

TEST REPORT

**CTK Co., Ltd.**

(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2025-01655
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1. Applicant

- Name : Samsung Electronics Co., Ltd.
- Address : 19 Chapin Rd, Building D. Pine Brook, New Jersey, United States
- Date of Receipt : 2025-06-09

2. Manufacturer

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Republic of Korea

3. Factory

- Name #1 : Samsung Electronics Co., Ltd.
- Address #1 : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Republic of Korea
- Name #2 : SJIT VINA Co., Ltd
- Address #2 : Lot X2, Ho Nai Industrial Zone, Ho Nai 3 Commune, Trang Bom District, Dong Nai Province, Vietnam

4. Use of Report : For FCC & ISSED Certification

5. Test Sample / Model : Wi-Fi Transceiver / WDH210S

6. Date of Test : 2025-06-18 to 2025-06-25

7. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247 ANSI C63.10-2013

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8. Testing Environment : refer to 9 page

9. Test Results : Compliance

10. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

(Address : (Unhak-Dong) 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yong-in-si,
Gyeonggi-do, Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

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Approval	Tested by	Technical Manager
	Ji-Won Hong: (Signature) 	Gwan-yong Kim: (Signature) 

2025-06-25

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REPORT REVISION HISTORY

Date	Revision	Page No
2025-06-25	Issued (CTK-2025-01655)	all

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1. General Product Description

1.1 Applicant Information

Company	Samsung Electronics Co Ltd
Contact Point	19 Chapin Rd, Building D. Pine Brook, New Jersey, United States
Contact Person	Name : JENNI CHUN E-mail : j1.chun@samsung.com Tel : 973-808-6375 Fax : -

1.2 Product Information

FCC ID	A3LWDH210S		
ISED	649E-WDH210S		
Product Description	Wi-Fi Transceiver		
Basic model (HVIN)	WDH210S		
Variant Model name	-		
Operating Frequency	2 412 MHz - 2 472 MHz (20MHz_BW)		
RF Output Power	802.11b : 13.00 dBm (19.95 mW) 802.11g : 16.43 dBm (43.95 mW) 802.11n_HT20 : 16.13 dBm (41.02 mW)		
Antenna Specification	Antenna type : Patch Antenna Peak Gain : 1.73 dBi		
Number of channels	13		
Channel Spacing	5 MHz		
Type of Modulation	802.11b : DSSS 802.11g/n : OFDM		
Power Source	DC 3.3 V		
Hardware Rev	v0.2		
FVIN	FRTOS-GEN01-01-*****_*****		
Test Program	DA 16200 DA 16600 AT GUI Tool v1.16.3		
Test Power Setting	802.11b	2 412 MHz	6
		2 442 MHz	4
		2 472 MHz	9
	802.11g	2 412 MHz - 2 472 MHz	3
	802.11n_HT20	2 412 MHz - 2 472 MHz	3

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	Samsung	NT350XCR	48JW9FFRA00628D
AC Adapter	Samsung	PA-1400-96	AD-4019A

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2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	CN : 8737A CAB ID : KR0025
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



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3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	6 dB Bandwidth	C	Conducted
15.247(b)	Maximum Output Power	C	
15.247(d)	Conducted Spurious emission	C	
15.247(d)	Unwanted Emission(Conducted)	C	
15.247(e)	Transmitter Power Spectral Density	C	
15.209	Radiated Emissions	C	Radiated
15.207	AC Conducted Emissions	C	Line Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.			
<u>Note 3:</u> The sample was tested according to the following specification: FCC Part 15.247			
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013			

ISED Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
RSS-247 5.2(a)	6 dB Bandwidth	C	Conducted
RSS-247 5.4(d)	Maximum Output Power	C	
RSS-247 5.5	Conducted Spurious emission	C	
RSS-247 5.5	Unwanted Emission(Conducted)	C	
RSS-247 5.2(b)	Transmitter Power Spectral Density	C	
RSS-Gen 6.13	Radiated Emissions	C	Radiated
RSS-Gen 8.8	AC Conducted Emissions	C	Line Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.			
<u>Note 3:</u> The sample was tested according to the following specification: RSS-247 Issue 3, RSS-GEN Issue 5			
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013			



3.2 Testing Environment

Test Item		Test Date	Temperature (℃)	Relative Humidity (%)
6 dB Bandwidth & 99 % Bandwidth OUTPUT POWER Transmitter Power Spectral Density Conducted Spurious emission		2025-06-24	23	55
Transmitter emission (Radiated)	1) 9 kHz to 30 MHz	2025-06-18	21	59
	2) 30 MHz to 1 GHz			
	3) 1 GHz to 18 GHz	2025-06-20, 2025-06-24	24, 23	56, 55
	4) 18 GHz to 25 GHz			
	5) Restricted Frequency Bands			
AC Conducted Emission		2025-06-18	23	63

3.3 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests.

Test Frequency & Bandwidth

Bandwidth	Lowest channel 1	Lowest channel 2	Middle channel	Highest channel 1	Highest channel 2	Highest channel 3
20 MHz	2 412 MHz	2 417 MHz	2 442 MHz	2 462 MHz	2 467 MHz	2 472 MHz



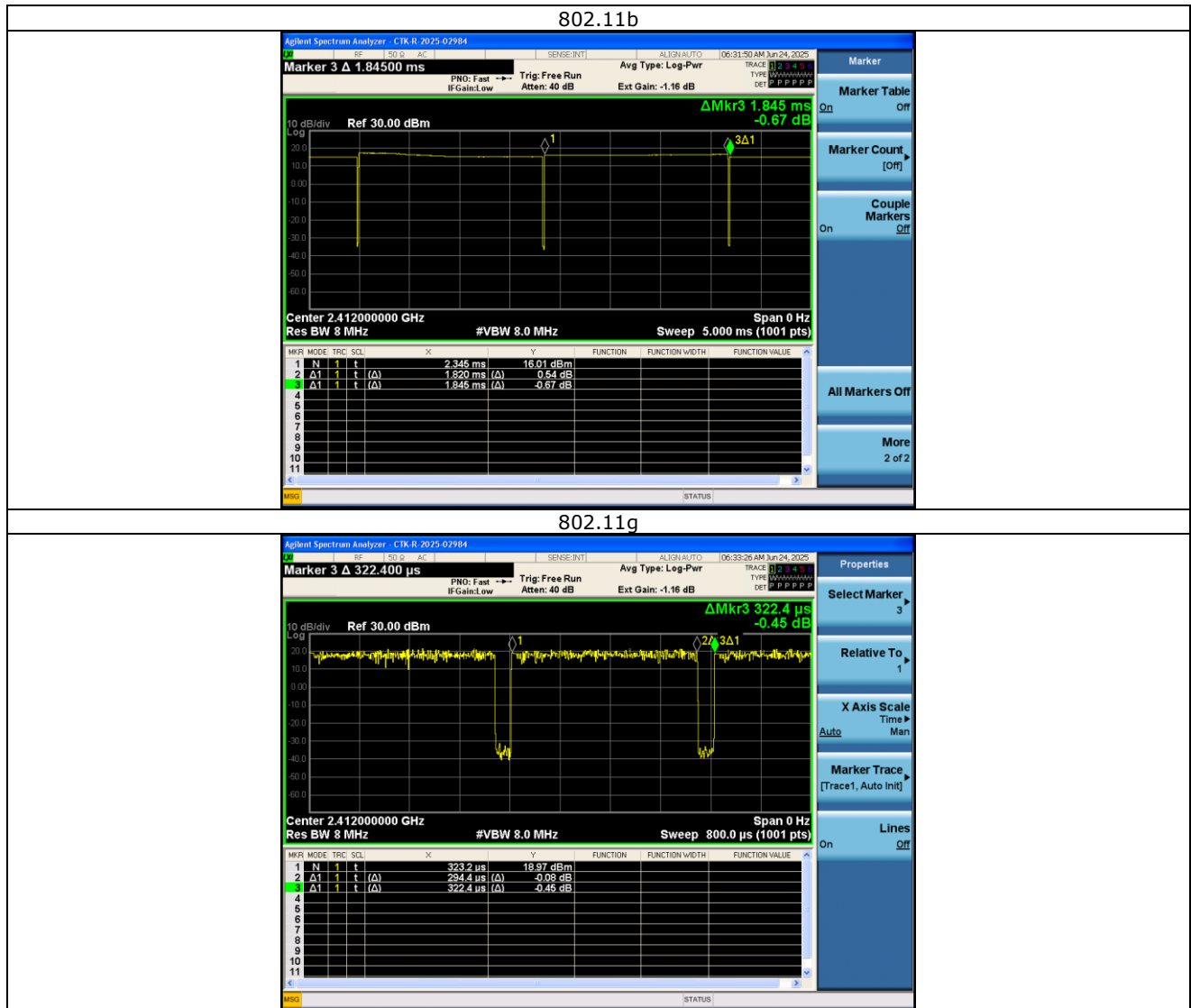
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Test mode & Worst case

Test mode	Modulation	Data rate (Worst case)	Duty Cycle	Duty Cycle Factor
802.11b	DSSS	1 Mbps	98.6 %	0.05 dB
802.11g	OFDM	6 Mbps	91.3 %	0.39 dB
802.11n_HT20	OFDM	MCS 0	91.5 %	0.39 dB

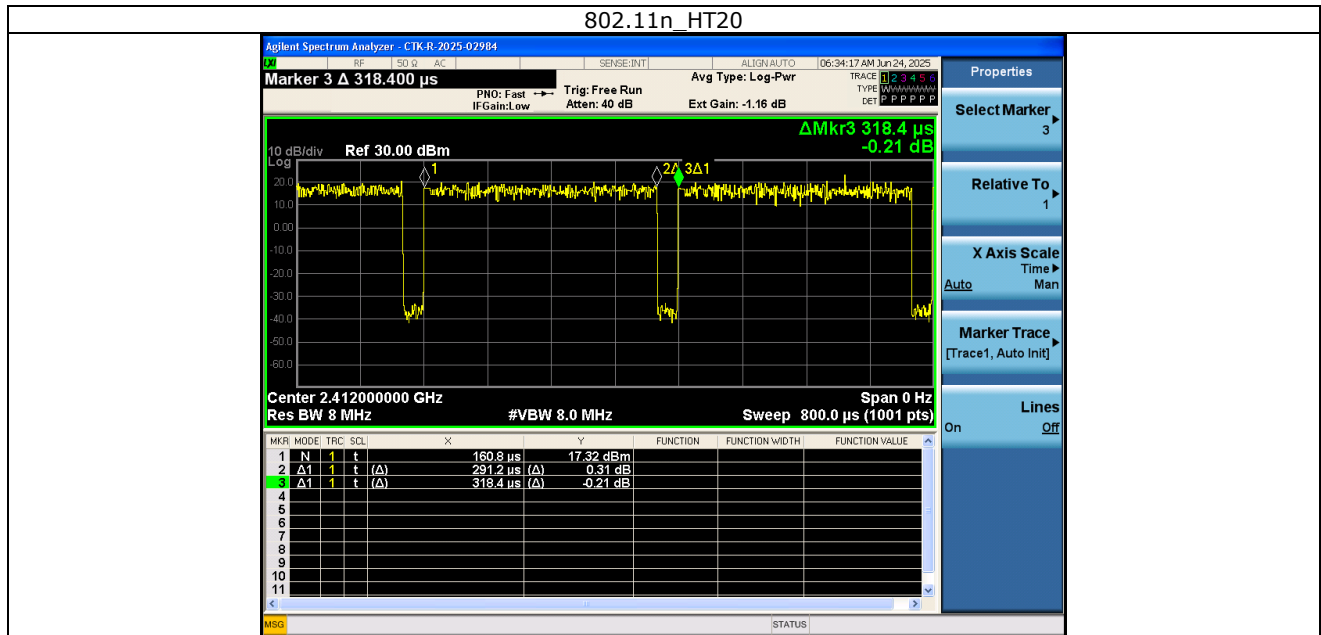
10 LOG(1/x), where x is the duty cycle





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3.4 Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB (C.L.: Approx. 95 %, $k = 2$)
Power Spectral Density	1.5 dB (C.L.: Approx. 95 %, $k = 2$)
Occupied Bandwidth	0.1 MHz (C.L.: Approx. 95 %, $k = 2$)
Unwanted Emission(conducted)	3.0 dB (C.L.: Approx. 95 %, $k = 2$)
Radiated Emissions ($f \leq 1$ GHz)	4.11 dB (C.L.: Approx. 95 %, $k = 2$)
Radiated Emissions ($f > 1$ GHz)	4.48 dB (C.L.: Approx. 95 %, $k = 2$)
Line Conducted Emission	2.06 dB (C.L.: Approx. 95 %, $k = 2$)

3.5 Test Software

Automation program

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	EP5RE Ver. 6.0.10, ES10 Ver. 2022.04.000
Line Conducted Test	EMC32 Ver. 10.50.00

Test program

Conducted Test, Radiated Test, Line Conducted Test	DA 16200 DA 16600 AT GUI Tool v1.16.3
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4. Technical Characteristic Test

4.1 6 dB Bandwidth & 99 % Bandwidth

Test Procedures

KDB 558074 - Section 8.2
ANSI C63.10-2013 - Section 11.8.2
RSS-Gen - Section 6.7

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Procedures

ANSI C63.10-2013 - Section 6.9.3
RSS-Gen - Section 6.7

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission.

Use the 99 % power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 100 kHz(6dB Bandwith), 1 % to 5 % of the OBW(99 % Bandwith)
- b) VBW $\geq 3 \times$ RBW
- c) Detector = peak
- d) Trace mode = Max hold
- e) Sweep = auto couple
- f) Allow trace to fully stabilize
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit : 6 dB Bandwith

6 dB Bandwidth > 500kHz

Limit : 99 % Bandwith

N/A

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Test Data :

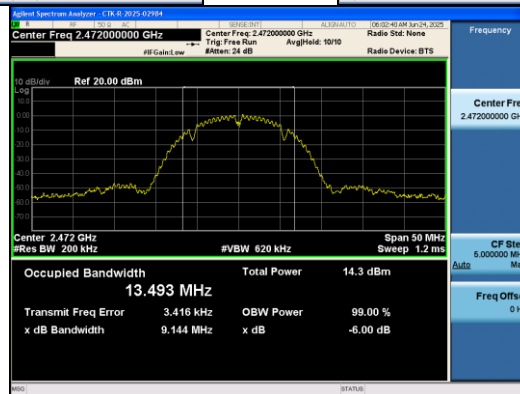
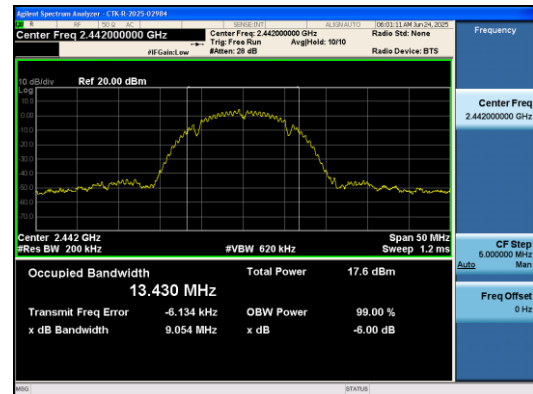
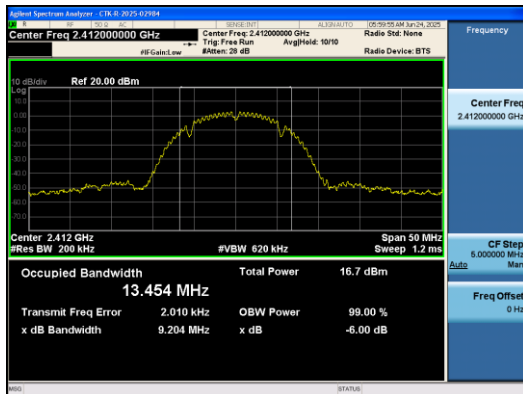
6 dB Bandwidth and 99 % Bandwidth (MHz)						
Frequency	Mode					
	802.11b		802.11g		802.11n_HT20	
	6 dB	99 %	6 dB	99 %	6 dB	99 %
2 412 MHz	9.113	13.454	15.190	16.586	15.440	17.541
2 442 MHz	9.122	13.430	15.190	16.506	15.340	17.612
2 472 MHz	9.110	13.493	15.190	16.414	15.190	17.473

See next pages for actual measured spectrum plots.

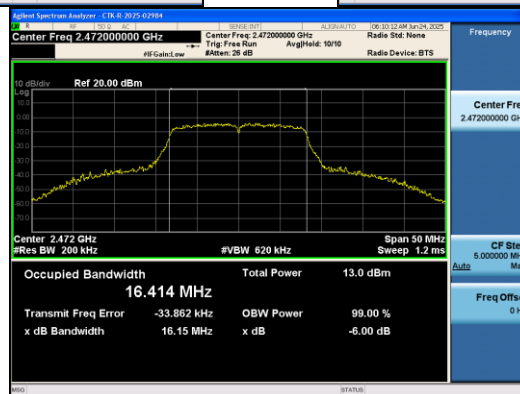
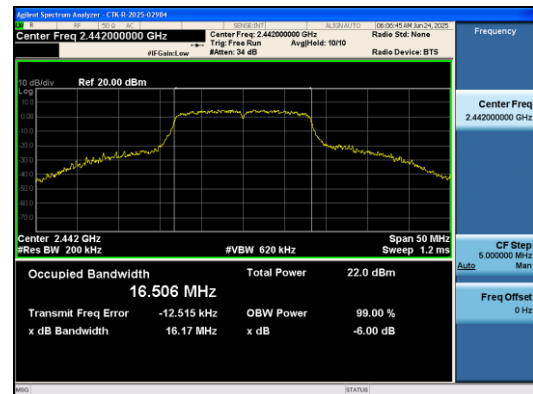
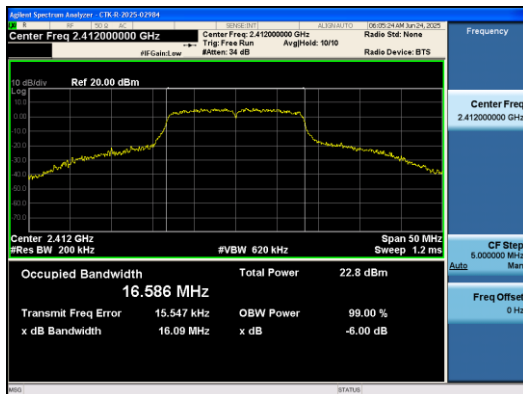


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802.11b, 99 % Bandwidth

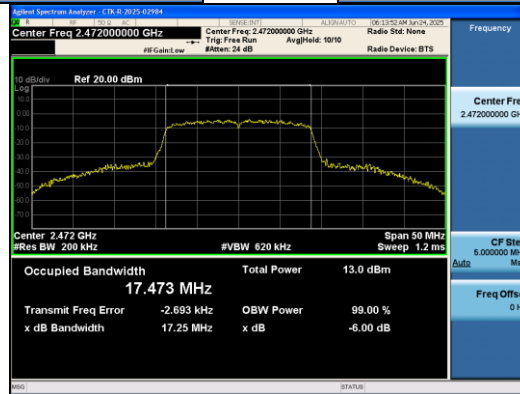
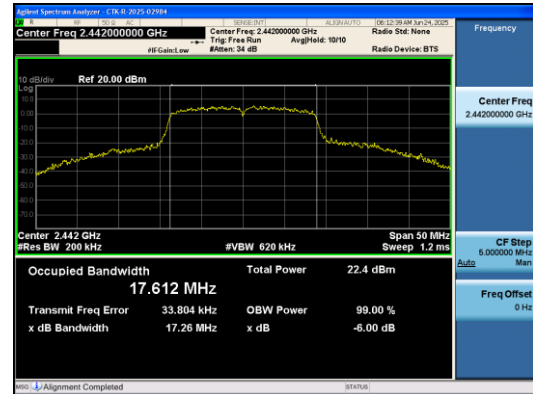
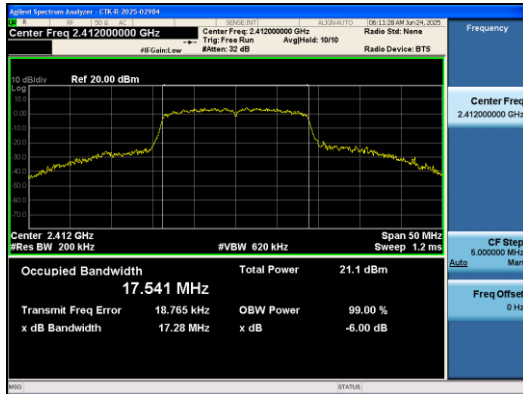


802.11g, 99 % Bandwidth



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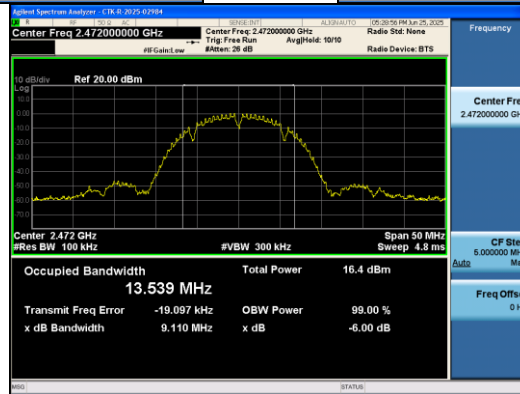
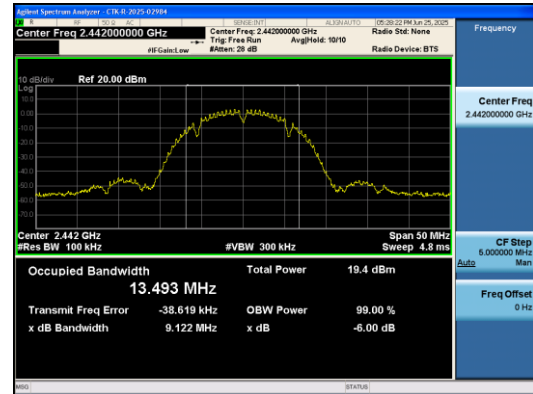
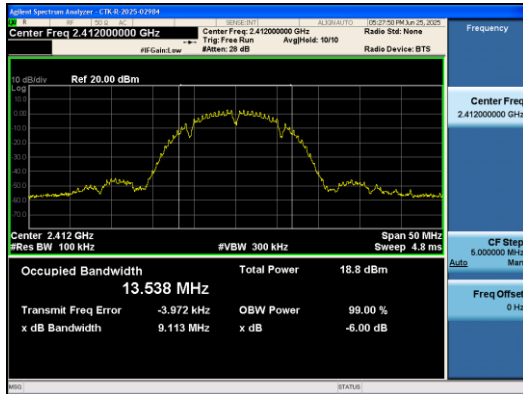


802.11n_HT20, 99 % Bandwidth

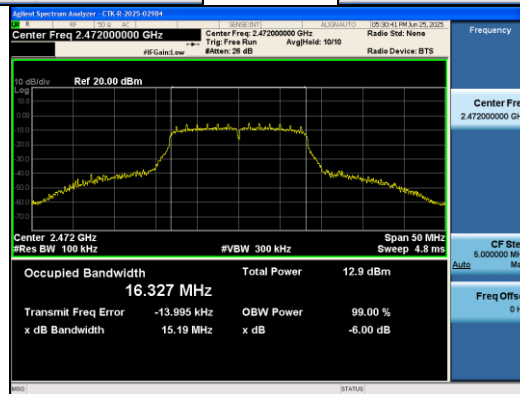
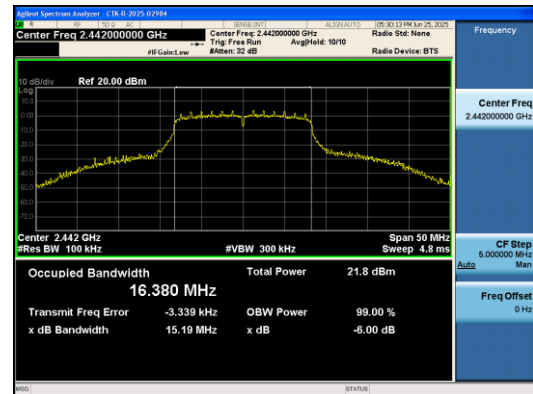
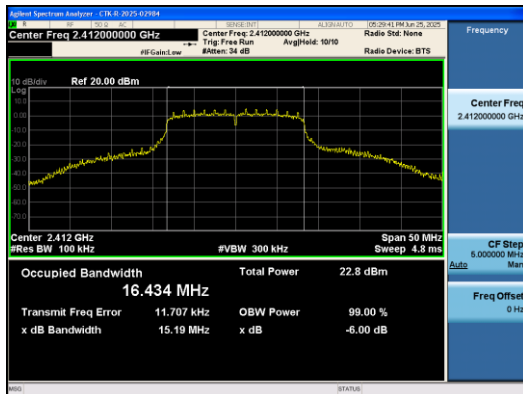


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802.11b, 6 dB Bandwidth

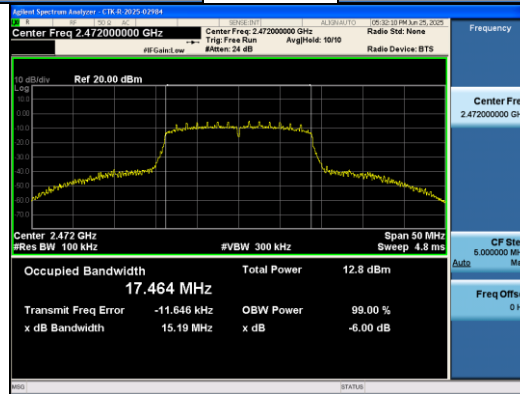
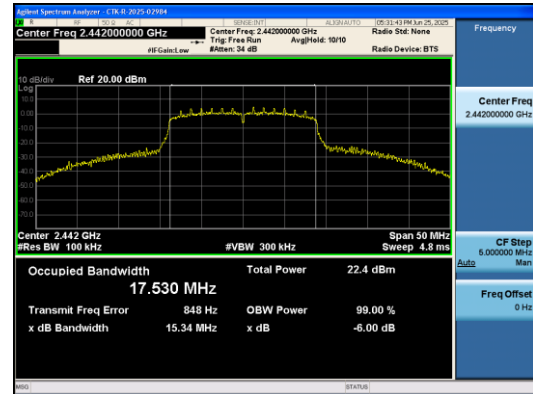
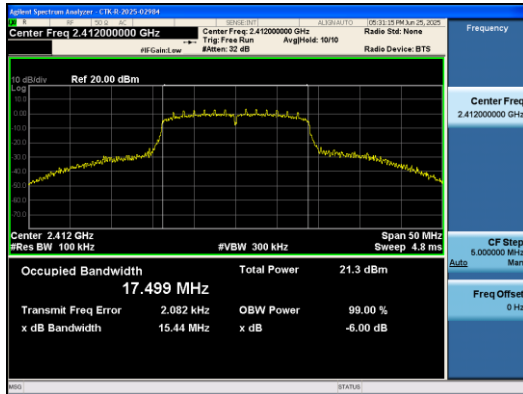


802.11g, 6 dB Bandwidth



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802.11n_HT20, 6 dB Bandwidth

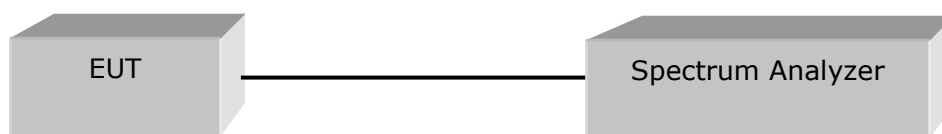


4.2 OUTPUT POWER

Test Procedures

KDB 558074 - Section 8.3.2.2 (Average Power)
ANSI C63.10-2013 - Section 11.9.2.2
RSS-Gen - Section 6.12

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth.



Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) span $\geq 1.5 \times \text{OBW}$
- b) RBW = 1 MHz
- c) VBW $\geq 3 \times \text{RBW}$
- d) Sweep time = auto
- e) Detector = RMS
- f) average at least 100
- g) Duty cycle factor = $10\log(1/x)$

Test mode	Duty Cycle Factor (dB)
802.11b	0.05
802.11g	0.39
802.11n_HT20	0.39

Limit :

Maximum Output Power < 1 W (30 dBm)



Test Data :

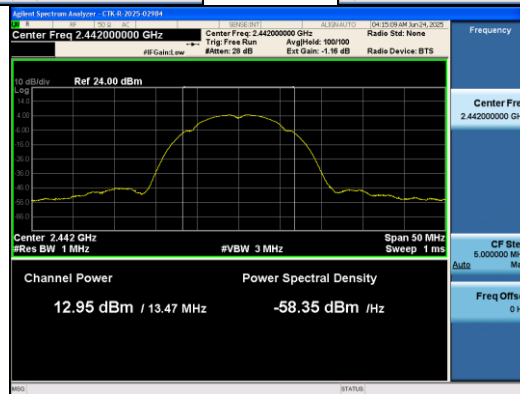
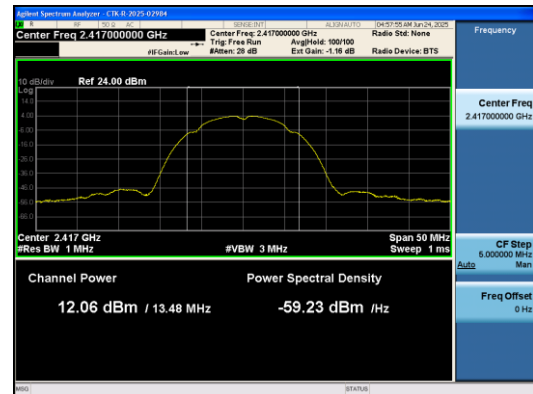
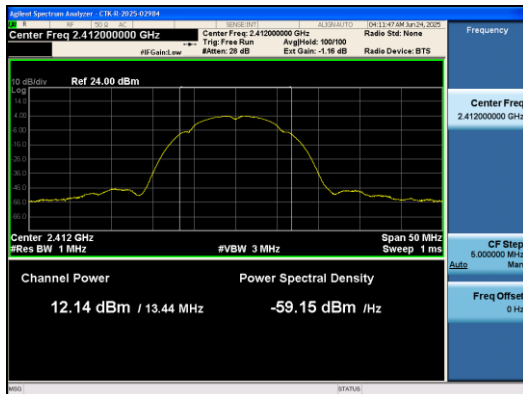
Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b	2 412	12.14	0.05	12.19	30.00	17.81
	2 417	12.06	0.05	12.11	30.00	17.89
	2 442	12.95	0.05	13.00	30.00	17.00
	2 462	11.09	0.05	11.14	30.00	18.86
	2 467	9.75	0.05	9.80	30.00	20.20
	2 472	9.80	0.05	9.85	30.00	20.15
802.11g	2 412	16.04	0.39	16.43	30.00	13.57
	2 417	16.01	0.39	16.40	30.00	13.60
	2 442	15.29	0.39	15.68	30.00	14.32
	2 462	14.36	0.39	14.75	30.00	15.25
	2 467	10.77	0.39	11.16	30.00	18.84
	2 472	6.41	0.39	6.80	30.00	23.20
802.11n _HT20	2 412	14.54	0.39	14.93	30.00	15.07
	2 417	15.74	0.39	16.13	30.00	13.87
	2 442	15.68	0.39	16.07	30.00	13.93
	2 462	12.43	0.39	12.82	30.00	17.18
	2 467	6.35	0.39	6.74	30.00	23.26
	2 472	6.28	0.39	6.67	30.00	23.33

See next pages for actual measured spectrum plots.

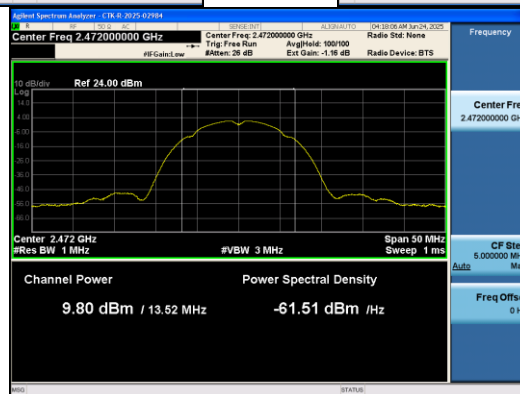
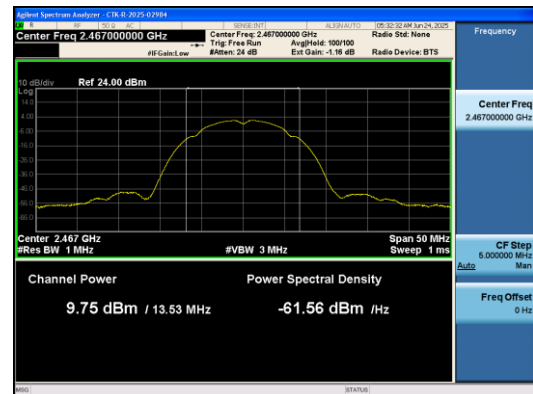
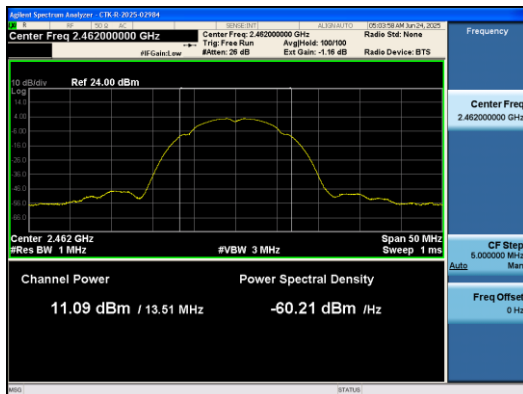


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802.11b

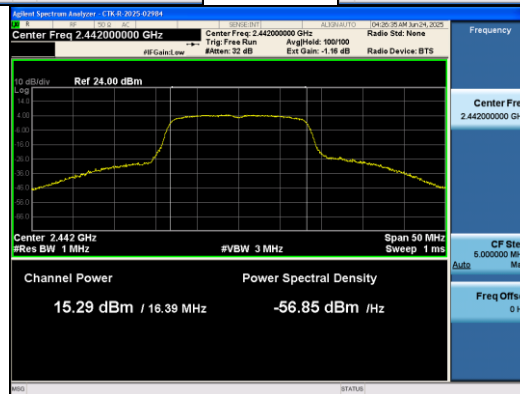
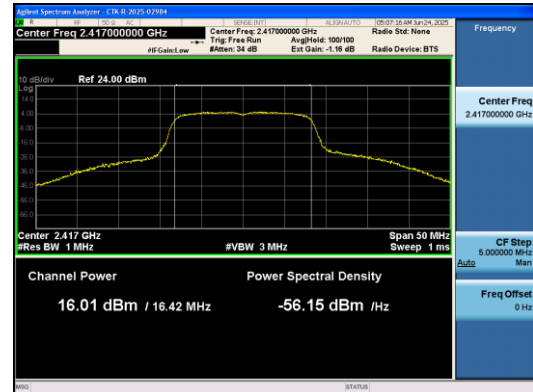
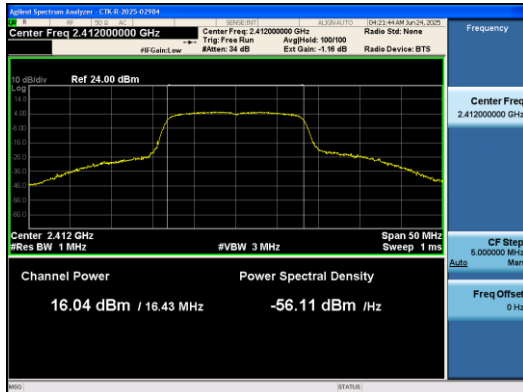


802.11b

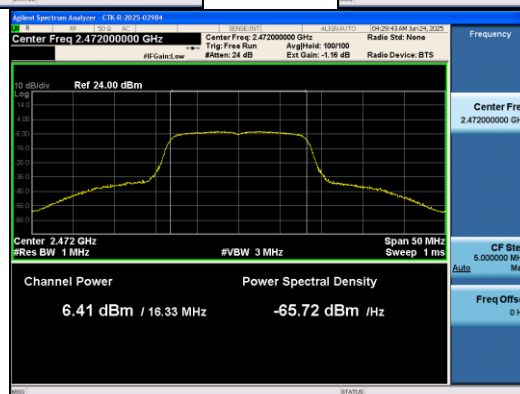
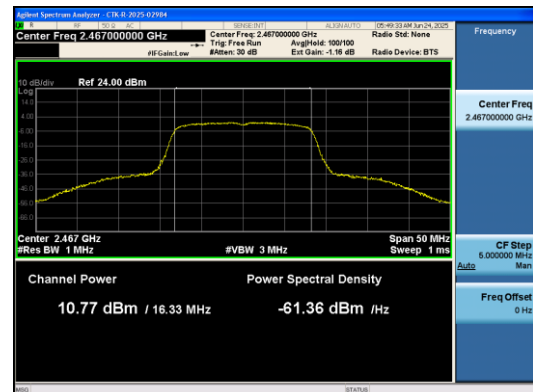
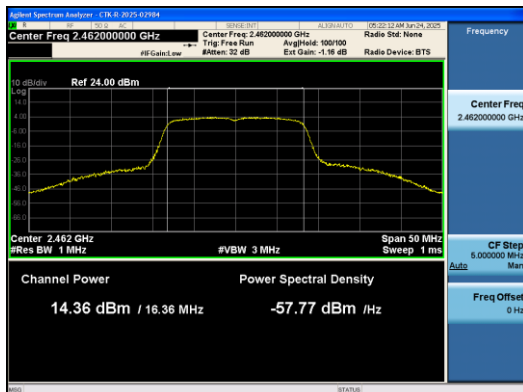


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802.11g

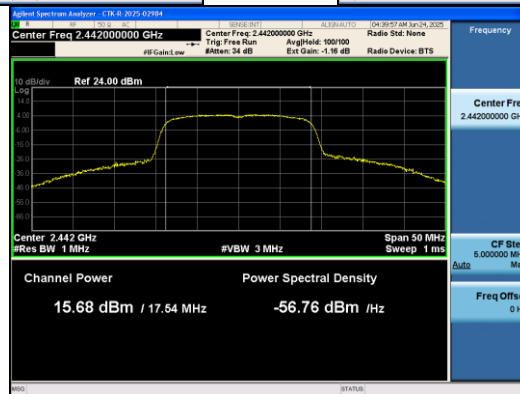
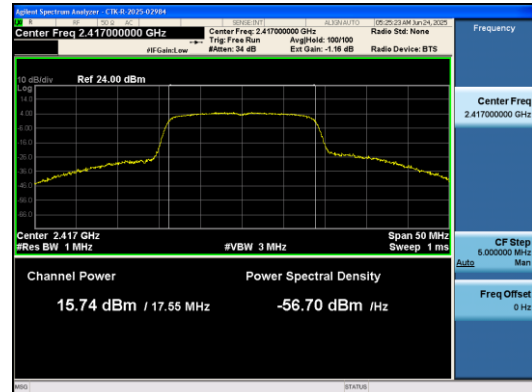
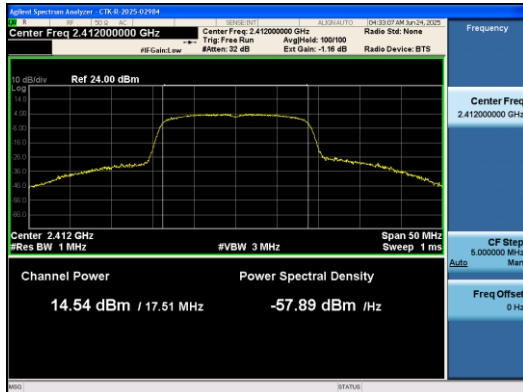


802.11g

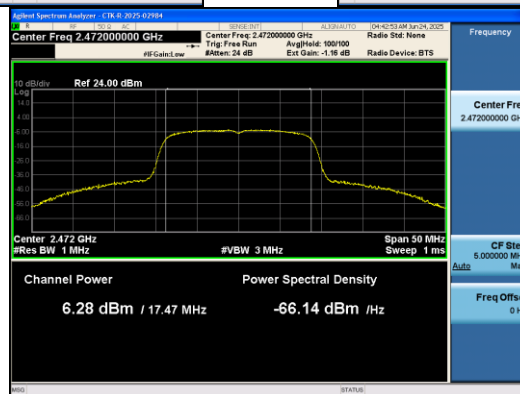
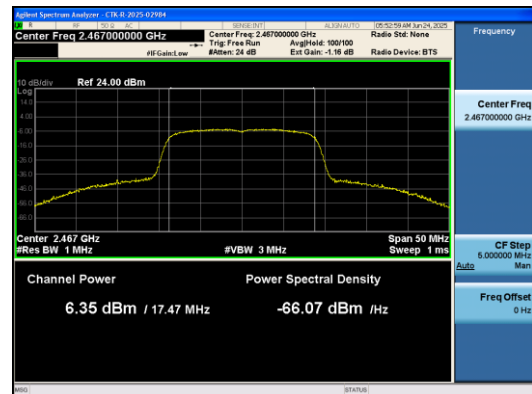
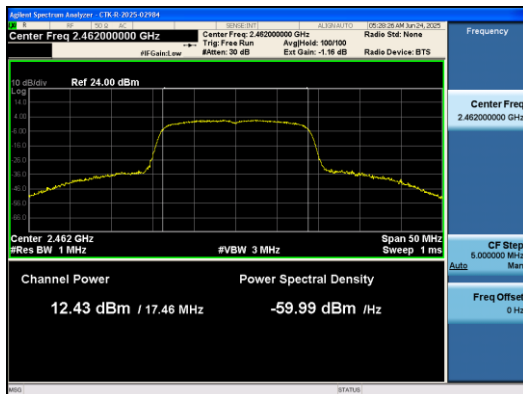


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4.3 Transmitter Power Spectral Density

Test Procedures

KDB 558074 - Section 8.4

ANSI C63.10-2013 - Section 11.10.2

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance.

Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) RBW : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- b) VBW $\geq 3 \times \text{RBW}$
- c) span $\geq 1.5 \times \text{DTS bandwidth}$
- d) Sweep time = auto couple
- e) Detector = peak
- f) Trace mode = max hold
- g) Allow trace to fully stabilize
- h) Use the peak marker function to determine the maximum amplitude level within the RBW.

Limit :

Power Spectral Density < 8 dBm @ 3 kHz BW



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Test Data

Test Mode	Frequency (MHz)	Measured Power Density (dBm)	Limit (dBm)	Margin (dB)
802.11b	2 412	-9.61	8.00	17.61
	2 417	-10.69	8.00	18.69
	2 442	-5.49	8.00	13.49
	2 462	-7.56	8.00	15.56
	2 467	-9.79	8.00	17.79
	2 472	-8.80	8.00	16.80
802.11g	2 412	-7.98	8.00	15.98
	2 417	-7.88	8.00	15.88
	2 442	-9.32	8.00	17.32
	2 462	-10.05	8.00	18.05
	2 467	-13.41	8.00	21.41
	2 472	-17.27	8.00	25.27
802.11n _HT20	2 412	-7.66	8.00	15.66
	2 417	-8.56	8.00	16.56
	2 442	-7.44	8.00	15.44
	2 462	-11.28	8.00	19.28
	2 467	-17.46	8.00	25.46
	2 472	-16.79	8.00	24.79

See next pages for actual measured spectrum plots.

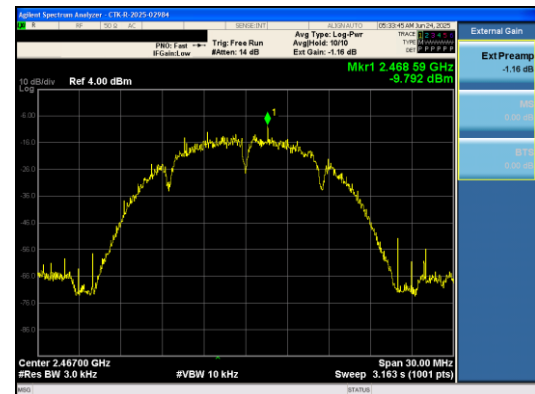
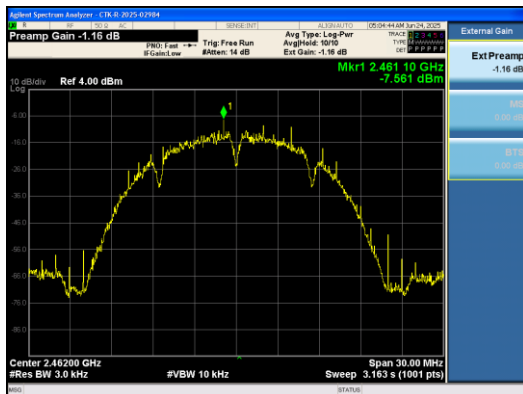


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802.11b

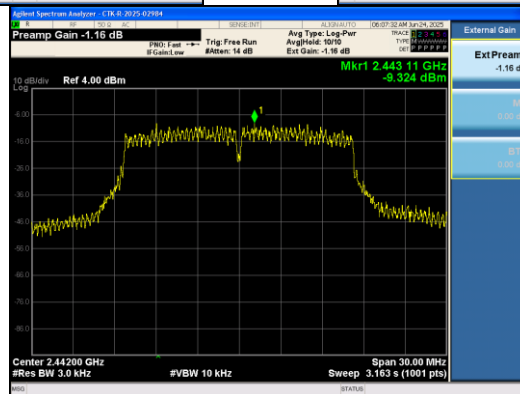
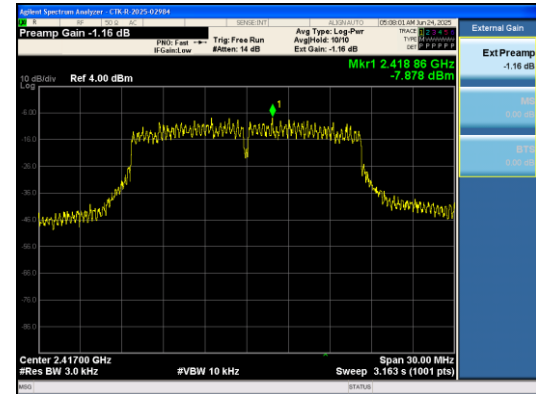
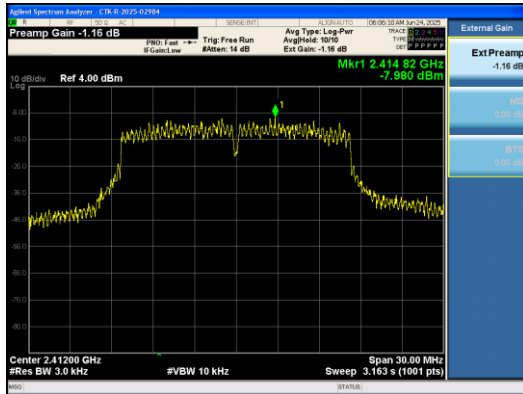


802.11b

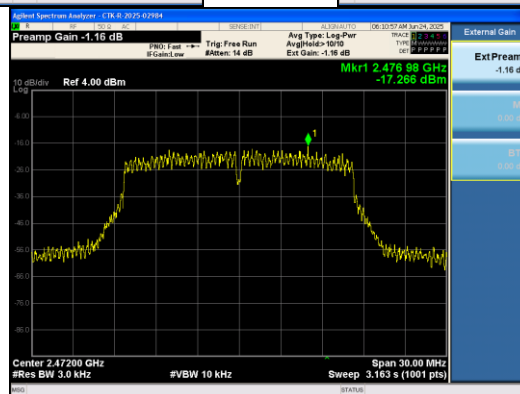
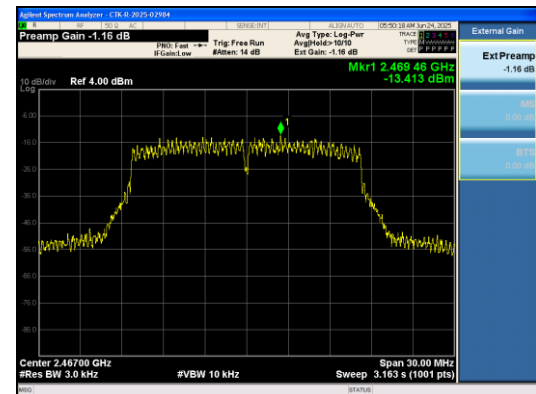
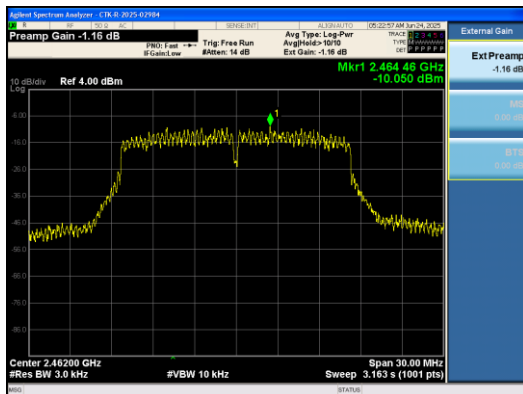


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802.11g

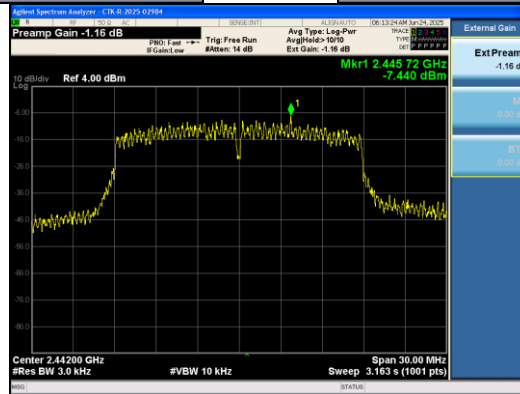
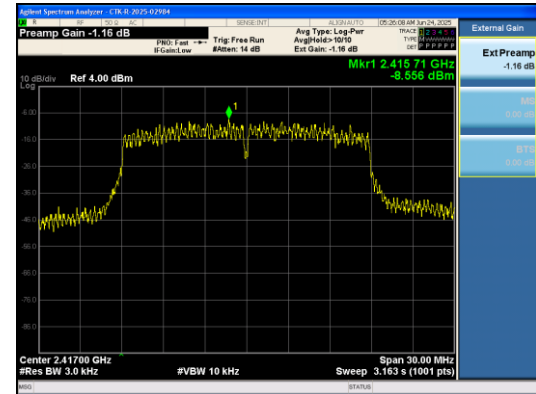
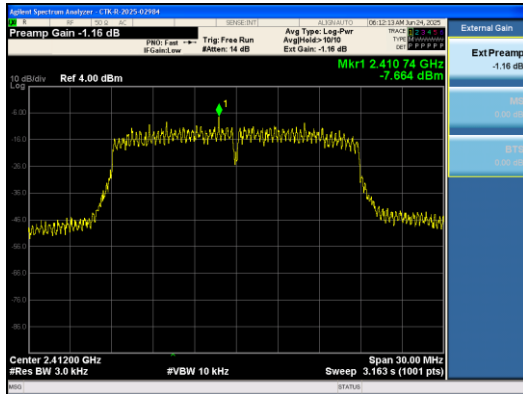


802.11g

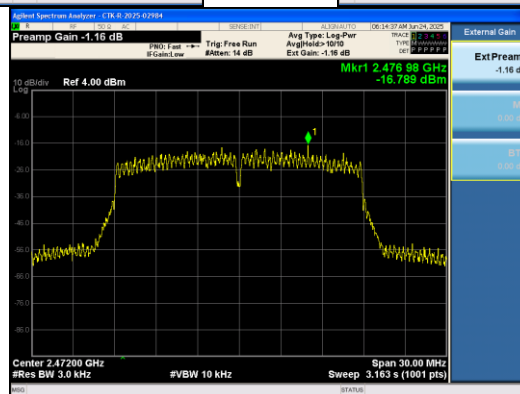
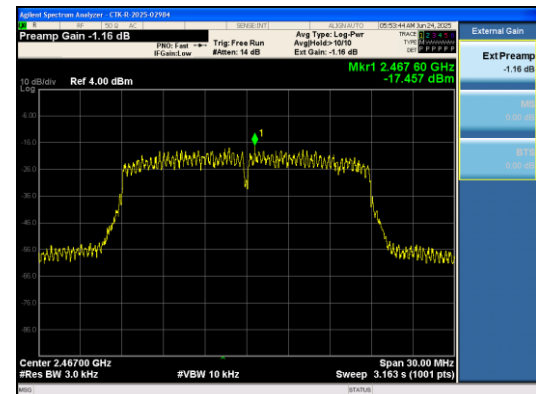
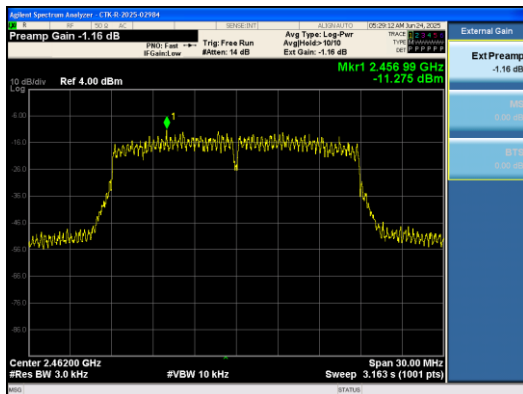


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802.11n_HT20



802.11n_HT20

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4.4 Conducted Spurious emission

Test Procedures

KDB 558074 – Section 8.5
ANSI C63.10-2013 – Section 11.11.3
RSS-Gen – Section 6.13

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Settings :

Center frequency = the highest, middle and the lowest channels

- a) RBW = 100 kHz
- b) VBW $\geq 3 \times$ RBW
- c) Detector = peak
- d) Sweep time = auto couple
- e) Trace mode= max hold
- f) Allow trace to fully stabilize
- g) Use the peak marker function to determine the maximum amplitude level.

Limit :

Emission level < 30 dBc

Test results : Complies

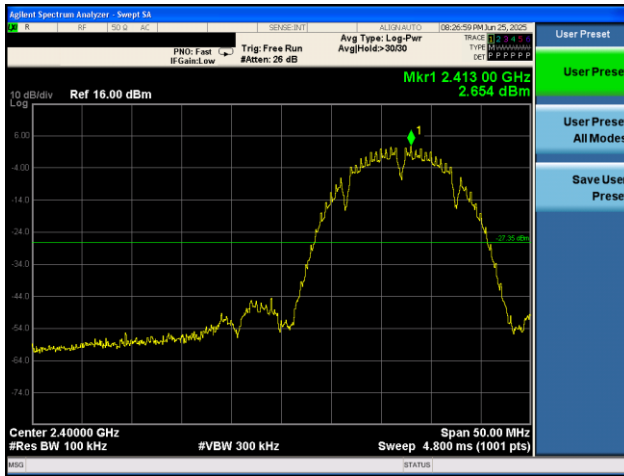
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 30 dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

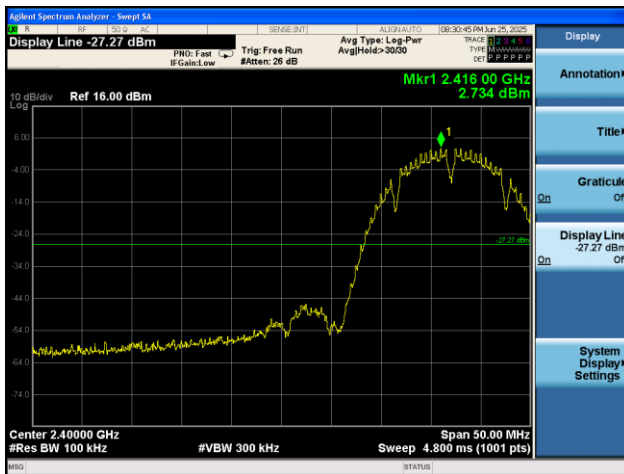


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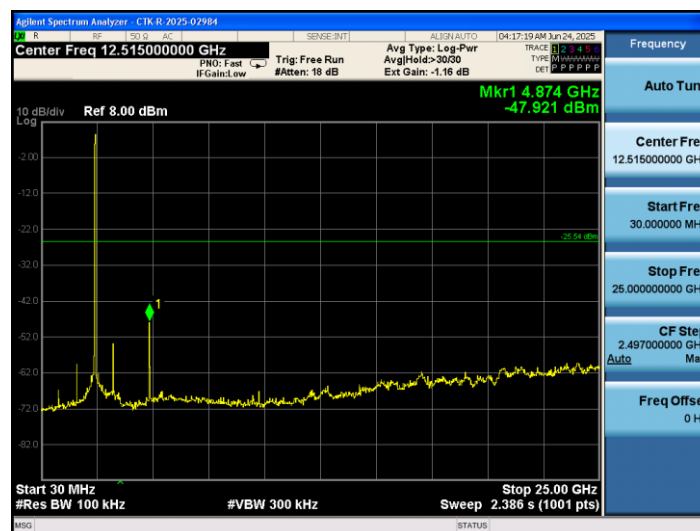
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802.11b_2 417 MHz

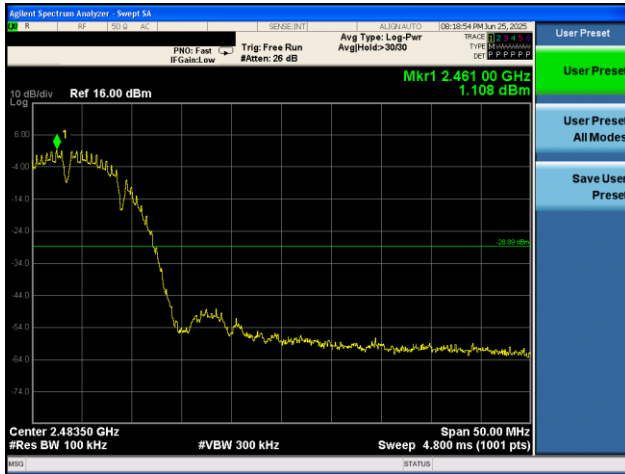


802.11b_2 442 MHz

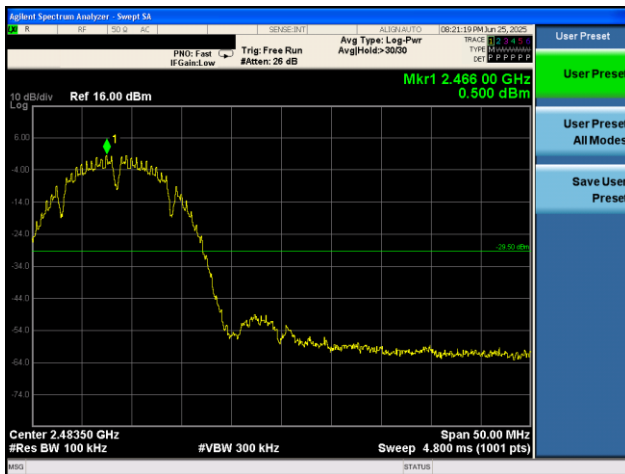
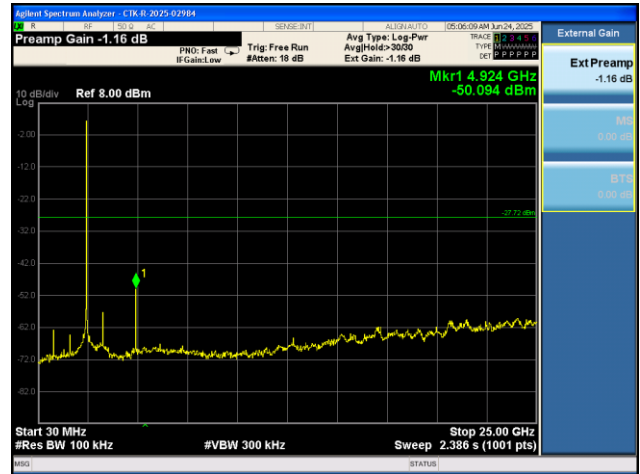


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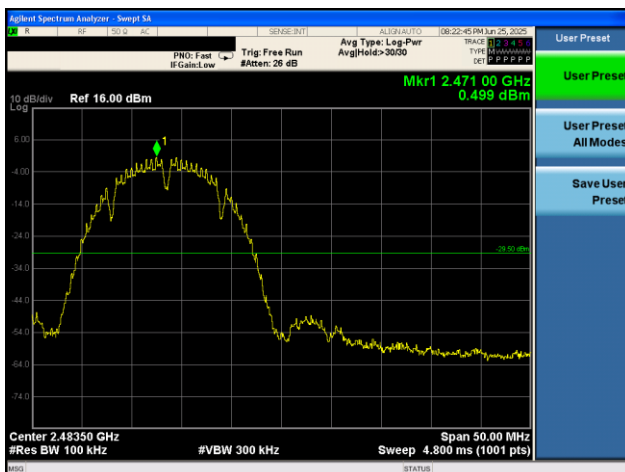
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802.11b_2 462 MHz



802.11b_2 467 MHz



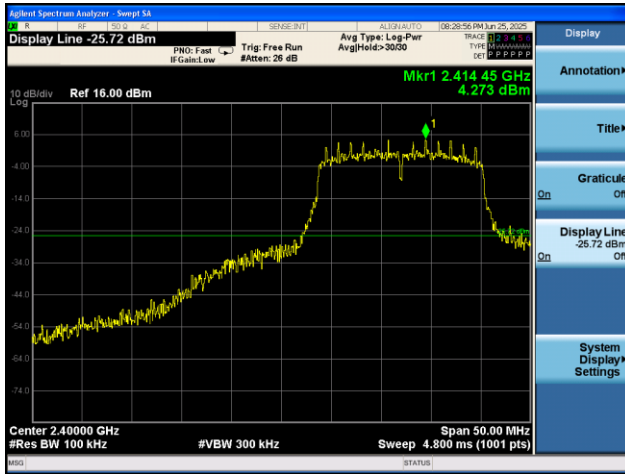
802.11b_2 472 MHz



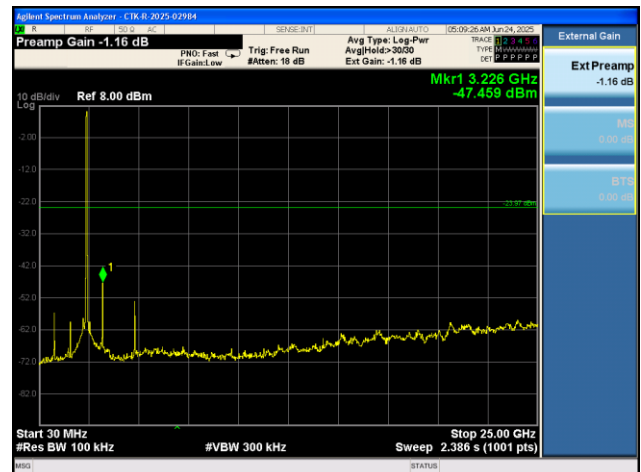
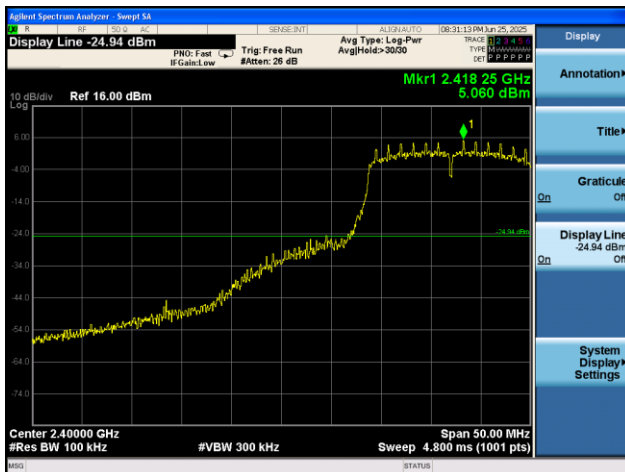


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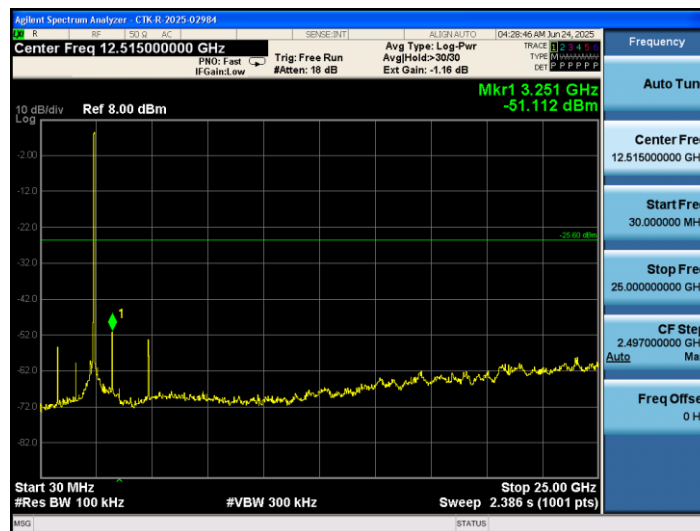
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802.11g_2 412 MHz



802.11g_2 417 MHz

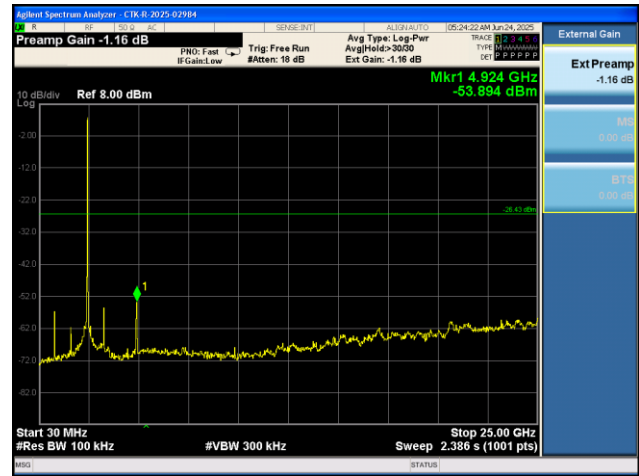


802.11g_2 442 MHz

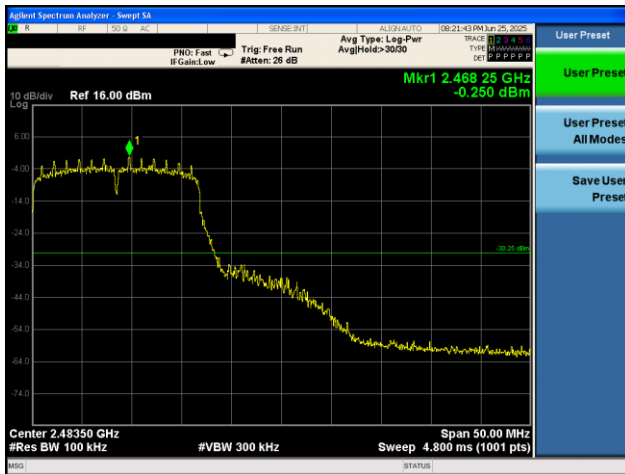


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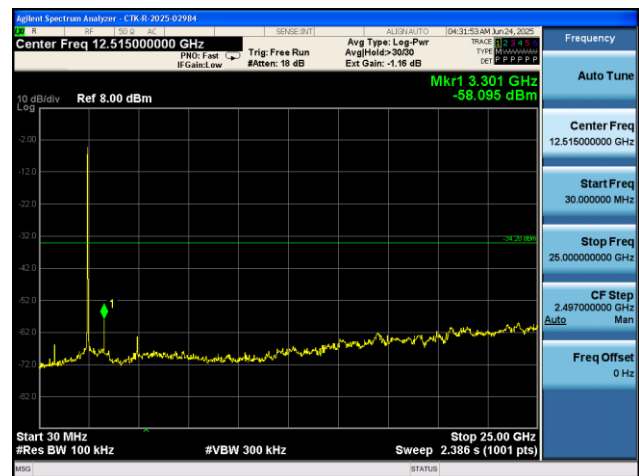
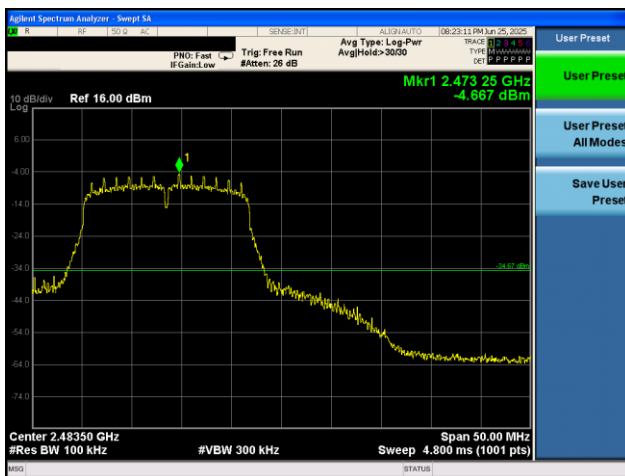
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802.11g_2 462 MHz



802.11g_2 467 MHz



802.11g_2 472 MHz