



# Test report

according to ISO/IEC 17025:2017

**FCC**

**(Federal Communications Commission)**

**Test Firm Registration Number: 768032**

**Designation Number DE0012**

**ISED**

**(Innovation, Science and Economic Development)**

**CAB identifier: DE0012**

**ISED#: 6155A**

## Electromagnetic compatibility

Intentional Radiators



Deutsche  
Akkreditierungsstelle  
D-PL-17379-01-00  
D-PL-17379-01-02  
D-PL-17379-01-03



Bundesnetzagentur

BNetzA-CAB-18/21-19



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Test report no.: **20/01-0030**

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### **Location of test facility:**



**STC Germany GmbH  
Ohmstrasse 1  
84160 Frontenhausen  
Germany**

## 1. Client information

Name: Vestel Elektronik San ve Tic. A.S.  
Address: Organize Sanayi Bölgesi  
Vestel City, High-End  
45030 MANISA  
TURKEY  
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Fax: +90 236 2332584  
E-mail: Andac.pamuk@vestel.com.tr

## 2. Equipment under test (EUT)

### 2.1 Identification of the EUT

Equipment: WIFI Module  
Model: 17WFM21  
Brand name: -/-  
Serial no.: -/-  
Manufacturer: Vestel Elektronik San ve Tic. A.S., Organize Sanayi Bölgesi, Vestel City, High-End, 45030 MANISA, TURKEY  
Country of origin: TURKEY  
Power rating:  
Highest frequency generated or used in the device or on which the device operates or tunes (MHz): 5.70 GHz  
Date Sample Received: 16.01.2020, 25.03.2020  
Tests were performed: 01.04.2020 – 08.04.2020

### 2.2 Additional information about the EUT:

The EUT can also operate as 5 GHz Wifi module, but not simultaneously to the 2.4 Ghz RF-function.  
The 5 GHz is not documented in this Report.

**To duplicate parts of this test report needs the written confirmation of the test laboratory.**

**The test results relate only to the above mentioned test sample(s).**

### 3. Description of the Equipment under test and test conditions

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                         |                         |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|-------------------------|
| FCC-ID:                                                | 2AVQS-17WFM21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |                         |                         |
| IC:                                                    | 25888-17WFM21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |                         |                         |
| HVIN:                                                  | 260419-R3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                         |                         |
| Power:                                                 | nominal 5 V =, +/- 5 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                         |                         |
| Cables:                                                | USB cable 100 cm<br>Cable to test adaptor 30 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |                         |                         |
| Approx. Size (l x w x h):                              | (70 x 25 x 4.5) mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |                         |                         |
| Test conditions:                                       | <p>The "WIFI Module – 17WFM21" (= equipment under test – EUT) had been tested, where applicable, in the following modes:</p> <ol style="list-style-type: none"> <li>(1) 802.11b: Tx mode BW 20MHz CCK 1MBps 2412 MHz</li> <li>(2) 802.11b: Tx mode BW 20MHz CCK 1MBps 2437 MHz</li> <li>(3) 802.11b: Tx mode BW 20MHz CCK 1MBps 2462 MHz</li> <li>(4) 802.11g: Tx mode BW 20MHz OFDM 6MBps 2412 MHz</li> <li>(5) 802.11g: Tx mode BW 20MHz OFDM 6MBps 2437 MHz</li> <li>(6) 802.11g: Tx mode BW 20MHz OFDM 6MBps 2462 MHz</li> <li>(7) 802.11n: Tx mode BW 20MHz HT Greenfield 6.5MBps 2412 MHz</li> <li>(8) 802.11n: Tx mode BW 20MHz HT Greenfield 6.5MBps 2437 MHz</li> <li>(9) 802.11n: Tx mode BW 20MHz HT Greenfield 6.5MBps 2462MHz</li> <li>(10) 802.11n: Tx mode BW 40MHz HT Greenfield 6.5MBps 2422 MHz</li> <li>(11) 802.11n: Tx mode BW 40MHz HT Greenfield 6.5MBps 2437 MHz</li> <li>(12) 802.11n: Tx mode BW 40MHz HT Greenfield 6.5MBps 2462 MHz</li> </ol> <p>with an active WLAN connection as well as controlled by a test software with maximum RF-output power and different data rate in order to find the worst case.</p> |                       |                         |                         |
| RF Module Model Number:                                | 17WFM21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                         |                         |
| Frequency range:                                       | 2.400 GHz – 2.483,5 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |                         |                         |
| Type of modulation:                                    | 802.11 b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 802.11 g              | 802.11 n [20]           | 802.11 n [40]           |
| Operating frequencies [MHz]:                           | 2412 - 2462                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2412 - 2462           | 2412 - 2462             | 2422 - 2452             |
| 6 dB Bandwidth [MHz]:                                  | 10.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16.30                 | 17.06                   | 34.46                   |
| Emission classification:                               | 12M9D1D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16M6D1D               | 17M6D1D                 | 36M2D1D                 |
| Transmission protocol:                                 | CCK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | OFDM                  | OFDM<br>(HT Greenfield) | OFDM<br>(HT Greenfield) |
| Number of channels:                                    | 1 - 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 - 11                | 1 - 11                  | 3 - 9                   |
| Spurious Emissions:                                    | 50.24 dBµV/m<br>@ 3m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 45.88 dBµV/m<br>@ 3m  | 48.00 dBµV/m<br>@ 3m    | 53.54 dBµV/m<br>@ 3m    |
| Max. conducted RF output Power (both ant.) [dBm / mW]: | 14.84 dBm<br>30.45 mW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 14.13 dBm<br>25.85 mW | 14.39 dBm<br>27.45 mW   | 13.75 dBm<br>23.74 mW   |
| Module Transmission Type:                              | WLAN (1TX, 1RX) / WLAN (2TX, 2RX)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                         |                         |
| Transmission protocol Specification:                   | CCK MCS=0; 1 MBps - MCS = 11; 11 MBps<br>OFDM MCS=0; 6 MBps - MCS = 7; 54 MBps<br>OFDM (HT Greenfield) MCS=0; 6.5 MBps - MCS = 9; 26 MBps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |                         |                         |
| Environmental conditions during tests:                 | Ambient temperature 20 °C<br>Relative humidity 40 %<br>Atmospheric pressure 962 mbar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |                         |                         |
| Antenna specification:                                 | Model: Printed PCB Antennas<br>Antenna 1 Gain: max. 3.4 dBi<br>Antenna 2 Gain: max 2.12 dBi<br>Type: <input type="checkbox"/> External (with accessible antenna socket)<br><input checked="" type="checkbox"/> Internal (integrated, PCB antenna)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                         |                         |
| Test standard:                                         | - e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247:<br>Operation within the bands 902-928 MHz, 2400-2483.5 MHz,<br>and 5725-5850 MHz<br><br>- RSS-247 issue 02 February 2017<br>Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                       |                         |                         |

**Channel List****2.4 GHz Band**

| Frequency Allocation for 802.11b/g/n                                        |                 |         |                 |
|-----------------------------------------------------------------------------|-----------------|---------|-----------------|
| Channel                                                                     | Frequency (MHz) | Channel | Frequency (MHz) |
| 1                                                                           | 2412            | 7       | 2442            |
| 2                                                                           | 2417            | 8       | 2447            |
| 3                                                                           | 2422            | 9       | 2452            |
| 4                                                                           | 2427            | 10      | 2457            |
| 5                                                                           | 2432            | 11      | 2462            |
| 6                                                                           | 2437            |         |                 |
| 20 MHz bandwidth systems, use Channel 1 – Channel 11 / TX Power setting: 19 |                 |         |                 |
| 40 MHz bandwidth systems, use Channel 3 – Channel 9 / TX Power setting: 19  |                 |         |                 |

The EUT has two antennas which can be used for transmitting and receiving simultaneously as 2TX and 2RX

The EUT can also operate as 5 GHz Wifi module, but not simultaneously to the 2.4 Ghz RF-function.

#### 4. Performed measurements and results

The complete list of measurements required in e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 is given below.

| Standard: | Standard:          | Test Method:                       |                                          | Test requirements:<br>applicable:<br>fulfilled: |                          |                                     |                          |
|-----------|--------------------|------------------------------------|------------------------------------------|-------------------------------------------------|--------------------------|-------------------------------------|--------------------------|
| § 15.207  | RSS-Gen<br>issue 5 | ANSI 63.10<br>Section 6.2          | AC Mains Conducted Emissions             | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| § 15.209  | RSS-Gen<br>issue 5 | ANSI 63.10<br>Section 6.3 -<br>6.6 | Radiated Emissions                       | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| §15.247   | RSS-247<br>issue 2 | ANSI 63.10<br>Section 11.8.1       | 6 dB DTS Bandwidth                       | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| §15.247   | RSS-247<br>issue 2 | ANSI 63.10<br>Section 11.9.2       | Output Power of Fundamental<br>Emissions | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| §15.247   | RSS-247<br>issue 2 | ANSI 63.10<br>Section<br>11.10.3   | Maximum Power Spectral<br>Density        | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| §15.247   | RSS-247<br>issue 2 | ANSI 63.10<br>Section<br>11.13.2   | Band Edges Measurement                   | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
|           | RSS-Gen<br>issue 5 | ANSI 63.10<br>Section 6.9.3        | 99% Power Bandwidth                      | <input checked="" type="checkbox"/>             | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

All required / applicable tests according to the following standards were performed under Ref-No. 20/01-0030.

- e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 with test Method according to ANSI C63.10-2013

-RSS-247 issue 02 February 2017 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

- e-CFR data is current as of February 06, 2020

**Remark: -/-**

## 5. AC Mains conducted emissions

### Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.207 Conducted limits  
-RSS-Gen issue 05 section 8.8

### Test site

Measurements of conducted emission from EUT was made in the shielded chamber (DC - 10GHz) located in the test facility.

### Test equipment and test set up

Test equipment used for conducted measurements on Mains as given in clause Test equipment of this report.

Test setup used for conducted measurements on Mains as given in clause Test setups of this report.

### Detector function selection and bandwidth

In conducted emissions measurement CISPR quasi-peak- and average-detector were used.  
The bandwidth of the detector of instrument is 10 kHz over the frequency range of 150 kHz to 30 MHz.

### Frequency range to be scanned

For conducted emission measurements, the spectrum in the range of 150 kHz to 30 MHz was investigated.

### Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under "Test conditions" in clause 3 above.

All modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below. The corresponding configuration is shown in the "Photo(s) of test setup".

The EUT was placed on a 80 cm high non metallic table. Measurements were performed on the AC terminals of the Host AC-Adaptor (Laptop), on neutral (N)- and live (L1)-wire had been performed.

### Requirements

| Frequency Range<br>[MHz]                                                 | Quasi-Peak Limits<br>[dB $\mu$ V] | Average Limits<br>[dB $\mu$ V] |
|--------------------------------------------------------------------------|-----------------------------------|--------------------------------|
| 0.15 - 0.5                                                               | 66 to 56 <small>Note 1</small>    | 56 to 46 <small>Note 1</small> |
| 0.5 - 5.0                                                                | 56                                | 46                             |
| 5.0 - 30.0                                                               | 60                                | 50                             |
| Note 1: The level decreases linearly with the logarithm of the frequency |                                   |                                |

### Measurement

Measurement performed on 08.04.2020

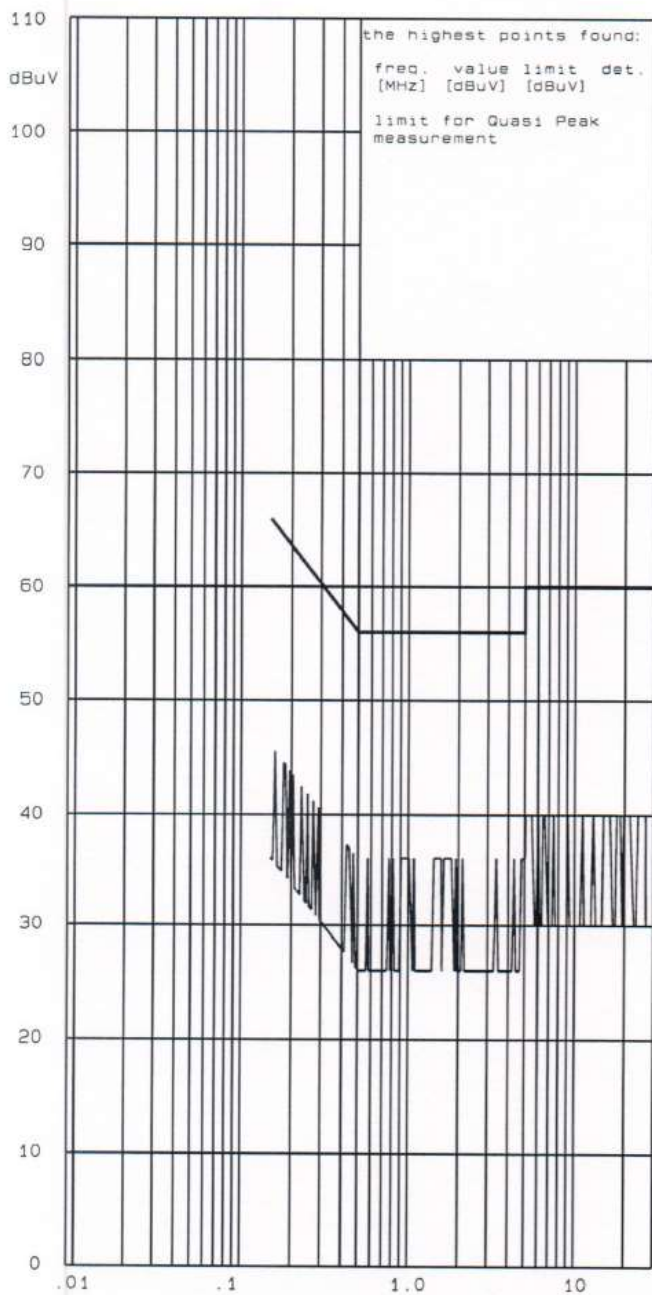
As worst cases the mode No. 3. with conditions as mentioned under "Test conditions" in clause 3 was found and documented in this report

# IT 1/2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RES-Gen

Cabin 1



Ref.-No.: 20/01-0030

Product: Trans.-/Rec.-System

Sample: 01

Date: 8 Apr 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Host PC

Operating mode:

WLAN CH.11 / CCK / 802.11 b

Power level: 19 / BW 20MHz

Tested on N

RFI suppression parts:

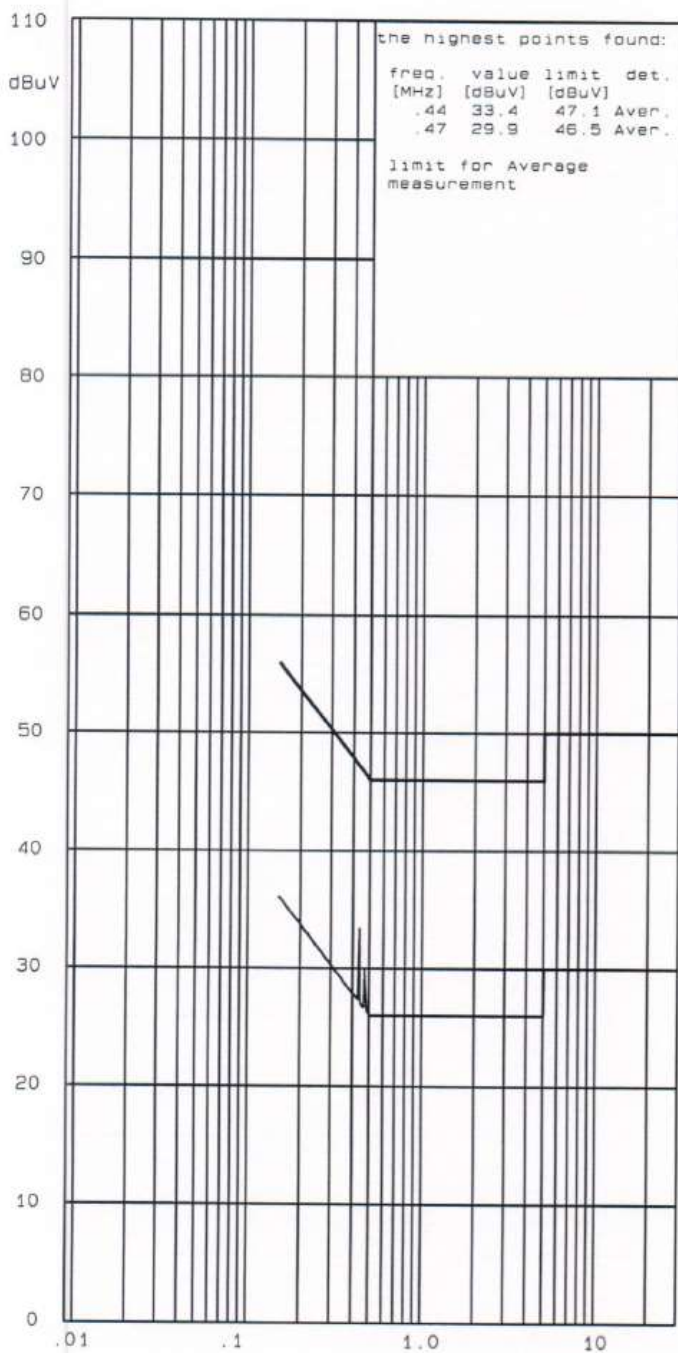
\* two dB safety margin for  
type approval recommended

Result: pass ☒ fail [ ]

STC Germany GmbH

# IT 1/2

Interference Voltage 150 KHz - 30 MHz  
acc. FCC 15.207 / RES-Gen  
Cabin 1



Ref.-No.: 20/01-0030

Product: Trans.-/Rec.-System

Sample: 01

Date: 8 Apr 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Host PC

Operating mode:

WLAN CH.11 / CCK / 802.11 b

Power level: 19 / BW 20MHz

Tested on N

RFI suppression parts:

\* two dB safety margin for  
type approval recommended

Result: pass ☒ fail [ ]

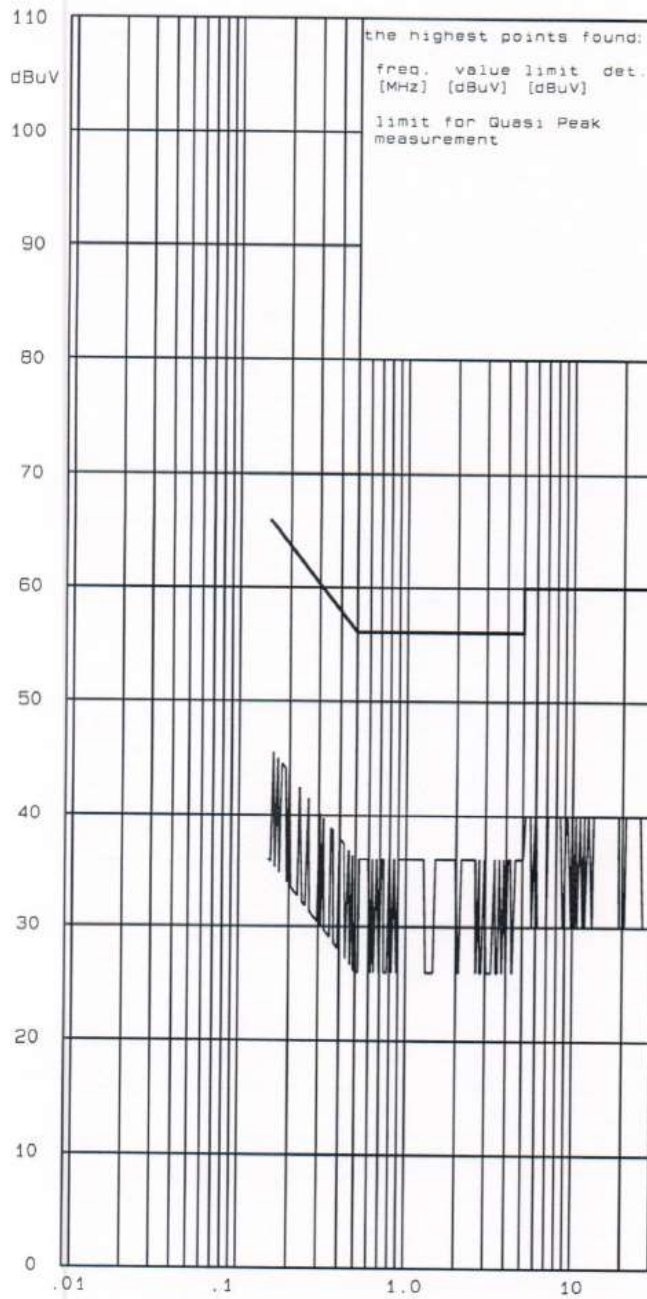
STC Germany GmbH

IT 1 / 2

Interference Voltage 150 KHz - 30 MHz

acc. FCC 15.207 / RES-Gen

Cabin 1



Ref.-No.: 20/01-0030

Product: Trans.-/Rec.-System

Sample: 01

Date: 8 Apr 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Host PC

Operating mode:

WLAN CH.11 / CCK / 802.11 b

Power level: 19 / BW 20MHz

Tested on L1

RFI suppression parts:

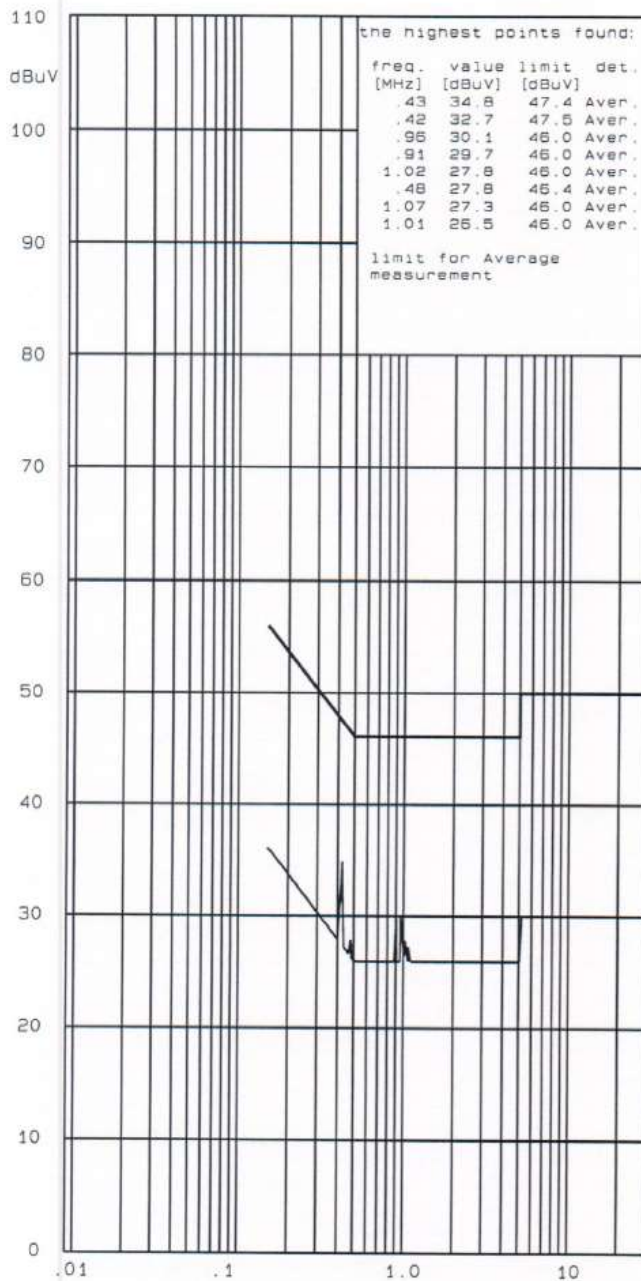
\* two dB safety margin for  
type approval recommended

Result: pass ☒ fail [ ]

STC Germany GmbH

# IT 1/2

Interference Voltage 150 KHz - 30 MHz  
acc. FCC 15.207 / RES-Gen  
Cabin 1



Ref.-No.: 20/01-0030

Product: Trans.-/Rec.-System

Sample: 01

Date: 8 Apr 2020

Operator: B1

Test equipment:

Rohde & Schwarz ESHS 30

Rohde & Schwarz ESH 2-Z5

Connected sets:

Host PC

Operating mode:

WLAN CH.11 / CCK / 802.11 b

Power level: 19 / BW 20MHz

Tested on L1

RFI suppression parts:

\* two dB safety margin for  
type approval recommended

Result: pass ☒ fail [ ]

STC Germany GmbH

The six highest emissions for each port (L/N)/detector are as following:

| Frequency [MHz] | Reading of test receiver [dBμV] | Detector | Port | loss of cable between LISN and test receiver [dB] | LISN correction [dB] | AC power line conducted emission [dBμV] | Limit [dBμV] | Result |
|-----------------|---------------------------------|----------|------|---------------------------------------------------|----------------------|-----------------------------------------|--------------|--------|
| (1)             | (2)                             | (3)      | (4)  | (5)                                               | (6)                  | (7)                                     | (8)          | (9)    |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| 0.44            | 33.2                            | AV       | N    | 0.10                                              | 0.10                 | 33.4                                    | 47.1         | Pass   |
| 0.47            | 29.7                            | AV       | N    | 0.10                                              | 0.10                 | 29.9                                    | 46.5         | Pass   |
| -/-             | -/-                             | AV       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | AV       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | AV       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | AV       | N    | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| -/-             | -/-                             | QP       | L1   | 0.10                                              | 0.10                 | -/-                                     | -/-          | Pass   |
| 0.43            | 34.6                            | AV       | L1   | 0.10                                              | 0.10                 | 34.8                                    | 47.4         | Pass   |
| 0.42            | 32.5                            | AV       | L1   | 0.10                                              | 0.10                 | 32.7                                    | 47.5         | Pass   |
| 0.91            | 29.9                            | AV       | L1   | 0.10                                              | 0.10                 | 30.1                                    | 46.0         | Pass   |
| 1.02            | 29.5                            | AV       | L1   | 0.10                                              | 0.10                 | 29.7                                    | 46.0         | Pass   |
| 0.48            | 27.6                            | AV       | L1   | 0.10                                              | 0.10                 | 27.8                                    | 46.4         | Pass   |
| 1.07            | 27.6                            | AV       | L1   | 0.10                                              | 0.10                 | 27.8                                    | 46.0         | Pass   |

- (1) = test frequency
- (2) = Reading of test receiver in dBμV without correction factors
- (3) = used detector
- (4) = tested port Phase (live, L1) or Neutral (N)
- (5) = loss of cable between LISN and test receiver in dB
- (6) = correction factor of LISN in dB
- (7) = Reading of test receiver [dBμV] (2) + loss of cable between Line impedance stabilisation network (LISN) and test receiver (dB) (5) + LISN correction [dB] (6)
- (8) = relevant limit in dBμV
- (9) = comparison between Limit [dBμV] (7) / (8) and AC power line conducted emission [dBμV]

## Result 0.15 MHz – 30 MHz

All emissions in the frequency range 0.15 MHz – 30 MHz are at least 20 dB below the relevant limit.

## Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Conducted Emission**.

## 6. Radiated emission measurements

### Test site

Measurement of radiated emissions from EUT was made in the semi-anechoic chamber SAC3 (DC to 40 GHz) located in the test facility.

### Test equipment and test set up

Test equipment used for radiated measurements as given in clause Test equipment of this report.  
Test setup used for radiated measurements as given in clause Test setups of this report.

### Detector function selection and bandwidth

In radiated emissions measurement, an EMI test receiver that have CISPR detectors was used.

| Frequency range                                 | Resolution Bandwidth |
|-------------------------------------------------|----------------------|
| 9KHz – 150kHz (Quasi Peak & Average* Detector)  | 200Hz                |
| 150KHz – 30MHz (Quasi Peak & Average* Detector) | 9kHz                 |
| 30MHz – 1GHz (Quasi Peak Detector)              | 120kHz               |
| Above 1GHz (Peak & Average Detector)            | 1MHz                 |

\*Average Detector only in specify frequency range.

### Antennas

Measurements were made using a calibrated loop antenna in the range 9 kHz – 30 MHz, as well as a calibrated bilog antenna in the range of 30 to 1000 MHz to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the EUT was 3 meters.

In the range of 1 GHz to 26 GHz measurements were made using a calibrated horn antenna to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization. The horizontal distance between the receiving antenna and the EUT was 3 meters.

### Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 9kHz MHz to 40 GHz was investigated as the highest frequency generated in the EUT is 5.7 GHz.

### Test conditions and configuration of EUT

The EUT was configured and operated with conditions as mentioned under “Test conditions” in clause 3 above.

During test the EUT was operated as specified in the user manual of the EUT. For frequencies below 1000 MHz the EUT was placed on a 80 cm and for frequencies above 1000 MHz the RF Transmitter modul was placed on a 150 cm high non metallic table placed on the turntable. The EUT was rotated and the antenna height was varied between 1 m to 4 m to find the maximum RF energy generated from EUT. The procedure according to ANSI C63.10:2013 is used and all modes are investigated by operating the EUT in a range of typical modes of operation, with typical cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation, cable manipulation are performed within the range of likely configurations. The highest values measured are shown in the table below.

As worst cases the mode No. 3 and 4 with conditions as mentioned under “Test conditions” in clause 3 were found and documented in this report

### Remarks:

-Correction factor included antenna factor and cable attenuation.

-In the frequency range 1 GHz – 7 GHz the Band Reject Filter 2,4 GHz (ID11243) was used to attenuate the fundamental emission.

### Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits  
 -RSS-Gen issue 05 section 8.9

### Requirements:

acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits

| Frequency MHz | Limits<br>[μV/m]<br>Quasi-peak | Limits<br>[dBμV/m]<br>Quasi-peak | Limits<br>[μV/m]<br>Average | Limits<br>[dBμV/m]<br>Average | Test distance<br>[m] |
|---------------|--------------------------------|----------------------------------|-----------------------------|-------------------------------|----------------------|
| 0.009 – 0.090 | -/-                            | -/-                              | 2400/F (kHz)                | 48.5 – 28.5                   | 300                  |
| 0.090 - 0.110 | 2400/F (kHz)                   | 28.5 – 26.8                      | -/-                         | -/-                           | 300                  |
| 0.110 – 0.490 | -/-                            | -/-                              | 2400/F (kHz)                | 26.8 – 13.8                   | 300                  |
| 0.490 - 1.705 | 24000/F (kHz)                  | 33.8 – 23.0                      | -/-                         | -/-                           | 30                   |
| 1.705 - 30.0  | 30                             | 29.5                             | -/-                         | -/-                           | 30                   |

acc. RSS-Gen issue 05 section 8.9

| Frequency MHz | Limits<br>[μA/m]<br>Quasi-peak | Limits<br>[dBμA/m]<br>Quasi-peak | Limits<br>[μA/m]<br>Average | Limits<br>[dBμA/m]<br>Average | Test distance<br>[m] |
|---------------|--------------------------------|----------------------------------|-----------------------------|-------------------------------|----------------------|
| 0.009 – 0.090 | -/-                            | -/-                              | 6.37/F (kHz)                | -3 – -23.0                    | 300                  |
| 0.090 - 0.110 | 6.37/F (kHz)                   | -23.0 – -24.7                    | -/-                         | -/-                           | 300                  |
| 0.110 – 0.490 | -/-                            | -/-                              | 6.37/F (kHz)                | -24.7 – -37.7                 | 300                  |
| 0.490 - 1.705 | 63.7/F (kHz)                   | -17.7 – -28.5                    | -/-                         | -/-                           | 30                   |
| 1.705 - 30.0  | 0.08                           | -22                              | -/-                         | -/-                           | 30                   |

acc. e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C, § 15.209 Radiated emission limits  
 and RSS-Gen issue 05 section 8.9

| Frequency MHz | Limits<br>[μV/m]<br>Quasi-peak | Limits<br>[dBμV/m]<br>Quasi-peak | Limits<br>[μV/m]<br>Average | Limits<br>[dBμV/m]<br>Average | Test distance<br>[m] |
|---------------|--------------------------------|----------------------------------|-----------------------------|-------------------------------|----------------------|
| 30 - 88       | 100                            | 40                               | -/-                         | -/-                           | 3                    |
| 88 - 216      | 150                            | 43.5                             | -/-                         | -/-                           | 3                    |
| 216 - 960     | 200                            | 46                               | -/-                         | -/-                           | 3                    |
| 960 - 1000    | 500                            | 54                               | -/-                         | -/-                           | 3                    |
| Above 1000    | -/-                            | -/-                              | 500                         | 54                            | 3                    |

### Measurements

The Measurement was performed on: 07.04.2020

### Result 9 kHz – 30 MHz

In the frequency range 9 kHz – 30 MHz the EUT had been scanned in a distance of 3 m and the Limit were corrected to the test distance of 3 m using a factor with 40 dB/decade acc. to § 15.31 (f)(2).

**All emissions in the frequency range 9 kHz – 30 MHz are at least 20 dB below the relevant limit.**



The six highest emissions for each polarization (H/V) in the frequency range 30 MHz – 1000 MHz are as following:

| Frequency [MHz] | Detector | Antenna polarization | Radiated emission [dBμV/m] | Radiated emission [μV/m] | Limit [dBμV/m] (3 m) | Limit [μV/m] (3 m) | Result |
|-----------------|----------|----------------------|----------------------------|--------------------------|----------------------|--------------------|--------|
| (1)             | (2)      | (3)                  | (4)                        | (5)                      | (6)                  | (7)                | (8)    |
| 941.92          | QP       | V                    | 35.21                      | 57.61                    | 46.00                | 200                | Pass   |
| 949.00          | QP       | V                    | 35.14                      | 57.15                    | 46.00                | 200                | Pass   |
| 916.96          | QP       | V                    | 34.99                      | 56.17                    | 46.00                | 200                | Pass   |
| 906.16          | QP       | V                    | 34.84                      | 55.21                    | 46.00                | 200                | Pass   |
| 889.24          | QP       | V                    | 34.61                      | 53.77                    | 46.00                | 200                | Pass   |
| -/-             | QP       | V                    | -/-                        | -/-                      | -/-                  | -/-                | -/-    |
| 954.72          | QP       | H                    | 35.31                      | 58.28                    | 46.00                | 200                | Pass   |
| 946.84          | QP       | H                    | 35.17                      | 57.35                    | 46.00                | 200                | Pass   |
| 921.76          | QP       | H                    | 35.05                      | 56.56                    | 46.00                | 200                | Pass   |
| 912.88          | QP       | H                    | 34.94                      | 55.85                    | 46.00                | 200                | Pass   |
| 882.00          | QP       | H                    | 34.68                      | 54.20                    | 46.00                | 200                | Pass   |
| -/-             | QP       | H                    | -/-                        | -/-                      | -/-                  | -/-                | -/-    |

- (1) = test frequency
- (2) = used detector - quasi peak (QP), peak, average (AV)
- (3) = polarization of the test antenna (Horizontal/Vertical)
- (4) = Reading of test receiver [dBμV] + correction factor
- (5) =  $10^{((\text{Radiated emission [dBμV/m]} (5))/20)}$
- (6) = relevant limit in dBμV/m
- (7) = relevant limit in μV/m
- (8) = comparison between Limit [dBμV/m] (6) and Radiated emission [dBμV/m] (4)

Result 1 GHz – 7 GHz

Mode No.: 3 with 802.11b 20MHz

TESTED  
IN GERMANY

IT 5/6  
Interference radiation  
acc. to FCC § 15.209 / RSS-Gen

STC

Ref.-No.: 20/01-0030

Product: Transmitting/Receiving System

Sample: 01

Date: 07.04.2020

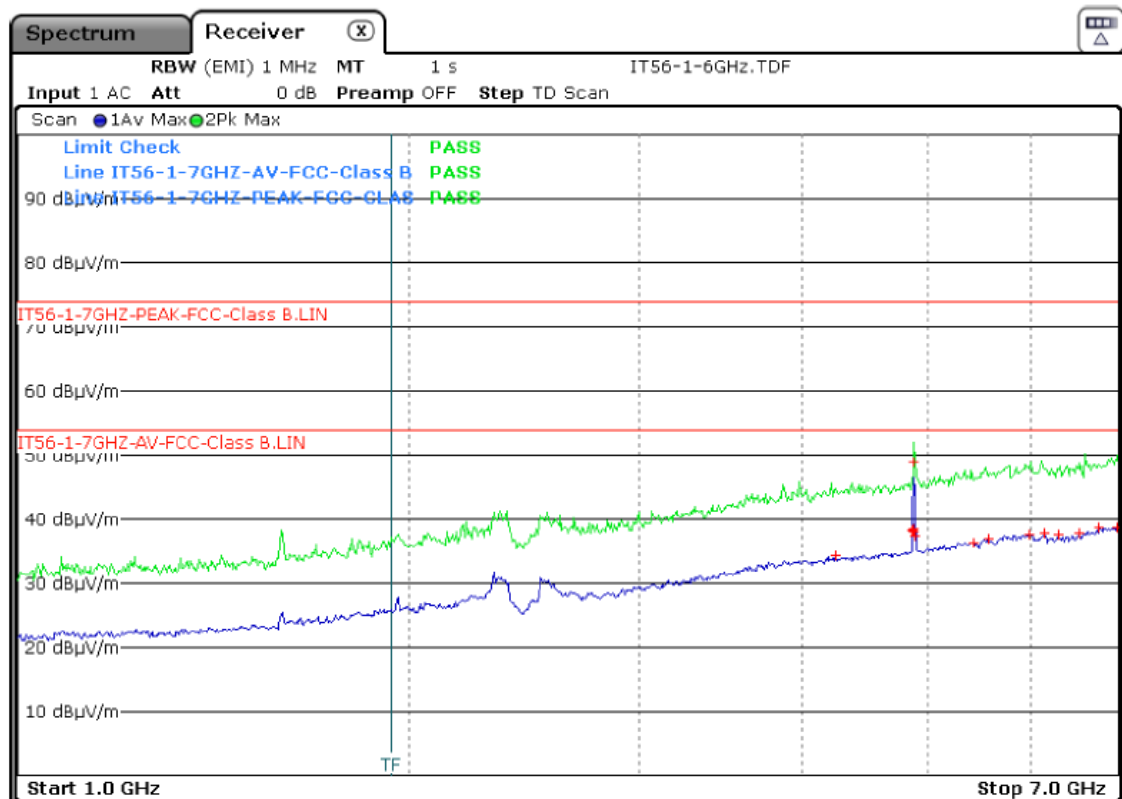
Operator: BI

pass fail

Remarks: Both ANT. ON; Band Stop Filter (2.4GHz / 11244) used

Result: ☒ ☐

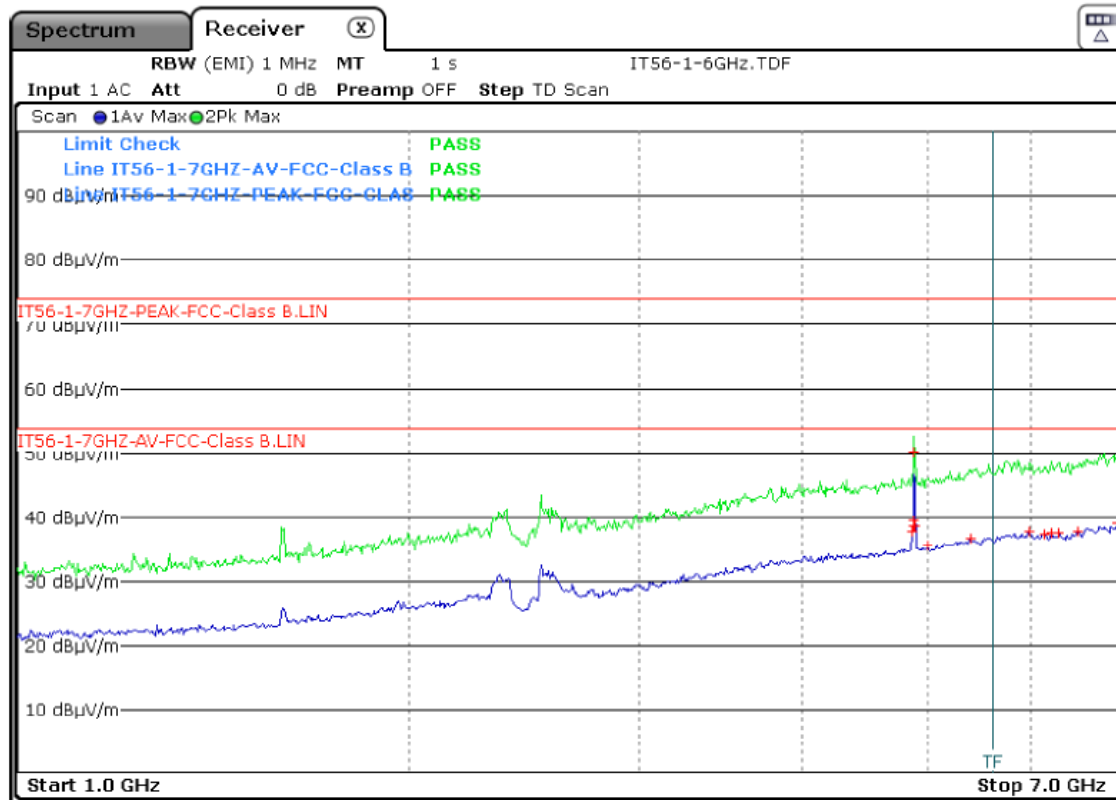
Operation mode: WLAN CH.11; BW = 20MHz; CCK; 802.11b; Power level 19



| Polarisation: V  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 4,8740           | 48,82          | -5,18                | 54,00          | pass   | 1 - 7         | -/-            | >20                  | 74,00          | pass   |
| 6,9880           | 38,80          | -15,20               | 54,00          | pass   |               |                |                      |                |        |
| 6,7708           | 38,63          | -15,37               | 54,00          | pass   |               |                |                      |                |        |
| 4,8770           | 38,56          | -15,44               | 54,00          | pass   |               |                |                      |                |        |
| 4,8660           | 38,17          | -15,83               | 54,00          | pass   |               |                |                      |                |        |
| 4,8710           | 37,96          | -16,04               | 54,00          | pass   |               |                |                      |                |        |

Ref.-No.: 20/01-0030

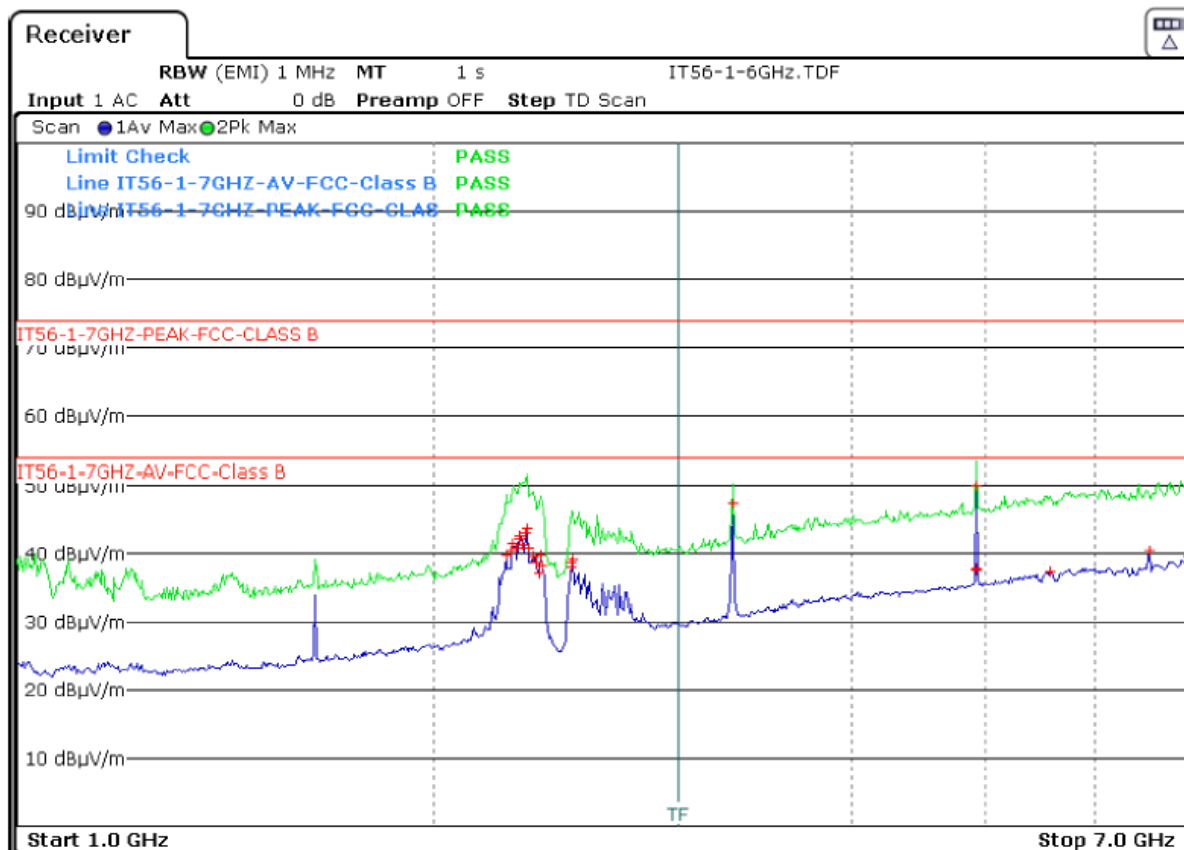
Operation mode: WLAN CH.11; BW = 20MHz; CCK; 802.11b; Power level 19



| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]  | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 4,8740           | 50,24          | -3,76                | 54,00          | pass   | 1 - 7         | -/-            | >20                  | 74,00          | pass   |
| 4,8710           | 39,65          | -14,35               | 54,00          | pass   |               |                |                      |                |        |
| 6,9913           | 39,11          | -14,89               | 54,00          | pass   |               |                |                      |                |        |
| 4,8820           | 38,66          | -15,34               | 54,00          | pass   |               |                |                      |                |        |
| 4,8770           | 38,64          | -15,36               | 54,00          | pass   |               |                |                      |                |        |
| 4,8660           | 37,84          | -16,16               | 54,00          | pass   |               |                |                      |                |        |

Ref.-No.: 18/11-0061

Operation mode: Tx 2.4GHz (802.11b 20MHz/CH11 – 2462MHz); BPF 2,4GHz (ID11243) used



| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]  | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 4,9240           | 49,95          | -4,05                | 54,00          | pass   | 1 - 7         | -/-            | >20                  | 74             | pass   |
| 3,2828           | 47,45          | -6,55                | 54,00          | pass   |               |                |                      |                |        |
| 2,3340           | 43,64          | -10,36               | 54,00          | pass   |               |                |                      |                |        |
| 2,3305           | 43,07          | -10,93               | 54,00          | pass   |               |                |                      |                |        |
| 2,3075           | 42,53          | -11,47               | 54,00          | pass   |               |                |                      |                |        |
| 2,3050           | 42,19          | -11,81               | 54,00          | pass   |               |                |                      |                |        |

## Result 7GHz – 40GHz

All emissions in the frequency range 7 GHz – 40 GHz are at least 20 dB below the relevant limit

## Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Radiated Emissions**.

## **7. Operation within the band 902-928 MHz, 2400-2483,5 MHz and 5725-5850 MHz**

### **Applied standards**

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247  
-RSS-247 issue 2

### **7.1. 6 dB DTS Bandwidth Measurement**

#### **Applied standards**

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (a) (2)  
-RSS-247 issue 2 Section 5.2 (a)

#### **Limit**

The minimum 6 dB bandwidth shall be at least 500 kHz.

#### **Test equipment and test set up**

Test equipment used for conducted measurements as given in clause Test equipment of this report.  
Test setup used for conducted measurements as given in clause Test setups of this report.

#### **Description**

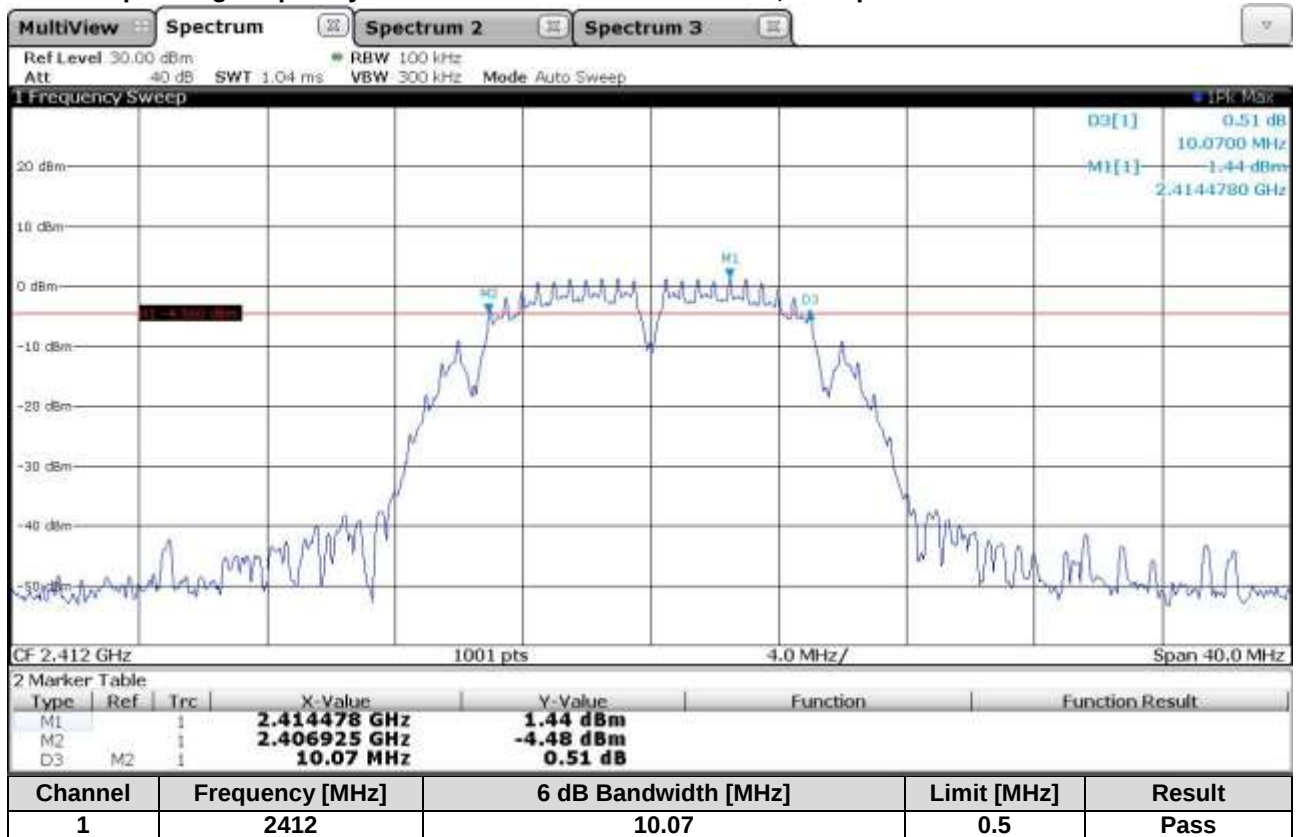
Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### **Measurement**

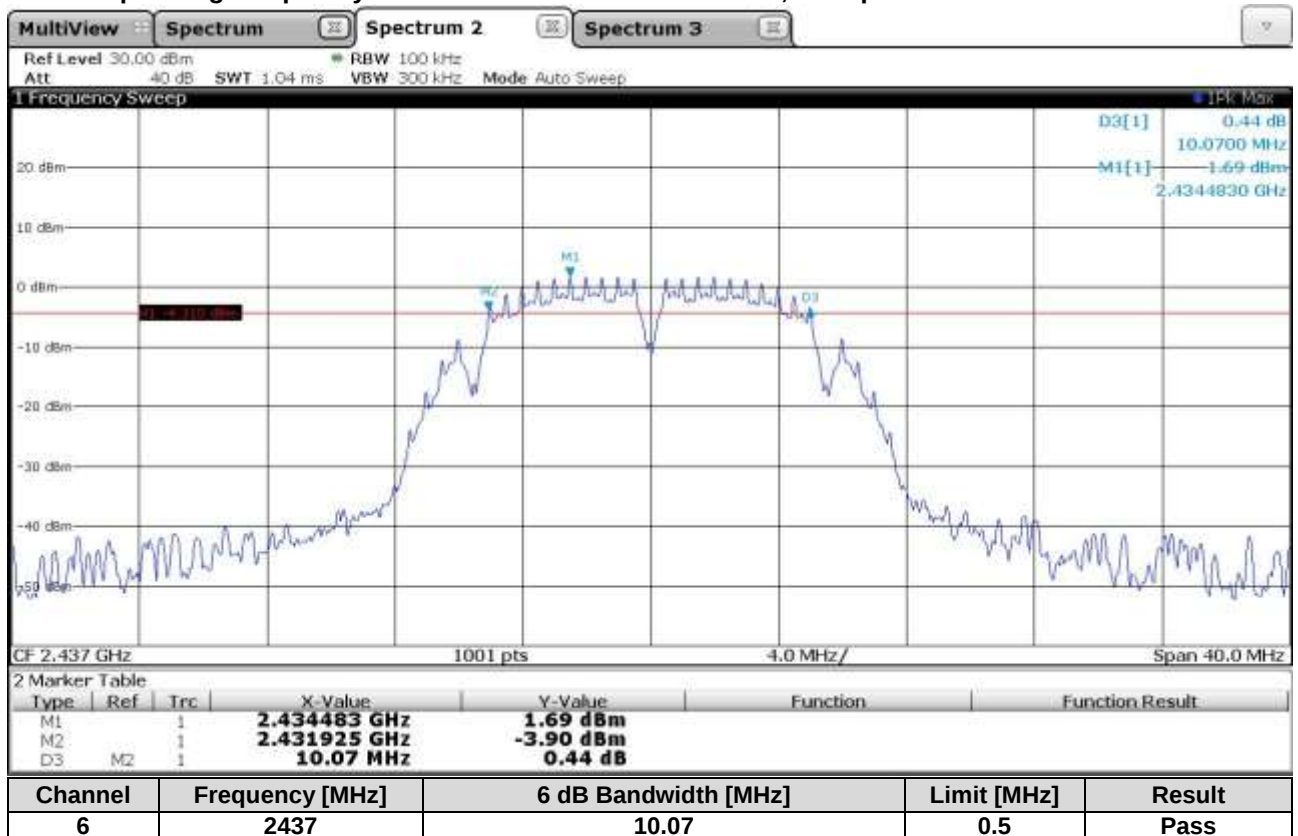
The Measurement was performed on: 01.04.2020 and 02.04.2020

#### **Conducted measurement data**

Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



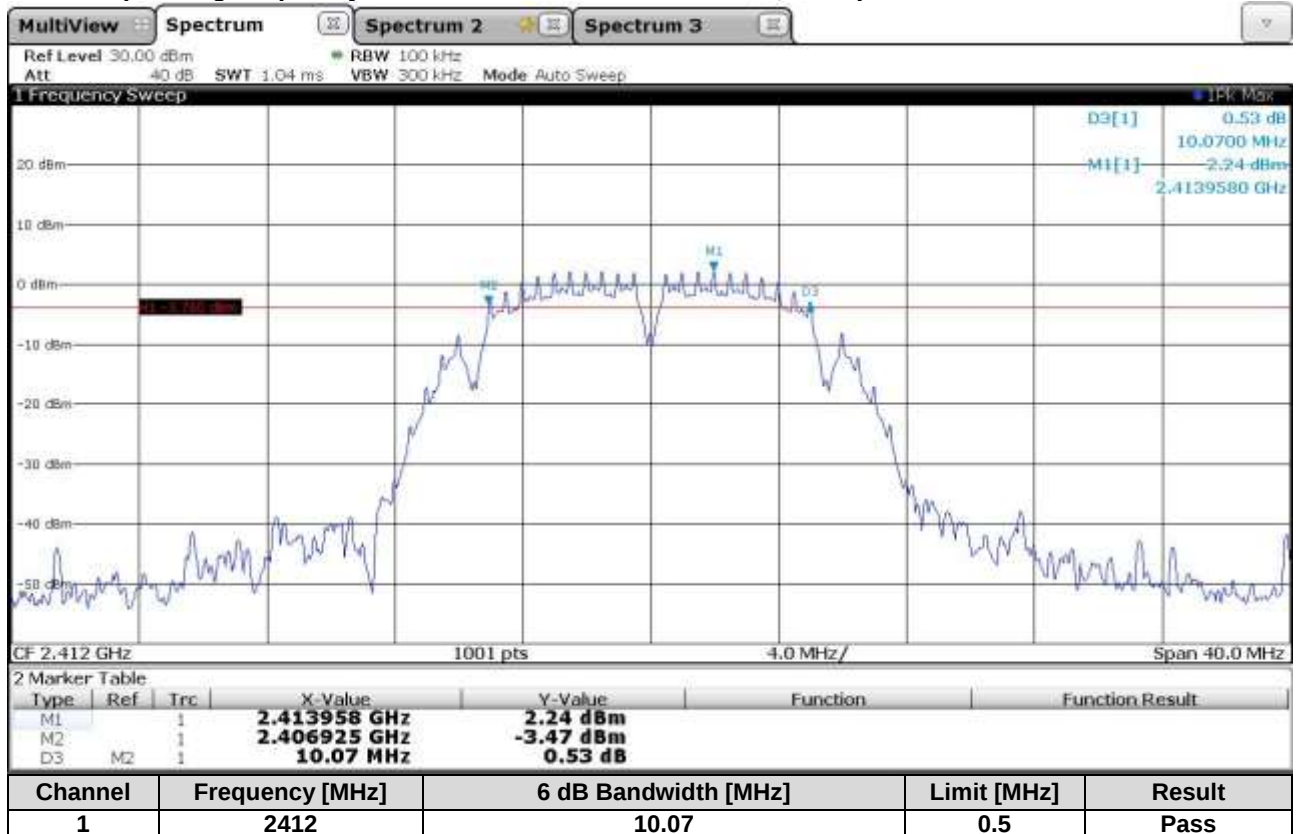
Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



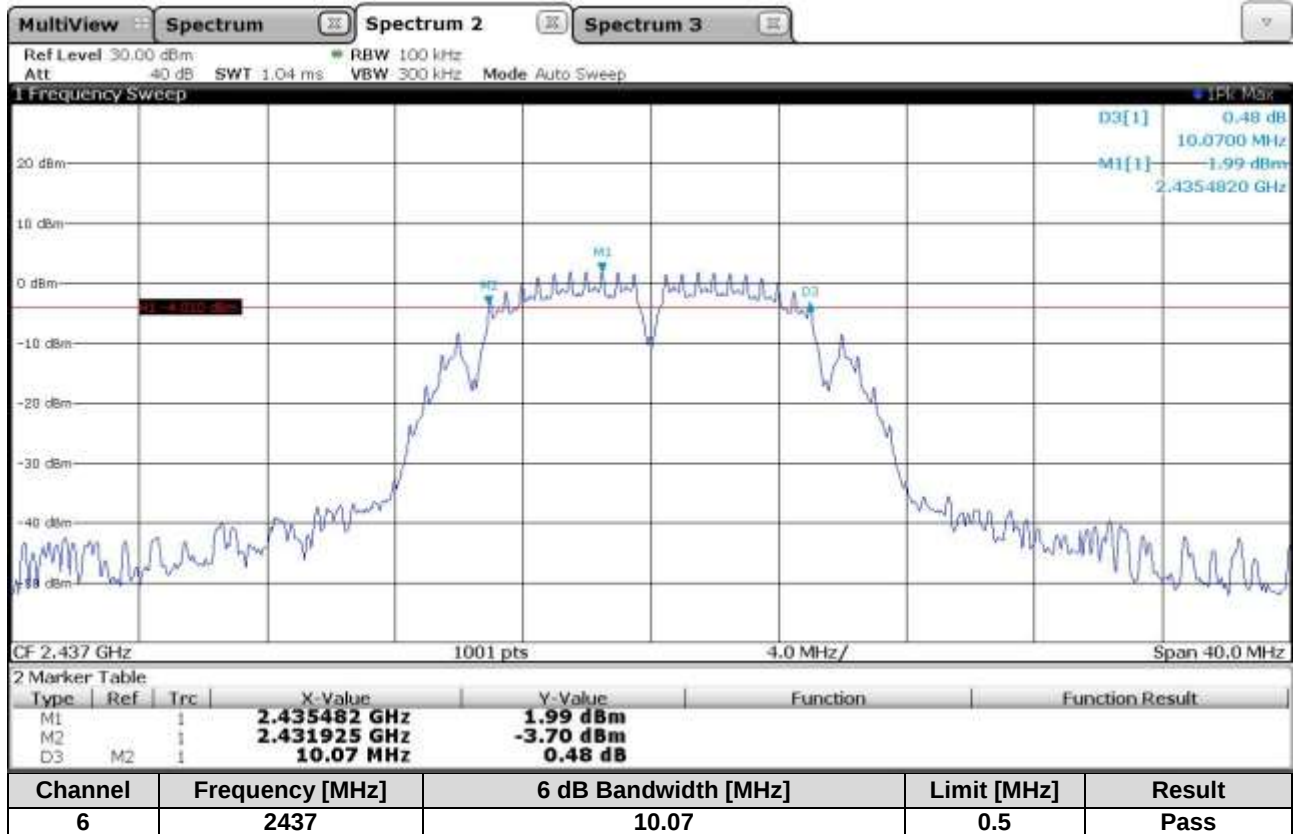
### Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



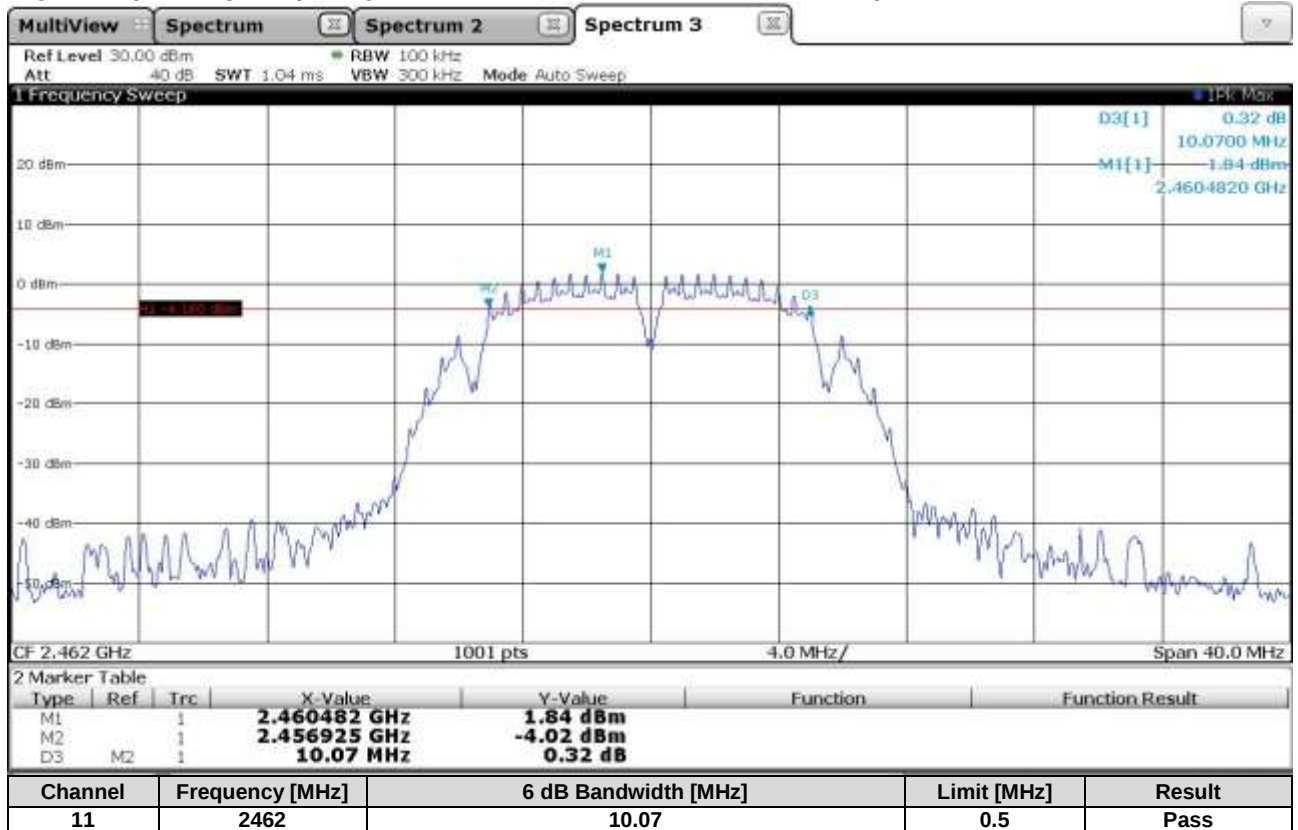
### Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



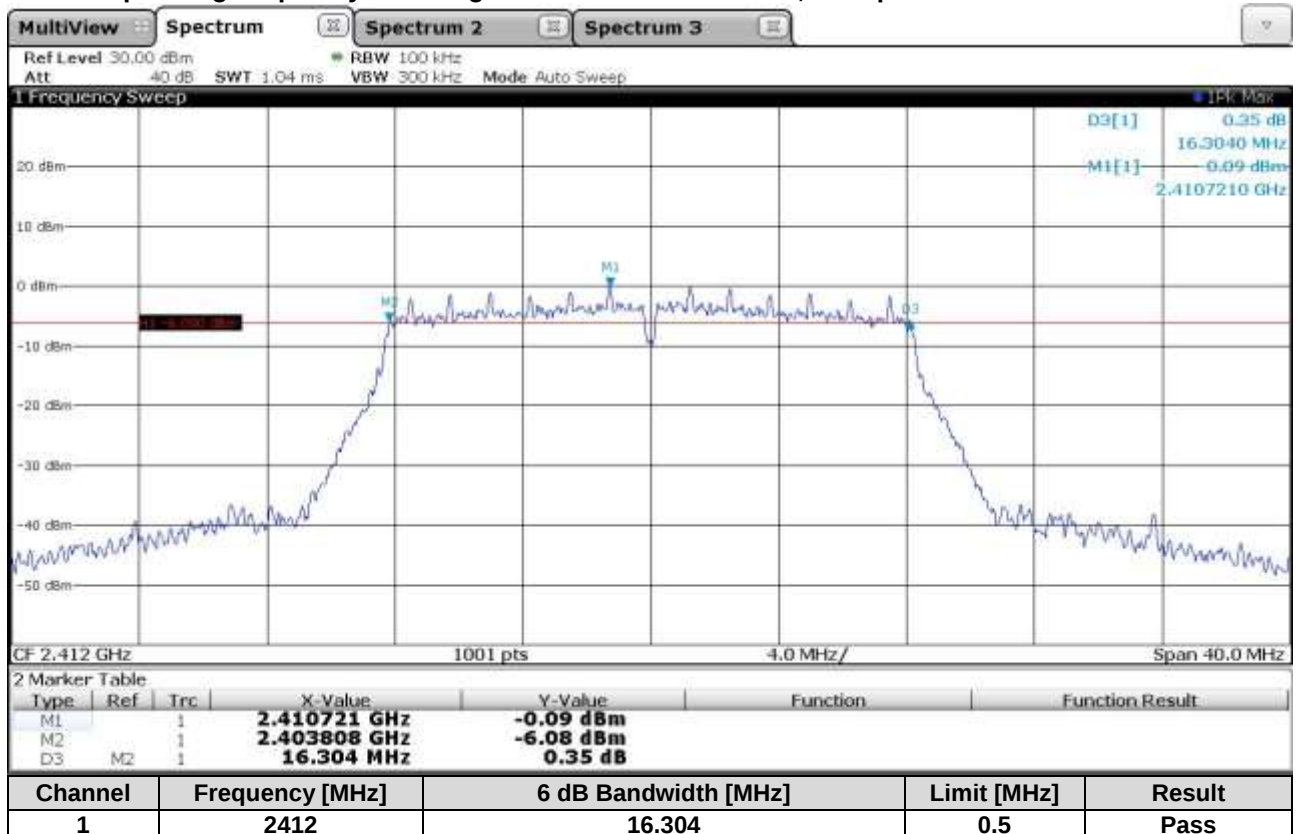
**Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**



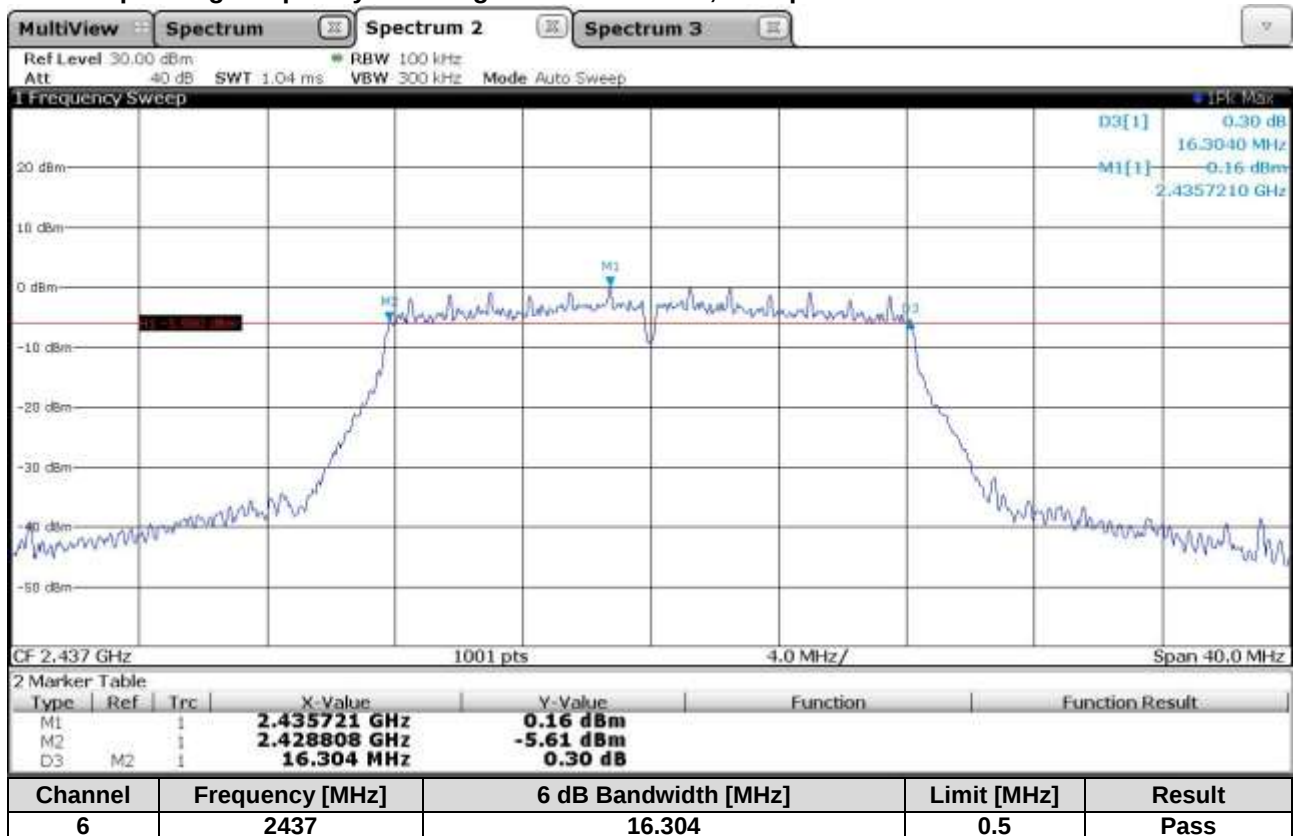
**Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**



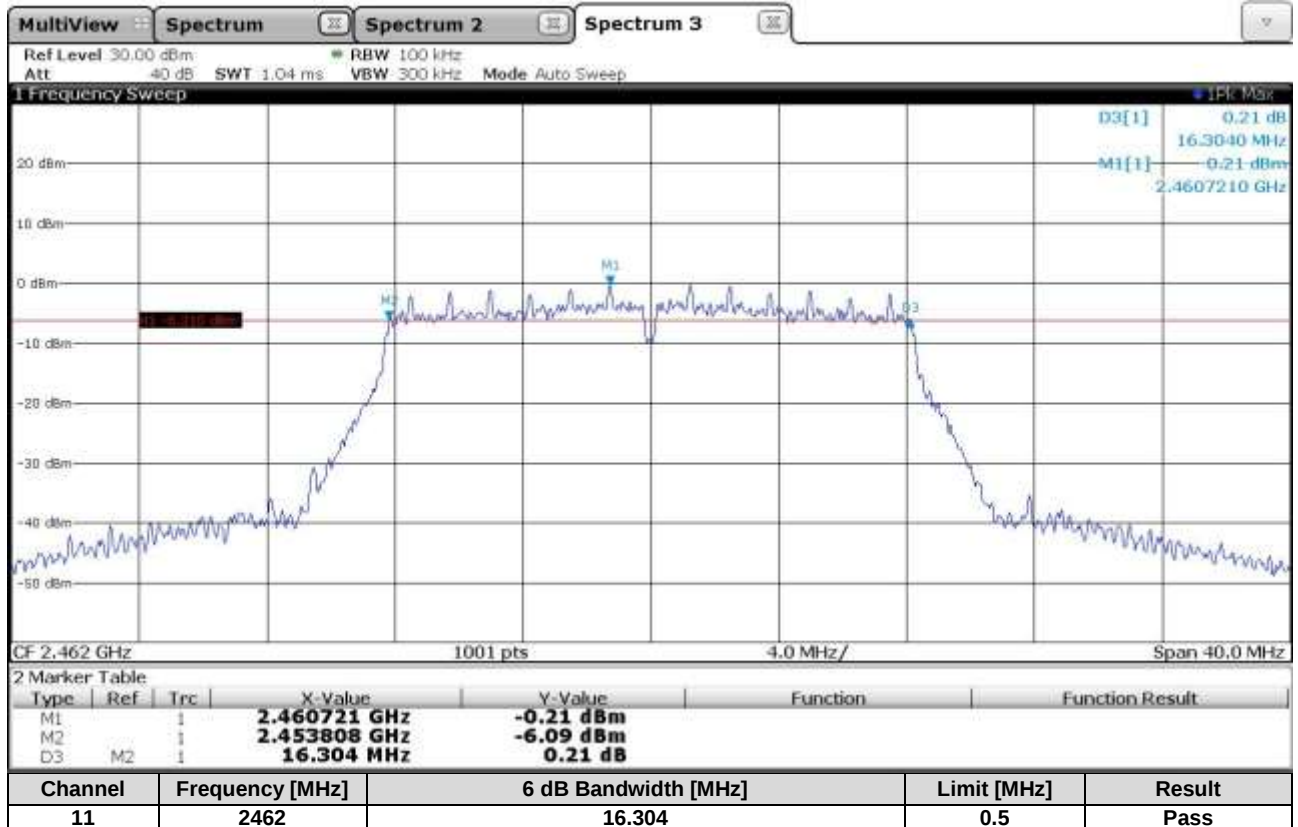
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



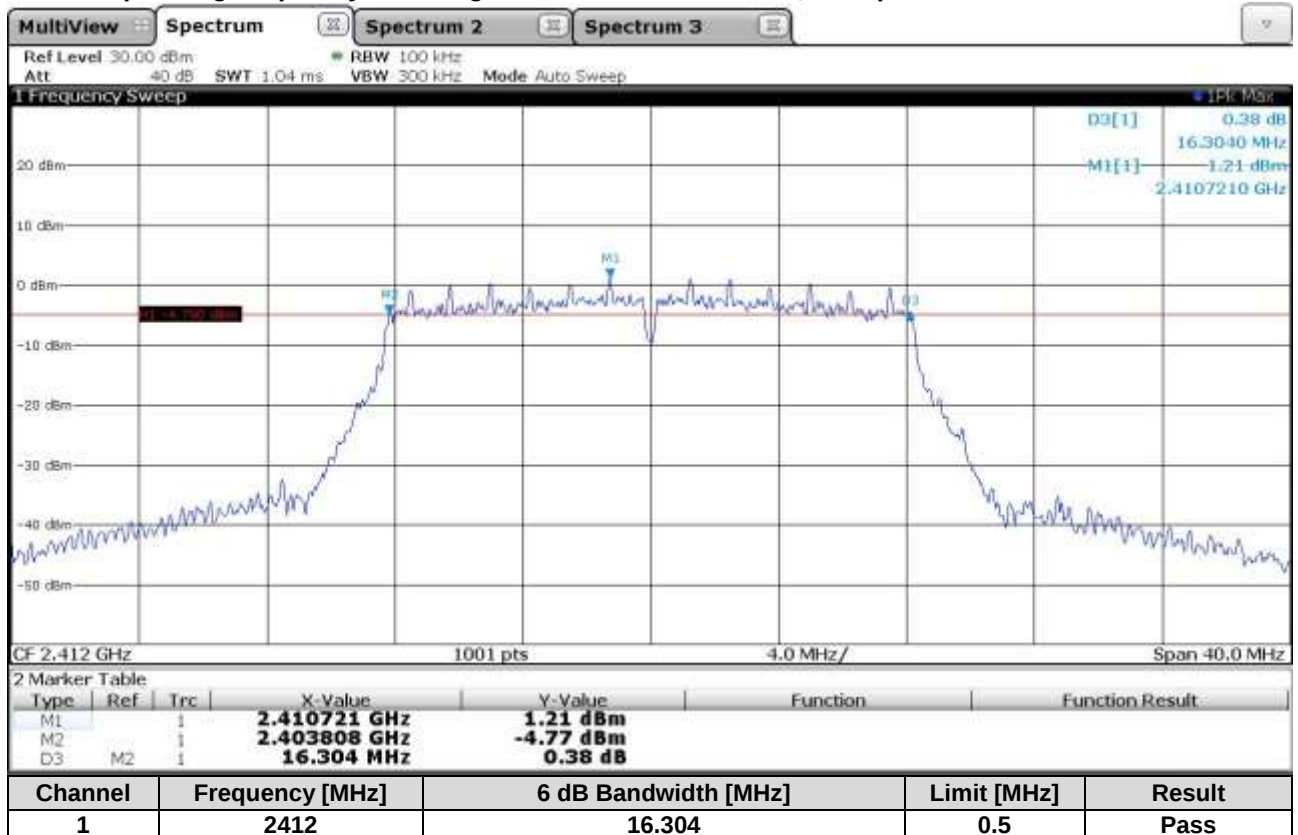
Middle Operating Frequency - 802.11g / OFDM – MCS=0; 6 MBps / Antenna 1



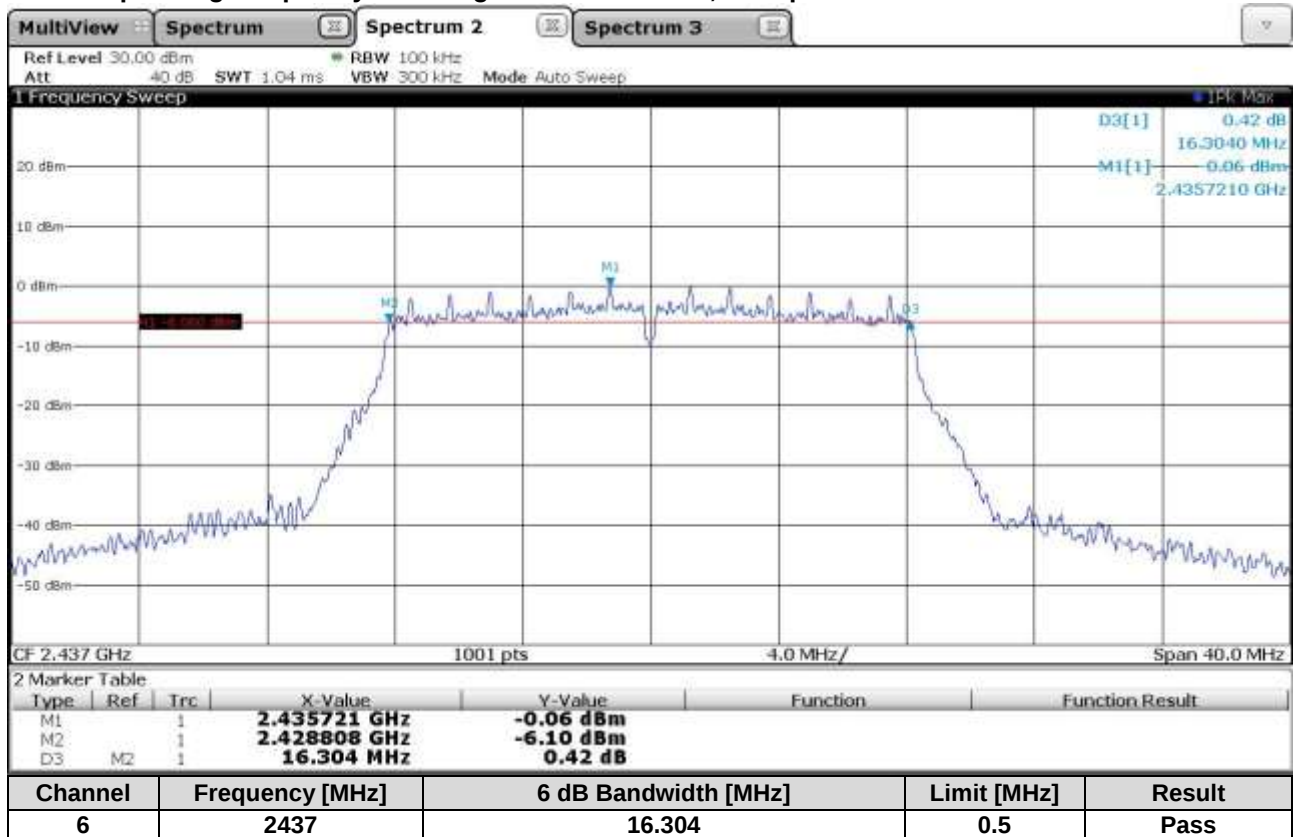
### Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



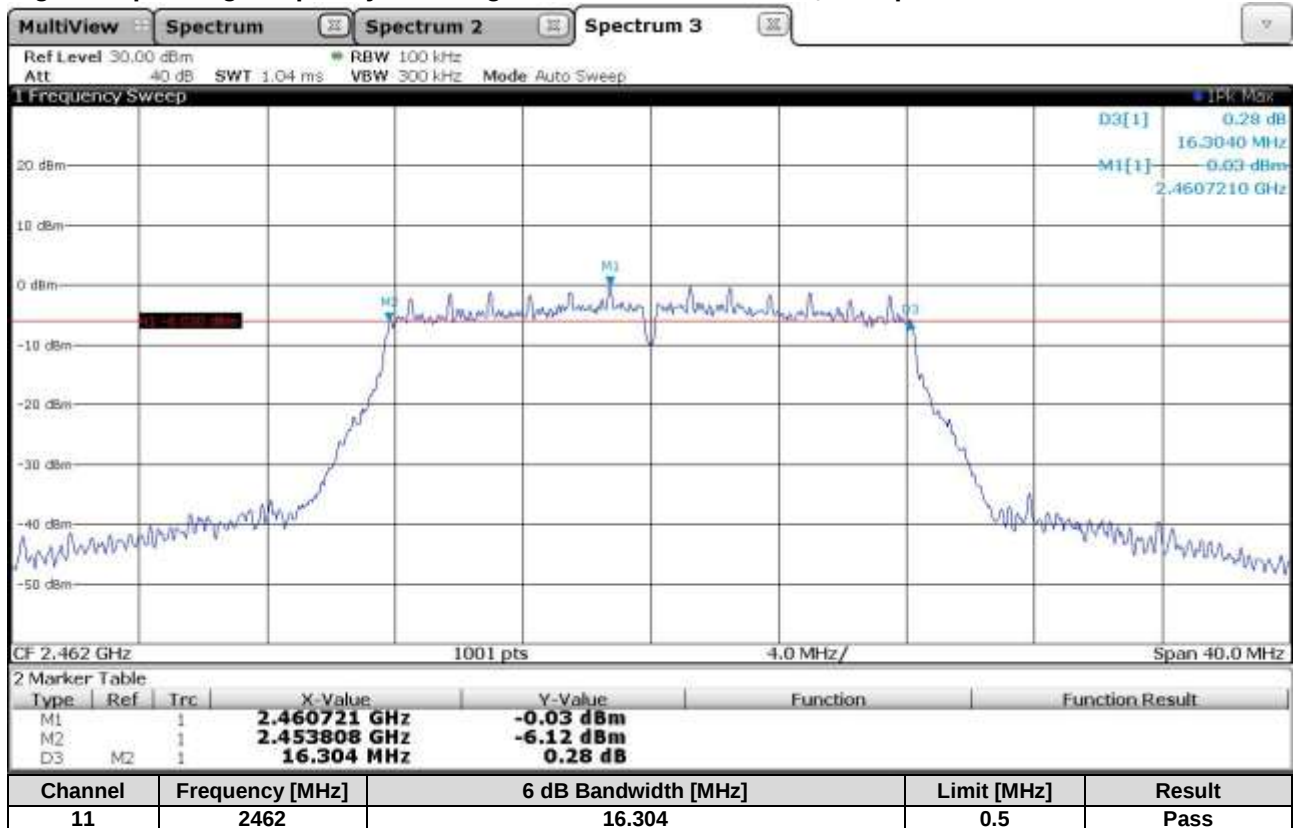
### Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



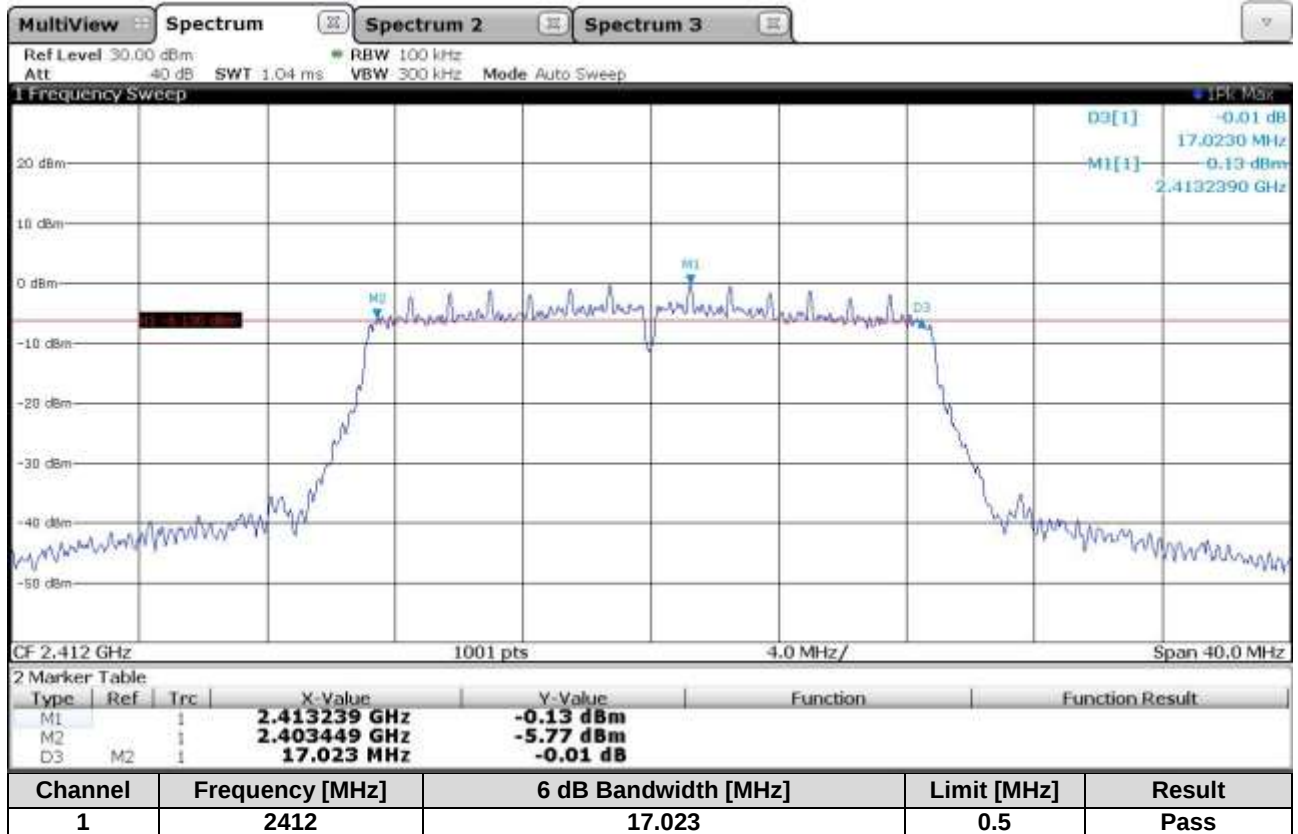
**Middle Operating Frequency - 802.11g / OFDM – MCS=0; 6 MBps / Antenna 2**



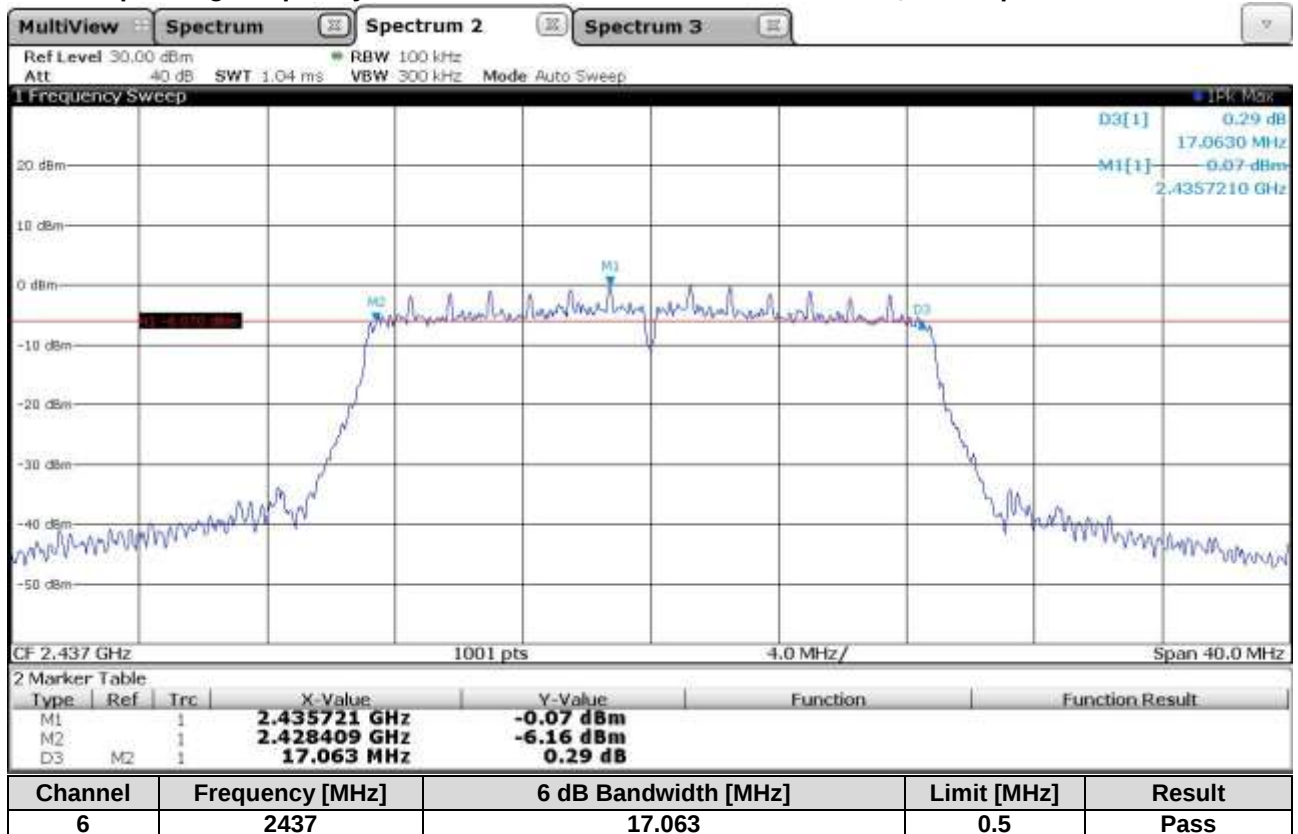
**Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2**



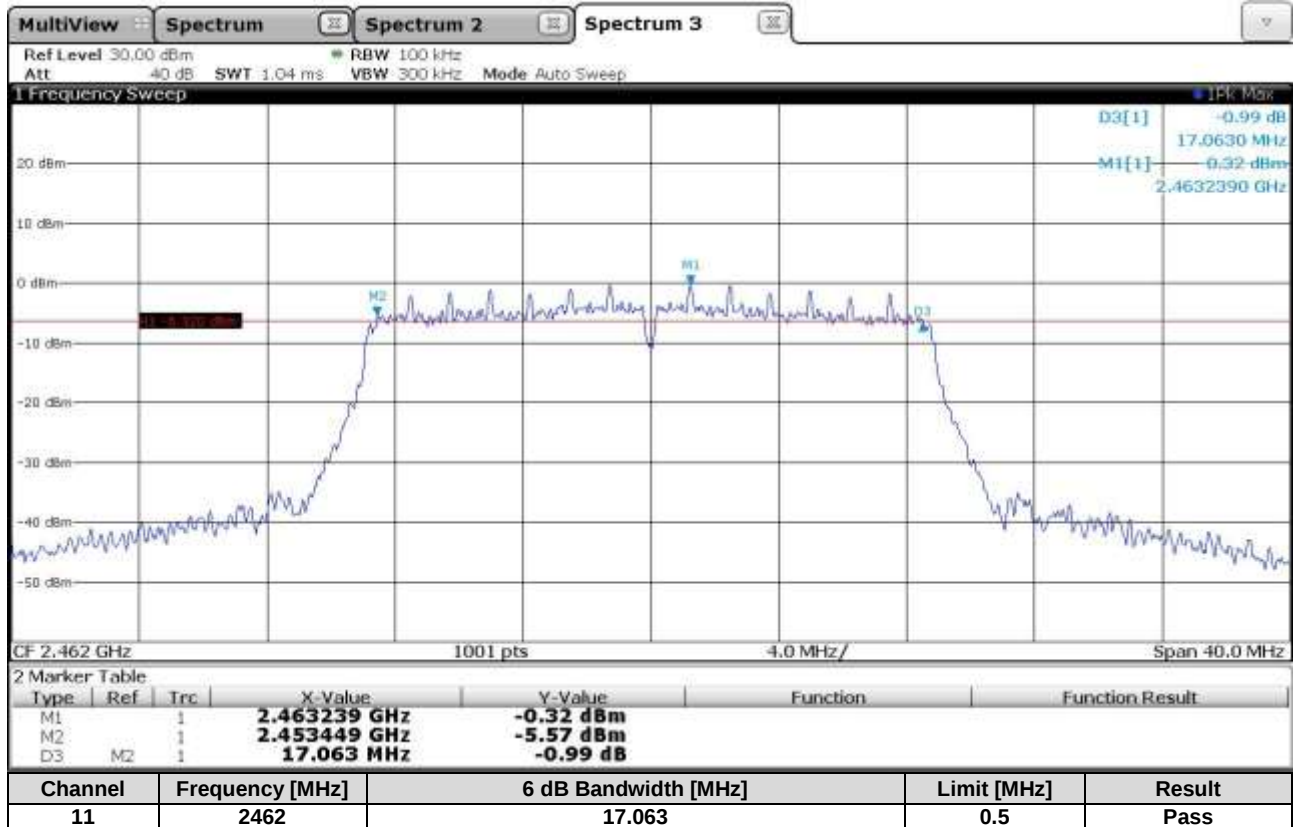
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



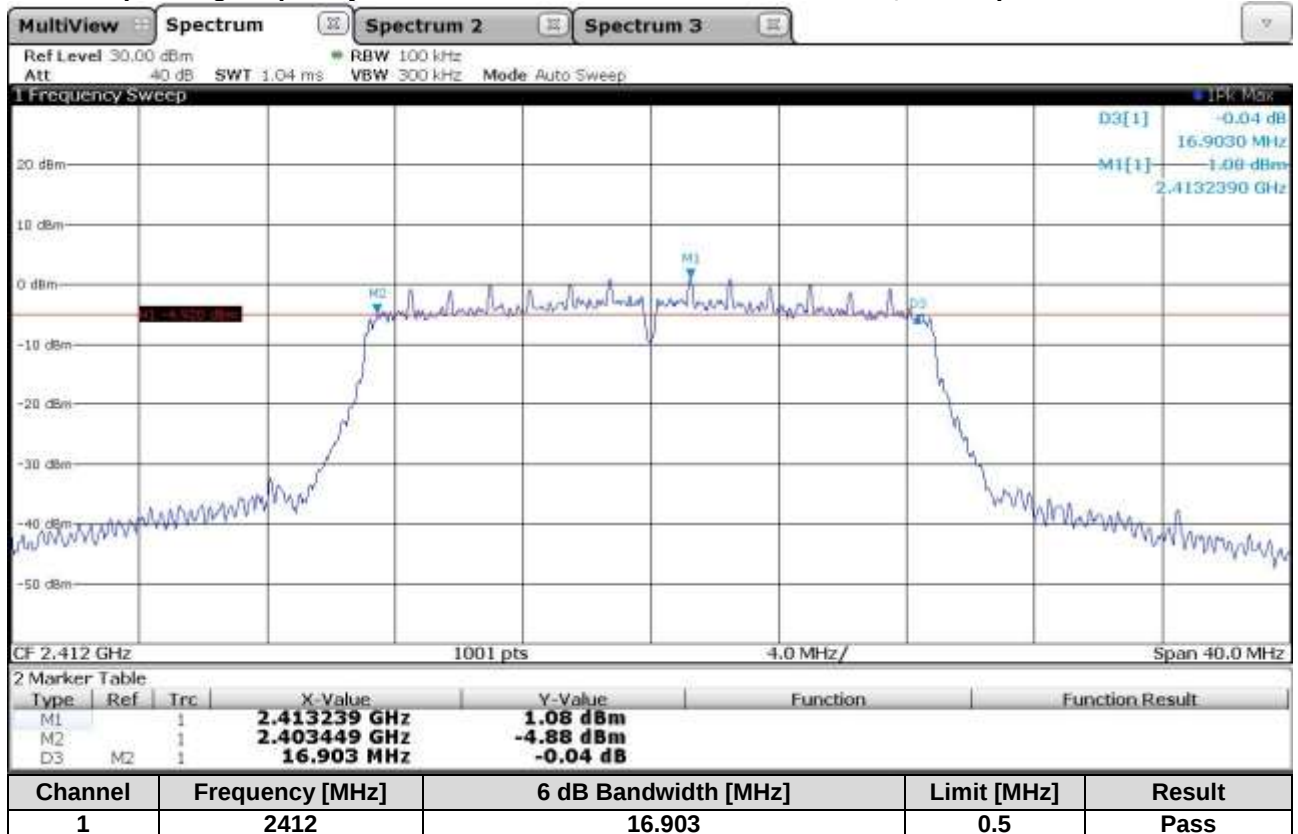
Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



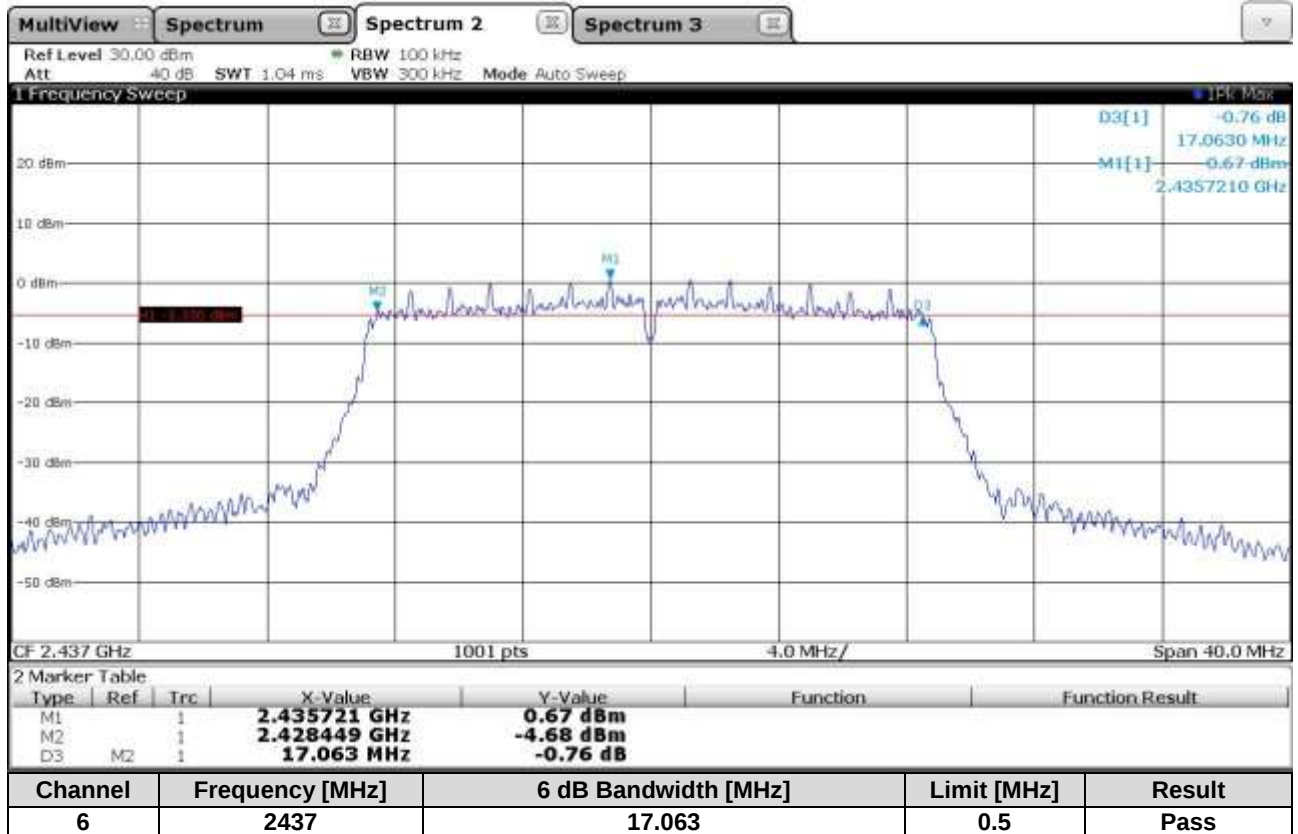
### Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



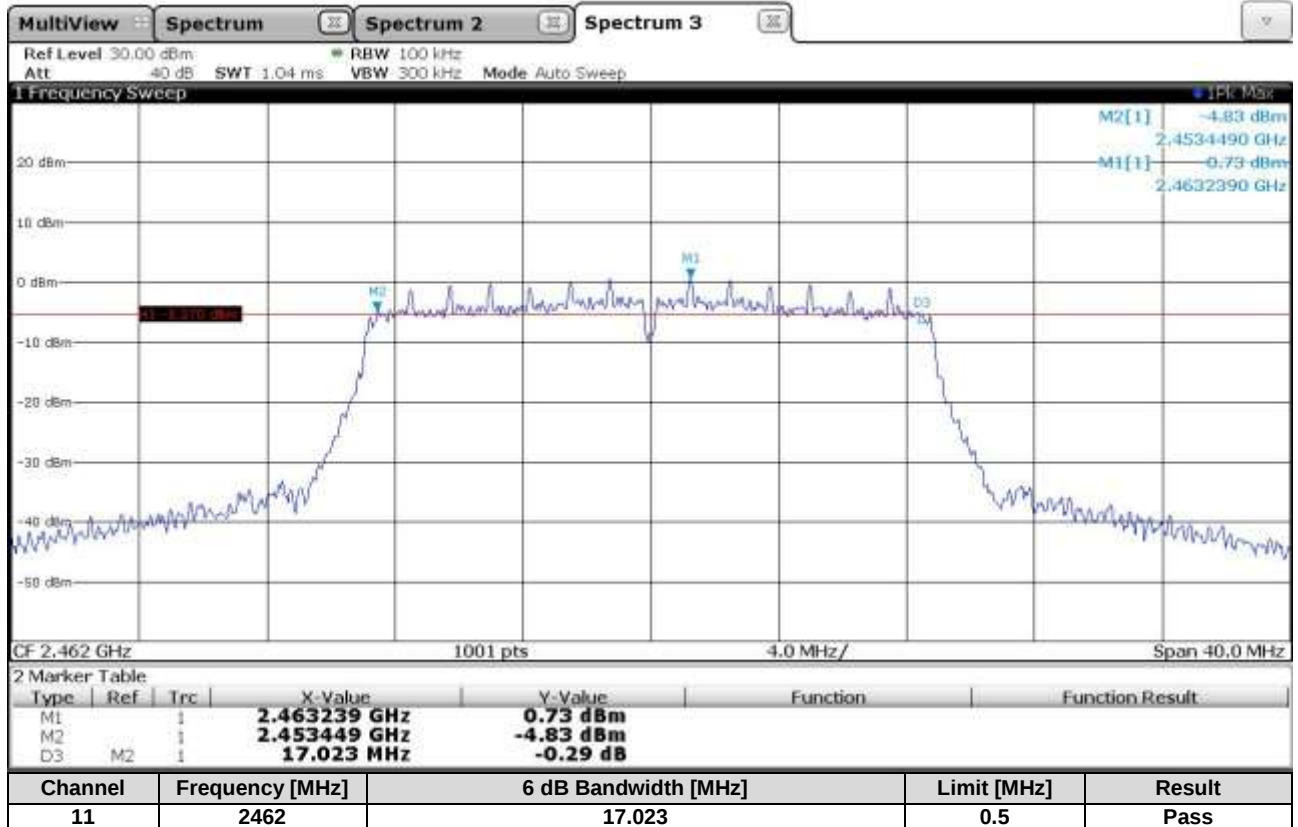
### Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



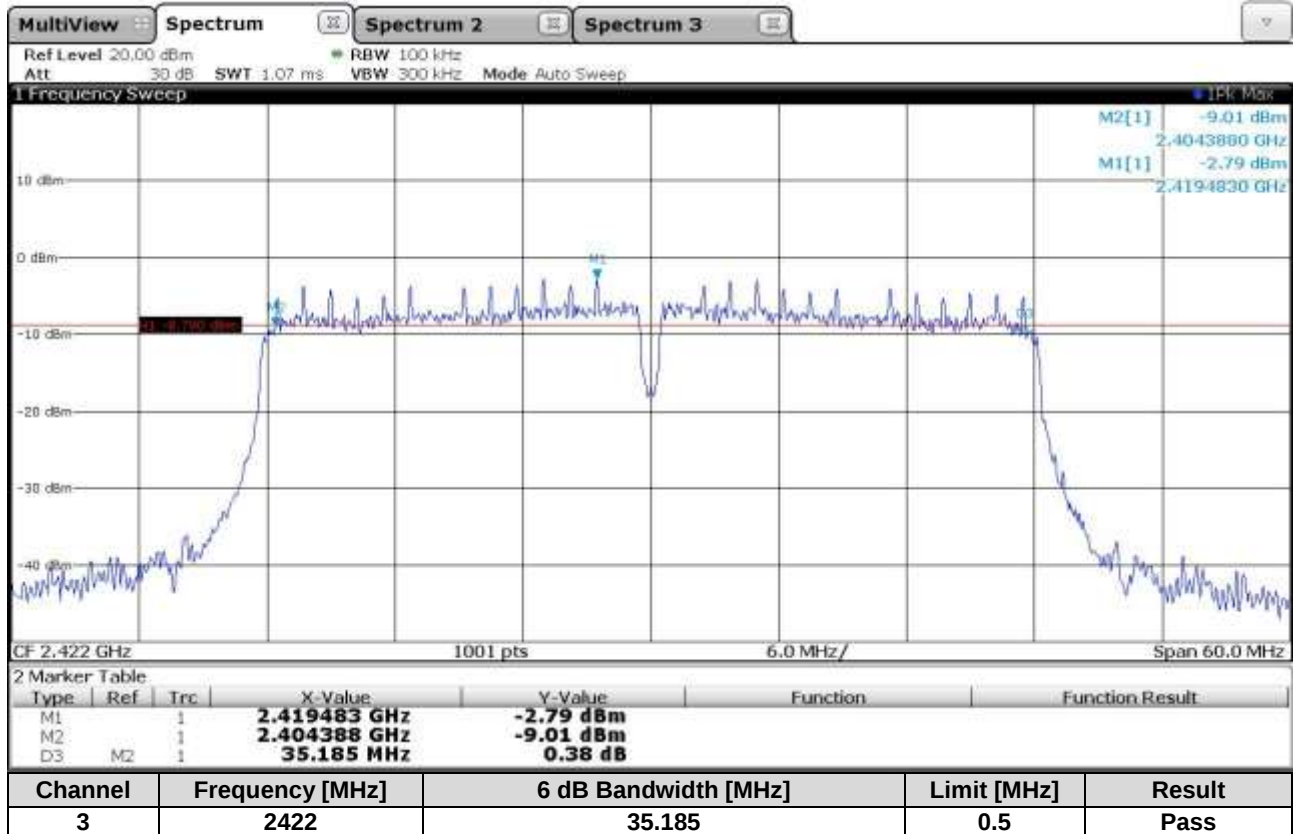
**Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



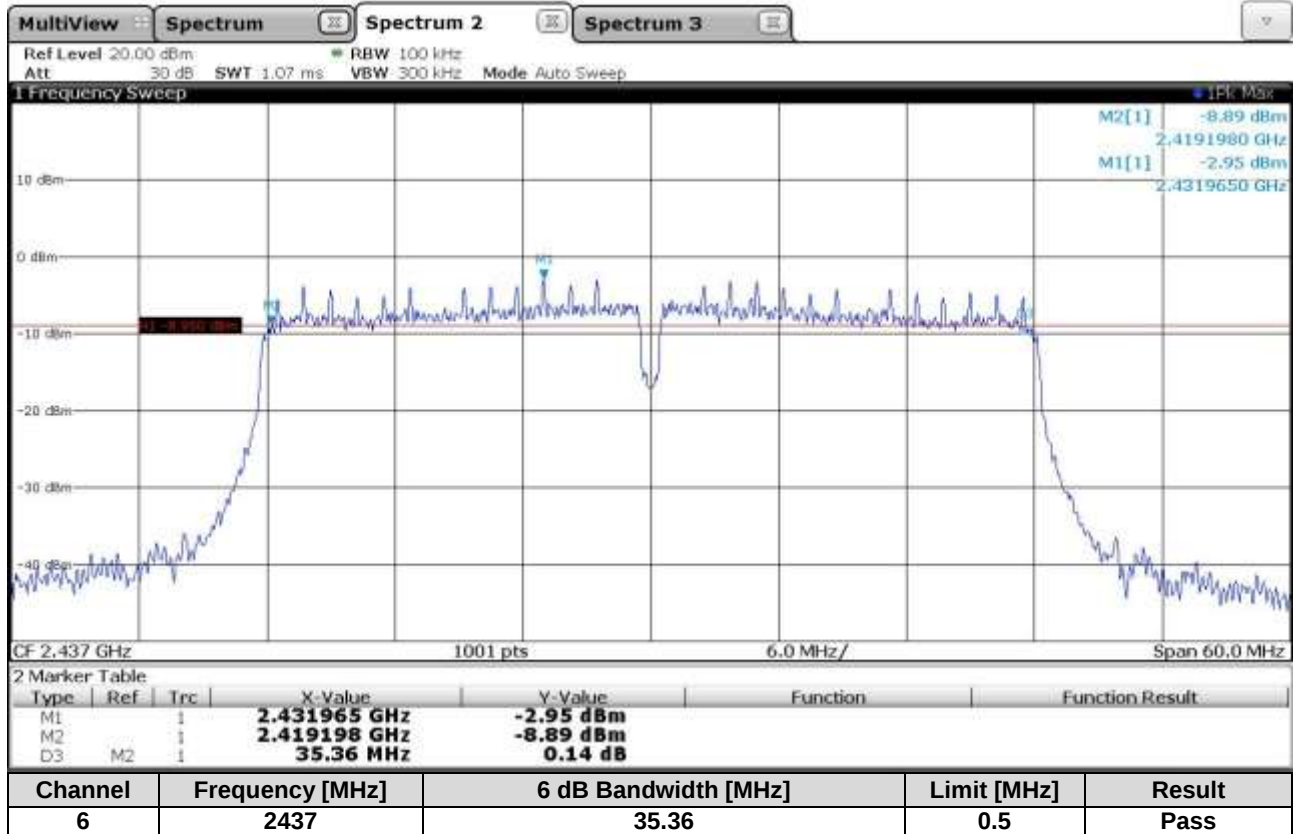
**Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



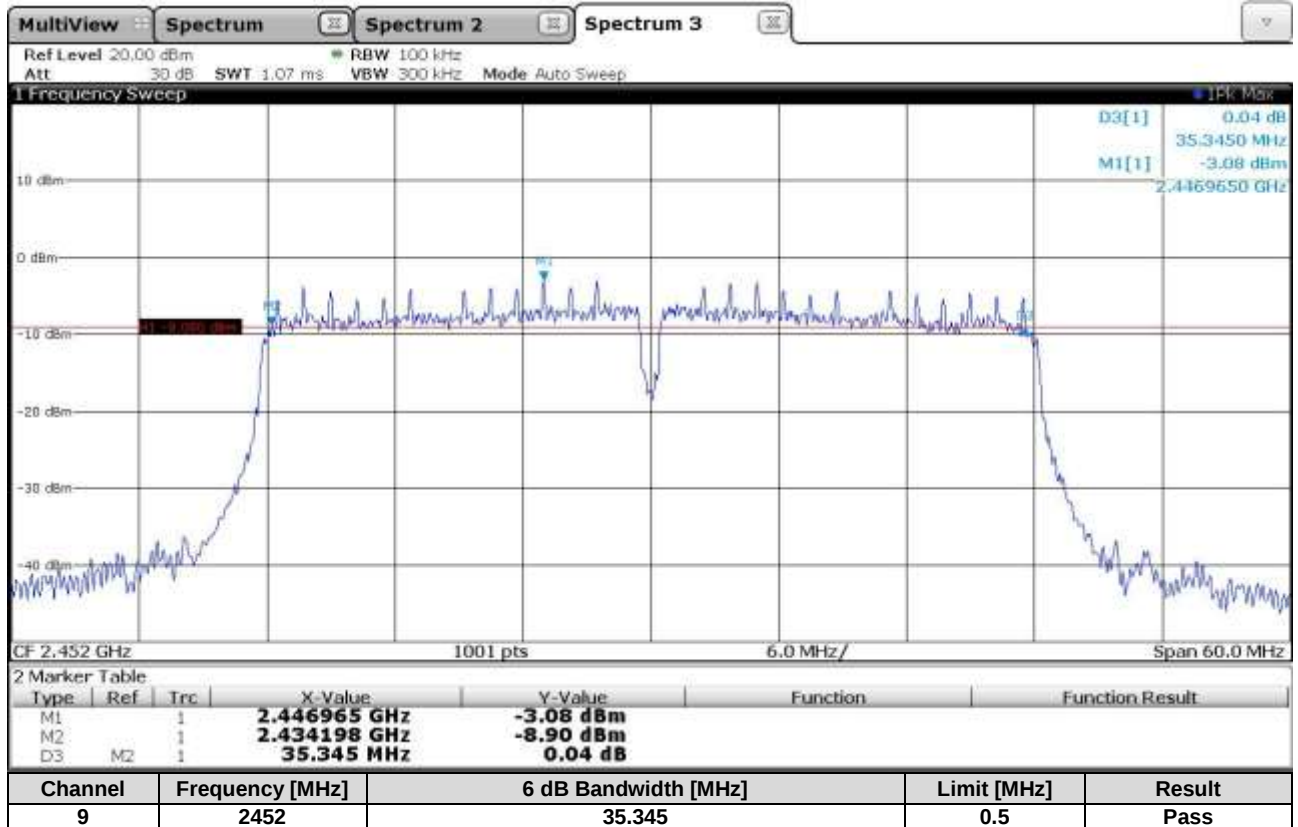
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



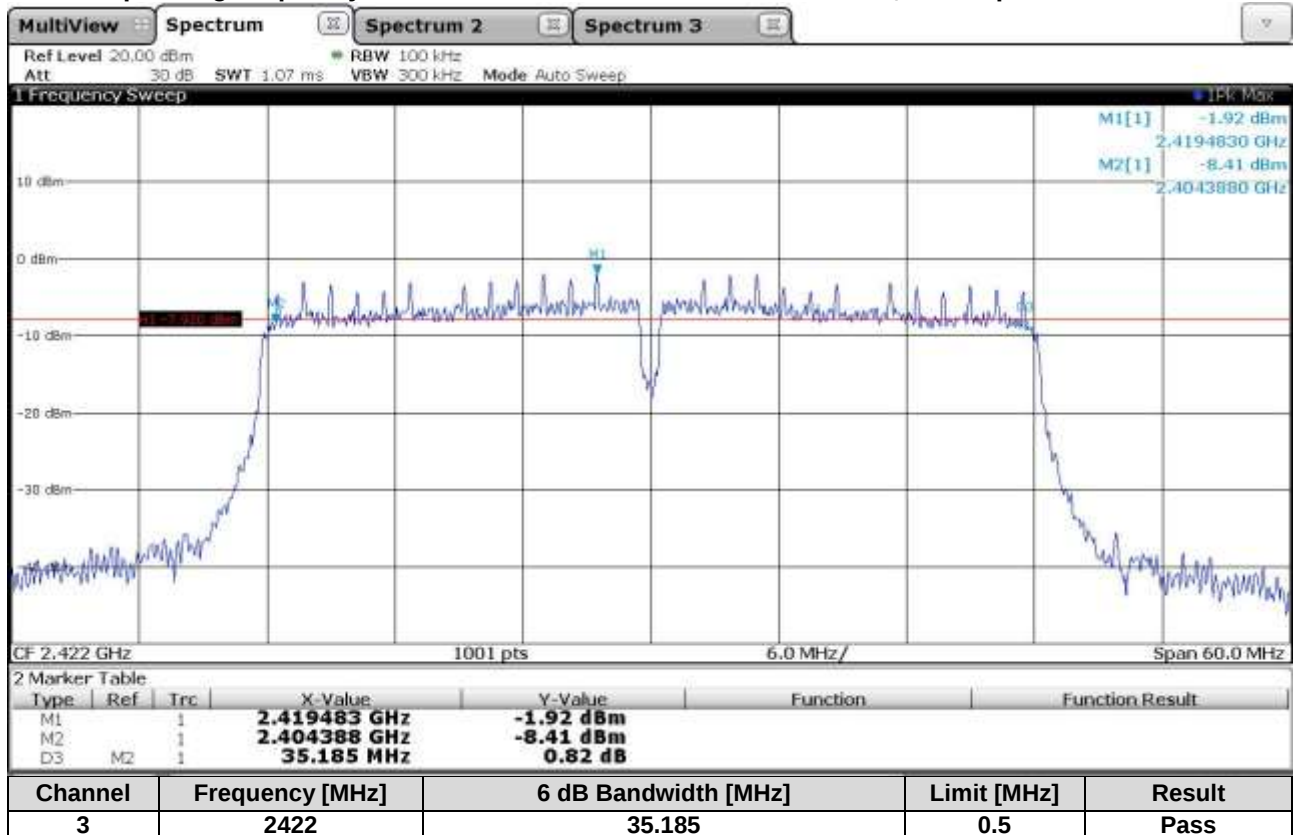
Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



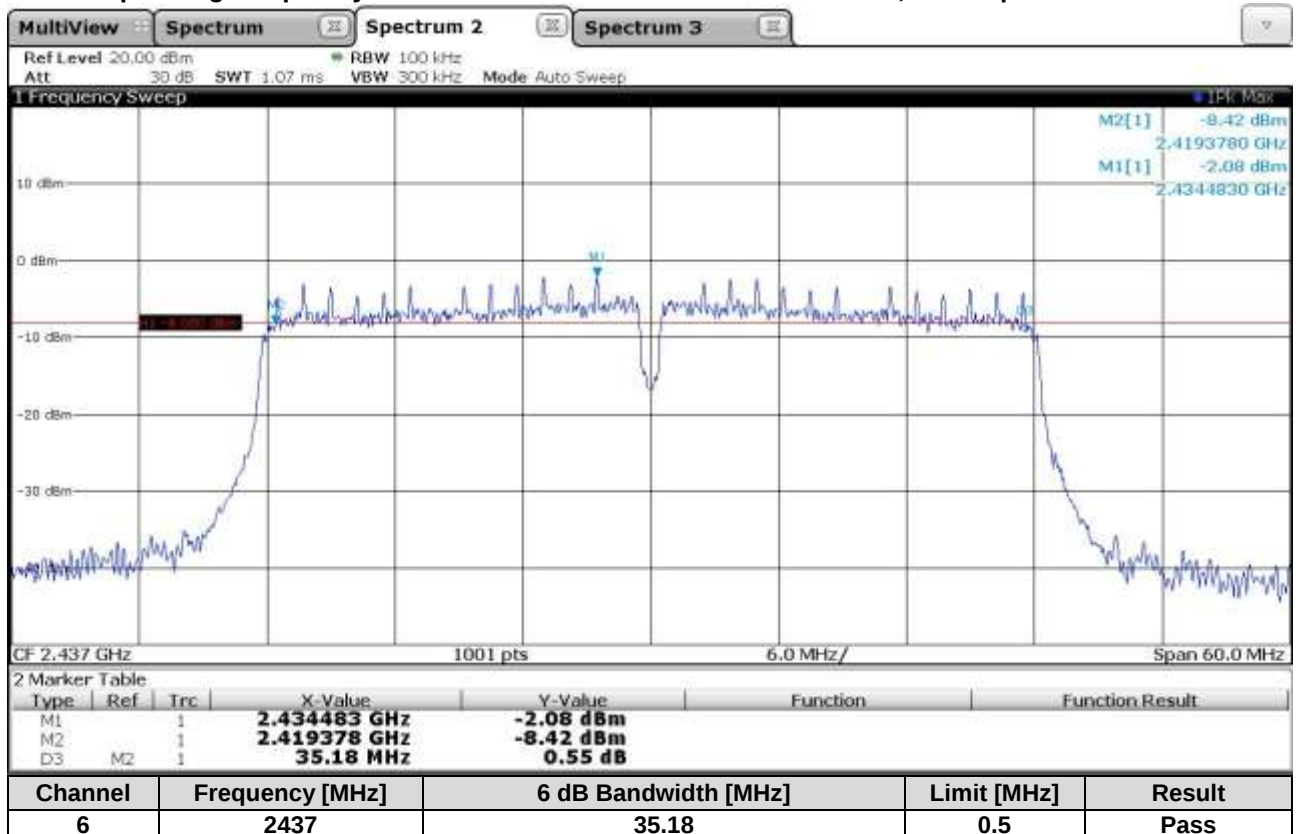
Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



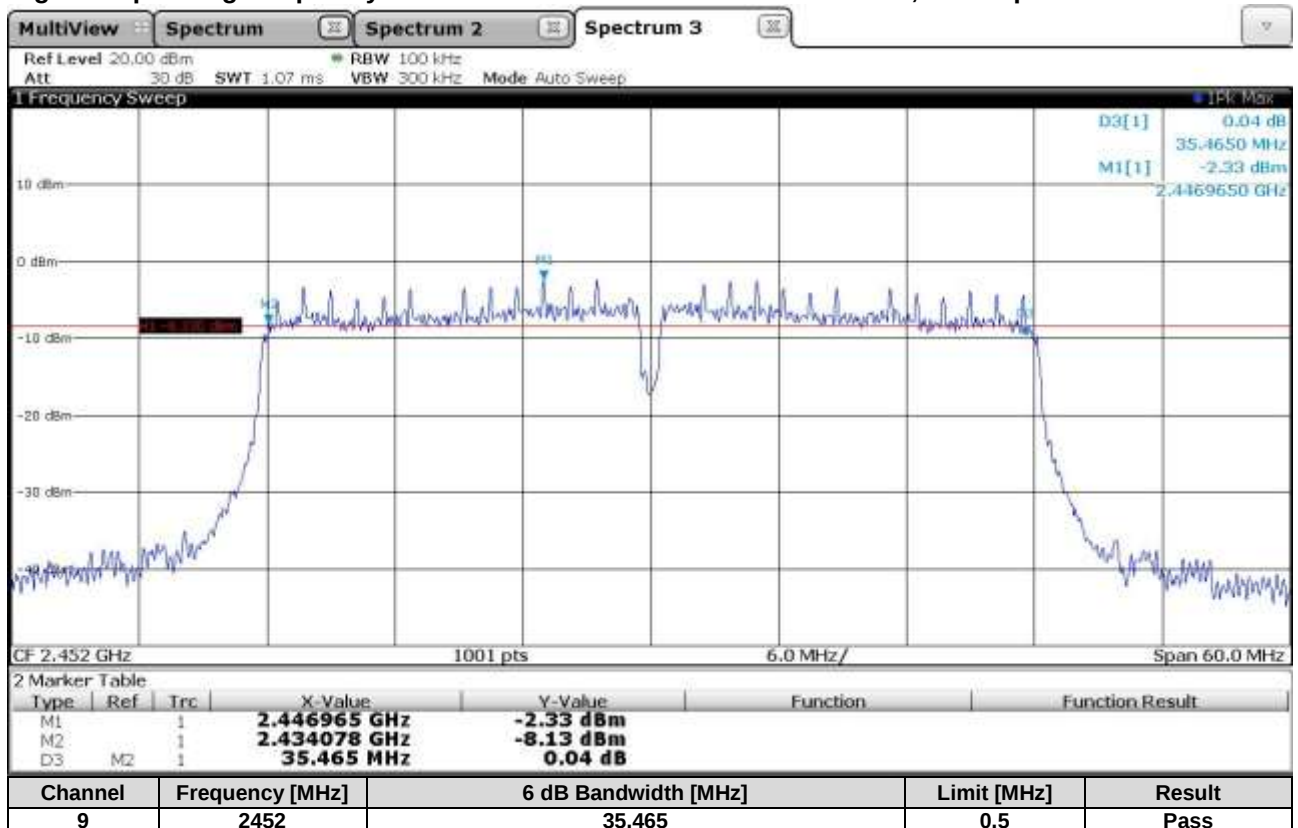
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



**Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



**Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



**Results**

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **6 dB Bandwidth**.

## **7.2. Output Power of Fundamental Emissions**

### **Maximum Conducted Output Power**

#### **Applied standards**

- e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (b) (3)
- RSS-247 Issue 2 section 5.4 (d)

#### **Limits for Peak Output Power of Fundamental (EIRP)**

The maximum peak conducted output power of the intentional radiator shall not exceeded: 1 Watt

As an alternative to the maximum peak conducted output power the average output power is measured to show compliance to the limit.

#### **Test equipment and test set up**

Test equipment used for conducted measurements as given in clause Test equipment of this report.

Test setup used for conducted measurements as given in clause Test setups of this report.

#### **Description**

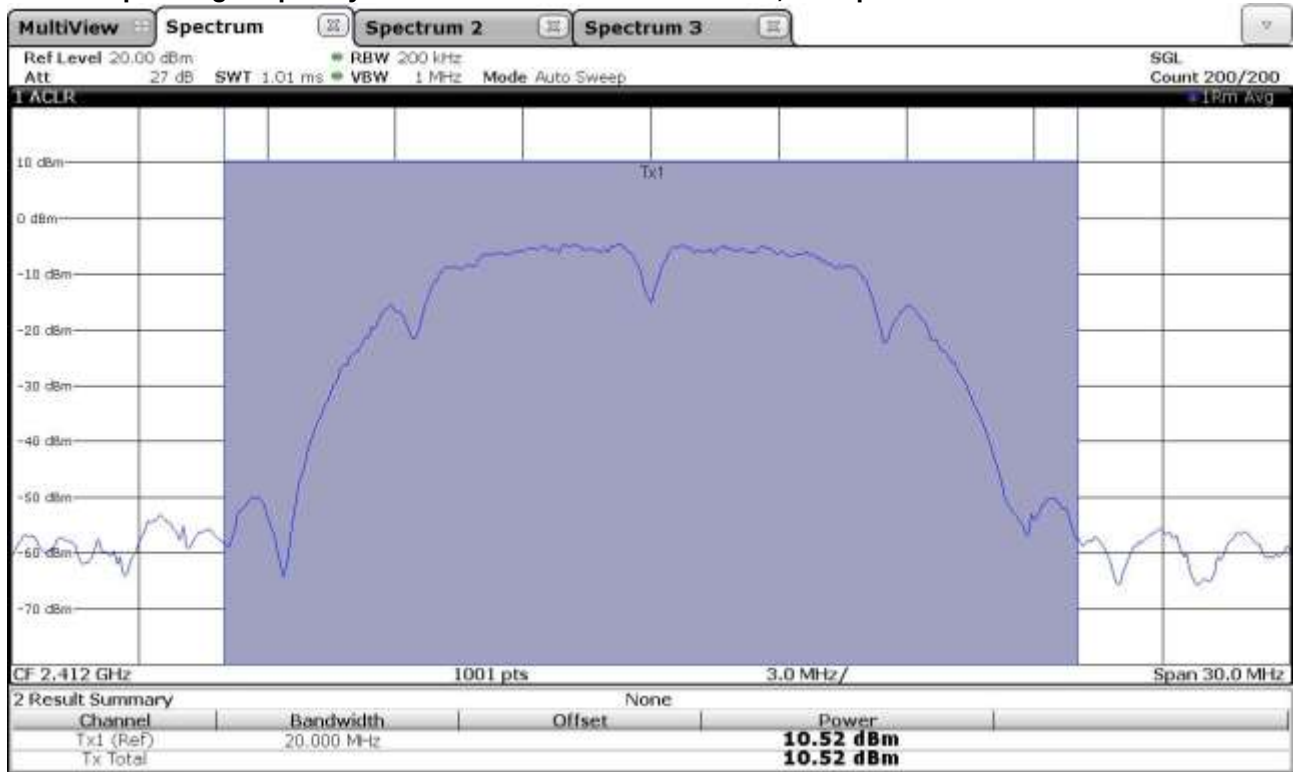
For the conducted measurement, the RF output of the EUT was connected to the Analyzer. All the attenuation or cable loss will be added to the measured maximum output power.

The results are recorded in Watt.

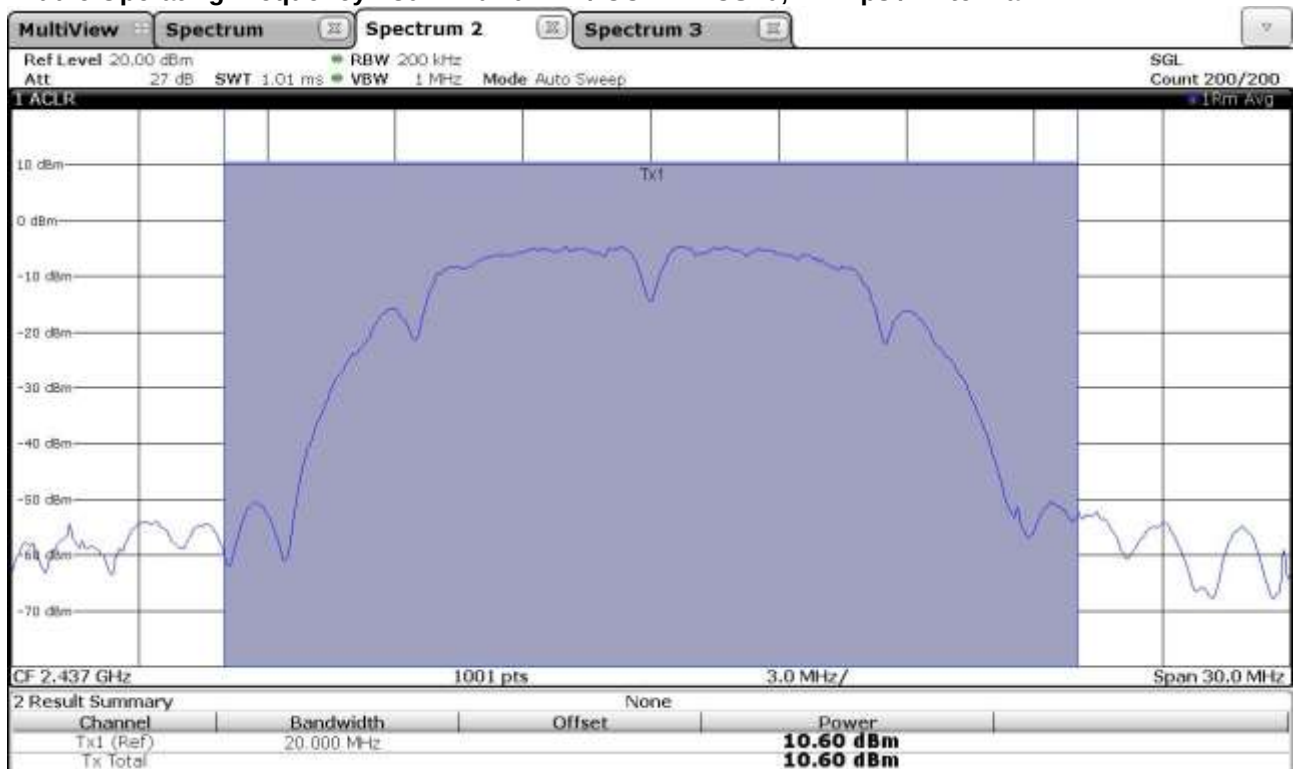
#### **Measurement**

The Measurement was performed on: 01.04.2020 and 02.04.2020

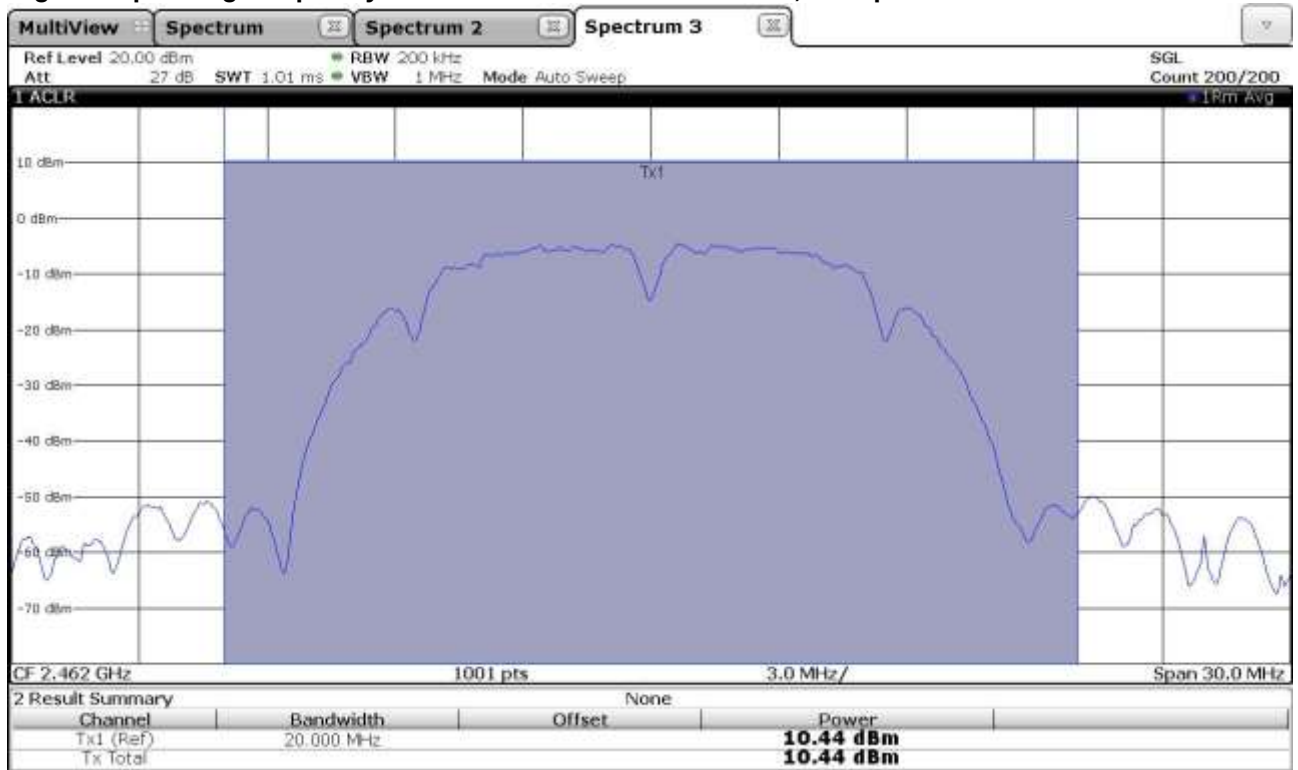
Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 Mbps / Antenna 1



Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 Mbps / Antenna 1



# Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1

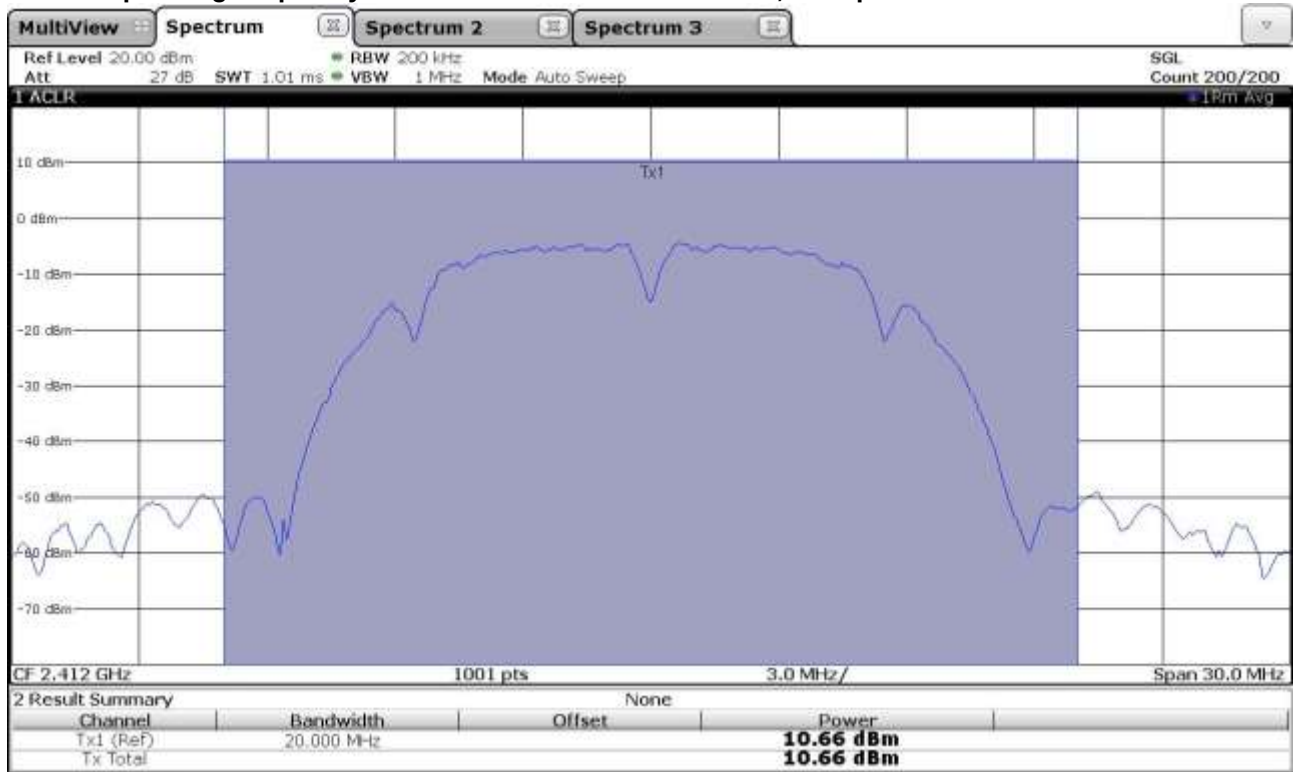


## Maximum output power conducted measurement:

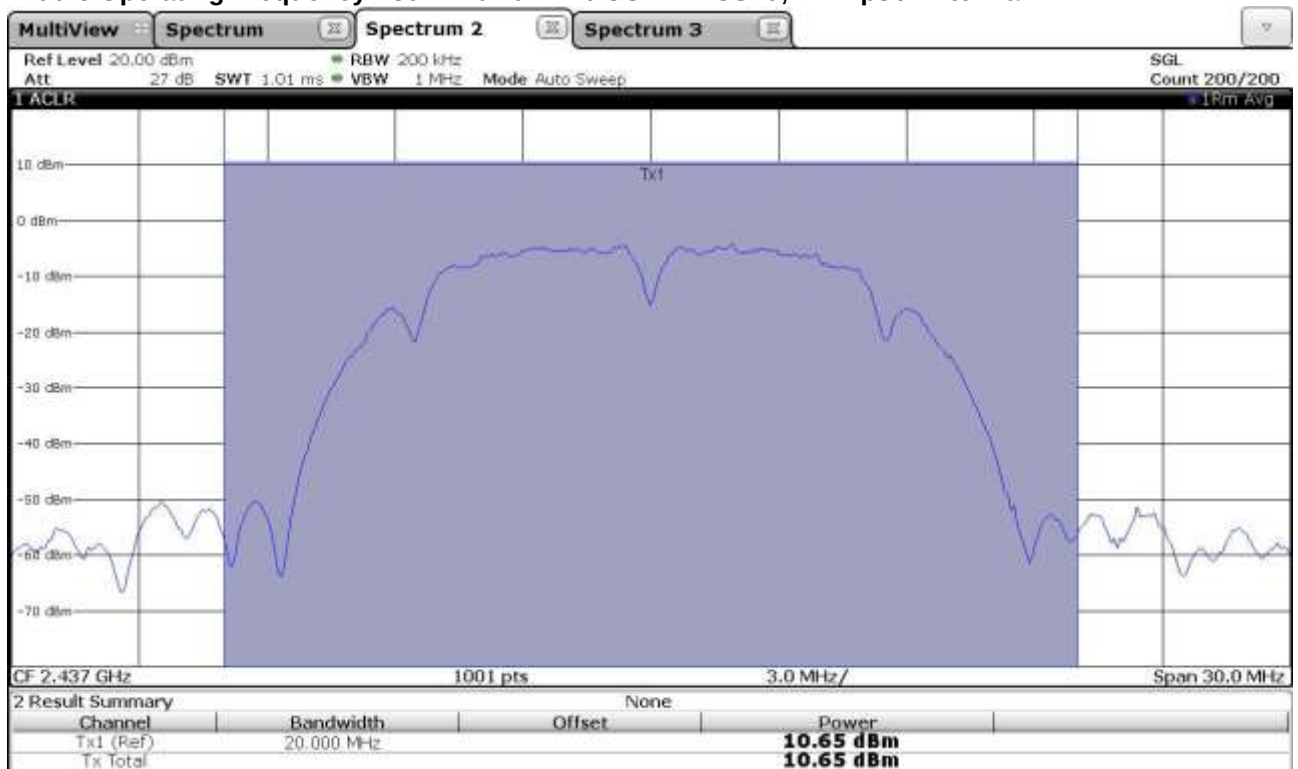
802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 10.52                     | 1.2             | 11.72        | 14.86 | 30    | 1000 | Pass   |
| 6       | 2437            | 10.60                     | 1.2             | 11.80        | 15.14 | 30    | 1000 | Pass   |
| 11      | 2462            | 10.44                     | 1.2             | 11.64        | 14.59 | 30    | 1000 | Pass   |

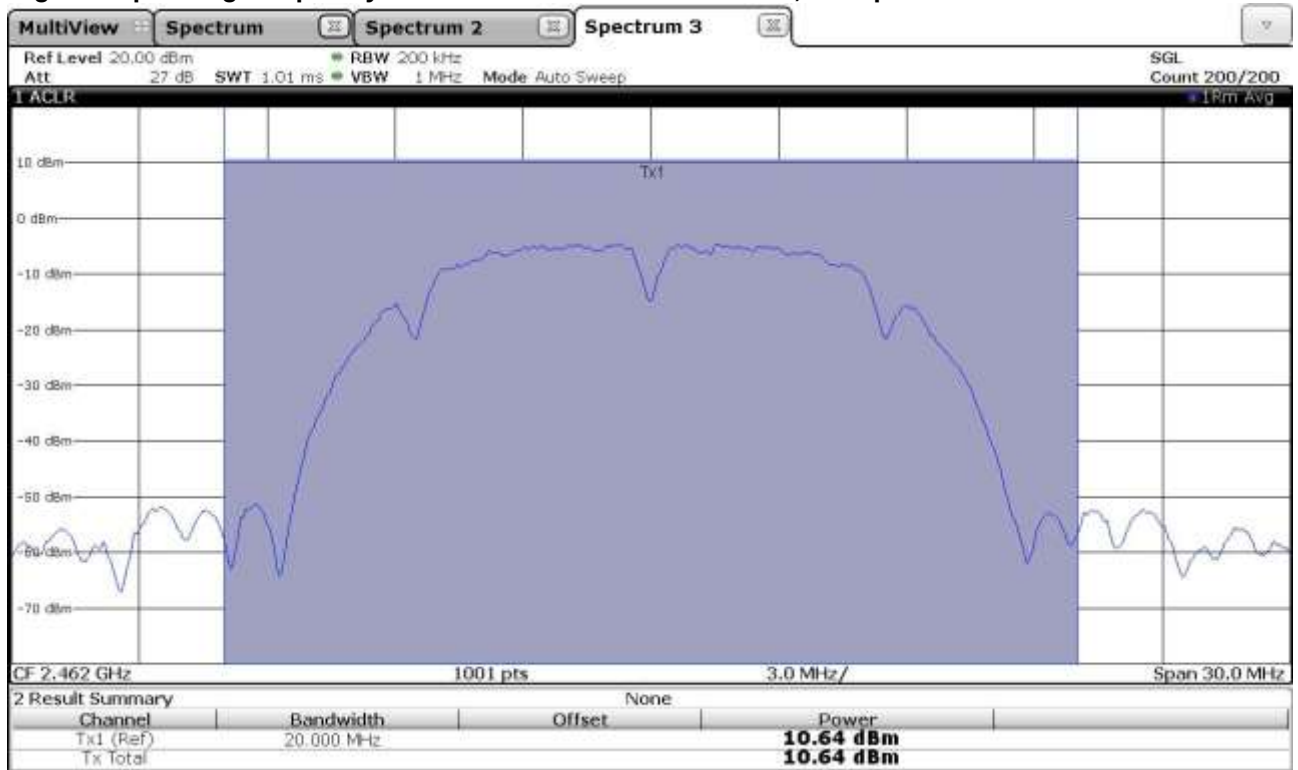
Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 Mbps / Antenna 2



Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 Mbps / Antenna 2



**Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**



**Maximum output power conducted measurement:**

**802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 10.66                     | 1.2             | 11.86        | 15.35 | 30    | 1000 | Pass   |
| 6       | 2437            | 10.65                     | 1.2             | 11.85        | 15.31 | 30    | 1000 | Pass   |
| 11      | 2462            | 10.64                     | 1.2             | 11.84        | 15.28 | 30    | 1000 | Pass   |

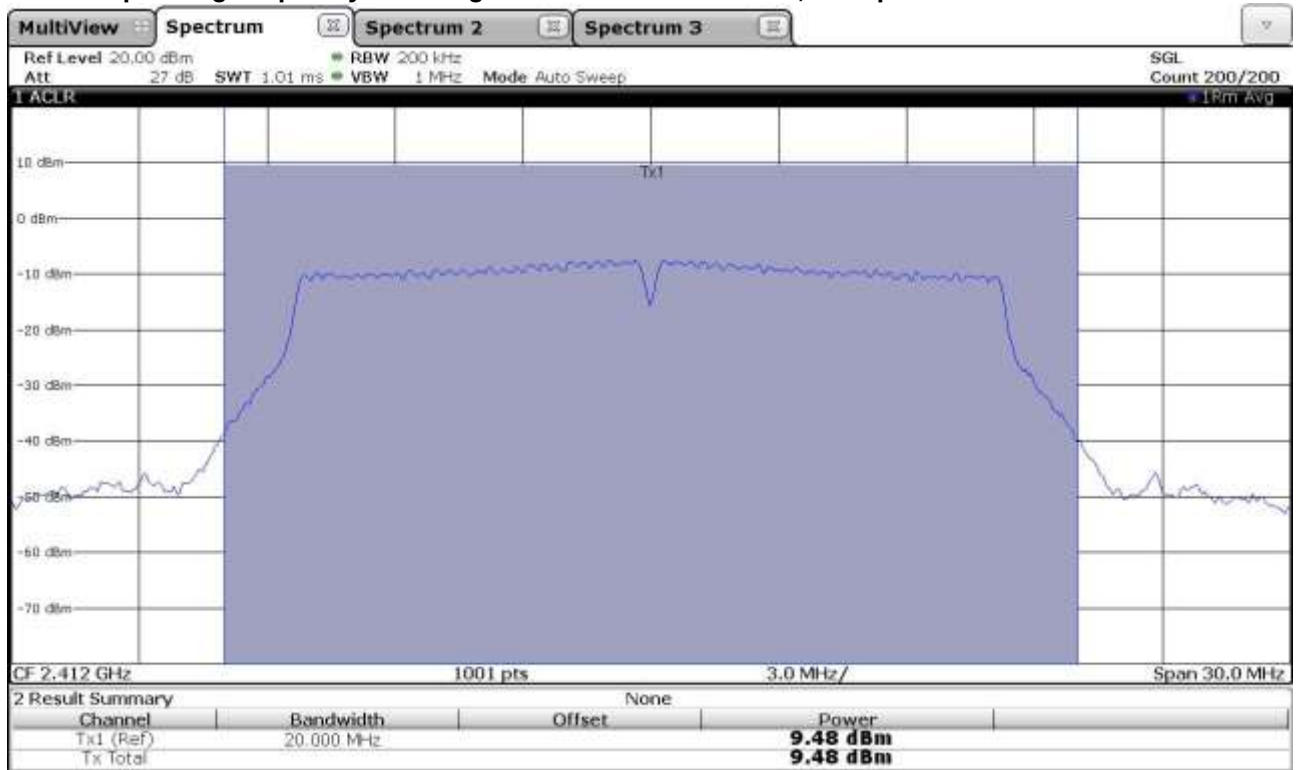
**Maximum output power conducted measurement:**

**802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1 + Antenna 2**

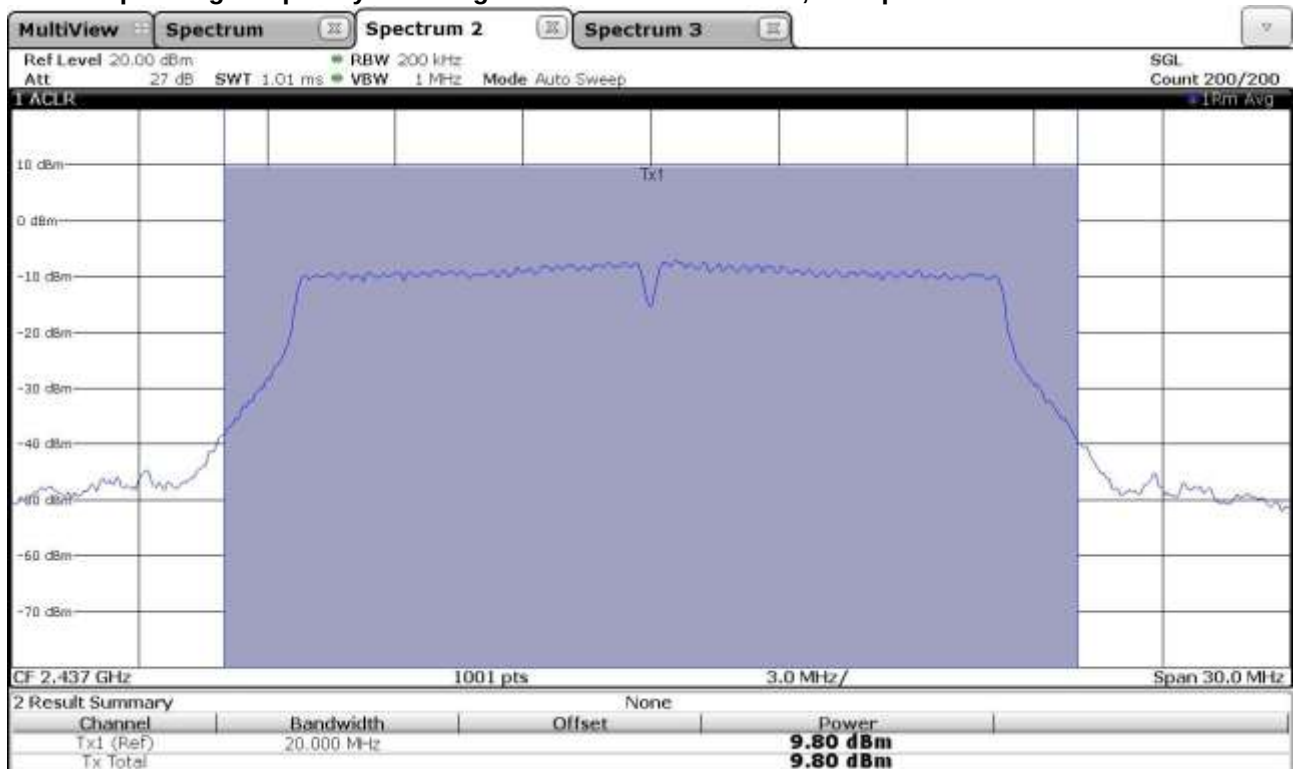
| Channel | Frequency [MHz] | Output Antenna 1 [mW] | Output Antenna 2 [mW] | Total Output Power |       | Limit |      | Result |
|---------|-----------------|-----------------------|-----------------------|--------------------|-------|-------|------|--------|
|         |                 |                       |                       | [dBm]              | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 14.86                 | 15.35                 | 14.80              | 30.21 | 30    | 1000 | Pass   |
| 6       | 2437            | 15.14                 | 15.31                 | 14.84              | 30.45 | 30    | 1000 | Pass   |
| 11      | 2462            | 14.59                 | 15.28                 | 14.75              | 29.86 | 30    | 1000 | Pass   |

According to KDB 662911 D01

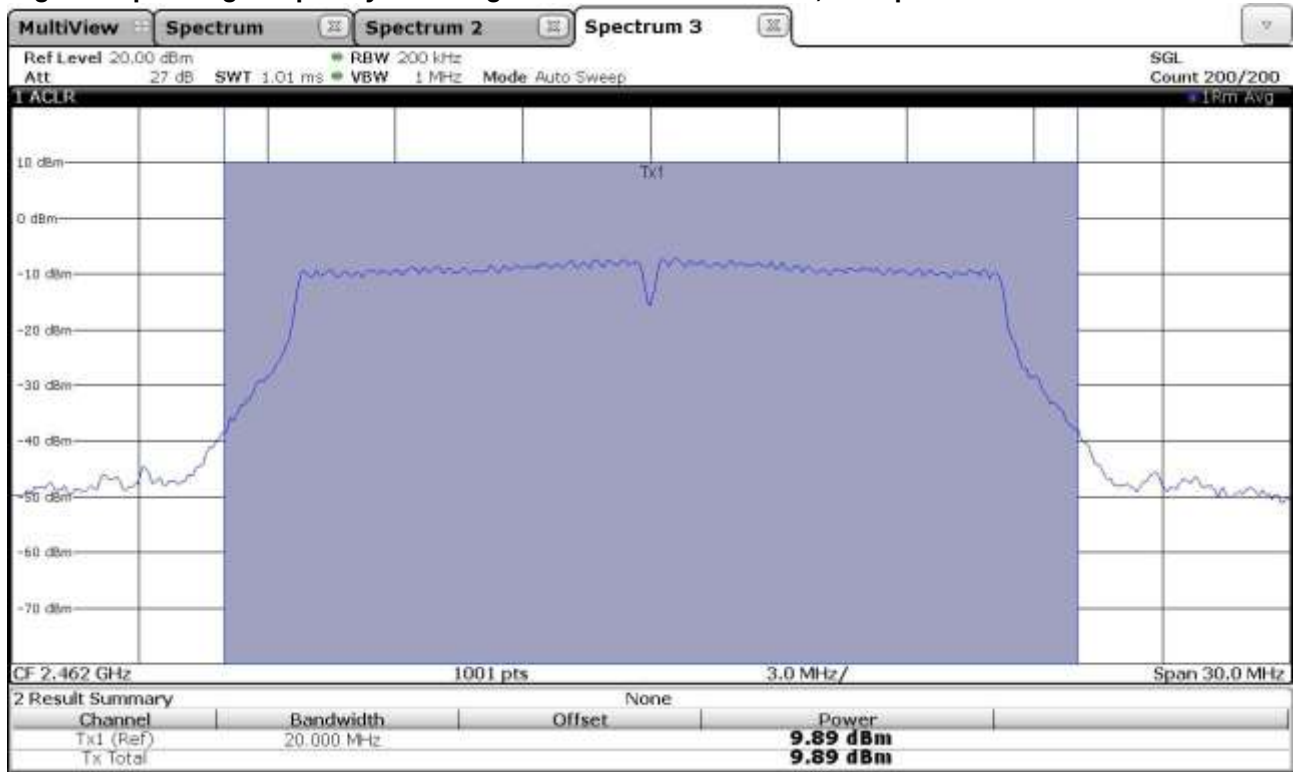
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



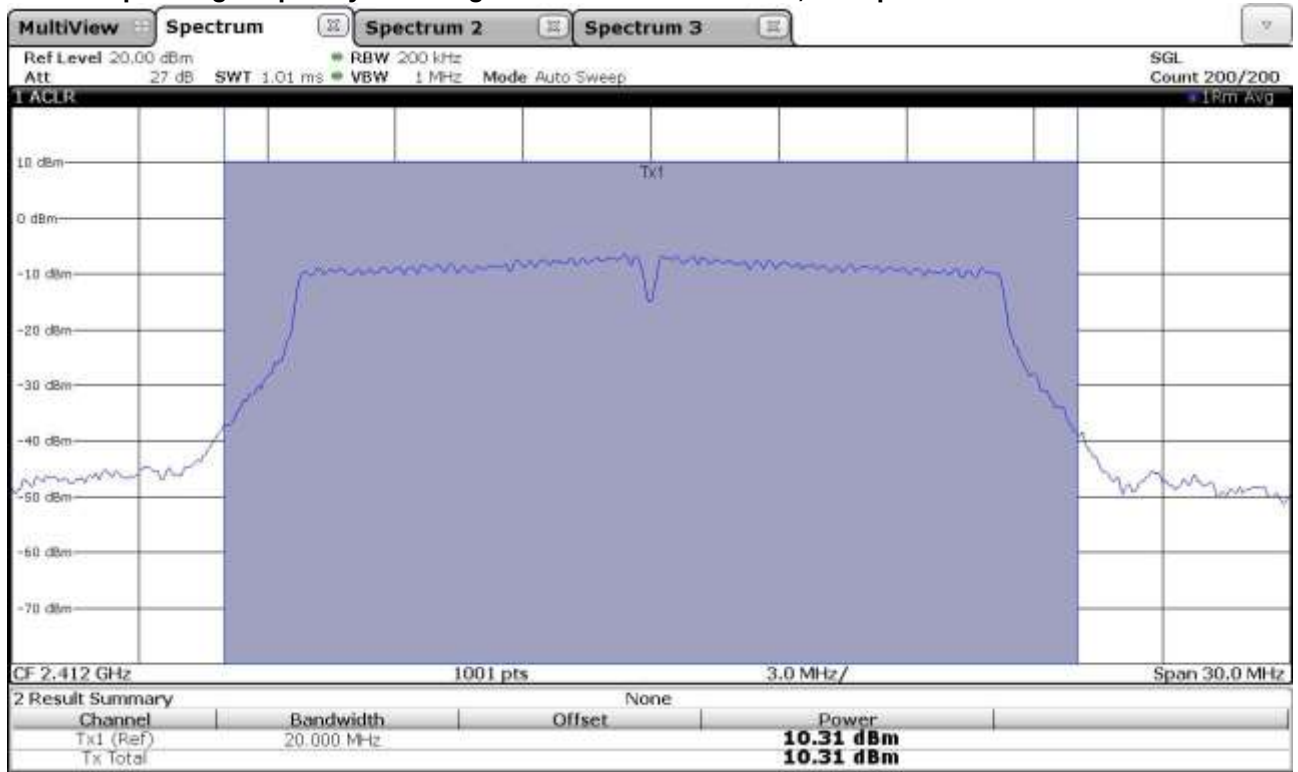
**Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1**



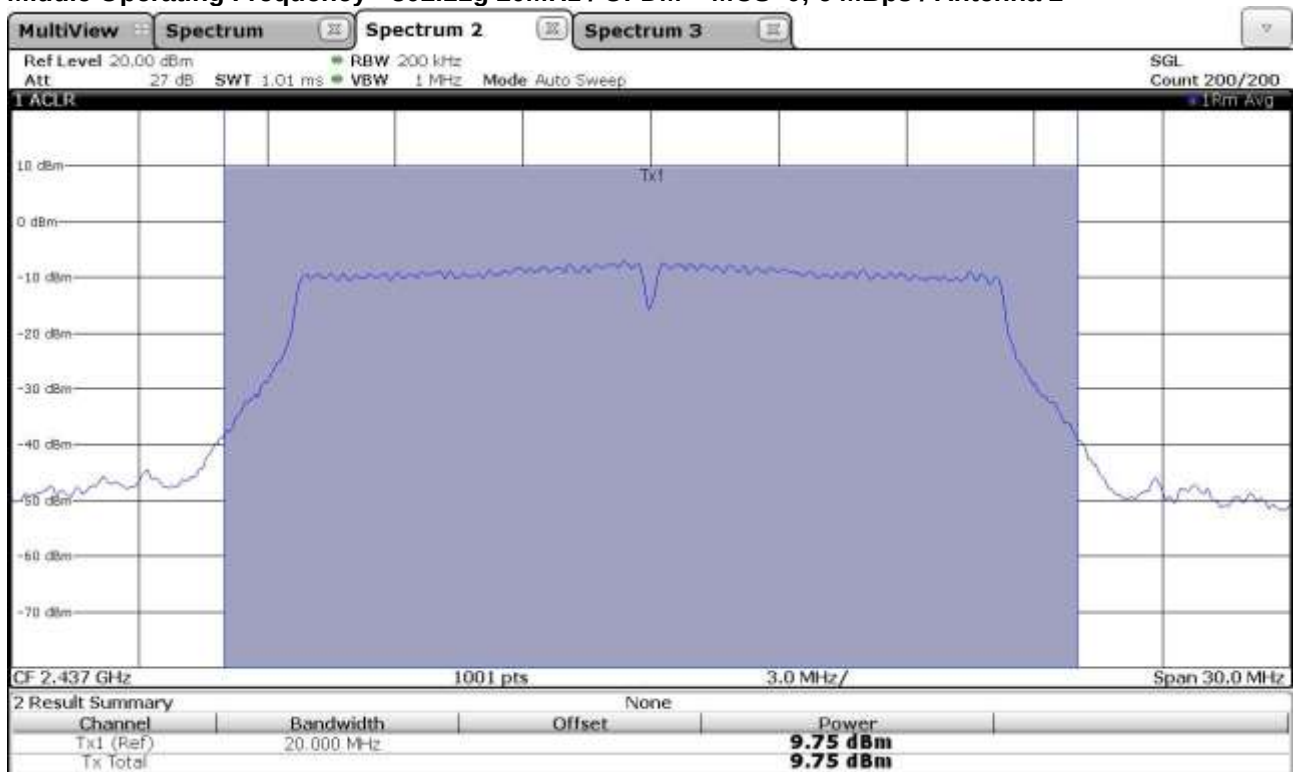
**Maximum output power conducted measurement:  
802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 9.48                      | 1.2             | 10.68        | 11.69 | 30    | 1000 | Pass   |
| 6       | 2437            | 9.80                      | 1.2             | 11.00        | 12.59 | 30    | 1000 | Pass   |
| 11      | 2462            | 9.89                      | 1.2             | 11.09        | 12.85 | 30    | 1000 | Pass   |

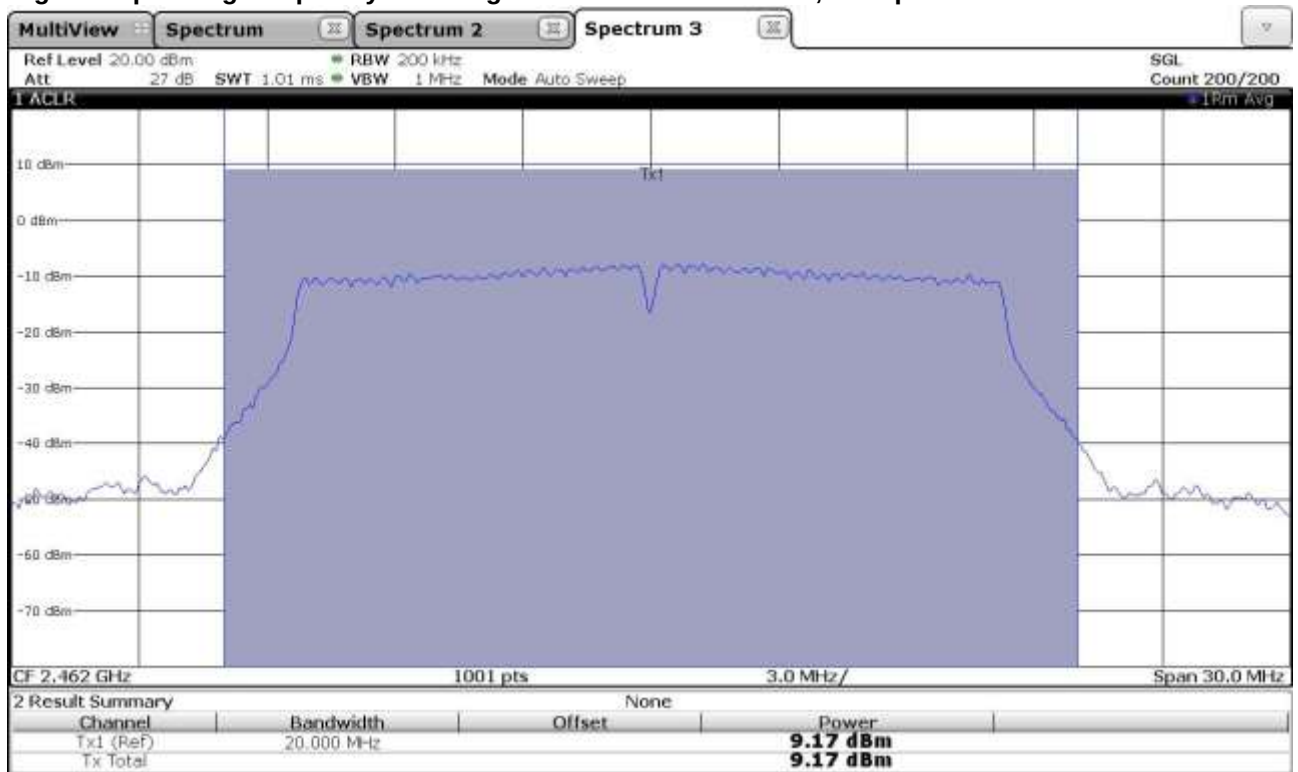
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



**Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2**



**Maximum output power conducted measurement:  
802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2**

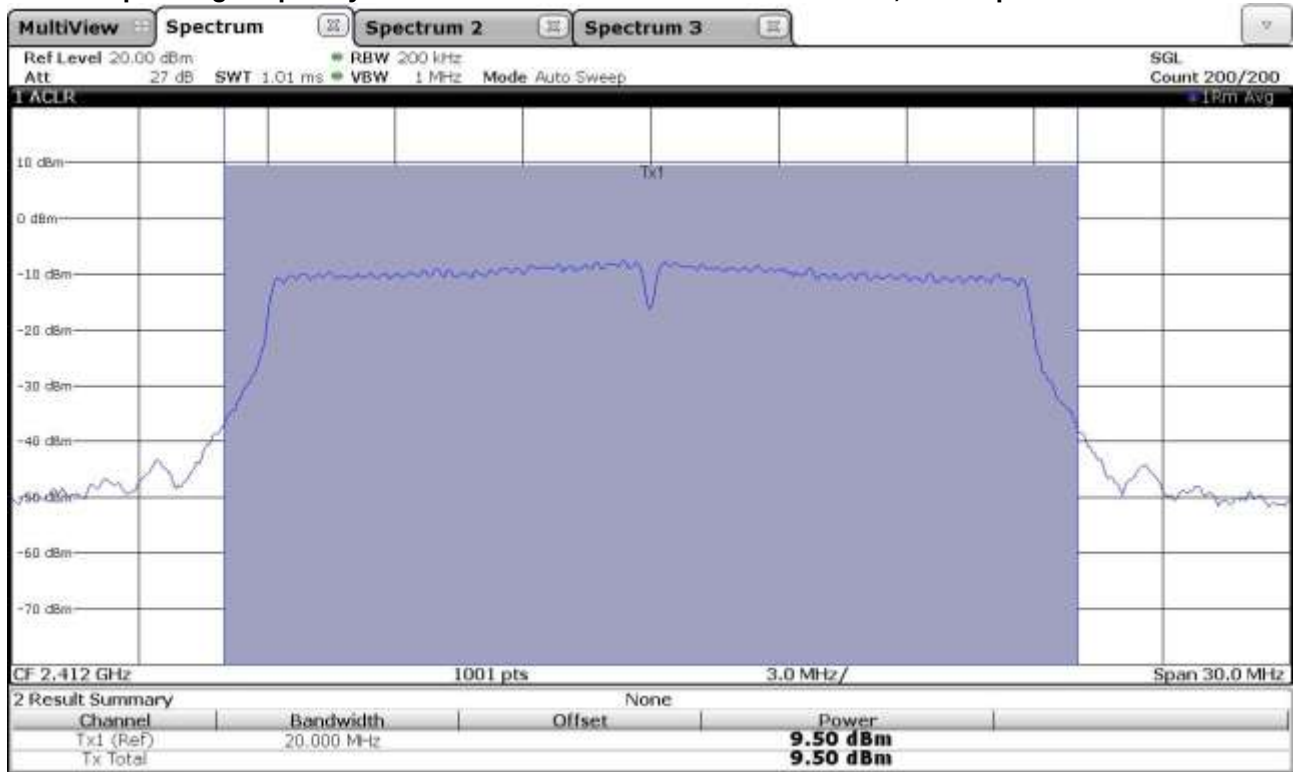
| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 10.31                     | 1.2             | 11.51        | 14.16 | 30    | 1000 | Pass   |
| 6       | 2437            | 9.75                      | 1.2             | 10.95        | 12.45 | 30    | 1000 | Pass   |
| 11      | 2462            | 9.17                      | 1.2             | 10.37        | 10.89 | 30    | 1000 | Pass   |

**Maximum output power conducted measurement:  
802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1 + Antenna 2**

| Channel | Frequency [MHz] | Output Antenna 1 [mW] | Output Antenna 2 [mW] | Total Output Power |       | Limit |      | Result |
|---------|-----------------|-----------------------|-----------------------|--------------------|-------|-------|------|--------|
|         |                 |                       |                       | [dBm]              | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 11.69                 | 14.16                 | 14.13              | 25.85 | 30    | 1000 | Pass   |
| 6       | 2437            | 12.59                 | 12.45                 | 13.99              | 25.03 | 30    | 1000 | Pass   |
| 11      | 2462            | 12.85                 | 10.89                 | 13.76              | 23.74 | 30    | 1000 | Pass   |

According to KDB 662911 D01

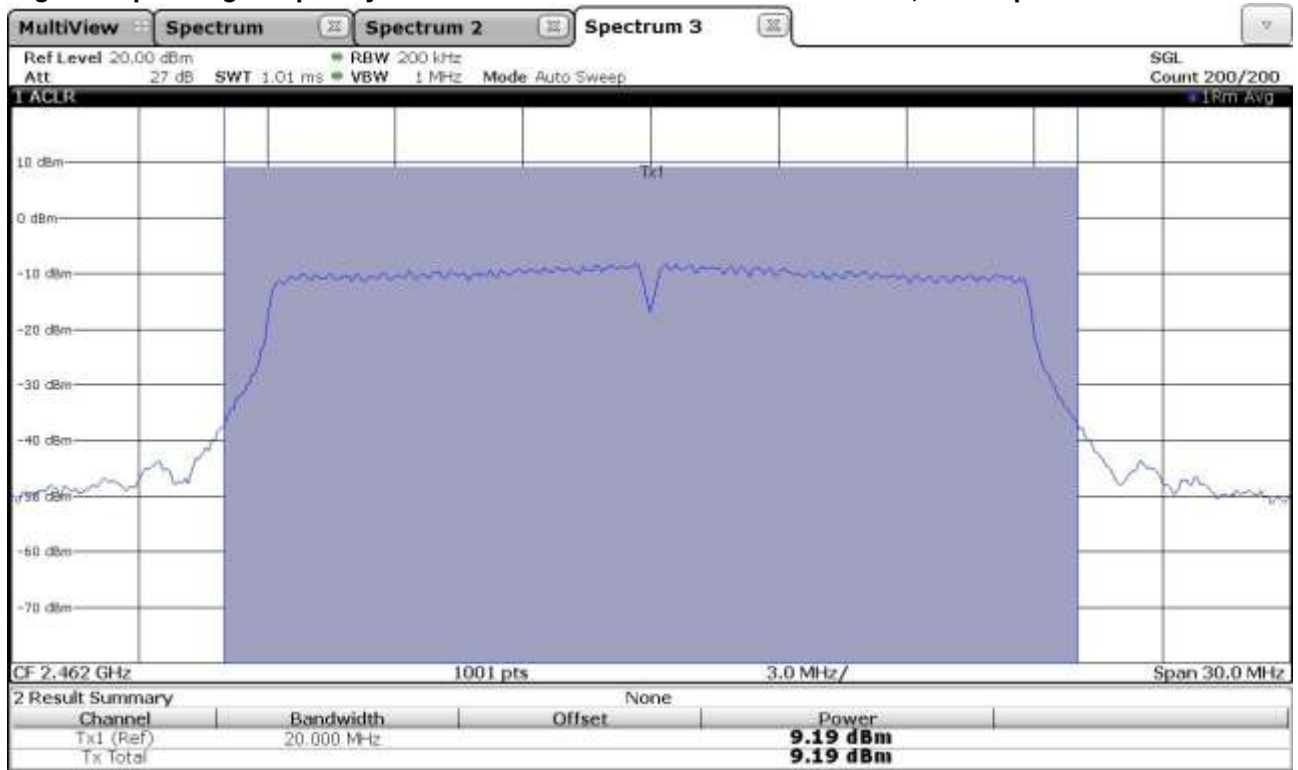
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



**Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**

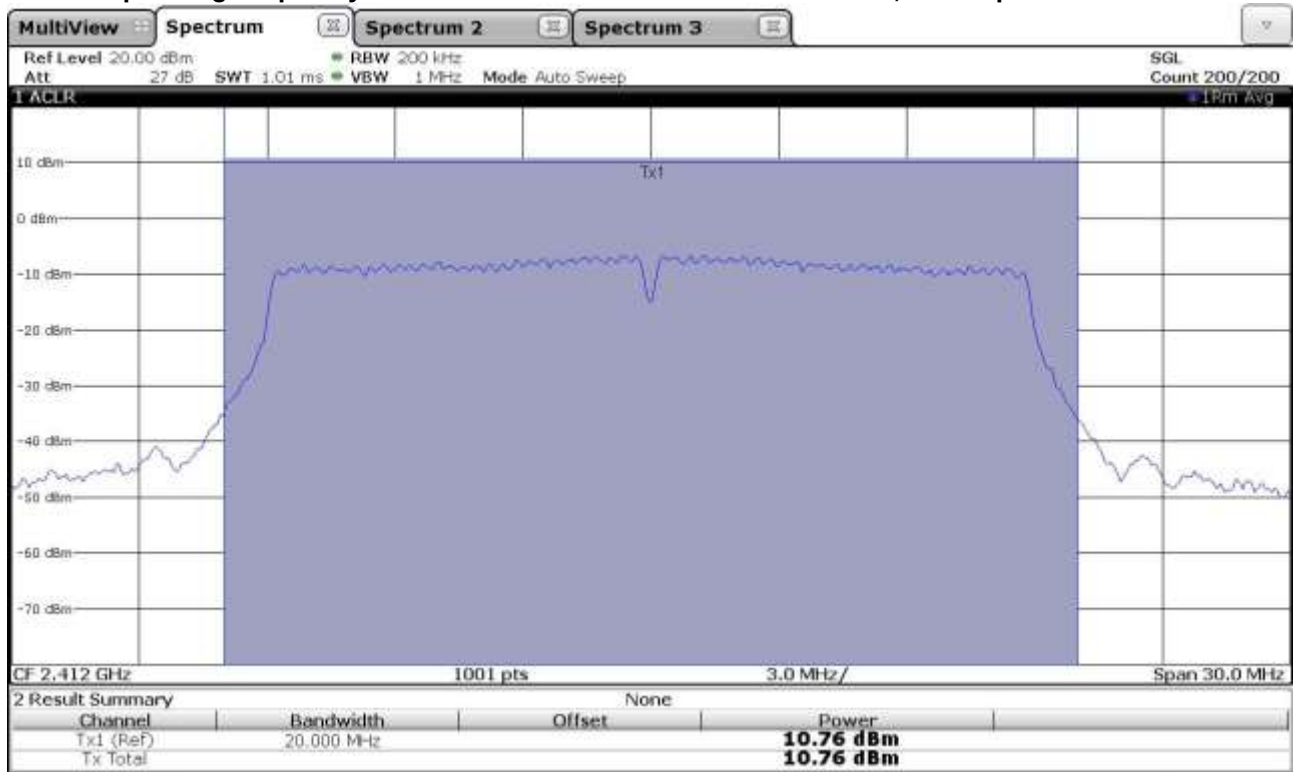


**Maximum output power conducted measurement:**

**802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 9.50                      | 1.2             | 10.70        | 11.75 | 30    | 1000 | Pass   |
| 6       | 2437            | 9.56                      | 1.2             | 10.76        | 11.91 | 30    | 1000 | Pass   |
| 11      | 2462            | 9.19                      | 1.2             | 10.39        | 10.94 | 30    | 1000 | Pass   |

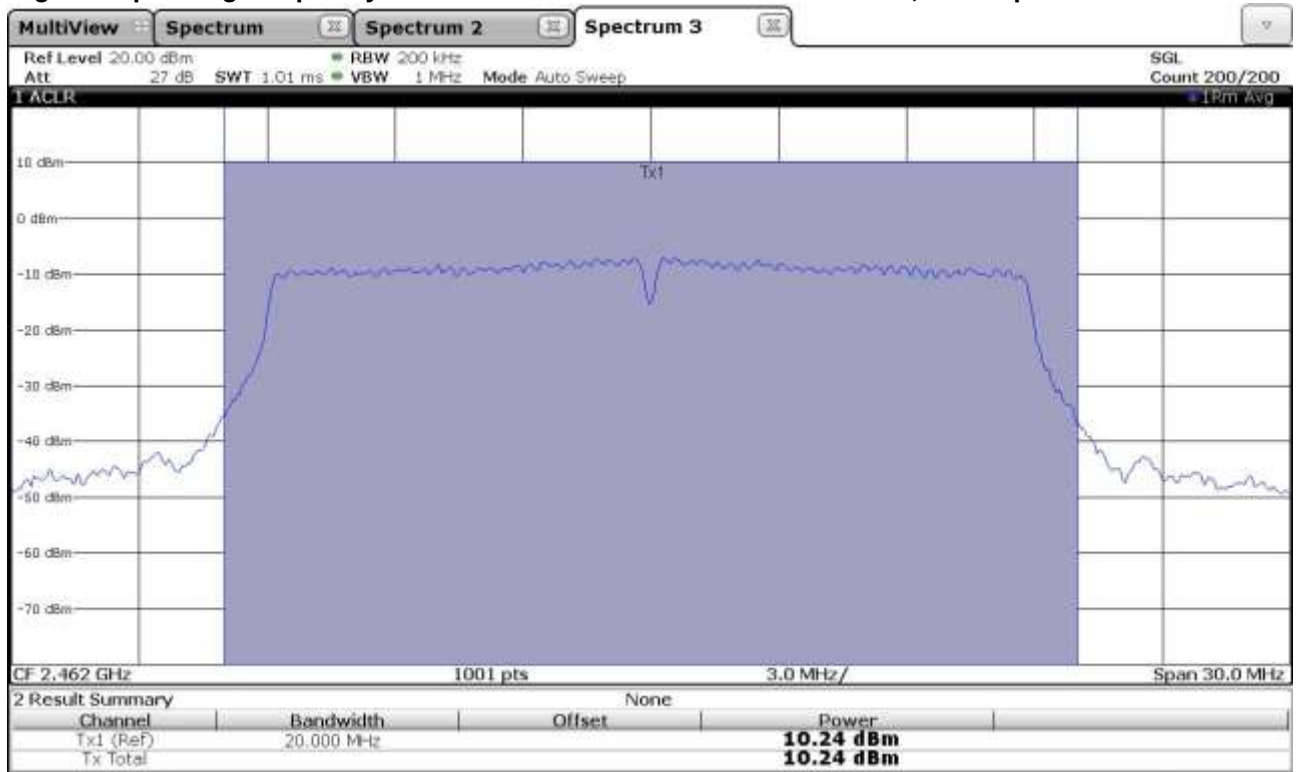
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



**Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



**Maximum output power conducted measurement:  
802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**

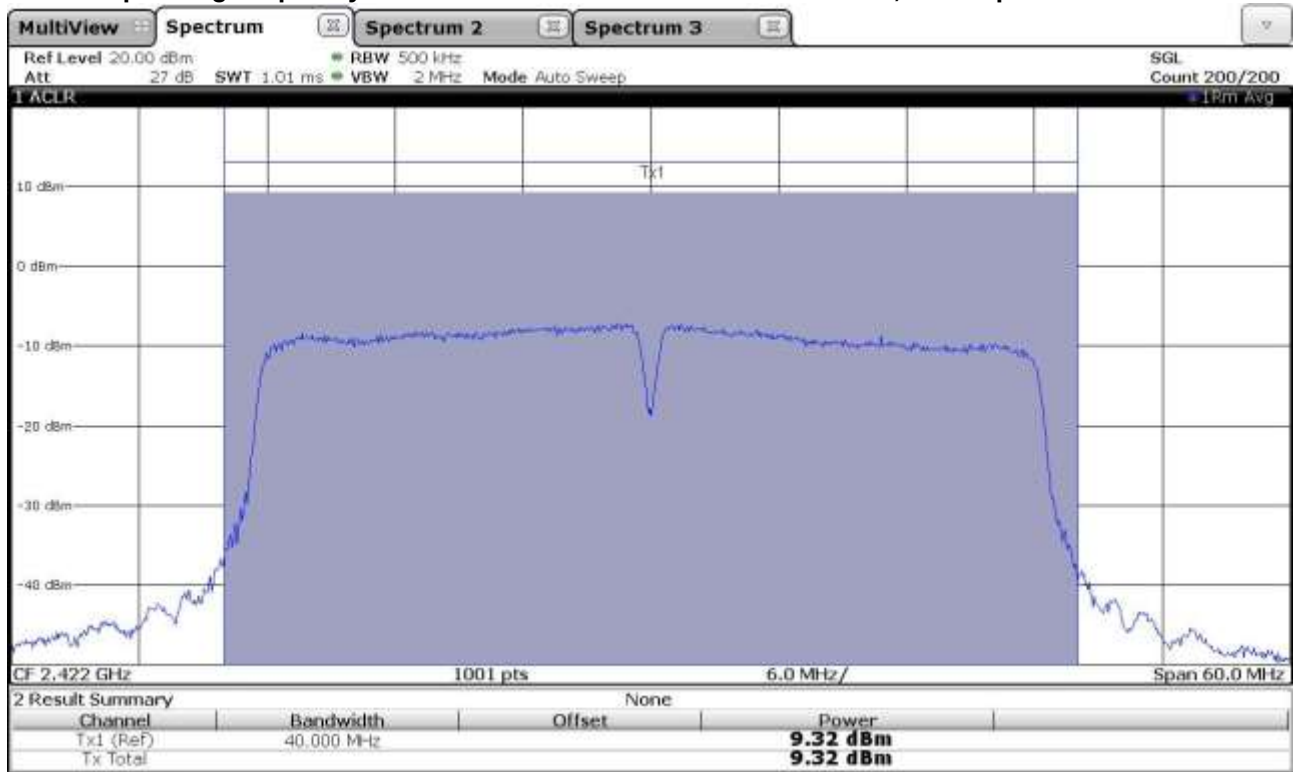
| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 10.76                     | 1.2             | 11.96        | 15.70 | 30    | 1000 | Pass   |
| 6       | 2437            | 10.26                     | 1.2             | 11.46        | 14.00 | 30    | 1000 | Pass   |
| 11      | 2462            | 10.24                     | 1.2             | 11.44        | 13.93 | 30    | 1000 | Pass   |

**Maximum output power conducted measurement:  
802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1 + Antenna 2**

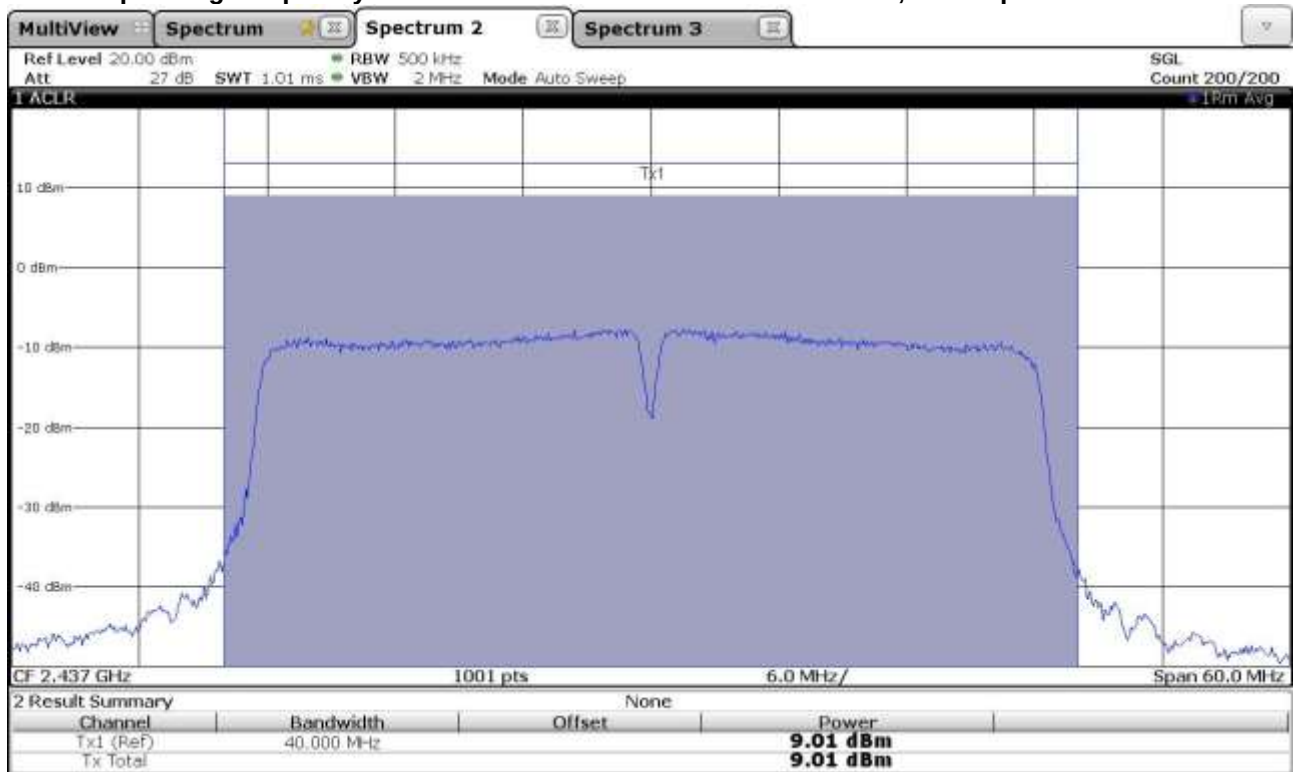
| Channel | Frequency [MHz] | Output Antenna 1 [mW] | Output Antenna 2 [mW] | Total Output Power |       | Limit |      | Result |
|---------|-----------------|-----------------------|-----------------------|--------------------|-------|-------|------|--------|
|         |                 |                       |                       | [dBm]              | [mW]  | [dBm] | [mW] |        |
| 1       | 2412            | 11.75                 | 15.70                 | 14.39              | 27.45 | 30    | 1000 | Pass   |
| 6       | 2437            | 11.91                 | 14.00                 | 14.13              | 25.91 | 30    | 1000 | Pass   |
| 11      | 2462            | 10.94                 | 13.93                 | 13.96              | 24.87 | 30    | 1000 | Pass   |

According to KDB 662911 D01

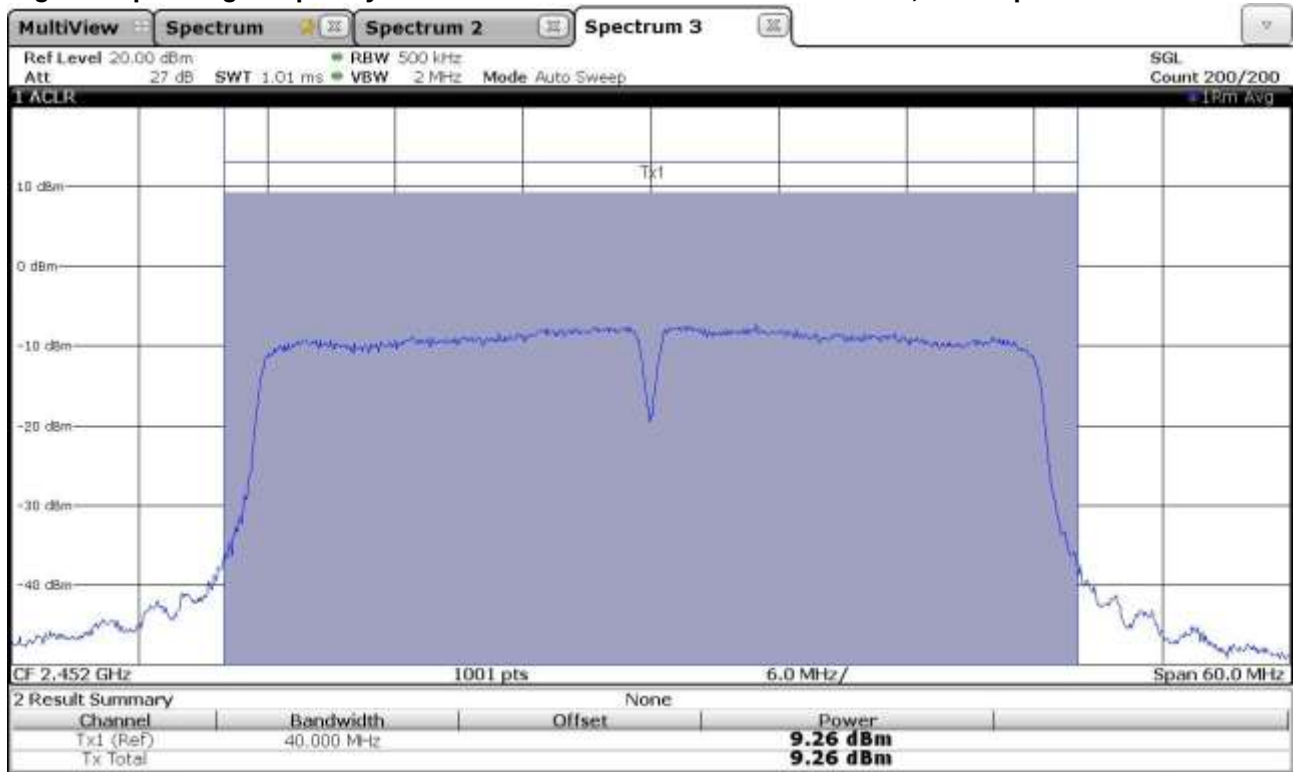
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1

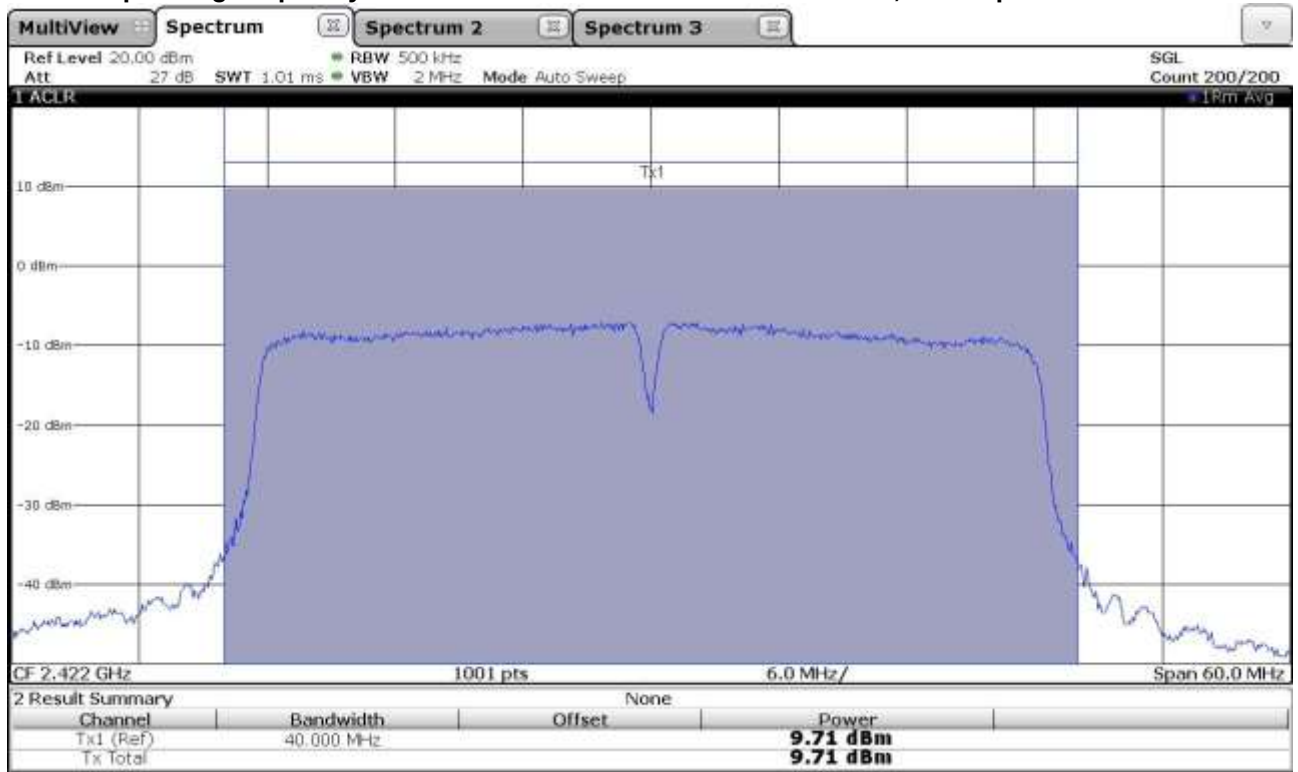


Maximum output power conducted measurement:

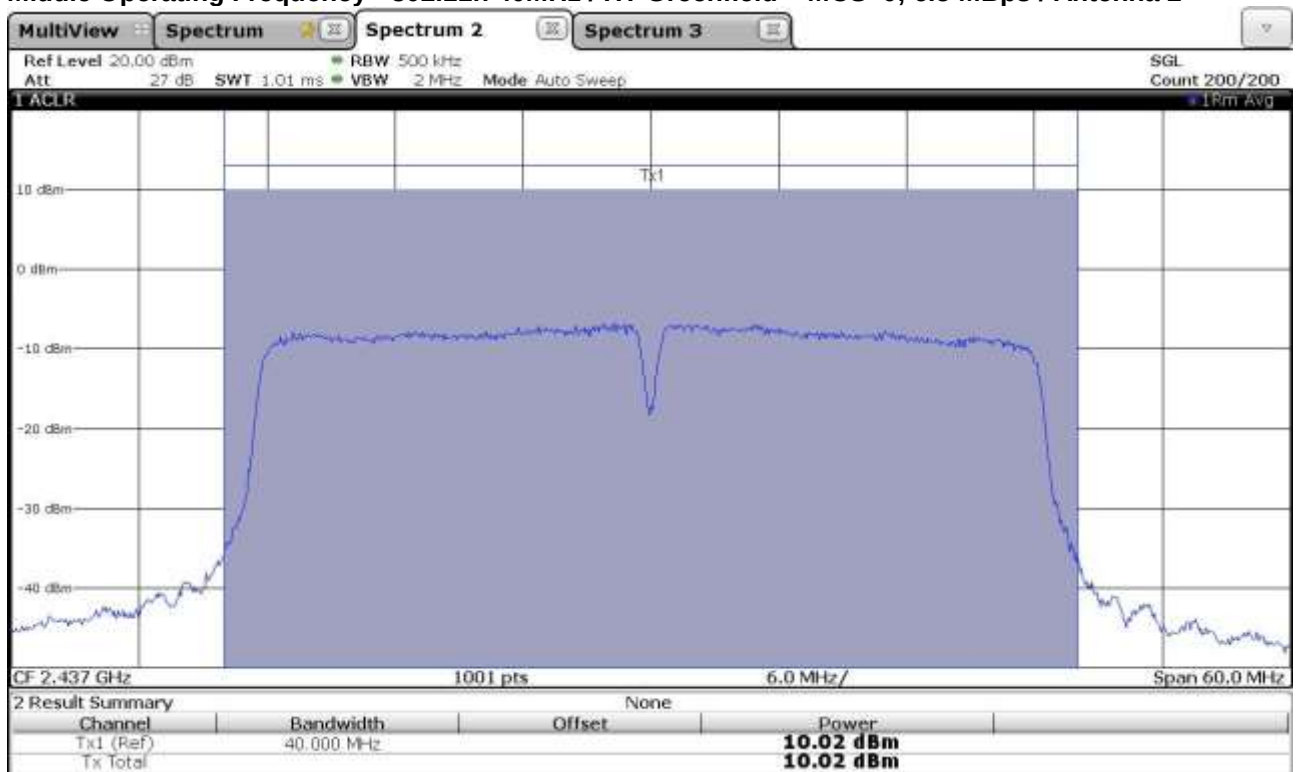
802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 3       | 2422            | 9.32                      | 1.2             | 10.52        | 11.27 | 30    | 1000 | Pass   |
| 6       | 2437            | 9.01                      | 1.2             | 10.21        | 10.50 | 30    | 1000 | Pass   |
| 9       | 2452            | 9.26                      | 1.2             | 10.46        | 11.12 | 30    | 1000 | Pass   |

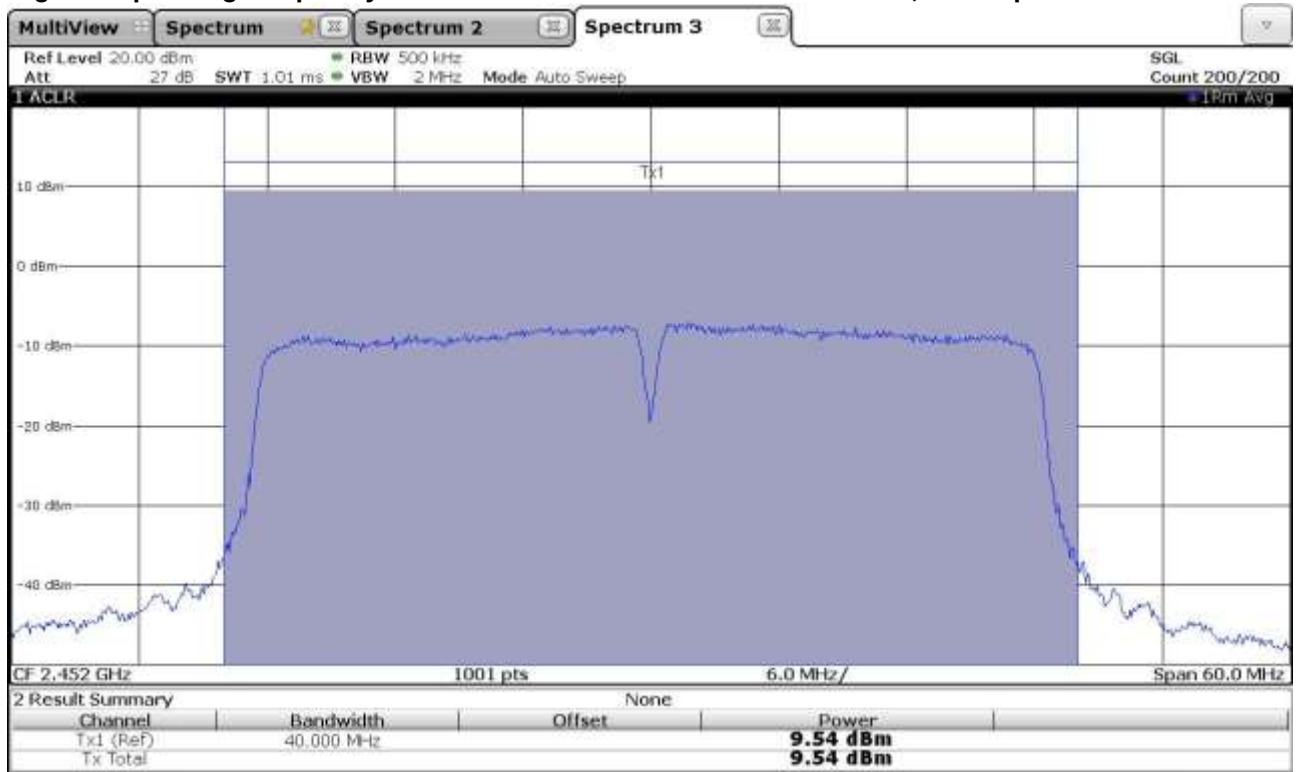
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Maximum output power conducted measurement:  
802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2

| Channel | Frequency [MHz] | Reading of Analyzer [dBm] | Cable Loss [dB] | Output Power |       | Limit |      | Result |
|---------|-----------------|---------------------------|-----------------|--------------|-------|-------|------|--------|
|         |                 |                           |                 | [dBm]        | [mW]  | [dBm] | [mW] |        |
| 3       | 2422            | 9.71                      | 1.2             | 10.91        | 12.33 | 30    | 1000 | Pass   |
| 6       | 2437            | 10.02                     | 1.2             | 11.22        | 13.24 | 30    | 1000 | Pass   |
| 9       | 2452            | 9.54                      | 1.2             | 10.74        | 11.86 | 30    | 1000 | Pass   |

Maximum output power conducted measurement:  
802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1 + Antenna 2

| Channel | Frequency [MHz] | Output Antenna 1 [mW] | Output Antenna 2 [mW] | Total Output Power |       | Limit |      | Result |
|---------|-----------------|-----------------------|-----------------------|--------------------|-------|-------|------|--------|
|         |                 |                       |                       | [dBm]              | [mW]  | [dBm] | [mW] |        |
| 3       | 2422            | 11.27                 | 12.33                 | 13.73              | 23.60 | 30    | 1000 | Pass   |
| 6       | 2437            | 10.50                 | 13.24                 | 13.75              | 23.74 | 30    | 1000 | Pass   |
| 9       | 2452            | 11.12                 | 11.86                 | 13.61              | 22.98 | 30    | 1000 | Pass   |

According to KDB 662911 D01

## Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements of **Output Power of Fundamental Emissions**.

### 7.3. Power Spectral Density

**Applied standards**

- e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (e)
- RSS-247 issue 2 Section 5.2 (b)

**Limit**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

**Test equipment and test set up**

Test equipment used for conducted measurements as given in clause Test equipment of this report.  
Test setup used for conducted measurements as given in clause Test setups of this report.

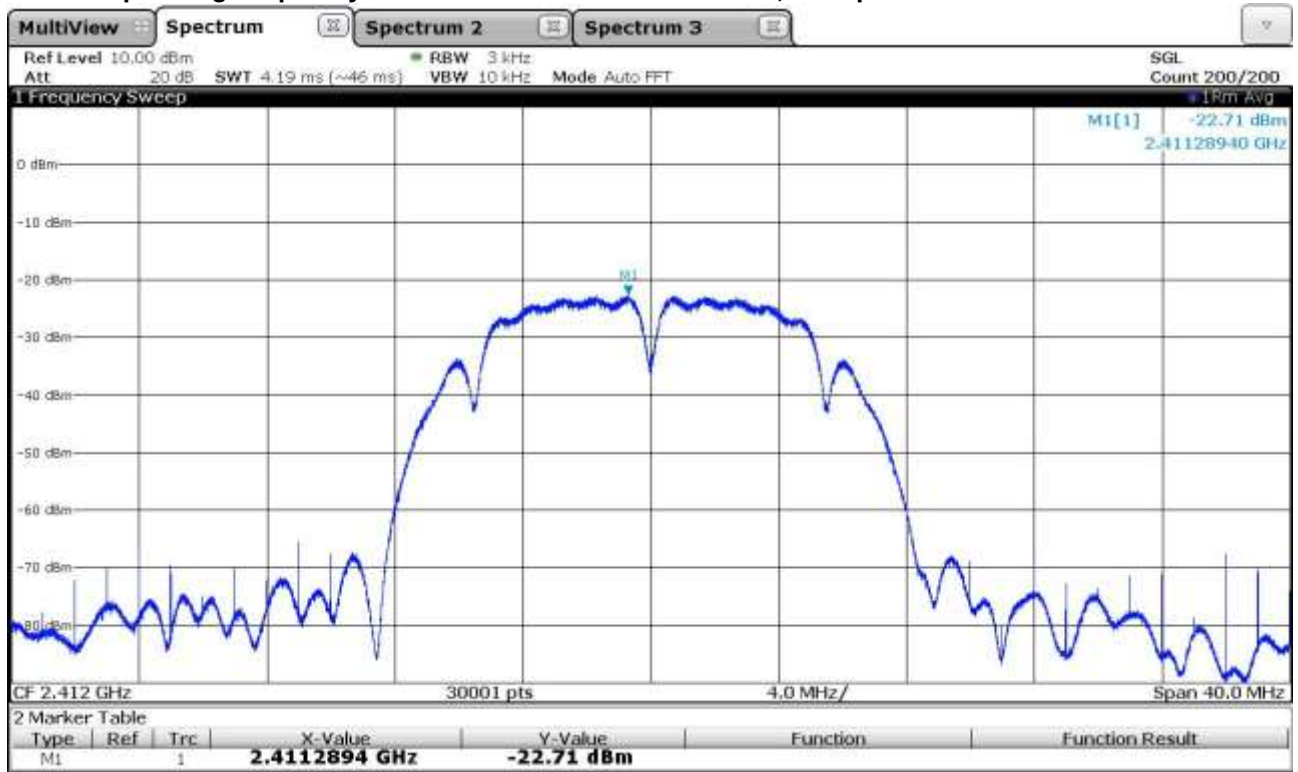
**Description**

The maximum average conducted output power was used to determine compliance to the fundamental output power limit. So the maximum average conducted PSD level is measured with a power averaging (rms) detector.

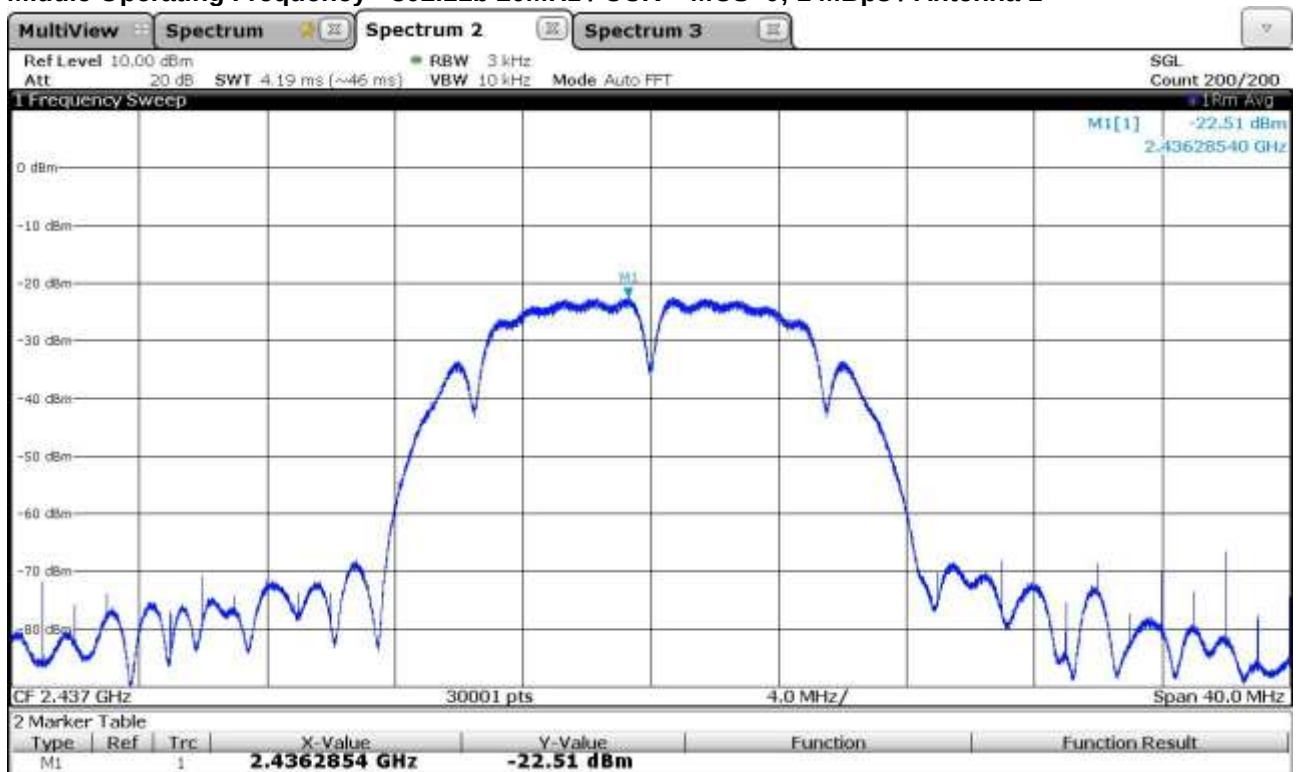
**Measurement**

The Measurement was performed on: 01.04.2020 and 02.04.2020

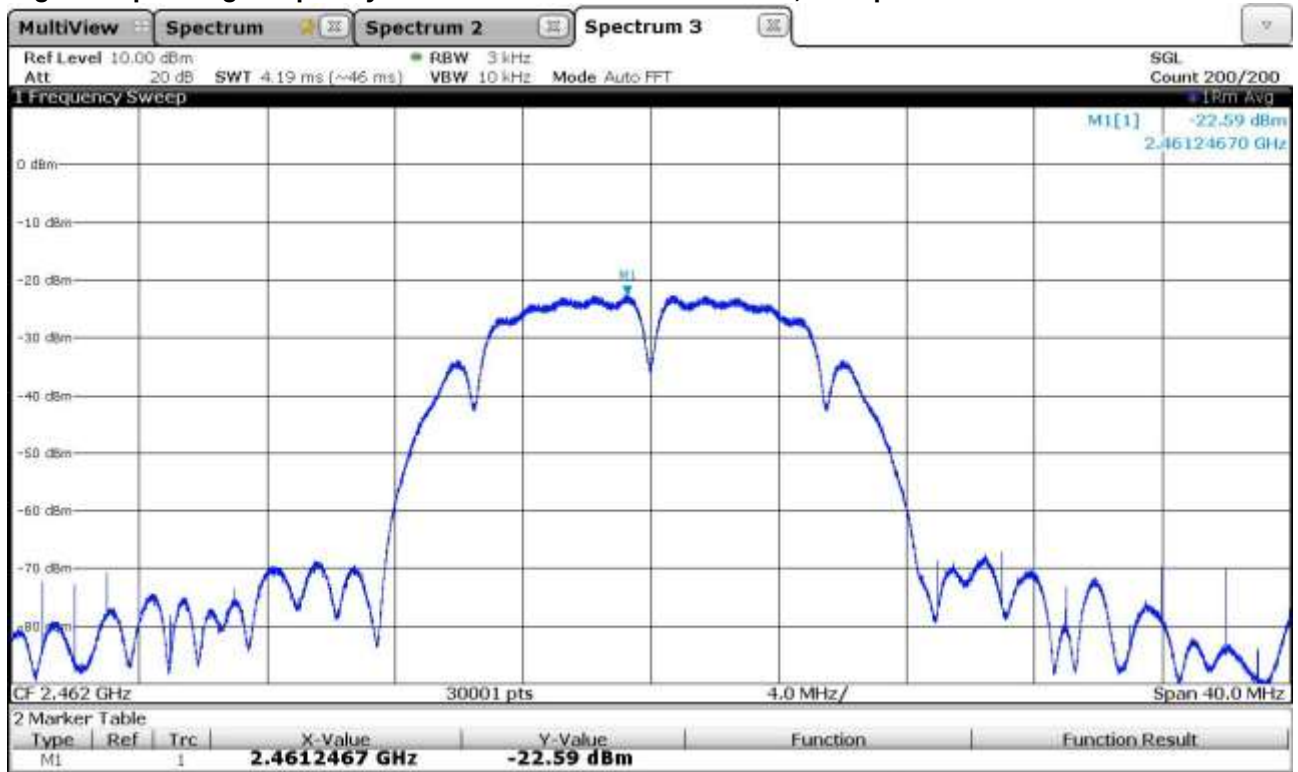
Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



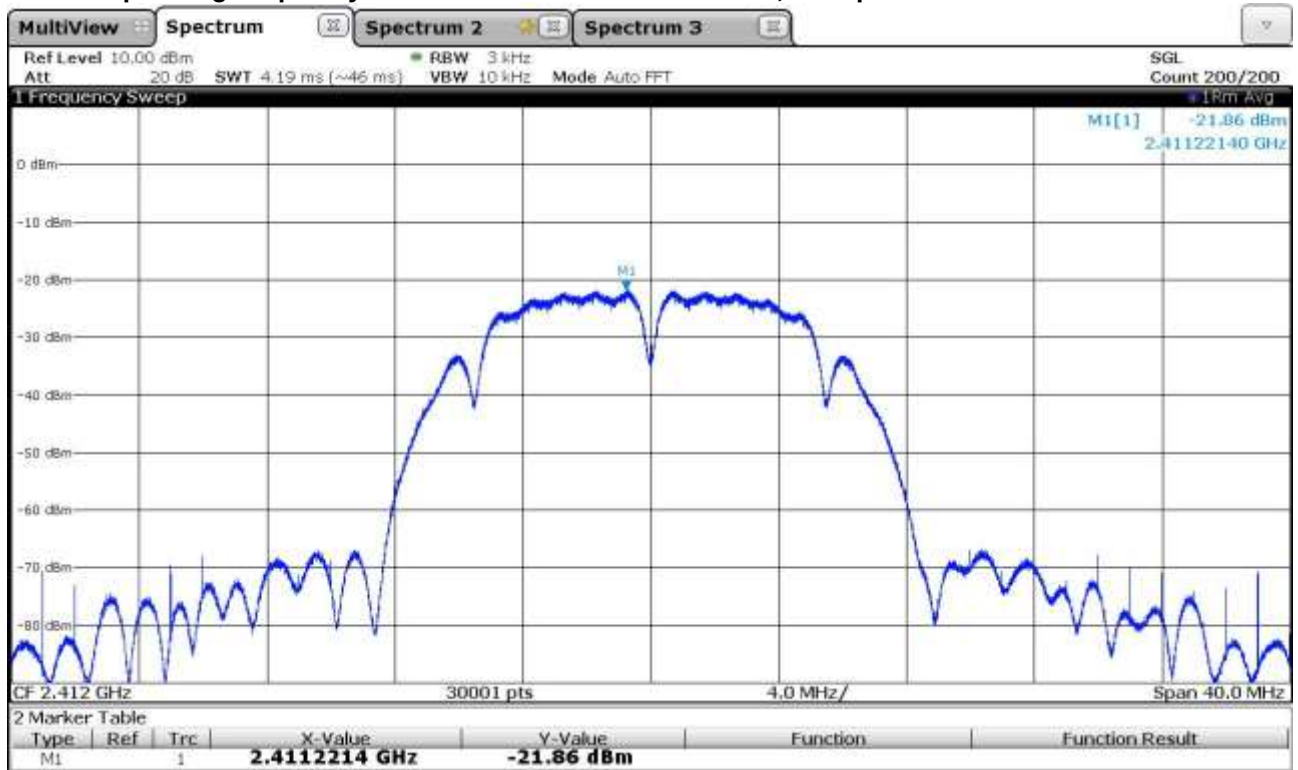
**Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1**



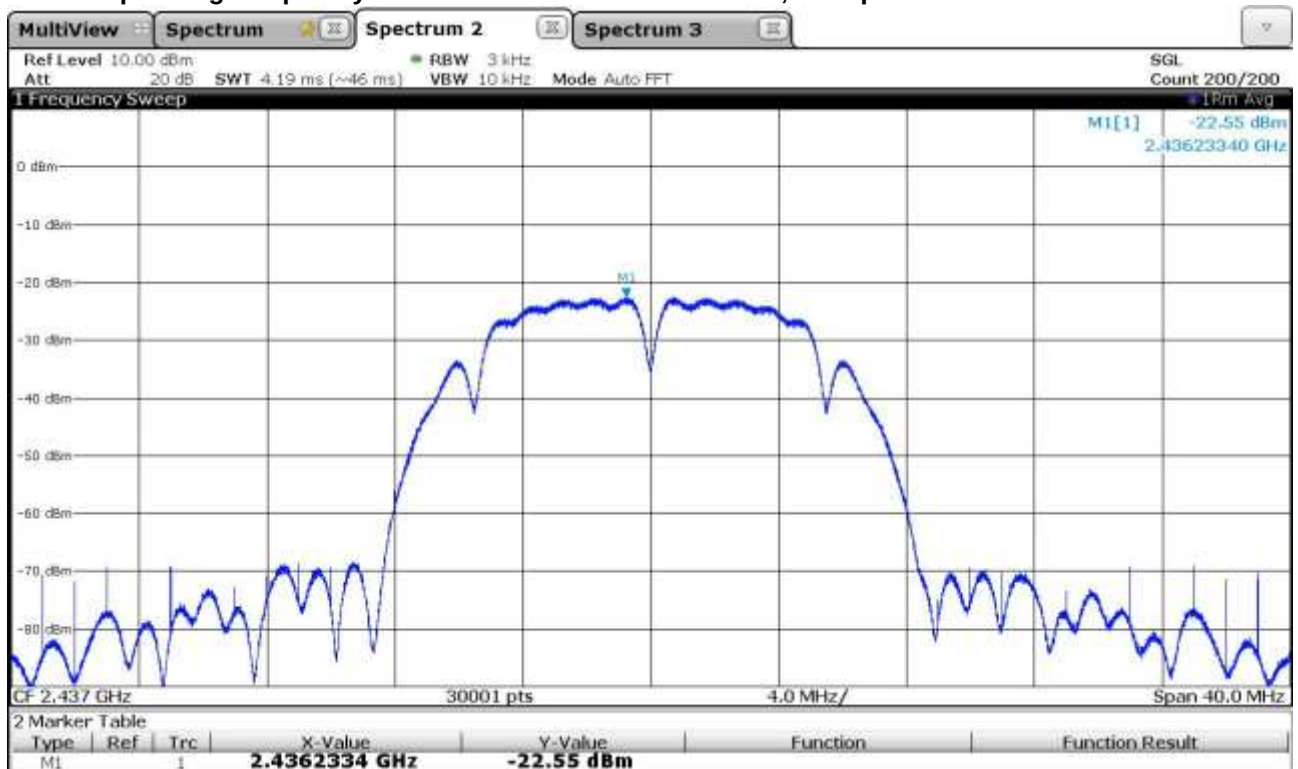
**Maximum power spectral density  
802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -22.71                            | 1.2             | -21.51                               | 8                   | Pass   |
| 6       | 2437            | -22.51                            | 1.2             | -21.31                               | 8                   | Pass   |
| 11      | 2462            | -22.59                            | 1.2             | -21.39                               | 8                   | Pass   |

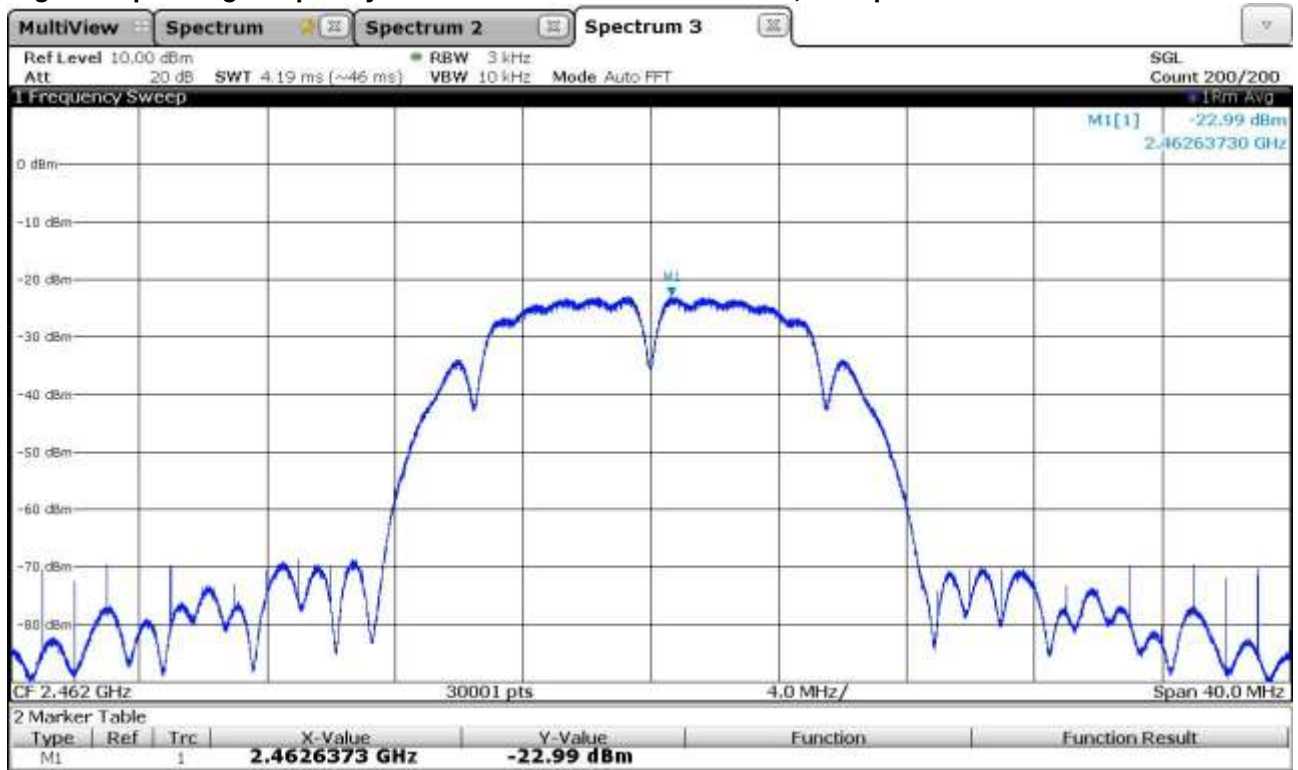
Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



**Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**



**Maximum power spectral density  
802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2**

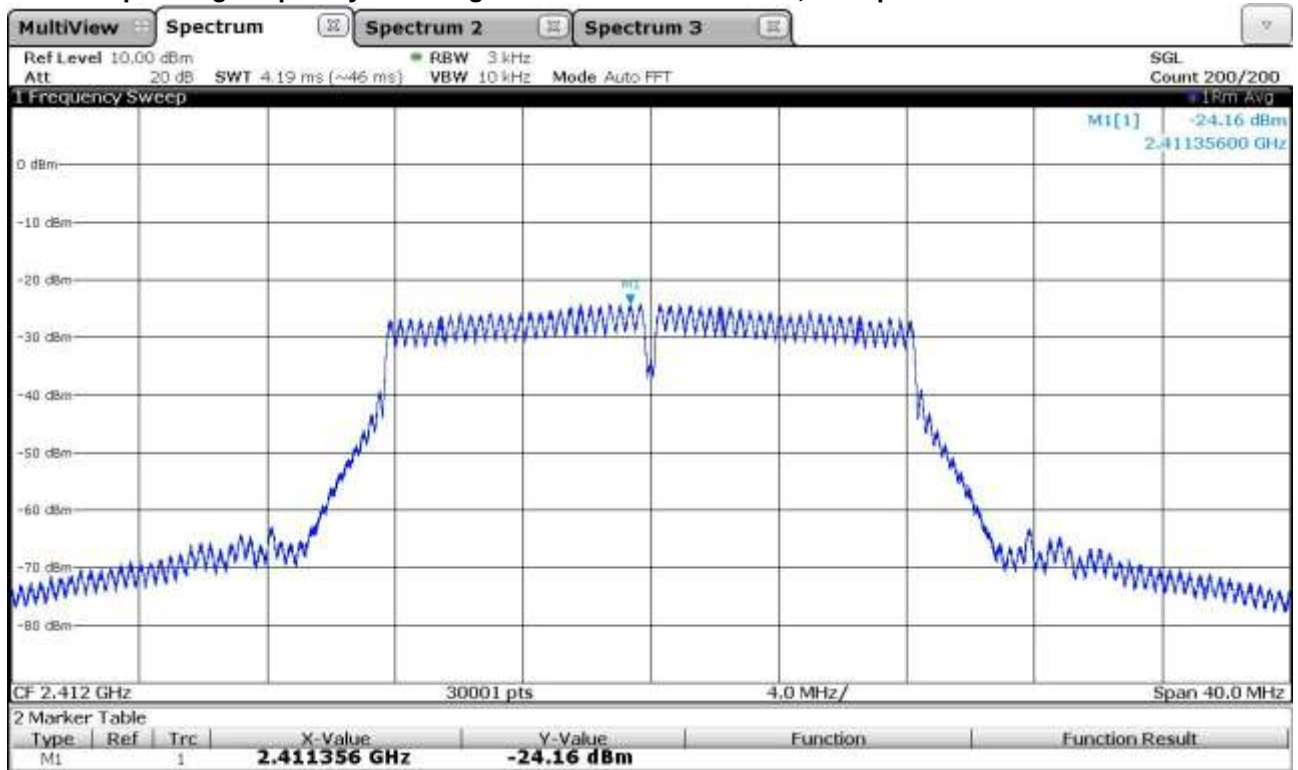
| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -21.86                            | 1.2             | -20.66                               | 8                   | Pass   |
| 6       | 2437            | -22.55                            | 1.2             | -21.35                               | 8                   | Pass   |
| 11      | 2462            | -22.99                            | 1.2             | -21.79                               | 8                   | Pass   |

**Maximum power spectral density  
802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1 + Antenna 2**

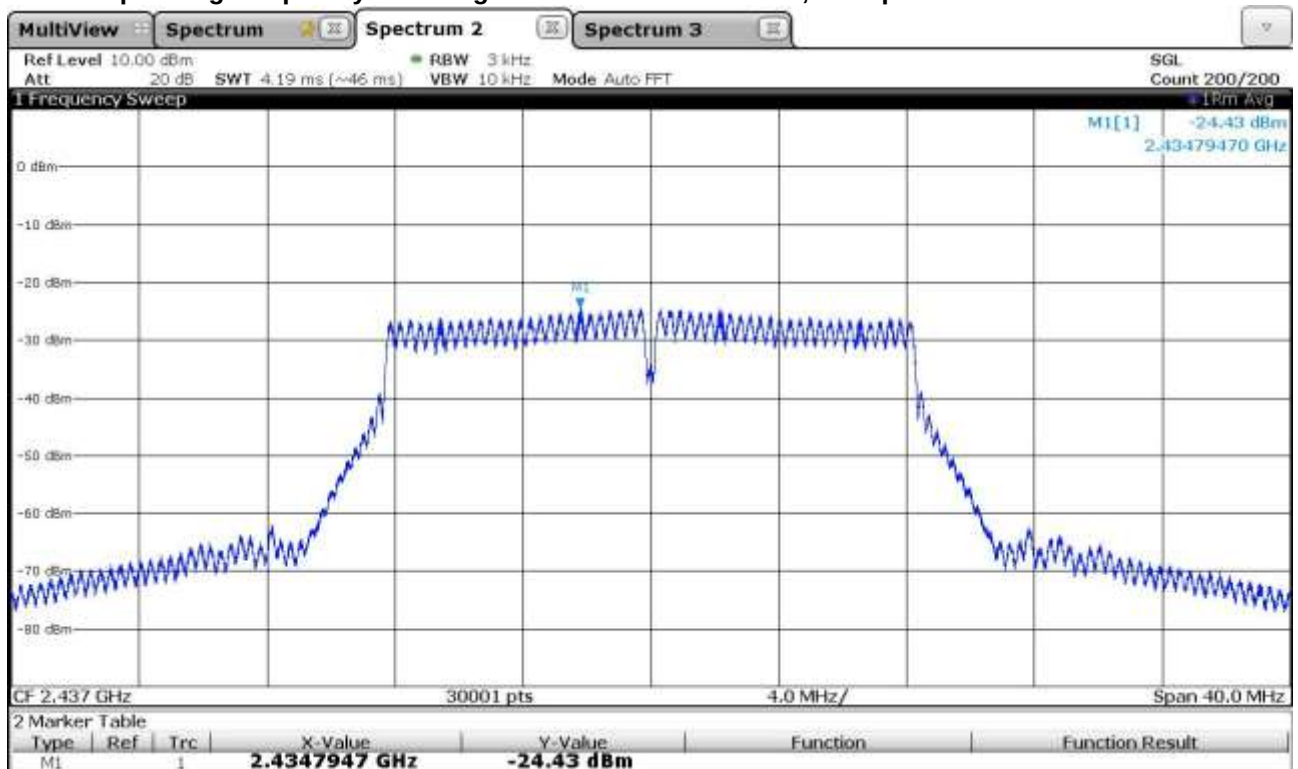
| Channel | Frequency [MHz] | Highest PSD of Ant 1 or Ant 2 [dBm/3kHz] | PSD calculated * Ant1 + Ant 2 [dBm/3kHz] | Limit [dBm/3kHz] | Result |
|---------|-----------------|------------------------------------------|------------------------------------------|------------------|--------|
| 1       | 2412            | -20,66                                   | -17.65                                   | 8                | Pass   |
| 6       | 2437            | -21,31                                   | -18.30                                   | 8                | Pass   |
| 11      | 2462            | -21,39                                   | -18.38                                   | 8                | Pass   |

\*According to KDB 662911 D01, add  $10 \log (N_{ANT})$  dB,  $N = 2$

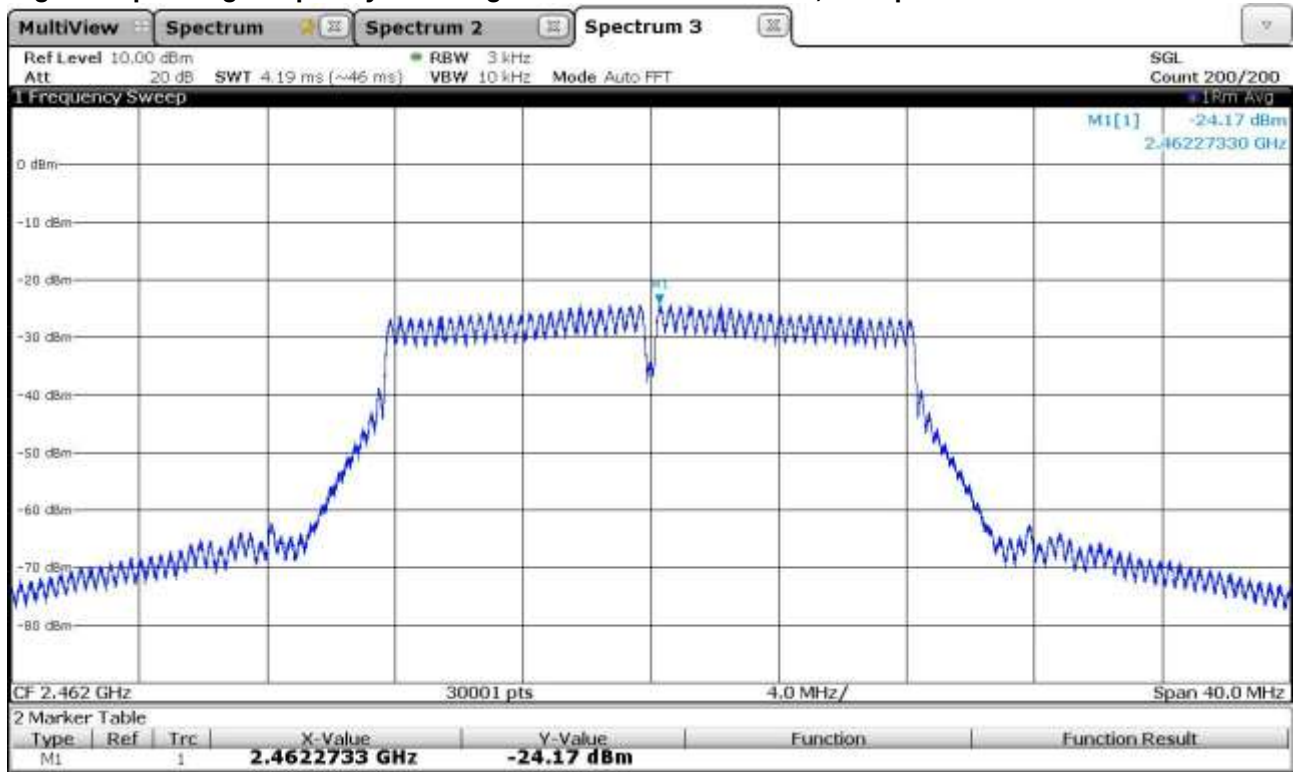
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



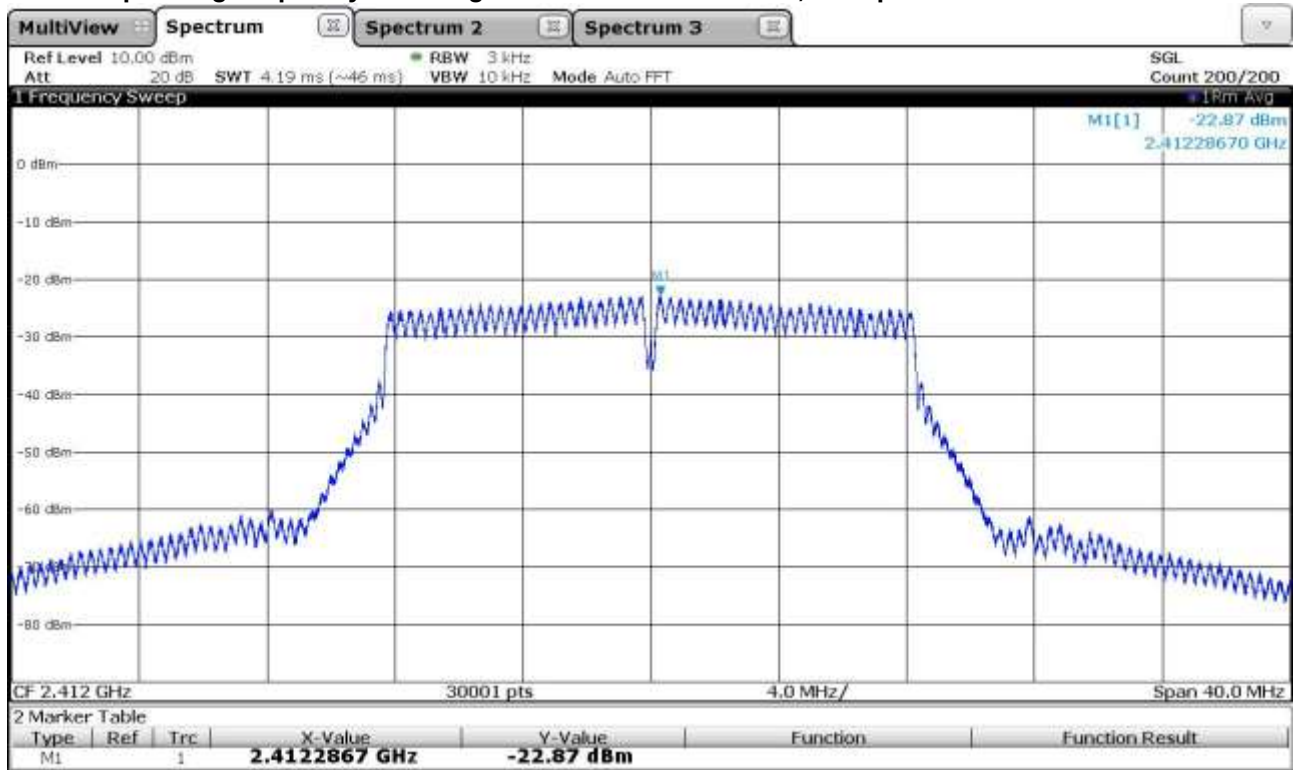
**Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1**



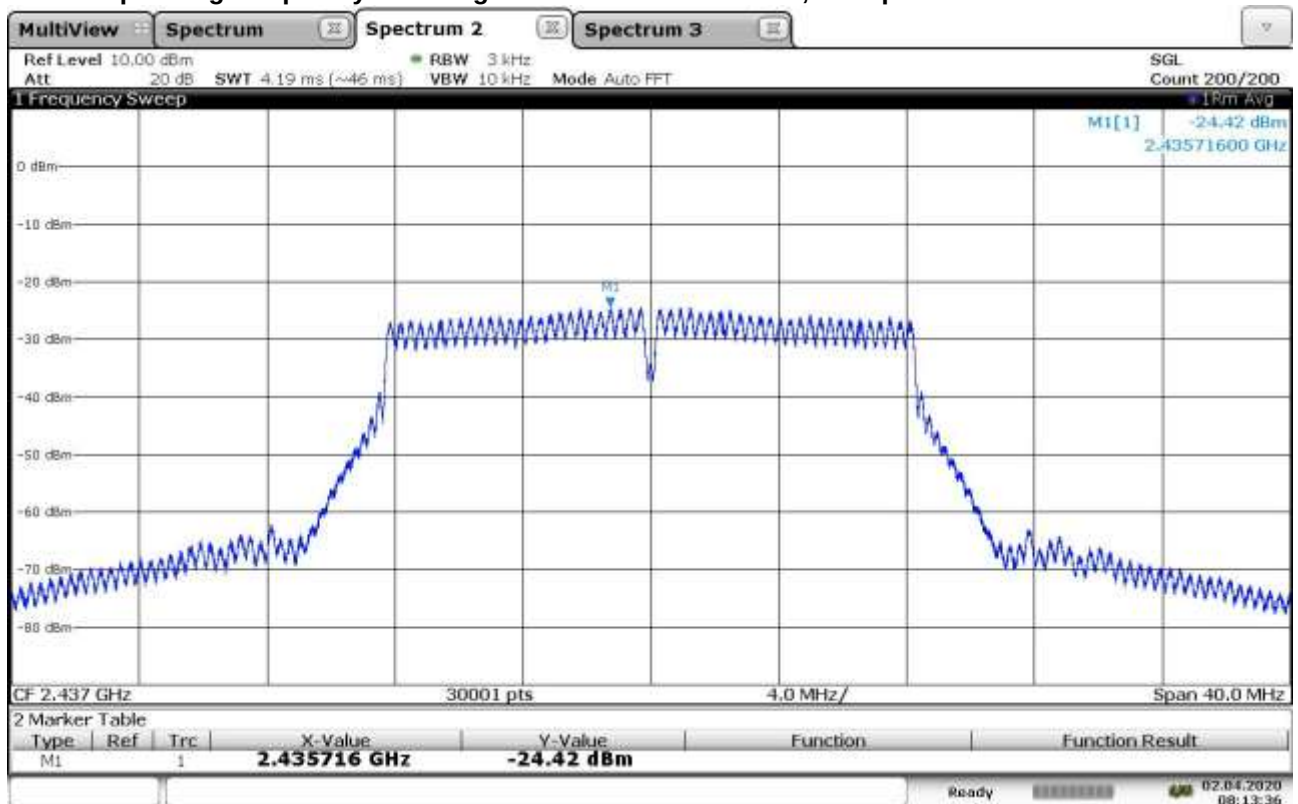
**Maximum power spectral density  
802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -24.16                            | 1.2             | -22.96                               | 8                   | Pass   |
| 6       | 2437            | -24.43                            | 1.2             | -23.23                               | 8                   | Pass   |
| 11      | 2462            | -24.17                            | 1.2             | -22.97                               | 8                   | Pass   |

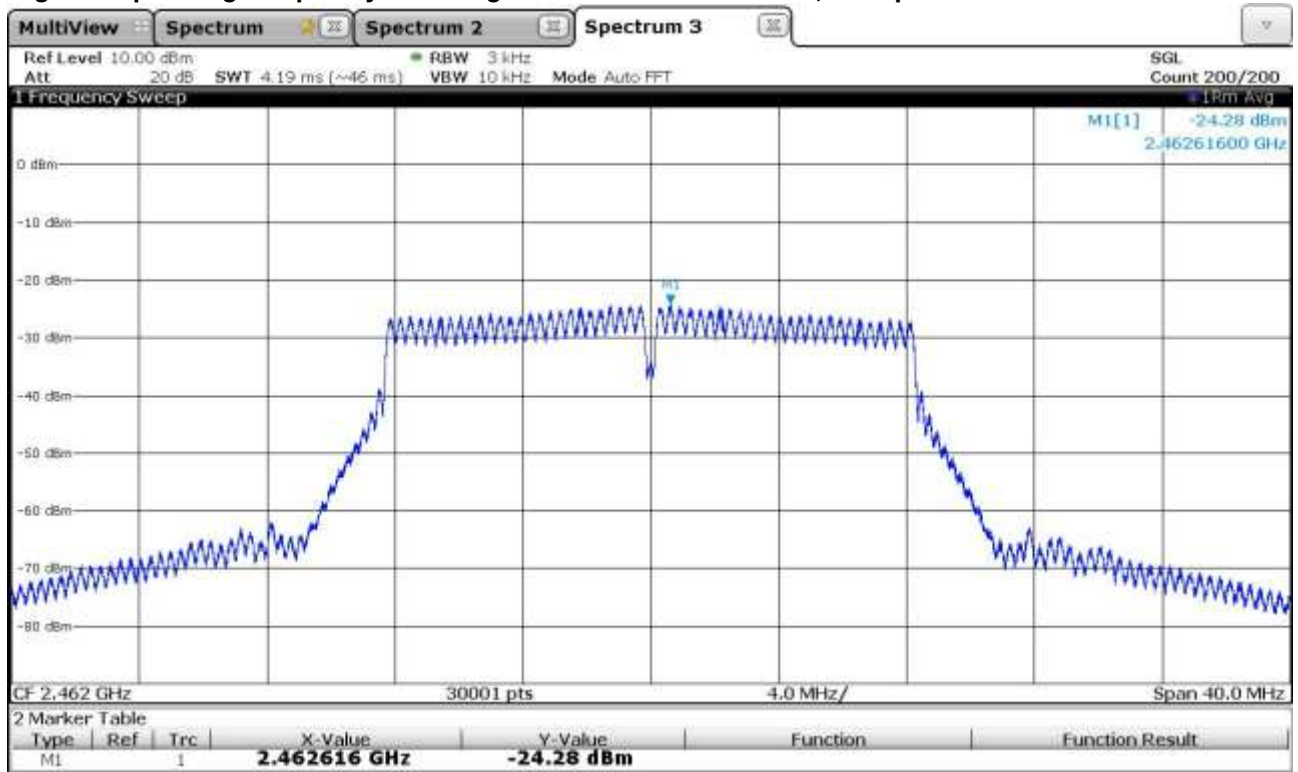
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



# Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



## Maximum power spectral density 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2

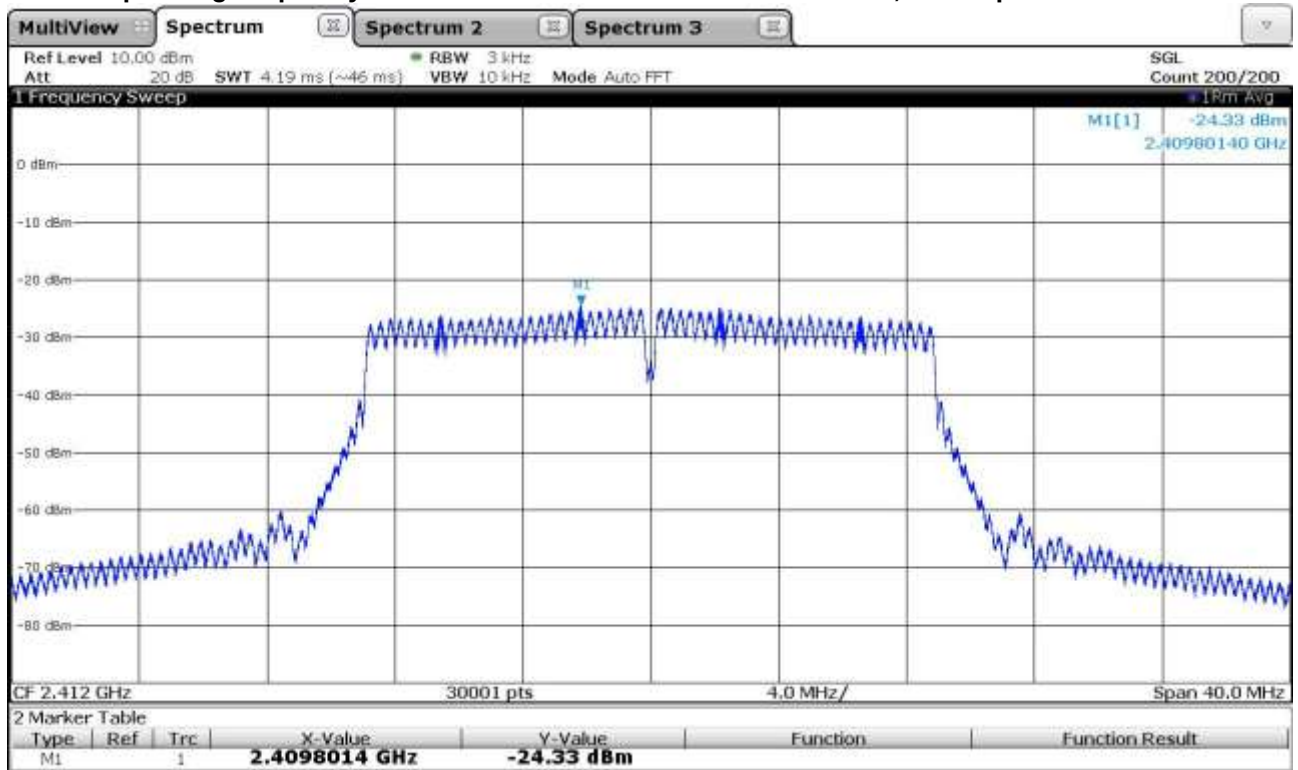
| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -22.87                            | 1.2             | -21.67                               | 8                   | Pass   |
| 6       | 2437            | -24.42                            | 1.2             | -23.22                               | 8                   | Pass   |
| 11      | 2462            | -24.28                            | 1.2             | -23.08                               | 8                   | Pass   |

## Maximum power spectral density 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1 + Antenna 2

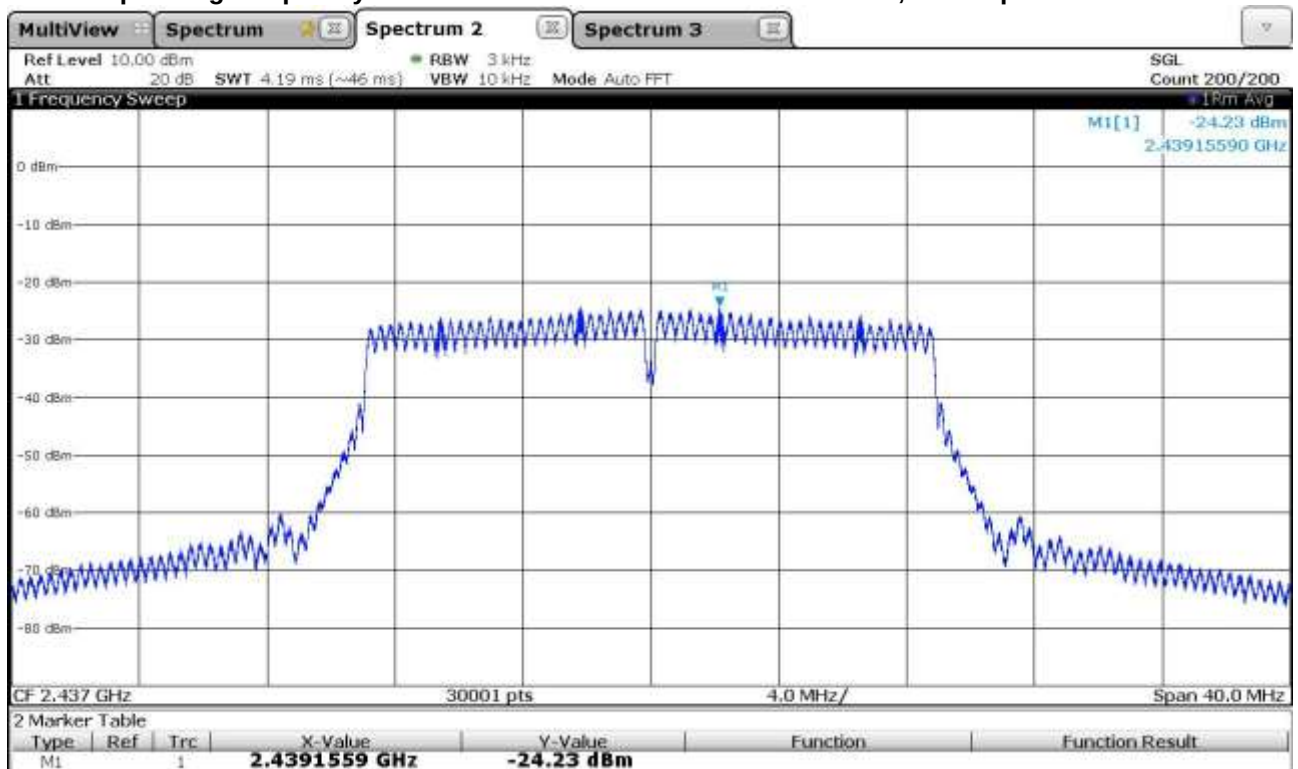
| Channel | Frequency [MHz] | Highest PSD of Ant 1 or Ant 2 [dBm/3kHz] | PSD calculated * Ant1 + Ant 2 [dBm/3kHz] | Limit [dBm/3kHz] | Result |
|---------|-----------------|------------------------------------------|------------------------------------------|------------------|--------|
| 1       | 2412            | -21,67                                   | -18.66                                   | 8                | Pass   |
| 6       | 2437            | -23.22                                   | -20.21                                   | 8                | Pass   |
| 11      | 2462            | -22,97                                   | -19.96                                   | 8                | Pass   |

\*According to KDB 662911 D01, add 10 log (N<sub>ANT</sub>) dB, N = 2

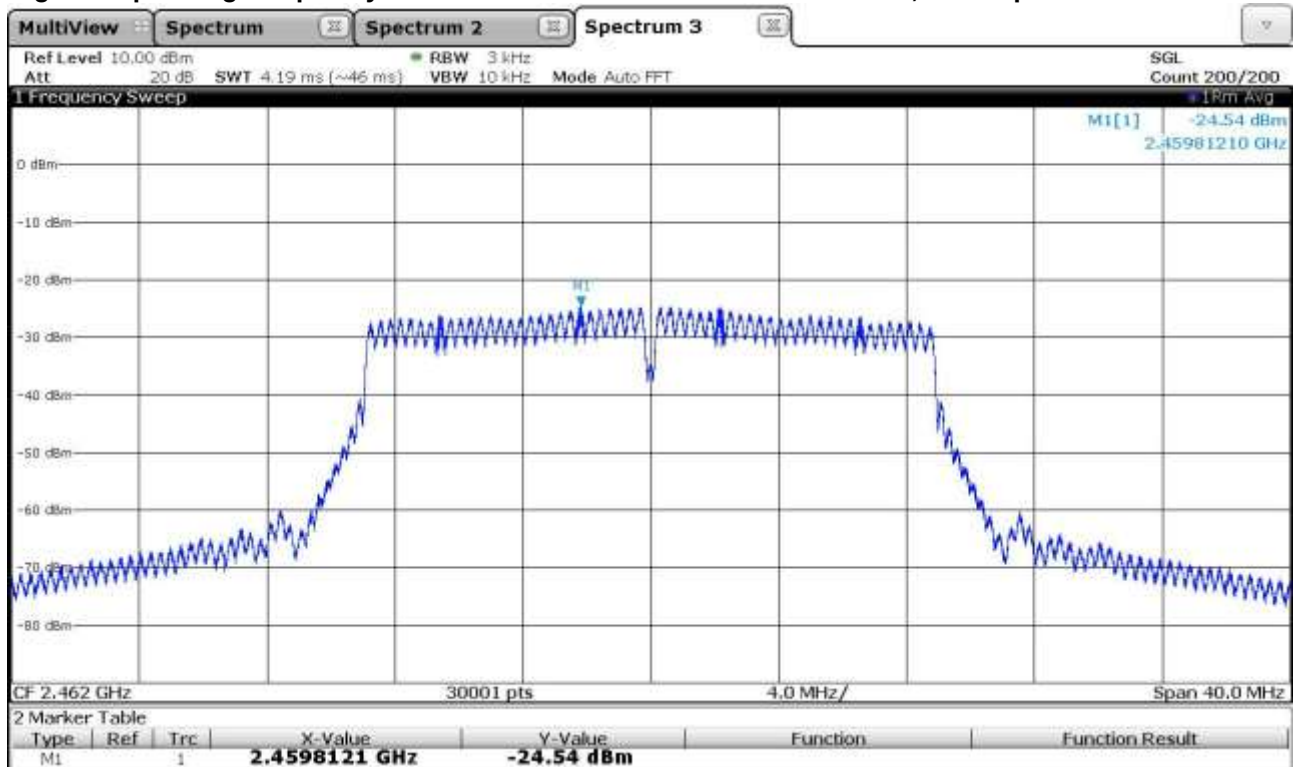
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



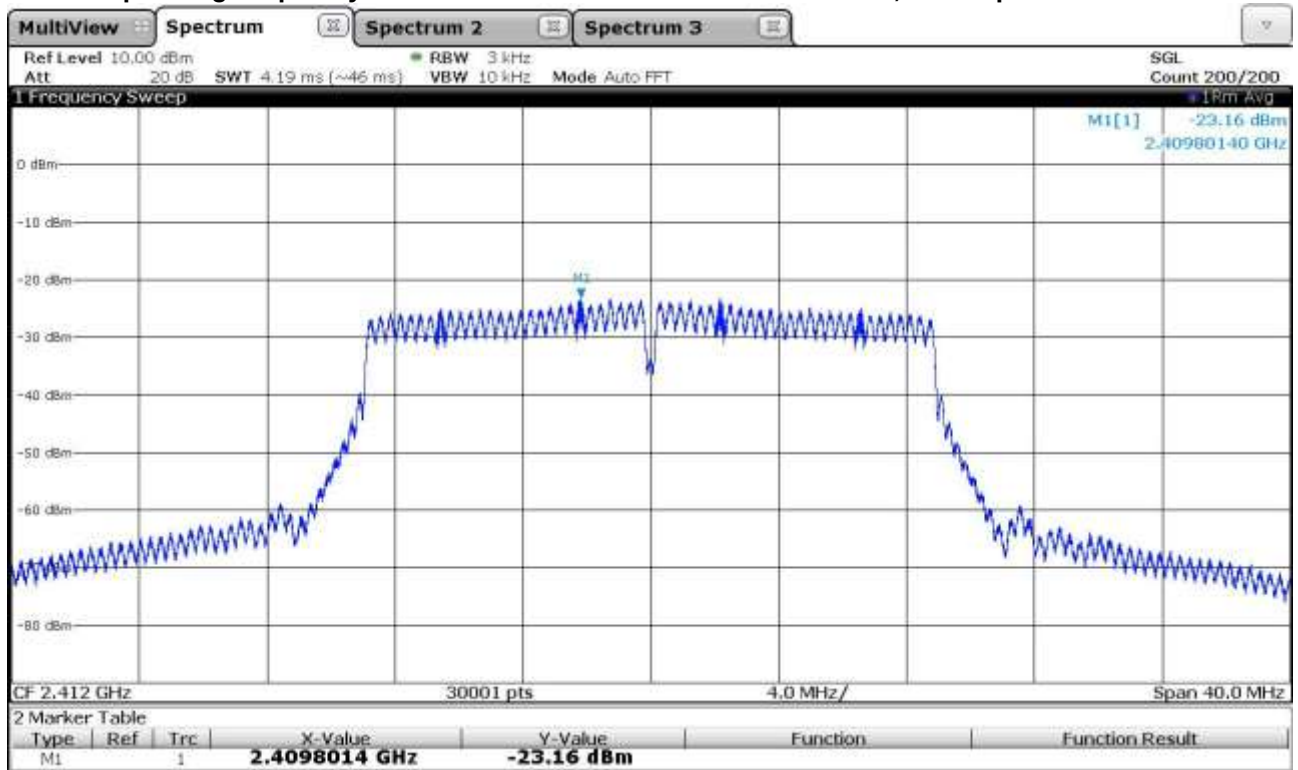
**Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**



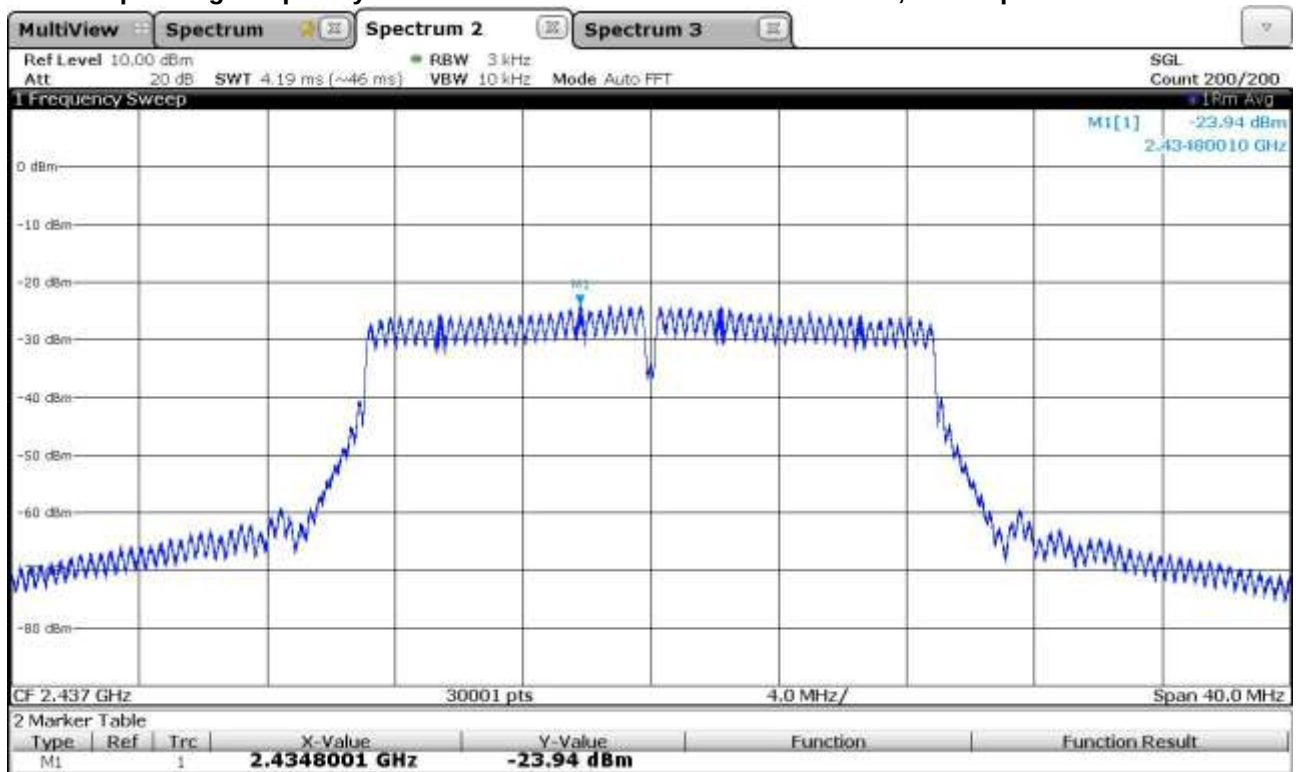
**Maximum power spectral density  
802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**

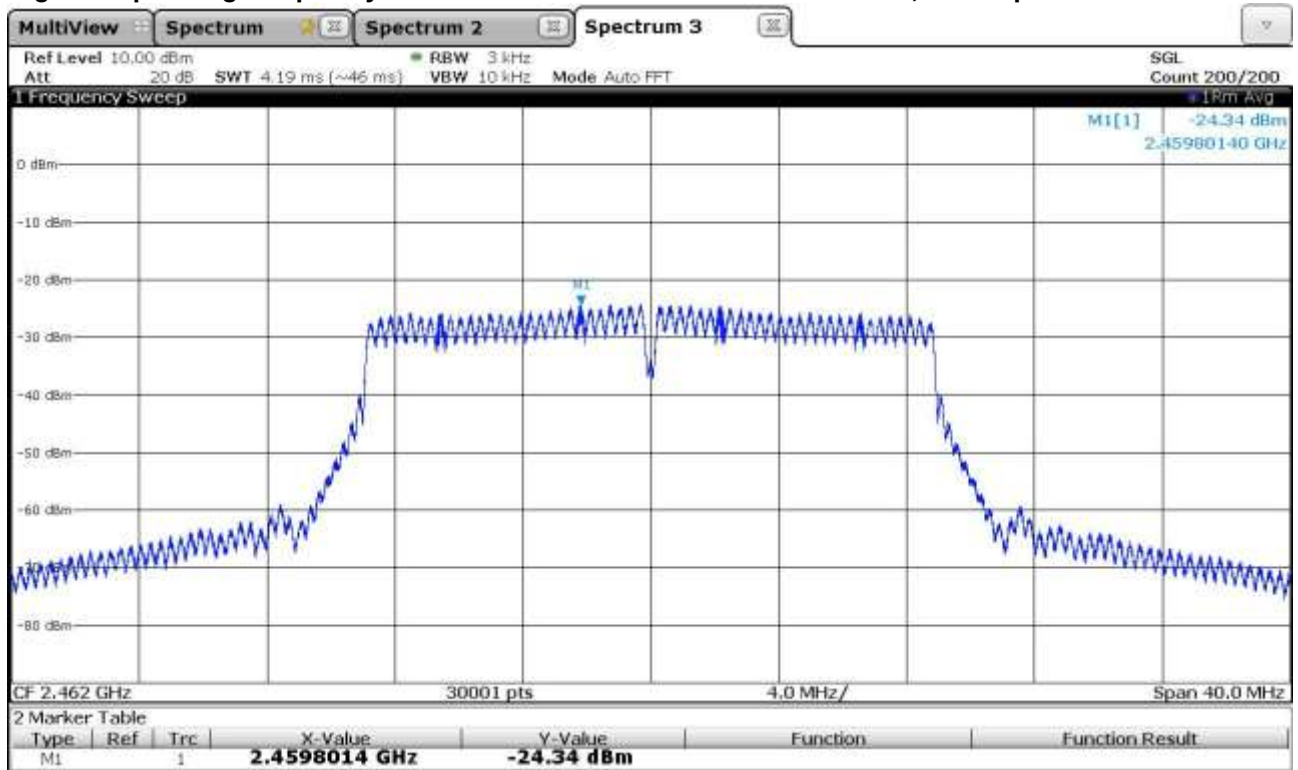
| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -24.33                            | 1.2             | -23.13                               | 8                   | Pass   |
| 6       | 2437            | -24.23                            | 1.2             | -23.03                               | 8                   | Pass   |
| 11      | 2462            | -24.54                            | 1.2             | -23.34                               | 8                   | Pass   |

Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



**Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**

**Maximum power spectral density  
802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**

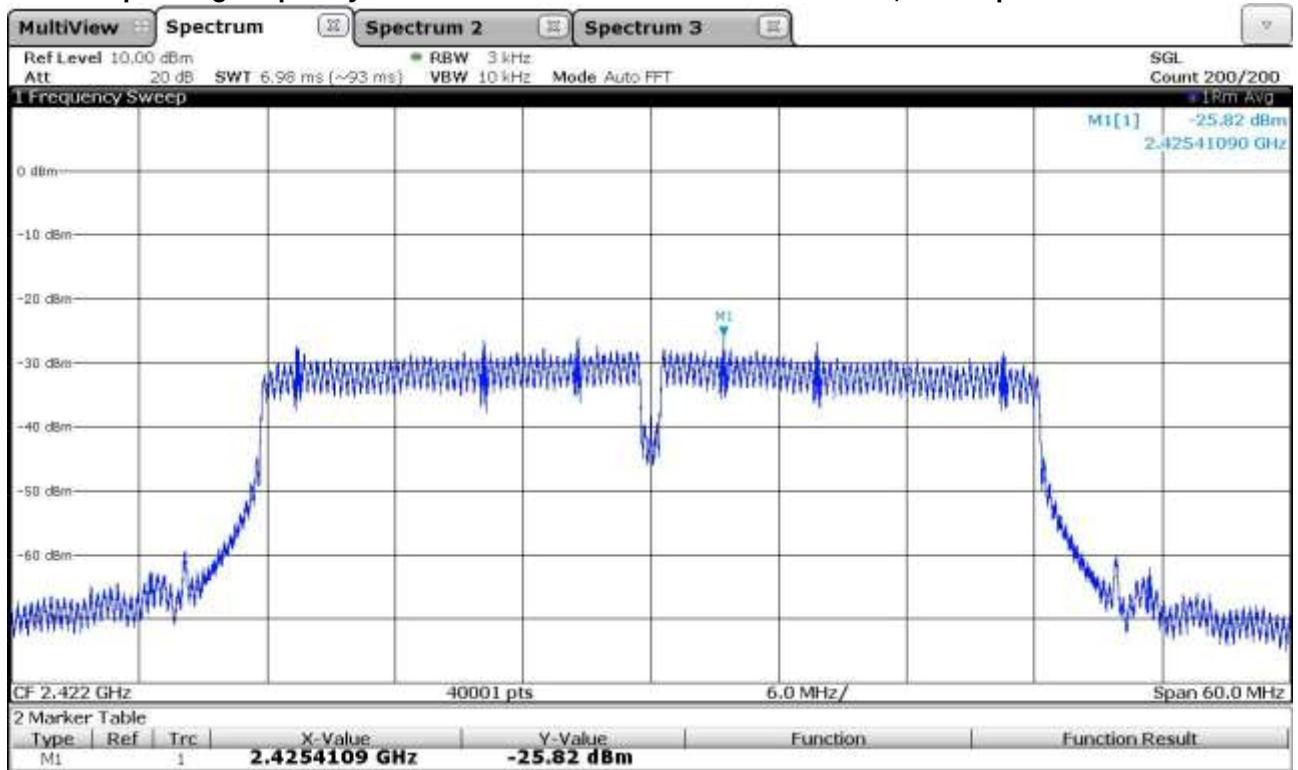
| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 1       | 2412            | -23.16                            | 1.2             | -21.96                               | 8                   | Pass   |
| 6       | 2437            | -23.94                            | 1.2             | -22.74                               | 8                   | Pass   |
| 11      | 2462            | -24.34                            | 1.2             | -23.14                               | 8                   | Pass   |

**Maximum power spectral density  
802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1 + Antenna 2**

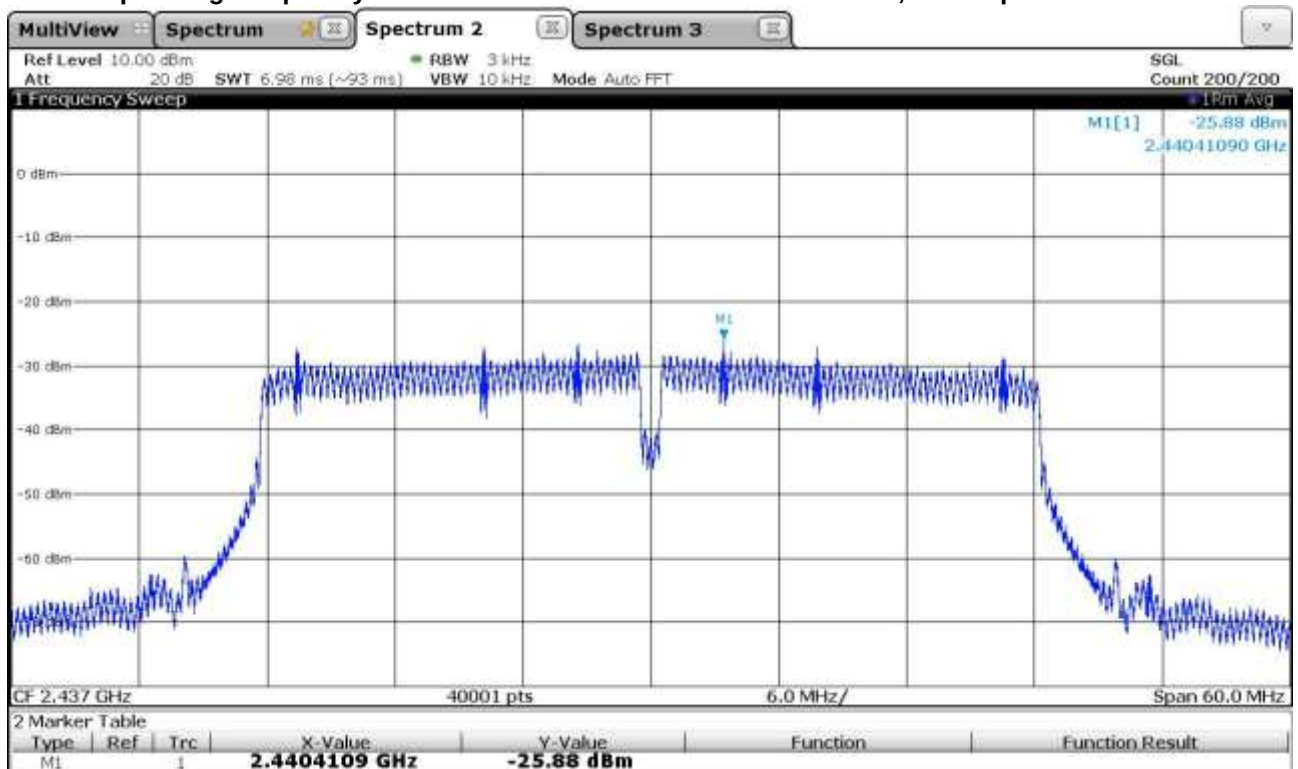
| Channel | Frequency [MHz] | Highest PSD of Ant 1 or Ant 2 [dBm/3kHz] | PSD calculated * Ant1 + Ant 2 [dBm/3kHz] | Limit [dBm/3kHz] | Result |
|---------|-----------------|------------------------------------------|------------------------------------------|------------------|--------|
| 1       | 2412            | -21.96                                   | -18.95                                   | 8                | Pass   |
| 6       | 2437            | -22.74                                   | -19.73                                   | 8                | Pass   |
| 11      | 2462            | -23.14                                   | -20.13                                   | 8                | Pass   |

\*According to KDB 662911 D01, add  $10 \log(N_{ANT})$  dB,  $N = 2$

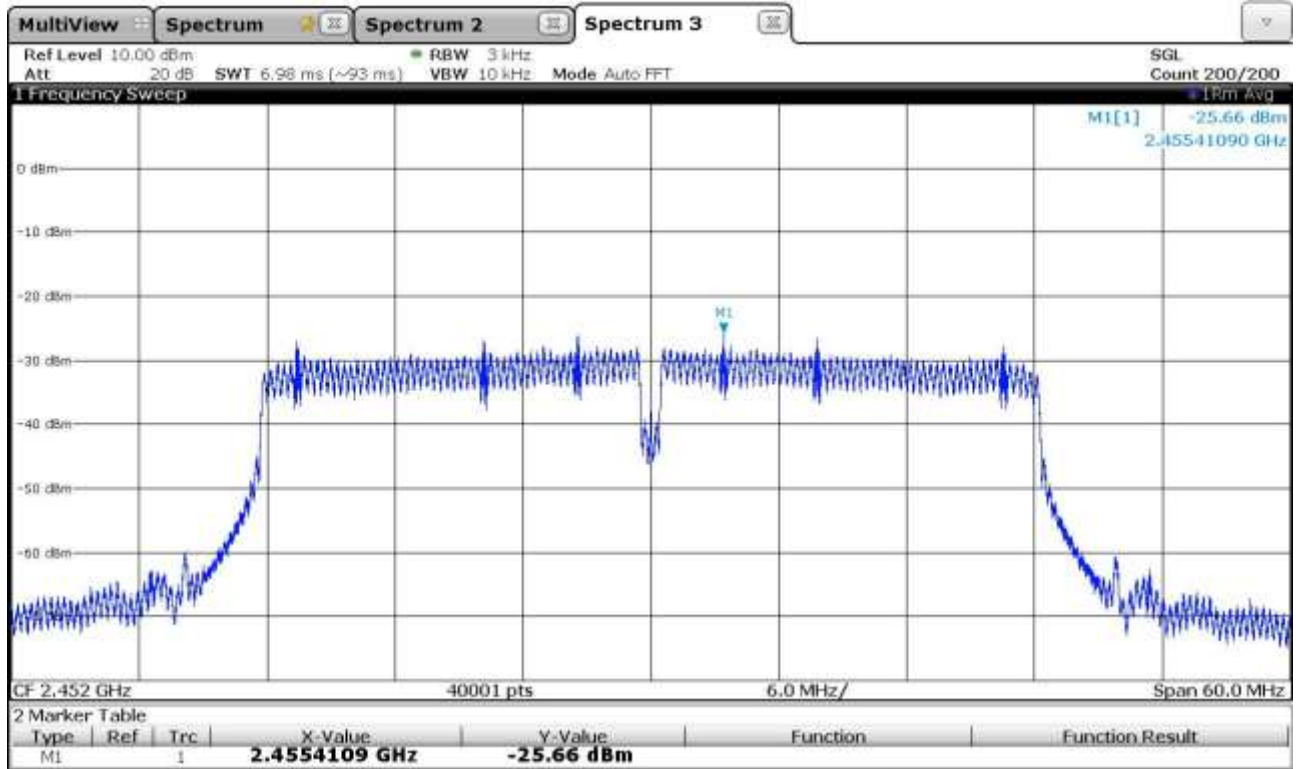
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



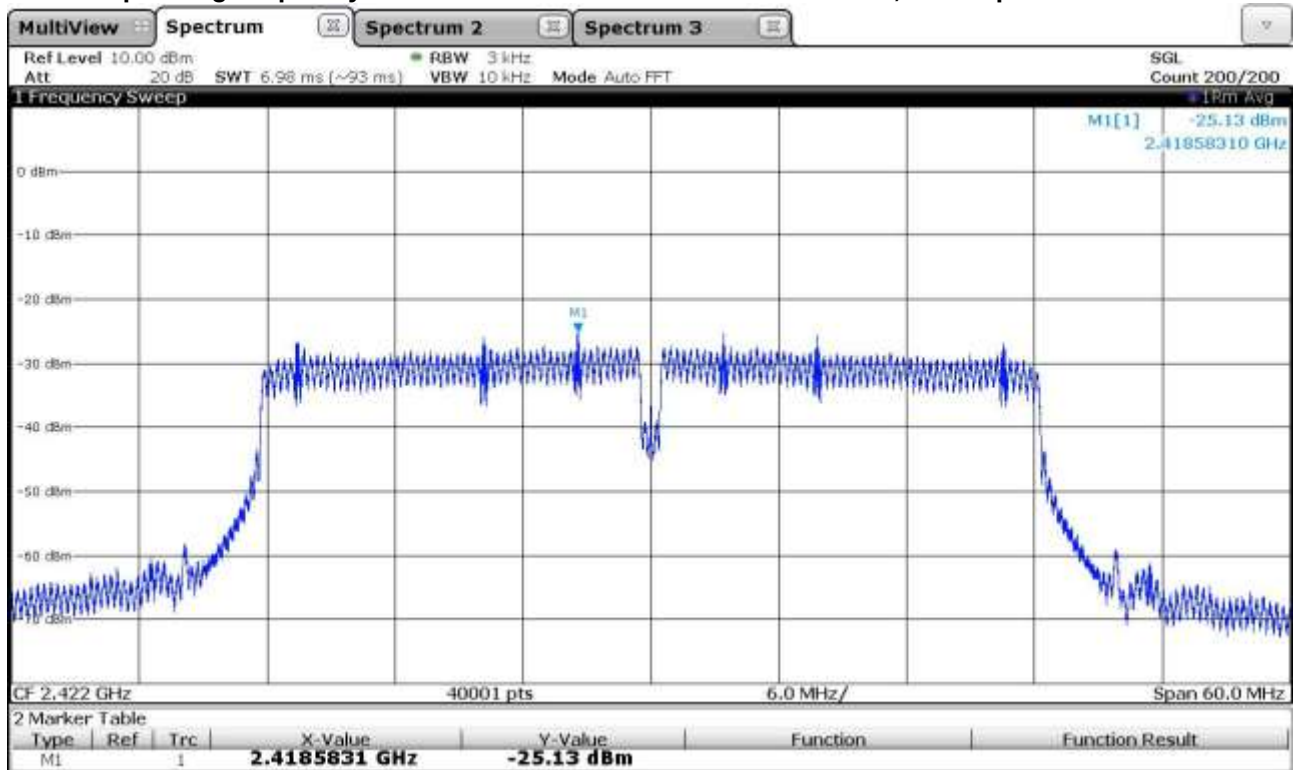
**Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**



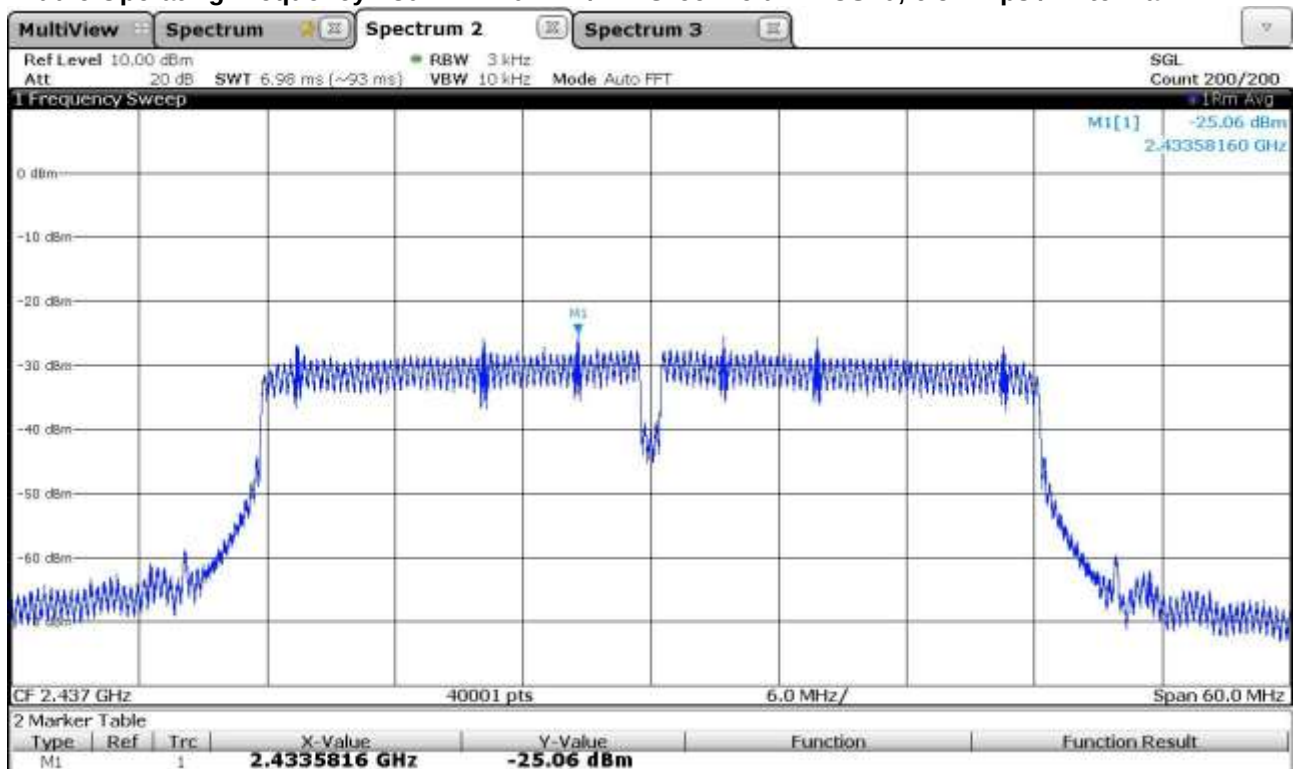
**Maximum power spectral density**  
**802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1**

| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 3       | 2422            | -25.82                            | 1.2             | -24.62                               | 8                   | Pass   |
| 6       | 2437            | -25.88                            | 1.2             | -24.68                               | 8                   | Pass   |
| 9       | 2452            | -25.66                            | 1.2             | -24.46                               | 8                   | Pass   |

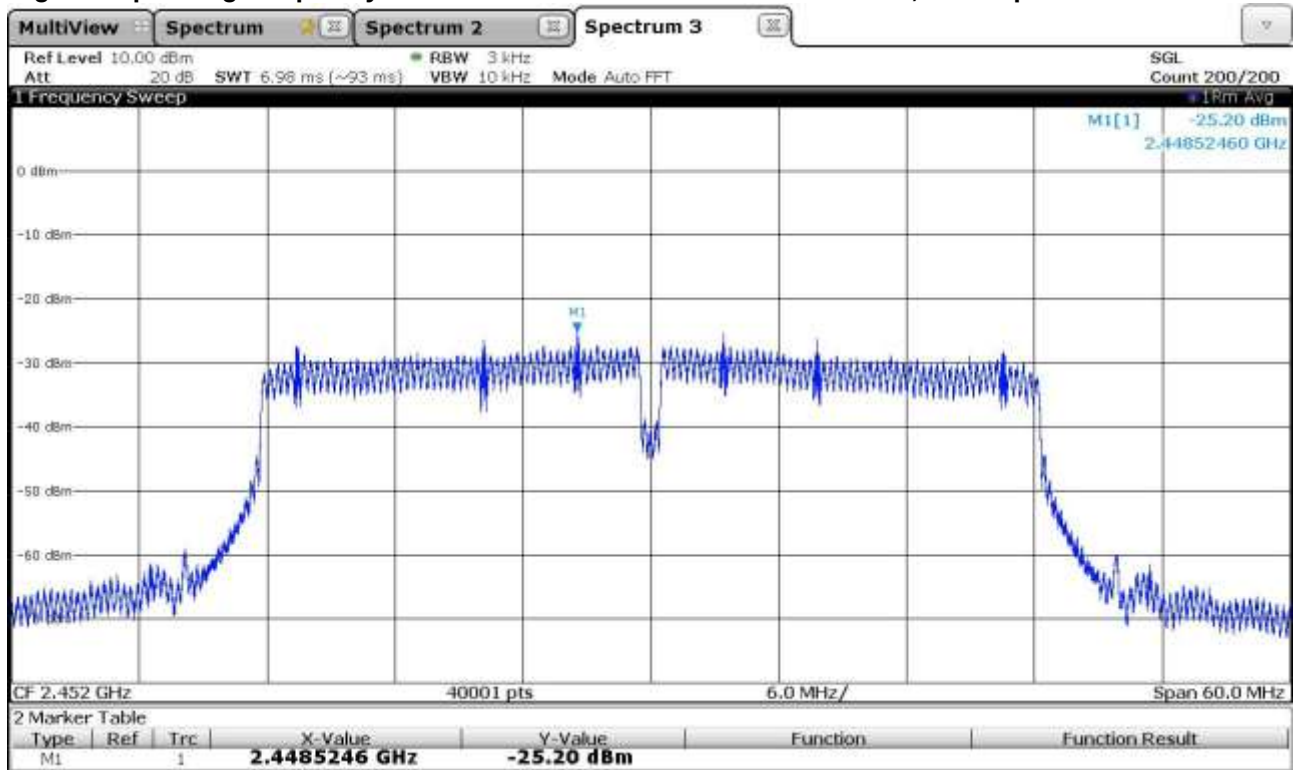
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



Maximum power spectral density  
802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2

| Channel | Frequency [MHz] | Reading of Analyzer [dBm / 3 kHz] | Cable Loss [dB] | Power Spectral Density [dBm / 3 kHz] | Limit [dBm / 3 kHz] | Result |
|---------|-----------------|-----------------------------------|-----------------|--------------------------------------|---------------------|--------|
| 3       | 2422            | -25.13                            | 1.2             | -23.93                               | 8                   | Pass   |
| 6       | 2437            | -25.06                            | 1.2             | -23.86                               | 8                   | Pass   |
| 9       | 2452            | -25.20                            | 1.2             | -24.00                               | 8                   | Pass   |

Maximum power spectral density  
802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1 + Antenna 2

| Channel | Frequency [MHz] | Highest PSD of Ant 1 or Ant 2 [dBm/3kHz] | PSD calculated * Ant1 + Ant 2 [dBm/3kHz] | Limit [dBm/3kHz] | Result |
|---------|-----------------|------------------------------------------|------------------------------------------|------------------|--------|
| 3       | 2422            | -23.93                                   | -20.92                                   | 8                | Pass   |
| 6       | 2437            | -23.86                                   | -20.85                                   | 8                | Pass   |
| 9       | 2452            | -24.00                                   | -20.99                                   | 8                | Pass   |

\*According to KDB 662911 D01, add 10 log (N<sub>ANT</sub>) dB, N = 2

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Power Spectral Density**.

## 7.4. Band-Edges Measurement

### Applied standards

-e-CFR Title 47 Chapter I Subchapter A Part 15 Subpart C §15.247 (d)  
-RSS-247 issue 2 Section 5.5

### 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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Emissions which fall in the restricted bands, as defined in §15.205 Restricted Bands of operation as well as in restricted bands of the RSS-Gen Issue 5 (see Section 8.10 Restricted Frequency Bands) and must also comply with the radiated emission limits specified in §15.209 Radiated emission limits as well as the limits specified in RSS-Gen Table 5.

### Test equipment and test set up

Test equipment used for Band Edge measurements as given in clause Test equipment of this report.  
Test setup used for Band Edge measurements as given in clause Test setups of this report.

### Description

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. In the Restricted Bands defined in § 15.205 the compliance with the §15.209 and RSS-Gen Radiated emission limits is investigate.

### Detector function selection and bandwidth

For the measurement, an EMI test receiver that have CISPR peak and avearge detector was used.

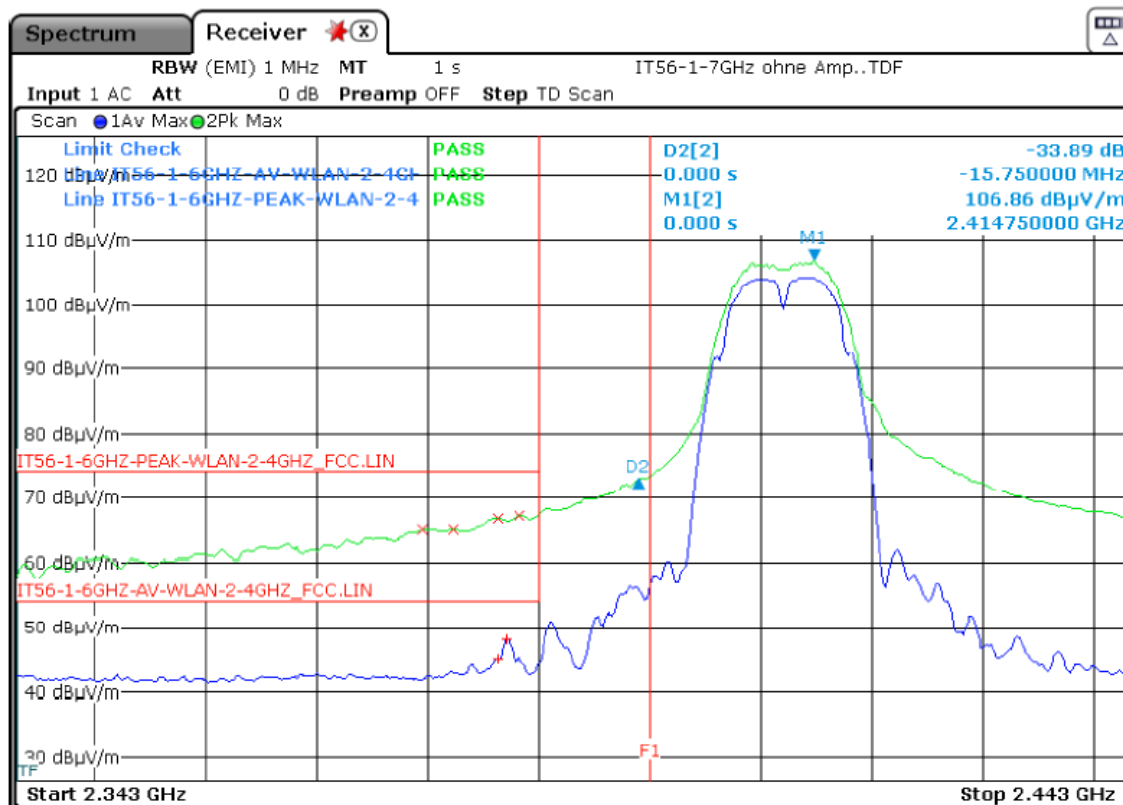
| Frequency range:      | Bandwidth |         |
|-----------------------|-----------|---------|
| See measurement graph | RBW:      | 100 kHz |
|                       | VBW:      | 300 kHz |

### Measurement

The Measurement was performed on: 07.04.2020



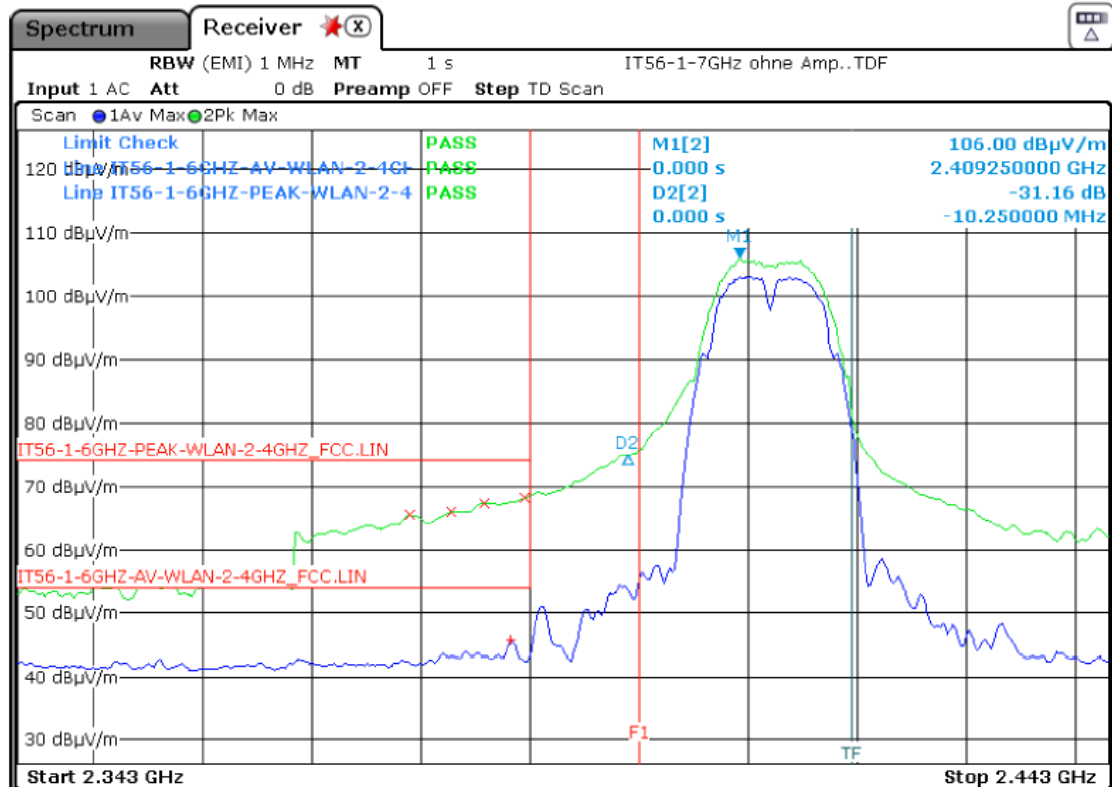
Operation mode: WLAN CH.01; BW = 20MHz; CCK; 802.11b; Low edge



| Polarisation: V  |                   |                            |                   |        |                 |                   |                            |                   |        |
|------------------|-------------------|----------------------------|-------------------|--------|-----------------|-------------------|----------------------------|-------------------|--------|
| Detector Average |                   |                            |                   |        | Detector Peak   |                   |                            |                   |        |
| Frequ.<br>[GHz]  | Level<br>[dBµV/m] | Margin<br>to Limit<br>[dB] | Limit<br>[dBµV/m] | Result | Frequ.<br>[GHz] | Level<br>[dBµV/m] | Margin<br>to Limit<br>[dB] | Limit<br>[dBµV/m] | Result |
| 2,3870           | 48,05             | -5,95                      | 54,00             | pass   | 2,3883          | 67,11             | -6,89                      | 74,00             | pass   |
| 2,3863           | 44,84             | -9,16                      | 54,00             | pass   | 2,3863          | 66,63             | -7,37                      | 74,00             | pass   |
|                  |                   |                            |                   |        | 2,3823          | 64,92             | -9,08                      | 74,00             | pass   |
|                  |                   |                            |                   |        | 2,3795          | 64,84             | -9,16                      | 74,00             | pass   |
|                  |                   |                            |                   |        |                 |                   |                            |                   |        |

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.01; BW = 20MHz; CCK; 802.11b; Low edge



| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]  | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 2,3883           | 45,57          | -8,43                | 54,00          | pass   | 2,3895        | 68,11          | -5,89                | 74,00          | pass   |
|                  |                |                      |                |        | 2,3858        | 67,36          | -6,64                | 74,00          | pass   |
|                  |                |                      |                |        | 2,3828        | 65,96          | -8,04                | 74,00          | pass   |
|                  |                |                      |                |        | 2,3790        | 65,46          | -8,54                | 74,00          | pass   |

Higher Band Edge - 802.11b 20MHz / CCK – MCS=0; 1 MBps / both antennas are active

TESTED  
IN GERMANY

**FCC 3**  
Band edge emission  
according to

STC

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Product: Transmitting/Receiving System

Sample: 01

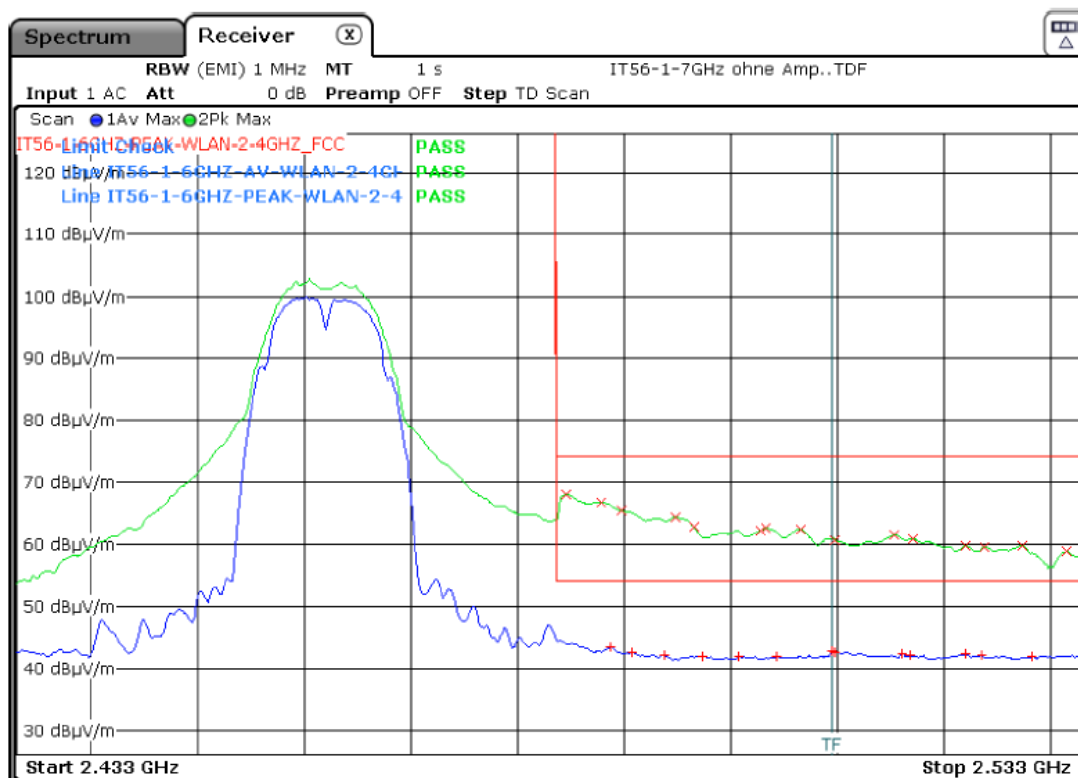
Date: 07.04.2020

Operator: BI

Remarks: DAC 0 (ANT1); DAC1 (ANT 2) Both Antennas ON

pass fail  
Result: ☒ ☐

Operation mode: WLAN CH.11; BW = 20MHz; CCK; 802.11b; High edge



| Polarisation: V  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,4888           | 43,39          | -10,61               | 54,00          | pass   | 2,4845        | 67,86          | -6,14                | 74,00          | pass   |
| 2,5095           | 42,64          | -11,36               | 54,00          | pass   | 2,4878        | 66,73          | -7,27                | 74,00          | pass   |
| 2,5098           | 42,61          | -11,39               | 54,00          | pass   | 2,4898        | 65,26          | -8,74                | 74,00          | pass   |
| 2,4908           | 42,60          | -11,40               | 54,00          | pass   | 2,4948        | 64,24          | -9,76                | 74,00          | pass   |
| 2,5330           | 42,60          | -11,40               | 54,00          | pass   | 2,4965        | 62,69          | -11,31               | 74,00          | pass   |
| 2,5220           | 42,28          | -11,72               | 54,00          | pass   | 2,5033        | 62,47          | -11,53               | 74,00          | pass   |



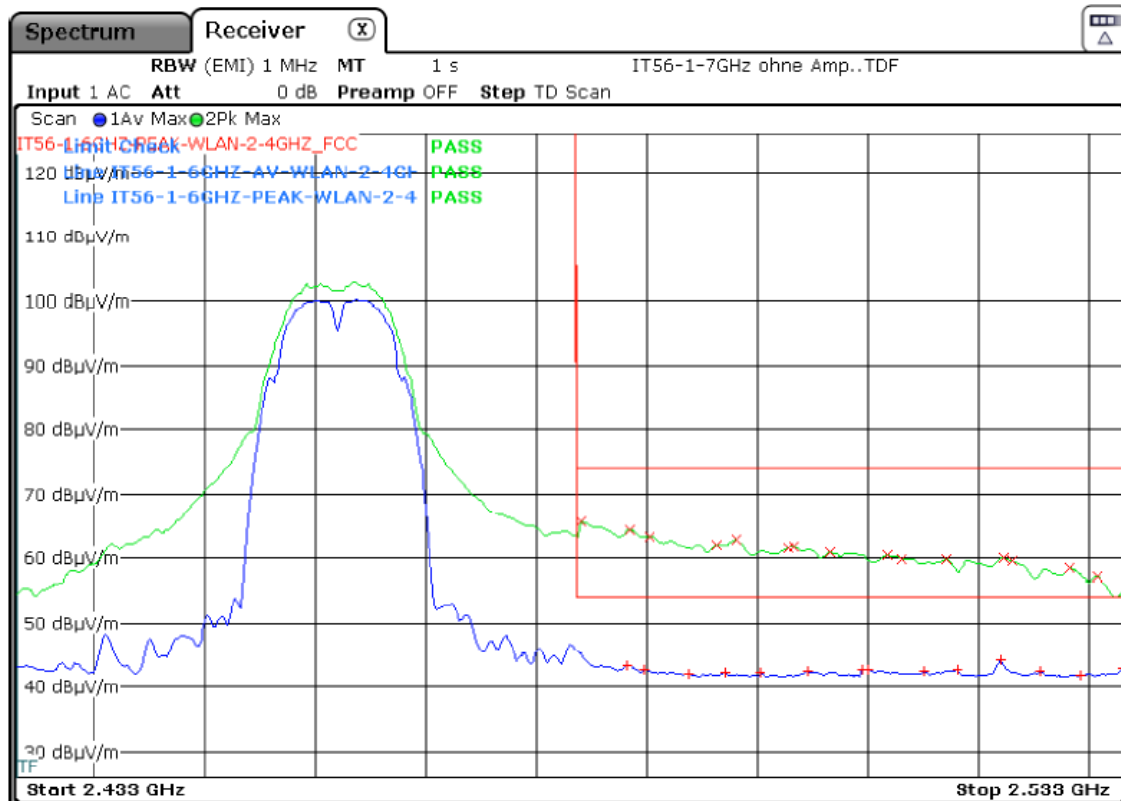
**FCC 3**  
Band edge emission  
according to



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.11; BW = 20MHz; CCK; 802.11b; High edge

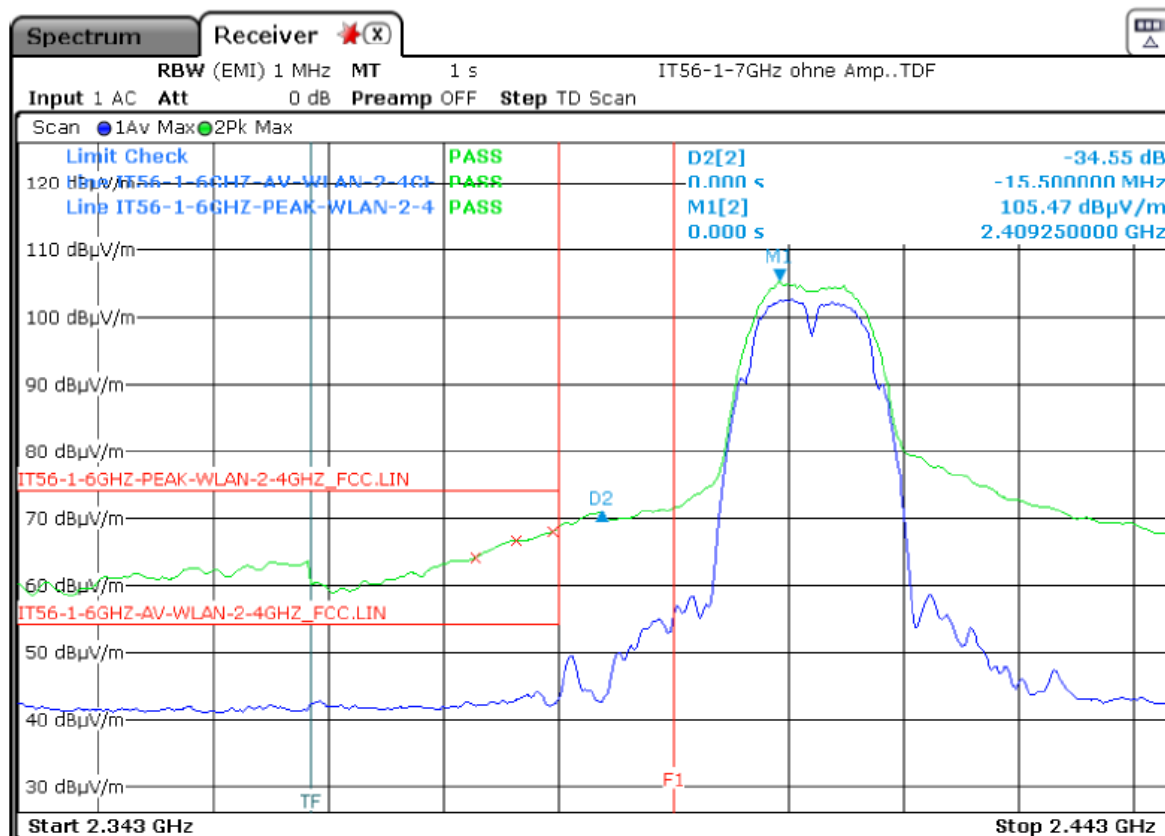


| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,5220           | 44,04          | -9,96                | 54,00          | pass   | 2,4840        | 65,50          | -8,50                | 74,00          | pass   |
| 2,4883           | 43,24          | -10,76               | 54,00          | pass   | 2,4885        | 64,35          | -9,65                | 74,00          | pass   |
| 2,5330           | 42,68          | -11,32               | 54,00          | pass   | 2,4903        | 63,27          | -10,73               | 74,00          | pass   |
| 2,5100           | 42,54          | -11,46               | 54,00          | pass   | 2,4980        | 62,76          | -11,24               | 74,00          | pass   |
| 2,5095           | 42,53          | -11,47               | 54,00          | pass   | 2,4963        | 61,93          | -12,07               | 74,00          | pass   |
| 2,4898           | 42,53          | -11,47               | 54,00          | pass   | 2,5033        | 61,72          | -12,28               | 74,00          | pass   |



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

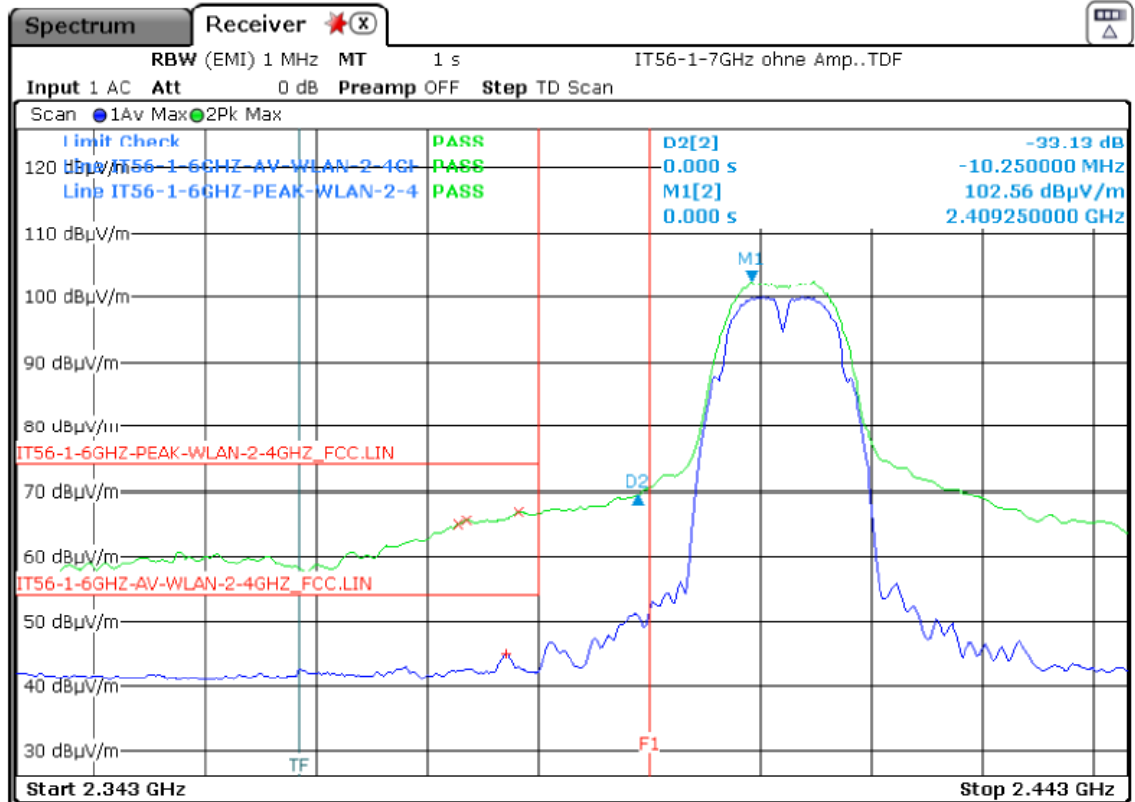
Operation mode: WLAN CH.01; BW = 20MHz; OFDM; 802.11g; Low edge

[illegible]

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.01; BW = 20MHz; OFDM; 802.11g; Low edge

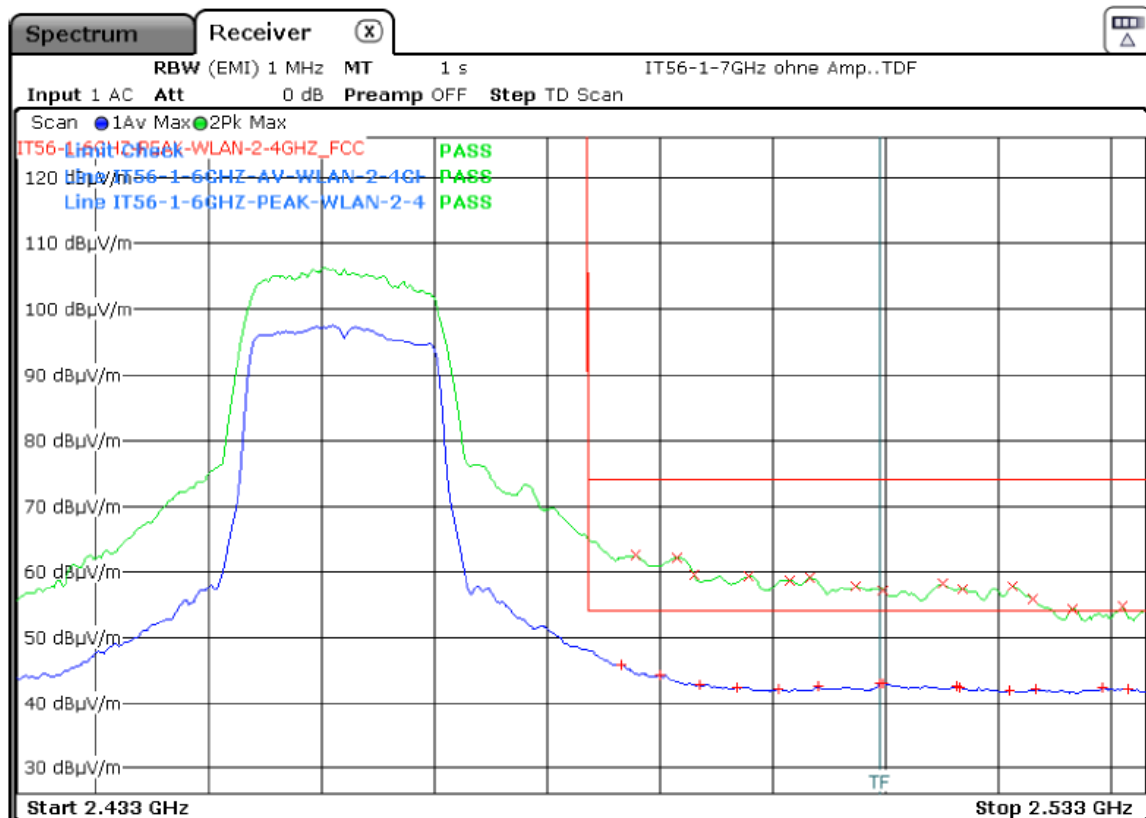


| Polarisation: H  |                   |                            |                   |        |                 |                   |                            |                   |        |
|------------------|-------------------|----------------------------|-------------------|--------|-----------------|-------------------|----------------------------|-------------------|--------|
| Detector Average |                   |                            |                   |        | Detector Peak   |                   |                            |                   |        |
| Frequ.<br>[GHz]  | Level<br>[dBµV/m] | Margin<br>to Limit<br>[dB] | Limit<br>[dBµV/m] | Result | Frequ.<br>[GHz] | Level<br>[dBµV/m] | Margin<br>to Limit<br>[dB] | Limit<br>[dBµV/m] | Result |
| 2,3870           | 44,87             | -9,13                      | 54,00             | pass   | 2,3883          | 66,92             | -7,08                      | 74,00             | pass   |
|                  |                   |                            |                   |        | 2,3835          | 65,49             | -8,51                      | 74,00             | pass   |
|                  |                   |                            |                   |        | 2,3828          | 64,83             | -9,17                      | 74,00             | pass   |
|                  |                   |                            |                   |        |                 |                   |                            |                   |        |
|                  |                   |                            |                   |        |                 |                   |                            |                   |        |

Higher Band Edge - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / both antennas are active

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.11; BW = 20MHz; OFDM; 802.11g; High edge



Polarisation: V

| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]  | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 2,4865           | 45,88          | -8,12                | 54,00          | pass   | 2,4878        | 62,44          | -11,56               | 74,00          | pass   |
| 2,4900           | 44,23          | -9,77                | 54,00          | pass   | 2,4915        | 62,14          | -11,86               | 74,00          | pass   |
| 2,5095           | 42,94          | -11,06               | 54,00          | pass   | 2,4930        | 59,41          | -14,59               | 74,00          | pass   |
| 2,5098           | 42,90          | -11,10               | 54,00          | pass   | 2,4978        | 59,22          | -14,78               | 74,00          | pass   |
| 2,4935           | 42,69          | -11,31               | 54,00          | pass   | 2,5033        | 59,04          | -14,96               | 74,00          | pass   |
| 2,5163           | 42,57          | -11,43               | 54,00          | pass   | 2,5015        | 58,69          | -15,31               | 74,00          | pass   |



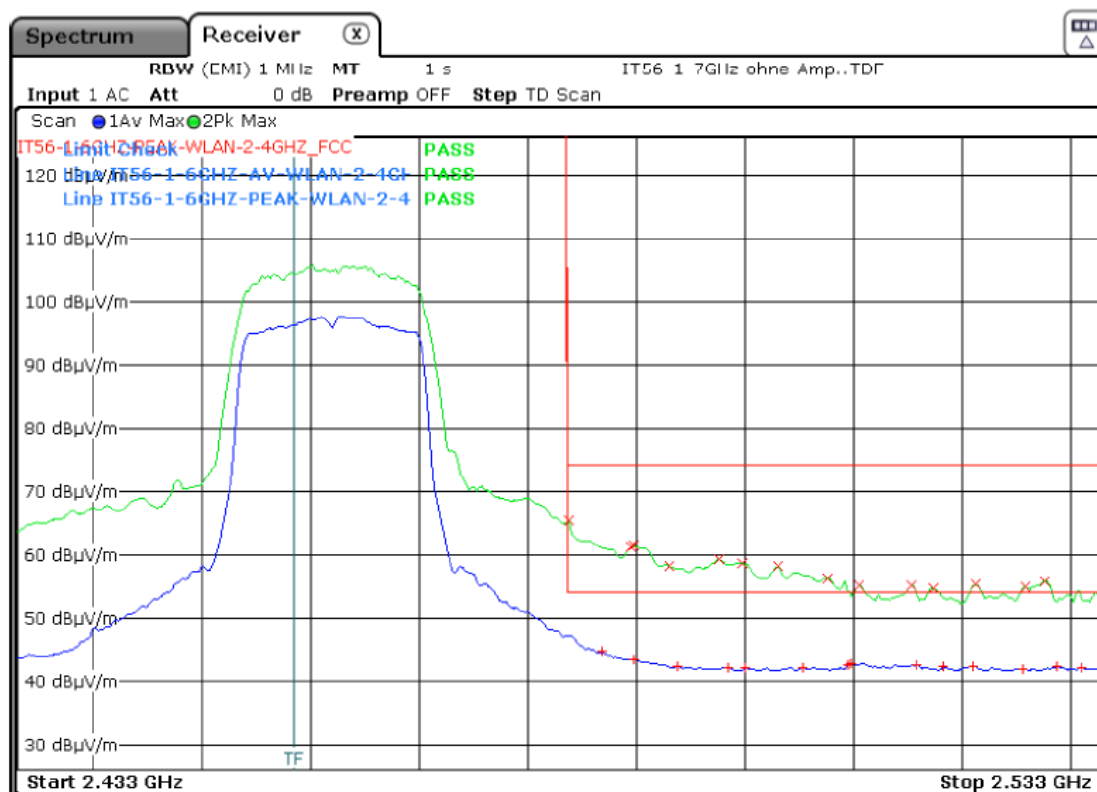
# FCC 3 Band edge emission



according to  
FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.11; BW = 20MHz; OFDM; 802.11g; High edge

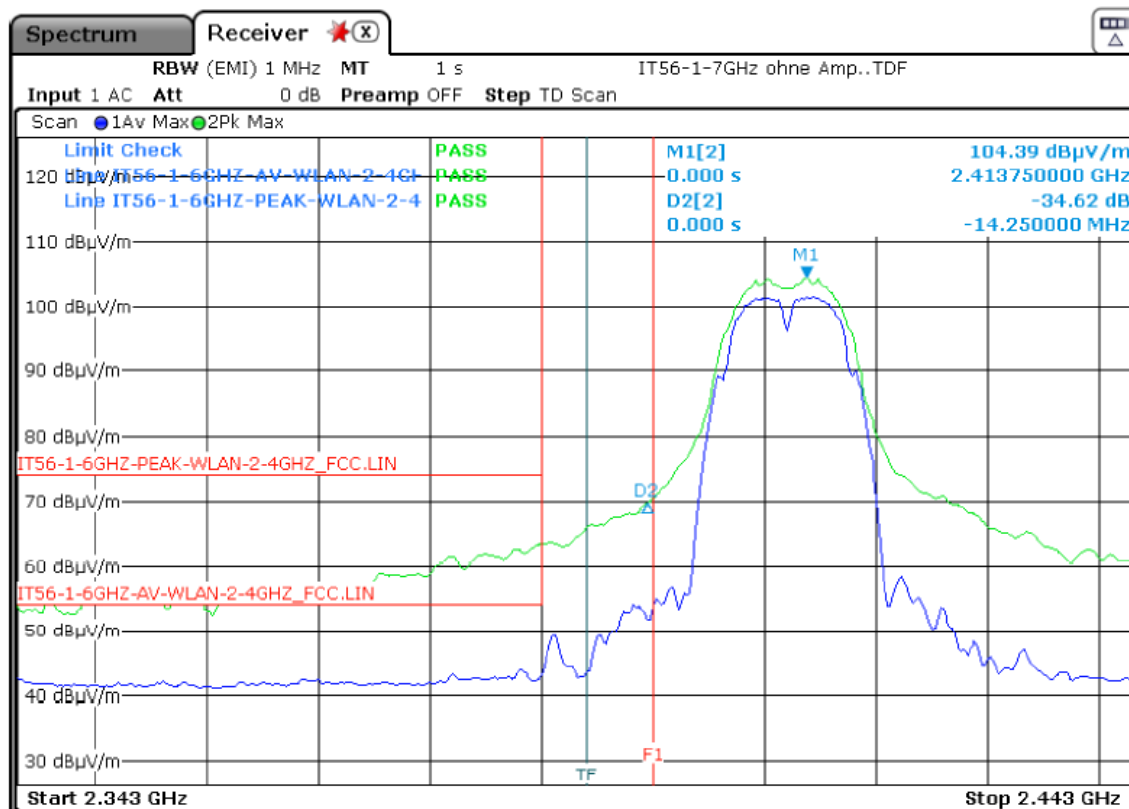


| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,4868           | 44,69          | -9,31                | 54,00          | pass   | 2,4838        | 65,28          | -8,72                | 74,00          | pass   |
| 2,4898           | 43,42          | -10,58               | 54,00          | pass   | 2,4898        | 61,35          | -12,65               | 74,00          | pass   |
| 2,5098           | 42,74          | -11,26               | 54,00          | pass   | 2,4895        | 61,24          | -12,76               | 74,00          | pass   |
| 2,5158           | 42,62          | -11,38               | 54,00          | pass   | 2,4975        | 59,17          | -14,83               | 74,00          | pass   |
| 2,5095           | 42,59          | -11,41               | 54,00          | pass   | 2,4998        | 58,52          | -15,48               | 74,00          | pass   |
| 2,4938           | 42,41          | -11,59               | 54,00          | pass   | 2,4930        | 58,14          | -15,86               | 74,00          | pass   |



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

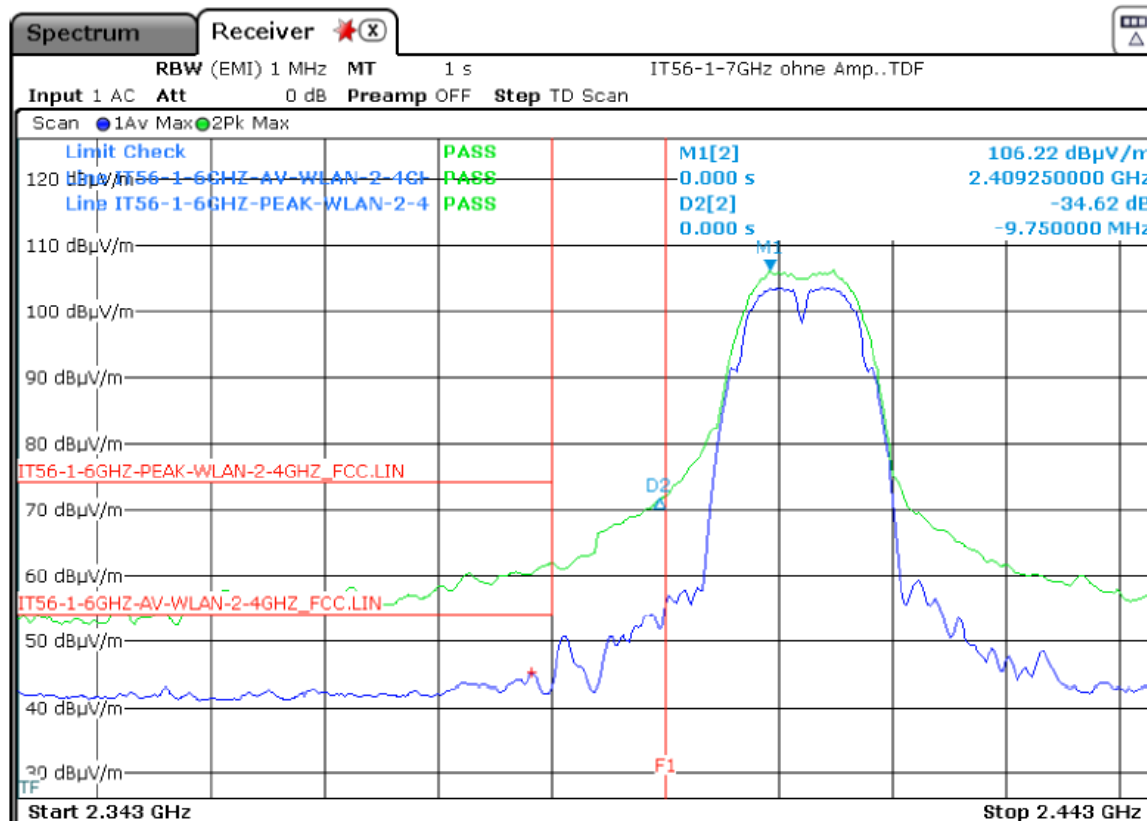
Operation mode: WLAN CH.01; BW = 20MHz; Greenfield; 802.11n; Low edge



| Polarisation: V                    |                |                      |                |        |                                    |                |                      |                |        |
|------------------------------------|----------------|----------------------|----------------|--------|------------------------------------|----------------|----------------------|----------------|--------|
| Detector Average                   |                |                      |                |        | Detector Peak                      |                |                      |                |        |
| Frequ. [GHz]                       | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]                       | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| all emissions are 10dB below limit |                |                      |                | pass   | all emissions are 10dB below limit |                |                      |                | pass   |
|                                    |                |                      |                |        |                                    |                |                      |                |        |
|                                    |                |                      |                |        |                                    |                |                      |                |        |
|                                    |                |                      |                |        |                                    |                |                      |                |        |
|                                    |                |                      |                |        |                                    |                |                      |                |        |

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Operation mode: WLAN CH.01; BW = 20MHz; Greenfield; 802.11n; Low edge

[illegible]

Higher Band Edge - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / both antennas are active



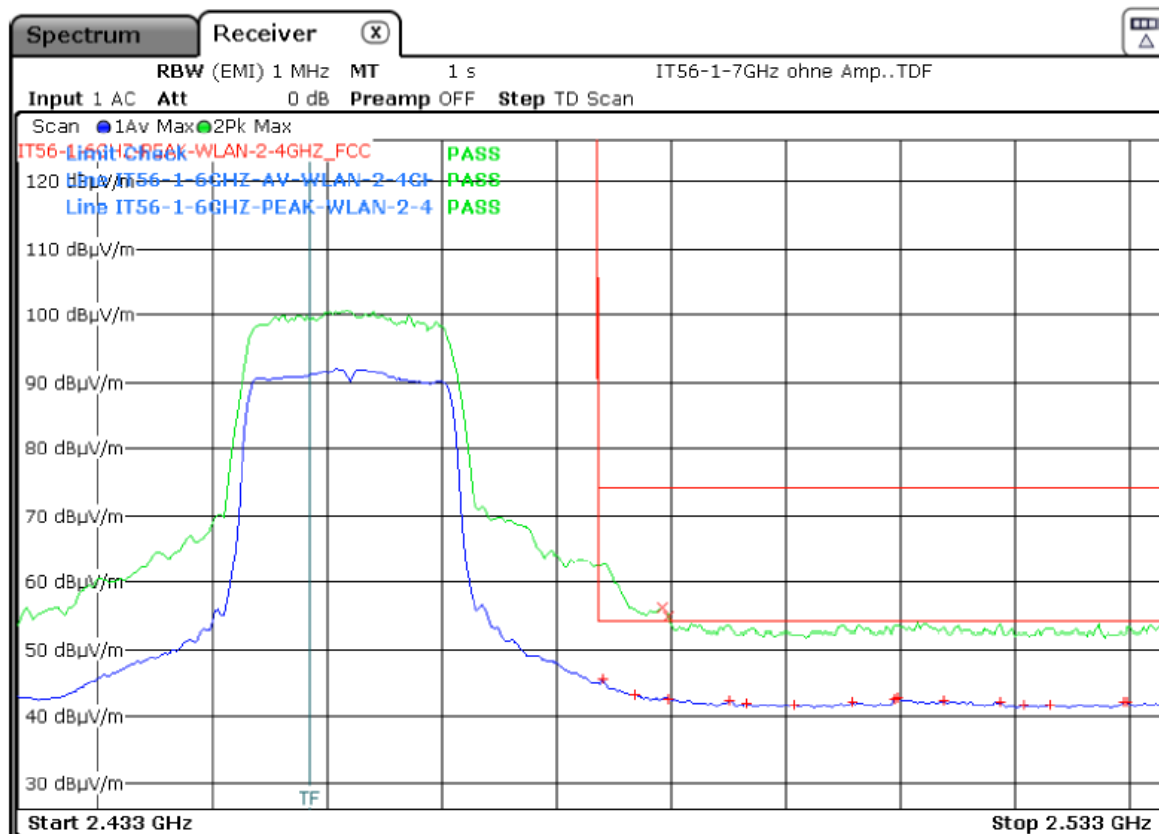
**FCC 3**  
Band edge emission  
according to



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.11; BW = 20MHz; Greenfield; 802.11n; High edge



| Polarisation: V  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,4840           | 45,53          | -8,47                | 54,00          | pass   | 2,4893        | 55,93          | -18,07               | 74,00          | pass   |
| 2,4868           | 43,27          | -10,73               | 54,00          | pass   | 2,4898        | 54,76          | -19,24               | 74,00          | pass   |
| 2,5098           | 42,68          | -11,32               | 54,00          | pass   |               |                |                      |                |        |
| 2,5095           | 42,60          | -11,40               | 54,00          | pass   |               |                |                      |                |        |
| 2,4898           | 42,43          | -11,57               | 54,00          | pass   |               |                |                      |                |        |
| 2,4950           | 42,41          | -11,59               | 54,00          | pass   |               |                |                      |                |        |



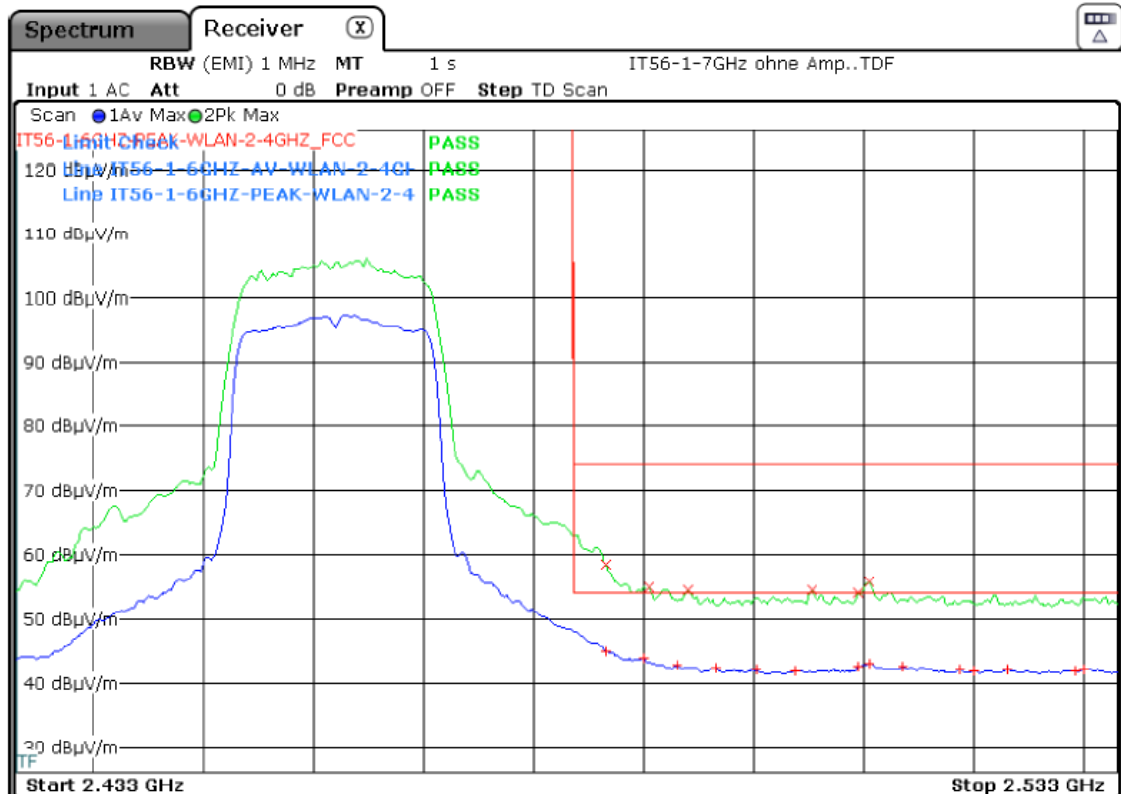
**FCC 3**  
Band edge emission  
according to



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.11; BW = 20MHz; Greenfield; 802.11n; High edge



| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,4865           | 45,02          | -8,98                | 54,00          | pass   | 2,4865        | 58,33          | -15,67               | 74,00          | pass   |
| 2,4900           | 43,76          | -10,24               | 54,00          | pass   | 2,5105        | 55,76          | -18,24               | 74,00          | pass   |
| 2,5105           | 43,06          | -10,94               | 54,00          | pass   | 2,4905        | 54,99          | -19,01               | 74,00          | pass   |
| 2,4930           | 42,65          | -11,35               | 54,00          | pass   | 2,4940        | 54,41          | -19,59               | 74,00          | pass   |
| 2,5095           | 42,52          | -11,48               | 54,00          | pass   | 2,5053        | 54,40          | -19,60               | 74,00          | pass   |
| 2,5135           | 42,42          | -11,58               | 54,00          | pass   | 2,5095        | 54,03          | -19,97               | 74,00          | pass   |

Lower Band Edge - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / both antennas are active

TESTED  
IN GERMANY

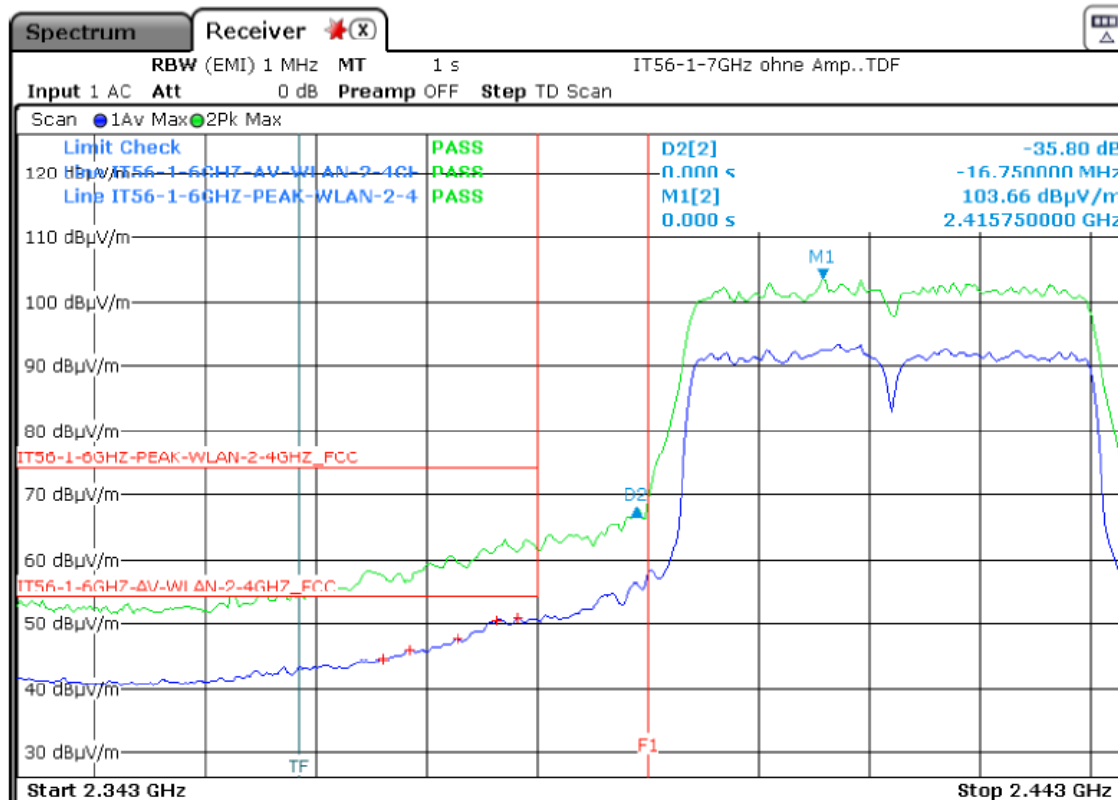
**FCC 3**  
Band edge emission  
according to

STC

FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

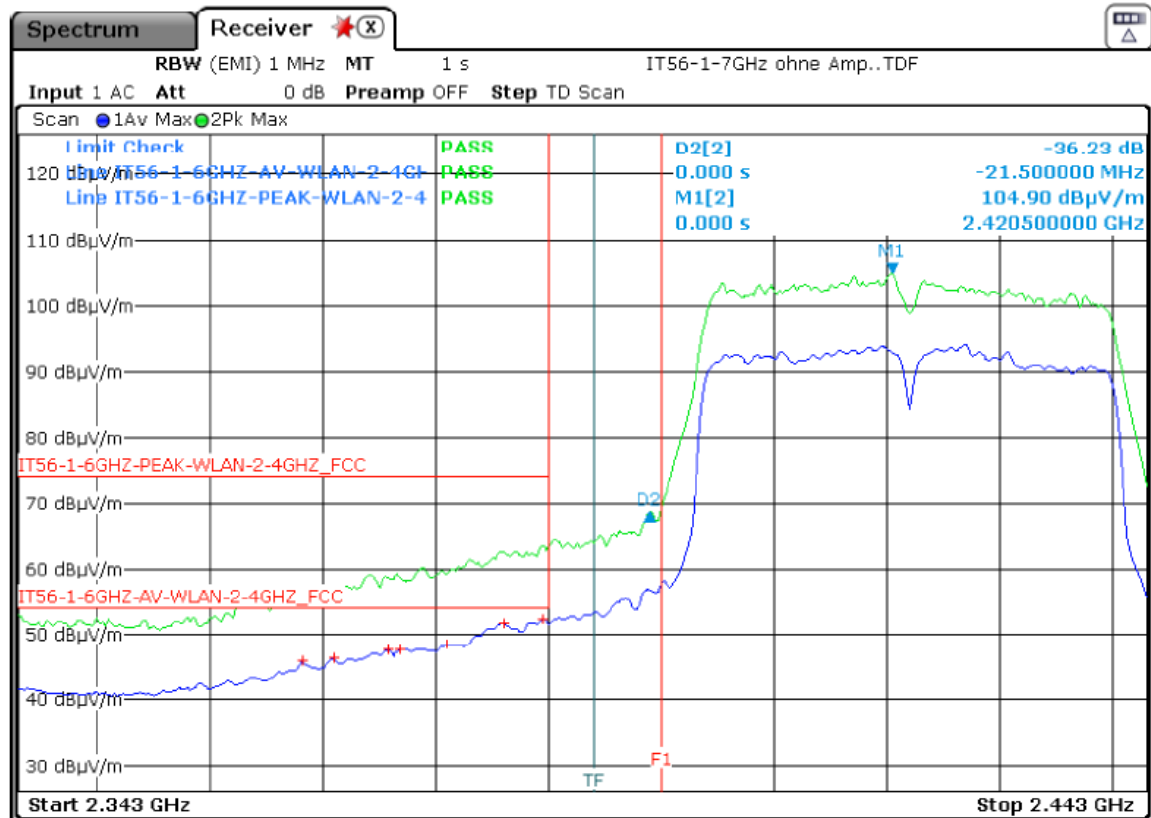
Operation mode: WLAN CH.03; BW = 40MHz; Greenfield; 802.11n40; Low edge



| Polarisation: V  |                |                      |                |        |                                    |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|------------------------------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak                      |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]                       | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,3883           | 50,87          | -3,13                | 54,00          | pass   | all emissions are 10dB below limit |                |                      |                | pass   |
| 2,3863           | 50,30          | -3,70                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3828           | 47,44          | -6,56                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3785           | 45,85          | -8,15                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3760           | 44,44          | -9,56                | 54,00          | pass   |                                    |                |                      |                |        |

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.03; BW = 40MHz; Greenfield; 802.11n40; Low edge



| Polarisation: H  |                |                      |                |        |                                    |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|------------------------------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak                      |                |                      |                |        |
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]                       | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 2,3895           | 52,28          | -1,72                | 54,00          | pass   | all emissions are 10dB below limit |                |                      |                | pass   |
| 2,3860           | 51,61          | -2,39                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3810           | 48,29          | -5,71                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3768           | 47,62          | -6,38                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3758           | 47,49          | -6,51                | 54,00          | pass   |                                    |                |                      |                |        |
| 2,3710           | 46,16          | -7,84                | 54,00          | pass   |                                    |                |                      |                |        |

Higher Band Edge - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / both antennas are active



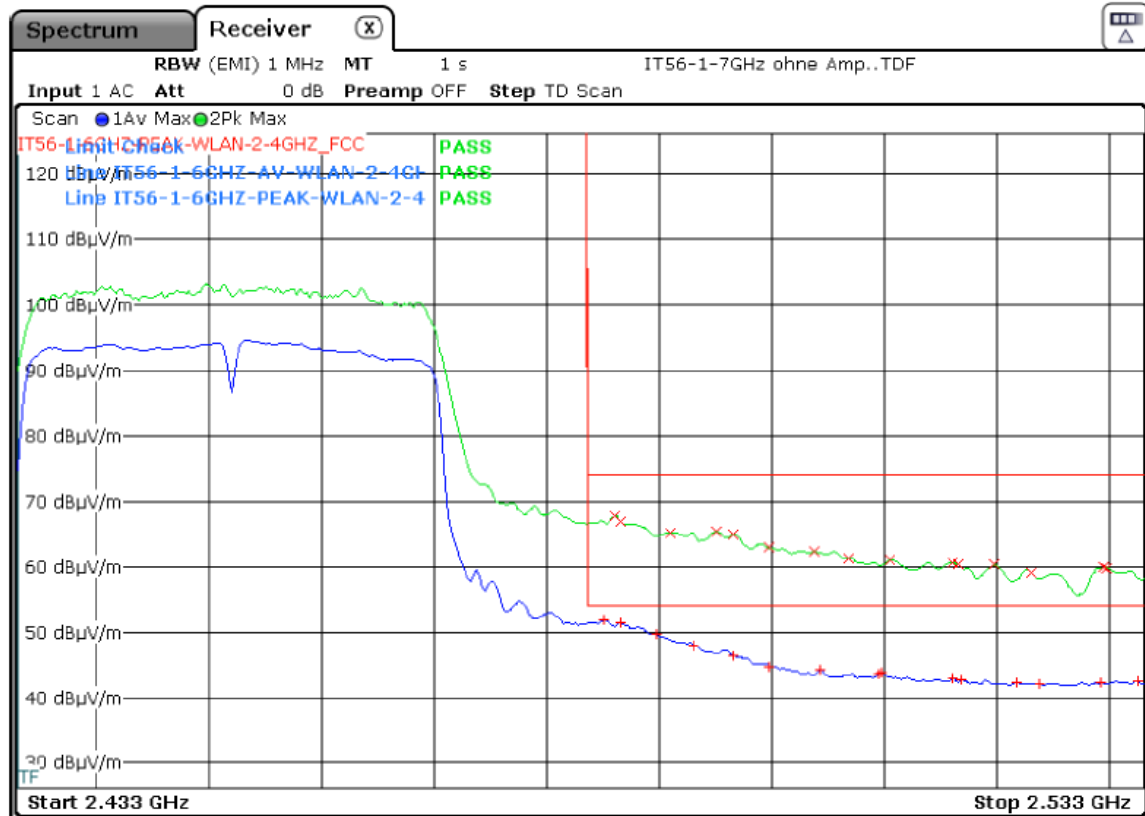
**FCC 3**  
Band edge emission  
according to



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.09; BW = 40MHz; Greenfield; 802.11n40; High edge



| Polarisation: V  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result | Frequ. [GHz]  | Level [dBµV/m] | Margin to Limit [dB] | Limit [dBµV/m] | Result |
| 2,4850           | 51,78          | -2,22                | 54,00          | pass   | 2,4860        | 67,79          | -6,21                | 74,00          | pass   |
| 2,4865           | 51,33          | -2,67                | 54,00          | pass   | 2,4865        | 66,94          | -7,06                | 74,00          | pass   |
| 2,4898           | 49,68          | -4,32                | 54,00          | pass   | 2,4950        | 65,32          | -8,68                | 74,00          | pass   |
| 2,4930           | 48,05          | -5,95                | 54,00          | pass   | 2,4910        | 65,16          | -8,84                | 74,00          | pass   |
| 2,4965           | 46,52          | -7,48                | 54,00          | pass   | 2,4965        | 64,88          | -9,12                | 74,00          | pass   |
| 2,4998           | 44,75          | -9,25                | 54,00          | pass   | 2,4998        | 62,85          | -11,15               | 74,00          | pass   |



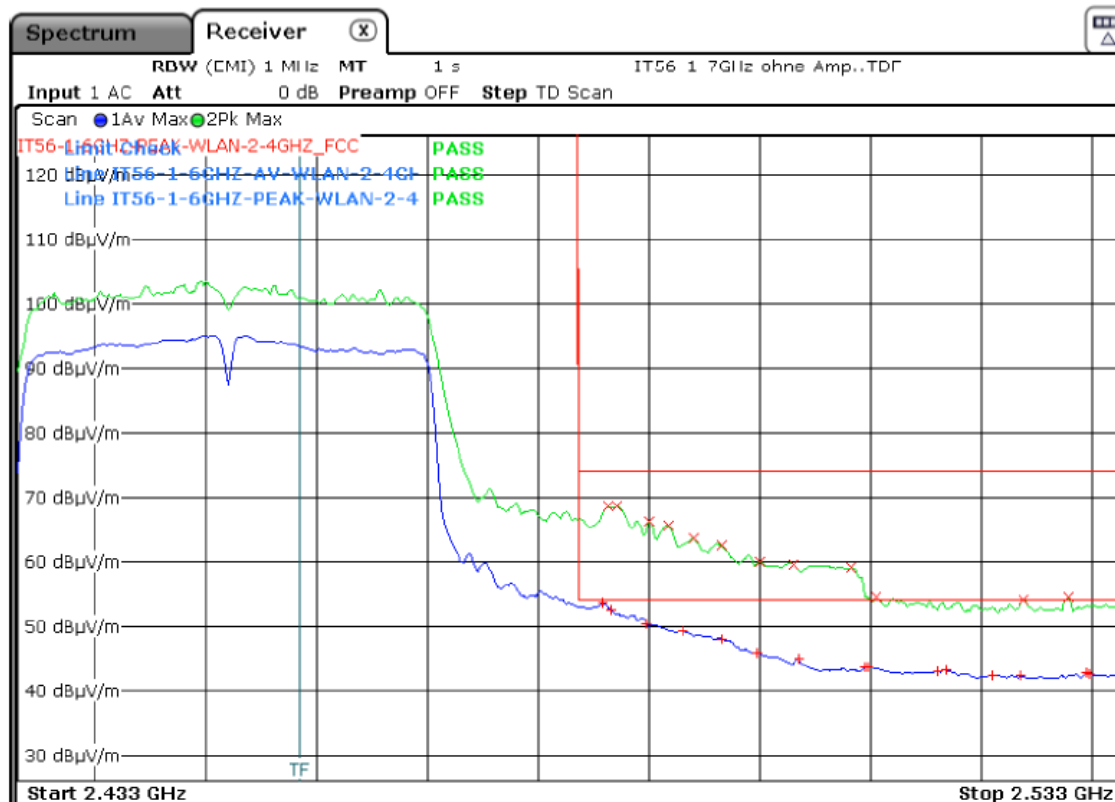
**FCC 3**  
Band edge emission  
according to



FCC §15.247, RSS-247, FCC §15.209 RSS-Gen

Ref.-No.: 20/01-0030

Operation mode: WLAN CH.09; BW = 40MHz; Greenfield; 802.11n40; High edge



| Polarisation: H  |                |                      |                |        |               |                |                      |                |        |
|------------------|----------------|----------------------|----------------|--------|---------------|----------------|----------------------|----------------|--------|
| Detector Average |                |                      |                |        | Detector Peak |                |                      |                |        |
| Frequ. [GHz]     | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result | Frequ. [GHz]  | Level [dBμV/m] | Margin to Limit [dB] | Limit [dBμV/m] | Result |
| 2,4858           | 53,54          | -0,46                | 54,00          | pass   | 2,4863        | 68,54          | -5,46                | 74,00          | pass   |
| 2,4865           | 52,43          | -1,57                | 54,00          | pass   | 2,4870        | 68,52          | -5,48                | 74,00          | pass   |
| 2,4898           | 50,37          | -3,63                | 54,00          | pass   | 2,4900        | 66,20          | -7,80                | 74,00          | pass   |
| 2,4930           | 49,20          | -4,80                | 54,00          | pass   | 2,4918        | 65,53          | -8,47                | 74,00          | pass   |
| 2,4965           | 48,06          | -5,94                | 54,00          | pass   | 2,4940        | 63,55          | -10,45               | 74,00          | pass   |
| 2,4998           | 45,78          | -8,22                | 54,00          | pass   | 2,4965        | 62,42          | -11,58               | 74,00          | pass   |

## Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **Band Edges Emission**.

## **7.5. 99% Power Bandwidth**

### **Applied standards**

-RSS-Gen issue 5 Section 6.7

### **Test equipment and test set up**

Test equipment used for conducted measurements as given in clause Test equipment of this report.

Test setup used for conducted measurements as given in clause Test setups of this report.

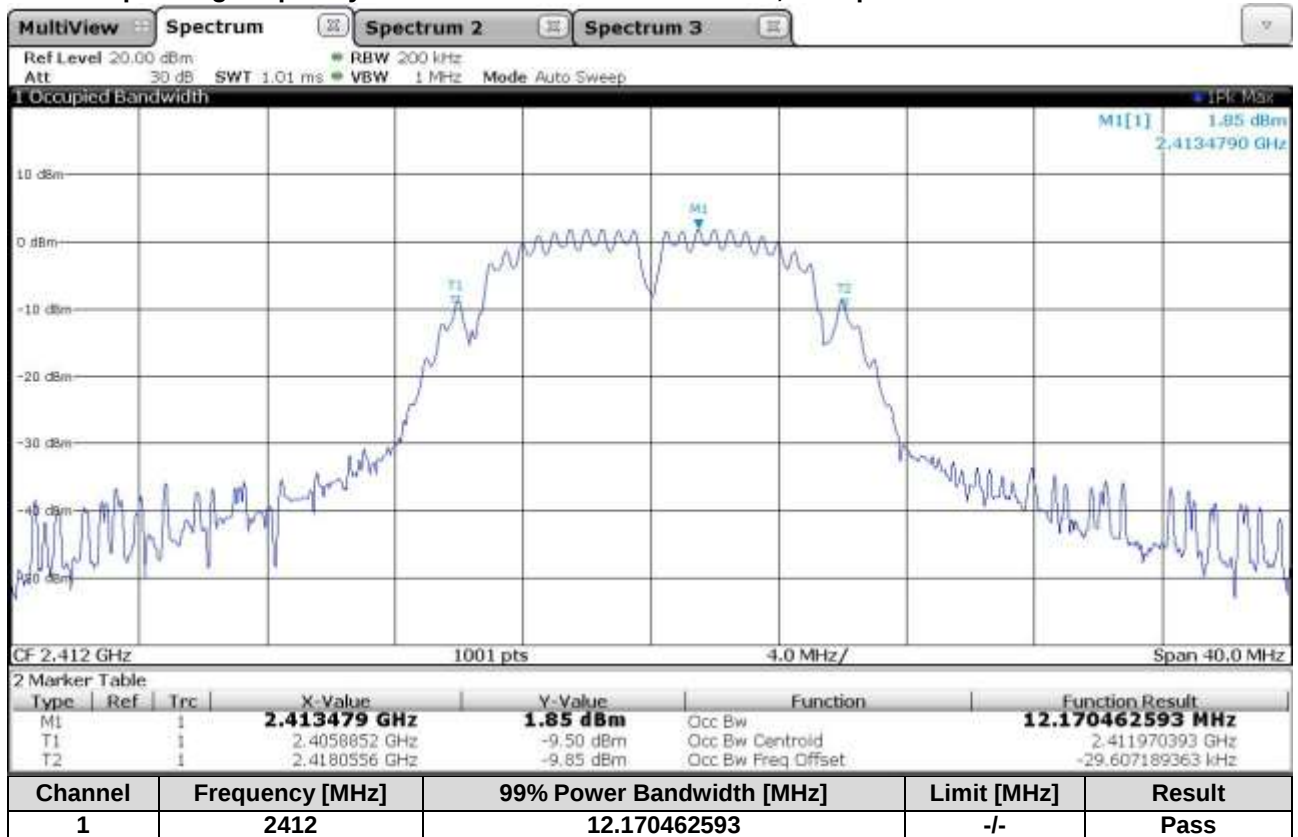
### **Description**

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The 99% power bandwidth function of the instrument was used for the measurement.

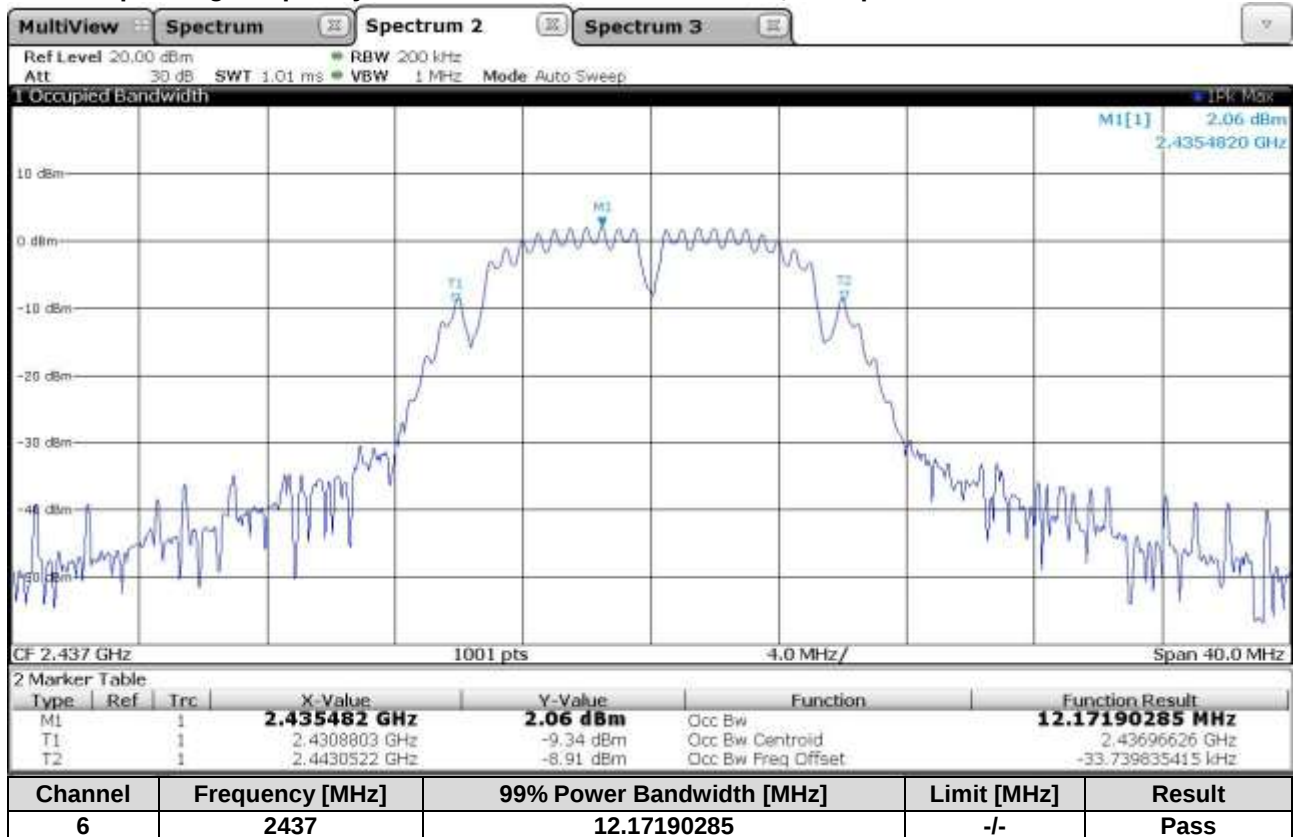
### **Measurement:**

The Measurement was performed on: 01.04.2020 and 02.04.2020

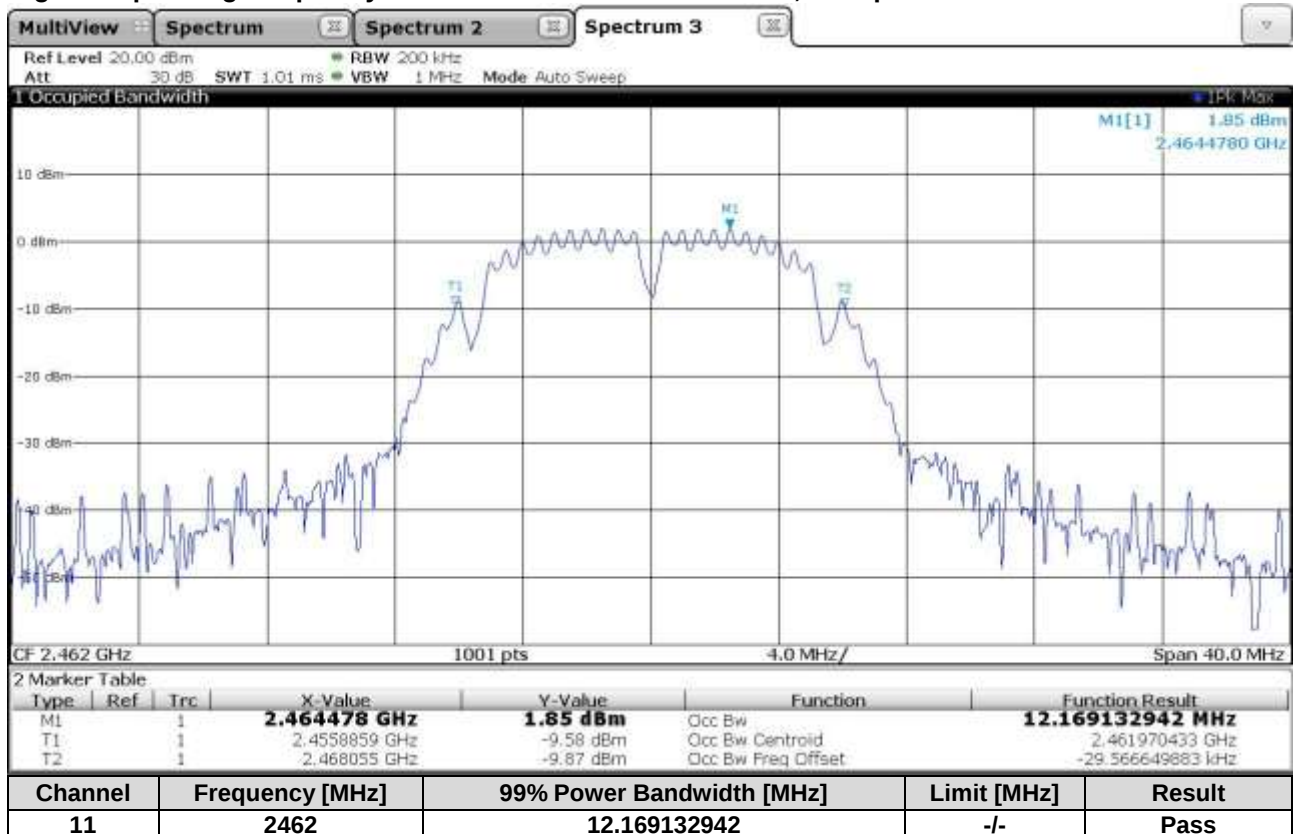
Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



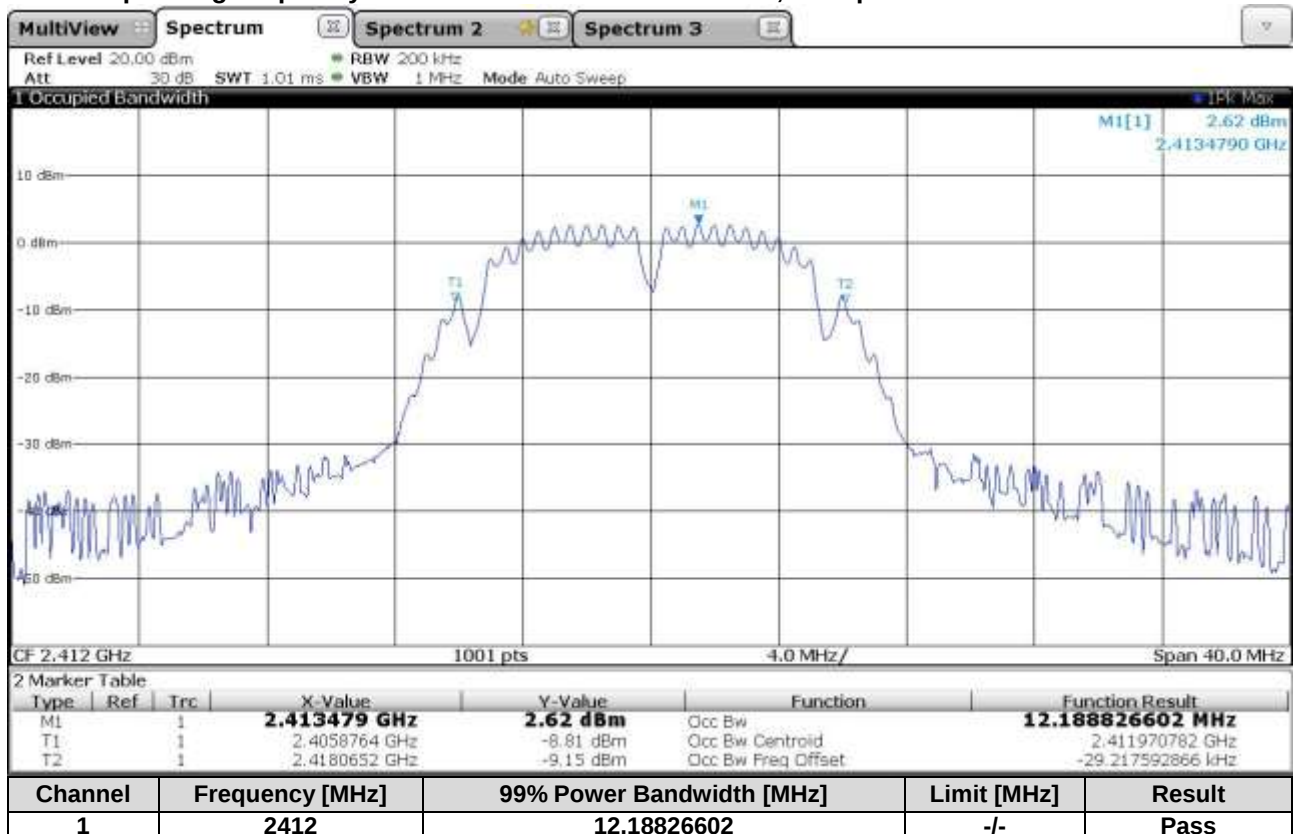
Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



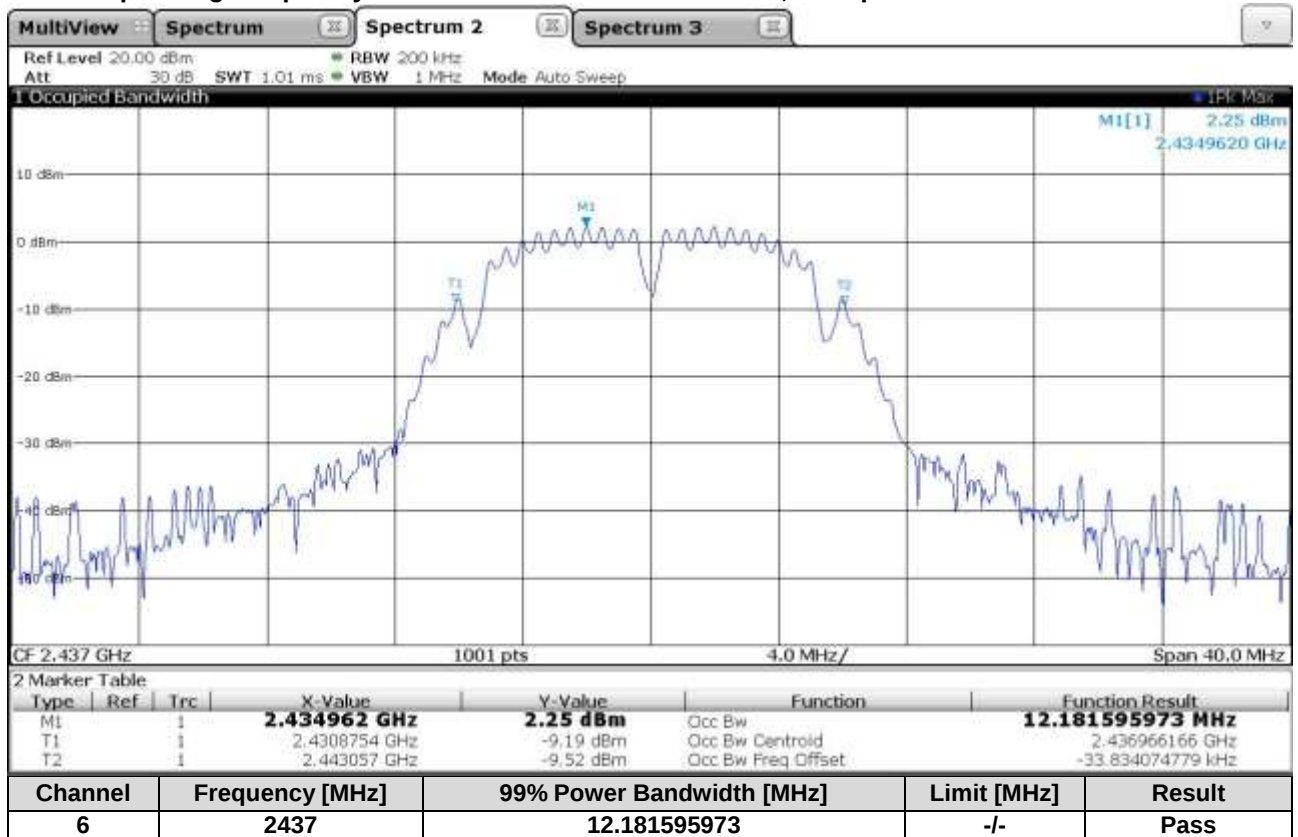
### Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 1



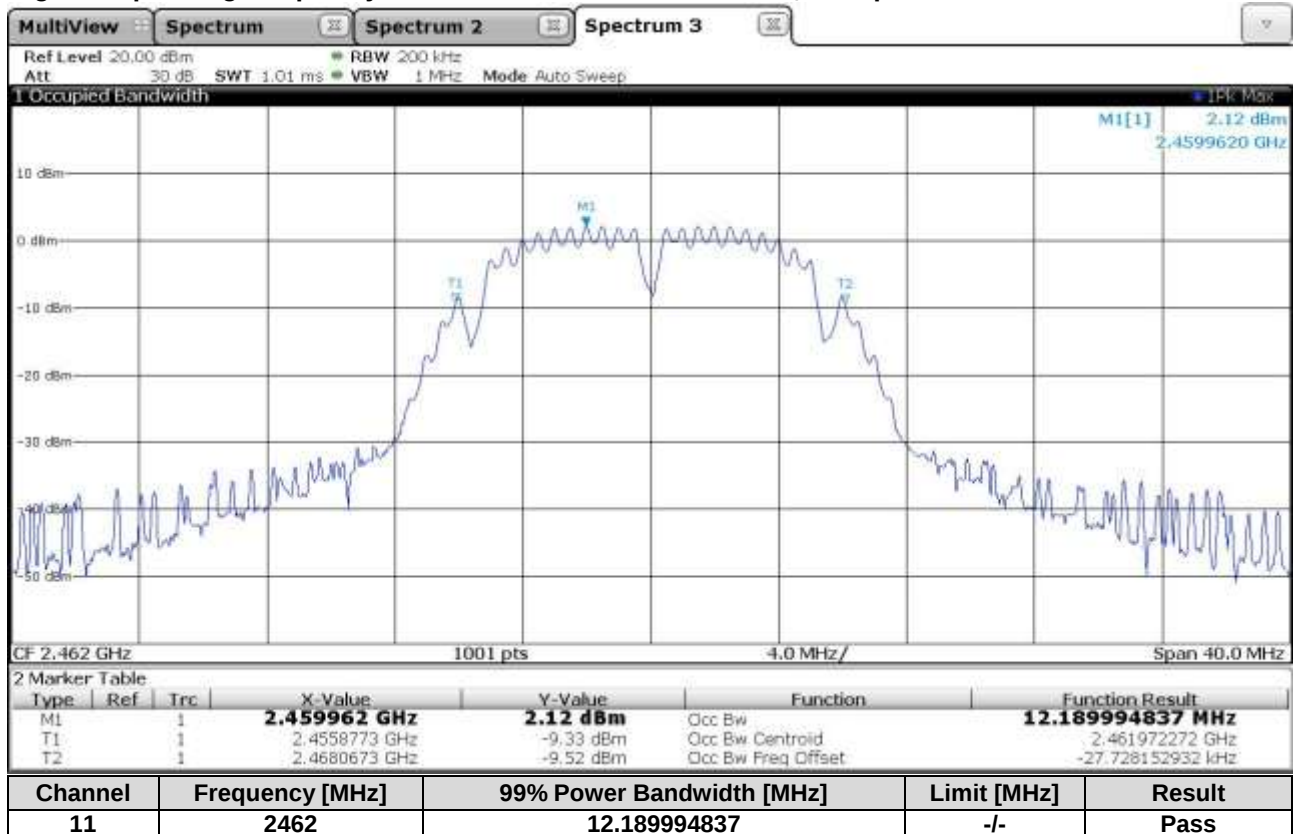
### Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



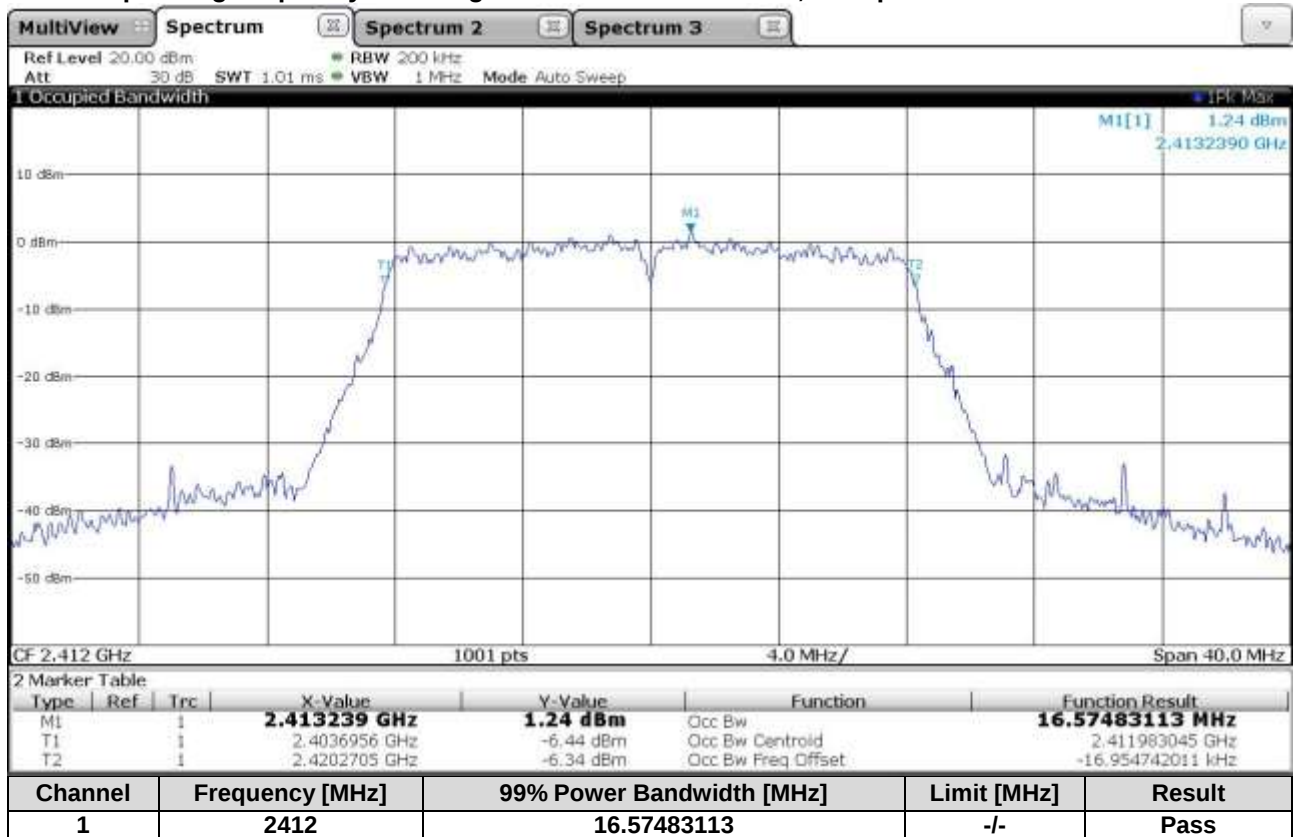
Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



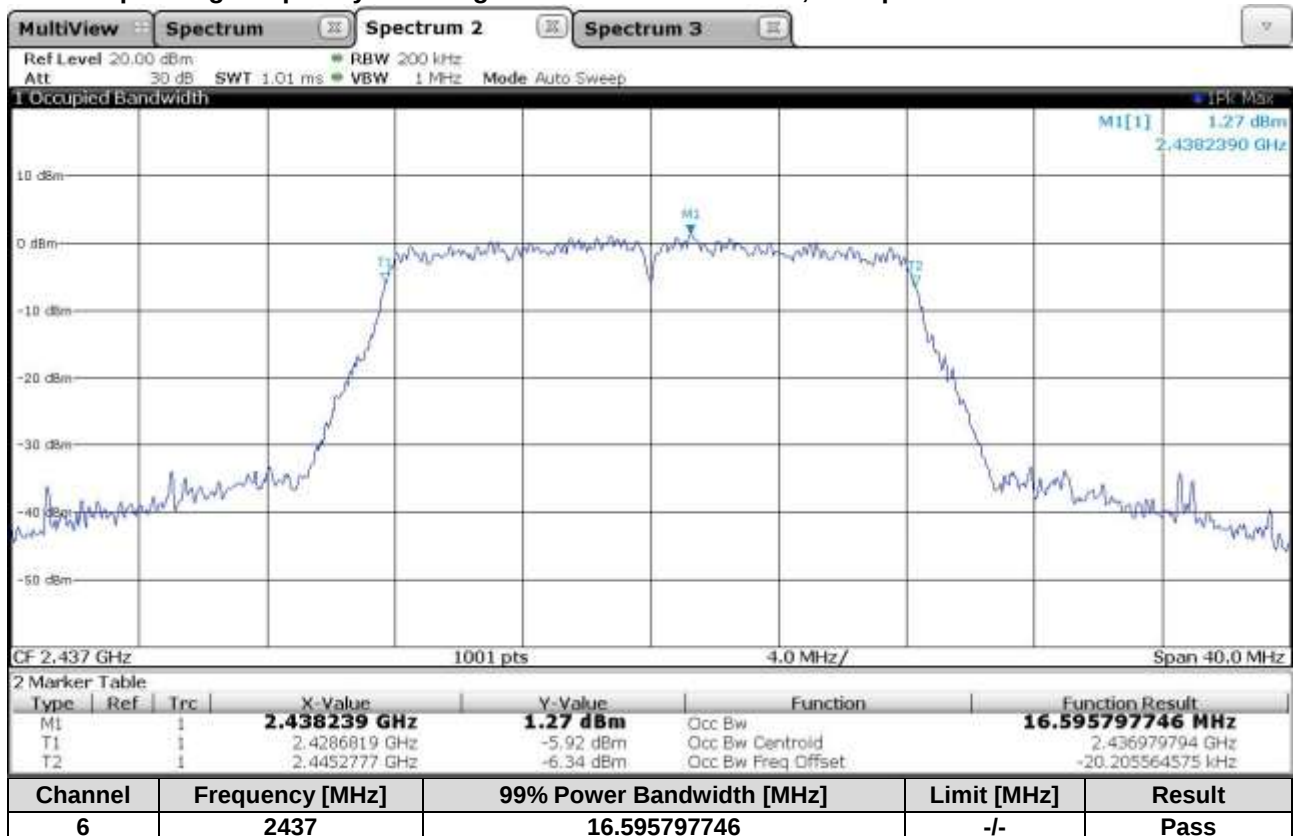
Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps / Antenna 2



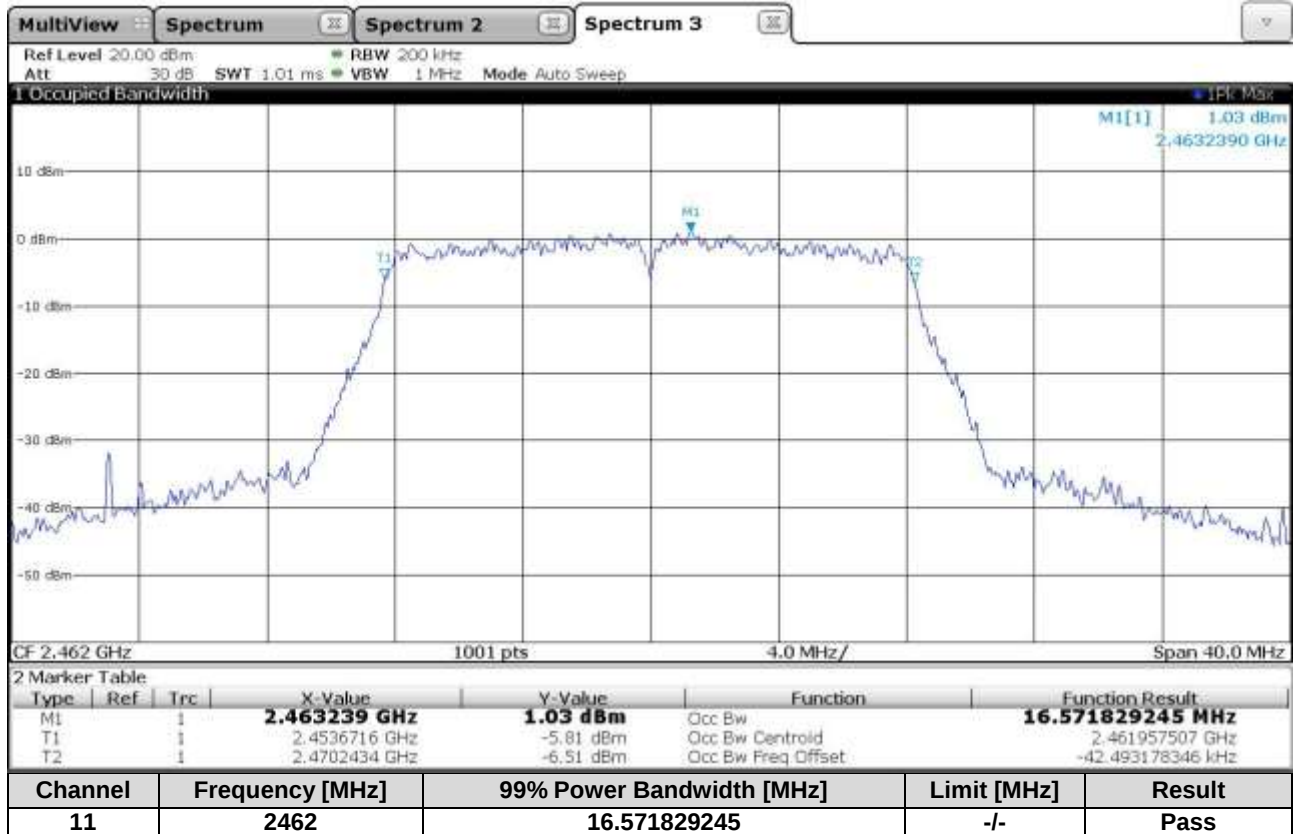
Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



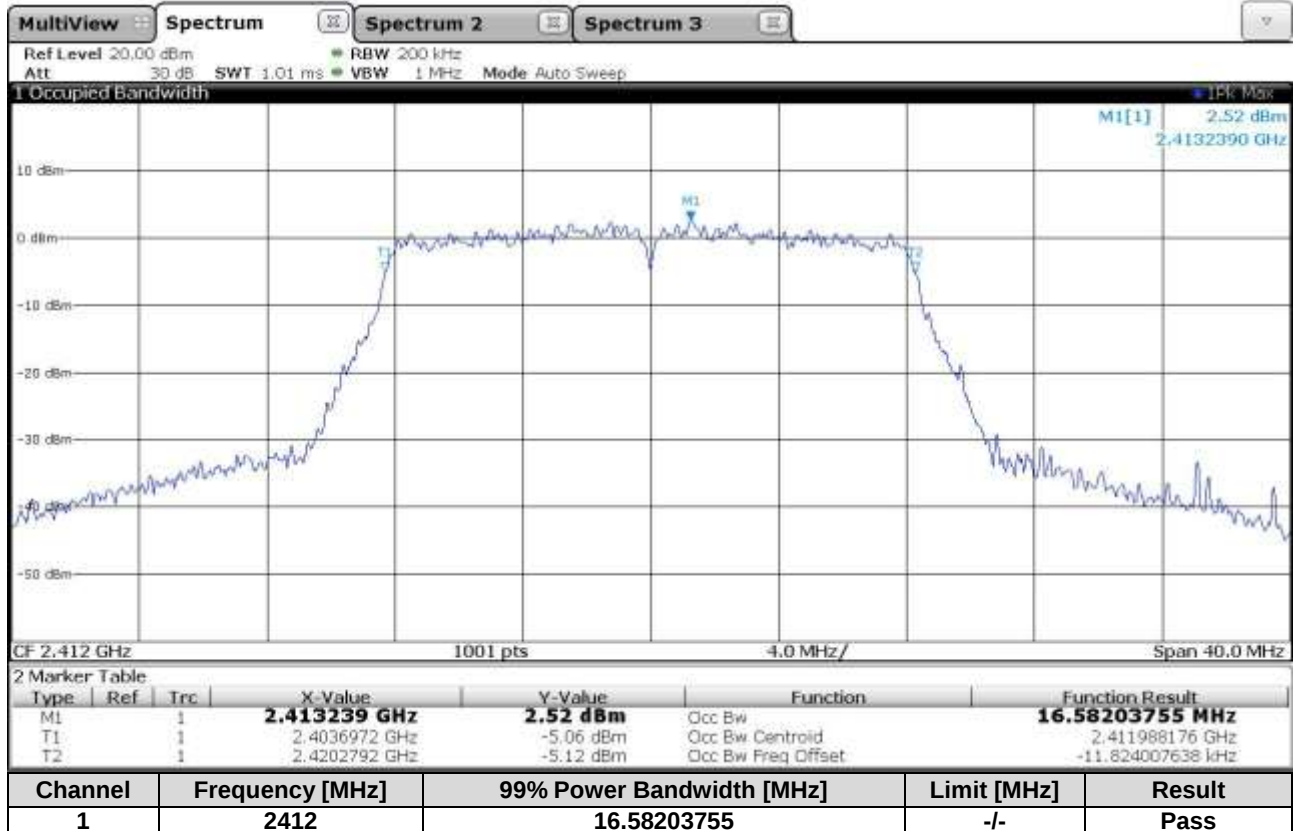
Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



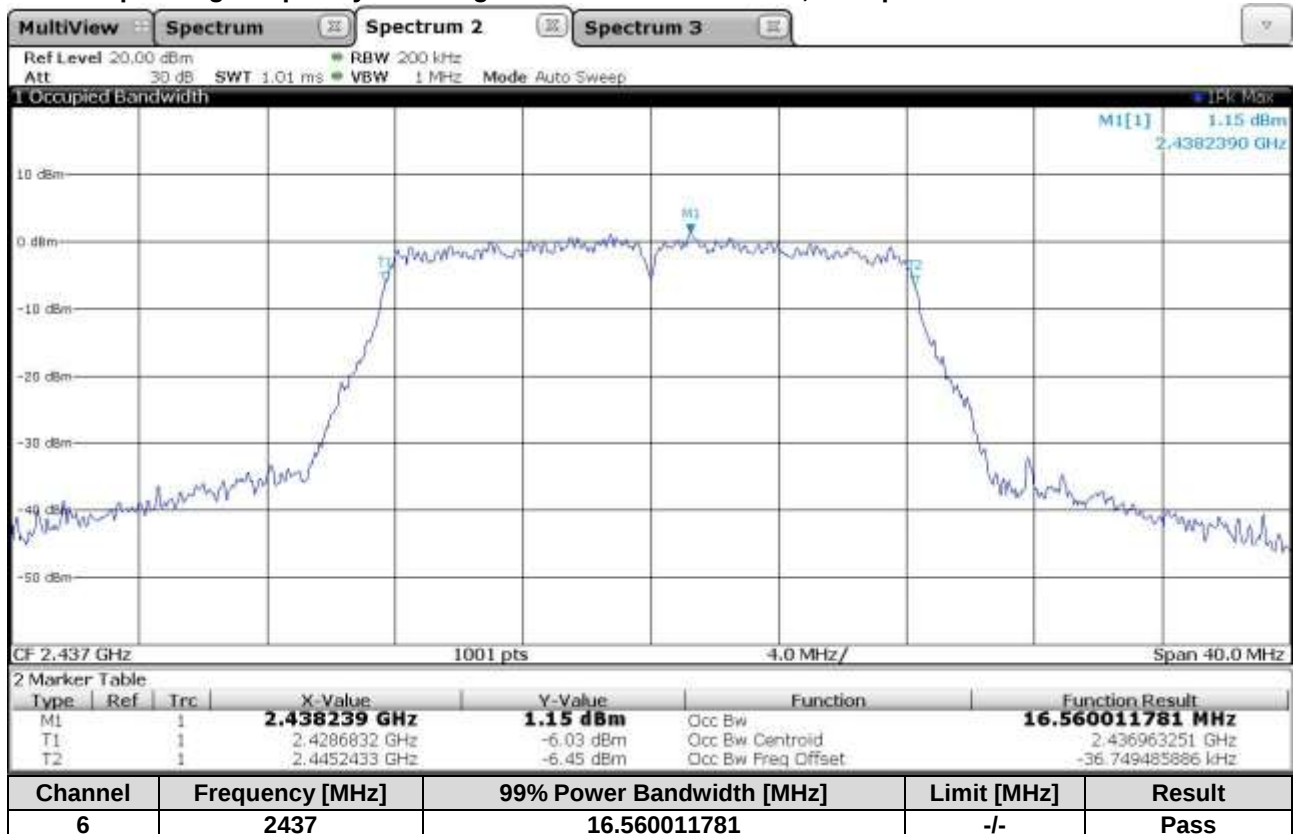
### Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 1



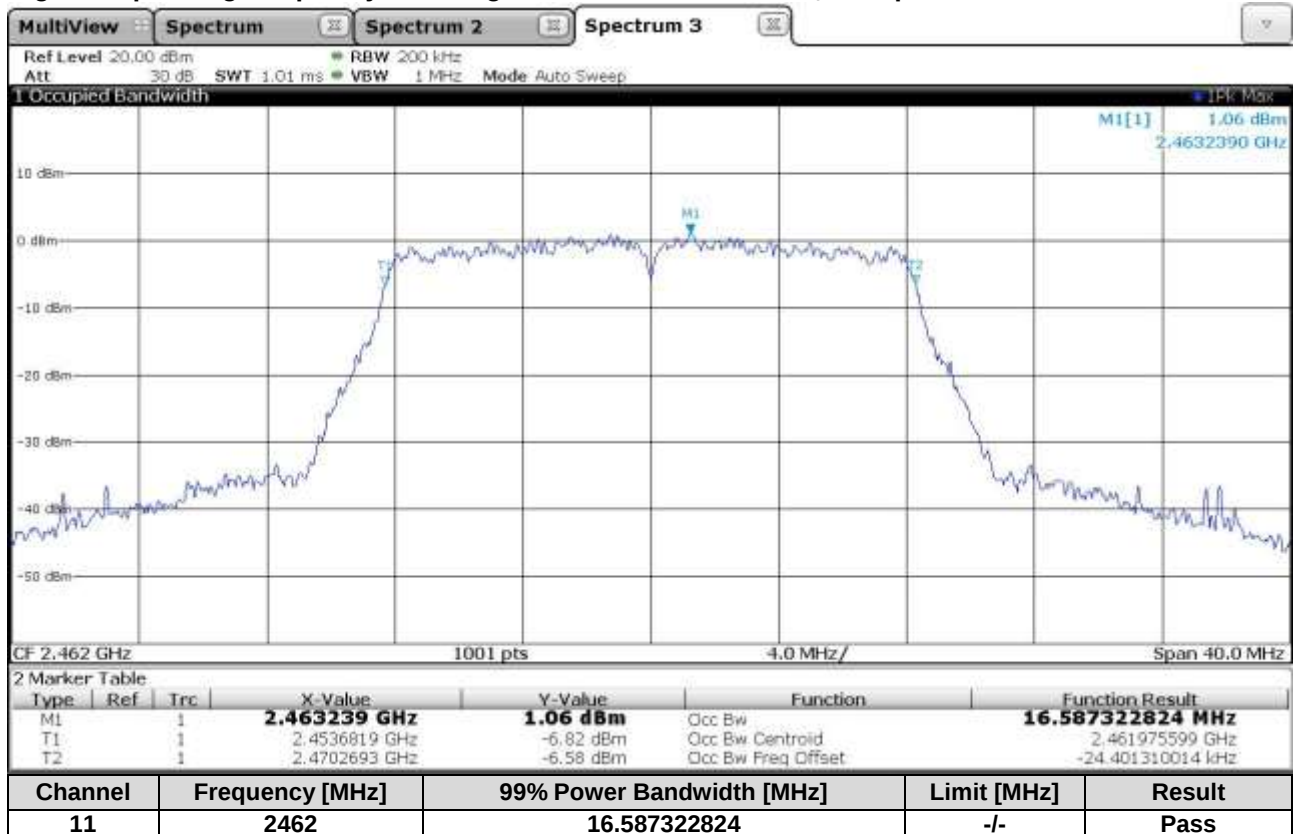
### Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



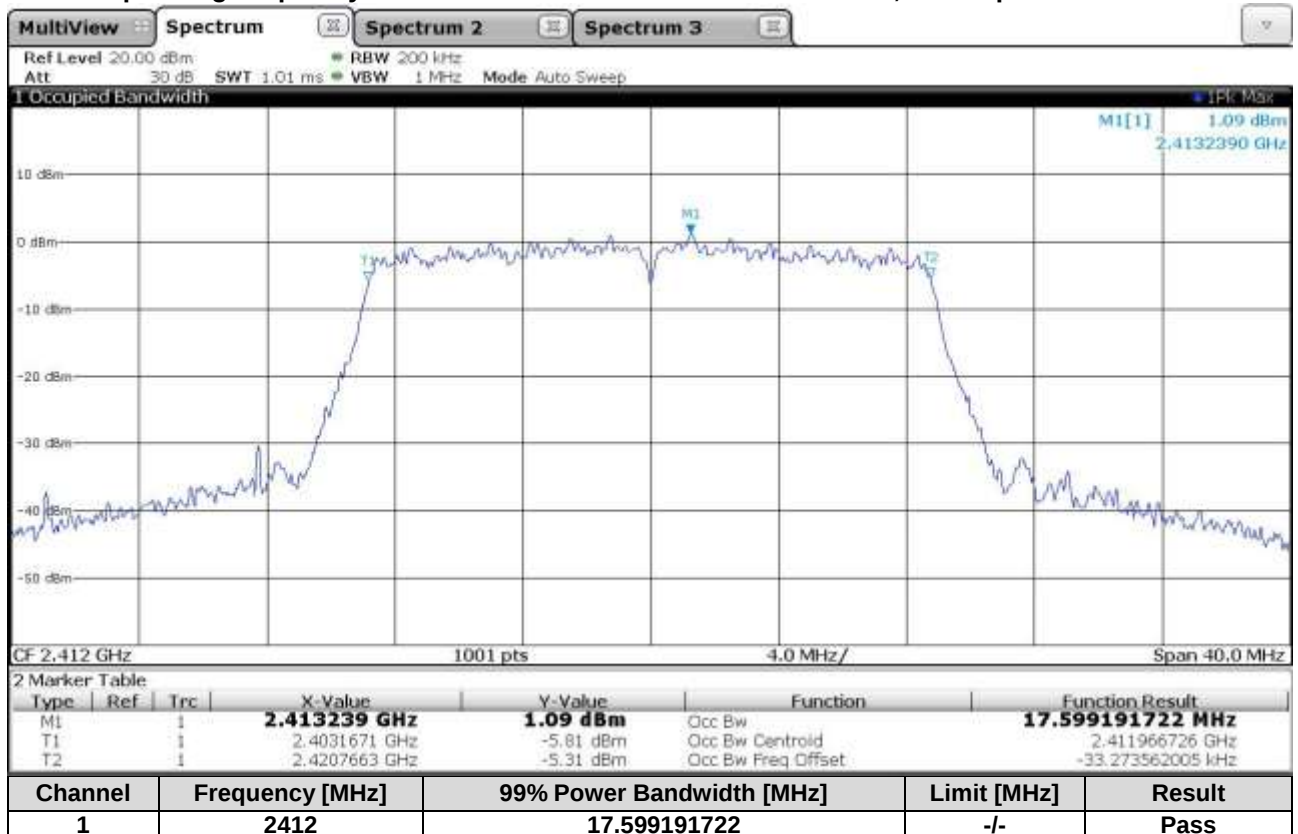
Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



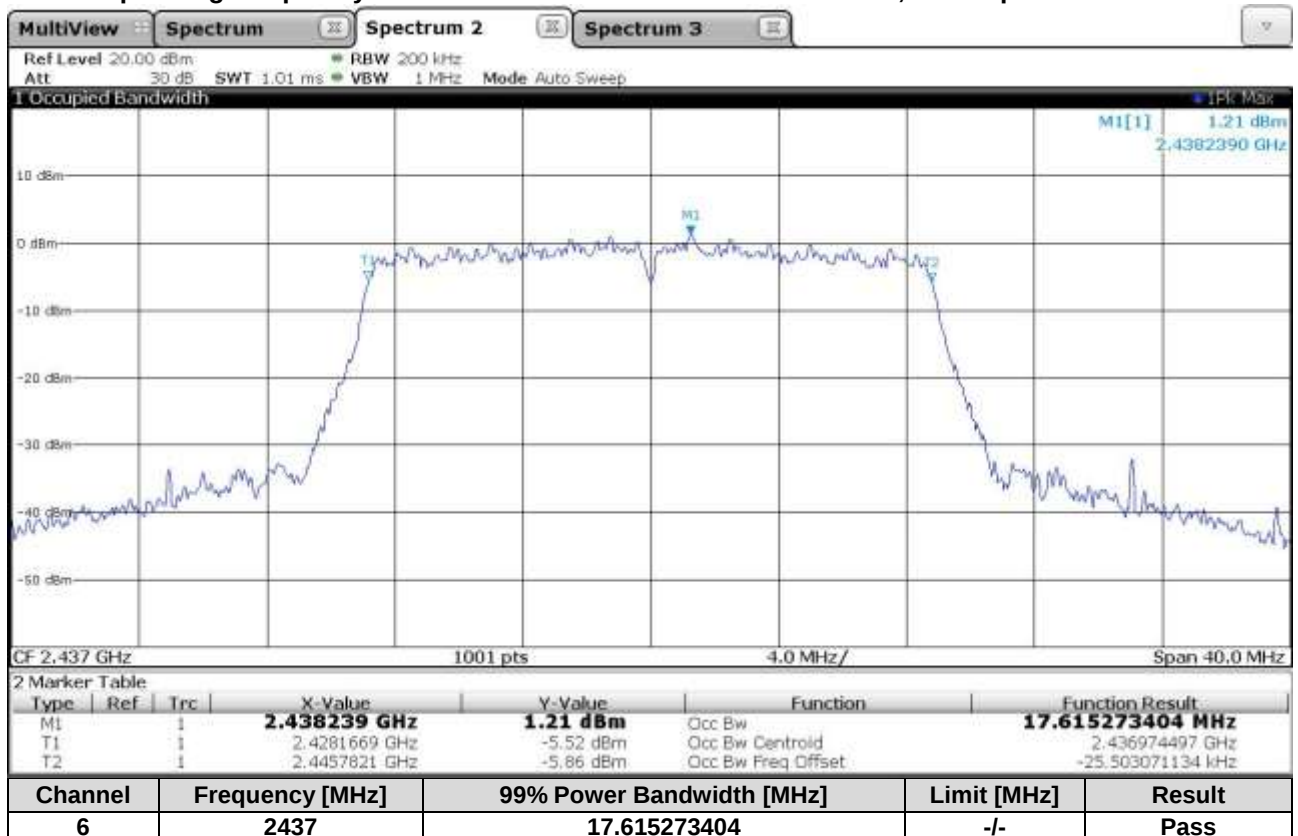
Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps / Antenna 2



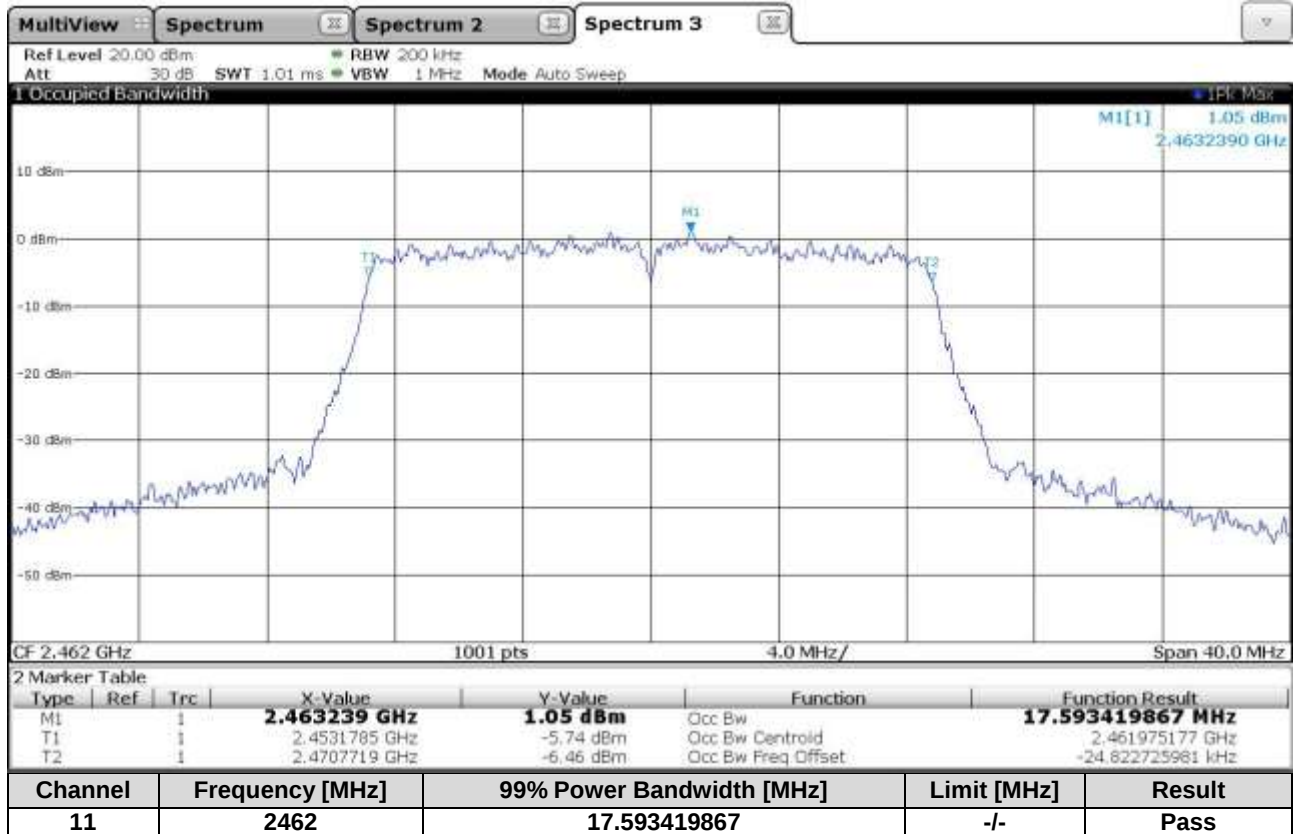
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



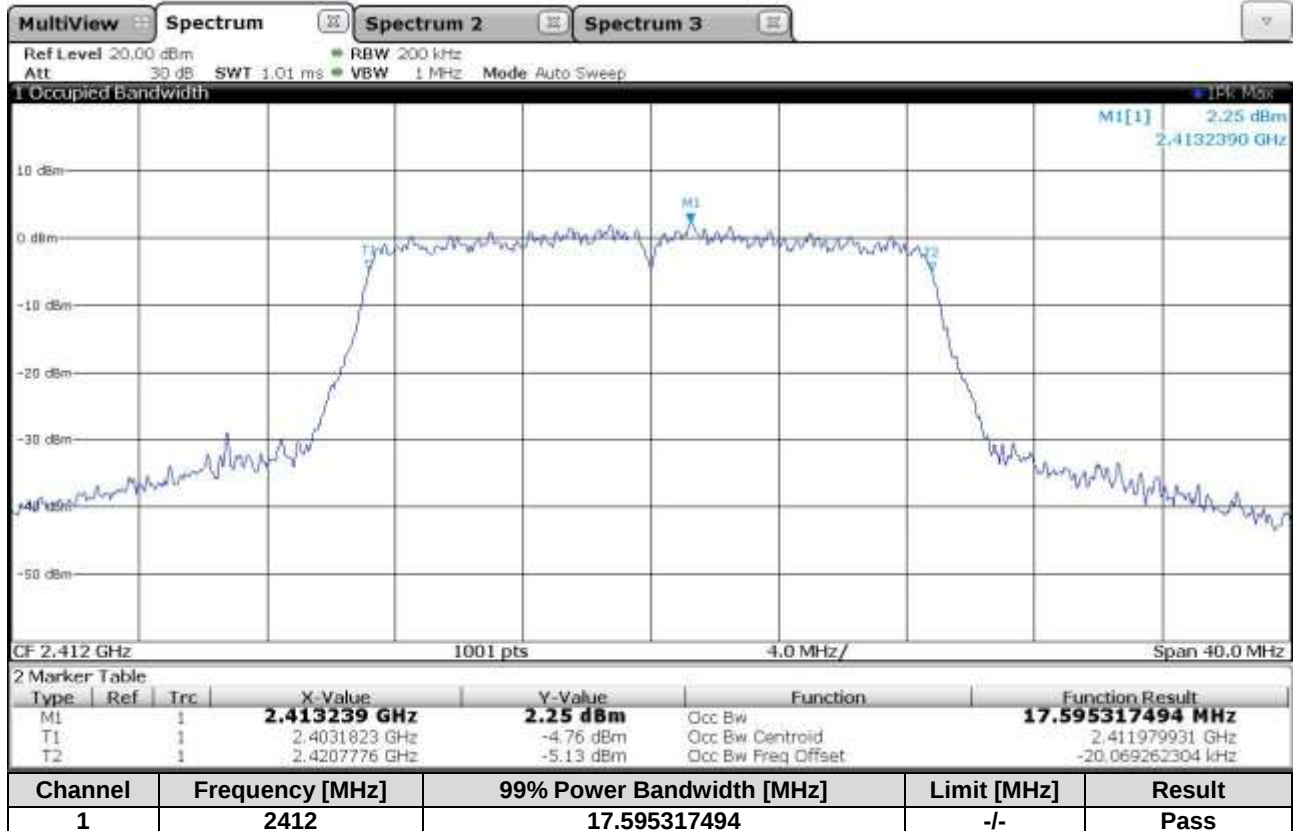
Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



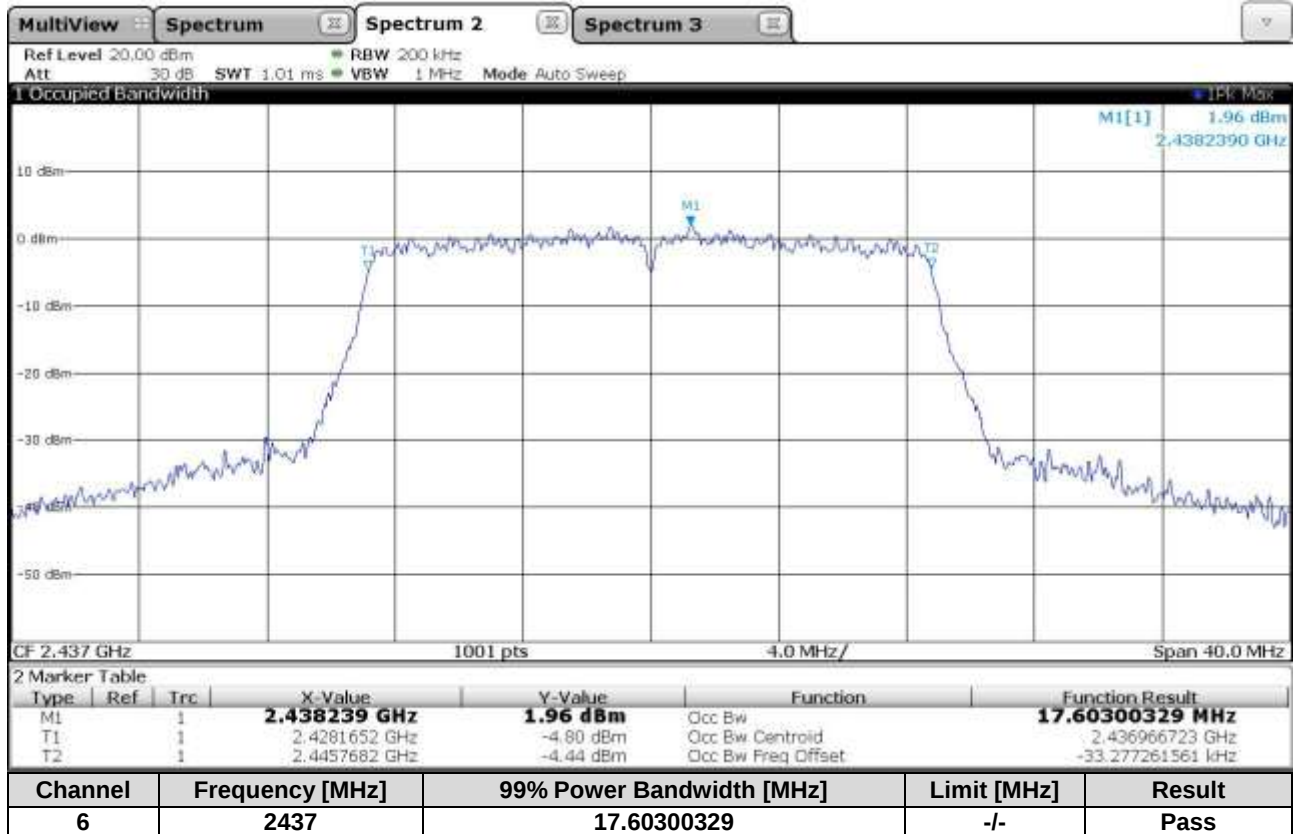
Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



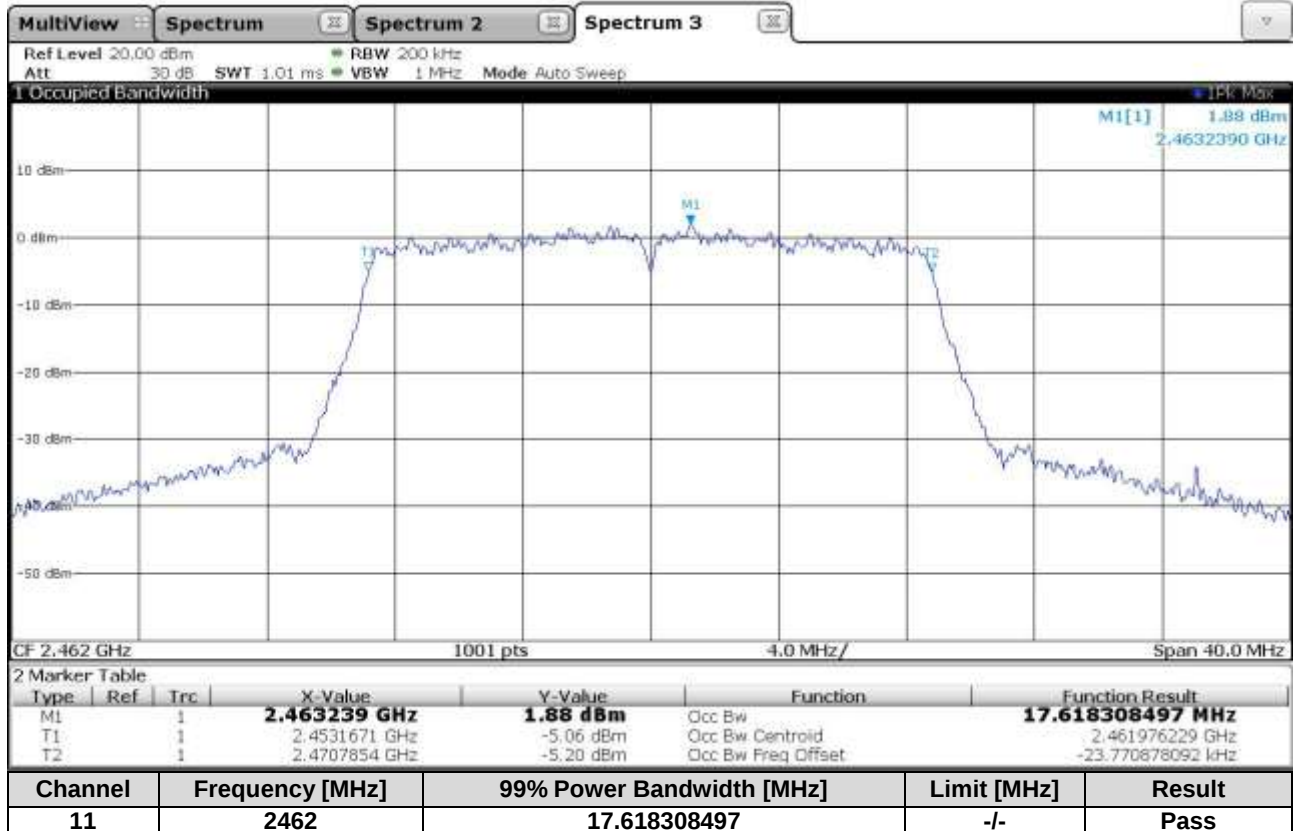
Lowest operating frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



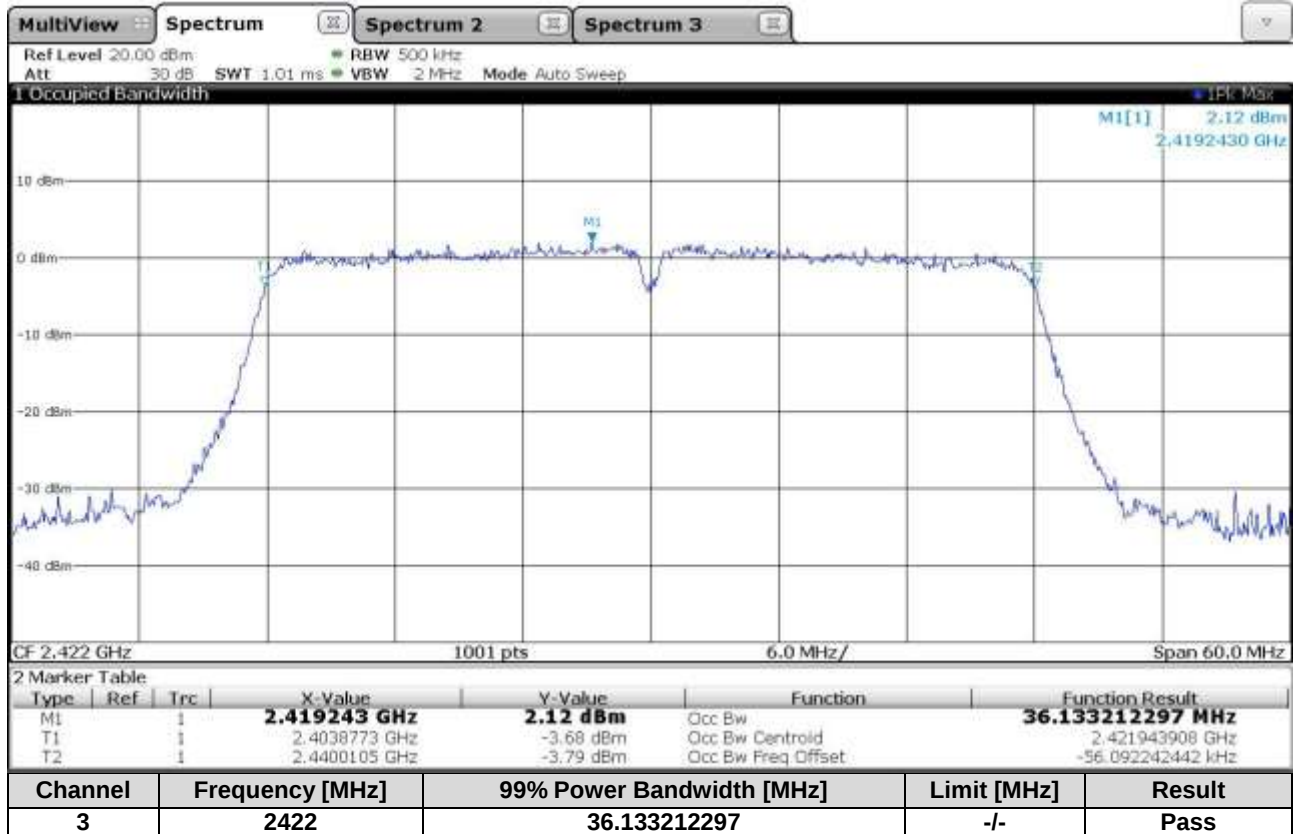
Middle Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



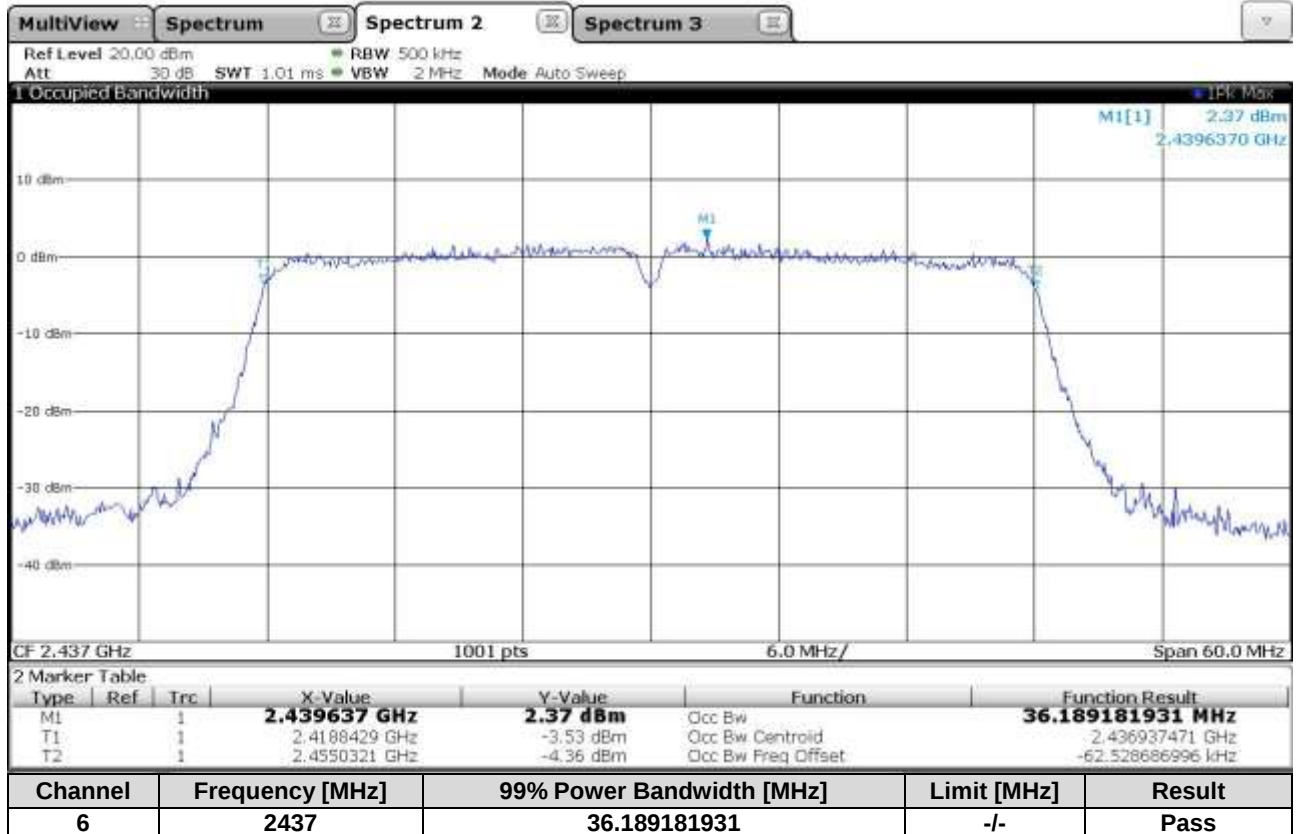
Highest Operating Frequency - 802.11n 20MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



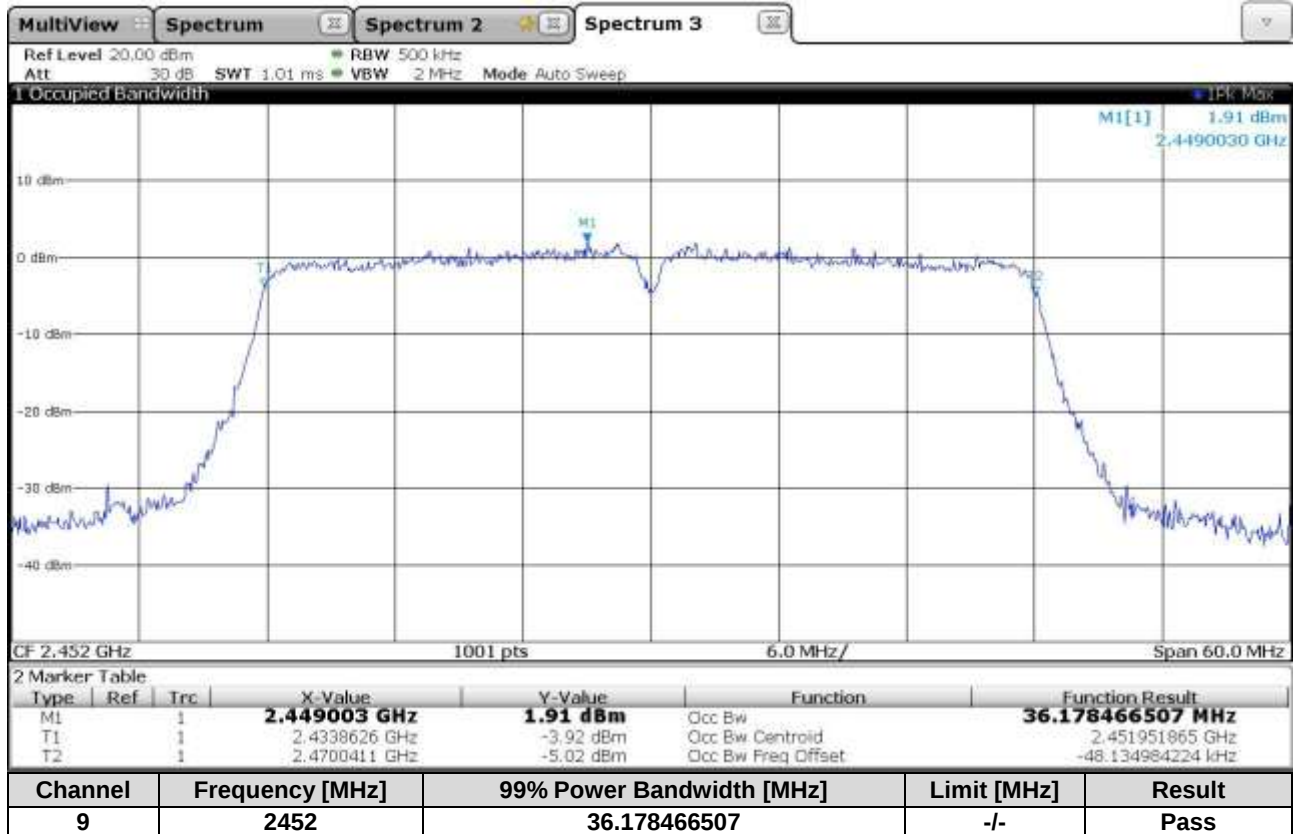
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



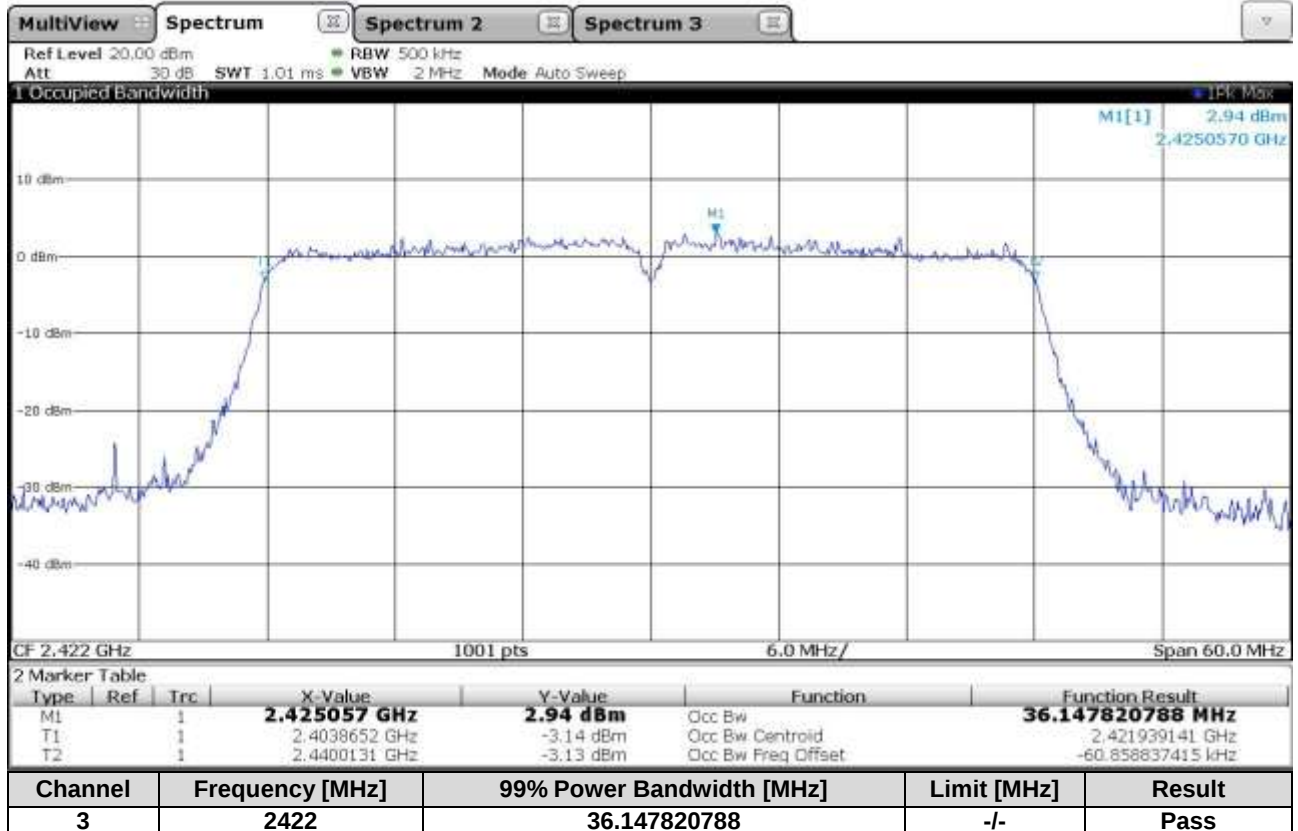
Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



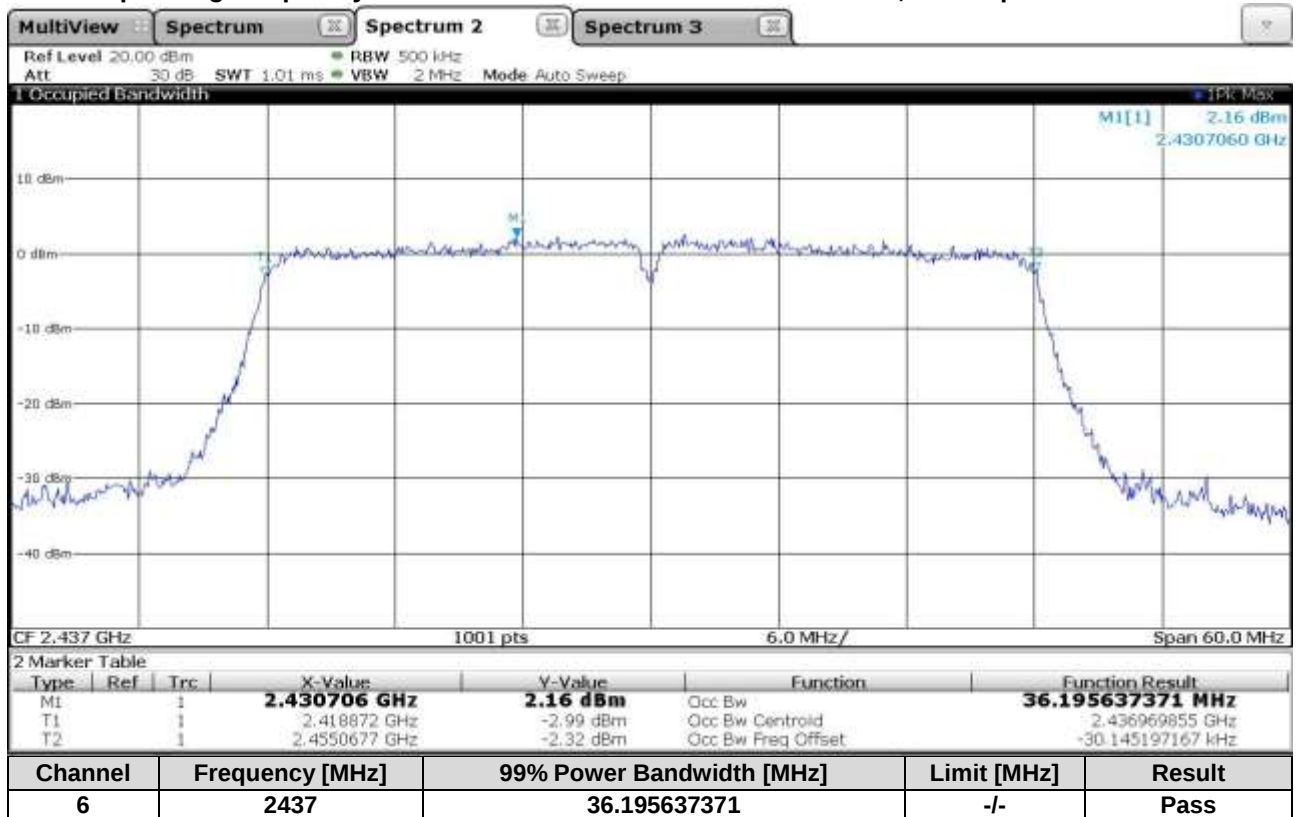
Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 1



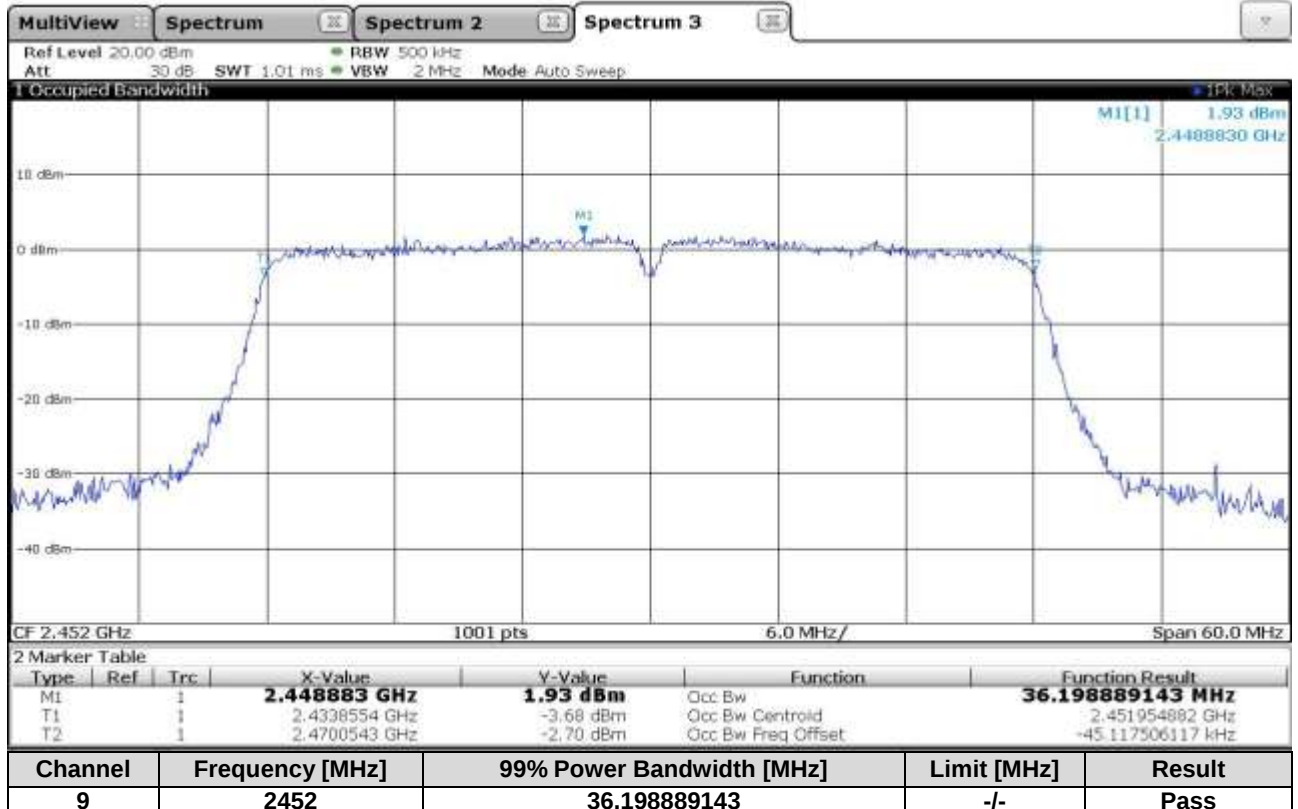
Lowest operating frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2



**Middle Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



**Highest Operating Frequency - 802.11n 40MHz / HT Greenfield – MCS=0; 6.5 MBps / Antenna 2**



**Results**

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **99% Power Bandwidth**.

## 8. Test equipment

### Test equipment used for radiated Measurements:

| Kind of equipment                        | Manufacturer         | Type                          | Ident no. | Serial no.         | Calibrated on (y-m) | Calibration interval |
|------------------------------------------|----------------------|-------------------------------|-----------|--------------------|---------------------|----------------------|
| Signal Spectrum Analyzer 2Hz – 26.5 GHz  | Rohde & Schwarz      | FSW 26 Instrument FW 2.60     | 11571     | 102047             | 2019-Jan.           | 3 years              |
| ESR7 EMI Testreceiver 7GHz               | Rohde & Schwarz      | ESR7                          | 11676     | 101694             | 2018-March          | 3 years              |
| Test-Receiver                            | Rohde & Schwarz      | ESVS30                        | 10572     | 833825/010         | 2020-April          | 3 years              |
| Antenna 9 kHz – 30 MHz                   | EMCO                 | 6502                          | 10546     | 2018               | 2017-Nov.           | 3 years              |
| Antenna 30 MHz – 1 GHz                   | Chase                | CBL6111C                      | 10022     | 1064               | 2019-Dec.           | 3 years              |
| Antenna 1GHz – 18 GHz                    | Electro Metric       | RGA50/60                      | 10273     | 2753               | 2017-Nov.           | 3 years              |
| Broadband-Hornantenne 15 - 26,5 (40) GHz | Schwarzbeck          | BBHA 9170                     | 11580     | BBHA91706 21       | 2019-Dec.           | 3 years              |
| Broadband-Preamplifier 1-18 GHz          | Schwarzbeck          | BBV9718                       | 11231     | 9718-002           | 2017-Oct.           | 3 years              |
| Preamplifier 18 - 40 GHz                 | CERNEX               | CBM18403523                   | 11679     | 29711              | 2019 - July         | 3 years              |
| Cable                                    | el-spec GmbH         | FlexCore-SMA11-SMA11-8000-ARM | 11625     | -/-                | 2017-Dec.           | 3 years              |
| Shielded room/Chamber                    | Frankonia            | SAC3 "SEMI-ANECHOIC-CHAMBER"  | 11609     | 004/16             | 2019-March          | 3 years              |
| Band Reject Filter                       | Telemeter            | BRF-2450-150-7-N (0441)       | 11243     | -/-                | -/-                 | -/-                  |
| Above 26 GHz Substitution procedure      |                      |                               |           |                    |                     |                      |
| Spectrum Analyzer                        | Rohde & Schwarz      | FSMS 26                       | 10481     | 839014/004         | -/-                 | -/-                  |
| Spectrum-Analyzer Display                | Rohde & Schwarz      | FSMS 26                       | 10482     | 838509/010         | -/-                 | -/-                  |
| Harmonic Mixer                           | Rohde & Schwarz      | FS-Z40                        | 10779     | 842529/003         | -/-                 | -/-                  |
| Harmonic Mixer LO-Amp.                   | Rohde & Schwarz      | FS-Z30                        | 10780     | 624413/005         | -/-                 | -/-                  |
| Phase3 Ultra Low Loss Cable Assembly     | TECH-INTER           | GC12-K1K1-197                 | 11718     | 1GVT4 19047702 001 | -/-                 | -/-                  |
| Preamplifier 18 - 40 GHz                 | CERNEX               | CBM18403523                   | 11679     | 29711              | 2019 - July         | 3 years              |
| A-INFO Braodband Horn Antenna            | EMCO Elektronik GmbH | LB-180400-KF                  | 11716     | J211060840         | -/-                 | -/-                  |
| Signal-Generator 100 KHz - 40 GHz        | Rohde & Schwarz      | SMB100A                       | 11563     | 177769             | 2019-Jan.           | 3 years              |
| Broadband-Hornantenne 15 - 26,5 (40) GHz | Schwarzbeck          | BBHA 9170                     | 11580     | BBHA91706 21       | 2019-Dec.           | 3 years              |

#### Test equipment used for Band Edge Measurements:

| Kind of equipment          | Manufacturer    | Type                          | Ident no. | Serial no. | Calibrated on (y-m) | Calibration interval |
|----------------------------|-----------------|-------------------------------|-----------|------------|---------------------|----------------------|
| ESR7 EMI Testreceiver 7GHz | Rohde & Schwarz | ESR7                          | 11676     | 101694     | 2018-March          | 3 years              |
| Antenna 1GHz – 18 GHz      | Electro Metric  | RGA50/60                      | 10273     | 2753       | 2017-Nov.           | 3 years              |
| Cable                      | el-spec GmbH    | FlexCore-SMA11-SMA11-8000-ARM | 11625     | -/-        | 2017-Dec.           | 3 years              |
| Shielded room/Chamber      | Frankonia       | SAC3 "SEMI-ANECHOIC-CHAMBER"  | 11609     | 004/16     | 2019-March          | 3 years              |

#### Test equipment used for conducted measurements:

| Kind of equipment                             | Manufacturer    | Type                          | Ident no. | Serial no. | Calibrated on (y-m) | Calibration interval |
|-----------------------------------------------|-----------------|-------------------------------|-----------|------------|---------------------|----------------------|
| Signal Spectrum Analyzer 2Hz – 26.5 GHz       | Rohde & Schwarz | FSW 26 Instrument FW 2.60     | 11571     | 102047     | 2019 - Jan.         | 3 years              |
| EMI-Test-Receiver                             | Rohde & Schwarz | ESR7 Instrument FW 3.36       | 11505     | 101103     | 2017 - Nov.         | 3 years              |
| Automatisation unit RF switch and power meter | Rohde & Schwarz | OSP120 and OSP B157           | 11573     | 101282     | 2017 - Dec.         | 3 years              |
| Cable                                         | el-spec GmbH    | FlexCore-SMA11-SMA11-8000-ARM | 11625     | -/-        | 2017 - Dec.         | 3 years              |

#### Test equipment used for Conducted Mains emissions:

| Kind of equipment                           | Manufacturer    | Type                                           | Ident no. | Serial no. | Calibrated on (y-m) | Calibration interval |
|---------------------------------------------|-----------------|------------------------------------------------|-----------|------------|---------------------|----------------------|
| Test-Receiver                               | Rohde & Schwarz | ESHS30                                         | 10571     | 842053/008 | 2019 – Mar.         | 3 years              |
| Software                                    | PKM             | PKM U5/6                                       | -/-       | V1.01.03   | -/-                 | -/-                  |
| Line impedance stabilisation network (LISN) | Rohde & Schwarz | ESH2-Z5                                        | 10139     | 879675/028 | 2019 – Jan.         | 3 years              |
| Shielded room                               | Siemens         | (6,2 x 4,7 x 3,3) m (l x w x h)<br>DC – 10 GHz | 10113     | 1          | -/-                 | -/-                  |

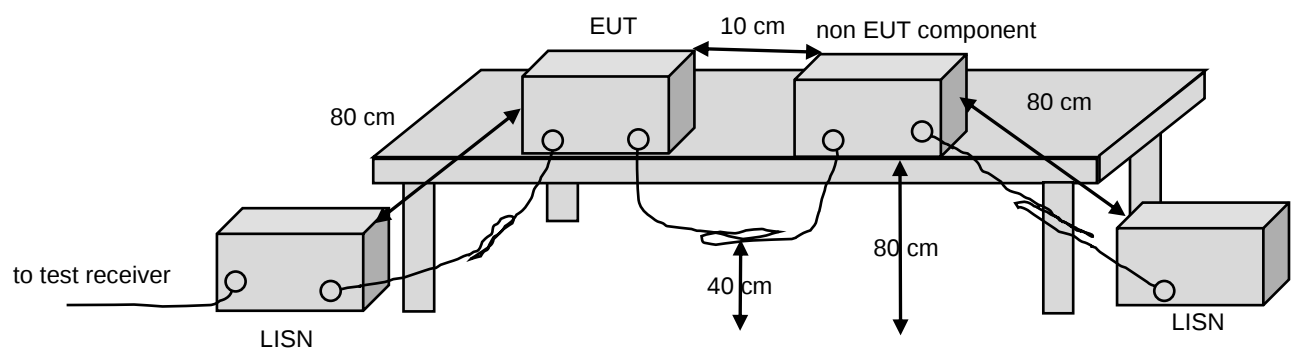
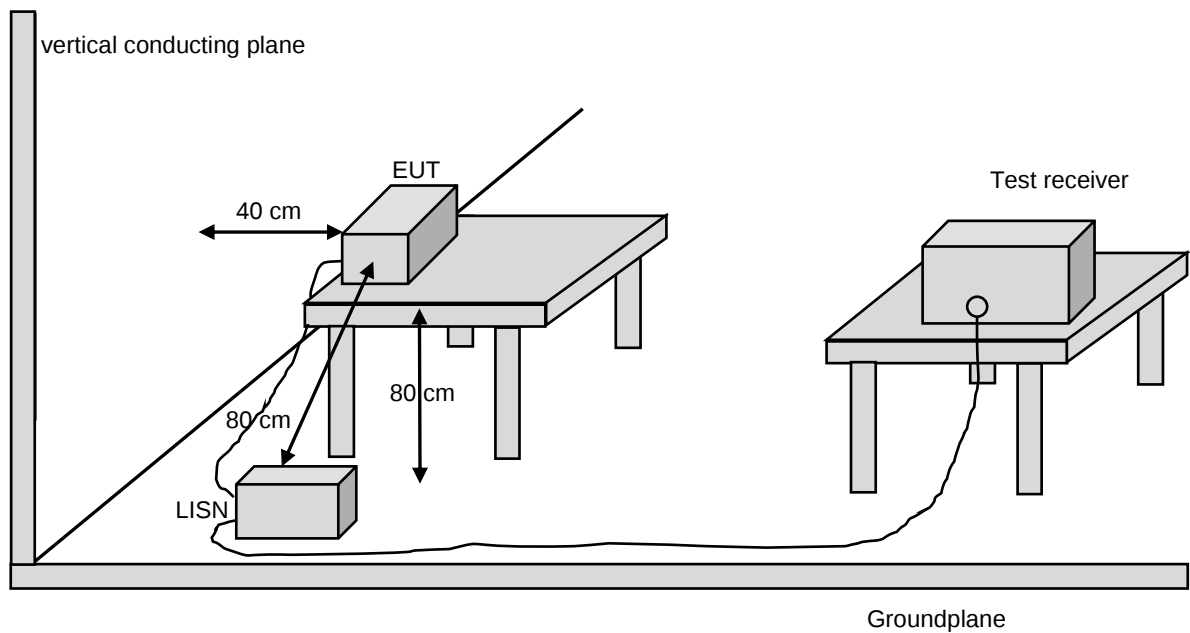
All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of conducted mains emissions was made with instruments conforming to American National Standard Specification, ANSI C63.4-2014.

#### Test equipment to support EUT functions:

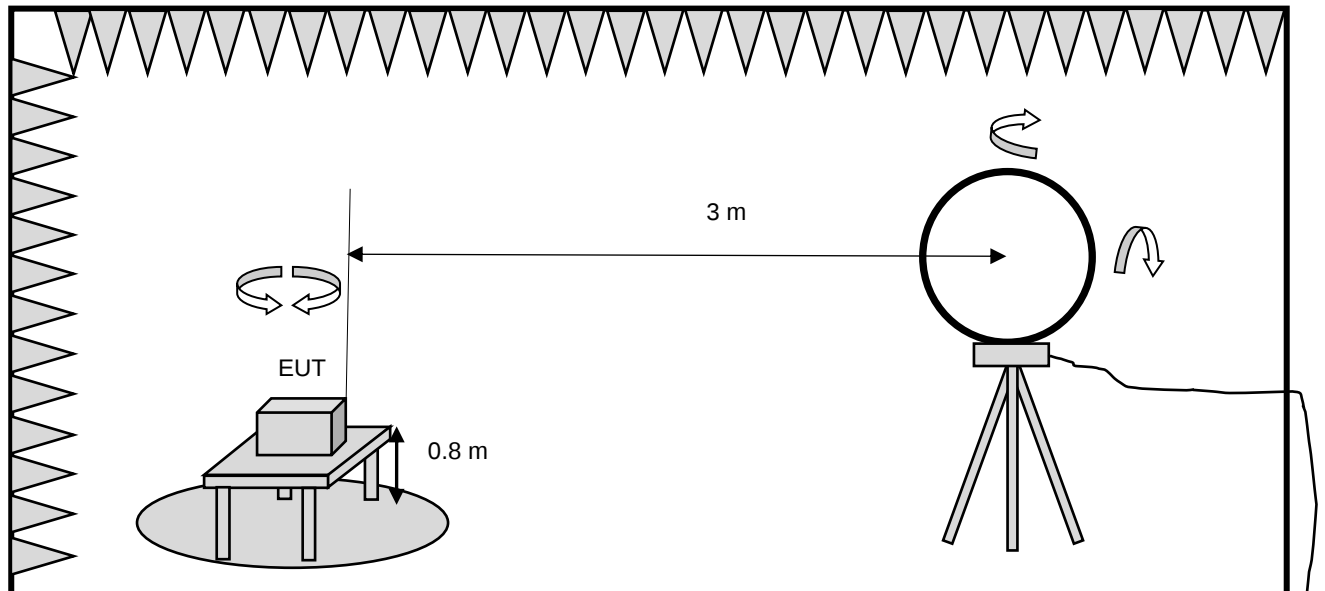
| Kind of equipment       | Manufacturer                | Type            | Ident no.     |
|-------------------------|-----------------------------|-----------------|---------------|
| Laptop                  | DELL                        | Inspiron        | 11488         |
| AC-Adaptor [Laptop/EUT] | DELL                        | DA130PE1-00     | Part of 11488 |
| Test Adaptor Board      | Vestel (Client)             | 17TEST02        | Client        |
| Software                | Provided by Vestel (Client) | MT7662U QA Tool | -/-           |

## 9. Test Setups

### Block diagram Conducted Mains emissions

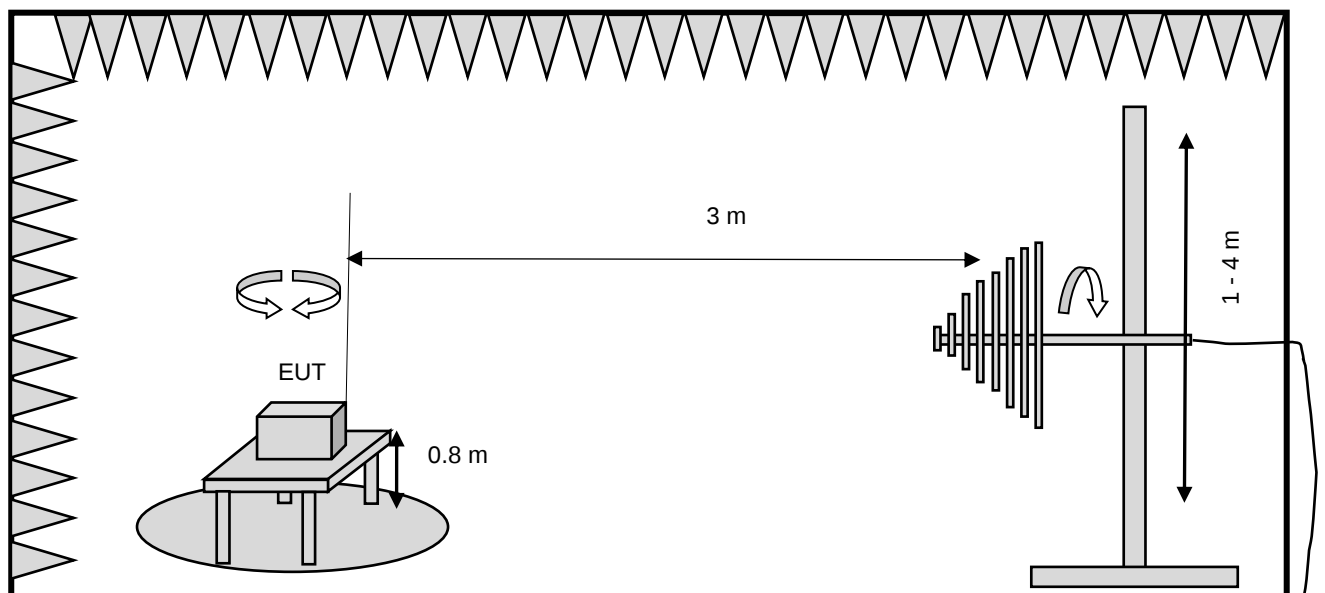
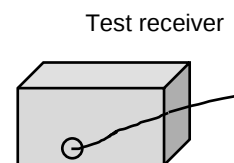


## Block diagram Radiated emissions



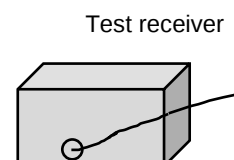
Semi anechoic chamber with absorber and ferrite tiles

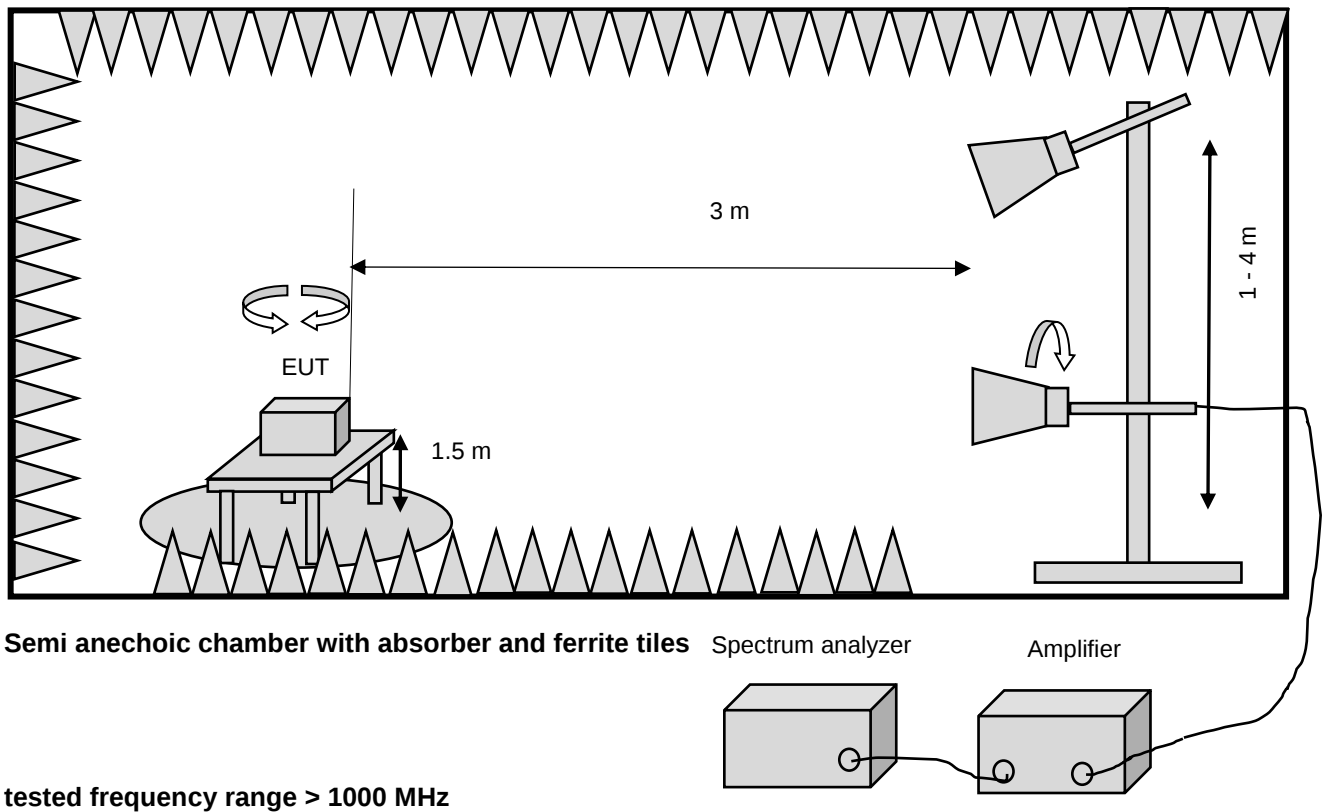
tested frequency range 9 kHz - 30 MHz



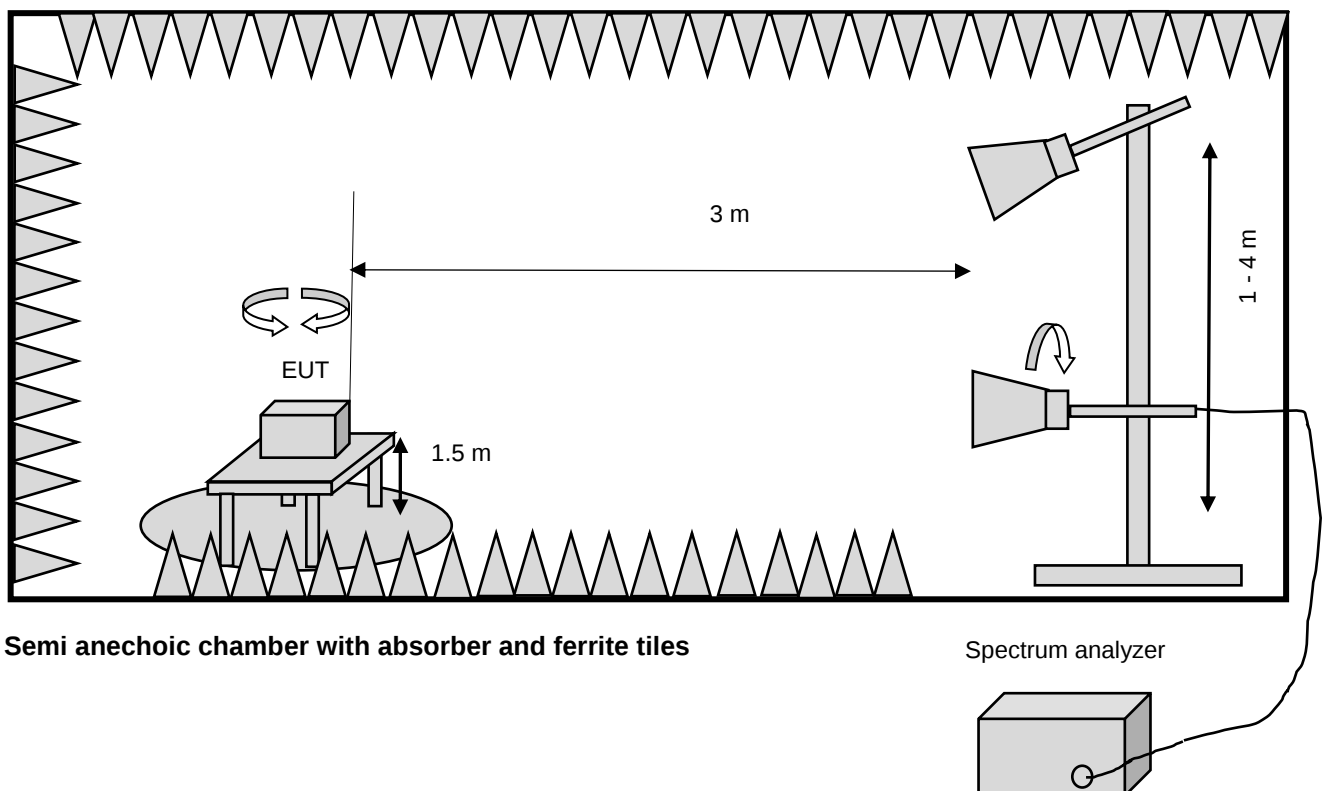
Semi anechoic chamber with absorber and ferrite tiles

tested frequency range 30 MHz - 1000 MHz

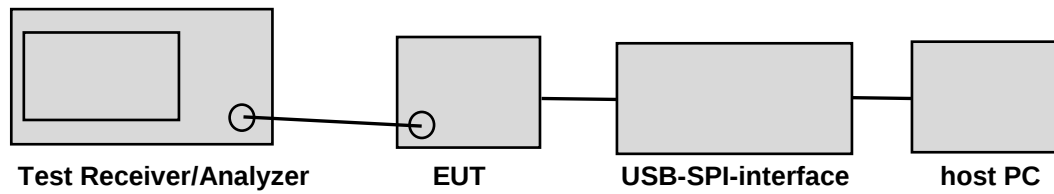




### Block diagram Band Edge emissions



**Block diagram for conducted measurements**



## 10. Measurement uncertainty

according to CISPR 16-4-2 Edition 2.0 2011-06

| Measurement                                                                      | calculated uncertainty<br>$U_{lab}$ | Specified CISPR uncertainty<br>according CISPR 16-4-2<br>Edition 2.0 2011-06, table 1<br>$U_{CISPR}$ |
|----------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------|
| Conducted disturbance at mains port using AMN<br>9 kHz – 150 kHz                 | 3.6 dB                              | 3.8 dB                                                                                               |
| Conducted disturbance at mains port using AMN<br>150 kHz – 30 MHz                | 3.2 dB                              | 3.4 dB                                                                                               |
| Magn. fieldstrength<br>9kHz - 30MHz                                              | 3.4 dB                              | -/-                                                                                                  |
| Radiated disturbance (electric field strength in the SAC)<br>30 MHz to 1 000 MHz | 4.7 dB                              | 6.3 dB                                                                                               |
| Radiated disturbance (electric field strength in the SAC)<br>1 GHz to 26.5 GHz   | 4.1 dB                              | -/-                                                                                                  |
| Radiated disturbance (electric field strength in the SAC)<br>26.5 GHz to 40 GHz  | 3.1 dB                              | -/-                                                                                                  |

| Measurement                       | calculated uncertainty<br>$U_{lab}$                                | Maximum measurement uncertainty  |
|-----------------------------------|--------------------------------------------------------------------|----------------------------------|
| Channel Bandwidth                 | $\pm 1.17 \%$                                                      | $\pm 5 \%$                       |
| RF output power, conducted        | $\pm 1.36 \text{ dB}$                                              | $\pm 1.5 \text{ dB}$             |
| Power Spectral Density, conducted | $\pm 1.99 \text{ dB}$                                              | $\pm 3 \text{ dB}$               |
| Unwanted Emissions, conducted     | $\pm 1.71 \text{ dB}$                                              | $\pm 3 \text{ dB}$               |
| All emissions, radiated           | $\pm 4.8 \text{ dB}$                                               | $\pm 6 \text{ dB}$               |
| Temperature                       | $\pm 0.72 \text{ }^{\circ}\text{C}$                                | $\pm 3 \text{ }^{\circ}\text{C}$ |
| Supply voltages                   | $\pm 0.76 \%$ (DC up to 40V)<br>$\pm 1.74 \%$ (AC 50Hz up to 400V) | $\pm 3 \%$                       |
| Time                              | $\pm 0.012 \%$                                                     | $\pm 5 \%$                       |

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % ( $k = 2$ ).



## **11. Photos setup**

Refer to “0030-fcc-ised-photos test setup.pdf” file

## 12. Conclusions

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant RSS-247 issue 02 Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network

Following specific modifications and/or special attributes are necessary to pass the above mentioned requirements:

none

10.04.2020

Erstellt am/prepared on

M. Beindl, Laboratory Engineer

(Name/Name / Stellung/position)



(Unterschrift/signature)

16.09.2020

Freigabe am/released on

A. Tropmann, Head of Laboratory

(Name/Name / Stellung/position)



(Unterschrift/signature)

|                                                                                   |                                       |                       |
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### 13. Photos of tested sample

Refer to “0030-fcc-ised-ext-photos.pdf” file

**End of test report**