



**F2 Labs**  
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**Middlefield, Ohio 44062**  
**United States of America**  
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## **CERTIFICATION TEST REPORT**

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**Manufacturer:** Woodstream Corporation  
69 North Locust Street  
Lititz, Pennsylvania 17543 USA

**Applicant:** Same as Above

**Product Name:** Victor WiFi Rat Trap

**Product Description:** WiFi enabled electronic rat trap which detects a rodent and then shocks it in order to kill it. The trap can then connect to WiFi in order to send notifications to the user's phone via an app. Runs on 4 C batteries.

**Operating Voltage/Frequency:** Battery-Operated (4 1.5V Alkaline C Cells)

**Model:** M2

**FCC ID:** SNA-M2

**Testing Commenced:** Oct. 30, 2019

**Testing Ended:** Jan. 23, 2020

**Summary of Test Results:** **In Compliance, with Modifications**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

**Standards:**

- **FCC Part 15 Subpart C, Section 15.247**
- **FCC Part 15.31(e)**
- **ANSI C63.10:2013**



Order Number: F2P22041A

Applicant: Woodstream Corporation

Model: M2

**Evaluation Conducted by:**

Julius Chiller, EMC/Wireless Engineer

**Report Reviewed by:**

Ken Littell, Director of EMC & Wireless Operations

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## 1 ADMINISTRATIVE INFORMATION

### 1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

### 1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement of DTS operating under Section 15.247 and in KDB558074. A list of the measurement equipment can be found in Section 6.

### 1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor. Note: Only measurements listed below which relate to tests included in this Test Report are applicable to it.

| Measurement Range                                   | Expanded Uncertainty | Combined Uncertainty |
|-----------------------------------------------------|----------------------|----------------------|
| Radiated Emissions <1 GHz @ 3m                      | ±5.07dB              | ±2.54                |
| Radiated Emissions <1 GHz @ 10m                     | ±5.09dB              | ±2.55                |
| Radiated Emissions 1 GHz to 2.7 GHz                 | ±3.62dB              | ±1.81                |
| Radiated Emissions 2.7 GHz to 18 GHz                | ±3.10dB              | ±1.55                |
| AC Power Line Conducted Emissions, 150kHz to 30 MHz | ±2.76dB              | ±1.38                |

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

### 1.4 Document History

| Document Number | Description | Issue Date    | Approved By |
|-----------------|-------------|---------------|-------------|
| F2P22041A-01E   | First Issue | Jan. 24, 2020 | K. Littell  |
|                 |             |               |             |
|                 |             |               |             |

**2 SUMMARY OF TEST RESULTS**

| Test Name                                               | Standard(s)                                     | Results   |
|---------------------------------------------------------|-------------------------------------------------|-----------|
| Occupied Bandwidth                                      | CFR 47 Part 15.247(a)(2) / KDB558074            | Complies  |
| Conducted Output Power                                  | CFR 47 Part 15.247(b)(3) / KDB558074            | Complies  |
| Voltage Variations                                      | CFR 47 Part 15.31(e)                            | Complies* |
| Conducted Spurious Emissions                            | CFR 47 Part 15.247(d) / Part 15.207 / KDB558074 | Complies  |
| Radiated Spurious Emission with 1.2dBi Integral Antenna | CFR 47 Part 15.247(d) / Part 15.209 / KDB558074 | Complies  |
| Peak Power Spectral Density                             | CFR 47 Part 15.247(e) / KDB558074               | Complies  |

*\*Requirements of 15.31 were met by using new batteries.*

| Modifications Made to the Equipment    |
|----------------------------------------|
| Power attenuation was adjusted to 5dB. |

**3 TABLE OF MEASURED RESULTS**

| Test                                    |                  | Low Channel<br>2.412 GHz | Mid Channel<br>2.437 GHz | High Channel<br>2.462 GHz |
|-----------------------------------------|------------------|--------------------------|--------------------------|---------------------------|
| Conducted Output<br>Power               | 11b CCK          | 16.35dBm                 | 16.61dBm                 | 16.84dBm                  |
|                                         | 11g 54 Mbps OFDM | 17.53dBm                 | 17.69dBm                 | 18.02dBm                  |
|                                         | 11n MCS7         | 16.32dBm                 | 16.48dBm                 | 16.55dBm                  |
| Conducted Output<br>Power Limit         |                  | 1 Watt, 30dBm            | 1 Watt, 30dBm            | 1 Watt, 30dBm             |
| Peak Power<br>Spectral Density          | 11b CCK          | -13.28dBm                | -13.20dBm                | -12.80dBm                 |
|                                         | 11g 54 Mbps OFDM | -18.40dBm                | -17.27dBm                | -17.14dBm                 |
|                                         | 11n MCS7         | -14.52dBm                | -14.37dBm                | -13.82dBm                 |
| Peak Power<br>Spectral Density<br>Limit |                  | 8dBm                     | 8dBm                     | 8dBm                      |
| -6dB Occupied<br>Bandwidth              | 11b CCK          | 8.068 MHz                | 8.073 MHz                | 8.068 MHz                 |
|                                         | 11g 54 Mbps OFDM | 16.476 MHz               | 16.431 MHz               | 16.431 MHz                |
|                                         | 11n MCS7         | 17.56 MHz                | 17.566 MHz               | 17.576 MHz                |
| -6dB Occupied<br>Bandwidth Limit        |                  | ≥ 500KHz                 | ≥ 500KHz                 | ≥ 500KHz                  |



#### **4 ENGINEERING STATEMENT**

This report has been prepared on behalf of Woodstream Corporation to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10:2013 and KDB558074 standards. The test results found in this test report relate only to the items tested.



## **5 EUT INFORMATION AND DATA**

### **5.1 Equipment Under Test:**

Product: Victor WiFi Rat Trap

Model: M2

Serial No.: None Specified

FCC ID: **SNA-M2**

### **5.2 Trade Name:**

Woodstream Corporation

### **5.3 Power Supply:**

Battery-Operated

### **5.4 Applicable Rules:**

CFR 47, Part 15.247, subpart C

### **5.5 Equipment Category:**

Radio Transmitter-DTS

### **5.6 Antenna:**

Integral, 1.443dBi Gain

### **5.7 Accessories:**

(4) Batteries – DA-ITON Alkaline C Cell

### **5.8 Test Item Condition:**

The equipment to be tested was received in good condition.

### **5.9 Testing Algorithm:**

The EUT was configured to provide a continuous modulated signal on the low, mid and high channels of the 2.4 GHz WiFi band. Measurements were made according to FCC Part 15.247 and KDB 55074 DO1 v05r02.

**6 LIST OF MEASUREMENT INSTRUMENTATION**

| Equipment Type           | Asset Number           | Manufacturer         | Model                                                  | Serial Number | Calibration Due Date |
|--------------------------|------------------------|----------------------|--------------------------------------------------------|---------------|----------------------|
| Shielded Chamber         | CL166-E                | Albatross Projects   | B83117-DF435-T261                                      | US140023      | Mar. 31, 2020        |
| Temp/Hum. Recorder       | CL261                  | Extech               | 445814                                                 | 04            | Mar. 6, 2020         |
| Temp/Hum. Recorder       | CL263                  | Extech               | 445814                                                 | 06            | Mar. 6, 2020         |
| Receiver                 | CL204                  | Rohde & Schwarz      | ESR7                                                   | 101714        | Oct. 16, 2020        |
| Receiver                 | CL151                  | Rohde & Schwarz      | ESU40                                                  | 100319        | Oct. 21, 2020        |
| Antenna, JB3 Combination | CL211                  | Sunol Sciences, Inc. | JB1                                                    | A021017       | Oct. 3, 2021         |
| Horn Antenna             | CL098                  | Emco                 | 3115                                                   | 9809-5580     | Jan. 31, 2021        |
| Antenna, Horn            | CL114                  | AH Systems Inc.      | SAS-572                                                | 237           | Feb. 4, 2021         |
| Pre-Amplifier            | CL153                  | Keysight Tech.       | 83006A                                                 | MY39500791    | Aug. 5, 2020         |
| Active 18" Loop Antenna  | CL163-Loop             | A.H. Systems, Inc.   | EHA-52B                                                | 100           | July 24, 2020        |
| Pre-amplifier            | CL189                  | Com-Power            | PAM-840A                                               | 461303        | July 31, 2021        |
| Software:                | Tile Version 3.4.B.3   |                      | Software Verified: Oct. 30-Nov. 1, 2019; Jan. 17, 2020 |               |                      |
| Software:                | EMC 32, Version 8.53.0 |                      | Software Verified: Oct. 30-Nov. 1, 2019; Jan. 17, 2020 |               |                      |



## **7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH**

### **7.1 Requirements:**

The 6dB bandwidth shall be greater than 500 kHz.

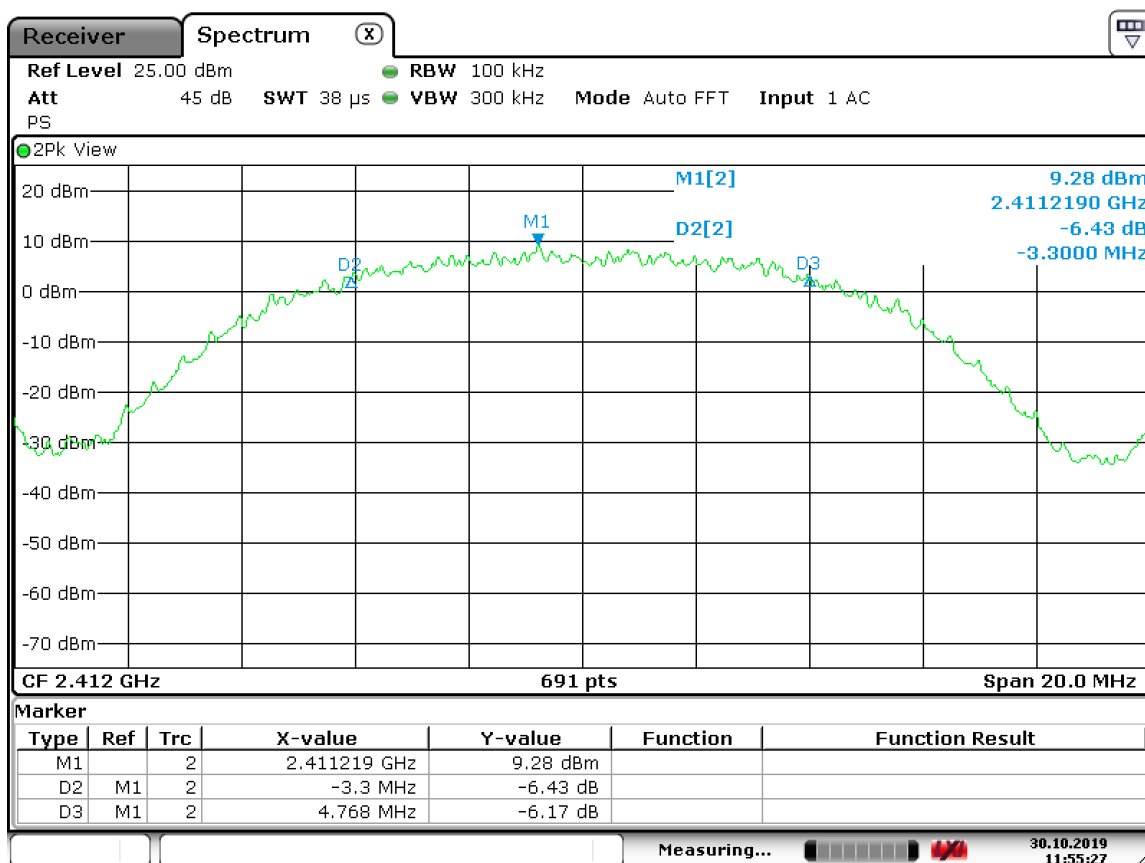
Bandwidth measurements were made at the low, mid and high frequencies with the resolution Bandwidth set at 100 kHz (video bandwidth set at 300 kHz) while the span was set at 20MHz to encompass the entire modulated waveform. The bandwidth was measured using the marker delta method.



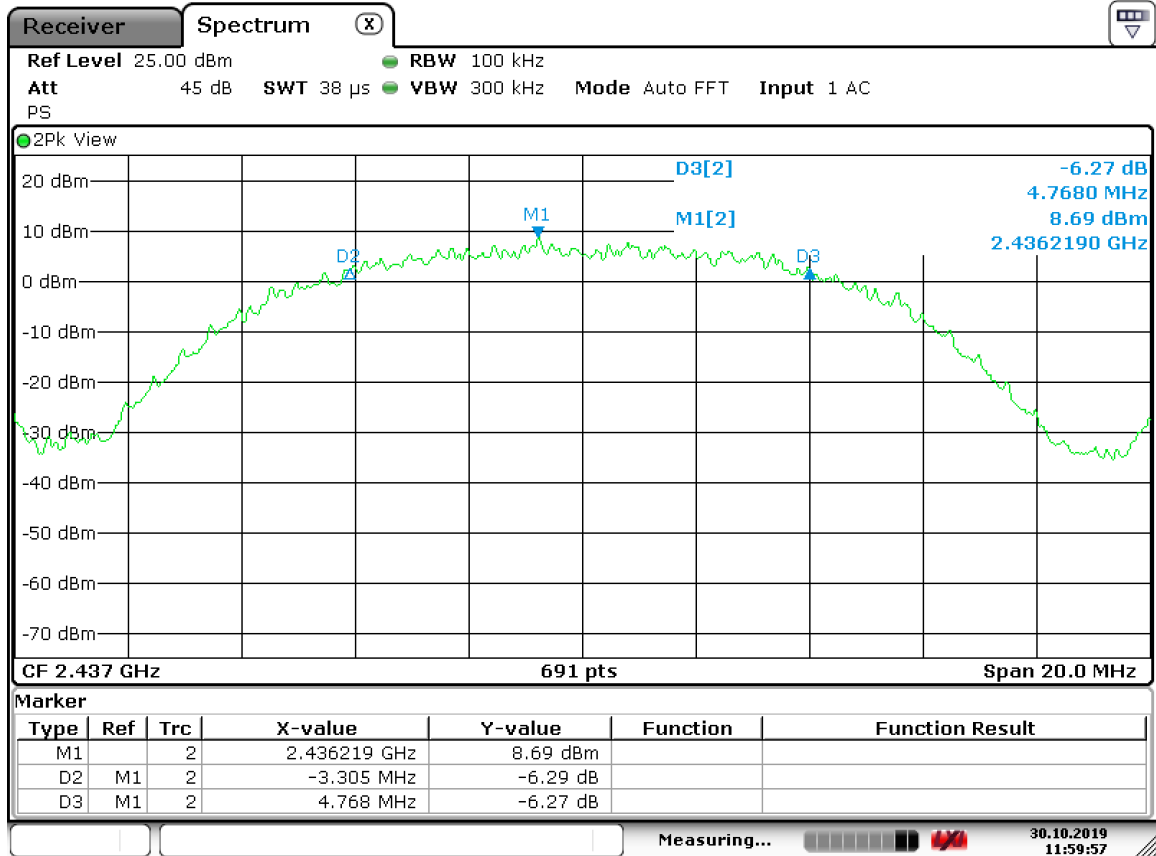
## 7.2 Occupied Bandwidth Test Data

|            |                                        |                    |            |
|------------|----------------------------------------|--------------------|------------|
| Test Date: | Oct. 30, 2019                          | Test Engineer:     | J. Chiller |
| Standards: | CFR 47 Part 15.247(a)(2);<br>KDB558074 | Air Temperature:   | 22.8°C     |
|            |                                        | Relative Humidity: | 40%        |

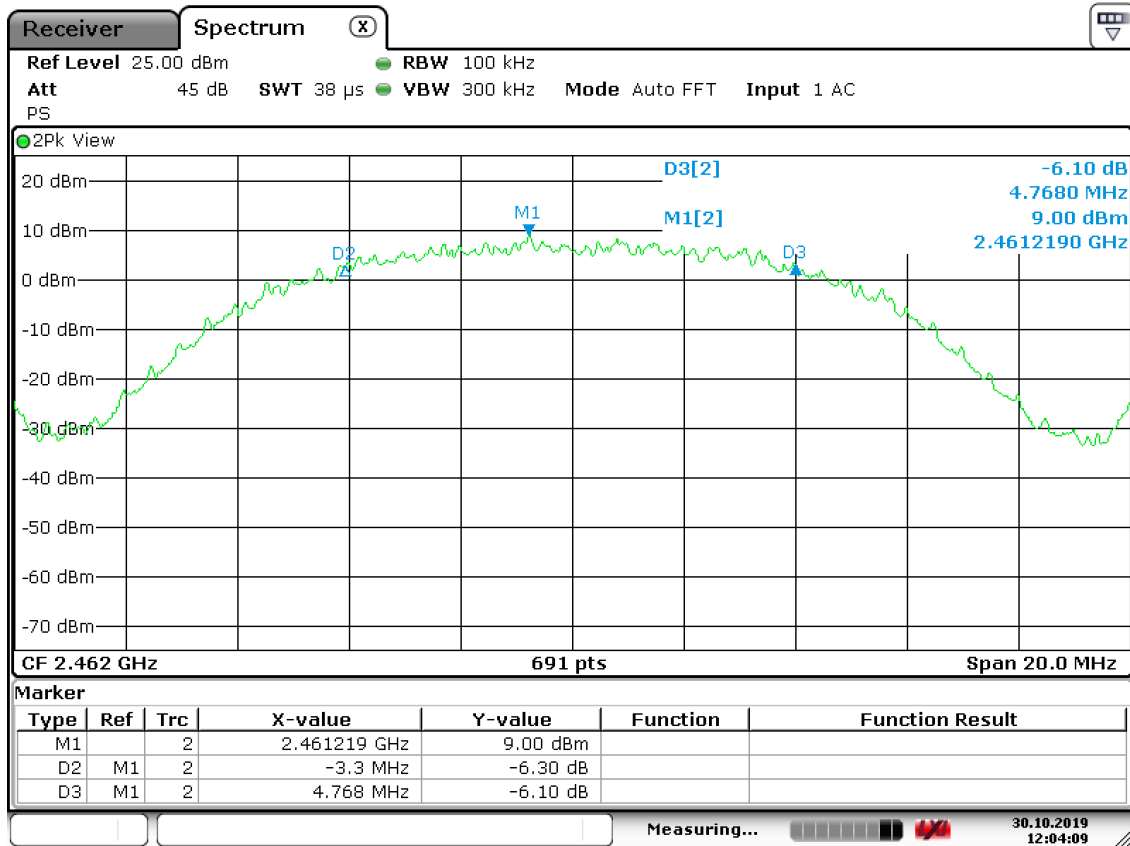
## -6dB OBW, 11b CCK: Low Channel



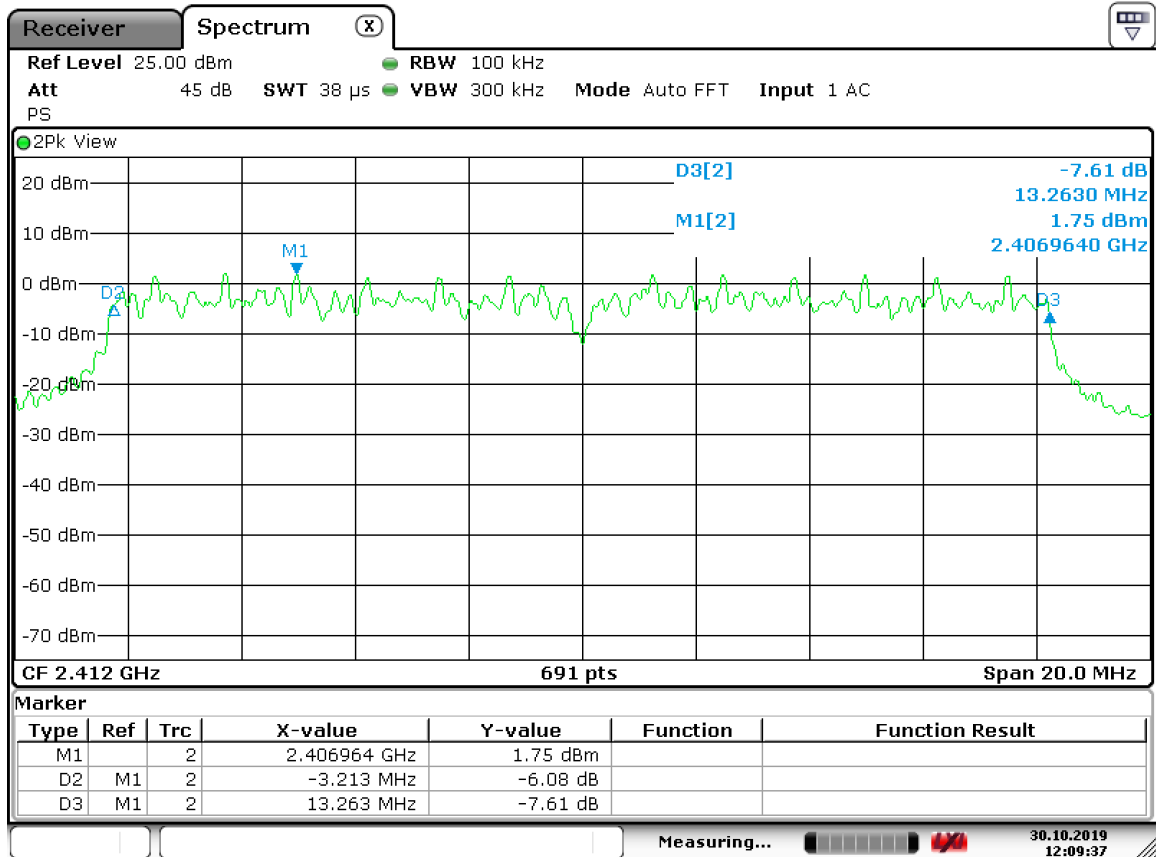
Date: 30.OCT.2019 11:55:28

**-6dB OBW, 11b CCK: Mid Channel**

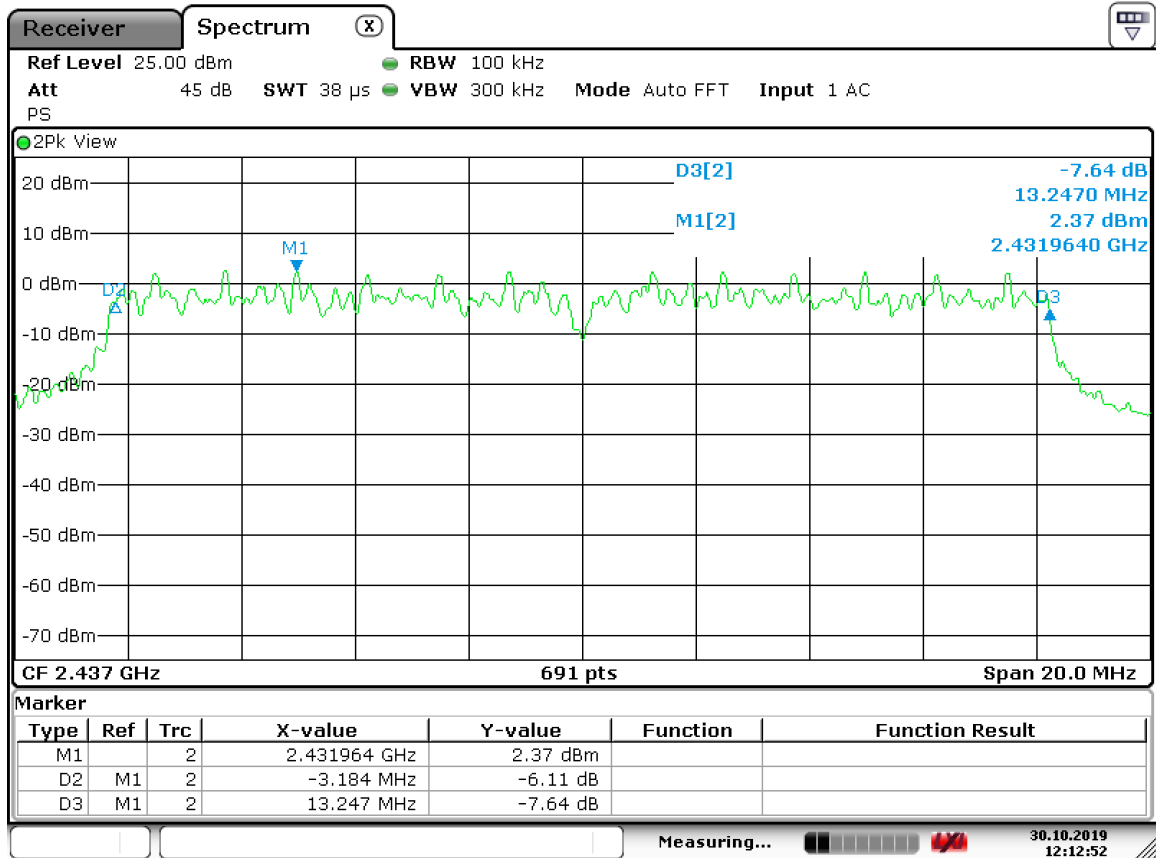
Date: 30.OCT.2019 11:59:57

**-6dB OBW, 11b CCK: High Channel**

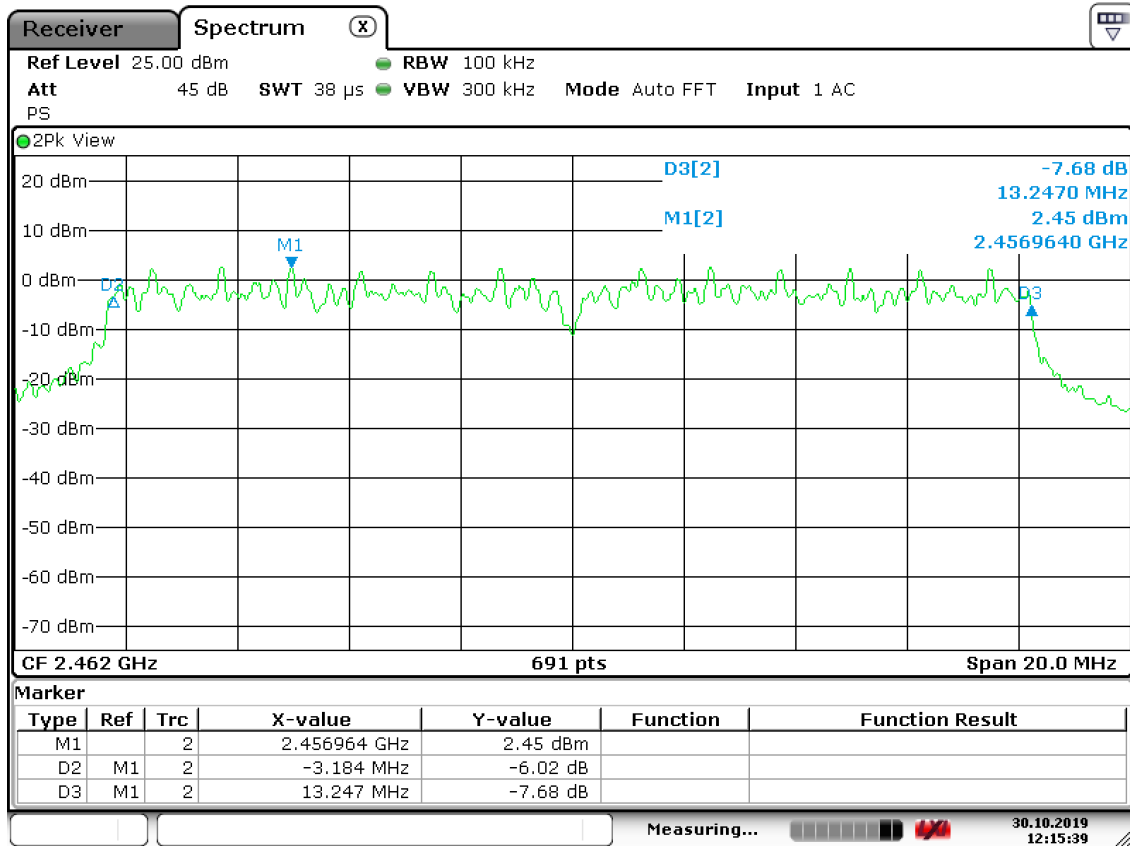
Date: 30.OCT.2019 12:04:08

**-6dB OBW, 11g 54 Mbps OFDM: Low Channel**

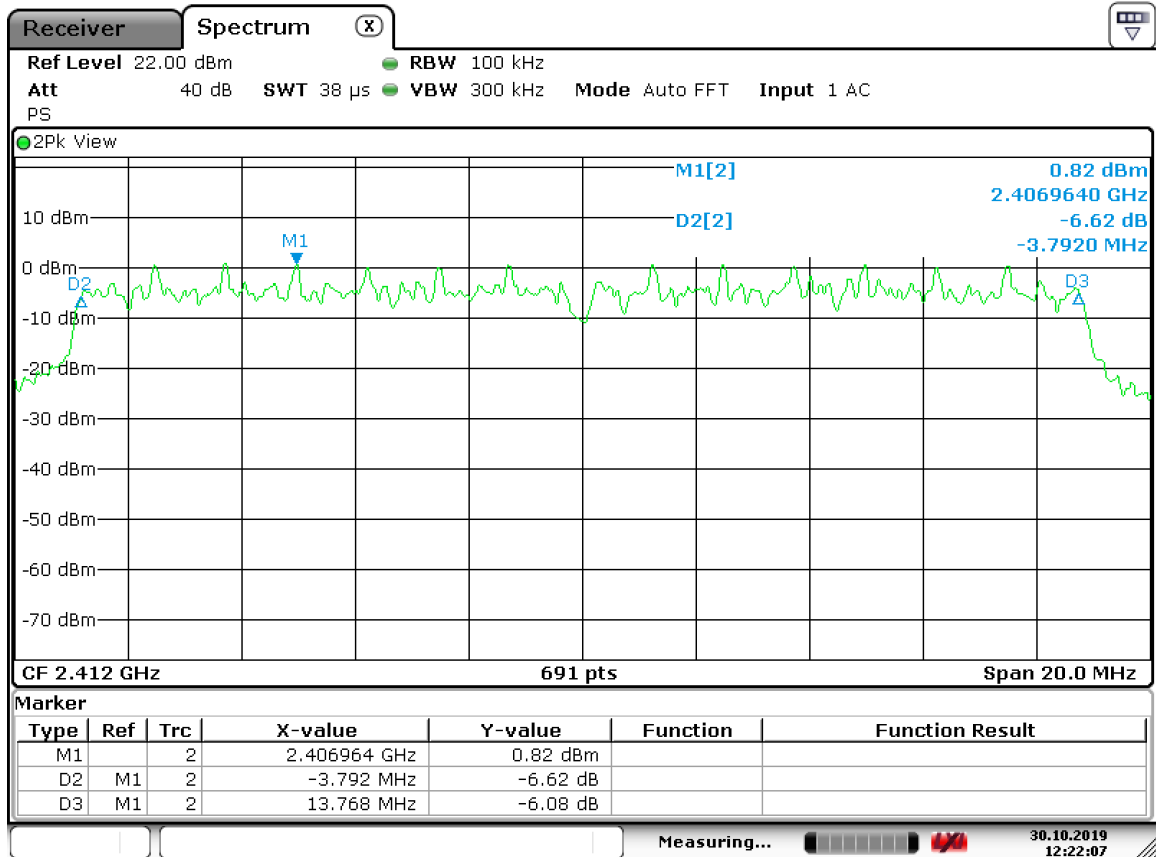
Date: 30.OCT.2019 12:09:38

**-6dB OBW, 11g 54 Mbps OFDM: Mid Channel**

Date: 30.OCT.2019 12:12:51

**-6dB OBW, 11g 54 Mbps OFDM: High Channel**

Date: 30.OCT.2019 12:15:39

**-6dB OBW, 11n MCS7: Low Channel**

Date: 30.OCT.2019 12:22:07

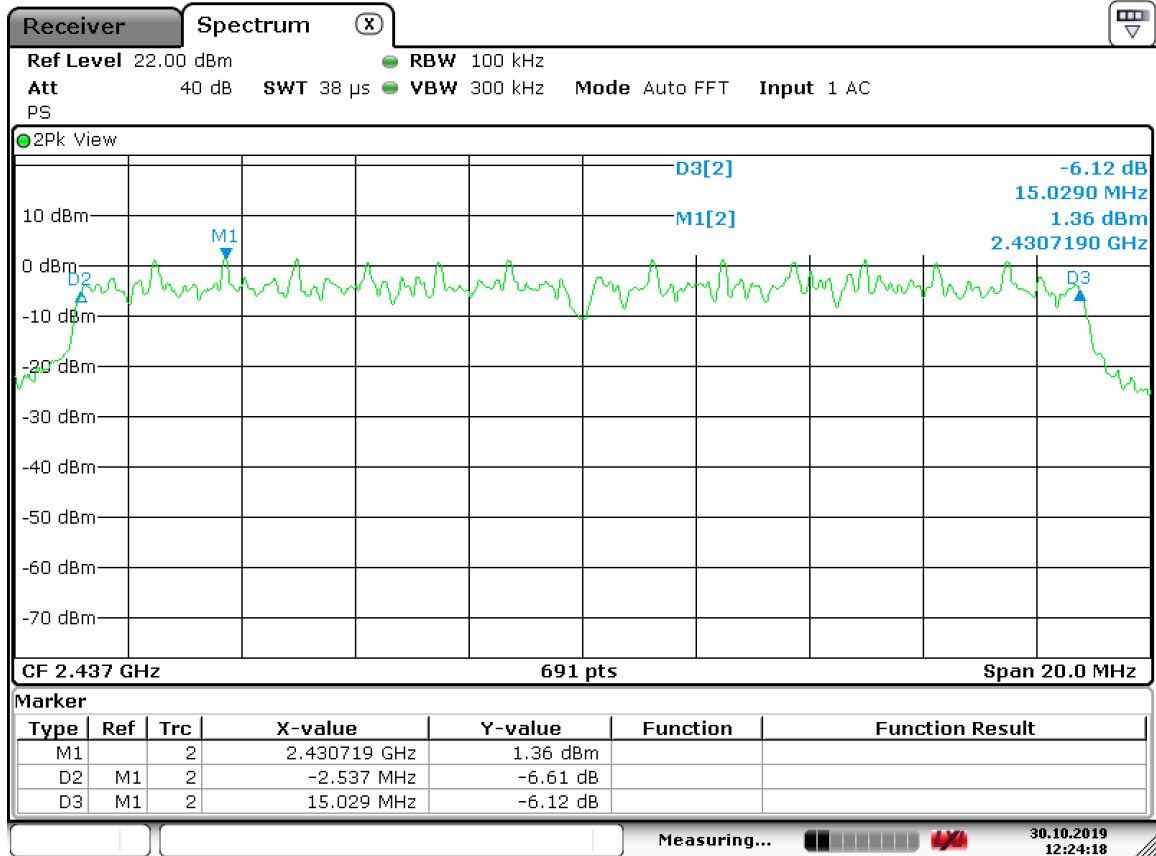


Order Number: F2P22041A

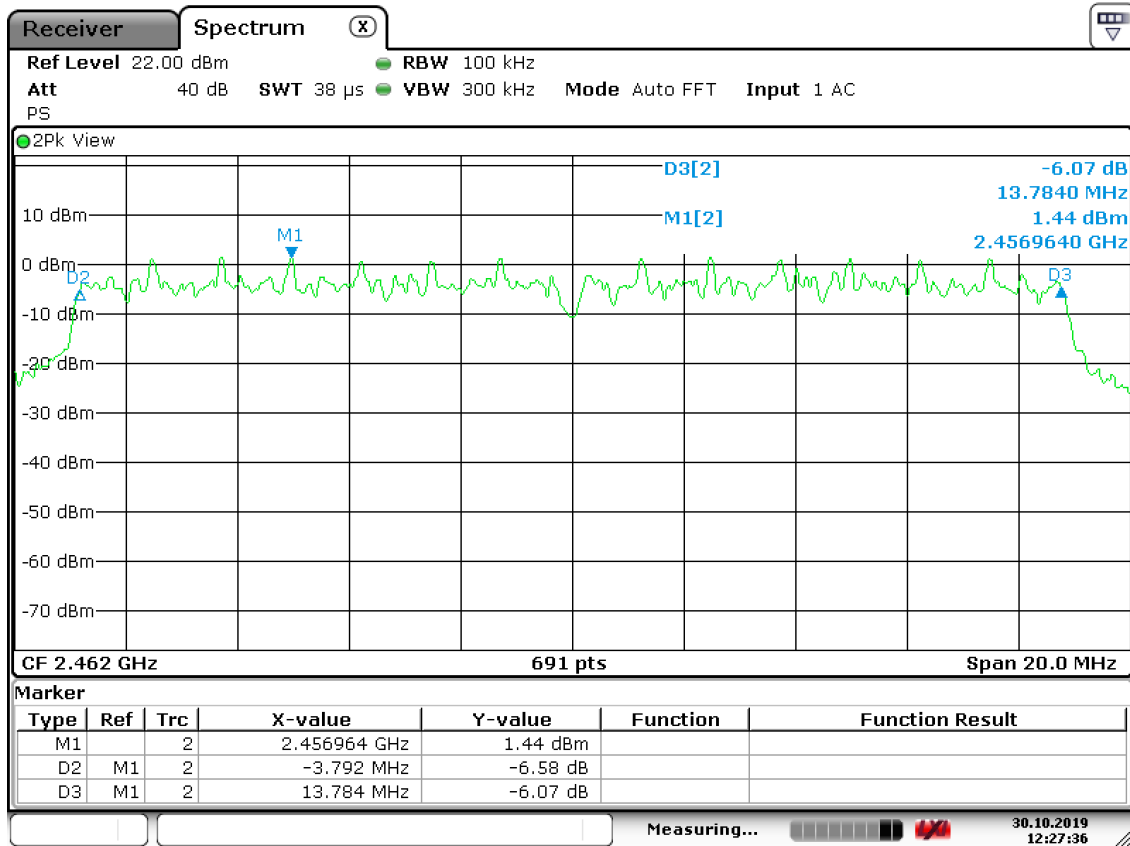
Applicant: Woodstream Corporation

Model: M2

### -6dB OBW, 11n MCS7: Mid Channel



Date: 30.OCT.2019 12:24:19

**-6dB OBW, 11n MCS7: High Channel**

Date: 30.OCT.2019 12:27:36



## **8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER**

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

### **8.1 Requirements:**

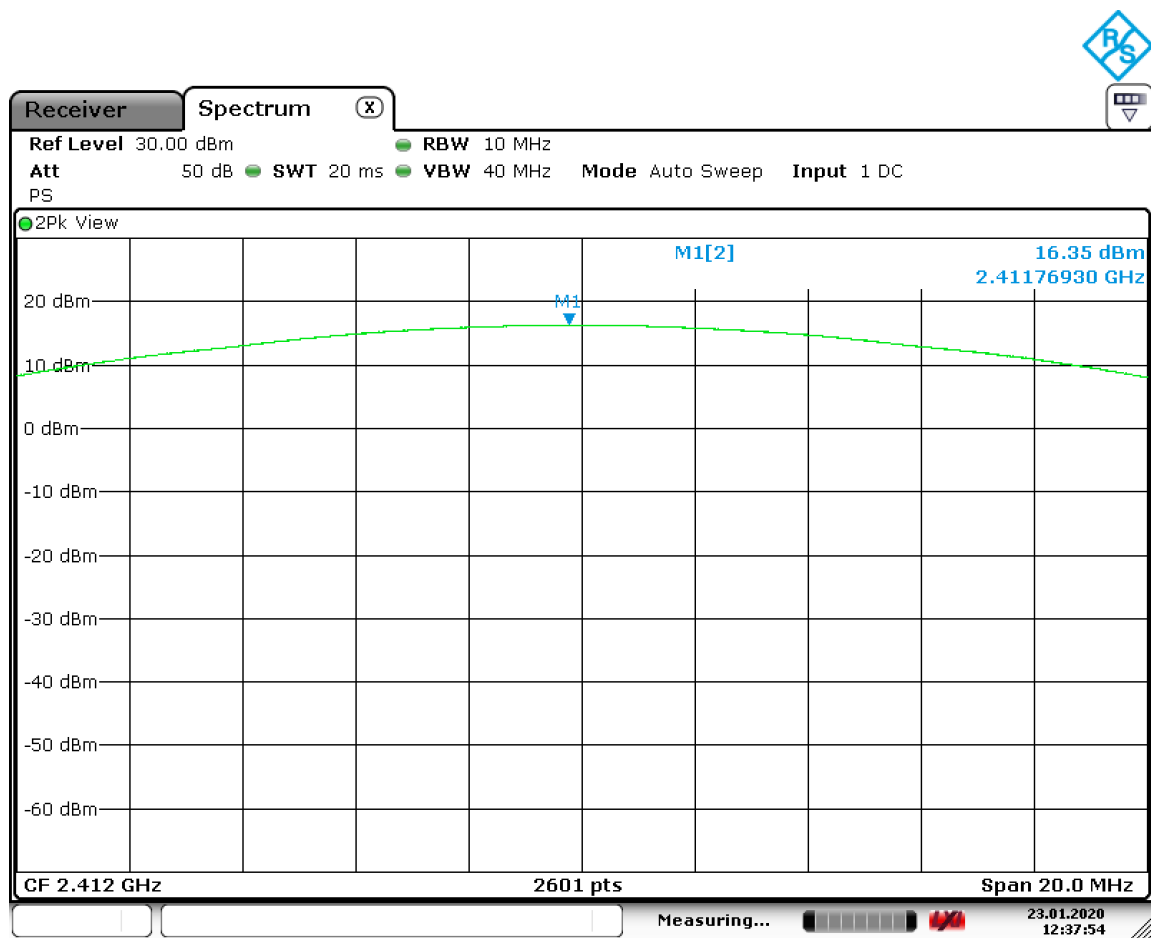
The power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.



## 8.2 Conducted Output Power Test Data

|            |                                        |                    |            |
|------------|----------------------------------------|--------------------|------------|
| Test Date: | Jan. 23, 2020                          | Test Engineer:     | J. Chiller |
| Standards: | CFR 47 Part 15.247(b)(3);<br>KDB558074 | Air Temperature:   | 22.3°C     |
|            |                                        | Relative Humidity: | 23%        |

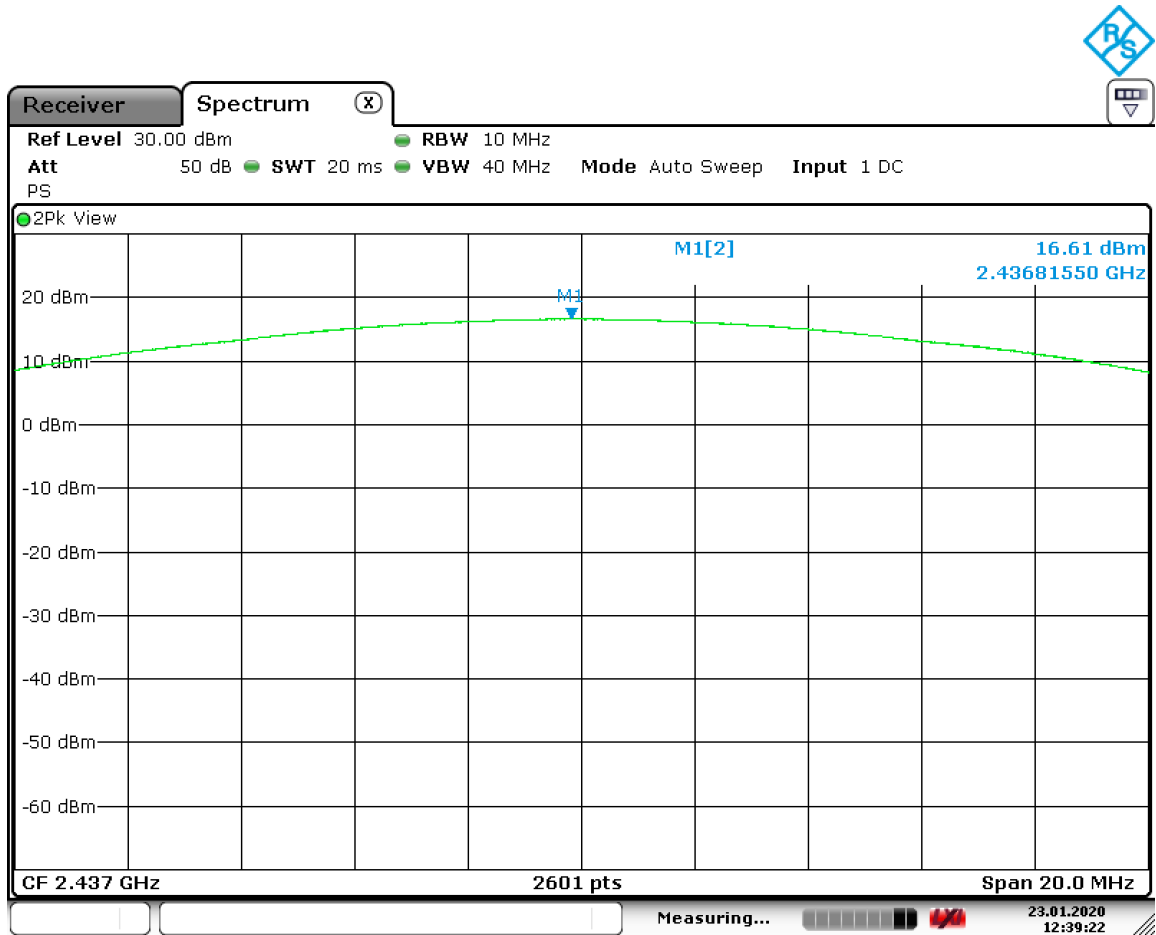
## 11b CCK: Low Channel



Date: 23.JAN.2020 12:37:54



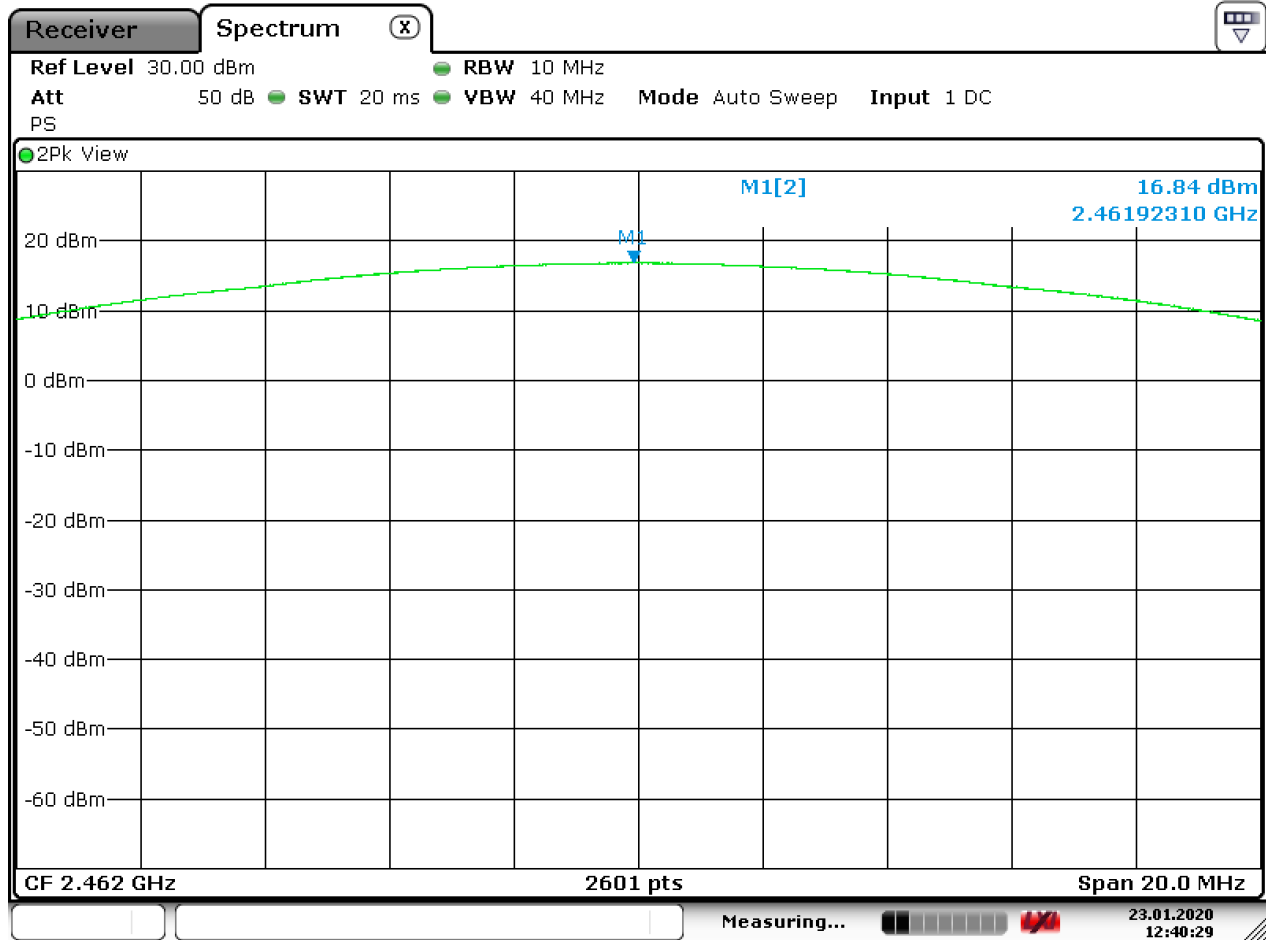
11b CCK: Mid Channel



Date: 23.JAN.2020 12:39:22



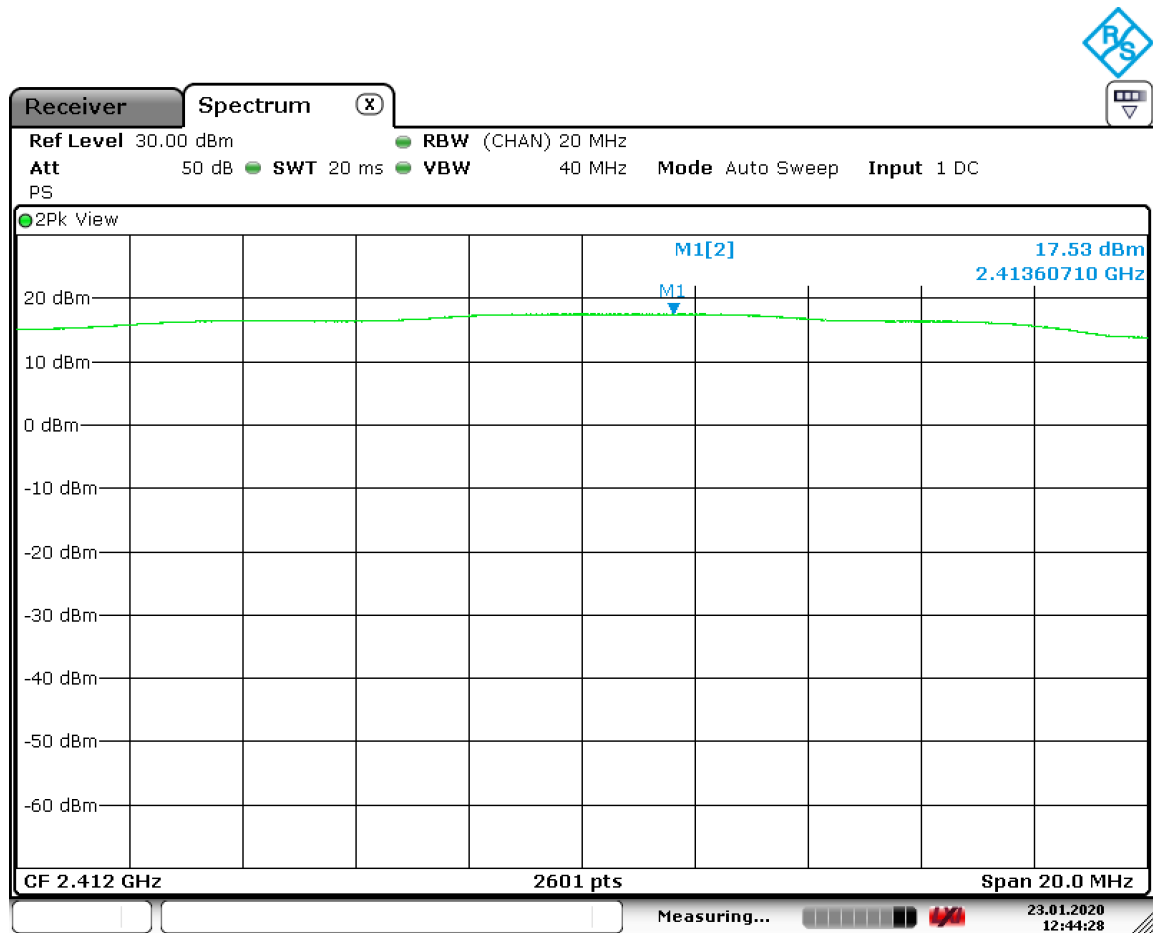
### 11b CCK: High Channel



Date: 23.JAN.2020 12:40:30



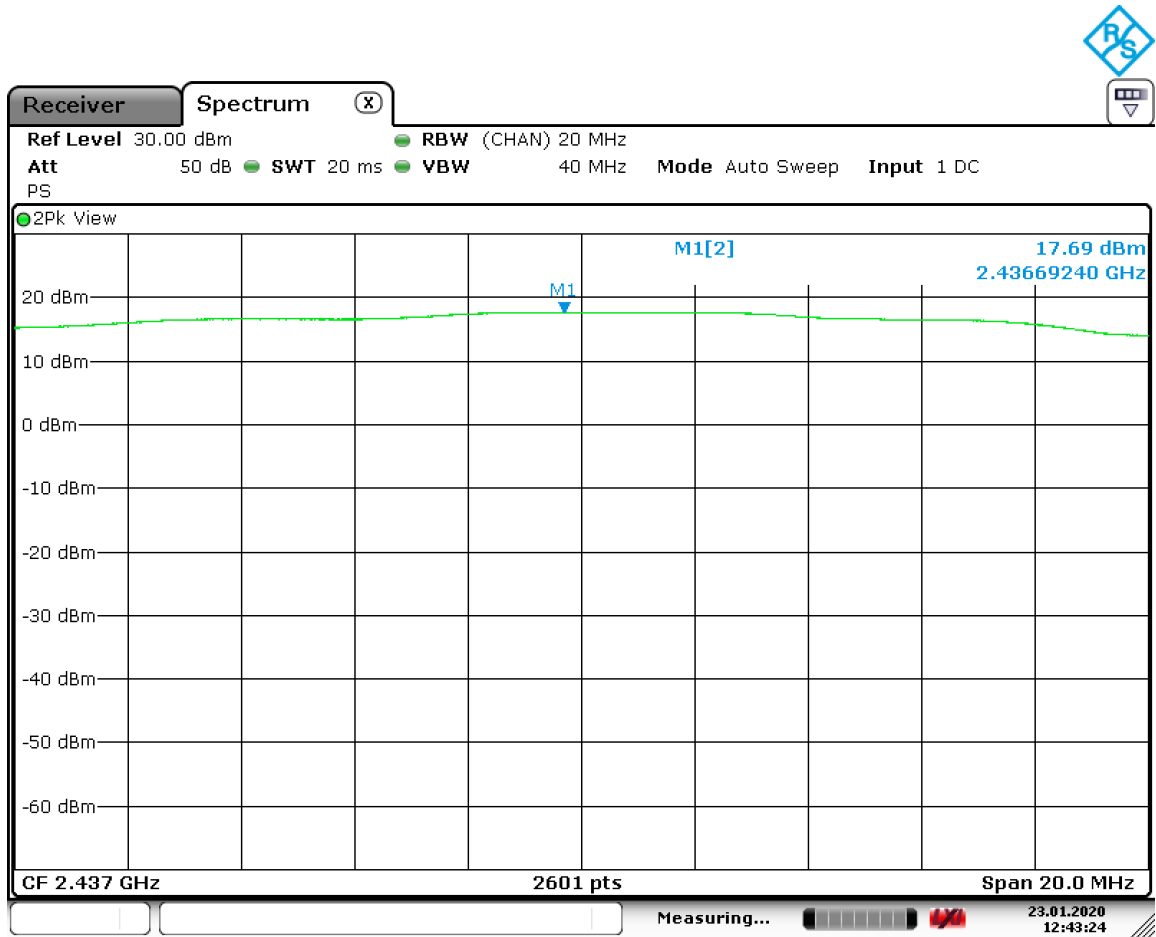
### 11g 54 Mbps OFDM: Low Channel



Date: 23.JAN.2020 12:44:28



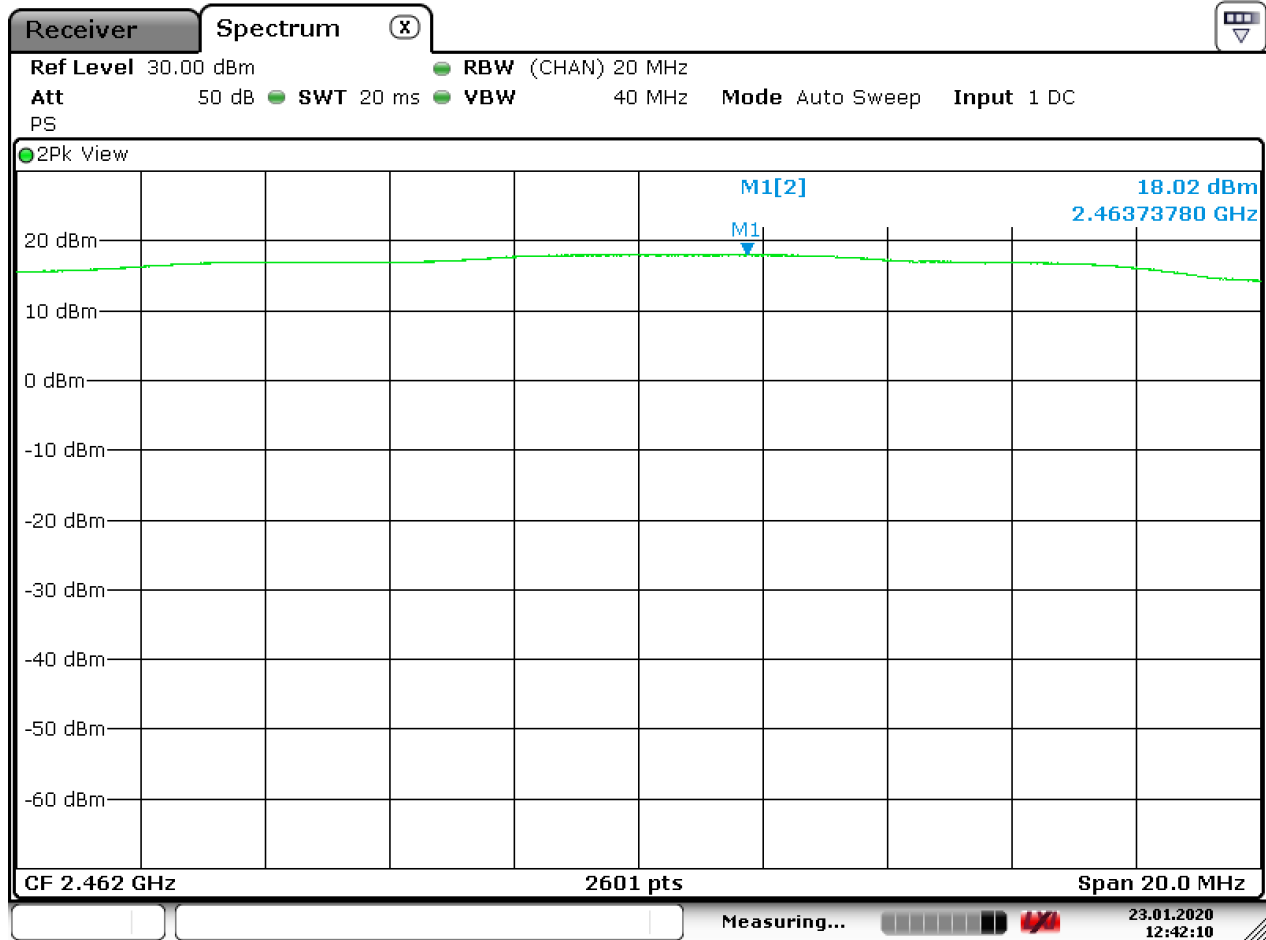
### 11g 54 Mbps OFDM: Mid Channel



Date: 23.JAN.2020 12:43:24



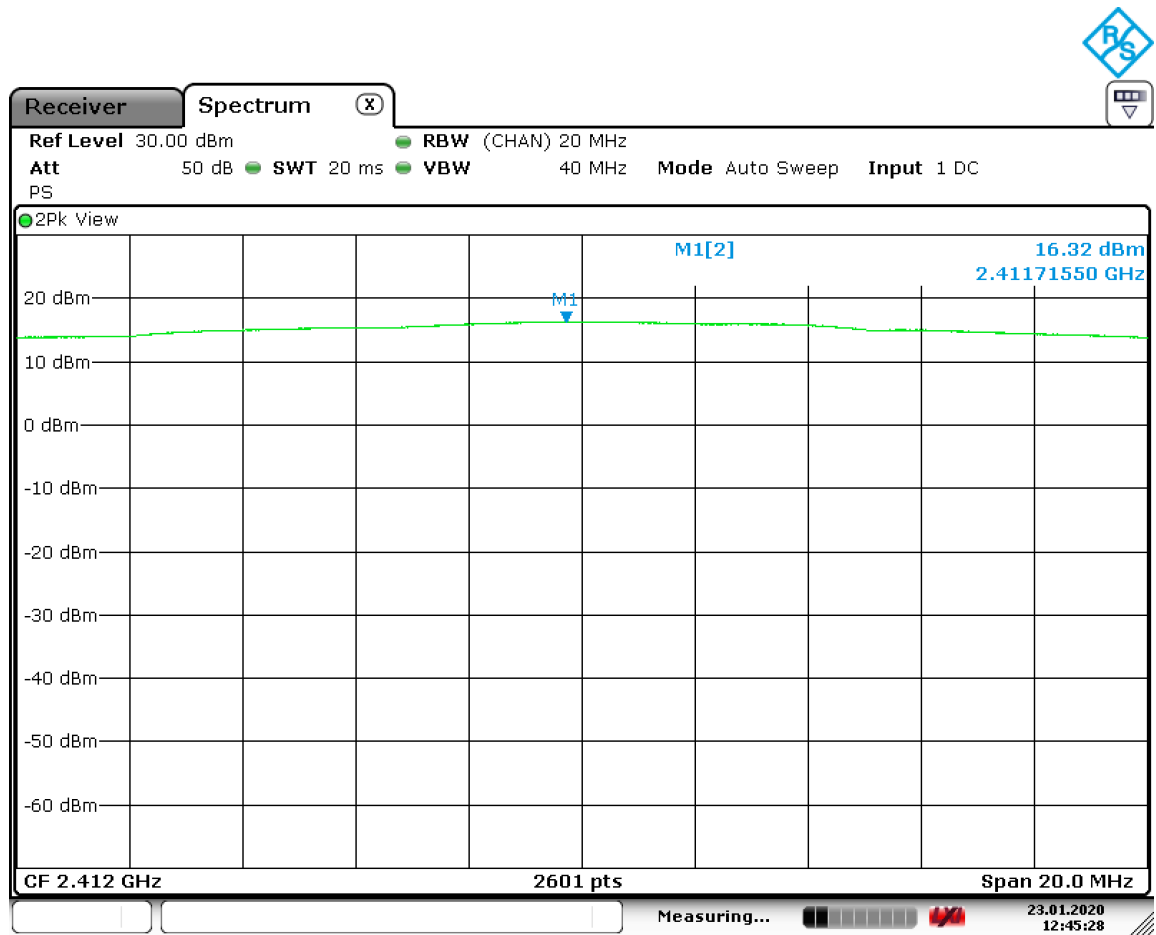
### 11g 54 Mbps OFDM: High Channel



Date: 23.JAN.2020 12:42:09



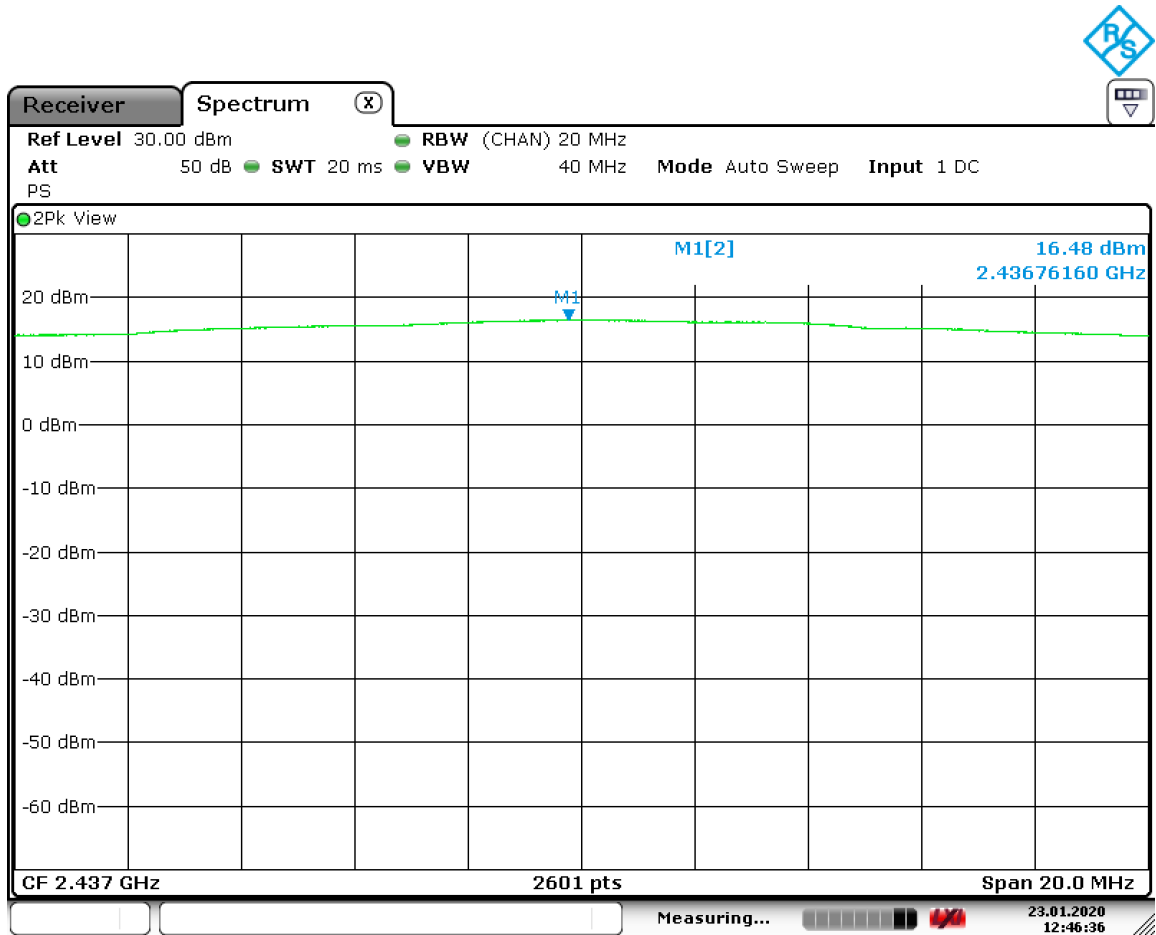
11n MCS7: Low Channel



Date: 23.JAN.2020 12:45:28



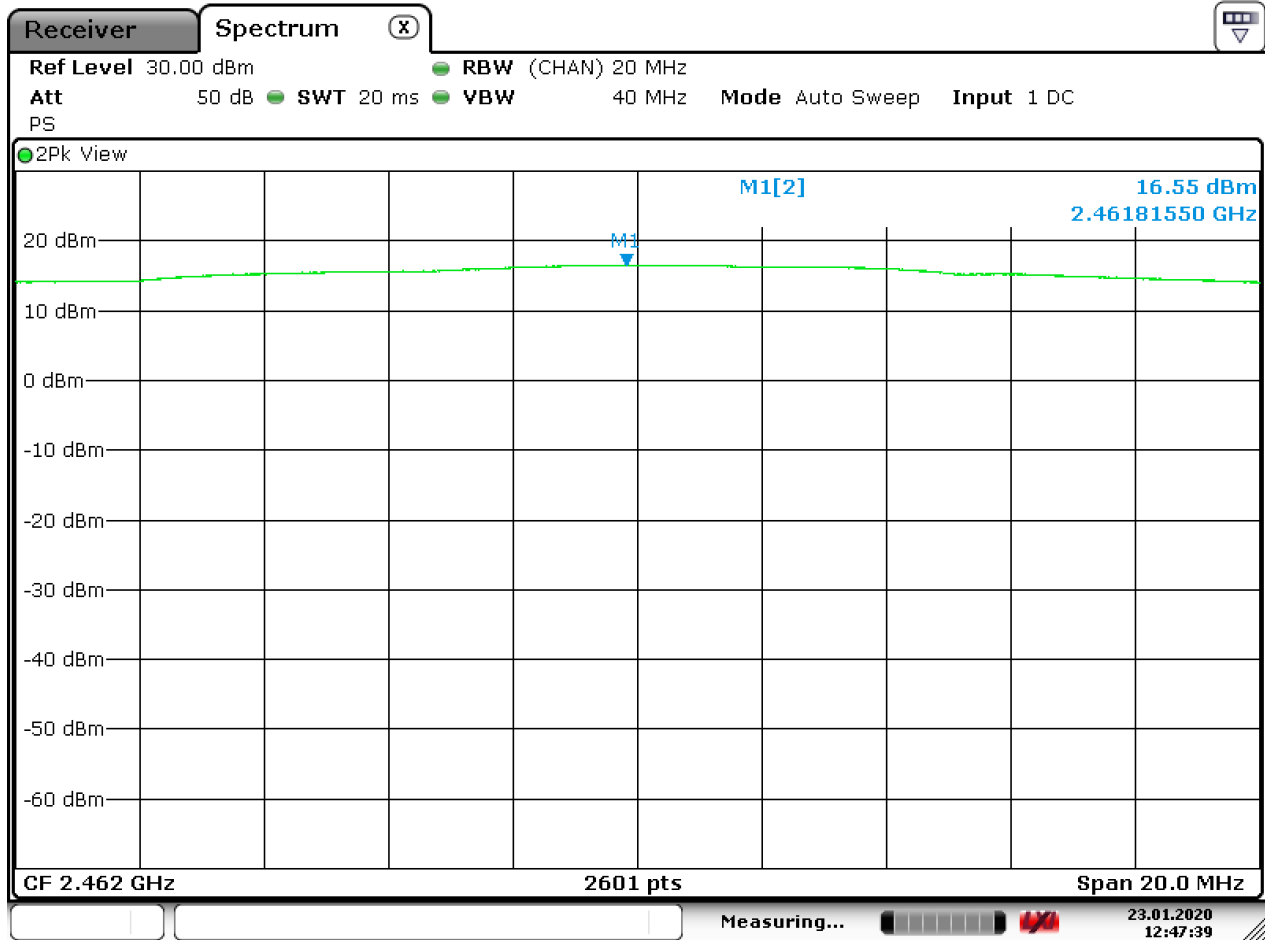
11n MCS7: Mid Channel



Date: 23.JAN.2020 12:46:36



11n MCS7: High Channel



Date: 23.JAN.2020 12:47:40



## 9 FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

### RF Antenna Conducted Test

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

#### 9.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

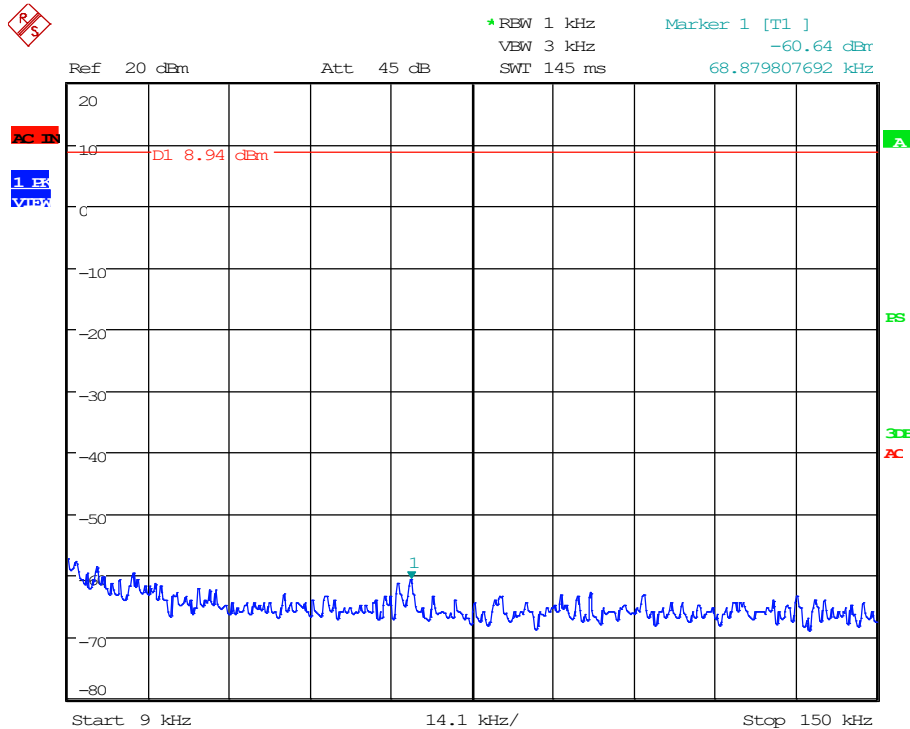
Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.



## 9.2 Conducted Spurious Emissions Test Data

|            |                                                  |                    |            |
|------------|--------------------------------------------------|--------------------|------------|
| Test Date: | Oct. 31, 2019                                    | Test Engineer:     | J. Chiller |
| Standards: | CFR 47 Part 15.247(d) / Part 15.207<br>KDB558074 | Air Temperature:   | 22.7°C     |
|            |                                                  | Relative Humidity: | 51%        |

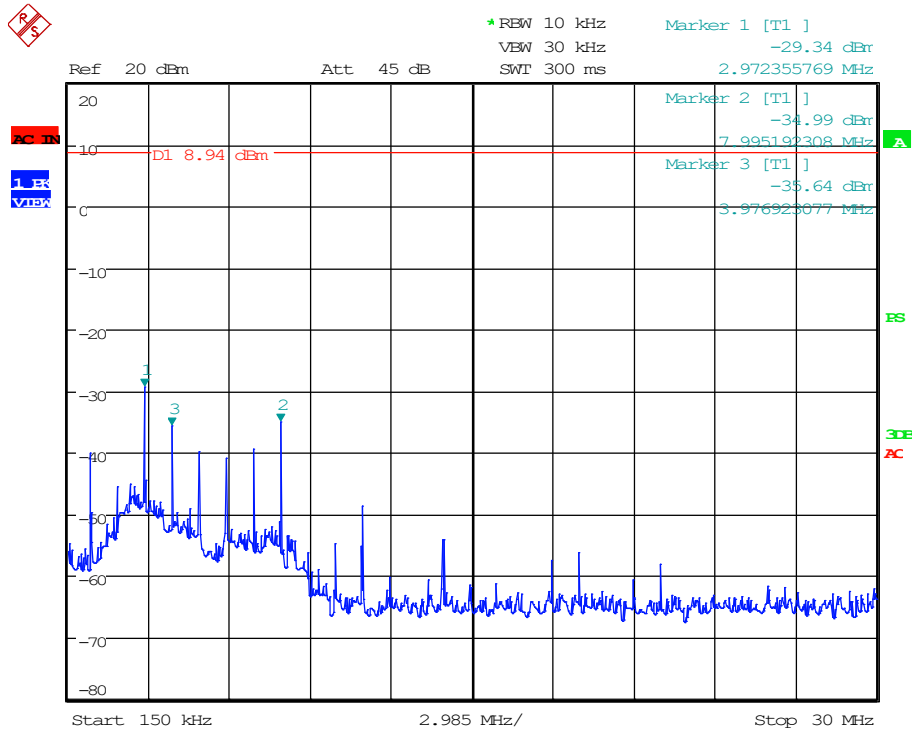
## 11b CCK: Low Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 14:55:06



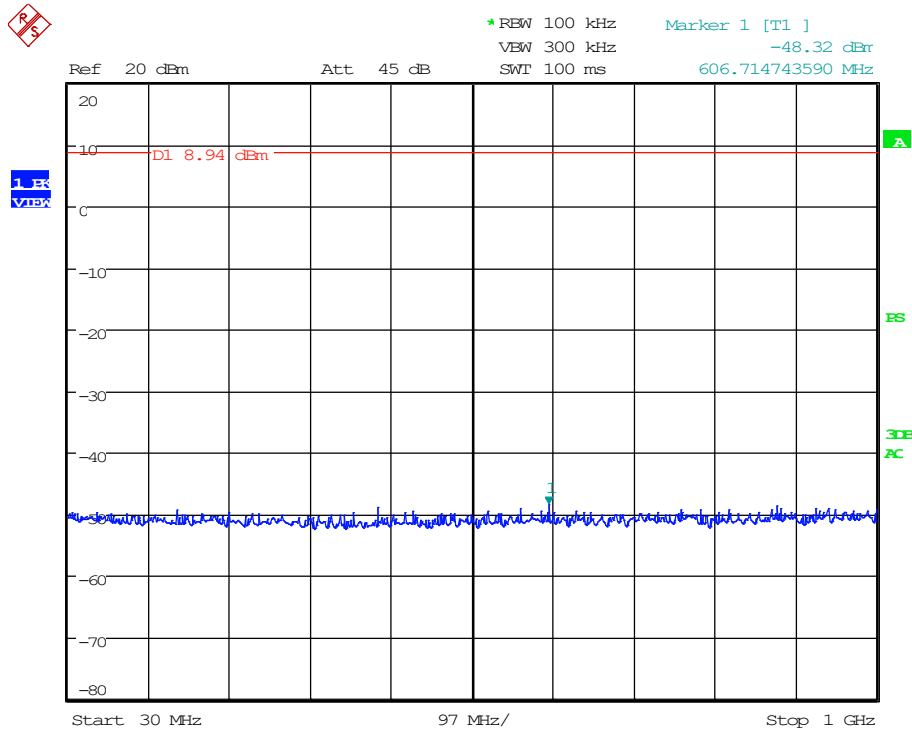
### 11b CCK: Low Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 14:53:57



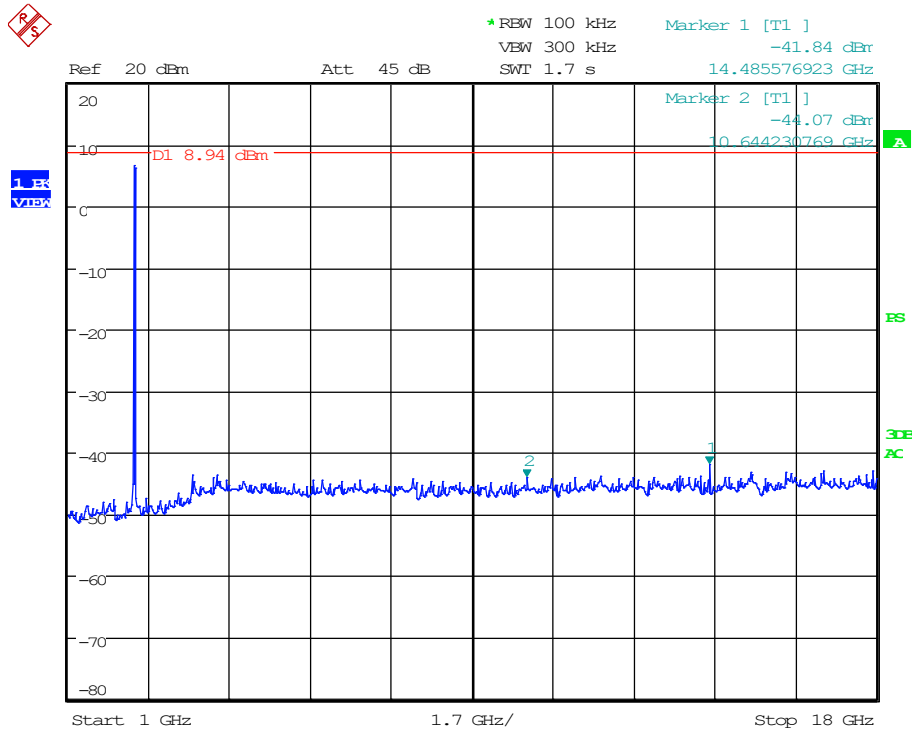
### 11b CCK: Low Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 14:48:52



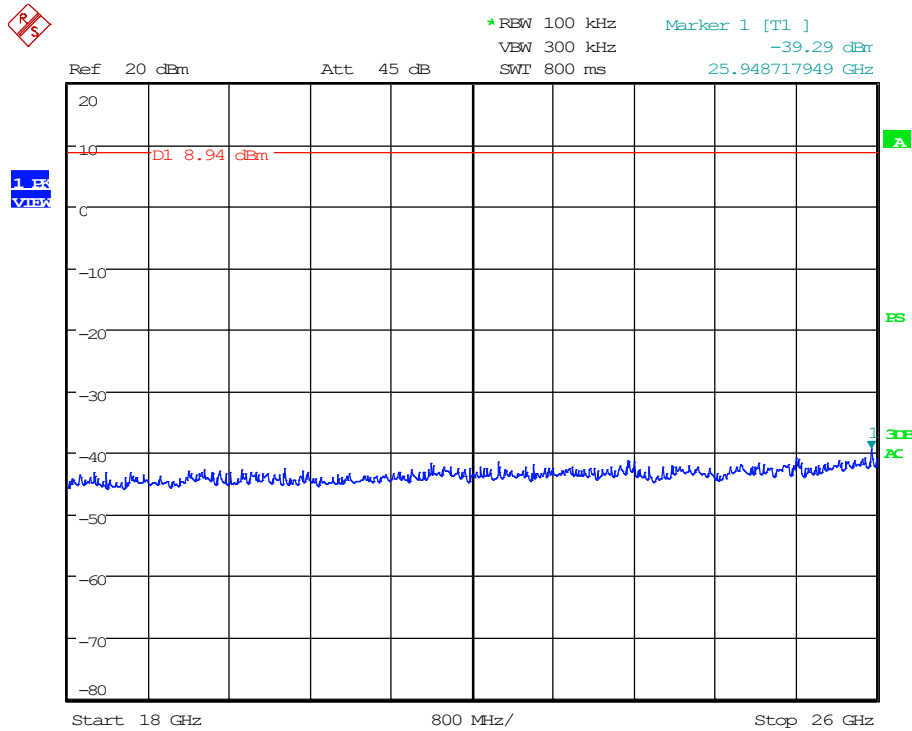
### 11b CCK: Low Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 14:46:18



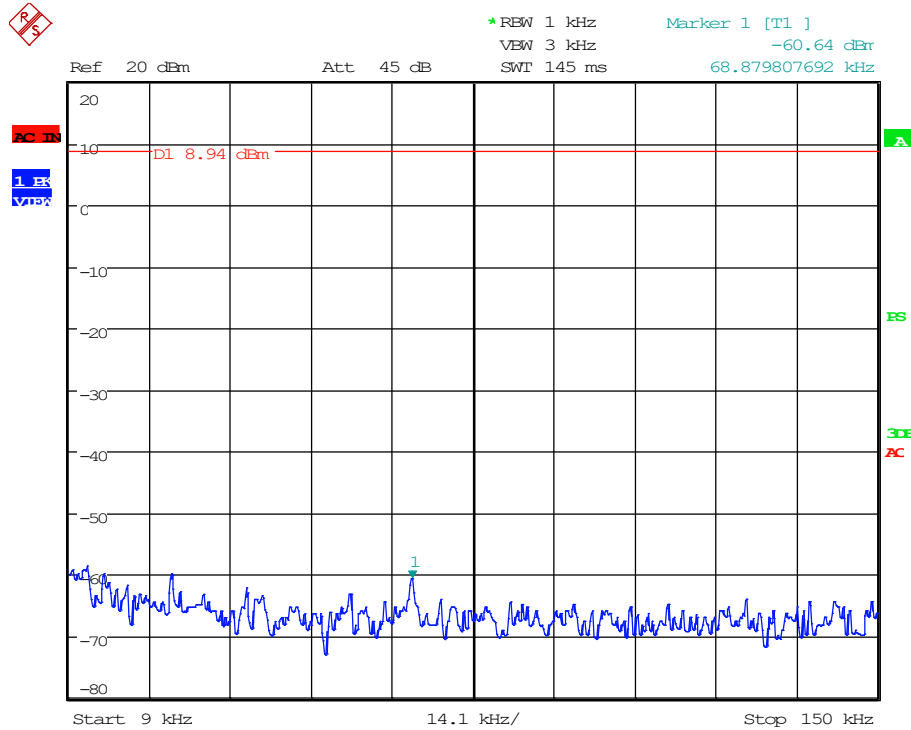
### 11b CCK: Low Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 14:39:27



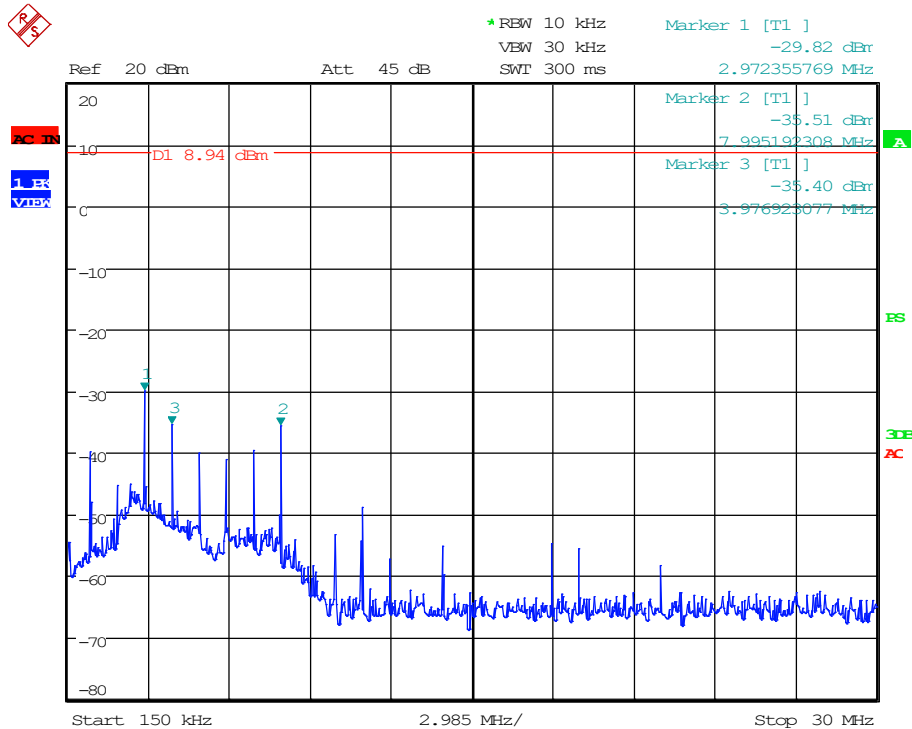
11b CCK: Mid Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 14:55:53



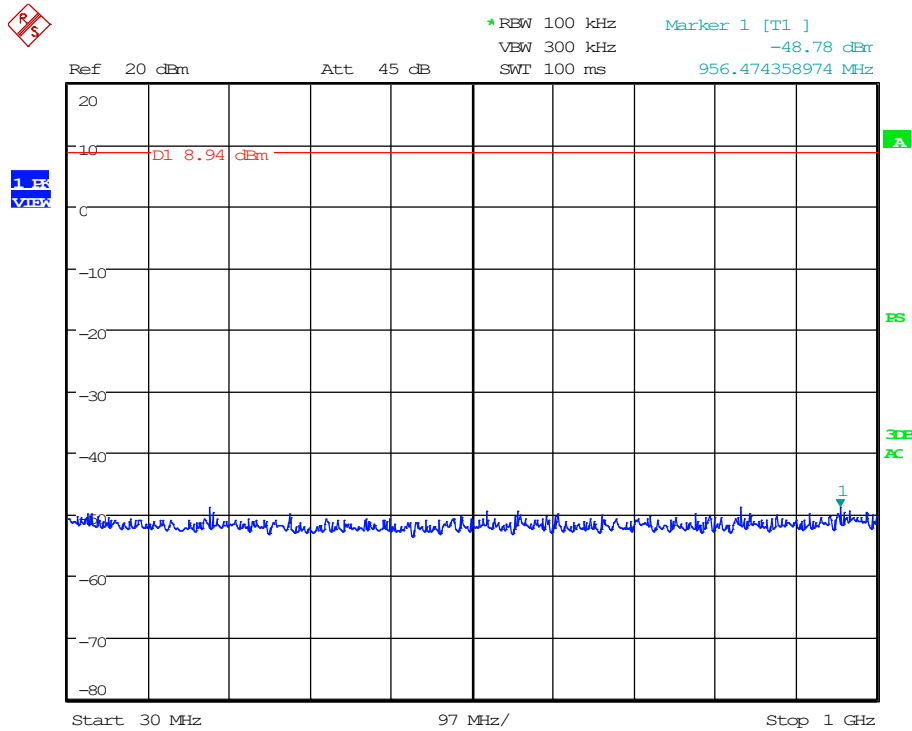
### 11b CCK: Mid Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 14:53:07



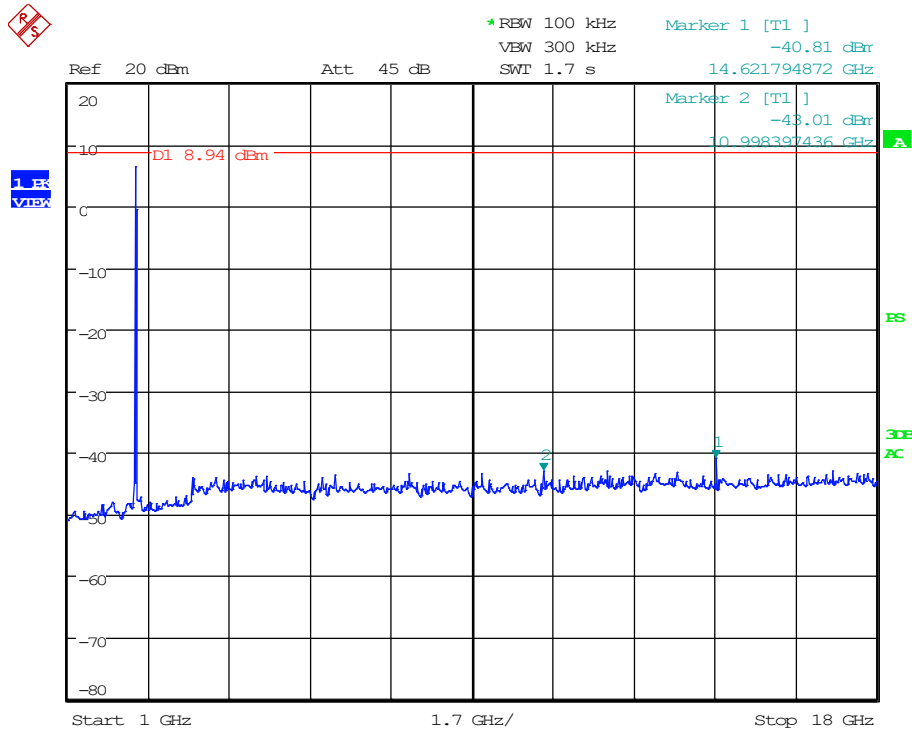
### 11b CCK: Mid Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 14:49:36



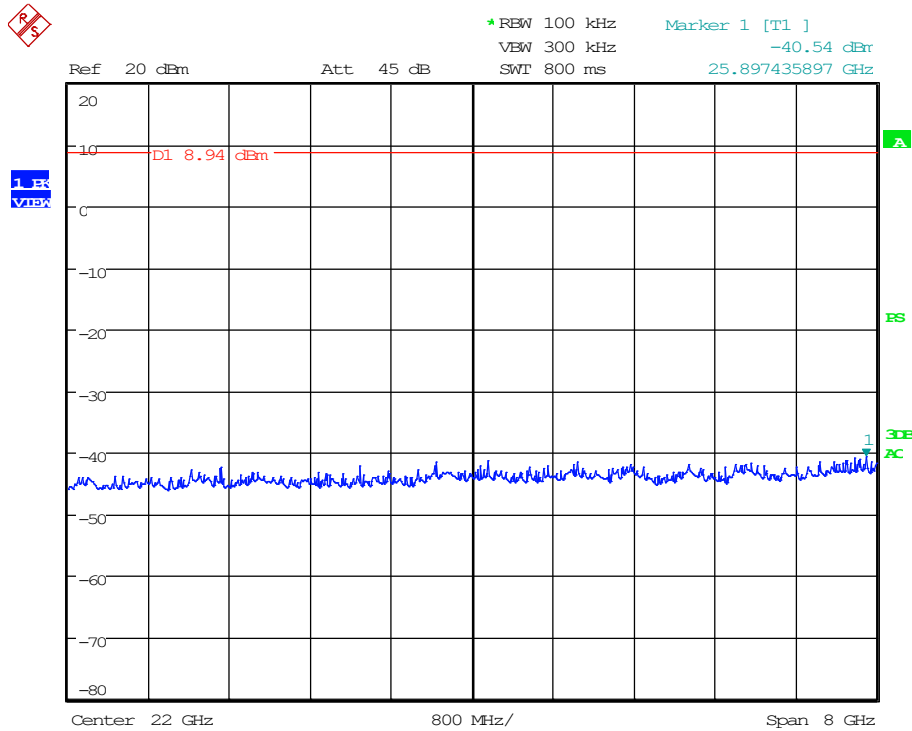
### 11b CCK: Mid Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 14:44:10



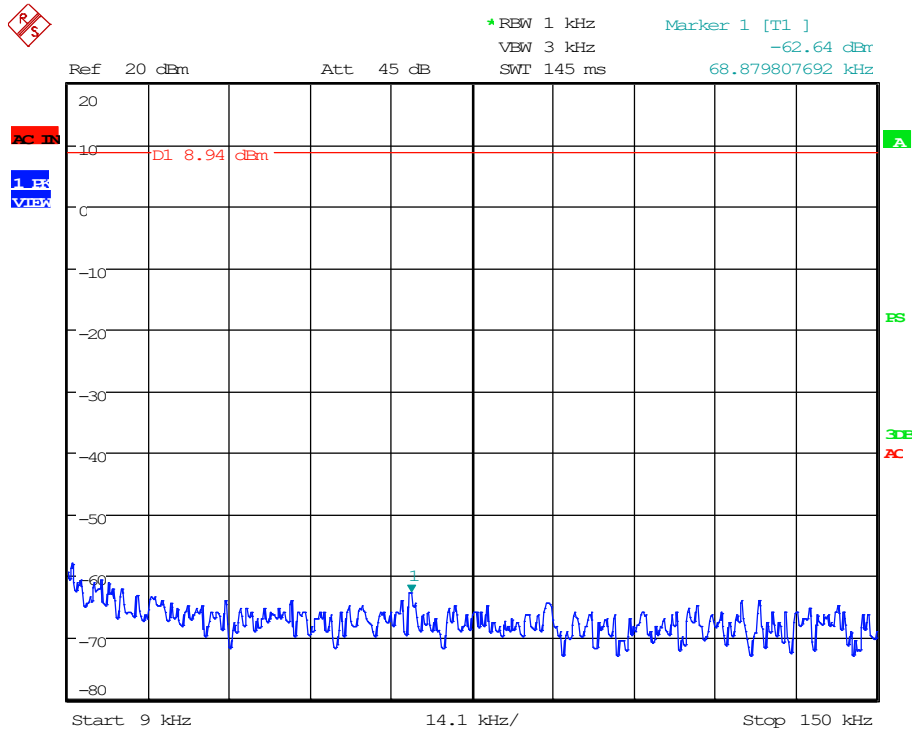
### 11b CCK: Mid Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 14:40:18



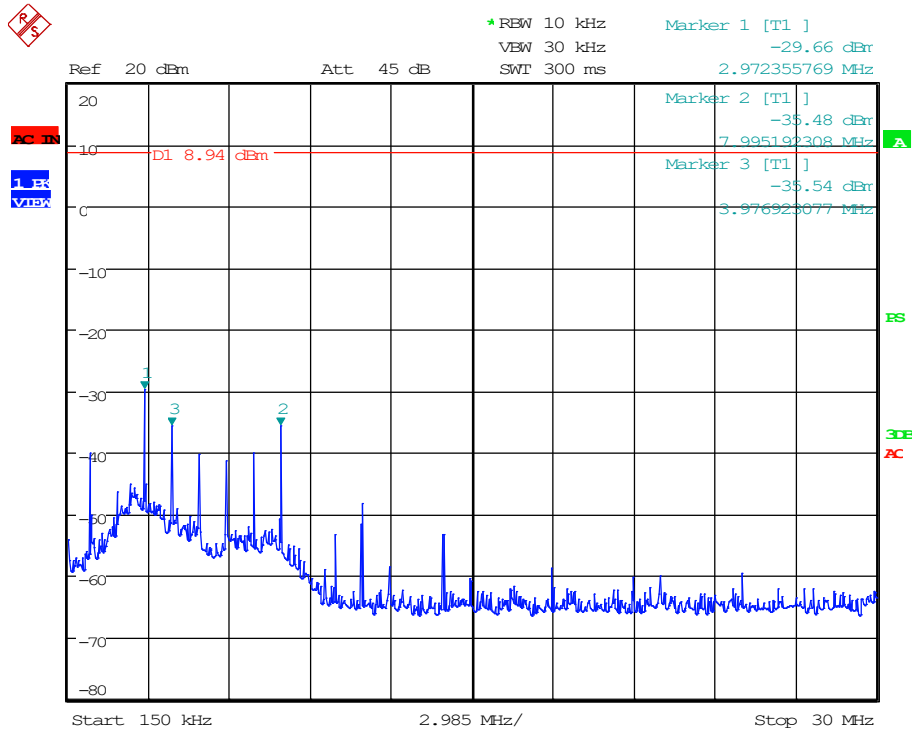
11b CCK: High Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 14:56:38



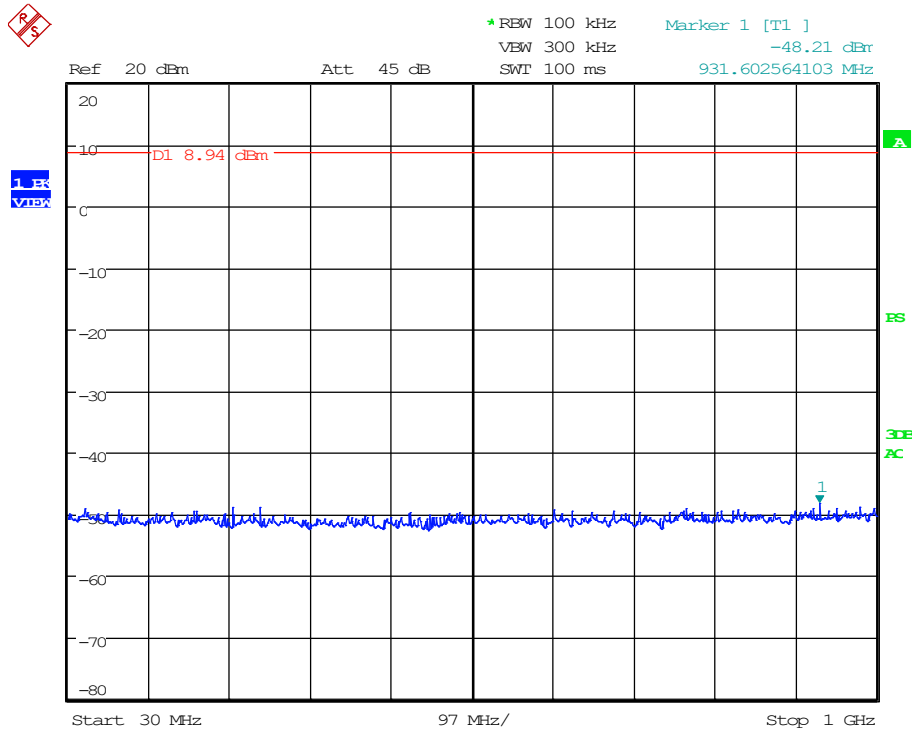
### 11b CCK: High Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 14:52:07



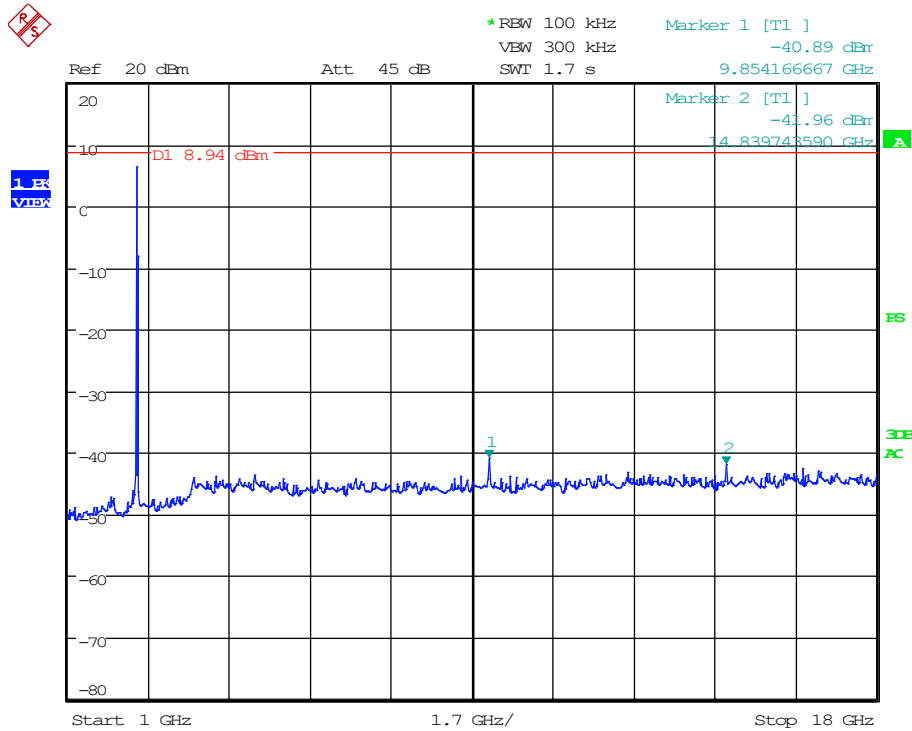
### 11b CCK: High Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 14:50:24



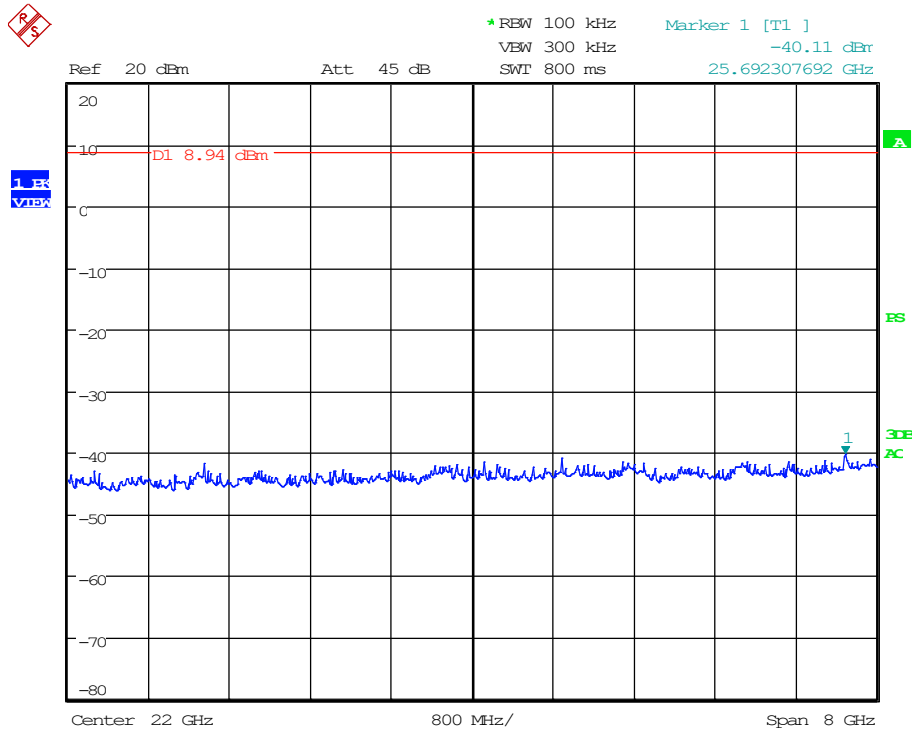
### 11b CCK: High Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 14:42:51



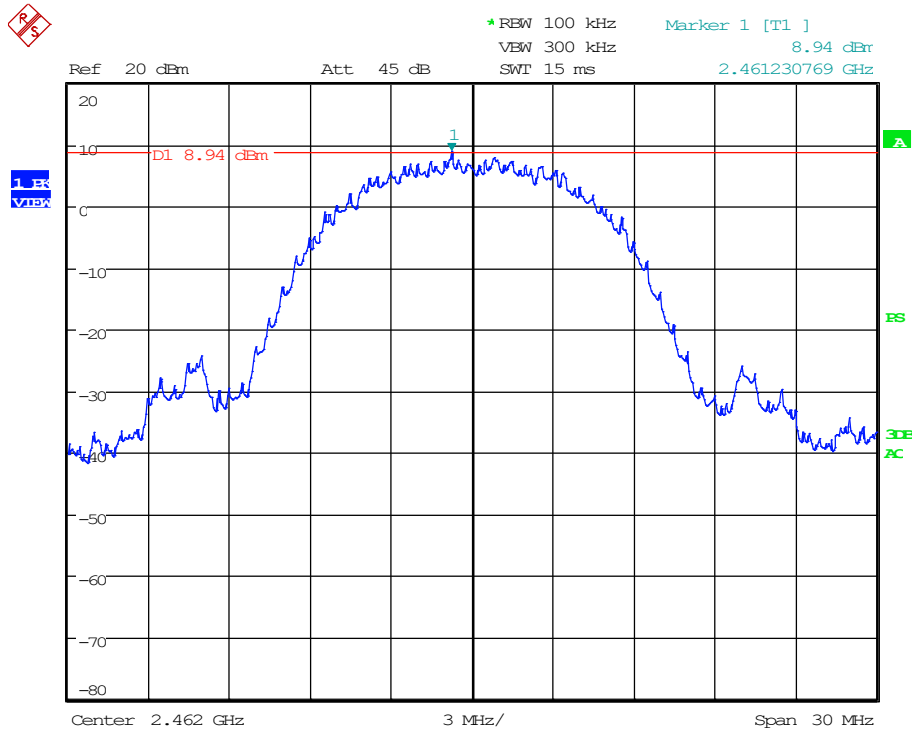
### 11b CCK: High Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 14:41:08



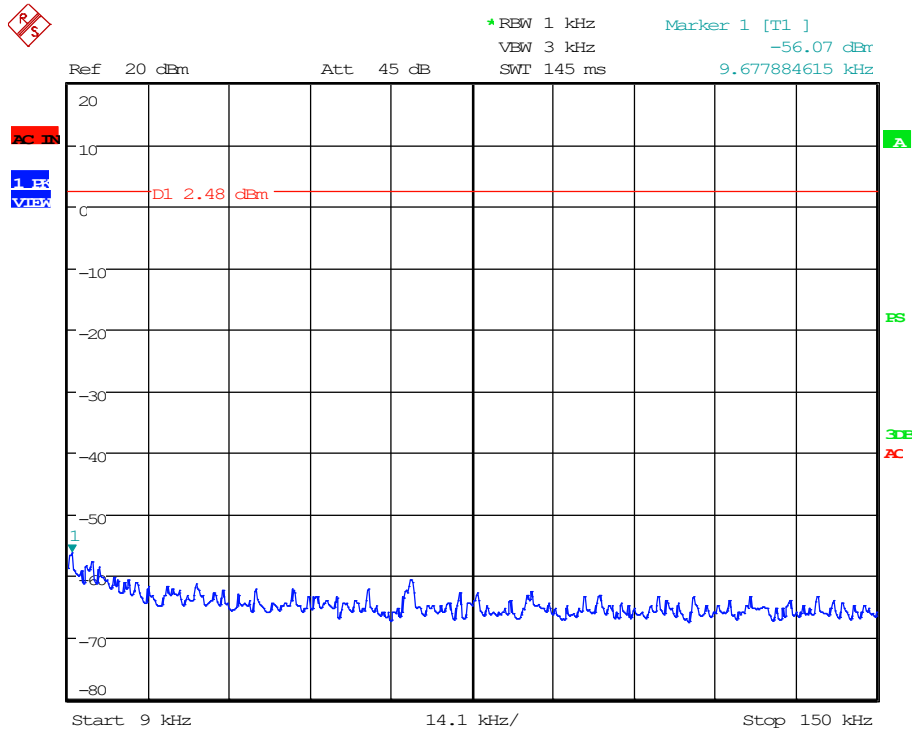
### 11b CCK: Reference



Date: 31.OCT.2019 14:37:57



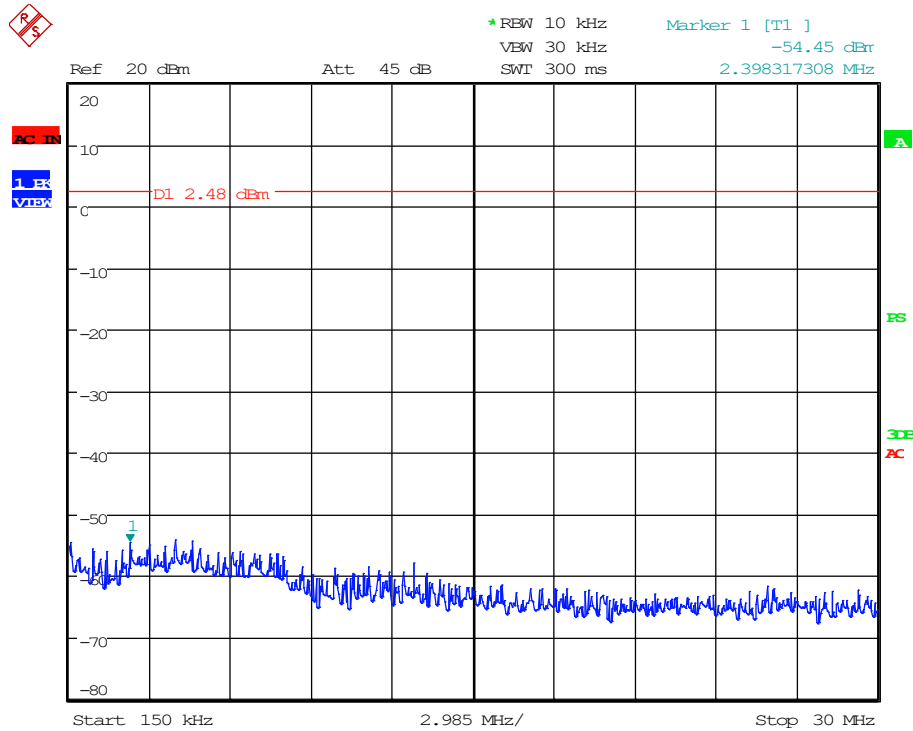
11g 54 Mbps OFDM: Low Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:18:26



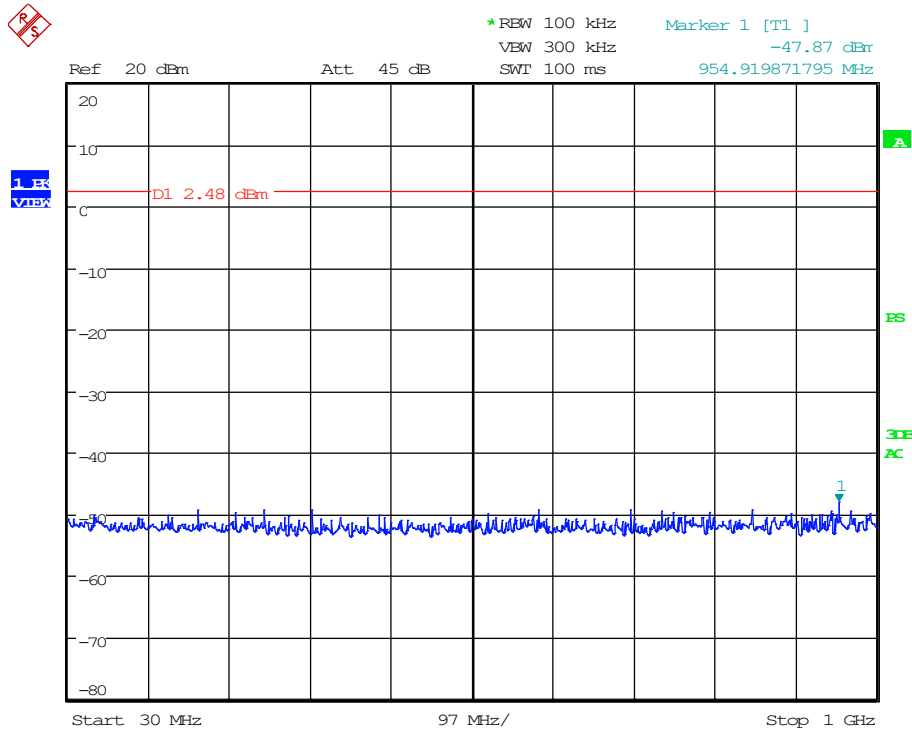
### 11g 54 Mbps OFDM: Low Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:17:25



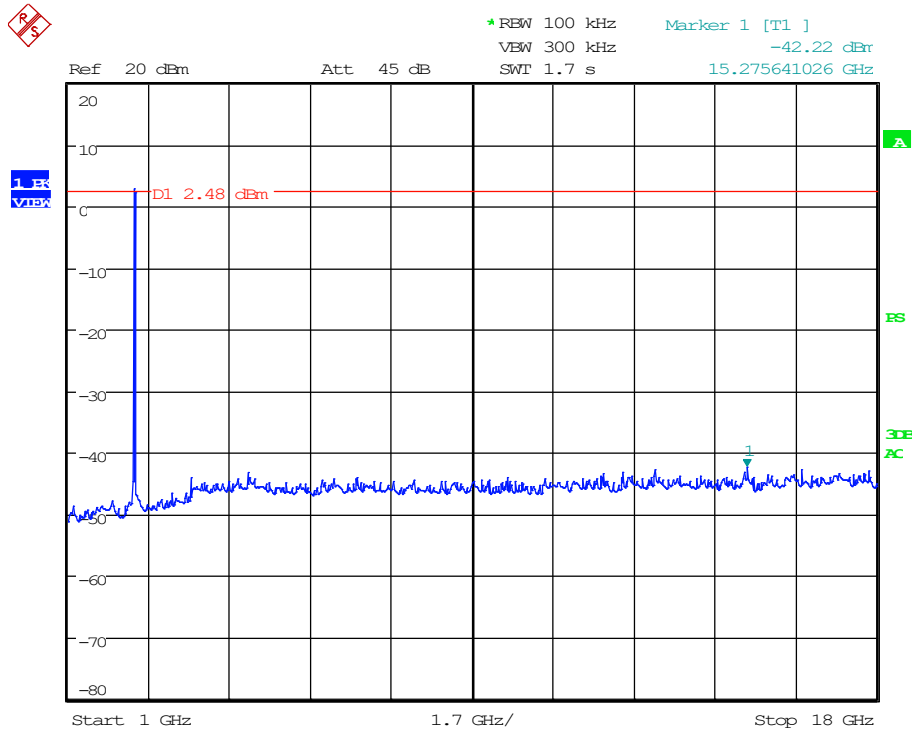
### 11g 54 Mbps OFDM: Low Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 15:12:57



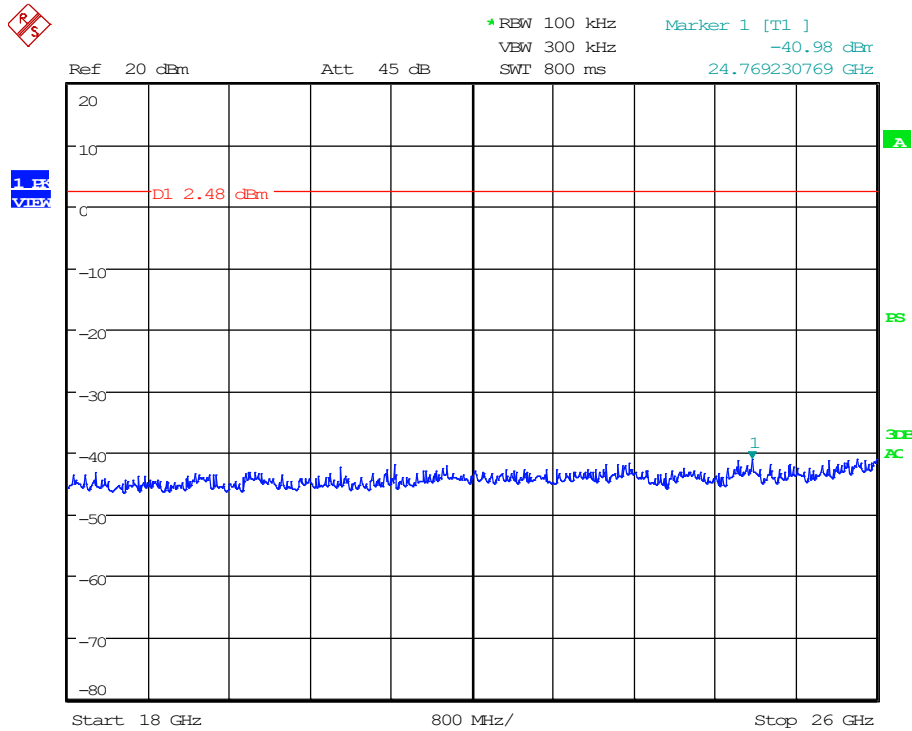
### 11g 54 Mbps OFDM: Low Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:12:02



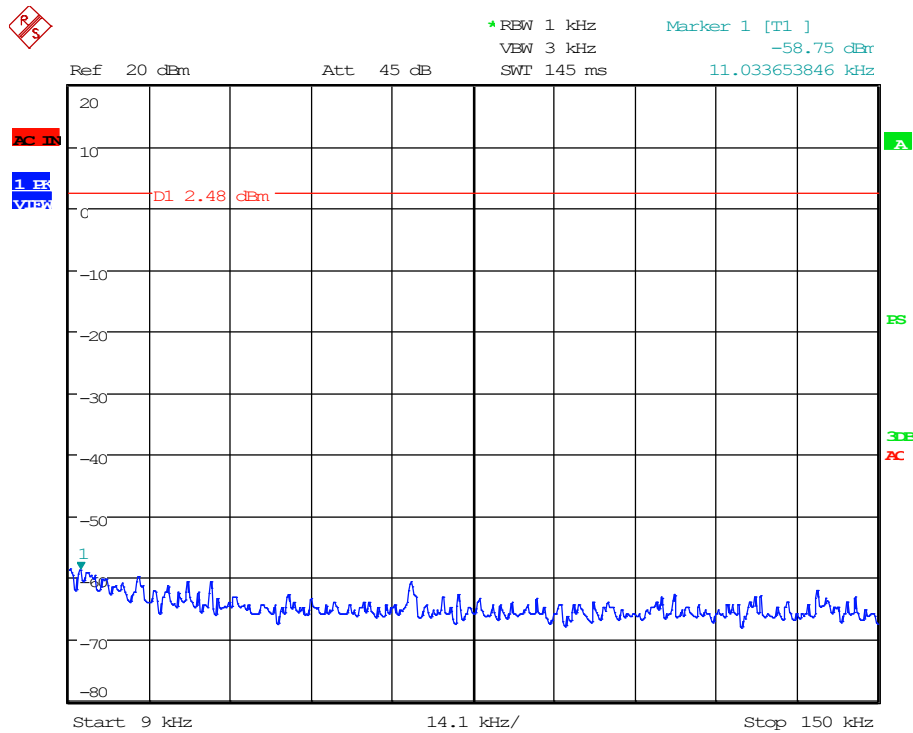
### 11g 54 Mbps OFDM: Low Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:05:51



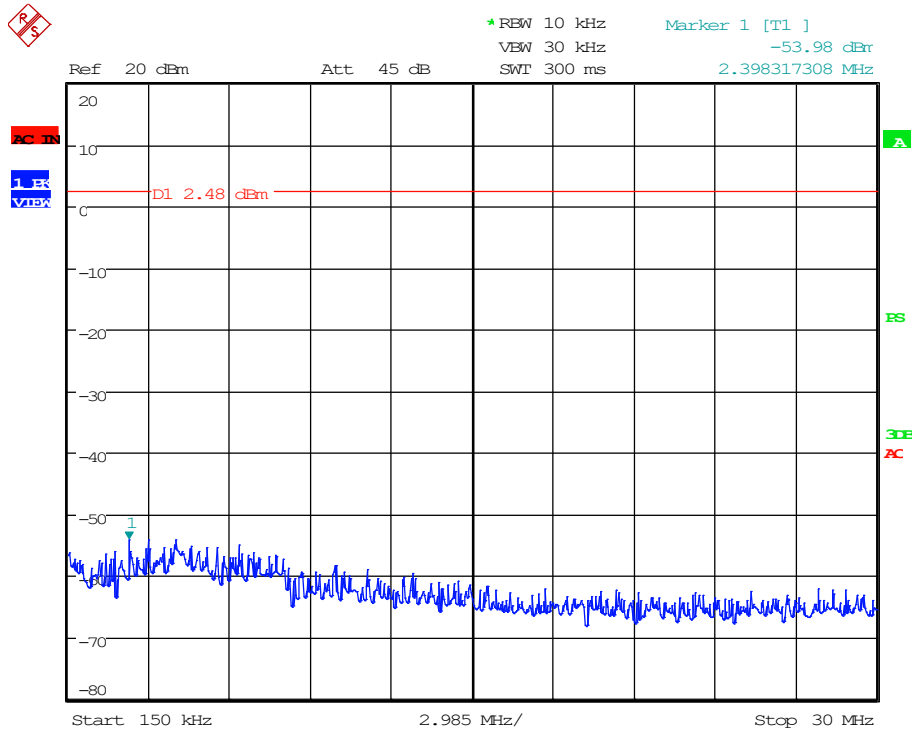
### 11g 54 Mbps OFDM: Mid Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:19:14



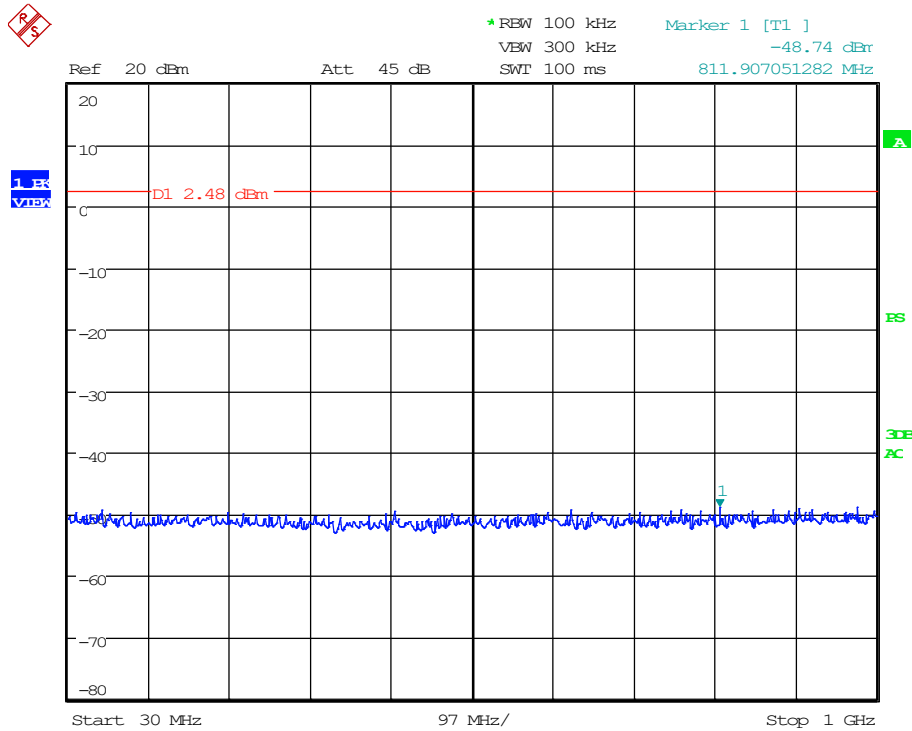
### 11g 54 Mbps OFDM: Mid Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:16:37



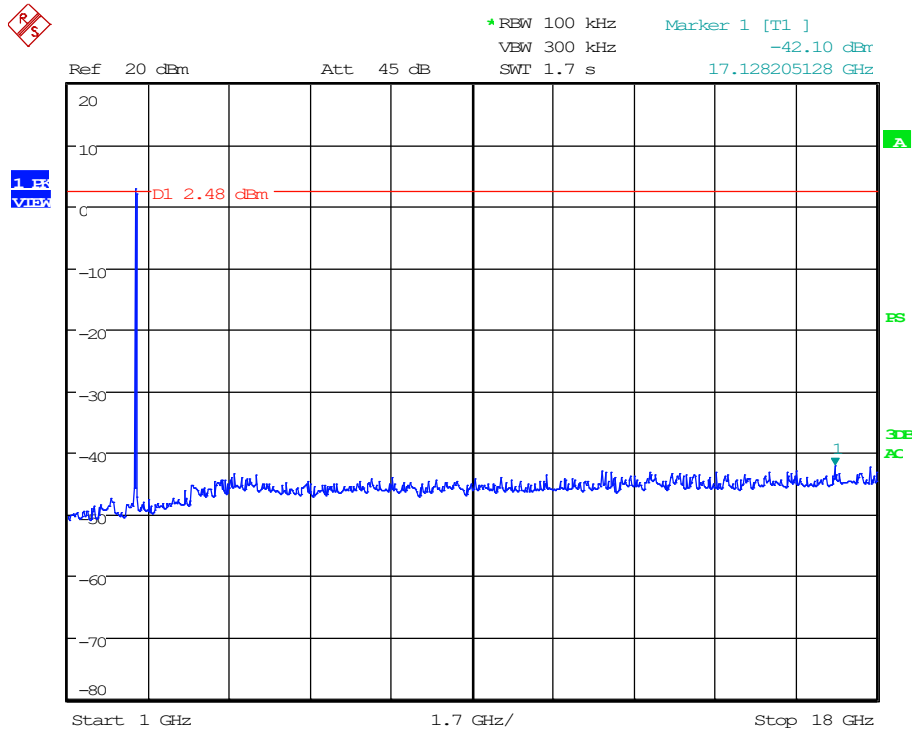
### 11g 54 Mbps OFDM: Mid Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 15:13:38



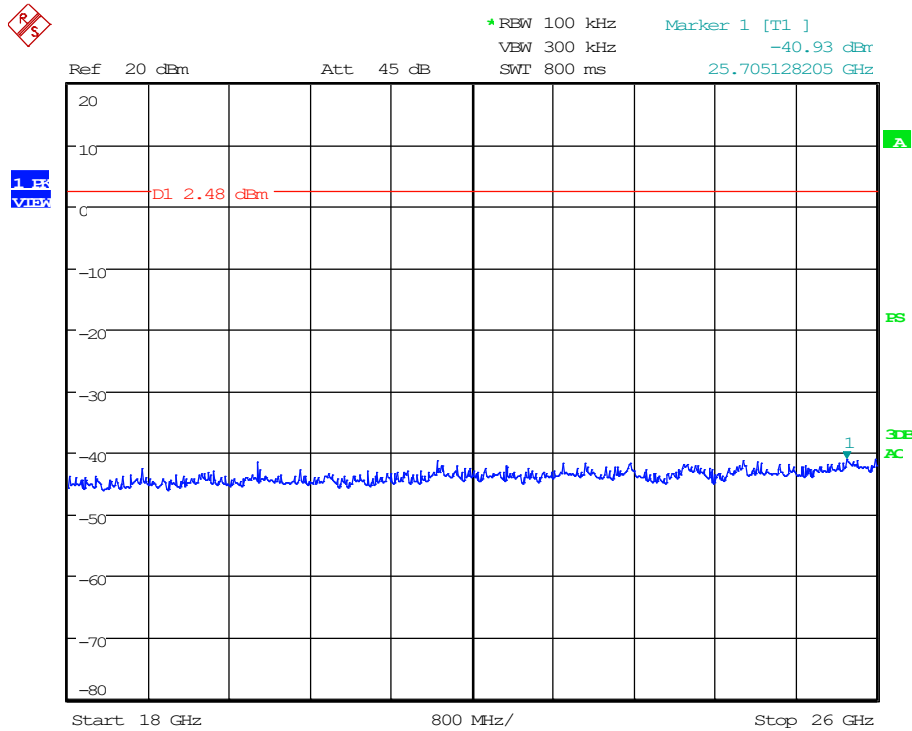
### 11g 54 Mbps OFDM: Mid Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:09:56

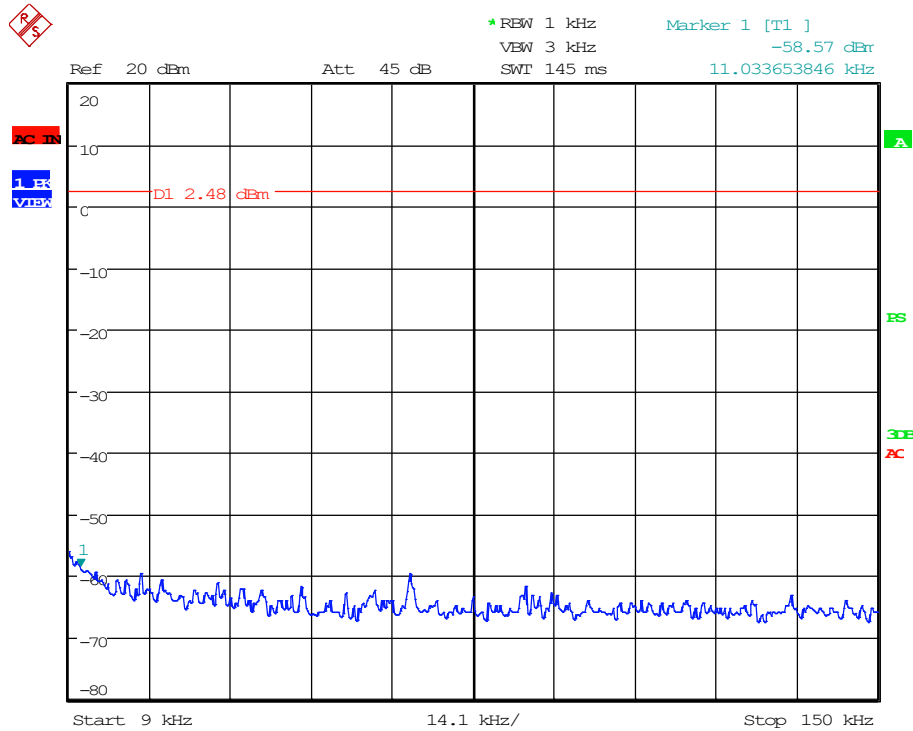


### 11g 54 Mbps OFDM: Mid Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:06:46

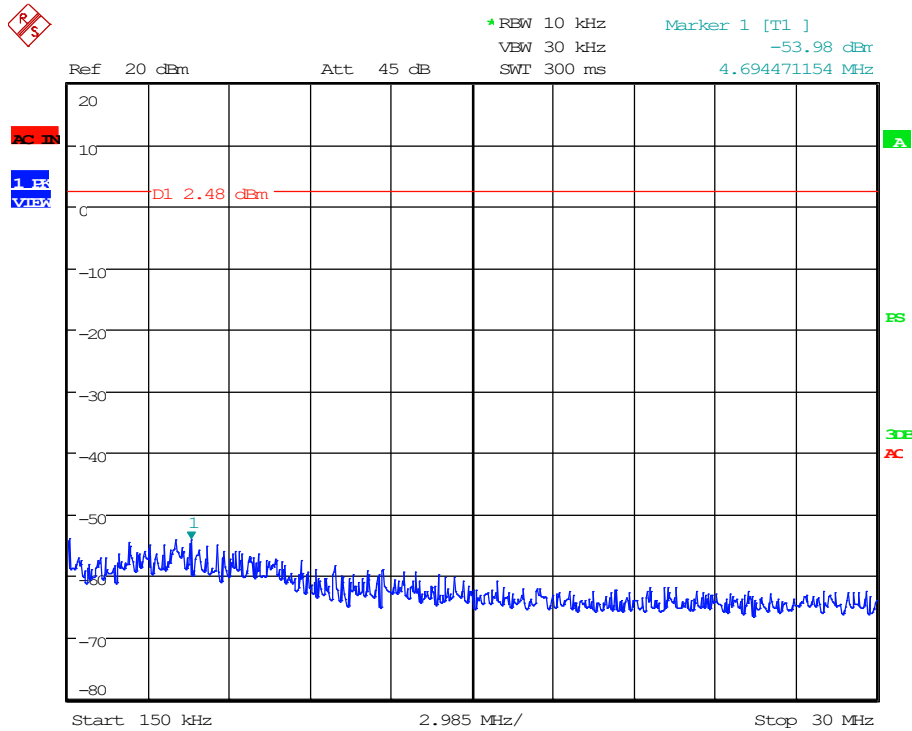
## 11g 54 Mbps OFDM: High Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:20:00



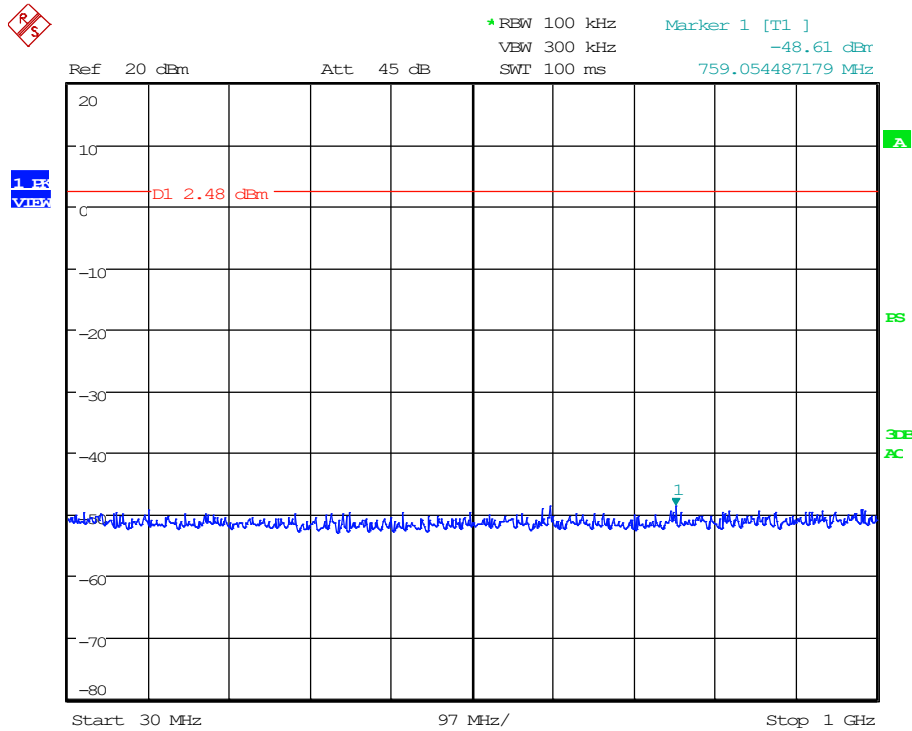
### 11g 54 Mbps OFDM: High Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:15:46

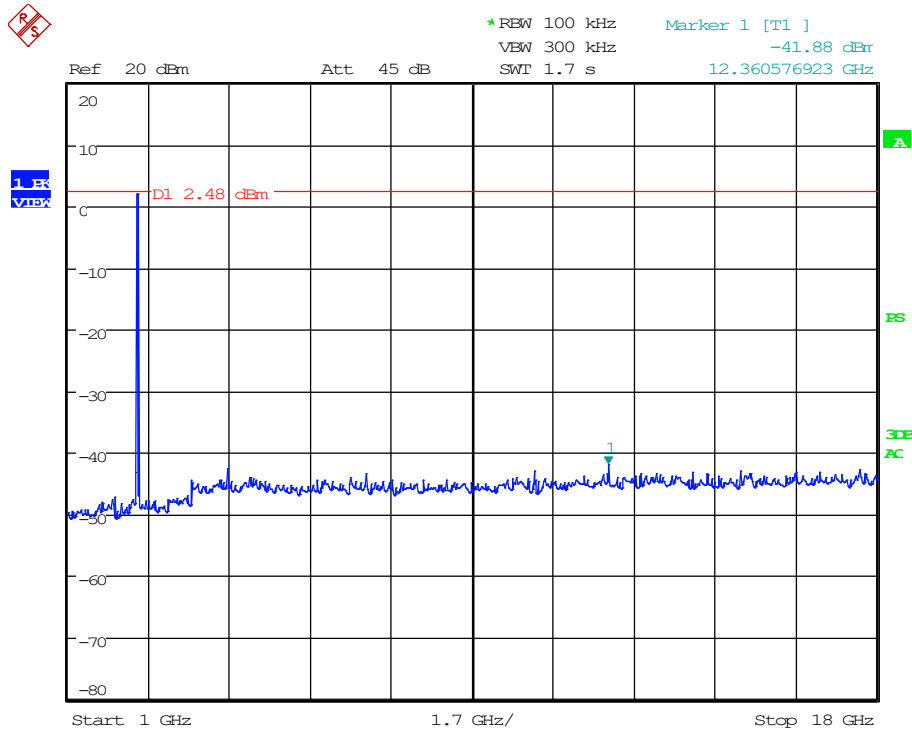


### 11g 54 Mbps OFDM: High Channel, 30 MHz to 1000 MHz





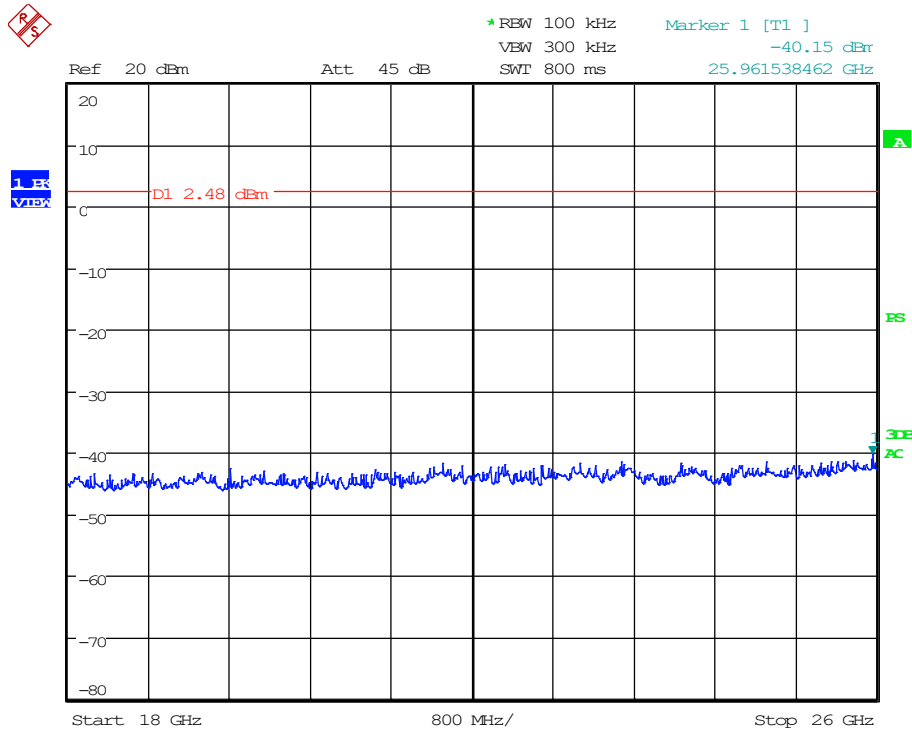
### 11g 54 Mbps OFDM: High Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:09:00



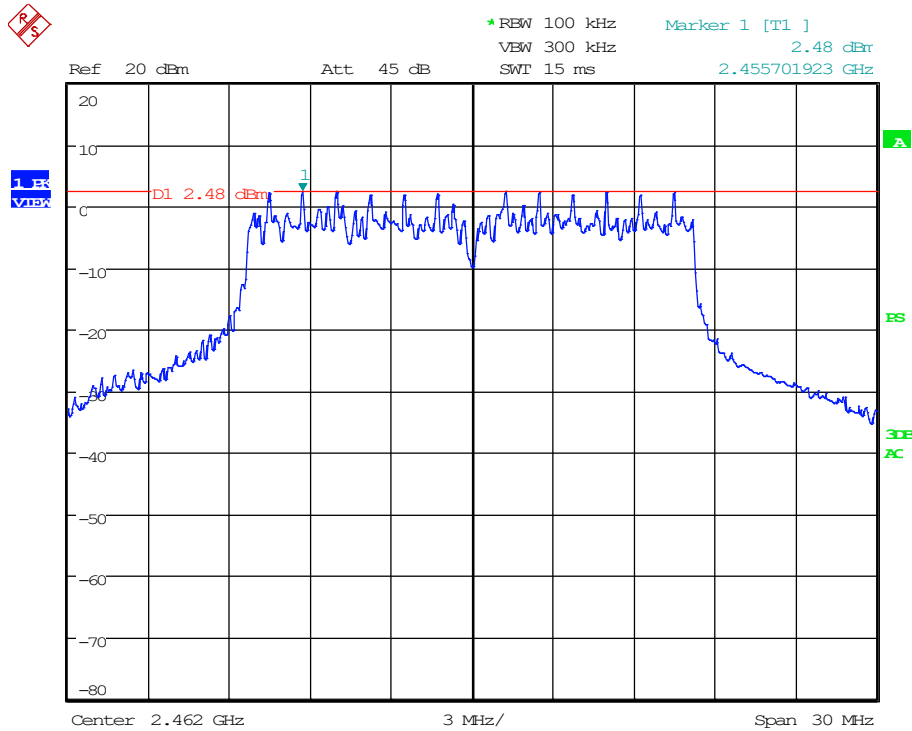
### 11g 54 Mbps OFDM: High Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:07:36



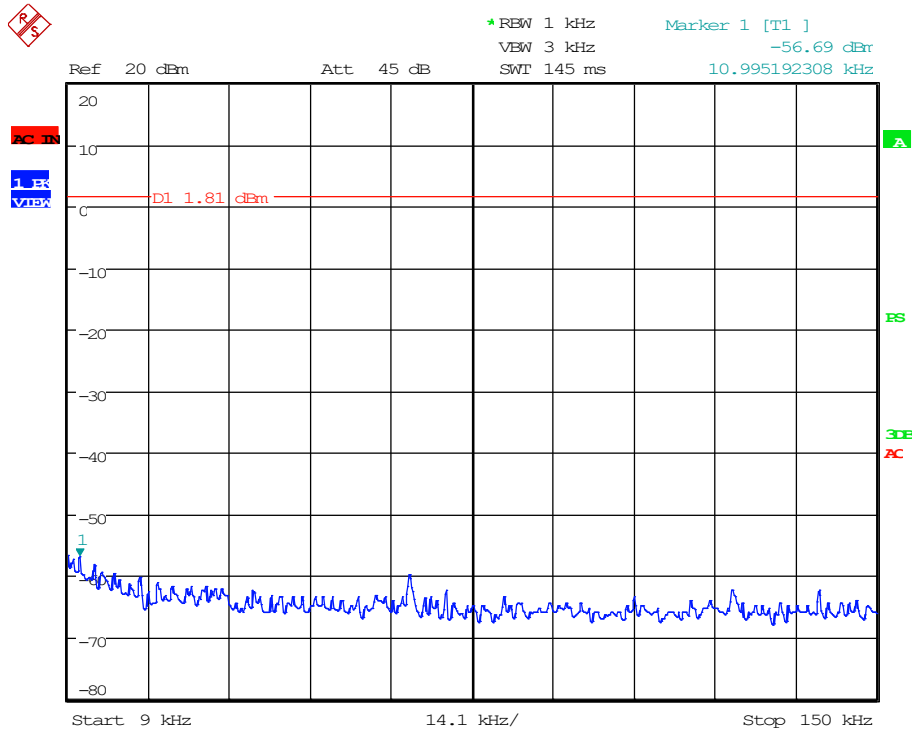
### 11g 54 Mbps OFDM: Reference



Date: 31.OCT.2019 15:04:38



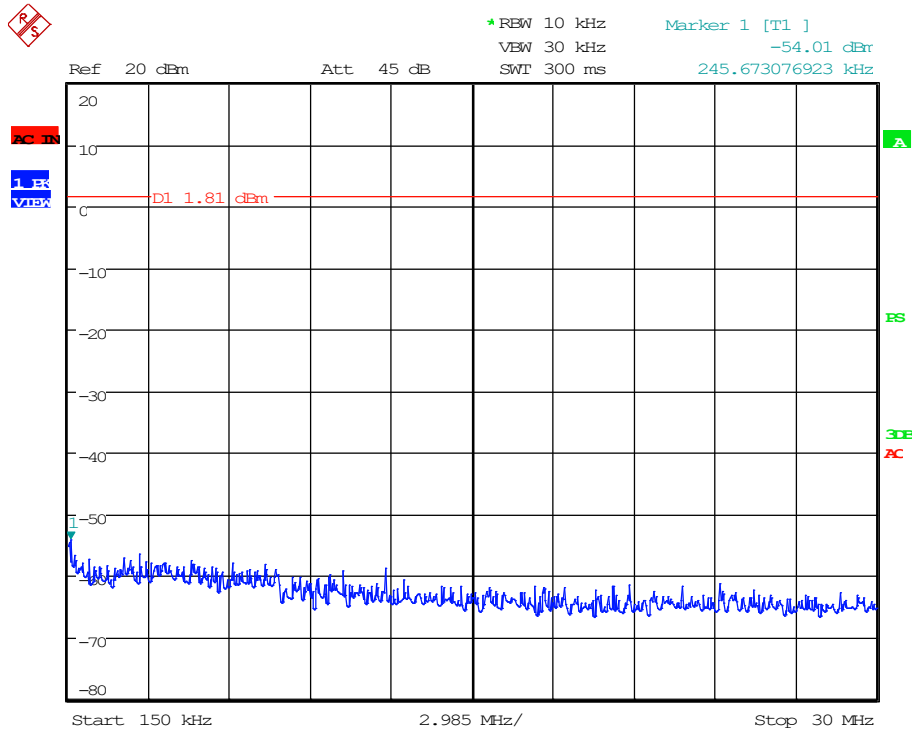
11n MCS7: Low Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:46:17



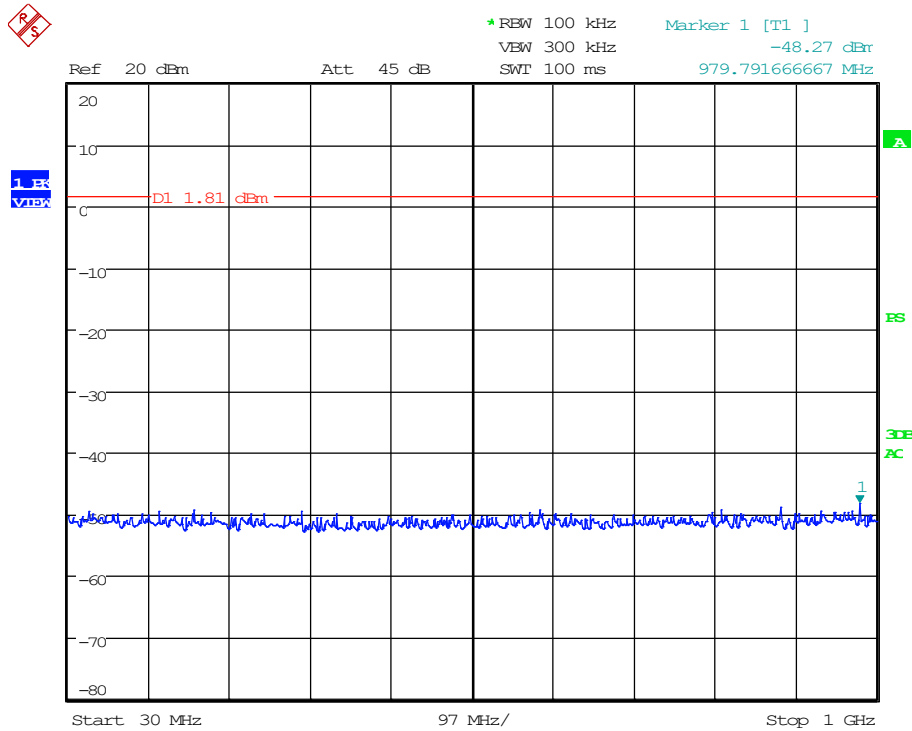
### 11n MCS7: Low Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:45:05



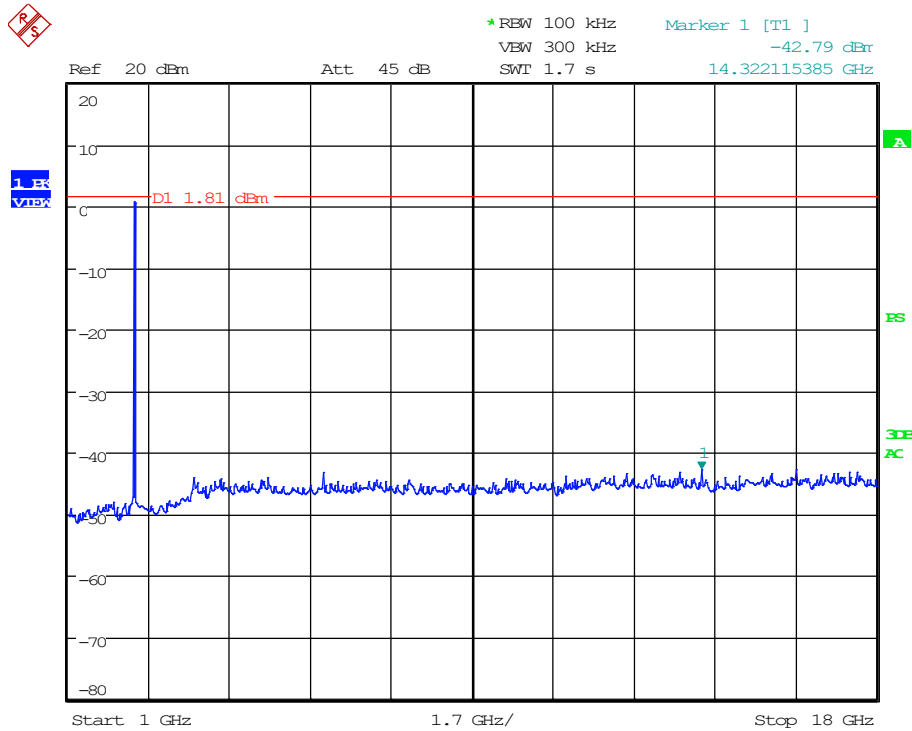
11n MCS7: Low Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 15:39:15



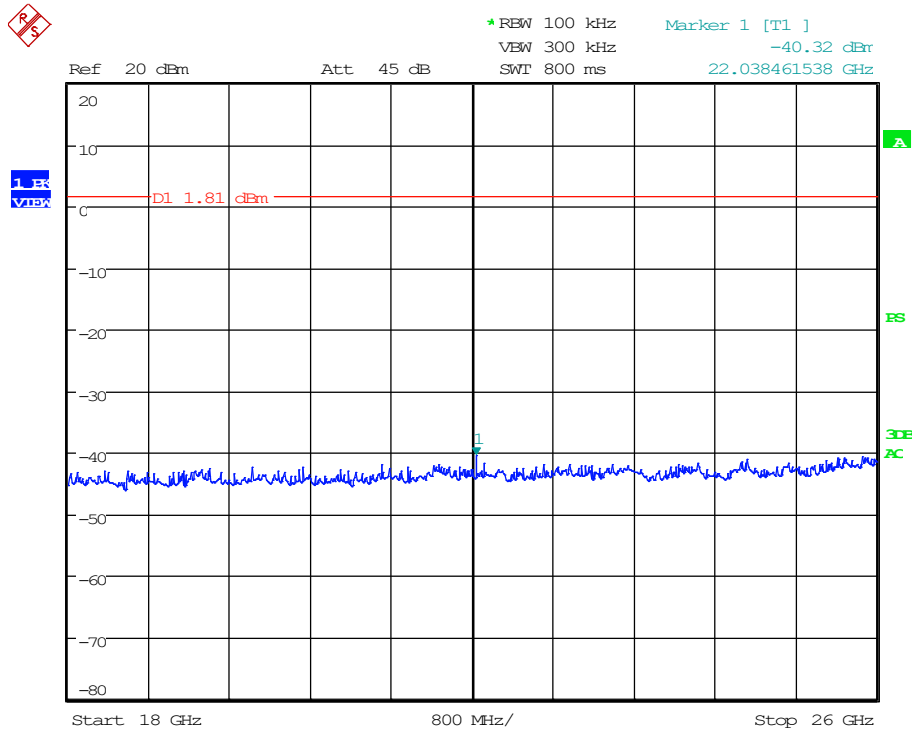
### 11n MCS7: Low Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:38:23



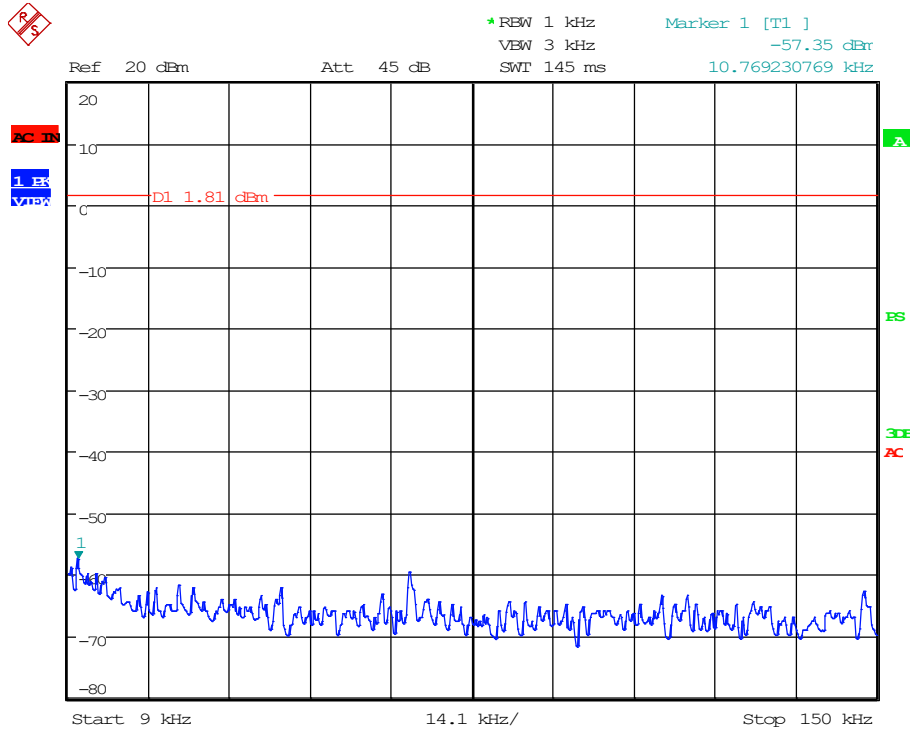
### 11n MCS7: Low Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:33:24



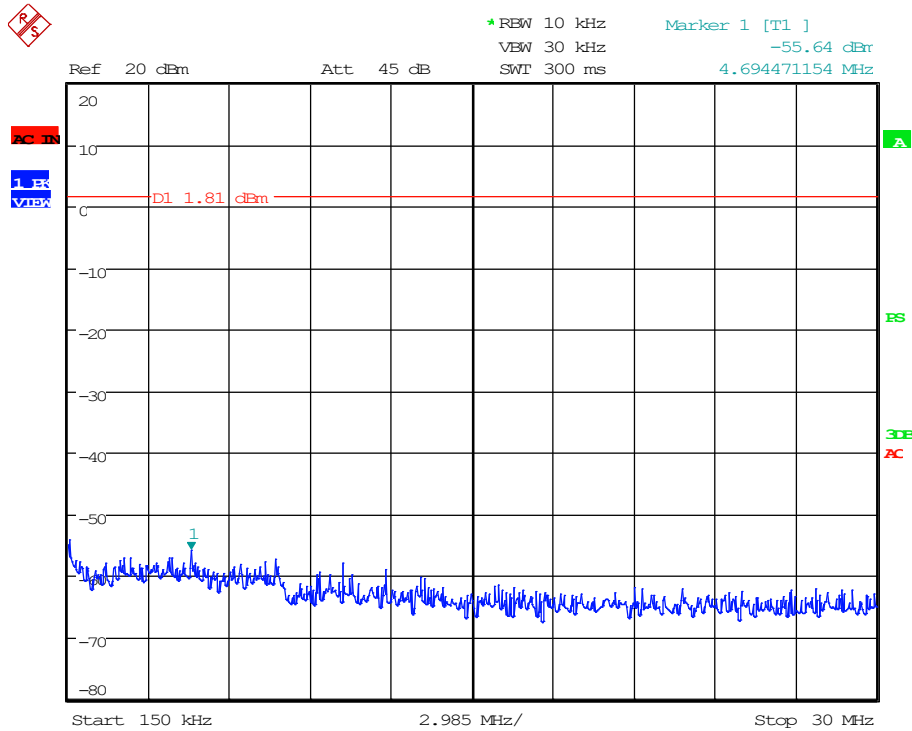
11n MCS7: Mid Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:46:52



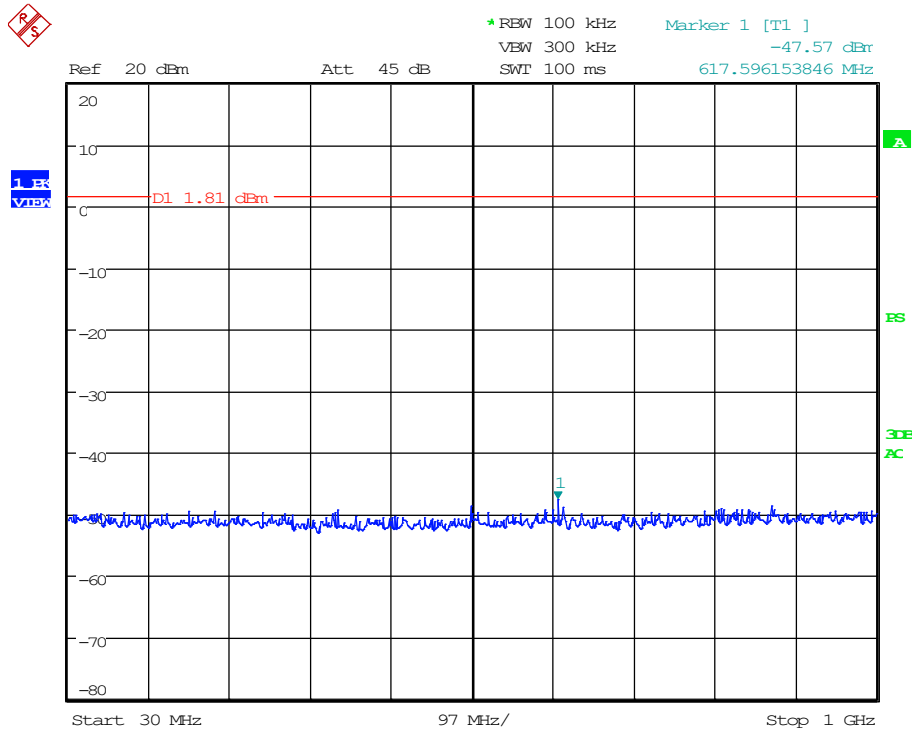
11n MCS7: Mid Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:44:05



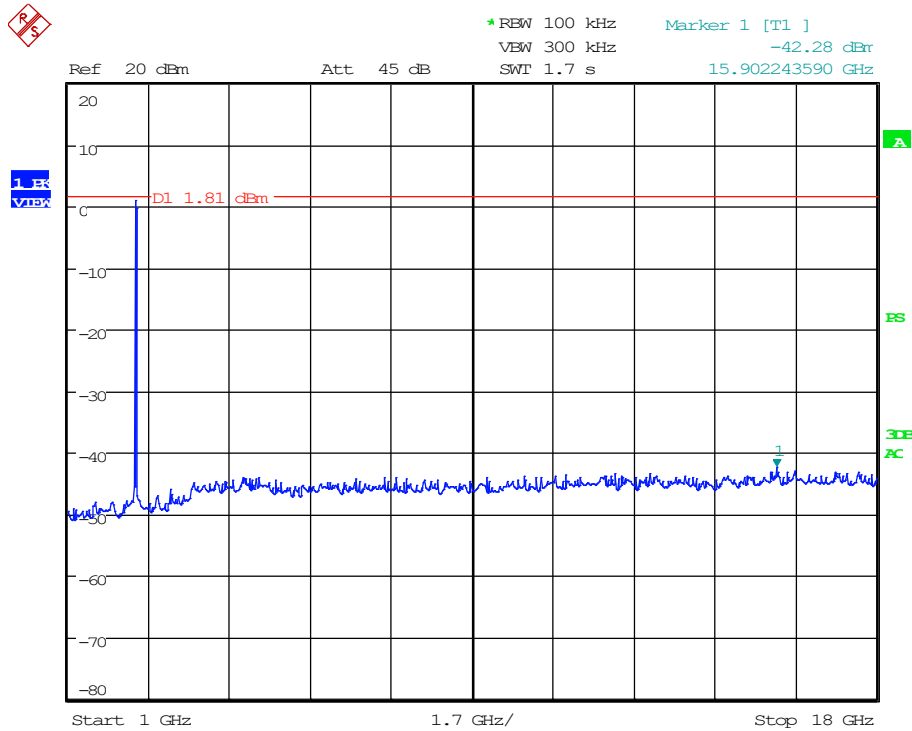
### 11n MCS7: Mid Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 15:40:14



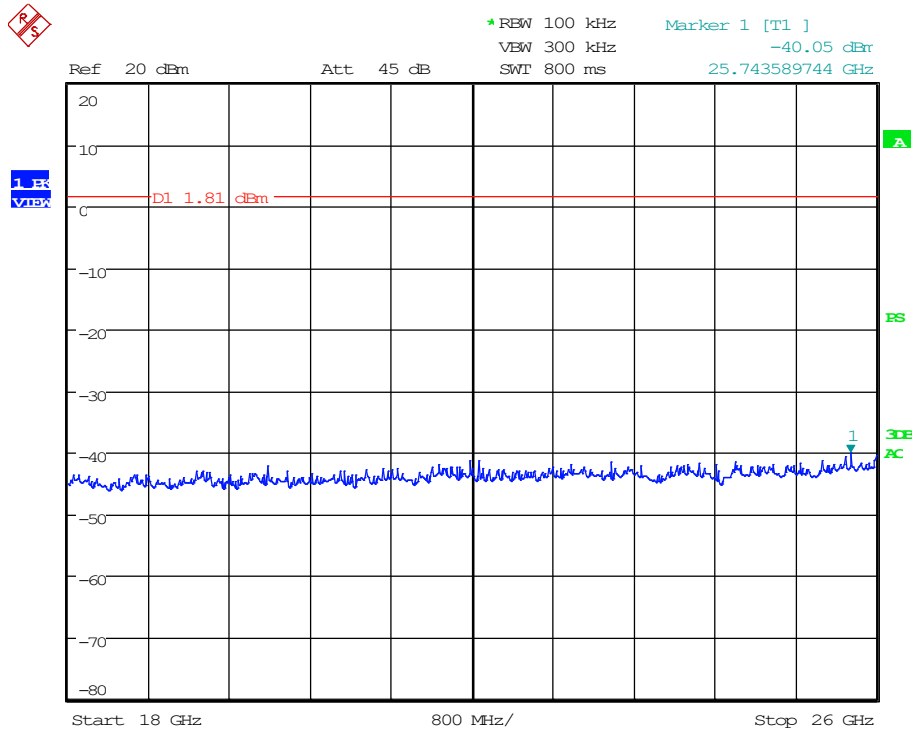
### 11n MCS7: Mid Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:37:28



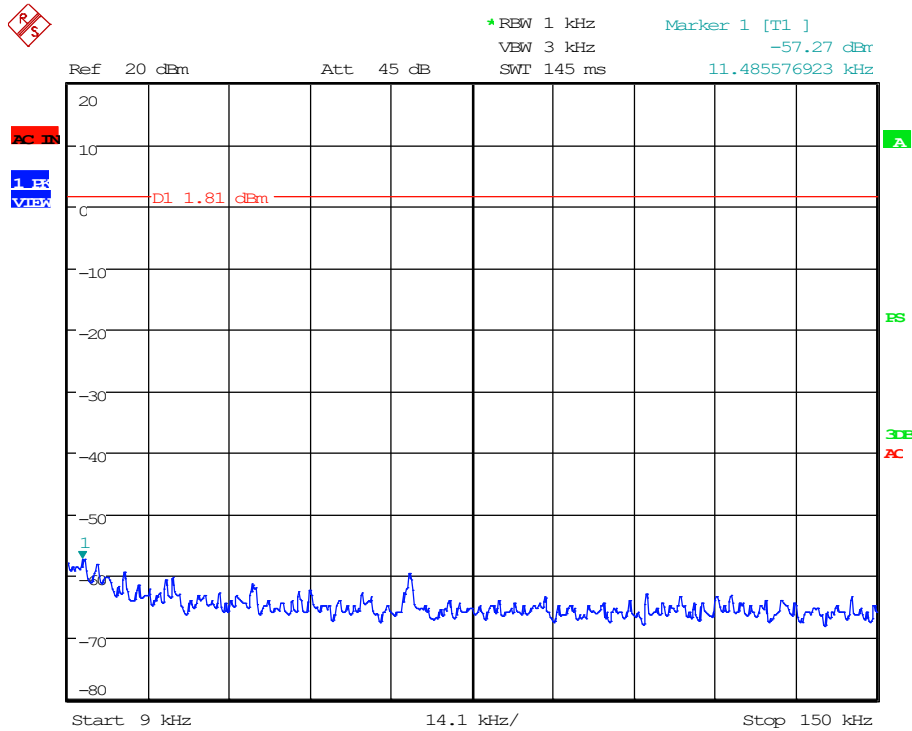
### 11n MCS7: Mid Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:34:13



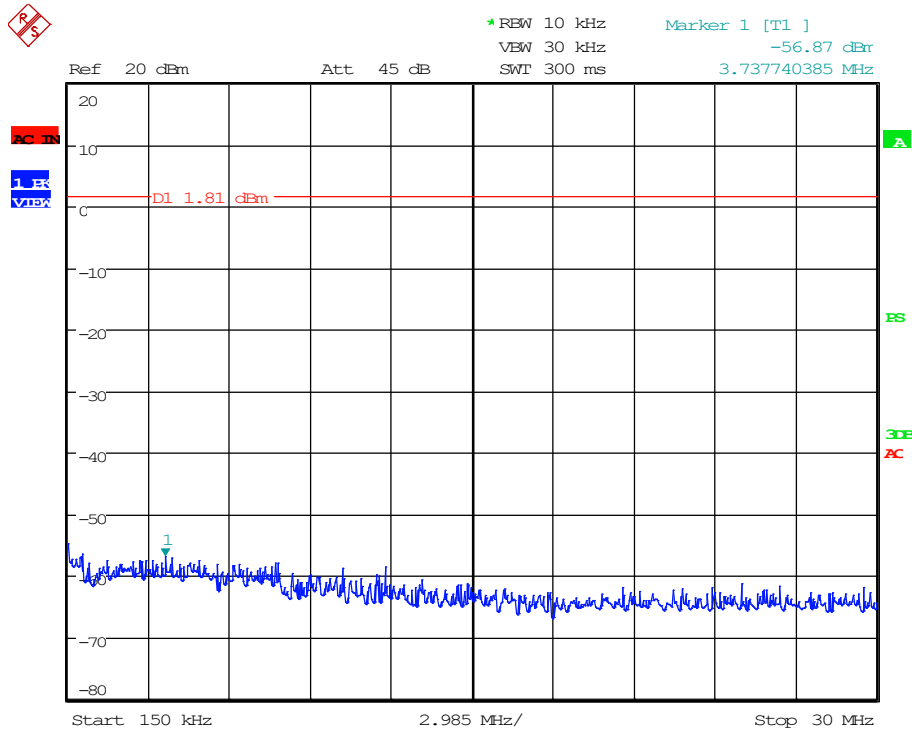
11n MCS7: High Channel, 0.009 MHz to 0.15 MHz



Date: 31.OCT.2019 15:47:42



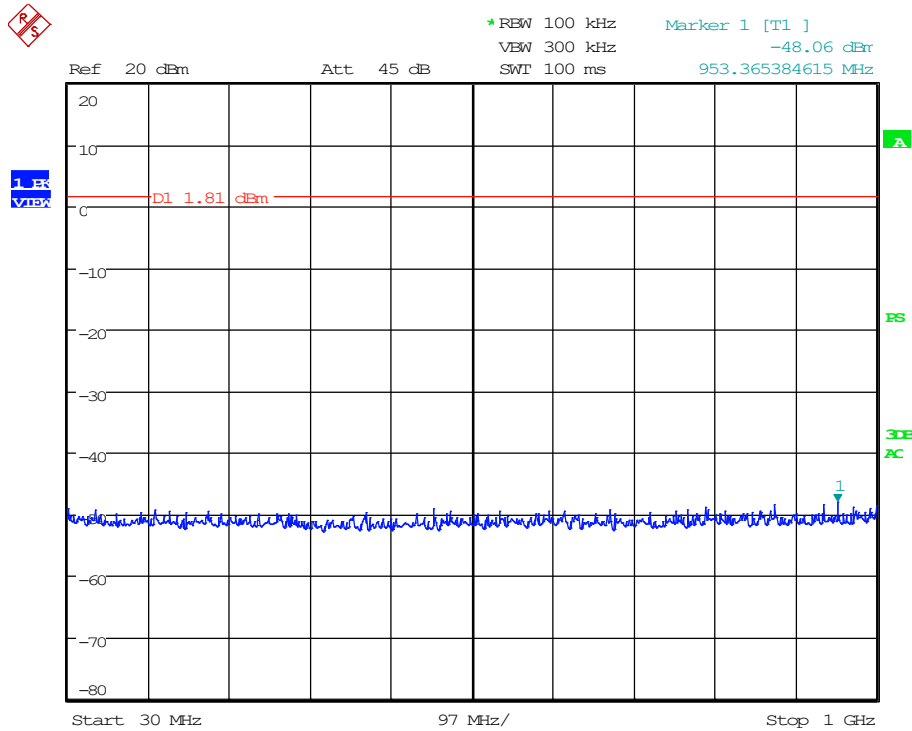
### 11n MCS7: High Channel, 0.15 MHz to 30 MHz



Date: 31.OCT.2019 15:43:21



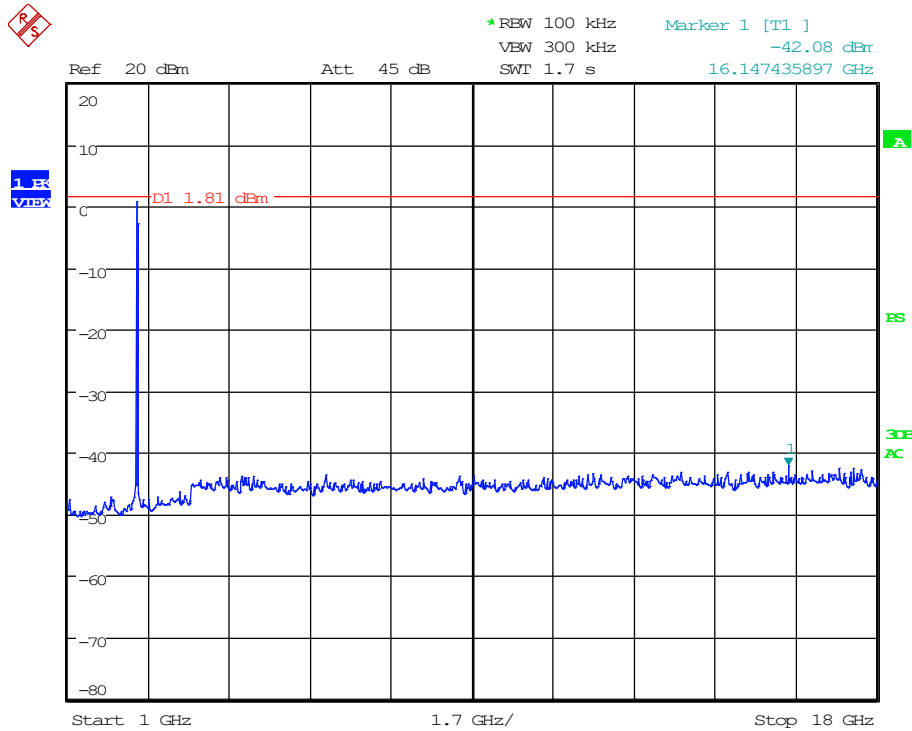
### 11n MCS7: High Channel, 30 MHz to 1000 MHz



Date: 31.OCT.2019 15:41:01



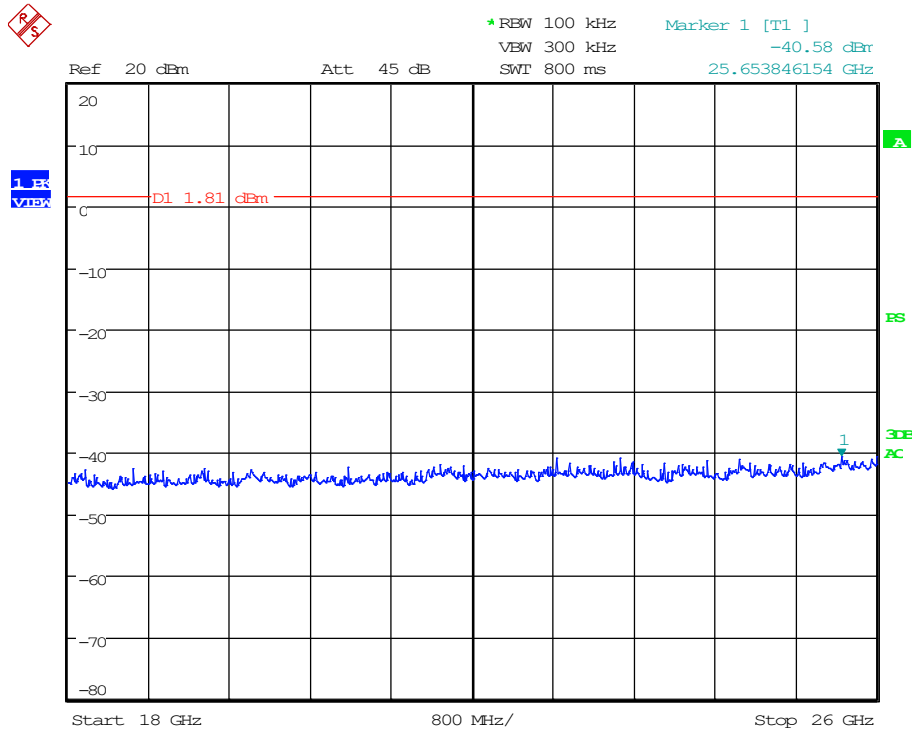
### 11n MCS7: High Channel, 1 GHz to 18 GHz



Date: 31.OCT.2019 15:36:35



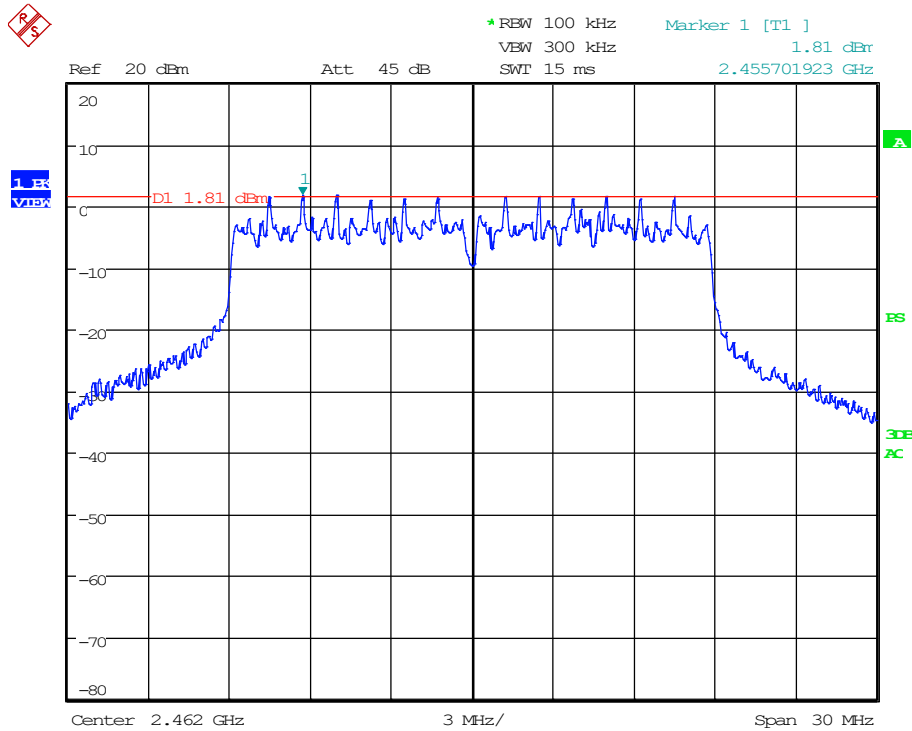
### 11n MCS7: High Channel, 18 GHz to 26 GHz



Date: 31.OCT.2019 15:35:10



### 11n MCS7: Reference



Date: 31.OCT.2019 15:25:36



## 10 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral/internal antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

### 10.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).



## 10.2 Radiated Spurious Emission Test Data

|                      |                                                   |                           |            |
|----------------------|---------------------------------------------------|---------------------------|------------|
| <b>Test Date(s):</b> | Oct. 31, 2019                                     | <b>Test Engineer:</b>     | J. Chiller |
| <b>Standards:</b>    | CFR 47 Part 15.247(d);<br>Part 15.209 / KDB558074 | <b>Air Temperature:</b>   | 23.0°C     |
|                      |                                                   | <b>Relative Humidity:</b> | 51%        |

Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber, and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

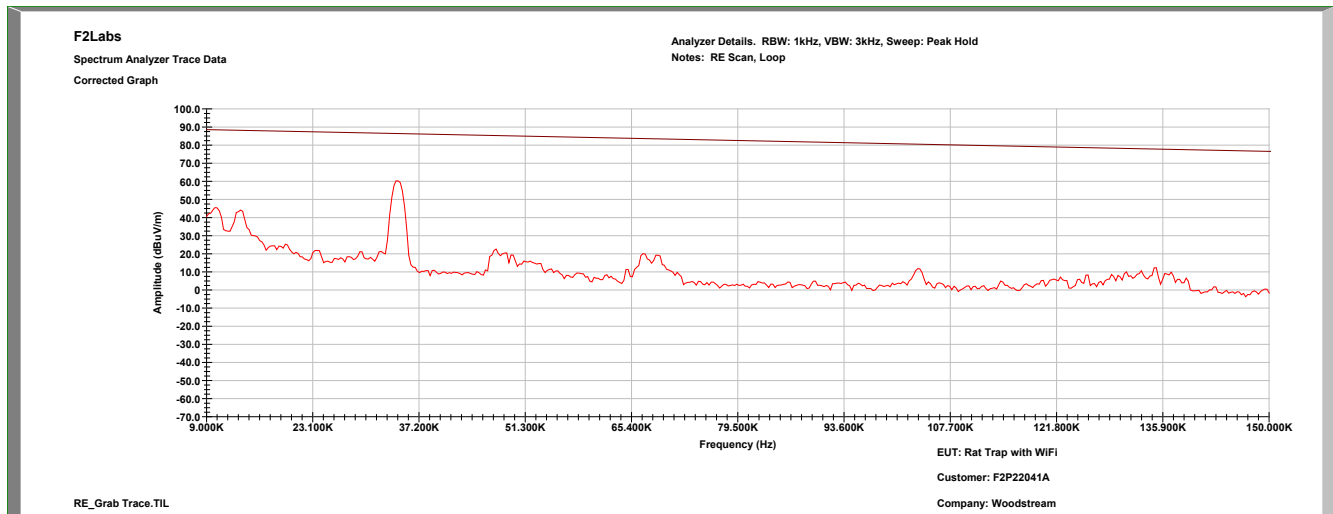
The equipment was fully exercised with all cabling attached to the EUT and was positioned on the table for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

In the following plots, the black line indicates the active scan and the green line indicates the MaxPk measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables. The plots are for reference only and the limit lines are not actual limit lines but merely a guide.

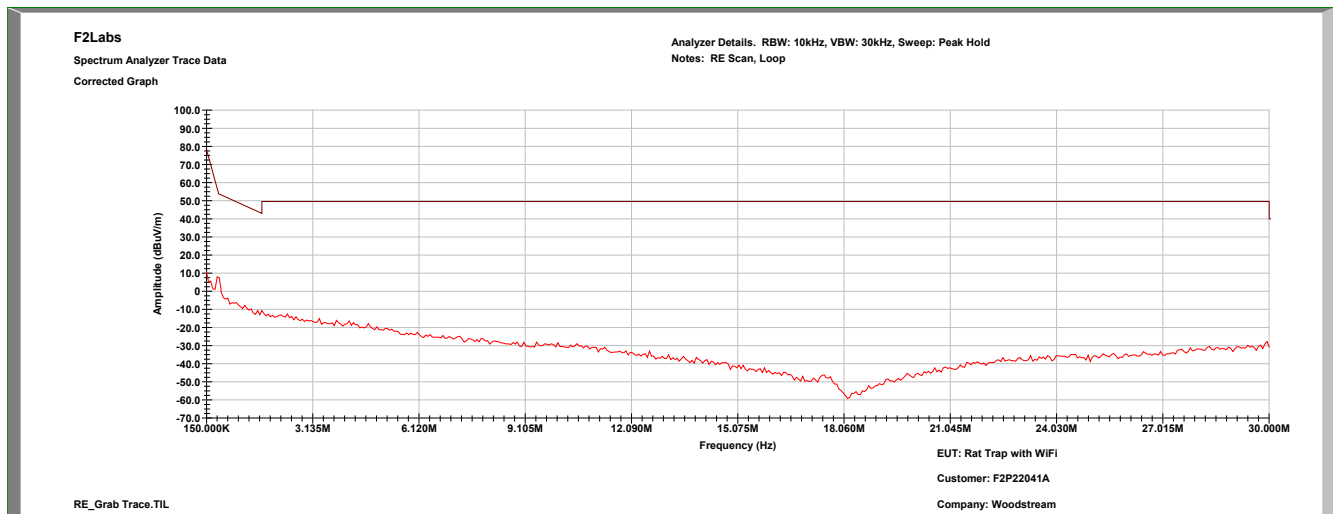
The following graphs are from the 11b CCK which was found to be the worst-case. The data presented in the table reflects results from all channels.



### 0.009 MHz to 0.15 MHz - Loop Antenna

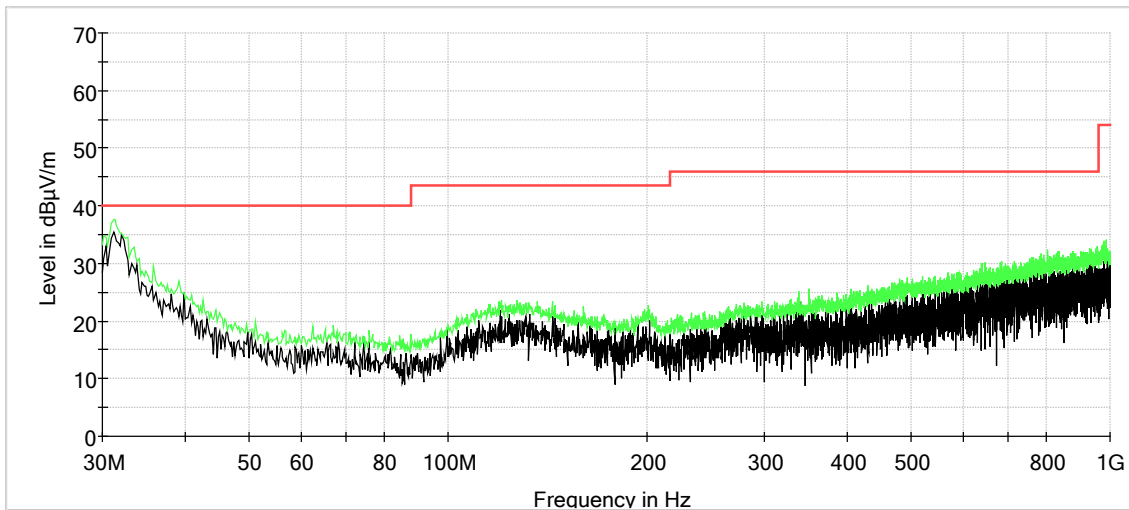


### 0.15 MHz to 30 MHz - Loop Antenna

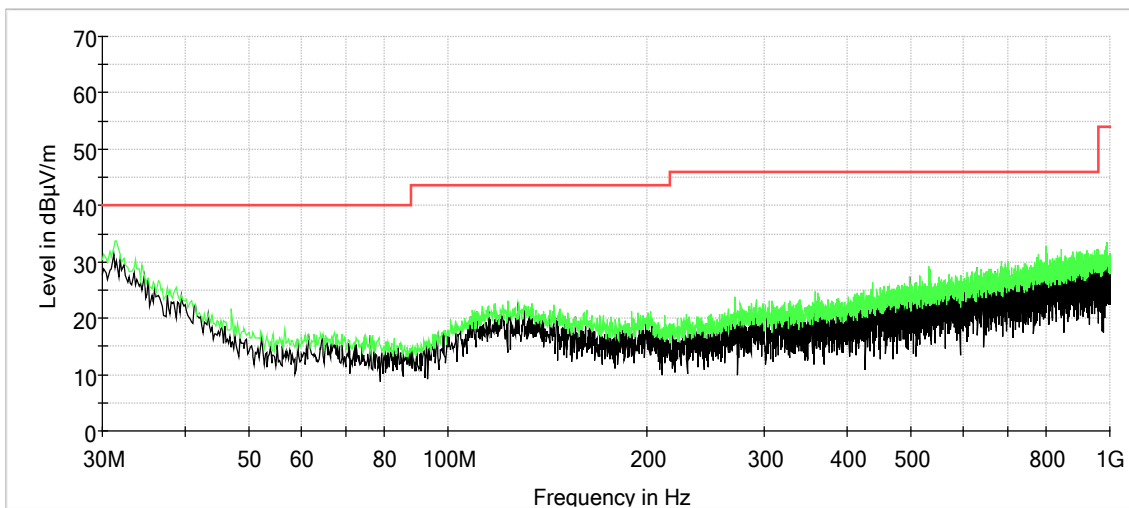




### 30 MHz to 1000 MHz - Vertical

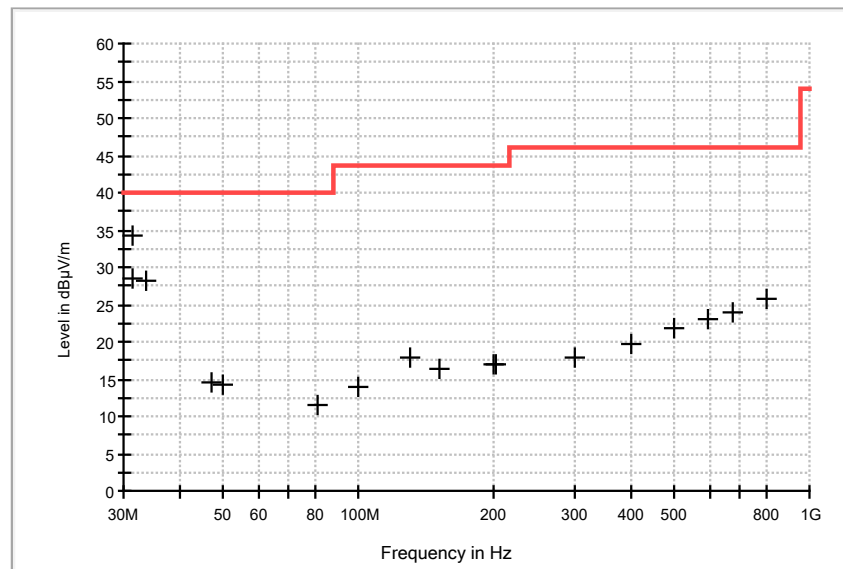


### 30 MHz to 1000 MHz - Horizontal



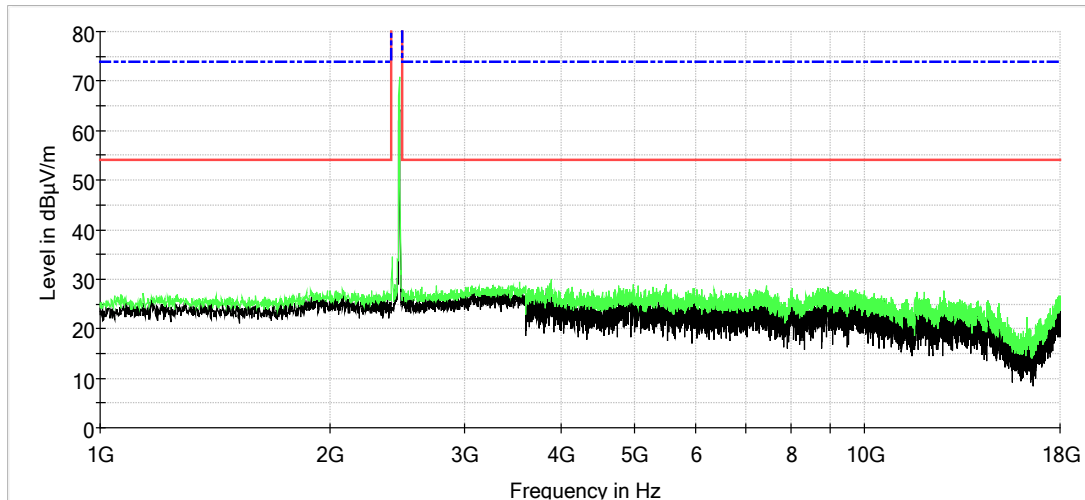


| Frequency (MHz) | Antenna Polarization | Reading (dBμV) | Correction Factors (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|----------------|-------------------------|-------------------|----------------|-------------|
| 31.360000       | V                    | 28.5           | 5.6                     | 34.1              | 40.0           | -5.9        |
| 31.560000       | H                    | 23.1           | 5.5                     | 28.6              | 40.0           | -11.4       |
| 33.480000       | V                    | 24.3           | 4.0                     | 28.3              | 40.0           | -11.7       |
| 47.080000       | H                    | 20.0           | -5.4                    | 14.6              | 40.0           | -25.4       |
| 49.600000       | V                    | 20.5           | -6.4                    | 14.1              | 40.0           | -25.9       |
| 80.640000       | H                    | 19.4           | -7.7                    | 11.7              | 40.0           | -28.3       |
| 100.040000      | V                    | 19.6           | -5.5                    | 14.1              | 43.5           | -29.4       |
| 130.120000      | H                    | 19.4           | -1.6                    | 17.8              | 43.5           | -25.7       |
| 150.000000      | V                    | 19.5           | -3.0                    | 16.5              | 43.5           | -27.0       |
| 200.000000      | V                    | 19.4           | -2.5                    | 16.9              | 43.5           | -26.6       |
| 200.520000      | H                    | 19.4           | -2.4                    | 17.0              | 43.5           | -26.5       |
| 301.000000      | H                    | 19.5           | -1.7                    | 17.8              | 46.0           | -28.2       |
| 403.840000      | V                    | 18.9           | 0.7                     | 19.6              | 46.0           | -26.4       |
| 498.120000      | H                    | 19.0           | 2.7                     | 21.7              | 46.0           | -24.3       |
| 593.960000      | V                    | 19.1           | 3.8                     | 22.9              | 46.0           | -23.1       |
| 677.760000      | H                    | 19.2           | 4.7                     | 23.9              | 46.0           | -22.1       |
| 803.880000      | V                    | 19.6           | 6.2                     | 25.8              | 46.0           | -20.2       |

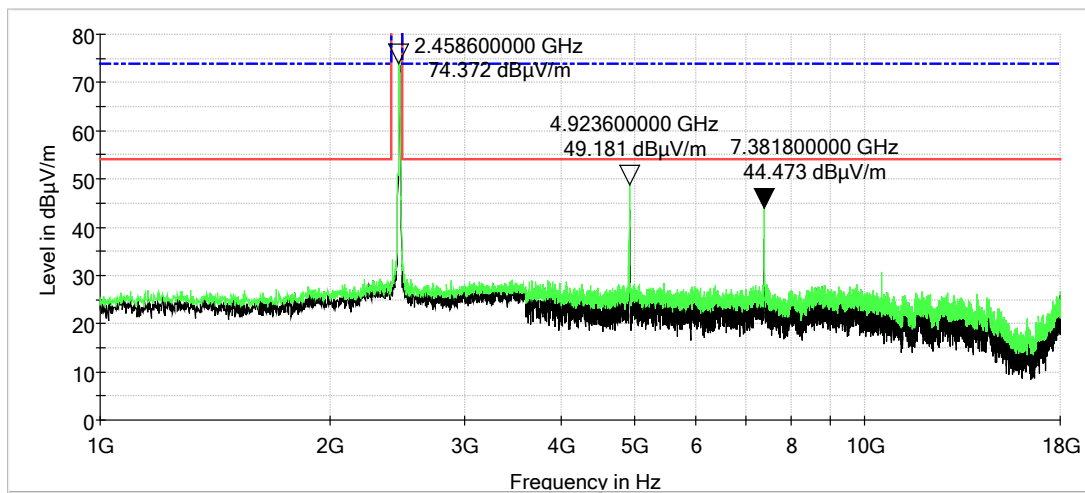




### 1 GHz to 18 GHz - Vertical

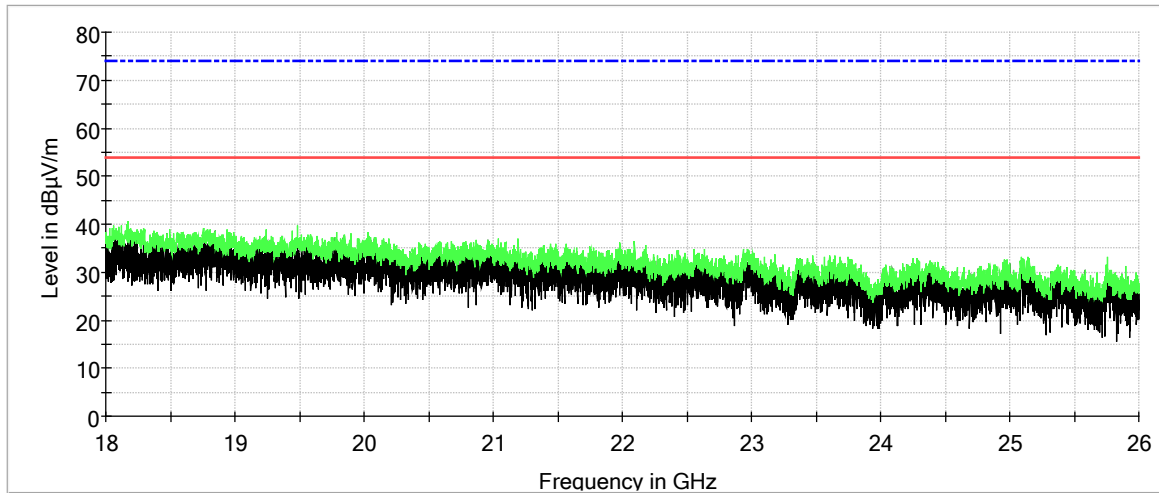


### 1 GHz to 18 GHz - Horizontal

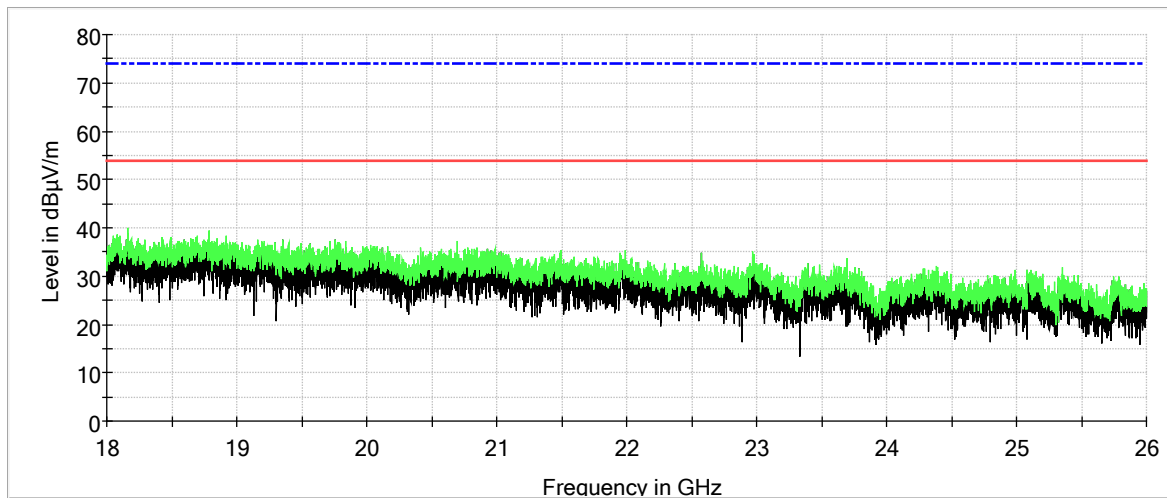




### 18 GHz to 26 GHz - Vertical

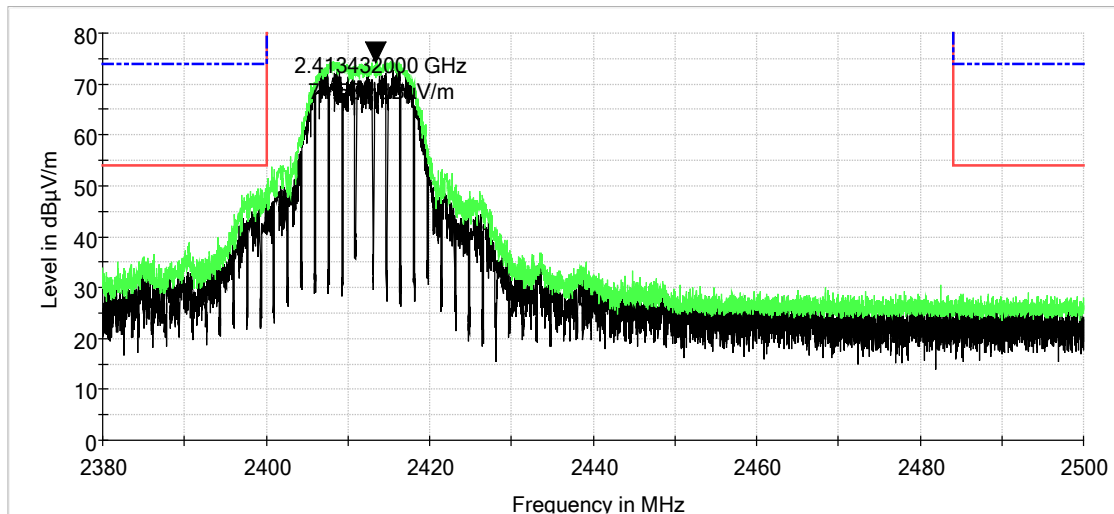


### 18 GHz to 26 GHz - Horizontal

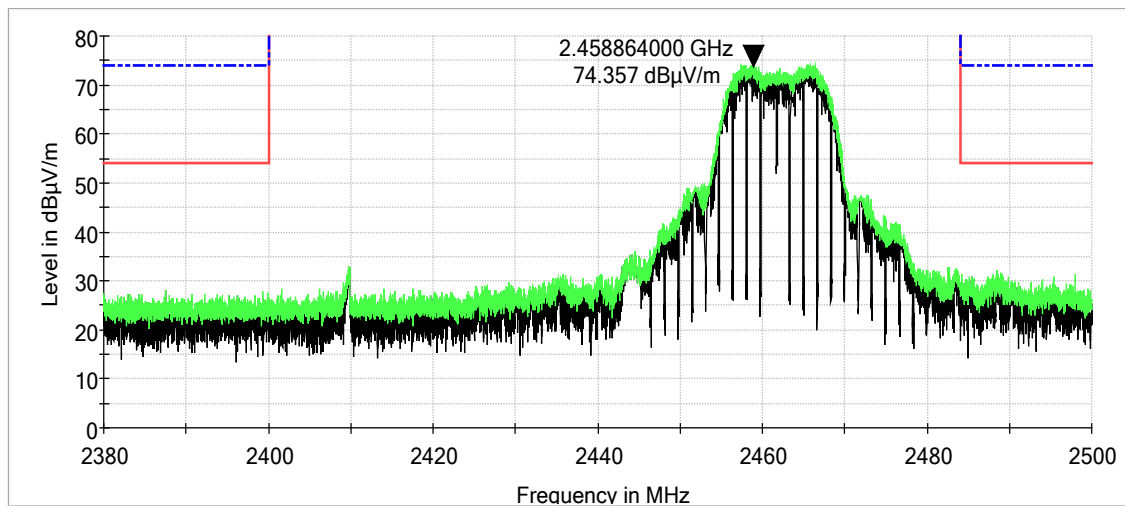




### Lower Band Edge, 11b CCK: Horizontal

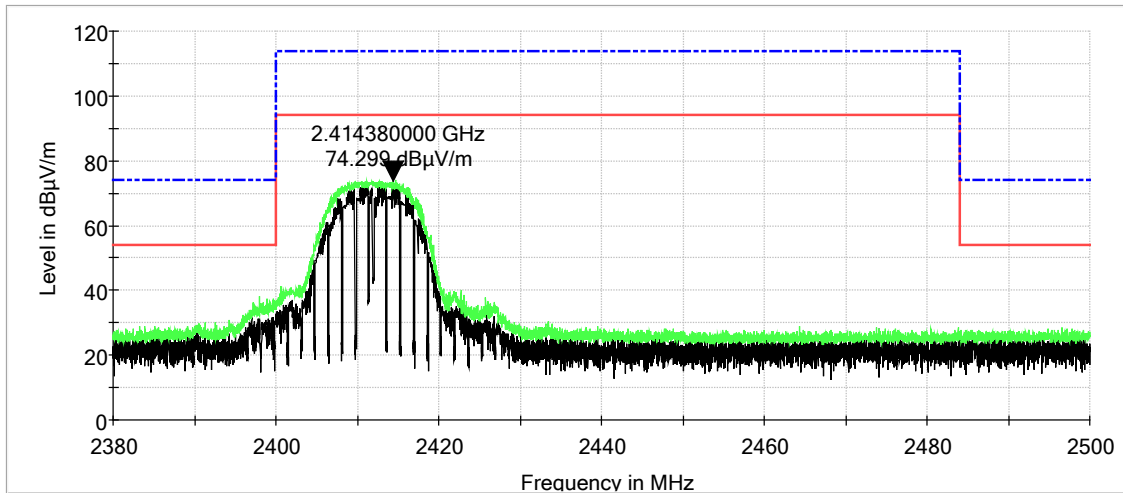


### Upper Band Edge, 11b CCK: Horizontal

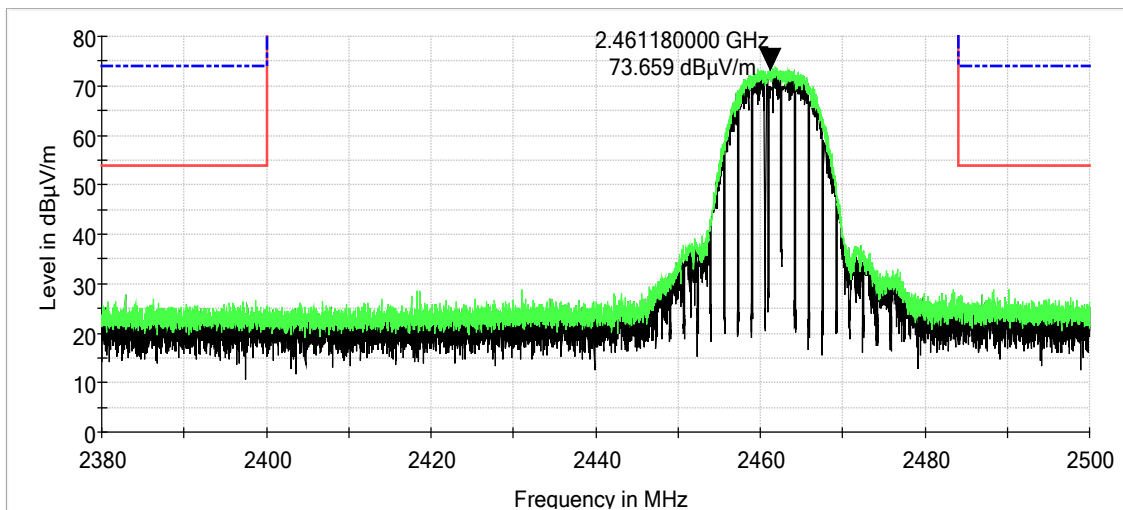




### Lower Band Edge, 11b CCK: Vertical

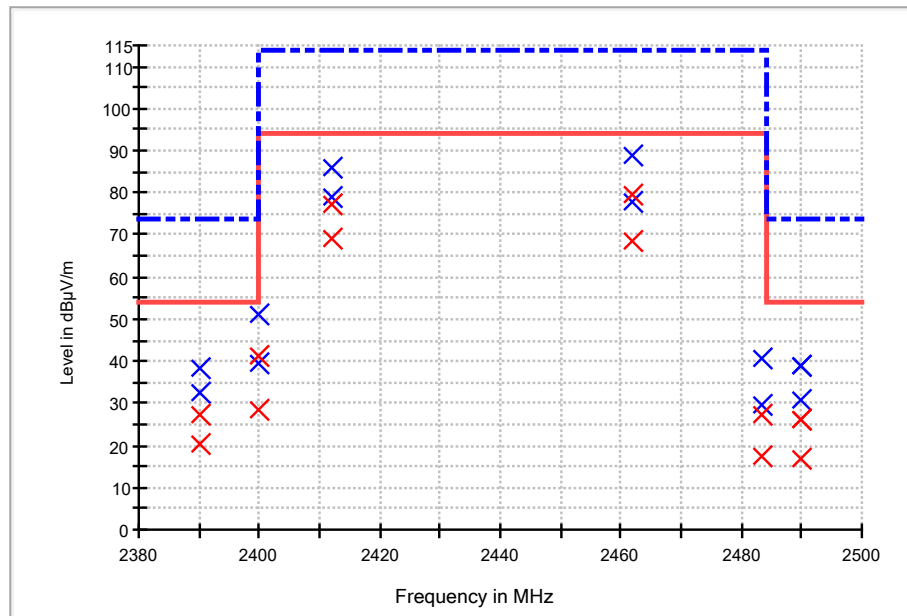


### Upper Band Edge, 11b CCK: Vertical





## 11b CCK: Band Edge



## MaxPeak

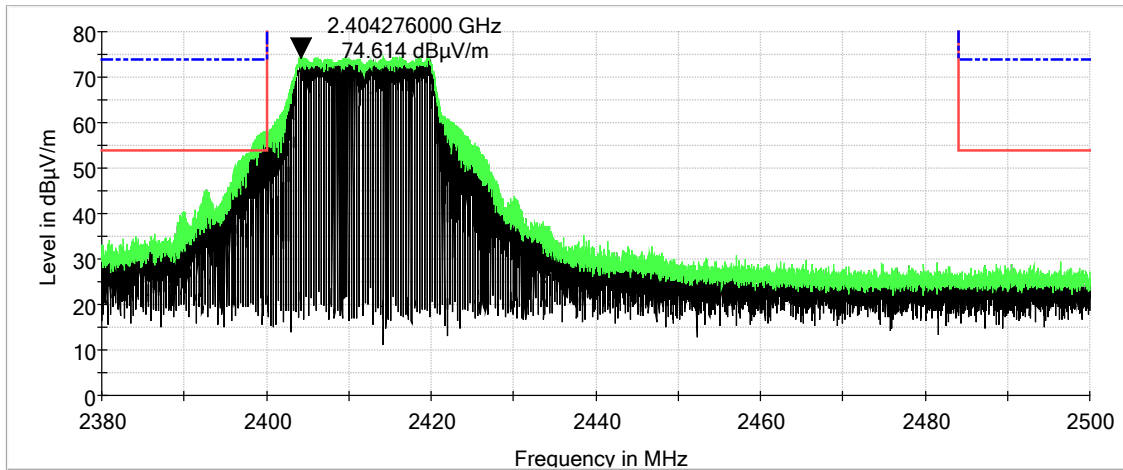
| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 170.00              | 301.00        | 51.9           | -19.1                            | 32.80             | 74.0           | -41.2       |
| 2390.00         | H                    | 180.00              | 281.00        | 57.5           | -19.1                            | 38.40             | 74.0           | -35.6       |
| 2400.00         | H                    | 180.00              | 281.00        | 70.4           | -19.4                            | 51.00             | 74.0           | -23.0       |
| 2400.00         | V                    | 170.00              | 301.00        | 59.1           | -19.4                            | 39.70             | 74.0           | -34.3       |
| 2412.00         | V                    | 170.00              | 301.00        | 98.1           | -19.3                            | 78.80             | 114.0          | -35.2       |
| 2412.00         | H                    | 180.00              | 281.00        | 105.4          | -19.3                            | 86.10             | 114.0          | -27.9       |
| 2462.00         | H                    | 160.00              | 259.00        | 108.2          | -19.2                            | 89.00             | 114.0          | -25.0       |
| 2462.00         | V                    | 160.00              | 8.00          | 97.0           | -19.2                            | 77.80             | 114.0          | -36.2       |
| 2483.50         | H                    | 160.00              | 259.00        | 59.4           | -19.0                            | 40.40             | 74.0           | -33.6       |
| 2483.50         | V                    | 160.00              | 8.00          | 48.9           | -19.0                            | 29.90             | 74.0           | -44.1       |
| 2490.00         | H                    | 160.00              | 259.00        | 58.2           | -19.0                            | 39.20             | 74.0           | -34.8       |
| 2490.00         | H                    | 160.00              | 259.00        | 58.0           | -19.0                            | 39.00             | 74.0           | -35.0       |
| 2490.00         | V                    | 160.00              | 8.00          | 49.5           | -19.0                            | 30.50             | 74.0           | -43.5       |

## AVG

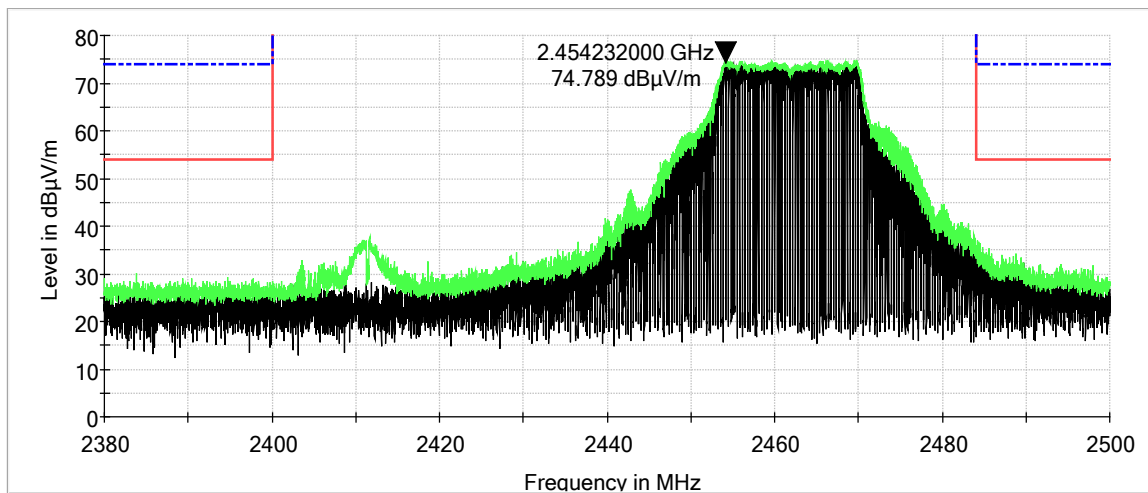
| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 170.00              | 301.00        | 39.6           | -19.1                            | 20.50             | 54.0           | -33.5       |
| 2390.00         | H                    | 180.00              | 281.00        | 46.2           | -19.1                            | 27.10             | 54.0           | -26.9       |
| 2400.00         | H                    | 180.00              | 281.00        | 60.4           | -19.4                            | 41.00             | 54.0           | -13.0       |
| 2400.00         | V                    | 170.00              | 301.00        | 47.9           | -19.4                            | 28.50             | 54.0           | -25.5       |
| 2412.00         | V                    | 170.00              | 301.00        | 88.2           | -19.3                            | 68.90             | 94.0           | -25.1       |
| 2412.00         | H                    | 180.00              | 281.00        | 96.6           | -19.3                            | 77.30             | 94.0           | -16.7       |
| 2462.00         | H                    | 160.00              | 259.00        | 98.9           | -19.2                            | 79.70             | 94.0           | -14.3       |
| 2462.00         | V                    | 160.00              | 8.00          | 87.5           | -19.2                            | 68.30             | 94.0           | -25.7       |
| 2483.50         | H                    | 160.00              | 259.00        | 46.2           | -19.0                            | 27.20             | 54.0           | -26.8       |
| 2483.50         | V                    | 160.00              | 8.00          | 36.5           | -19.0                            | 17.50             | 54.0           | -36.5       |
| 2490.00         | H                    | 160.00              | 259.00        | 45.1           | -19.0                            | 26.10             | 54.0           | -27.9       |
| 2490.00         | H                    | 160.00              | 259.00        | 45.1           | -19.0                            | 26.10             | 54.0           | -27.9       |
| 2490.00         | V                    | 160.00              | 8.00          | 35.7           | -19.0                            | 16.70             | 54.0           | -37.3       |



### Lower Band Edge, 11g 54 Mbps OFDM: Horizontal

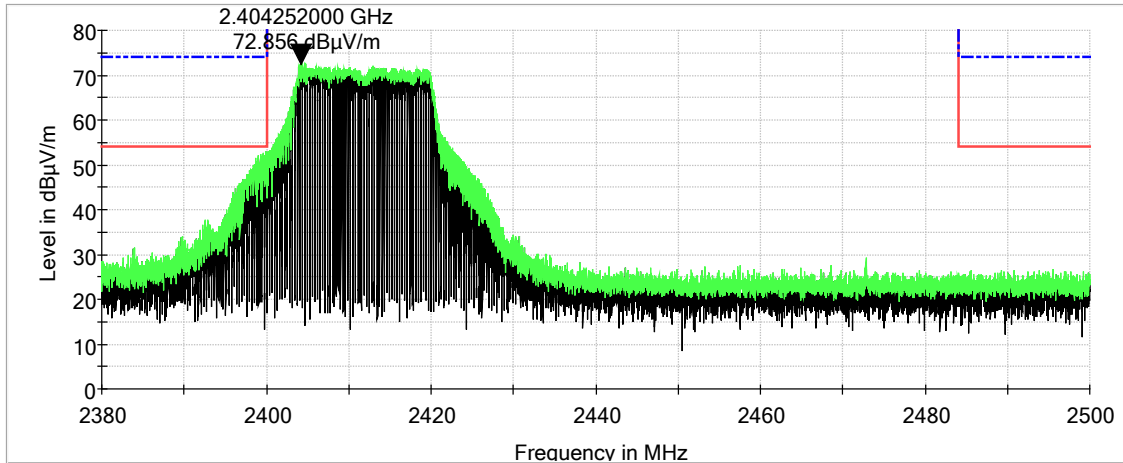


### Upper Band Edge, 11g 54 Mbps OFDM: Horizontal

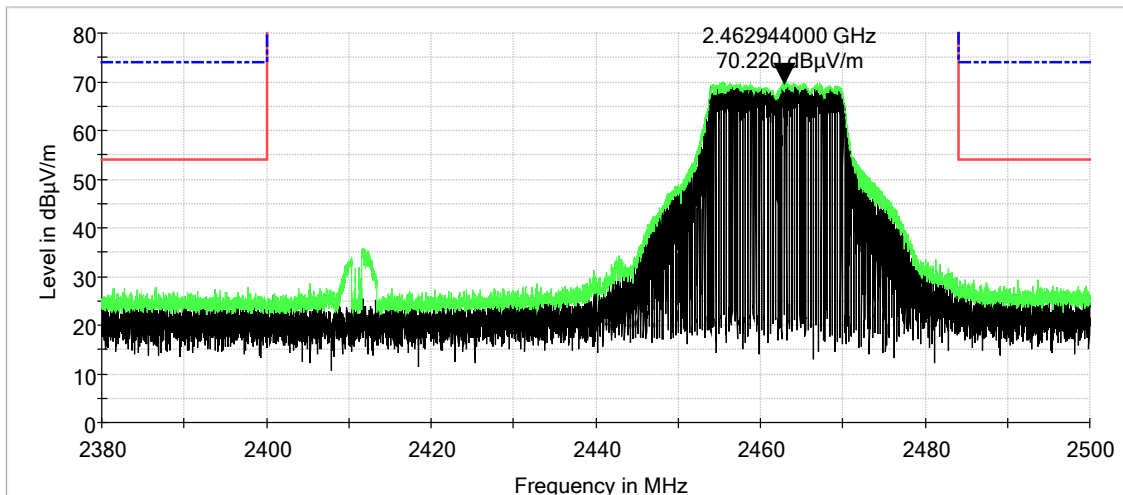




### Lower Band Edge, 11g 54 Mbps OFDM: Vertical

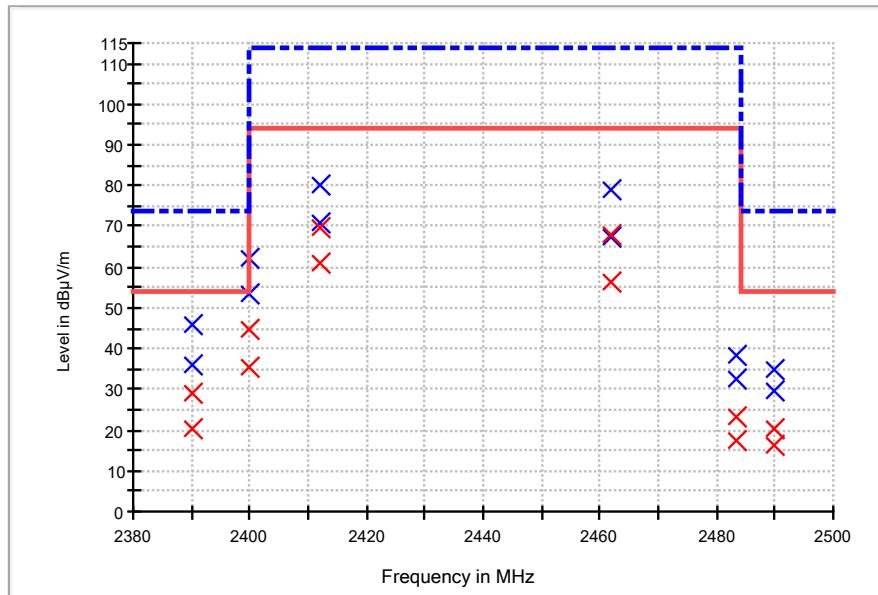


### Upper Band Edge, 11g 54 Mbps OFDM: Vertical





## 11g 54 Mbps OFDM: Band Edge



## MaxPeak

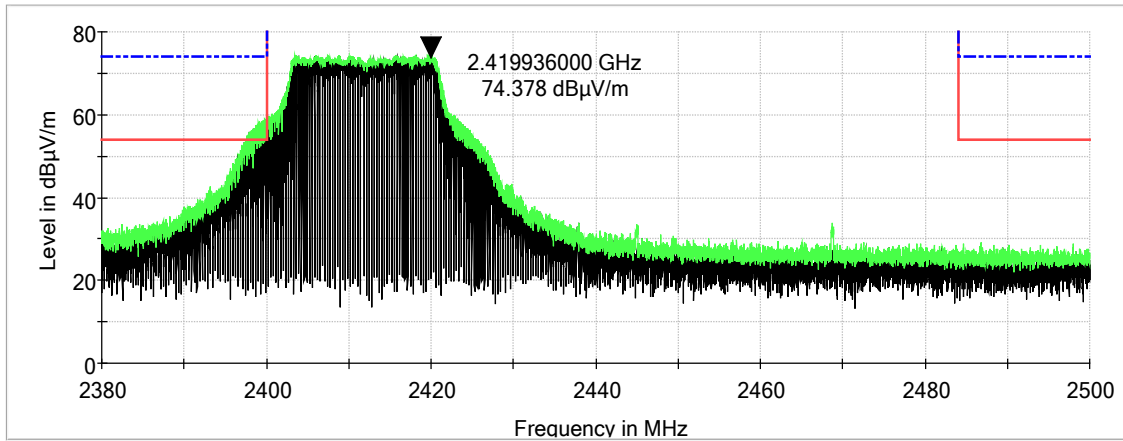
| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 170.00              | 257.00        | 55.2           | -19.1                            | 36.10             | 74.0           | -37.9       |
| 2390.00         | H                    | 170.00              | 278.00        | 65.1           | -19.1                            | 46.00             | 74.0           | -28.0       |
| 2400.00         | V                    | 170.00              | 257.00        | 72.9           | -19.4                            | 53.50             | 74.0           | -20.5       |
| 2400.00         | H                    | 170.00              | 278.00        | 81.4           | -19.4                            | 62.00             | 74.0           | -12.0       |
| 2412.00         | H                    | 170.00              | 278.00        | 99.2           | -19.3                            | 79.90             | 114.0          | -34.1       |
| 2412.00         | V                    | 170.00              | 257.00        | 90.3           | -19.3                            | 71.00             | 114.0          | -43.0       |
| 2462.00         | H                    | 170.00              | 0.00          | 98.0           | -19.2                            | 78.80             | 114.0          | -35.2       |
| 2462.00         | V                    | 150.00              | 8.00          | 86.4           | -19.2                            | 67.20             | 114.0          | -46.8       |
| 2483.50         | H                    | 170.00              | 0.00          | 57.6           | -19.0                            | 38.60             | 74.0           | -35.4       |
| 2483.50         | V                    | 150.00              | 8.00          | 51.6           | -19.0                            | 32.60             | 74.0           | -41.4       |
| 2490.00         | V                    | 150.00              | 8.00          | 48.8           | -19.0                            | 29.80             | 74.0           | -44.2       |
| 2490.00         | H                    | 170.00              | 0.00          | 54.1           | -19.0                            | 35.10             | 74.0           | -38.9       |

## AVG

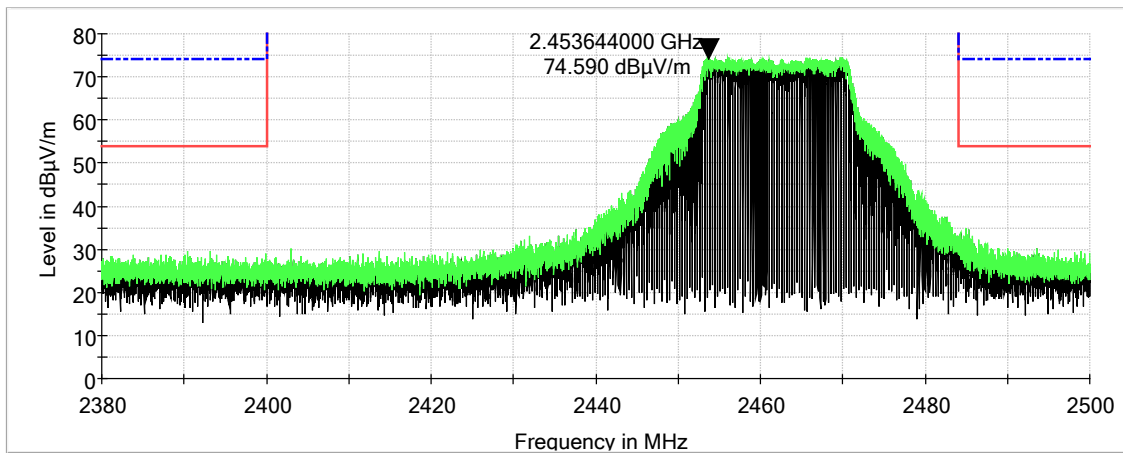
| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 170.00              | 257.00        | 39.2           | -19.1                            | 20.10             | 54.0           | -33.9       |
| 2390.00         | H                    | 170.00              | 278.00        | 48.3           | -19.1                            | 29.20             | 54.0           | -24.8       |
| 2400.00         | V                    | 170.00              | 257.00        | 54.6           | -19.4                            | 35.20             | 54.0           | -18.8       |
| 2400.00         | H                    | 170.00              | 278.00        | 63.9           | -19.4                            | 44.50             | 54.0           | -9.5        |
| 2412.00         | H                    | 170.00              | 278.00        | 89.0           | -19.3                            | 69.70             | 94.0           | -24.3       |
| 2412.00         | V                    | 170.00              | 257.00        | 80.1           | -19.3                            | 60.80             | 94.0           | -33.2       |
| 2462.00         | H                    | 170.00              | 0.00          | 87.3           | -19.2                            | 68.10             | 94.0           | -25.9       |
| 2462.00         | V                    | 150.00              | 8.00          | 75.8           | -19.2                            | 56.60             | 94.0           | -37.4       |
| 2483.50         | H                    | 170.00              | 0.00          | 42.5           | -19.0                            | 23.50             | 54.0           | -30.5       |
| 2483.50         | V                    | 150.00              | 8.00          | 36.2           | -19.0                            | 17.20             | 54.0           | -36.8       |
| 2490.00         | V                    | 150.00              | 8.00          | 35.2           | -19.0                            | 16.20             | 54.0           | -37.8       |
| 2490.00         | H                    | 170.00              | 0.00          | 39.5           | -19.0                            | 20.50             | 54.0           | -33.5       |



### Lower Band Edge, 11n MCS7: Horizontal

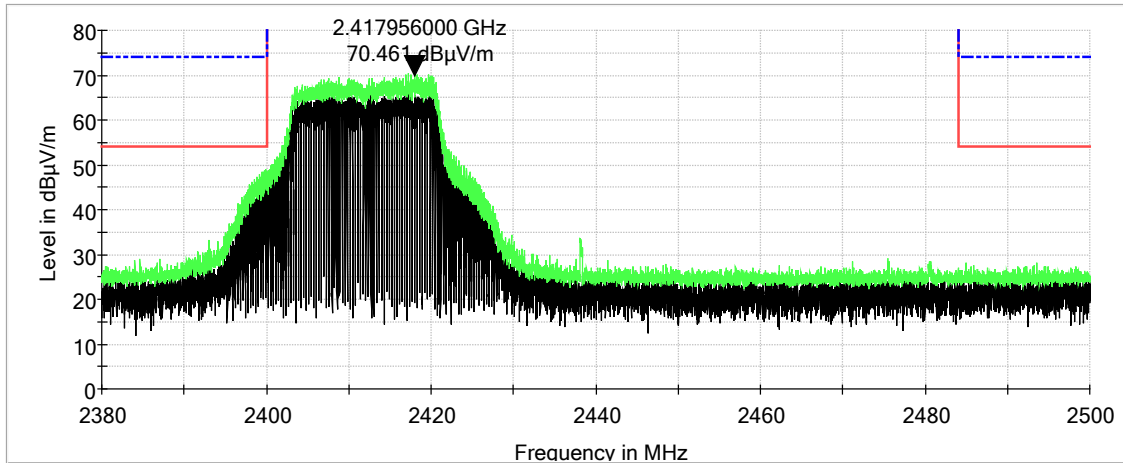


### Upper Band Edge, 11n MCS7: Horizontal

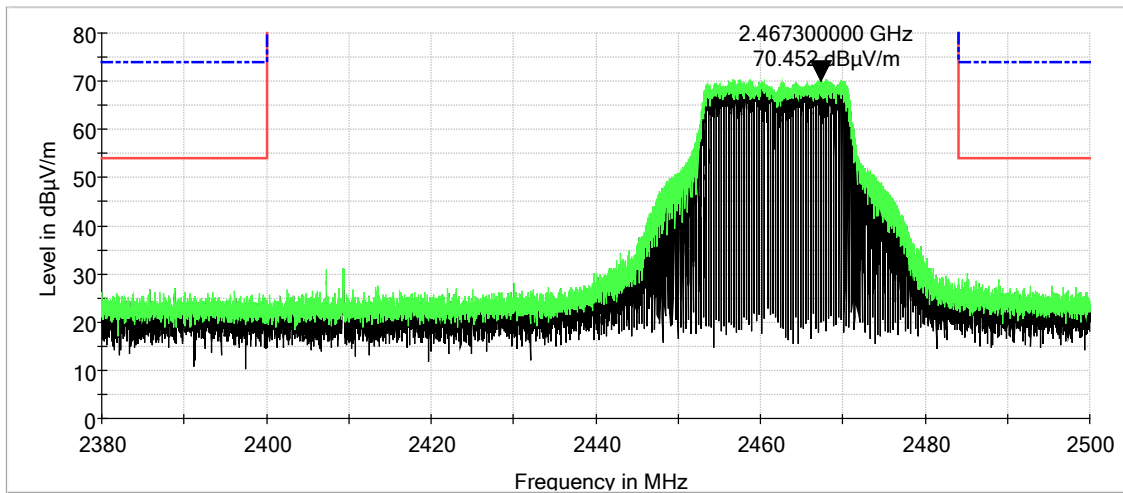




### Lower Band Edge, 11n MCS7: Vertical

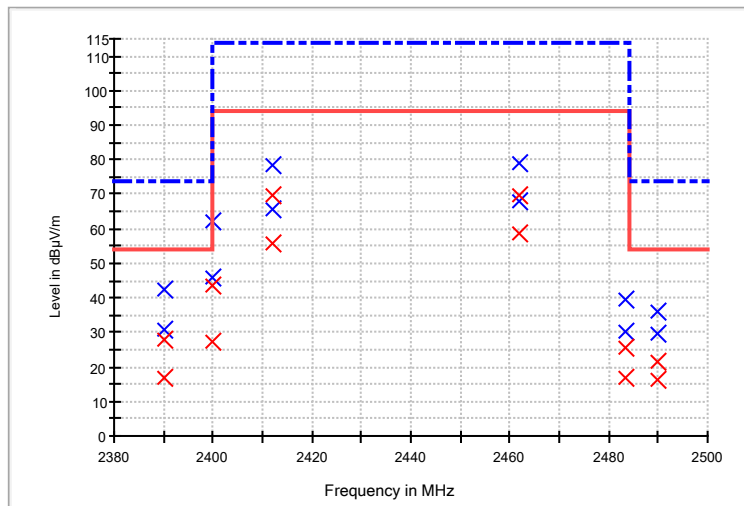


### Upper Band Edge, 11n MCS7: Vertical





## 11n MCS7: Band Edge



## MaxPeak

| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 160.00              | 8.00          | 50.1           | -19.1                            | 31.00             | 74.0           | -43.0       |
| 2390.00         | H                    | 160.00              | 264.00        | 61.6           | -19.1                            | 42.50             | 74.0           | -31.5       |
| 2400.00         | H                    | 160.00              | 264.00        | 81.5           | -19.4                            | 62.10             | 74.0           | -11.9       |
| 2400.00         | V                    | 160.00              | 8.00          | 65.2           | -19.4                            | 45.80             | 74.0           | -28.2       |
| 2412.00         | V                    | 160.00              | 8.00          | 84.8           | -19.3                            | 65.50             | 74.0           | -8.5        |
| 2412.00         | H                    | 160.00              | 264.00        | 97.9           | -19.3                            | 78.60             | 114.0          | -35.4       |
| 2462.00         | H                    | 160.00              | 263.00        | 98.1           | -19.2                            | 78.90             | 114.0          | -35.1       |
| 2462.00         | V                    | 160.00              | 8.00          | 87.0           | -19.2                            | 67.80             | 74.0           | -6.2        |
| 2483.50         | H                    | 160.00              | 263.00        | 58.5           | -19.0                            | 39.50             | 74.0           | -34.5       |
| 2483.50         | V                    | 160.00              | 8.00          | 49.3           | -19.0                            | 30.30             | 74.0           | -43.7       |
| 2490.00         | H                    | 160.00              | 263.00        | 54.8           | -19.0                            | 35.80             | 74.0           | -38.2       |
| 2490.00         | V                    | 160.00              | 8.00          | 48.4           | -19.0                            | 29.40             | 74.0           | -44.6       |

## AVG

| Frequency (MHz) | Antenna Polarization | Antenna Height (cm) | Azimuth (deg) | Reading (dBμV) | Cable Loss & Antenna Factor (dB) | Emission (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|----------------------|---------------------|---------------|----------------|----------------------------------|-------------------|----------------|-------------|
| 2390.00         | V                    | 160.00              | 8.00          | 36.0           | -19.1                            | 16.90             | 54.0           | -37.1       |
| 2390.00         | H                    | 160.00              | 264.00        | 47.0           | -19.1                            | 27.90             | 54.0           | -26.1       |
| 2400.00         | H                    | 160.00              | 264.00        | 63.0           | -19.4                            | 43.60             | 54.0           | -10.4       |
| 2400.00         | V                    | 160.00              | 8.00          | 46.8           | -19.4                            | 27.40             | 54.0           | -26.6       |
| 2412.00         | V                    | 160.00              | 8.00          | 75.3           | -19.3                            | 56.00             | 94.0           | -38.0       |
| 2412.00         | H                    | 160.00              | 264.00        | 88.9           | -19.3                            | 69.60             | 94.0           | -24.4       |
| 2462.00         | H                    | 160.00              | 263.00        | 89.0           | -19.2                            | 69.80             | 94.0           | -24.2       |
| 2462.00         | V                    | 160.00              | 8.00          | 77.7           | -19.2                            | 58.50             | 94.0           | -35.5       |
| 2483.50         | H                    | 160.00              | 263.00        | 44.6           | -19.0                            | 25.60             | 54.0           | -28.4       |
| 2483.50         | V                    | 160.00              | 8.00          | 35.8           | -19.0                            | 16.80             | 54.0           | -37.2       |
| 2490.00         | H                    | 160.00              | 263.00        | 40.4           | -19.0                            | 21.40             | 54.0           | -32.6       |
| 2490.00         | V                    | 160.00              | 8.00          | 35.2           | -19.0                            | 16.20             | 54.0           | -37.8       |



## **11 FCC PART 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)**

Peak power spectral density measurements were performed.

### **11.1 Requirements:**

The peak power spectral density shall not exceed +8dBm in any 3 kHz band during any time interval of continuous transmission.

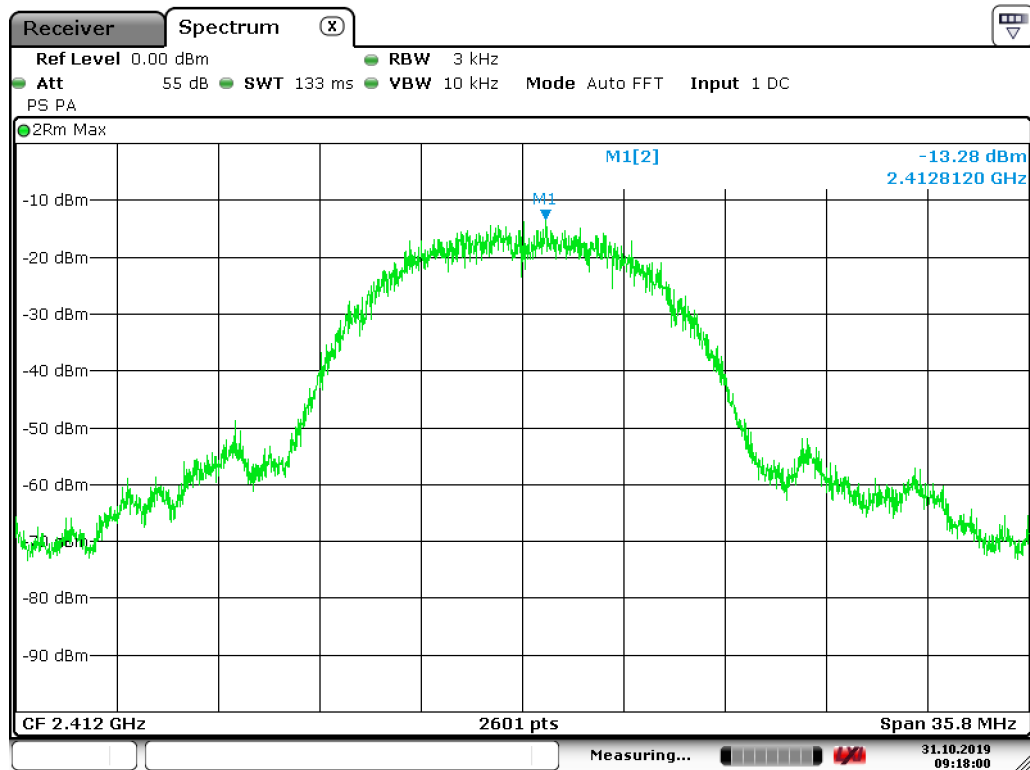
Power spectral density measurements were performed at a resolution bandwidth of 3 kHz (video bandwidth set at 10 kHz). The peak spectral densities were measured at the low, mid, and upper channels.



## 12.2 Peak Power Spectral Density Test Data

|               |                                     |                    |            |
|---------------|-------------------------------------|--------------------|------------|
| Test Date(s): | Oct. 31, 2019                       | Test Engineer:     | J. Chiller |
| Standards:    | CFR 47 Part 15.247(e);<br>KDB558074 | Air Temperature:   | 22.1°C     |
|               |                                     | Relative Humidity: | 49%        |

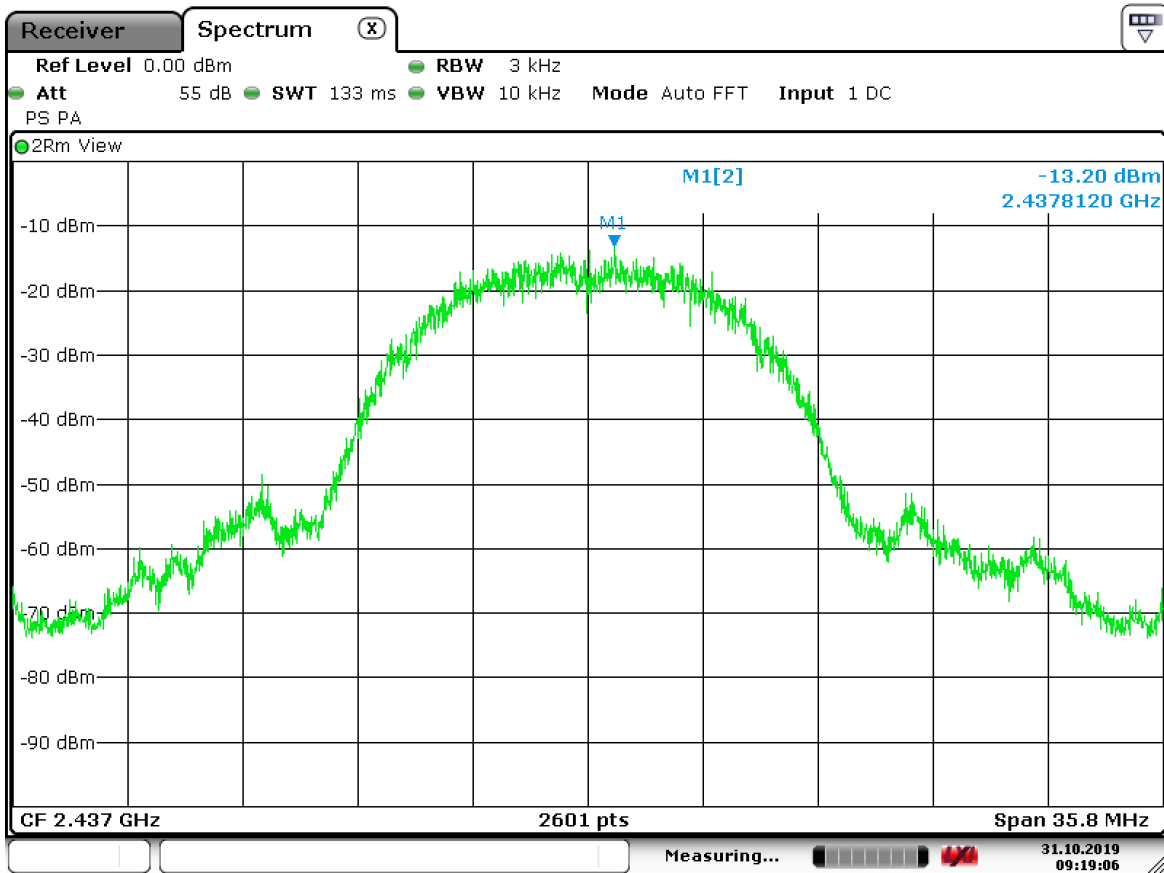
## 11b CCK: Low Channel



Date: 31.OCT.2019 09:18:01



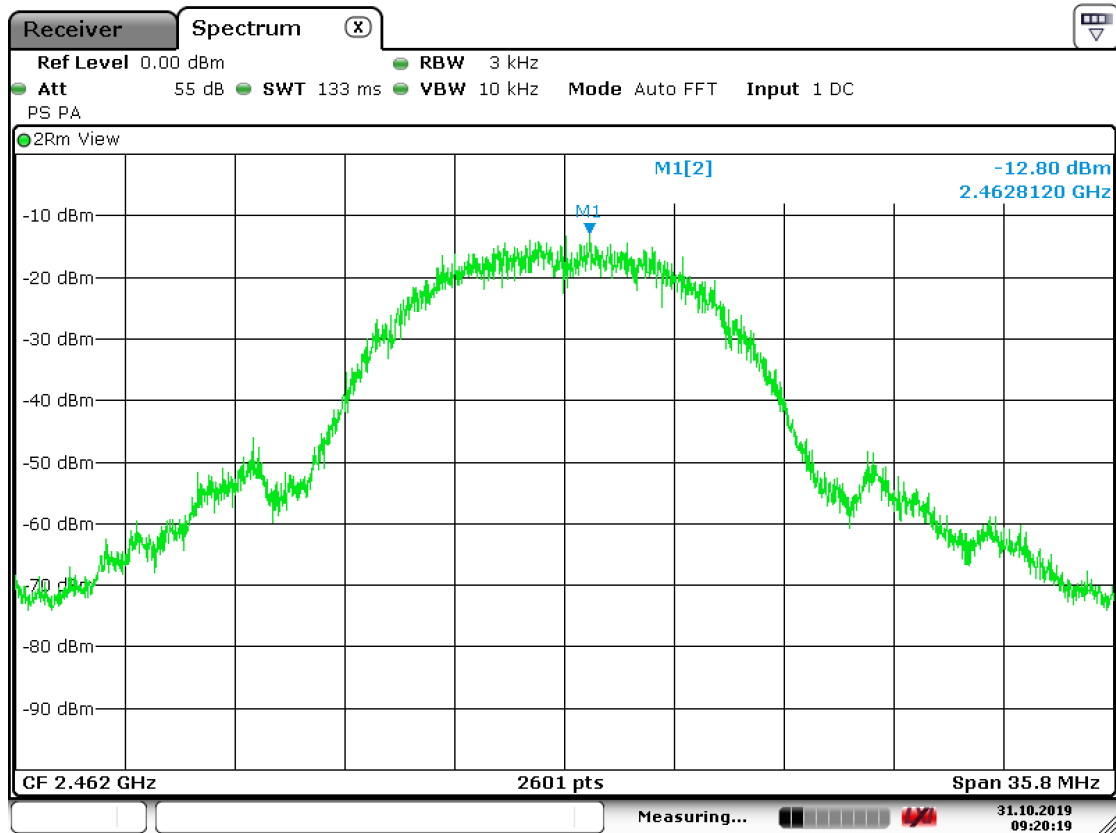
11b CCK: Mid Channel



Date: 31.OCT.2019 09:19:06

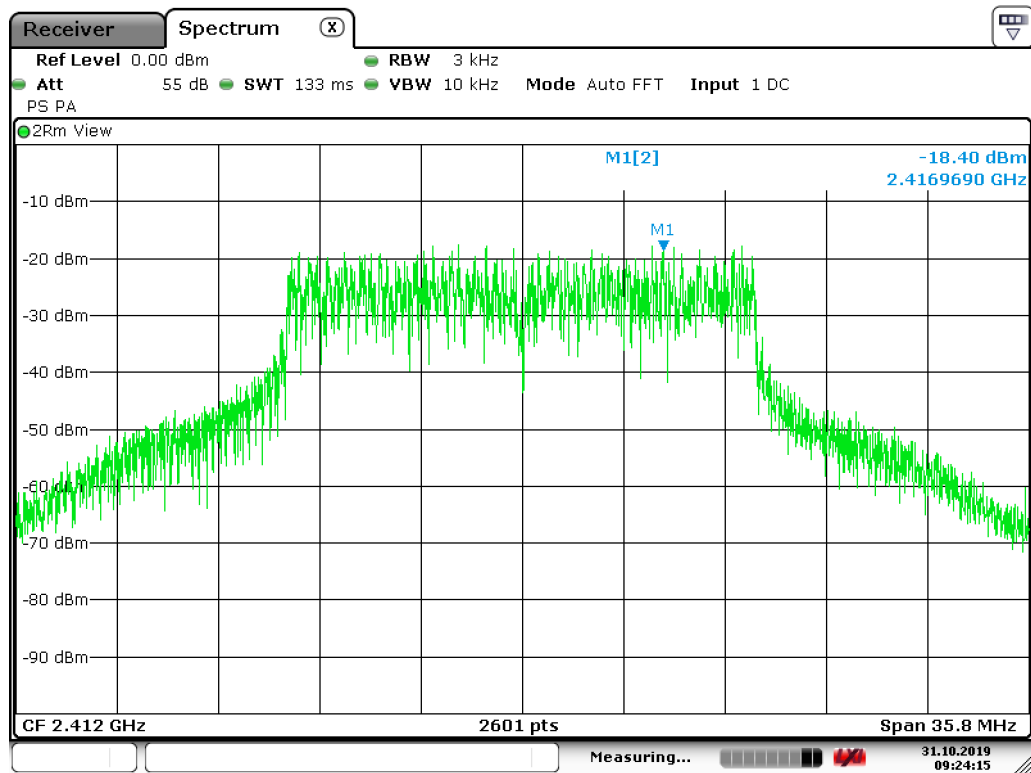


### 11b CCK: High Channel



Date: 31.OCT.2019 09:20:19

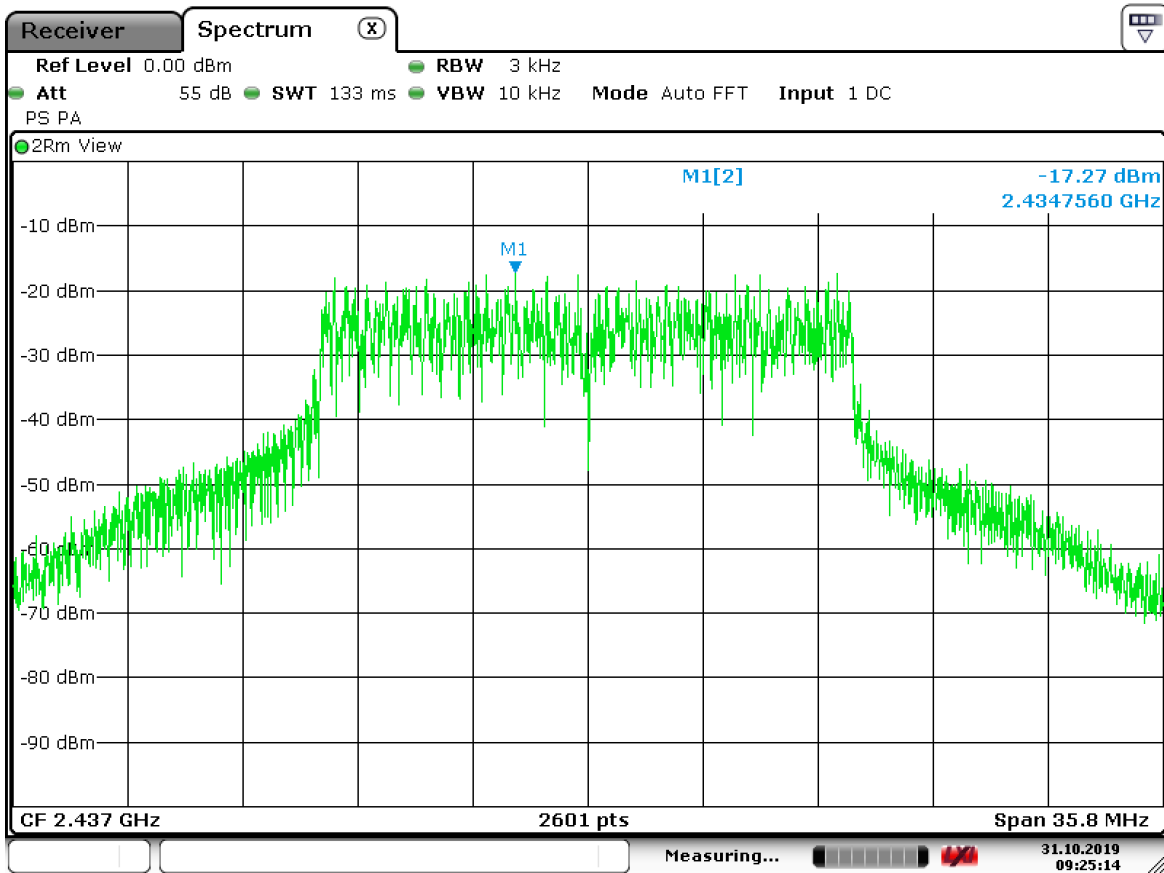
## 11g 54 Mbps OFDM: Low Channel



Date: 31.OCT.2019 09:24:16



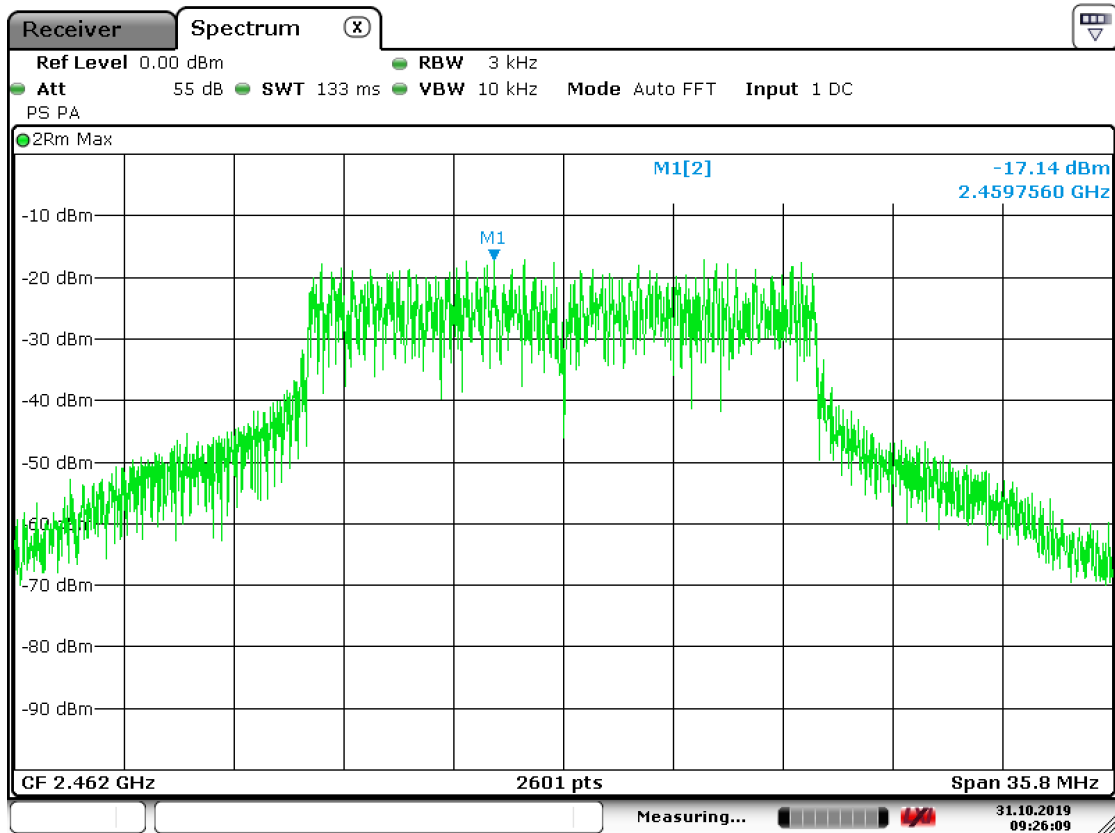
### 11g 54 Mbps OFDM: Mid Channel



Date: 31.OCT.2019 09:25:14



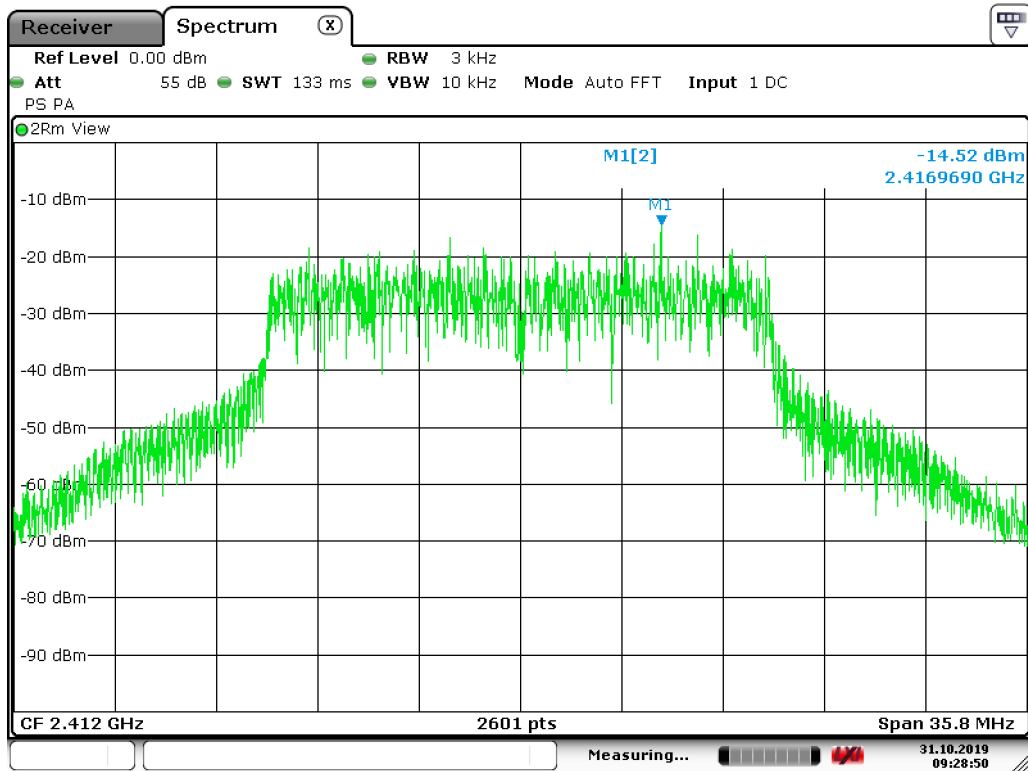
### 11g 54 Mbps OFDM: High Channel



Date: 31.OCT.2019 09:26:08



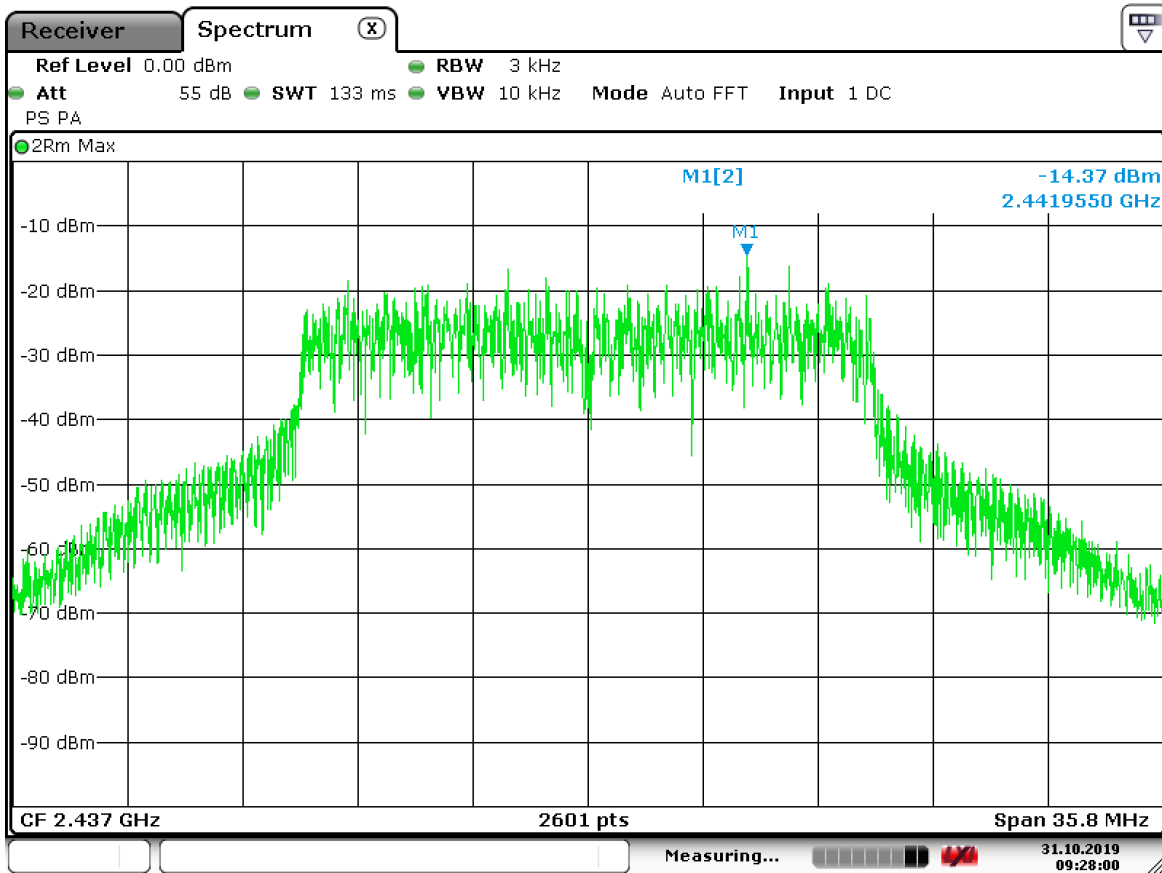
### 11n MCS7: Low Channel



Date: 31.OCT.2019 09:28:50



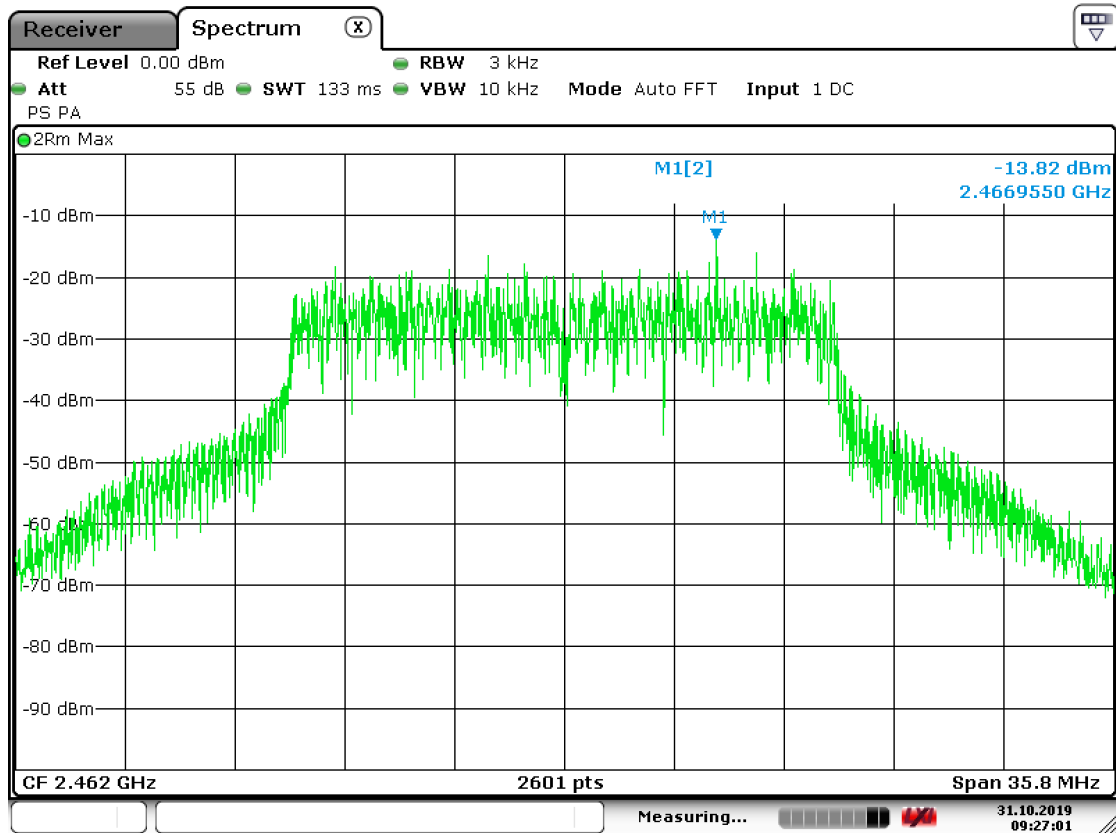
### 11n MCS7: Mid Channel



Date: 31.OCT.2019 09:28:00



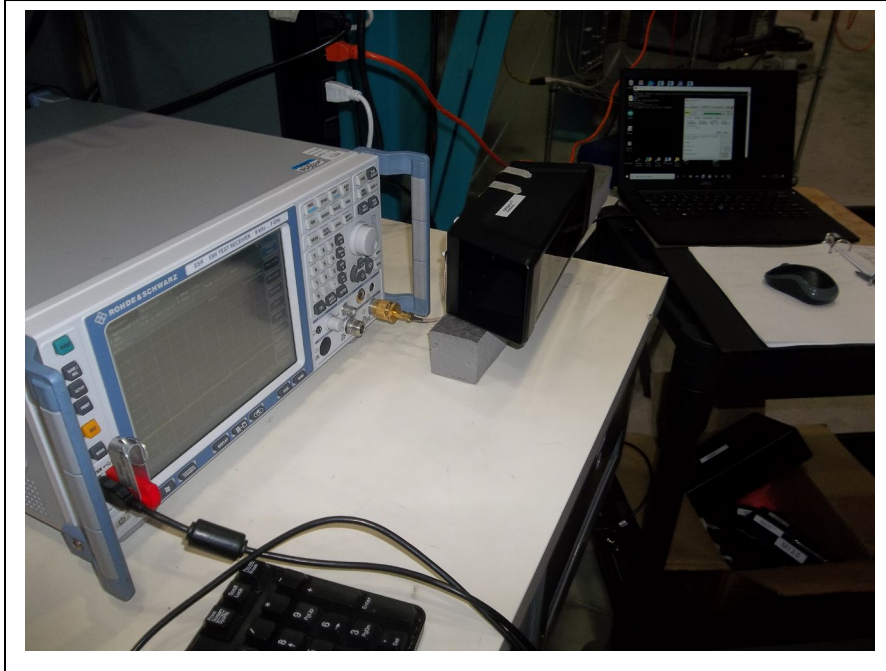
### 11n MCS7: High Channel



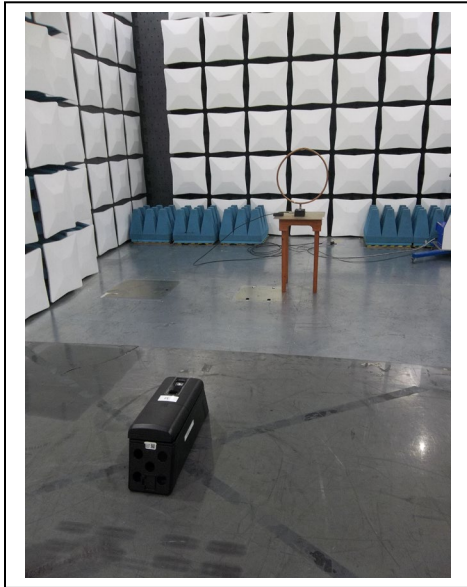
Date: 31.OCT.2019 09:27:00

## 12 PHOTOGRAPHS

**Conducted Output Power, Peak Power Spectral Density,  
Occupied Bandwidth, and Conducted Spurious Emissions**



### Radiated Spurious Emissions, Less than 30 MHz



### Radiated Spurious Emissions, 30 MHz to 1000 MHz





## Radiated Spurious Emissions Greater than 1GHz

