



FCC PART 15 TEST REPORT No.I22Z60940-IOT01

for

TCL Communication Ltd.

Mobile Hot Spot

MW513U

With

FCC ID: 2ACCJB183

Hardware Version: 06

Software Version: MW513U_ZZ_02.00_06

Issued Date: 2022-08-03

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.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z60940-IOT01	Rev.0	1st edition	2022-08-01
I22Z60940-IOT01	Rev.1	Update the Contention Based Protocol result. Add the description on page 13.	2022-08-03

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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

1.3. Testing Environment

Normal Temperature: 15-35°C

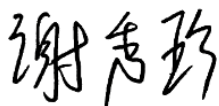
Relative Humidity: 20-75%

1.4. Project date

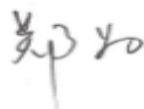
Testing Start Date: 2022-05-11

Testing End Date: 2022-08-01

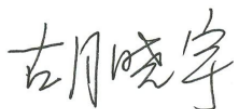
1.5. Signature



Xie Xiuzhen
(Prepared this test report)



Zheng Wei
(Reviewed this test report)



Hu Xiaoyu
(Approved this test report)

2. CLIENT INFORMATION

2.1 Applicant Information

Company Name: TCL Communication Ltd.
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Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86075536645759
Fax: /

2.2 Manufacturer Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86075536645759
Fax: /

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

3.1. About EUT

Description	Mobile Hot Spot
Model name	MW513U
FCC ID	2ACCJB183
WLAN Frequency Band	ISM Bands: -5925MHz~6425MHz -6425MHz~6525MHz -6525MHz~6875MHz -6875MHz~7125MHz
Type of modulation	OFDM/OFDMA
Antenna	Integral Antenna
Voltage	3.8V
Equipment class	Low power indoor AP

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	352950940201148	06	MW513U_ZZ_02.00_06
EUT2	352950940002589	06	MW513U_ZZ_02.00_06
EUT3	352950940202708	06	MW513U_ZZ_02.00_06

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

* is used for Conduction test, is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Type
AE1	Charger1	QC13US

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

3.4. General Description

The Equipment under Test (EUT) is a model of Mobile Hot Spot with integrated 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	2018
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	/	/	P
In-Band Emissions	/	/	P
Duty Cycle	/	/	P
Band edge compliance (Radiated)	15.407 (b)	/	P
AC Powerline Conducted Emission (150kHz- 30MHz)	15.107, 15.207	/	P
Transmitter spurious emissions(Radiated)	15.407, 15.205, 15.209	/	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.

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	3.8V
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 Generator	SMW200A	103421	Rohde & Schwarz	1 year	2023-05-15
3	Attenuator	10dB/2W	/	Rosenberger	/	/
4	LISN	ENV216	101200	R&S	1 year	2022-06-29
5	Test Receiver	ESCI	100344	R&S	1 year	2023-03-21
6	Shielding Room	S81	/	ETS-Lindgren	/	/

Note: The LISN was in calibration due date when used for testing.

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	103023	R&S	1 year	2022-10-28
2	BiLog Antenna	VULB9163	9163-302	Schwarzbeck	1 year	2022-12-28
3	EMI Antenna	3115	0016725	ETS-Lindgren	1 year	2022-07-01

Note: The radiated emission test system was in calibration due date when used for testing.

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	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.16
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.44
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.28

8.7. AC Power-line Conducted Emission

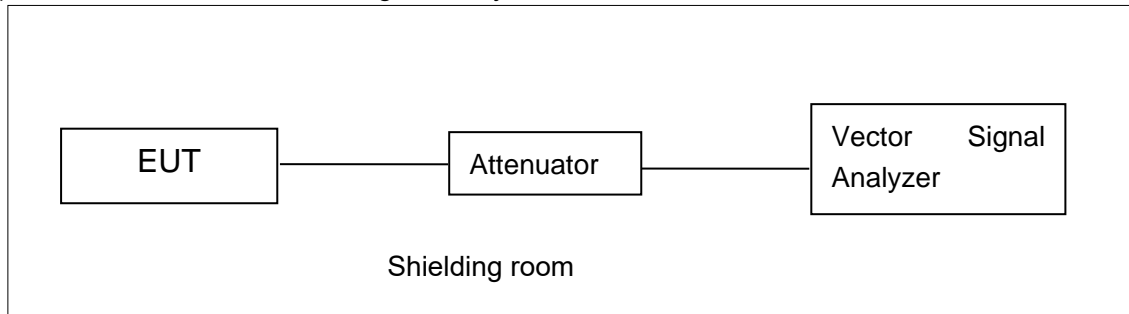
Measurement Uncertainty : 3.08dB,k=2

ANNEX A: MEASUREMENT RESULTS

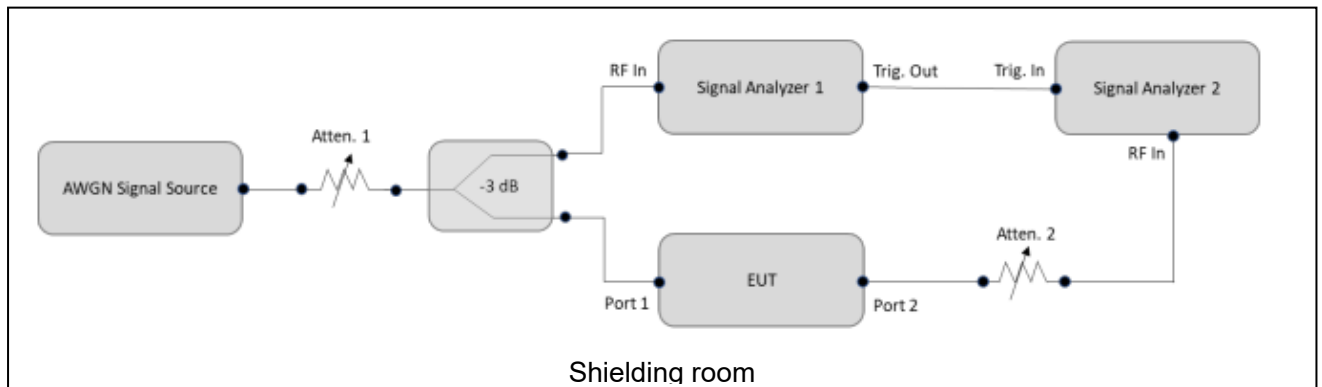
A.1. Measurement Method

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



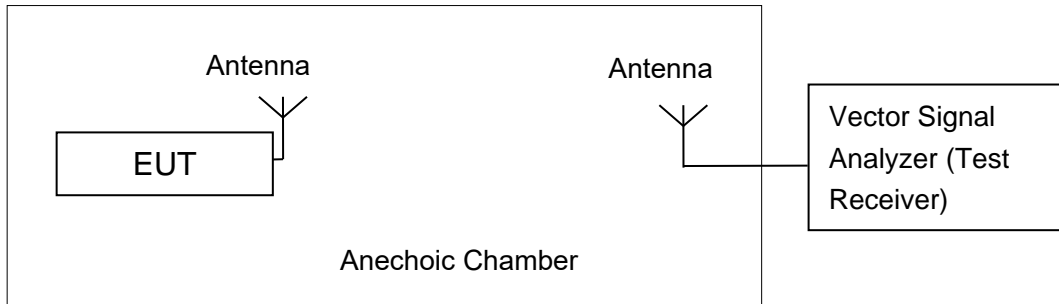
Test Setup for Contention Based Protocol

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 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.

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. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

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	30dBm
	6425MHz~6525MHz	30dBm
	6525MHz~6875MHz	30dBm
	6875MHz~7125MHz	30dBm

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

Antenna Gain

Mode	Ant9(dBi)	Ant10(dBi)	Power(dBi)	PSD(dBi)
CDD	1.41	1.8	1.8	4.62
BF	1.41	1.8	4.62	4.62

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, as following table for Power, where Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

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

Directional gain = $10 \log [(10G1 / 20 + 10G2 / 20 + \dots + 10Gn / 20) 2 / \text{NANT}]$ dBi, as following table for PSD. NANT = number of transmit antennas NSS = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

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

Directional gain = $10 \log [(10G1 / 20 + 10G2 / 20 + \dots + 10Gn / 20) 2 / \text{NANT}]$ dBi, as following table for PSD. NANT = number of transmit antennas NSS = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

Measurement Results:
SISO
802.11a mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11a 6Mbps			
	Ant9 Conducted	Ant9 e.i.r.p	Ant10 Conducted	Ant10 e.i.r.p
5955MHz (Ch1)	5.57	10.19	4.64	9.26
6175MHz (Ch45)	4.14	8.76	5.78	10.40
6415MHz (Ch93)	6.32	10.94	8.35	12.97
6435MHz (Ch97)	5.19	9.81	8.12	12.74
6475MHz (Ch105)	5.22	9.84	8.58	13.20
6515MHz (Ch113)	4.06	8.68	8.83	13.45
6535MHz (Ch117)	3.19	7.81	8.85	13.47
6695MHz (Ch149)	5.07	9.69	6.67	11.29
6855MHz (Ch181)	4.05	8.67	6.32	10.94
6875MHz (Ch185)	2.89	7.51	6.14	10.76
6895MHz (ch189)	4.04	8.66	6.09	10.71
6995MHz (Ch209)	5.26	9.88	5.47	10.09
7115MHz (Ch233)	5.08	9.70	5.35	9.97

The data rate 6Mbps is selected as worse condition, and the following cases are performed with this condition.

802.11ax HE20 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE20 MCS0			
	Ant9 Conducted	Ant9 e.i.r.p	Ant10 Conducted	Ant10 e.i.r.p
5955MHz (Ch1)	-1.03	3.59	-1.38	3.24
6175MHz (Ch45)	-1.05	3.57	0.12	4.74
6415MHz (Ch93)	-3.93	0.69	0.93	5.55
6435MHz (Ch97)	-2.61	2.01	2.09	6.71
6475MHz (Ch105)	-3.03	1.59	2.92	7.54
6515MHz (Ch113)	-3.69	0.93	2.51	7.13
6535MHz (Ch117)	-3.02	1.60	2.85	7.47
6695MHz (Ch149)	-2.70	1.92	0.88	5.50
6855MHz (Ch181)	-3.73	0.89	0.49	5.11
6875MHz (Ch185)	-4.09	0.53	-0.05	4.57
6895MHz (ch189)	-2.82	1.80	-0.21	4.41
6995MHz (Ch209)	-0.40	4.22	1.71	6.33
7115MHz (Ch233)	-1.18	3.44	-0.12	4.50

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

802.11ax-HE40 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE40 MCS0			
	Ant9 Conducted	Ant9 e.i.r.p	Ant10 Conducted	Ant10 e.i.r.p
5965MHz (Ch3)	-0.49	4.13	-1.29	3.33
6165MHz (Ch43)	-2.16	2.46	-0.32	4.30
6405MHz (Ch91)	-1.41	3.21	2.13	6.75
6445MHz (Ch99)	-1.94	2.68	2.49	7.11
6485MHz (Ch107)	-2.55	2.07	2.18	6.80
6525MHz (Ch115)	-3.67	0.95	2.71	7.33
6565MHz (Ch123)	-3.03	1.59	2.74	7.36
6685MHz (Ch147)	-3.49	1.13	1.28	5.90
6845MHz (Ch179)	-3.98	0.64	0.36	4.98
6885MHz (Ch187)	-3.73	0.89	0.27	4.89
6925MHz (ch195)	-2.34	2.28	-0.13	4.49
6965MHz (Ch203)	-1.37	3.25	-0.11	4.51
7085MHz (Ch227)	-0.47	4.15	0.58	5.20

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

802.11ax-HE80 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE80 MCS0			
	Ant9 Conducted	Ant9 e.i.r.p	Ant10 Conducted	Ant10 e.i.r.p
5985MHz (Ch7)	1.19	5.81	0.68	5.30
6145MHz (Ch39)	-0.21	4.41	1.82	6.44
6385MHz (Ch87)	0.79	5.41	4.41	9.03
6465MHz (Ch103)	0.01	4.63	4.07	8.69
6545MHz (Ch119)	-2.52	2.10	4.12	8.74
6625MHz (Ch135)	-0.08	4.54	3.92	8.54
6705MHz (Ch151)	-0.62	4.00	2.91	7.53
6785MHz (Ch167)	-1.16	3.46	2.01	6.63
6865MHz (Ch183)	-1.76	2.86	2.81	7.43
6945MHz (Ch199)	0.08	4.70	2.09	6.71
7025MHz (Ch215)	1.45	6.07	2.21	6.83

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

802.11ax-HE160 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE160 MCS0			
	Ant9 Conducted	Ant9 e.i.r.p	Ant10 Conducted	Ant10 e.i.r.p
6025MHz (Ch15)	5.04	9.66	5.26	9.88
6185MHz (Ch47)	5.39	10.01	6.11	10.73
6345MHz (Ch79)	7.07	11.69	7.76	12.38
6505MHz (Ch111)	1.85	6.47	7.64	12.26
6665MHz (Ch143)	2.93	7.55	6.17	10.79
6825MHz (Ch175)	3.16	7.78	6.31	10.93

6985MHz (Ch207)	4.23	8.85	5.21	9.83
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The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

MIMO

802.11ax HE20 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE20 MCS0			
	Ant9	Ant10	Sum Conducted	Sum e.i.r.p
5955MHz (Ch1)	-2.19	-0.41	1.80	6.42
6175MHz (Ch45)	-1.20	1.29	3.23	7.85
6415MHz (Ch93)	-2.97	1.41	2.76	7.38
6435MHz (Ch97)	-2.83	2.37	3.52	8.13
6475MHz (Ch105)	-3.72	3.01	3.85	8.46
6515MHz (Ch113)	-3.81	2.10	3.09	7.71
6535MHz (Ch117)	-3.09	1.77	3.00	7.61
6695MHz (Ch149)	-2.24	0.87	2.60	7.22
6855MHz (Ch181)	-3.99	0.61	1.90	6.52
6875MHz (Ch185)	-4.05	0.42	1.75	6.36
6895MHz (ch189)	-2.74	0.25	2.02	6.64
6995MHz (Ch209)	-1.33	0.15	2.48	7.10
7115MHz (Ch233)	-1.71	-1.73	1.29	5.91

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

802.11ax-HE40 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE40 MCS0			
	Ant9	Ant10	Sum Conducted	Sum e.i.r.p
5965MHz (Ch3)	-0.41	-0.01	2.80	7.42
6165MHz (Ch43)	-2.58	2.02	3.31	7.93
6405MHz (Ch91)	-1.71	2.53	3.92	8.54
6445MHz (Ch99)	-2.66	2.66	3.78	8.40
6485MHz (Ch107)	-3.60	2.37	3.35	7.97
6525MHz (Ch115)	-3.54	2.81	3.72	8.33
6565MHz (Ch123)	-2.70	3.06	4.08	8.70
6685MHz (Ch147)	-2.05	1.56	3.13	7.75
6845MHz (Ch179)	-3.70	0.33	1.78	6.39
6885MHz (Ch187)	-3.40	0.76	2.17	6.79
6925MHz (ch195)	-2.45	0.33	2.17	6.79
6965MHz (Ch203)	-1.79	-0.04	2.18	6.80
7085MHz (Ch227)	-0.94	-0.17	2.47	7.09

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

802.11ax-HE80 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE80 MCS0			
	Ant9	Ant10	Sum Conducted	Sum e.i.r.p
5985MHz (Ch7)	0.81	0.63	3.73	8.35
6145MHz (Ch39)	-0.68	2.22	4.02	8.64
6385MHz (Ch87)	1.28	4.41	6.13	10.75
6465MHz (Ch103)	0.06	3.93	5.42	10.04
6545MHz (Ch119)	-2.41	4.25	5.10	9.72
6625MHz (Ch135)	0.05	4.02	5.48	10.10
6705MHz (Ch151)	-0.62	3.27	4.76	9.37
6785MHz (Ch167)	-0.82	2.66	4.27	8.89
6865MHz (Ch183)	-1.51	3.13	4.41	9.03
6945MHz (Ch199)	0.09	2.61	4.54	9.16
7025MHz (Ch215)	1.66	2.21	4.95	9.57

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

802.11ax-HE160 mode

Frequency	Test Result (dBm)			
	Data Rate			
	802.11ax HE160 MCS0			
	Ant9	Ant10	Sum Conducted	Sum e.i.r.p
6025MHz (Ch15)	4.57	5.21	7.91	12.53
6185MHz (Ch47)	5.03	6.16	8.64	13.26
6345MHz (Ch79)	7.34	7.82	10.60	15.21
6505MHz (Ch111)	1.92	7.58	8.62	13.24
6665MHz (Ch143)	3.49	6.46	8.23	12.85
6825MHz (Ch175)	3.55	6.55	8.31	12.93
6985MHz (Ch207)	4.20	5.19	7.73	12.35

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

Note: The following cases are performed with this condition:

- a) 802.11a/ax20/ax40/ax80/ax160 mode (Ant10) are selected as the worst condition (SISO);
- b) 802.11a/ax20/ax40/ax80/ax160 mode (Ant10) are selected as the worst condition (MIMO);
- c) The device only support full RU(11ax20-RU242/11ax40-RU484/11ax80-RU996/11ax160-RU996*2);
- d) Both of the CDD mode and BF mode have the same power setting. So only report the BF mode power and PSD e.i.r.p result.

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	5
	6425MHz~6525MHz	5
	6525MHz~6875MHz	5
	6875MHz~7125MHz	5

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

Measurement Results:

Ant10

Mode	Frequency	Power Spectral Density (dBm/MHz)		
		Conducted	e.i.r.p	Conclusion
802.11a	5955MHz (Ch1)	-5.22	-0.60	P
	6175MHz (Ch45)	-4.00	0.62	P
	6415MHz (Ch93)	-1.49	3.13	P
	6435MHz (Ch97)	-1.71	2.91	P
	6475MHz (Ch105)	-1.25	3.37	P
	6515MHz (Ch113)	-1.51	3.11	P
	6535MHz (Ch117)	-1.02	3.60	P
	6695MHz (Ch149)	-3.20	1.42	P
	6855MHz (Ch181)	-3.45	1.17	P
	6875MHz (Ch185)	-3.73	0.89	P
	6895MHz (ch189)	-3.64	0.98	P
	6995MHz (Ch209)	-4.19	0.43	P
7115MHz (Ch233)	-4.47	0.15	P	
802.11ax HE20	5955MHz (Ch1)	-12.86	-8.24	P
	6175MHz (Ch45)	-10.86	-6.24	P
	6415MHz (Ch93)	-9.78	-5.16	P
	6435MHz (Ch97)	-8.70	-4.08	P
	6475MHz (Ch105)	-7.67	-3.05	P
	6515MHz (Ch113)	-8.03	-3.41	P
	6535MHz (Ch117)	-7.22	-2.60	P
	6695MHz (Ch149)	-7.69	-3.07	P
	6855MHz (Ch181)	-10.06	-5.44	P
	6875MHz (Ch185)	-10.31	-5.69	P
	6895MHz (ch189)	-10.48	-5.86	P
	6995MHz (Ch209)	-8.68	-4.06	P

	7115MHz (Ch233)	-10.50	-5.88	P
802.11ax HE40	5965MHz (Ch3)	-14.46	-9.84	P
	6165MHz (Ch43)	-13.55	-8.93	P
	6405MHz (Ch91)	-10.93	-6.31	P
	6445MHz (Ch99)	-10.62	-6.00	P
	6485MHz (Ch107)	-10.98	-6.36	P
	6525MHz (Ch115)	-10.31	-5.69	P
	6565MHz (Ch123)	-10.29	-5.67	P
	6685MHz (Ch147)	-11.98	-7.36	P
	6845MHz (Ch179)	-13.05	-8.43	P
	6885MHz (Ch187)	-13.36	-8.74	P
	6925MHz (ch195)	-13.35	-8.73	P
	6965MHz (Ch203)	-13.11	-8.49	P
	7085MHz (Ch227)	-12.81	-8.19	P
802.11ax HE80	5985MHz (Ch7)	-15.04	-10.42	P
	6145MHz(Ch39)	-13.57	-8.95	P
	6385MHz (Ch87)	-10.92	-6.30	P
	6465MHz (Ch103)	-11.52	-6.90	P
	6545MHz (Ch119)	-11.38	-6.76	P
	6625MHz (Ch135)	-11.49	-6.87	P
	6705MHz (Ch151)	-12.60	-7.98	P
	6785MHz (Ch167)	-13.44	-8.82	P
	6865MHz (Ch183)	-12.68	-8.06	P
	6945MHz (Ch199)	-13.31	-8.69	P
7025MHz (Ch215)	-13.34	-8.72	P	
802.11ax HE160	6025MHz (Ch15)	-13.09	-8.47	P
	6185MHz (Ch47)	-12.14	-7.52	P
	6345MHz (Ch79)	-10.41	-5.79	P
	6505MHz (Ch111)	-10.69	-6.07	P
	6665MHz (Ch143)	-12.45	-7.83	P
	6825MHz (Ch175)	-12.11	-7.49	P
	6985MHz (Ch207)	-13.13	-8.51	P

MIMO

Mode	Frequency	Power Spectral Density (dBm/MHz)				Conclusion
		Ant9	Ant10	Sum Conducted	Sum e.i.r.p	
802.11ax HE20	5955MHz (Ch1)	-12.00	-10.63	-8.25	-3.63	P
	6175MHz (Ch45)	-10.92	-8.92	-6.80	-2.18	P
	6415MHz (Ch93)	-12.54	-9.25	-7.58	-2.96	P
	6435MHz (Ch97)	-13.50	-8.11	-7.01	-2.39	P
	6475MHz (Ch105)	-13.52	-7.69	-6.68	-2.06	P

	6515MHz (Ch113)	-13.51	-8.48	-7.29	-2.68	P
	6535MHz (Ch117)	-13.79	-8.96	-7.73	-3.11	P
	6695MHz (Ch149)	-13.02	-9.82	-8.12	-3.50	P
	6855MHz (Ch181)	-14.83	-10.01	-8.77	-4.16	P
	6875MHz (Ch185)	-14.92	-10.23	-8.96	-4.34	P
	6895MHz (ch189)	-13.74	-10.48	-8.80	-4.18	P
	6995MHz (Ch209)	-12.21	-10.53	-8.28	-3.66	P
	7115MHz (Ch233)	-12.51	-12.10	-9.29	-4.67	P
802.11ax HE40	5965MHz (Ch3)	-13.18	-12.72	-9.93	-5.32	P
	6165MHz (Ch43)	-14.77	-13.05	-10.82	-6.20	P
	6405MHz (Ch91)	-14.37	-10.40	-8.94	-4.32	P
	6445MHz (Ch99)	-16.01	-10.34	-9.30	-4.68	P
	6485MHz (Ch107)	-16.06	-10.85	-9.71	-5.09	P
	6525MHz (Ch115)	-15.75	-10.43	-9.31	-4.69	P
	6565MHz (Ch123)	-14.92	-10.08	-8.85	-4.23	P
	6685MHz (Ch147)	-15.31	-11.99	-10.33	-5.71	P
	6845MHz (Ch179)	-17.52	-13.15	-11.80	-7.18	P
	6885MHz (Ch187)	-16.92	-12.57	-11.21	-6.59	P
	6925MHz (ch195)	-15.91	-12.74	-11.03	-6.41	P
	6965MHz (Ch203)	-15.26	-13.16	-11.07	-6.46	P
7085MHz (Ch227)	-14.64	-13.44	-10.99	-6.37	P	
802.11ax HE80	5985MHz (Ch7)	-14.00	-13.79	-10.88	-6.27	P
	6145MHz(Ch39)	-16.51	-12.47	-11.03	-6.41	P
	6385MHz (Ch87)	-14.36	-10.32	-8.88	-4.26	P
	6465MHz (Ch103)	-15.18	-10.43	-9.18	-4.56	P
	6545MHz (Ch119)	-17.00	-11.21	-10.19	-5.58	P
	6625MHz (Ch135)	-14.70	-11.09	-9.52	-4.90	P
	6705MHz (Ch151)	-16.17	-12.26	-10.78	-6.16	P
	6785MHz (Ch167)	-15.43	-12.52	-10.73	-6.11	P
	6865MHz (Ch183)	-16.38	-11.72	-10.44	-5.83	P
	6945MHz (Ch199)	-15.91	-12.39	-10.79	-6.17	P
	7025MHz (Ch215)	-14.10	-13.20	-10.62	-6.00	P
802.11ax HE160	6025MHz (Ch15)	-13.35	-12.43	-9.86	-5.24	P
	6185MHz (Ch47)	-13.31	-10.65	-8.77	-4.15	P
	6345MHz (Ch79)	-9.58	-9.75	-6.65	-2.04	P
	6505MHz (Ch111)	-15.40	-9.30	-8.35	-3.73	P
	6665MHz (Ch143)	-13.98	-12.02	-9.88	-5.26	P
	6825MHz (Ch175)	-14.26	-11.59	-9.71	-5.10	P
	6985MHz (Ch207)	-13.93	-12.85	-10.35	-5.73	P

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
		Fig.	Value	
802.11a	5955MHz (Ch1)	Fig.1	18.64	P
	6175MHz (Ch45)	Fig.2	18.64	P
	6415MHz (Ch93)	Fig.3	18.60	P
	6435MHz (Ch97)	Fig.4	18.48	P
	6475MHz (Ch105)	Fig.5	18.88	P
	6515MHz (Ch113)	Fig.6	18.52	P
	6535MHz (Ch117)	Fig.7	18.64	P
	6695MHz (Ch149)	Fig.8	18.52	P
	6855MHz (Ch181)	Fig.9	18.56	P
	6875MHz (Ch185)	Fig.10	18.88	P
	6895MHz (ch189)	Fig.11	18.60	P
	6995MHz (Ch209)	Fig.12	18.44	P
	7115MHz (Ch233)	Fig.13	18.52	P
802.11ax HE20	5955MHz (Ch1)	Fig.14	20.60	P
	6175MHz (Ch45)	Fig.15	20.92	P
	6415MHz (Ch93)	Fig.16	20.68	P
	6435MHz (Ch97)	Fig.17	20.76	P
	6475MHz (Ch105)	Fig.18	20.84	P
	6515MHz (Ch113)	Fig.19	20.44	P
	6535MHz (Ch117)	Fig.20	20.96	P
	6695MHz (Ch149)	Fig.21	20.68	P
	6855MHz (Ch181)	Fig.22	20.68	P
	6875MHz (Ch185)	Fig.23	20.76	P
	6895MHz (ch189)	Fig.24	20.72	P
	6995MHz (Ch209)	Fig.25	21.00	P
	7115MHz (Ch233)	Fig.26	20.68	P
802.11ax HE40	5965MHz (Ch3)	Fig.27	39.84	P
	6165MHz (Ch43)	Fig.28	40.56	P
	6405MHz (Ch91)	Fig.29	40.16	P
	6445MHz (Ch99)	Fig.30	40.24	P
	6485MHz (Ch107)	Fig.31	40.64	P
	6525MHz (Ch115)	Fig.32	40.48	P
	6565MHz (Ch123)	Fig.33	40.24	P

	6685MHz (Ch147)	Fig.34	40.40	P
	6845MHz (Ch179)	Fig.35	40.32	P
	6885MHz (Ch187)	Fig.36	40.40	P
	6925MHz (ch195)	Fig.37	40.32	P
	6965MHz (Ch203)	Fig.38	40.32	P
	7085MHz (Ch227)	Fig.39	40.56	P
802.11ax HE80	5985MHz (Ch7)	Fig.40	81.76	P
	6145MHz (Ch39)	Fig.41	82.08	P
	6385MHz (Ch87)	Fig.42	81.76	P
	6465MHz (Ch103)	Fig.43	82.56	P
	6545MHz (Ch119)	Fig.44	81.44	P
	6625MHz (Ch135)	Fig.45	81.76	P
	6705MHz (Ch151)	Fig.46	82.24	P
	6785MHz (Ch167)	Fig.47	81.76	P
	6865MHz (Ch183)	Fig.48	82.24	P
	6945MHz (Ch199)	Fig.49	81.44	P
	7025MHz (Ch215)	Fig.50	82.08	P
802.11ax HE160	6025MHz (Ch15)	Fig.51	164.48	P
	6185MHz (Ch47)	Fig.52	165.12	P
	6345MHz (Ch79)	Fig.53	164.80	P
	6505MHz (Ch111)	Fig.54	164.80	P
	6665MHz (Ch143)	Fig.55	165.76	P
	6825MHz (Ch175)	Fig.56	165.44	P
	6985MHz (Ch207)	Fig.57	165.44	P

Conclusion: PASS

Test graphs as below:

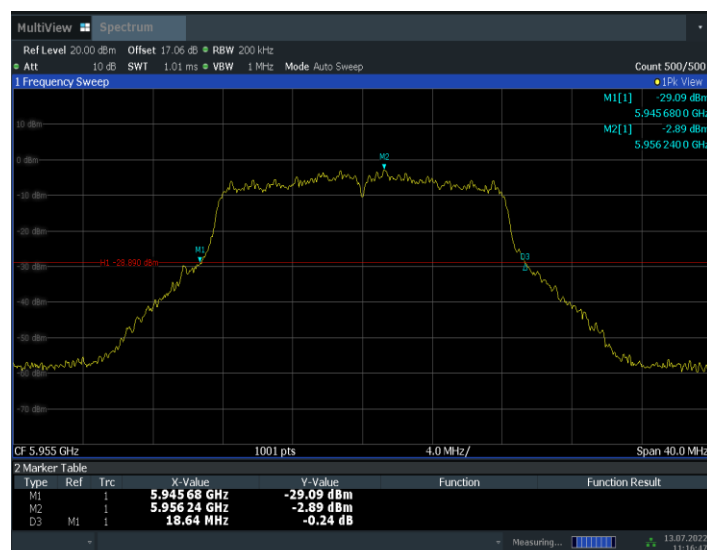
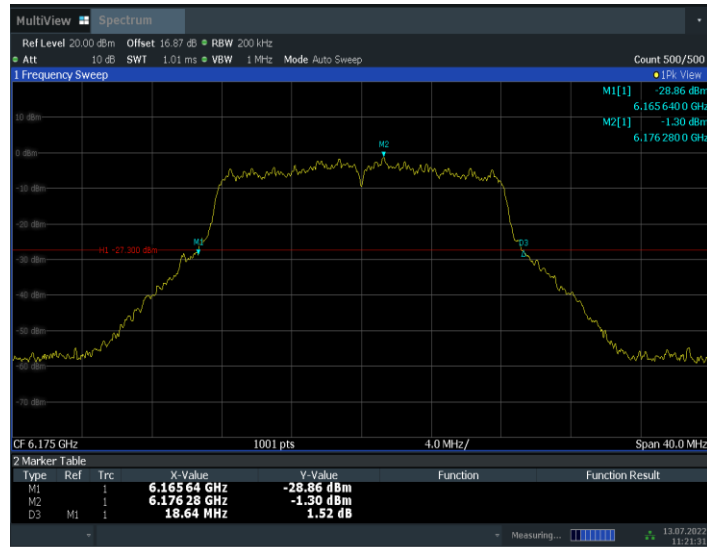
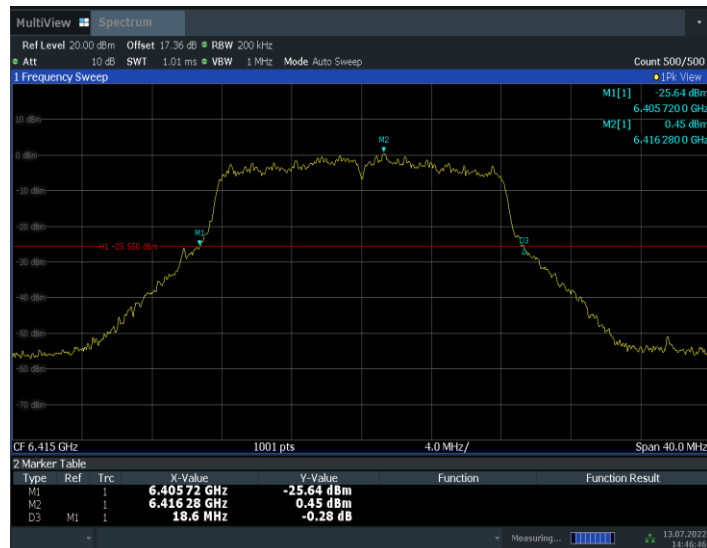


Fig.1 Occupied 26dB Bandwidth (802.11a, 5955MHz)



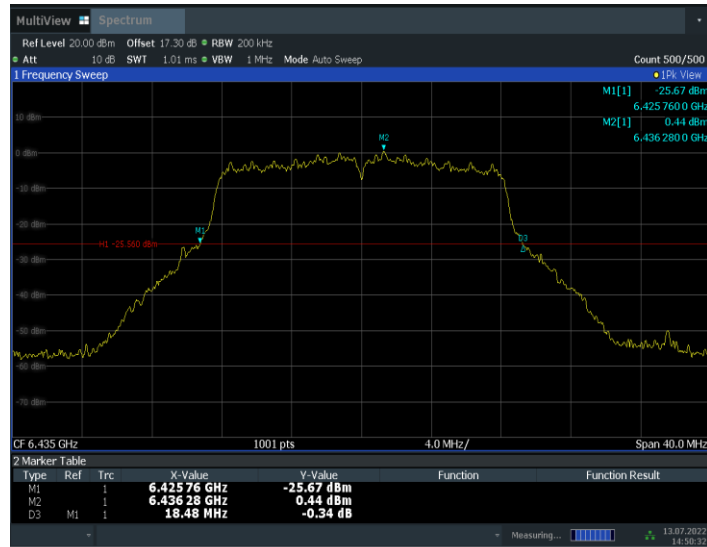
11:21:31 13.07.2022

Fig.2 Occupied 26dB Bandwidth (802.11a, 6175MHz)



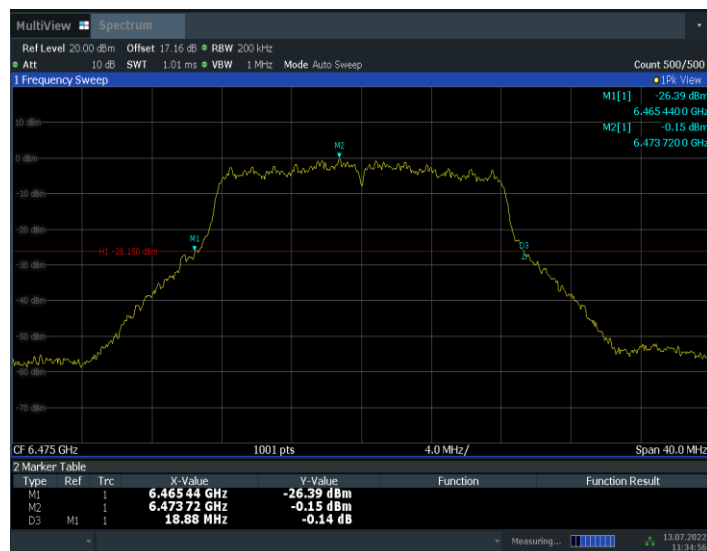
14:46:46 13.07.2022

Fig.3 Occupied 26dB Bandwidth (802.11a, 6415MHz)



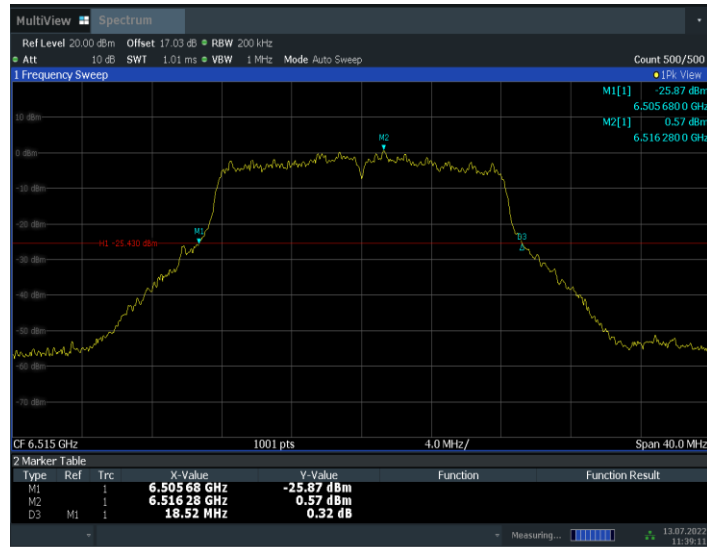
14:50:33 13.07.2022

Fig.4 Occupied 26dB Bandwidth (802.11a, 6435MHz)



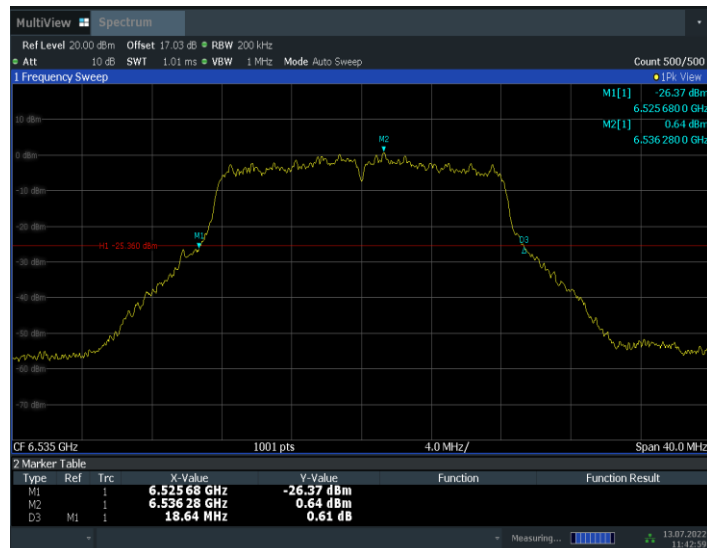
11:34:56 13.07.2022

Fig.5 Occupied 26dB Bandwidth (802.11a, 6475MHz)



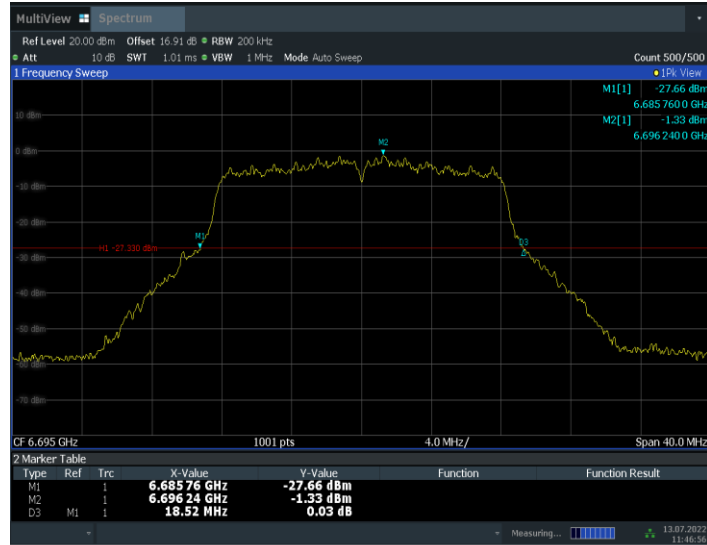
11:39:11 13.07.2022

Fig.6 Occupied 26dB Bandwidth (802.11a, 6515MHz)



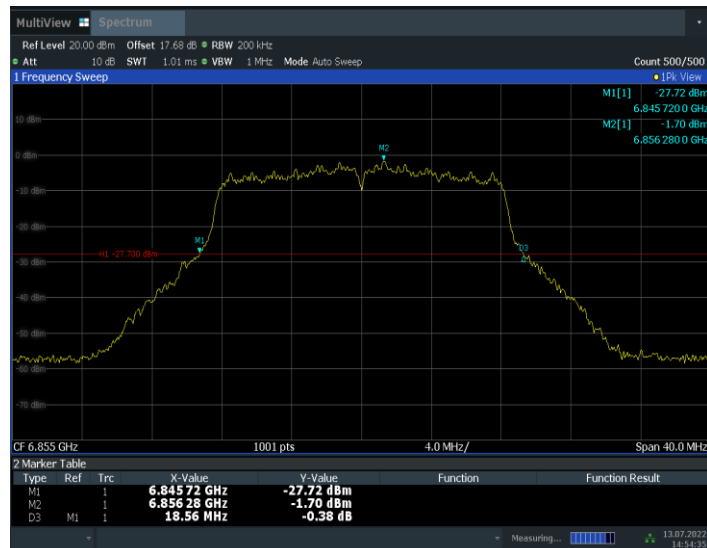
11:42:59 13.07.2022

Fig.7 Occupied 26dB Bandwidth (802.11a, 6535MHz)



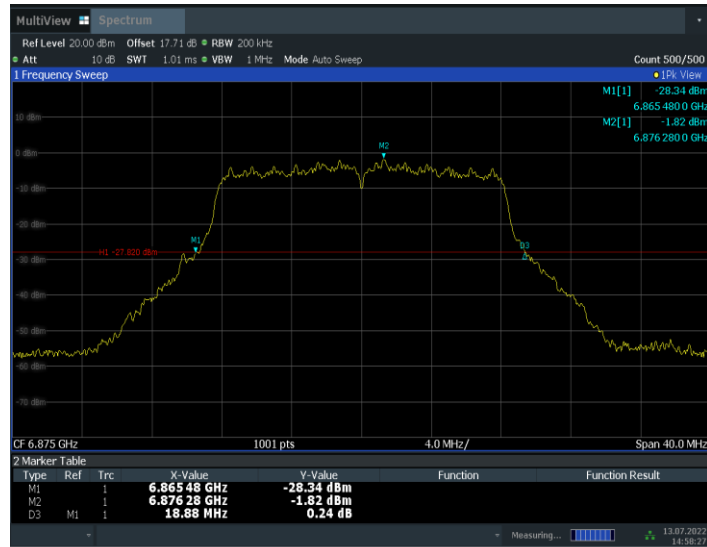
11:46:57 13.07.2022

Fig.8 Occupied 26dB Bandwidth (802.11a, 6695MHz)



14:54:35 13.07.2022

Fig.9 Occupied 26dB Bandwidth (802.11a, 6855MHz)



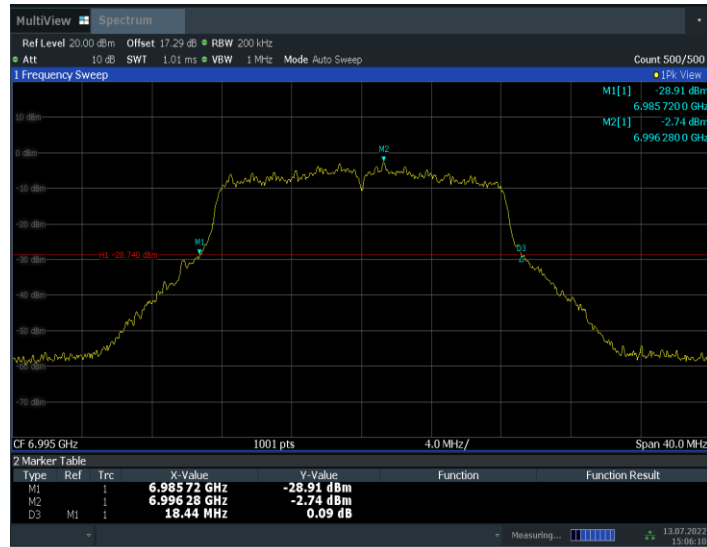
14:58:27 13.07.2022

Fig.10 Occupied 26dB Bandwidth (802.11a, 6875MHz)



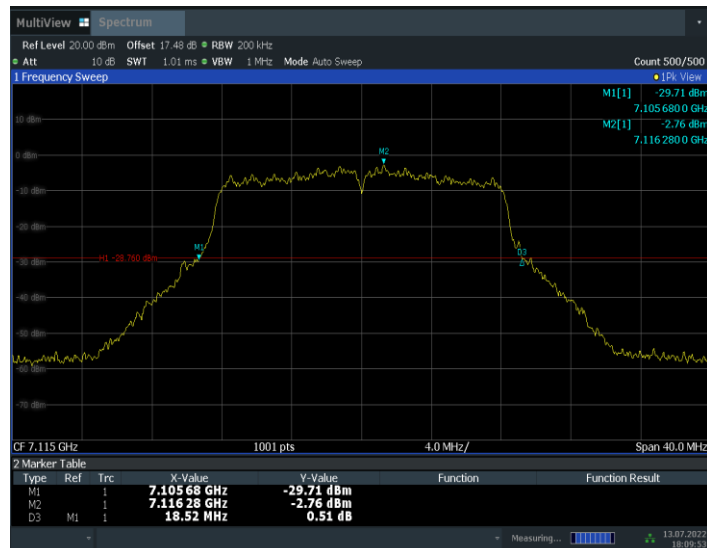
15:02:20 13.07.2022

Fig.11 Occupied 26dB Bandwidth (802.11a, 6895MHz)



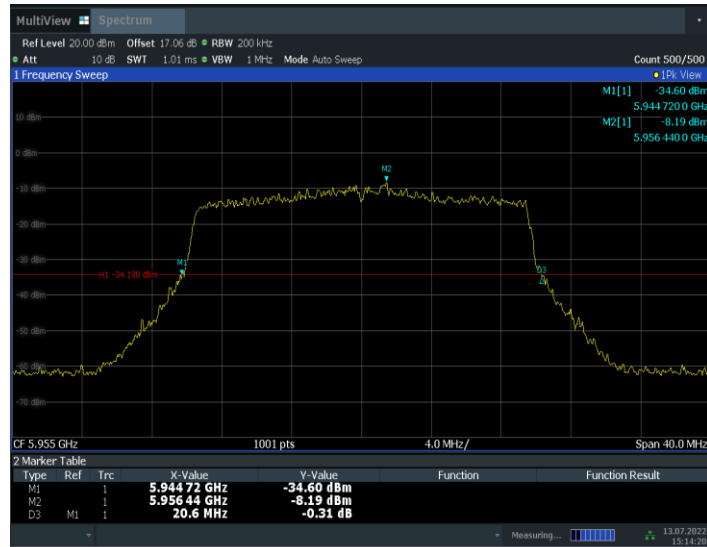
15:06:11 13.07.2022

Fig.12 Occupied 26dB Bandwidth (802.11a 6995MHz)



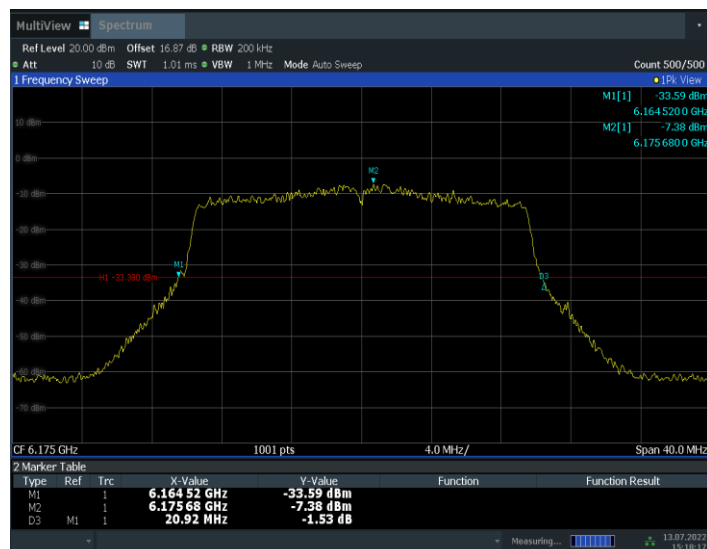
18:09:54 13.07.2022

Fig.13 Occupied 26dB Bandwidth (802.11a, 7115MHz)



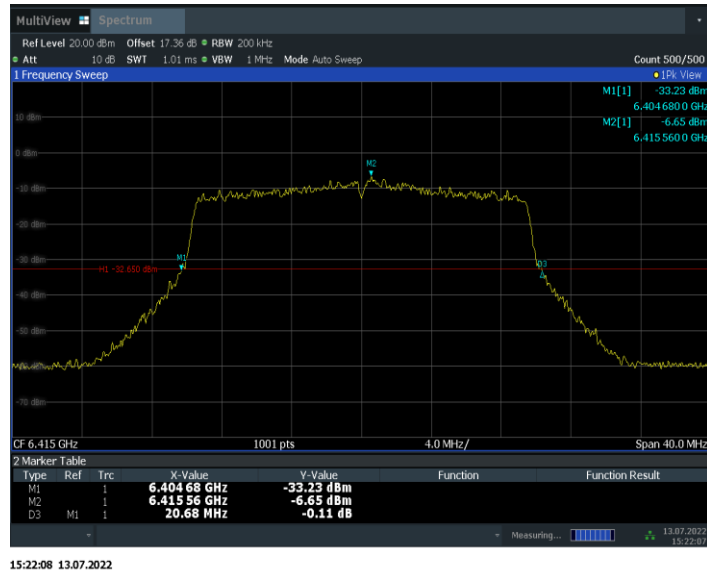
15:14:21 13.07.2022

Fig.14 Occupied 26dB Bandwidth (802.11ax-HE20, 5955MHz)



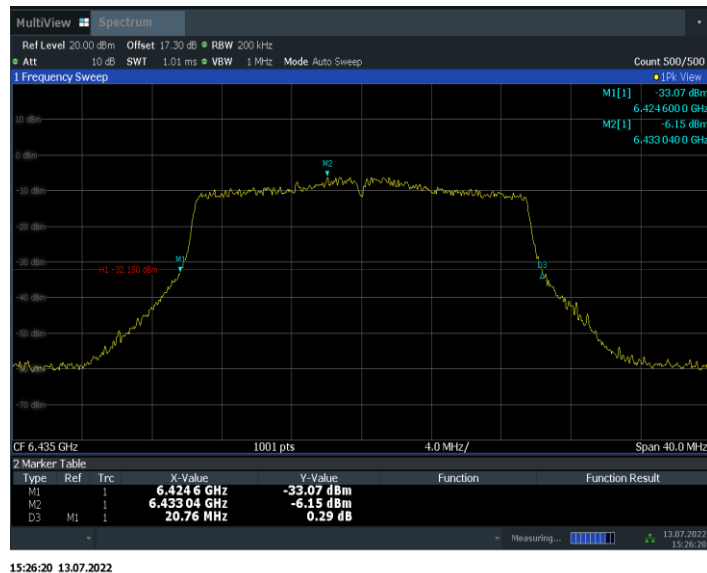
15:18:18 13.07.2022

Fig.15 Occupied 26dB Bandwidth (802.11ax-HE20, 6175MHz)



15:22:08 13.07.2022

Fig.16 Occupied 26dB Bandwidth (802.11ax-HE20, 6415MHz)



15:26:20 13.07.2022

Fig.17 Occupied 26dB Bandwidth (802.11ax-HE20, 6435MHz)

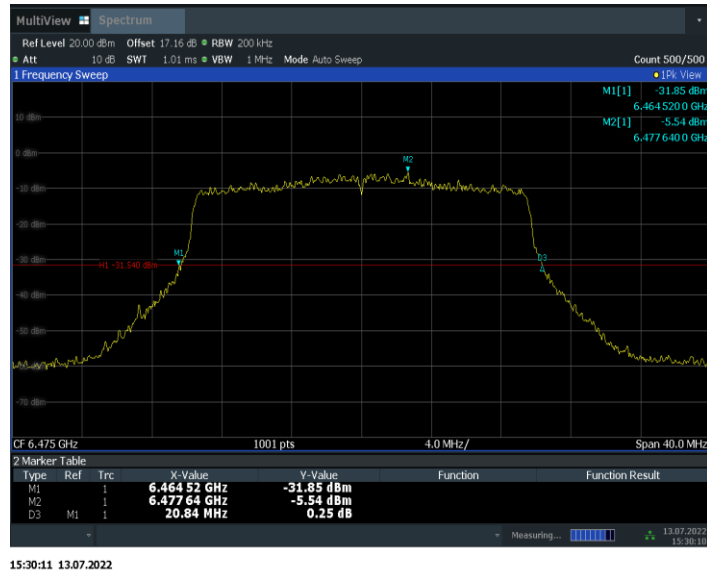


Fig.18 Occupied 26dB Bandwidth (802.11ax-HE20, 6475MHz)

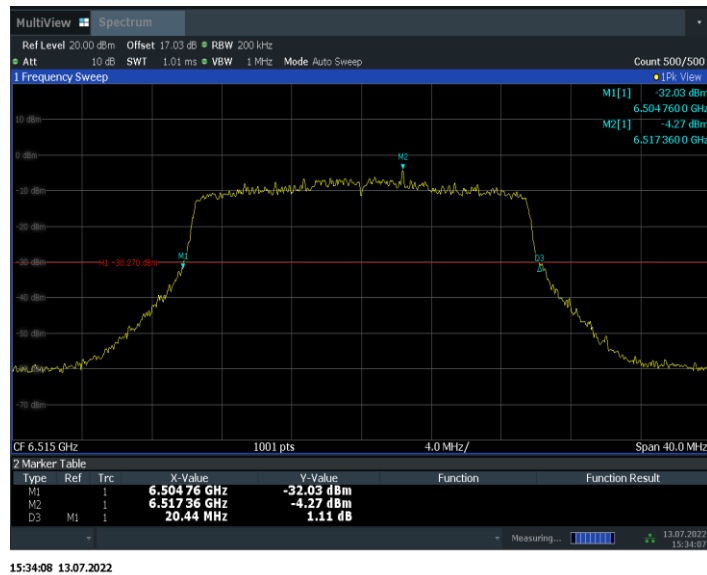
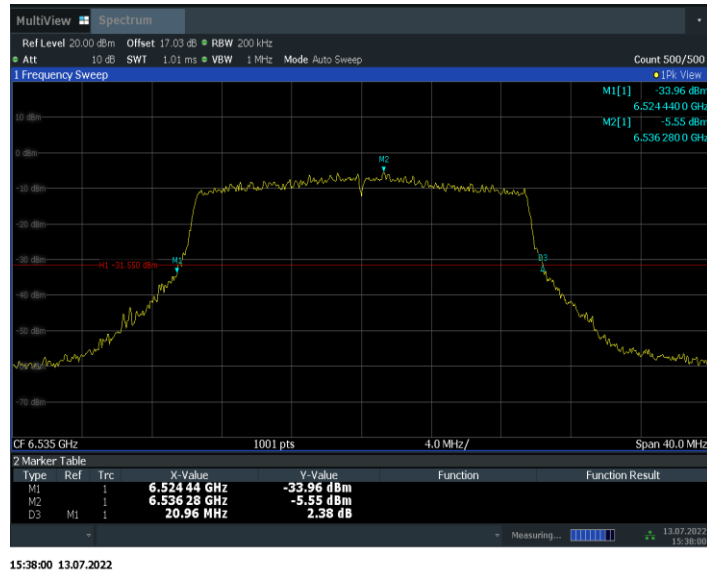
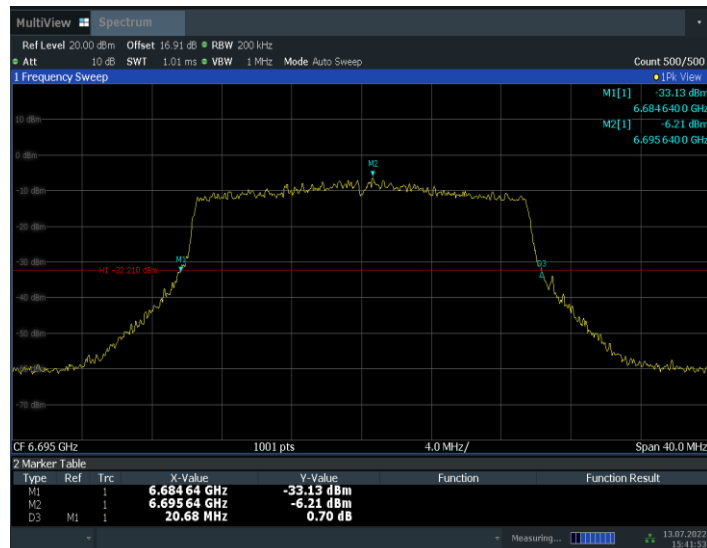


Fig.19 Occupied 26dB Bandwidth (802.11ax-HE20, 6515MHz)



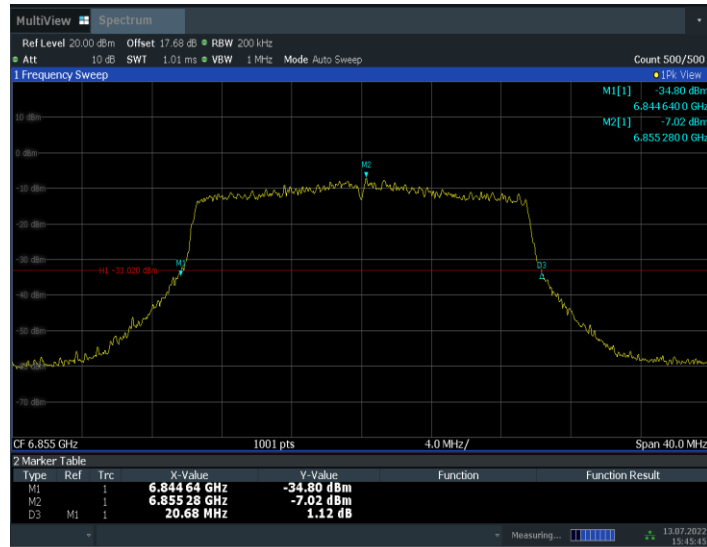
15:38:00 13.07.2022

Fig.20 Occupied 26dB Bandwidth (802.11ax-HE20, 6535MHz)



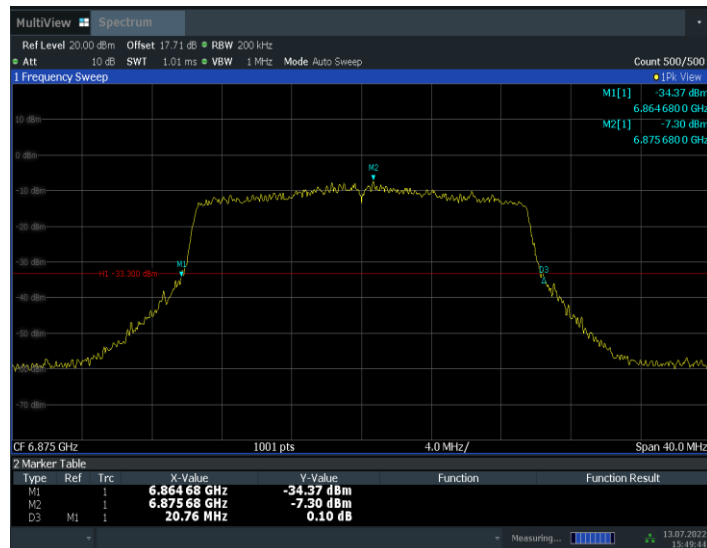
15:41:54 13.07.2022

Fig.21 Occupied 26dB Bandwidth (802.11ax-HE20, 6695MHz)



15:45:46 13.07.2022

Fig.22 Occupied 26dB Bandwidth (802.11ax-HE20, 6855MHz)



15:49:44 13.07.2022

Fig.23 Occupied 26dB Bandwidth (802.11ax-HE20, 6875MHz)

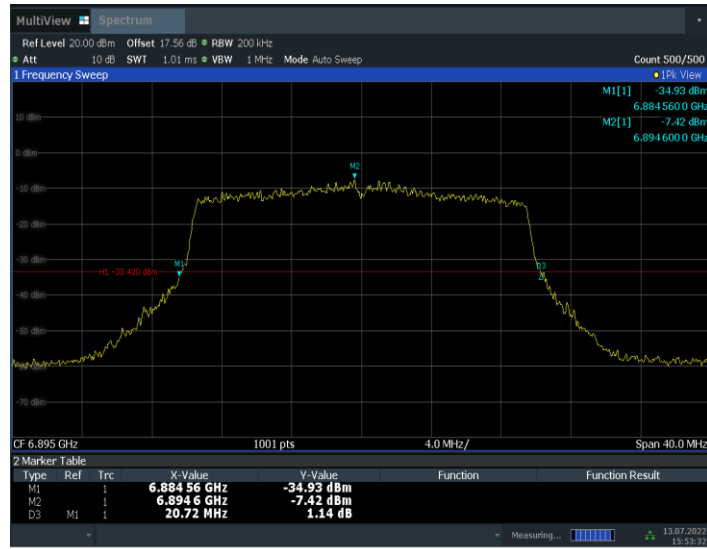


Fig.24 Occupied 26dB Bandwidth (802.11ax-HE20, 6895MHz)

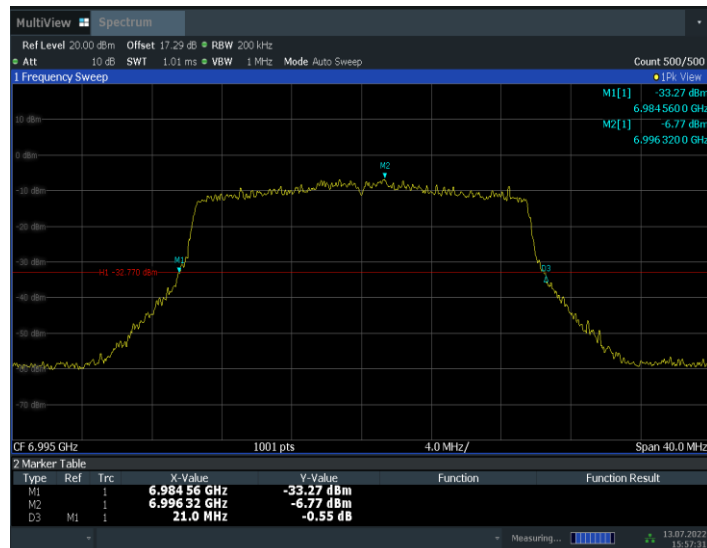
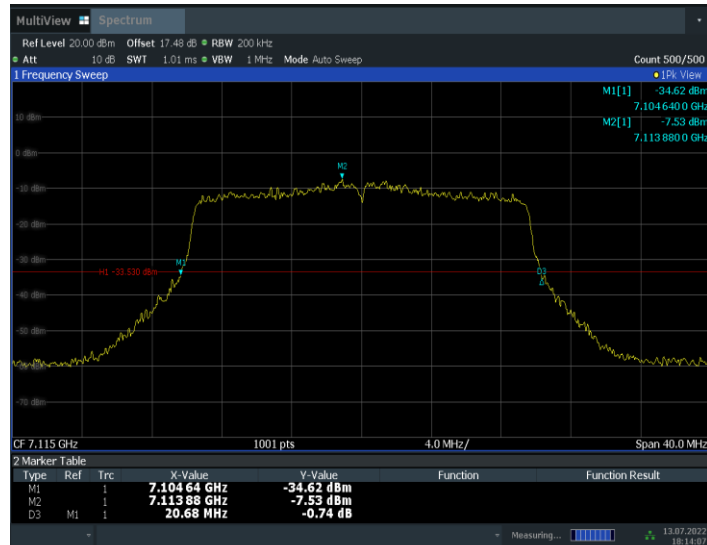
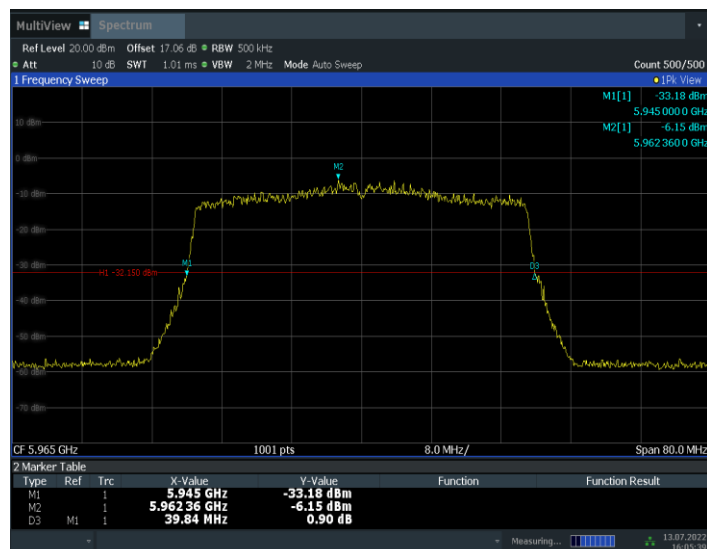


Fig.25 Occupied 26dB Bandwidth (802.11ax-HE20, 6995MHz)



18:14:08 13.07.2022

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



16:05:40 13.07.2022

Fig.27 Occupied 26dB Bandwidth (802.11ax-HE40, 5965MHz)

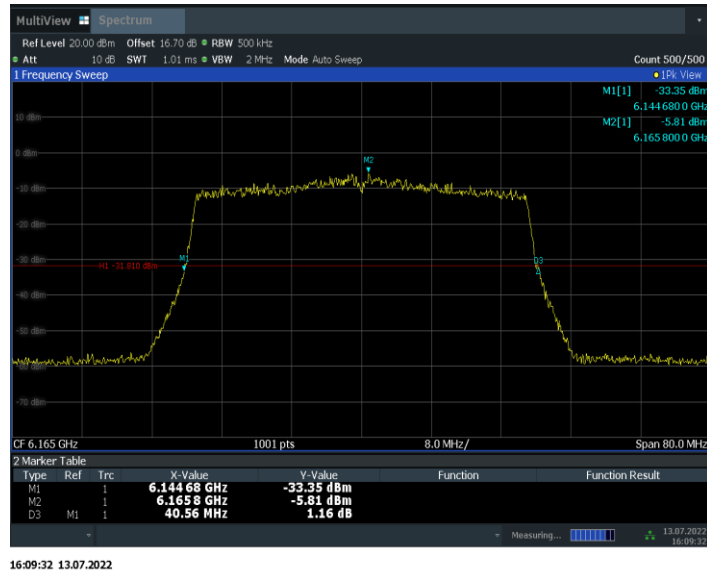


Fig.28 Occupied 26dB Bandwidth (802.11ax-HE40, 6165MHz)

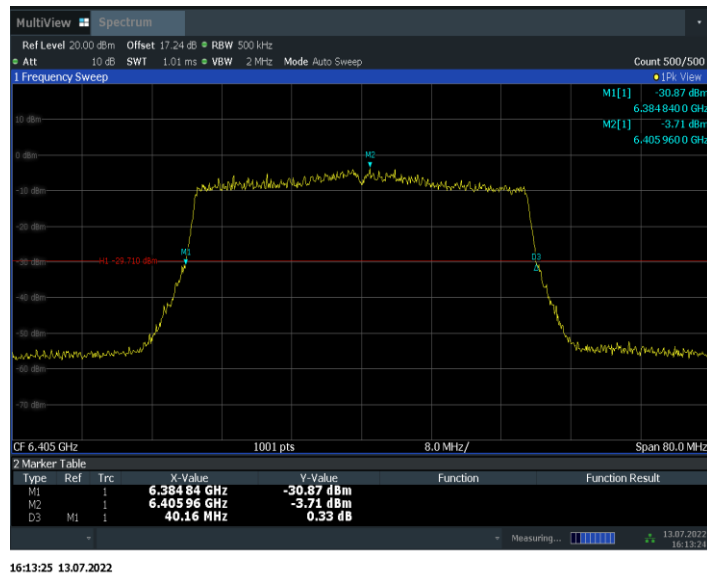
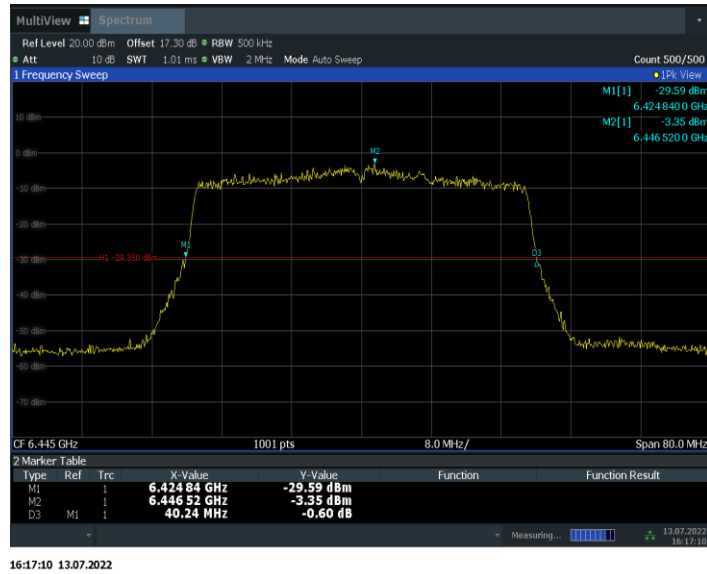
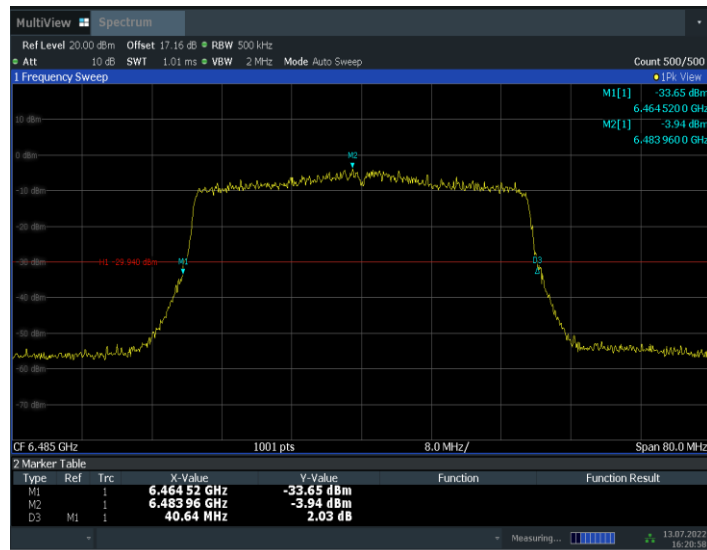


Fig.29 Occupied 26dB Bandwidth (802.11ax-HE40, 6405MHz)



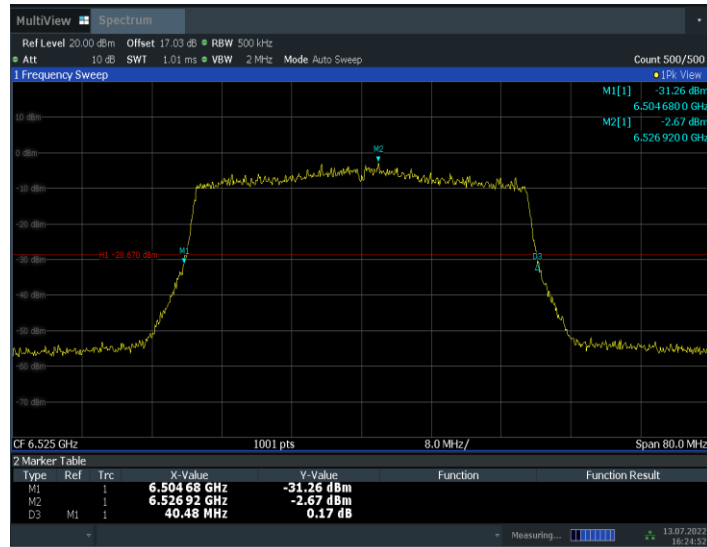
16:17:10 13.07.2022

Fig.30 Occupied 26dB Bandwidth (802.11ax-HE40, 6445MHz)



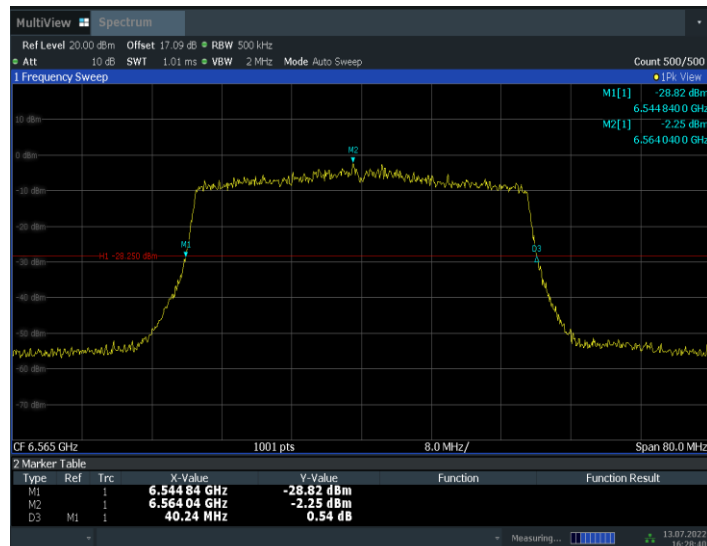
16:20:59 13.07.2022

Fig.31 Occupied 26dB Bandwidth (802.11ax-HE40, 6485MHz)



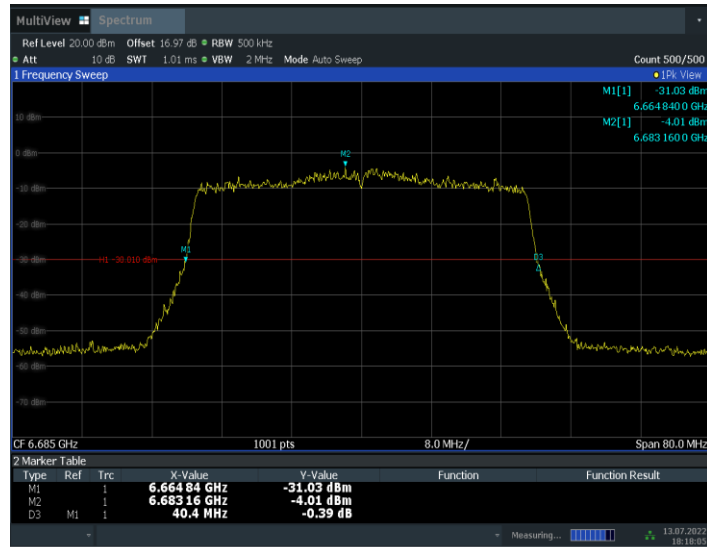
16:24:53 13.07.2022

Fig.32 Occupied 26dB Bandwidth (802.11ax-HE40, 6525MHz)



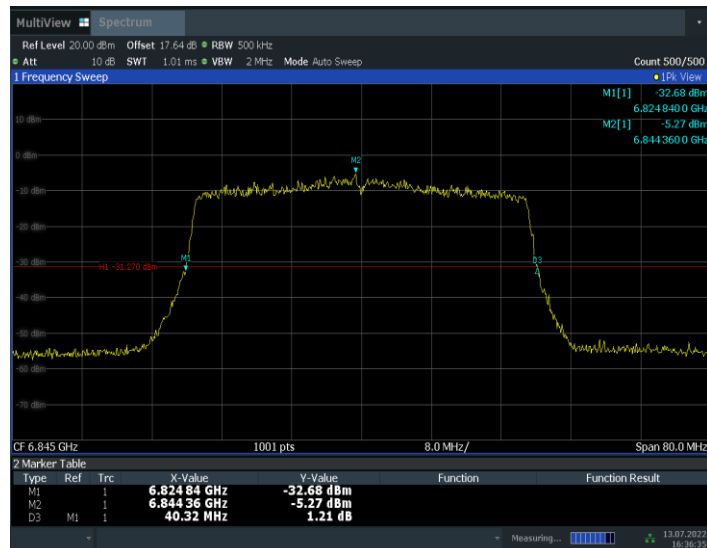
16:28:40 13.07.2022

Fig.33 Occupied 26dB Bandwidth (802.11ax-HE40, 6565MHz)



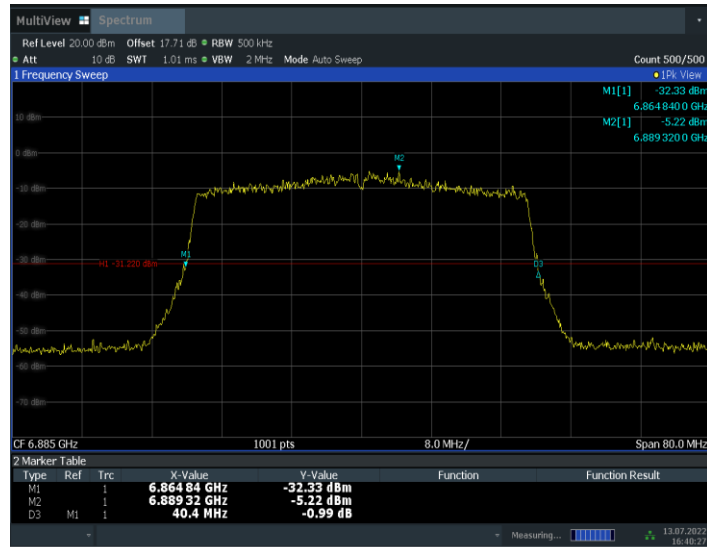
18:18:06 13.07.2022

Fig.34 Occupied 26dB Bandwidth (802.11ax-HE40, 6685MHz)



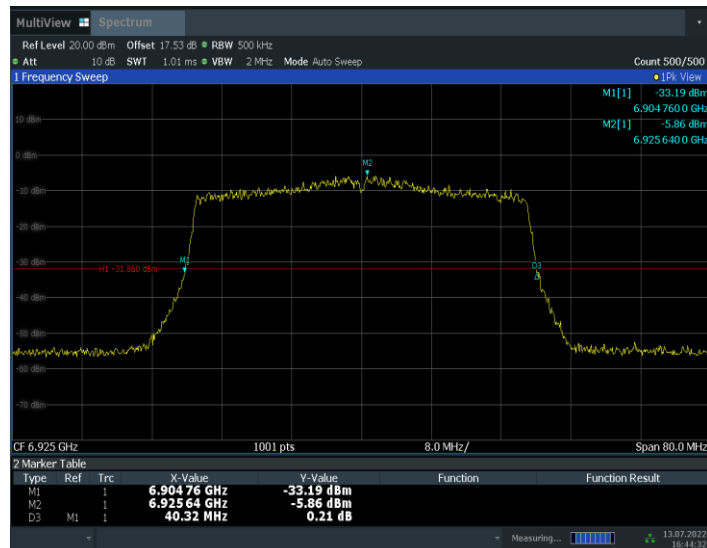
16:36:36 13.07.2022

Fig.35 Occupied 26dB Bandwidth (802.11ax-HE40, 6845MHz)



16:40:28 13.07.2022

Fig.36 Occupied 26dB Bandwidth (802.11ax-HE40, 6885MHz)



16:44:33 13.07.2022

Fig.37 Occupied 26dB Bandwidth (802.11ax-HE40, 6925MHz)

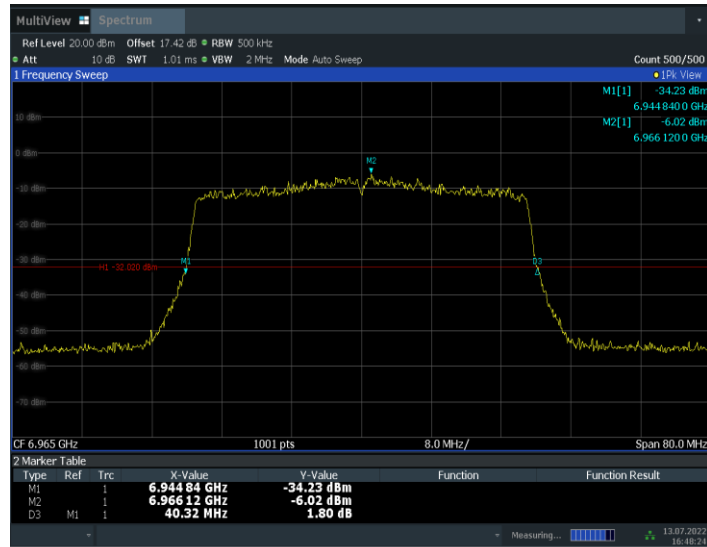


Fig.38 Occupied 26dB Bandwidth (802.11ax-HE40, 6969MHz)

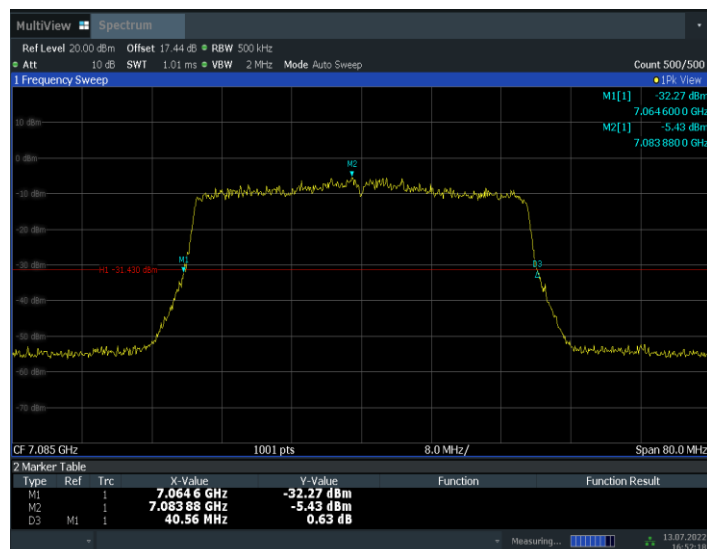
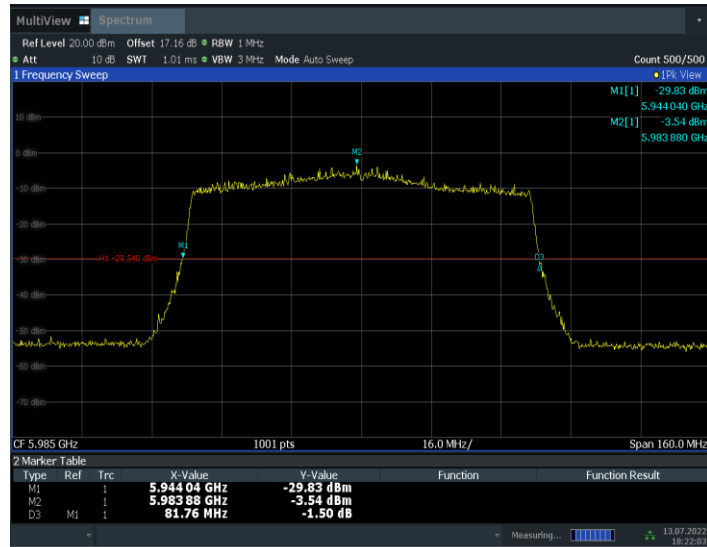
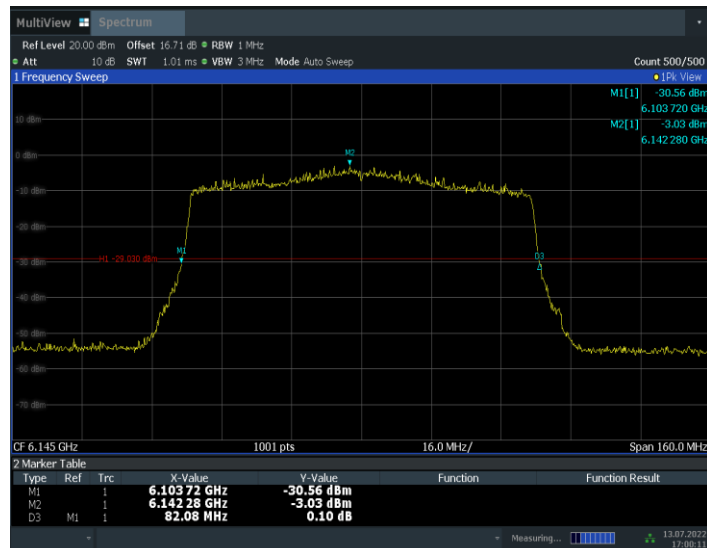


Fig.39 Occupied 26dB Bandwidth (802.11ax-HE40, 7085MHz)



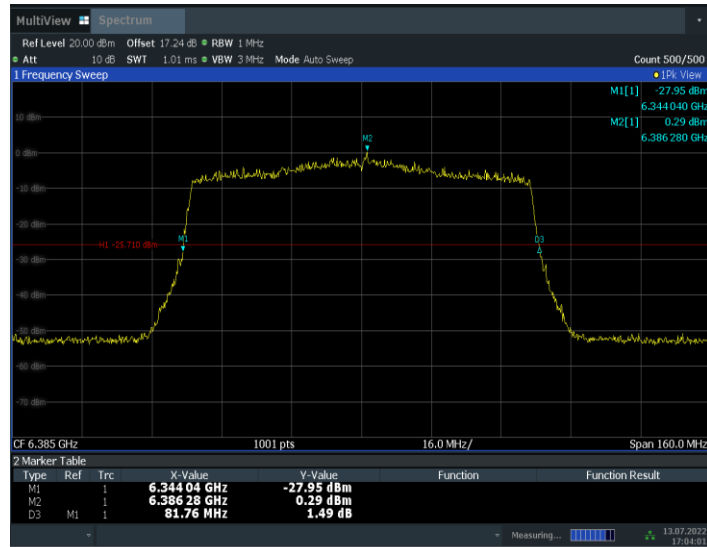
18:22:04 13.07.2022

Fig.40 Occupied 26dB Bandwidth (802. 11ax-HE80, 5985MHz)



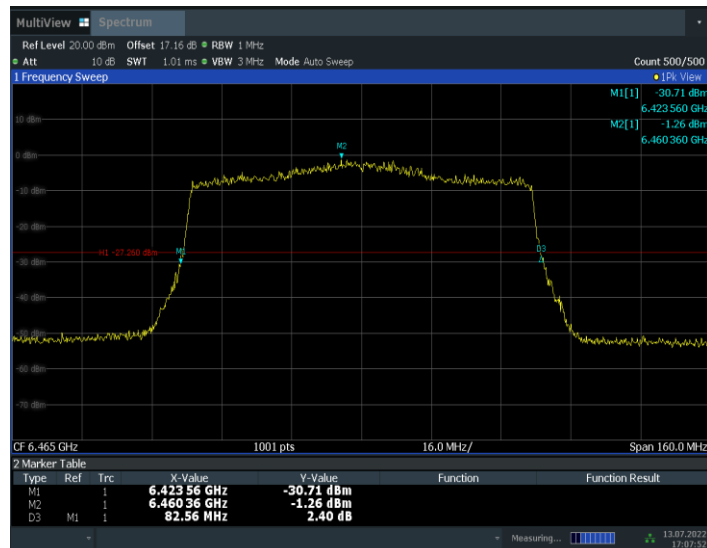
17:00:11 13.07.2022

Fig.41 Occupied 26dB Bandwidth (802. 11ax-HE80, 6145MHz)



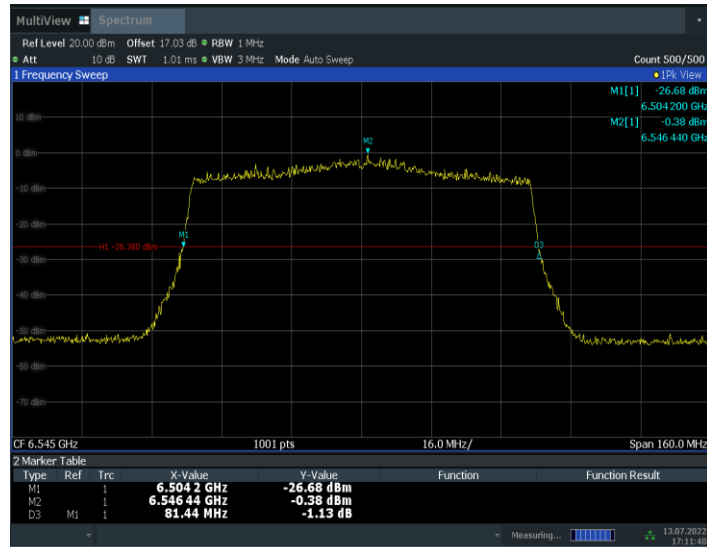
17:04:02 13.07.2022

Fig.42 Occupied 26dB Bandwidth (802. 11ax-HE80, 6385MHz)



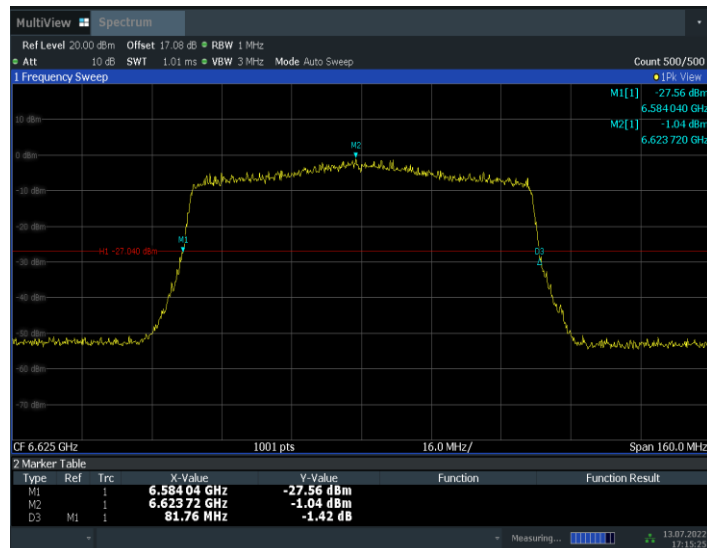
17:07:53 13.07.2022

Fig.43 Occupied 26dB Bandwidth (802. 11ax-HE80, 6465MHz)



17:11:41 13.07.2022

Fig.44 Occupied 26dB Bandwidth (802. 11ax-HE80, 6545MHz)



17:15:26 13.07.2022

Fig.45 Occupied 26dB Bandwidth (802. 11ax-HE80, 6625MHz)

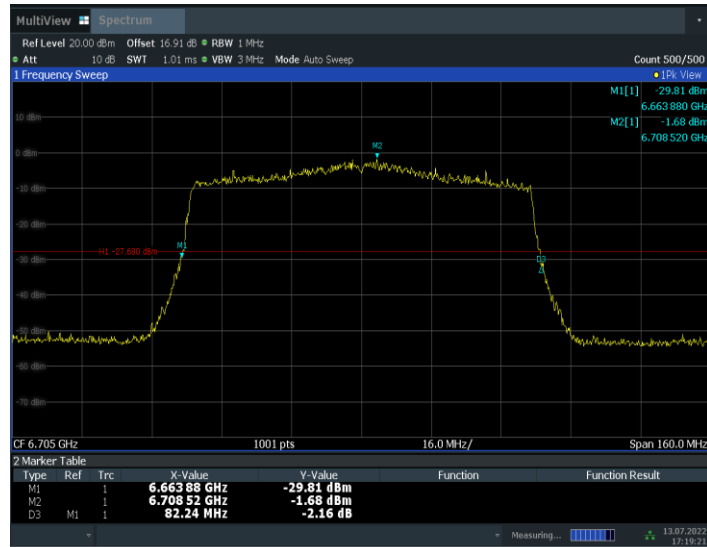


Fig.46 Occupied 26dB Bandwidth (802. 11ax-HE80, 6705MHz)

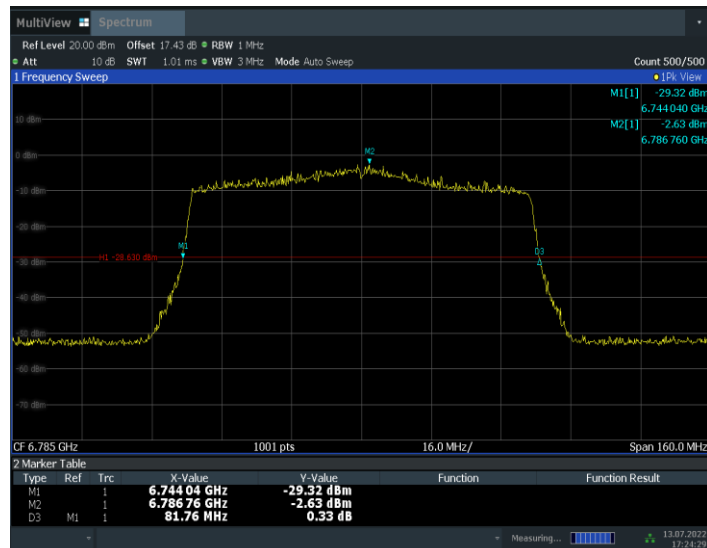


Fig.47 Occupied 26dB Bandwidth (802. 11ax-HE80, 6785MHz)

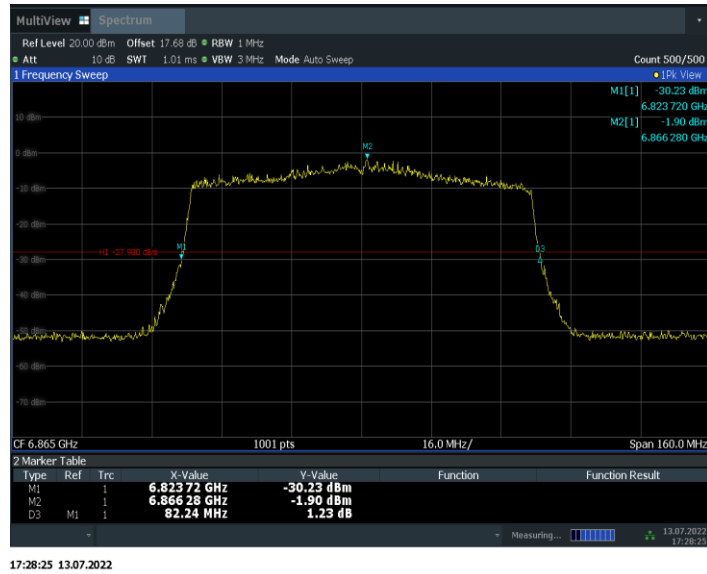


Fig.48 Occupied 26dB Bandwidth (802. 11ax-HE80, 6865MHz)

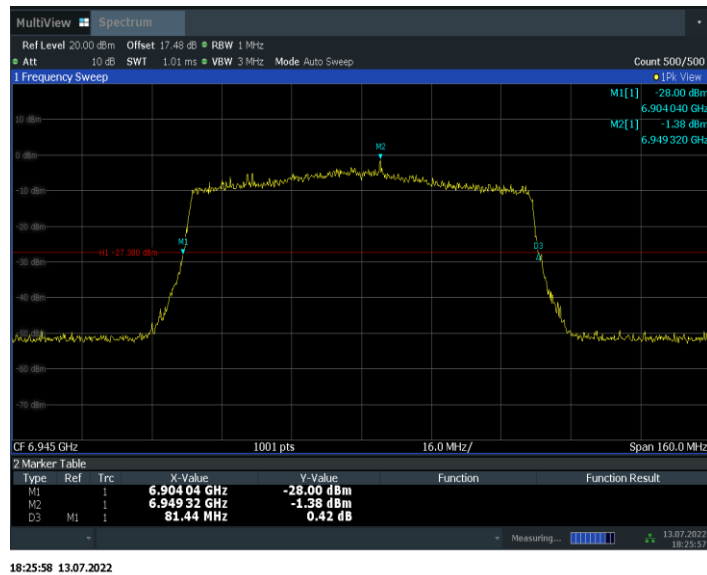


Fig.49 Occupied 26dB Bandwidth (802. 11ax-HE80, 6945MHz)

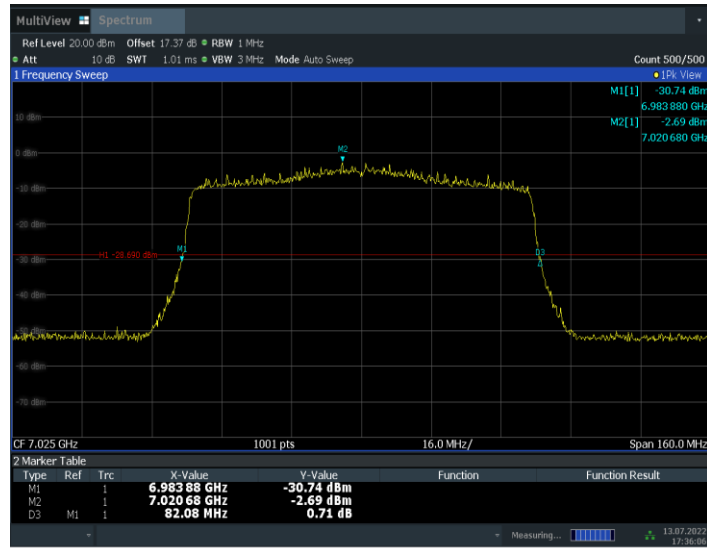


Fig.50 Occupied 26dB Bandwidth (802. 11ax-HE80, 7025MHz)

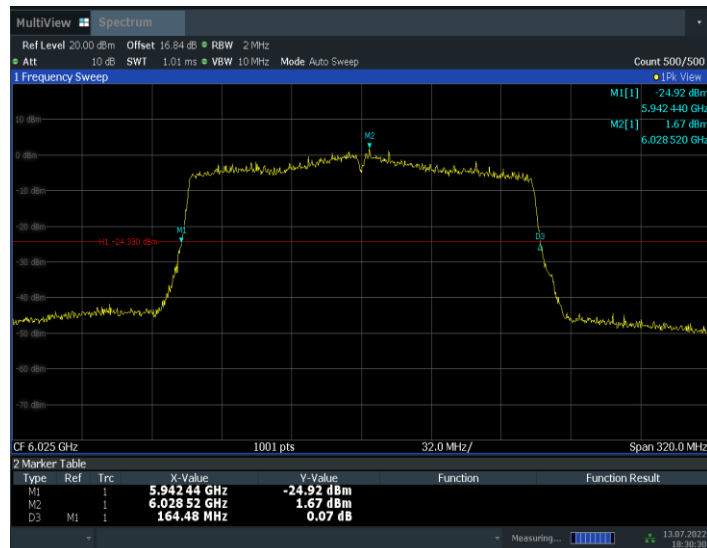


Fig.51 Occupied 26dB Bandwidth (802. 11ax-HE160, 6025MHz)

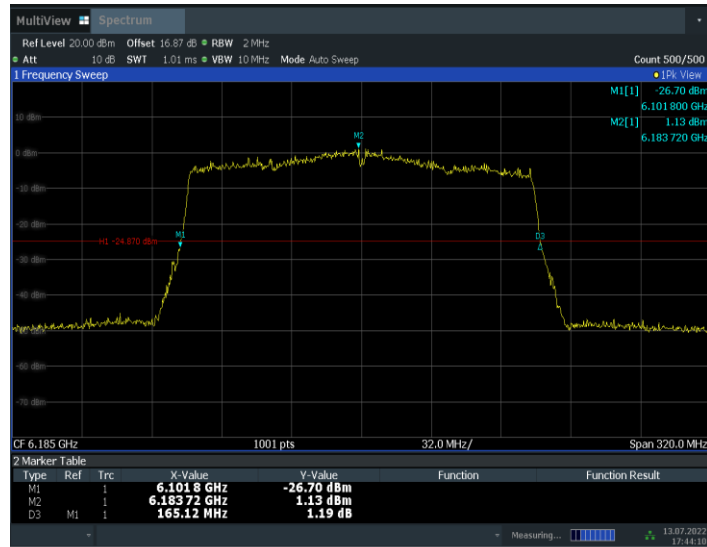


Fig.52 Occupied 26dB Bandwidth (802. 11ax-HE160, 6185MHz)

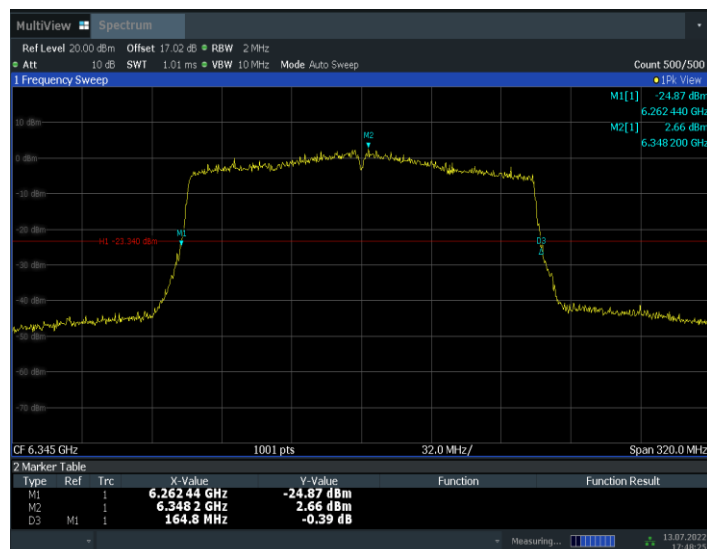


Fig.53 Occupied 26dB Bandwidth (802. 11ax-HE160, 6345MHz)

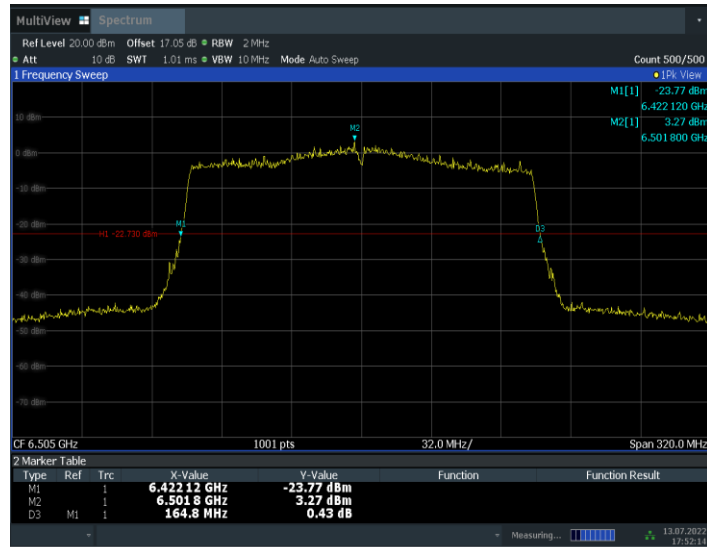


Fig.54 Occupied 26dB Bandwidth (802.11ax-HE160, 6505MHz)



Fig.55 Occupied 26dB Bandwidth (802.11ax-HE160, 6665MHz)

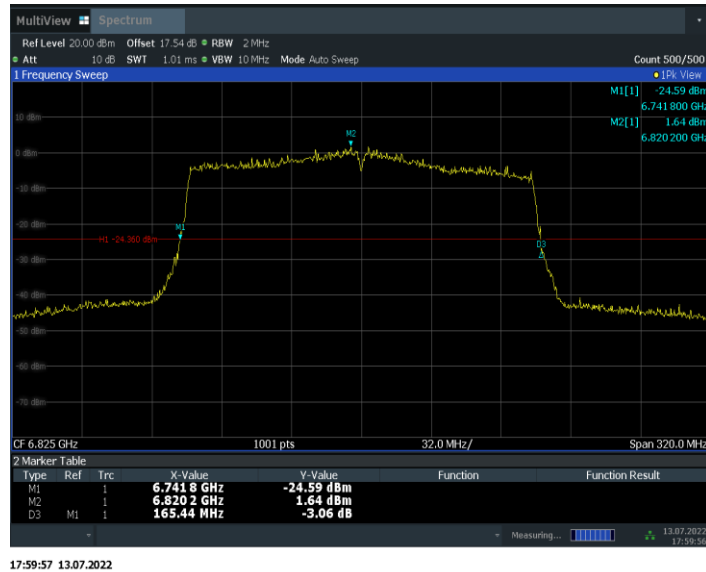


Fig.56 Occupied 26dB Bandwidth (802. 11ax-HE160, 6825MHz)

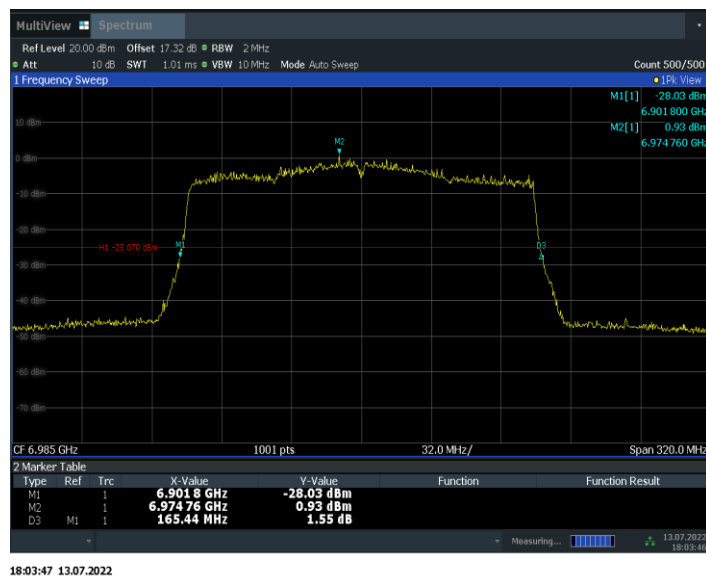


Fig.57 Occupied 26dB Bandwidth (802. 11ax-HE160 6985MHz)

A.5. 99% Occupied bandwidth

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

- 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.
- 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.
- 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.
- 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	
802.11a	5955MHz (Ch1)	Fig.58	16.58	P
	6175MHz (Ch45)	Fig.59	16.55	P
	6415MHz (Ch93)	Fig.60	16.54	P
	6435MHz (Ch97)	Fig.61	16.57	P
	6475MHz (Ch105)	Fig.62	16.60	P
	6515MHz (Ch113)	Fig.63	16.57	P
	6535MHz (Ch117)	Fig.64	16.54	P
	6695MHz (Ch149)	Fig.65	16.55	P
	6855MHz (Ch181)	Fig.66	16.58	P
	6875MHz (Ch185)	Fig.67	16.64	P
	6895MHz (ch189)	Fig.68	16.58	P
	6995MHz (Ch209)	Fig.69	16.59	P
7115MHz (Ch233)	Fig.70	16.58	P	
802.11ax HE20	5955MHz (Ch1)	Fig.71	18.95	P
	6175MHz (Ch45)	Fig.72	18.93	P
	6415MHz (Ch93)	Fig.73	18.93	P
	6435MHz (Ch97)	Fig.74	18.89	P
	6475MHz (Ch105)	Fig.75	18.92	P
	6515MHz (Ch113)	Fig.76	18.94	P
	6535MHz (Ch117)	Fig.77	18.95	P
	6695MHz (Ch149)	Fig.78	18.94	P
	6855MHz (Ch181)	Fig.79	18.96	P
	6875MHz (Ch185)	Fig.80	18.93	P
	6895MHz (ch189)	Fig.81	18.98	P
	6995MHz (Ch209)	Fig.82	19.00	P
7115MHz (Ch233)	Fig.83	18.96	P	

802.11ax HE40	5965MHz (Ch3)	Fig.84	37.77	P
	6165MHz (Ch43)	Fig.85	37.87	P
	6405MHz (Ch91)	Fig.86	37.77	P
	6445MHz (Ch99)	Fig.87	37.75	P
	6485MHz (Ch107)	Fig.88	37.78	P
	6525MHz (Ch115)	Fig.89	37.73	P
	6565MHz (Ch123)	Fig.90	37.84	P
	6685MHz (Ch147)	Fig.91	37.79	P
	6845MHz (Ch179)	Fig.92	37.90	P
	6885MHz (Ch187)	Fig.93	37.81	P
	6925MHz (ch195)	Fig.94	37.84	P
	6965MHz (Ch203)	Fig.95	37.89	P
	7085MHz (Ch227)	Fig.96	37.91	P
802.11ax HE80	5985MHz (Ch7)	Fig.97	77.25	P
	6145MHz (Ch39)	Fig.98	76.95	P
	6385MHz (Ch87)	Fig.99	76.94	P
	6465MHz (Ch103)	Fig.100	77.14	P
	6545MHz (Ch119)	Fig.101	77.08	P
	6625MHz (Ch135)	Fig.102	77.08	P
	6705MHz (Ch151)	Fig.103	76.93	P
	6785MHz (Ch167)	Fig.104	77.18	P
	6865MHz (Ch183)	Fig.105	77.22	P
	6945MHz (Ch199)	Fig.106	77.30	P
	7025MHz (Ch215)	Fig.107	77.40	P
802.11ax HE160	6025MHz (Ch15)	Fig.108	156.40	P
	6185MHz (Ch47)	Fig.109	156.01	P
	6345MHz (Ch79)	Fig.110	156.04	P
	6505MHz (Ch111)	Fig.111	156.45	P
	6665MHz (Ch143)	Fig.112	156.36	P
	6825MHz (Ch175)	Fig.113	156.84	P
	6985MHz (Ch207)	Fig.114	157.36	P

Conclusion: PASS

Test graphs as below:

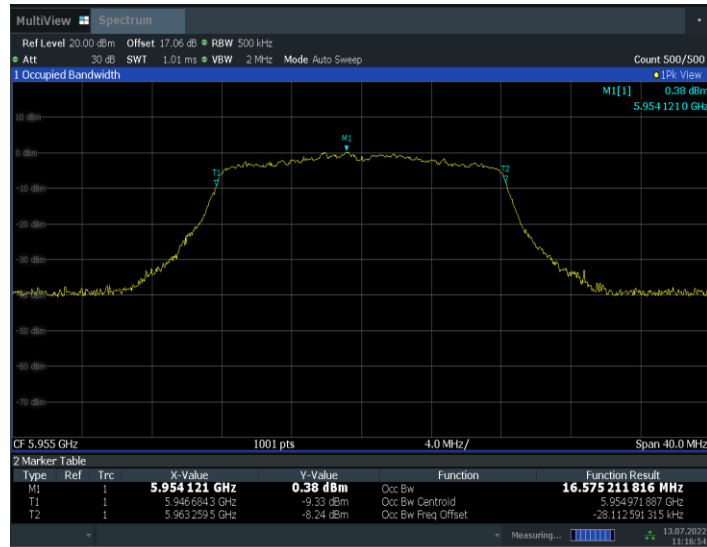


Fig.58 99% Occupied bandwidth (802.11a, 5955MHz)

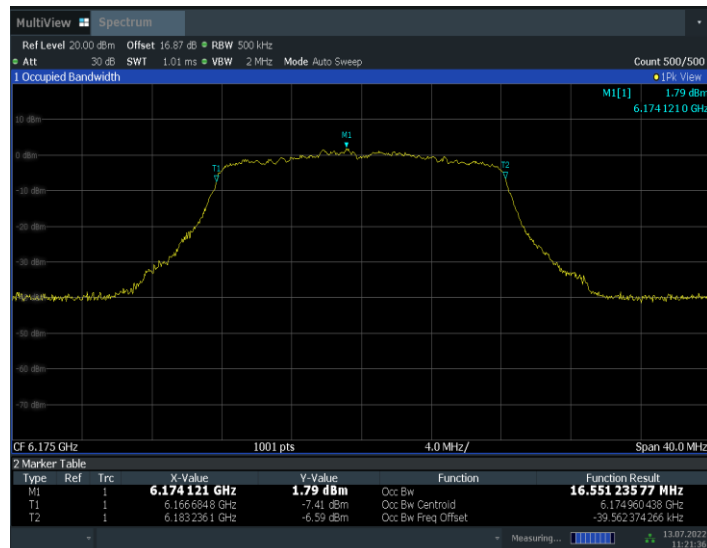
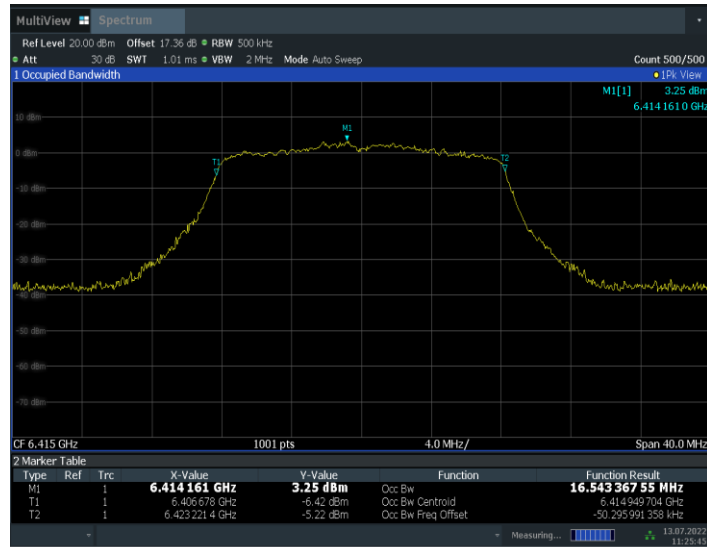
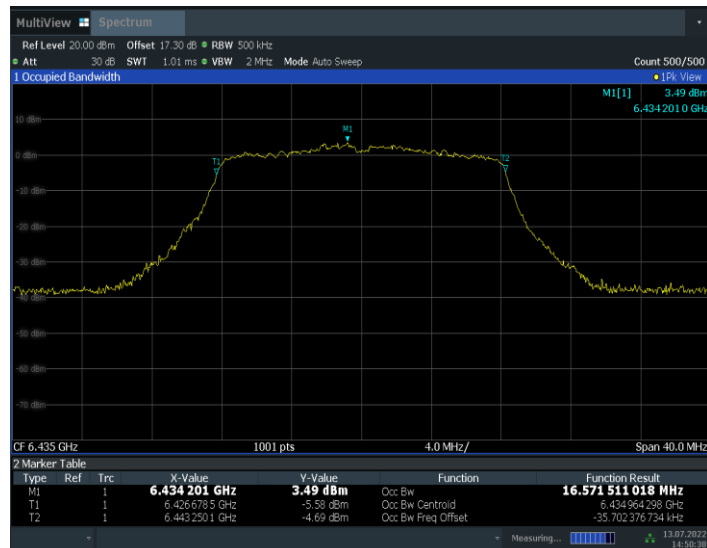


Fig.59 99% Occupied Bandwidth (802.11a, 6175MHz)



11:25:46 13.07.2022

Fig.60 99% Occupied Bandwidth (802.11a, 6415MHz)



14:50:39 13.07.2022

Fig.61 99% Occupied Bandwidth (802.11a, 6435MHz)

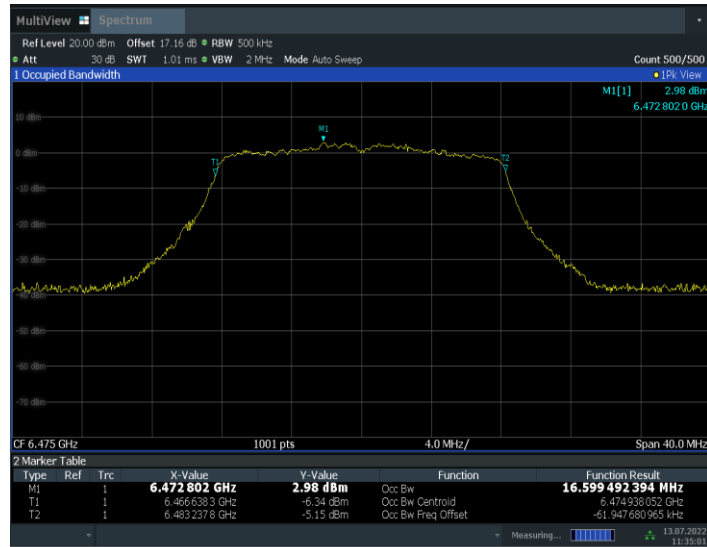


Fig.62 99% Occupied Bandwidth (802.11a, 6475MHz)

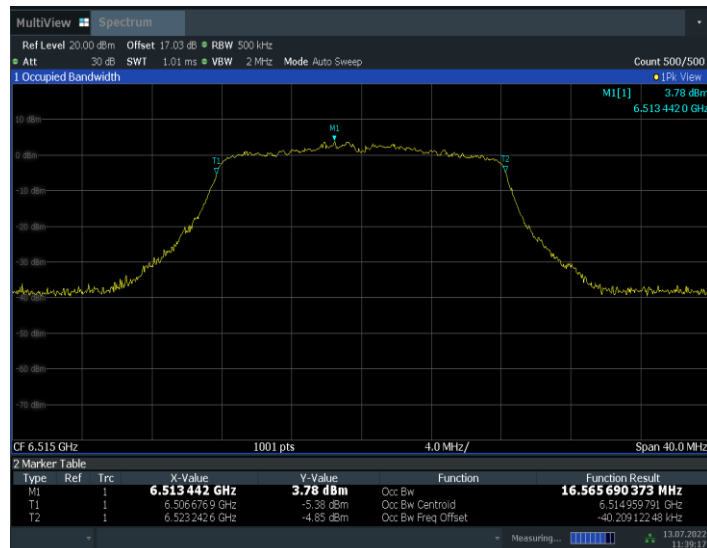
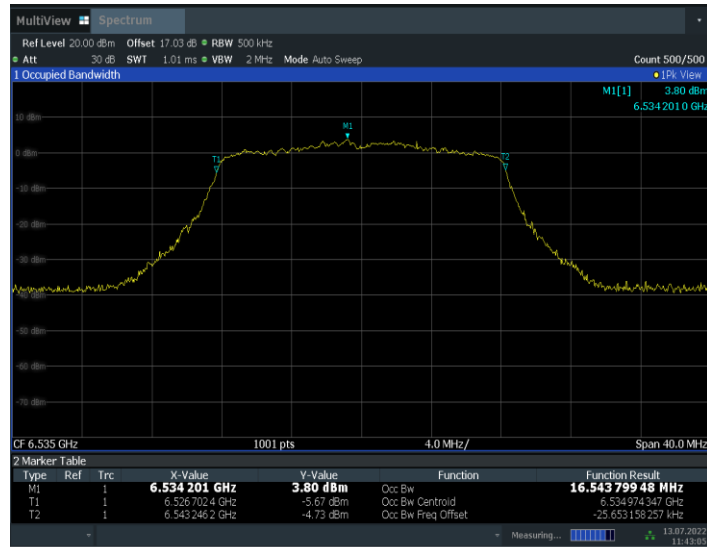
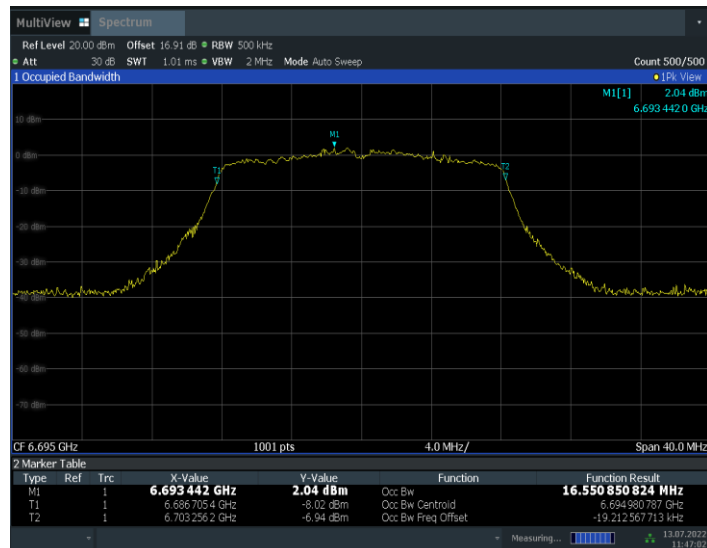


Fig.63 99% Occupied Bandwidth (802.11a, 6515MHz)



11:43:05 13.07.2022

Fig.64 99% Occupied Bandwidth (802.11a, 6535MHz)



11:47:03 13.07.2022

Fig.65 99% Occupied Bandwidth (802.11a, 6695MHz)