TEST REPORT

Applicant Name:	SMART SIM TECHNOLOGY COMPANY LIMITED
Address:	RM 908 9/F TAI SANG BANK BUILDING 130-132 DES VOEUX ROAD CENTRAL, HongKong, China
Report Number:	SZ1240111-02642E-RF-00A
FCC ID:	2BE7FB30CPE

Test Standard (s)

FCC PART 15.247

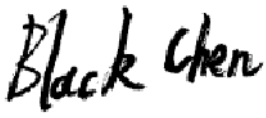
Sample Description

Product Type:	4G LTE WiFi Router
Model No.:	B30
Multiple Model(s) No.:	N/A
Trade Mark:	N/A
Date Received:	2024/01/11
Report Date:	2024/02/29

Test Result:	Pass▲

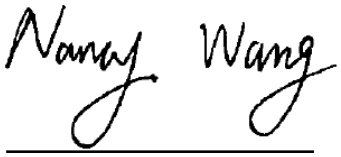
▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Black Chen
RF Engineer

Approved By:



Nancy Wang
RF Supervisor

Note: The information marked# is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1240111-02642E-RF-00A	Original Report	2024/02/29

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	4G LTE WiFi Router
Tested Model	B30
Multiple Model(s)	N/A
Frequency Range	2412-2462MHz
Maximum Conducted Average Output Power	802.11b: 25.06dBm 802.11g: 24.83dBm 802.11n-HT20M: 25.76dBm 802.11n-HT40M: 21.65dBm
Modulation Technique	DSSS,OFDM
Antenna Specification#	2.84dBi (provided by the applicant)
Voltage Range	DC12V form adapter
Sample serial number	2GHX-2 for Conducted and Radiated Emissions Test 2GHX-1 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: ZL-A012W1201000 Input: 100-240~50/60Hz 0.5A Max Output: 12V,1.0A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.94dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For Wi-Fi mode, total 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	/	/
6	2437	/	/
7	2442	/	/

802.11 b&802.11g&802.11n-HT20 mode was tested with Channel 1, 6 and 11.
802.11n-HT40 mode was tested with Channel 3, 6 and 9.
The device supports SISO/MIMO in all modes, per pretest, MIMO mode was the worst mode and reported for all modes.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"cmd.exe---adb shell"# Exercise Software was used.

The device was tested with the worst case was performed as below:

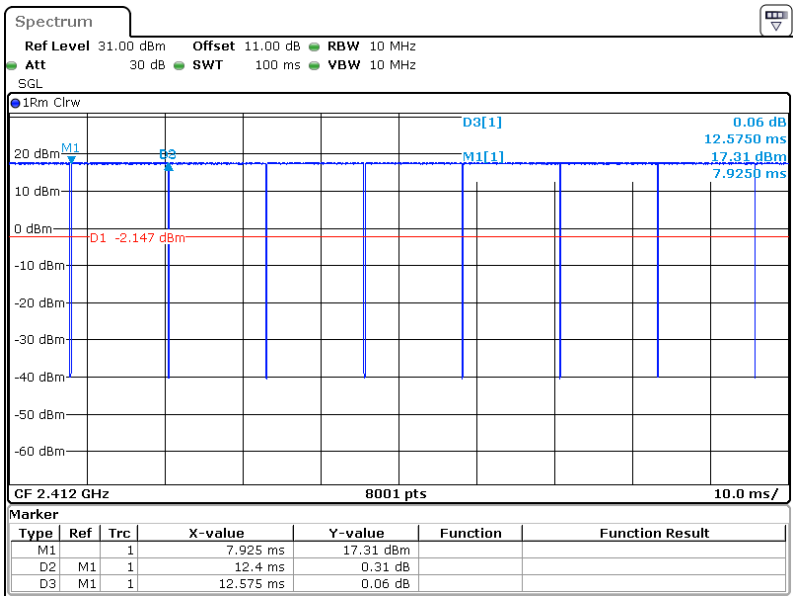
Test Modes	Test Channels	Test Frequency	Data rate	Power Level Setting#	
				Chain 0	Chain 1
802.11b	Lowest	2412	1Mbps	**35**	**35**
	Middle	2437	1Mbps	**35**	**35**
	Highest	2462	1Mbps	**35**	**35**
802.11g	Lowest	2412	6Mbps	**34**	**34**
	Middle	2437	6Mbps	**34**	**34**
	Highest	2462	6Mbps	**34**	**34**
802.11n ht20	Lowest	2412	MCS8	**35**	**35**
	Middle	2437	MCS8	**35**	**35**
	Highest	2462	MCS8	**35**	**35**
802.11n ht40	Lowest	2422	MCS8	**28**	**28**
	Middle	2437	MCS8	**28**	**28**
	Highest	2452	MCS8	**28**	**28**

The software and power level was provided by applicant.

Duty cycle

Test Modes	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	1/T (Hz)	VBW Setting (Hz)
802.11b	12.4	12.575	98.61	81	/
802.11g	2.06	2.24125	91.91	485	500
802.11n-HT20	1.91375	2.105	90.91	523	1000
802.11n-HT40	0.943125	1.095	86.13	1060	2000

802.11b



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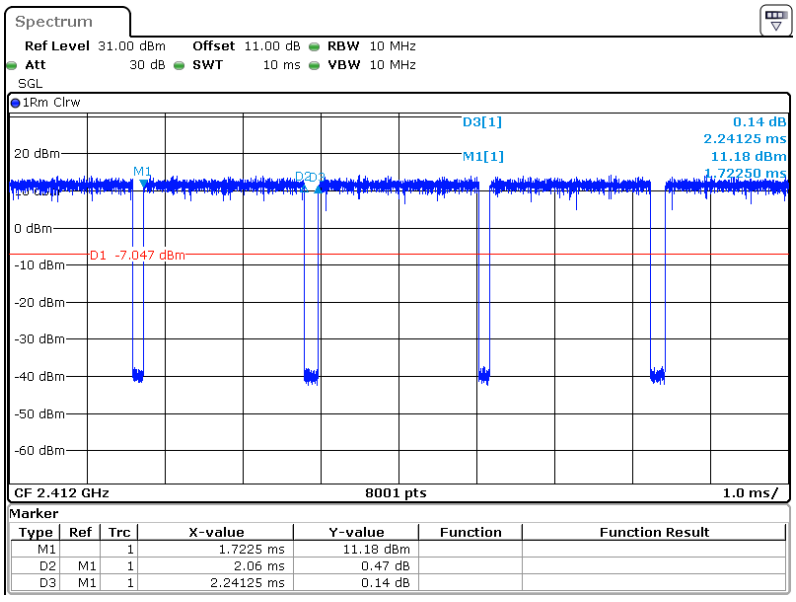
Date: 21.FEB.2024 09:40:07

802.11g



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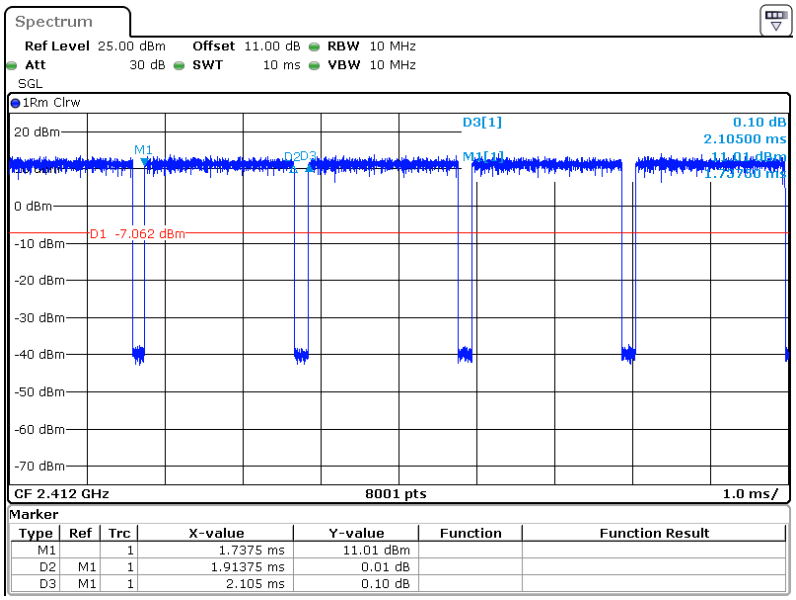
802.11n20



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	1.7375 ms	11.01 dBm		
D2	M1	1	1.91375 ms	0.01 dB		
D3	M1	1	2.105 ms	0.10 dB		

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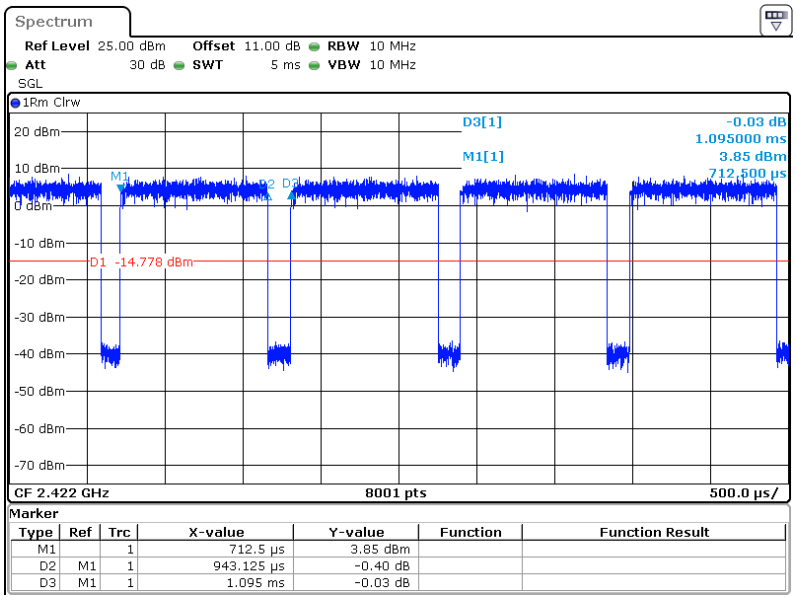
802.11n40



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	712.5 µs	3.85 dBm		
D2	M1	1	943.125 µs	-0.40 dB		
D3	M1	1	1.095 ms	-0.03 dB		

ProjectNo.:SZ1240111-02642E Tester:Bamboo Zhan

Date: 21.FEB.2024 11:38:54

Support Equipment List and Details

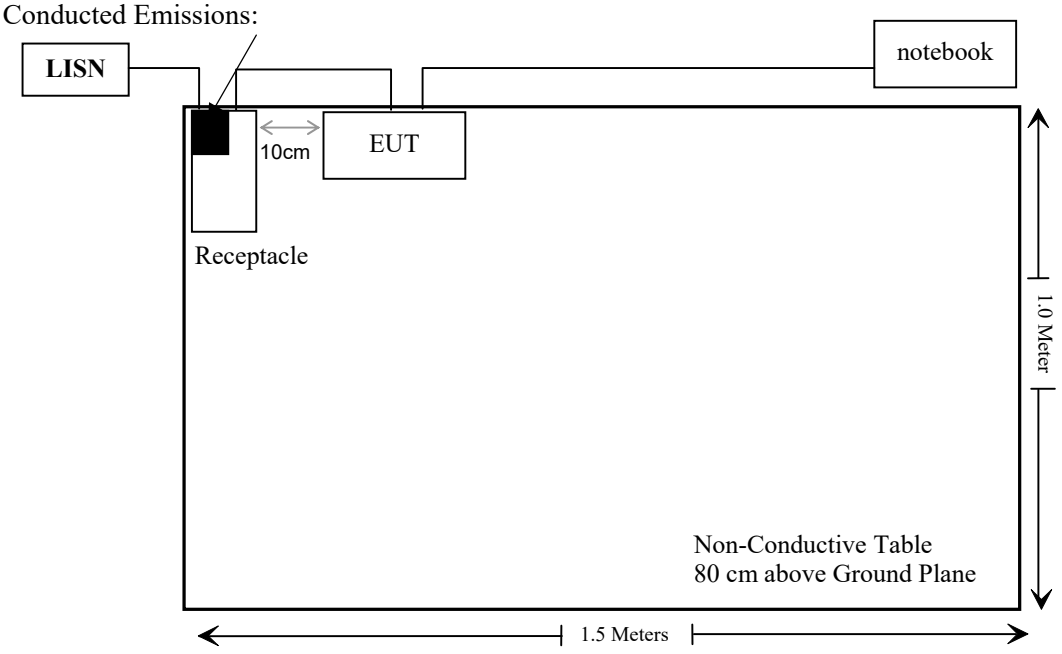
Manufacturer	Description	Model	Serial Number
Dell	Notebook	Inspiron	Unknown

External I/O Cable

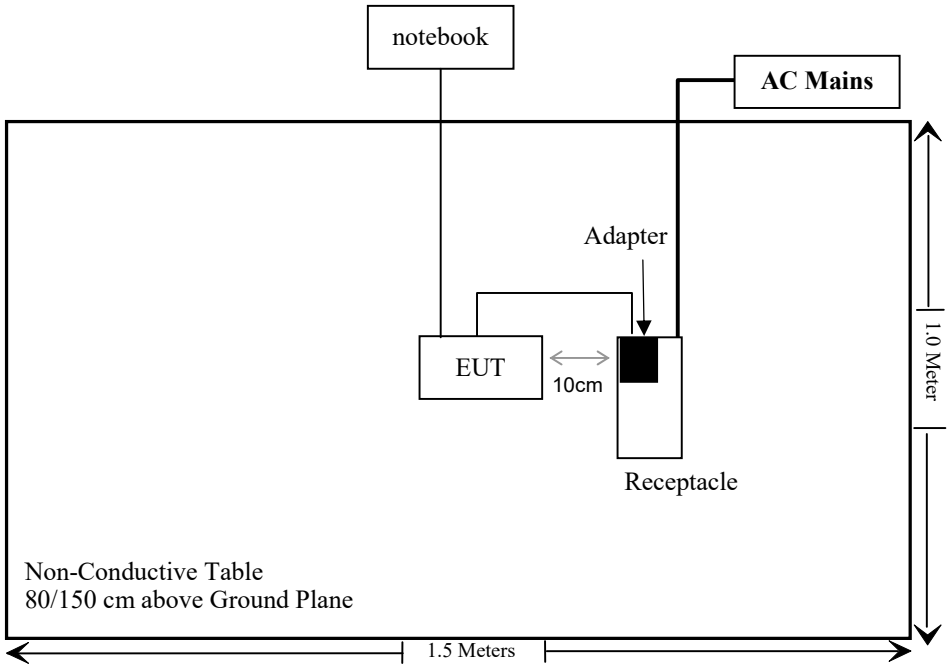
Cable Description	Length (m)	From Port	To
RJ45 cable	10	Notebook	EUT

Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 ,§2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2023/02/08	2024/02/07
Rohde & Schwarz	LISN	ENV216	101613	2023/02/08	2024/02/07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2023/08/03	2024/08/02
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218	NCR	NCR
Radiated Emissions Test					
R&S	EMI Test Receiver	ESR3	102455	2023/02/08	2024/02/07
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2024/07/19
ETS	Passive Loop Antenna	6512	29604	2023/07/07	2024/07/06
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2024/08/02
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2023/04/18	2024/04/17
COM-POWER	Pre-amplifier	PA-122	181919	2023/06/29	2024/06/28
Schwarzbeck	Horn Anetenna	BBHA9120D (1201)	1143	2023/07/26	2024/07/25
Unknown	RF Cable	KMSE	0735	2023/10/08	2024/10/07
Unknown	RF Cable	UFA147	219661	2023/10/08	2024/10/07
MICRO-TRONICS	2.8G Passband filter	HPM50111	F-03-EM217	2023/08/03	2024/08/02
SNSD	2.4G Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
A.H.System	Pre-amplifier	PAM-1840VH	190	2023/08/03	2024/08/02
Electro-Mechanics Co	Horn Antenna	3116	2026	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Agilent	USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2024/02/07	2025/02/06
Unknown	10dB Attenuator	Unknown	F-03-EM122	2023/07/04	2024/07/03

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & 2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (Minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Result

For worst case:

Mode	Frequency (MHz)	Antenna Gain#		Tune up conducted power#		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi	2412-2462	2.84	1.92	26	398.11	20	0.1521	1
WCDMA B2	1850-1910	2.56	1.8	23	199.53	20	0.0715	1
WCDMA B5	824-849	-2.31	0.59	25	316.23	20	0.0371	0.549
LTE B2	1850-1910	2.56	1.8	23	199.53	20	0.0715	1
LTE B4	1710-1755	1.62	1.45	22	158.49	20	0.0457	1
LTE B12	699-716	-1.56	0.7	23	199.53	20	0.0278	0.466
LTE B17	704-716	-1.56	0.7	24	251.19	20	0.0350	0.469

Note: The tune-up power and antenna gain was declared by the applicant.

Simultaneous transmitting consideration (worst case):

The ratio=$MPE_{Wi\text{-}Fi}/limit_{Wi\text{-}Fi} + MPE_{LTE\ Band\ 17}/limit_{LTE\ Band\ 17} = 0.1521/1+0.0350/0.469=0.227 < 1.0$

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has an internal antenna arrangement, which was permanently attached and the antenna gain# is 2.84dBi, fulfill the requirement of this section. Please refer to the EUT photos.

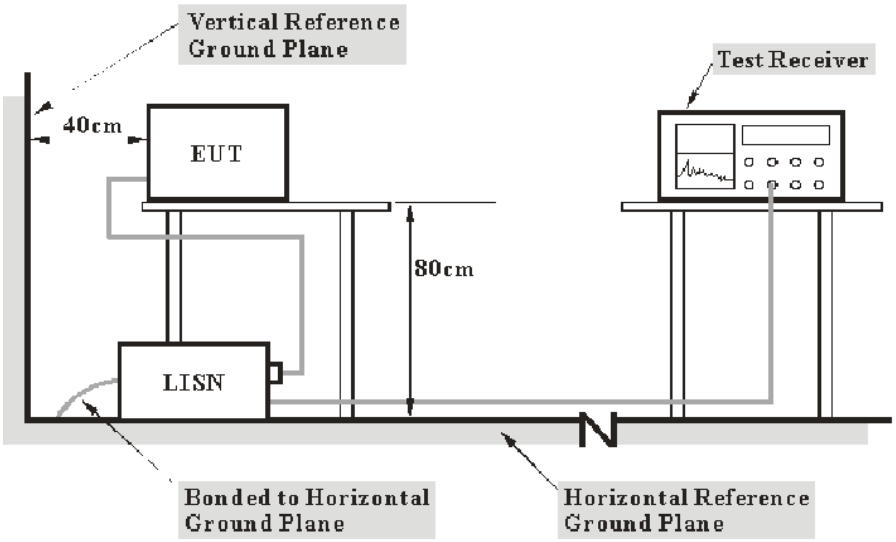
Result: Compliant

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the device was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over Limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over Limit = level – Limit
Level= reading level+ Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

Environmental Conditions

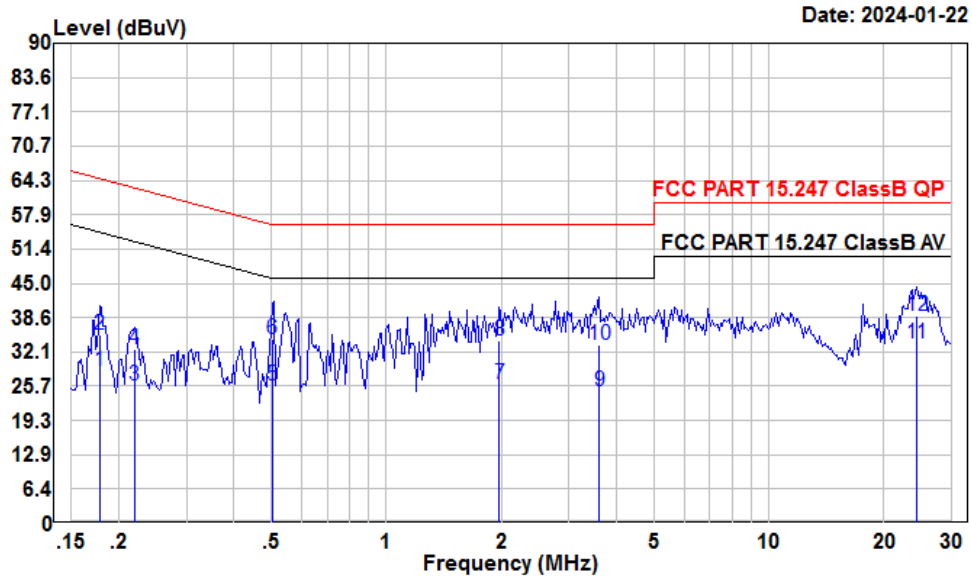
Temperature:	25 ℃
Relative Humidity:	52%
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-01-22.

EUT operation mode: Transmitting

Wi-Fi: (Worst case is 802.11b mode, Low Channel)

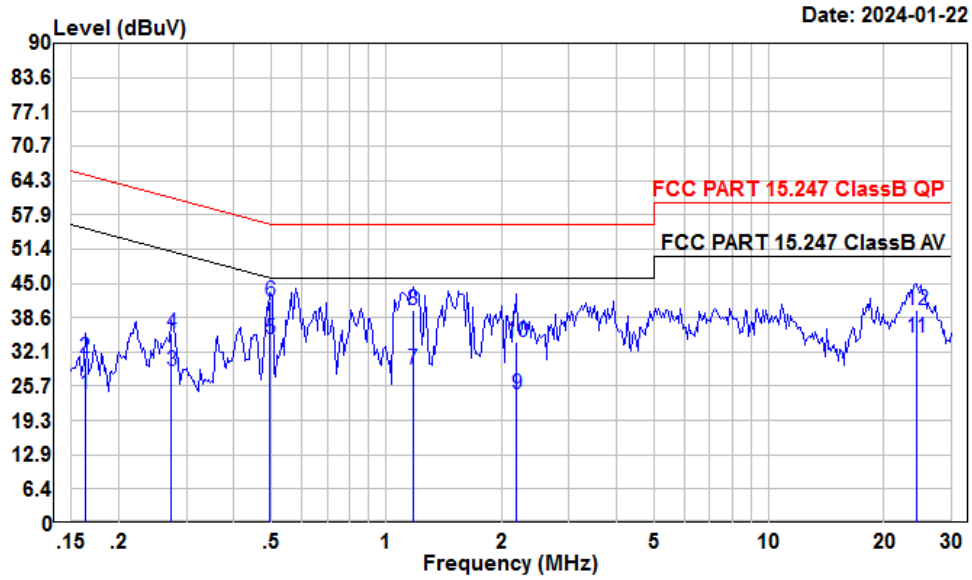
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240111-02642E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	7.95	28.68	10.13	10.60	54.59	-25.91	Average
2	0.18	14.54	35.27	10.13	10.60	64.59	-29.32	QP
3	0.22	5.11	25.86	10.14	10.61	52.83	-26.97	Average
4	0.22	11.78	32.53	10.14	10.61	62.83	-30.30	QP
5	0.50	5.12	25.97	10.15	10.70	46.00	-20.03	Average
6	0.50	13.79	34.64	10.15	10.70	56.00	-21.36	QP
7	1.97	5.02	26.00	10.18	10.80	46.00	-20.00	Average
8	1.97	13.40	34.38	10.18	10.80	56.00	-21.62	QP
9	3.60	3.91	24.80	10.26	10.63	46.00	-21.20	Average
10	3.60	12.60	33.49	10.26	10.63	56.00	-22.51	QP
11	24.27	12.84	33.81	10.22	10.75	50.00	-16.19	Average
12	24.27	17.88	38.85	10.22	10.75	60.00	-21.15	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ1240111-02642E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	3.38	24.09	10.15	10.56	55.30	-31.21	Average
2	0.16	10.39	31.10	10.15	10.56	65.30	-34.20	QP
3	0.27	7.59	28.49	10.17	10.73	50.98	-22.49	Average
4	0.27	14.76	35.66	10.17	10.73	60.98	-25.32	QP
5	0.50	13.51	34.46	10.15	10.80	46.05	-11.59	Average
6	0.50	20.64	41.59	10.15	10.80	56.05	-14.46	QP
7	1.17	8.25	28.94	10.07	10.62	46.00	-17.06	Average
8	1.17	19.34	40.03	10.07	10.62	56.00	-15.97	QP
9	2.19	3.42	24.32	10.20	10.70	46.00	-21.68	Average
10	2.19	12.97	33.87	10.20	10.70	56.00	-22.13	QP
11	24.27	13.78	34.75	10.22	10.75	50.00	-15.25	Average
12	24.27	18.91	39.88	10.22	10.75	60.00	-20.12	QP

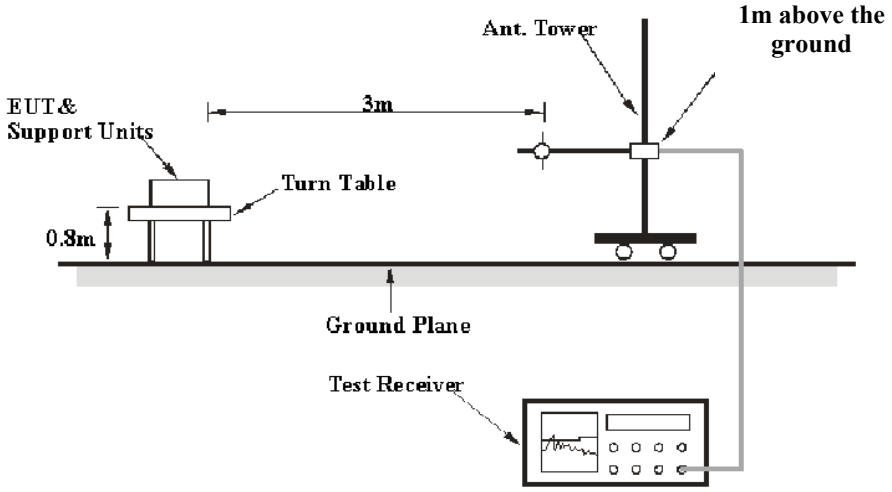
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

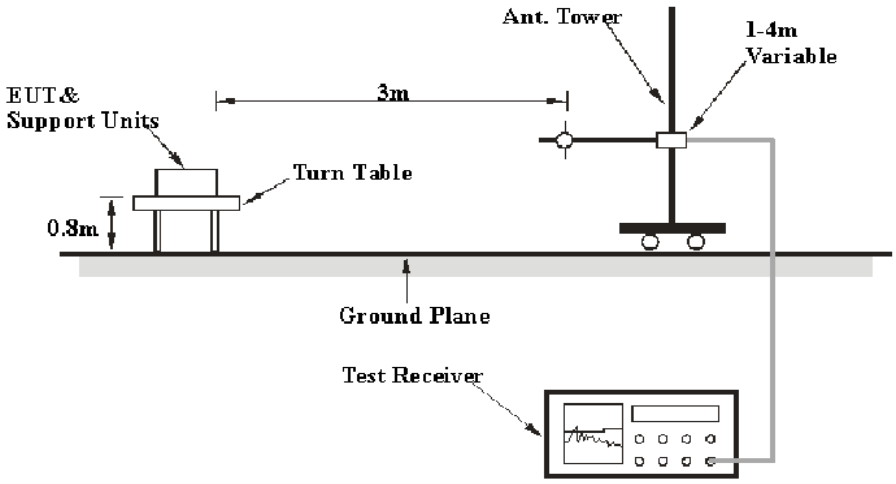
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

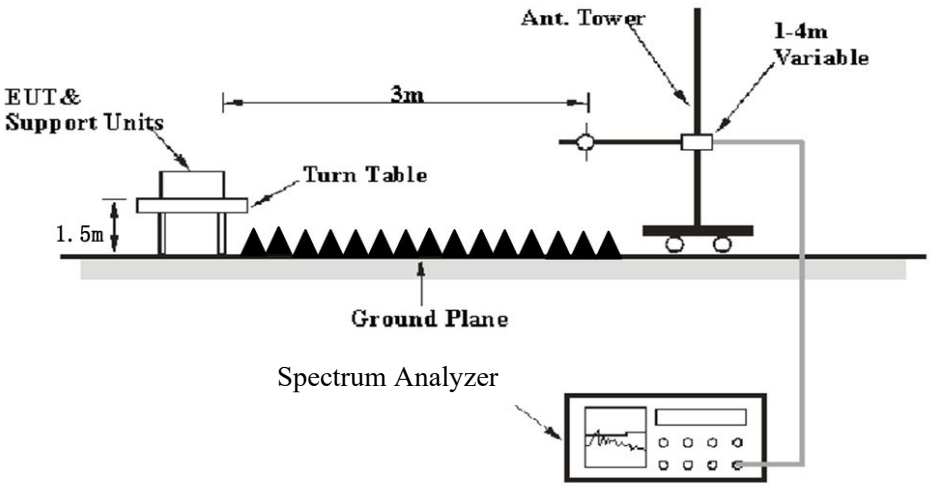
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK

1-25GHz:

Frequency Range	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	≥1/T

Note: T is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

Factor & Over Limit/Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit or Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit/margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin/Over Limit = Corrected Amplitude/Level-Limit
Corrected Amplitude/Level = Reading + Corrected Factor

Test Data

Environmental Conditions

Temperature:	22~24 ℃
Relative Humidity:	54~61 %
ATM Pressure:	101~101.2 kPa

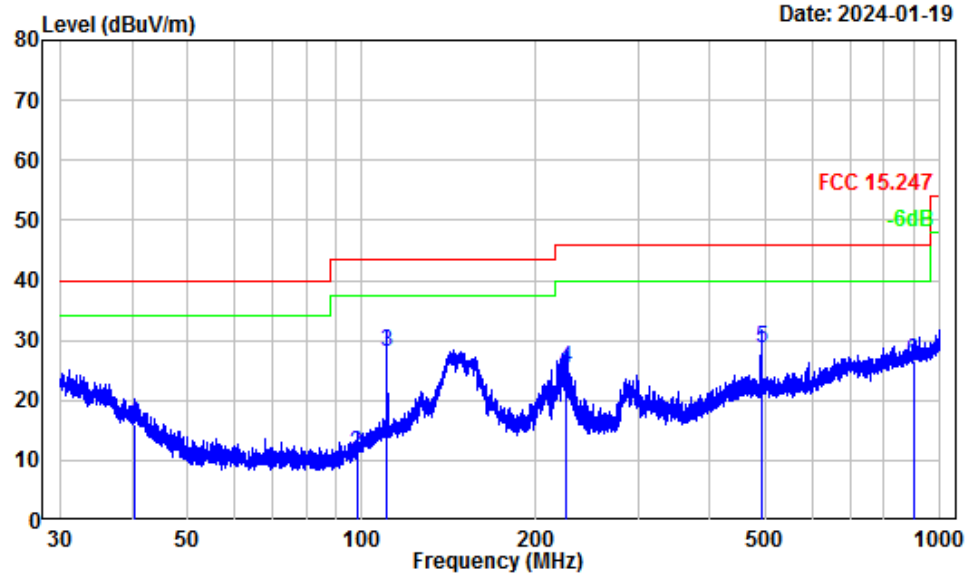
The testing was performed by Anson Su on 2024-01-19 for below 1GHz and Dylan Yang on 2024-02-19 for above 1GHz.

EUT operation mode: Transmitting

Note: For 9 kHz-30MHz, The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.
Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded.

30MHz-1GHz: (Worst case is 802.11b mode, low Channel)

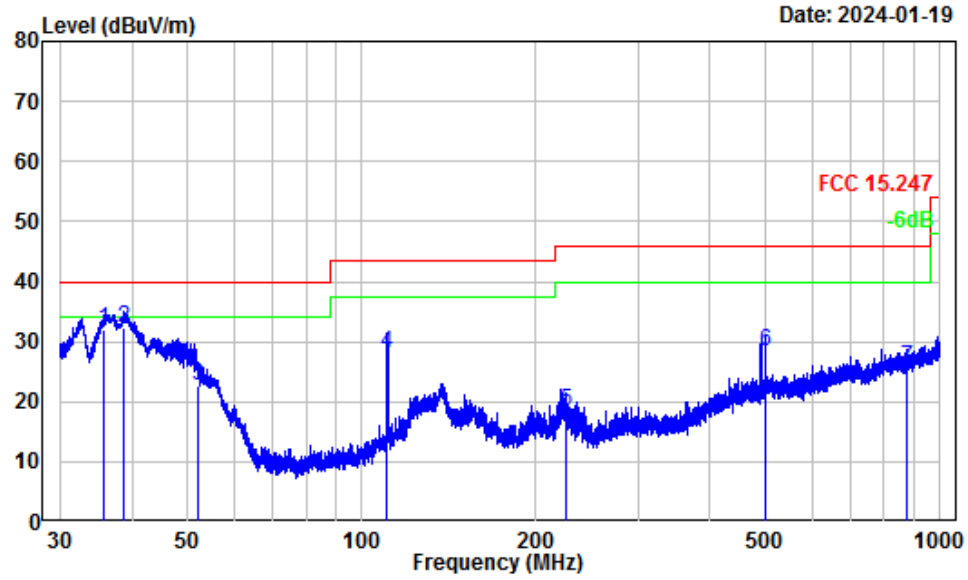
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ1240111-02642E-RF
Note : 2.4G WIFI
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.49	-10.70	26.82	16.12	40.00	-23.88	QP
2	97.93	-14.32	25.37	11.05	43.50	-32.45	QP
3	110.52	-11.10	39.29	28.19	43.50	-15.31	QP
4	225.11	-11.44	36.86	25.42	46.00	-20.58	QP
5	490.96	-5.15	33.90	28.75	46.00	-17.25	QP
6	898.96	0.99	25.70	26.69	46.00	-19.31	QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ1240111-02642E-RF
Note : 2.4G WIFI
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	35.83	-9.30	41.21	31.91	40.00	-8.09	QP
2	38.82	-11.15	43.49	32.34	40.00	-7.66	QP
3	52.16	-17.49	40.07	22.58	40.00	-17.42	QP
4	110.62	-12.24	40.45	28.21	43.50	-15.29	QP
5	225.60	-12.24	30.67	18.43	46.00	-27.57	QP
6	500.08	-5.25	33.59	28.34	46.00	-17.66	QP
7	877.94	0.29	25.27	25.56	46.00	-20.44	QP

1-18 GHz:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11b									
Low Channel(2412MHz)									
4824.00	51.52	PK	79	1.6	H	2.45	53.97	74	-20.03
4824.00	48.25	AV	79	1.6	H	2.45	50.70	54	-3.30
4824.00	46.54	PK	230	1.4	V	2.45	48.99	74	-25.01
4824.00	41.33	AV	230	1.4	V	2.45	43.78	54	-10.22
Middle Channel(2437MHz)									
4874.00	50.91	PK	348	1.3	H	2.56	53.47	74	-20.53
4874.00	47.70	AV	348	1.3	H	2.56	50.26	54	-3.74
4874.00	46.01	PK	274	1.1	V	2.56	48.57	74	-25.43
4874.00	41.30	AV	274	1.1	V	2.56	43.86	54	-10.14
The maximum value of the main wave on the X-axis: 109.78dBuV									
The maximum value of the main wave on the Y-axis: 110.66dBuV									
The maximum value of the main wave on the Z-axis: 112.33dBuV *（worst case position）									
High Channel(2462MHz)									
4924.00	52.13	PK	305	1.0	H	2.63	54.76	74	-19.24
4924.00	47.65	AV	305	1.0	H	2.63	50.28	54	-3.72
4924.00	46.74	PK	117	2.1	V	2.63	49.37	74	-24.63
4924.00	38.12	AV	117	2.1	V	2.63	40.75	54	-13.25

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Reading (dBµV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11g									
Low Channel(2412MHz)									
4824.00	50.77	PK	189	1.5	H	2.45	53.22	74	-20.78
4824.00	35.27	AV	189	1.5	H	2.45	37.72	54	-16.28
4824.00	46.81	PK	47	1.3	V	2.45	49.26	74	-24.74
4824.00	34.66	AV	47	1.3	V	2.45	37.11	54	-16.89
Middle Channel(2437MHz)									
4874.00	48.39	PK	209	1.4	H	2.56	50.95	74	-23.05
4874.00	34.13	AV	209	1.4	H	2.56	36.69	54	-17.31
4874.00	48.55	PK	296	1.2	V	2.56	51.11	74	-22.89
4874.00	33.67	AV	296	1.2	V	2.56	36.23	54	-17.77
High Channel(2462 MHz)									
4924.00	47.02	PK	73	1.1	H	2.63	49.65	74	-24.35
4924.00	33.39	AV	73	1.1	H	2.63	36.02	54	-17.98
4924.00	47.84	PK	355	1.6	V	2.63	50.47	74	-23.53
4924.00	32.77	AV	355	1.6	V	2.63	35.40	54	-18.60

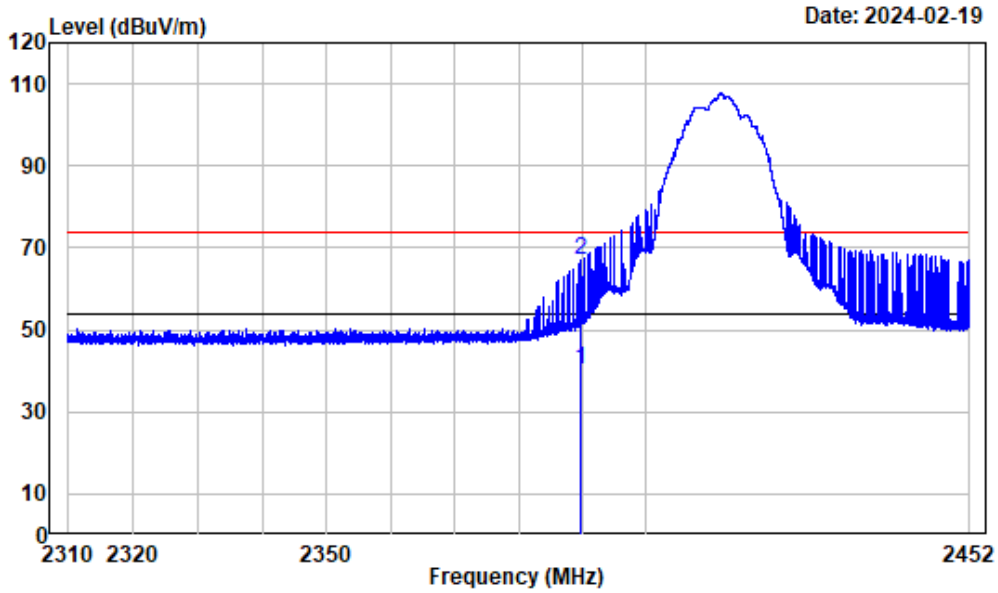
Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n20									
Low Channel(2412MHz)									
4824.00	50.45	PK	139	1.1	H	2.45	52.90	74	-21.10
4824.00	35.51	AV	139	1.1	H	2.45	37.96	54	-16.04
4824.00	47.31	PK	83	1.5	V	2.45	49.76	74	-24.24
4824.00	34.62	AV	83	1.5	V	2.45	37.07	54	-16.93
Middle Channel(2437MHz)									
4874.00	49.71	PK	253	2.5	H	2.56	52.27	74	-21.73
4874.00	35.44	AV	253	2.5	H	2.56	38.00	54	-16.00
4874.00	47.33	PK	349	1.4	V	2.56	49.89	74	-24.11
4874.00	34.52	AV	349	1.4	V	2.56	37.08	54	-16.92
High Channel(2462 MHz)									
4924.00	49.31	PK	297	1.9	H	2.63	51.94	74	-22.06
4924.00	34.17	AV	297	1.9	H	2.63	36.80	54	-17.20
4924.00	46.62	PK	72	2.5	V	2.63	49.25	74	-24.75
4924.00	33.65	AV	72	2.5	V	2.63	36.28	54	-17.72

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave.		Height (m)	Polar (H/V)				
802.11n40									
Low Channel 2422MHz									
4844.00	46.51	PK	5	1.4	H	2.45	48.96	74	-25.04
4844.00	33.29	AV	5	1.4	H	2.45	35.74	54	-18.26
4844.00	46.65	PK	277	1.4	V	2.45	49.10	74	-24.90
4844.00	33.09	AV	277	1.4	V	2.45	35.54	54	-18.46
Middle Channel 2437MHz									
4874.00	46.06	PK	286	1.1	H	2.56	48.62	74	-25.38
4874.00	32.71	AV	286	1.1	H	2.56	35.27	54	-18.73
4874.00	46.44	PK	130	1.7	V	2.56	49.00	74	-25.00
4874.00	32.77	AV	130	1.7	V	2.56	35.33	54	-18.67
High Channel 2452MHz									
4904.00	46.19	PK	323	1.7	H	2.64	48.83	74	-25.17
4904.00	33.05	AV	323	1.7	H	2.64	35.69	54	-18.31
4904.00	46.29	PK	47	1.8	V	2.64	48.93	74	-25.07
4904.00	33.12	AV	47	1.8	V	2.64	35.76	54	-18.24

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude= Factor + Reading
Margin = Corrected Amplitude - Limit
The other spurious emission which is 20dB below to the limit or in noise floor level was not recorded.

Test plots for Band Edge Measurements (Radiated):

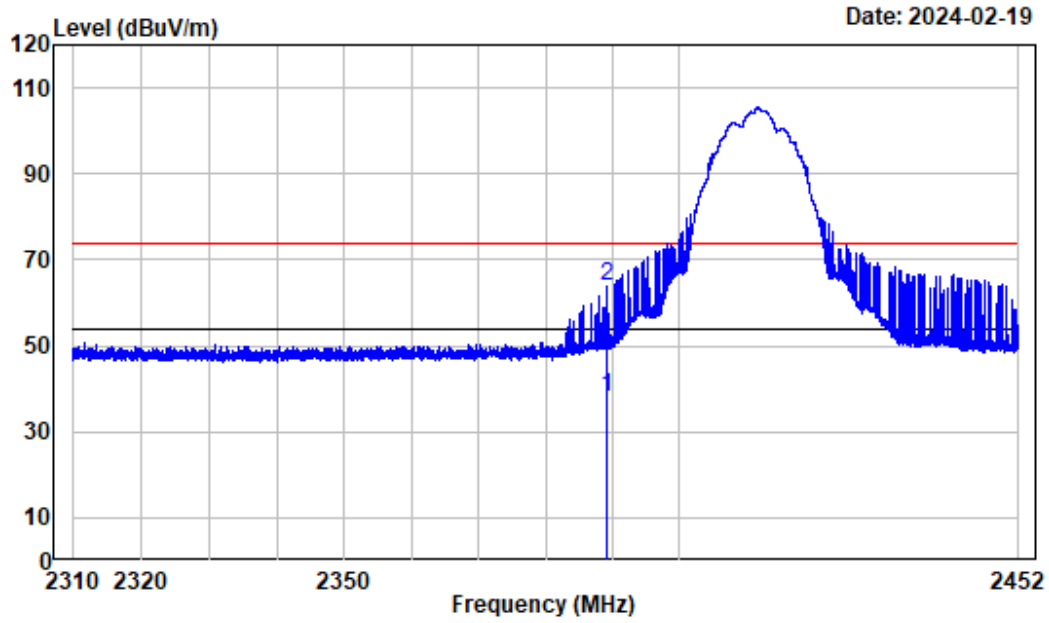
802.11b Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11b_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.804	-3.20	43.68	40.48	54.00	Average	-13.52
2	2389.804	-3.20	70.09	66.89	74.00	Peak	-7.11

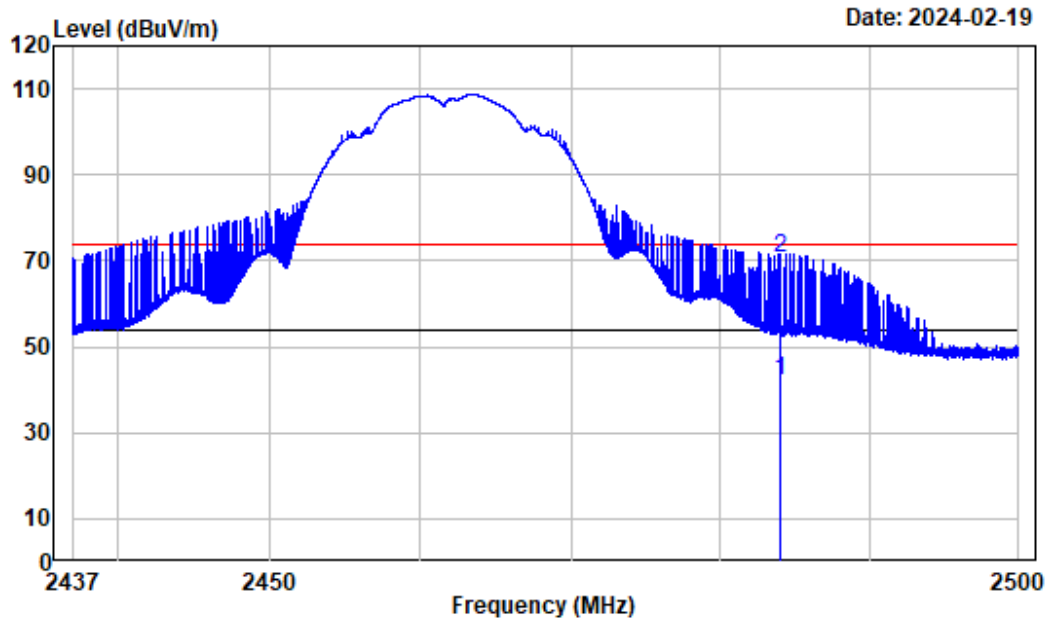
802.11b Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11b_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.129	-3.20	41.37	38.17	54.00	Average	-15.83
2	2389.129	-3.20	66.84	63.64	74.00	peak	-10.36

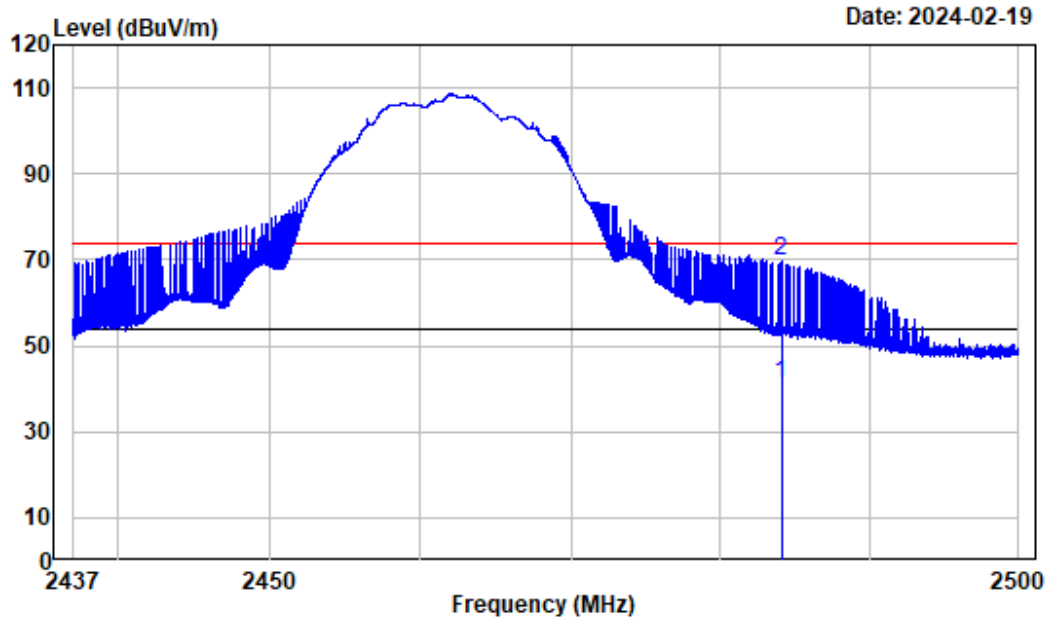
802.11b Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11b_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.927	-3.17	45.14	41.97	54.00	Average	-12.03
2	2483.927	-3.17	73.66	70.49	74.00	peak	-3.51

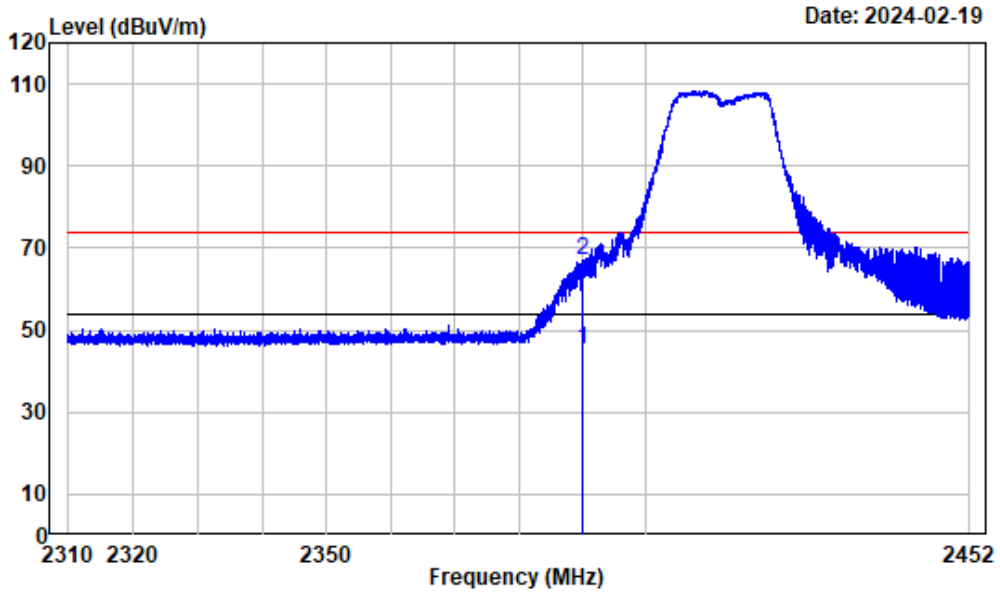
802.11b Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11b_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2484.053	-3.17	44.28	41.11	54.00	Average	-12.89
2	2484.053	-3.17	72.75	69.58	74.00	peak	-4.42

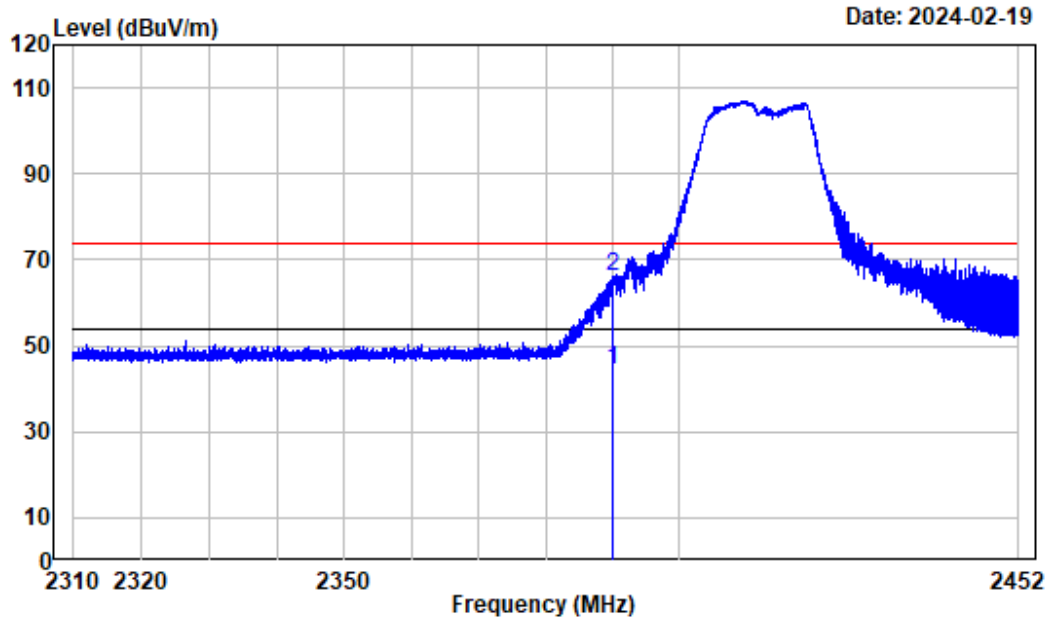
802.11g Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11g_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.964	-3.20	48.46	45.26	54.00	Average	-8.74
2	2389.964	-3.20	70.21	67.01	74.00	peak	-6.99

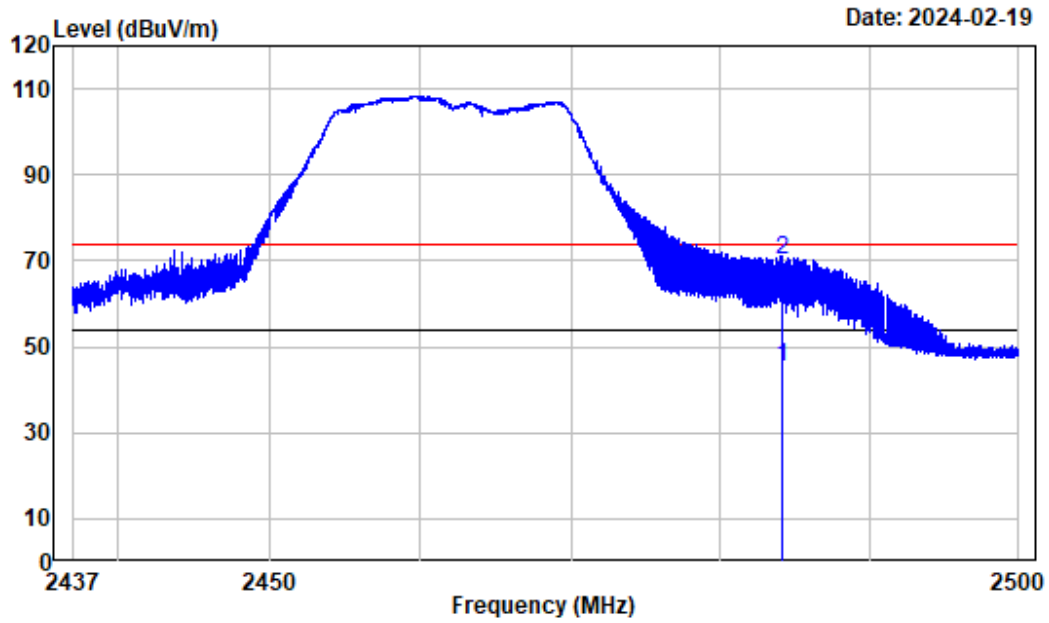
802.11g Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11g_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.946	-3.20	47.66	44.46	54.00	Average	-9.54
2	2389.946	-3.20	69.24	66.04	74.00	peak	-7.96

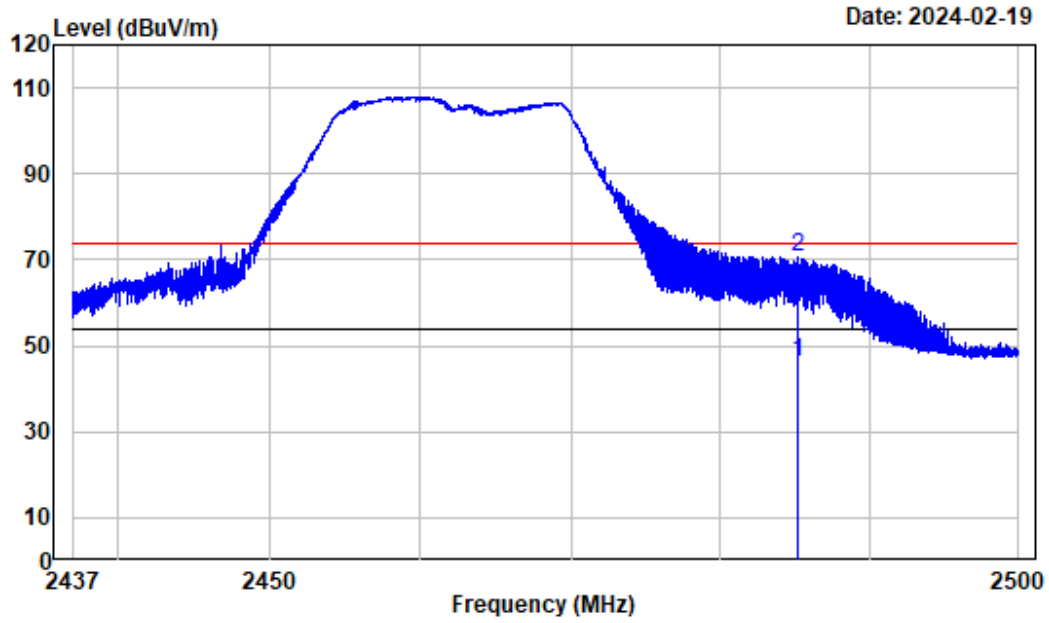
802.11g Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11g_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2484.171	-3.17	48.36	45.19	54.00	Average	-8.81
2	2484.171	-3.17	73.23	70.06	74.00	peak	-3.94

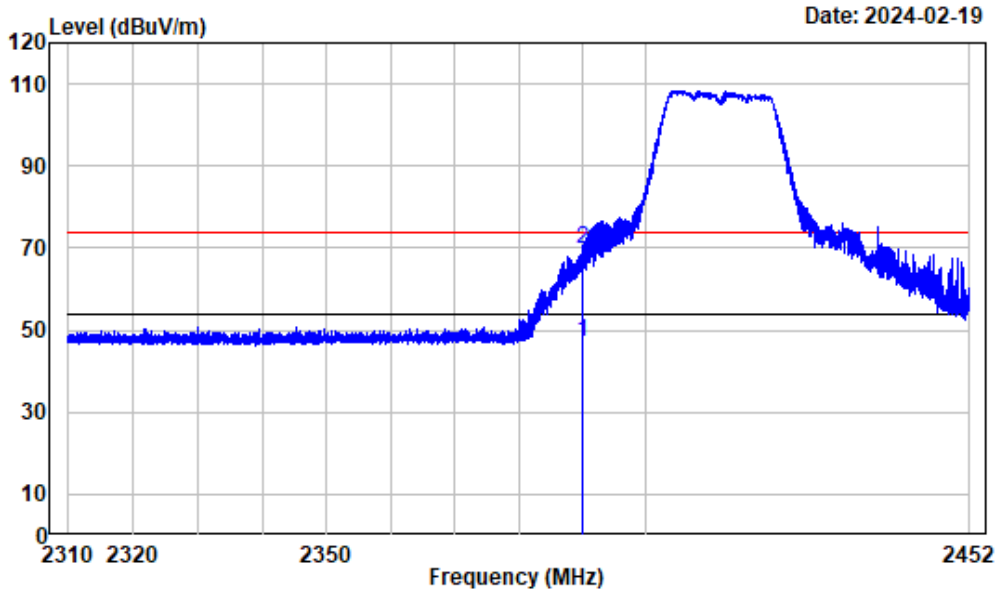
802.11g Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11g_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2485.140	-3.17	49.32	46.15	54.00	Average	-7.85
2	2485.140	-3.17	73.94	70.77	74.00	peak	-3.23

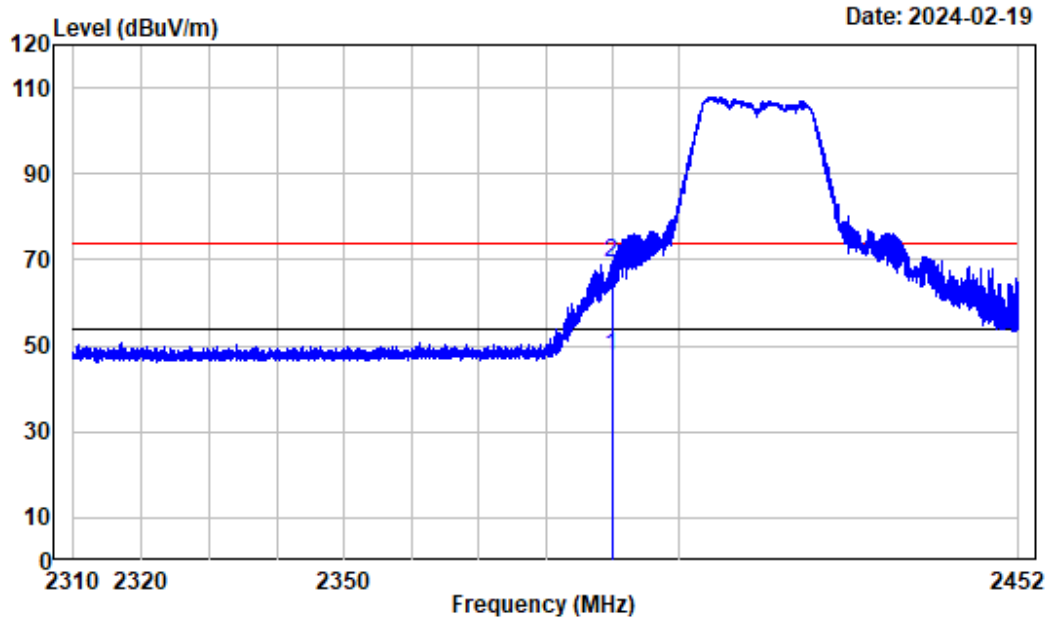
802.11n 20 Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11n20_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.999	-3.20	50.42	47.22	54.00	Average	-6.78
2	2389.999	-3.20	72.89	69.69	74.00	peak	-4.31

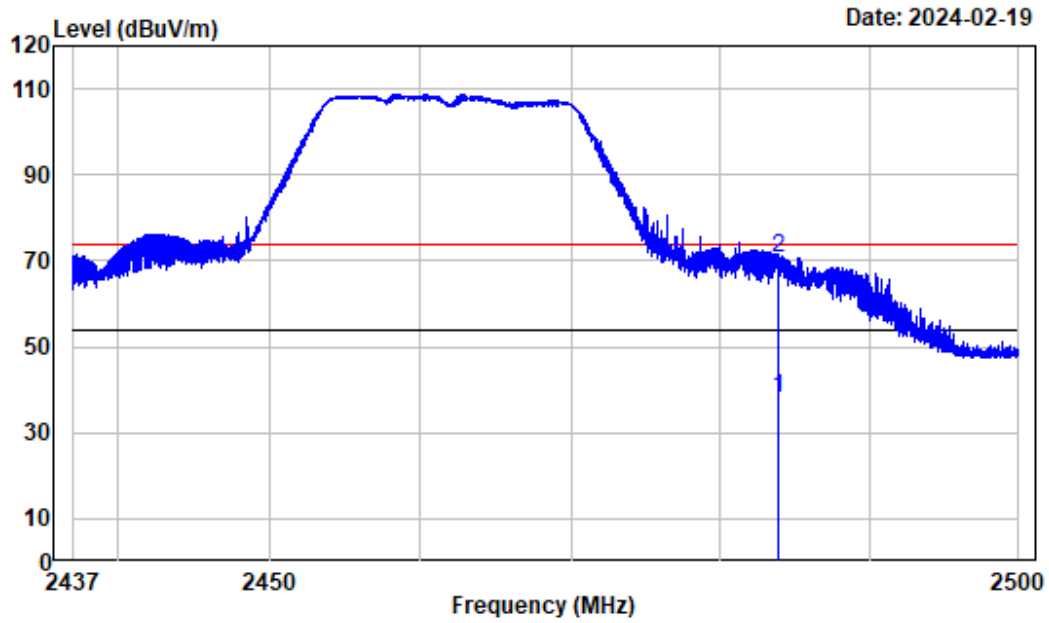
802.11n 20 Mode			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11n20_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.910	-3.20	50.67	47.47	54.00	Average	-6.53
2	2389.910	-3.20	72.48	69.28	74.00	peak	-4.72

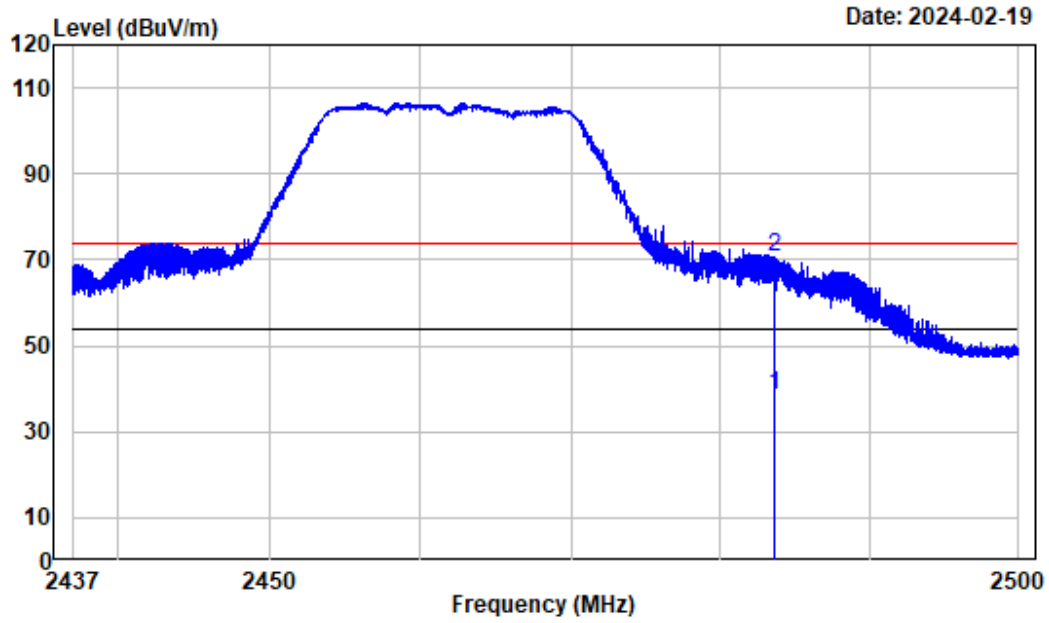
802.11n 20 Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11n20_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.817	-3.17	41.26	38.09	54.00	Average	-15.91
2	2483.817	-3.17	73.62	70.45	74.00	peak	-3.55

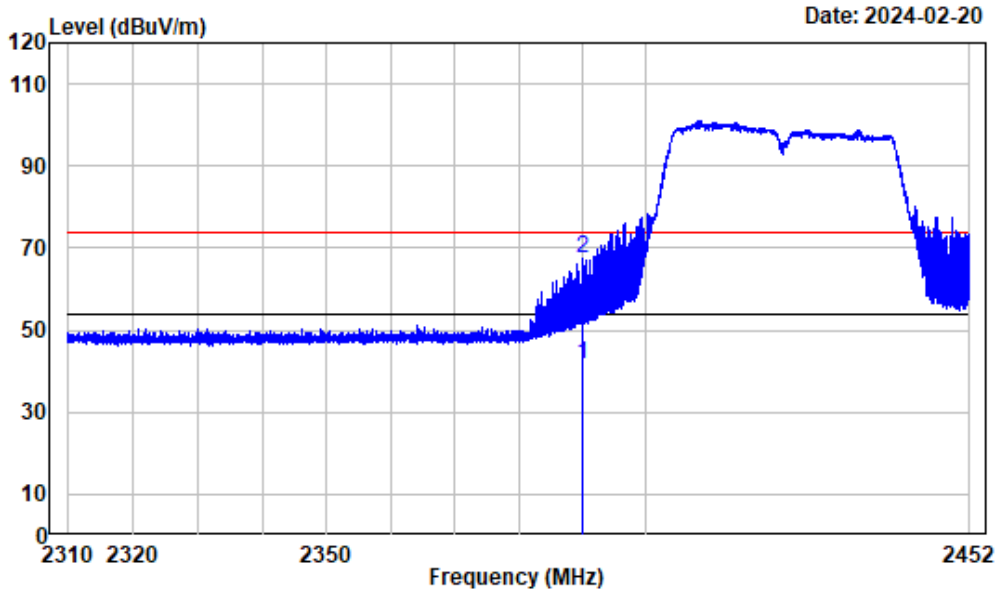
802.11n 20 Mode			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11n20_2462

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.620	-3.17	41.55	38.38	54.00	Average	-15.62
2	2483.620	-3.17	73.87	70.70	74.00	peak	-3.30

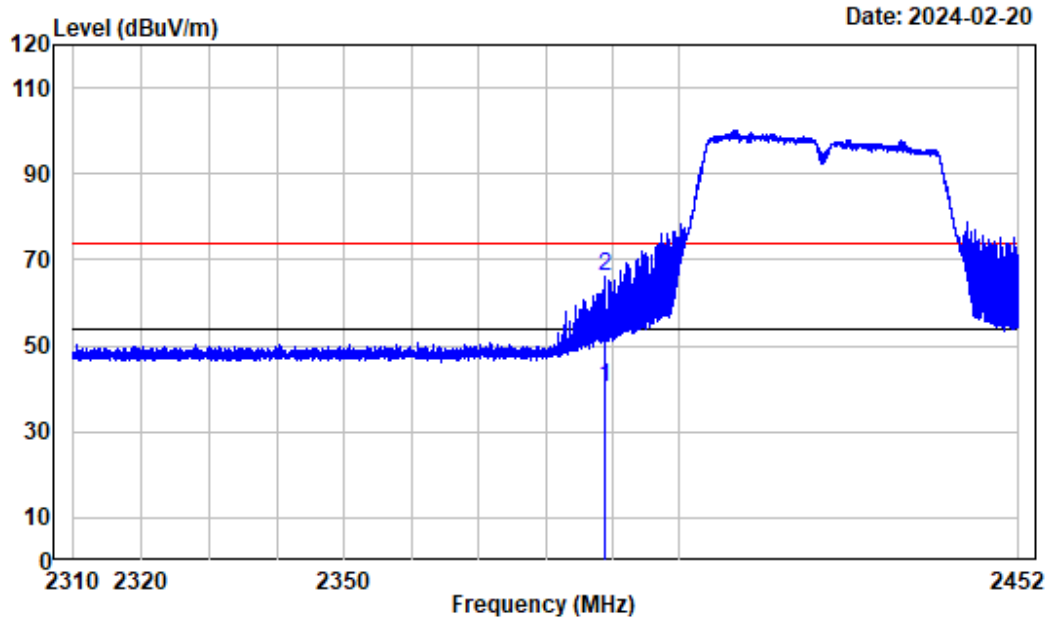
802.11n 40 Mode			
Test Channel:	**2422MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11n40_2422

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.928	-3.20	44.91	41.71	54.00	Average	-12.29
2	2389.928	-3.20	70.46	67.26	74.00	peak	-6.74

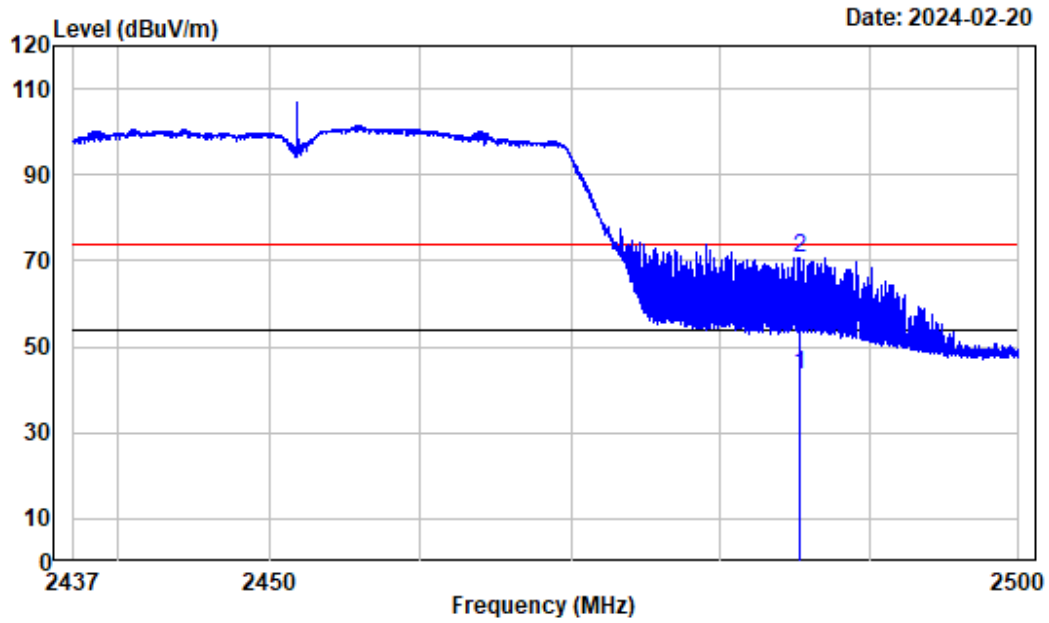
802.11n 40 Mode			
Test Channel:	**2422MHz**	**Ant. Polar. :**	**Vertical**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11n40_2422

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2388.988	-3.20	43.56	40.36	54.00	Average	-13.64
2	2388.988	-3.20	69.13	65.93	74.00	peak	-8.07

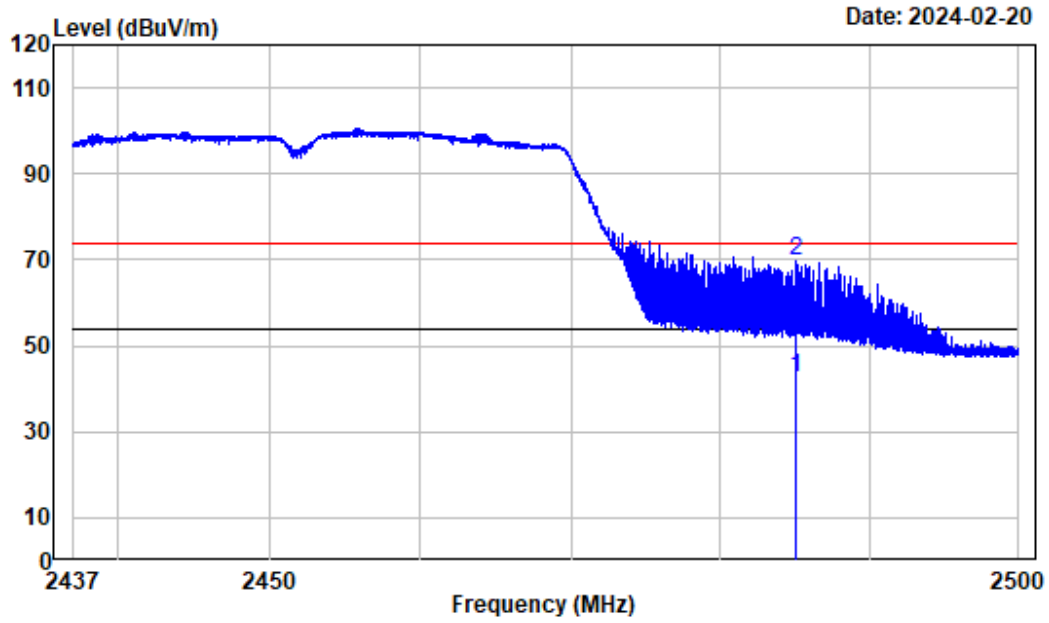
802.11n 40 Mode			
Test Channel:	**2452MHz**	**Ant. Polar. :**	**Horizontal**



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11n40_2452

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2485.337	-3.17	46.67	43.50	54.00	Average	-10.50
2	2485.337	-3.17	74.02	70.85	74.00	peak	-3.15

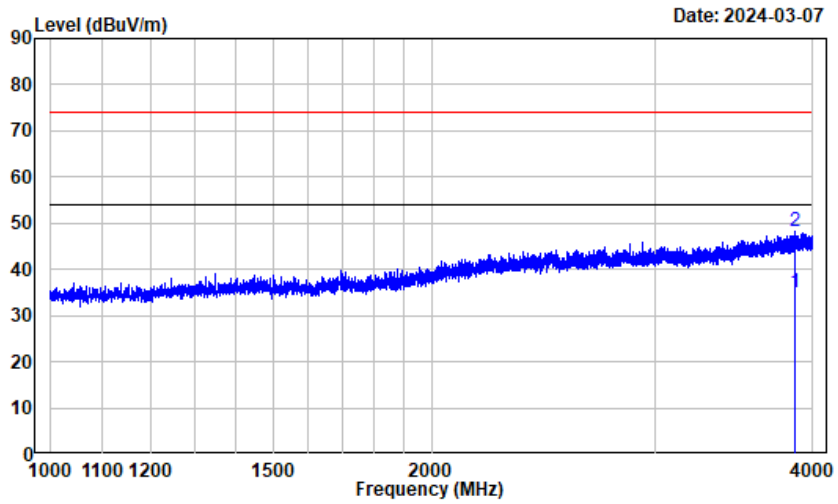
802.11n 40 Mode			
Test Channel:	**2452MHz**	**Ant. Polar. :**	**Vertical**

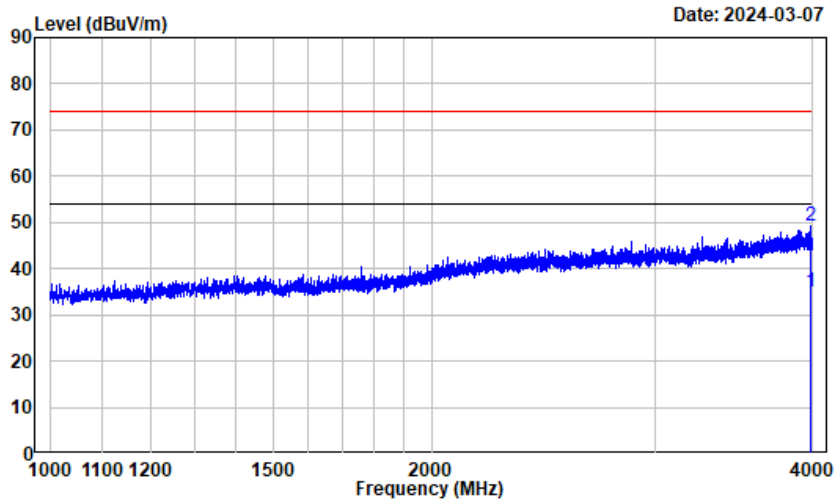


Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11n40_2452

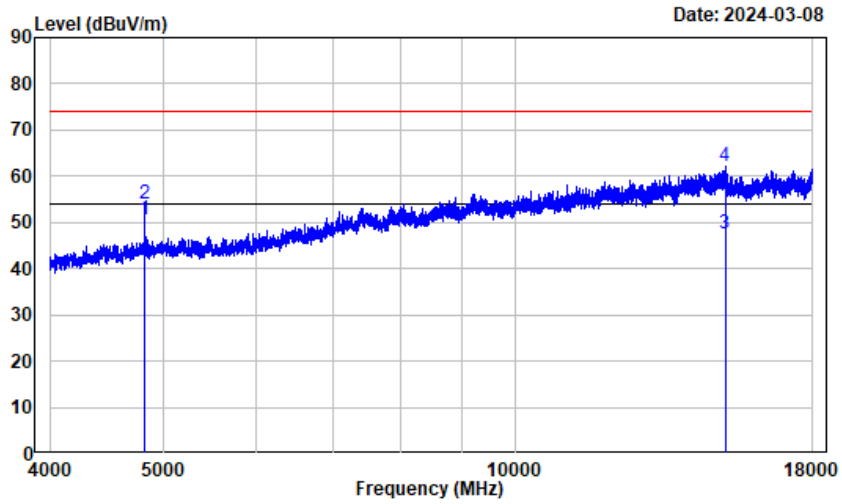
	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2485.022	-3.17	45.52	42.35	54.00	Average	-11.65
2	2485.022	-3.17	73.00	69.83	74.00	peak	-4.17

Listed with the worst harmonic margin test plot:

Horizontal	
1-4GHz	 Project No. : SZ1240111-02642E Tester : Dylan Polarization: Horizontal Note : 802.11B_2412 | | Freq | Factor | Read Level | Limit Level | Limit Line | Remark | Over Limit | | | MHz | dB/m | dBuV | dBuV/m | dBuV/m | | dB | | 1 | 3869.875 | -0.68 | 35.62 | 34.94 | 54.00 | Average | -19.06 | | 2 | 3869.875 | -0.68 | 48.95 | 48.27 | 74.00 | Peak | -25.73 |

Vertical	
1-4GHz	 Project No. : SZ1240111-02642E Tester : Dylan Polarization: Vertical Note : 802.11B_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	3981.250	-0.20	35.27	35.07	54.00	Average	-18.93
2	3981.250	-0.20	49.39	49.19	74.00	Peak	-24.81

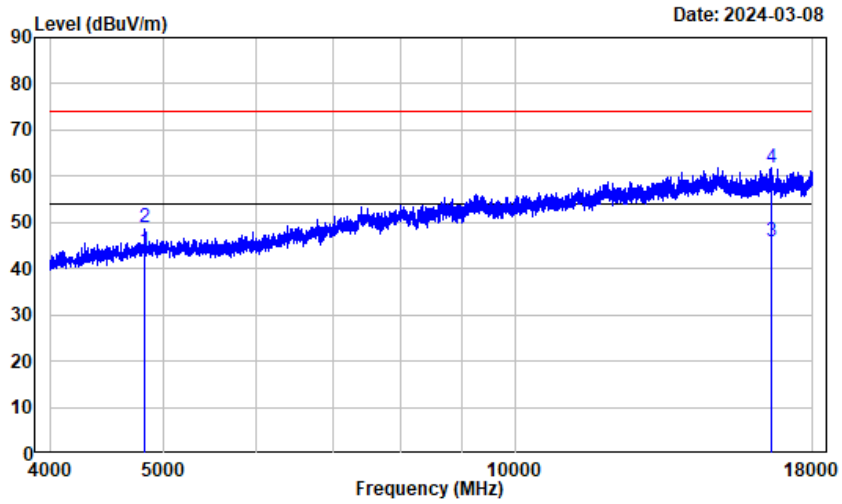
Horizontal	
4-18GHz	

Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Horizontal
Note : 802.11B_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	4824.000	2.45	48.25	50.70	54.00	Average	-3.30
2	4824.000	2.45	51.52	53.97	74.00	Peak	-20.03
3	15144.000	15.47	32.08	47.55	74.00	Average	-26.45
4	15144.000	15.47	46.82	62.29	74.00	Peak	-11.71

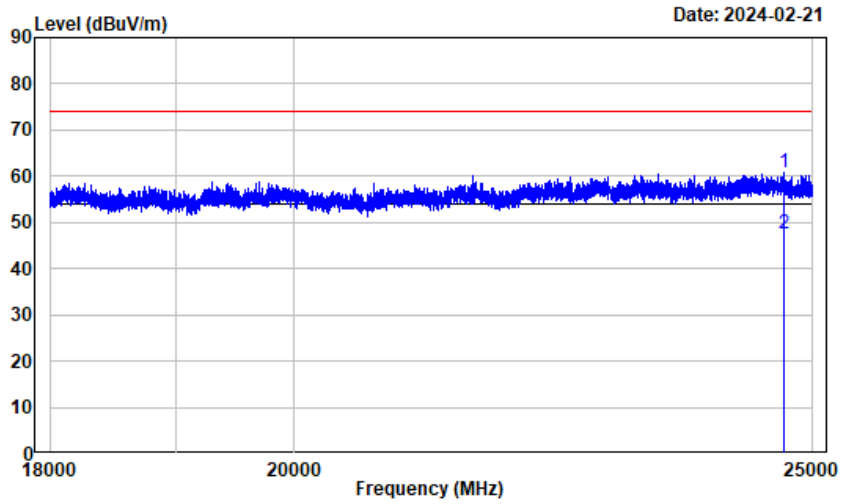
Vertical

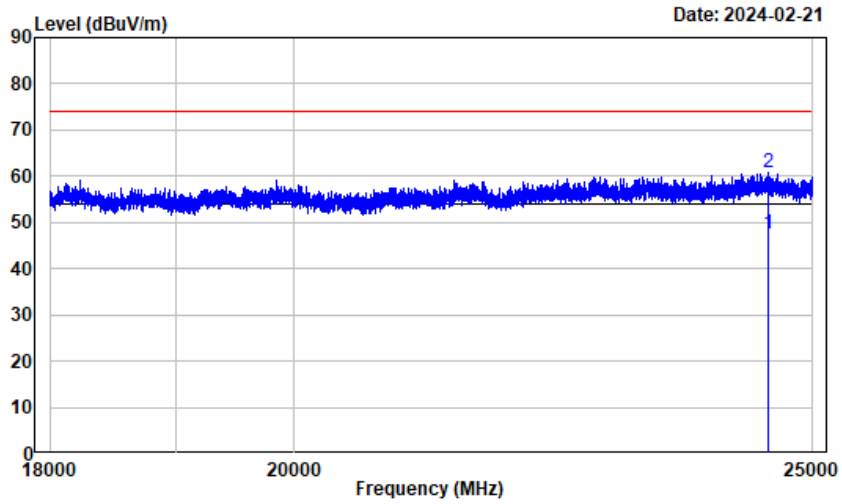
4-18GHz



Project No. : SZ1240111-02642E
Tester : Dylan
Polarization: Vertical
Note : 802.11B_2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	4824.000	2.45	41.33	43.78	54.00	Average	-10.22
2	4824.000	2.45	46.54	48.99	74.00	Peak	-25.01
3	16610.500	16.08	29.82	45.90	54.00	Average	-8.10
4	16610.500	16.08	45.78	61.86	74.00	Peak	-12.14

Horizontal	
18-25GHz	 Project No. : SZ1240111-02642E Tester : Dylan Polarization: Horizontal Note : 802.11B_2412 Freq / Factor / Read Level / Limit Level / Limit Line / Remark / Over Limit MHz / dB/m / dBuV / dBuV/m / dBuV/m / / dB 1 24687.630 18.77 42.15 60.92 74.00 Peak -13.08 2 24687.630 18.77 28.76 47.53 54.00 Average -6.47

Vertical	
18-25GHz	 Project No. : SZ1240111-02642E Tester : Dylan Polarization: Vertical Note : 802.11B_2412 Freq / Factor / Read Level / Limit Level / Limit Line / Remark / Over Limit MHz / dB/m / dBuV / dBuV/m / dBuV/m / / dB 1 24531.000 18.96 28.56 47.52 54.00 Average -6.48 2 24531.000 18.96 41.69 60.65 74.00 Peak -13.35

FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

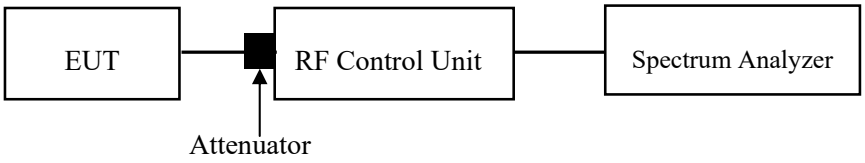
Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.8.1 & Clause 6.9.3

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.



Test Data

Environmental Conditions

Temperature:	25.1℃
Relative Humidity:	48 %
ATM Pressure:	101 kPa

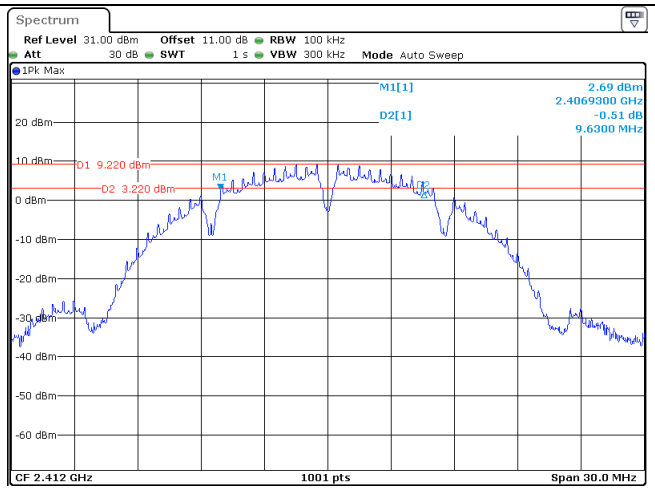
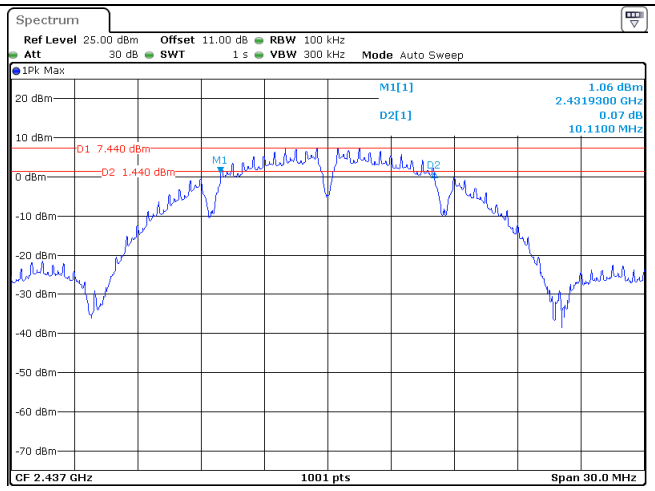
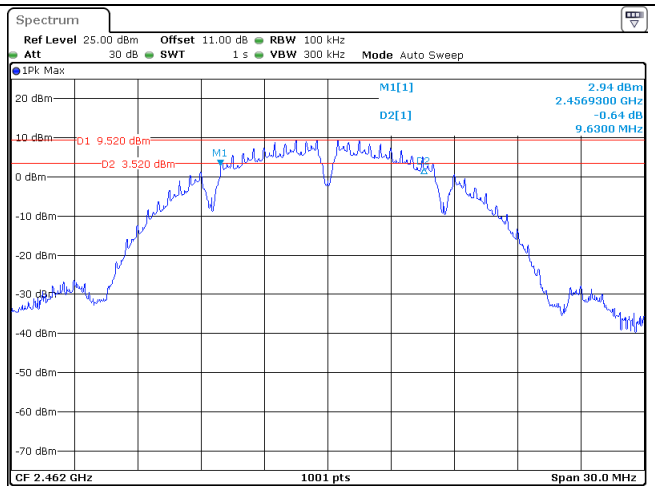
The testing was performed by Bamboo Zhan on 2024-02-21.

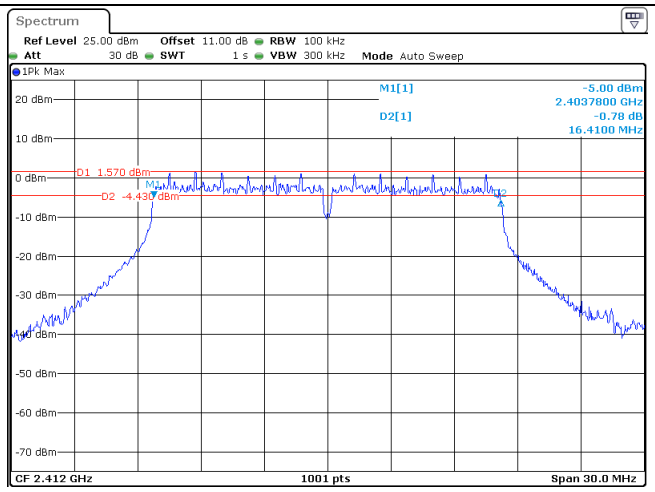
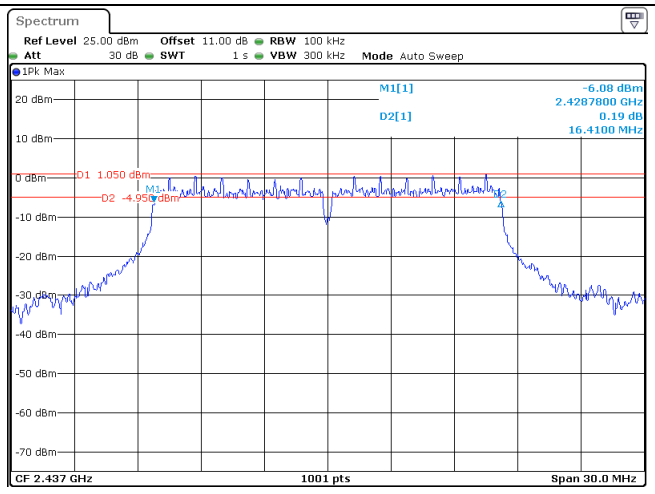
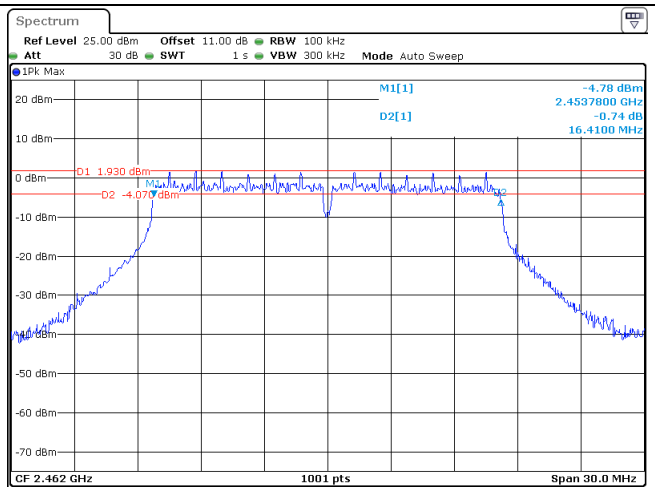
EUT operation mode: Transmitting

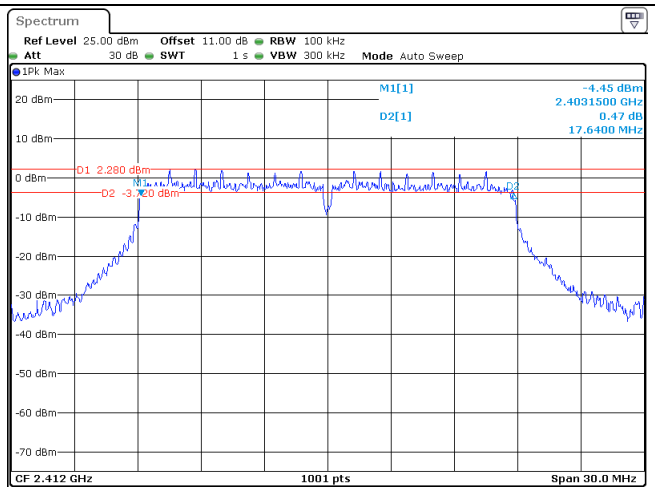
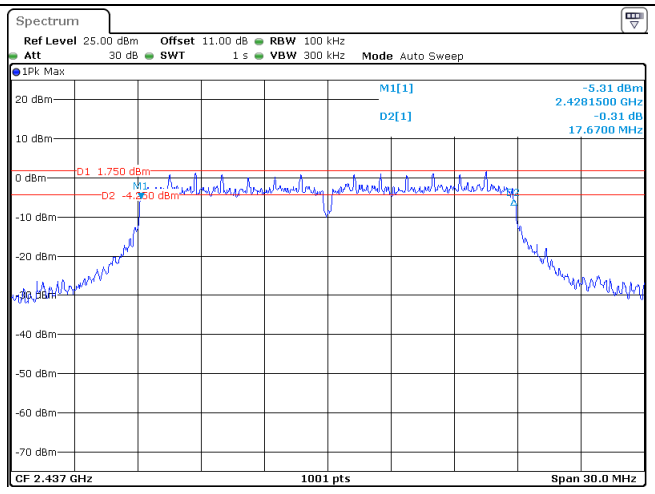
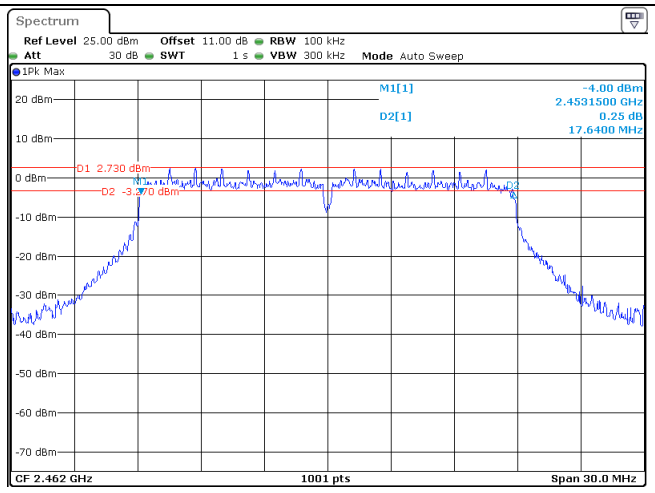
Test Result: Compliant.

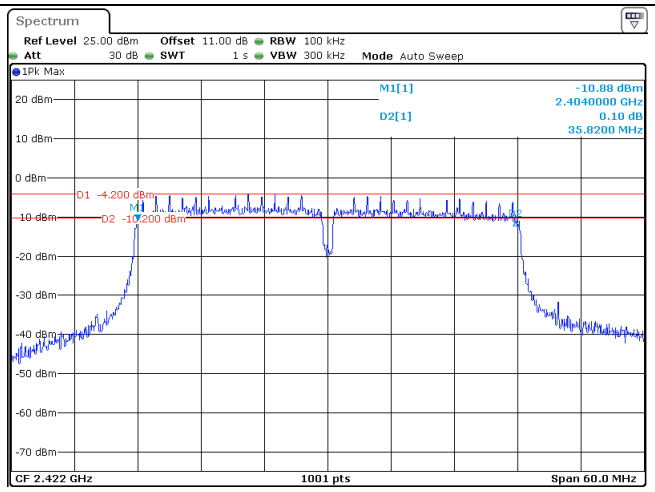
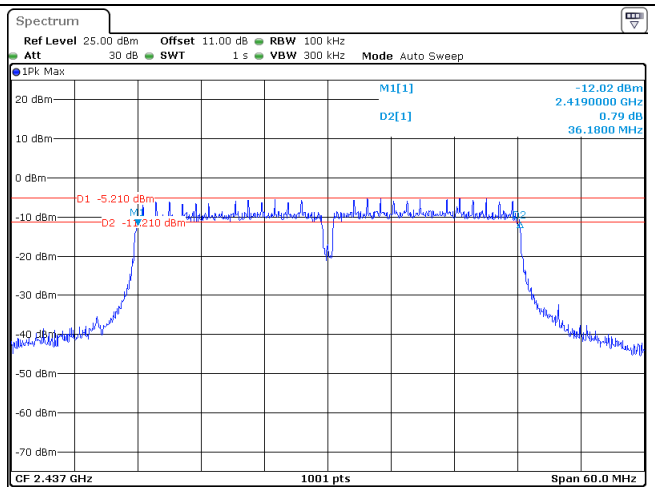
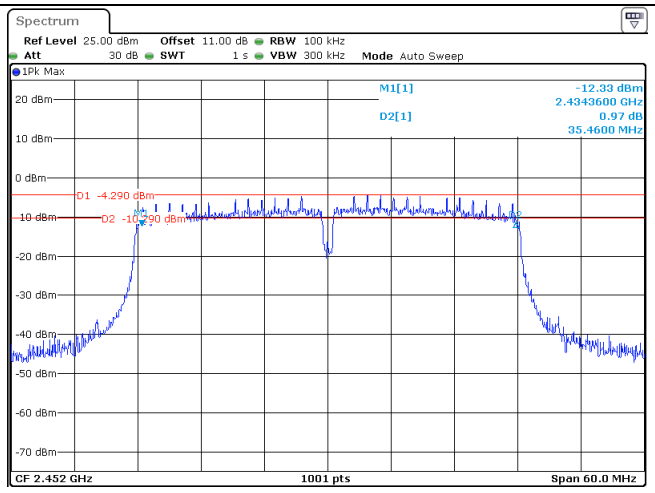
Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)
802.11b	2412	9.63	15.18	0.5
	2437	10.11	16.06	0.5
	2462	9.63	15.1	0.5
802.11g	2412	16.41	17.1	0.5
	2437	16.41	17.38	0.5
	2462	16.41	17.06	0.5
802.11n ht20	2412	17.64	18.3	0.5
	2437	17.67	18.7	0.5
	2462	17.64	18.22	0.5
802.11n ht40	2422	35.82	36.6	0.5
	2437	36.18	36.52	0.5
	2452	35.46	36.28	0.5

6 dB Bandwidth

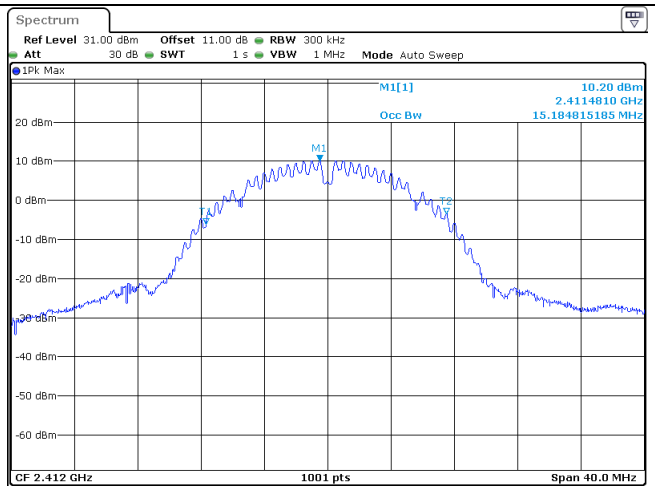
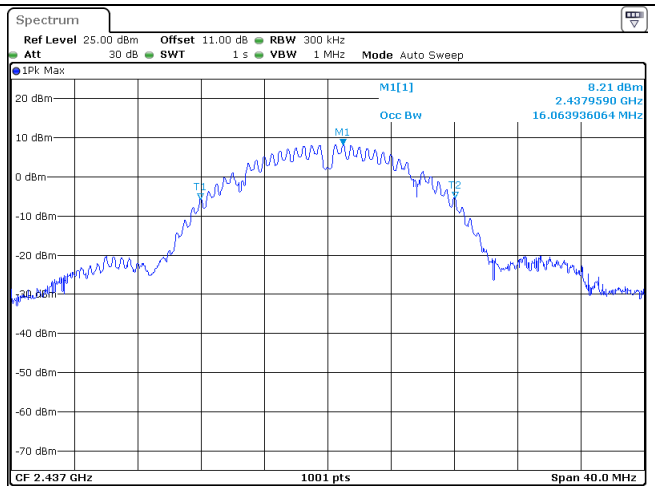
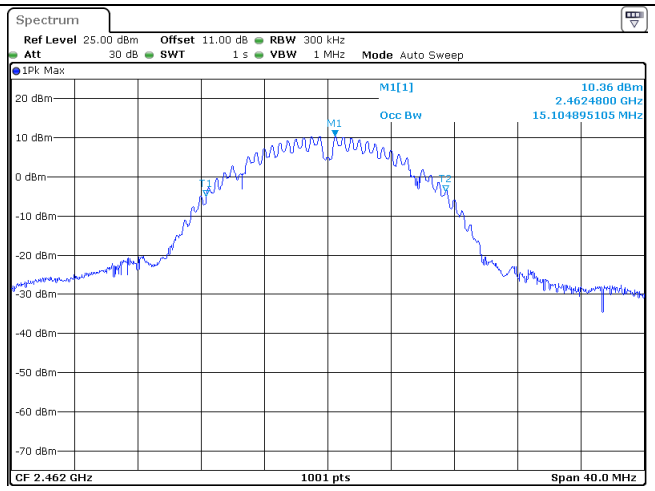
802.11b	
Low Channel	
Middle Channel	
High Channel	

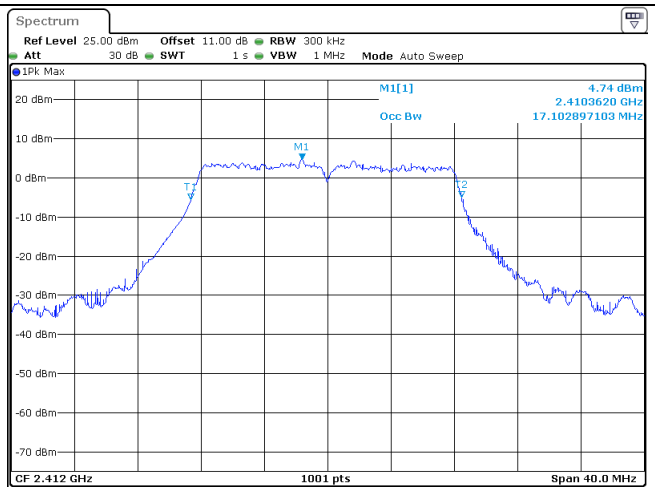
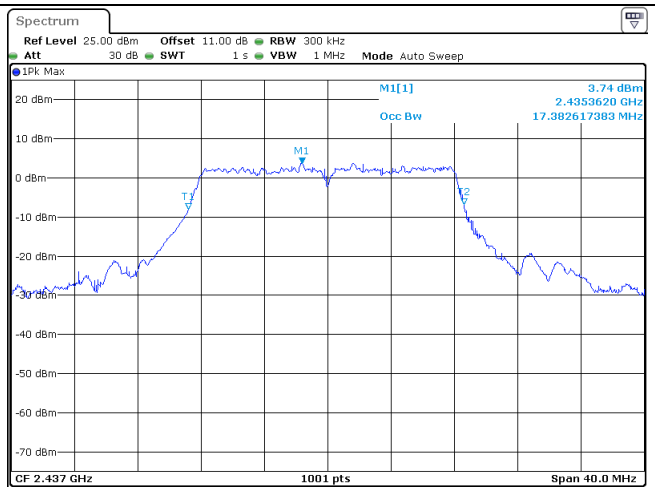
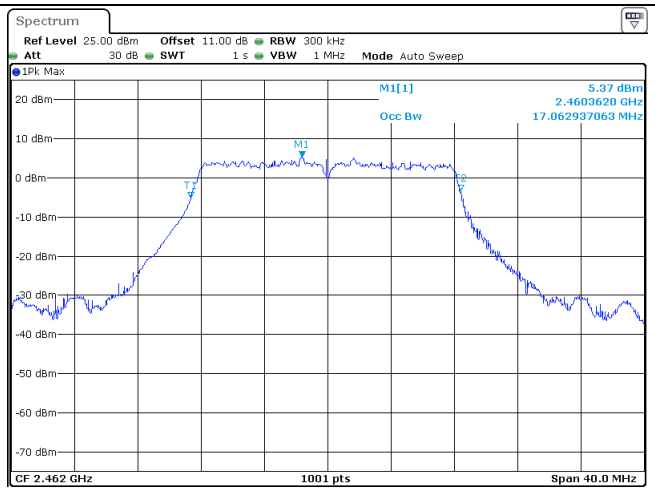
802.11g	
Low Channel	
Middle Channel	
High Channel	

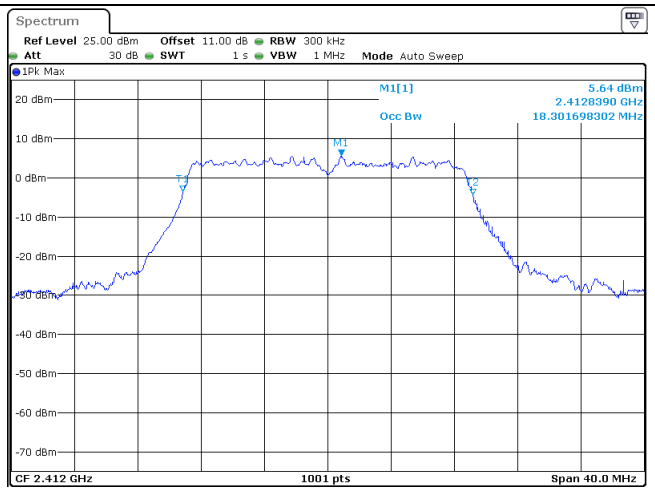
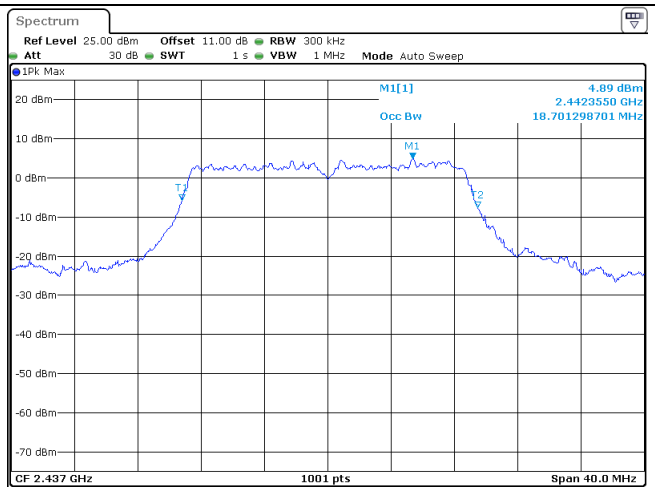
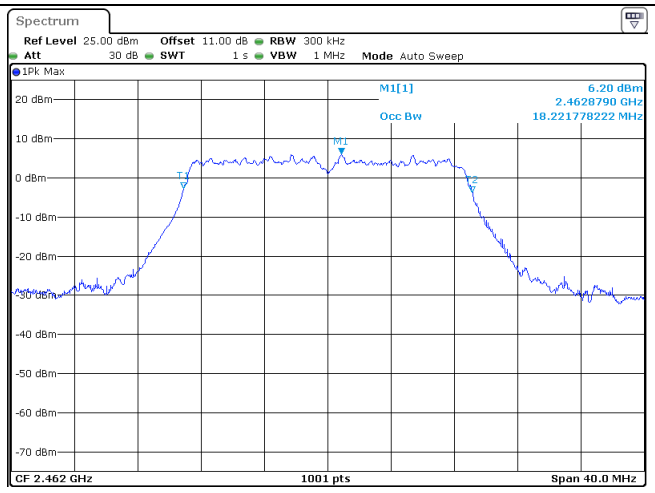
802.11n20	
Low Channel	
Middle Channel	
High Channel	

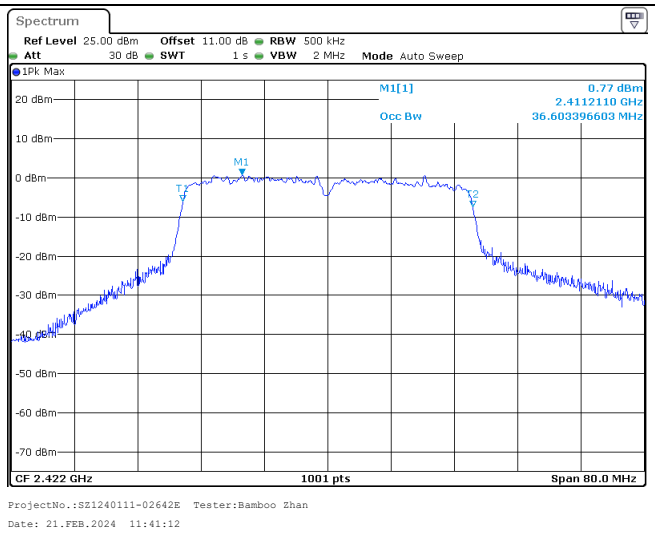
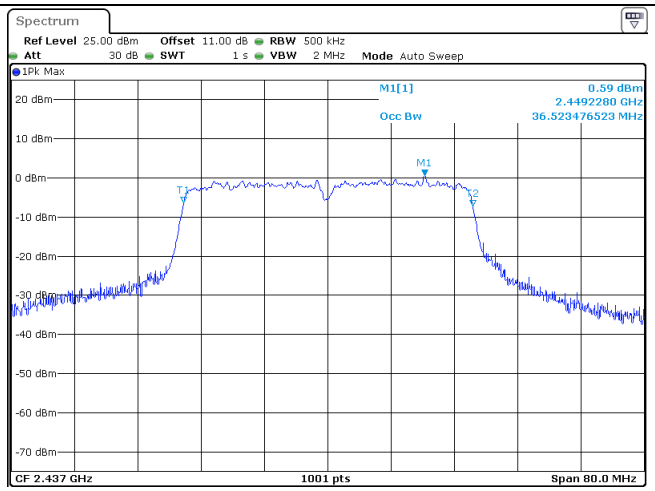
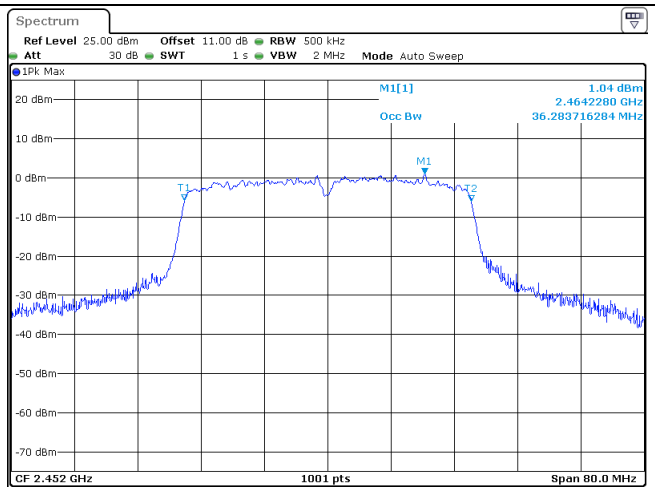
802.11n40	
Low Channel	
Middle Channel	
High Channel	

99% Occupied Bandwidth

802.11b	
Low Channel	
Middle Channel	
High Channel	

802.11g	
Low Channel	
Middle Channel	
High Channel	

802.11n20	
Low Channel	
Middle Channel	
High Channel	

802.11n40	
Low Channel	 ProjectNo.:SZ1240111-02642E Tester:Bamboo Zhan Date: 21.FEB.2024 11:41:12
Middle Channel	 ProjectNo.:SZ1240111-02642E Tester:Bamboo Zhan Date: 21.FEB.2024 11:57:01
High Channel	 ProjectNo.:SZ1240111-02642E Tester:Bamboo Zhan Date: 21.FEB.2024 12:09:25

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

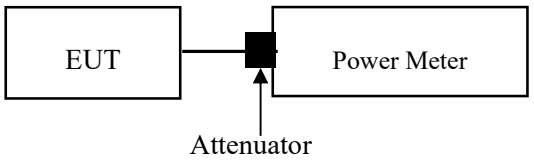
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.9.2.3

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25.1℃
Relative Humidity:	48 %
ATM Pressure:	101 kPa

The testing was performed by Bamboo Zhan on 2024-02-21.

EUT operation mode: Transmitting

***Test Result: Compliant**.*

Test Modes	Test Frequency (MHz)	Maximum Conducted Peak Output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
802.11b	2412	22.13	21.69	24.93	30
	2437	20.72	20.32	23.53	30
	2462	22.37	21.7	25.06	30
802.11g	2412	21.44	21.95	24.71	30
	2437	20.68	21.31	24.02	30
	2462	21.73	21.9	24.83	30
802.11n ht20	2412	22.01	22.55	25.30	30
	2437	21.33	21.82	24.59	30
	2462	22.28	23.18	25.76	30
802.11n ht40	2422	18.29	18.97	21.65	30
	2437	17.58	18.31	20.97	30
	2452	18.14	18.29	21.23	30

Note: The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

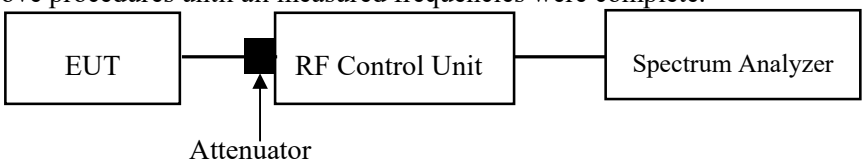
Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.11

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

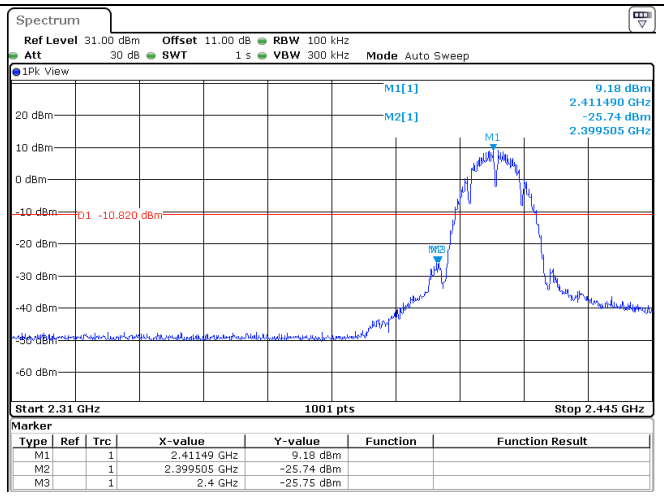
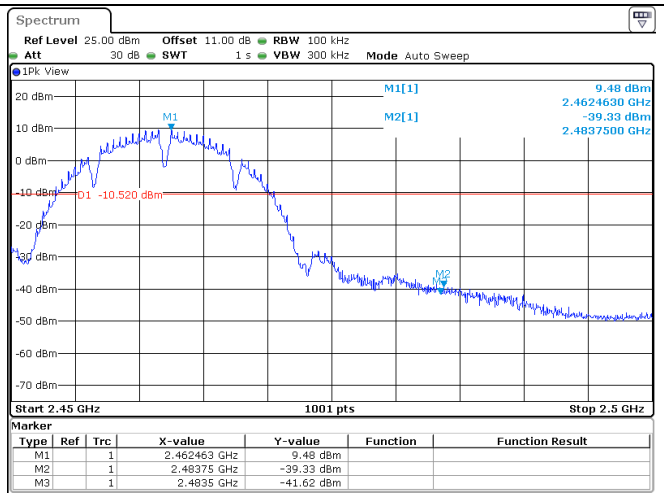
Environmental Conditions

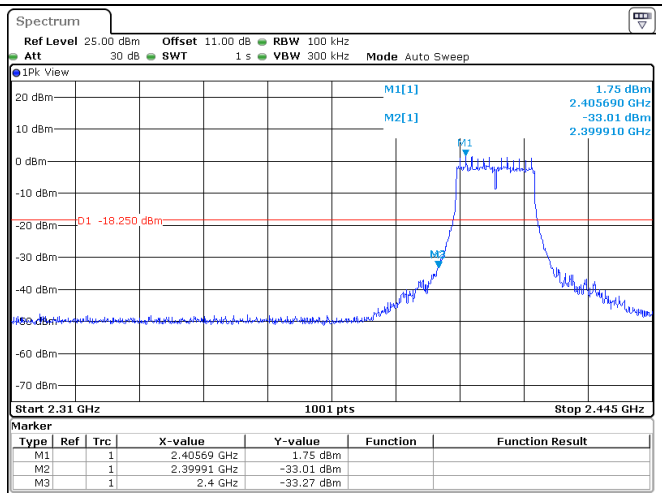
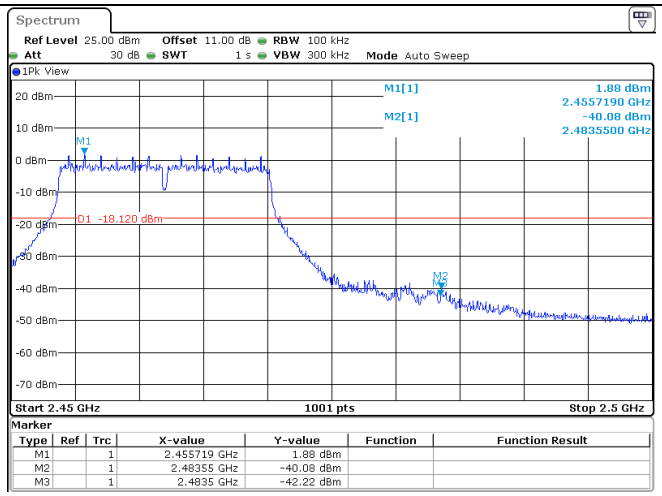
Temperature:	25.1℃
Relative Humidity:	48 %
ATM Pressure:	101 kPa

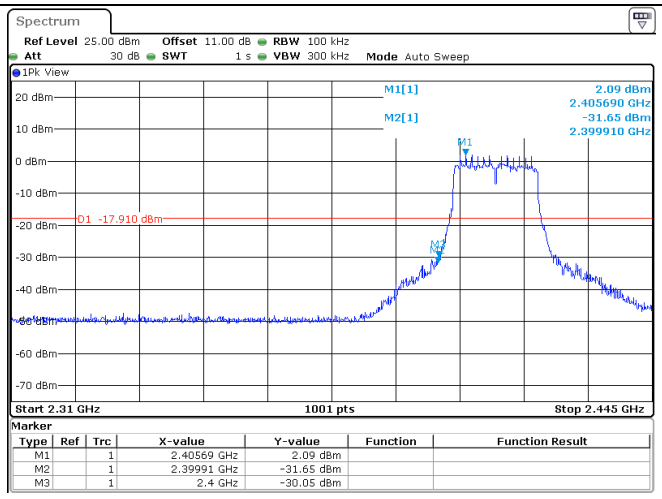
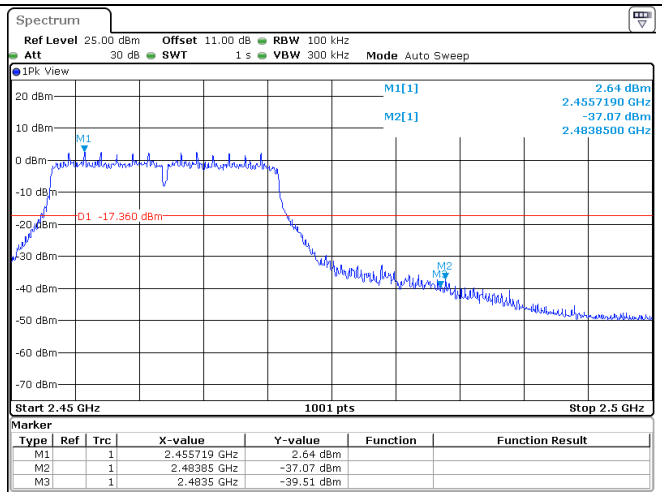
The testing was performed by Bamboo Zhan on 2024-02-21.

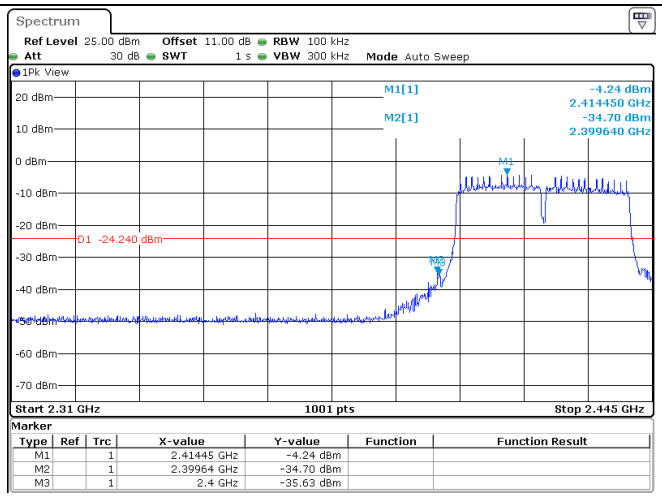
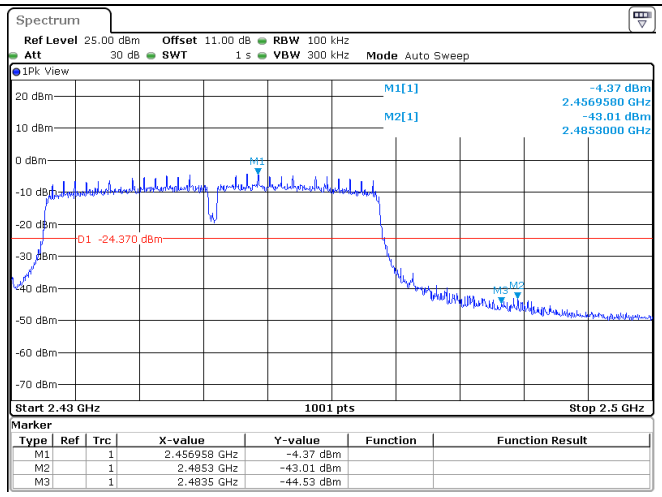
EUT operation mode: Transmitting

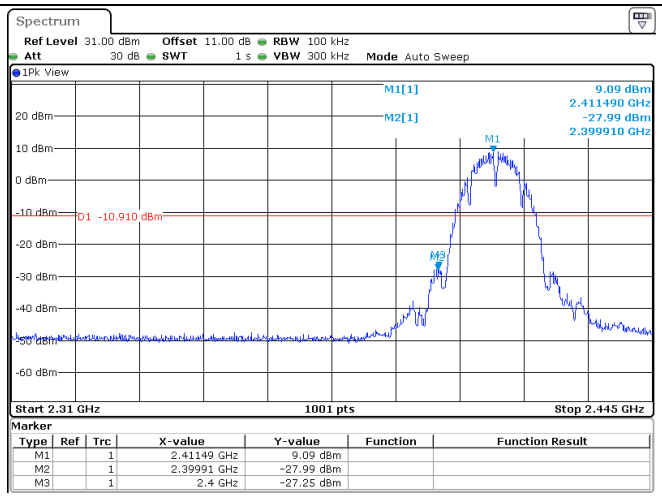
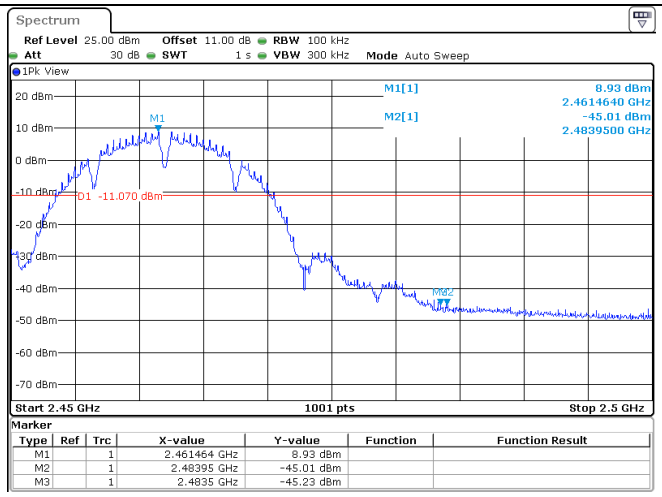
Test Result: Compliant

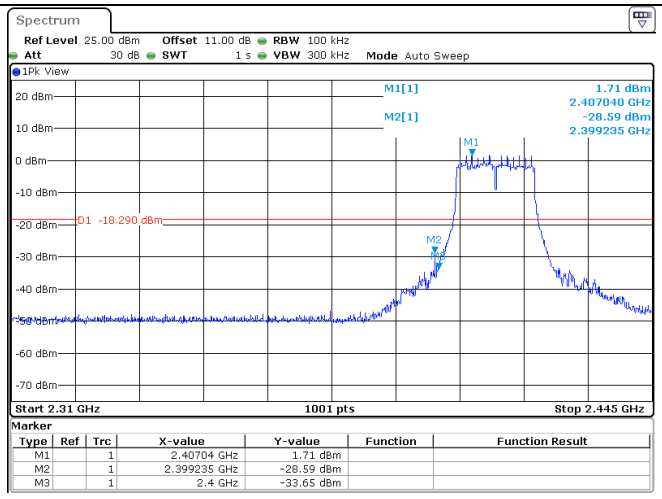
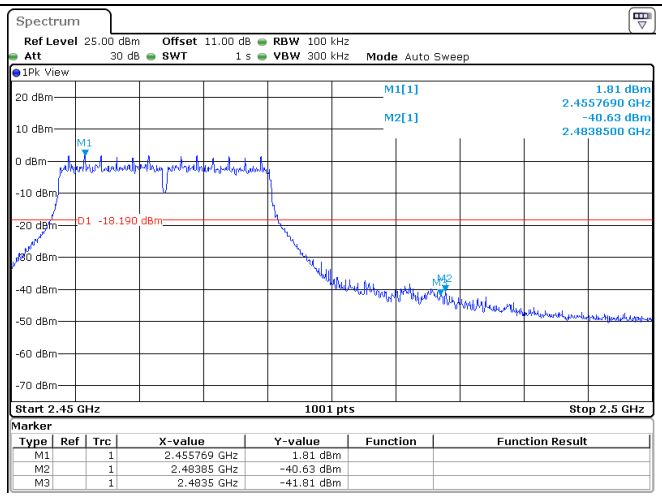
Band Edge	
802.11b, Left Side (Chain 0)	
802.11b, Right Side (Chain 0)	

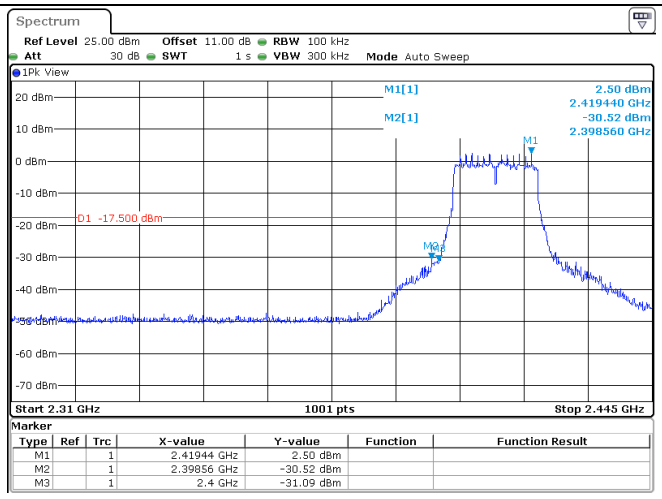
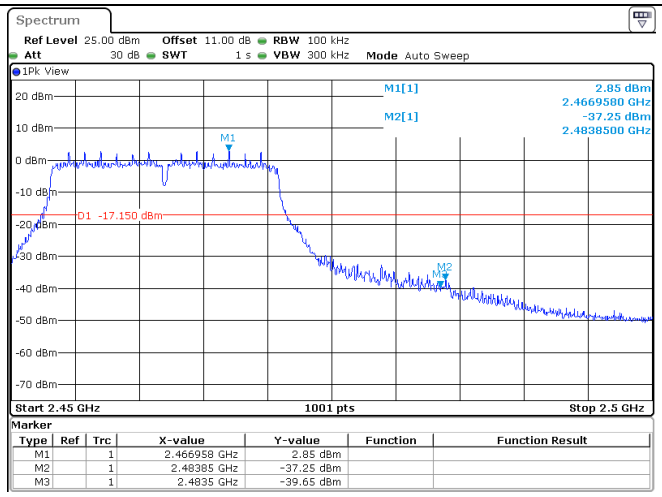
Band Edge	
802.11g, Left Side (Chain 0)	
802.11g, Right Side (Chain 0)	

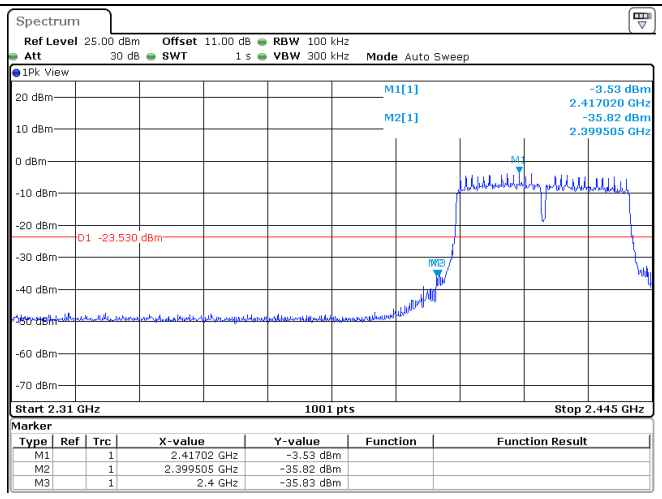
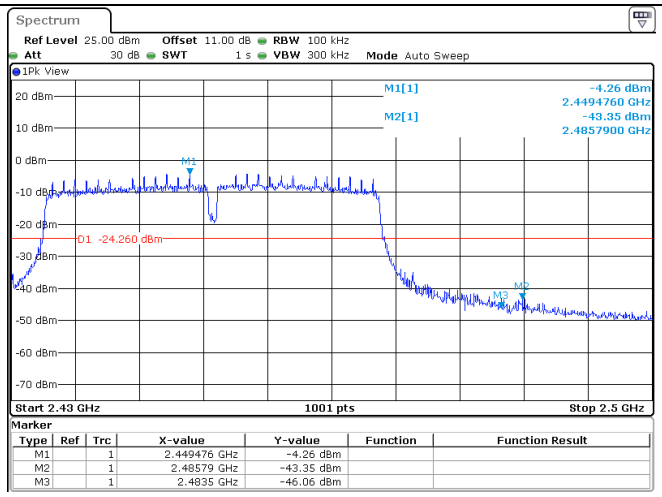
Band Edge	
802.11n20, Left Side (Chain 0)	
802.11n20, Right Side (Chain 0)	

Band Edge	
802.11n40, Left Side (Chain 0)	
802.11n40, Right Side (Chain 0)	

Band Edge	
802.11b, Left Side (Chain 1)	
802.11b, Right Side (Chain 1)	

Band Edge	
802.11g, Left Side (Chain 1)	
802.11g, Right Side (Chain 1)	

Band Edge	
802.11n20, Left Side (Chain 1)	
802.11n20, Right Side (Chain 1)	

Band Edge	
802.11n40, Left Side (Chain 1)	
802.11n40, Right Side (Chain 1)	

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.10.2

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

1. Set the RBW to: 3kHz≤ RBW≤100 kHz.
2. Set the VBW ≥ 3×RBW.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Method: ANSI C63.10-2013 Clause 11.10.3 Method AVGPSD-1

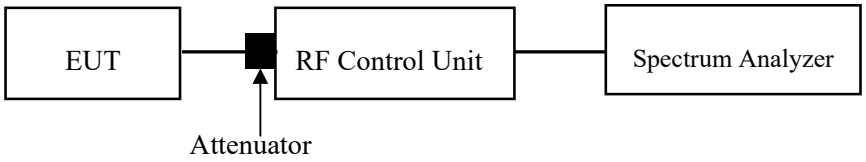
The following procedure may be used when the maximum (average) conducted output power was used to determine compliance to the fundamental output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, then it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously (D ⩾ 98%), or else sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter OFF time to be considered):

1. Set instrument center frequency to DTS channel center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to: 3kHz≤ RBW≤100 kHz.
4. Set the VBW ≥ 3×BW.
5. Detector = power averaging (rms) or sample detector (when rms not available)
6. Ensure that the number of measurement points in the sweep ⩾ [2 × span / RBW].
7. Sweep time = auto couple.
8. Employ trace averaging (rms) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level.
10. If the measured value exceeds requirement, 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).

Test Method: ANSI C63.10-2013 Clause 11.10.5 Method AVGPSD-2

The following procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., D < 98%), when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ±2%):

1. Measure the duty cycle (D) of the transmitter output signal as described in 11.6.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. Set the RBW to: 3kHz≤ RBW≤100 kHz.
5. Set the VBW ≥ 3×BW.
6. Detector = power averaging (rms) or sample detector (when rms not available)
7. Ensure that the number of measurement points in the sweep ⩾ [2 × span / RBW].
8. Sweep time = auto couple.
9. Do not 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. If the measured value exceeds requirement, 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).



Test Data

Environmental Conditions

Temperature:	25.1℃
Relative Humidity:	48 %
ATM Pressure:	101 kPa

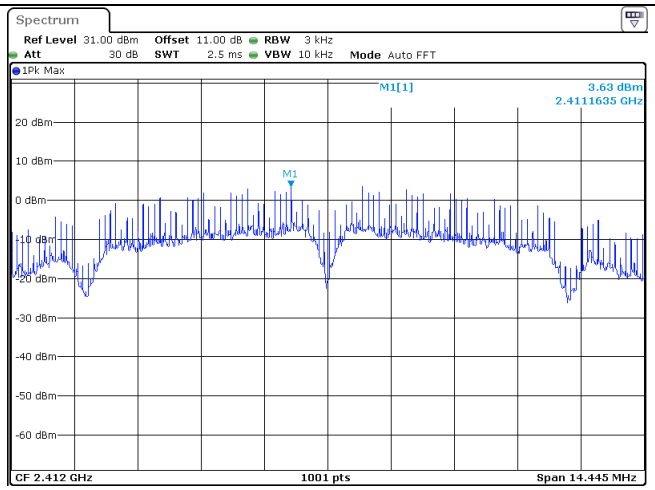
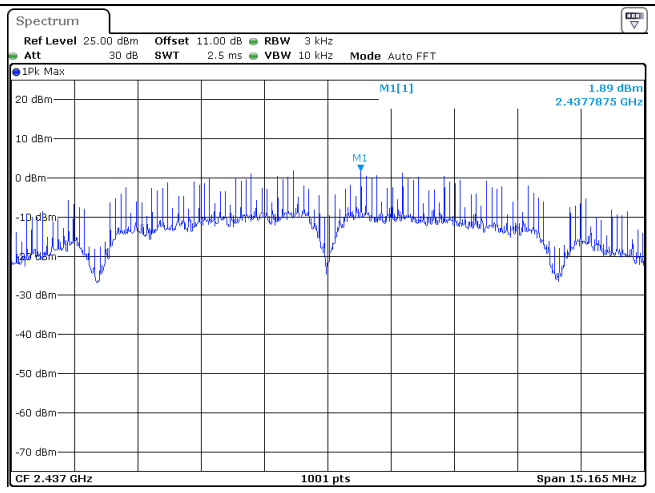
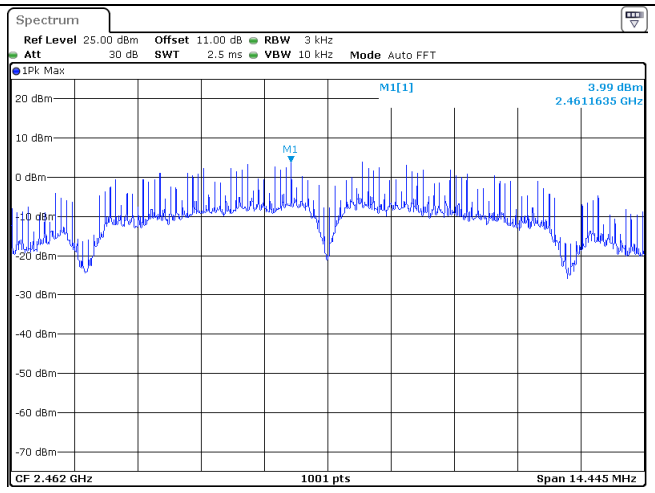
The testing was performed by Bamboo Zhan on 2024-02-21.

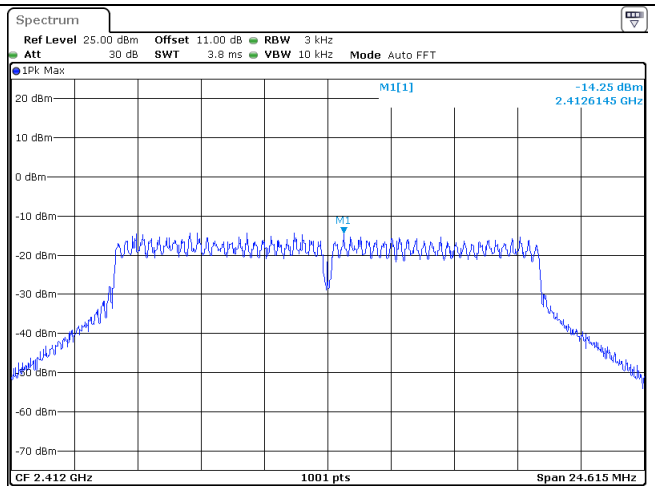
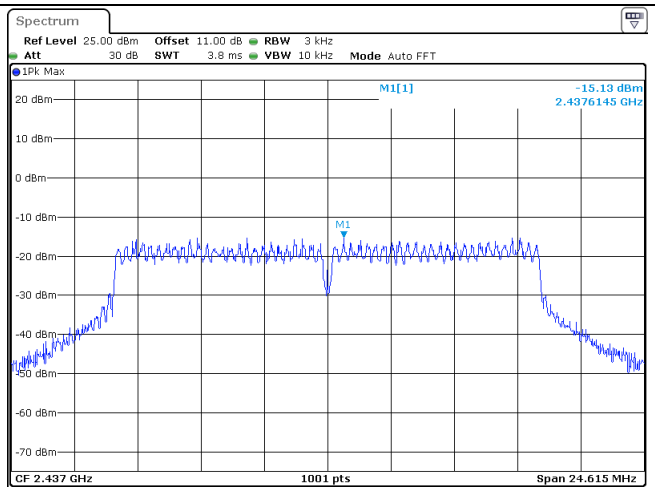
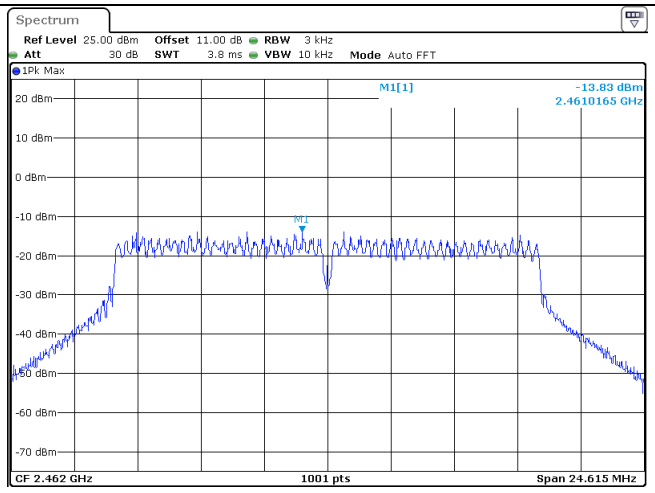
EUT operation mode: Transmitting

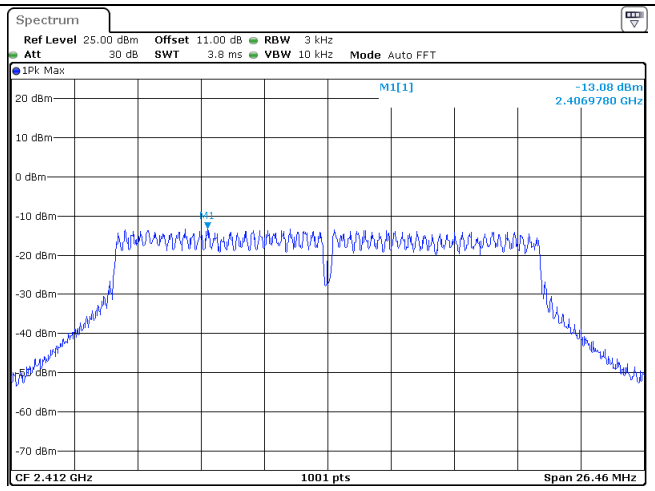
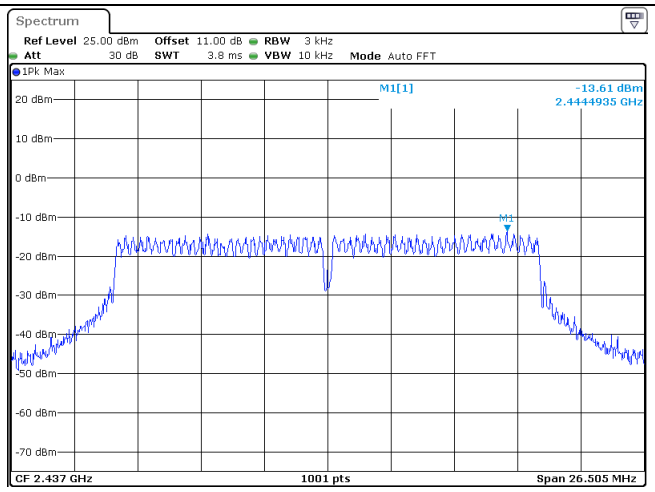
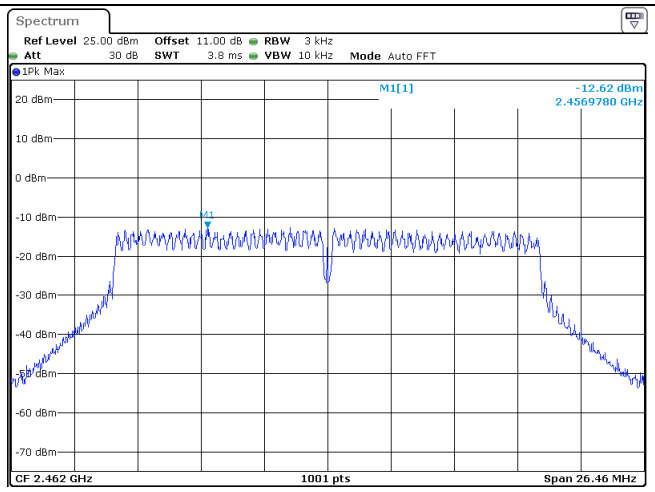
Test Result: Compliant.

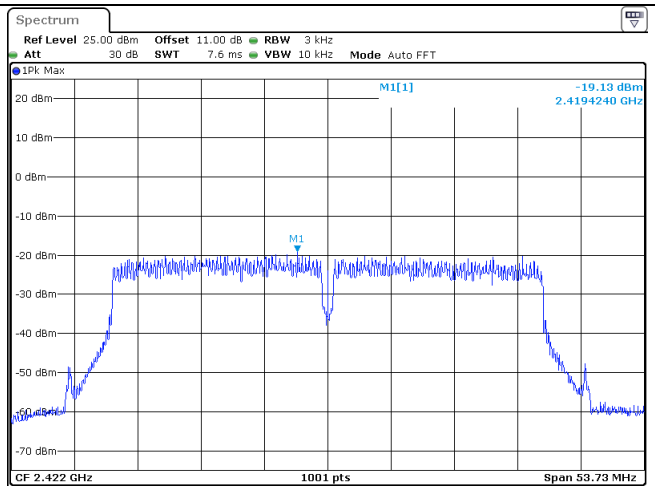
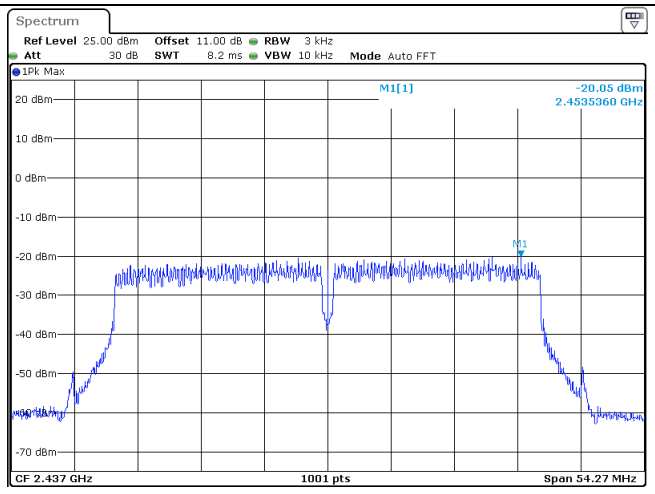
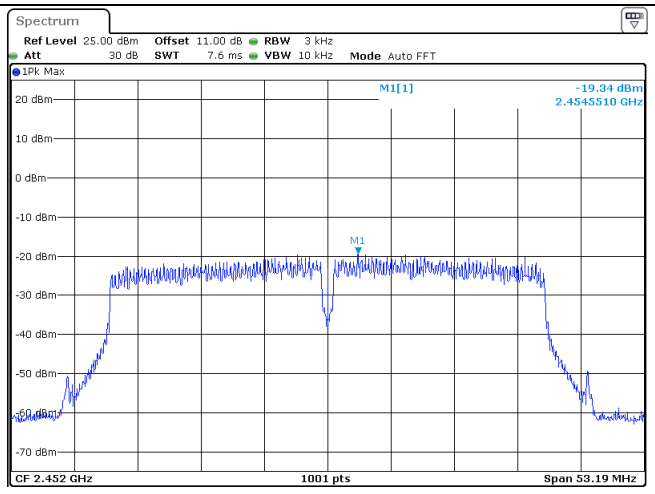
Test Modes	Test Frequency (MHz)	Reading(dBm/3kHz)		Maximum Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
		Chain 0	Chain 1		
802.11b	2412	3.63	3.45	6.55	8.00
	2437	1.89	1.88	4.90	8.00
	2462	3.99	3.42	6.72	8.00
802.11g	2412	-14.25	-13.95	-10.72	8.00
	2437	-15.13	-14.6	-11.48	8.00
	2462	-13.83	-13.47	-10.27	8.00
802.11n ht20	2412	-13.08	-12.52	-9.37	8.00
	2437	-13.61	-13.44	-10.10	8.00
	2462	-12.62	-12.47	-9.12	8.00
802.11n ht40	2422	-19.13	-18.94	-15.38	8.00
	2437	-20.05	-19.62	-16.17	8.00
	2452	-19.34	-19.12	-15.57	8.00

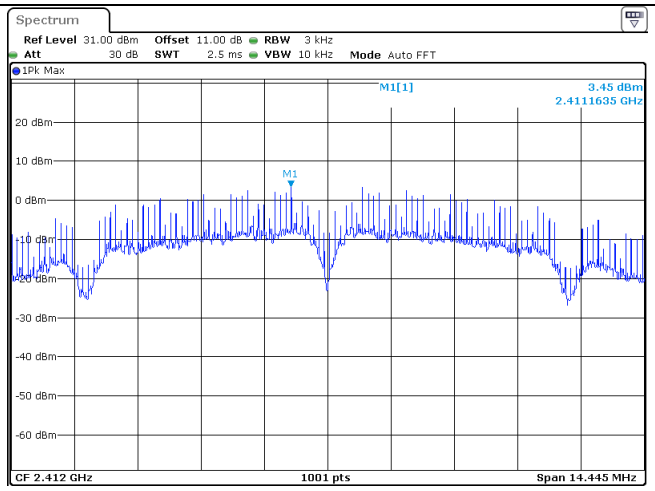
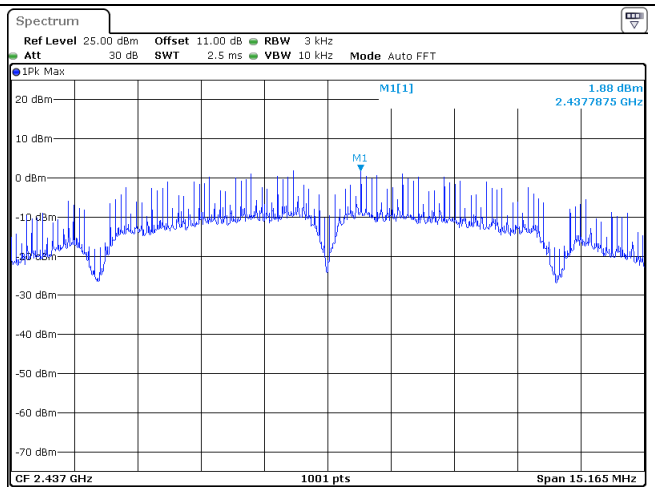
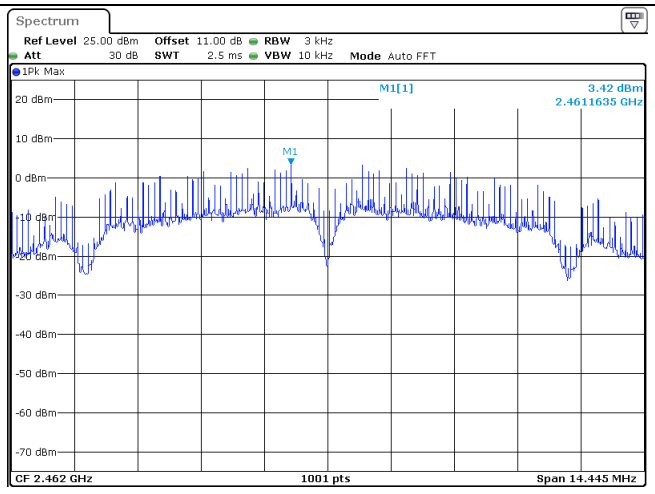
Note:
The maximum Power Spectral Density was calculated the result of the maximum chain for SISO mode, and Total chains for MIMO mode.
The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices:
Array Gain = 10 log(NANT/NSS) dB

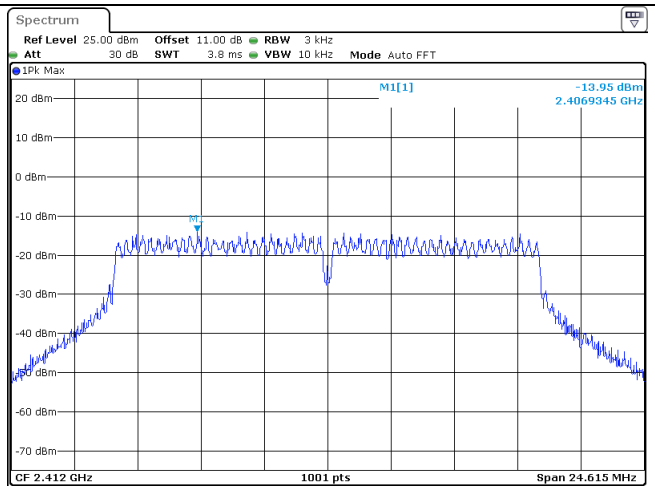
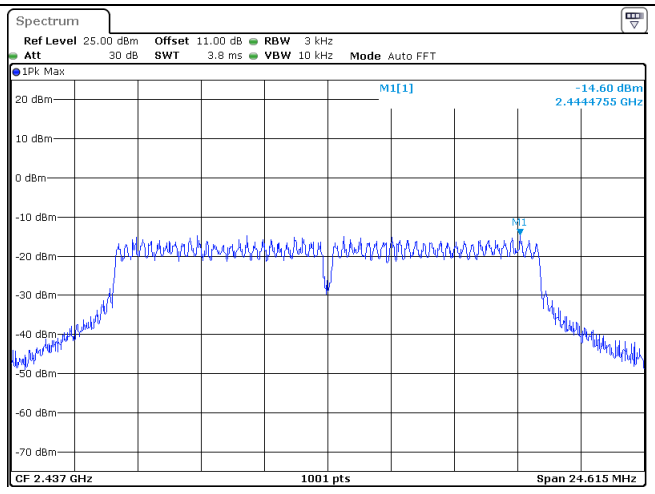
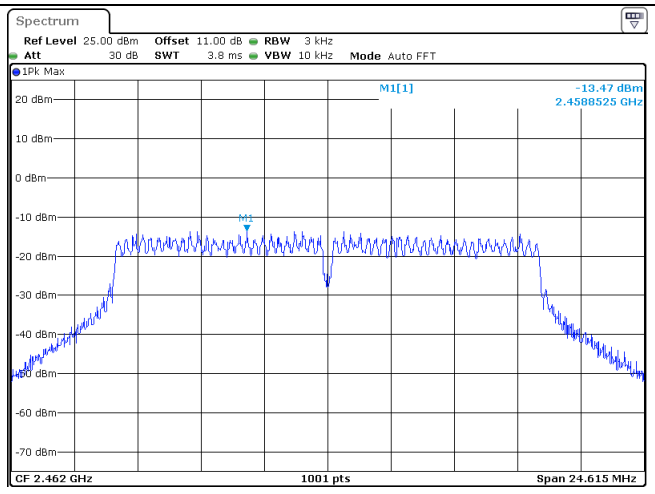
802.11b	
Low Channel (Chain 0)	
Middle Channel (Chain 0)	
High Channel (Chain 0)	

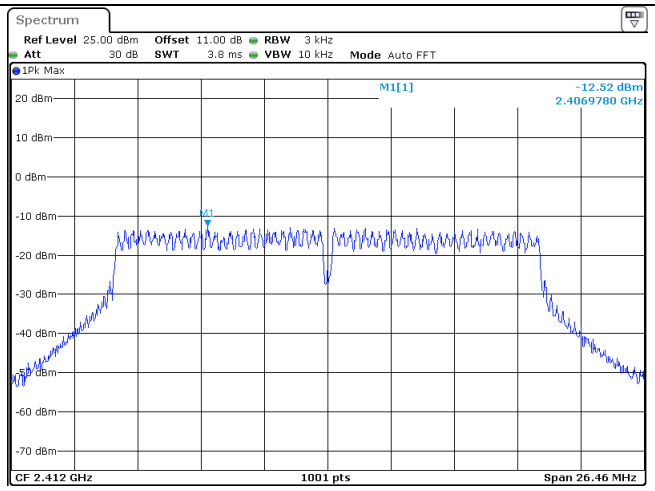
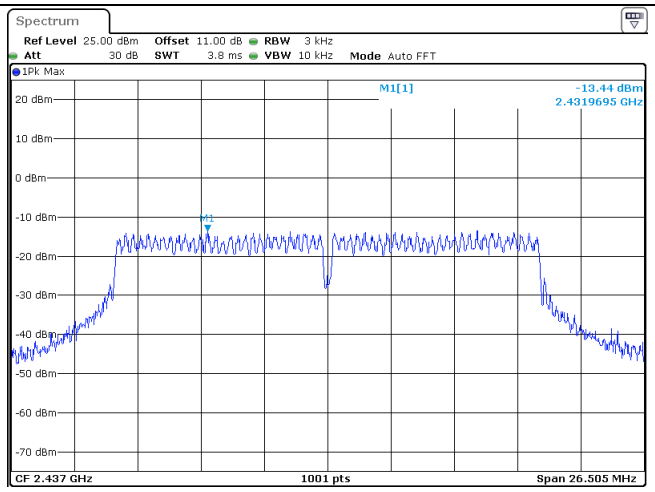
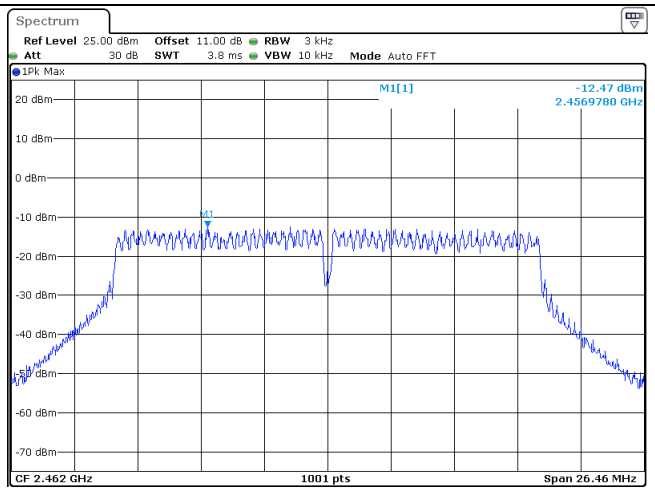
802.11g	
Low Channel (Chain 0)	
Middle Channel (Chain 0)	
High Channel (Chain 0)	

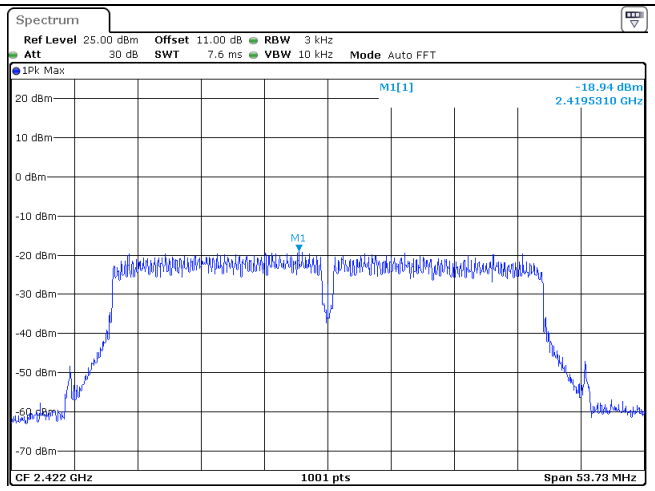
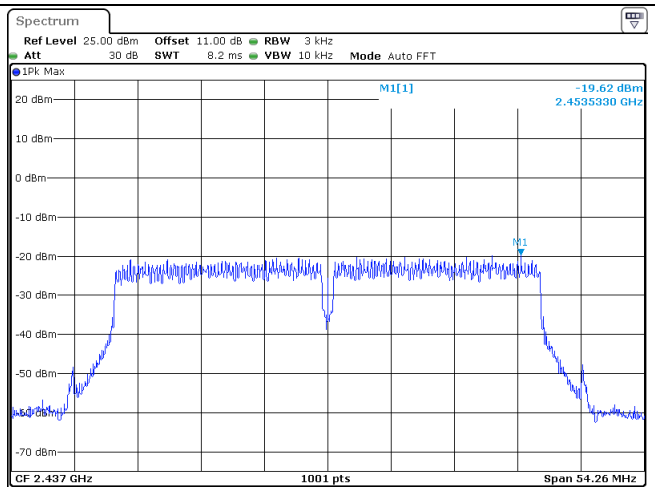
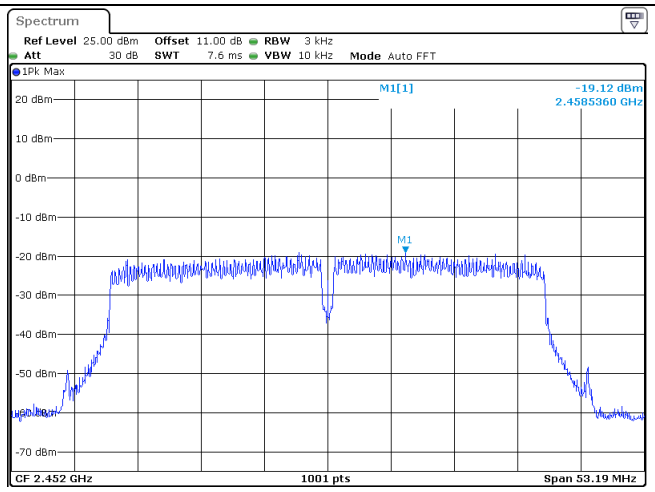
802.11n20	
Low Channel (Chain 0)	
Middle Channel (Chain 0)	
High Channel (Chain 0)	

802.11n40	
Low Channel (Chain 0)	
Middle Channel (Chain 0)	
High Channel (Chain 0)	

802.11b	
Low Channel (Chain 1)	
Middle Channel (Chain 1)	
High Channel (Chain 1)	

802.11g	
Low Channel (Chain 1)	
Middle Channel (Chain 1)	
High Channel (Chain 1)	

802.11n20	
Low Channel (Chain 1)	
Middle Channel (Chain 1)	
High Channel (Chain 1)	

802.11n40	
Low Channel (Chain 1)	
Middle Channel (Chain 1)	
High Channel (Chain 1)	

EUT PHOTOGRAPHS

Please refer to the attachment SZ1240111-02642E-RF External photo and SZ1240111-02642E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ1240111-02642E-RF Test Setup photo.

******* END OF REPORT *******