



# FCC TEST REPORT

**Test report  
On Behalf of  
Inspire Mobile  
For  
Rugged IP PTT  
Model No.: IM-550**

**FCC ID: 2AR6HIMP-R01W**

**Prepared for :** Inspire Mobile  
Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si,  
Gyeonggi-do, 14057, Korea

**Prepared By :** Shenzhen HUAKE Testing Technology Co., Ltd.  
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District, Shenzhen City, China

**Date of Test:** Dec. 28, 2018~Jan. 14, 2019

**Date of Report:** Jan. 14, 2019

**Report Number:** HK1901140099E



**TEST RESULT CERTIFICATION**

**Applicant's name**.....: Inspire Mobile  
**Address** .....: Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
**Manufacture's Name** .....: Inspire Mobile  
**Address** .....: Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea  
**Factory's Name** .....: Shenzhen Bee Technology co., Ltd  
**Address**.....: 4 Floor,ABuilding,Chuangjin No.1,No.125 Chuangye 2nd rood,BaoanDistrict,Shenzhen  
**Product description** .....: Rugged IP PTT  
**Brand Name** .....: IM-550  
**Mode Name** .....: IM-550  
**Standards**.....: FCC Rules and Regulations Part 15 Subpart C Section 15.247  
KDB 558074 D01 15.247 Meas Guidance v05

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**Date of Test**.....  
Date (s) of performance of tests ..... **Dec. 28, 2018~Jan. 14, 2019**  
Date of Issue ..... **Jan. 14, 2019**  
Test Result ..... **Pass**

Testing Engineer : Gary Qian  
(Gary Qian)

Technical Manager : Eden Hu  
(Eden Hu)

Authorized Signatory : Jason Zhou  
(Jason Zhou)



| Revision | Issue Date    | Revisions     | Revised By |
|----------|---------------|---------------|------------|
| V1.0     | Jan. 14, 2019 | Initial Issue | Jason Zhou |



## TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>1. GENERAL INFORMATION</b> .....                              | <b>6</b>  |
| 1.1. PRODUCT DESCRIPTION .....                                   | 6         |
| 1.2. TABLE OF CARRIER FREQUENCYS .....                           | 6         |
| 1.3. IEEE 802.11N MODULATION SCHEME.....                         | 7         |
| 1.4. RELATED SUBMITTAL(S) / GRANT (S) .....                      | 7         |
| 1.5. TEST METHODOLOGY .....                                      | 8         |
| 1.6. SPECIAL ACCESSORIES .....                                   | 8         |
| 1.7. EQUIPMENT MODIFICATIONS .....                               | 8         |
| <b>2. MEASUREMENT UNCERTAINTY</b> .....                          | <b>9</b>  |
| <b>3. DESCRIPTION OF TEST MODES</b> .....                        | <b>10</b> |
| <b>4 SYSTEM TEST CONFIGURATION</b> .....                         | <b>11</b> |
| 4.1. CONFIGURATION OF EUT SYSTEM .....                           | 11        |
| 4.2. EQUIPMENT USED IN EUT SYSTEM.....                           | 11        |
| 4.3. SUMMARY OF TEST RESULTS.....                                | 11        |
| <b>5. TEST FACILITY</b> .....                                    | <b>12</b> |
| <b>6. OUTPUT POWER</b> .....                                     | <b>14</b> |
| 6.1. MEASUREMENT PROCEDURE .....                                 | 14        |
| 6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....           | 14        |
| 6.3. LIMITS AND MEASUREMENT RESULT .....                         | 15        |
| <b>7. 6DB BANDWIDTH</b> .....                                    | <b>17</b> |
| 7.1. MEASUREMENT PROCEDURE .....                                 | 17        |
| 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....           | 17        |
| 7.3. LIMITS AND MEASUREMENT RESULTS .....                        | 18        |
| <b>9. CONDUCTED SPURIOUS EMISSION</b> .....                      | <b>21</b> |
| 9.1. MEASUREMENT PROCEDURE .....                                 | 21        |
| 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....           | 21        |
| 9.3. MEASUREMENT EQUIPMENT USED.....                             | 21        |
| 9.4. LIMITS AND MEASUREMENT RESULT .....                         | 22        |
| <b>10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY</b> ..... | <b>29</b> |
| 10.1 MEASUREMENT PROCEDURE .....                                 | 29        |
| 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....           | 29        |
| 10.3 MEASUREMENT EQUIPMENT USED.....                             | 29        |
| 10.4 LIMITS AND MEASUREMENT RESULT .....                         | 30        |
| <b>11. RADIATED EMISSION</b> .....                               | <b>33</b> |
| 11.1. MEASUREMENT PROCEDURE .....                                | 33        |



11.2. TEST SETUP ..... 34

11.3. LIMITS AND MEASUREMENT RESULT ..... 35

11.4. TEST RESULT ..... 36

**12. BAND EDGE EMISSION ..... 39**

12.1. MEASUREMENT PROCEDURE ..... 39

12.2. TEST SET-UP..... 39

12.3. RADIATED TEST RESULT ..... 40

12.4. CONDUCTED TEST RESULT ..... 42

**13. FCC LINE CONDUCTED EMISSION TEST ..... 44**

13.1. LIMITS OF LINE CONDUCTED EMISSION TEST..... 44

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST ..... 44

13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST ..... 45

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST ..... 46

13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST ..... 47

**APPENDIX A: PHOTOGRAPHS OF TEST SETUP ..... 49**



## 1. GENERAL INFORMATION

### 1.1. PRODUCT DESCRIPTION

The EUT is designed as “Rugged IP PTT”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

|                            |  |
|----------------------------|--|
| <b>Operation Frequency</b> | 2.412 GHz~2.462GHz   |
| <b>Output Power</b>        | IEEE 802.11b: <b>13.19</b> dBm, IEEE 802.11g: <b>11.03</b> dBm;<br>IEEE 802.11n(20): <b>10.99</b> dBm,IEEE 802.11n(40): <b>10.58</b> dBm |
| <b>Modulation</b>          | DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)  |
| <b>Number of channels</b>  | 11 Channels (IEEE802.11b/g/n20)& 7 Channels (IEEE802.11n40)  |
| <b>Hardware Version</b>    | K2_US_Main_Rev1.0  |
| <b>Software Version</b>    | D08  |
| <b>Antenna Designation</b> | FPC Antenna  |
| <b>Antenna Gain</b>        | 1.2dBi   |
| <b>Power Supply</b>        | DC3.8V by Built-in Li-ion Battery  |

### 1.2. TABLE OF CARRIER FREQUENCIES

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 2400~2483.5MHZ | 1              | 2412 MHZ  |
|                | 2              | 2417 MHZ  |
|                | 3              | 2422 MHZ  |
|                | 4              | 2427 MHZ  |
|                | 5              | 2432 MHZ  |
|                | 6              | 2437 MHZ  |
|                | 7              | 2442 MHZ  |
|                | 8              | 2447 MHZ  |
|                | 9              | 2452 MHZ  |
|                | 10             | 2457 MHZ  |
|                | 11             | 2462 MHZ  |

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 9.



**1.3. IEEE 802.11N MODULATION SCHEME**

| MCS Index | Nss | Modulation | R   | NBPS | NCBPS   |       | NDBPS |       | Data rate(Mbps) |       |       |       |
|-----------|-----|------------|-----|------|---------|-------|-------|-------|-----------------|-------|-------|-------|
|           |     |            |     |      | 800nsGI |       | 20MHz | 40MHz | 20MHz           | 40MHz | 20MHz | 40MHz |
|           |     |            |     |      | 20MHz   | 40MHz |       |       |                 |       |       |       |
| 0         | 1   | BPSK       | 1/2 | 1    | 52      | 108   | 26    | 54    | 6.5             | 13.5  |       |       |
| 1         | 1   | QPSK       | 1/2 | 2    | 104     | 216   | 52    | 108   | 13.0            | 27.0  |       |       |
| 2         | 1   | QPSK       | 3/4 | 2    | 104     | 216   | 78    | 162   | 19.5            | 40.5  |       |       |
| 3         | 1   | 16-QAM     | 1/2 | 4    | 208     | 432   | 104   | 216   | 26.0            | 54.0  |       |       |
| 4         | 1   | 16-QAM     | 3/4 | 4    | 208     | 432   | 156   | 324   | 39.0            | 81.0  |       |       |
| 5         | 1   | 64-QAM     | 2/3 | 6    | 312     | 648   | 208   | 432   | 52.0            | 108.0 |       |       |
| 6         | 1   | 64-QAM     | 3/4 | 6    | 312     | 648   | 234   | 489   | 58.5            | 121.5 |       |       |
| 7         | 1   | 64-QAM     | 5/6 | 6    | 312     | 648   | 260   | 540   | 65.0            | 135.0 |       |       |

| Symbol | Explanation                             |
|--------|---|
| NSS    | Number of spatial streams               |
| R      | Code rate                               |
| NBPS   | Number of coded bits per single carrier |
| NCBPS  | Number of coded bits per symbol         |
| NDBPS  | Number of data bits per symbol          |
| GI     | Guard interval                          |

**1.4. RELATED SUBMITTAL(S) / GRANT (S)**

This submittal(s) (test report) is intended for **FCC ID: 2AR6HIMP-R01W** filing to comply with the FCC Part 15 requirements.



### **1.5. TEST METHODOLOGY**

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).

Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v05.

### **1.6. SPECIAL ACCESSORIES**

Refer to section 5.2.

### **1.7. EQUIPMENT MODIFICATIONS**

Not available for this EUT intended for grant.



## 2. MEASUREMENT UNCERTAINTY

| Test                                    | Measurement Uncertainty | Notes |
|---|-------------------------|-------|
| Transmitter power conducted             | $\pm 0.57$ dB           | (1)   |
| Transmitter power Radiated              | $\pm 2.20$ dB           | (1)   |
| Conducted spurious emission 9KHz-40 GHz | $\pm 2.20$ dB           | (1)   |
| Occupied Bandwidth                      | $\pm 0.01$ ppm          | (1)   |
| Radiated Emission 30~1000MHz            | $\pm 4.10$ dB           | (1)   |
| Radiated Emission Above 1GHz            | $\pm 4.32$ dB           | (1)   |
| Conducted Disturbance 0.15~30MHz        | $\pm 3.20$ dB           | (1)   |

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



### 3. DESCRIPTION OF TEST MODES

| NO. | TEST MODE DESCRIPTION |
|-----|-----------------------|
| 1   | Low channel TX        |
| 2   | Middle channel TX     |
| 3   | High channel TX       |
| 4   | Normal operating      |

Note:  
Transmit by 802.11b with Data rate (1/2/5.5/11)  
Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54)  
Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)  
Transmit by 802.11n (40MHz) with Data rate (13.5/27/40.5/54/81/108/121.5/135)

**Note:**

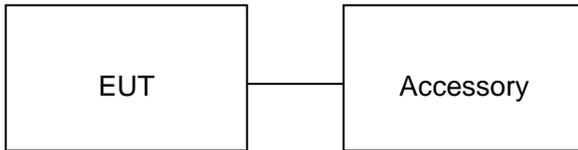
1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.



## 4 SYSTEM TEST CONFIGURATION

### 4.1. CONFIGURATION OF EUT SYSTEM

Configure:



### 4.2. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment     | Model No.     | ID or Specification | Remark    |
|------|---------------|---------------|---------------------|-----------|
| 1    | Rugged IP PTT | IM-550        | 2AR6HIMP-R01W       | EUT       |
| 2    | Adapter       | M050200E111U1 | DC 5.0V 2A          | Accessory |
| 3    | Battery       | K2            | DC3.8V/ 3600mAh     | Accessory |
| 4    | USB           | N/A           | N/A                 | Accessory |

Note: All the accessories have been used during the test in conduction emission test.

### 4.3. SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST                             | RESULT    |
|-----------|---|-----------|
| §15.247   | Output Power                                    | Compliant |
| §15.247   | 6 dB Bandwidth                                  | Compliant |
| §15.247   | Conducted Spurious Emission                     | Compliant |
| §15.247   | Maximum Conducted Output Power SPECTRAL Density | Compliant |
| §15.209   | Radiated Emission                               | Compliant |
| §15.247   | Band Edges                                      | Compliant |
| §15.207   | Line Conduction Emission                        | Compliant |



## 5. TEST FACILITY

|  |   |
|--|---|
| <b>Site</b>                            | Shenzhen HUAKE Testing Technology Co., Ltd.   |
| <b>Location</b>                        | 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China |
| <b>Designation Number</b>              | CN1229  |
| Test Firm Registration Number : 616276 |   |

### ALL TEST EQUIPMENT LIST

| RF Test Room              |              |                 |               |                 |
|---------------------------|--------------|-----------------|---------------|-----------------|
| Equipment                 | Manufacturer | Model           | Serial Number | Calibration Due |
| Power meter               | Agilent      | E4417B          | HKE-107       | Dec. 26, 2019   |
| Power Sensor              | Agilent      | E9327A          | HKE-113       | Dec. 26, 2019   |
| RF cable                  | Times        | 1-40G           | HKE-034       | Dec. 26, 2019   |
| RF automatic control unit | Tonscend     | JS0806-2        | HKE-060       | Dec. 26, 2019   |
| Spectrum analyzer         | Agilent      | N9020A          | HKE-048       | Dec. 26, 2019   |
| RF Cable (9KHz-26.5GHz)   | Tonscend     | 170660          | N/A           | Dec. 26, 2019   |
| Signal generator          | Agilent      | N5183A          | HKE-071       | Dec. 26, 2019   |
| Receiver                  | R&S          | ESCI-7          | HKE-010       | Dec. 26, 2019   |
| Spectrum analyzer         | Agilent      | N9020A          | HKE-048       | Dec. 26, 2019   |
| Preamplifier              | EMCI         | EMC051845SE     | HKE-015       | Dec. 26, 2019   |
| Preamplifier              | Agilent      | 83051A          | HKE-016       | Dec. 26, 2019   |
| Loop antenna              | Schwarzbeck  | FMZB 1519 B     | HKE-014       | Dec. 26, 2019   |
| Broadband antenna         | Schwarzbeck  | VULB 9163       | HKE-012       | Dec. 26, 2019   |
| Horn antenna              | Schwarzbeck  | 9120D           | HKE-013       | Dec. 26, 2019   |
| Antenna Mast              | Keleto       | CC-A-4M         | N/A           | N/A             |
| Position controller       | Taiwan MF    | MF7802          | HKE-011       | Dec. 26, 2019   |
| Radiated test software    | Tonscend     | TS+ Rev 2.5.0.0 | HKE-082       | N/A             |
| RF cable (9KHz-1GHz)      | Times        | 381806-001      | N/A           | N/A             |
| RF cable                  | Times        | 1-40G           | HKE-034       | Dec. 26, 2019   |



|                         |             |                   |         |               |
|-------------------------|-------------|-------------------|---------|---------------|
| Horn Ant<br>(18G-40GHz) | Schwarzbeck | BBHA 9170         | HKE-094 | Feb. 28, 2020 |
| Horn Ant<br>(18G-40GHz) | ETS         | QWH_SL_18_40_K_SG | HKE-092 | Feb. 28, 2020 |



## 6. OUTPUT POWER

### 6.1. MEASUREMENT PROCEDURE

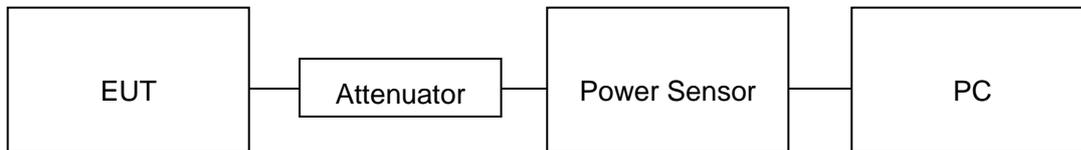
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

**Note :** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

### 6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

#### AVERAGE POWER SETUP



**6.3. LIMITS AND MEASUREMENT RESULT**

|                  |                          |
|------------------|--------------------------|
| <b>TEST ITEM</b> | OUTPUT POWER             |
| <b>TEST MODE</b> | 802.11b with data rate 1 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412           | <b>13.19</b>        | 30                      | Pass         |
| 2.437           | 13.09               | 30                      | Pass         |
| 2.462           | 13.01               | 30                      | Pass         |

|                  |                          |
|------------------|--------------------------|
| <b>TEST ITEM</b> | OUTPUT POWER             |
| <b>TEST MODE</b> | 802.11g with data rate 6 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412           | 9.49                | 30                      | Pass         |
| 2.437           | <b>11.03</b>        | 30                      | Pass         |
| 2.462           | 10.80               | 30                      | Pass         |

|                  |                               |
|------------------|-------------------------------|
| <b>TEST ITEM</b> | OUTPUT POWER                  |
| <b>TEST MODE</b> | 802.11n 20 with data rate 6.5 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412           | 9.44                | 30                      | Pass         |
| 2.437           | <b>10.99</b>        | 30                      | Pass         |
| 2.462           | 10.76               | 30                      | Pass         |



|                  |                                |
|------------------|--------------------------------|
| <b>TEST ITEM</b> | OUTPUT POWER                   |
| <b>TEST MODE</b> | 802.11n 40 with data rate 13.5 |

| <b>Frequency<br/>(GHz)</b> | <b>Average Power<br/>(dBm)</b> | <b>Applicable Limits<br/>(dBm)</b> | <b>Pass or Fail</b> |
|----------------------------|--------------------------------|------------------------------------|---------------------|
| 2.422                      | 9.81                           | 30                                 | Pass                |
| 2.437                      | <b>10.58</b>                   | 30                                 | Pass                |
| 2.452                      | 10.34                          | 30                                 | Pass                |



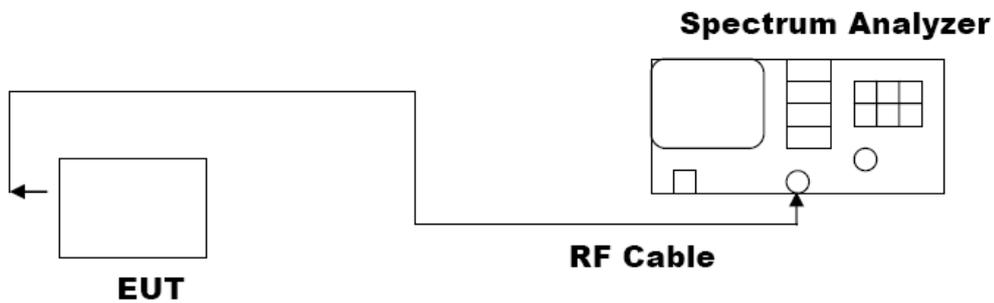
## 7. 6dB BANDWIDTH

### 7.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW $\geq$ 3 $\times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

### 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



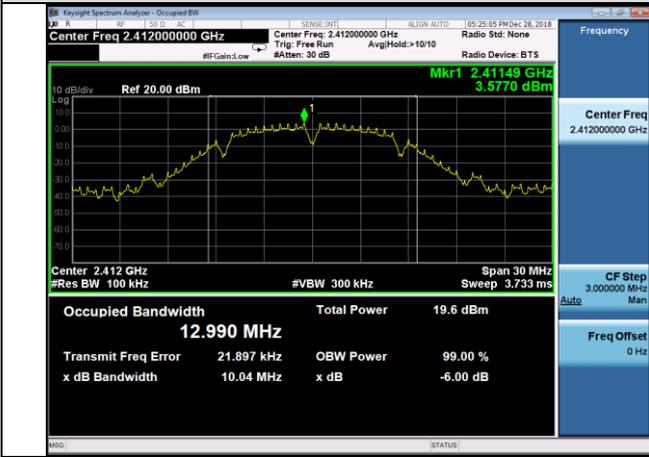
**7.3. LIMITS AND MEASUREMENT RESULTS**

| Mode    | Channel | 6dB Bandwidth [MHz] | Verdict |
|---------|---------|---------------------|---------|
| 11b     | LCH     | 10.04               | PASS    |
|         | MCH     | 10.04               | PASS    |
|         | HCH     | 10.04               | PASS    |
| 11g     | LCH     | 15.14               | PASS    |
|         | MCH     | 15.14               | PASS    |
|         | HCH     | 15.14               | PASS    |
| 11nHT20 | LCH     | 15.46               | PASS    |
|         | MCH     | 15.32               | PASS    |
|         | HCH     | 15.94               | PASS    |
| 11nHT40 | LCH     | 35.17               | PASS    |
|         | MCH     | 35.17               | PASS    |
|         | HCH     | 35.17               | PASS    |



### Test Graph

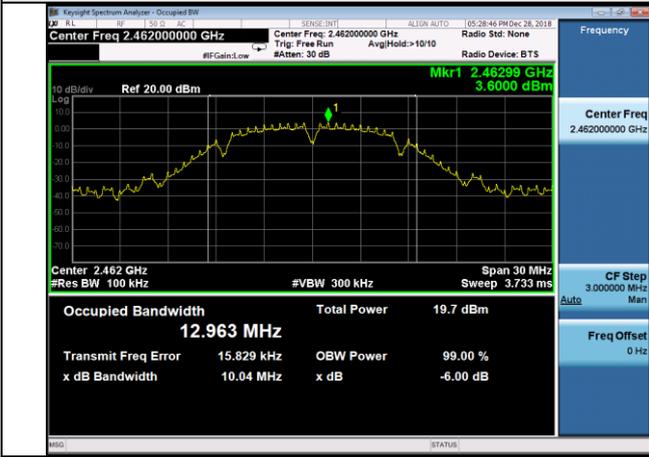
#### 11b-LCH



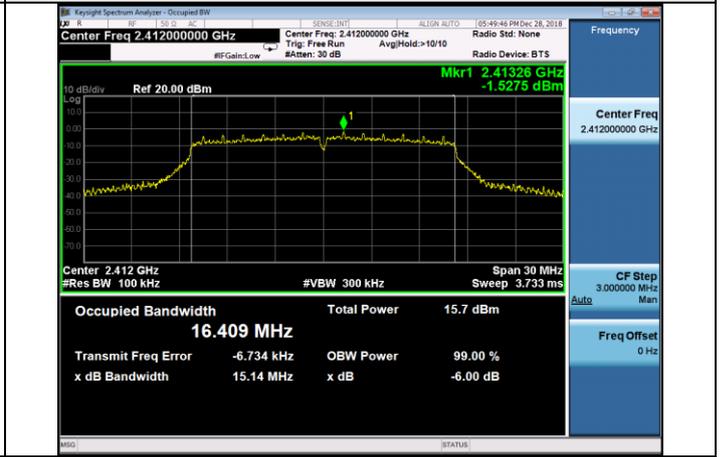
#### 11b-MCH



#### 11b-HCH



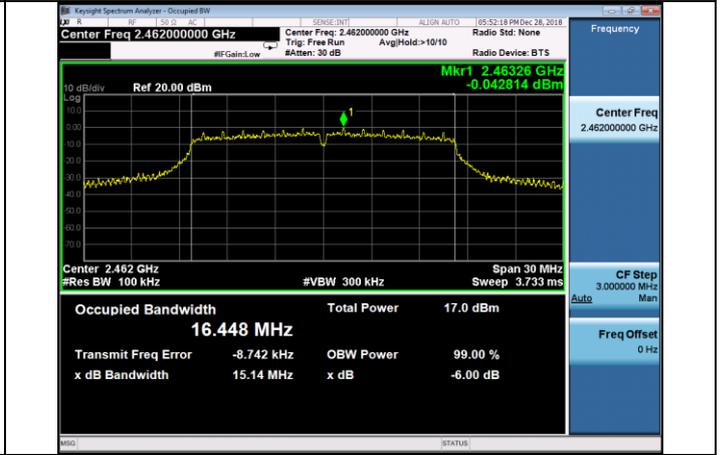
#### 11g-LCH

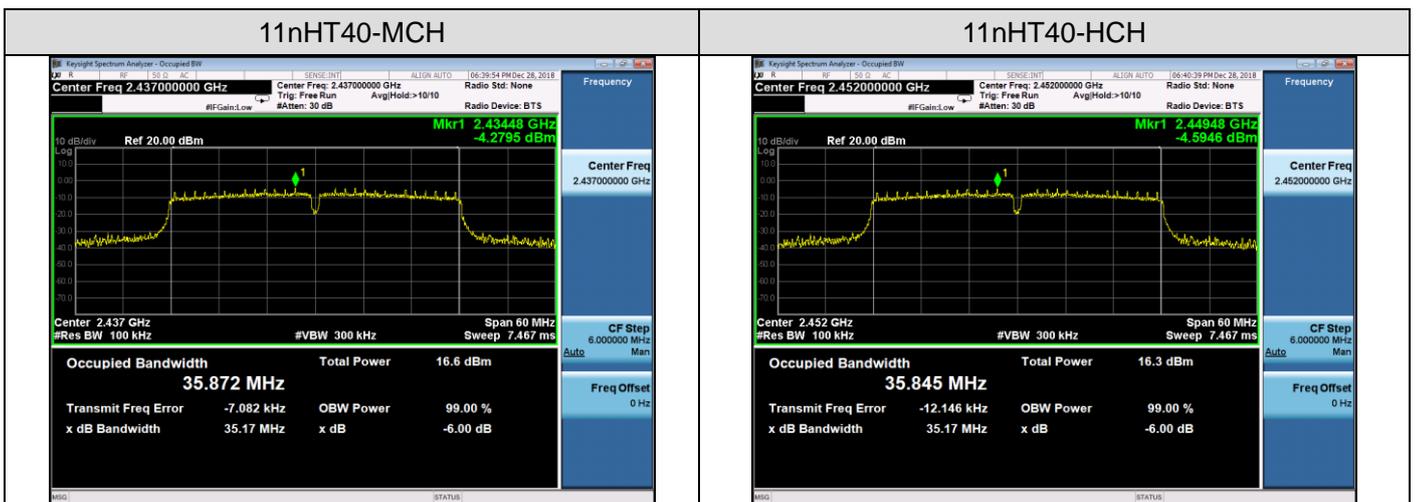
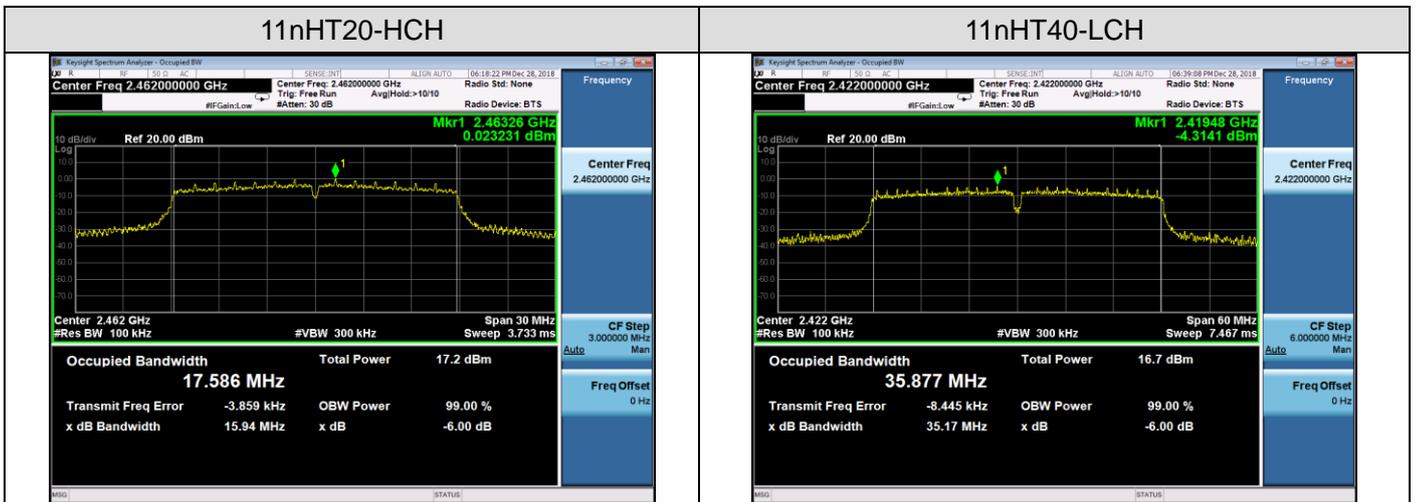
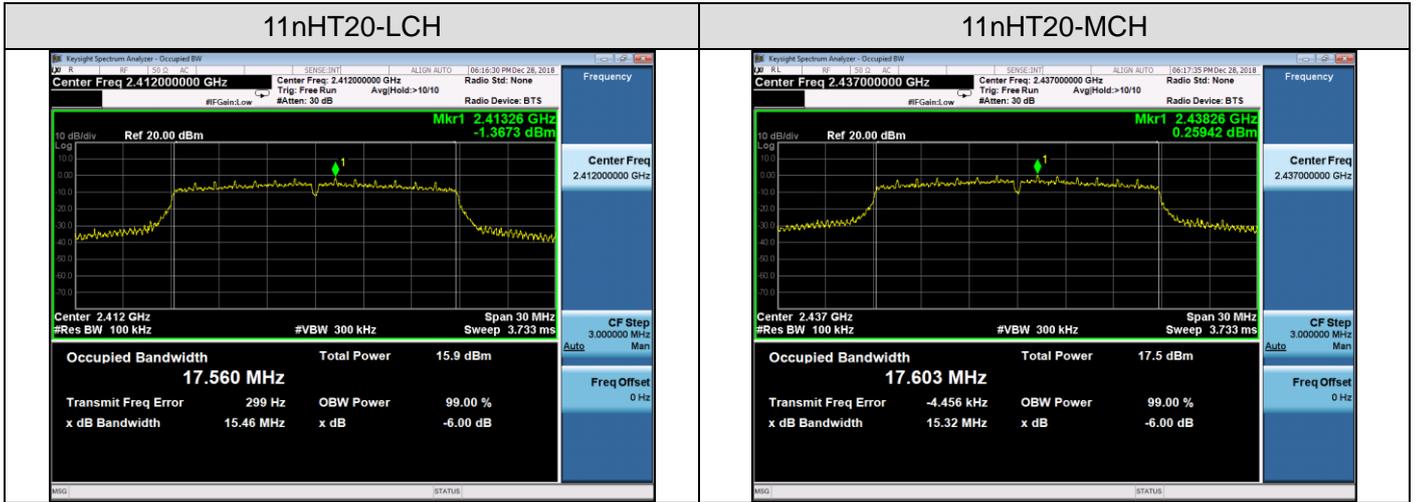


#### 11g-MCH



#### 11g-HCH







## 9. CONDUCTED SPURIOUS EMISSION

### 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

### 9.3. MEASUREMENT EQUIPMENT USED

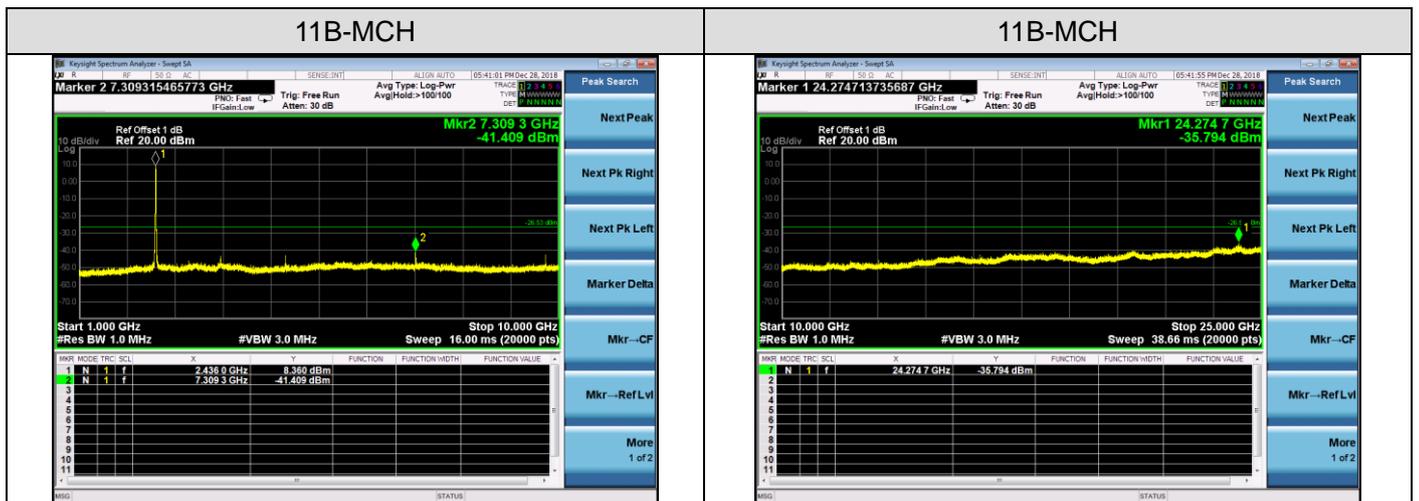
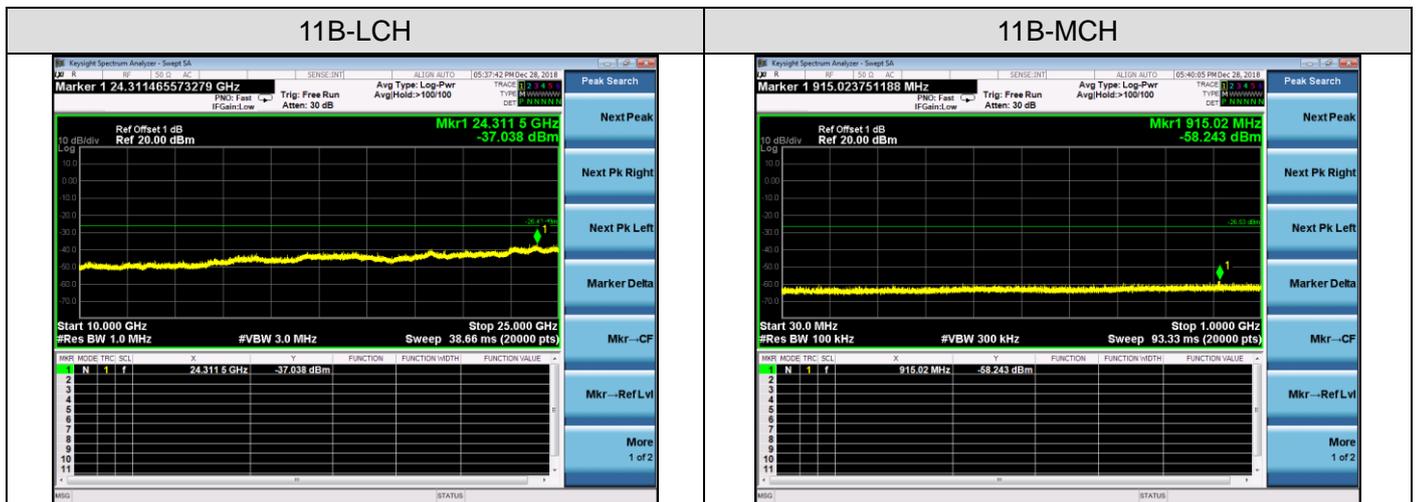
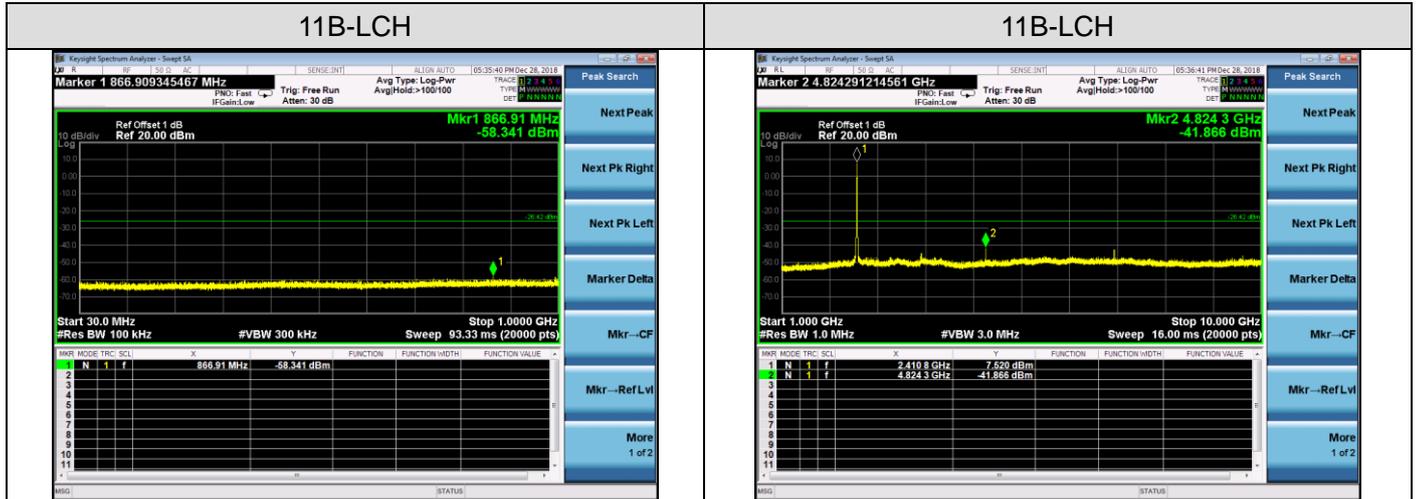
The same as described in section 6.

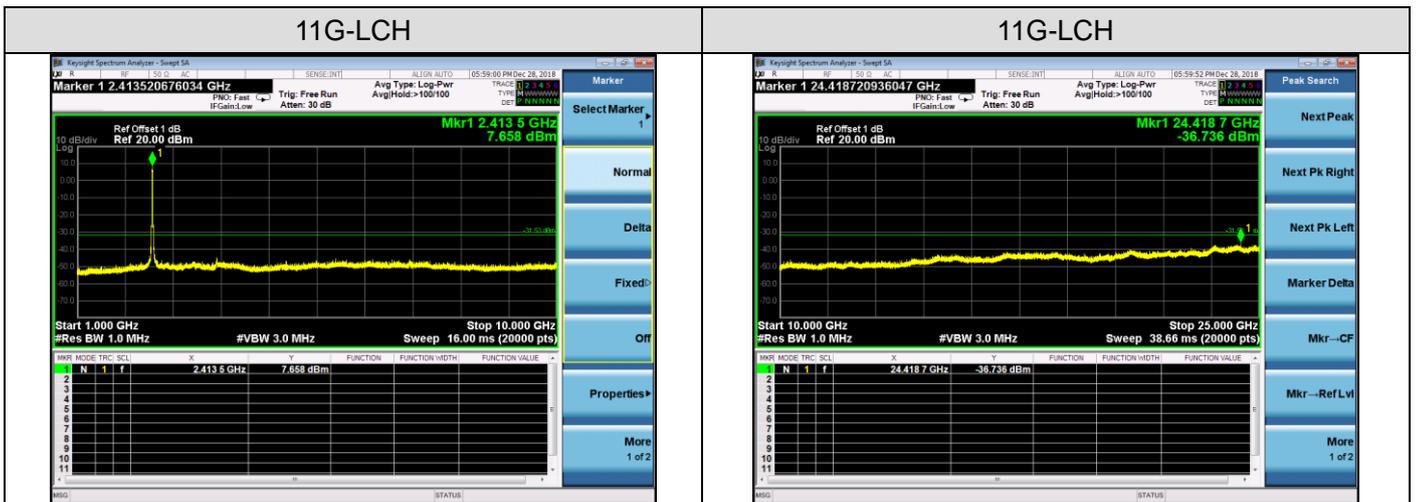
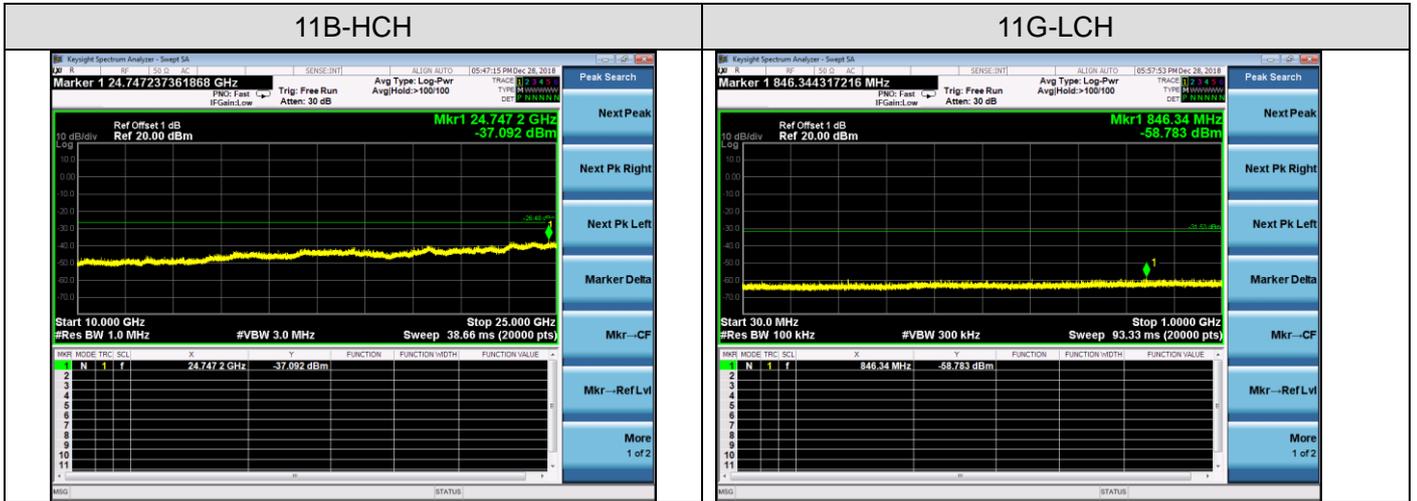
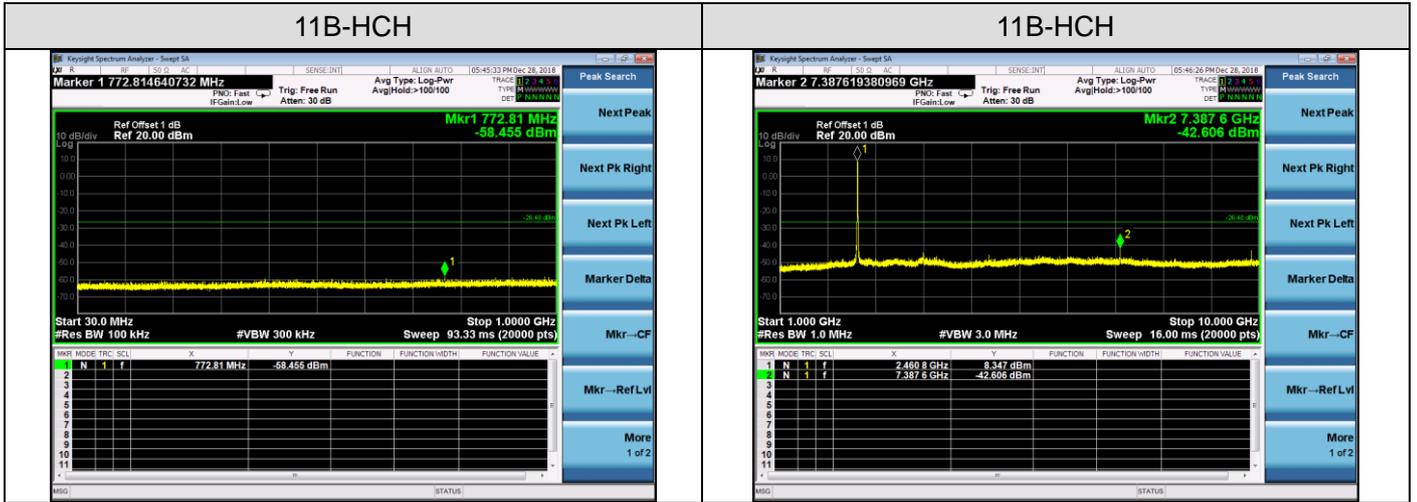
**9.4. LIMITS AND MEASUREMENT RESULT**

| <b>LIMITS AND MEASUREMENT RESULT</b>  |                           |                 |
|---|---------------------------|-----------------|
| <b>Applicable Limits</b>  | <b>Measurement Result</b> |                 |
|   | <b>Test Data</b>          | <b>Criteria</b> |
| <p>In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 30 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.</p> <p>In addition, radiation 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)</p> | Refer Test Graph          | PASS            |



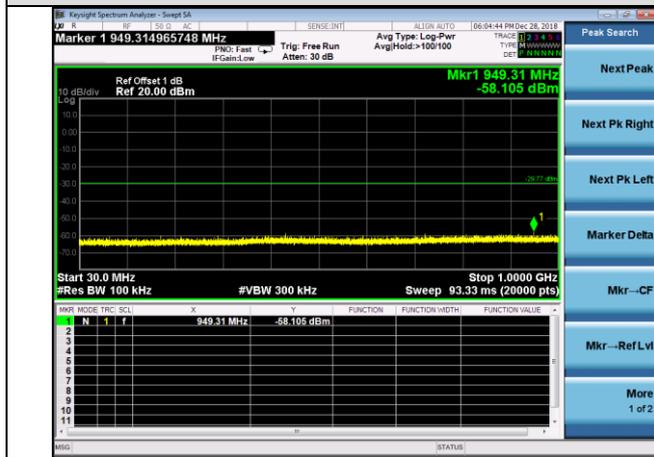
### Test Graph



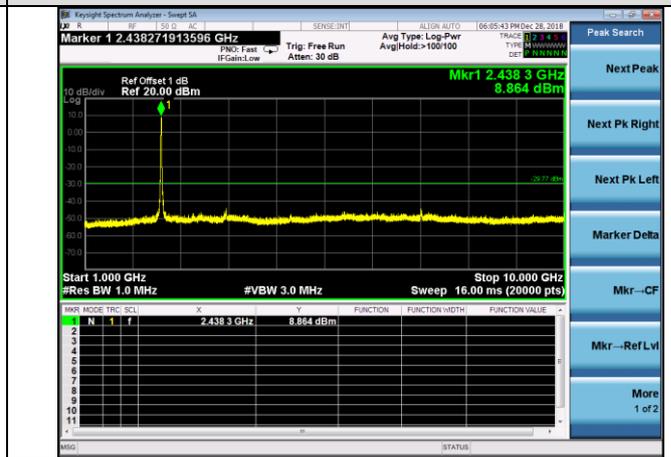




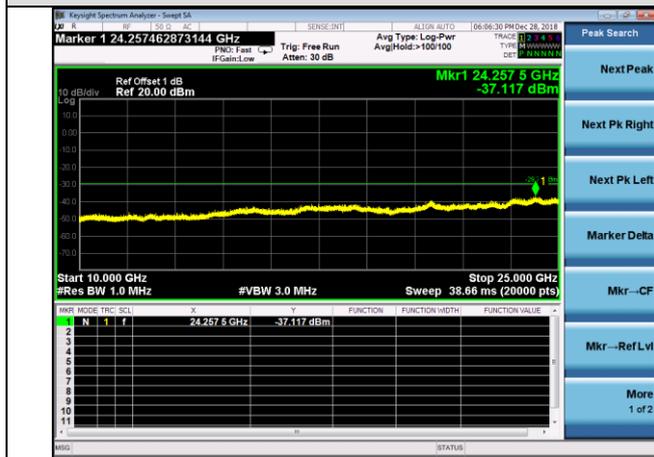
### 11G-MCH



### 11G-MCH



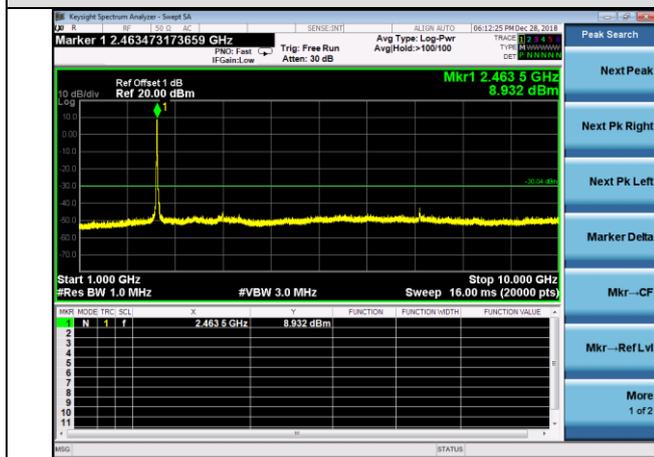
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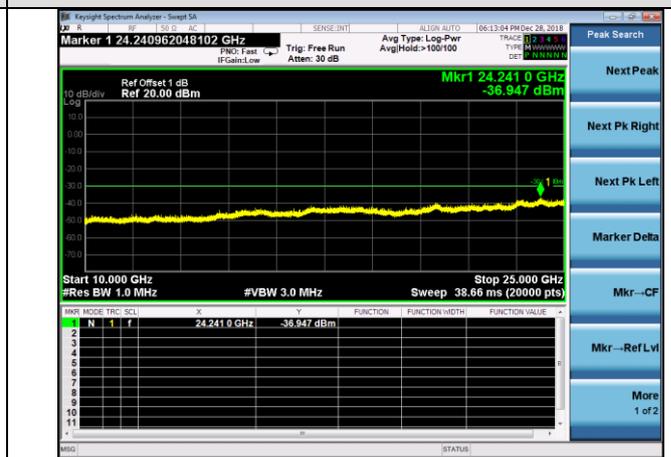
### 11G-HCH



### 11G-HCH

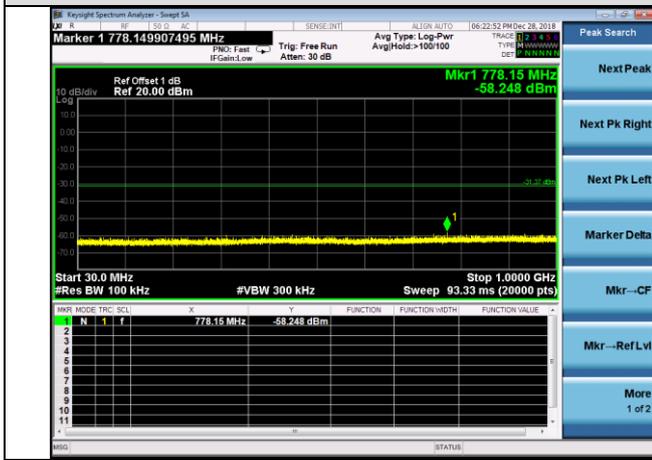


### 11G-HCH

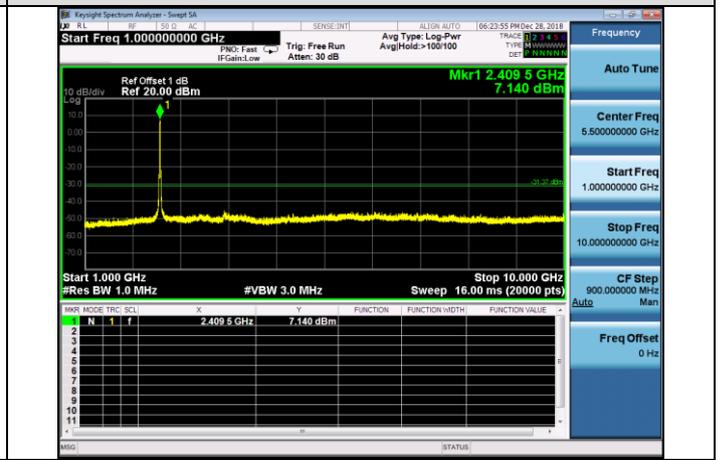




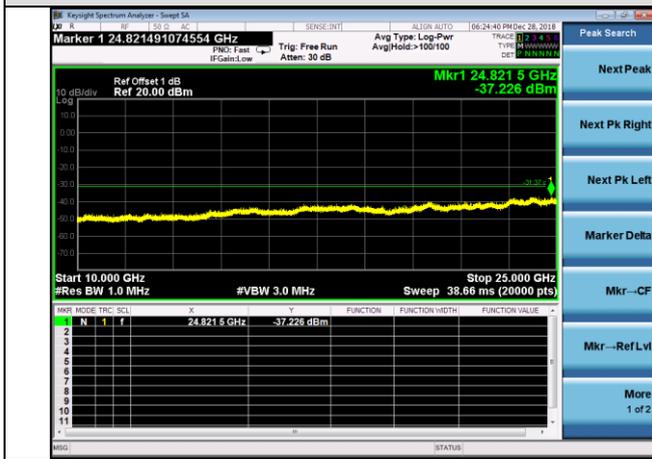
### 11nHT20-LCH



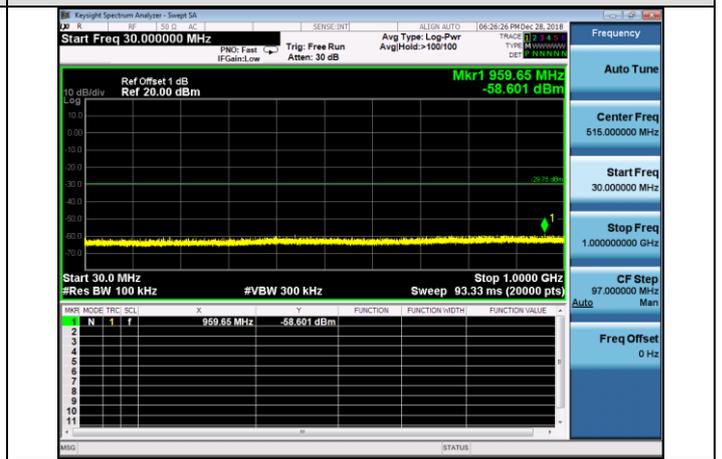
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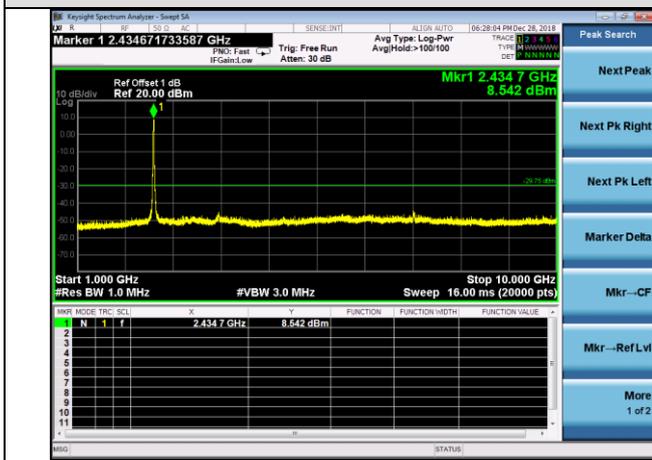
### 11nHT20-LCH



### 11nHT20-MCH



### 11nHT20-MCH

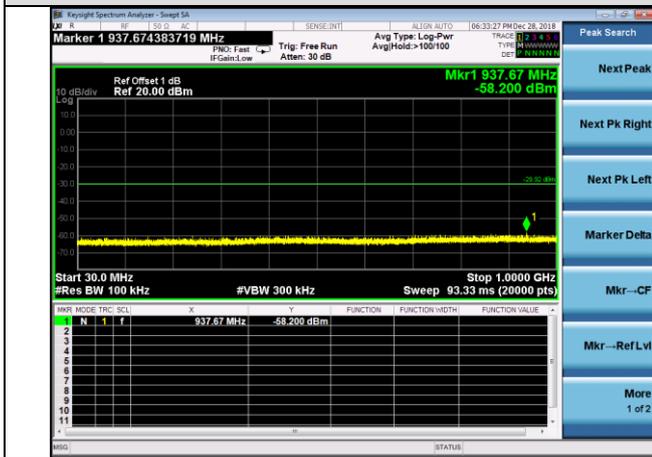


### 11nHT20-MCH

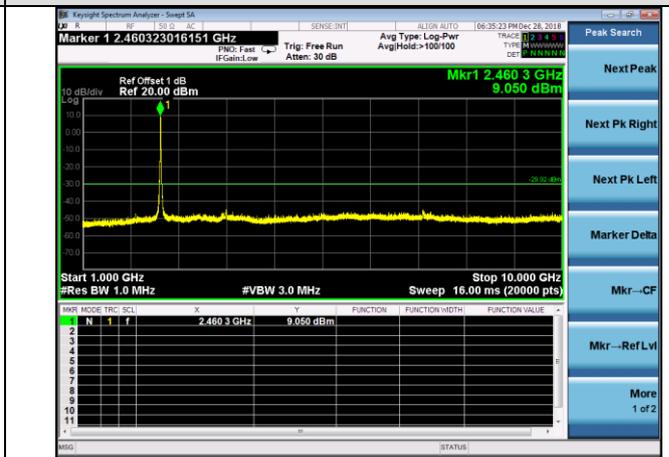




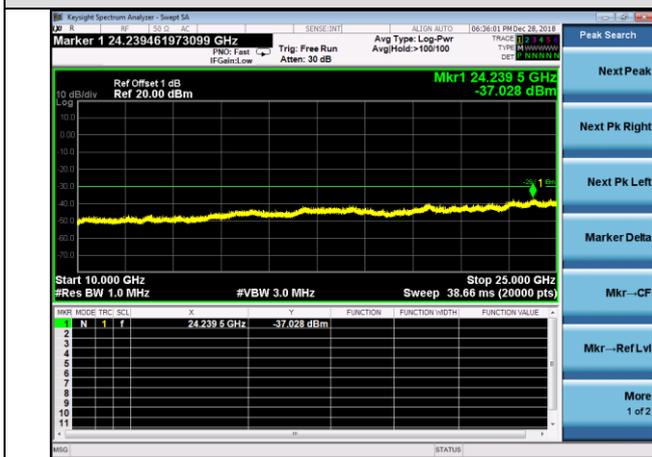
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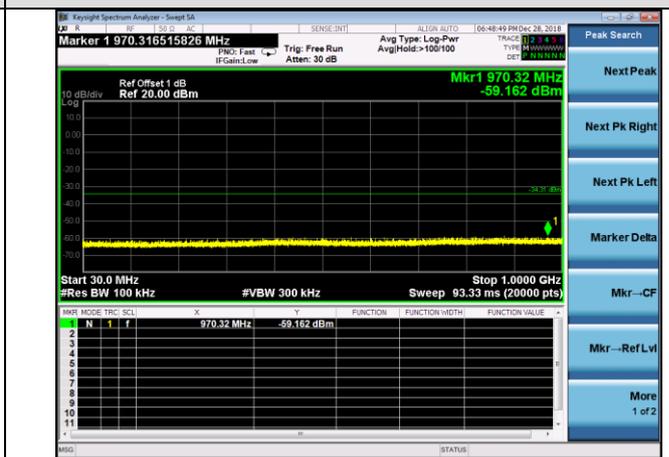
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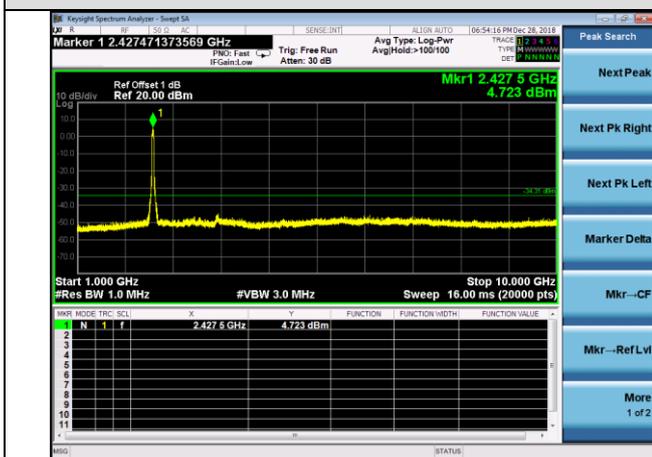
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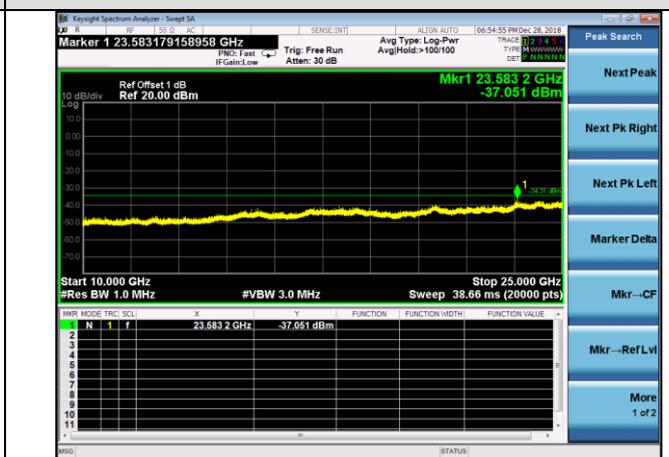
### 11nHT40-LCH



### 11nHT40-LCH



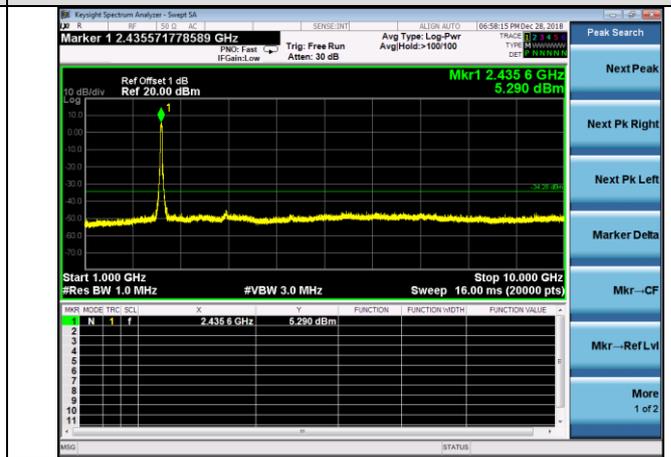
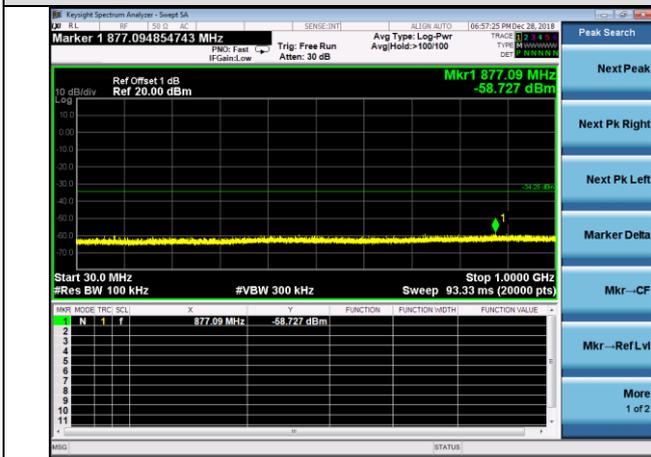
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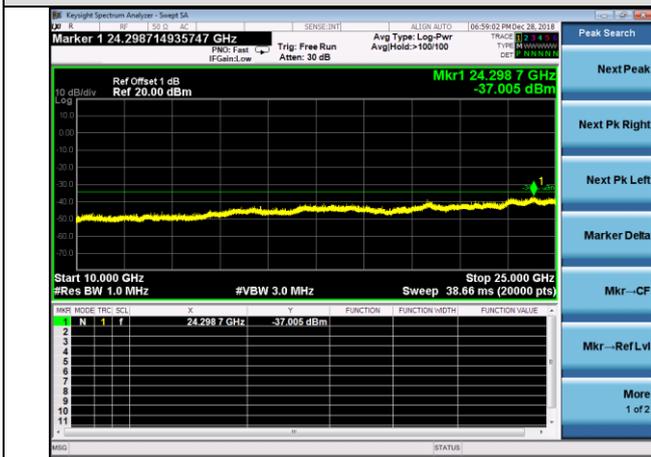
### 11nHT40-MCH

### 11nHT40-MCH



### 11nHT40-MCH

### 11nHT40-HCH



### 11nHT40-HCH

### 11nHT40-HCH

