**Produkte**
*Products*

| | | |
|---|---|---|
| **Prüfbericht - Nr.:** *Test Report No.:* | **19660379 001** | **Seite 1 von 85** *Page 1 of 85* |
| **Auftraggeber:** *Client:* | **The Kroger Co.<br>11450 Grooms Rd.,<br>Blue Ash, OH 45242,<br>United States** | |
| **Gegenstand der Prüfung:** *Test item:* | **Gen 3 Zooter** | |
| **Bezeichnung:** *Identification:* | **SRG3APWC** | **Serien-Nr.:** *Serial No.* Engineering Sample |
| **Wareneingangs-Nr.:** *Receipt No.:* | **1803307436** | **Eingangsdatum:** *Date of receipt:* 16.03.2018 |
| **Prüfort:** *Testing location:* | **Refer Page 5 of 85 for test facilities** | |
| **Prüfgrundlage:** *Test specification:* | **FCC Part 15 Subpart C 15.247<br>ANSI C63.10-2013** | |
| **Prüfergebnis:** *Test Result:* | **Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).**<br>*The test items passed the test specification(s).* | |
| **Prüflaboratorium:** *Testing Laboratory:* | **TÜV Rheinland (India) Pvt. Ltd.**<br>27/B, 2nd corss, Electronic City Phase 1<br>Bangalore – 560 100. India<br>FCC Test Site Registration no.: **496599** | |

| **geprüft** / *tested by:* | | | **kontrolliert** / *reviewed by:* | | |
|---|---|---|---|---|---|
| 16.03.2018 | Girish Kumar G<br>Engineer | | 04.06.2018 | Saibaba Siddapur<br>Assistant Manager | |
| **Datum**<br>*Date* | **Name/Stellung**<br>*Name/Position* | **Unterschrift**<br>*Signature* | **Datum**<br>*Date* | **Name/Stellung**<br>*Name/Position* | **Unterschrift**<br>*Signature* |

**Sonstiges** /*Other Aspects:* **FCC ID :PBR-SZG3APWC, On receipt the equipment was in good condition**

| ***Abkürzungen:*** | | | | ***Abbreviations:*** | | | |
|---|---|---|---|---|---|---|---|
| ***P(ass)*** | = | ***entspricht Prüfgrundlage*** | | ***P(ass)*** | = | ***passed*** | |
| ***F(ail)*** | = | ***entspricht nicht Prüfgrundlage*** | | ***F(ail)*** | = | ***failed*** | |
| ***N/A*** | = | ***nicht anwendbar*** | | ***N/A*** | = | ***not applicable*** | |
| ***N/T*** | = | ***nicht getestet*** | | ***N/T*** | = | ***not tested*** | |

**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**

*This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.*



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CIN: U72501KA1996PTC020653

**TEST SUMMARY**

| Section | Test item | Result | Remarks |
|---|---|---|---|
| 15.247 (b) (3) | Maximum Conducted Output Power | Pass | **Gen 3 Zooter** contains both FCC uncertified and certified radio modules, hence antenna port measurements of certified modules are excluded. Refer FCC ID of the certified radio modules listed in the below table. |
| 15.247 (a) (2) | 6 dB / DTS Bandwidth | Pass | |
| 15.247 (e) | Maximum Power Spectral Density | Pass | |
| 15.247 (d) | Emissions in non – restricted band | Pass | |
| 15.247 (a)(1) | Conducted Spurious Emissions | Pass | |
| 15.247 (d) / (15.209 & 15.205) | Restricted bands of Emissions and Restricted Bands of Operation. | Pass | |
| 15.207 | Conducted emission on A.C power lines | NA | |

*** -> RF power verified**
**NA -> Not Applicable, as DUT will power on over PoE**

**Gen 3 Zooter** has integrated with following certified radio modules:

| Sl No. | Radio Protocol | FCC ID | Tested By | Report Number |
|---|---|---|---|---|
| 1 | ZigBee | PBR-SZMDLNR1 | TUV Rheinland India | 01200091 001 |
| 2 | ZigBee | PBR-SZMDLM3BR1 | TUV Rheinland India | 19660372 001 |
| 3 | ZigBee | PBR-SZMDLM3BR1 | TUV Rheinland India | 19660372 001 |
| 4 | BLE | PBR-SZMDLBTNR1 | TUV Rheinland India | 19660373 001 |

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# 1 GENERAL REMARKS

## 1.1 Complimentary Materials

All attachments are integral part of this test report.

**APPENDIX 1:** TEST SETUP PHOTOS

**APPENDIX 2:** EUT EXTERNAL PHOTOS

**APPENDIX 3:** EUT INTERNAL PHOTOS

**APPENDIX 4:** FCC LABEL AND LABEL LOCATION

**APPENDIX 5:** BLOCK DIAGRAM

**APPENDIX 6:** SPECIFICATION OF EUT

**APPENDIX 7**: SCHEMATIC DIAGRAM

**APPENDIX 8**: BILL OF MATERIAL

**APPENDIX 9**: USER MANUAL

**APPENDIX 10**: MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

# 2 TEST SITES

## 2.1 Testing Facilities

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

## 2.2 List of Test and Measurement Instruments

Table 1: Test and measurements instrument used

| Equipment | Manufacturer | Model Name | Serial Number | Calibration Due Date | Periodicity | Used for Test Items |
|---|---|---|---|---|---|---|
| Signal Analyser | Rohde & Schwarz | FSV7 | 101644 | 15.12.2018 | Yearly | Antenna - Port Measurements |
| EMI Test Receiver | Rohde & Schwarz | ESU 40 | 100288 | 24-10-2018 | Yearly | Radiated Spurious Emission |
| Active loop antenna | Frankonia | LAX-10 | LAX-10-800 | 15-01-2019 | Yearly | |
| Biconical Antenna | Schwarzbeck mess-elektronik | VHBB-9124 / BBA-9106 | 9124-656 | 09-01-2019 | Yearly | |
| Log-Periodic Antenna | Schwarzbeck mess-elektronik | VUSLP-9111B | 9111B-111 | 16-01-2019 | Yearly | |
| Broadband Horn Antenna | Frankonia | HAX-18 | HAX18-802 | 16-09-2018 | Yearly | |
| Emission Horn Antenna | ETS Lindgren | 116706 | 00107323 | 22-06-2018 | Yearly | |
| Semi Anechoic Chamber | Frankonia | - | - | - | - | |

# 3 GENERAL PRODUCT INFORMATION

## 3.1 Product Function and Intended Use

**Gen 3 Zooter** has cameras integrated in the product, which will be used for the displaying 360-degree view through LAN port/server. It also has three ZigBee modules mounted on it. These ZigBee Modules are used for wireless data communication with other ZigBee device. It also has BLE module mounted on it which can be used to communicate to the other BLE devices. Apart from all these, it also contains Wi-Fi modules. It has two Wi-Fi modules mounted on it supporting a, b, and g mode. These two Wi-Fi modules are capable of communicating over six channels simultaneously, creating a high speed/throughput Wireless connectivity network. It is used as a camera and wireless access point.

**Note:** Product supports simultaneous transmission operation.

## 3.2 Ratings and System Details

**Table 2: Ratings and System Details**

| | | | | |
|---|---|---|---|---|
| **Operating frequency range** | 2400 MHz to 2483.5 MHz | | | |
| **Radio Protocol** | **ZigBee** | | **BLE** | **Wi-Fi** |
| **RF Power** | PBR-SZMDLNR1 | 0.44 dBm | -0.42 dBm | 10.78 dBm |
| | PBR-SZMDLM3BR1 | 18.93 dBm | | |
| **Channel Spacing** | 5 MHz | | 2 MHz | 5 MHz |
| **Modulation** | DSSS | | GFSK | 802.11b: DSSS<br>802.11g: OFDM |
| **Number of antennas** | 3 | | 1 | 2 |
| **Antenna type** | PCB | | | |
| **Antenna gain** | PBR-SZMDLNR1 | 2.0 dBi | 2.0 dBi | 4.03 dBi (Tx)<br>4.32 dBi (Rx) |
| | PBR-SZMDLM3BR1 | 3.27 dBi | | |
| **Supply Voltage to Product** | +56 VDC, 4 pair Power over Ethernet | | | |
| **Environmental conditions** | Temp: 5°C to 40°C<br>Humidity: 20%-80% RH | | | |

## 3.3 Measurement Uncertainty:

Table 3: Measurement Uncertainty

| Parameter | Uncertainty |
|---|---|
| Occupied Channel Bandwidth | ±5 % |
| RF output power, conducted | ±1.5 dB |
| Power Spectral Density, conducted | ±3 dB |
| Unwanted Emissions, conducted | ±3 dB |
| All emissions, radiated | ±6 dB |
| Temperature | ±3 ℃ |
| Supply Voltages | ±3 % |
| Time | ±5 % |

# 4 TEST SET-UP AND OPERATION MODE

## 4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle transmission on low, mid and high channels to obtain maximum emissions.

## 4.2 Test Operation and Test Software

Testing software was used to enable the continuous transmission on low/mid/high channels for Wi-Fi.

**Test Software, Software Version, Hardware Version used:**

| Protocol | FCC ID | Software used for TX | Software Version | Hardware Version |
|---|---|---|---|---|
| Zigbee | PBR-SZMDLNR1 | Chipconflash Utility | 1 | Rev C |
| Zigbee | PBR-SZMDLM3BR1 | Smart RF Flashprogrammer 2 | 1.7.5 | Rev A |
| Zigbee | PBR-SZMDLM3BR1 | Smart RF Flashprogrammer 2 | 1.7.5 | Rev A |
| BLE | PBR-SZMDLBTNR1 | Smart RF Flashprogrammer 2 | 1.7.5 | Rev B |
| Wi-Fi | Uncertified | RTP Utility | 1 | 1 |

## 4.3 Special Accessories and Auxiliary Equipment

- None

## 4.4 Countermeasures to achieve EMC Compliance

- None

## 4.5 Test modes – data rates and modulations

For Radiated spurious emissions only the worst case results i.e. the emissions with less margin are reported in this report.

## 4.6 List of Frequencies and Frequency bands

| Frequency Band (MHz) | Channel No. | Frequency (MHz) |
|---|---|---|
| 2400-2483.5 | 11 | 2405 |
| | 12 | 2410 |
| | 13 | 2415 |
| | 14 | 2420 |
| | 15 | 2425 |
| | 16 | 2430 |
| | 17 | 2435 |
| | 18 | 2440 |
| | 19 | 2445 |
| | 20 | 2450 |
| | 21 | 2455 |
| | 22 | 2460 |
| | 23 | 2465 |
| | 24 | 2470 |
| | 25 | 2475 |

Table 4: List of Center Frequiences of ZigBee

| Frequency Band (MHz) | Channel No. | Channel Frequency (MHz) |
|---|---|---|
| 2400 – 2483.5 | 0 | 2402 |
| | 1 | 2404 |
| | 2 | 2406 |
| | 3 | 2408 |
| | : | : |
| | : | : |
| | 18 | 2438 |
| | 19 | 2440 |
| | 20 | 2437 |
| | : | : |
| | : | : |
| | 36 | 2474 |
| | 37 | 2476 |
| | 38 | 2478 |
| | 39 | 2480 |

Table 5: List of Center Frequiences of BLE

| Frequency Band (MHz) | Channel No. | Channel Frequency (MHz) |
|---|---|---|
| 2400 – 2483.5 | 1 | 2412 |
| | 2 | 2417 |
| | 3 | 2422 |
| | 4 | 2427 |
| | 5 | 2432 |
| | 6 | 2437 |
| | 7 | 2437 |
| | 8 | 2447 |
| | 9 | 2452 |
| | 10 | 2457 |
| | 11 | 2462 |

Table 6: List of Wi-Fi center Frequencies

## Note:

- The test was performed with the following power settings during transmission,

| Protocol | FCC ID | Channel number | Power settings |
|---|---|---|---|
| ZigBee | PBR-SZMDLNR1 | 11 to 25 | 01 dBm |
| ZigBee | PBR-SZMDLM3BR1 | 11 to 25 | 19 dBm |
| | | 26 | 13 dBm |
| ZigBee | PBR-SZMDLM3BR1 | 11 to 25 | 19 dBm |
| | | 26 | 13 dBm |
| BLE | PBR-SZMDLBTNR1 | 0 to 39 | 3 dBm |
| Wi-Fi | Uncertified | 1 to 11 | 13 dBm |

- Testing was performed on the sample with the TUV Identification Number : 1803307436-1-1-1

# 5 RADIATED TEST METHODOLOGY

## 5.1 Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1 GHz & 1.5 m height for above 1 GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000 MHz was performed by horn antenna, The measurement below 30 MHz was performed by loop antenna, Measurement from 30 MHz to 200 MHz was performed by Baloon and Biconical Antenna, and mesurement from 200 MHz to 1 GHz was performed by Log-Periodic Antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

### 5.1.1 Test Setup Configuration

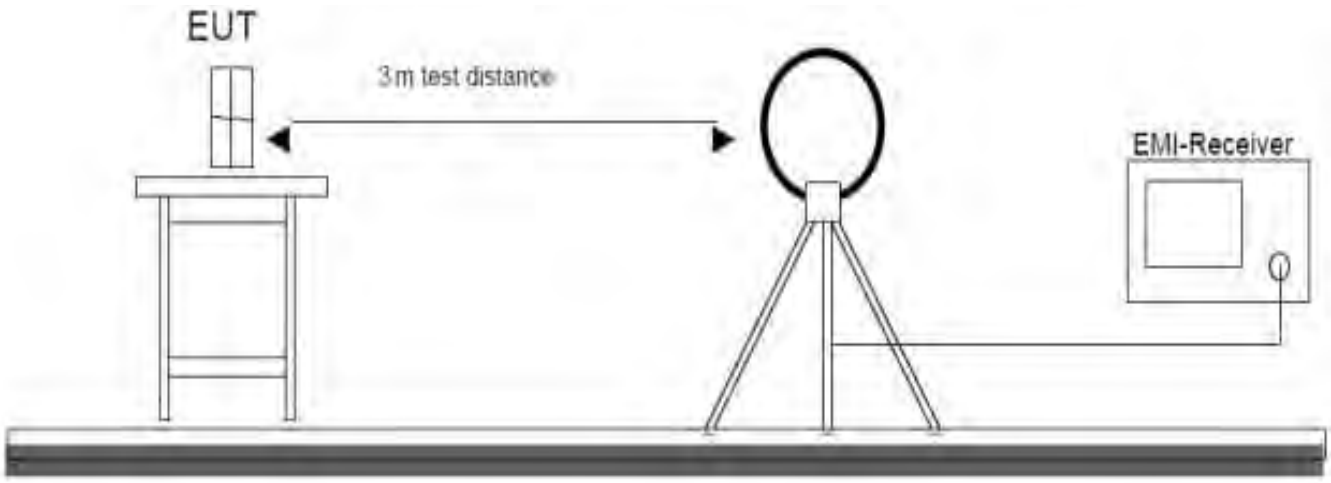



**Figure 1: Frequency Range 9 kHz- 30 MHz**

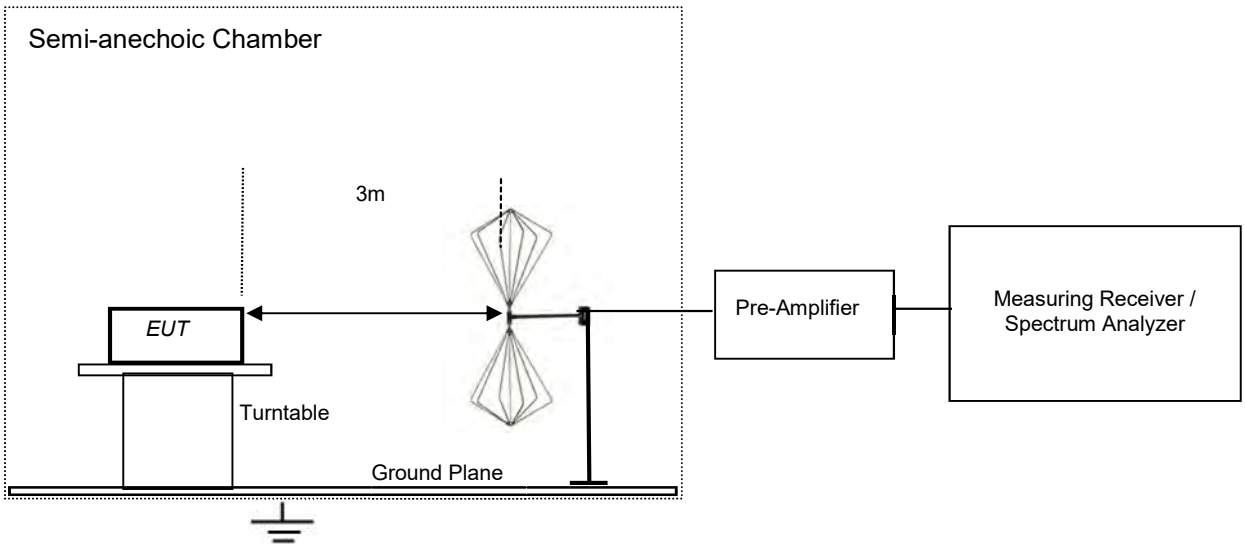



**Figure 2: Frequency Range 30 MHz – 200 MHz**

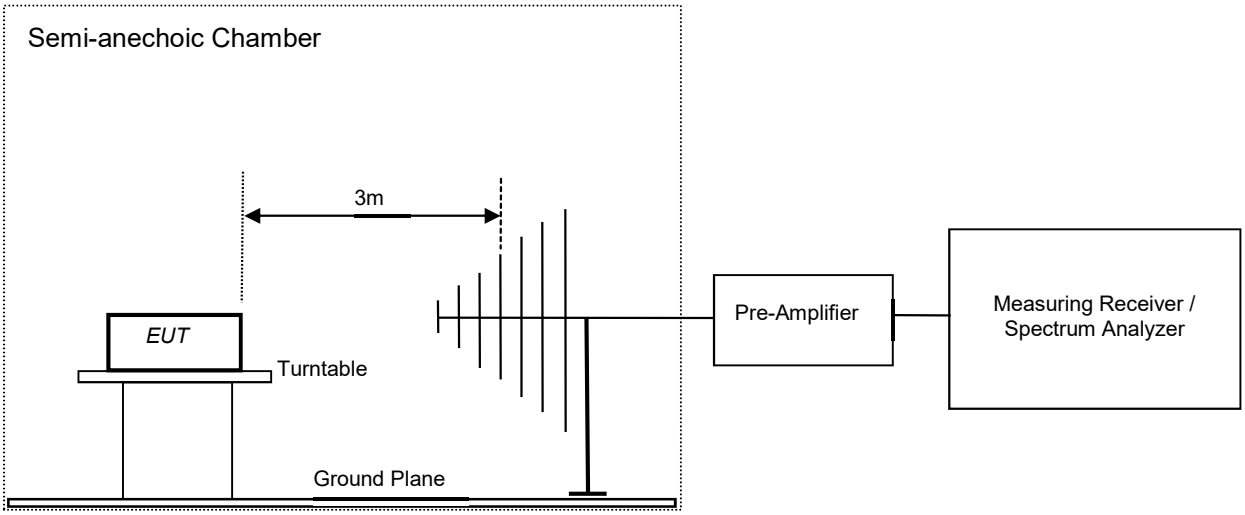



**Figure 3: Frequency Range 200 MHz - 1GHz**

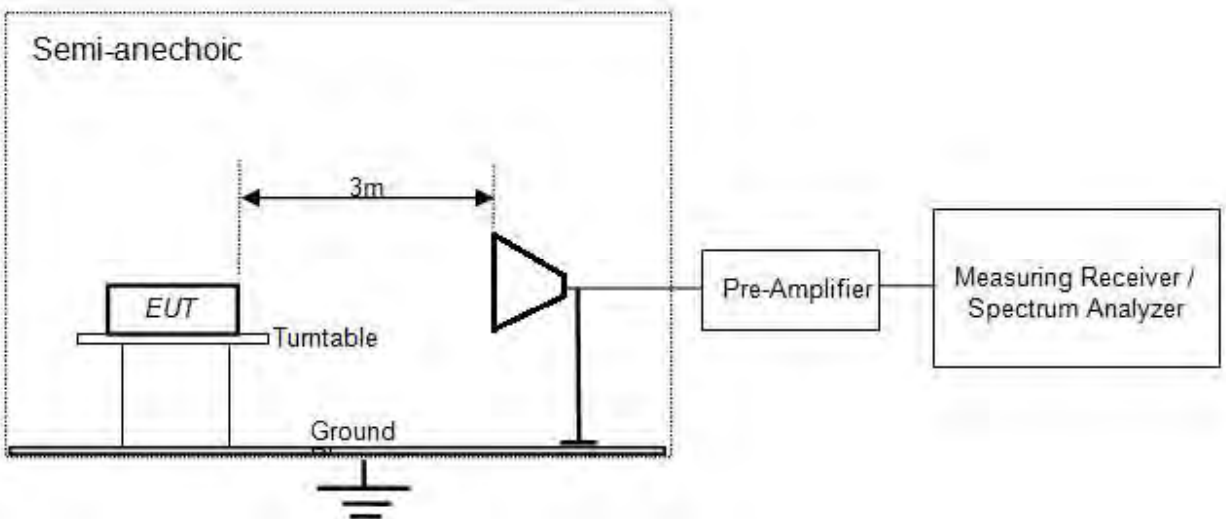



**Figure 4: Frequency Range above 1 GHz**

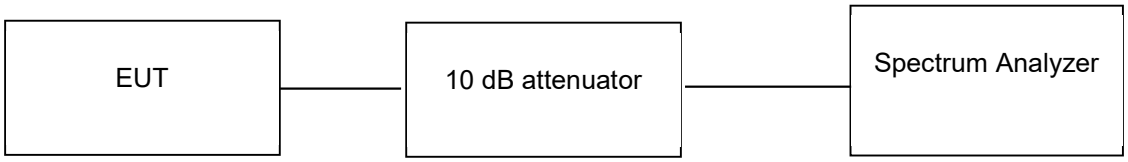
# 6 Test Results

## 6.1 Maximum conducted output power

***Result*** ***Passed***

| | |
|---|---|
| Test Specification | FCC part 15 Subpart C 15.247 (b)(3) |
| Measurement Bandwidth | 1 MHz |
| Detector | Peak |
| Requirement | ≤ 1 W (30 dBm) |

**Test Method:**



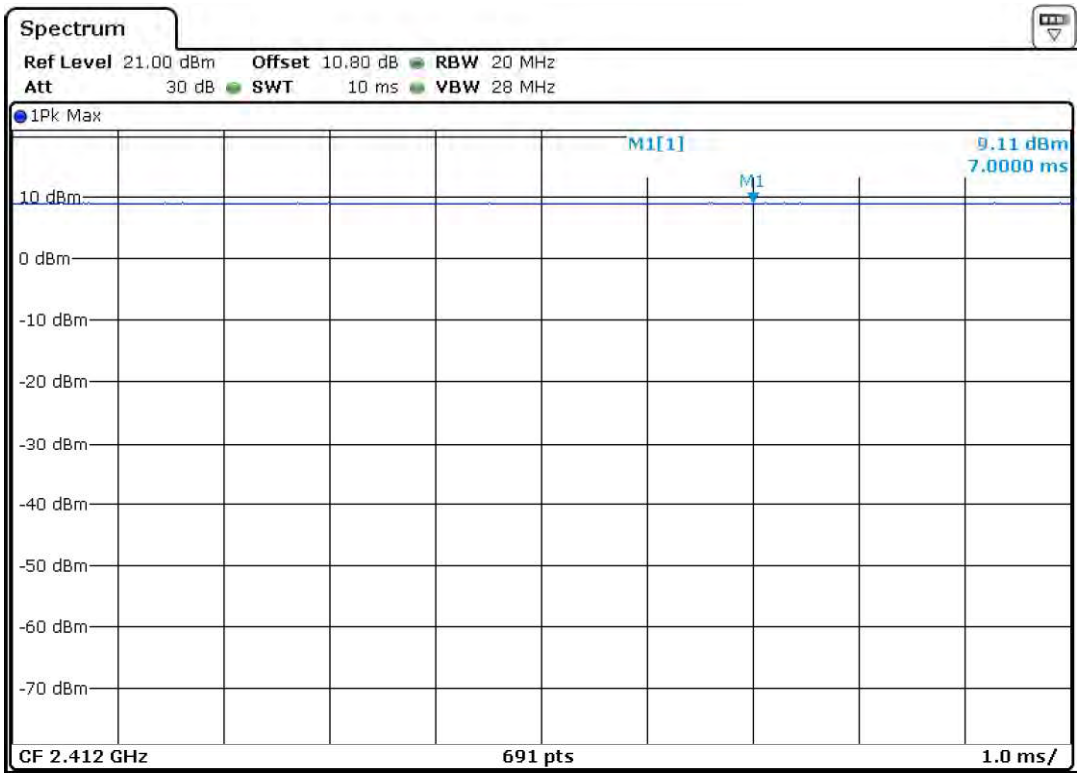

**Test results:**

10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

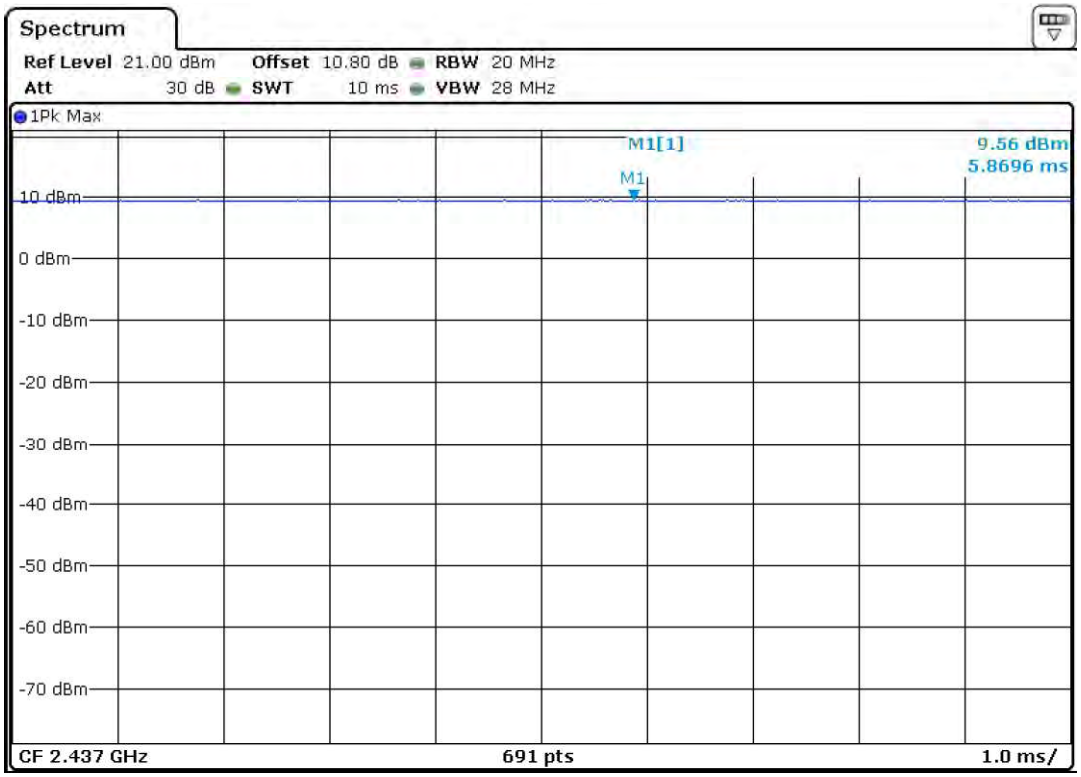
**Note:** Measurements were made as per section 9.1.1 in KDB 558074 D01 DTS Meas Guidance v04.

**Protocol: 802.11b & 802.11g**

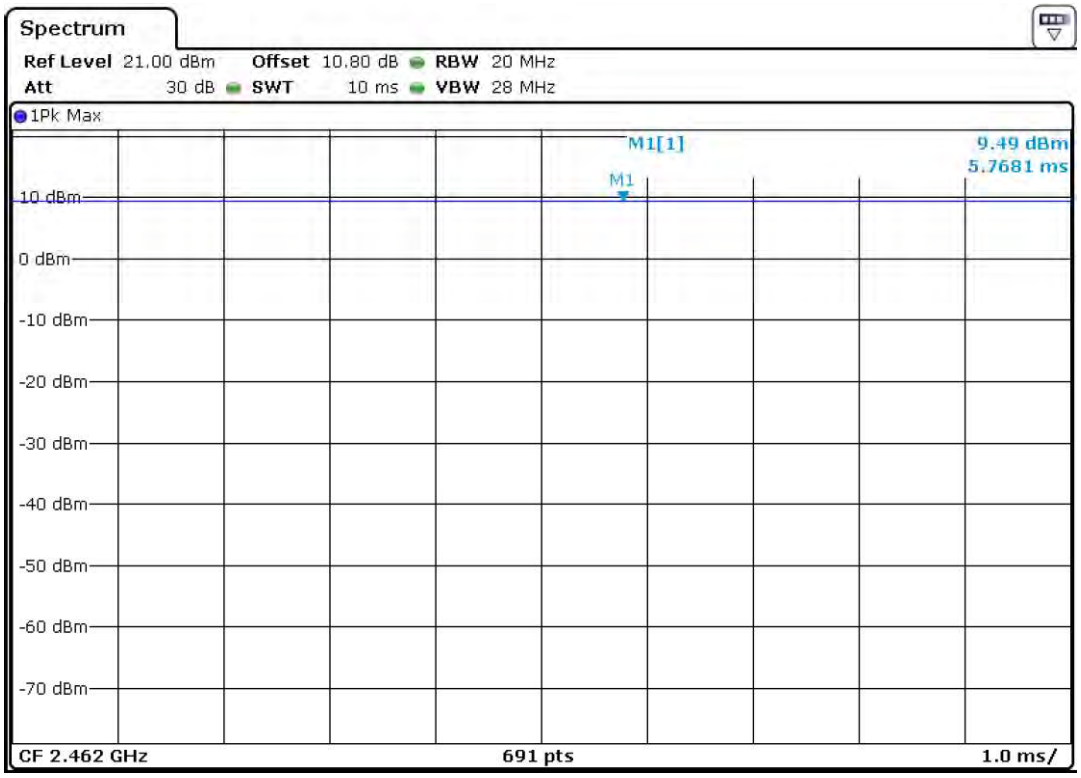
| Data Rate (Mbps) | Channel No. | Frequency (MHz) | Output power (dBm) | Limit (dBm) |
|---|---|---|---|---|
| **1** | 1 | 2412 | 9.11 | 30 |
| | 6 | 2437 | 9.56 | 30 |
| | 11 | 2462 | 9.49 | 30 |
| **11** | 1 | 2412 | 9.24 | 30 |
| | 6 | 2437 | 9.68 | 30 |
| | 11 | 2462 | 9.49 | 30 |
| **6** | 1 | 2412 | 10.43 | 30 |
| | 6 | 2437 | 10.78 | 30 |
| | 11 | 2462 | 10.56 | 30 |
| **24** | 1 | 2412 | 9.33 | 30 |
| | 6 | 2437 | 9.71 | 30 |
| | 11 | 2462 | 9.40 | 30 |
| **54** | 1 | 2412 | 8.98 | 30 |
| | 6 | 2437 | 9.44 | 30 |
| | 11 | 2462 | 9.28 | 30 |



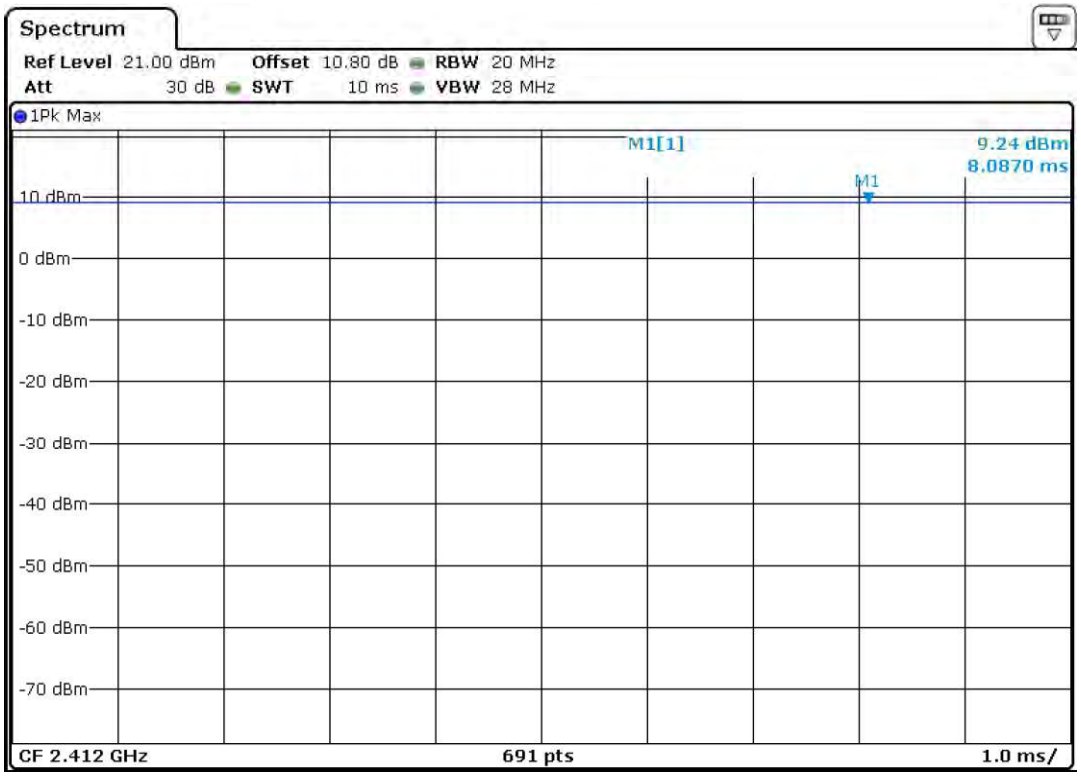

**1Mbps Channel low**



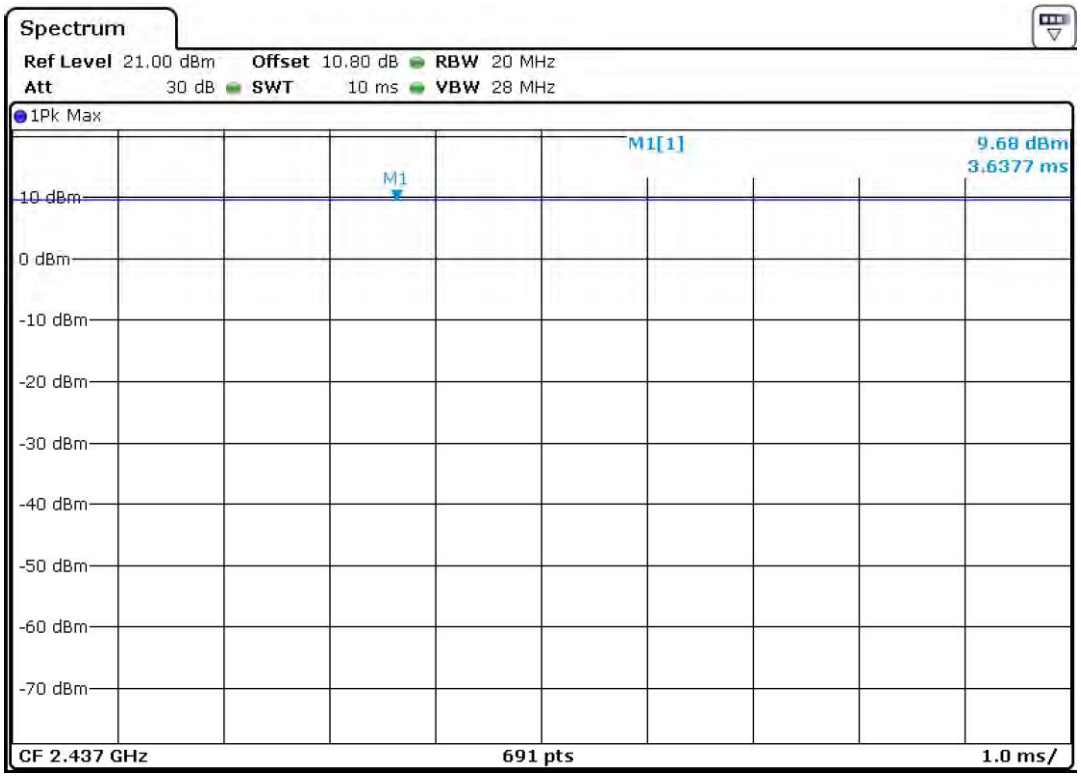

**1Mbps Channel mid**



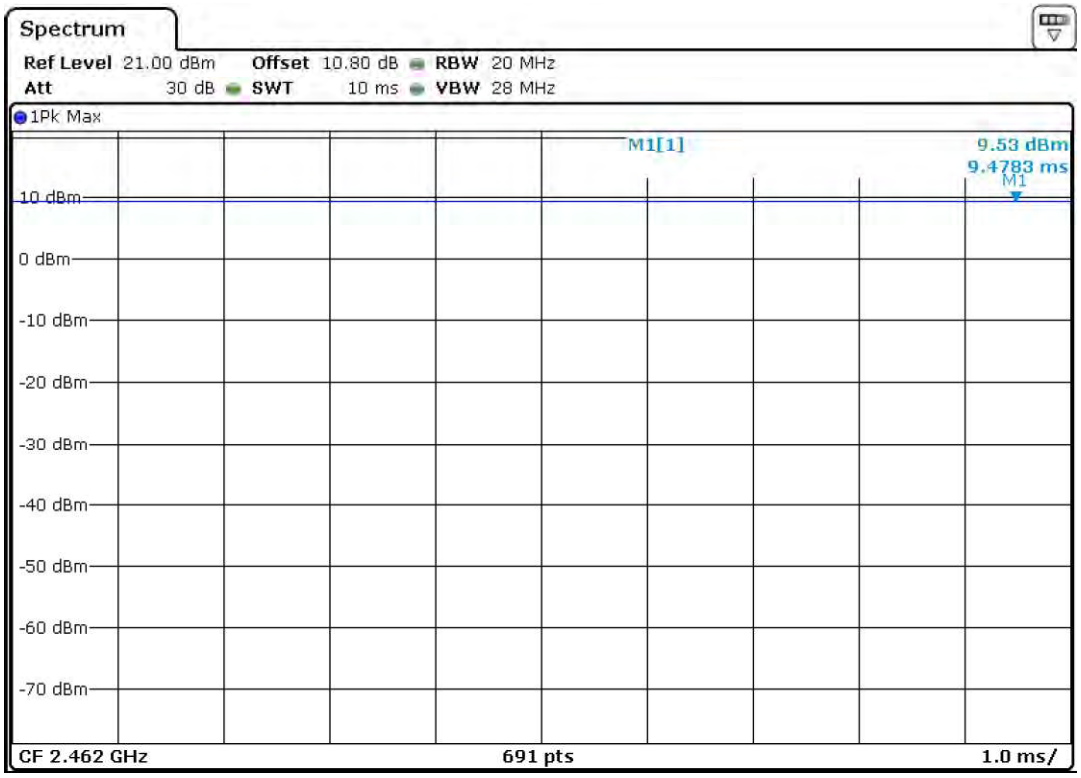

**1Mbps Channel High**



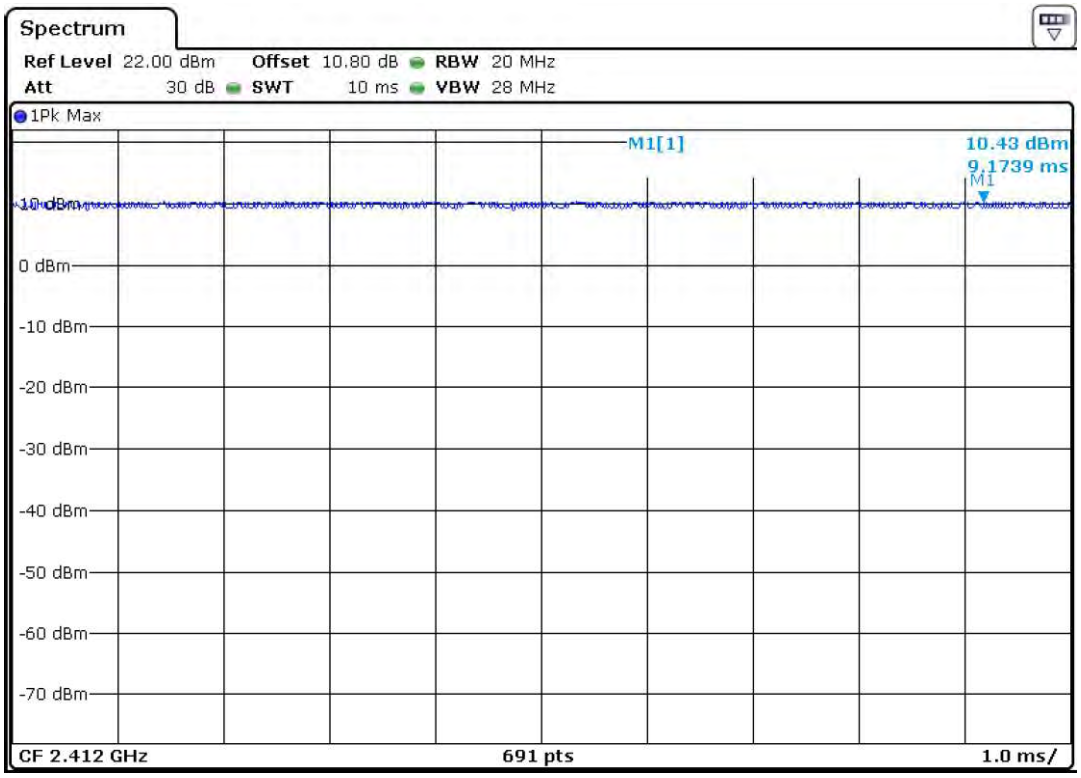

**11 Mbps Channel low**



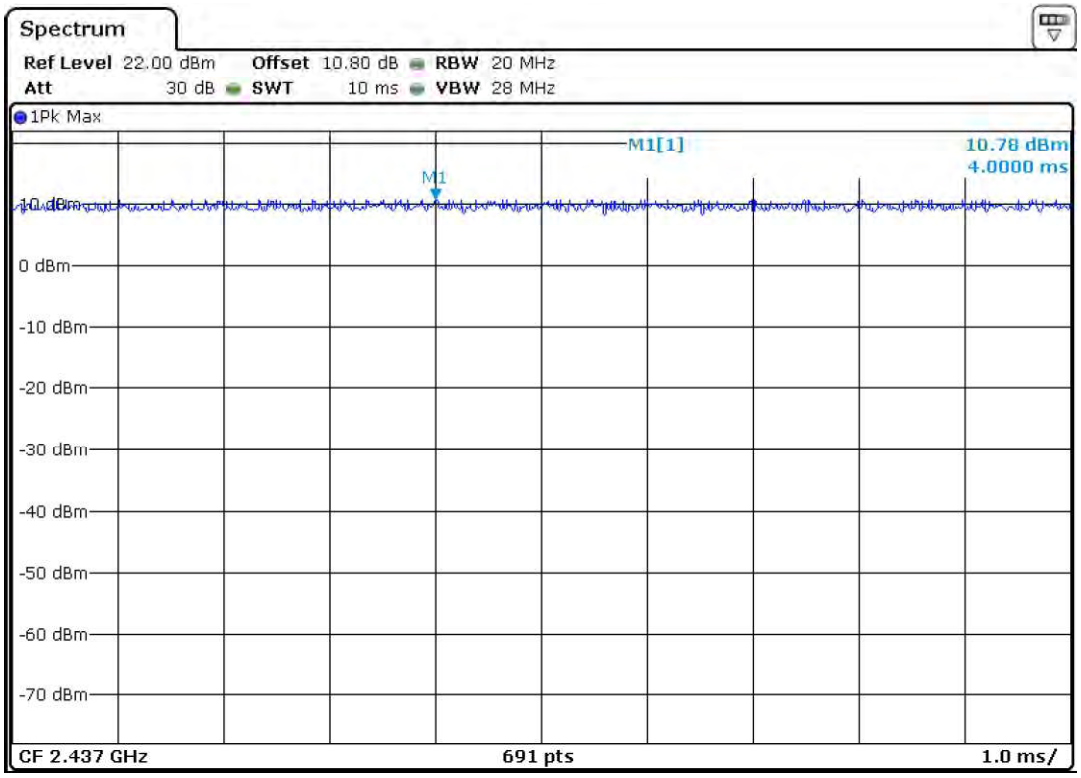

**11 Mbps Channel mid**



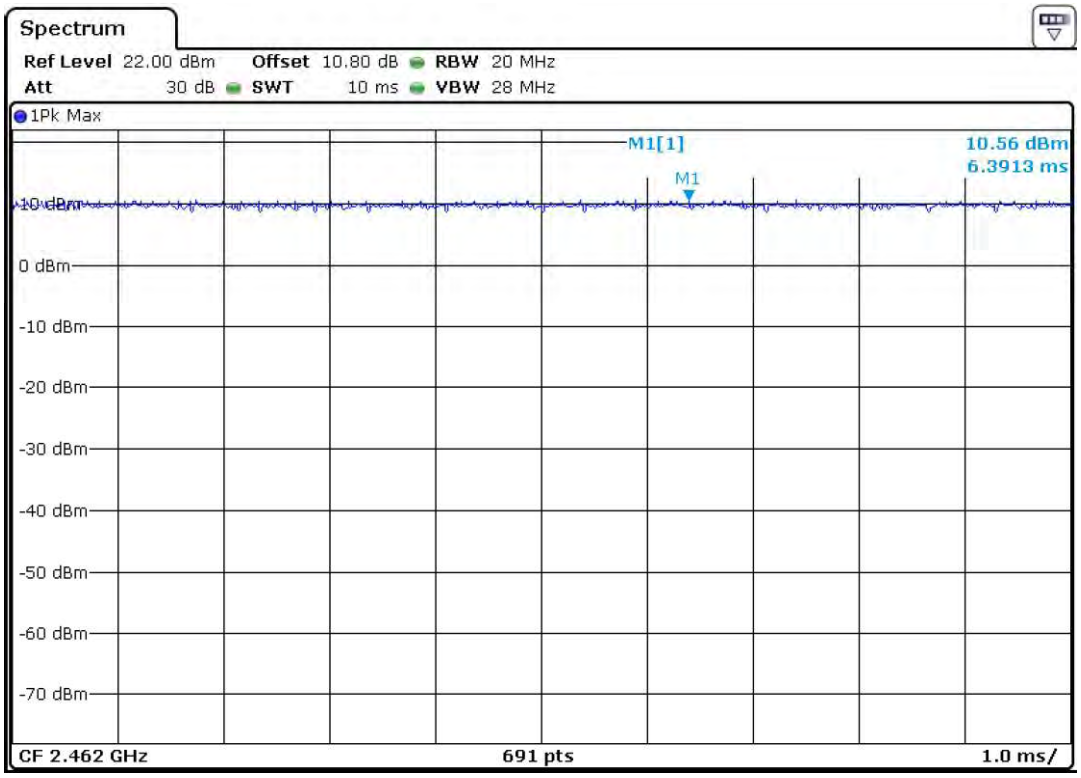

**11 Mbps Channel High**



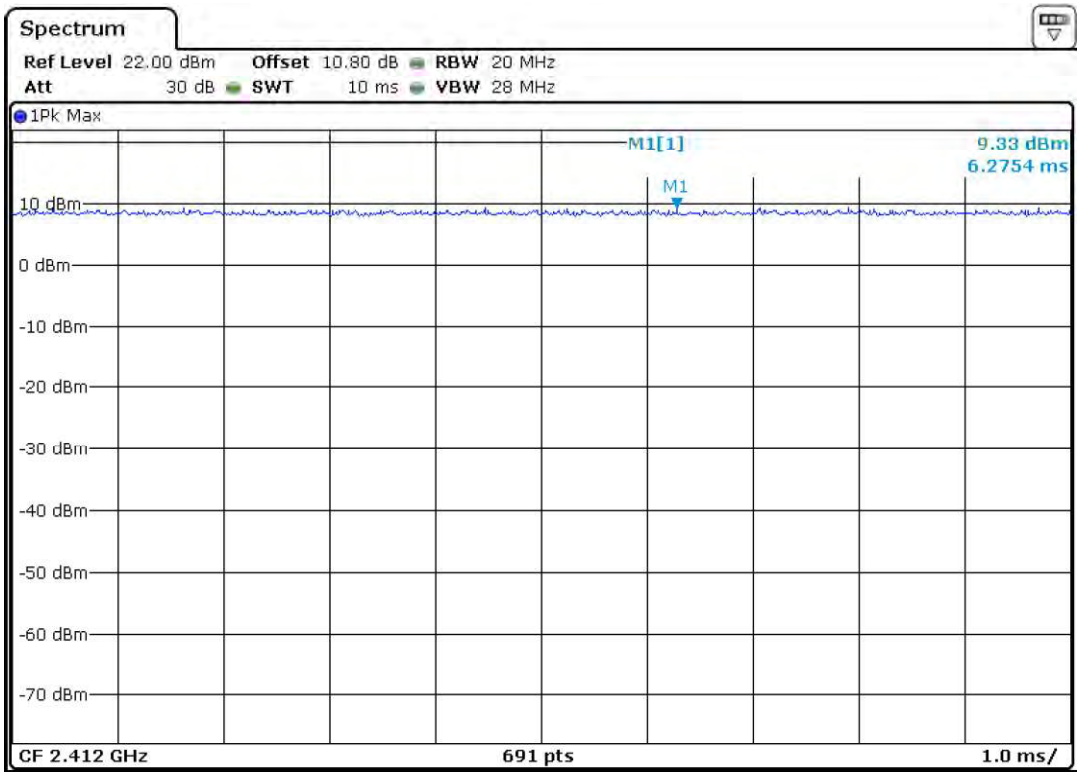

**6 Mbps Channel low**



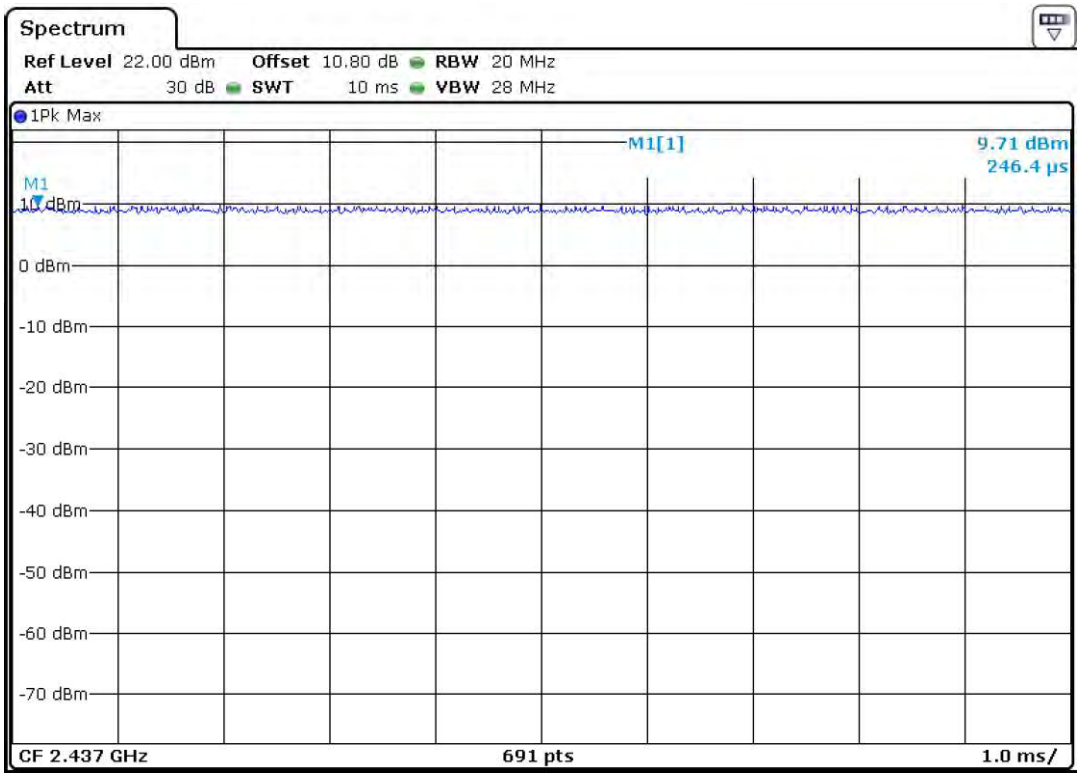

**6 Mbps Channel mid**



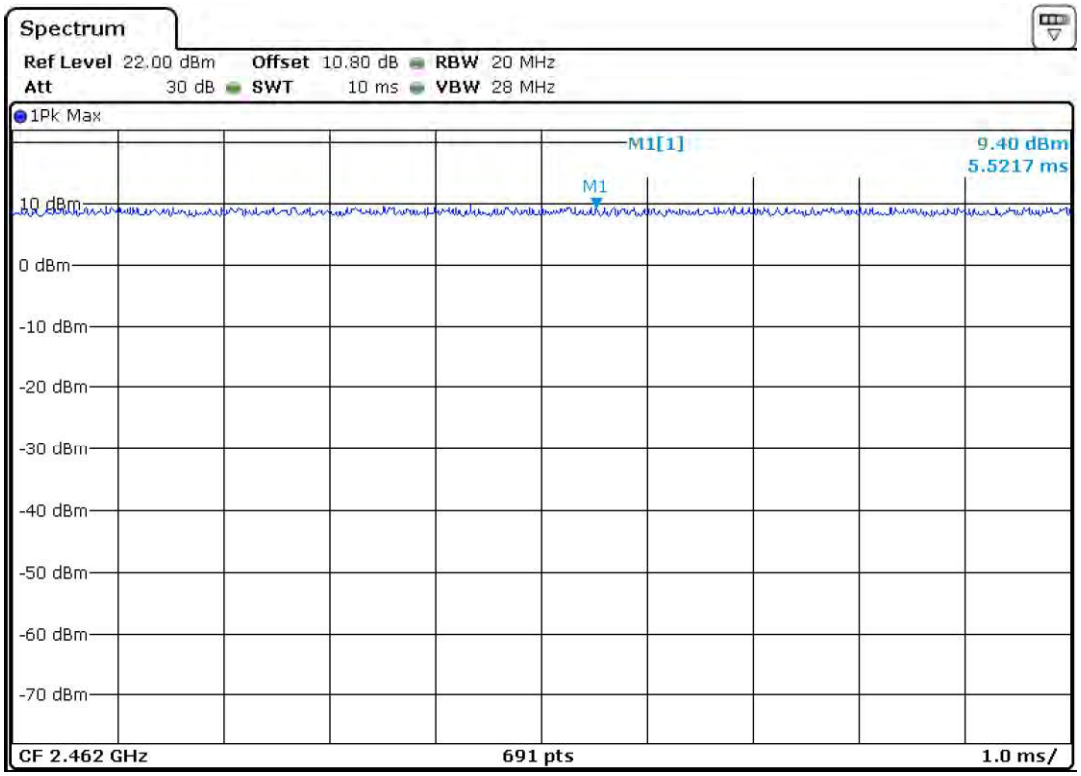

**6 Mbps Channel High**



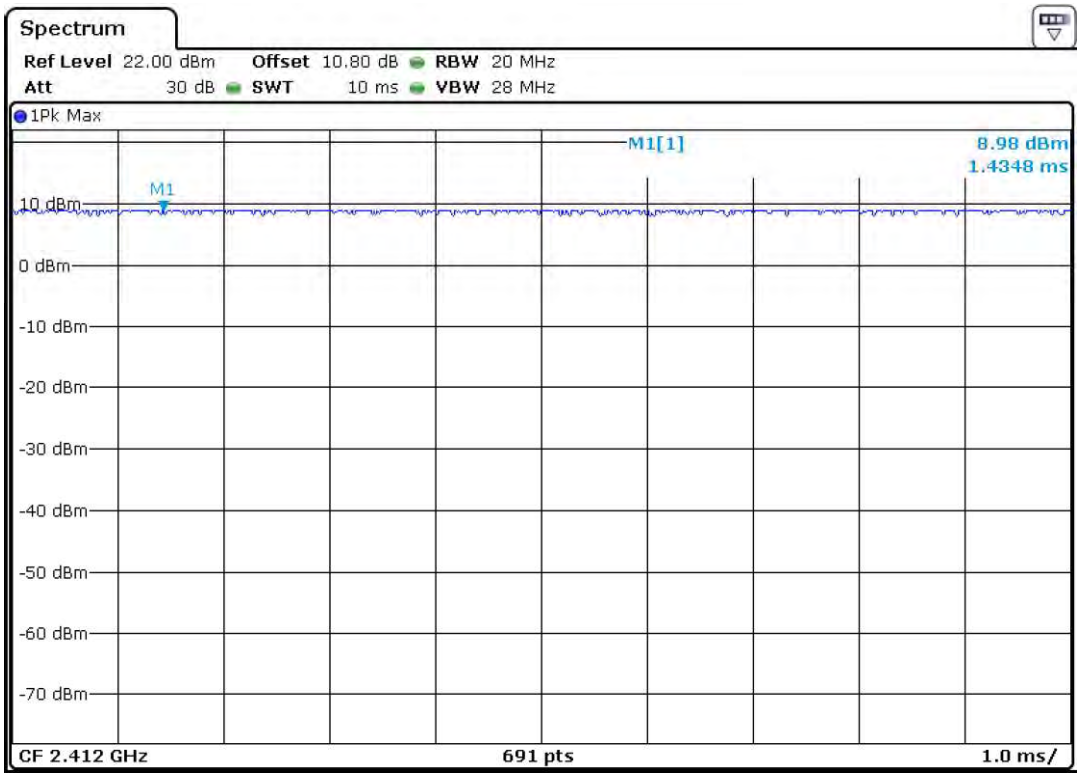

**24 Mbps Channel low**



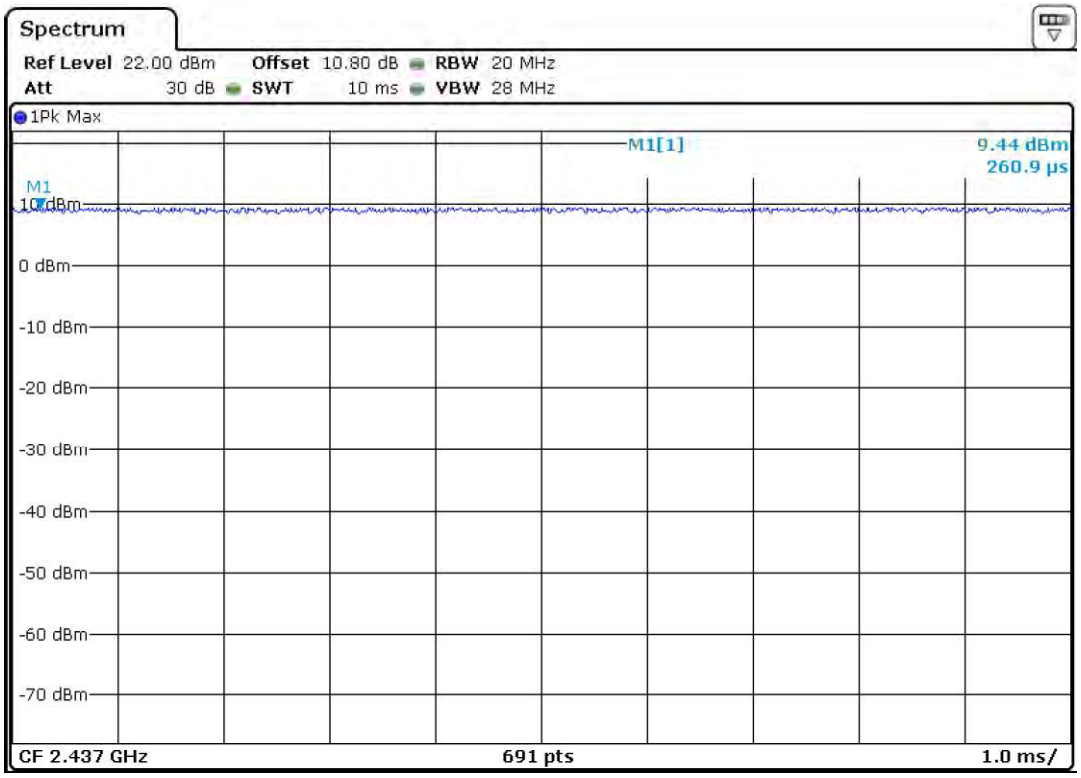

**24 Mbps Channel mid**



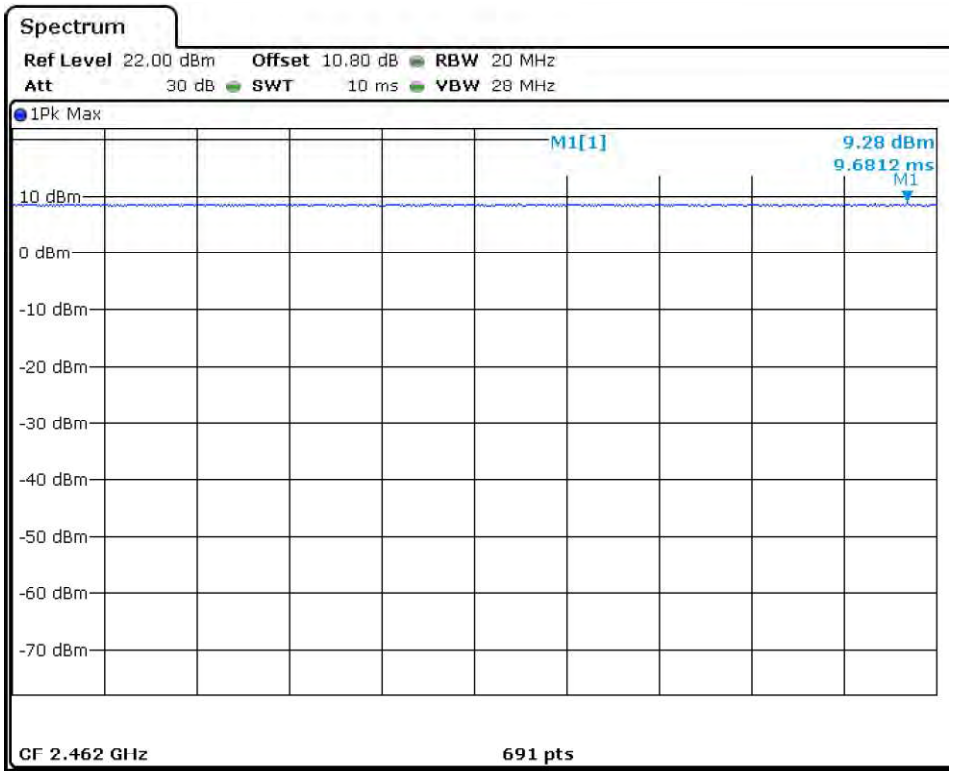

**24 Mbps Channel high**




**54 Mbps Channel low**

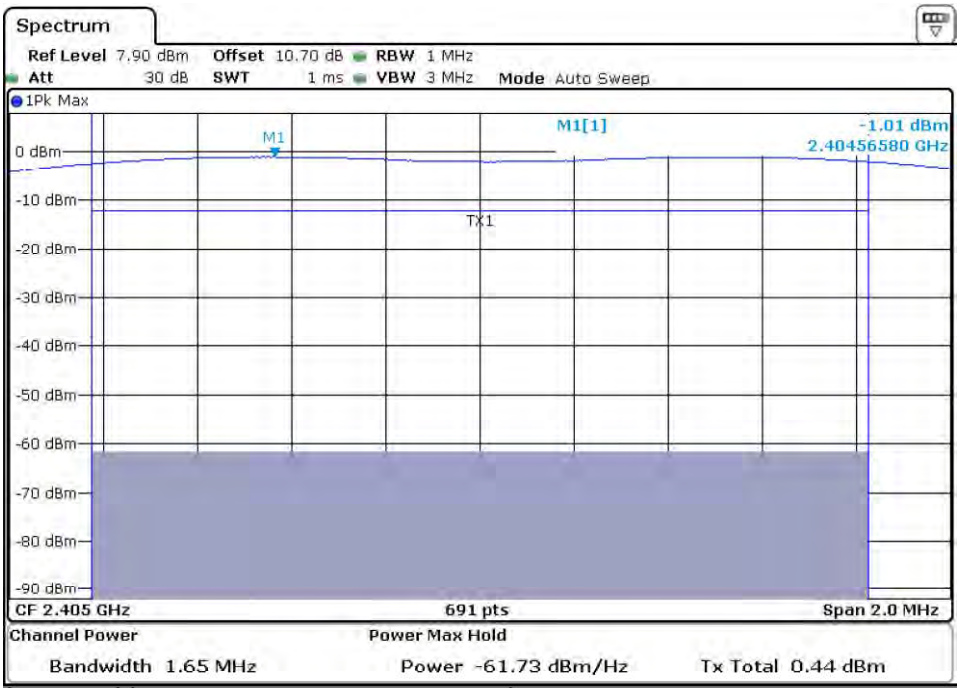



**54 Mbps Channel mid**

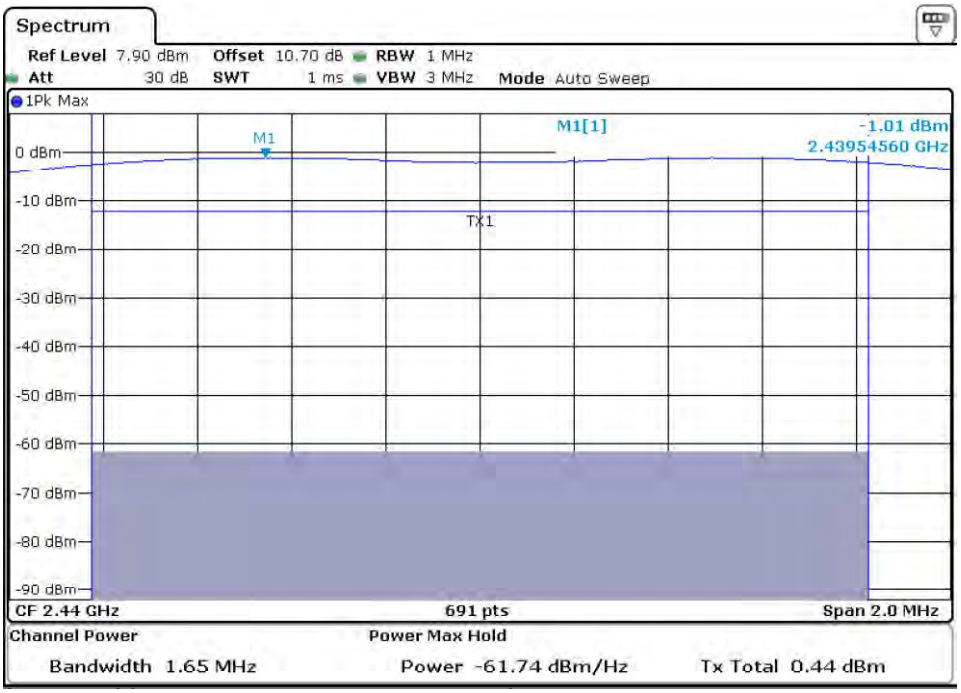



**54 Mbps Channel high**

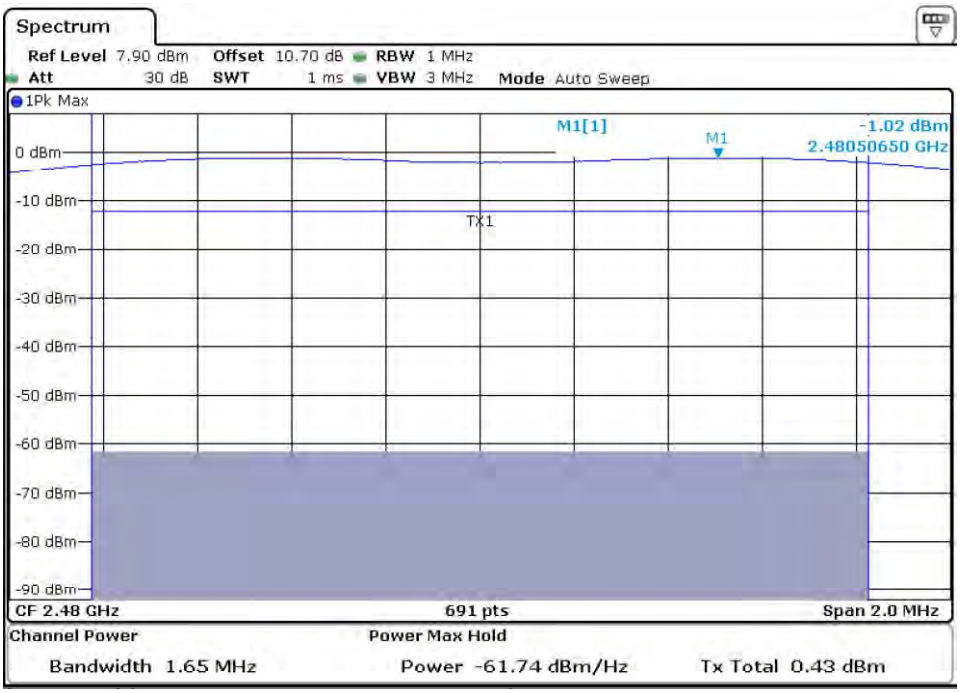
## ZigBee 1:




**Channel low**



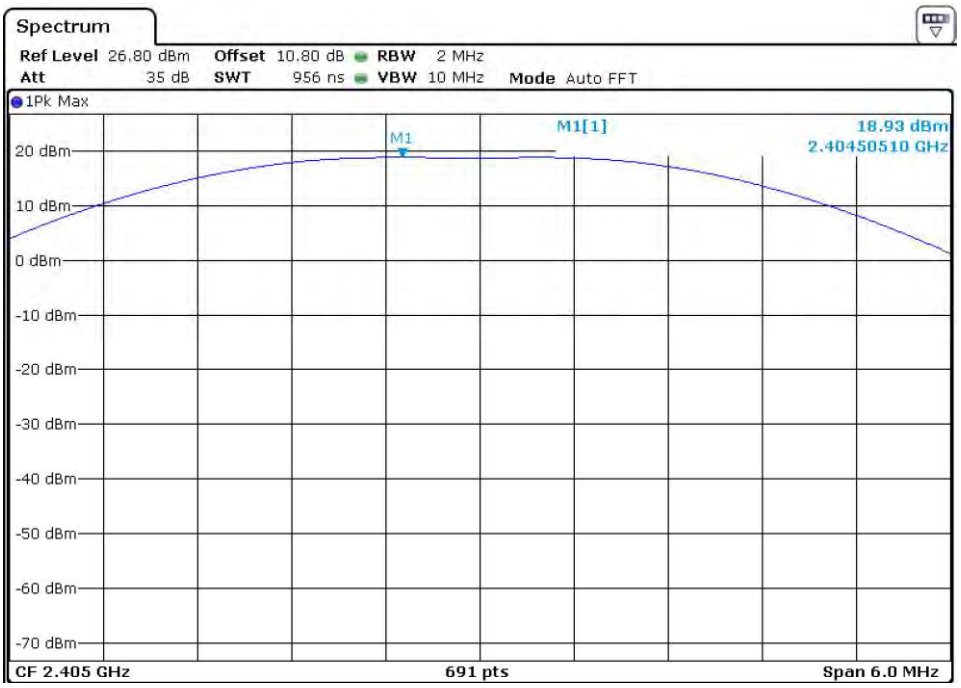

**Channel mid**



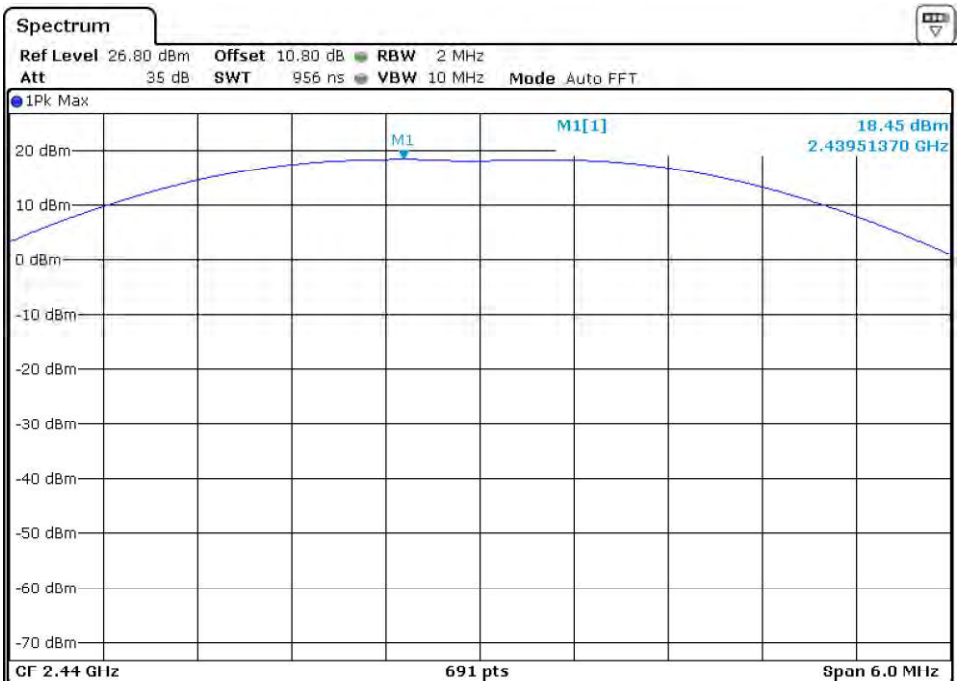

**Channel high**

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2405 | 0.44 | 30 | -29.56 |
| Mid | 2440 | 0.44 | 30 | -29.56 |
| High | 2480 | 0.43 | 30 | -29.57 |

**ZigBee 2 & 3:**

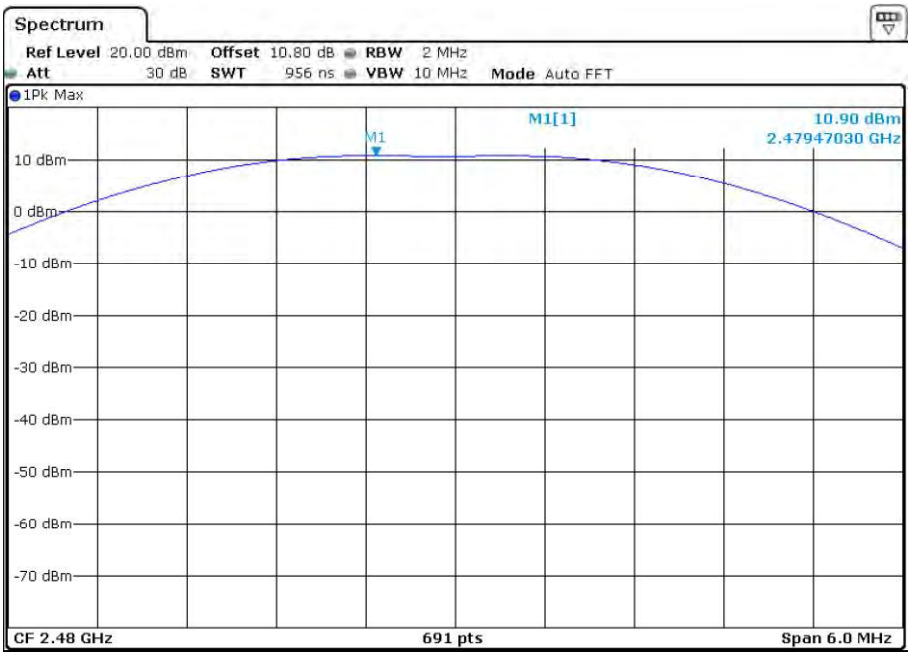



**Channel low**




**Channel mid**

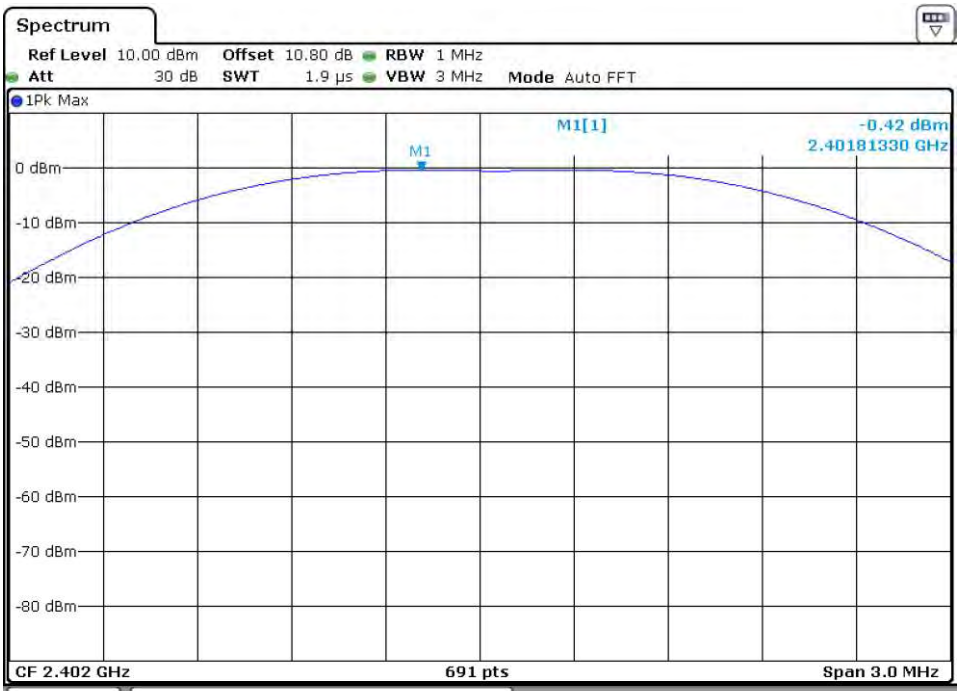
**Channel number 25**



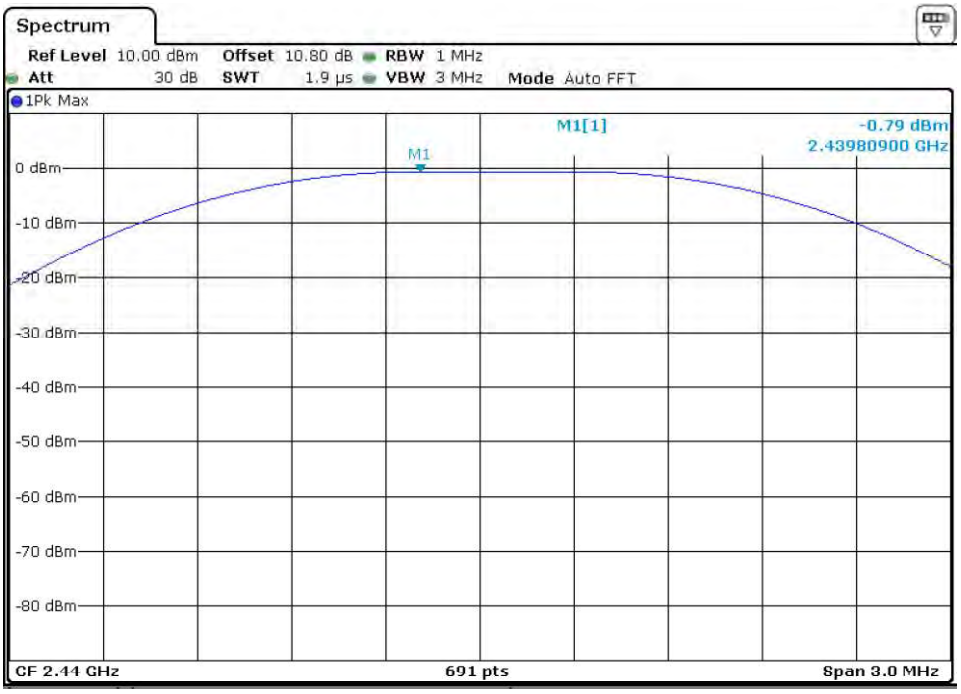

**Channel high**

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2405 | 18.93 | 30 | -11.07 |
| Mid | 2440 | 18.45 | 30 | -11.55 |
| 25 | 2475 | 17.73 | 30 | -12.27 |
| High | 2480 | 10.90 | 30 | -19.1 |

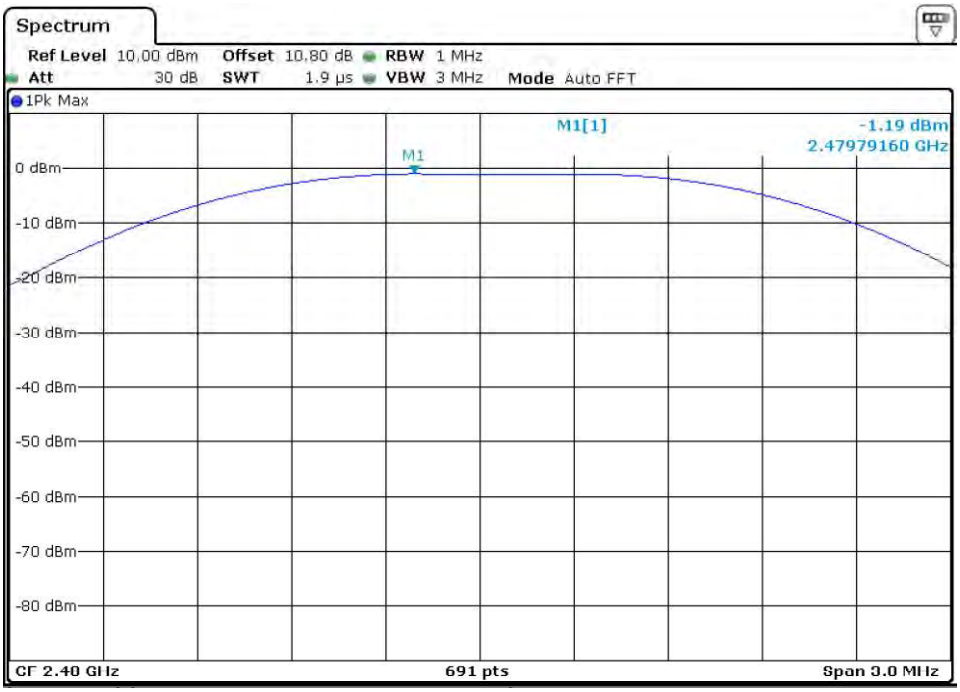
**Bluetooth Low Energy:**




**Channel low**




**Channel mid**




**Channel high**

| Channel | Frequency (MHz) | Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | -0.42 | 30 | -30.42 |
| Mid | 2440 | -0.79 | 30 | -30.79 |
| High | 2480 | -1.19 | 30 | -31.19 |

**Power Table for Simultaneous Transmission (Only the worst case readings are tabulated)**

| ZigBee 1 | ZigBee 2 | ZigBee 3 | Wi-Fi (6Mbps) 2.4GHz | BLE | Sum | Sum |
|---|---|---|---|---|---|---|
| mW | mW | mW | mW | mW | mW | dBm |
| 1.106 | 78.162 | 78.162 | 11.040 | 0.907 | 169.38 | 22.28 |
| 1..106 | 69.984 | 69.984 | 11.967 | 0.833 | 153.87 | 21.87 |
| 1.104 | 12.302 | 12.302 | 11.376 | 0.760 | 37.84 | 15.78 |

Maximum possible power value = 1.106 + 78.162 + 78.162 + 11.967 + 0.907 = 170.30 mW

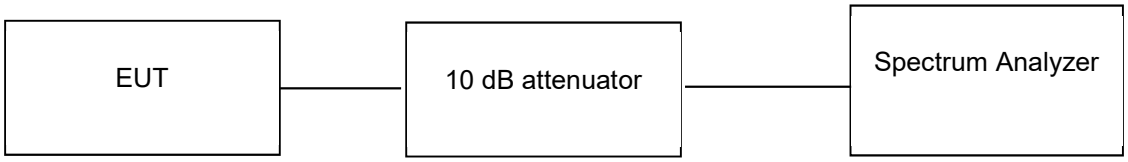
Note: Transmitter output signals from the modules are declared as not correlated.

## 6.2 Maximum Power Spectral Density

***Result*** ***Pass***

| | |
|---|---|
| Test Specification | FCC Part 15 Subpart C Section 15.247 (e) |
| Detector Function | Peak |
| Port of testing | Antenna port |
| Requirement | For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm. |

**Test Method:**

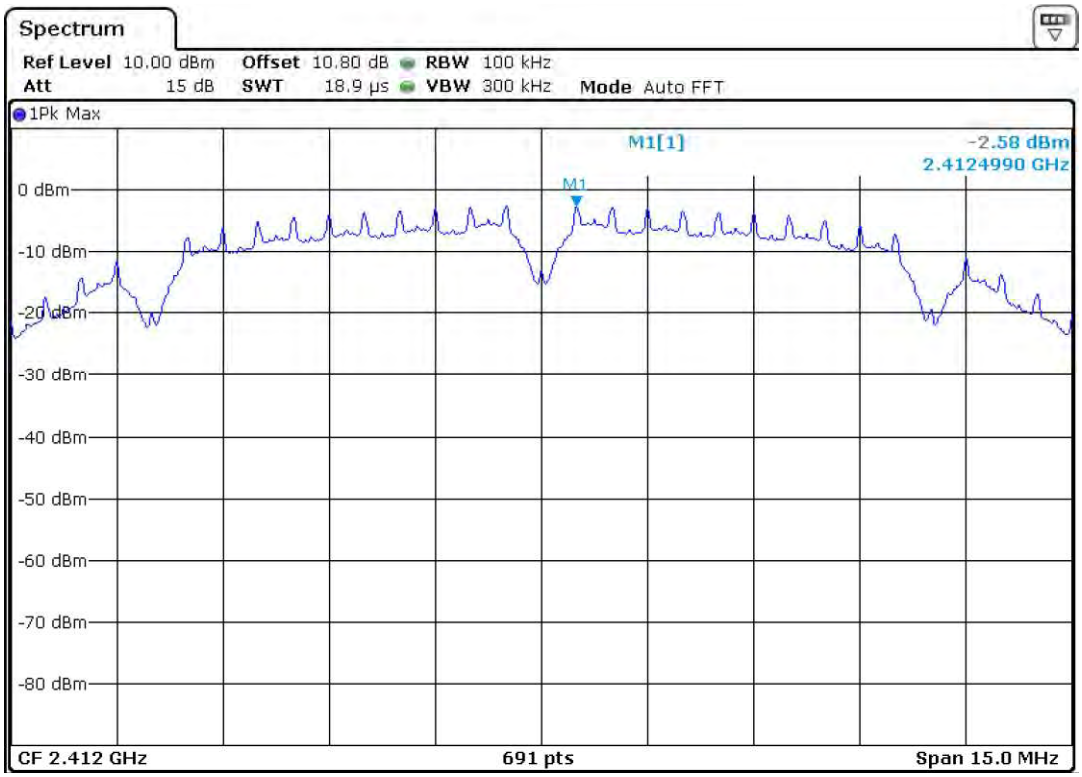



**Test results for 802.11 b**

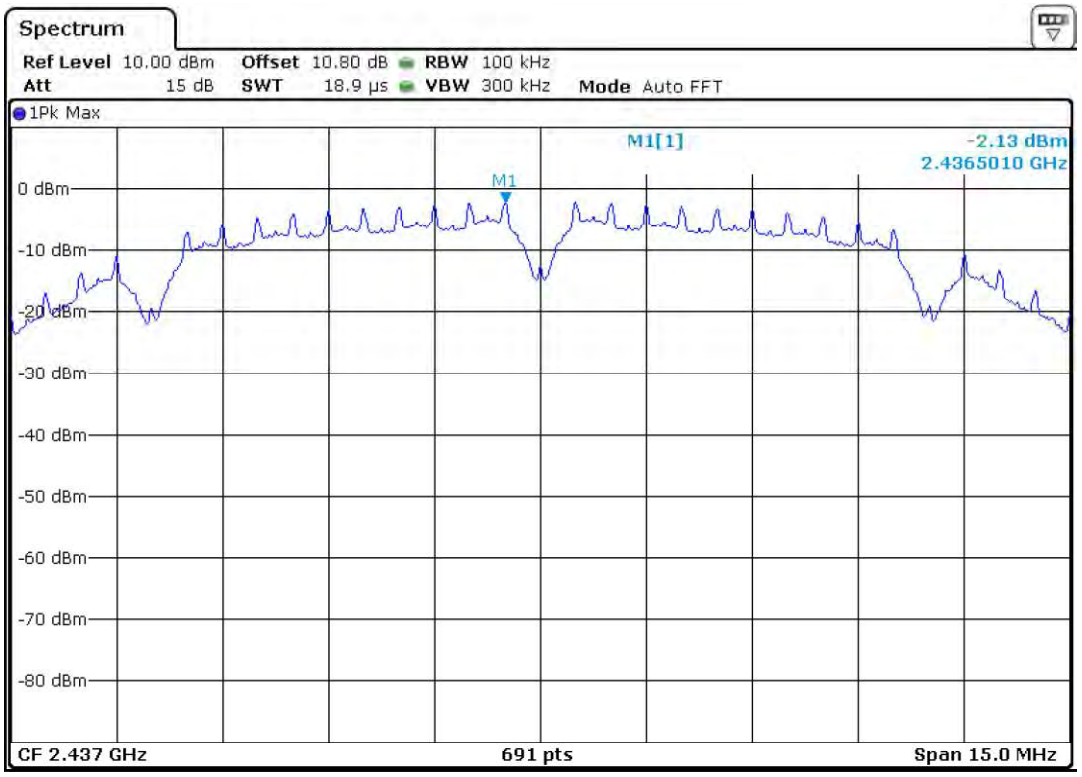
10 dB attenuator + 0.8 Cable loss = 10.8 dB offset is considered in below result

**Note:** Measurements were made as per section 10.2 in KDB 558074 D01 DTS Meas Guidance v04.

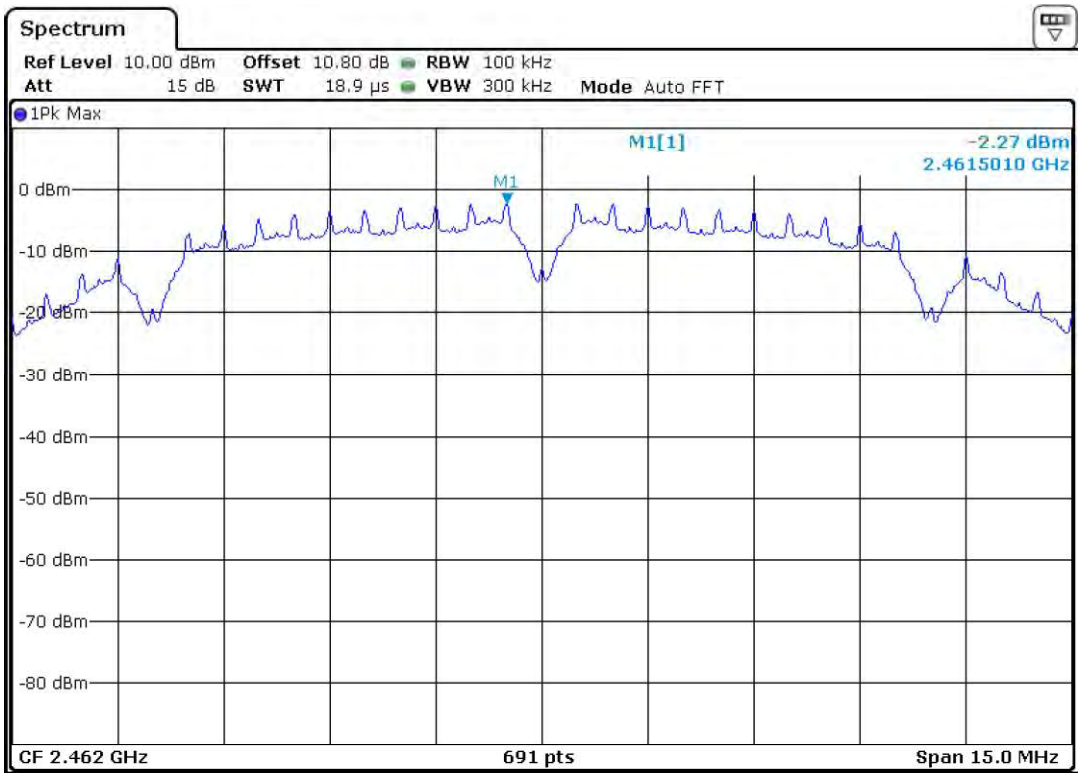
| 802.11 Protocol | Data rate (Mbps) | Channel Frequency (MHz) | Total PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| b | 1 | 2412.00 | -2.58 | 8.00 | -10.58 |
| | | 2437.00 | -2.13 | 8.00 | -10.13 |
| | | 2462.00 | -2.27 | 8.00 | -10.27 |
| | 11 | 2412.00 | -1.78 | 8.00 | -9.78 |
| | | 2437.00 | -1.56 | 8.00 | -9.56 |
| | | 2462.00 | -1.98 | 8.00 | -9.98 |



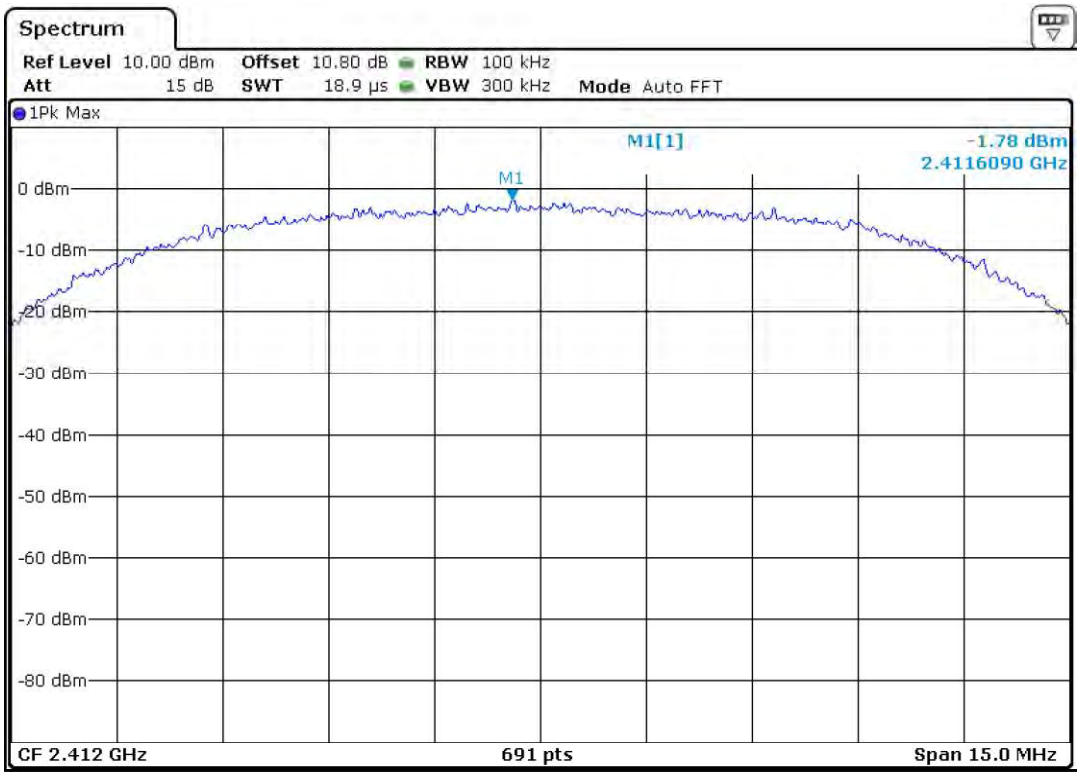

**1 Mbps Channel low**



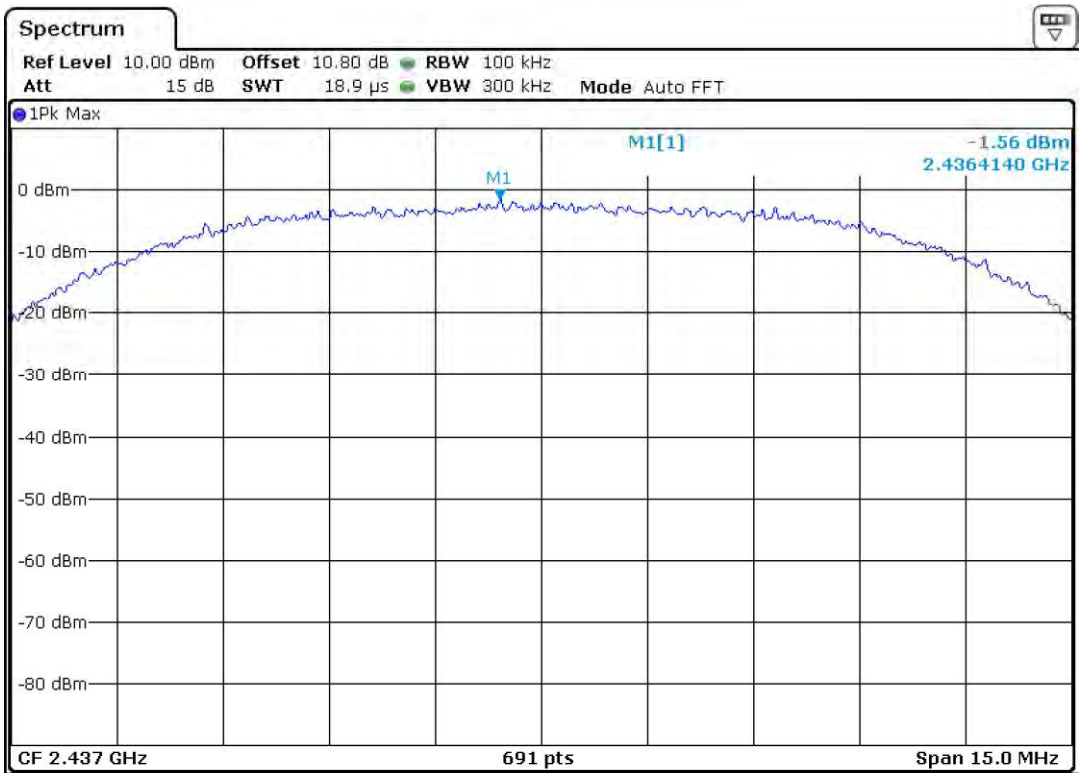

**1Mbps Channel mid**



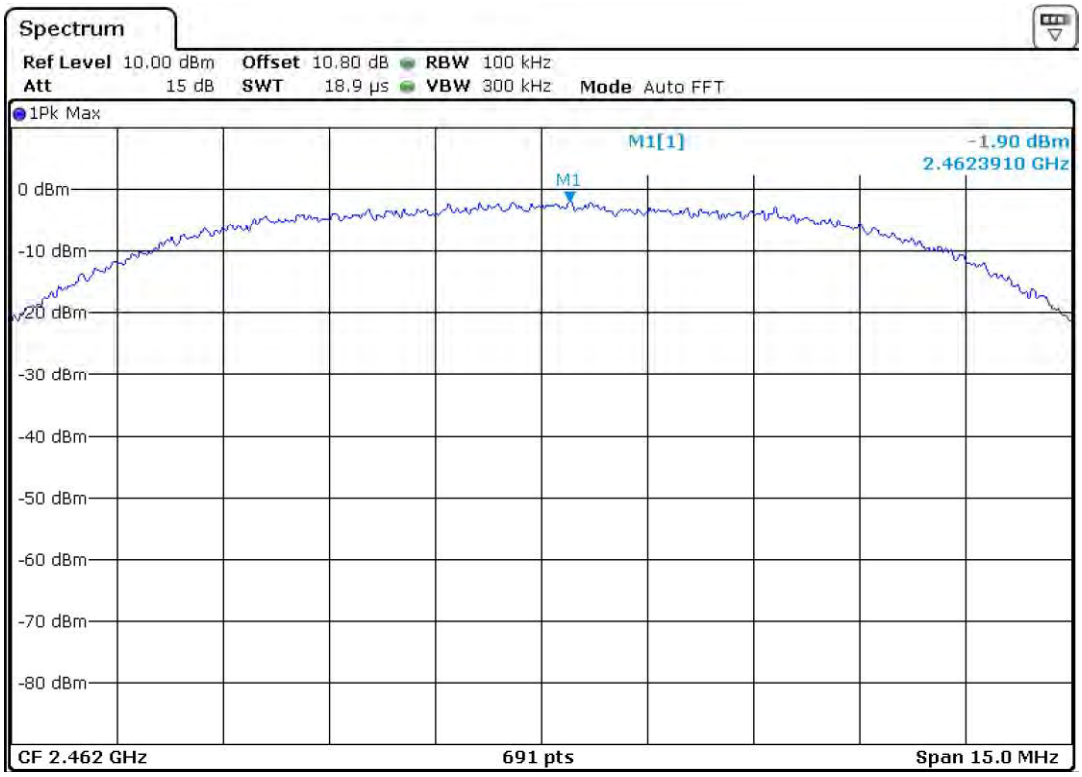

**1 Mbps Channel high**




**11 Mbps Channel low**



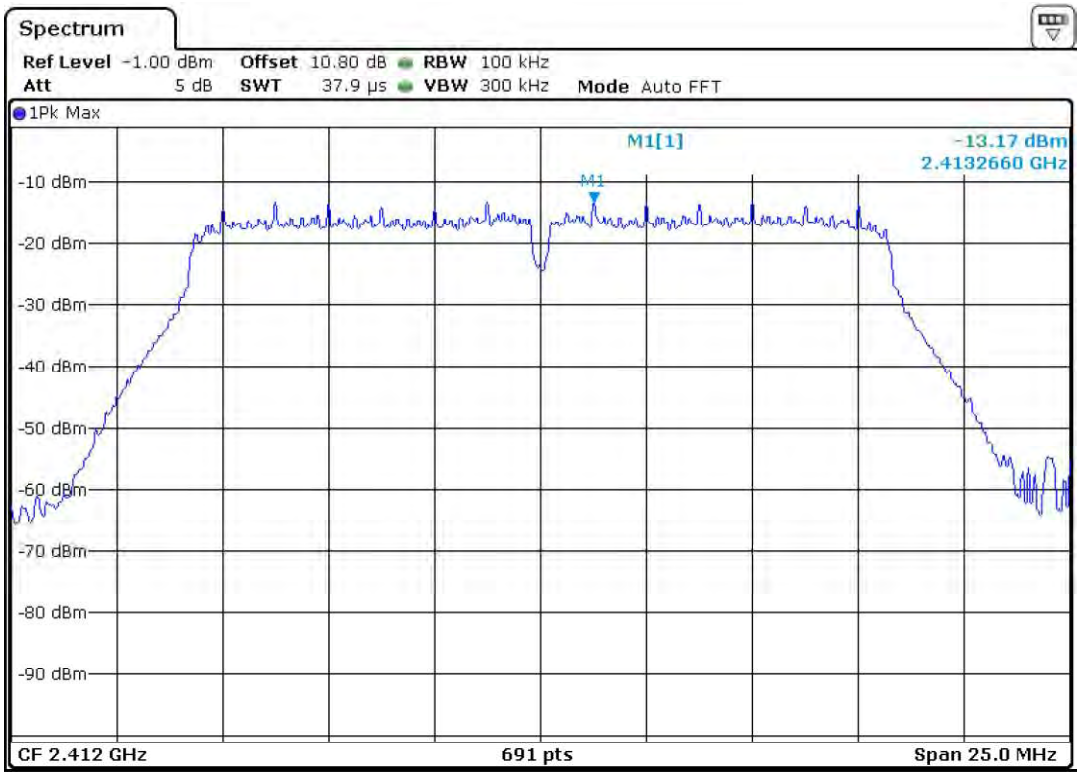

**11 Mbps Channel mid**




**11 Mbps Channel high**

**Test results for 802.11g**

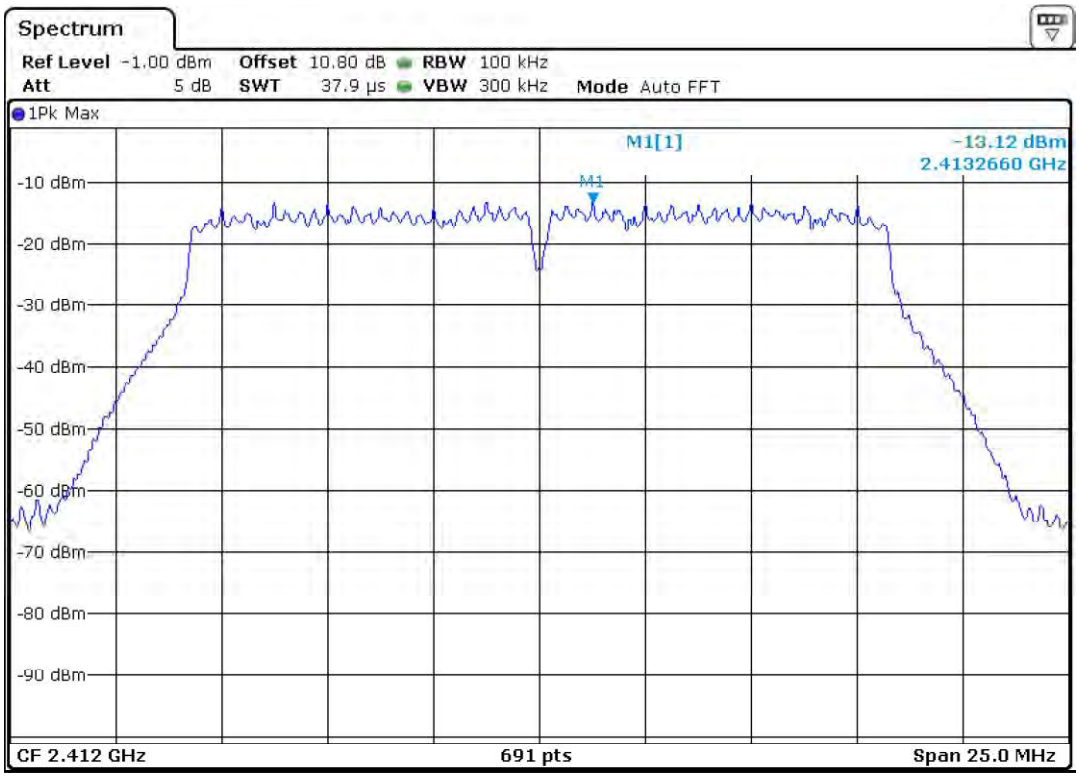
| 802.11 Protocol | Data rate (Mbps) | Channel Frequency (MHz) | Total PSD (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|
| g | 6 | 2412.00 | -13.17 | 8.00 | -21.17 |
| | | 2437.00 | -12.89 | 8.00 | -20.89 |
| | | 2462.00 | -12.94 | 8.00 | -20.94 |
| | 24 | 2412.00 | -13.12 | 8.00 | -21.12 |
| | | 2437.00 | -12.85 | 8.00 | -20.85 |
| | | 2462.00 | -12.87 | 8.00 | -20.87 |
| | 54 | 2412.00 | -13.17 | 8.00 | -21.17 |
| | | 2437.00 | -12.86 | 8.00 | -20.86 |
| | | 2462.00 | -12.95 | 8.00 | -20.95 |



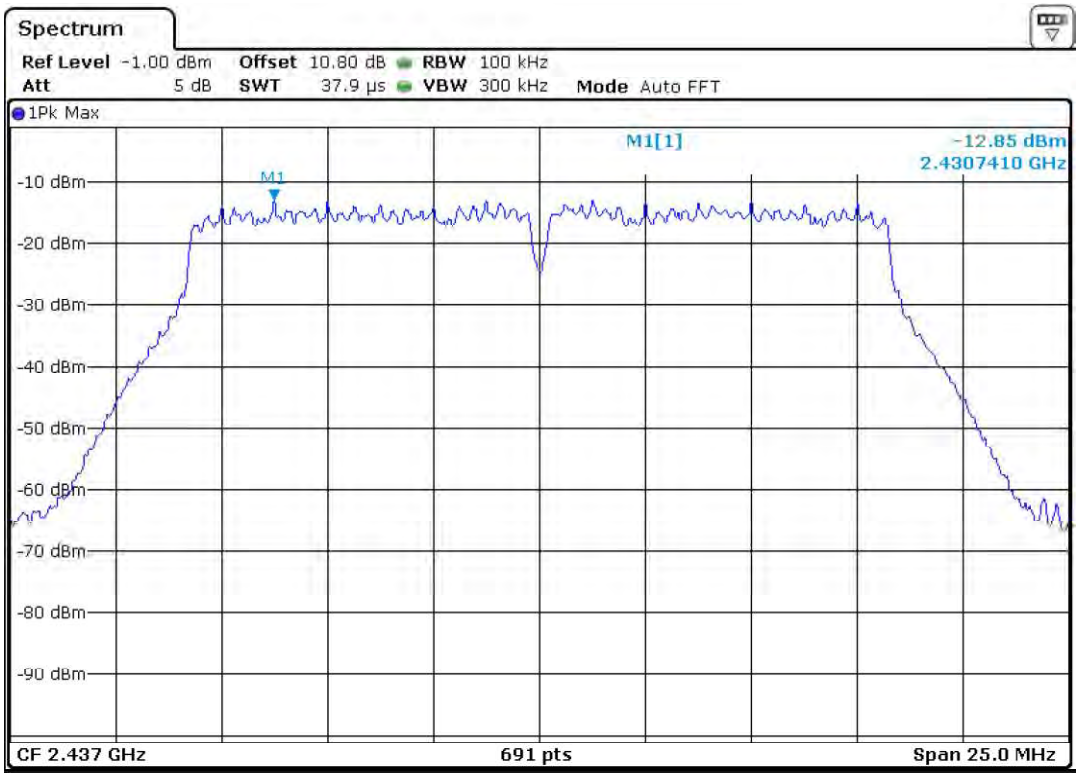

**6 Mbps Channel low**

**6 Mbps Channel mid**

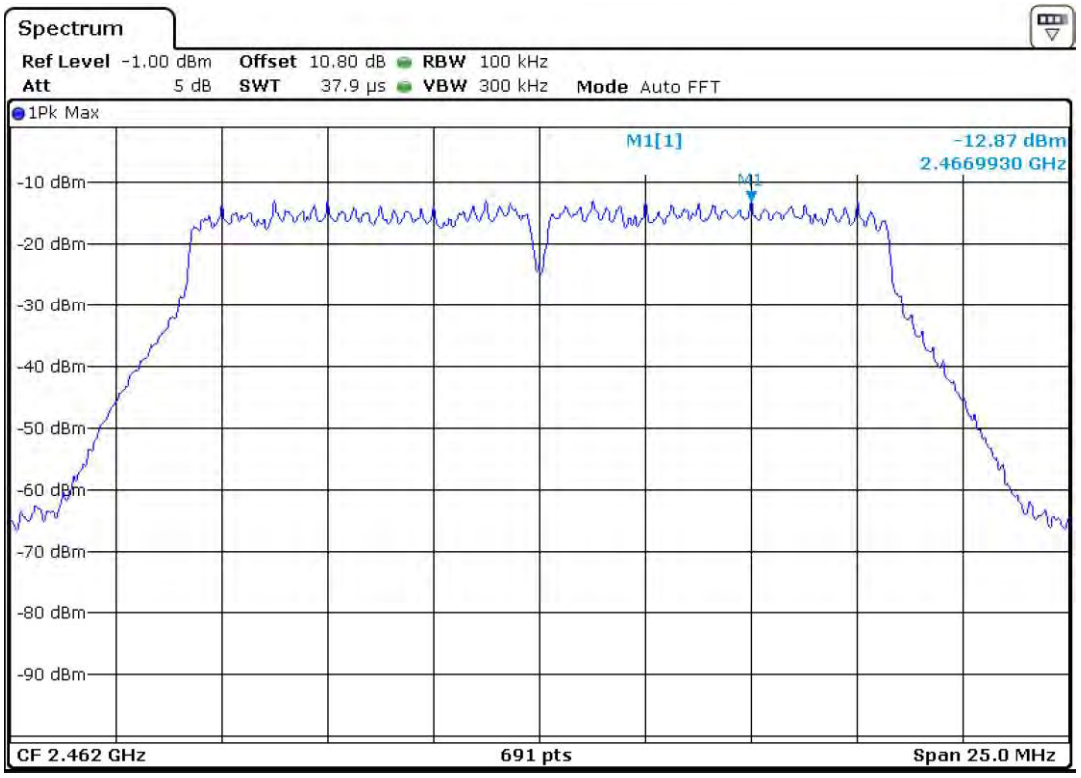
**6 Mbps Channel high**



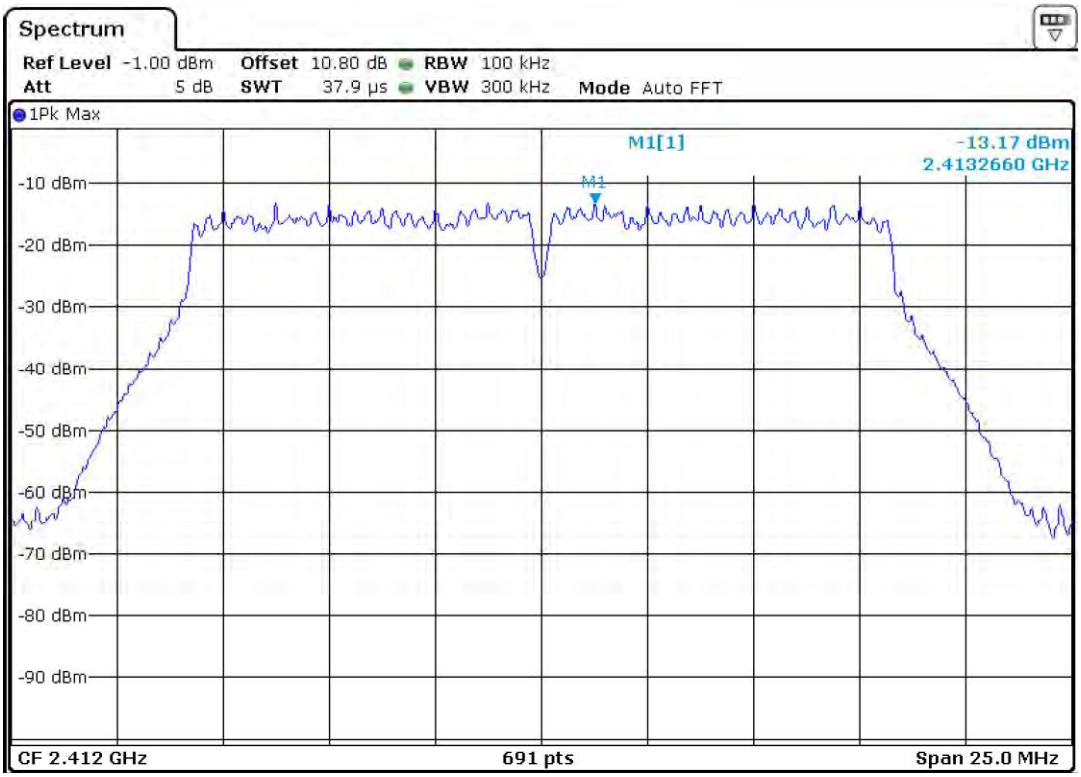

**24 Mbps Channel low**



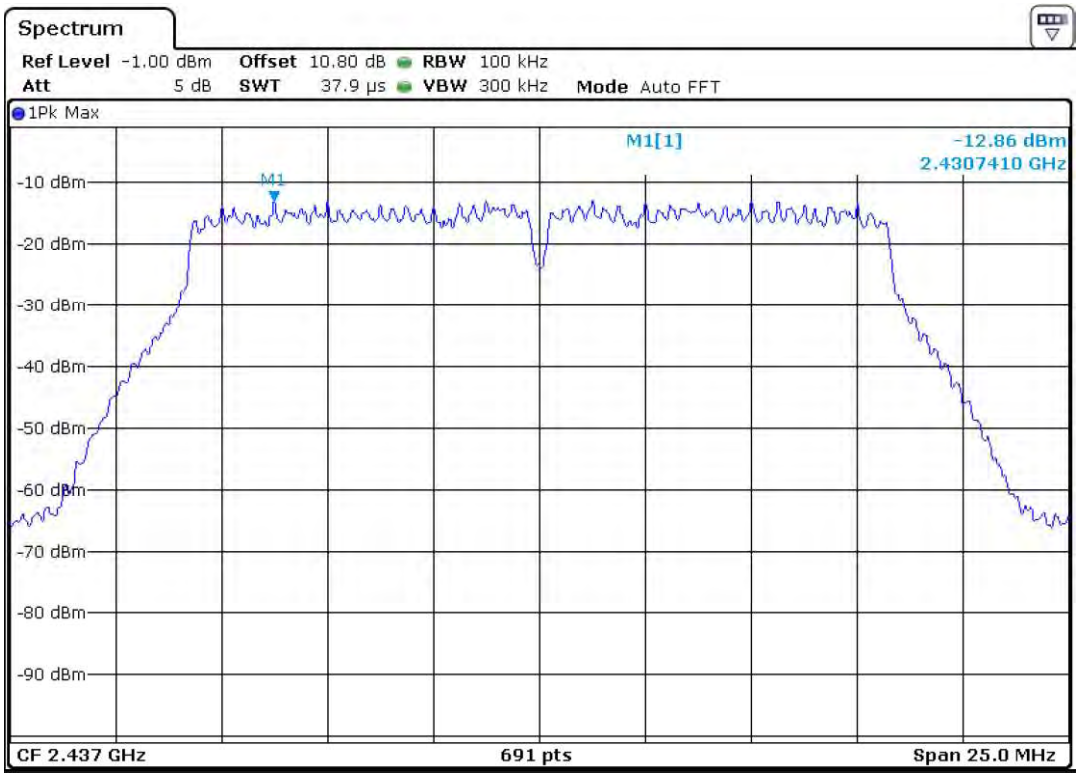

**24 Mbps Channel mid**



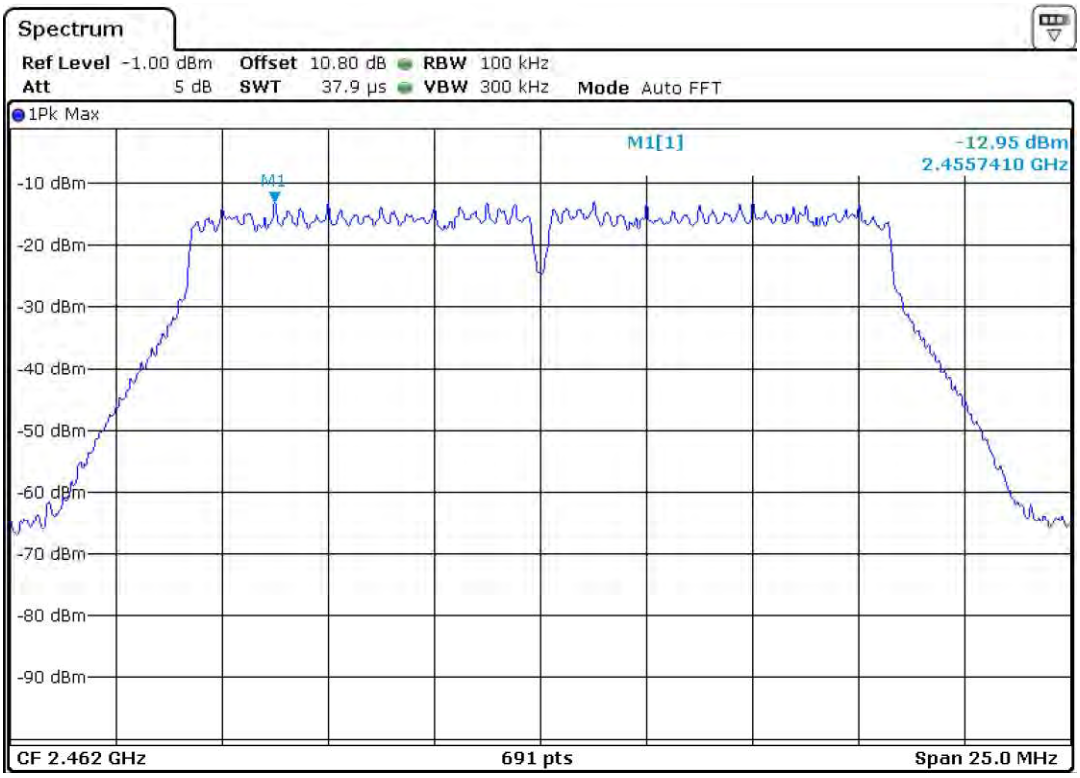

**24 Mbps Channel high**




**54 Mbps Channel low**




**54 Mbps Channel mid**




**54 Mbps Channel high**