
FCC Test Report

Report No.: AGC01892161220FE05

FCC ID : 2AFDG-VA-CD001
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Car DVR
BRAND NAME : VAVA
MODEL NAME : VA-CD001
CLIENT : SUNVALLEYTEK INTERNATIONAL, INC.
DATE OF ISSUE : Feb. 10, 2017
STANDARD(S) : FCC Part 15.247
TEST PROCEDURE(S) : KDB 558074 v03r05
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|-----------------------|--------------------|--------------------|----------------------|-----------------|
| V1.0 | / | Feb. 10, 2017 | Valid | Original Report |

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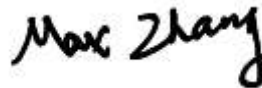
1. VERIFICATION OF CONFORMITY

| | |
|---------------------------------|--|
| Applicant | SUNVALLEYTEK INTERNATIONAL, INC. |
| Address | 46724 Lakeview Blvd, Fremont, CA 94538-6529. |
| Manufacturer | Shenzhen NearbyExpress Technology Development Company Limited |
| Address | Block D, Minle Industrial Park, Meiban Road, Longhua District, Shenzhen, China. 518131 |
| Product Designation | Car DVR |
| Brand Name | VAVA |
| Test Model | VA-CD001 |
| Date of test | Feb. 07, 2017 to Feb. 10, 2017 |
| Deviation | None |
| Condition of Test Sample | Normal |
| Test Result | Pass |
| Report Template | AGCRT-US-BGN/RF |

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Tested by



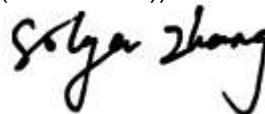
Max Zhang(Zhang Yi) Feb. 10, 2017

Reviewed by



Bart Xie(Xie Xiaobin) Feb. 10, 2017

Approved by



Solger Zhang(Zhang Hongyi) Feb. 10, 2017
Authorized Officer

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Car DVR”. 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

| | |
|----------------------------|--|
| Operation Frequency | 2.412 GHz~2.462GHz |
| Output Power | IEEE 802.11b:13.74dBm; IEEE 802.11g:10.22dBm; IEEE 802.11n(20):9.51dBm |
| Modulation | DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM) |
| Number of channels | 11 |
| Hardware Version | 00.01.01.00 |
| Software Version | 00.01.01.12 |
| Antenna Designation | Integrated Antenna (Met 15.203 Antenna requirement) |
| Antenna Gain | 4.8dBi |
| Power Supply | DC 5V by car charger |

Note: The USB port is only for charging.

2.2. 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

2.3. 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 |

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

This submittal(s) (test report) is intended for **FCC ID: 2AFDG-VA-CD001** filing to comply with the FCC Part 15 requirements.

2.5. 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 v03r05.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 3.18dB

Radiated measurement: +/- 3.91dB

4. 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)

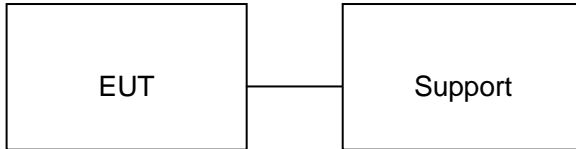
Note:

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.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment | Model No. | ID or Specification | Remark |
|------|-------------|-----------|---------------------|---------|
| 1 | CAR DVR | VA-CD001 | 2AFDG-VA-CD001 | EUT |
| 2 | Car charger | 1330619 | DC 5V/2A | Support |

5.3. 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 |

6. TEST FACILITY

| | |
|----------------------|--|
| Site | Dongguan Precise Testing Service Co., Ltd. |
| Location | Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China. |
| FCC Registration No. | 371540 |
| Description | The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014. |

ALL TEST EQUIPMENT LIST

| Radiated Emission Test Site | | | | | |
|-------------------------------------|-----------------|--------------|---------------|------------------|-----------------|
| Name of Equipment | Manufacturer | Model Number | Serial Number | Last Calibration | Due Calibration |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | July 3, 2016 | July 2, 2017 |
| Trilog Broadband Antenna (25M-1GHz) | SCHWARZBECK | VULB9160 | 9160-3355 | July 3, 2016 | July 2, 2017 |
| Signal Amplifier | SCHWARZBECK | BBV 9475 | 9745-0013 | July 3, 2016 | July 2, 2017 |
| RF Cable | SCHWARZBECK | AK9515E | 96221 | July 3, 2016 | July 2, 2017 |
| 3m Anechoic Chamber | CHENGYU | 966 | PTS-001 | June 3, 2016 | June 2, 2017 |
| MULTI-DEVICE Positioning Controller | Max-Full | MF-7802 | MF780208339 | N/A | N/A |
| Active loop antenna (9K-30MHz) | Schwarzbeck | FMZB1519 | 1519-038 | June 3, 2016 | June 2, 2017 |
| Spectrum analyzer | Agilent | E4407B | MY46185649 | June 3, 2016 | June 2, 2017 |
| Power Sensor | Agilent | U2021XA | MY55050474 | June 3, 2016 | June 2, 2017 |
| Horn Antenna (1G-18GHz) | SCHWARZBECK | BBHA9120D | 9120D-1246 | June 3, 2016 | June 2, 2017 |
| Horn Ant (18G-40GHz) | Schwarzbeck | BBHA 9170 | 9170-181 | June 3, 2016 | June 2, 2017 |

7. OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

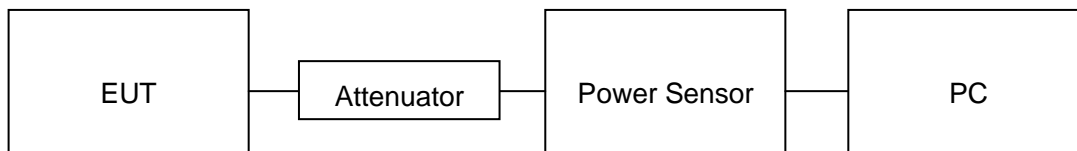
For average power test:

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 KDB 558074v03r05 for compliance to FCC 47CFR 15.247 requirements.

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

AVERAGE POWER SETUP



7.3. 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 | 13.12 | 30 | Pass |
| 2.437 | 13.74 | 30 | Pass |
| 2.462 | 12.98 | 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 | 10.22 | 30 | Pass |
| 2.437 | 10.16 | 30 | Pass |
| 2.462 | 9.84 | 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 | 9.33 | 30 | Pass |
| 2.437 | 9.51 | 30 | Pass |
| 2.462 | 9.11 | 30 | Pass |

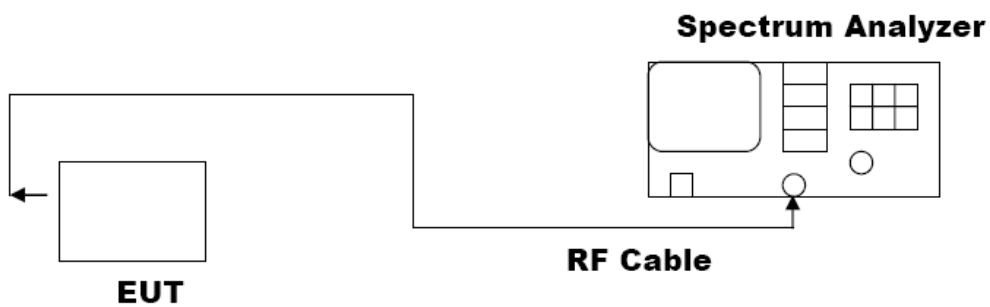
8. 6 DB BANDWIDTH

8.1. 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.

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



8.3. 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 | 10.08 | PASS |
| | Middle Channel | 10.08 | PASS |
| | High Channel | 10.08 | 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 | 16.34 | PASS |
| | Middle Channel | 16.35 | PASS |
| | High Channel | 16.35 | 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 | 17.32 | PASS |
| | Middle Channel | 17.30 | PASS |
| | High Channel | 17.52 | 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

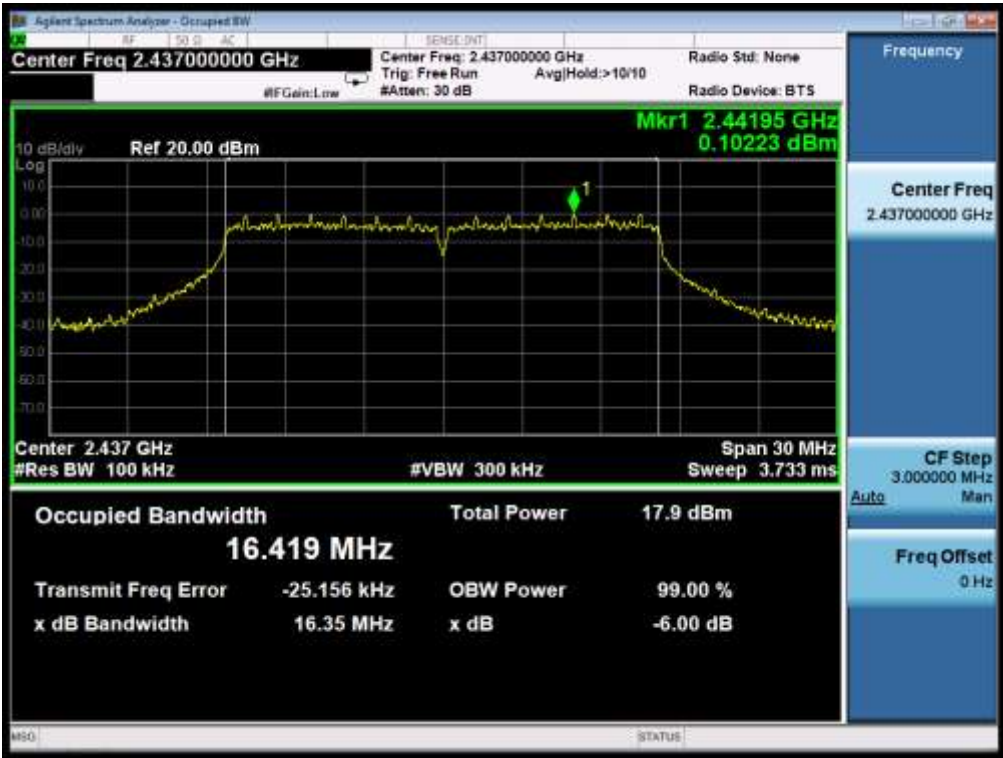


802.11g TEST RESULT

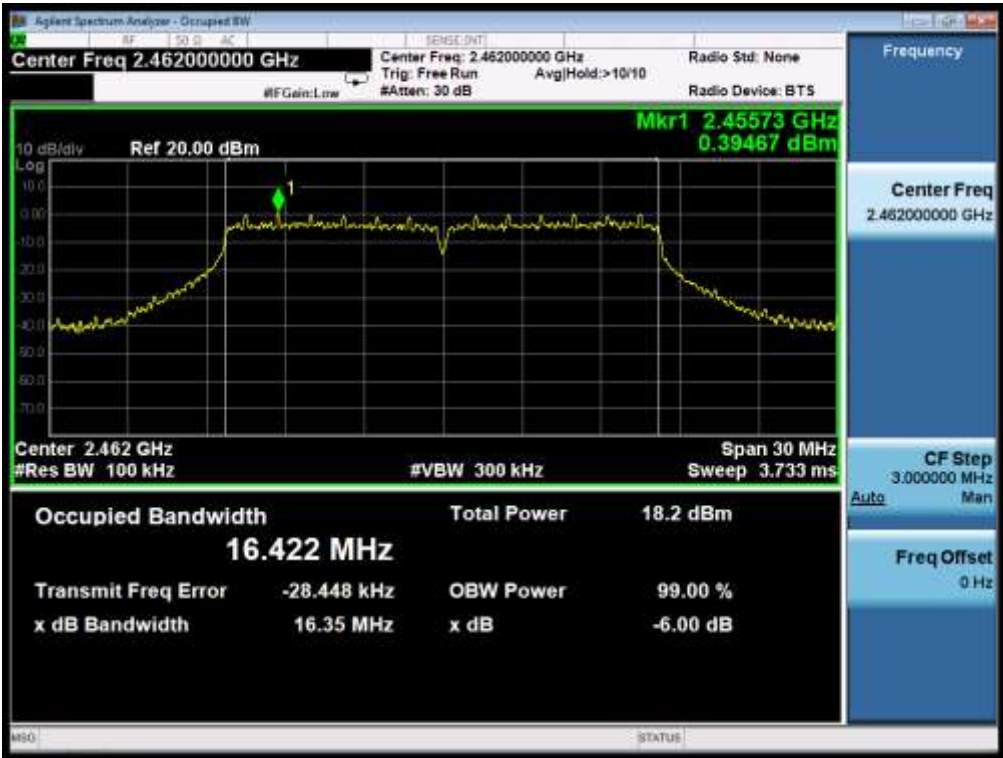
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



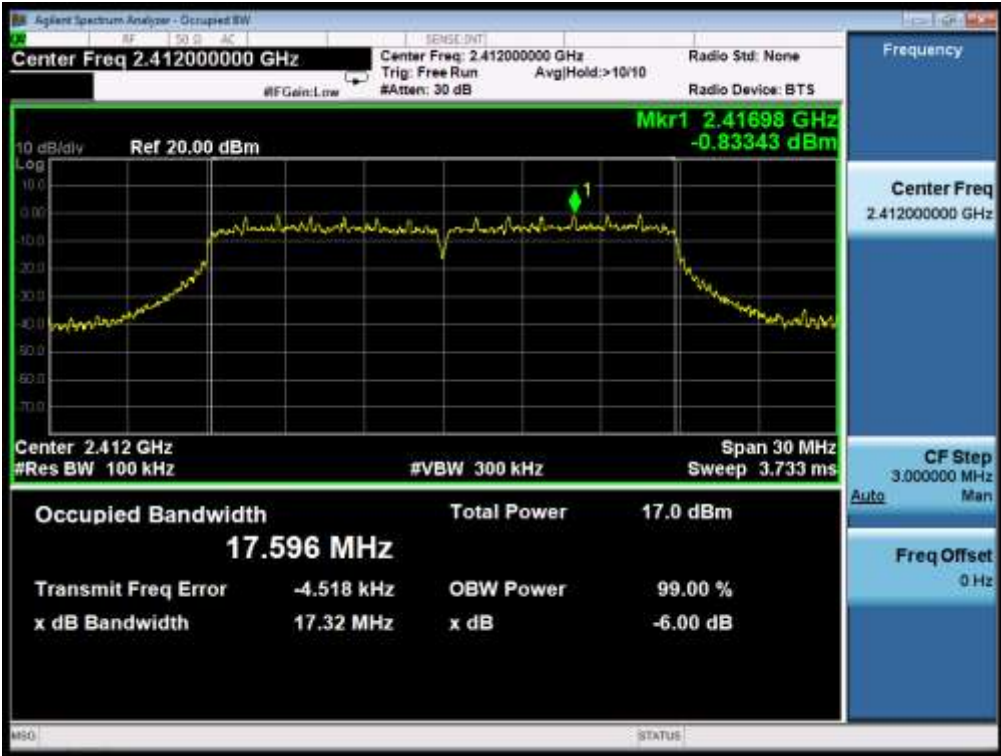
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



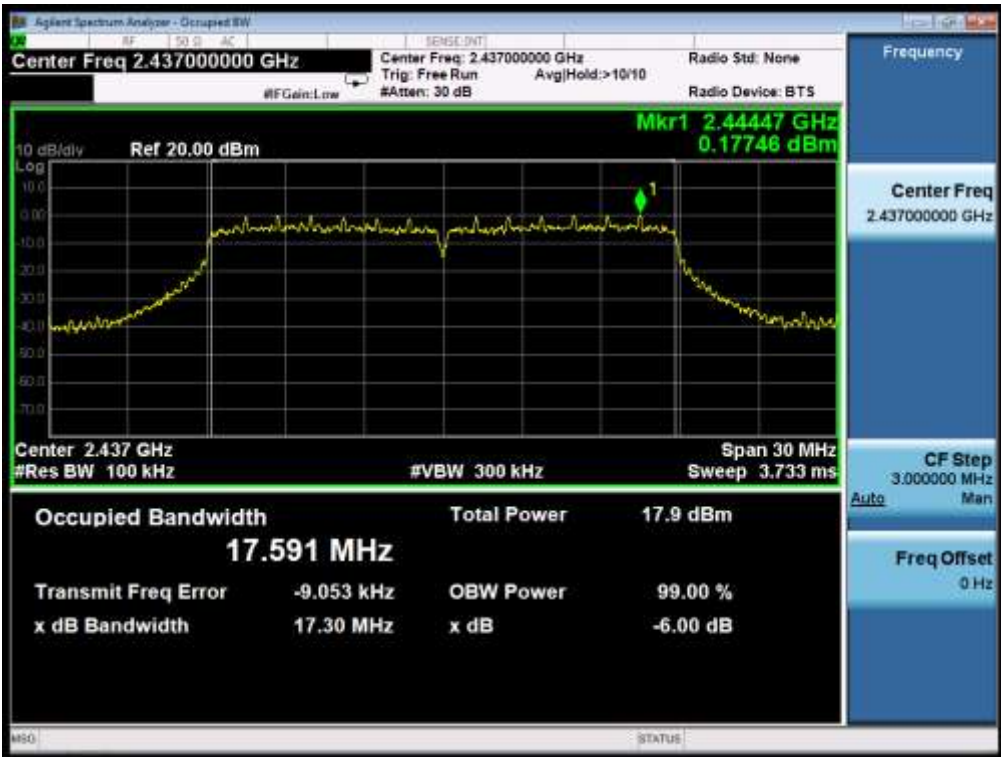
TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



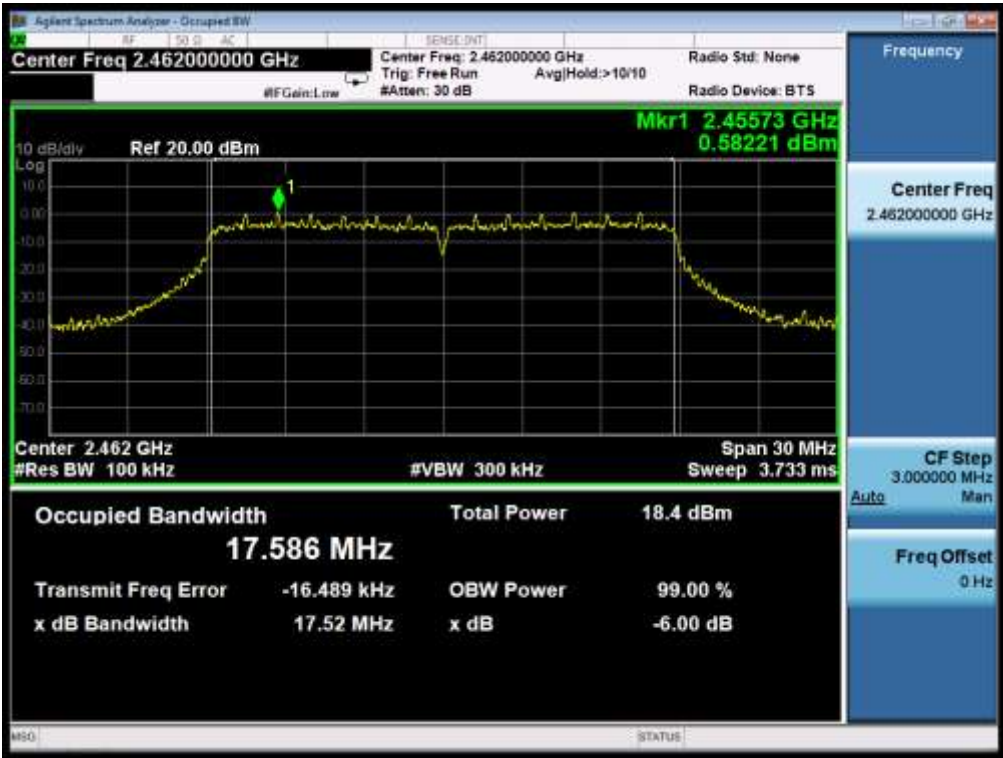
802.11n (20) TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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.

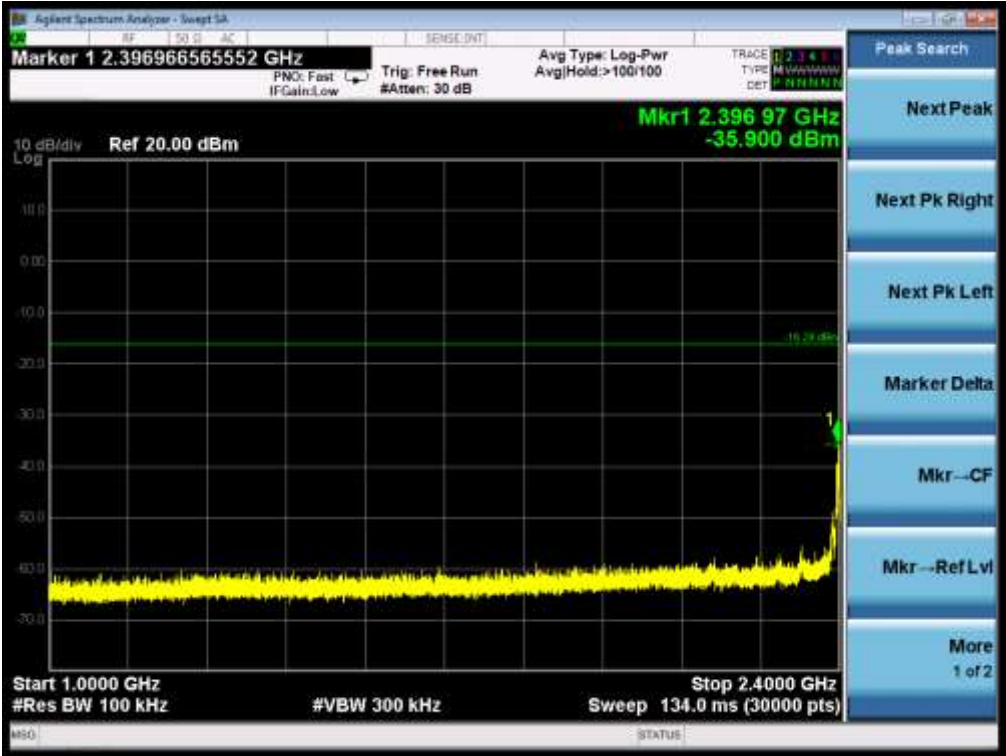
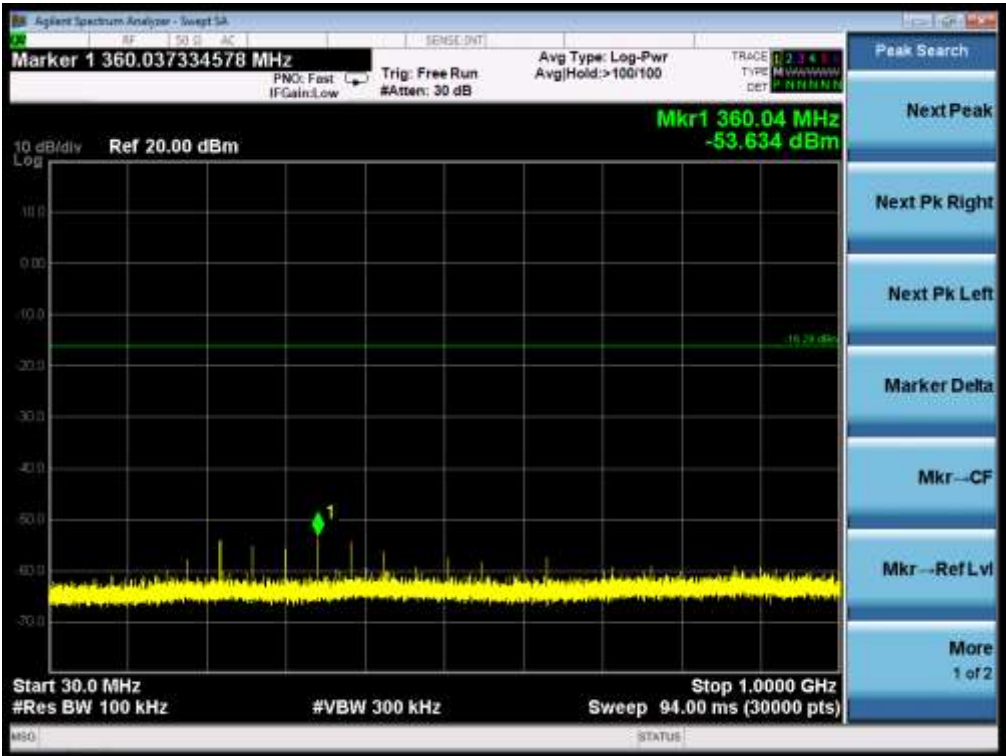
9.3. MEASUREMENT EQUIPMENT USED

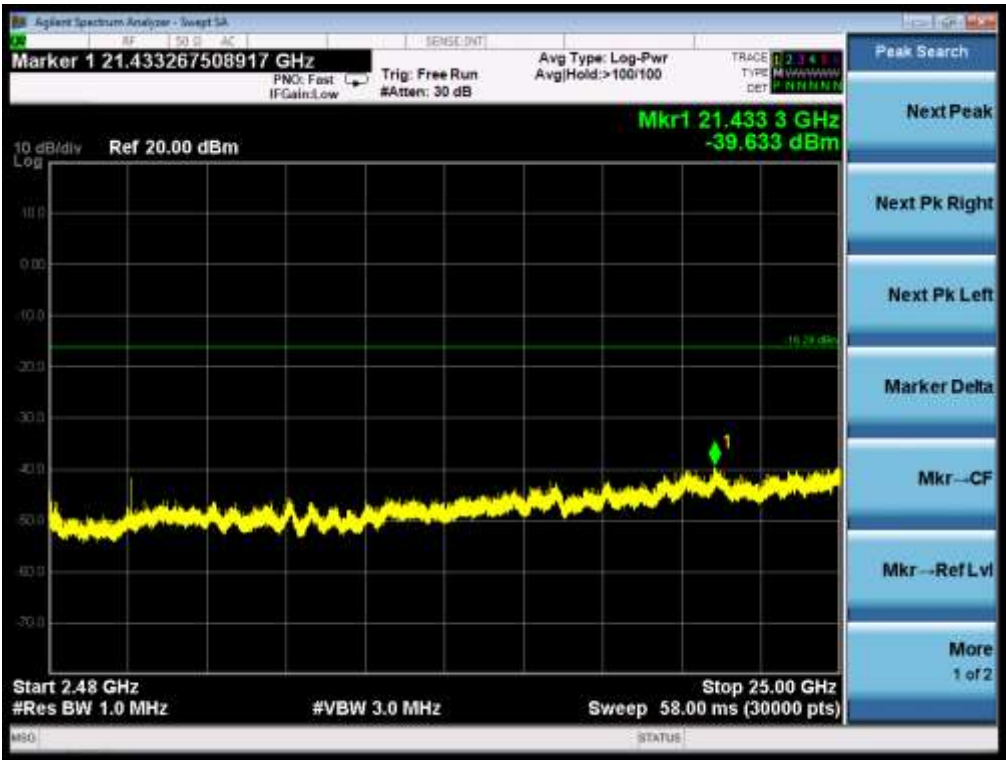
The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

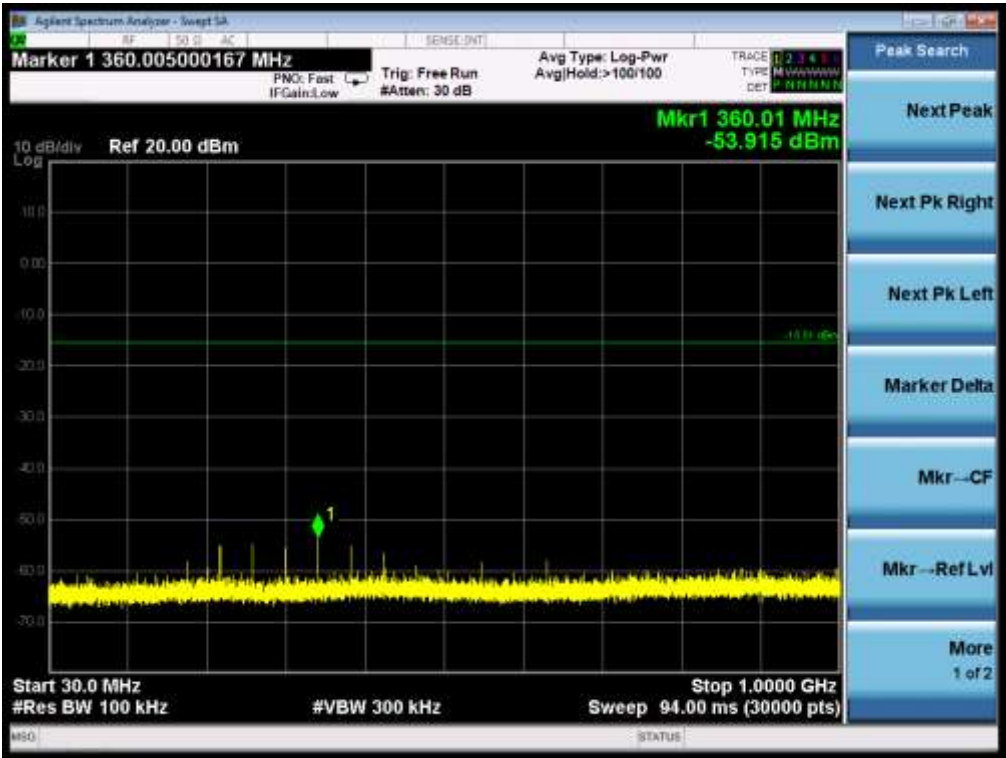
| LIMITS AND MEASUREMENT RESULT | | |
|--|--|----------|
| Applicable Limits | Measurement Result | |
| | Test Data | Criteria |
| In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 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 -20dBc than the limit Specified on the BOTTOM Channel | PASS |
| | At least -20dBc than the limit Specified on the TOP Channel | PASS |

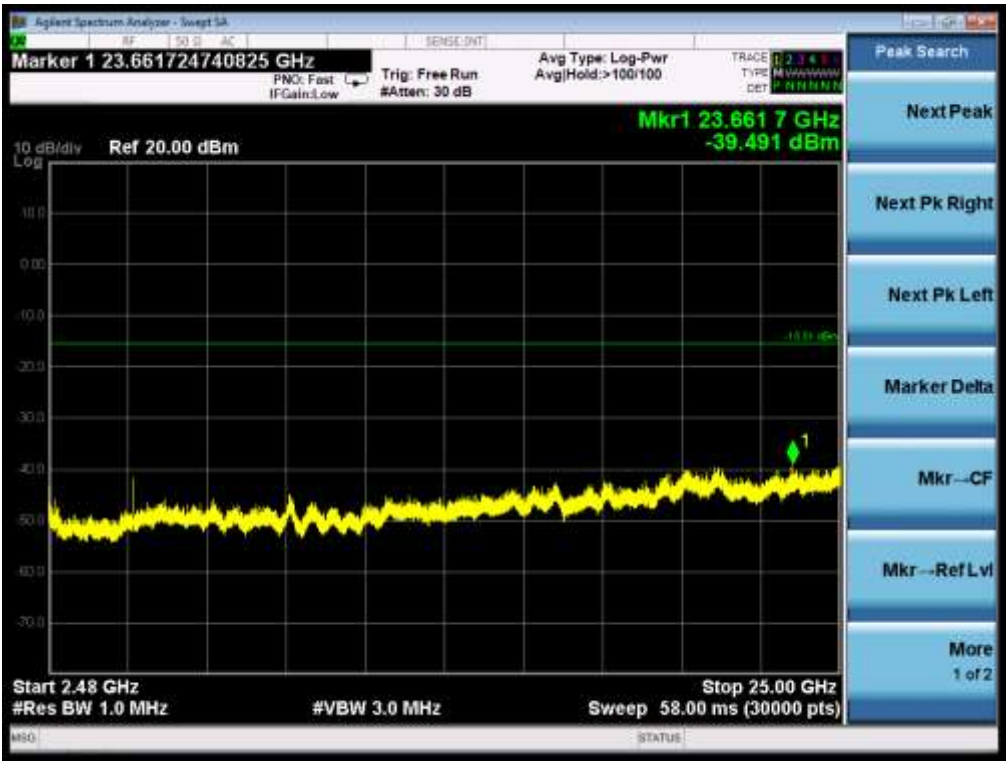
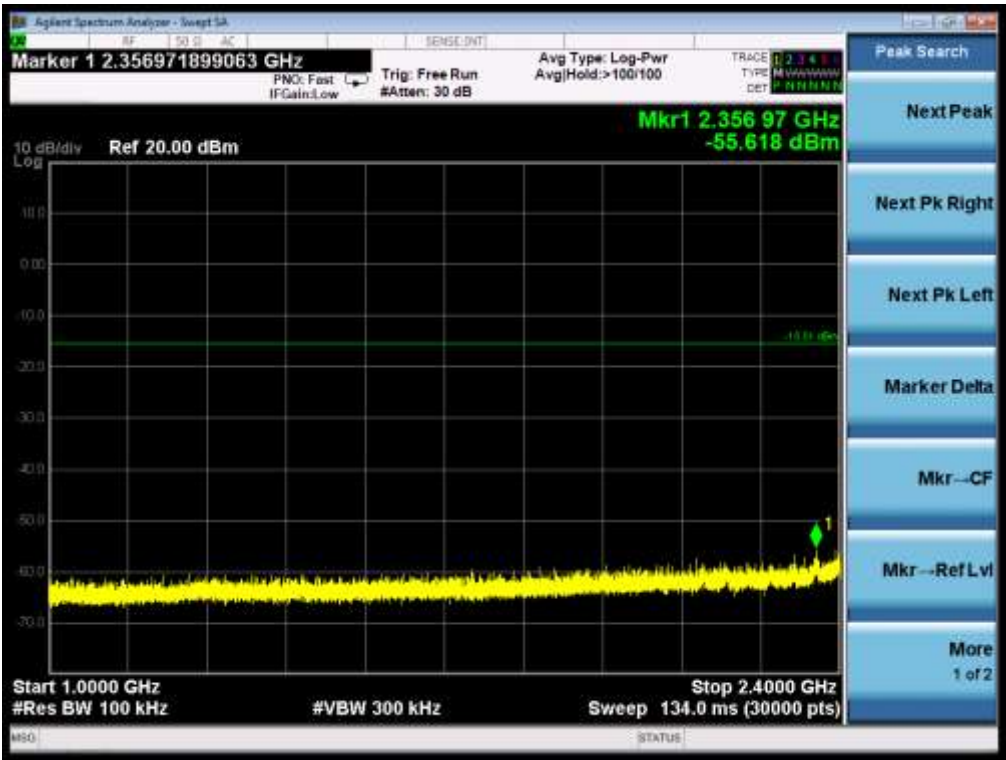
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11b FOR MODULATION IN LOW CHANNEL



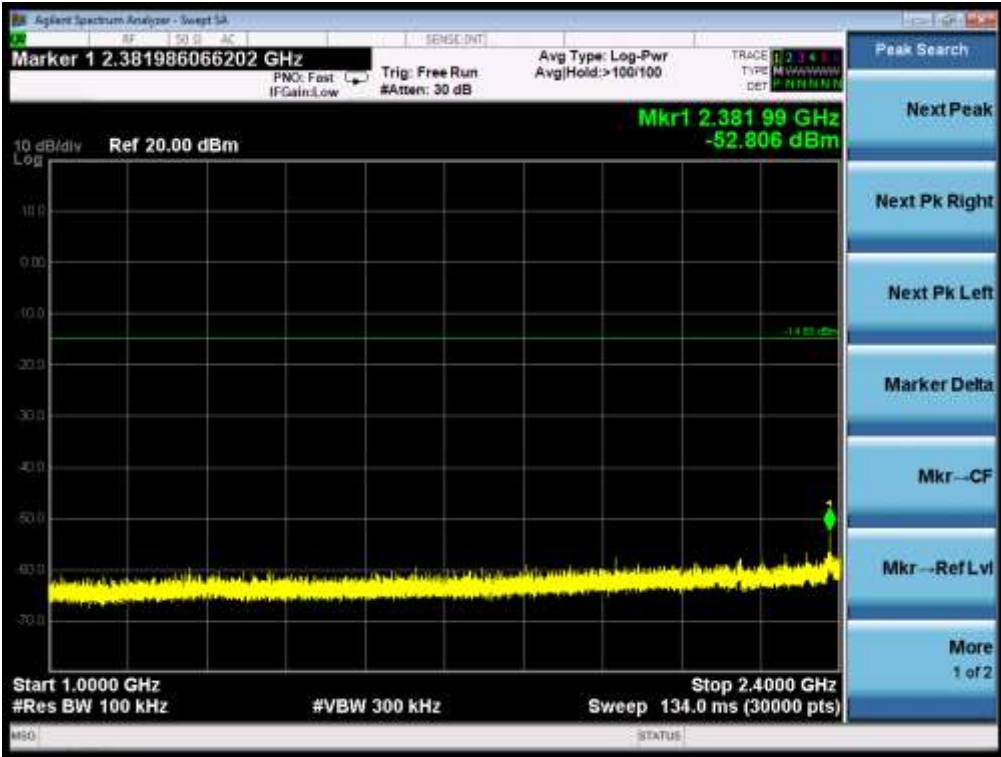
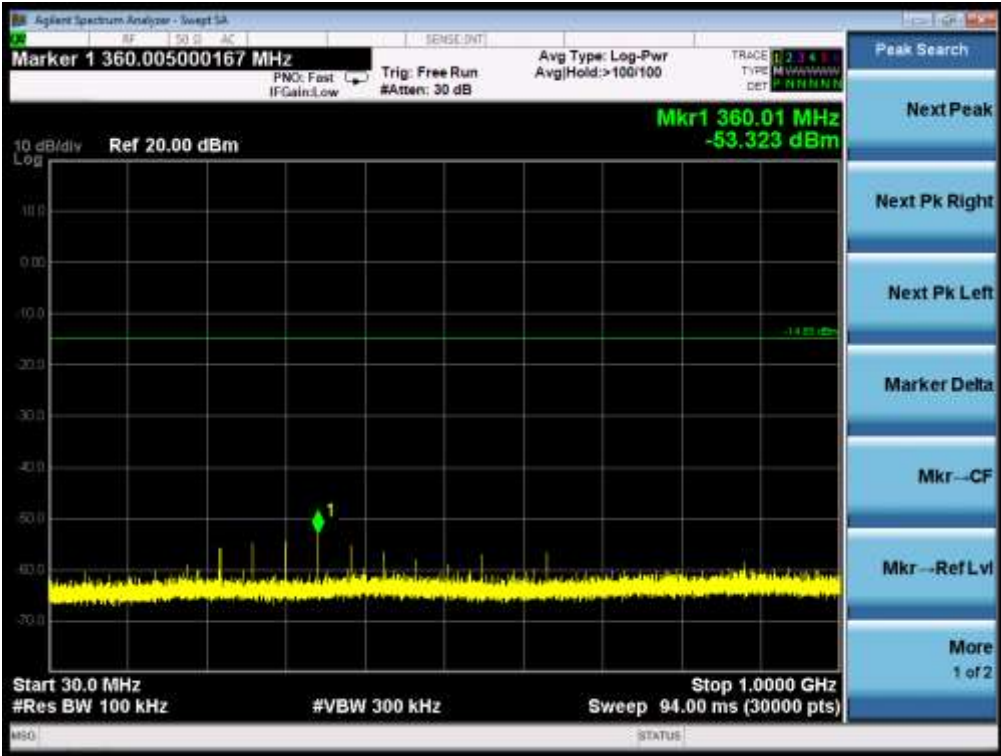


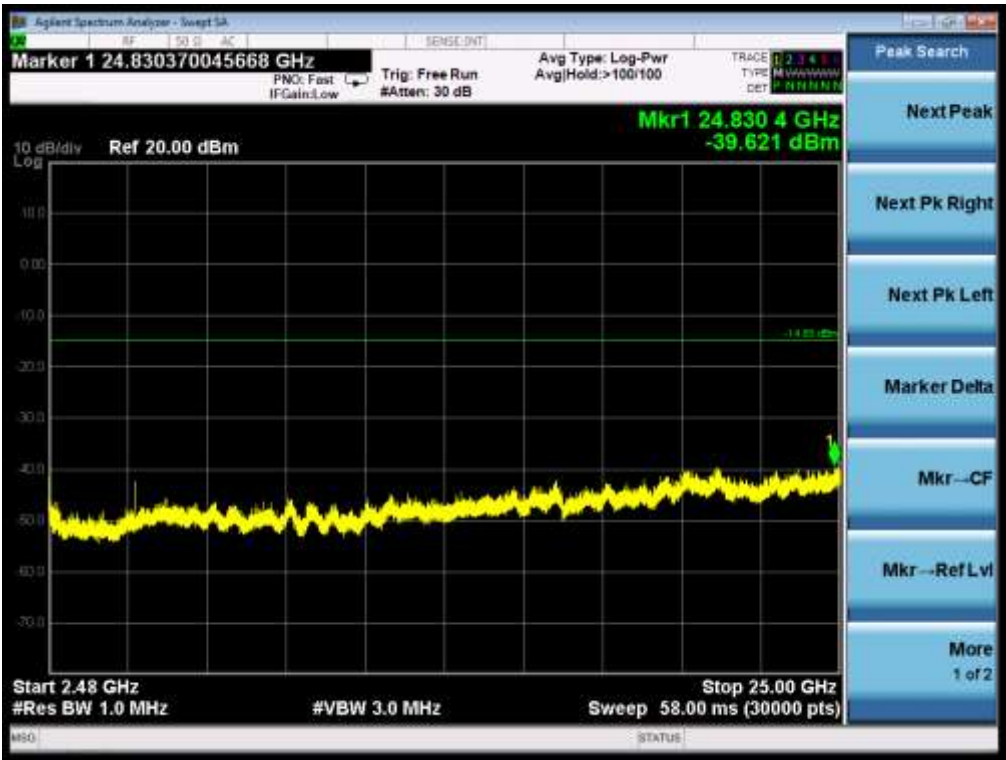
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN MIDDLE CHANNEL



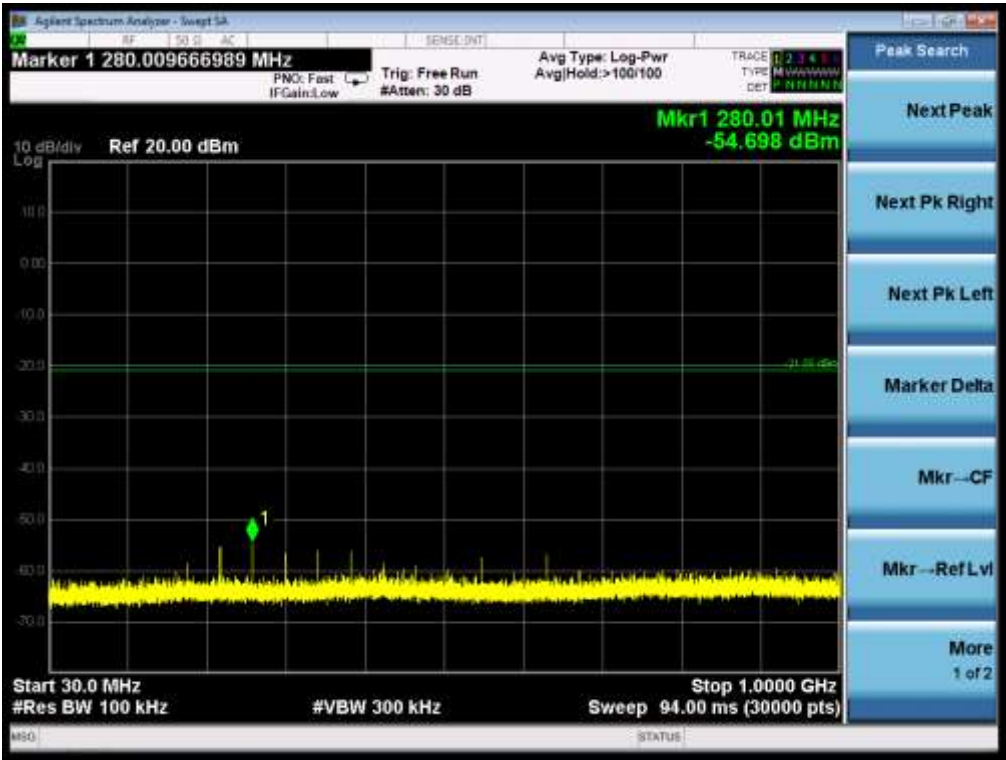


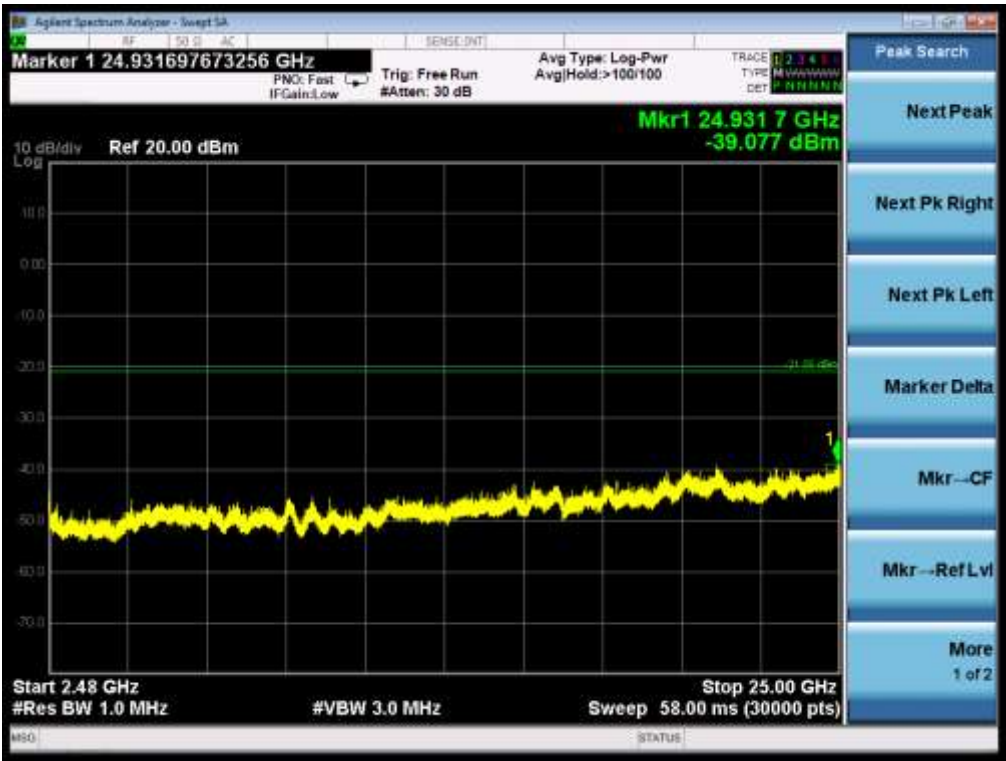
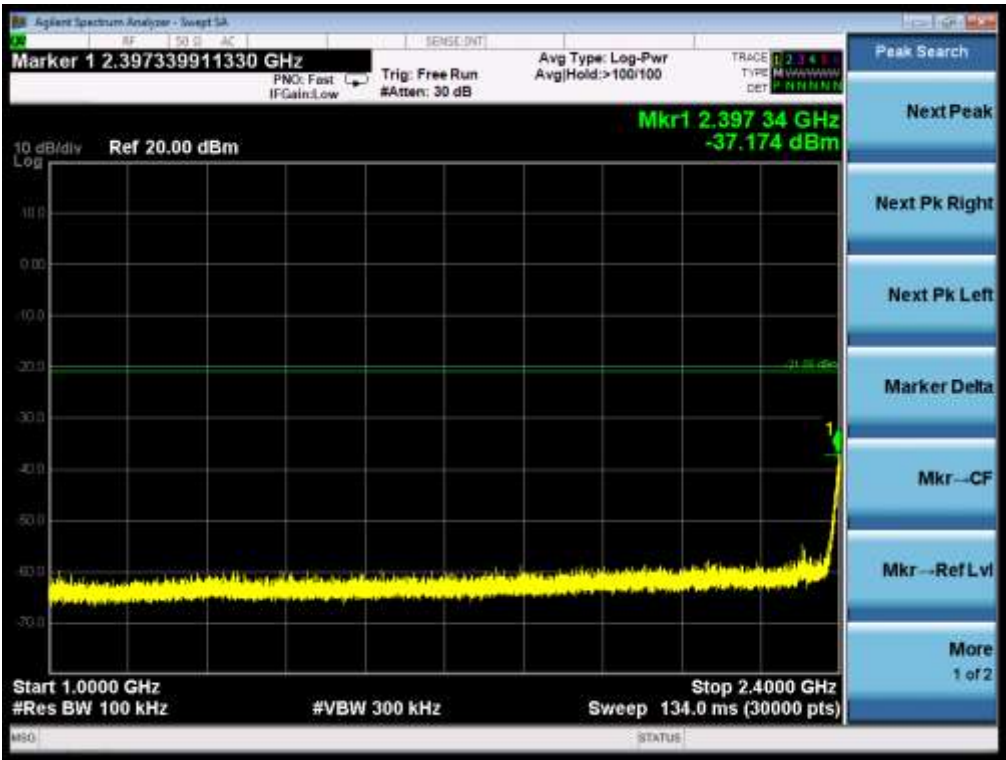
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11b FOR MODULATION IN HIGH CHANNEL



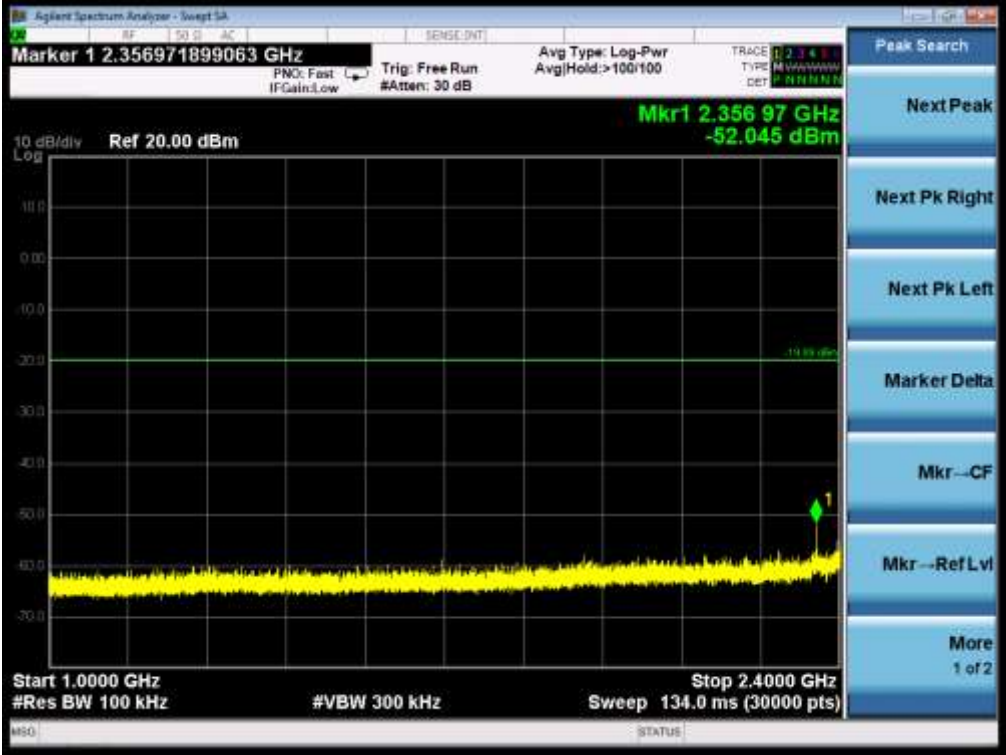
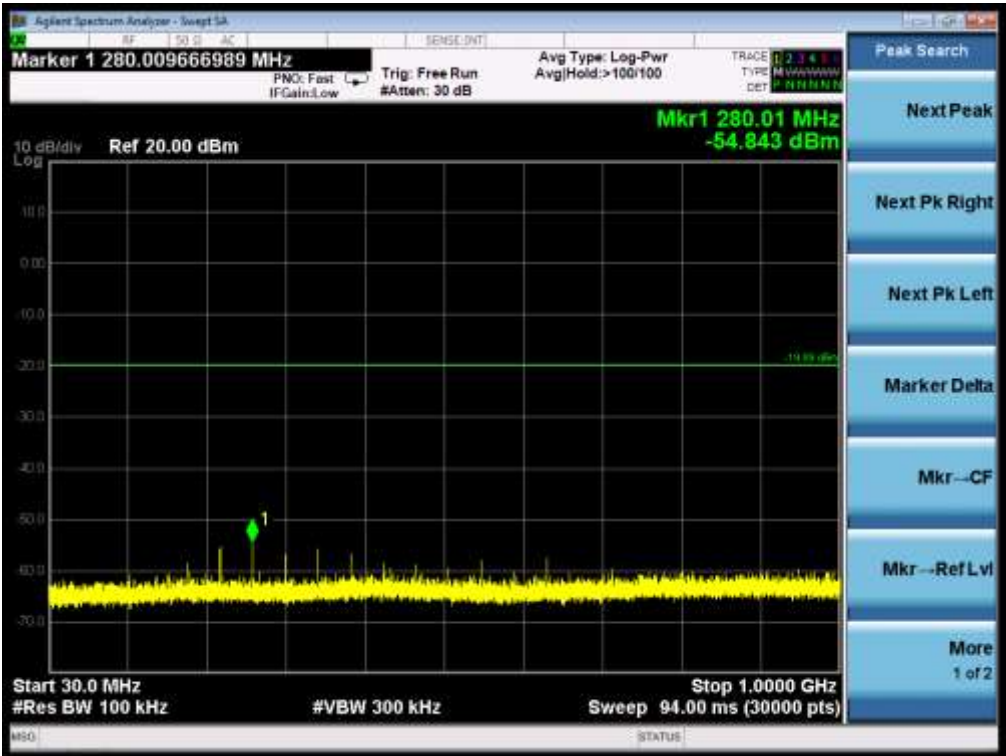


TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11g FOR MODULATION IN LOW CHANNEL



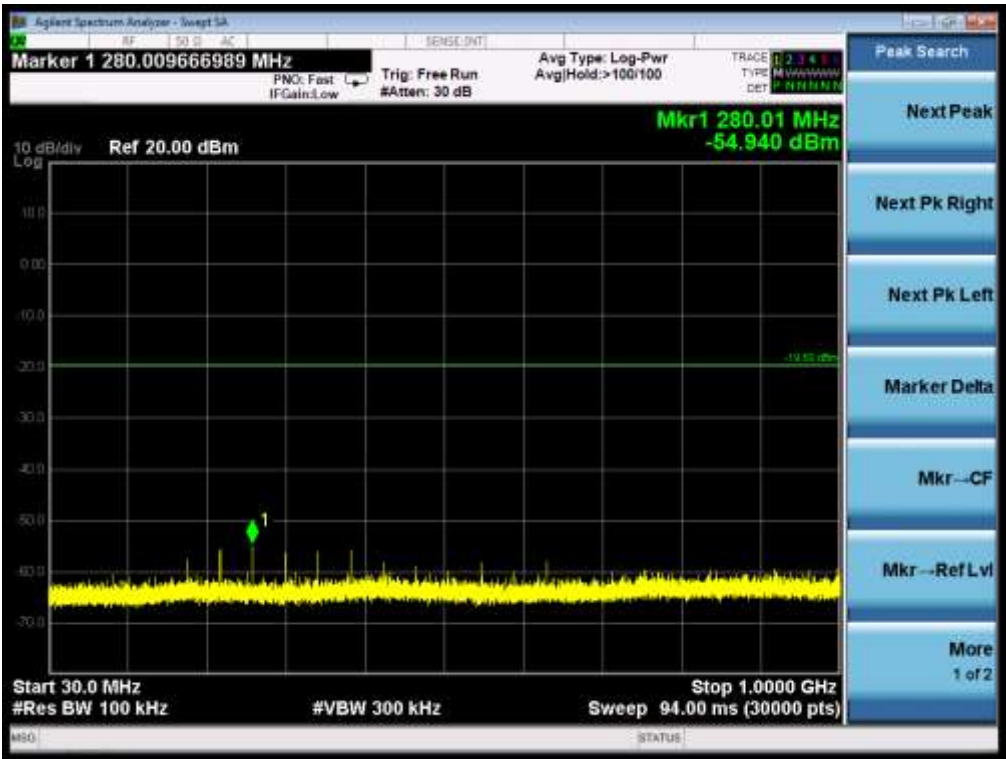


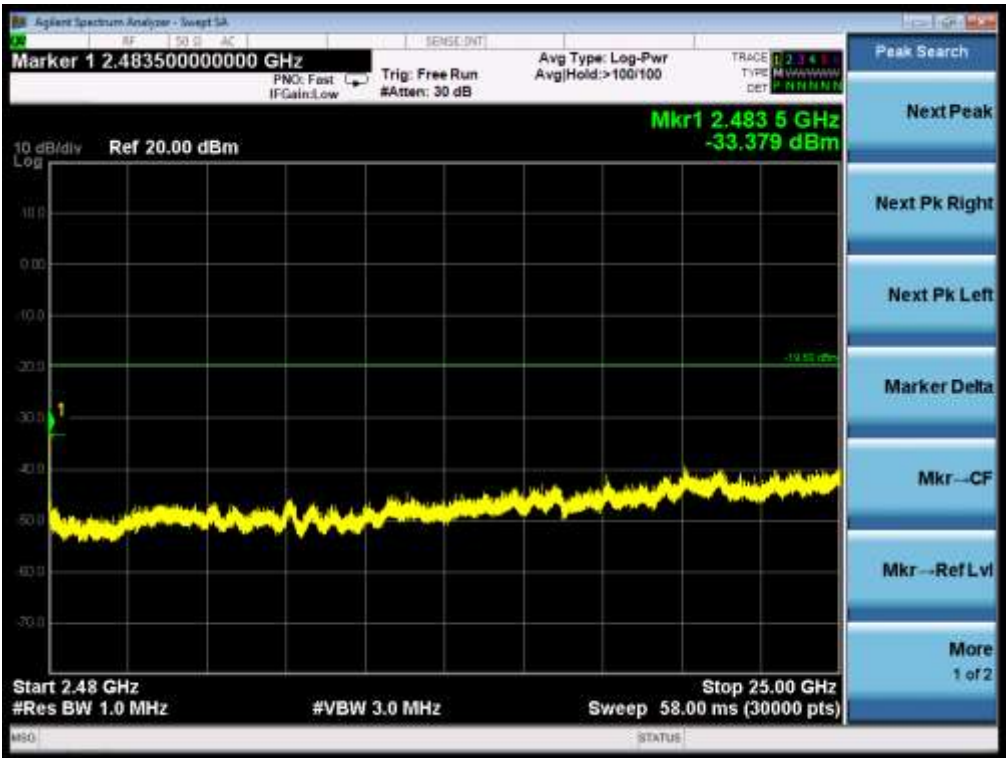
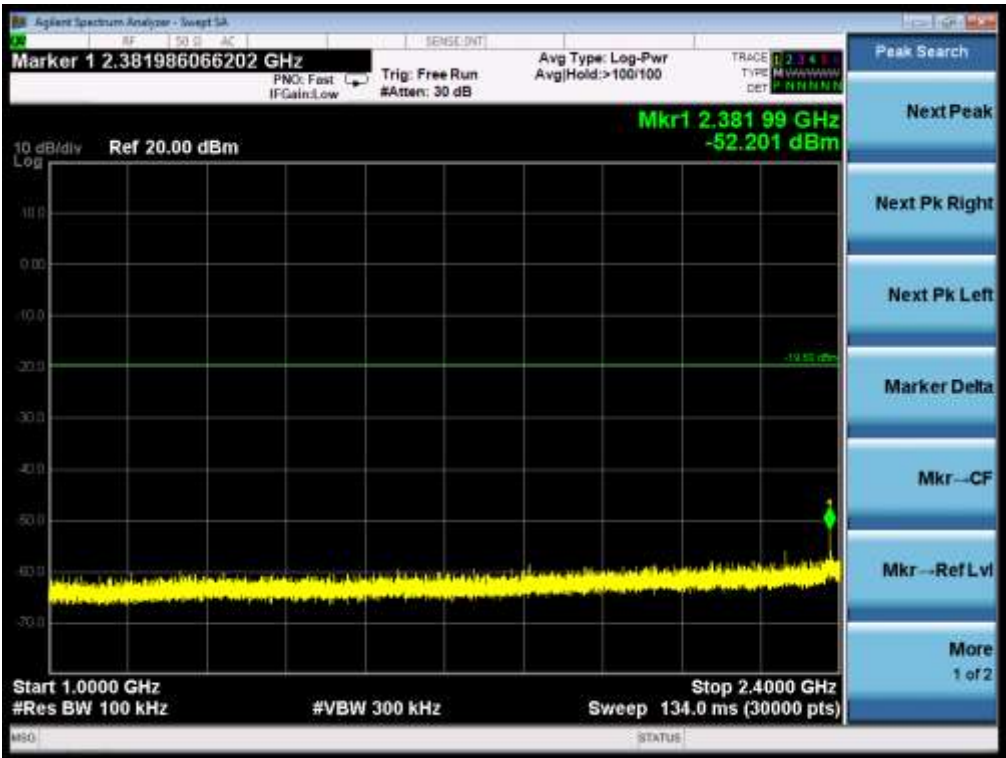
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE
OF 802.11g FOR MODULATION IN MIDDLE CHANNEL



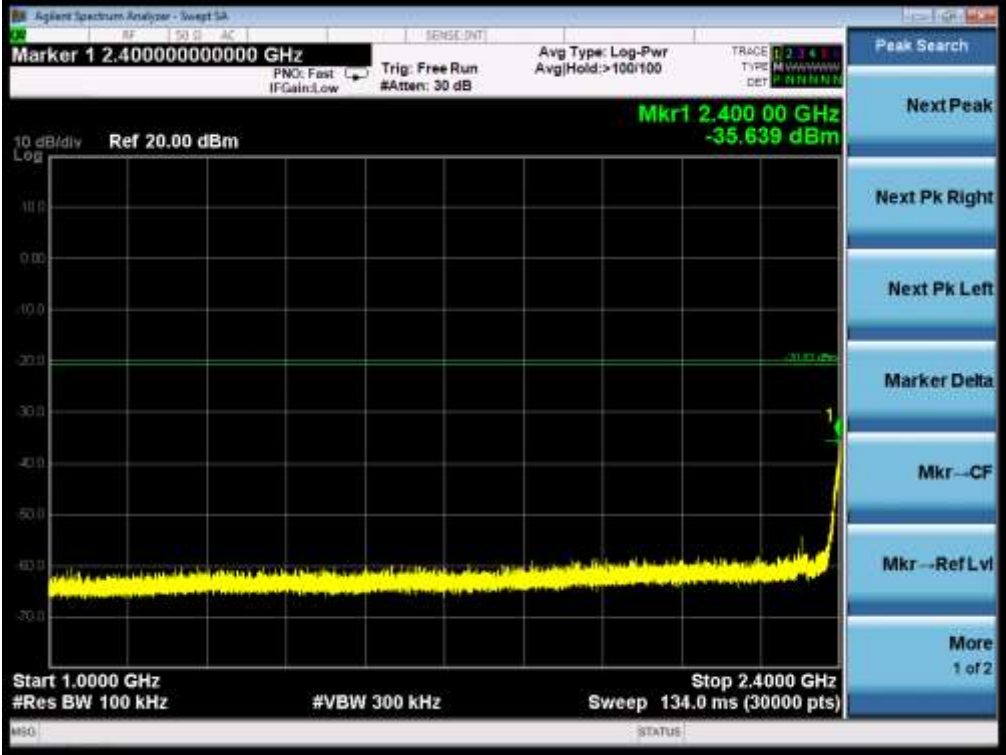
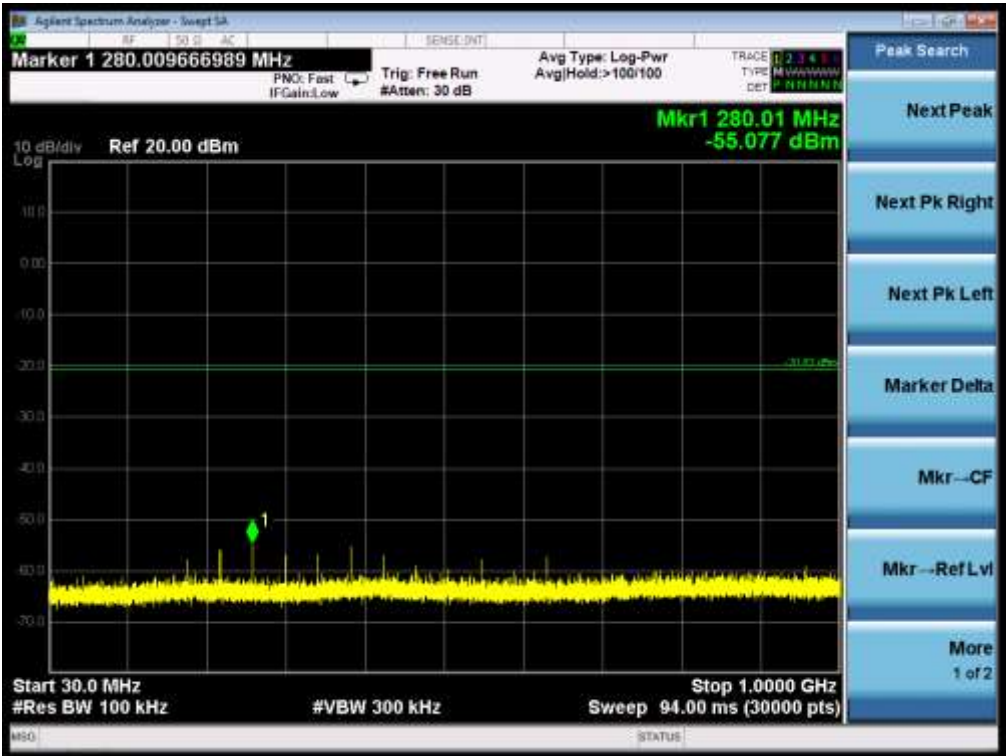


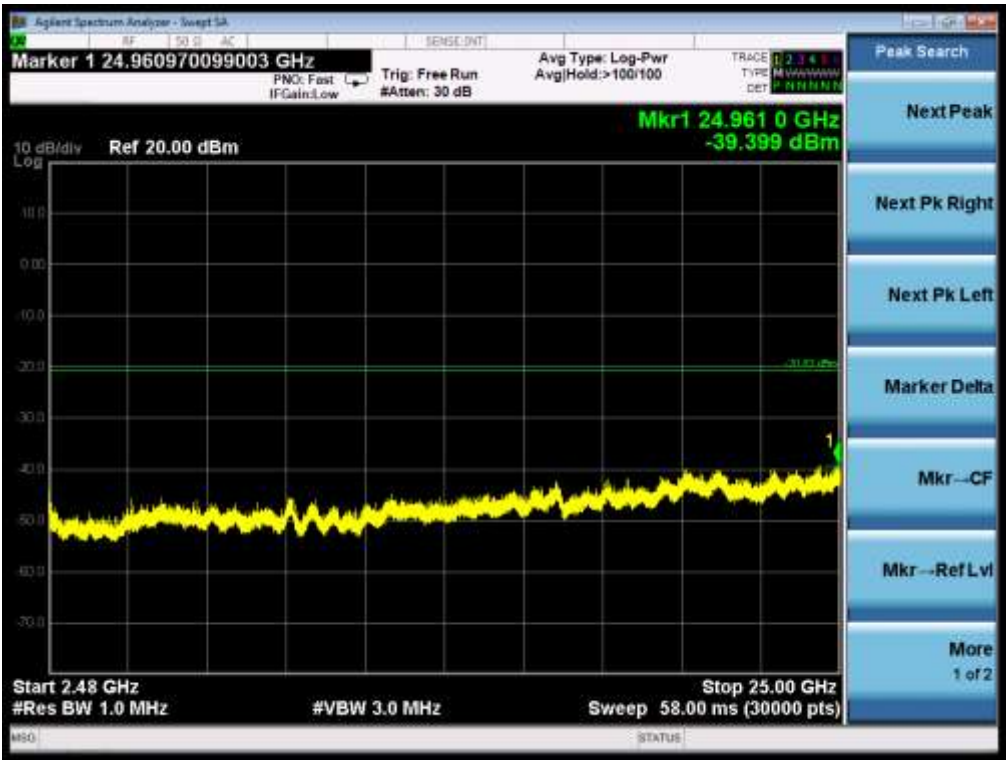
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN HIGH CHANNEL



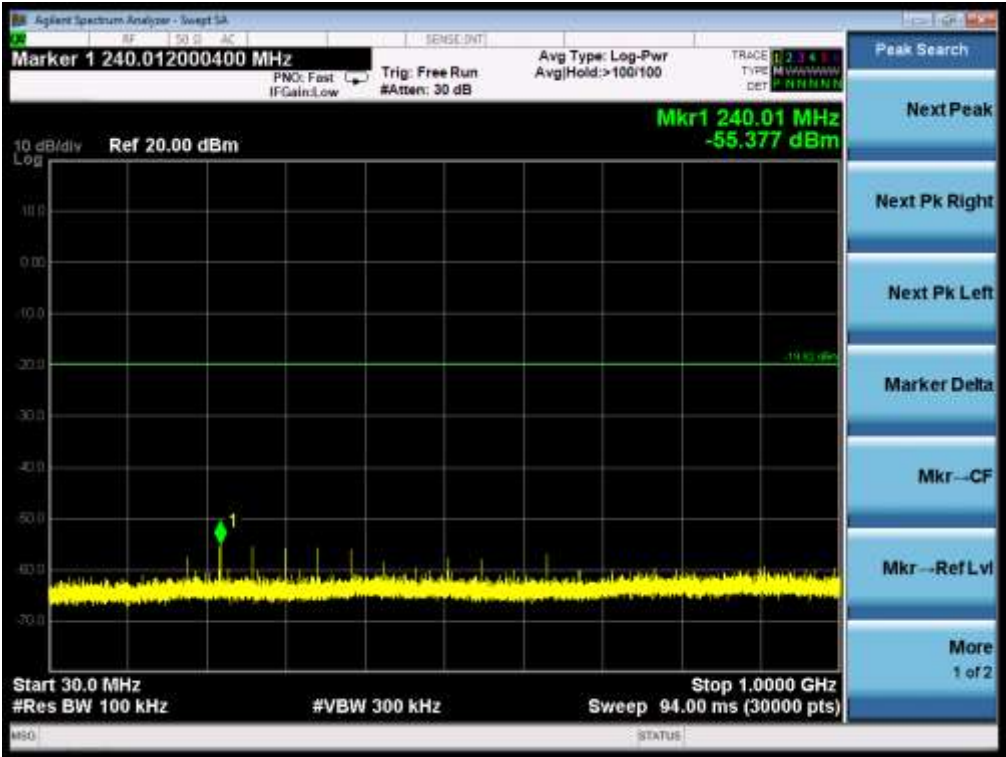


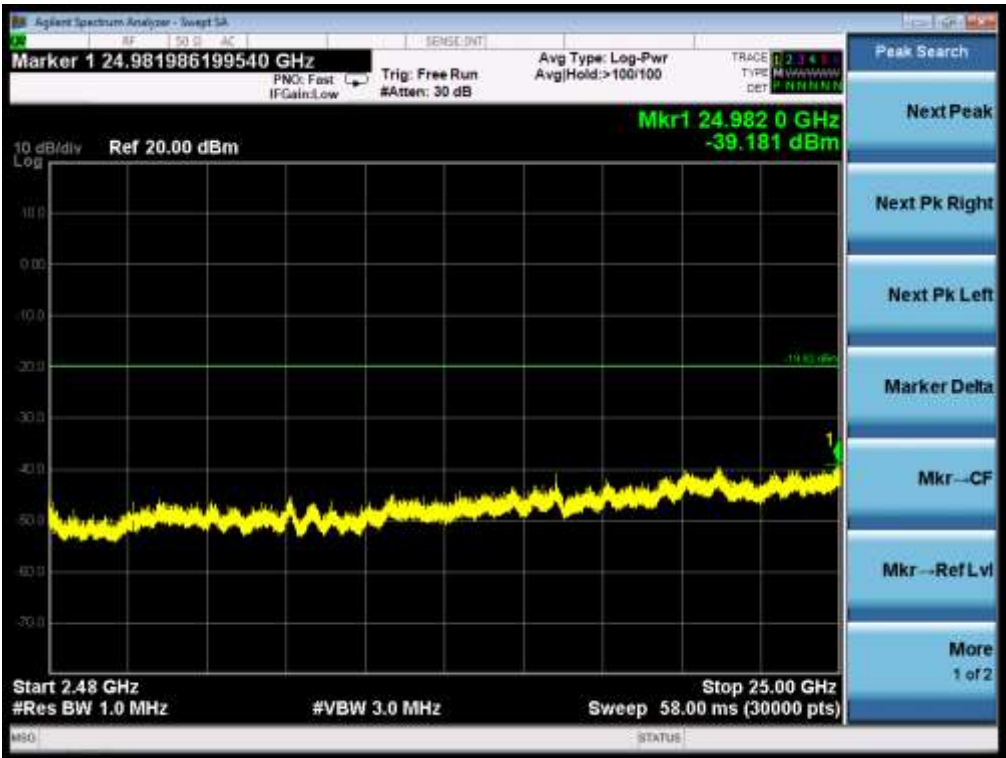
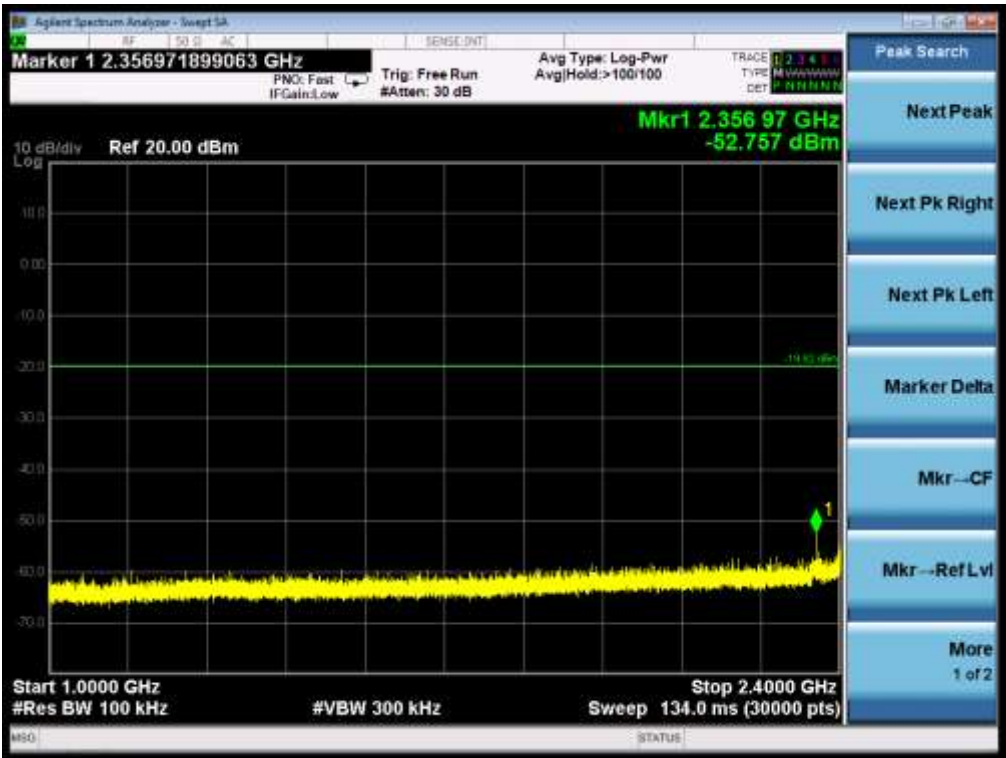
TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE
OF 802.11n20 FOR MODULATION IN LOW CHANNEL



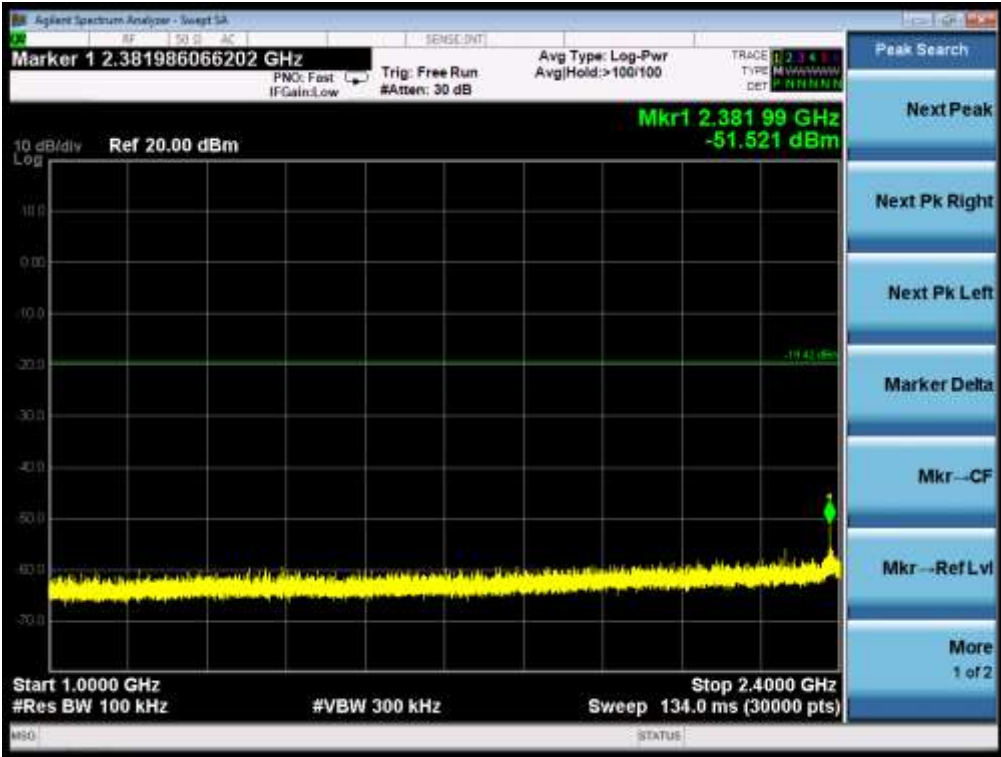
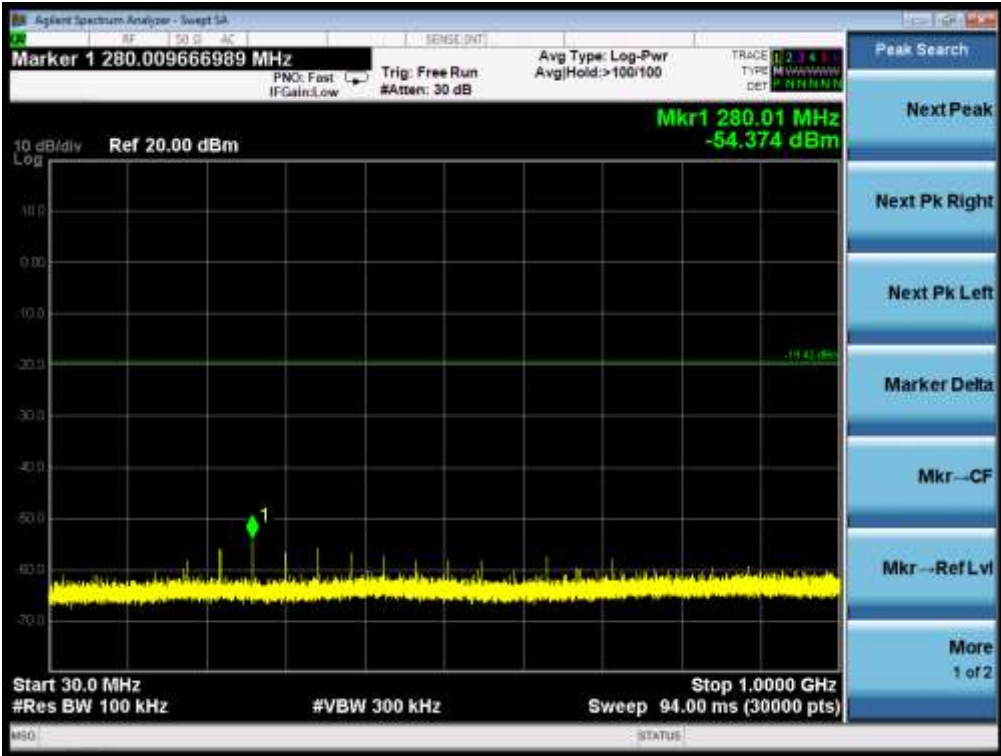


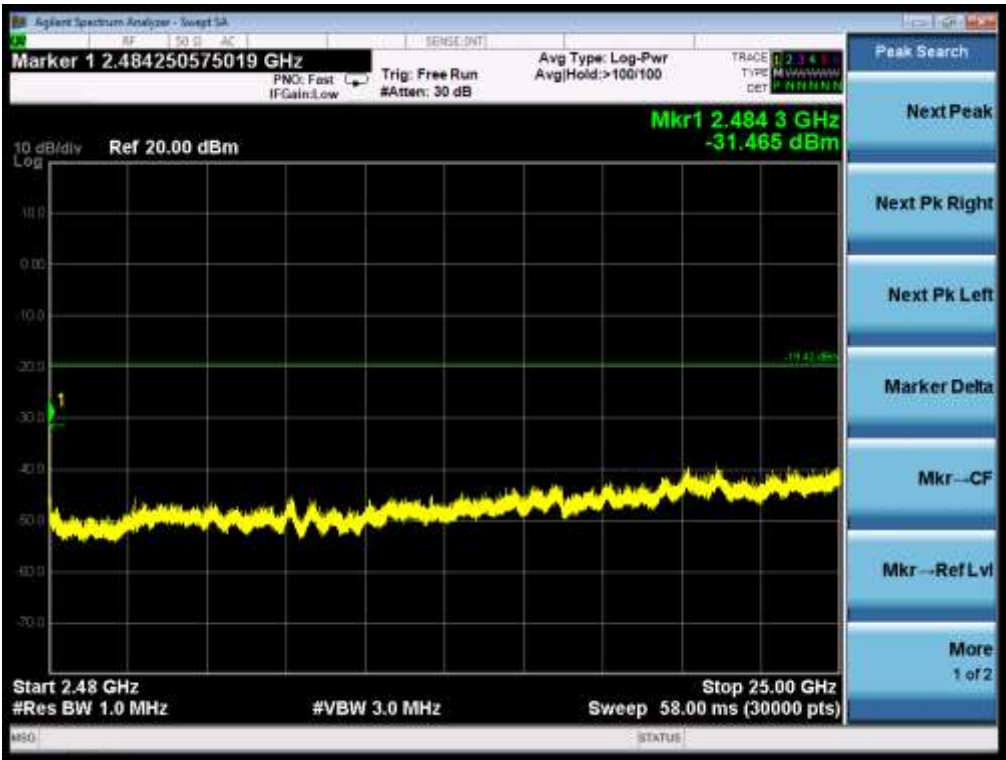
TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL





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





Note: The 100kHz RBW used in the conducted spurious test from 2.4835GHz to 25GHz may result in long measuring times, To avoid such long measuring times, the 1MHz RBW can be used for pre-test. If the emission level exceeded the limit at one or more frequencies, the 100kHz RBW would be used for final test at the special frequency.

10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 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 AVPSD in the KDB 558074 item 10.3 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

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

| Channel No. | PSD (dBm/20kHz) | Limit (dBm/3kHz) | Result |
|----------------|--------------------|---------------------|--------|
| Low Channel | 3.933 | 8 | Pass |
| Middle Channel | 4.800 | 8 | Pass |
| High Channel | 5.375 | 8 | Pass |

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

| Channel No. | PSD (dBm/20kHz) | Limit (dBm/3kHz) | Result |
|----------------|--------------------|---------------------|--------|
| Low Channel | -6.949 | 8 | Pass |
| Middle Channel | -4.943 | 8 | Pass |
| High Channel | -4.474 | 8 | Pass |

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

| Channel No. | PSD (dBm/20kHz) | Limit (dBm/3kHz) | Result |
|--------------------|----------------------------|-----------------------------|---------------|
| Low Channel | -7.255 | 8 | Pass |
| Middle Channel | -6.811 | 8 | Pass |
| High Channel | -6.215 | 8 | Pass |

802.11b TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

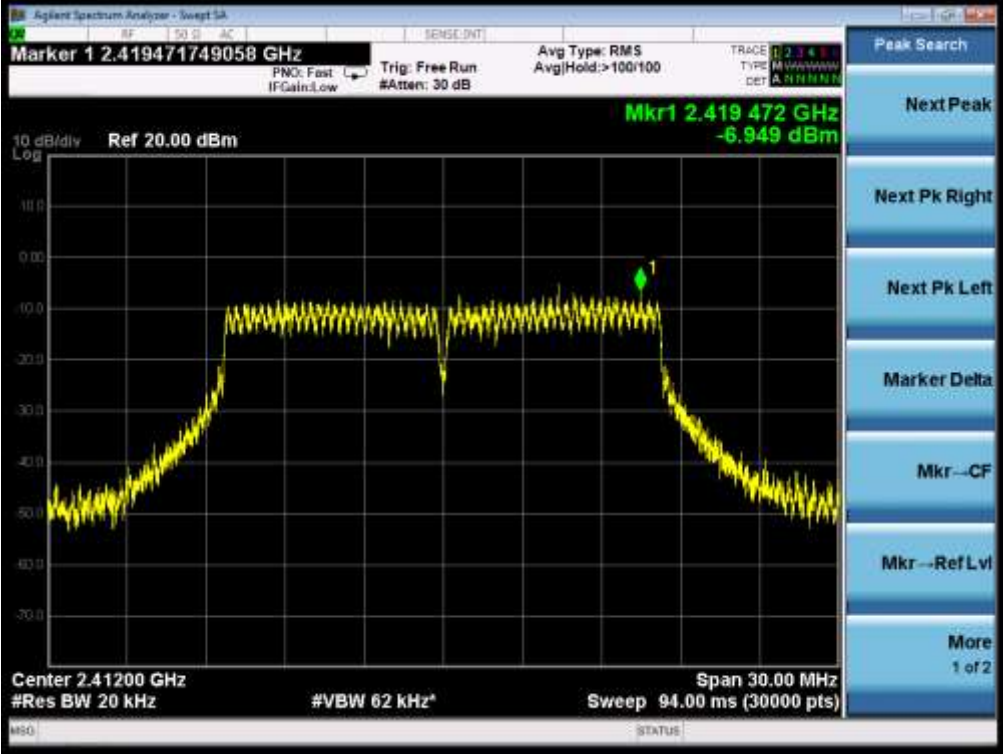


TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL

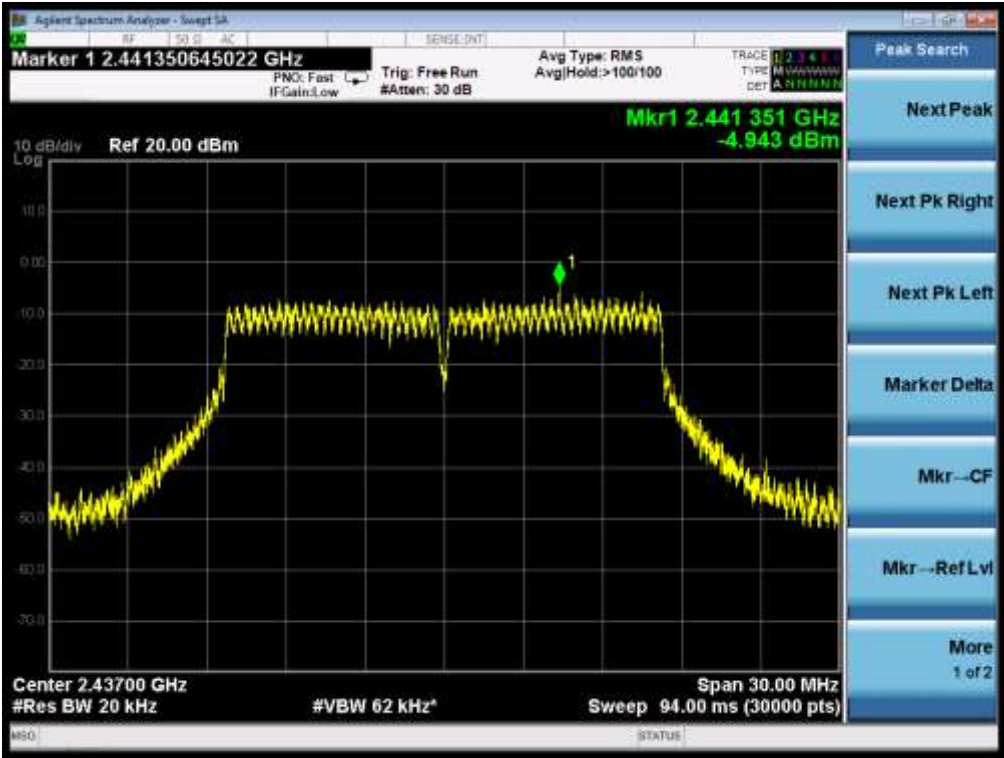


802.11g TEST RESULT

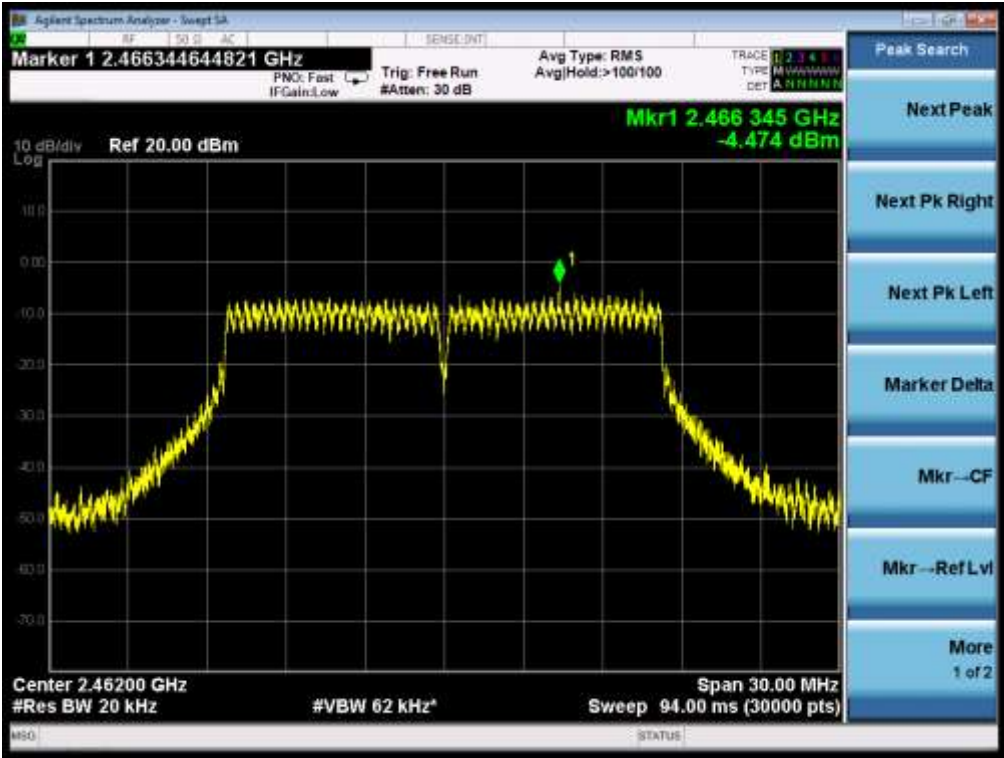
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



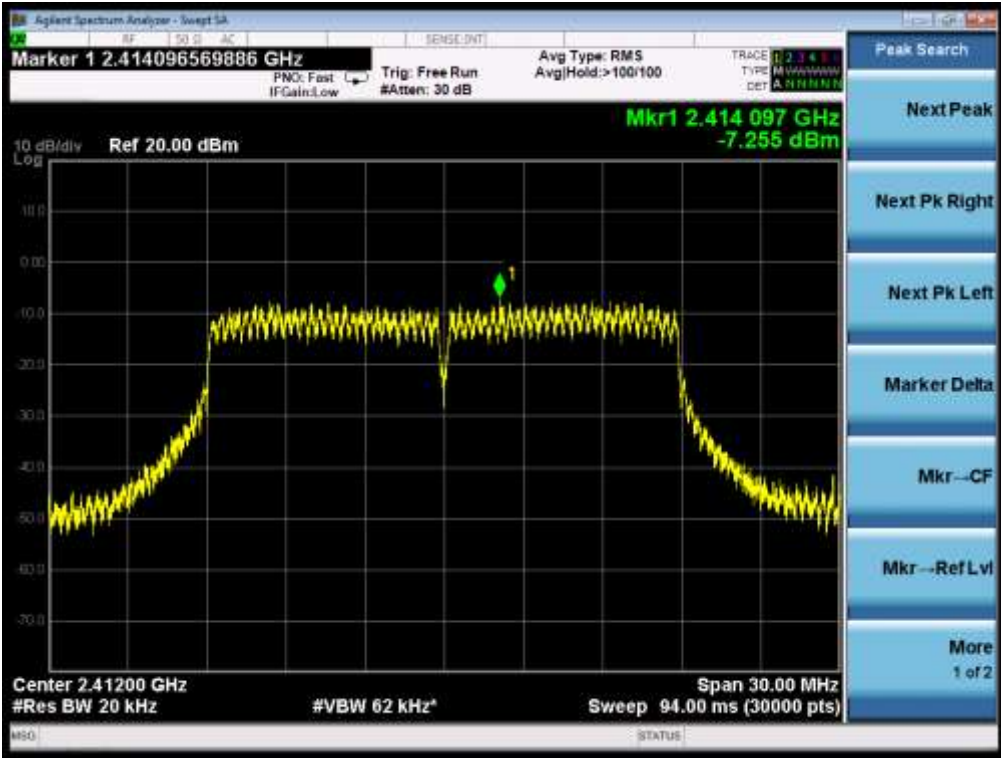
TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



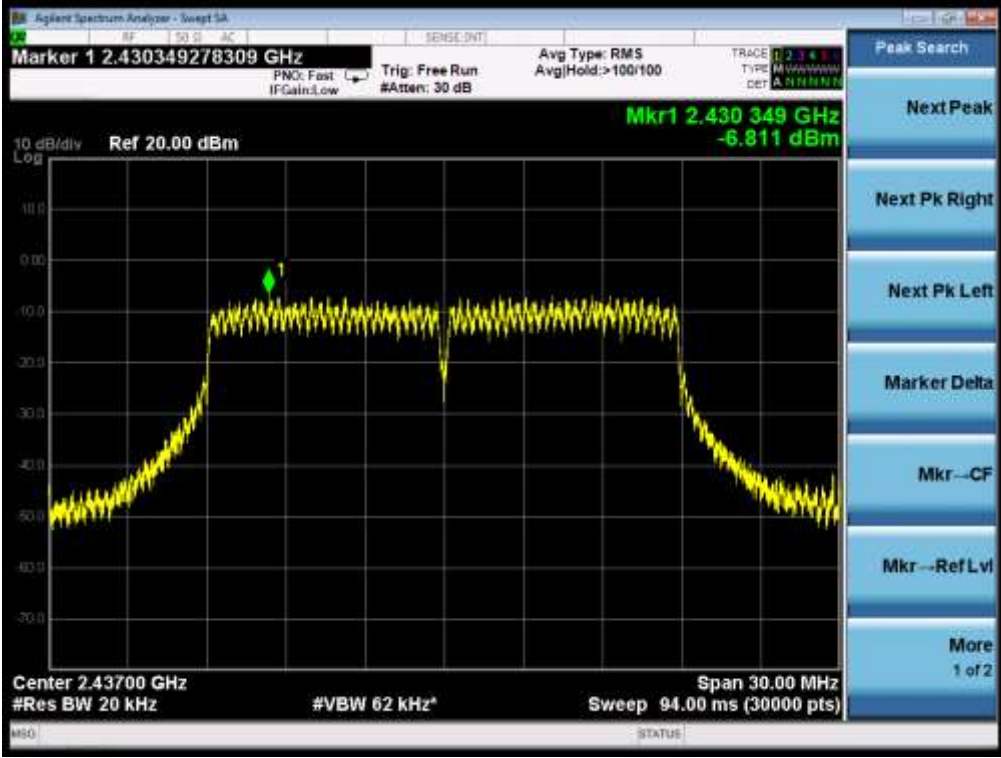
TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



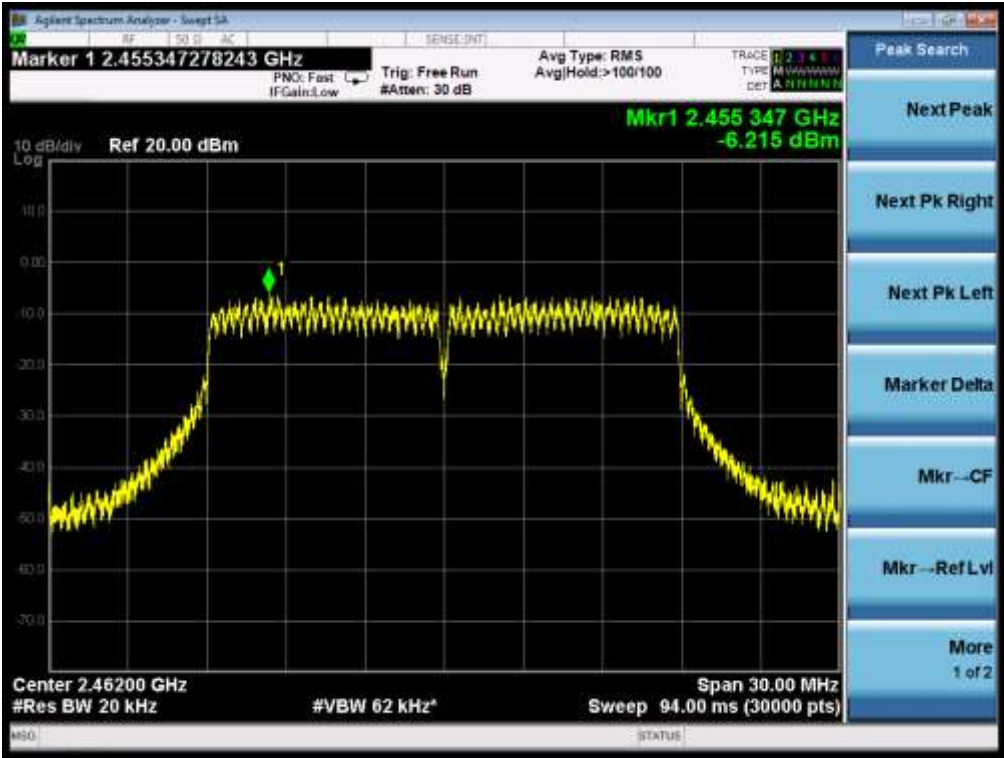
802.11n 20 TEST RESULT
TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



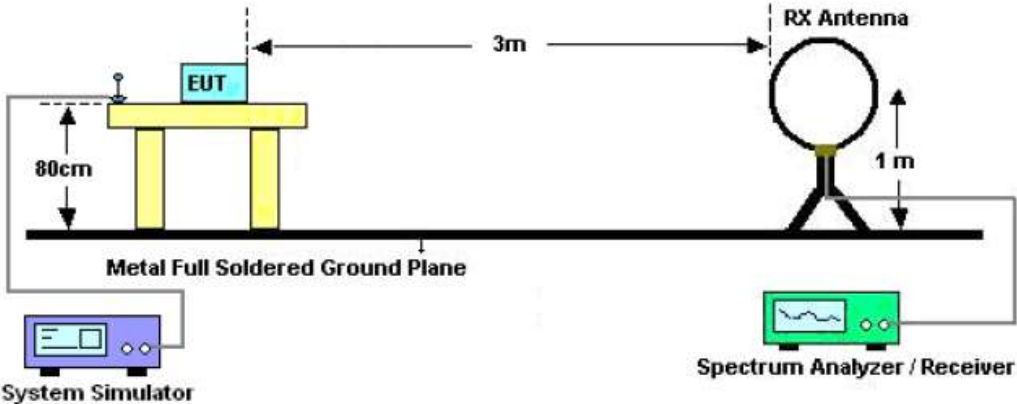
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

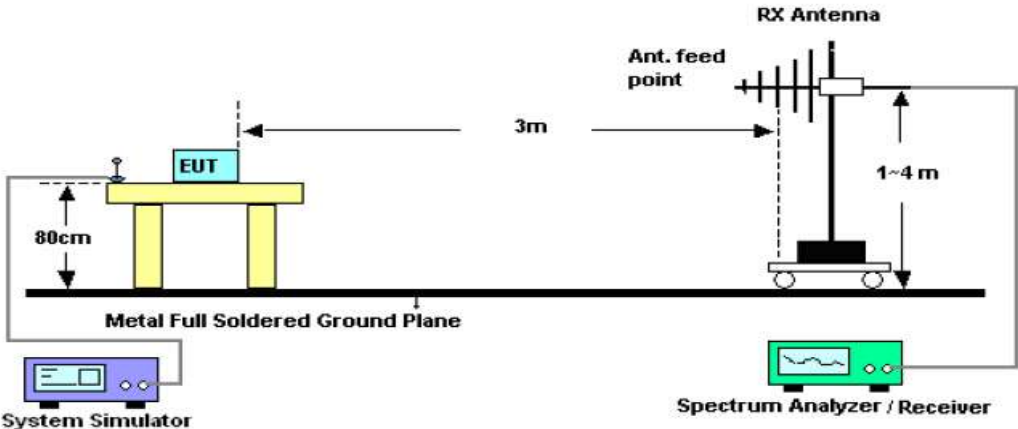
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. 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.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

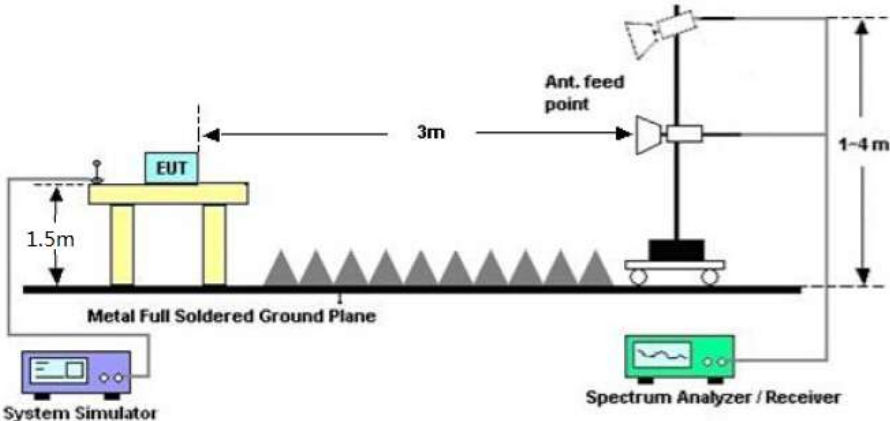
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|--------------------------|--|--------------------------------------|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested For restricted band radiated emission, the test records reported below are the worst result compared to other modes.

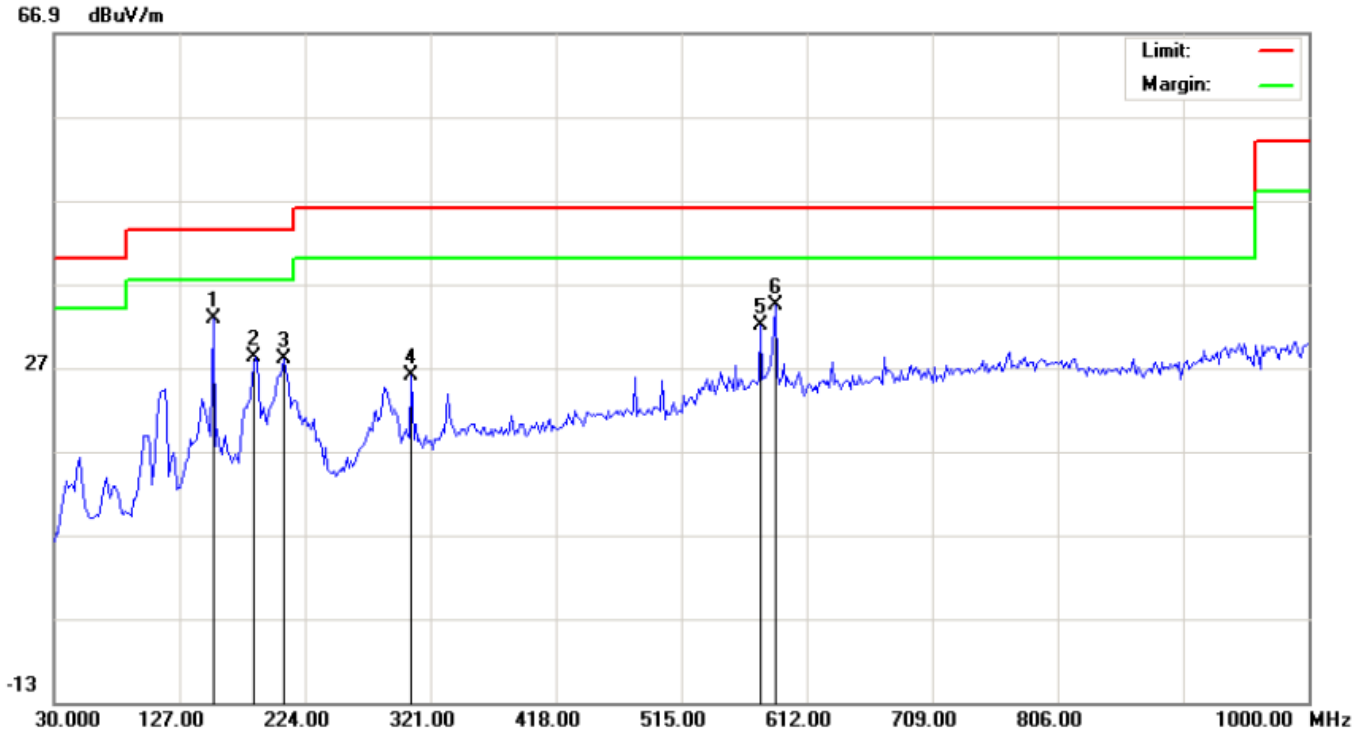
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

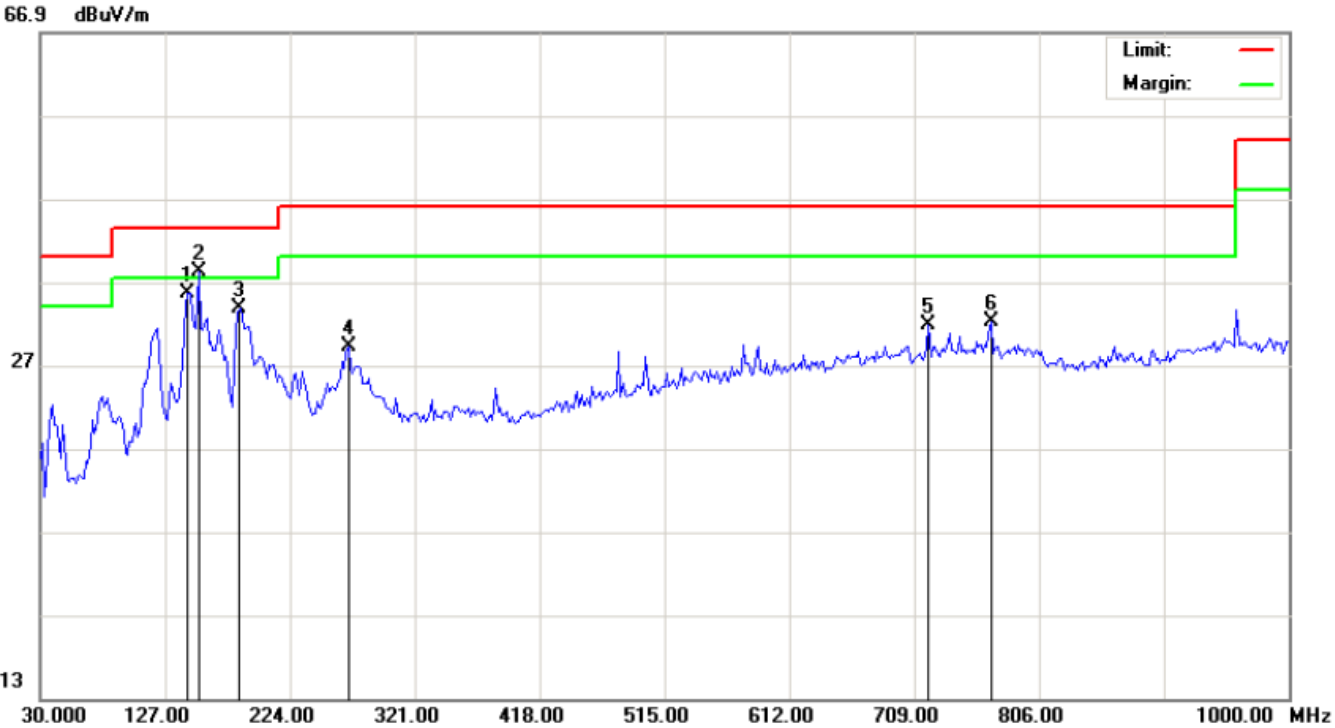
| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2412MHZ | Antenna | Horizontal |



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | * | 152.8667 | 20.83 | 12.07 | 32.90 | 43.50 | -10.60 | peak | | | |
| 2 | | 185.1999 | 16.98 | 11.31 | 28.29 | 43.50 | -15.21 | peak | | | |
| 3 | | 207.8333 | 16.75 | 11.20 | 27.95 | 43.50 | -15.55 | peak | | | |
| 4 | | 306.4499 | 10.07 | 15.84 | 25.91 | 46.00 | -20.09 | peak | | | |
| 5 | | 576.4333 | 8.81 | 23.14 | 31.95 | 46.00 | -14.05 | peak | | | |
| 6 | | 587.7500 | 10.92 | 23.42 | 34.34 | 46.00 | -11.66 | peak | | | |

RESULT: PASS

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2412MHZ | Antenna | Vertical |



| No. | Mk | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Antenna Height | Table Degree | Comment |
|-----|----|----------|---------|--------|-------------|--------|--------|----------|----------------|--------------|---------|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | cm | degree | |
| 1 | | 144.7830 | 20.38 | 15.23 | 35.61 | 43.50 | -7.89 | peak | | | |
| 2 | * | 152.8667 | 22.96 | 15.28 | 38.24 | 43.50 | -5.26 | peak | | | |
| 3 | | 185.1999 | 20.96 | 12.75 | 33.71 | 43.50 | -9.79 | peak | | | |
| 4 | | 269.2667 | 14.79 | 14.48 | 29.27 | 46.00 | -16.73 | peak | | | |
| 5 | | 720.3165 | 6.03 | 25.77 | 31.80 | 46.00 | -14.20 | peak | | | |
| 6 | | 768.8165 | 5.31 | 26.89 | 32.20 | 46.00 | -13.80 | peak | | | |

RESULT: PASS

Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2412MHZ | Antenna | Horizontal |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4824.105 | 47.25 | 3.72 | 50.97 | 74 | -23.03 | peak |
| 4824.090 | 42.33 | 3.72 | 46.05 | 54 | -7.95 | AVG |
| 7236.087 | 41.12 | 8.15 | 49.27 | 74 | -24.73 | peak |
| 7236.092 | 36.54 | 8.15 | 44.69 | 54 | -9.31 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2412MHZ | Antenna | Vertical |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4824.060 | 46.33 | 3.72 | 50.05 | 74 | -23.95 | peak |
| 4824.118 | 41.78 | 3.72 | 45.5 | 54 | -8.5 | AVG |
| 7236.057 | 42.07 | 8.15 | 50.22 | 74 | -23.78 | peak |
| 7236.020 | 37.11 | 8.15 | 45.26 | 54 | -8.74 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2437MHZ | Antenna | Horizontal |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4874.097 | 47.96 | 3.75 | 51.71 | 74 | -22.29 | peak |
| 4874.082 | 42.74 | 3.75 | 46.49 | 54 | -7.51 | AVG |
| 7311.069 | 41.35 | 8.16 | 49.51 | 74 | -24.49 | peak |
| 7311.104 | 36.55 | 8.16 | 44.71 | 54 | -9.29 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2437MHZ | Antenna | Vertical |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|--------------------|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4874.078 | 47.52 | 3.75 | 51.27 | 74 | -22.73 | peak |
| 4874.063 | 42.38 | 3.75 | 46.13 | 54 | -7.87 | AVG |
| 7311.023 | 41.22 | 8.16 | 49.38 | 74 | -24.62 | peak |
| 7311.117 | 36.49 | 8.16 | 44.65 | 54 | -9.35 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2462MHZ | Antenna | Horizontal |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|---|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4924.087 | 48.22 | 3.81 | 52.03 | 74 | -21.97 | peak |
| 4924.100 | 43.21 | 3.81 | 47.02 | 54 | -6.98 | AVG |
| 7386.086 | 41.76 | 8.19 | 49.95 | 74 | -24.05 | peak |
| 7386.104 | 36.92 | 8.19 | 45.11 | 54 | -8.89 | AVG |
| | | | | | | |
| Remark: | | | | | | |
| Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2462MHZ | Antenna | Vertical |

| Frequency (MHz) | Meter Reading (dBµV) | Factor (dB) | Emission Level (dBµV/m) | Limits (dBµV/m) | Margin (dB) | Value Type |
|---|-------------------------|----------------|----------------------------|--------------------|----------------|------------|
| 4924.092 | 46.78 | 3.81 | 50.59 | 74 | -23.41 | peak |
| 4924.113 | 42.38 | 3.81 | 46.19 | 54 | -7.81 | AVG |
| 7386.028 | 41.59 | 8.19 | 49.78 | 74 | -24.22 | peak |
| 7386.113 | 36.84 | 8.19 | 45.03 | 54 | -8.97 | AVG |
| | | | | | | |
| Remark: | | | | | | |
| Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | |

RESULT: PASS

Note:

Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report.
 Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.
 The "Factor" value can be calculated automatically by software of measurement system.
 All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

12.2. TEST SET-UP

same as 11.2

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μ V) to represent the Amplitude. Use the F dB(μ V/m) to represent the Field Strength. So A=F.

12.3. TEST RESULT

| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2412MHZ | Antenna | Horizontal |

PK



AV



| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2412MHZ | Antenna | Vertical |

PK



AV



| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2462MHZ | Antenna | Horizontal |

PK



AV



| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2462MHZ | Antenna | Vertical |

PK



AV

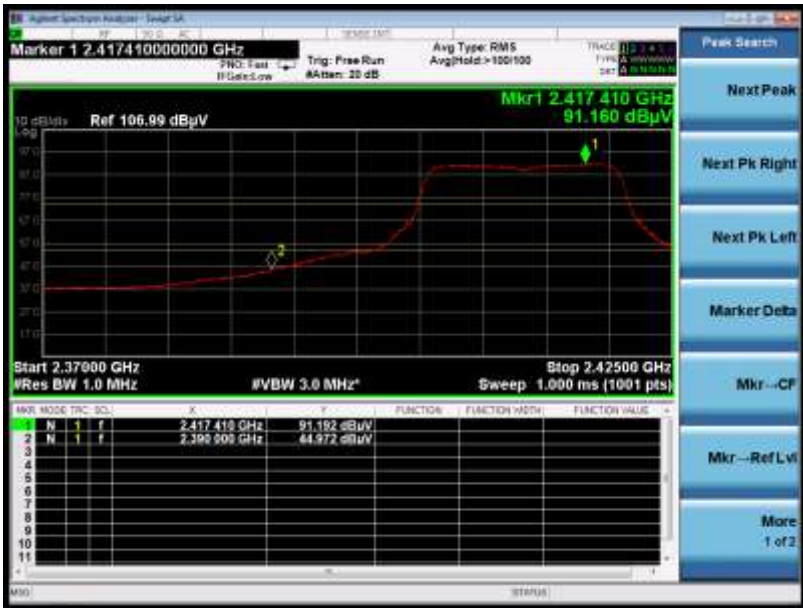


| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11g with data rate 6 2412MHZ | Antenna | Horizontal |

PK



AV

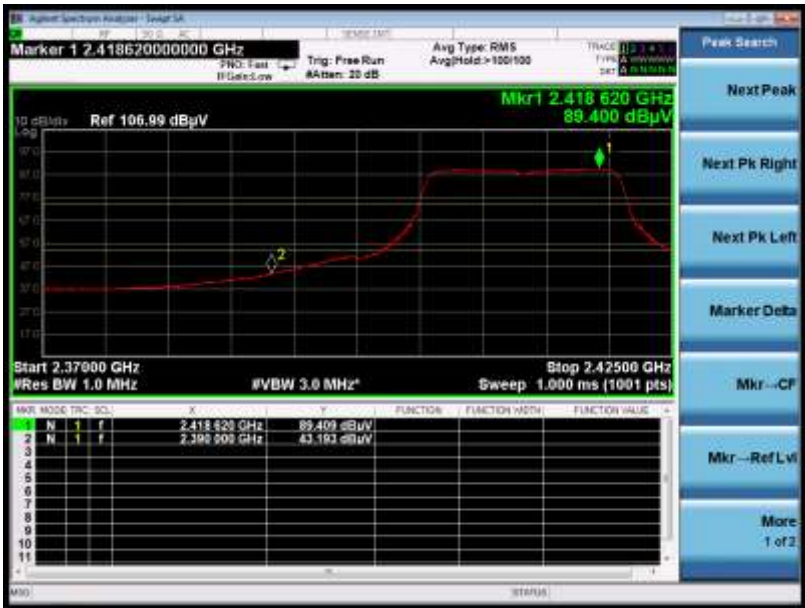


| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11g with data rate 6 2412MHZ | Antenna | Vertical |

PK



AV

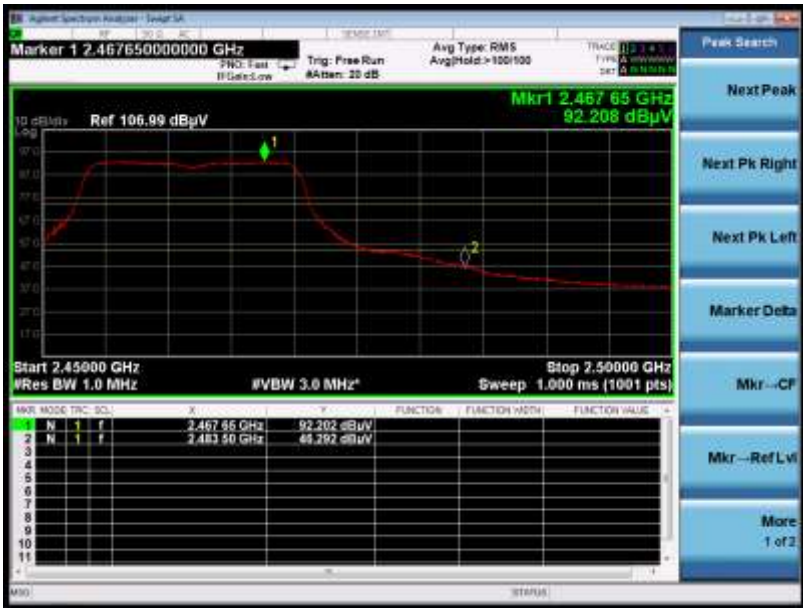


| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11g with data rate 6 2462MHZ | Antenna | Horizontal |

PK



AV

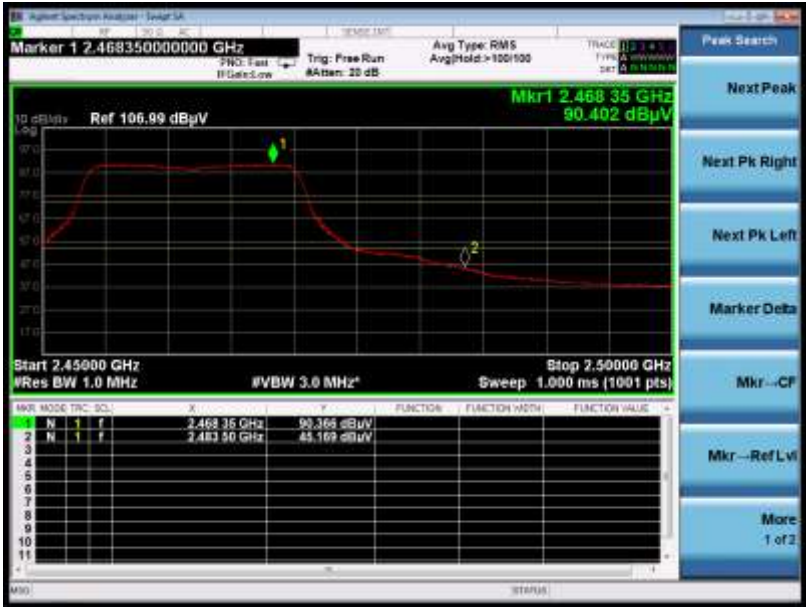


| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11g with data rate 6 2462MHZ | Antenna | Vertical |

PK



AV



| | | | |
|-------------|--|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11n 20 with data rate 6.5 2412MHZ | Antenna | Horizontal |

PK



AV

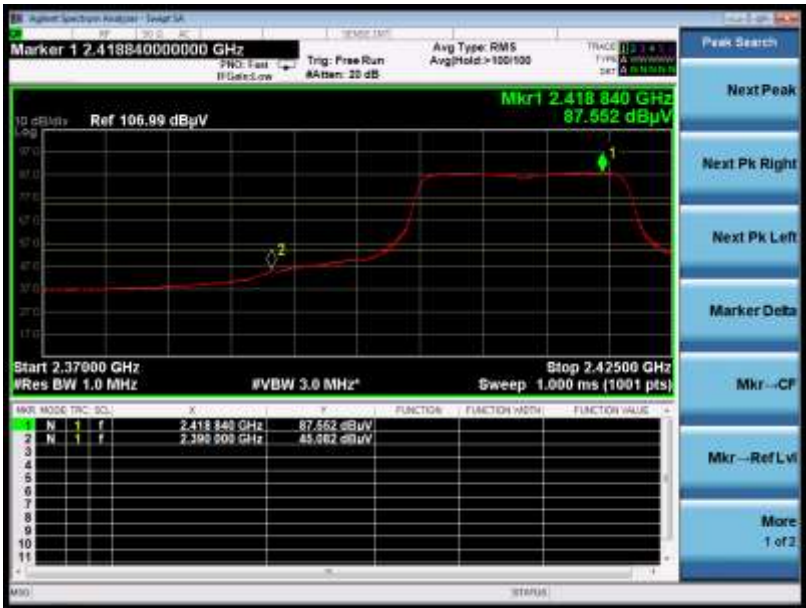


| | | | |
|-------------|--|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11n 20 with data rate 6.5 2412MHZ | Antenna | Vertical |

PK



AV

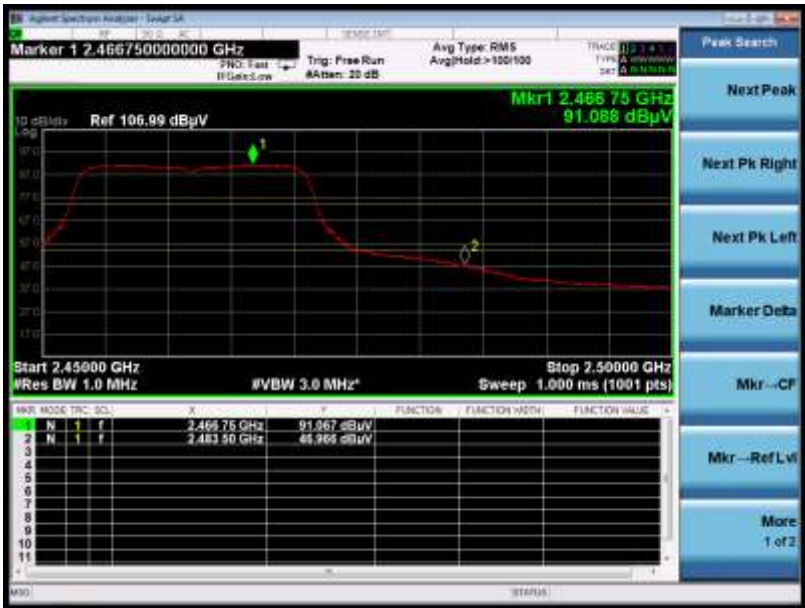


| | | | |
|-------------|---|-------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11n 20with data rate 6.5 2462MHZ | Antenna | Horizontal |

PK



AV

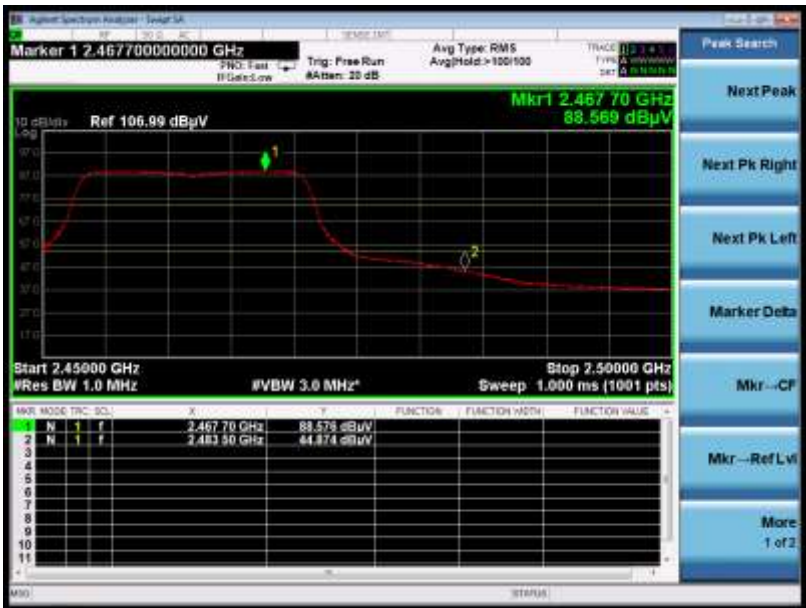


| | | | |
|--------------------|--|--------------------------|----------------|
| EUT | CAR DVR | Model Name | VA-CD001 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11n 20 with data rate 6.5 2462MHZ | Antenna | Vertical |

PK



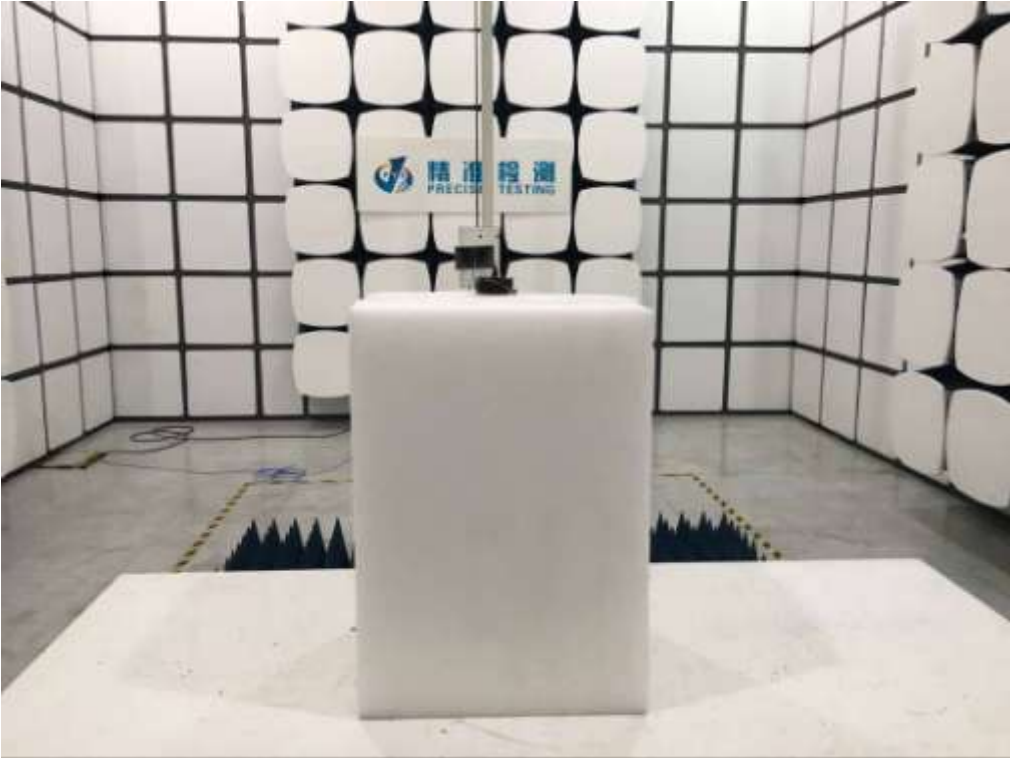
AV



APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ



APPENDIX B: PHOTOGRAPHS OF EUT
ALL VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



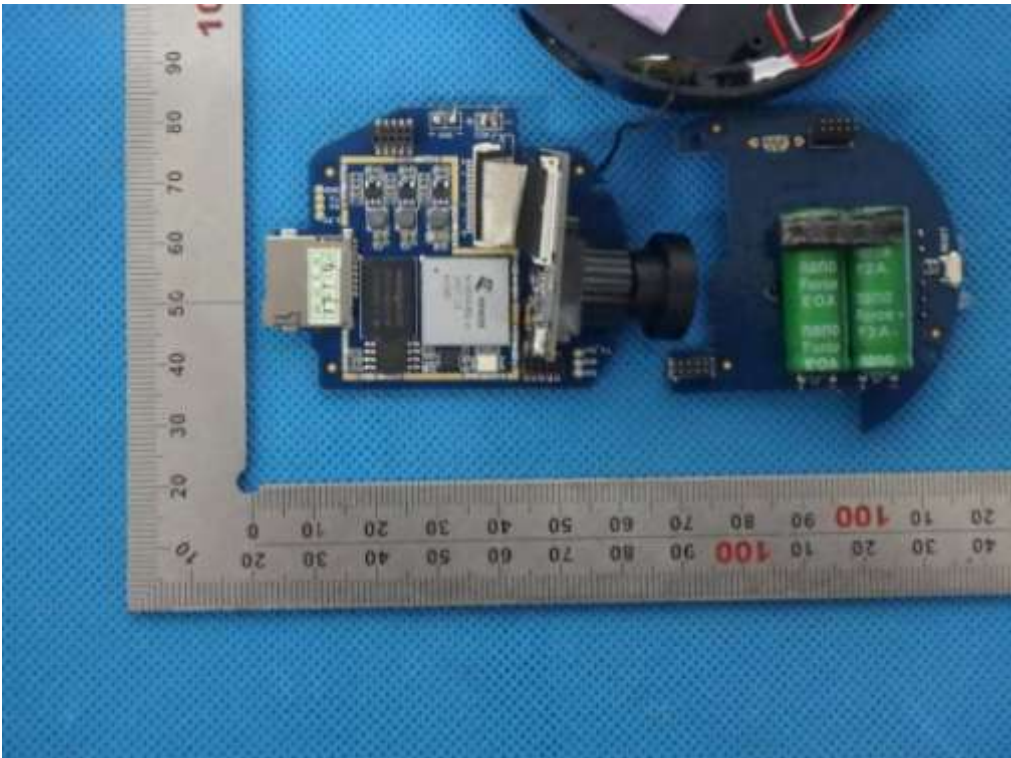
RIGHT VIEW OF EUT



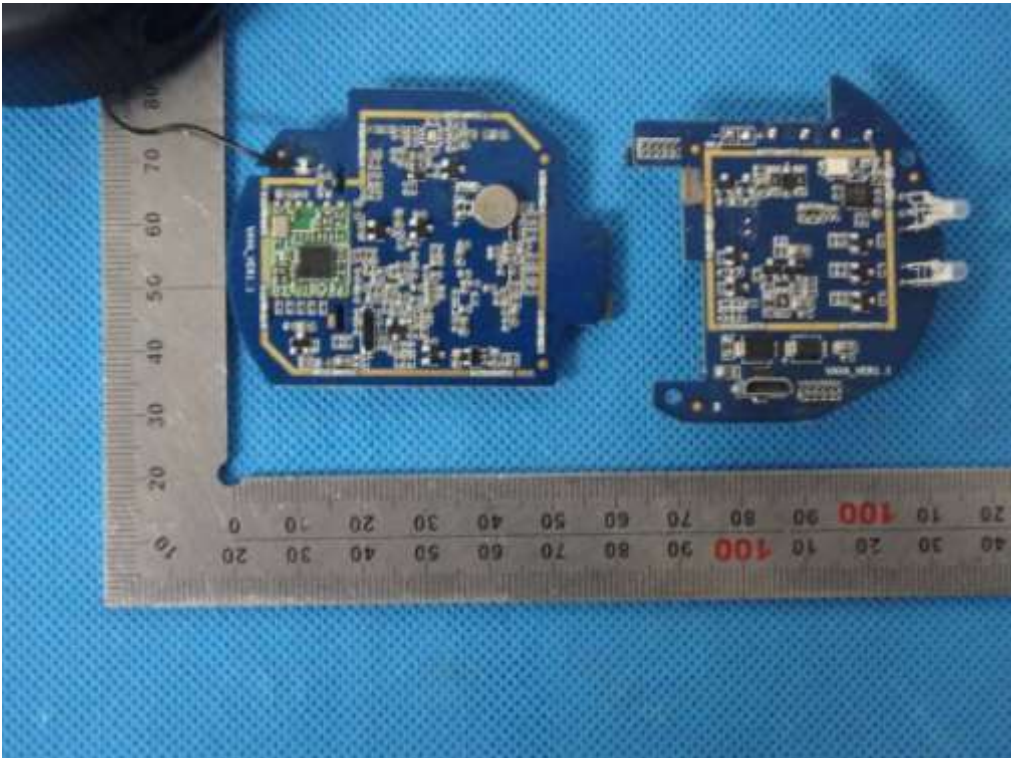
OPEN VIEW OF EUT



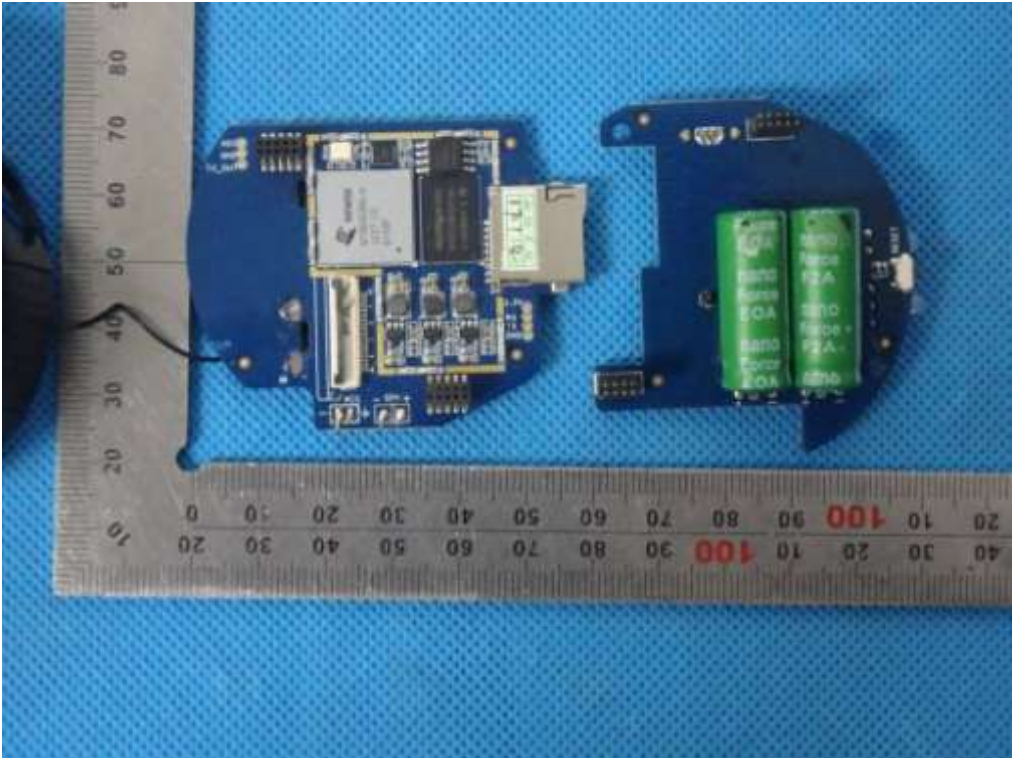
INTERNAL VIEW OF EUT-1



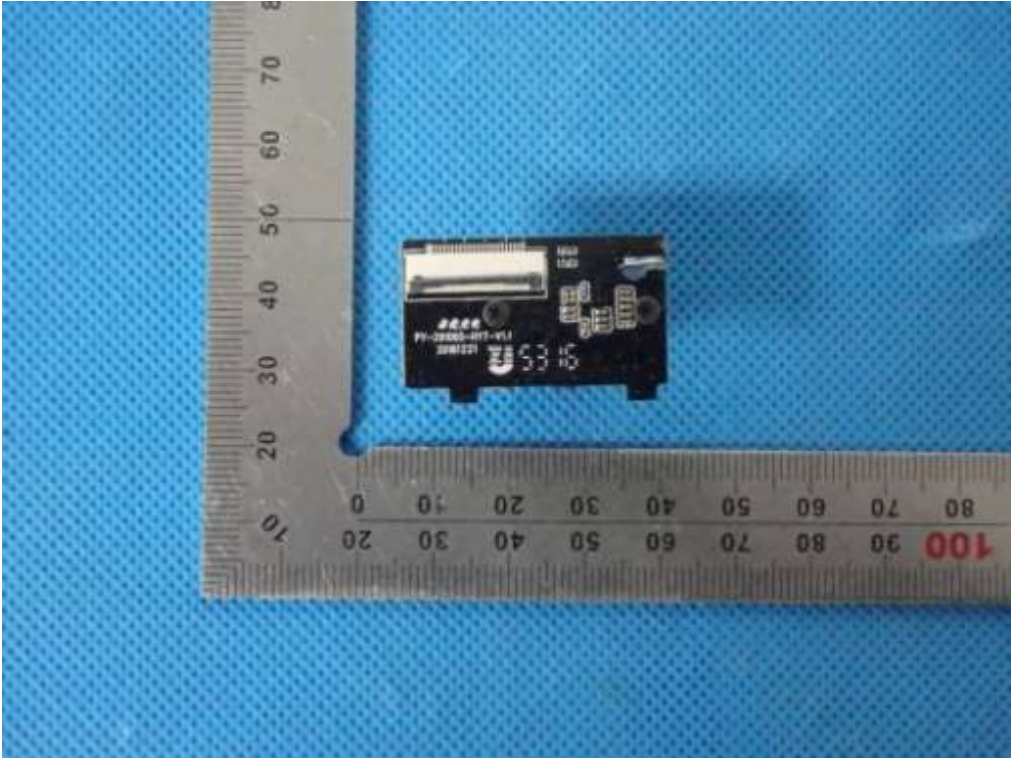
INTERNAL VIEW OF EUT-2



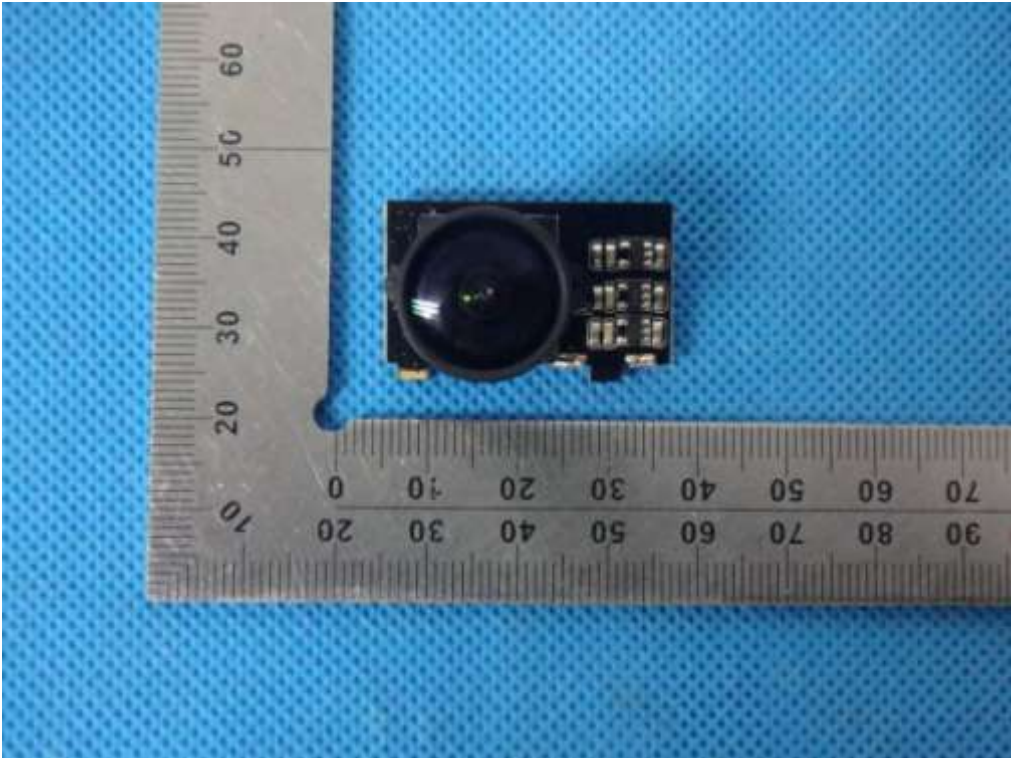
INTERNAL VIEW OF EUT-3



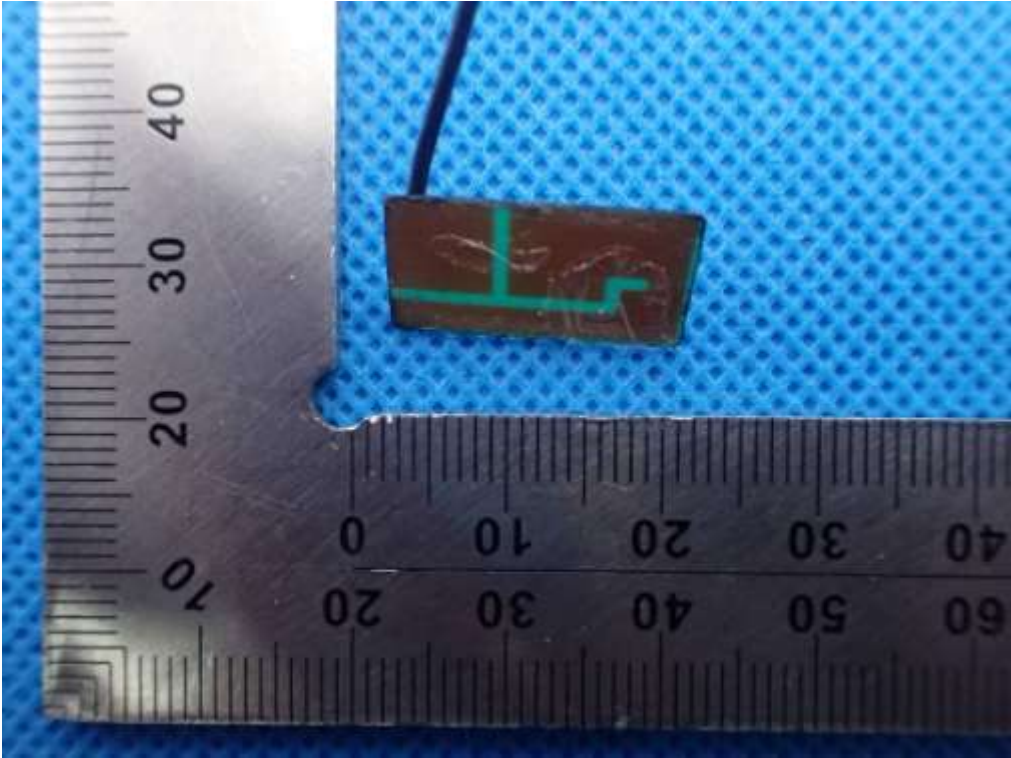
INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



VIEW OF ANTENNA



-----END OF REPORT-----