FCC PART 15.247

TEST REPORT

For

Shanghai Huace Navigation Technology Ltd.

577 Songying Road, Qingpu District, Shanghai, China 201706

FCC ID: SY4-CTS-A100

Report Type:	**Product Name:**
Original Report	Total Station

Report Number: RSHA240520001-00A

Report Date: 2024-07-19

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RSHA240520001-00A	R1V1	2024-07-19	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Huace Navigation Technology Ltd.
Tested Model	CTS-A100
Product Name	Total Station
Power Supply	DC 7.4V battery
RF Function:	2.4G Wi-Fi, BLE
Operating Band/Frequency:	2.4G Wi-Fi: 2412~2462 MHz(802.11b/g/n20), 2422~2452 MHz(802.11n40) BLE(1Mbps): 2402-2480 MHz
Maximum Conducted Peak Output Power:	2.4G Wi-Fi: 802.11b: 17.65 dBm 802.11g: 20.13 dBm 802.11n20: 22.57 dBm 802.11n40: 22.78 dBm BLE(1Mbps): -2.02 dBm
Channel Number:	2.4G Wi-Fi: 11(802.11b/g/n20), 7(802.11n40) BLE: 40
Channel Separation:	2.4G Wi-Fi: 5 MHz BLE: 2 MHz
Modulation Type:	2.4G Wi-Fi: DSSS, OFDM BLE: GFSK
Antenna Type:	2.4G Wi-Fi /BLE: FPC Antenna
★Maximum Antenna Gain:	2.4G Wi-Fi /BLE: 1.96 dBi
★Cable Loss:	0.2dB

Adapter Information:
Model: NC-III
Input: AC100-240V 50/60Hz
Output:DC8.40V, 1400mA

Note: The maximum antenna gain was declared by the manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RSHA240520001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-05-20.)

Objective

This report is prepared for *Shanghai Huace Navigation Technology Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions' rules.

The tests were performed in order to determine Compliant 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 Compliant Testing of Unlicensed Wireless Devices and FCC 558074 D01 15.247 Meas Guidance v05r02.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	9 kHz~150 kHz	3.8dB
	150 kHz~30 MHz	3.4dB
	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu Province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN5055.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel List for BLE mode:

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

EUT was tested with channel 0, 19 and 39.

Channel List for Wi-Fi Mode:

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

For 802.11b, 802.11g and 802.11n-HT20 mode, EUT was tested with Channel 1, 6 and 11.
For 802.11n-HT40 mode, EUT was tested with Channel 3, 6 and 9.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

RF test software: QSPR

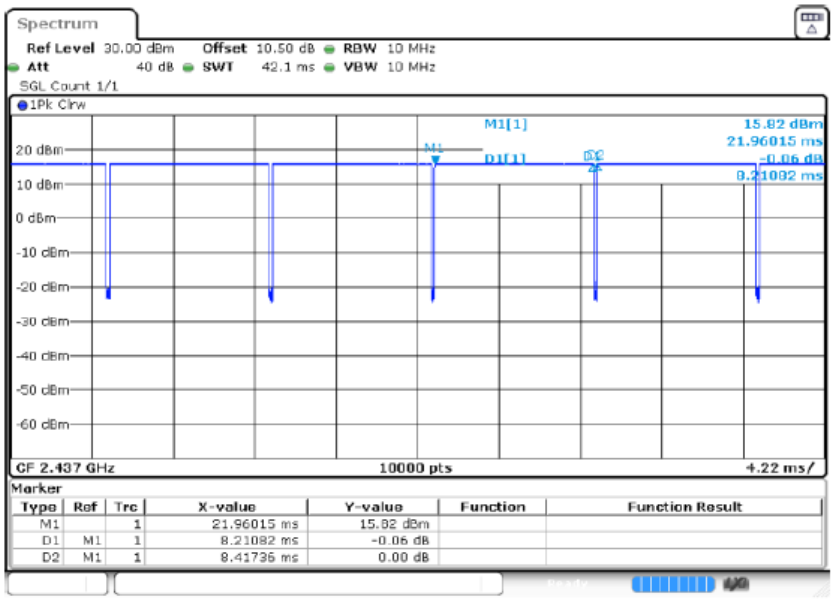
Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data Rate	★Power Level
802.11b	1 Mbps	15
802.11g	6 Mbps	15
802.11n-HT20	MCS0	15
802.11n-HT40	MCS0	12
BLE(1Mbps)	1Mbps	Default

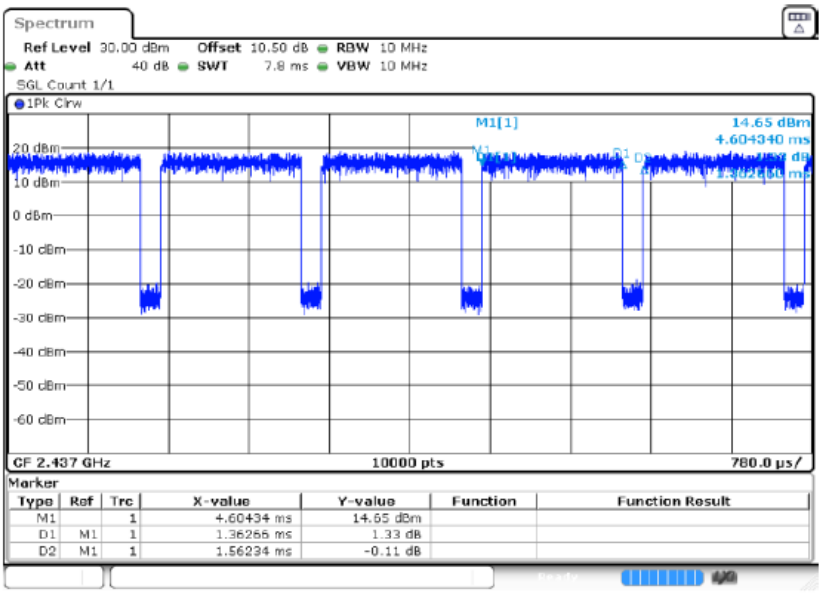
Note: The power level was declared by the applicant.

Duty Cycle:

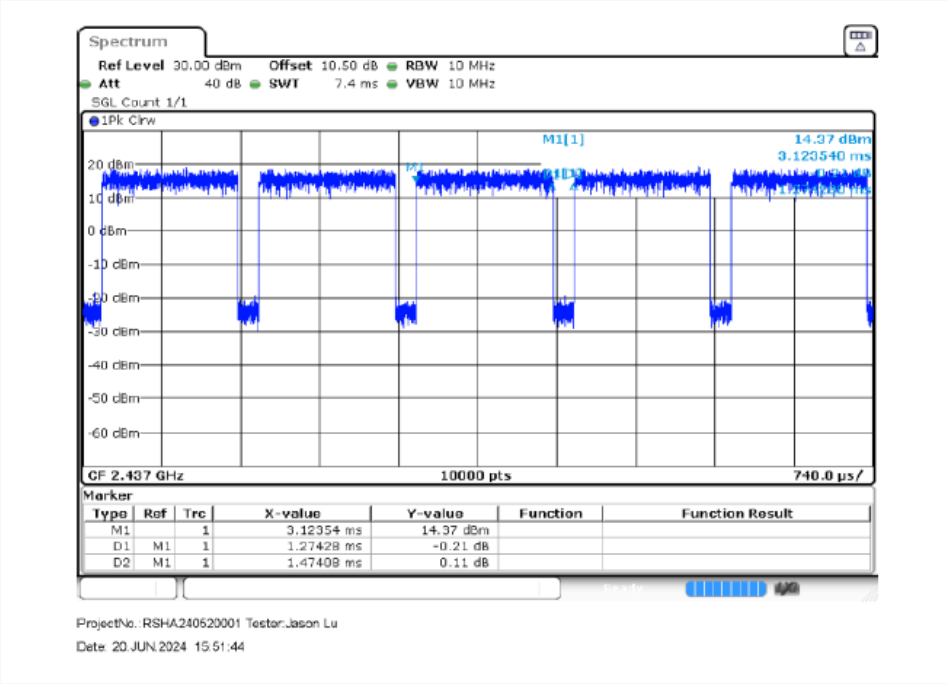
802.11b Mode Middle Channel



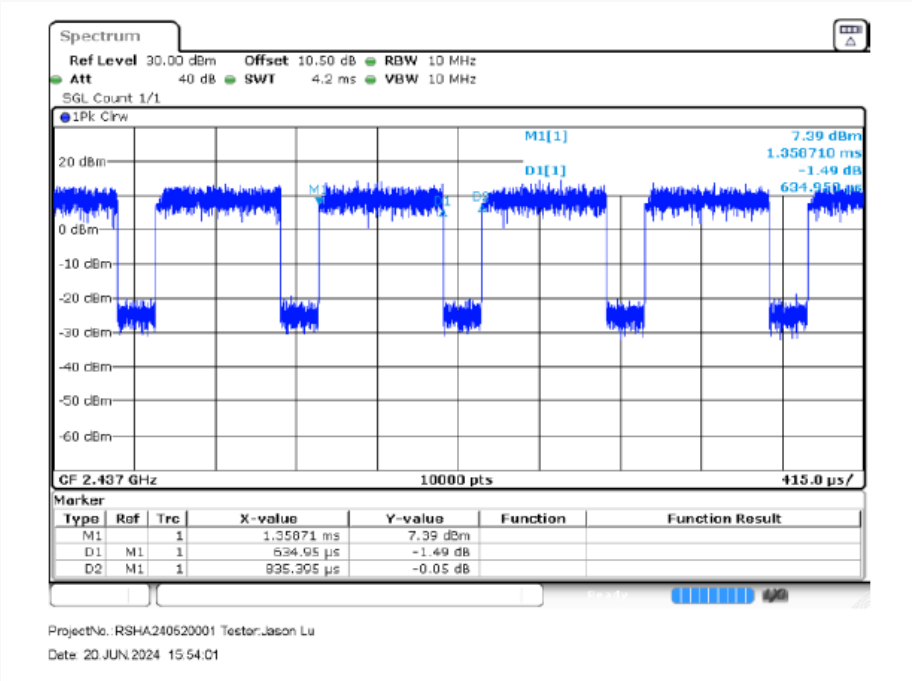
802.11g Mode Middle Channel



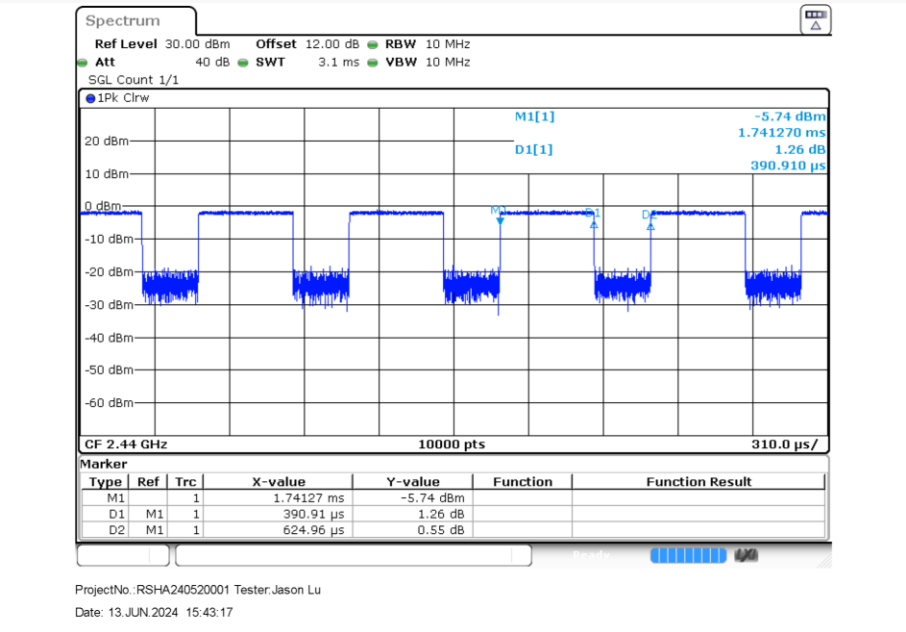
802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



BLE(1Mbps) Mode Middle Channel



Mode	Ton(ms)	Ton+off(ms)	Duty Cycle (%)
802.11b	8.211	8.417	97.55
802.11g	1.363	1.562	87.26
802.11n-HT20	1.274	1.474	86.43
802.11n-HT40	0.635	0.835	76.05
BLE(1Mbps)	0.391	0.625	62.56

Support Equipment List and Details

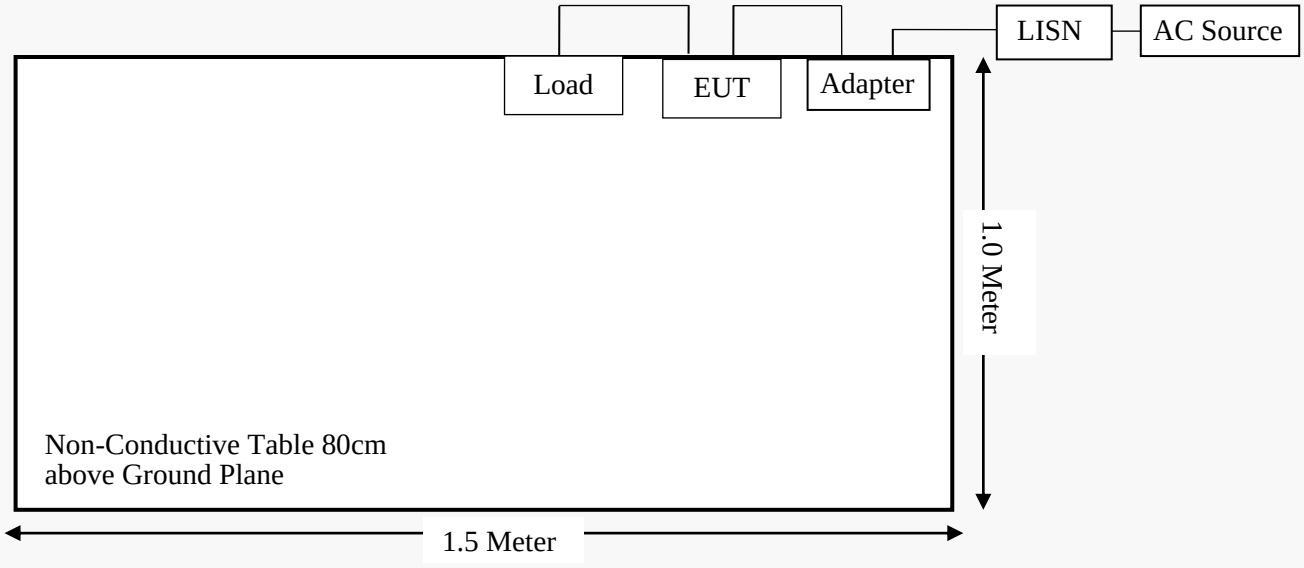
Manufacturer	Description	Model	Serial Number
/	Load	/	/

External I/O Cable

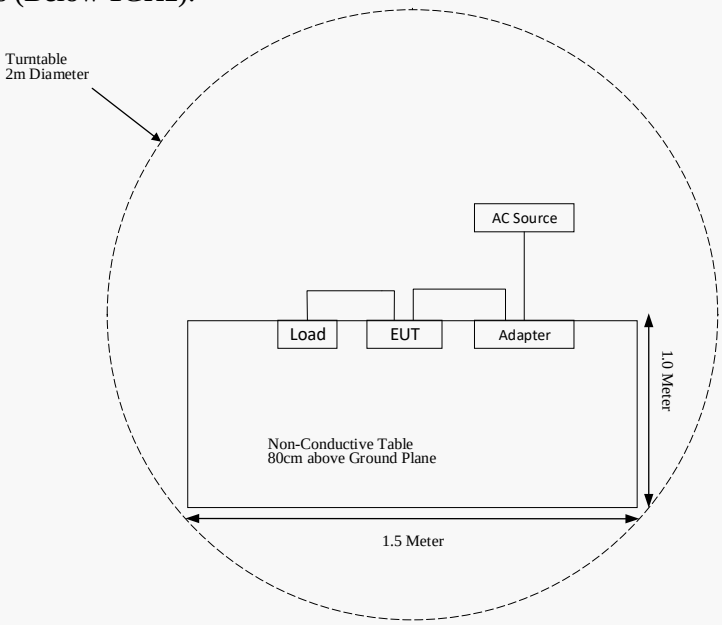
Cable Description	Length (m)	From Port	To
Power Cable 1	1.2	EUT	Adapter
Power Cable 2	1.0	Adapter	LISN/AC Source
Power Cable 3	1.0	EUT	Load

Block Diagram of Test Setup

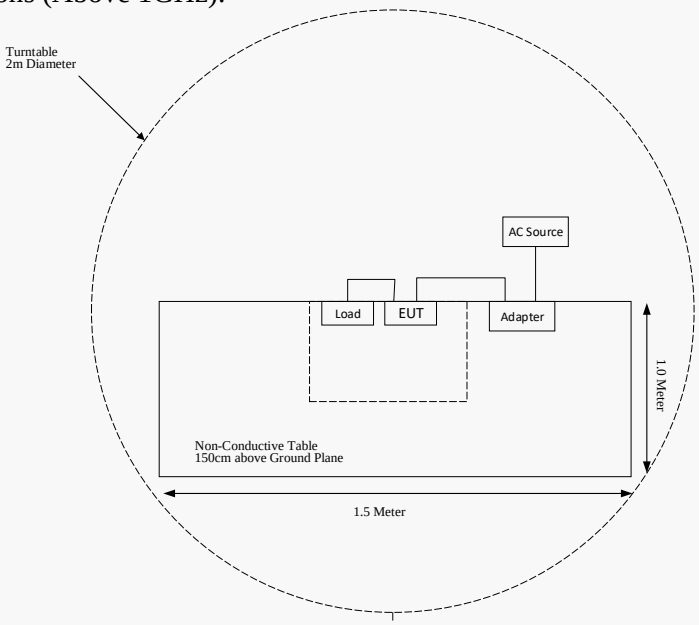
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§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	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
§15.247 (I), §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber #1)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2024-04-23	2025-04-22
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2023-11-11	2024-11-10
Narda	6dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Sonoma Instrument	Pre-amplifier	310N	171205	2024-04-23	2025-04-22
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2024-04-23	2025-04-22
Radiated Emission Test (Chamber #2)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2024-04-25	2025-04-24
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2023-12-02	2024-12-01
ETS-LINDGREN	Horn Antenna	3116	2516	2023-12-08	2024-12-07
A.H.Systems, inc	Amplifier	PAM-0118P	512	2024-04-25	2025-04-24
SELECTOR	Amplifier	EM18G40G	060726	2024-04-25	2025-04-24
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2023-08-05	2024-08-04
Narda	Attenuator	10dB	010	2023-08-15	2024-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2024-04-25	2025-04-24
MICRO-COAX	Coaxial Cable	Cable-12	012	2024-04-25	2025-04-24
MICRO-COAX	Coaxial Cable	Cable-13	013	2024-04-25	2025-04-24
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200103	2024-04-24	2025-04-23
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2024-04-24	2025-04-23
Narda	Attenuator	10dB	010	2024-04-23	2025-04-22
Anritsu	Power Sensor	MA24418A	12621	2024-04-23	2025-04-22
Unknown	RF Cable	RF Cable C01	C01	Each Time	N/A
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2024-04-23	2025-04-22
Rohde & Schwarz	LISN	ENV216	101115	2024-04-23	2025-04-22
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-15	015	2024-04-23	2025-04-22

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

FCC §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:
Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = 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:

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

Calculation Data:

Mode	Frequency Range (MHz)	Antenna Gain With cable loss		Tune-up Output Power★		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
BLE	2402-2480	1.76	1.50	-2.00	0.63	20	0.0002	1.0	0.0002
2.4G Wi-Fi	2412-2462	1.76	1.50	23.00	199.53	20	0.0595	1.0	0.0595
LTE Band 5	824-849	-0.77	0.84	23.50	223.87	20	0.0373	0.5493	0.0679
LTE Band 41	2555-2655	0.98	1.25	25.00	316.23	20	0.0788	1.0	0.0788

Note:
1. For the above tune up power were declared by the manufacturer.
2. 2.4G Wi-Fi , LTE Band 41 can transmit simultaneously（worst case）.

$$\sum_i \frac{S_i}{S_{Limit,i}}$$ =0.0595+0.0788=0.1383 < 1.0

Result: The device meet FCC MPE at 20 cm distance.

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 Compliant 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 an FPC for 2.4G Wi-Fi & BLE, and the antenna gain is 1.96 dBi, which permanently attached to the unit, fulfill the requirement of this section. Please refer to the EUT photos.

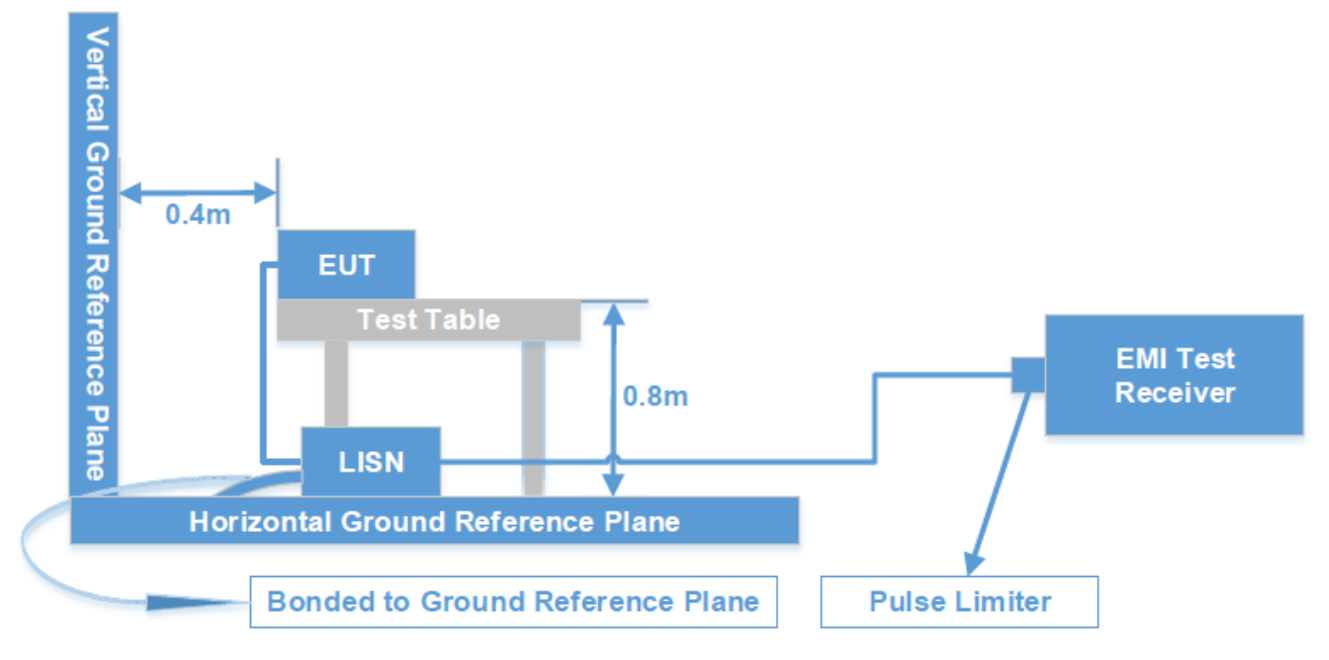
Result: Compliant.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

Test System Setup



The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

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	RBW	VBW
150 kHz - 30 MHz	9 kHz	30 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

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

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

If the maximum peak value of the emissions is below the average limit, the QP value and average value measurement will not need to be performed and only record the maximum peak measured value to meet the requirements.

Level & Over Limit Calculation

The Level is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
Level (dBμV) = Read level (dBμV) + Factor (dB)

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 above the limit. The equation for Over Limit calculation is as follows:

Over Limit (dB) = Level (dBμV) - Limit (dBμV)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data: See Appendix

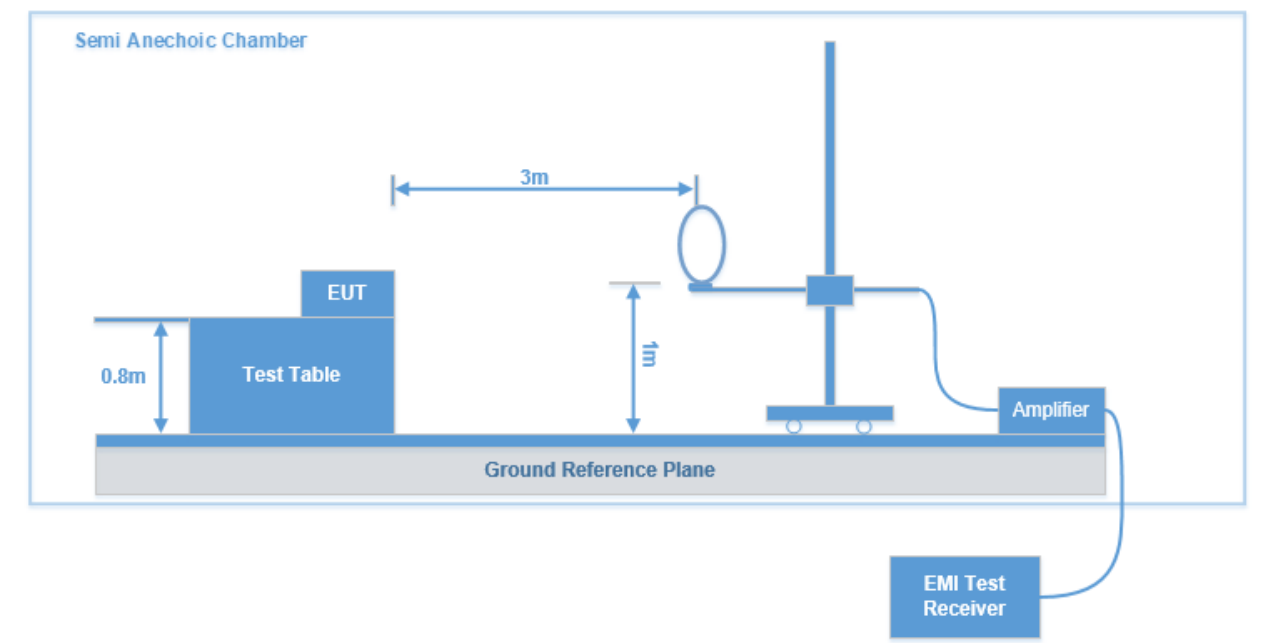
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

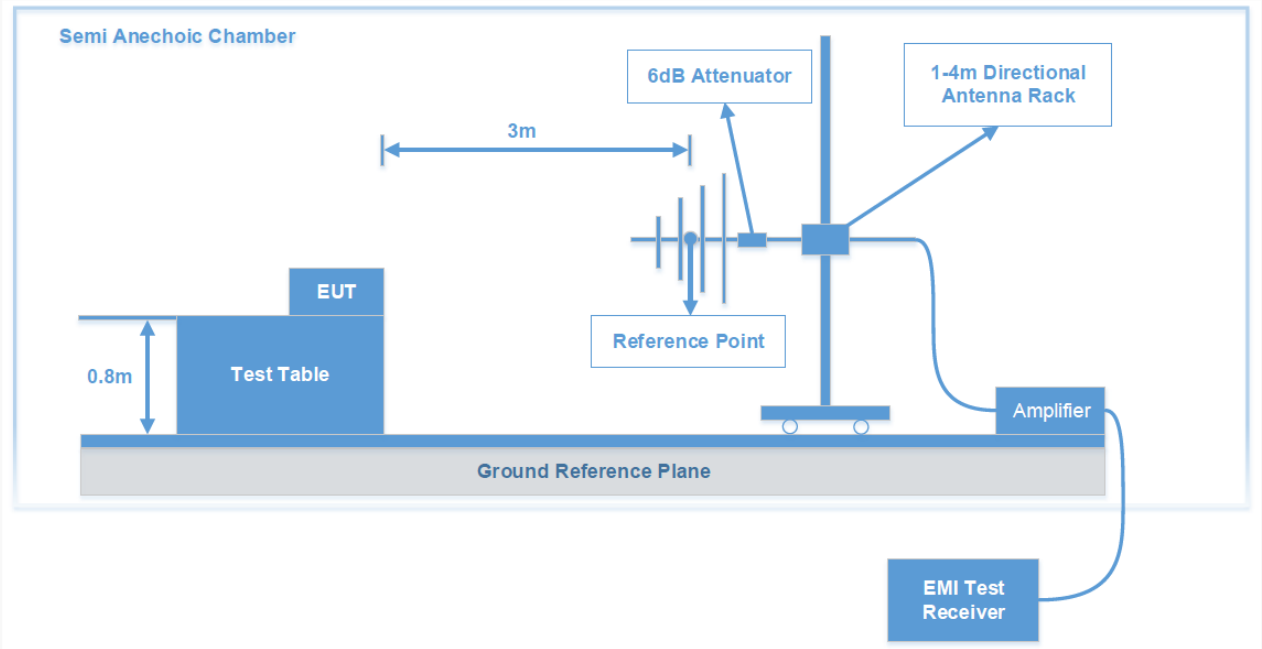
FCC §15.247 (d); §15.209; §15.205;

Test System Setup

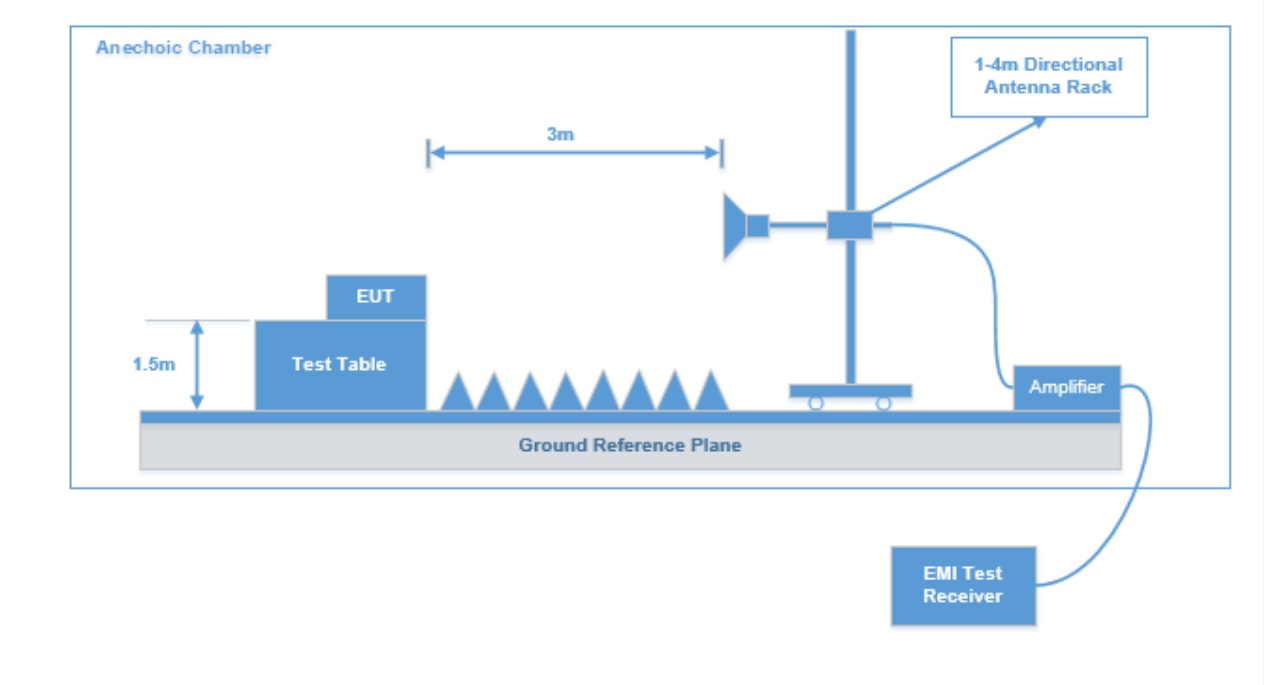
9 kHz-30MHz:



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 Setup

The system was investigated from 9 kHz to 25 GHz.

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

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz – 150 kHz	200 Hz	1 kHz	200 Hz	QP/Average
150 kHz – 30 MHz	9 kHz	30 kHz	9 kHz	QP/ Average
30 MHz – 1000 MHz	100 kHz	300 kHz	/	Peak
	/	/	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	Peak
	1MHz	3 MHz	/	Average

Test Procedure

According to ANSI C63.10-2013 clause 6.5, 6.6 and 6.7.

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

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

For 9 kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

Corrected Amplitude & 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 (dBμV/m) = Meter Reading (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV/m)

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data: See Appendix

FCC §15.247(A) (2) - 6 DB EMISSION BANDWIDTH

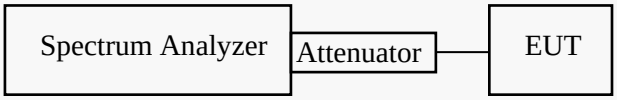
Applicable Standard

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

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 * RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data: See Appendix

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, Compliant 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

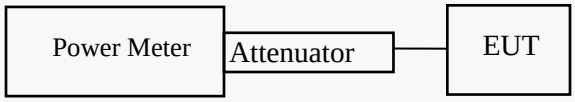
For 2.4G Wi-Fi:

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

11.9.2.3.2 Method AVGPM-G

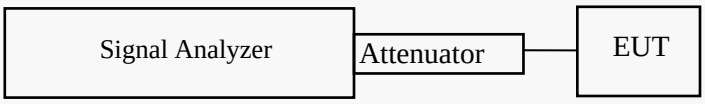
Method AVGPM-G is a measurement using a gated RF average power meter.
Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.



For BLE:

According to ANSI C63.10-2013 sub-clause 11.9.1.1

1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ 3 x RBW.
3. Set span ≥ 3 x RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.



Test Data: See Appendix

FCC §15.247(D) – 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

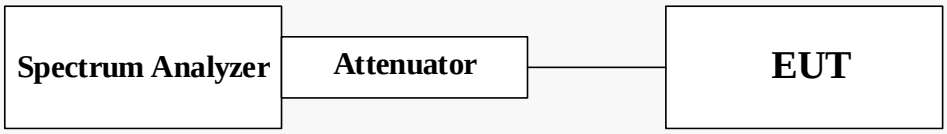
Applicable Standard

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 Compliant 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

According to ANSI C63.10-2013 sub-clause 6.10.

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: See Appendix

FCC §15.247(E) - POWER SPECTRAL DENSITY

Applicable Standard

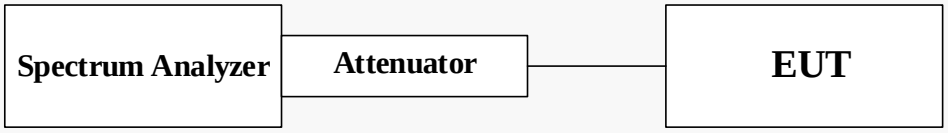
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of 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

According to ANSI C63.10-2013 sub-clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine Compliant, and it is optional if the maximum conducted (average) output power was used to determine Compliant:

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 Data: See Appendix

Appendix - TEST DATA

Environmental Conditions & Test Information

Test Item:	DUTY CYCLE	AC LINE CONDUCTED EMISSIONS	RADIATED EMISSIONS
			9kHz -25GHz
Test Date:	2024-06-13~2024-06-20	2024-06-12	2024-06-04~2024-07-16
Temperature:	15.9 ℃~18.8 ℃	24.6 ℃	24.6℃~22.7 ℃
Relative Humidity:	43 %~57 %	55 %	55 %~61 %
ATM Pressure:	101.5kPa~102.8kPa	100.5 kPa	101.4kPa~102.8 kPa
Test Result:	Pass	Pass	Pass
Test Engineer:	Jason Lu	Frank Liu	Klein Zhu & Leah Li & Hugh Wu

Test Item:	6 DB EMISSION BANDWIDTH	OCCUPIED BANDWIDTH	POWER SPECTRAL DENSITY
Test Date:	2024-06-13~2024-06-20	2024-06-13~2024-06-20	2024-06-13~2024-06-20
Temperature:	15.9 ℃~18.8 ℃	15.9 ℃~18.8 ℃	15.9 ℃~18.8 ℃
Relative Humidity:	43 %~57 %	43 %~57 %	43 %~57 %
ATM Pressure:	101.5kPa~102.8kPa	101.5kPa~102.8kPa	101.5kPa~102.8kPa
Test Result:	Pass	/	Pass
Test Engineer:	Jason Lu	Jason Lu	Jason Lu

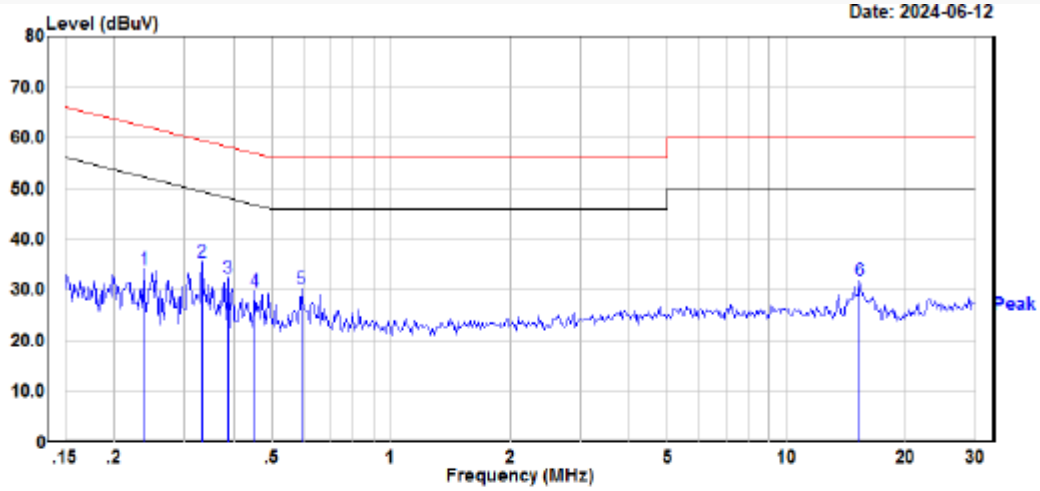
Test Item:	TRANSMITTER OUTPUT POWER MEASUREMENT	OUT OF BAND EMISSIONS
Test Date:	2024-06-13	2024-06-13~2024-06-20
Temperature:	15.9 ℃	15.9 ℃~18.8 ℃
Relative Humidity:	43 %	43 %~57 %
ATM Pressure:	101.5kPa	101.5kPa~102.8kPa
Test Result:	Pass	Pass
Test Engineer:	Jason Lu	Jason Lu

AC LINE CONDUCTED EMISSIONS

For Wi-Fi Mode:

EUT operation mode: Transmitting in maximum output power mode 802.11n40 low channel

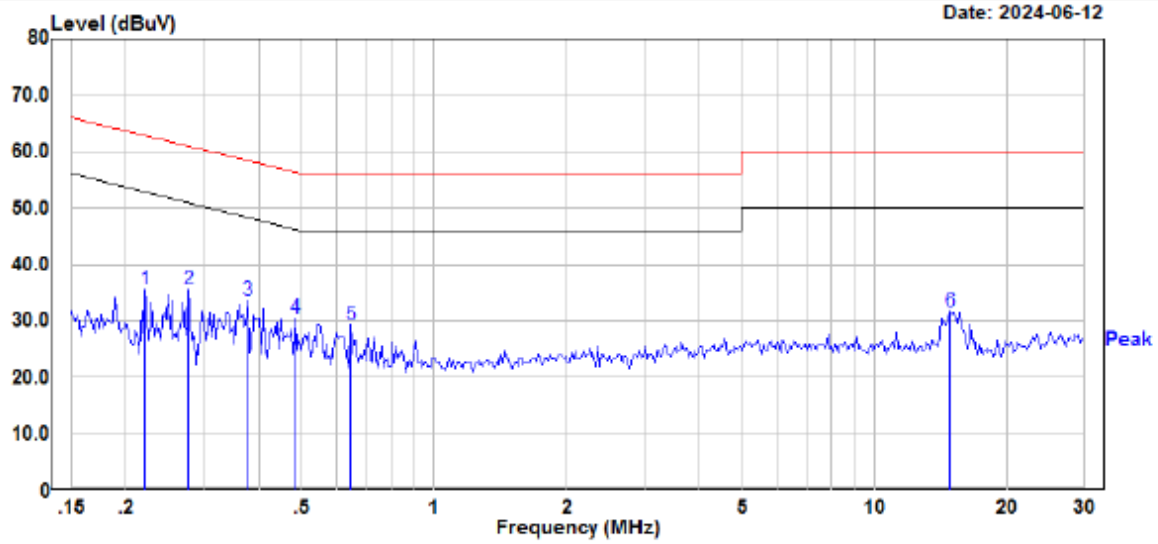
Neutral:




```
Site                : CE
Condition           : FCC Part 15.207
                    : DET:Peak
Project No.         : RSHA240520001
Model               : CTS-A100
Phase               : N
Voltage             : AC 120V
Mode                : 2.4G WIFI
Test Equipment      : ENV216,ESR
Temperature         : 24.6℃
Humidity            : 55%
Atmospheric pressure: 100.5kPa
Test Engineer       : Frank Liu
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.237	14.00	20.13	34.13	62.20	-28.07	Peak
2	0.332	15.47	20.18	35.65	59.39	-23.74	Peak
3	0.386	12.22	20.20	32.42	58.16	-25.74	Peak
4	0.452	9.62	20.22	29.84	56.84	-27.00	Peak
5	0.591	10.21	20.10	30.31	56.00	-25.69	Peak
6	15.260	12.29	19.70	31.99	60.00	-28.01	Peak

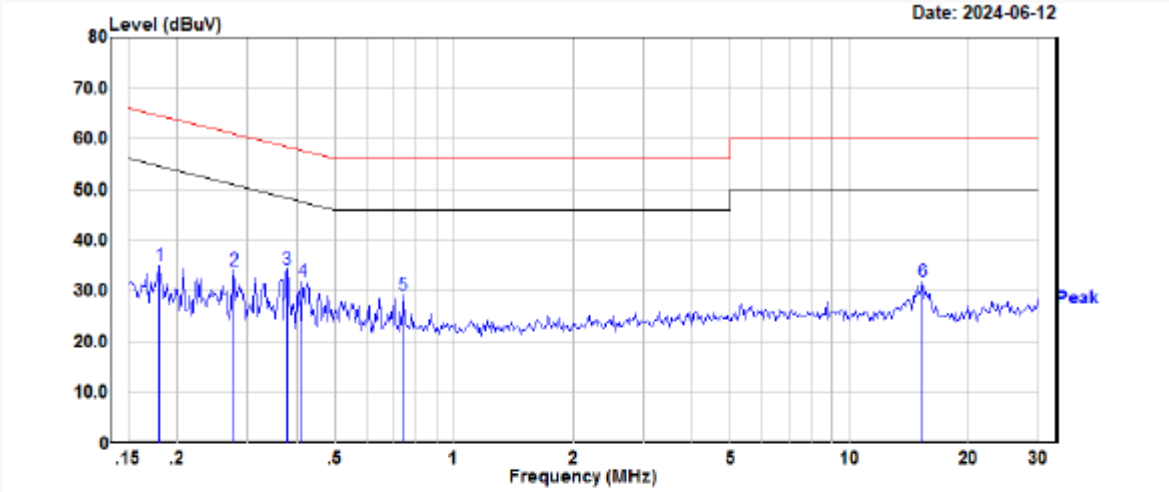
Line:




```
Site                : CE
Condition           : FCC Part 15.207
                    : DET:Peak
Project No.         : RSHA240520001
Model               : CTS-A100
Phase               : L
Voltage             : AC 120V
Mode                : 2.4G WIFI
Test Equipment      : ENV216,ESR
Temperature         : 24.6℃
Humidity            : 55%
Atmospheric pressure: 100.5kPa
Test Engineer       : Frank Liu
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.221	15.35	20.13	35.48	62.78	-27.30	Peak
2	0.278	15.48	20.15	35.63	60.88	-25.25	Peak
3	0.378	13.41	20.19	33.60	58.32	-24.72	Peak
4	0.485	10.39	20.16	30.55	56.26	-25.71	Peak
5	0.647	9.23	20.08	29.31	56.00	-26.69	Peak
6	14.812	11.97	19.71	31.68	60.00	-28.32	Peak

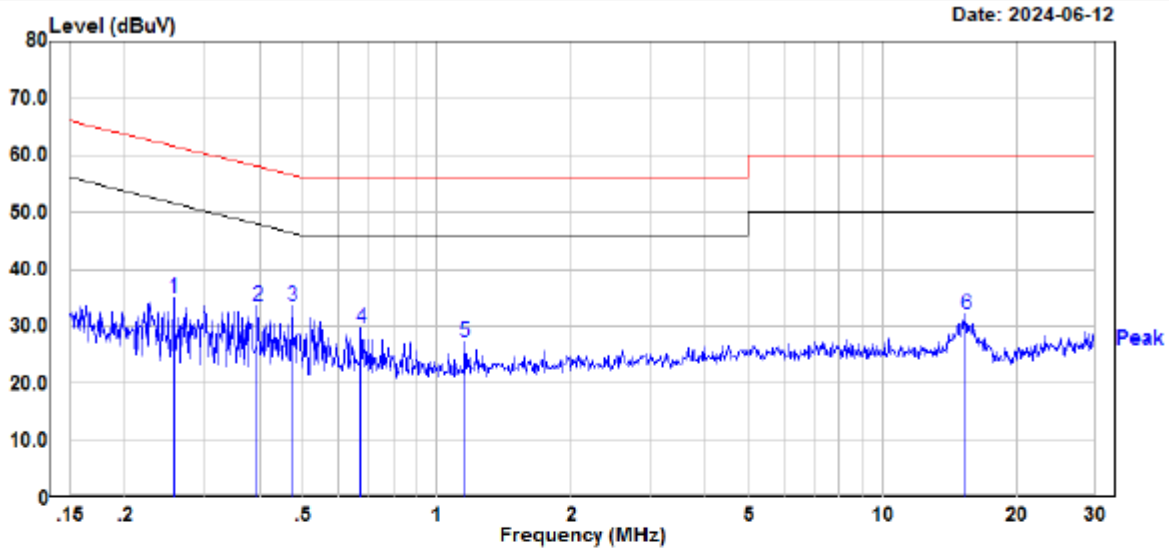
For BLE Mode: *Transmitting in maximum output power mode middle channel*
Neutral:




```
Site                : CE
Condition           : FCC Part 15.207
                    : DET:Peak
Project No.         : RSHA240520001
Model               : CTS-A100
Phase               : N
Voltage             : AC 120V
Mode                : BLE 1M
Test Equipment      : ENV216,ESR
Temperature         : 24.6℃
Humidity            : 55%
Atmospheric pressure: 100.5kPa
Test Engineer       : Frank Liu
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.179	14.96	20.12	35.08	64.51	-29.43	Peak
2	0.278	13.94	20.15	34.09	60.88	-26.79	Peak
3	0.378	14.07	20.19	34.26	58.32	-24.06	Peak
4	0.413	11.65	20.21	31.86	57.58	-25.72	Peak
5	0.743	9.19	20.01	29.20	56.00	-26.80	Peak
6	15.260	12.29	19.70	31.99	60.00	-28.01	Peak

Line:



Site : CE
Condition : FCC Part 15.207
: DET:Peak
Project No. : RSHA240520001
Model : CTS-A100
Phase : L
Voltage : AC 120V
Mode : BLE 1M
Test Equipment : ENV216,ESR
Temperature : 24.6℃
Humidity : 55%
Atmospheric pressure: 100.5kPa
Test Engineer : Frank Liu

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.257	14.93	20.14	35.07	61.53	-26.46	Peak
2	0.396	13.45	20.20	33.65	57.93	-24.28	Peak
3	0.474	13.41	20.18	33.59	56.44	-22.85	Peak
4	0.676	9.69	20.08	29.77	56.00	-26.23	Peak
5	1.158	7.60	19.81	27.41	56.00	-28.59	Peak
6	15.384	12.42	19.70	32.12	60.00	-27.88	Peak

SPURIOUS EMISSIONS

Test Result: Compliant

EUT operation mode: Transmitting

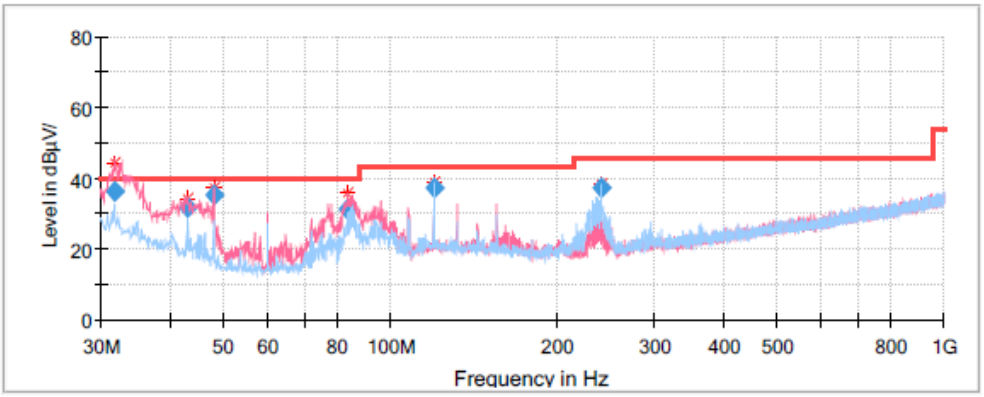
9 kHz-30MHz:
Transmitting in maximum output power mode and channel. The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

For Wi-Fi Mode:
30MHz-1GHz: 802.11b mode is worst case

Low channel: 2412MHz

Common Information

Project No:	RSHA240520001
Test Mode:	2.4G WiFi
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



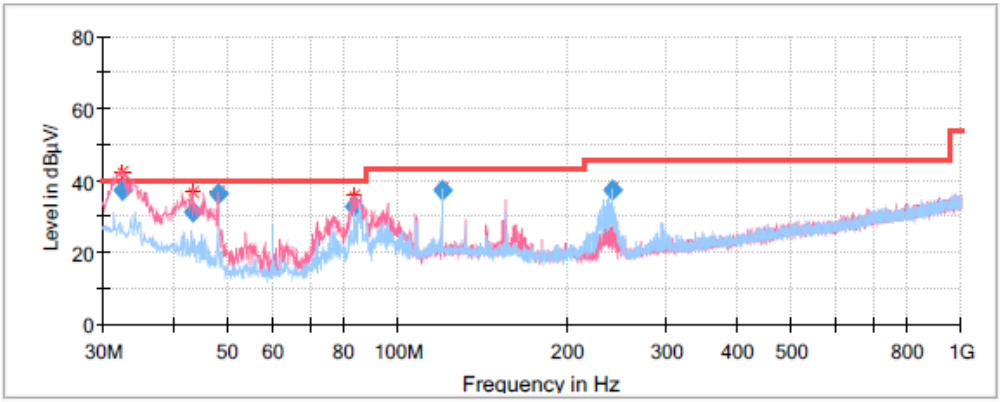
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
31.940000	36.07	40.00	3.93	V	-6.6
43.087150	31.74	40.00	8.26	V	-13.1
47.995100	35.14	40.00	4.86	V	-15.7
83.950000	31.23	40.00	8.77	V	-17.1
120.005600	37.23	43.50	6.27	H	-10.9
240.008300	37.41	46.00	8.59	H	-12.6

Middle channel: 2437MHz

Common Information

Project No:	RSHA240520001
Test Mode:	2.4G WiFi
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



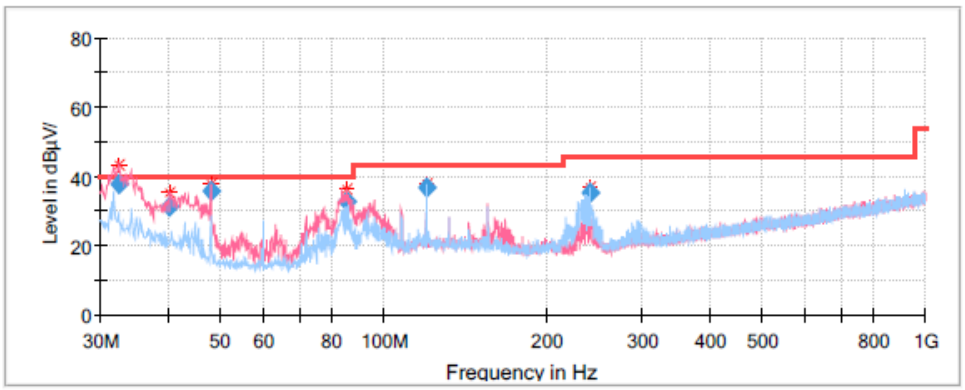
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.425000	37.33	40.00	2.67	V	-6.6
43.330000	31.42	40.00	8.58	V	-13.1
47.998450	36.18	40.00	3.82	V	-15.7
83.976650	32.69	40.00	7.31	V	-17.2
119.989400	37.43	43.50	6.07	H	-10.9
240.027200	37.11	46.00	8.89	H	-12.6

High Channel: 2462MHz

Common Information

Project No:	RSHA240520001
Test Mode:	2.4GWiFi
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



Final_Result

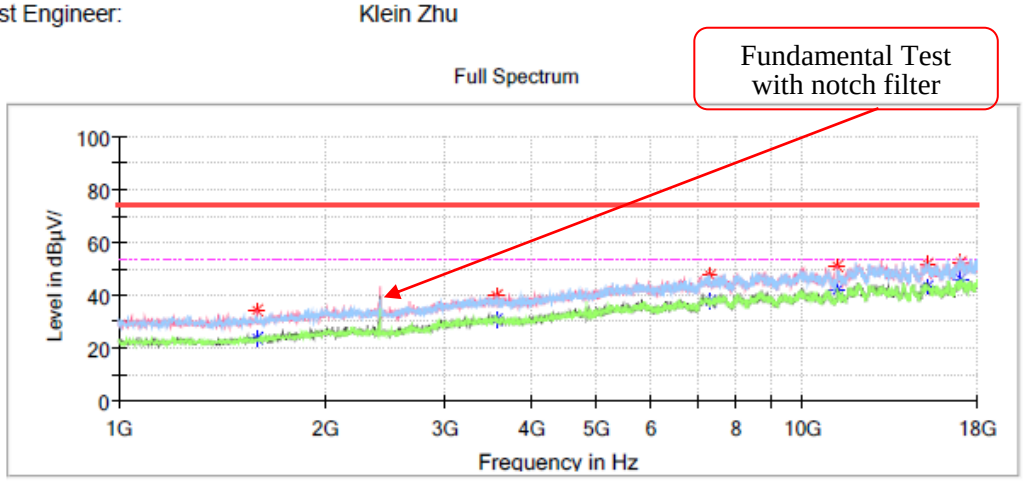
Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.420000	37.83	40.00	2.17	V	-5.9
40.420000	30.95	40.00	9.05	V	-11.8
47.986100	35.56	40.00	4.44	V	-15.7
85.627050	32.56	40.00	7.44	V	-17.1
119.996600	36.91	43.50	6.59	H	-10.9
240.017000	35.23	46.00	10.77	H	-12.6

1GHz-18GHz:
802.11b Mode:

Low Channel: 2412MHz

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



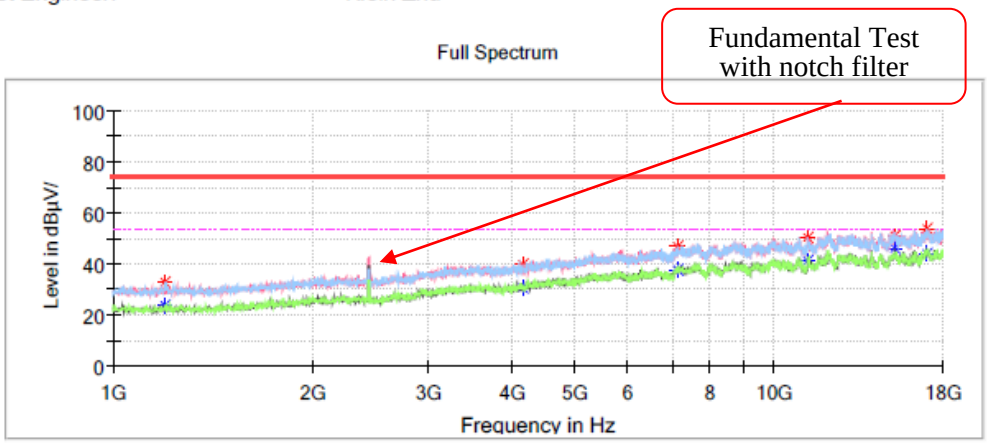
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1593.300000	34.13	---	74.00	39.87	V	-14.2
1593.300000	---	23.84	54.00	30.16	V	-14.2
3565.300000	40.13	---	74.00	33.87	H	-6.3
3565.300000	---	30.51	54.00	23.49	H	-6.3
7335.900000	47.71	---	74.00	26.29	H	3.5
7335.900000	---	37.56	54.00	16.44	H	3.5
11211.900000	50.76	---	74.00	23.24	V	8.0
11211.900000	---	41.76	54.00	12.24	V	8.0
15213.700000	52.08	---	74.00	21.92	H	9.5
15213.700000	---	43.34	54.00	10.66	H	9.5
17031.000000	52.49	---	74.00	21.51	V	12.2
17031.000000	---	46.04	54.00	7.96	V	12.2

Middle Channel: 2437MHz

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



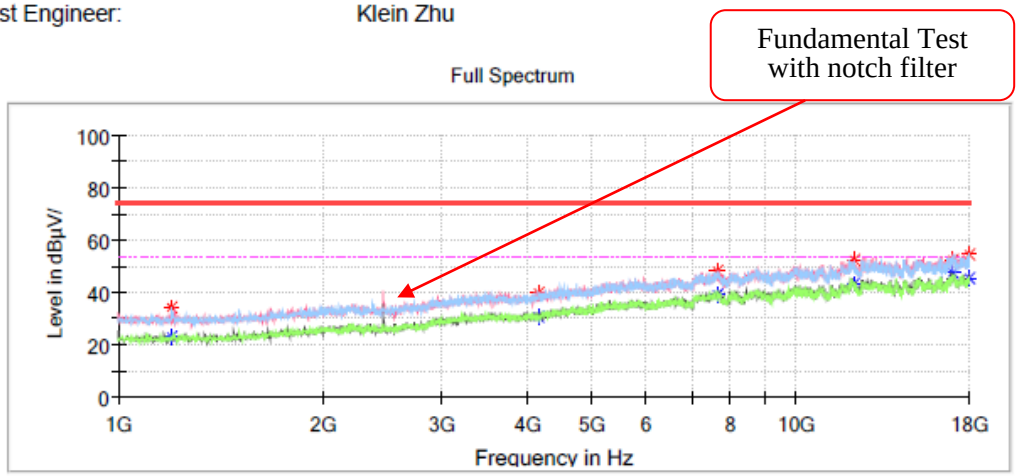
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1198.900000	---	24.08	54.00	29.92	H	-15.2
1198.900000	32.72	---	74.00	41.28	H	-15.2
4155.200000	---	30.99	54.00	23.01	H	-5.4
4155.200000	40.05	---	74.00	33.95	H	-5.4
7126.800000	---	37.93	54.00	16.07	H	2.9
7126.800000	47.10	---	74.00	26.90	H	2.9
11210.200000	50.24	---	74.00	23.76	V	8.0
11210.200000	---	41.42	54.00	12.58	V	8.0
15183.100000	---	46.18	54.00	7.82	H	9.5
15183.100000	50.89	---	74.00	23.11	H	9.5
17017.400000	---	44.35	54.00	9.65	H	12.3
17017.400000	53.75	---	74.00	20.25	H	12.3

High Channel: 2462MHz

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1198.900000	---	23.04	54.00	30.96	H	-15.2
1198.900000	34.12	---	74.00	39.88	H	-15.2
4155.200000	---	30.60	54.00	23.40	V	-5.4
4155.200000	39.92	---	74.00	34.08	V	-5.4
7633.400000	---	39.45	54.00	14.55	V	3.9
7633.400000	48.40	---	74.00	25.60	V	3.9
12153.700000	---	43.45	54.00	10.55	V	9.2
12153.700000	52.76	---	74.00	21.24	V	9.2
17024.200000	---	47.25	54.00	6.75	V	12.2
17024.200000	52.56	---	74.00	21.44	V	12.2
17998.300000	---	45.44	54.00	8.56	V	12.0
17998.300000	54.89	---	74.00	19.11	V	12.0

802.11g Mode

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
Low Channel: 2412 MHz						
1442.000000	---	24.24	54.00	29.76	V	-14.8
1442.000000	30.70	---	74.00	43.30	V	-14.8
3184.500000	39.26	---	74.00	34.74	H	-7.7
3184.500000	---	28.95	54.00	25.05	H	-7.7
5712.400000	---	34.92	54.00	19.08	V	-0.2
5712.400000	45.67	---	74.00	28.33	V	-0.2
11205.100000	---	42.61	54.00	11.39	V	7.9
11205.100000	51.24	---	74.00	22.76	V	7.9
15244.300000	---	42.95	54.00	11.05	H	9.6
15244.300000	53.40	---	74.00	20.60	H	9.6
17962.600000	---	43.59	54.00	10.41	V	11.9
17962.600000	52.58	---	74.00	21.42	V	11.9
Middle Channel: 2437 MHz						
1498.100000	31.36	---	74.00	42.64	V	-14.7
1498.100000	---	22.15	54.00	31.85	V	-14.7
3696.200000	39.32	---	74.00	34.68	H	-6.2
3696.200000	---	29.67	54.00	24.33	H	-6.2
7264.500000	48.24	---	74.00	25.76	H	3.3
7264.500000	---	37.56	54.00	16.44	H	3.3
11203.400000	49.89	---	74.00	24.11	V	7.9
11203.400000	---	42.67	54.00	11.33	V	7.9
14491.200000	53.23	---	74.00	20.77	H	9.4
14491.200000	---	43.78	54.00	10.22	H	9.4
17063.300000	51.64	---	74.00	22.36	H	12.2
17063.300000	---	45.42	54.00	8.58	H	12.2
High Channel: 2462 MHz						
1680.000000	34.99	---	74.00	39.01	H	-13.7
1680.000000	---	23.10	54.00	30.90	H	-13.7
3731.900000	39.63	---	74.00	34.37	H	-6.1
3731.900000	---	30.79	54.00	23.21	H	-6.1
7589.200000	48.28	---	74.00	25.72	V	3.9
7589.200000	---	37.66	54.00	16.34	V	3.9
11652.200000	50.48	---	74.00	23.52	H	8.9
11652.200000	---	40.83	54.00	13.17	H	8.9
16303.400000	52.93	---	74.00	21.07	V	10.2
16303.400000	---	43.92	54.00	10.08	V	10.2
17998.300000	---	45.92	54.00	8.08	H	12.0
17998.300000	53.14	---	74.00	20.86	H	12.0

802.11n20 Mode

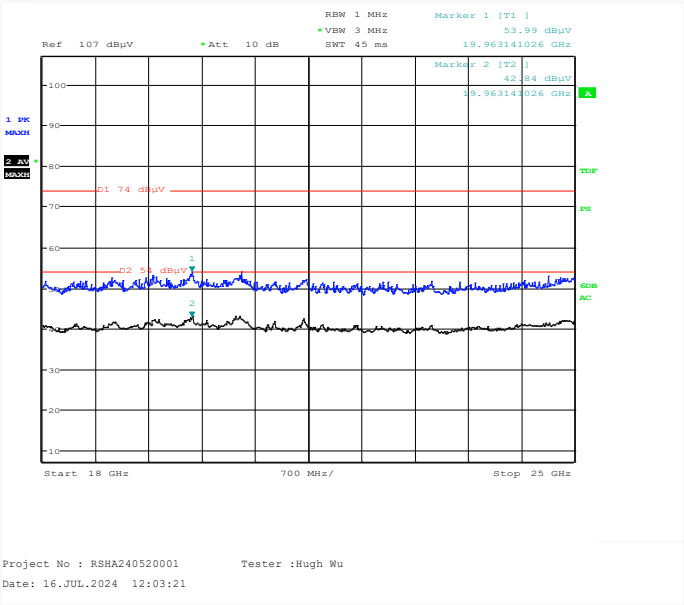
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
Low Channel: 2412 MHz						
1202.300000	---	22.83	54.00	31.17	V	-15.2
1202.300000	33.56	---	74.00	40.44	V	-15.2
3563.600000	---	32.10	54.00	21.90	H	-6.3
3563.600000	39.13	---	74.00	34.87	H	-6.3
6927.900000	---	35.19	54.00	18.81	V	2.3
6927.900000	45.36	---	74.00	28.64	V	2.3
12082.300000	53.02	---	74.00	20.98	H	9.1
12082.300000	---	42.70	54.00	11.30	H	9.1
15604.700000	51.11	---	74.00	22.89	H	9.7
15604.700000	---	41.15	54.00	12.85	H	9.7
16301.700000	52.73	---	74.00	21.27	V	10.2
16301.700000	---	46.21	54.00	7.79	V	10.2
Middle Channel: 2437 MHz						
1380.800000	---	24.05	54.00	29.95	H	-14.9
1380.800000	31.64	---	74.00	42.36	H	-14.9
3023.000000	---	29.97	54.00	24.03	V	-8.3
3023.000000	38.90	---	74.00	35.10	V	-8.3
4731.500000	---	35.86	54.00	18.14	H	-3.4
4731.500000	41.90	---	74.00	32.10	H	-3.4
7694.600000	---	38.60	54.00	15.40	H	3.9
7694.600000	48.24	---	74.00	25.76	H	3.9
12126.500000	---	43.41	54.00	10.59	V	9.1
12126.500000	52.42	---	74.00	21.58	V	9.1
17070.100000	54.19	---	74.00	19.81	H	12.2
17070.100000	---	44.04	54.00	9.96	H	12.2
High Channel: 2462 MHz						
1266.900000	31.52	---	74.00	42.48	H	-15.1
1266.900000	---	22.59	54.00	31.41	H	-15.1
2989.000000	38.78	---	74.00	35.22	H	-8.5
2989.000000	---	29.85	54.00	24.15	H	-8.5
5401.300000	44.41	---	74.00	29.59	V	-0.7
5401.300000	---	35.39	54.00	18.61	V	-0.7
8799.600000	49.09	---	74.00	24.91	H	5.4
8799.600000	---	41.23	54.00	12.77	H	5.4
14006.700000	51.86	---	74.00	22.14	V	9.8
14006.700000	---	44.04	54.00	9.96	V	9.8
16308.500000	---	44.96	54.00	9.04	H	10.3
16308.500000	53.96	---	74.00	20.04	H	10.3

802.11n40 Mode

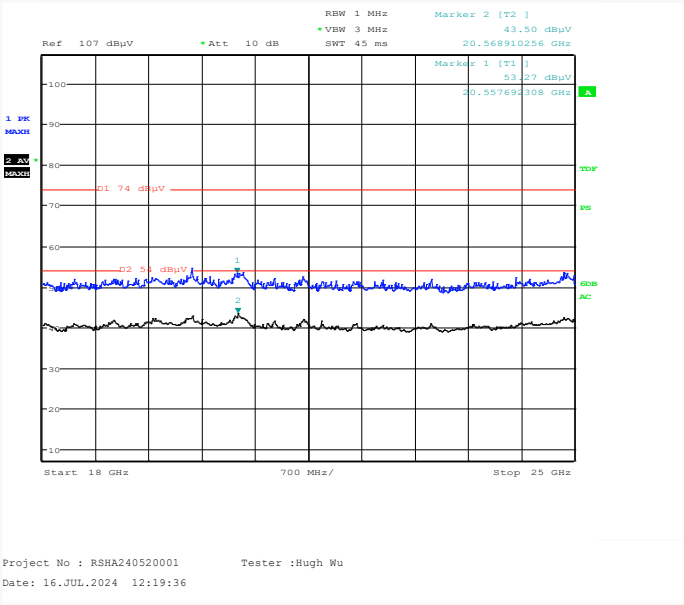
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
Low Channel: 2422MHz						
1200.600000	---	23.03	54.00	30.97	V	-15.2
1200.600000	33.73	---	74.00	40.27	V	-15.2
3555.100000	---	30.49	54.00	23.51	H	-6.3
3555.100000	39.98	---	74.00	34.02	H	-6.3
8741.800000	---	40.84	54.00	13.16	V	5.4
8741.800000	49.53	---	74.00	24.47	V	5.4
14494.600000	---	43.66	54.00	10.34	H	9.4
14494.600000	52.43	---	74.00	21.57	H	9.4
16743.700000	---	42.46	54.00	11.54	V	11.5
16743.700000	51.53	---	74.00	22.47	V	11.5
Middle Channel: 2437 MHz						
1207.400000	33.11	---	74.00	40.89	H	-15.2
1207.400000	---	22.48	54.00	31.52	H	-15.2
3271.200000	40.29	---	74.00	33.71	V	-7.3
3271.200000	---	30.99	54.00	23.01	V	-7.3
5306.100000	44.38	---	74.00	29.62	H	-1.1
5306.100000	---	35.31	54.00	18.69	H	-1.1
9863.800000	49.43	---	74.00	24.57	V	6.6
9863.800000	---	39.96	54.00	14.04	V	6.6
14001.600000	50.93	---	74.00	23.07	H	9.8
14001.600000	---	44.53	54.00	9.47	H	9.8
16301.700000	---	44.00	54.00	10.00	V	10.2
16301.700000	53.04	---	74.00	20.96	V	10.2
High Channel: 2452 MHz						
1285.600000	31.52	---	74.00	42.48	H	-15.0
1285.600000	---	21.85	54.00	32.15	H	-15.0
3697.900000	39.82	---	74.00	34.18	V	-6.2
3697.900000	---	33.37	54.00	20.63	V	-6.2
7259.400000	47.17	---	74.00	26.83	H	3.3
7259.400000	---	38.73	54.00	15.27	H	3.3
11205.100000	50.27	---	74.00	23.73	V	7.9
11205.100000	---	42.43	54.00	11.57	V	7.9
14001.600000	51.88	---	74.00	22.12	H	9.8
14001.600000	---	44.06	54.00	9.94	H	9.8
15174.600000	---	43.04	54.00	10.96	V	9.5
15174.600000	53.70	---	74.00	20.30	V	9.5

18GHz-25GHz: Transmitting in maximum output power mode and channel

Horizontal



Vertical



Note: The test distance is 3m. The limit is 74dBµV/m(Peak) and 54dBµV/m(Average).

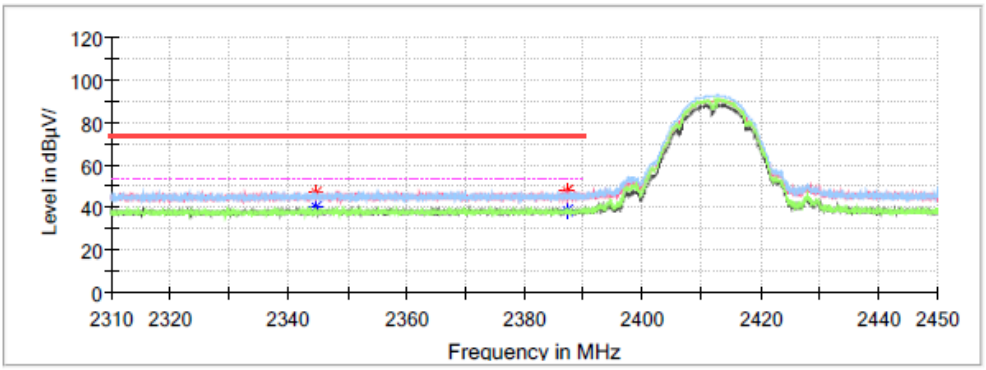
Band Edge:
802.11b Mode:

Low Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

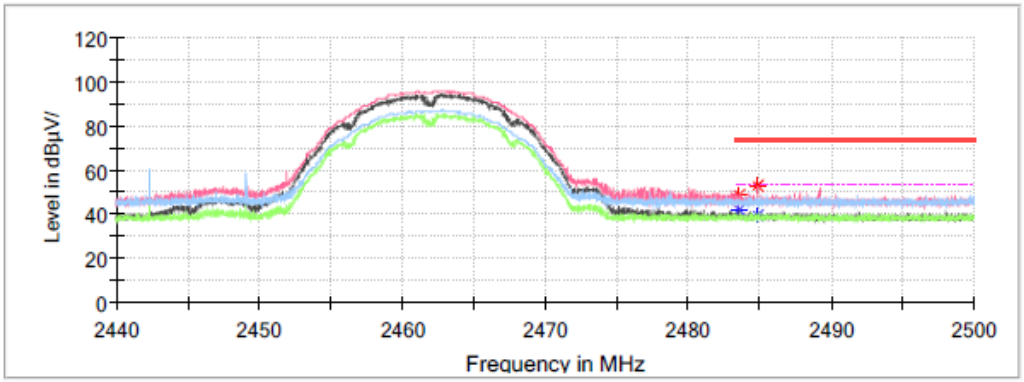
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2344.748000	46.77	---	74.00	27.23	V	-0.7
2344.748000	---	40.34	54.00	13.66	V	-0.7
2387.168000	48.06	---	74.00	25.94	H	-0.6
2387.168000	---	38.33	54.00	15.67	H	-0.6

High Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

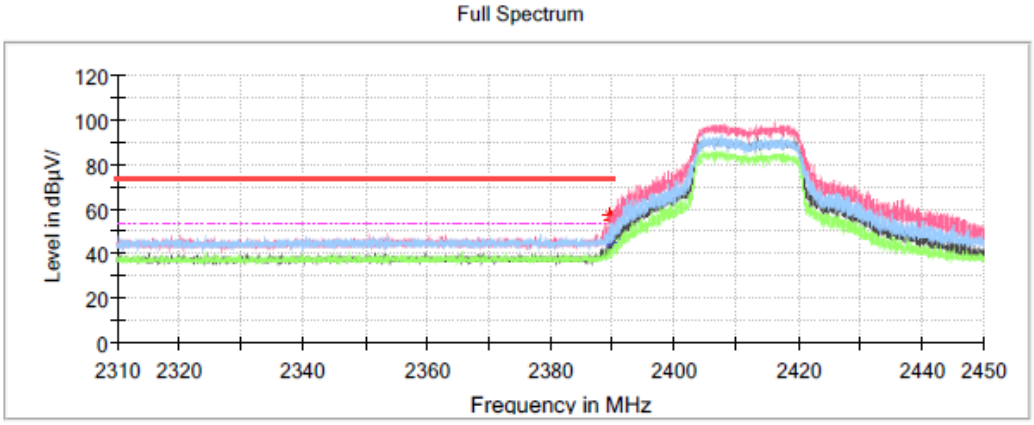
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.530000	49.05	---	74.00	24.95	V	-0.3
2483.530000	---	41.66	54.00	12.34	V	-0.3
2484.916000	52.68	---	74.00	21.32	V	-0.3
2484.916000	---	39.61	54.00	14.39	V	-0.3

802.11g Mode :

Low Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



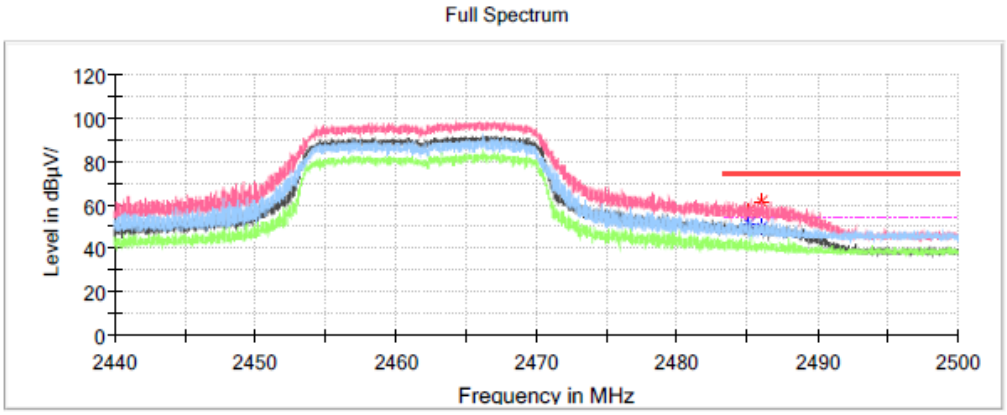
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2389.800000	56.79	---	74.00	17.21	V	-0.6
2389.800000	---	45.48	54.00	8.52	V	-0.6
2389.996000	55.32	---	74.00	18.68	V	-0.6
2389.996000	---	46.26	54.00	7.74	V	-0.6

High Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



Critical_Freqs

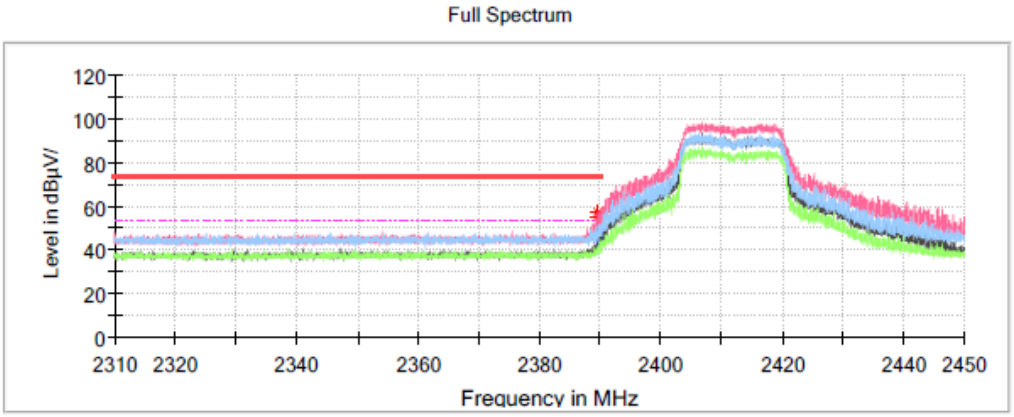
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2485.108000	57.19	---	74.00	16.81	V	-0.3
2485.108000	---	51.15	54.00	2.85	V	-0.3
2486.056000	61.59	---	74.00	12.41	V	-0.2
2486.056000	---	49.16	54.00	4.84	V	-0.2

802.11n-HT20 Mode:

Low Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



Critical_Freqs

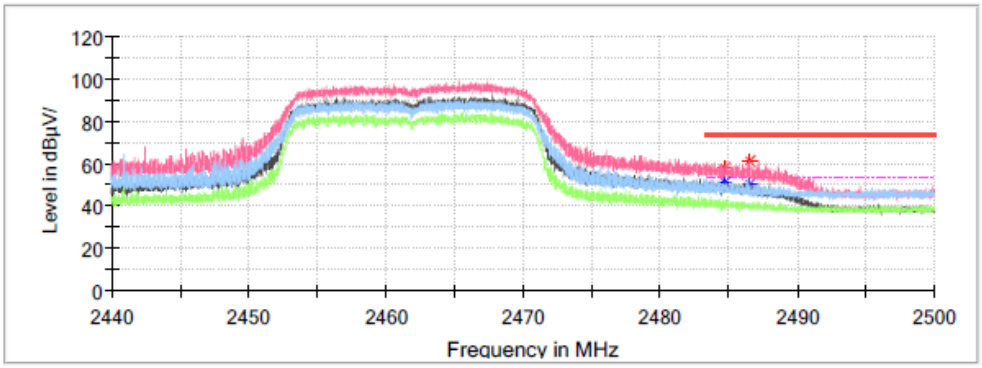
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2389.632000	---	47.55	54.00	6.45	V	-0.6
2389.632000	55.10	---	74.00	18.90	V	-0.6
2389.716000	---	45.43	54.00	8.57	V	-0.6
2389.716000	57.34	---	74.00	16.66	V	-0.6

High Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2484.688000	---	51.37	54.00	2.63	V	-0.3
2484.688000	57.57	---	74.00	16.43	V	-0.3
2486.530000	---	50.46	54.00	3.54	V	-0.2
2486.530000	61.39	---	74.00	12.61	V	-0.2

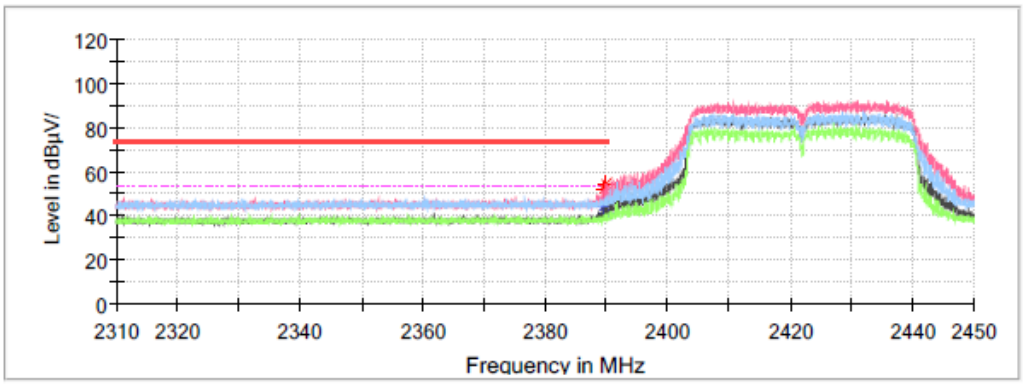
802.11n-HT40 Mode:

Low Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

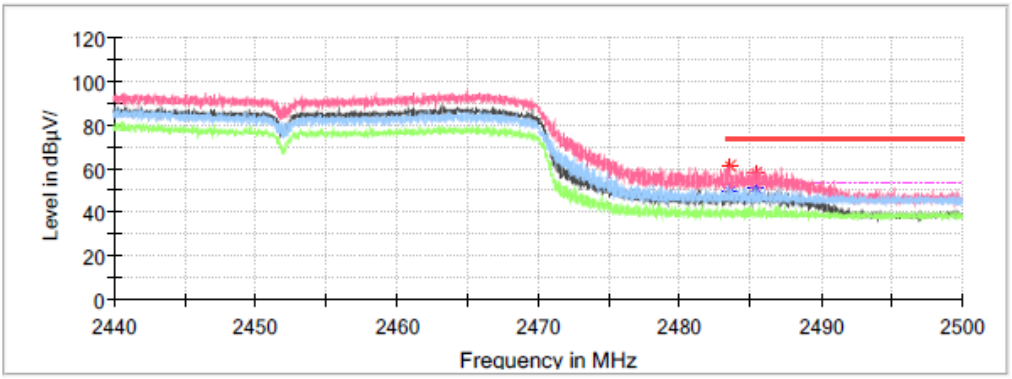
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2389.548000	---	44.79	54.00	9.21	V	-0.6
2389.548000	52.18	---	74.00	21.82	V	-0.6
2389.856000	---	40.95	54.00	13.05	V	-0.6
2389.856000	54.47	---	74.00	19.53	V	-0.6

High Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	2.4GWIFI
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

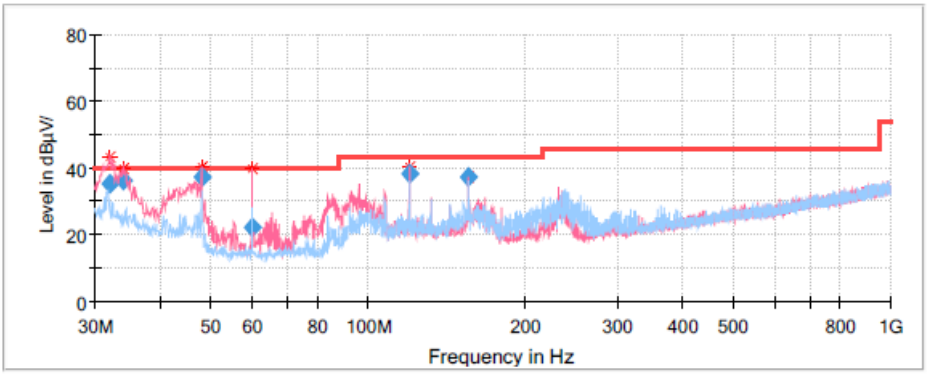
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.602000	61.11	---	74.00	12.89	V	-0.3
2483.602000	---	49.57	54.00	4.43	V	-0.3
2485.402000	57.77	---	74.00	16.23	V	-0.2
2485.402000	---	50.96	54.00	3.04	V	-0.2

For BLE Mode:
30MHz-1GHz

Low Channel: 2402MHz

Common Information

Project No:	RSHA240520001
Test Mode:	Transmitting in BLE 1M mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



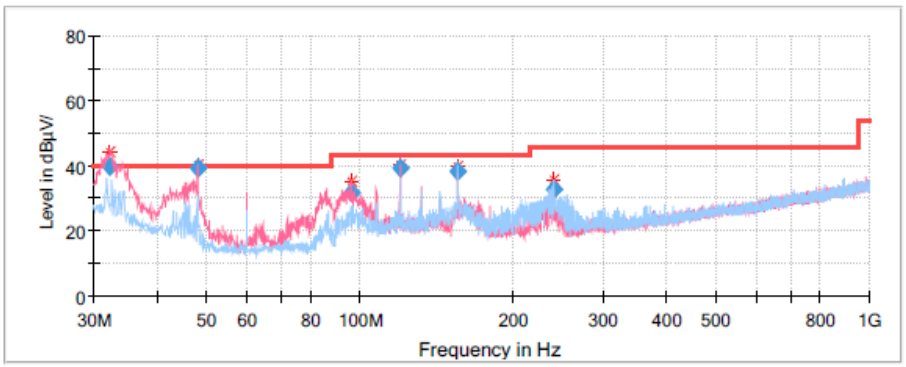
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.136550	35.24	40.00	4.76	V	-6.2
33.975450	36.07	40.00	3.93	V	-7.4
48.025700	37.48	40.00	2.52	V	-15.7
60.014450	22.18	40.00	17.82	V	-17.6
120.005600	38.29	43.50	5.21	V	-10.9
156.001250	37.23	43.50	6.27	V	-12.0

Middle Channel: 2440MHz

Common Information

Project No:	RSHA240520001
Test Mode:	Transmitting in BLE 1M mode middle channel
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



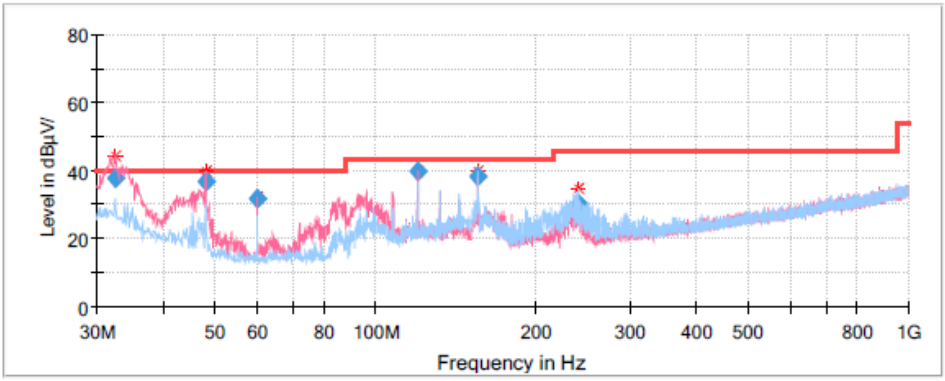
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.414750	39.61	40.00	0.39	V	-6.4
47.982800	39.41	40.00	0.59	V	-15.7
96.004100	31.67	43.50	11.83	V	-15.4
120.004400	39.13	43.50	4.37	V	-10.9
156.013250	38.39	43.50	5.11	H	-12.0
240.003200	32.56	46.00	13.44	H	-12.6

High Channel: 2480MHz

Common Information

Project No:	RSHA240520001
Test Mode:	Transmitting in BLE 1M mode high channel
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li



Final_Result

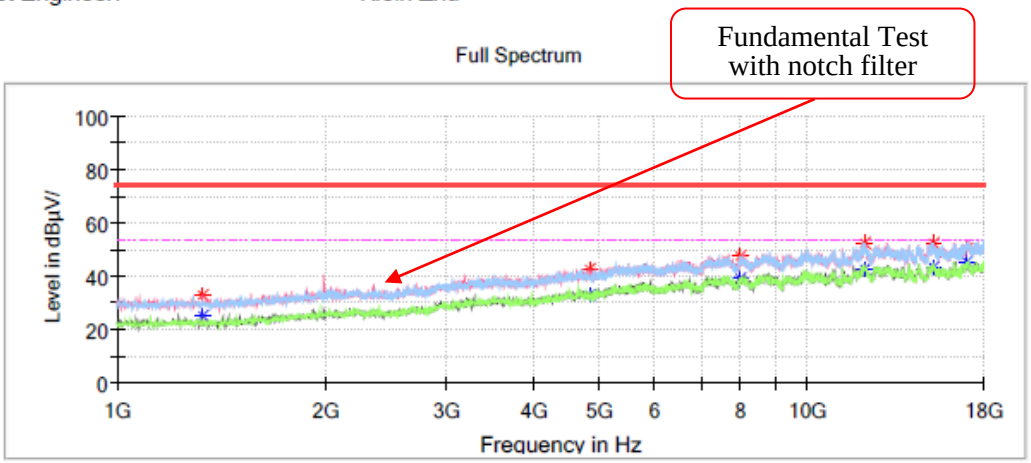
Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.420000	37.63	40.00	2.37	V	-5.9
48.029600	36.77	40.00	3.23	V	-15.7
59.995250	31.50	40.00	8.50	V	-17.6
120.008600	39.82	43.50	3.68	V	-10.9
156.007550	38.36	43.50	5.14	H	-12.0
239.993000	30.06	46.00	15.94	H	-12.6

1GHz-18GHz:

Low Channel: 2402MHz

Common Information

Project No.:	RSHA240520001
Test Mode:	BLE 1M
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



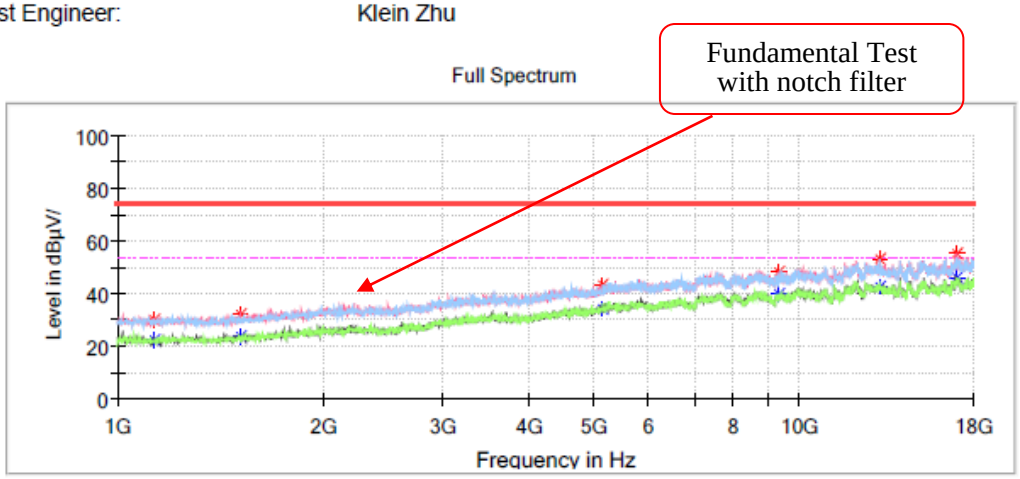
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1331.500000	32.95	---	74.00	41.05	V	-15.0
1331.500000	---	25.01	54.00	28.99	V	-15.0
4835.200000	42.57	---	74.00	31.43	V	-3.0
4835.200000	---	32.89	54.00	21.11	V	-3.0
7995.500000	47.31	---	74.00	26.69	V	3.9
7995.500000	---	39.39	54.00	14.61	V	3.9
12138.400000	52.19	---	74.00	21.81	H	9.2
12138.400000	---	42.78	54.00	11.22	H	9.2
15184.800000	52.67	---	74.00	21.33	V	9.5
15184.800000	---	43.17	54.00	10.83	V	9.5
17066.700000	50.49	---	74.00	23.51	H	12.2
17066.700000	---	45.71	54.00	8.29	H	12.2

Middle Channel: 2440MHz

Common Information

Project No.:	RSHA240520001
Test Mode:	BLE 1M
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



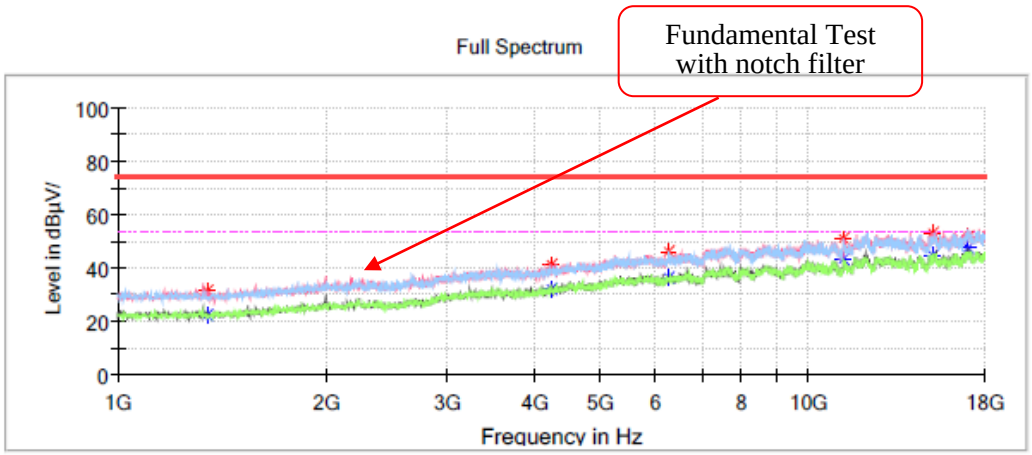
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1132.600000	---	22.59	54.00	31.41	V	-15.3
1132.600000	30.27	---	74.00	43.73	V	-15.3
1511.700000	32.16	---	74.00	41.84	V	-14.7
1511.700000	---	23.92	54.00	30.08	V	-14.7
5136.100000	43.36	---	74.00	30.64	H	-1.9
5136.100000	---	34.30	54.00	19.70	H	-1.9
9350.400000	48.57	---	74.00	25.43	V	5.4
9350.400000	---	39.54	54.00	14.46	V	5.4
13093.800000	53.08	---	74.00	20.92	V	9.7
13093.800000	---	42.83	54.00	11.17	V	9.7
17058.200000	---	46.28	54.00	7.72	V	12.2
17058.200000	55.14	---	74.00	18.86	V	12.2

High Channel: 2480MHz

Common Information

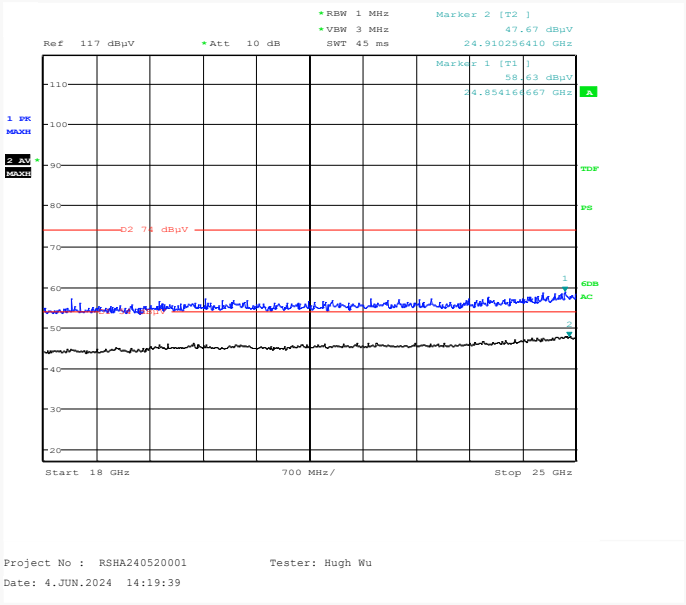
Project No.:	RSHA240520001
Test Mode:	BLE 1M
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



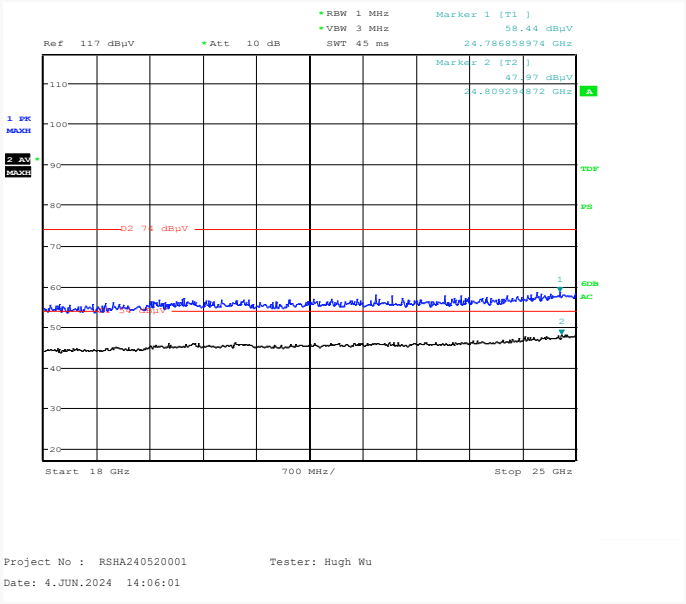
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1346.800000	31.51	---	74.00	42.49	V	-15.0
1346.800000	---	22.63	54.00	31.37	V	-15.0
4247.000000	41.19	---	74.00	32.81	V	-5.1
4247.000000	---	32.08	54.00	21.92	V	-5.1
6290.400000	46.28	---	74.00	27.72	H	0.3
6290.400000	---	36.37	54.00	17.63	H	0.3
11203.400000	51.24	---	74.00	22.76	V	7.9
11203.400000	---	43.02	54.00	10.98	V	7.9
15123.600000	53.37	---	74.00	20.63	V	9.5
15123.600000	---	44.44	54.00	9.56	V	9.5
17019.100000	---	47.33	54.00	6.67	V	12.3
17019.100000	51.74	---	74.00	22.26	V	12.3

18GHz-25GHz: *Transmitting in maximum output power mode and channel*
Horizontal:



Vertical:



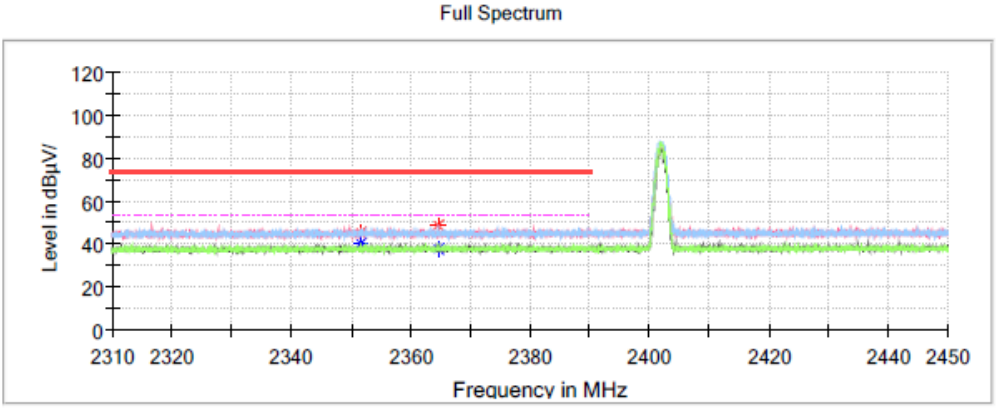
Note: The test distance is 3m. The limit is 74dBµV/m(Peak) and 54dBµV/m(Average).

Band Edge:

Low Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	BLE 1M
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



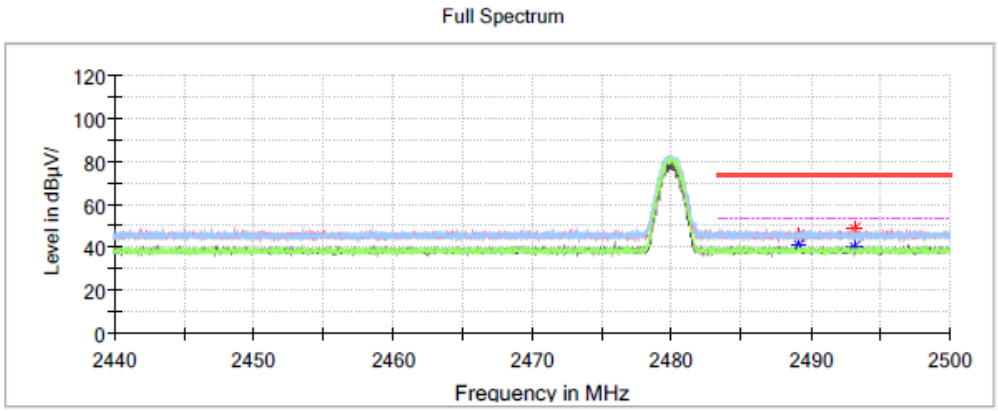
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2351.524000	45.70	---	74.00	28.30	H	-0.7
2351.524000	---	40.51	54.00	13.49	H	-0.7
2364.684000	48.42	---	74.00	25.58	H	-0.7
2364.684000	---	37.67	54.00	16.33	H	-0.7

High Channel

Common Information

Project No.:	RSHA240520001
Test Mode:	BLE 1M
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Engineer:	Klein Zhu



Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2489.122000	---	40.91	54.00	13.09	V	-0.2
2489.122000	45.36	---	74.00	28.64	H	-0.2
2493.166000	---	40.05	54.00	13.95	V	-0.2
2493.166000	48.60	---	74.00	25.40	V	-0.2

6 dB EMISSION BANDWIDTH

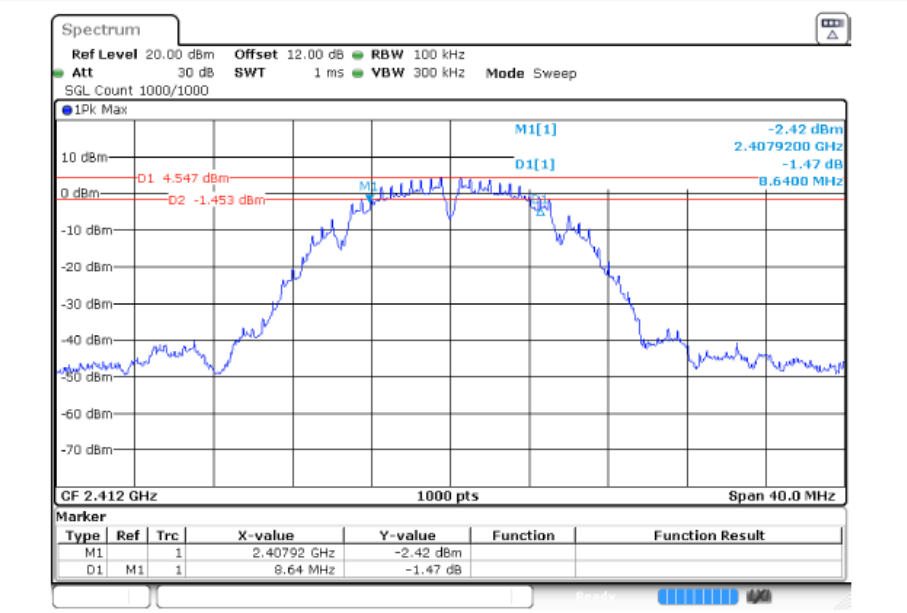
Test Result: Compliant.

EUT operation mode: Transmitting

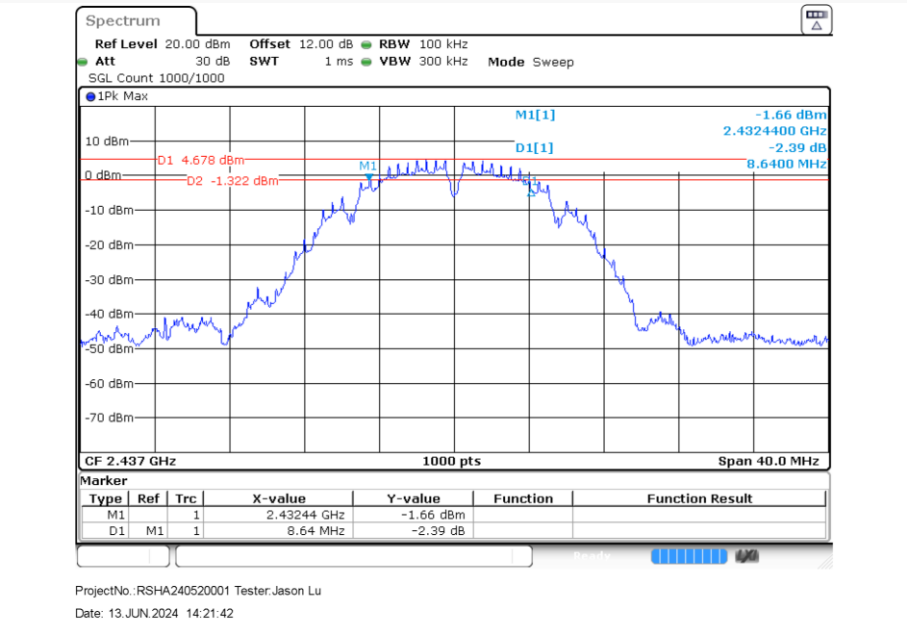
For Wi-Fi Mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	8.640	≥0.5
Middle	2437	8.640	≥0.5
High	2462	8.160	≥0.5
802.11g Mode			
Low	2412	16.040	≥0.5
Middle	2437	16.160	≥0.5
High	2462	16.160	≥0.5
802.11n-HT20 Mode			
Low	2412	16.440	≥0.5
Middle	2437	16.400	≥0.5
High	2462	17.000	≥0.5
802.11n-HT40 Mode			
Low	2422	35.280	≥0.5
Middle	2437	35.680	≥0.5
High	2452	35.360	≥0.5

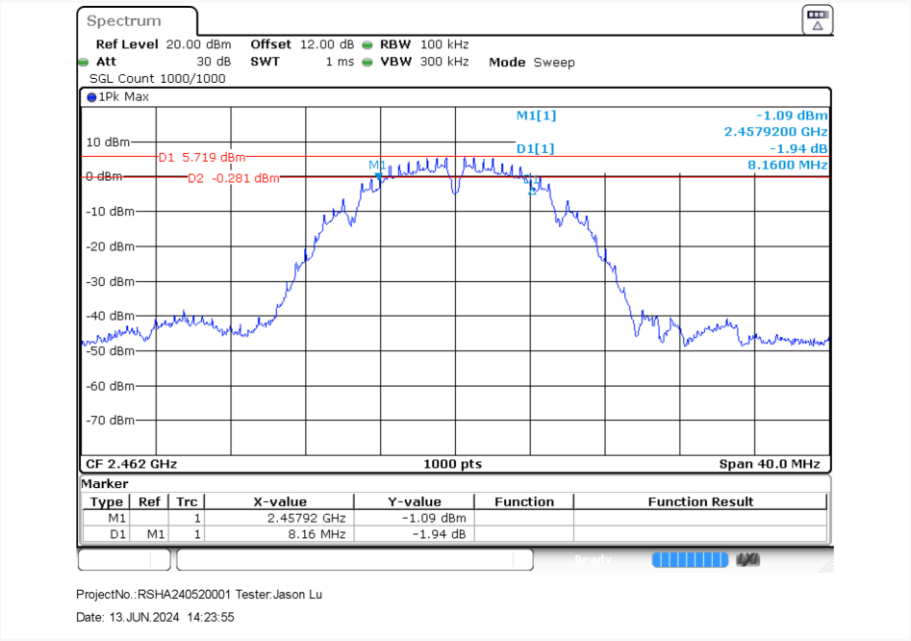
802.11b Mode Low Channel



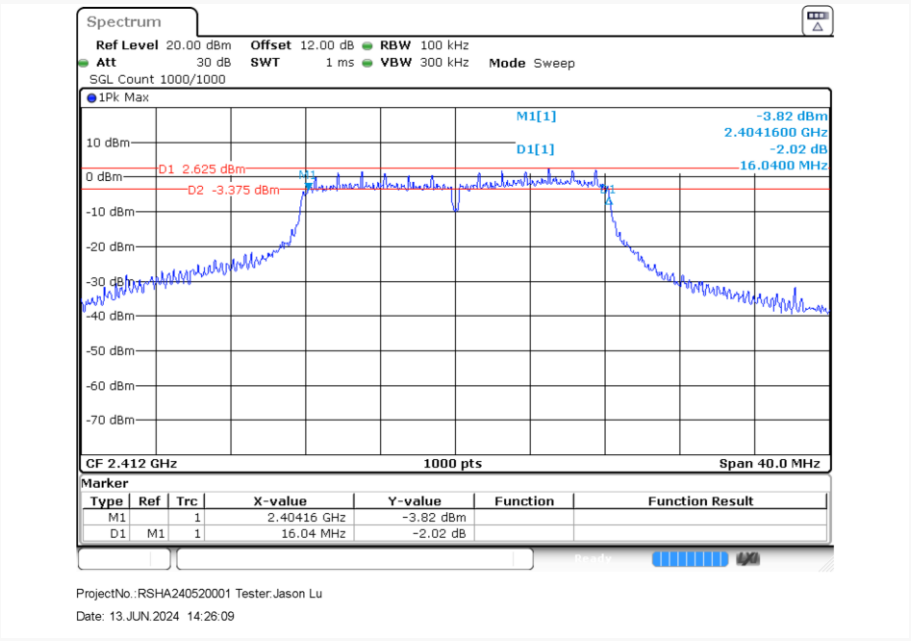
802.11b Mode Middle Channel



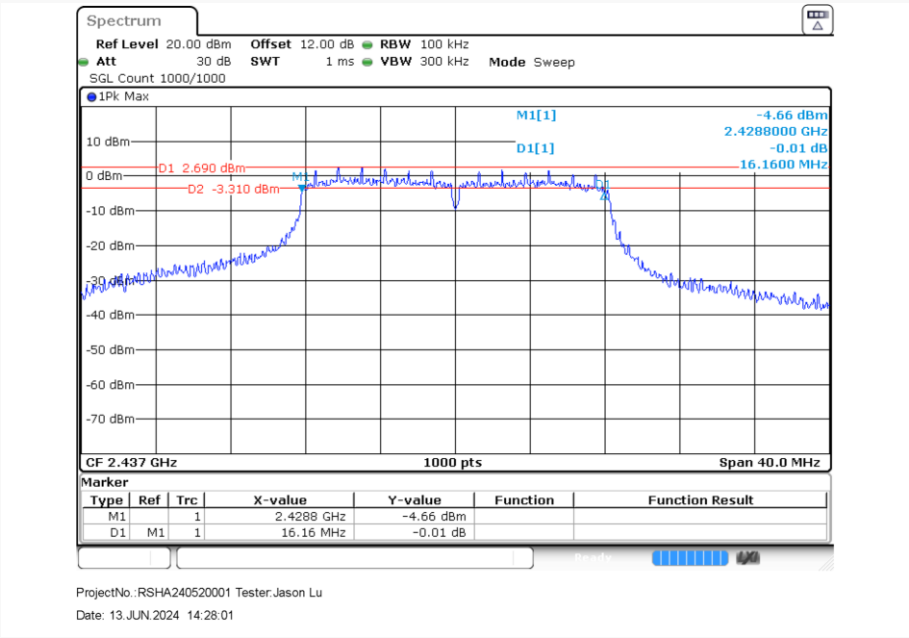
802.11b Mode High Channel



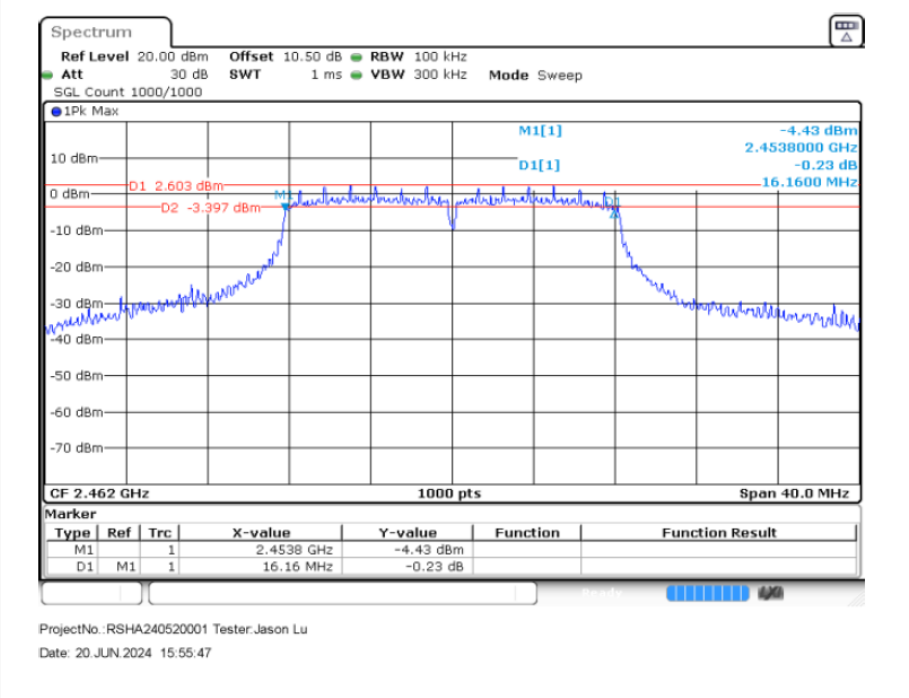
802.11g Mode Low Channel



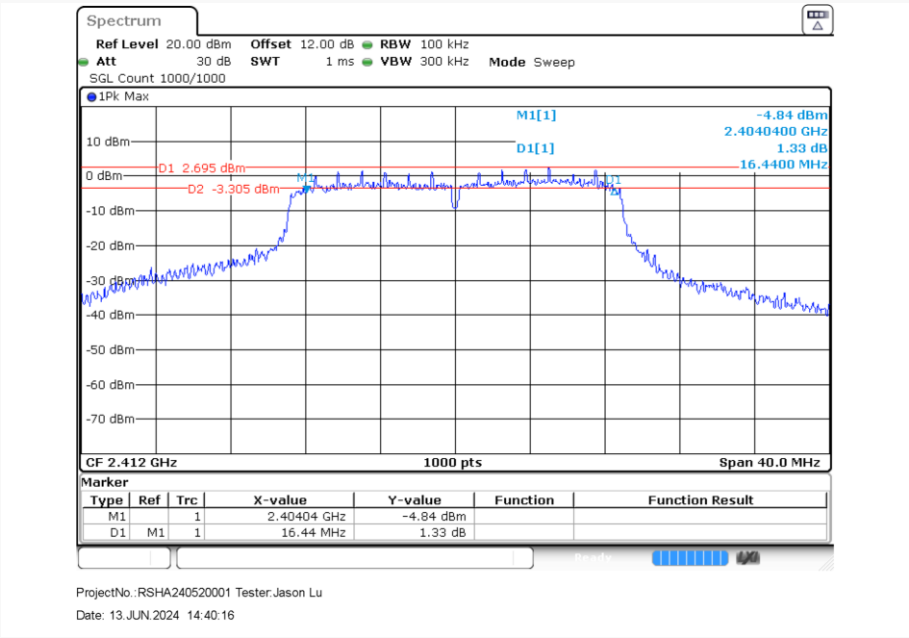
802.11g Mode Middle Channel



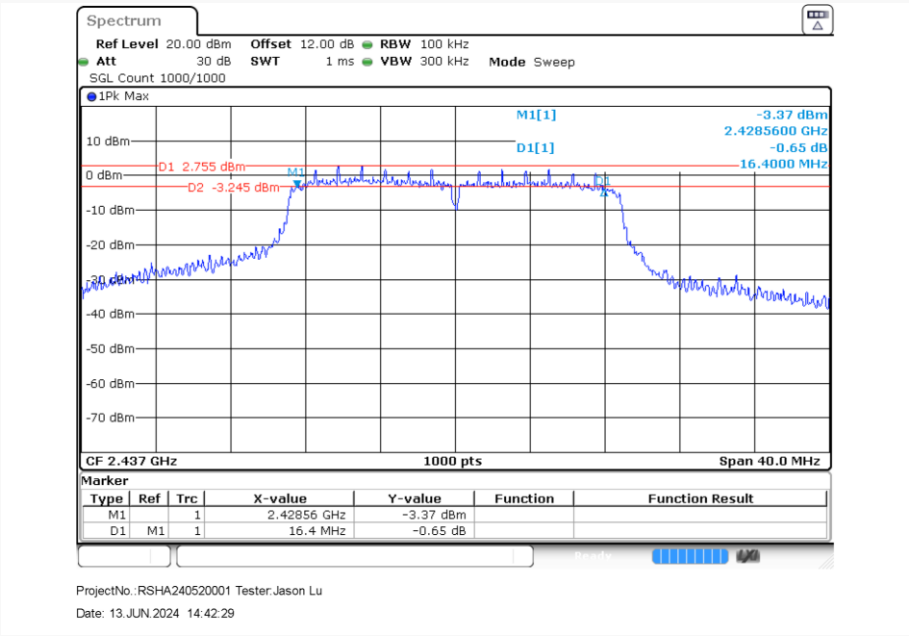
802.11g Mode High Channel



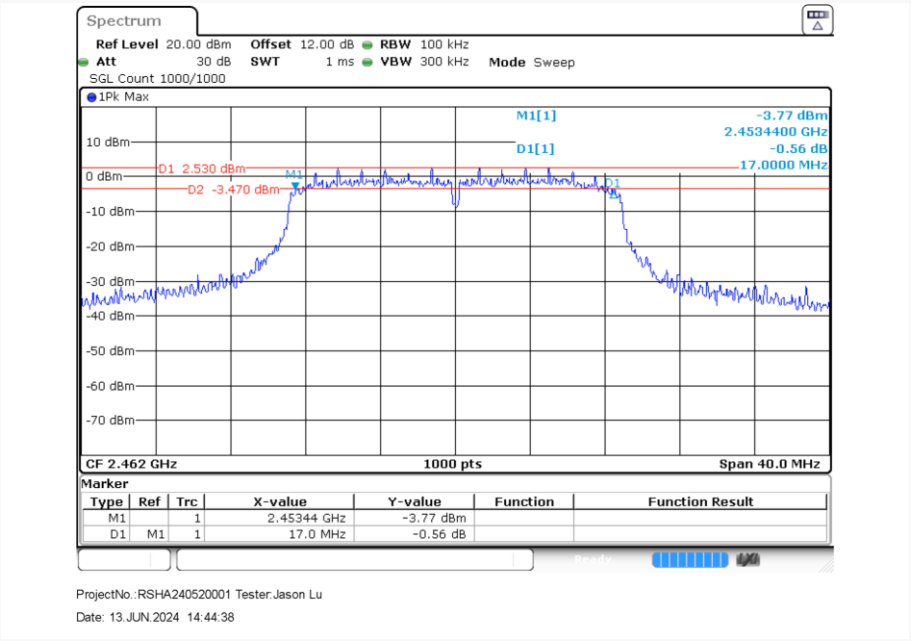
802.11n-HT20 Mode Low Channel



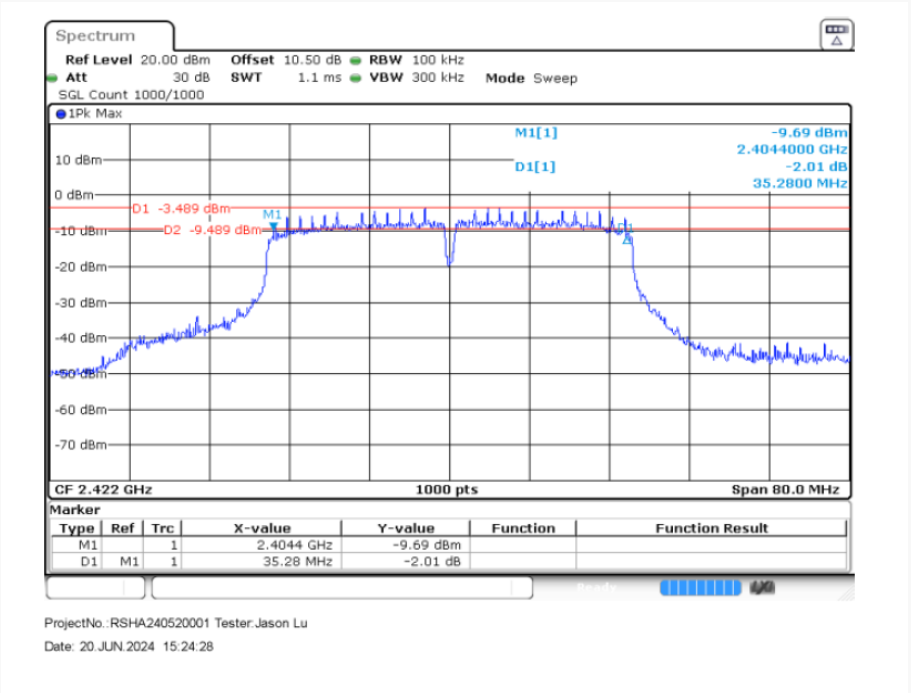
802.11n-HT20 Mode Middle Channel



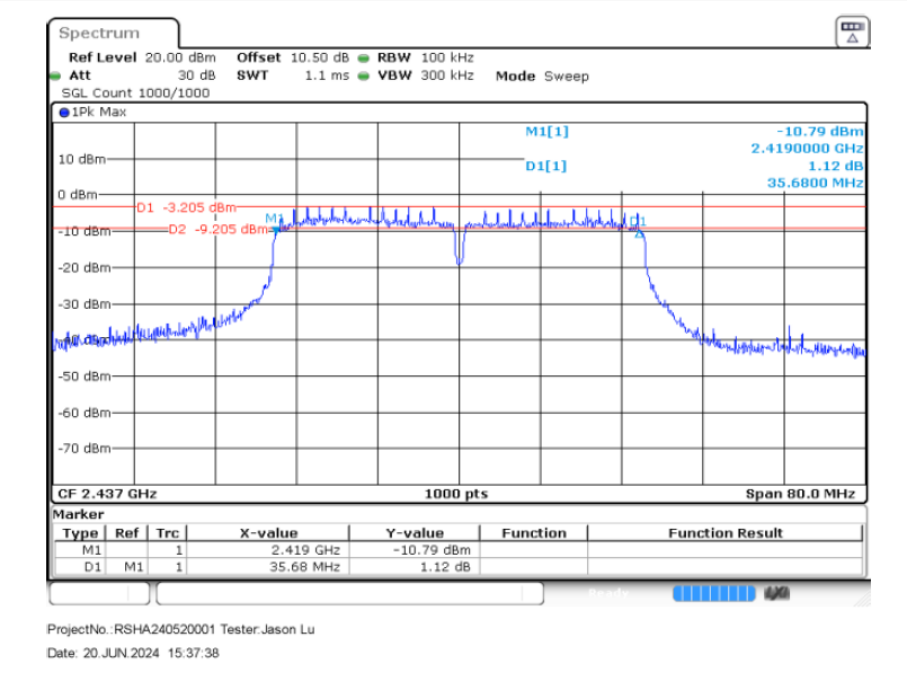
802.11n-HT20 Mode High Channel



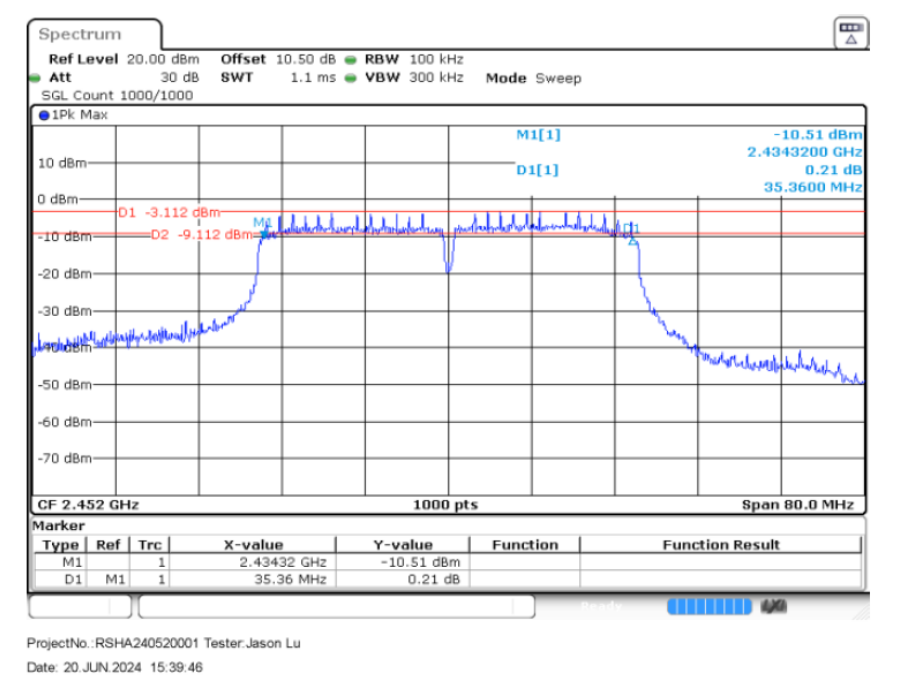
802.11n-HT40 Mode Low Channel



802.11n-HT40 Mode Middle Channel



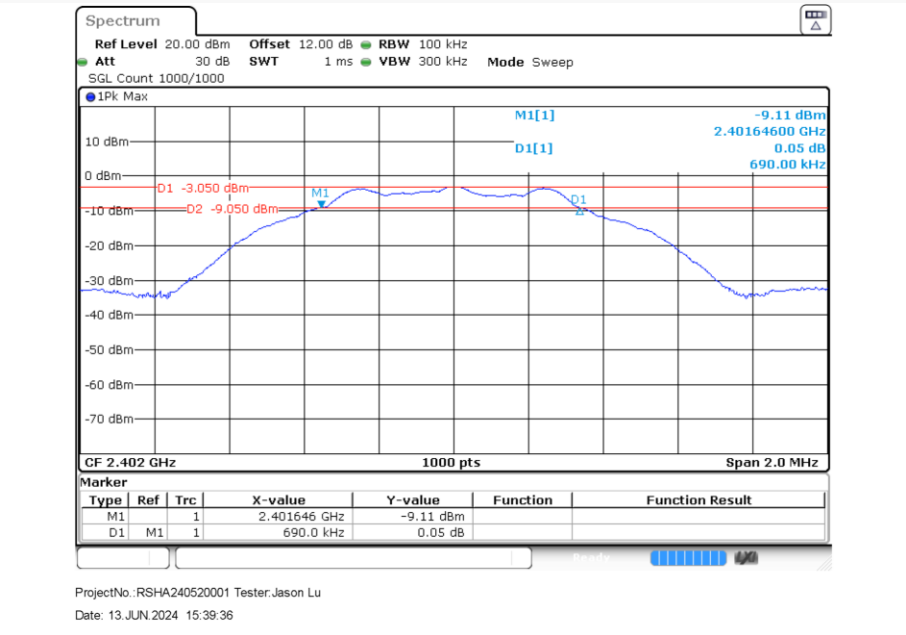
802.11n-HT40 Mode High Channel



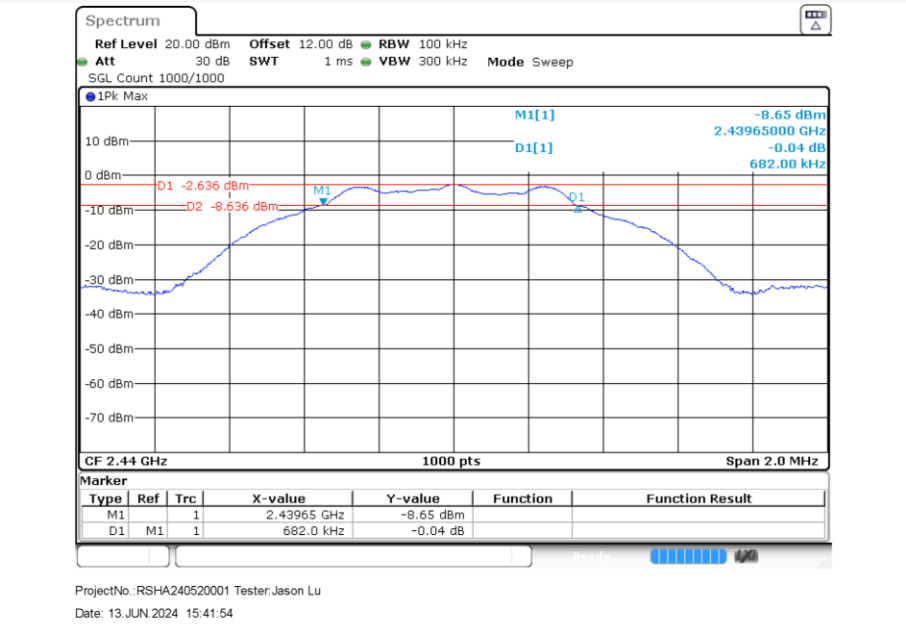
For BLE Mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Low	2402	0.690	≥0.5
Middle	2440	0.682	≥0.5
High	2480	0.686	≥0.5

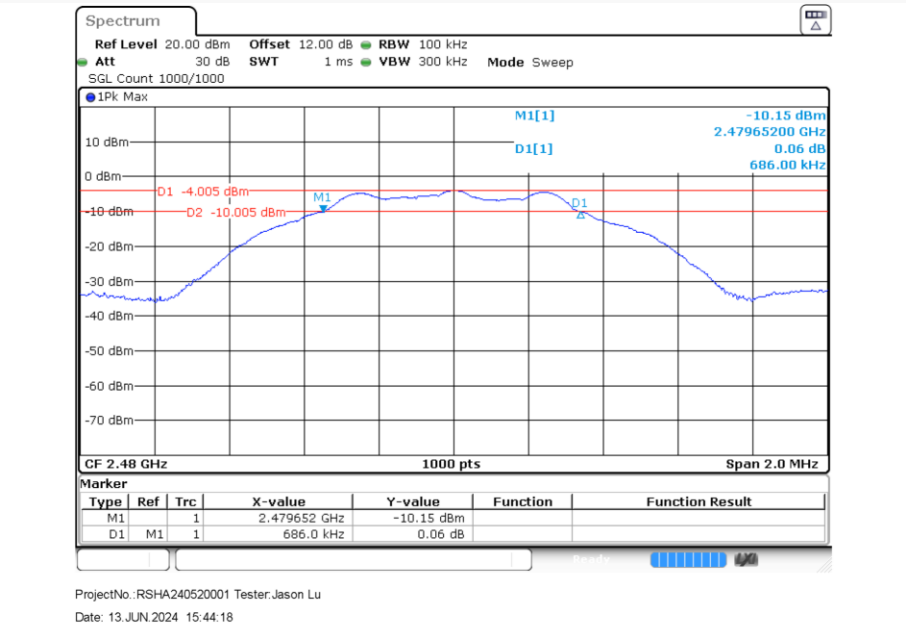
Low Channel



Middle Channel



High Channel



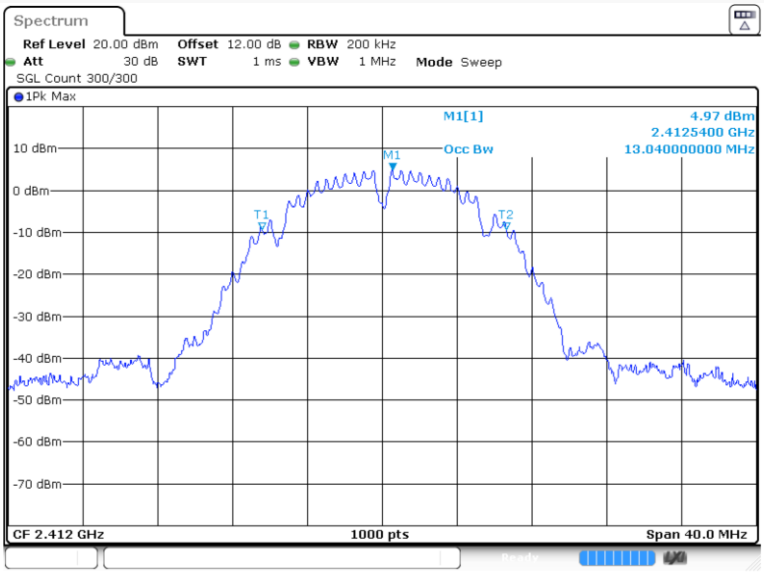
OCCUPIED BANDWIDTH

EUT operation mode: Transmitting

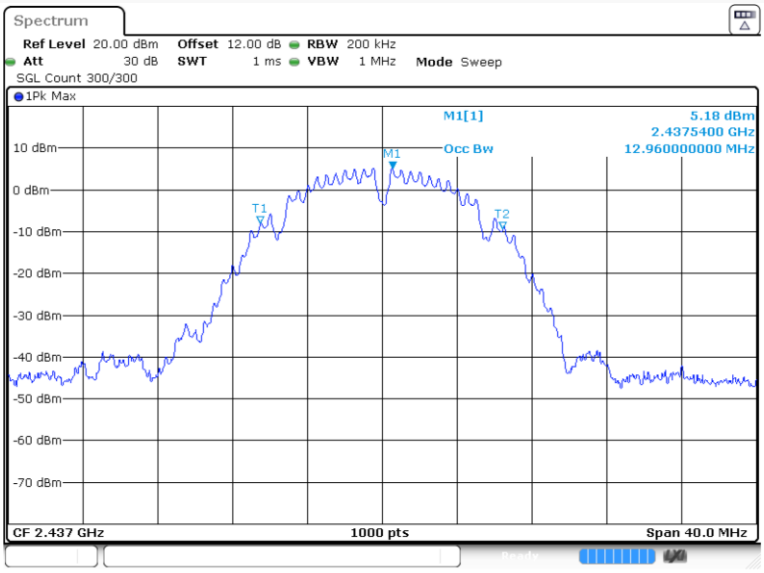
For Wi-Fi Mode:

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
802.11b Mode		
Low	2412	13.040
Middle	2437	12.960
High	2462	12.600
802.11g Mode		
Low	2412	16.640
Middle	2437	16.680
High	2462	16.250
802.11n-HT20 mode		
Low	2412	17.720
Middle	2437	17.720
High	2462	17.520
802.11n-HT40 mode		
Low	2422	36.160
Middle	2437	36.400
High	2452	36.320

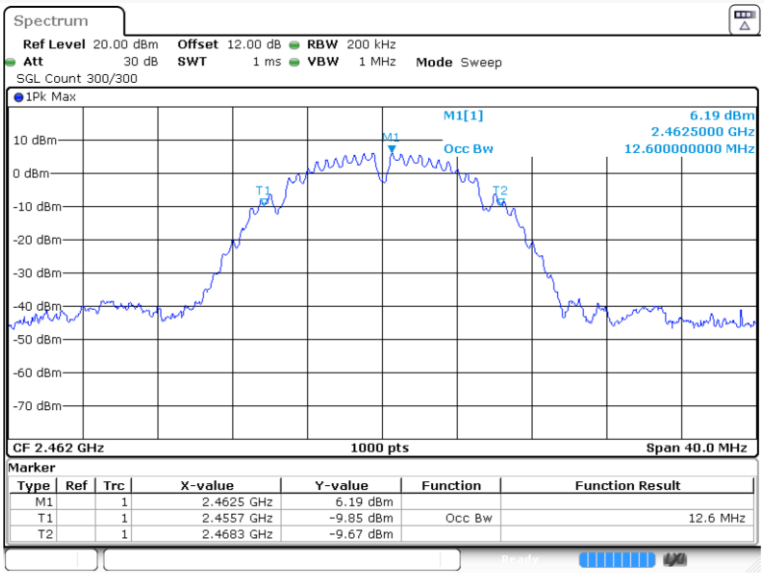
802.11b Mode Low Channel



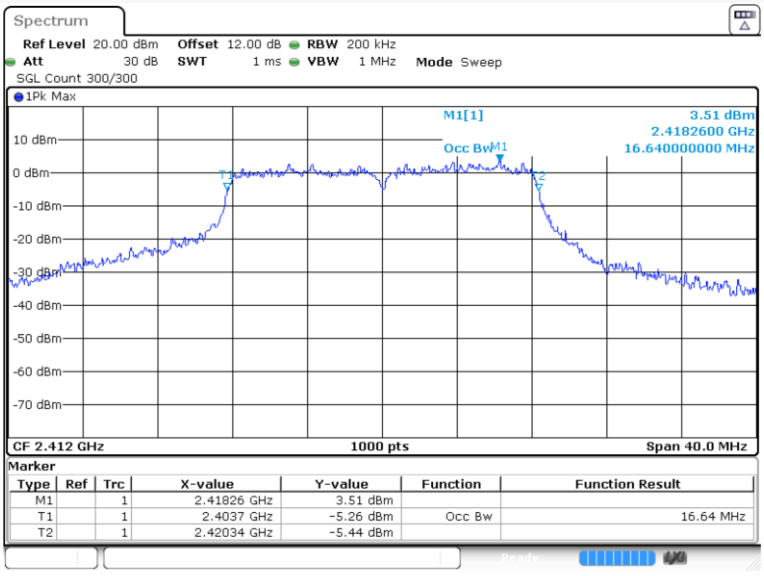
802.11b Mode Middle Channel



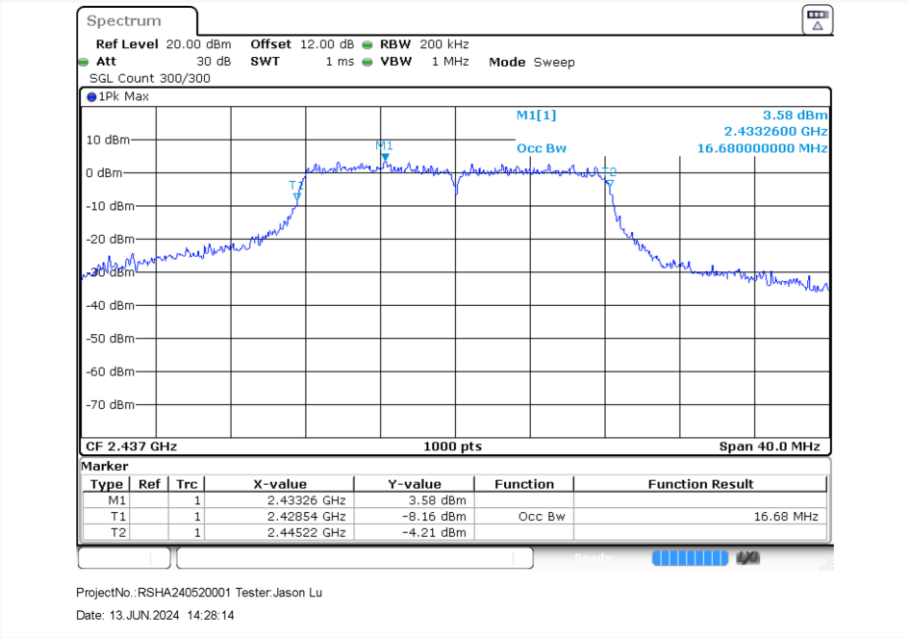
802.11b Mode High Channel



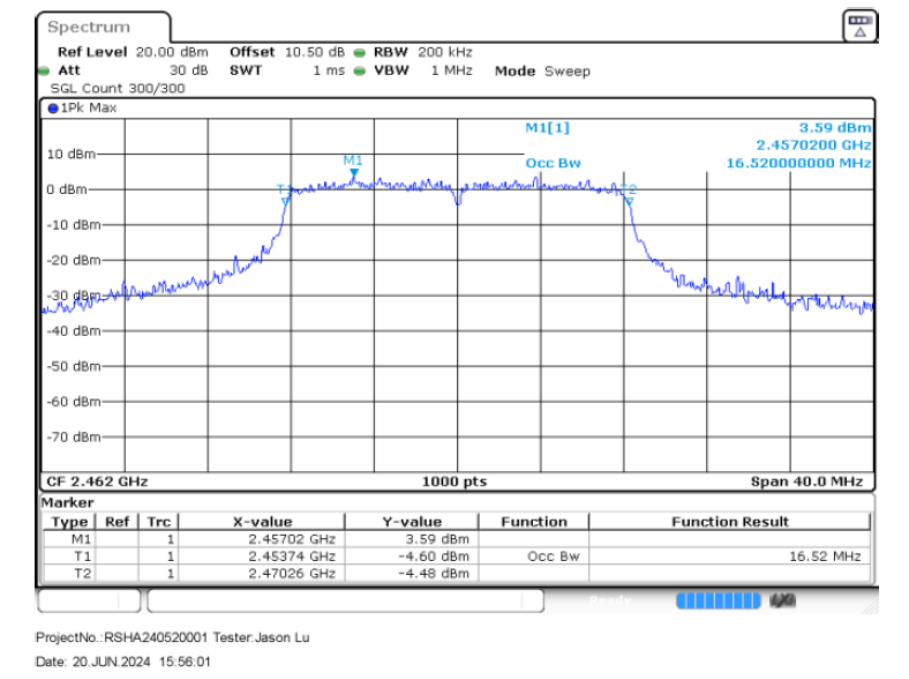
802.11g Mode Low Channel



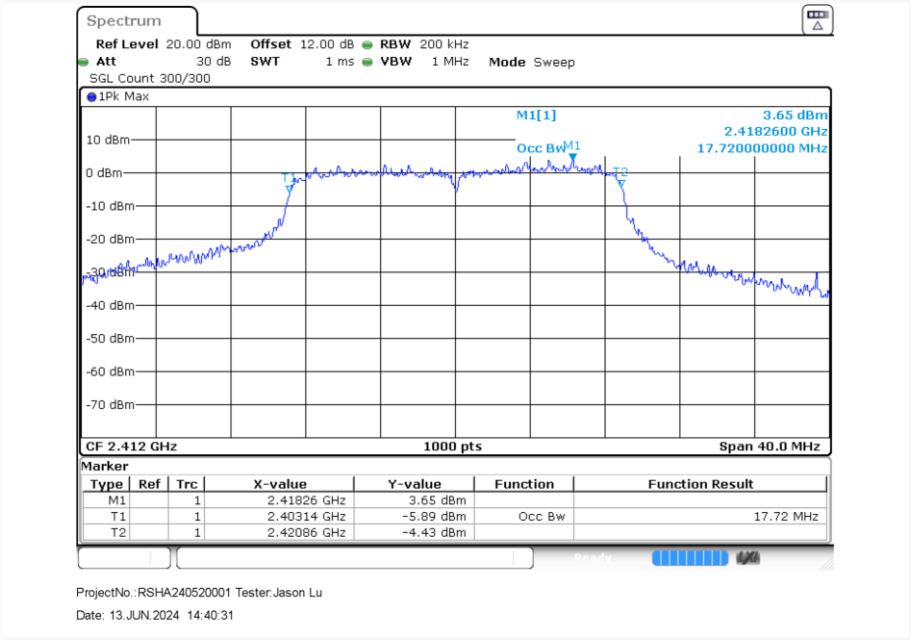
802.11g Mode Middle Channel



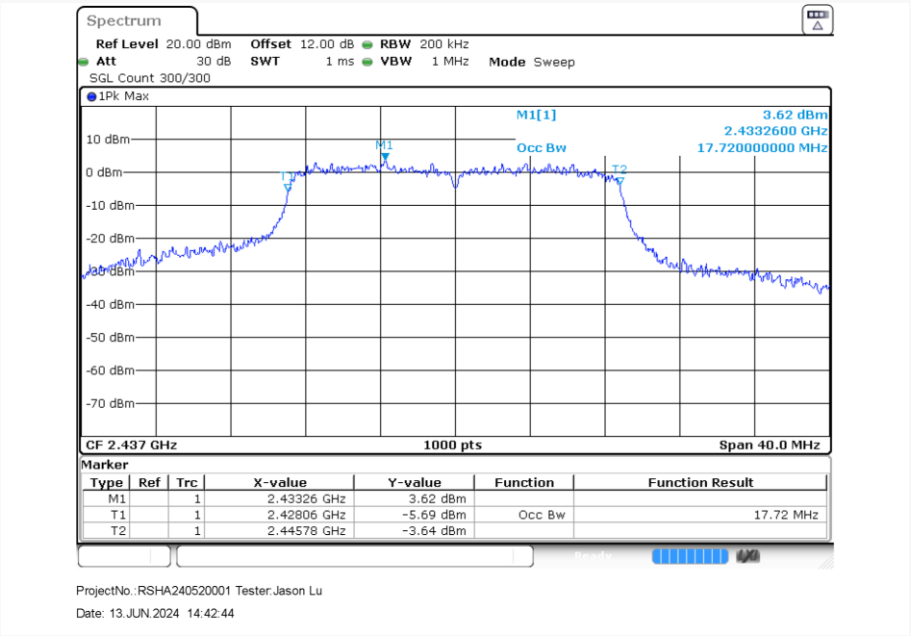
802.11g Mode High Channel



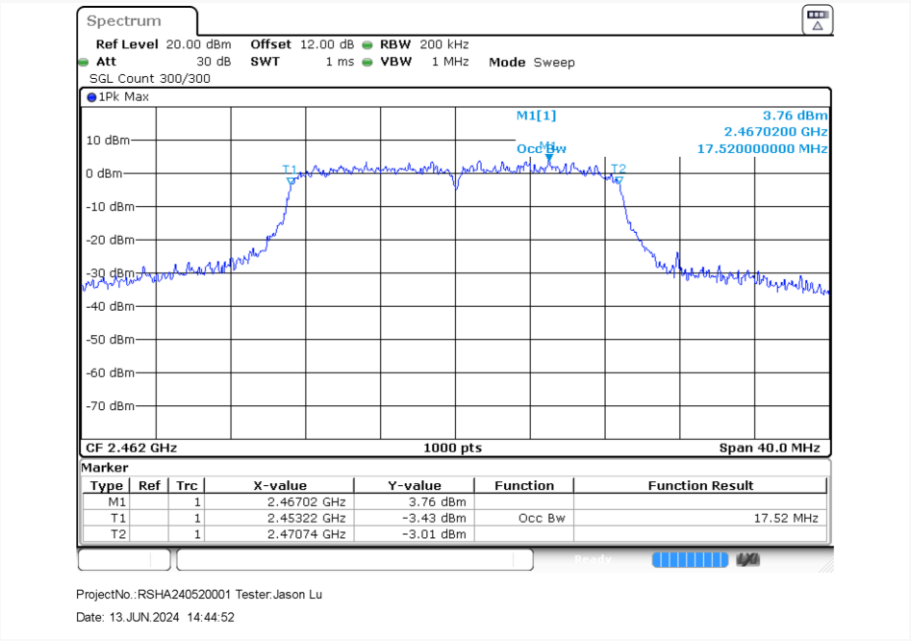
802.11n-HT20 Mode Low Channel



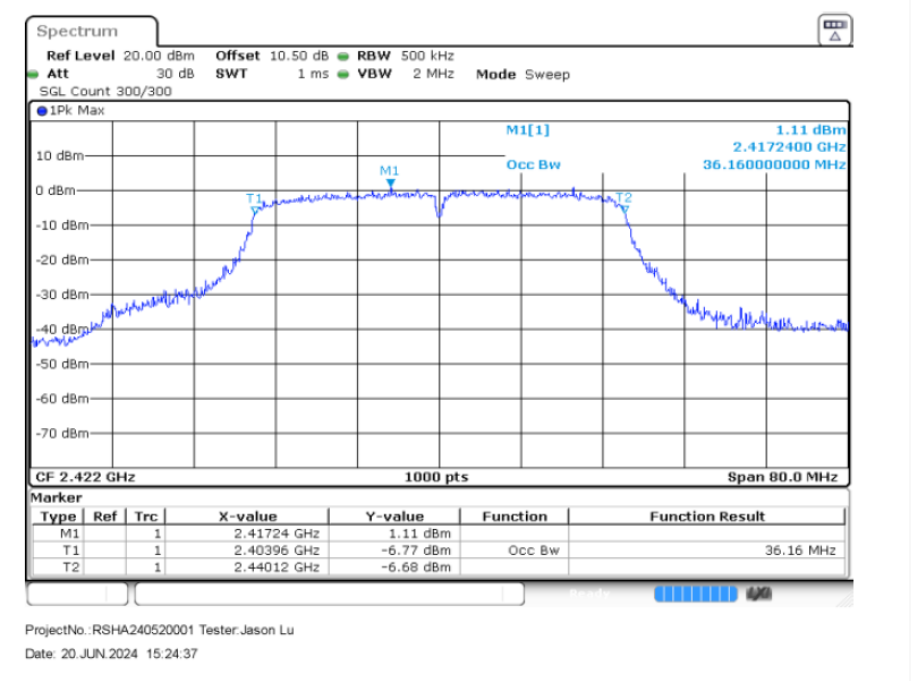
802.11n-HT20 Mode Middle Channel



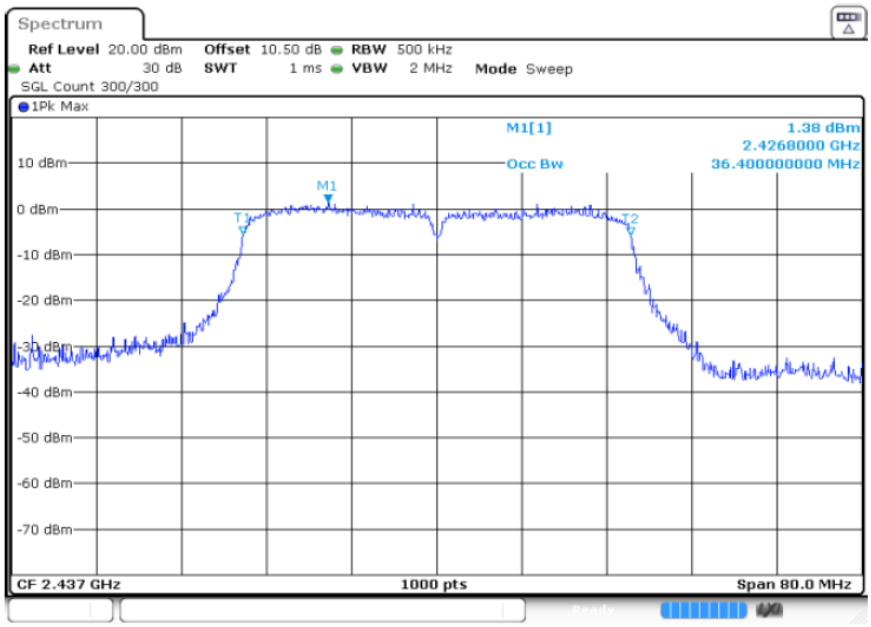
802.11n-HT20 Mode High Channel



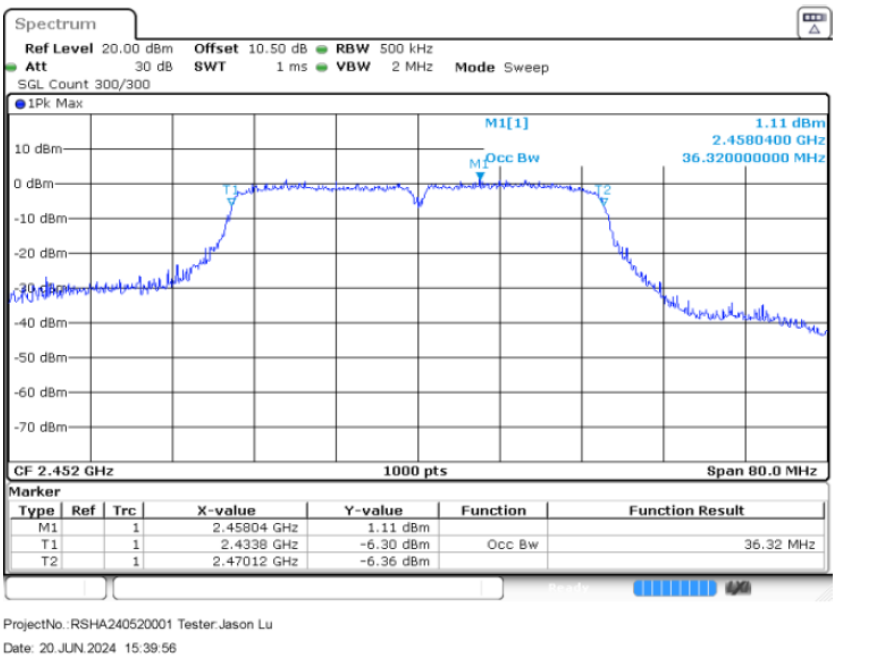
802.11n-HT40 Mode Low Channel



802.11n-HT40 Mode Middle Channel



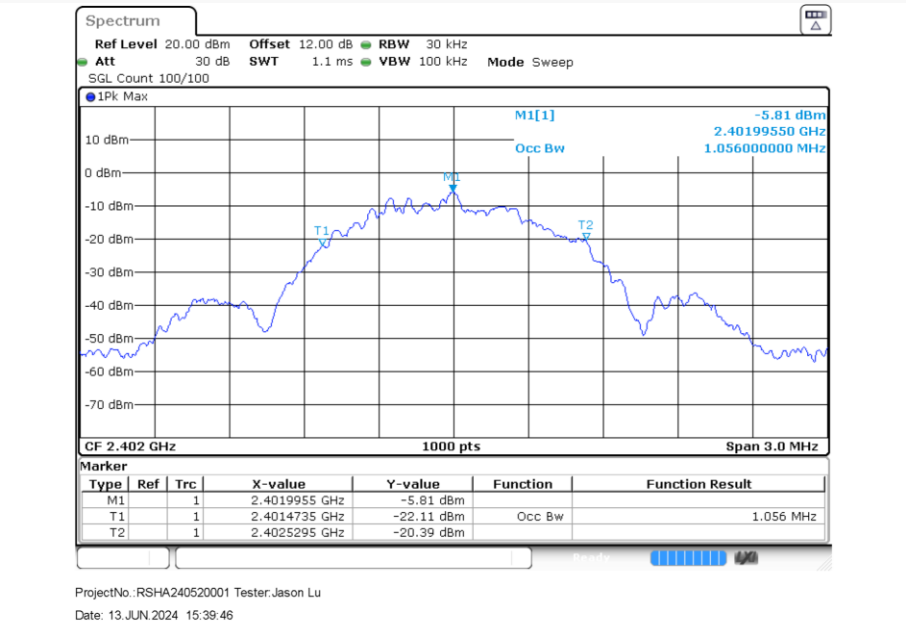
802.11n-HT40 Mode High Channel



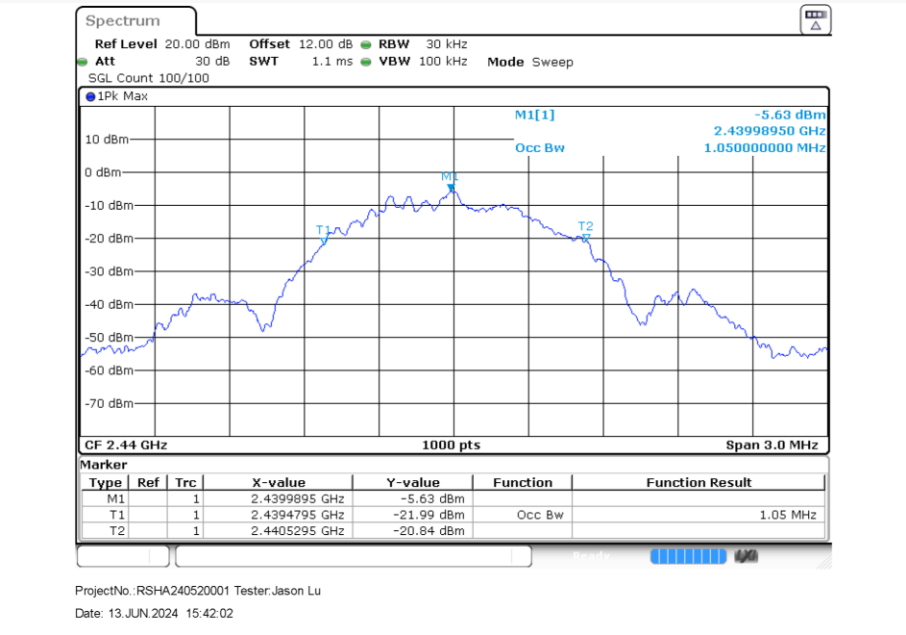
For BLE Mode:

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2402	1.056
Middle	2440	1.050
High	2480	1.053

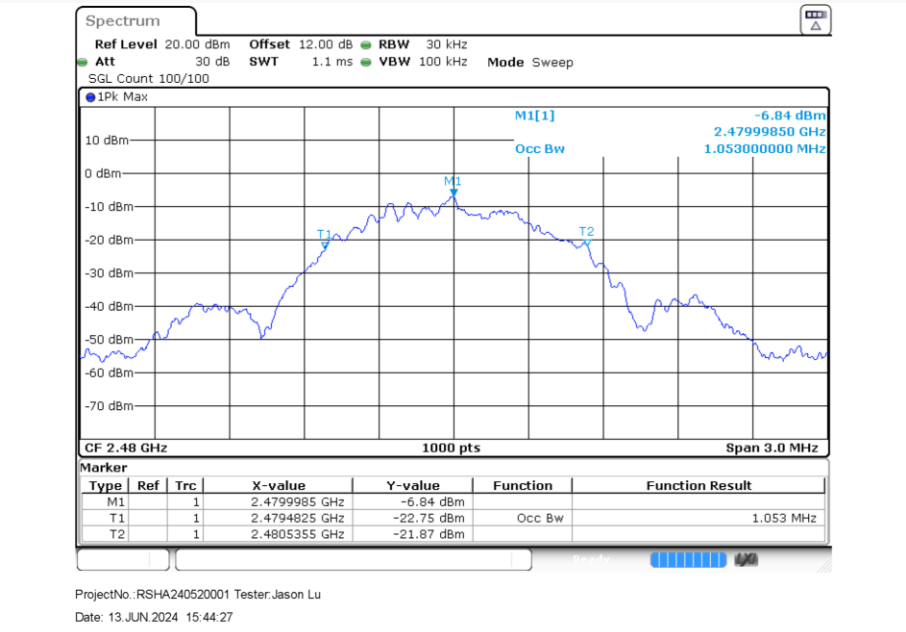
Low Channel



Middle Channel



High Channel



POWER SPECTRAL DENSITY

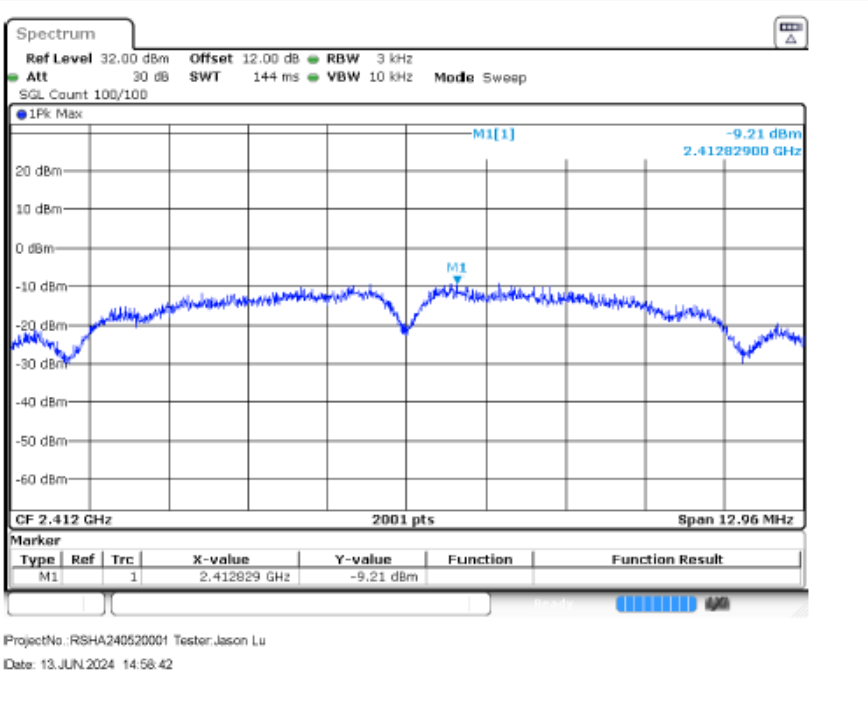
Test Result: Compliant.

EUT operation mode: Transmitting

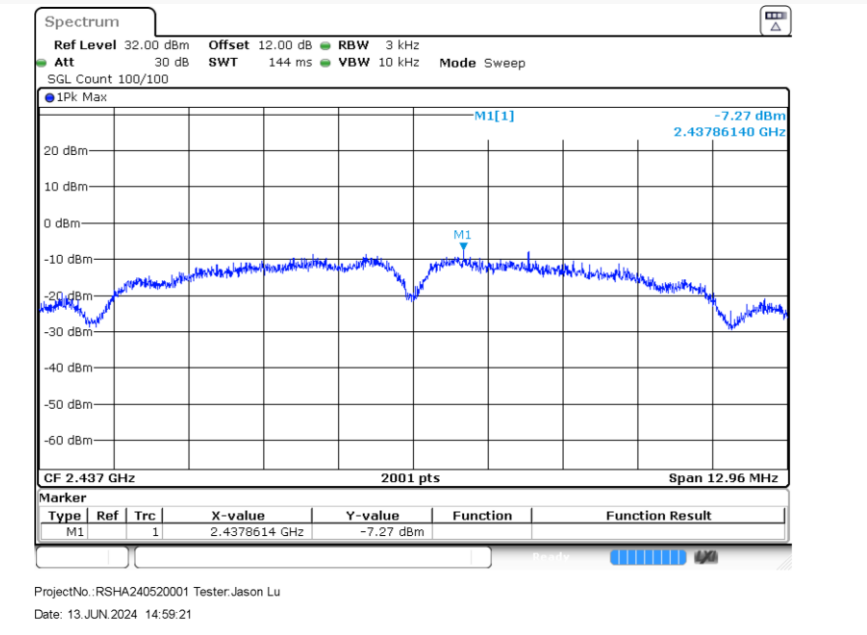
For Wi-Fi Mode:

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-9.21	≤8
Middle	2437	-7.27	≤8
High	2462	-6.55	≤8
802.11g Mode			
Low	2412	-11.07	≤8
Middle	2437	-10.14	≤8
High	2462	-11.29	≤8
802.11n-HT20 mode			
Low	2412	-8.34	≤8
Middle	2437	-11.74	≤8
High	2462	-10.68	≤8
802.11n-HT40 mode			
Low	2422	-17.70	≤8
Middle	2437	-15.96	≤8
High	2452	-16.89	≤8

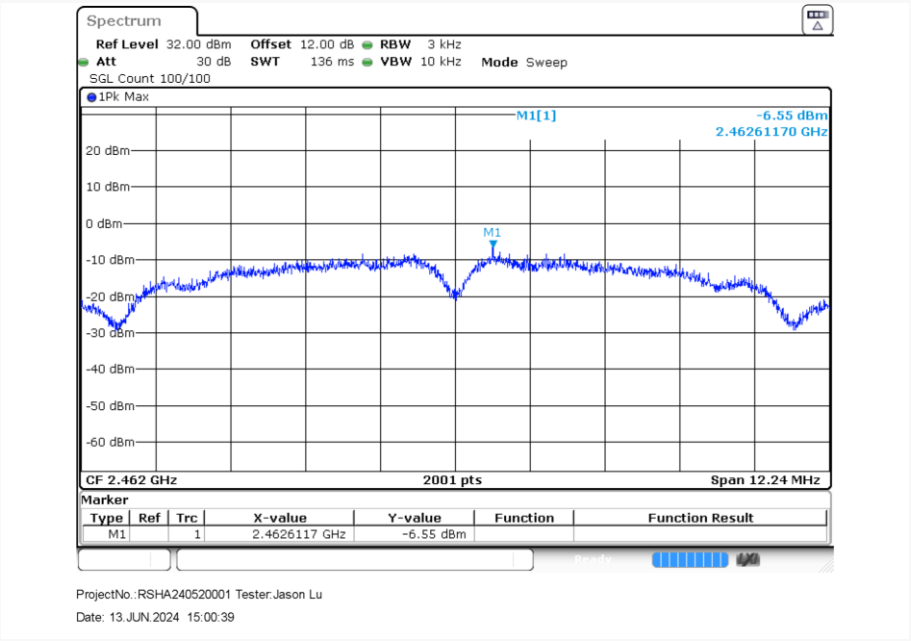
802.11b Low Channel



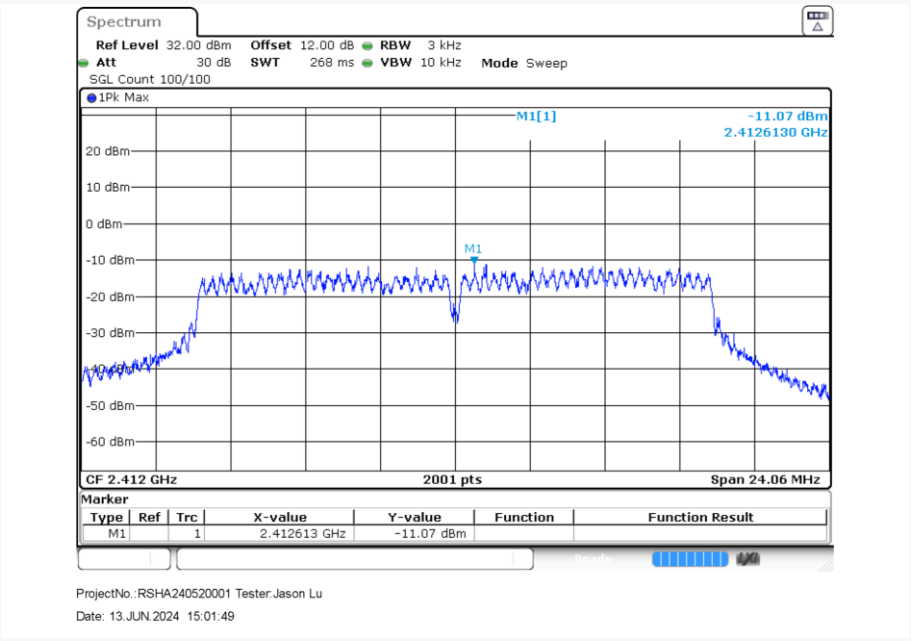
802.11b Middle Channel



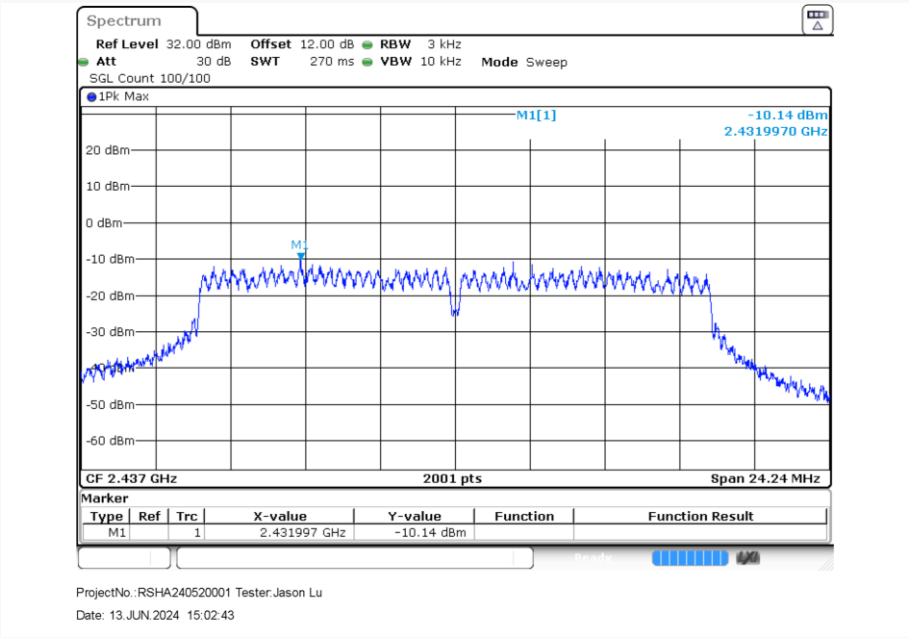
802.11b High Channel



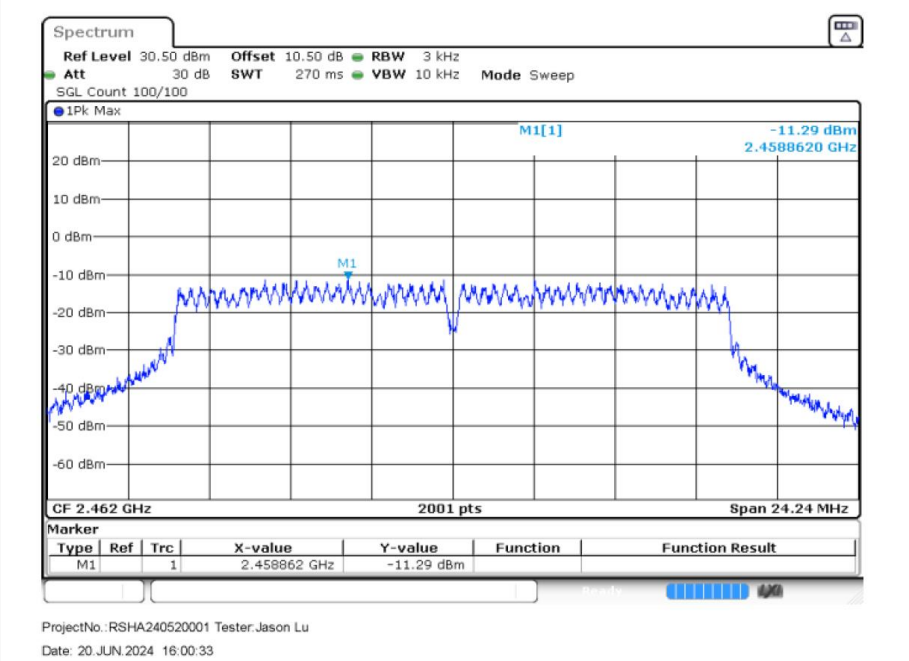
802.11g Low Channel



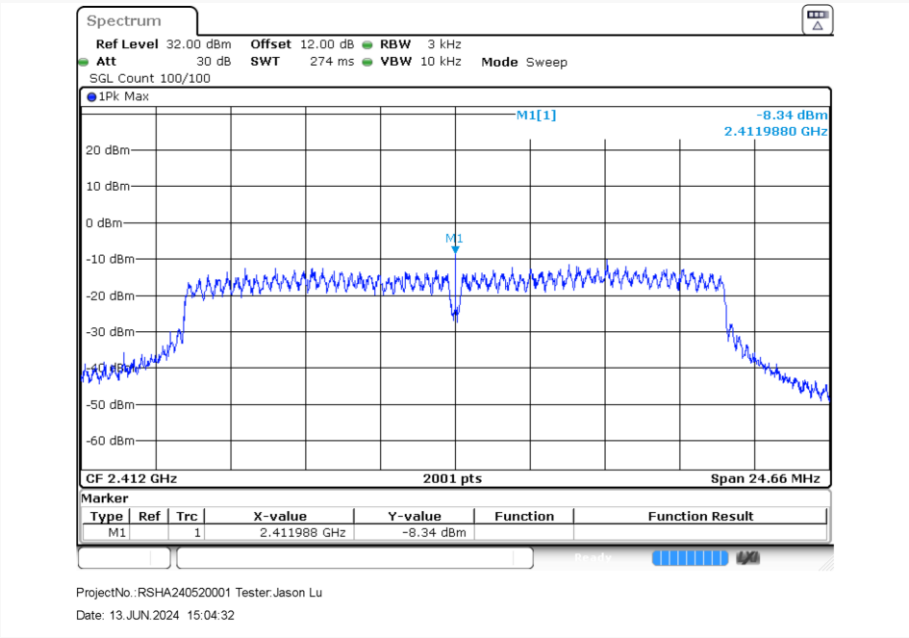
802.11g Middle Channel



802.11g High Channel



802.11n-HT20 Low Channel



802.11n-HT20 Middle Channel