# TEST REPORT

| | | |
|---|---|---|
| **Reference No.** | : | WTS18S12133148-2W |
| **FCC ID** | : | XUJROXIE |
| **Applicant** | : | Launch Tech Co., Ltd. |
| **Address** | : | Launch Industrial Park, North of Wuhe Rd. Banxuegang, Longgang, Shenzhen, China |
| **Manufacturer** | : | The same as above |
| **Address** | : | The same as above |
| **Product** | : | Automotive AI Inspection Terminal |
| **Model(s)** | : | ROXIE W |
| **Brand Name** | : | LAUNCH |
| **Standards** | : | FCC CFR47 Part 15.247:2017 |
| **Date of Receipt sample** | : | 2018-12-20 |
| **Date of Test** | : | 2018-12-21 to 2019-01-06 |
| **Date of Issue** | : | 2019-01-07 |
| **Test Result** | : | **Pass** |

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.


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# 2 Laboratories Introduction

**Waltek Services (Shenzhen) Co., Ltd** is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC (The Federal Communications Commission), CEC (California energy efficiency), ISED (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek (ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.


Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. Electro Magnetic Compatibility (EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

**Test Facility:**

**A. Accreditations for Conformity Assessment (International)**

| Country/Region | Scope Covered By | Scope | Note |
|---|---|---|---|
| USA | ISO/IEC 17025 | FCC ID \ DOC \ VOC | 1 |
| Canada | | IC ID \ VOC | 2 |
| Japan | | MIC-T \ MIC-R | - |
| Europe | | EMCD \ RED | - |
| Taiwan | | NCC | - |
| Hong Kong | | OFCA | - |
| Australia | | RCM | - |
| India | | WPC | - |
| Thailand | | NTC | - |
| Singapore | | IDA | - |
| Note:<br>1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.<br>2. ISED CAB identifier: CN0013 | | | |

**B. TCBs and Notify Bodies Recognized Testing Laboratory.**

| Recognized Testing Laboratory of … | Notify body number |
|---|---|
| TUV Rheinland | Optional. |
| Intertek | |
| TUV SUD | |
| SGS | |
| Phoenix Testlab GmbH | 0700 |
| Element Materials Technology Warwick Ltd | 0891 |
| Timco Engineering, Inc. | 1177 |
| Eurofins Product Service GmbH | 0681 |

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# 4 Revision History

| Test report No. | Date of Receipt sample | Date of Test | Date of Issue | Purpose | Comment | Approved |
|---|---|---|---|---|---|---|
| WTS18S12133148-2W | 2018-12-20 | 2018-12-21 to 2019-01-06 | 2019-01-07 | original | - | Valid |
| | | | | | | |

# 5 General Information

## 5.1 General Description of E.U.T.

| | |
|---|---|
| Product: | Automotive AI Inspection Terminal |
| Model(s): | ROXIE W |
| Model Description: | N/A |
| Wi-Fi Specification: | 2.4G-802.11b/g/n HT20/n HT40 |
| Hardware Version: | B622-MB-V1.0-181112 |
| Software Version: | V60501_007 |
| Highest frequency (Exclude Radio): | 1.25GHz |
| Storage Location: | Internal Storage |
| Note: | N/A |

## 5.2 Details of E.U.T.

| | |
|---|---|
| Operation Frequency: | 802.11b/g/n HT20: 2412~2462MHz<br>802.11n HT40: 2422~2452MHz |
| Max. RF output power: | WiFi(2.4G): 20.41dBm |
| Type of Modulation: | WiFi: CCK, OFDM |
| Antenna installation: | WiFi: internal permanent antenna |
| Antenna Gain: | WiFi(2.4G): 2.92dBi |
| Ratings: | Battery DC 3.7V 6100mAh<br>Car Battery DC 12V 1.2A<br>DC 5V, 2A, charging from adapter<br>(Adapter Input: 100-240V~50/60Hz, 0.35A) |
| Adapter : | Manufacturer: Shenzhen TEKA Technology Co., Ltd.<br>Model No.: TEKA012-1201000EU<br>(sale without adapter) |

## 5.3 Channel List

**WIFI**

| Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) | Channel No. | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 1 | 2412 | 2 | 2417 | 3 | 2422 | 4 | 2427 |
| 5 | 2432 | 6 | 2437 | 7 | 2442 | 8 | 2447 |
| 9 | 2452 | 10 | 2457 | 11 | 2462 | 12 | - |

## 5.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

| Test Items | Mode | Data Rate | Channel | TX/RX |
|---|---|---|---|---|
| Maximum Peak Output Power | 802.11b | 1 Mbps | 1/6/11 | TX |
| | 802.11g | 6 Mbps | 1/6/11 | TX |
| | 802.11n HT20 | MCS0 | 1/6/11 | TX |
| | 802.11n HT40 | MCS0 | 3/6/9 | TX |
| Power Spectral Density | 802.11b | 1 Mbps | 1/6/11 | TX |
| | 802.11g | 6 Mbps | 1/6/11 | TX |
| | 802.11n HT20 | MCS0 | 1/6/11 | TX |
| | 802.11n HT40 | MCS0 | 3/6/9 | TX |
| 6dB Bandwidth | 802.11b | 1 Mbps | 1/6/11 | TX |
| | 802.11g | 6 Mbps | 1/6/11 | TX |
| | 802.11n HT20 | MCS0 | 1/6/11 | TX |
| | 802.11n HT40 | MCS0 | 3/6/9 | TX |
| Band Edge | 802.11b | 1 Mbps | 1/6/11 | TX |
| | 802.11g | 6 Mbps | 1/6/11 | TX |
| | 802.11n HT20 | MCS0 | 1/6/11 | TX |
| | 802.11n HT40 | MCS0 | 3/6/9 | TX |
| Transmitter Spurious Emissions | 802.11b | 1 Mbps | 1/6/11 | TX |
| | 802.11g | 6 Mbps | 1/6/11 | TX |
| | 802.11n HT20 | MCS0 | 1/6/11 | TX |
| | 802.11n HT40 | MCS0 | 3/6/9 | TX |

**Note** :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .

# 6 Test Summary

| Test Items | Test Requirement | Result |
|---|---|---|
| Radiated Spurious Emissions | 15.247(d)<br>15.205(a)<br>15.209(a) | PASS |
| Conducted Spurious Emissions | 15.247(d) | PASS |
| Conducted Emissions | 15.207(a) | PASS |
| 6dB Bandwidth | 15.247(a)(2) | PASS |
| Maximum Peak Output Power | 15.247(b)(3),(4) | PASS |
| Power Spectral Density | 15.247(e) | PASS |
| Band Edge | 15.247(d) | PASS |
| Antenna Requirement | 15.203 | PASS |
| Maximum Permissible Exposure<br>(Exposure of Humans to RF Fields) | 1.1307(b)(1) | PASS |

# 7 Equipment Used during Test

## 7.1 Equipments List

| Conducted Emissions Test Site 1# | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1. | EMI Test Receiver | R&S | ESCI | 100947 | 2018-09-12 | 2019-09-11 |
| 2. | LISN | R&S | ENV216 | 101215 | 2018-09-12 | 2019-09-11 |
| 3. | Cable | Top | TYPE16(3.5M) | - | 2018-09-12 | 2019-09-11 |
| **Conducted Emissions Test Site 2#** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1. | EMI Test Receiver | R&S | ESCI | 101155 | 2018-09-12 | 2019-09-11 |
| 2. | LISN | SCHWARZBECK | NSLK 8128 | 8128-289 | 2018-09-12 | 2019-09-11 |
| 3. | Limiter | York | MTS-IMP-136 | 261115-001-0024 | 2018-09-12 | 2019-09-11 |
| 4. | Cable | LARGE | RF300 | - | 2018-09-12 | 2019-09-11 |
| **3m Semi-anechoic Chamber for Radiation Emissions Test site 1#** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | Spectrum Analyzer | R&S | FSP | 100091 | 2018-04-29 | 2019-04-28 |
| 2 | Active Loop Antenna | Beijing Dazhi | ZN30900A | - | 2018-04-09 | 2019-04-08 |
| 3 | Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 336 | 2018-04-09 | 2019-04-08 |
| 4 | Coaxial Cable (below 1GHz) | Top | TYPE16(13M) | - | 2018-09-12 | 2019-09-11 |
| 5 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120 D | 667 | 2018-04-09 | 2019-04-08 |
| 6 | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9170 | 335 | 2018-04-09 | 2019-04-08 |
| 7 | Broadband Preamplifier | COMPLIANCE DIRECTION | PAP-1G18 | 2004 | 2018-04-13 | 2019-04-12 |
| 8 | Coaxial Cable (above 1GHz) | Top | 1GHz-25GHz | EW02014-7 | 2018-04-13 | 2019-04-12 |
| **3m Semi-anechoic Chamber for Radiation Emissions Test site 2#** | | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No** | **Last Calibration Date** | **Calibration Due Date** |
| 1 | Test Receiver | R&S | ESCI | 101296 | 2018-04-13 | 2019-04-12 |
| 2 | Trilog Broadband Antenna | SCHWARZBECK | VULB9160 | 9160-3325 | 2018-04-09 | 2019-04-08 |
| 3 | Amplifier | Compliance pirection systems inc | PAP-0203 | 22024 | 2018-04-13 | 2019-04-12 |
| 4 | Cable | HUBER+SUHNER | CBL2 | 525178 | 2018-04-13 | 2019-04-12 |

| RF Conducted Testing | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Calibration Date** | **Calibration Due Date** |
| 1. | EMC Analyzer (9k~26.5GHz) | Agilent | E7405A | MY45114943 | 2018-09-12 | 2019-09-11 |
| 2. | Spectrum Analyzer (9k-6GHz) | R&S | FSL6 | 100959 | 2018-09-12 | 2019-09-11 |
| 3. | Signal Analyzer (9k~26.5GHz) | Agilent | N9010A | MY50520207 | 2018-09-12 | 2019-09-11 |

## 7.2 Description of Support Units

| Equipment | Manufacturer | Model No. | Series No. |
|---|---|---|---|
| / | / | / | / |

## 7.3 Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Conducted Emission | ± 3.64 dB(AC mains 150KHz~30MHz) |
| Radiated Spurious Emissions | ± 5.08 dB (Bilog antenna 30M~1000MHz) |
| | ± 5.47 dB (Horn antenna 1000M~25000MHz) |
| Radio Frequency | ± 1 x $10^{-7}$Hz |
| RF Power | ± 0.42 dB |
| RF Power Density | ± 0.7dB |
| Conducted Spurious Emissions | ± 2.76 dB (9kHz~26500MHz) |
| Confidence interval：95%. Confidence factor:k=2 | |

## 7.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

# 8 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit:

| Frequency (MHz) | Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 to 0.5 | 66 to 56* | 56 to 46* |
| 0.5 t 5 | 5 | 46 |
| 5 o 30 | 60 | 50 |

## 8.1 E.U.T. Operation

Operating Environment **:**

Temperature: 21.5 °C

Humidity: 51.9 % RH

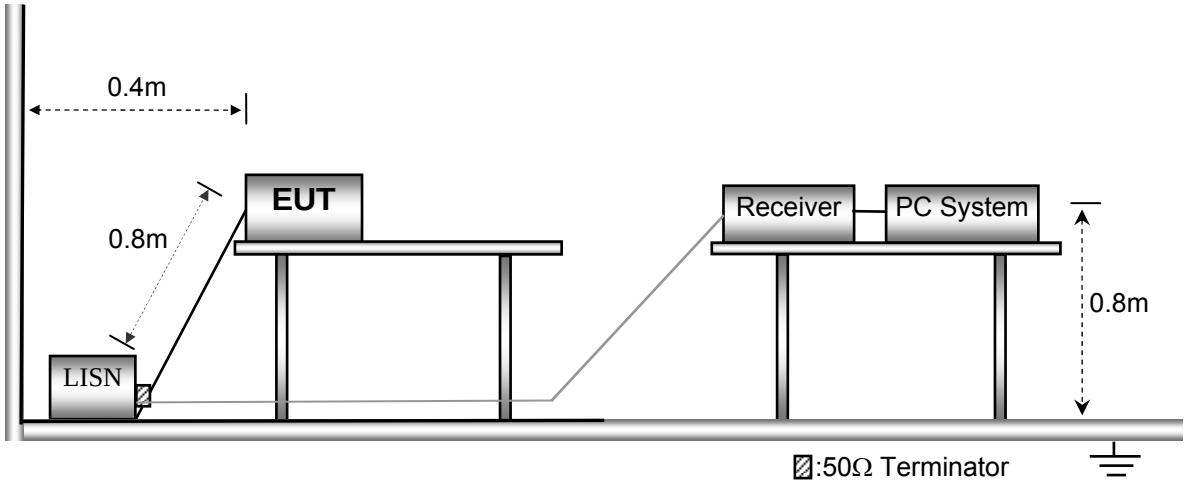
Atmospheric Pressure: 101.2kPa

EUT Operation **:**

The test was performed in TX transmitting mode, the worst data were shown in the report.

## 8.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10.




## 8.3 Measurement Description

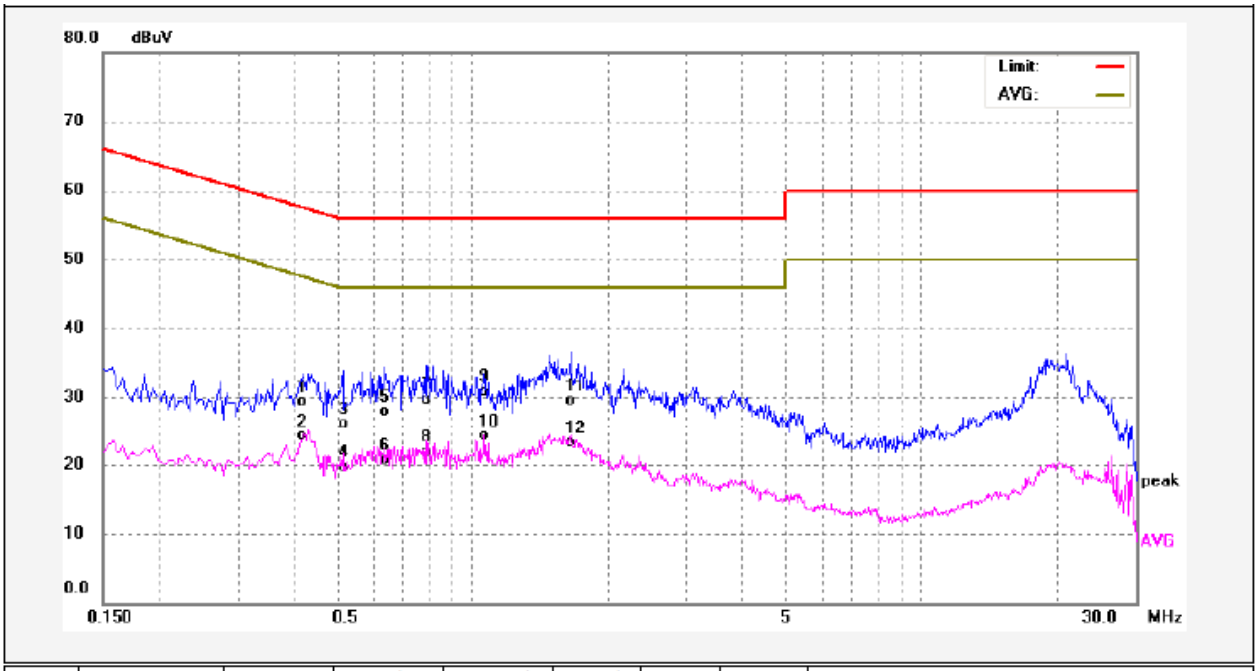
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 8.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

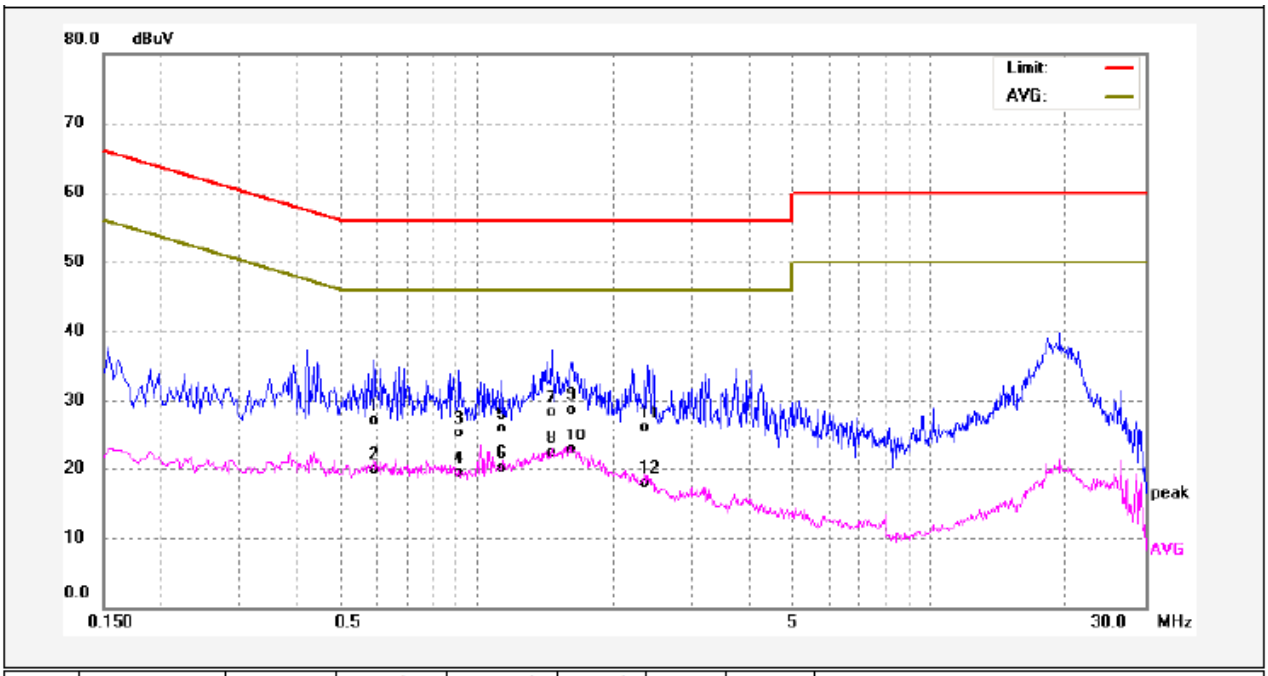
Worst Mode: WIFI mode ( 802.11b mode low channel )

Live line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.4180 | 19.00 | 10.27 | 29.27 | 57.49 | -28.22 | QP | |
| 2 | 0.4180 | 13.97 | 10.27 | 24.24 | 47.49 | -23.25 | AVG | |
| 3 | 0.5140 | 15.88 | 10.26 | 26.14 | 56.00 | -29.86 | QP | |
| 4 | 0.5140 | 9.49 | 10.26 | 19.75 | 46.00 | -26.25 | AVG | |
| 5 | 0.6380 | 17.51 | 10.32 | 27.83 | 56.00 | -28.17 | QP | |
| 6 | 0.6380 | 10.31 | 10.32 | 20.63 | 46.00 | -25.37 | AVG | |
| 7 | 0.7860 | 19.25 | 10.36 | 29.61 | 56.00 | -26.39 | QP | |
| 8 | 0.7860 | 11.59 | 10.36 | 21.95 | 46.00 | -24.05 | AVG | |
| 9 | 1.0620 | 20.54 | 10.40 | 30.94 | 56.00 | -25.06 | QP | |
| 10 | 1.0620 | 13.95 | 10.40 | 24.35 | 46.00 | -21.65 | AVG | |
| 11 | 1.6460 | 19.11 | 10.44 | 29.55 | 56.00 | -26.45 | QP | |
| 12 | 1.6460 | 12.79 | 10.44 | 23.23 | 46.00 | -22.77 | AVG | |

Neutral line:




| No. | Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit dBuV | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.5940 | 16.81 | 10.30 | 27.11 | 56.00 | -28.89 | QP | |
| 2 | 0.5940 | 9.69 | 10.30 | 19.99 | 46.00 | -26.01 | AVG | |
| 3 | 0.9180 | 15.01 | 10.38 | 25.39 | 56.00 | -30.61 | QP | |
| 4 | 0.9180 | 8.87 | 10.38 | 19.25 | 46.00 | -26.75 | AVG | |
| 5 | 1.1380 | 15.49 | 10.40 | 25.89 | 56.00 | -30.11 | QP | |
| 6 | 1.1380 | 9.67 | 10.40 | 20.07 | 46.00 | -25.93 | AVG | |
| 7 | 1.4660 | 17.78 | 10.43 | 28.21 | 56.00 | -27.79 | QP | |
| 8 | 1.4660 | 11.89 | 10.43 | 22.32 | 46.00 | -23.68 | AVG | |
| 9 | 1.6140 | 18.34 | 10.44 | 28.78 | 56.00 | -27.22 | QP | |
| 10 | 1.6140 | 12.26 | 10.44 | 22.70 | 46.00 | -23.30 | AVG | |
| 11 | 2.3940 | 15.67 | 10.48 | 26.15 | 56.00 | -29.85 | QP | |
| 12 | 2.3940 | 7.33 | 10.48 | 17.81 | 46.00 | -28.19 | AVG | |

# 9 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

| Frequency (MHz) | Field Strength | | Field Strength Limit at 3m Measurement Dist | |
|---|---|---|---|---|
| | uV/m | Distance (m) | uV/m | dBuV/m |
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 | 10000 * 2400/F(kHz) | $20\log^{(2400/F(kHz))} + 80$ |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 | 100 * 24000/F(kHz) | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30 | 30 | 30 | 100 * 30 | $20\log^{(30)} + 40$ |
| 30 ~ 88 | 100 | 3 | 100 | $20\log^{(100)}$ |
| 88 ~ 216 | 150 | 3 | 150 | $20\log^{(150)}$ |
| 216 ~ 960 | 200 | 3 | 200 | $20\log^{(200)}$ |
| Above 960 | 500 | 3 | 500 | $20\log^{(500)}$ |

## 9.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

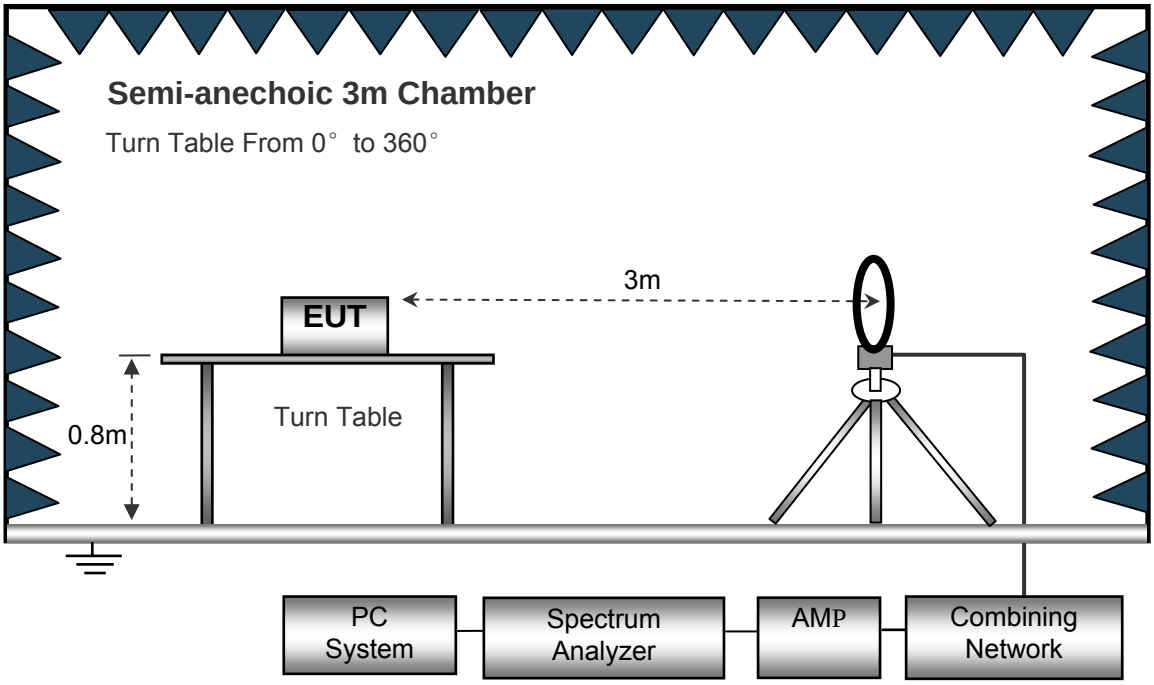
EUT Operation **:**

The test was performed in TX transmitting mode, the test data were shown in the report.

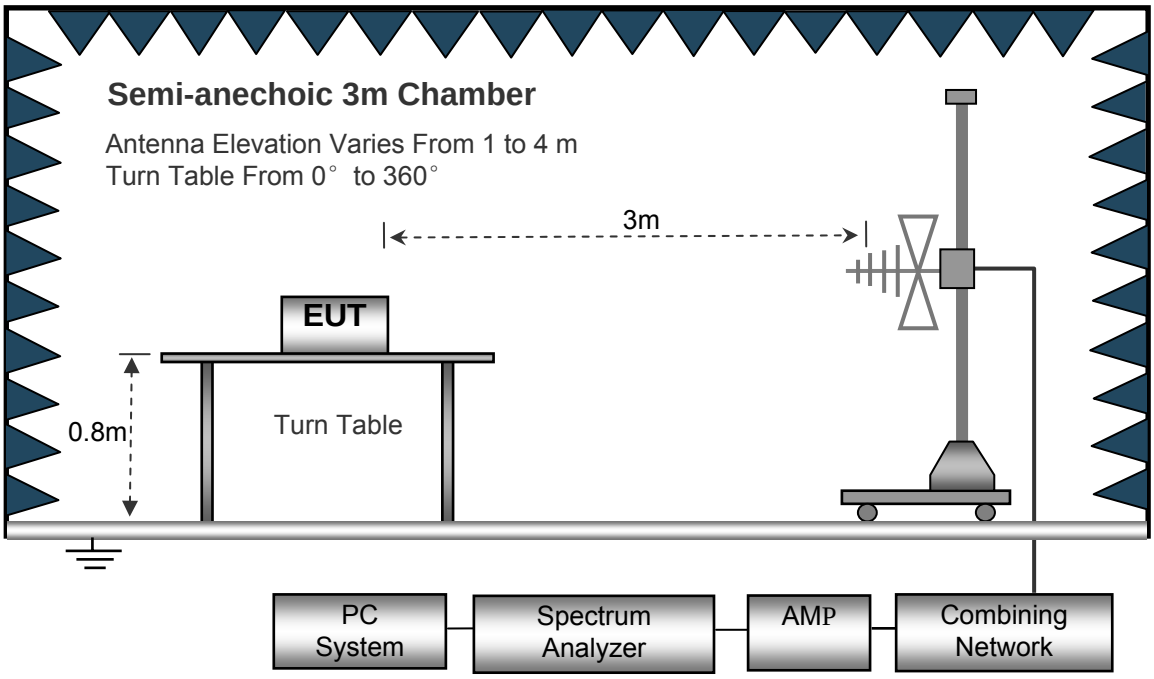
## 9.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

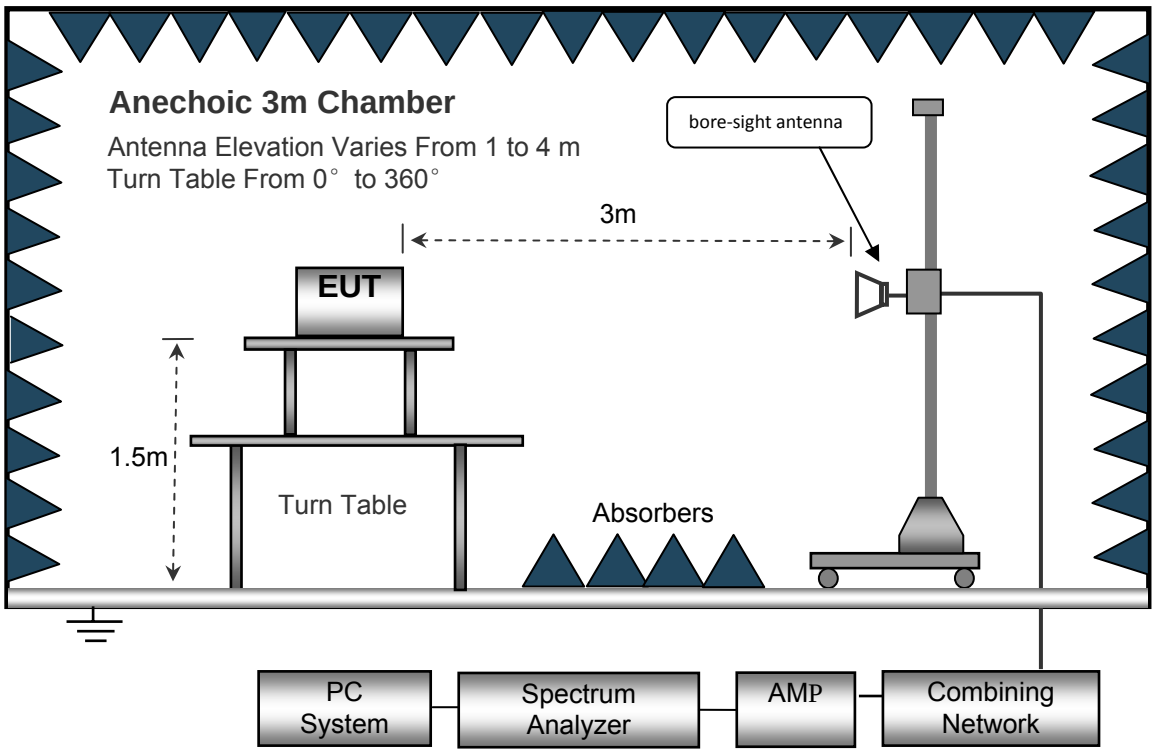
The test setup for emission measurement below 30MHz.




The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.




## 9.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

## 9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

## 9.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

## 9.6 Summary of Test Results

**Wifi:**

**Test Frequency: 9KHz~30MHz**

Remark: only the worst data (802.11b/g/n Low channel mode) were recorded.

| Frequency | Measurement results dBμV @3m | Detector PK/QP | Correct factor dB/m | Extrapolation factor dB | Measurement results (calculated) dBμV/m @30m | Limits dBμV/m @30m | Margin dB |
|---|---|---|---|---|---|---|---|
| (MHz) | Measurement results | Detector | Correct factor | Extrapolation factor | Measurement results (calculated) | Limits | Margin |
| 802.11b | | | | | | | |
| 6.020 | 25.55 | QP | 21.84 | 40.00 | 7.39 | 29.54 | -22.15 |
| 15.730 | 25.39 | QP | 21.35 | 40.00 | 6.74 | 29.54 | -22.80 |
| 25.680 | 24.57 | QP | 20.67 | 40.00 | 5.24 | 29.54 | -24.30 |
| 802.11g | | | | | | | |
| 6.020 | 25.22 | QP | 21.84 | 40.00 | 7.06 | 29.54 | -22.48 |
| 15.730 | 25.16 | QP | 21.35 | 40.00 | 6.51 | 29.54 | -23.03 |
| 25.680 | 25.51 | QP | 20.67 | 40.00 | 6.18 | 29.54 | -23.36 |
| 802.11n(HT20) | | | | | | | |
| 6.020 | 25.01 | QP | 21.84 | 40.00 | 6.85 | 29.54 | -22.69 |
| 15.730 | 25.34 | QP | 21.35 | 40.00 | 6.69 | 29.54 | -22.85 |
| 25.680 | 25.46 | QP | 20.67 | 40.00 | 6.13 | 29.54 | -23.41 |
| 802.11n(HT40) | | | | | | | |
| 6.020 | 25.80 | QP | 21.84 | 40.00 | 7.64 | 29.54 | -21.90 |
| 15.730 | 25.49 | QP | 21.35 | 40.00 | 6.84 | 29.54 | -22.70 |
| 25.680 | 25.32 | QP | 20.67 | 40.00 | 5.99 | 29.54 | -23.55 |

**Test Frequency : 30MHz ~ 18GHz**

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11b: Low Channel 2412MHz | | | | | | | | | |
| 223.45 | 40.45 | QP | 331 | 1.7 | H | -11.62 | 28.83 | 46.00 | -17.17 |
| 223.45 | 35.68 | QP | 342 | 1.7 | V | -11.62 | 24.06 | 46.00 | -21.94 |
| 4824.00 | 49.04 | PK | 239 | 1.9 | V | -1.06 | 47.98 | 74.00 | -26.02 |
| 4824.00 | 45.66 | Ave | 239 | 1.9 | V | -1.06 | 44.60 | 54.00 | -9.40 |
| 7236.00 | 42.27 | PK | 28 | 1.6 | H | 1.33 | 43.60 | 74.00 | -30.40 |
| 7236.00 | 41.47 | Ave | 28 | 1.6 | H | 1.33 | 42.80 | 54.00 | -11.20 |
| 2313.55 | 46.35 | PK | 292 | 1.6 | V | -13.19 | 33.16 | 74.00 | -40.84 |
| 2313.55 | 37.95 | Ave | 292 | 1.6 | V | -13.19 | 24.76 | 54.00 | -29.24 |
| 2377.93 | 44.71 | PK | 214 | 1.6 | H | -13.14 | 31.57 | 74.00 | -42.43 |
| 2377.93 | 38.29 | Ave | 214 | 1.6 | H | -13.14 | 25.15 | 54.00 | -28.85 |
| 2486.34 | 42.81 | PK | 338 | 1.8 | V | -13.08 | 29.73 | 74.00 | -44.27 |
| 2486.34 | 38.63 | Ave | 338 | 1.8 | V | -13.08 | 25.55 | 54.00 | -28.45 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11b: Middle Channel 2437MHz | | | | | | | | | |
| 223.45 | 40.02 | QP | 108 | 1.4 | H | -11.62 | 28.40 | 46.00 | -17.60 |
| 223.45 | 36.32 | QP | 139 | 1.7 | V | -11.62 | 24.70 | 46.00 | -21.30 |
| 4874.00 | 48.70 | PK | 108 | 1.9 | V | -0.62 | 48.08 | 74.00 | -25.92 |
| 4874.00 | 46.47 | Ave | 108 | 1.9 | V | -0.62 | 45.85 | 54.00 | -8.15 |
| 7311.00 | 41.59 | PK | 208 | 1.1 | H | 2.21 | 43.80 | 74.00 | -30.20 |
| 7311.00 | 42.21 | Ave | 208 | 1.1 | H | 2.21 | 44.42 | 54.00 | -9.58 |
| 2326.56 | 45.44 | PK | 160 | 1.9 | V | -13.19 | 32.25 | 74.00 | -41.75 |
| 2326.56 | 38.18 | Ave | 160 | 1.9 | V | -13.19 | 24.99 | 54.00 | -29.01 |
| 2371.06 | 43.72 | PK | 274 | 1.9 | H | -13.14 | 30.58 | 74.00 | -43.42 |
| 2371.06 | 36.49 | Ave | 274 | 1.9 | H | -13.14 | 23.35 | 54.00 | -30.65 |
| 2496.64 | 43.99 | PK | 237 | 1.2 | V | -13.08 | 30.91 | 74.00 | -43.09 |
| 2496.64 | 37.94 | Ave | 237 | 1.2 | V | -13.08 | 24.86 | 54.00 | -29.14 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11b: High Channel 2462MHz | | | | | | | | | |
| 223.45 | 39.97 | QP | 264 | 1.9 | H | -11.62 | 28.35 | 46.00 | -17.65 |
| 223.45 | 36.74 | QP | 278 | 1.9 | V | -11.62 | 25.12 | 46.00 | -20.88 |
| 4924.00 | 47.92 | PK | 194 | 1.5 | V | -0.24 | 47.68 | 74.00 | -26.32 |
| 4924.00 | 45.50 | Ave | 194 | 1.5 | V | -0.24 | 45.26 | 54.00 | -8.74 |
| 7386.00 | 41.18 | PK | 141 | 1.9 | H | 2.84 | 44.02 | 74.00 | -29.98 |
| 7386.00 | 42.31 | Ave | 141 | 1.9 | H | 2.84 | 45.15 | 54.00 | -8.85 |
| 2342.06 | 46.07 | PK | 277 | 1.4 | V | -13.19 | 32.88 | 74.00 | -41.12 |
| 2342.06 | 37.12 | Ave | 277 | 1.4 | V | -13.19 | 23.93 | 54.00 | -30.07 |
| 2370.32 | 44.23 | PK | 262 | 1.1 | H | -13.14 | 31.09 | 74.00 | -42.91 |
| 2370.32 | 38.53 | Ave | 262 | 1.1 | H | -13.14 | 25.39 | 54.00 | -28.61 |
| 2499.64 | 42.60 | PK | 155 | 1.7 | V | -13.08 | 29.52 | 74.00 | -44.48 |
| 2499.64 | 37.28 | Ave | 155 | 1.7 | V | -13.08 | 24.20 | 54.00 | -29.80 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11g: Low Channel 2412MHz | | | | | | | | | |
| 223.45 | 41.32 | QP | 200 | 1.6 | H | -11.62 | 29.70 | 46.00 | -16.30 |
| 223.45 | 37.94 | QP | 233 | 1.2 | V | -11.62 | 26.32 | 46.00 | -19.68 |
| 4824.00 | 49.27 | PK | 245 | 1.6 | V | -1.06 | 48.21 | 74.00 | -25.79 |
| 4824.00 | 45.98 | Ave | 245 | 1.6 | V | -1.06 | 44.92 | 54.00 | -9.08 |
| 7236.00 | 40.32 | PK | 93 | 1.8 | H | 1.33 | 41.65 | 74.00 | -32.35 |
| 7236.00 | 41.37 | Ave | 93 | 1.8 | H | 1.33 | 42.70 | 54.00 | -11.30 |
| 2332.19 | 45.95 | PK | 312 | 1.8 | V | -13.19 | 32.76 | 74.00 | -41.24 |
| 2332.19 | 37.12 | Ave | 312 | 1.8 | V | -13.19 | 23.93 | 54.00 | -30.07 |
| 2385.49 | 44.15 | PK | 28 | 1.3 | H | -13.14 | 31.01 | 74.00 | -42.99 |
| 2385.49 | 37.97 | Ave | 28 | 1.3 | H | -13.14 | 24.83 | 54.00 | -29.17 |
| 2487.43 | 44.03 | PK | 0 | 1.5 | V | -13.08 | 30.95 | 74.00 | -43.05 |
| 2487.43 | 37.23 | Ave | 0 | 1.5 | V | -13.08 | 24.15 | 54.00 | -29.85 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11g: Middle Channel 2437MHz | | | | | | | | | |
| 223.45 | 41.77 | QP | 357 | 1.8 | H | -11.62 | 30.15 | 46.00 | -15.85 |
| 223.45 | 38.86 | QP | 261 | 1.2 | V | -11.62 | 27.24 | 46.00 | -18.76 |
| 4874.00 | 49.92 | PK | 108 | 1.7 | V | -0.62 | 49.30 | 74.00 | -24.70 |
| 4874.00 | 46.35 | Ave | 108 | 1.7 | V | -0.62 | 45.73 | 54.00 | -8.27 |
| 7311.00 | 39.75 | PK | 224 | 1.8 | H | 2.21 | 41.96 | 74.00 | -32.04 |
| 7311.00 | 40.80 | Ave | 224 | 1.8 | H | 2.21 | 43.01 | 54.00 | -10.99 |
| 2324.19 | 45.13 | PK | 116 | 1.4 | V | -13.19 | 31.94 | 74.00 | -42.06 |
| 2324.19 | 39.30 | Ave | 116 | 1.4 | V | -13.19 | 26.11 | 54.00 | -27.89 |
| 2365.33 | 42.28 | PK | 55 | 1.3 | H | -13.14 | 29.14 | 74.00 | -44.86 |
| 2365.33 | 36.97 | Ave | 55 | 1.3 | H | -13.14 | 23.83 | 54.00 | -30.17 |
| 2497.14 | 44.12 | PK | 305 | 1.4 | V | -13.08 | 31.04 | 74.00 | -42.96 |
| 2497.14 | 36.68 | Ave | 305 | 1.4 | V | -13.08 | 23.60 | 54.00 | -30.40 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11g: High Channel 2462MHz | | | | | | | | | |
| 223.45 | 40.73 | QP | 266 | 1.6 | H | -11.62 | 29.11 | 46.00 | -16.89 |
| 223.45 | 40.27 | QP | 309 | 1.4 | V | -11.62 | 28.65 | 46.00 | -17.35 |
| 4924.00 | 50.89 | PK | 89 | 1.2 | V | -0.24 | 50.65 | 74.00 | -23.35 |
| 4924.00 | 44.90 | Ave | 89 | 1.2 | V | -0.24 | 44.66 | 54.00 | -9.34 |
| 7386.00 | 38.53 | PK | 92 | 1.7 | H | 2.84 | 41.37 | 74.00 | -32.63 |
| 7386.00 | 40.39 | Ave | 92 | 1.7 | H | 2.84 | 43.23 | 54.00 | -10.77 |
| 2334.80 | 45.26 | PK | 213 | 1.8 | V | -13.19 | 32.07 | 74.00 | -41.93 |
| 2334.80 | 37.62 | Ave | 213 | 1.8 | V | -13.19 | 24.43 | 54.00 | -29.57 |
| 2370.44 | 44.47 | PK | 299 | 1.8 | H | -13.14 | 31.33 | 74.00 | -42.67 |
| 2370.44 | 37.98 | Ave | 299 | 1.8 | H | -13.14 | 24.84 | 54.00 | -29.16 |
| 2495.31 | 44.87 | PK | 197 | 1.7 | V | -13.08 | 31.79 | 74.00 | -42.21 |
| 2495.31 | 37.20 | Ave | 197 | 1.7 | V | -13.08 | 24.12 | 54.00 | -29.88 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n20: Low Channel 2412MHz | | | | | | | | | |
| 223.45 | 39.76 | QP | 131 | 1.5 | H | -11.62 | 28.14 | 46.00 | -17.86 |
| 223.45 | 39.04 | QP | 329 | 1.6 | V | -11.62 | 27.42 | 46.00 | -18.58 |
| 4824.00 | 50.18 | PK | 290 | 1.3 | V | -1.06 | 49.12 | 74.00 | -24.88 |
| 4824.00 | 44.67 | Ave | 290 | 1.3 | V | -1.06 | 43.61 | 54.00 | -10.39 |
| 7236.00 | 37.87 | PK | 272 | 1.8 | H | 1.33 | 39.20 | 74.00 | -34.80 |
| 7236.00 | 38.94 | Ave | 272 | 1.8 | H | 1.33 | 40.27 | 54.00 | -13.73 |
| 2318.60 | 46.70 | PK | 320 | 1.1 | V | -13.19 | 33.51 | 74.00 | -40.49 |
| 2318.60 | 38.49 | Ave | 320 | 1.1 | V | -13.19 | 25.30 | 54.00 | -28.70 |
| 2370.52 | 42.76 | PK | 42 | 2.0 | H | -13.14 | 29.62 | 74.00 | -44.38 |
| 2370.52 | 38.49 | Ave | 42 | 2.0 | H | -13.14 | 25.35 | 54.00 | -28.65 |
| 2497.85 | 44.95 | PK | 216 | 1.2 | V | -13.08 | 31.87 | 74.00 | -42.13 |
| 2497.85 | 36.84 | Ave | 216 | 1.2 | V | -13.08 | 23.76 | 54.00 | -30.24 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n20: Middle Channel 2437MHz | | | | | | | | | |
| 223.45 | 40.79 | QP | 152 | 1.3 | H | -11.62 | 29.17 | 46.00 | -16.83 |
| 223.45 | 40.27 | QP | 48 | 1.5 | V | -11.62 | 28.65 | 46.00 | -17.35 |
| 4874.00 | 49.21 | PK | 65 | 2.0 | V | -0.62 | 48.59 | 74.00 | -25.41 |
| 4874.00 | 43.58 | Ave | 65 | 2.0 | V | -0.62 | 42.96 | 54.00 | -11.04 |
| 7311.00 | 37.01 | PK | 104 | 1.2 | H | 2.21 | 39.22 | 74.00 | -34.78 |
| 7311.00 | 39.27 | Ave | 104 | 1.2 | H | 2.21 | 41.48 | 54.00 | -12.52 |
| 2318.86 | 45.22 | PK | 356 | 1.6 | V | -13.19 | 32.03 | 74.00 | -41.97 |
| 2318.86 | 37.18 | Ave | 356 | 1.6 | V | -13.19 | 23.99 | 54.00 | -30.01 |
| 2385.79 | 44.85 | PK | 297 | 1.4 | H | -13.14 | 31.71 | 74.00 | -42.29 |
| 2385.79 | 37.81 | Ave | 297 | 1.4 | H | -13.14 | 24.67 | 54.00 | -29.33 |
| 2495.27 | 43.71 | PK | 87 | 1.2 | V | -13.08 | 30.63 | 74.00 | -43.37 |
| 2495.27 | 38.69 | Ave | 87 | 1.2 | V | -13.08 | 25.61 | 54.00 | -28.39 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n20: High Channel 2462MHz | | | | | | | | | |
| 223.45 | 40.45 | QP | 6 | 1.8 | H | -11.62 | 28.83 | 46.00 | -17.17 |
| 223.45 | 40.72 | QP | 243 | 1.8 | V | -11.62 | 29.10 | 46.00 | -16.90 |
| 4924.00 | 48.51 | PK | 163 | 1.3 | V | -0.24 | 48.27 | 74.00 | -25.73 |
| 4924.00 | 42.68 | Ave | 163 | 1.3 | V | -0.24 | 42.44 | 54.00 | -11.56 |
| 7386.00 | 36.37 | PK | 162 | 1.2 | H | 2.84 | 39.21 | 74.00 | -34.79 |
| 7386.00 | 39.84 | Ave | 162 | 1.2 | H | 2.84 | 42.68 | 54.00 | -11.32 |
| 2330.93 | 46.92 | PK | 163 | 1.4 | V | -13.19 | 33.73 | 74.00 | -40.27 |
| 2330.93 | 38.83 | Ave | 163 | 1.4 | V | -13.19 | 25.64 | 54.00 | -28.36 |
| 2369.45 | 42.53 | PK | 57 | 1.0 | H | -13.14 | 29.39 | 74.00 | -44.61 |
| 2369.45 | 37.93 | Ave | 57 | 1.0 | H | -13.14 | 24.79 | 54.00 | -29.21 |
| 2489.59 | 45.00 | PK | 267 | 1.2 | V | -13.08 | 31.92 | 74.00 | -42.08 |
| 2489.59 | 37.55 | Ave | 267 | 1.2 | V | -13.08 | 24.47 | 54.00 | -29.53 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n40: Low Channel 2422MHz | | | | | | | | | |
| 223.45 | 41.04 | QP | 14 | 1.3 | H | -11.62 | 29.42 | 46.00 | -16.58 |
| 223.45 | 41.73 | QP | 320 | 1.9 | V | -11.62 | 30.11 | 46.00 | -15.89 |
| 4844.00 | 47.01 | PK | 319 | 1.2 | V | -1.06 | 45.95 | 74.00 | -28.05 |
| 4844.00 | 41.07 | Ave | 319 | 1.2 | V | -1.06 | 40.01 | 54.00 | -13.99 |
| 7266.00 | 34.73 | PK | 77 | 1.5 | H | 1.33 | 36.06 | 74.00 | -37.94 |
| 7266.00 | 38.05 | Ave | 77 | 1.5 | H | 1.33 | 39.38 | 54.00 | -14.62 |
| 2348.79 | 45.42 | PK | 133 | 1.2 | V | -13.19 | 32.23 | 74.00 | -41.77 |
| 2348.79 | 37.71 | Ave | 133 | 1.2 | V | -13.19 | 24.52 | 54.00 | -29.48 |
| 2381.65 | 42.12 | PK | 285 | 1.2 | H | -13.14 | 28.98 | 74.00 | -45.02 |
| 2381.65 | 38.69 | Ave | 285 | 1.2 | H | -13.14 | 25.55 | 54.00 | -28.45 |
| 2495.50 | 43.42 | PK | 225 | 1.4 | V | -13.08 | 30.34 | 74.00 | -43.66 |
| 2495.50 | 36.11 | Ave | 225 | 1.4 | V | -13.08 | 23.03 | 54.00 | -30.97 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n40: Middle Channel 2437MHz | | | | | | | | | |
| 223.45 | 40.95 | QP | 349 | 1.9 | H | -11.62 | 29.33 | 46.00 | -16.67 |
| 223.45 | 40.81 | QP | 137 | 1.9 | V | -11.62 | 29.19 | 46.00 | -16.81 |
| 4874.00 | 47.44 | PK | 260 | 1.7 | V | -0.62 | 46.82 | 74.00 | -27.18 |
| 4874.00 | 40.78 | Ave | 260 | 1.7 | V | -0.62 | 40.16 | 54.00 | -13.84 |
| 7311.00 | 35.68 | PK | 24 | 1.3 | H | 2.21 | 37.89 | 74.00 | -36.11 |
| 7311.00 | 38.11 | Ave | 24 | 1.3 | H | 2.21 | 40.32 | 54.00 | -13.68 |
| 2321.65 | 46.68 | PK | 202 | 1.8 | V | -13.19 | 33.49 | 74.00 | -40.51 |
| 2321.65 | 37.07 | Ave | 202 | 1.8 | V | -13.19 | 23.88 | 54.00 | -30.12 |
| 2372.00 | 42.15 | PK | 314 | 1.9 | H | -13.14 | 29.01 | 74.00 | -44.99 |
| 2372.00 | 36.30 | Ave | 314 | 1.9 | H | -13.14 | 23.16 | 54.00 | -30.84 |
| 2491.10 | 42.36 | PK | 51 | 1.9 | V | -13.08 | 29.28 | 74.00 | -44.72 |
| 2491.10 | 36.65 | Ave | 51 | 1.9 | V | -13.08 | 23.57 | 54.00 | -30.43 |

| Frequency | Receiver Reading | Detector | Turn table Angle | RX Antenna | | Corrected Factor | Corrected Amplitude | FCC Part 15.247/209/205 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Height | Polar | | | Limit | Margin |
| (MHz) | (dBμV) | (PK/QP/Ave) | Degree | (m) | (H/V) | (dB) | (dBμV/m) | (dBμV/m) | (dB) |
| 11n40: High Channel 2452MHz | | | | | | | | | |
| 223.45 | 41.11 | QP | 16 | 1.6 | H | -11.62 | 29.49 | 46.00 | -16.51 |
| 223.45 | 41.46 | QP | 109 | 1.0 | V | -11.62 | 29.84 | 46.00 | -16.16 |
| 4904.00 | 46.90 | PK | 234 | 1.7 | V | -0.24 | 46.66 | 74.00 | -27.34 |
| 4904.00 | 40.06 | Ave | 234 | 1.7 | V | -0.24 | 39.82 | 54.00 | -14.18 |
| 7356.00 | 36.02 | PK | 275 | 1.3 | H | 2.84 | 38.86 | 74.00 | -35.14 |
| 7356.00 | 37.43 | Ave | 275 | 1.3 | H | 2.84 | 40.27 | 54.00 | -13.73 |
| 2336.41 | 45.69 | PK | 94 | 1.8 | V | -13.19 | 32.50 | 74.00 | -41.50 |
| 2336.41 | 38.30 | Ave | 94 | 1.8 | V | -13.19 | 25.11 | 54.00 | -28.89 |
| 2361.43 | 44.21 | PK | 327 | 1.3 | H | -13.14 | 31.07 | 74.00 | -42.93 |
| 2361.43 | 38.36 | Ave | 327 | 1.3 | H | -13.14 | 25.22 | 54.00 | -28.78 |
| 2494.07 | 43.93 | PK | 189 | 1.1 | V | -13.08 | 30.85 | 74.00 | -43.15 |
| 2494.07 | 36.77 | Ave | 189 | 1.1 | V | -13.08 | 23.69 | 54.00 | -30.31 |

**Test Frequency: 18GHz~25GHz**

The measurements were more than 20 dB below the limit and not reported.

# 10 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018;
ANSI C63.10:2013

Test Result: PASS

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 10.1 Test Procedure

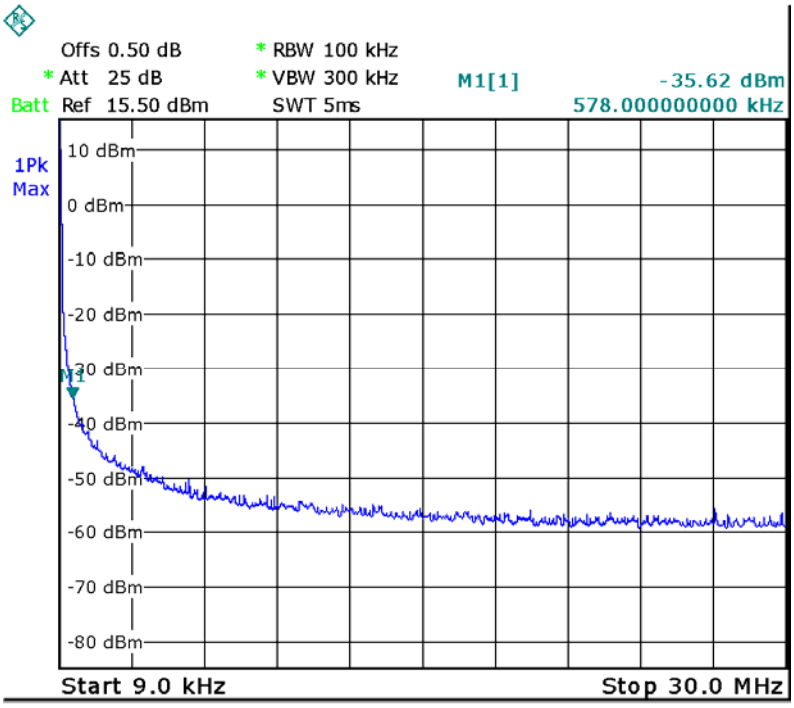
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
   a) Set instrument center frequency to DTS channel center frequency.
   b) Set the span to _ 1.5 times the DTS bandwidth.
   c) Set the RBW = 100 kHz.
   d) Set the VBW _ [3 × RBW].
   e) Detector = peak.
   f) Sweep time = auto couple.
   g) Trace mode = max hold.
   h) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum PSD level.
   Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

## 10.2 Test Result

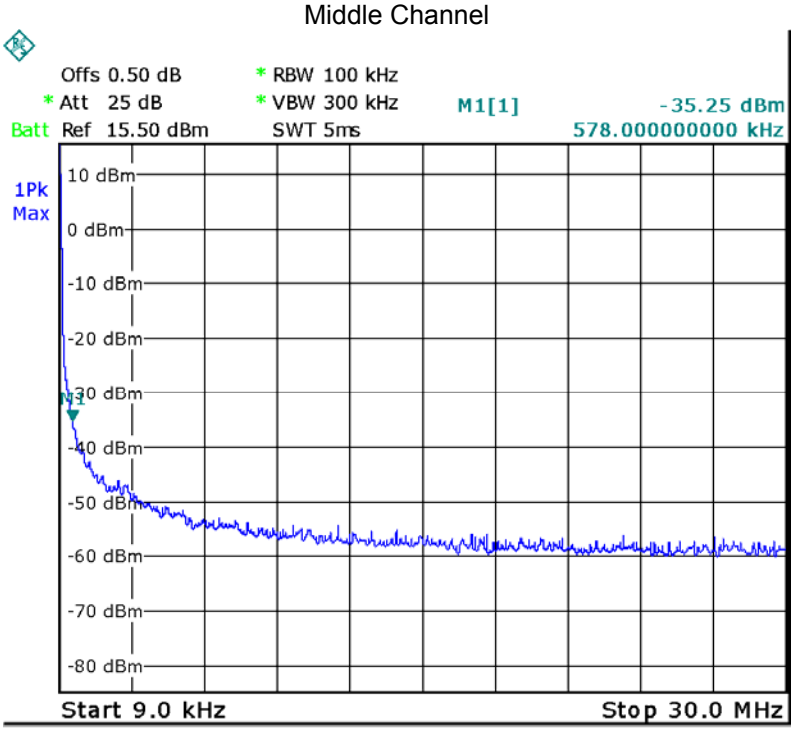
**9KHz – 30MHz**

802.11b

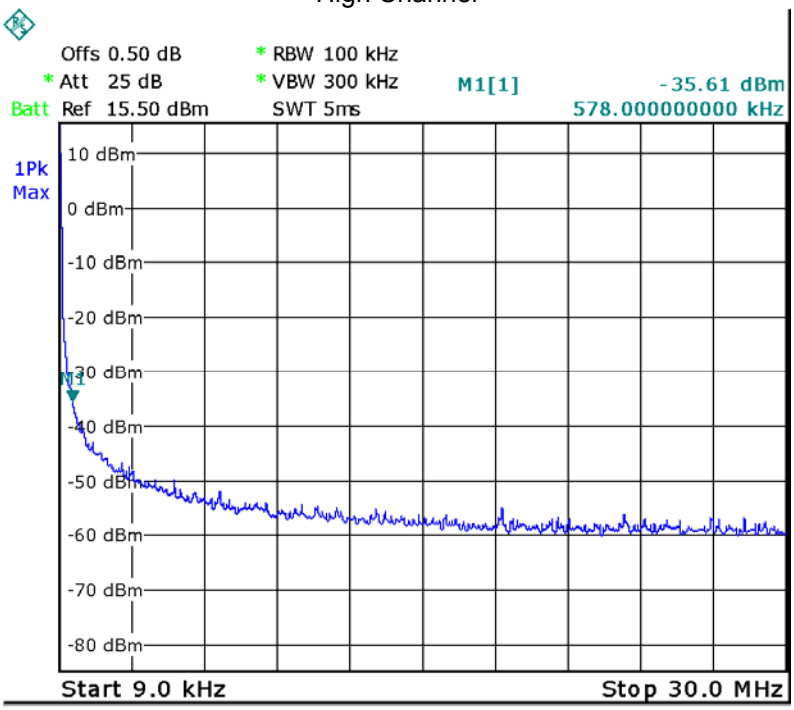
Low Channel




Middle Channel

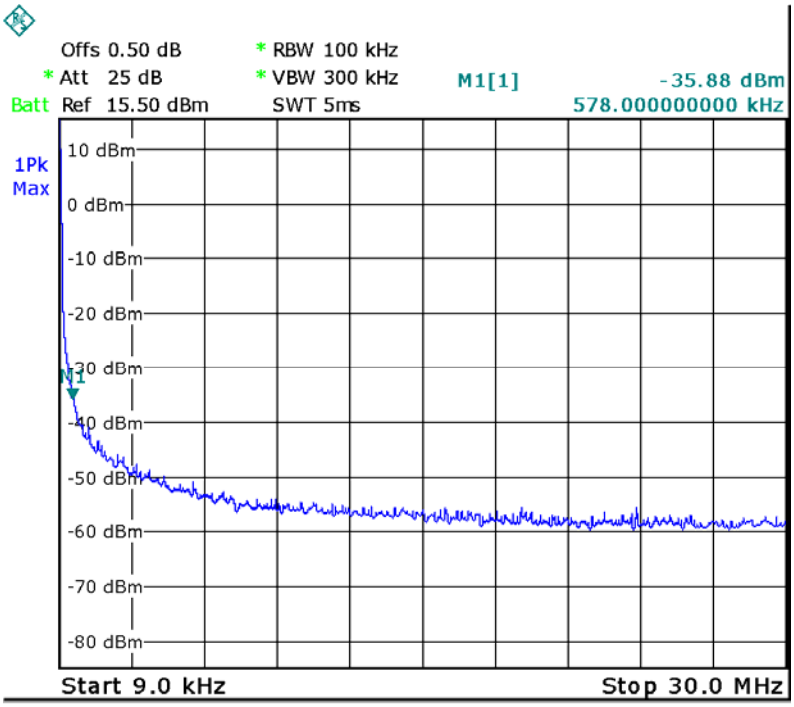


High Channel

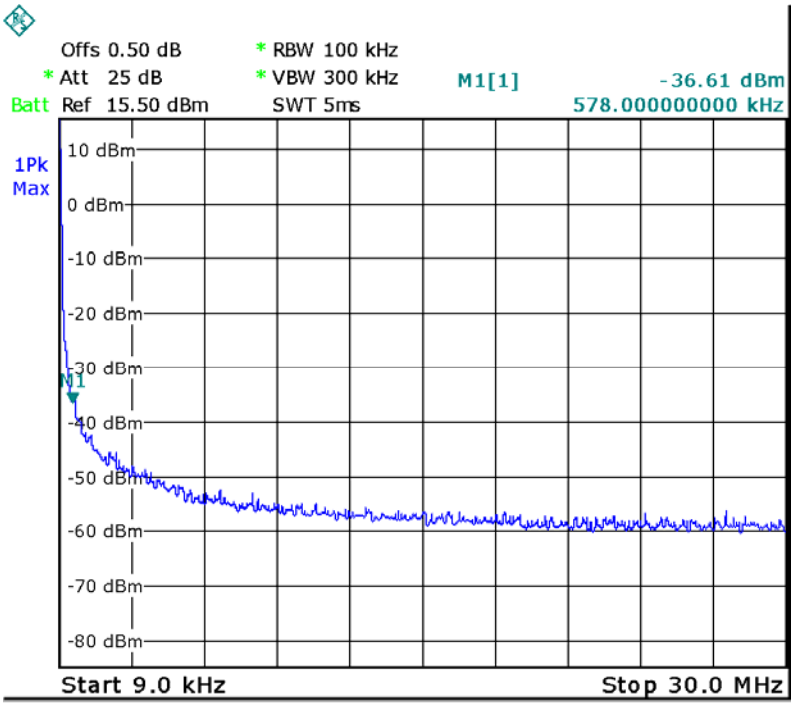



802.11g

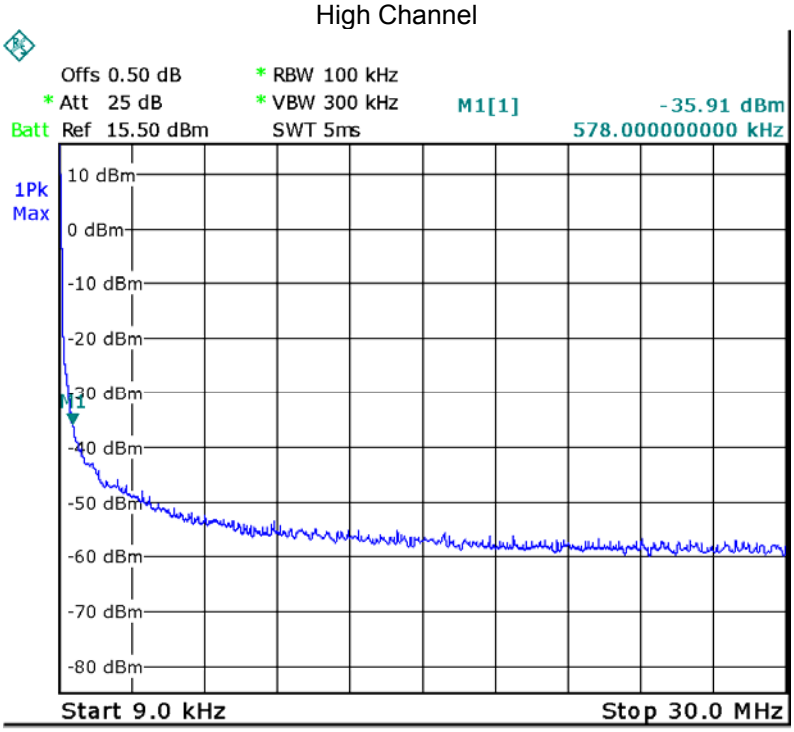
Low Channel



Middle Channel

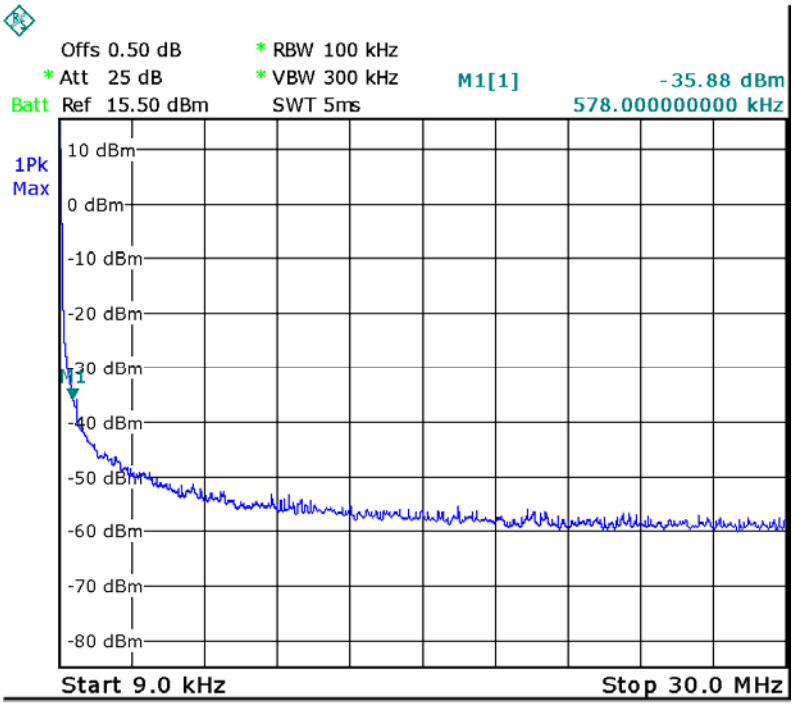



High Channel

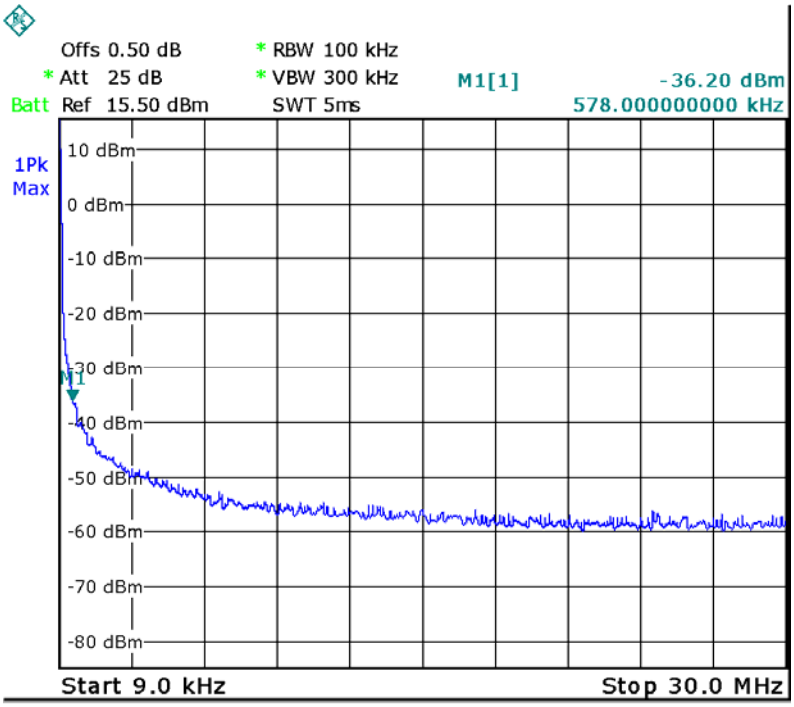


802.11n HT20

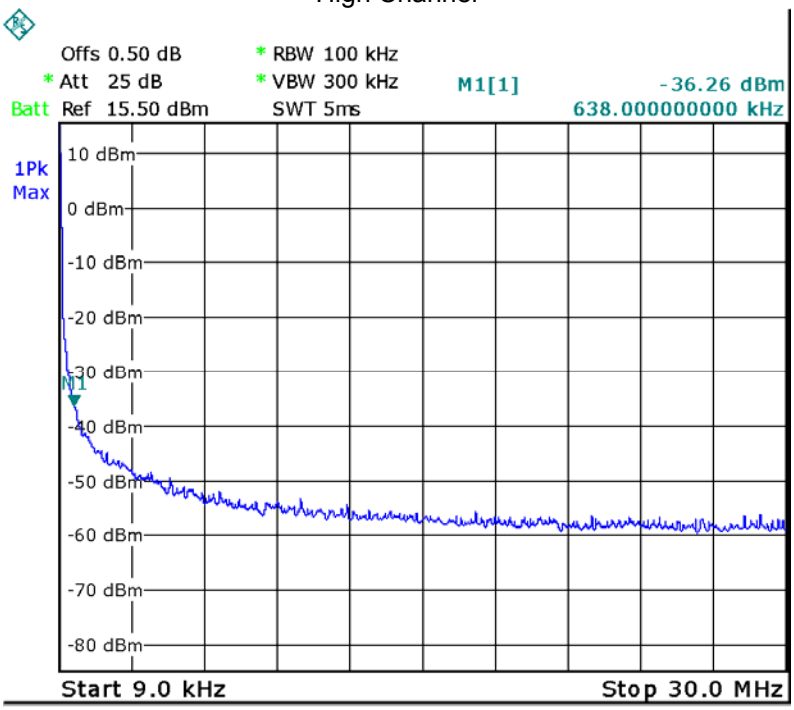
Low Channel




Middle Channel

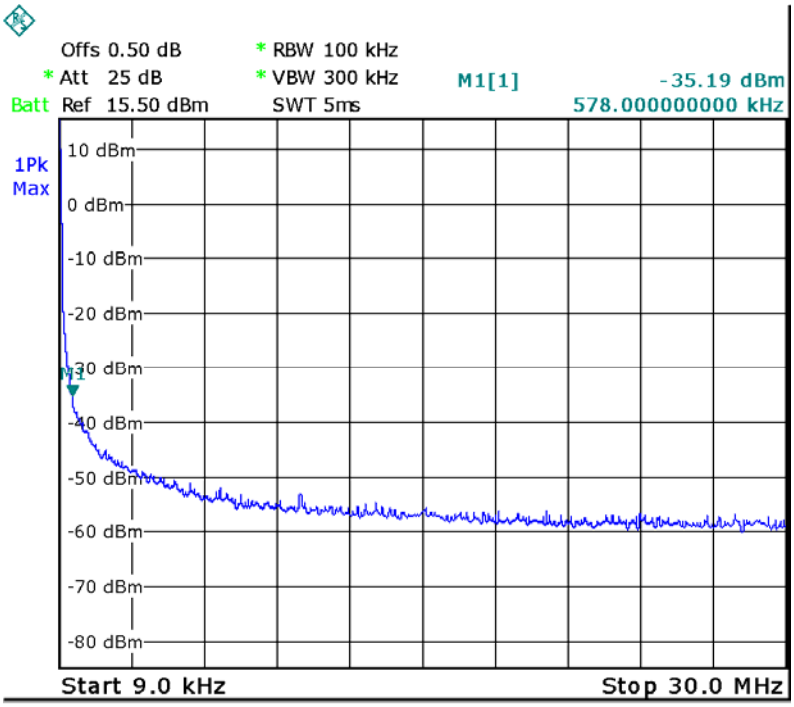


High Channel

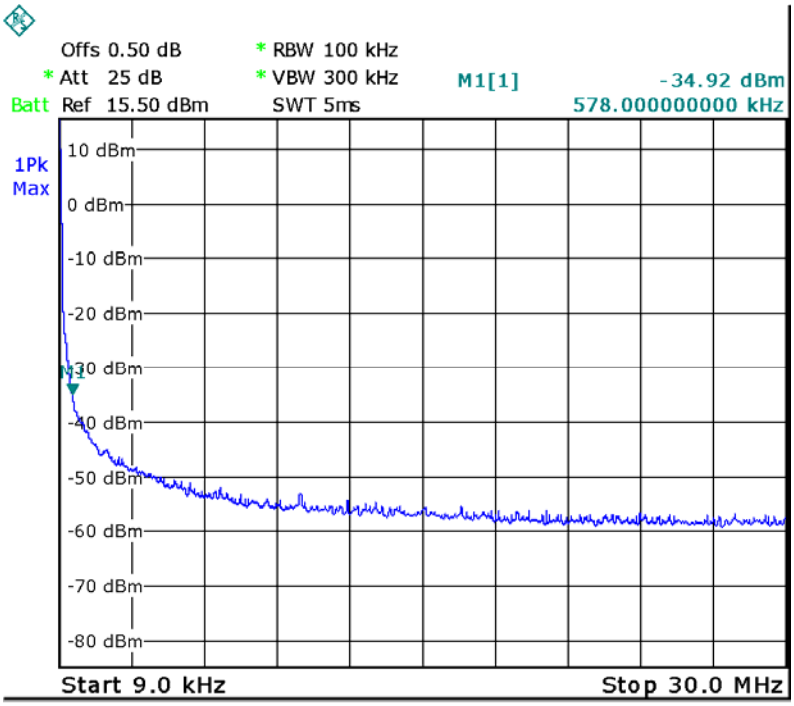



802.11n HT40

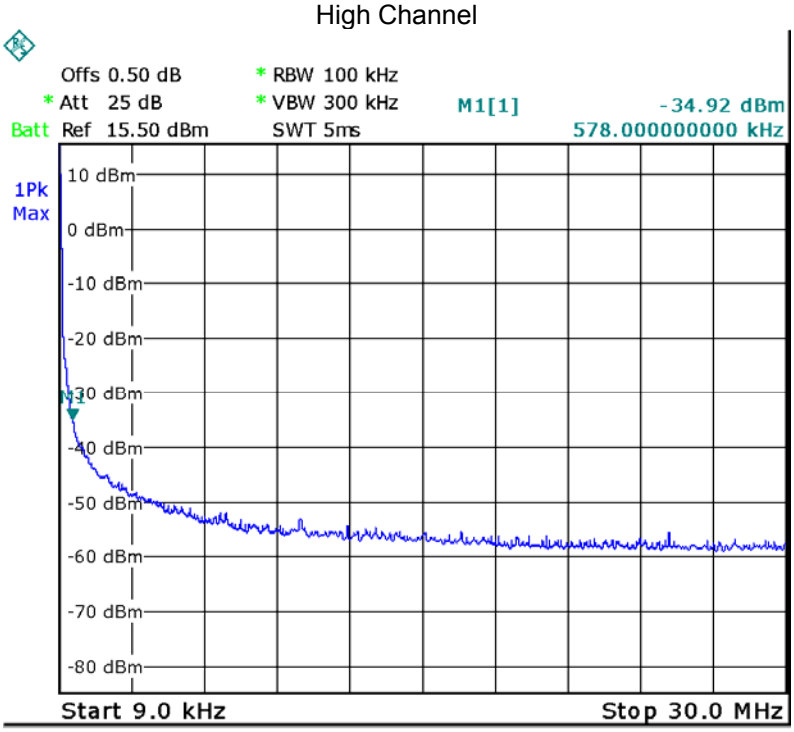
Low Channel



Middle Channel



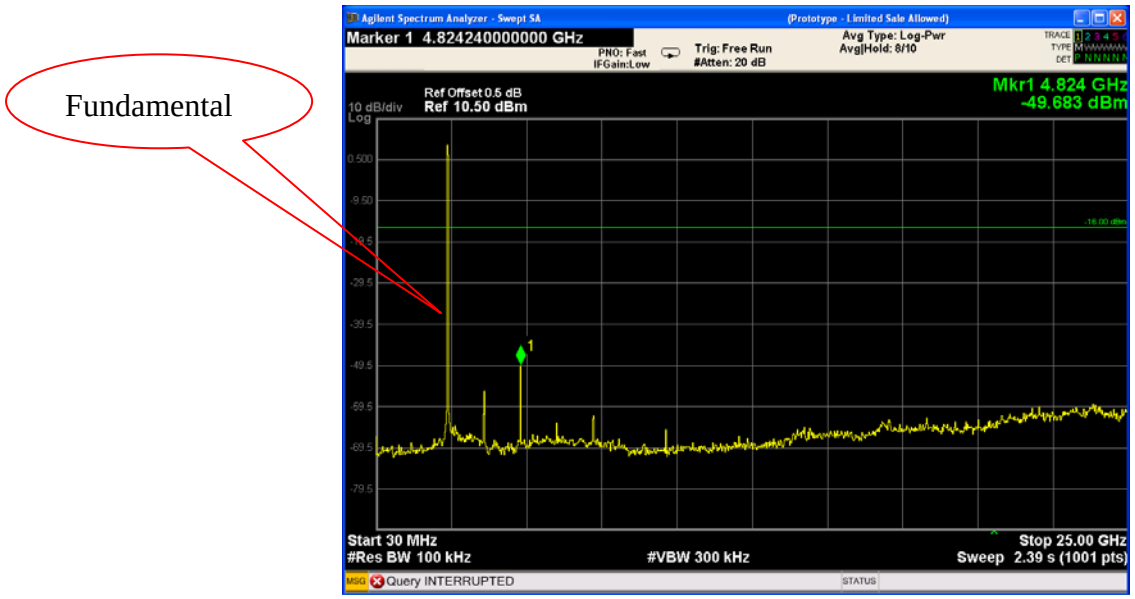

High Channel



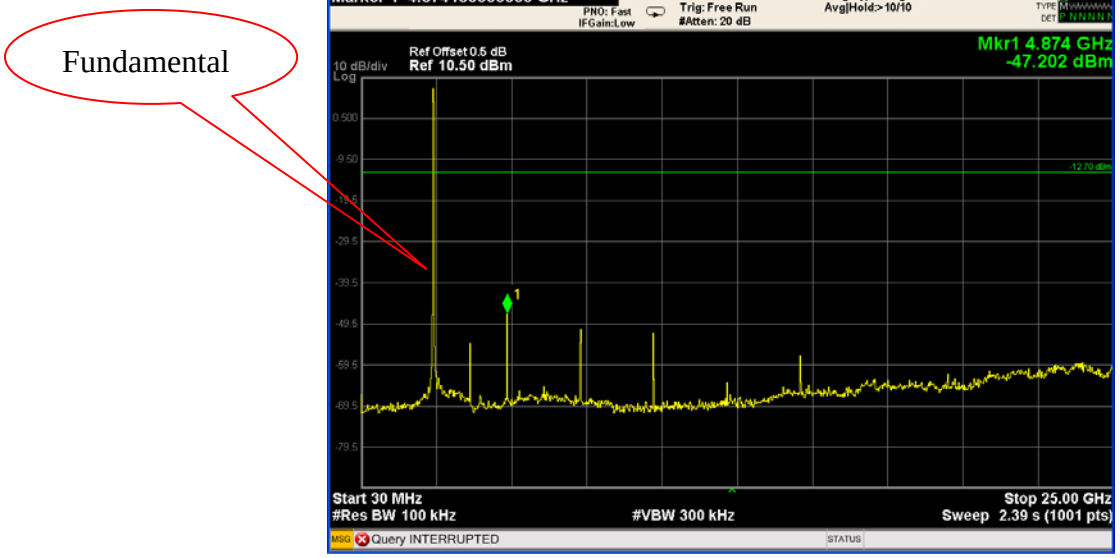
**Above 30MHz**

802.11b

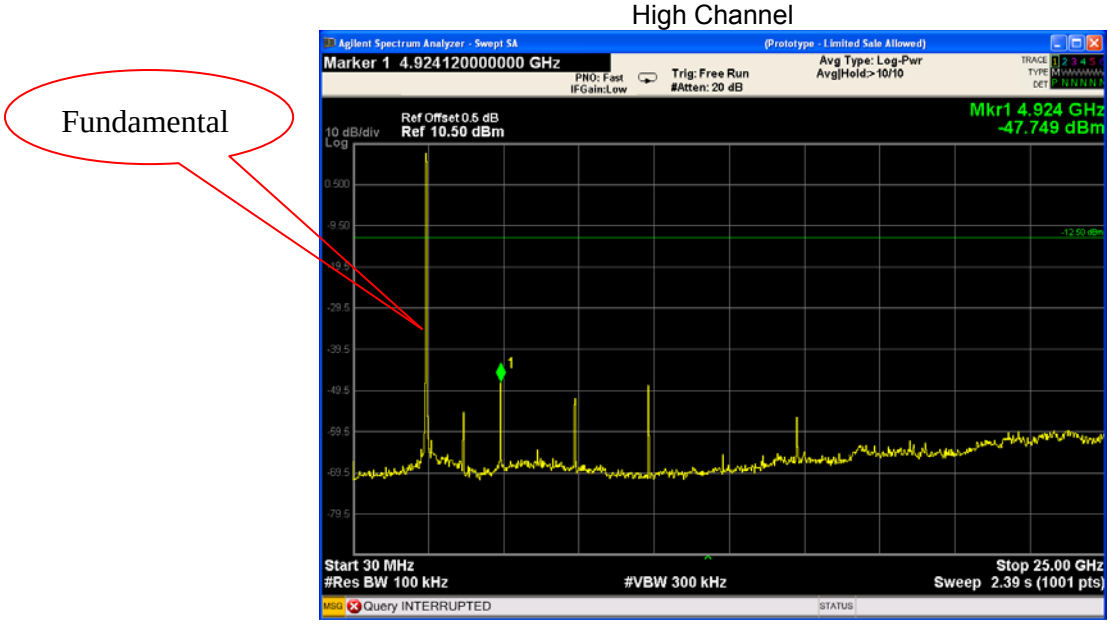
Low Channel




Middle Channel

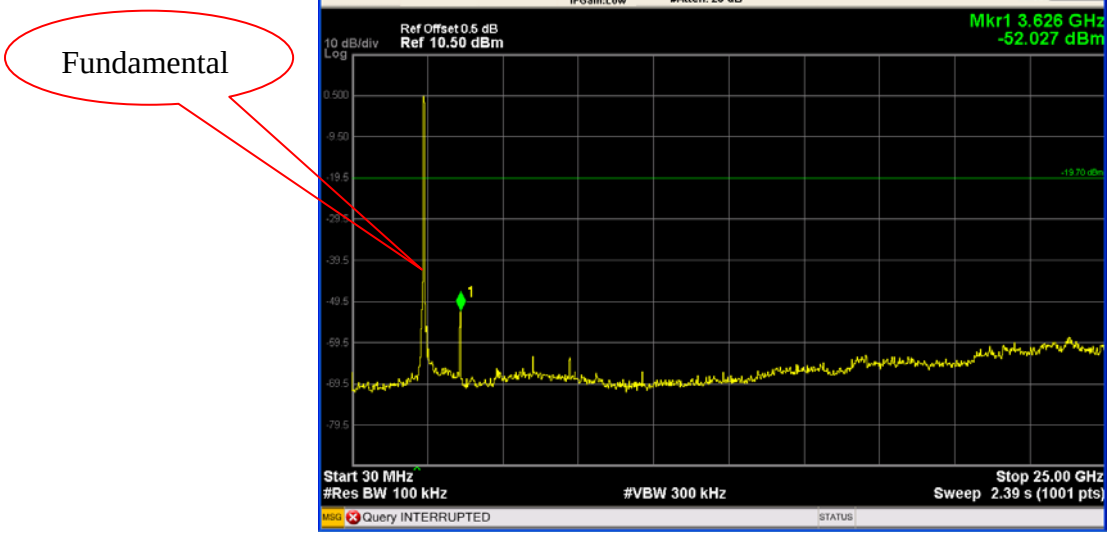


High Channel

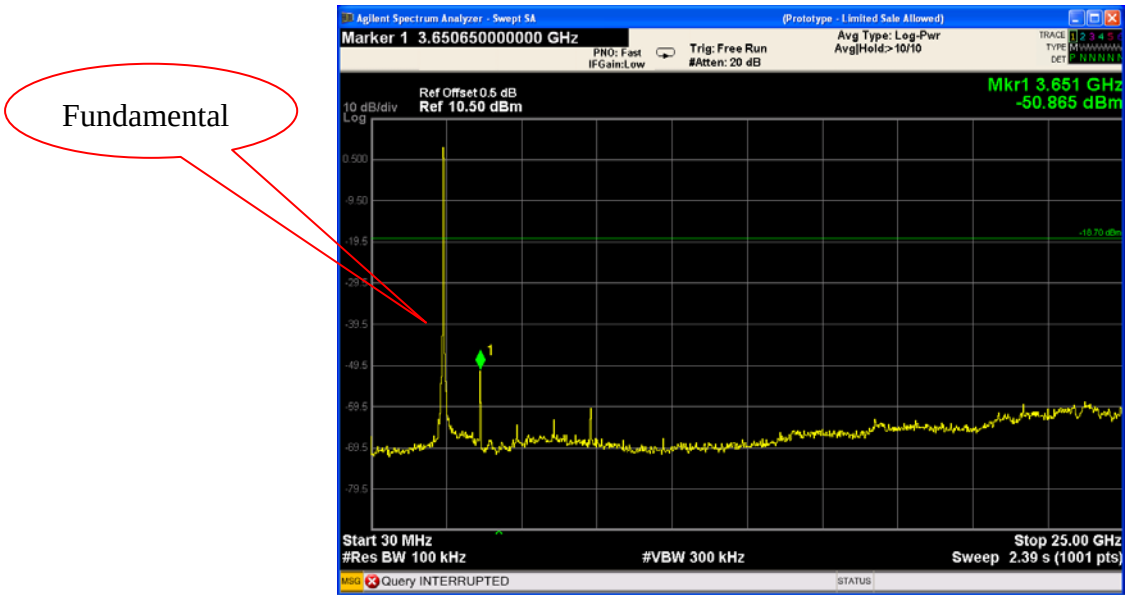



802.11g

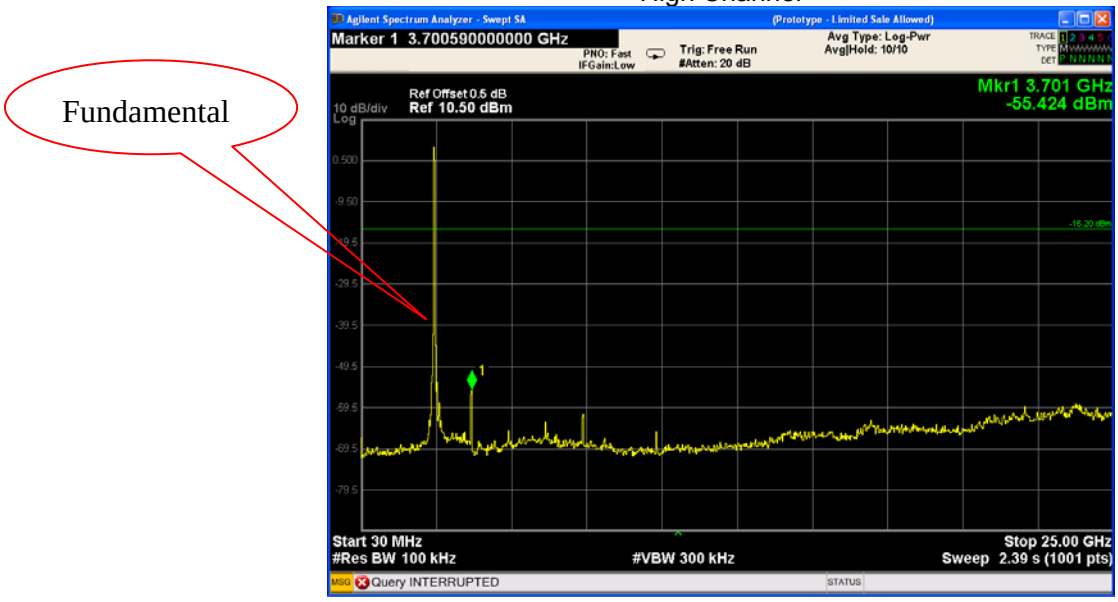
Low Channel



Middle Channel

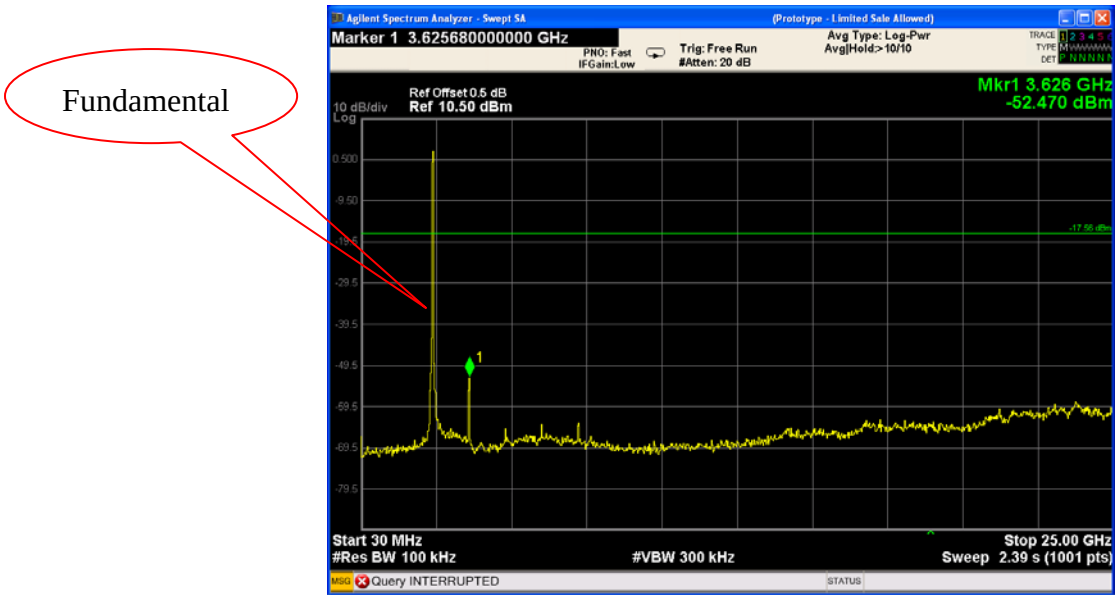



High Channel

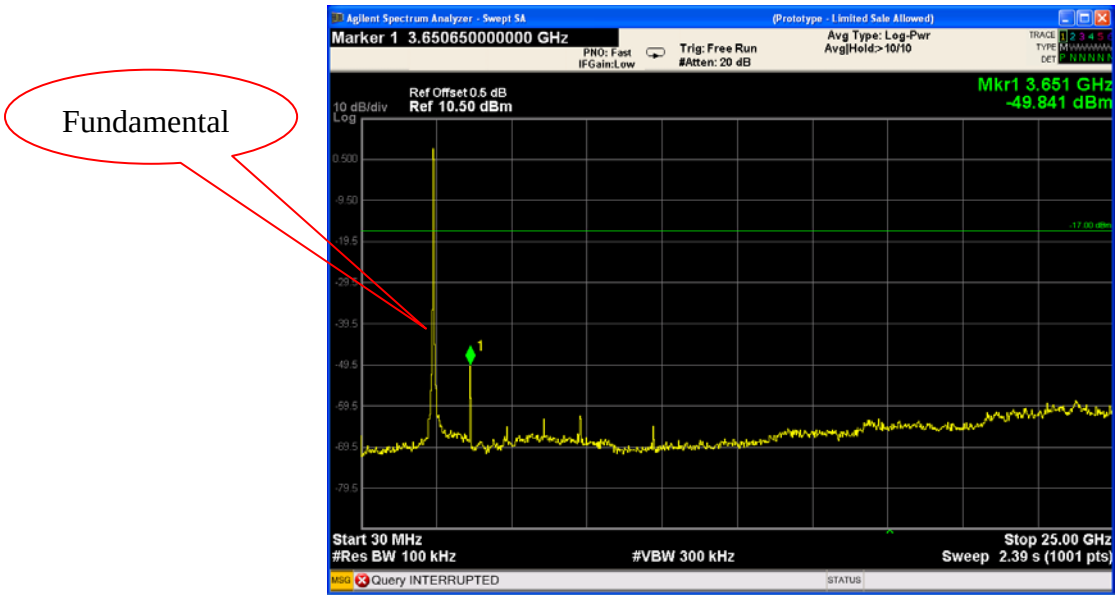


802.11n HT20

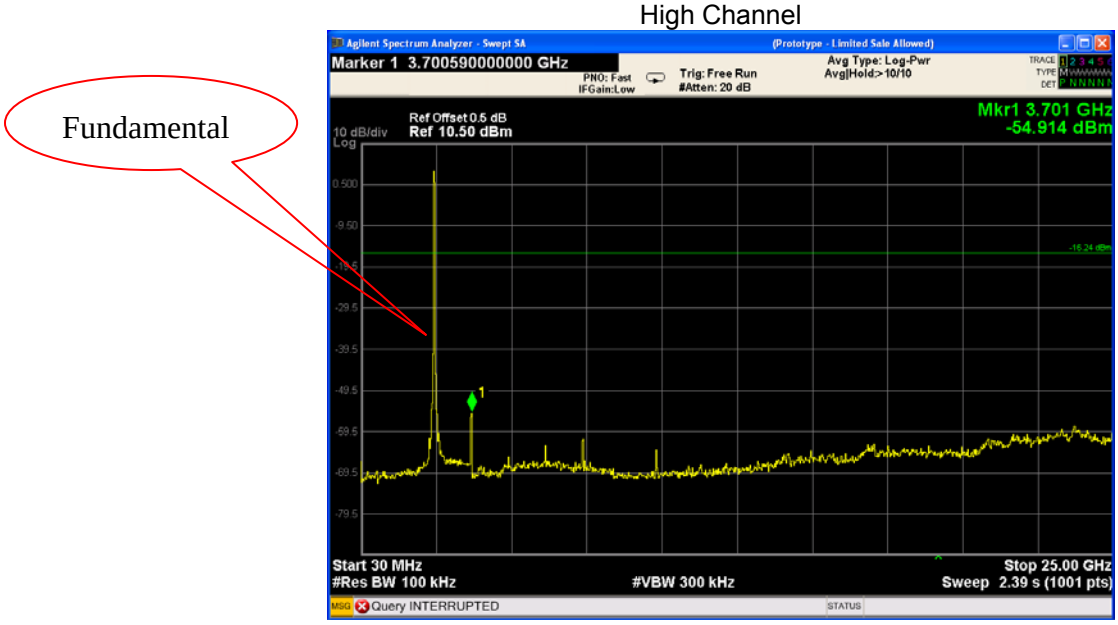
Low Channel




Middle Channel

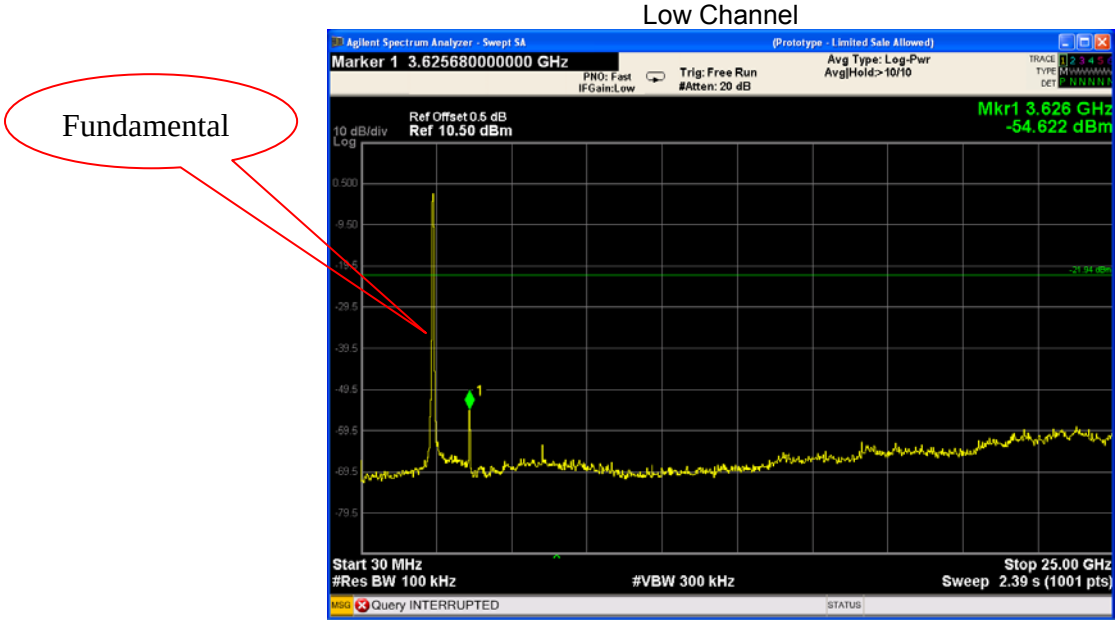


High Channel

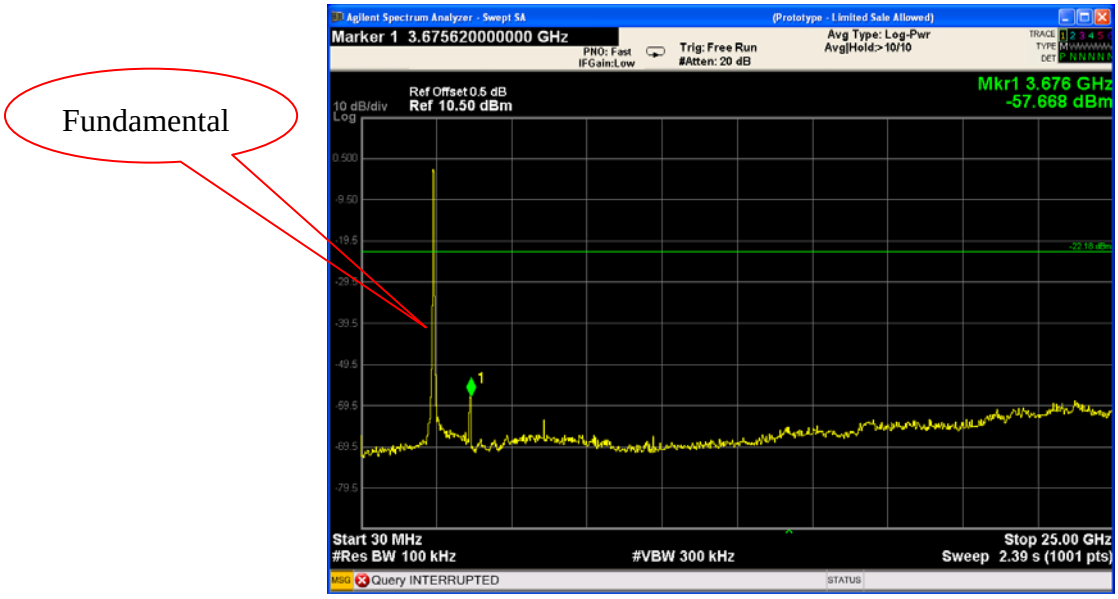



802.11n HT40

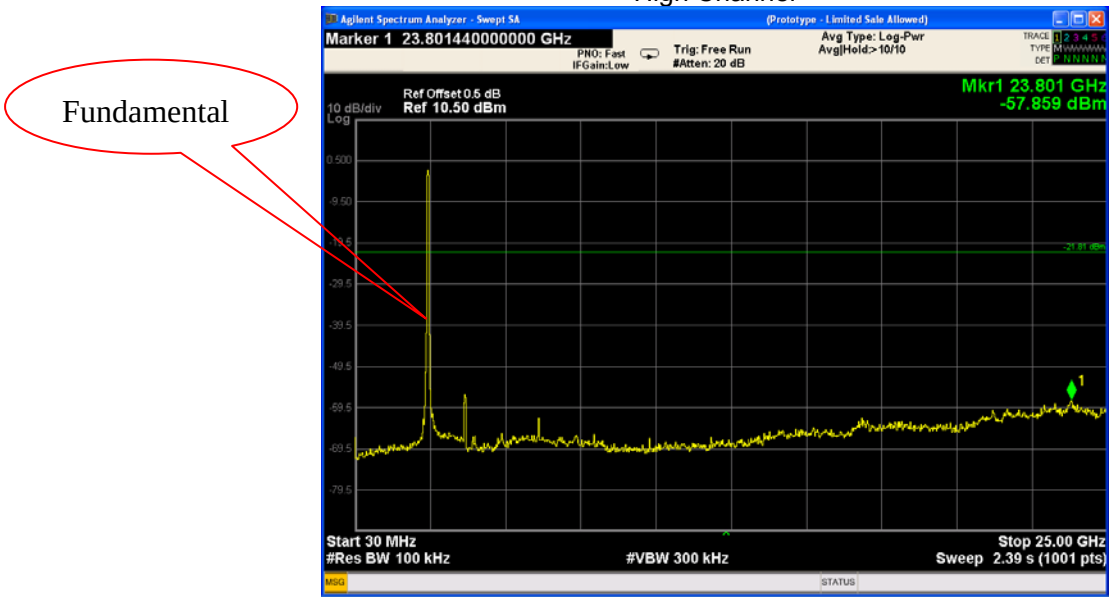
Low Channel



Middle Channel




High Channel



# 11 Band Edge Measurement

| | |
|---|---|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247 |
| Test Method: | KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10:2013 |
| Test Limit: | Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated 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) (see §15.205(c)). |
| Test Mode: | Transmitting |

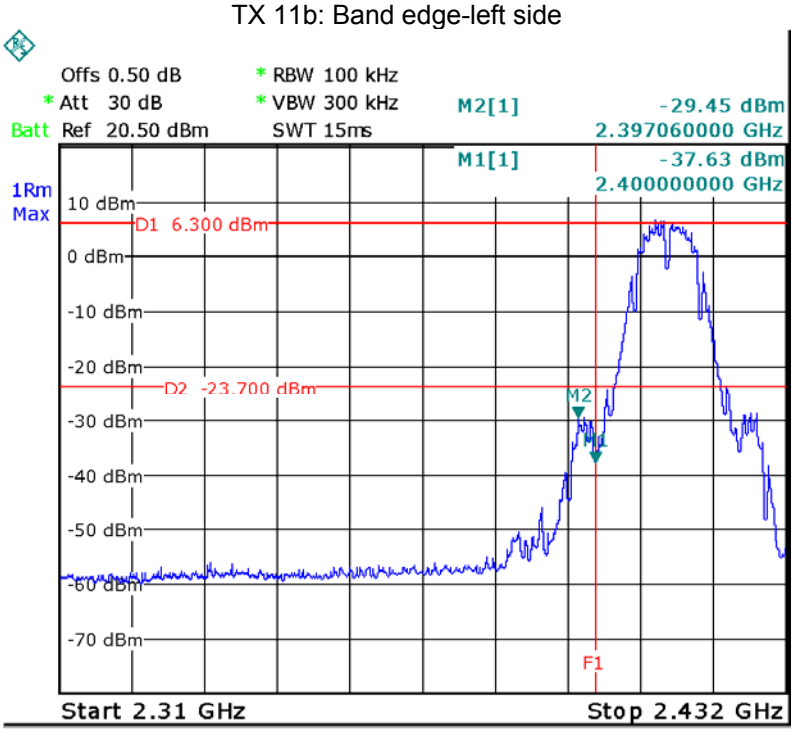
## 11.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

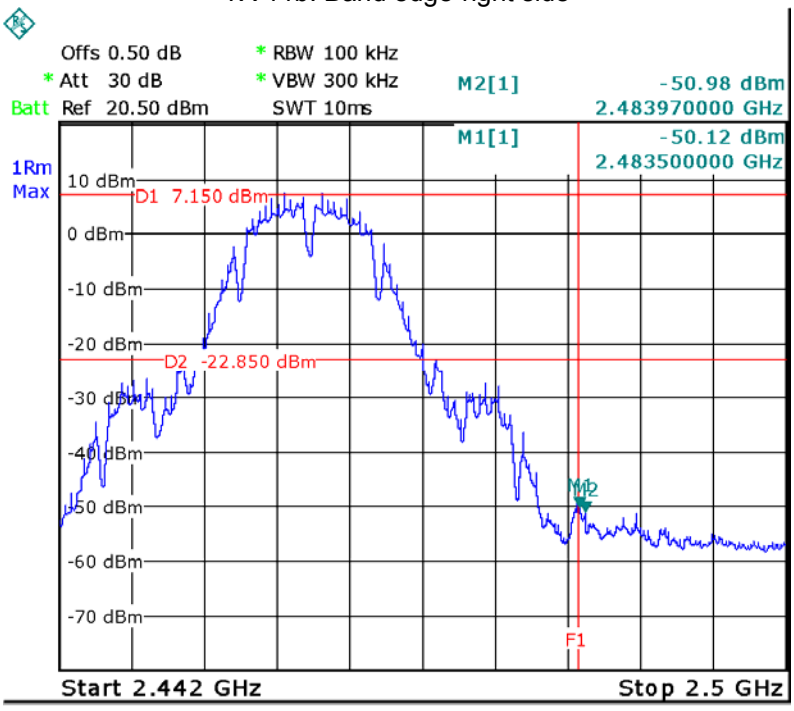
## 11.2 Test Result

Test result plots shown as follows:

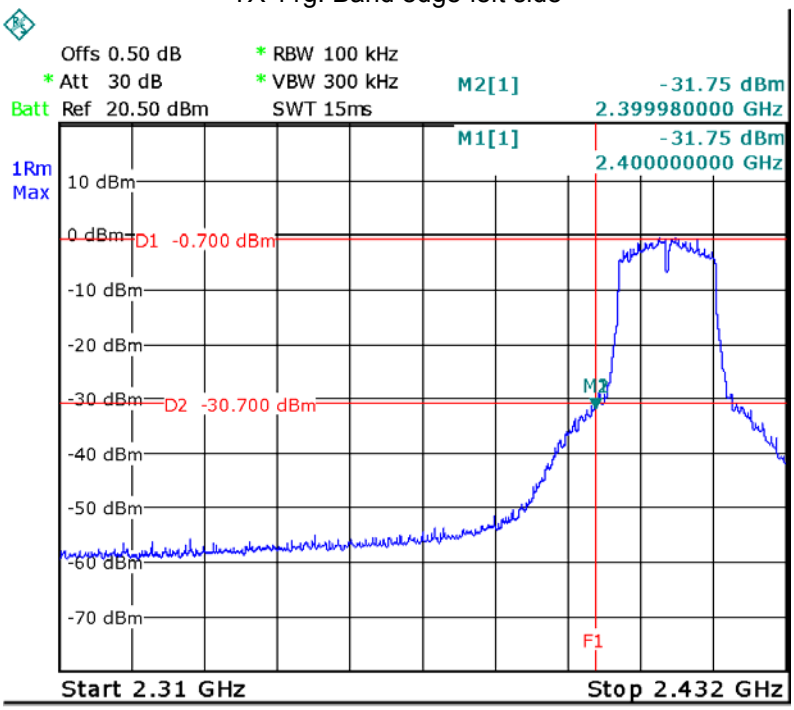
TX 11b: Band edge-left side



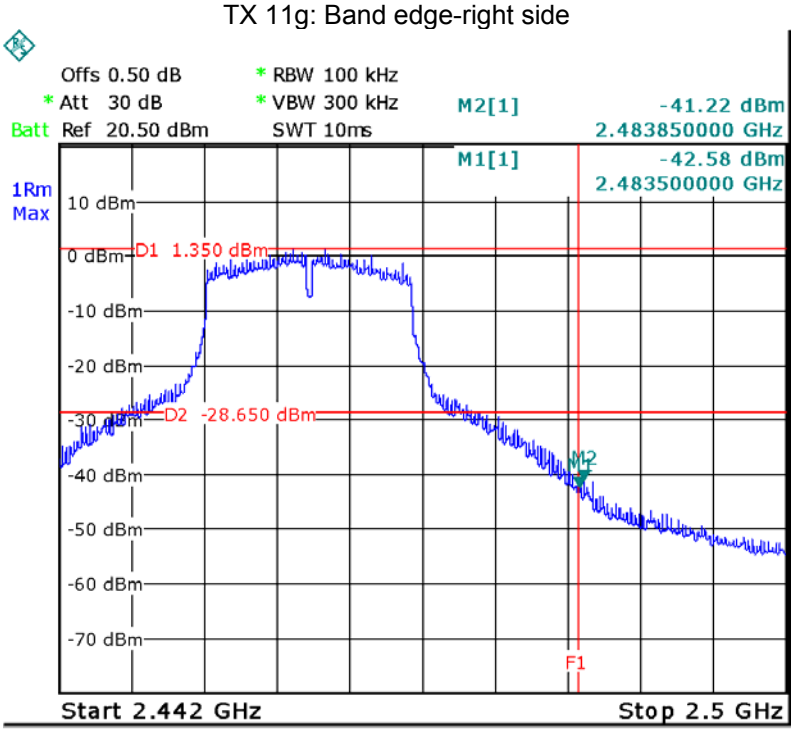

TX 11b: Band edge-right side



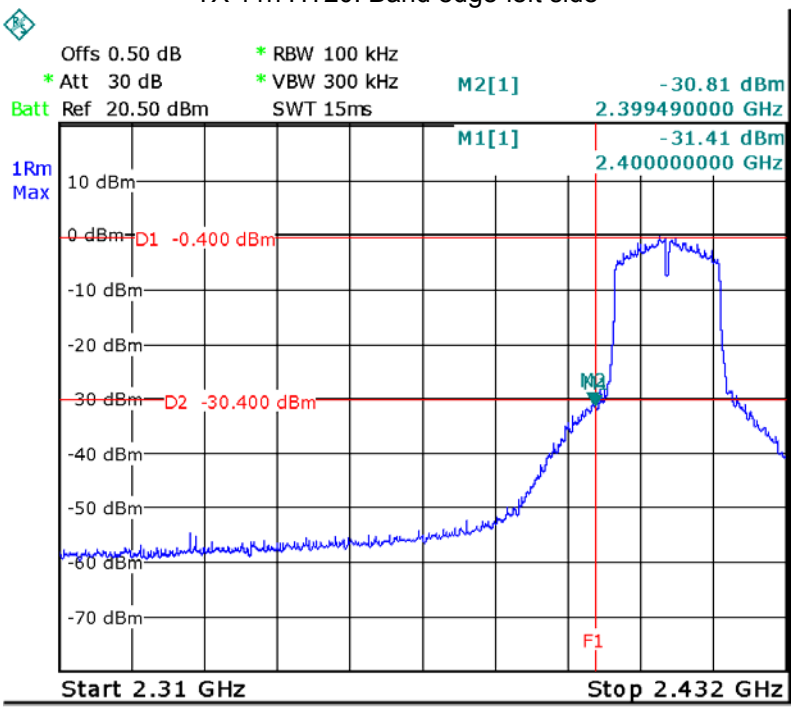
TX 11g: Band edge-left side



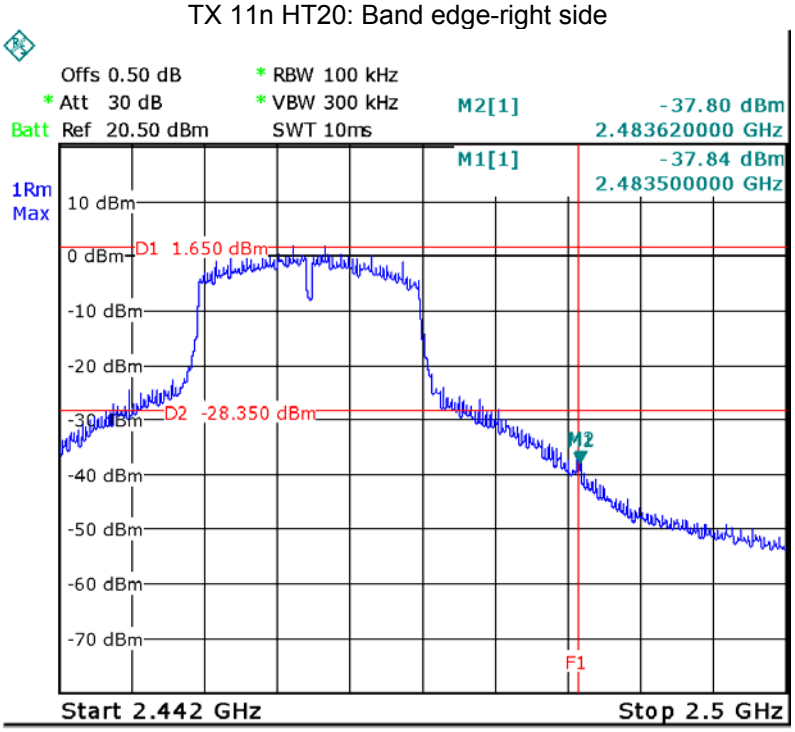

TX 11g: Band edge-right side



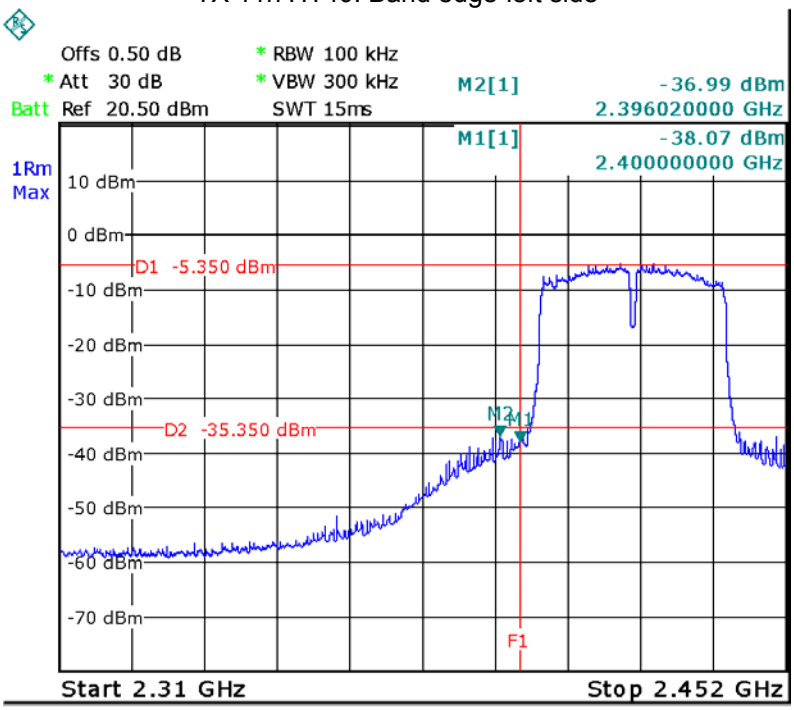
TX 11n HT20: Band edge-left side



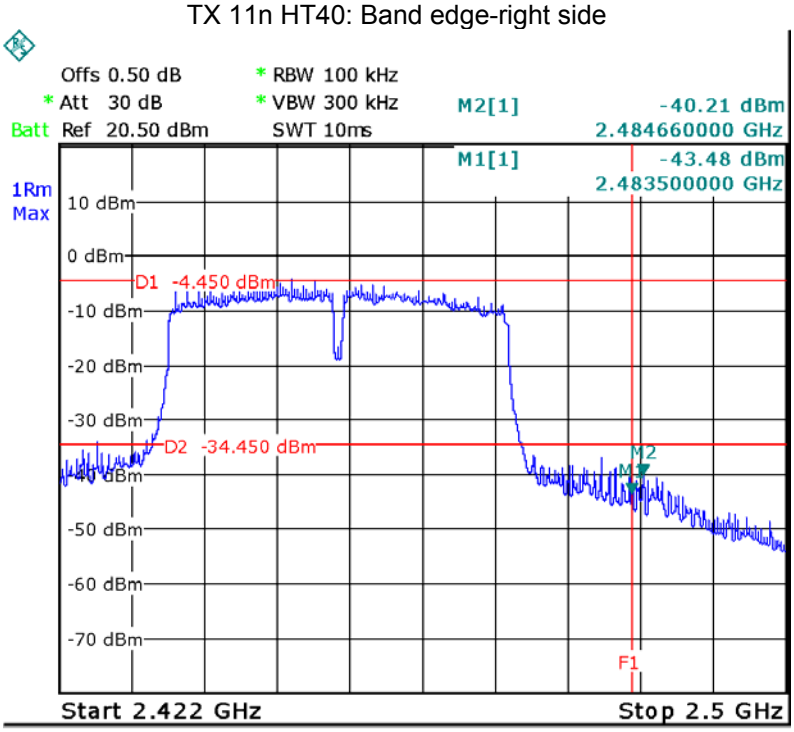

TX 11n HT20: Band edge-right side



TX 11n HT40: Band edge-left side




TX 11n HT40: Band edge-right side



# 12 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10:2013

## 12.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

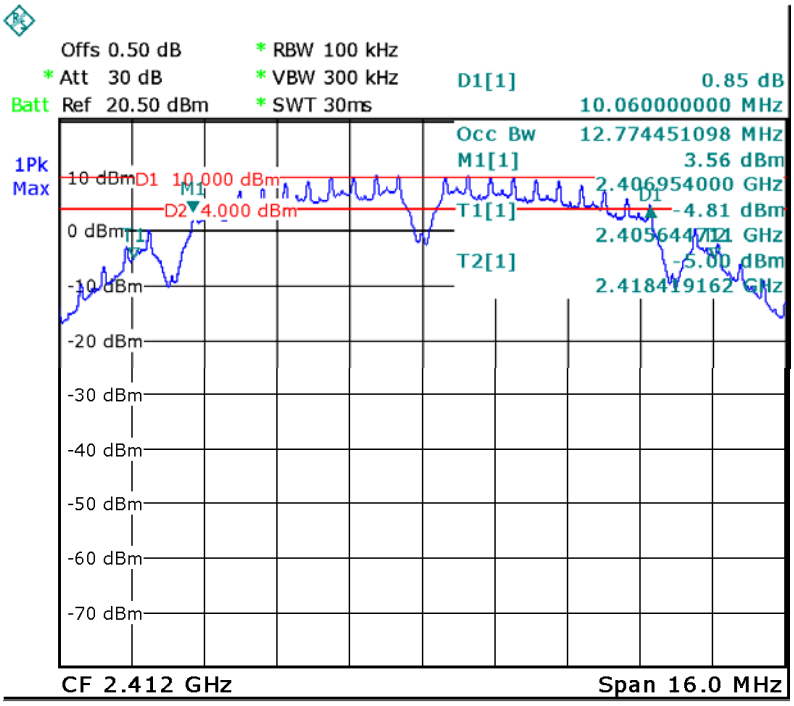
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

## 12.2 Test Result:

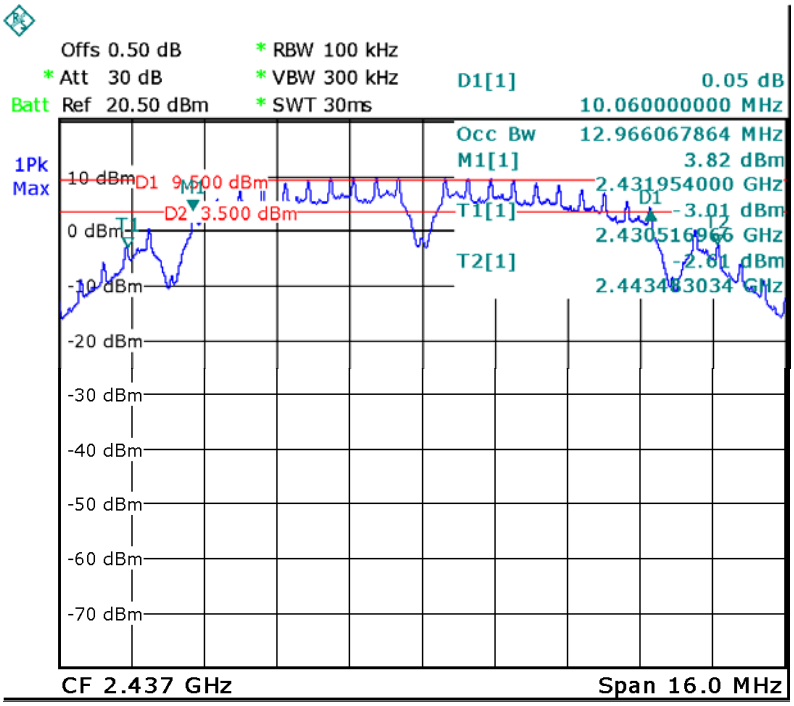
| Operation mode | Test Channel | Bandwidth (MHz) |
|---|---|---|
| TX 11b | Channel 1 | 10.060 |
| | Channel 6 | 10.060 |
| | Channel 11 | 10.060 |
| TX 11g | Channel 1 | 15.830 |
| | Channel 6 | 15.473 |
| | Channel 11 | 15.665 |
| TX 11n HT20 | Channel 1 | 16.365 |
| | Channel 6 | 16.118 |
| | Channel 11 | 16.118 |
| TX 11n HT40 | Channel 3 | 35.350 |
| | Channel 6 | 35.440 |
| | Channel 9 | 35.320 |

**Test result plot:**

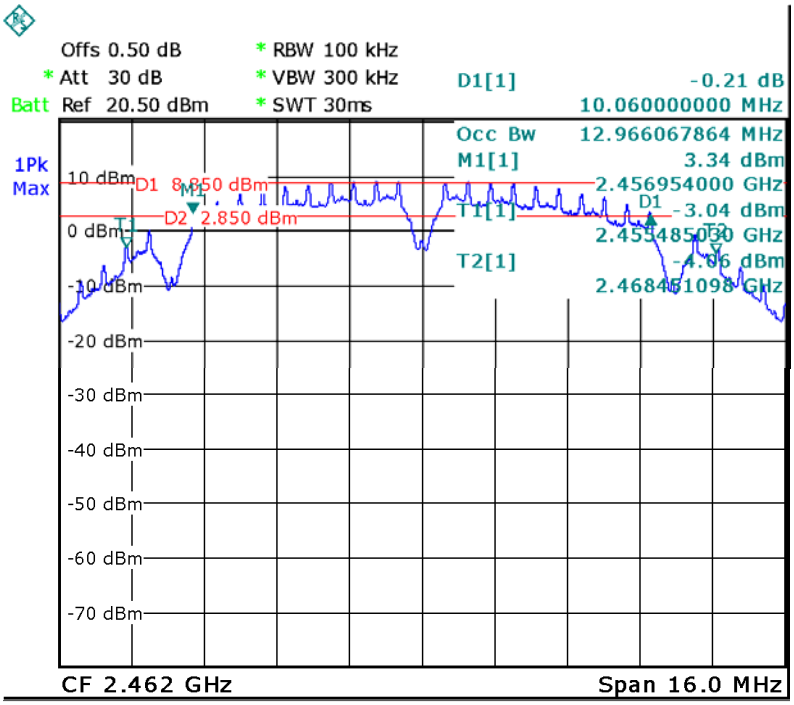
Mode: TX 11b channel 1



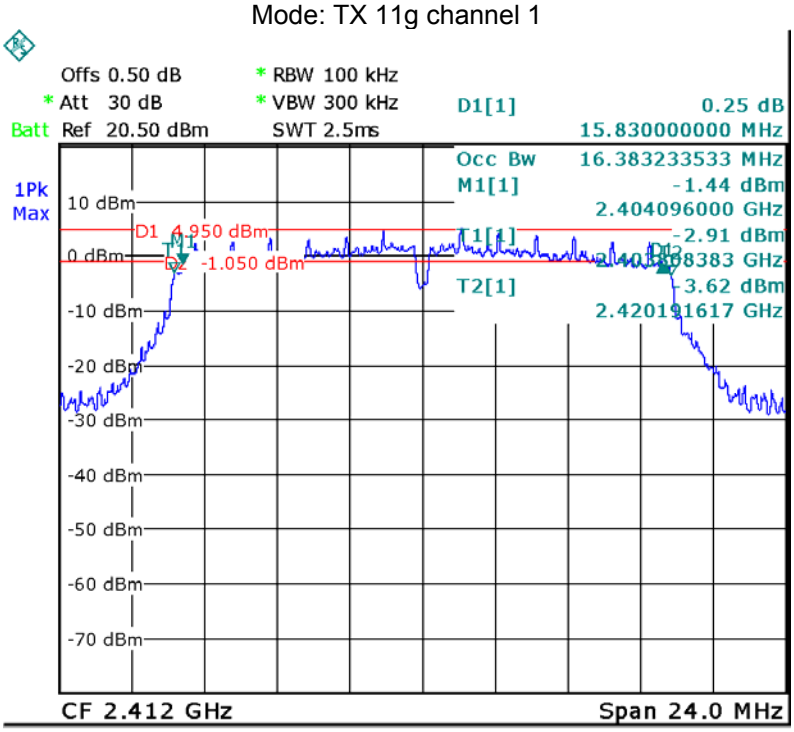

Mode: TX 11b channel 6



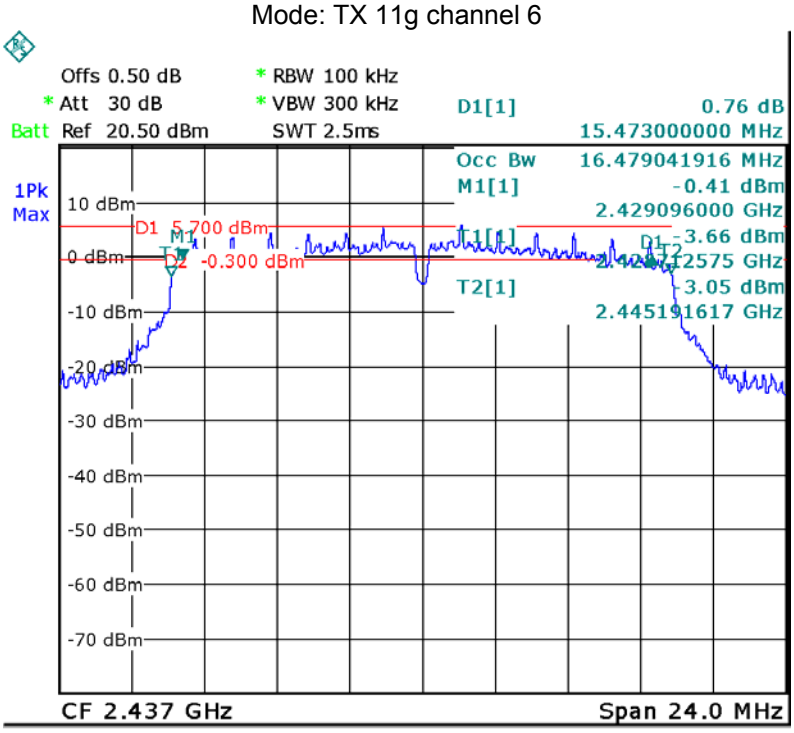
Mode: TX 11b channel 11



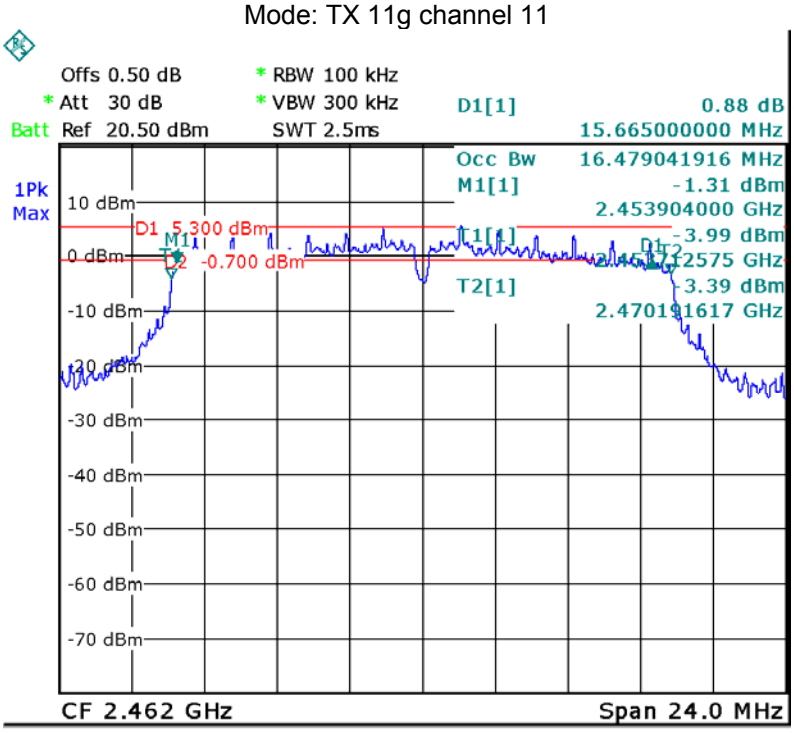

Mode: TX 11g channel 1



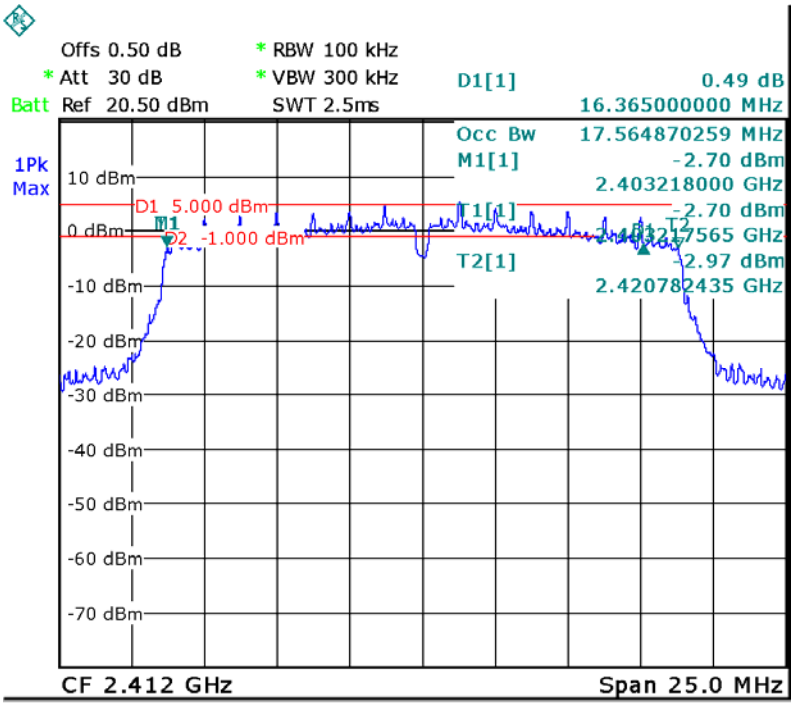
Mode: TX 11g channel 6



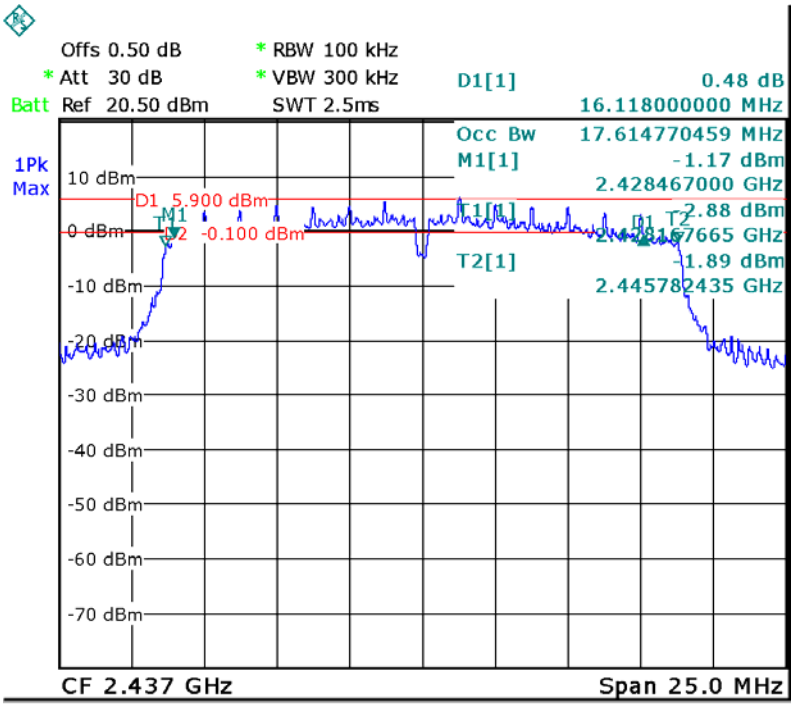

Mode: TX 11g channel 11



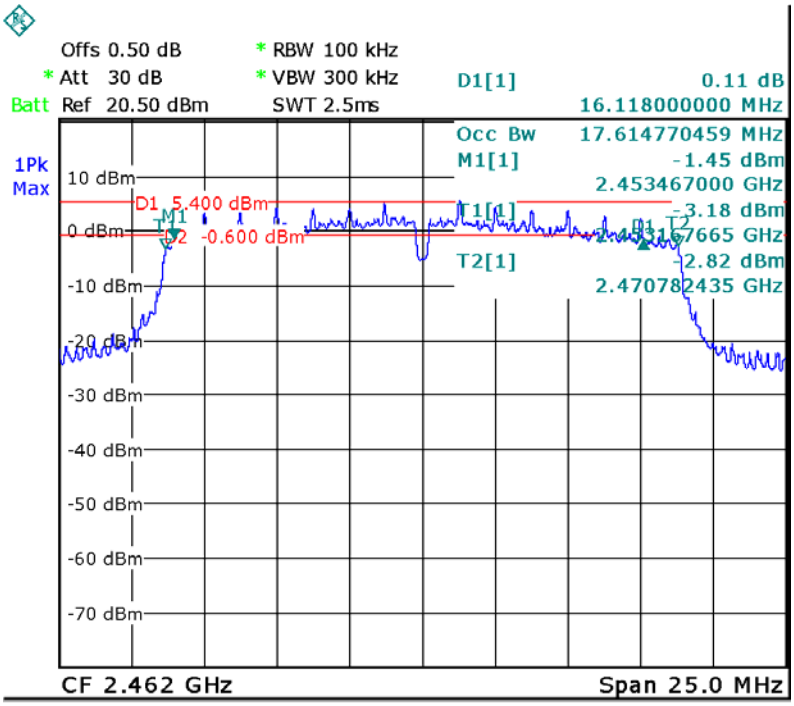
Mode: TX 11n HT20 channel 1



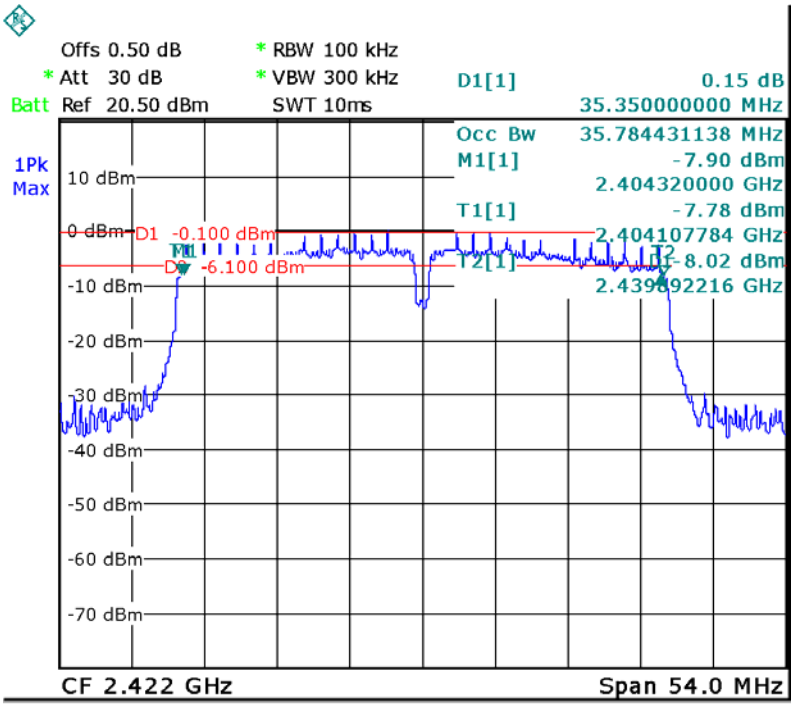

Mode: TX 11n HT20 channel 6



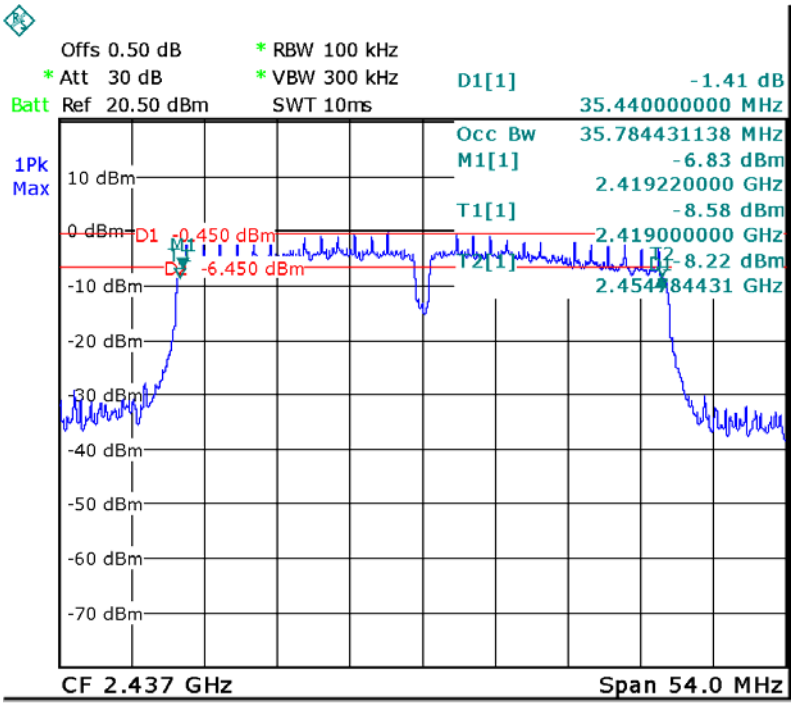
Mode: TX 11n HT20 channel 11



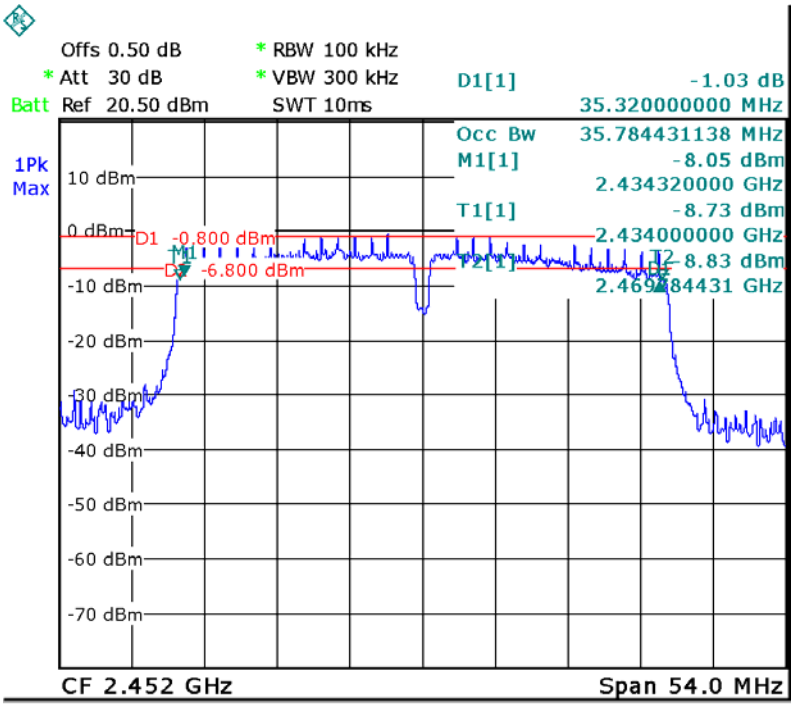

Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6




Mode: TX 11n HT40 channel 9



# 13 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10:2013

## 13.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018

section 9.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a)Set the RBW ≥ DTS bandwidth.

b)Set VBW ≥ 3 RBW.

c)Set span ≥ 3 x RBW

d)Sweep time = auto couple.

e)Detector = peak.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

h)Use peak marker function to determine the peak amplitude level.

section 9.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a)Set the RBW = 1 MHz.

b)Set the VBW ≥ 3 RBW

c)Set the span ≥ 1.5 x DTS bandwidth.

d)Detector = peak.

e)Sweep time = auto couple.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

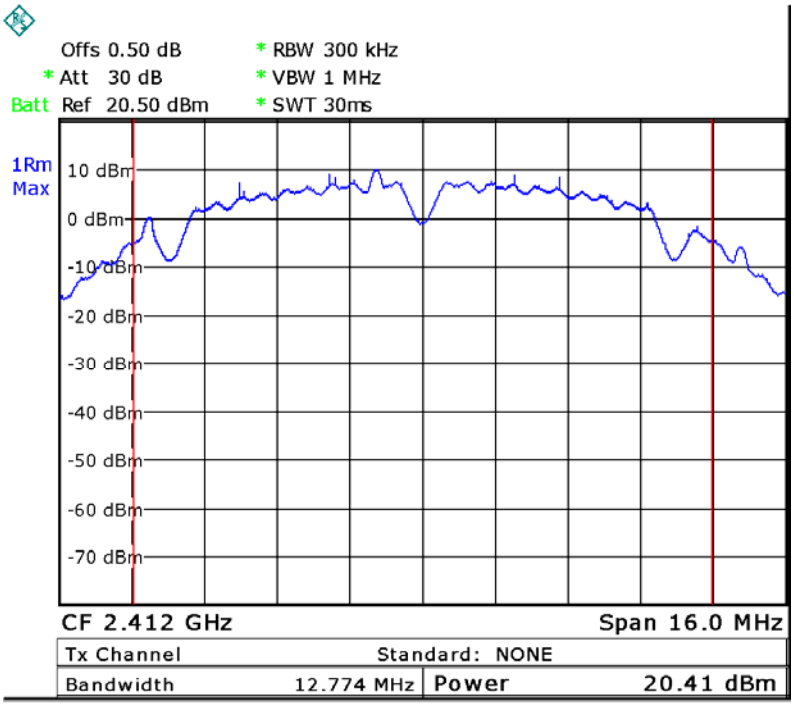
h)Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

## 13.2 Test Result:

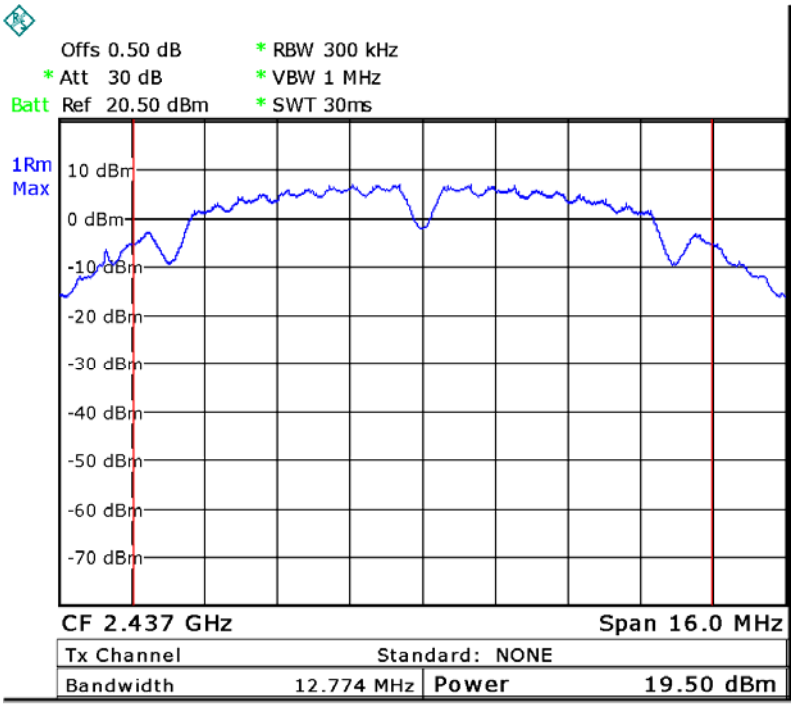
| Operation mode | Channel Frequency (MHz) | Maximum Peak Output Power (dBm) | Limit |
|---|---|---|---|
| TX 11b | Low-2412 | 20.41 | 1W/30dBm |
| | Middle-2437 | 19.50 | 1W/30dBm |
| | High-2462 | 19.26 | 1W/30dBm |
| TX 11g | Low-2412 | 20.35 | 1W/30dBm |
| | Middle-2437 | 20.10 | 1W/30dBm |
| | High-2462 | 19.76 | 1W/30dBm |
| TX 11n HT20 | Low-2412 | 18.66 | 1W/30dBm |
| | Middle-2437 | 19.74 | 1W/30dBm |
| | High-2462 | 19.67 | 1W/30dBm |
| TX 11n HT40 | Low-2422 | 15.55 | 1W/30dBm |
| | Middle-2437 | 15.30 | 1W/30dBm |
| | High-2452 | 15.03 | 1W/30dBm |

**Test Plot**

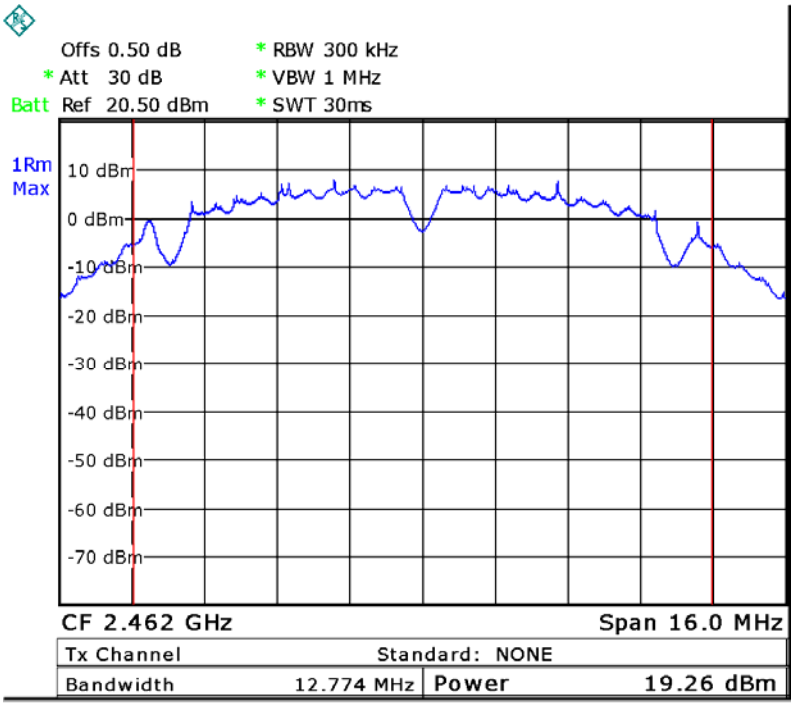
Mode: TX 11b channel 1



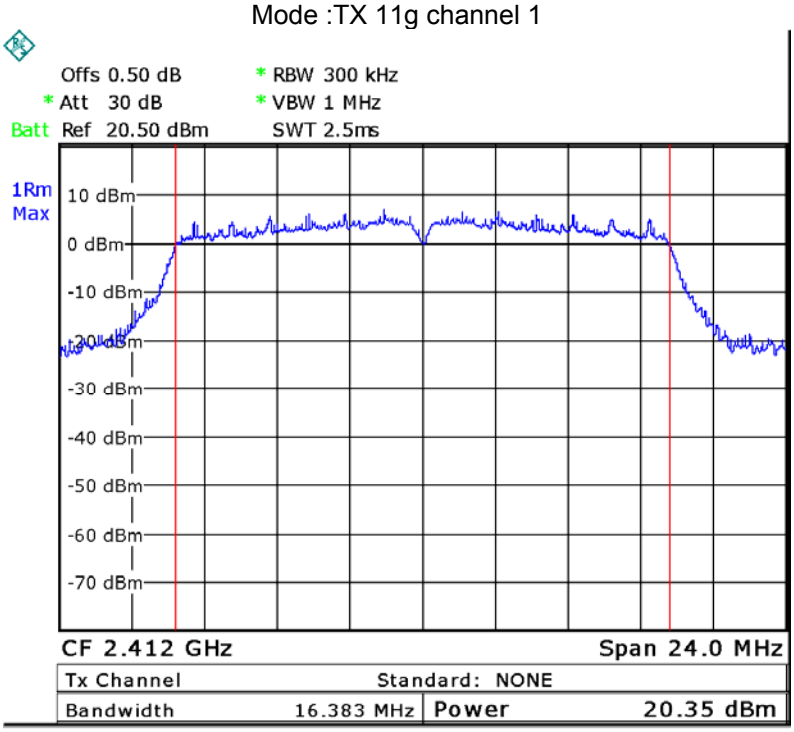

Mode: TX 11b channel 6



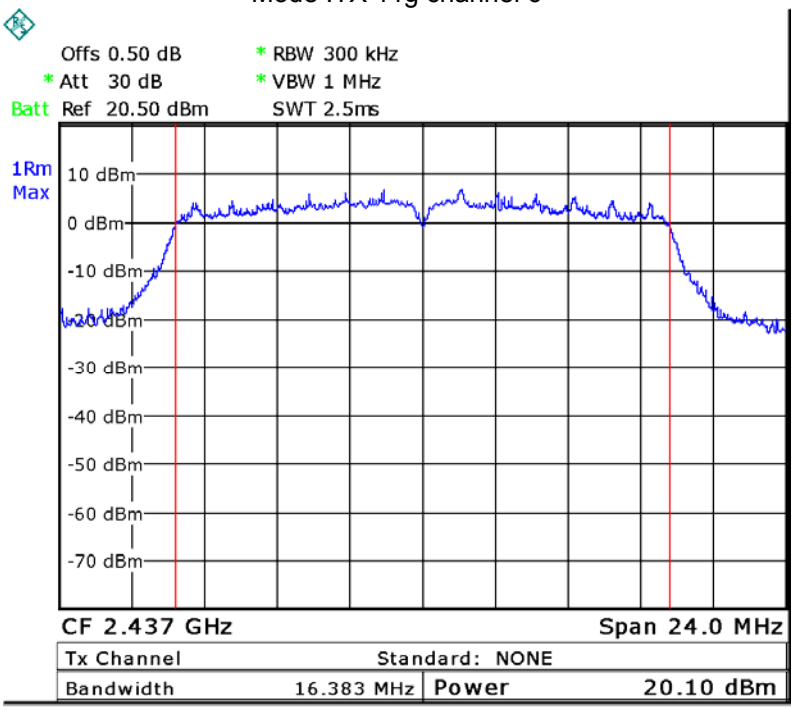
Mode: TX 11b channel 11



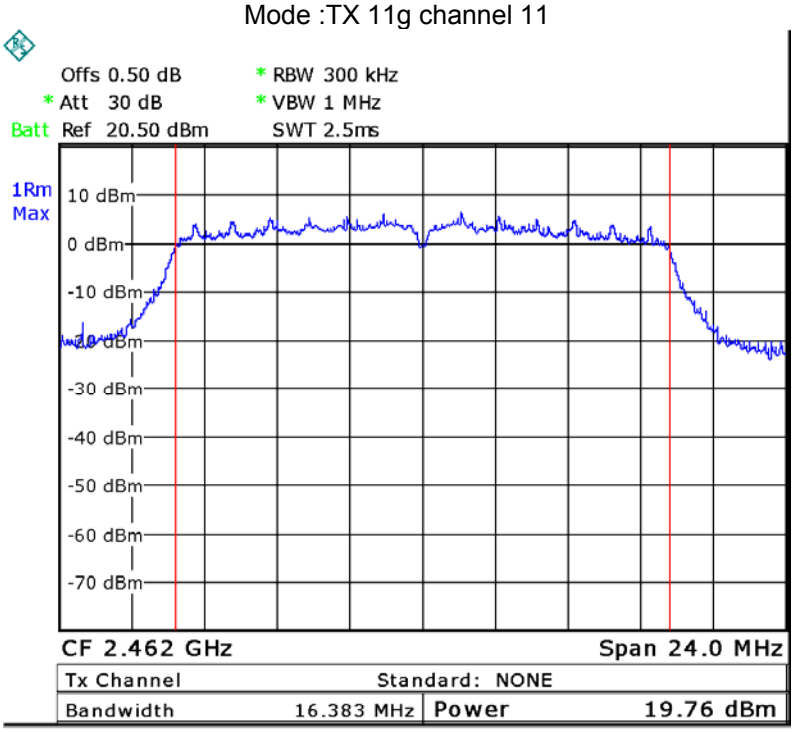

Mode :TX 11g channel 1



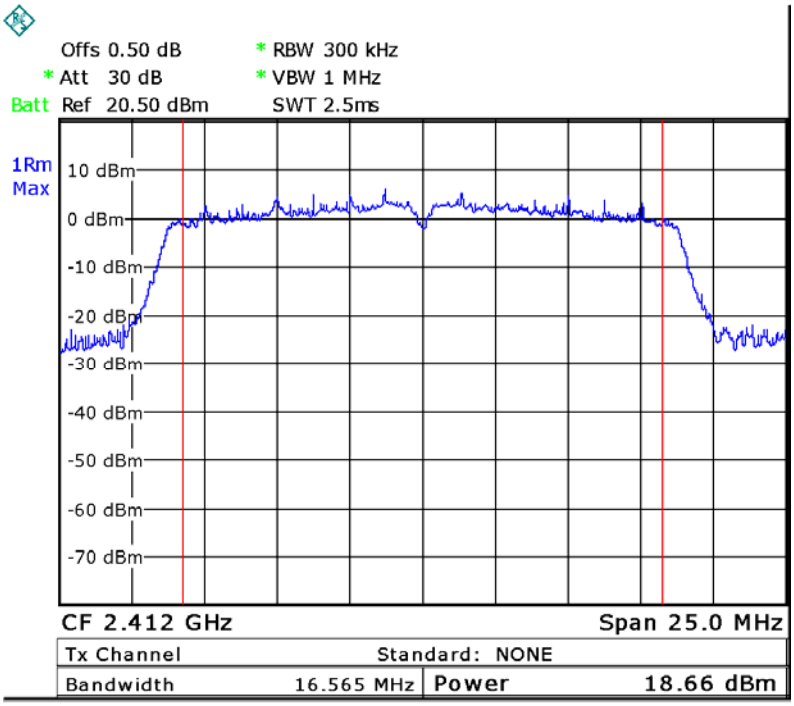
Mode :TX 11g channel 6



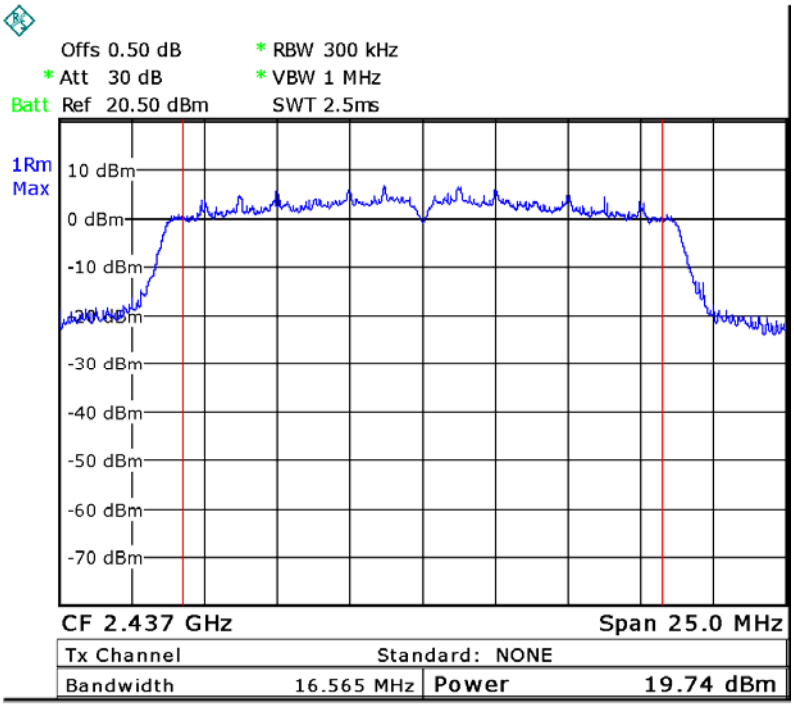

Mode :TX 11g channel 11



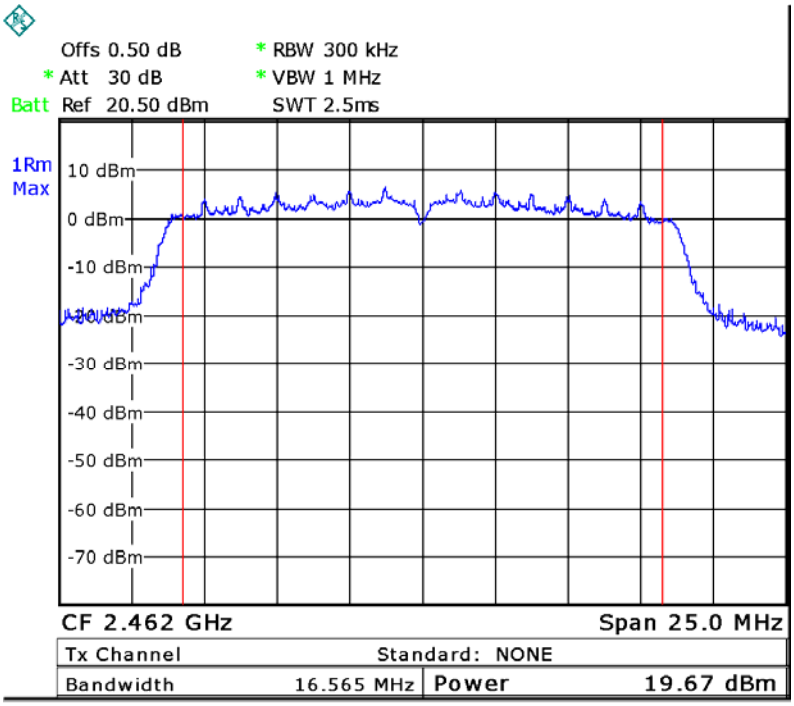
Mode: TX 11n HT20 channel 1



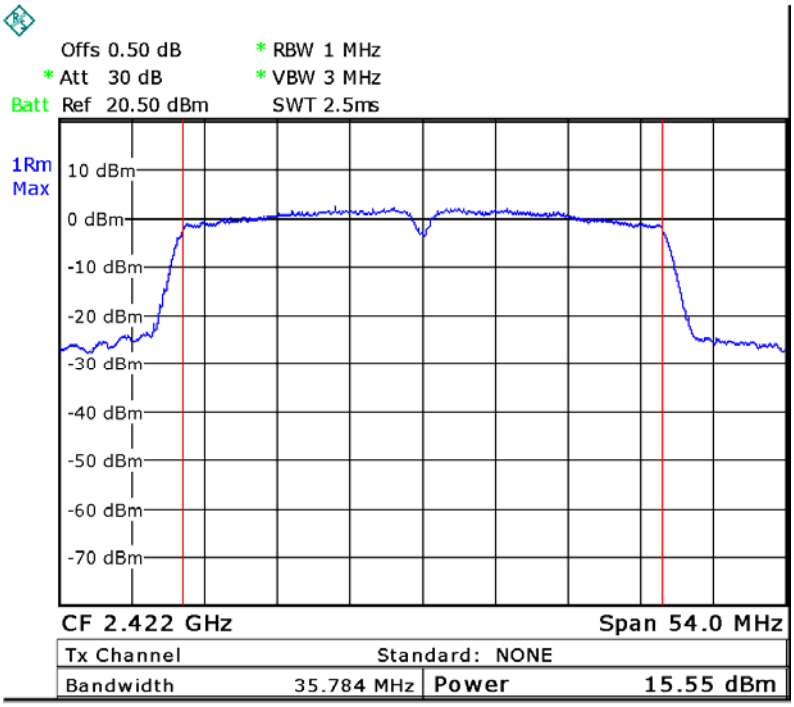

Mode: TX 11n HT20 channel 6



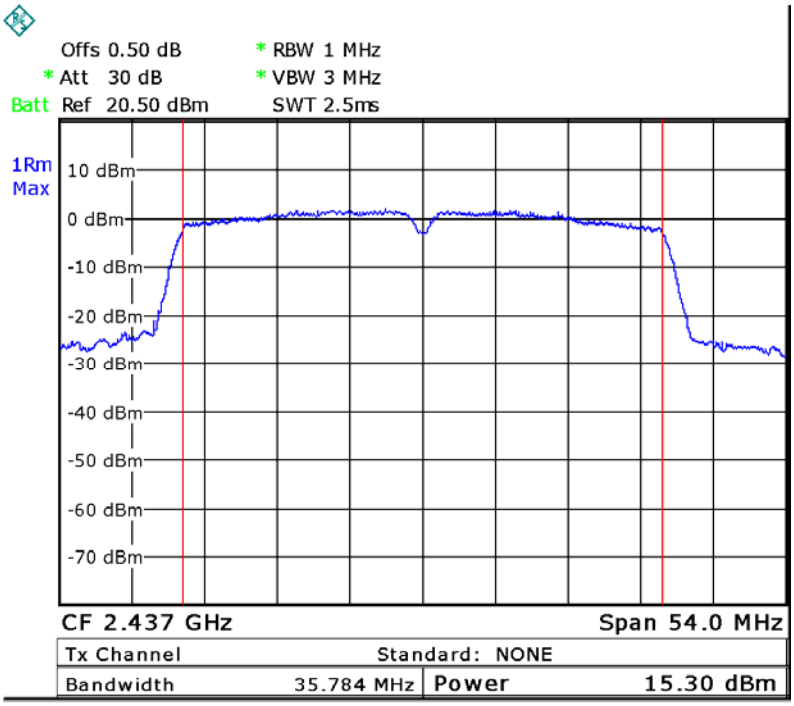
Mode: TX 11n HT20 channel 11



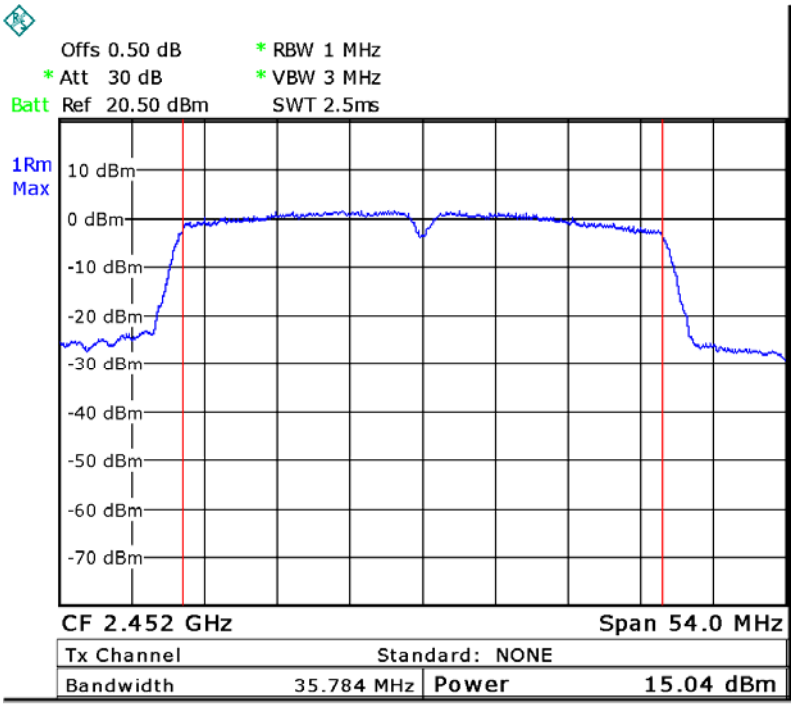

Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6




Mode: TX 11n HT40 channel 9



# 14 Duty cycle

| | |
|---|---|
| Test Requirement: | FCC CFR47 Part 15 Section 15.247 |
| Test Method: | ANSI C63.10: 2013 |
| Test Limit: | N/A |
| Test Result: | PASS |
| Remark: | EUT transmitting continuously |

# 15 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10:2013

## 15.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018 section 10.2

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

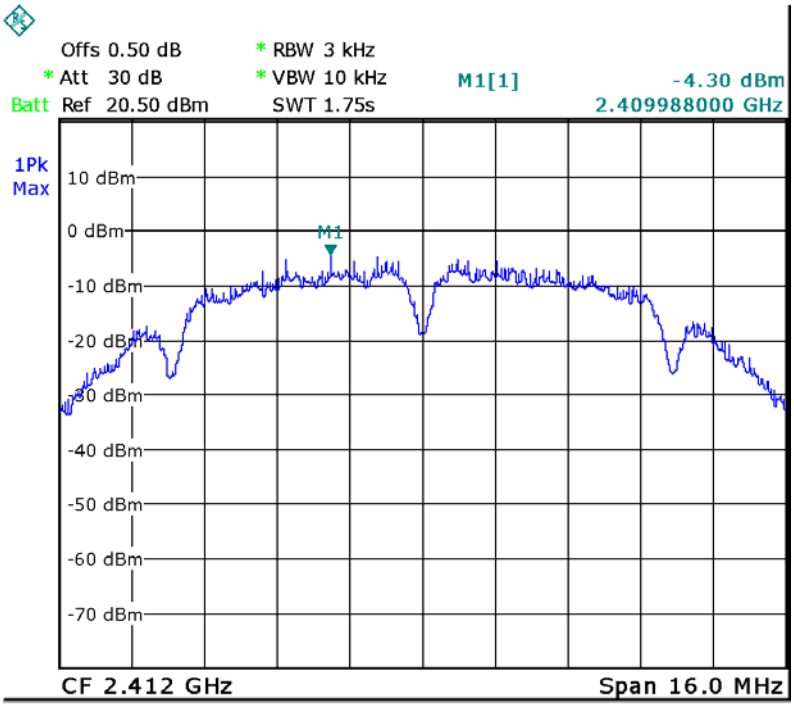
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

## 15.2 Test Result:

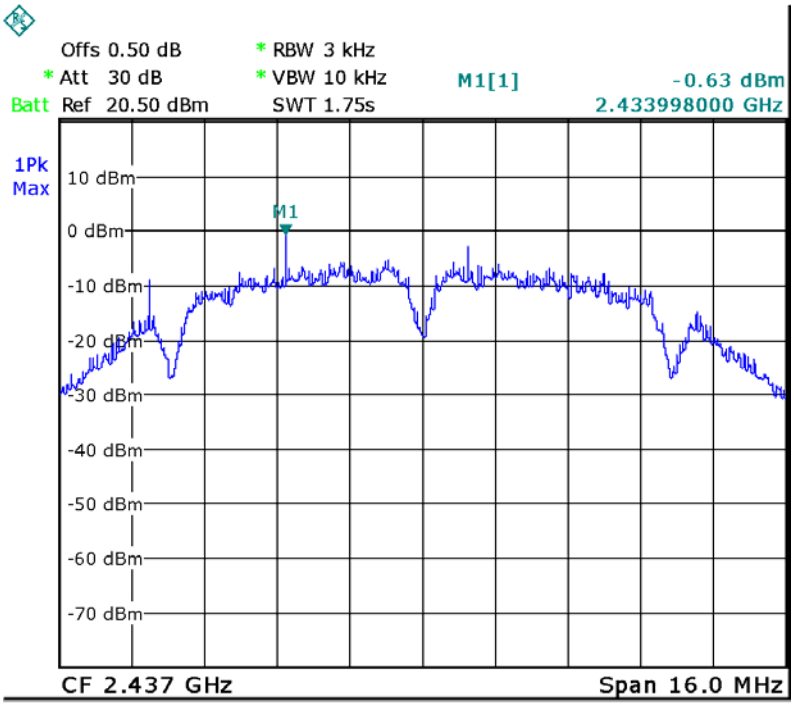
| Operation mode | Channel Frequency (MHz) | Power Spectral (dBm per 3kHz) | Limit |
|---|---|---|---|
| TX 11b | Low-2412 | -4.30 | 8dBm per 3kHz |
| | Middle-2437 | -0.63 | 8dBm per 3kHz |
| | High-2462 | -5.41 | 8dBm per 3kHz |
| TX 11g | Low-2412 | -8.43 | 8dBm per 3kHz |
| | Middle-2437 | -9.32 | 8dBm per 3kHz |
| | High-2462 | -8.56 | 8dBm per 3kHz |
| TX 11n HT20 | Low-2412 | -9.87 | 8dBm per 3kHz |
| | Middle-2437 | -7.67 | 8dBm per 3kHz |
| | High-2462 | -9.94 | 8dBm per 3kHz |
| TX 11n HT40 | Low-2422 | -15.08 | 8dBm per 3kHz |
| | Middle-2437 | -14.45 | 8dBm per 3kHz |
| | High-2452 | -15.63 | 8dBm per 3kHz |

**Test Plot**

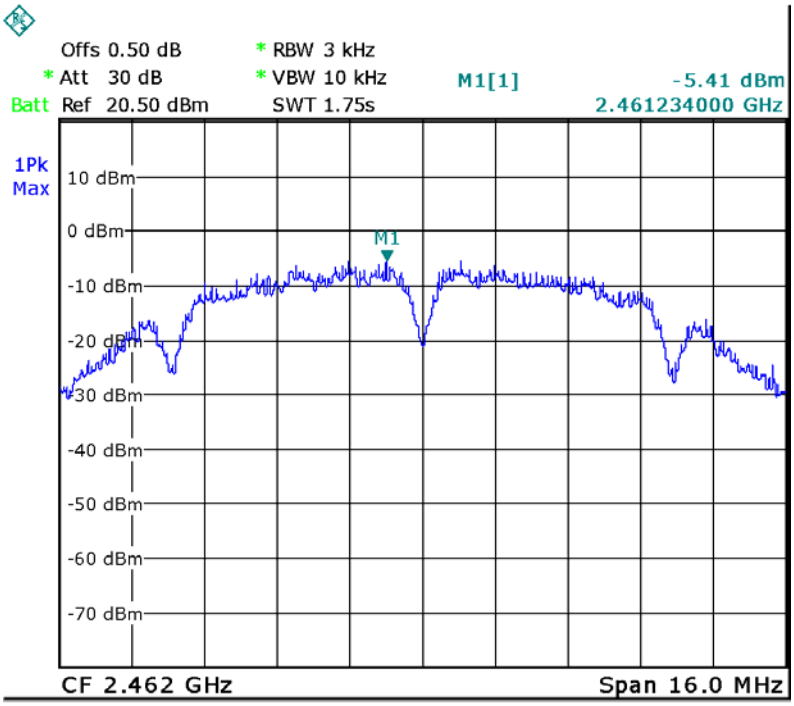
Mode: TX 11b channel 1



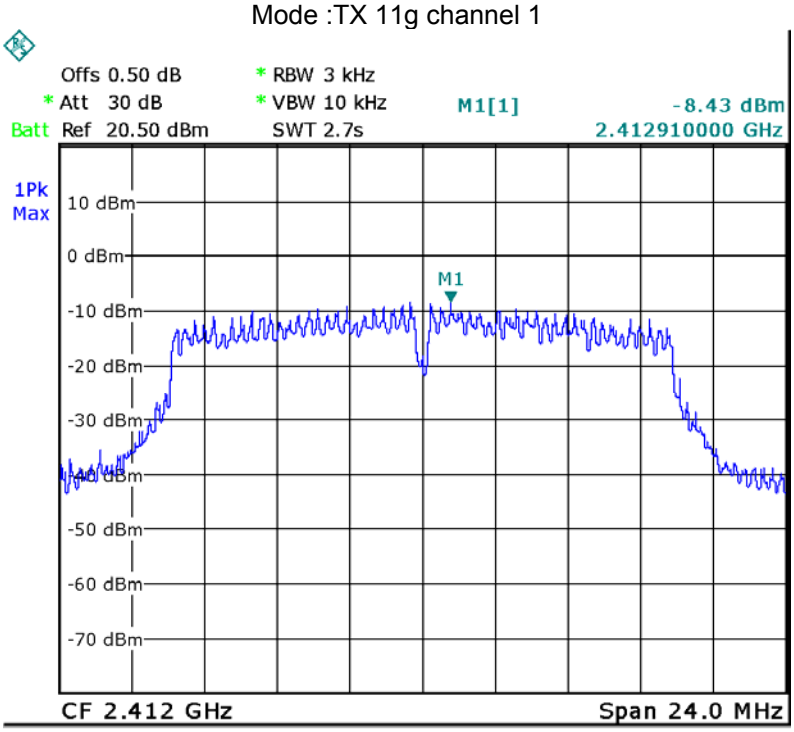

Mode: TX 11b channel 6



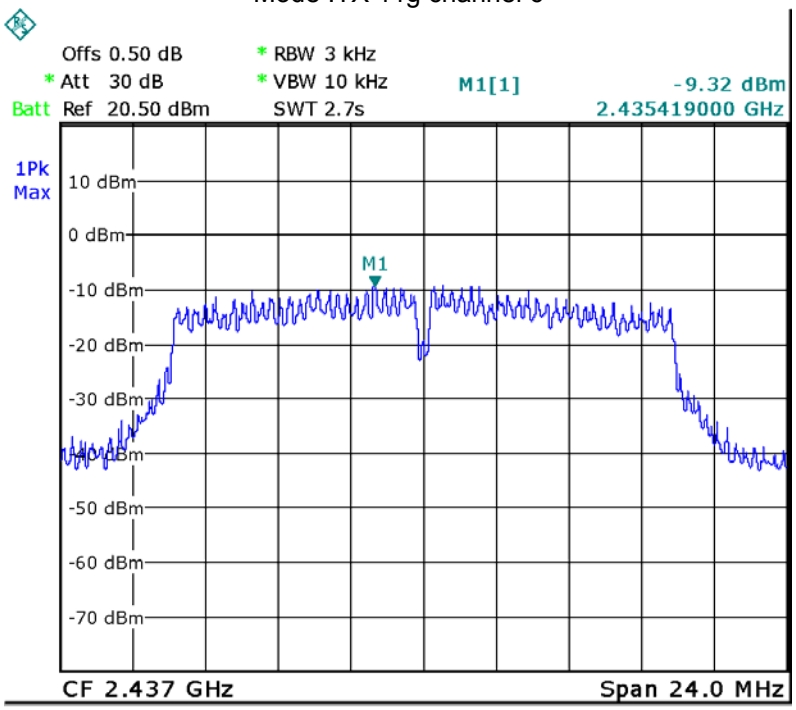
Mode: TX 11b channel 11



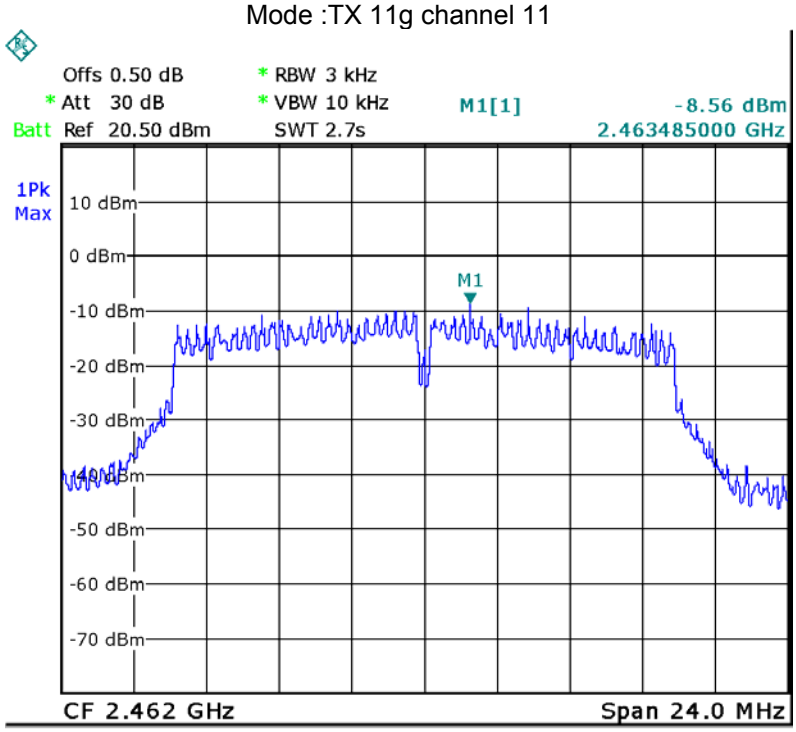

Mode :TX 11g channel 1



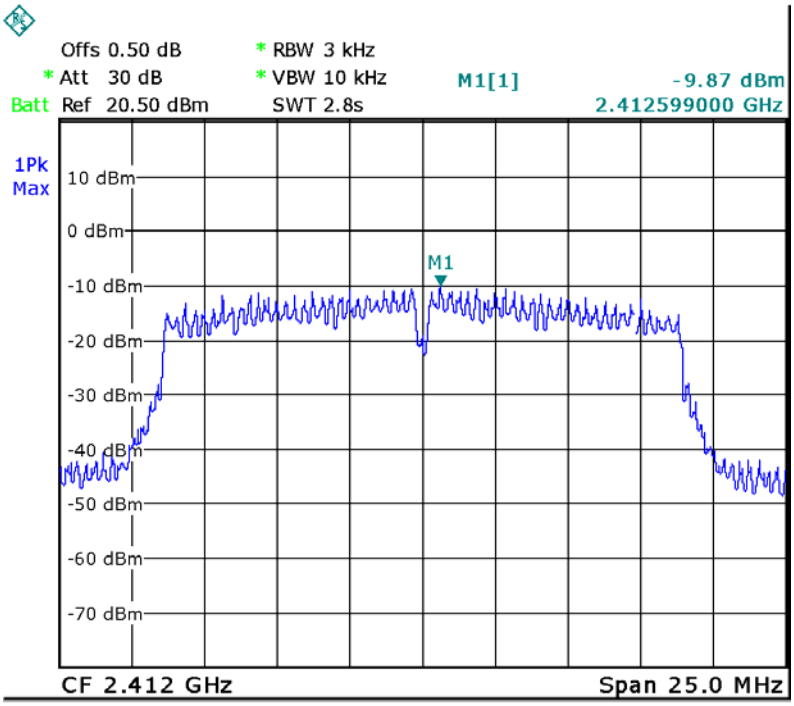
Mode :TX 11g channel 6



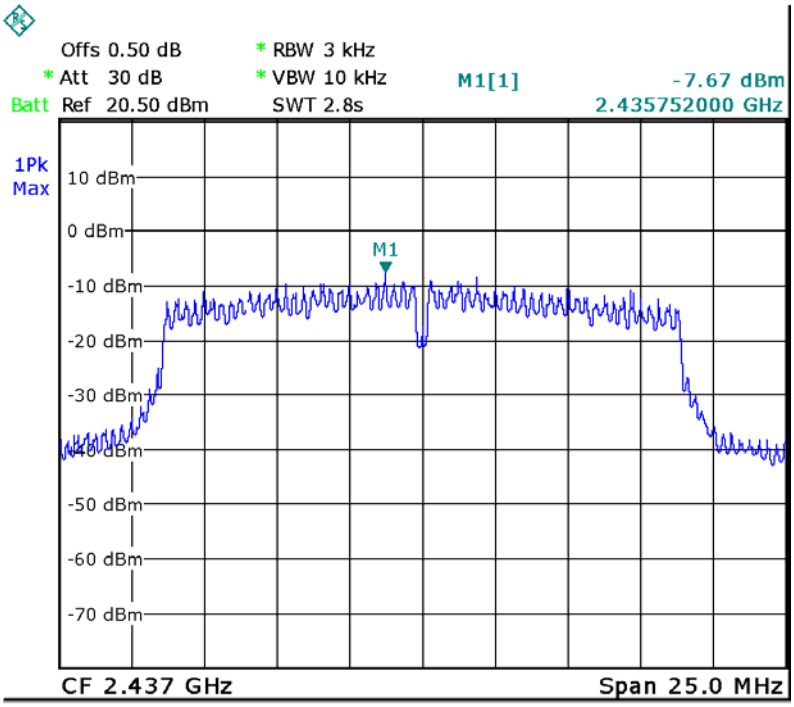

Mode :TX 11g channel 11



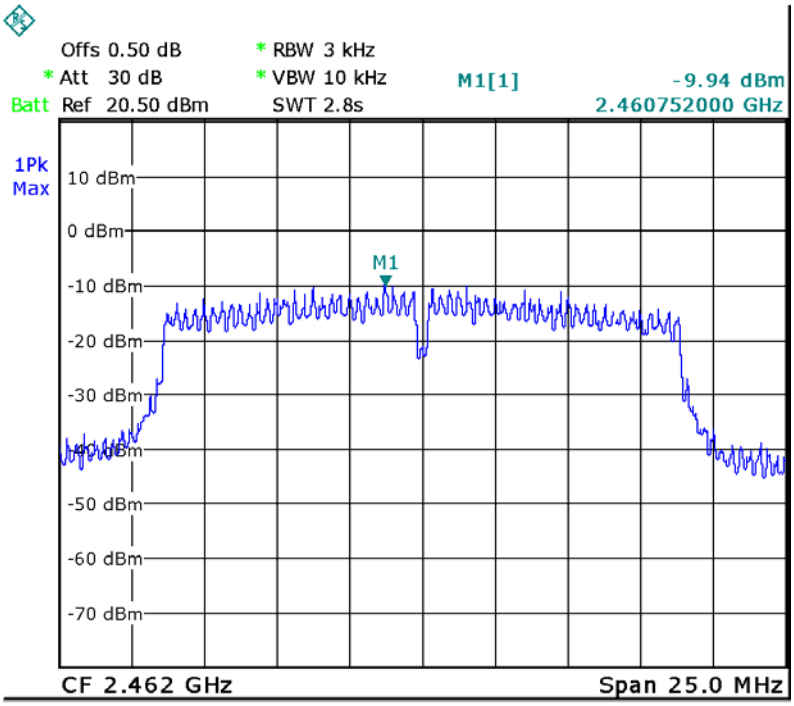
Mode: TX 11n HT20 channel 1



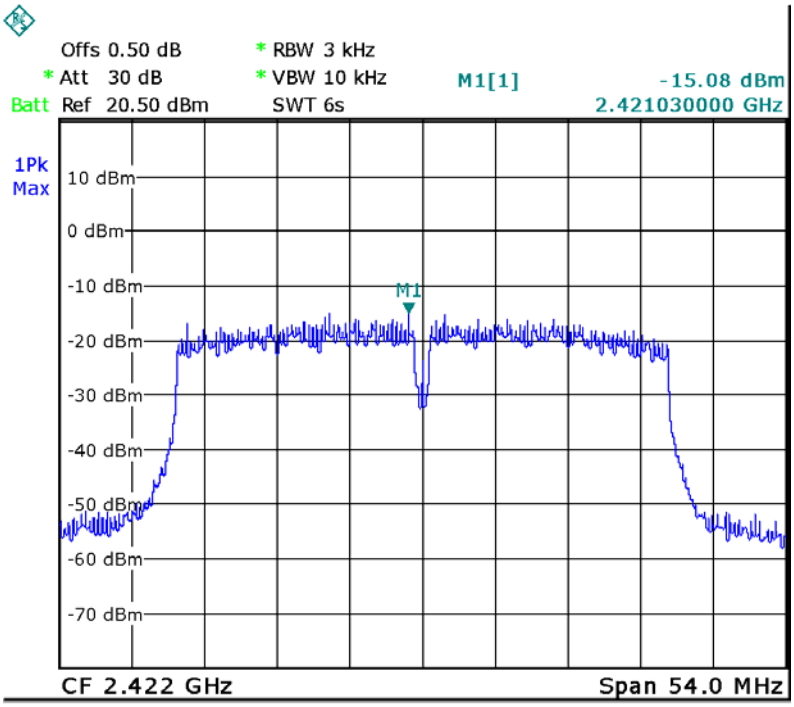

Mode: TX 11n HT20 channel 6



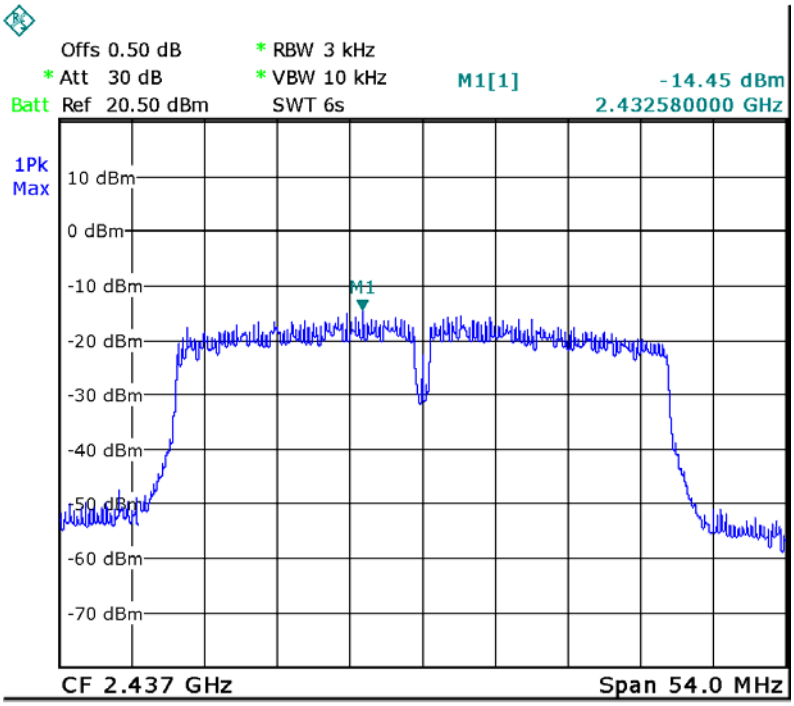
Mode: TX 11n HT20 channel 11



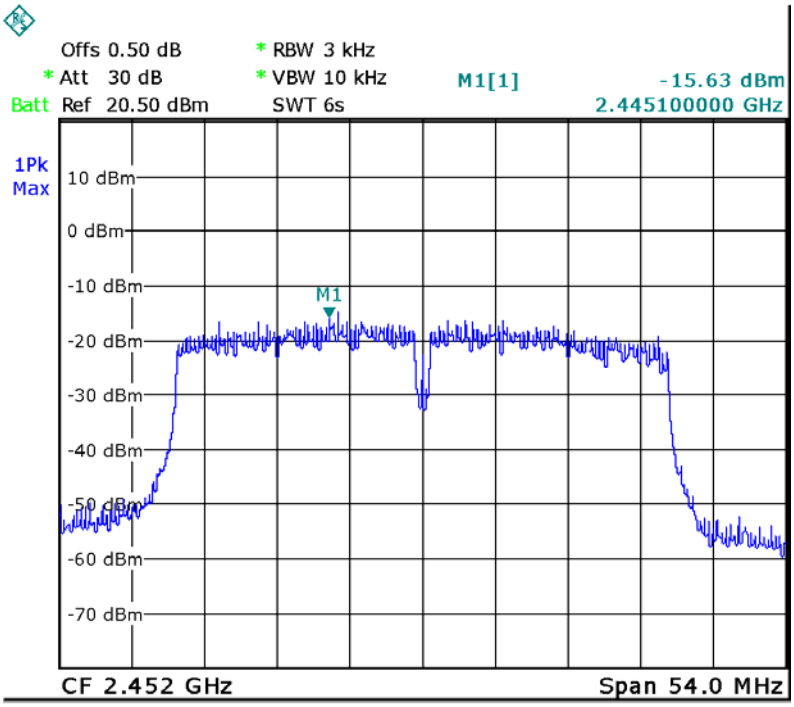

Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6




Mode: TX 11n HT40 channel 9



# 16 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has an integrated antenna fulfill the requirement of this section.

# 17 RF Exposure

Remark: Please refer to SAR test report: WTS18S12133148-1W.

# 18 Photographs of test setup and EUT.

Note: Please refer to appendix: WTS18S12133148W_Photo.

======End of Report======