



## FCC RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant/ Manufacturer : Pinsheng technologies Co., Ltd

Address : 7Floor, No.5 middle Huangshan Avenue, North New Zone, Chongqing

Factory : Chongqing Datiejiang Science and Technology Co.,Ltd.

Address : NO.368, BOE Avenue, Beibei District, Chongqing

E.U.T. : Label Printer

Brand Name : MakeID

Model No. : WB51R-WT (For additional model and model difference refer to section 1)

FCC ID : 2AVAP-WB51

Measurement Standard : FCC PART 15.247

Date of Receiver : February 28, 2020

Date of Test : February 28, 2020 to June 05, 2020

Date of Report : June 05, 2020

This Test Report is Issued Under the Authority of :

Prepared by

Alina Guo / Engineer

Approved & Authorized Signer



Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

## Table of Contents

|                                                            |           |
|------------------------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION .....</b>                        | <b>5</b>  |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST .....     | 5         |
| 1.2 RELATED SUBMITTAL(S) / GRANT (S) .....                 | 9         |
| 1.3 TEST METHODOLOGY .....                                 | 9         |
| 1.4 EQUIPMENT MODIFICATIONS .....                          | 9         |
| 1.5 SUPPORT DEVICE .....                                   | 9         |
| 1.6 TEST FACILITY AND LOCATION .....                       | 10        |
| 1.7 SUMMARY OF TEST RESULTS.....                           | 11        |
| <b>2. SYSTEM TEST CONFIGURATION.....</b>                   | <b>12</b> |
| 2.1 EUT CONFIGURATION .....                                | 12        |
| 2.2 SPECIAL ACCESSORIES .....                              | 12        |
| 2.3 DESCRIPTION OF TEST MODES .....                        | 12        |
| 2.4 EUT EXERCISE .....                                     | 12        |
| <b>3. CONDUCTED EMISSIONS TEST .....</b>                   | <b>13</b> |
| 3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 13        |
| 3.2 TEST CONDITION.....                                    | 13        |
| 3.3 MEASUREMENT RESULTS .....                              | 13        |
| <b>4. MAX. PEAK CONDUCTED OUTPUT POWER.....</b>            | <b>16</b> |
| 4.1 MEASUREMENT PROCEDURE .....                            | 16        |
| 4.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 16        |
| 4.3 MEASUREMENT RESULTS .....                              | 16        |
| <b>5. 6DB BANDWIDTH.....</b>                               | <b>18</b> |
| 5.1 MEASUREMENT PROCEDURE .....                            | 18        |
| 5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 18        |
| 5.3 MEASUREMENT RESULTS .....                              | 18        |
| <b>6. POWER SPECTRAL DENSITY .....</b>                     | <b>26</b> |
| 6.1 MEASUREMENT PROCEDURE .....                            | 26        |
| 6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 26        |
| 6.3 MEASUREMENT RESULTS .....                              | 26        |
| <b>7. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS .....</b> | <b>34</b> |
| 7.1 REQUIREMENT AND MEASUREMENT PROCEDURE.....             | 34        |
| 7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 34        |
| 7.3 MEASUREMENT RESULTS .....                              | 34        |



**8. RADIATED SPURIOUS EMISSIONS AND RESTRICTED BANDS..... 42**

8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) ..... 42

8.2 MEASUREMENT PROCEDURE ..... 43

8.3 LIMIT ..... 44

8.4 MEASUREMENT RESULTS ..... 44

**9. ANTENNA APPLICATION ..... 49**

9.1 ANTENNA REQUIREMENT..... 49

9.2 MEASUREMENT RESULTS ..... 49

**10. TEST EQUIPMENT LIST..... 50**

## Revision History of This Test Report

| Report Number  | Description   | Issued Date |
|----------------|---------------|-------------|
| NTC2003037FV00 | Initial Issue | 2020-06-05  |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |
|                |               |             |

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test

|                                 |                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name                    | : Label Printer                                                                                                                                                                                           |
| Main Model Number               | : WB51R-WT                                                                                                                                                                                                |
| Additional Model Number         | : See page 7, 8 of model list.                                                                                                                                                                            |
| Description of Model Difference | : These models have the same circuit schematic, construction, PCB Layout and critical components. The difference are model number, brand name, color of appearance and resolution due to trading purpose. |
| Brand Name                      | : MakeID                                                                                                                                                                                                  |
| Rating                          | : DC 24V From adapter                                                                                                                                                                                     |
| Adapter                         | : Model: EA10682P-240<br>Input: AC 100-240V, 2.0A, 50-60Hz<br>Output: DC 24V, 2.5A                                                                                                                        |
| Test voltage                    | : AC 120V 60Hz, AC 240V 60Hz<br>(Only the worst case was recorded in this report)                                                                                                                         |
| Cable                           | : USB Line: 2.51m shielded<br>AC Mains: 1.51m unshielded<br>DC Line: 1.20m with one core unshielded                                                                                                       |
| Hardware Version                | : 18L3_Main_ V1.2                                                                                                                                                                                         |
| Software Version                | : DS51_V1.0_V1.0                                                                                                                                                                                          |
| Note                            | : According to the model difference, all tests were performed on model WB51R-WT.                                                                                                                          |
| Remark                          | : This report applies to WiFi function.                                                                                                                                                                   |

---

### Technical parameters

|                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Frequency Range   | : 2412MHz~2462MHz(802.11b/802.11g/802.11n(HT20))<br>2422MHz~2452MHz(802.11n(HT40))                    |
| Modulation Type   | : CCK, DQPSK, DBPSK for 802.11b<br>OFDM for 802.11g/n(HT20)/n(HT40)                                   |
| Number of Channel | : 11 for 802.11b/g/n(HT20)<br>7 for 802.11n(HT40)                                                     |
| Channel space     | : 5MHz                                                                                                |
| Date Rate         | : 802.11b:1~11Mbps,<br>802.11g:6~54Mbps<br>802.11n(HT20): 6.5~72.2Mbps<br>802.11n(HT40): 13.5~135Mbps |
| Antenna Type      | : PCB antenna                                                                                         |
| Antenna Gain      | : 2 dBi                                                                                               |

### Model List

|          |           |           |           |           |           |
|----------|-----------|-----------|-----------|-----------|-----------|
| WB51-2N  | WB51A-2N  | WB51B-2N  | WB51C-2N  | WB51T-2N  | WB51S-2N  |
| WB51-3N  | WB51A-3N  | WB51B-3N  | WB51C-3N  | WB51T-3N  | WB51S-3N  |
| WB51-2F  | WB51A-2F  | WB51B-2F  | WB51C-2F  | WB51T-2F  | WB51S-2F  |
| WB51-3F  | WB51A-3F  | WB51B-3F  | WB51C-3F  | WB51T-3F  | WB51S-3F  |
| WB51-2NR | WB51A-2NR | WB51B-2NR | WB51C-2NR | WB51T-2NR | WB51S-2NR |
| WB51-3NR | WB51A-3NR | WB51B-3NR | WB51C-3NR | WB51T-3NR | WB51S-3NR |
| WB51-2FR | WB51A-2FR | WB51B-2FR | WB51C-2FR | WB51T-2FR | WB51S-2FR |
| WB51-3FR | WB51A-3FR | WB51B-3FR | WB51C-3FR | WB51T-3FR | WB51S-3FR |
| DS51-2N  | DS51A-2N  | DS51B-2N  | DS51C-2N  | DS51T-2N  | DS51S-2N  |
| DS51-3N  | DS51A-3N  | DS51B-3N  | DS51C-3N  | DS51T-3N  | DS51S-3N  |
| DS51-2F  | DS51A-2F  | DS51B-2F  | DS51C-2F  | DS51T-2F  | DS51S-2F  |
| DS51-3F  | DS51A-3F  | DS51B-3F  | DS51C-3F  | DS51T-3F  | DS51S-3F  |
| DS51-2NR | DS51A-2NR | DS51B-2NR | DS51C-2NR | DS51T-2NR | DS51S-2NR |
| DS51-3NR | DS51A-3NR | DS51B-3NR | DS51C-3NR | DS51T-3NR | DS51S-3NR |
| DS51-2FR | DS51A-2FR | DS51B-2FR | DS51C-2FR | DS51T-2FR | DS51S-2FR |
| DS51-3FR | DS51A-3FR | DS51B-3FR | DS51C-3FR | DS51T-3FR | DS51S-3FR |
| WD51-2N  | WD51A-2N  | WD51B-2N  | WD51C-2N  | WD51T-2N  | WD51S-2N  |
| WD51-3N  | WD51A-3N  | WD51B-3N  | WD51C-3N  | WD51T-3N  | WD51S-3N  |
| WD51-2F  | WD51A-2F  | WD51B-2F  | WD51C-2F  | WD51T-2F  | WD51S-2F  |
| WD51-3F  | WD51A-3F  | WD51B-3F  | WD51C-3F  | WD51T-3F  | WD51S-3F  |
| WD51-2NR | WD51A-2NR | WD51B-2NR | WD51C-2NR | WD51T-2NR | WD51S-2NR |
| WD51-3NR | WD51A-3NR | WD51B-3NR | WD51C-3NR | WD51T-3NR | WD51S-3NR |
| WD51-2FR | WD51A-2FR | WD51B-2FR | WD51C-2FR | WD51T-2FR | WD51S-2FR |
| WD51-3FR | WD51A-3FR | WD51B-3FR | WD51C-3FR | WD51T-3FR | WD51S-3FR |
| HC51-2N  | HC51A-2N  | HC51B-2N  | HC51C-2N  | HC51T-2N  | HC51S-2N  |
| HC51-3N  | HC51A-3N  | HC51B-3N  | HC51C-3N  | HC51T-3N  | HC51S-3N  |
| HC51-2F  | HC51A-2F  | HC51B-2F  | HC51C-2F  | HC51T-2F  | HC51S-2F  |
| HC51-3F  | HC51A-3F  | HC51B-3F  | HC51C-3F  | HC51T-3F  | HC51S-3F  |
| HC51-2NR | HC51A-2NR | HC51B-2NR | HC51C-2NR | HC51T-2NR | HC51S-2NR |
| HC51-3NR | HC51A-3NR | HC51B-3NR | HC51C-3NR | HC51T-3NR | HC51S-3NR |
| HC51-2FR | HC51A-2FR | HC51B-2FR | HC51C-2FR | HC51T-2FR | HC51S-2FR |
| HC51-3FR | HC51A-3FR | HC51B-3FR | HC51C-3FR | HC51T-3FR | HC51S-3FR |
| XT51-2N  | XT51A-2N  | XT51B-2N  | XT51C-2N  | XT51T-2N  | XT51S-2N  |
| XT51-3N  | XT51A-3N  | XT51B-3N  | XT51C-3N  | XT51T-3N  | XT51S-3N  |
| XT51-2F  | XT51A-2F  | XT51B-2F  | XT51C-2F  | XT51T-2F  | XT51S-2F  |
| XT51-3F  | XT51A-3F  | XT51B-3F  | XT51C-3F  | XT51T-3F  | XT51S-3F  |
| XT51-2NR | XT51A-2NR | XT51B-2NR | XT51C-2NR | XT51T-2NR | XT51S-2NR |
| XT51-3NR | XT51A-3NR | XT51B-3NR | XT51C-3NR | XT51T-3NR | XT51S-3NR |
| XT51-2FR | XT51A-2FR | XT51B-2FR | XT51C-2FR | XT51T-2FR | XT51S-2FR |
| XT51-3FR | XT51A-3FR | XT51B-3FR | XT51C-3FR | XT51T-3FR | XT51S-3FR |
| HS51-2N  | HS51A-2N  | HS51B-2N  | HS51C-2N  | HS51T-2N  | HS51S-2N  |
| HS51-3N  | HS51A-3N  | HS51B-3N  | HS51C-3N  | HS51T-3N  | HS51S-3N  |
| HS51-2F  | HS51A-2F  | HS51B-2F  | HS51C-2F  | HS51T-2F  | HS51S-2F  |
| HS51-3F  | HS51A-3F  | HS51B-3F  | HS51C-3F  | HS51T-3F  | HS51S-3F  |

|          |           |           |           |           |           |
|----------|-----------|-----------|-----------|-----------|-----------|
| HS51-2NR | HS51A-2NR | HS51B-2NR | HS51C-2NR | HS51T-2NR | HS51S-2NR |
| HS51-3NR | HS51A-3NR | HS51B-3NR | HS51C-3NR | HS51T-3NR | HS51S-3NR |
| HS51-2FR | HS51A-2FR | HS51B-2FR | HS51C-2FR | HS51T-2FR | HS51S-2FR |
| HS51-3FR | HS51A-3FR | HS51B-3FR | HS51C-3FR | HS51T-3FR | HS51S-3FR |
| WB51     | WB51A     | WB51B     | WB51A-WT  | WB51B-WT  | WB51R-WT  |
| WB51C    | WB51A-BU  | WB51B-BU  | WB51R-BU  | WB51F     | WB51R-PK  |
| WB51D    | WB51A-GN  | WB51B-GN  | WB51R-GN  | WB51B-PK  | WB51A-PK  |
| WB51E    |           |           |           |           |           |

### WIFI Channel List

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

**Note:** According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

| 802.11b/g/n(HT20) |               | 802.11n(HT40) |               |
|-------------------|---------------|---------------|---------------|
| Channel           | Frequency MHz | Channel       | Frequency MHz |
| 1                 | 2412          | 3             | 2422          |
| 6                 | 2437          | 6             | 2437          |
| 11                | 2462          | 9             | 2452          |

|                 |            |
|-----------------|------------|
| Test SW version | espRFTTool |
|-----------------|------------|

## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AVAP-WB51 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rule.

## 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 Support Device

|                           |   |                                                                                                       |
|---------------------------|---|-------------------------------------------------------------------------------------------------------|
| Notebook                  | : | Manufacturer: IBM<br>Model: 1834<br>P/N: 13N5615<br>CE, FCC: DOC                                      |
| Adapter<br>(For Notebook) | : | Manufacturer: Huntkey<br>Model: HKA09019047-6D<br>I/P: AC 100-240V 50-60Hz, 1.5A<br>O/P: DC 19V 4.74A |

## 1.6 Test Facility and Location

### Site Description

EMC Lab : Listed by CNAS, August 13, 2018  
The certificate is valid until August 13, 2024  
The Laboratory has been assessed and proved to  
be in compliance with CNAS/CL01  
The Certificate Registration Number is L5795.

Listed by A2LA, November 01, 2017  
The certificate is valid until December 31, 2021  
The Laboratory has been assessed and proved to  
be in compliance with ISO17025  
The Certificate Registration Number is 4429.01

Listed by FCC, November 06, 2017  
The Designation Number is CN1214  
Test Firm Registration Number: 907417

Listed by Industry Canada, June 08, 2017  
The Certificate Registration Number. Is 46405-9743  
Name of Firm : Dongguan Nore Testing Center Co., Ltd.  
(Dongguan NTC Co., Ltd.)

Site Location : Building D, Gaosheng Science and Technology  
park, Hongtu road, Nancheng district,  
Dongguan city, Guangdong province, China

## 1.7 Summary of Test Results

| FCC Rules                   | Description Of Test                              | Uncertainty               | Result    |
|-----------------------------|--------------------------------------------------|---------------------------|-----------|
| §15.207 (a)                 | AC Power Conducted Emission                      | ±1.06dB                   | Compliant |
| §15.247(b)(3)               | Max. Conducted Output Power                      | ±1.06dB                   | Compliant |
| §15.247(a)(2)               | 6dB Bandwidth                                    | ±1.42 x10 <sup>-4</sup> % | Compliant |
| §15.247(e)                  | Power Spectral Density                           | ±1.06dB                   | Compliant |
| §15.247(d)                  | Band Edge and Conducted Spurious Emissions       | ±1.70dB                   | Compliant |
| §15.247(d),§15.209, §15.205 | Radiated Spurious Emissions and Restricted Bands | ±3.70dB                   | Compliant |
| §15.203                     | Antenna Requirement                              | N/A                       | Compliant |

---

## **2. System Test Configuration**

### **2.1 EUT Configuration**

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

### **2.2 Special Accessories**

Not available for this EUT intended for grant.

### **2.3 Description of test modes**

The EUT has been tested under continuous operating condition. Test program used to control the EUT staying in continuous transmitting mode. The Lowest, middle and highest channel were chosen for testing, and modulation type CCK, DQPSK, DBPSK, OFDM and all data rate were tested. But only the worst case data is shown in this report.

### **2.4 EUT Exercise**

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

### 3.1 Test SET-UP (Block Diagram of Configuration)

### 3.1 Test SET-UP (Block Diagram of Configuration)



**Operation Mode: TX**

**Please refer to following plots of the worst case: 802.11n(HT20) Low channel**



Dongguan NTC Co., Ltd.  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

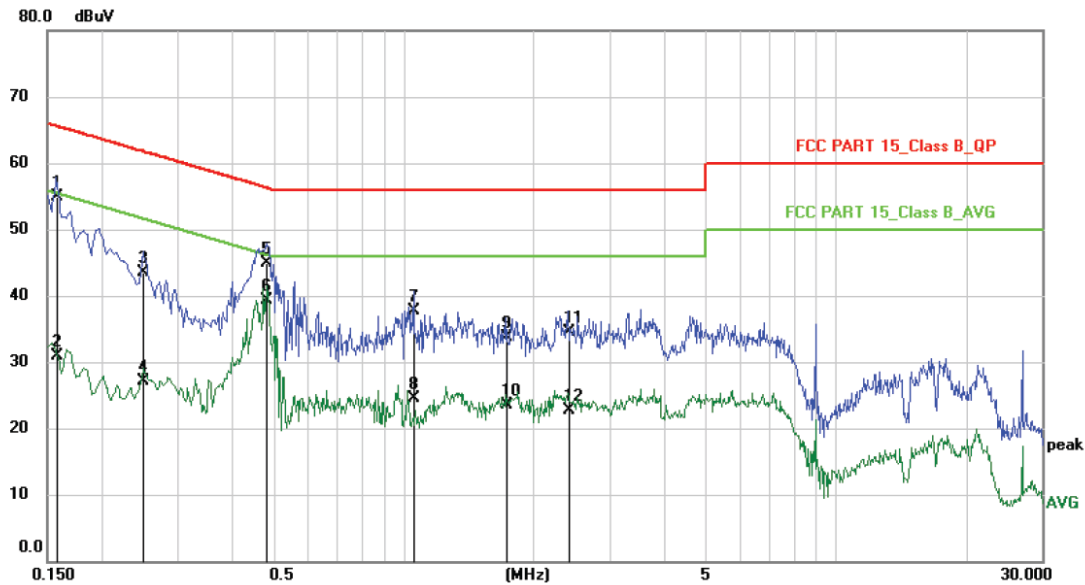
### Conducted Emission Measurement

File :MB51R-WT

Data :#20

Date: 2020/3/4

Time: 16:51:07



Site

Phase: **L1**

Temperature: 26

Limit: FCC PART 15\_Class B\_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Label Printer

M/N: MB51R-WT

Mode: TX(WIFI)

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1580       | 44.30                    | 10.60                   | 54.90                    | 65.57         | -10.67     | QP       |         |
| 2   |     | 0.1580       | 20.30                    | 10.60                   | 30.90                    | 55.57         | -24.67     | AVG      |         |
| 3   |     | 0.2500       | 33.00                    | 10.60                   | 43.60                    | 61.76         | -18.16     | QP       |         |
| 4   |     | 0.2500       | 16.50                    | 10.60                   | 27.10                    | 51.76         | -24.66     | AVG      |         |
| 5   |     | 0.4818       | 34.27                    | 10.63                   | 44.90                    | 56.31         | -11.41     | QP       |         |
| 6   | *   | 0.4818       | 28.77                    | 10.63                   | 39.40                    | 46.31         | -6.91      | AVG      |         |
| 7   |     | 1.0580       | 27.10                    | 10.70                   | 37.80                    | 56.00         | -18.20     | QP       |         |
| 8   |     | 1.0580       | 13.80                    | 10.70                   | 24.50                    | 46.00         | -21.50     | AVG      |         |
| 9   |     | 1.7338       | 23.00                    | 10.70                   | 33.70                    | 56.00         | -22.30     | QP       |         |
| 10  |     | 1.7338       | 12.80                    | 10.70                   | 23.50                    | 46.00         | -22.50     | AVG      |         |
| 11  |     | 2.4020       | 23.90                    | 10.70                   | 34.60                    | 56.00         | -21.40     | QP       |         |
| 12  |     | 2.4020       | 12.00                    | 10.70                   | 22.70                    | 46.00         | -23.30     | AVG      |         |



Dongguan NTC Co., Ltd.  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

### Conducted Emission Measurement

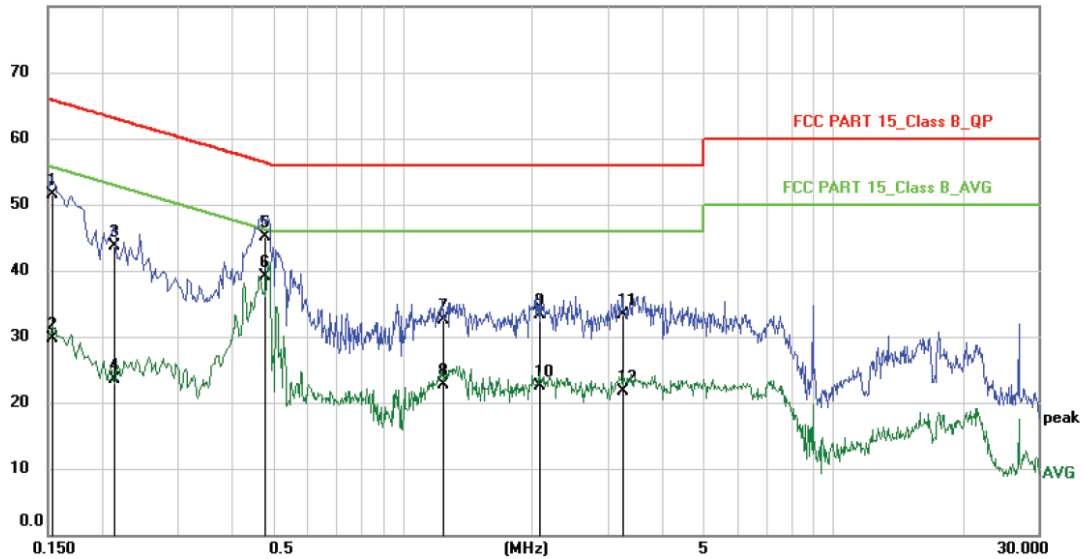
File : MB51R-WT

Data : #19

Date: 2020/3/4

Time: 16:43:24

80.0 dBuV



Site

Phase: **N**

Temperature: 26

Limit: FCC PART 15\_Class B\_QP

Power: AC120V/60Hz

Humidity: 50 %

EUT: Label Printer

M/N: MB51R-WT

Mode: TX(WIFI)

Note:

| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Over<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|------------|----------|---------|
| 1   |     | 0.1539       | 41.00                    | 10.60                   | 51.60                    | 65.79         | -14.19     | QP       |         |
| 2   |     | 0.1539       | 19.10                    | 10.60                   | 29.70                    | 55.79         | -26.09     | AVG      |         |
| 3   |     | 0.2139       | 33.10                    | 10.60                   | 43.70                    | 63.05         | -19.35     | QP       |         |
| 4   |     | 0.2139       | 13.00                    | 10.60                   | 23.60                    | 53.05         | -29.45     | AVG      |         |
| 5   |     | 0.4778       | 34.47                    | 10.63                   | 45.10                    | 56.38         | -11.28     | QP       |         |
| 6   | *   | 0.4778       | 28.57                    | 10.63                   | 39.20                    | 46.38         | -7.18      | AVG      |         |
| 7   |     | 1.2419       | 21.90                    | 10.70                   | 32.60                    | 56.00         | -23.40     | QP       |         |
| 8   |     | 1.2419       | 12.10                    | 10.70                   | 22.80                    | 46.00         | -23.20     | AVG      |         |
| 9   |     | 2.0859       | 22.70                    | 10.70                   | 33.40                    | 56.00         | -22.60     | QP       |         |
| 10  |     | 2.0859       | 11.80                    | 10.70                   | 22.50                    | 46.00         | -23.50     | AVG      |         |
| 11  |     | 3.2418       | 22.69                    | 10.71                   | 33.40                    | 56.00         | -22.60     | QP       |         |
| 12  |     | 3.2418       | 10.99                    | 10.71                   | 21.70                    | 46.00         | -24.30     | AVG      |         |

## 4. Max. Peak Conducted Output Power

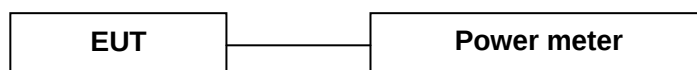
### 4.1 Measurement Procedure

Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Results

**Pass**

Please refer to following table.

|                                                    |                   |                          |                |
|----------------------------------------------------|-------------------|--------------------------|----------------|
| Temperature :                                      | 22 °C             | Humidity :               | 53%            |
| Test By:                                           | Sance             | Test Date :              | April 29, 2020 |
| Test Result:                                       | PASS              |                          |                |
| Frequency<br>MHz                                   | Data Rate<br>Mbps | Peak Output Power<br>dBm | Limit<br>dBm   |
| IEEE 802.11b Mode (CCK, Antenna Gain=2 dBi)        |                   |                          |                |
| Low Channel: 2412                                  | 1                 | 12.93                    | 30             |
| Middle Channel: 2437                               | 1                 | 12.20                    | 30             |
| High Channel: 2462                                 | 1                 | 11.23                    | 30             |
| IEEE 802.11g Mode (OFDM, Antenna Gain=2 dBi)       |                   |                          |                |
| Low Channel: 2412                                  | 6                 | 12.96                    | 30             |
| Middle Channel: 2437                               | 6                 | 12.43                    | 30             |
| High Channel: 2462                                 | 6                 | 11.44                    | 30             |
| IEEE 802.11n(HT20) Mode (OFDM, Antenna Gain=2 dBi) |                   |                          |                |
| Low Channel: 2412                                  | 6.5               | 13.03                    | 30             |
| Middle Channel: 2437                               | 6.5               | 12.15                    | 30             |
| High Channel: 2462                                 | 6.5               | 11.53                    | 30             |
| IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=2 dBi) |                   |                          |                |
| Low Channel: 2422                                  | 13.5              | 9.87                     | 30             |
| Middle Channel: 2437                               | 13.5              | 10.32                    | 30             |
| High Channel: 2452                                 | 13.5              | 10.71                    | 30             |
| Duty Cycle of test signal is ≥98%                  |                   |                          |                |

Note: CCK was worst case of the 802.11b

## 5. 6dB Bandwidth

### 5.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074(v05):

1. Set resolution bandwidth (RBW) = 100kHz
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Results

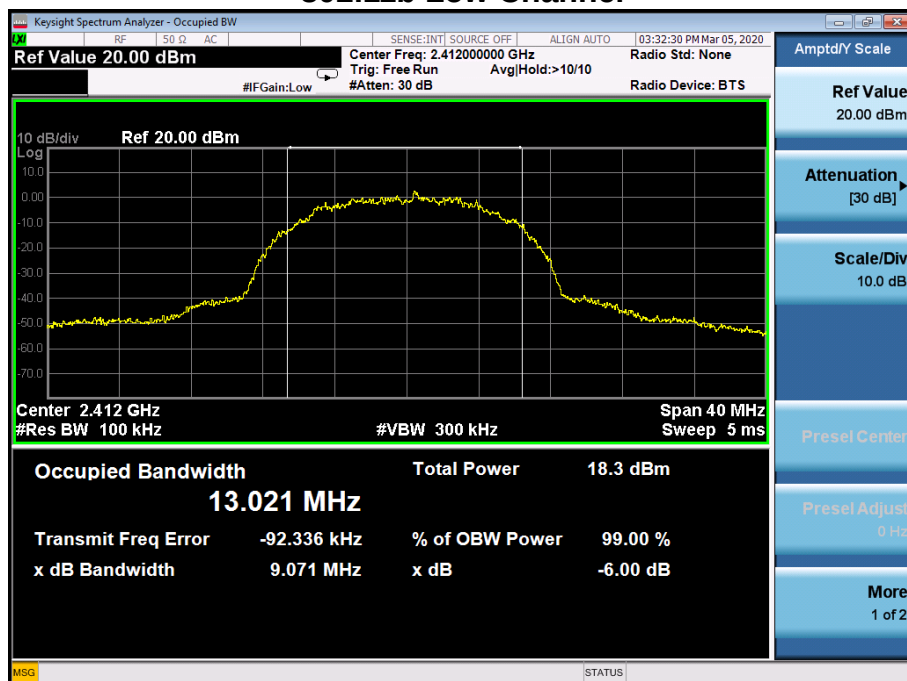
**Pass**

Please refer to following table and plots.

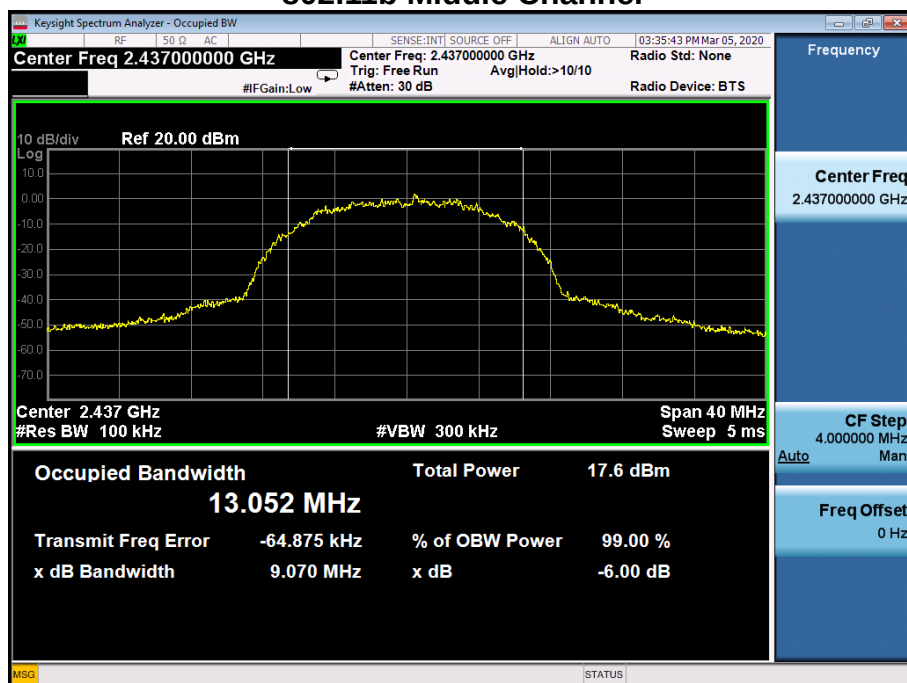
|                                |                   |                                                             |         |
|--------------------------------|-------------------|-------------------------------------------------------------|---------|
| Temperature :                  | 22 °C             | Humidity : 53 %                                             |         |
| Test By:                       | Sance             | Test Date : March 05, 2020;<br>June 04, 2020; June 05, 2020 |         |
| Test Result:                   | PASS              |                                                             |         |
| Frequency<br>MHz               | Data Rate<br>Mbps | 6dB Bandwidth<br>MHz                                        | Limit   |
| IEEE 802.11b Mode (CCK)        |                   |                                                             |         |
| Low Channel: 2412              | 1                 | 9.071                                                       | >500KHz |
| Middle Channel: 2437           | 1                 | 9.070                                                       | >500KHz |
| High Channel: 2462             | 1                 | 9.071                                                       | >500KHz |
| IEEE 802.11g Mode (OFDM)       |                   |                                                             |         |
| Low Channel: 2412              | 6                 | 16.252                                                      | >500KHz |
| Middle Channel: 2437           | 6                 | 16.255                                                      | >500KHz |
| High Channel: 2462             | 6                 | 16.247                                                      | >500KHz |
| IEEE 802.11n(HT20) Mode (OFDM) |                   |                                                             |         |
| Low Channel: 2412              | 6.5               | 16.995                                                      | >500KHz |
| Middle Channel: 2437           | 6.5               | 17.003                                                      | >500KHz |
| High Channel: 2462             | 6.5               | 16.780                                                      | >500KHz |
| IEEE 802.11n(HT40) Mode (OFDM) |                   |                                                             |         |
| Low Channel: 2422              | 13.5              | 35.75                                                       | >500KHz |
| Middle Channel: 2437           | 13.5              | 36.29                                                       | >500KHz |
| High Channel: 2452             | 13.5              | 36.28                                                       | >500KHz |

Note: CCK was worst case of the 802.11b

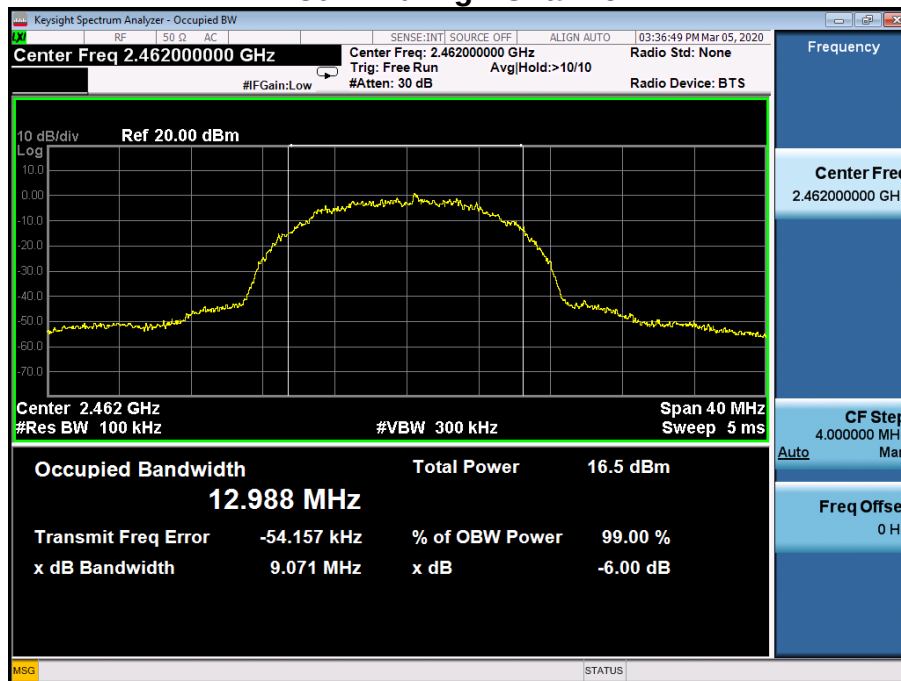
## 802.11b Low Channel



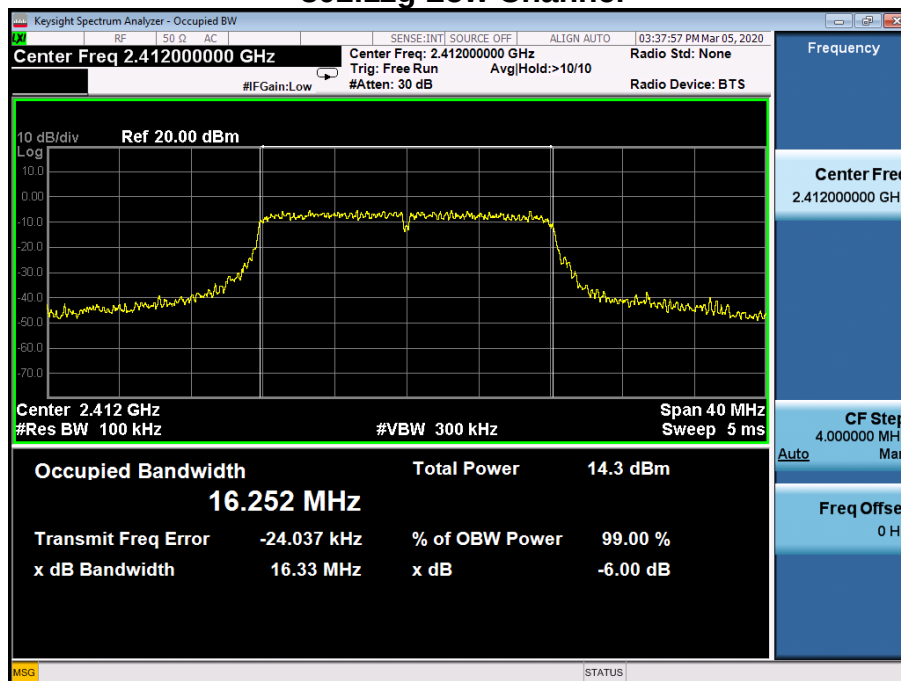
## 802.11b Middle Channel



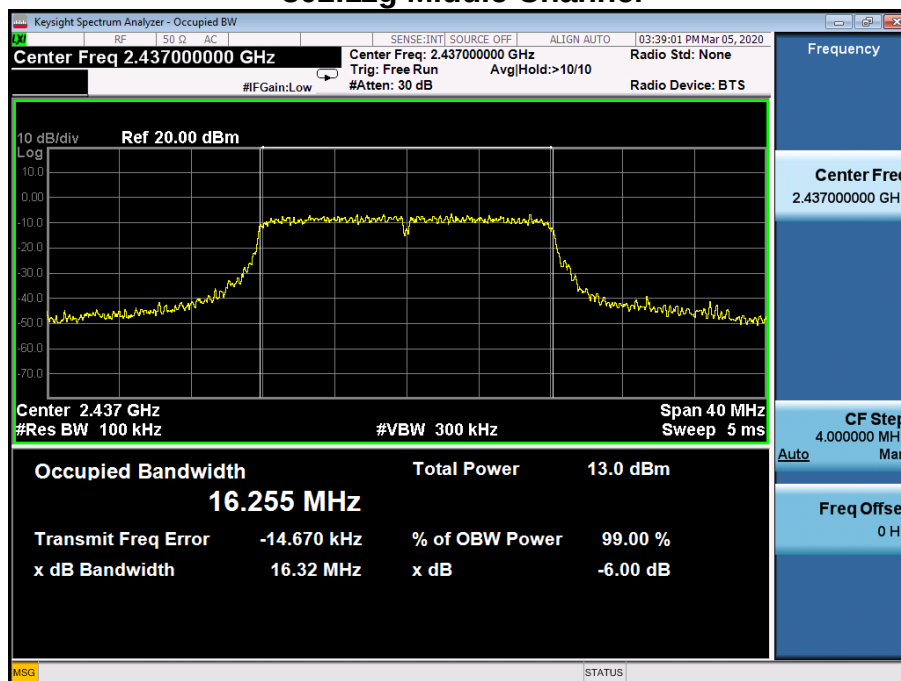
## 802.11b High Channel



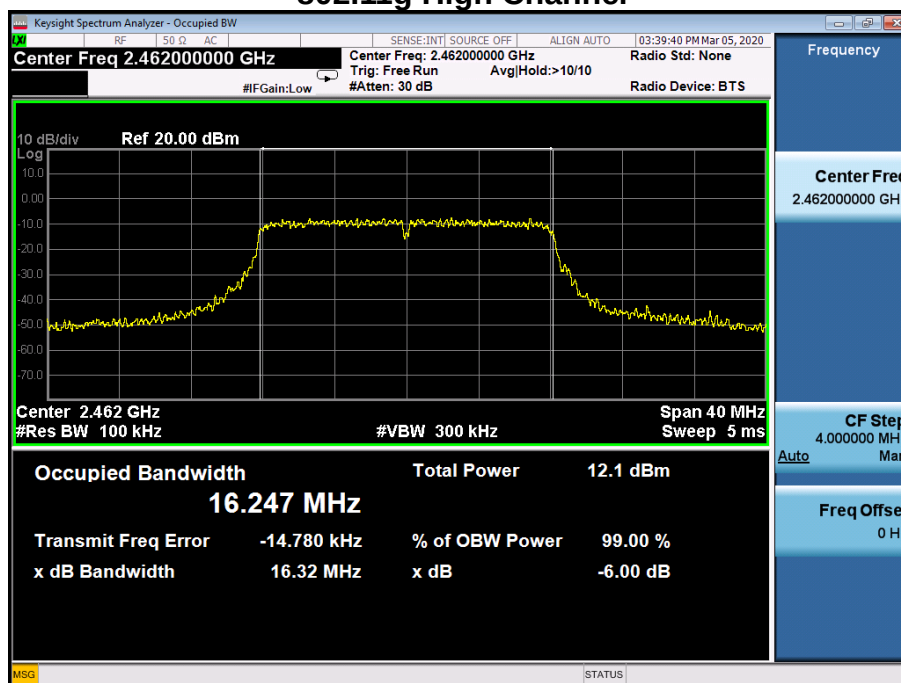
## 802.11g Low Channel



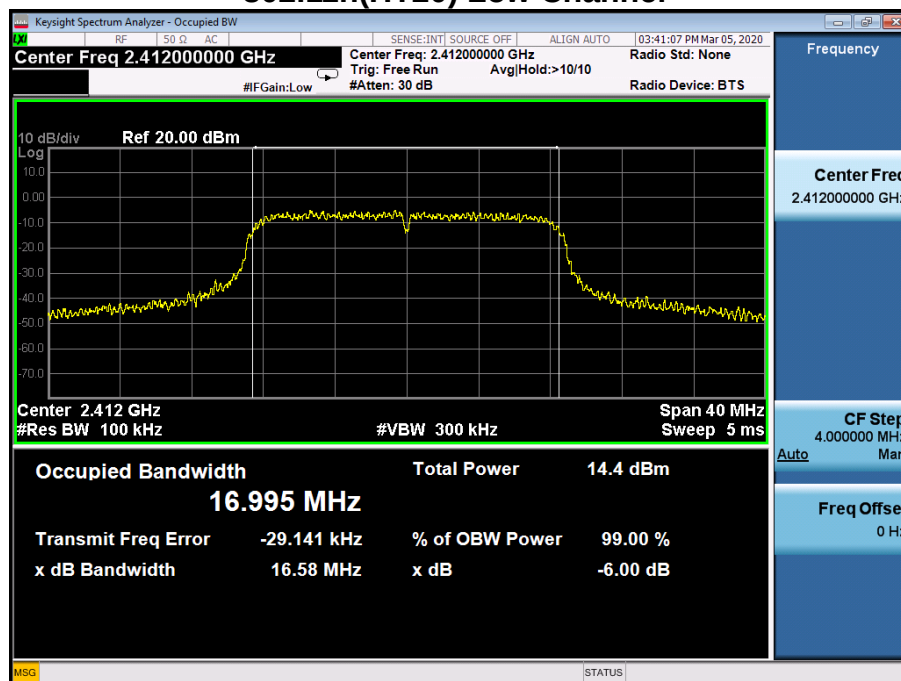
## 802.11g Middle Channel



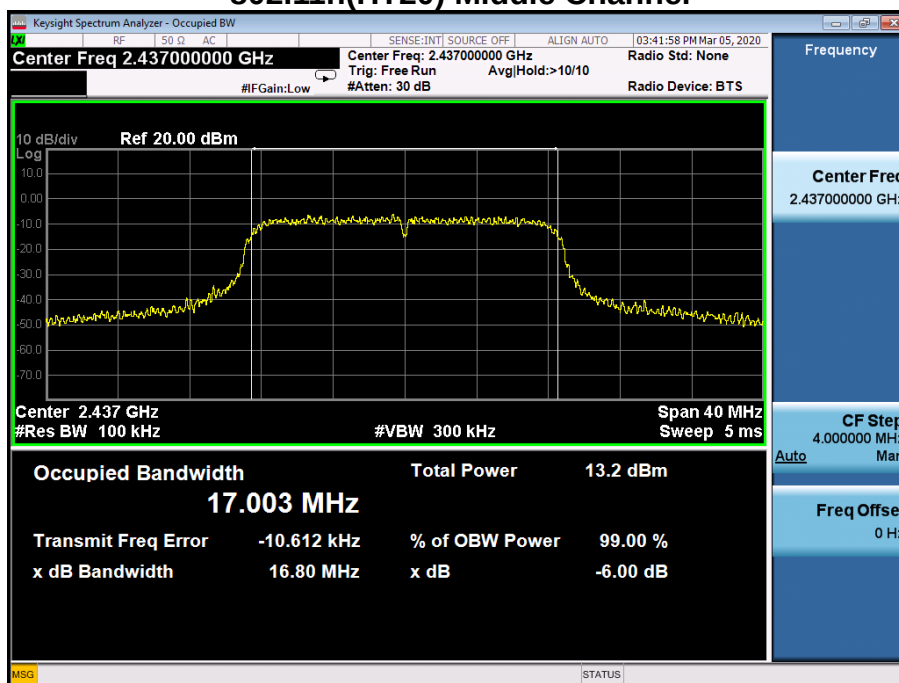
## 802.11g High Channel



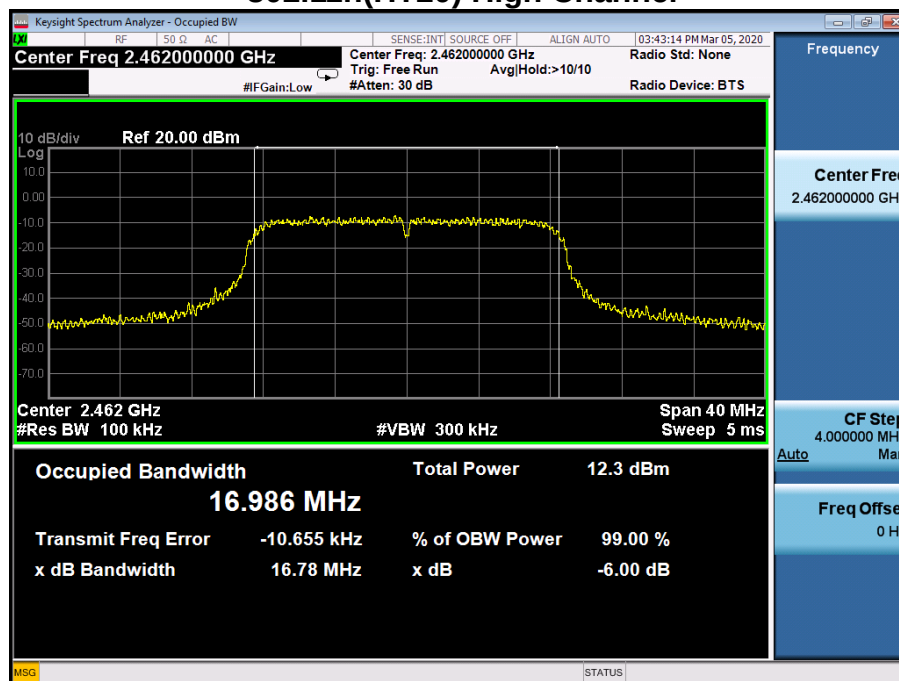
## 802.11n(HT20) Low Channel



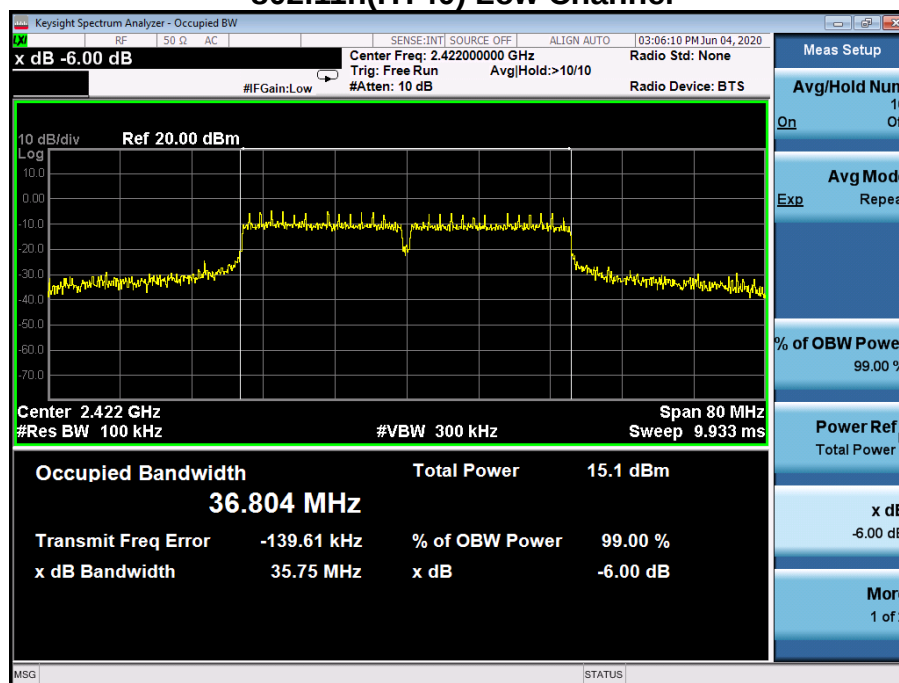
## 802.11n(HT20) Middle Channel



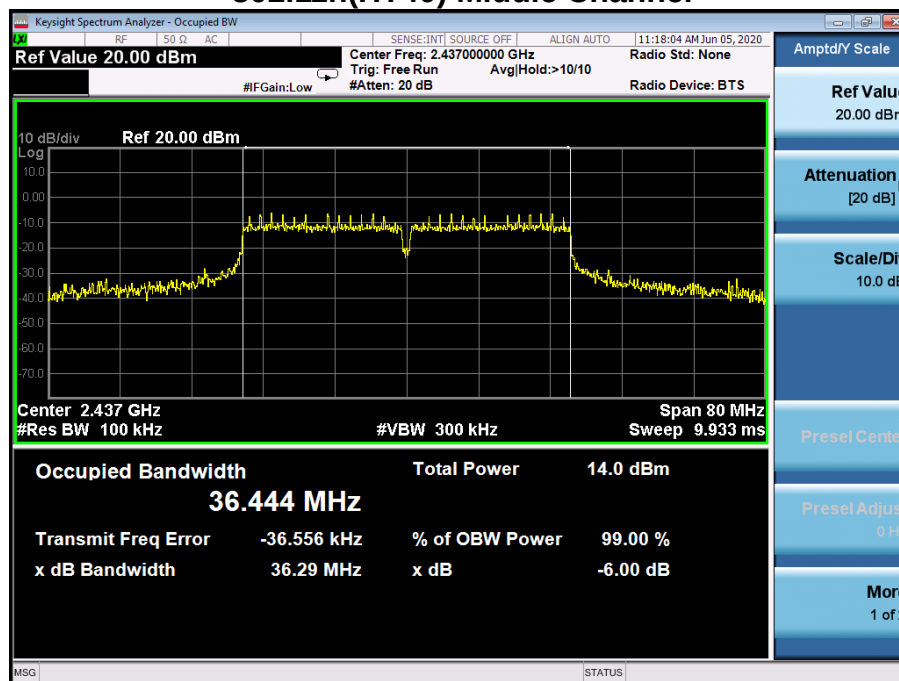
### 802.11n(HT20) High Channel



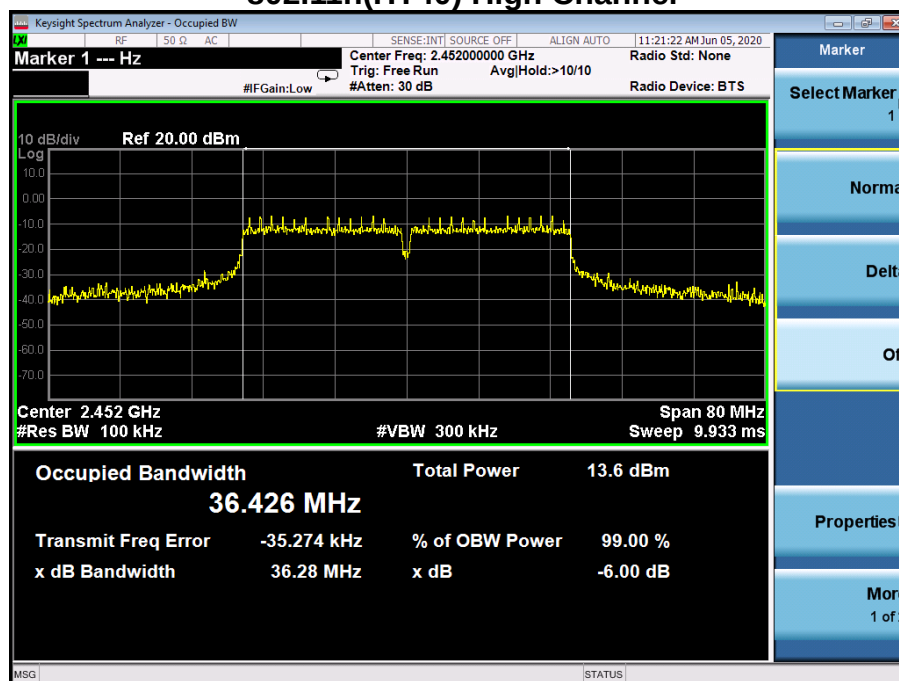
### 802.11n(HT40) Low Channel



## 802.11n(HT40) Middle Channel



## 802.11n(HT40) High Channel



## 6. Power Spectral Density

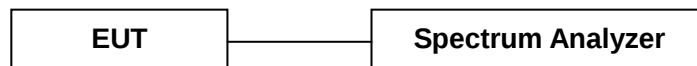
### 6.1 Measurement Procedure

Power Spectral Density, FCC Rule 15.247(e):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to FCC KDB558074 (v05):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ KHz}$
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.2 Test SET-UP (Block Diagram of Configuration)



### 6.3 Measurement Results

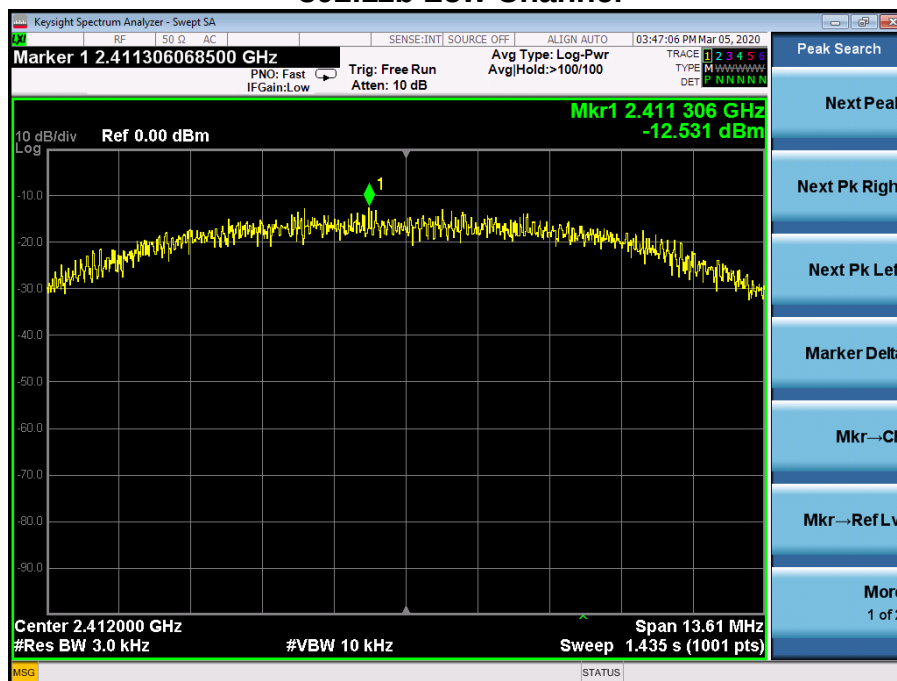
**Pass**

Please refer to following table and plots.

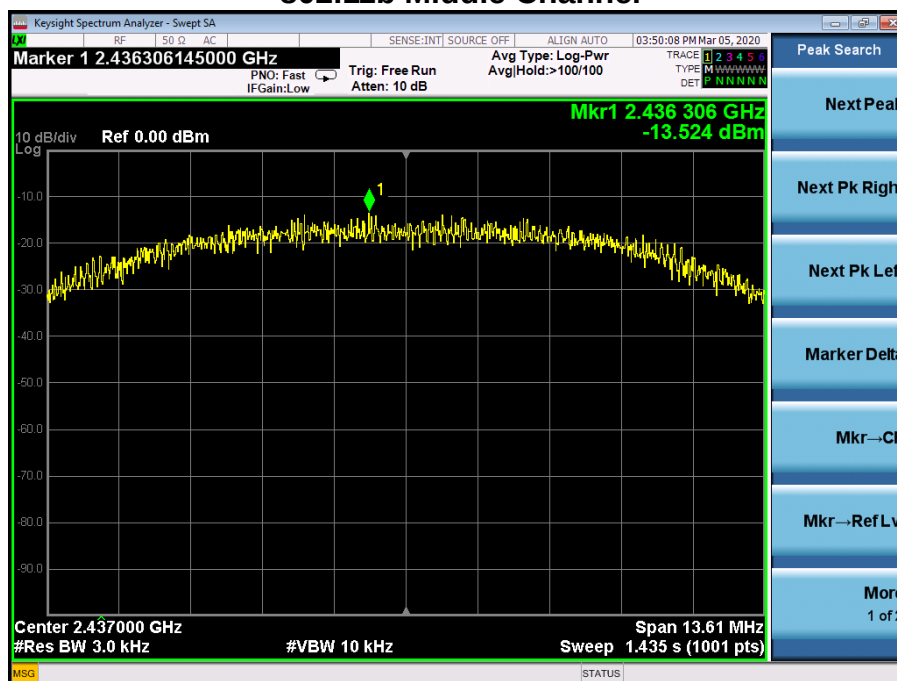
|                                |                   |                 |                                                    |
|--------------------------------|-------------------|-----------------|----------------------------------------------------|
| Temperature :                  | 22 °C             | Humidity :      | 53 %                                               |
| Test By:                       | Sance             | Test Date :     | March 05, 2020;<br>June 04, 2020;<br>June 05, 2020 |
| Test Result:                   | PASS              |                 |                                                    |
| Frequency<br>MHz               | Data Rate<br>Mbps | PSD<br>dBm/3kHz | Limit<br>dBm/3kHz                                  |
| IEEE 802.11b Mode (CCK)        |                   |                 |                                                    |
| Low Channel: 2412              | 1                 | -12.531         | 8                                                  |
| Middle Channel: 2437           | 1                 | -13.524         | 8                                                  |
| High Channel: 2462             | 1                 | -14.530         | 8                                                  |
| IEEE 802.11g Mode (OFDM)       |                   |                 |                                                    |
| Low Channel: 2412              | 6                 | -18.999         | 8                                                  |
| Middle Channel: 2437           | 6                 | -20.019         | 8                                                  |
| High Channel: 2462             | 6                 | -21.040         | 8                                                  |
| IEEE 802.11n(HT20) Mode (OFDM) |                   |                 |                                                    |
| Low Channel: 2412              | 6.5               | -19.153         | 8                                                  |
| Middle Channel: 2437           | 6.5               | -20.098         | 8                                                  |
| High Channel: 2462             | 6.5               | -21.045         | 8                                                  |
| IEEE 802.11n(HT40) Mode (OFDM) |                   |                 |                                                    |
| Low Channel: 2422              | 13.5              | -19.378         | 8                                                  |
| Middle Channel: 2437           | 13.5              | -19.735         | 8                                                  |
| High Channel: 2452             | 13.5              | -19.894         | 8                                                  |

Note: CCK was worst case of the 802.11b

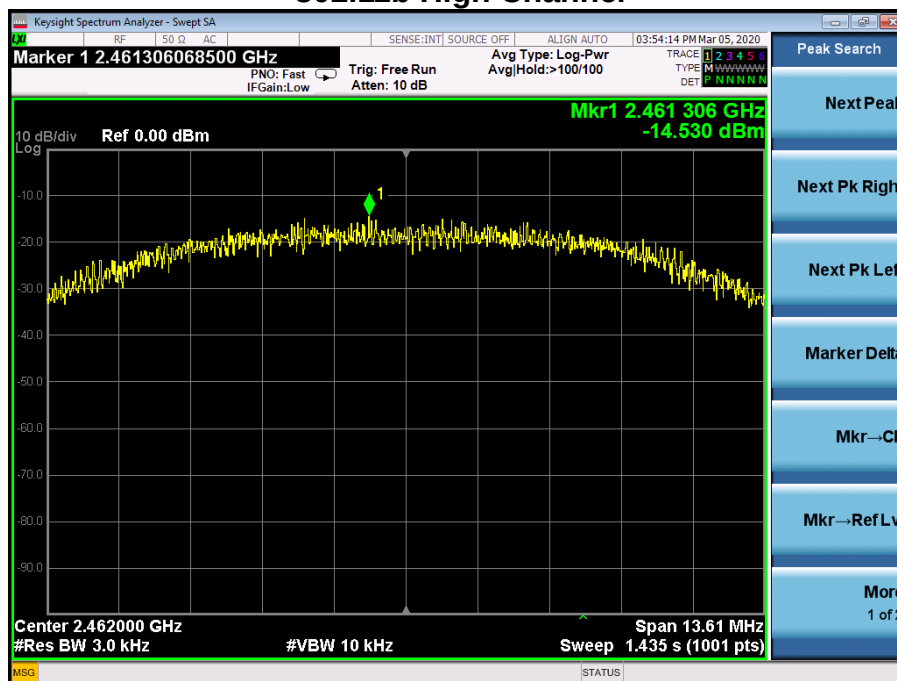
## 802.11b Low Channel



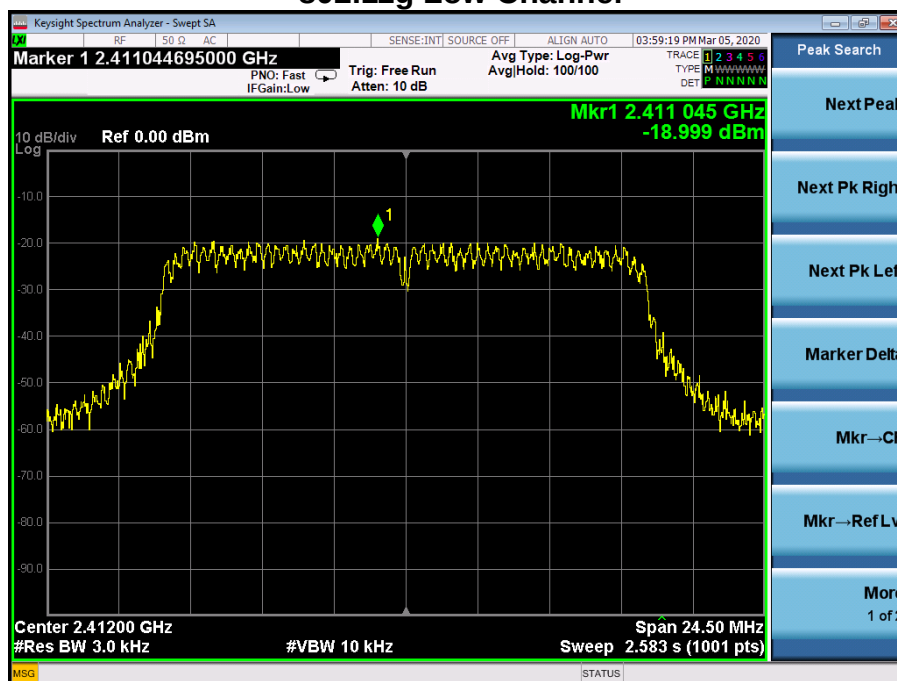
## 802.11b Middle Channel



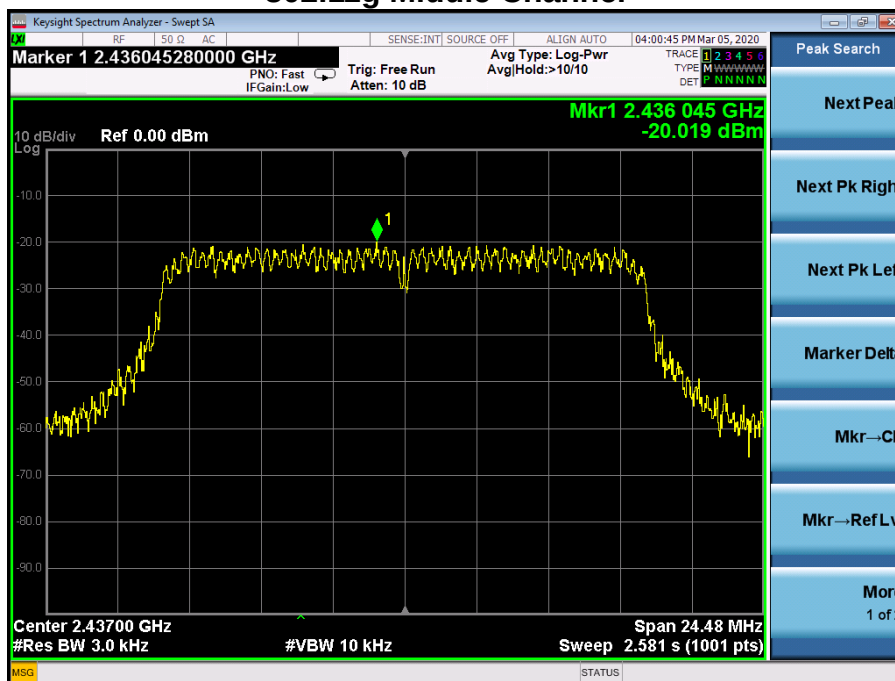
## 802.11b High Channel



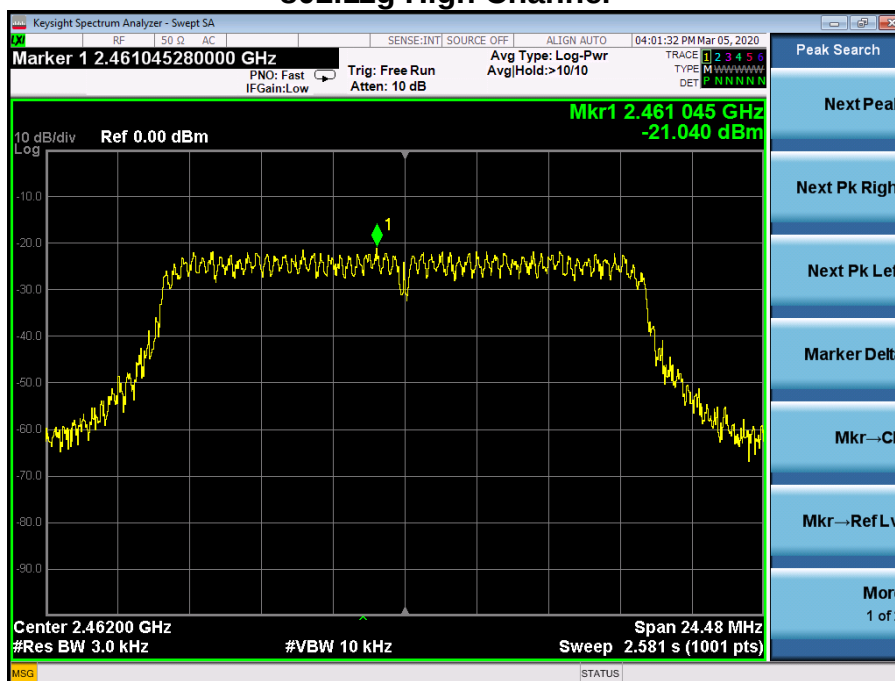
## 802.11g Low Channel



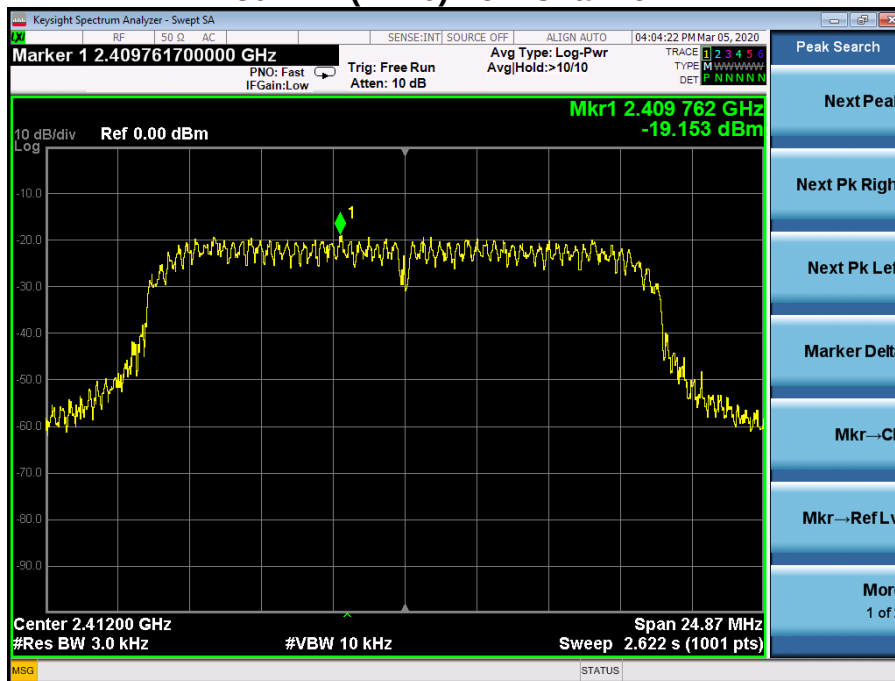
## 802.11g Middle Channel



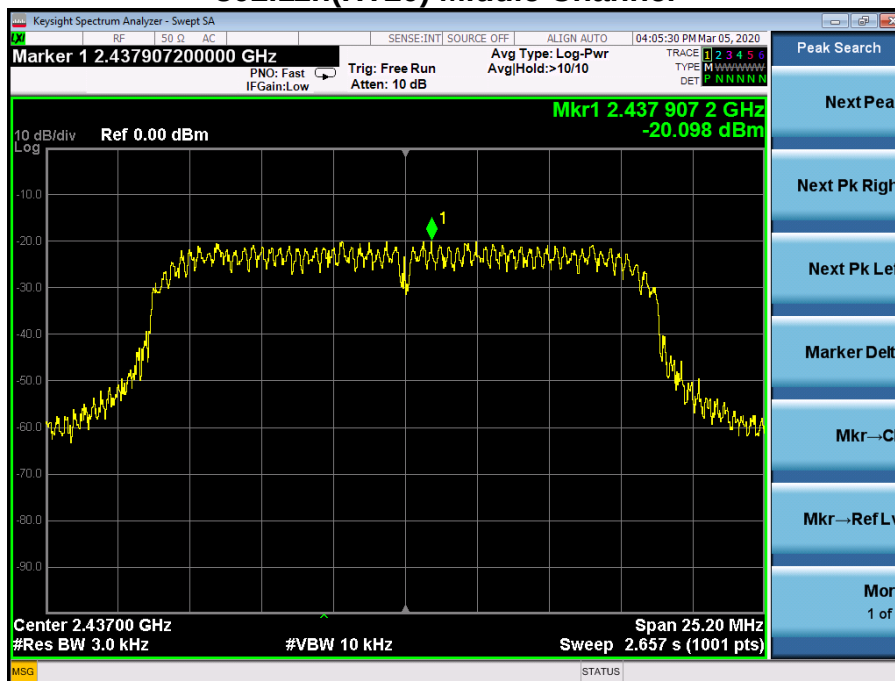
## 802.11g High Channel



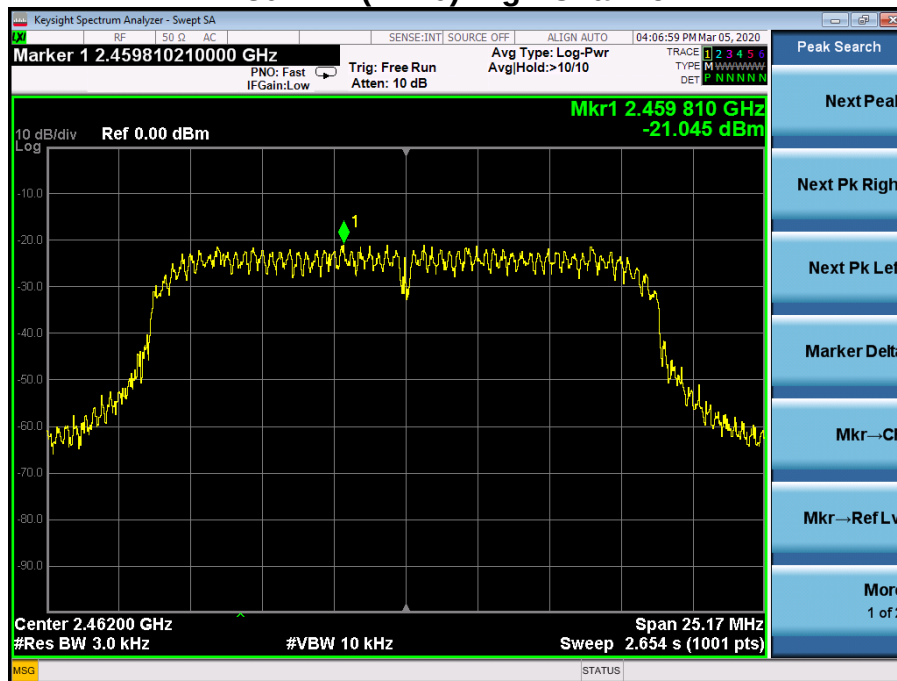
### 802.11n(HT20) Low Channel



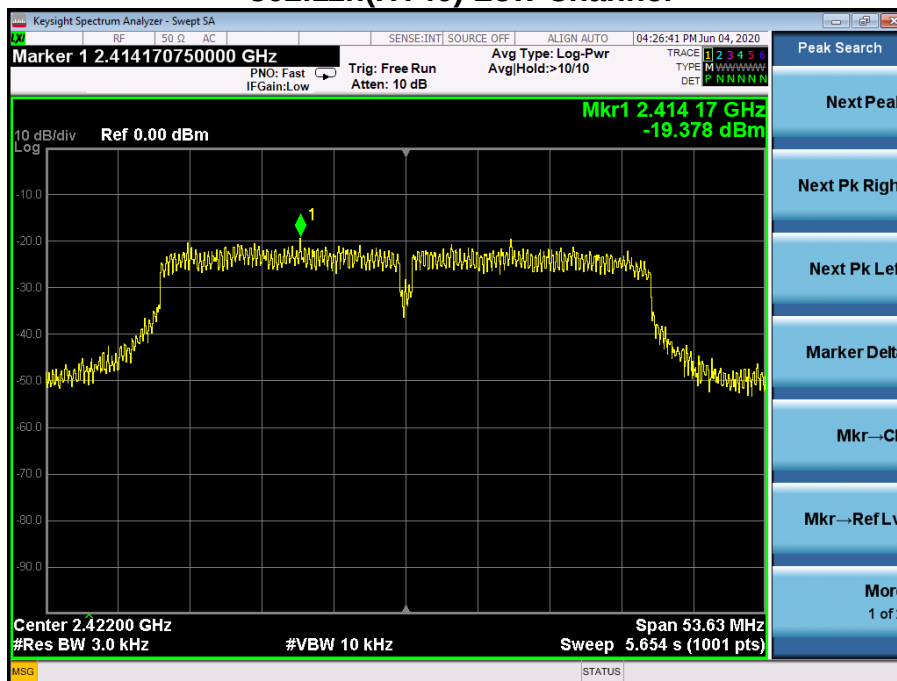
### 802.11n(HT20) Middle Channel



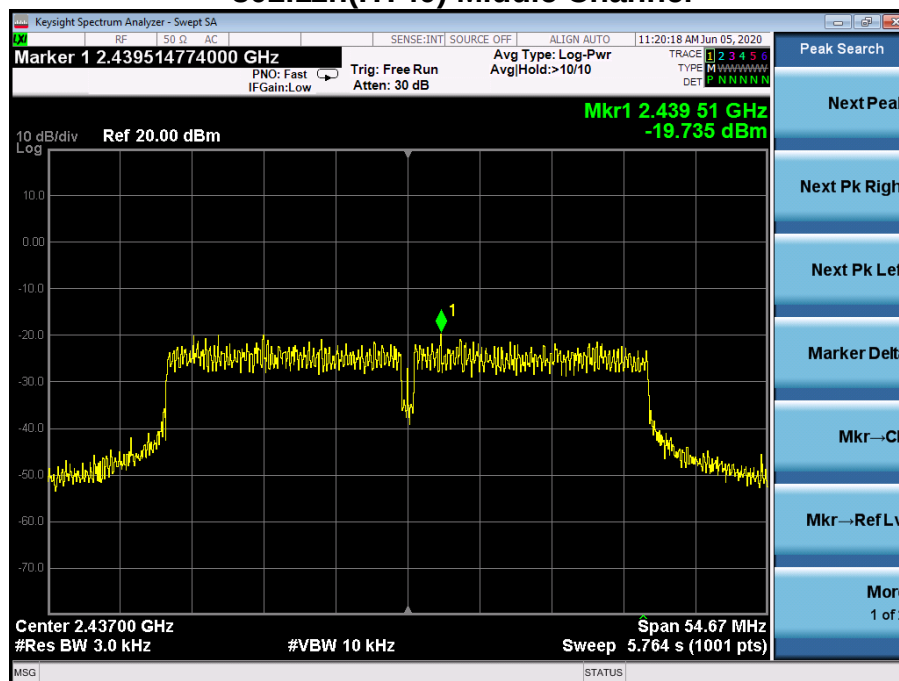
### 802.11n(HT20) High Channel



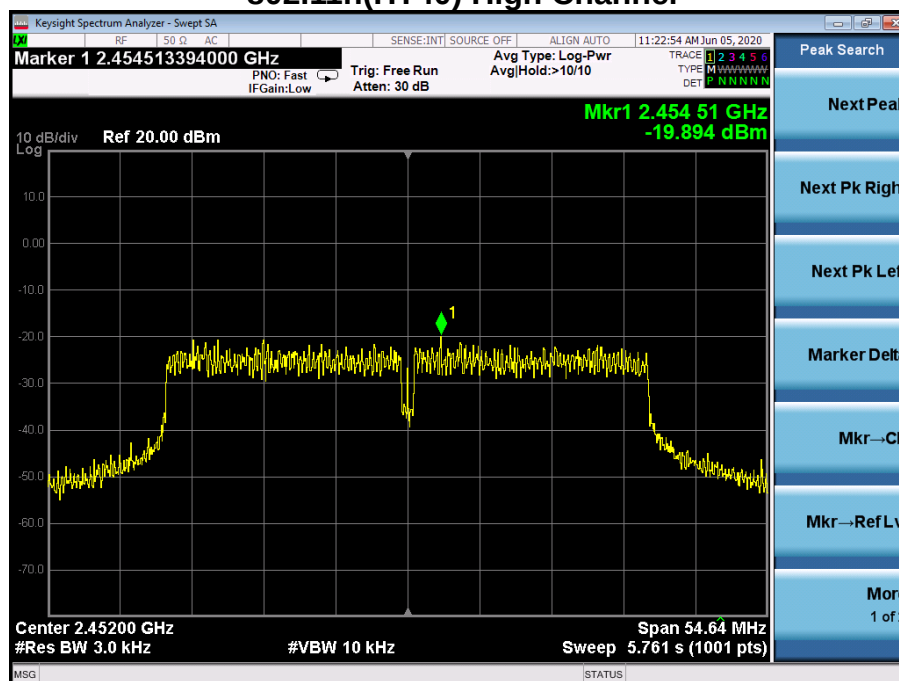
### 802.11n(HT40) Low Channel



### 802.11n(HT40) Middle Channel



### 802.11n(HT40) High Channel



## 7. Band Edge and Conducted Spurious Emissions

### 7.1 Requirement and Measurement Procedure

In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below.

#### MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

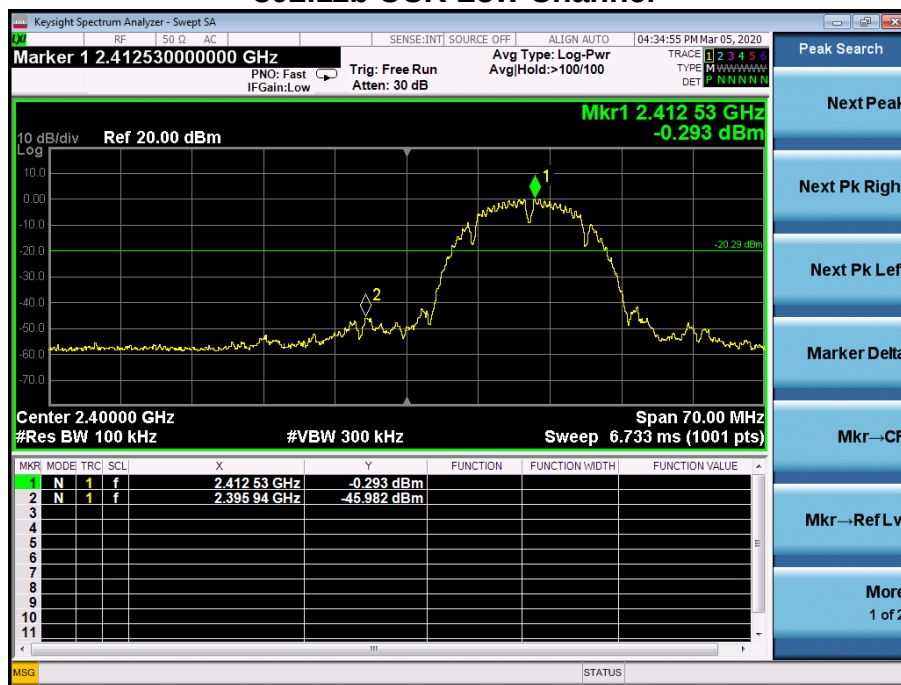
### 7.2 Test SET-UP (Block Diagram of Configuration)



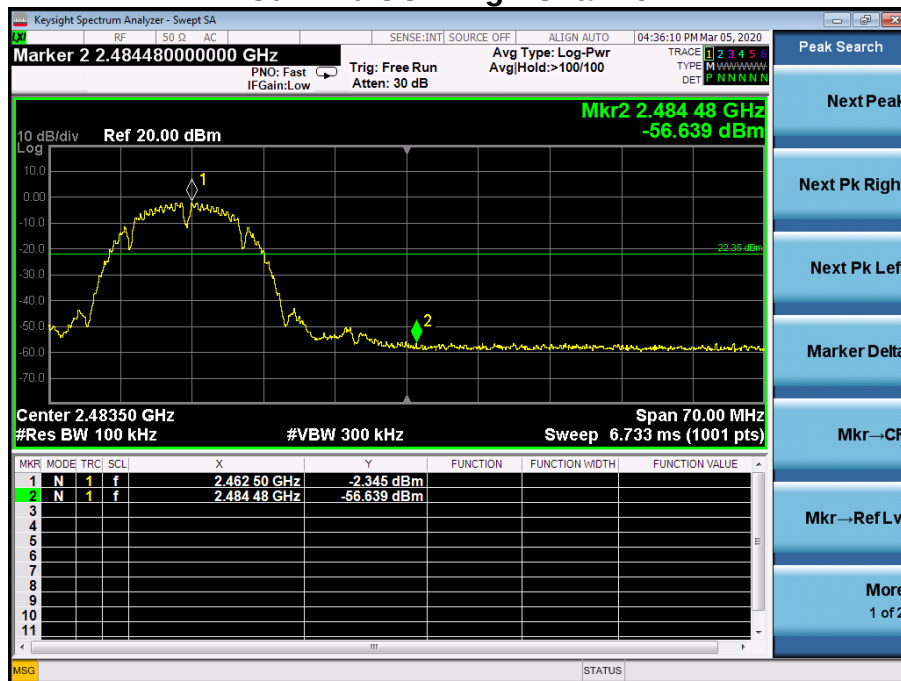
### 7.3 Measurement Results

The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

## Band Edge 802.11b CCK Low Channel

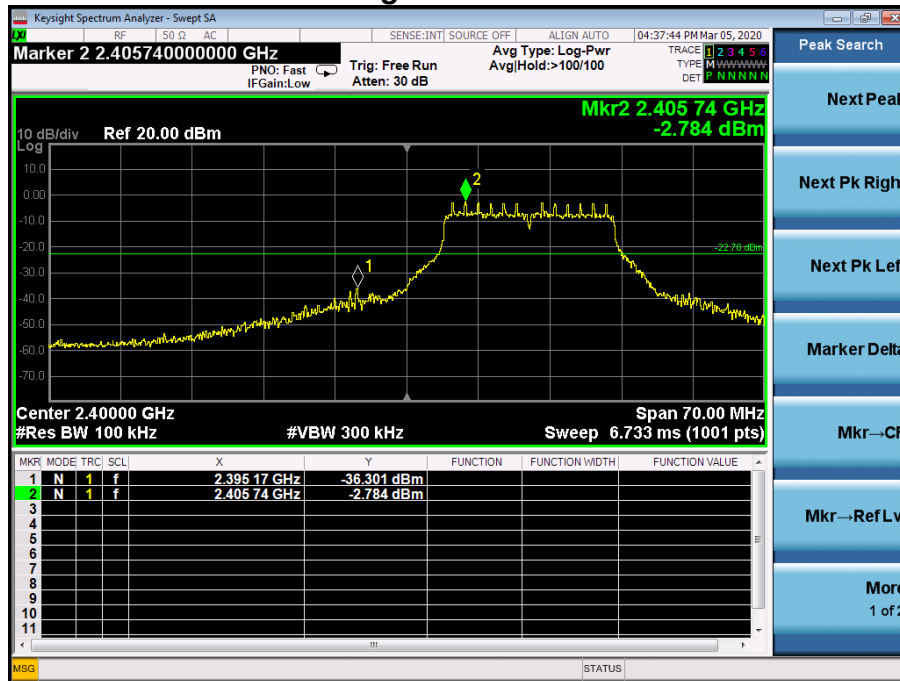


## 802.11b CCK High Channel

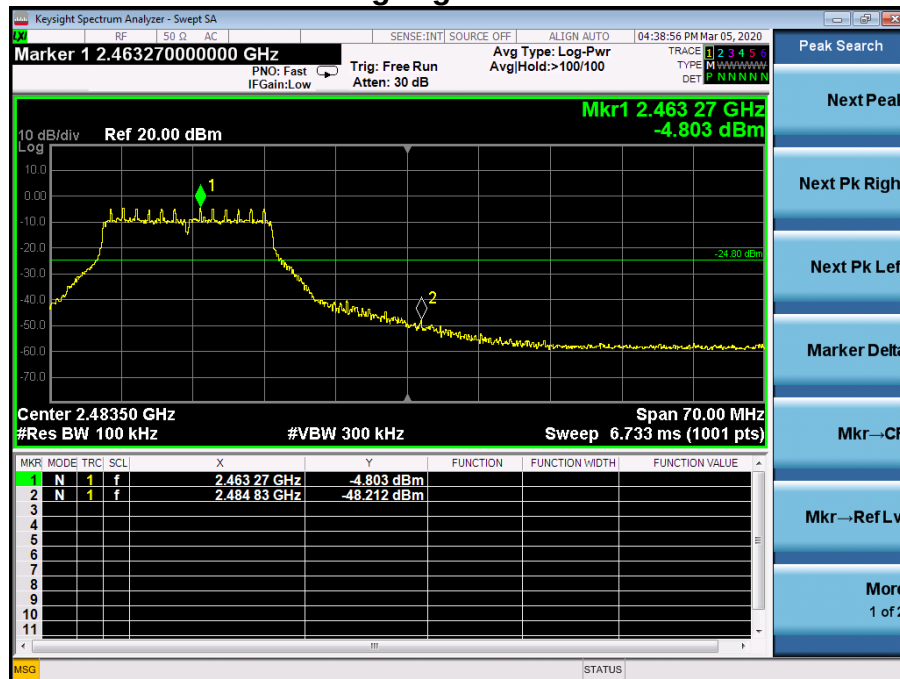


Note: CCK was worst case of the 802.11b

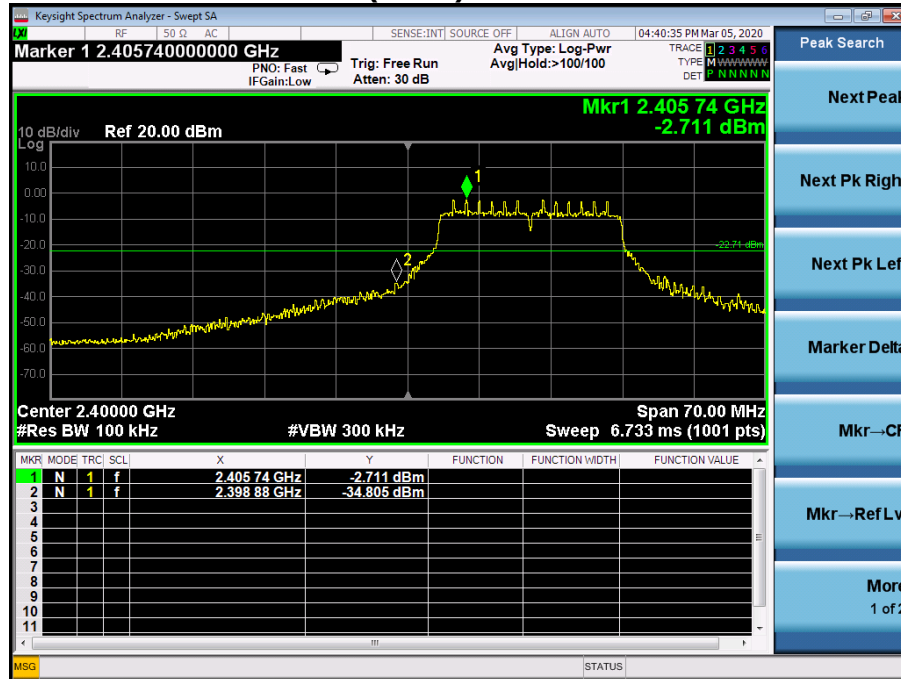
### 802.11g Low Channel



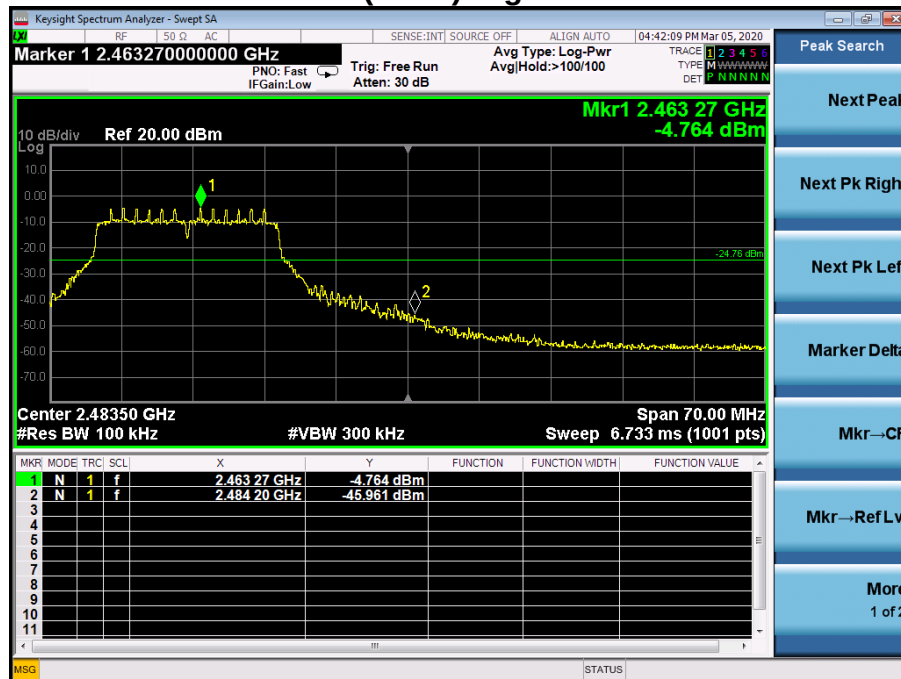
### 802.11g High Channel



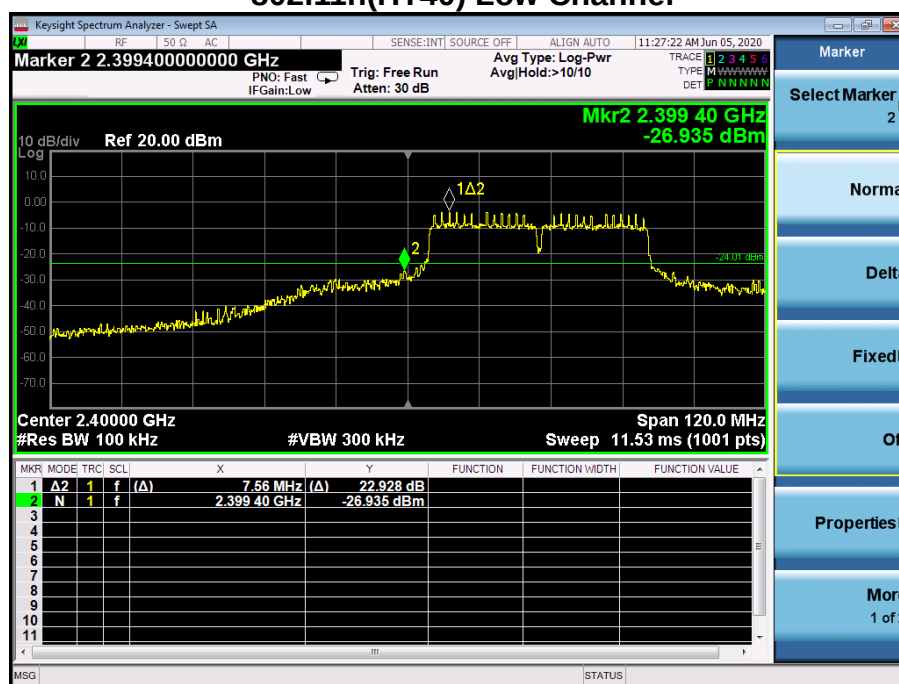
### 802.11n(HT20) Low Channel



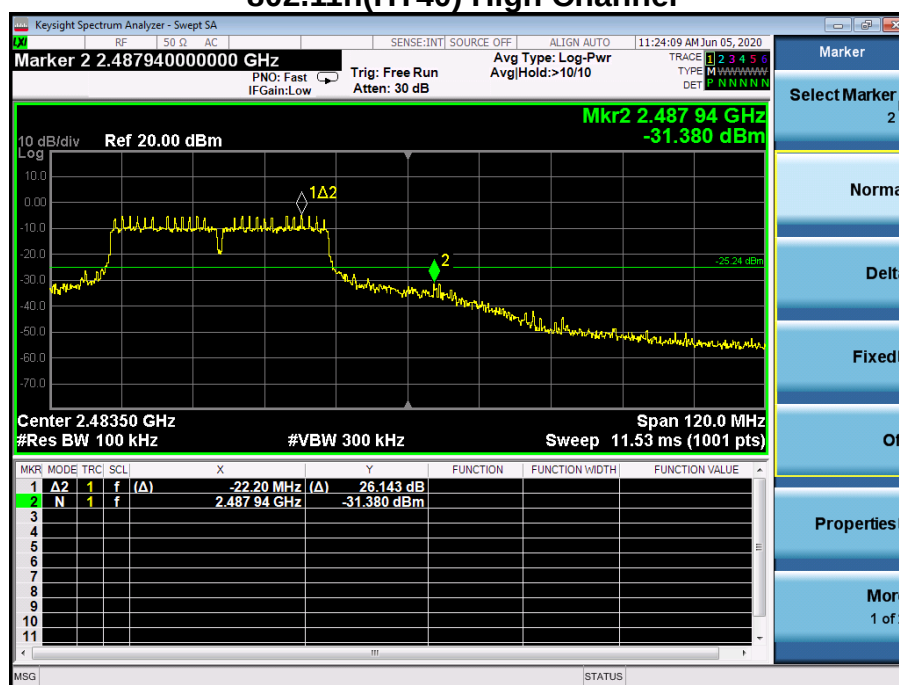
### 802.11n(HT20) High Channel



## 802.11n(HT40) Low Channel



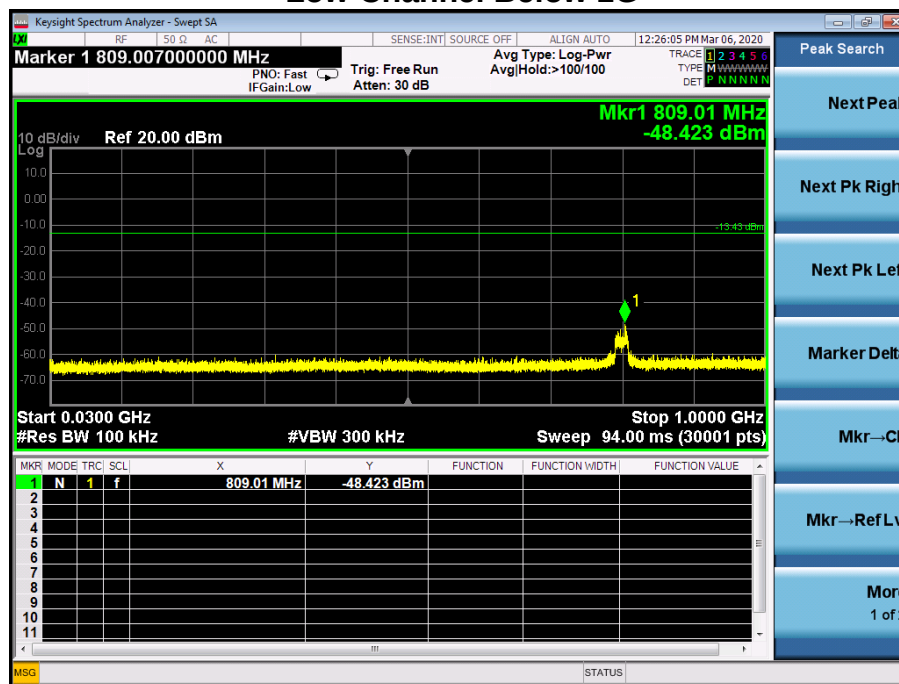
## 802.11n(HT40) High Channel



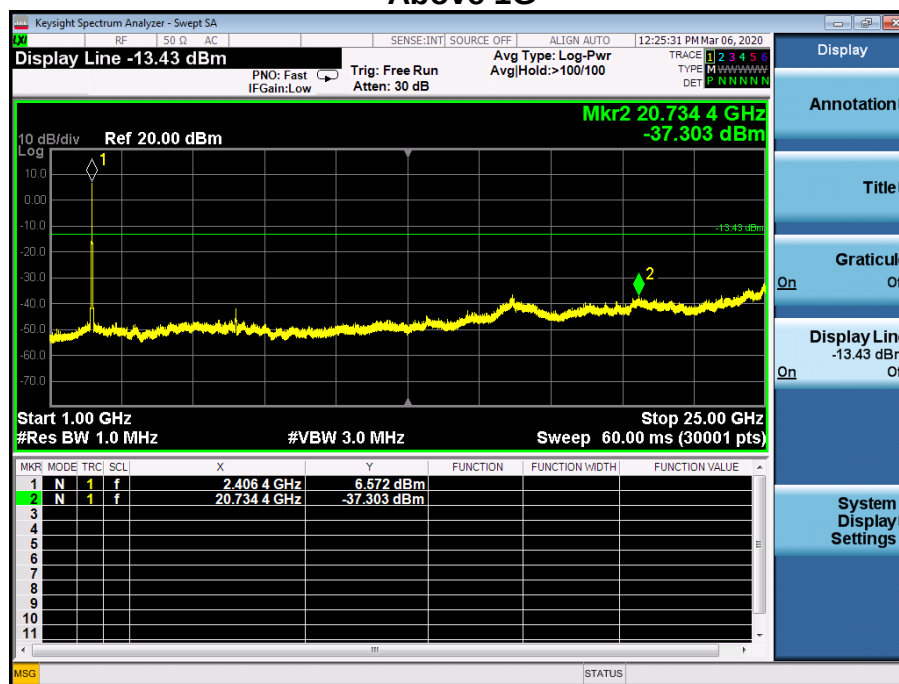
## Conducted Spurious Emissions

### The worst case: 802.11n(20)

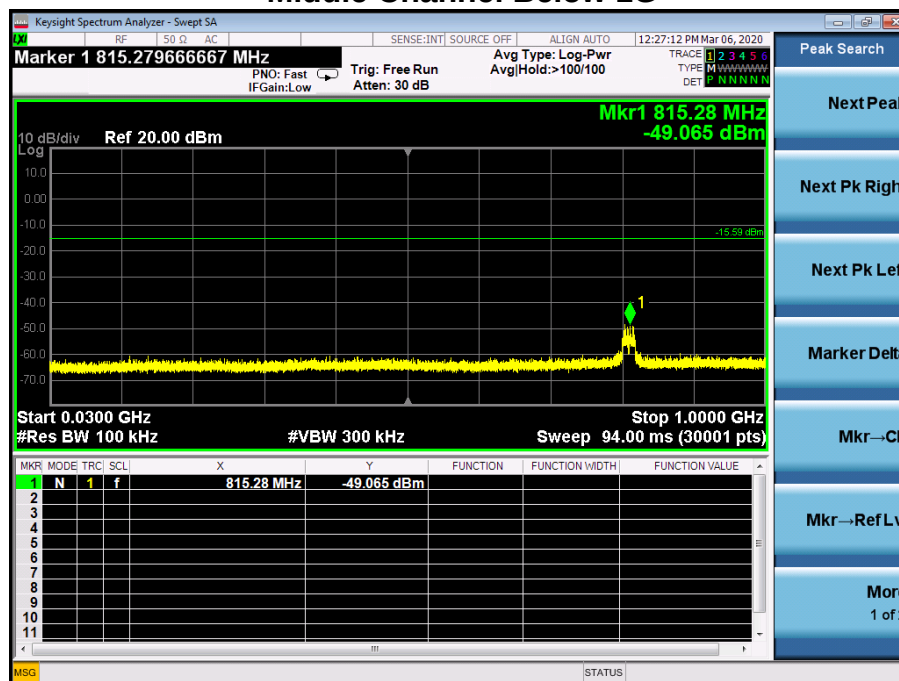
### Low Channel Below 1G



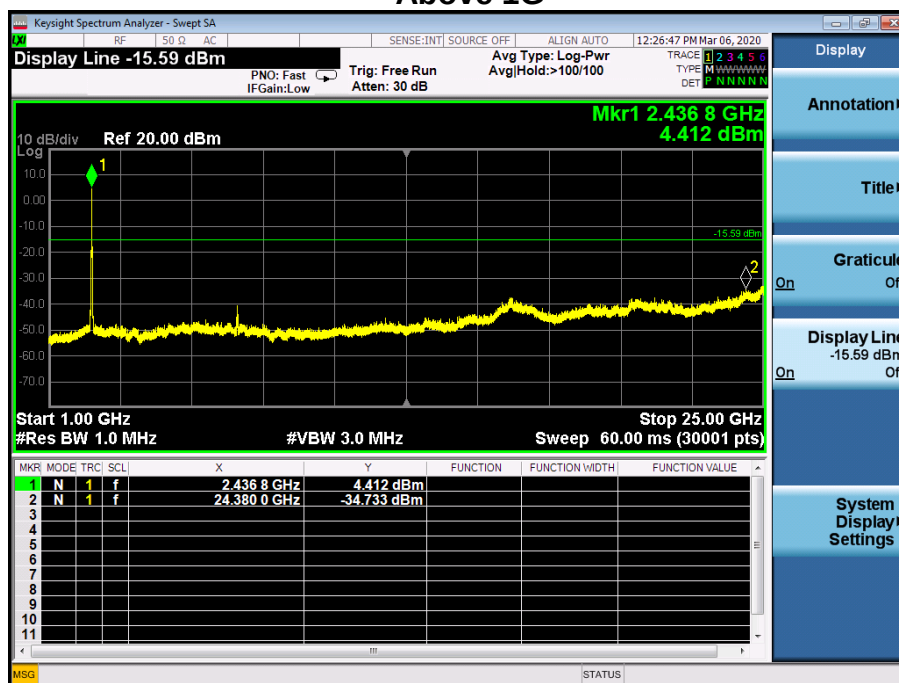
### Above 1G



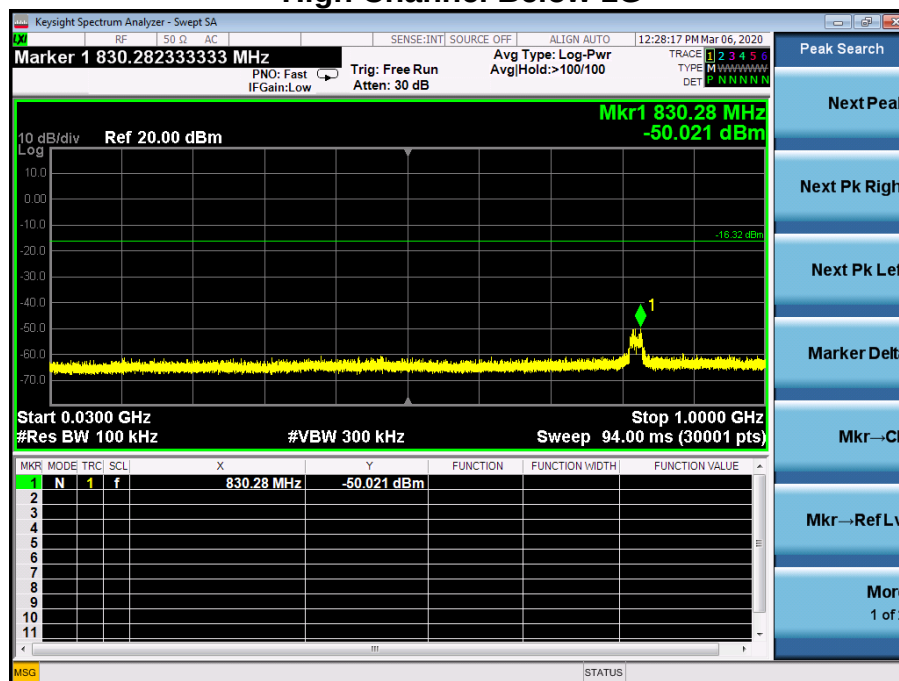
### Middle Channel Below 1G



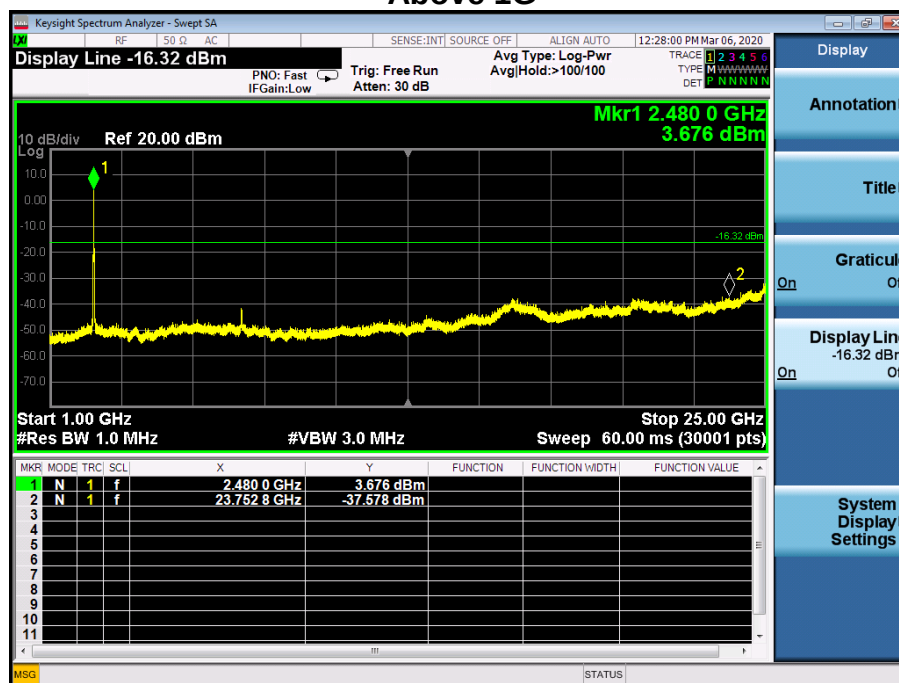
### Above 1G



## High Channel Below 1G



## Above 1G

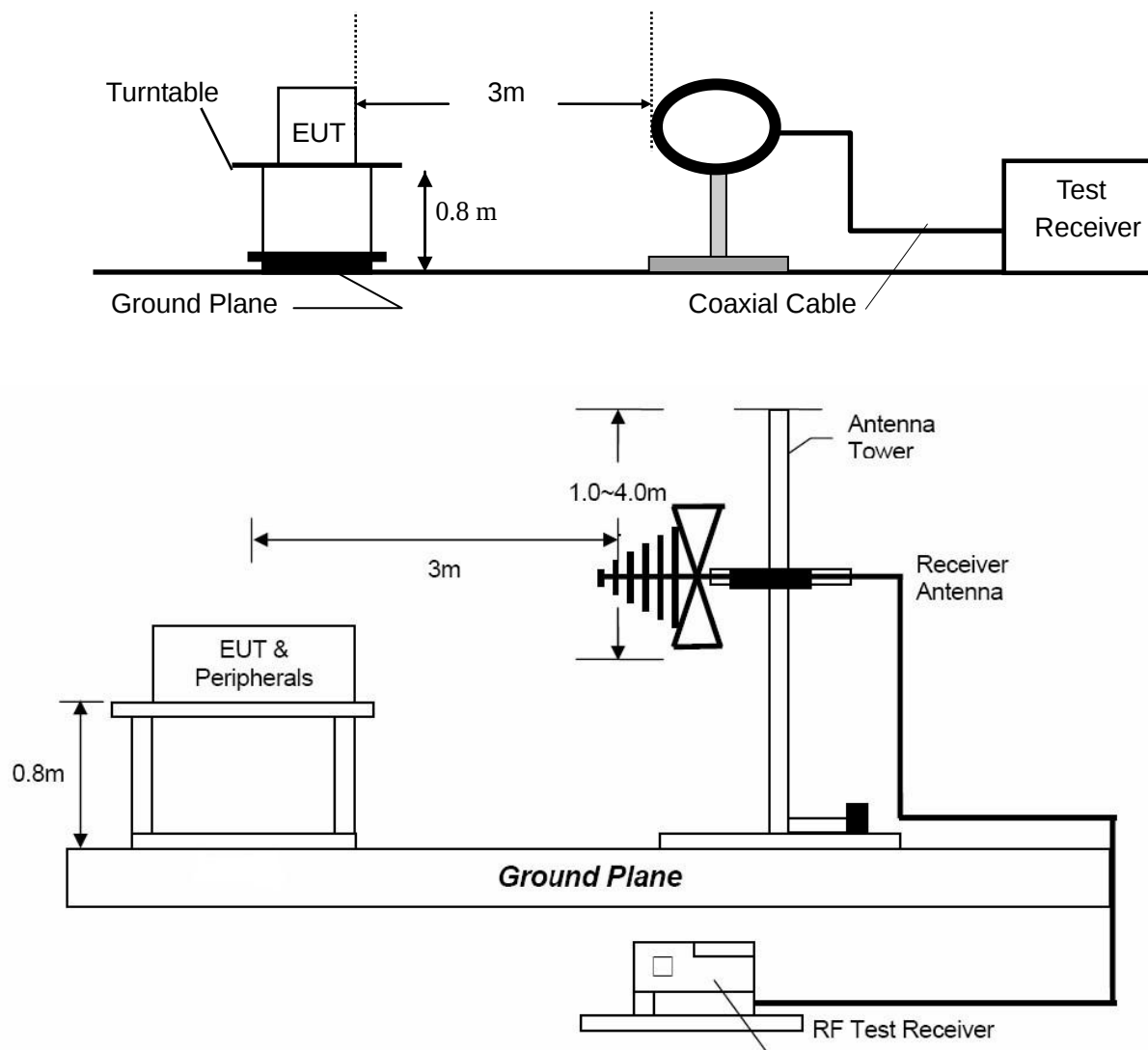


Note: Sweep points=30001pts

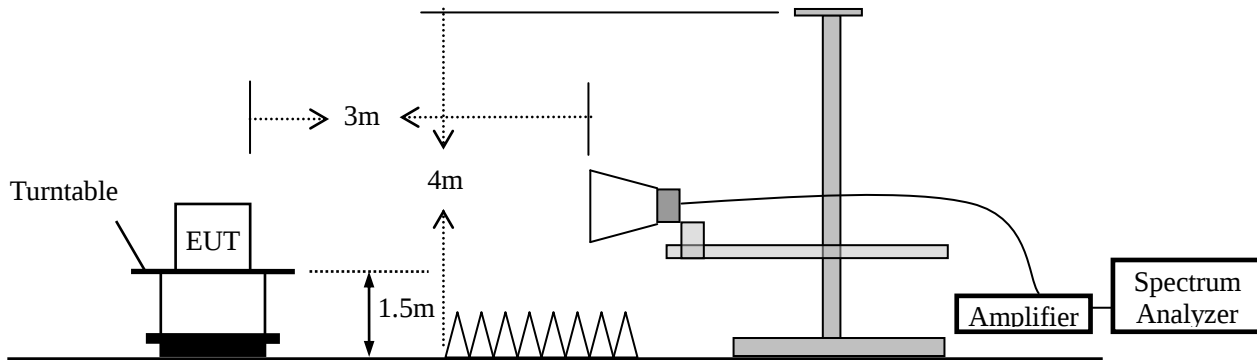
## 8. Radiated Spurious Emissions and Restricted Bands

### 8.1 Test SET-UP (Block Diagram of Configuration)

#### 8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



### 8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



### 8.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:  
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Level   | Resolution Bandwidth | Video Bandwidth |
|----------------------|---------|----------------------|-----------------|
| 30 to 1000           | QP      | 120 kHz              | 300 kHz         |
| Above 1000           | Peak    | 1 MHz                | 3 MHz           |
|                      | Average | 1 MHz                | 10 Hz           |

### 8.3 Limit

| Frequency range MHz | Distance Meters | Field Strengths Limit (15.209) |
|---------------------|-----------------|--------------------------------|
|                     |                 | $\mu\text{V/m}$                |
| 0.009 ~ 0.490       | 300             | $2400/F(\text{kHz})$           |
| 0.490 ~ 1.705       | 30              | $24000/F(\text{kHz})$          |
| 1.705 ~ 30          | 30              | 30                             |
| 30 ~ 88             | 3               | 100                            |
| 88 ~ 216            | 3               | 150                            |
| 216 ~ 960           | 3               | 200                            |
| Above 960           | 3               | 500                            |

- Remark : (1) Emission level  $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$   
 (2) The smaller limit shall apply at the cross point between two frequency bands.  
 (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.  
 (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.  
 (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

### 8.4 Measurement Results

Please refer to following plots of the worst case: 802.11n(HT20) Low Channel.



Dongguan NTC Co., Ltd.  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

### Radiated Emission Measurement

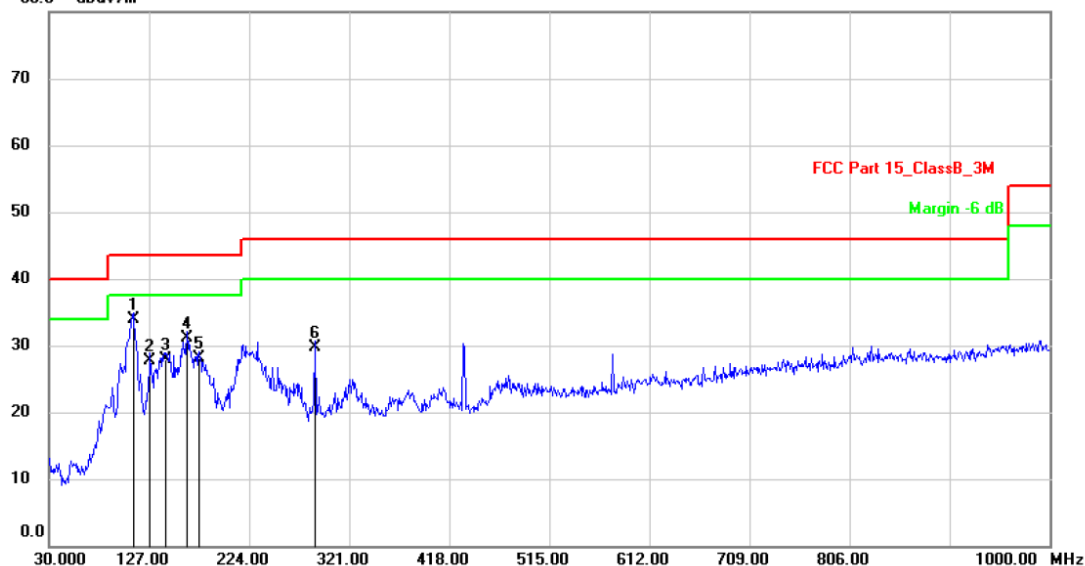
File: WB51R-WT

Data: #305

Date: 2020/3/13

Time: 13:28:47

80.0 dBuV/m



Site: 3m Chamber

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part 15\_ClassB\_3M

Power: AC120V/60Hz

Humidity: 47 %

EUT: Label Printer

Distance: 3m

M/N: WB51R-WT

Mode: TX(WIFI)

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m       | dBuV/m | dB     | Detector       | cm           | degree |
| 1   | *   | 111.4800 | 46.32         | -12.42         | 33.90        | 43.50  | -9.60  | QP             | 200          | 74     |
| 2   |     | 127.9700 | 42.74         | -14.94         | 27.80        | 43.50  | -15.70 | QP             | 200          | 96     |
| 3   |     | 142.5200 | 43.50         | -15.60         | 27.90        | 43.50  | -15.60 | QP             | 200          | 225    |
| 4   |     | 163.8600 | 46.12         | -15.02         | 31.10        | 43.50  | -12.40 | QP             | 200          | 130    |
| 5   |     | 175.5000 | 42.57         | -14.47         | 28.10        | 43.50  | -15.40 | QP             | 200          | 207    |
| 6   |     | 288.0200 | 40.59         | -10.79         | 29.80        | 46.00  | -16.20 | QP             | 200          | 153    |

**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**



Dongguan NTC Co., Ltd.  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

### Radiated Emission Measurement

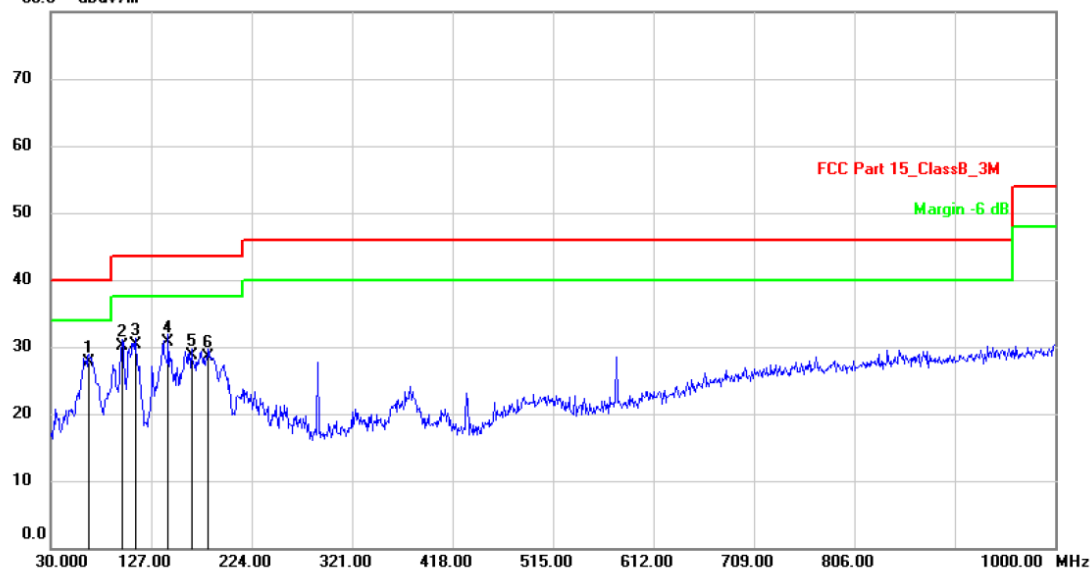
File :WB51R-WT

Data :#306

Date: 2020/3/13

Time: 13:35:09

80.0 dBuV/m



Site: 3m Chamber

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15\_ClassB\_3M

Power: AC120V/60Hz

Humidity: 47 %

EUT: Label Printer

Distance: 3m

M/N: WB51R-WT

Mode: TX(WIFI)

Note:

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measure-ment | Limit  | Over   | Antenna Height | Table Degree |        |
|-----|-----|----------|---------------|----------------|--------------|--------|--------|----------------|--------------|--------|
|     |     | MHz      | dBuV          | dB/m           | dBuV/m       | dBuV/m | dB     | Detector       | cm           | degree |
| 1   | *   | 66.8600  | 44.04         | -16.24         | 27.80        | 40.00  | -12.20 | QP             | 200          | 103    |
| 2   |     | 98.8700  | 46.15         | -16.05         | 30.10        | 43.50  | -13.40 | QP             | 200          | 196    |
| 3   |     | 111.4800 | 46.42         | -16.12         | 30.30        | 43.50  | -13.20 | QP             | 200          | 35     |
| 4   |     | 143.4900 | 49.39         | -18.59         | 30.80        | 43.50  | -12.70 | QP             | 200          | 14     |
| 5   |     | 165.8000 | 46.65         | -17.95         | 28.70        | 43.50  | -14.80 | QP             | 200          | 107    |
| 6   |     | 182.2899 | 45.60         | -17.00         | 28.60        | 43.50  | -14.90 | QP             | 200          | 253    |

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Test Mode: The worst case: Test Date : March 10, 2020  
802.11n(HT20)  
Frequency Range: Above 1GHz Temperature : 24℃  
Test Result: PASS Humidity : 47 %  
Measured Distance: 3m Test By: Sance

| Freq.<br>(MHz)                 | Ant.Pol.<br>(H/V) | Reading<br>Level(dBuV) |       | Factor<br>(dB/m) | Emission Level<br>(dBuV) |       | Limit 3m<br>(dBuV/m) |       | Margin<br>(dB) |        |
|--------------------------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
|                                |                   | PK                     | AV    |                  | PK                       | AV    | PK                   | AV    | PK             | AV     |
| Operation Mode: TX Mode (Low)  |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4824                           | V                 | 57.40                  | 43.32 | 6.38             | 63.78                    | 49.70 | 74.00                | 54.00 | -10.22         | -4.30  |
| 7236                           | V                 | 46.55                  | 32.25 | 10.48            | 57.03                    | 42.73 | 74.00                | 54.00 | -16.97         | -11.27 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4824                           | H                 | 57.92                  | 43.55 | 6.38             | 64.30                    | 49.93 | 74.00                | 54.00 | -9.70          | -4.07  |
| 7236                           | H                 | 46.47                  | 31.47 | 10.48            | 56.95                    | 41.95 | 74.00                | 54.00 | -17.05         | -12.05 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| Operation Mode: TX Mode (Mid)  |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4874                           | V                 | 56.99                  | 42.87 | 6.56             | 63.55                    | 49.43 | 74.00                | 54.00 | -10.45         | -4.57  |
| 7311                           | V                 | 46.48                  | 31.51 | 10.53            | 57.01                    | 42.04 | 74.00                | 54.00 | -16.99         | -11.96 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4874                           | H                 | 56.98                  | 42.85 | 6.56             | 63.54                    | 49.41 | 74.00                | 54.00 | -10.46         | -4.59  |
| 7311                           | H                 | 46.05                  | 31.78 | 10.53            | 56.58                    | 42.31 | 74.00                | 54.00 | -17.42         | -11.69 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| Operation Mode: TX Mode (High) |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4924                           | V                 | 57.83                  | 42.91 | 6.76             | 64.59                    | 49.67 | 74.00                | 54.00 | -9.41          | -4.33  |
| 7386                           | V                 | 46.12                  | 31.41 | 10.57            | 56.69                    | 41.98 | 74.00                | 54.00 | -17.31         | -12.02 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4924                           | H                 | 56.21                  | 42.53 | 6.76             | 62.97                    | 49.29 | 74.00                | 54.00 | -11.03         | -4.71  |
| 7386                           | H                 | 45.96                  | 31.31 | 10.57            | 56.53                    | 41.88 | 74.00                | 54.00 | -17.47         | -12.12 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level + Factor
  - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
  - (4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
  - (5) Measurement uncertainty :  $\pm 3.7$ dB.
  - (6) Horn antenna used for the emission over 1000MHz.

Spurious Emission in restricted band:

|                    |            |               |                |
|--------------------|------------|---------------|----------------|
| Operation Mode:    | TX         | Test Date :   | March 10, 2020 |
| Frequency Range:   | Above 1GHz | Temperature : | 24 °C          |
| Test Result:       | PASS       | Humidity :    | 47 %           |
| Measured Distance: | 3m         | Test By:      | Sance          |

| Freq.<br>(MHz)                        | Ant.Pol.<br>(H/V) | Reading<br>Level(dBuV) |       | Factor<br>(dB/m) | Emission Level<br>(dBuV) |       | Limit 3m<br>(dBuV/m) |       | Margin<br>(dB) |        |
|---------------------------------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
|                                       |                   | PK                     | AV    |                  | PK                       | AV    | PK                   | AV    | PK             | AV     |
| The worst case:<br>Test Mode: 802.11b |                   |                        |       |                  |                          |       |                      |       |                |        |
| 2390.000                              | H                 | 50.49                  | 36.20 | 0.09             | 50.58                    | 36.29 | 74.00                | 54.00 | -23.42         | -17.71 |
| 2390.000                              | V                 | 51.65                  | 34.20 | 0.09             | 51.74                    | 34.29 | 74.00                | 54.00 | -22.26         | -19.71 |
| 2483.500                              | H                 | 50.58                  | 35.79 | 0.35             | 50.93                    | 36.14 | 74.00                | 54.00 | -23.07         | -17.86 |
| 2483.500                              | V                 | 49.51                  | 35.38 | 0.35             | 49.86                    | 35.73 | 74.00                | 54.00 | -24.14         | -18.27 |

**Note:** (1) All Readings are Peak Value and AV.  
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss  
 (3) Measurement uncertainty :  $\pm 3.7$ dB

## **9. Antenna Application**

### **9.1 Antenna requirement**

According to of FCC part 15C section 15.203 and 15.240:

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, 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.

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

### **9.2 Measurement Results**

The antenna is PCB antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 2 dBi, So, the antenna is consider meet the requirement.

## 10. Test Equipment List

| Item | Equipment                      | Manufacturer                      | Model No. | Serial No.        | Last Cal.     | Cal. Interval |
|------|--------------------------------|-----------------------------------|-----------|-------------------|---------------|---------------|
| 1.   | Test Receiver                  | Rohde & Schwarz                   | ESCI7     | 100837            | Mar. 13, 2020 | 1 Year        |
| 2.   | Antenna                        | Schwarzbeck                       | VULB9162  | 9162-010          | Mar. 23, 2020 | 1 Year        |
| 3.   | Spectrum Analyzer              | Rohde & Schwarz                   | FSU26     | 200409/026        | Mar. 13, 2020 | 1 Year        |
| 4.   | Spectrum Analyzer              | Keysight                          | N9020A    | MY54200831        | Mar. 13, 2020 | 1 Year        |
| 5.   | Spectrum Analyzer              | Rohde & Schwarz                   | FSV40     | 101094            | Mar. 13, 2020 | 1 Year        |
| 6.   | Horn Antenna                   | Schwarzbeck                       | BBHA9170  | 9170-172          | Mar. 22, 2019 | 2 Year        |
| 7.   | Power Sensor                   | DARE                              | RPR3006W  | 15I00041SNO<br>64 | Mar. 13, 2020 | 1 Year        |
| 8.   | Communication Tester           | Rohde & Schwarz                   | CMW500    | 149004            | Mar. 13, 2020 | 1 Year        |
| 9.   | Horn Antenna                   | COM-Power                         | AH-118    | 071078            | Mar. 23, 2020 | 1 Year        |
| 10.  | Pre-Amplifier                  | HP                                | HP 8449B  | 3008A00964        | Mar. 13, 2020 | 1 Year        |
| 11.  | Pre-Amplifier                  | HP                                | HP 8447D  | 1145A00203        | Mar. 13, 2020 | 1 Year        |
| 12.  | Loop Antenna                   | Schwarzbeck                       | FMZB 1513 | 1513-272          | Mar. 23, 2020 | 1 Year        |
| 13.  | Test Receiver                  | Rohde & Schwarz                   | ESCI      | 101152            | Mar. 14, 2020 | 1 Year        |
| 14.  | L.I.S.N                        | Rohde & Schwarz                   | ENV 216   | 101317            | Mar. 13, 2020 | 1 Year        |
| 15.  | L.I.S.N                        | Rohde & Schwarz                   | ESH2-Z5   | 893606/014        | Mar. 13, 2020 | 1 Year        |
| 16.  | RF Switching Unit              | Compliance Direction Systems Inc. | RSU-M2    | 38311             | Mar.13, 2020  | 1 Year        |
| 17.  | Temperature & Humidity Chamber | REMAFEE                           | SYHR225L  | N/A               | Mar. 13, 2020 | 1 Year        |
| 18.  | DC Source                      | Maynuo                            | MY8811    | N/A               | Mar. 13, 2020 | 1 Year        |
| 19.  | Temporary antenna connector    | TESCOM                            | SS402     | N/A               | N/A           | N/A           |
| 20.  | Chamber                        | SAEMC                             | 9*7*7m    | N/A               | Jun. 20, 2019 | 2 Year        |
| 21.  | Test Software                  | EZ                                | EZ_EMCC   | N/A               | N/A           | N/A           |

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---