



RF MEASUREMENT REPORT

FCC ID: 2BAXN-MR0005

Applicant: Willand (Beijing) Technology Co., LTD.

Product: Segway Navimow X3 Series

Model No.: X315N, X330N, X350N, X390N

Brand Name: Segway Navimow

FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part 15 Subpart C (Section 15.247)

Result: Complies

Received Date: 2024-11-04

Test Date: 2024-12-11 ~ 2025-01-06

Reviewed By:

Vincent Yu

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2411RSU003-U4	V01	Initial Report	2025-01-10	Valid

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1. General Information

1.1. Applicant

Willand (Beijing) Technology Co., LTD.

Room 203, A1 Bldg. Zhongguancun Dongsheng Technology Park (Northern Territory), No. 66, Xixiaokou Rd,
Haidian Dist., Beijing, China.

1.2. Manufacturer

Willand (Beijing) Technology Co., LTD.

Room 203, A1 Bldg. Zhongguancun Dongsheng Technology Park (Northern Territory), No. 66, Xixiaokou Rd,
Haidian Dist., Beijing, China.

Navimow B.V.

Dynamostraat 7. 1014 BN Amsterdam, The Netherlands

1.3. Testing Facility

☒	Test Site – MRT Suzhou Laboratory			
	Laboratory Location (Suzhou - Wuzhong)			
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China			
	Laboratory Location (Suzhou - SIP)			
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China			
	Laboratory Location (Suzhou - Wujiang)			
	Building 1, No.1 Xingdong Road, Wujiang, Suzhou, Jiangsu, People's Republic of China			
☒	Laboratory Accreditations			
	A2LA: 3628.01		CNAS: L10551	
	FCC: CN1166		ISED: CN0001	
	VCCI:	☐ R-20025	☐ G-20034	☐ C-20020
		☐ T-20020		
		☐ R-20141	☐ G-20134	☐ C-20103
			☐ T-20104	
☐	Test Site – MRT Shenzhen Laboratory			
	Laboratory Location (Shenzhen)			
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China			
	Laboratory Accreditations			
	A2LA: 3628.02		CNAS: L10551	
☐	FCC: CN1284		ISED: CN0105	
	Test Site – MRT Taiwan Laboratory			
	Laboratory Location (Taiwan)			
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)			
	Laboratory Accreditations			
☐	TAF: 3261			
	FCC: 291082, TW3261		ISED: TW3261	

1.4. Product Information

Product Name	Segway Navimow X3 Series
Model No.	X315N, X330N, X350N, X390N
Brand Name	Segway Navimow
EUT Identification No.	20241104Sample#09
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Bluetooth Version	Bluetooth-LE only
SRD Specification	915.05 ~ 917.9MHz
3GPP Specification	WCDMA Band 2/4/5 LTE Band 2/4/5/12/13/14/66/71
Antenna Information	Refer to section 1.7
Operating Temp.	0 ~ 40°C
Power Type	By Battery
Accessories	
Charging Station	Product Name: Navimow Charging Station Model No.: X3C00G Input: 32V = 7.0A MAX Output: 25.2V = 7.0A MAX
Adapter	Model No.: NBW32D007D0N01-US Input: 100 ~ 240V, 50/60Hz, 4.0A MAX Output: 32.0V = 7.0A
Li-ion Battery Pack	Model No.: NBCF2213A Capacitance: 12800mAh / 276.5Wh Charging Voltage: 21.6VDC
Trimmer	Product Name: Trimmer Model No.: X3A10N
Antenna	Product Name: Antenna Model No.: X3R00G Power Type: 12VDC, 1A
Notes:	
- The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. - The manufacturer states that the difference between the four models are only the battery capacity. The manufacturer selected the model X390N for testing. - For WWAN part, this device Contains FCC ID: XMR201909EC25AFX. - The adapter model used in the actual test is NBW32D007D0N01-EU. According to the manufacturer's statement, the only difference between NBW32D007D0N01-EU and NBW32D007D0N01-US is the	

connector of the AC cable, the others are identical.
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1.5. Radio Specification under Test

Frequency Range	802.11b/g/n-HT20/ax-HE20: 2412 ~ 2462MHz 802.11n-HT40/ax-HE40: 2422 ~ 2452MHz	
Channel Number	802.11b/g/n-HT20/ax-HE20: 11 802.11n-HT40/ax-HE40: 7	
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM 802.11ax: OFDMA	
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ax: up to 286.8Mbps	
Channel Puncturing Function	☐ Supported	☒ Unsupported
Support RU	☒ Full RU	☐ Partial RU

1.6. Working Frequencies

802.11b/g/n-HT20/ax-HE20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40/ax-HE40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

1.7. Antenna Details

Antenna Type	Frequency Range (MHz)	Tx Paths	Antenna Gain (dBi)
Wi-Fi Antenna			
PCB	2400 ~ 2483.5	1	3.55
	5150 ~ 5250	1	3.85
	5250 ~ 5350	1	3.85
	5470 ~ 5725	1	3.85
	5725 ~ 5850	1	3.85
Note: All antenna information is provided by the manufacturer.			

2. Test Configuration

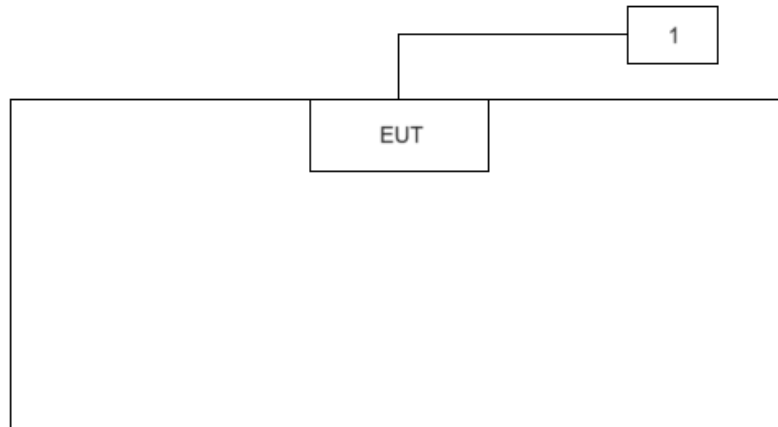
2.1. Test Mode

Mode 1: Transmit by 802.11b (1Mbps)
Mode 2: Transmit by 802.11g (6Mbps)
Mode 3: Transmit by 802.11n-HT20 (MCS0)
Mode 4: Transmit by 802.11n-HT40 (MCS0)
Mode 5: Transmit by 802.11ax-HE20 (MCS0)
Mode 6: Transmit by 802.11ax-HE40 (MCS0)
Note: As Designated by manufacturer, the lowest data rate was the worst condition, so all the tests were done with lowest data rate.

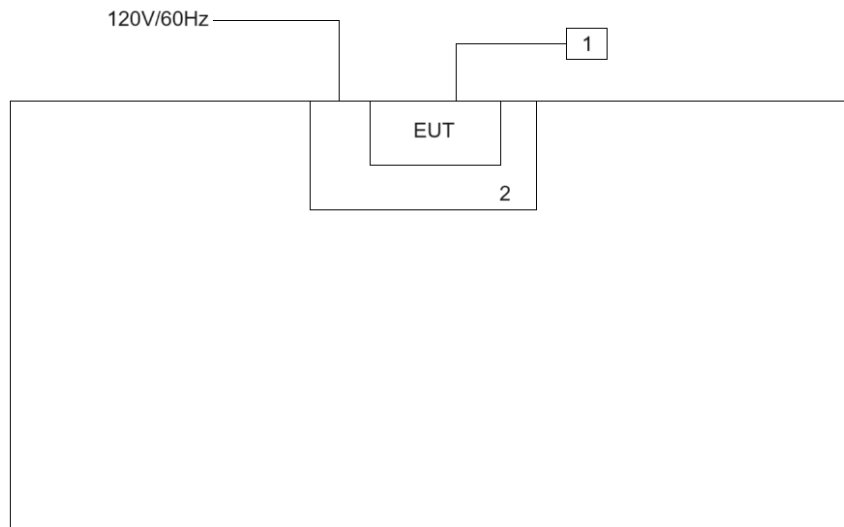
2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram - Radiated emissions testing



Connection Diagram - AC line conducted testing



Product		Manufacturer	Model No.
1	Notebook	HP	445R G6
2	Navimow Charging Station	Navimow B.V.	X3C00G

2.3. Test Software

The test utility software used during testing was “Windows PowerShell”, and the version was 1.27.2.

2.4. Applied Standards

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

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.5. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2024-12-21	SIP-AC1
				1 year	2025-12-19	SIP-AC1
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2025-02-03	SIP-AC1
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2025-06-12	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2025-10-16	SIP-AC1
Preamplifier	MRT	AMP-AC1	MRTSUE11265	1 year	2025-11-02	SIP-AC1
Cable	HUBER+SUHNER	SF106	MRTSUE06594	1 year	2024-12-21	SIP-AC1
				1 year	2025-12-19	SIP-AC1
Cable	HUBER+SUHNER	SF106	MRTSUE06874	1 year	2024-12-21	SIP-AC1
				1 year	2025-12-19	SIP-AC1
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2025-12-05	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2025-11-03	SIP-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2025-10-08	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2025-09-05	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2025-10-29	SIP-AC2
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06647	1 year	2025-06-15	SIP-AC2
Active Loop Antenna	Schwarzbeck	FMZB 1519-60 D	MRTSUE07075	1 year	2025-11-19	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2024-12-21	SIP-AC2
				1 year	2025-12-20	SIP-AC2
Cable	HUBER+SUHNER	SF106	MRTSUE06522	1 year	2025-05-07	SIP-AC2
Cable	HUBER+SUHNER	SF106	MRTSUE06875	1 year	2024-12-21	SIP-AC2
				1 year	2025-12-20	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2025-05-08	SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2025-07-07	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2025-10-16	SIP-AC3
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2025-01-11	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2024-12-21	SIP-AC3
				1 year	2025-12-20	SIP-AC3
Cable	HUBER+SUHNER	SF106	MRTSUE06873	1 year	2024-12-21	SIP-AC3
				1 year	2025-12-20	SIP-AC3
Cable	HUBER+SUHNER	SF106	MRTSUE06878	1 year	2024-12-21	SIP-AC3
				1 year	2025-12-20	SIP-AC3
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2025-06-21	SIP-TR1
Thermohygrometer	testo	608-H1	MRTSUE11022	1 year	2025-10-16	SIP-TR1
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2025-07-23	SIP-TR1

Attenuator	MVE	MVE2213	MRTSUE11101	1 year	2025-06-06	SIP-TR1
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2025-05-08	SIP-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2025-05-08	SIP-SR2
Four-Line V-Network	R&S	ENV432	MRTSUE06614	1 year	2025-10-13	SIP-SR2
Thermohygrometer	testo	608-H1	MRTSUE06621	1 year	2025-10-29	SIP-SR2
Shielding Room	MIX-BEP	SIP-SR2	MRTSUE06949	5 years	2029-10-13	SIP-SR2

Software	Version	Function
e3	230711	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.
(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
The maximum measurement uncertainty is evaluated as: Coaxial: 9kHz~30MHz: 2.61dB Coplanar: 9kHz~30MHz: 2.62dB Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~40GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~40GHz: 4.90dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.2dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.4dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.2dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.7%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Note: The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

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

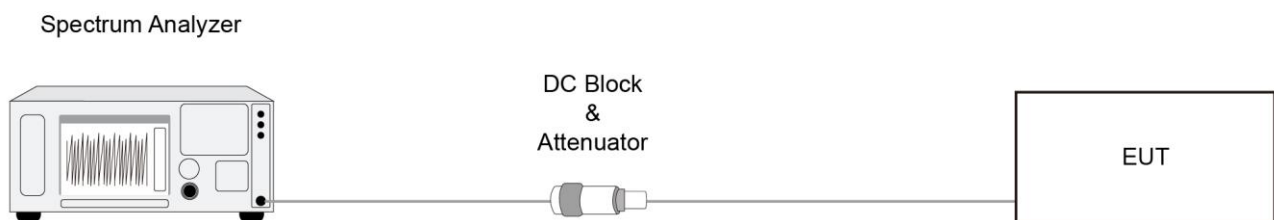
6.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

6.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3.2. Test Procedure

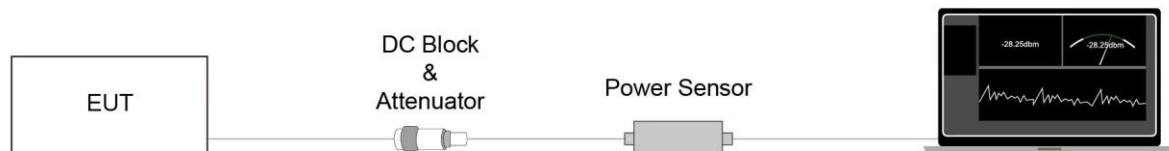
ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

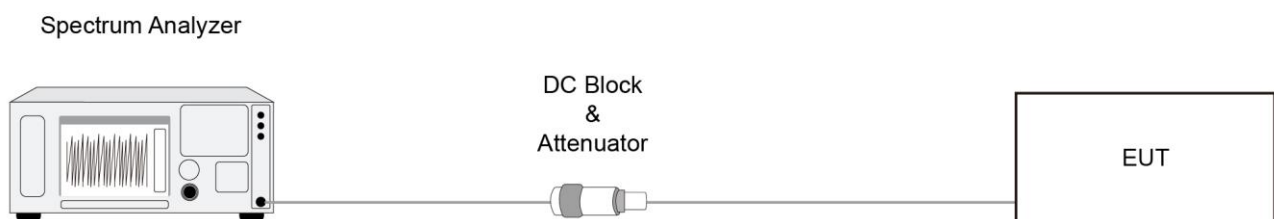
6.4.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.10.5

6.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
8. Sweep time = auto couple.
9. Don't use sweep triggering. Allow sweep to "free run".
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Conducted Band Edge and Out-of-Band Emissions Measurement

6.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 30dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Settling

Reference level measurement

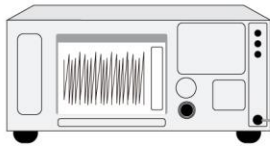
1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW $\geq 3 \times$ RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

6.5.4. Test Setup

Spectrum Analyzer



DC Block
&
Attenuator



EUT



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.6.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

6.6.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize

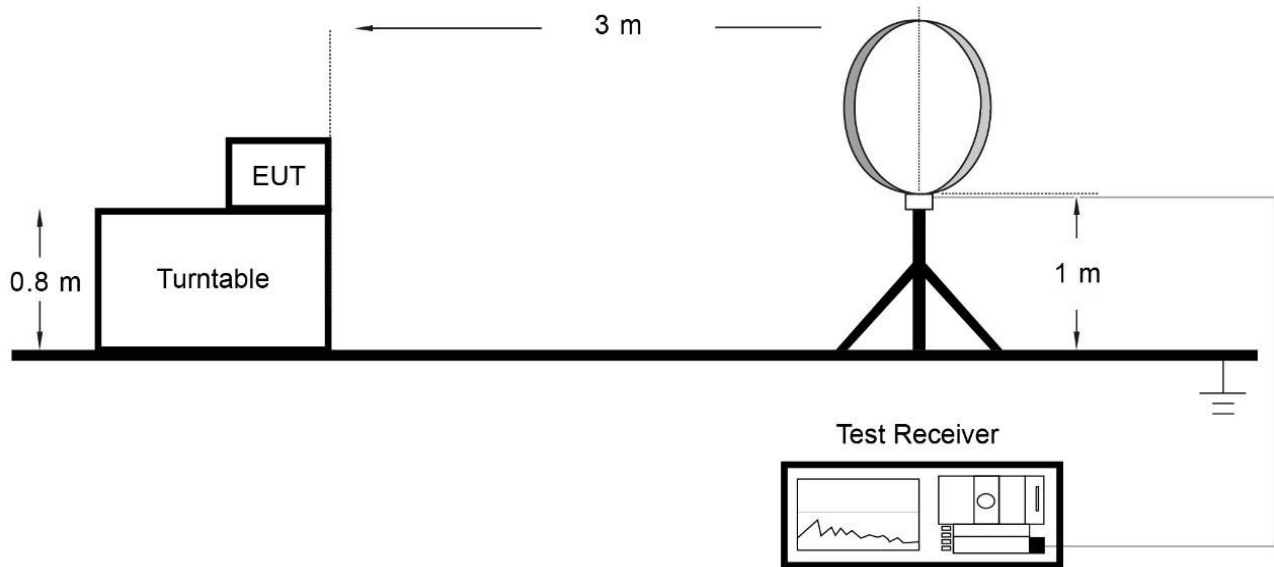
Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; if the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10Hz

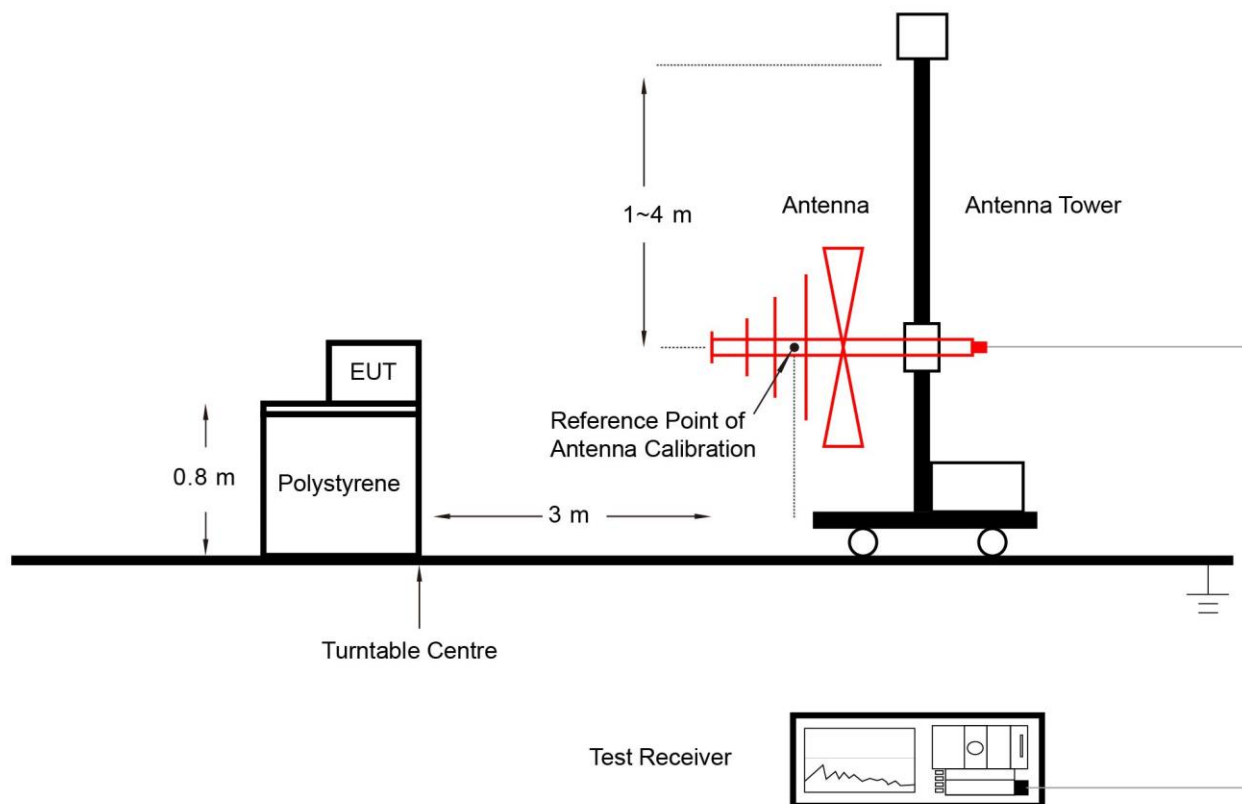
If the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$. T is the minimum transmission duration.
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = Auto
7. Trace mode = Max hold
8. Trace was allowed to stabilize

6.6.4. Test Setup

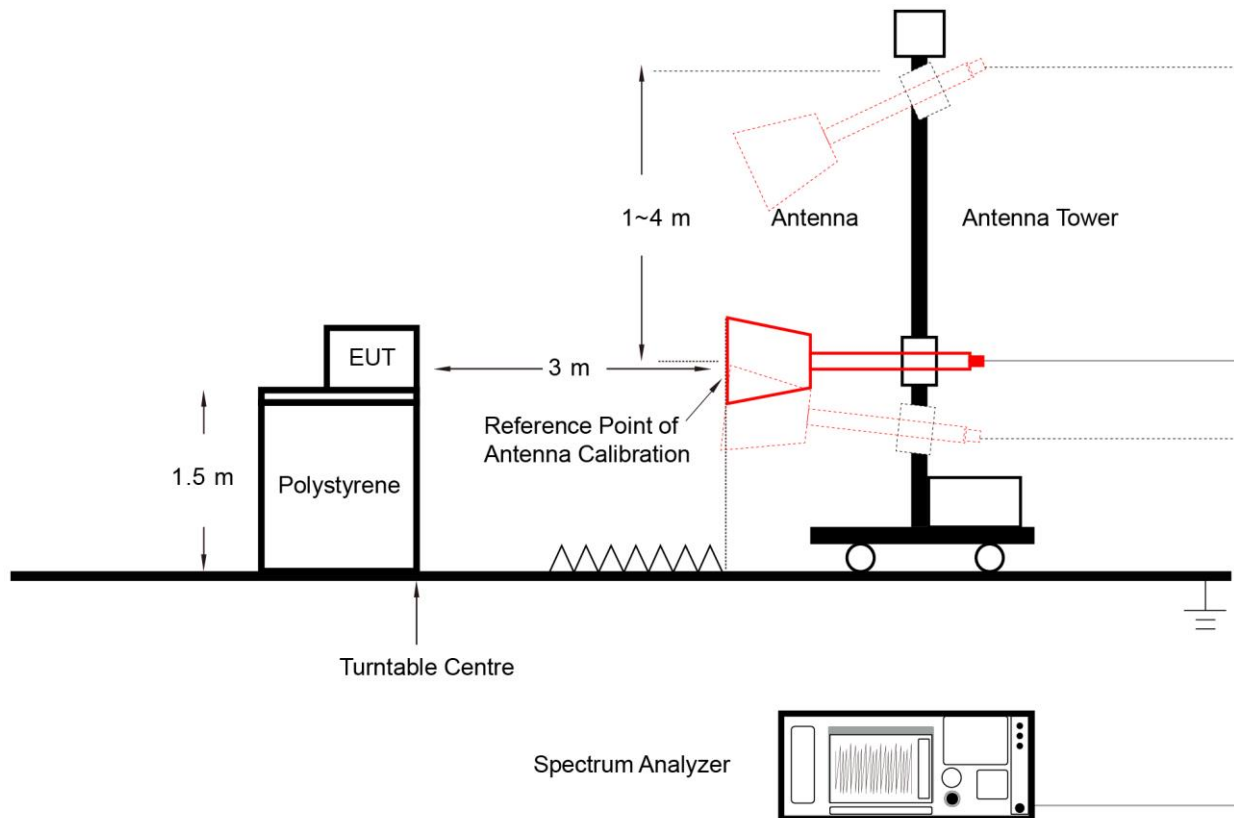
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Refer to Appendix A.6.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.7.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 11.13

6.7.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

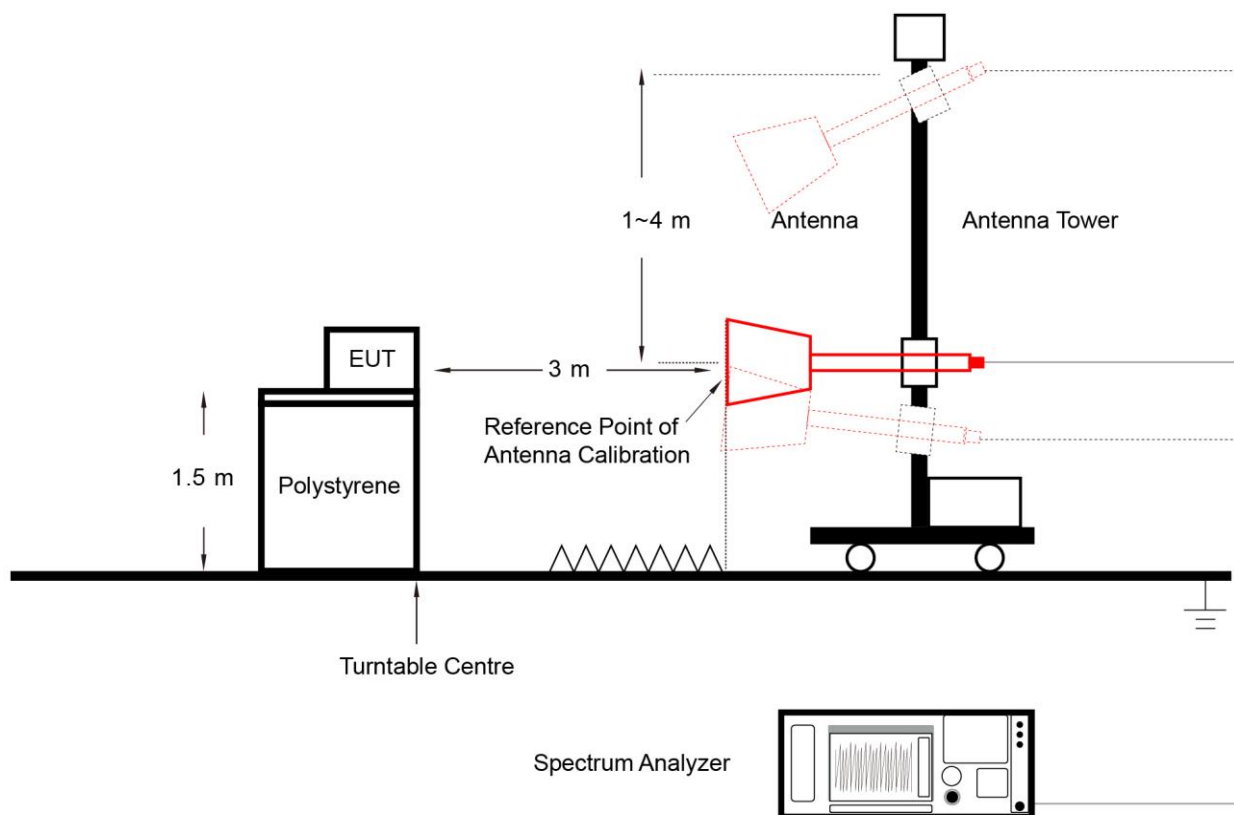
Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.

If the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$. T is the minimum transmission duration.

4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

6.7.4. Test Setup



6.7.5. Test Result

Refer to Appendix A.7.

6.8. AC Conducted Emissions Measurement

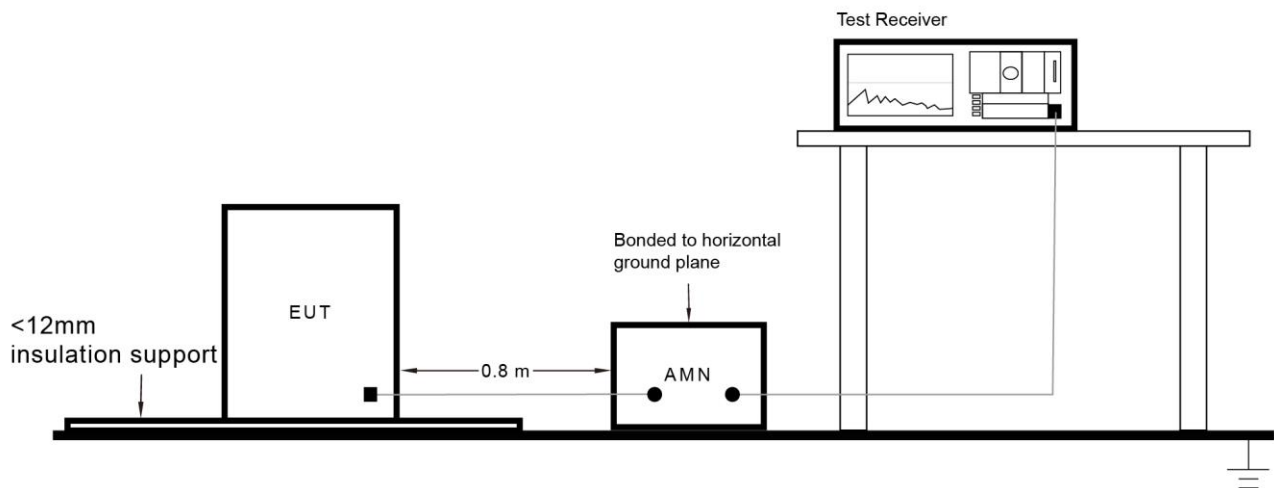
6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
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

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.8.2. Test Setup



6.8.3. Test Result

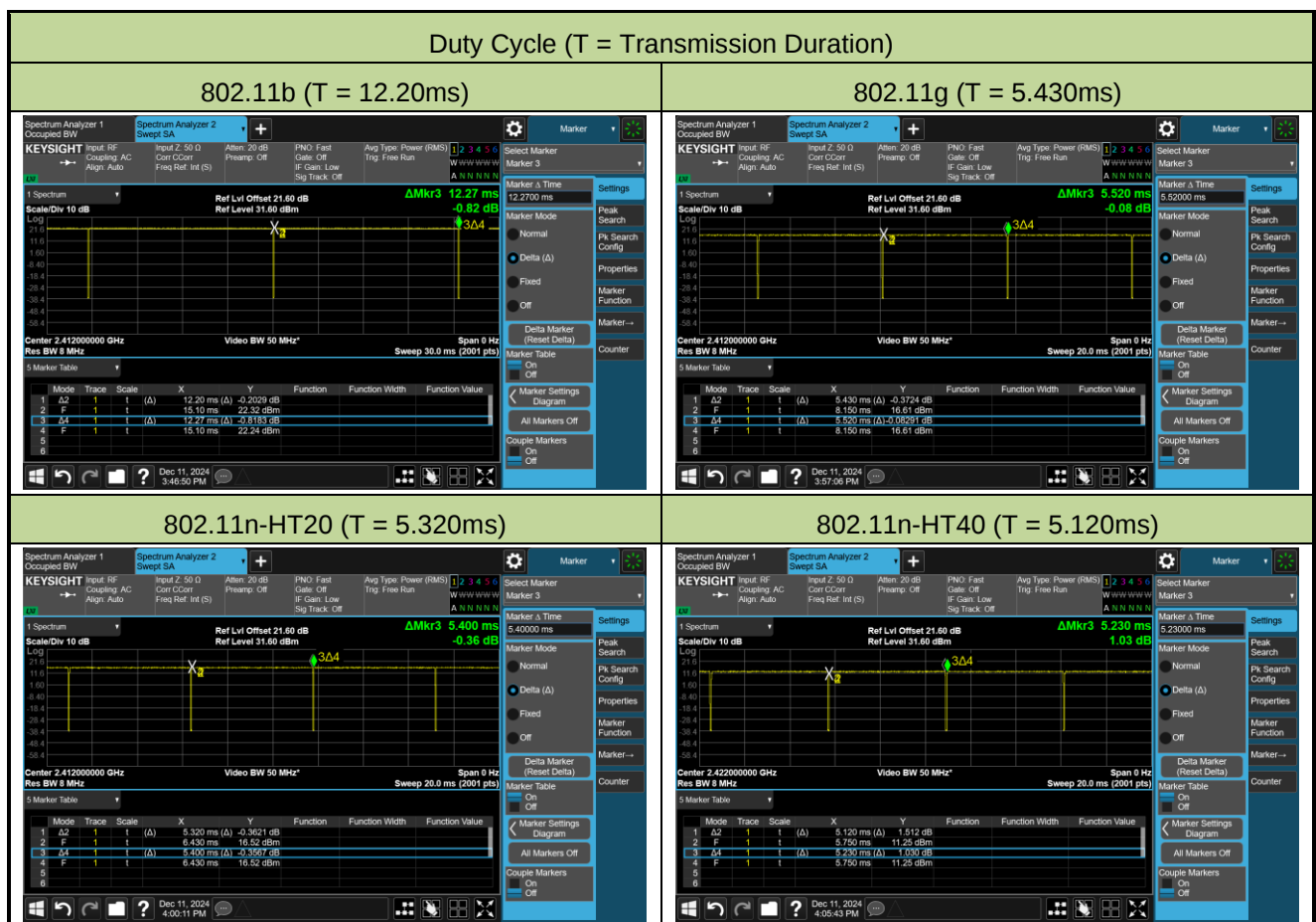
Refer to Appendix A.8.

Appendix A – Test Result

A.1 Duty Cycle Test Result

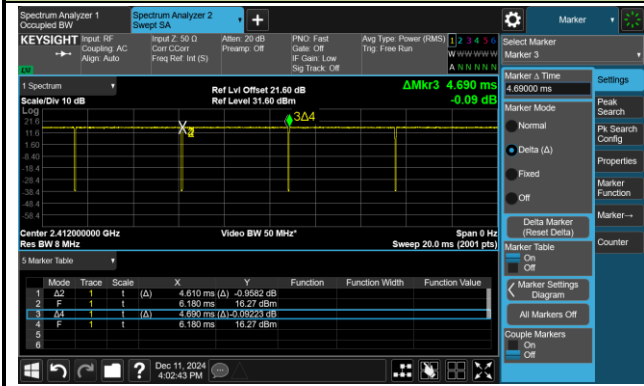
Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2024-12-11		

Test Mode	Duty Cycle
802.11b	99.43%
802.11g	98.37%
802.11n-HT20	98.52%
802.11n-HT40	97.90%
802.11ax-HE20	98.29%
802.11ax-HE40	98.29%

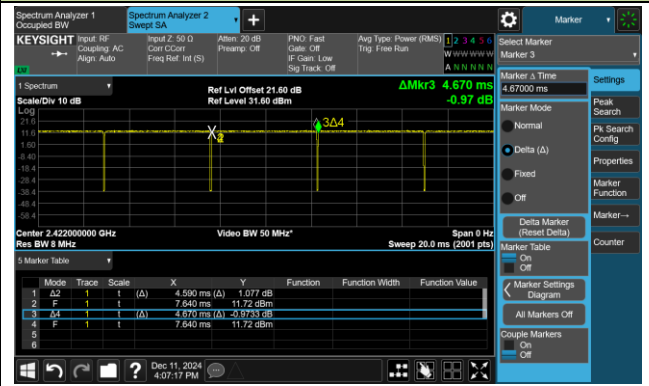


Duty Cycle (T = Transmission Duration)

802.11ax-HE20 (T = 4.610ms)



802.11ax-HE40 (T = 4.590ms)



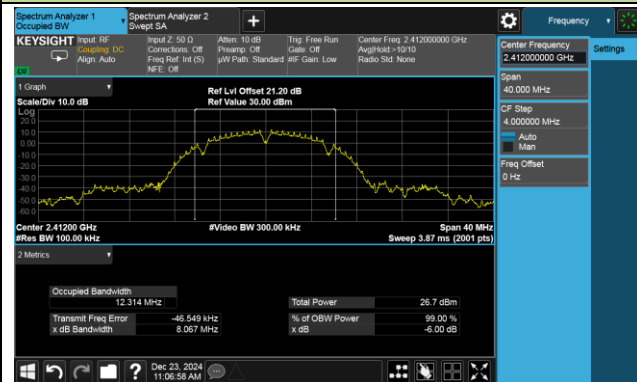
A.2 6dB Bandwidth Test Result

Test Site	SIP-TR1	Test Engineer	Alan Yu
Test Date	2024-12-23		

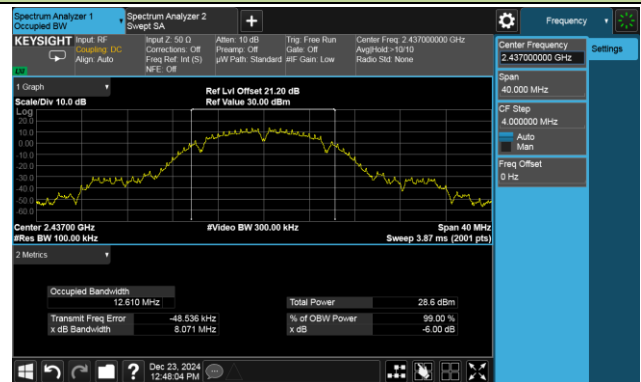
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
11b	1Mbps	01	2412	8.067	≥ 0.5
11b	1Mbps	06	2437	8.071	≥ 0.5
11b	1Mbps	11	2462	8.081	≥ 0.5
11g	6Mbps	01	2412	16.45	≥ 0.5
11g	6Mbps	06	2437	16.44	≥ 0.5
11g	6Mbps	11	2462	16.53	≥ 0.5
11n-HT20	MCS0	01	2412	17.66	≥ 0.5
11n-HT20	MCS0	06	2437	17.62	≥ 0.5
11n-HT20	MCS0	11	2462	17.70	≥ 0.5
11n-HT40	MCS0	03	2422	36.50	≥ 0.5
11n-HT40	MCS0	06	2437	36.36	≥ 0.5
11n-HT40	MCS0	09	2452	36.35	≥ 0.5
11ax-HE20	MCS0	01	2412	19.00	≥ 0.5
11ax-HE20	MCS0	06	2437	19.11	≥ 0.5
11ax-HE20	MCS0	11	2462	19.15	≥ 0.5
11ax-HE40	MCS0	03	2422	38.09	≥ 0.5
11ax-HE40	MCS0	06	2437	38.08	≥ 0.5
11ax-HE40	MCS0	09	2452	38.16	≥ 0.5

802.11b 6dB Bandwidth

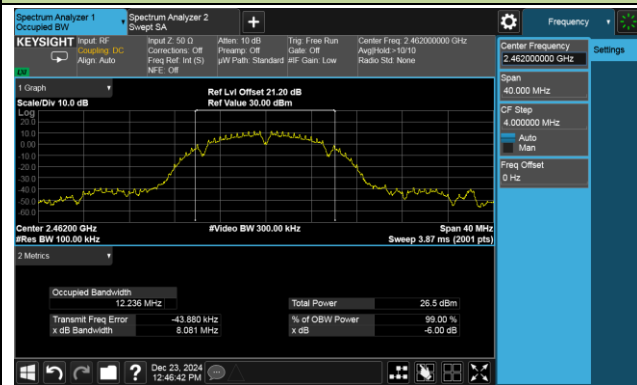
Channel 01 (2412MHz)



Channel 06 (2437MHz)

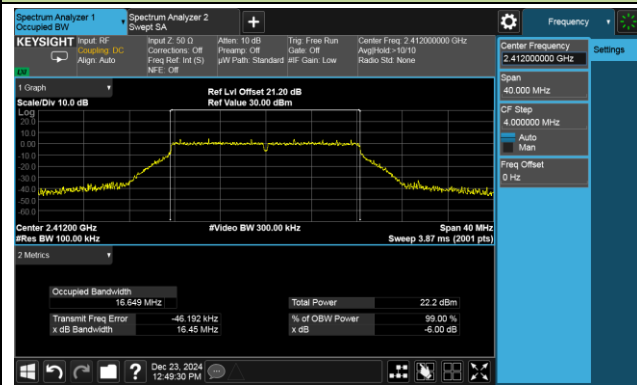


Channel 11 (2462MHz)

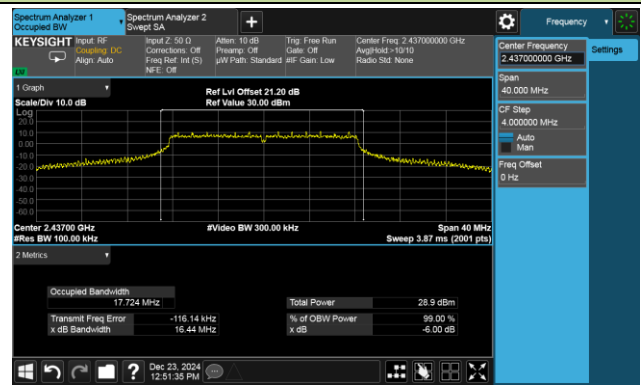


802.11g 6dB Bandwidth

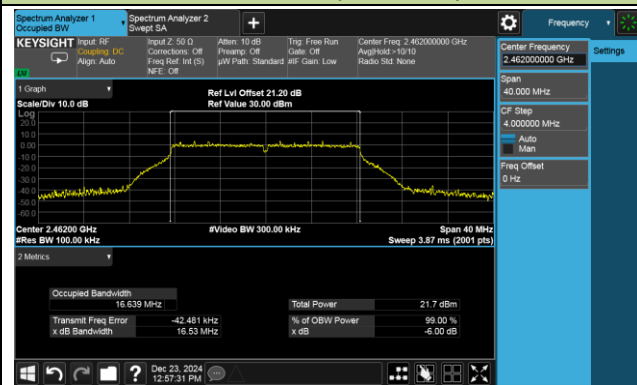
Channel 01 (2412MHz)



Channel 06 (2437MHz)

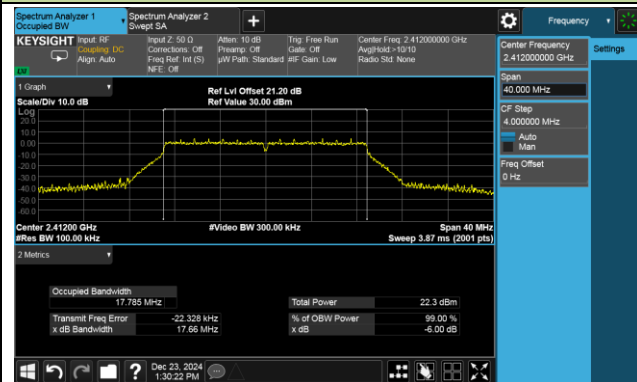


Channel 11 (2462MHz)

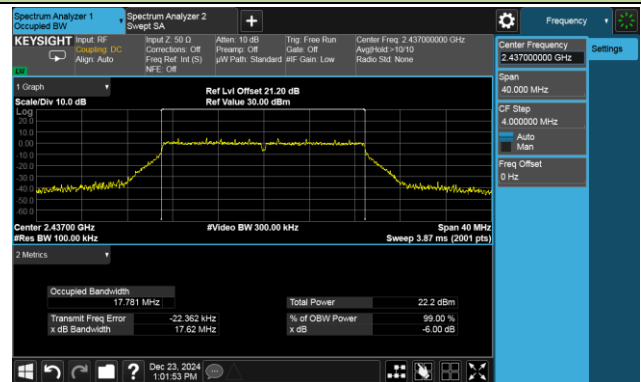


802.11n-HT20 6dB Bandwidth

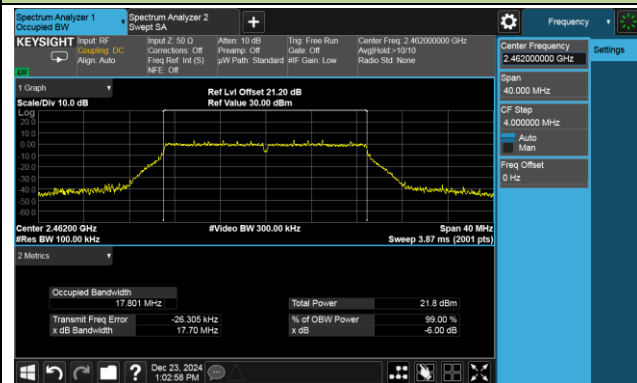
Channel 01 (2412MHz)



Channel 06 (2437MHz)

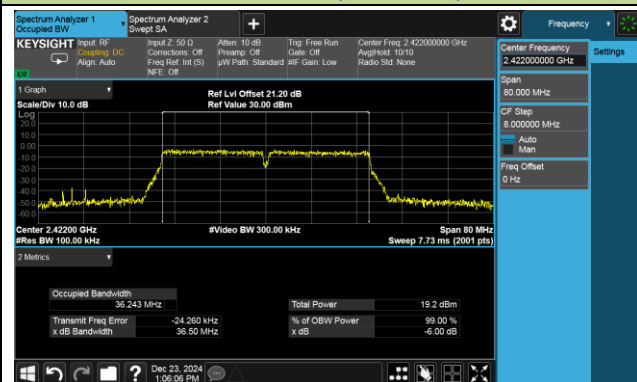


Channel 11 (2462MHz)

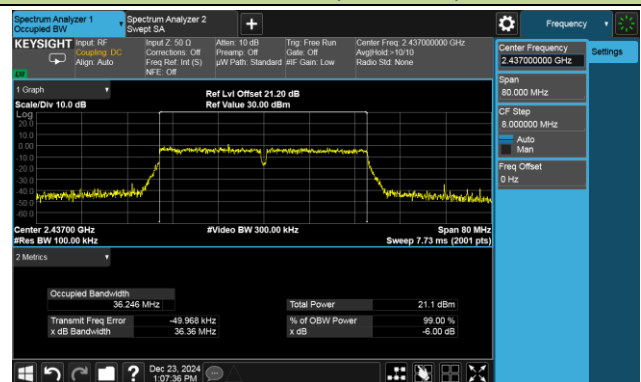


802.11n-HT40 6dB Bandwidth

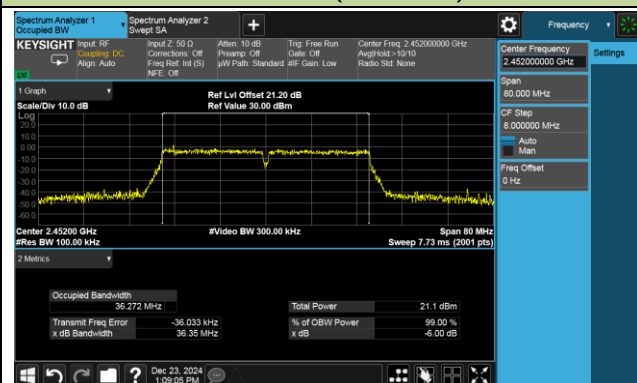
Channel 03 (2422MHz)



Channel 06 (2437MHz)

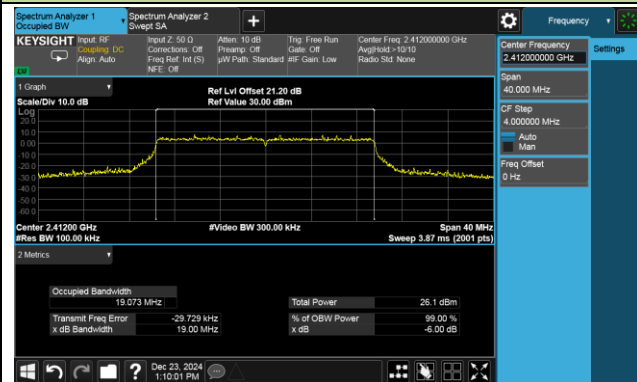


Channel 09 (2452MHz)

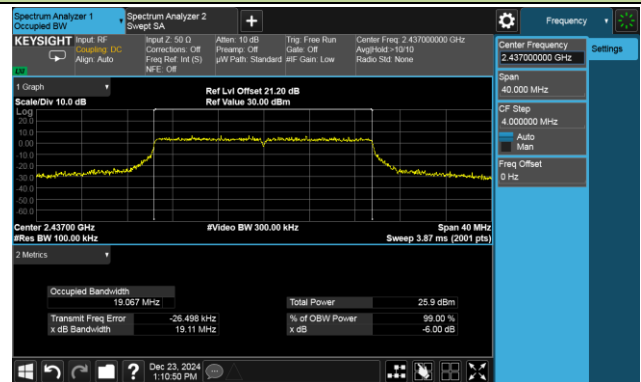


802.11ax-HE20 6dB Bandwidth

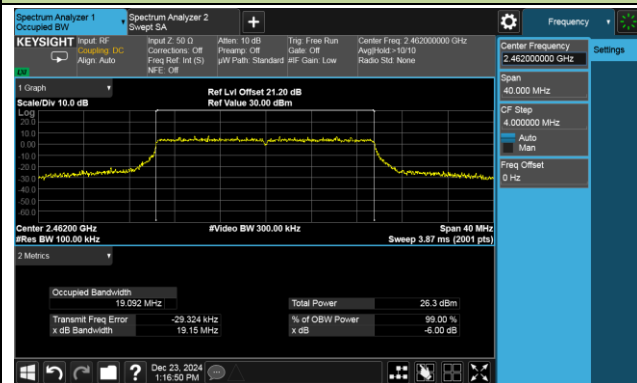
Channel 01 (2412MHz)



Channel 06 (2437MHz)

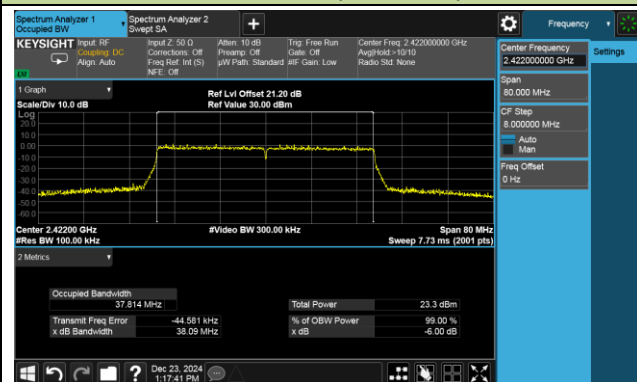


Channel 11 (2462MHz)

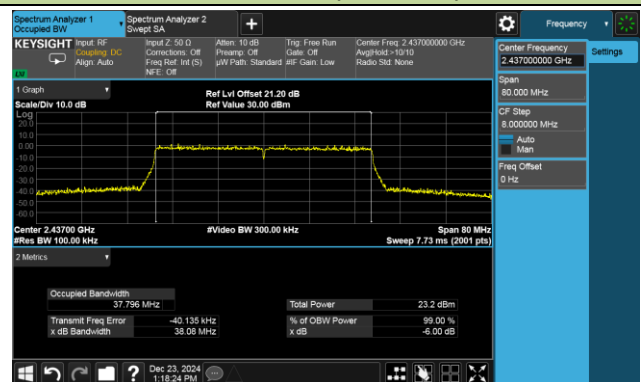


802.11ax-HE40 6dB Bandwidth

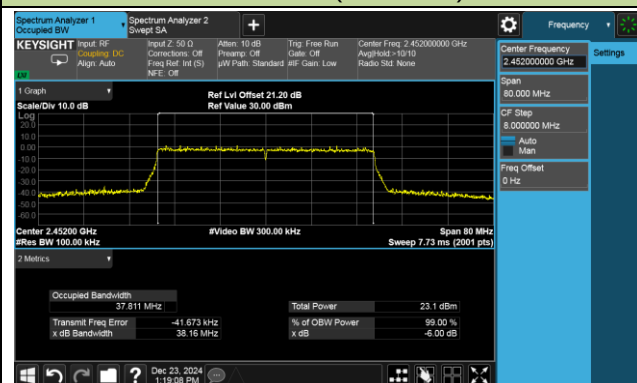
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



A.3 Output Power Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2024-12-11		

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)
11b	1Mbps	01	2412	19.96	≤ 30.00
11b	1Mbps	06	2437	22.82	≤ 30.00
11b	1Mbps	11	2462	20.60	≤ 30.00
11g	6Mbps	01	2412	16.35	≤ 30.00
11g	6Mbps	02	2417	19.28	≤ 30.00
11g	6Mbps	06	2437	20.04	≤ 30.00
11g	6Mbps	10	2457	18.91	≤ 30.00
11g	6Mbps	11	2462	16.18	≤ 30.00
11n-HT20	MCS0	01	2412	16.44	≤ 30.00
11n-HT20	MCS0	02	2422	19.37	≤ 30.00
11n-HT20	MCS0	06	2437	20.11	≤ 30.00
11n-HT20	MCS0	11	2462	17.31	≤ 30.00
11n-HT40	MCS0	03	2422	15.27	≤ 30.00
11n-HT40	MCS0	06	2437	17.19	≤ 30.00
11n-HT40	MCS0	09	2452	15.07	≤ 30.00
11ax-HE20	MCS0	01	2412	16.52	≤ 30.00
11ax-HE20	MCS0	02	2417	18.54	≤ 30.00
11ax-HE20	MCS0	06	2437	19.94	≤ 30.00
11ax-HE20	MCS0	10	2457	18.47	≤ 30.00
11ax-HE20	MCS0	11	2462	15.35	≤ 30.00
11ax-HE40	MCS0	03	2422	15.24	≤ 30.00
11ax-HE40	MCS0	06	2437	17.16	≤ 30.00
11ax-HE40	MCS0	09	2452	15.23	≤ 30.00

A.4 Power Spectral Density Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2024-12-24 ~ 2024-12-30		

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/10kHz)	Duty Cycle (%)	10*log (1/x)	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)
11b	1Mbps	01	2412	-6.524	99.43	0.02	-6.524	≤ 8.00
11b	1Mbps	06	2437	-3.869	99.43	0.02	-3.869	≤ 8.00
11b	1Mbps	11	2462	-6.220	99.43	0.02	-6.220	≤ 8.00
11g	6Mbps	01	2412	-13.042	98.37	0.07	-13.042	≤ 8.00
11g	6Mbps	06	2437	-9.531	98.37	0.07	-9.531	≤ 8.00
11g	6Mbps	11	2462	-13.765	98.37	0.07	-13.765	≤ 8.00
11n-HT20	MCS0	01	2412	-13.527	98.52	0.06	-13.527	≤ 8.00
11n-HT20	MCS0	06	2437	-9.784	98.52	0.06	-9.784	≤ 8.00
11n-HT20	MCS0	11	2462	-13.793	98.52	0.06	-13.793	≤ 8.00
11n-HT40	MCS0	03	2422	-18.262	97.90	0.09	-18.170	≤ 8.00
11n-HT40	MCS0	06	2437	-16.750	97.90	0.09	-16.658	≤ 8.00
11n-HT40	MCS0	09	2452	-18.364	97.90	0.09	-18.272	≤ 8.00
11ax-HE20	MCS0	01	2412	-15.068	98.29	0.07	-15.068	≤ 8.00
11ax-HE20	MCS0	06	2437	-9.600	98.29	0.07	-9.600	≤ 8.00
11ax-HE20	MCS0	11	2462	-14.934	98.29	0.07	-14.934	≤ 8.00
11ax-HE40	MCS0	03	2422	-18.263	98.29	0.07	-18.263	≤ 8.00
11ax-HE40	MCS0	06	2437	-16.589	98.29	0.07	-16.589	≤ 8.00
11ax-HE40	MCS0	09	2452	-18.838	98.29	0.07	-18.838	≤ 8.00

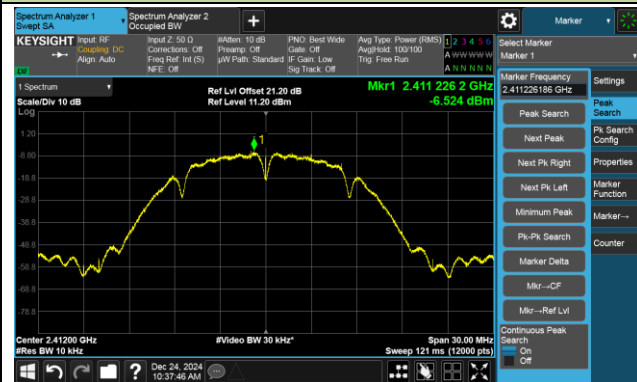
Note:

When EUT duty cycle ≥ 98%, Total PSD (dBm / 10kHz) = PSD (dBm / 10kHz).

When EUT duty cycle < 98%, Total PSD (dBm / 10kHz) = PSD + 10*log (1/Duty Cycle).

802.11b – AVGPSD

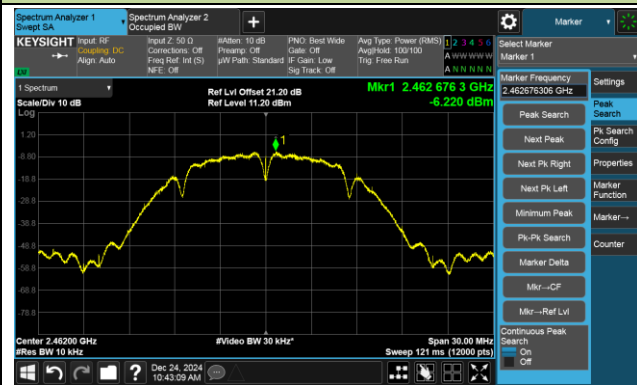
Channel 01 (2412MHz)



Channel 06 (2437MHz)

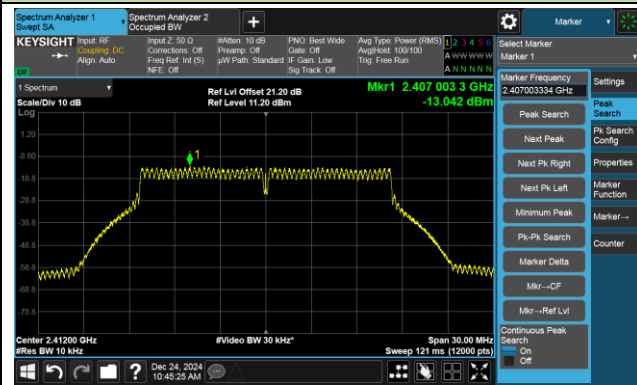


Channel 11 (2462MHz)

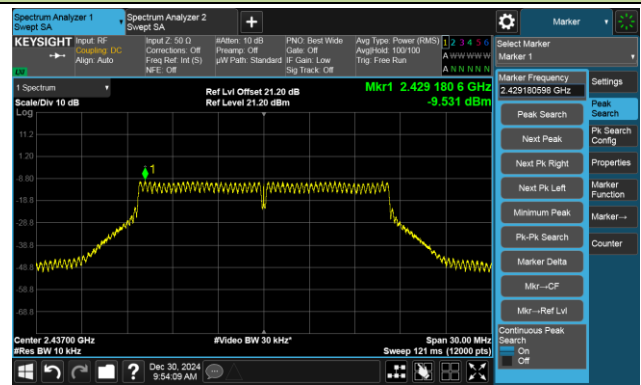


802.11g – AVGPSD

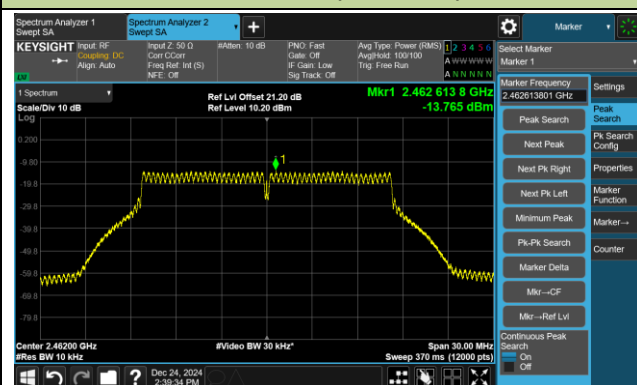
Channel 01 (2412MHz)



Channel 06 (2437MHz)

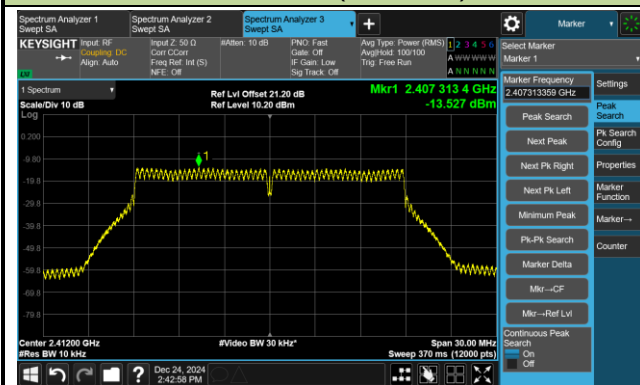


Channel 11 (2462MHz)

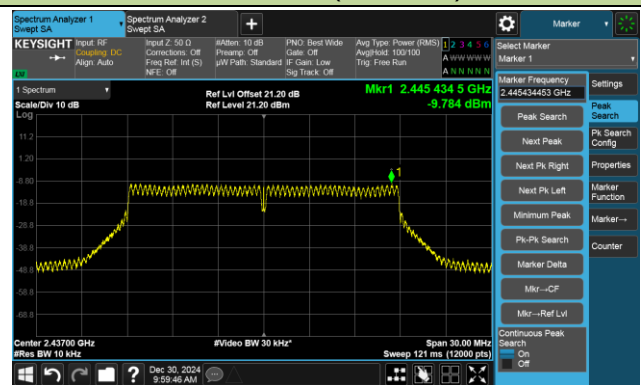


802.11n-HT20 – AVGPSD

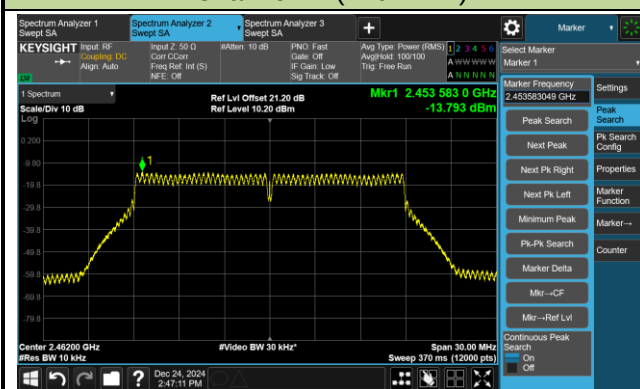
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



802.11n-HT40 – AVGPSD

Channel 03 (2422MHz)



Channel 06 (2437MHz)

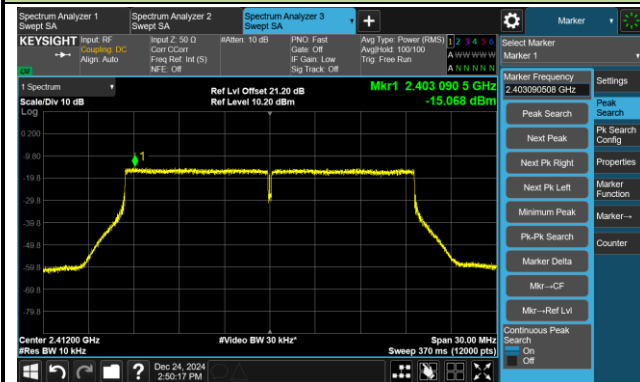


Channel 09 (2452MHz)

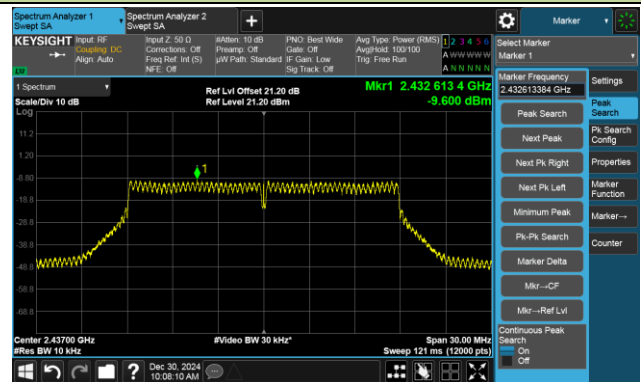


802.11ax-HE20 – AVGPSPD

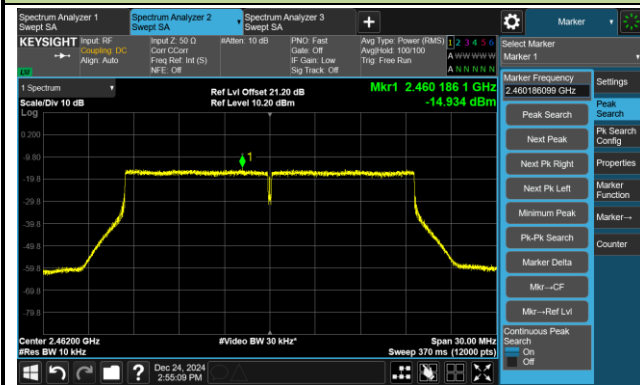
Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)

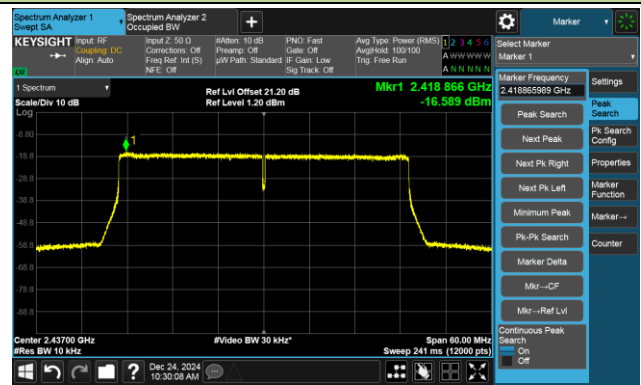


802.11ax-HE40 – AVGPSPD

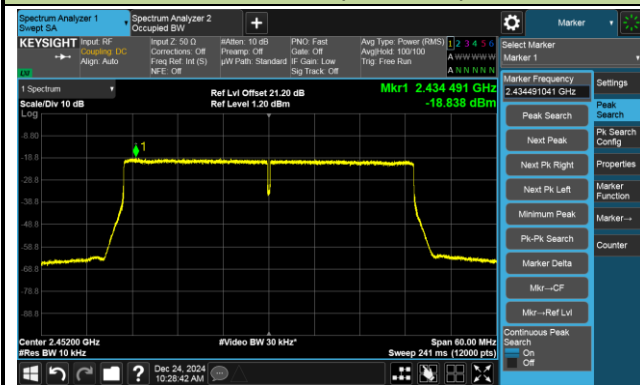
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

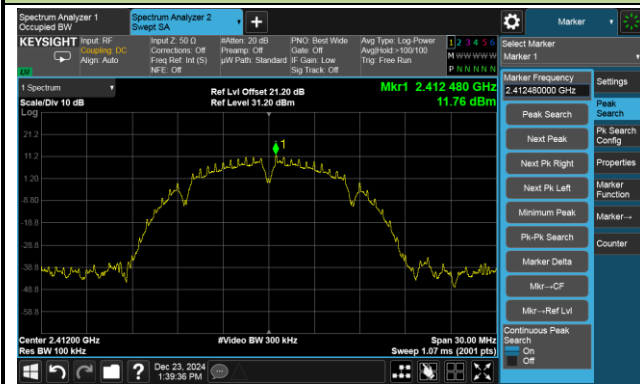
Test Site	SIP-TR1	Test Engineer	Alan Yu
Test Date	2024-12-23		

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	Limit
11b	1Mbps	01	2412	30dBc
11b	1Mbps	06	2437	30dBc
11b	1Mbps	11	2462	30dBc
11g	6Mbps	01	2412	30dBc
11g	6Mbps	06	2437	30dBc
11g	6Mbps	11	2462	30dBc
11n-HT20	MCS0	01	2412	30dBc
11n-HT20	MCS0	06	2437	30dBc
11n-HT20	MCS0	11	2462	30dBc
11n-HT40	MCS0	03	2422	30dBc
11n-HT40	MCS0	06	2437	30dBc
11n-HT40	MCS0	09	2452	30dBc
11ax-HE20	MCS0	01	2412	30dBc
11ax-HE20	MCS0	06	2437	30dBc
11ax-HE20	MCS0	11	2462	30dBc
11ax-HE40	MCS0	03	2422	30dBc
11ax-HE40	MCS0	06	2437	30dBc
11ax-HE40	MCS0	09	2452	30dBc

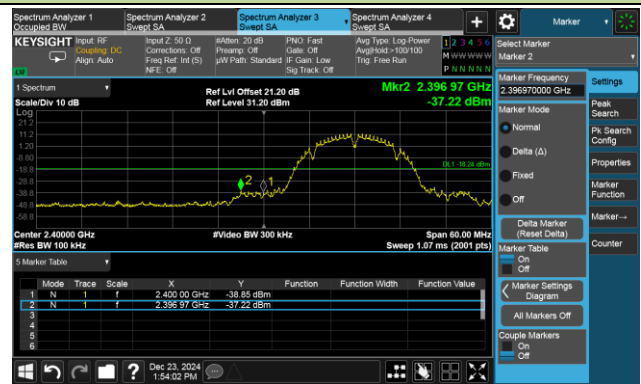
802.11b Out-of-Band Emissions

Channel 01 (2412MHz)

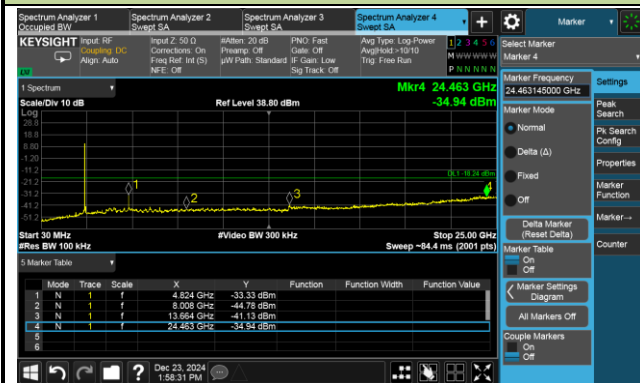
Reference Level



Low Band Edge



Spurious Emission

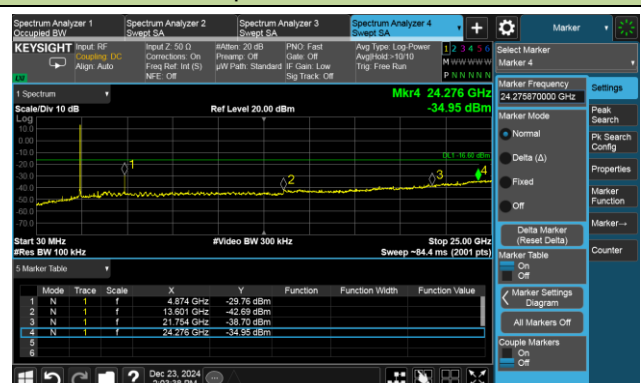


Channel 06 (2437MHz)

Reference Level



Spurious Emission



802.11b Out-of-Band Emissions

Channel 11 (2462MHz)

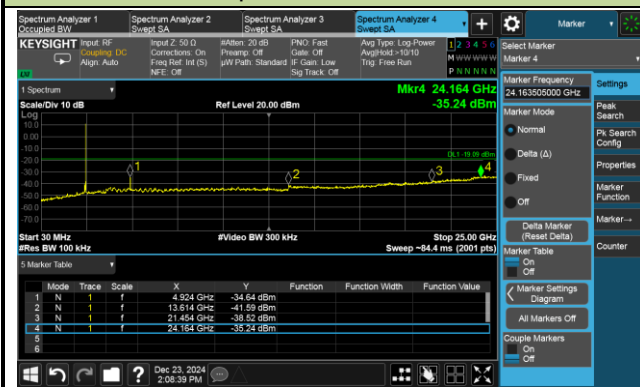
Reference Level



High Band Edge



Spurious Emission



802.11g Out-of-Band Emissions

Channel 01 (2412MHz)

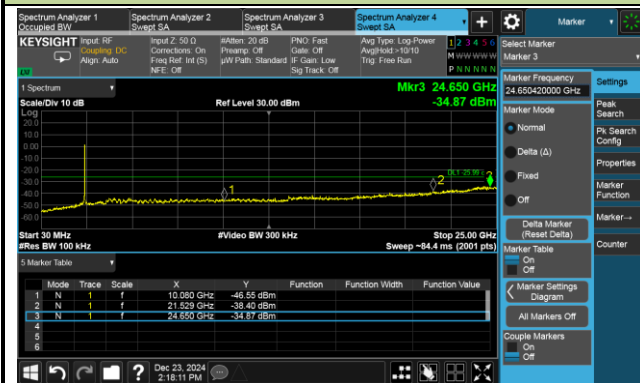
Reference Level



Low Band Edge

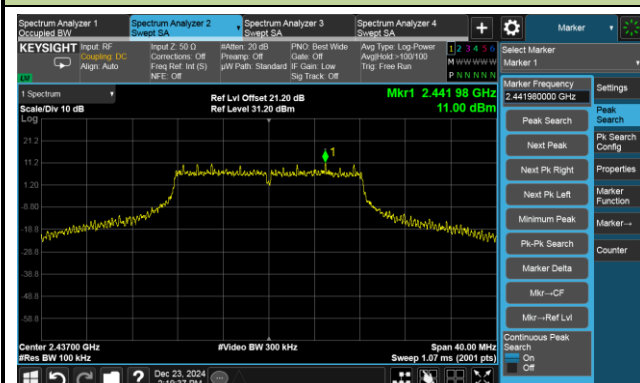


Spurious Emission

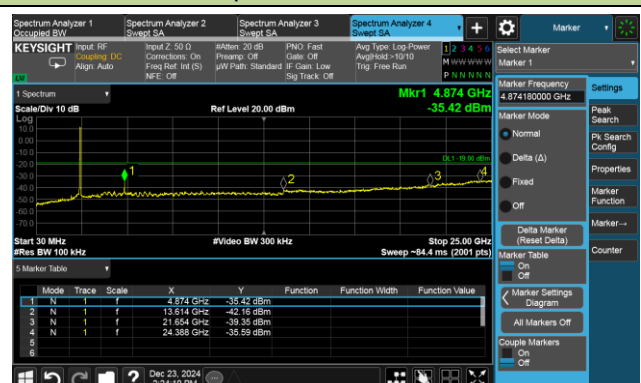


Channel 06 (2437MHz)

Reference Level



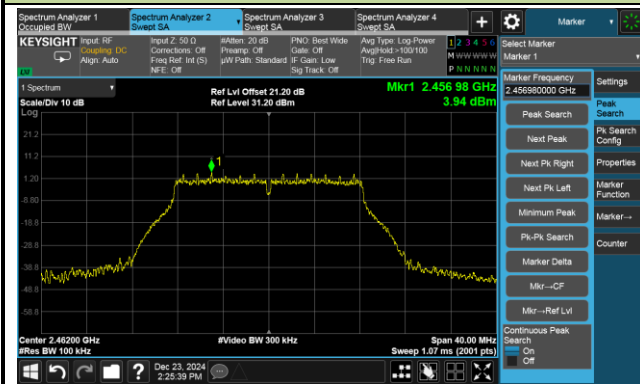
Spurious Emission



802.11g Out-of-Band Emissions

Channel 11 (2462MHz)

Reference Level



High Band Edge



Spurious Emission

