# CFR 47 FCC PART 15 SUBPART C

# TEST REPORT

*For*

**IP Camera**

**MODEL NUMBER: IPC6415SR-X5UPW**

**ADDITIONAL NUMBER: IPC6415SR-X5UPW-NB, IPC-B645, IPC-B645-IR, IPC-B645-WH, IPC-B645-FW, IPC-S645, IPC-S645-IR, IPC-S645-WH, IPC-S645-FW, IPC-E645, IPC-E645-IR, IPC-E645-WH, IPC-E645-FW, AFSXJ-NC-C-IPC-B645, AFSXJ-NC-C-IPC-B645-IR, AFSXJ-NC-C-IPC-B645-WH, AFSXJ-NC-C-IPC-B645-FW, IPC-B645-XYZ-ABC**

**FCC ID: 2AL8S-0235C3GQ**

**REPORT NUMBER: 4789049979-1**

**ISSUE DATE: Jul. 08, 2019**

*Prepared for*

**Zhejiang Uniview Technologies Co., Ltd.**

*Prepared by*

**UL-CCIC COMPANY LIMITED**
**No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China**
**Tel: +86 769 22038881**
**Fax: +86 769 33244054**
**Website: www.ul.com**

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V0 | 07/08/2019 | Initial Issue | |

| Summary of Test Results | | | |
|---|---|---|---|
| **Clause** | **Test Items** | **FCC/IC Rules** | **Test Results** |
| 1 | 6dB Bandwidth | FCC Part 15.247 (a) (2) | Pass |
| 2 | Peak Conducted Output Power | FCC Part 15.247 (b) (3) | Pass |
| 3 | Power Spectral Density | FCC Part 15.247 (e) | Pass |
| 4 | Conducted Bandedge and Spurious Emission | FCC Part 15.247 (d) | Pass |
| 5 | Radiated Bandedge and Spurious Emission | FCC Part 15.247 (d)<br>FCC Part 15.209<br>FCC Part 15.205 | Pass |
| 6 | Conducted Emission Test For AC Power Port | FCC Part 15.207 | Pass |
| 7 | Antenna Requirement | FCC Part 15.203 | Pass |

# TABLE OF CONTENTS

# 1. ATTESTATION OF TEST RESULTS

**Applicant Information**

| | |
|---|---|
| Company Name: | Zhejiang Uniview Technologies Co., Ltd. |
| Address: | 88 JIANGLING RD, BINJIANG DISTRICT, HANGZHOU, ZHEJIANG 310051 CHINA |

**Manufacturer Information**

| | |
|---|---|
| Company Name: | Zhejiang Uniview Technologies Co., Ltd. |
| Address: | 88 JIANGLING RD, BINJIANG DISTRICT, HANGZHOU, ZHEJIANG 310051 CHINA |

**Factory Information**

Factory 1:

| | |
|---|---|
| Company Name: | Zhejiang Uniview Systems Technology Co.,Ltd. |
| Address: | No.1277 South Qingfeng South Road, Tongxiang City,Jiaxing City |

Factory 2:

| | |
|---|---|
| Company Name: | TDG Technology Co.,Ltd. |
| Address: | YATAI ROAD NO.1, NANHU DISTRICT, JIAXING, ZHEJIANG, 314050, CHINA |

Factory 3:

| | |
|---|---|
| Company Name: | SUZHOU QIAOXIN ELECTRONIC Technology Co.,Ltd. |
| Address: | NO.77,YITANG ROAD,ECONOMIC DEVELOPMENT ZONE,WUJIANG DISTRICT, SUZHOU JIANGSU CHINA |

**EUT Description**

| | |
|---|---|
| EUT Name: | IP Camera |
| Model: | IPC6415SR-X5UPW |
| Additional Number: | IPC6415SR-X5UPW-NB, IPC-B645, IPC-B645-IR, IPC-B645-WH, IPC-B645-FW, IPC-S645, IPC-S645-IR, IPC-S645-WH, IPC-S645-FW, IPC-E645, IPC-E645-IR, IPC-E645-WH, IPC-E645-FW, AFSXJ-NC-C-IPC-B645, AFSXJ-NC-C-IPC-B645-IR, AFSXJ-NC-C-IPC-B645-WH, AFSXJ-NC-C-IPC-B645-FW, IPC-B645-XYZ-ABC |
| Sample Number: | 2349907 |
| Sample Received Date: | May 16, 2019 |
| Date of Tested: | May 16~ June 20, 2019 |

All the modules have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with IPC6415SR-X5UPW. The difference lies only for model designation, different sales markets and consumer.

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 FCC PART 15 SUBPART C | PASS |

Prepared By:

Tom Tang

Tom Tang
Engineer Project Associate

Checked By:

Chris Zhong

Chris Zhong
Senior Project Engineer

Approved By:

Scholl Zhang

Scholl Zhang
Laboratory Leader

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013.

# 3. FACILITIES AND ACCREDITATION

| | |
|---|---|
| Accreditation Certificate | **A2LA (Certificate No.: 4829.01)**<br>**UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.**<br>**FCC (FCC Designation No.: CN1247)**<br>**UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules** |

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognize national standards.

## 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test Item | Uncertainty |
|---|---|
| Conduction emission | 3.80dB |
| Radiation Emission test(include Fundamental emission) (9KHz-30MHz) | 3.32dB |
| Radiation Emission test(include Fundamental emission) (30MHz-1GHz) | 3.27dB |
| Radiation Emission test (1GHz to 26GHz)( include Fundamental emission) | 3.72dB (1GHz-18Gz) |
| | 4.11dB (18GHz-26Gz) |
| Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | |

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

| | |
|---|---|
| EUT Name | IP Camera |
| Model | IPC6415SR-X5UPW |
| Radio Technology | IEEE802.11b/g/n HT20&HT40 |
| Operation frequency | IEEE 802.11b: 2412MHz—2462MHz<br>IEEE 802.11g: 2412MHz—2462MHz<br>IEEE 802.11n HT20: 2412MHz—2462MHz<br>IEEE 802.11n HT40: 2422MHz—2452MHz |
| Modulation | IEEE 802.11b: DSSS(CCK)<br>IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) |
| Power Supply | DC 12V |

Remark:
Model No.:

| Number | Name | Number | Name | Number: | Name |
|---|---|---|---|---|---|
| 1 | IPC6415SR-X5UPW | 2 | IPC6415SR-X5UPW-NB | 3 | IPC-B645 |
| 4 | IPC-B645-IR | 5 | IPC-B645-WH | 6 | IPC-B645-FW |
| 7 | IPC-S645 | 8 | IPC-S645-IR | 9 | IPC-S645-WH |
| 10 | IPC-S645-FW | 11 | IPC-E645 | 12 | IPC-E645-IR |
| 13 | IPC-E645-WH | 14 | IPC-E645-FW | 15 | AFSXJ-NC-C-IPC-B645 |
| 16 | AFSXJ-NC-C-IPC-B645-IR | 17 | AFSXJ-NC-C-IPC-B645-WH | 18 | AFSXJ-NC-C-IPC-B645-FW |
| 19 | IPC-B645-XYZ-ABC | | | | |

Only the main model IPC6415SR-X5UPW is tested and only the data of this model is shown in this test report. Since have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with IPC6415SR-X5UPW. The difference lies only for model designation, different sales markets and consumer.

## 5.2. MAXIMUM OUTPUT POWER

| Number of Transmit Chains (NTX) | IEE Std. 802.11 | Frequency (MHz) | Channel Number | Max PK Conducted Power (dBm) |
|---|---|---|---|---|
| 1 | IEEE 802.11b | 2412-2462 | 1-11[11] | 11.12 |
| 1 | IEEE 802.11g | 2412-2462 | 1-11[11] | 18.50 |
| 1 | IEEE 802.11nHT20 | 2412-2462 | 1-11[11] | 18.09 |
| 1 | IEEE 802.11nHT40 | 2422-2452 | 3-9[7] | 18.07 |

## 5.3. CHANNEL LIST

| Channel List for 802.11b/g/n (20 MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1 | 2412 | 4 | 2427 | 7 | 2442 | 10 | 2457 |
| 2 | 2417 | 5 | 2432 | 8 | 2447 | 11 | 2462 |
| 3 | 2422 | 6 | 2437 | 9 | 2452 | / | / |

| Channel List for 802.11n (40 MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequenc y(MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 3 | 2422 | 5 | 2432 | 7 | 2442 | 9 | 2452 |
| 4 | 2427 | 6 | 2437 | 8 | 2447 | / | / |

## 5.4. TEST CHANNEL CONFIGURATION

| Test Mode | Test Channel | Frequency |
|---|---|---|
| WiFi TX(802.11b) | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11g) | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11n HT20) | CH 1, CH 6, CH 11 | 2412MHz, 2437MHz, 2462MHz |
| WiFi TX(802.11n HT40) | CH 3, CH 6, CH 9 | 2422MHz, 2437MHz, 2452MHz |

## 5.5. THE WORSE CASE CONFIGURATIONS

| The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band | | | | | | | |
|---|---|---|---|---|---|---|---|
| Test Software | | SecureCRT | | | | | |
| Modulation Mode | Transmit Antenna Number | Test Channel | | | | | |
| | | NCB: 20MHz | | | NCB: 40MHz | | |
| | | CH 1 | CH 6 | CH 11 | CH 3 | CH 6 | CH 9 |
| 802.11b | 1 | N/A | N/A | N/A | / | | |
| 802.11g | 1 | N/A | N/A | N/A | | | |
| 802.11n HT20 | 1 | N/A | N/A | N/A | | | |
| 802.11n HT40 | 1 | / | | | N/A | N/A | N/A |

## 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

| Antenna | Frequency (MHz) | Antenna Type | MAX Antenna Gain (dBi) |
|---|---|---|---|
| 1 | 2412-2462 | Internal Antenna | 2.4 |

| Test Mode | Transmit and Receive Mode | Description |
|---|---|---|
| IEEE 802.11b | ☒1TX, 1RX | ANT 1 can be used as transmitting/receiving antenna. |
| IEEE 802.11g | ☒1TX, 1RX | ANT 1 can be used as transmitting/receiving antenna. |
| IEEE 802.11n HT20 | ☒1TX, 1RX | ANT 1 can be used as transmitting/receiving antenna. |
| IEEE 802.11n HT40 | ☒1TX, 1RX | ANT 1 can be used as transmitting/receiving antenna. |

## 5.7. THE WORSE CASE CONFIGURATIONS

For the product, there is only one transmission antenna, so only the worst data for the antenna is recorded in the report.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps
802.11b mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

## 5.8. DESCRIPTION OF TEST SETUP

**SUPPORT EQUIPMENT**

| Item | Equipment | Brand Name | Model Name | P/N |
|---|---|---|---|---|
| 1 | Laptop | ThinkPad | E550c | N/A |

**I/O CABLES**

| Cable No | Port | Connector Type | Cable Type | Cable Length(m) | Remarks |
|---|---|---|---|---|---|
| 1 | LAN | LAN | LAN | 1 | N/A |

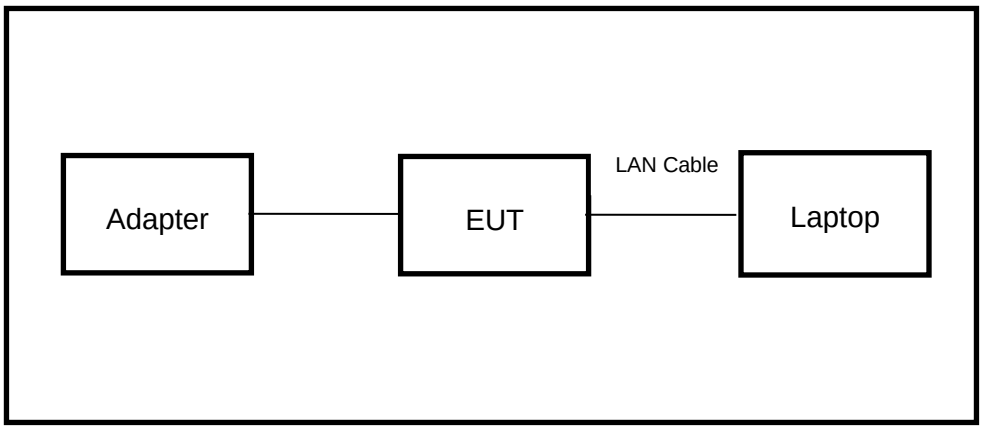
**ACCESSORIES**

| Item | Accessory | Brand Name | Model Name | Description |
|---|---|---|---|---|
| 1 | Adapter | GUCF | UWP-24W-1220T | N/A |

**TEST SETUP**

The EUT can work in engineering mode with a software through a Laptop.

**SETUP DIAGRAM FOR TESTS**



# 6. MEASURING INSTRUMENT AND SOFTWARE USED

| **Conducted Emissions (**Instrument**)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Used | Equipment | Manufacturer | Model No. | Serial No. | Upper Last Cal. | Last Cal. | Next Cal. |
| ☑ | EMI Test Receiver | R&S | ESR3 | 126700 | 2017-12-14 | 2018-12-13 | 2019-12-12 |
| ☑ | Two-Line V-Network | R&S | ENV216 | 126701 | 2017-12-14 | 2018-12-13 | 2019-12-12 |
| ☑ | Artificial Mains Networks | R&S | ENY81 | 126711 | 2017-12-14 | 2018-12-13 | 2019-12-12 |
| Software | | | | | | | |
| Used | Description | | | Manufacturer | Name | Version | |
| ☑ | Test Software for Conducted disturbance | | | R&S | EMC32 | Ver. 9.25 | |
| **Radiated Emissions (**Instrument**)** | | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Upper Last Cal. | Last Cal. | Next Cal. |
| ☑ | Spectrum Analyzer | Keysight | N9010B | MY57110128 | 2018-05-30 | 2019-05-29 | 2020-05-28 |
| ☑ | EMI test receiver | R&S | ESR26 | 1267603 | 2017-12-14 | 2018-12-13 | 2019-12-22 |
| ☑ | Receiver Antenna (9kHz-30MHz) | Schwarzbeck | FMZB 1513 | 513-265 | 2018-06-17 | 2019-06-16 | 2020-06-15 |
| ☑ | Receiver Antenna (30MHz-1GHz) | SunAR RF Motion | JB1 | 126704 | N/A | 2019-01-28 | 2022-01-27 |
| ☑ | Receiver Antenna (1GHz-18GHz) | R&S | HF907 | 126705 | 2018-01-27 | 2019-01-26 | 2020-01-26 |
| ☑ | Receiver Antenna (18GHz-26.5GHz) | Schwarzbeck | BBHA9170 | 126706 | 2018-02-07 | 2019-02-06 | 2020-02-05 |
| ☑ | Receiver Antenna (26.5GHz-40GHz) | TOYO | HAP 26-40W | 00000012 | 2017-07-26 | 2018-07-25 | 2019-07-24 |
| ☑ | Pre-amplification (To 1GHz) | R&S | SCU-03D | 134666 | 2018-02-07 | 2019-02-06 | 2020-02-05 |
| ☑ | Pre-amplification (To 18GHz) | TDK | PA-02-0118 | TRS-305-00066 | 2017-12-12 | 2018-12-11 | 2019-12-10 |
| ☑ | Pre-amplification (To 26.5GHz) | R&S | SCU-26D | 134668 | 2018-02-07 | 2019-02-06 | 2020-02-05 |
| ☑ | Band Reject Filter | Wainwright | WRCJV8-2350-2400-2483.5-2533.5-40SS | 1 | 2018-05-30 | 2019-05-29 | 2020-05-28 |
| ☑ | Highpass Filter | Wainwright | WHKX10-2700-3000-18000-40SS | 2 | 2018-05-30 | 2019-05-29 | 2020-05-28 |
| **Software** | | | | | | | |
| Used | Description | | | Manufacturer | Name | Version | |
| ☑ | Test Software for Radiated disturbance | | | Tonscend | JS32 | V1.0 | |
| **Other instruments** | | | | | | | |
| Used | Equipment | Manufacturer | Model No. | Serial No. | Upper Last Cal. | Next Cal. | |
| ☑ | Spectrum Analyzer | Keysight | N9010B | MY57110128 | 2018-05-30 | 2019-05-29 | 2020-05-28 |
| ☑ | Power Meter | Keysight | U2021XA | MY57110002 | 2018-06-13 | 2019-06-12 | 2020-06-11 |

# 7. MEASUREMENT METHODS

| No. | Test Item | KDB Name | Section |
|---|---|---|---|
| 1 | 6dB Bandwidth | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.2 |
| 2 | Peak Output Power | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.3.1.3/8.3.2.3 |
| 3 | Power Spectral Density | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.4 |
| 4 | Out-of-band emissions in non-restricted bands | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.5 |
| 5 | Out-of-band emissions in restricted bands | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.6 |
| 6 | Band-edge | KDB 558074 D01 15.247 Meas Guidance v05r02 | 8.7 |
| 7 | Conducted Emission Test For AC Power Port | ANSI C63.10-2013 | 6.2 |

# 8. ANTENNA PORT TEST RESULTS

## 8.1. ON TIME AND DUTY CYCLE

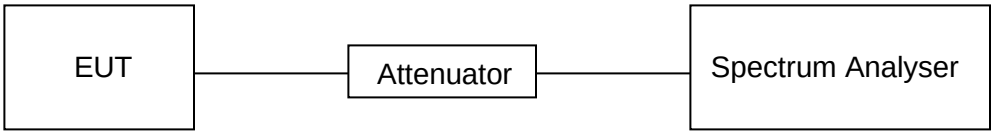
**LIMITS**

None; for reporting purposes only

**PROCEDURE**

KDB 558074 Zero-Span Spectrum Analyzer Method

**TEST SETUP**




**TEST ENVIRONMENT**

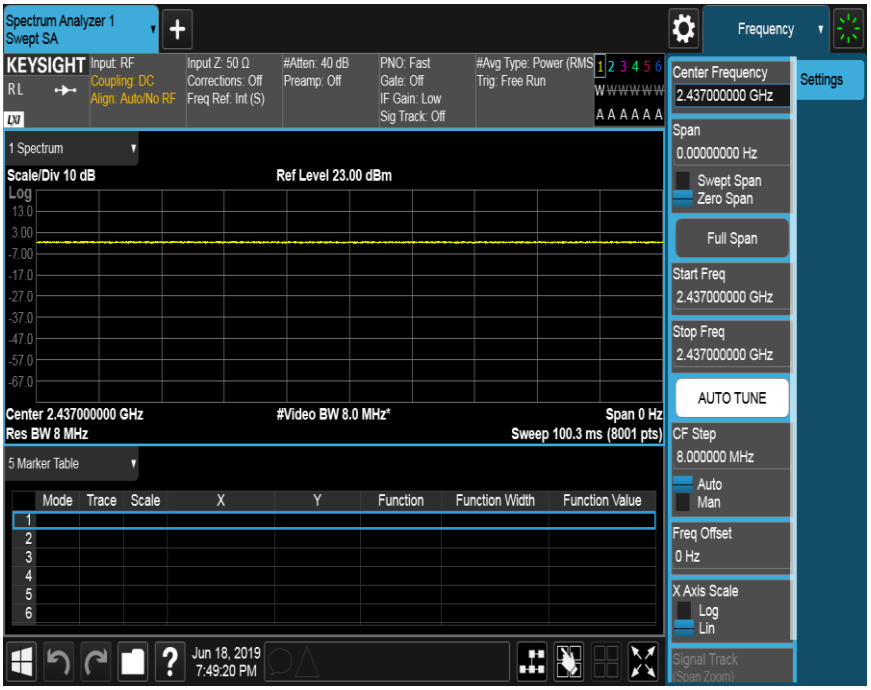
| | | | |
|---|---|---|---|
| Temperature | 20°C | Relative Humidity | 56% |
| Atmosphere Pressure | 101kPa | Test Voltage | DC 12V |

**RESULTS**

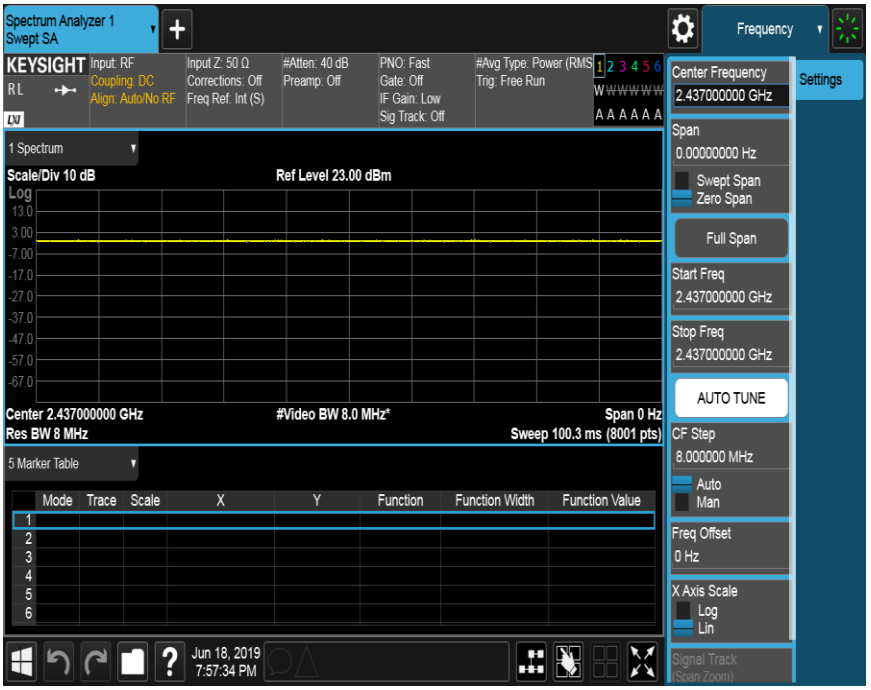
| Mode | On Time (msec) | Period (msec) | Duty Cycle x (Linear) | Duty Cycle (%) | Duty Cycle Correction Factor (db) | 1/T Minimum VBW (KHz) | Final setting For VBW (KHz) |
|---|---|---|---|---|---|---|---|
| 11B | 100.3 | 100.3 | 1 | 100% | 0 | 0.01 | 0.01 |
| 11G | 100.3 | 100.3 | 1 | 100% | 0 | 0.01 | 0.01 |
| 11N20 | 100.3 | 100.3 | 1 | 100% | 0 | 0.01 | 0.01 |
| 11N40 | 100.3 | 100.3 | 1 | 100% | 0. | 0.01 | 0.01 |

Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.

11B ON TIME AND DUTY CYCLE MID CH




11G ON TIME AND DUTY CYCLE MID CH



11N HT20 ON TIME AND DUTY CYCLE MID CH


11N HT40 ON TIME AND DUTY CYCLE MID CH

## 8.2. 6 dB DTS BANDWIDTH

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(a)(2) | 6 dB Bandwidth | ≥ 500KHz | 2400-2483.5 |

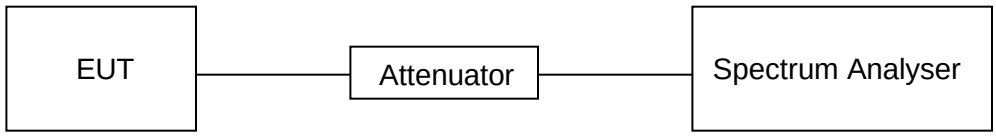
**TEST PROCEDURE**

Connect the UUT to the spectrum analyser and use the following settings:

| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | 100K |
| VBW | ≥3 × RBW |
| Trace | Max hold |
| Sweep | Auto couple |

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB to the maximum level measured in the fundamental emission.

**TEST SETUP**



**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 20°C | Relative Humidity | 56% |
| Atmosphere Pressure | 101kPa | Test Voltage | DC 12V |

**RESULTS**

### 8.2.1. 802.11b MODE

| Channel | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|
| Low | 9.075 | ≥500 | Pass |
| Middle | 9.065 | ≥500 | Pass |
| High | 9.073 | ≥500 | Pass |

6 dB BANDWIDTH LOW CH

6 dB BANDWIDTH MID CH

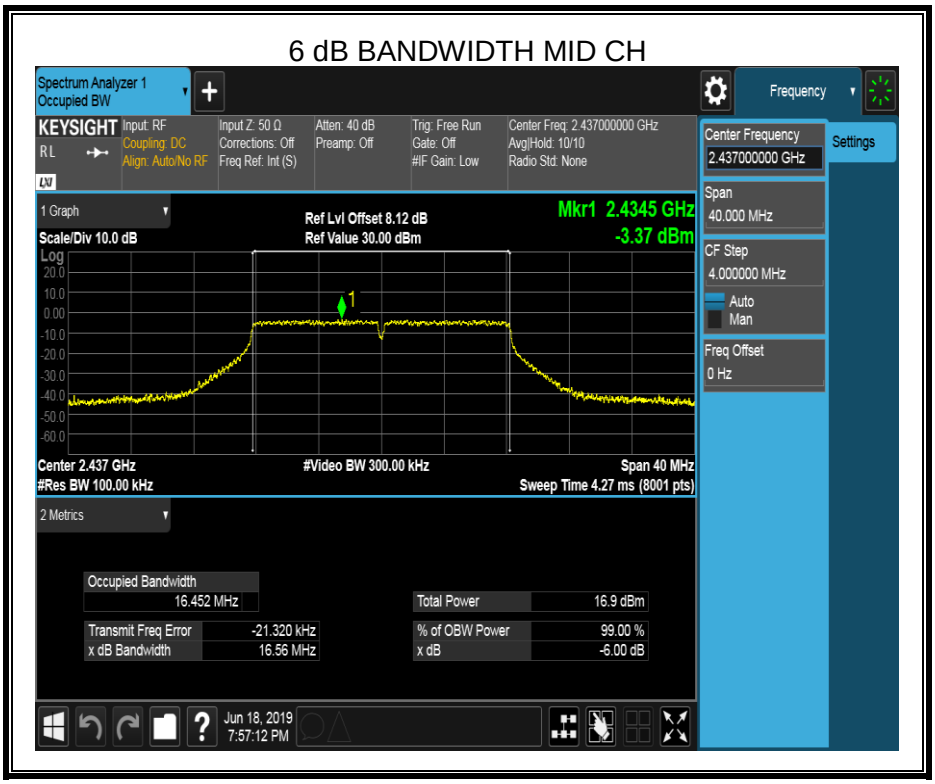

6 dB BANDWIDTH HIGH CH

### 8.2.2. 802.11g MODE

| Channel | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|
| Low | 16.57 | ≥500 | Pass |
| Middle | 16.56 | ≥500 | Pass |
| High | 16.57 | ≥500 | Pass |

6 dB BANDWIDTH LOW CH

6 dB BANDWIDTH MID CH

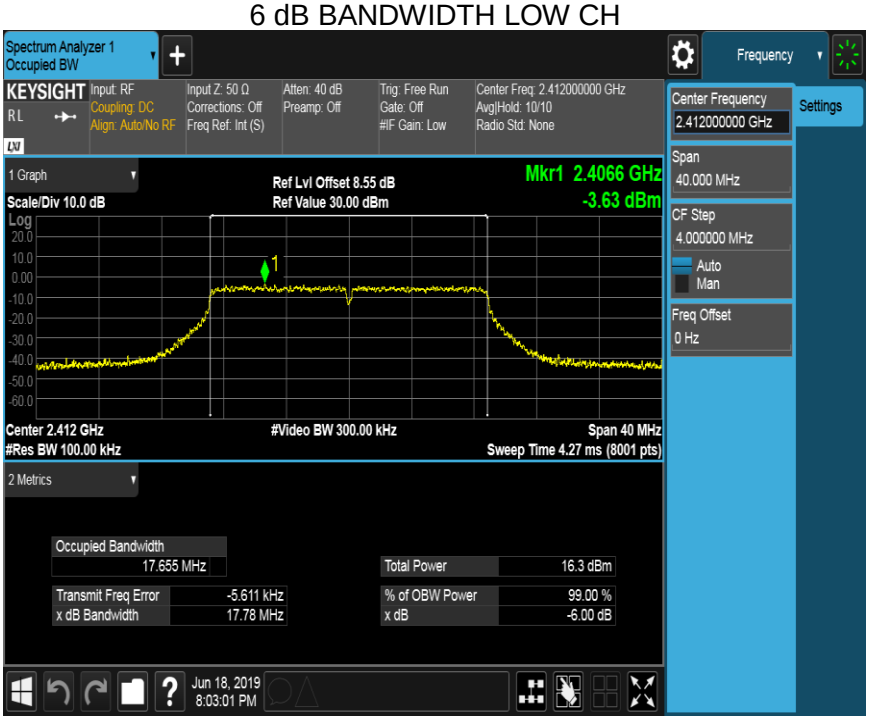



6 dB BANDWIDTH HIGH CH

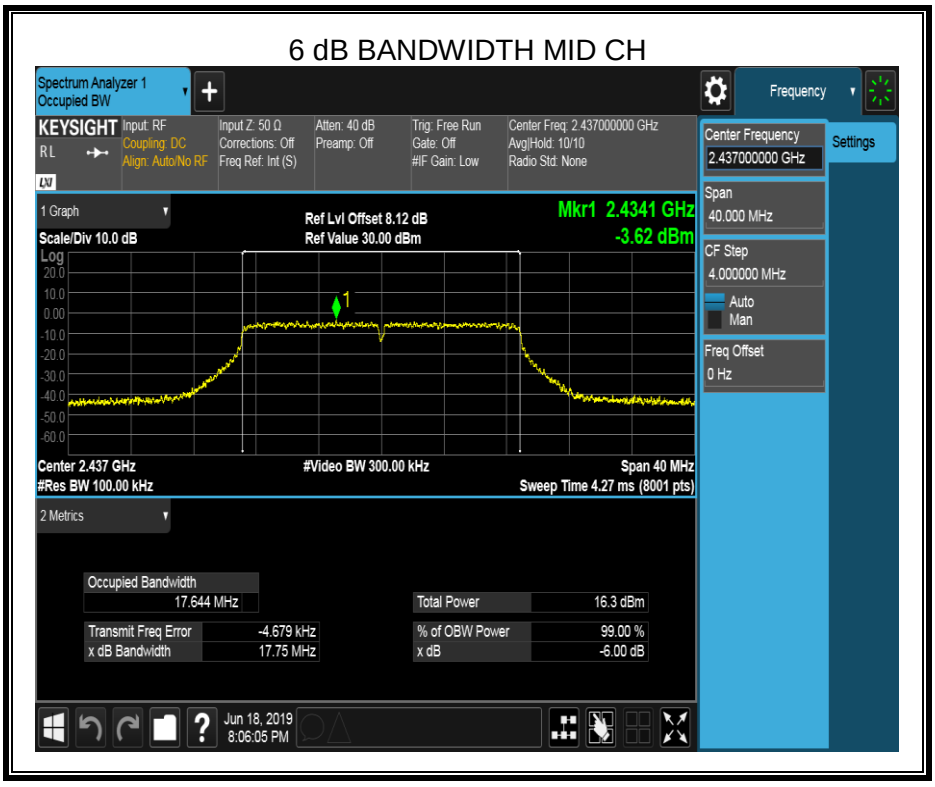
### 8.2.3. 802.11n HT20 MODE

| Channel | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|
| Low | 17.78 | ≥500 | Pass |
| Middle | 17.75 | ≥500 | Pass |
| High | 17.76 | ≥500 | Pass |

6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH

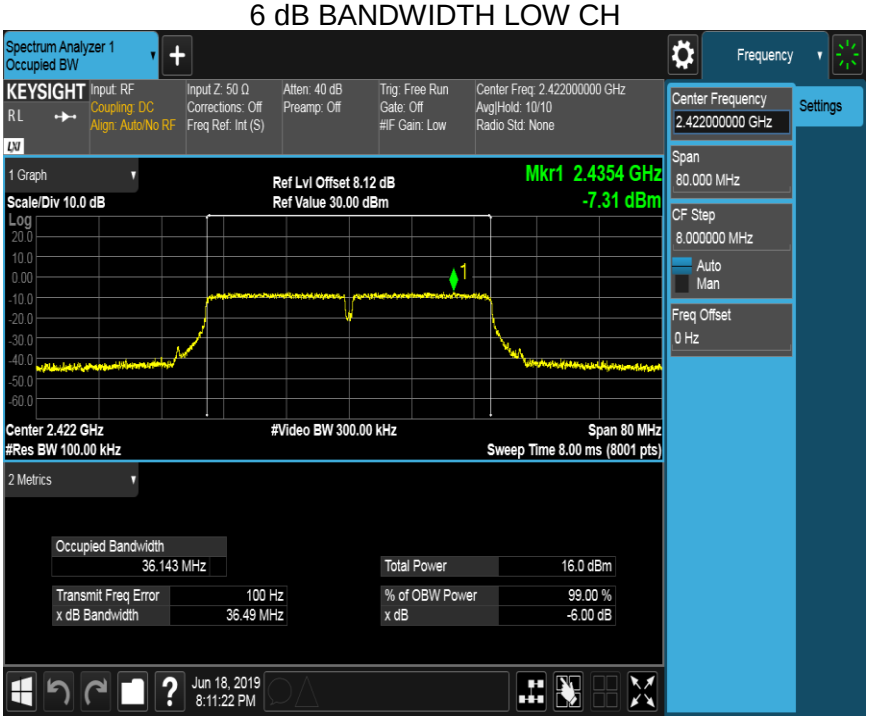



6 dB BANDWIDTH HIGH CH

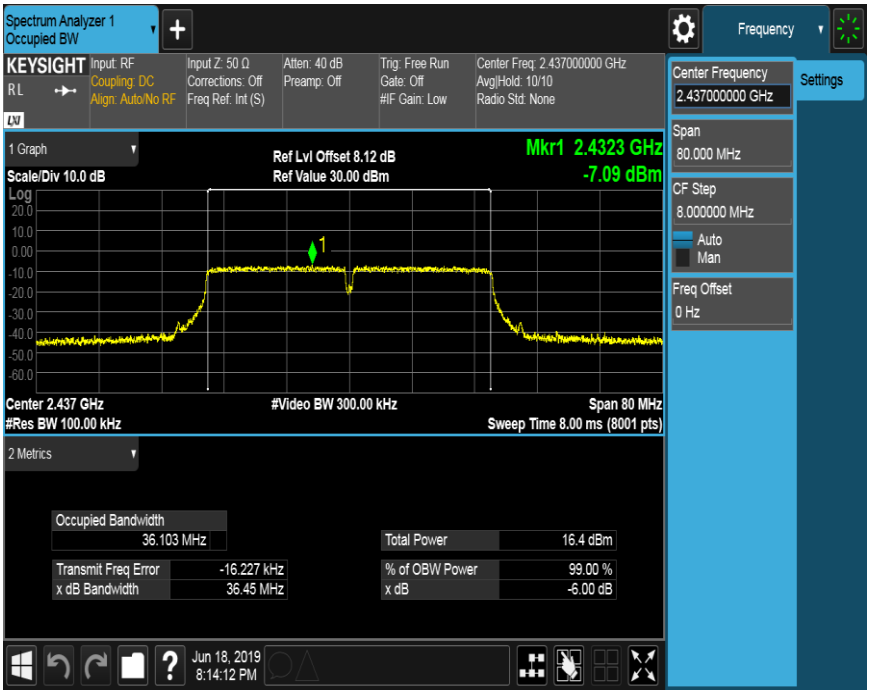
### 8.2.4. 802.11n HT40 MODE

| Channel | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|
| Low | 36.49 | ≥500 | Pass |
| Middle | 36.45 | ≥500 | Pass |
| High | 36.47 | ≥500 | Pass |

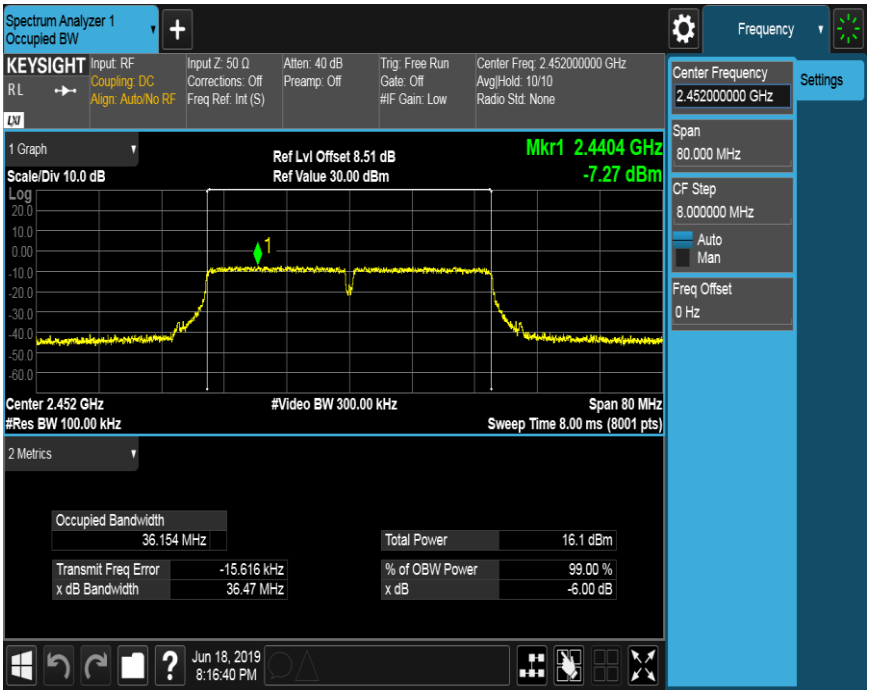
6 dB BANDWIDTH LOW CH



6 dB BANDWIDTH MID CH




6 dB BANDWIDTH HIGH CH



## 8.3. PEAK CONDUCTED OUTPUT POWER

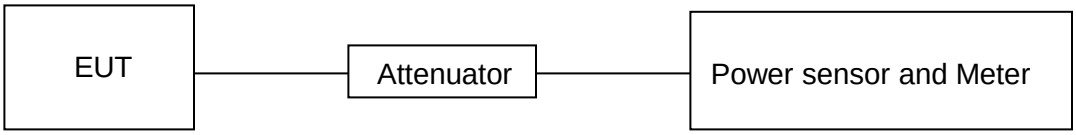
**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC 15.247(b)(3) | Peak Output Power | 1 watt or 30dBm (See note1) | 2400-2483.5 |
| Note:<br>1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. | | | |

**TEST PROCEDURE**

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure the power of each channel.
Peak Detector use for Peak result.
AVG Detector use for AVG result.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 20°C | Relative Humidity | 56% |
| Atmosphere Pressure | 101kPa | Test Voltage | DC 12V |

**RESULTS**

### 8.3.1. 802.11b MODE

| Test Channel | ANT. | Maximum Conducted Output Power(PK) (dBm) | LIMIT dBm |
|---|---|---|---|
| Low | 1 | 10.82 | 30 |
| Middle | 1 | 10.40 | 30 |
| High | 1 | 11.12 | 30 |

### 8.3.2. 802.11g MODE

| Test Channel | ANT. | Maximum Conducted Output Power(PK) (dBm) | LIMIT dBm |
|---|---|---|---|
| Low | 1 | 18.50 | 30 |
| Middle | 1 | 18.46 | 30 |
| High | 1 | 17.87 | 30 |

### 8.3.3. 802.11n HT20 MODE

| Test Channel | ANT. | Maximum Conducted Output Power(PK) (dBm) | LIMIT dBm |
|---|---|---|---|
| Low | 1 | 18.09 | 30 |
| Middle | 1 | 18.04 | 30 |
| High | 1 | 17.45 | 30 |

### 8.3.4. 802.11n HT40 MODE

| Test Channel | ANT. | Maximum Conducted Output Power(PK) (dBm) | LIMIT dBm |
|---|---|---|---|
| Low | 1 | 17.77 | 30 |
| Middle | 1 | 18.07 | 30 |
| High | 1 | 17.80 | 30 |

## 8.4. POWER SPECTRAL DENSITY

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C | | | |
|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) |
| CFR 47 FCC §15.247 (e) | Power Spectral Density | 8 dBm/3 kHz (See note1) | 2400-2483.5 |
| Note:<br>1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. | | | |

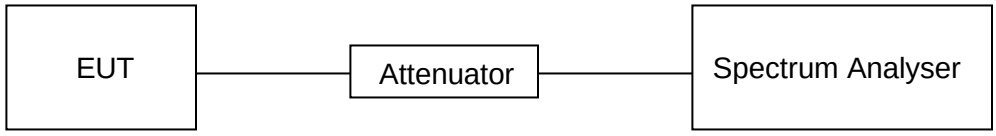
**TEST PROCEDURE**

Connect the UUT to the spectrum analyser and use the following settings:

| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | 3 kHz ≤ RBW ≤100 kHz |
| VBW | ≥3 × RBW |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple. |

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

**TEST SETUP**




**TEST ENVIRONMENT**

| | | | |
|---|---|---|---|
| Temperature | 20°C | Relative Humidity | 56% |
| Atmosphere Pressure | 101kPa | Test Voltage | DC 12V |

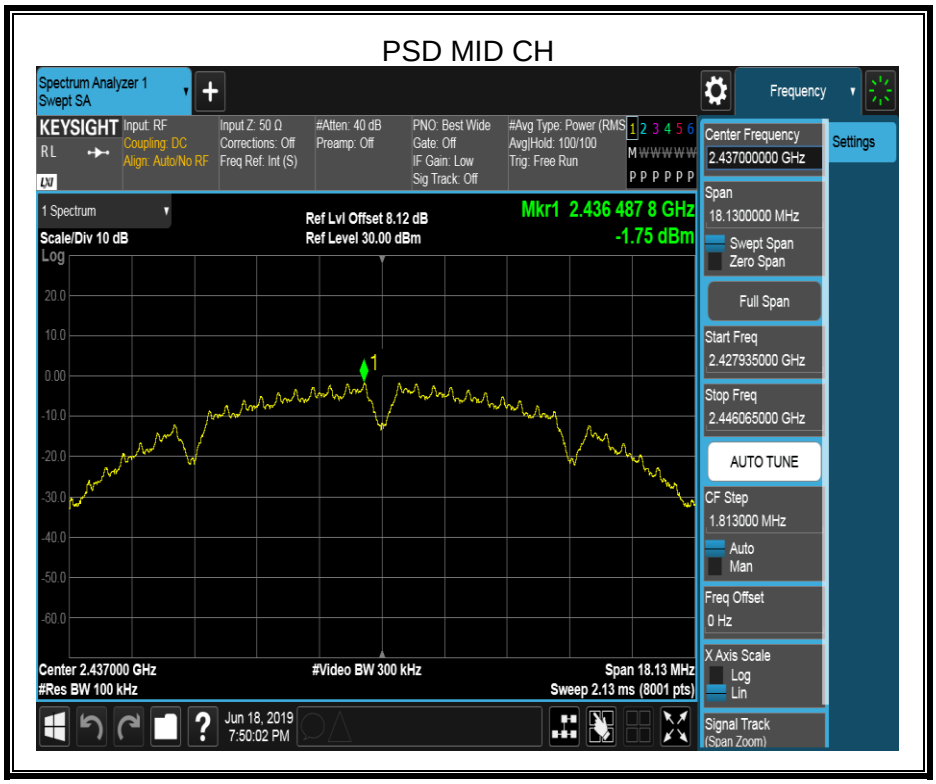
**RESULTS**

### 8.4.1. 802.11b MODE

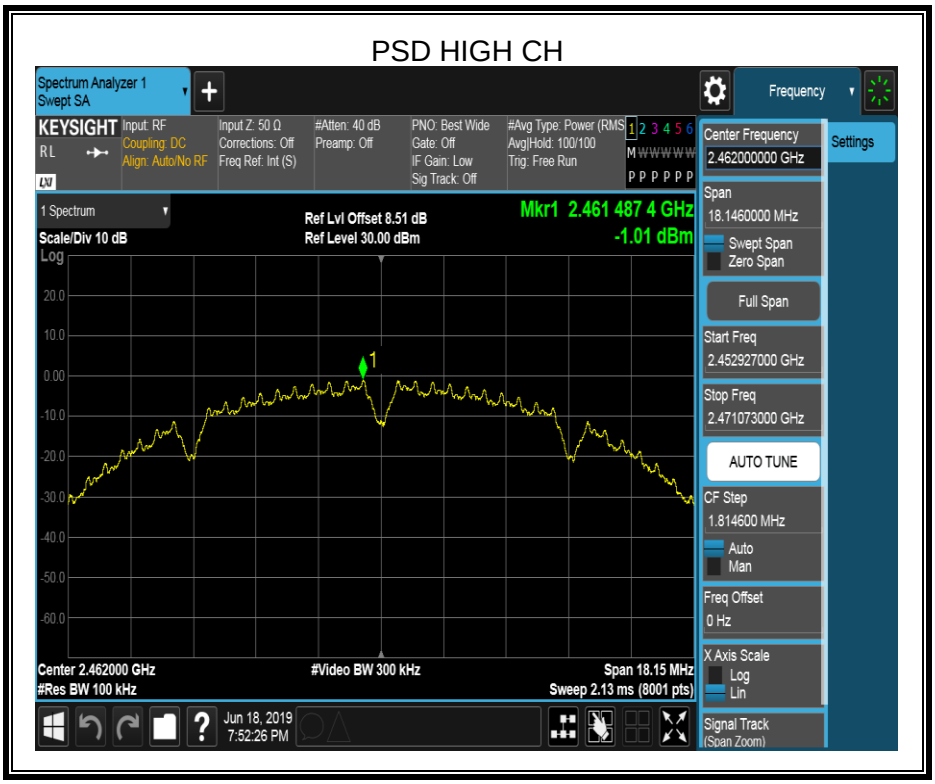
| Test Channel | Power Spectral Density (dBm/100kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|
| Low | -1.30 | 8 | PASS |
| Middle | -1.75 | 8 | PASS |
| High | -1.01 | 8 | PASS |

PSD LOW CH

PSD MID CH



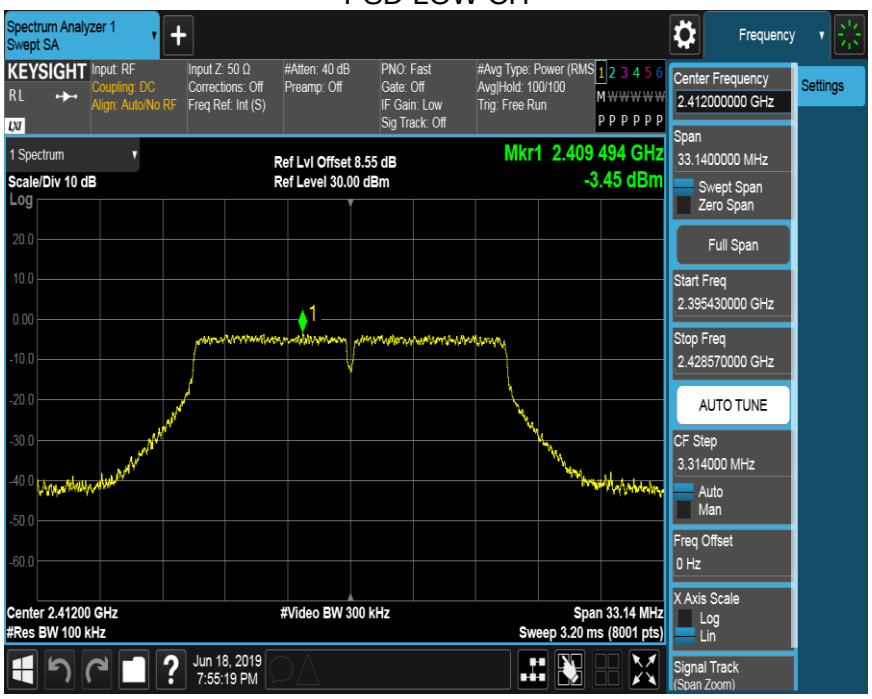

PSD HIGH CH



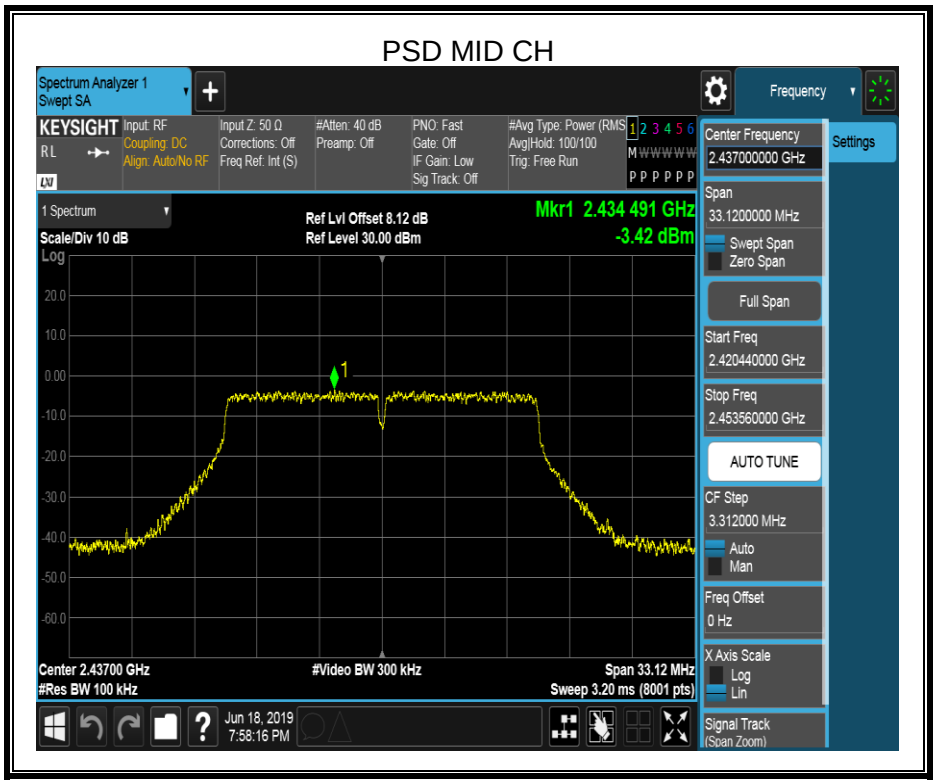
### 8.4.2. 802.11g MODE

| Test Channel | Power Spectral Density (dBm/100kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|
| Low | -3.45 | 8 | PASS |
| Middle | -3.42 | 8 | PASS |
| High | -4.21 | 8 | PASS |

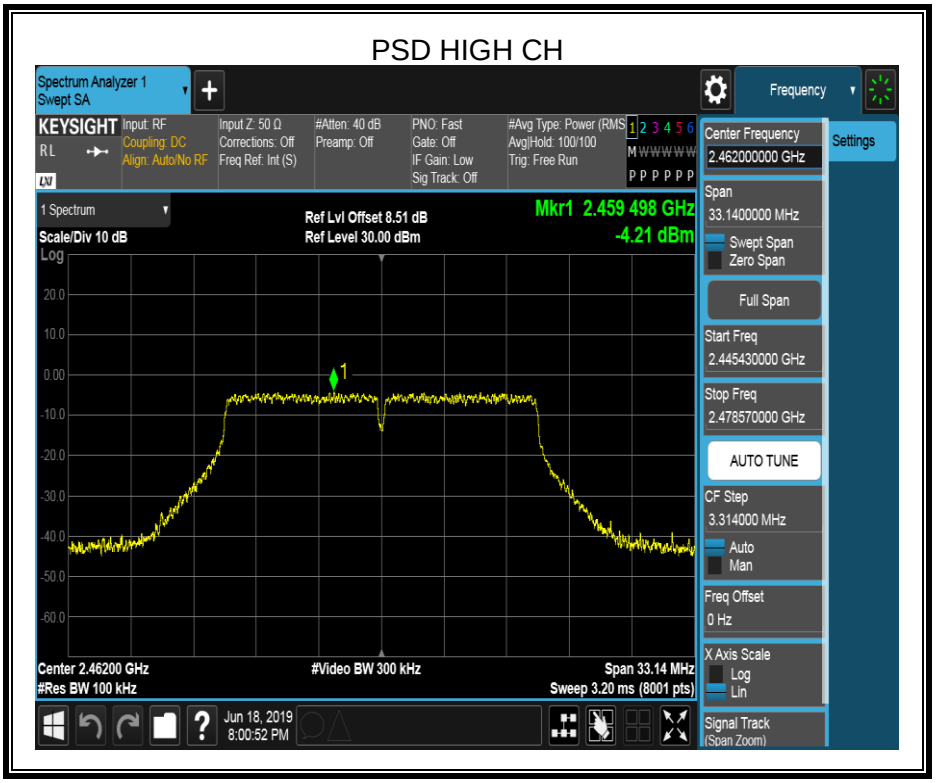
PSD LOW CH



PSD MID CH



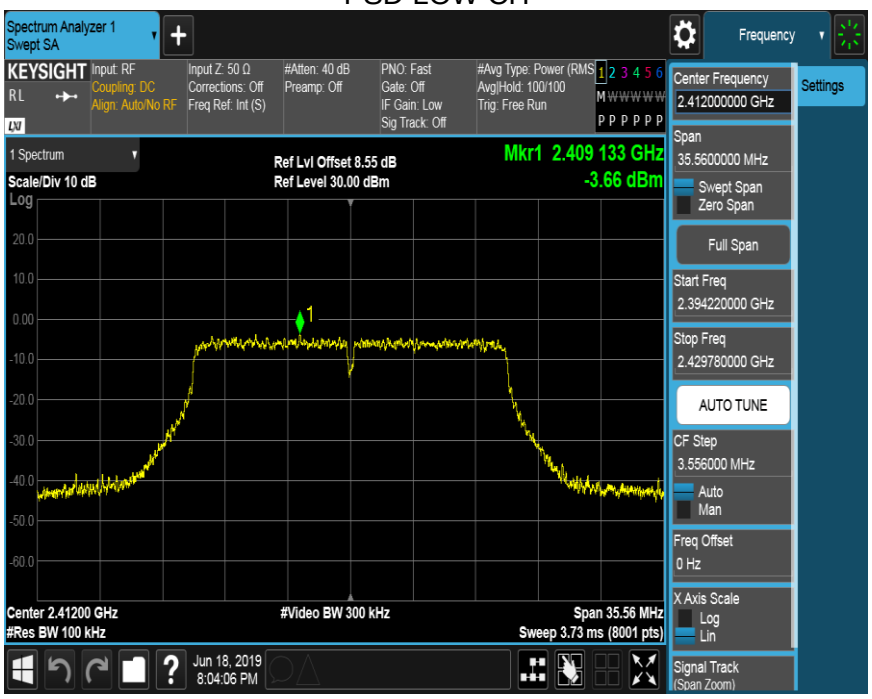

PSD HIGH CH



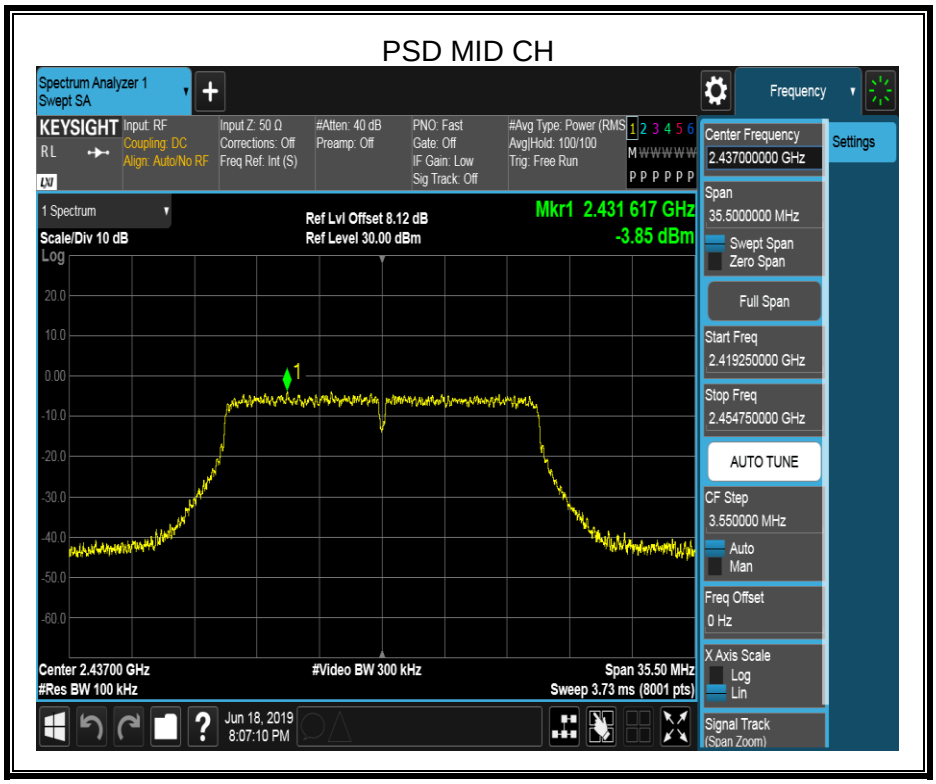
### 8.4.3. 802.11n HT20 MODE

| Test Channel | Power Spectral Density (dBm/100kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|
| Low | -3.66 | 8 | PASS |
| Middle | -3.85 | 8 | PASS |
| High | -4.39 | 8 | PASS |

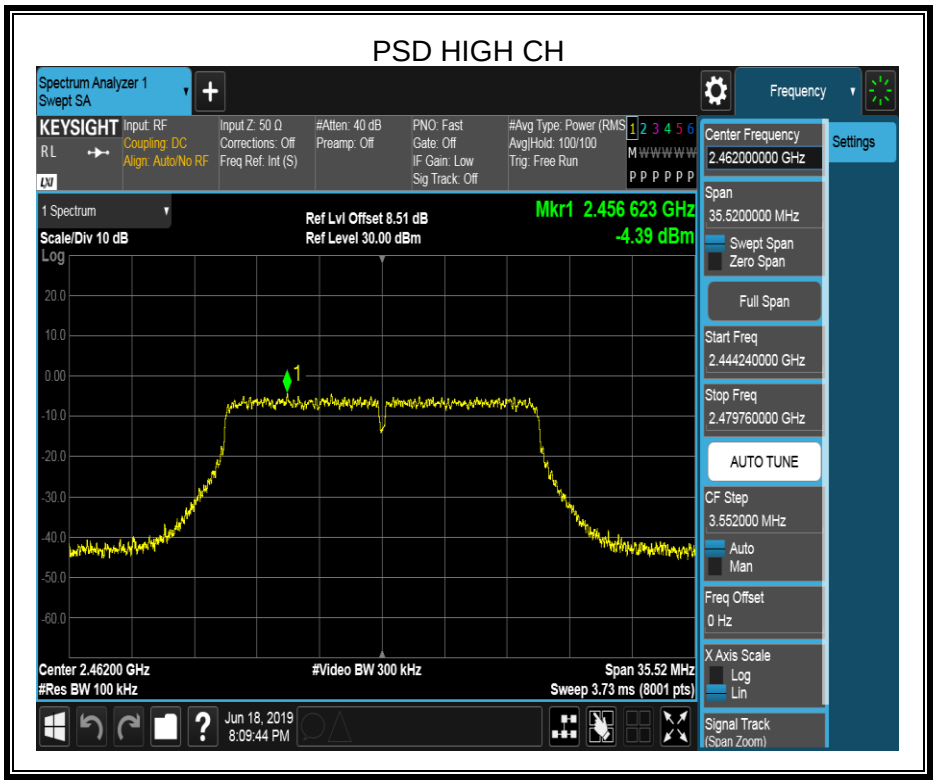
PSD LOW CH



PSD MID CH



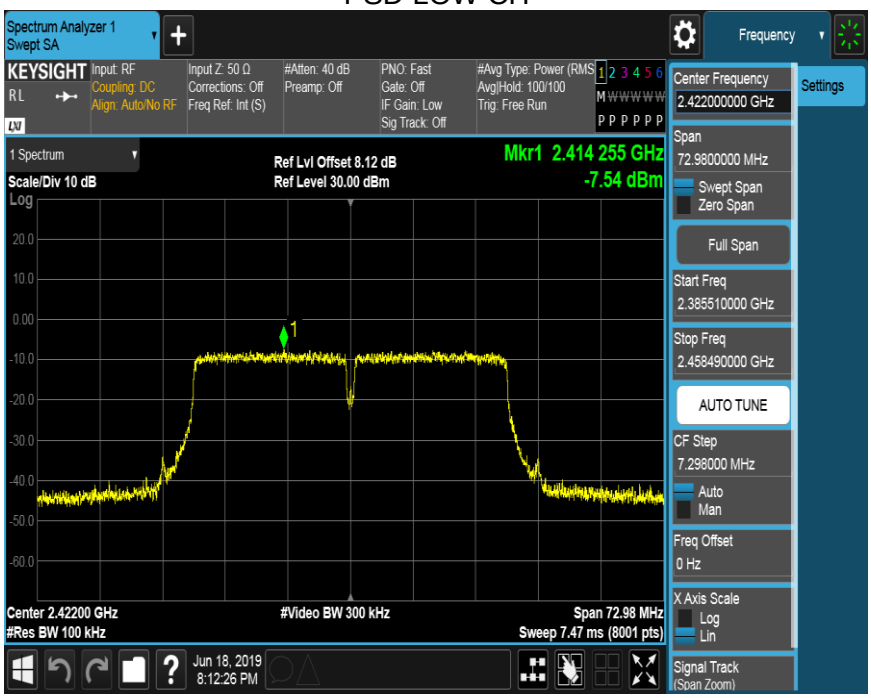

PSD HIGH CH



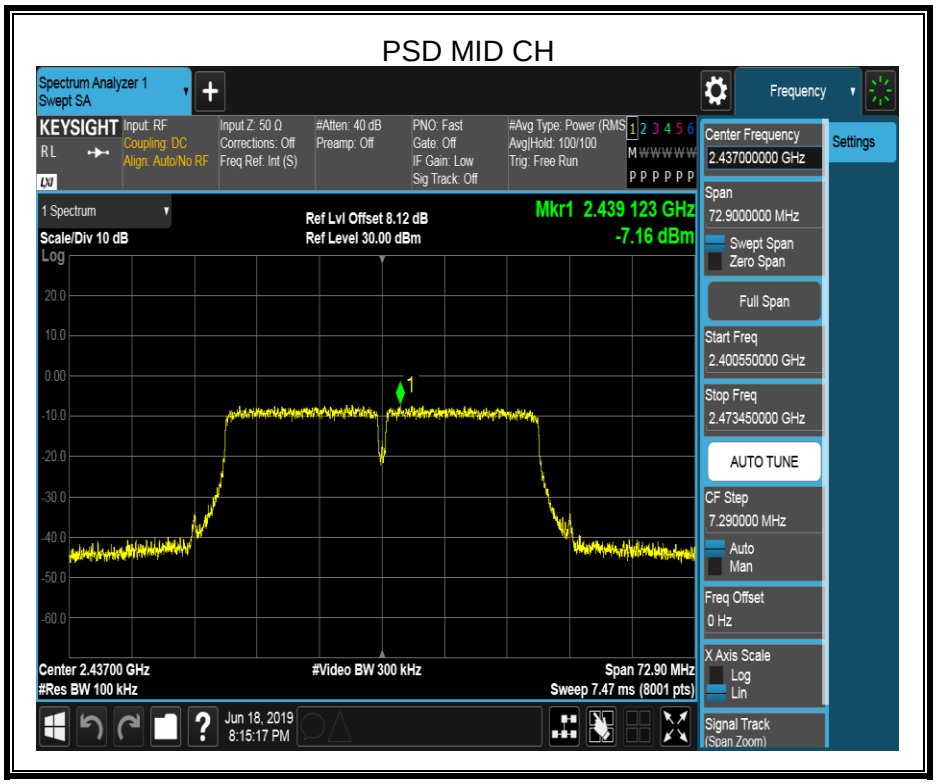
### 8.4.1. 802.11n HT40 MODE

| Test Channel | Power Spectral Density (dBm/100kHz) | Limit (dBm/3kHz) | Result |
|---|---|---|---|
| Low | -7.54 | 8 | PASS |
| Middle | -7.16 | 8 | PASS |
| High | -7.50 | 8 | PASS |

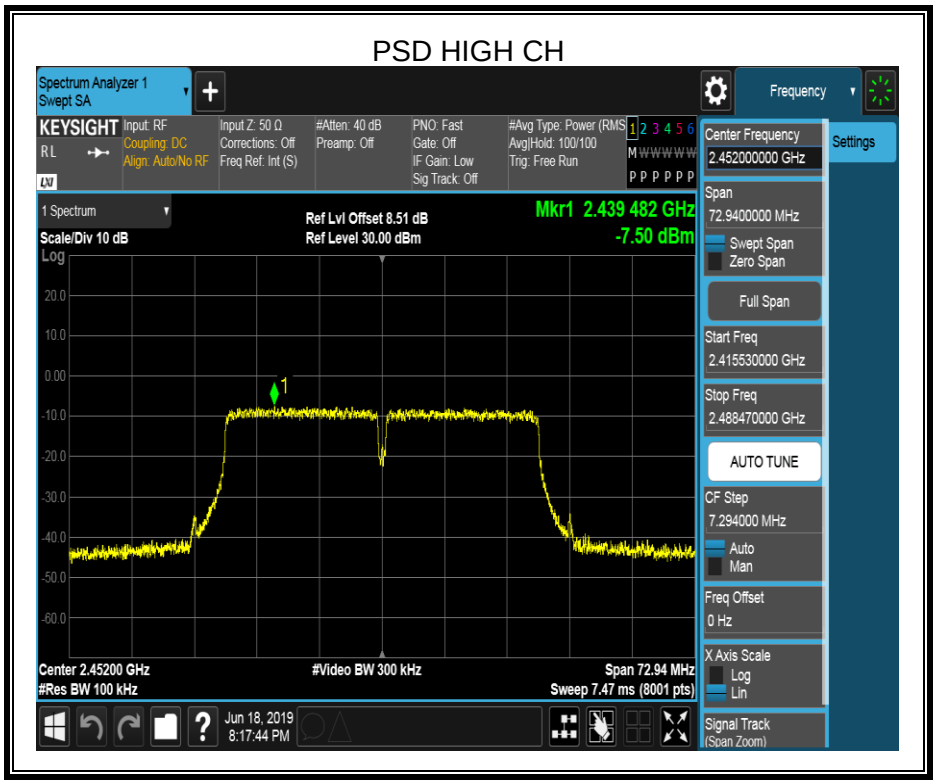
PSD LOW CH



PSD MID CH




PSD HIGH CH



## 8.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

**LIMITS**

| CFR 47 FCC Part15 (15.247) Subpart C | | |
|---|---|---|
| Section | Test Item | Limit |
| CFR 47 FCC §15.247 (d) | Conducted Bandedge and Spurious Emissions | at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power |

**TEST PROCEDURE**

Connect the UUT to the spectrum analyser and use the following settings:

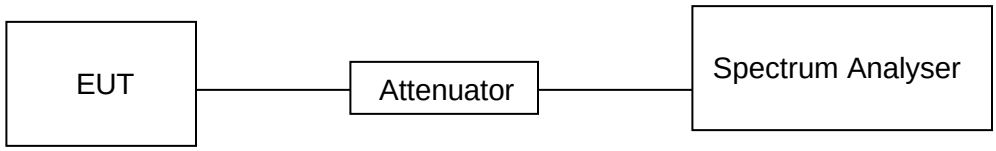
| | |
|---|---|
| Center Frequency | The centre frequency of the channel under test |
| Detector | Peak |
| RBW | 100K |
| VBW | ≥3 × RBW |
| Span | 1.5 x DTS bandwidth |
| Trace | Max hold |
| Sweep time | Auto couple. |

Use the peak marker function to determine the maximum PSD level.

| | |
|---|---|
| Span | Set the center frequency and span to encompass frequency range to be measured |
| Detector | Peak |
| RBW | 100K |
| VBW | ≥3 × RBW |
| measurement points | ≥span/RBW |
| Trace | Max hold |
| Sweep time | Auto couple. |

Use the peak marker function to determine the maximum amplitude level**.**

**TEST SETUP**




**TEST ENVIRONMENT**

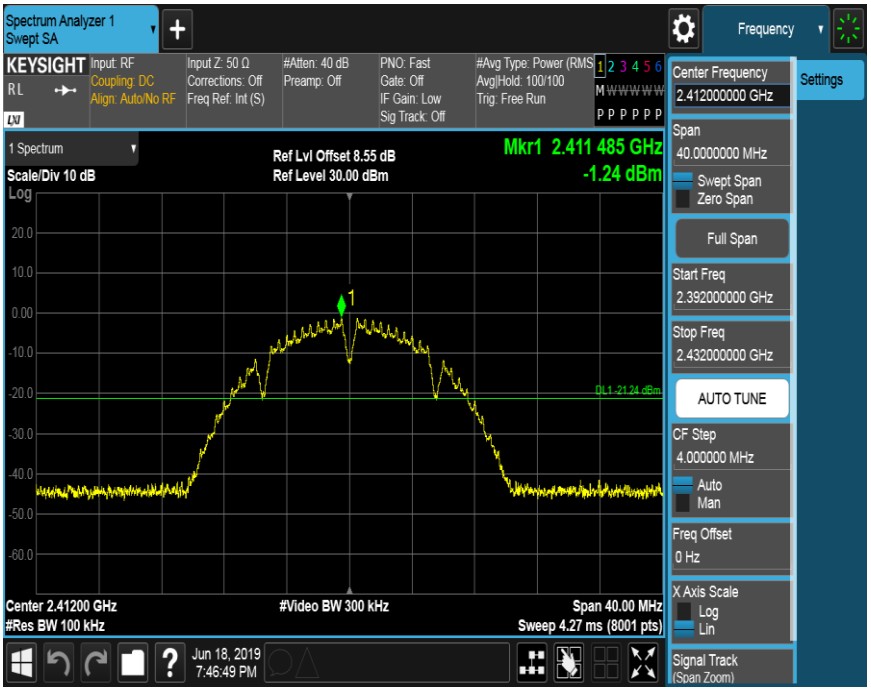
| | | | |
|---|---|---|---|
| Temperature | 20°C | Relative Humidity | 56% |
| Atmosphere Pressure | 101kPa | Test Voltage | DC 12V |

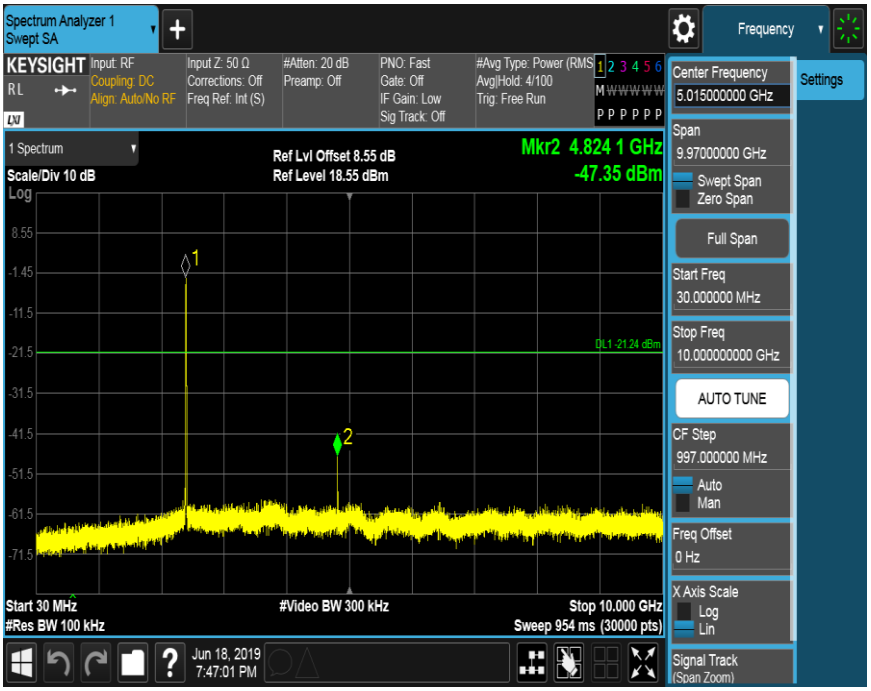
**RESULTS**

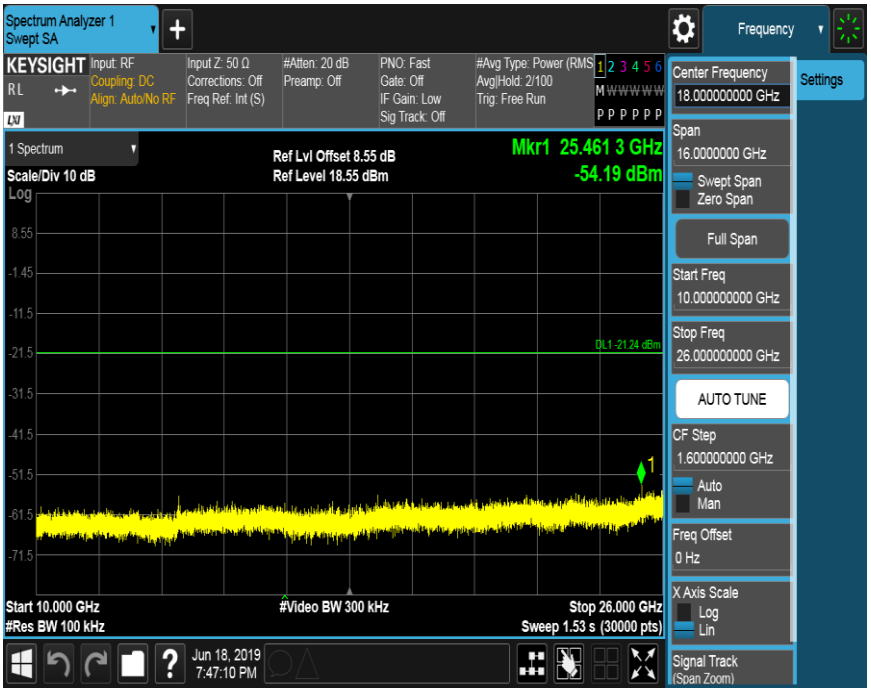
## 8.5.1. 802.11b MODE

LOW CH BANDEDGE

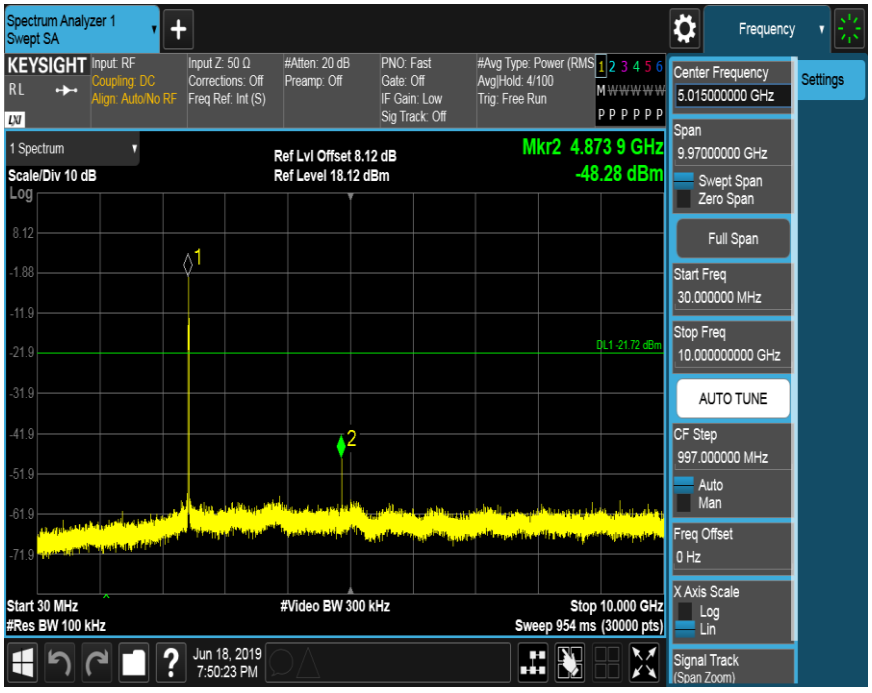

LOW CH SPURIOUS EMISSIONS

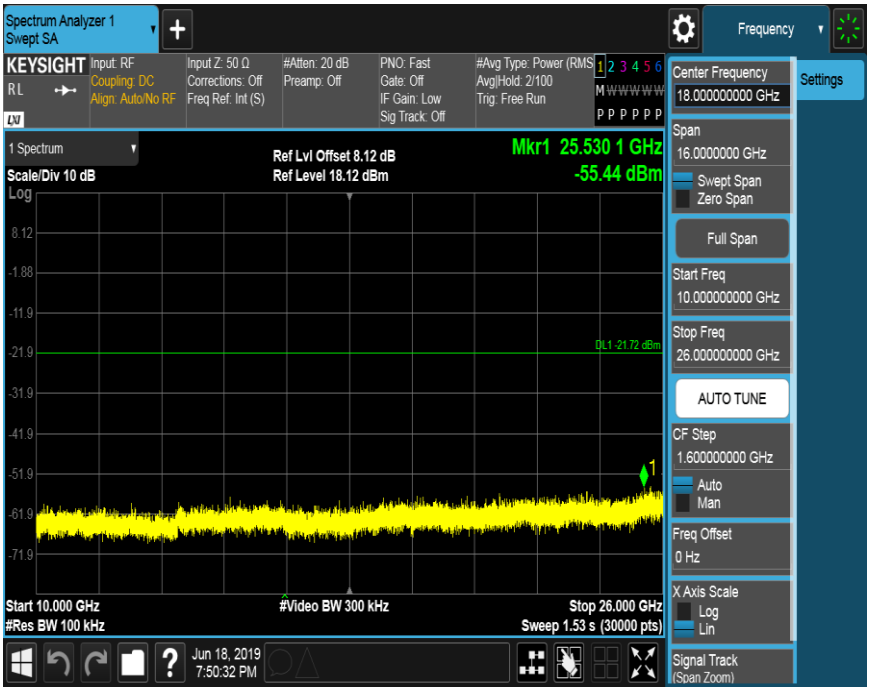




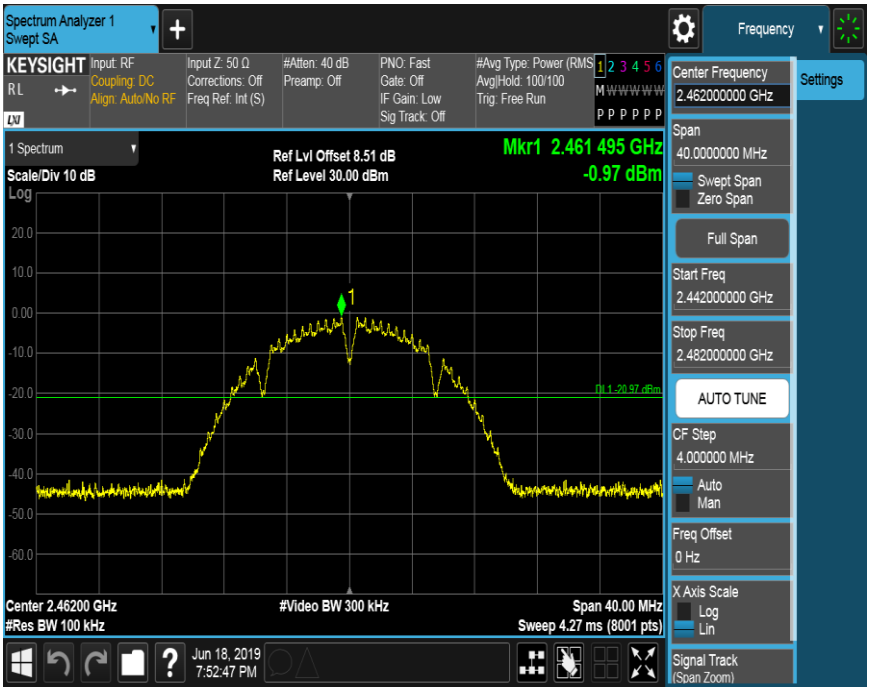
MID CH SPURIOUS EMISSIONS

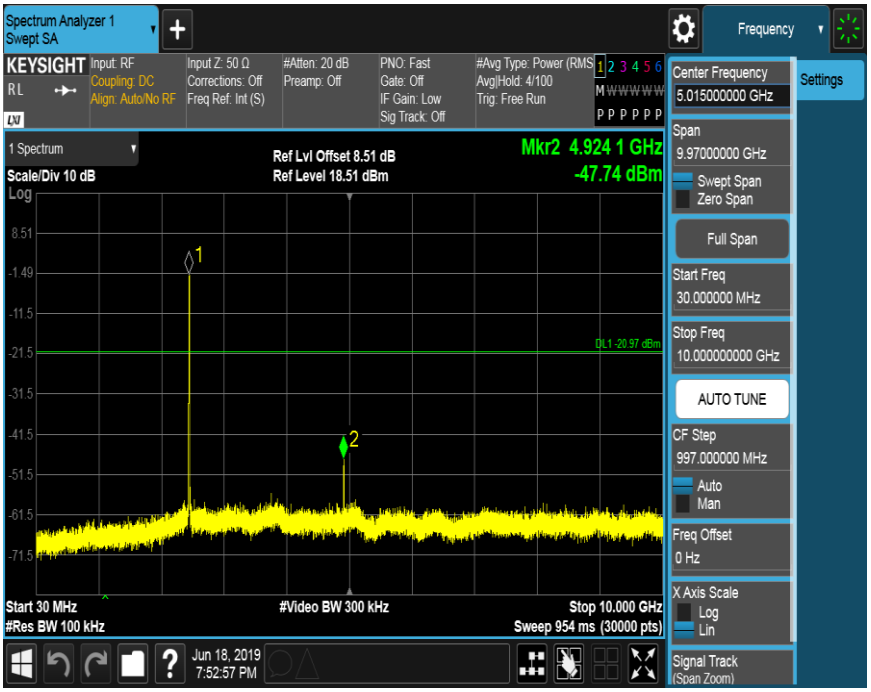



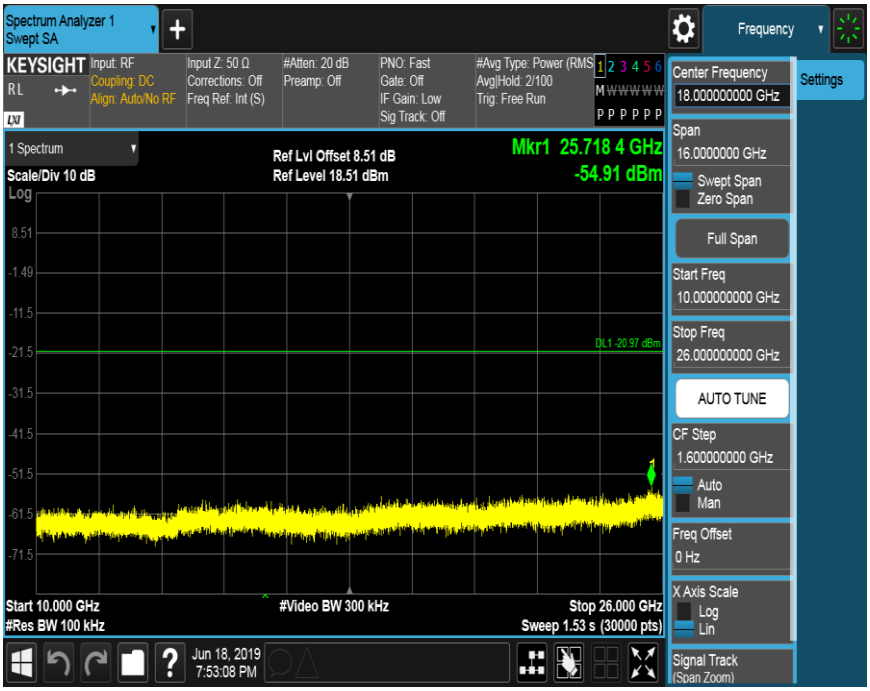



HIGH CH BANDEDGE

HIGH CH SPURIOUS EMISSIONS

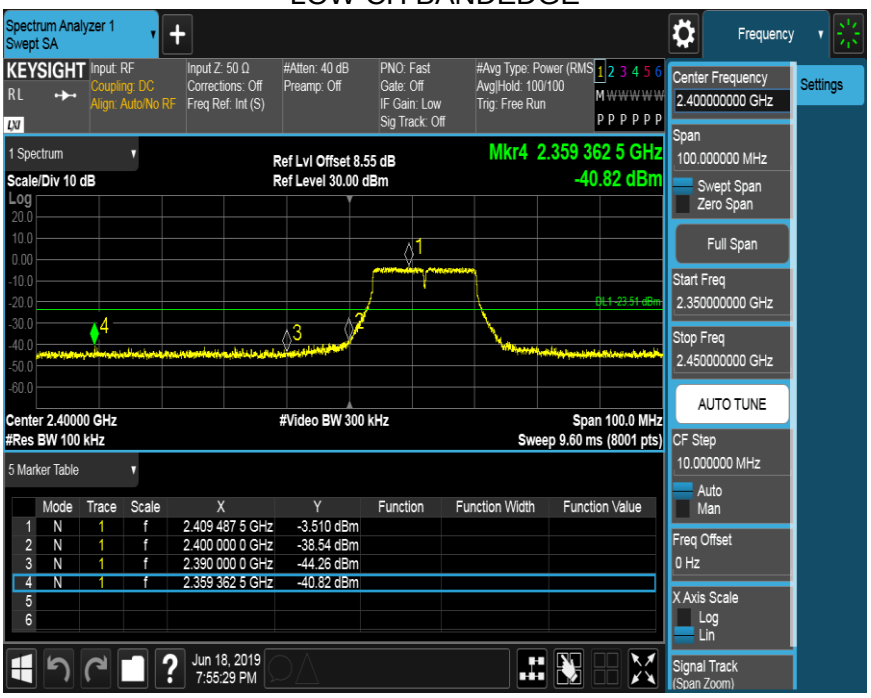


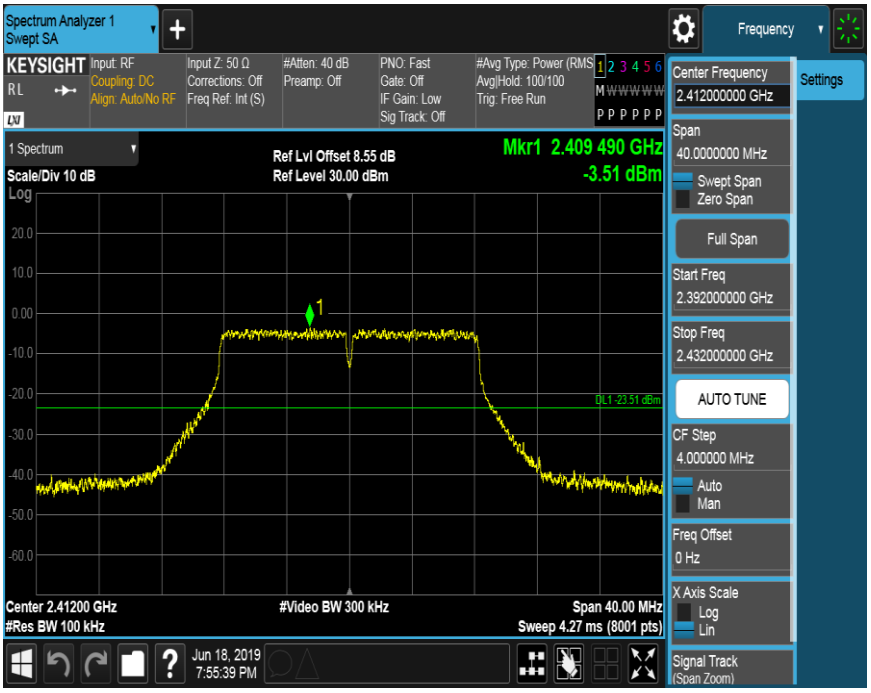


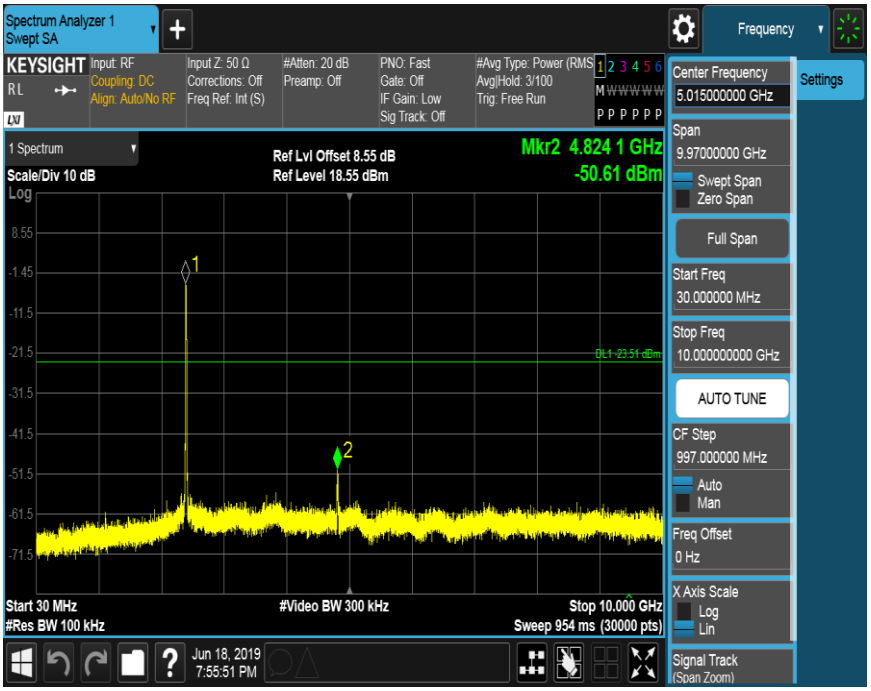
## 8.5.2. 802.11g MODE

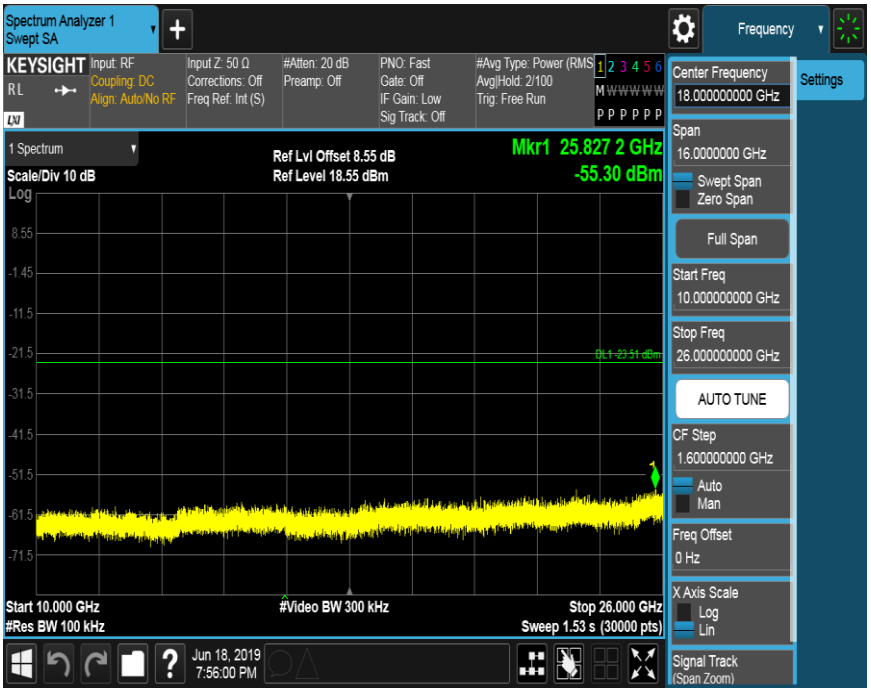
LOW CH BANDEDGE



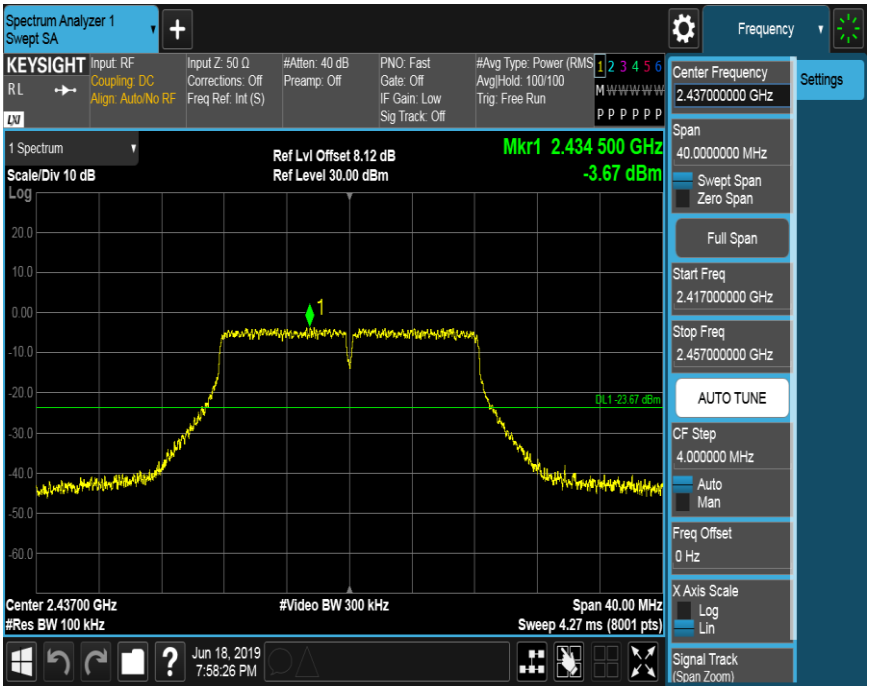

LOW CH SPURIOUS EMISSIONS

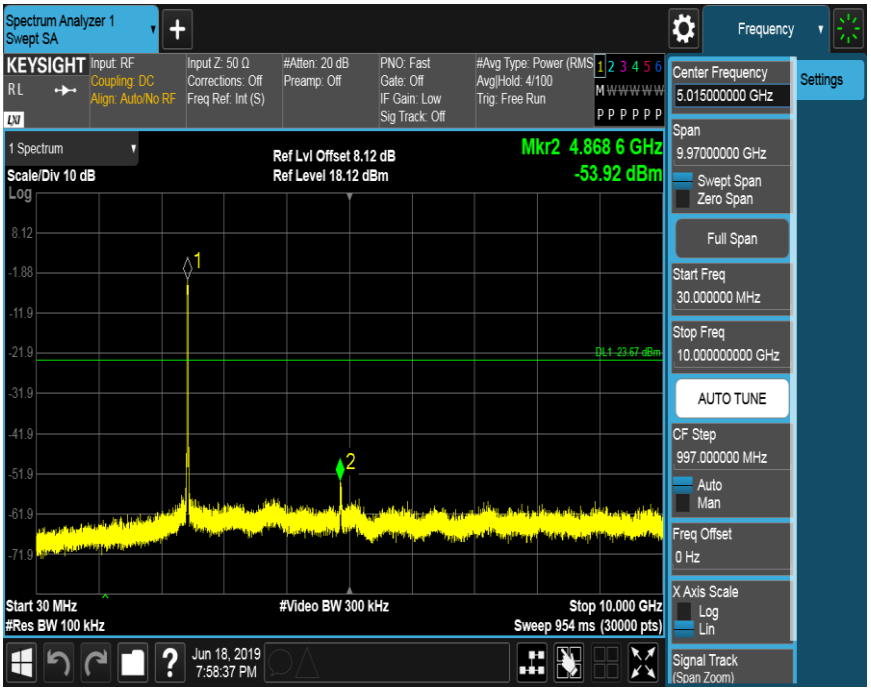


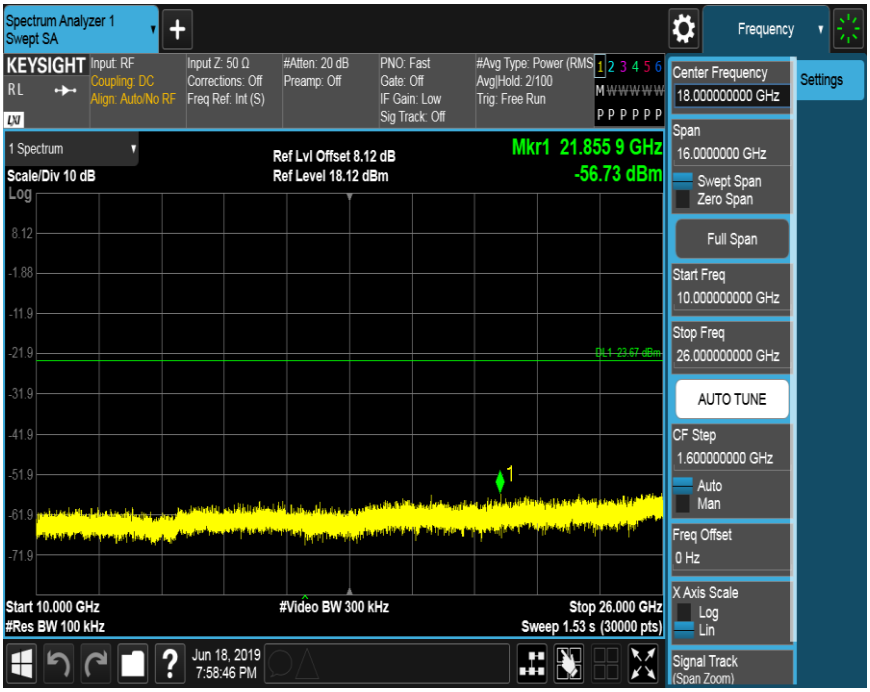


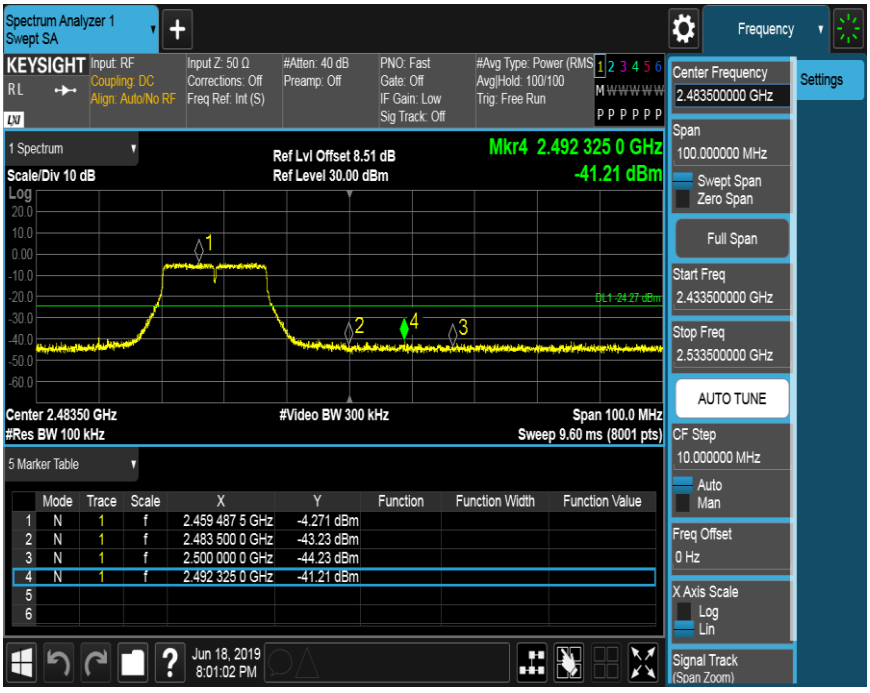
MID CH SPURIOUS EMISSIONS






HIGH CH BANDEDGE



HIGH CH SPURIOUS EMISSIONS