



**FCC PART 15  
TEST REPORT  
No.I22Z62049-IOT02**

**for**

**unitech electronics co., ltd.**

**Rugged Handheld Computer**

**PA768**

**With**

**FCC ID: HLEPA768BWNW**

**Hardware Version: FH09\_MB\_PCB\_V1.3**

**Software Version: RAYA\_V03.25b02\_20221010**

**Issued Date: 2023-04-14**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I22Z62049-IOT02	Rev.0	1st edition	2023-02-16
I22Z62049-IOT02	Rev.1	Update the formula of directional gain	2023-03-01
I22Z62049-IOT02	Rev.2	Add the worst plots result of PSD(40M).	2023-03-22
I22Z62049-IOT02	Rev.3	Add the worst plots result of PSD(20M/80M/160M).	2023-04-14

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## 1. TEST LABORATORY

### 1.1. Introduction & Accreditation

**Telecommunication Technology Labs, CAICT** is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

### 1.2. Testing Location

Conducted testing Location: CTTL(Huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Radiated testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

### 1.3. Testing Environment

Normal Temperature: 15-35°C

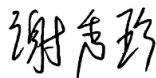
Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2022-10-18

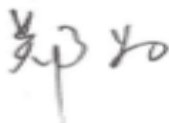
Testing End Date: 2022-02-07

### 1.5. Signature



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**Xie Xiuzhen**  
**(Prepared this test report)**



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**Zheng Wei**  
**(Reviewed this test report)**



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**Pang Shuai**  
**(Approved this test report)**



## **2. CLIENT INFORMATION**

### **2.1 Applicant Information**

Company Name: unitech electronics co., ltd.  
Address /Post: 5F., No. 136, Ln. 235, Baoqiao Rd., Xindian Dist.,  
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Contact: Ben Chiang  
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### **2.2 Manufacturer Information**

Company Name: unitech electronics co., ltd.  
Address /Post: 5F., No. 136, Ln. 235, Baoqiao Rd., Xindian Dist.,  
New Taipei City 231028 , Taiwan  
Contact: Ben Chiang  
Email: BenC@tw.ute.com  
Telephone: 886-2-8912-1122  
Fax: 886-2-89121391

### 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT(AE)

#### 3.1. About EUT

Description	Rugged Handheld Computer
Model name	PA768
FCC ID	HLEPA768BWNW
WLAN Frequency Band	ISM Bands: -5925MHz~6425MHz -6425MHz~6525MHz -6525MHz~6875MHz -6875MHz~7125MHz
Type of modulation	OFDM/OFDMA
Antenna	Integral Antenna
Voltage	3.85V
Equipment class	Indoor client

#### 3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	358585240001881	FH09_MB_PCB_V1.3	RAYA_V03.25b02_20221010
EUT2	358585240002061	FH09_MB_PCB_V1.3	RAYA_V03.25b02_20221010
EUT3	358585240006740	FH09_MB_PCB_V1.3	RAYA_V03.25b02_20221010

\*EUT ID: is used to identify the test sample in the lab internally.  
 EUT2/EUT3 is used for Conduction test, EUT1 is used for Radiation test.

#### 3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB Cable	/	/

\*AE ID: is used to identify the test sample in the lab internally.

AE1

Model	1400-900069G
Manufacturer	LIFUN TECHNOLOGY CO.,LTD.
Nominal Voltage	3.85V

AE2

Model	S018BYU12000150
Manufacturer	Ten Pao Electronics (Huizhou) Co. Ltd.

AE3

Model	1550-905908G
Manufacturer	JHEN VEI ELECTRONIC CO., LTD.

### 3.4. General Description

The Equipment under Test (EUT) is a model of Rugged Handheld Computer with Integral antenna and inbuilt battery.

It consists of normal options: travel charger, USB cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

### 3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor  $k=2$ .

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

## 4. REFERENCE DOCUMENTS

### 4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

### 4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

FCC Part15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	2021
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033 D02	General U-NII Test Procedures New Rules v02r01	2017-12
KDB 987594 D02	GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE 6 GHz (U-NII) DEVICES PART 15, SUBPART E	2021-02
KDB 662911 D01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band(e.g., MIMO, Smart Antenna, etc)	2013-10



## 5. LABORATORY ENVIRONMENT

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

## 6. SUMMARY OF TEST RESULTS

### 6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Sub-clause of IC	Verdict
Maximum Output Power	15.407	/	P
Peak Power Spectral Density	15.407	/	P
Occupied 26dB Bandwidth	15.403	/	P
99% Occupied bandwidth	/	/	P
Contention Based Protocol	15.407	/	P
In-Band Emissions	15.407	/	P
Band edge compliance (Radiated)	15.209,15.407	/	P
AC Powerline Conducted Emission (150kHz- 30MHz)	15.107, 15.207	/	P
Transmitter spurious emissions(Radiated)	15.407	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NM	Not measured, The test was not measured by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

### 6.2. Statements

CTTL has evaluated the test cases requested by the client/manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2.

This report only deals with the WLAN function among the features described in section 3.

KDB 987594 is not accredited by the NVLAP.

### 6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26°C
Voltage	3.85V
Humidity	44%

## 7. TEST EQUIPMENTS UTILIZED

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2023-05-15
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2024-03-06
3	Vector Signal Generator	SMW200A	103421	Rohde & Schwarz	1 year	2023-05-15
4	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2023-02-21
5	LISN	ESCI	100344	Rohde & Schwarz	1 year	2023-05-30
6	Attenuator	10dB/2W	/	Rosenberger	/	/
7	Shielding Room	S81	/	ETS-Lindgren	/	/

Instrument	Brand Name	Model
WLAN AP	ASUS	GT-AXE11000

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103144	Rohde & Schwarz	1 year	2023-10-25
2	BiLog Antenna	VULB9163	1223	Schwarzbeck	1 year	2023-07-25
3	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	1 year	2023-11-29
4	EMI Antenna	3115	00167250	ETS-Lindgren	1 Year	2023-06-20

## 8. Measurement Uncertainty

### 8.1 Transmitter Output Power

Measurement Uncertainty: 0.387dB, k=1.96

### 8.2 Peak Power Spectral Density

Measurement Uncertainty: 0.705dB, k=1.96

### 8.3 99% Occupied bandwidth

Measurement Uncertainty: 60.80Hz, k=1.96

### 8.4 Occupied Channel Bandwidth

Measurement Uncertainty: 60.80Hz, k=1.96

### 8.5 Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

### 8.6 Spurious Emissions

#### Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

#### Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	4.92
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.15
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.54
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

### 8.7 AC Power-line Conducted Emission

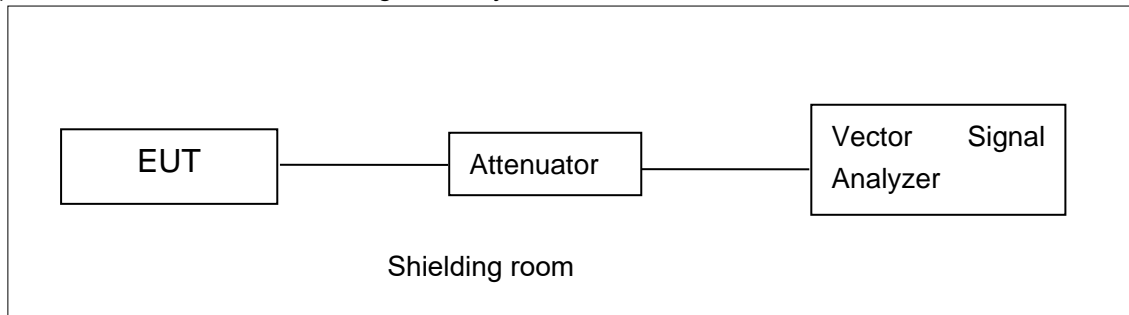
Measurement Uncertainty : 3.08dB,k=2

## ANNEX A: MEASUREMENT RESULTS

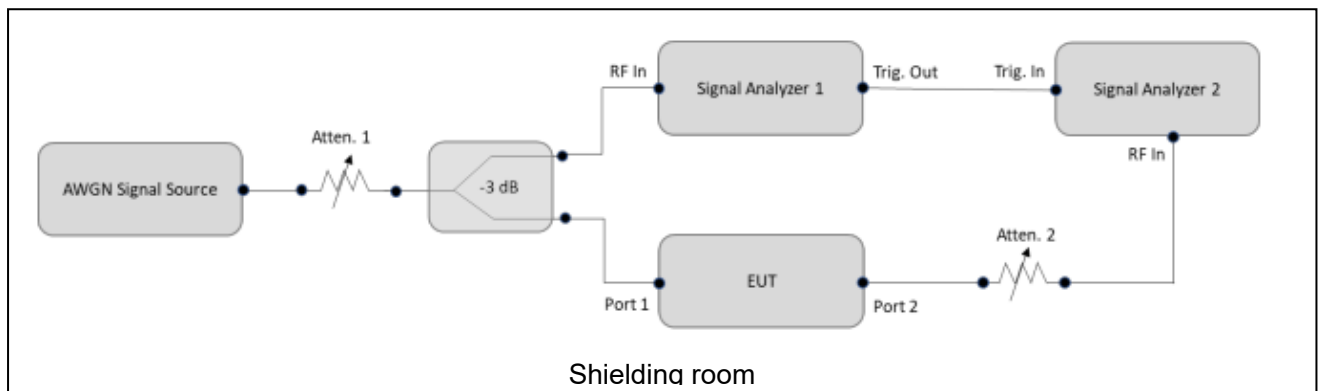
### A.1. Measurement Method

#### A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer



Test Setup for Maximum Output Power, Peak Power Spectral Density, Occupied 26dB Bandwidth, 99% Occupied bandwidth, In-Band Emissions



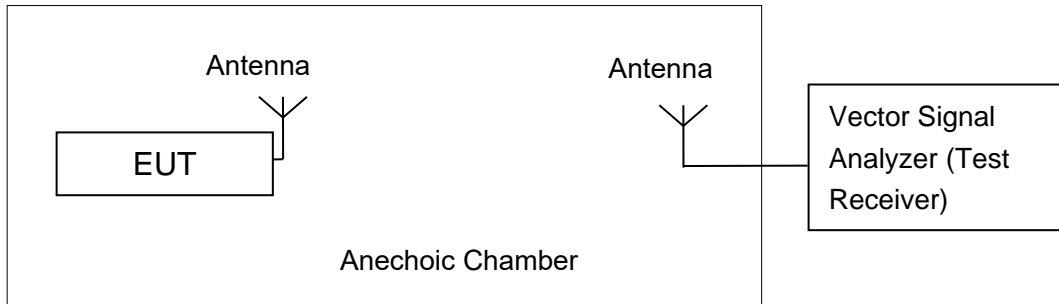
Test Setup for Contention Based Protocol

### A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 40GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to KDB 789033 and 987594

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

## A.2. Maximum output Power

### Measurement Limit and Method:

Standard	Frequency (MHz)	e.i.r.p Limit (dBm)
FCC CRF Part 15.407(a)	5925MHz~6425MHz	24dBm
	6425MHz~6525MHz	24dBm
	6525MHz~6875MHz	24dBm
	6875MHz~7125MHz	24dBm

The measurement method SA-2 is made according to KDB 987594 and KDB 789033.

### Antenna Gain

	Ant2(dBi)	Ant3(dBi)	Power(dBi)	PSD(dBi)
CDD	-1.60	-1.00	-1.00	1.72
BF	-1.60	-1.00	1.72	1.72

For BF transmissions, power and PSD directional gain is calculated as:

a) Directional gain =  $10 \log [(10^{G^1/20} + 10^{G^2/20} + \dots + 10^{G^n/20})^2 / N_{ANT}]$  dBi.  $N_{ANT}$  = number of transmit antennas NSS = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

For CDD transmissions, directional gain is calculated as:

a) For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e.,

Directional gain = GANT MAX (Ant.1 Gain, Ant.2 Gain, ...) + Array Gain, where Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

b) For PSD, the directional gain calculation is following:

Directional gain =  $10 \log [(10^{G^1/20} + 10^{G^2/20} + \dots + 10^{G^n/20})^2 / N_{ANT}]$  dBi.  $N_{ANT}$  = number of transmit antennas NSS = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

As both of the CDD and BF use the same power setting, only eirp results of BF have been reported.

**Measurement Results:**
**SISO**
**802.11ax HE20(full RU) mode**

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE20 MCS0			
	Ant2 Conducted	Ant2 e.i.r.p	Ant3 Conducted	Ant3 e.i.r.p
5955MHz (Ch1)	0.63	-0.97	4.13	3.13
6175MHz (Ch45)	-3.84	-5.44	1.16	0.16
6415MHz (Ch93)	1.82	0.22	-0.75	-1.75
6435MHz (Ch97)	2.31	0.71	0.12	-0.88
6475MHz (Ch105)	3.17	1.57	-0.42	-1.42
6515MHz (Ch113)	2.55	0.95	-1.22	-2.22
6535MHz (Ch117)	2.86	1.26	-0.86	-1.86
6695MHz (Ch149)	-1.55	-3.15	0.02	-0.98
6855MHz (Ch181)	-5.44	-7.04	-3.02	-4.02
6875MHz (Ch185)	-5.11	-6.71	-3.24	-4.24
6895MHz (ch189)	-5.83	-7.43	-2.65	-3.65
6995MHz (Ch209)	-3.63	-5.23	0.64	-0.36
7115MHz (Ch233)	-3.54	-5.14	-0.20	-1.20

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

**802.11ax-HE40(full RU) mode**

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE40 MCS0			
	Ant2 Conducted	Ant2 e.i.r.p	Ant3 Conducted	Ant3 e.i.r.p
5965MHz (Ch3)	4.35	2.75	7.83	6.83
6165MHz (Ch43)	0.47	-1.13	5.27	4.27

6405MHz (Ch91)	5.75	4.15	6.10	5.10
6445MHz (Ch99)	6.14	4.54	5.13	4.13
6485MHz (Ch107)	5.21	3.61	2.77	1.77
6525MHz (Ch115)	5.63	4.03	1.93	0.93
6565MHz (Ch123)	5.46	3.86	1.79	0.79
6685MHz (Ch147)	2.79	1.19	4.34	3.34
6845MHz (Ch179)	-2.08	-3.68	-0.07	-1.07
6885MHz (Ch187)	-2.13	-3.73	-0.52	-1.52
6925MHz (ch195)	-2.39	-3.99	0.24	-0.76
6965MHz (Ch203)	-1.02	-2.62	2.79	1.79
7085MHz (Ch227)	-0.40	-2.00	2.87	1.87

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

#### 802.11ax-HE80(full RU) mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE80 MCS0			
	Ant2 Conducted	Ant2 e.i.r.p	Ant3 Conducted	Ant3 e.i.r.p
5985MHz (Ch7)	5.78	4.18	9.48	8.48
6145MHz (Ch39)	2.55	0.95	7.08	6.08
6385MHz (Ch87)	6.63	5.03	7.96	6.96
6465MHz (Ch103)	8.06	6.46	7.05	6.05
6545MHz (Ch119)	8.19	6.59	5.34	4.34
6625MHz (Ch135)	6.58	4.98	5.93	4.93
6705MHz (Ch151)	3.95	2.35	6.31	5.31
6785MHz (Ch167)	1.72	0.12	4.33	3.33
6865MHz (Ch183)	0.92	-0.68	3.31	2.31
6945MHz (Ch199)	0.48	-1.12	4.12	3.12



7025MHz (Ch215)	1.17	-0.43	5.40	4.40
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The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

#### 802.11ax-HE160(full RU) mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE160 MCS0			
	Ant2 Conducted	Ant2 e.i.r.p	Ant3 Conducted	Ant3 e.i.r.p
6025MHz(Ch15)	6.52	4.92	11.04	10.04
6185MHz(Ch47)	4.96	3.36	10.00	9.00
6345MHz(Ch79)	8.12	6.52	10.74	9.74
6505MHz(Ch111)	11.06	9.46	8.13	7.13
6665MHz(Ch143)	7.54	5.94	8.38	7.38
6825MHz(Ch175)	3.59	1.99	6.36	5.36
6985MHz(Ch207)	3.44	1.84	7.12	6.12

The data rate MCS0 is selected as worst condition, and the following cases are performed with this condition.

#### MIMO

#### 802.11ax HE20(full RU) mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE20 MCS0			
	Ant2	Ant3	Sum Conducted	Sum e.i.r.p
5955MHz (Ch1)	5.11	1.42	6.66	8.38
6175MHz (Ch45)	-3.43	0.60	2.05	3.77
6415MHz (Ch93)	1.99	-1.30	3.66	5.38
6435MHz (Ch97)	2.31	-0.55	4.12	5.84
6475MHz (Ch105)	3.10	-1.02	4.52	6.24
6515MHz (Ch113)	2.43	-1.76	3.83	5.55

6535MHz (Ch117)	3.07	-1.26	4.43	6.15
6695MHz (Ch149)	-1.68	-1.02	1.67	3.39
6855MHz (Ch181)	-5.39	-3.97	-1.61	0.11
6875MHz (Ch185)	-4.91	-4.05	-1.45	0.27
6895MHz (ch189)	-5.68	-3.78	-1.62	0.10
6995MHz (Ch209)	-4.24	-0.74	0.86	2.58
7115MHz (Ch233)	-3.90	-0.93	0.84	2.56

The data rate MCS2 is selected as worst condition, and the following cases are performed with this condition.

#### 802.11ax-HE40 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE40 MCS0			
	Ant2	Ant3	Sum Conducted	Sum e.i.r.p
5965MHz (Ch3)	4.64	7.98	9.63	11.35
6165MHz (Ch43)	1.10	5.56	6.89	8.61
6405MHz (Ch91)	6.42	6.44	9.44	11.16
6445MHz (Ch99)	6.72	5.45	9.14	10.86
6485MHz (Ch107)	4.76	2.10	6.64	8.36
6525MHz (Ch115)	5.11	1.15	6.58	8.30
6565MHz (Ch123)	4.89	0.91	6.35	8.07
6685MHz (Ch147)	3.19	4.69	7.01	8.73
6845MHz (Ch179)	-2.48	-1.32	1.15	2.87
6885MHz (Ch187)	-2.52	-1.86	0.83	2.55
6925MHz (ch195)	-2.73	-1.06	1.20	2.92
6965MHz (Ch203)	-0.43	3.14	4.72	6.44
7085MHz (Ch227)	-1.34	1.82	3.53	5.25

The data rate MCS2 is selected as worst condition, and the following cases are performed with this condition.

**802.11ax-HE80 mode**

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE80 MCS0			
	Ant2	Ant3	Sum Conducted	Sum e.i.r.p
5985MHz (Ch7)	6.57	9.78	11.48	13.20
6145MHz (Ch39)	3.53	7.28	8.81	10.53
6385MHz (Ch87)	7.49	8.33	10.94	12.66
6465MHz (Ch103)	8.63	7.40	11.07	12.79
6545MHz (Ch119)	8.61	5.68	10.40	12.12
6625MHz (Ch135)	7.02	6.29	9.68	11.40
6705MHz (Ch151)	4.45	6.59	8.66	10.38
6785MHz (Ch167)	2.40	4.81	6.78	8.50
6865MHz (Ch183)	1.66	3.77	5.85	7.57
6945MHz (Ch199)	1.27	4.63	6.28	8.00
7025MHz (Ch215)	2.21	5.95	7.48	9.20

The data rate MCS2 is selected as worst condition, and the following cases are performed with this condition.

**802.11ax-HE160 mode**

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE160 MCS0			
	Ant2	Ant3	Sum Conducted	Sum e.i.r.p
6025MHz (Ch15)	6.95	11.03	12.46	14.18
6185MHz (Ch47)	5.67	9.92	11.31	13.03
6345MHz (Ch79)	8.76	10.85	12.94	14.66
6505MHz (Ch111)	11.26	8.05	12.96	14.68
6665MHz (Ch143)	7.61	8.33	11.00	12.72
6825MHz (Ch175)	3.85	6.35	8.29	10.01

6985MHz (Ch207)	4.16	7.10	8.88	10.60
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The data rate MCS2 is selected as worst condition, and the following cases are performed with this condition.

Duty Cycle

Mode	11ax20	11ax40	11ax80	11ax160
Duty Cycle	99%	99%	99%	99%



16:53:26 09.11.2022

Note: The following cases are performed with this condition:

- Ant3 is selected as the worst condition (SISO);
- Ant2 is selected as the worst condition (MIMO);
- The maximum power of 802.11ax20/40/80/160 are got with full RU (SISO/MIMO).
- The device only support full RU(11ax20-RU242/11ax40-RU484/11ax80-RU996/11ax160-RU996\*2);

**Conclusion: PASS**

### A.3. Peak Power Spectral Density (conducted)

#### Measurement Limit and Method:

Standard	Frequency (MHz)	e.i.r.p Limit (dBm/MHz)
FCC CRF Part 15.407(a)	5925MHz~6425MHz	-1
	6425MHz~6525MHz	-1
	6525MHz~6875MHz	-1
	6875MHz~7125MHz	-1

The output power measurement method Section F is made according to KDB 987594 and KDB 789033.

#### Measurement Results:

##### Ant3

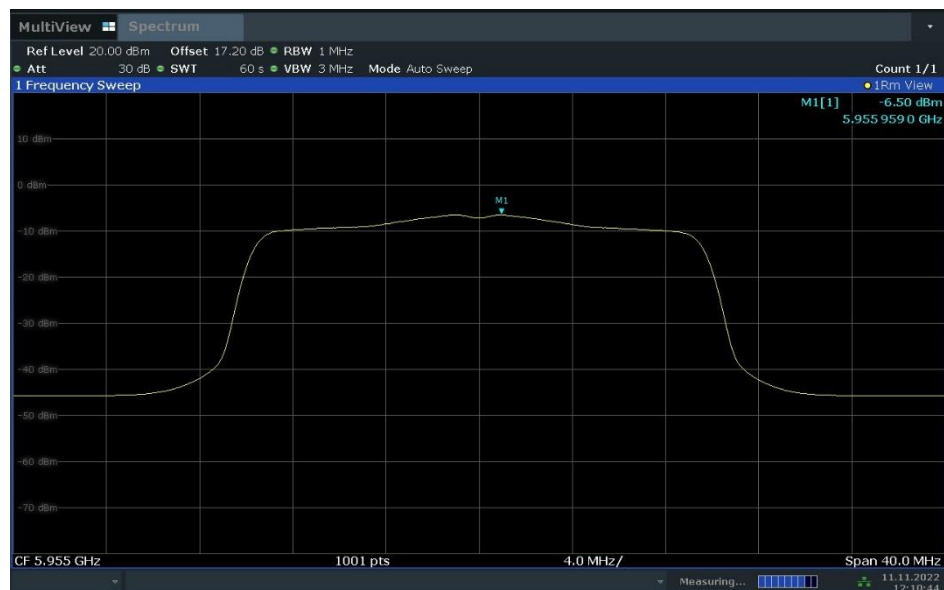
Mode	Frequency	Power Spectral Density (dBm/MHz)		
		Conducted	e.i.r.p	Conclusion
802.11ax HE20 (full RU)	5955MHz (Ch1)	-6.50	-7.50	P
	6175MHz (Ch45)	-9.55	-10.55	P
	6415MHz (Ch93)	-11.39	-12.39	P
	6435MHz (Ch97)	-10.53	-11.53	P
	6475MHz (Ch105)	-11.04	-12.04	P
	6515MHz (Ch113)	-11.88	-12.88	P
	6535MHz (Ch117)	-11.52	-12.52	P
	6695MHz (Ch149)	-10.60	-11.60	P
	6855MHz (Ch181)	-13.79	-14.79	P
	6875MHz (Ch185)	-14.00	-15.00	P
	6895MHz (ch189)	-13.41	-14.41	P
	6995MHz (Ch209)	-9.94	-10.94	P
7115MHz (Ch233)	-10.86	-11.86	P	
802.11ax HE40 (full RU)	5965MHz (Ch3)	-5.51	-6.51	P
	6165MHz (Ch43)	-8.10	-9.10	P
	6405MHz (Ch91)	-7.29	-8.29	P
	6445MHz (Ch99)	-8.39	-9.39	P
	6485MHz (Ch107)	-10.80	-11.80	P
	6525MHz (Ch115)	-11.57	-12.57	P
	6565MHz (Ch123)	-11.68	-12.68	P
	6685MHz (Ch147)	-9.00	-10.00	P
	6845MHz (Ch179)	-13.44	-14.44	P
	6885MHz (Ch187)	-13.92	-14.92	P
	6925MHz (ch195)	-12.92	-13.92	P
	6965MHz (Ch203)	-10.34	-11.34	P
7085MHz (Ch227)	-10.55	-11.55	P	

802.11ax HE80 (full RU)	5985MHz (Ch7)	-6.11	-7.11	P
	6145MHz(Ch39)	-8.52	-9.52	P
	6385MHz (Ch87)	-7.72	-8.72	P
	6465MHz (Ch103)	-8.38	-9.38	P
	6545MHz (Ch119)	-10.32	-11.32	P
	6625MHz (Ch135)	-10.00	-11.00	P
	6705MHz (Ch151)	-9.34	-10.34	P
	6785MHz (Ch167)	-11.34	-12.34	P
	6865MHz (Ch183)	-12.59	-13.59	P
	6945MHz (Ch199)	-12.13	-13.13	P
	7025MHz (Ch215)	-10.13	-11.13	P
802.11ax HE160 (full RU)	6025MHz (Ch15)	-7.75	-8.75	P
	6185MHz (Ch47)	-8.83	-9.83	P
	6345MHz (Ch79)	-8.39	-9.39	P
	6505MHz (Ch111)	-10.34	-11.34	P
	6665MHz (Ch143)	-10.43	-11.43	P
	6825MHz (Ch175)	-12.63	-13.63	P
	6985MHz (Ch207)	-12.03	-13.03	P

**MIMO**

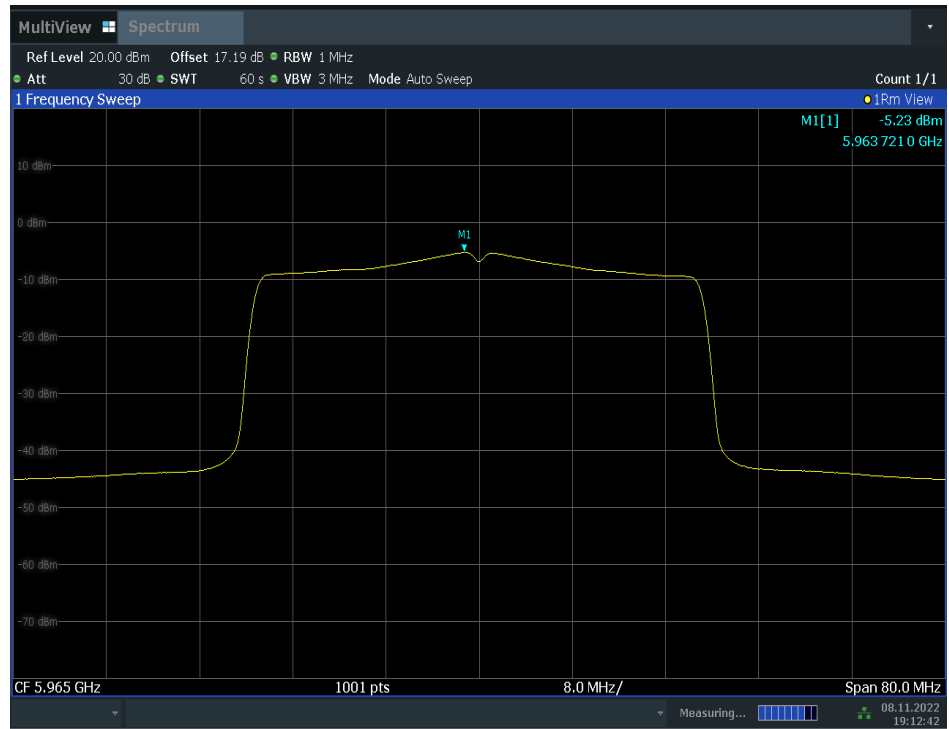
Mode	Frequency	Power Spectral Density (dBm/MHz)				Conclusion
		Ant2	Ant3	Sum Conducted	Sum e.i.r.p	
802.11ax HE20 (full RU)	5955MHz (Ch1)	-5.50	-9.04	-3.91	-2.19	P
	6175MHz (Ch45)	-14.03	-9.85	-8.45	-6.73	P
	6415MHz (Ch93)	-8.54	-11.10	-6.62	-4.90	P
	6435MHz (Ch97)	-8.25	-10.59	-6.25	-4.53	P
	6475MHz (Ch105)	-7.42	-10.98	-5.83	-4.11	P
	6515MHz (Ch113)	-8.12	-11.98	-6.62	-4.90	P
	6535MHz (Ch117)	-7.50	-11.50	-6.04	-4.32	P
	6695MHz (Ch149)	-12.13	-11.76	-8.93	-7.21	P
	6855MHz (Ch181)	-16.03	-14.81	-12.37	-10.65	P
	6875MHz (Ch185)	-15.61	-14.87	-12.21	-10.49	P
	6895MHz (ch189)	-16.35	-14.55	-12.35	-10.63	P
	6995MHz (Ch209)	-14.74	-11.29	-9.67	-7.59	P
7115MHz (Ch233)	-14.24	-11.39	-9.57	-7.85	P	
802.11ax HE40 (full RU)	5965MHz (Ch3)	-8.40	-5.23	-3.52	-1.80	P
	6165MHz (Ch43)	-12.01	-7.55	-6.22	-4.50	P
	6405MHz (Ch91)	-6.51	-6.38	-3.43	-1.72	P
	6445MHz (Ch99)	-6.53	-7.54	-4.00	-2.28	P
	6485MHz (Ch107)	-8.45	-10.80	-6.46	-4.74	P
	6525MHz (Ch115)	-8.06	-11.66	-6.49	-4.77	P

	6565MHz (Ch123)	-8.30	-12.21	-6.82	-5.10	P
	6685MHz (Ch147)	-9.99	-8.50	-6.17	-4.45	P
	6845MHz (Ch179)	-15.77	-14.61	-12.14	-10.42	P
	6885MHz (Ch187)	-15.74	-15.26	-12.48	-10.76	P
	6925MHz (ch195)	-15.78	-14.34	-11.99	-10.27	P
	6965MHz (Ch203)	-13.21	-9.76	-8.14	-6.42	P
	7085MHz (Ch227)	-14.47	-11.44	-9.69	-7.97	P
802.11ax HE80 (full RU)	5985MHz (Ch7)	-8.95	-5.68	-4.00	-2.28	P
	6145MHz(Ch39)	-12.03	-7.99	-6.55	-4.83	P
	6385MHz (Ch87)	-8.35	-6.83	-4.51	-2.79	P
	6465MHz (Ch103)	-6.61	-7.41	-3.98	-2.26	P
	6545MHz (Ch119)	-6.90	-9.63	-5.04	-3.32	P
	6625MHz (Ch135)	-8.66	-9.23	-5.93	-4.21	P
	6705MHz (Ch151)	-10.82	-8.96	-6.78	-5.06	P
	6785MHz (Ch167)	-13.35	-10.68	-8.80	-7.08	P
	6865MHz (Ch183)	-14.15	-12.12	-10.01	-8.29	P
	6945MHz (Ch199)	-14.75	-11.52	-9.83	-8.11	P
7025MHz (Ch215)	-13.05	-9.39	-7.84	-6.12	P	
802.11ax HE160 (full RU)	6025MHz (Ch15)	-11.61	-7.63	-6.17	-4.45	P
	6185MHz (Ch47)	-13.42	-8.71	-7.45	-5.73	P
	6345MHz (Ch79)	-9.72	-7.98	-5.75	-4.03	P
	6505MHz (Ch111)	-7.21	-9.92	-5.35	-3.63	P
	6665MHz (Ch143)	-10.88	-10.24	-7.54	-5.82	P
	6825MHz (Ch175)	-14.88	-12.66	-10.62	-8.90	P
6985MHz (Ch207)	-14.56	-11.94	-10.05	-8.33	P	



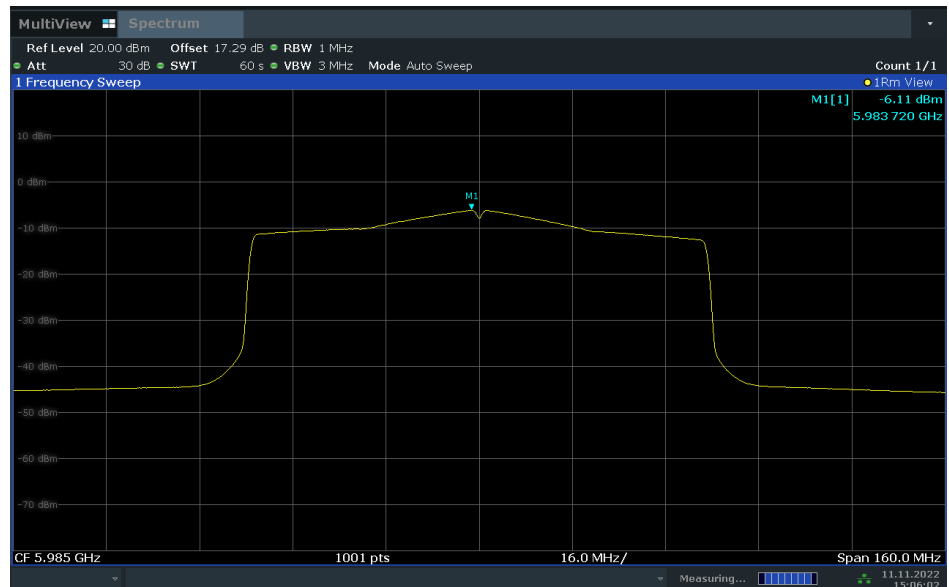
12:10:45 11.11.2022

**PSD: 11ax-HE20-5955MHz(sono-ant3)**



19:12:43 08.11.2022

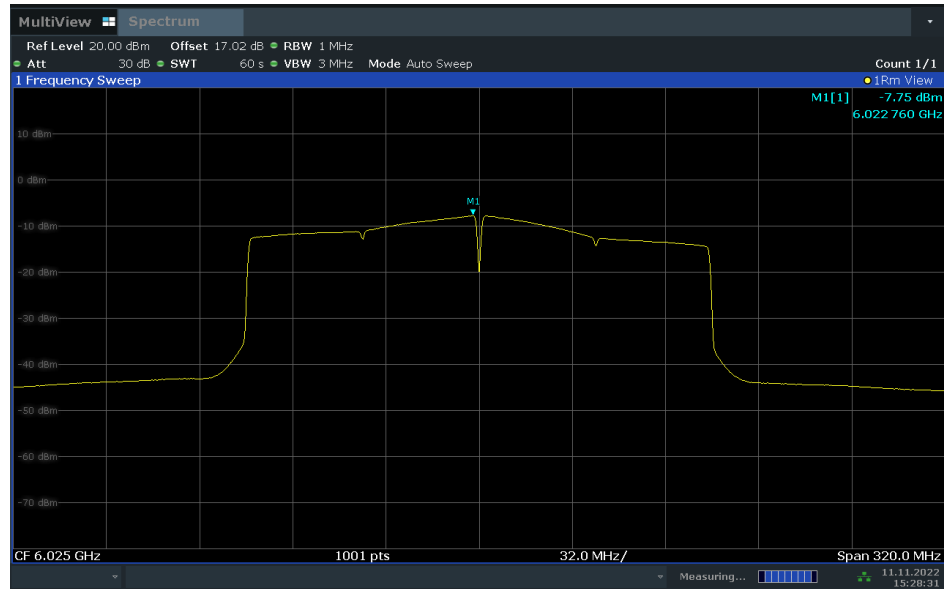
### PSD: 11ax-HE40-5965MHz(mimo-ant3)



15:06:02 11.11.2022

### PSD: 11ax-HE80-5985MHz(sono-ant3)





15:28:32 11.11.2022

**PSD: 11ax-HE160-6025MHz(ISO-ant3)**
**Conclusion: PASS**
**A.4. Occupied 26dB Bandwidth(conducted)**
**Measurement Limit and Method:**

Standard	Limit (kHz)
FCC 47 CFR Part 15.403 (i)	/

The measurement is made according to KDB 987594 and KDB 789033

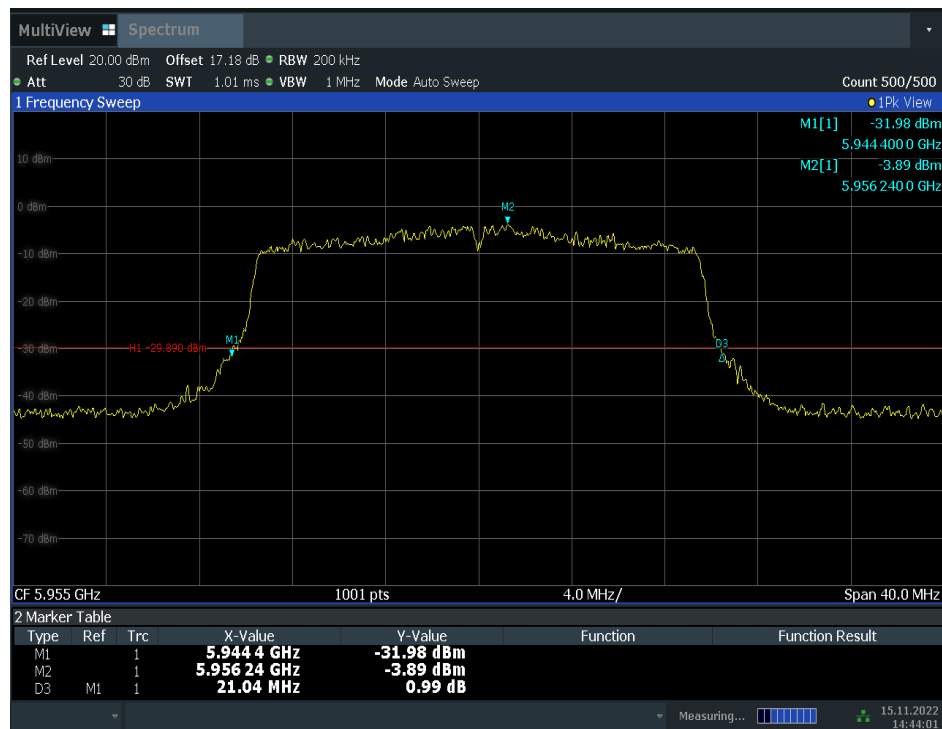
**Measurement Result:**

Mode	Frequency	Occupied 26dB Bandwidth ( MHz)		conclusion
802.11ax HE20 (full RU)	5955MHz (Ch1)	Fig.1	21.04	P
	6175MHz (Ch45)	Fig.2	21.08	P
	6415MHz (Ch93)	Fig.3	20.72	P
	6435MHz (Ch97)	Fig.4	20.76	P
	6475MHz (Ch105)	Fig.5	21.20	P
	6515MHz (Ch113)	Fig.6	21.08	P
	6535MHz (Ch117)	Fig.7	21.00	P
	6695MHz (Ch149)	Fig.8	20.84	P
	6855MHz (Ch181)	Fig.9	20.88	P
	6875MHz (Ch185)	Fig.10	21.12	P
	6895MHz (ch189)	Fig.11	21.20	P
	6995MHz (Ch209)	Fig.12	20.88	P
7115MHz (Ch233)	Fig.13	20.88	P	
802.11ax	5965MHz (Ch3)	Fig.14	40.32	P

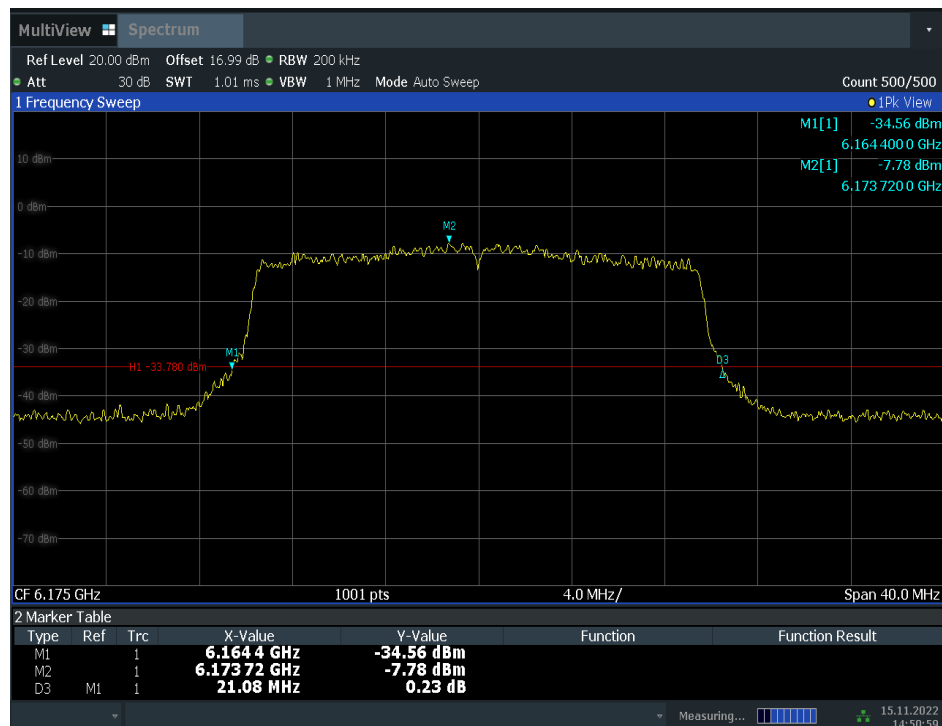
HE40 (full RU)	6165MHz (Ch43)	Fig.15	40.72	P
	6405MHz (Ch91)	Fig.16	40.48	P
	6445MHz (Ch99)	Fig.17	40.64	P
	6485MHz (Ch107)	Fig.18	40.24	P
	6525MHz (Ch115)	Fig.19	40.80	P
	6565MHz (Ch123)	Fig.20	40.40	P
	6685MHz (Ch147)	Fig.21	40.56	P
	6845MHz (Ch179)	Fig.22	40.72	P
	6885MHz (Ch187)	Fig.23	40.88	P
	6925MHz (ch195)	Fig.24	40.48	P
	6965MHz (Ch203)	Fig.25	40.48	P
	7085MHz (Ch227)	Fig.26	40.56	P
802.11ax HE80 (full RU)	5985MHz (Ch7)	Fig.27	81.76	P
	6145MHz (Ch39)	Fig.28	82.08	P
	6385MHz (Ch87)	Fig.29	81.76	P
	6465MHz (Ch103)	Fig.30	81.60	P
	6545MHz (Ch119)	Fig.31	82.56	P
	6625MHz (Ch135)	Fig.32	82.08	P
	6705MHz (Ch151)	Fig.33	82.24	P
	6785MHz (Ch167)	Fig.34	82.24	P
	6865MHz (Ch183)	Fig.35	82.08	P
	6945MHz (Ch199)	Fig.36	82.56	P
	7025MHz (Ch215)	Fig.37	81.92	P
802.11ax HE160 (full RU)	6025MHz (Ch15)	Fig.38	165.44	P
	6185MHz (Ch47)	Fig.39	164.48	P
	6345MHz (Ch79)	Fig.40	165.76	P
	6505MHz (Ch111)	Fig.41	165.44	P
	6665MHz (Ch143)	Fig.42	165.76	P
	6825MHz (Ch175)	Fig.43	166.40	P
	6985MHz (Ch207)	Fig.44	166.08	P

**Conclusion: PASS**

**Test graphs as below:**



14:44:02 15.11.2022

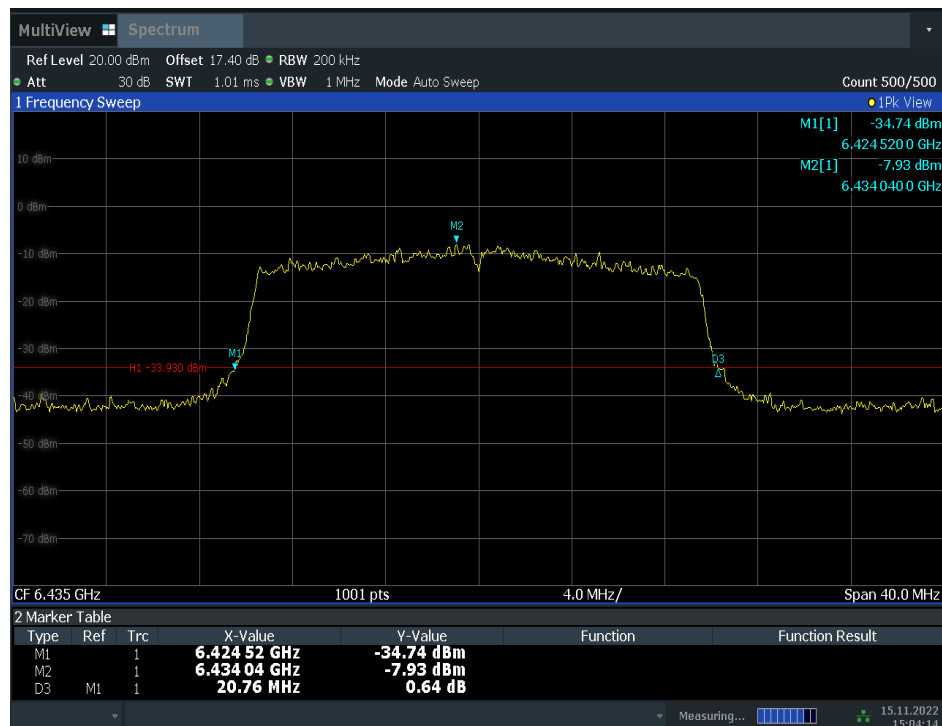
**Fig.1 Occupied 26dB Bandwidth (802.11ax-HE20, 5955MHz)**


14:51:00 15.11.2022

**Fig.2 Occupied 26dB Bandwidth (802.11ax-HE20, 6175MHz)**

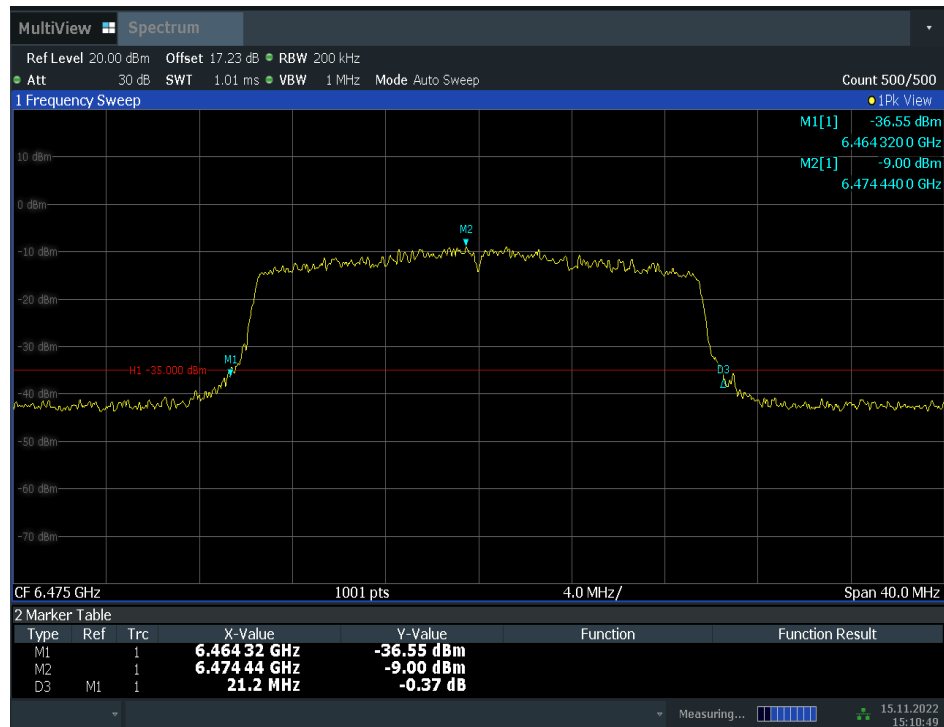


14:57:31 15.11.2022

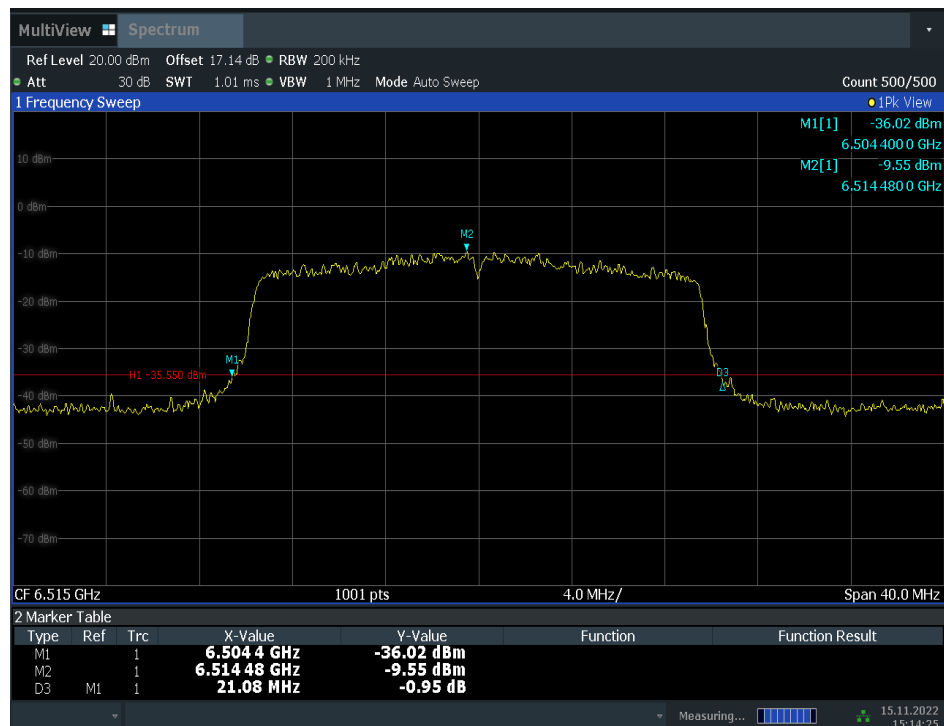
**Fig.3 Occupied 26dB Bandwidth (802.11ax-HE20, 6415MHz)**


15:04:15 15.11.2022

**Fig.4 Occupied 26dB Bandwidth (802.11ax-HE20, 6435MHz)**

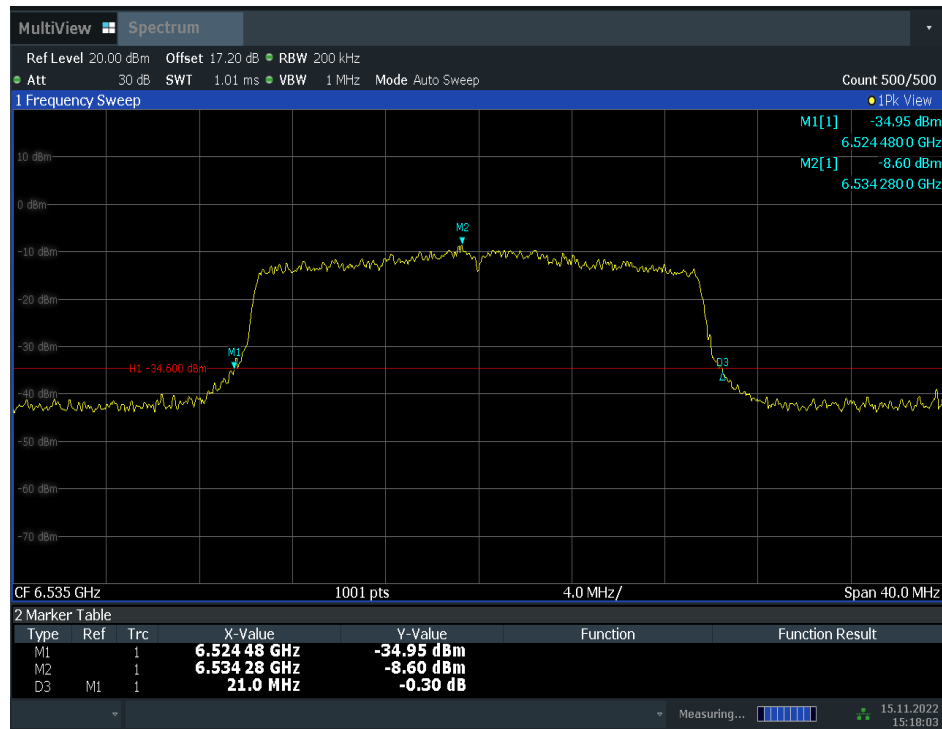


15:10:49 15.11.2022

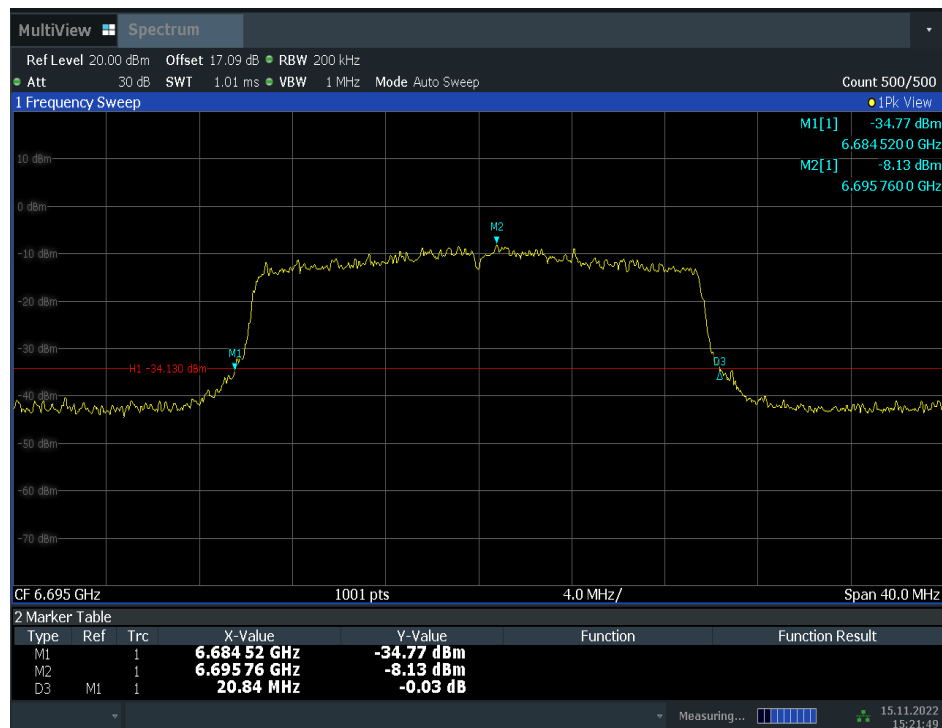
**Fig.5 Occupied 26dB Bandwidth (802.11ax-HE20, 6475MHz)**


15:14:25 15.11.2022

**Fig.6 Occupied 26dB Bandwidth (802.11ax-HE20, 6515MHz)**

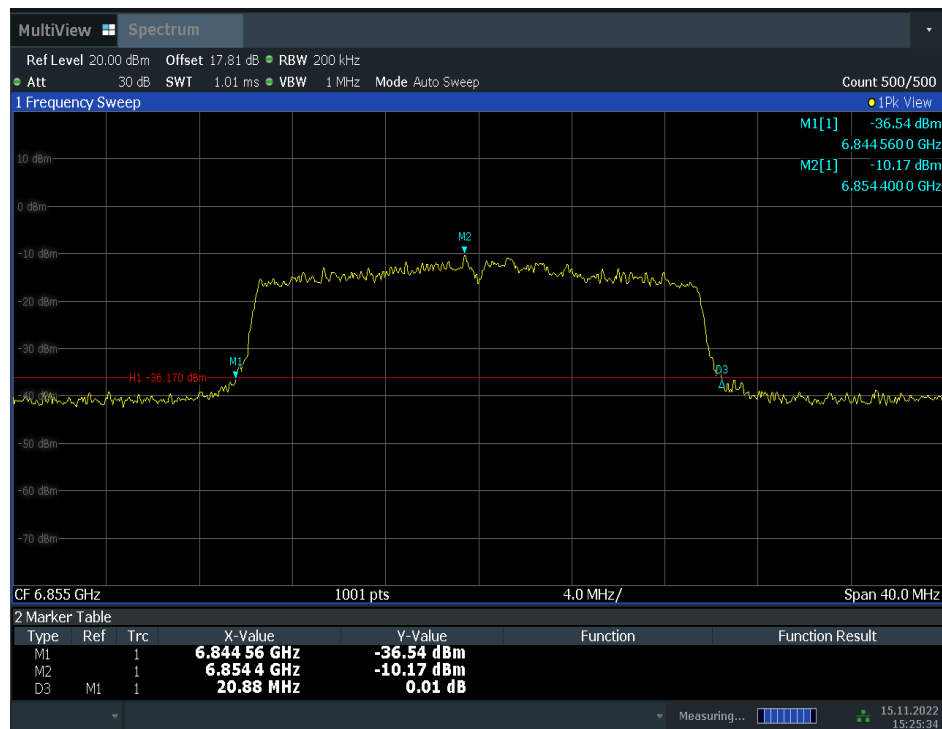


15:18:03 15.11.2022

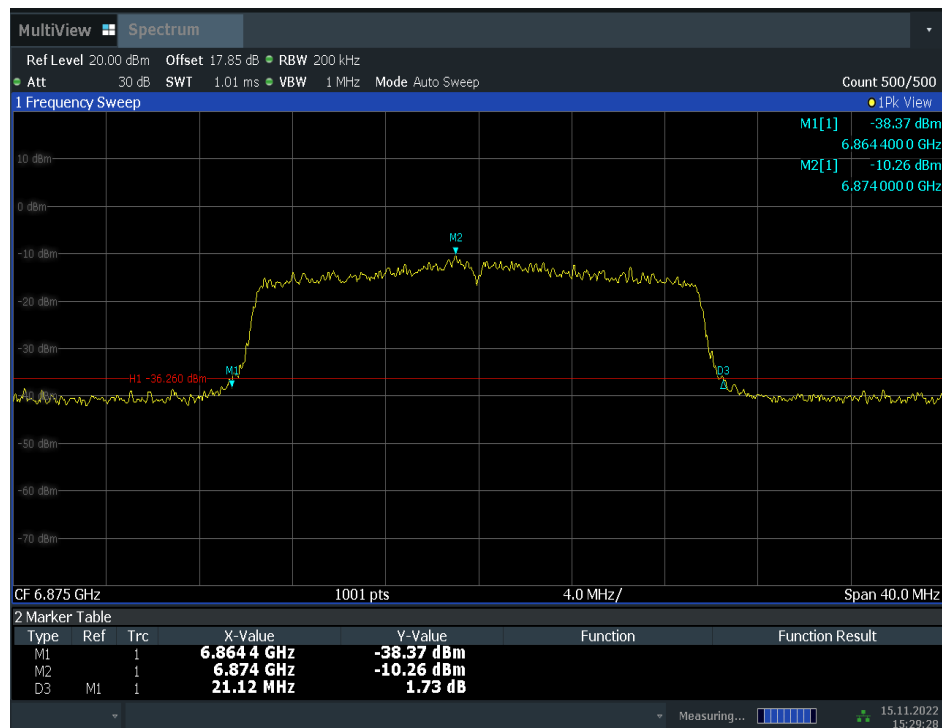
**Fig.7 Occupied 26dB Bandwidth (802.11ax-HE20, 6535MHz)**


15:21:49 15.11.2022

**Fig.8 Occupied 26dB Bandwidth (802.11ax-HE20, 6695MHz)**

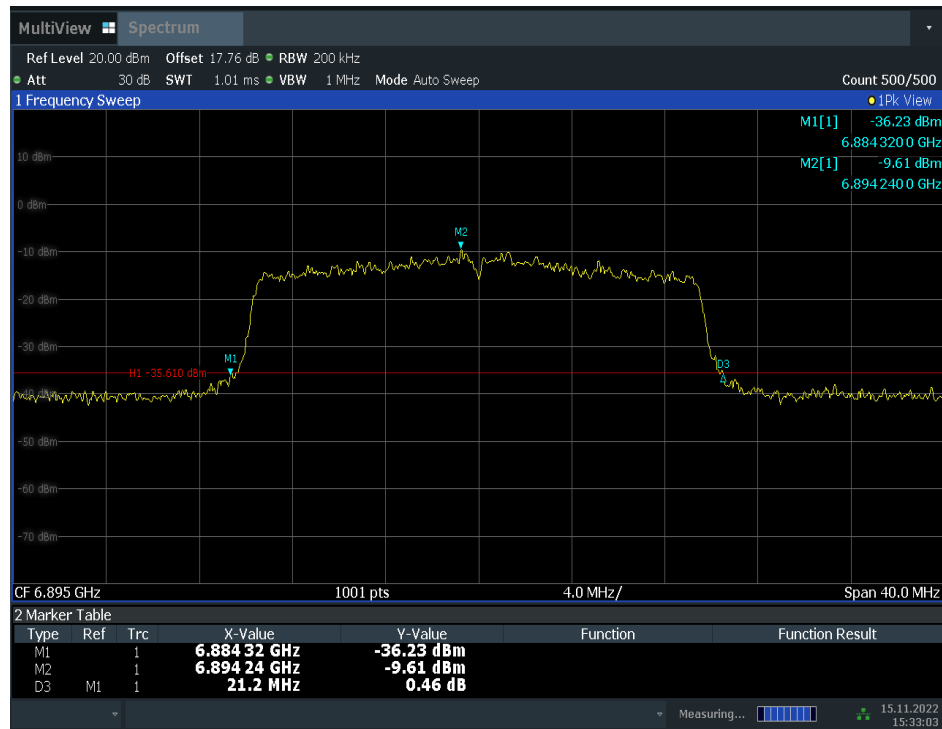


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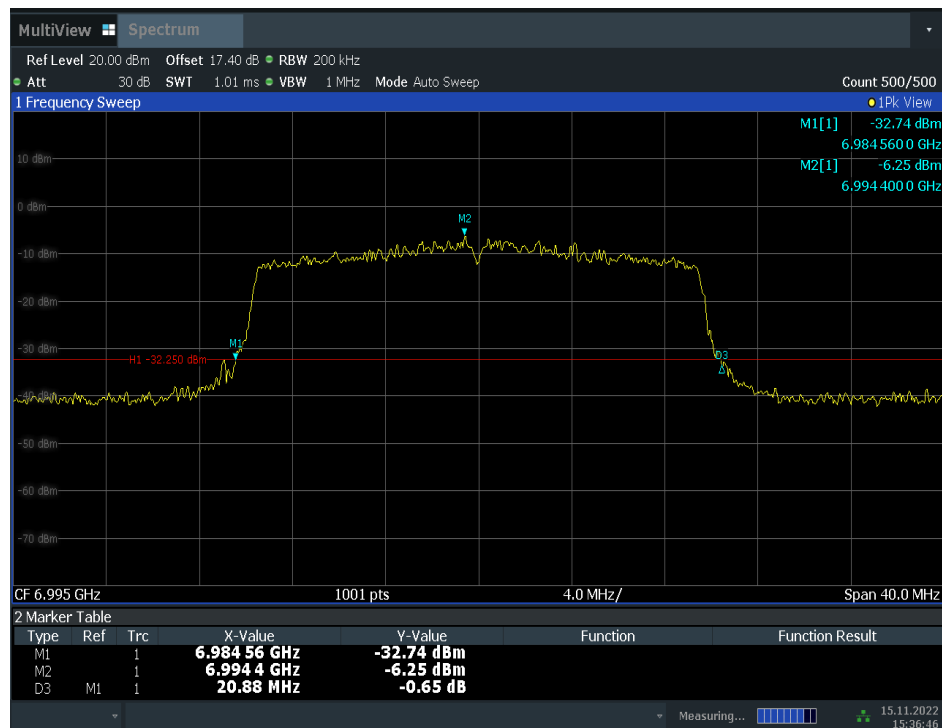
**Fig.9 Occupied 26dB Bandwidth (802.11ax-HE20, 6855MHz)**


15:29:29 15.11.2022

**Fig.10 Occupied 26dB Bandwidth (802.11ax-HE20, 6875MHz)**



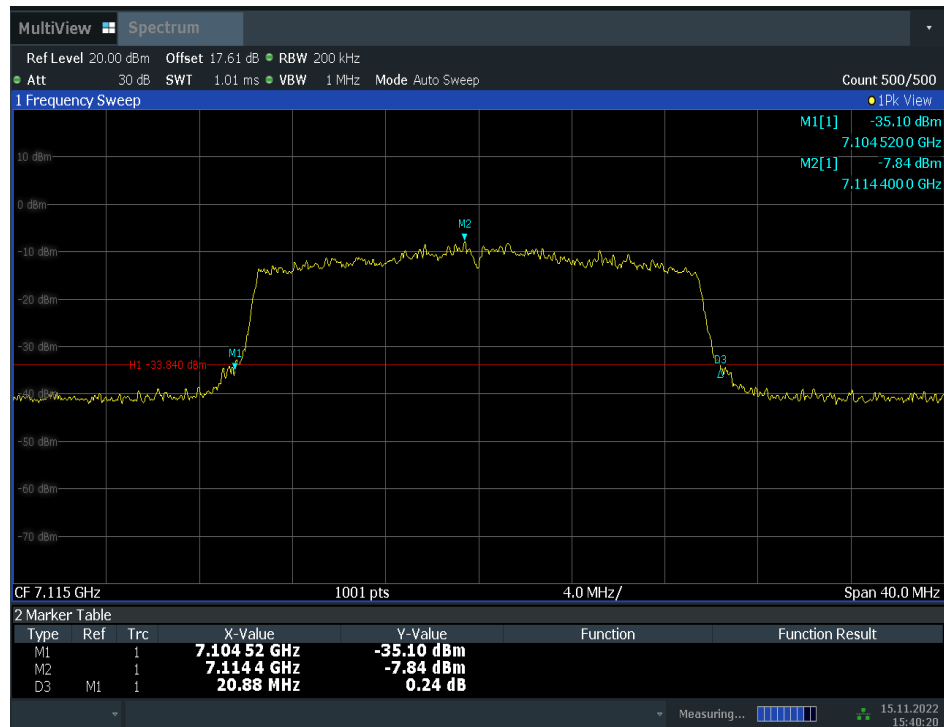
15:33:04 15.11.2022

**Fig.11 Occupied 26dB Bandwidth (802.11ax-HE20, 6895MHz)**


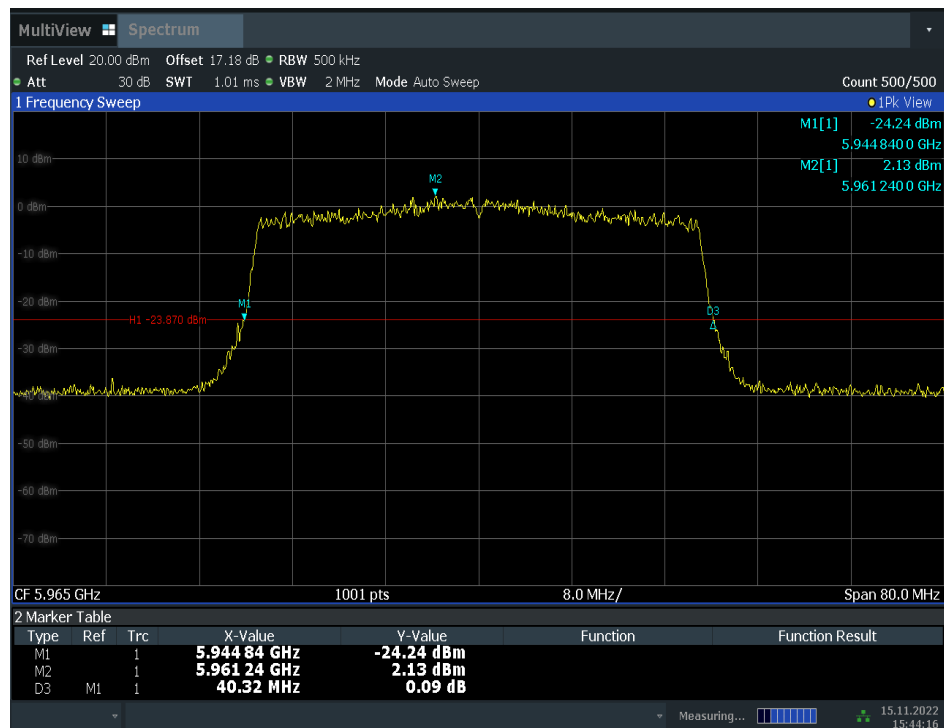
15:36:46 15.11.2022

**Fig.12 Occupied 26dB Bandwidth (802.11ax-HE20, 6995MHz)**



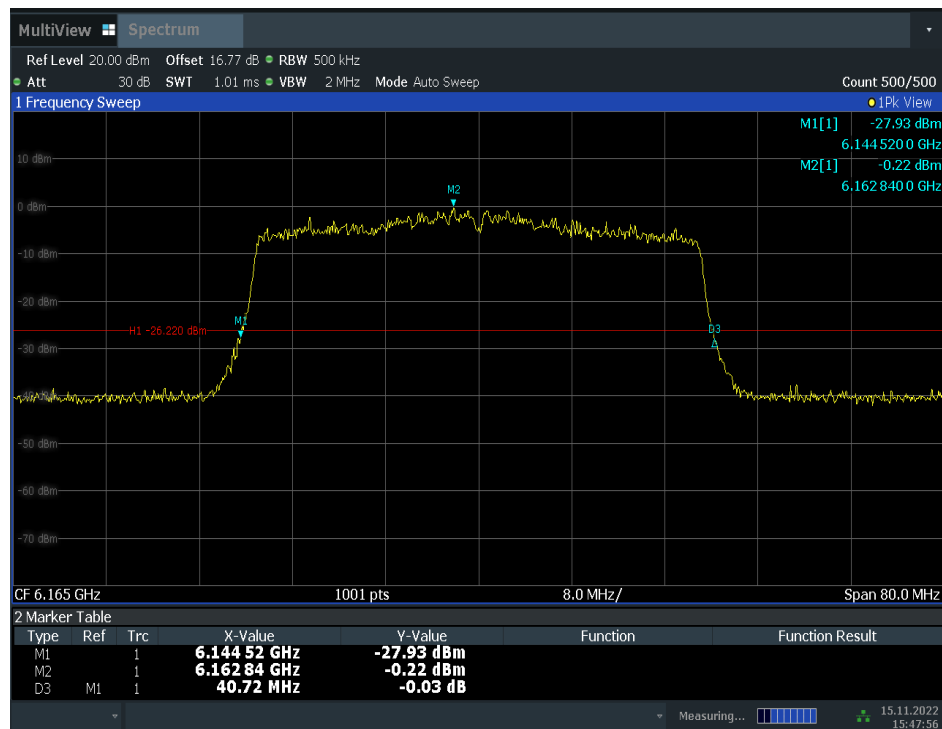


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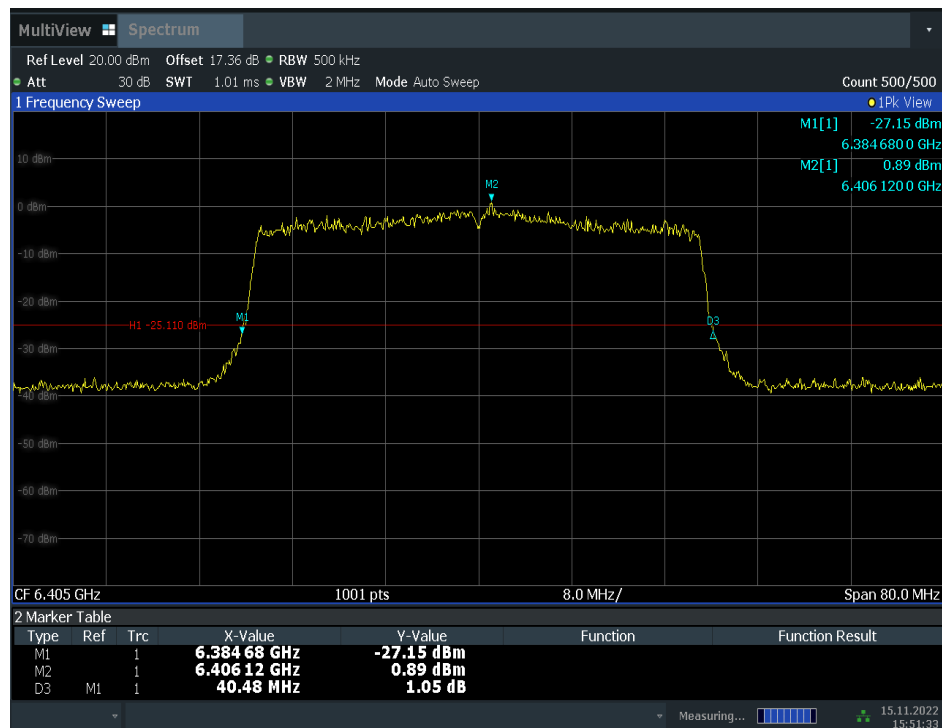
**Fig.13 Occupied 26dB Bandwidth (802.11ax-HE20, 7115MHz)**


15:44:17 15.11.2022

**Fig.14 Occupied 26dB Bandwidth (802.11ax-HE40, 5965MHz)**

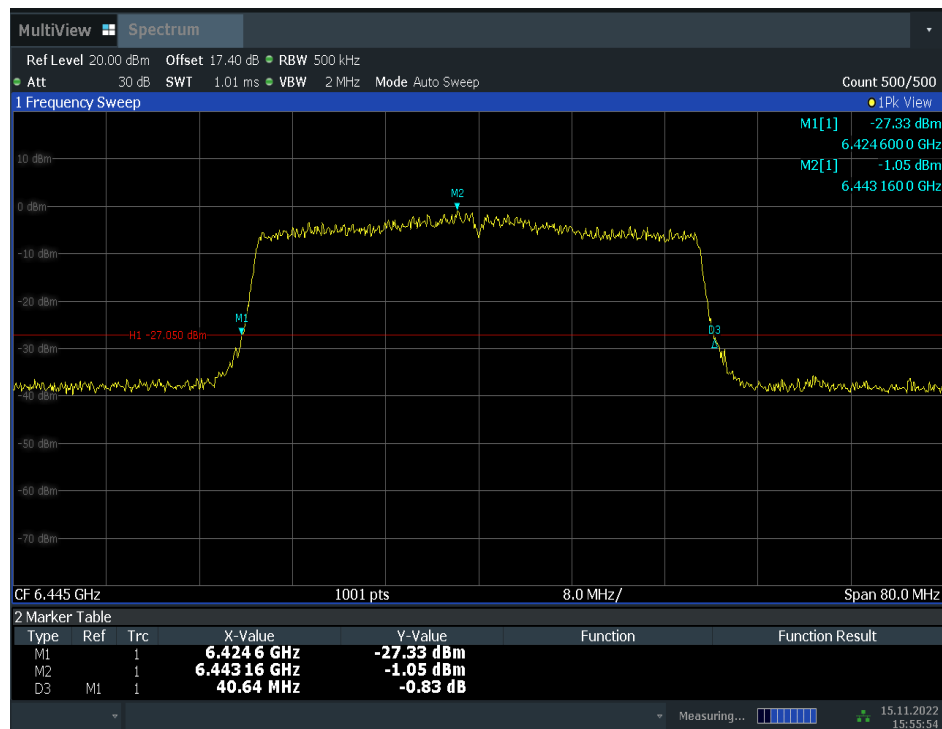


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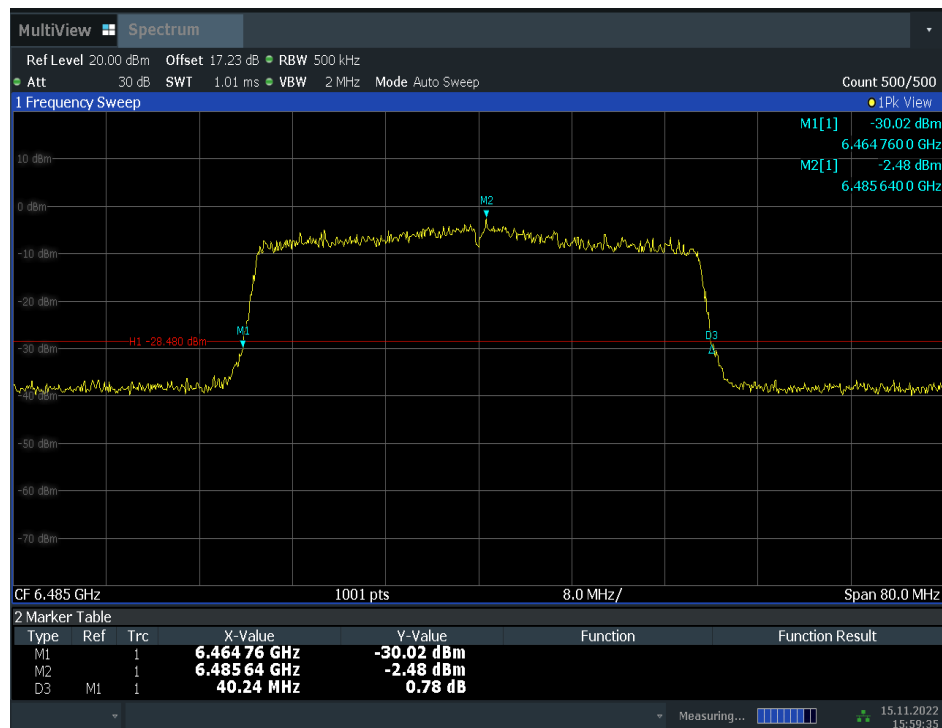
**Fig.15 Occupied 26dB Bandwidth (802.11ax-HE40, 6165MHz)**


15:51:34 15.11.2022

**Fig.16 Occupied 26dB Bandwidth (802.11ax-HE40, 6405MHz)**

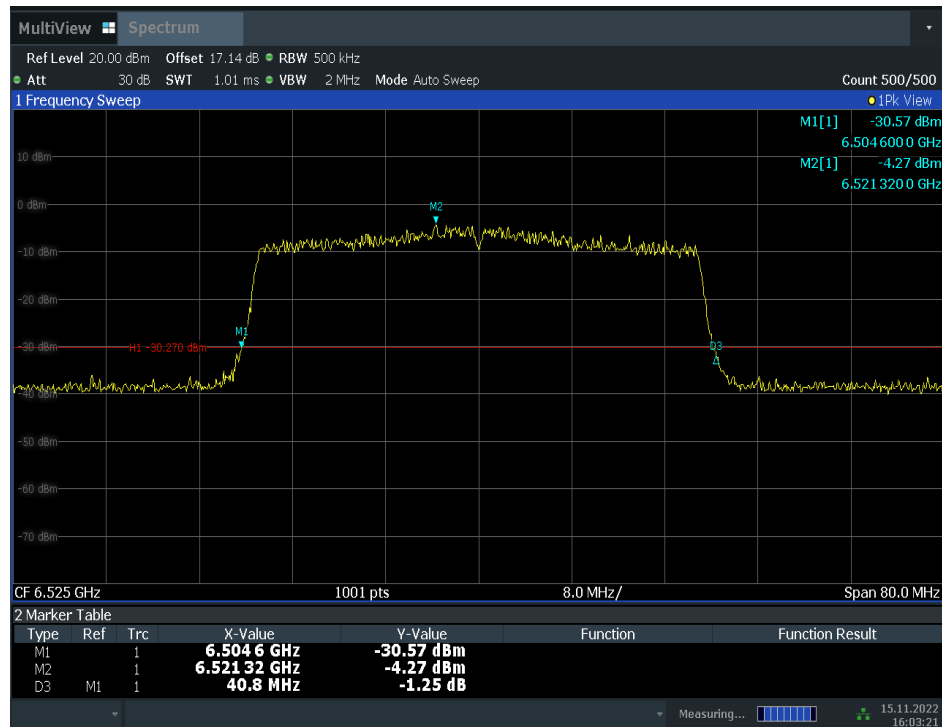


15:55:54 15.11.2022

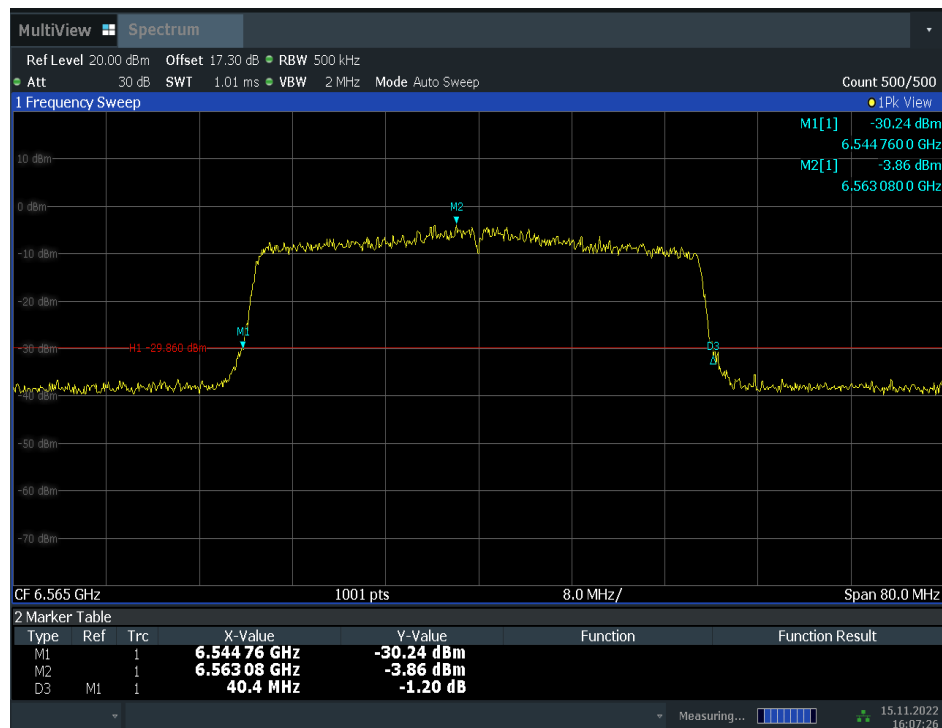
**Fig.17 Occupied 26dB Bandwidth (802.11ax-HE40, 6445MHz)**


15:59:36 15.11.2022

**Fig.18 Occupied 26dB Bandwidth (802.11ax-HE40, 6485MHz)**

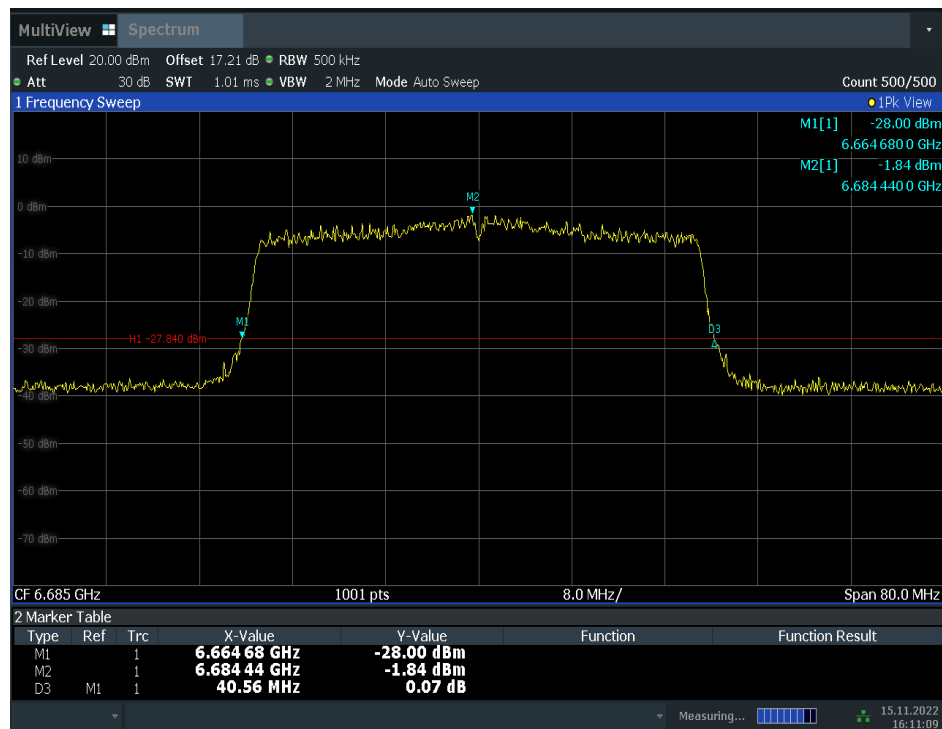


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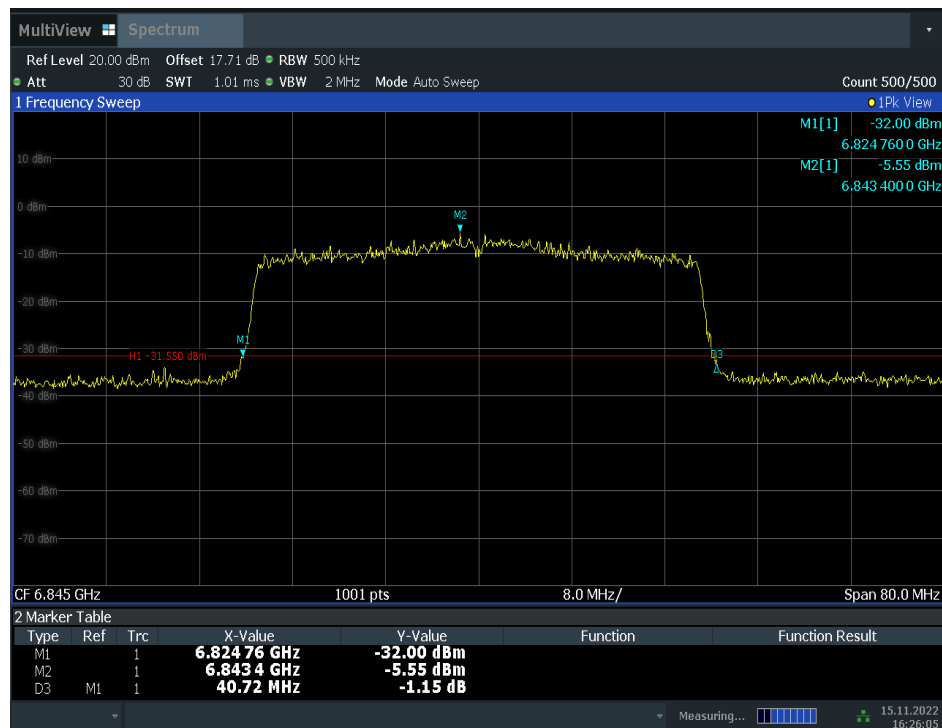
**Fig.19 Occupied 26dB Bandwidth (802.11ax-HE40, 6525MHz)**


16:07:26 15.11.2022

**Fig.20 Occupied 26dB Bandwidth (802.11ax-HE40, 6565MHz)**

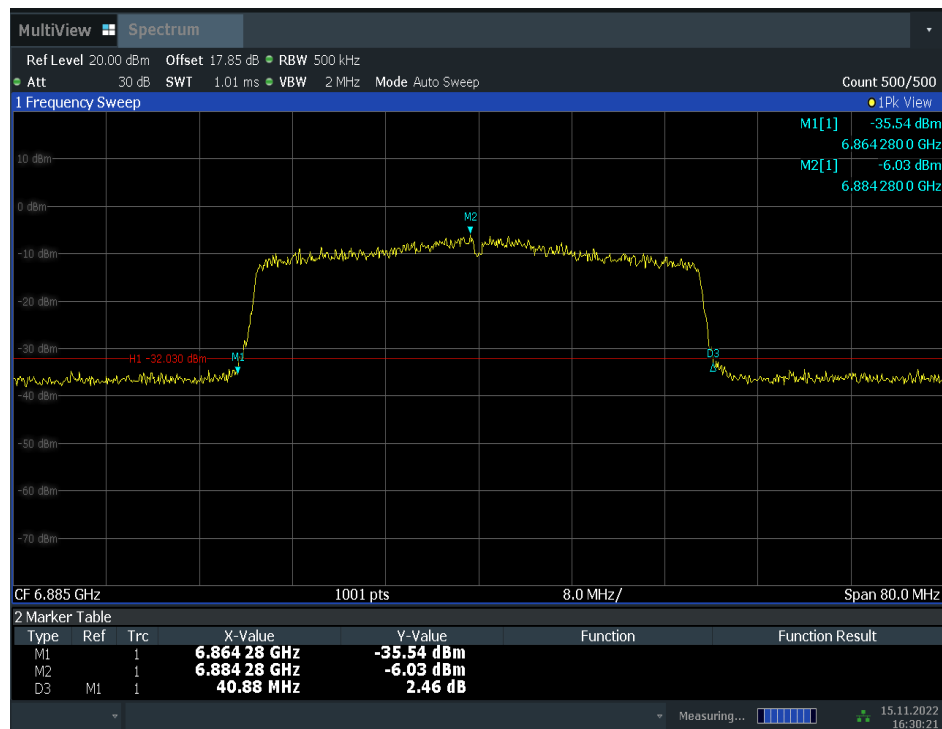


16:11:09 15.11.2022

**Fig.21 Occupied 26dB Bandwidth (802.11ax-HE40, 6685MHz)**


16:26:06 15.11.2022

**Fig.22 Occupied 26dB Bandwidth (802.11ax-HE40, 6845MHz)**

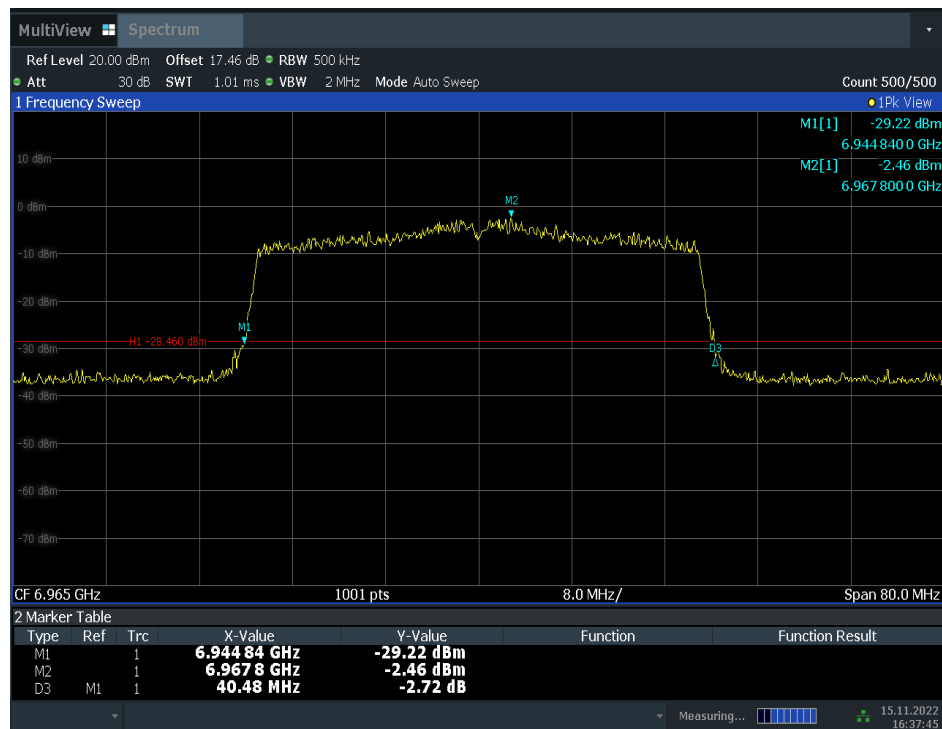


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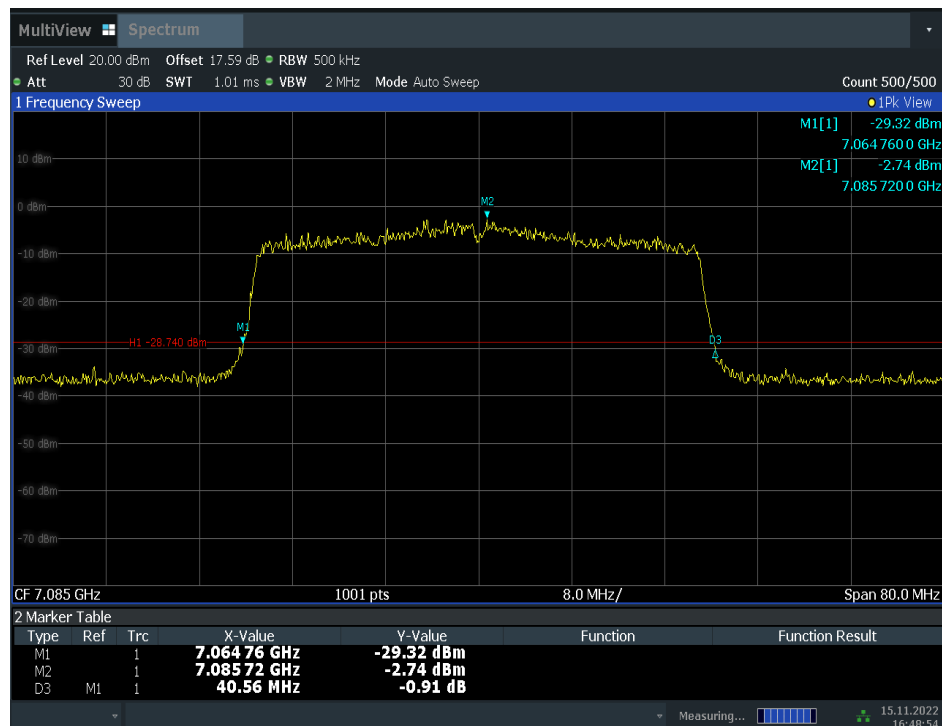
**Fig.23 Occupied 26dB Bandwidth (802.11ax-HE40, 6885MHz)**


16:34:08 15.11.2022

**Fig.24 Occupied 26dB Bandwidth (802.11ax-HE40, 6925MHz)**

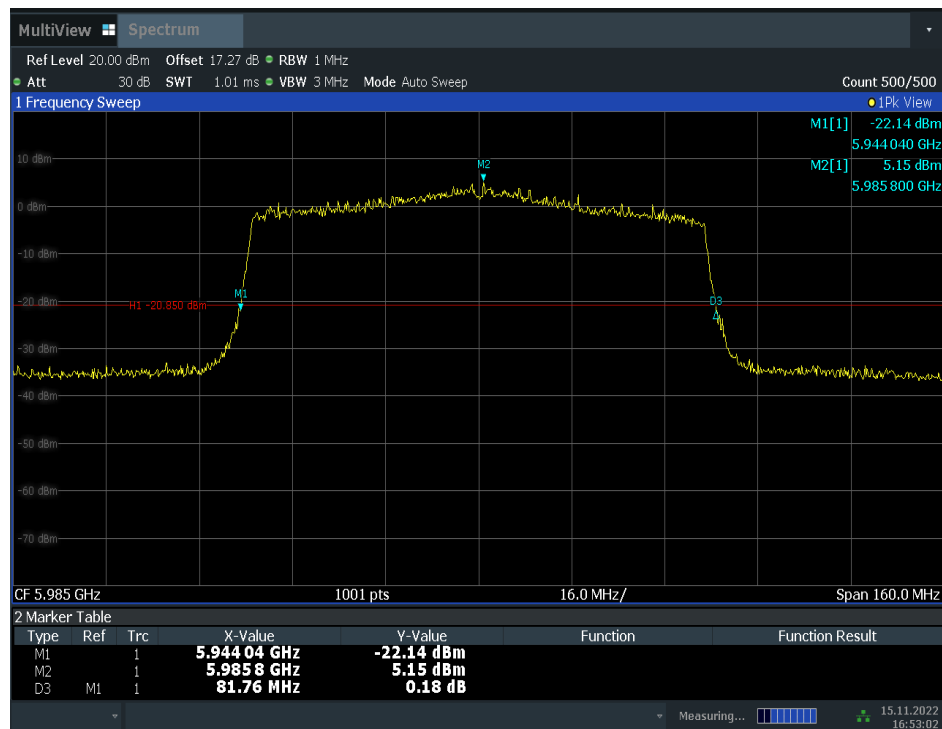


16:37:46 15.11.2022

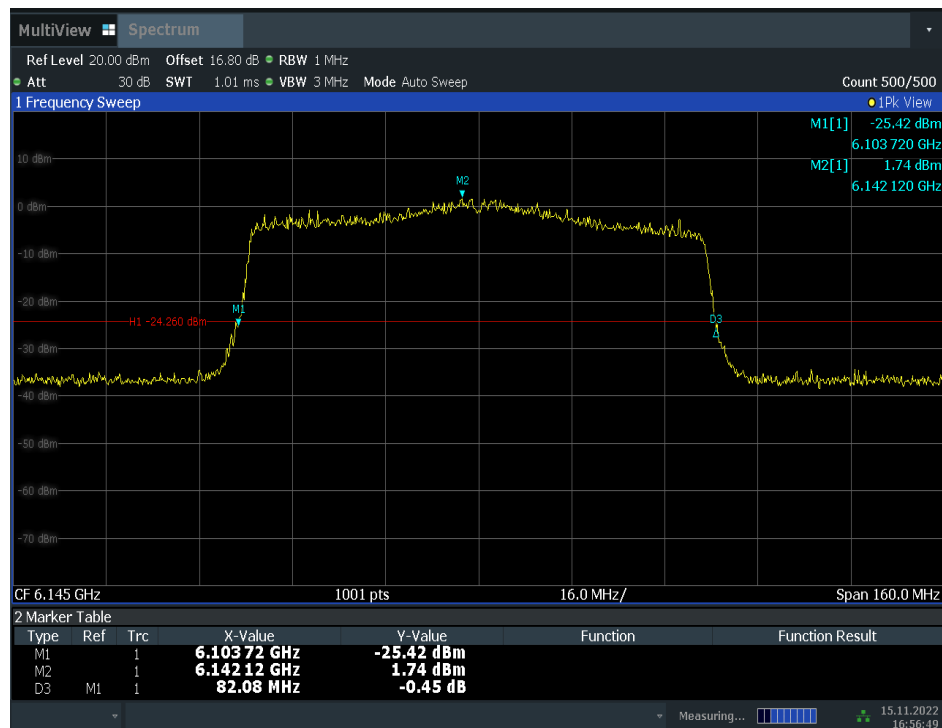
**Fig.25 Occupied 26dB Bandwidth (802.11ax-HE40, 6965MHz)**


16:48:54 15.11.2022

**Fig.26 Occupied 26dB Bandwidth (802.11ax-HE40, 7085MHz)**



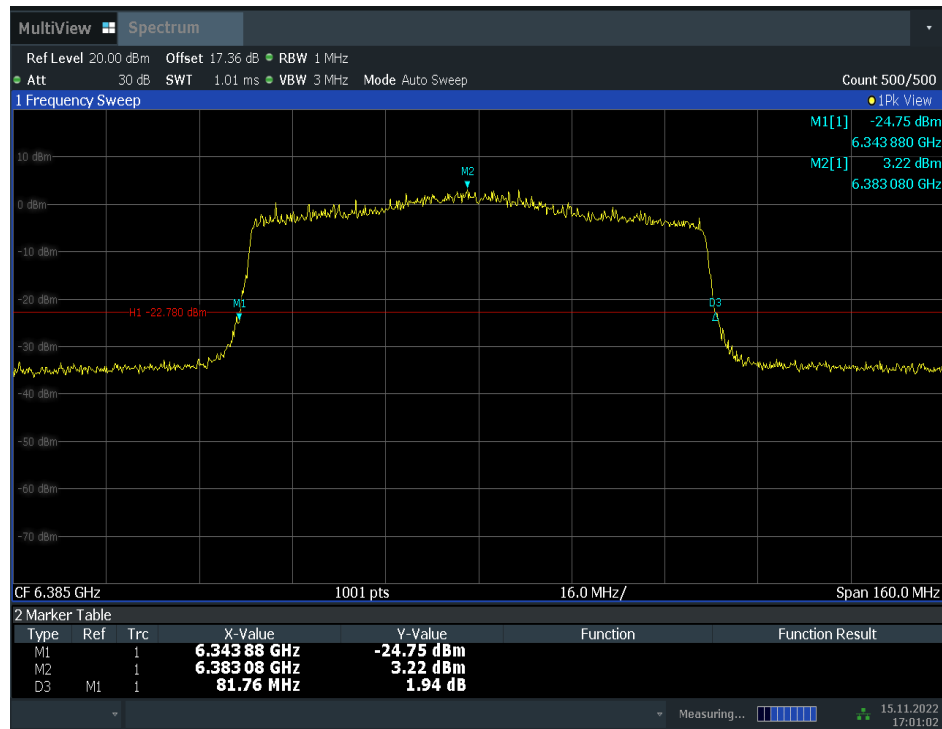
16:53:03 15.11.2022

**Fig.27 Occupied 26dB Bandwidth (802. 11ax-HE80, 5985MHz)**


16:56:50 15.11.2022

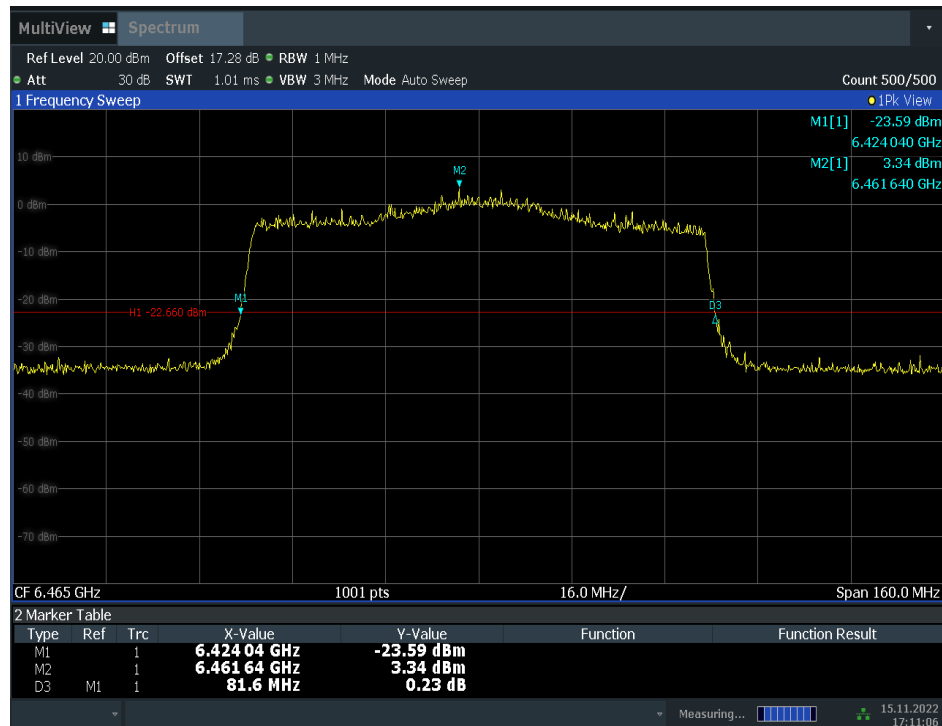
**Fig.28 Occupied 26dB Bandwidth (802. 11ax-HE80, 6145MHz)**





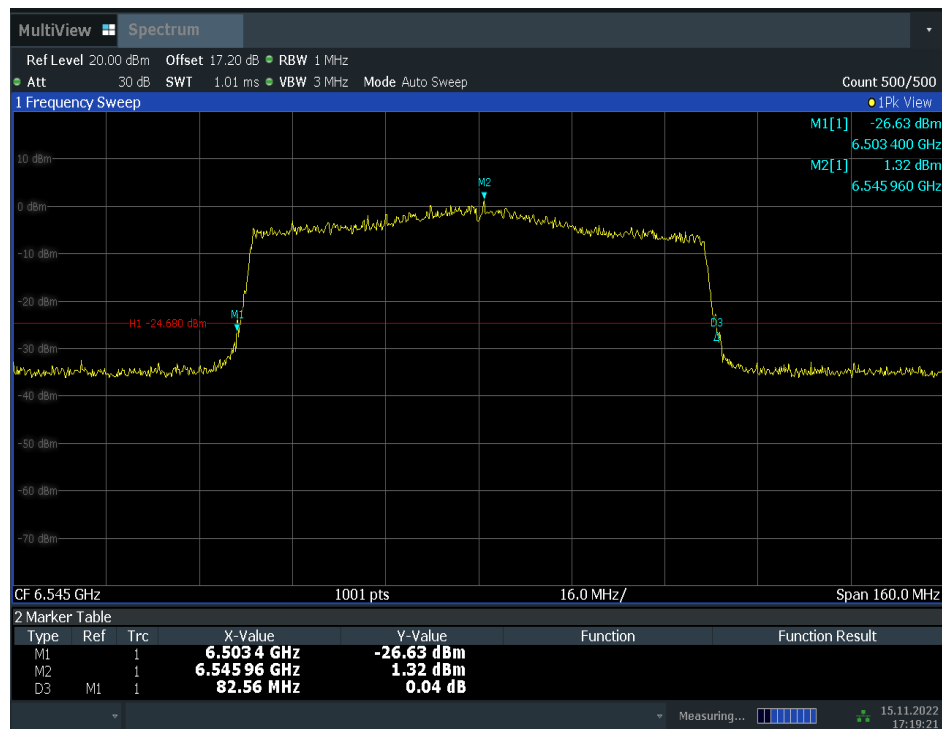
17:01:03 15.11.2022

**Fig.29 Occupied 26dB Bandwidth (802. 11ax-HE80, 6385MHz)**

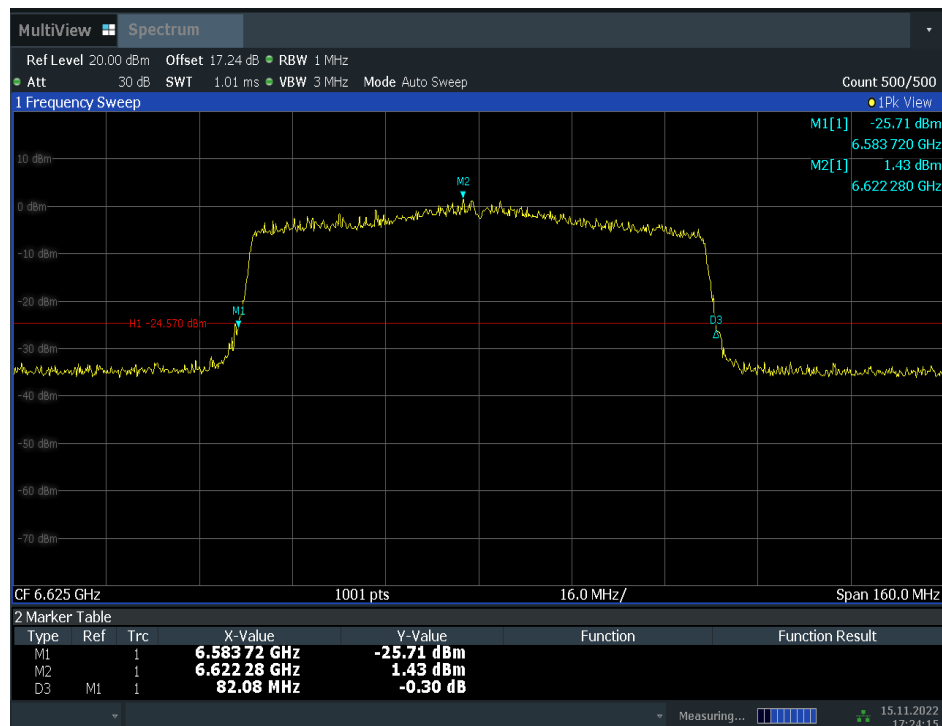


17:11:06 15.11.2022

**Fig.30 Occupied 26dB Bandwidth (802. 11ax-HE80, 6465MHz)**

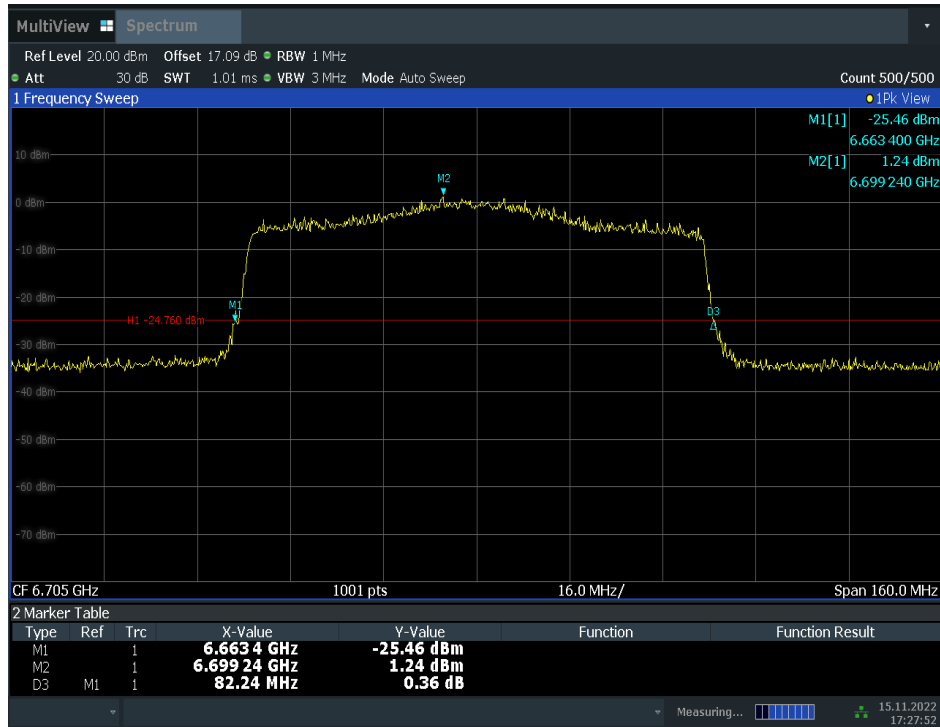


17:19:22 15.11.2022

**Fig.31 Occupied 26dB Bandwidth (802. 11ax-HE80, 6545MHz)**


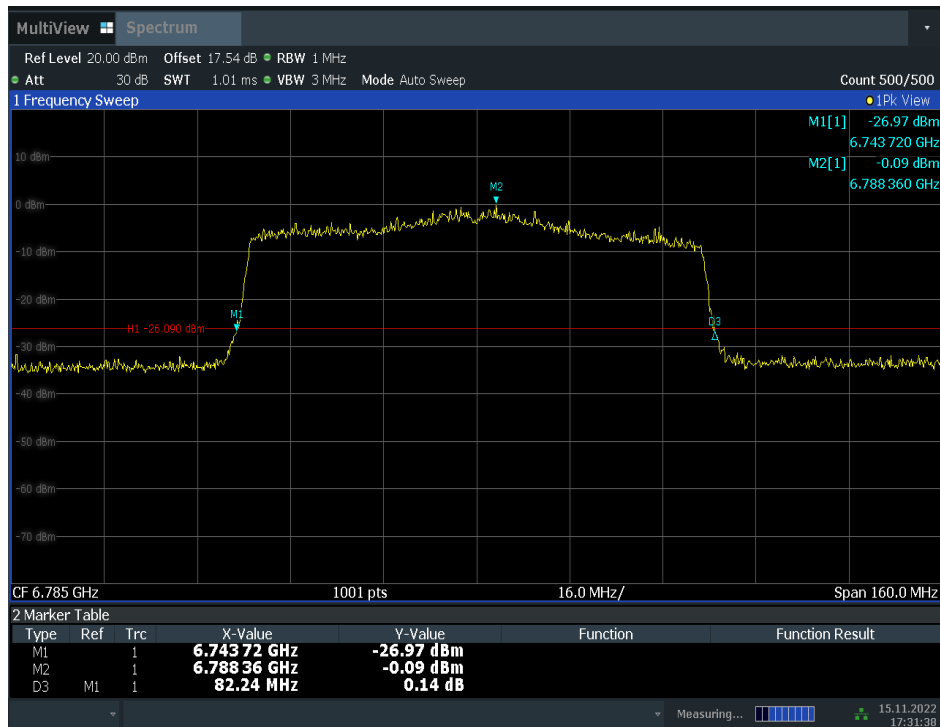
17:24:16 15.11.2022

**Fig.32 Occupied 26dB Bandwidth (802. 11ax-HE80, 6625MHz)**



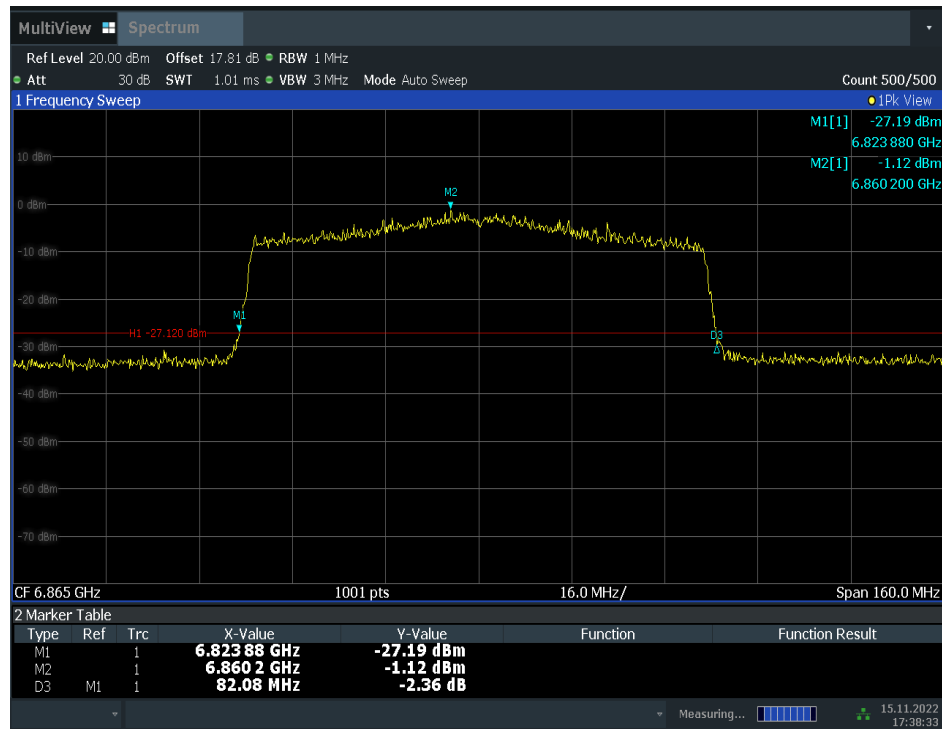
17:27:53 15.11.2022

Fig.33 Occupied 26dB Bandwidth (802. 11ax-HE80, 6705MHz)



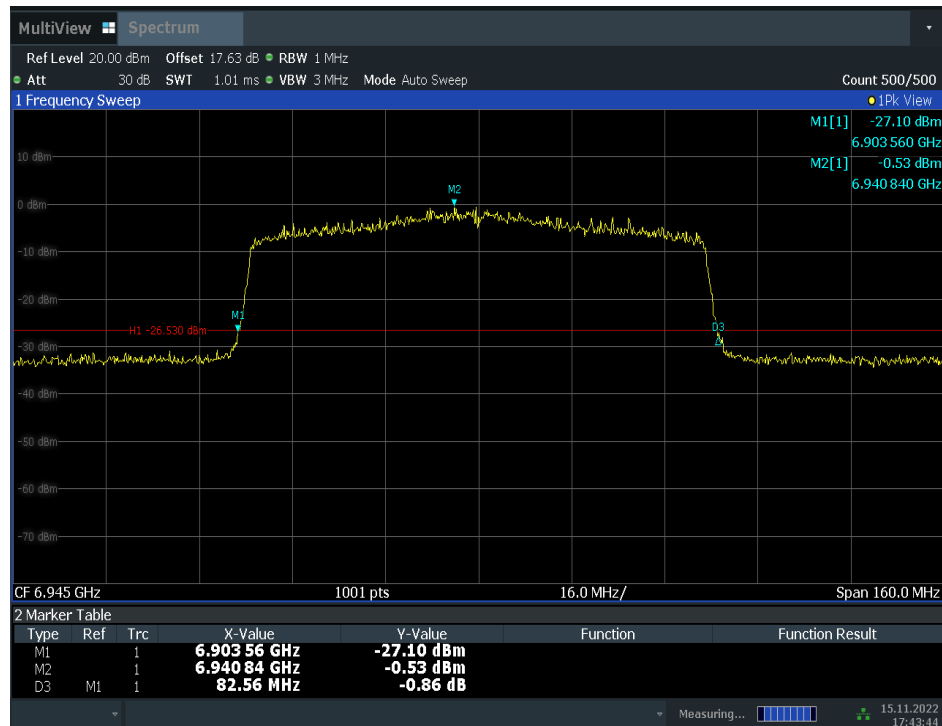
17:31:39 15.11.2022

Fig.34 Occupied 26dB Bandwidth (802. 11ax-HE80, 6785MHz)



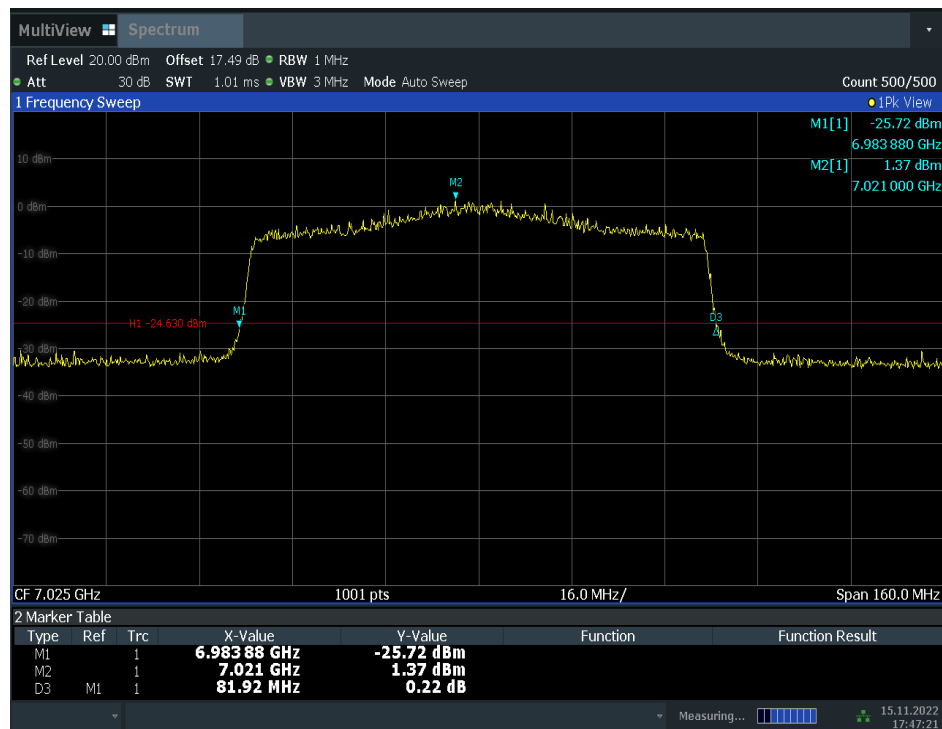
17:38:34 15.11.2022

**Fig.35 Occupied 26dB Bandwidth (802. 11ax-HE80, 6865MHz)**

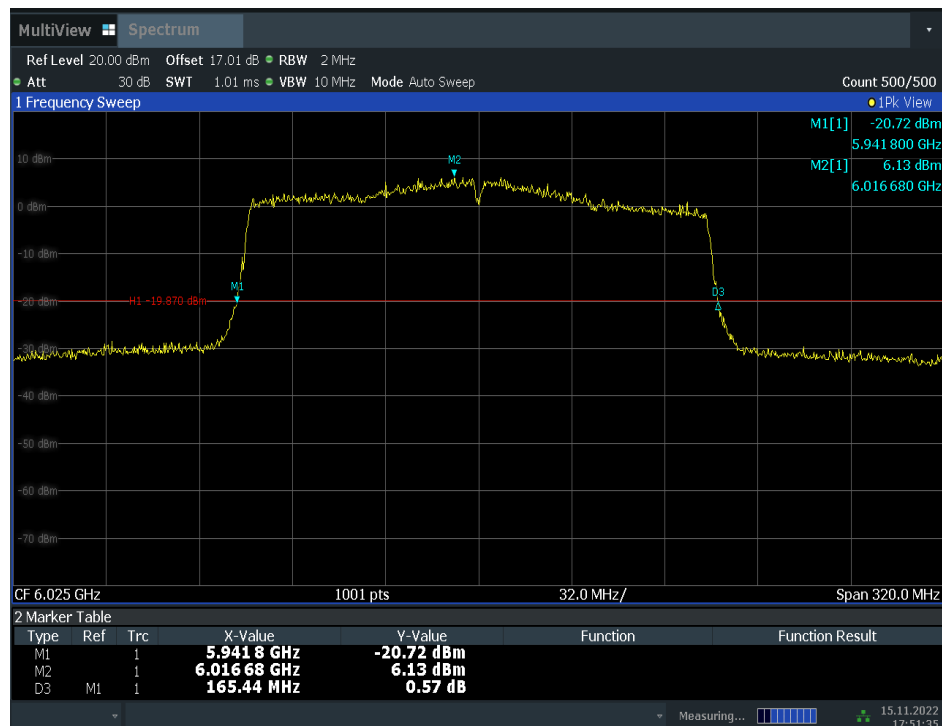


17:43:45 15.11.2022

**Fig.36 Occupied 26dB Bandwidth (802. 11ax-HE80, 6945MHz)**



17:47:22 15.11.2022

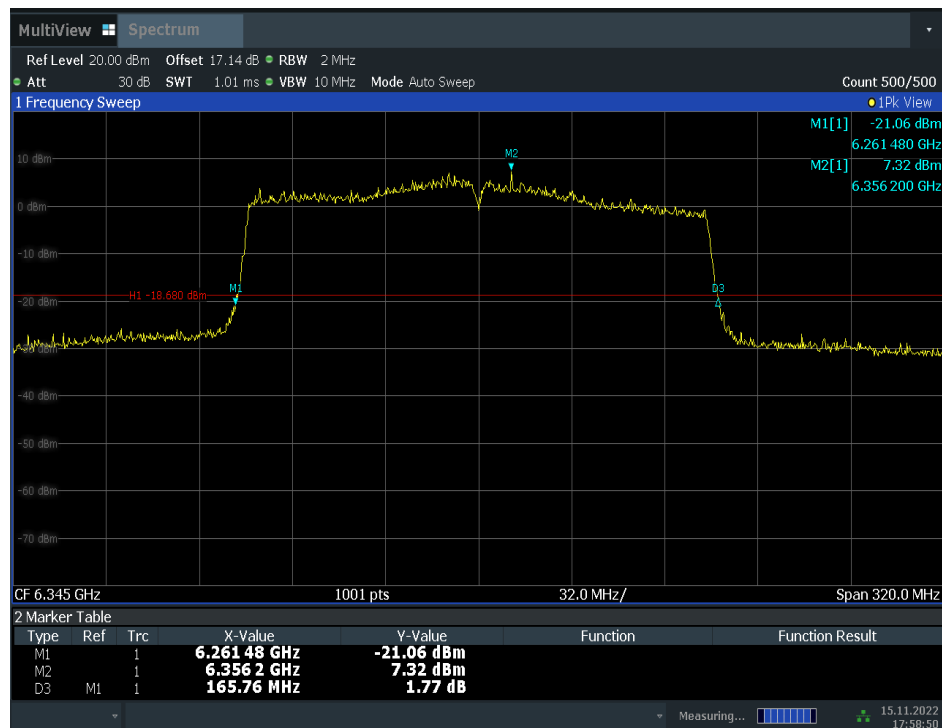
**Fig.37 Occupied 26dB Bandwidth (802. 11ax-HE80, 7025MHz)**


17:51:35 15.11.2022

**Fig.38 Occupied 26dB Bandwidth (802. 11ax-HE160, 6025MHz)**



17:55:14 15.11.2022

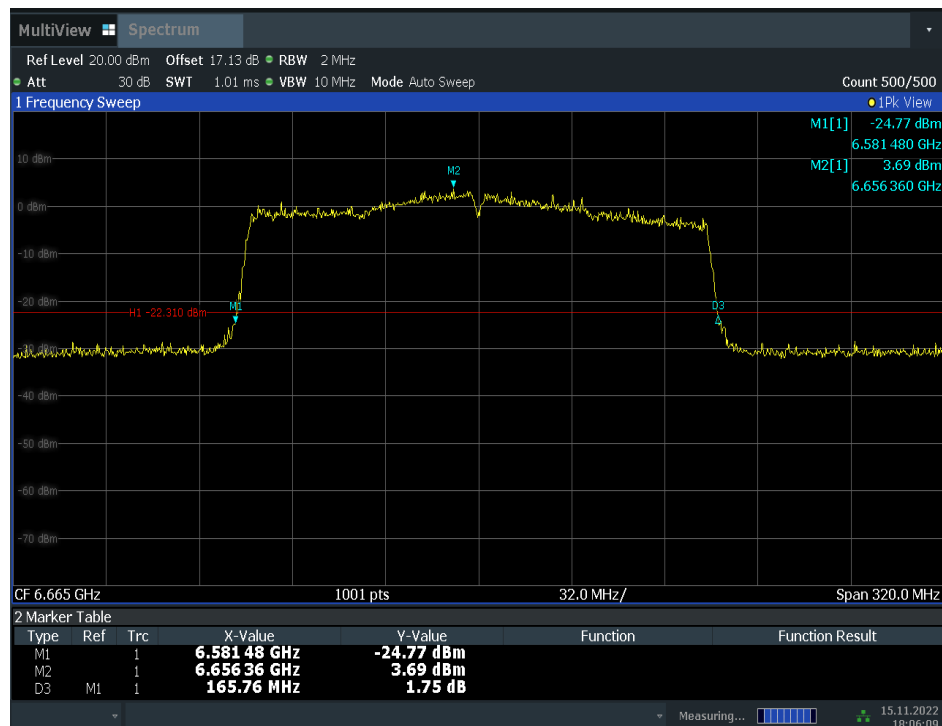
**Fig.39 Occupied 26dB Bandwidth (802. 11ax-HE160, 6185MHz)**


17:58:50 15.11.2022

**Fig.40 Occupied 26dB Bandwidth (802. 11ax-HE160, 6345MHz)**



18:02:26 15.11.2022

**Fig.41 Occupied 26dB Bandwidth (802. 11ax-HE160, 6505MHz)**


18:06:10 15.11.2022

**Fig.42 Occupied 26dB Bandwidth (802. 11ax-HE160, 6665MHz)**



18:09:55 15.11.2022

**Fig.43 Occupied 26dB Bandwidth (802. 11ax-HE160, 6825MHz)**


18:13:32 15.11.2022

**Fig.44 Occupied 26dB Bandwidth (802. 11ax-HE160 6985MHz)**



### A.5. 99% Occupied bandwidth

**Method of Measurement: See ANSI C63.10-2013-clause 12.4.2.**

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than  $[10 \log (OBW/RBW)]$  below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

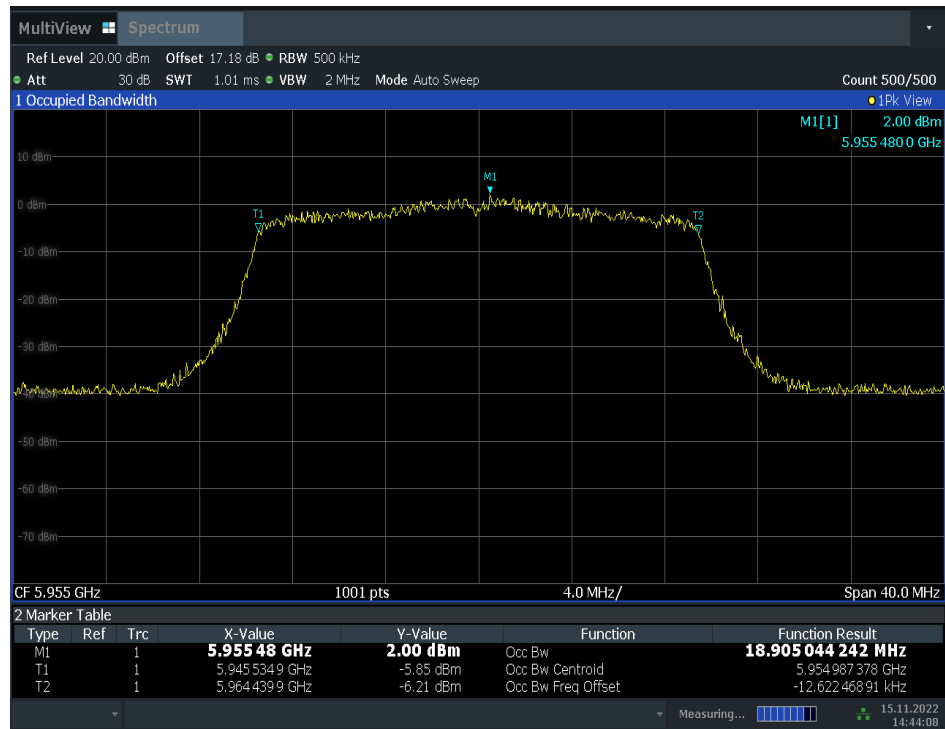
**Measurement Result:**

Mode	Frequency	99% Occupied bandwidth ( MHz)		conclusion
		Fig.	Value	
802.11ax HE20 (full RU)	5955MHz (Ch1)	Fig.45	18.91	P
	6175MHz (Ch45)	Fig.46	18.95	P
	6415MHz (Ch93)	Fig.47	18.99	P
	6435MHz (Ch97)	Fig.48	18.96	P
	6475MHz (Ch105)	Fig.49	18.93	P
	6515MHz (Ch113)	Fig.50	18.93	P
	6535MHz (Ch117)	Fig.51	18.99	P
	6695MHz (Ch149)	Fig.52	18.93	P
	6855MHz (Ch181)	Fig.53	19.00	P
	6875MHz (Ch185)	Fig.54	19.01	P
	6895MHz (ch189)	Fig.55	19.01	P
	6995MHz (Ch209)	Fig.56	18.95	P
7115MHz (Ch233)	Fig.57	18.94	P	
802.11ax HE40 (full RU)	5965MHz (Ch3)	Fig.58	37.72	P
	6165MHz (Ch43)	Fig.59	37.69	P
	6405MHz (Ch91)	Fig.60	37.87	P

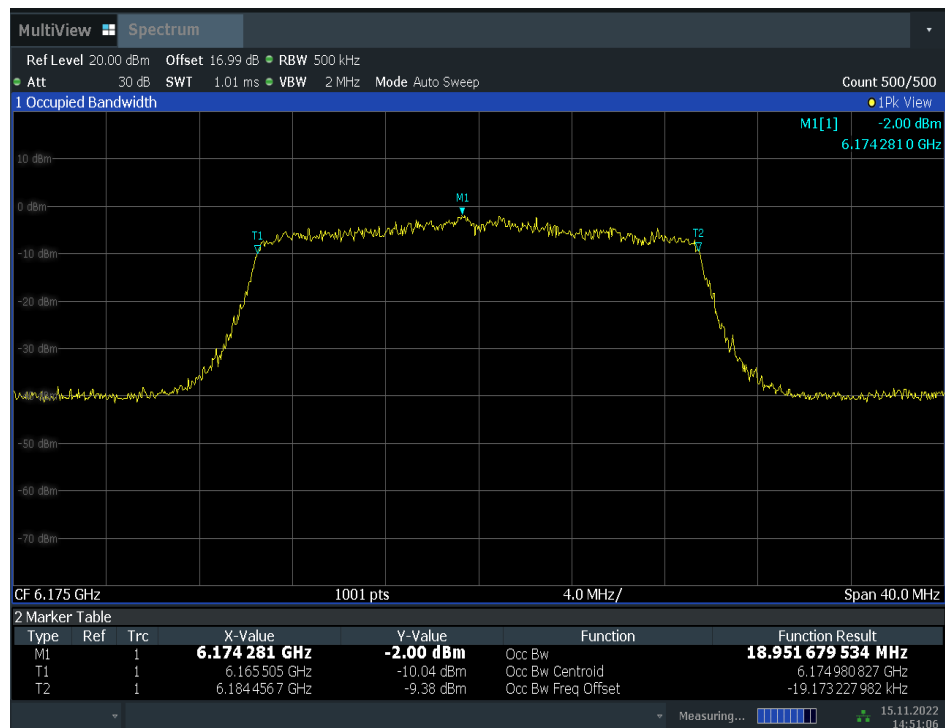
	6445MHz (Ch99)	Fig.61	37.90	P
	6485MHz (Ch107)	Fig.62	37.81	P
	6525MHz (Ch115)	Fig.63	37.77	P
	6565MHz (Ch123)	Fig.64	37.90	P
	6685MHz (Ch147)	Fig.65	37.80	P
	6845MHz (Ch179)	Fig.66	37.97	P
	6885MHz (Ch187)	Fig.67	37.90	P
	6925MHz (ch195)	Fig.68	37.87	P
	6965MHz (Ch203)	Fig.69	37.67	P
	7085MHz (Ch227)	Fig.70	37.83	P
802.11ax HE80 (full RU)	5985MHz (Ch7)	Fig.71	76.83	P
	6145MHz (Ch39)	Fig.72	77.00	P
	6385MHz (Ch87)	Fig.73	76.99	P
	6465MHz (Ch103)	Fig.74	76.96	P
	6545MHz (Ch119)	Fig.75	76.96	P
	6625MHz (Ch135)	Fig.76	77.01	P
	6705MHz (Ch151)	Fig.77	76.80	P
	6785MHz (Ch167)	Fig.78	77.09	P
	6865MHz (Ch183)	Fig.79	77.13	P
	6945MHz (Ch199)	Fig.80	77.08	P
	7025MHz (Ch215)	Fig.81	77.05	P
802.11ax HE160 (full RU)	6025MHz (Ch15)	Fig.82	156.03	P
	6185MHz (Ch47)	Fig.83	156.27	P
	6345MHz (Ch79)	Fig.84	156.63	P
	6505MHz (Ch111)	Fig.85	156.21	P
	6665MHz (Ch143)	Fig.86	156.33	P
	6825MHz (Ch175)	Fig.87	156.775	P
	6985MHz (Ch207)	Fig.88	156.954	P

**Conclusion: PASS**

**Test graphs as below:**

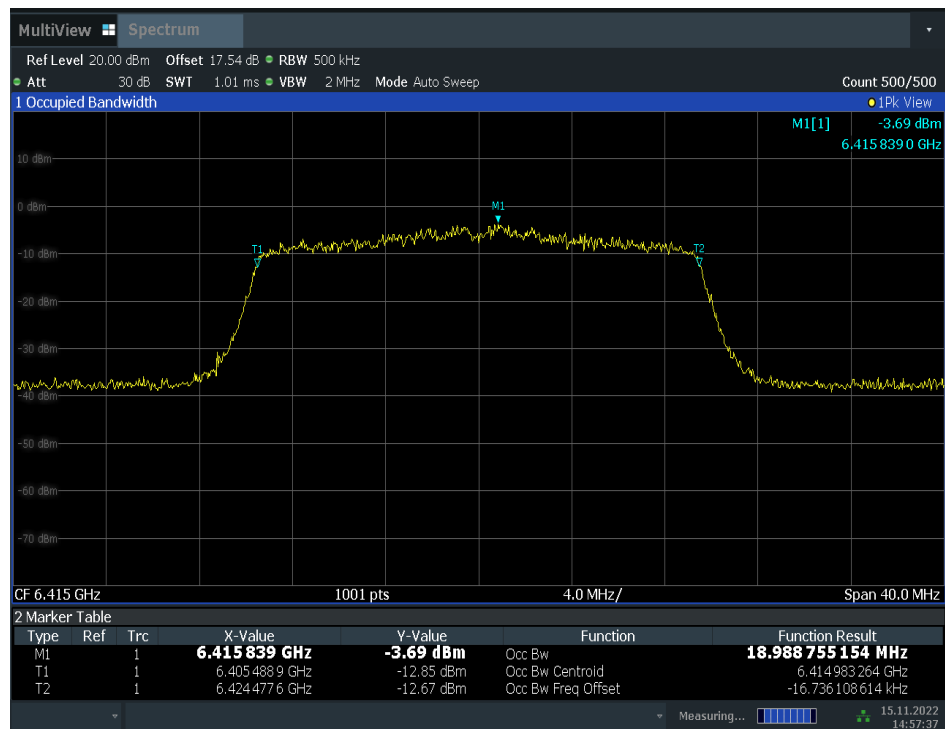


14:44:08 15.11.2022

**Fig.45 99% Occupied Bandwidth (802.11ax-HE20, 5955MHz)**


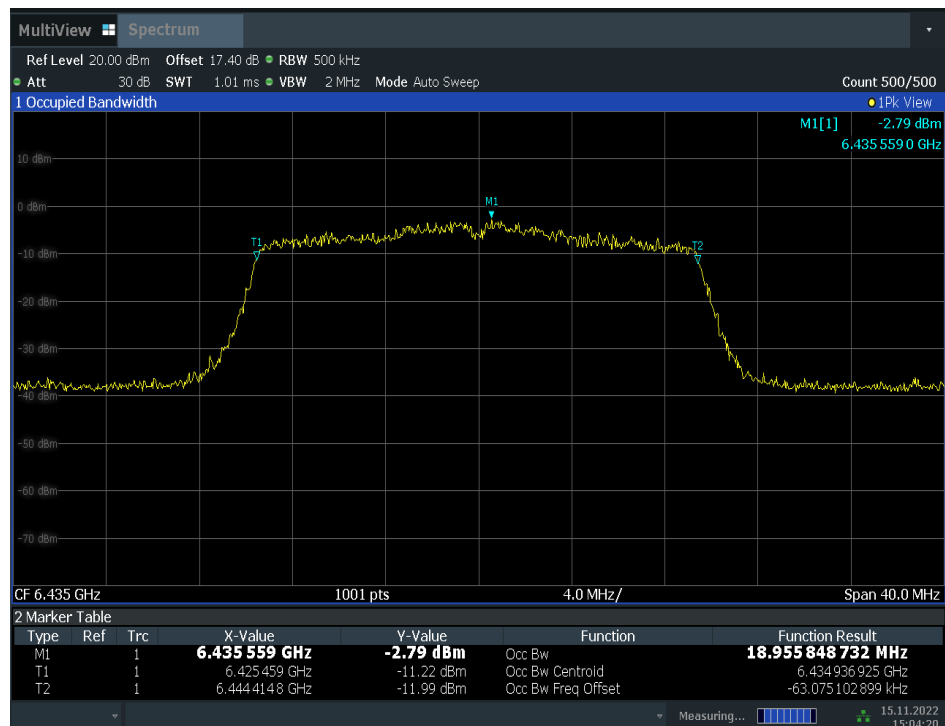
14:51:06 15.11.2022

**Fig.46 99% Occupied Bandwidth (802.11ax-HE20, 6175MHz)**



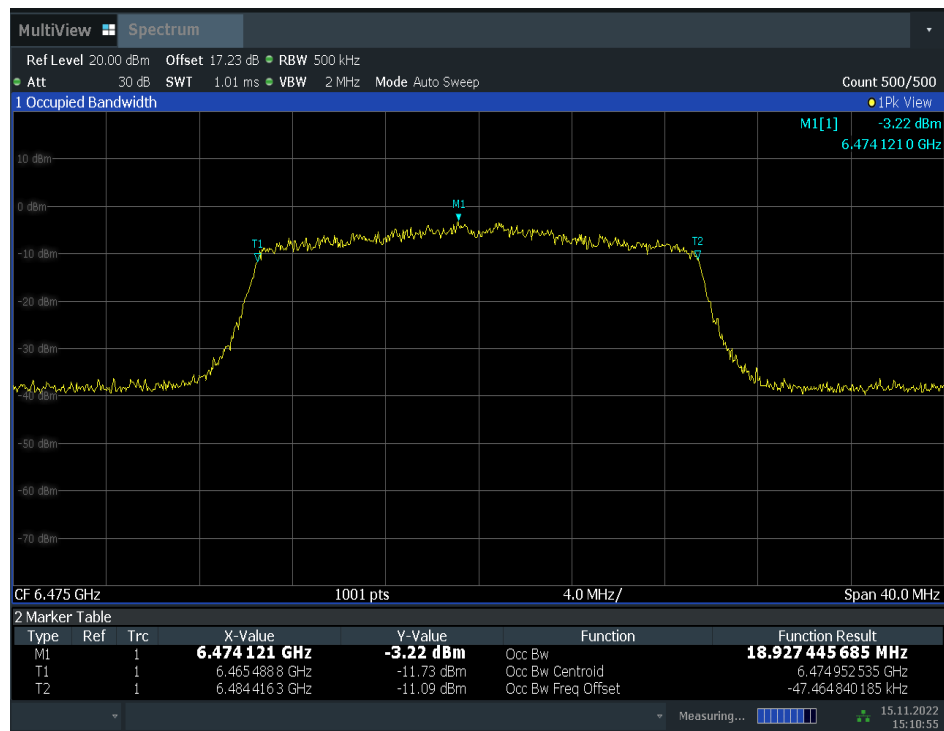
14:57:38 15.11.2022

**Fig.47 99% Occupied Bandwidth (802.11ax-HE20, 6415MHz)**

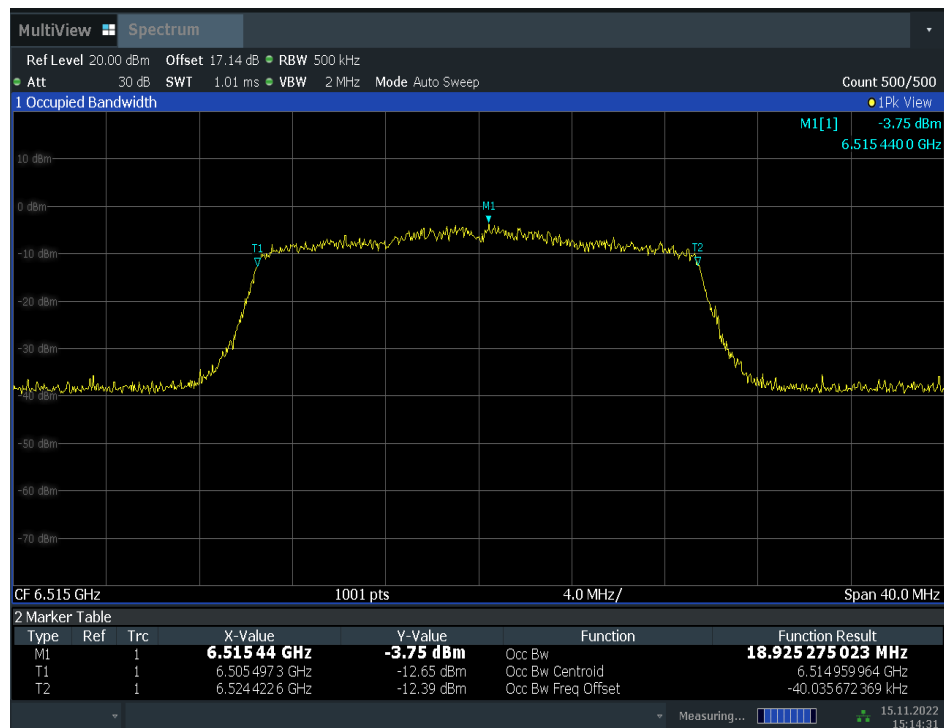


15:04:21 15.11.2022

**Fig.48 99% Occupied Bandwidth (802.11ax-HE20, 6435MHz)**

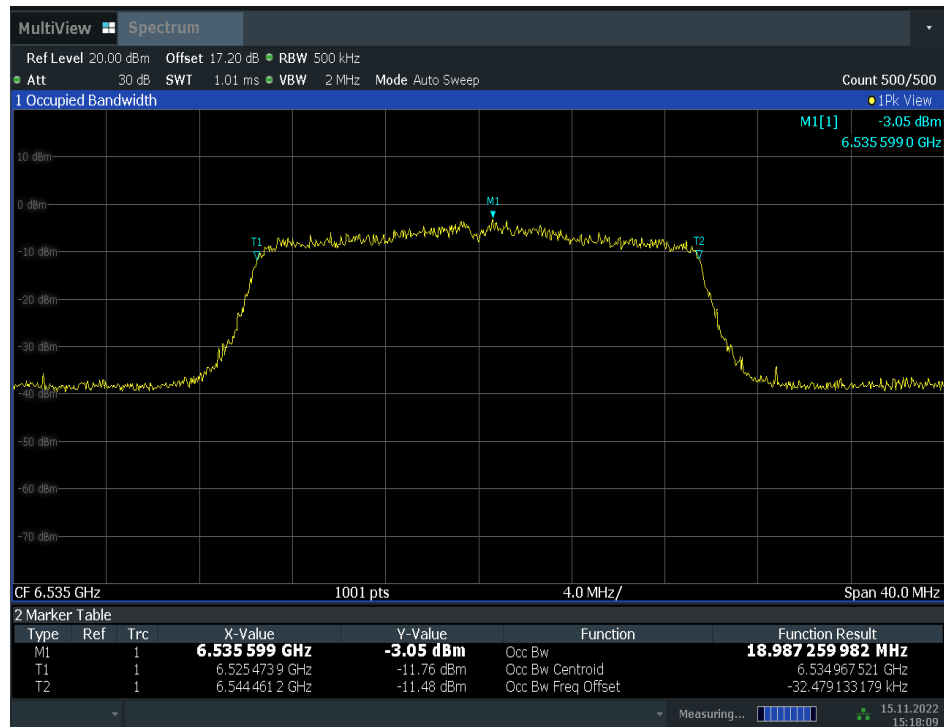


15:10:55 15.11.2022

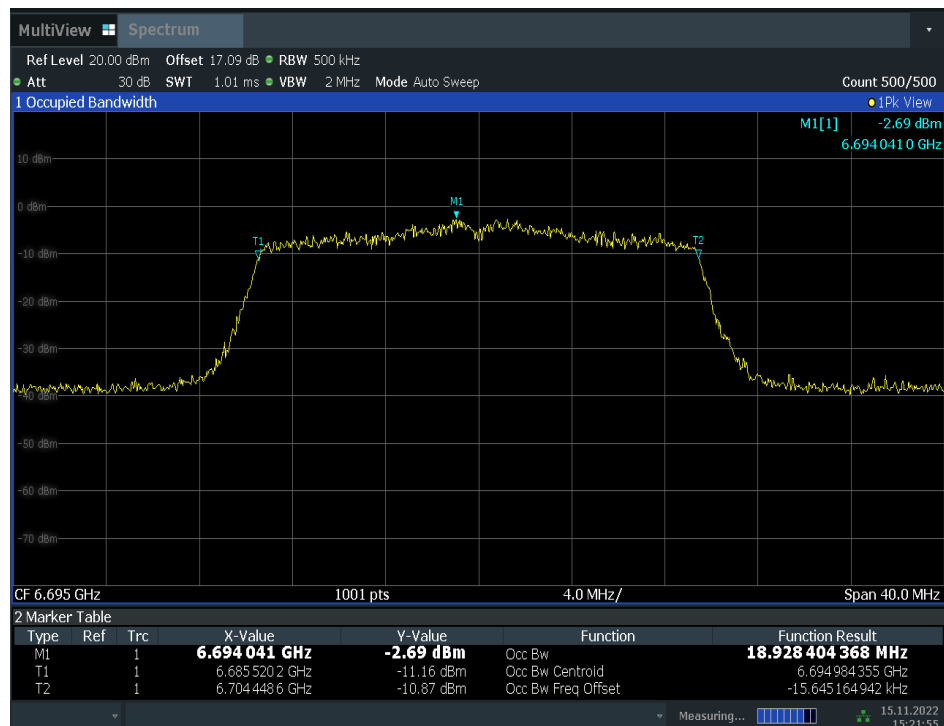
**Fig.49 99% Occupied Bandwidth (802.11ax-HE20, 6475MHz)**


15:14:31 15.11.2022

**Fig.50 99% Occupied Bandwidth (802.11ax-HE20, 6515MHz)**



15:18:09 15.11.2022

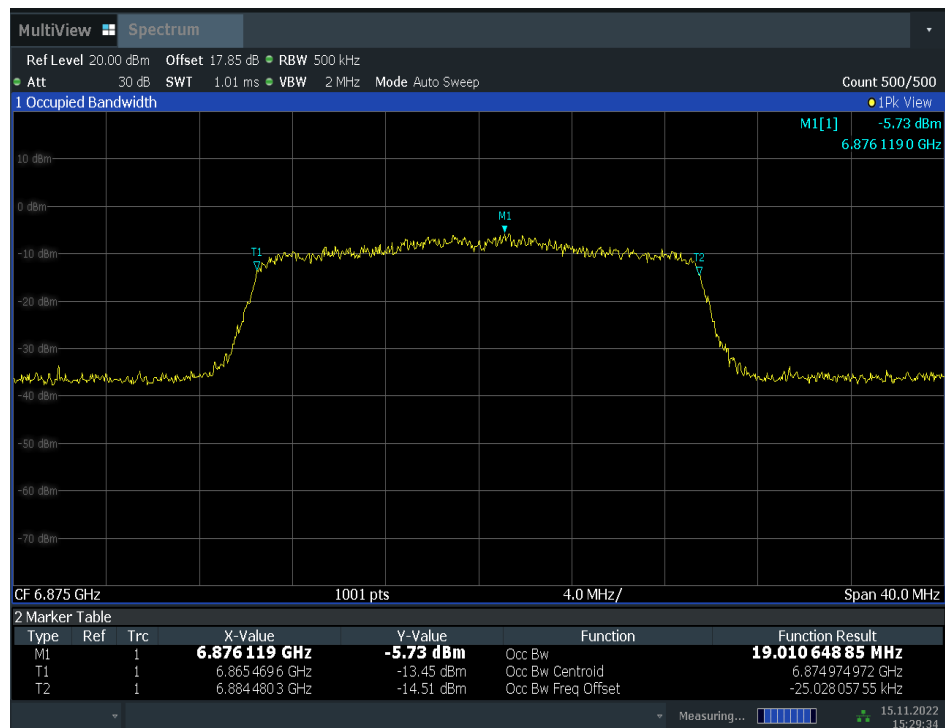
**Fig.51 99% Occupied Bandwidth (802.11ax-HE20, 6535MHz)**


15:21:56 15.11.2022

**Fig.52 99% Occupied Bandwidth (802.11ax-HE20, 6695MHz)**

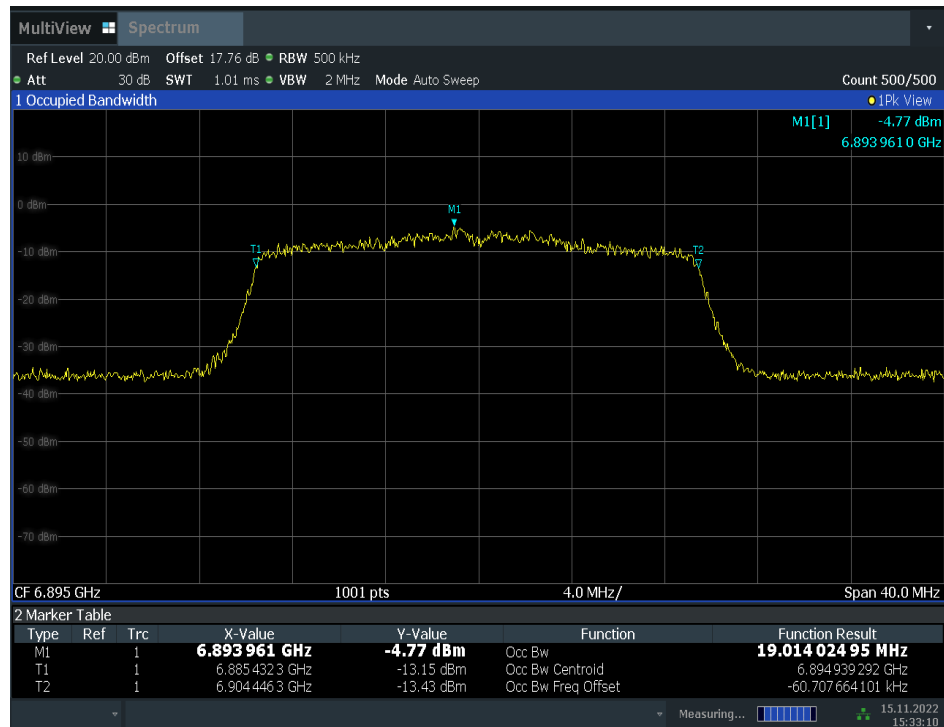


15:25:41 15.11.2022

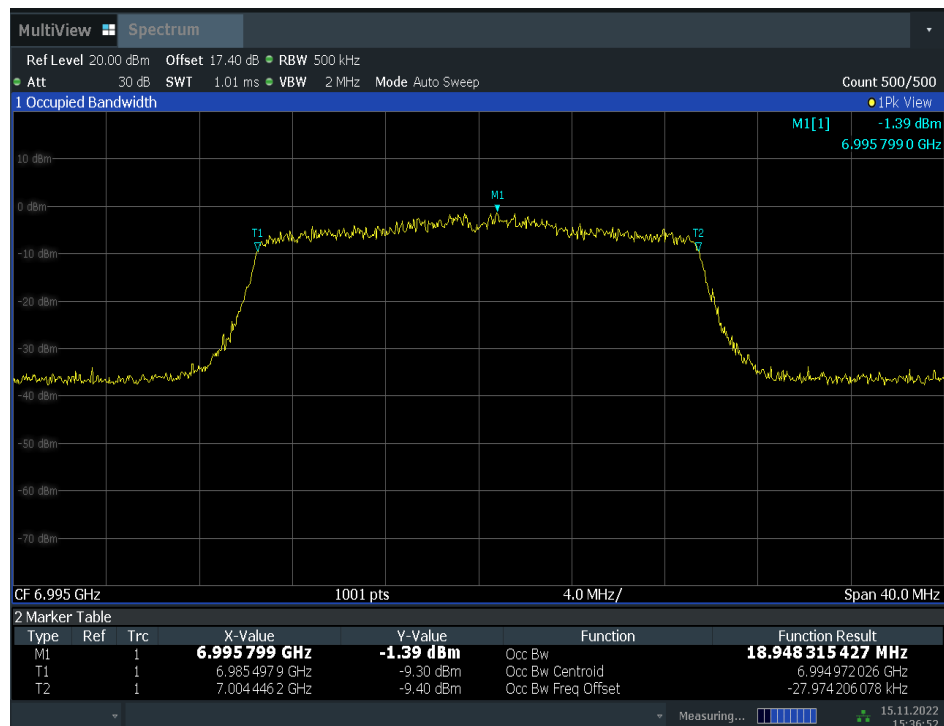
**Fig.53 99% Occupied Bandwidth (802.11ax-HE20, 6855MHz)**


15:29:35 15.11.2022

**Fig.54 99% Occupied Bandwidth (802.11ax-HE20, 6875MHz)**



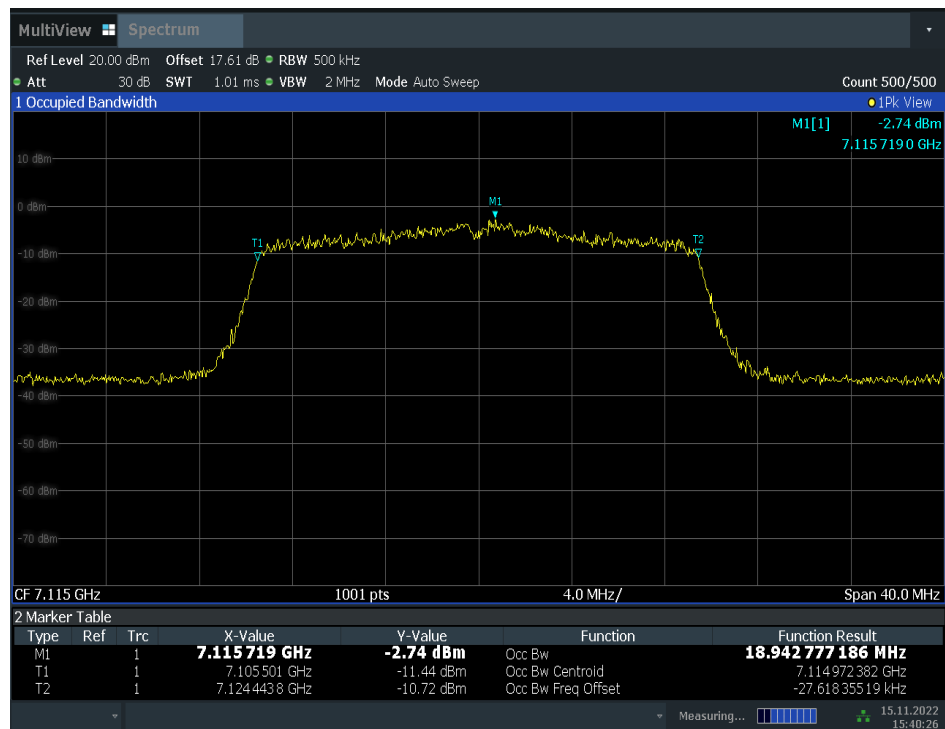
15:33:10 15.11.2022

**Fig.55 99% Occupied Bandwidth (802.11ax-HE20, 6895MHz)**


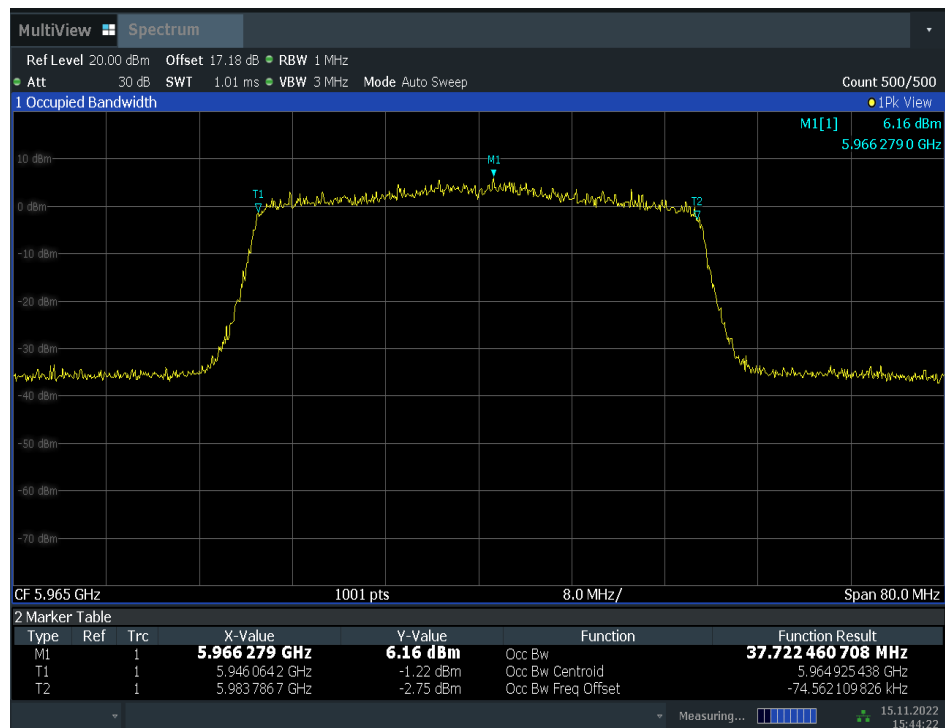
15:36:53 15.11.2022

**Fig.56 99% Occupied Bandwidth (802.11ax-HE20, 6995MHz)**



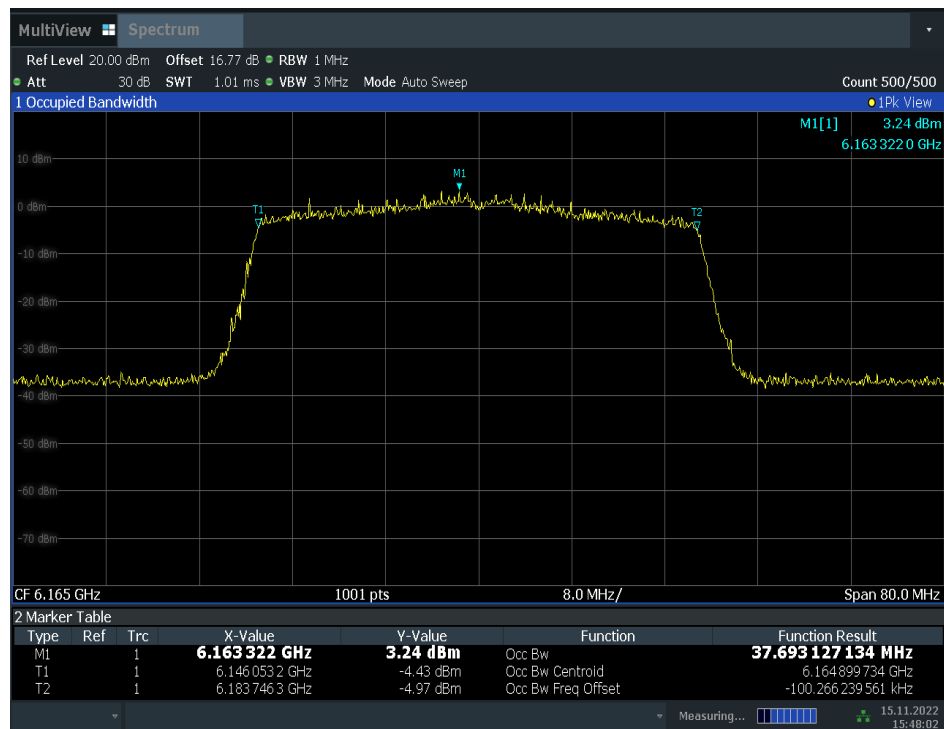


15:40:27 15.11.2022

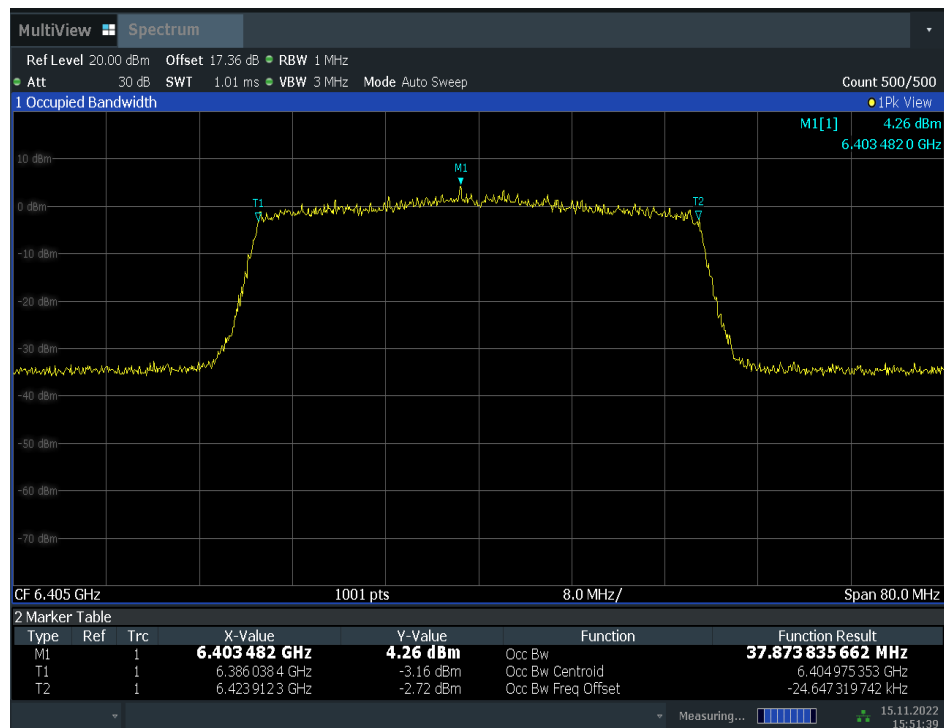
**Fig.57 99% Occupied Bandwidth (802.11ax-HE20, 7115MHz)**


15:44:23 15.11.2022

**Fig.58 99% Occupied Bandwidth (802.11ax-HE40, 5965MHz)**

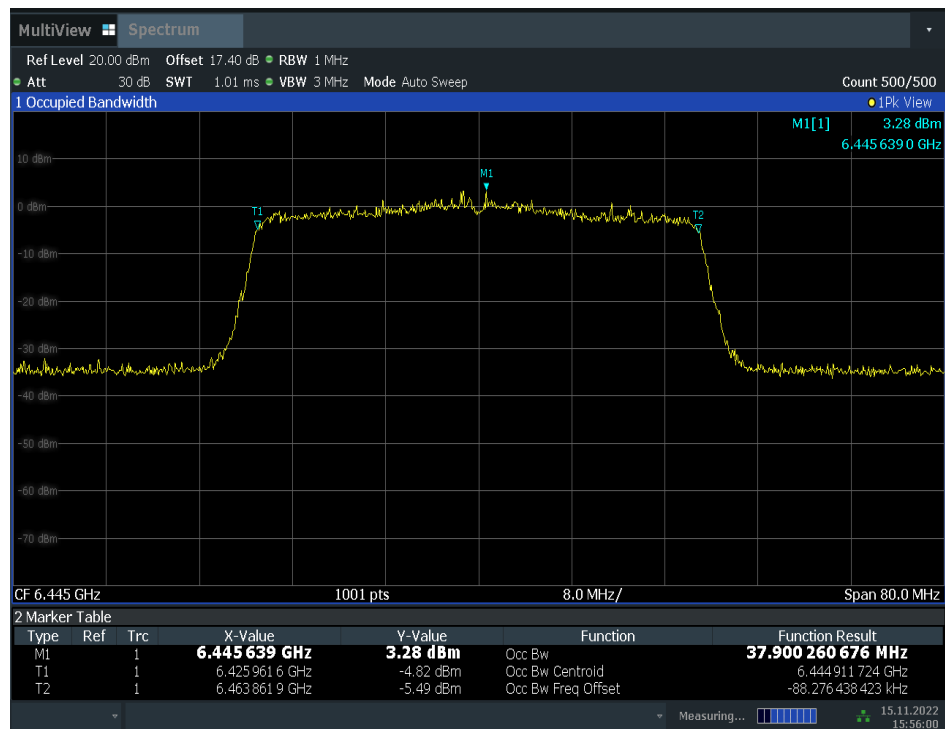


15:48:03 15.11.2022

**Fig.59 99% Occupied Bandwidth (802.11ax-HE40, 6165MHz)**


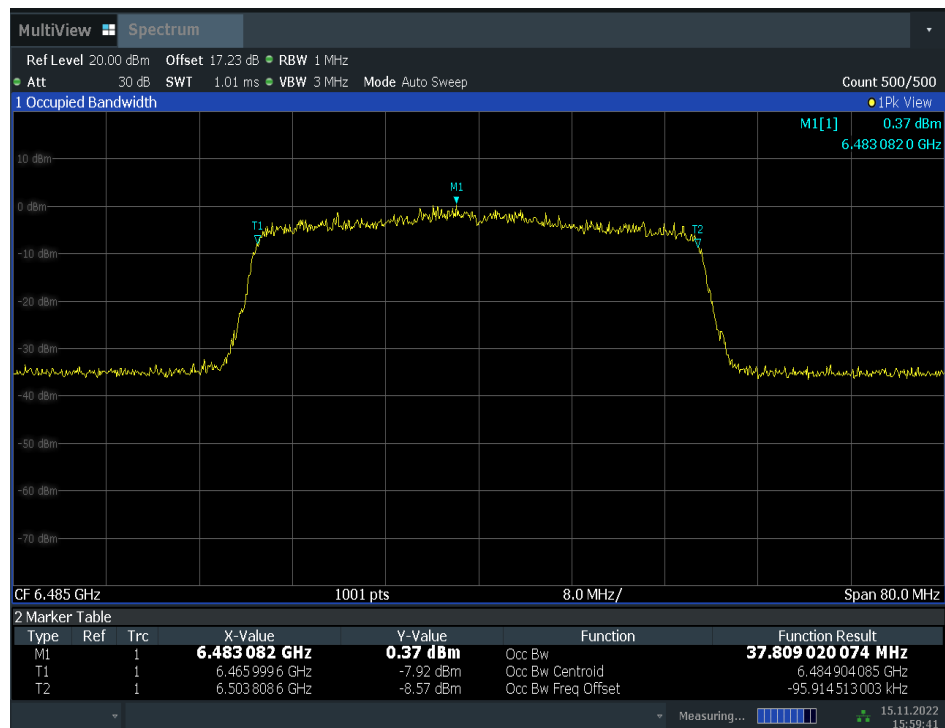
15:51:40 15.11.2022

**Fig.60 99% Occupied Bandwidth (802.11ax-HE40, 6405MHz)**



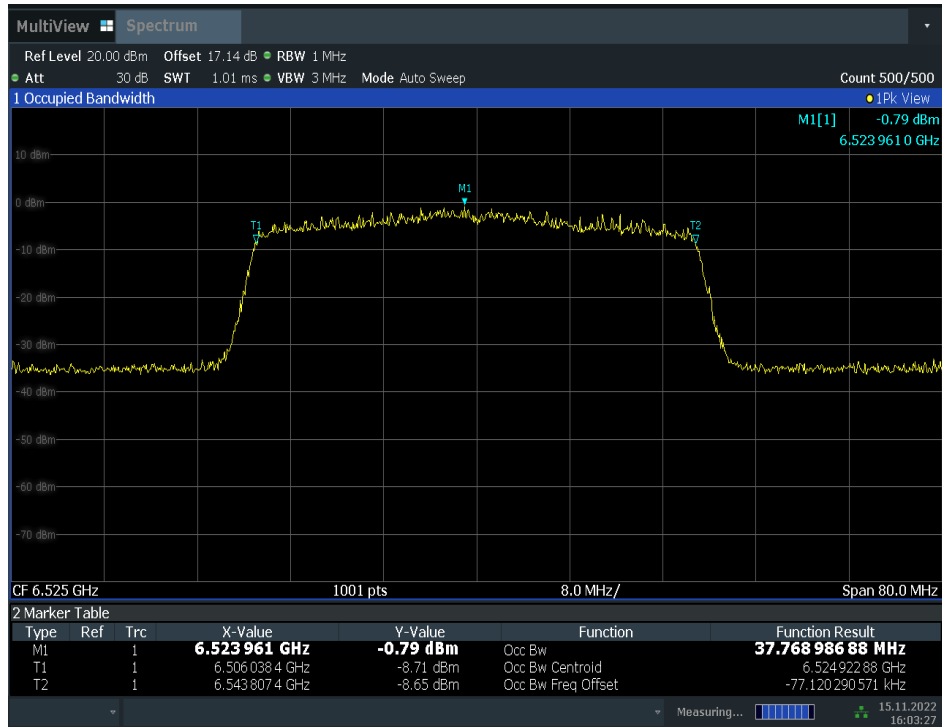
15:56:00 15.11.2022

**Fig.61 99% Occupied Bandwidth (802.11ax-HE40, 6445MHz)**

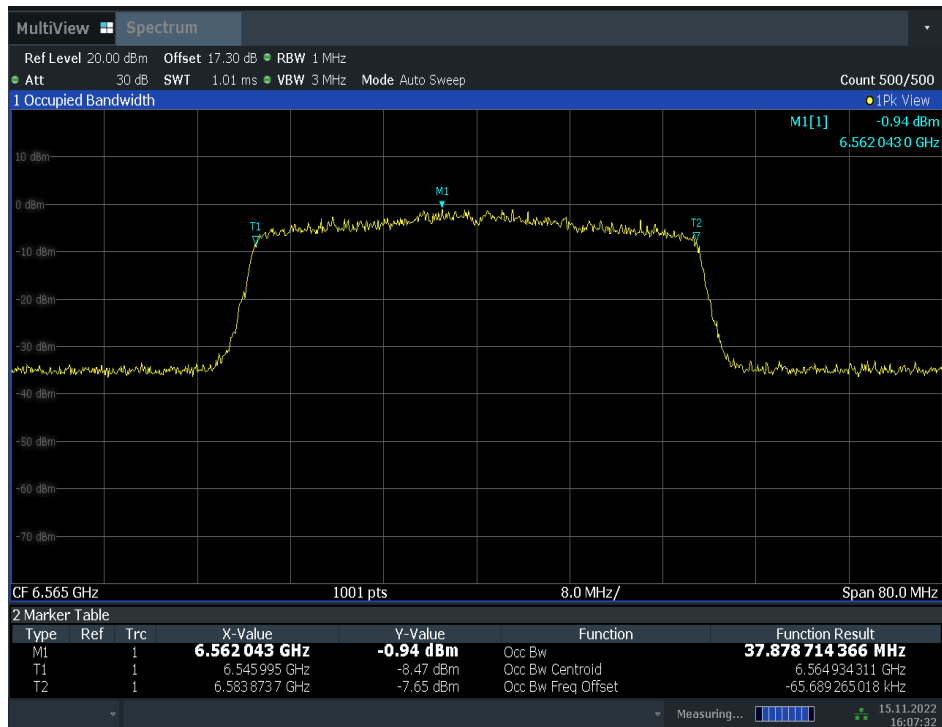


15:59:42 15.11.2022

**Fig.62 99% Occupied Bandwidth (802.11ax-HE40, 6485MHz)**

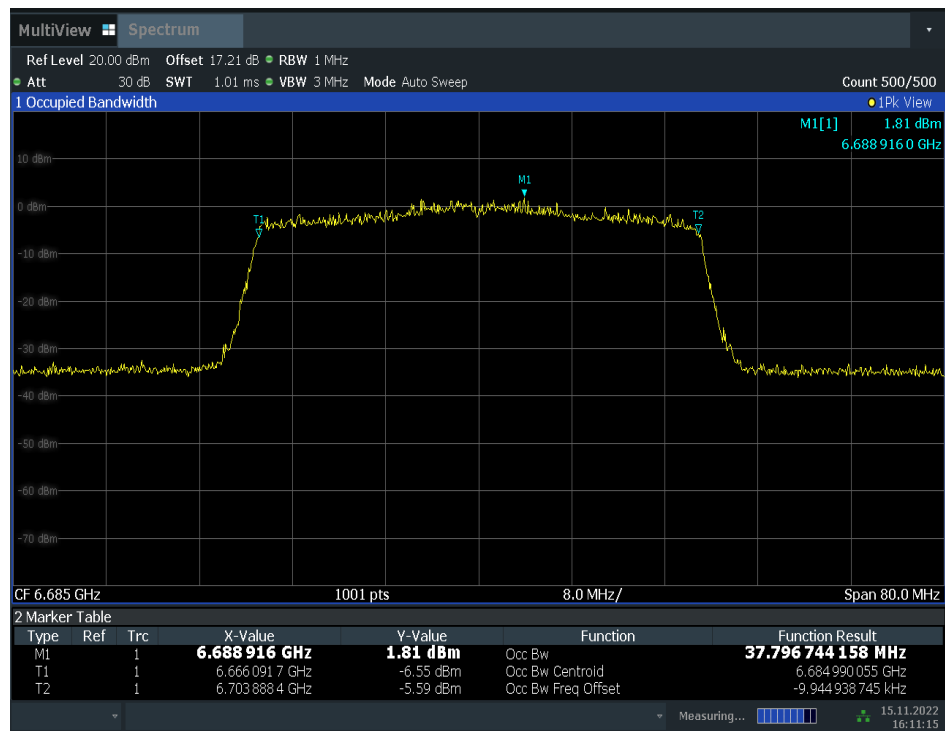


16:03:27 15.11.2022

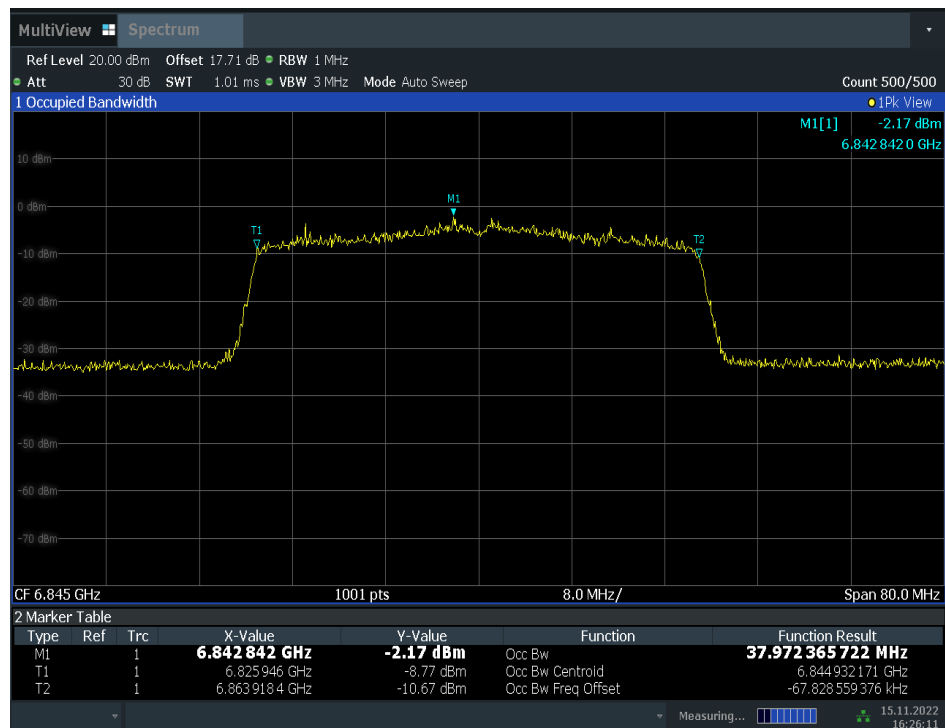
**Fig.63 99% Occupied Bandwidth (802.11ax-HE40, 6525MHz)**


16:07:32 15.11.2022

**Fig.64 99% Occupied Bandwidth (802.11ax-HE40, 6565MHz)**

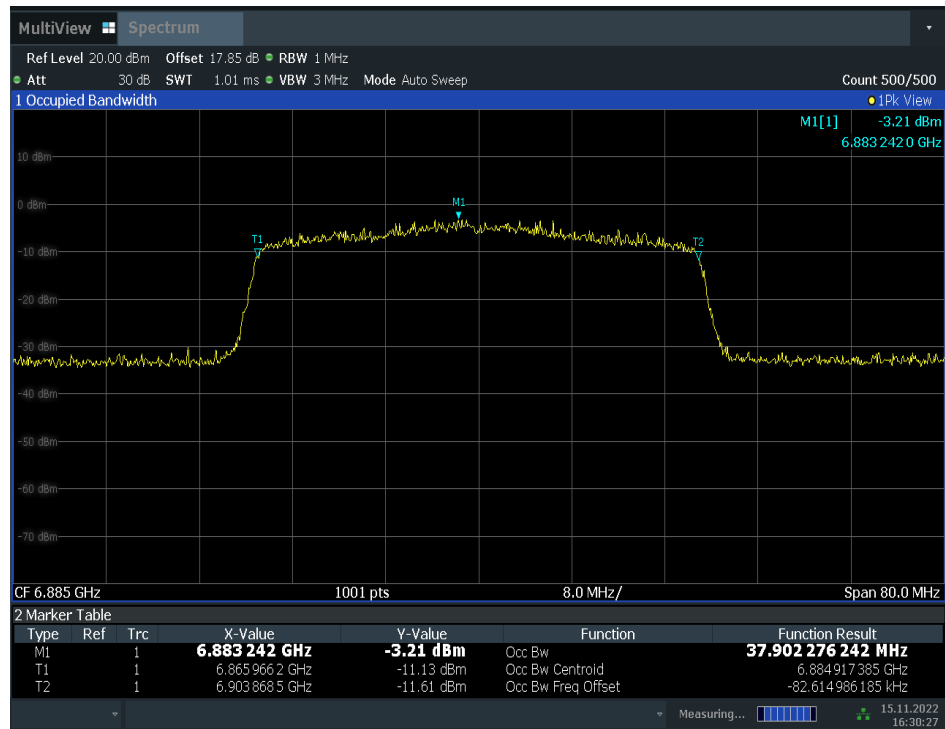


16:11:15 15.11.2022

**Fig.65 99% Occupied Bandwidth (802.11ax-HE40, 6685MHz)**


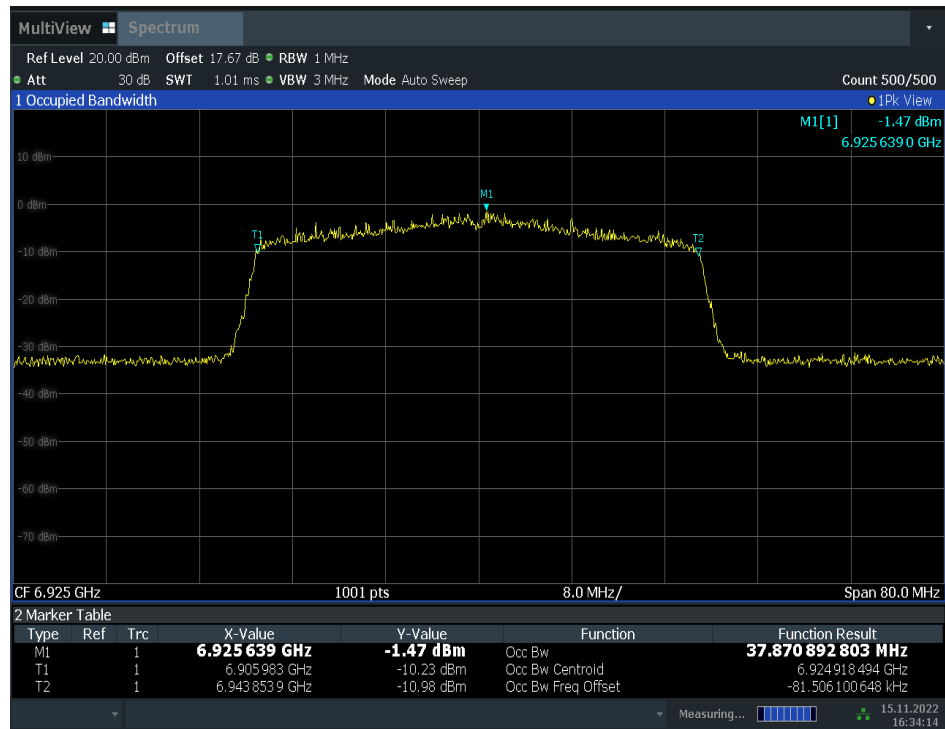
16:26:12 15.11.2022

**Fig.66 99% Occupied Bandwidth (802.11ax-HE40, 6845MHz)**



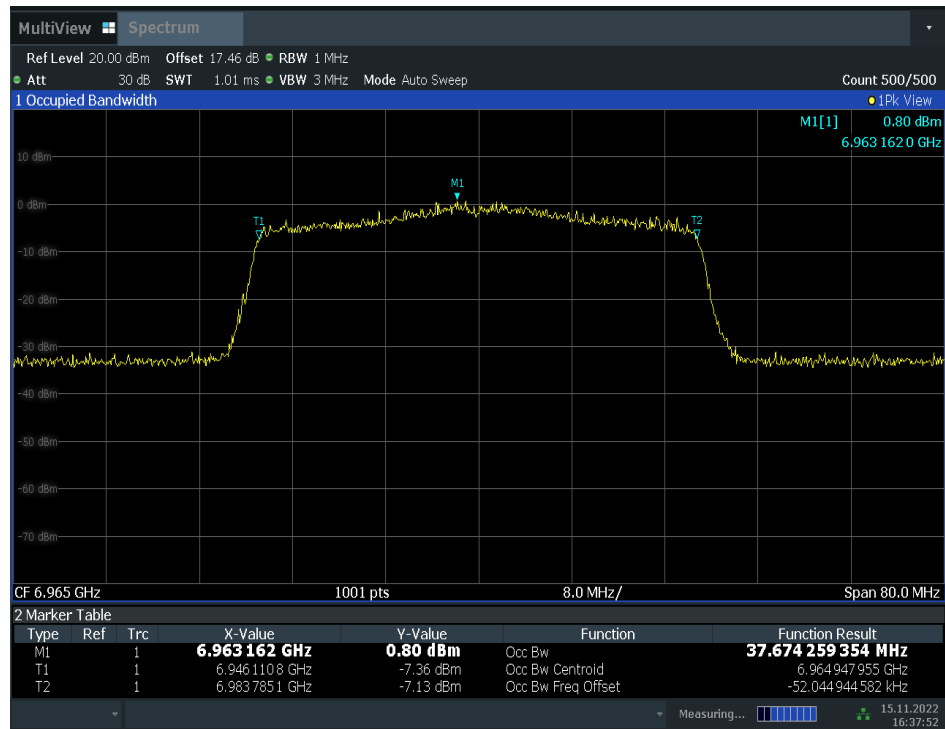
16:30:27 15.11.2022

Fig.67 99% Occupied Bandwidth (802.11ax-HE40, 6885MHz)

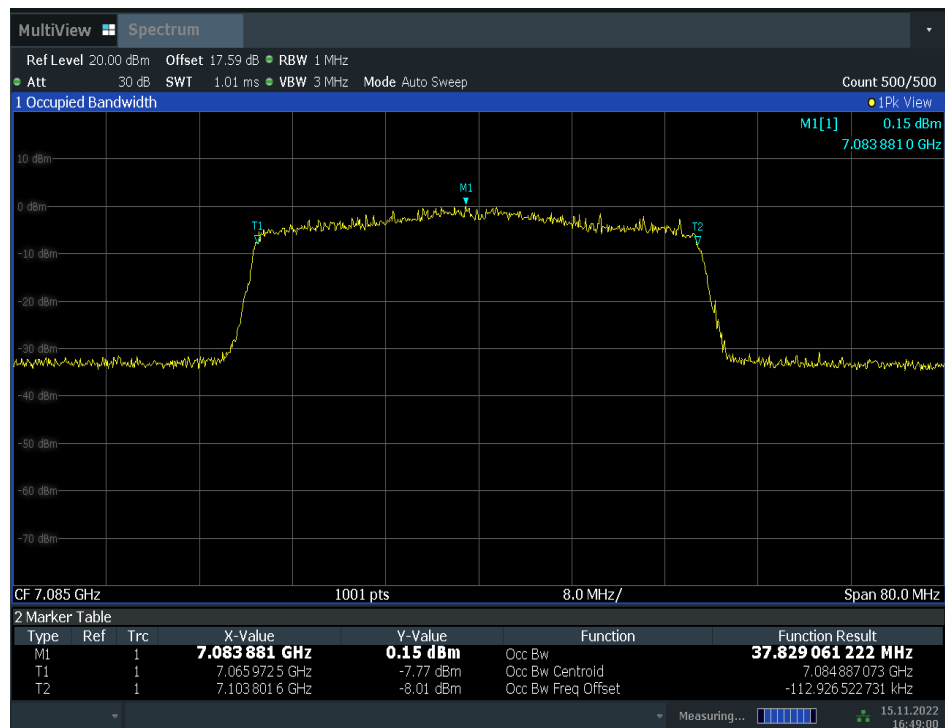


16:34:14 15.11.2022

Fig.68 99% Occupied Bandwidth (802.11ax-HE40, 6925MHz)

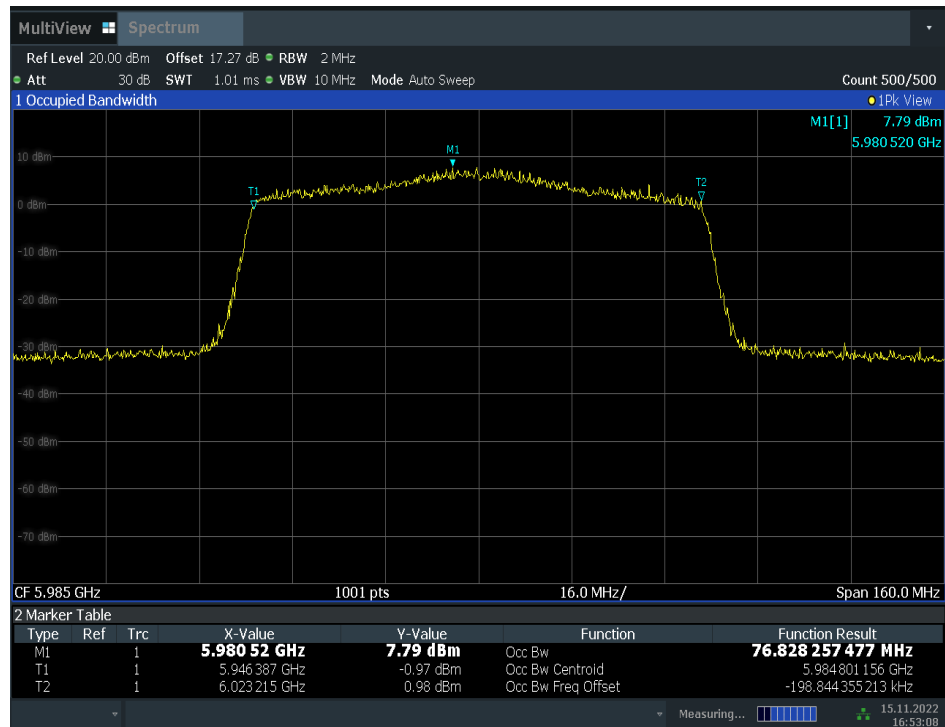


16:37:52 15.11.2022

**Fig.69 99% Occupied Bandwidth (802.11ax-HE40, 6969MHz)**


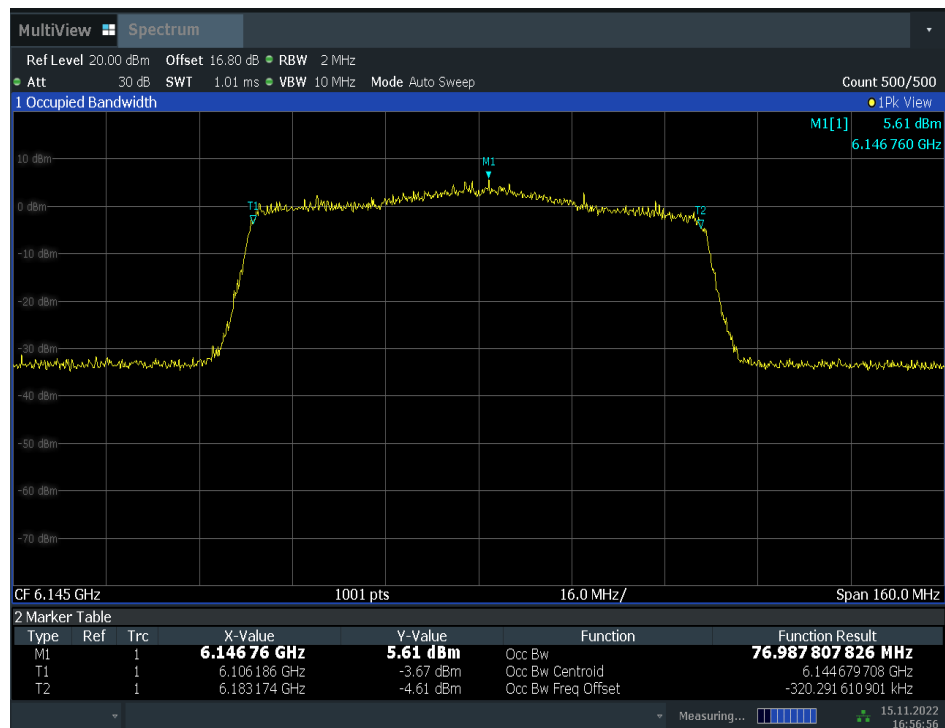
16:49:01 15.11.2022

**Fig.70 99% Occupied Bandwidth (802.11ax-HE40, 7085MHz)**



16:53:09 15.11.2022

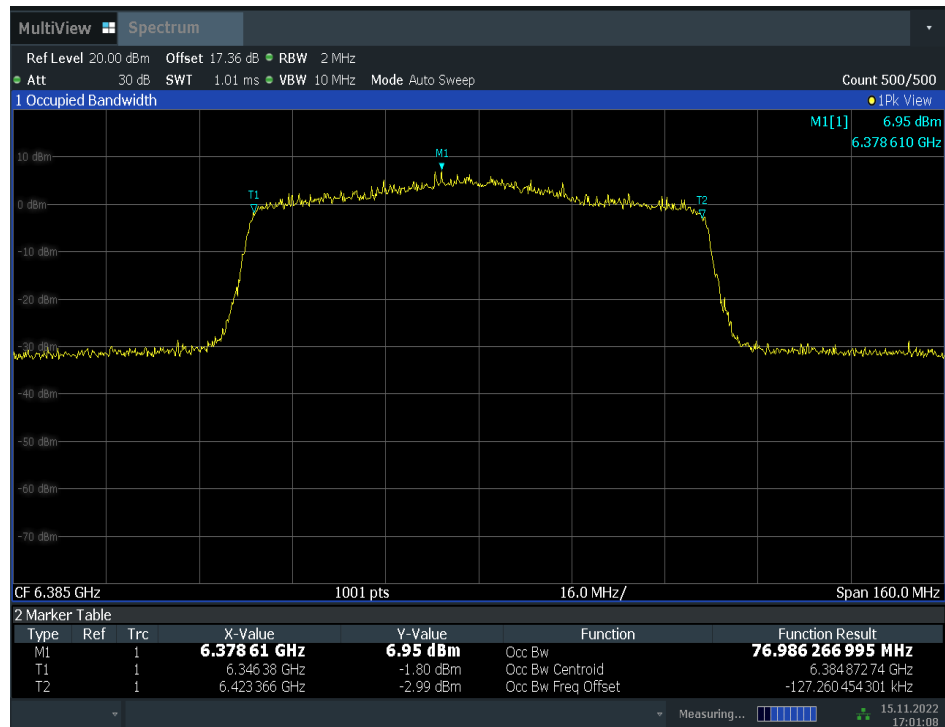
**Fig.71 99% Occupied Bandwidth (802. 11ax-HE80, 5985MHz)**



16:56:56 15.11.2022

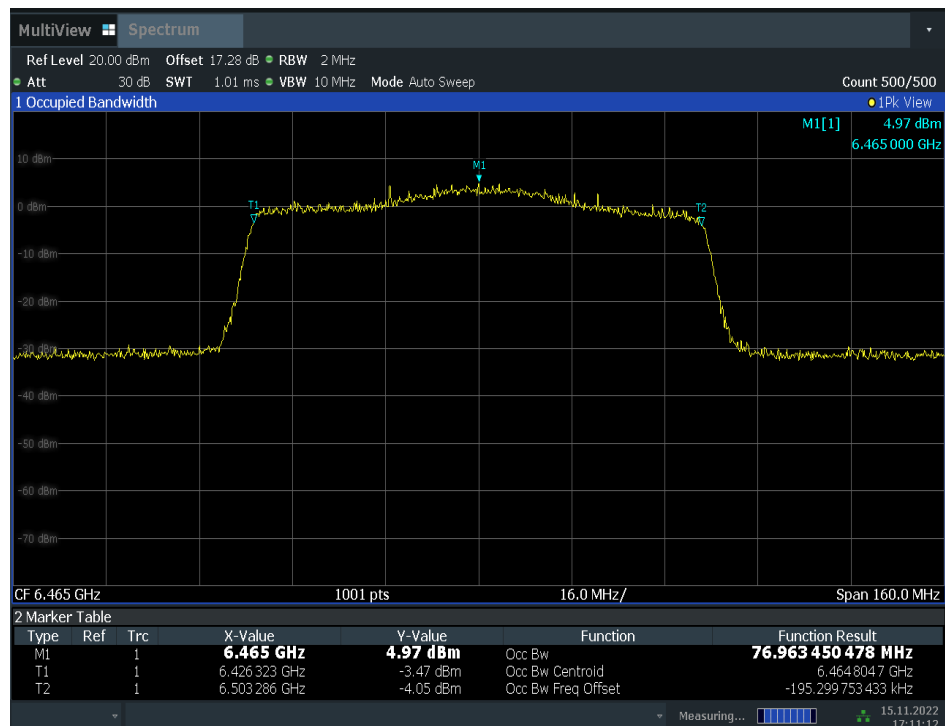
**Fig.72 99% Occupied Bandwidth (802. 11ax-HE80, 6145MHz)**





17:01:09 15.11.2022

**Fig.73 99% Occupied Bandwidth (802. 11ax-HE80, 6385MHz)**



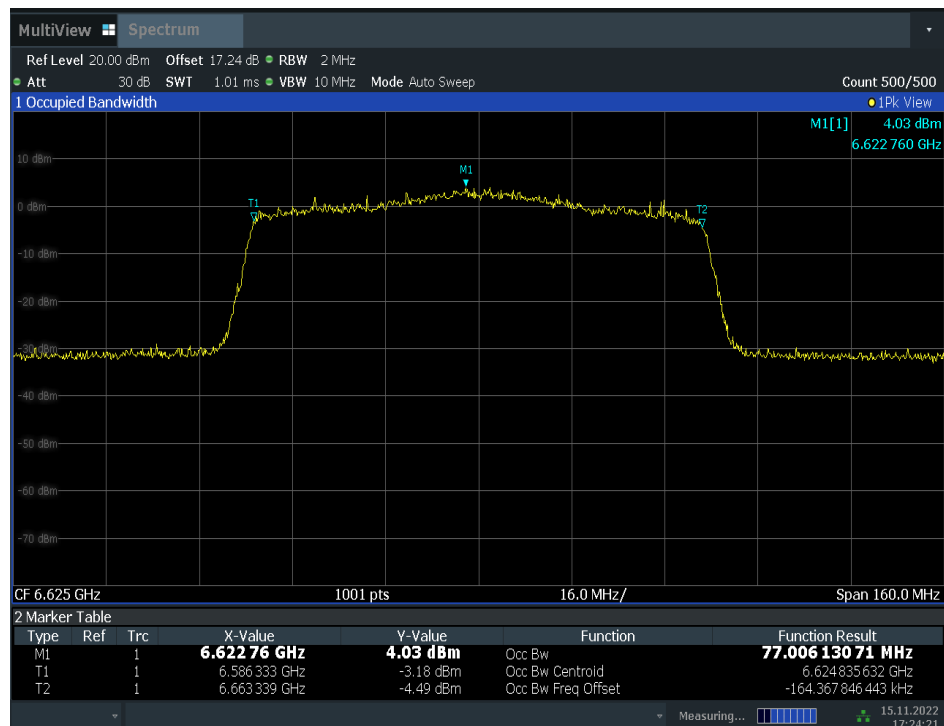
17:11:13 15.11.2022

**Fig.74 Occupied 26dB Bandwidth (802. 11ax-HE80, 6465MHz)**



17:19:28 15.11.2022

Fig.75 99% Occupied Bandwidth (802. 11ax-HE80, 6545MHz)

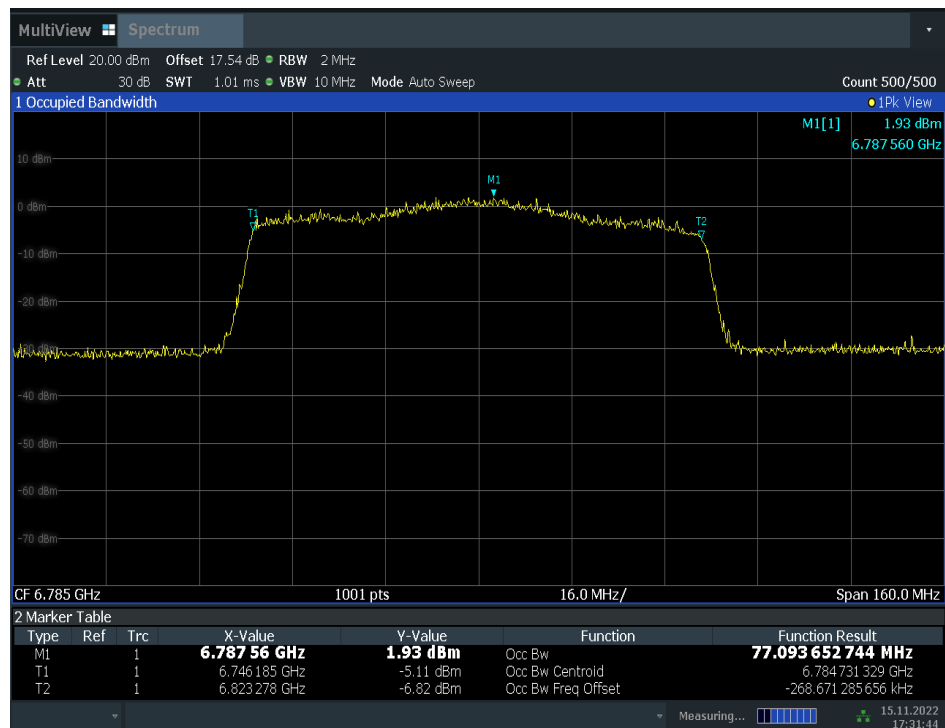


17:24:22 15.11.2022

Fig.76 99% Occupied Bandwidth (802. 11ax-HE80, 6625MHz)

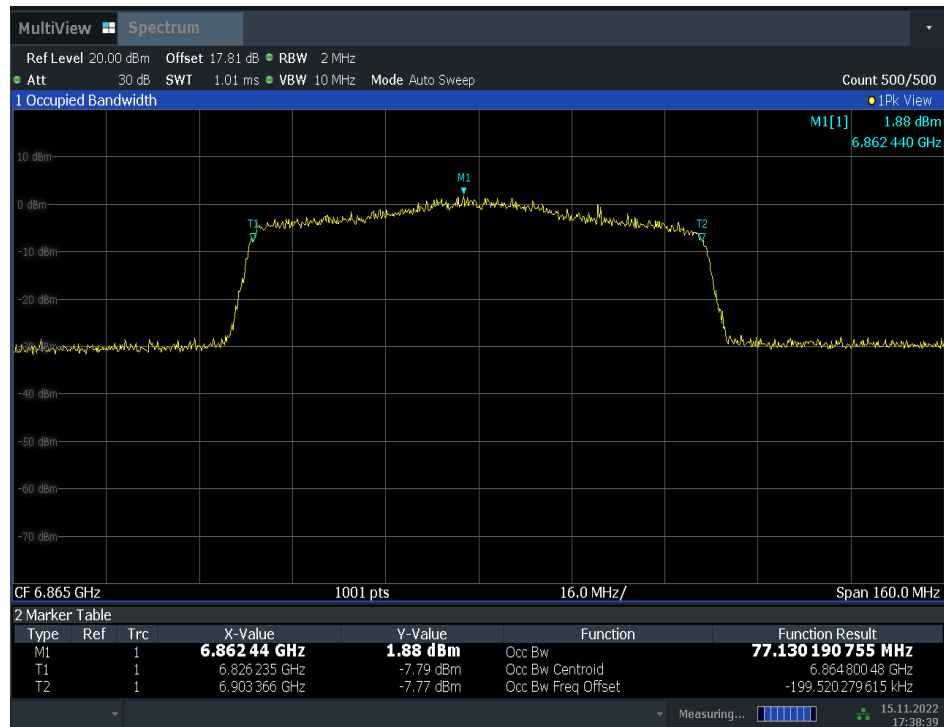


17:27:59 15.11.2022

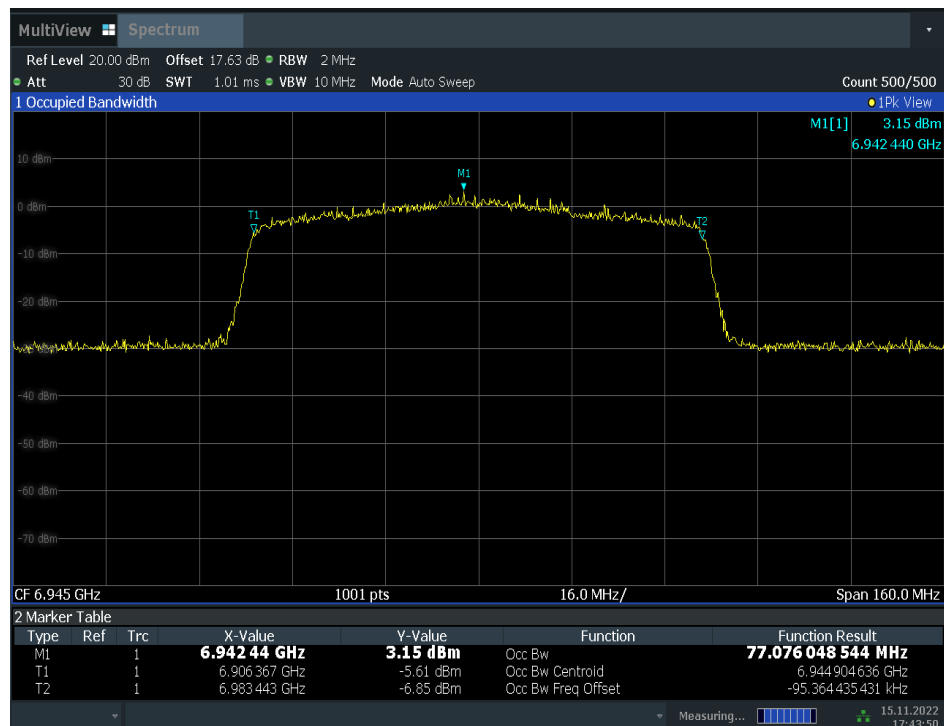
**Fig.77 99% Occupied Bandwidth (802. 11ax-HE80, 6705MHz)**


17:31:45 15.11.2022

**Fig.78 99% Occupied Bandwidth (802. 11ax-HE80, 6785MHz)**

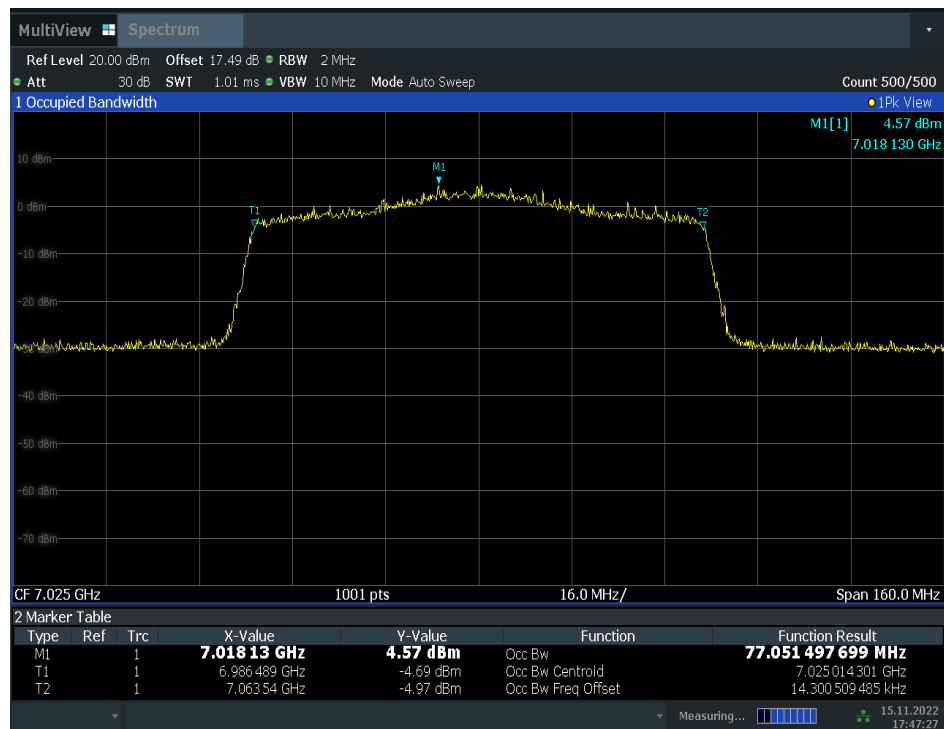


17:38:40 15.11.2022

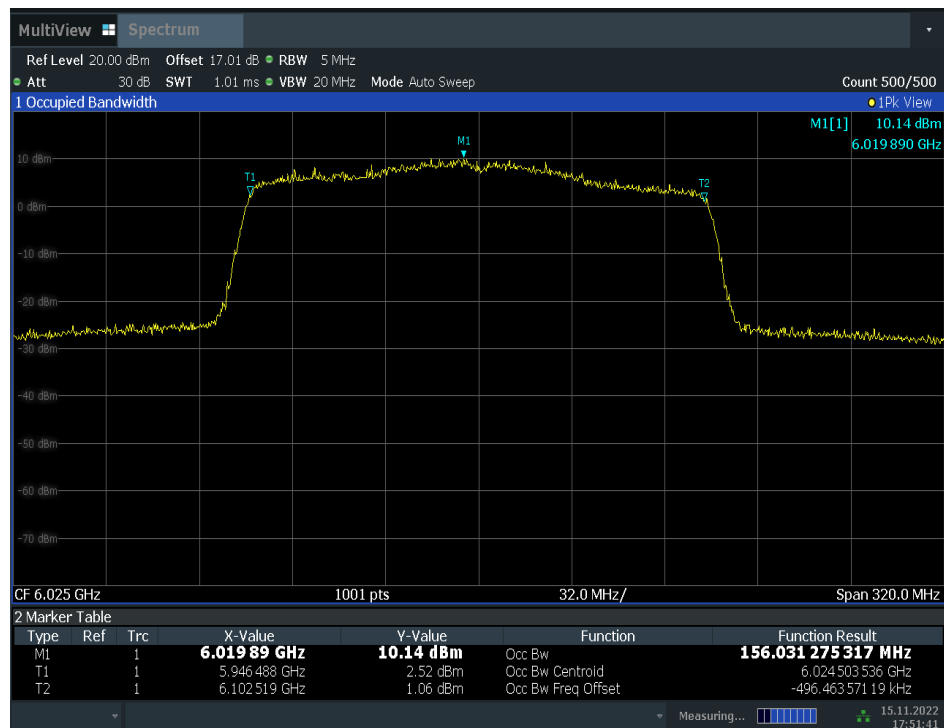
**Fig.79 99% Occupied Bandwidth (802. 11ax-HE80, 6865MHz)**


17:43:51 15.11.2022

**Fig.80 99% Occupied Bandwidth (802. 11ax-HE80, 6945MHz)**

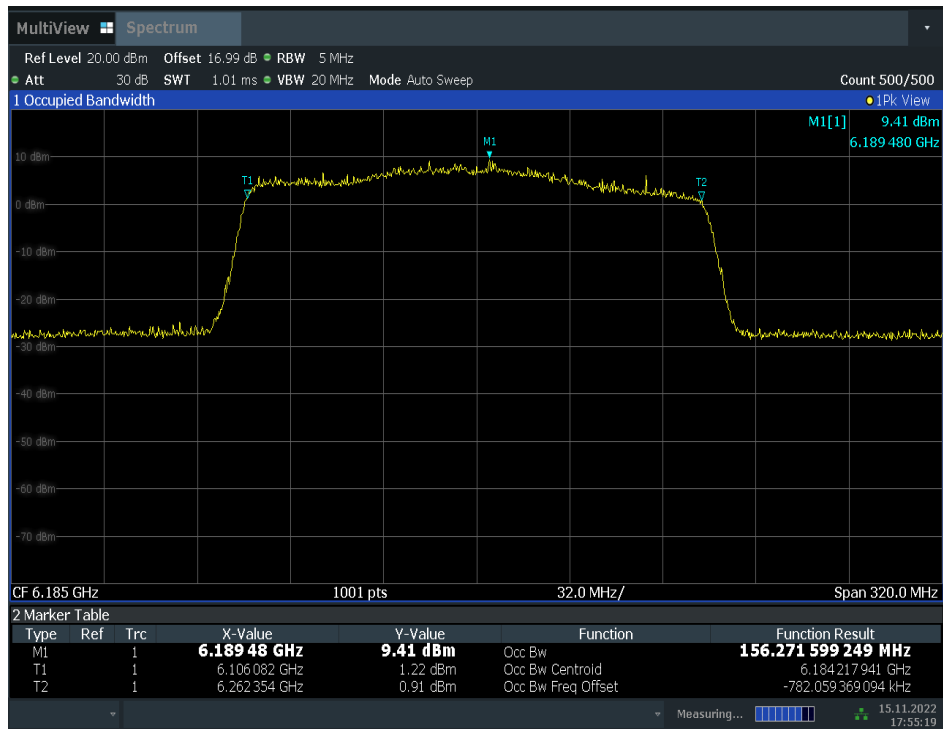


17:47:28 15.11.2022

**Fig.81 99% Occupied Bandwidth (802. 11ax-HE80, 7025MHz)**


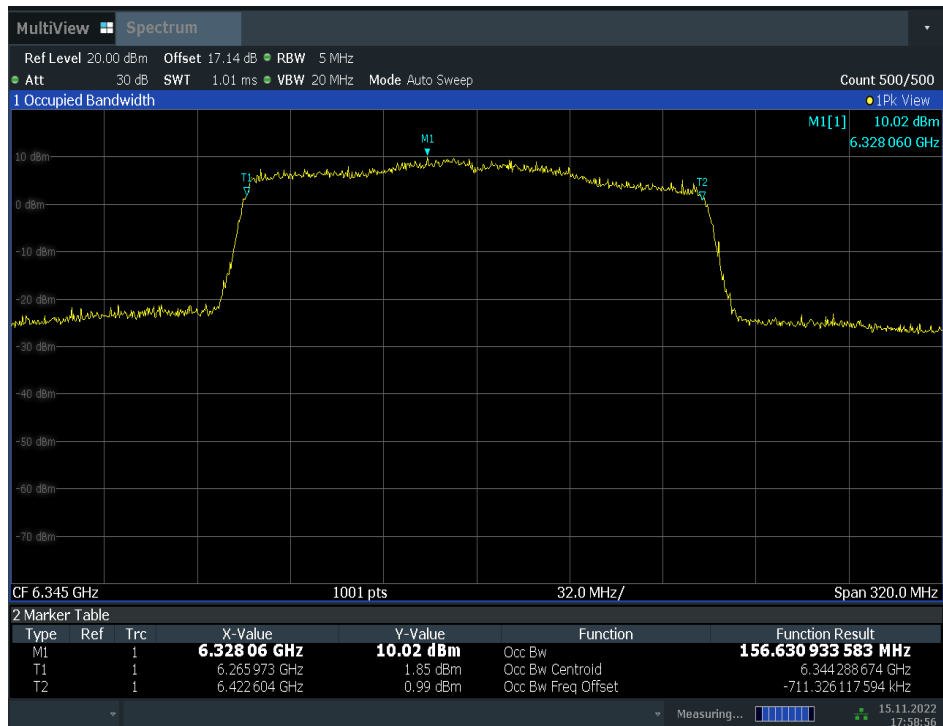
17:51:41 15.11.2022

**Fig.82 99% Occupied Bandwidth (802. 11ax-HE160, 6025MHz)**



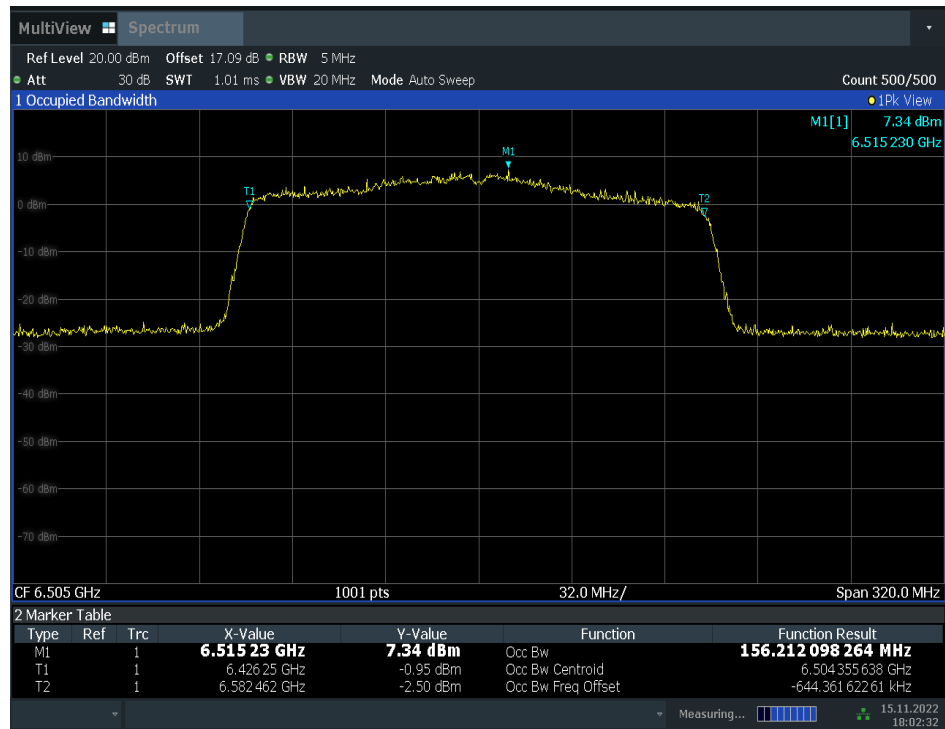
17:55:20 15.11.2022

**Fig.83 99% Occupied Bandwidth (802. 11ax-HE160, 6185MHz)**



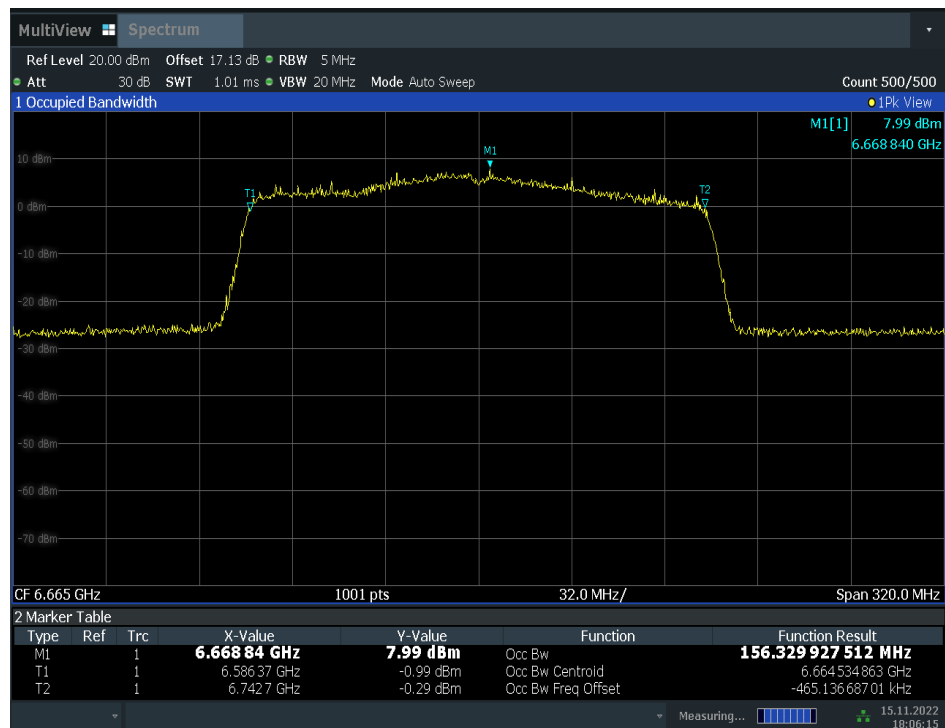
17:58:56 15.11.2022

**Fig.84 99% Occupied Bandwidth (802. 11ax-HE160, 6345MHz)**



18:02:32 15.11.2022

Fig.85 99% Occupied Bandwidth (802.11ax-HE160, 6505MHz)

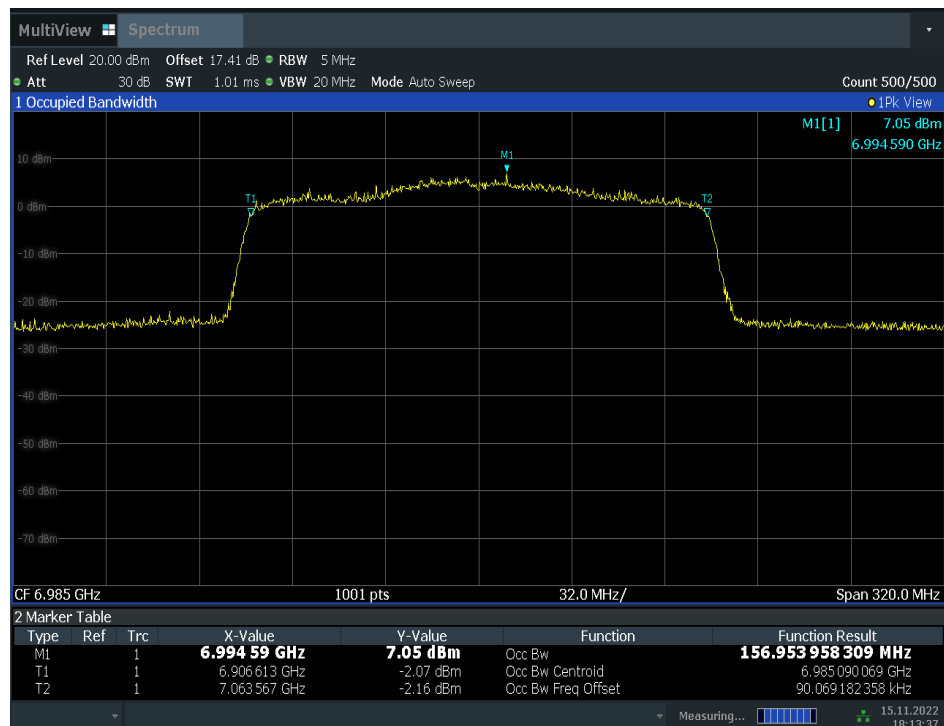


18:06:16 15.11.2022

Fig.86 99% Occupied Bandwidth (802.11ax-HE160, 6665MHz)



18:10:01 15.11.2022

**Fig.87 99% Occupied Bandwidth (802. 11ax-HE160, 6825MHz)**


18:13:38 15.11.2022

**Fig.88 99% Occupied Bandwidth (802. 11ax-HE160 6985MHz)**



## A.6. Contention Based Protocol

### Measurement Limit and Method:

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm)<sup>1</sup>. The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

The measurement is made according to KDB 987594.

### Measurement Results:

#### Note

- 1) Incumbent signal level (dBm) = AWGN Signal power Level (dBm)-Antenna Gain (Ant2, gain=-1.60dBi).  
The EUT encounters the incumbent signal that its power level is less than or equal to the detection threshold (-62dBm) with reference to 0dBi antenna gain.
- 2) Path loss is negligible (0dB).

Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dBm)
UNII Band 5	20	6215	6215	-68.00	-66.40	100	-62
					Cease transmission		
				-69.00	-67.40	<90	-62
	Minimal transmission						
	-80.00	-78.40	0	-62			
		Normal transmission					
160	6185	6110	-70.00	-68.40	100	-62	
				Cease transmission			
			-71.00	-69.40	<90	-62	

					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6185	-63.86	-62.26	90	-62
					Cease transmission		
				-64.00	-62.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6260	-68.00	-66.40	100	-62
					Cease transmission		
				-70.00	-68.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dBm)
UNII Band 6	20	6455	6455	-69.00	-67.40	90	-62
					Cease transmission		
				-69.50	-67.90	<90	-62
					Minimal transmission		
		-80.00	-78.40	0	-62		
		Normal transmission					
	160	6505	6430	-67.00	-65.40	90	-62
					Cease transmission		
			-68.00	-66.40	<90	-62	

					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6505	-63.90	-62.30	90	-62
					Cease transmission		
				-64.00	-62.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6580	-69.00	-67.40	100	-62
					Cease transmission		
				-70.00	-68.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dBm)
UNII Band 7	20	6855	6855	-65.93	-64.33	100	-62
					Cease transmission		
				-67.00	-65.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
	Normal transmission						
	160	6665	6590	-69.00	-67.40	100	-62
					Cease transmission		
				-70.00	-68.40	<90	-62

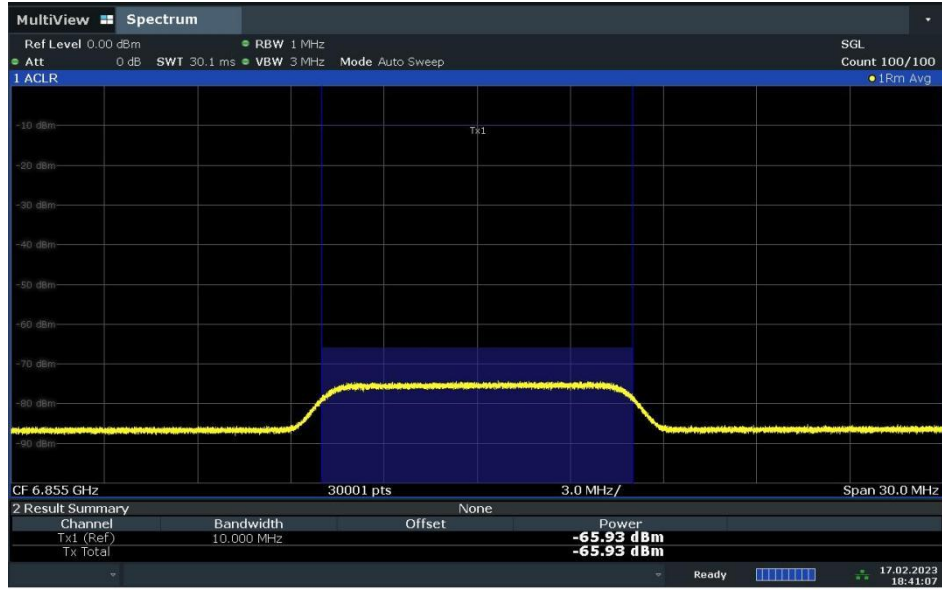
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6665	-63.90	-62.30	90	-62
					Cease transmission		
				-64.00	-62.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
			6740	-67.00	-65.40	100	-62
					Cease transmission		
				-69.00	-67.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
Band	BW (MHz)	Fre. (MHz)	Incumbent Freq (MHz)	AWGN Signal Level (at Antenna Port) (dBm)	Incumbent Signal Level (Refer to 0dBi Antenna) (dBm)	Detection Rate(%)	Threshold Level(dBm)
UNII Band 8	20	7015	7015	-70.00	-68.40	100	-62
					Cease transmission		
				-71.00	-69.40	<90	-62
					Minimal transmission		
	-80.00	-78.40	0	-62			
		Normal transmission					
	160	6985	6910	-66.00	-64.40	100	-62
					Cease transmission		
			-68.00	-66.40	<90	-62	

			6985		Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		
				-63.90	-62.30	90	-62
					Cease transmission		
				-64.00	-62.40	<90	-62
				Minimal transmission			
			-80.00	-78.40	0	-62	
				Normal transmission			
			7060	-68.00	-66.40	90	-62
					Cease transmission		
				-69.00	-67.40	<90	-62
					Minimal transmission		
				-80.00	-78.40	0	-62
					Normal transmission		

**Conclusion: PASS**

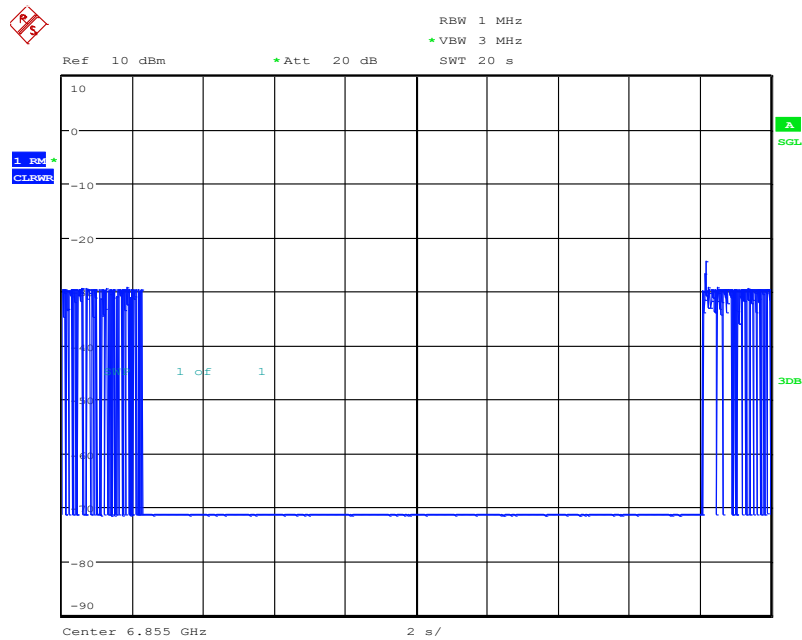
**Test graphs as below:**

Mode	Frequency(MHz)	AWGN Signal Level	cease transmission
802.11ax20	6855	Fig.89	Fig.90
802.11ax160	6185	Fig.91	Fig.92



18:41:07 17.02.2023

**Fig.89 AWGN Signal Level 802.11ax HE20 6855MHz (at Antenna Port)**



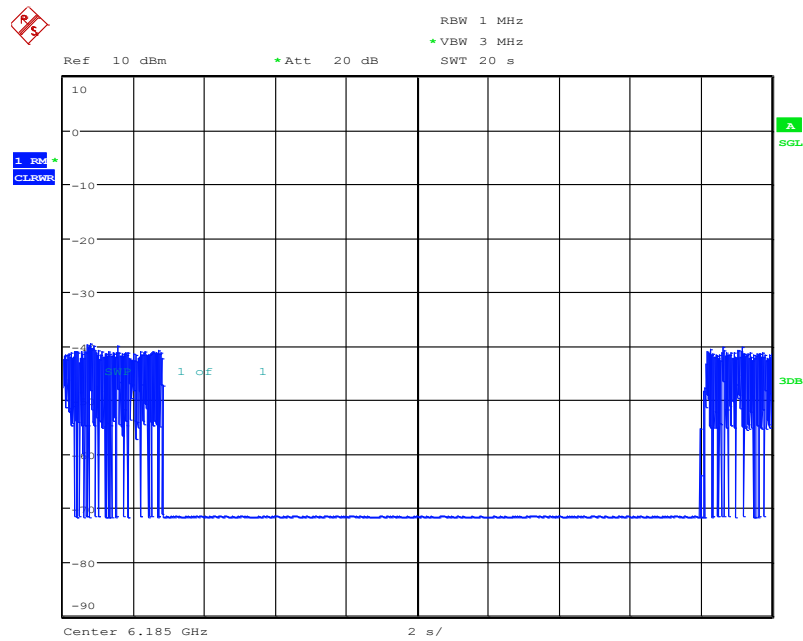
Date: 6.FEB.2023 14:28:32

**Fig.90 Contention Based Protocol 802.11ax HE20 6855MHz (cease transmission)**



19:02:57 17.02.2023

**Fig.91 AWGN Signal Level 802.11ax HE160 6185 (middle, at Antenna Port)**



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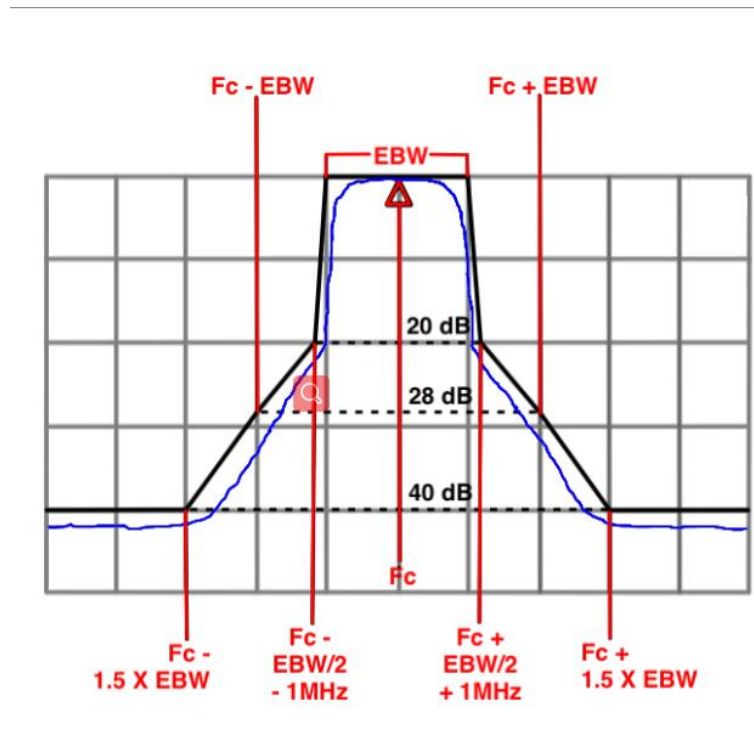
**Fig.92 Contention Based Protocol 802.11ax HE160 6185 (middle, cease transmission)**

## A.7. In-Band Emissions

### Measurement Limit and Method:

1. Take nominal bandwidth as reference channel bandwidth provided that 26 dB emission bandwidth is always larger than nominal bandwidth
2. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
  - a) Set the span to encompass the entire 26 dB EBW of the signal.
  - b) Set RBW = same RBW used for 26 dB EBW measurement.
  - c) Set VBW  $\geq 3 \times$  RBW
  - d) Number of points in sweep  $\geq [2 \times \text{span} / \text{RBW}]$ .
  - e) Sweep time = auto.
  - f) Detector = RMS (i.e., power averaging)
  - g) Trace average at least 100 traces in power averaging (rms) mode.
  - h) Use the peak search function on the instrument to find the peak of the spectrum.
3. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
  - a. Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
  - b. Suppressed by 28 dB at one channel bandwidth from the channel center.
  - c. Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
4. Adjust the span to encompass the entire mask as necessary.
5. Clear trace.
6. Trace average at least 100 traces in power averaging (rms) mode.
7. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.





### Generic Emission Mask

The measurement is made according to KDB 987594.

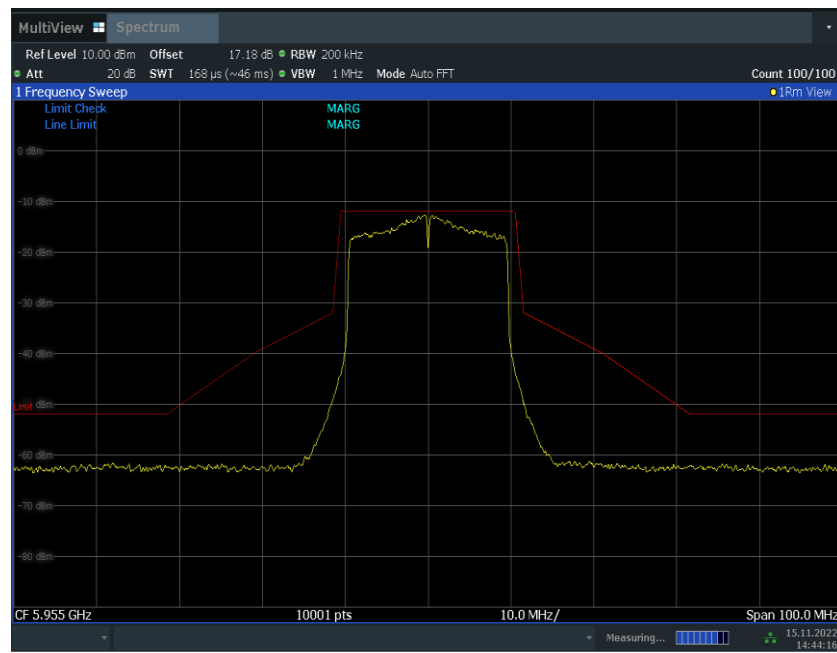
#### Measurement Results:

Mode	Frequency	Result	conclusion
802.11ax HE20 (full RU)	5955MHz (Ch1)	Fig.93	P
	6175MHz (Ch45)	Fig.94	P
	6415MHz (Ch93)	Fig.95	P
	6435MHz (Ch97)	Fig.96	P
	6475MHz (Ch105)	Fig.97	P
	6515MHz (Ch113)	Fig.98	P
	6535MHz (Ch117)	Fig.99	P
	6695MHz (Ch149)	Fig.100	P
	6855MHz (Ch181)	Fig.101	P
	6875MHz (Ch185)	Fig.102	P
	6895MHz (ch189)	Fig.103	P
	6995MHz (Ch209)	Fig.104	P
7115MHz (Ch233)	Fig.105	P	
802.11ax HE40 (full RU)	5965MHz (Ch3)	Fig.106	P
	6165MHz (Ch43)	Fig.107	P
	6405MHz (Ch91)	Fig.108	P
	6445MHz (Ch99)	Fig.109	P
	6485MHz (Ch107)	Fig.110	P
	6525MHz (Ch115)	Fig.111	P
	6565MHz (Ch123)	Fig.112	P

	6685MHz (Ch147)	Fig.113	P
	6845MHz (Ch179)	Fig.114	P
	6885MHz (Ch187)	Fig.115	P
	6925MHz (ch195)	Fig.116	P
	6965MHz (Ch203)	Fig.117	P
	7085MHz (Ch227)	Fig.118	P
802.11ax HE80 (full RU)	5985MHz (Ch7)	Fig.119	P
	6145MHz (Ch39)	Fig.120	P
	6385MHz (Ch87)	Fig.121	P
	6465MHz (Ch103)	Fig.122	P
	6545MHz (Ch119)	Fig.123	P
	6625MHz (Ch135)	Fig.124	P
	6705MHz (Ch151)	Fig.125	P
	6785MHz (Ch167)	Fig.126	P
	6865MHz (Ch183)	Fig.127	P
	6945MHz (Ch199)	Fig.128	P
	7025MHz (Ch215)	Fig.129	P
802.11ax HE160 (full RU)	6025MHz (Ch15)	Fig.130	P
	6185MHz (Ch47)	Fig.131	P
	6345MHz (Ch79)	Fig.132	P
	6505MHz (Ch111)	Fig.133	P
	6665MHz (Ch143)	Fig.134	P
	6825MHz (Ch175)	Fig.135	P
	6985MHz (Ch207)	Fig.136	P

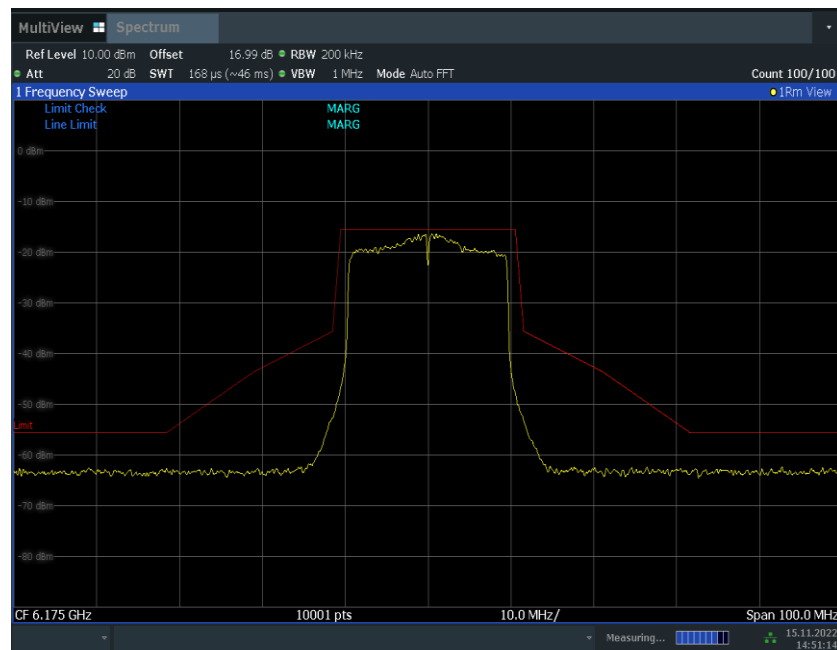
**Conclusion: PASS**

**Test graphs as below:**



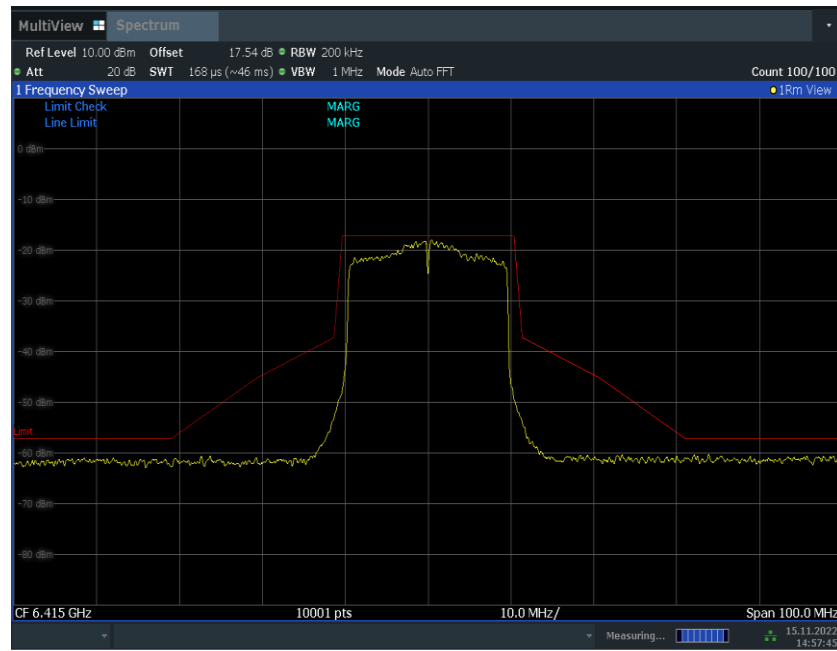
14:44:16 15.11.2022

**Fig.93 In-Band Emissions (802.11ax-HE20, 5955MHz)**



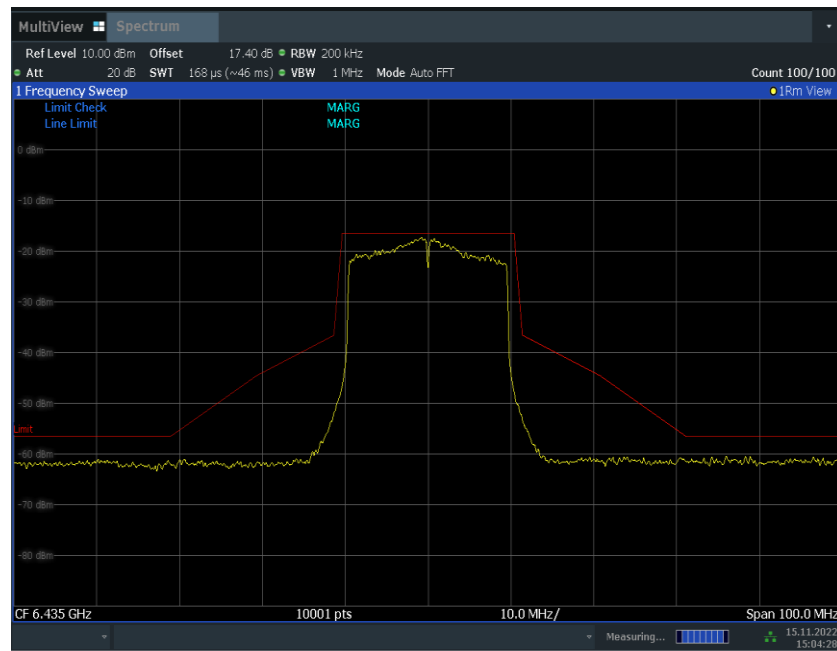
14:51:15 15.11.2022

**Fig.94 In-Band Emissions (802.11ax-HE20, 6175MHz)**



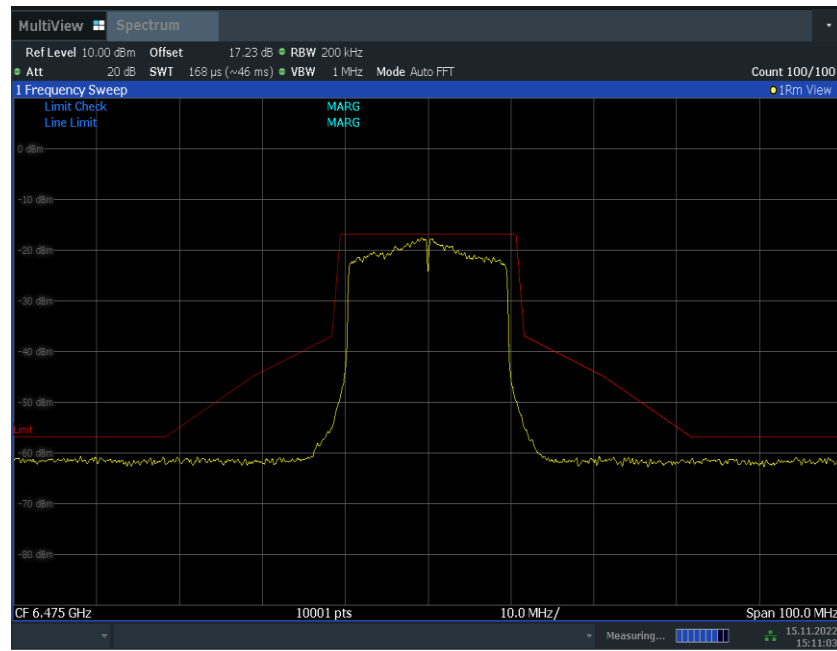
14:57:46 15.11.2022

**Fig.95 In-Band Emissions (802.11ax-HE20, 6415MHz)**



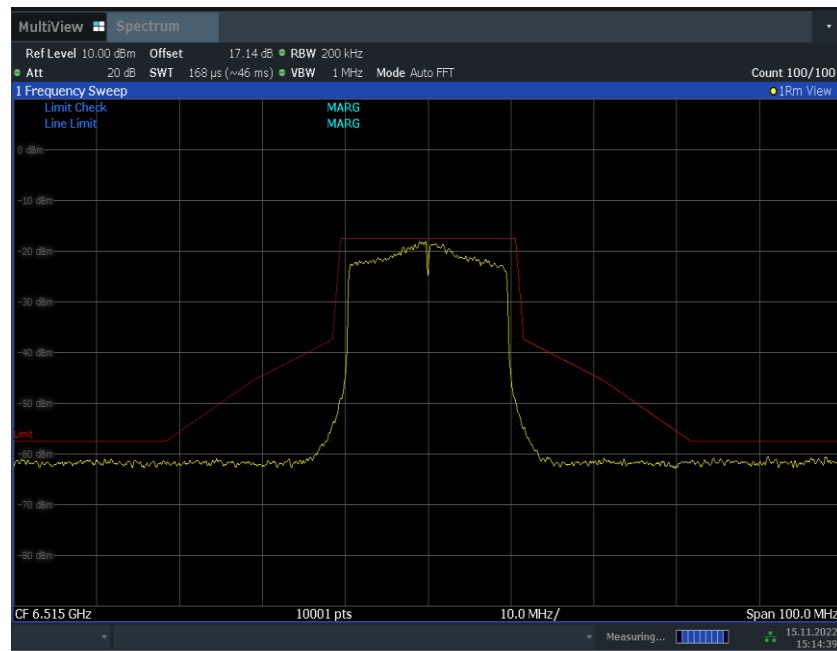
15:04:29 15.11.2022

**Fig.96 In-Band Emissions (802.11ax-HE20, 6435MHz)**



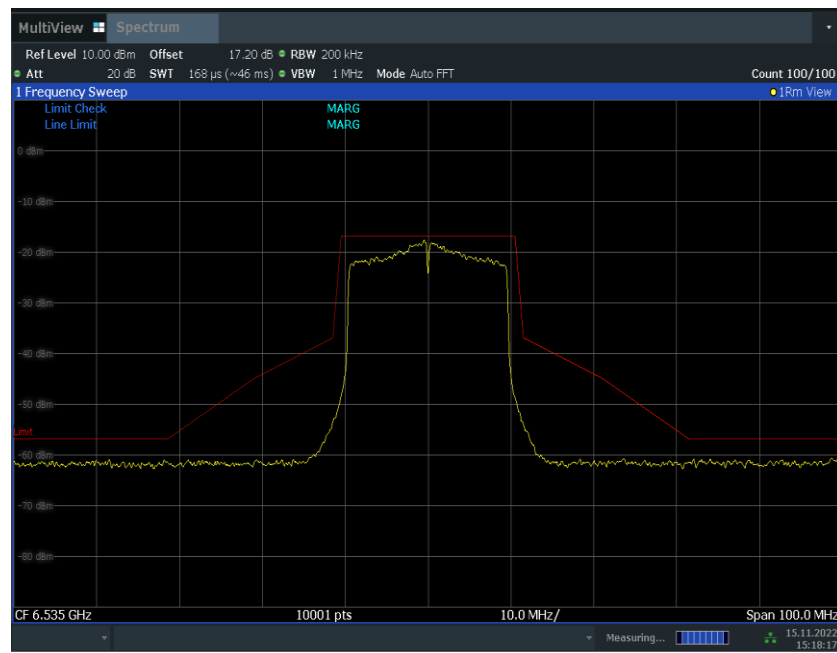
15:11:04 15.11.2022

**Fig.97 In-Band Emissions (802.11ax-HE20, 6475MHz)**



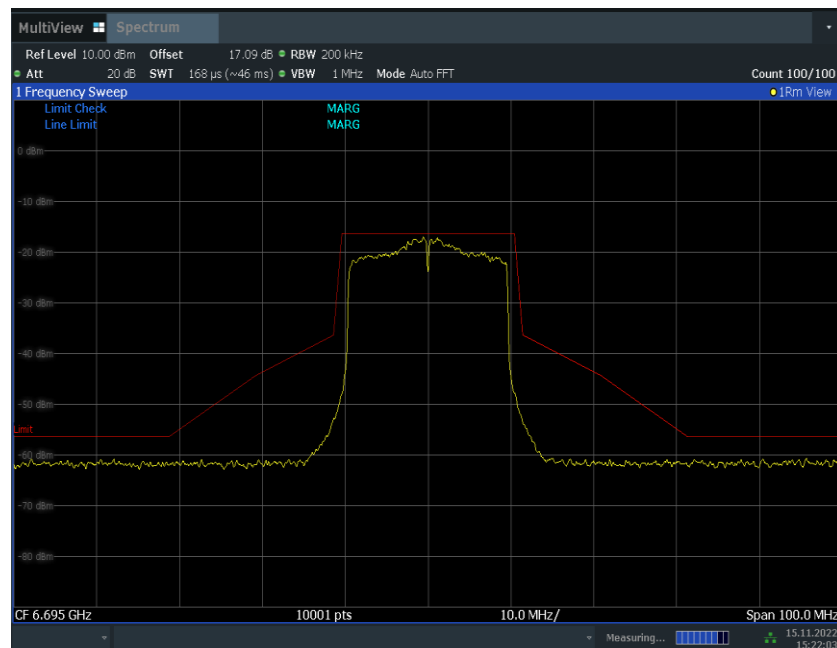
15:14:39 15.11.2022

**Fig.98 In-Band Emissions (802.11ax-HE20, 6515MHz)**



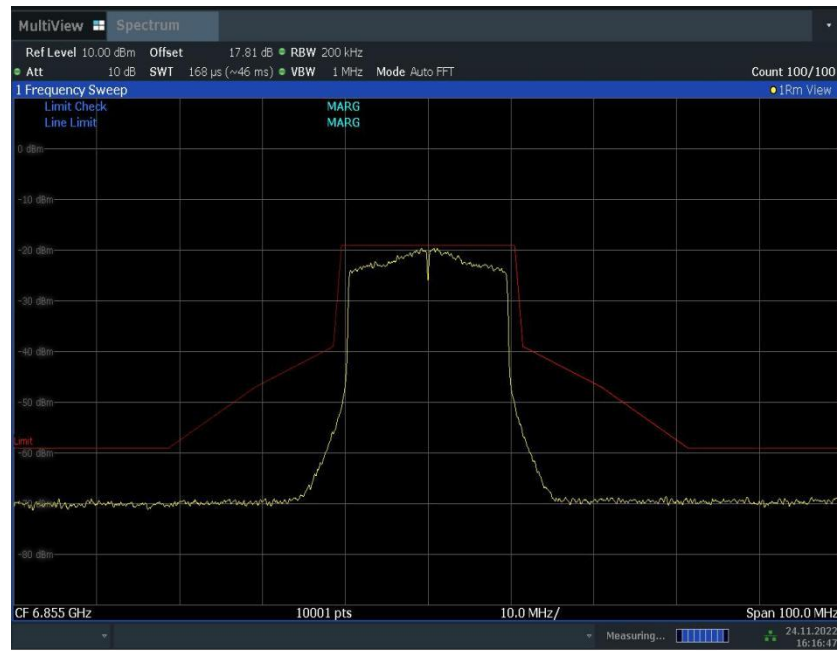
15:18:17 15.11.2022

**Fig.99 In-Band Emissions (802.11ax-HE20, 6535MHz)**



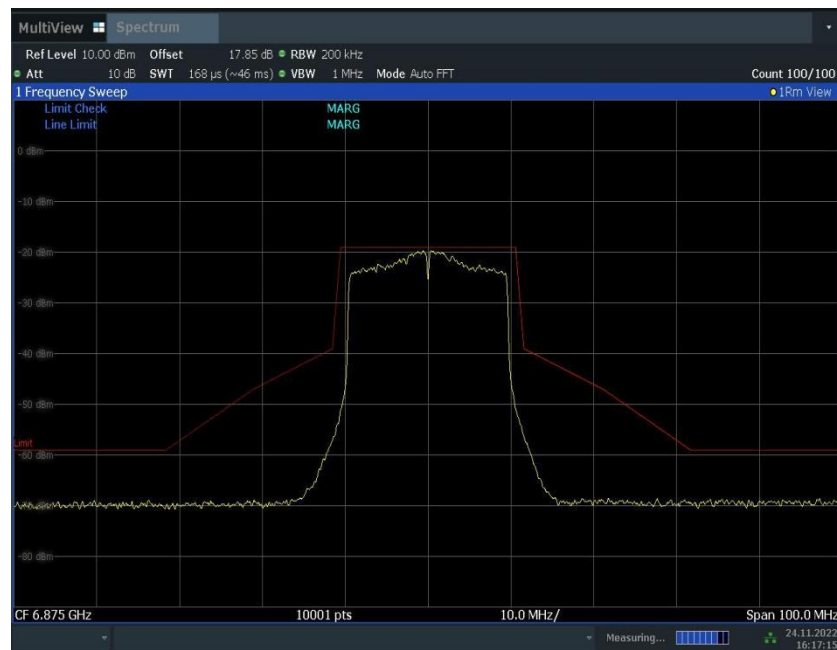
15:22:04 15.11.2022

**Fig.100 In-Band Emissions (802.11ax-HE20, 6695MHz)**



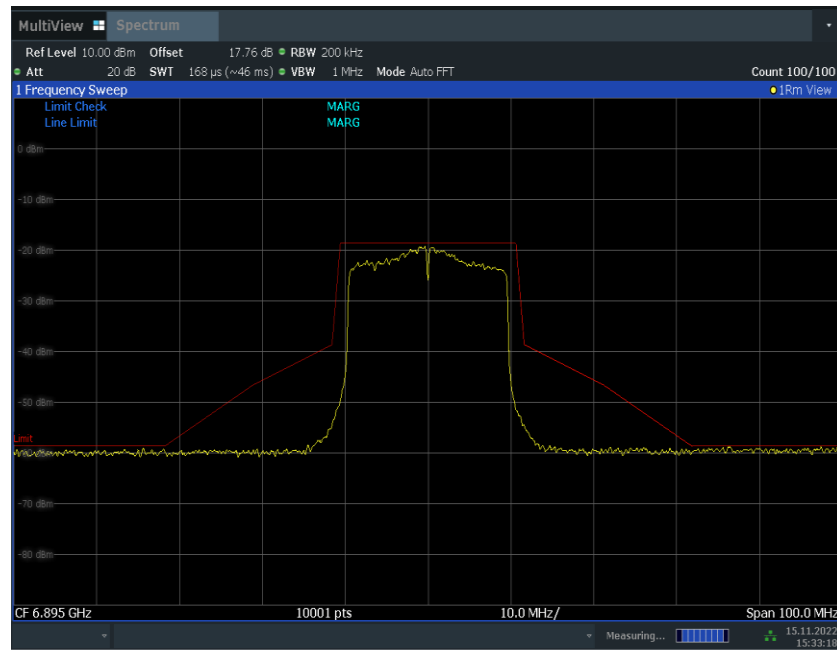
16:16:47 24.11.2022

**Fig.101 In-Band Emissions (802.11ax-HE20, 6855MHz)**



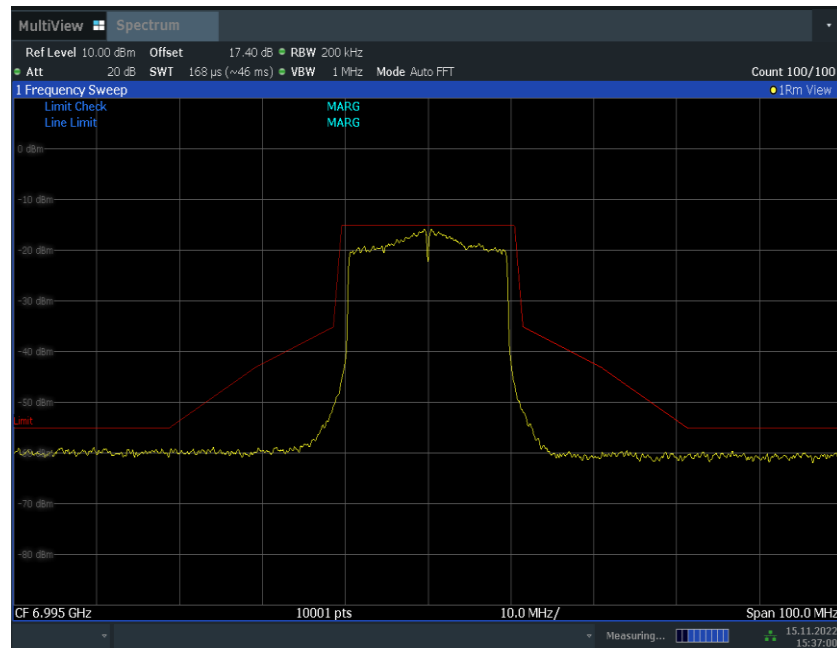
16:17:16 24.11.2022

**Fig.102 In-Band Emissions (802.11ax-HE20, 6875MHz)**



15:33:18 15.11.2022

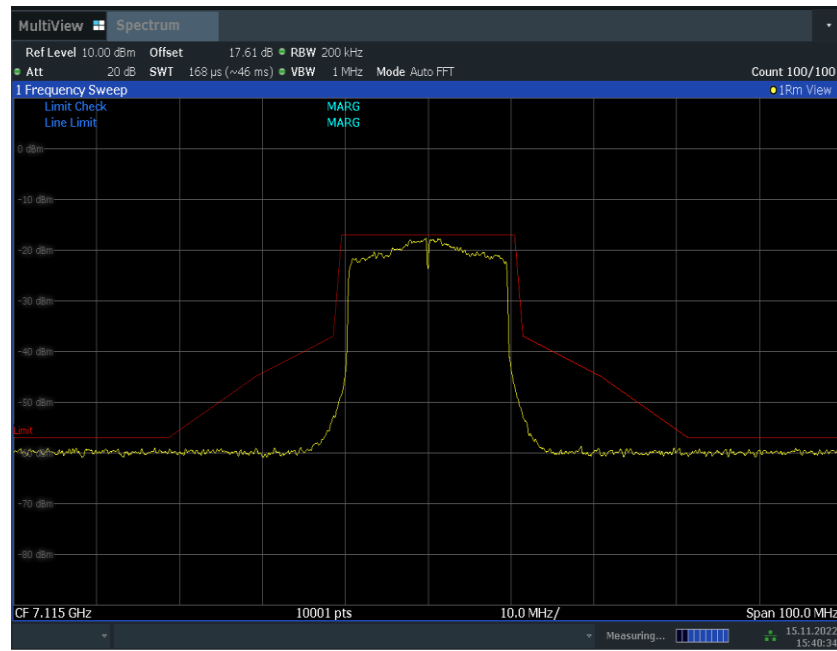
**Fig.103 In-Band Emissions (802.11ax-HE20, 6895MHz)**



15:37:01 15.11.2022

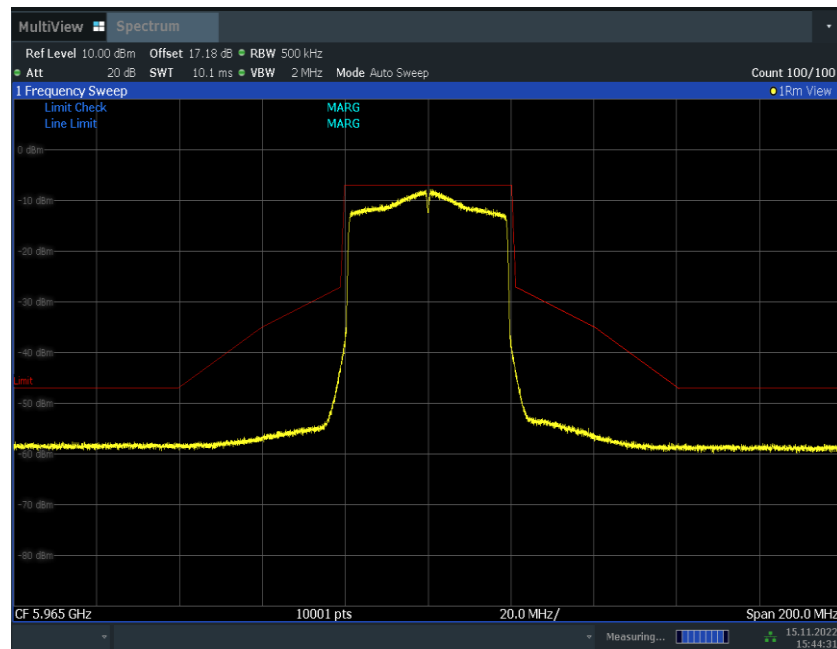
**Fig.104 In-Band Emissions (802.11ax-HE20, 6995MHz)**





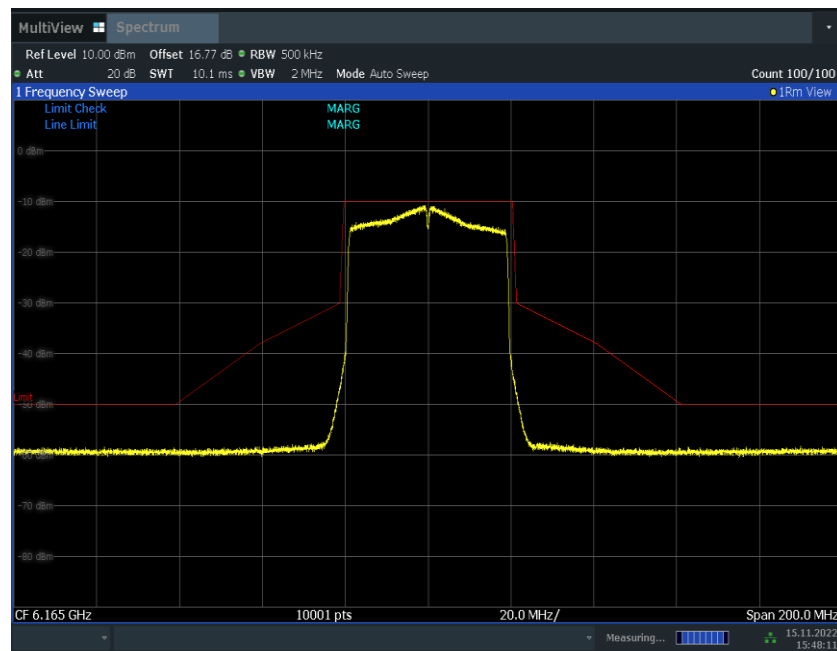
15:40:35 15.11.2022

**Fig.105 In-Band Emissions (802.11ax-HE20, 7115MHz)**



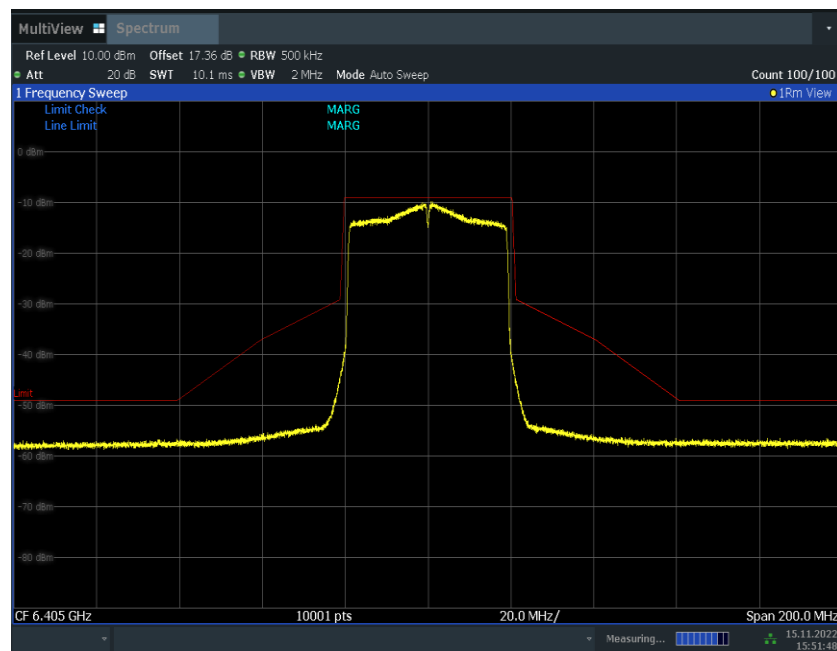
15:44:31 15.11.2022

**Fig.106 In-Band Emissions (802.11ax-HE40, 5965MHz)**



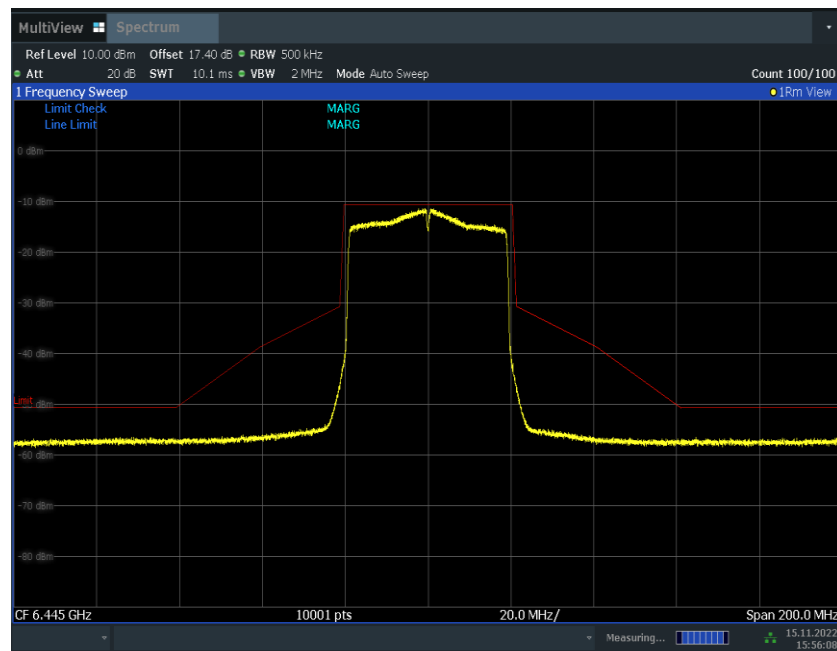
15:48:11 15.11.2022

**Fig.107 In-Band Emissions (802.11ax-HE40, 6165MHz)**



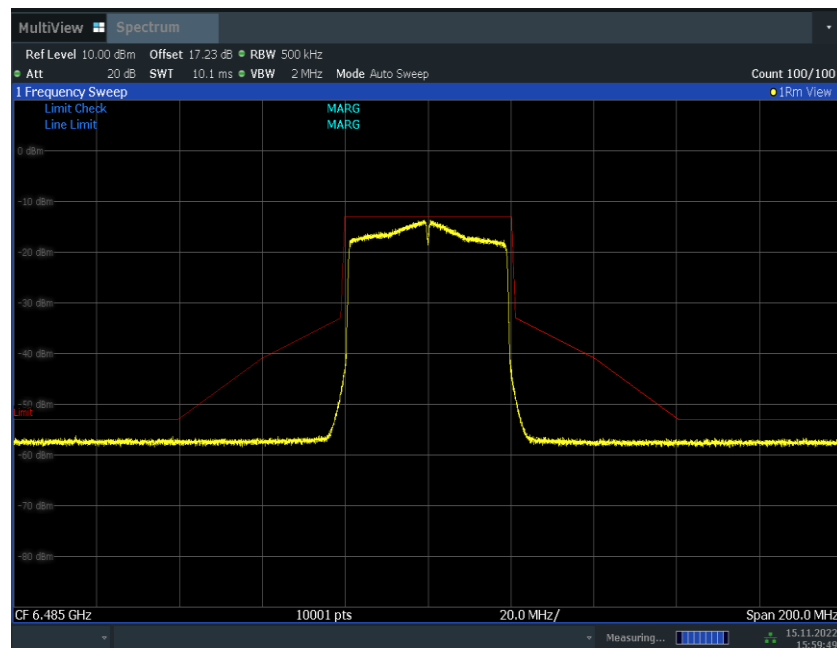
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**Fig.108 In-Band Emissions (802.11ax-HE40, 6405MHz)**



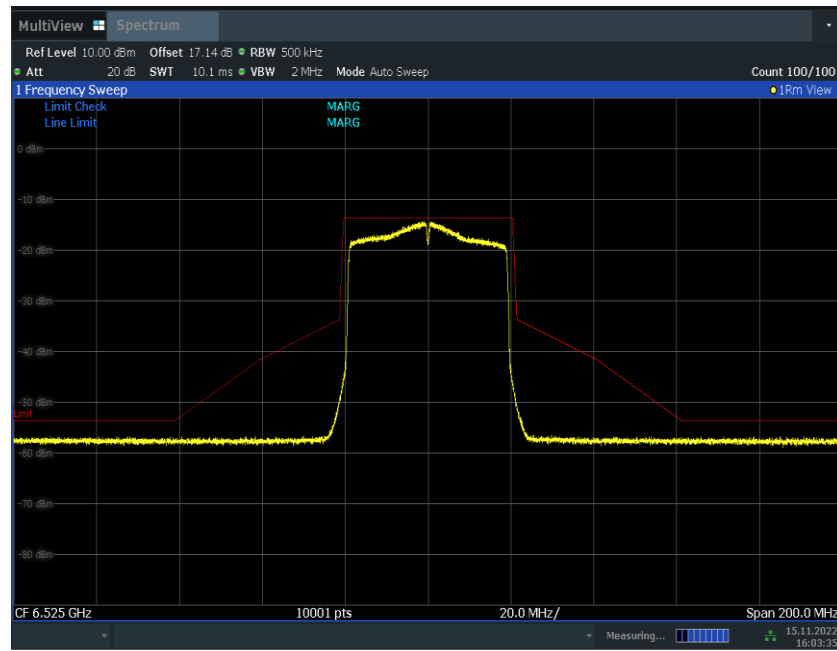
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**Fig.109 In-Band Emissions (802.11ax-HE40, 6445MHz)**



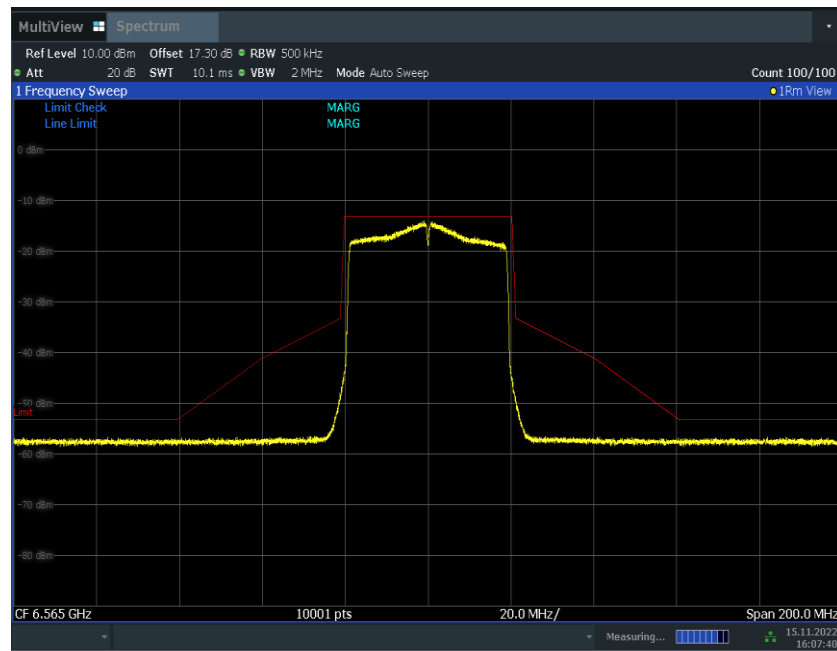
15:59:50 15.11.2022

**Fig.110 In-Band Emissions (802.11ax-HE40, 6485MHz)**



16:03:35 15.11.2022

**Fig.111 In-Band Emissions (802.11ax-HE40, 6525MHz)**



16:07:40 15.11.2022

**Fig.112 In-Band Emissions (802.11ax-HE40, 6565MHz)**