Test Report No:
2470803R-RFUSV03S-E

TEST REPORT
FCC Rules&Regulations

Product Name	WiFi USB Adapter
Brand Name	msi
Model No.	GUBE65
FCC ID	I4L-GUBE65
Applicant´s Name / Address	Micro-Star Int'l Co.,Ltd. No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan
Manufacturer's Name / Address	Micro-Star Int'l Co.,Ltd. No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan
Test Method Requested, Standard	FCC CFR Title 47 Part 15 Subpart E Section 15.407 ANSI C63.10-2013
Verdict Summary	IN COMPLIANCE
Documented By	Amelia Wu
Approved By	Allen Lin
Date of Receipt	Jul. 26, 2024
Date of Issue	Jan. 16, 2025
Report Version	V1.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

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1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jan. 16, 2025

Summary of Test Result

Report Clause	Test Items	Result (PASS/FAIL)	Remark
3	AC Power Line Conducted Emission	PASS	-
4	Emission Bandwidth	PASS	-
5	Maximum Conducted Output Power	PASS	-
6	Maximum Power Spectral Density	PASS	-
7	Transmitter Radiated Spurious Emission	PASS	-

Comments and Explanations
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Comments and Remarks

The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1. General Information

1.1. EUT Description

Frequency Range	5850 ~ 5895 MHz	
Operating Frequency / Channel Number	IEEE 802.11a IEEE 802.11n/ac/ax/be (20 MHz)	5845 ~ 5885 MHz / 3 Channels
	IEEE 802.11n/ac/ax/be (40 MHz)	5835 ~ 5875 MHz / 2 Channels
	IEEE 802.11ac/ax/be (80 MHz)	5855 MHz / 1 Channel
	IEEE 802.11ac/ax/be (160 MHz)	5815 MHz / 1 Channel
Type of Modulation	IEEE 802.11a/n	OFDM-BPSK, QPSK, 16QAM, 64QAM
	IEEE 802.11ac	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
	IEEE 802.11ax	OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
	IEEE 802.11be	OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM

Accessories Information				
No.	Equipment Name	Brand Name	Model No.	Remark
1	Cradle	msi	GUBE65 Cradle	With cable: Shielded, 0.9m

Antenna Information					
Ant.	Brand Name	Model No.	Type	Antenna Gain (dBi)	Directional Gain (dBi)
1	WHA YU	C059-510503-A	PCB	2.61	5.50
2	WHA YU	C059-510504-A	PCB	2.36	

Directional Gain = 10log $[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{Ant}]$

For IEEE 802.11a/n/ac/ax/be Mode: (2TX, 2RX)

Both Ant. 1 and Ant. 2 can be used as transmitting/receiving antennas, and they can transmit/receive signal simultaneously.

1.2. EUT Information

EUT Power Type	From Host system			
Beamforming Function	☐	With beamforming	☒	Without beamforming
Resource Unit of 802.11ax/be	☒	Full RU	☐	Partial RU
Product Type	☐	Outdoor AP	☐	Indoor AP
	☐	Fixed P2P AP	☒	Client

1.3. Applicable Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- KDB 662911 D01 v02r01
- KDB 412172 D01 v01r01
- KDB 414788 D01 v01r01

1.4. Testing Location Information

Testing Location Information		
Test Laboratory：DEKRA Testing and Certification Co., Ltd.		
	1 (TAF: 3024)	ADD: No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. TEL: +886-3-582-8001 FAX: +886-3-582-8958 Test site Designation No. TW3024 with FCC. Conformity Assessment Body Identifier (CABID) TW3024 with ISED.
	2 (TAF: 3024)	ADD: No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. TEL: +886-3-582-8001 FAX: +886-3-582-8958 Test site Designation No. TW3024 with FCC. Conformity Assessment Body Identifier (CABID) TW3024 with ISED.
Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.		

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
AC Conduction Emission	HC-SR02	Gary Liao	19~21 / 60~61.5	2024/11/21~2024/11/22
RF Conducted Emission	HC-SR12	Kevin Teng	22.8~24.2 / 49.2~52.1	2024/10/01~2024/11/22
Radiated Emission	HC-CB04	Ling Chen Cyril Chen Brook Cheng	22.7~24.9 / 47.2~50.9	2024/10/08~2024/10/29

1.5. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test Item	Uncertainty
AC Power Line Conducted Emission	± 2.34 dB
Emission Bandwidth	± 636.54 Hz
Maximum Conducted Output Power	± 1.16 dB
Maximum Power Spectral Density	± 2.47 dB
Transmitter Radiated Spurious Emission	± 3.52 dB below 1 GHz ± 3.56 dB above 1 GHz

1.6. List of Test Equipment

HC-SR02

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	9kHz-30MHz, 4line/100A	2023/12/15	2024/12/14
EMI Test Receiver	R&S	ESR3	102608	9 kHz - 3.6 GHz	2024/09/11	2025/09/10
Two-Line V-Network	R&S	ENV216	100096	9kHz-30MHz	2024/06/03	2025/06/02
Coaxial Cable(9 m)	Harbour	RG-400	HC-SR02	9 kHz–2500 MHz	2024/08/15	2025/08/14
EMI Testing System	Audix	e3 210616 dekra V9	HC-SR02	N/A	N/A	N/A

HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1947001	0.3-40 GHz	2024/01/09	2025/01/08
Pulse Power Sensor	Anritsu	MA2411B	1911082	0.3-40 GHz	2024/01/09	2025/01/08
Pulse Power Sensor	Anritsu	MA2411B	1911083	0.3-40 GHz	2024/01/09	2025/01/08
Signal & Spectrum Analyzer	R&S	FSV40	101869	10Hz-40GHz	2024/06/20	2025/06/19

HC-CB04

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Next Cal. Date
Signal and Spectrum Analyzer	R&S	FSVA40	101435	10 Hz-40 GHz	2024/05/17	2025/05/16
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1209	30 MHz-2 GHz	2024/06/11	2025/06/10
Double Ridged Horn Antenna	RF SPIN	DRH18-E	211212A18EN	1G-18GHz	2023/11/17	2024/11/16
Horn Antenna	Schwarzbeck	BBHA 9170	203	18G-40GHz	2024/02/02	2025/02/01
Pre-Amplifier	EMCI	EMC01820I	980364	30M-8 GHz,20 dB	2024/06/04	2025/06/03
Pre-Amplifier	EMEC	EM01G18GA	060835	1-18 GHz,50 dB	2024/07/16	2025/07/15
Pre-Amplifier	SGH	SGH184	20230411-2	18G-40 GHz,54 dB	2024/04/23	2025/04/22
EMI Test Receiver	R&S	ESR7	102260	10 Hz-7 GHz	2023/11/27	2024/11/26
Magnetic Loop Antenna	Teseq	HLA 6121	49611	0.01-30 MHz	2024/02/23	2025/02/22
Coaxial Cable	Huber+Suhner	SF104	HC-CB04	30 MHz-18 GHz, 11m	2024/08/07	2025/08/06
Coaxial Cable	Huber+Suhner,Rosnol	SF102_UP0264	HC-CB04-1	18-40 GHz, 3m	2024/08/13	2025/08/12
Radiated Software	Audix	e3 V9	HC-CB04_1	N/A	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2. Test Configuration of EUT

2.1. Test Condition

EUT Operational Condition	
Testing Voltage	AC 120V/60Hz

2.2. Test Frequency Mode

Test Software	AX Series MP Toolkit

<2TX, NSS 1>

Modulation	Frequency (MHz)	Power Setting
802.11a	5845	12.5
	5865	12.0
	5885	12.0
802.11be (20 MHz)	5845	12.5
	5865	12.0
	5885	12.0
802.11be (40 MHz)	5835	12.5
	5875	11.5
802.11be (80 MHz)	5855	12.0
802.11be (160 MHz)	5815	12.0

<2TX, NSS 2>

Modulation	Frequency (MHz)	Power Setting
802.11be (20 MHz)	5845	12.5
	5865	12.0
	5885	12.0
802.11be (40 MHz)	5835	12.5
	5875	11.5
802.11be (80 MHz)	5855	12.0
802.11be (160 MHz)	5815	12.0

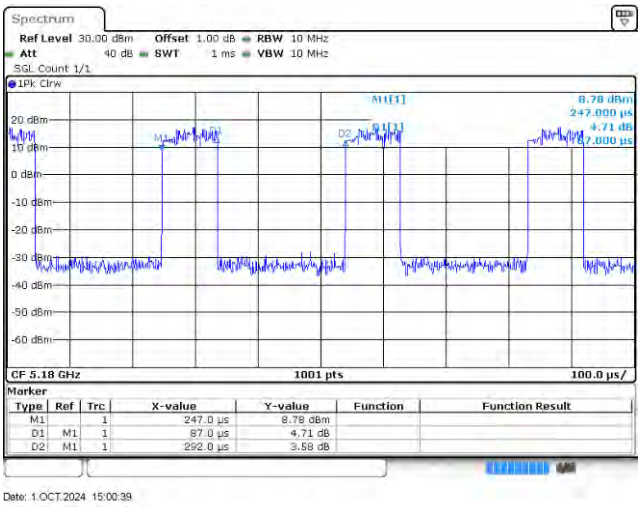
2.3. Duty Cycle

<2TX, NSS 1>

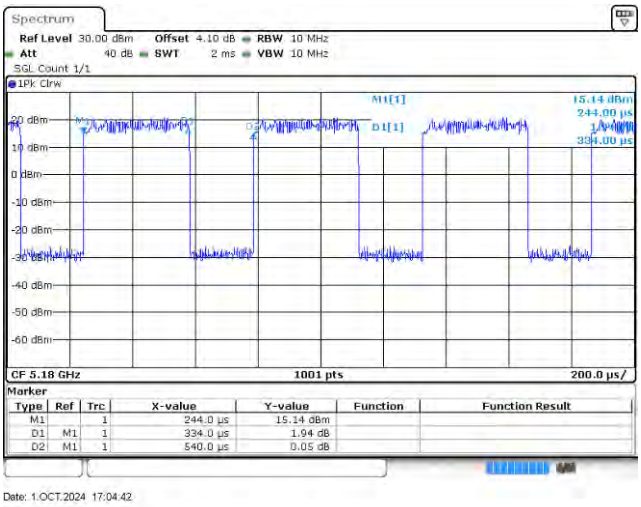
Modulation	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	0.087	0.292	29.79	5.259	11.494
802.11be (20 MHz)	0.334	0.540	61.85	2.086	2.994
802.11be (40 MHz)	0.334	0.540	61.85	2.086	2.994
802.11be (80 MHz)	0.332	0.540	61.48	2.113	3.012
802.11be (160 MHz)	0.332	0.540	61.48	2.11	3.012

Note: The duty factor will compensate for the total power and power spectral density.

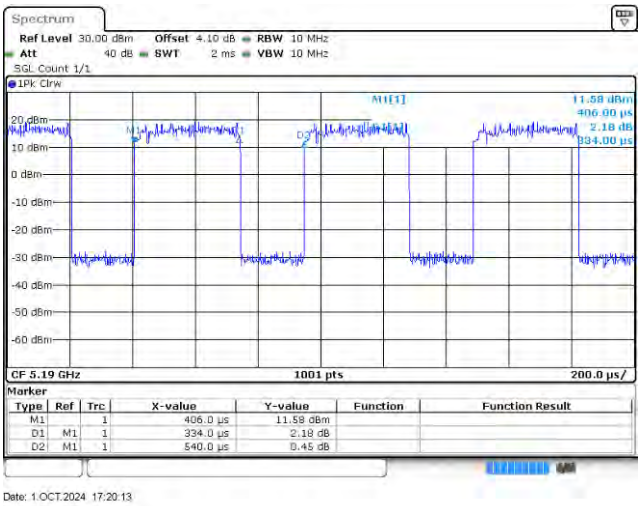
802.11a



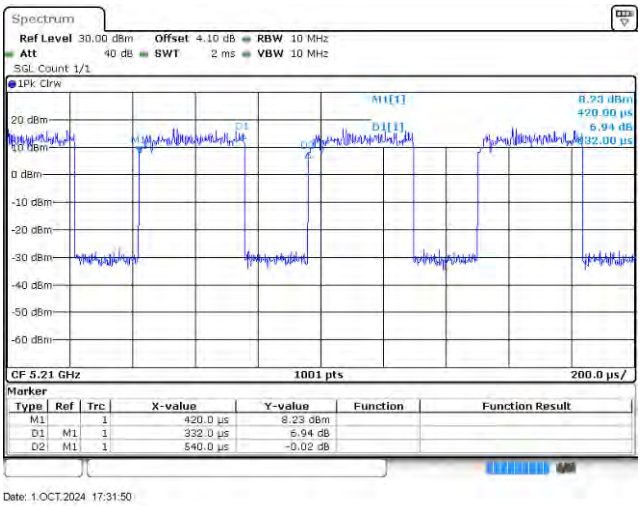
802.11be (20 MHz)



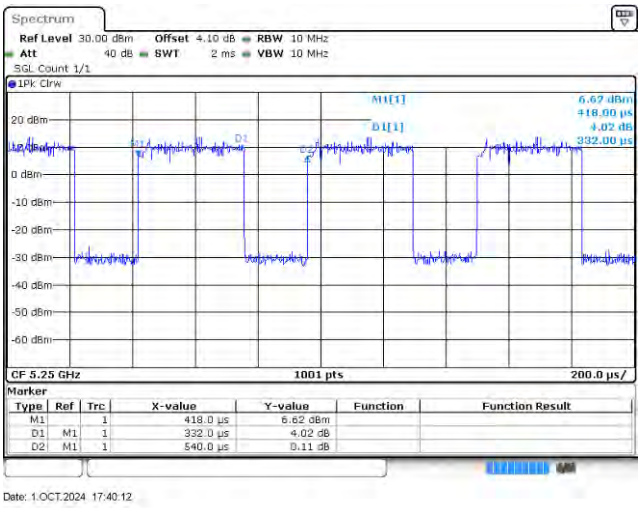
802.11be (40 MHz)



802.11be (80 MHz)



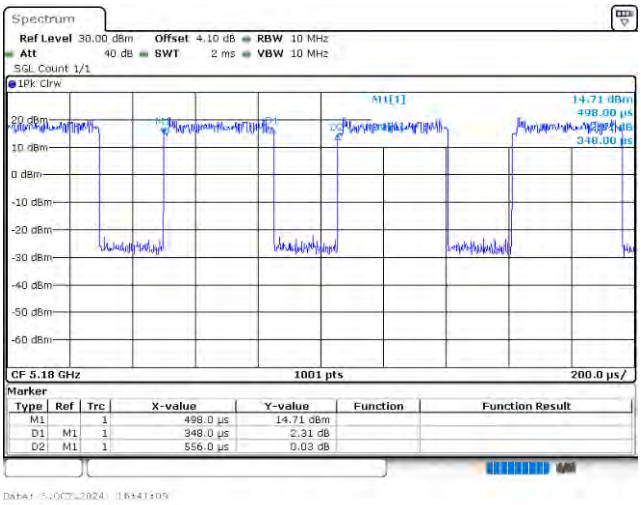
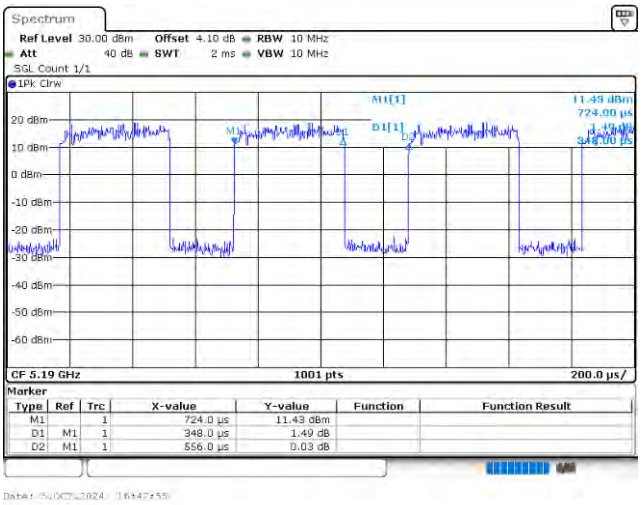
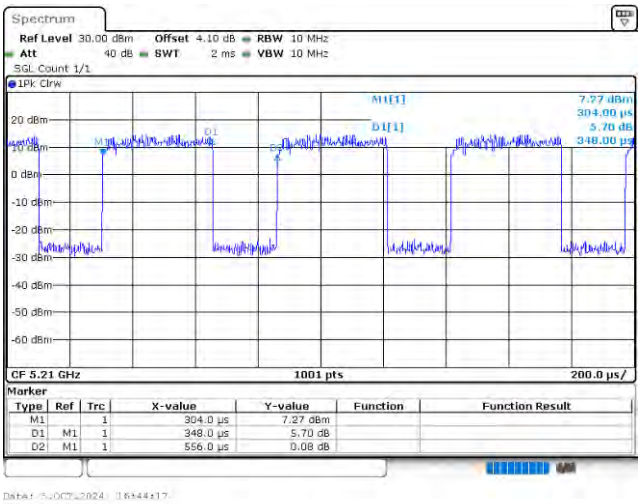
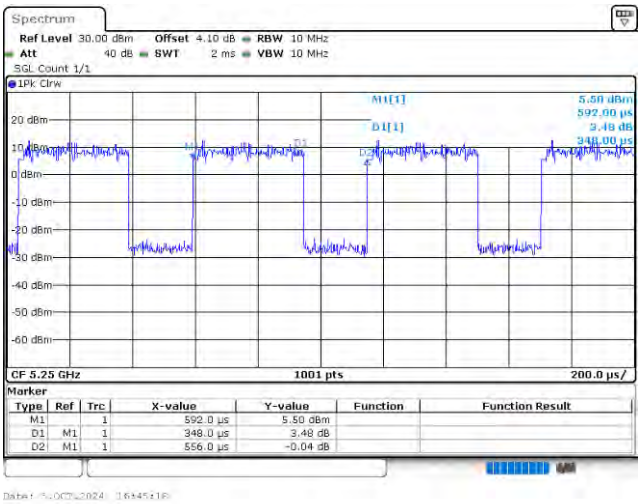
802.11be (160 MHz)



<2TX, NSS 2>

Modulation	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11be (20 MHz)	0.348	0.556	62.59	2.035	2.874
802.11be (40 MHz)	0.348	0.556	62.59	2.035	2.874
802.11be (80 MHz)	0.348	0.556	62.59	2.035	2.874
802.11be (160 MHz)	0.348	0.556	62.59	2.03	2.874

Note: The duty factor will compensate for the total power and power spectral density.

802.11be (20 MHz)	802.11be (40 MHz)
	
802.11be (80 MHz)	**802.11be (160 MHz)**
	

2.4. The Worst Case Measurement Configuration

Tests Item	AC Power Line Conducted Emission
Test Condition	AC power line conducted measurement for line and neutral
Operating Mode	Transmit

Tests Item	Emission Bandwidth Maximum Conducted Output Power Maximum Power Spectral Density
Test Condition	Conducted measurement at transmit chains

Tests Item	Transmitter Radiated Spurious Emission
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	Transmit
Operating Mode > 1GHz	Transmit
The EUT was performed at X axis, Y axis and Z axis position for radiated spurious emission test. The worst case was found at Z axis, so the measurement will follow this same test configuration.	

Note:

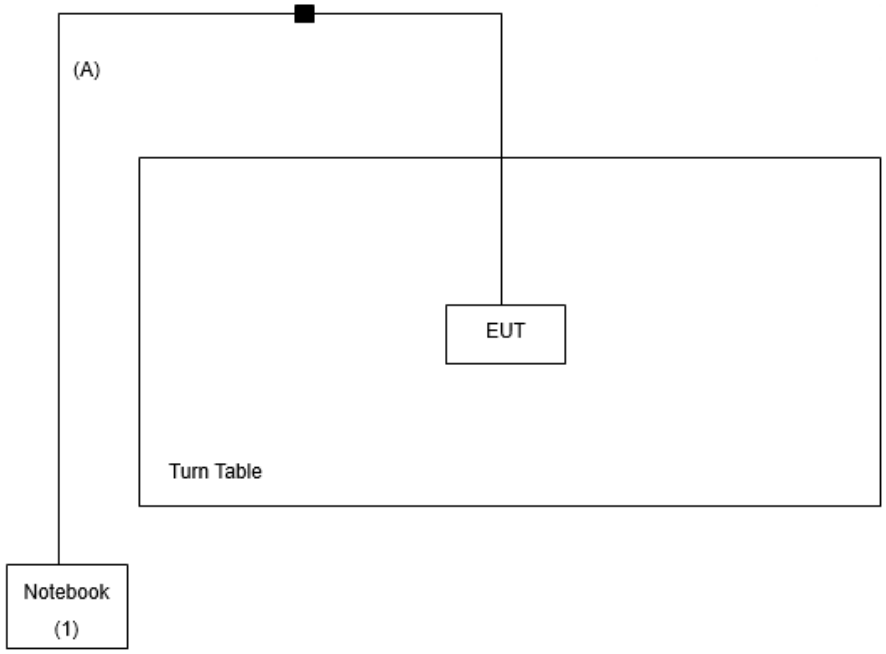
1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For radiated emission below 1 GHz and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
3. The modulation and bandwidth are similar for 802.11n mode for HT20/HT40, 802.11ac mode for VHT20/VHT40/VHT80/VHT160, 802.11ax mode for HEW20/HEW40/HEW80/HEW160 and 802.11be mode for EHT20/EHT40/EHT80/EHT160, therefore investigated worst case to representative mode in test report.

2.5. Tested System Details

No.	Equipment	Brand Name	Model No.	Serial No.
1	Notebook	ASUS	BX310U	J5N0CV04S32319B

2.6. Configuration of tested System

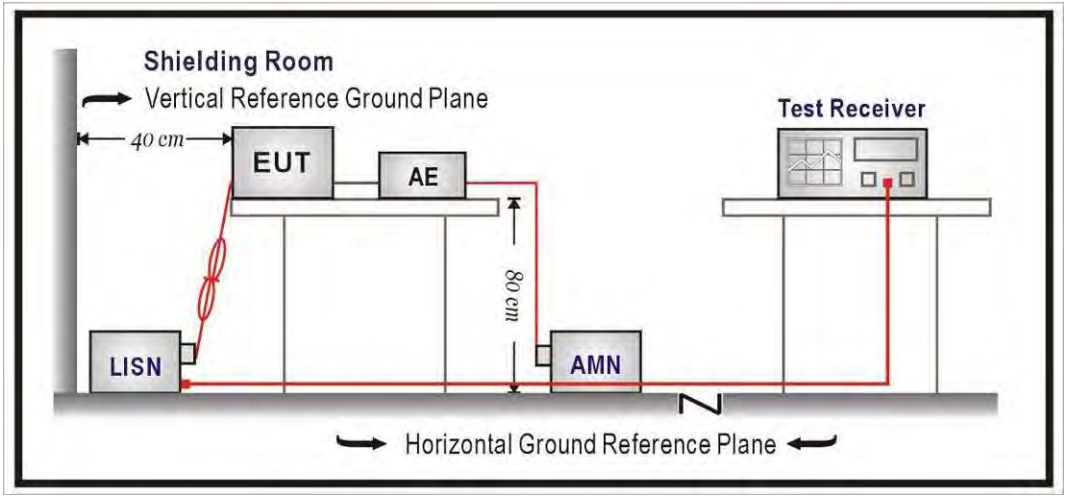
Connection Diagram



Signal Cable Type		Signal cable Description
A	USB Cable	Non-Shielded, 10m

3. AC Power Line Conducted Emission

3.1. Test Setup



3.2. Test Limit

Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remark: In the above table, the tighter limit applies at the band edges.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

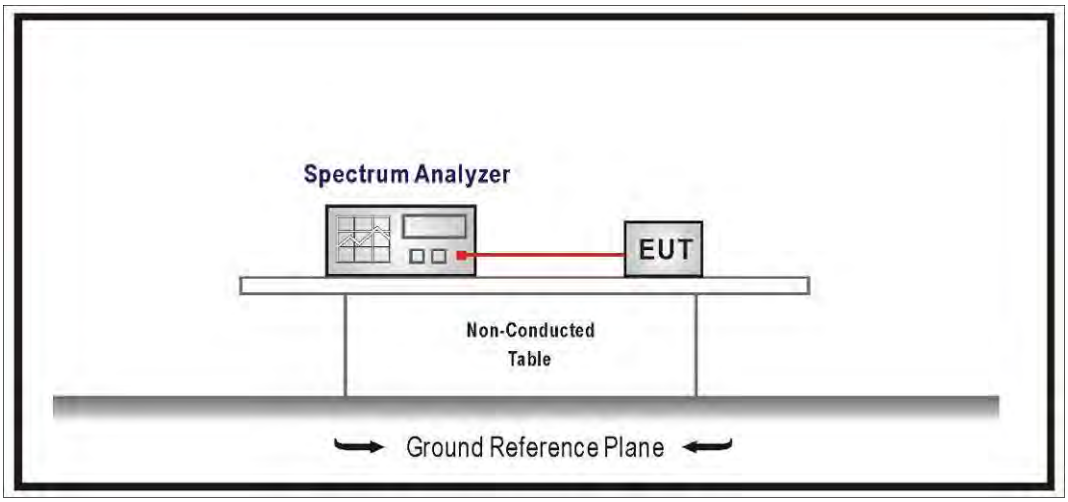
Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

3.4. Test Result of AC Power Line Conducted Emission

Refer as Appendix A

4. Emission Bandwidth

4.1. Test Setup



4.2. Test Limit

99% & 26dB Bandwidth : No Required

6dB Bandwidth ≧ 500kHz (within the 5.725-5.85GHz and 5.85-5.896GHz)

4.3. Test Procedure

99% & 26dB Bandwidth :

The EUT was tested according to U-NII test procedure of KDB 789033.

Set RBW 1% of the emission bandwidth, VBW equal to 3 times the RBW.

DTS Bandwidth :

Set RBW = 100kHz, VBW≧3xRBW, Sweep time=Auto, Set Peak detector.

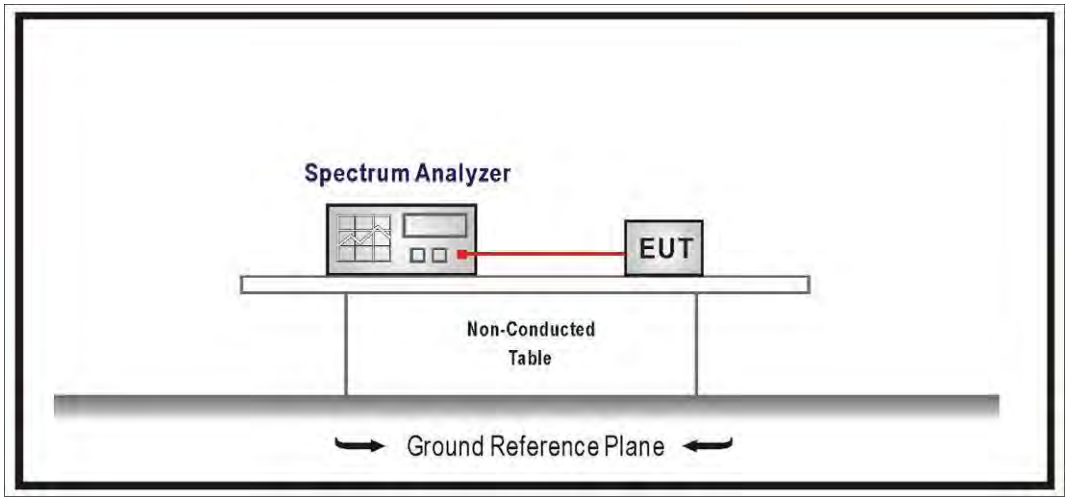
4.4. Test Result of Emission Bandwidth

Refer as Appendix B

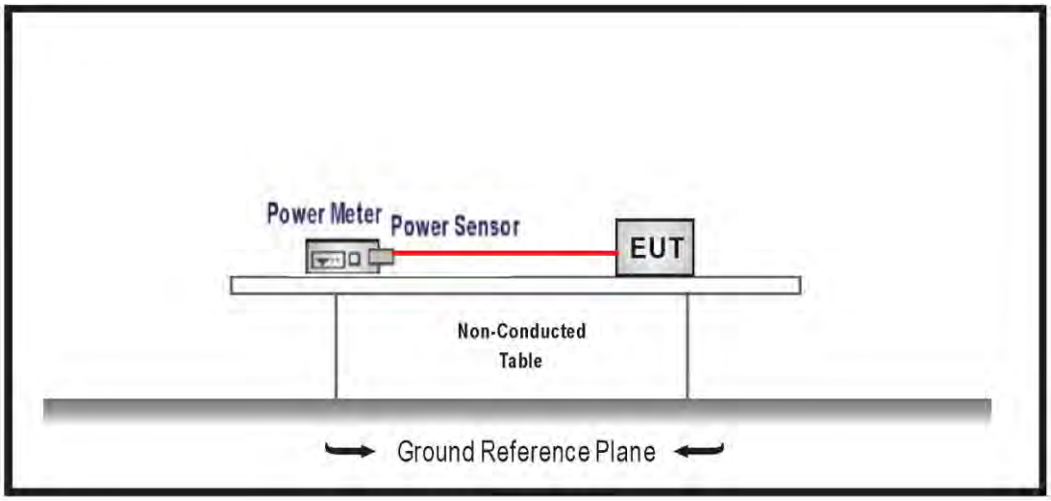
5. Maximum Conducted Output Power

5.1. Test Setup

For straddle channels:



For othes channels:



5.2. Test Limit

For the band 5.850–5.895 GHz:

For an indoor access point, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm. Indoor access points operating on a channel that spans the 5.725–5.850 GHz and 5.850–5.895 GHz bands must not exceed an e.i.r.p. of 36 dBm.

For client devices, the maximum e.i.r.p. over the frequency band of operation must not exceed 30 dBm. Client devices operating on a channel that spans the 5.725–5.850 GHz and 5.850–5.895 GHz bands must not exceed an e.i.r.p. of 30 dBm.

For a subordinate device, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm.

5.3. Test Procedure

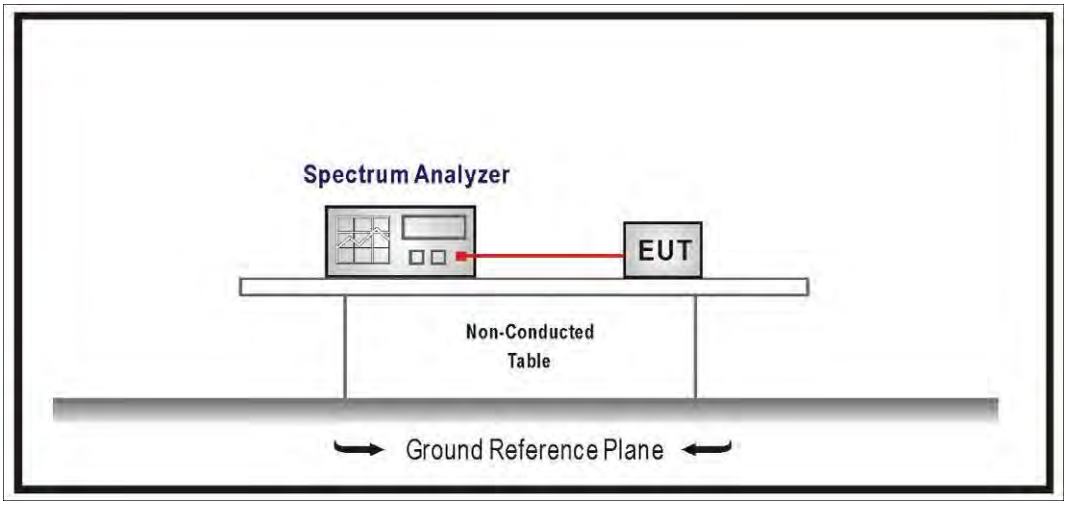
The EUT was setup to ANSI C63.10: 2013; tested according to U-NII test procedure of KDB 789033.

5.4. Test Result of Maximum Conducted Output Power

Refer as Appendix C

6. Maximum Power Spectral Density

6.1. Test Setup



6.2. Test Limit

For an indoor access point operating in the 5.850–5.895 GHz band, the maximum power spectral density must not exceed 20 dBm e.i.r.p. in any 1–megahertz band.

For client devices operating under the control of an indoor access point in the 5.850–5.895 GHz band, the maximum power spectral density must not exceed 14 dBm e.i.r.p. in any 1-megahertz band.

For a subordinate device operating under the control of an indoor access point in the 5.850–5.895 GHz band, the maximum power spectral density must not exceed 20 dBm e.i.r.p in any 1–megahertz band.

6.3. Test Procedure

The EUT was setup to ANSI C63.10: 2013; tested to U-NII test procedure of KDB 789033.

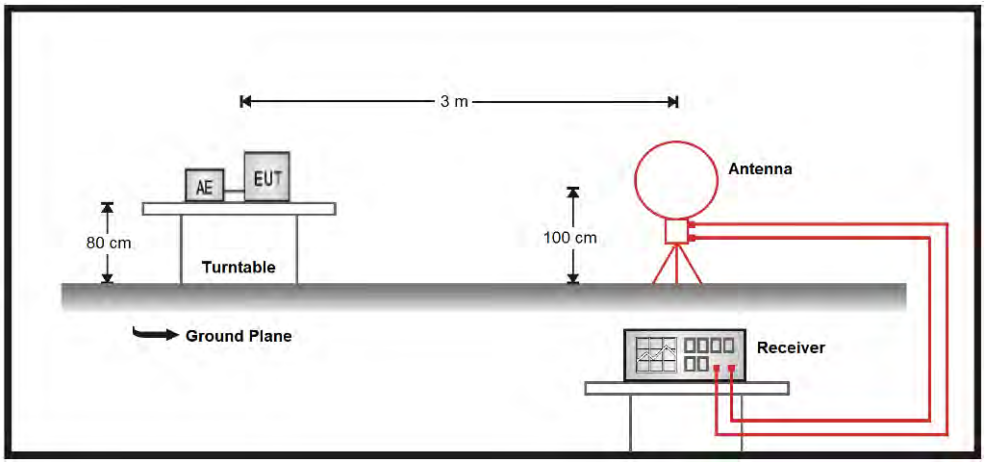
6.4. Test Result of Maximum Power Spectral Density

Refer as Appendix D

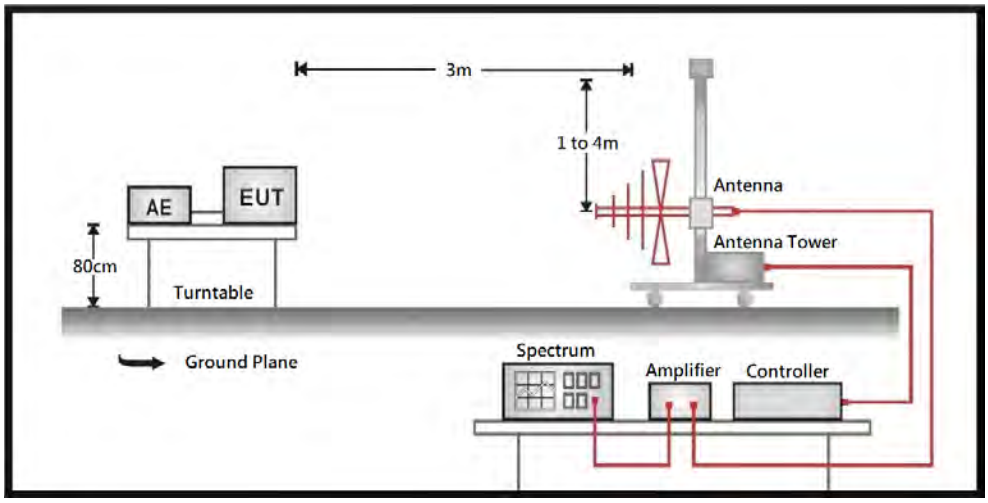
7. Transmitter Radiated Spurious Emission

7.1. Test Setup

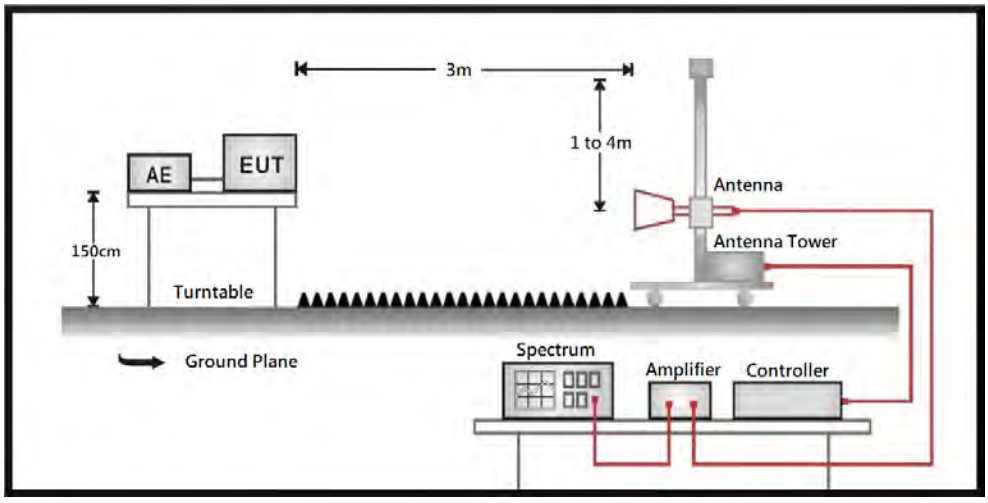
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



7.2. Test Limit

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	20 log (2400/F(kHz))	300
0.490 – 1.705	24000/F(kHz)	20 log (24000/F(kHz))	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

1. Field strength (dBuV/m) = 20 log Field strength (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Unwanted Emission out of the restricted bands Test Limit

Frequency (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength (dBuV/m@3m)
5850 – 5895	(i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of −7 dBm/MHz at or above 5.925 GHz. (ii) For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of −5 dBm/MHz and shall decrease linearly to an e.i.r.p. of −27 dBm/MHz at or above 5.925 GHz. (iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of −27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.	
*1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

Remark:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$E = \frac{1000000\sqrt{30P}}{3}$ uV/m, where P is the eirp (Watts).

7.3. Test Procedure

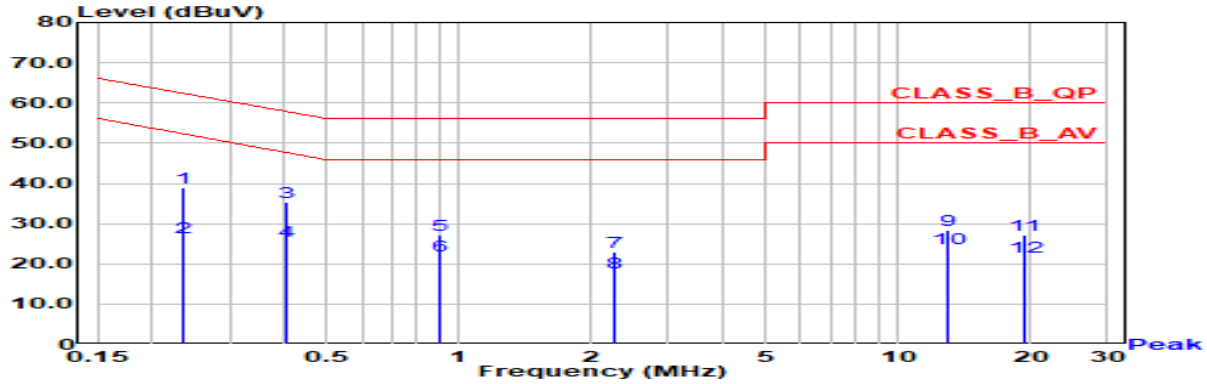
The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
The additional latch filter below 1 GHz was used to measure the level of harmonics radiated emission during field dtrength of harmonics measurement.
The bandwidth below 1 GHz setting on the field strength meter is 120 kHz, above 1 GHz are 1 MHz.
The frequency range from 9 kHz to 10th harmonics and included The frequency range from the lowest oscillator frequency generated within the device up to the 10th harmonic was checked is checked.

7.4. Test Result of Transmitter Radiated Spurious Emission

Refer as Appendix E

Appendix A. Test Result of AC Power Line Conducted Emission

Test Mode	Transmit	Phase	Line
Test Condition	802.11be (80 MHz) / Ant. 1 + Ant. 2		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.235	39.01	62.27	-23.26	29.34	9.67	QP
2	0.235	26.63	52.27	-25.64	16.96	9.67	AV
3	0.403	35.34	57.80	-22.45	25.67	9.67	QP
*4	0.403	25.78	47.80	-22.02	16.11	9.67	AV
5	0.907	27.03	56.00	-28.97	17.34	9.69	QP
6	0.907	22.00	46.00	-24.00	12.30	9.69	AV
7	2.261	23.01	56.00	-32.99	13.14	9.88	QP
8	2.261	17.91	46.00	-28.09	8.04	9.88	AV
9	12.919	28.45	60.00	-31.55	18.29	10.15	QP
10	12.919	23.75	50.00	-26.25	13.60	10.15	AV
11	19.441	27.21	60.00	-32.79	16.97	10.24	QP
12	19.441	21.78	50.00	-28.22	11.54	10.24	AV

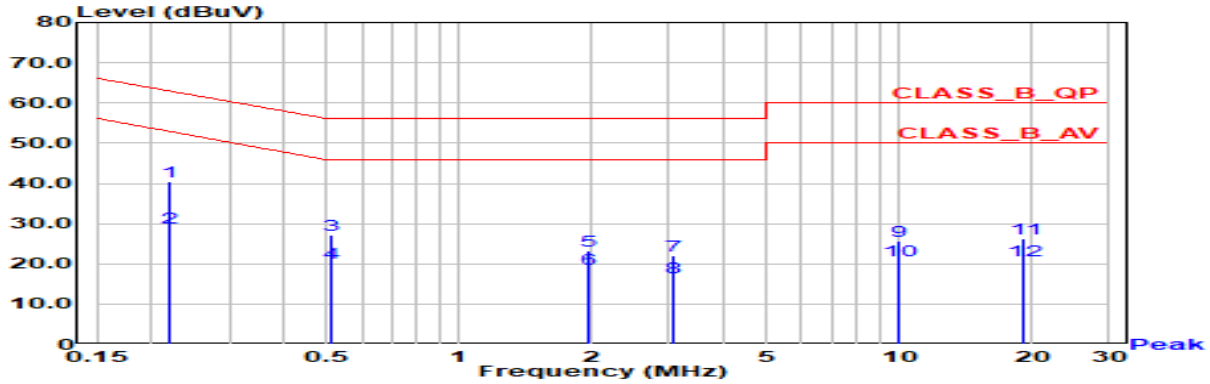
Remark:

1. "*" means this data is the worst emission level.

2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).

3. Margin = Emission Level - Limit.

Test Mode	Transmit	Phase	Neutral
Test Condition	802.11be (80 MHz) / Ant. 1 + Ant. 2		



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.220	40.41	62.83	-22.41	30.74	9.67	QP
2	0.220	29.07	52.83	-23.76	19.40	9.67	AV
3	0.508	27.16	56.00	-28.84	17.48	9.67	QP
4	0.508	20.22	46.00	-25.78	10.54	9.67	AV
5	1.959	23.28	56.00	-32.72	13.42	9.86	QP
6	1.959	18.66	46.00	-27.34	8.80	9.86	AV
7	3.066	22.18	56.00	-33.82	12.28	9.90	QP
8	3.066	16.67	46.00	-29.33	6.77	9.90	AV
9	9.933	25.54	60.00	-34.46	15.45	10.09	QP
10	9.933	20.81	50.00	-29.19	10.72	10.09	AV
11	19.200	26.41	60.00	-33.59	16.16	10.24	QP
12	19.200	20.98	50.00	-29.02	10.73	10.24	AV

Remark:

1. "*" means this data is the worst emission level.

2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).

3. Margin = Emission Level - Limit.

Appendix B. Test Result of Emission Bandwidth

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 1	Ant. 2	Ant. 1	Ant. 2	99% Bandwidth	DTS Bandwidth
802.11a	5845 (U-NII-3~4)	16.22	16.22	15.18	15.18	-	0.50
	5865	16.22	16.22	15.16	15.16	-	0.50
	5885	16.18	16.18	15.18	15.18	-	0.50

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 1	Ant. 2	Ant. 1	Ant. 2	99% Bandwidth	DTS Bandwidth
802.11be (20 MHz)	5845 (U-NII-3~4)	18.70	18.74	16.60	17.28	-	0.50
	5865	18.82	18.78	17.58	17.58	-	0.50
	5885	18.74	18.74	17.02	16.38	-	0.50

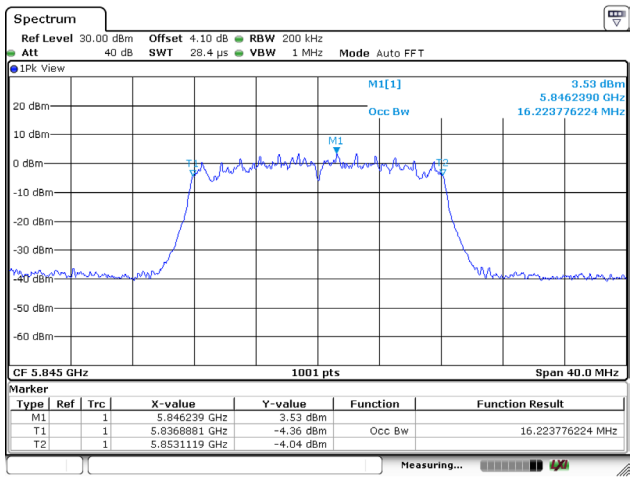
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 1	Ant. 2	Ant. 1	Ant. 2	99% Bandwidth	DTS Bandwidth
802.11be (40 MHz)	5835 (U-NII-3~4)	37.72	37.56	35.26	35.34	-	0.50
	5875	37.56	37.56	35.21	35.29	-	0.50

Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 1	Ant. 2	Ant. 1	Ant. 2	99% Bandwidth	DTS Bandwidth
802.11be (80 MHz)	5855 (U-NII-3~4)	77.04	77.04	75.56	75.56	-	0.50

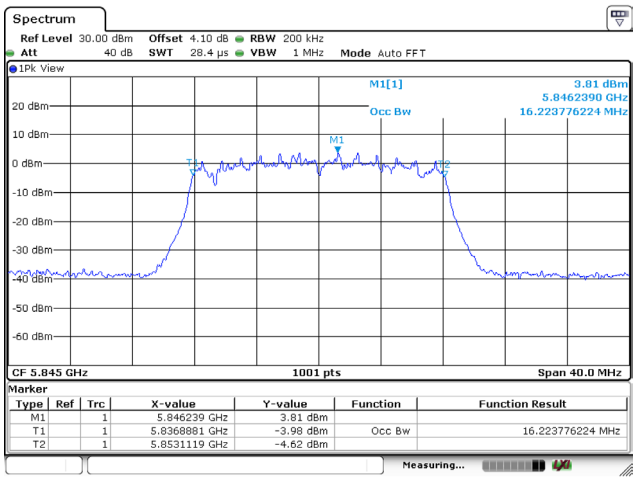
Modulation	Frequency (MHz)	99% Bandwidth (MHz)		DTS Bandwidth (MHz)		Limit (MHz)	
		Ant. 1	Ant. 2	Ant. 1	Ant. 2	99% Bandwidth	DTS Bandwidth
802.11be (160 MHz)	5815 (U-NII-3~4)	155.36	154.40	155.48	154.53	-	0.50

For 99% Bandwidth:

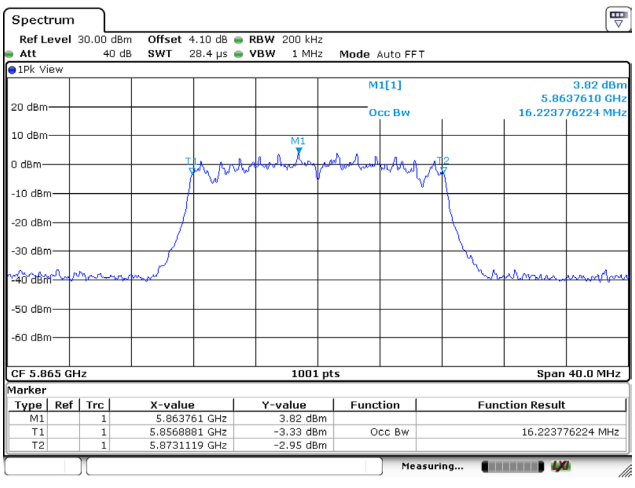
802.11a / Ant.1 / 5845MHz / Ch169



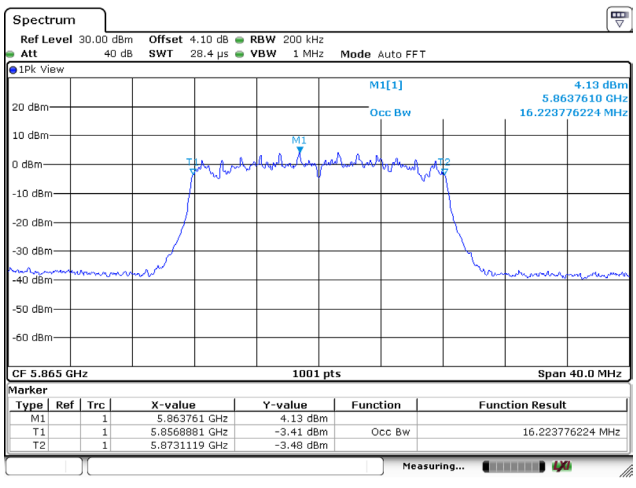
802.11a / Ant.2 / 5845MHz / Ch169



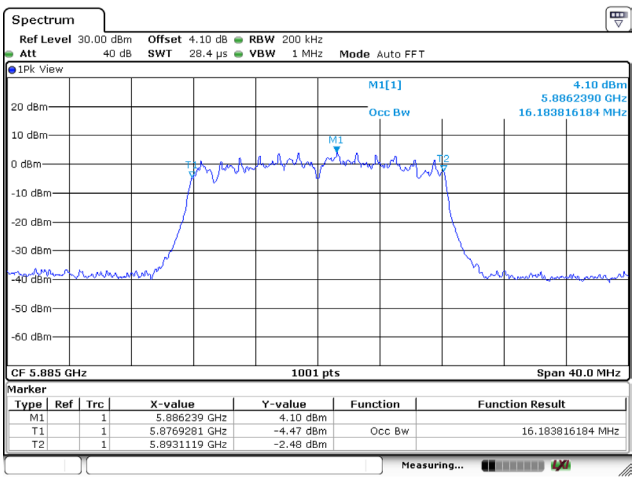
802.11a / Ant.1 / 5865MHz / Ch173



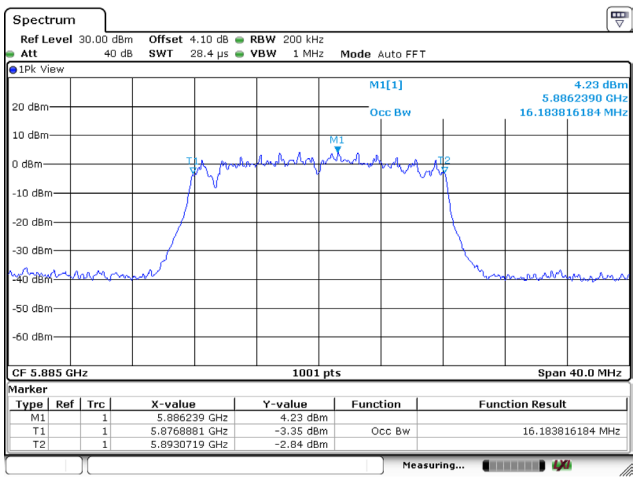
802.11a / Ant.2 / 5865MHz / Ch173



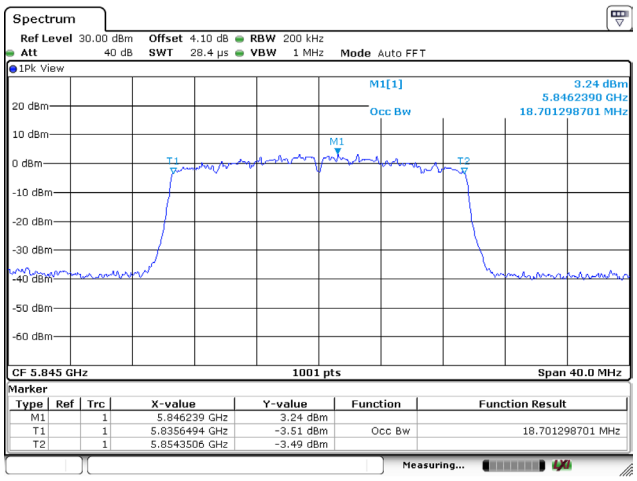
802.11a / Ant.1 / 5885MHz / Ch177



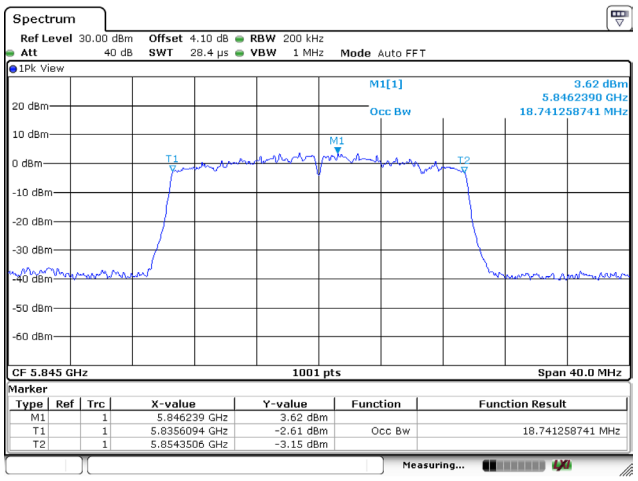
802.11a / Ant.2 / 5885MHz / Ch177



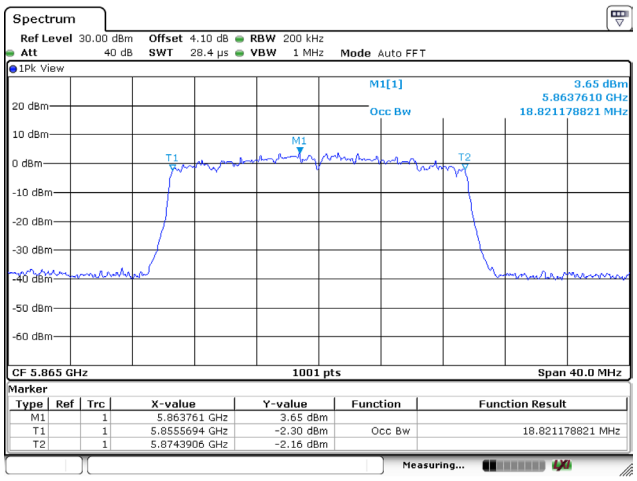
802.11be / 20MHz / Ant.1 / 5845MHz / Ch169



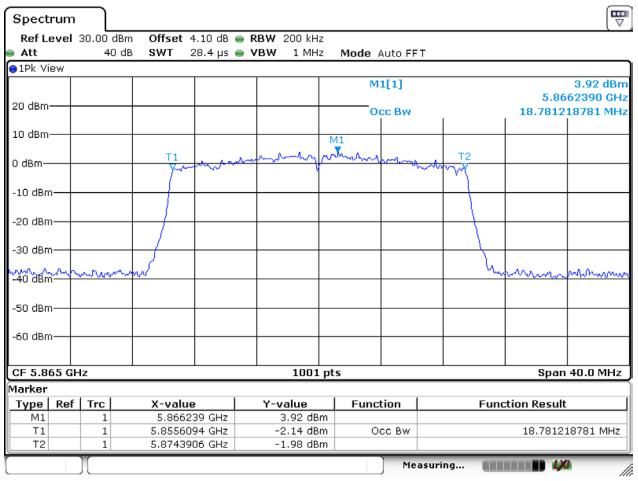
802.11be / 20MHz / Ant.2 / 5845MHz / Ch169



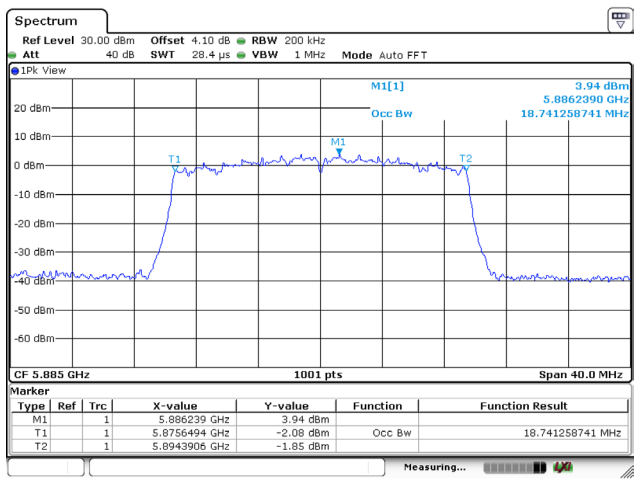
802.11be / 20MHz / Ant.1 / 5865MHz / Ch173



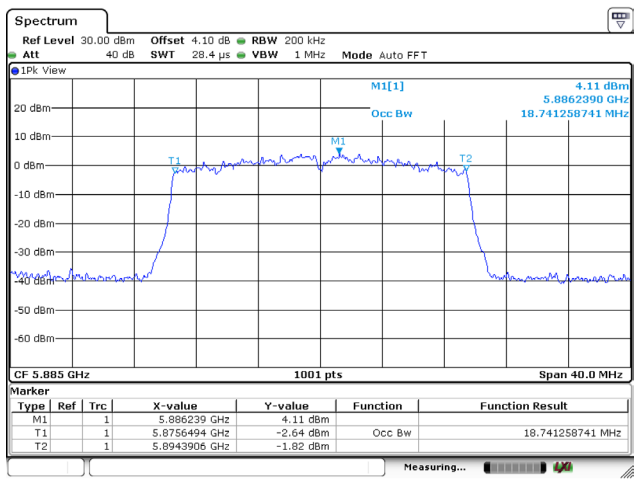
802.11be / 20MHz / Ant.2 / 5865MHz / Ch173



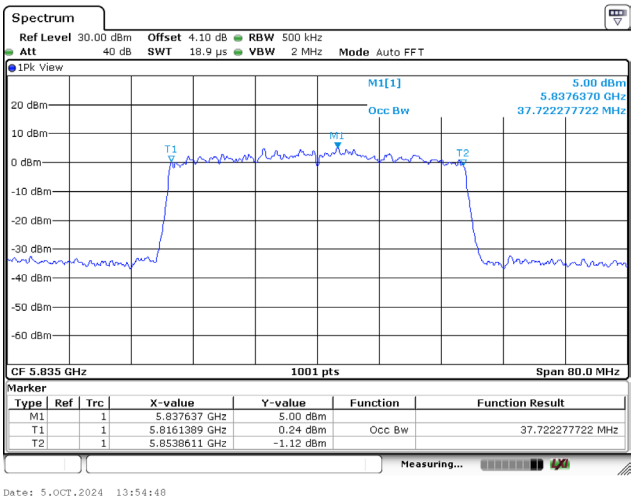
802.11be / 20MHz / Ant.1 / 5885MHz / Ch177



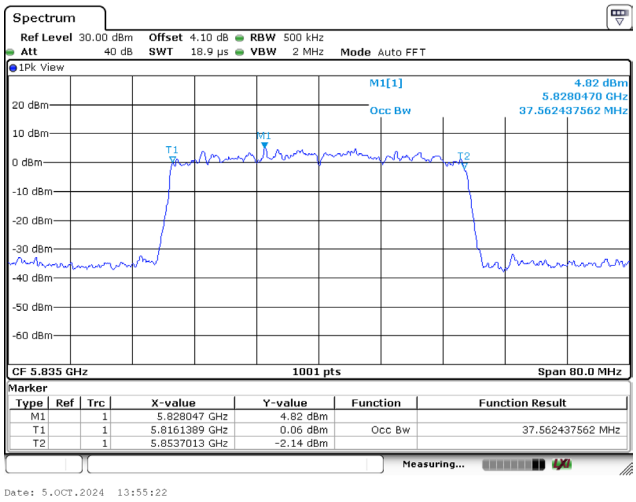
802.11be/ 20MHz / Ant.2 / 5885MHz / Ch177



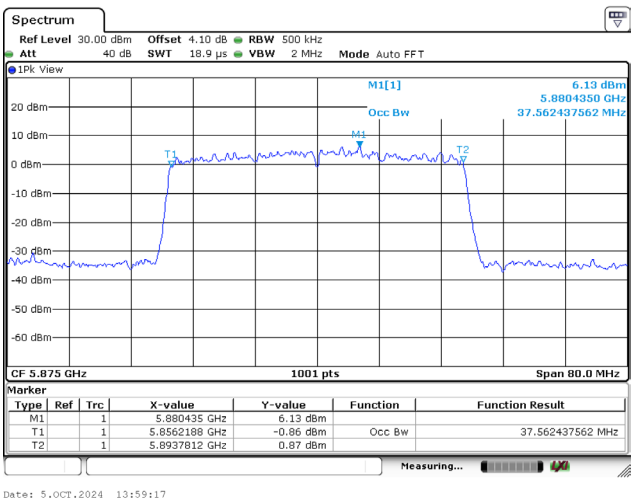
802.11be / 40MHz / Ant.1 / 5835MHz / Ch167



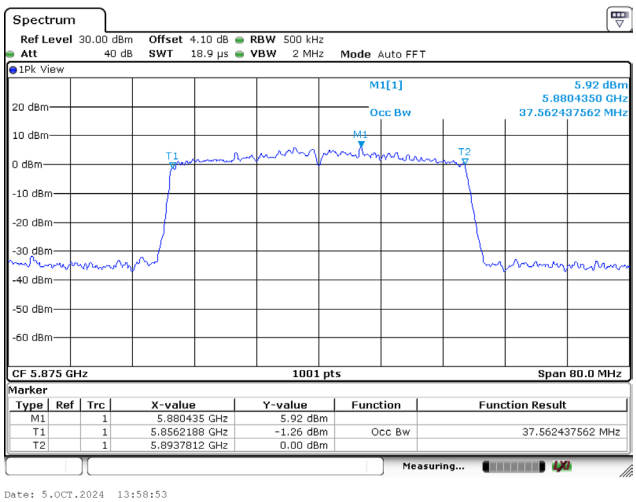
802.11be / 40MHz / Ant.2 / 5835MHz / Ch167



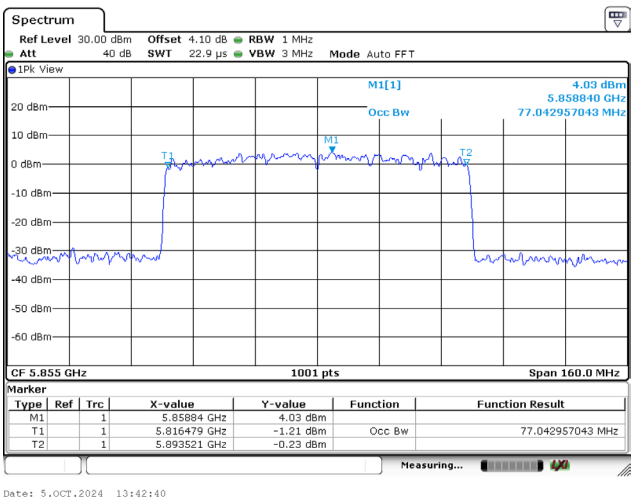
802.11be / 40MHz / Ant.1 / 5875MHz / Ch175



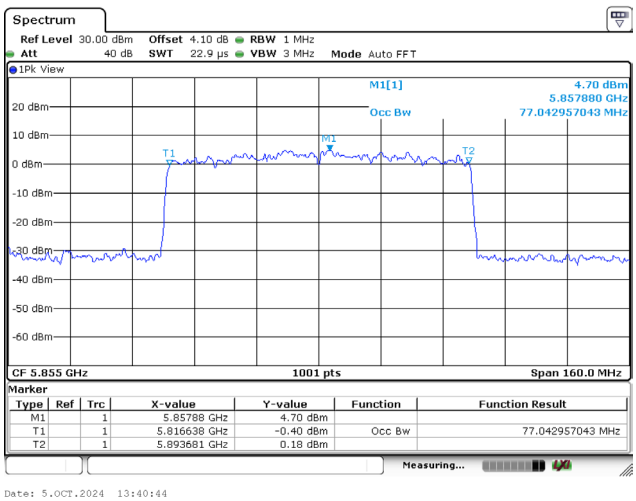
802.11be / 40MHz / Ant.2 / 5875MHz / Ch175

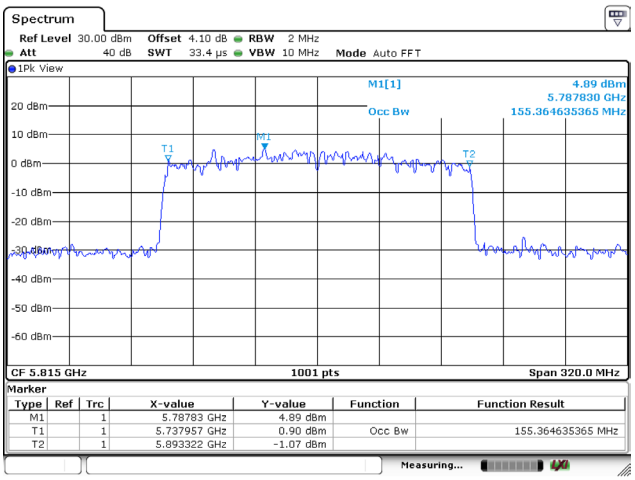
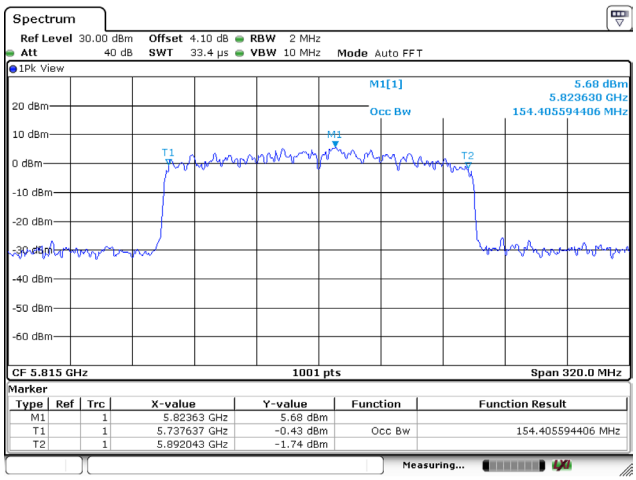


802.11be / 80MHz / Ant.1 / 5855MHz / Ch171



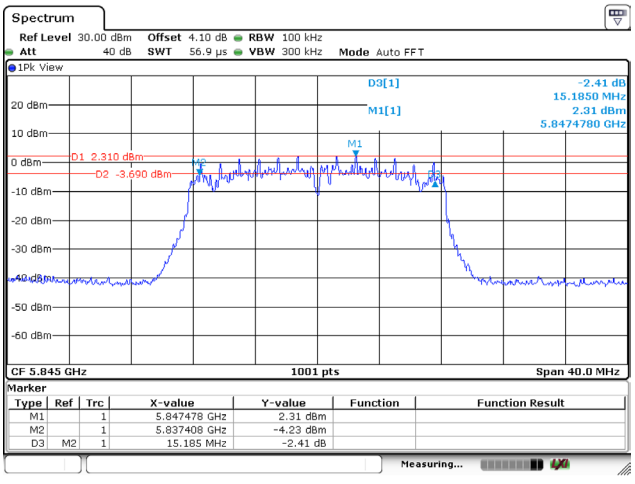
802.11be / 80MHz / Ant.2 / 5855MHz / Ch171



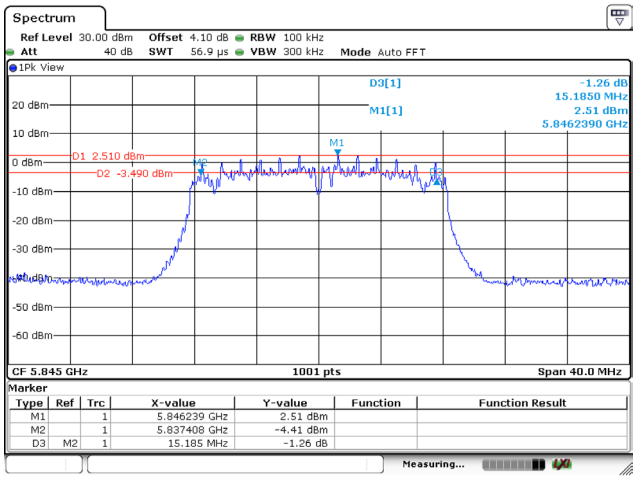
802.11be / 160MHz / Ant.1 / 5815MHz / Ch163	802.11be / 160MHz / Ant.2 / 5815MHz / Ch163
	

For DTS Bandwidth:

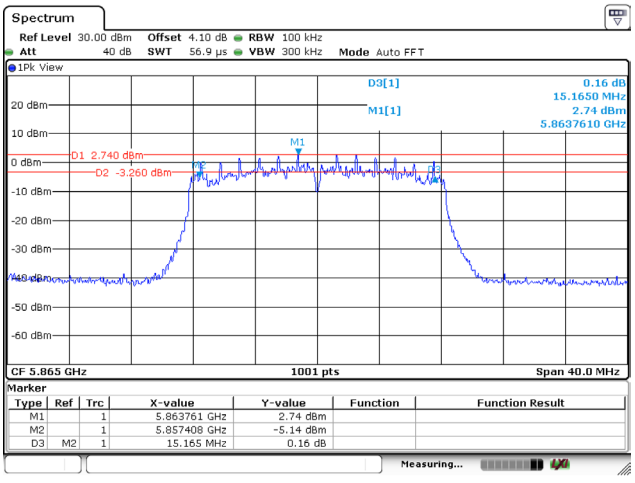
802.11a / Ant.1 / 5845MHz / Ch169



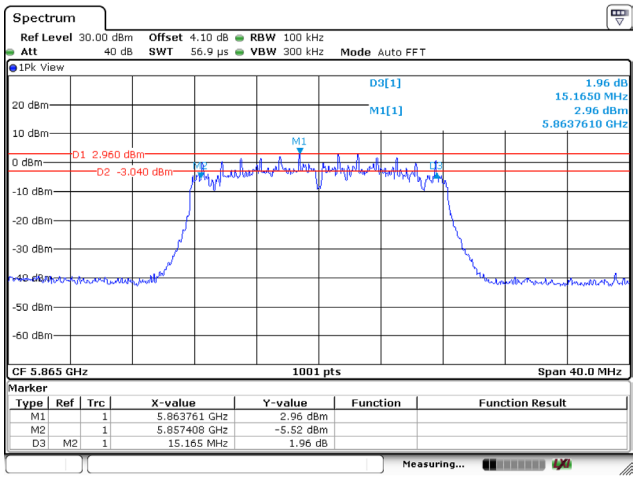
802.11a / Ant.2 / 5845MHz / Ch169



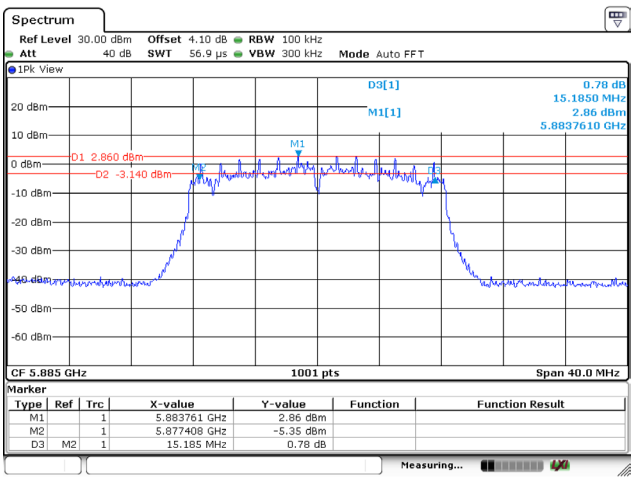
802.11a / Ant.1 / 5865MHz / Ch173



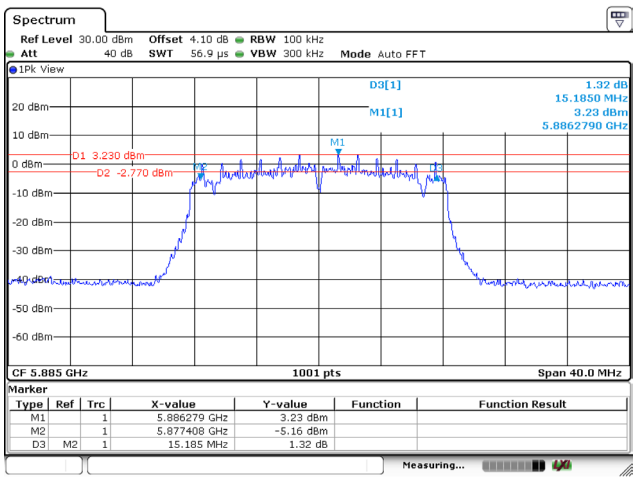
802.11a / Ant.2 / 5865MHz / Ch173

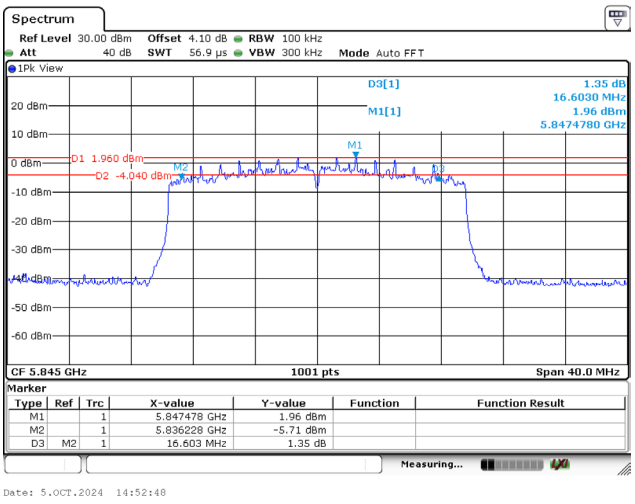
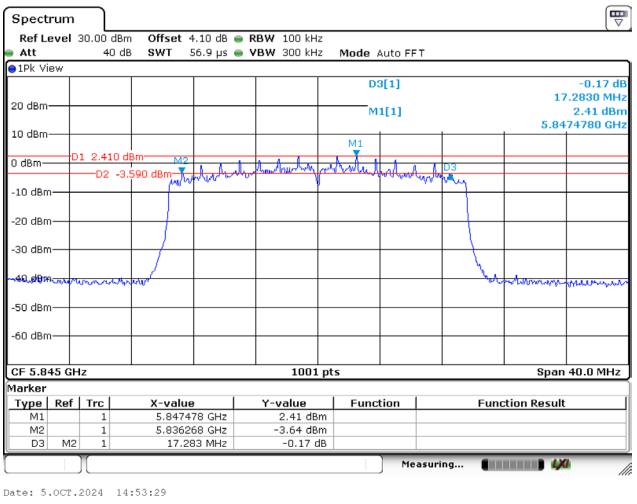
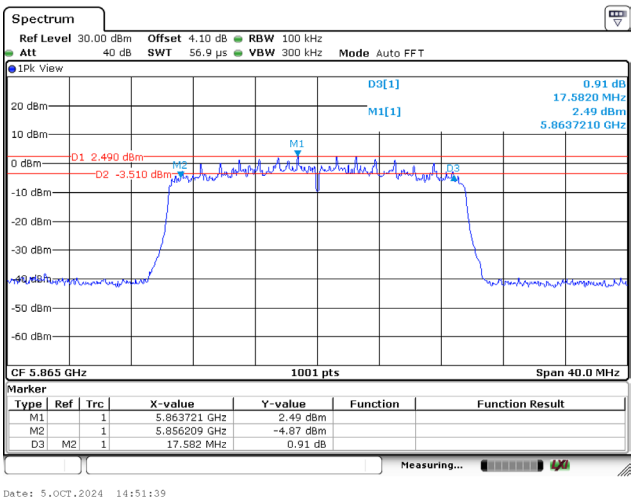
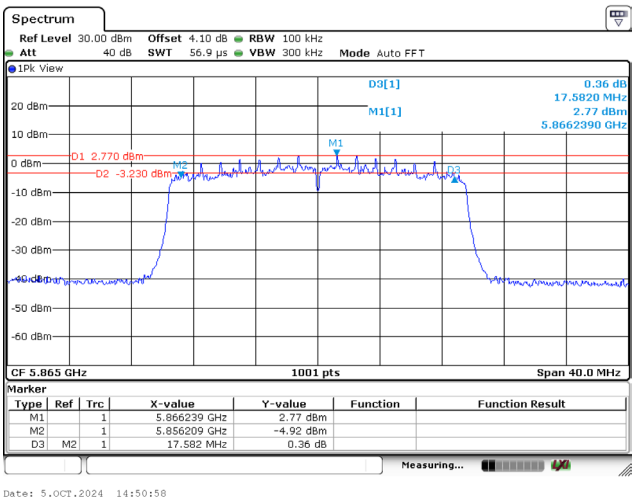
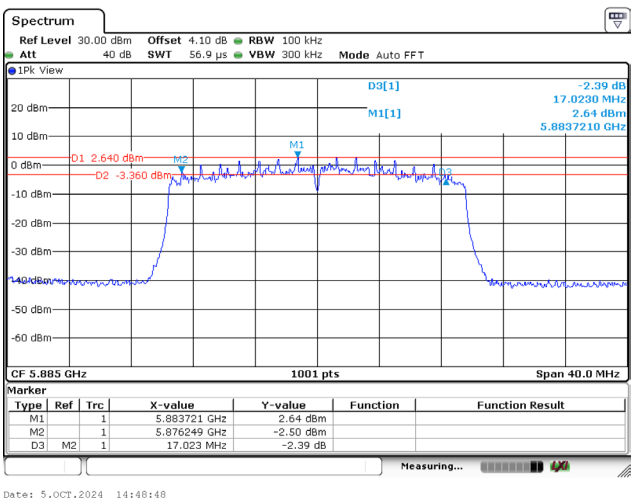
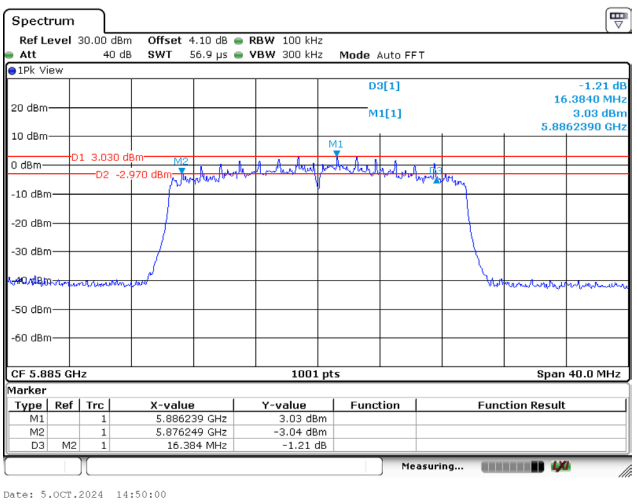


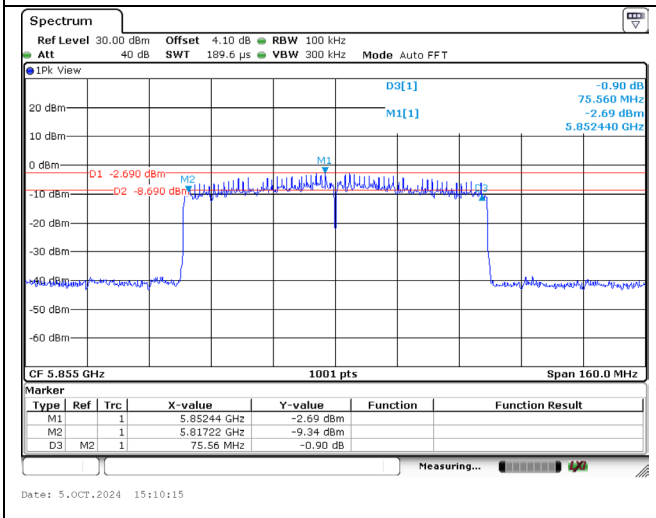
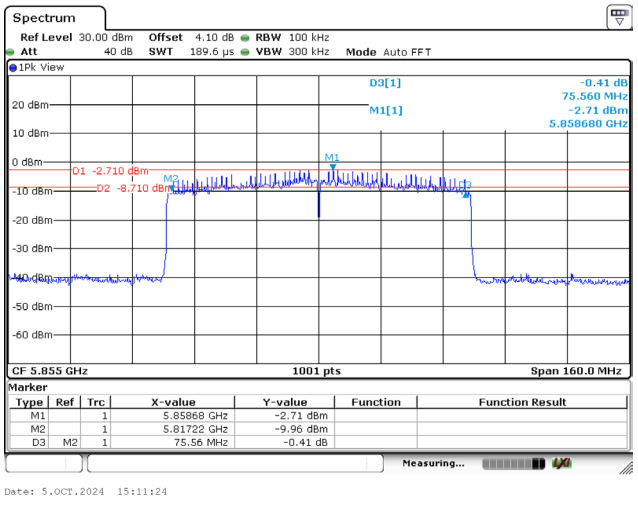
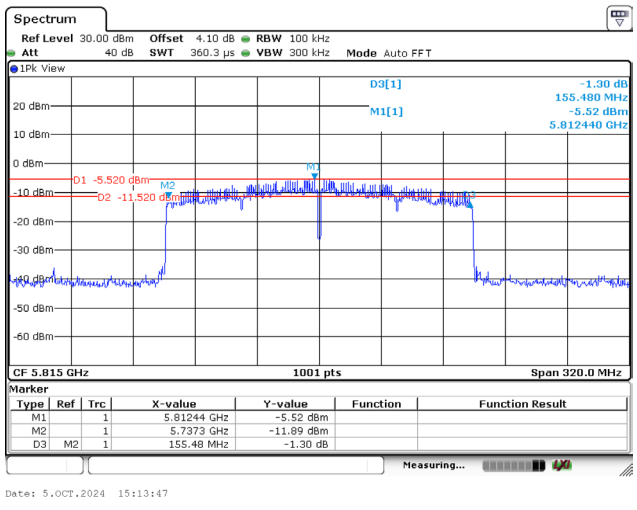
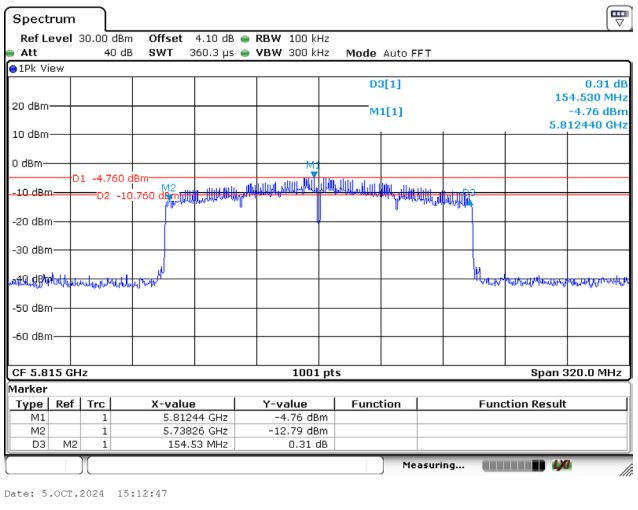
802.11a / Ant.1 / 5885MHz / Ch177



802.11a / Ant.2 / 5885MHz / Ch177



802.11be / 20MHz / Ant.1 / 5845MHz / Ch169	802.11be / 20MHz / Ant.2 / 5845MHz / Ch169
	
802.11be / 20MHz / Ant.1 / 5865MHz / Ch173	802.11be / 20MHz / Ant.2 / 5865MHz / Ch173
	
802.11be / 20MHz / Ant.1 / 5885MHz / Ch177	802.11be / 20MHz / Ant.2 / 5885MHz / Ch177
	

802.11be / 80MHz / Ant.1 / 5855MHz / Ch171	802.11be / 80MHz / Ant.2 / 5855MHz / Ch171
	
802.11be / 160MHz / Ant.1 / 5815MHz / Ch163	802.11be / 160MHz / Ant.2 / 5815MHz / Ch163
	

Appendix C. Test Result of Maximum Conducted Output Power

<2TX, NSS1 for 5GHz U-NII 4>

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Max Gain (dBi)	E.I.R.P Power (dBm)	E.I.R.P Limit (dBm)
		Ant. 1	Ant. 2	Total			
802.11a	5845 (U-NII-3~4)	12.560	12.640	15.610	2.610	18.220	30.000
	5865	12.510	12.720	15.627	2.610	18.237	30.000
	5885	12.640	12.780	15.721	2.610	18.331	30.000
802.11be (20 MHz)	5845 (U-NII-3~4)	12.360	12.610	15.497	2.610	18.107	30.000
	5865	12.440	12.730	15.598	2.610	18.208	30.000
	5885	12.490	12.860	15.689	2.610	18.299	30.000
802.11be (40 MHz)	5835 (U-NII-3~4)	12.860	12.910	15.895	2.610	18.505	30.000
	5875	12.360	12.540	15.461	2.610	18.071	30.000
802.11be (80 MHz)	5855 (U-NII-3~4)	12.550	12.740	15.656	2.610	18.266	30.000
802.11be (160 MHz)	5815 (U-NII-3~4)	12.520	12.780	15.662	2.610	18.272	30.000

<2TX, NSS 2 for 5GHz U-NII 4>

Modulation	Frequency (MHz)	Maximum Conducted Output Power (dBm)			Max Gain (dBi)	E.I.R.P Power (dBm)	E.I.R.P Limit (dBm)
		Ant. 1	Ant. 2	Total			
802.11be (20 MHz)	5845 (U-NII-3~4)	12.270	12.560	15.428	2.610	18.038	30.000
	5865	12.360	12.600	15.492	2.610	18.102	30.000
	5885	12.510	12.690	15.611	2.610	18.221	30.000
802.11be (40 MHz)	5835 (U-NII-3~4)	12.730	12.970	15.862	2.610	18.472	30.000
	5875	12.310	12.530	15.432	2.610	18.042	30.000
802.11be (80 MHz)	5855 (U-NII-3~4)	12.530	12.730	15.641	2.610	18.251	30.000
802.11be (160 MHz)	5815 (U-NII-3~4)	12.490	12.770	15.643	2.610	18.253	30.000

Appendix D. Test Result of Maximum Power Spectral Density

<2TX, NSS1>

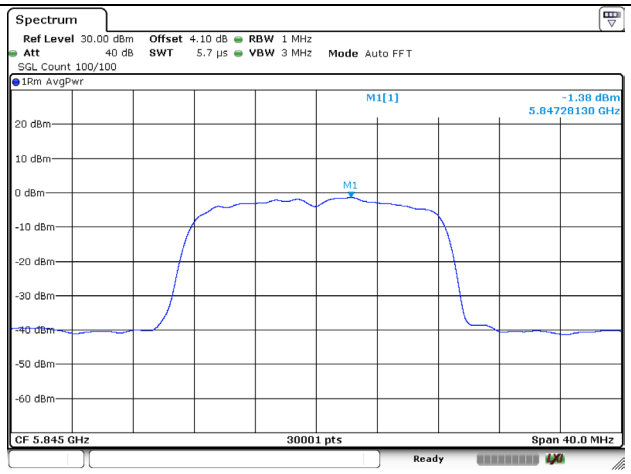
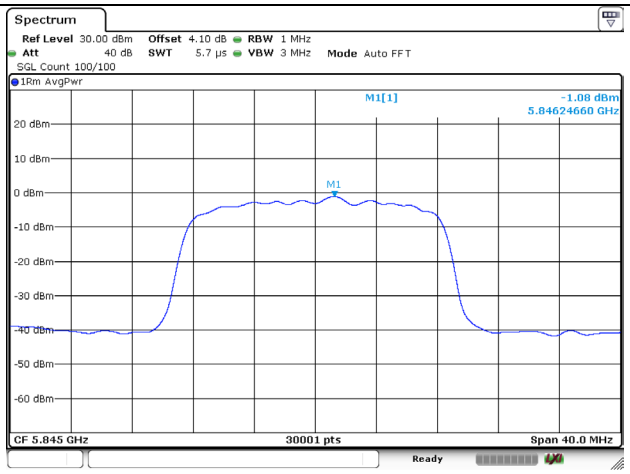
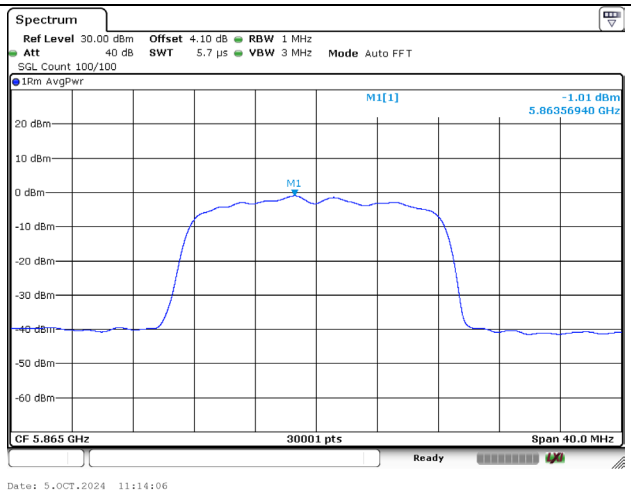
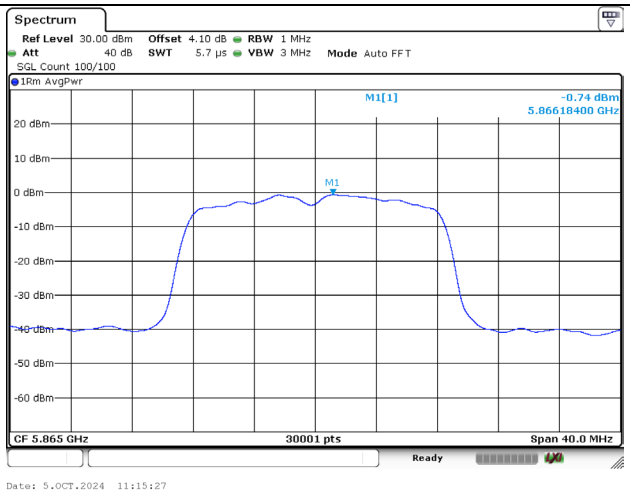
Modulation	Frequency (MHz)	Power Spectral Density (dBm/MHz)			EIRP (dBm/MHz)		Result
		Ant. 1	Ant. 2	Total	Total	Limit	
802.11a	5845 (U-NII-3~4)	-1.38	-1.08	7.04	12.54	14.00	Pass
	5865	-1.01	-0.74	7.40	12.90	14.00	Pass
	5885	-0.84	-0.67	7.51	13.01	14.00	Pass

Modulation	Frequency (MHz)	Power Spectral Density (dBm/MHz)			EIRP (dBm/MHz)		Result
		Ant. 1	Ant. 2	Total	Total	Limit	
802.11be (20 MHz)	5845 (U-NII-3~4)	0.22	0.45	5.43	10.93	14.00	Pass
	5865	0.92	1.07	6.09	11.59	14.00	Pass
	5885	0.98	1.11	6.14	11.64	14.00	Pass

Modulation	Frequency (MHz)	Power Spectral Density (dBm/MHz)			EIRP (dBm/MHz)		Result
		Ant. 1	Ant. 2	Total	Total	Limit	
802.11be (40 MHz)	5835 (U-NII-3~4)	-1.68	-1.66	3.43	8.93	14.00	Pass
	5875	-1.28	-1.26	3.83	9.33	14.00	Pass

Modulation	Frequency (MHz)	Power Spectral Density (dBm/MHz)			EIRP (dBm/MHz)		Result
		Ant. 1	Ant. 2	Total	Total	Limit	
802.11be (80 MHz)	5855 (U-NII-3~4)	-5.50	-5.23	-0.24	5.26	14.00	Pass

Modulation	Frequency (MHz)	Power Spectral Density (dBm/MHz)			EIRP (dBm/MHz)		Result
		Ant. 1	Ant. 2	Total	Total	Limit	
802.11be (160 MHz)	5815 (U-NII-3~4)	-7.12	-7.05	-1.96	3.54	14.00	Pass

802.11a / Ant.1 / 5845MHz / Ch169	802.11a / 20MHz / Ant.2 / 5845MHz / Ch169
	
802.11a / Ant.1 / 5865MHz / Ch173	802.11a / 20MHz / Ant.2 / 5865MHz / Ch173
	
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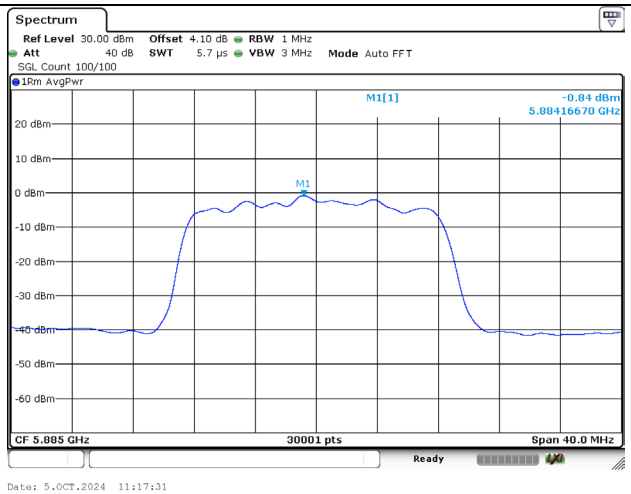
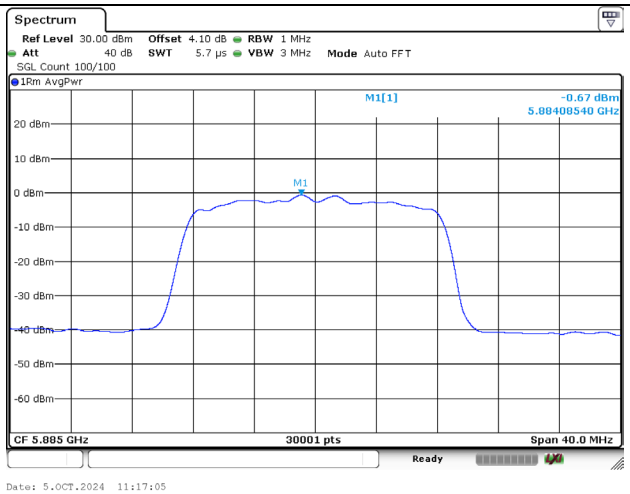
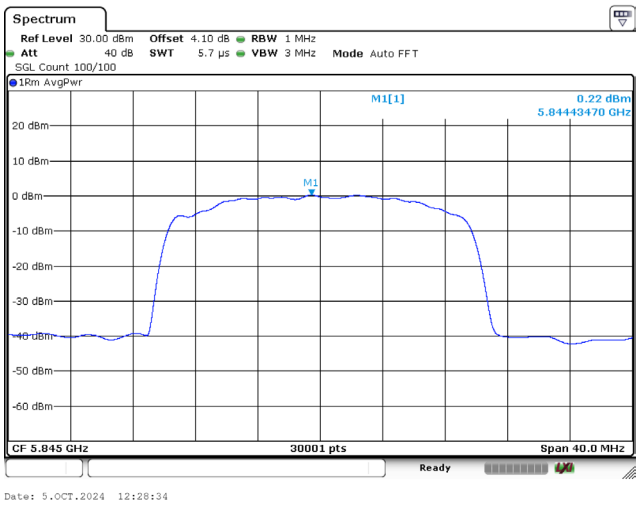
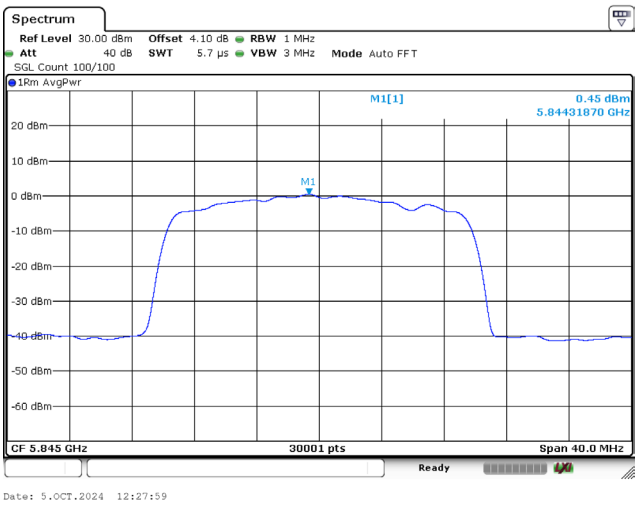
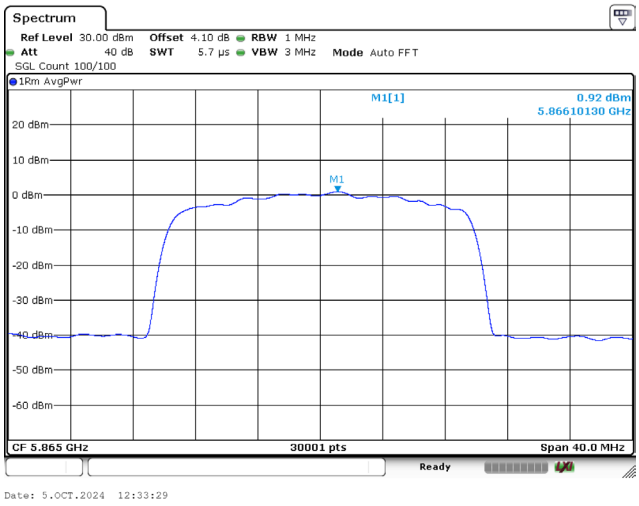
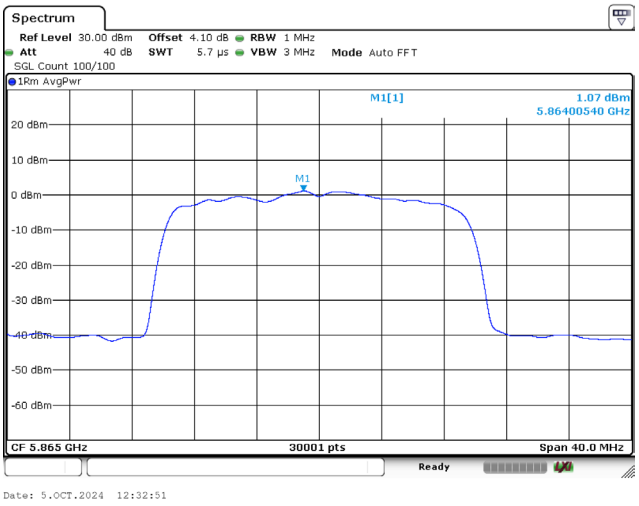
	

802.11be / 20MHz / Ant.1 / 5845MHz / Ch169	802.11be / 20MHz / Ant.2 / 5845MHz / Ch169
	
802.11be / 20MHz / Ant.1 / 5865MHz / Ch173	802.11be / 20MHz / Ant.2 / 5865MHz / Ch173
	
802.11be / 20MHz / Ant.1 / 5885MHz / Ch177	802.11be / 20MHz / Ant.2 / 5885MHz / Ch177