



TEST REPORT

FCC PART 15 SUBPART C 15.247

**Test report
On Behalf of
C.F.E.B. SISLEY
For
Hair Rituel Analyzer**

Model No.: S1

FCC ID: 2ARUT-S1

**Prepared for : C.F.E.B. SISLEY
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Date of Test: Dec. 03, 2018 ~ Dec. 10, 2018

Date of Report: Dec. 10, 2018

Report Number: HK1812101840E

**TEST RESULT CERTIFICATION****Applicant's name**: C.F.E.B. SISLEY

Address: 3 Avenue de Friedland, Paris, France

Manufacture's Name: Mustech Electronics Co., Limited

Address: 3F, Building No.B2, Shanghe Industry Park, Nanchang Road, Xixiang, Baoan District, Shenzhen City, China

Product description

Trade Mark: Sisley

Product name: Hair Rituel Analyzer

Model and/or type reference: S1

Difference description All the same except for the model name.

Standards: **47 CFR FCC Part 15 Subpart C 15.247**

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Date of Test.....:

Date (s) of performance of tests: Dec. 03, 2018 ~ Dec. 10, 2018

Date of Issue.....: Dec. 10, 2018

Test Result.....: **Pass**Testing Engineer : 

(Gary Qian)

Technical Manager : 

(Eden Hu)

Authorized Signatory : 

(Jason Zhou)



TABLE OF CONTENTS

| | |
|---|-----------|
| 1. SUMMARY | 5 |
| 1.1 TEST STANDARDS | 5 |
| 1.2 TEST DESCRIPTION | 5 |
| 1.3 TEST FACILITY | 6 |
| 1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY | 6 |
| 2. GENERAL INFORMATION | 7 |
| 2.1 ENVIRONMENTAL CONDITIONS | 7 |
| 2.2 GENERAL DESCRIPTION OF EUT | 7 |
| 2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY | 7 |
| 2.4 RELATED SUBMITTAL(S) / GRANT (S) | 8 |
| 2.5 MODIFICATIONS | 8 |
| 2.6. IEEE 802.11N MODULATION SCHEME | 9 |
| 2.7 EQUIPMENT USED | 10 |
| 3. OUTPUT POWER | 11 |
| 3.1. MEASUREMENT PROCEDURE | 11 |
| 3.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 11 |
| 3.3. LIMITS AND MEASUREMENT RESULT | 12 |
| 4. 6 DB BANDWIDTH | 14 |
| 4.1. MEASUREMENT PROCEDURE | 14 |
| 4.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 14 |
| 4.3. LIMITS AND MEASUREMENT RESULTS | 15 |
| 5. CONDUCTED SPURIOUS EMISSION | 23 |
| 5.1. MEASUREMENT PROCEDURE | 23 |
| 5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 23 |
| 5.3. LIMITS AND MEASUREMENT RESULT | 23 |
| 6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY | 42 |
| 6.1 MEASUREMENT PROCEDURE | 42 |
| 6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) | 42 |
| 6.3 LIMITS AND MEASUREMENT RESULT | 42 |
| 7. RADIATED EMISSION | 50 |



| | |
|--|-----------|
| 7.1. MEASUREMENT PROCEDURE..... | 50 |
| 7.2. TEST SETUP..... | 51 |
| 7.3. LIMITS AND MEASUREMENT RESULT | 52 |
| 7.4. TEST RESULT..... | 52 |
| 8. BAND EDGE EMISSION | 58 |
| 8.1. MEASUREMENT PROCEDURE..... | 58 |
| 8.2. TEST SET-UP..... | 58 |
| 8.3. TEST RESULT..... | 59 |
| APPENDIX A: PHOTOGRAPHS OF TEST SETUP | 75 |
| APPENDIX B: PHOTOGRAPHS OF EUT..... | 76 |



1. SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[ANSI C63.10:2013](#) : American National Standard for Testing Unlicensed Wireless Devices

1.2 TEST DESCRIPTION

| 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 | N/A |

NOTE: N/A stands for not applicable. The EUT can not transmit with charging.



1.3 TEST FACILITY

1.3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.

Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: CN1229

Test Firm Registration Number : 616276

1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for HUAK laboratory is reported:

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

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



2.GENERAL INFORMATION

2.1 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

| | |
|---------------------|---------|
| Normal Temperature: | 25°C |
| Relative Humidity: | 55 % |
| Air Pressure: | 101 kPa |

2.2 GENERAL DESCRIPTION OF EUT

| | |
|-----------------------|---|
| Product Name: | Hair Rituel Analyzer |
| Model/Type reference: | S1 |
| Power supply: | DC 3.7V by battery |
| Modulation | DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM) |
| Supported modes | 802.11 b/g/n20/n40 |
| Operation Frequency | 2.412 GHz~2.462GHz |
| Channel number: | 11 |
| Antenna type: | Internal Antenna |
| Antenna gain: | 3.5dBi |
| Hardware Version: | S1-MIAN-V1.3 |
| Software Version: | 1.9.8 F |

Note: For more details, refer to the user's manual of the EUT.

2.3 DESCRIPTION OF TEST MODES AND TEST FREQUENCY

| 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 40MHZ bandwidth system use Channel 3 to Channel 9



| 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 Date rate (1/2/5.5/11)
Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)
Transmit by 802.11n (40MHz) with Date 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.

Configure :

**2.4 RELATED SUBMITTAL(S) / GRANT (S)**

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.5 MODIFICATIONS

No modifications were implemented to meet testing criteria.

**2.6. IEEE 802.11N MODULATION SCHEME**

| MCS Index | Nss | Modulation | R | NBPSC | NCBPS | | NDBPS | | Data rate(Mbps) | |
|-----------|-----|------------|-----|-------|-------|-------|-------|-------|-----------------|-------|
| | | | | | 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 |
| NBPSC | Number of coded bits per single carrier |
| NCBPS | Number of coded bits per symbol |
| NDBPS | Number of data bits per symbol |
| GI | Guard interval |

**2.7 EQUIPMENT USED**

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|---|-----------------|---------------------|------------|---------------|---------------|
| 1. | L.I.S.N. Artificial Mains Network | R&S | ENV216 | HKE-002 | Dec. 28, 2017 | 1 Year |
| 2. | Receiver | R&S | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 3. | RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Dec. 28, 2017 | 1 Year |
| 4. | Spectrum analyzer | R&S | FSP40 | HKE-025 | Dec. 28, 2017 | 1 Year |
| 5. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 6. | Preamplifier | Schwarzbeck | BBV 9743 | HKE-006 | Dec. 28, 2017 | 1 Year |
| 7. | EMI Test Receiver | Rohde & Schwarz | ESCI 7 | HKE-010 | Dec. 28, 2017 | 1 Year |
| 8. | Bilog Broadband Antenna | Schwarzbeck | VULB9163 | HKE-012 | Dec. 28, 2017 | 1 Year |
| 9. | Loop Antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | Dec. 28, 2017 | 1 Year |
| 10. | Horn Antenna | Schwarzbeck | 9120D | HKE-013 | Dec. 28, 2017 | 1 Year |
| 11. | Pre-amplifier | EMCI | EMC051845 SE | HKE-015 | Dec. 28, 2017 | 1 Year |
| 12. | Pre-amplifier | Agilent | 83051A | HKE-016 | Dec. 28, 2017 | 1 Year |
| 13. | EMI Test Software EZ-EMC | Tonscend | JS1120-B Version | HKE-083 | Dec. 28, 2017 | N/A |
| 14. | Power Sensor | Agilent | E9300A | HKE-086 | Dec. 28, 2017 | 1 Year |
| 15. | Spectrum analyzer | Agilent | N9020A | HKE-048 | Dec. 28, 2017 | 1 Year |
| 16. | Signal generator | Agilent | N5182A | HKE-029 | Dec. 28, 2017 | 1 Year |
| 17. | Signal Generator | Agilent | 83630A | HKE-028 | Dec. 28, 2017 | 1 Year |
| 18. | Shielded room | Shiel Hong | 4*3*3 | HKE-039 | Dec. 28, 2017 | 3 Year |

The calibration interval was one year



3. OUTPUT POWER

3.1. MEASUREMENT PROCEDURE

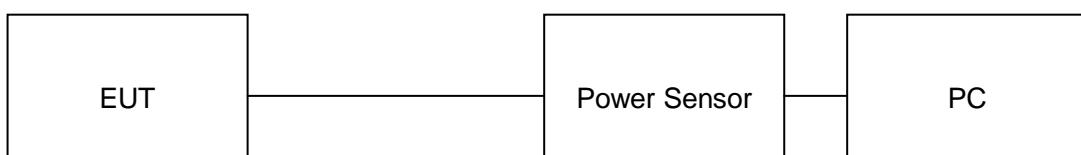
For average power test:

1. Connect EUT RF output port to power sensor through an RF attenuator.
2. Connect the power sensor 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 ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

3.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

AVERAGE POWER SETUP





3.3. LIMITS AND MEASUREMENT RESULT

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

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 8.74 | 30 | Pass |
| 2.437 | 8.52 | 30 | Pass |
| 2.462 | 8.62 | 30 | Pass |

| | | | |
|-----------|--------------------------|--|--|
| TEST ITEM | OUTPUT POWER | | |
| TEST MODE | 802.11g with data rate 6 | | |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 7.35 | 30 | Pass |
| 2.437 | 7.41 | 30 | Pass |
| 2.462 | 7.35 | 30 | Pass |

| | | | |
|-----------|-------------------------------|--|--|
| TEST ITEM | OUTPUT POWER | | |
| TEST MODE | 802.11n 20 with data rate 6.5 | | |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 7.25 | 30 | Pass |
| 2.437 | 7.33 | 30 | Pass |
| 2.462 | 7.21 | 30 | Pass |



| | |
|------------------|--------------------------------|
| TEST ITEM | OUTPUT POWER |
| TEST MODE | 802.11n 40 with data rate 13.5 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.422 | 6.54 | 30 | Pass |
| 2.437 | 6.72 | 30 | Pass |
| 2.452 | 6.51 | 30 | Pass |



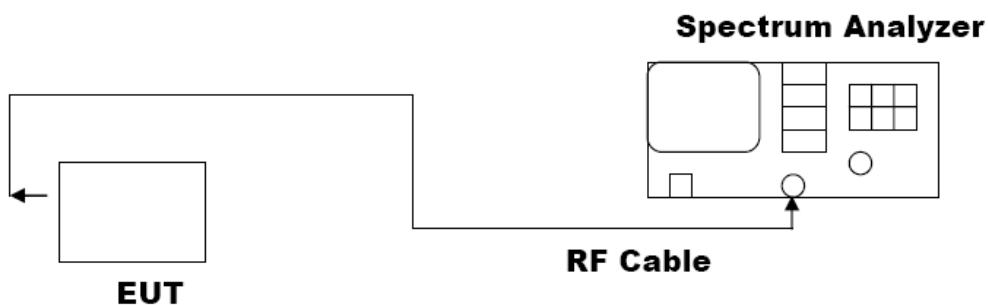
4. 6 DB BANDWIDTH

4.1. 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 \geqslant 3 \times RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

4.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)





4.3. LIMITS AND MEASUREMENT RESULTS

| | | |
|-----------|---------------------------|--|
| TEST ITEM | 6DB BANDWIDTH | |
| TEST MODE | 802.11b with data rate 11 | |

| LIMITS AND MEASUREMENT RESULT | | | |
|-------------------------------|-------------------|----------|------|
| Applicable Limits | Applicable Limits | | |
| | Test Data (MHz) | Criteria | |
| >500KHZ | Low Channel | 9.606 | PASS |
| | Middle Channel | 10.09 | PASS |
| | High Channel | 9.616 | PASS |

| | | |
|-----------|---------------------------|--|
| TEST ITEM | 6DB BANDWIDTH | |
| TEST MODE | 802.11g with data rate 54 | |

| LIMITS AND MEASUREMENT RESULT | | | |
|-------------------------------|-------------------|----------|------|
| Applicable Limits | Applicable Limits | | |
| | Test Data (MHz) | Criteria | |
| >500KHZ | Low Channel | 16.37 | PASS |
| | Middle Channel | 16.35 | PASS |
| | High Channel | 16.34 | PASS |

| | | |
|-----------|------------------------------|--|
| TEST ITEM | 6DB BANDWIDTH | |
| TEST MODE | 802.11n 20 with data rate 65 | |

| LIMITS AND MEASUREMENT RESULT | | | |
|-------------------------------|-------------------|----------|------|
| Applicable Limits | Applicable Limits | | |
| | Test Data (MHz) | Criteria | |
| >500KHZ | Low Channel | 17.09 | PASS |
| | Middle Channel | 17.10 | PASS |
| | High Channel | 17.07 | PASS |



| | |
|------------------|-------------------------------|
| TEST ITEM | 6DB BANDWIDTH |
| TEST MODE | 802.11n 40 with data rate 135 |

| LIMITS AND MEASUREMENT RESULT | | | |
|-------------------------------|-------------------|-------|----------|
| Applicable Limits | Applicable Limits | | |
| | Test Data (MHz) | | Criteria |
| >500KHZ | Low Channel | 35.50 | PASS |
| | Middle Channel | 35.53 | PASS |
| | High Channel | 35.46 | PASS |

**802.11b TEST RESULT****TEST PLOT OF BANDWIDTH FOR LOW CHANNEL****TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL**

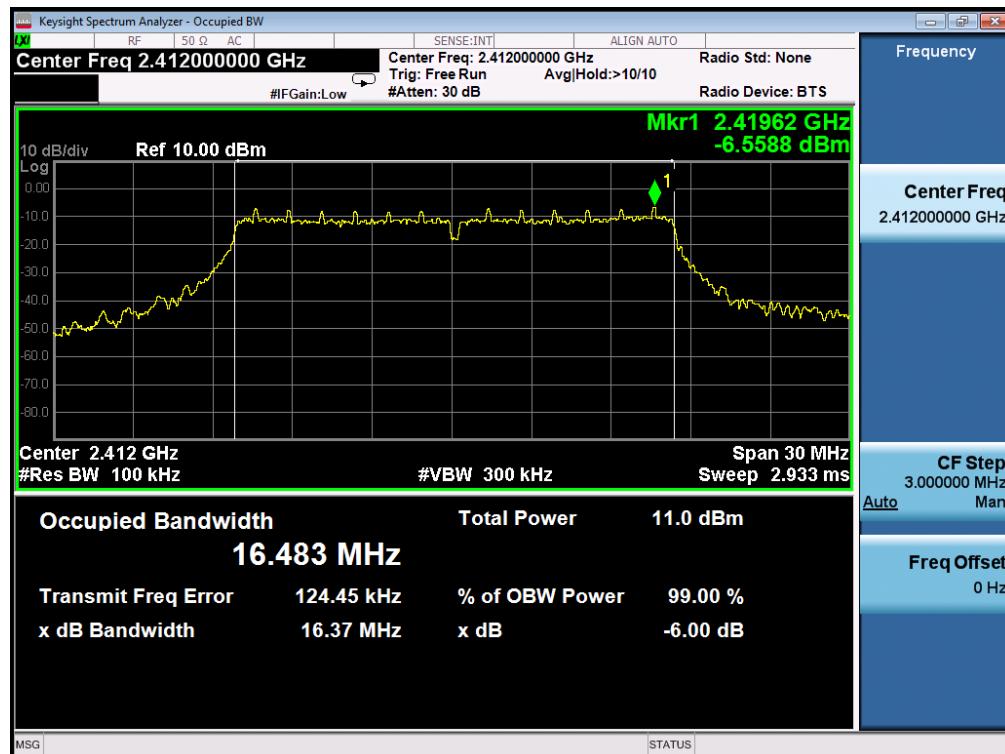


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



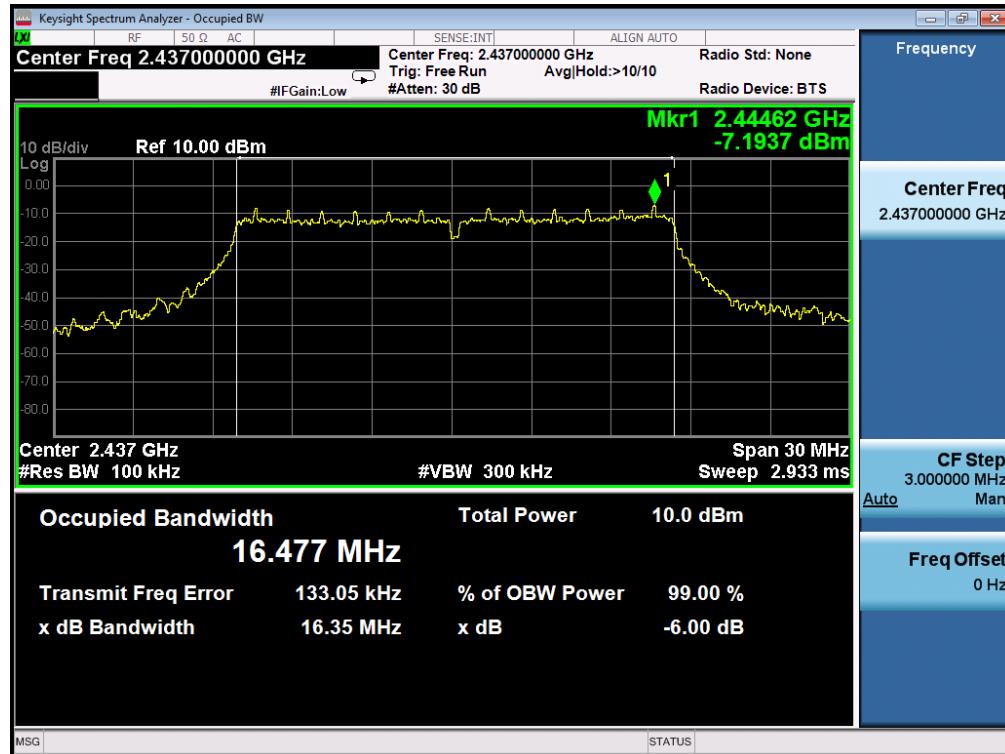
802.11g TEST RESULT

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

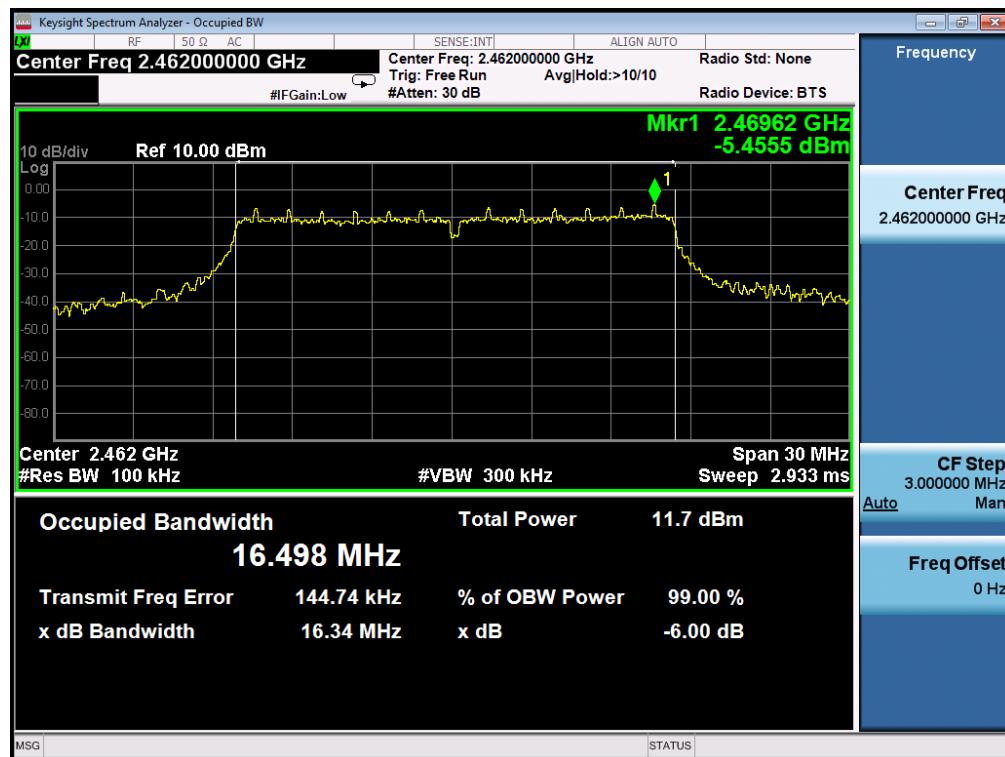


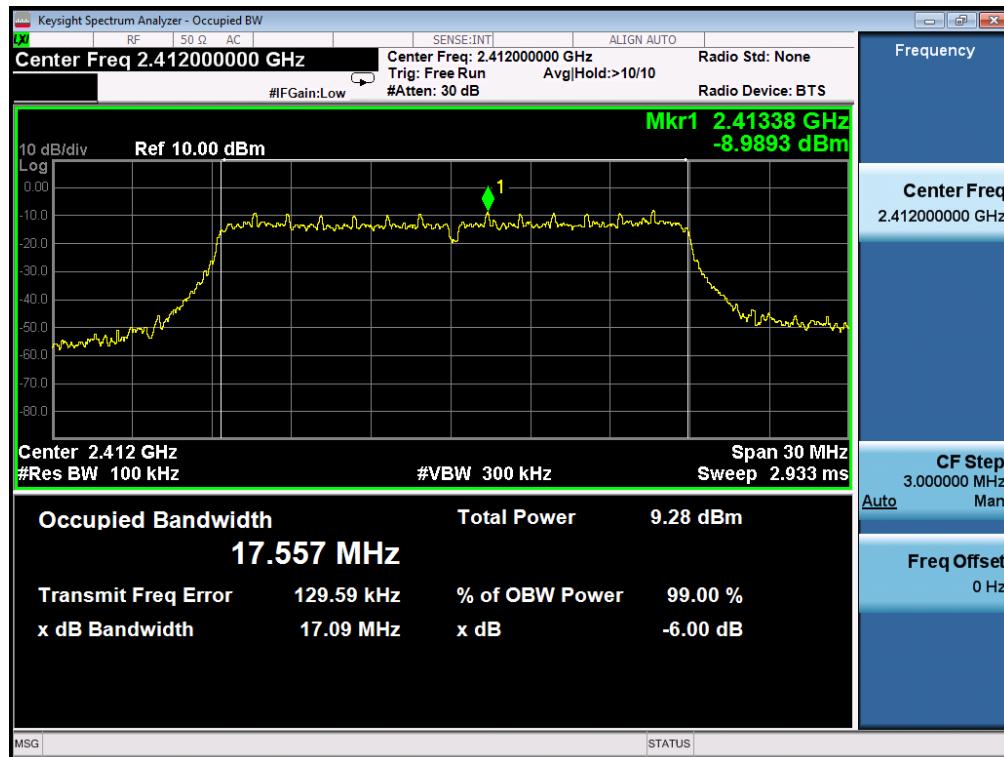
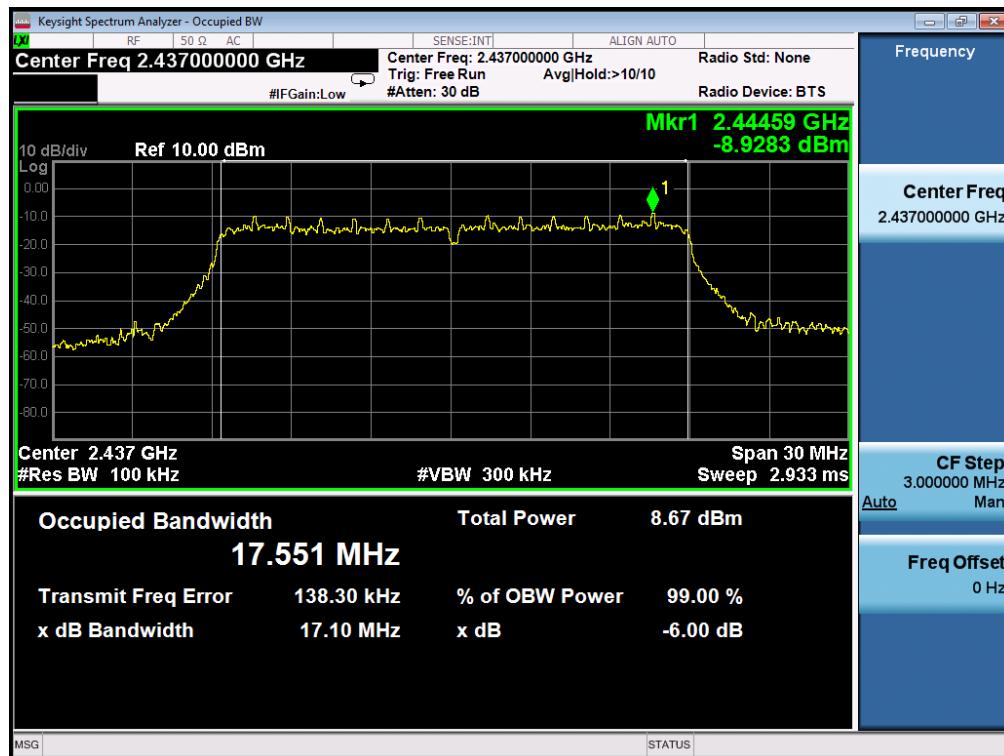


TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



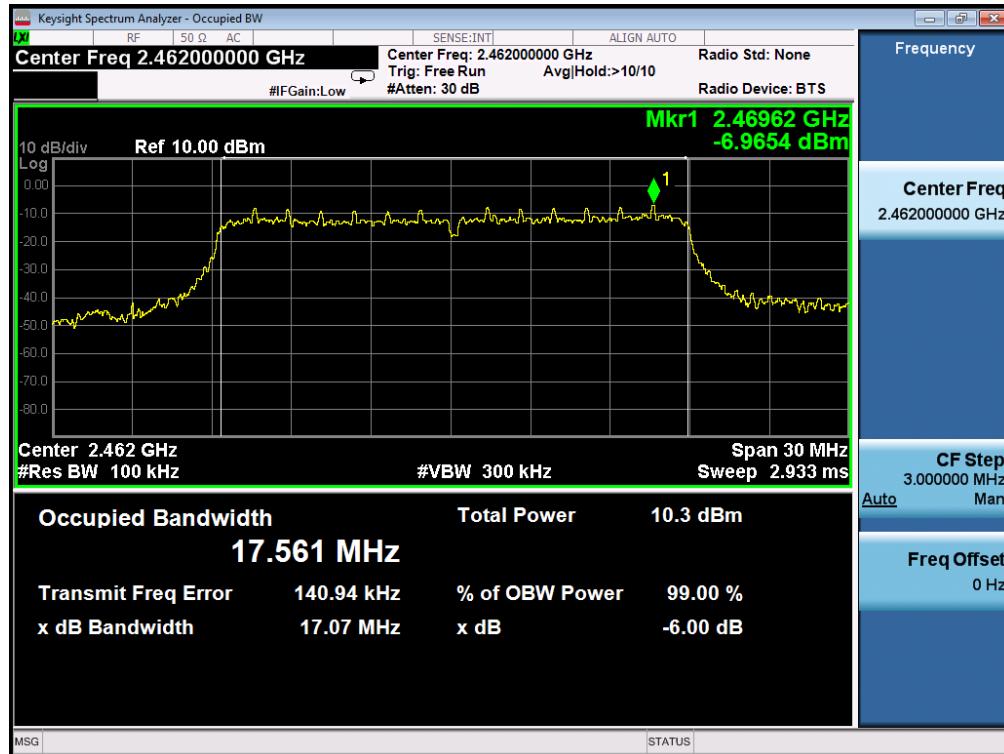
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



**802.11n (20) TEST RESULT****TEST PLOT OF BANDWIDTH FOR LOW CHANNEL****TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL**

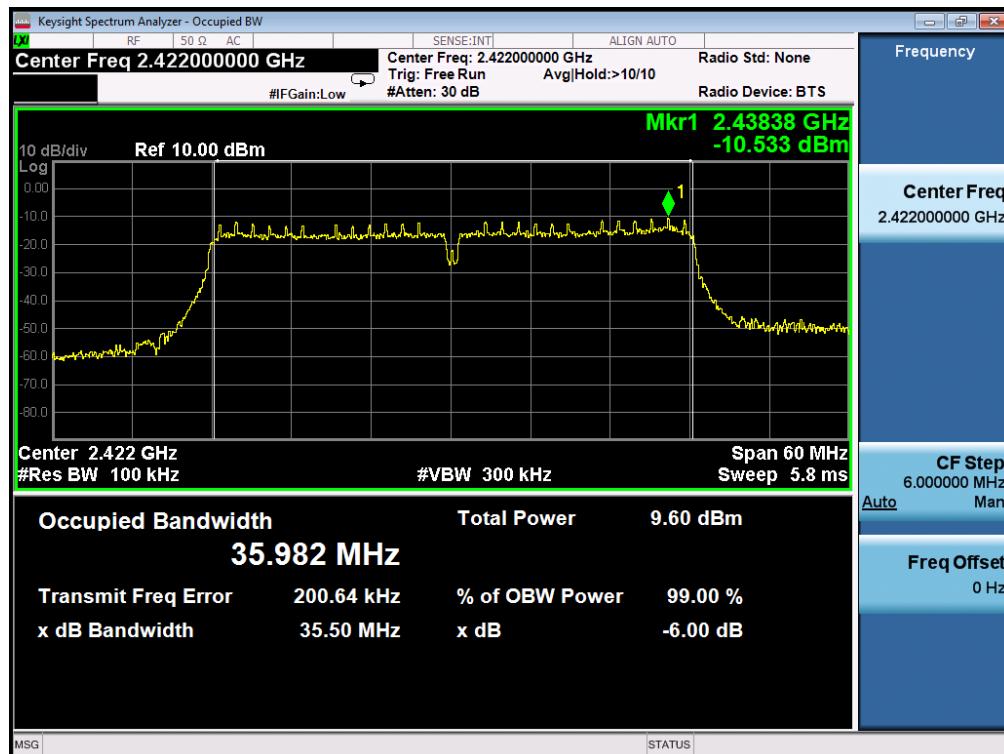


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



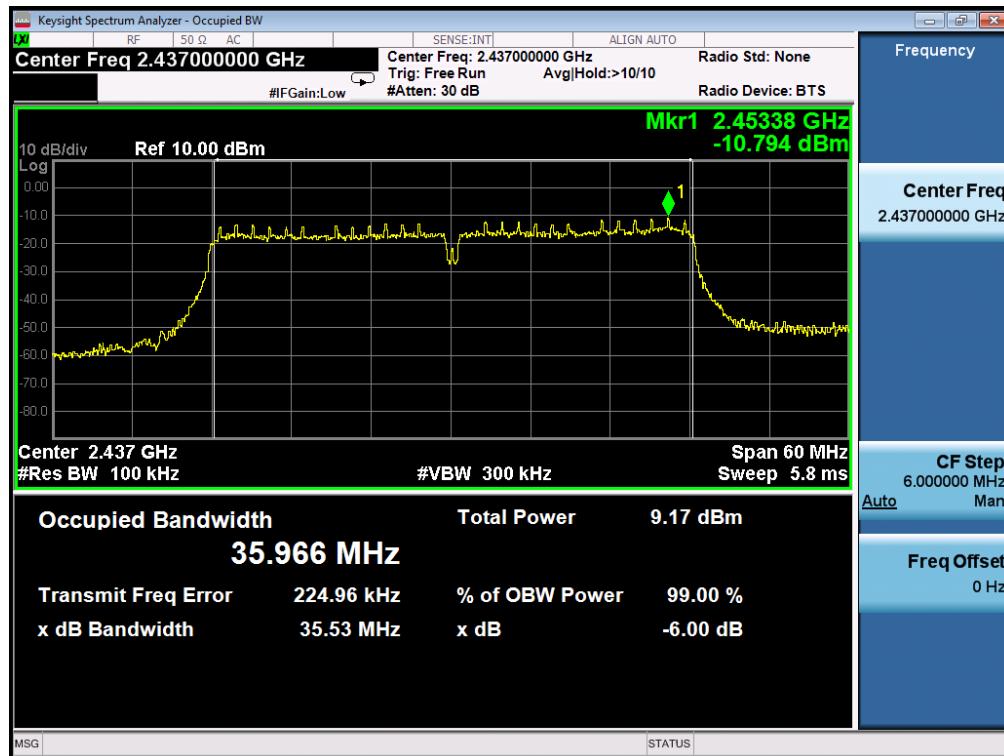
802.11n (40) TEST RESULT

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

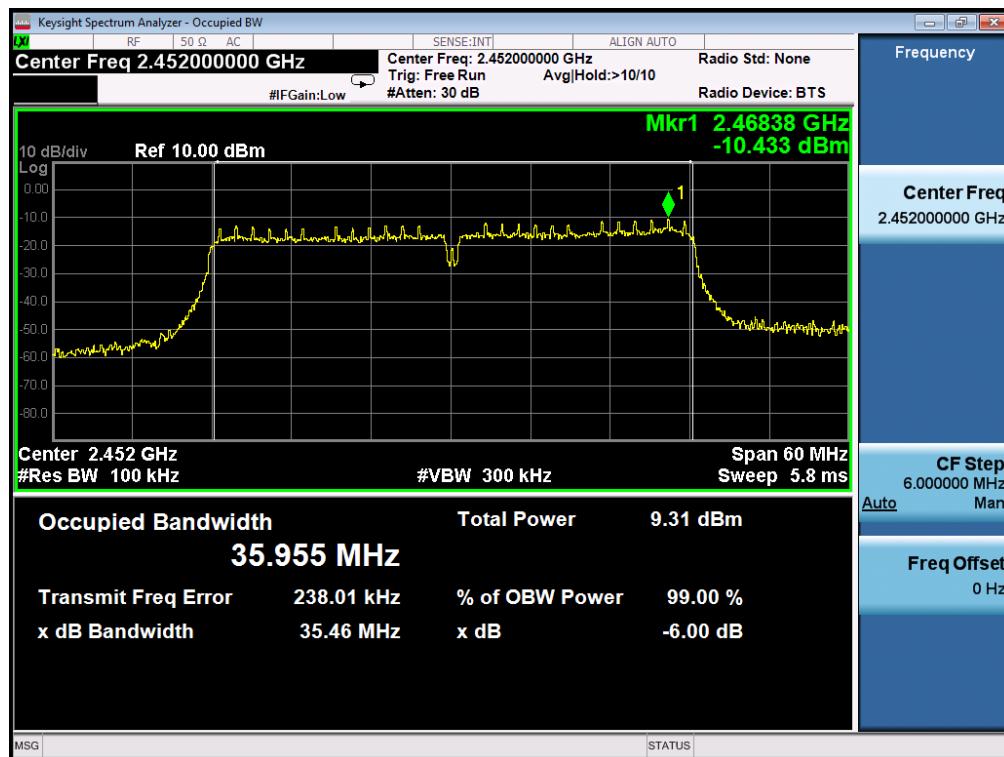




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





5. CONDUCTED SPURIOUS EMISSION

5.1. 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 ANSI C63.10 (2013) 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.

5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

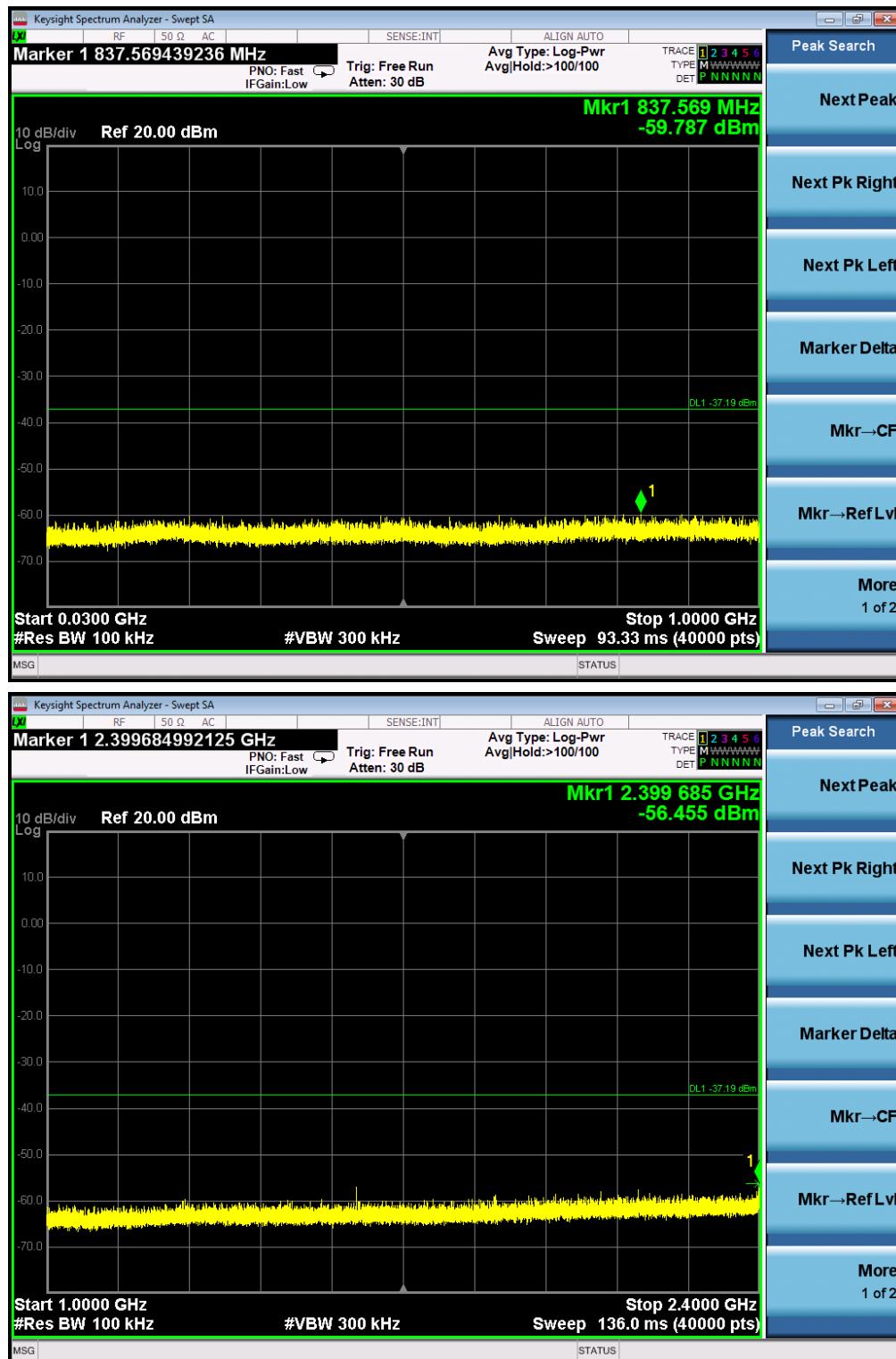
The same as described in section 4.2.

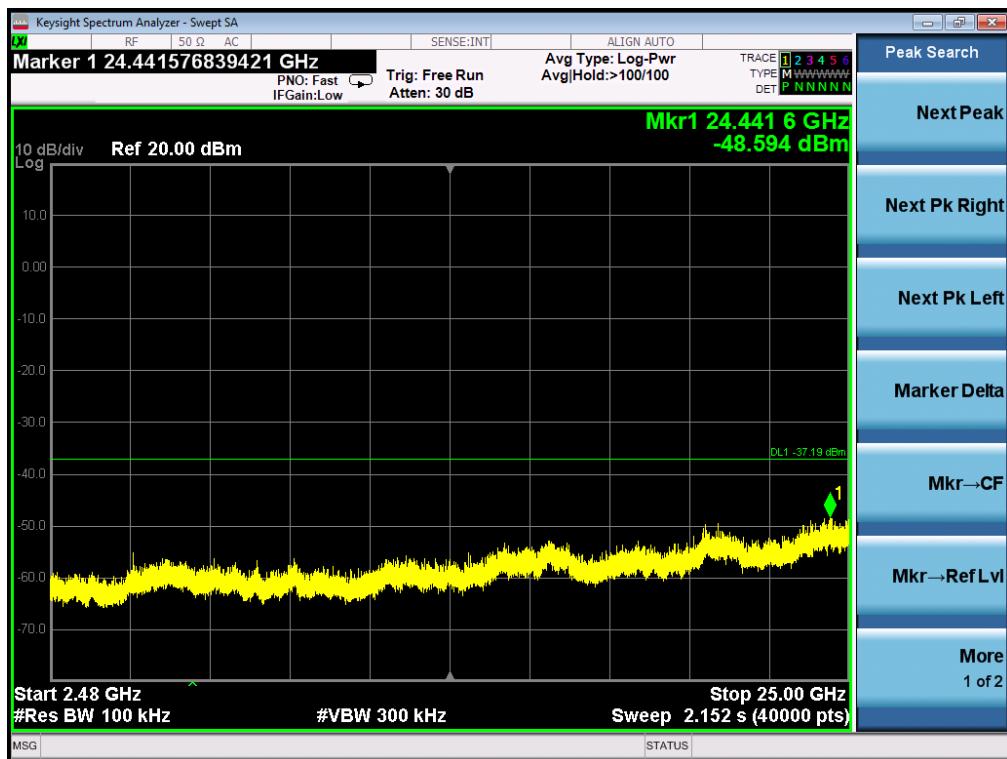
5.3. LIMITS AND MEASUREMENT RESULT

| LIMITS AND MEASUREMENT RESULT | | |
|---|--|----------|
| Applicable Limits | Measurement Result | |
| | Test Data | Criteria |
| 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. 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)) | At least -30dBc than the limit Specified on the BOTTOM Channel | PASS |
| | At least -30dBc than the limit Specified on the TOP Channel | PASS |

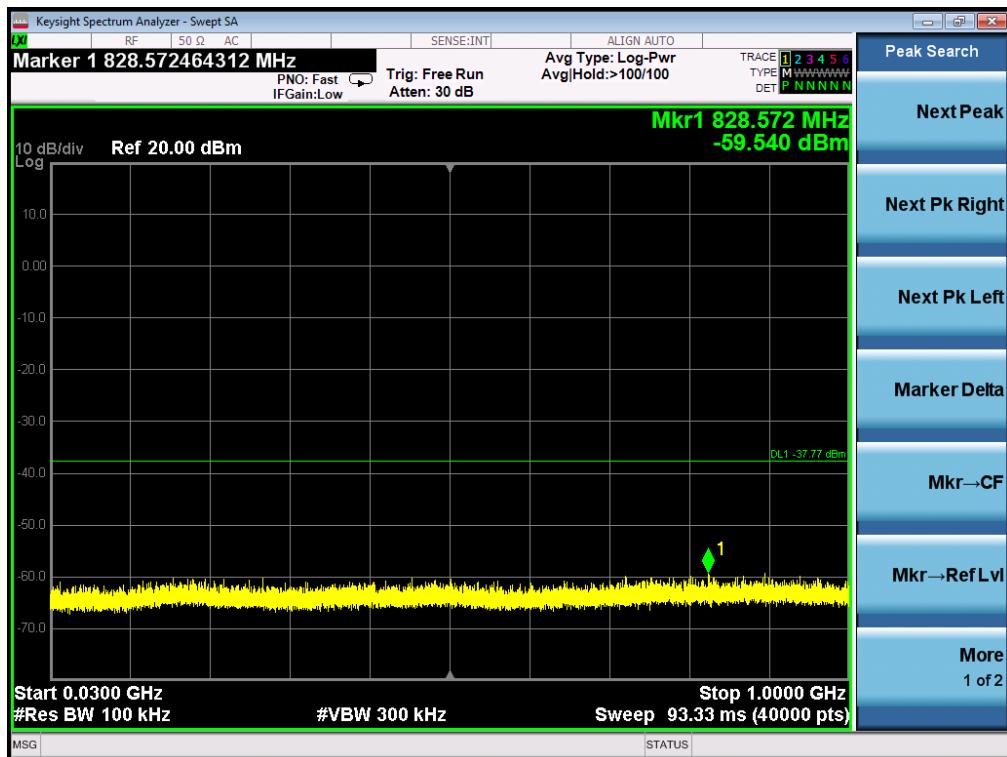


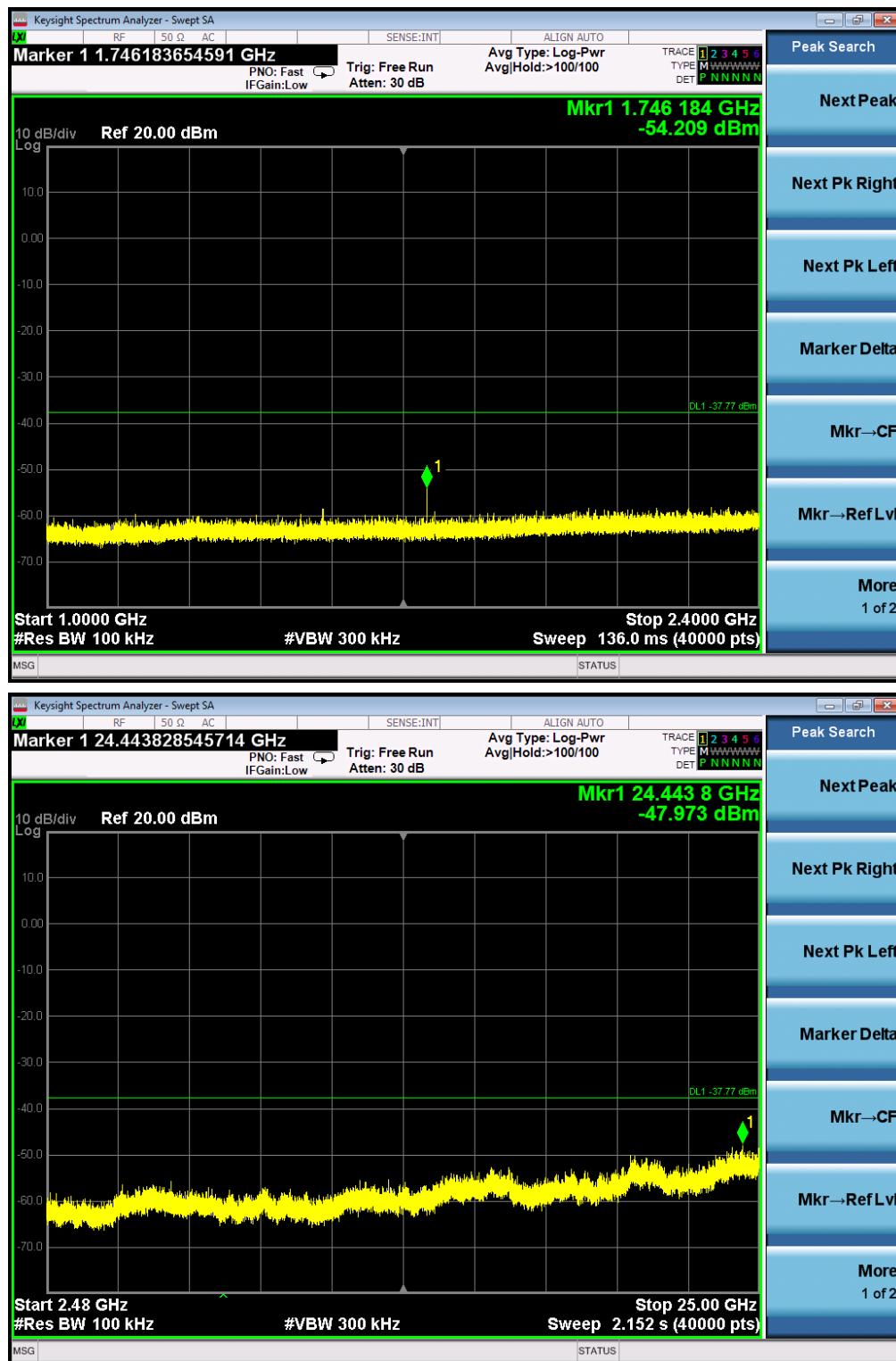
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11b FOR MODULATION IN LOW CHANNEL





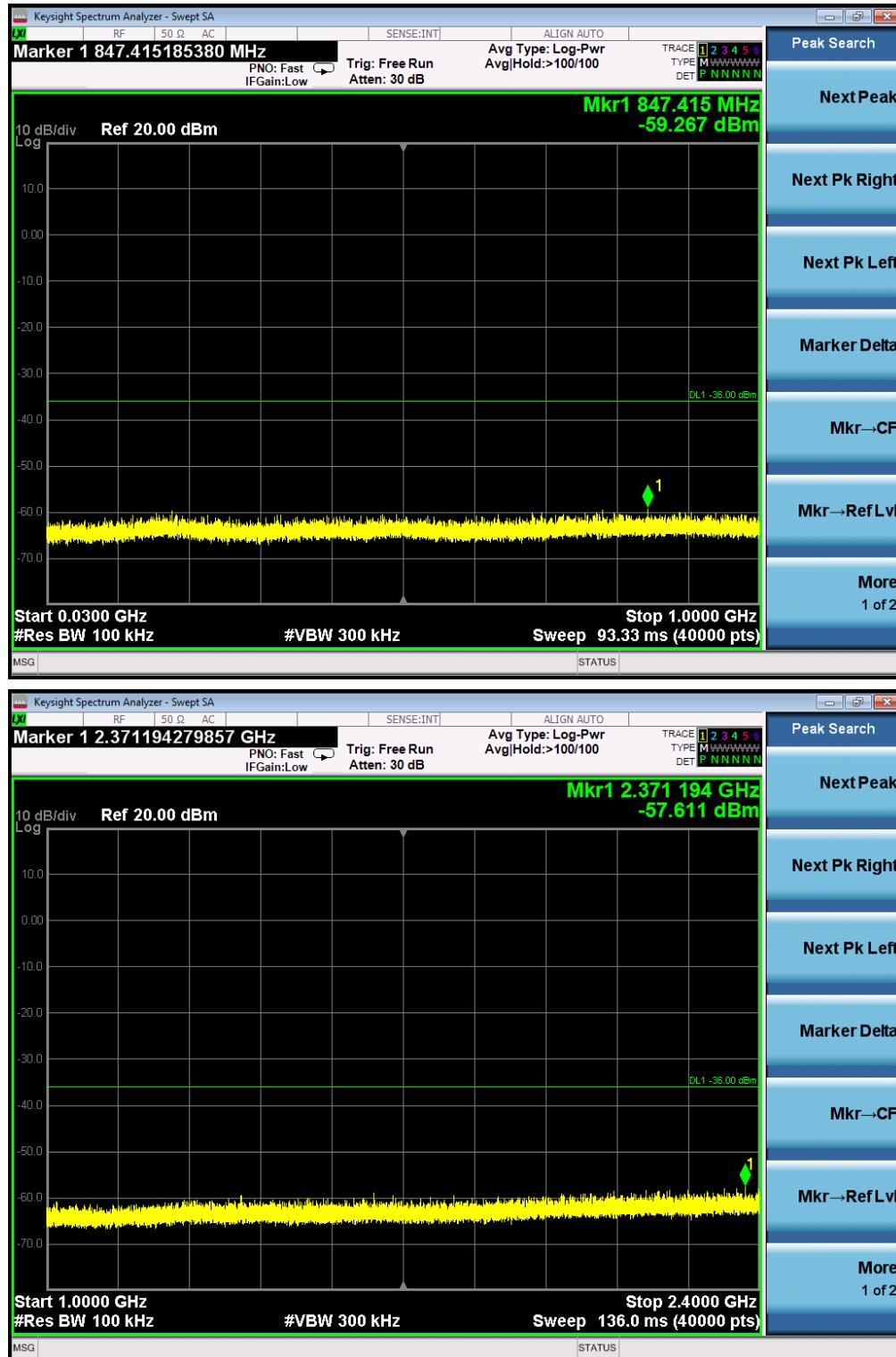
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11b FOR MODULATION IN MIDDLE CHANNEL

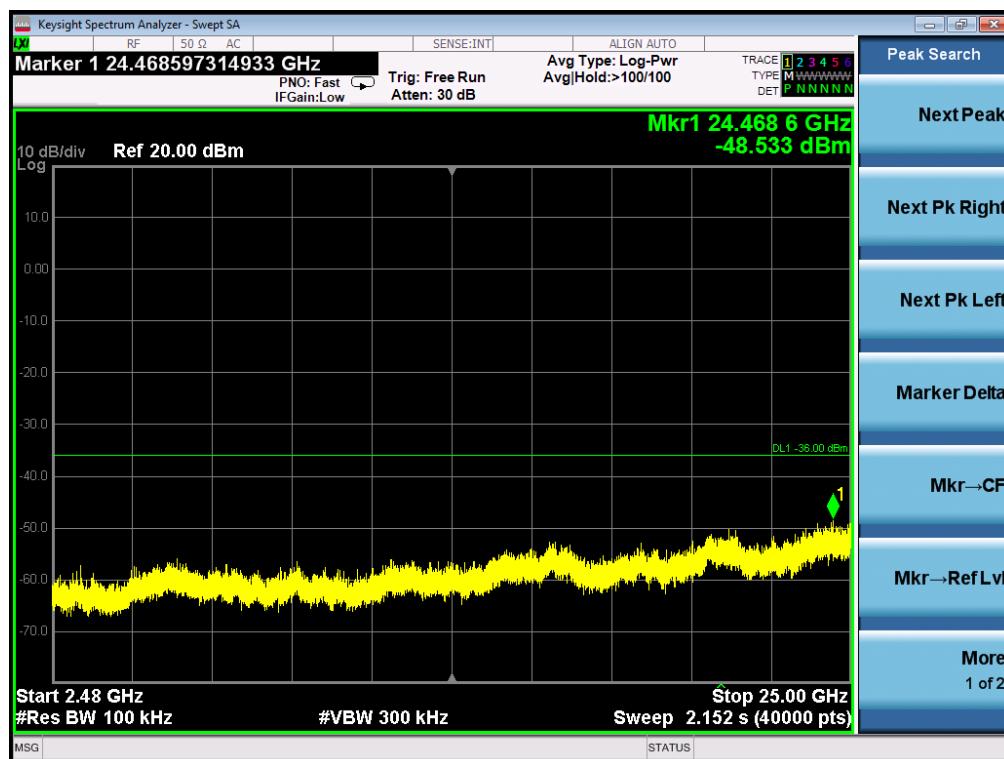




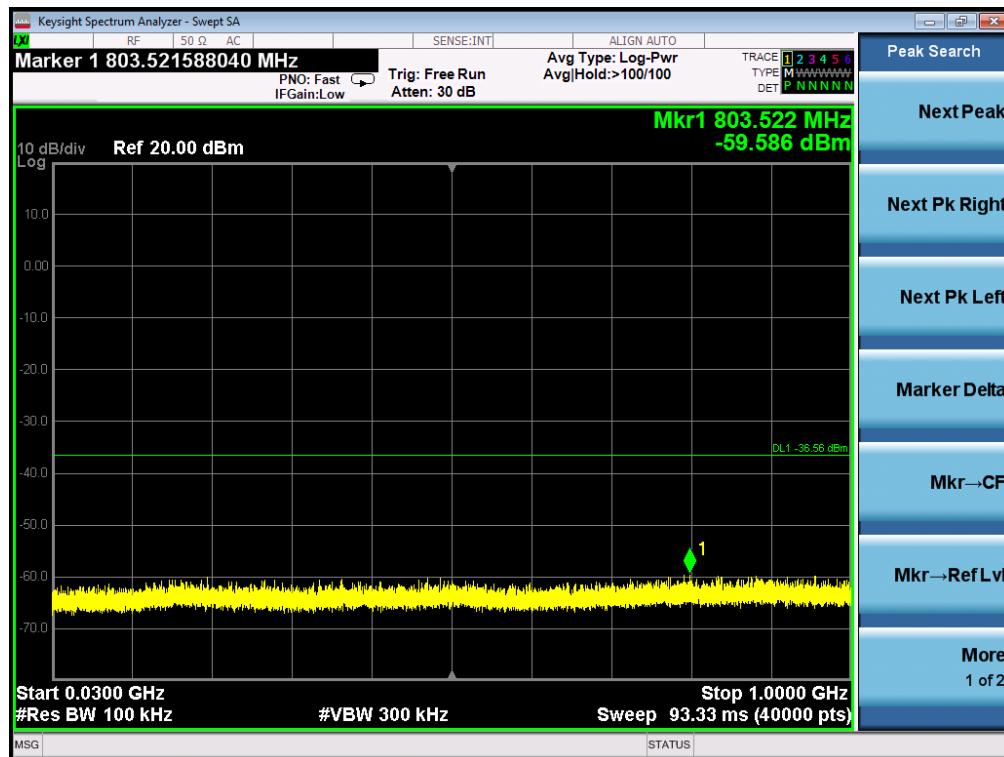


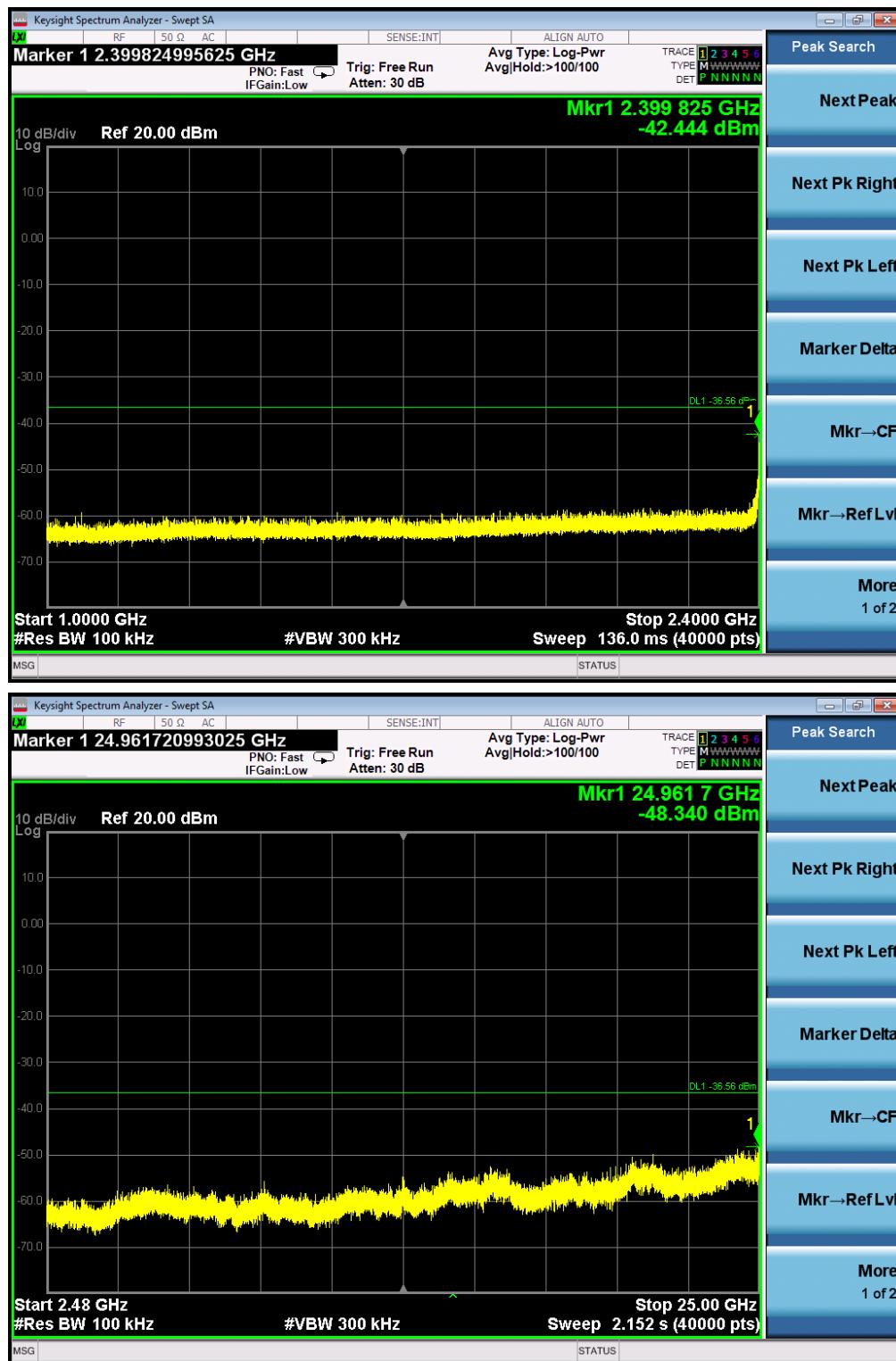
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11b FOR MODULATION IN HIGH CHANNEL





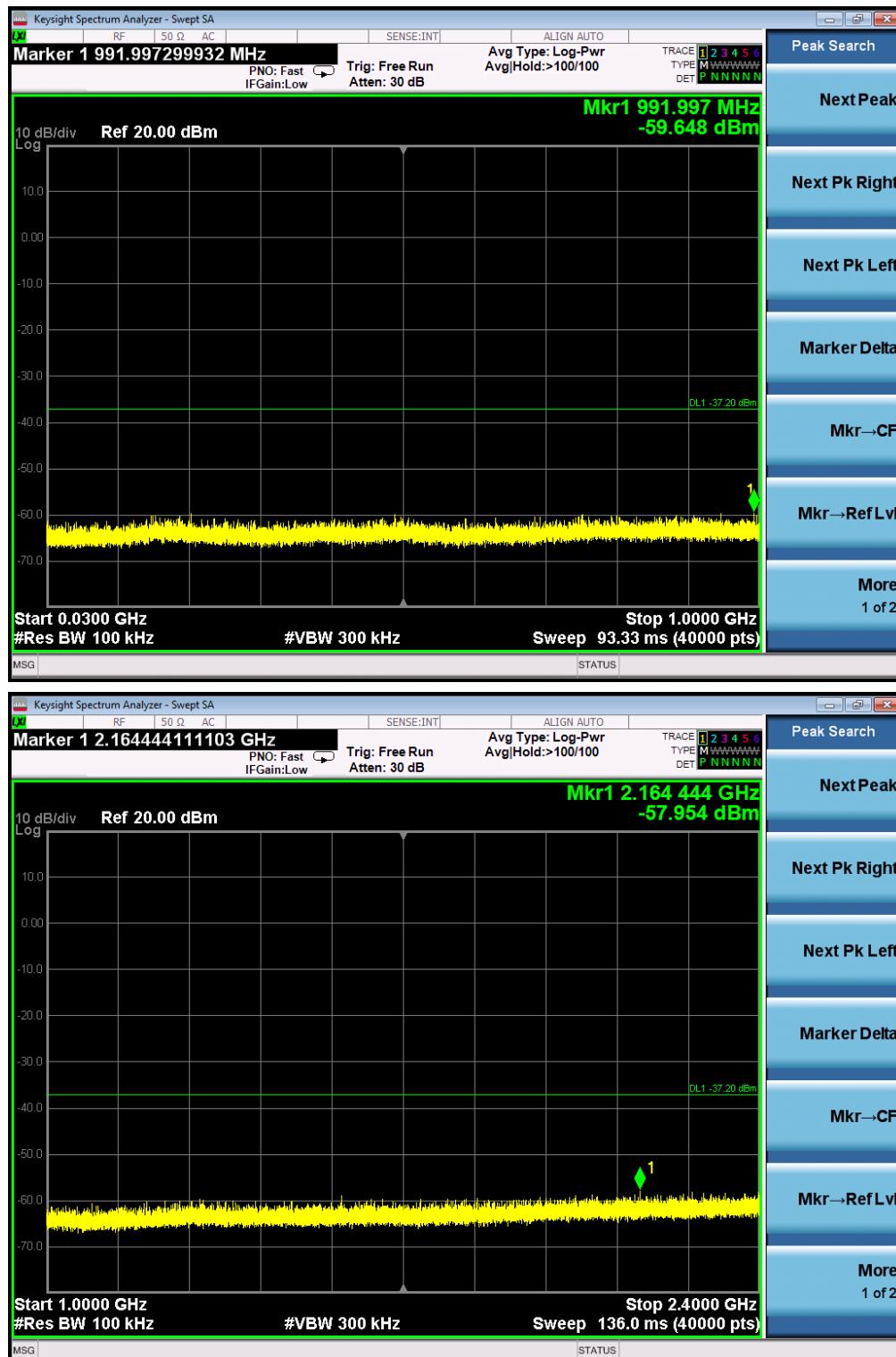
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11g FOR MODULATION IN LOW CHANNEL





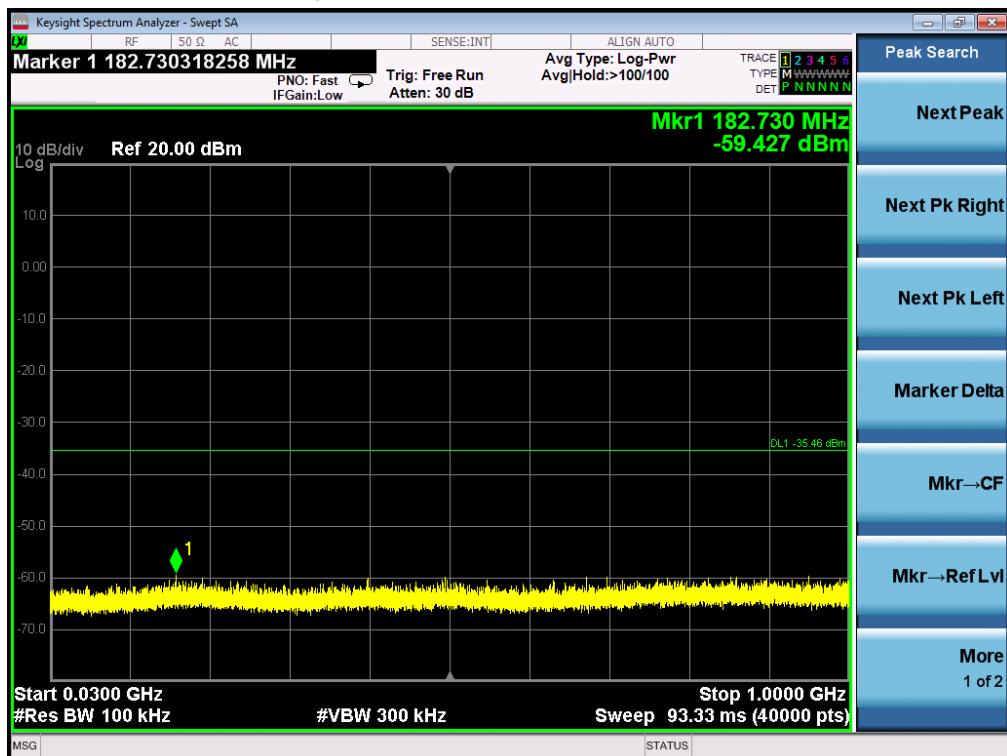


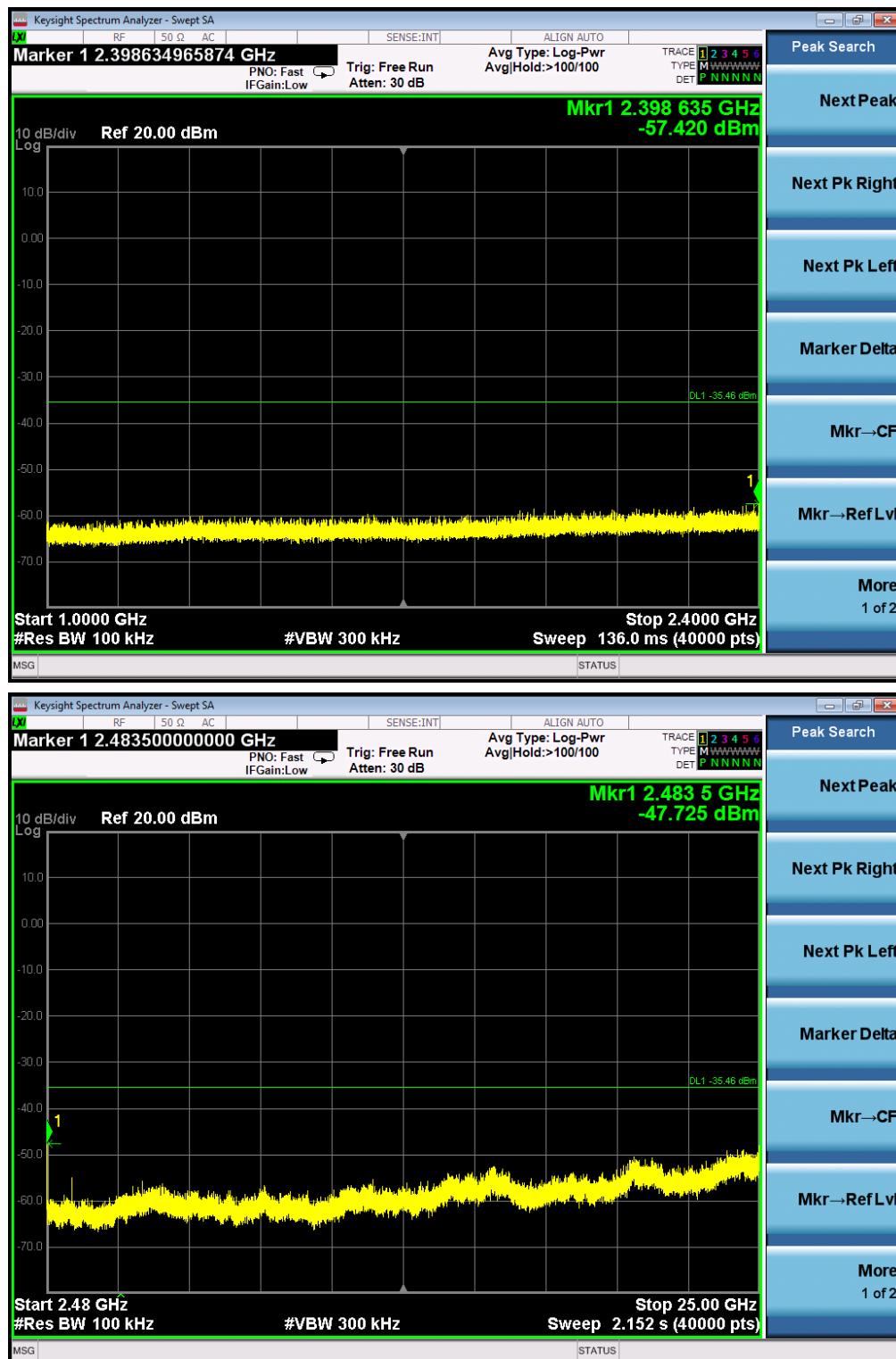
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN MIDDLE CHANNEL





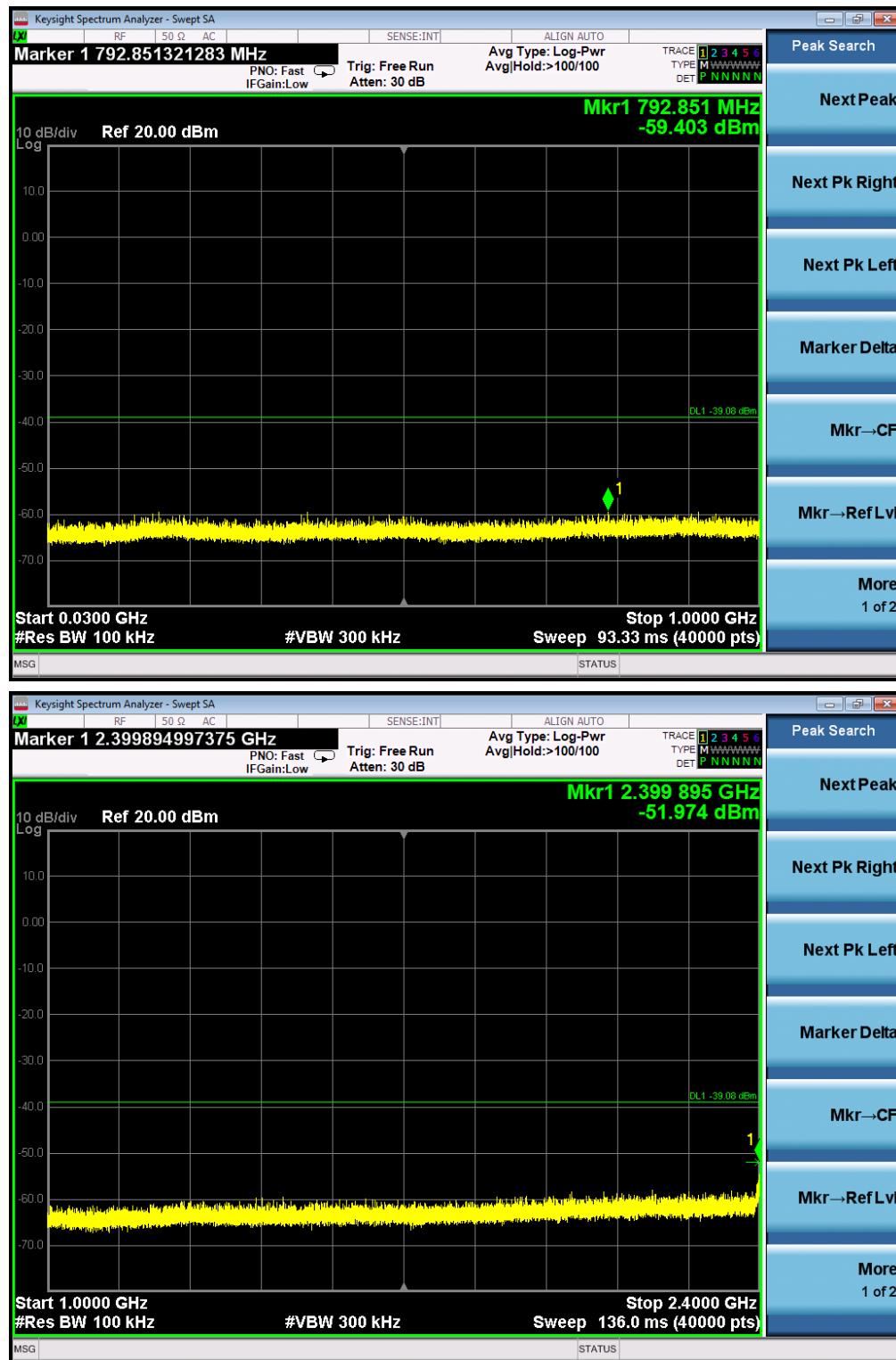
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN HIGH CHANNEL





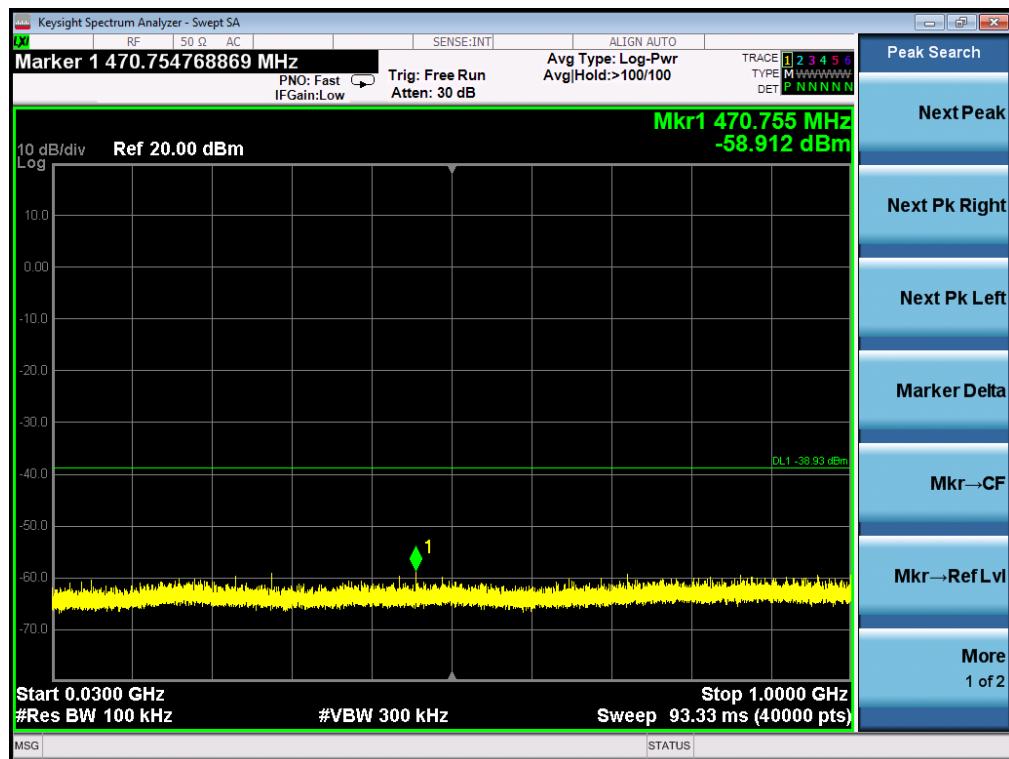


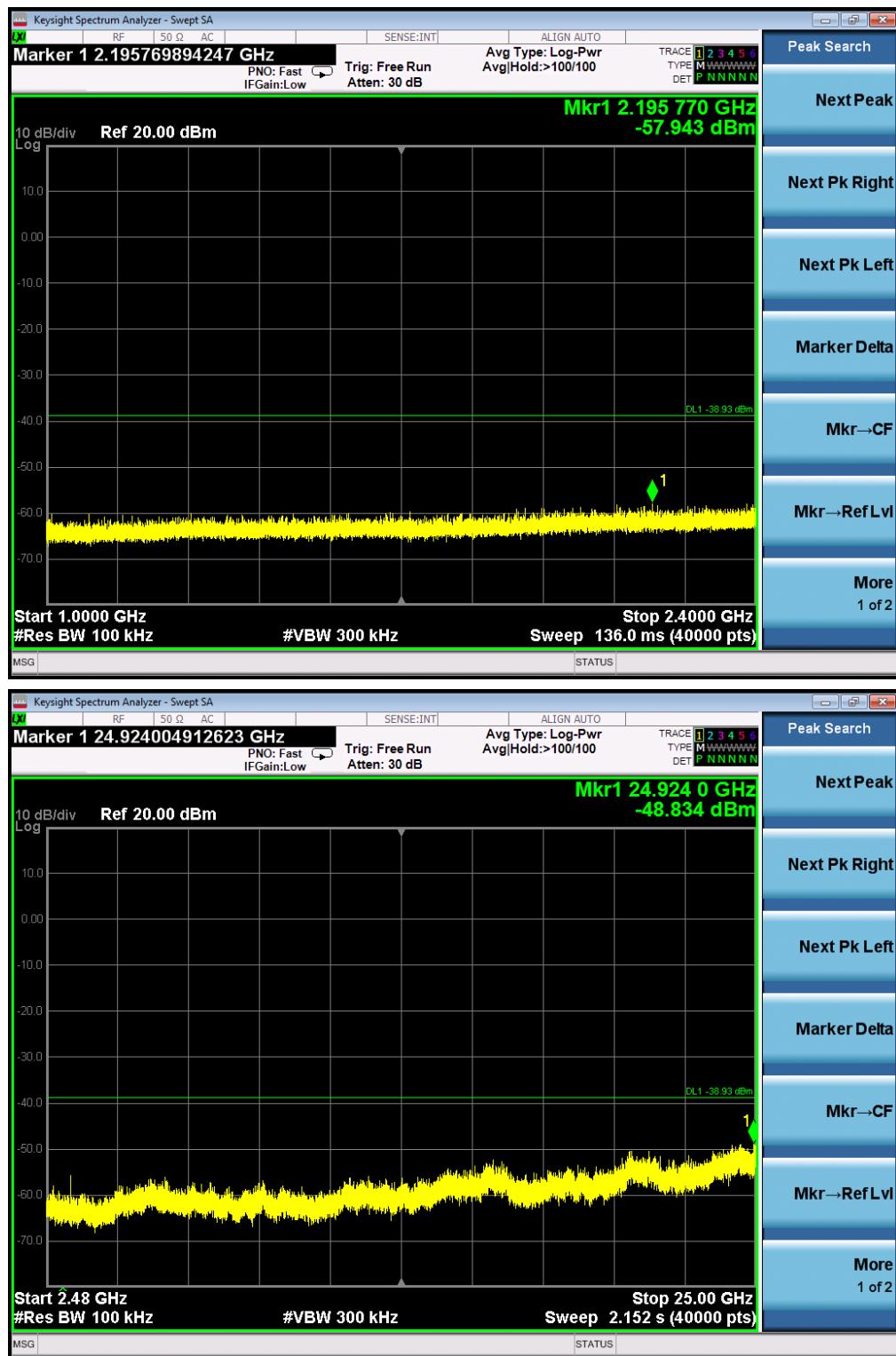
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n20 FOR MODULATION IN LOW CHANNEL





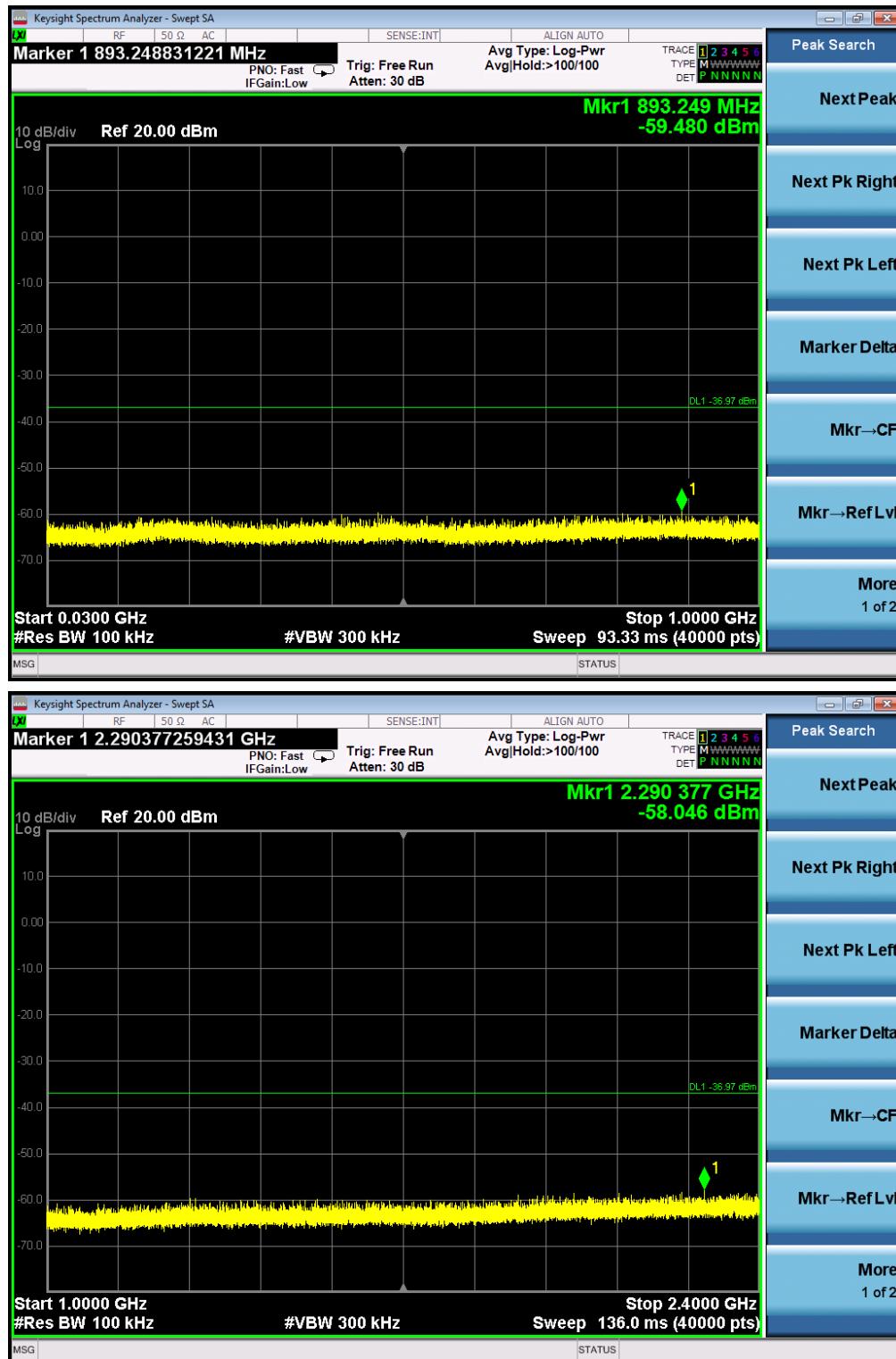
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL

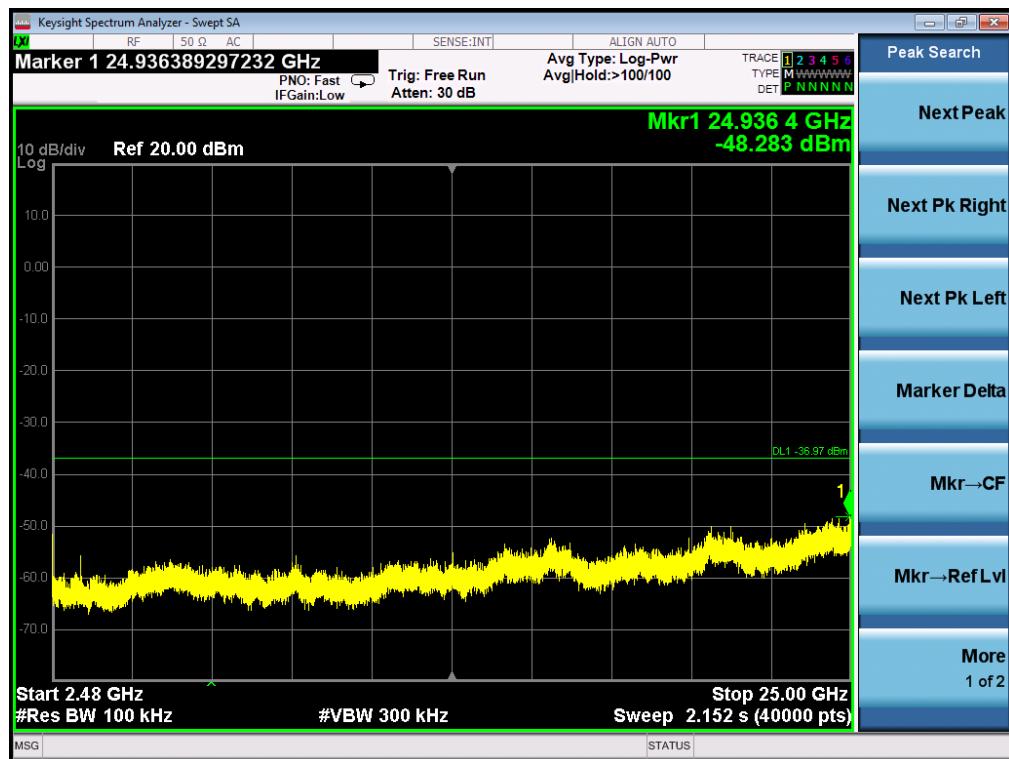




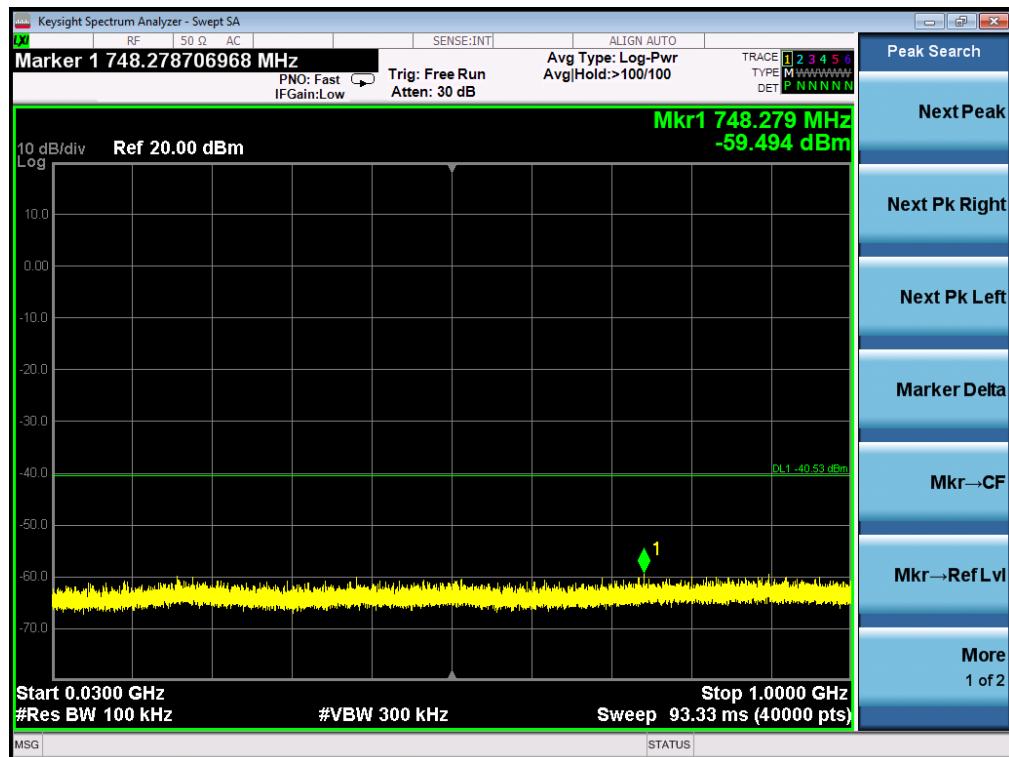


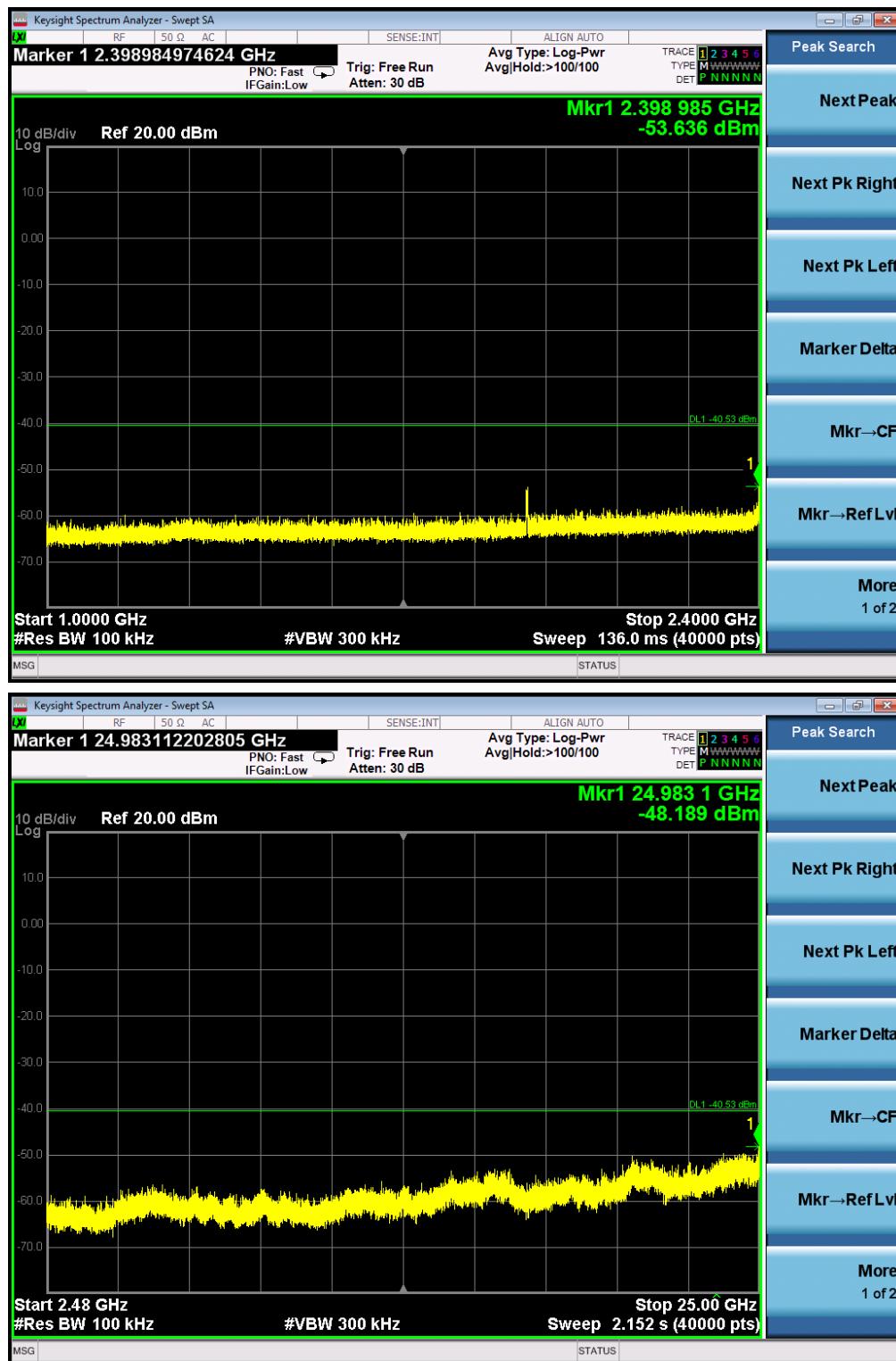
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n20 FOR MODULATION IN HIGH CHANNEL





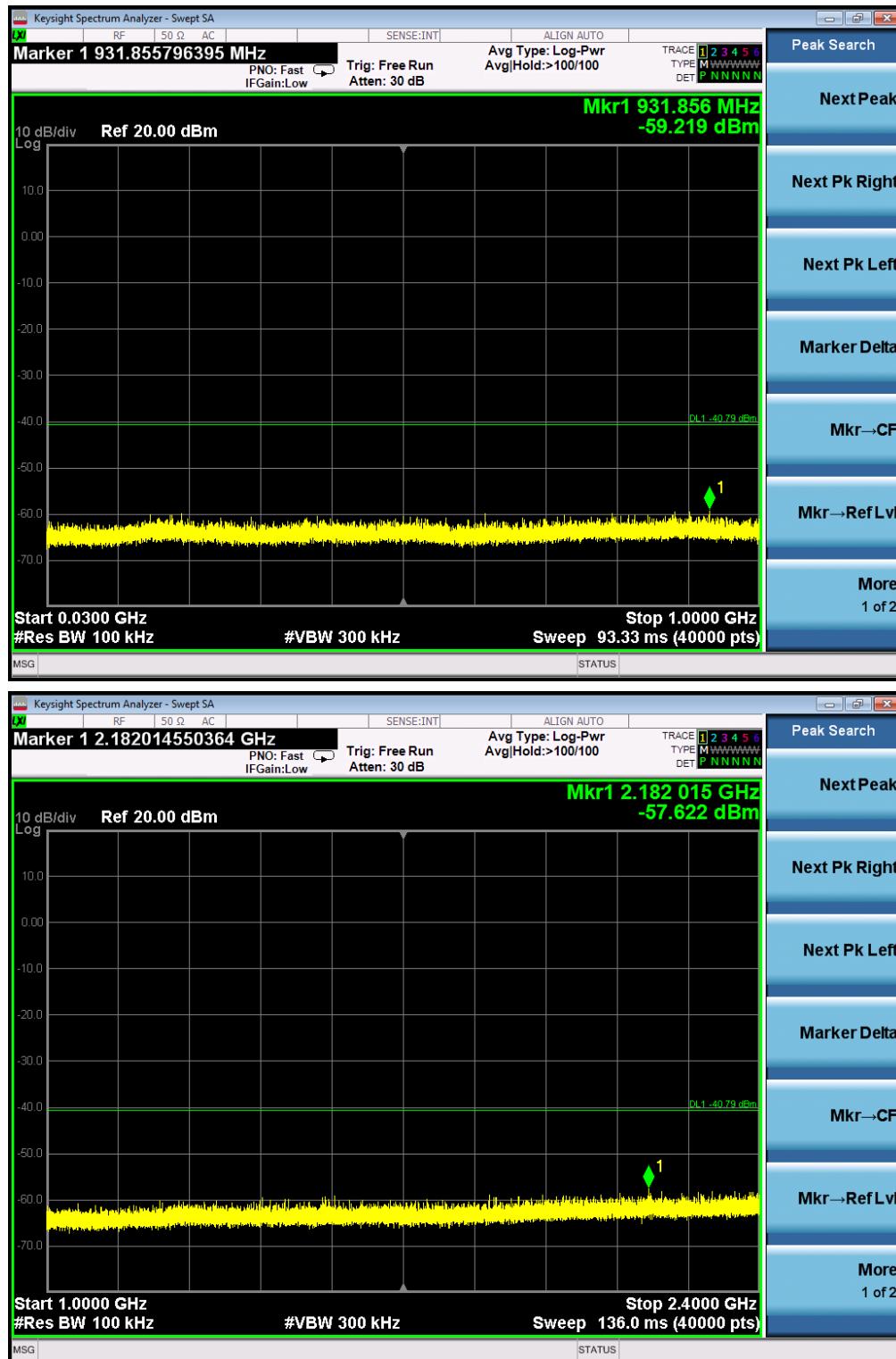
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n40 FOR MODULATION IN LOW CHANNEL

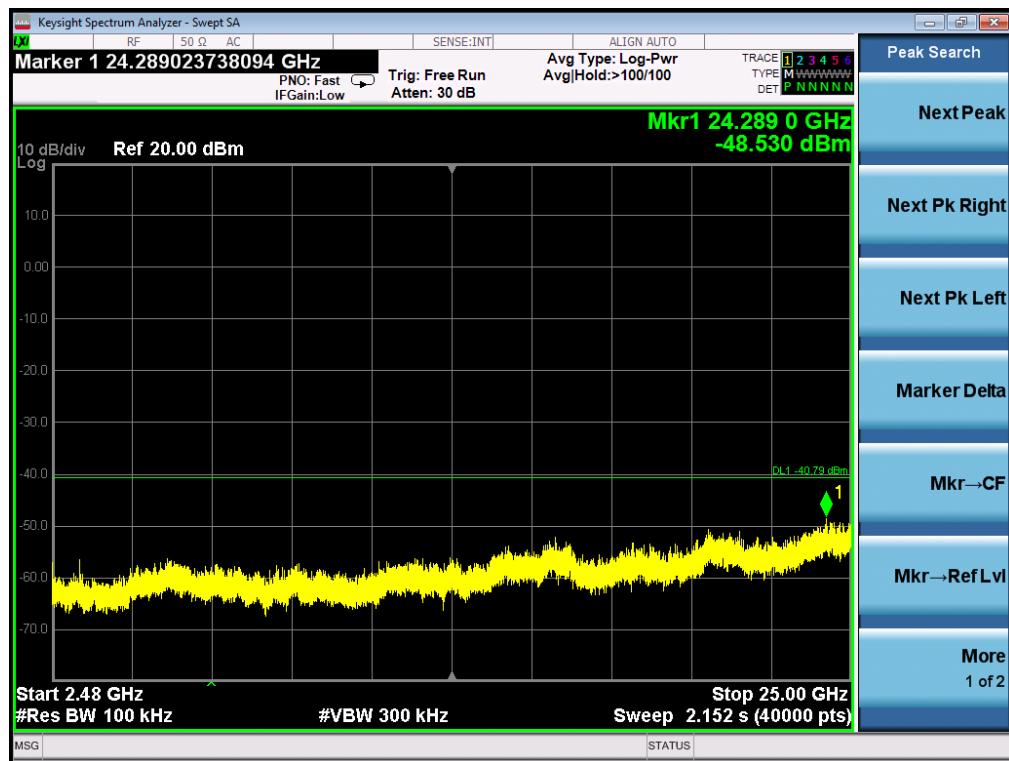




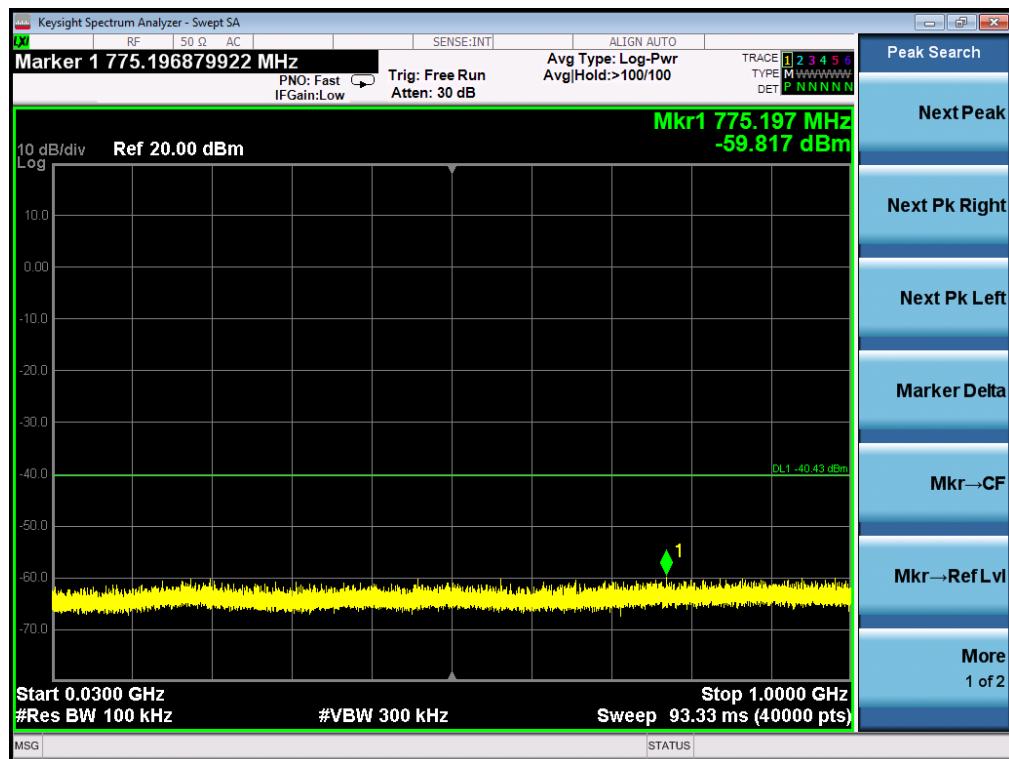


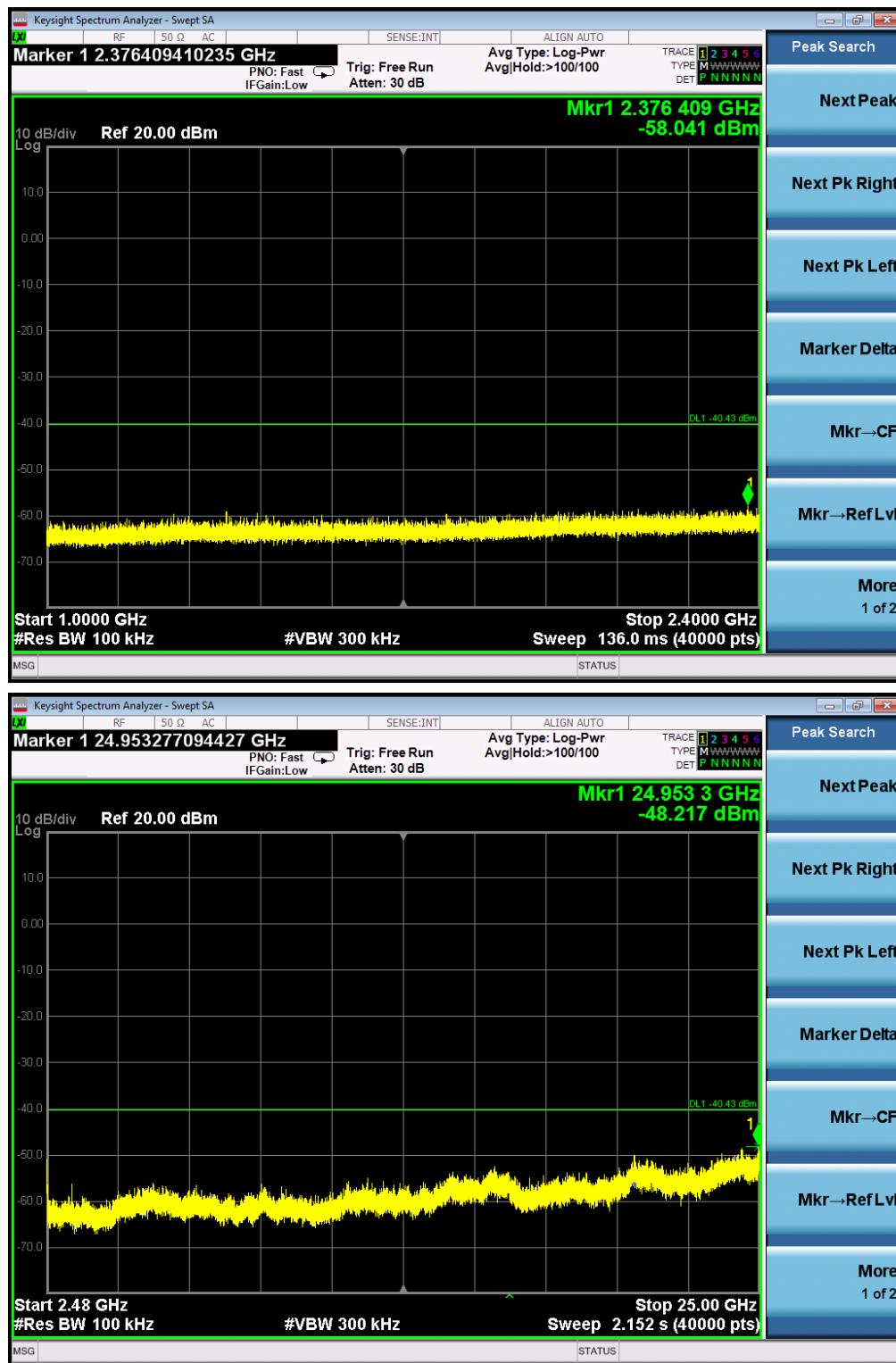
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n40 FOR MODULATION IN MIDDLE CHANNEL





TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11n40 FOR MODULATION IN HIGH CHANNEL







6. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

6.1 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 method of AVGPSD-1 in the ANSI C63.10 (2013) item 11.10 was used in this testing.

6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 4.2.

6.3 LIMITS AND MEASUREMENT RESULT

| TEST ITEM | POWER SPECTRAL DENSITY |
|-----------|--------------------------|
| TEST MODE | 802.11b with data rate 1 |

| Channel No. | Power density (dBm/20kHz) | Limit (dBm/3kHz) | Result |
|----------------|---------------------------|------------------|--------|
| Low Channel | -8.662 | 8 | Pass |
| Middle Channel | -8.932 | 8 | Pass |
| High Channel | -7.143 | 8 | Pass |

| TEST ITEM | POWER SPECTRAL DENSITY |
|-----------|--------------------------|
| TEST MODE | 802.11g with data rate 6 |

| Channel No. | Power density (dBm/20kHz) | Limit (dBm/3kHz) | Result |
|----------------|---------------------------|------------------|--------|
| Low Channel | -14.324 | 8 | Pass |
| Middle Channel | -12.159 | 8 | Pass |
| High Channel | -11.642 | 8 | Pass |