FCC PART 15.247

TEST REPORT

For

Altenergy Power System Inc.

Building 2, No. 522, Yatai Road, Jiaxing, China 314050

FCC ID: 2AFGR-ECUR2

Report Type:	**Product Name:**
Original Report	Energy Communication Unit

Report Number:	RSHA240325001-00B
Report Date:	2024-05-10
Reviewed By:	Jenny Yang
Approved By:	Kyle Xu
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248, Chenghu Road, Development Zone, Yushan, Kunshan, Suzhou, Jiangsu, China Tel: +86-512-86175000 Fax: +86-512-88934268 www.baclcorp.com.cn

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RSHA240325001-00B	R1V1	2024-05-10	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Altenergy Power System Inc.
Tested Model:	ECU-R
Series Model:	ECU-B
Product Name:	Energy Communication Unit
Power Supply:	DC 5V
Maximum peak Output Power:	802.11b: 18.36 dBm 802.11g: 17.87 dBm 802.11n20: 17.88 dBm 802.11n40: 17.72 dBm
RF Function:	2.4G Wi-Fi
Operating Band/Frequency:	2412~2462 MHz(802.11b/g/n20), 2422~2452 MHz(802.11n40)
Channel Number:	11(802.11b/g/n20), 7(802.11n40)
Channel Separation:	5 MHz
Modulation Type:	DSSS,OFDM
Antenna Type:	Omni Antenna
★Maximum Antenna Gain:	2.47 dBi

Note:
1. The antenna gain was provided by the applicant.
2. Model difference: ECU-R, ECU-B have the only difference on model name.

All measurement and test data in this report was gathered from production sample serial number: RSHA240325001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-03-25.)

Objective

This report is prepared for *Altenergy Power System Inc.* 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		3.19 dB
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, Development Zone, Yushan, Kunshan, Suzhou, Jiangsu, 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

Test channel list is as below:

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.

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	/	/

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

RF test tool: Smart Studio 7

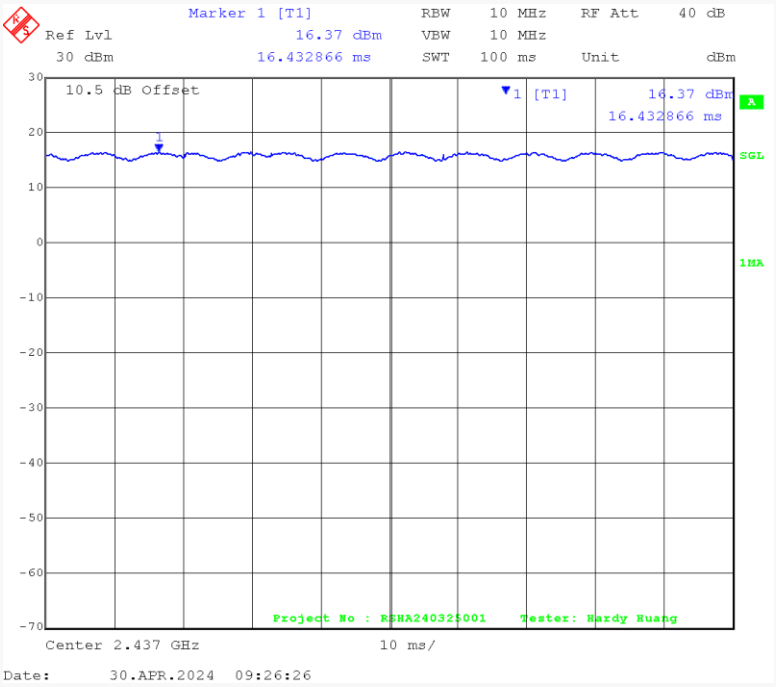
Pre-scan with all the data rates, and the worst case was performed as below:

Mode	Data Rate	Channel	★Power Level Setting
802.11b	1 Mbps	Low	40
		Middle	40
		High	40
802.11g	6 Mbps	Low	40
		Middle	40
		High	40
802.11n-HT20	MCS0	Low	40
		Middle	40
		High	40
802.11n-HT40	MCS0	Low	38
		Middle	38
		High	38

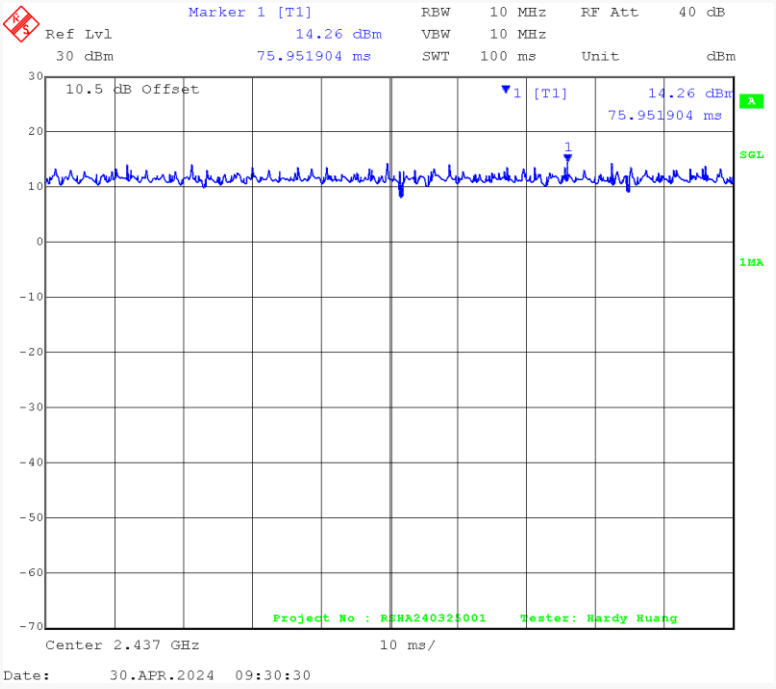
Note: The power level setting was declared by the applicant.

Duty Cycle:

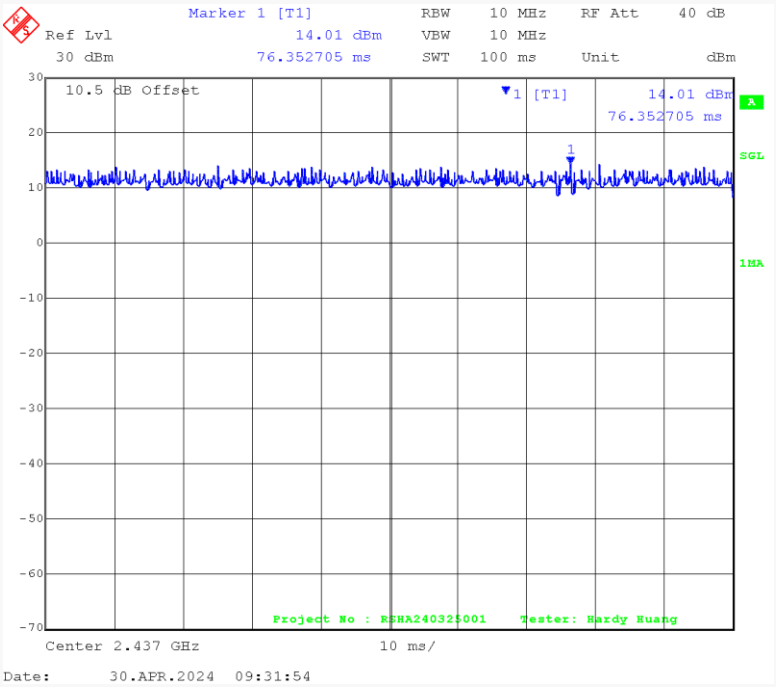
802.11b Mode Middle Channel



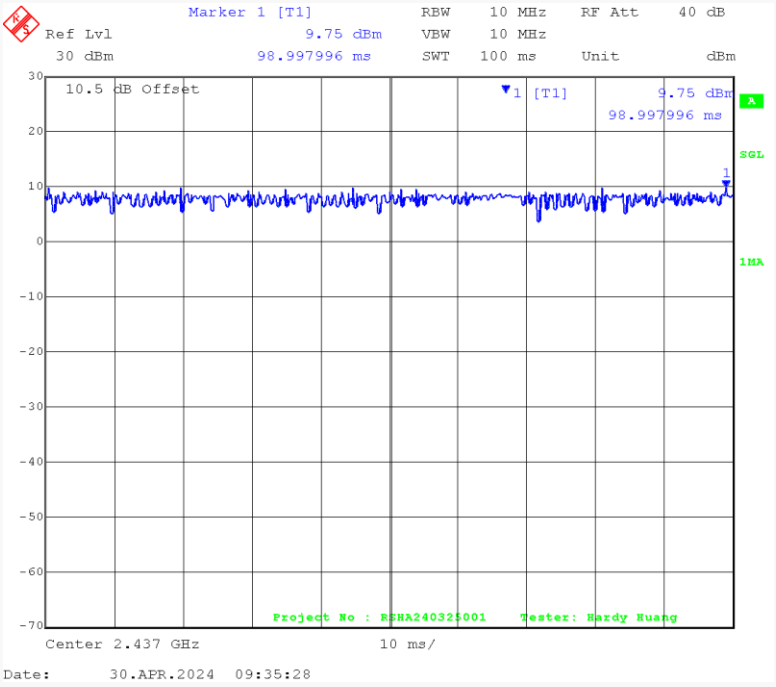
802.11g Mode Middle Channel



802.11n-HT20 Mode Middle Channel



802.11n-HT40 Mode Middle Channel



Mode	Duty Cycle(%)	Ton(ms)	Ton+off(ms)	10log(1/x)
802.11b	100	100	100	0
802.11g	100	100	100	0
802.11n-HT20	100	100	100	0
802.11n-HT40	100	100	100	0

Note: "x" means the Duty Cycle.

Support Equipment List and Details

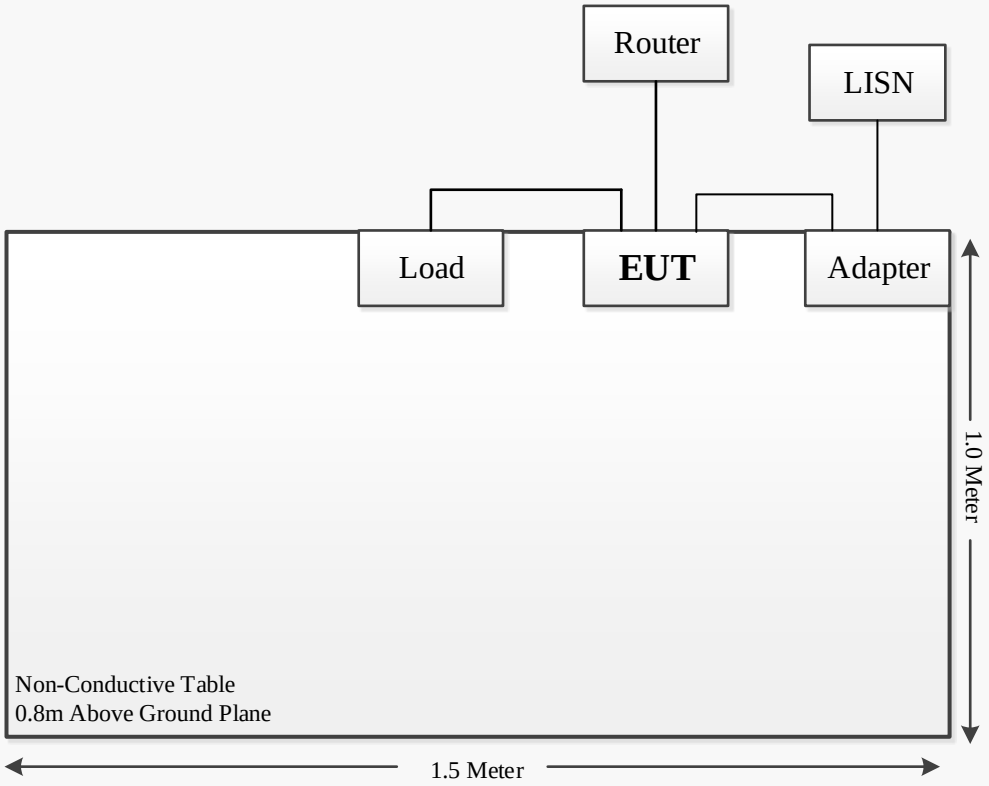
Manufacturer	Description	Model	Serial Number
/	Load	/	/
TP-LINK	Router	TL-XDR3010	12373X0002080
SIMSUKIRN	Adapter	SK02T-0500200U	22090601001172

External I/O Cable

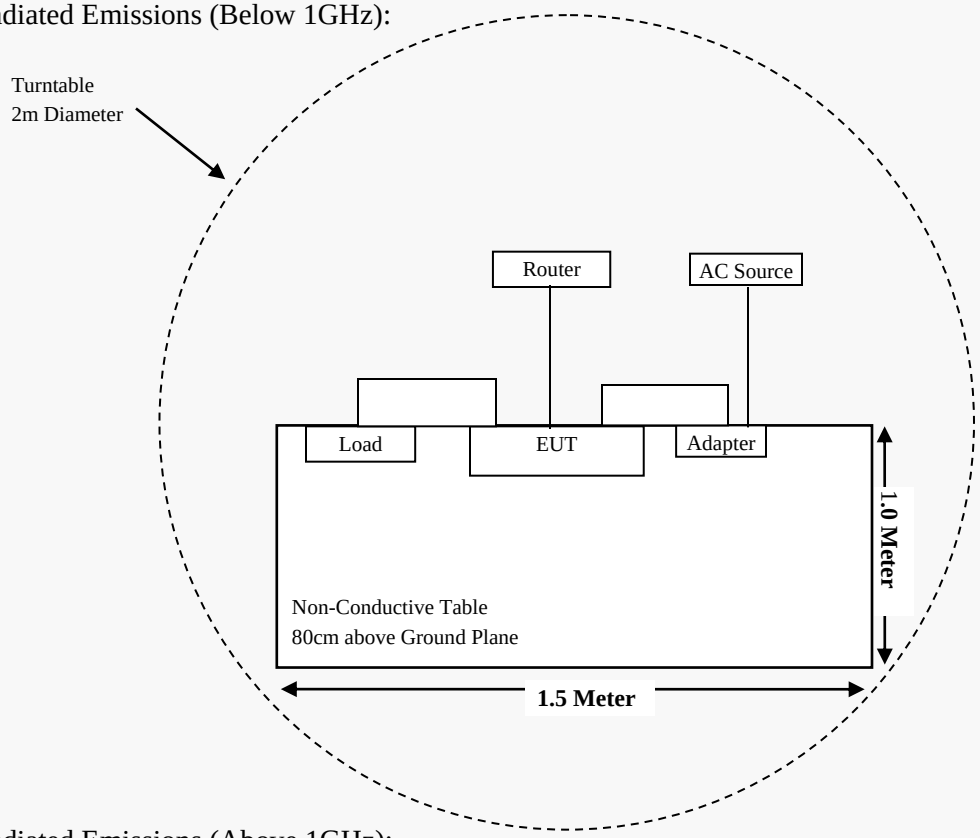
Cable Description	Length (m)	From Port	To Port
Power Cable 1	1.5	LISN	Adapter
Power Cable 2	1.5	Adapter	EUT
RJ45 Cable	8.0	Router	EUT
USB Cable	0.2	EUT	Load

Block Diagram of Test Setup

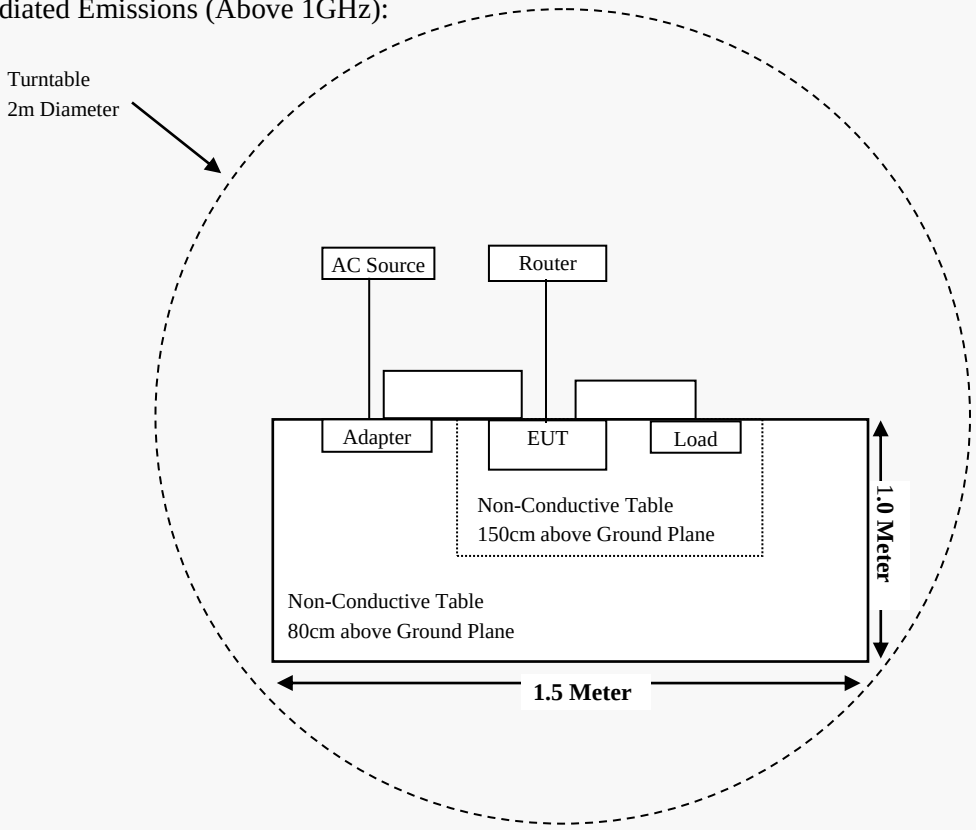
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (I), §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.247(d)	Spurious Emissions at Antenna Port	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

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	2023-05-23	2024-05-22
Sunol Sciences	Hybrid Antenna	JB3	A090314-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Narda	6dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
Sonoma Instrument	Amplifier	310N	171205	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-8	008	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2023-05-23	2024-05-22
Rohde & Schwarz	Test Software	EMC32	100361	N/A	N/A
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2023-05-19	2024-05-18
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2023-06-27	2024-06-26
ETS-LINDGREN	Horn Antenna	3116	2516	2023-12-08	2024-12-07
A.H.Systems, inc	Amplifier	PAM-0118P（2641-1）	512	2023-05-23	2024-05-22
EM Electronics Corporation	Amplifier	EM18G40G	060726	2023-05-23	2024-05-22
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2023-05-23	2024-05-22
Narda	Attenuator	20dB	020	2023-05-23	2024-05-22
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-12	012	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-13	013	2023-05-23	2024-05-22
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2023-05-23	2024-05-22
Rohde & schwarz	Spectrum Analyzer	FSU26	200103	2023-05-23	2024-05-22
Anritsu	Power Sensor	MA24418A	12621	2023-09-27	2024-09-26
Narda	Attenuator	10dB	010	2023-05-23	2024-05-22
XHFDZ	RG316 Coaxial Cable	SMA-316	XHF-1175	Each time	N/A

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	101746	2023-05-23	2024-05-22
Rohde & Schwarz	LISN	ENV216	101115	2023-05-23	2024-05-22
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	0357.8810.54	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-15	015	2023-05-23	2024-05-22

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)

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		Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)	MPE Ratio
		(dBi)	(numeric)	(dBm)	(mW)				
802.11b	2412~2462	2.47	1.77	18.5	70.79	20	0.0249	1.0	0.0249
802.11g		2.47	1.77	18.0	63.10	20	0.0222	1.0	0.0222
802.11n-HT20		2.47	1.77	18.0	63.10	20	0.0222	1.0	0.0222
802.11n-HT40	2422~2452	2.47	1.77	18.0	63.10	20	0.0222	1.0	0.0222
Zigbee	2405~2480	2.47	1.77	7.0	5.01	20	0.0018	1.0	0.0018

Note: For the above tune up power were declared by the manufacturer.

Wi-Fi and Zigbee can transmit simultaneously, The worst condition is 802.11b of Wi-Fi & Zigbee, as below:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$ =0.0249/1.00+0.0018/1.0=0.0249+0.0018=0.0267 < 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 Omni antenna and the antenna gain is 2.47 dBi, which use a unique type of connector to attach to the EUT. Fulfill the requirement of this section. Please refer to the EUT photos.

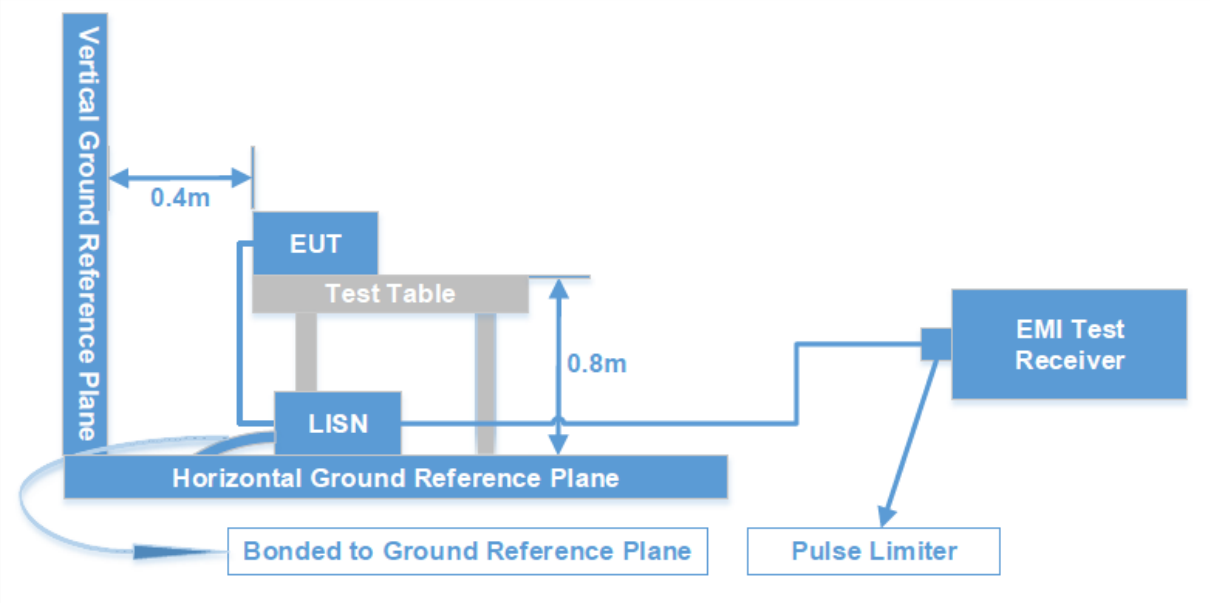
Result: Compliant.

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT 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	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

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.
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.

Factor & Over Limit Calculation

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

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

Test Results Summary

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

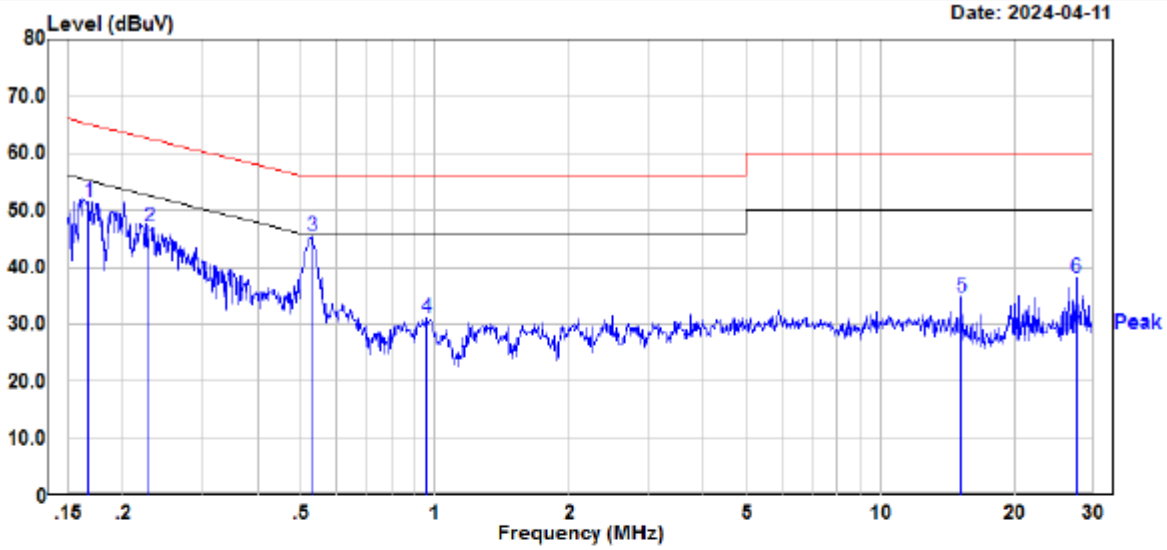
Test Data

Environmental Conditions & Test Information

Temperature:	19.6 ℃
Relative Humidity:	62 %
ATM Pressure:	101.8 kPa
Test Date:	2024-04-11
Test Engineer:	Frank Liu

EUT operation mode: Transmitting in maximum output power mode 802.11b mode Low channel

AC 120V/60 Hz, Line

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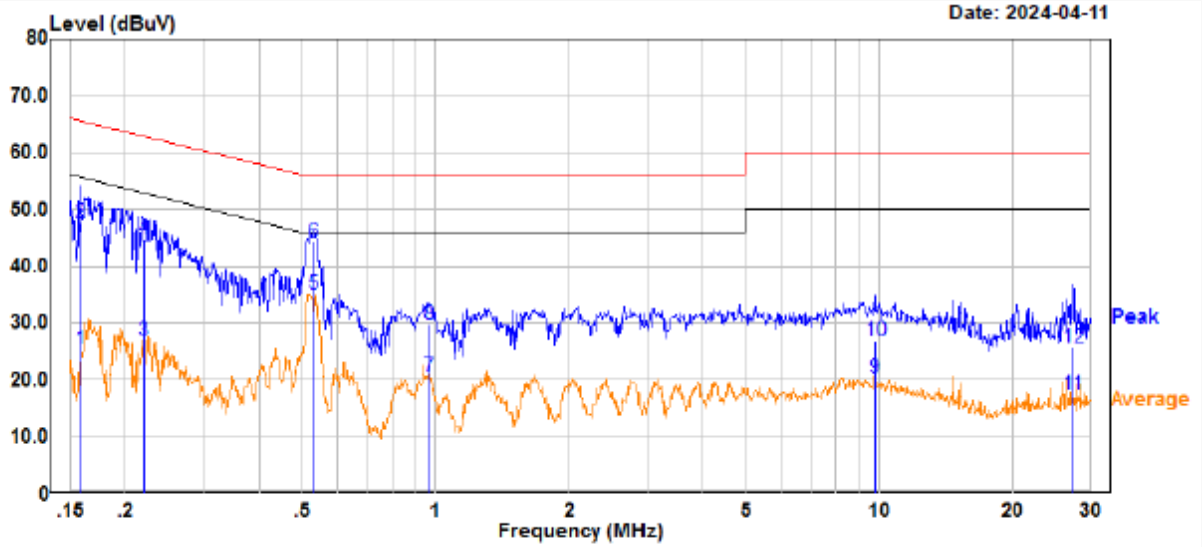
Site                : CE
Condition           : limit\FCC PART 15C
                    : DET:Peak
Project             : RSHA240325001
Model               : ECU-R
Phase               : L
Voltage             : 120V/60Hz
Mode                : 2.4G wifi
Test Equipment      : ENV216,ESR
Temperature         : 19.6℃
Humidity            : 62%
Atmospheric pressure: 101.8kPa
Test Engineer       : Frank Liu
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.167	31.51	20.01	51.52	65.09	-13.57	Peak
2	0.229	26.99	20.03	47.02	62.48	-15.46	Peak
3	0.529	25.42	19.97	45.39	56.00	-10.61	Peak
4	0.958	11.55	19.64	31.19	56.00	-24.81	Peak
5	15.155	15.25	19.63	34.88	60.00	-25.12	Peak
6	27.426	18.15	19.98	38.13	60.00	-21.87	Peak

AC 120V/60 Hz, Neutral



Trace: 1

Site : CE
Condition : limit\FCC PART 15C
: DET:Peak
Project : RSHA240325001
Model : ECU-R
Phase : N
Voltage : 120V/60Hz
Mode : 2.4G wifi
Test Equipment : ENV216,ESR
Temperature : 19.6℃
Humidity : 62%
Atmospheric pressure: 101.8kPa
Test Engineer : Frank Liu

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.158	5.50	20.00	25.50	55.54	-30.04	Average
2	0.158	27.60	20.00	47.60	65.54	-17.94	QP
3	0.220	6.70	20.04	26.74	52.81	-26.07	Average
4	0.220	24.80	20.04	44.84	62.81	-17.97	QP
5	0.529	15.00	19.97	34.97	46.00	-11.03	Average
6	0.529	24.20	19.97	44.17	56.00	-11.83	QP
7	0.968	1.00	19.63	20.63	46.00	-25.37	Average
8	0.968	10.00	19.63	29.63	56.00	-26.37	QP
9	9.774	0.50	19.88	20.38	50.00	-29.62	Average
10	9.774	6.90	19.88	26.78	60.00	-33.22	QP
11	27.289	-2.60	19.97	17.37	50.00	-32.63	Average
12	27.289	5.60	19.97	25.57	60.00	-34.43	QP

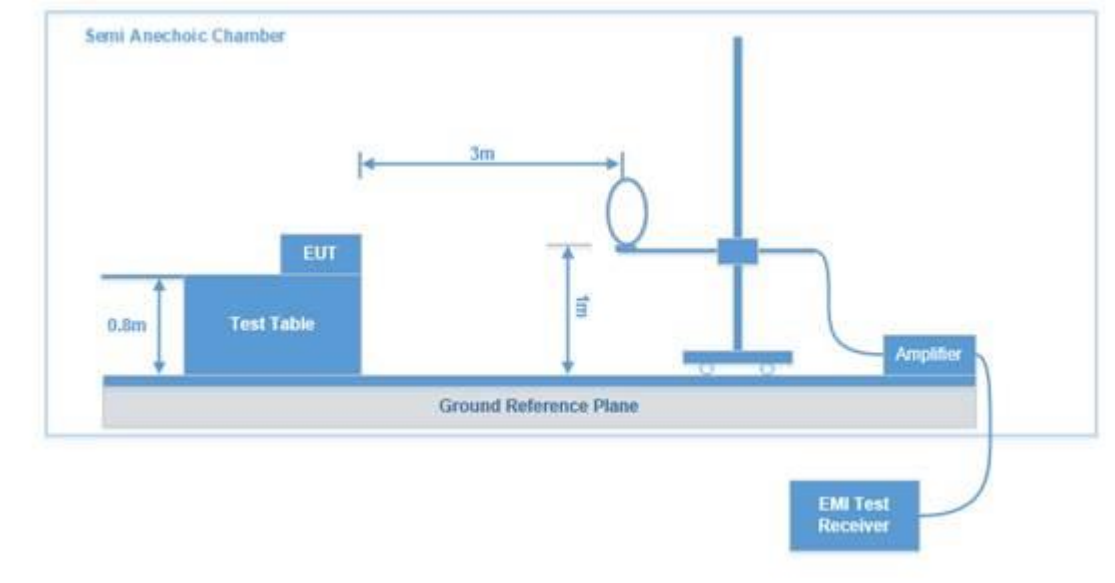
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

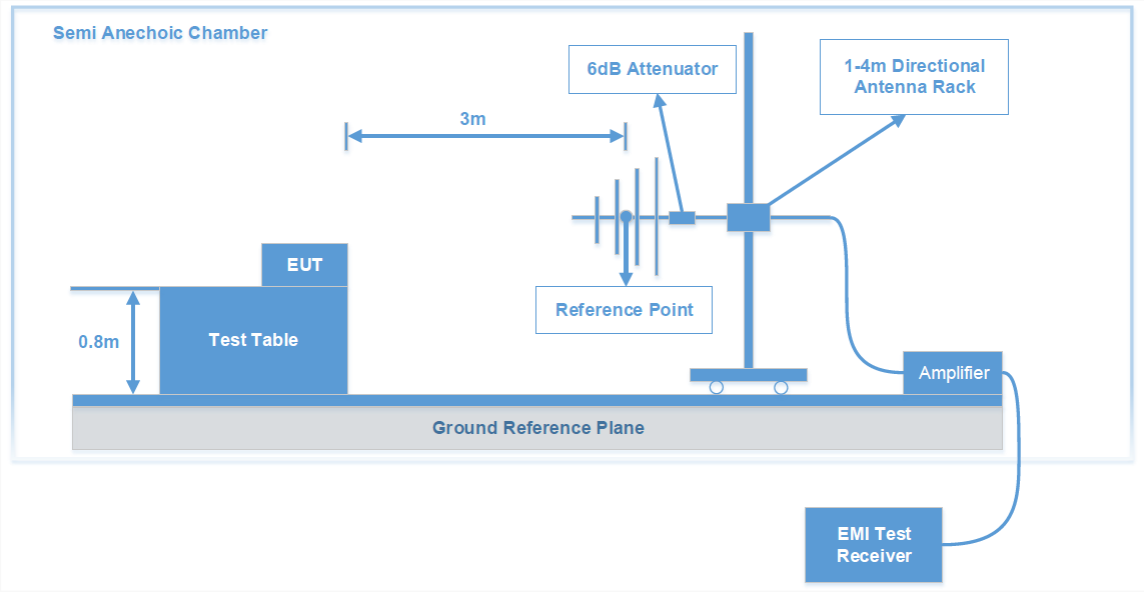
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

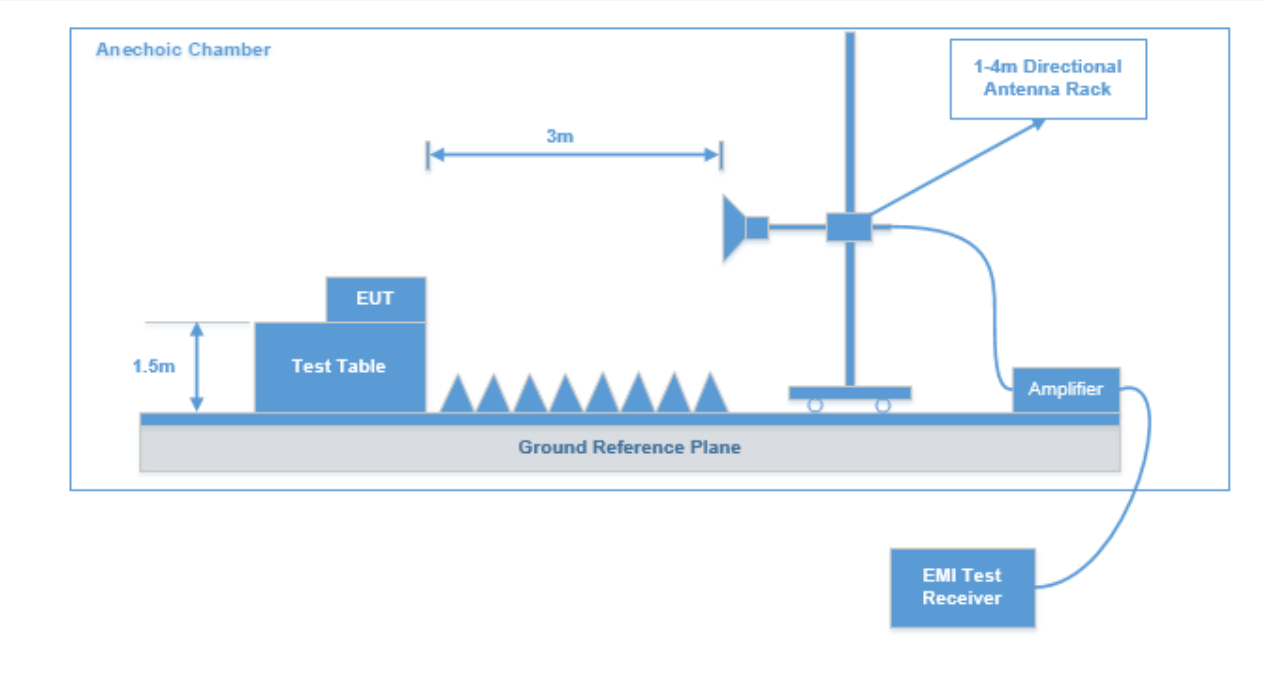
9 kHz - 30 MHz:



30 MHz - 1 GHz:



1 GHz – 25 GHz:



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	Detector
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.

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.

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.

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)

Note: The QuasiPeak (dBμV/m), MaxPeak (dBμV/m), Average (dBμV/m) which shown in the data table are all Corrected Amplitude.

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

Environmental Conditions & Test Information

Frequency Range:	Below 1 GHz	Above 1 GHz
Temperature:	17.7 ℃	20.3~22.5 ℃
Relative Humidity:	54 %	42~52 %
ATM Pressure:	102.2 kPa	102.1~102.5 kPa
Test Date:	2024-04-10	2024-04-26 to 2024-04-29
Test Engineer:	Leah Li	Peter Wang & Klein Zhu

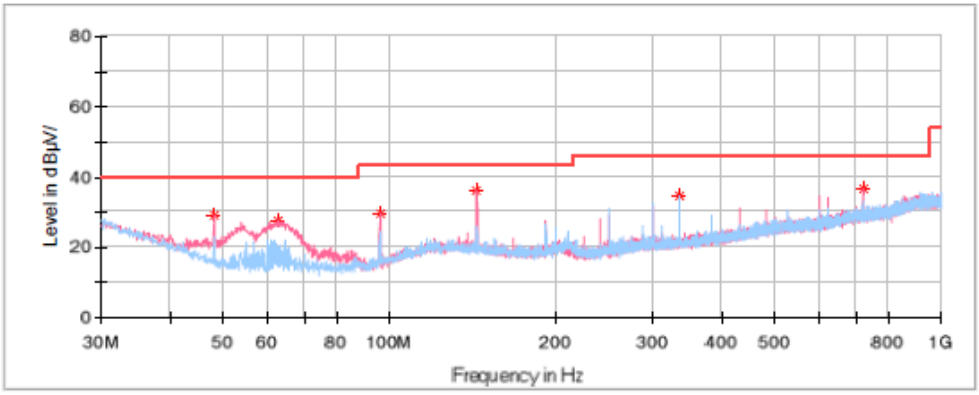
EUT operation mode: Transmitting
After pre-scan in the X, Y and Z axes of orientation, the worst case is below:
9 kHz-30 MHz（*Transmitting in maximum output power channel*）*:*
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30 MHz - 1 GHz: (802.11b mode is worst case)

Low channel: 2412MHz

Common Information

Project No:	RSHA240325001
EUT Model:	ECU-R
Test Mode:	2.4G
Standard:	FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
Test Equipment:	ESCI、JB3、310N
Temperature:	17.7℃
Humidity:	54%
Barometric Pressure:	102.2kPa
Test Engineer:	Leah Li
Test Date:	2024/4/10



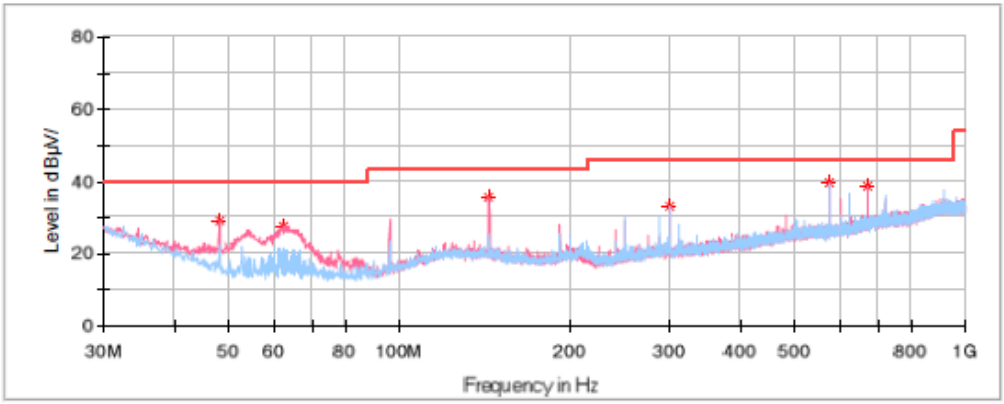
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.945000	29.17	40.00	10.83	V	-15.6
62.858750	27.88	40.00	12.12	V	-17.3
95.960000	29.88	43.50	13.62	V	-15.7
143.975000	35.99	43.50	7.51	V	-11.7
335.913750	34.87	46.00	11.13	H	-10.1
720.033750	36.68	46.00	9.32	V	-2.2

Middle channel: 2437MHz

Common Information

Project No:	RSHA240325001
EUT Model:	ECU-R
Test Mode:	2.4G
Standard:	FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
Test Equipment:	ESCI、JB3、310N
Temperature:	17.7℃
Humidity:	54%
Barometric Pressure:	102.2kPa
Test Engineer:	Leah Li
Test Date:	2024/4/10



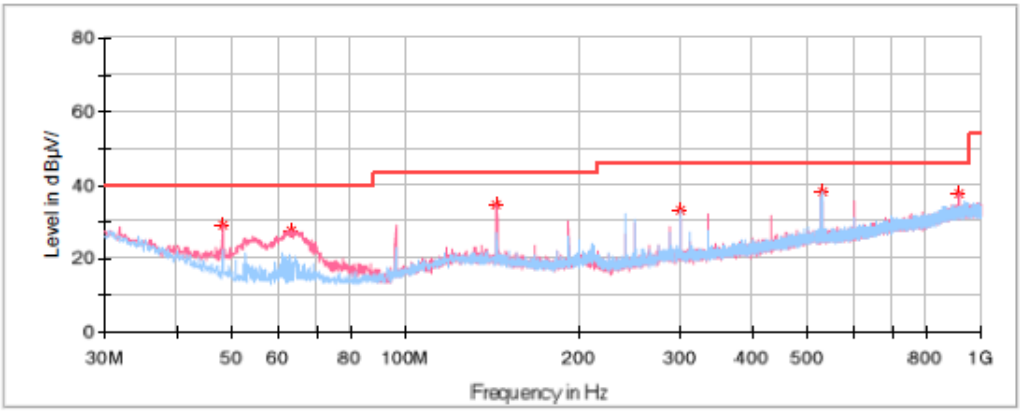
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.945000	28.95	40.00	11.05	V	-15.6
62.495000	27.90	40.00	12.10	V	-17.3
143.975000	35.70	43.50	7.80	V	-11.7
300.023750	33.25	46.00	12.75	H	-11.0
575.988750	39.50	46.00	6.50	V	-5.0
672.018750	38.55	46.00	7.45	V	-3.1

High channel: 2462MHz

Common Information

Project No:	RSHA240325001
EUT Model:	ECU-R
Test Mode:	2.4G
Standard:	FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
Test Equipment:	ESCI、JB3、310N
Temperature:	17.7℃
Humidity:	54%
Barometric Pressure:	102.2kPa
Test Engineer:	Leah Li
Test Date:	2024/4/10



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.945000	29.04	40.00	10.96	V	-15.6
63.101250	27.78	40.00	12.22	V	-17.3
143.975000	34.83	43.50	8.67	V	-11.7
300.023750	33.31	46.00	12.69	H	-11.0
528.095000	38.15	46.00	7.85	H	-5.5
911.972500	37.67	46.00	8.33	V	1.4

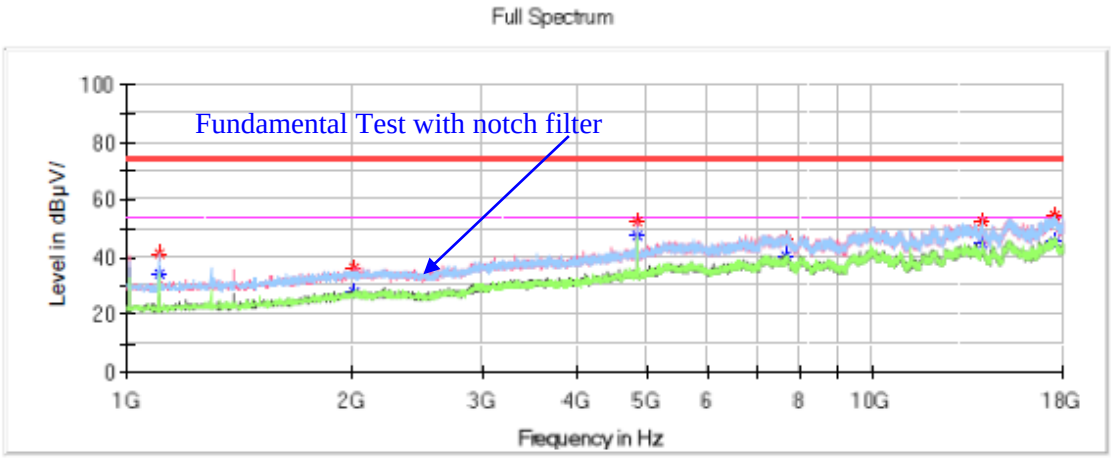
1 GHz - 18 GHz:

802.11b Mode:

Low Channel: 2412 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11b Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



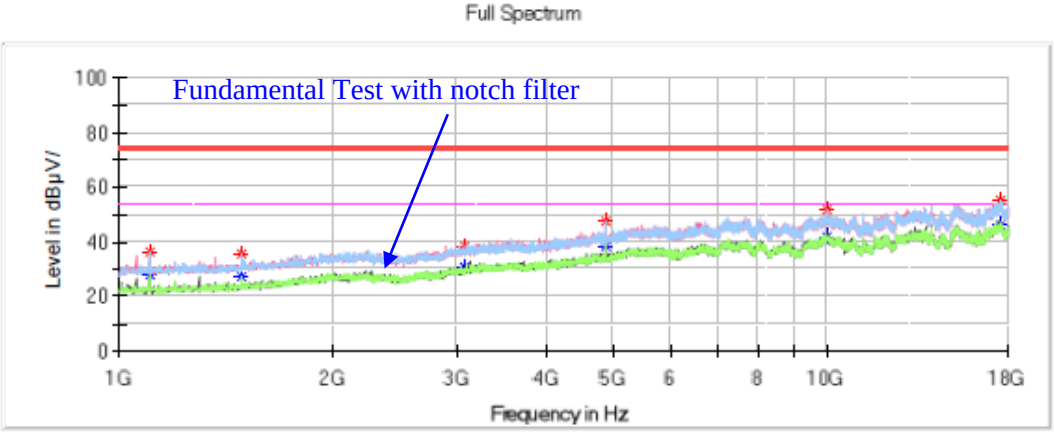
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1102.000000	41.18	---	74.00	32.82	H	-15.2
1102.000000	---	34.57	54.00	19.43	H	-15.2
2021.700000	---	27.65	54.00	26.35	H	-10.5
2021.700000	36.26	---	74.00	37.74	H	-10.5
4823.300000	---	47.32	54.00	6.68	V	-2.1
4823.300000	52.52	---	74.00	21.48	V	-2.1
7638.500000	---	40.40	54.00	13.60	H	4.1
7638.500000	46.34	---	74.00	27.66	H	4.1
14001.600000	---	44.57	54.00	9.43	H	10.5
14001.600000	52.44	---	74.00	21.56	H	10.5
17539.300000	---	45.26	54.00	8.74	H	13.5
17539.300000	54.48	---	74.00	19.52	H	13.5

Middle Channel: 2437 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11b Middle Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



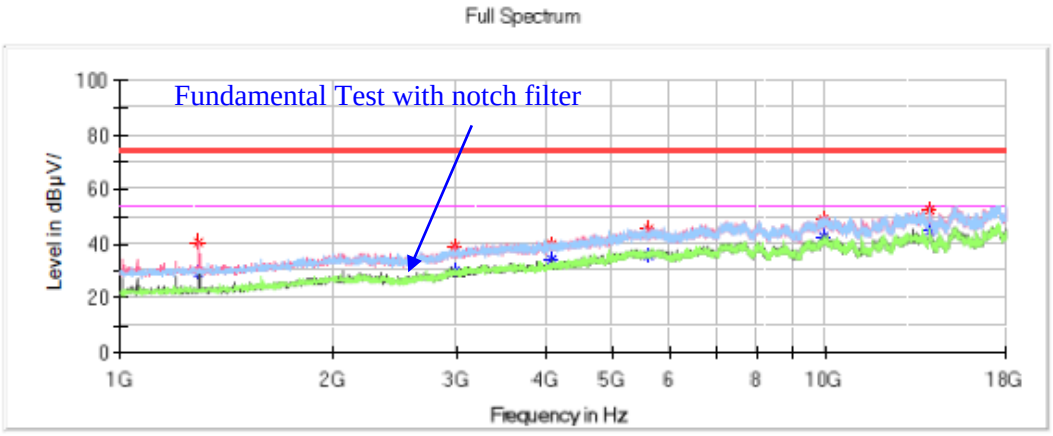
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1102.000000	---	28.24	54.00	25.76	H	-15.2
1102.000000	36.57	---	74.00	37.43	H	-15.2
1486.200000	---	27.02	54.00	26.98	H	-14.0
1486.200000	35.99	---	74.00	38.01	H	-14.0
3067.200000	---	30.98	54.00	23.02	V	-7.8
3067.200000	38.66	---	74.00	35.34	V	-7.8
4874.300000	---	38.59	54.00	15.41	H	-1.9
4874.300000	47.78	---	74.00	26.22	H	-1.9
10006.600000	---	41.67	54.00	12.33	H	7.8
10006.600000	51.47	---	74.00	22.53	H	7.8
17598.800000	---	46.35	54.00	7.65	H	13.2
17598.800000	55.03	---	74.00	18.97	H	13.2

High Channel: 2462 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11b High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



Critical_Freqs

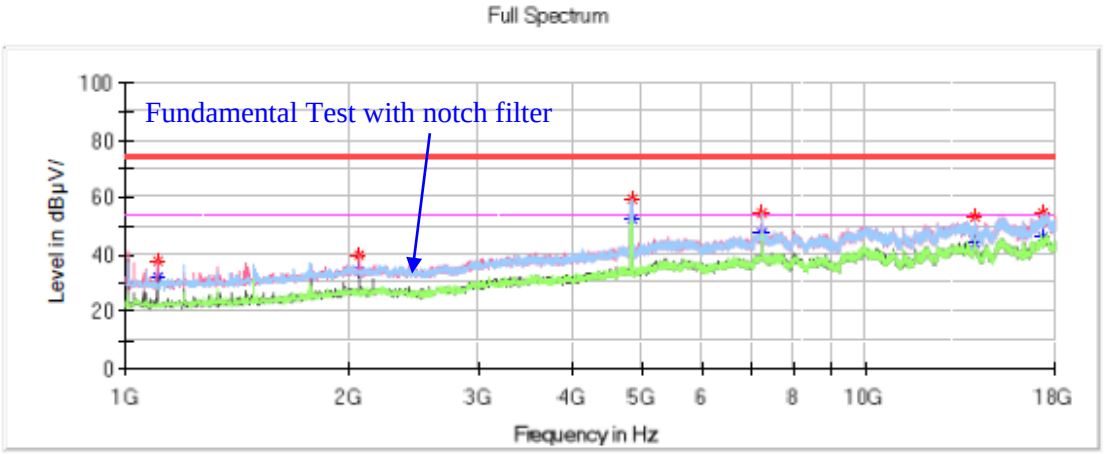
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1290.700000	---	29.20	54.00	24.80	V	-14.6
1290.700000	40.40	---	74.00	33.60	V	-14.6
2985.600000	---	29.75	54.00	24.25	V	-8.1
2985.600000	39.21	---	74.00	34.79	V	-8.1
4088.900000	---	34.13	54.00	19.87	V	-4.8
4088.900000	40.15	---	74.00	33.85	V	-4.8
5598.500000	---	35.54	54.00	18.46	H	0.7
5598.500000	45.37	---	74.00	28.63	H	0.7
9926.700000	---	42.85	54.00	11.15	H	7.6
9926.700000	48.92	---	74.00	25.08	H	7.6
14001.600000	52.12	---	74.00	21.88	V	10.5
14001.600000	---	44.74	54.00	9.26	V	10.5

802.11g Mode:

Low Channel: 2412 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11g Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



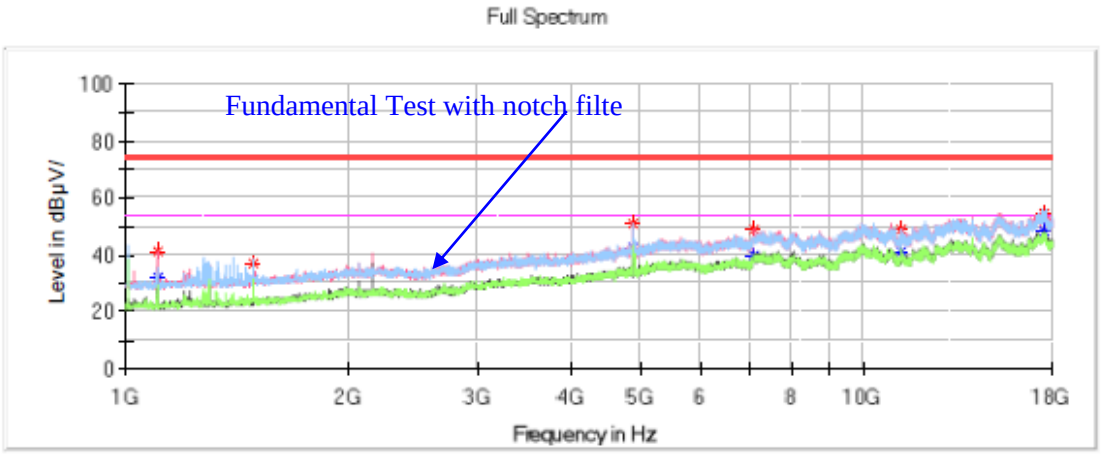
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1102.000000	37.99	---	74.00	36.01	V	-15.2
1102.000000	---	31.82	54.00	22.18	V	-15.2
2062.500000	---	34.24	54.00	19.76	V	-10.5
2062.500000	39.86	---	74.00	34.14	V	-10.5
4828.400000	59.23	---	74.00	14.77	H	-2.1
4828.400000	---	52.45	54.00	1.55	H	-2.1
7239.000000	---	47.31	54.00	6.69	H	4.0
7239.000000	54.55	---	74.00	19.45	H	4.0
14010.100000	---	44.22	54.00	9.78	H	10.5
14010.100000	52.96	---	74.00	21.04	H	10.5
17325.100000	---	46.21	54.00	7.79	V	13.2
17325.100000	54.62	---	74.00	19.38	V	13.2

Middle Channel: 2437 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11g Middle Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



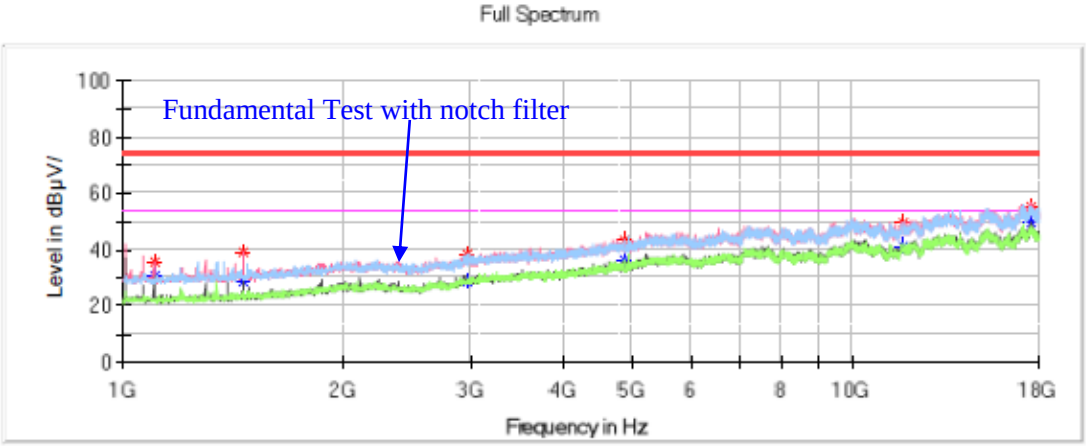
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB)
1102.000000	---	32.31	54.00	21.69	V	-15.2
1102.000000	41.37	---	74.00	32.63	V	-15.2
1486.200000	---	31.24	54.00	22.76	H	-14.0
1486.200000	37.34	---	74.00	36.66	H	-14.0
4865.800000	---	42.82	54.00	11.18	H	-1.9
4865.800000	50.95	---	74.00	23.05	H	-1.9
7091.100000	---	39.59	54.00	14.41	H	3.9
7091.100000	49.18	---	74.00	24.82	H	3.9
11201.700000	---	41.47	54.00	12.53	H	6.7
11201.700000	49.29	---	74.00	24.71	H	6.7
17552.900000	54.44	---	74.00	19.56	H	13.4
17552.900000	---	48.04	54.00	5.96	H	13.4

High Channel: 2462 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11g High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



Critical_Freqs

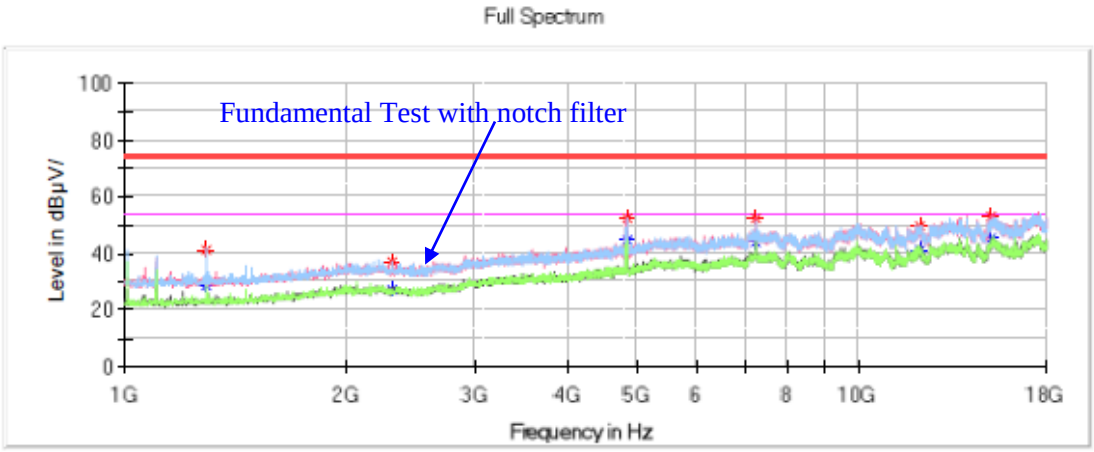
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1102.000000	---	30.77	54.00	23.23	V	-15.2
1102.000000	35.90	---	74.00	38.10	V	-15.2
1462.400000	39.21	---	74.00	34.79	V	-14.0
1462.400000	---	28.87	54.00	25.13	V	-14.0
2956.700000	38.30	---	74.00	35.70	H	-8.2
2956.700000	---	28.74	54.00	25.26	H	-8.2
4859.000000	43.64	---	74.00	30.36	H	-1.9
4859.000000	---	36.41	54.00	17.59	H	-1.9
11727.000000	---	41.23	54.00	12.77	H	7.1
11727.000000	49.82	---	74.00	24.18	H	7.1
17593.700000	55.10	---	74.00	18.90	H	13.2
17593.700000	---	49.54	54.00	4.46	H	13.2

802.11n-HT20 Mode:

Low Channel : 2412 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n20 Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



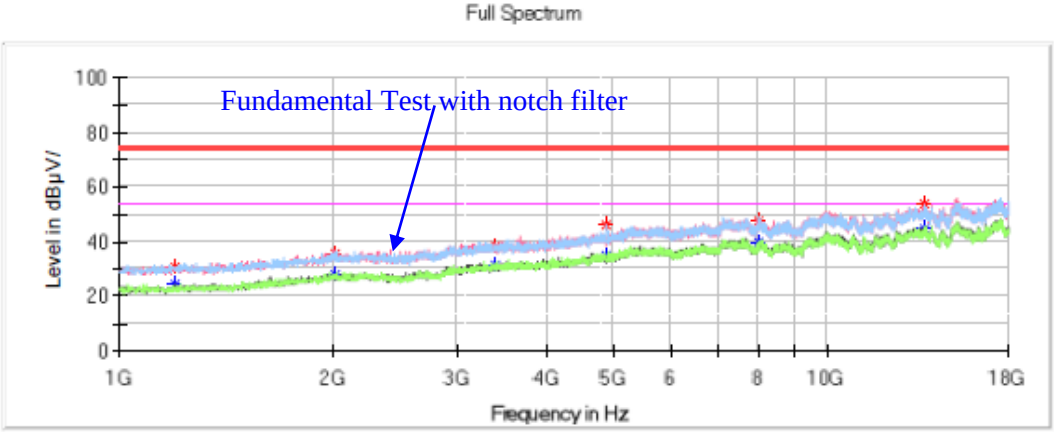
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1290.700000	41.28	---	74.00	32.72	H	-14.6
1290.700000	---	28.50	54.00	25.50	H	-14.6
2307.300000	---	27.61	54.00	26.39	H	-10.1
2307.300000	37.30	---	74.00	36.70	H	-10.1
4826.700000	---	44.64	54.00	9.36	H	-2.1
4826.700000	52.48	---	74.00	21.52	H	-2.1
7242.400000	---	44.12	54.00	9.88	V	4.0
7242.400000	52.12	---	74.00	21.88	V	4.0
12094.200000	---	41.40	54.00	12.60	V	7.1
12094.200000	49.57	---	74.00	24.43	V	7.1
15169.500000	---	45.49	54.00	8.51	V	10.7
15169.500000	53.48	---	74.00	20.52	V	10.7

Middle Channel: 2437 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n20 Middle Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



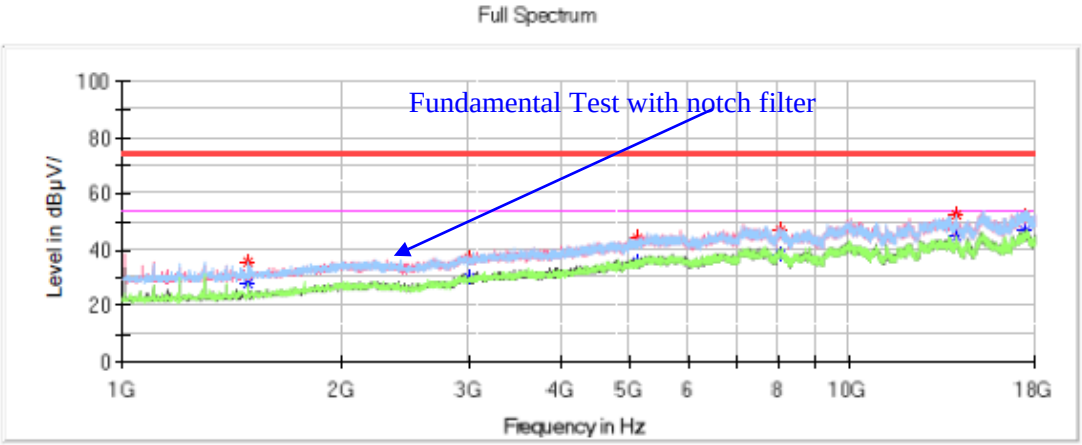
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµ V/m)	Average (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB)
1200.600000	---	24.68	54.00	29.32	V	-14.9
1200.600000	30.77	---	74.00	43.23	V	-14.9
2018.300000	---	28.23	54.00	25.77	V	-10.5
2018.300000	35.84	---	74.00	38.16	H	-10.5
3403.800000	38.36	---	74.00	35.64	V	-6.5
3403.800000	---	31.73	54.00	22.27	V	-6.5
4864.100000	46.35	---	74.00	27.65	H	-1.9
4864.100000	---	35.18	54.00	18.82	V	-1.9
8009.100000	---	40.17	54.00	13.83	V	3.8
8009.100000	47.63	---	74.00	26.37	H	3.8
13719.400000	---	44.87	54.00	9.13	H	10.8
13719.400000	53.74	---	74.00	20.26	V	10.8

High Channel : 2462 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n20 High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



Critical_Freqs

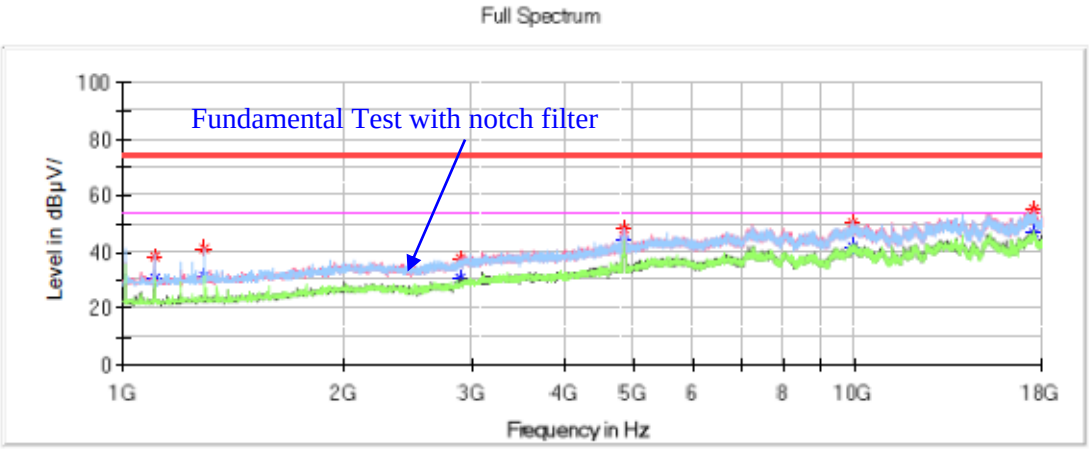
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1486.200000	35.66	---	74.00	38.34	H	-14.0
1486.200000	---	27.65	54.00	26.35	H	-14.0
2999.200000	37.02	---	74.00	36.98	V	-8.0
2999.200000	---	29.86	54.00	24.14	V	-8.0
5122.500000	44.34	---	74.00	29.66	V	-0.7
5122.500000	---	35.39	54.00	18.61	V	-0.7
8026.100000	47.17	---	74.00	26.83	V	3.8
8026.100000	---	38.57	54.00	15.43	V	3.8
14001.600000	52.31	---	74.00	21.69	V	10.5
14001.600000	---	44.54	54.00	9.46	V	10.5
17495.100000	52.00	---	74.00	22.00	V	13.6
17495.100000	---	46.96	54.00	7.04	V	13.6

802.11n-HT40 Mode:

Low Channel : 2422 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n40 Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



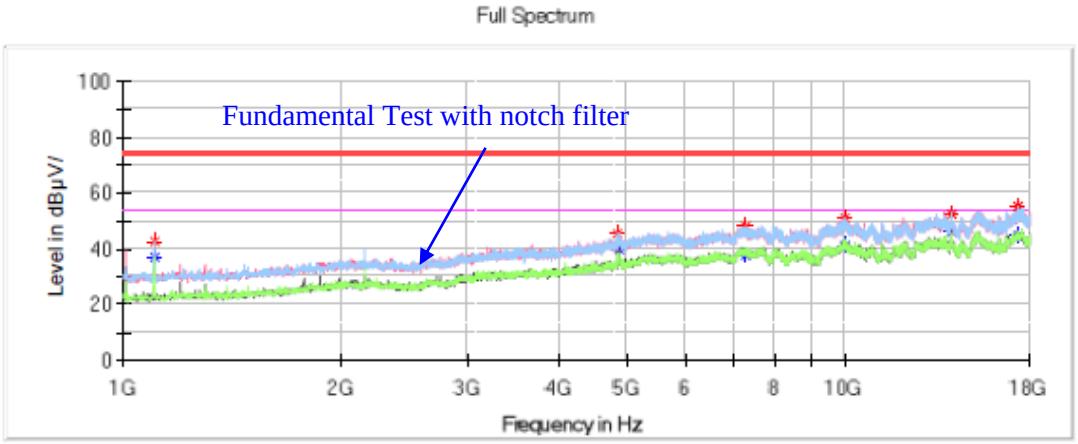
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1102.000000	---	30.77	54.00	23.23	H	-15.2
1102.000000	38.12	---	74.00	35.88	H	-15.2
1290.700000	41.52	---	74.00	32.48	H	-14.6
1290.700000	---	31.40	54.00	22.60	H	-14.6
2887.000000	37.97	---	74.00	36.03	V	-8.4
2887.000000	---	30.53	54.00	23.47	V	-8.4
4828.400000	---	44.39	54.00	9.61	V	-2.1
4828.400000	47.94	---	74.00	26.06	V	-2.1
9940.300000	---	42.25	54.00	11.75	V	7.6
9940.300000	50.65	---	74.00	23.35	V	7.6
17566.500000	---	47.14	54.00	6.86	V	13.3
17566.500000	55.44	---	74.00	18.56	V	13.3

Middle Channel: 2437 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n40 Middle Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



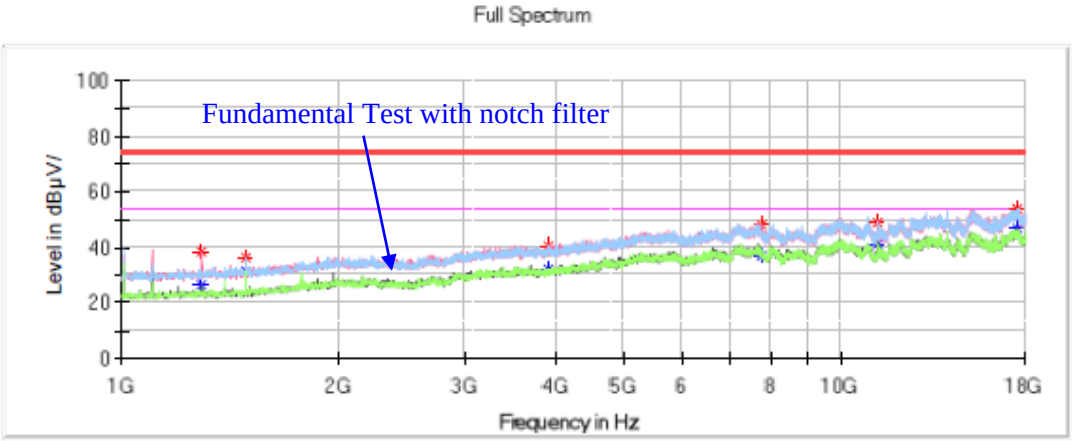
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB)
1102.000000	42.50	---	74.00	31.50	H	-15.2
1102.000000	---	36.72	54.00	17.28	H	-15.2
4847.100000	45.31	---	74.00	28.69	V	-2.0
4848.800000	---	40.03	54.00	13.97	V	-2.0
7283.200000	---	37.82	54.00	16.18	H	4.0
7283.200000	48.28	---	74.00	25.72	H	4.0
9987.900000	---	41.00	54.00	13.00	H	7.8
9987.900000	51.38	---	74.00	22.62	H	7.8
14001.600000	---	45.88	54.00	8.12	H	10.5
14001.600000	52.56	---	74.00	21.44	H	10.5
17367.600000	---	44.51	54.00	9.49	H	13.3
17367.600000	55.25	---	74.00	18.75	H	13.3

High Channel : 2452 MHz

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n40 High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Peter Wang



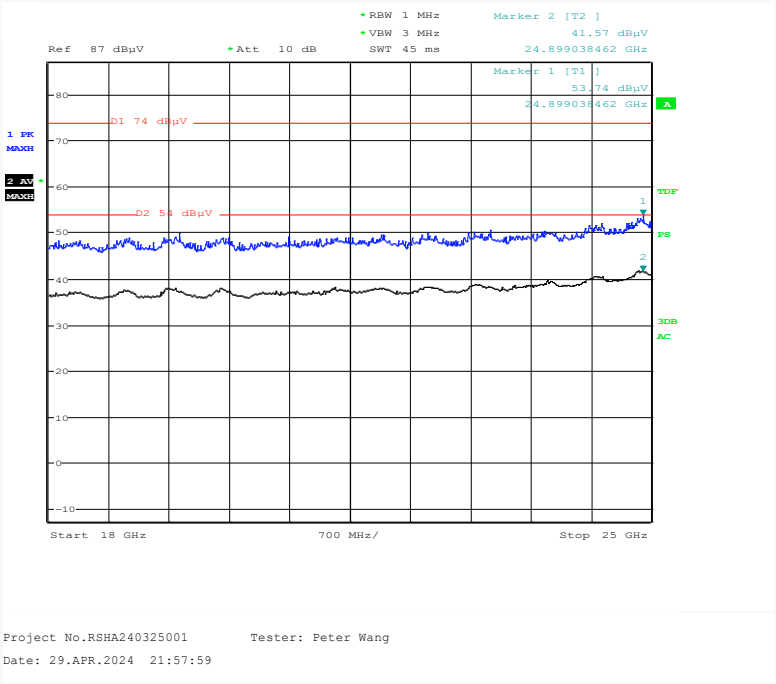
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1290.700000	38.73	---	74.00	35.27	V	-14.6
1290.700000	---	26.87	54.00	27.13	V	-14.6
1486.200000	---	31.42	54.00	22.58	H	-14.0
1486.200000	36.36	---	74.00	37.64	H	-14.0
3918.900000	---	31.86	54.00	22.14	H	-5.2
3918.900000	40.41	---	74.00	33.59	H	-5.2
7743.900000	---	37.28	54.00	16.72	V	4.0
7743.900000	48.51	---	74.00	25.49	V	4.0
11201.700000	49.14	---	74.00	24.86	H	6.7
11201.700000	---	41.45	54.00	12.55	H	6.7
17551.200000	54.16	---	74.00	19.84	V	13.4
17551.200000	---	46.53	54.00	7.47	V	13.4

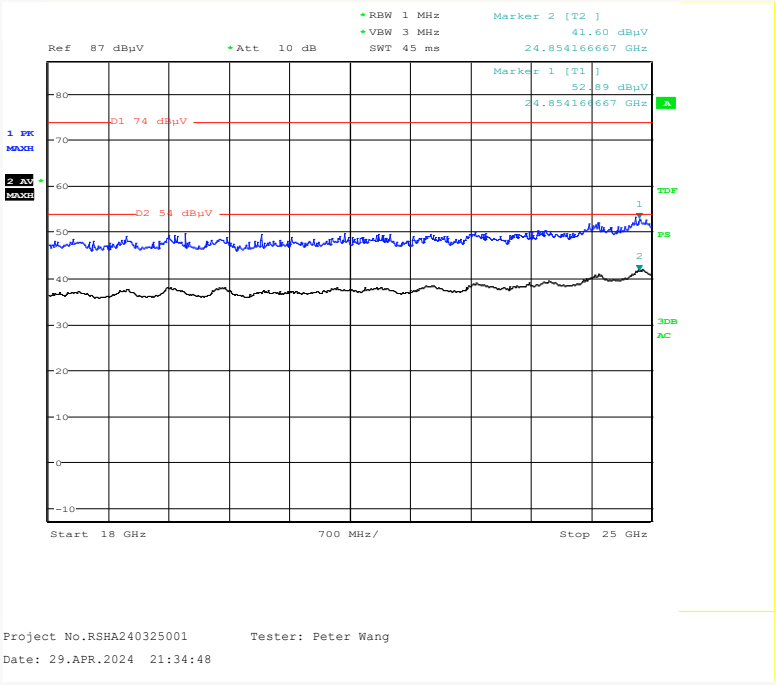
18GHz-25GHz:

Pre-scan with 802.11b, 802.11g, 802.11n-HT20 and 802.11n-HT40 modes of operation in the X,Y and Z axes of orientation, the worst case ***low channel of 802.11b modes in Y-axis of orientation*** *was recorded*

Vertical



Horizontal



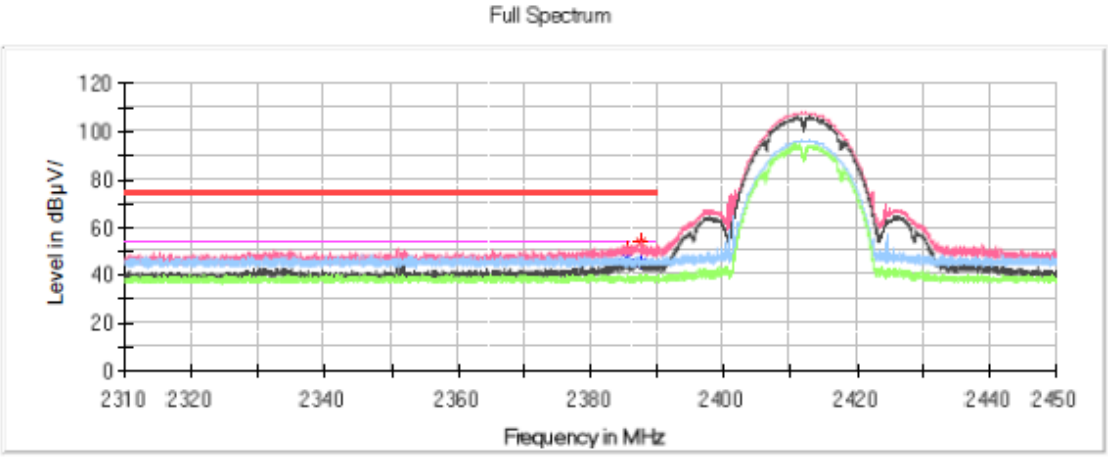
Note: The test distance is 3m. The limit is 74dBµV/m(Peak) and 54dBµV/m(Average).

Band Edge:

802.11b Mode:

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11b Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu

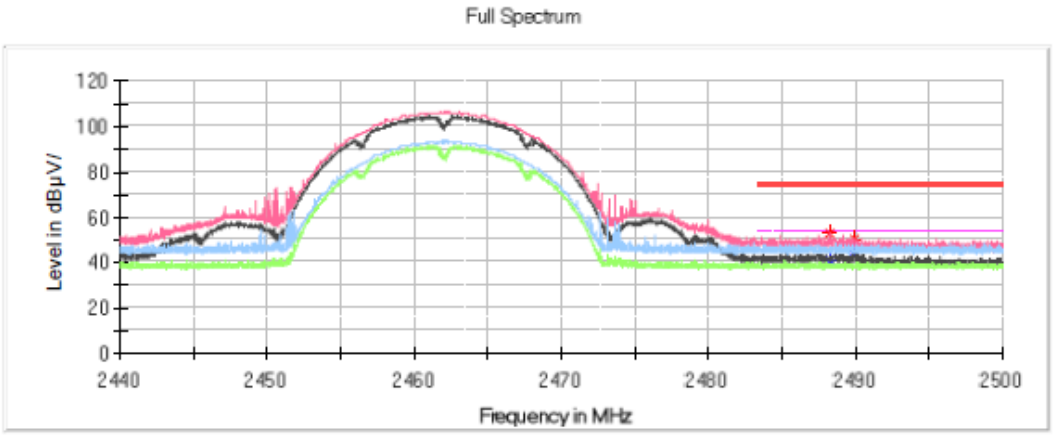


Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2385.404000	50.31	---	74.00	23.69	V	0.1
2385.404000	---	46.70	54.00	7.30	V	0.1
2387.560000	53.96	---	74.00	20.04	V	0.1
2387.560000	---	45.70	54.00	8.30	V	0.1

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11b High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu



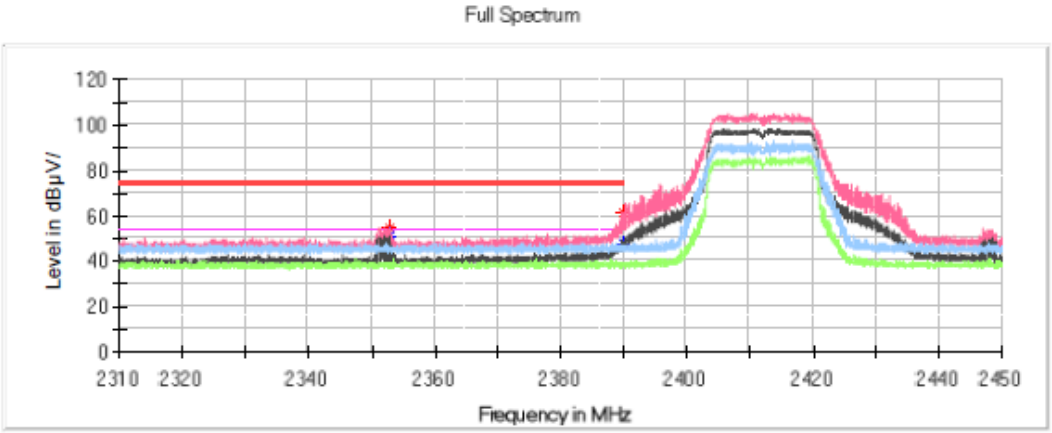
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2488.186000	53.09	---	74.00	20.91	V	0.2
2488.186000	---	41.45	54.00	12.55	V	0.2
2489.968000	50.19	---	74.00	23.81	V	0.2
2489.968000	---	45.00	54.00	9.00	V	0.2

802.11g Mode:

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11g Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu

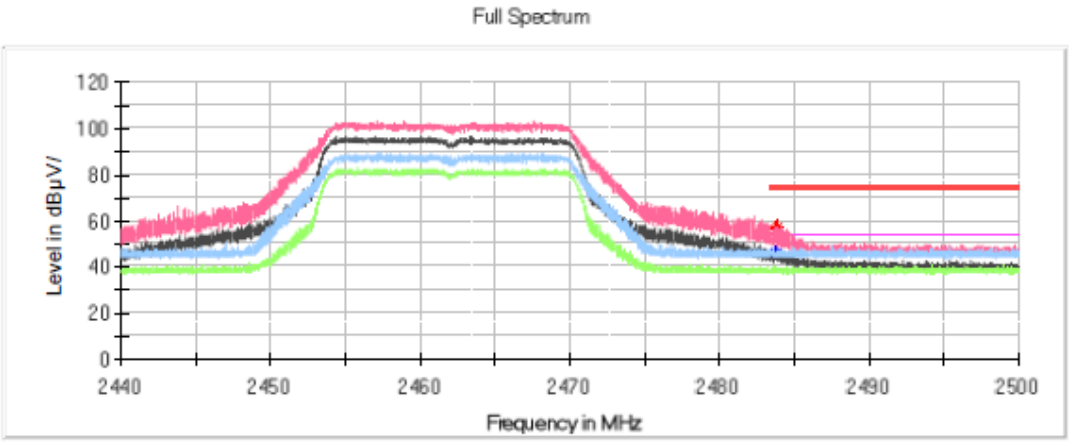


Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2352.700000	54.29	---	74.00	19.71	V	0.0
2352.700000	---	51.17	54.00	2.83	V	0.0
2389.814000	61.38	---	74.00	12.62	V	0.1
2389.814000	---	47.97	54.00	6.03	V	0.1

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11g High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu



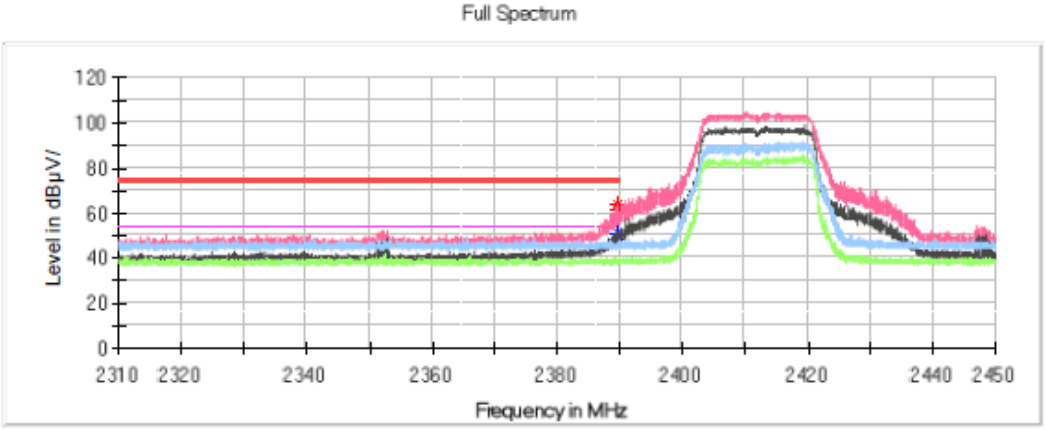
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.662000	---	46.43	54.00	7.57	V	0.2
2483.662000	56.48	---	74.00	17.52	V	0.2
2483.854000	---	45.83	54.00	8.17	V	0.2
2483.854000	57.26	---	74.00	16.74	V	0.2

802.11n-HT20 Mode:

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n20 Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu

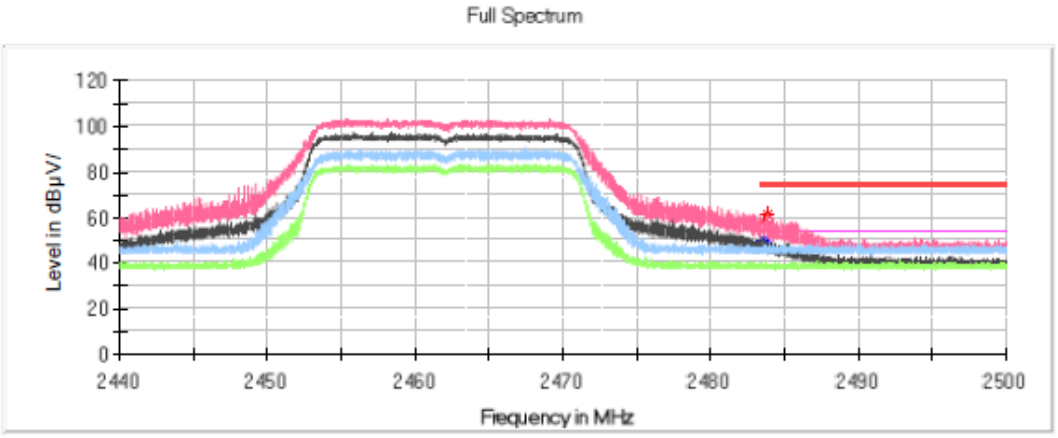


Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2389.702000	---	51.19	54.00	2.81	V	0.1
2389.702000	61.19	---	74.00	12.81	V	0.1
2389.716000	---	48.99	54.00	5.01	V	0.1
2389.716000	63.49	---	74.00	10.51	V	0.1

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n20 High Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu



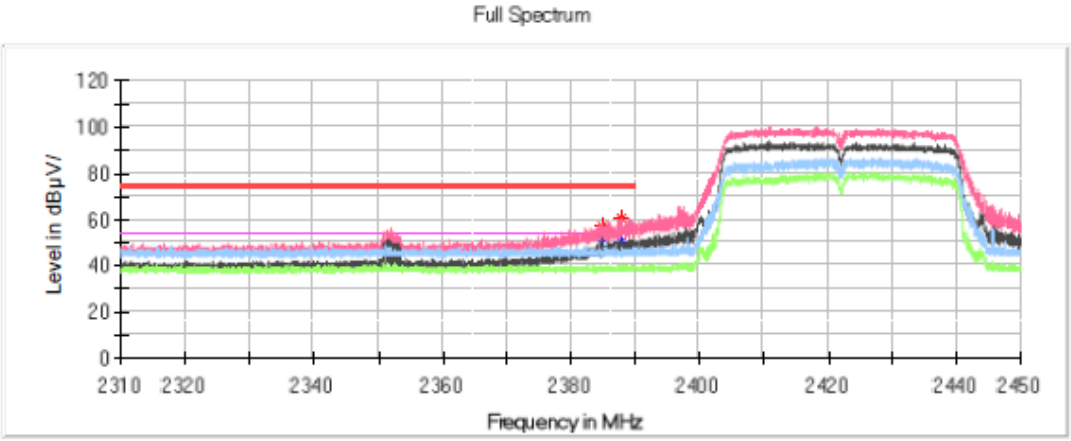
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.584000	57.94	---	74.00	16.06	V	0.2
2483.584000	---	50.60	54.00	3.40	V	0.2
2483.842000	61.17	---	74.00	12.83	V	0.2
2483.842000	---	47.48	54.00	6.52	V	0.2

802.11n-HT40 Mode:

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n40 Low Channel
Standard:	FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer:	Klein Zhu

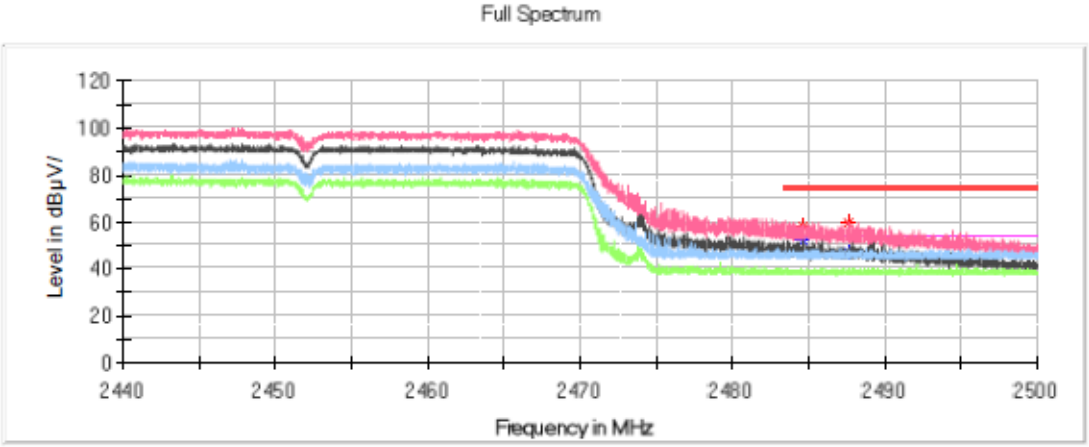


Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2384.718000	57.12	---	74.00	16.88	V	0.1
2384.718000	---	51.72	54.00	2.28	V	0.1
2387.756000	60.10	---	74.00	13.90	V	0.1
2387.756000	---	49.95	54.00	4.05	V	0.1

Common Information

Project No.:	RSHA240325001
Test Mode:	2.4G WIFI 802.11n40 High Channel
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)
2484.652000	57.78	---	74.00	16.22	V	0.2
2484.652000	---	51.76	54.00	2.24	V	0.2
2487.640000	59.96	---	74.00	14.04	V	0.2
2487.640000	---	47.05	54.00	6.95	V	0.2

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

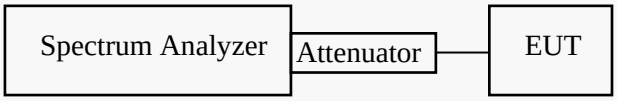
Applicable Standard

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

Environmental Conditions & Test Information

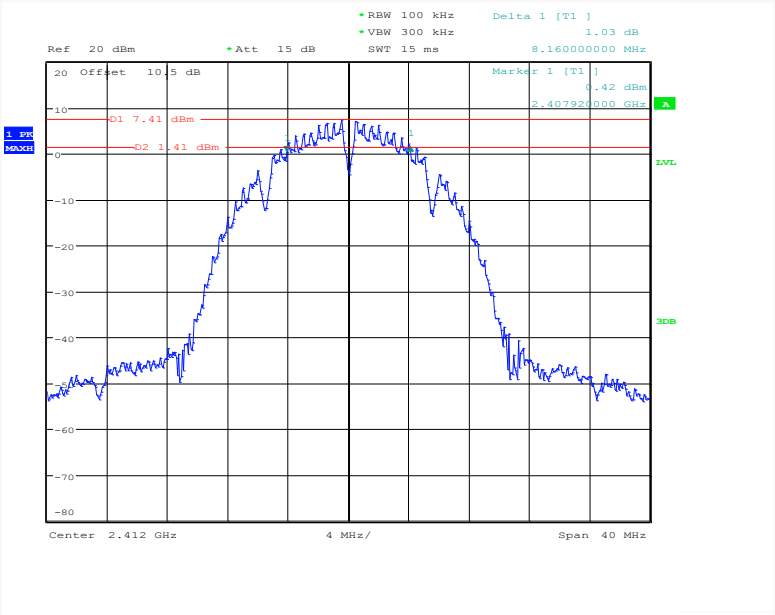
Temperature:	20.5 ℃
Relative Humidity:	43 %
ATM Pressure:	102.3 kPa
Test Date:	2024-04-26
Test Engineer:	Hardy Huang

EUT operation mode: Transmitting

Test Result: Pass

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
802.11b Mode			
Low	2412	8.16	≥ 0.5
Middle	2437	9.04	≥ 0.5
High	2462	8.96	≥ 0.5
802.11g Mode			
Low	2412	16.24	≥ 0.5
Middle	2437	16.24	≥ 0.5
High	2462	16.40	≥ 0.5
802.11n-HT20 Mode			
Low	2412	17.28	≥ 0.5
Middle	2437	17.36	≥ 0.5
High	2462	17.36	≥ 0.5
802.11n-HT40 Mode			
Low	2422	35.68	≥ 0.5
Middle	2437	35.84	≥ 0.5
High	2452	35.84	≥ 0.5

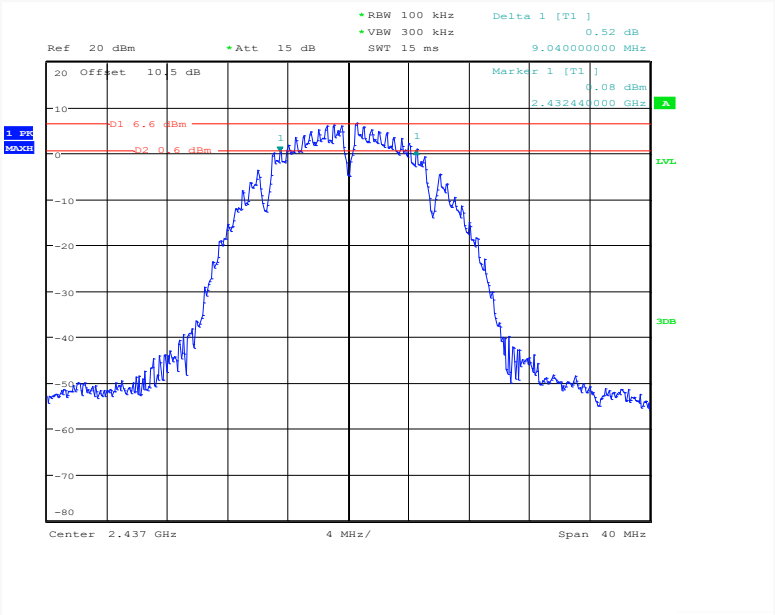
802.11b Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:23:29

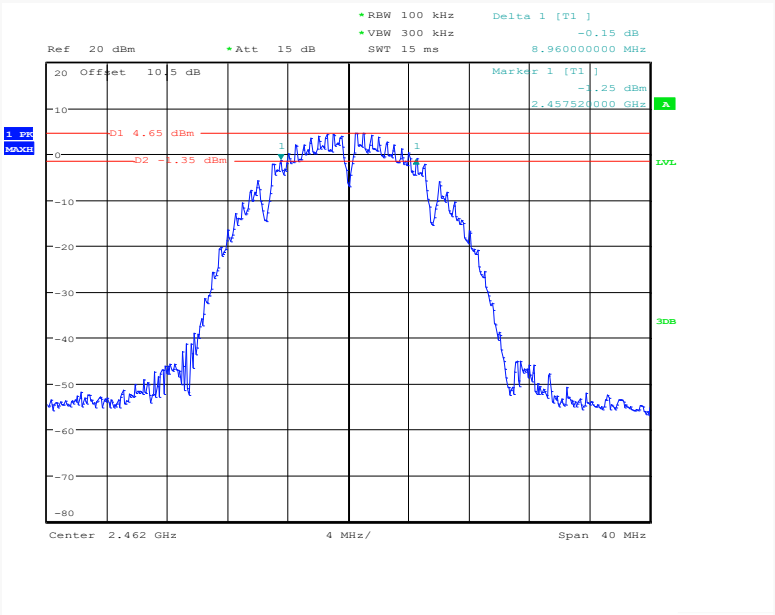
802.11b Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

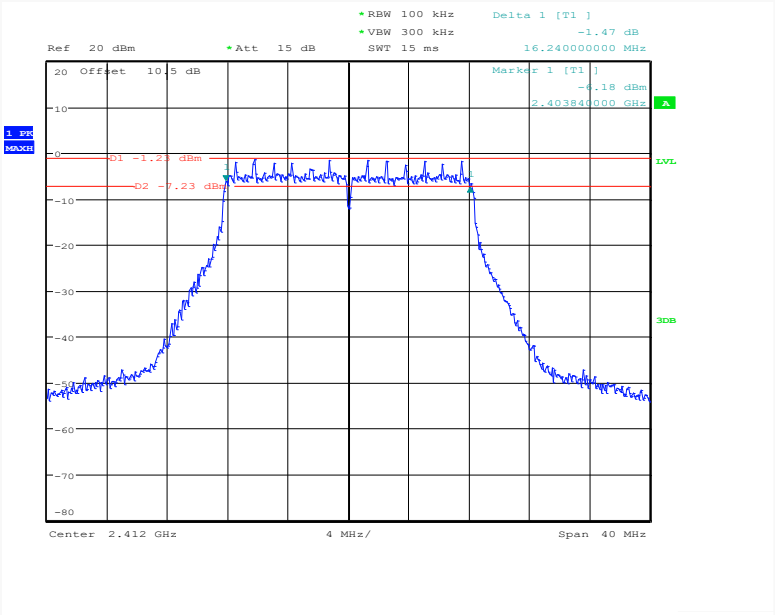
Date: 26.APR.2024 16:27:12

802.11b Mode High Channel



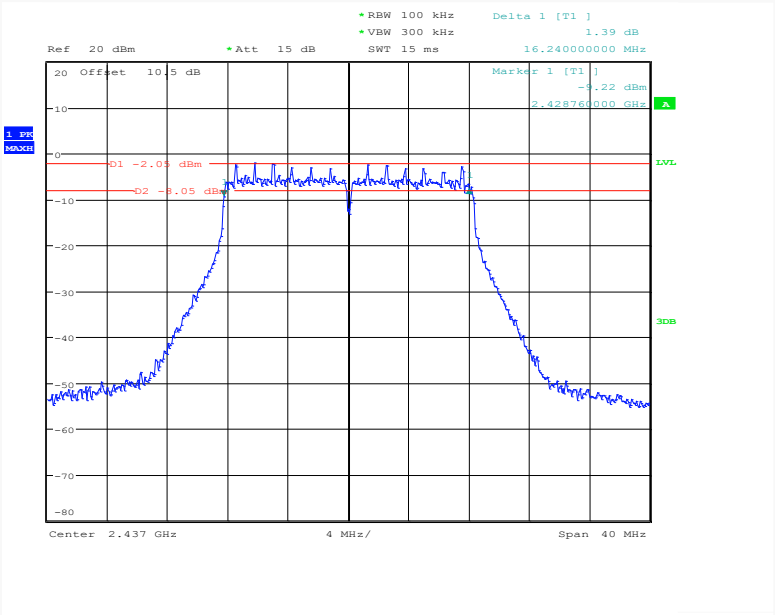
ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:31:18

802.11g Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:34:38

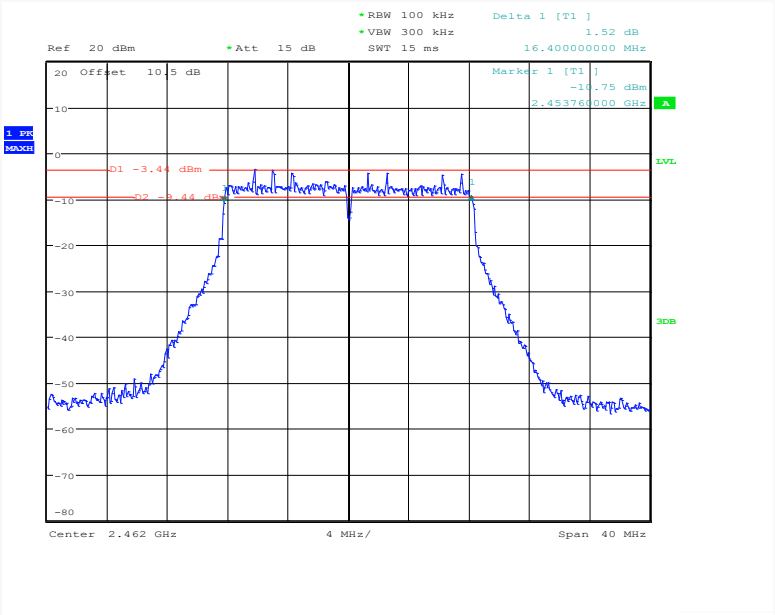
802.11g Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:37:47

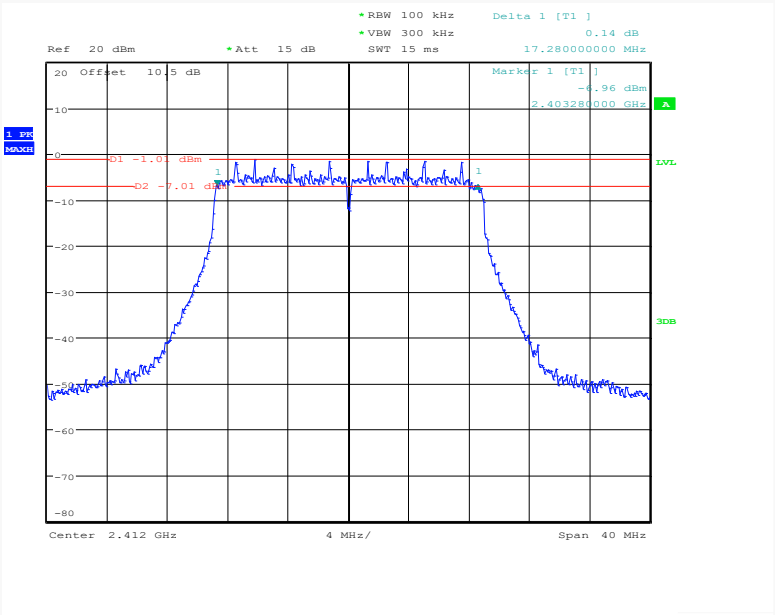
802.11g Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

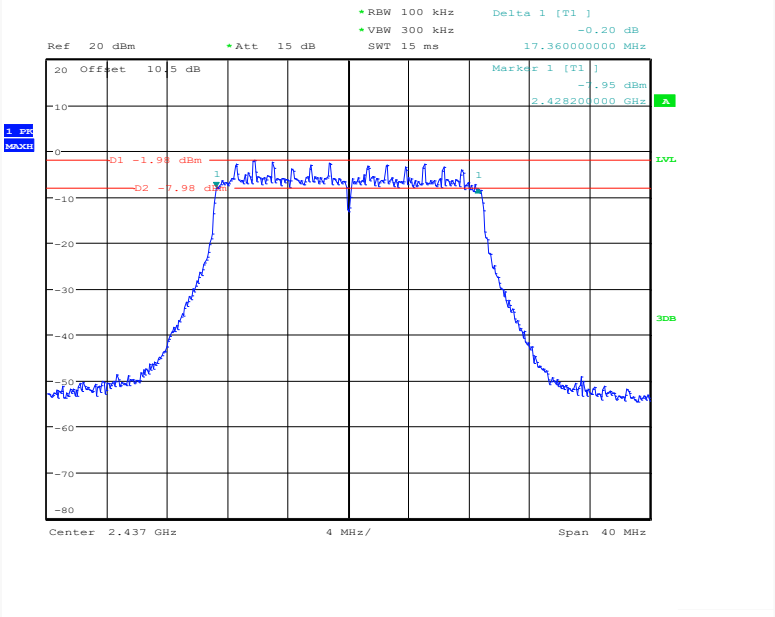
Date: 26.APR.2024 16:41:51

802.11n-HT20 Mode Low Channel



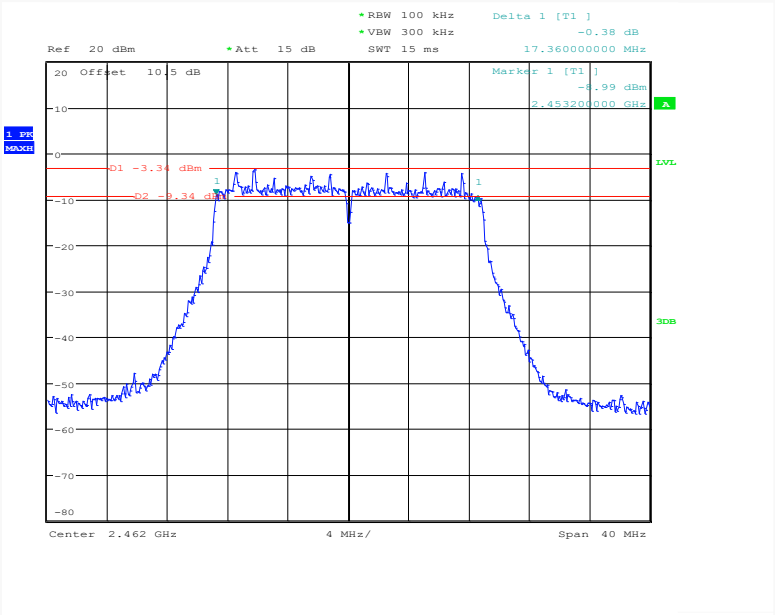
ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:44:54

802.11n-HT20 Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:50:09

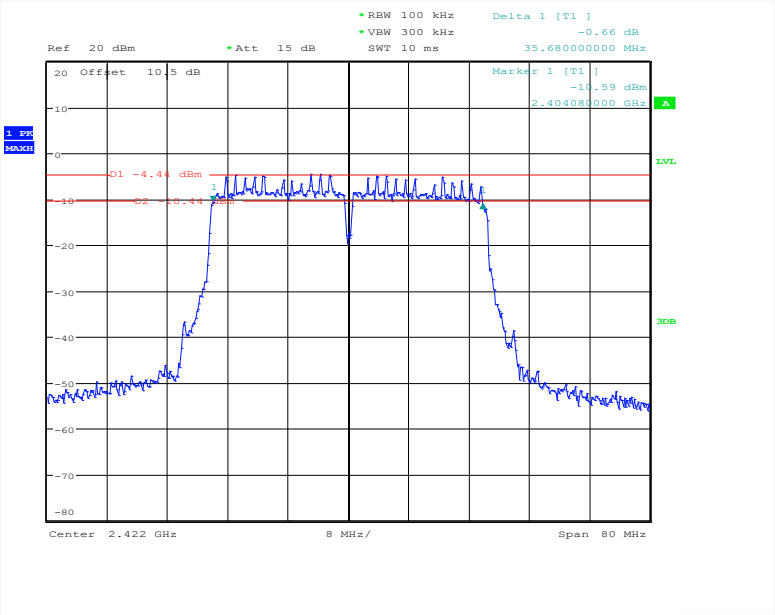
802.11n-HT20 Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:54:16

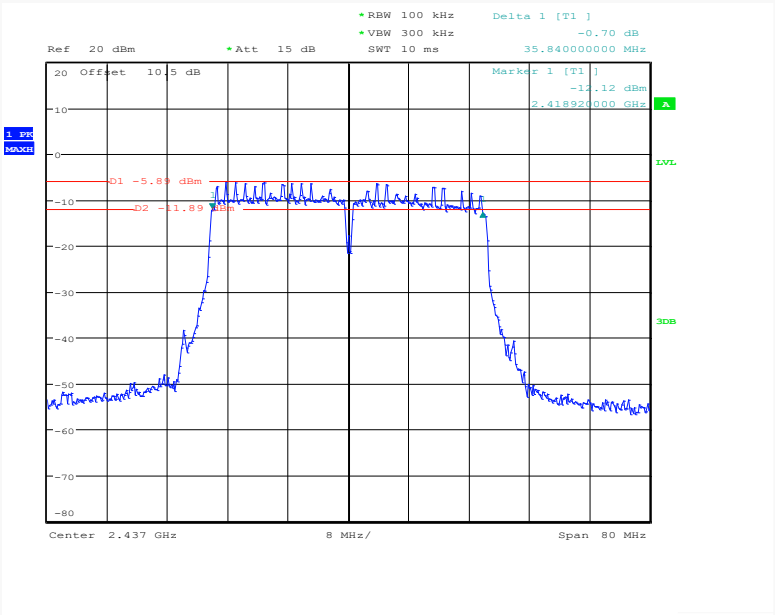
802.11n-HT40 Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

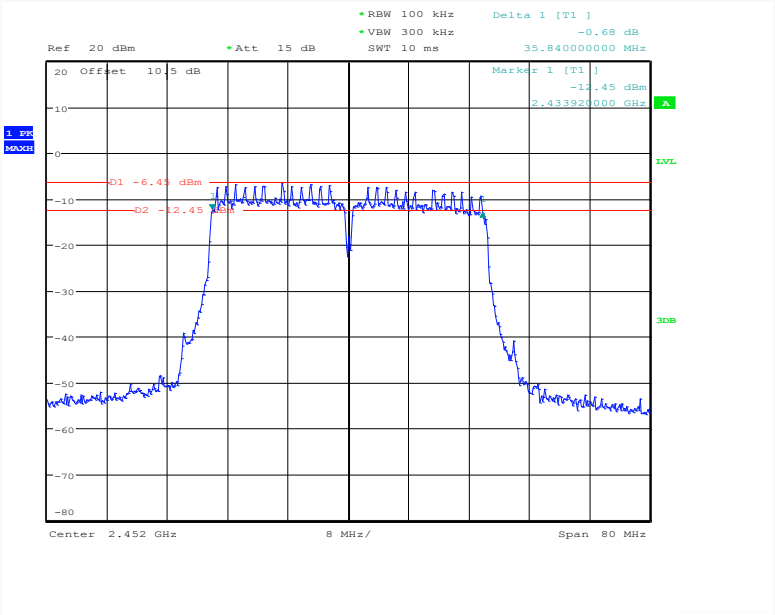
Date: 26.APR.2024 17:03:34

802.11n-HT40 Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 17:06:38

802.11n-HT40 Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 17:09:24

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

Applicable Standard

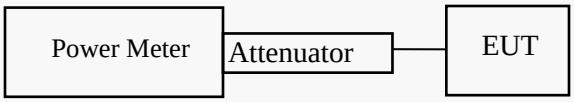
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, Compliant with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted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

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.

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



Test Data

Environmental Conditions & Test Information

Temperature:	20.5 ℃
Relative Humidity:	43 %
ATM Pressure:	102.3 kPa
Test Date:	2024-04-26
Test Engineer:	Hardy Huang

EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
802.11b Mode				
Low	2412	18.36	30	Pass
Middle	2437	18.06	30	Pass
High	2462	16.24	30	Pass
802.11g Mode				
Low	2412	17.87	30	Pass
Middle	2437	17.10	30	Pass
High	2462	15.65	30	Pass
802.11n-HT20 Mode				
Low	2412	17.88	30	Pass
Middle	2437	17.21	30	Pass
High	2462	15.55	30	Pass
802.11n-HT40 Mode				
Low	2422	17.72	30	Pass
Middle	2437	16.04	30	Pass
High	2452	15.31	30	Pass

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

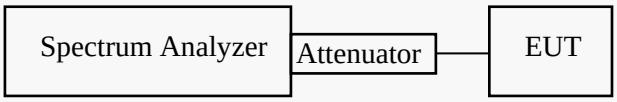
Applicable Standard

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

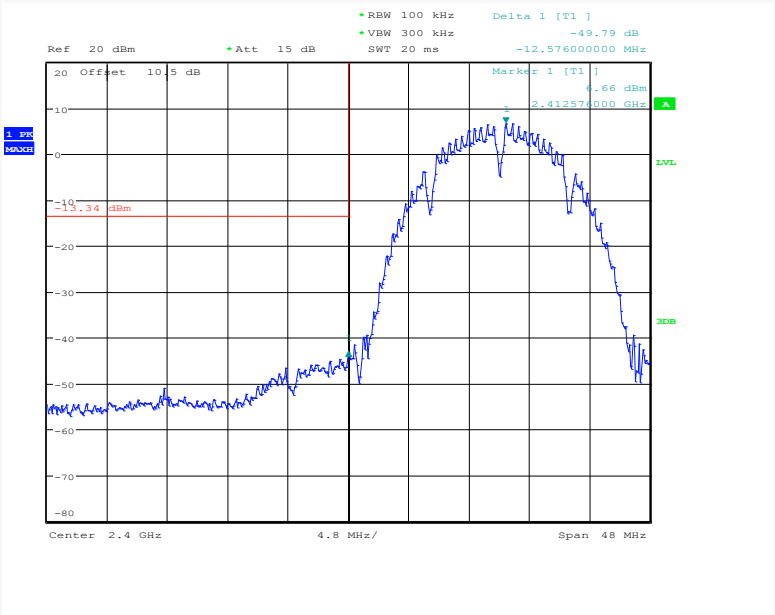
Environmental Conditions & Test Information

Temperature:	20.5 ℃
Relative Humidity:	43 %
ATM Pressure:	102.3 kPa
Test Date:	2024-04-26
Test Engineer:	Hardy Huang

EUT operation mode: Transmitting

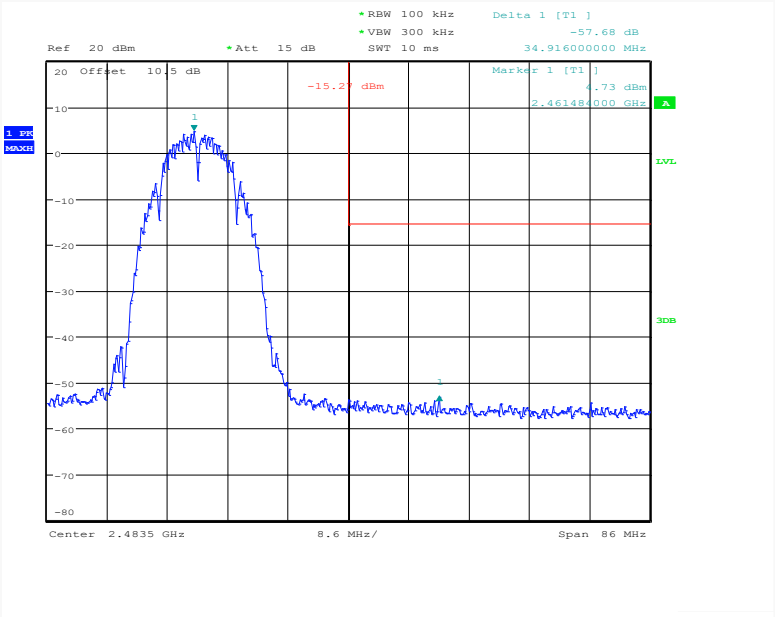
Test Result: Compliant

802.11b Mode Left Side



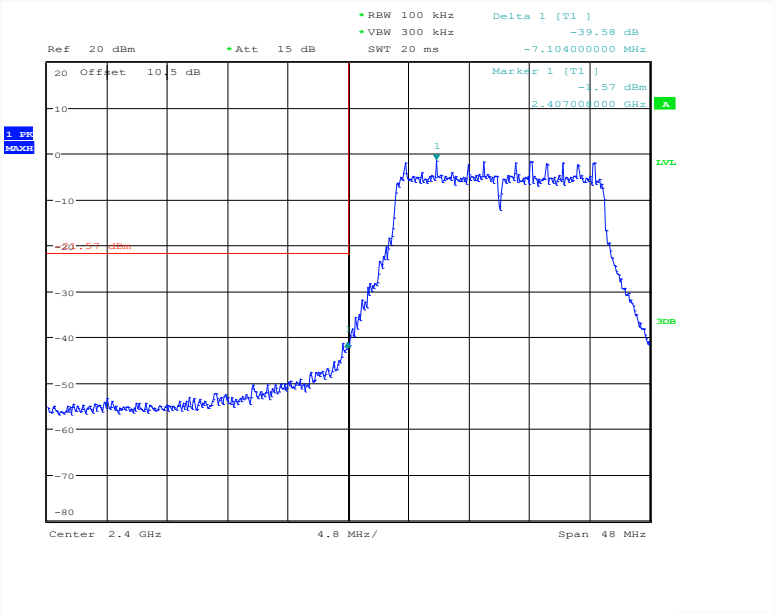
ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:25:08

802.11b Mode Right Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:33:02

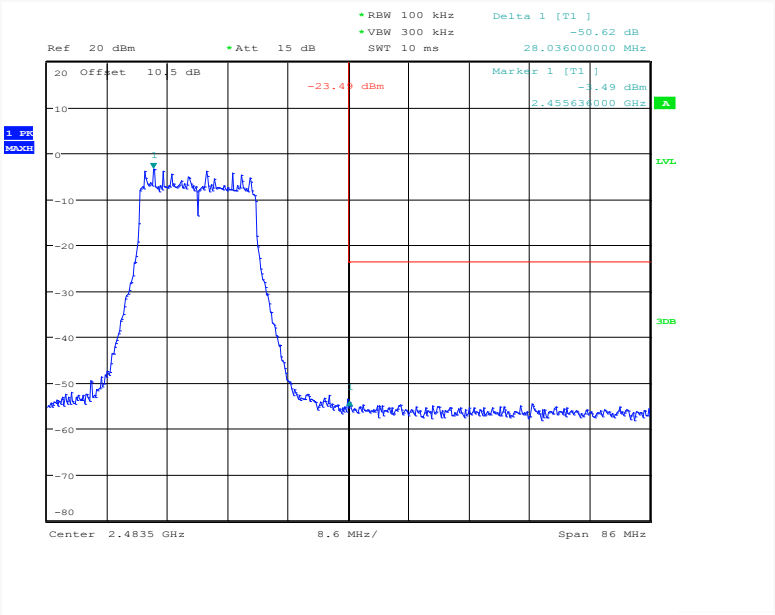
802.11g Mode Left Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:36:26

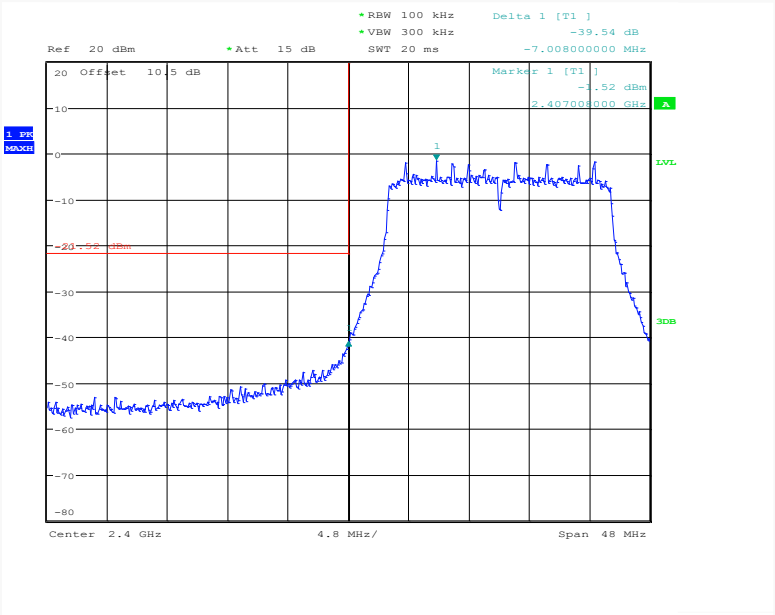
802.11g Mode Right Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:43:36

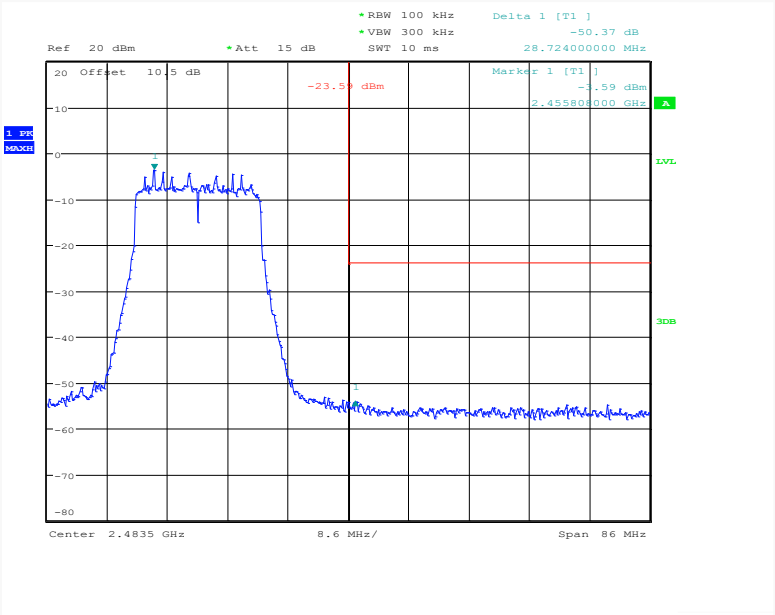
802.11n-HT20 Mode Left Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:46:48

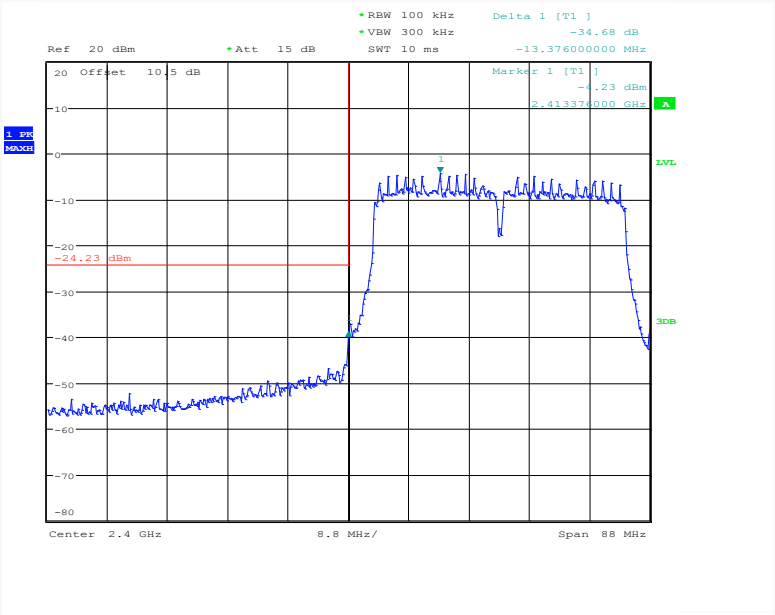
802.11n-HT20 Mode Right Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:55:56

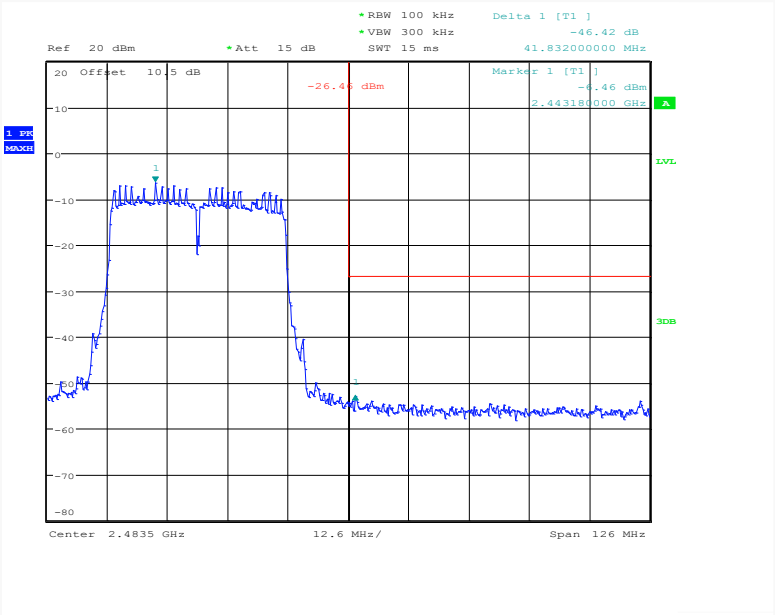
802.11n-HT40 Mode Left Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 17:05:57

802.11n-HT40 Mode Right Side



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 17:11:48

FCC §15.247(E) - POWER SPECTRAL DENSITY

Applicable Standard

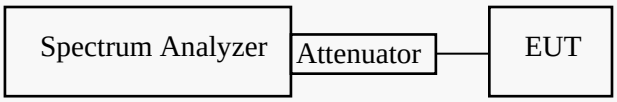
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of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

Environmental Conditions & Test Information

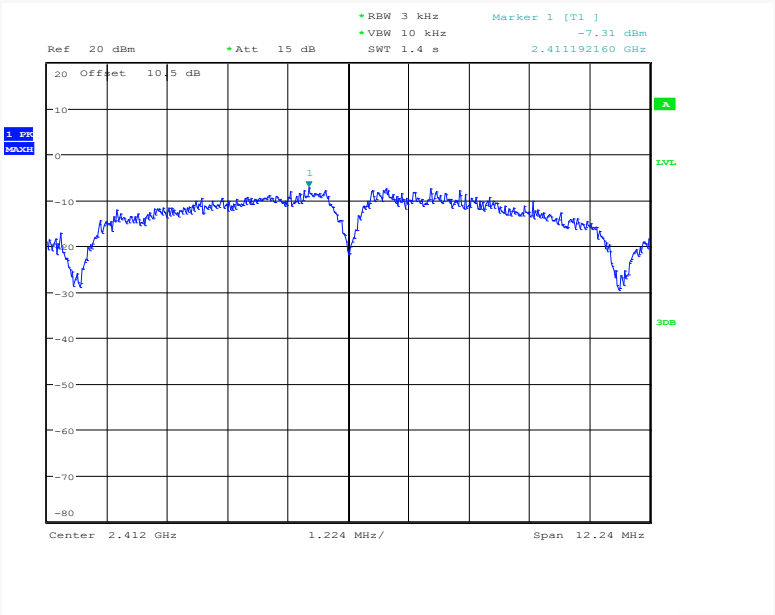
Temperature:	20.5 ℃
Relative Humidity:	43 %
ATM Pressure:	102.3 kPa
Test Date:	2024-04-26
Test Engineer:	Hardy Huang

EUT operation mode: Transmitting

Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b Mode			
Low	2412	-7.31	≤ 8
Middle	2437	-8.01	≤ 8
High	2462	-8.46	≤ 8
802.11g Mode			
Low	2412	-14.98	≤ 8
Middle	2437	-16.26	≤ 8
High	2462	-17.98	≤ 8
802.11n-HT20 mode			
Low	2412	-15.16	≤ 8
Middle	2437	-15.93	≤ 8
High	2462	-17.71	≤ 8
802.11n-HT40 mode			
Low	2422	-18.30	≤ 8
Middle	2437	-20.67	≤ 8
High	2452	-21.12	≤ 8

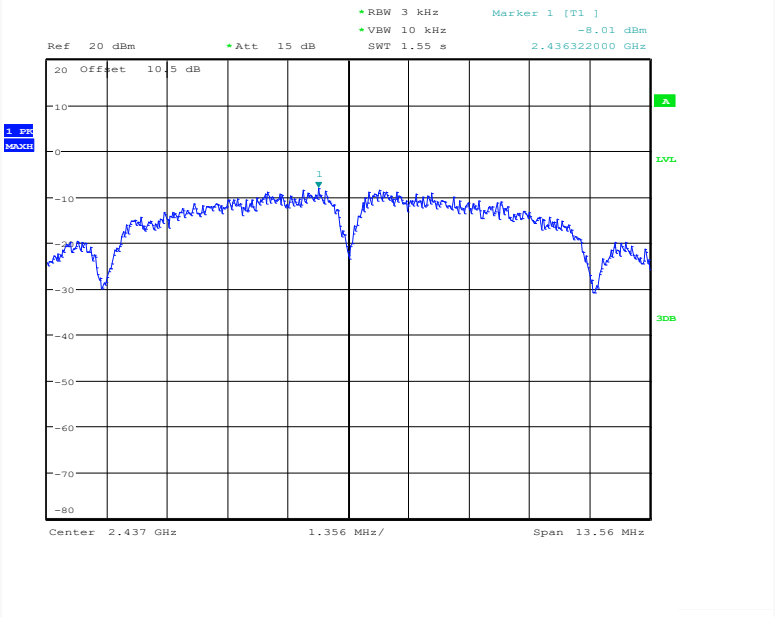
802.11b Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:24:28

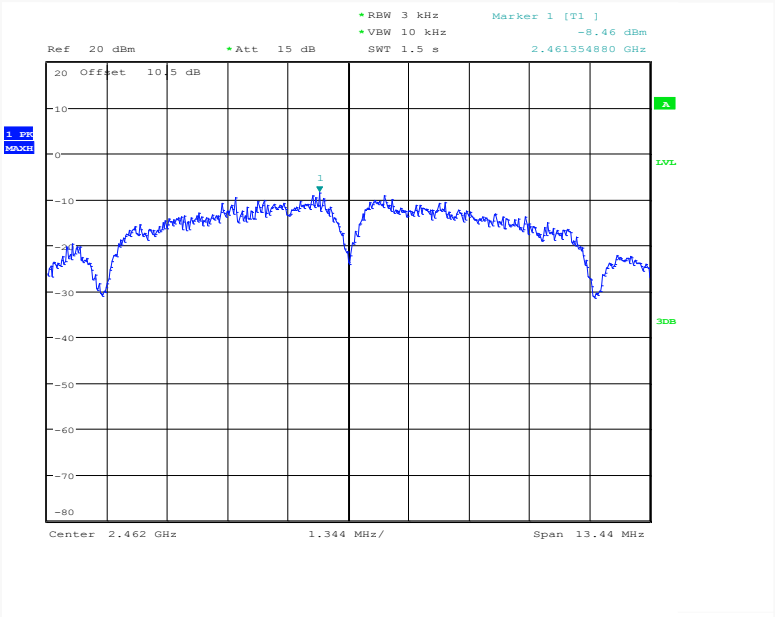
802.11b Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:28:15

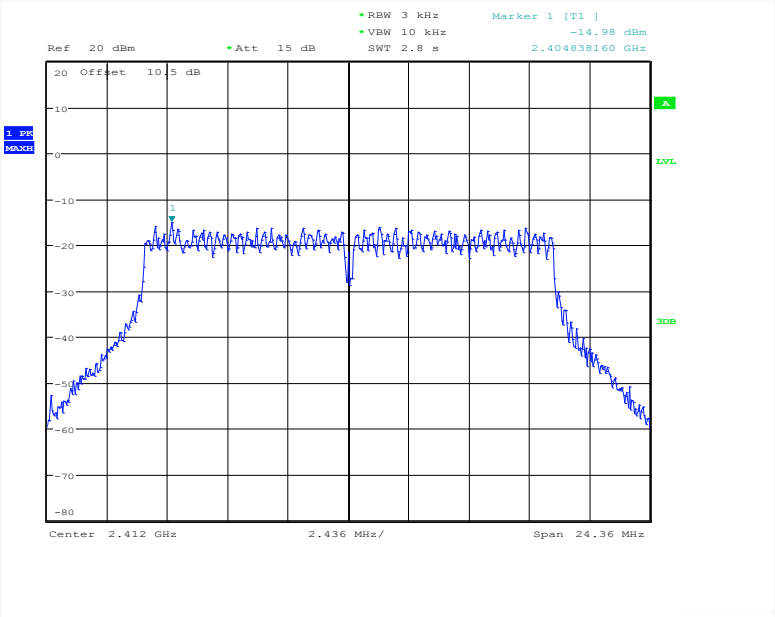
802.11b Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:32:17

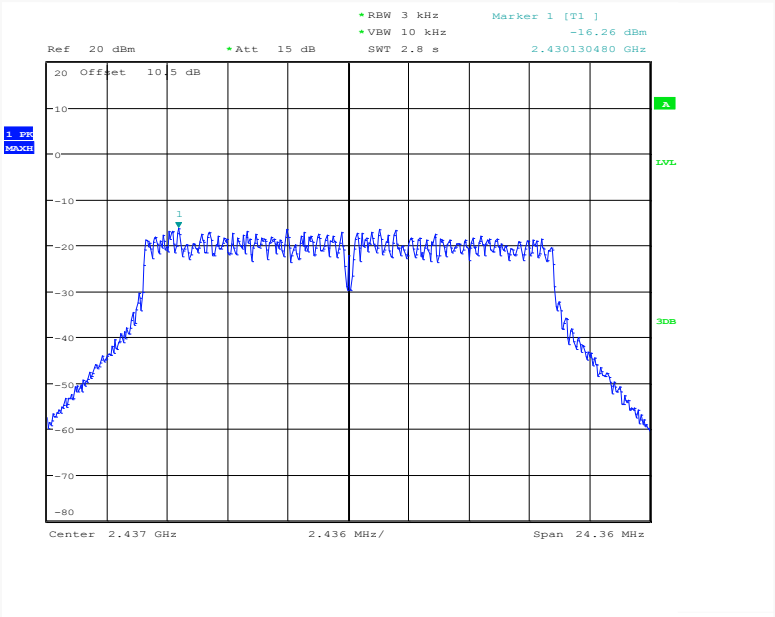
802.11g Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:35:47

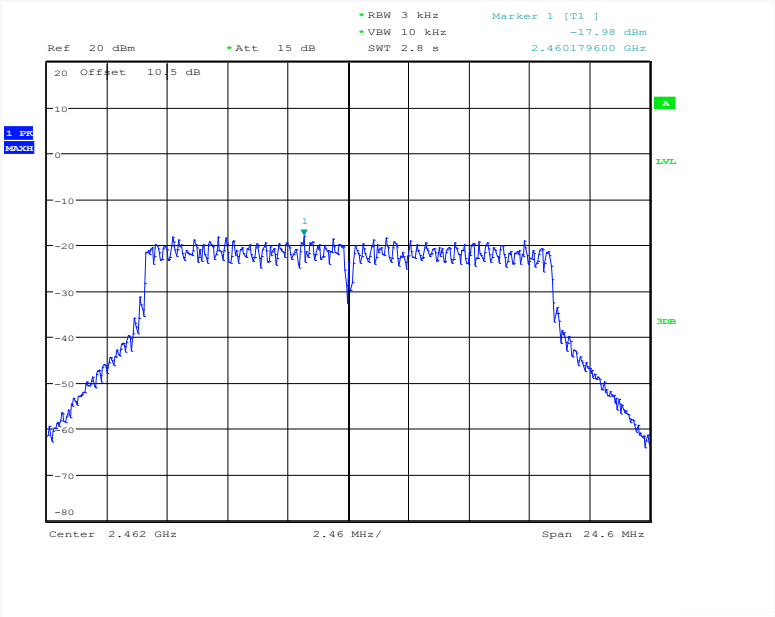
802.11g Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:38:56

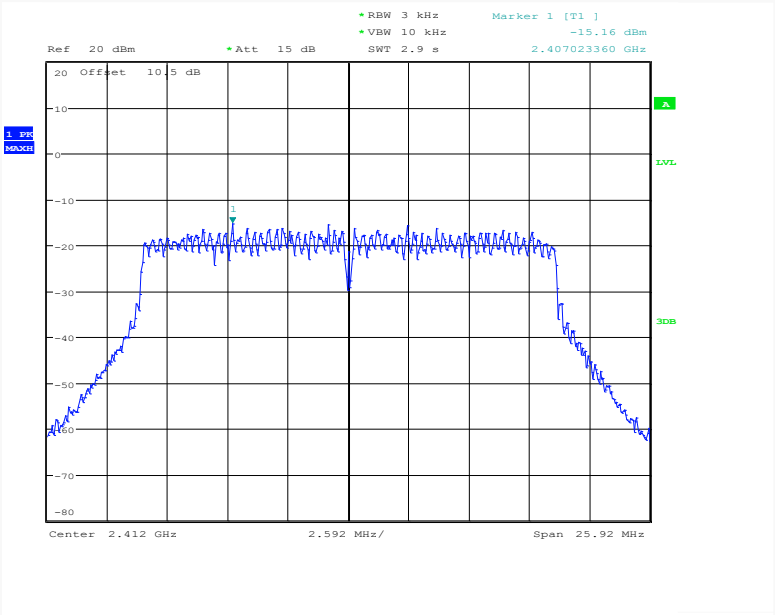
802.11g Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:42:53

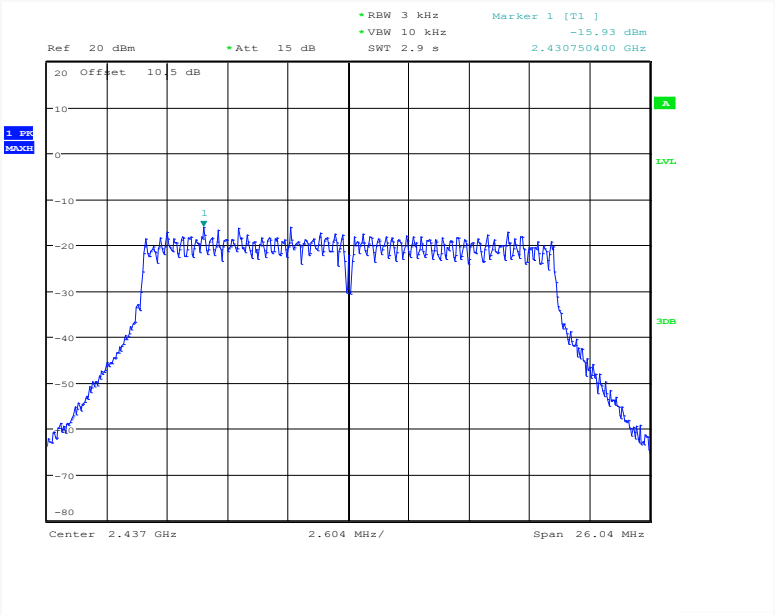
802.11n-HT20 Mode Low Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

Date: 26.APR.2024 16:46:04

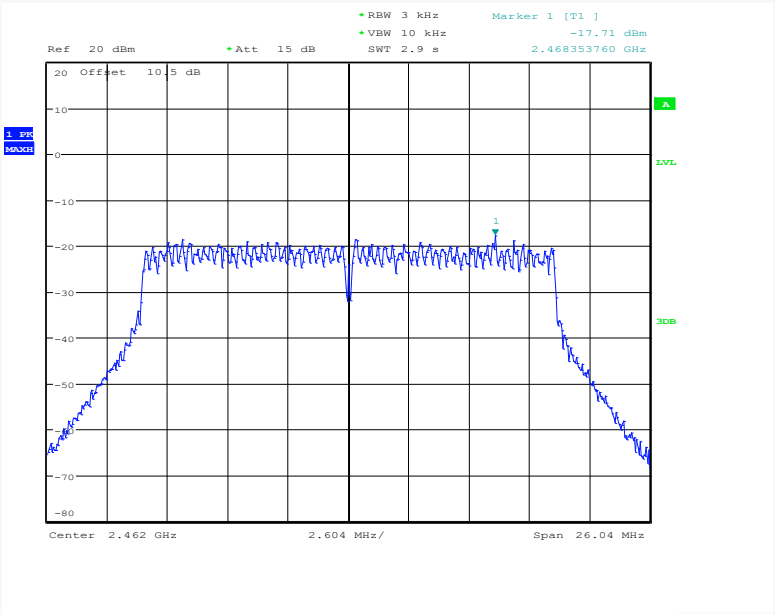
802.11n-HT20 Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang

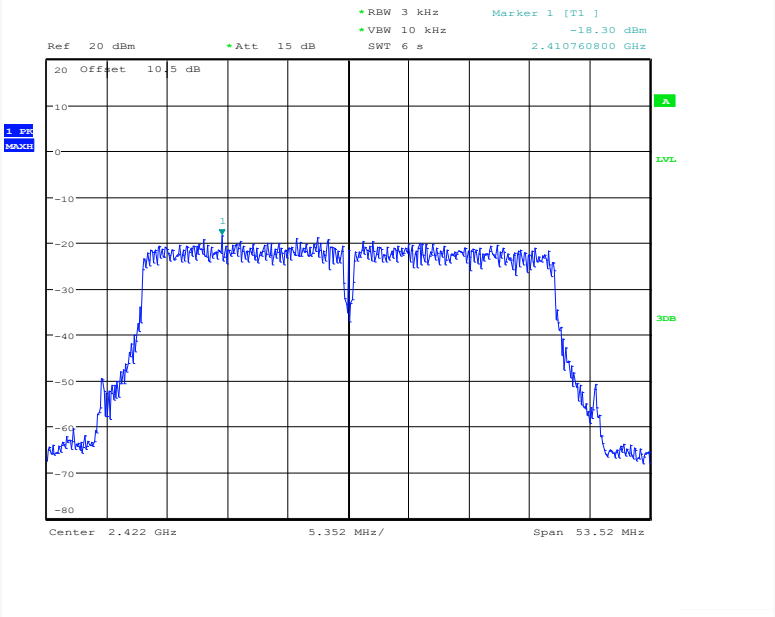
Date: 26.APR.2024 16:51:18

802.11n-HT20 Mode High Channel



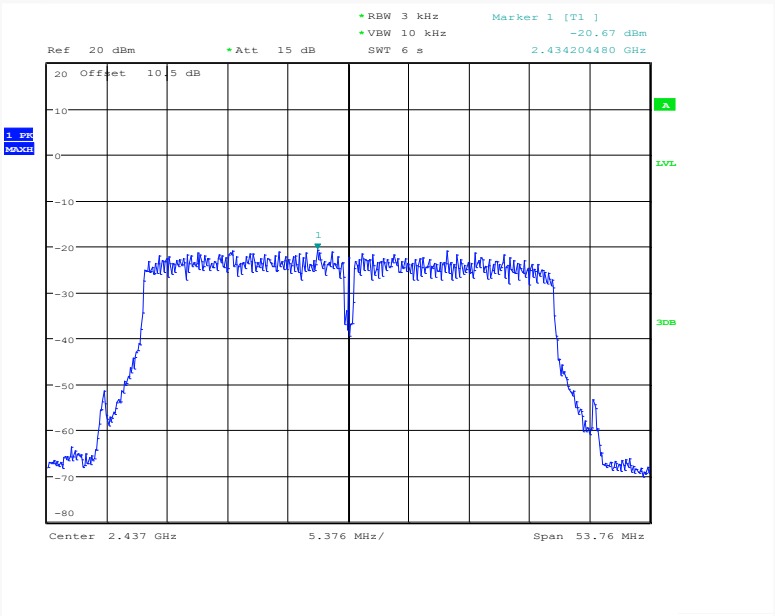
ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 16:55:17

802.11n-HT40 Mode Low Channel



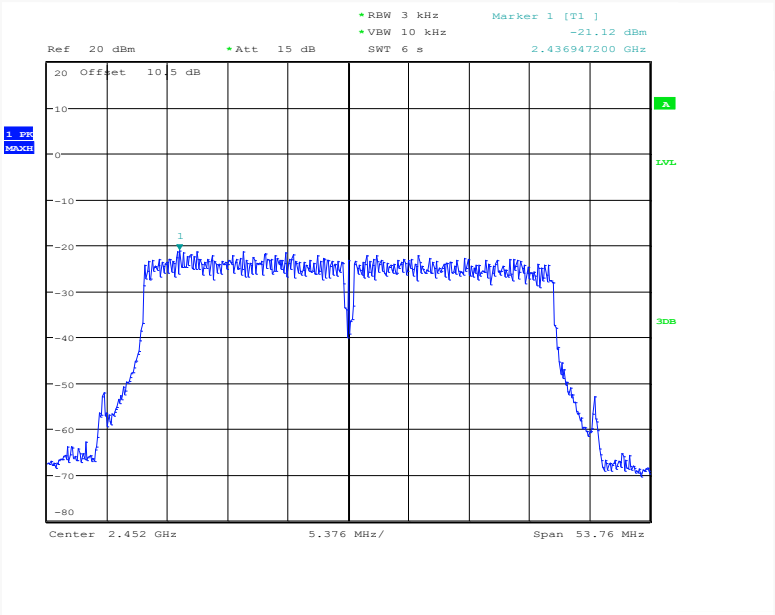
ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 17:05:14

802.11n-HT40 Mode Middle Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 17:07:59

802.11n-HT40 Mode High Channel



ProjectNo.:RSHA240325001 Tester:Hardy Huang
Date: 26.APR.2024 17:11:08

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS and EXHIBIT B - EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment EXHIBIT C - TEST SETUP PHOTOGRAPHS.

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with "★".

2. The test data was only valid for the test sample(s).

3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

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