FCC RF Test Report

APPLICANT	:	OnePlus Technology (Shenzhen) Co., Ltd.
EQUIPMENT	:	Mobile Phone
BRAND NAME	:	1+,ONEPLUS
MODEL NAME	:	CPH2583
FCC ID	:	2ABZ2-AA550
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	15E 6 GHz Low Power Dual Client (6CD)
TEST DATE(S)	:	Sep. 08, 2023 ~ Oct. 12, 2023

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FR382311G	01	Initial issue of report	Oct. 20, 2023

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403(i) 15.407(a)(10)	26dB Emission Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407(a)(8)	Maximum Conducted Output Power	Reporting only	-
3.2	15.407(a)(8)	Fundamental Maximum EIRP	Pass	-
3.3	15.407(a)(8)	Fundamental Power Spectral Density	Pass	-
3.4	15.407(b)(6)	In-Band Emissions (Channel Mask)	Pass	-
3.5	15.407(d)(6)	Contention Based Protocol	Pass	
3.6	15.407(b)	Unwanted Emissions	Pass	Under limit 5.33 dB at 7125.00 MHz
3.7	15.207	AC Conducted Emission	Pass	Under limit 18.94 dB at 0.19 MHz
3.8	15.203 15.407(a)	Antenna Requirement	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

OnePlus Technology (Shenzhen) Co., Ltd.
18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China.

1.2 Manufacturer

OnePlus Technology (Shenzhen) Co., Ltd.
18C02, 18C03, 18C04, and 18C05, Shum Yip Terra Building, Binhe Avenue North, Futian District, Shenzhen, Guangdong, P.R. China.

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	1+,ONEPLUS
Model Name	CPH2583
FCC ID	2ABZ2-AA550
IMEI Code	Conducted: 865154060024691/865154060024683 Conduction: 865154060025771/865154060025763 Radiation: 865154060025714/865154060025706 CBP: 8651540600025011/8651540600025003
HW Version	11
SW Version	OxygenOS V14.0
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. WIFI 6E 6CD contains two separate reports. This report (FR382311G) is indoor client mode for U-NII-5~8, and another report (FR382311H) is standard client mode for U-NII-5&7.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	U-NII-5: 5925 MHz ~ 6425 MHz U-NII-6: 6425 MHz ~ 6525 MHz U-NII-7: 6525 MHz ~ 6875 MHz U-NII-8: 6875 MHz ~ 7125 MHz
Maximum EIRP	**<MIMO Ant.9+15>** **<U-NII-5~8>** 802.11a : 8.05 dBm / 0.0064 W 802.11be EHT20 : 8.63 dBm / 0.0073 W 802.11be EHT40 : 9.70 dBm / 0.0093 W 802.11be EHT80 : 9.72 dBm / 0.0094 W 802.11be EHT160 : 9.69 dBm / 0.0093 W 802.11be EHT320 : 11.53 dBm / 0.0142 W
99% Occupied Bandwidth	802.11a : 17.68 MHz 802.11be EHT20 : 19.33 MHz 802.11be EHT40 : 38.16 MHz 802.11be EHT80 : 77.92 MHz 802.11be EHT160 : 157.52 MHz 802.11be EHT320 : 316.00 MHz
Antenna Type / Gain	**<5925 MHz ~ 6425 MHz >** <Ant. 9> : IFA Antenna with gain -1.0 dBi <Ant. 15> : IFA Antenna with gain 1.0 dBi **<6425 MHz ~ 6525 MHz >** <Ant. 9> : IFA Antenna with gain -2.0 dBi <Ant. 15> : IFA Antenna with gain -2.8 dBi **<6525 MHz ~ 6875 MHz >** <Ant. 9> : IFA Antenna with gain -2.0 dBi <Ant. 15> : IFA Antenna with gain -2.0 dBi **<6875 MHz ~ 7125 MHz >** <Ant. 9> : IFA Antenna with gain -0.5 dBi <Ant. 15> : IFA Antenna with gain 0 dBi
Type of Modulation	802.11a: OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM) 802.11be: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)

Remark:

1. For 802.11ax/be 20/40/80/160MHz mode, the power setting of 802.11ax 20/40/80/160MHz mode is the same or lower than 802.11be 20/40/80/160MHz mode. Therefore, the whole testing has assessed only 802.11be 20/40/80/160MHz mode.
2. For WLAN SISO & MIMO CDD mode, the whole testing has assessed only MIMO CDD mode by referring to the higher normal conducted power.
3. The device does not support channel puncturing function under CBP mode.
4. 802.11ax/be support full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) are tested for conducted power/PSD/Channel Mask in appendix A, all the other test case were performed with full RU with its maximum power/PSD.

5. 802.11be support small size RU, Large size RU and Puncturing modes as below, which is less than full RU conducted power, therefore have assessed only Power Density/Mask/RSE.

<Small size RU 52+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	26	52	1	38	1
20MHz	52	26	38	4	2
20MHz	52	26	39	7	3

<Small size RU 106+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	106	26	53	4	1
20MHz	26	106	4	54	2

<Large size RU 484+242 tone> & <80M BW Puncturing 20MHz>:

Bandwidth	Tones		Index		For test modes configure
80MHz	242	484	62	66	1
80MHz	242	484	61	66	2
80MHz	484	242	65	64	3
80MHz	484	242	65	63	4

<Large size RU 996+484 tone> & <160M BW Puncturing 40MHz>:

Bandwidth	Tones		Index		For test modes configure
160MHz	484-Left	996-Right	66-Left	67-Right	1
160MHz	484-Left	996-Right	65-Left	67-Right	2
160MHz	996-Left	484-Right	67-Left	66-Right	3
160MHz	996-Left	484-Right	67-Left	65-Right	4

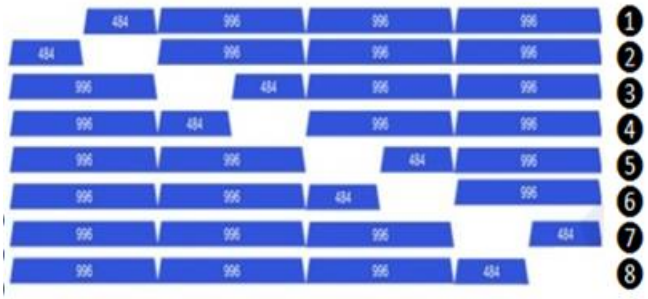
<Large size RU 996+484+242 tone> & <160M BW Puncturing 20MHz>:

Bandwidth	Tones			Index			For test modes configure
160MHz	242-Left	484-Left	996-Right	62-Left	66-Left	67-Right	1
160MHz	242-Left	484-Left	996-Right	61-Left	66-Left	67-Right	2
160MHz	484-Left	242-Left	996-Right	65-Left	64-Left	67-Right	3
160MHz	484-Left	242-Left	996-Right	65-Left	63-Left	67-Right	4
160MHz	996-Left	242-Right	484-Right	67-Left	62-Right	66-Right	5
160MHz	996-Left	242-Right	484-Right	67-Left	61-Right	66-Right	6
160MHz	996-Left	484-Right	242-Right	67-Left	65-Right	64-Right	7
160MHz	996-Left	484-Right	242-Right	67-Left	65-Right	63-Right	8

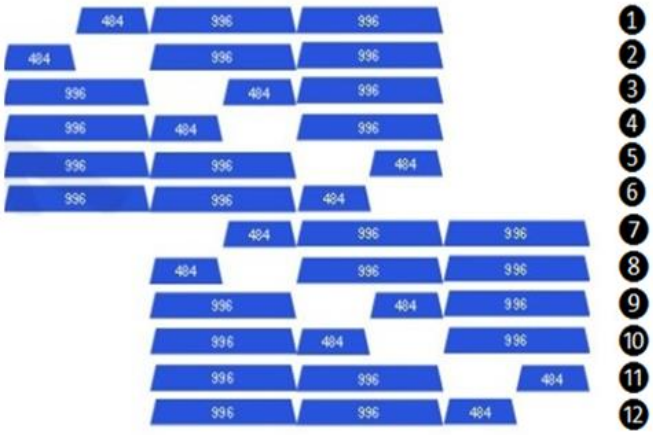
<Large size RU 3*996 tone> & <320M BW Puncturing 80MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4

<Large size RU 3*996+484 tone> & <320M BW Puncturing 40MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4
			5
			6
			7
			8

<Large size RU 2*996+484 tone> & <320M BW Puncturing 80+40MHz>:

Bandwidth	Tones	Index	For test modes configure
320MHz			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12

Only the worse cases are shown in this report.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-SZ TH01-SZ DFS01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b
3.	DFS01-SZ	Sporton	Test Tools	1.0

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v02r01
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

<U-NII-5, 6, 7, 8>

BW 20M	**Channel**	1	5	9	13	17	21	25	29
	Freq. (MHz)	5955	5975	5995	6015	6035	6055	6075	6095
BW 40M	**Channel**	3		11		19		27	
	Freq. (MHz)	5965		6005		6045		6085	
BW 80M	**Channel**	7				23			
	Freq. (MHz)	5985				6065			
BW 160M	**Channel**	15							
	Freq. (MHz)	6025							

BW 20M	**Channel**	33	37	41	45	49	53	57	61
	Freq. (MHz)	6115	6135	6155	6175	6195	6215	6235	6255
BW 40M	**Channel**	35		43		51		59	
	Freq. (MHz)	6125		6165		6205		6245	
BW 80M	**Channel**	39				55			
	Freq. (MHz)	6145				6225			
BW 160M	**Channel**	47							
	Freq. (MHz)	6185							
BW 320M	**Channel**	31				63			
	Freq. (MHz)	6105				6265			

BW 20M	Channel	65	69	73	77	81	85	89	93
	Freq. (MHz)	6275	6295	6315	6335	6355	6375	6395	6415
BW 40M	Channel	67		75		83		91	
	Freq. (MHz)	6285		6325		6365		6405	
BW 80M	Channel	71				87			
	Freq. (MHz)	6305				6385			
BW 160M	Channel	79							
	Freq. (MHz)	6345							
BW 320M	Channel	95							
	Freq. (MHz)	6425							

BW 20M	Channel	97	101	105	109	113	117	121	125
	Freq. (MHz)	6435	6455	6475	6495	6515	6535	6555	6575
BW 40M	Channel	99		107		115		123	
	Freq. (MHz)	6445		6485		6525		6565	
BW 80M	Channel	103				119			
	Freq. (MHz)	6465				6545			
BW 160M	Channel	111							
	Freq. (MHz)	6505							

BW 20M	Channel	129	133	137	141	145	149	153	157
	Freq. (MHz)	6595	6615	6635	6655	6675	6695	6715	6735
BW 40M	Channel	131		139		147		155	
	Freq. (MHz)	6605		6645		6685		6725	
BW 80M	Channel	135				151			
	Freq. (MHz)	6625				6705			
BW 160M	Channel	143							
	Freq. (MHz)	6665							
BW 320M	Channel	127							
	Freq. (MHz)	6585							

BW 20M	Channel	161	165	169	173	177	181	185	189
	Freq. (MHz)	6755	6775	6795	6815	6835	6855	6875	6895
BW 40M	Channel	163		171		179		187	
	Freq. (MHz)	6765		6805		6845		6885	
BW 80M	Channel	167				183			
	Freq. (MHz)	6785				6865			
BW 160M	Channel	175							
	Freq. (MHz)	6825							
BW 320M	Channel	159							
	Freq. (MHz)	6745							

BW 20M	Channel	193	197	201	205	209	213	217	221
	Freq. (MHz)	6915	6935	6955	6975	6995	7015	7035	7055
BW 40M	Channel	195		203		211		219	
	Freq. (MHz)	6925		6965		7005		7045	
BW 80M	Channel	199				215			
	Freq. (MHz)	6945				7025			
BW 160M	Channel	207							
	Freq. (MHz)	6985							
BW 320M	Channel	191							
	Freq. (MHz)	6905							

BW 20M	Channel	225	229	233
	Freq. (MHz)	7075	7095	7115
BW 40M	Channel	227		
	Freq. (MHz)	7085		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11a	6 Mbps
802.11be EHT20	MCS0
802.11be EHT40	MCS0
802.11be EHT80	MCS0
802.11be EHT160	MCS0
802.11be EHT320	MCS0

Co-location modes
WLAN6G 11a CH233 + WLAN2.4G 11be40(Ant.7+12) CH06 + LTE B48 Link
WLAN6G 11a CH233 + WLAN2.4G 11be40(Ant.12) CH06 + LTE B48 Link + BLE CH38(Ant.7)
WLAN6G 11a CH233 + WLAN2.4G 11be40(Ant.7) CH06 + LTE B48 Link + BLE CH38(Ant. 12)

Test Cases	
AC Conducted Emission	Mode 1 : GSM850 Idle + BT Link + WLAN Link(6G) + USB Cable + Adapter 1

Remark:
1. For Radiated Test Cases, the tests were performed with Adapter 1 and USB Cable.
2. For simultaneous transmission test mode, the combination testing was assessed from the worst RSE link mode of WWAN (GSM/WCDMA/LTE/5G NR) and the worst RSE link mode of BT/WLAN (2.4G/6G).

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11a/be EHT20	802.11a/be EHT20	802.11a/be EHT20	802.11a/be EHT20
L	Low	001	097	117	189
M	Middle	045	105	149	209
H	High	093	113	181	229/233
Straddle		-	-	-	185

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE40	802.11ax HE40	802.11ax HE40	802.11ax HE40
L	Low	003	099	123	195
M	Middle	043	-	147	203
H	High	091	107	179	227
Straddle		-	115	-	187

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE80	802.11ax HE80	802.11ax HE80	802.11ax HE80
L	Low	007	103	135	199
M	Middle	039		151	-
H	High	087		167	215
Straddle		-	119	183	-

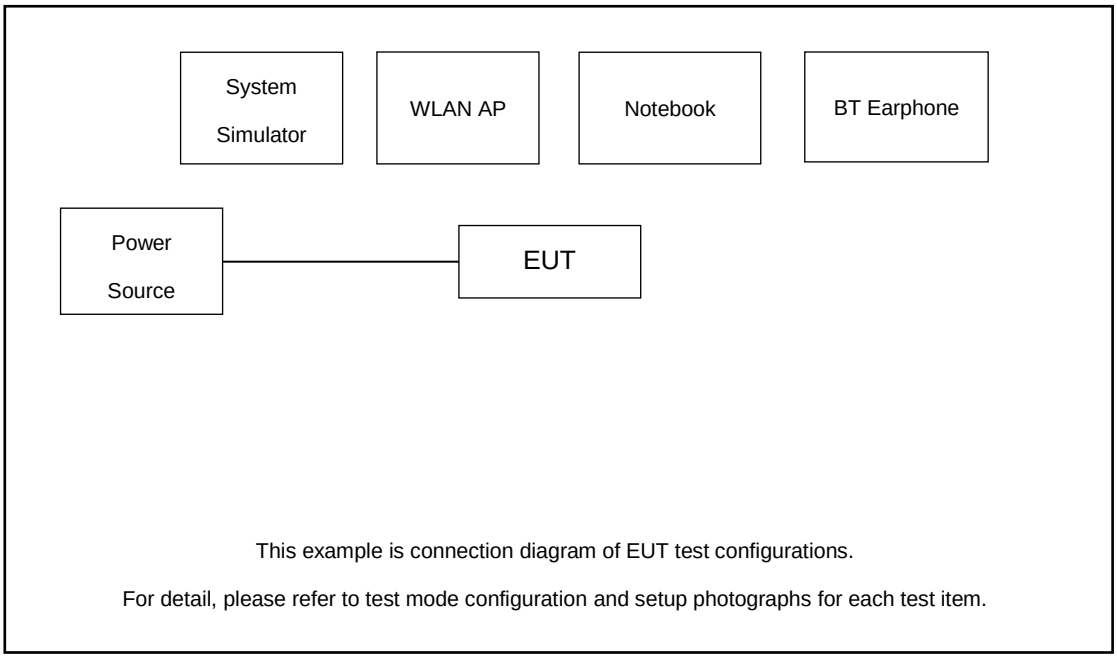
Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11ax HE160	802.11ax HE160	802.11ax HE160	802.11ax HE160
L	Low	015	-	143	207
M	Middle	047			
H	High	079			
Straddle		-	111	175	-

Ch. #		5925-6425 MHz UNII-5	6425-6525 MHz UNII-6	6525-6875 MHz UNII-7	6875-7125 MHz UNII-8
		802.11be EHT320	802.11be EHT320	802.11be EHT320	802.11be EHT320
L	Low	-	-	-	-
M	Middle	031			
H	High	063			
Straddle		095	-	127/159	191

Remark: For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.

2.3 Connection Diagram of Test System

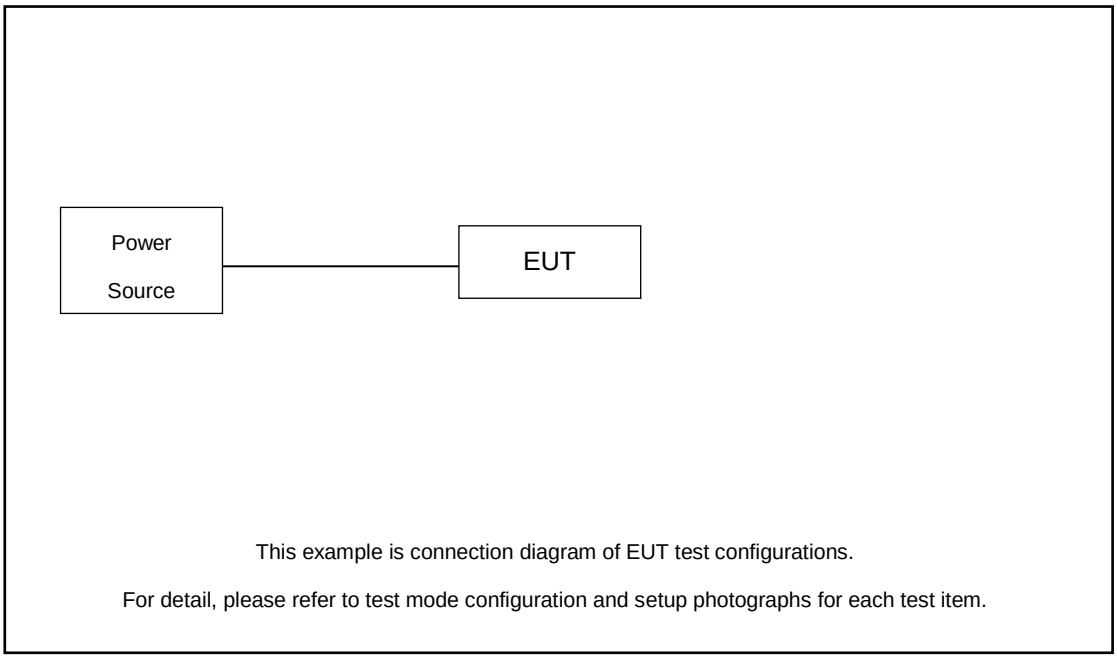
For AC Conducted Emission



This example is connection diagram of EUT test configurations.

For detail, please refer to test mode configuration and setup photographs for each test item.

For Radiated Emission



This example is connection diagram of EUT test configurations.

For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
2.	WLAN AP	Dlink	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
3.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Samsung	EO-MG900	PYAHS-107W	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program (QRCT TX Tool) was provided and enabled to make EUT continuously transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 3.0 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 3.0 + 10 = 13.0 (dB)

3 Test Result

3.1 26dB & 99% Occupied Bandwidth Measurement

3.1.1 Limit of 26dB & 99% Occupied Bandwidth

<FCC 14-30 CFR 15.407>

(a)(10) The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.

3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
8. Measure and record the results in the test report.

3.1.4 Test Setup

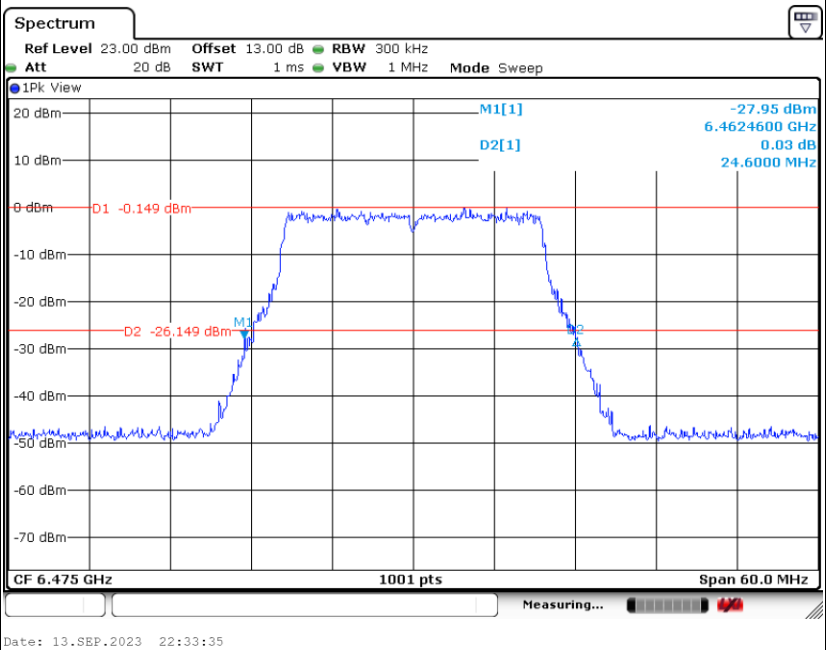
3.1.5 Test Result of 26dB & 99% Occupied Bandwidth

Please refer to Appendix A.

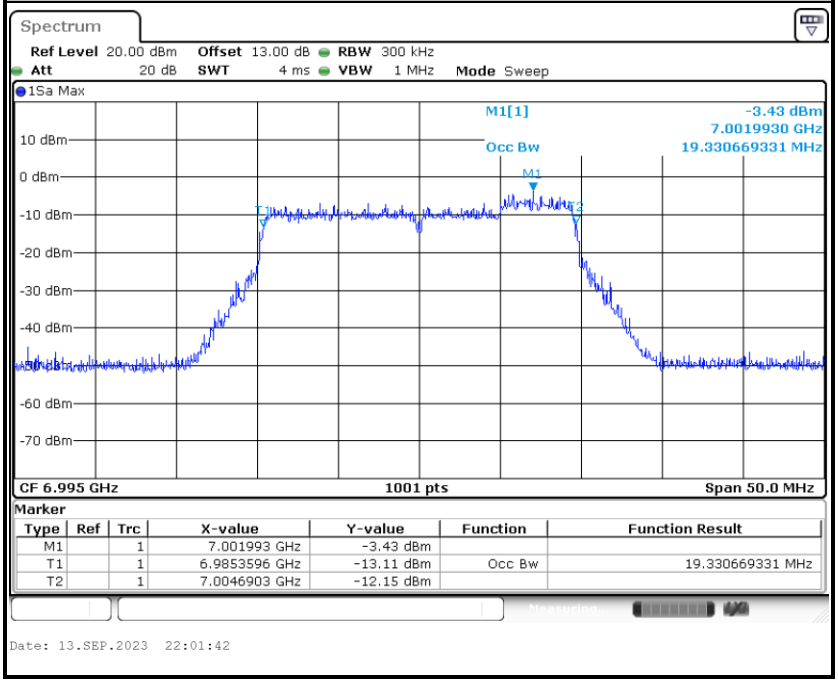
Only the maximum 26dB EBW & 99% OBW plots of each bandwidth shown in the report.

For 20MHz:

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth

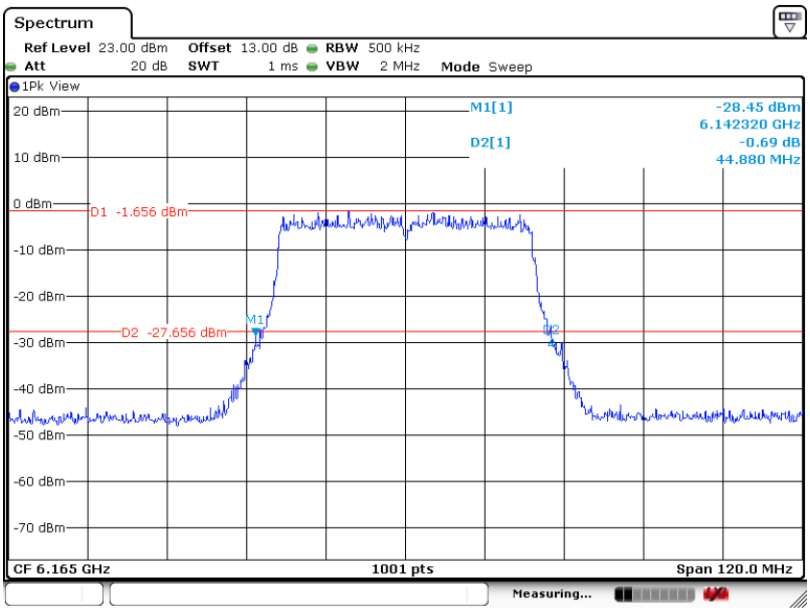


Marker

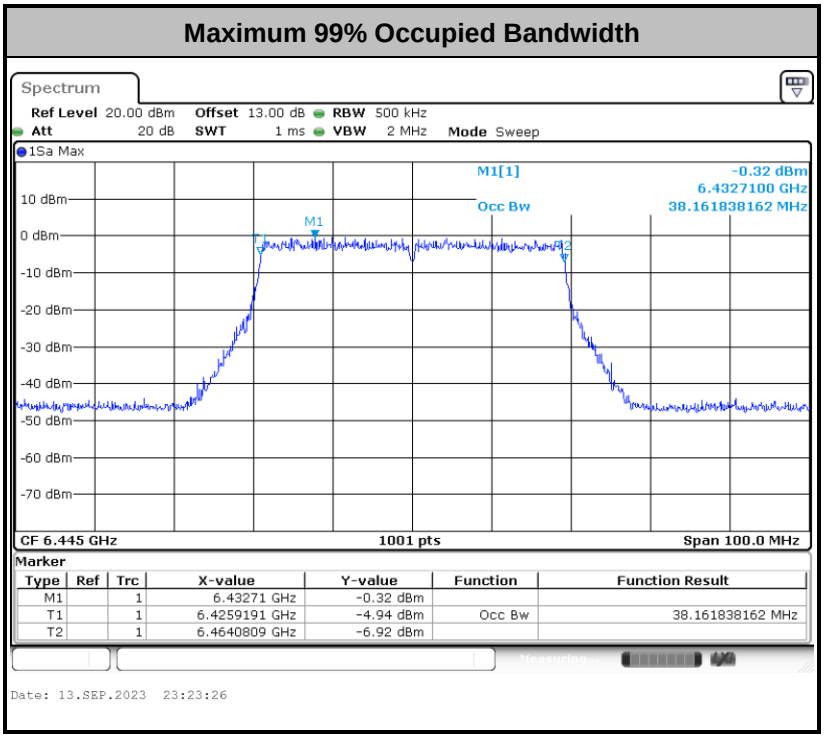
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	7.001993 GHz	-3.43 dBm		
T1		1	6.9853596 GHz	-13.11 dBm	Occ Bw	19.330669331 MHz
T2		1	7.0046903 GHz	-12.15 dBm		

For 40MHz:

Maximum 26dB Bandwidth

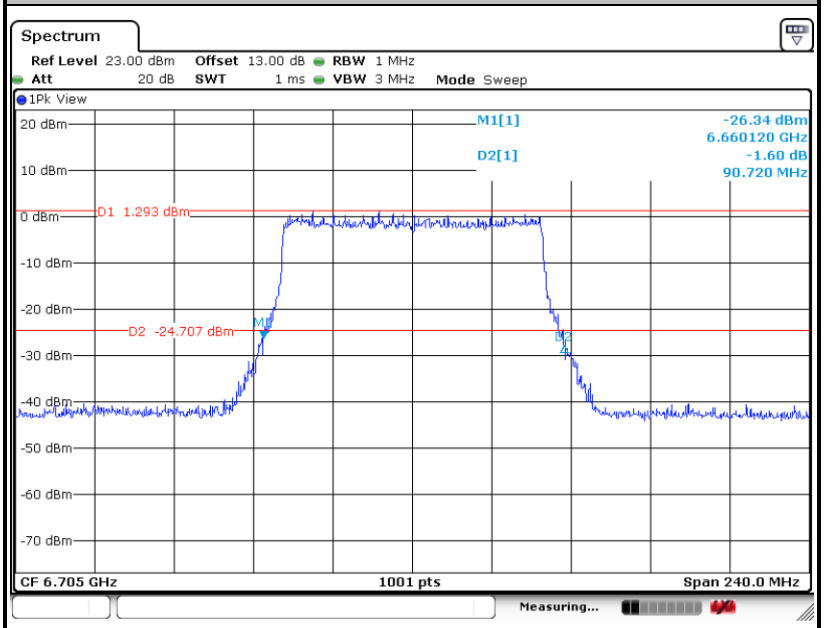


Maximum 99% Occupied Bandwidth

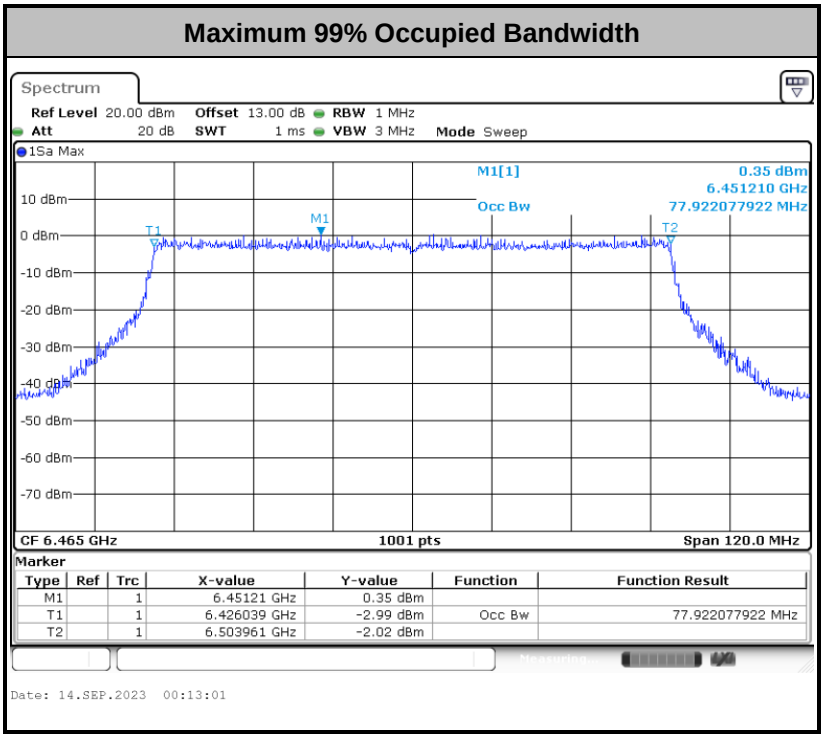


For 80MHz:

Maximum 26dB Bandwidth

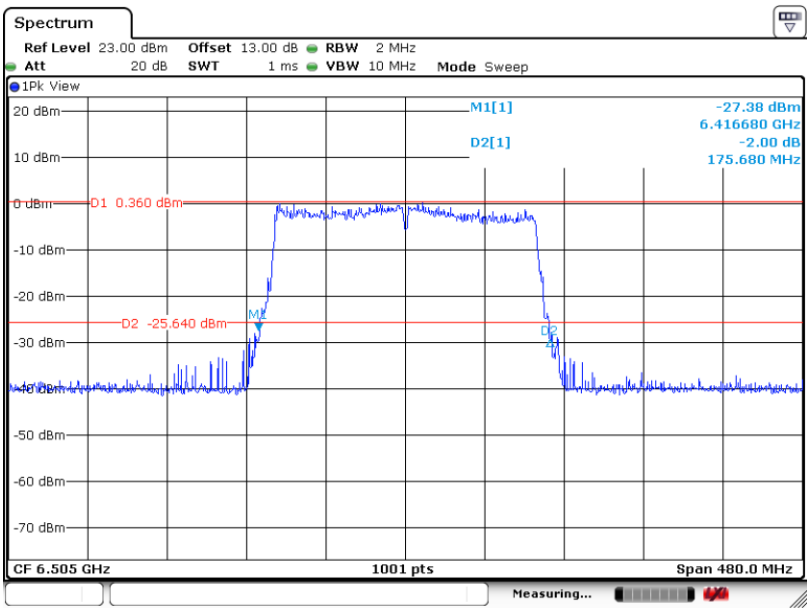


Maximum 99% Occupied Bandwidth

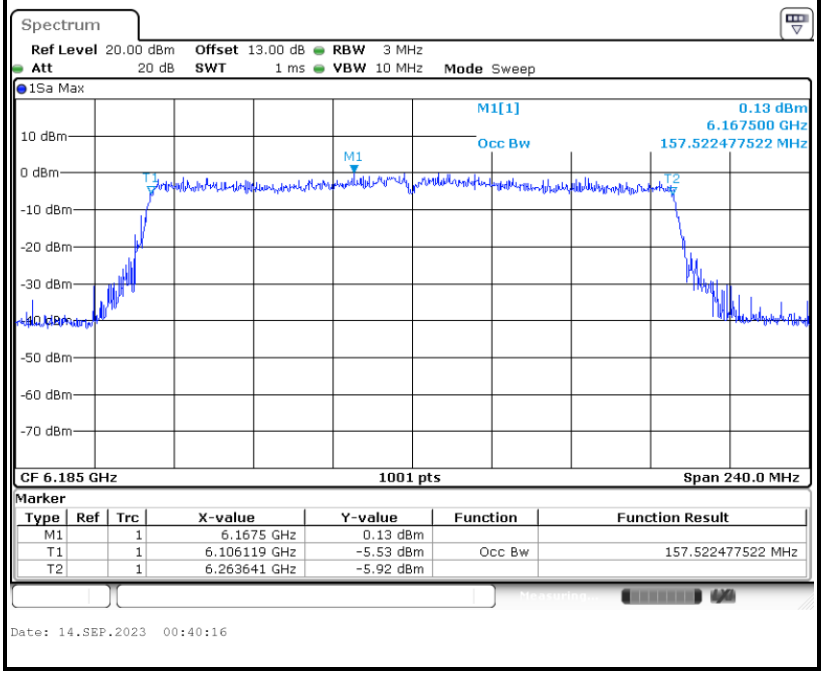


For 160MHz:

Maximum 26dB Bandwidth

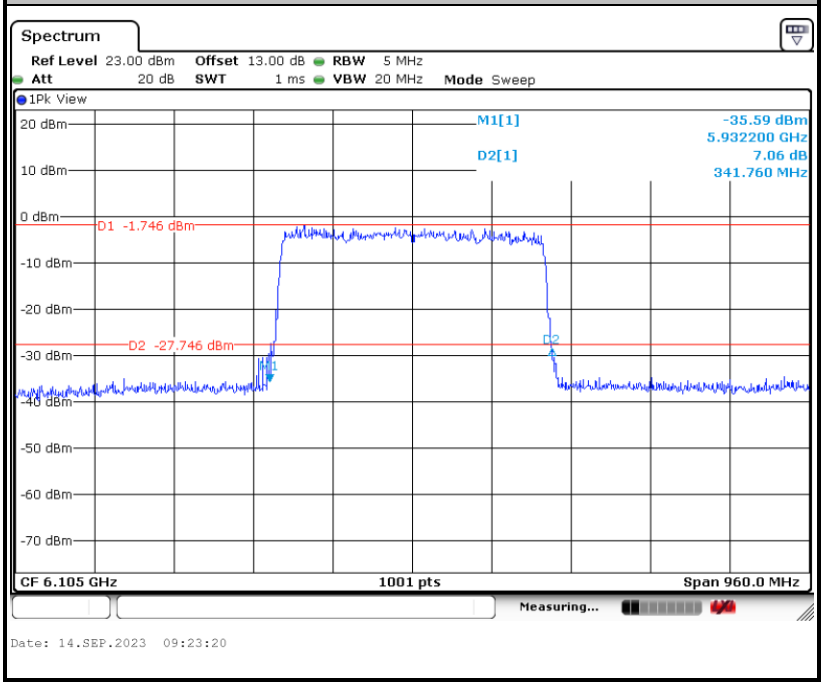


Maximum 99% Occupied Bandwidth

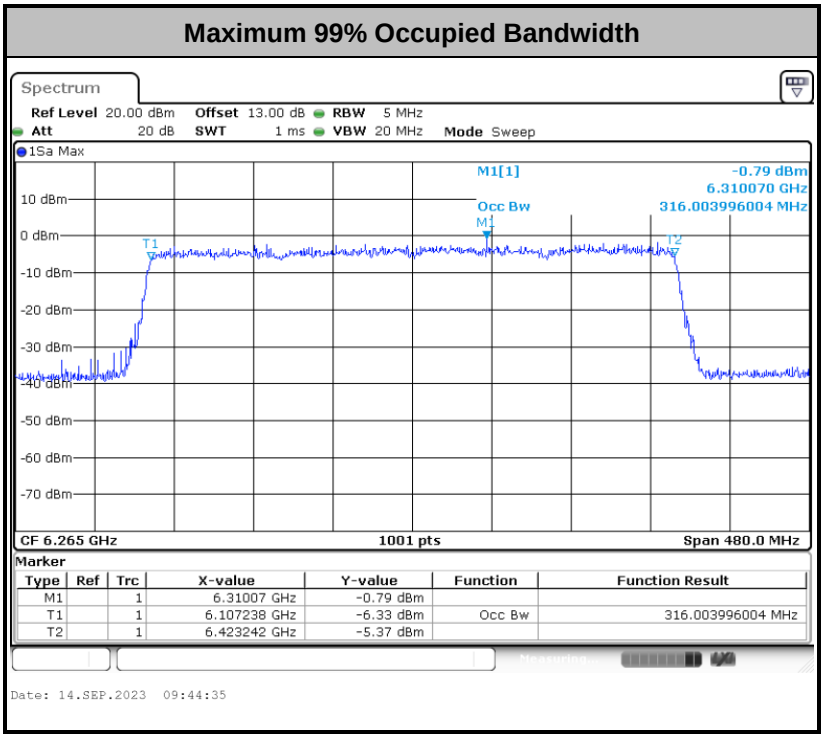


For 320MHz:

Maximum 26dB Bandwidth



Maximum 99% Occupied Bandwidth



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum conducted Output Power and Fundamental Maximum EIRP Measurement

3.2.1 Limit of Fundamental Maximum EIRP

<FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

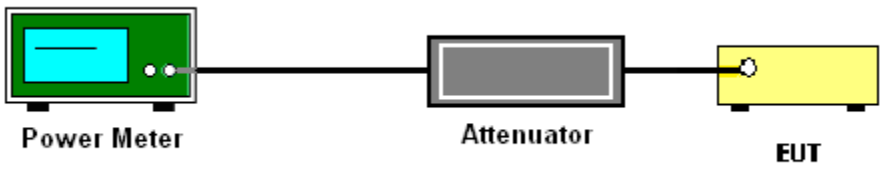
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

3.2.4 Test Setup



3.2.5 Test Result of Fundamental Maximum EIRP

Please refer to Appendix A.

3.3 Fundamental Power Spectral Density Measurement

3.3.1 Limit of Fundamental Power Spectral Density

<FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed −1 dBm e.i.r.p. in any 1-megahertz band.

3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section F) Maximum power spectral density.

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

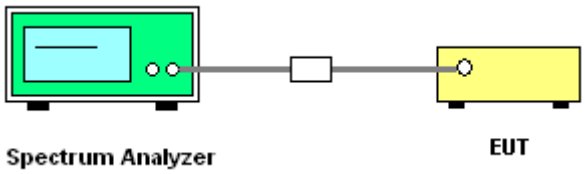
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, attenuator loss and duty factor. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (a): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

3.3.4 Test Setup

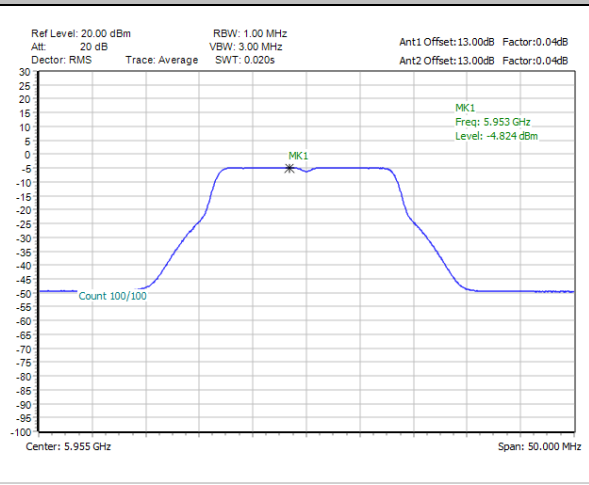
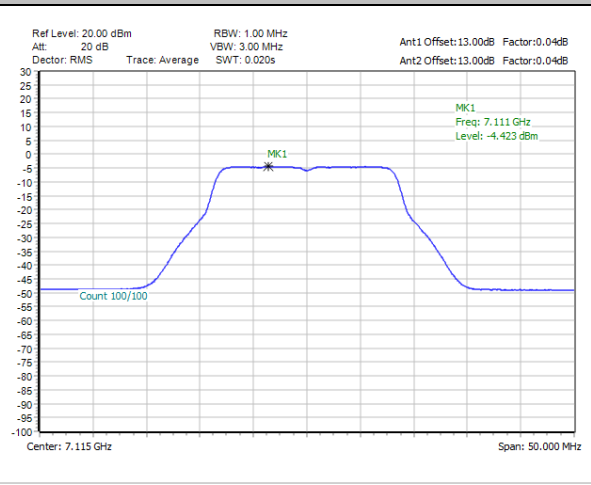
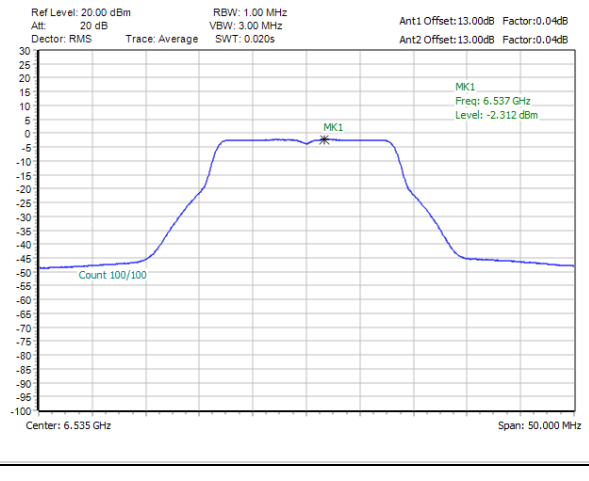
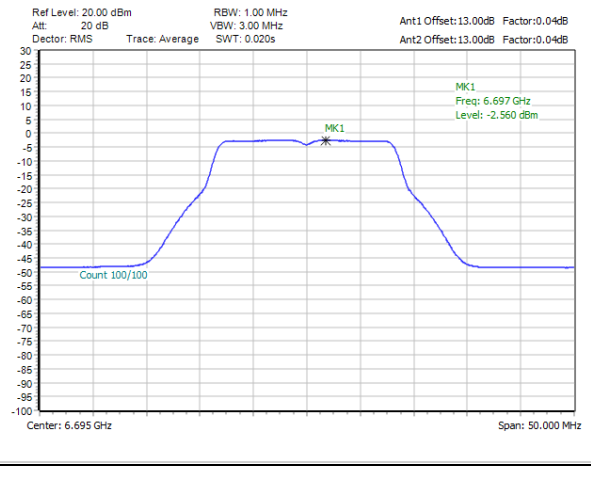


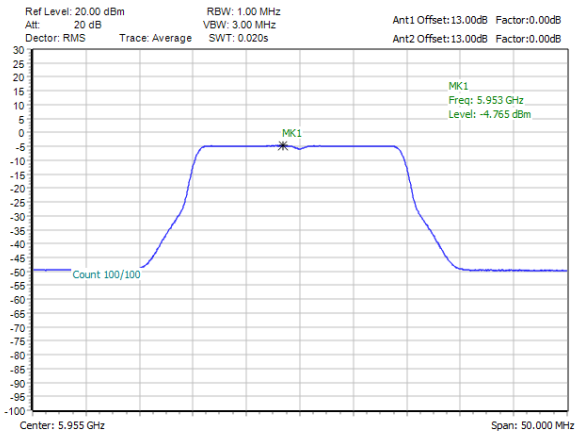
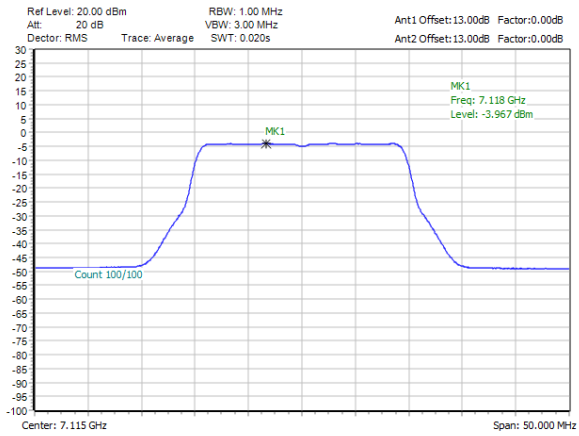
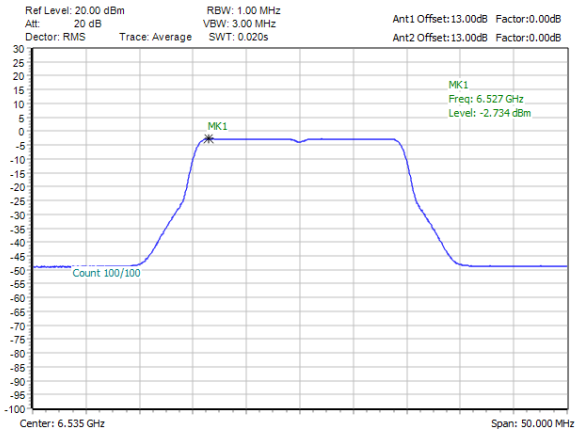
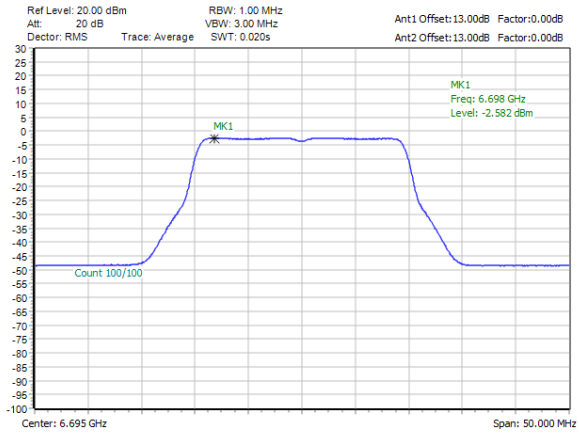
3.3.5 Test Result of Power Spectral Density

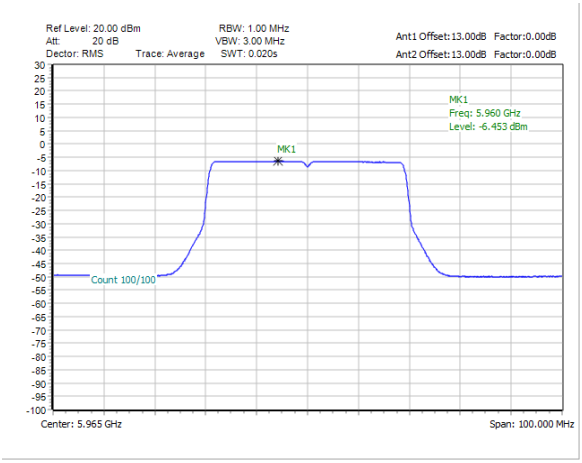
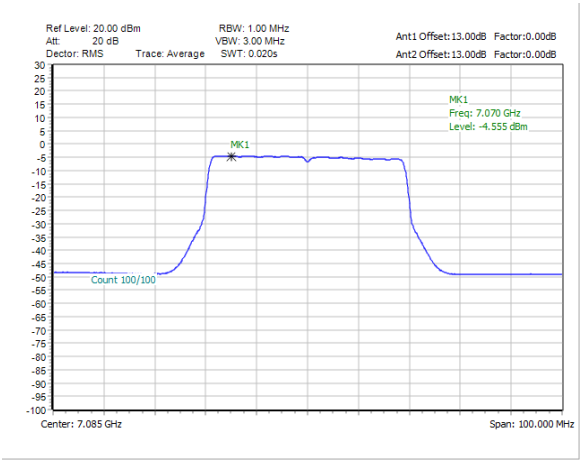
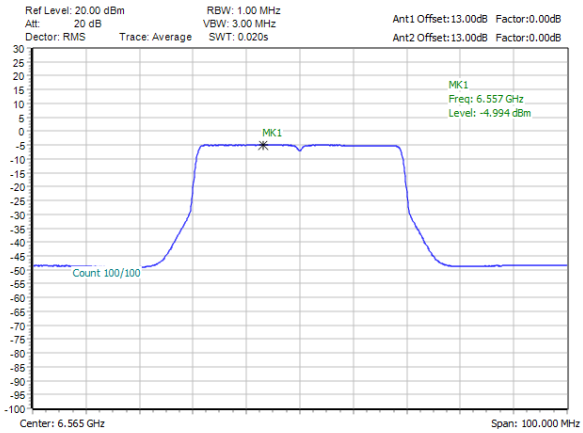
Please refer to Appendix A for Small RU & Large RU & Puncturing mode.

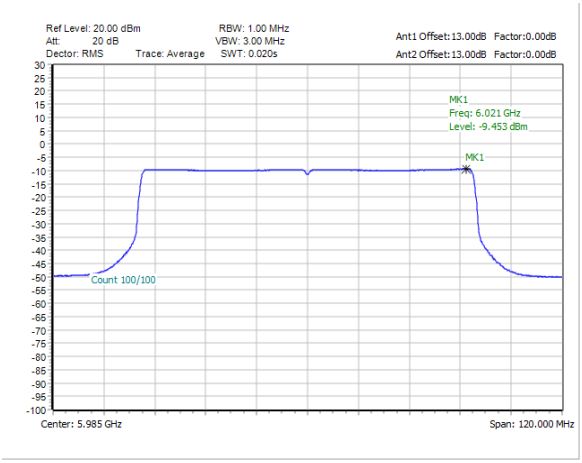
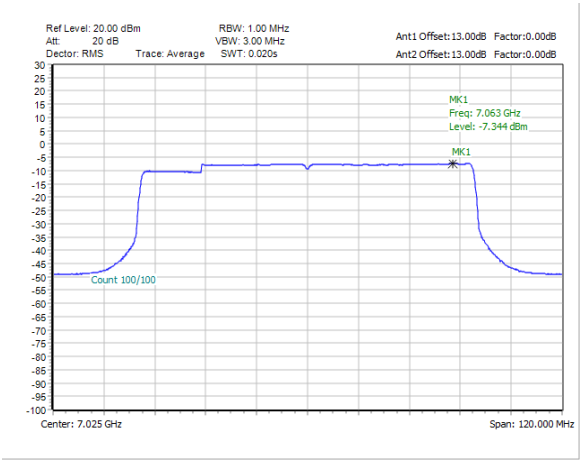
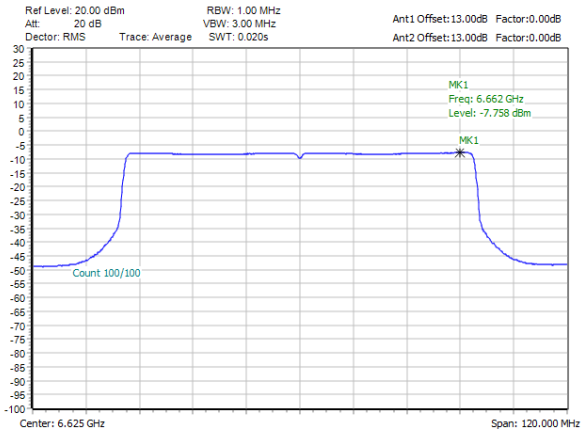
Only the L/M/H channel PSD plots of Full RU & Partial Single RU for each bandwidth are shown as follows:

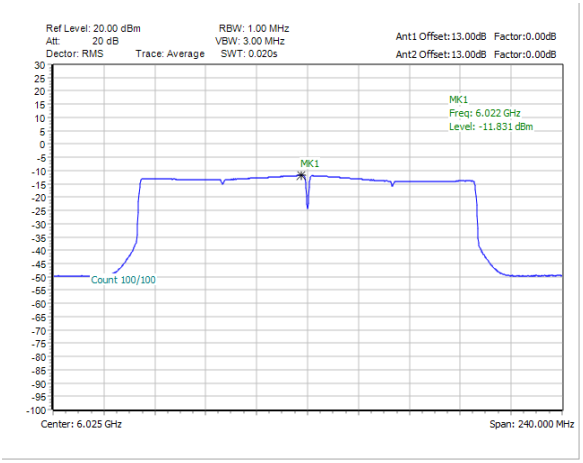
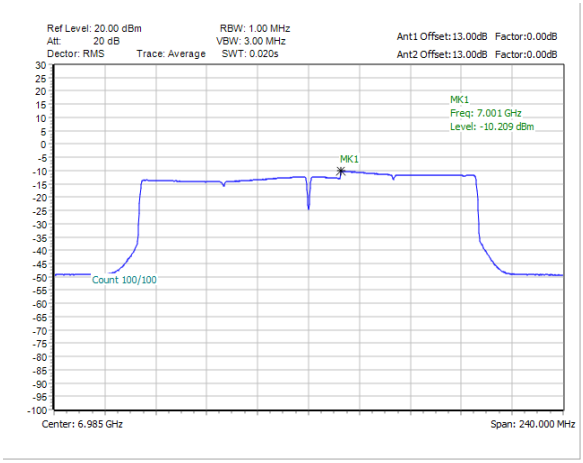
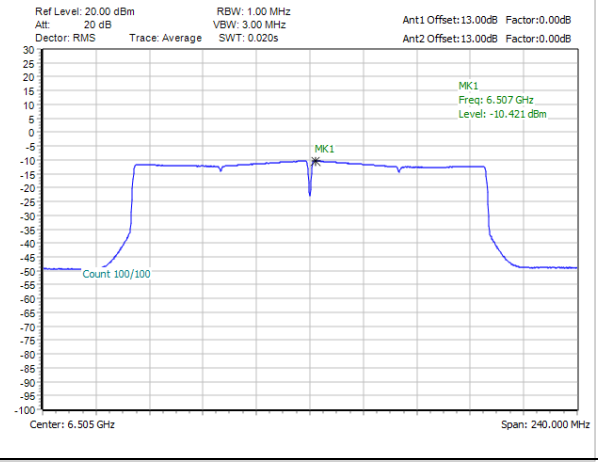
<MIMO Ant.9+15>:

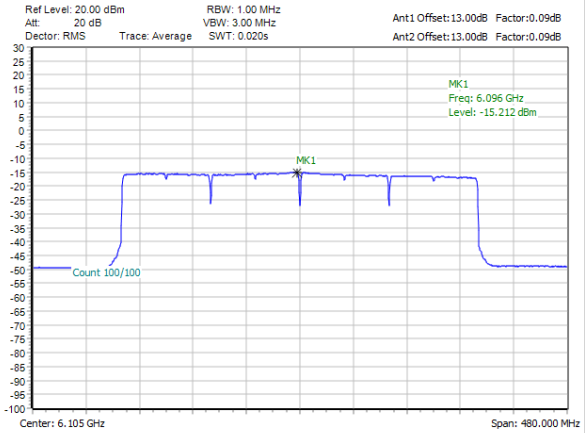
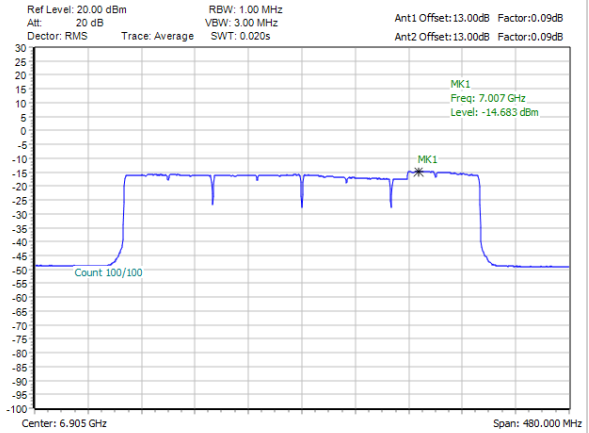
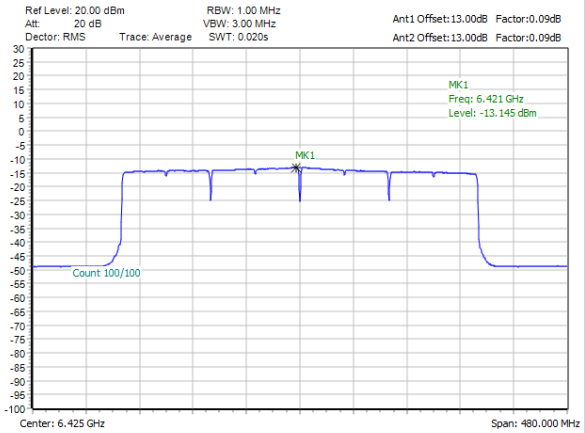
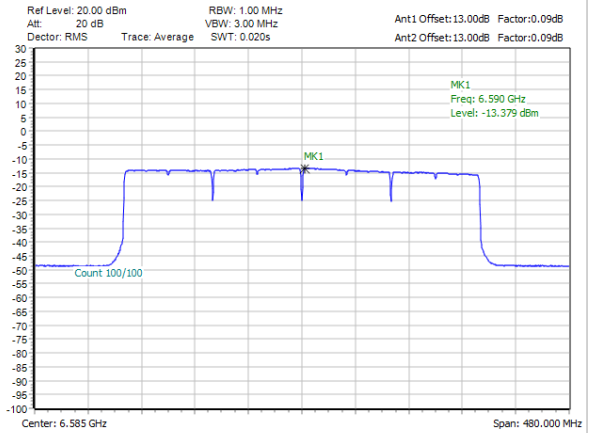
802.11a	
Low CH01 5955MHz	**High CH233 7115MHz**
	
Middle CH 117 6535MHz	**Middle CH 149 6695MHz**
	

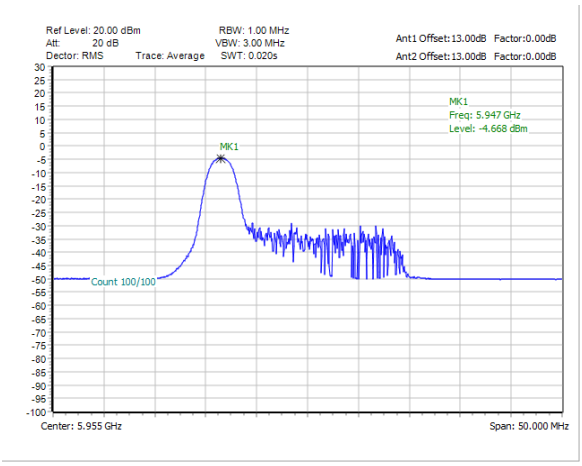
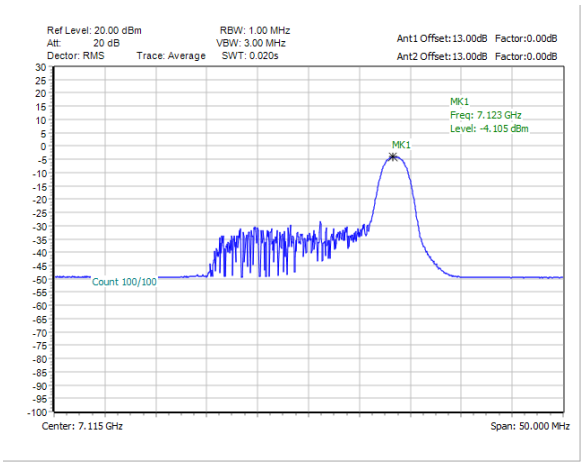
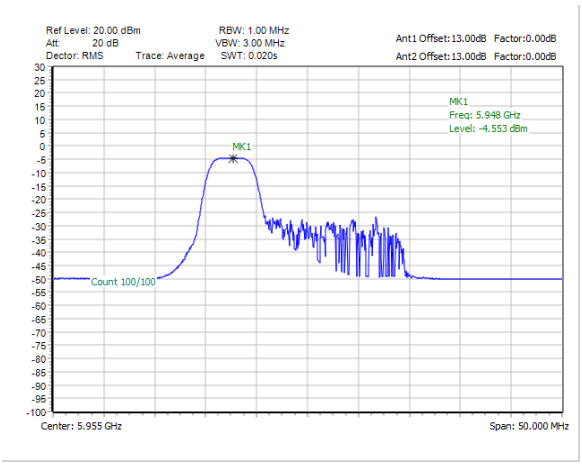
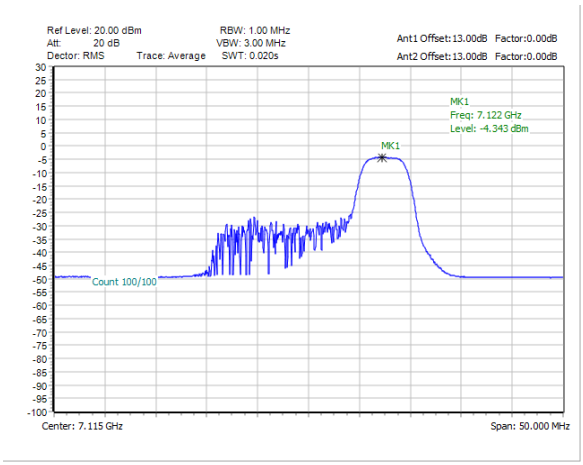
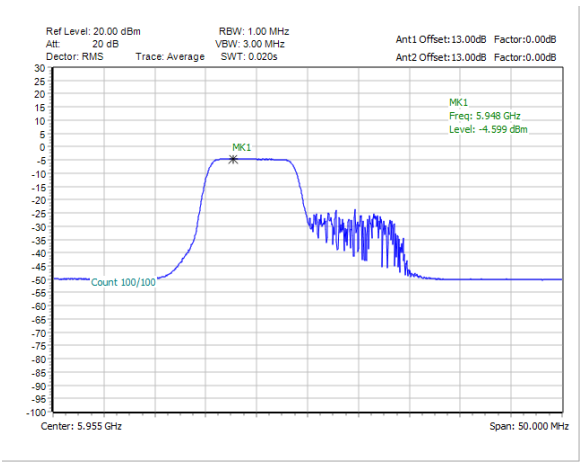
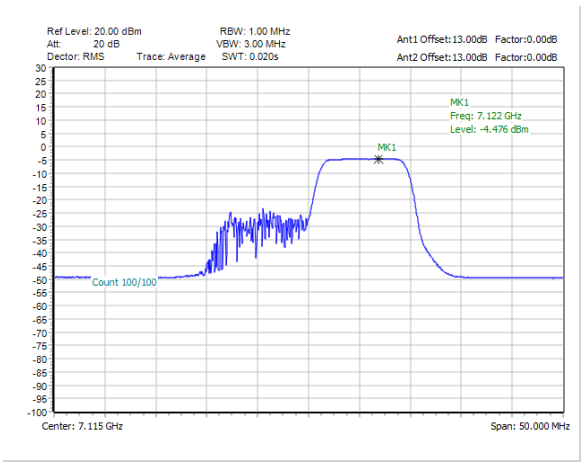
802.11be EHT20 Full RU	
Low CH01 5955MHz	**High CH233 7115MHz**
	
Middle CH 117 6535MHz	**Middle CH 149 6695MHz**
	

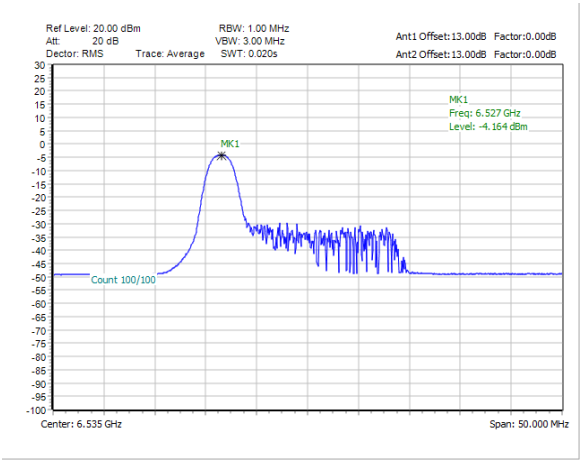
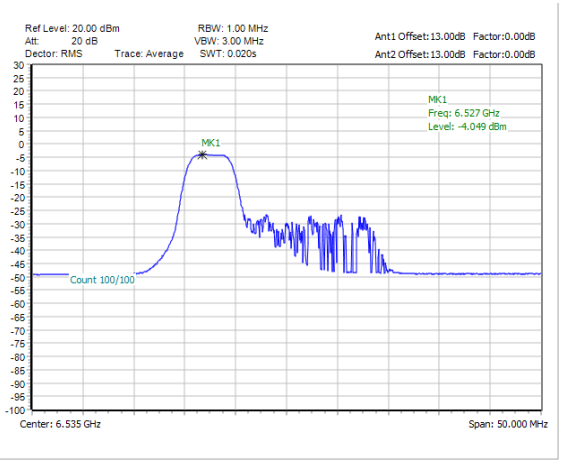
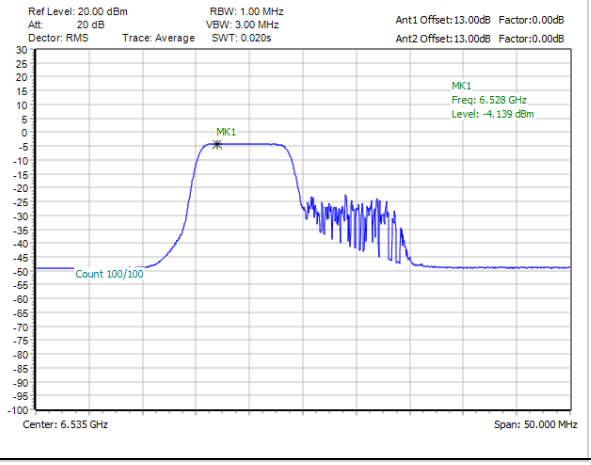
802.11ax HE40 Full RU	
Low CH03 5965MHz	High CH227 7085MHz
	
Middle CH123 6565MHz	
	

802.11be EHT80 Full RU	
Low CH07 5985MHz	High CH215 7025MHz
	
Middle CH 135 6625MHz	
	

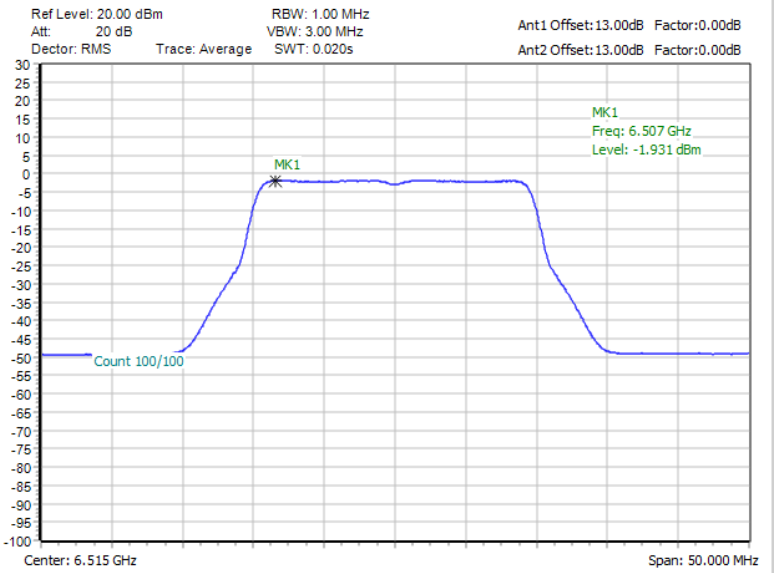
802.11be EHT160 Full RU	
Low CH015 6025MHz	High CH207 6985MHz
	
Middle CH 111 6505MHz	
	

802.11be EHT320 Full RU	
Low CH31 6105MHz	**High CH191 6905MHz**
	
Middle CH 95 6425MHz	**Middle CH 127 6585MHz**
	

802.11be EHT20 Partial RU	
Low CH01 5955MHz 26RU0	**High CH233 7115MHz 26RU8**
	
Low CH01 5955MHz 52RU37	**High CH233 7115MHz 52RU40**
	
Low CH01 5955MHz 106RU53	**High CH233 7115MHz 106RU54**
	

802.11be EHT20 Partial RU	
Middle CH 117 6535MHz 26RU0	Middle CH 117 6535MHz 52RU37
	
Middle CH 117 6535MHz 106RU53	
	

Worst Case Power Density (dBm/MHz)
802.11be EHT20 CH113 6515MHz



3.4 In-Band Emissions (Channel Mask)

3.4.1 Limit of Unwanted Emissions

<FCC 14-30 CFR 15.407>

(b)(6) For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement.

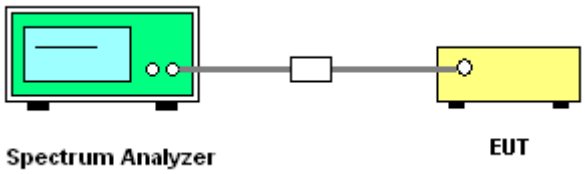
Section J) In-Band Emissions.

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 ≥ 3 X RBW
   d) Number of points in sweep ≥ [2 X span / 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.
   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.

3.4.4 Test Setup



3.4.5 Test Result

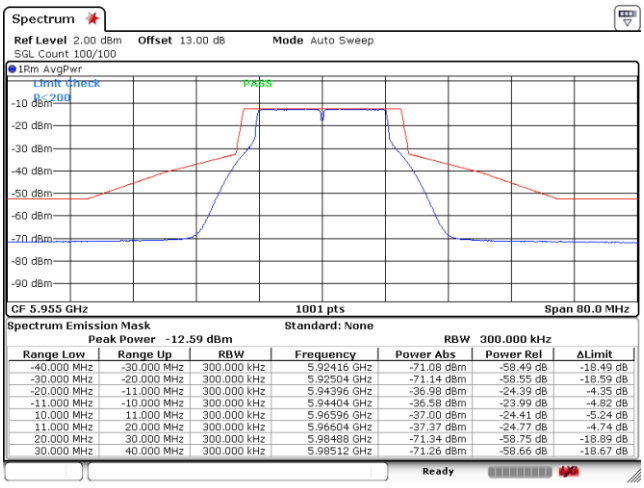
Please refer to Appendix A for Small RU & Large RU & Puncturing mode.

Only the Channel Mask plots of Full RU & Partial Single RU are shown as follows:

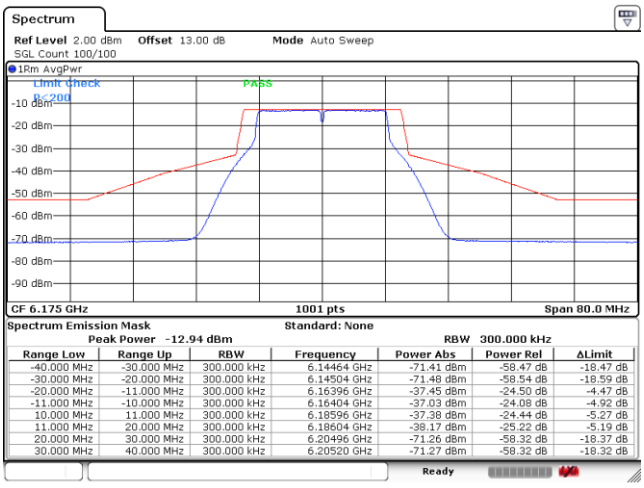
<MIMO Ant.9+15(9)>:

EUT Mode :	802.11a

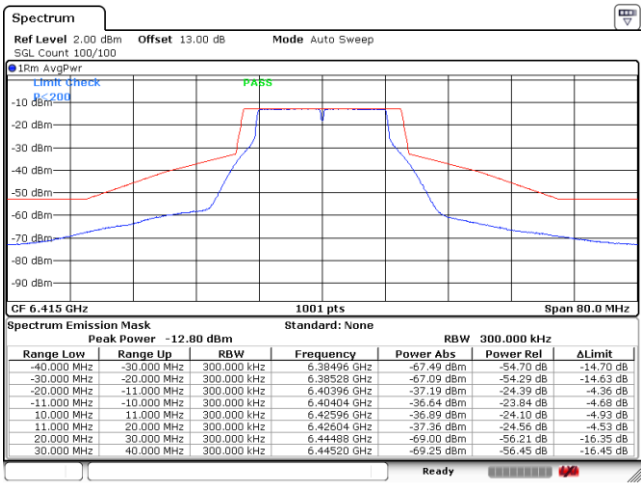
Plot on Channel 5955MHz



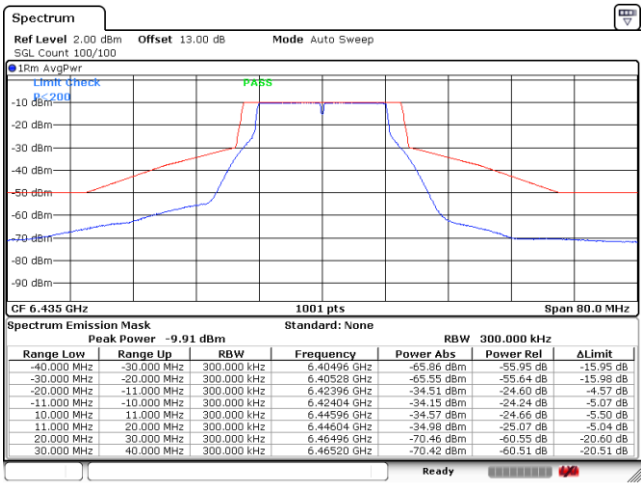
Plot on Channel 6175MHz



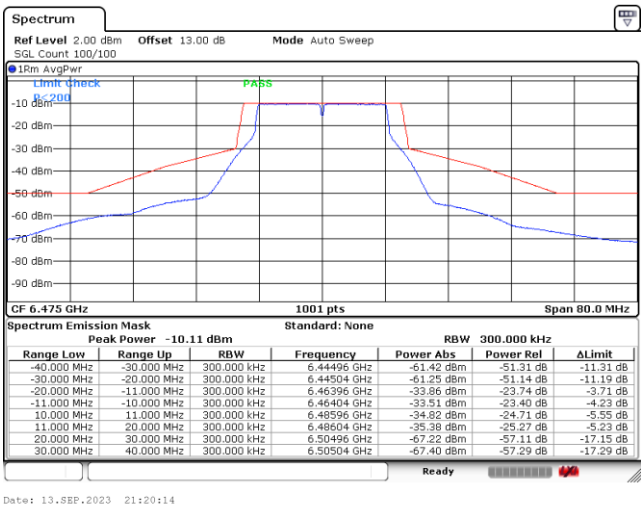
Plot on Channel 6415MHz



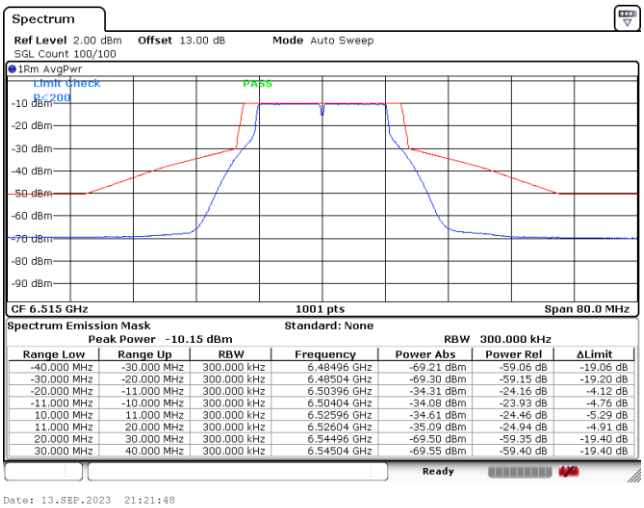
Plot on Channel 6435MHz



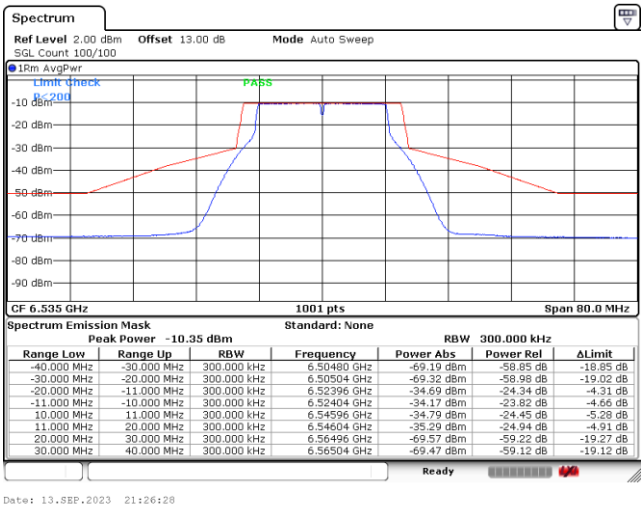
Plot on Channel 6475MHz



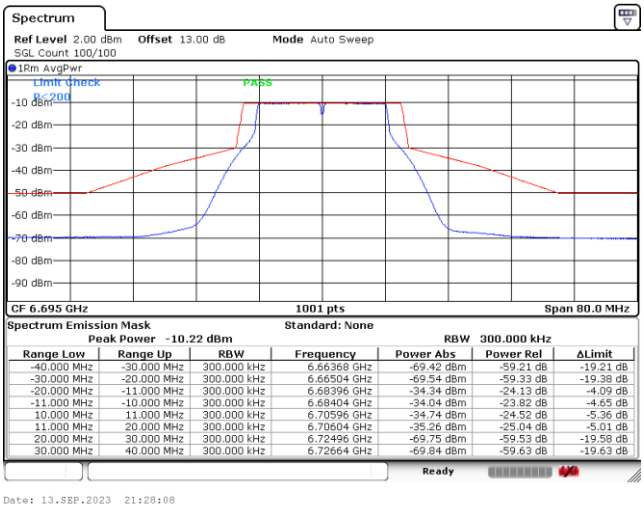
Plot on Channel 6515MHz



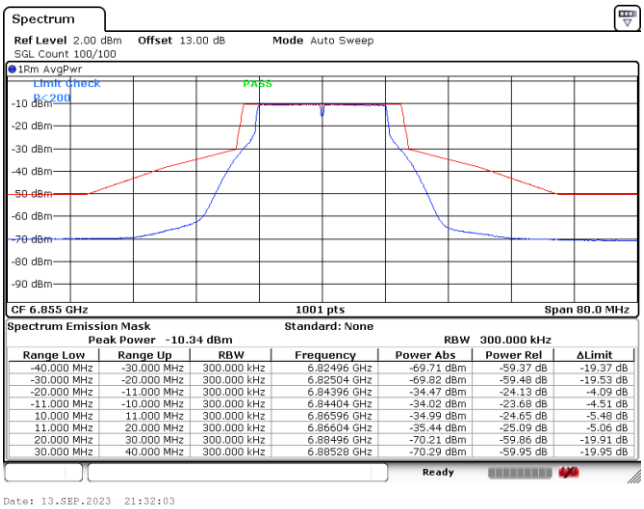
Plot on Channel 6535MHz



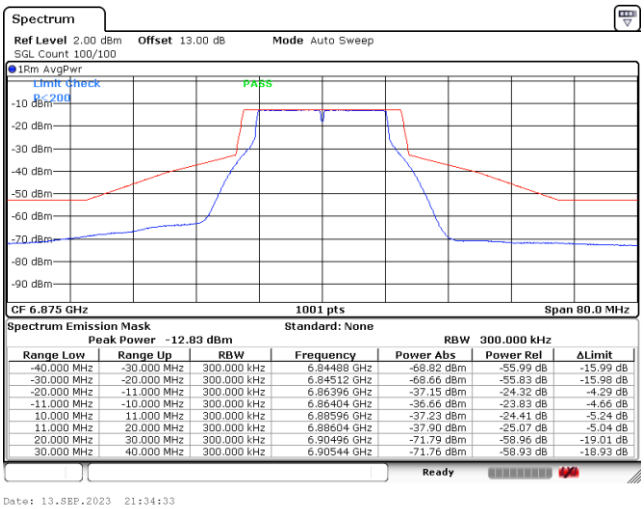
Plot on Channel 6695MHz



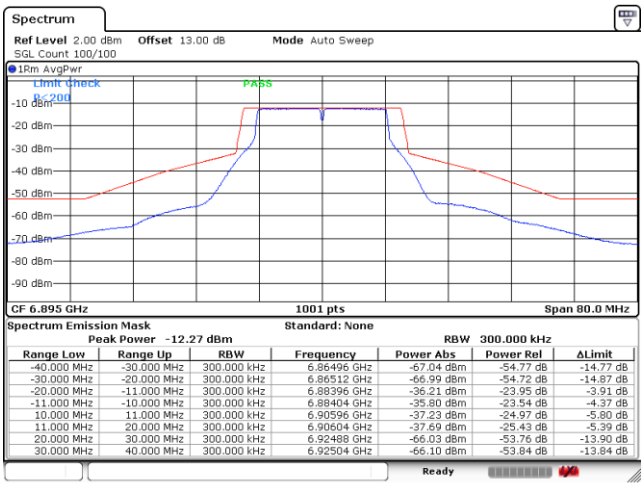
Plot on Channel 6855MHz



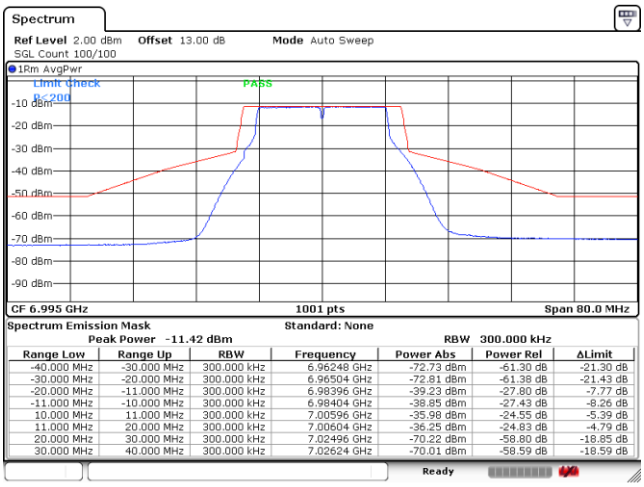
Plot on Channel 6875MHz



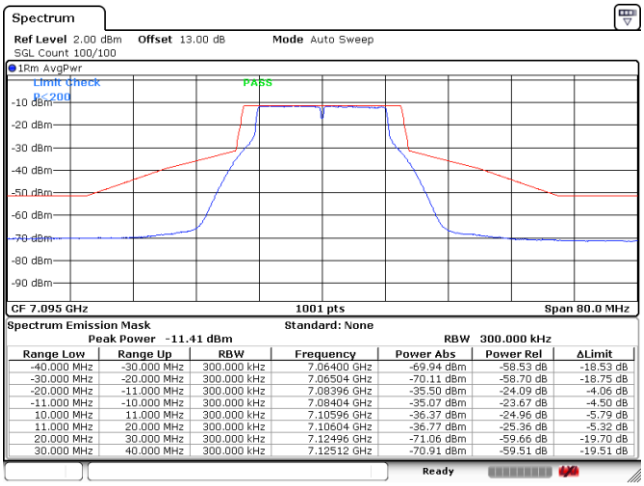
Plot on Channel 6895MHz



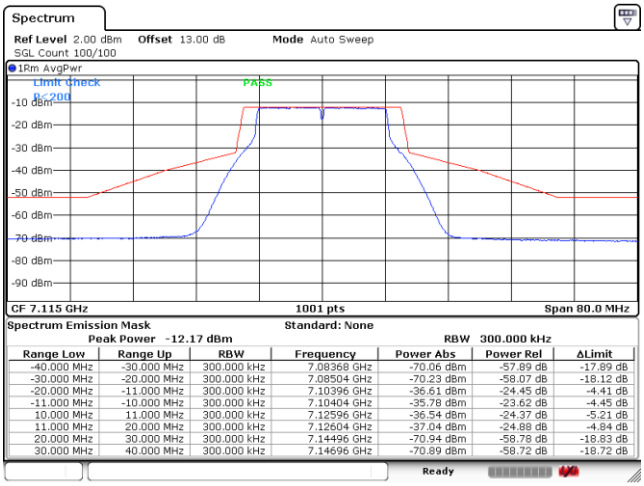
Plot on Channel 6995MHz



Plot on Channel 7095MHz

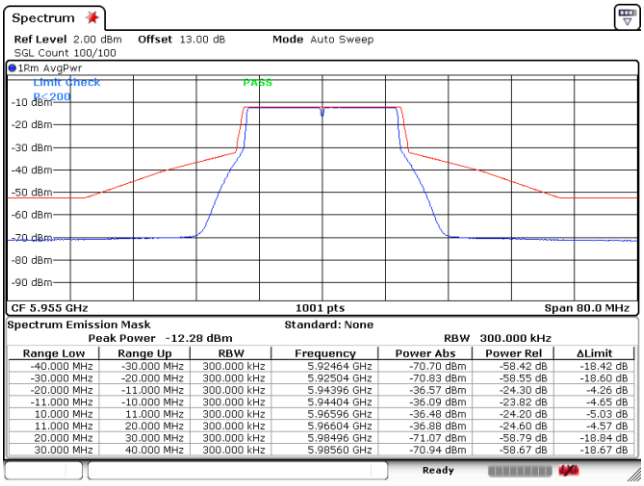


Plot on Channel 7115MHz

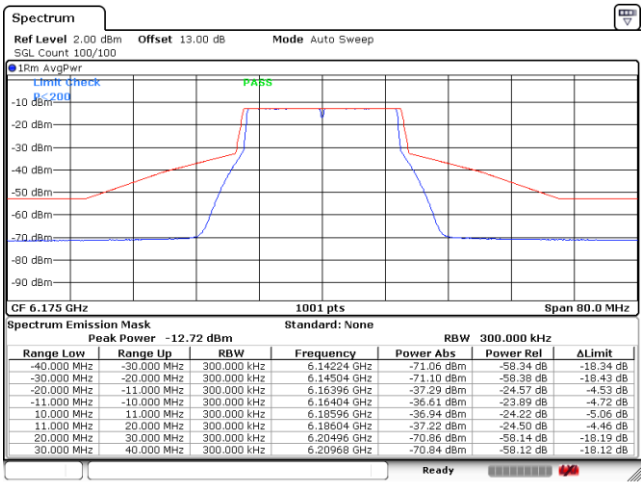


EUT Mode :	802.11be EHT20

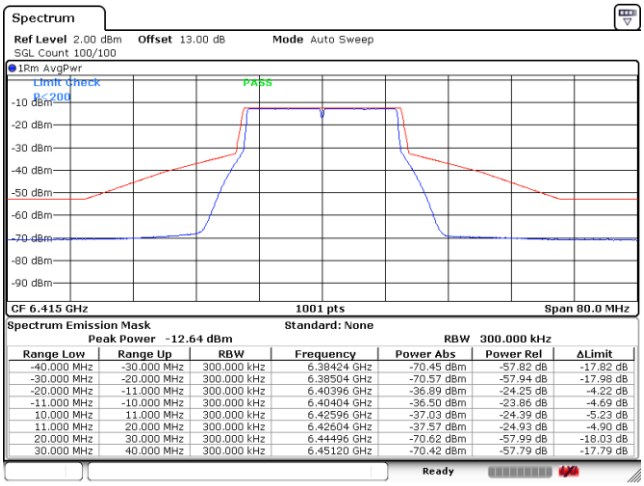
Plot on Channel 5955MHz



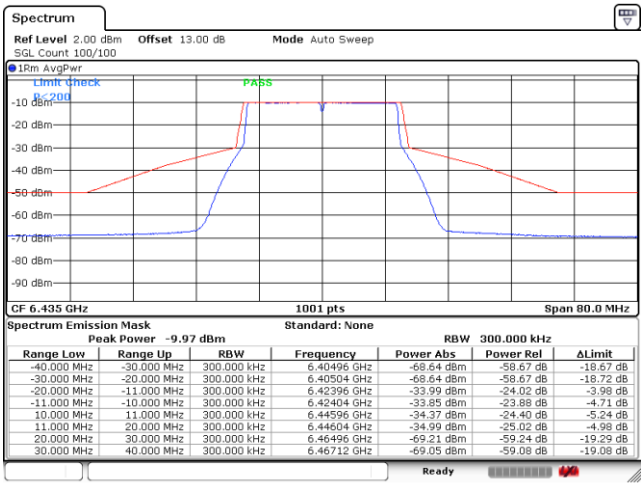
Plot on Channel 6175MHz



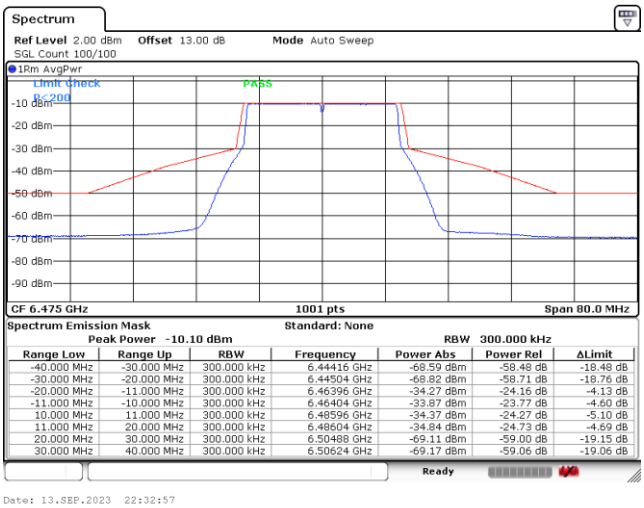
Plot on Channel 6415MHz



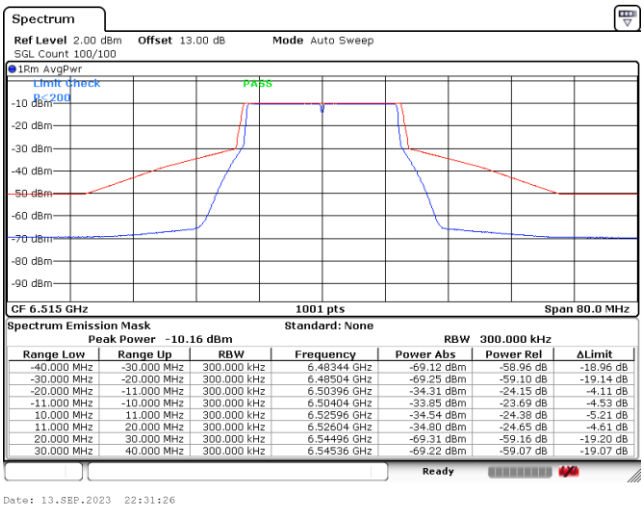
Plot on Channel 6435MHz



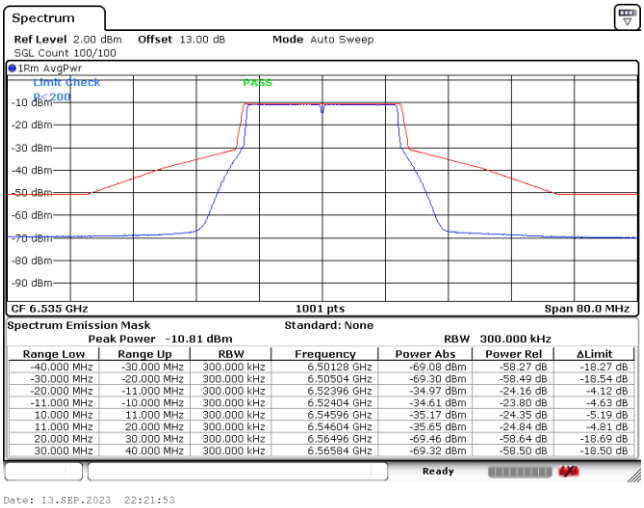
Plot on Channel 6475MHz



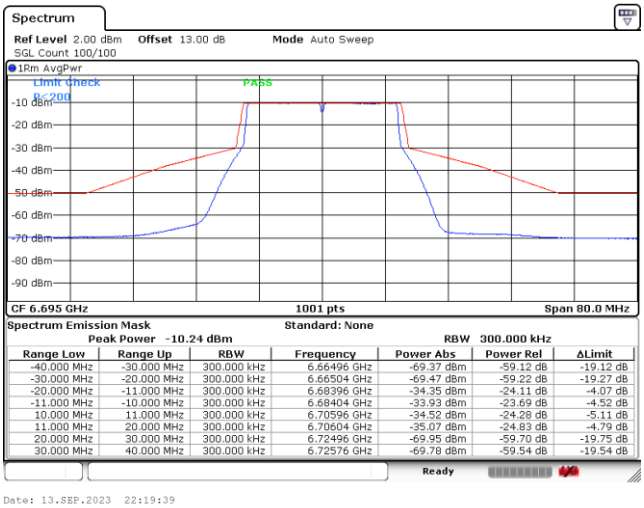
Plot on Channel 6515MHz



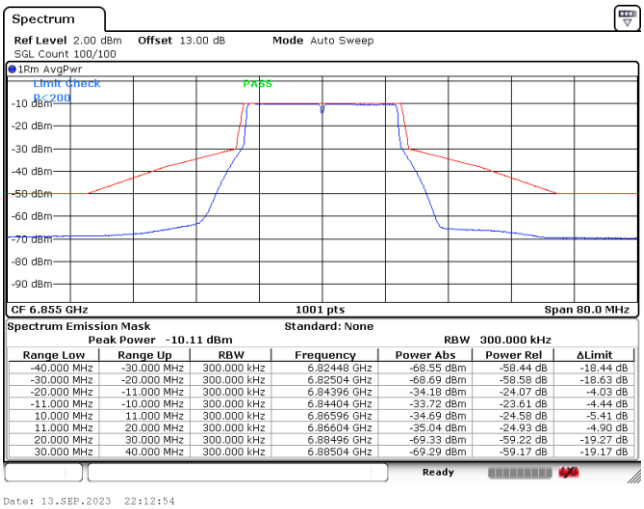
Plot on Channel 6535MHz



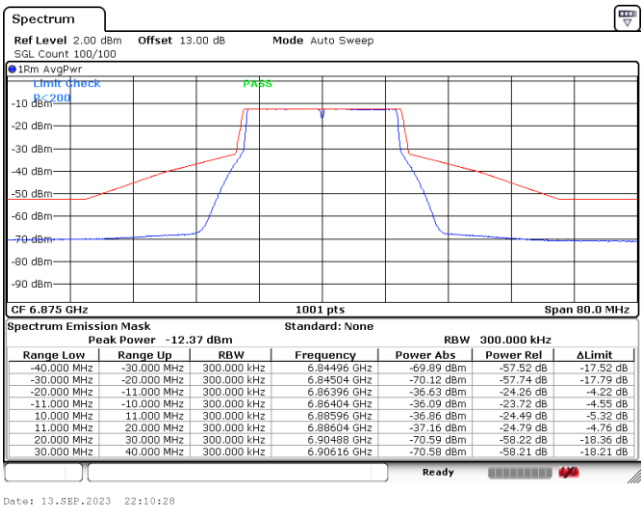
Plot on Channel 6695MHz



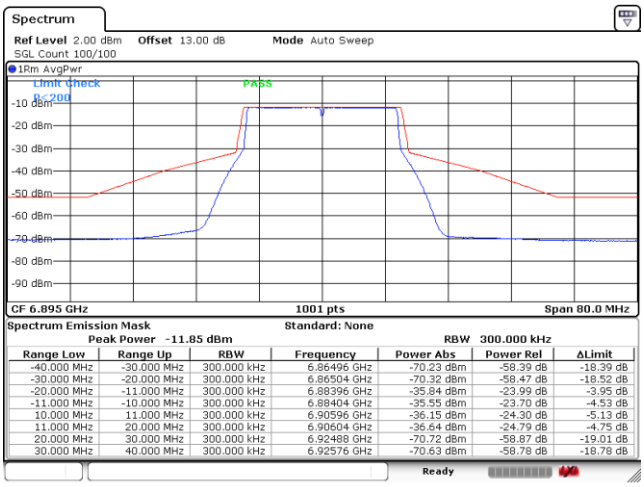
Plot on Channel 6855MHz



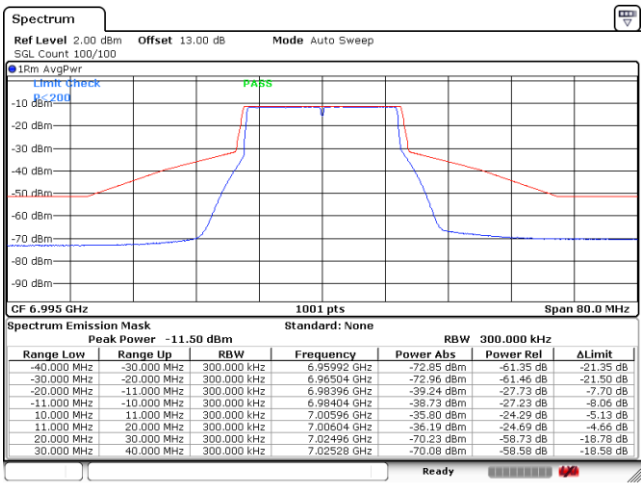
Plot on Channel 6875MHz



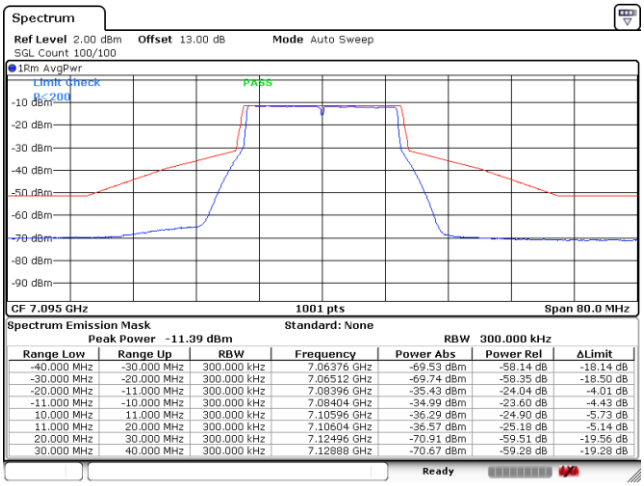
Plot on Channel 6895MHz



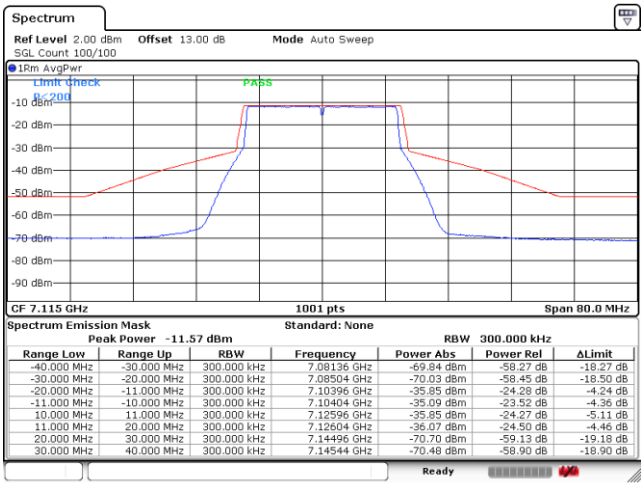
Plot on Channel 6995MHz



Plot on Channel 7095MHz

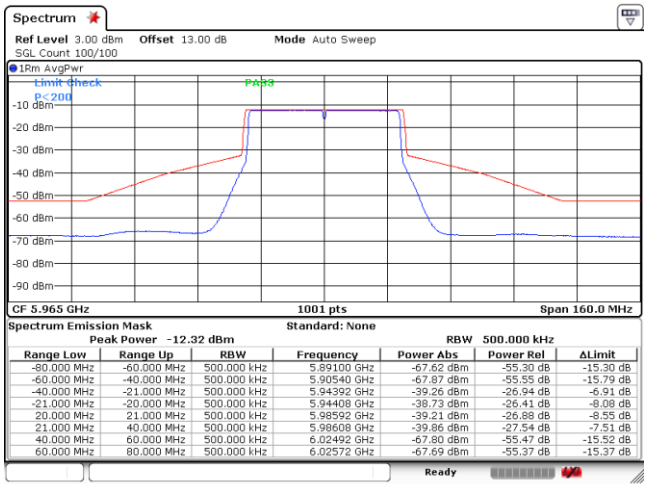


Plot on Channel 7115MHz



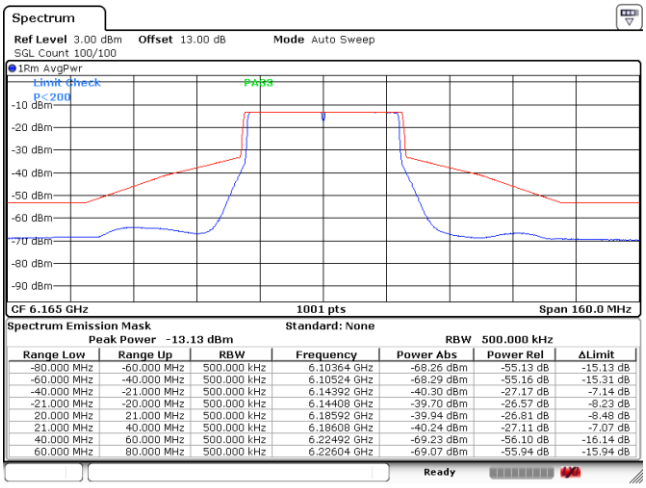
EUT Mode :	802.11be EHT40

Plot on Channel 5965MHz



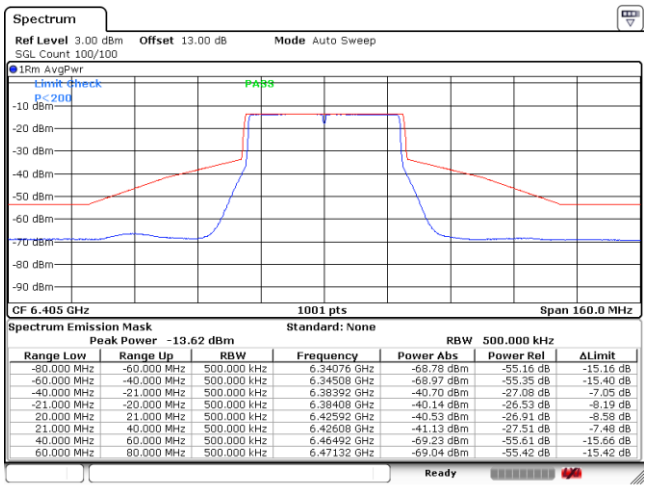
Date: 12.OCT.2023 13:39:53

Plot on Channel 6165MHz



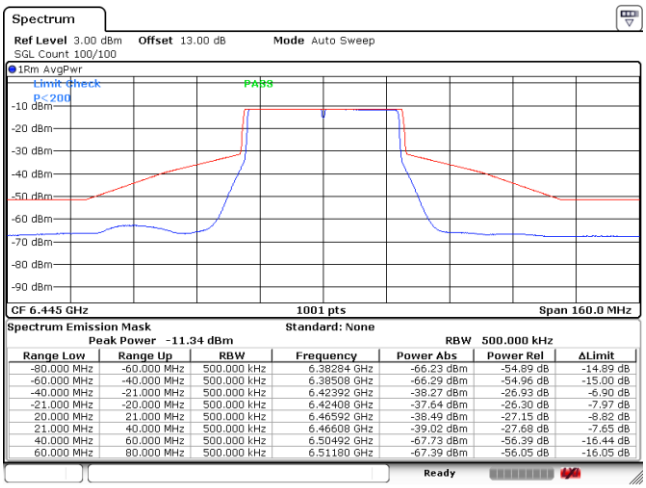
Date: 12.OCT.2023 13:43:02

Plot on Channel 6405MHz



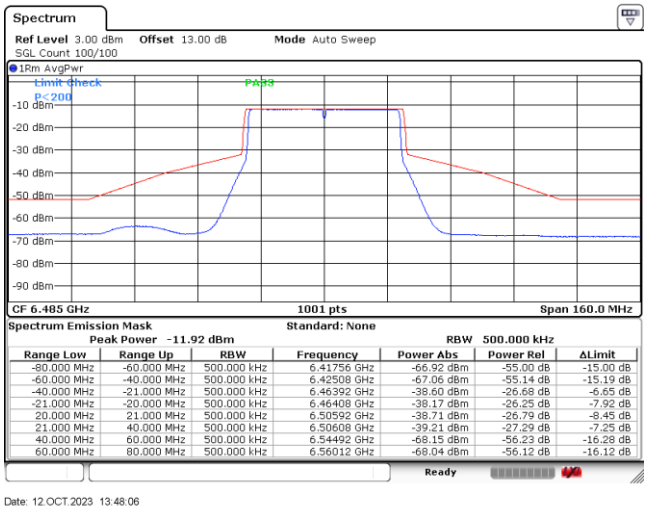
Date: 12.OCT.2023 13:45:36

Plot on Channel 6445MHz



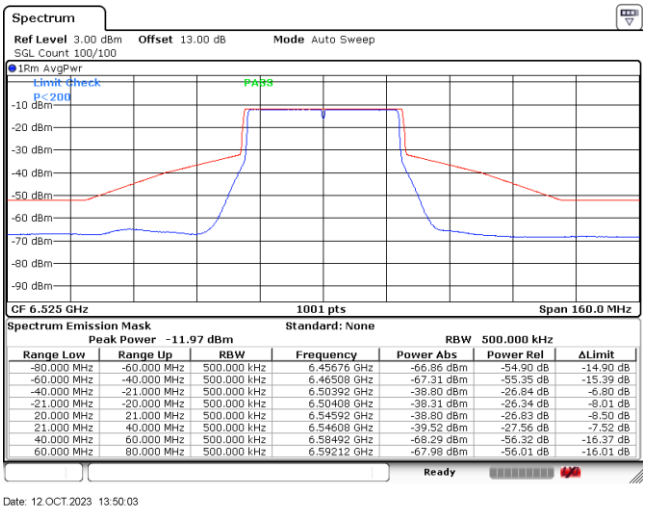
Date: 12.OCT.2023 13:47:16

Plot on Channel 6485MHz



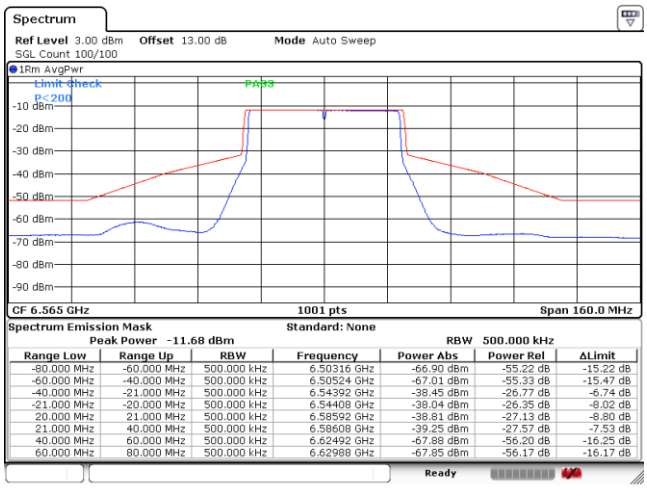
Date: 12.OCT.2023 13:48:06

Plot on Channel 6525MHz



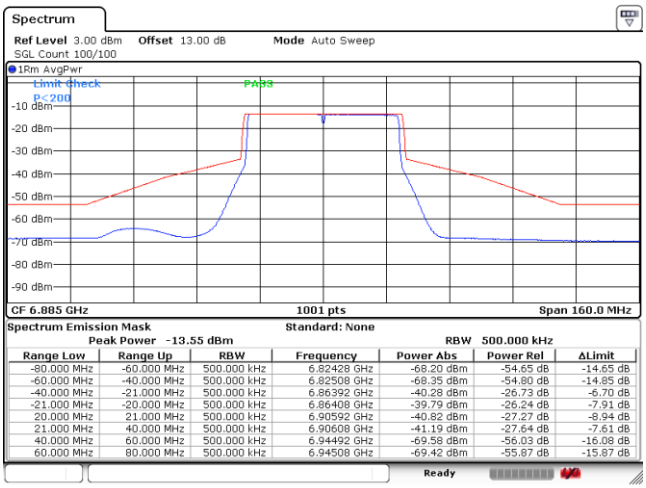
Date: 12.OCT.2023 13:50:03

Plot on Channel 6565MHz



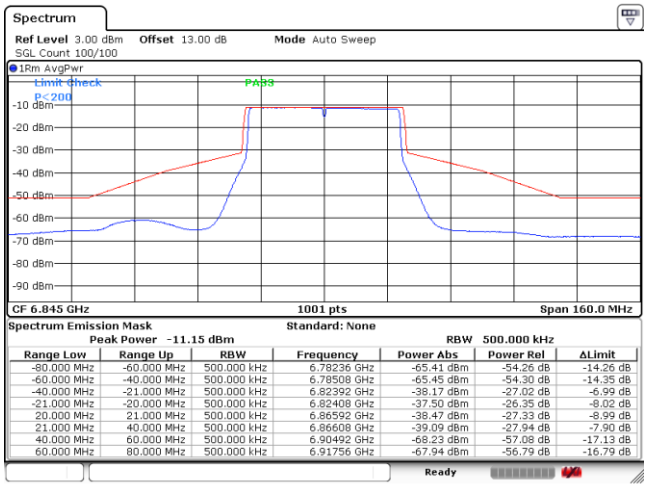
Date: 12.OCT.2023 13:50:52

Plot on Channel 6685MHz



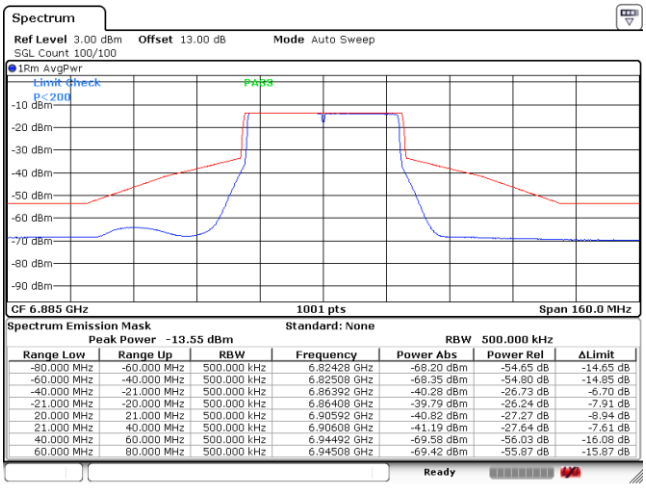
Date: 12.OCT.2023 13:54:39

Plot on Channel 6845MHz



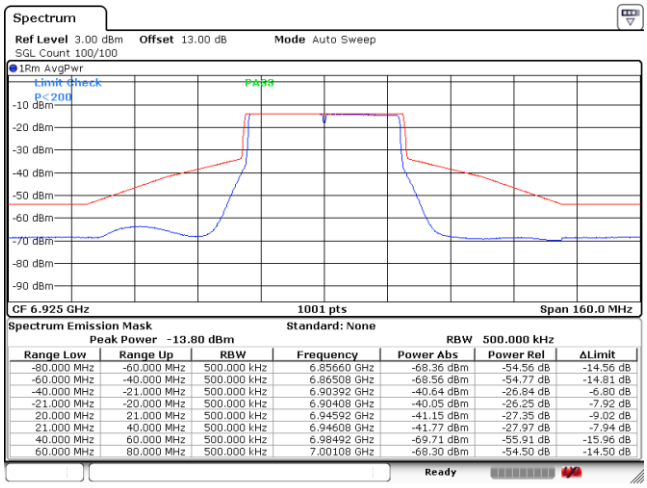
Date: 12.OCT.2023 13:53:03

Plot on Channel 6885MHz



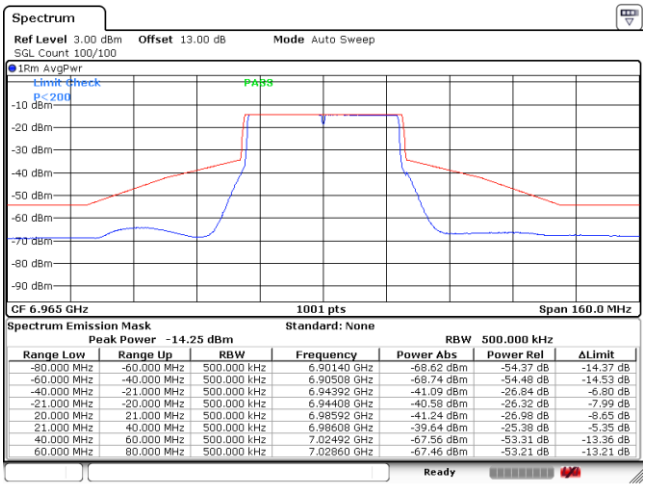
Date: 12.OCT.2023 13:54:39

Plot on Channel 6925MHz



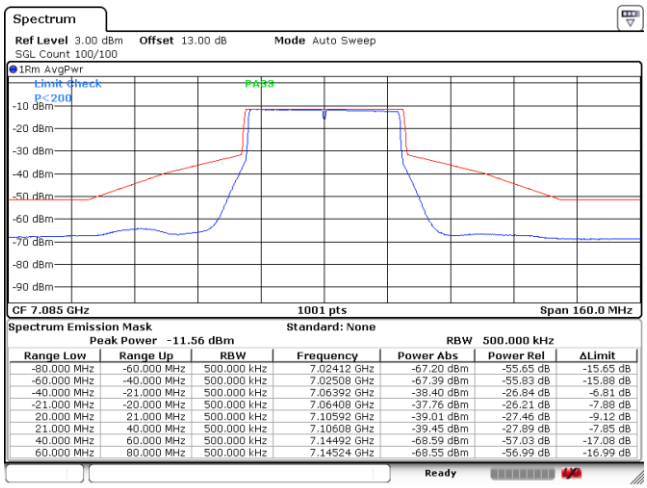
Date: 12.OCT.2023 13:55:26

Plot on Channel 6965MHz



Date: 12.OCT.2023 13:57:07

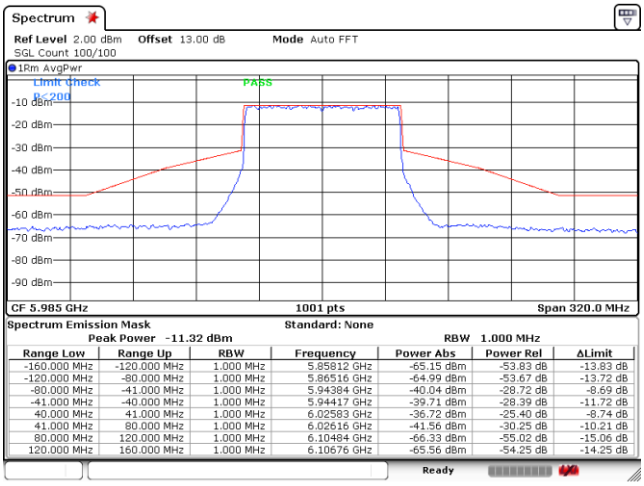
Plot on Channel 7085MHz



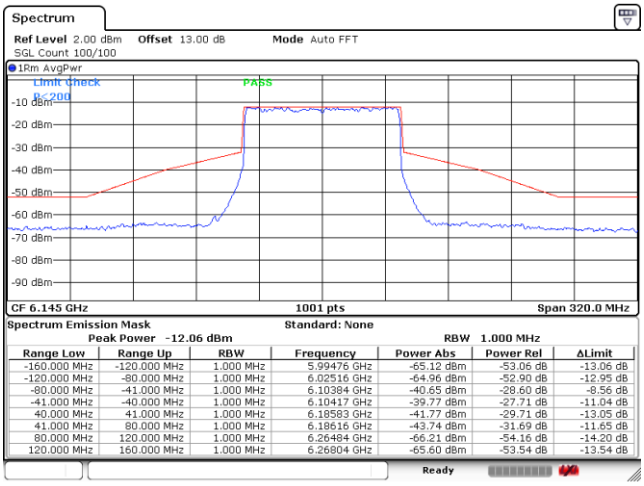
Date: 12.OCT.2023 13:58:00

EUT Mode :	802.11be EHT80

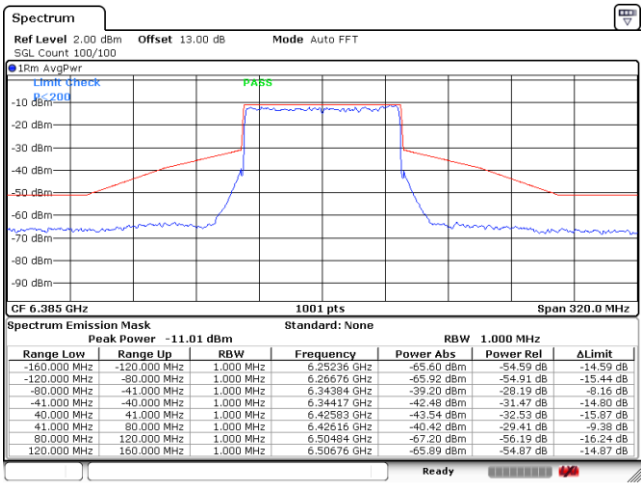
Plot on Channel 5985MHz



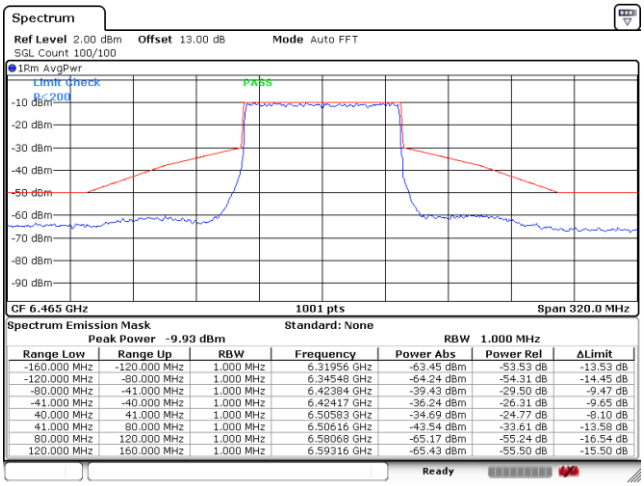
Plot on Channel 6145MHz



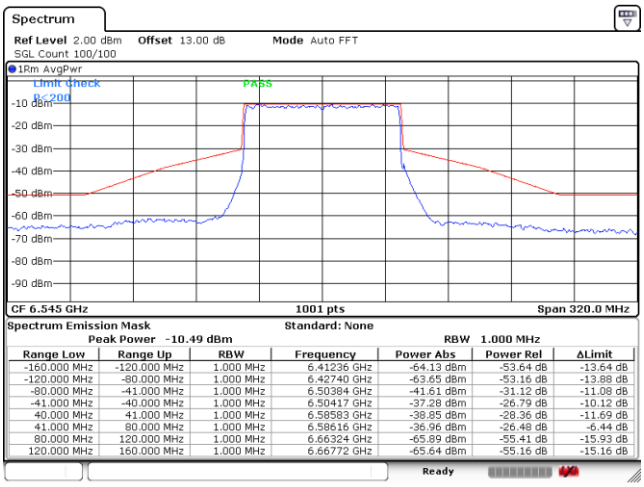
Plot on Channel 6385MHz



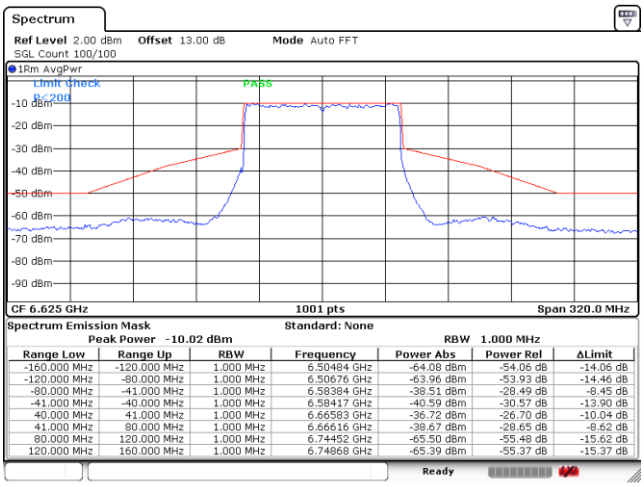
Plot on Channel 6465MHz



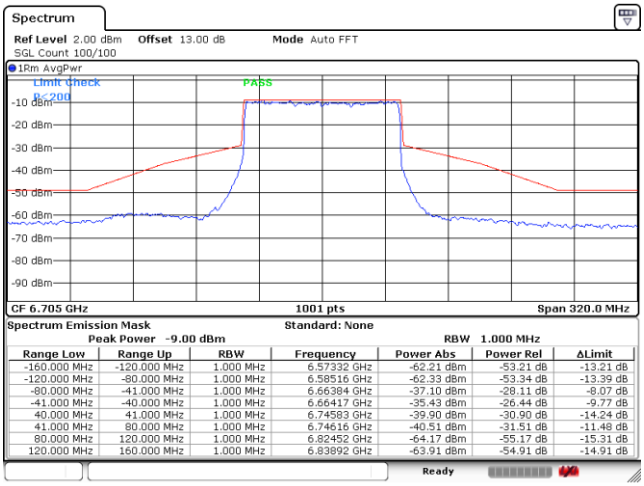
Plot on Channel 6545MHz



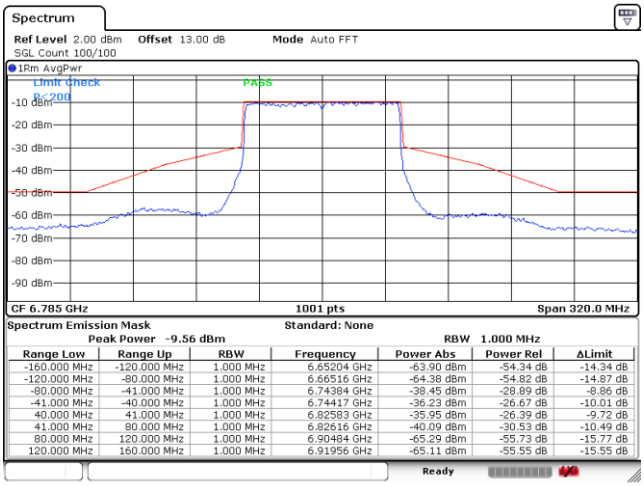
Plot on Channel 6625MHz



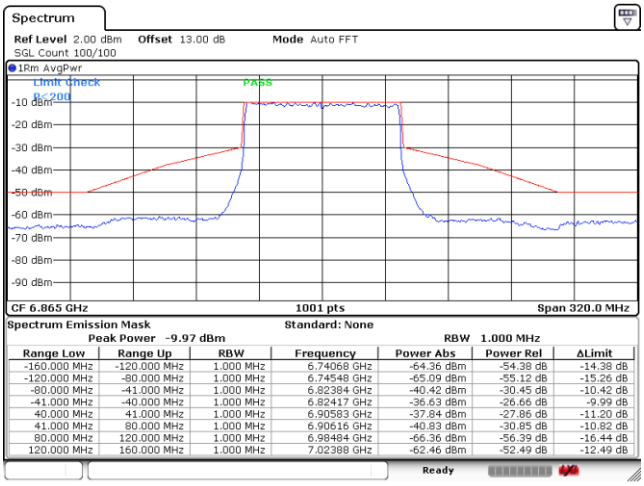
Plot on Channel 6705MHz



Plot on Channel 6785MHz



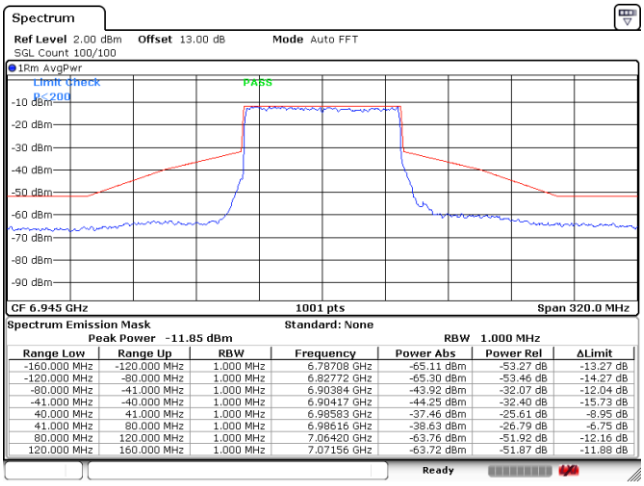
Plot on Channel 6865MHz



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-160.000 MHz	-120.000 MHz	1.000 MHz	6.74068 GHz	-64.36 dBm	-54.38 dB	-14.38 dB
-120.000 MHz	-80.000 MHz	1.000 MHz	6.74548 GHz	-65.09 dBm	-55.12 dB	-15.26 dB
-80.000 MHz	-41.000 MHz	1.000 MHz	6.82384 GHz	-40.42 dBm	-30.45 dB	-10.42 dB
-41.000 MHz	-40.000 MHz	1.000 MHz	6.82417 GHz	-36.63 dBm	-26.66 dB	-9.99 dB
40.000 MHz	41.000 MHz	1.000 MHz	6.90583 GHz	-37.84 dBm	-27.86 dB	-11.20 dB
41.000 MHz	80.000 MHz	1.000 MHz	6.90616 GHz	-40.83 dBm	-30.85 dB	-10.82 dB
80.000 MHz	120.000 MHz	1.000 MHz	6.98484 GHz	-66.36 dBm	-56.39 dB	-16.44 dB
120.000 MHz	160.000 MHz	1.000 MHz	7.02388 GHz	-62.46 dBm	-52.49 dB	-12.49 dB

Date: 14.SEP.2023 00:25:28

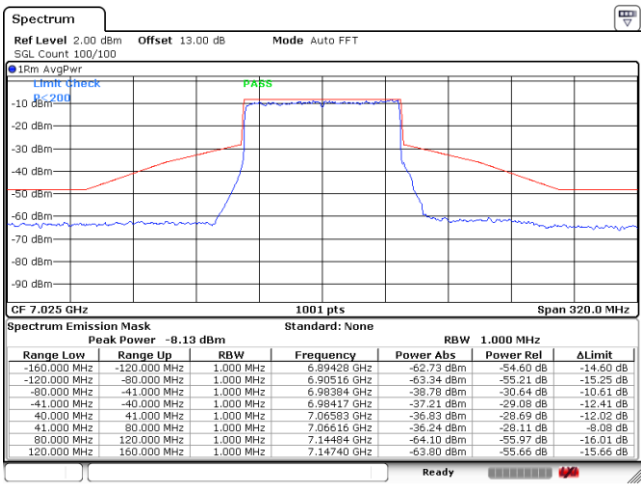
Plot on Channel 6945MHz



Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-160.000 MHz	-120.000 MHz	1.000 MHz	6.78708 GHz	-65.11 dBm	-53.27 dB	-13.27 dB
-120.000 MHz	-80.000 MHz	1.000 MHz	6.82772 GHz	-65.30 dBm	-53.46 dB	-14.27 dB
-80.000 MHz	-41.000 MHz	1.000 MHz	6.90384 GHz	-43.92 dBm	-32.07 dB	-12.04 dB
-41.000 MHz	-40.000 MHz	1.000 MHz	6.90417 GHz	-44.25 dBm	-32.40 dB	-15.73 dB
40.000 MHz	41.000 MHz	1.000 MHz	6.98583 GHz	-37.46 dBm	-25.61 dB	-8.95 dB
41.000 MHz	80.000 MHz	1.000 MHz	6.98616 GHz	-38.63 dBm	-26.79 dB	-6.75 dB
80.000 MHz	120.000 MHz	1.000 MHz	7.06420 GHz	-63.76 dBm	-51.92 dB	-12.16 dB
120.000 MHz	160.000 MHz	1.000 MHz	7.07156 GHz	-63.72 dBm	-51.87 dB	-11.88 dB

Date: 14.SEP.2023 00:29:46

Plot on Channel 7025MHz

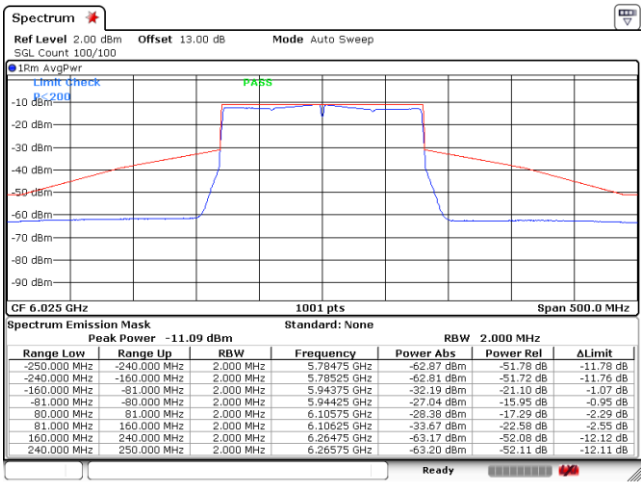


Range Low	Range Up	RBW	Frequency	Power Abs	Power Rel	ΔLimit
-160.000 MHz	-120.000 MHz	1.000 MHz	6.89428 GHz	-62.73 dBm	-54.60 dB	-14.60 dB
-120.000 MHz	-80.000 MHz	1.000 MHz	6.90516 GHz	-63.34 dBm	-55.21 dB	-15.25 dB
-80.000 MHz	-41.000 MHz	1.000 MHz	6.98384 GHz	-38.78 dBm	-30.64 dB	-10.61 dB
-41.000 MHz	-40.000 MHz	1.000 MHz	6.98417 GHz	-37.21 dBm	-29.08 dB	-12.41 dB
40.000 MHz	41.000 MHz	1.000 MHz	7.06583 GHz	-36.83 dBm	-28.69 dB	-12.02 dB
41.000 MHz	80.000 MHz	1.000 MHz	7.06616 GHz	-36.24 dBm	-28.11 dB	-8.08 dB
80.000 MHz	120.000 MHz	1.000 MHz	7.14484 GHz	-64.10 dBm	-55.97 dB	-16.01 dB
120.000 MHz	160.000 MHz	1.000 MHz	7.14740 GHz	-63.80 dBm	-55.66 dB	-15.66 dB

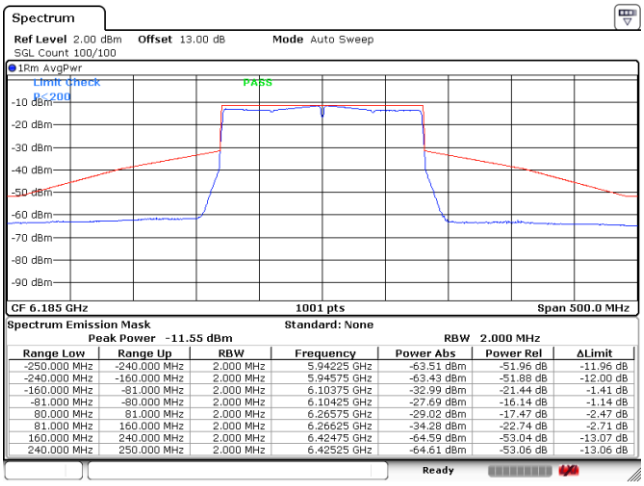
Date: 14.SEP.2023 00:33:07

EUT Mode :	802.11be EHT160

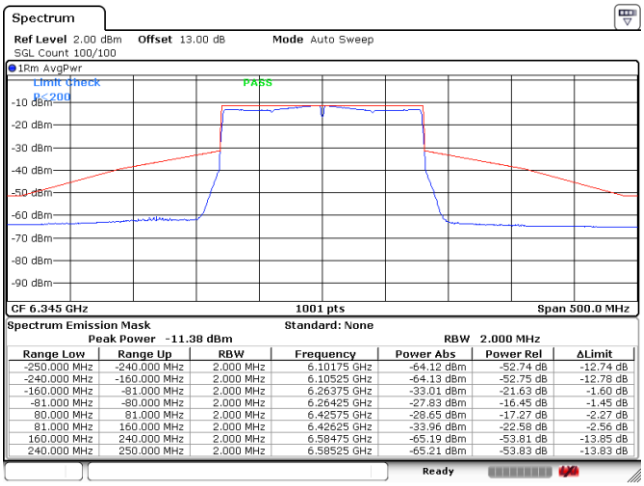
Plot on Channel 6025MHz



Plot on Channel 6185MHz



Plot on Channel 6345MHz



Plot on Channel 6505MHz