note:

- The EUT has two antennas, the antennas can support SISO function in IEEE 802.11b and IEEE 802.11g, and can support MIMO function in IEEE 802.11n.
- The EUT can work as CDD mode in IEEE 802.11n HT20 and IEEE 802.11n HT40, and can operate with one spatial stream.
- According to ANSI C63.10:2013 14.4.3.2.5 a):  
 $\text{Directional gain} = 2\text{dBi} + 10 \times \log(2/1)\text{dB} = 5.01\text{dBi} < 6\text{dBi}$   
 So, the output power limit and power spectral density do not need to be reduced.
- After pre-test all antenna configurations, the worst case configuration is listed below.

| TX Mode \ ANT No. | SISO Configuration | MIMO Configuration |
|-------------------|--------------------|--------------------|
| IEEE 802.11b      | ANT1               | /                  |
| IEEE 802.11g      | ANT1               | /                  |
| IEEE 802.11n HT20 | /                  | ANT1+ANT2          |
| IEEE 802.11n HT40 | /                  | ANT1+ANT2          |

## 2. SUMMARY OF TEST

### 2.1. Summary of test result

| Report Section | Description of Test Item                  | FCC Standard Section          | Results |
|----------------|-------------------------------------------|-------------------------------|---------|
| 3              | 6dB Bandwidth                             | 15.247(a)(2)                  | PASS    |
| 4              | Maximum Peak Output Power                 | 15.247(b)(3)                  | PASS    |
| 5              | Power Spectral Density                    | 15.247(e)                     | PASS    |
| 6              | Conducted Band Edge                       | 15.247(d)                     | PASS    |
| 7              | Conducted Spurious Emissions              | 15.247(d)                     | PASS    |
| 8              | Radiated Spurious Emissions and Band Edge | 15.205<br>15.209<br>15.247(d) | PASS    |
| 9              | AC Power Line Conducted Emissions         | 15.207                        | PASS    |
| 10             | Antenna Requirement                       | 15.203                        | PASS    |

Note:

(1) "N/A" denotes test is not applicable in this test report

## 2.2. Test Facilities

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EMC Lab       | <p>: Certificated by CNAS, CHINA<br/>Registration No.: L5288<br/>Date of registration: November 13, 2017</p> <p>Certificated by FCC, USA<br/>Designation Number: CN1215<br/>Test Firm Registration Number: 722932<br/>Date of registration: November 21, 2017</p> <p>Certificated by A2LA, USA<br/>Registration No.: 4366.01<br/>Date of registration: November 07, 2017</p> <p>Certificated by Industry Canada<br/>CAB identifier No.: CN0035<br/>Date of registration: January 04, 2019</p> <p>Certificated by VCCI, Japan<br/>Registration No.: R-13663; C-14103<br/>Date of registration: July 25, 2017<br/>This Certificate is valid until: July 24, 2020</p> <p>Certificated by TUV Rheinland, Germany<br/>Registration No.: UA 50413872 0001<br/>Date of registration: July 31, 2018</p> <p>Certificated by TUV/PS, Shenzhen<br/>Registration No.: SCN1017<br/>Date of registration: January 27, 2011</p> <p>Certificated by Intertek ETL SEMKO<br/>Registration No.: 2011-RTL-L2-64<br/>Date of registration: April 28, 2011</p> <p>Certificated by Nemko, Hong Kong<br/>Registration No.: 175193<br/>Date of registration: May 4, 2011</p> |
| Name of Firm  | : EST Technology Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Site Location | : Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

### 2.3. Measurement uncertainty

| Test Item                                                  | Uncertainty                       |
|------------------------------------------------------------|-----------------------------------|
| Uncertainty for Conduction emission test                   | $\pm 3.48\text{dB}$               |
| Uncertainty for spurious emissions test<br>(30MHz-1GHz)    | $\pm 4.60\text{ dB(Polarize: H)}$ |
|                                                            | $\pm 4.68\text{ dB(Polarize: V)}$ |
| Uncertainty for spurious emissions test<br>(1GHz to 18GHz) | $\pm 4.96\text{dB}$               |
| Uncertainty for radio frequency                            | $7 \times 10^{-8}$                |
| Uncertainty for conducted RF Power                         | $0.20\text{dB}$                   |
| Uncertainty for Power density test                         | $0.26\text{dB}$                   |

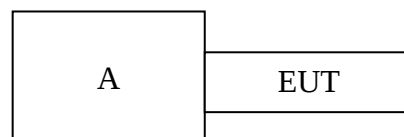
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

### 2.4. Assistant equipment used for test

| Item | Equipment | Brand  | Model Name/Type No. | FCC ID | Series No. |
|------|-----------|--------|---------------------|--------|------------|
| A    | PC        | Lenovo | Thinkpad x250       | -      | -          |

### 2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground. EUT was beset into 2.4G WIFI test mode by software before test.



DC 5V

(EUT: WIFI MODULE)

### 2.6. Test Mode

The test mode was selected for the final test as listed below.

| Test Item                               | Mode              | Date Rate | Test Channel    |
|-----------------------------------------|-------------------|-----------|-----------------|
| 6dB Bandwidth                           | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Maximum Peak Output Power               | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Power Spectral Density                  | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Conducted Band Edge                     | IEEE 802.11b      | 1Mbps     | Low/ High       |
|                                         | IEEE 802.11g      | 6Mbps     | Low/ High       |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/ High       |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/ High       |
| Conducted Spurious Emissions            | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Radiated Spurious Emissions(Below 1GHz) | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Radiated Spurious Emissions(Above 1GHz) | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| Radiated Band Edge                      | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |
| AC Power Line Conducted Emissions       | IEEE 802.11b      | 1Mbps     | Low/Middle/High |
|                                         | IEEE 802.11g      | 6Mbps     | Low/Middle/High |
|                                         | IEEE 802.11n HT20 | MCS8      | Low/Middle/High |
|                                         | IEEE 802.11n HT40 | MCS8      | Low/Middle/High |

Note:

1. In radiated measurement, the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane**.

## 2.7. Power Setting of Test Software

| Software Name             | QATool_Dbg |      |      |
|---------------------------|------------|------|------|
| Frequency(MHz)            | 2412       | 2437 | 2462 |
| IEEE 802.11b Setting      | 14         | 14   | 14   |
| IEEE 802.11g Setting      | 14         | 14   | 14   |
| IEEE 802.11n HT20 Setting | 14         | 14   | 14   |
| Frequency(MHz)            | 2422       | 2437 | 2452 |
| IEEE 802.11n HT40 Setting | 14         | 14   | 14   |

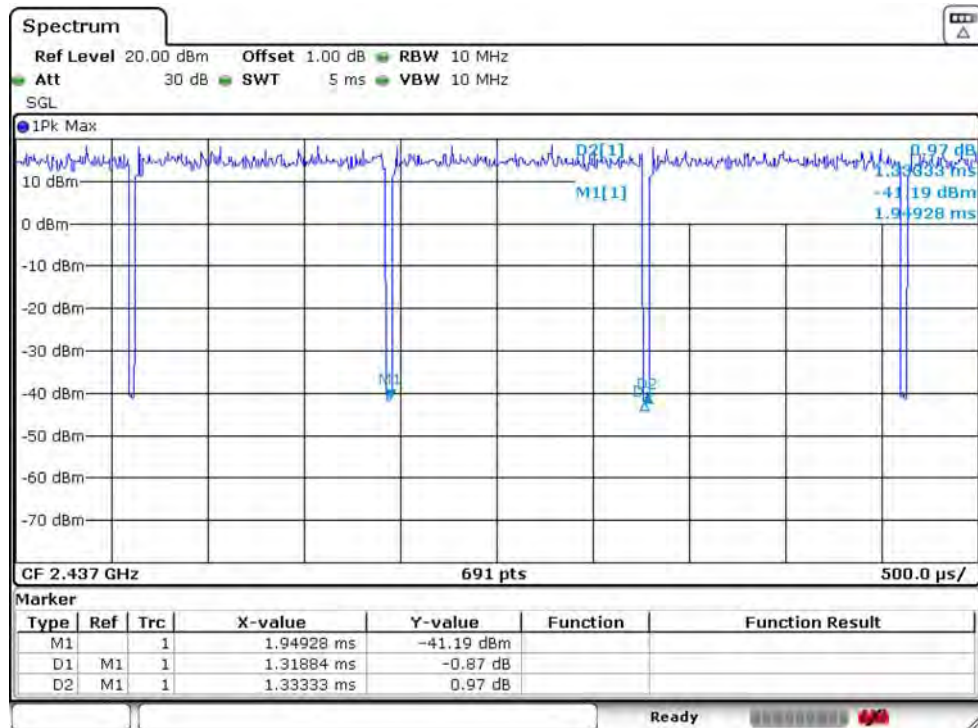
## 2.8. Duty Cycle

|                   |          |                   |                |              |             |
|-------------------|----------|-------------------|----------------|--------------|-------------|
| Temperature       | 25.3℃    | Relative Humidity | 56%            | Test Voltage | DC 5V       |
| Mode              | Fre(MHz) | On time(ms)       | Total Time(ms) | Duty Cycle   | Duty Factor |
| IEEE 802.11b      | 2437     | 1.31884           | 1.33333        | 98.91        | 0.00        |
| IEEE 802.11g      | 2437     | 1.40580           | 1.42754        | 98.48        | 0.00        |
| IEEE 802.11n HT20 | 2437     | 1.31159           | 1.33333        | 98.37        | 0.00        |
| IEEE 802.11n HT40 | 2437     | 0.65507           | 0.68406        | 95.76        | 0.19        |

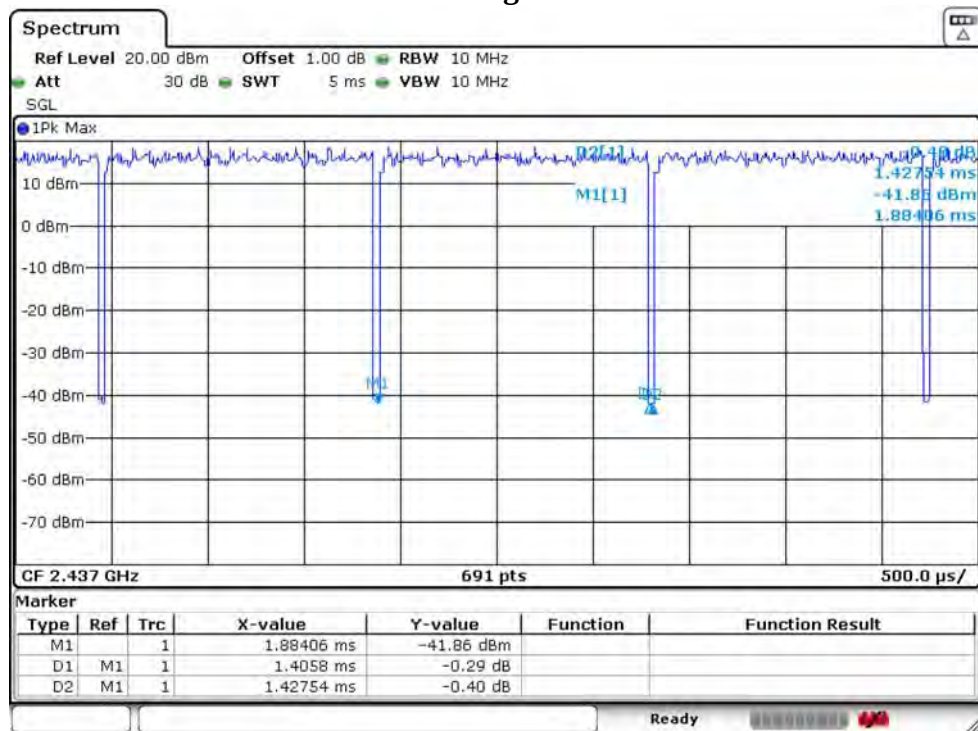
Note:

1. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
2. If duty cycle  $\geq$  98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor(consider to be zero).
3. The conducted peak output power and peak power spectral density no need to consider duty factor.
4. The on-time time is transmission duration(T).

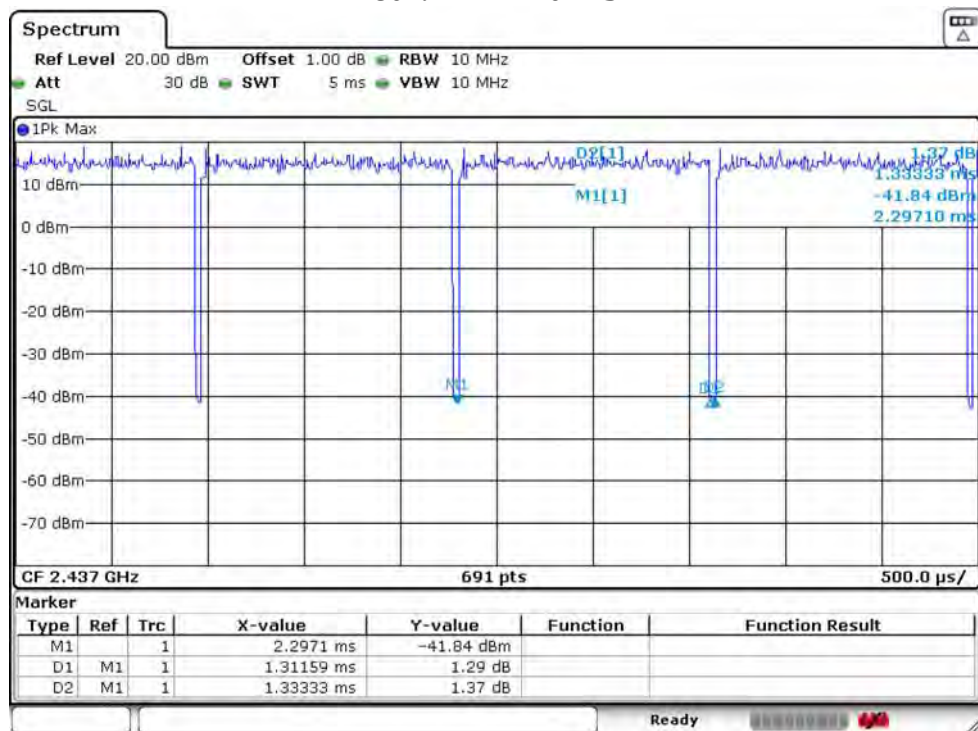
## IEEE 802.11b 2437MHz



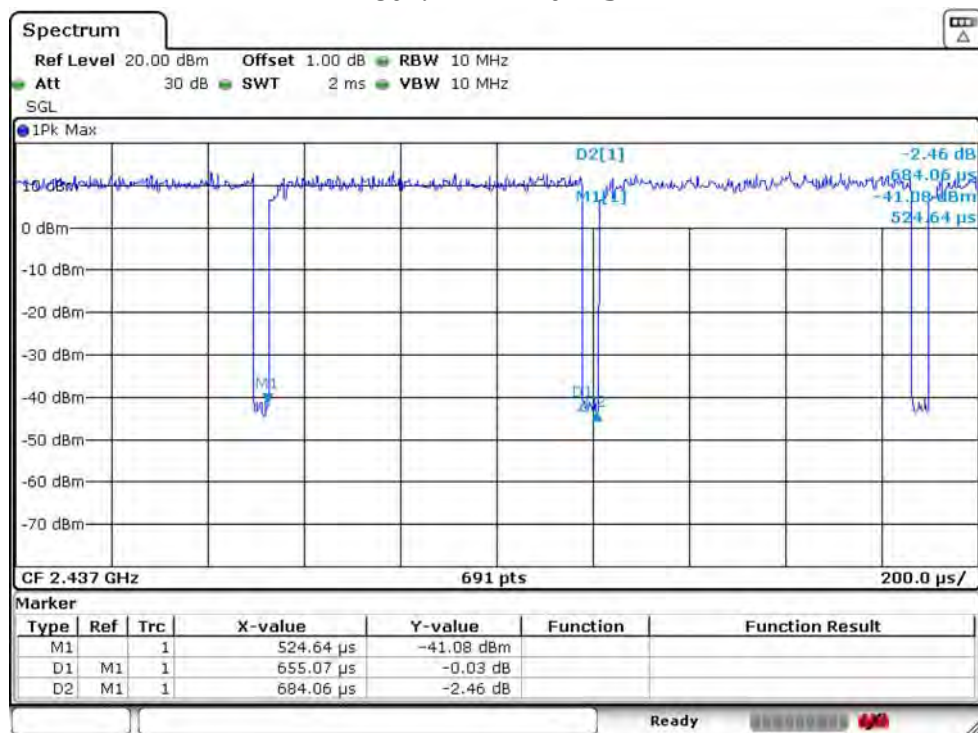
## IEEE 802.11g 2437MHz



## IEEE 802.11n HT20 2437MHz



## IEEE 802.11n HT40 2437MHz



## 2.9. Channel List

| IEEE 802.11b/802.11g/802.11n HT20 |                    |         |                    |         |                    |
|-----------------------------------|--------------------|---------|--------------------|---------|--------------------|
| Channel                           | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) |
| 1                                 | 2412               | 6       | 2437               | 11      | 2462               |
| 2                                 | 2417               | 7       | 2442               |         |                    |
| 3                                 | 2422               | 8       | 2447               |         |                    |
| 4                                 | 2427               | 9       | 2452               |         |                    |
| 5                                 | 2432               | 10      | 2457               |         |                    |
| IEEE 802.11n HT40                 |                    |         |                    |         |                    |
| Channel                           | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) | Channel | Frequency<br>(MHz) |
| 3                                 | 2422               | 6       | 2437               | 9       | 2452               |
| 4                                 | 2427               | 7       | 2442               |         |                    |
| 5                                 | 2432               | 8       | 2447               |         |                    |

## 2.10. Test Equipment List

| For conducted emission test |                 |              |            |                  |            |           |
|-----------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                   | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver           | Rohde & Schwarz | ESHS30       | EST-E001   | LISAI            | June 14,19 | 1 Year    |
| Artificial Mains Network    | Rohde & Schwarz | ENV216       | EST-E002   | LISAI            | June 14,19 | 1 Year    |
| Pulse Limiter               | Rohde & Schwarz | ESH3-Z2      | EST-E078   | LISAI            | June 14,19 | 1 Year    |
| Test Software               | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |

| For radiated emission test(9kHz-30MHz) |                 |              |            |                  |            |           |
|----------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                              | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                      | Rohde & Schwarz | ESR7         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Active Loop Antenna                    | SCHWARZB ECK    | FMZB 1519B   | EST-E054   | LISAI            | June 14,19 | 1 Year    |
| Test Software                          | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| 9kHz-30MHz Cable                       | N/A             | EST-001      | N/A        | N/A              | N/A        | N/A       |

| For radiated emissions test (30MHz-1000MHz) |                 |              |            |                  |            |           |
|---------------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                   | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| EMI Test Receiver                           | Rohde & Schwarz | ESR7         | EST-E047   | LISAI            | June 14,19 | 1 Year    |
| Bilog Antenna                               | Teseq           | CBL 6111D    | EST-E034   | LISAI            | June 14,19 | 1 Year    |
| Test Software                               | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| 30-1000MHz Cable                            | N/A             | EST-002      | N/A        | N/A              | N/A        | N/A       |

| For radiated emission test(Above 1000MHz) |                 |              |            |                  |            |           |
|-------------------------------------------|-----------------|--------------|------------|------------------|------------|-----------|
| Equipment                                 | Manufacturer    | Model No.    | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| Horn Antenna                              | SCHWARZB ECK    | BBHA9120D    | EST-E031   | LISAI            | June 14,19 | 1 Year    |
| Signal Amplifier                          | SCHWARZB ECK    | BBV9718      | EST-E032   | LISAI            | June 14,19 | 1 Year    |
| Spectrum Analyzer                         | Rohde & Schwarz | FSV40        | EST-E069   | LISAI            | June 14,19 | 1 Year    |
| Test Software                             | Audix           | e3-6.111221a | N/A        | N/A              | N/A        | N/A       |
| Above 1GHz Cable                          | N/A             | EST-003      | N/A        | N/A              | N/A        | N/A       |

| For connect EUT antenna terminal test |                 |           |            |                  |            |           |
|---------------------------------------|-----------------|-----------|------------|------------------|------------|-----------|
| Equipment                             | Manufacturer    | Model No. | Serial No. | Calibration Body | Last Cal.  | Next Cal. |
| Spectrum Analyzer                     | Rohde & Schwarz | FSV40     | EST-E069   | LISAI            | June 14,19 | 1 Year    |

### 3. 6dB BANDWIDTH

#### 3.1. Limit

Systems using digital modulation techniques operate in the 2400-2483.5 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### 3.2. Test Setup



#### 3.3. Spectrum Analyzer Setting

6dB Bandwidth

| Spectrum Parameters | Setting                                                 |
|---------------------|---------------------------------------------------------|
| RBW                 | 100KHz                                                  |
| VBW                 | 300KHz                                                  |
| Span                | 40MHz(20MHz Bandwidth mode)/80MHz(40MHz Bandwidth mode) |
| Sweep Time          | Auto                                                    |
| Detector            | Peak                                                    |
| Trace Mode          | Max Hold                                                |

99% Occupied Bandwidth

| Spectrum Parameters | Setting                                                 |
|---------------------|---------------------------------------------------------|
| RBW                 | 300KHz(20MHz Bandwidth mode)/1MHz(40MHz Bandwidth mode) |
| VBW                 | 1MHz(20MHz Bandwidth mode)/3MHz(40MHz Bandwidth mode)   |
| Span                | 40MHz(20MHz Bandwidth mode)/80MHz(40MHz Bandwidth mode) |
| Sweep Time          | Auto                                                    |
| Detector            | Peak                                                    |
| Trace Mode          | Max Hold                                                |

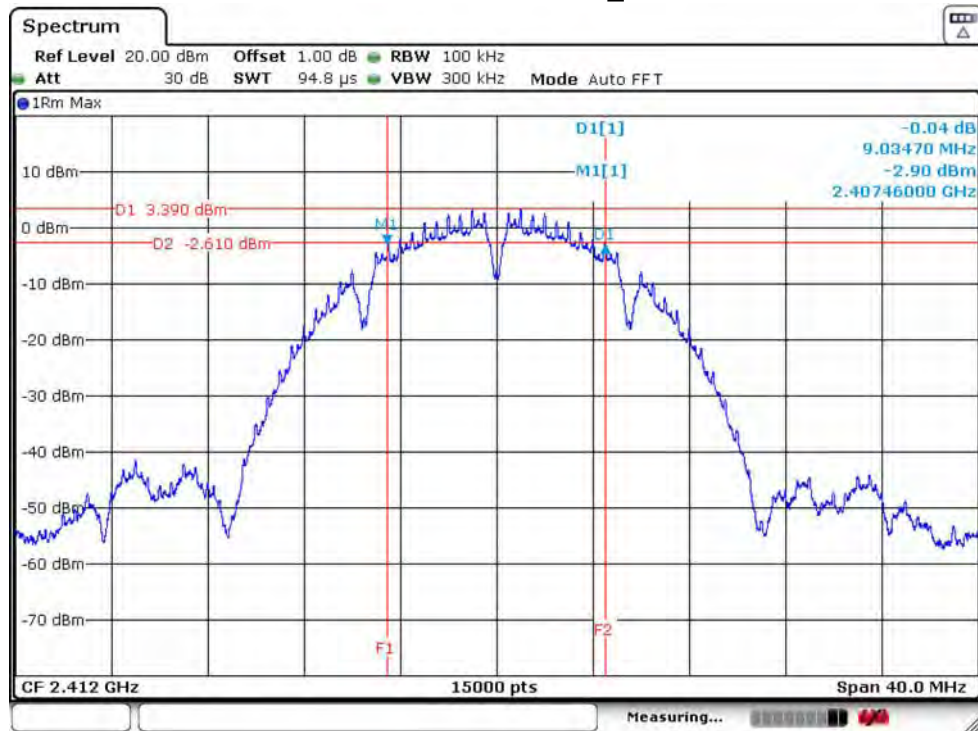
#### 3.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 3.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, 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.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

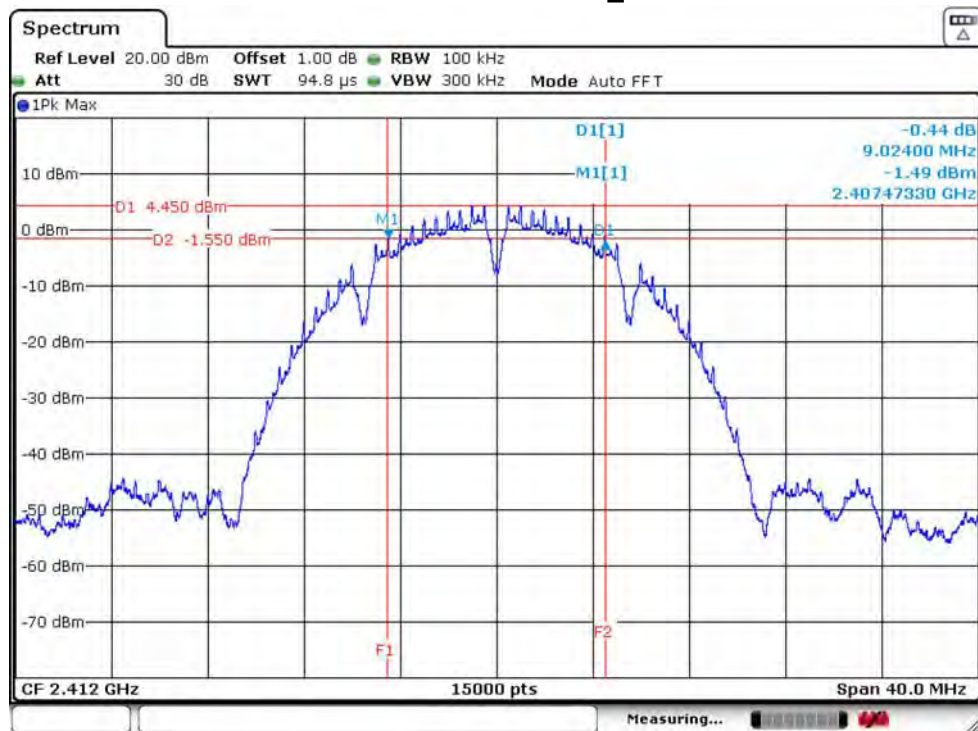
## 3.5. Test Result

| Temperature          | 25.3℃      | Relative Humidity   | 56%    | Test Voltage | DC 5V  |
|----------------------|------------|---------------------|--------|--------------|--------|
| Mode                 | Freq (MHz) | 6dB Bandwidth (MHz) |        | Limit (MHz)  | Result |
|                      |            | ANT 1               | ANT 2  |              |        |
| IEEE 802.11b         | 2412       | 9.035               | 9.024  | $\geq 0.5$   | PASS   |
|                      | 2437       | 9.024               | 9.021  | $\geq 0.5$   | PASS   |
|                      | 2462       | 9.024               | 9.029  | $\geq 0.5$   | PASS   |
| IEEE 802.11g         | 2412       | 15.523              | 15.120 | $\geq 0.5$   | PASS   |
|                      | 2437       | 15.315              | 15.117 | $\geq 0.5$   | PASS   |
|                      | 2462       | 15.304              | 15.317 | $\geq 0.5$   | PASS   |
| IEEE 802.11n<br>HT20 | 2412       | 15.115              | 15.120 | $\geq 0.5$   | PASS   |
|                      | 2437       | 15.115              | 15.120 | $\geq 0.5$   | PASS   |
|                      | 2462       | 15.120              | 15.120 | $\geq 0.5$   | PASS   |
| IEEE 802.11n<br>HT40 | 2422       | 35.109              | 35.115 | $\geq 0.5$   | PASS   |
|                      | 2437       | 35.109              | 35.115 | $\geq 0.5$   | PASS   |
|                      | 2452       | 35.109              | 35.115 | $\geq 0.5$   | PASS   |

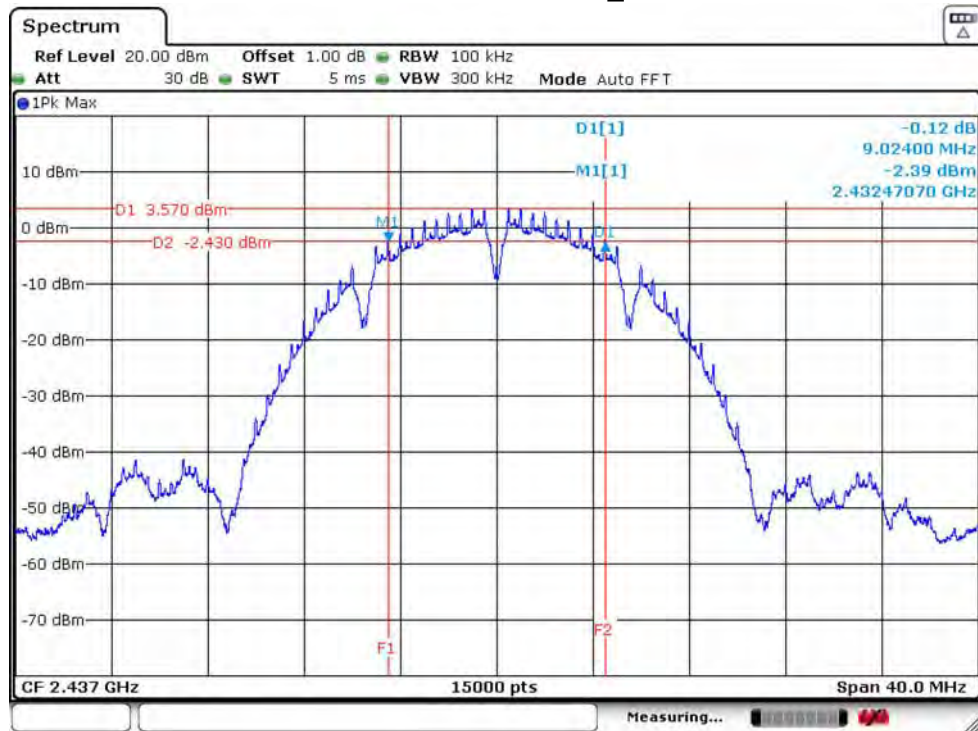
## IEEE 802.11b 2412MHz\_ANT 1



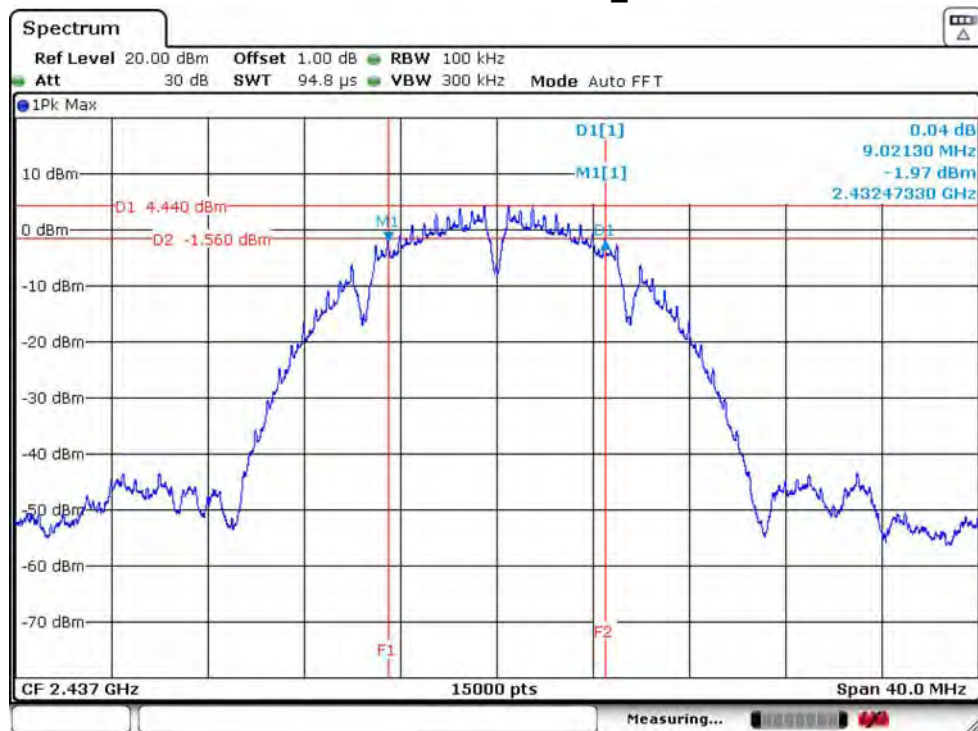
## IEEE 802.11b 2412MHz\_ANT 2



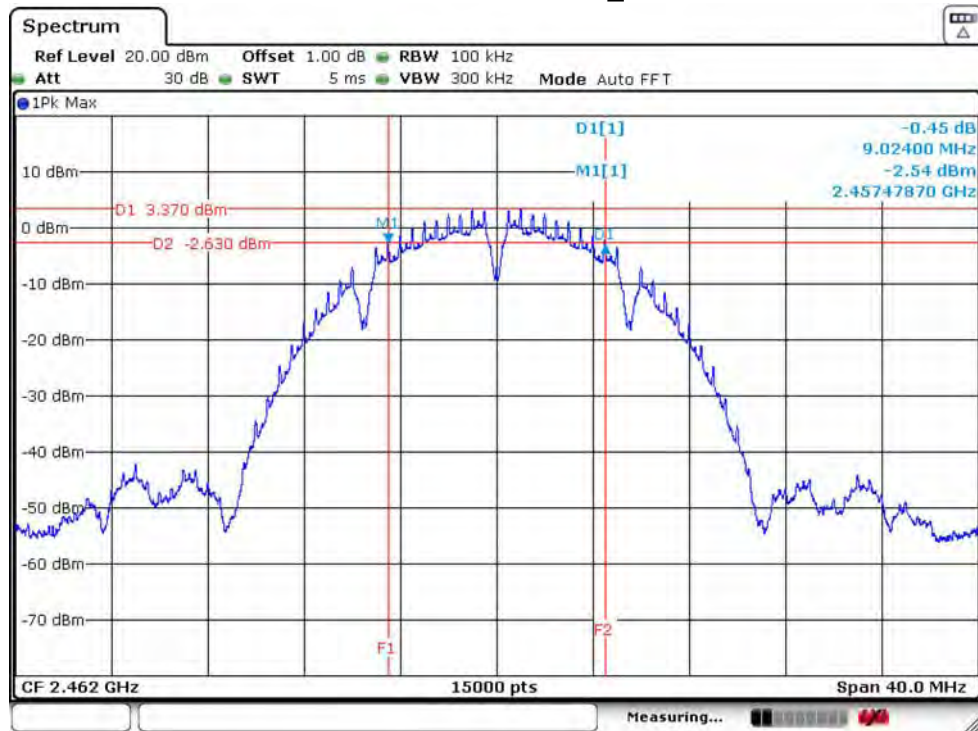
## IEEE 802.11b 2437MHz\_ANT 1



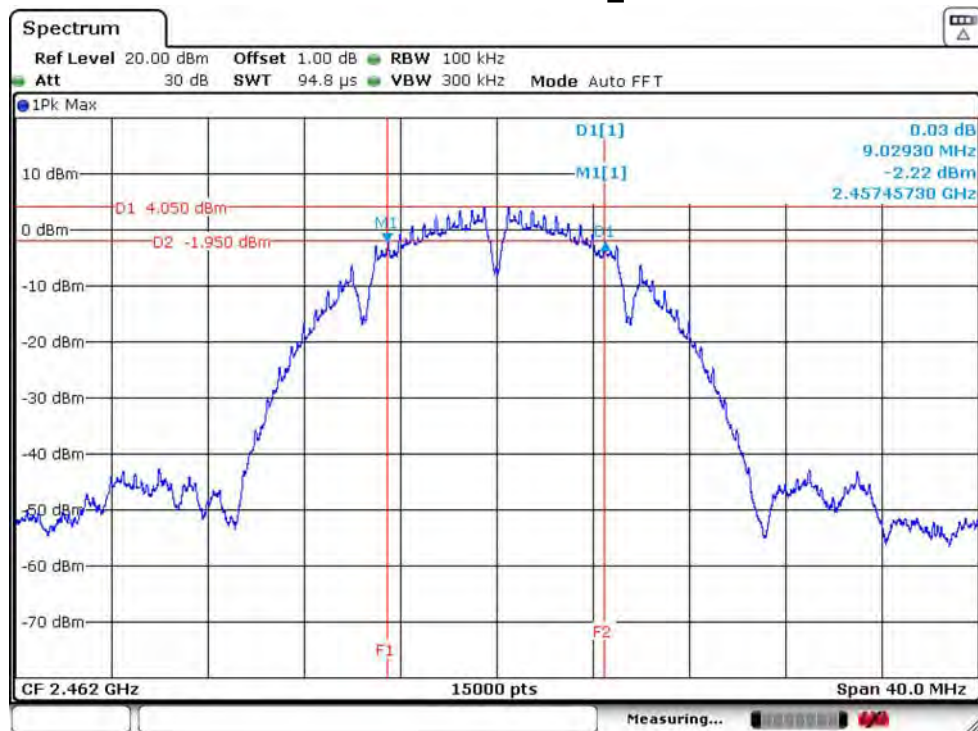
## IEEE 802.11b 2437MHz\_ANT2



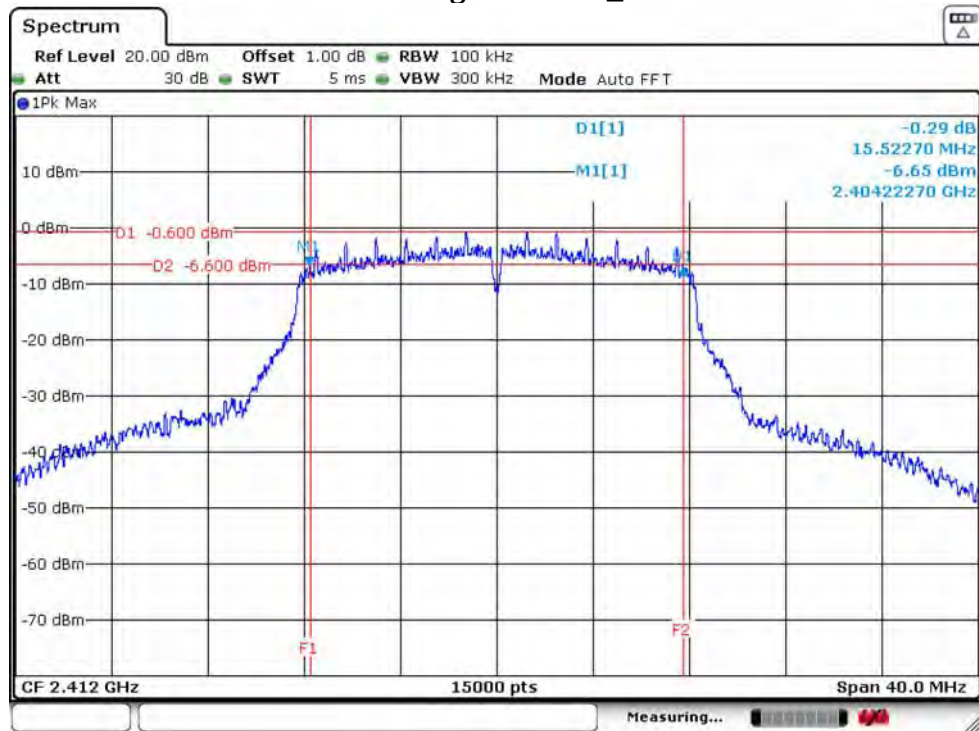
## IEEE 802.11b 2462MHz\_ANT 1



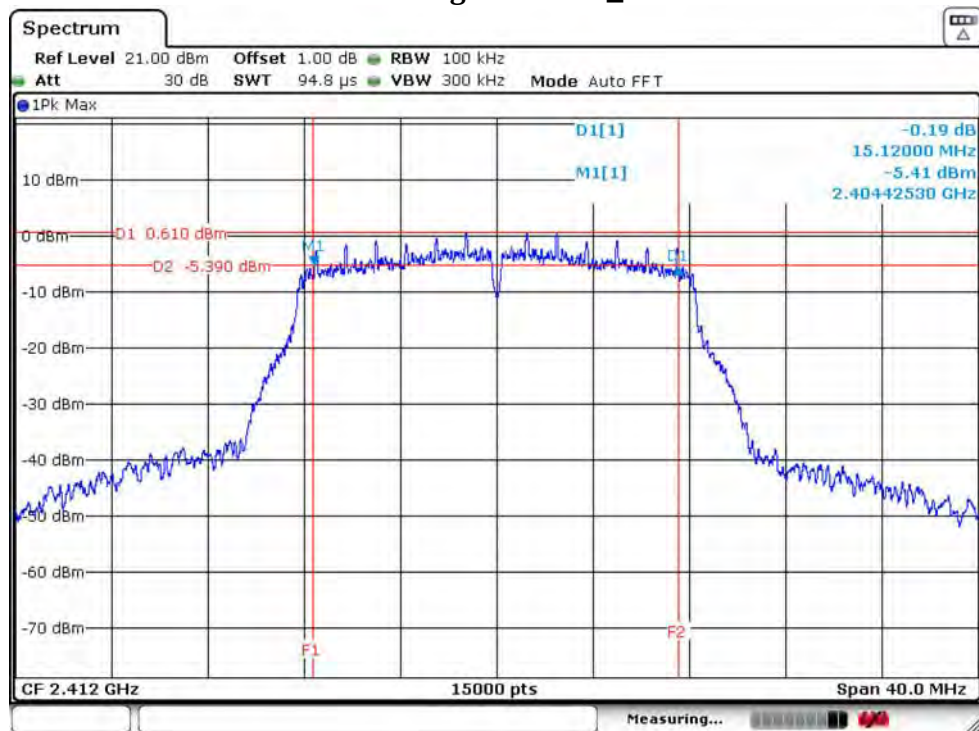
## IEEE 802.11b 2462MHz\_ANT 2



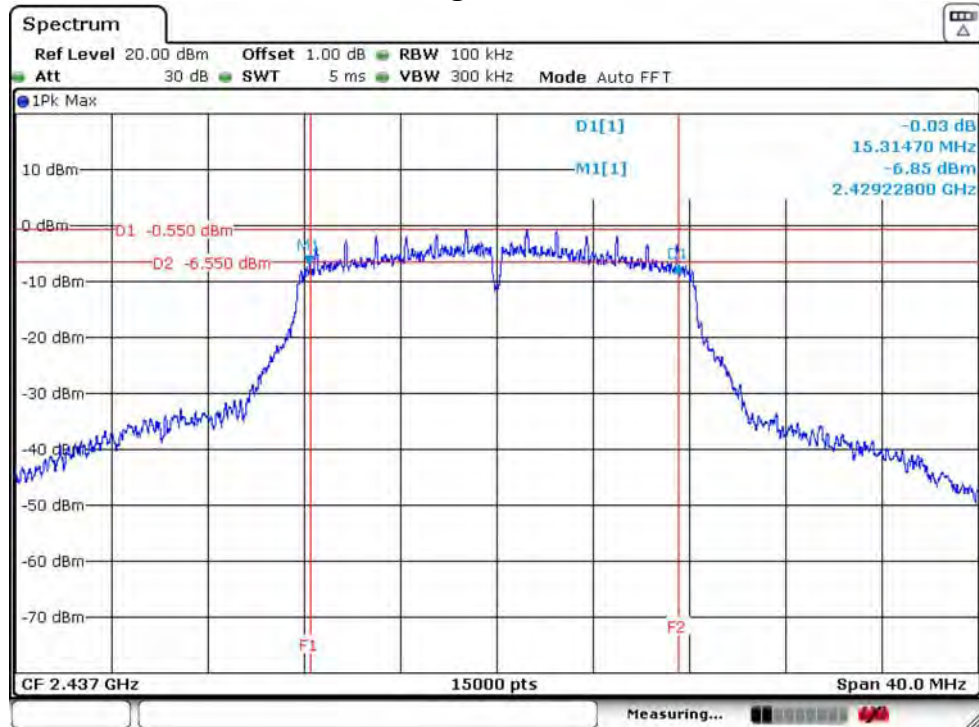
## IEEE 802.11g 2412MHz\_ANT 1



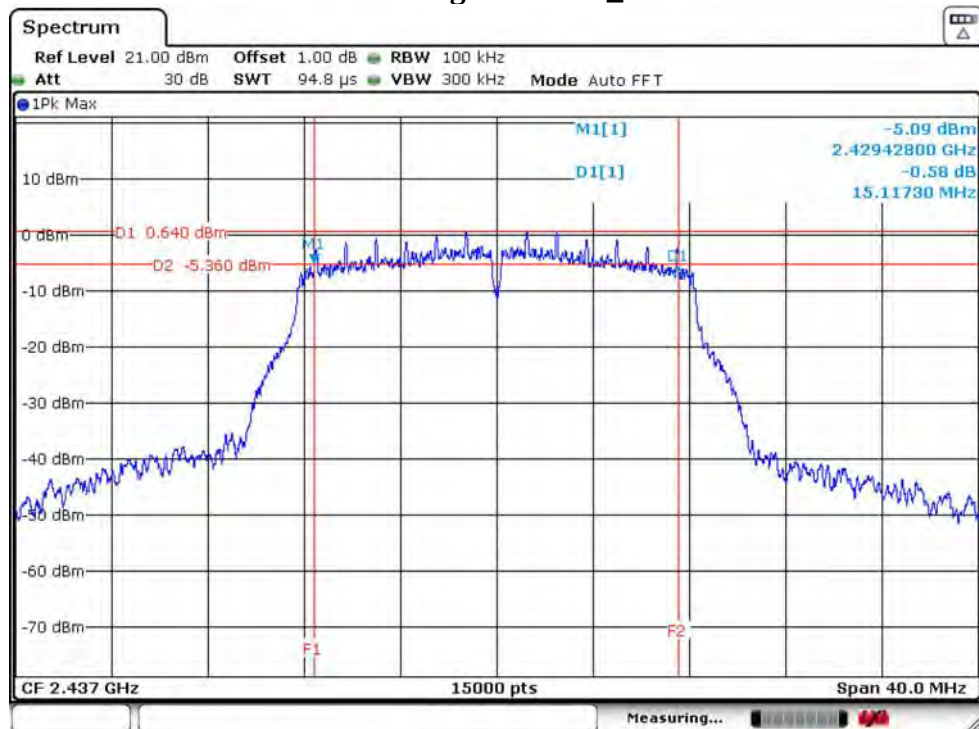
## IEEE 802.11g 2412MHz\_ANT 2



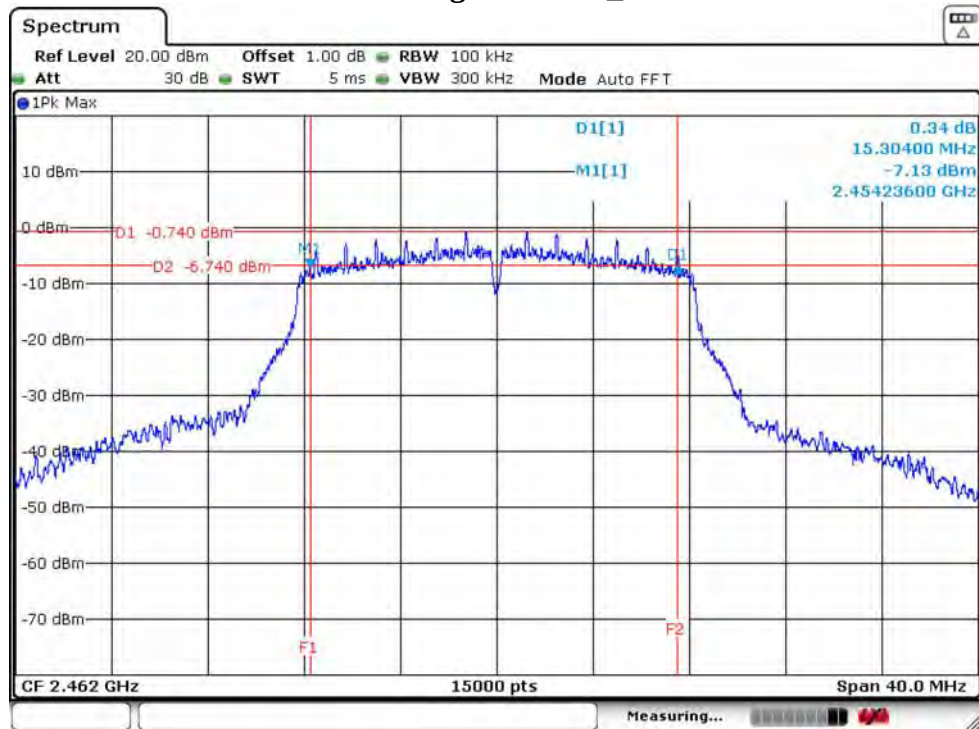
## IEEE 802.11g 2437MHz\_ANT 1



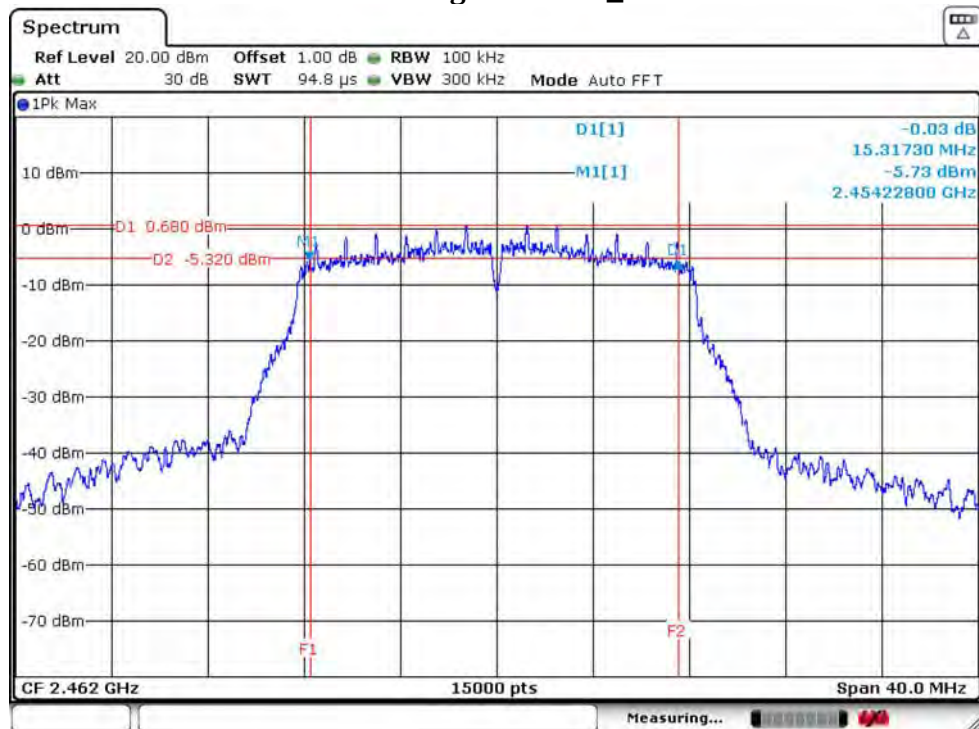
## IEEE 802.11g 2437MHz\_ANT 2



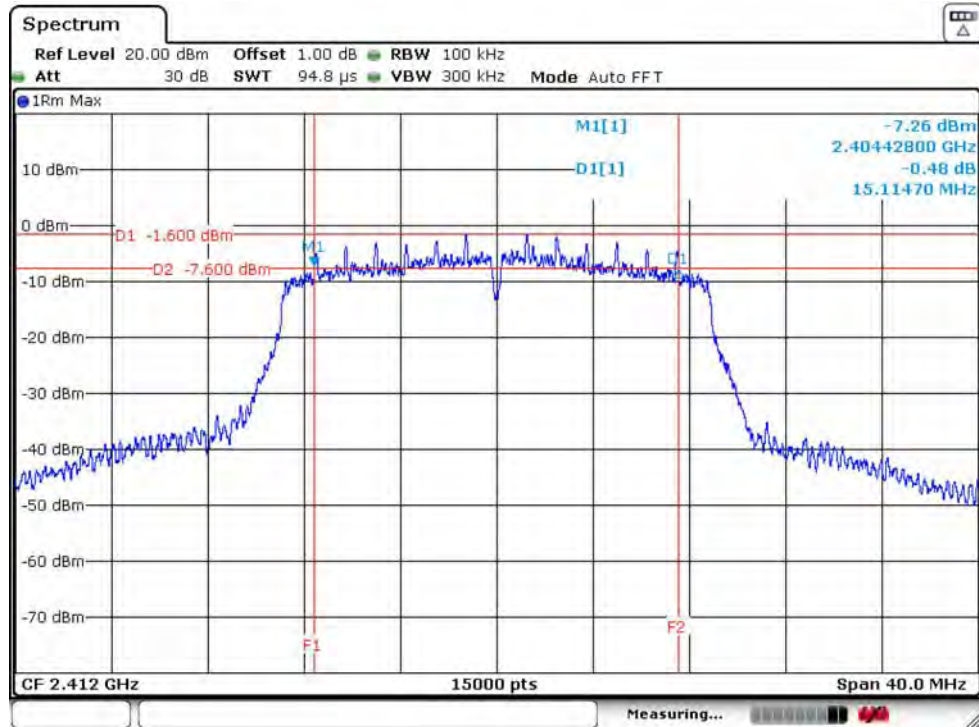
## IEEE 802.11g 2462MHz\_ANT 1



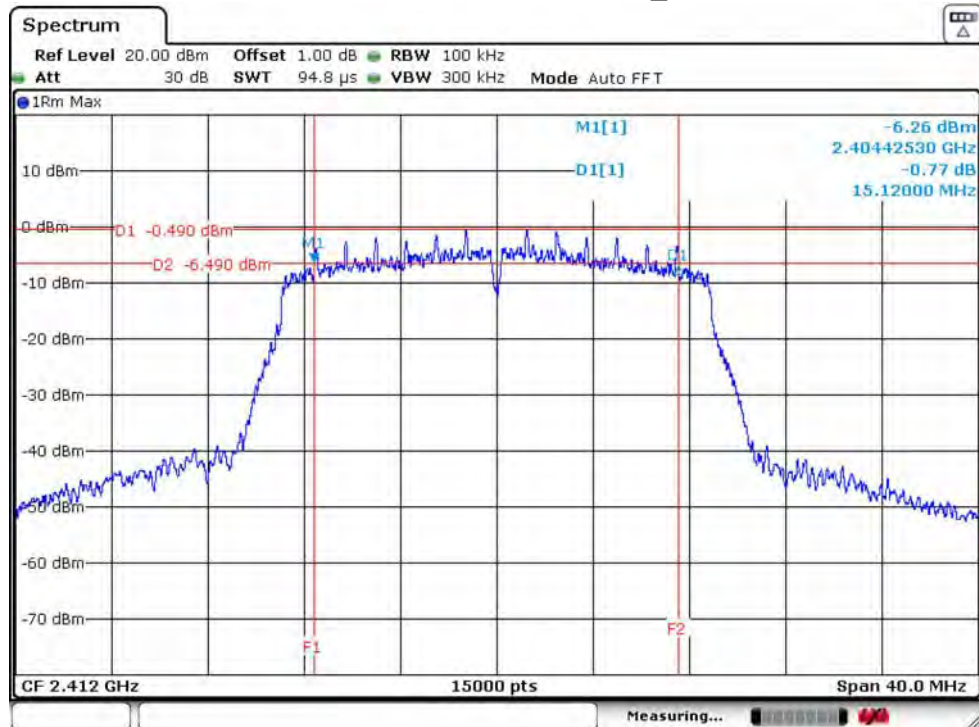
## IEEE 802.11g 2462MHz\_ANT 2



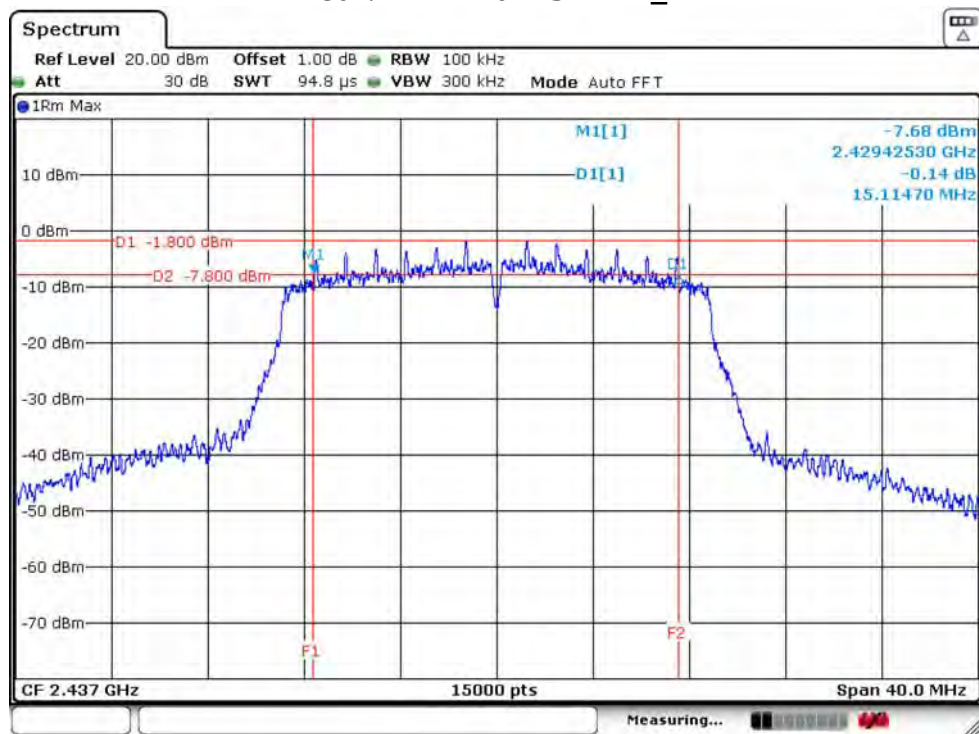
## IEEE 802.11n HT20 2412MHz\_ANT 1



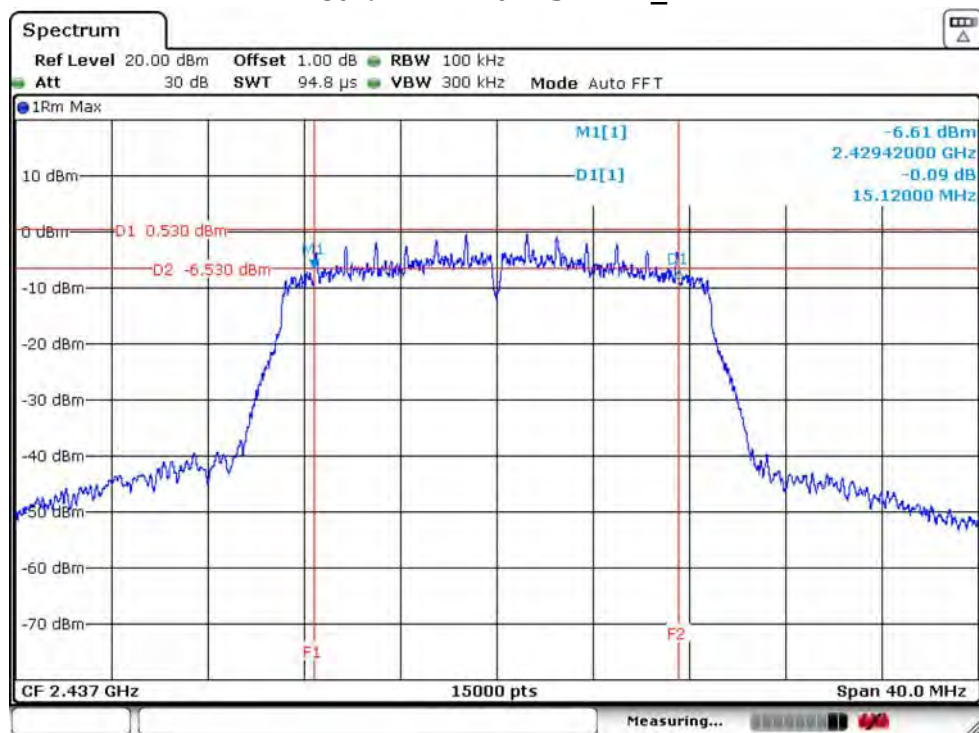
## IEEE 802.11n HT20 2412MHz\_ANT 2



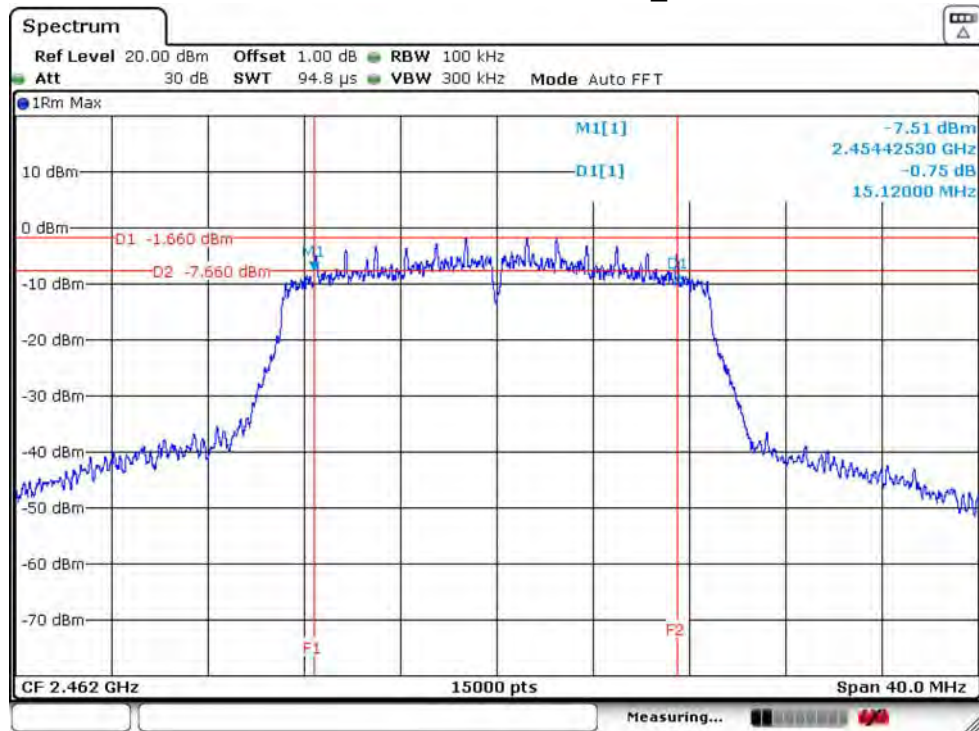
## IEEE 802.11n HT20 2437MHz\_ANT 1



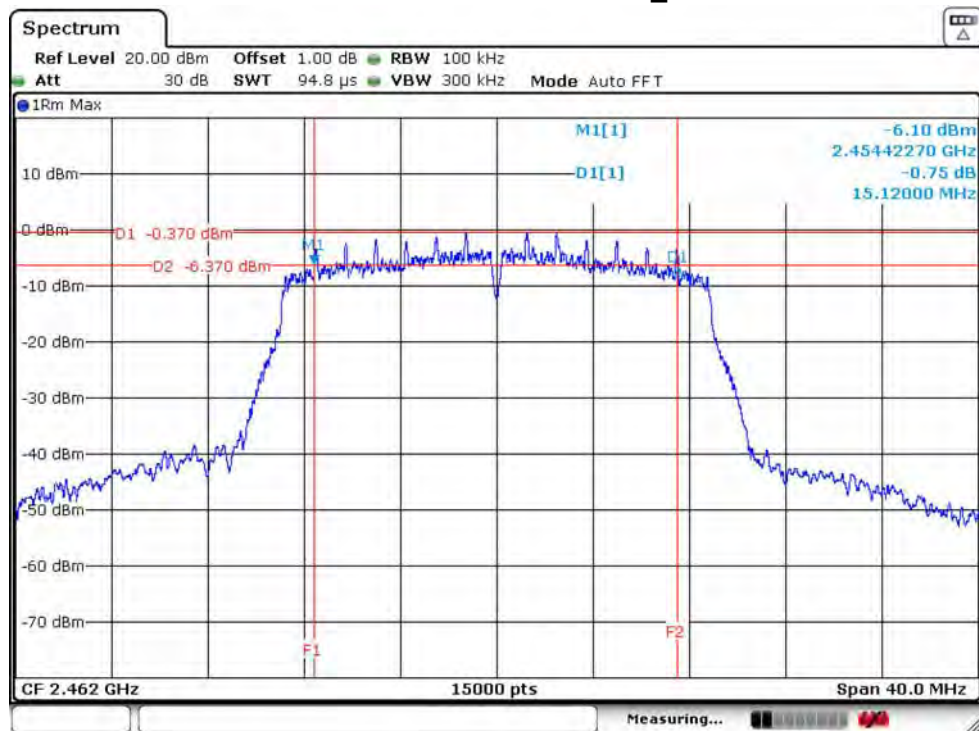
## IEEE 802.11n HT20 2437MHz\_ANT 2



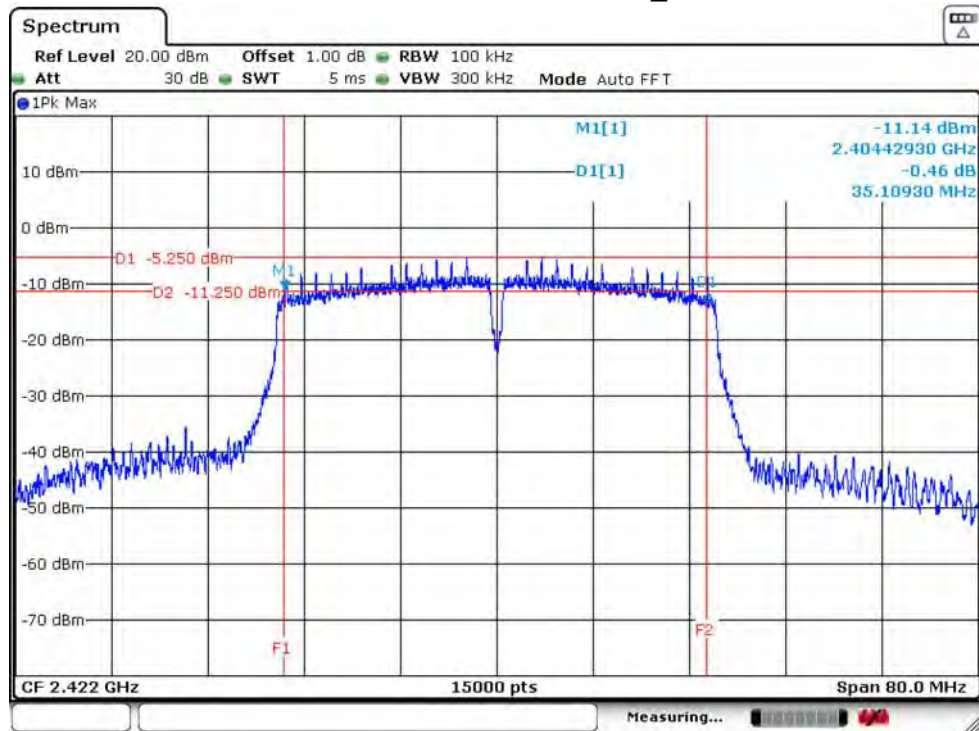
## IEEE 802.11n HT20 2462MHz\_ANT 1



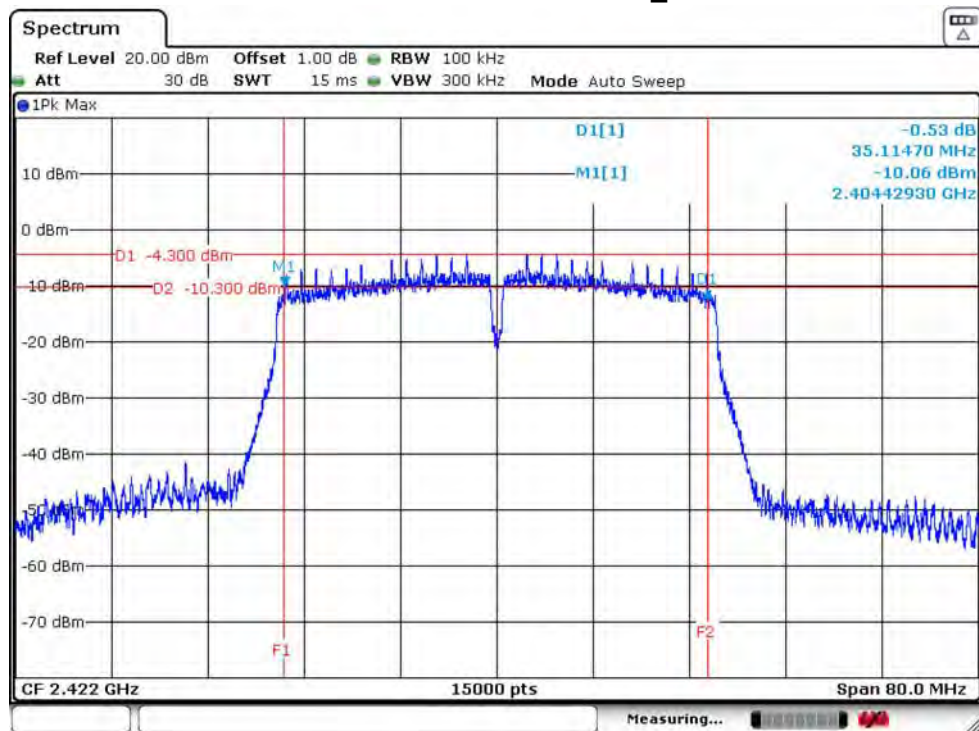
## IEEE 802.11n HT20 2462MHz\_ANT 2



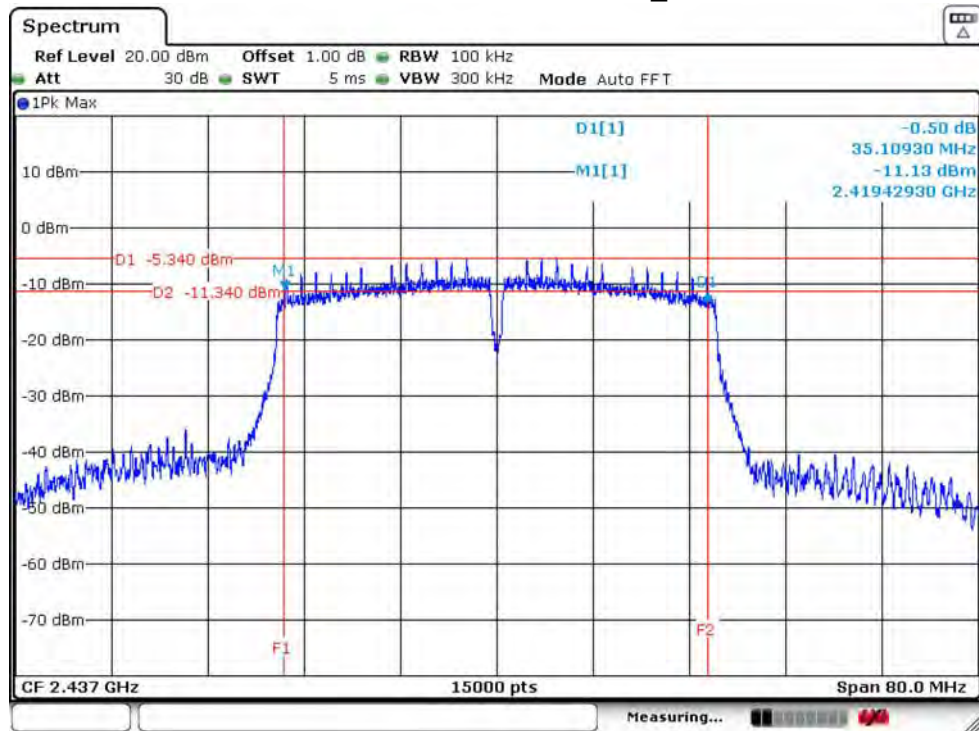
## IEEE 802.11n HT40 2422MHz\_ANT 1



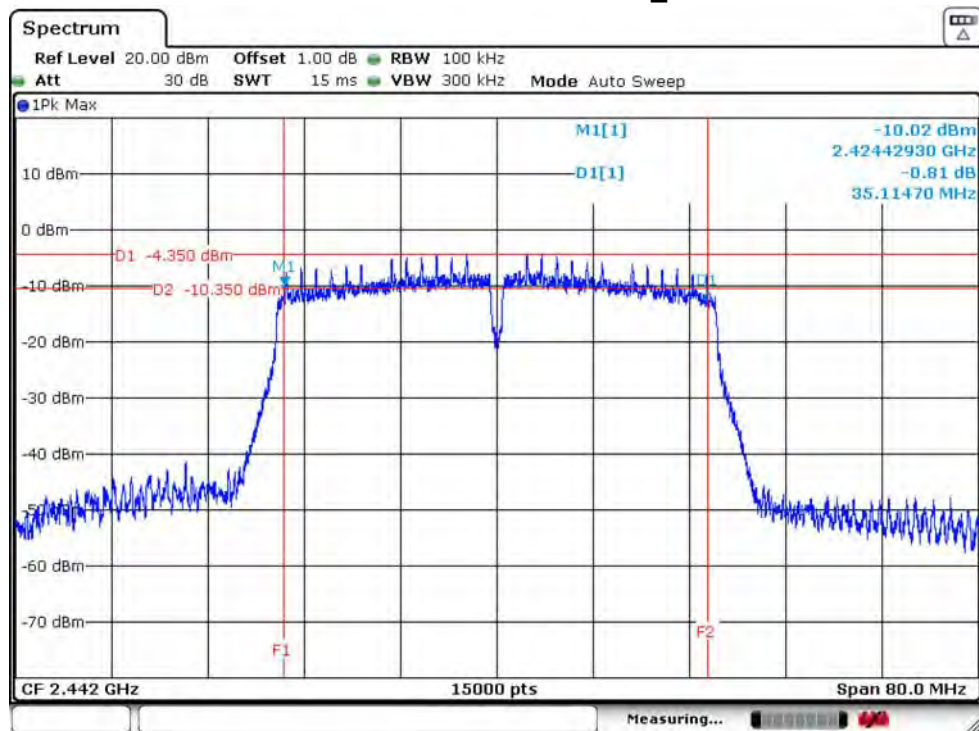
## IEEE 802.11n HT40 2422MHz\_ANT 2



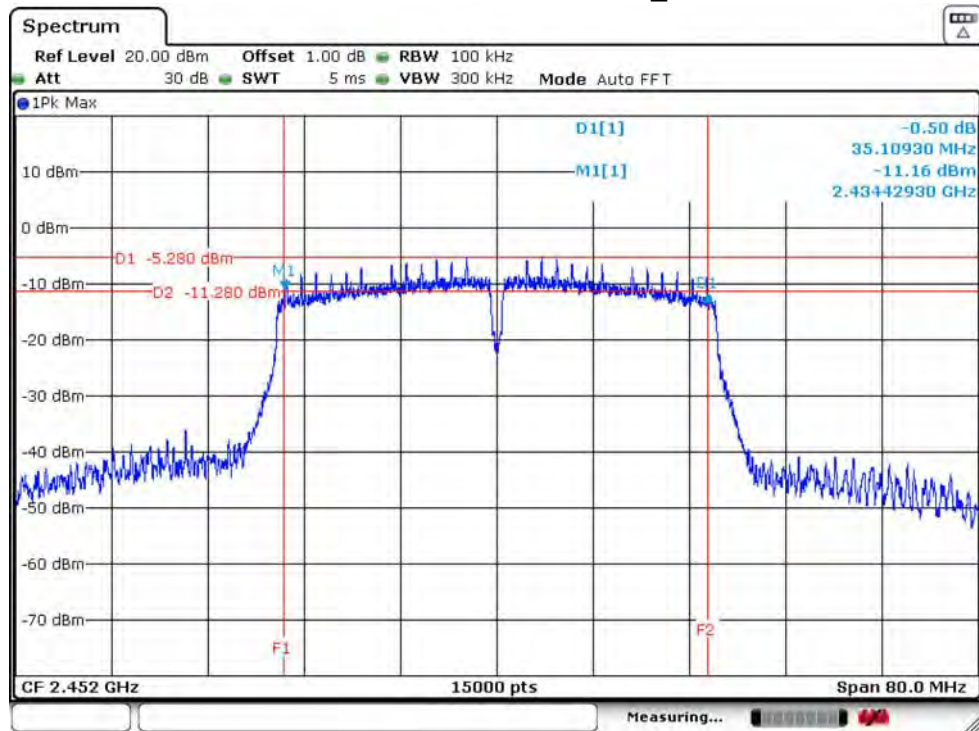
## IEEE 802.11n HT40 2437MHz\_ANT 1



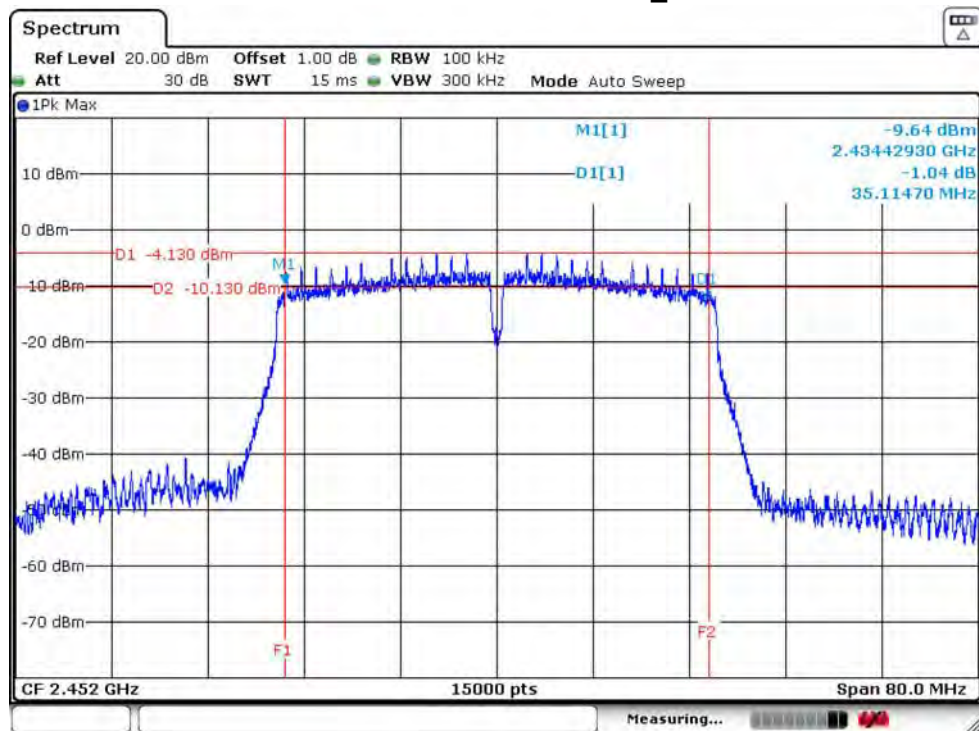
## IEEE 802.11n HT40 2437MHz\_ANT 2



## IEEE 802.11n HT40 2452MHz\_ANT 1



## IEEE 802.11n HT40 2452MHz\_ANT 2

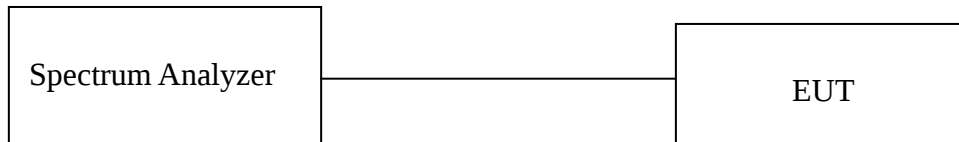


## 4. MAXIMUM PEAK OUTPUT POWER

### 4.1. Limit

For systems using digital modulation in 2400-2483.5MHz, the maximum peak output power is 1 Watt(30dBm).

### 4.2. Test Setup



### 4.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting                                                 |
|---------------------|---------------------------------------------------------|
| RBW                 | 1MHz                                                    |
| VBW                 | 3MHz                                                    |
| Span                | 40MHz(20MHz Bandwidth mode)/80MHz(40MHz Bandwidth mode) |
| Sweep Time          | Auto                                                    |
| Detector            | Peak                                                    |
| Trace Mode          | Max Hold                                                |

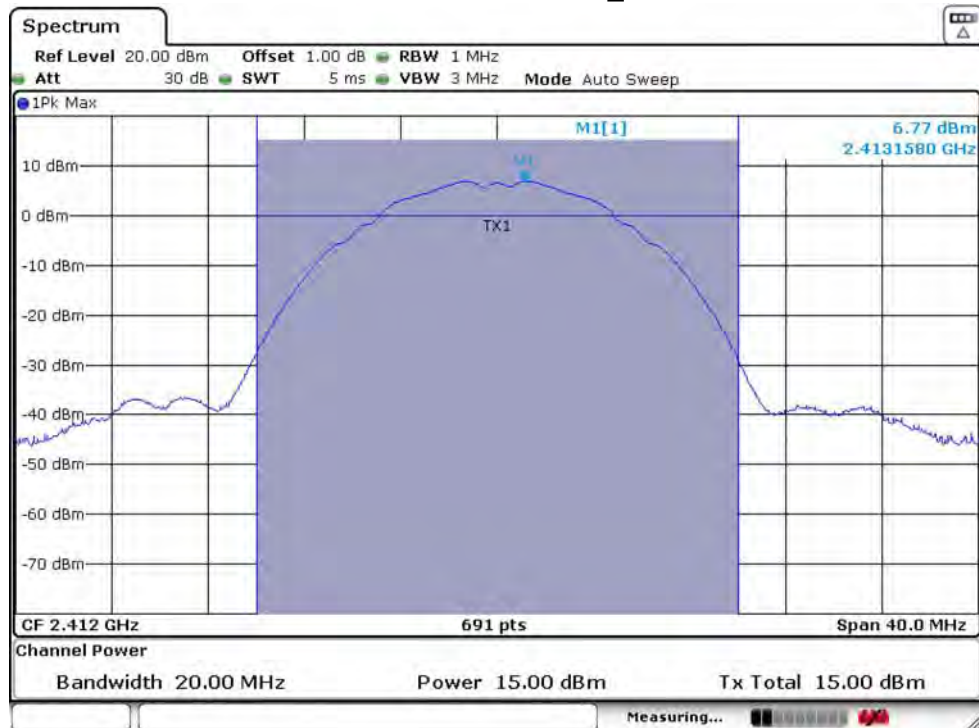
### 4.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 4.3.
- Set the EUT transmit continuously with maximum output power.
- Use the channel power function to measure maximum peak output power, allow trace to stabilize, save test pictures.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

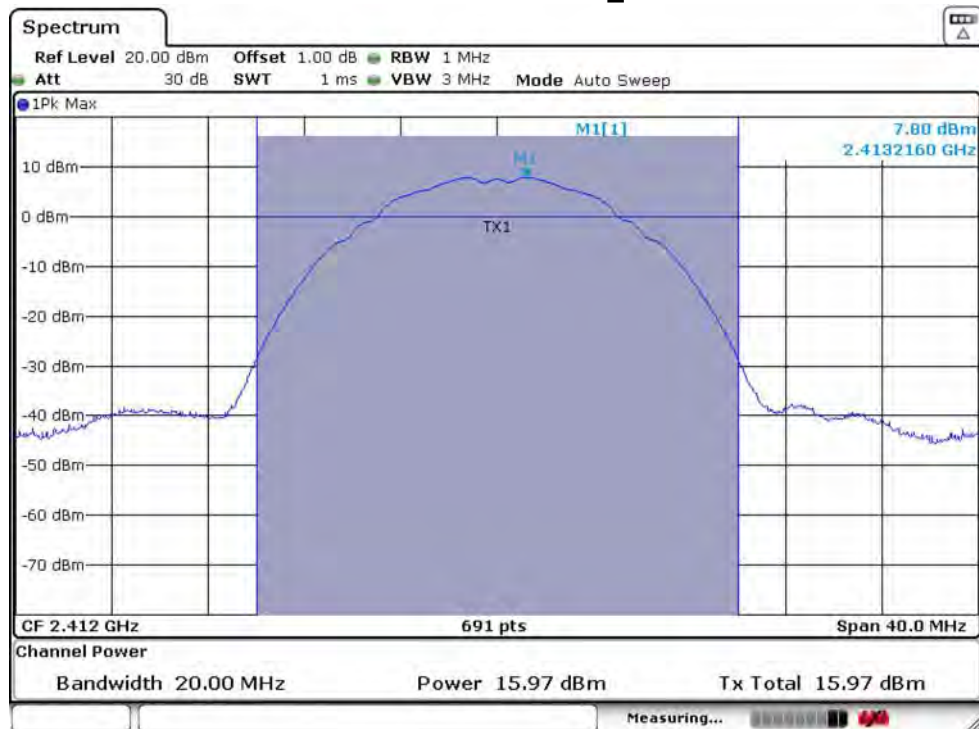
## 4.5. Test Result

| Temperature       | 25.3°C     | Relative Humidity       |       | 56%                         |        |                               |       | Test Voltage |       | DC 5V  |
|-------------------|------------|-------------------------|-------|-----------------------------|--------|-------------------------------|-------|--------------|-------|--------|
| Mode              | Freq (MHz) | Peak Output Power (dBm) |       | Total Peak Output Power (W) |        | Total Peak Output Power (dBm) |       | Limit        |       | Result |
|                   |            | ANT 1                   | ANT 2 | ANT 1                       | ANT 2  | ANT 1                         | ANT 2 | W            | dBm   |        |
| IEEE 802.11b      | 2412       | 15.00                   | 15.97 | 0.0316                      | 0.0395 | 15.00                         | 15.97 | 1.0000       | 30.00 | PASS   |
|                   | 2437       | 14.78                   | 15.91 | 0.0301                      | 0.0390 | 14.78                         | 15.91 | 1.0000       | 30.00 | PASS   |
|                   | 2462       | 14.80                   | 15.88 | 0.0302                      | 0.0387 | 14.80                         | 15.88 | 1.0000       | 30.00 | PASS   |
| IEEE 802.11g      | 2412       | 18.12                   | 19.29 | 0.0649                      | 0.0849 | 18.12                         | 19.29 | 1.0000       | 30.00 | PASS   |
|                   | 2437       | 17.89                   | 19.20 | 0.0615                      | 0.0832 | 17.89                         | 19.20 | 1.0000       | 30.00 | PASS   |
|                   | 2462       | 17.91                   | 19.26 | 0.0618                      | 0.0843 | 17.91                         | 19.26 | 1.0000       | 30.00 | PASS   |
| IEEE 802.11n HT20 | 2412       | 16.81                   | 18.07 | 0.1121                      |        | 20.50                         |       | 1.0000       | 30.00 | PASS   |
|                   | 2437       | 16.79                   | 18.12 | 0.1126                      |        | 20.52                         |       | 1.0000       | 30.00 | PASS   |
|                   | 2462       | 16.74                   | 18.06 | 0.1112                      |        | 20.46                         |       | 1.0000       | 30.00 | PASS   |
| IEEE 802.11n HT40 | 2422       | 16.02                   | 17.18 | 0.0922                      |        | 19.65                         |       | 1.0000       | 30.00 | PASS   |
|                   | 2437       | 16.01                   | 17.36 | 0.0944                      |        | 19.75                         |       | 1.0000       | 30.00 | PASS   |
|                   | 2452       | 16.01                   | 17.41 | 0.0950                      |        | 19.78                         |       | 1.0000       | 30.00 | PASS   |

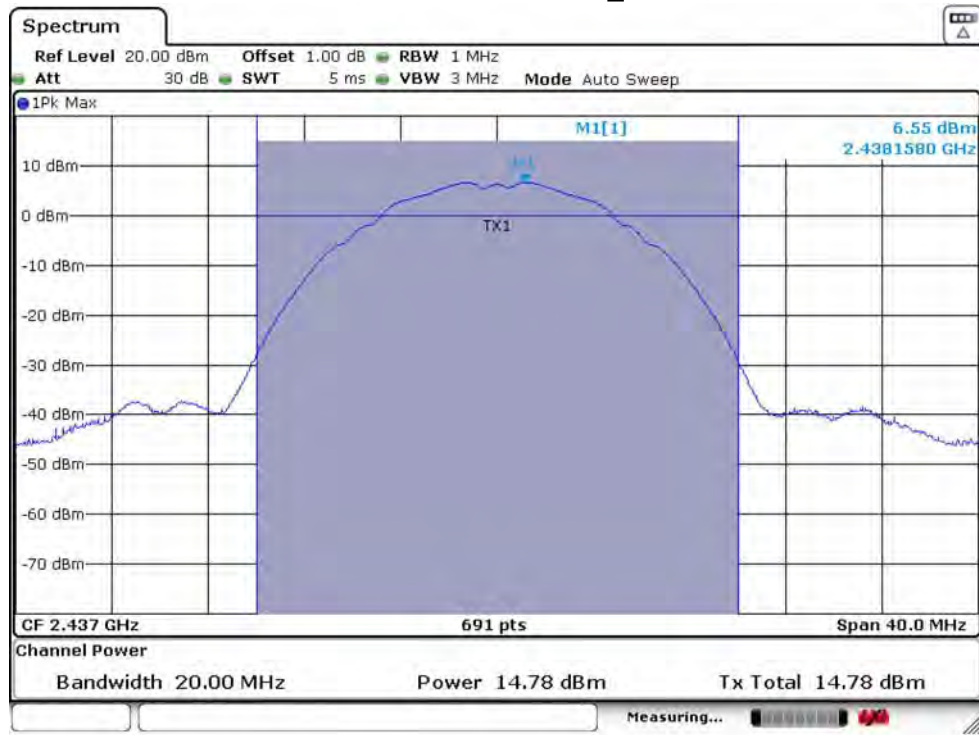
## IEEE 802.11b 2412MHz\_ANT 1



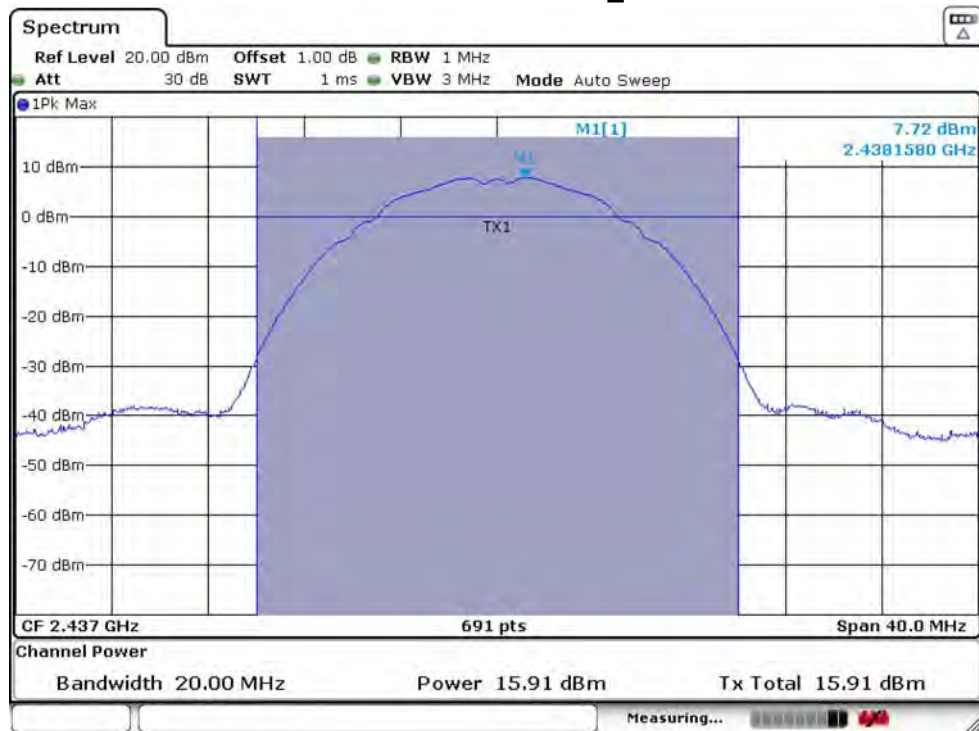
## IEEE 802.11b 2412MHz\_ANT 2



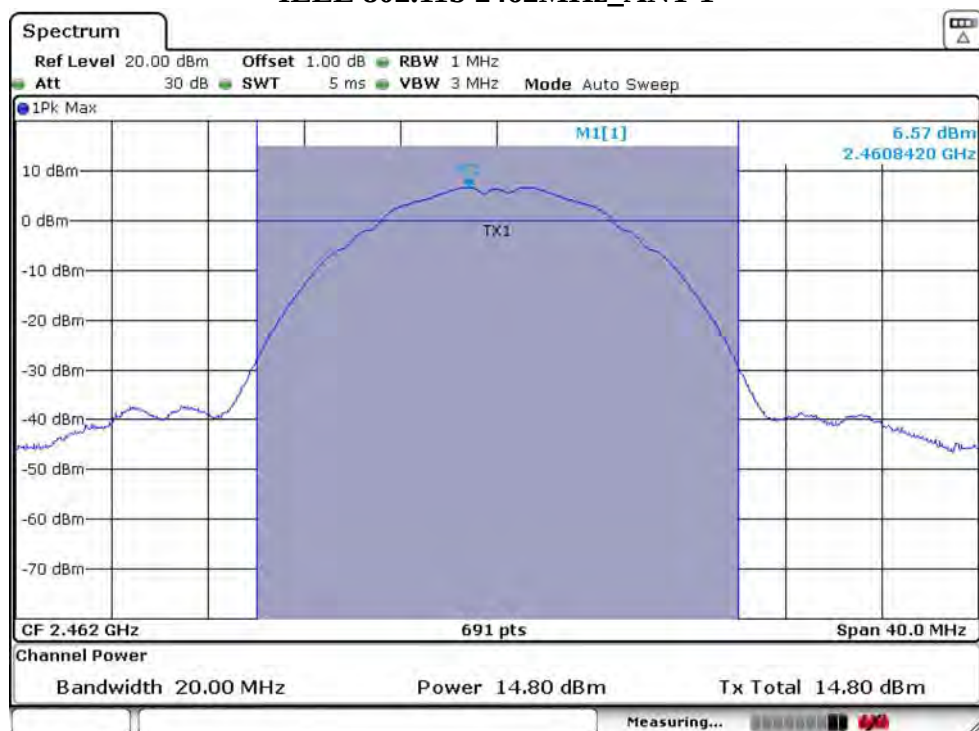
## IEEE 802.11b 2437MHz\_ANT 1



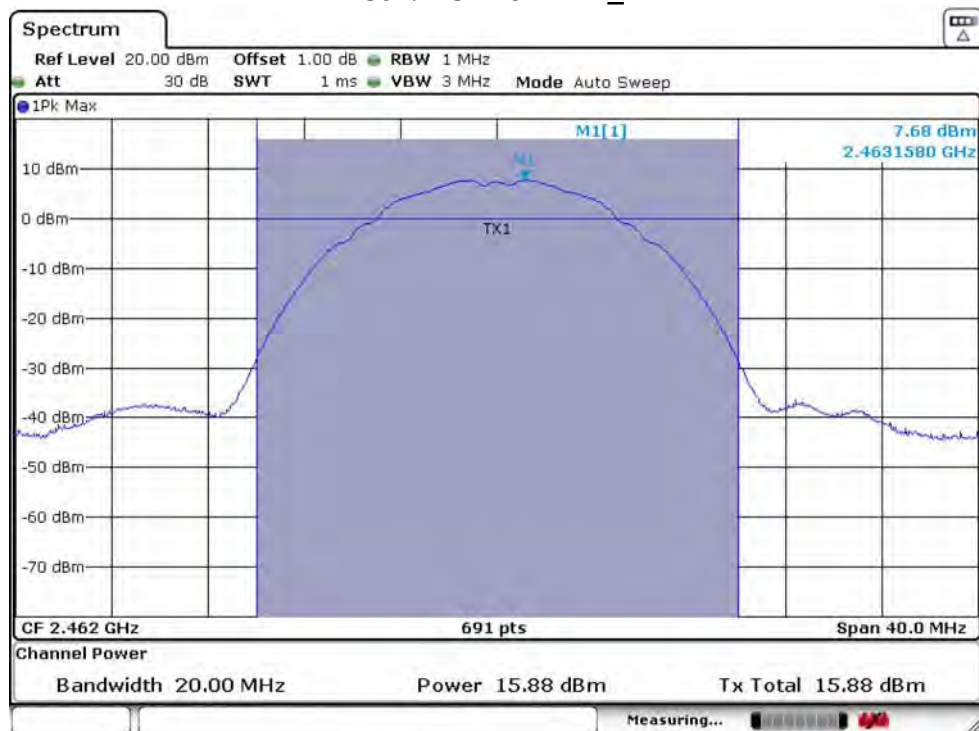
## IEEE 802.11b 2437MHz\_ANT 2



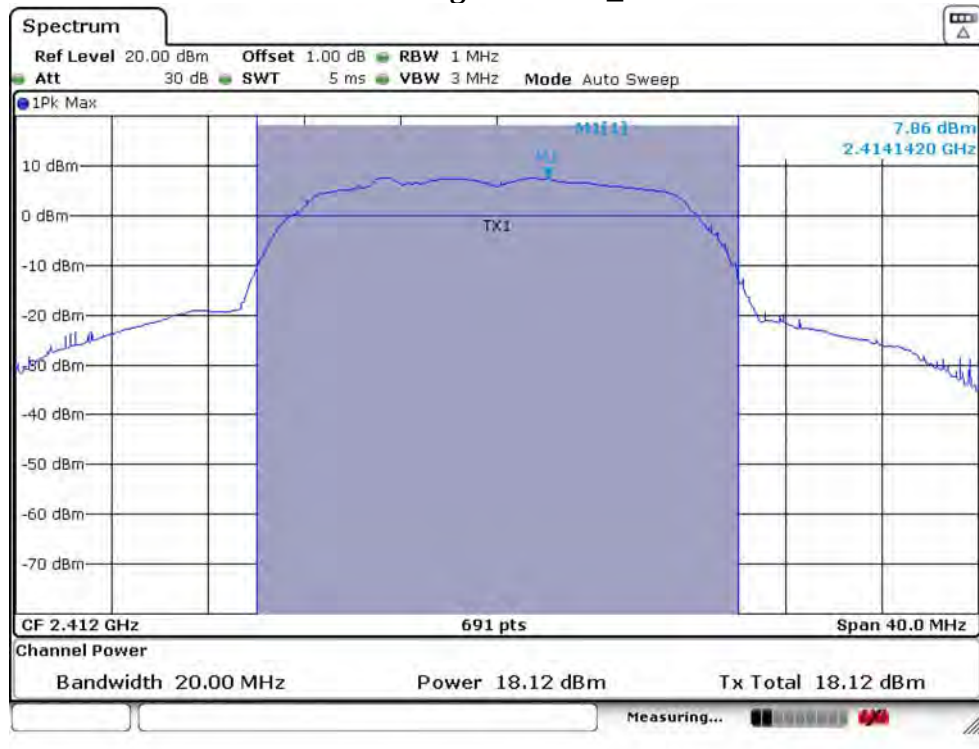
## IEEE 802.11b 2462MHz\_ANT 1



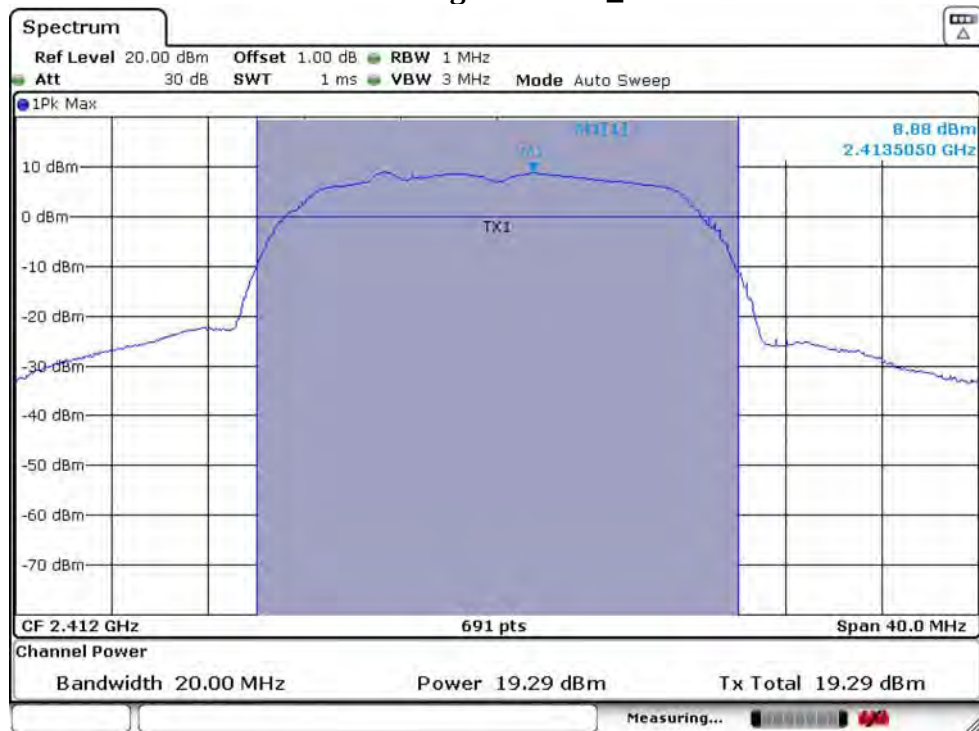
## IEEE 802.11b 2462MHz\_ANT 2



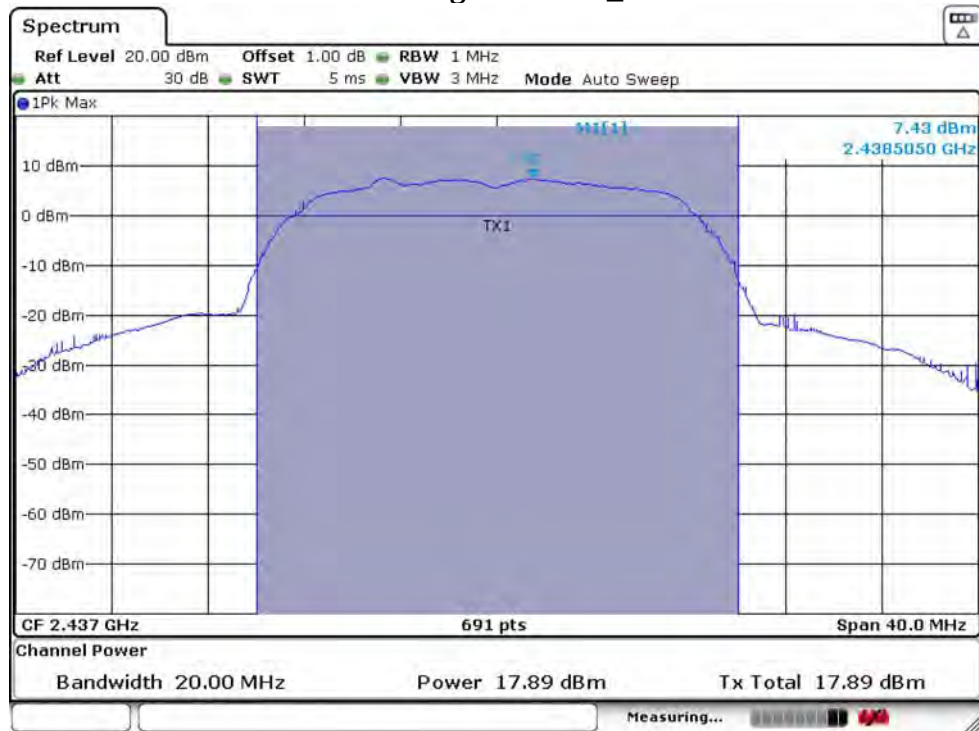
## IEEE 802.11g 2412MHz\_ANT 1



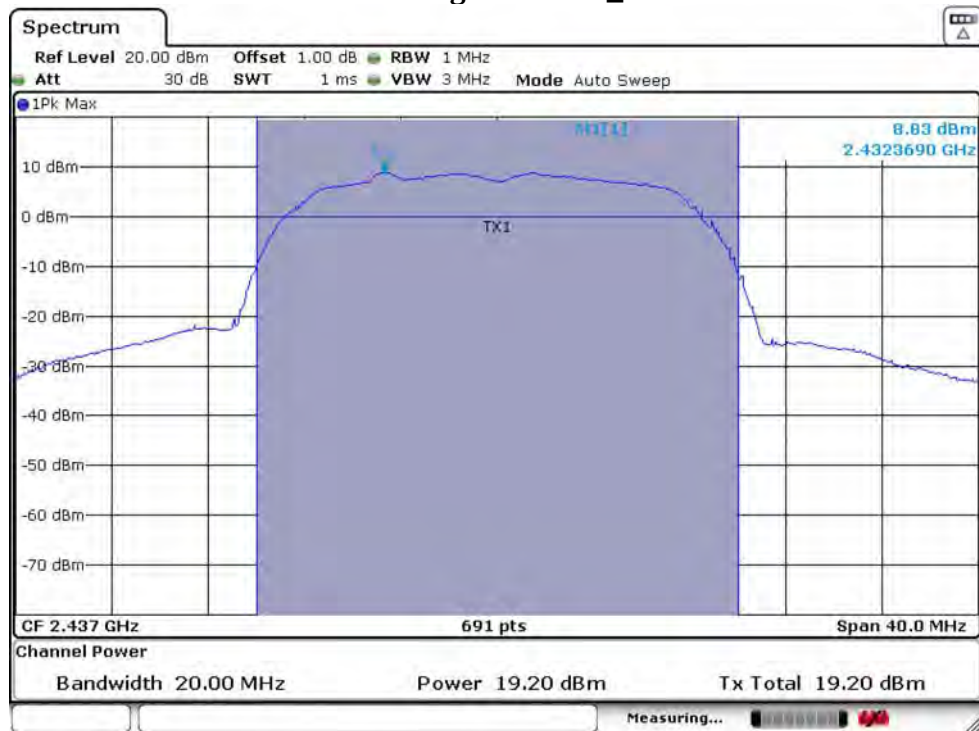
## IEEE 802.11g 2412MHz\_ANT 2



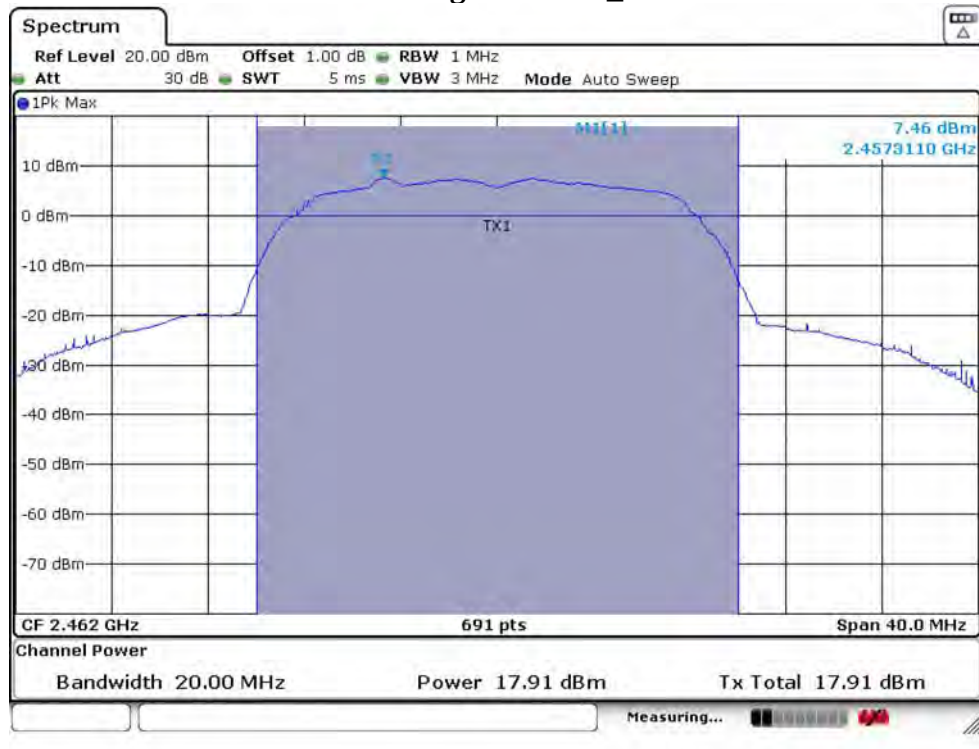
## IEEE 802.11g 2437MHz\_ANT 1



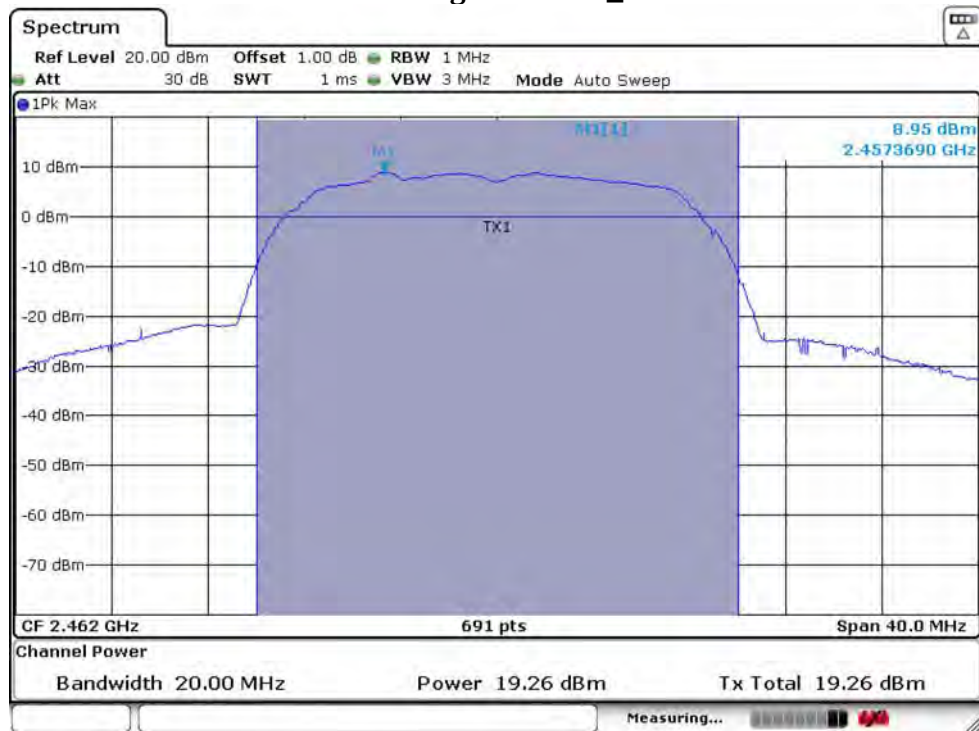
## IEEE 802.11g 2437MHz\_ANT 2



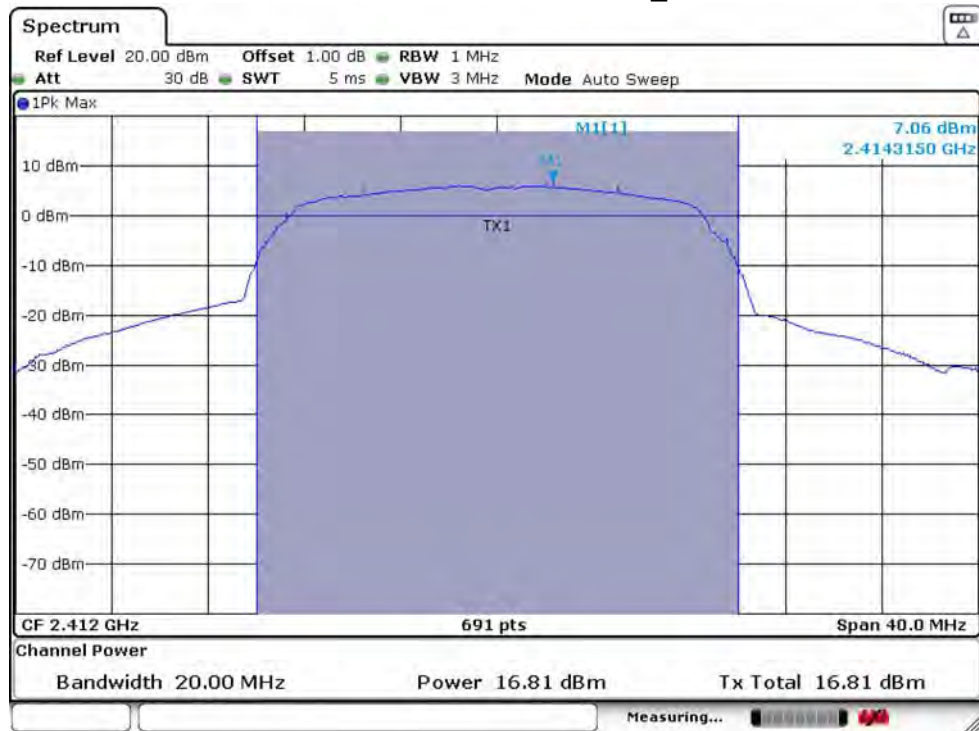
## IEEE 802.11g 2462MHz\_ANT 1



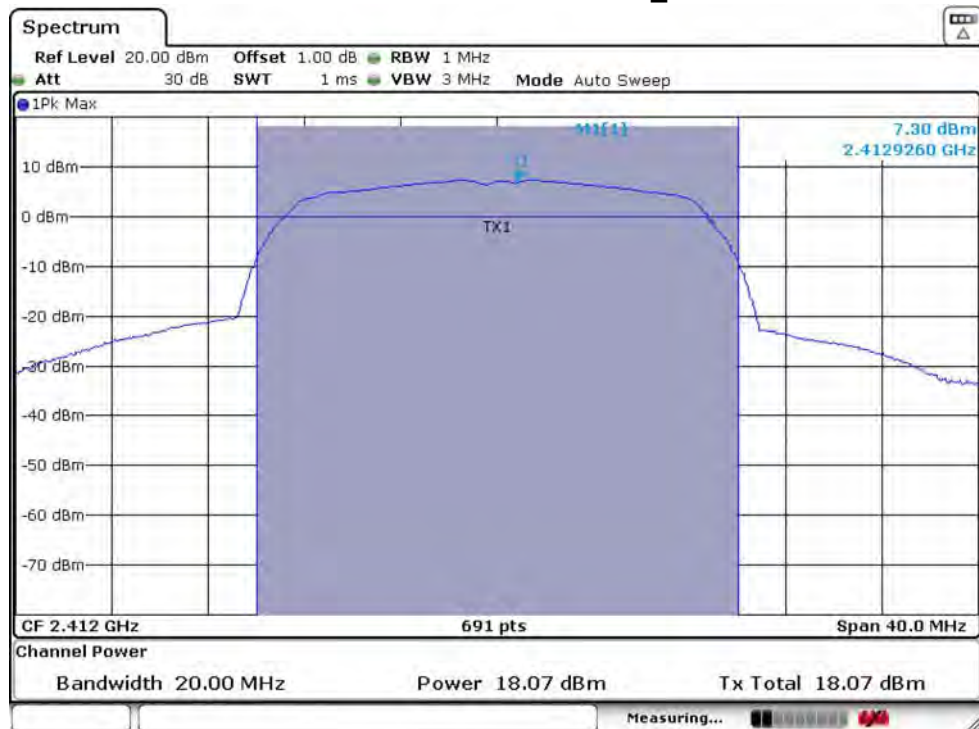
## IEEE 802.11g 2462MHz\_ANT 2



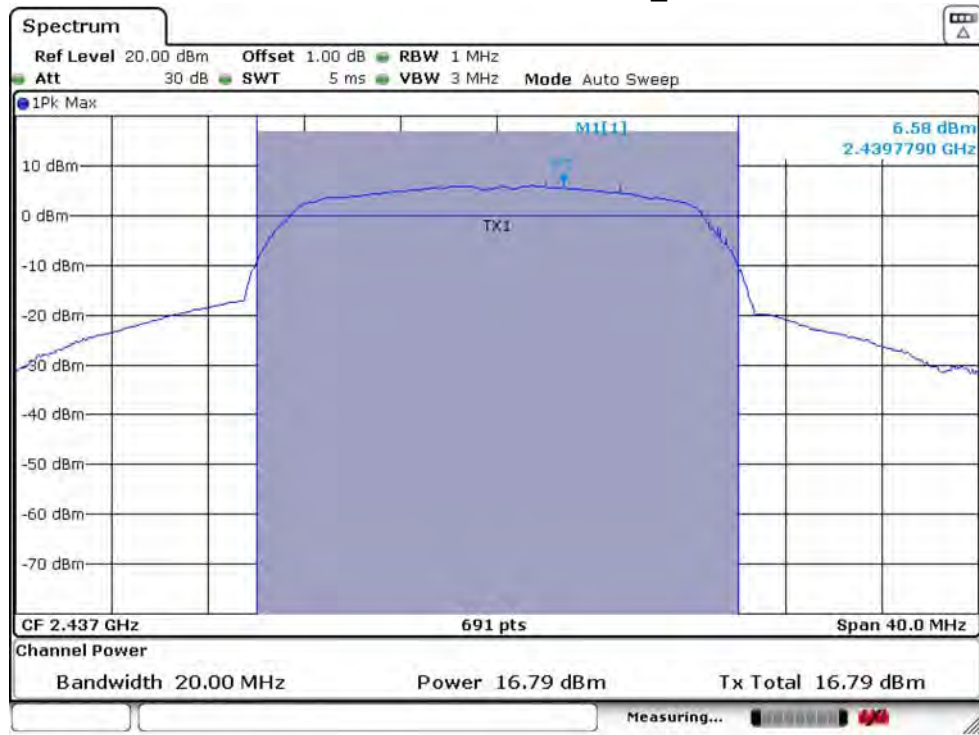
# IEEE 802.11n HT20 2412MHz\_ANT 1



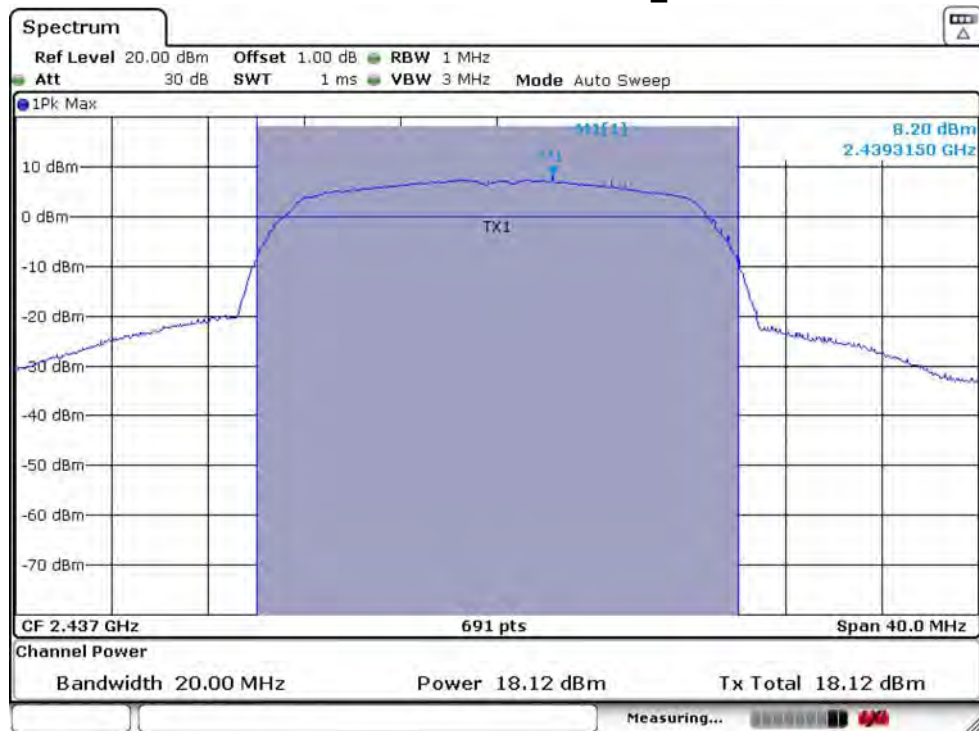
# IEEE 802.11n HT20 2412MHz\_ANT 2



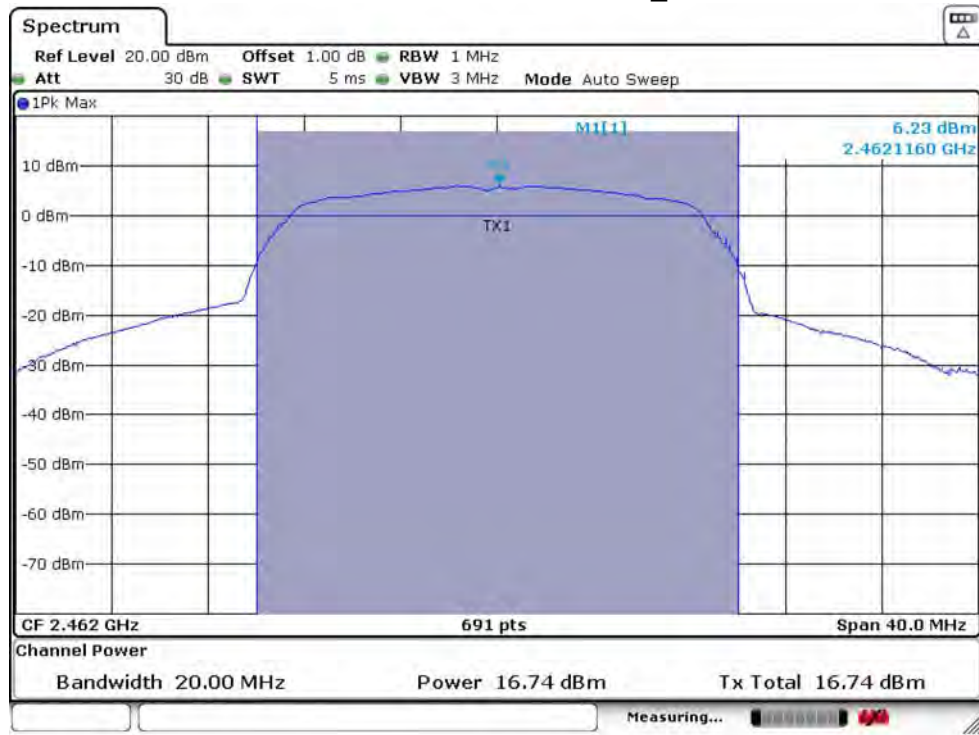
## IEEE 802.11n HT20 2437MHz\_ANT 1



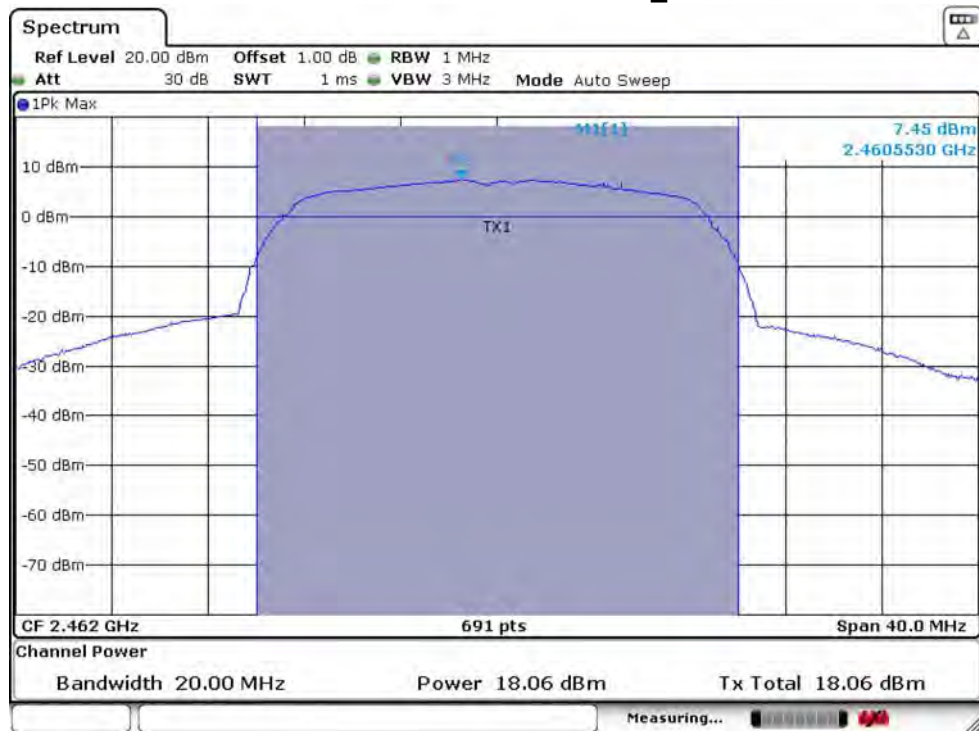
# IEEE 802.11n HT20 2437MHz\_ANT 2



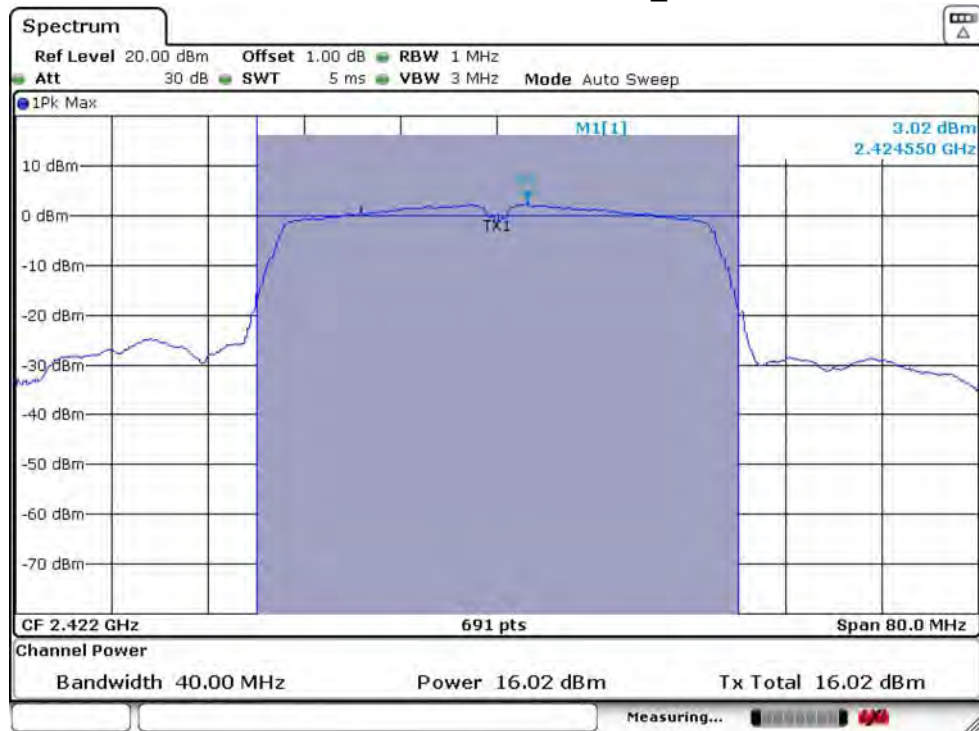
## IEEE 802.11n HT20 2462MHz\_ANT 1



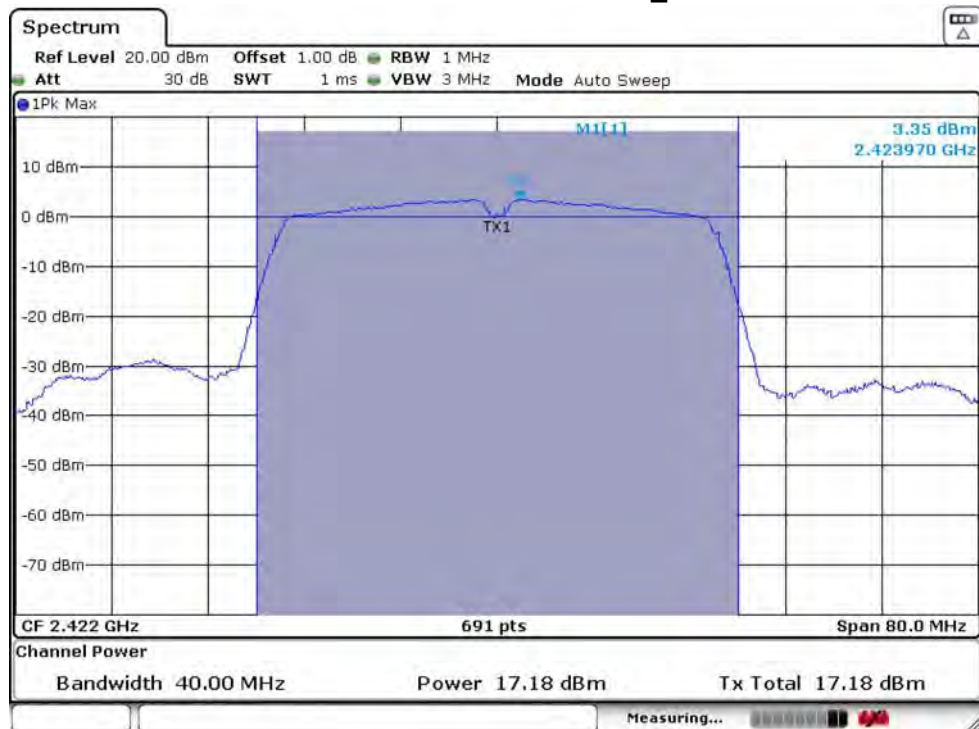
## IEEE 802.11n HT20 2462MHz\_ANT 2



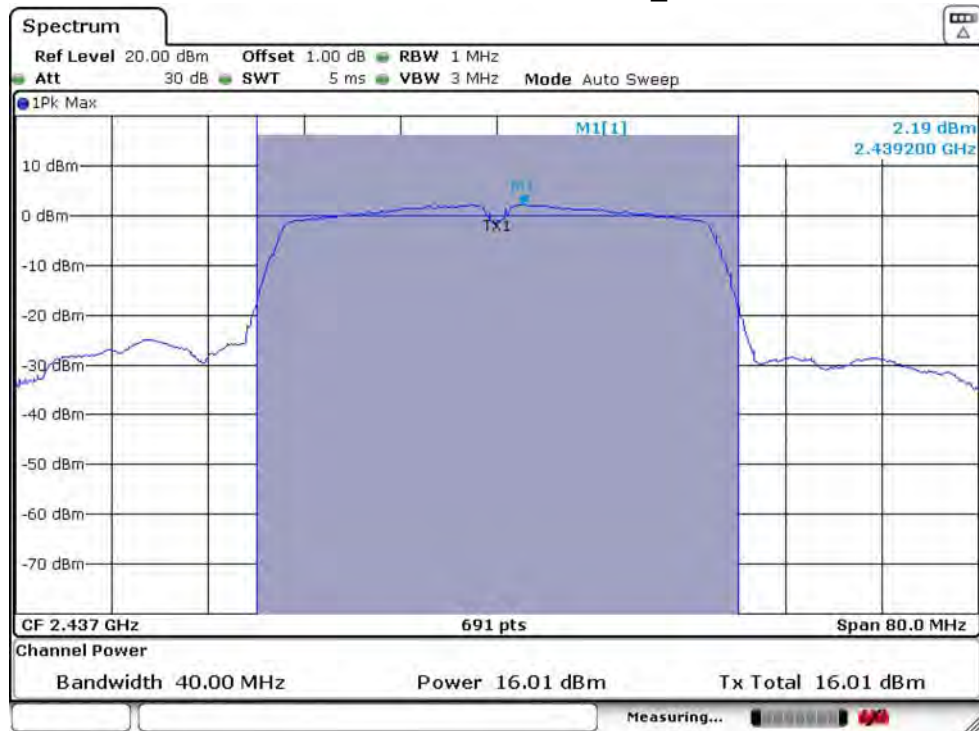
## IEEE 802.11n HT40 2422MHz\_ANT 1



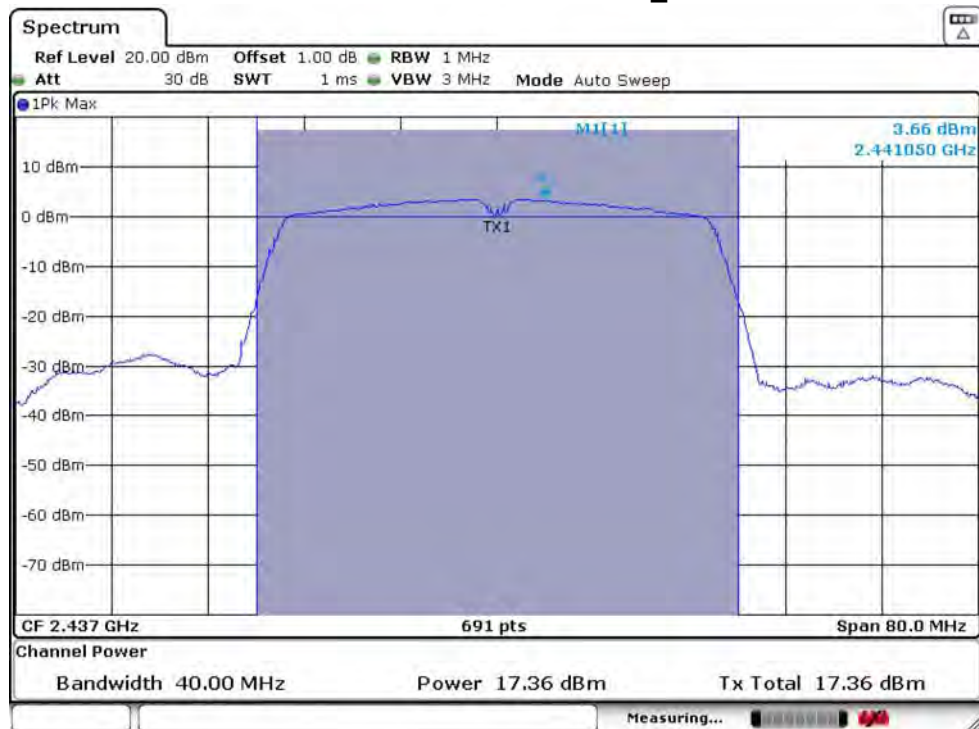
## IEEE 802.11n HT40 2422MHz\_ANT 2



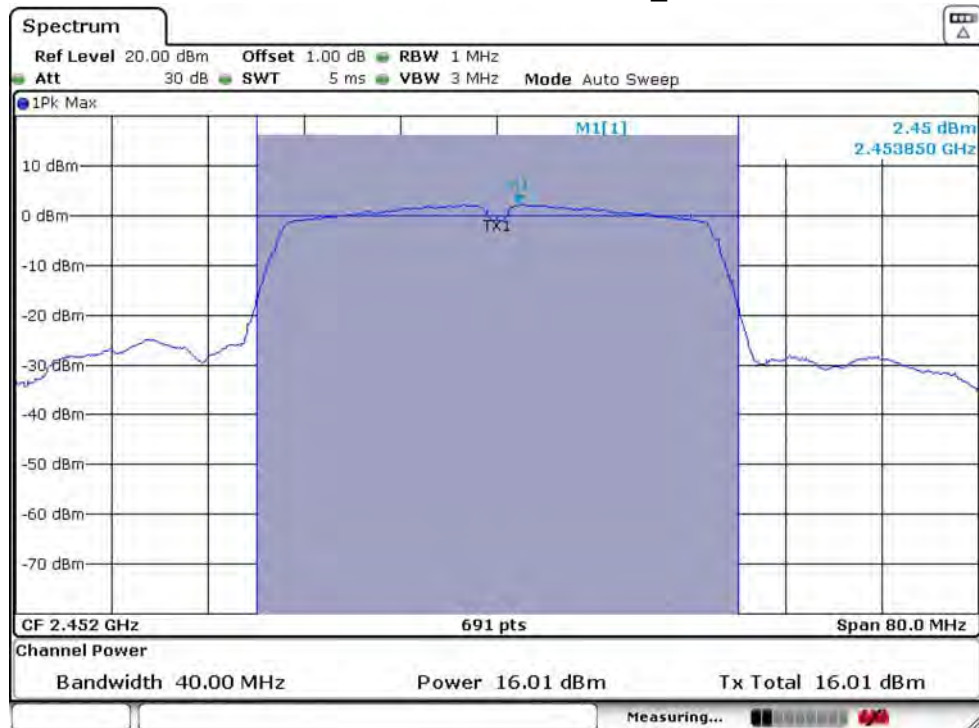
## IEEE 802.11n HT40 2437MHz\_ANT 1



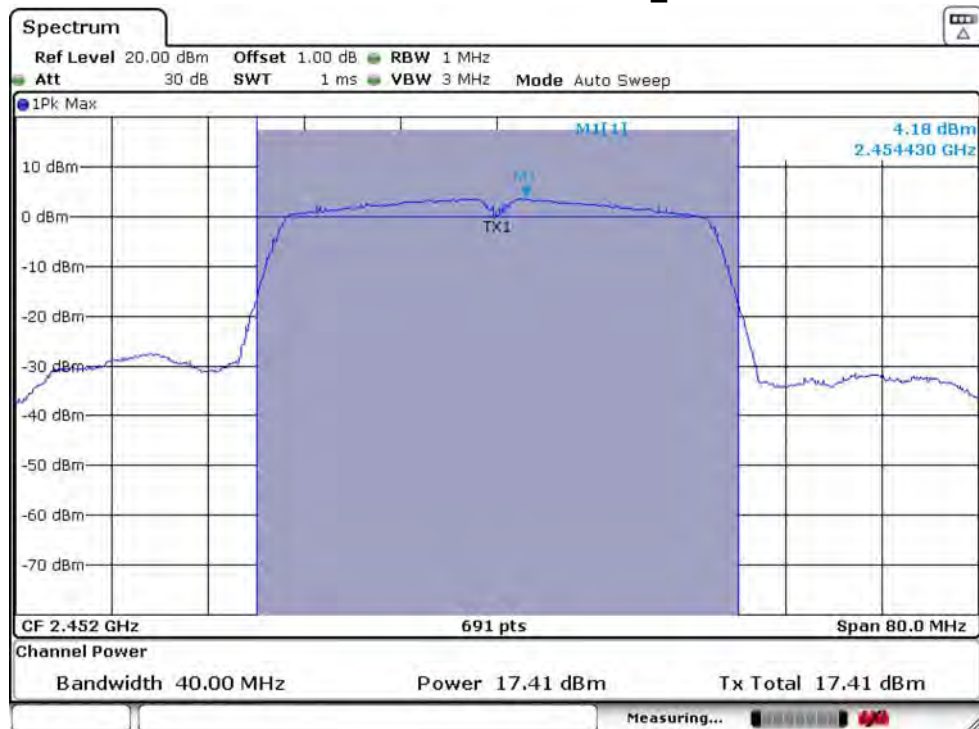
## IEEE 802.11n HT40 2437MHz\_ANT 2



## IEEE 802.11n HT40 2452MHz\_ANT 1



## IEEE 802.11n HT40 2452MHz\_ANT 2

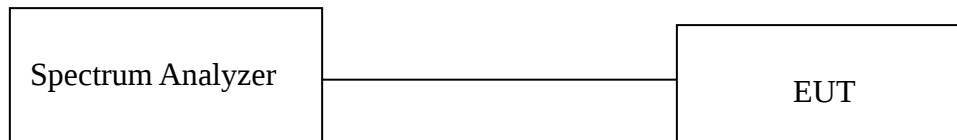


## 5. POWER SPECTRAL DENSITY

### 5.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 5.2. Test Setup



### 5.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting                                                 |
|---------------------|---------------------------------------------------------|
| RBW                 | 3KHz                                                    |
| VBW                 | 10KHz                                                   |
| Span                | 30MHz(20MHz Bandwidth mode)/60MHz(40MHz Bandwidth mode) |
| Sweep Time          | Auto                                                    |
| Detector            | Peak                                                    |
| Trace Mode          | Max Hold                                                |

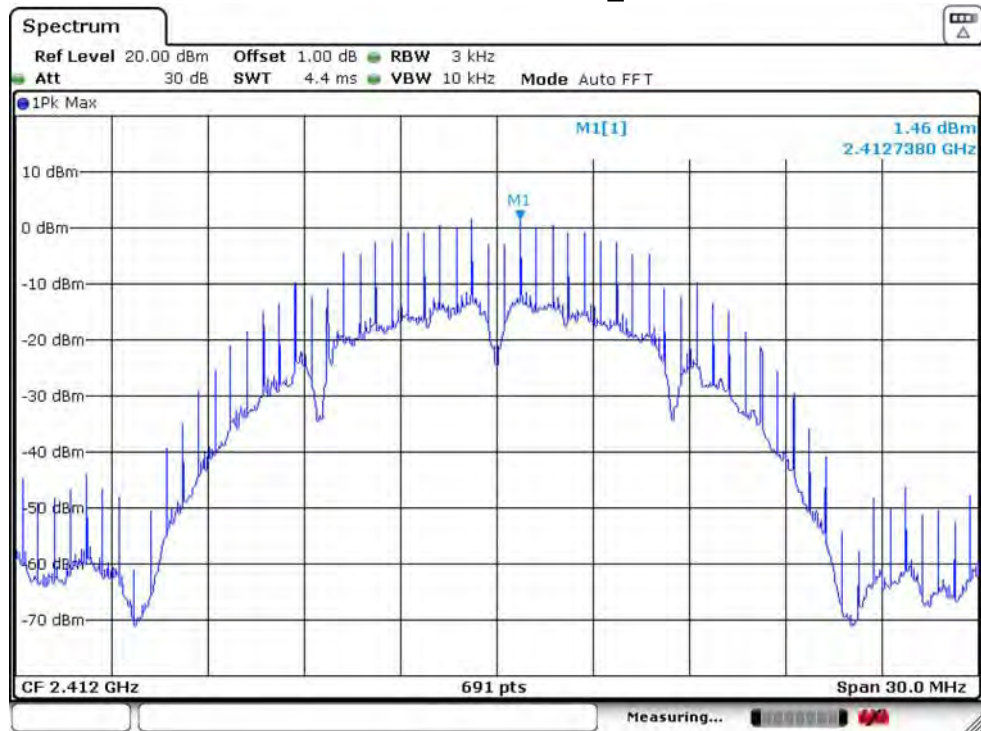
### 5.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 5.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

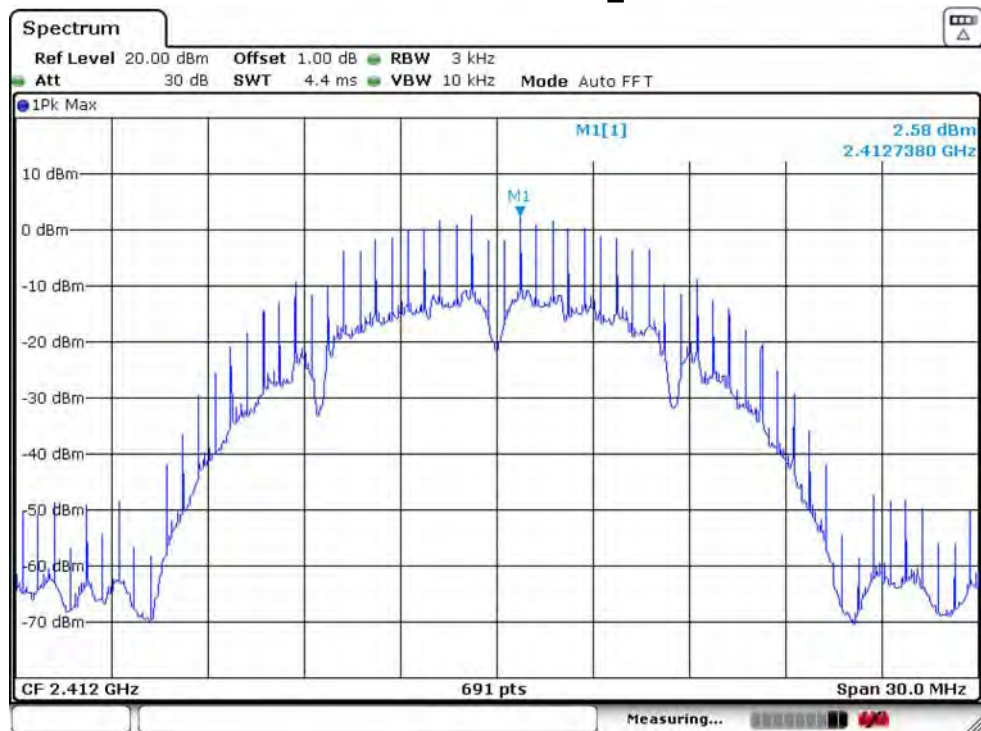
## 5.5. Test Result

| Temperature             | 25.3℃         | Relative Humidity           |        | 56%                                  | Test Voltage        | DC 5V  |
|-------------------------|---------------|-----------------------------|--------|--------------------------------------|---------------------|--------|
| Mode                    | Freq<br>(MHz) | Power Density<br>(dBm/3KHz) |        | Total Power<br>Density<br>(dBm/3KHz) | Limit<br>(dBm/3KHz) | Result |
|                         |               | ANT 1                       | ANT 2  |                                      |                     |        |
| IEEE<br>802.11b         | 2412          | 1.46                        | 2.58   | /                                    | 8.00                | PASS   |
|                         | 2437          | 1.51                        | 2.63   | /                                    | 8.00                | PASS   |
|                         | 2462          | 1.36                        | 2.53   | /                                    | 8.00                | PASS   |
| IEEE<br>802.11g         | 2412          | -13.72                      | -13.03 | /                                    | 8.00                | PASS   |
|                         | 2437          | -14.67                      | -12.37 | /                                    | 8.00                | PASS   |
|                         | 2462          | -13.89                      | -13.93 | /                                    | 8.00                | PASS   |
| IEEE<br>802.11n<br>HT20 | 2412          | -14.47                      | -13.96 | -11.20                               | 8.00                | PASS   |
|                         | 2437          | -15.74                      | -14.24 | -11.92                               | 8.00                | PASS   |
|                         | 2462          | -15.14                      | -13.70 | -11.09                               | 8.00                | PASS   |
| IEEE<br>802.11n<br>HT40 | 2422          | -19.64                      | -18.55 | -16.05                               | 8.00                | PASS   |
|                         | 2437          | -20.25                      | -19.21 | -16.69                               | 8.00                | PASS   |
|                         | 2452          | -20.17                      | -18.30 | -16.12                               | 8.00                | PASS   |

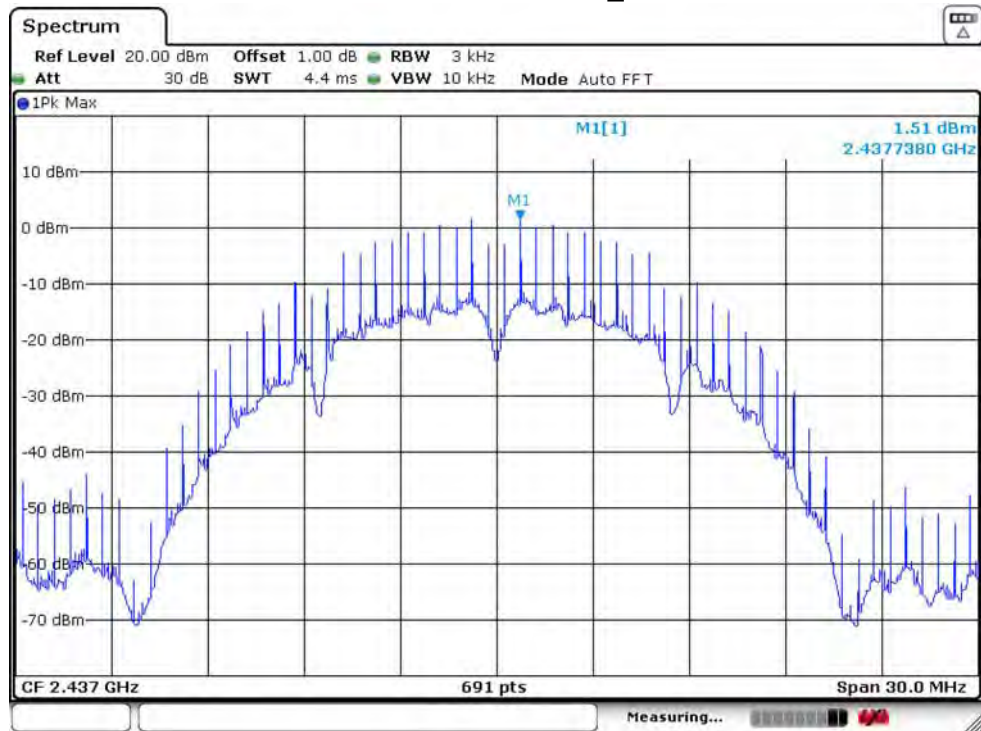
## IEEE 802.11b 2412MHz\_ANT 1



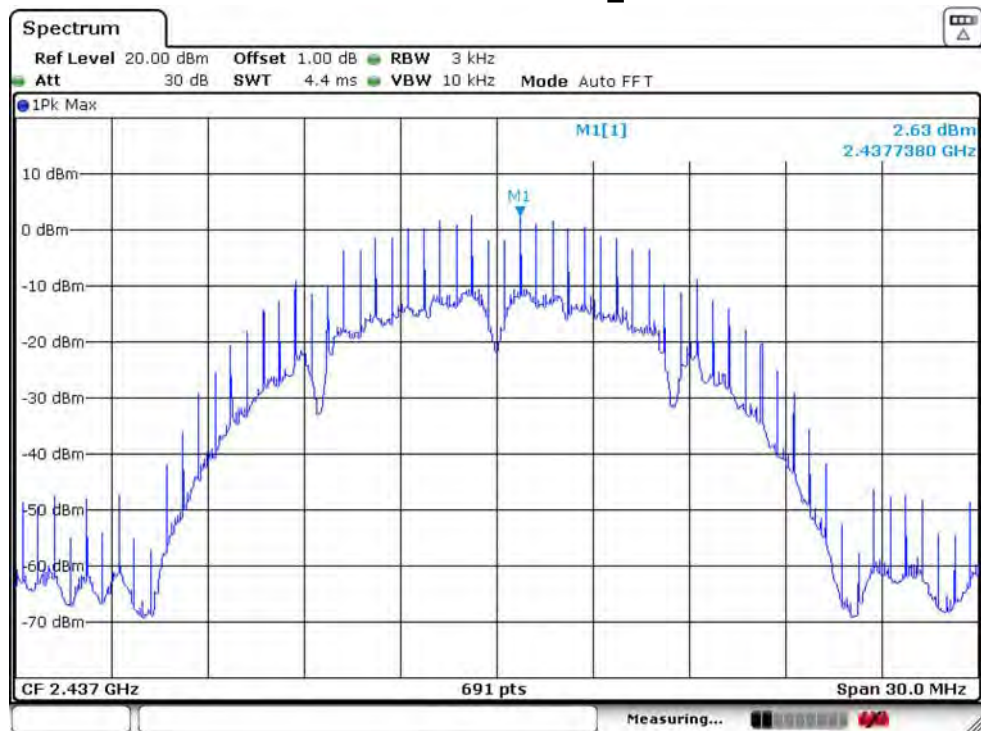
## IEEE 802.11b 2412MHz\_ANT 2



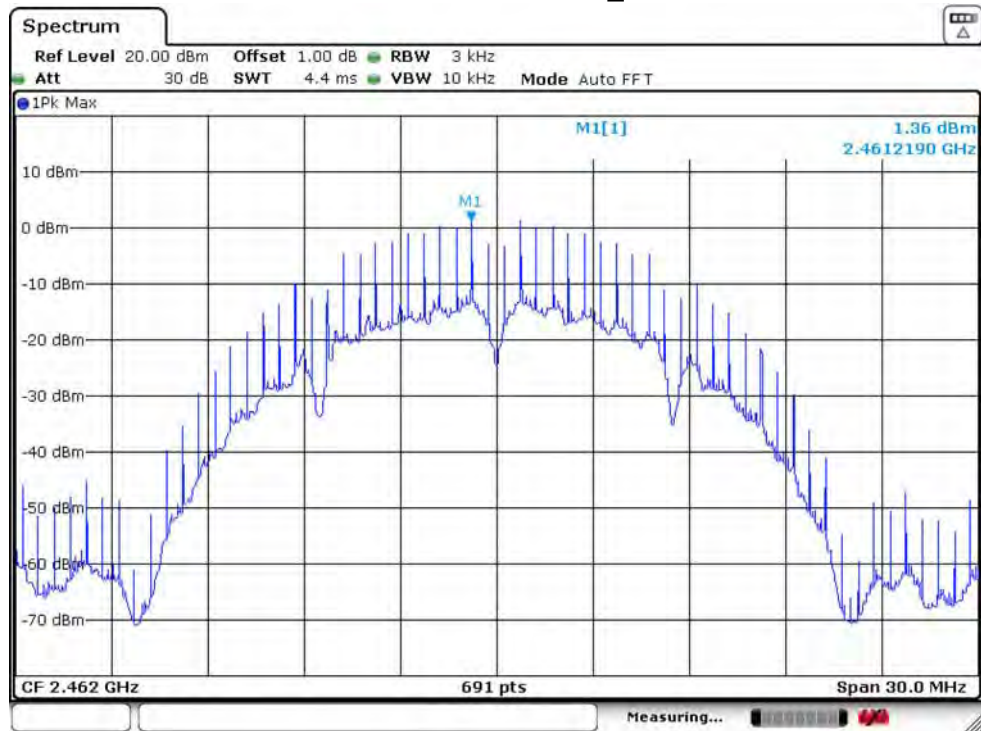
## IEEE 802.11b 2437MHz\_ANT 1



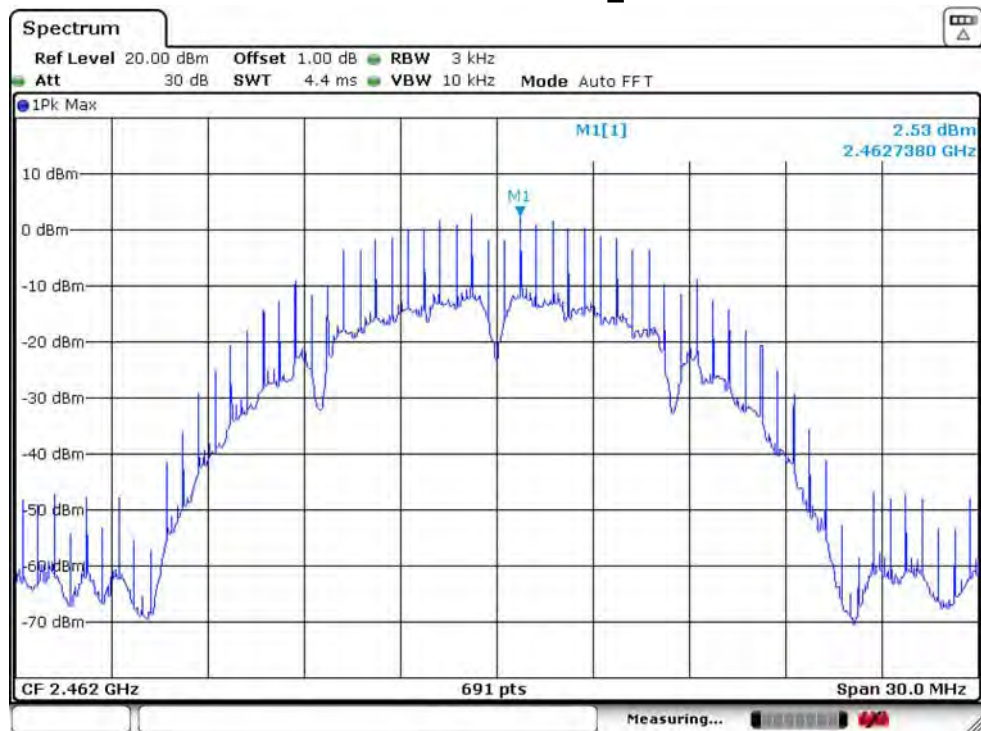
## IEEE 802.11b 2437MHz\_ANT 2



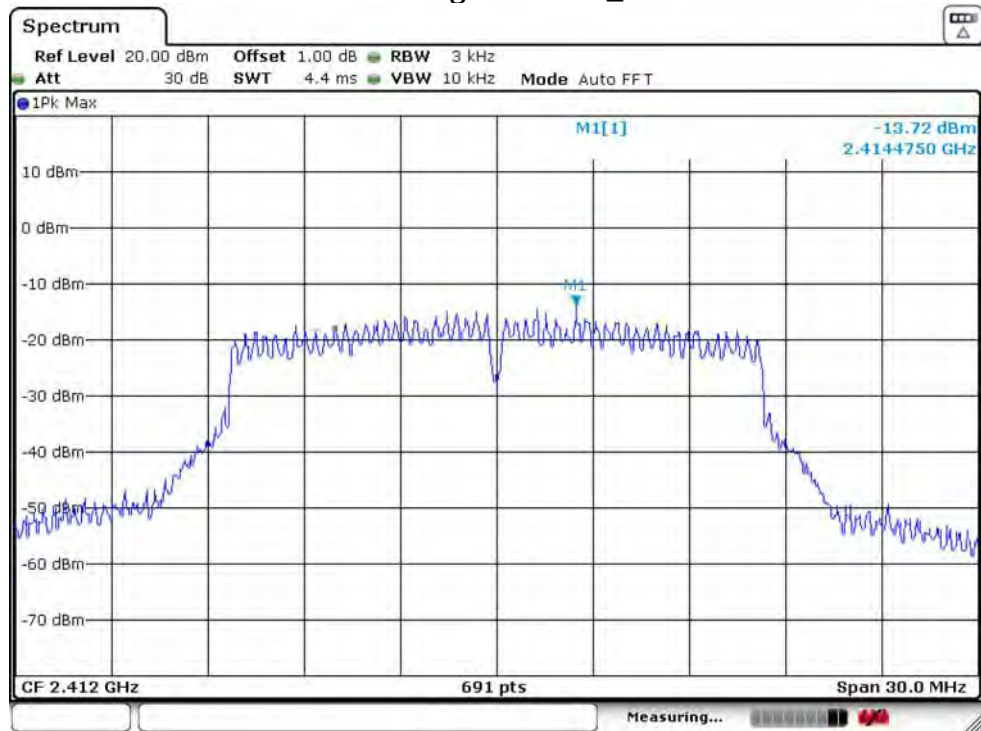
## IEEE 802.11b 2462MHz\_ANT 1



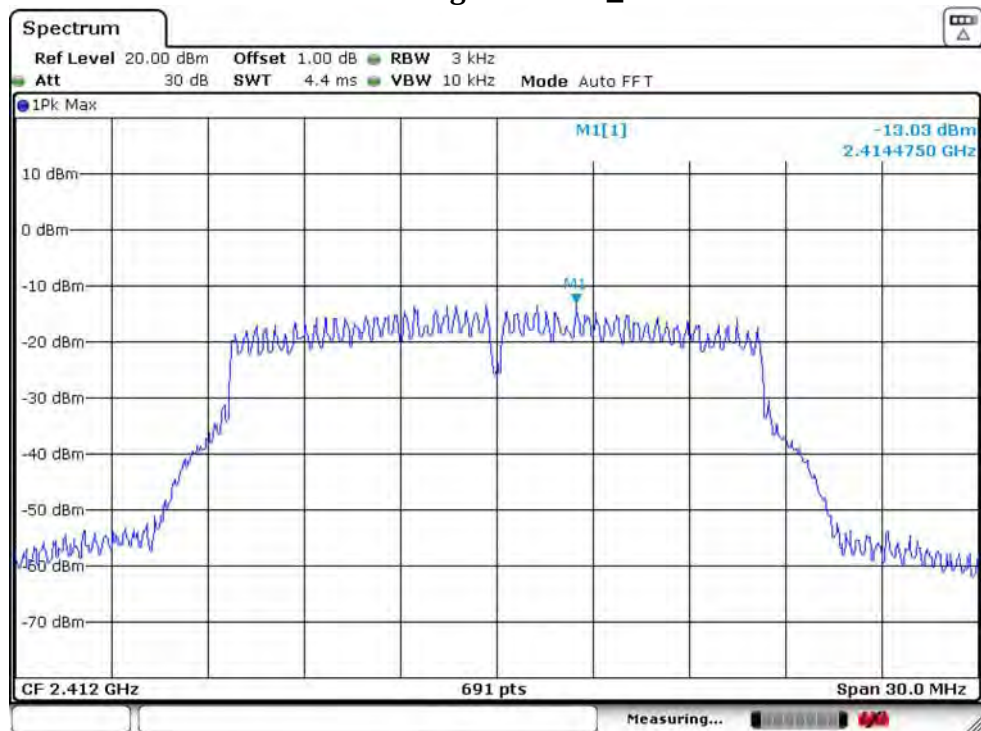
## IEEE 802.11b 2462MHz\_ANT 2



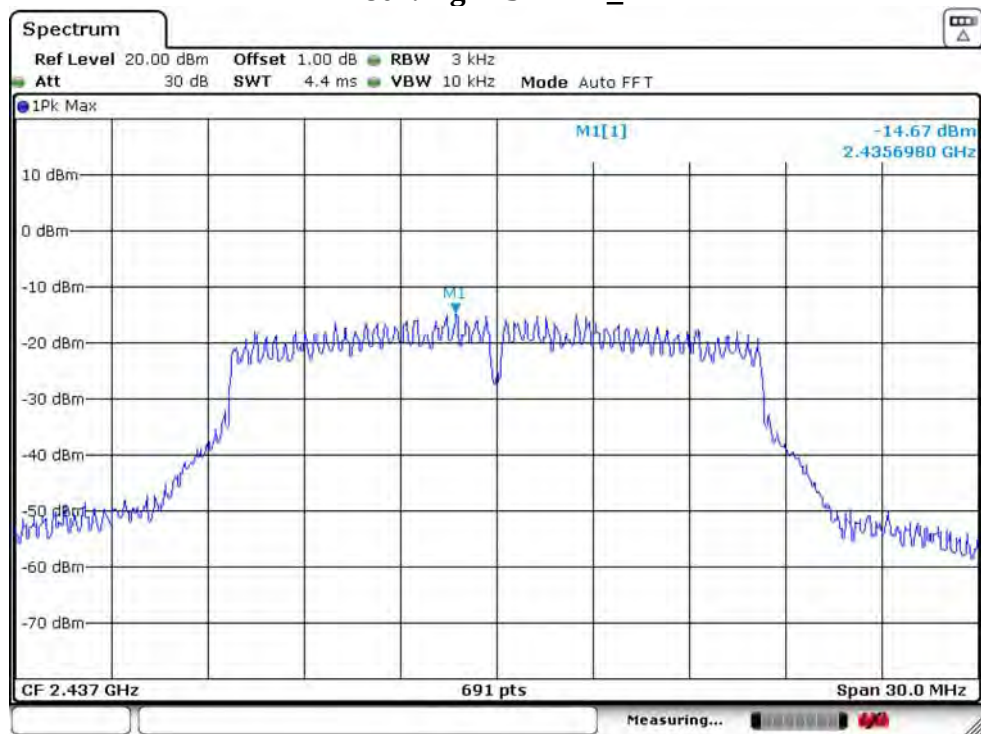
## IEEE 802.11g 2412MHz\_ANT 1



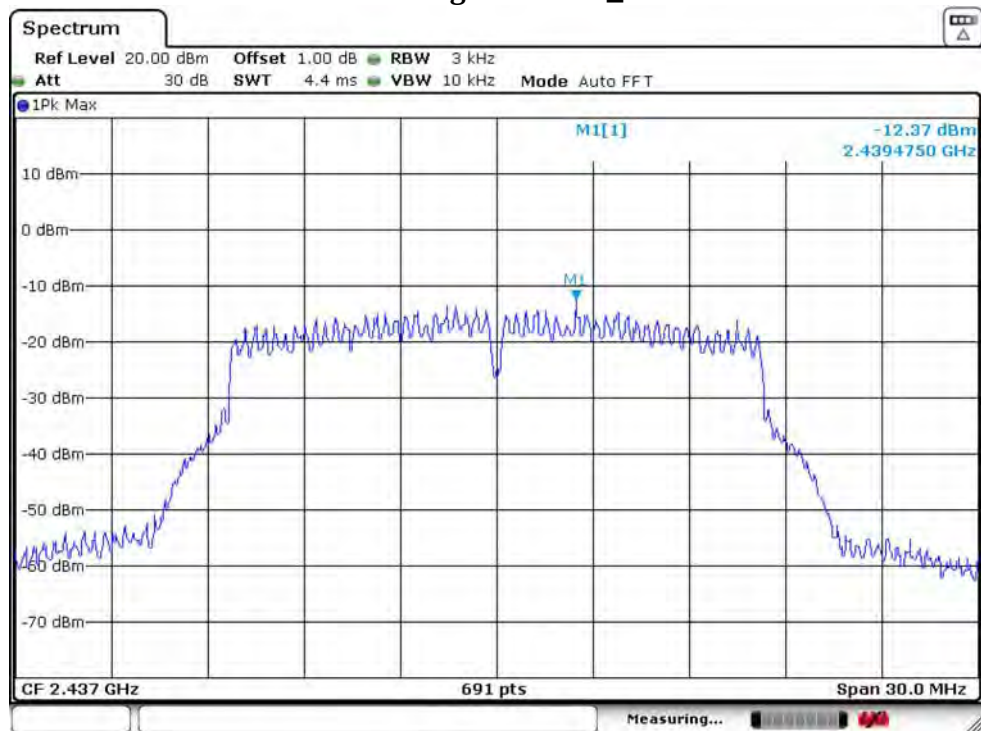
## IEEE 802.11g 2412MHz\_ANT 2



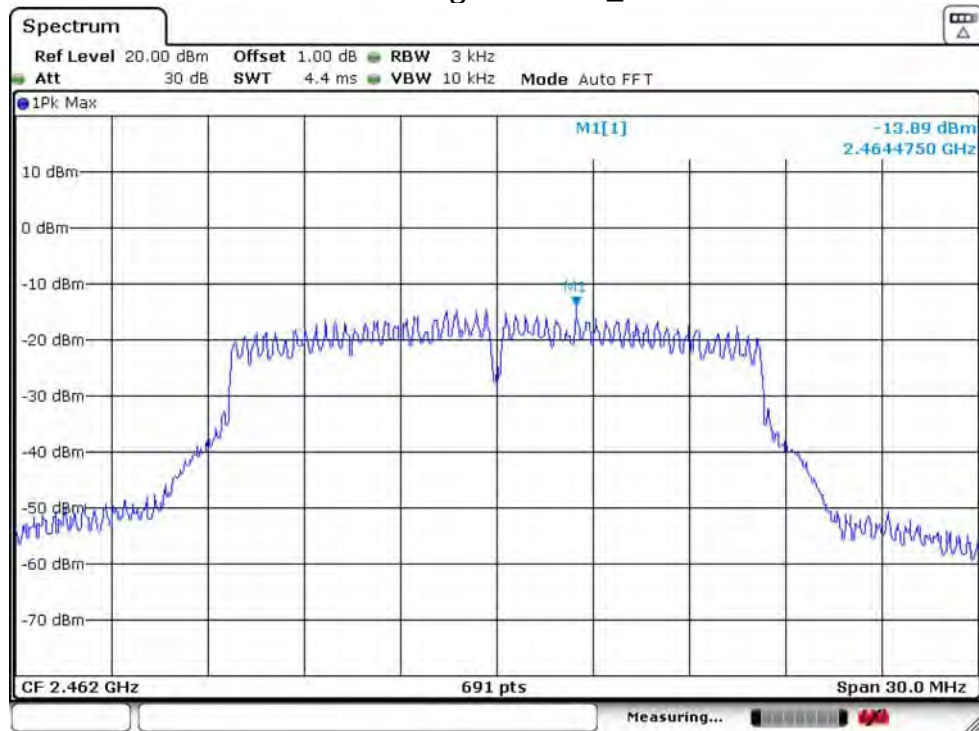
## IEEE 802.11g 2437MHz\_ANT 1



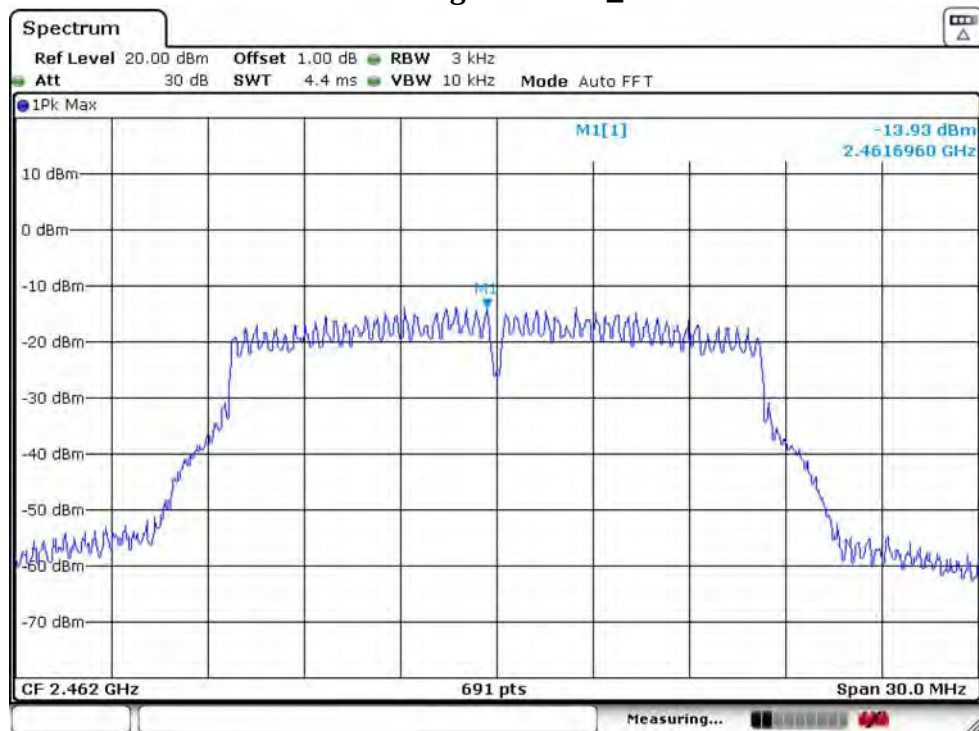
## IEEE 802.11g 2437MHz\_ANT 2



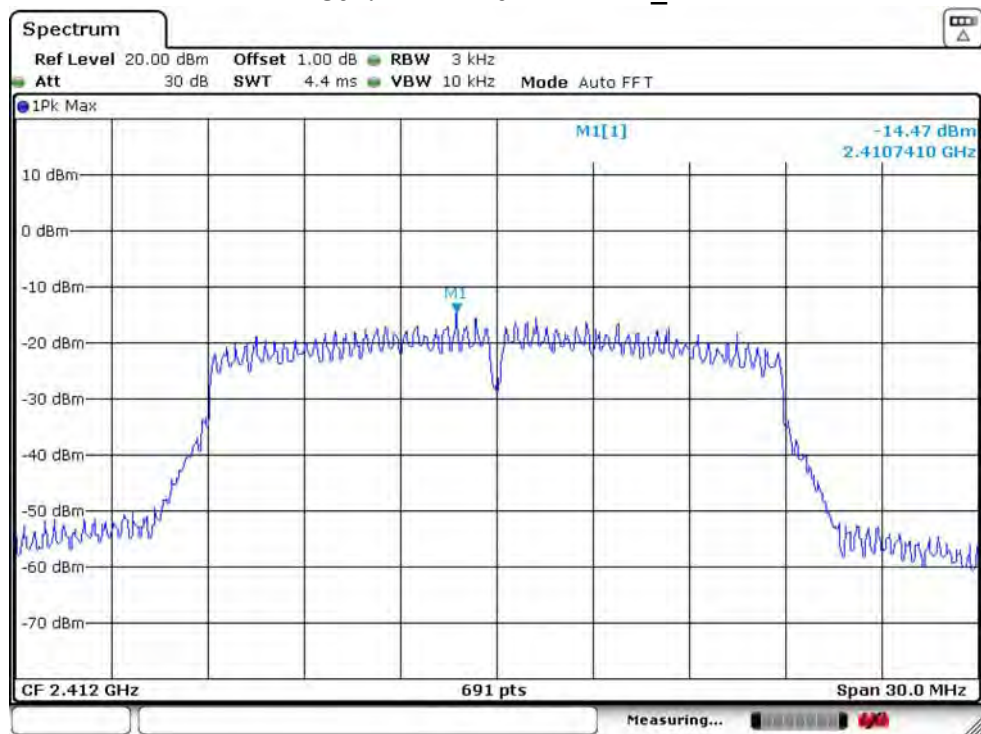
### IEEE 802.11g 2462MHz\_ANT 1



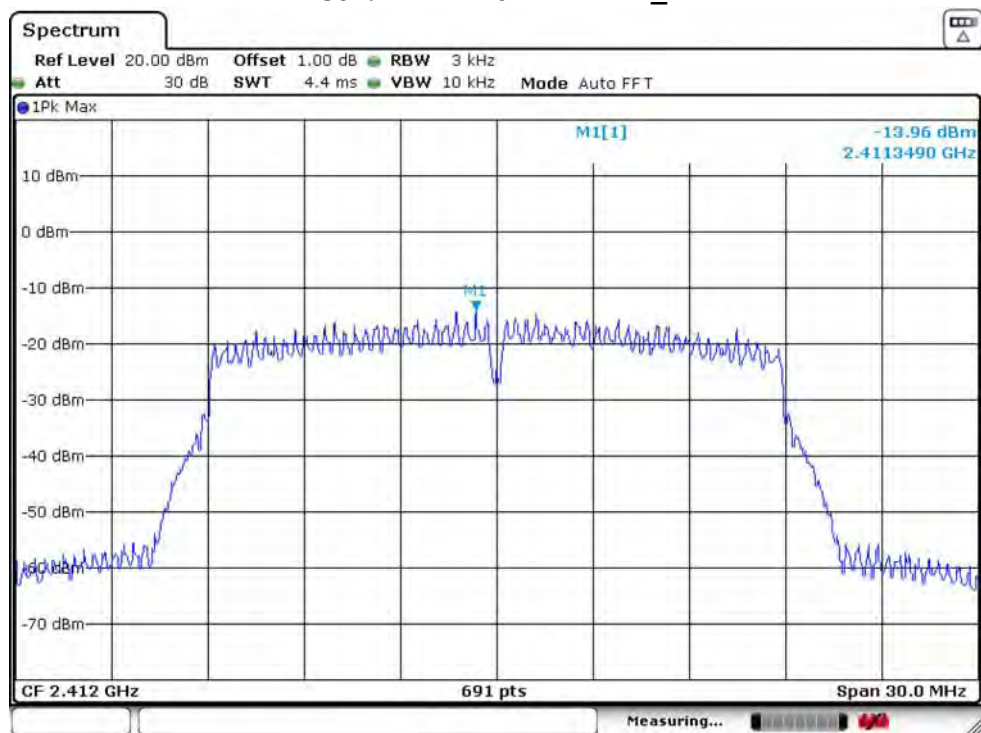
### IEEE 802.11g 2462MHz\_ANT 2



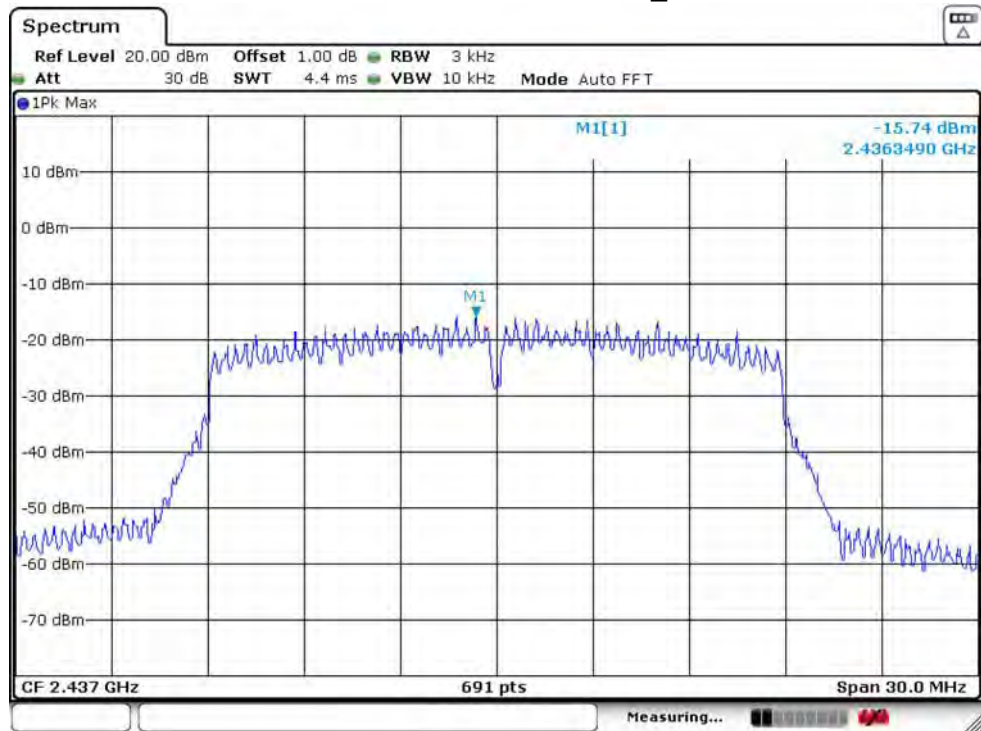
## IEEE 802.11n HT20 2412MHz\_ANT 1



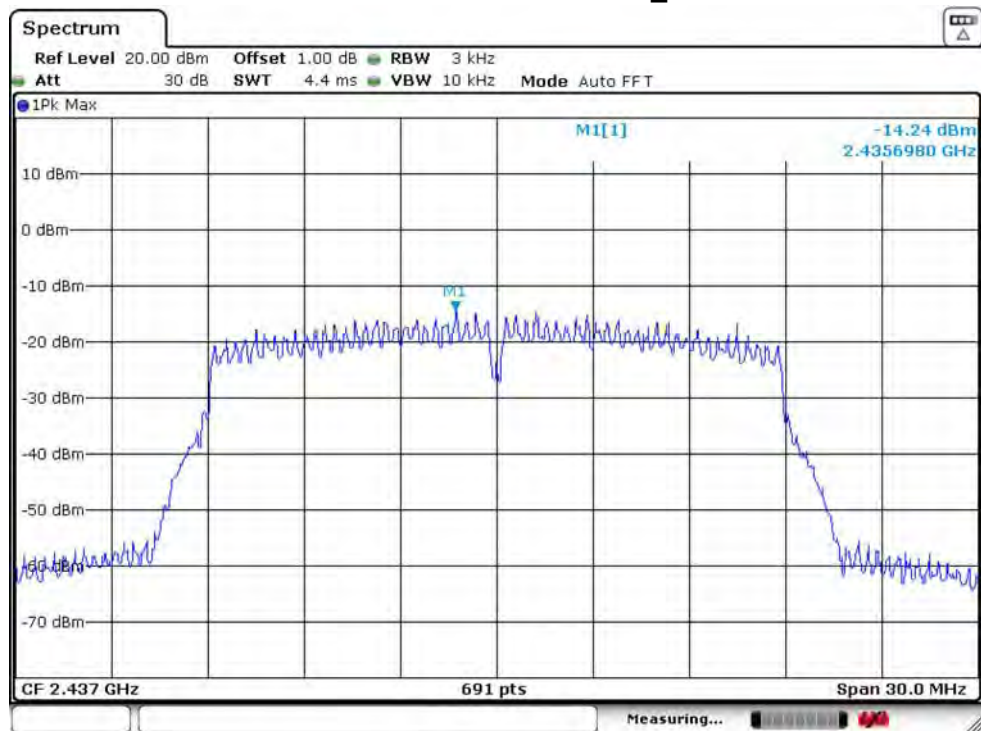
## IEEE 802.11n HT20 2412MHz\_ANT 2



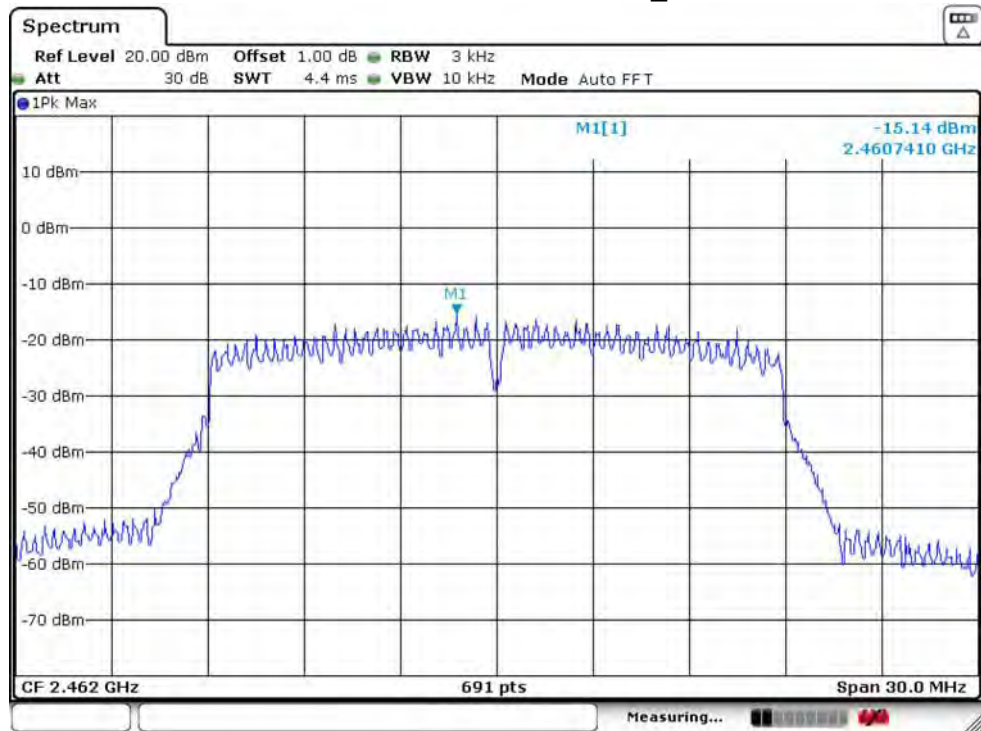
## IEEE 802.11n HT20 2437MHz\_ANT 1



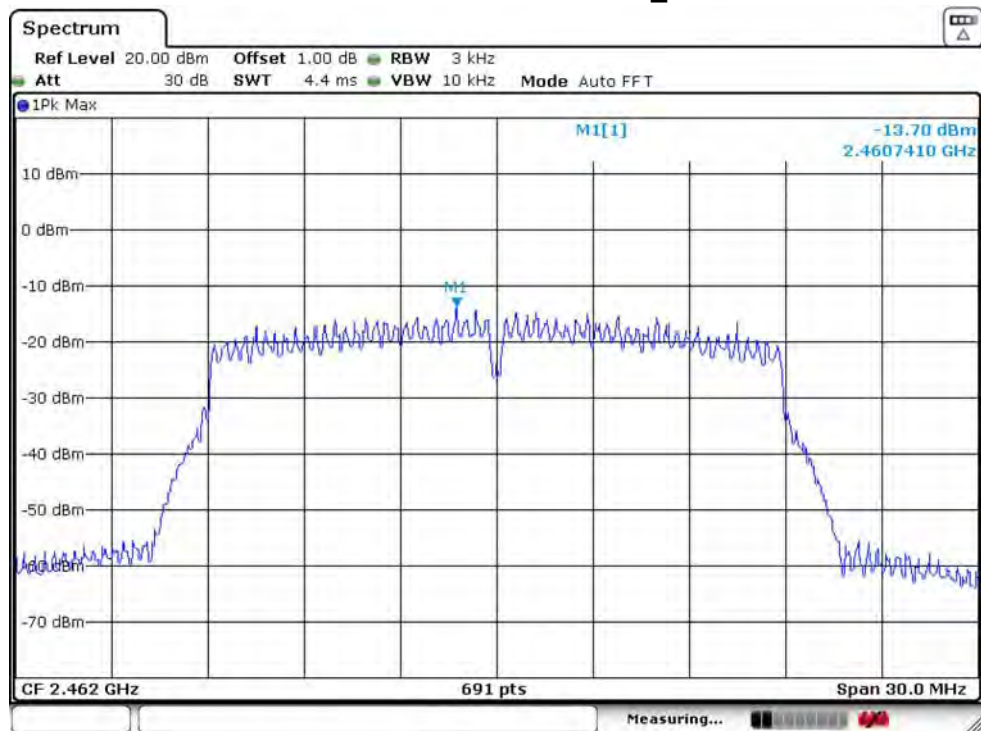
## IEEE 802.11n HT20 2437MHz\_ANT 2



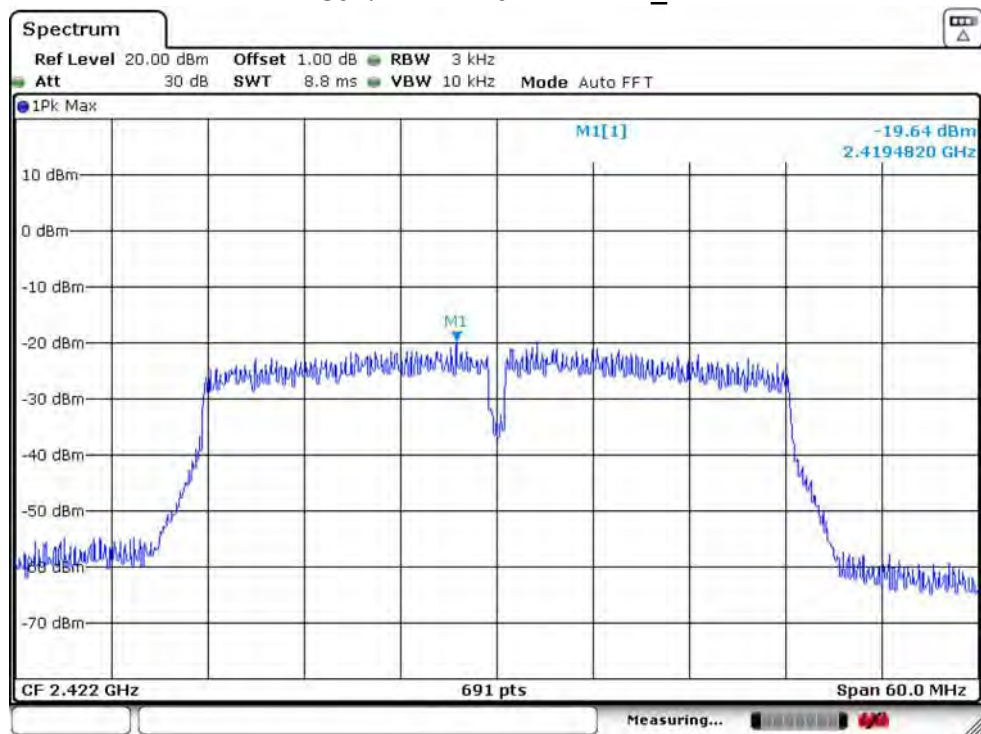
## IEEE 802.11n HT20 2462MHz\_ANT 1



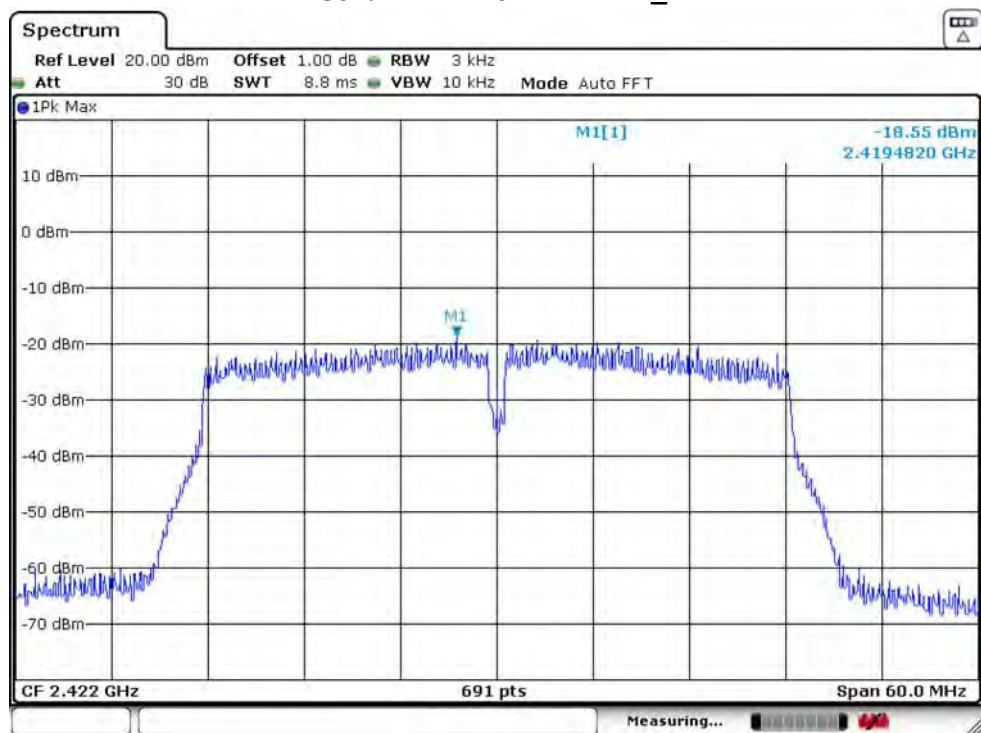
## IEEE 802.11n HT20 2462MHz\_ANT 2



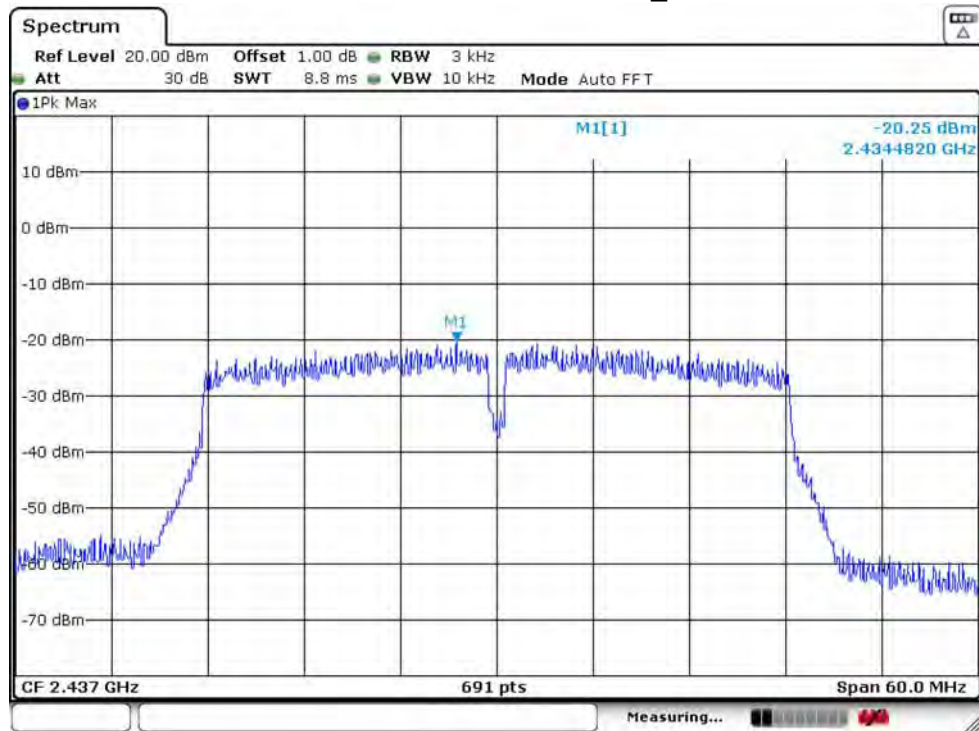
## IEEE 802.11n HT40 2422MHz\_ANT 1



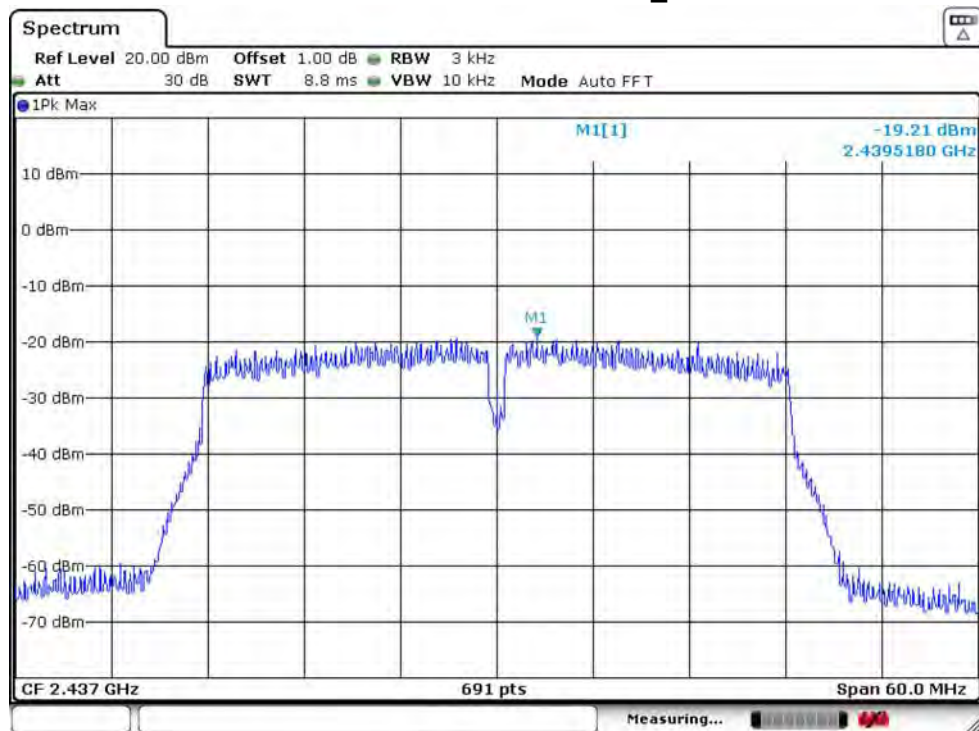
## IEEE 802.11n HT40 2422MHz\_ANT 2



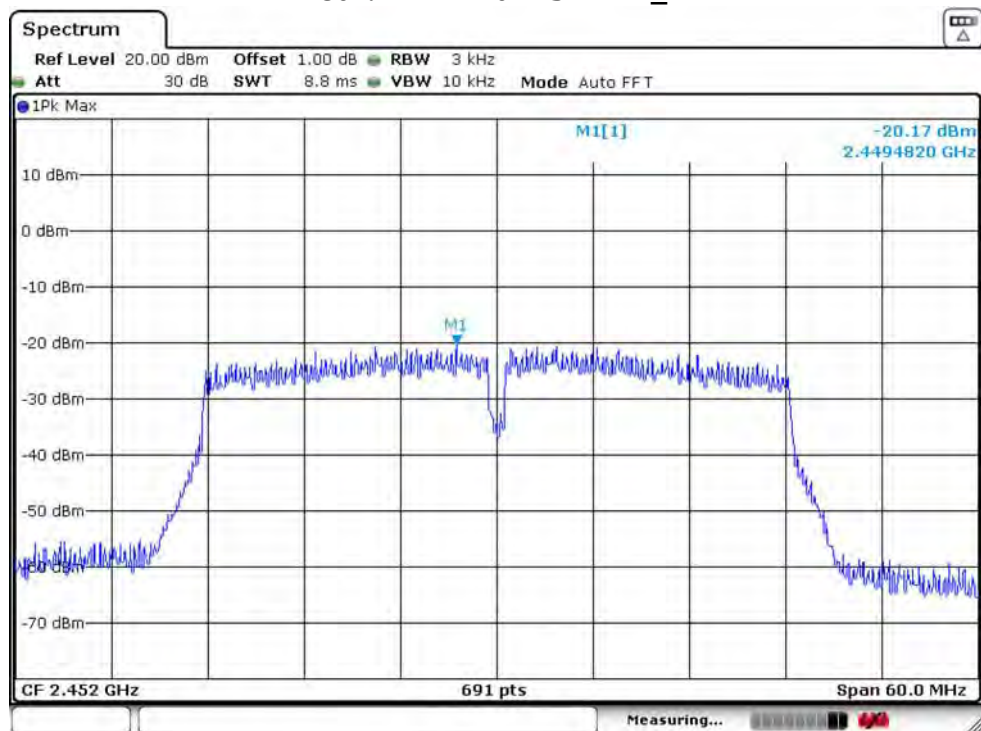
## IEEE 802.11n HT40 2437MHz\_ANT 1



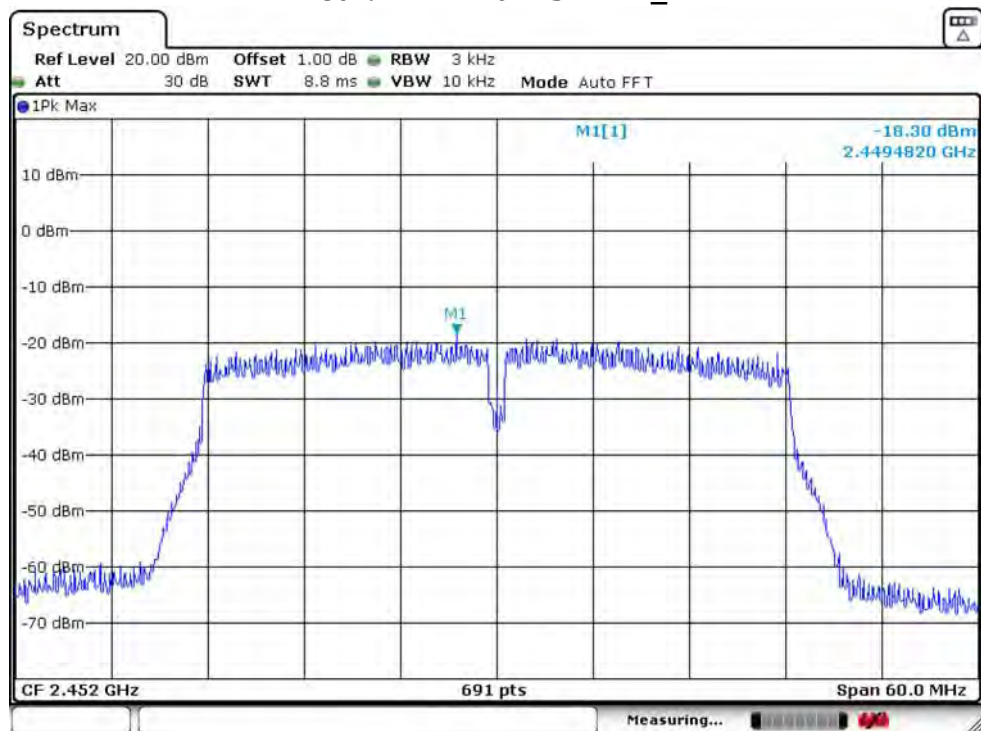
## IEEE 802.11n HT40 2437MHz\_ANT 2



## IEEE 802.11n HT40 2452MHz\_ANT 1



## IEEE 802.11n HT40 2452MHz\_ANT 2

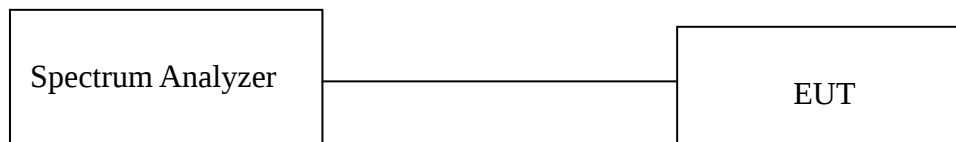


## 6. CONDUCTED BAND EDGE

### 6.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 6.2. Test Setup



### 6.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting                                                   |
|---------------------|-----------------------------------------------------------|
| RBW                 | 100KHz                                                    |
| VBW                 | 300KHz                                                    |
| Span                | 100MHz(20MHz Bandwidth mode)/200MHz(40MHz Bandwidth mode) |
| Sweep Time          | Auto                                                      |
| Detector            | Peak                                                      |
| Trace Mode          | Max Hold                                                  |

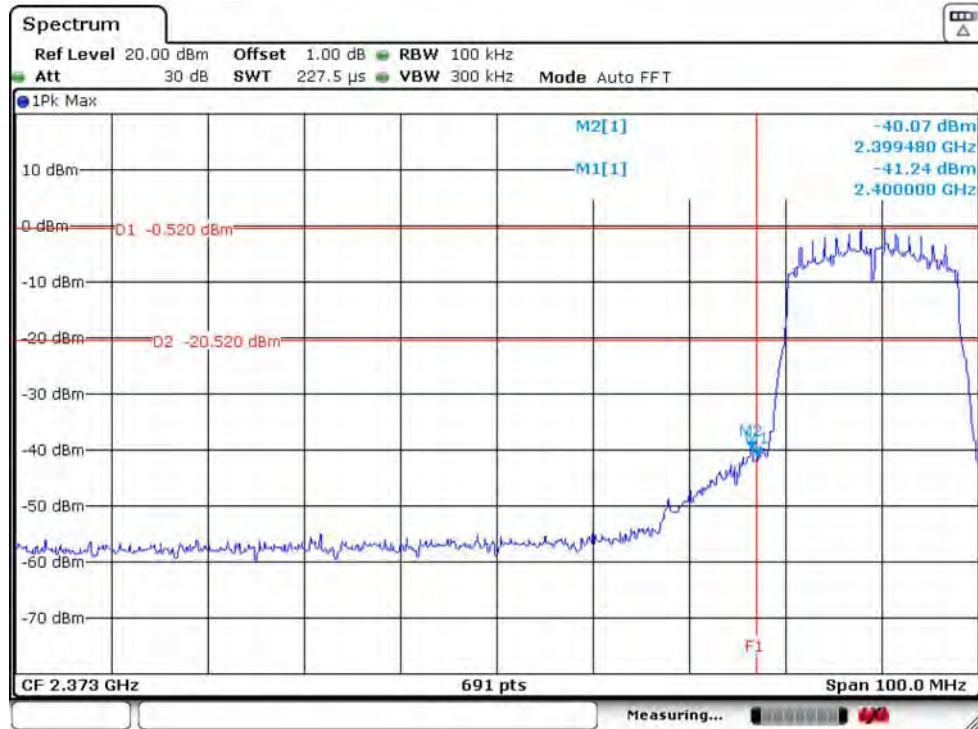
### 6.4. Test Procedure

- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 6.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

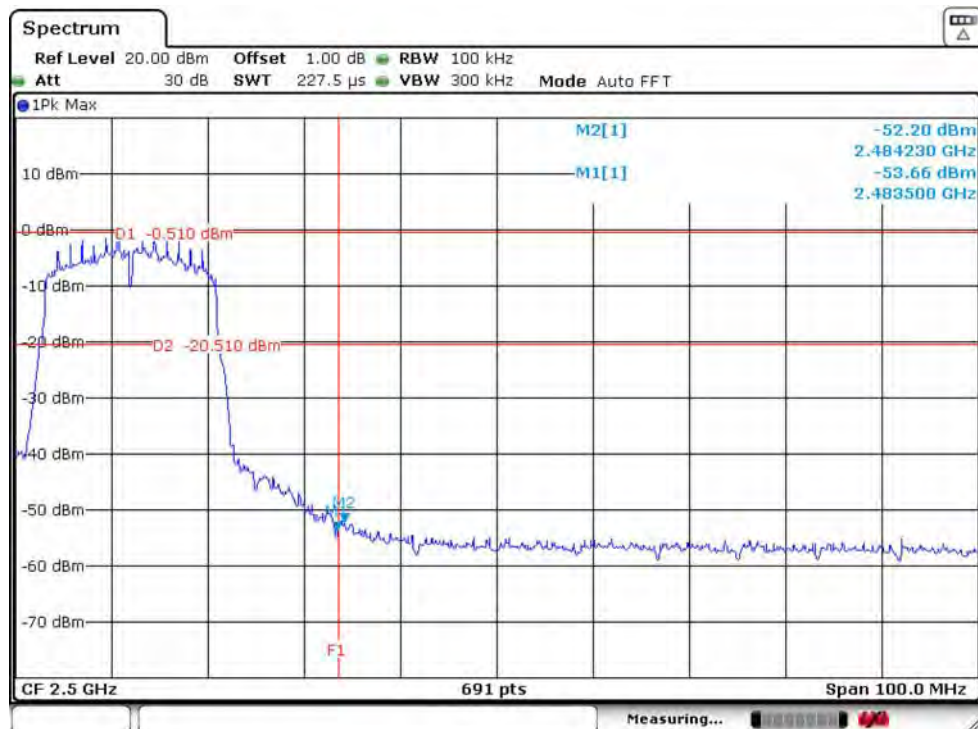
## 6.5. Test Result

|             |        |                   |     |              |       |
|-------------|--------|-------------------|-----|--------------|-------|
| Temperature | 25.3°C | Relative Humidity | 56% | Test Voltage | DC 5V |
| Result      | PASS   |                   |     |              |       |

## IEEE 802.11n HT20 2412MHz



## IEEE 802.11n HT20 2462MHz



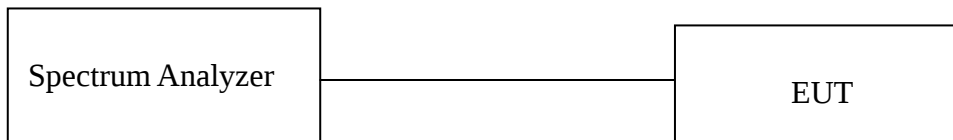
All modulations are all tested ,only worse case is reported

## 7. CONDUCTED SPURIOUS EMISSIONS

### 7.1. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 7.2. Test Setup



### 7.3. Spectrum Analyzer Setting

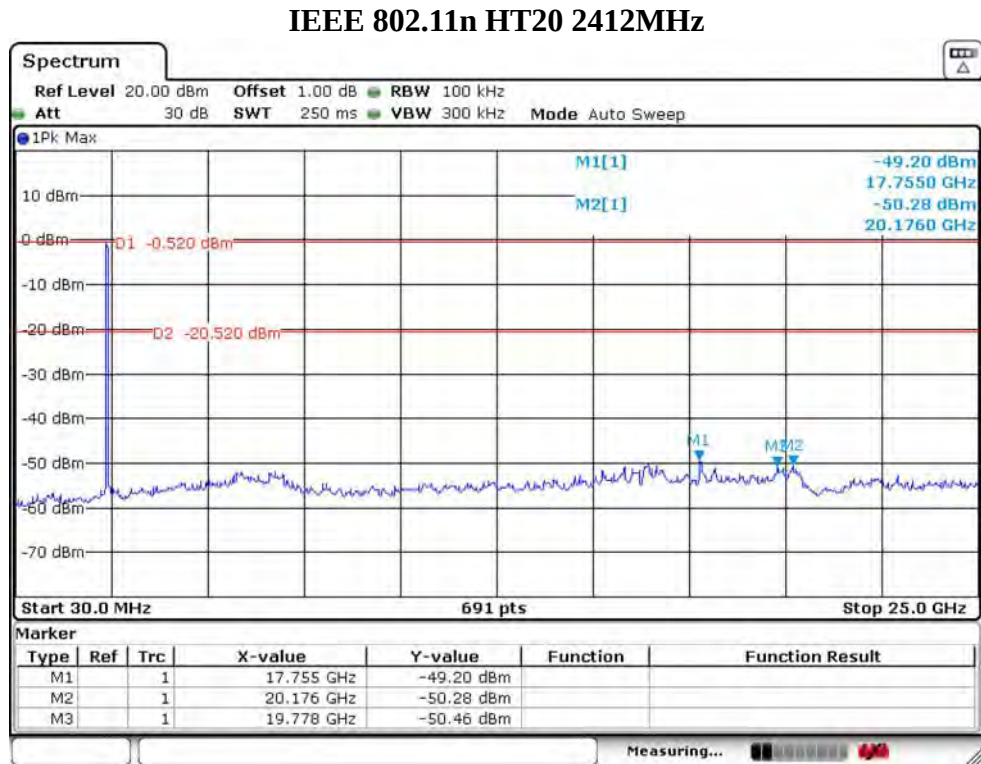
| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 100KHz   |
| VBW                 | 300KHz   |
| Start frequency     | 30MHz    |
| Stop frequency      | 25GHz    |
| Sweep Time          | Auto     |
| Detector            | Peak     |
| Trace Mode          | Max Hold |

### 7.4. Test Procedure

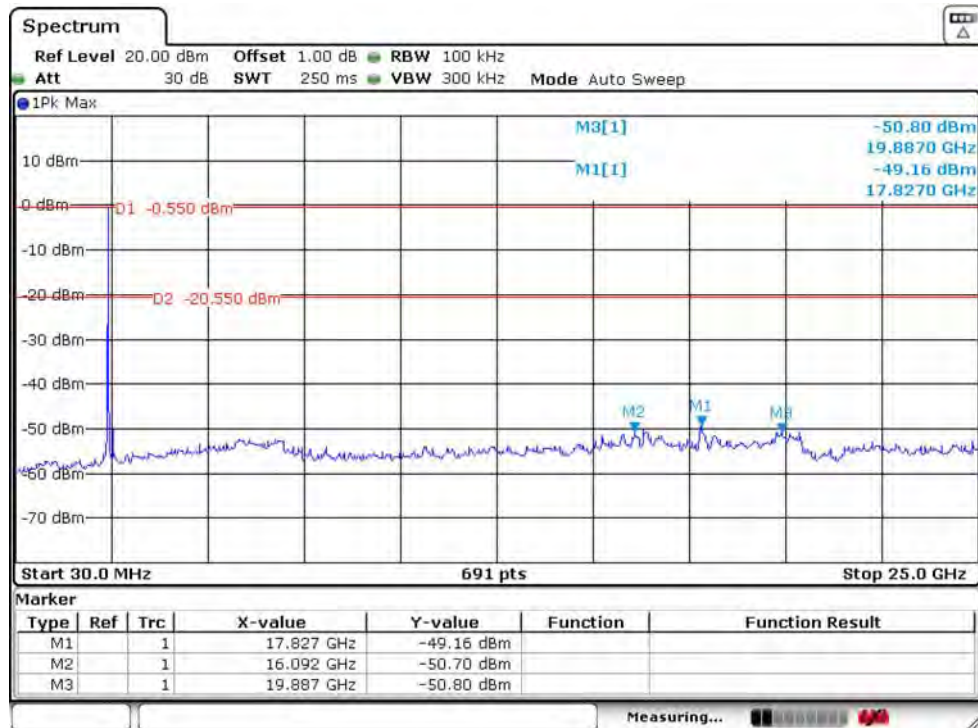
- Connect EUT antenna terminal to the spectrum analyzer with RF cable.
- Spectrum analyzer setting parameters in accordance with section 7.3.
- Set the EUT transmit continuously with maximum output power.
- Allow trace to stabilize, use the marker function to mark the highest emission level outside the authorized band.
- Repeat above procedures until all modes and channels were measured.
- Record the results in the test report.

## 7.5. Test Result

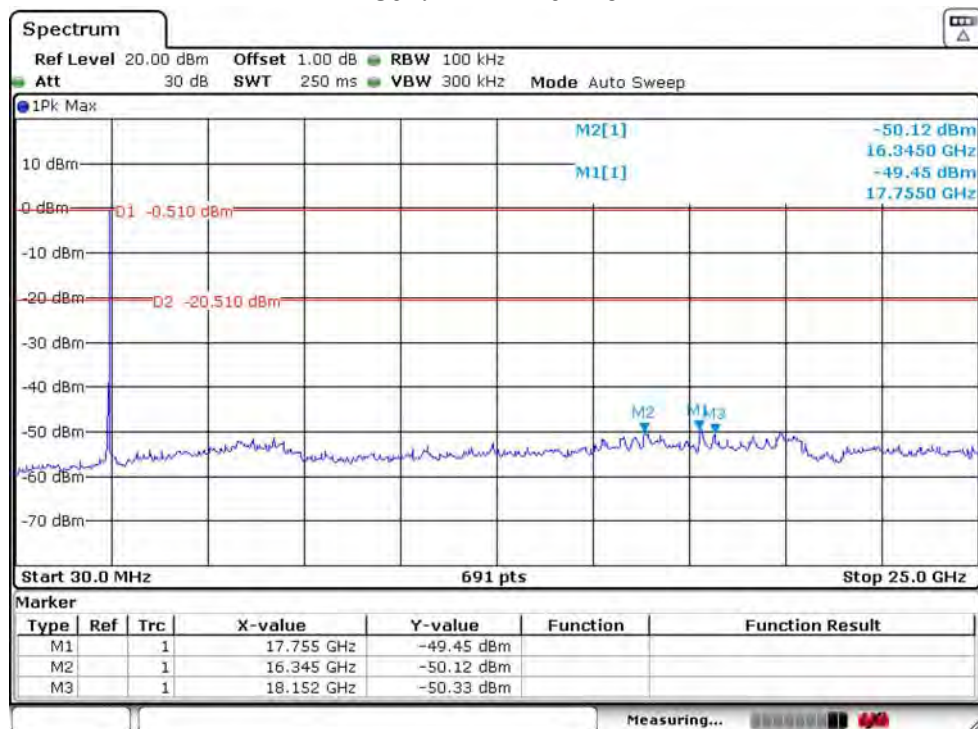
|             |        |                   |     |              |       |
|-------------|--------|-------------------|-----|--------------|-------|
| Temperature | 25.3°C | Relative Humidity | 56% | Test Voltage | DC 5V |
| Result      | PASS   |                   |     |              |       |



## IEEE 802.11n HT20 2437MHz



## IEEE 802.11n HT20 2462MHz



All modulations are all tested ,only worse case is reported

## 8. RADIATED SPURIOUS EMISSIONS AND BAND EDGE

### 8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

#### 15.205 Restricted frequency band

| 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> ) |

#### 15.209 Limit

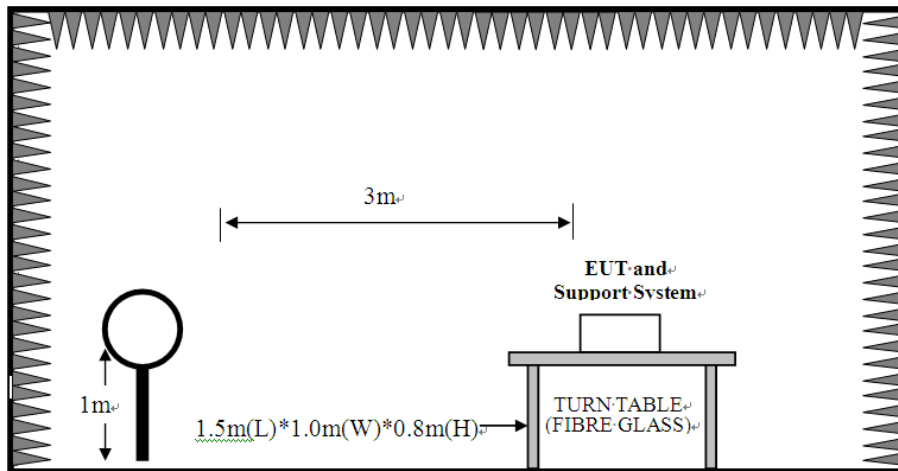
| Frequency (MHz) | Field Strength( $\mu$ V/m) | Distance(m) |
|-----------------|----------------------------|-------------|
| 0.009-0.490     | 2400/F(kHz)                | 300         |
| 0.490-1.705     | 24000/F(kHz)               | 30          |
| 1.705-30        | 30                         | 30          |
| 30-88           | 100                        | 3           |
| 88-216          | 150                        | 3           |
| 216-960         | 200                        | 3           |
| Above 960       | 500                        | 3           |

Note:

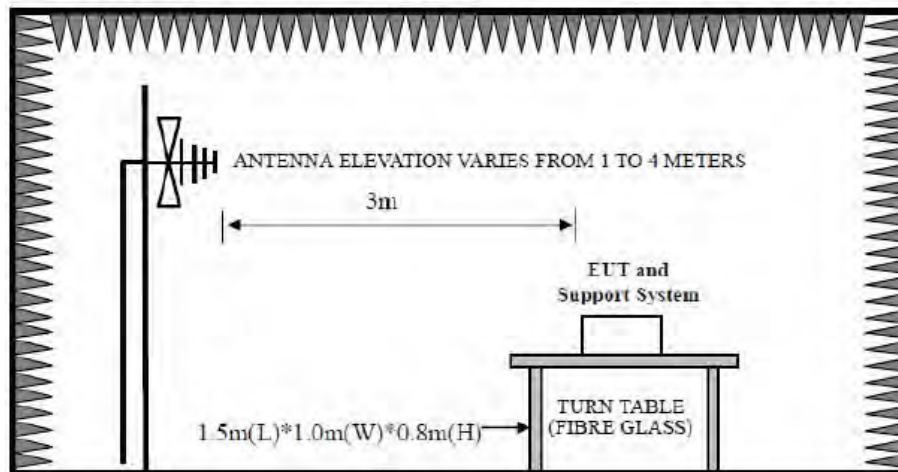
- (1) Emission level dB $\mu$ V = 20 log Emission level  $\mu$ V/m.
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

## 8.2. Test Setup

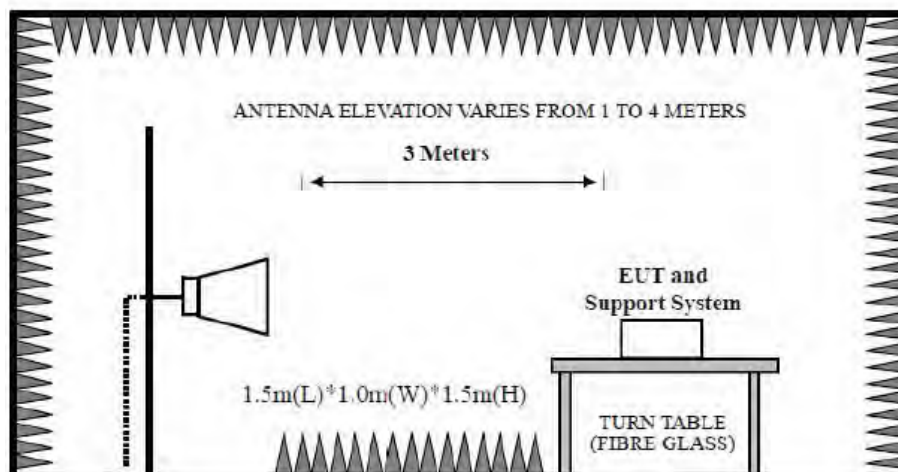
9kHz~30MHz



30~1000MHz



Above 1GHz



### 8.3. Spectrum Analyzer Setting

For 9KHz-150KHz

| Spectrum Parameters | Setting                                 |
|---------------------|-----------------------------------------|
| RBW                 | 300Hz(for Peak&AVG)/CISPR 200Hz(for QP) |
| VBW                 | 300Hz(for Peak&AVG)/CISPR 200Hz(for QP) |
| Start frequency     | 9KHz                                    |
| Stop frequency      | 150KHz                                  |
| Sweep Time          | Auto                                    |
| Detector            | PEAK/QP/AVG                             |
| Trace Mode          | Max Hold                                |

For 150KHz-30MHz

| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 9KHz     |
| VBW                 | 9KHz     |
| Start frequency     | 150KHz   |
| Stop frequency      | 30MHz    |
| Sweep Time          | Auto     |
| Detector            | QP       |
| Trace Mode          | Max Hold |

For 30MHz-1GHz

| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 120KHz   |
| VBW                 | 300KHz   |
| Start frequency     | 30MHz    |
| Stop frequency      | 1GHz     |
| Sweep Time          | Auto     |
| Detector            | QP       |
| Trace Mode          | Max Hold |

For Above 1GHz

| Spectrum Parameters | Setting          |                                      |
|---------------------|------------------|--------------------------------------|
| RBW                 | 1MHz             |                                      |
| VBW                 | PEAK Measurement | AVG Measurement                      |
|                     | 3MHz             | Duty cycle $\geq 98\%$ , VBW=10Hz    |
|                     |                  | Duty cycle $< 98\%$ , VBW $\geq 1/T$ |
| Start frequency     | 1GHz             |                                      |
| Stop frequency      | 25GHz            |                                      |
| Sweep Time          | Auto             |                                      |
| Detector            | PEAK             |                                      |
| Trace Mode          | Max Hold         |                                      |

Note :

1. T is the on-time time of the duty cycle,when EUT transmit continuously with maximum output power,unit is seconds. reference section 2.8 for the on-time time.

## 8.4. Test Procedure

- a. EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
- b. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
- c. Set the EUT transmit continuously with maximum output power.
- d. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- e. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
- f. Spectrum analyzer setting parameters in accordance with section 8.3.
- g. Repeat above procedures until all channels were measured.
- h. Record the results in the test report.

### Note:

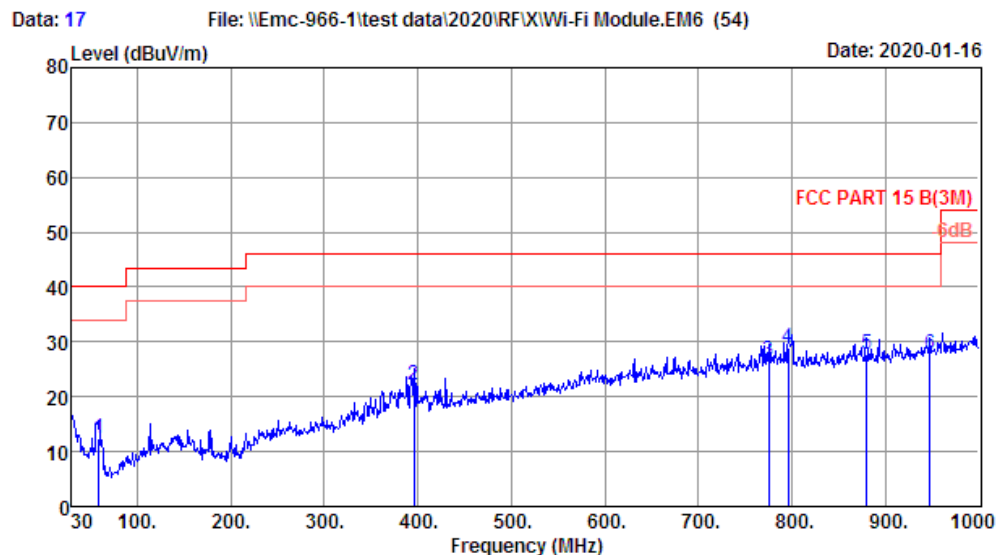
1. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.
2. The frequency 2412MHz/2422MHz/2437MHz/2452MHz/2462MHz are fundamental frequency, which no limit, the limit on plots is automatically generated by the software, it's not fundamental limit, we can't remove it.

## 8.5. Test Result

## Radiated Emissions Below 1GHz

EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



Site no. : 1# 966 Chamber Data no. : 17  
Dis. / Ant. : 3m 37062 Ant. pol. : VERTICAL  
Limit : FCC PART 15 B(3M)  
Env. / Ins. : Temp:27.3';Humi:54%;Press:101.52kPa  
Engineer : Boris  
EUT : WIFI MODULE  
Power : DC 5V From PC  
M/N : 00WIMRA  
Test Mode : TX Mode

| Freq.<br>(MHz) | ANT<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------------|-----------------------|-------------------|-------------------------------|-------------------|----------------|--------|
| 59.10          | 5.25                    | 0.42                  | 6.75              | 12.42                         | 40.00             | 27.58          | QP     |
| 395.69         | 16.20                   | 2.12                  | 3.89              | 22.21                         | 46.00             | 23.79          | QP     |
| 774.96         | 22.55                   | 3.51                  | 0.41              | 26.47                         | 46.00             | 19.53          | QP     |
| 796.30         | 22.82                   | 3.58                  | 2.59              | 28.99                         | 46.00             | 17.01          | QP     |
| 879.72         | 23.80                   | 3.89                  | 0.03              | 27.72                         | 46.00             | 18.28          | QP     |
| 947.62         | 24.56                   | 4.49                  | -1.38             | 27.67                         | 46.00             | 18.33          | QP     |

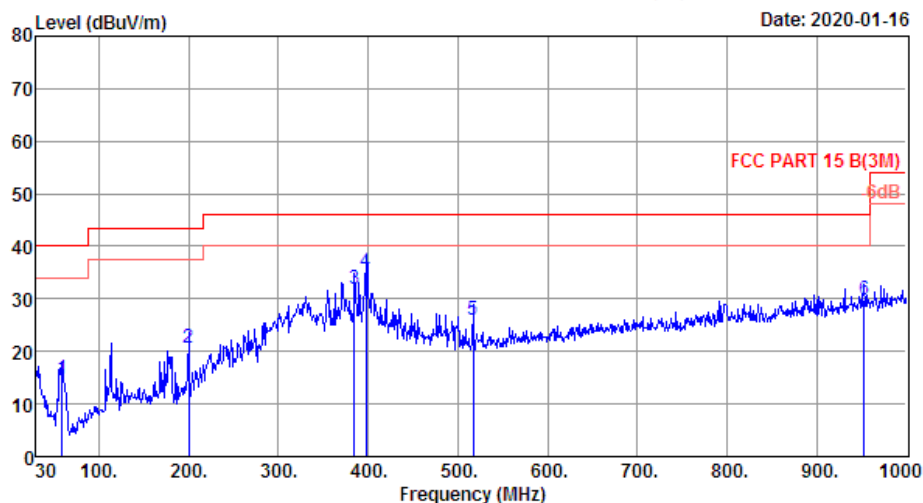
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
2. Margin= Limit - Emission Level.  
3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 18 File: \\Emc-966-1\\test data\\2020\\RF\\X\\Wi-Fi Module.EM6 (54)

Date: 2020-01-16



Site no. : 1# 966 Chamber Data no. : 18  
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15 B(3M)  
Env. / Ins. : Temp:27.3';Humi:54%;Press:101.52kPa  
Engineer : Boris  
EUT : WIFI MODULE  
Power : DC 5V From PC  
M/N : 00WIMRA  
Test Mode : TX Mode

| Freq.<br>(MHz) | ANT<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Remark |
|----------------|-------------------------|-----------------------|-------------------|-------------------------------|-------------------|----------------|--------|
| 59.10          | 5.25                    | 0.42                  | 9.02              | 14.69                         | 40.00             | 25.31          | QP     |
| 199.75         | 8.40                    | 1.28                  | 11.06             | 20.74                         | 43.50             | 22.76          | QP     |
| 385.02         | 16.00                   | 2.13                  | 13.81             | 31.94                         | 46.00             | 14.06          | QP     |
| 397.63         | 16.20                   | 2.13                  | 16.91             | 35.24                         | 46.00             | 10.76          | QP     |
| 516.94         | 18.43                   | 2.72                  | 4.86              | 26.01                         | 46.00             | 19.99          | QP     |
| 952.47         | 24.63                   | 4.57                  | 0.54              | 29.74                         | 46.00             | 16.26          | QP     |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
2. Margin= Limit - Emission Level.  
3. The emission levels that are 20dB below the official limit are not reported.

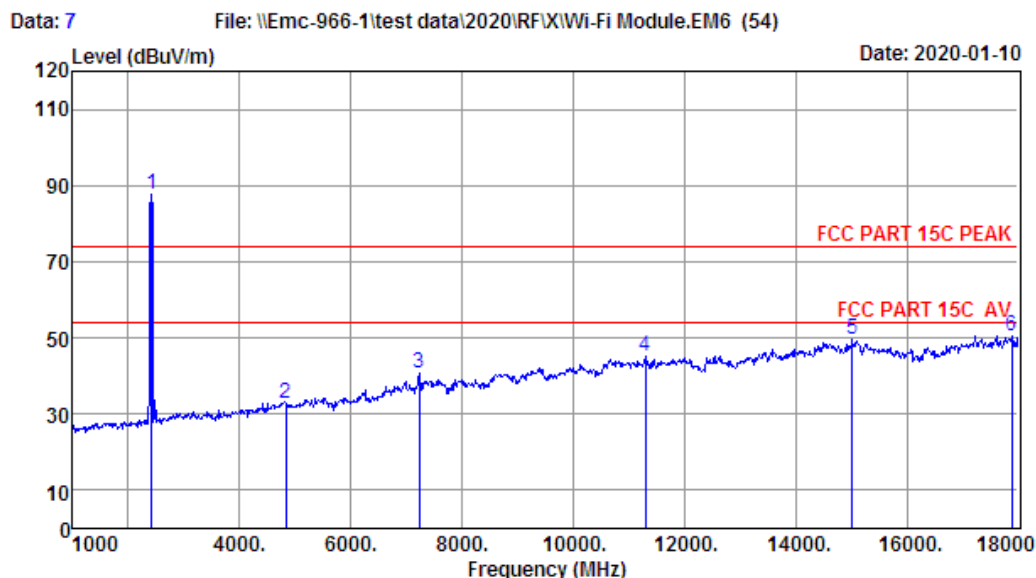
## Note:

1. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. All channels had been pre-test, only the worst case was reported.

## Radiated Emissions Above 1G

EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



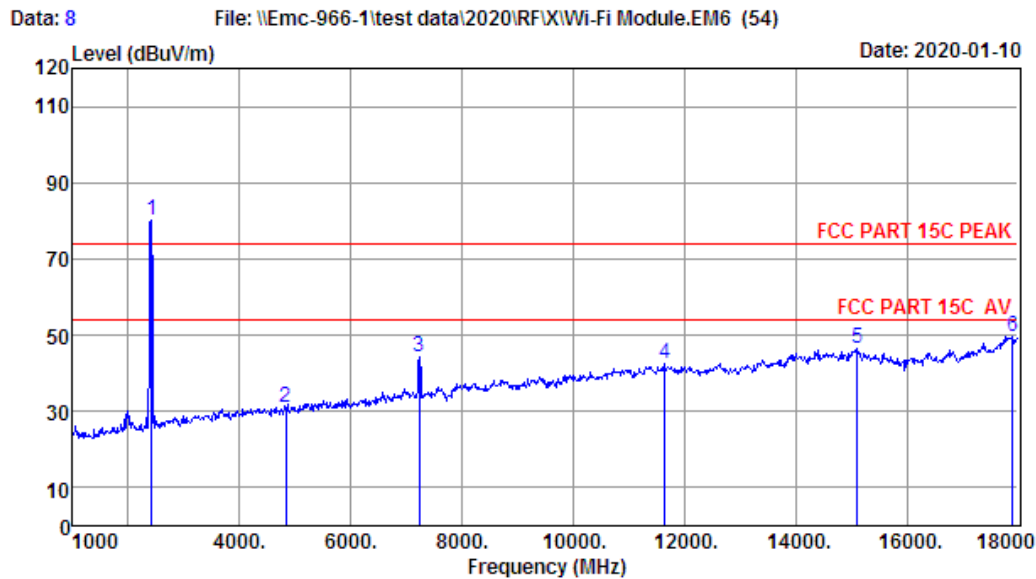
Site no. : 1# 966 Chamber Data no. : 7  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2412MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2412.00        | 27.28                    | 1.46                  | 34.64                 | 93.70             | 87.80                         | 74.00              | -13.80         | Peak   |
| 2 | 4824.00        | 31.18                    | 3.26                  | 34.67                 | 33.10             | 32.87                         | 74.00              | 41.13          | Peak   |
| 3 | 7236.00        | 36.28                    | 5.20                  | 34.82                 | 33.93             | 40.59                         | 74.00              | 33.41          | Peak   |
| 4 | 11302.00       | 39.90                    | 6.13                  | 34.59                 | 33.54             | 44.98                         | 74.00              | 29.02          | Peak   |
| 5 | 15025.00       | 40.88                    | 6.80                  | 34.59                 | 36.62             | 49.71                         | 74.00              | 24.29          | Peak   |
| 6 | 17881.00       | 47.95                    | 8.16                  | 34.31                 | 28.90             | 50.70                         | 74.00              | 23.30          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



Site no. : 1# 966 Chamber Data no. : 8  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2412MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2412.00        | 27.28                    | 1.46                  | 34.64                 | 86.07             | 80.17                         | 74.00              | -6.17          | Peak   |
| 2 | 4824.00        | 31.18                    | 3.26                  | 34.67                 | 31.15             | 30.92                         | 74.00              | 43.08          | Peak   |
| 3 | 7236.00        | 36.28                    | 5.20                  | 34.82                 | 37.62             | 44.28                         | 74.00              | 29.72          | Peak   |
| 4 | 11642.00       | 39.90                    | 6.08                  | 34.69                 | 31.34             | 42.63                         | 74.00              | 31.37          | Peak   |
| 5 | 15110.00       | 40.79                    | 6.73                  | 34.56                 | 33.42             | 46.38                         | 74.00              | 27.62          | Peak   |
| 6 | 17898.00       | 48.09                    | 8.17                  | 34.31                 | 27.73             | 49.68                         | 74.00              | 24.32          | Peak   |

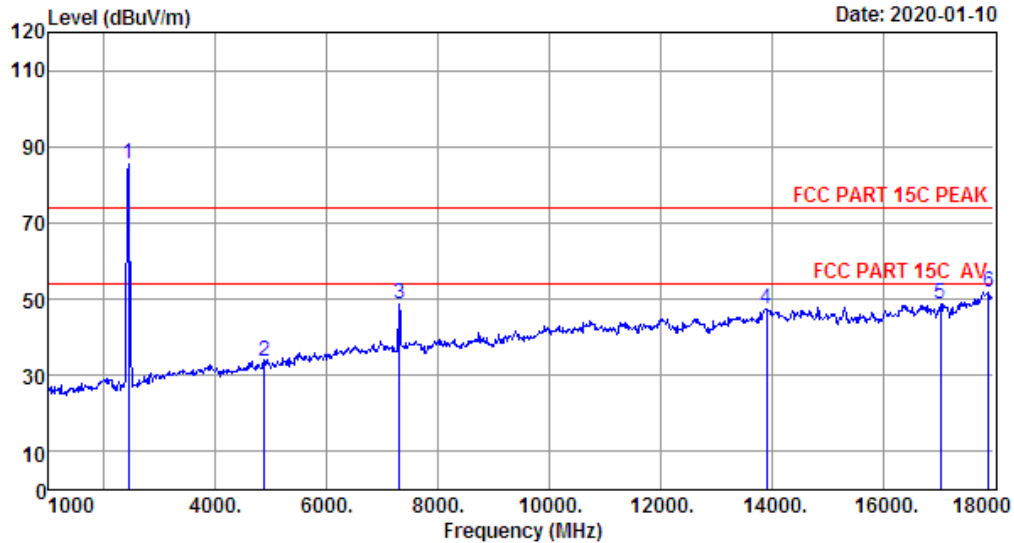
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 11 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)

Date: 2020-01-10



Site no. : 1# 966 Chamber Data no. : 11  
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
Limit : FCC PART 15C PEAK  
Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
Engineer : Boris  
EUT : WIFI MODULE  
Power : DC 5V From PC  
M/N : 00WIMRA  
Test Mode : IEEE 802.11n20 TX 2437MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2437.00        | 27.33                    | 1.47                  | 34.62                 | 91.11             | 85.29                         | 74.00              | -11.29         | Peak   |
| 2 | 4874.00        | 31.37                    | 3.31                  | 34.68                 | 33.57             | 33.57                         | 74.00              | 40.43          | Peak   |
| 3 | 7311.00        | 36.42                    | 5.22                  | 34.83                 | 42.09             | 48.90                         | 74.00              | 25.10          | Peak   |
| 4 | 13903.00       | 40.93                    | 6.49                  | 34.31                 | 34.37             | 47.48                         | 74.00              | 26.52          | Peak   |
| 5 | 17031.00       | 41.17                    | 7.45                  | 34.40                 | 34.32             | 48.54                         | 74.00              | 25.46          | Peak   |
| 6 | 17898.00       | 48.09                    | 8.17                  | 34.31                 | 29.81             | 51.76                         | 74.00              | 22.24          | Peak   |

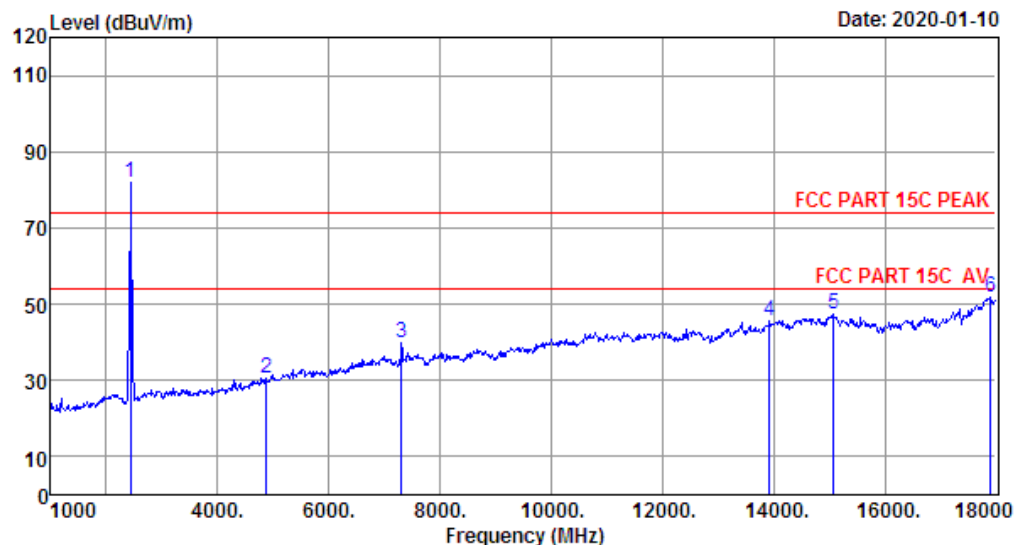
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. Margin= Limit - Emission Level.  
3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 12 File: \\Emc-966-1\test data\2020\RF\X\Wi-Fi Module.EM6 (54)

Date: 2020-01-10



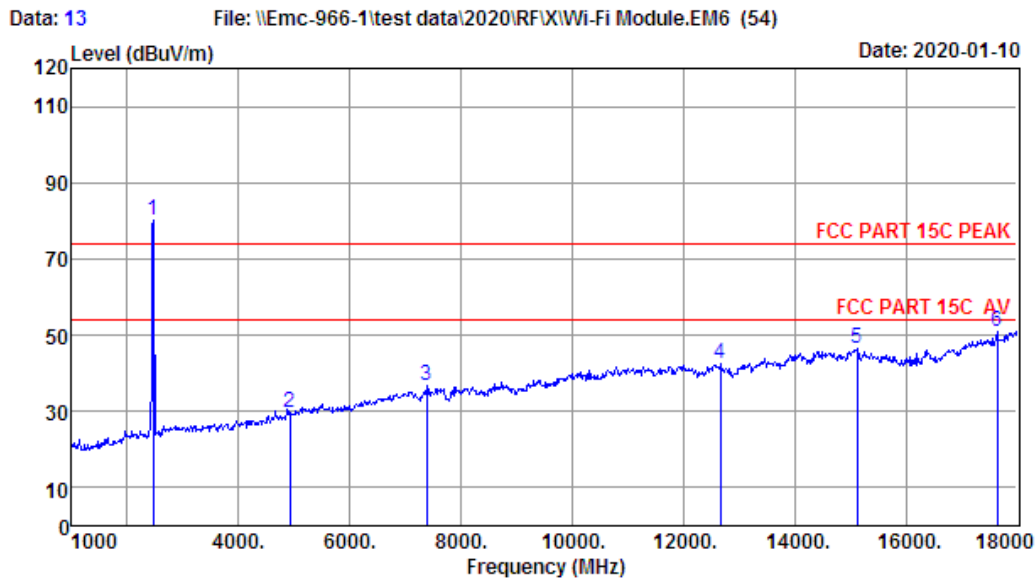
Site no. : 1# 966 Chamber Data no. : 12  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2437MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2437.00        | 27.33                    | 1.47                  | 34.62                 | 87.53             | 81.71                         | 74.00              | -7.71          | Peak   |
| 2 | 4874.00        | 31.37                    | 3.31                  | 34.68                 | 30.67             | 30.67                         | 74.00              | 43.33          | Peak   |
| 3 | 7311.00        | 36.42                    | 5.22                  | 34.83                 | 33.11             | 39.92                         | 74.00              | 34.08          | Peak   |
| 4 | 13920.00       | 40.96                    | 6.50                  | 34.31                 | 32.41             | 45.56                         | 74.00              | 28.44          | Peak   |
| 5 | 15076.00       | 40.82                    | 6.76                  | 34.57                 | 34.55             | 47.56                         | 74.00              | 26.44          | Peak   |
| 6 | 17898.00       | 48.09                    | 8.17                  | 34.31                 | 29.78             | 51.73                         | 74.00              | 22.27          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



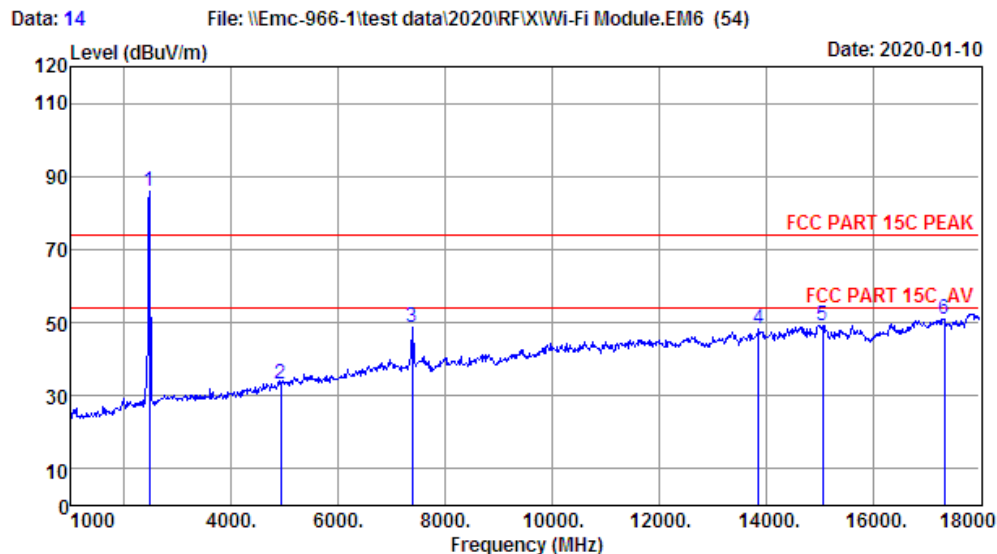
Site no. : 1# 966 Chamber Data no. : 13  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2462MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2462.00        | 27.35                    | 1.48                  | 34.62                 | 86.12             | 80.33                         | 74.00              | -6.33          | Peak   |
| 2 | 4924.00        | 31.55                    | 3.35                  | 34.69                 | 29.31             | 29.52                         | 74.00              | 44.48          | Peak   |
| 3 | 7386.00        | 36.59                    | 5.24                  | 34.84                 | 29.76             | 36.75                         | 74.00              | 37.25          | Peak   |
| 4 | 12662.00       | 39.57                    | 6.23                  | 34.54                 | 31.10             | 42.36                         | 74.00              | 31.64          | Peak   |
| 5 | 15127.00       | 40.77                    | 6.72                  | 34.55                 | 33.34             | 46.28                         | 74.00              | 27.72          | Peak   |
| 6 | 17643.00       | 46.05                    | 8.01                  | 34.34                 | 31.16             | 50.88                         | 74.00              | 23.12          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



Site no. : 1# 966 Chamber Data no. : 14  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2462MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2462.00        | 27.35                    | 1.48                  | 34.62                 | 91.61             | 85.82                         | 74.00              | -11.82         | Peak   |
| 2 | 4924.00        | 31.55                    | 3.35                  | 34.69                 | 32.99             | 33.20                         | 74.00              | 40.80          | Peak   |
| 3 | 7386.00        | 36.59                    | 5.24                  | 34.84                 | 41.78             | 48.77                         | 74.00              | 25.23          | Peak   |
| 4 | 13869.00       | 40.87                    | 6.48                  | 34.31                 | 35.20             | 48.24                         | 74.00              | 25.76          | Peak   |
| 5 | 15059.00       | 40.84                    | 6.77                  | 34.58                 | 36.18             | 49.21                         | 74.00              | 24.79          | Peak   |
| 6 | 17337.00       | 43.61                    | 7.75                  | 34.37                 | 34.14             | 51.13                         | 74.00              | 22.87          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

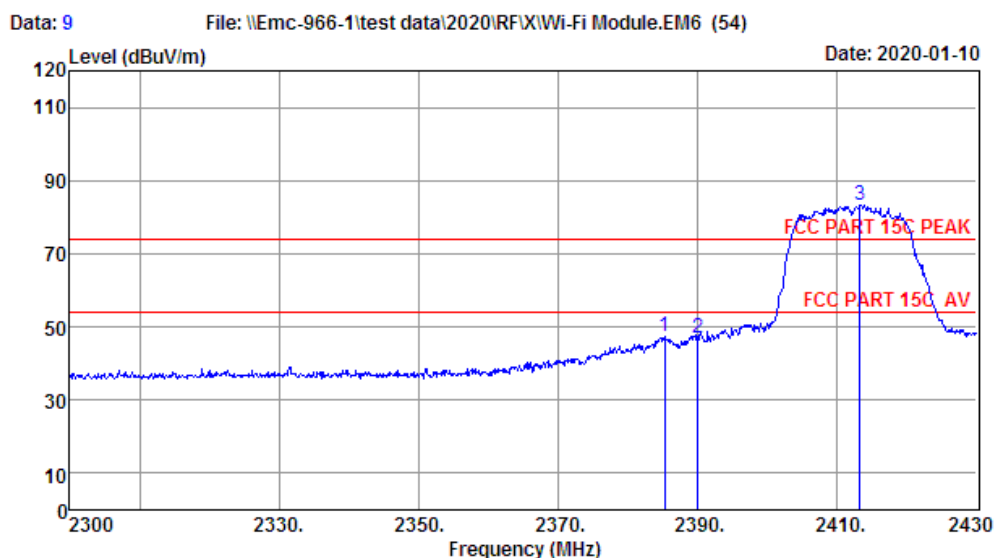
## Note:

1. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

## Radiated Band Edge

EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



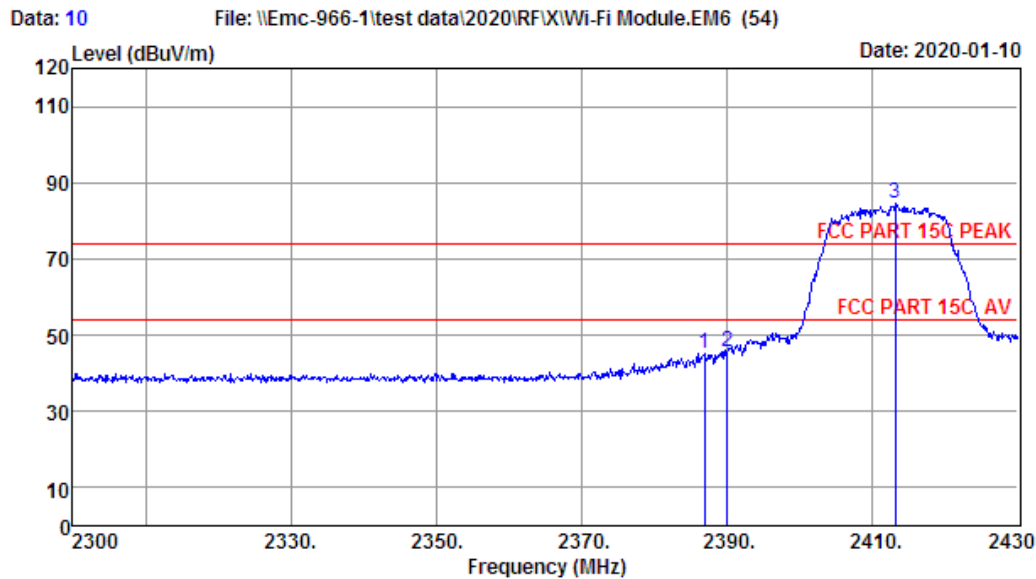
Site no. : 1# 966 Chamber Data no. : 9  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2412MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2385.28        | 27.23                    | 1.44                  | 34.65                 | 53.45             | 47.47                         | 74.00              | 26.53          | Peak   |
| 2 | 2390.00        | 27.26                    | 1.45                  | 34.64                 | 52.78             | 46.85                         | 74.00              | 27.15          | Peak   |
| 3 | 2413.23        | 27.28                    | 1.46                  | 34.64                 | 89.19             | 83.29                         | 74.00              | -9.29          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



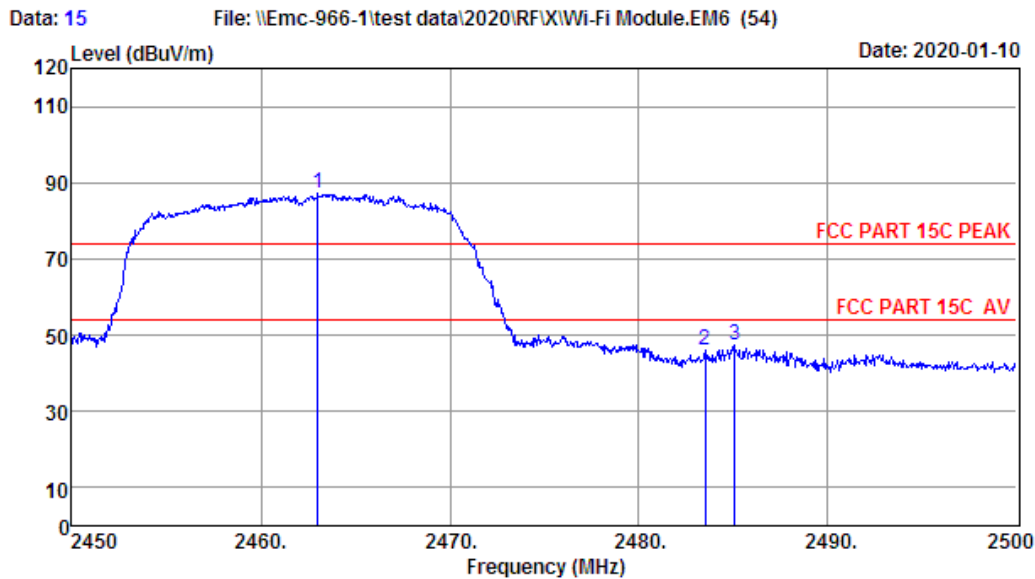
Site no. : 1# 966 Chamber Data no. : 10  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2412MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2386.84        | 27.26                    | 1.45                  | 34.64                 | 51.18             | 45.25                         | 74.00              | 28.75          | Peak   |
| 2 | 2390.00        | 27.26                    | 1.45                  | 34.64                 | 51.73             | 45.80                         | 74.00              | 28.20          | Peak   |
| 3 | 2413.10        | 27.28                    | 1.46                  | 34.64                 | 90.63             | 84.73                         | 74.00              | -10.73         | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



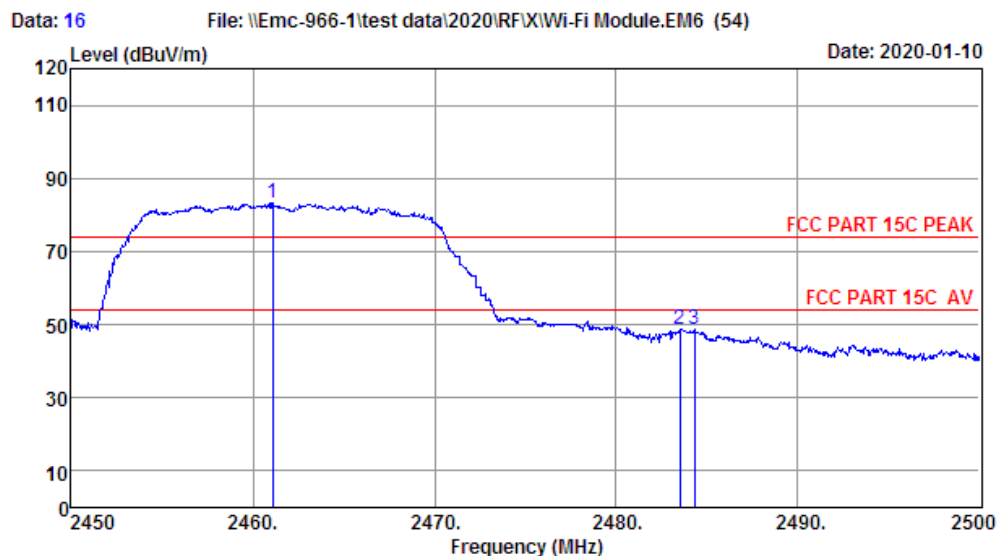
Site no. : 1# 966 Chamber Data no. : 15  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2462MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2463.00        | 27.35                    | 1.48                  | 34.62                 | 92.82             | 87.03                         | 74.00              | -13.03         | Peak   |
| 2 | 2483.50        | 27.38                    | 1.48                  | 34.61                 | 52.01             | 46.26                         | 74.00              | 27.74          | Peak   |
| 3 | 2485.05        | 27.38                    | 1.48                  | 34.61                 | 52.91             | 47.16                         | 74.00              | 26.84          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



Site no. : 1# 966 Chamber Data no. : 16  
 Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : Temp:24.3';Humi:51%;Press:101.53kPa  
 Engineer : Boris  
 EUT : WIFI MODULE  
 Power : DC 5V From PC  
 M/N : 00WIMRA  
 Test Mode : IEEE 802.11n20 TX 2462MHz

|   | Freq.<br>(MHz) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Amp<br>Factor<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limits<br>(dBuV/m) | Margin<br>(dB) | Remark |
|---|----------------|--------------------------|-----------------------|-----------------------|-------------------|-------------------------------|--------------------|----------------|--------|
| 1 | 2461.10        | 27.35                    | 1.48                  | 34.62                 | 89.25             | 83.46                         | 74.00              | -9.46          | Peak   |
| 2 | 2483.50        | 27.38                    | 1.48                  | 34.61                 | 54.49             | 48.74                         | 74.00              | 25.26          | Peak   |
| 3 | 2484.30        | 27.38                    | 1.48                  | 34.61                 | 54.32             | 48.57                         | 74.00              | 25.43          | Peak   |

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. Margin= Limit - Emission Level.  
 3. The emission levels that are 20dB below the official limit are not reported.

## Note:

1. All channels had been pre-test, only of the worst case channels were reported.



## 9. AC POWER LINE CONDUCTED EMISSIONS

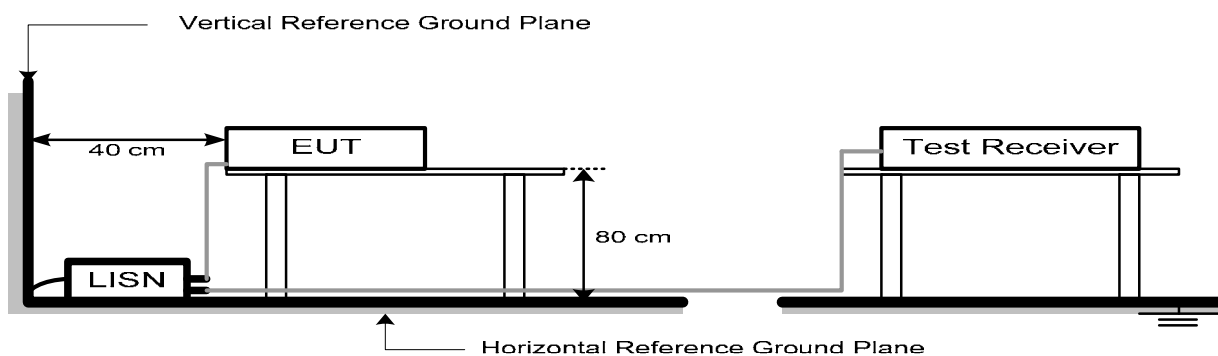
### 9.1. Limit

| Frequency |   |        | Maximum RF Line Voltage          |                               |
|-----------|---|--------|----------------------------------|-------------------------------|
|           |   |        | Quasi-Peak Level<br>dB( $\mu$ V) | Average Level<br>dB( $\mu$ V) |
| 150kHz    | ~ | 500kHz | 66 ~ 56*                         | 56 ~ 46*                      |
| 500kHz    | ~ | 5MHz   | 56                               | 46                            |
| 5MHz      | ~ | 30MHz  | 60                               | 50                            |

Note:

1. \* Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

### 9.2. Test Setup



### 9.3. Spectrum Analyzer Setting

| Spectrum Parameters | Setting  |
|---------------------|----------|
| RBW                 | 9KHz     |
| VBW                 | 9KHz     |
| Start frequency     | 150KHz   |
| Stop frequency      | 30MHz    |
| Sweep Time          | Auto     |
| Detector            | QP/AVG   |
| Trace Mode          | Max Hold |

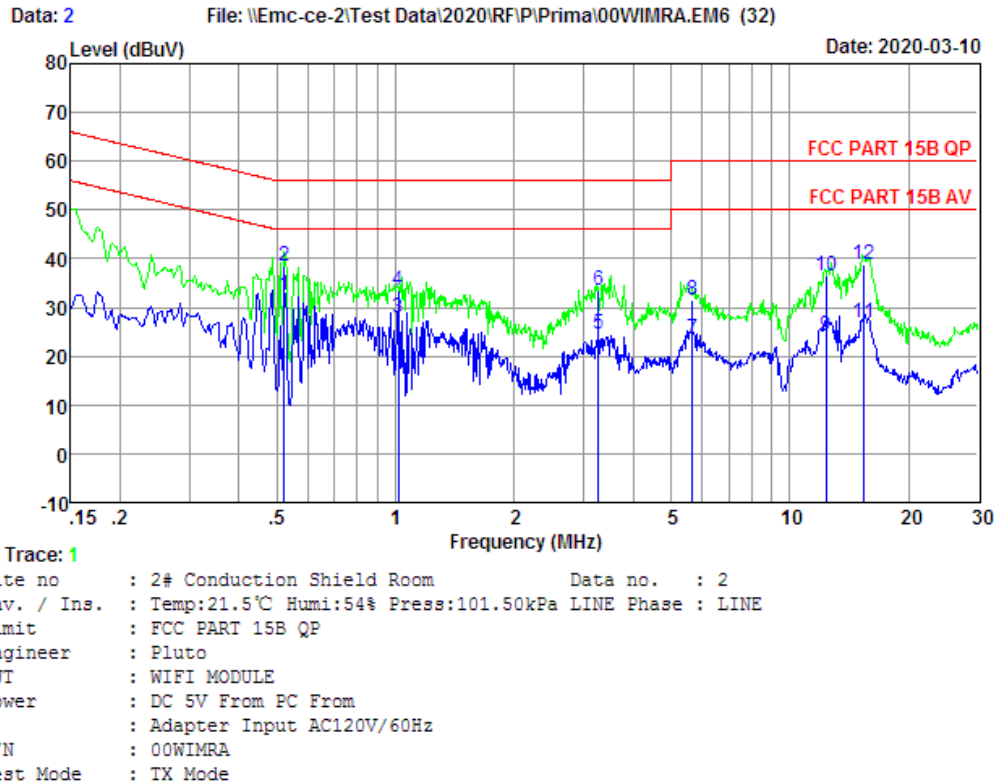
### 9.4. Test Procedure

- a. The EUT was placed on a non-metallic table, 80cm above the ground plane.
- b. The EUT Power connected to the power mains through a line impedance stabilization network.
- c. Provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs).
- d. Set the EUT transmit continuously with maximum output power.
- e. Spectrum analyzer setting parameters in accordance with section 9.3.
- f. The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.
- g. Record the results in the test report.

## 9.5. Test Result

EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878



|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBUV) | Emission<br>Level<br>(dBUV) | Limits<br>(dBUV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.521          | 9.79                   | 0.05                  | 22.63             | 32.47                       | 56.00            | 23.53          | Average |
| 2  | 0.521          | 9.79                   | 0.05                  | 28.60             | 38.44                       | 56.00            | 17.56          | QP      |
| 3  | 1.016          | 9.89                   | 0.06                  | 18.05             | 28.00                       | 56.00            | 28.00          | Average |
| 4  | 1.016          | 9.89                   | 0.06                  | 23.50             | 33.45                       | 56.00            | 22.55          | QP      |
| 5  | 3.276          | 9.90                   | 0.07                  | 14.54             | 24.51                       | 56.00            | 31.49          | Average |
| 6  | 3.276          | 9.90                   | 0.07                  | 23.54             | 33.51                       | 56.00            | 22.49          | QP      |
| 7  | 5.653          | 10.19                  | 0.07                  | 13.22             | 23.48                       | 60.00            | 36.52          | Average |
| 8  | 5.653          | 10.19                  | 0.07                  | 21.23             | 31.49                       | 60.00            | 28.51          | QP      |
| 9  | 12.384         | 9.78                   | 0.08                  | 14.51             | 24.37                       | 60.00            | 35.63          | Average |
| 10 | 12.384         | 9.78                   | 0.08                  | 26.52             | 36.38                       | 60.00            | 23.62          | QP      |
| 11 | 15.470         | 9.98                   | 0.08                  | 16.79             | 26.85                       | 60.00            | 33.15          | Average |
| 12 | 15.470         | 9.98                   | 0.08                  | 28.79             | 38.85                       | 60.00            | 21.15          | QP      |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.  
2. Margin=Limit - Emission Level.  
3. If the average limit is met when using a quasi-peak detector,  
the EUT shall be deemed to meet both limits and measurement  
with average detector is unnecessary.

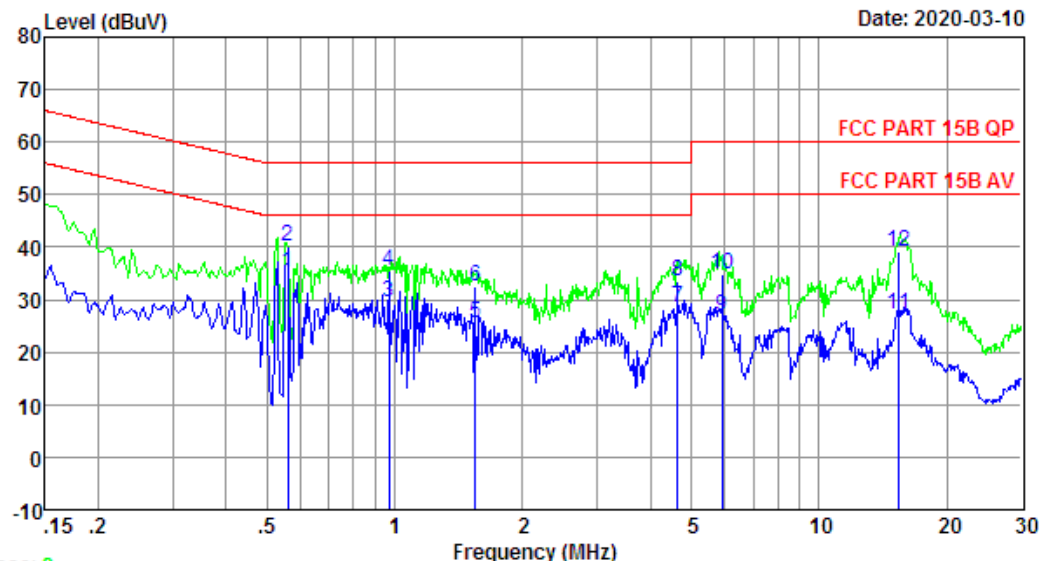
## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 4

File: \\Emc-ce-2\Test Data\2020\RF\IP\Prima\00WIMRA.EM6 (32)

Date: 2020-03-10



Trace: 3

Site no : 2# Conduction Shield Room Data no. : 4  
 Env. / Ins. : Temp:21.5°C Humi:54% Press:101.50kPa LINE Phase : NEUTRAL  
 Limit : FCC PART 15B QP  
 Engineer : Pluto  
 EUT : WIFI MODULE  
 Power : DC 5V From PC From  
 : Adapter Input AC120V/60Hz  
 M/N : 00WIMRA  
 Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.561          | 9.70                   | 0.05                  | 25.37             | 35.12                       | 56.00            | 20.88          | Average |
| 2  | 0.561          | 9.70                   | 0.05                  | 30.36             | 40.11                       | 56.00            | 15.89          | QP      |
| 3  | 0.968          | 9.76                   | 0.06                  | 19.82             | 29.64                       | 56.00            | 26.36          | Average |
| 4  | 0.968          | 9.76                   | 0.06                  | 25.74             | 35.56                       | 56.00            | 20.44          | QP      |
| 5  | 1.552          | 9.78                   | 0.06                  | 15.68             | 25.52                       | 56.00            | 30.48          | Average |
| 6  | 1.552          | 9.78                   | 0.06                  | 22.67             | 32.51                       | 56.00            | 23.49          | QP      |
| 7  | 4.647          | 9.93                   | 0.07                  | 18.54             | 28.54                       | 56.00            | 27.46          | Average |
| 8  | 4.647          | 9.93                   | 0.07                  | 23.58             | 33.58                       | 56.00            | 22.42          | QP      |
| 9  | 5.898          | 9.76                   | 0.07                  | 17.07             | 26.90                       | 60.00            | 33.10          | Average |
| 10 | 5.898          | 9.76                   | 0.07                  | 25.07             | 34.90                       | 60.00            | 25.10          | QP      |
| 11 | 15.470         | 10.10                  | 0.08                  | 17.04             | 27.22                       | 60.00            | 32.78          | Average |
| 12 | 15.470         | 10.10                  | 0.08                  | 29.04             | 39.22                       | 60.00            | 20.78          | QP      |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.  
 2. Margin=Limit - Emission Level.  
 3. If the average limit is met when using a quasi-peak detector,  
 the EUT shall be deemed to meet both limits and measurement  
 with average detector is unnecessary.

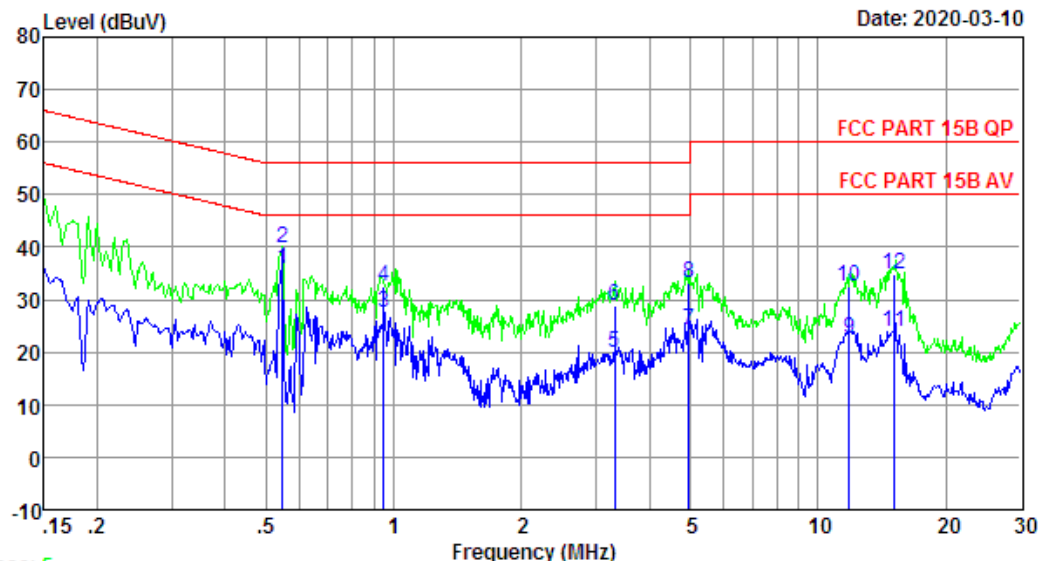
## EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 6

File: \\Emc-ce-2\Test Data\2020\RF\IP\Prima\00WIMRA.EM6 (32)

Date: 2020-03-10



Trace: 5

Site no : 2# Conduction Shield Room Data no. : 6  
Env. / Ins. : Temp:21.5°C Humi:54% Press:101.50kPa LINE Phase : LINE  
Limit : FCC PART 15B QP  
Engineer : Pluto  
EUT : WIFI MODULE  
Power : DC 5V From PC From  
Adapter Input AC240V/60Hz  
M/N : 00WIMRA  
Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.546          | 9.80                   | 0.05                  | 25.89             | 35.74                       | 56.00            | 20.26          | Average |
| 2  | 0.546          | 9.80                   | 0.05                  | 29.89             | 39.74                       | 56.00            | 16.26          | QP      |
| 3  | 0.948          | 9.88                   | 0.06                  | 17.65             | 27.59                       | 56.00            | 28.41          | Average |
| 4  | 0.948          | 9.88                   | 0.06                  | 22.65             | 32.59                       | 56.00            | 23.41          | QP      |
| 5  | 3.310          | 9.91                   | 0.07                  | 9.85              | 19.83                       | 56.00            | 36.17          | Average |
| 6  | 3.310          | 9.91                   | 0.07                  | 18.85             | 28.83                       | 56.00            | 27.17          | QP      |
| 7  | 4.952          | 10.06                  | 0.07                  | 14.13             | 24.26                       | 56.00            | 31.74          | Average |
| 8  | 4.952          | 10.06                  | 0.07                  | 23.14             | 33.27                       | 56.00            | 22.73          | QP      |
| 9  | 11.870         | 9.73                   | 0.08                  | 12.70             | 22.51                       | 60.00            | 37.49          | Average |
| 10 | 11.870         | 9.73                   | 0.08                  | 22.70             | 32.51                       | 60.00            | 27.49          | QP      |
| 11 | 15.146         | 9.98                   | 0.08                  | 13.71             | 23.77                       | 60.00            | 36.23          | Average |
| 12 | 15.146         | 9.98                   | 0.08                  | 24.79             | 34.85                       | 60.00            | 25.15          | QP      |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.  
2. Margin=Limit - Emission Level.  
3. If the average limit is met when using a quasi-peak detector,  
the EUT shall be deemed to meet both limits and measurement  
with average detector is unnecessary.

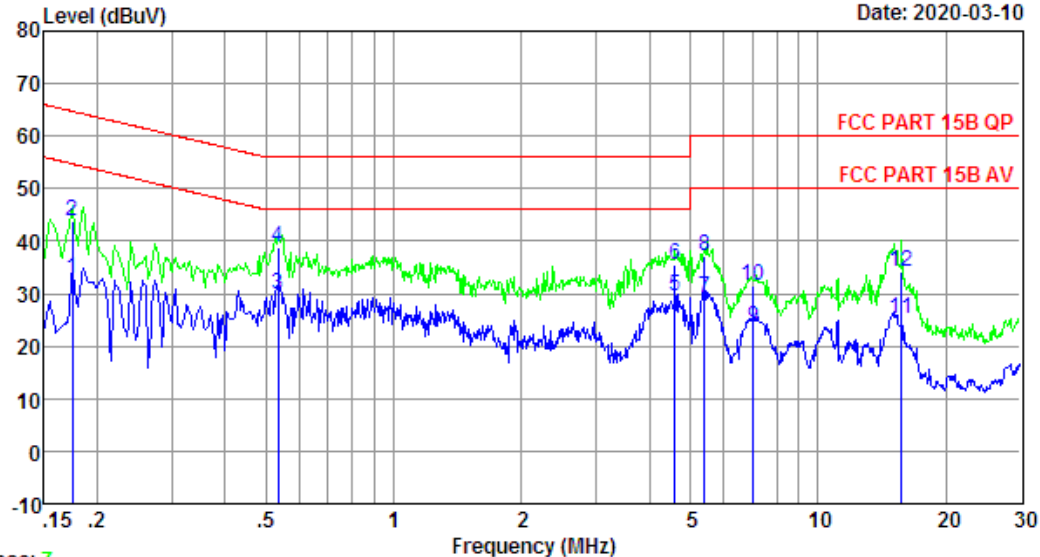
EST Technology

Chilingxiang, Qishantou, Santun,  
Houjie, Dongguan, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 8

File: \\Emc-ce-2\Test Data\2020\RF\IP\Prima\00WIMRA.EM6 (32)

Date: 2020-03-10



Trace: 7

Site no : 2# Conduction Shield Room Data no. : 8  
Env. / Ins. : Temp:21.5°C Humi:54% Press:101.50kPa LINE Phase : NEUTRAL  
Limit : FCC PART 15B QP  
Engineer : Pluto  
EUT : WIFI MODULE  
Power : DC 5V From PC From  
Adapter Input AC240V/60Hz  
M/N : 00WIMRA  
Test Mode : TX Mode

|    | Freq.<br>(MHz) | LISN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Reading<br>(dBuV) | Emission<br>Level<br>(dBuV) | Limits<br>(dBuV) | Margin<br>(dB) | Remark  |
|----|----------------|------------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.175          | 9.65                   | 0.04                  | 23.21             | 32.90                       | 64.72            | 31.82          | Average |
| 2  | 0.175          | 9.65                   | 0.04                  | 34.21             | 43.90                       | 64.72            | 20.82          | QP      |
| 3  | 0.535          | 9.70                   | 0.05                  | 20.14             | 29.89                       | 56.00            | 26.11          | Average |
| 4  | 0.535          | 9.70                   | 0.05                  | 29.12             | 38.87                       | 56.00            | 17.13          | QP      |
| 5  | 4.598          | 9.93                   | 0.07                  | 19.35             | 29.35                       | 56.00            | 26.65          | Average |
| 6  | 4.598          | 9.93                   | 0.07                  | 25.35             | 35.35                       | 56.00            | 20.65          | QP      |
| 7  | 5.390          | 9.86                   | 0.07                  | 19.12             | 29.05                       | 60.00            | 30.95          | Average |
| 8  | 5.390          | 9.86                   | 0.07                  | 27.11             | 37.04                       | 60.00            | 22.96          | QP      |
| 9  | 7.025          | 9.55                   | 0.08                  | 14.05             | 23.68                       | 60.00            | 36.32          | Average |
| 10 | 7.025          | 9.55                   | 0.08                  | 22.05             | 31.68                       | 60.00            | 28.32          | QP      |
| 11 | 15.718         | 10.09                  | 0.08                  | 14.97             | 25.14                       | 60.00            | 34.86          | Average |
| 12 | 15.718         | 10.09                  | 0.08                  | 23.96             | 34.13                       | 60.00            | 25.87          | QP      |

Remarks: 1. Emission Level= LISN Factor + Cable Loss + Reading.  
2. Margin=Limit - Emission Level.  
3. If the average limit is met when using a quasi-peak detector,  
the EUT shall be deemed to meet both limits and measurement  
with average detector is unnecessary.

## 10. ANTENNA REQUIREMENTS

### 10.1. Limit

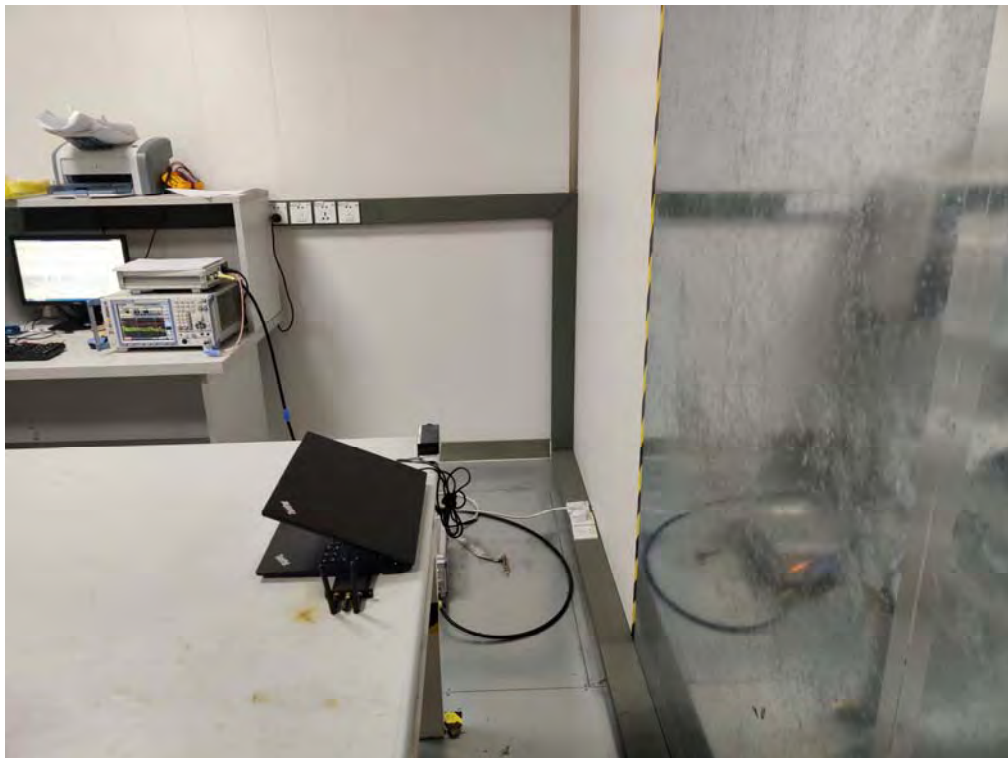
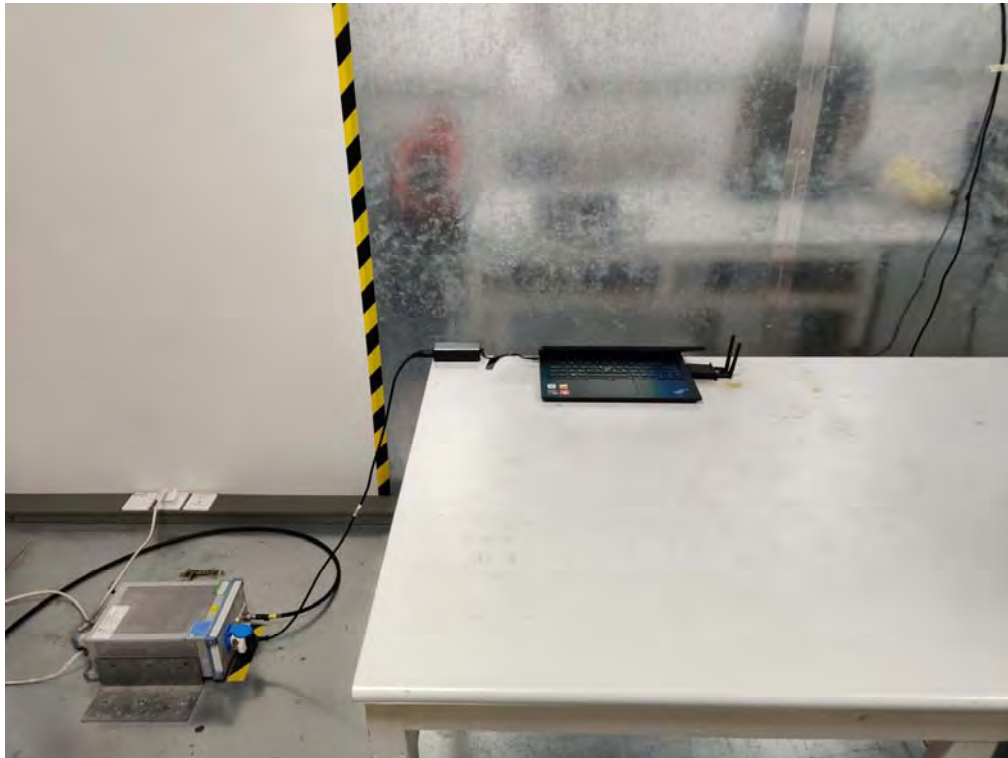
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### 10.2. Test Result

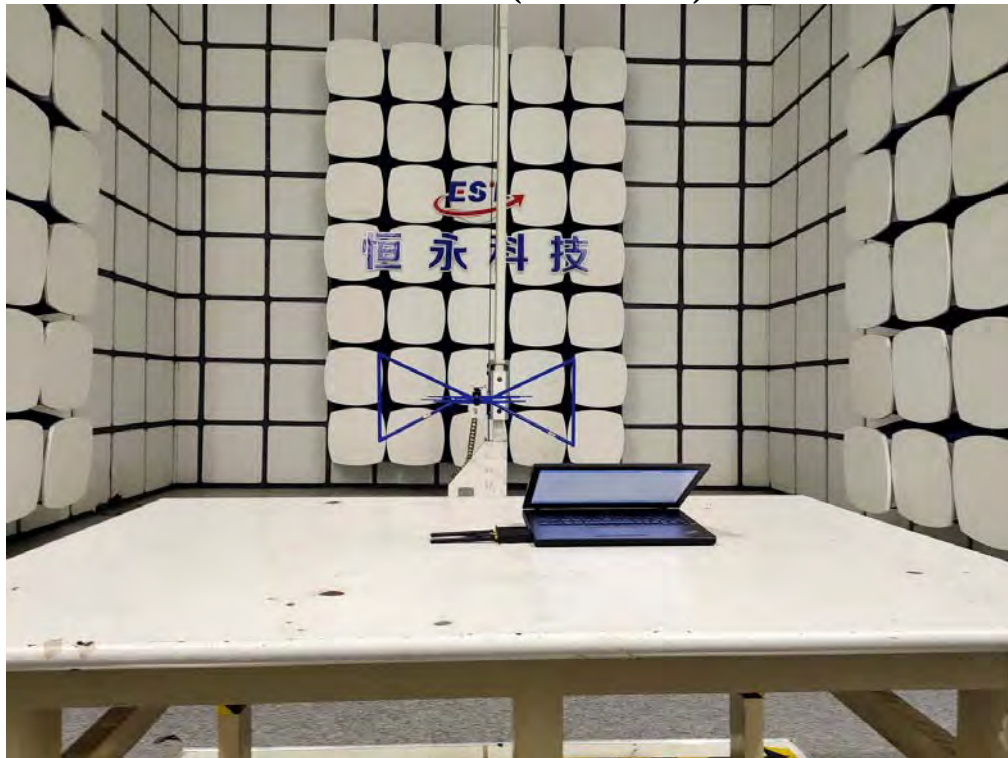
The antennas used for this product is External antenna, so compliance with antenna requirements.  
( Please refer to the EUT photo for details)

## 11. TEST SETUP PHOTO

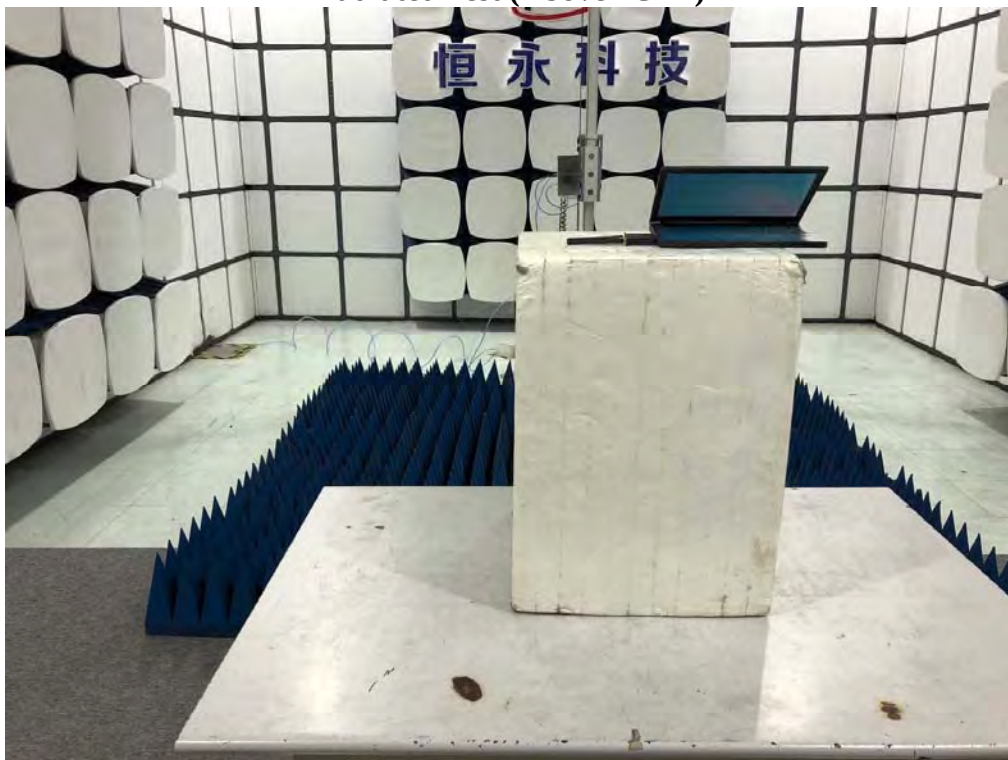
Conducted Test



**Radiated Test (Below 1GHz)**



**Radiated Test (Above 1GHz)**

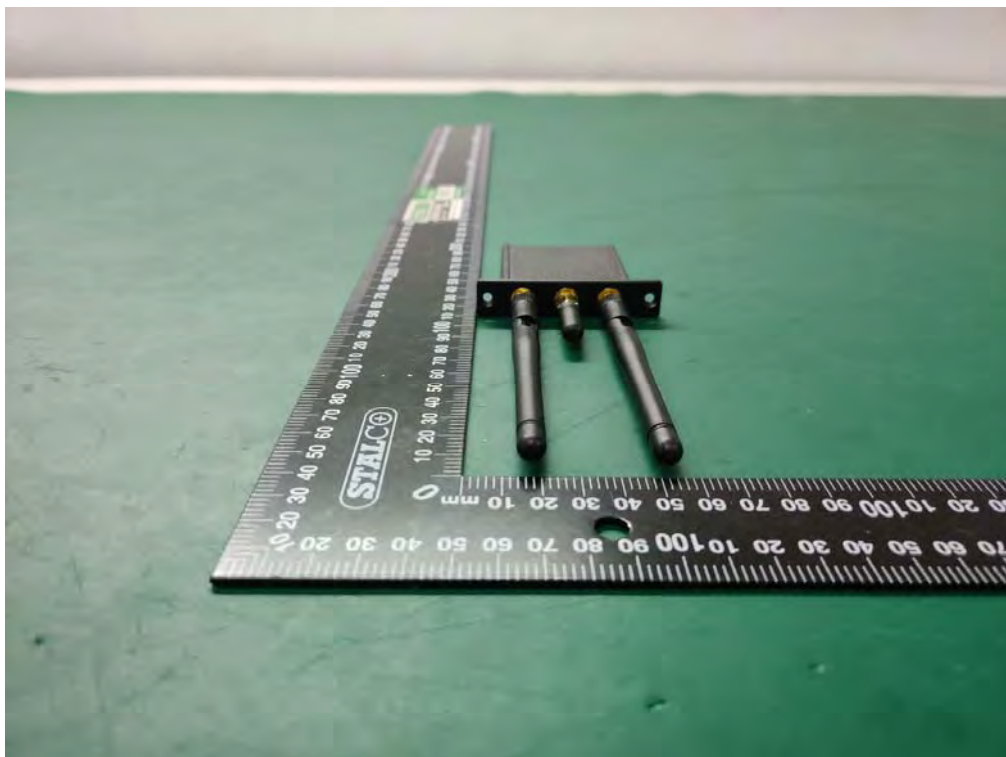
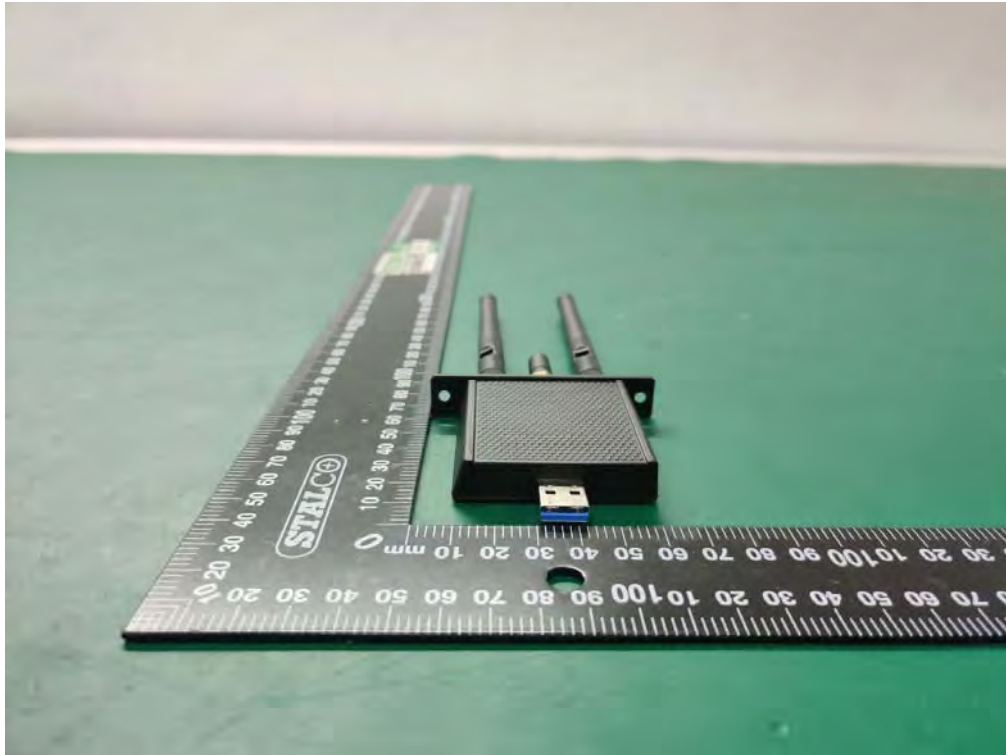


## 12. EUT PHOTO

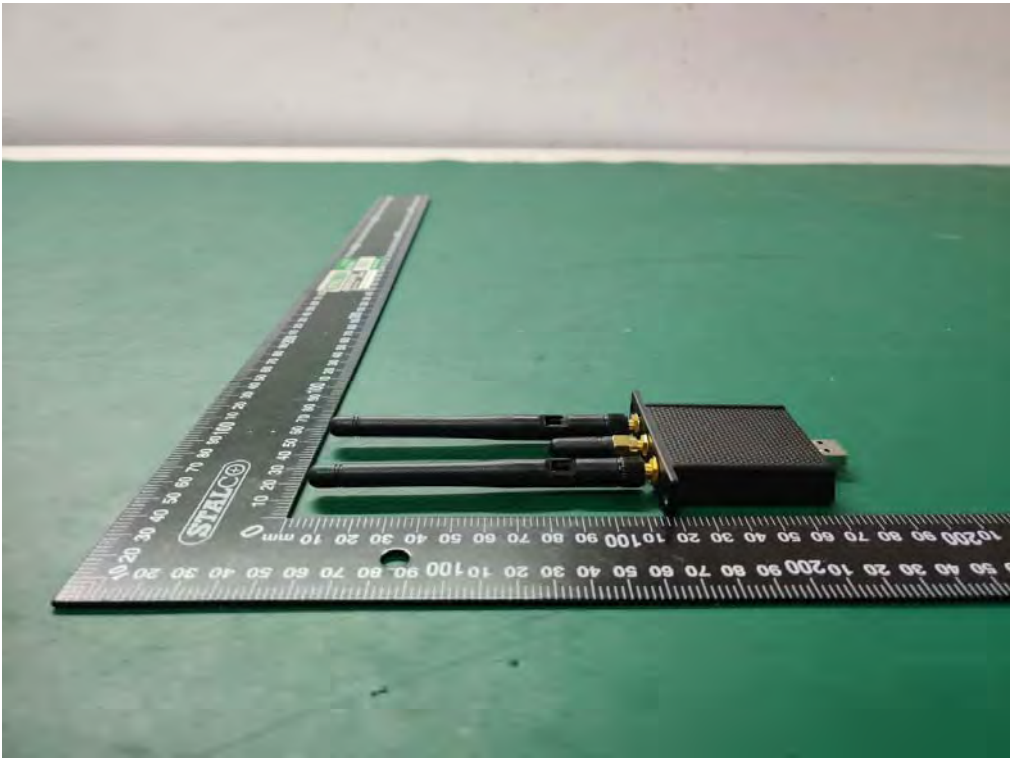
External Photos  
M/N: 00WIMRA



**External Photos**  
M/N: 00WIMRA



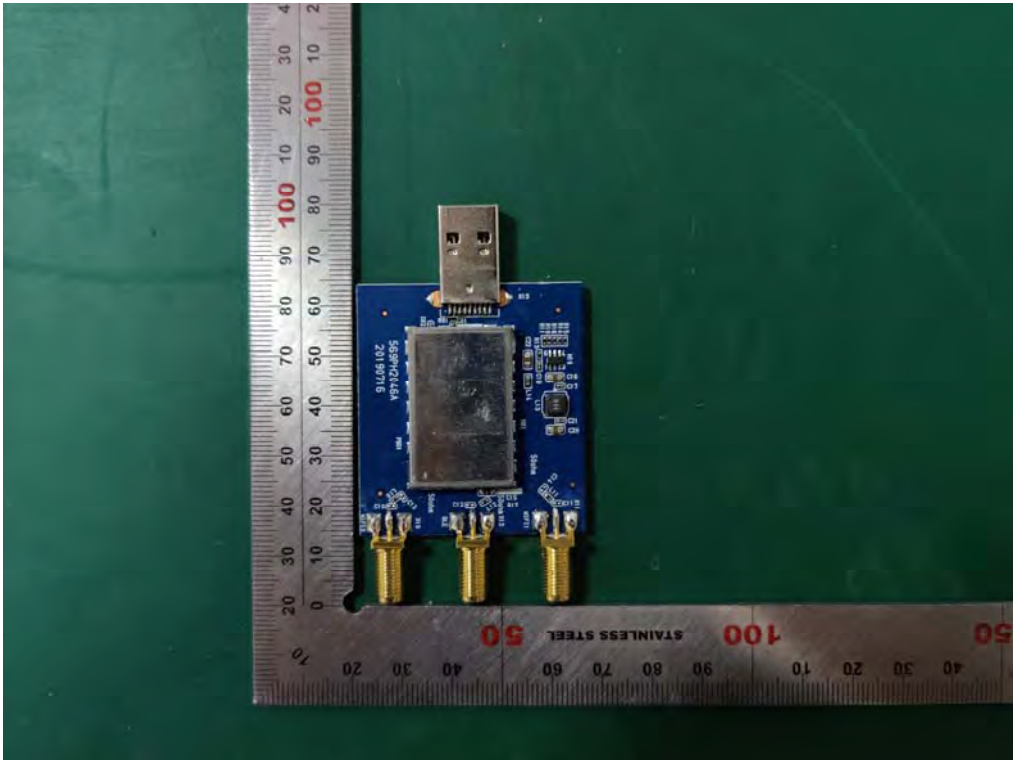
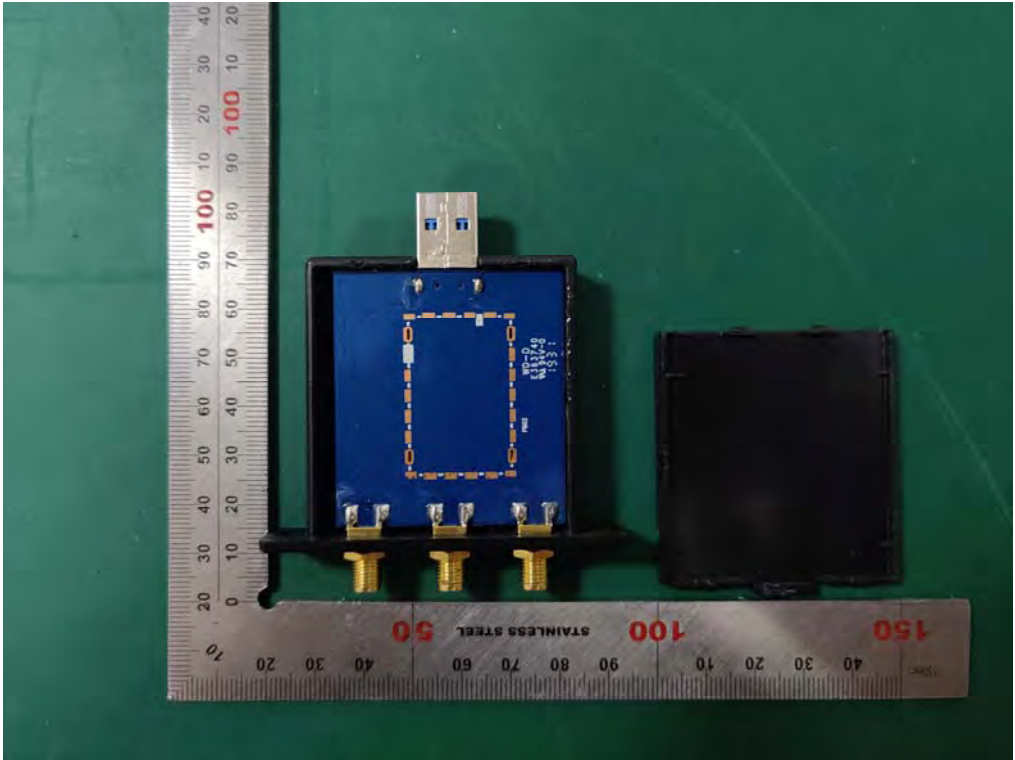
External Photos  
M/N: 00WIMRA



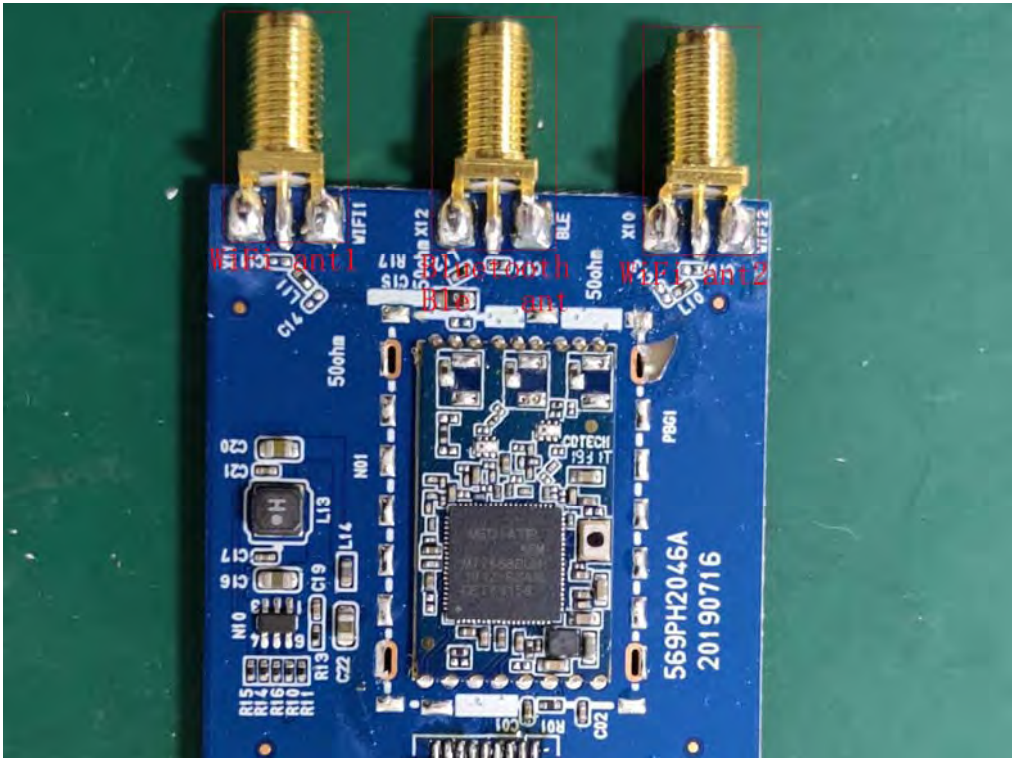
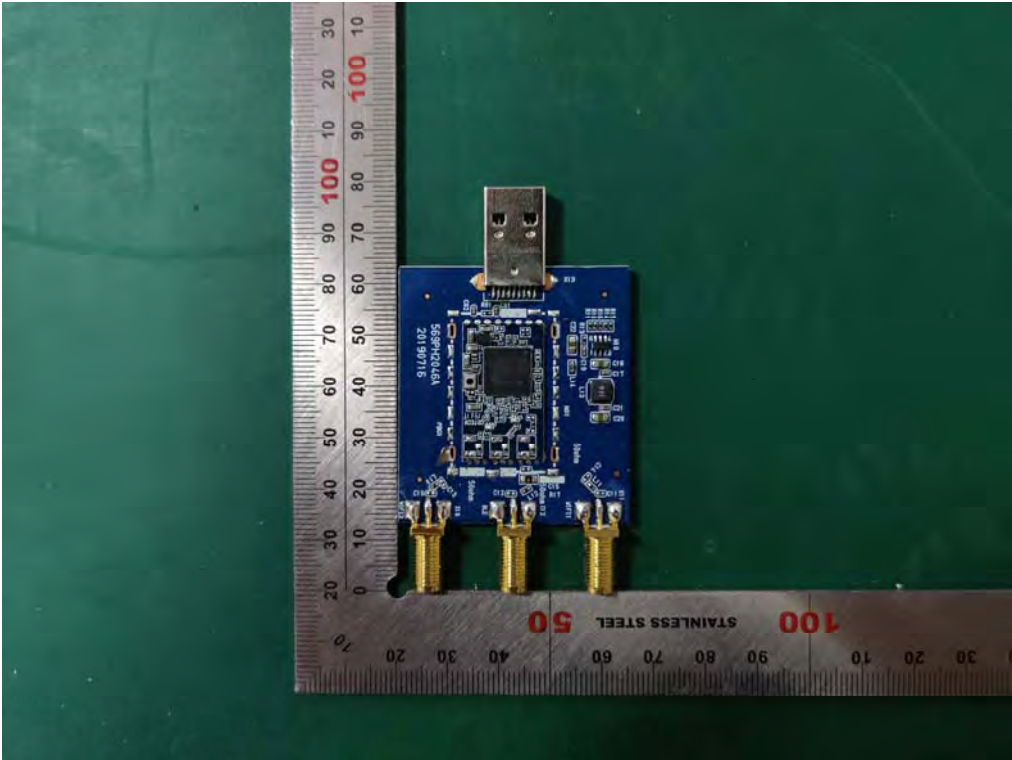
**External Photos**  
M/N: 00WIMRA



Internal Photos  
M/N: 00WIMRA



Internal Photos  
M/N: 00WIMRA



End of Test Report