TEST REPORT

Applicant Name:	TECNO MOBILE LIMITED
Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Report Number:	SZ1231211-74617E-RF-00B
FCC ID:	2ADYY-CL7

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	Mobile Phone
Model No.:	CL7
Multiple Model(s) No.:	N/A
Trade Mark:	TECNO
Date Received:	2023/12/11
Issue Date:	2024/03/08

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.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1231211-74617E-RF-00B	Original Report	2024/03/08

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Mobile Phone
Tested Model	CL7
Multiple Model(s)	N/A
Frequency Range	BLE: 2402-2480MHz Wi-Fi: 2412-2472MHz
Maximum Conducted Output Peak Power	BLE: 3.21dBm Wi-Fi: 19.58dBm(802.11b), 18.84dBm(802.11g), 18.89dBm(802.11n20)
Modulation Technique	BLE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification#	-0.27dBi (provided by the applicant)
Voltage Range	DC 3.91V from battery or DC 4-20V from adapter
Sample serial number	2F2G-4 for Conducted and Radiated Emissions Test 2F2G-1 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: U700TSA Input: 100~240V, 50/60Hz 2.0A Output: 5.0V, 3.0A 15.0W or 5.0-10.0V, 7.0A MAX or 11.0V, 6.4A MAX or 4.0-20.0V, 3.5A 70.0W MAX

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.

Each test item follows test standards and with no deviation.

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~150 kHz	3.94dB(k=2, 95% level of confidence)
	150 kHz ~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 2.4GHz Wi-Fi mode, total 13 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	12	2467
6	2437	13	2472
7	2442	/	/

802.11b, 802.11g and 802.11n-HT20 mode was tested with Channel 1, 7 and 13.

For BLE mode, 40 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

For BLE 1M, EUT was tested with Channel 0, 19 and 39.
For BLE 2M, EUT was tested with Channel 1, 19 and 38.
Note: For BLE 2M, channel 0 and channel 39 was disabled.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

EUT was testing in engineering mode.

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

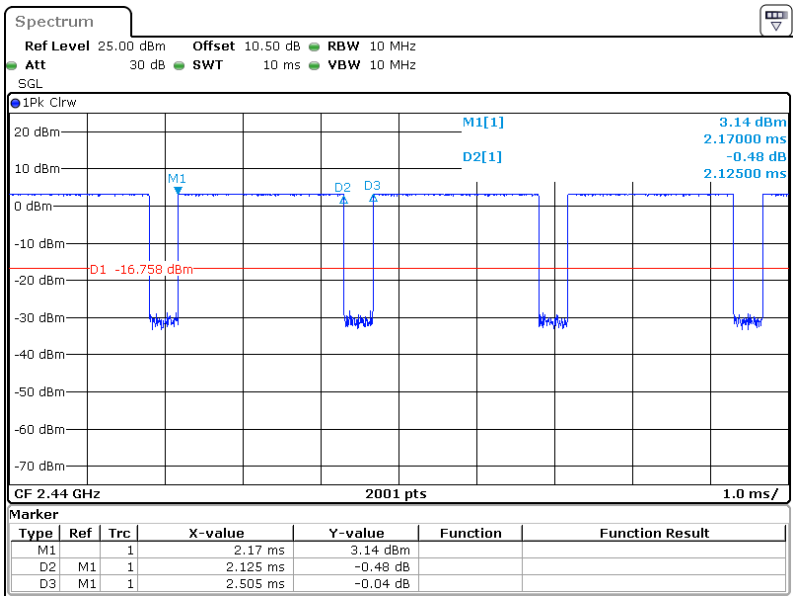
Mode	Data rate	Power Level#		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	16.5	16.5	16.5
802.11g	6Mbps	10	10	10
802.11n20	MCS0	10	10	10
BLE	1Mbps	Default	Default	Default
BLE	2Mbps	Default	Default	Default

Note: the power level was provided by applicant.

Duty cycle

Test Modes	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	1/T (Hz)	VBW Setting (Hz)
BLE 1Mbps	2.125	2.505	84.83	471	500
BLE 2Mbps	1.07	1.88	56.91	935	1000
802.11b	20	20	100.00	/	10
802.11g	20	20	100.00	/	10
802.11n-HT20	20	20	100.00	/	10

BLE 1M



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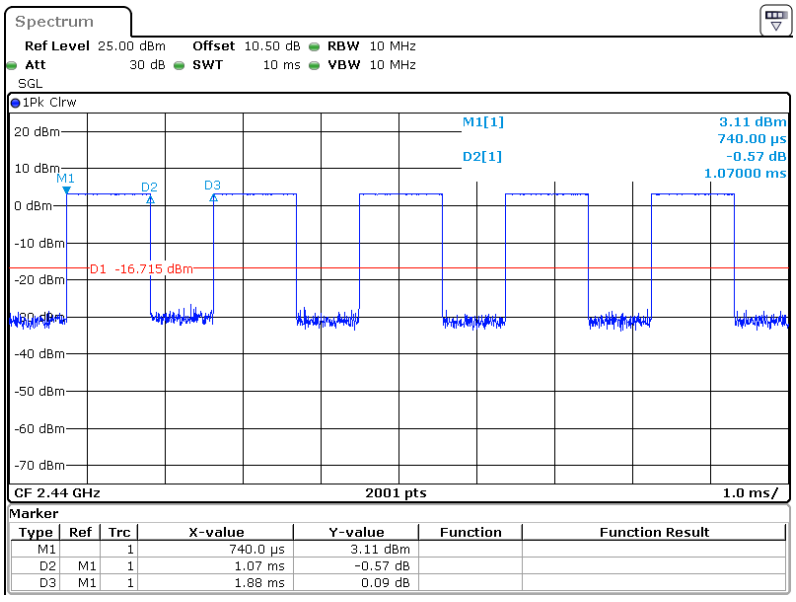
Date: 5.FEB.2024 22:45:08

BLE 2M



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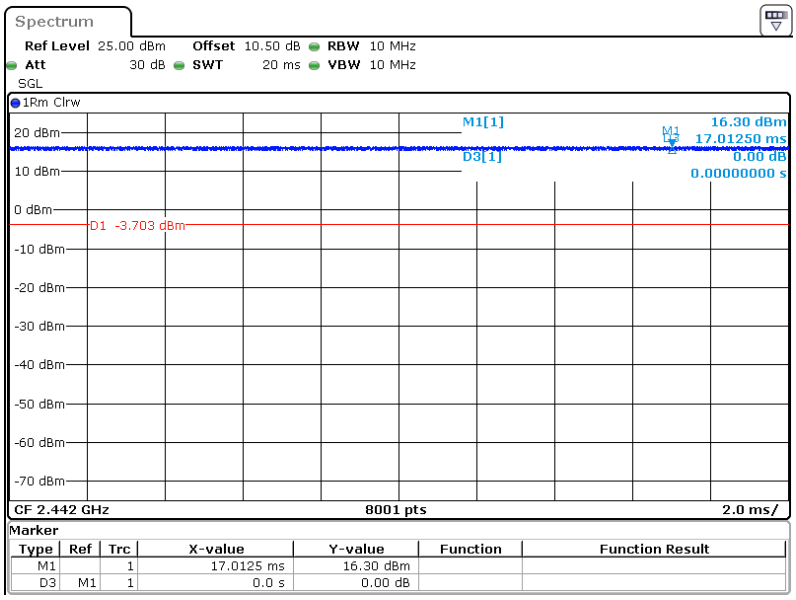
Date: 5.FEB.2024 23:00:32

802.11b



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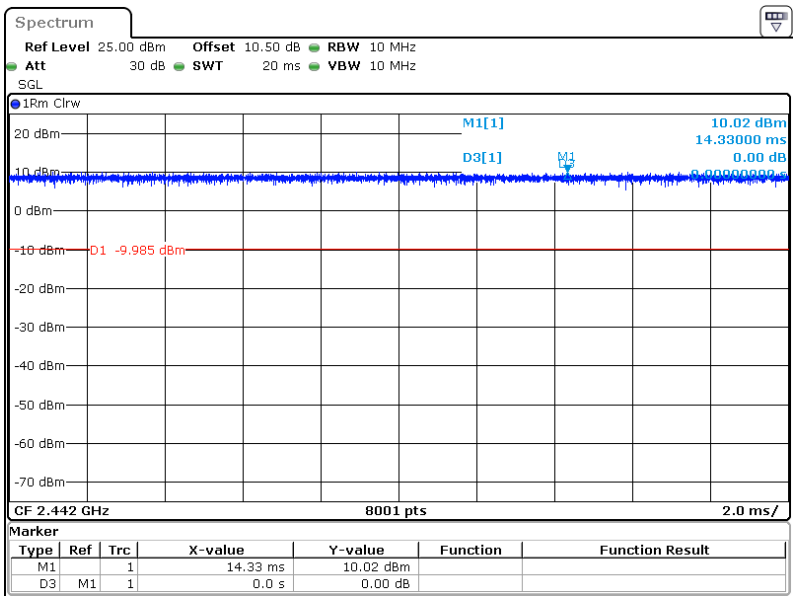
Date: 7.FEB.2024 20:53:33

802.11g



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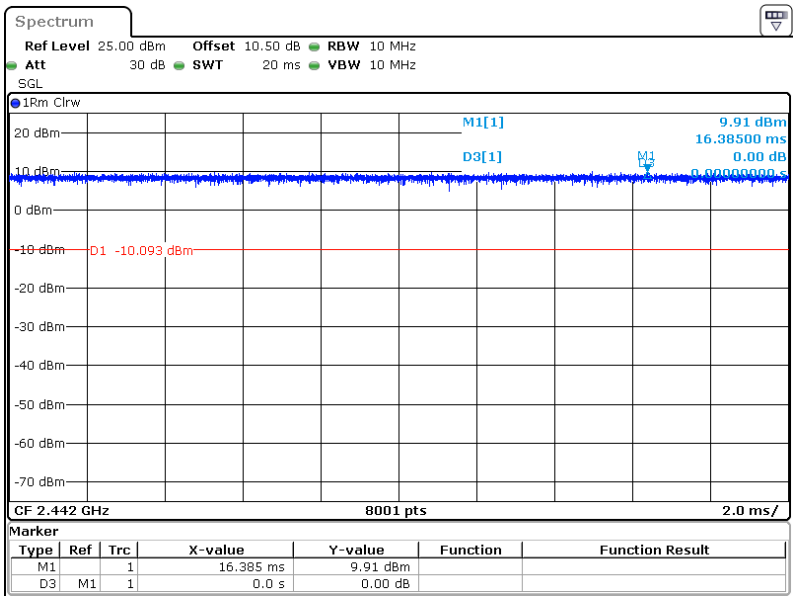
Date: 7.FEB.2024 21:05:32

802.11n20



ProjectNo.:SZ1231211-74617E Tester:Jim Cheng

Date: 7.FEB.2024 21:18:12

Support Equipment List and Details

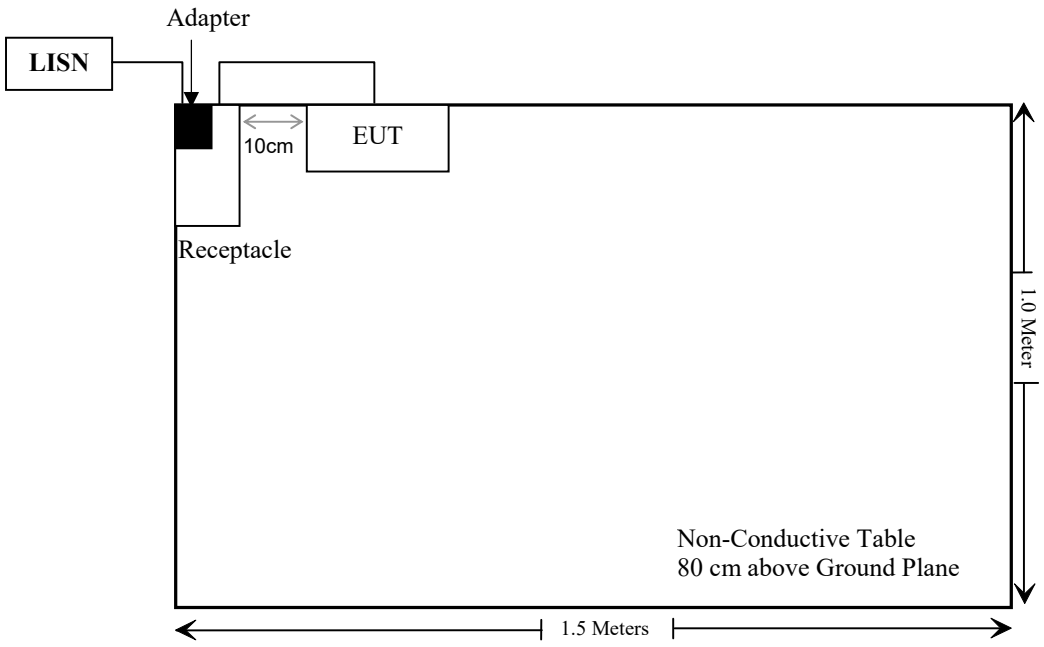
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

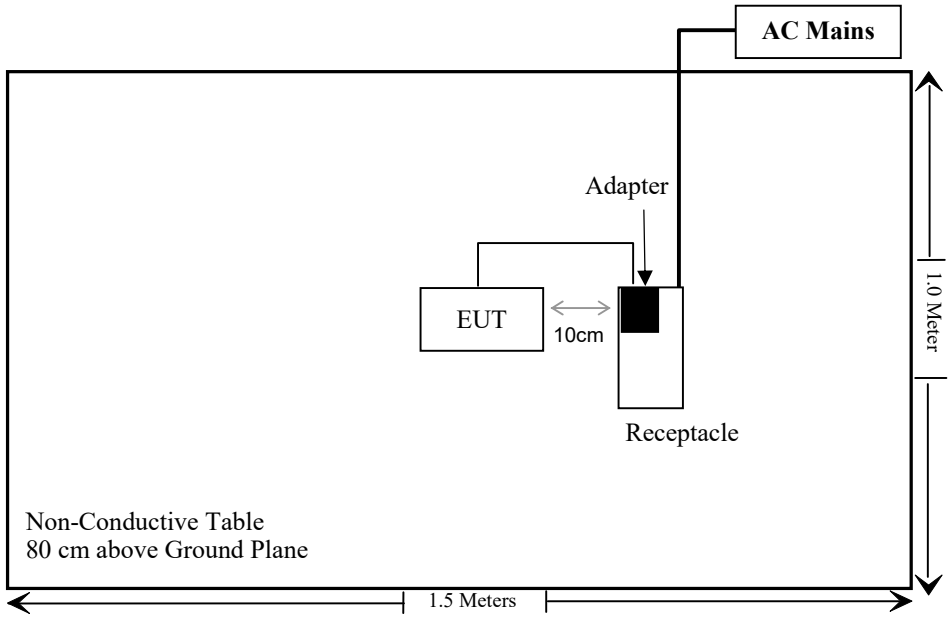
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

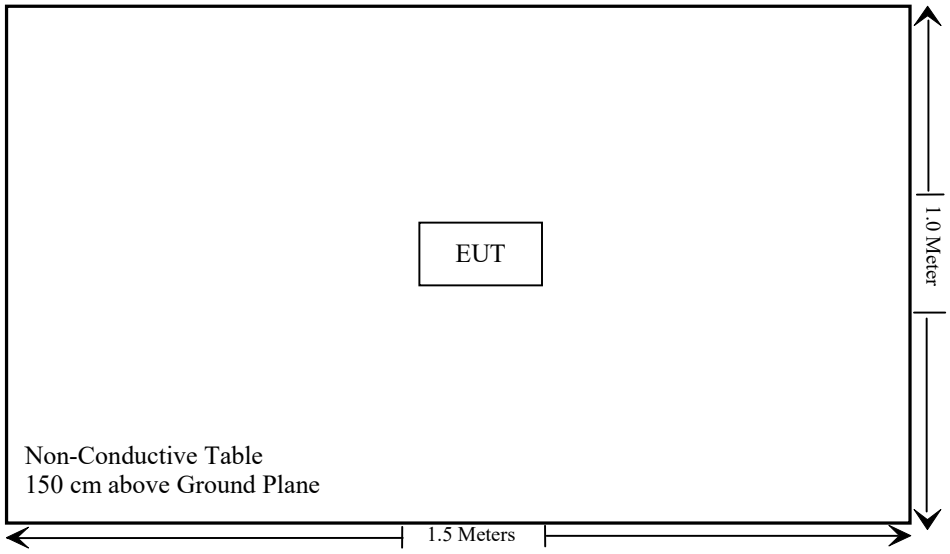
For Conducted Emission:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1) & §2.1093	RF Exposure	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 Emission Test (below 1GHz)					
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
Radiated Emission Test (above 1GHz)					
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 Antenna	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
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
RF Conducted Test					
R&S	spectrum analyzer	FSV40	101942	2023/02/08	2024/02/07
Agilent	USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
MARCONI	10dB Attenuator	6534/3	2942	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§15.247 (i), §1.1307 (b) (1) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

a) According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

For worst case:

For BLE:

Frequency (MHz)	Maximum Tune-up power#		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
	(dBm)	(mW)				
2402-2480	3.5	2.24	5	0.7	3.0	**Yes**

Result: No Standalone SAR test is required

For Wi-Fi mode, please refer to SAR report: Please refer to SAR test report: SZ1231211-74617E-SA.

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.
c. 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 one internal antenna arrangement, which was permanently attached, the antenna gain[#] is -0.27dBi, fulfill the requirement of this section. Please refer to the EUT photos.

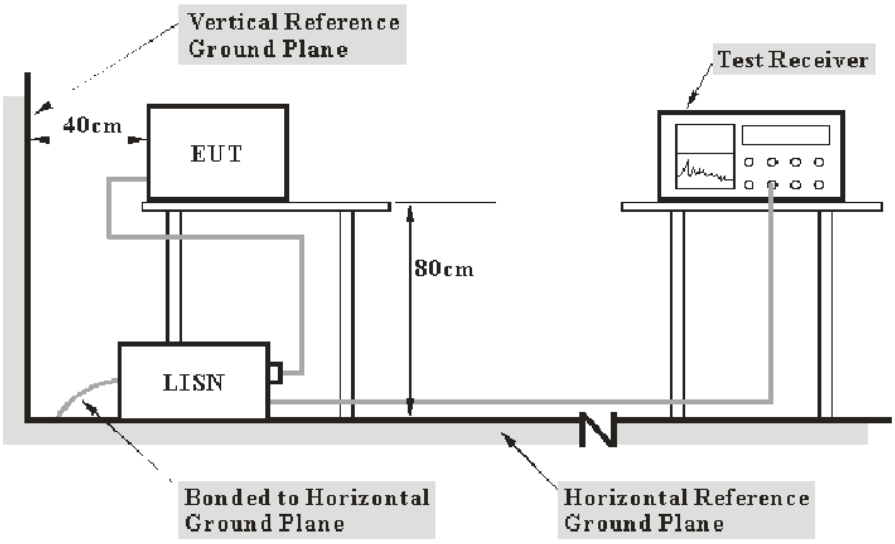
Result: Compliant.

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 adapter 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 calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

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

Test Data

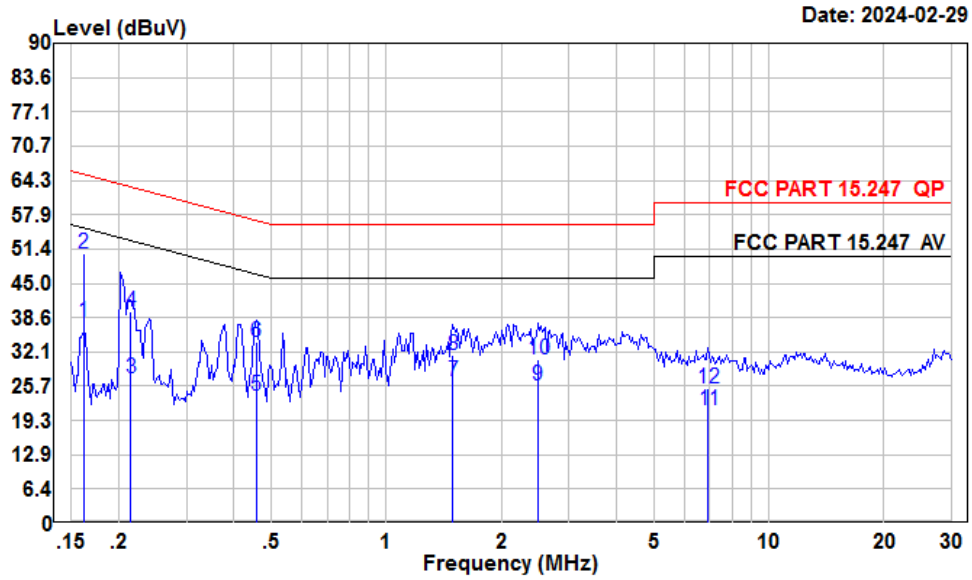
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	51 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-02-29.

EUT operation mode: Transmitting (Maximum output power mode, 802.11b Middle Channel)

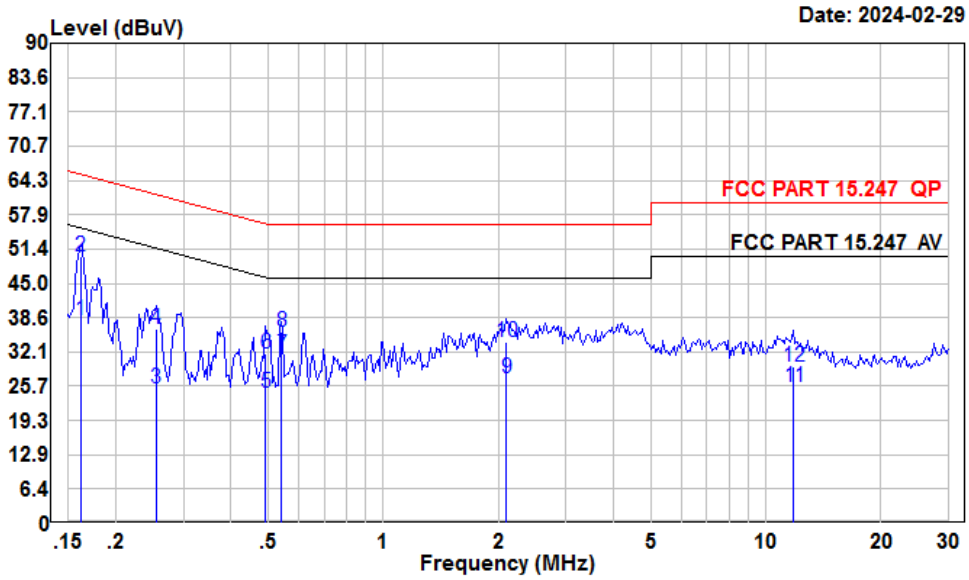
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1231211-74617E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	17.11	37.86	10.60	10.15	55.38	-17.52	Average
2	0.16	29.91	50.66	10.60	10.15	65.38	-14.72	QP
3	0.22	6.51	27.25	10.61	10.13	53.01	-25.76	Average
4	0.22	18.97	39.71	10.61	10.13	63.01	-23.30	QP
5	0.46	3.14	24.01	10.69	10.18	46.76	-22.75	Average
6	0.46	13.19	34.06	10.69	10.18	56.76	-22.70	QP
7	1.50	5.82	26.64	10.76	10.06	46.00	-19.36	Average
8	1.50	10.84	31.66	10.76	10.06	56.00	-24.34	QP
9	2.49	4.80	25.75	10.74	10.21	46.00	-20.25	Average
10	2.49	9.75	30.70	10.74	10.21	56.00	-25.30	QP
11	6.95	0.25	21.27	10.80	10.22	50.00	-28.73	Average
12	6.95	4.26	25.28	10.80	10.22	60.00	-34.72	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ1231211-74617E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	17.29	37.99	10.55	10.15	55.38	-17.39	Average
2	0.16	29.37	50.07	10.55	10.15	65.38	-15.31	QP
3	0.25	4.32	25.25	10.73	10.20	51.60	-26.35	Average
4	0.25	15.54	36.47	10.73	10.20	61.60	-25.13	QP
5	0.49	3.47	24.43	10.80	10.16	46.14	-21.71	Average
6	0.49	10.86	31.82	10.80	10.16	56.14	-24.32	QP
7	0.54	10.52	31.43	10.73	10.18	46.00	-14.57	Average
8	0.54	14.89	35.80	10.73	10.18	56.00	-20.20	QP
9	2.10	6.37	27.26	10.70	10.19	46.00	-18.74	Average
10	2.10	13.14	34.03	10.70	10.19	56.00	-21.97	QP
11	11.81	4.62	25.50	10.68	10.20	50.00	-24.50	Average
12	11.81	8.41	29.29	10.68	10.20	60.00	-30.71	QP

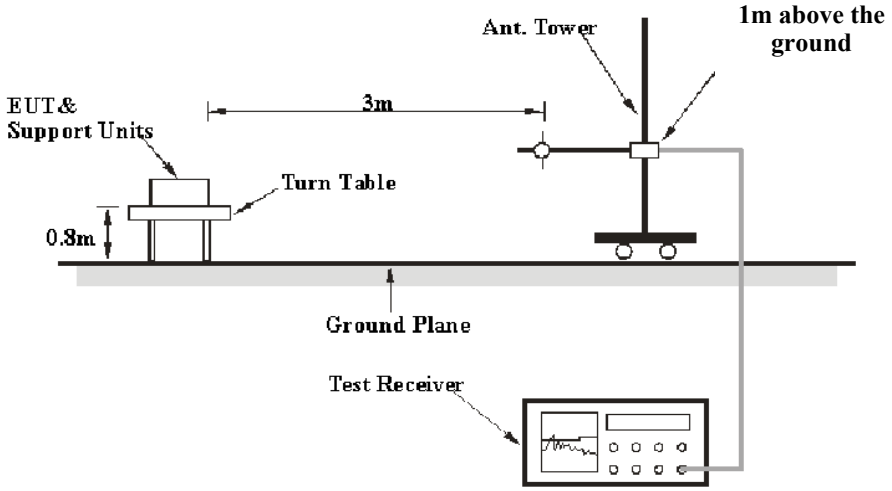
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

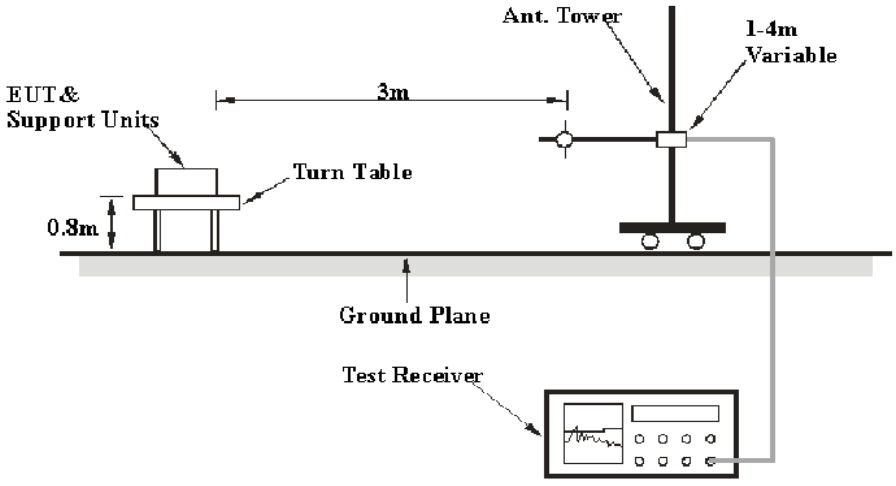
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

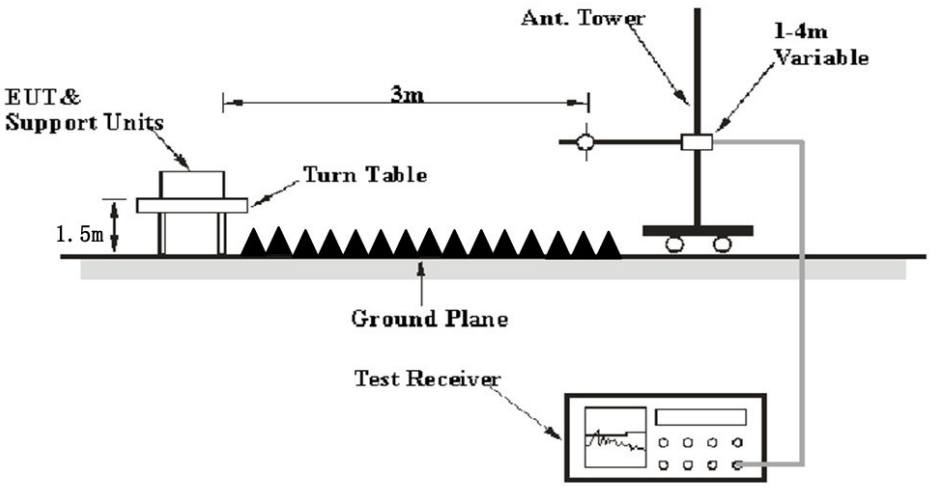
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and 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 Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/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 calculation is as follows:

Over Limit/Margin = Level/Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	22~25.6 ℃
Relative Humidity:	50~56 %
ATM Pressure:	101 kPa

The testing was performed by Warren Huang on 2024-01-22 for below 1GHz, Dylan Yang from 2024-01-19 to 2024-03-01 and Zenos Qiao from 2024-01-21 to 2024-03-01 for above 1GHz.

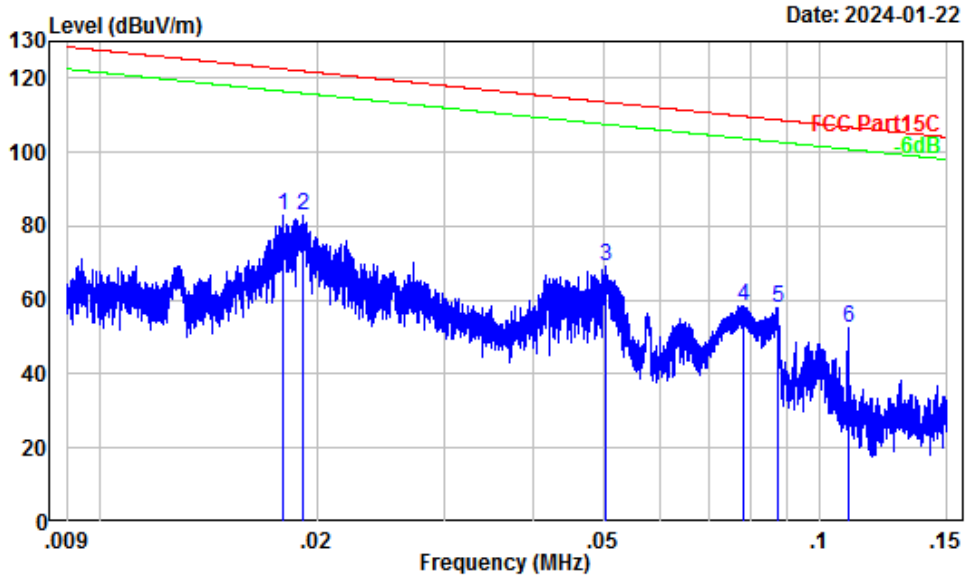
EUT operation mode: Transmitting

Note: Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded.

9 kHz-30MHz: *(Maximum output power mode, 802.11b Middle Channel)*

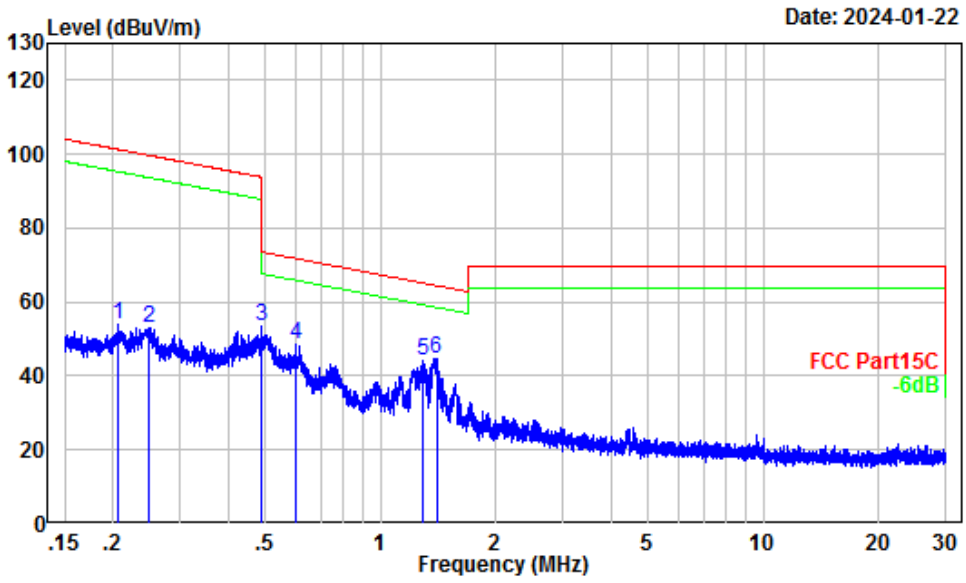
Note: When the test result of peak was less than the limit of QP/Average more than 6dB, just peak value were recorded.

Parallel (worst case)



Site : chamber
Condition : 3m
Project Number: SZ1231211-74617E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.02	50.86	32.10	82.96	122.52	-39.56	Peak
2	0.02	50.49	32.46	82.95	121.95	-39.00	Peak
3	0.05	40.93	28.04	68.97	113.54	-44.57	Peak
4	0.08	37.13	21.26	58.39	109.74	-51.35	Peak
5	0.09	35.89	22.02	57.91	108.79	-50.88	Peak
6	0.11	33.65	18.90	52.55	106.82	-54.27	Peak

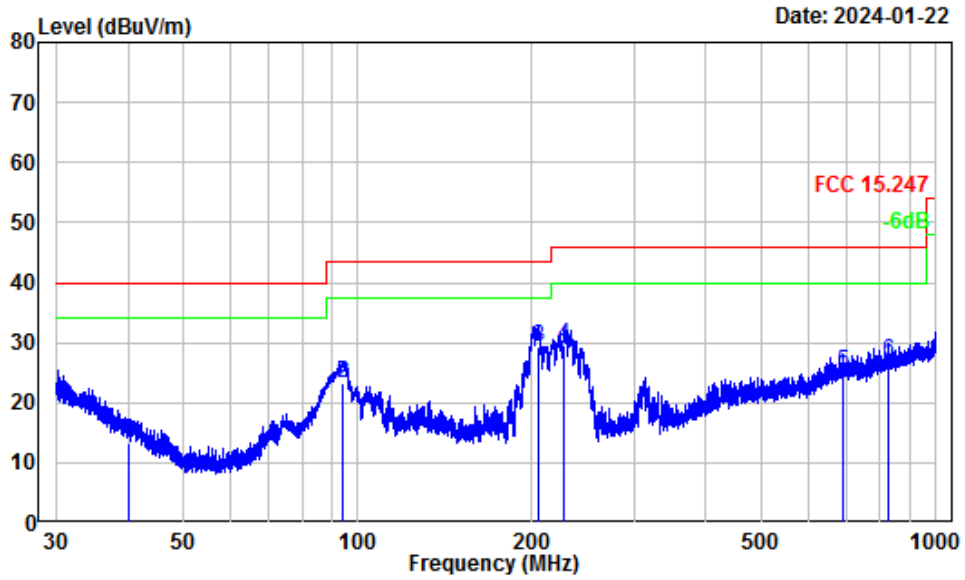


Site : chamber
Condition : 3m
Project Number: SZ1231211-74617E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.21	28.72	25.13	53.85	101.27	-47.42	Peak
2	0.25	27.30	25.87	53.17	99.73	-46.56	Peak
3	0.49	21.08	32.62	53.70	73.79	-20.09	Peak
4	0.60	19.70	28.80	48.50	72.02	-23.52	Peak
5	1.29	14.02	30.01	44.03	65.23	-21.20	Peak
6	1.40	13.45	31.38	44.83	64.48	-19.65	Peak

30MHz-1GHz: *(Maximum output power mode, 802.11b Middle Channel)*

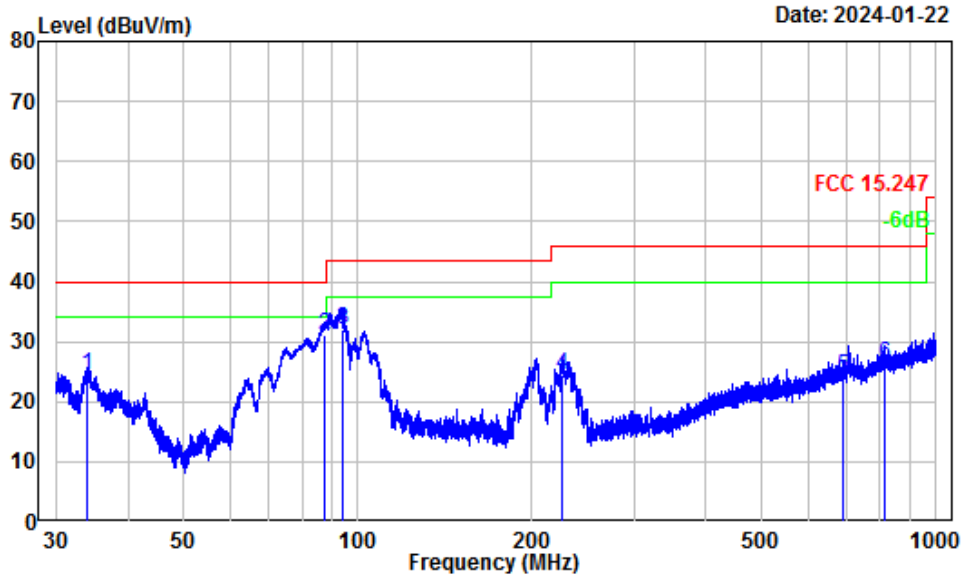
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ1231211-74617E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.13	-10.47	23.66	13.19	40.00	-26.81	QP
2	94.18	-15.38	38.68	23.30	43.50	-20.20	QP
3	204.87	-11.11	40.51	29.40	43.50	-14.10	QP
4	227.59	-11.48	41.02	29.54	46.00	-16.46	QP
5	690.17	-1.70	26.82	25.12	46.00	-20.88	QP
6	827.49	-0.14	26.98	26.84	46.00	-19.16	QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ1231211-74617E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	34.11	-8.20	32.60	24.40	40.00	-15.60	QP
2	87.49	-17.32	48.40	31.08	40.00	-8.92	QP
3	94.35	-16.43	48.43	32.00	43.50	-11.50	QP
4	225.90	-12.24	36.74	24.50	46.00	-21.50	QP
5	690.47	-2.09	26.10	24.01	46.00	-21.99	QP
6	815.97	-0.48	26.74	26.26	46.00	-19.74	QP

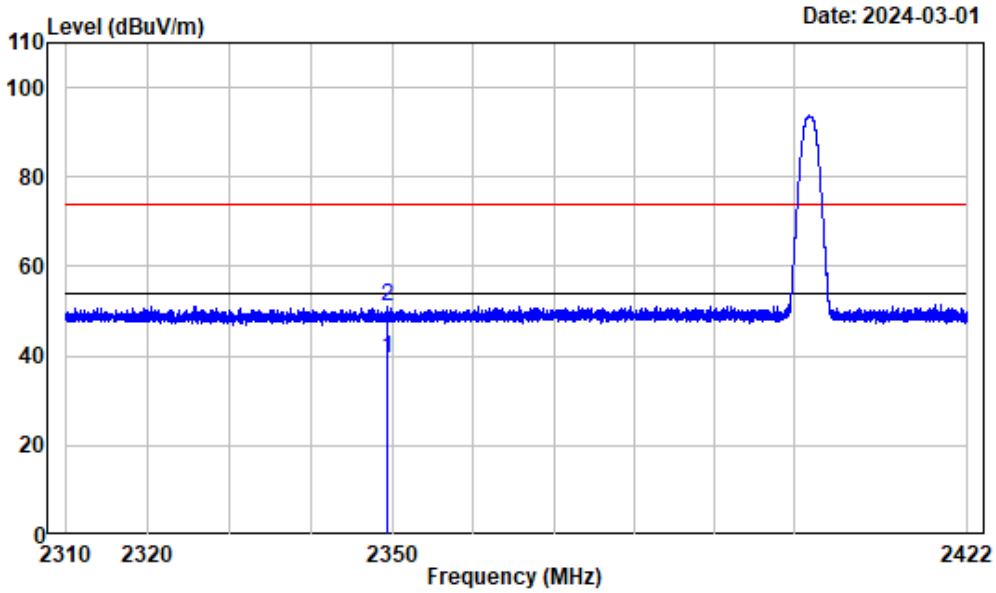
1-25 GHz:
BLE:

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
BLE 1M							
Low Channel 2402MHz							
4804.00	45.37	PK	H	1.69	47.06	74	-26.94
4804.00	33.19	AV	H	1.69	34.88	54	-19.12
4804.00	46.35	PK	V	1.69	48.04	74	-25.96
4804.00	33.52	AV	V	1.69	35.21	54	-18.79
Middle Channel 2440MHz							
4880.00	45.01	PK	H	1.79	46.80	74	-27.20
4880.00	32.47	AV	H	1.79	34.26	54	-19.74
4880.00	46.02	PK	V	1.79	47.81	74	-26.19
4880.00	32.59	AV	V	1.79	34.38	54	-19.62
High Channel 2480MHz							
4960.00	46.39	PK	H	2.77	49.16	74	-24.84
4960.00	33.34	AV	H	2.77	36.11	54	-17.89
4960.00	45.77	PK	V	2.77	48.54	74	-25.46
4960.00	33.02	AV	V	2.77	35.79	54	-18.21
BLE 2M							
Low Channel 2402MHz							
4808.00	45.83	PK	H	1.69	47.52	74	-26.48
4808.00	34.64	AV	H	1.69	36.33	54	-17.67
4808.00	46.78	PK	V	1.69	48.47	74	-25.53
4808.00	34.92	AV	V	1.69	36.61	54	-17.39
Middle Channel 2440MHz							
4880.00	45.24	PK	H	1.79	47.03	74	-26.97
4880.00	33.90	AV	H	1.79	35.69	54	-18.31
4880.00	45.69	PK	V	1.79	47.48	74	-26.52
4880.00	34.77	AV	V	1.79	36.56	54	-17.44
High Channel 2480MHz							
4956.00	44.96	PK	H	2.77	47.73	74	-26.27
4956.00	34.43	AV	H	2.77	37.20	54	-16.80
4956.00	45.73	PK	V	2.77	48.50	74	-25.50
4956.00	35.09	AV	V	2.77	37.86	54	-16.14

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

Test plots for Band Edge Measurements (Radiated):

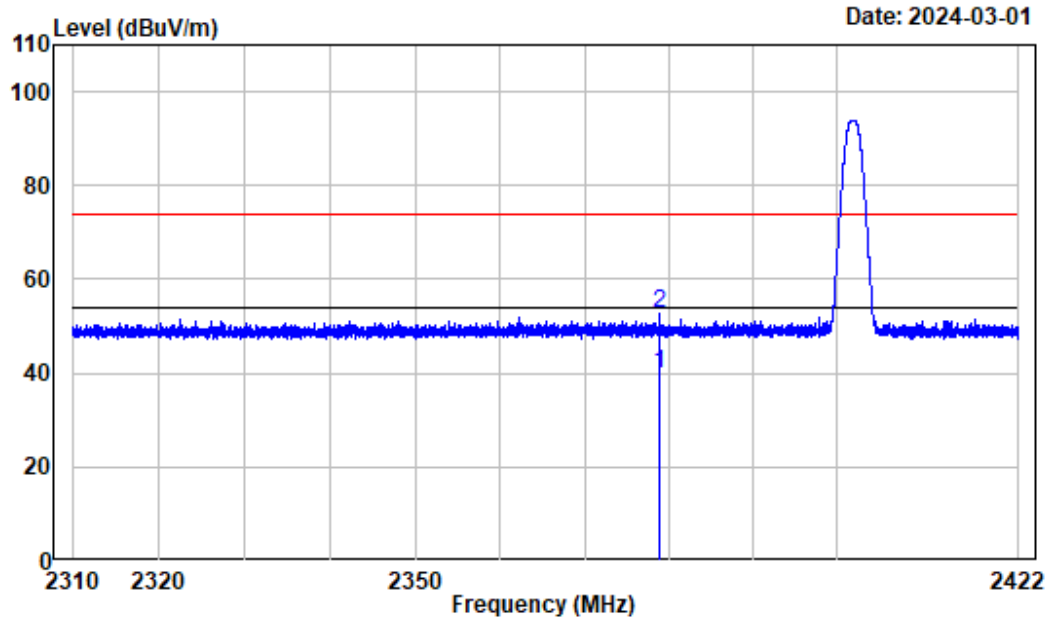
BLE 1M			
Test Channel:	**2402MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE1M_2402

	Freq	Factor	Read Level	Limit Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2349.382	-3.15	42.77	39.62	54.00	Average	-14.38
2	2349.382	-3.15	54.26	51.11	74.00	peak	-22.89

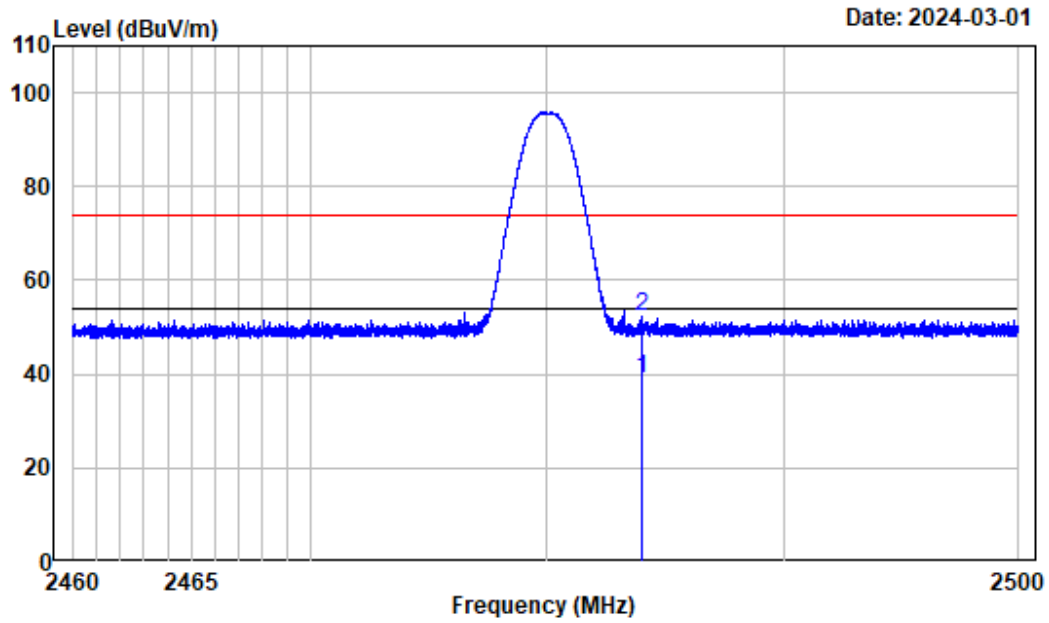
BLE 1M			
Test Channel:	**2402MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE1M_2402

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2378.866	-3.19	42.84	39.65	54.00	Average	-14.35
2	2378.866	-3.19	55.71	52.52	74.00	peak	-21.48

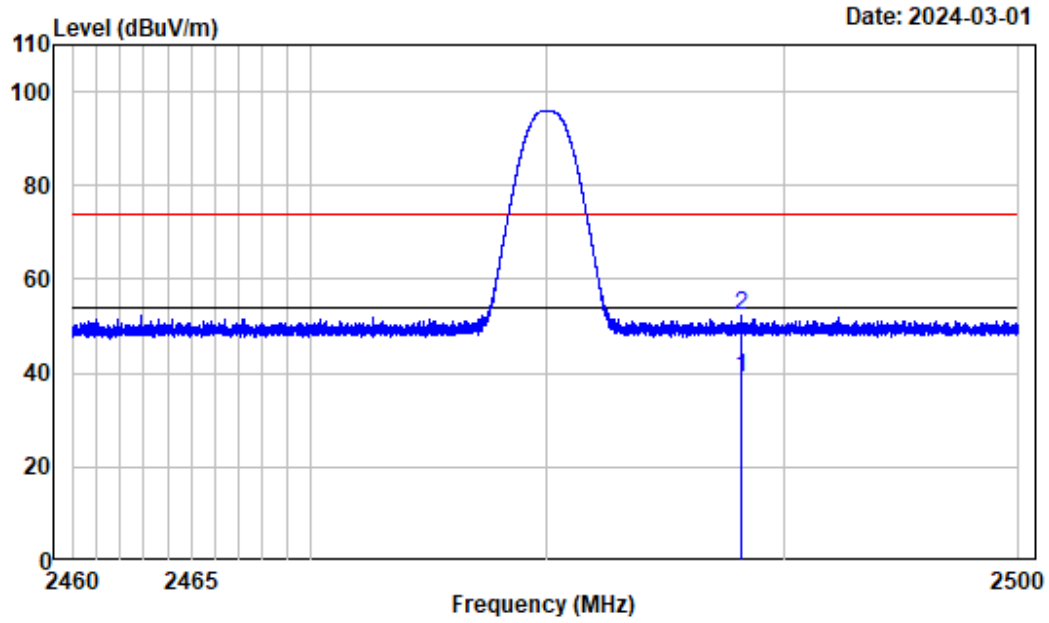
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE1M_2480

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2484.010	-3.17	42.33	39.16	54.00	Average	-14.84
2	2484.010	-3.17	55.64	52.47	74.00	peak	-21.53

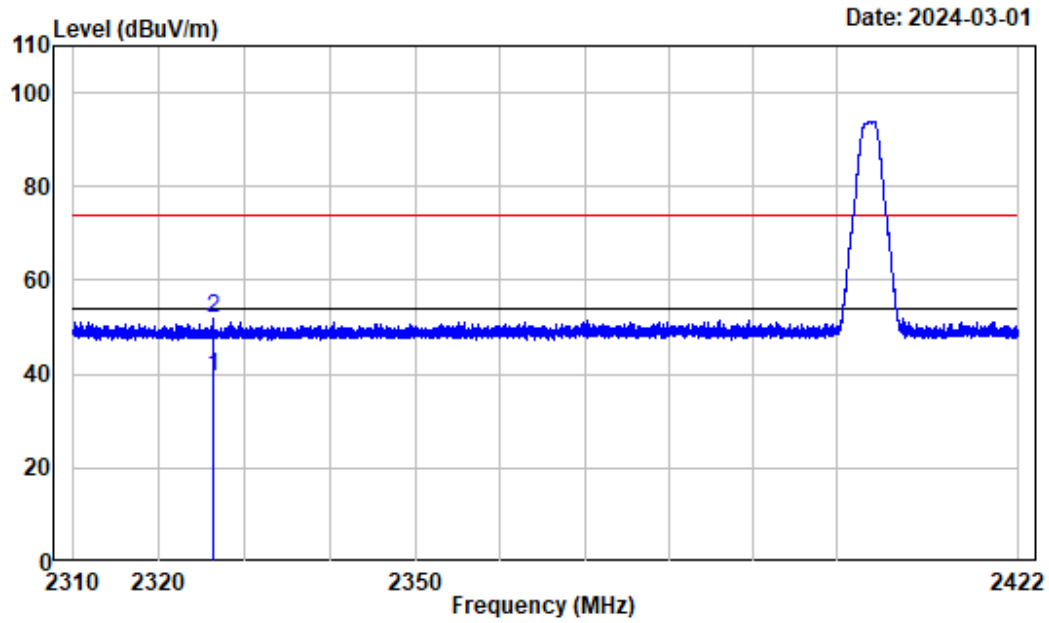
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE1M_2480

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2488.225	-3.18	42.24	39.06	54.00	Average	-14.94
2	2488.225	-3.18	55.61	52.43	74.00	peak	-21.57

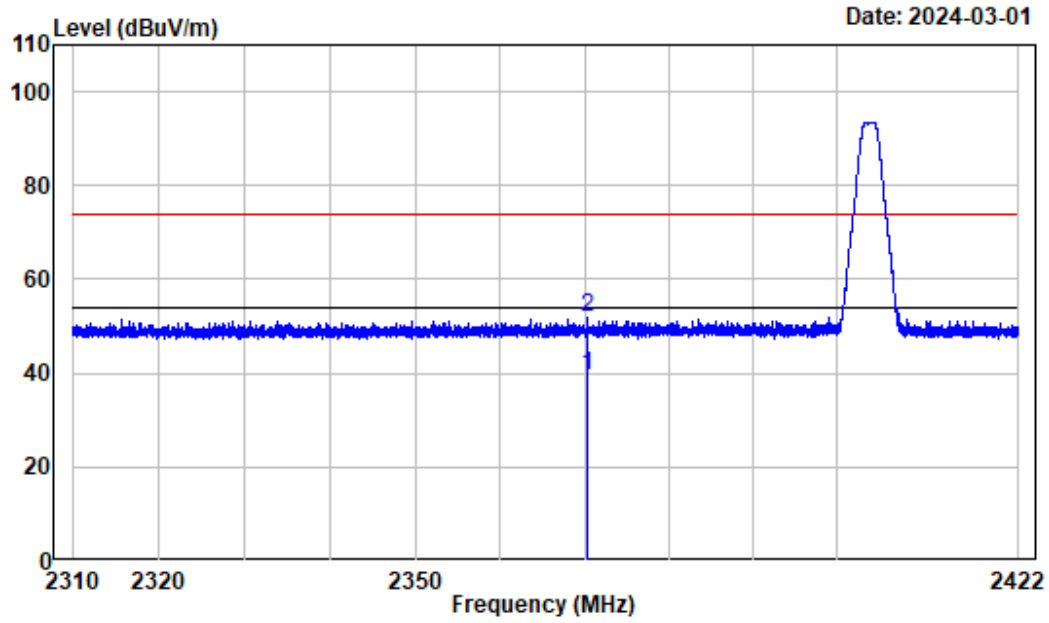
BLE 2M			
Test Channel:	**2404MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE2M_2404

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2326.352	-3.12	42.64	39.52	54.00	Average	-14.48
2	2326.352	-3.12	54.83	51.71	74.00	peak	-22.29

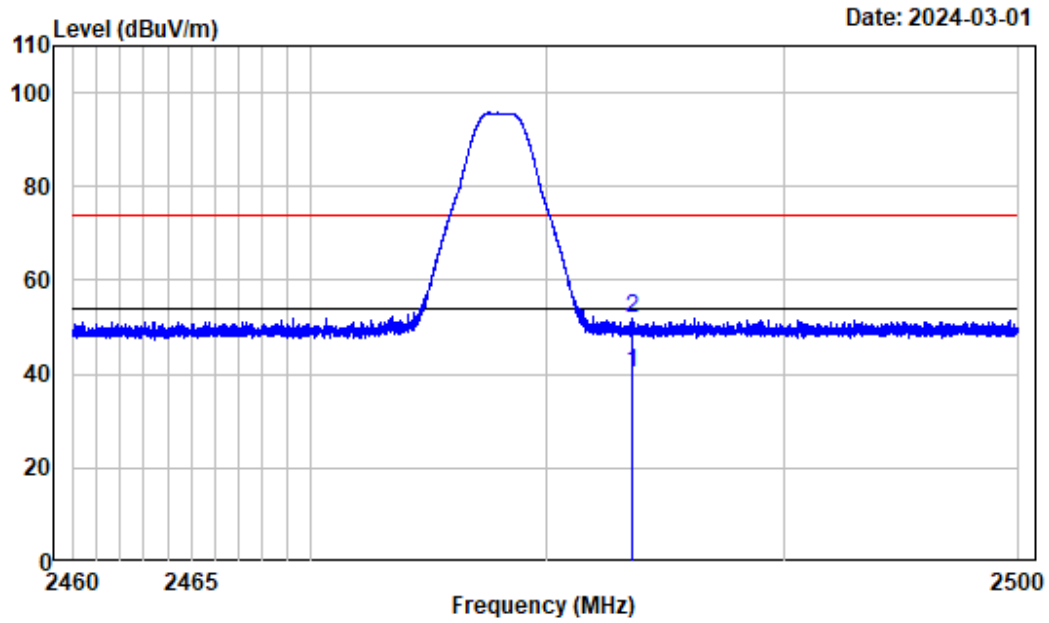
BLE 2M			
Test Channel:	**2404MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE2M_2404

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2370.214	-3.17	42.62	39.45	54.00	Average	-14.55
2	2370.214	-3.17	54.85	51.68	74.00	peak	-22.32

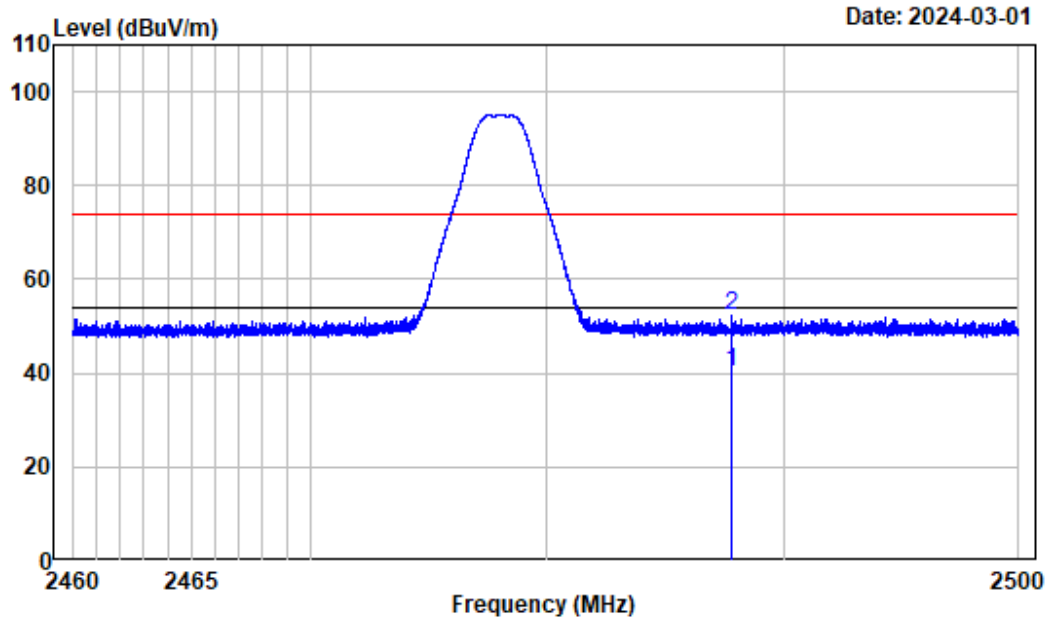
BLE 2M			
Test Channel:	**2478MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE2M_2478

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.590	-3.17	43.62	40.45	54.00	Average	-13.55
2	2483.590	-3.17	55.10	51.93	74.00	peak	-22.07

BLE 2M			
Test Channel:	**2478MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E
Tester : Dylan
Note : BLE2M_2478

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2487.790	-3.18	43.56	40.38	54.00	Average	-13.62
2	2487.790	-3.18	55.47	52.29	74.00	peak	-21.71

2.4G Wi-Fi

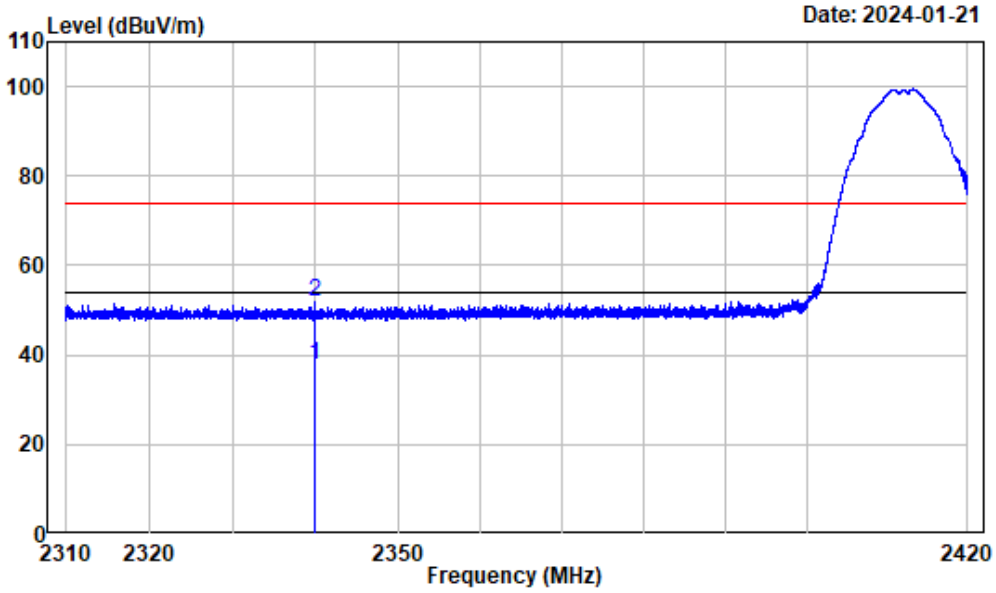
Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11b							
Low Channel 2412MHz							
4824.00	48.84	PK	H	2.45	51.29	74	-22.71
4824.00	38.79	AV	H	2.45	41.24	54	-12.76
4824.00	49.36	PK	V	2.45	51.81	74	-22.19
4824.00	39.48	AV	V	2.45	41.93	54	-12.07
Middle Channel 2437MHz							
4884.00	48.47	PK	H	2.60	51.07	74	-22.93
4884.00	38.38	AV	H	2.60	40.98	54	-13.02
4884.00	48.96	PK	V	2.60	51.56	74	-22.44
4884.00	38.89	AV	V	2.60	41.49	54	-12.51
High Channel 2462MHz							
4944.00	48.15	PK	H	2.61	50.76	74	-23.24
4944.00	38.07	AV	H	2.61	40.68	54	-13.32
4944.00	48.64	PK	V	2.61	51.25	74	-22.75
4944.00	38.51	AV	V	2.61	41.12	54	-12.88
802.11g							
Low Channel 2412MHz							
4824.00	47.12	PK	H	2.45	49.57	74	-24.43
4824.00	33.07	AV	H	2.45	35.52	54	-18.48
4824.00	47.35	PK	V	2.45	49.80	74	-24.20
4824.00	33.24	AV	V	2.45	35.69	54	-18.31
Middle Channel 2437MHz							
4884.00	46.74	PK	H	2.60	49.34	74	-24.66
4884.00	32.85	AV	H	2.60	35.45	54	-18.55
4884.00	46.98	PK	V	2.60	49.58	74	-24.42
4884.00	33.06	AV	V	2.60	35.66	54	-18.34
High Channel 2462MHz							
4944.00	46.48	PK	H	2.61	49.09	74	-24.91
4944.00	32.59	AV	H	2.61	35.20	54	-18.80
4944.00	46.87	PK	V	2.61	49.48	74	-24.52
4944.00	32.76	AV	V	2.61	35.37	54	-18.63

Frequency (MHz)	Receiver		Rx Antenna	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave	Polar (H/V)				
802.11n20							
Low Channel 2412MHz							
4824.00	46.05	PK	H	2.45	48.50	74	-25.50
4824.00	33.12	AV	H	2.45	35.57	54	-18.43
4824.00	46.49	PK	V	2.45	48.94	74	-25.06
4824.00	33.26	AV	V	2.45	35.71	54	-18.29
Middle Channel 2437MHz							
4884.00	46.12	PK	H	2.60	48.72	74	-25.28
4884.00	33.03	AV	H	2.60	35.63	54	-18.37
4884.00	46.57	PK	V	2.60	49.17	74	-24.83
4884.00	33.65	AV	V	2.60	36.25	54	-17.75
High Channel 2462MHz							
4944.00	46.18	PK	H	2.61	48.79	74	-25.21
4944.00	32.84	AV	H	2.61	35.45	54	-18.55
4944.00	46.75	PK	V	2.61	49.36	74	-24.64
4944.00	32.96	AV	V	2.61	35.57	54	-18.43

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

Test plots for Band Edge Measurements (Radiated):

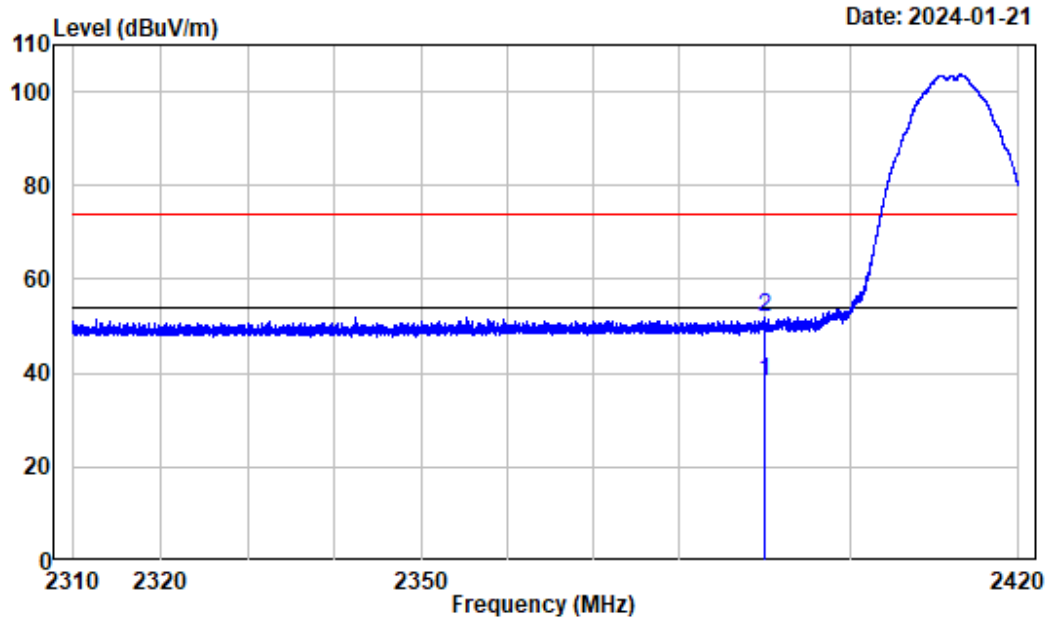
802.11b			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_b-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2339.893	-3.14	40.98	37.84	54.00	Average	-16.16
2	2339.893	-3.14	54.89	51.75	74.00	Peak	-22.25

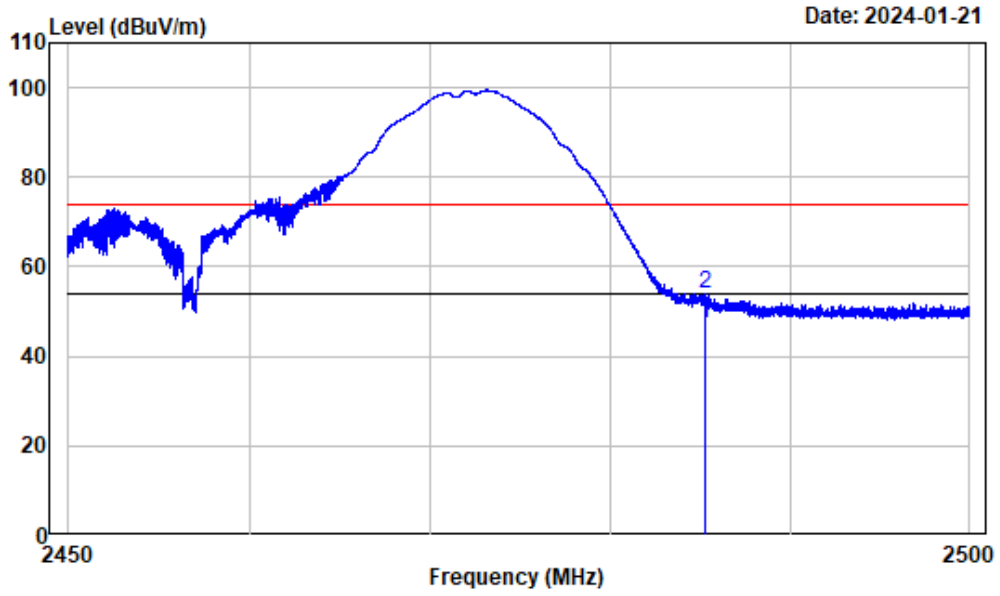
802.11b			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_b-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.984	-3.20	41.50	38.30	54.00	Average	-15.70
2	2389.984	-3.20	55.03	51.83	74.00	Peak	-22.17

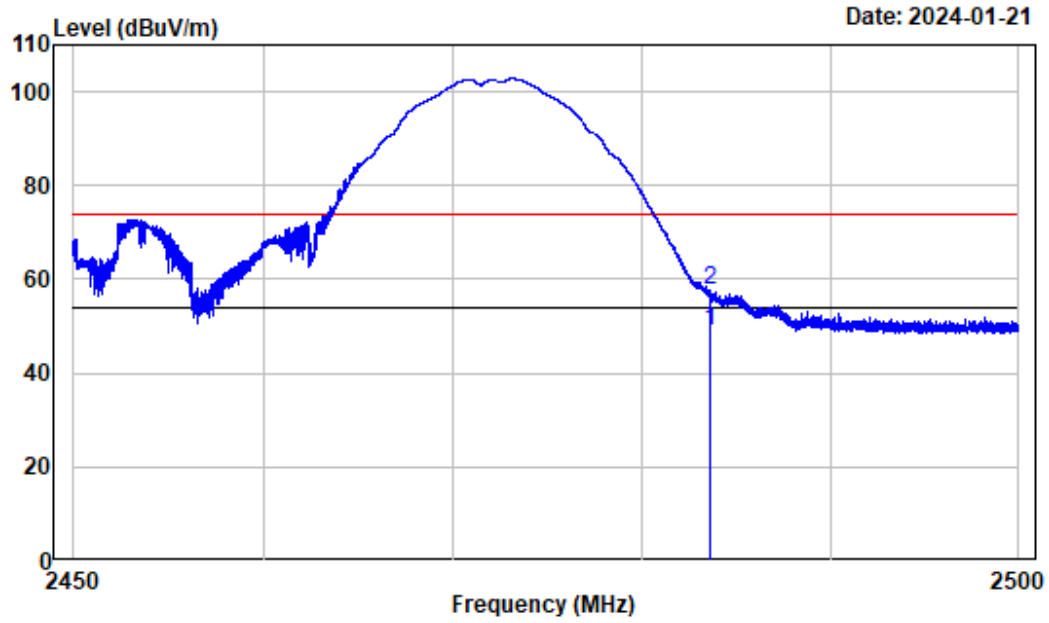
802.11b			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_b-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2485.262	-3.17	50.64	47.47	54.00	Average	-6.53
2	2485.262	-3.17	57.28	54.11	74.00	Peak	-19.89

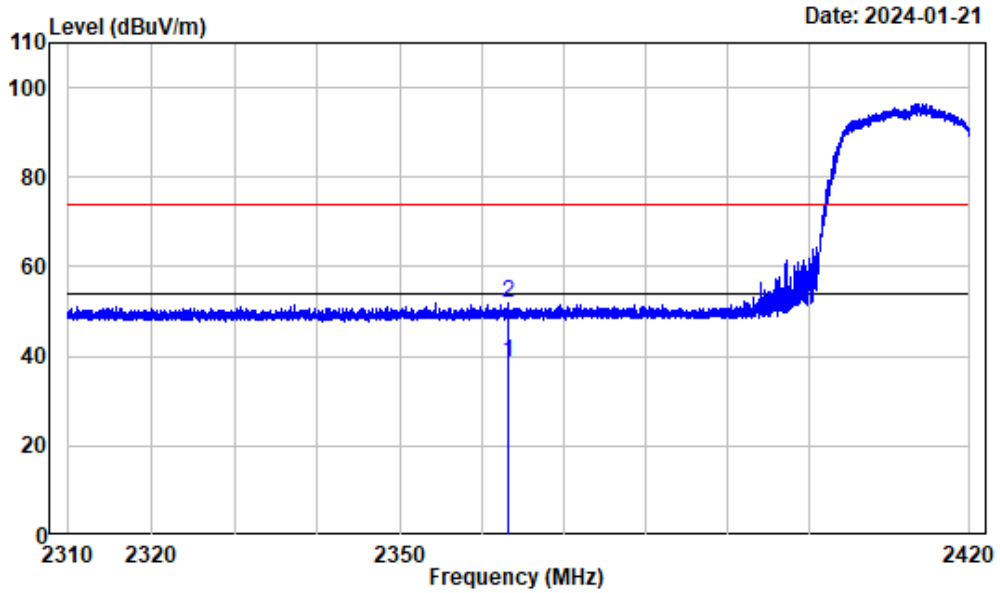
802.11b			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_b-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.606	-3.17	52.22	49.05	54.00	Average	-4.95
2	2483.606	-3.17	60.67	57.50	74.00	Peak	-16.50

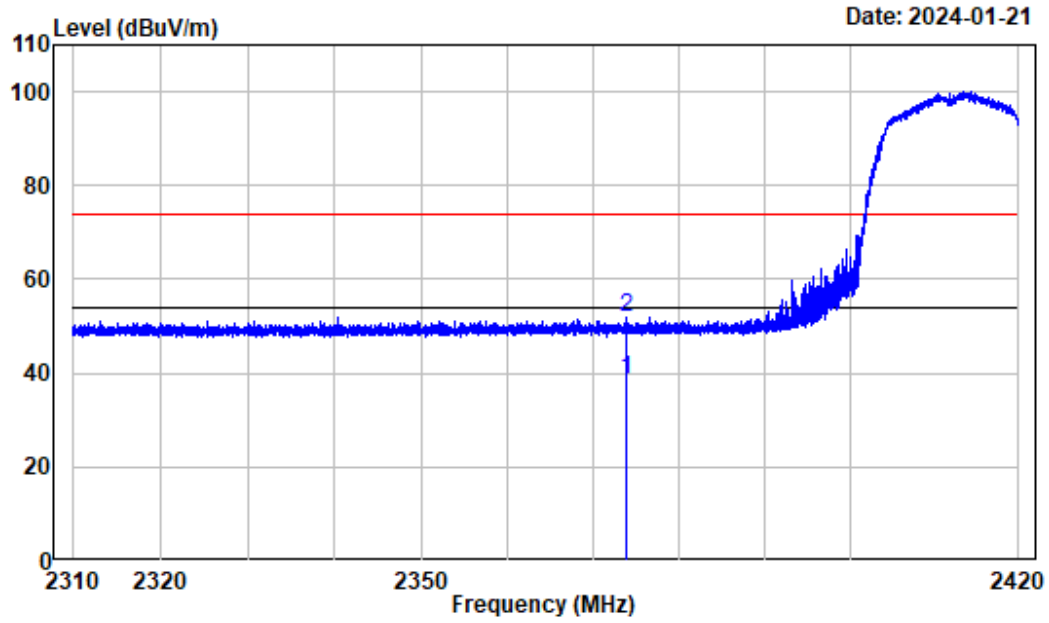
802.11g			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_g-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2363.144	-3.17	41.61	38.44	54.00	Average	-15.56
2	2363.144	-3.17	54.94	51.77	74.00	Peak	-22.23

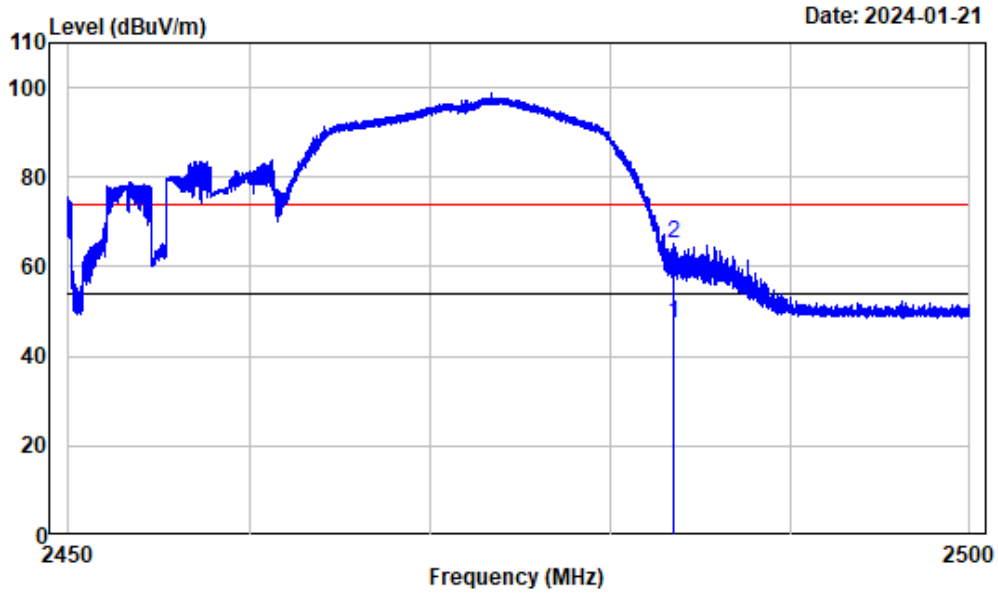
802.11g			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_g-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2373.745	-3.18	41.89	38.71	54.00	Average	-15.29
2	2373.745	-3.18	55.14	51.96	74.00	Peak	-22.04

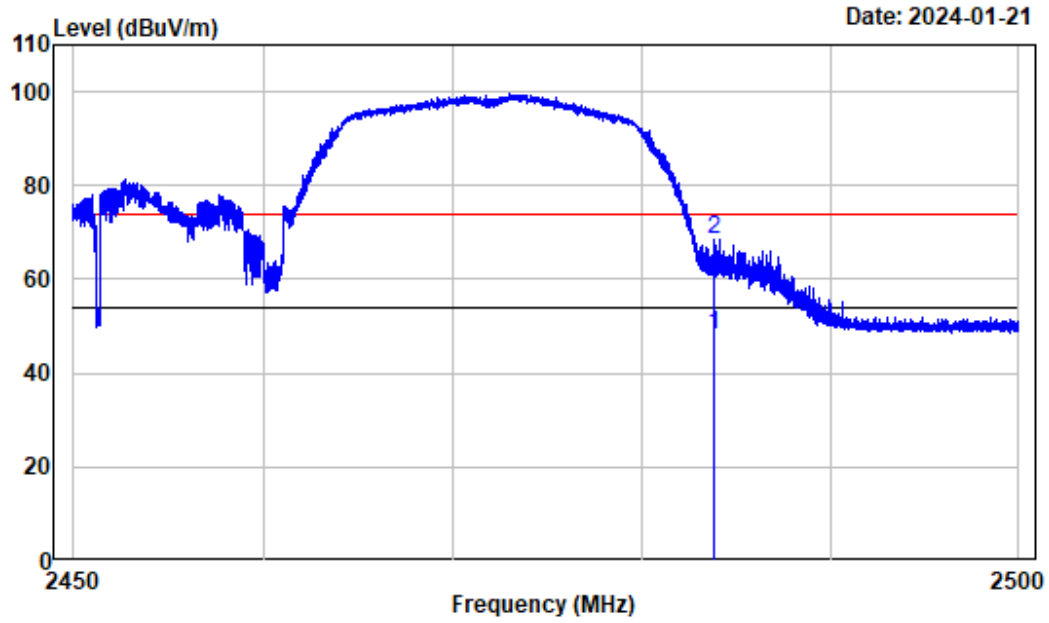
802.11g			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_g-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.538	-3.17	50.38	47.21	54.00	Average	-6.79
2	2483.538	-3.17	68.15	64.98	74.00	Peak	-9.02

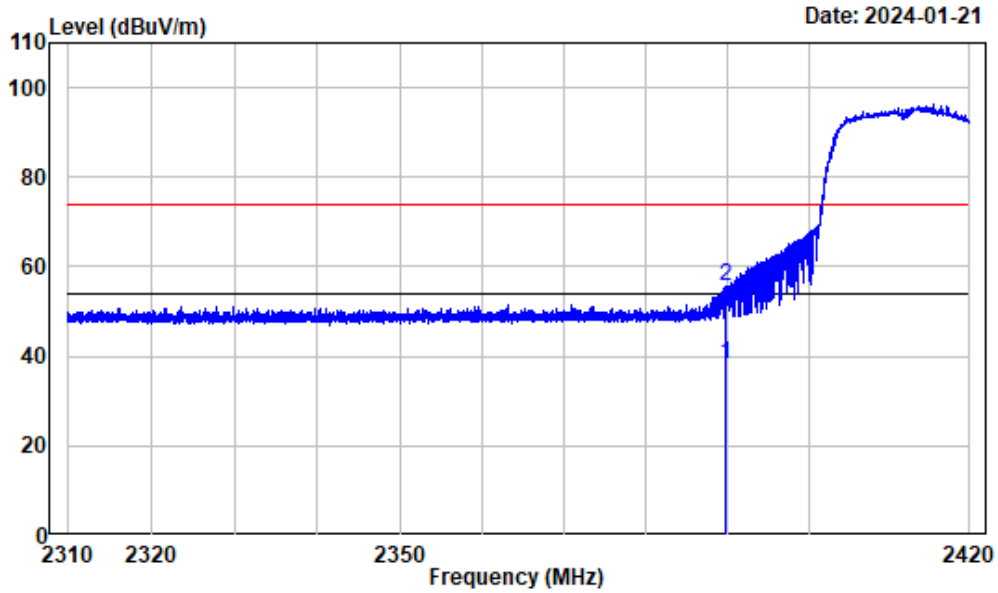
802.11g			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : 2.4GWiFi_g-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.794	-3.17	51.45	48.28	54.00	Average	-5.72
2	2483.794	-3.17	71.64	68.47	74.00	Peak	-5.53

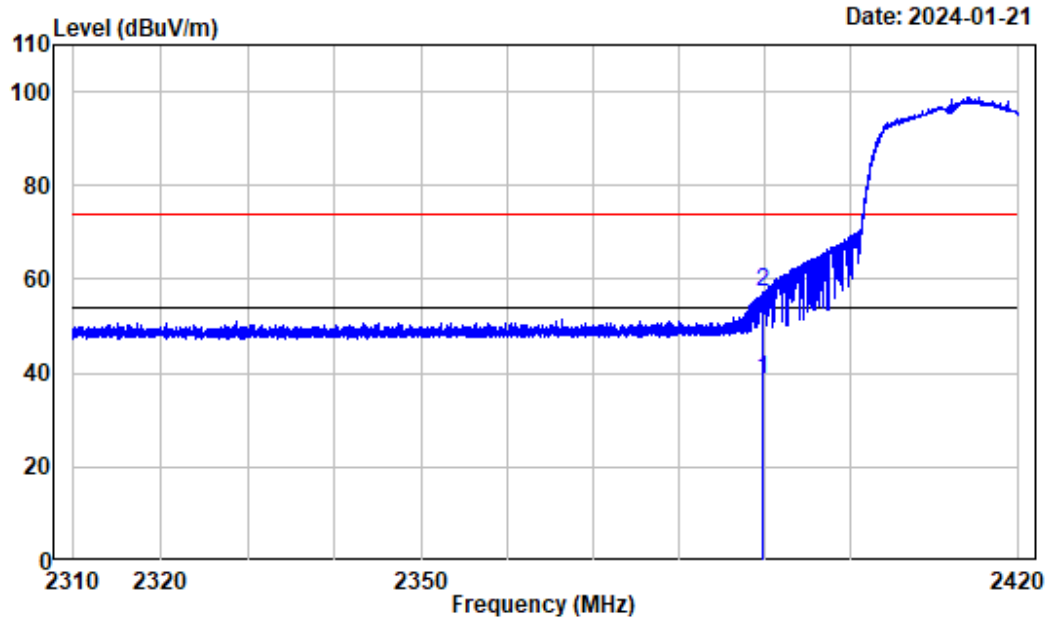
802.11n20			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Tyler
Note : 2.4GWiFi_n20-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.750	-3.20	41.45	38.25	54.00	Average	-15.75
2	2389.750	-3.20	58.96	55.76	74.00	peak	-18.24

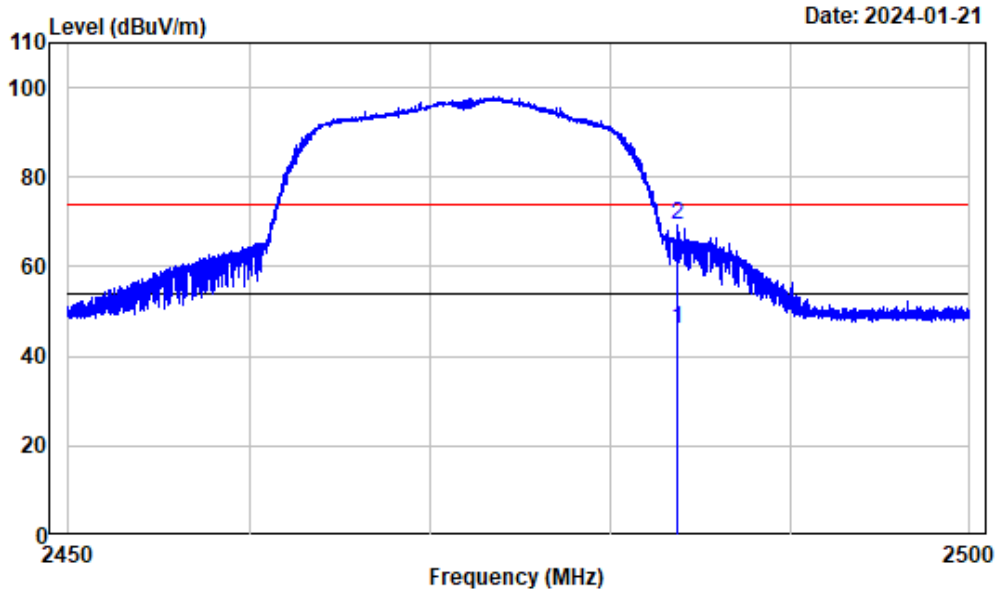
802.11n20			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Tyler
Note : 2.4GWiFi_n20-2412

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2389.722	-3.20	41.92	38.72	54.00	Average	-15.28
2	2389.722	-3.20	60.45	57.25	74.00	peak	-16.75

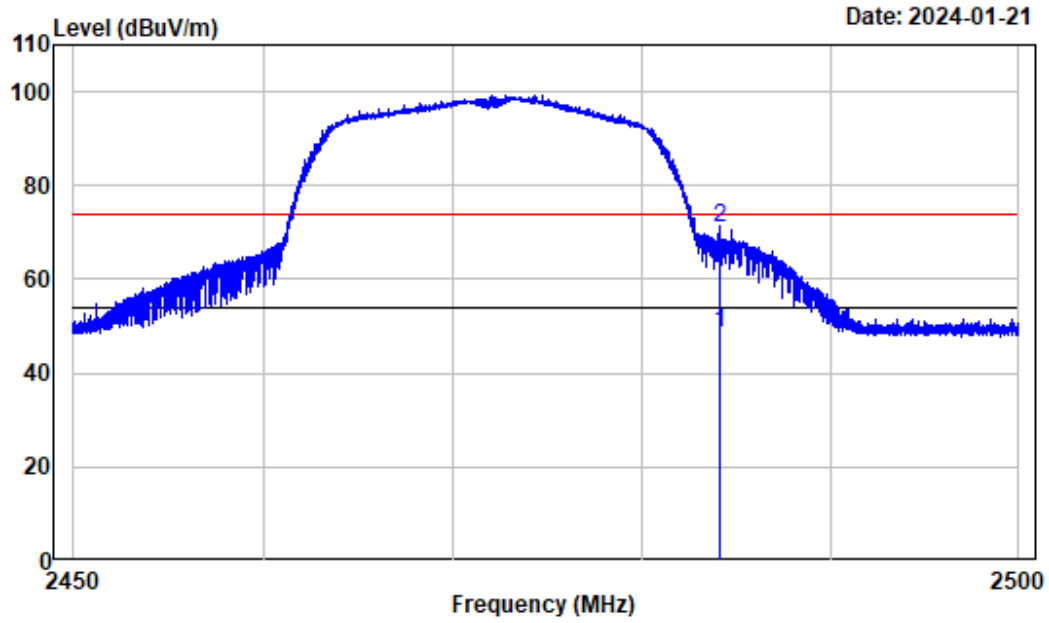
802.11n20			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Tyler
Note : 2.4GWiFi_n20-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2483.656	-3.17	49.41	46.24	54.00	Average	-7.76
2	2483.656	-3.17	72.30	69.13	74.00	peak	-4.87

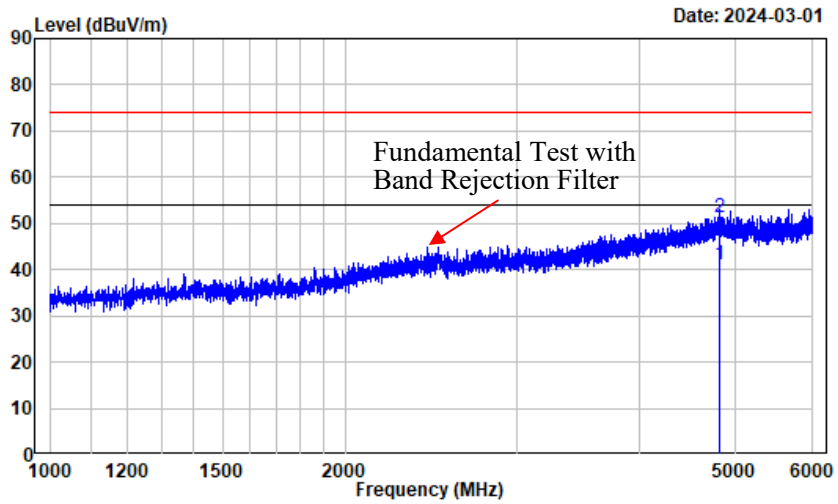
802.11n20			
Test Channel:	**2472MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Tyler
Note : 2.4GWiFi_n20-2472

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	2484.094	-3.17	51.82	48.65	54.00	Average	-5.35
2	2484.094	-3.17	74.17	71.00	74.00	peak	-3.00

Listed with the worst harmonic margin test plot: 802.11b Low Channel

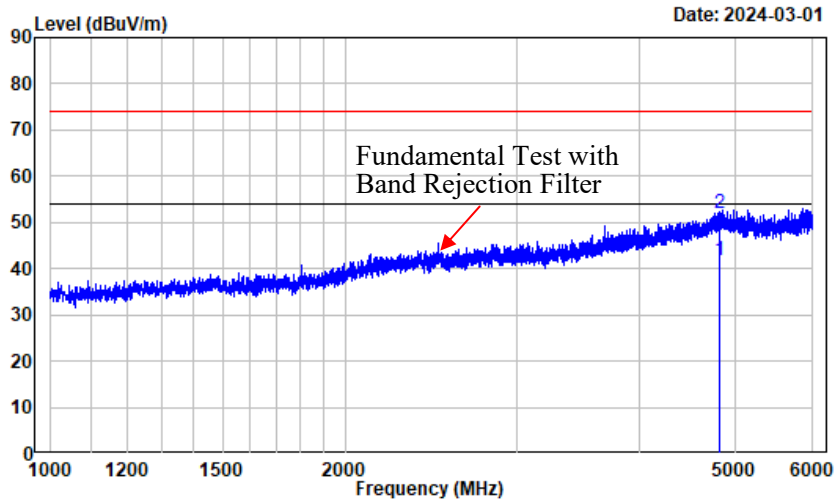
Horizontal	
1-6GHz	

```
Condition  : Horizontal
Project No.: SZ1231211-74617E-RF
Tester     : Zenos Qiao
Note       : Transmitting Listed with the worst harmonic margin
           : test plot(2.4GWiFi b Mode Low channel)
```

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	4824.000	2.45	38.79	41.24	54.00	Average	-12.76
2	4824.000	2.45	48.84	51.29	74.00	Peak	-22.71

Vertical

1-6GHz

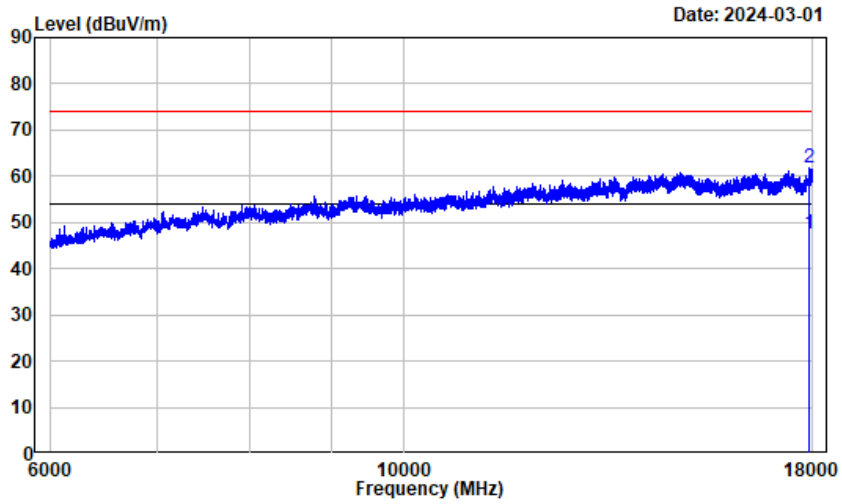


Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : Transmitting Listed with the worst harmonic margin
: test plot(2.4GWiFi b Mode Low channel)

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	4824.000	2.45	39.48	41.93	54.00	Average	-12.07
2	4824.000	2.45	49.36	51.81	74.00	Peak	-22.19

Horizontal

6-18GHz

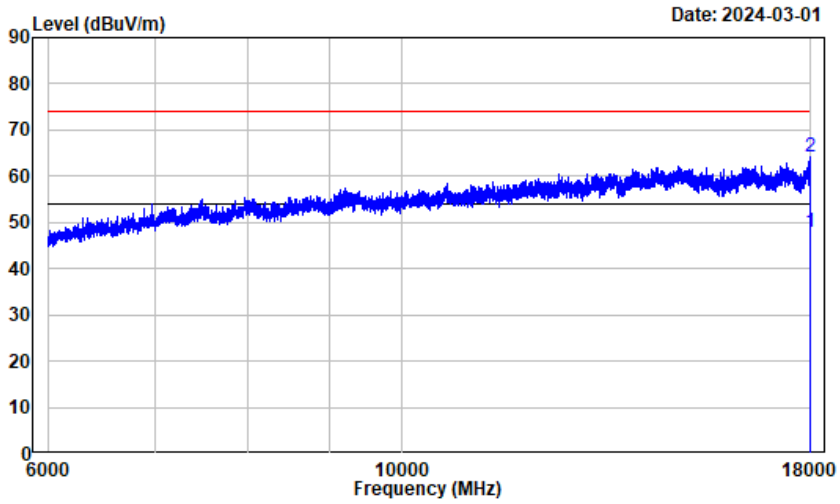


Condition : Horizontal
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : Transmitting Listed with the worst harmonic margin
: test plot(2.4GWiFi b Mode Low channel)

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	17905.500	23.95	23.59	47.54	54.00	Average	-6.46
2	17905.500	23.95	37.76	61.71	74.00	Peak	-12.29

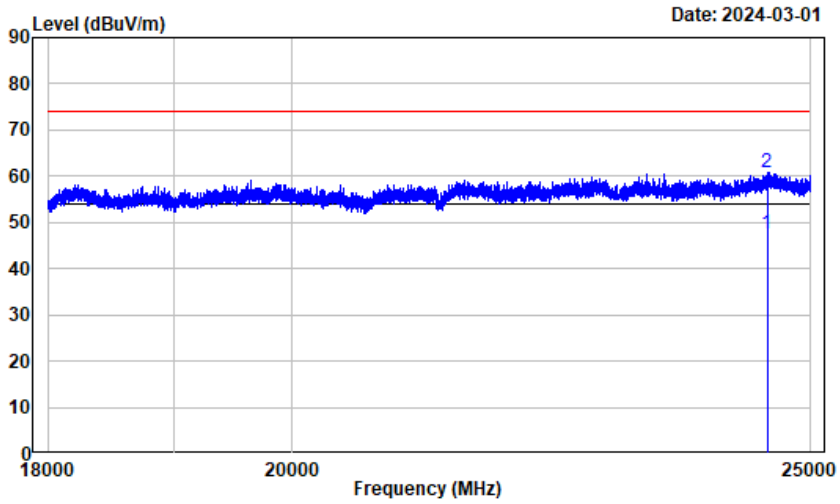
Vertical

6-18GHz



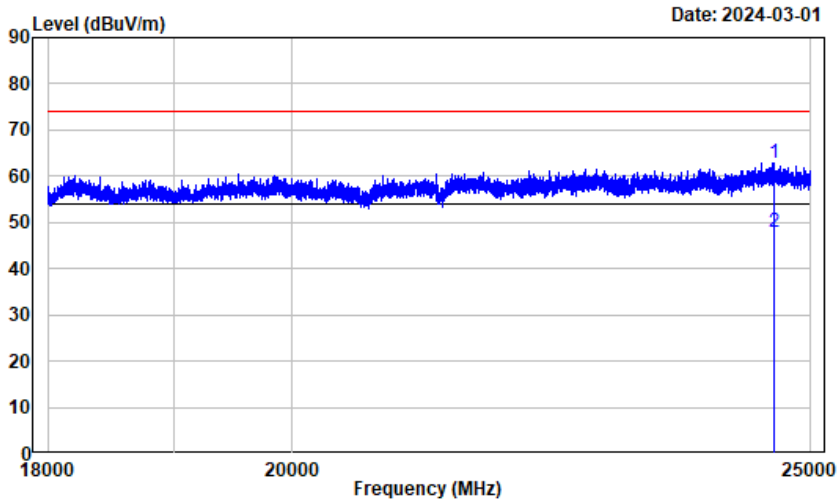
Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : Transmitting Listed with the worst harmonic margin
: test plot(2.4GWiFi b Mode Low channel)

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	17998.500	24.61	23.26	47.87	54.00	Average	-6.13
2	17998.500	24.61	39.42	64.03	74.00	Peak	-9.97

Horizontal	
18-25GHz	 Condition : Horizontal Project No.: SZ1231211-74617E-RF Tester : Zenos Qiao Note : Transmitting Listed with the worst harmonic margin : test plot(2.4GWiFi b Mode Low channel) Freq / Factor / Read Level / Limit Level / Limit Line / Remark / Over Limit MHz / dB/m / dBuV / dBuV/m / dBuV/m / / dB 1 24534.500 18.96 28.43 47.39 54.00 Average -6.61 2 24534.500 18.96 41.88 60.84 74.00 Peak -13.16

Vertical

18-25GHz



Condition : Vertical
Project No.: SZ1231211-74617E-RF
Tester : Zenos Qiao
Note : Transmitting Listed with the worst harmonic margin
: test plot(2.4GWiFi b Mode Low channel)

	Freq	Factor	Read Level	Level	Limit Line	Remark	Over Limit
	MHz	dB/m	dBuV	dBuV/m	dBuV/m		dB
1	24614.130	18.85	44.00	62.85	74.00	Peak	-11.15
2	24614.130	18.85	28.99	47.84	54.00	Average	-6.16

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

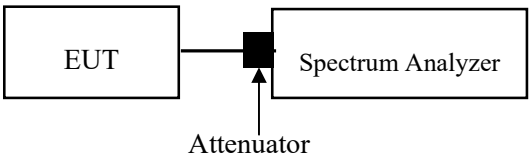
Applicable Standard

According to FCC §15.247(a) (2)
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:	24~25.3 ℃
Relative Humidity:	41~45 %
ATM Pressure:	101 kPa

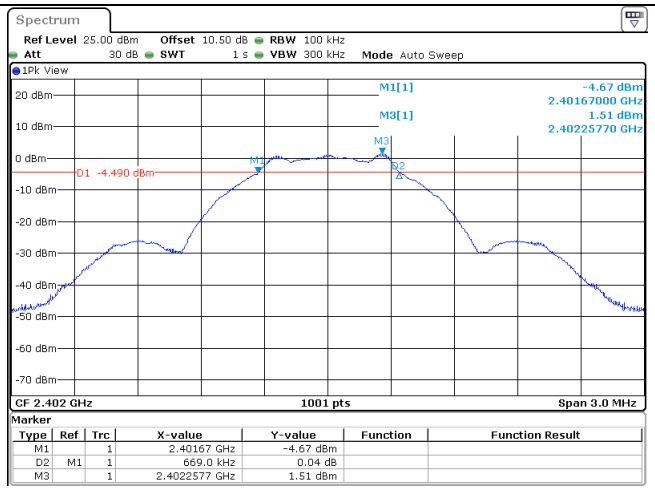
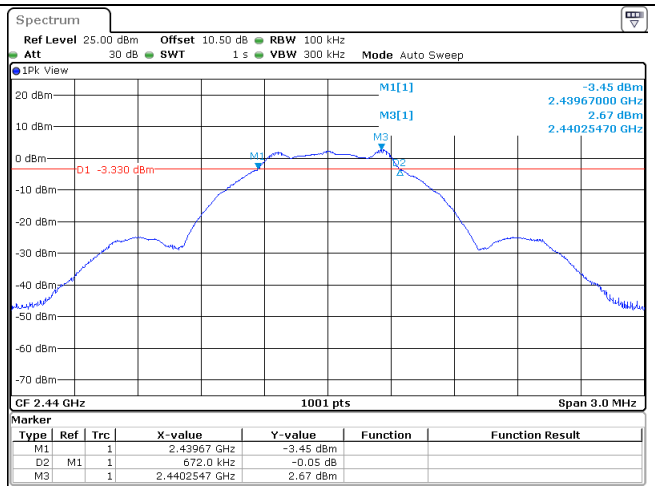
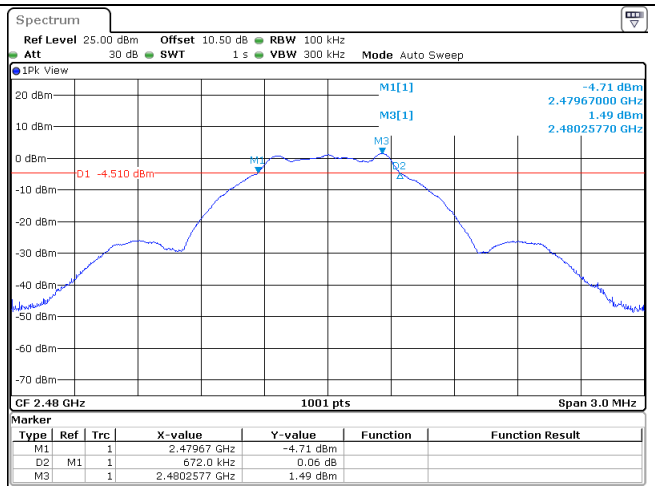
The testing was performed by Jim Cheng from 2024-02-05 to 2024-02-07.

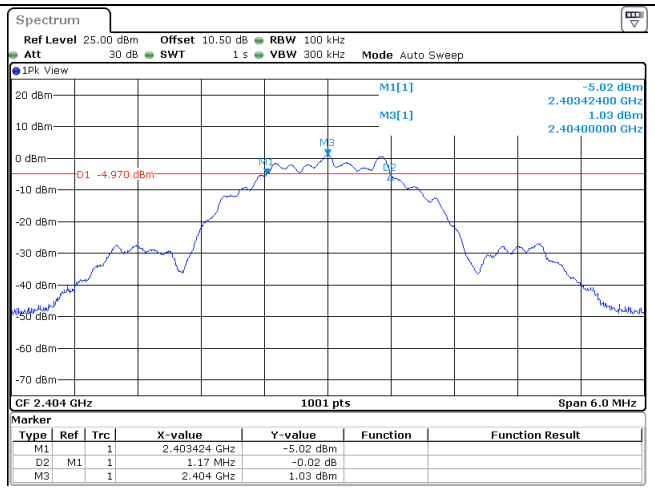
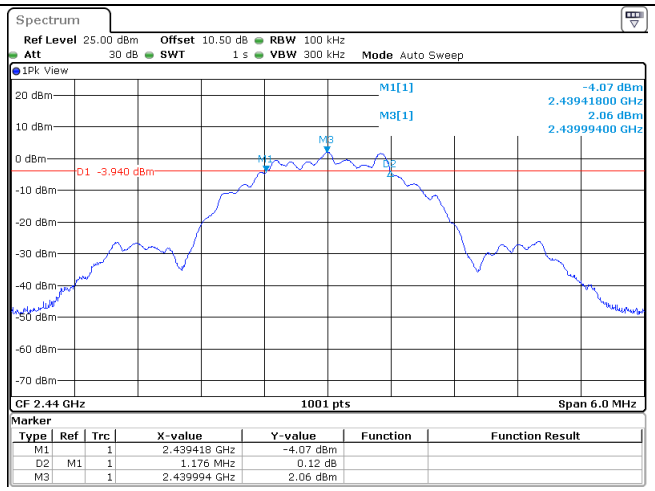
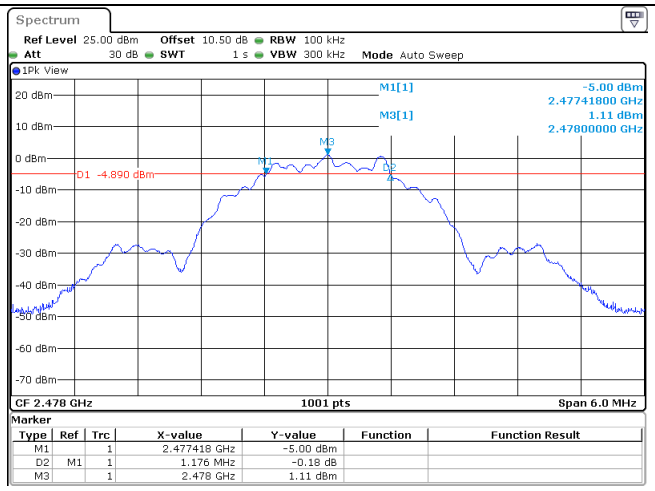
EUT operation mode: Transmitting

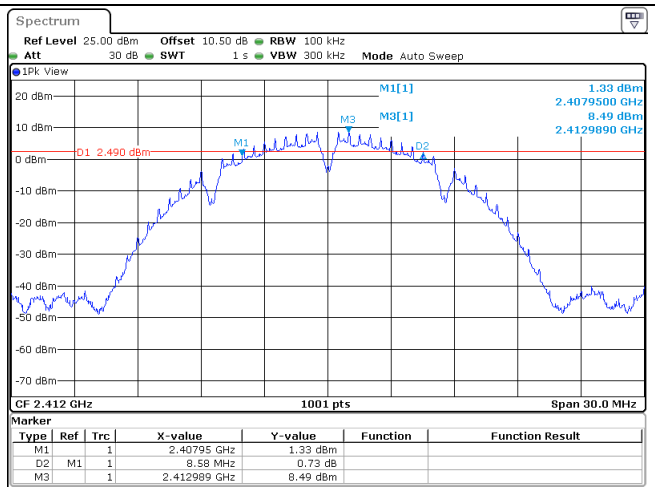
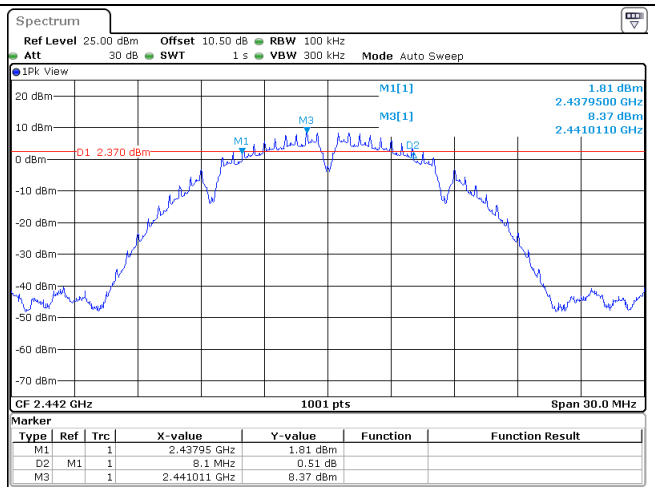
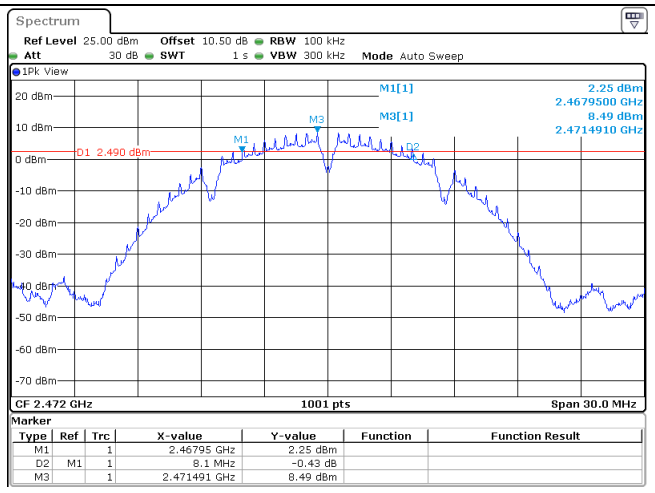
Test Result: Compliant.

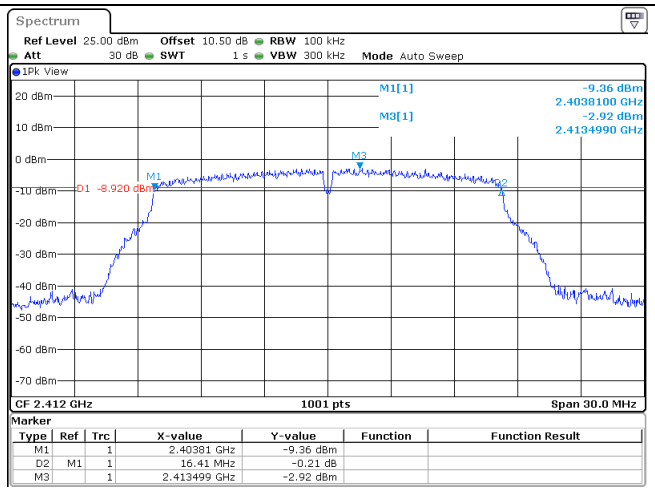
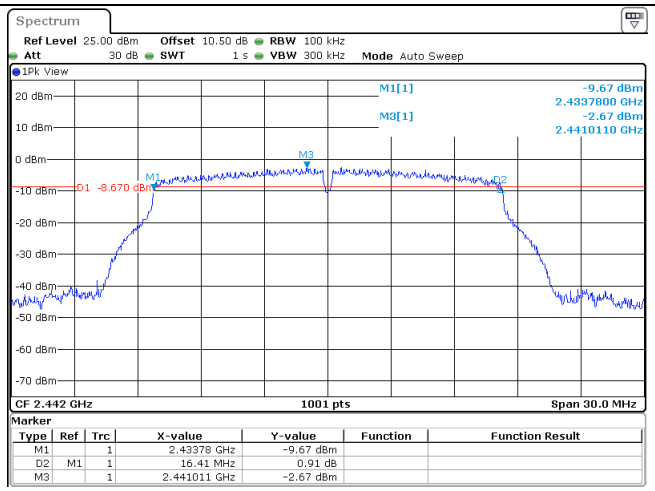
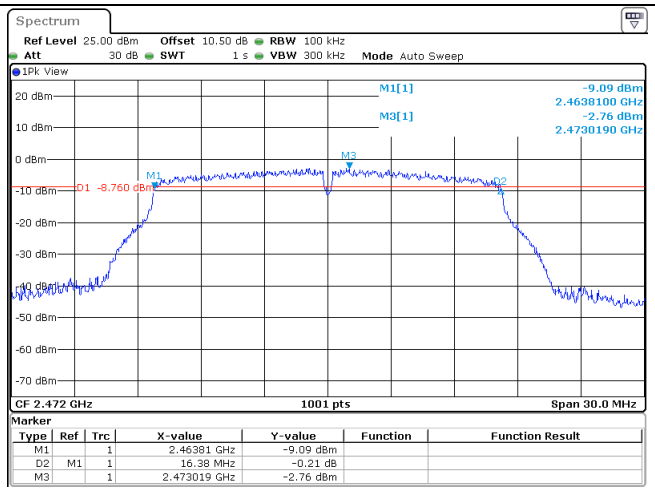
Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	2412	8.58	0.5
	2442	8.10	0.5
	2472	8.10	0.5
802.11g	2412	16.41	0.5
	2442	16.41	0.5
	2472	16.38	0.5
802.11n20	2412	17.64	0.5
	2442	17.64	0.5
	2472	17.64	0.5
BLE 1Mbps	2402	0.669	0.5
	2440	0.672	0.5
	2480	0.672	0.5
BLE 2Mbps	2404	1.170	0.5
	2440	1.176	0.5
	2478	1.176	0.5

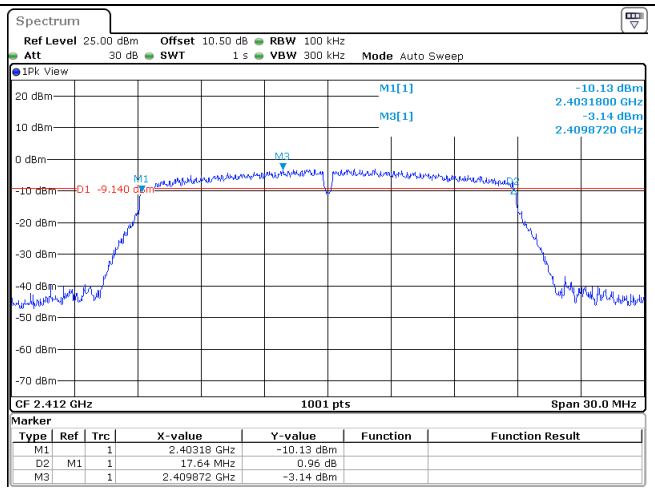
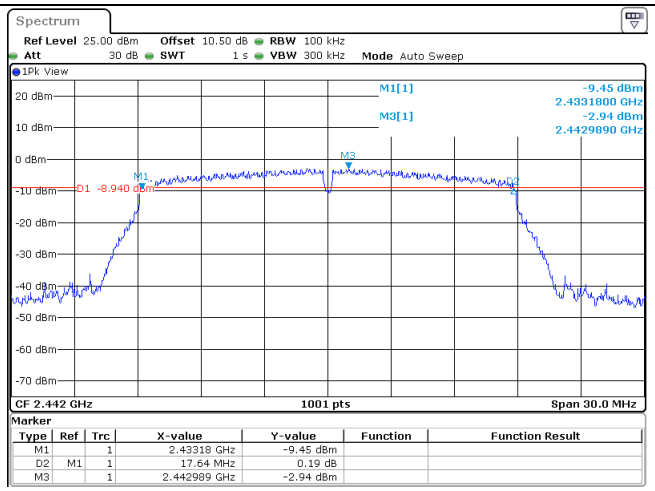
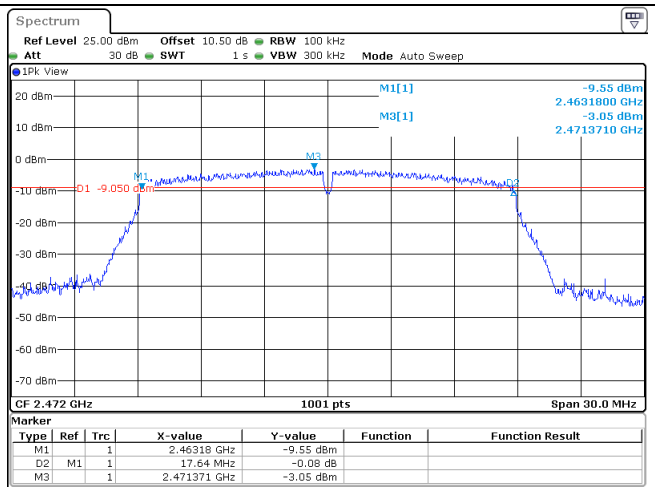
6 dB Bandwidth

BLE 1M	
Low Channel	
Middle Channel	
High Channel	

BLE 2M	
Low Channel	 ProjectNo.:SZ1231211-74617E Tester:Jim Cheng Date: 5.FEB.2024 22:56:53
Middle Channel	 ProjectNo.:SZ1231211-74617E Tester:Jim Cheng Date: 5.FEB.2024 23:01:45
High Channel	 ProjectNo.:SZ1231211-74617E Tester:Jim Cheng Date: 5.FEB.2024 23:04:14

802.11b	
Low Channel	
Middle Channel	
High Channel	

802.11g	
Low Channel	
Middle Channel	
High Channel	

802.11n20	
Low Channel	
Middle Channel	
High Channel	

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

Applicable Standard

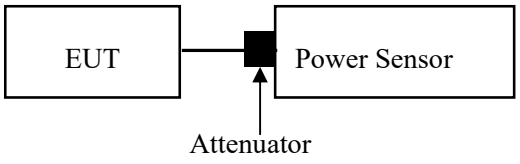
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted 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

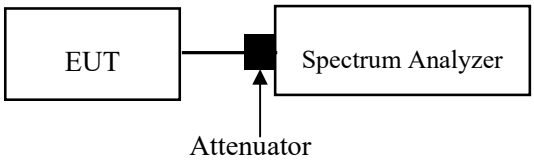
Test Method: ANSI C63.10-2013 Clause 11.9.1.1 for BLE & Clause 11.9.2.3.2 for Wi-Fi

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.

For Wi-Fi mode:



For BLE mode:



Test Data

Environmental Conditions

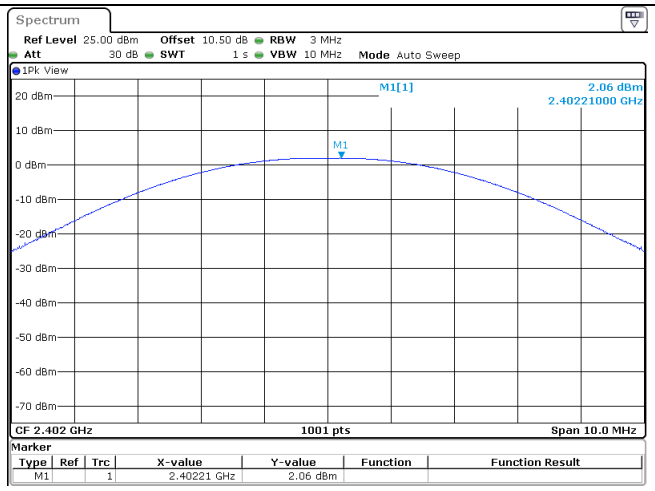
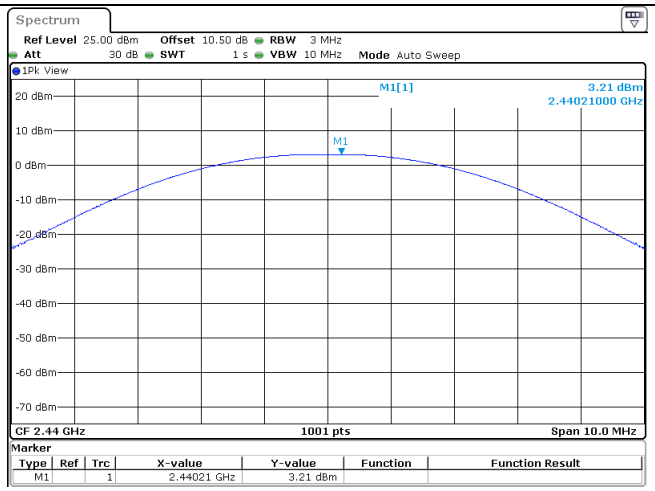
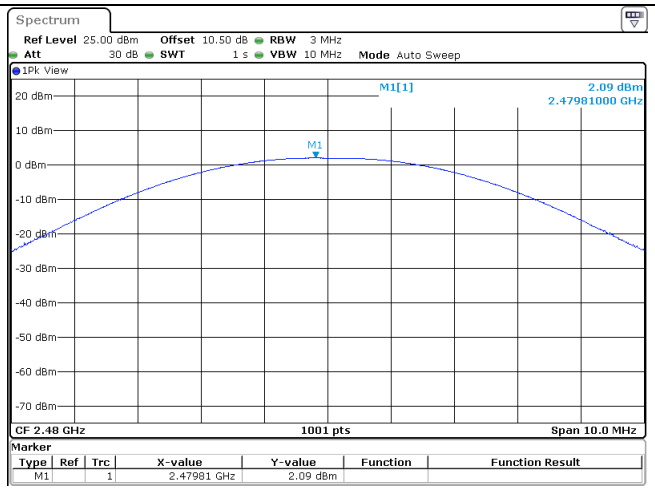
Temperature:	24~25.3 ℃
Relative Humidity:	41~45 %
ATM Pressure:	101 kPa

The testing was performed by Jim Cheng from 2024-02-05 to 2024-02-07.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Modes	Test Frequency (MHz)	Maximum Conducted Peak Output Power (dBm)	Maximum Conducted Average Output Power (dBm)	Limit (dBm)
802.11b	2412	19.57	17.74	30
	2442	19.58	16.61	30
	2472	19.47	16.50	30
802.11g	2412	18.78	10.25	30
	2442	18.84	10.36	30
	2472	18.58	10.12	30
802.11n20	2412	18.80	10.22	30
	2442	18.89	10.33	30
	2472	18.71	10.17	30
BLE 1M	2402	2.06	/	30
	2440	3.21	/	30
	2480	2.09	/	30
BLE 2M	2404	2.11	/	30
	2440	3.13	/	30
	2478	2.23	/	30

BLE 1M	
Low Channel	
Middle Channel	
High Channel	

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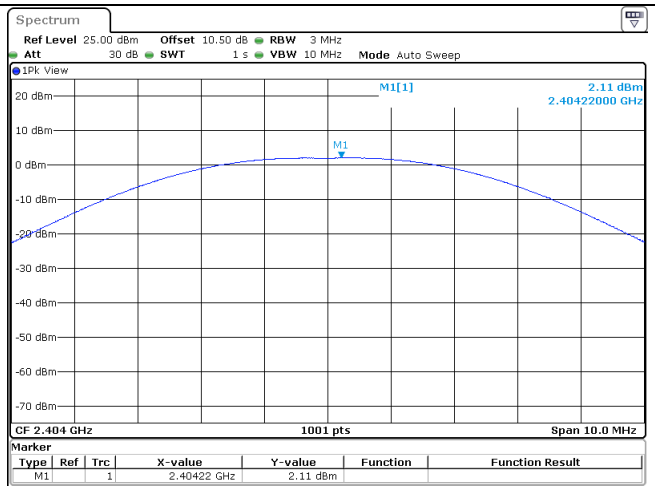
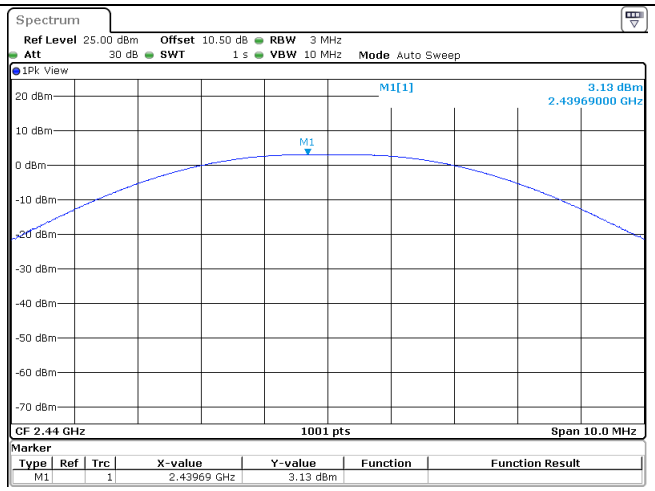
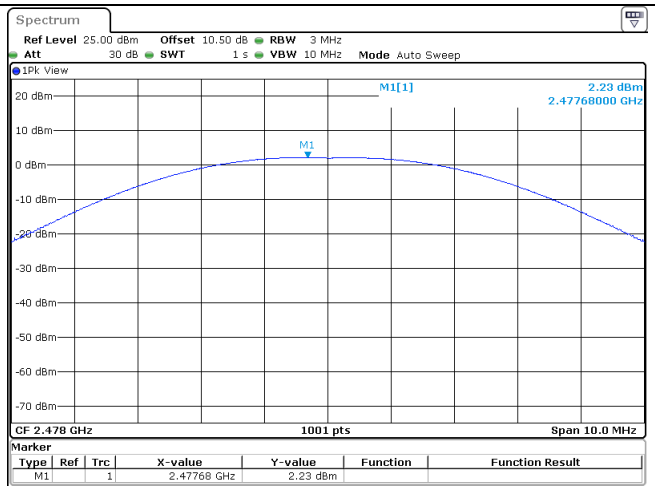
Low Channel	
Middle Channel	
High Channel	

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

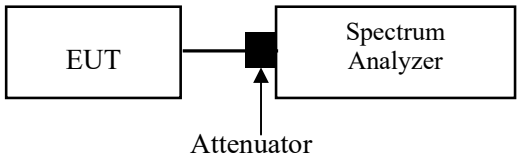
Applicable Standard

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

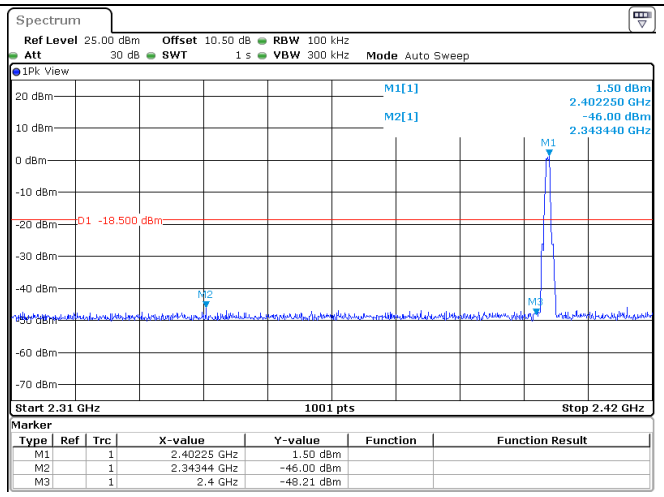
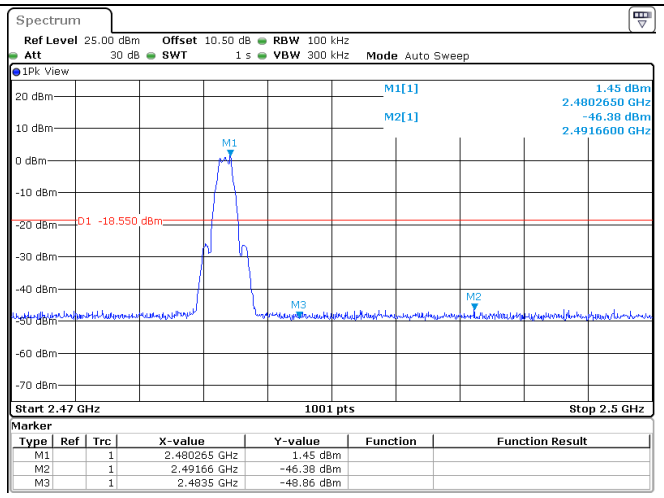
Environmental Conditions

Temperature:	24~25.3 ℃
Relative Humidity:	41~45 %
ATM Pressure:	101 kPa

The testing was performed by Jim Cheng from 2024-02-05 to 2024-02-07.

EUT operation mode: Transmitting

Test Result: Compliant.

<table>
<tr><th colspan="2">Band Edge, Single Channel</th></tr>
<tr><td>BLE 1M,
Left Side</td><td> 
</td></tr>
<tr><td>BLE 1M,
Right Side</td><td> 
</td></tr>
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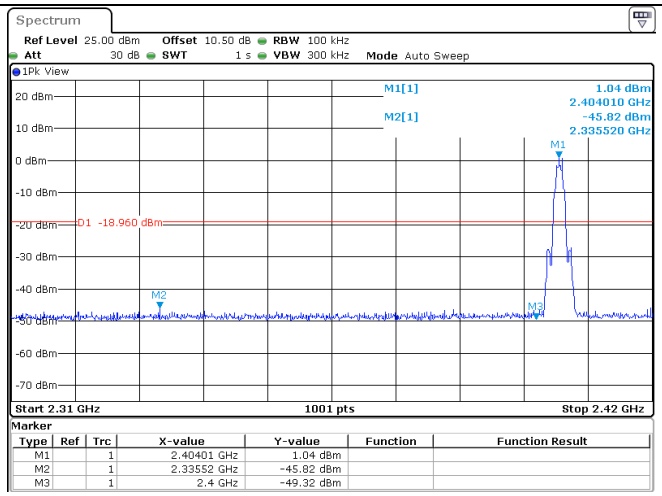
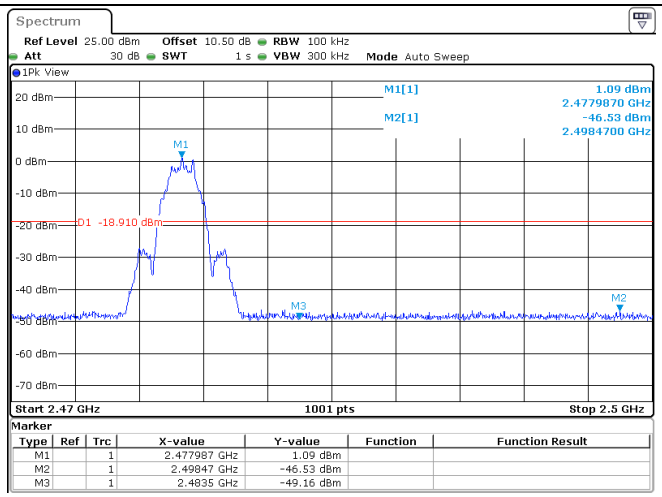
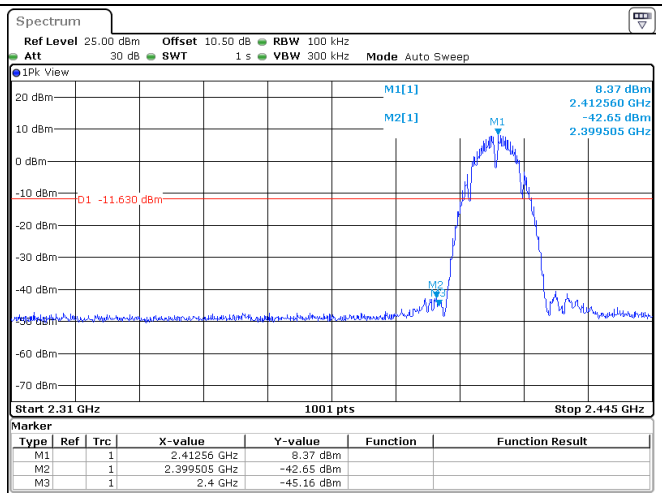
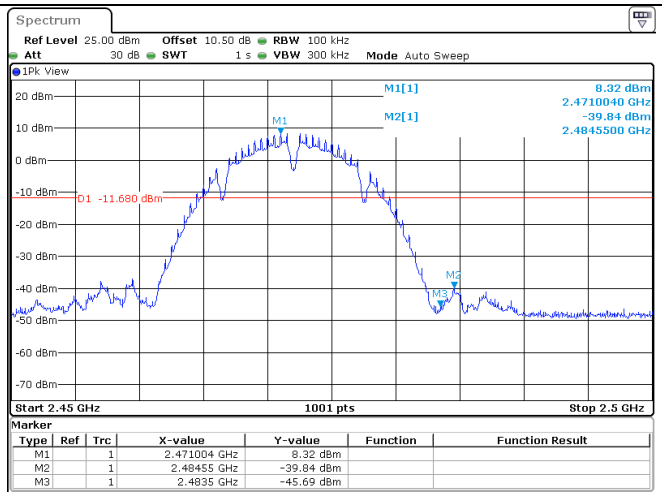
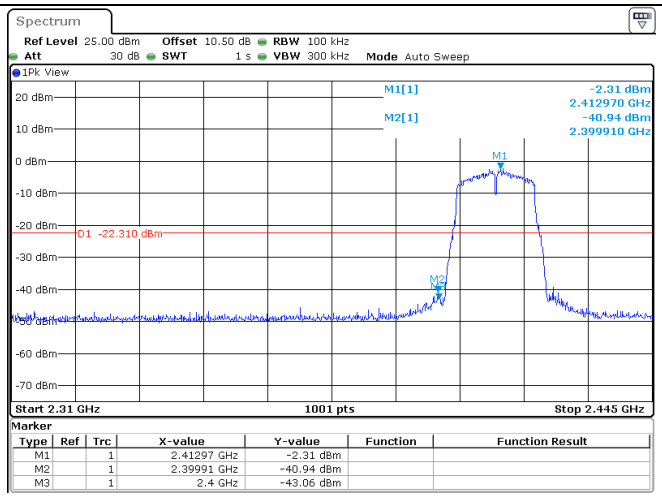
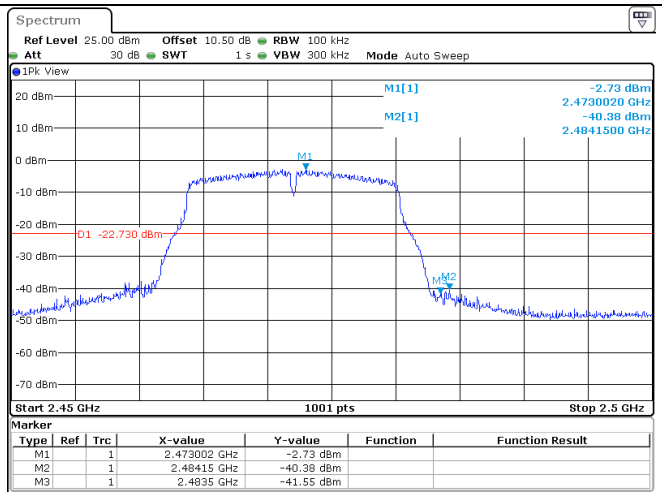
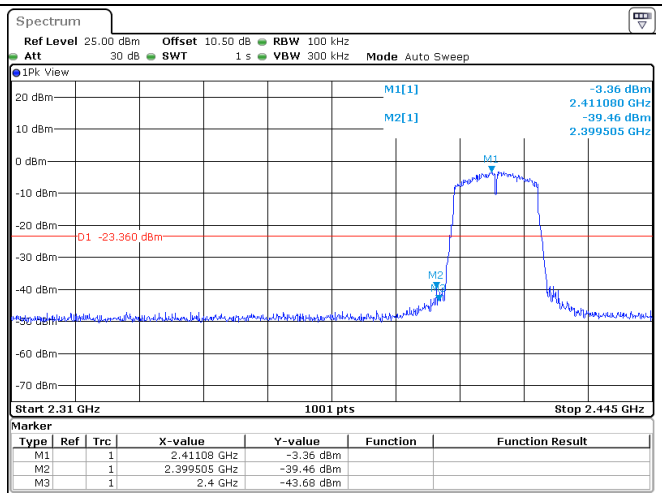
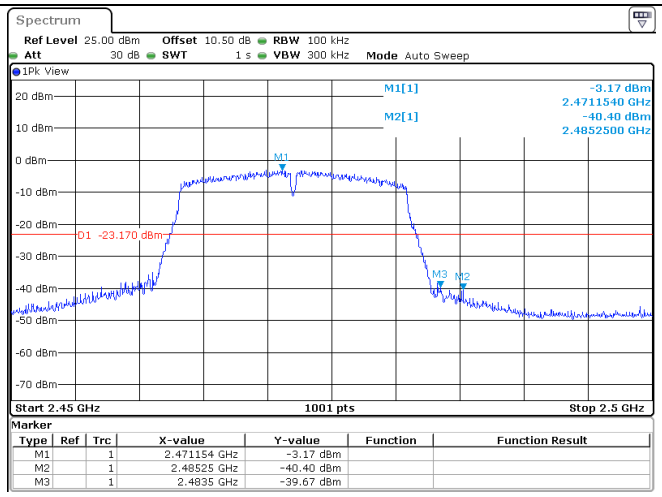
Band Edge, Single Channel	
BLE 2M, Left Side	
BLE 2M, Right Side	

Band Edge	
802.11b, Left Side	
802.11b, Right Side	

Band Edge	
802.11g, Left Side	
802.11g, Right Side	

Band Edge	
802.11n20, Left Side	
802.11n20, Right Side	

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

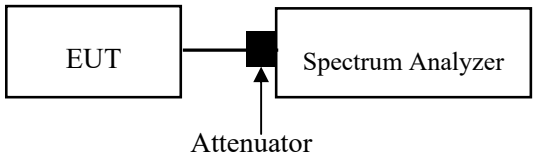
The following procedure may be used when the maximum (average) conducted output power was used to determine compliance to the fundamental output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, 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

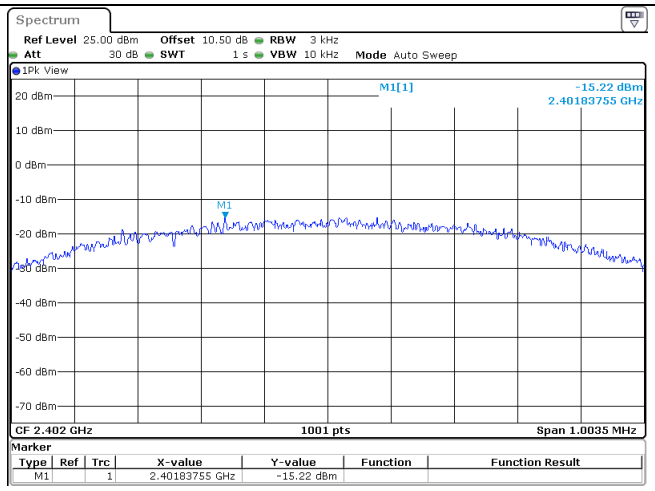
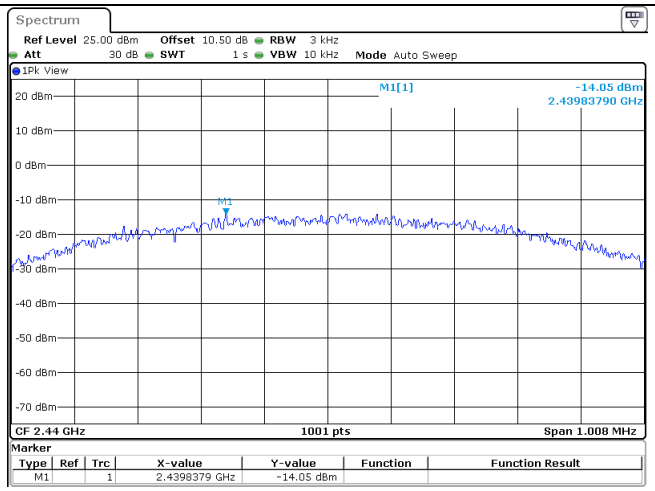
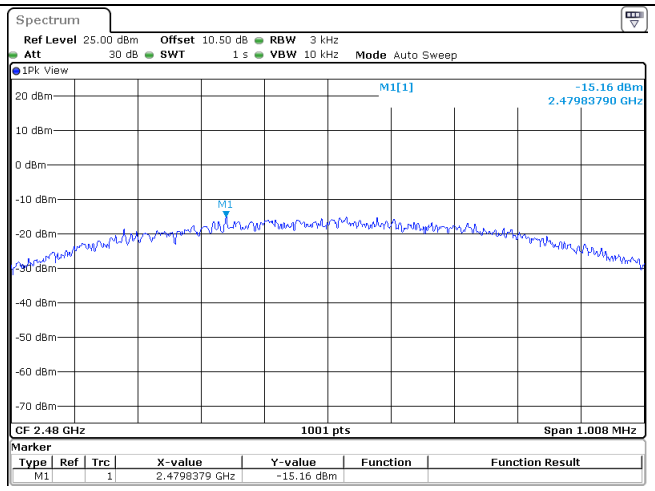
Temperature:	24~25.3 ℃
Relative Humidity:	41~45 %
ATM Pressure:	101 kPa

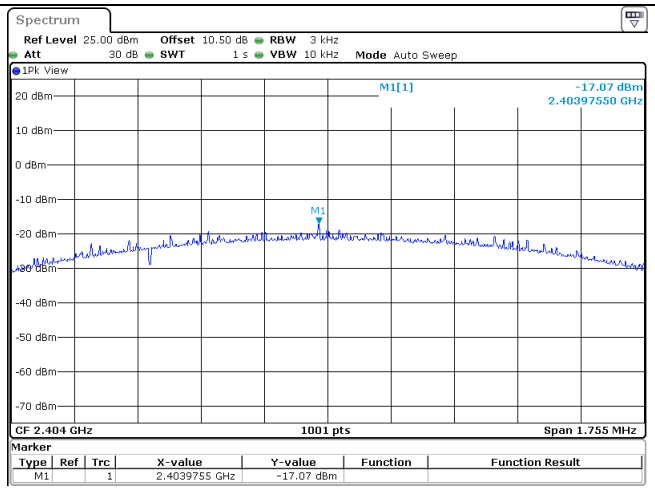
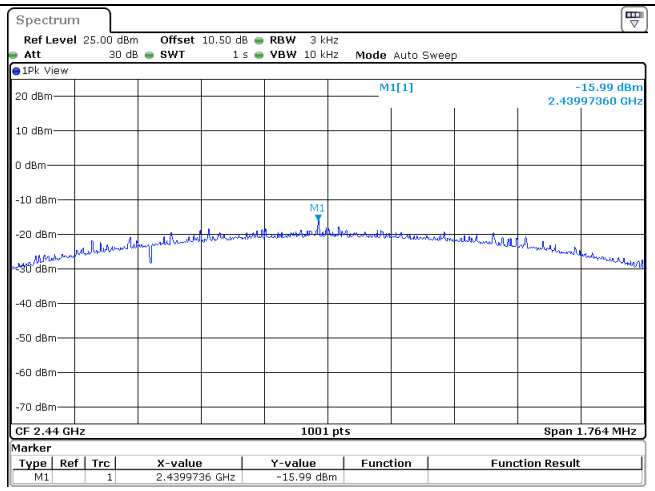
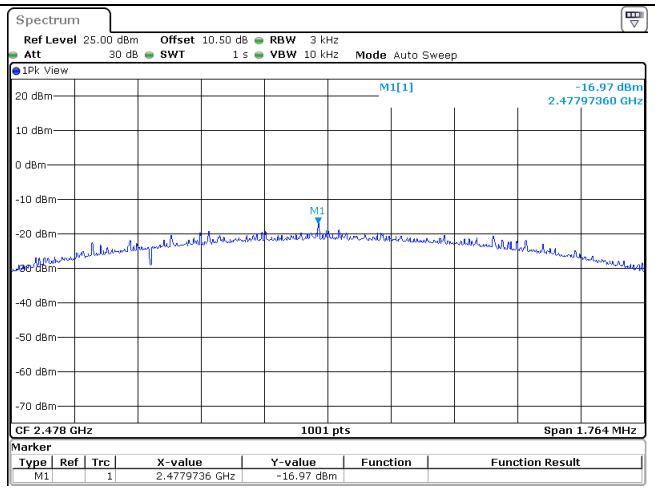
The testing was performed by Jim Cheng from 2024-02-05 to 2024-02-07.

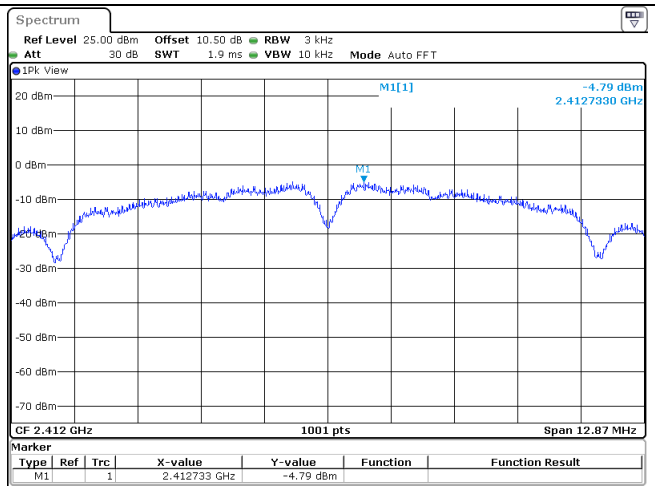
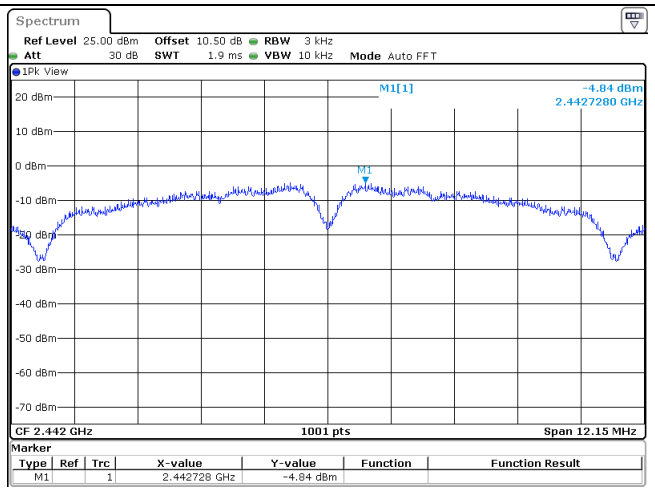
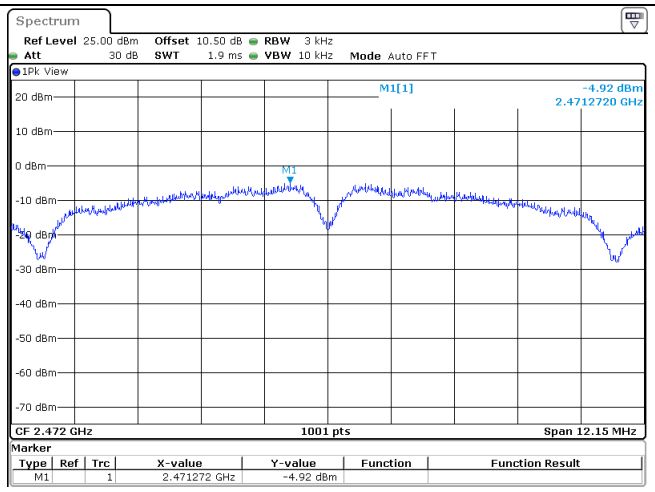
EUT operation mode: Transmitting

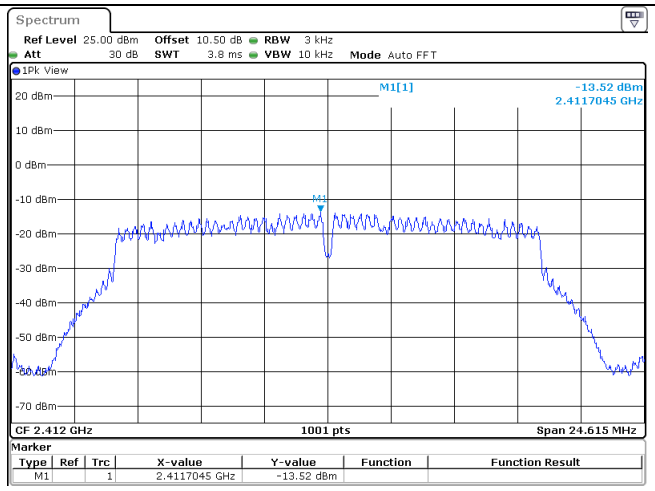
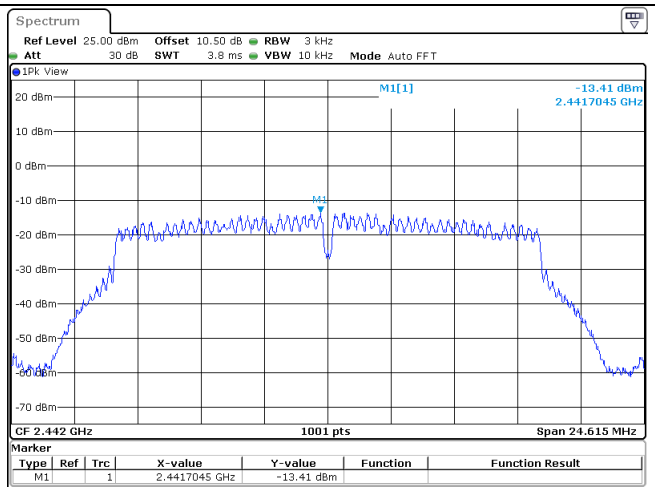
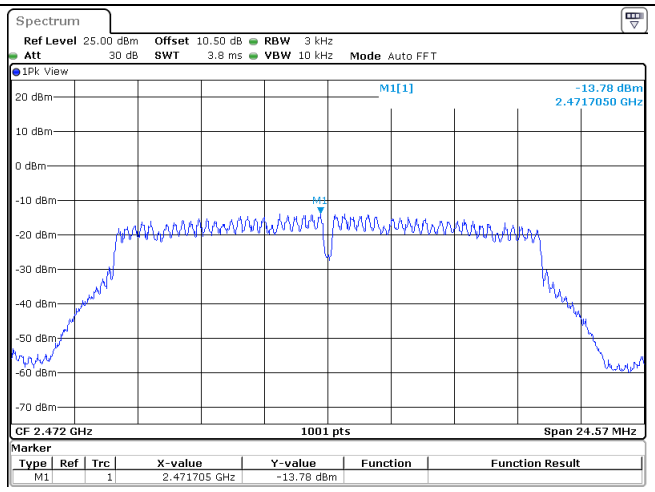
Test Result: Compliant.

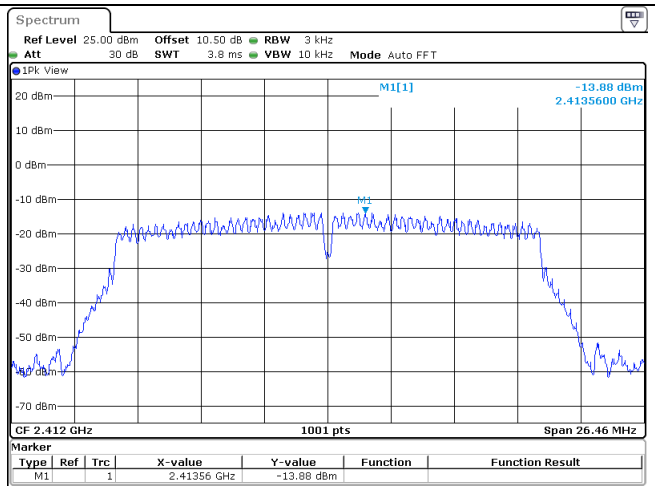
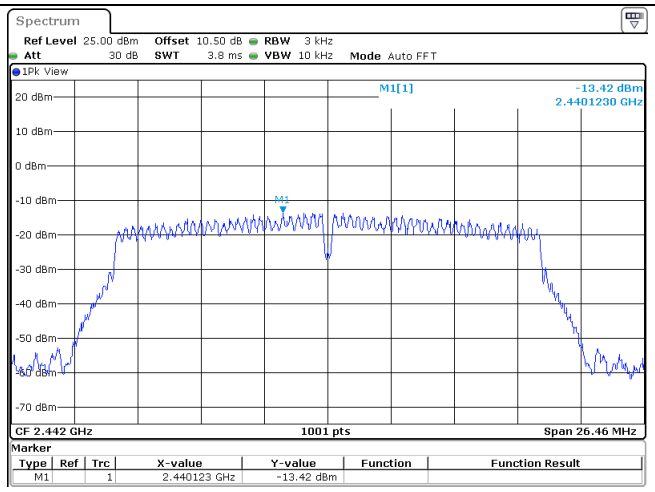
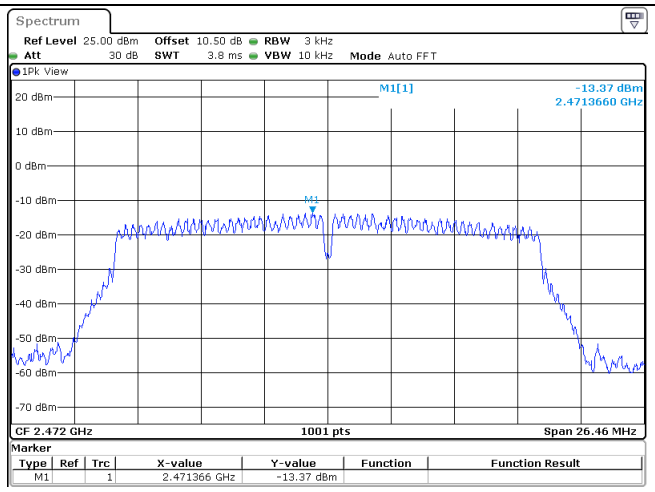
Test Modes	Test Frequency (MHz)	Reading (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-4.79	8.00
	2442	-4.84	8.00
	2472	-4.92	8.00
802.11g	2412	-13.52	8.00
	2442	-13.41	8.00
	2472	-13.78	8.00
802.11n20	2412	-13.88	8.00
	2442	-13.42	8.00
	2472	-13.37	8.00
BLE 1M	2402	-15.22	8.00
	2440	-14.05	8.00
	2480	-15.16	8.00
BLE 2M	2404	-17.07	8.00
	2440	-15.99	8.00
	2478	-16.97	8.00

BLE 1M	
Low Channel	
Middle Channel	
High Channel	

BLE 2M	
Low Channel	
Middle Channel	
High Channel	

802.11b	
Low Channel	
Middle Channel	
High Channel	

802.11g	
Low Channel	
Middle Channel	
High Channel	

802.11n20	
Low Channel	
Middle Channel	
High Channel	

EUT PHOTOGRAPHS

Please refer to the attachment SZ1231211-74617E-RF External photo and SZ1231211-74617E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ1231211-74617E-RF Test Setup photo.

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