

TEST REPORT

Applicant Name : TECNO MOBILE LIMITED
Address : FLAT 39 8/F BLOCK D WAH LOK INDUSTRIAL CENTRE 31-35
SHAN MEI STREET FOTAN NT Hong Kong
Report Number : SZNS211228-67614E-RF-00
FCC ID: 2ADYY-TH300

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type: INTELLIGENT SECURITY WIFI CAMERA
Model No.: TH300
Multiple Model(s) No.: N/A
Trade Mark: TECNO
Date Received: 2021/12/28
Date of Test: 2022/01/11~2022/01/19
Report Date: 2022/01/20

Test Result:	Pass*
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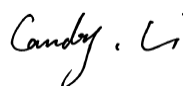
* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Black Ding
EMC Engineer

Approved By:



Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	Wi-Fi: 2412-2462MHz
Maximum Conducted Peak Output Power	Wi-Fi: 802.11b: 22.30dBm, 802.11g: 22.16dBm, 802.11n-HT20: 21.43dBm, 802.11n-HT40: 21.69dBm,
Modulation Technique	Wi-Fi: DSSS, OFDM
Antenna Specification*	FPC Antenna: 3.11dBi(provided by the applicant)
Voltage Range	DC 5V from adapter
Sample serial number	SZNS211228-67614E-RF-S1 (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter 1 Information	Model: SA0051-0501000UA Input: AC100-240V~50/60Hz, 0.2A MAX Output: DC 5.0V, 1.0A, 5.0W
Adapter 2 Information	Model: TPA-46B050100UU Input: AC100-240V~50/60Hz, 0.2A Output: DC 5.0V, 1000mA

Objective

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

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

Test Methodology

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

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		0.082×10^{-7}
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1 °C
Humidity		6%
Supply voltages		0.4%

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

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b, 802.11g and 802.11n-HT20 mode, total 11 channels are provided to testing:

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	/	/

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

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

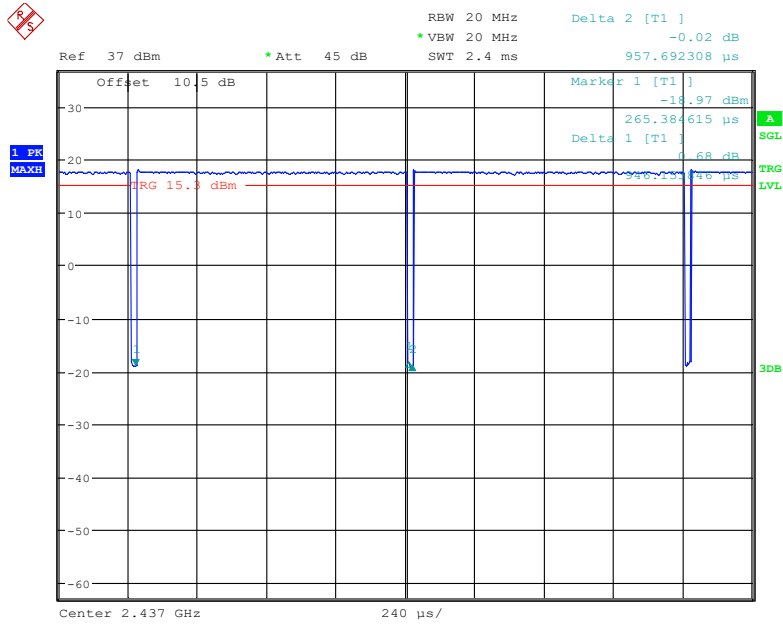
“SecureCRT*” Software was used to test and power level as below:

Item	Mode	Data Rate (Mbps)	Power Level*
2.4G Wi-Fi	802.11 b	1	Default
	802.11 g	6	Default
	802.11 n20	MCS0	Default
	802.11 n40	MCS0	Default

Duty Cycle

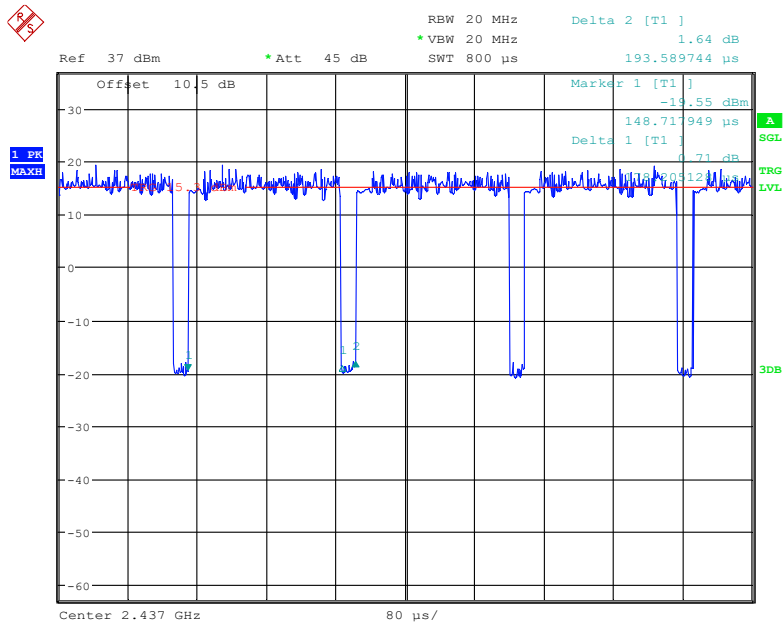
Mode	Ton(ms)	Tp(ms)	Duty Cycle (%)
802.11 b	0.946	0.958	98.75
802.11 g	0.178	0.194	91.75
802.11 n20	0.556	0.569	97.72
802.11 n40	0.286	0.300	95.33

802.11b Mode



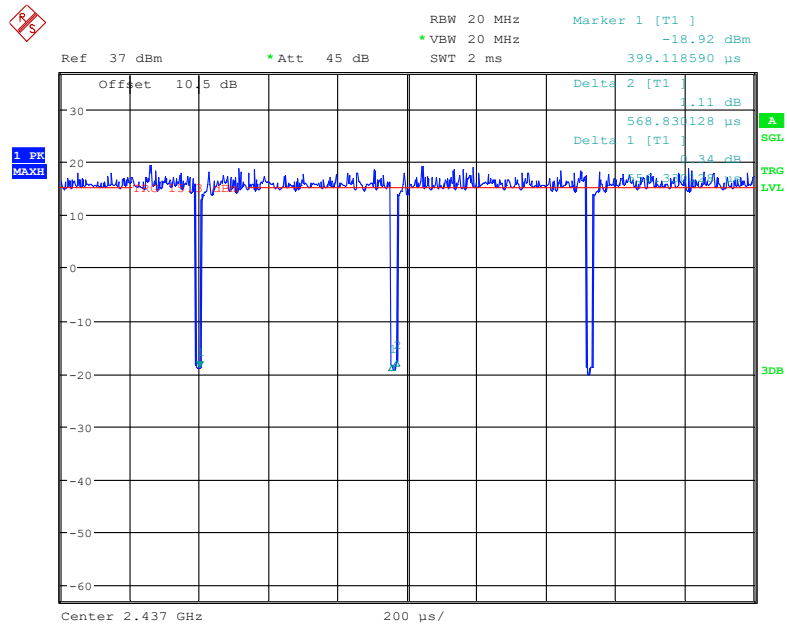
Date: 19.JAN.2022 17:26:21

802.11g Mode



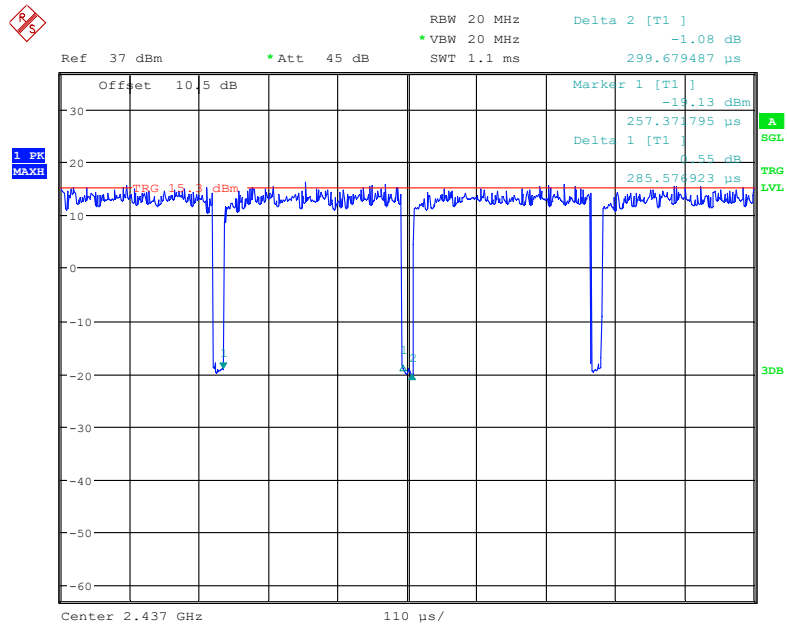
Date: 19.JAN.2022 17:25:06

802.11n20



Date: 19.JAN.2022 17:23:18

802.11n40



Date: 19.JAN.2022 17:27:36

Support Equipment List and Details

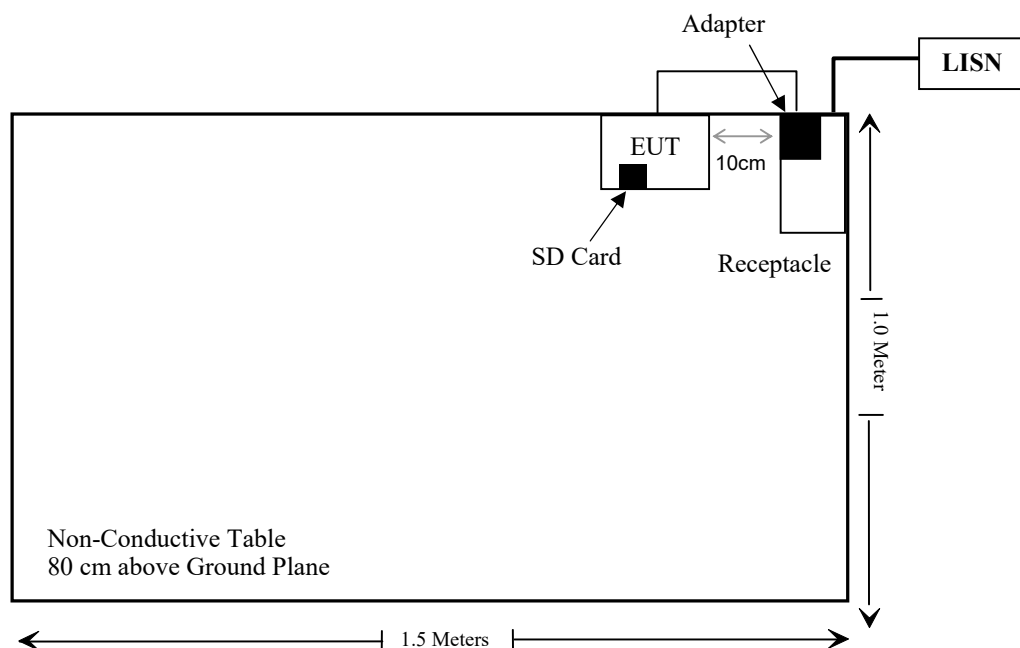
Manufacturer	Description	Model	Serial Number
Kingston	SD Card	Unknown	Unknown

External I/O Cable

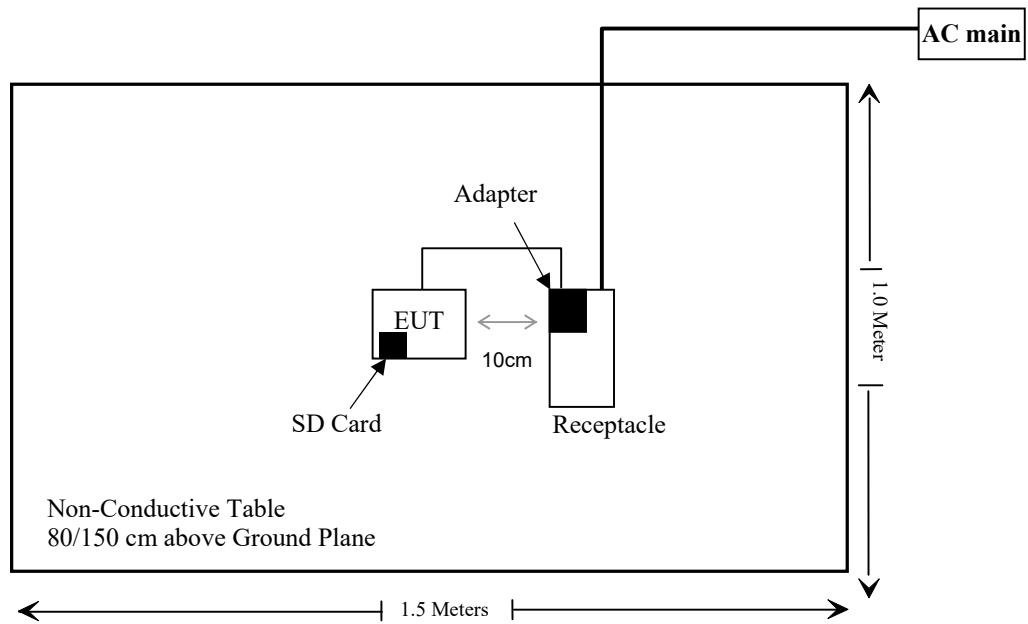
Cable Description	Length (m)	From Port	To
Unshield Detachable USB Cable	2.45	Adapter	EUT

Block Diagram of Test Setup

For conducted emission:



For radiated emission:



SUMMARY OF TEST RESULTS

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

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/12/13	2022/12/12
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
Conducted Emission Test Software: e3 19821b (V9)					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
SPECTRUM ANALYZER	Rohde & Schwarz	FSU26	200982	2021/07/06	2022/07/05
WEINSCHIEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2021/12/13	2022/12/12

* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm²)

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)

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
2412-2462	3.11	2.05	22.5	177.83	20	0.073	1

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

Result: Compliant

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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

- a. Antenna must be permanently attached to the unit.
 - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one internal antenna arrangement, which was permanently attached and the antenna gain is 3.11dBi, fulfill the requirement of this section. Please refer to the EUT photos.

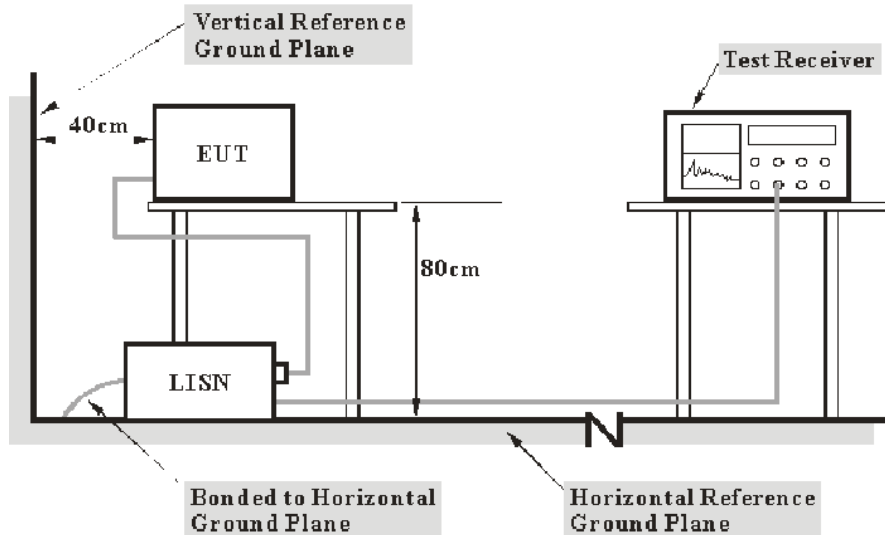
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



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

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

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

Transd Factor & Margin Calculation

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

$$\text{Transd Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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

$$\text{Over limit} = \text{Level} - \text{Limit}$$

$$\text{Level} = \text{Reading level} + \text{Transd Factor}$$

Test Data

Environmental Conditions

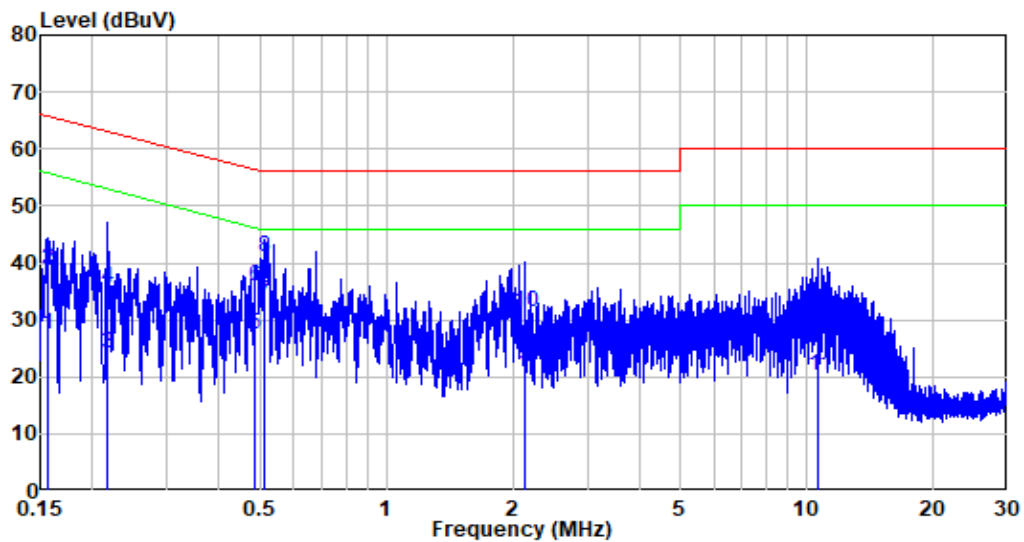
Temperature:	23 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Bin Duan on 2022-01-11.

EUT operation mode: Transmitting

Wi-Fi: (Worst case is 802.11B mode, low Channel)

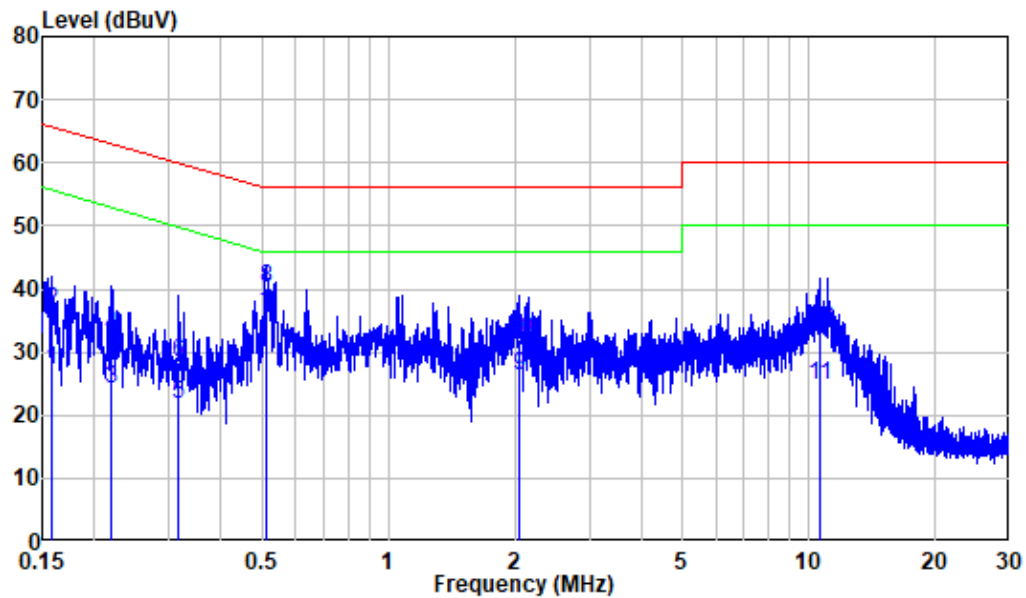
AC 120V/60 Hz, Line



Site : Shielding Room
 Condition: Line
 Mode : 2.4G WIFI
 Model : HT300
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.156	9.89	17.72	27.61	55.66	-28.05	Average
2	0.156	9.89	29.17	39.06	65.66	-26.60	QP
3	0.217	9.80	14.32	24.12	52.92	-28.80	Average
4	0.217	9.80	25.70	35.50	62.92	-27.42	QP
5	0.486	9.80	17.72	27.52	46.23	-18.71	Average
6	0.486	9.80	25.99	35.79	56.23	-20.44	QP
7	0.512	9.81	23.42	33.23	46.00	-12.77	Average
8	0.512	9.81	31.39	41.20	56.00	-14.80	QP
9	2.141	9.92	12.17	22.09	46.00	-23.91	Average
10	2.141	9.92	21.61	31.53	56.00	-24.47	QP
11	10.655	10.09	10.18	20.27	50.00	-29.73	Average
12	10.655	10.09	21.93	32.02	60.00	-27.98	QP

AC 120V/60 Hz, Neutral



Site : Shielding Room
 Condition: Neutral
 Mode : 2.4G WIFI
 Model : HT300
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.158	9.92	17.14	27.06	55.58	-28.52	Average
2	0.158	9.92	26.66	36.58	65.58	-29.00	QP
3	0.220	9.99	14.17	24.16	52.82	-28.66	Average
4	0.220	9.99	22.67	32.66	62.82	-30.16	QP
5	0.315	9.95	11.78	21.73	49.83	-28.10	Average
6	0.315	9.95	18.44	28.39	59.83	-31.44	QP
7	0.512	9.91	25.82	35.73	46.00	-10.27	Average
8	0.512	9.91	30.27	40.18	56.00	-15.82	QP
9	2.052	9.92	16.45	26.37	46.00	-19.63	Average
10	2.052	9.92	22.00	31.92	56.00	-24.08	QP
11	10.578	10.10	14.53	24.63	50.00	-25.37	Average
12	10.578	10.10	23.48	33.58	60.00	-26.42	QP

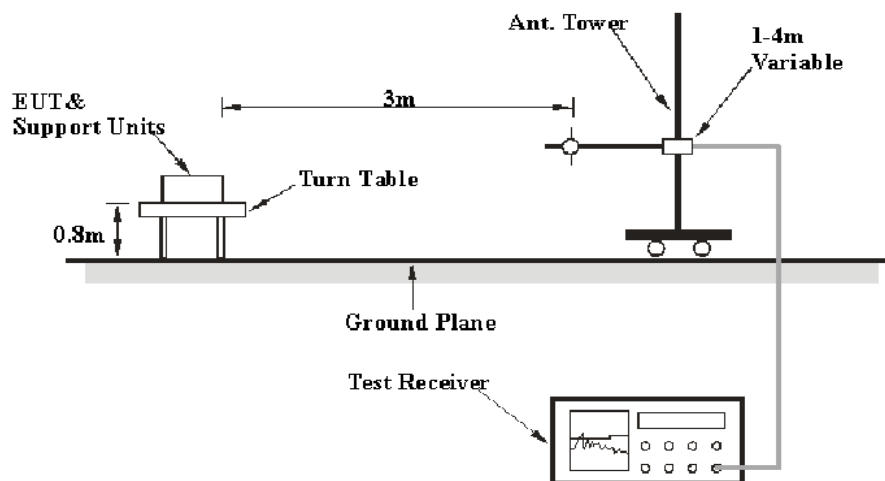
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

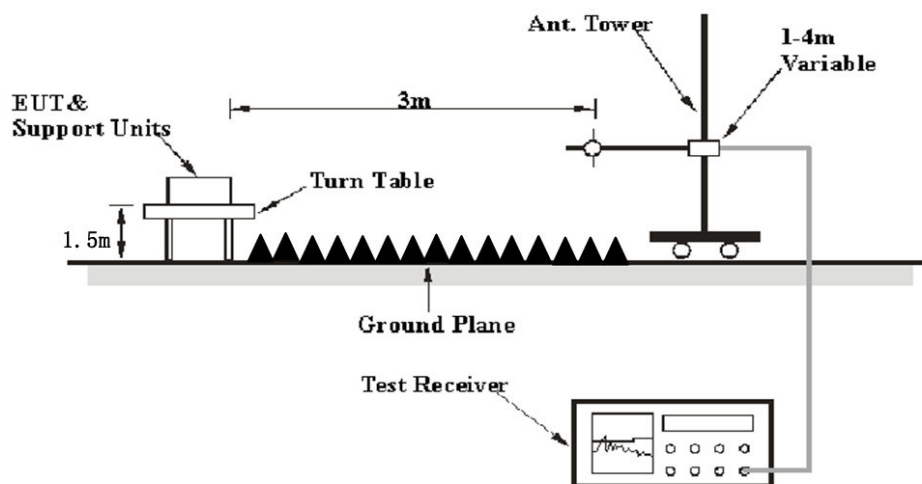
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



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

EMI Test Receiver & Spectrum Analyzer Setup

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz ^{Note 1}	/	Average
	1MHz	> 1/T ^{Note 2}	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Factor & Margin Calculation

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

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\begin{aligned} \text{Over Limit/Margin} &= \text{Level} / \text{Corrected Amplitude} - \text{Limit} \\ \text{Level} / \text{Corrected Amplitude} &= \text{Read Level} + \text{Factor} \end{aligned}$$

Test Data

Environmental Conditions

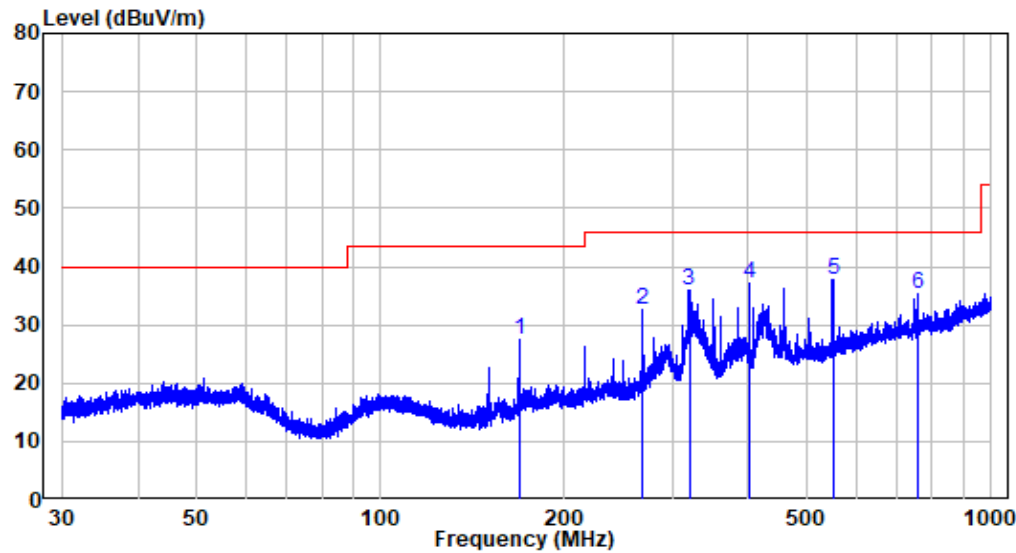
Temperature:	21~25.1 °C
Relative Humidity:	44~62 %
ATM Pressure:	101.0 kPa

The testing was performed by Chao on 2022-01-11 for below 1GHz and Caro on 2022-01-18 for above 1GHz.

EUT operation mode: Transmitting

30MHz-1GHz: (Worst case is 802.11B mode, Middle Channel)

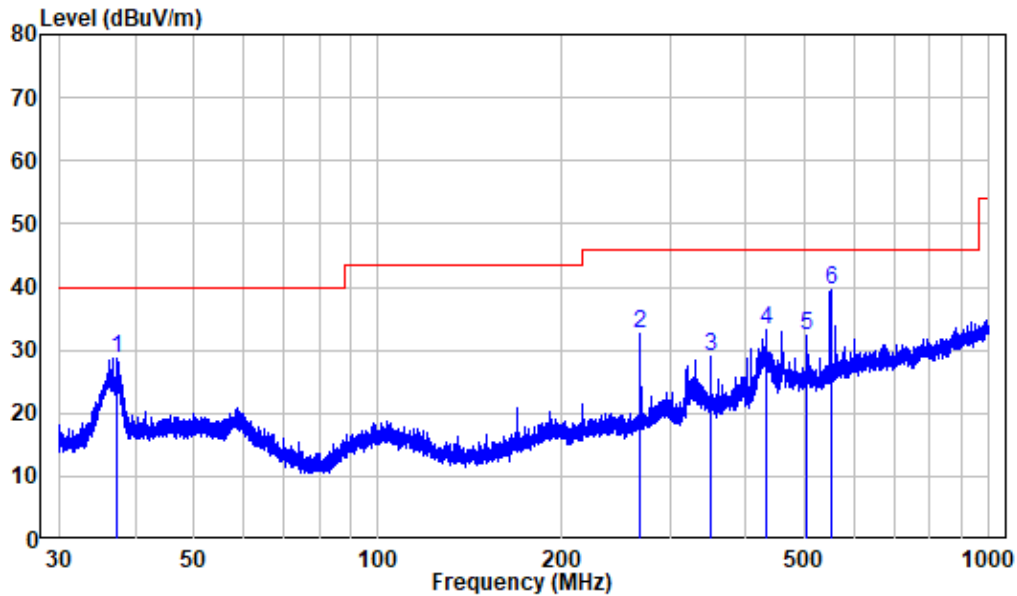
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS211228-67614E-RF
Test Mode: 2.4G Wifi TX

	Freq Factor		Read Level	Level	Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	168.783	-13.70	41.16	27.46	43.50	-16.04	Peak
2	268.839	-10.28	42.79	32.51	46.00	-13.49	Peak
3	320.077	-8.45	44.50	36.05	46.00	-9.95	Peak
4	402.015	-6.73	43.72	36.99	46.00	-9.01	Peak
5	550.224	-4.02	41.76	37.74	46.00	-8.26	Peak
6	760.370	-0.54	35.96	35.42	46.00	-10.58	Peak

Vertical



Site : chamber
 Condition: 3m VERTICAL
 Job No. : SZNS211228-67614E-RF
 Test Mode: 2.4G Wifi TX

	Freq	Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	37.335	-10.95	39.62	28.67	40.00	-11.33	Peak
2	268.839	-10.28	42.74	32.46	46.00	-13.54	Peak
3	350.016	-7.31	36.26	28.95	46.00	-17.05	Peak
4	431.977	-5.75	39.00	33.25	46.00	-12.75	Peak
5	504.043	-4.26	36.66	32.40	46.00	-13.60	Peak
6	550.224	-4.02	43.52	39.50	46.00	-6.50	Peak

1-25 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11b									
Low Channel(2412MHz)									
2310	68.01	PK	135	1.7	H	-7.24	60.77	74	-13.23
2310	53.38	AV	135	1.7	H	-7.24	46.14	54	-7.86
2390	70.41	PK	66	1.1	H	-7.22	63.19	74	-10.81
2390	56.91	AV	66	1.1	H	-7.22	49.69	54	-4.31
2310	67.95	PK	331	1.5	V	-7.24	60.71	74	-13.29
2310	53.4	AV	331	1.5	V	-7.24	46.16	54	-7.84
2390	69.11	PK	111	1.8	V	-7.22	61.89	74	-12.11
2390	55.7	AV	111	1.8	V	-7.22	48.48	54	-5.52
4824	64.21	PK	300	2.1	H	-3.52	60.69	74	-13.31
4824	50.98	AV	300	2.1	H	-3.52	47.46	54	-6.54
4824	62.99	PK	39	1.1	V	-3.52	59.47	74	-14.53
4824	49.01	AV	39	1.1	V	-3.52	45.49	54	-8.51
Middle Channel(2437MHz)									
4874	62.74	PK	33	1.7	H	-3.42	59.32	74	-14.68
4874	48.71	AV	33	1.7	H	-3.42	45.29	54	-8.71
4874	61.34	PK	304	2	V	-3.42	57.92	74	-16.08
4874	47.53	AV	304	2	V	-3.42	44.11	54	-9.89
High Channel(2462 MHz)									
2483.5	72.23	PK	198	2.4	H	-7.2	65.03	74	-8.97
2483.5	56	AV	198	2.4	H	-7.2	48.8	54	-5.2
2500	68.56	PK	172	2.1	H	-7.18	61.38	74	-12.62
2500	55.54	AV	172	2.1	H	-7.18	48.36	54	-5.64
2483.5	72.06	PK	276	1.5	V	-7.2	64.86	74	-9.14
2483.5	56.09	AV	276	1.5	V	-7.2	48.89	54	-5.11
2500	69.02	PK	239	1.1	V	-7.18	61.84	74	-12.16
2500	55.33	AV	239	1.1	V	-7.18	48.15	54	-5.85
4924	59.07	PK	344	2	H	-3.16	55.91	74	-18.09
4924	45.35	AV	344	2	H	-3.16	42.19	54	-11.81
4924	56.84	PK	109	1.1	V	-3.16	53.68	74	-20.32
4924	42.29	AV	109	1.1	V	-3.16	39.13	54	-14.87

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11g									
Low Channel(2412MHz)									
2310	67.62	PK	108	1.8	H	-7.24	60.38	74	-13.62
2310	56.47	AV	108	1.8	H	-7.24	49.23	54	-4.77
2390	76.38	PK	180	1.1	H	-7.22	69.16	74	-4.84
2390	58.35	AV	180	1.1	H	-7.22	51.13	54	-2.87
2310	67.51	PK	70	1.7	V	-7.24	60.27	74	-13.73
2310	55.89	AV	70	1.7	V	-7.24	48.65	54	-5.35
2390	71.5	PK	40	2.3	V	-7.22	64.28	74	-9.72
2390	57.34	AV	40	2.3	V	-7.22	50.12	54	-3.88
4824	59.45	PK	81	1.6	H	-3.52	55.93	74	-18.07
4824	48.48	AV	81	1.6	H	-3.52	44.96	54	-9.04
4824	57.9	PK	214	1.5	V	-3.52	54.38	74	-19.62
4824	47.79	AV	214	1.5	V	-3.52	44.27	54	-9.73
Middle Channel(2437MHz)									
4874	58.66	PK	259	1.7	H	-3.42	55.24	74	-18.76
4874	47.57	AV	259	1.7	H	-3.42	44.15	54	-9.85
4874	56.47	PK	138	2	V	-3.42	53.05	74	-20.95
4874	45.88	AV	138	2	V	-3.42	42.46	54	-11.54
High Channel(2462 MHz)									
2483.5	77.61	PK	119	2.3	H	-7.2	70.41	74	-3.59
2483.5	60.95	AV	119	2.3	H	-7.2	53.75	54	-0.25
2500	68.43	PK	273	1.9	H	-7.18	61.25	74	-12.75
2500	58.75	AV	273	1.9	H	-7.18	51.57	54	-2.43
2483.5	71.77	PK	97	1.5	V	-7.2	64.57	74	-9.43
2483.5	58.98	AV	97	1.5	V	-7.2	51.78	54	-2.22
2500	69.49	PK	111	1	V	-7.18	62.31	74	-11.69
2500	57.97	AV	111	1	V	-7.18	50.79	54	-3.21
4924	55.86	PK	336	1.4	H	-3.16	52.7	74	-21.3
4924	54.02	PK	319	2.3	V	-3.16	50.86	74	-23.14

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11n20									
Low Channel(2412MHz)									
2310	68.31	PK	76	1.6	H	-7.24	61.07	74	-12.93
2310	54.72	AV	76	1.6	H	-7.24	47.48	54	-6.52
2390	75.06	PK	144	2.3	H	-7.22	67.84	74	-6.16
2390	56.74	AV	144	2.3	H	-7.22	49.52	54	-4.48
2310	67.79	PK	17	2.4	V	-7.24	60.55	74	-13.45
2310	54.38	AV	17	2.4	V	-7.24	47.14	54	-6.86
2390	69.2	PK	353	1.2	V	-7.22	61.98	74	-12.02
2390	55.65	AV	353	1.2	V	-7.22	48.43	54	-5.57
4824	59.47	PK	176	2	H	-3.52	55.95	74	-18.05
4824	46.09	AV	176	2	H	-3.52	42.57	54	-11.43
4824	56.65	PK	178	2.2	V	-3.52	53.13	74	-20.87
4824	42.04	AV	178	2.2	V	-3.52	38.52	54	-15.48
Middle Channel(2437MHz)									
4874	57.9	PK	8	1.7	H	-3.42	54.48	74	-19.52
4874	44.98	AV	8	1.7	H	-3.42	41.56	54	-12.44
4874	56.28	PK	257	1.9	V	-3.42	52.86	74	-21.14
4874	42.63	AV	257	1.9	V	-3.42	39.21	54	-14.79
High Channel(2462 MHz)									
2483.5	75.41	PK	139	1.8	H	-7.2	68.21	74	-5.79
2483.5	58.12	AV	139	1.8	H	-7.2	50.92	54	-3.08
2500	70.27	PK	163	2.2	H	-7.18	63.09	74	-10.91
2500	56.56	AV	163	2.2	H	-7.18	49.38	54	-4.62
2483.5	72.58	PK	333	2	V	-7.2	65.38	74	-8.62
2483.5	57.18	AV	333	2	V	-7.2	49.98	54	-4.02
2500	68.93	PK	58	1.9	V	-7.18	61.75	74	-12.25
2500	55.96	AV	58	1.9	V	-7.18	48.78	54	-5.22
4924	55	PK	231	1.2	H	-3.16	51.84	74	-22.16
4924	54.94	PK	113	1.1	V	-3.16	51.78	74	-22.22

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11n40									
Low Channel(2422MHz)									
2310	67.41	PK	119	1.1	H	-7.24	60.17	74	-13.83
2310	55.61	AV	119	1.1	H	-7.24	48.37	54	-5.63
2390	73.45	PK	49	1.5	H	-7.22	66.23	74	-7.77
2390	59.41	AV	49	1.5	H	-7.22	52.19	54	-1.81
2310	67.98	PK	75	1.1	V	-7.24	60.74	74	-13.26
2310	55.38	AV	75	1.1	V	-7.24	48.14	54	-5.86
2390	72.25	PK	50	1	V	-7.22	65.03	74	-8.97
2390	59.1	AV	50	1	V	-7.22	51.88	54	-2.12
4844	57.62	PK	98	1.5	H	-3.54	54.08	74	-19.92
4844	44.77	AV	98	1.5	H	-3.54	41.23	54	-12.77
4844	55.92	PK	208	1.7	V	-3.54	52.38	74	-21.62
4844	43.34	AV	208	1.7	V	-3.54	39.8	54	-14.2
Middle Channel(2437MHz)									
4874	57.19	PK	227	1.7	H	-3.42	53.77	74	-20.23
4874	55.98	PK	227	1.7	V	-3.42	52.56	74	-21.44
High Channel(2452 MHz)									
2483.5	75.19	PK	245	1.4	H	-7.2	67.99	74	-6.01
2483.5	60.57	AV	245	1.4	H	-7.2	53.37	54	-0.63
2500	72.62	PK	251	2.1	H	-7.18	65.44	74	-8.56
2500	57.8	AV	251	2.1	H	-7.18	50.62	54	-3.38
2483.5	71.43	PK	9	1.7	V	-7.2	64.23	74	-9.77
2483.5	58.74	AV	9	1.7	V	-7.2	51.54	54	-2.46
2500	70.82	PK	307	2.1	V	-7.18	63.64	74	-10.36
2500	57.12	AV	307	2.1	V	-7.18	49.94	54	-4.06
4904	55.74	PK	307	2	H	-3.26	52.48	74	-21.52
4904	55.19	PK	132	1.7	V	-3.26	51.93	74	-22.07

Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Absolute Level (Corrected Amplitude) = Factor + Reading

Margin = Absolute Level - Limit

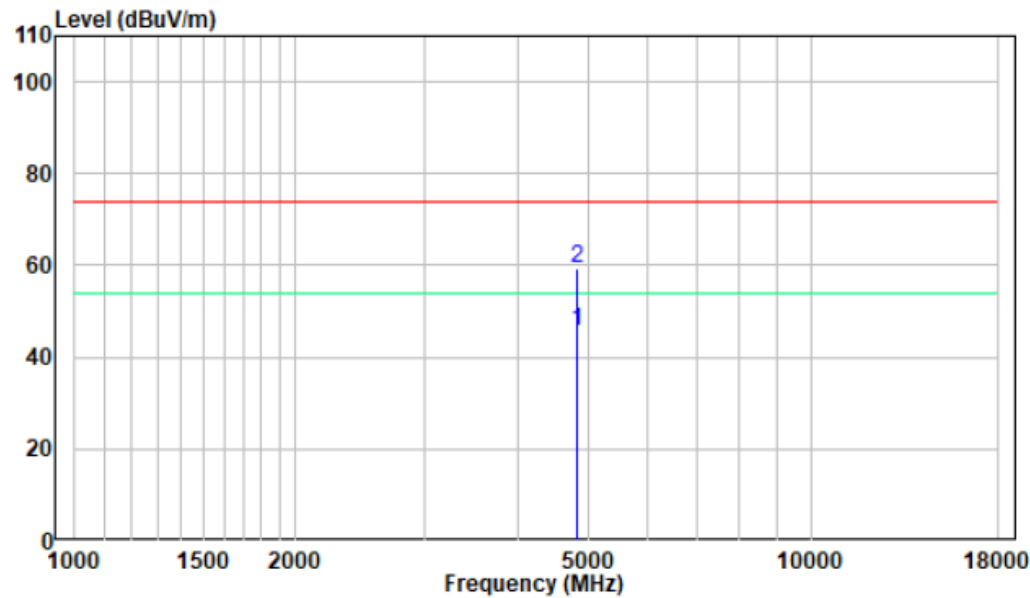
The other spurious emission which is 20dB below to the limit was not recorded.

When the test result of peak was less than the limit of average, just peak values were recorded.

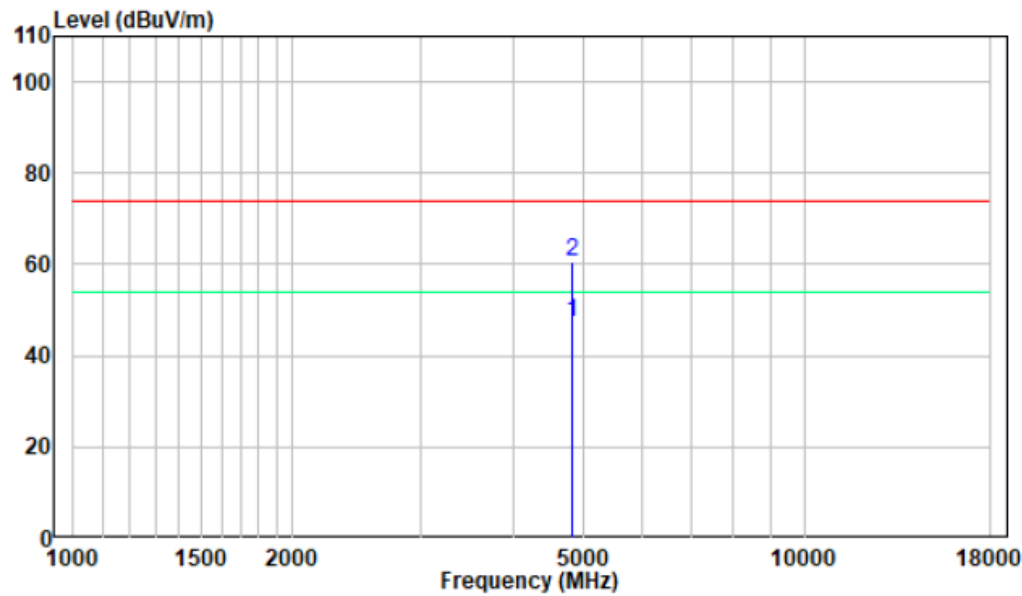
1-18 GHz:

Pre-scan Plots:

802.11 b Low Channel
Horizontal



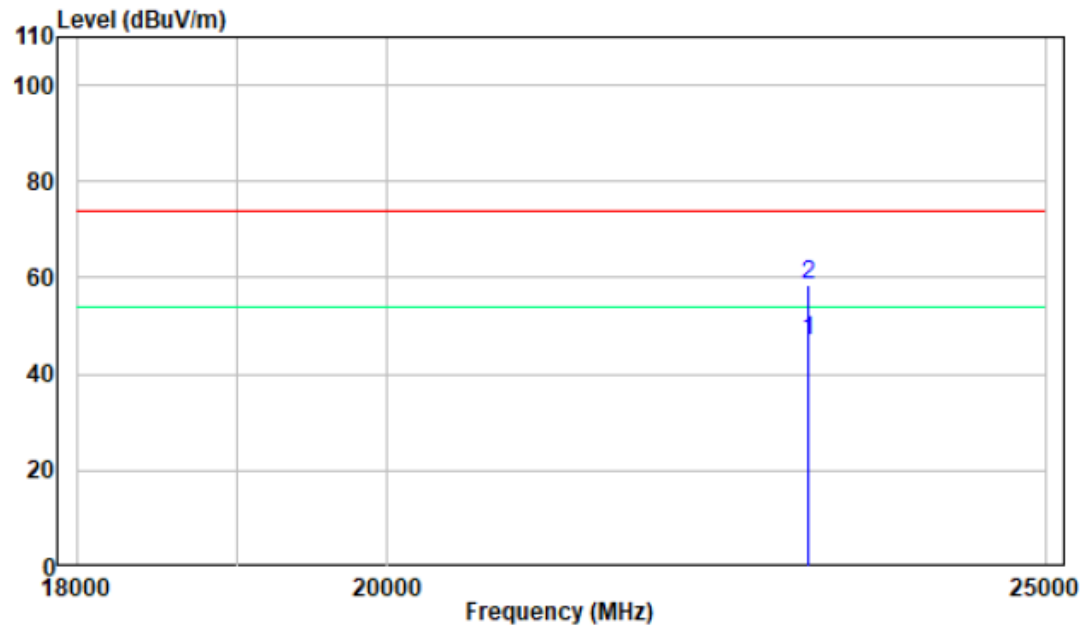
Vertical



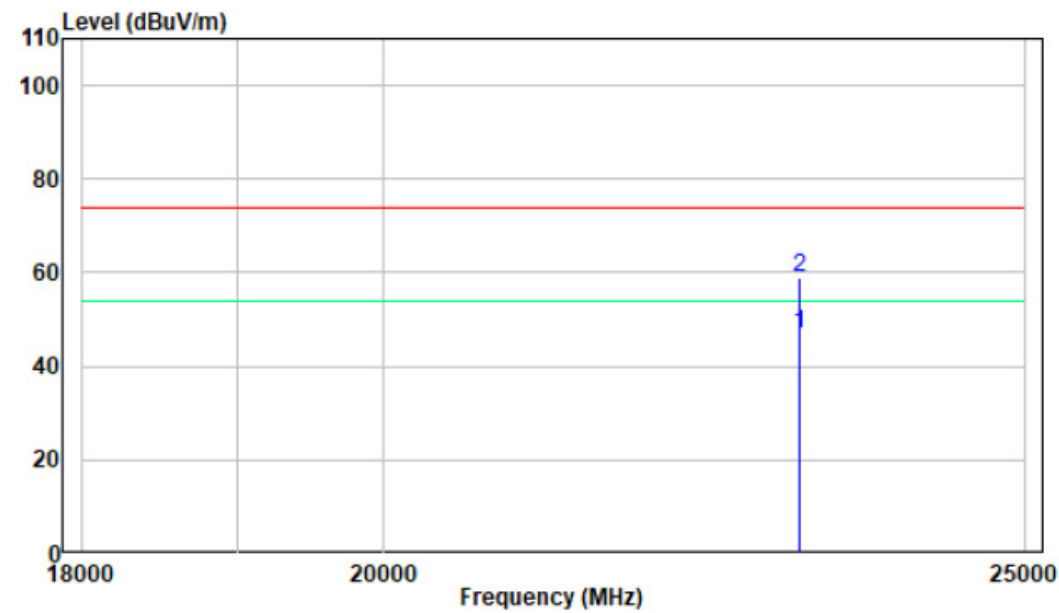
18 -25GHz:

Pre-scan Plots:

802.11 b Low Channel
Horizontal



Vertical



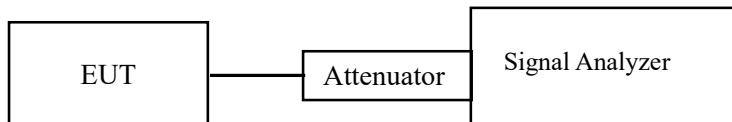
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

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

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



Test Data

Environmental Conditions

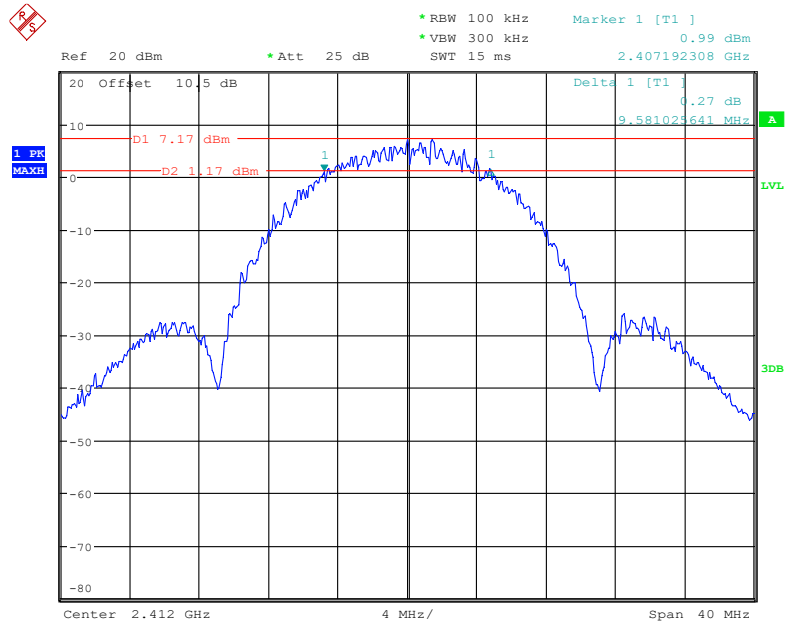
Temperature:	26.8 °C
Relative Humidity:	57.6 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu on 2022-01-19.

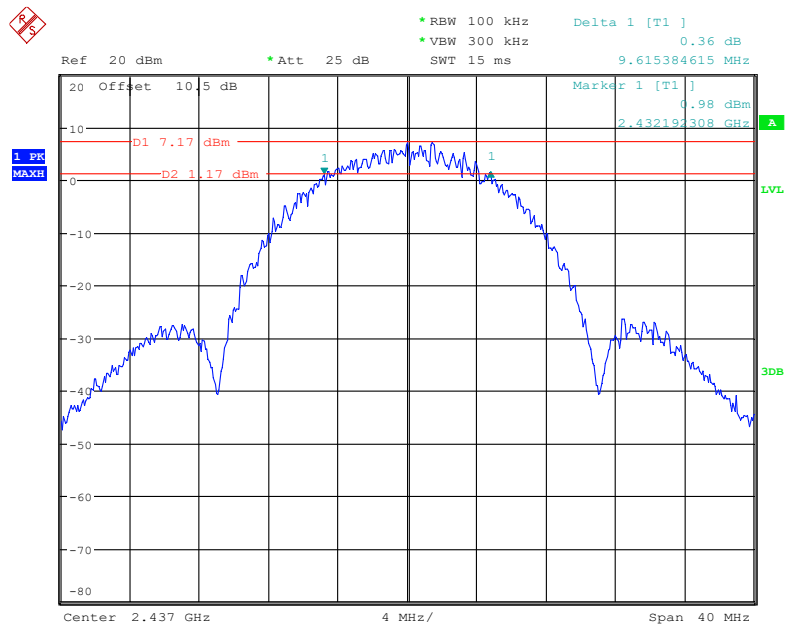
EUT operation mode: Transmitting

Test Result Compliant. Please refer to the following table and plots.

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)
802.11b mode			
Low	2412	9.581	≥ 500
Middle	2437	9.615	≥ 500
High	2462	9.551	≥ 500
802.11g mode			
Low	2412	16.603	≥ 500
Middle	2437	16.667	≥ 500
High	2462	16.625	≥ 500
802.11n-HT20 mode			
Low	2412	17.781	≥ 500
Middle	2437	17.825	≥ 500
High	2462	17.823	≥ 500
802.11n HT40 mode			
Low	2422	36.538	≥ 500
Middle	2437	36.538	≥ 500
High	2452	36.538	≥ 500

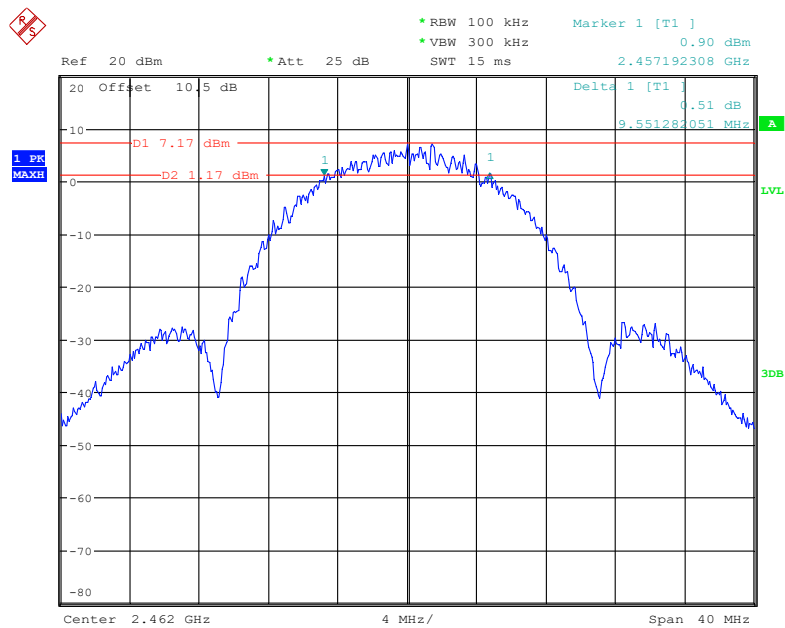
802.11b Mode:**Low Channel**

Date: 19.JAN.2022 17:10:58

Middle Channel

Date: 19.JAN.2022 17:11:44

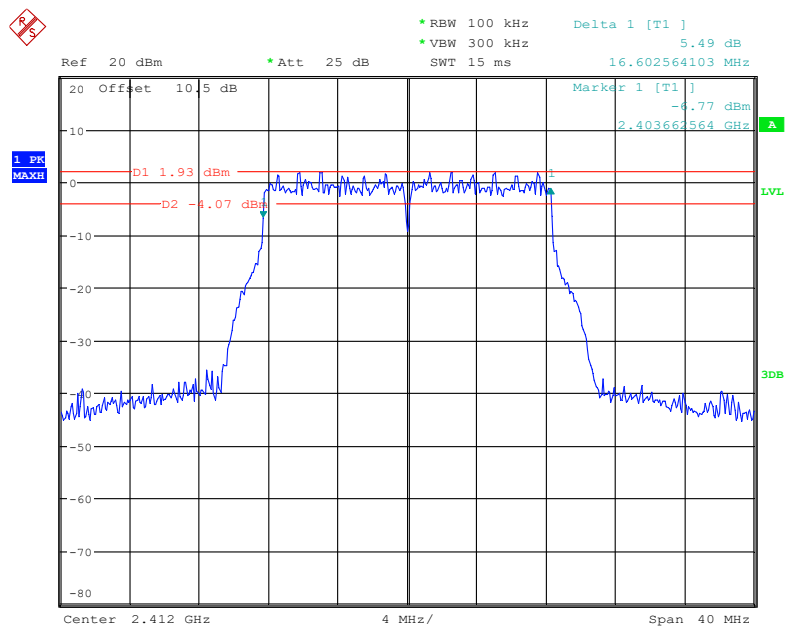
High Channel



Date: 19.JAN.2022 17:12:34

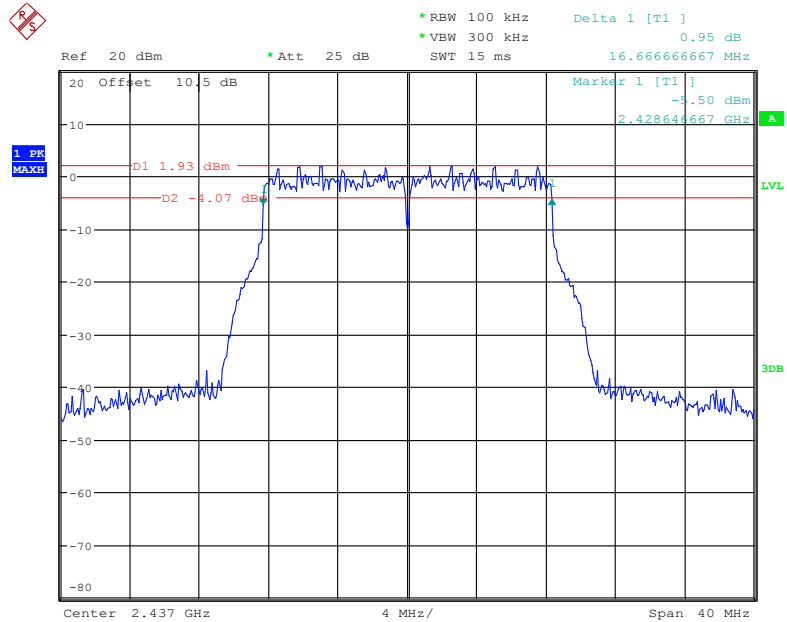
802.11g Mode:

Low Channel



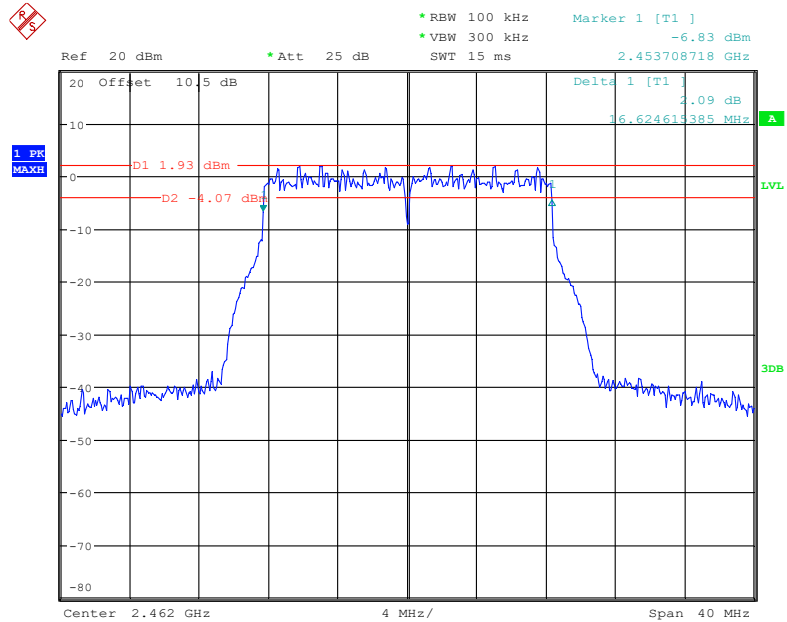
Date: 19.JAN.2022 17:15:40

Middle Channel

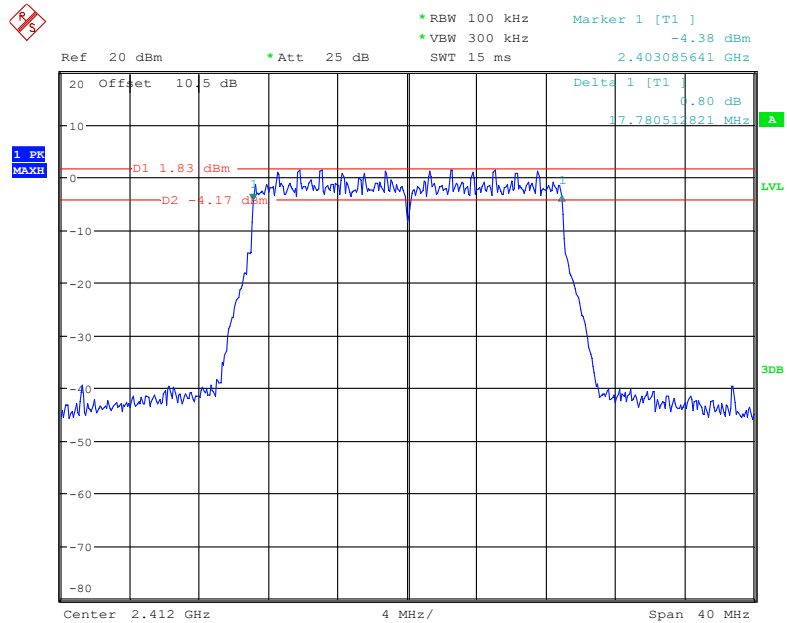


Date: 19.JAN.2022 17:14:35

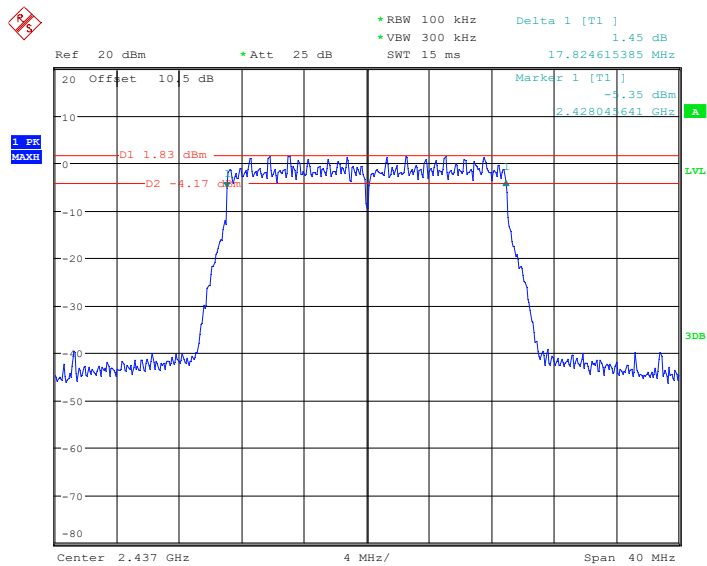
High Channel



Date: 19.JAN.2022 17:13:59

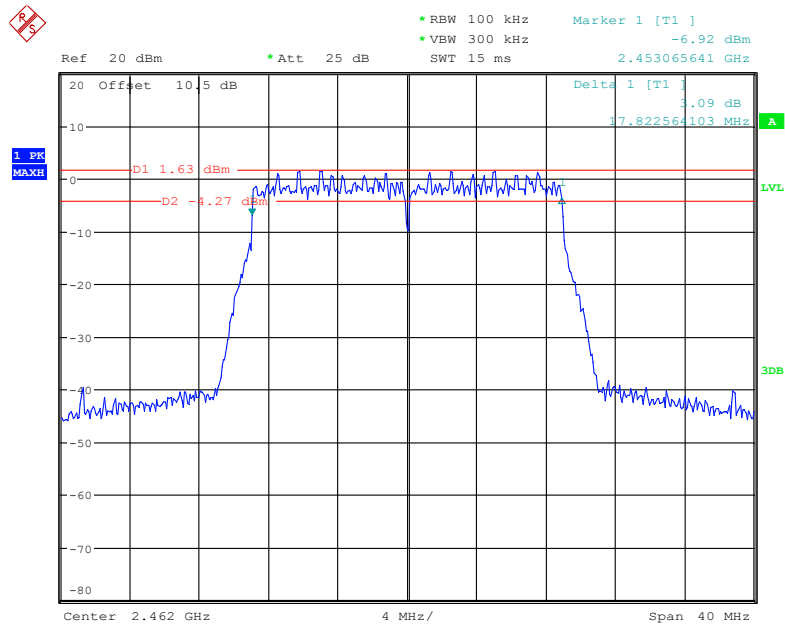
802.11n-20 Mode:**Low Channel**

Date: 19.JAN.2022 17:16:28

Middle Channel

Date: 19.JAN.2022 17:17:48

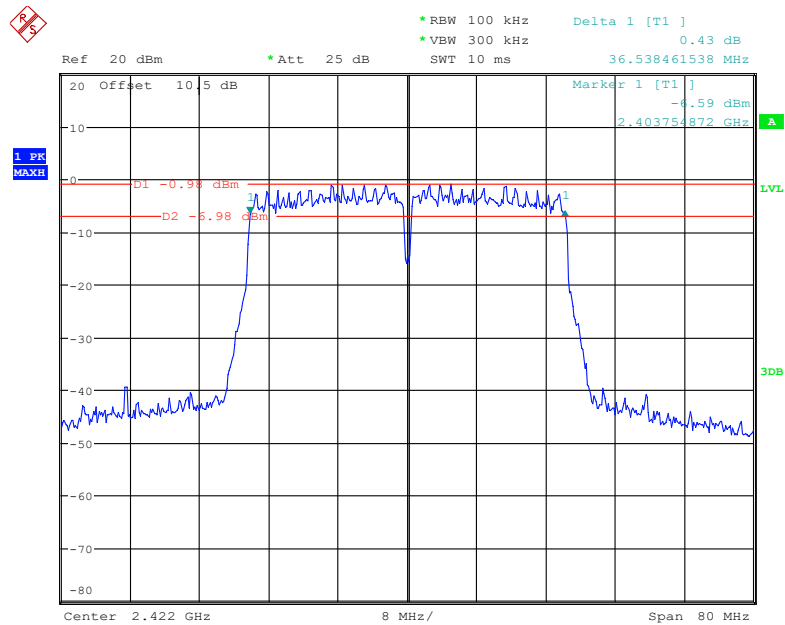
High Channel



Date: 19.JAN.2022 17:18:58

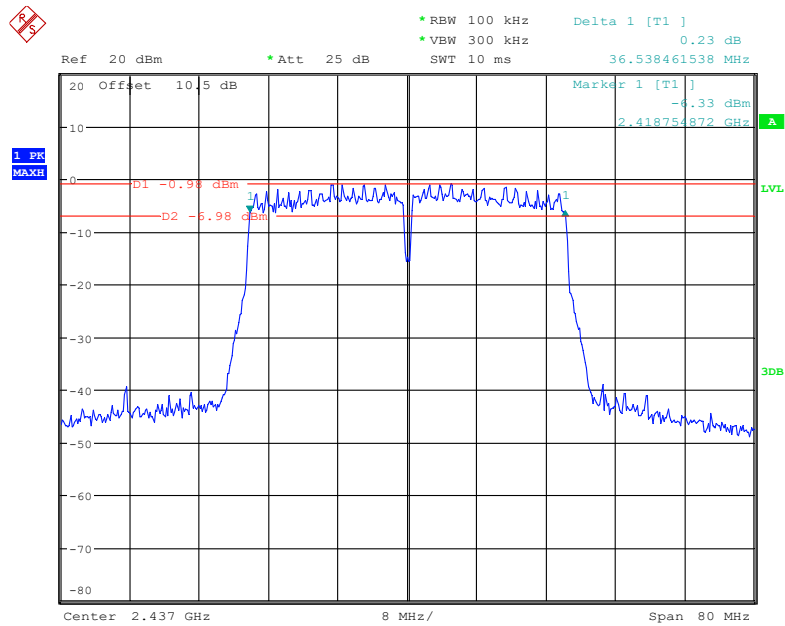
802.11n-40 Mode:

Low Channel



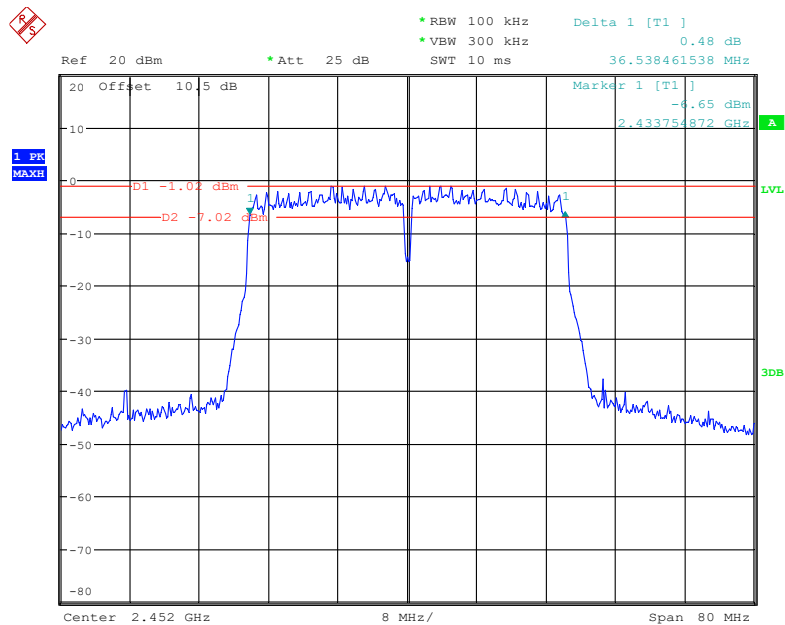
Date: 19.JAN.2022 17:09:52

Middle Channel



Date: 19.JAN.2022 17:09:10

High Channel



Date: 19.JAN.2022 17:08:07

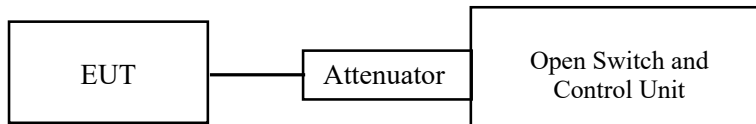
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

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

Test Procedure

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



Note: the Open Switch and Control Unit has a built-in power sensor.

Test Data

Environmental Conditions

Temperature:	26.8 °C
Relative Humidity:	57.6 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu on 2022-01-19.

EUT operation mode: Transmitting

Test Result Compliant. Please refer to the following table.

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)
802.11b mode				
Low	2412	22.29	18.55	30
Middle	2437	22.30	18.60	30
High	2462	22.27	18.56	30
802.11g mode				
Low	2412	22.13	16.15	30
Middle	2437	22.16	16.28	30
High	2462	21.98	16.20	30
802.11n HT20 mode				
Low	2412	21.32	15.82	30
Middle	2437	21.43	15.96	30
High	2462	21.36	15.77	30
802.11n HT40 mode				
Low	2422	21.69	16.07	30
Middle	2437	21.61	16.10	30
High	2452	21.61	16.36	30

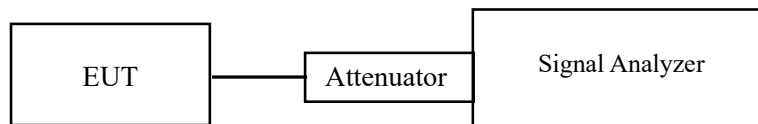
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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

Test Procedure

- f. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- g. 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.
- h. 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.
- i. 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.
- j. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

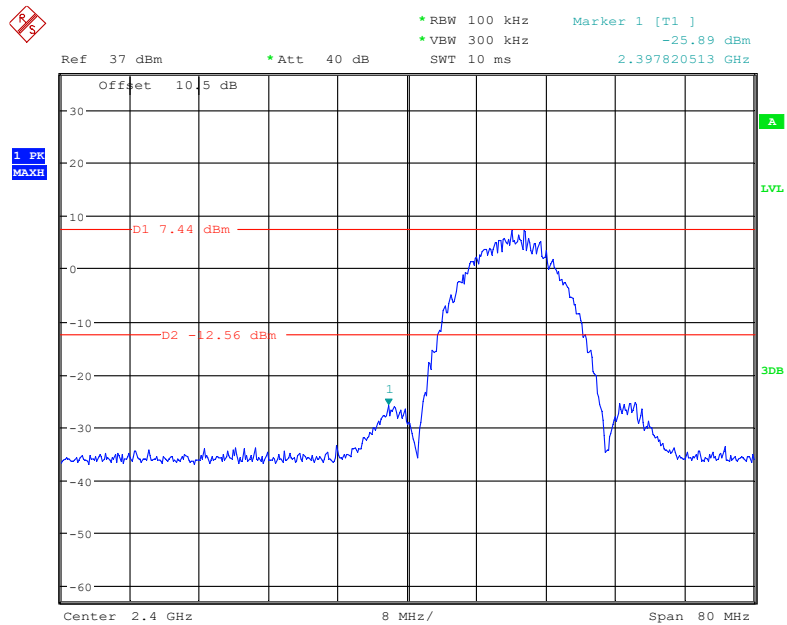
Temperature:	26.8 °C
Relative Humidity:	57.6 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu on 2022-01-19.

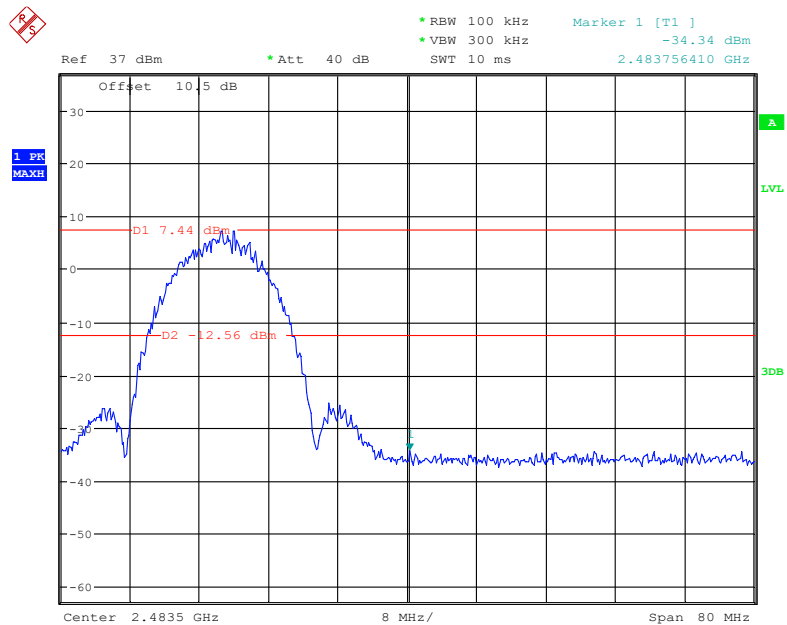
EUT operation mode: Transmitting

Test Result: Compliant.

Test Result Compliant. Please refer to the following table and plots.

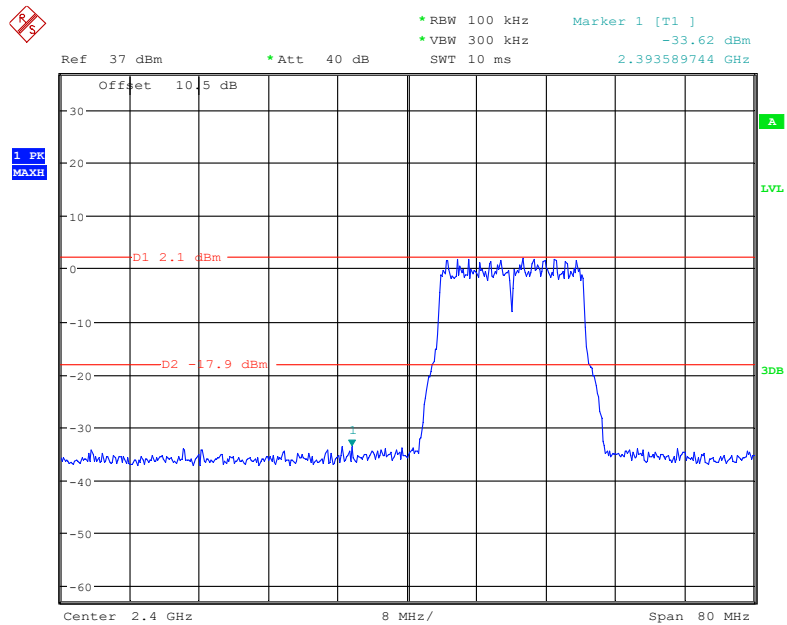
802.11b mode Left Side

Date: 19.JAN.2022 17:01:58

802.11b mode Right Side

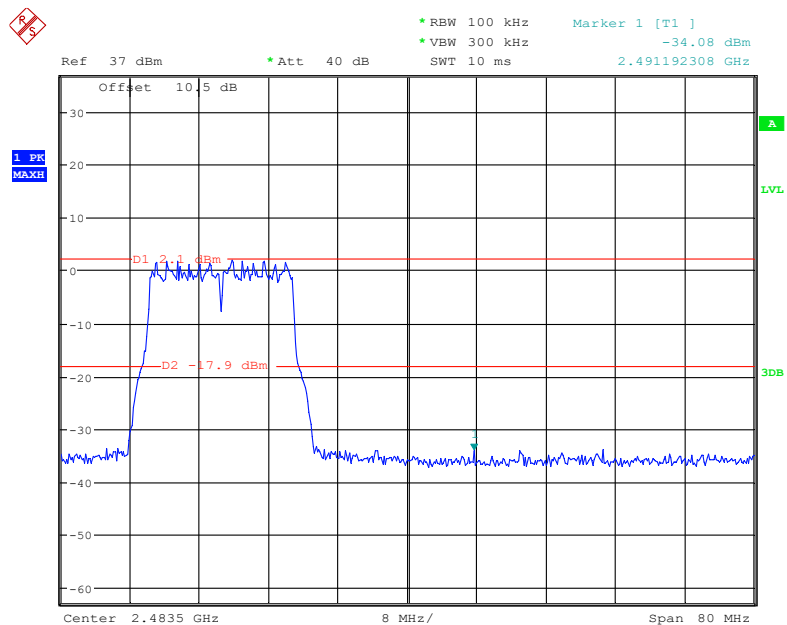
Date: 19.JAN.2022 17:02:27

802.11g mode Left Side



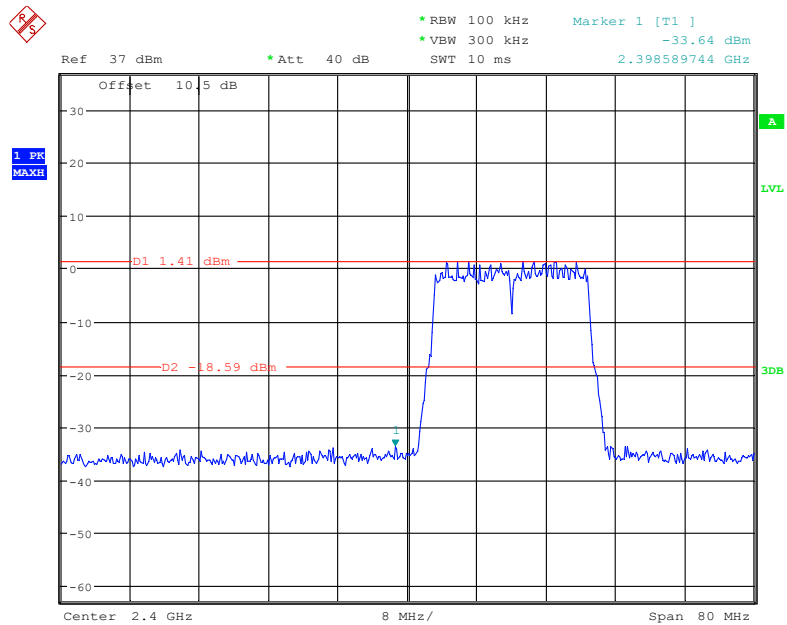
Date: 19.JAN.2022 17:00:42

802.11g mode Right Side



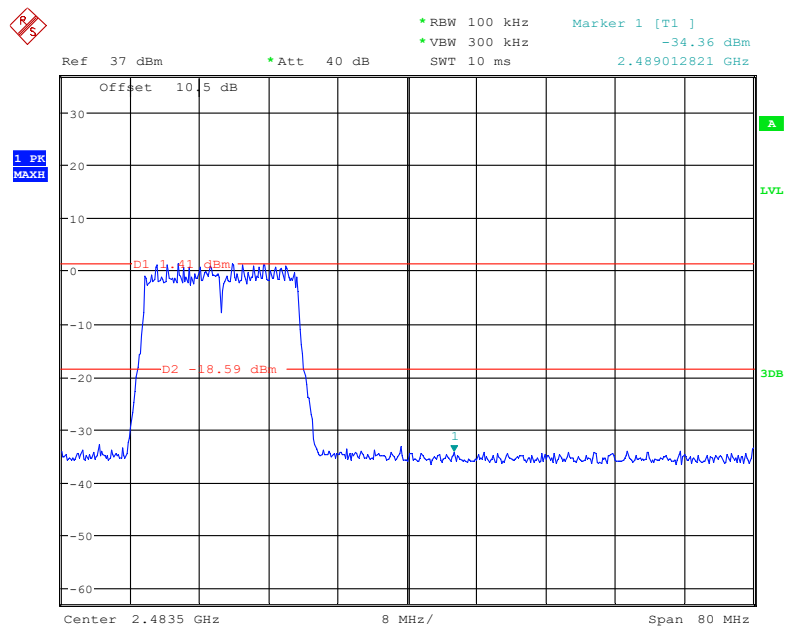
Date: 19.JAN.2022 17:00:06

802.11n-20 mode Left Side



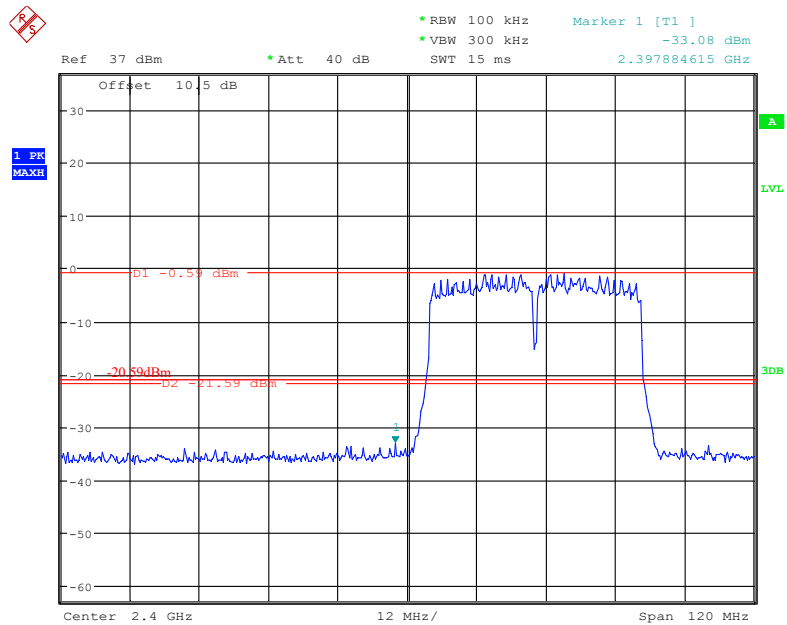
Date: 19.JAN.2022 17:04:21

802.11n-20 mode Right Side



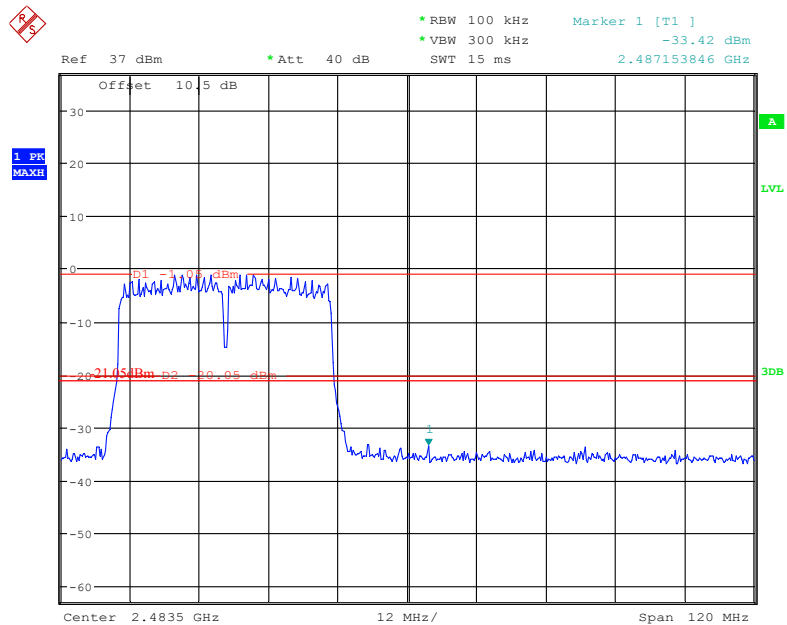
Date: 19.JAN.2022 17:03:36

802.11n-40 mode Left Side



Date: 19.JAN.2022 17:05:22

802.11n-40 mode Right Side



Date: 19.JAN.2022 17:06:10

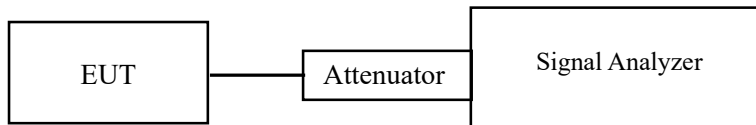
FCC §15.247(e) - POWER SPECTRAL DENSITY

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

- k. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
- l. Set the RBW to: $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
- m. Set the VBW $\geq 3 \times \text{RBW}$.
- n. Set the span to 1.5 times the DTS bandwidth.
- o. Detector = peak.
- p. Sweep time = auto couple.
- q. Trace mode = max hold.
- r. Allow trace to fully stabilize.
- s. Use the peak marker function to determine the maximum amplitude level within the RBW.
- t. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	26.8 °C
Relative Humidity:	57.6 %
ATM Pressure:	101.0 kPa

The testing was performed by Gala Liu on 2022-01-19.

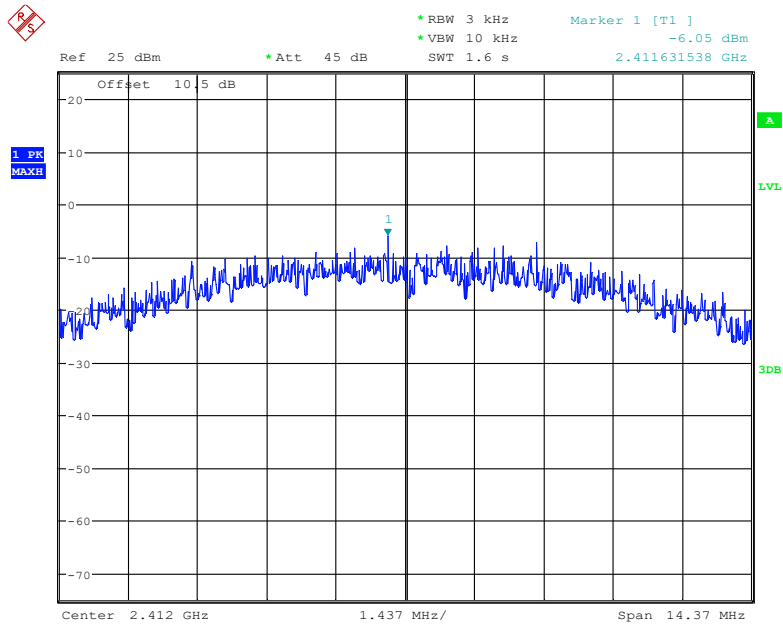
EUT operation mode: Transmitting

Test Result Compliant. Please refer to the following table and plots.

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-6.05	≤ 8
Middle	2437	-6.13	≤ 8
High	2462	-6.20	≤ 8
802.11g mode			
Low	2412	-11.12	≤ 8
Middle	2437	-11.23	≤ 8
High	2462	-11.31	≤ 8
802.11n-HT20 mode			
Low	2412	-12.44	≤ 8
Middle	2437	-14.03	≤ 8
High	2462	-14.28	≤ 8
802.11n HT40 mode			
Low	2422	-17.45	≤ 8
Middle	2437	-16.57	≤ 8
High	2452	-16.43	≤ 8

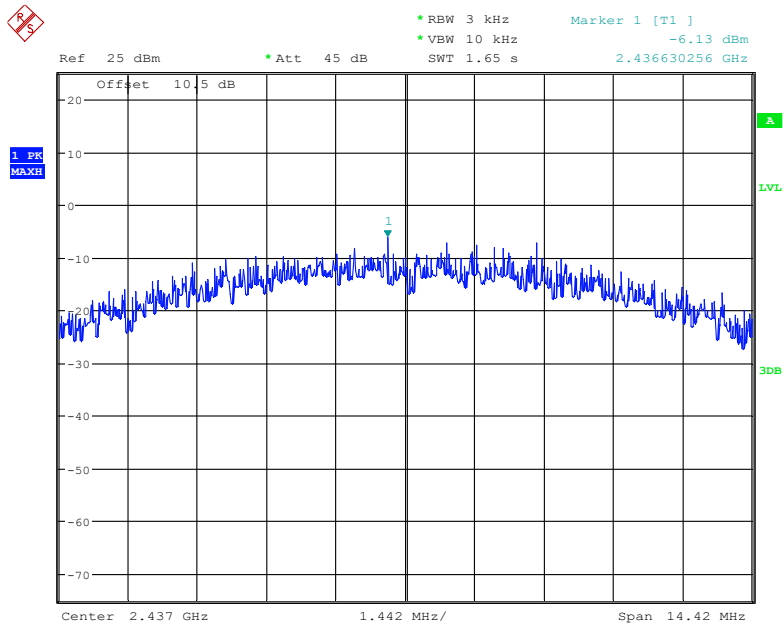
802.11 b mode:

Power Spectral Density, Low Channel



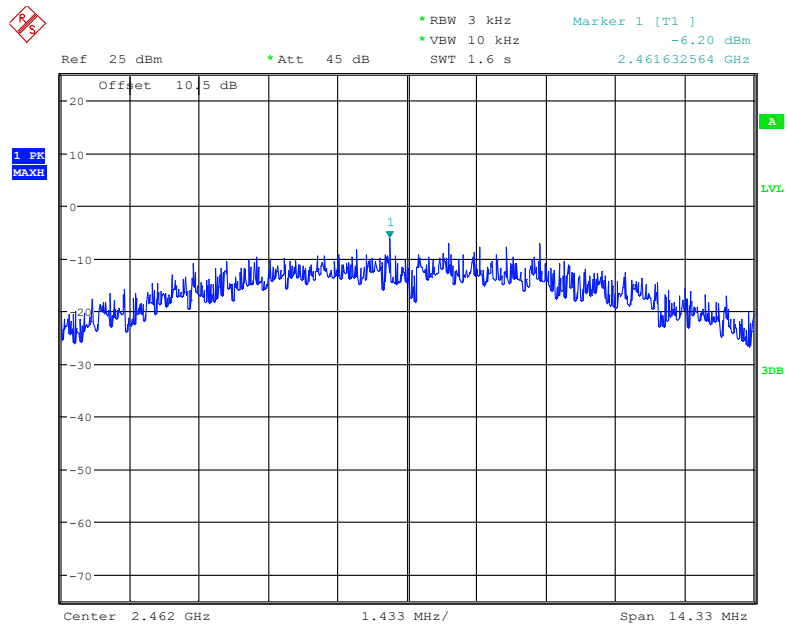
Date: 19.JAN.2022 17:31:48

Power Spectral Density, Middle Channel



Date: 19.JAN.2022 17:32:42

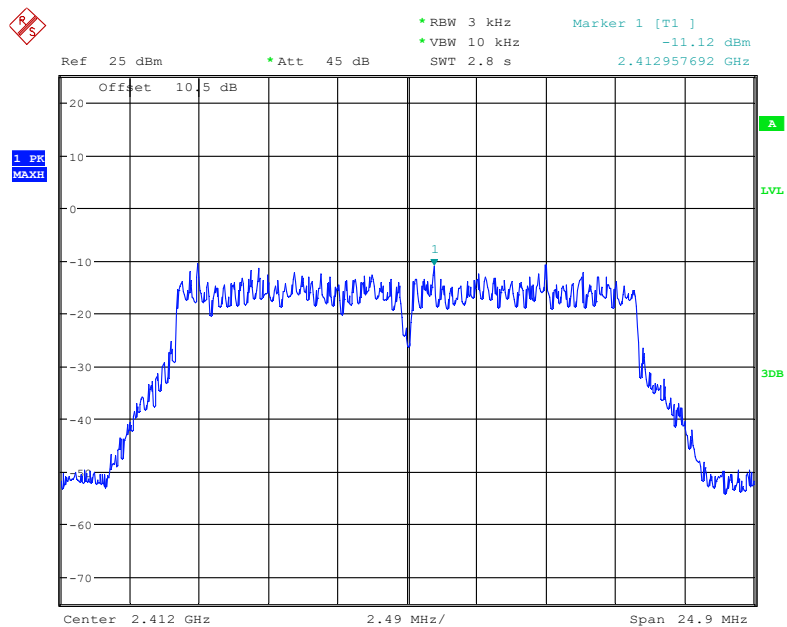
Power Spectral Density, High Channel



Date: 19.JAN.2022 17:33:49

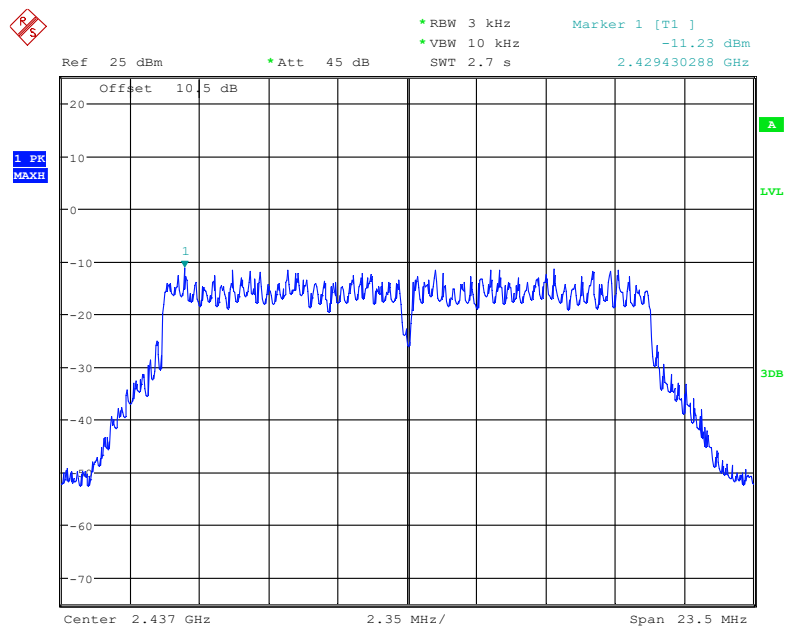
802.11 g mode:

Power Spectral Density, Low Channel



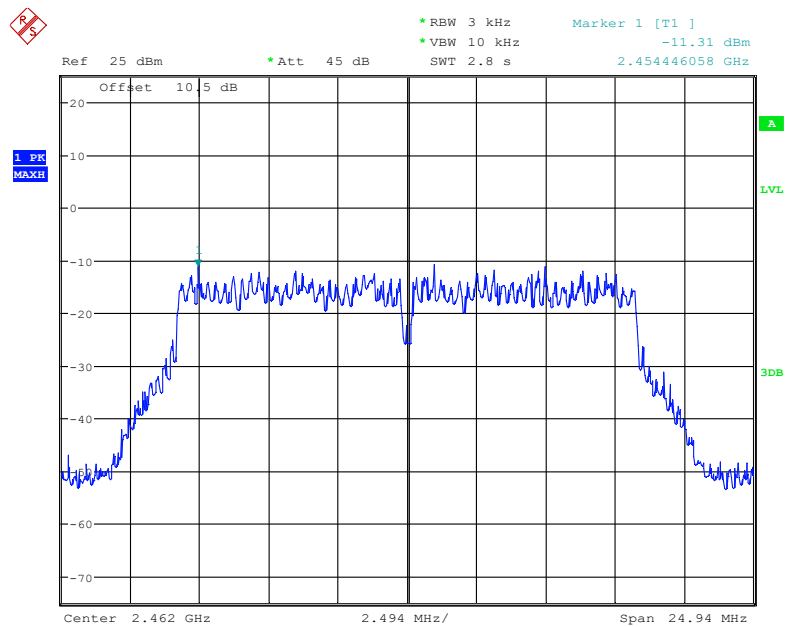
Date: 19.JAN.2022 17:36:25

Power Spectral Density, Middle Channel



Date: 19.JAN.2022 17:35:44

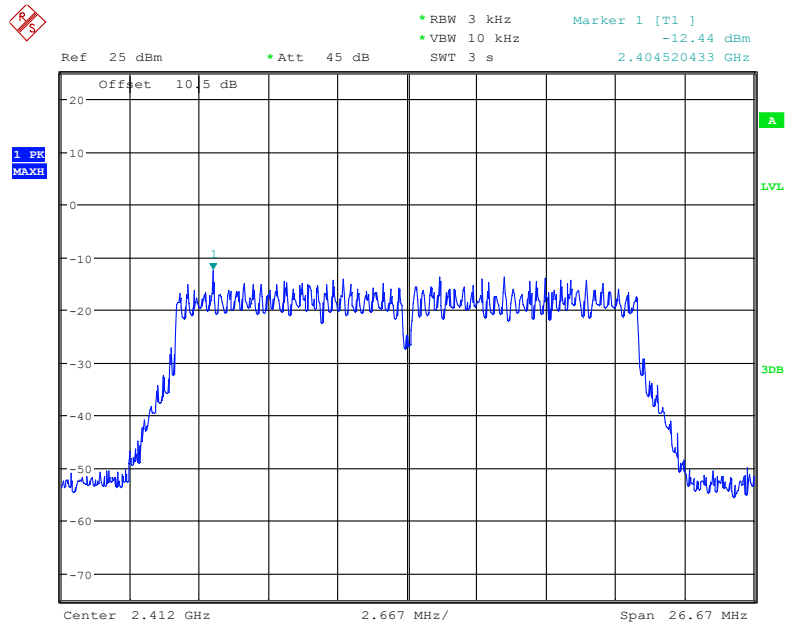
Power Spectral Density, High Channel



Date: 19.JAN.2022 17:34:48

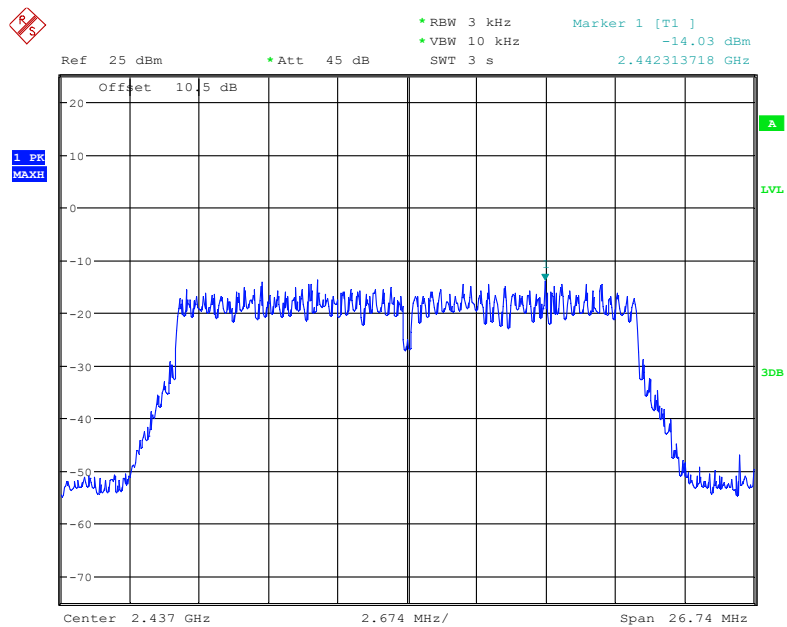
802.11n-20 mode:

Power Spectral Density, Low Channel



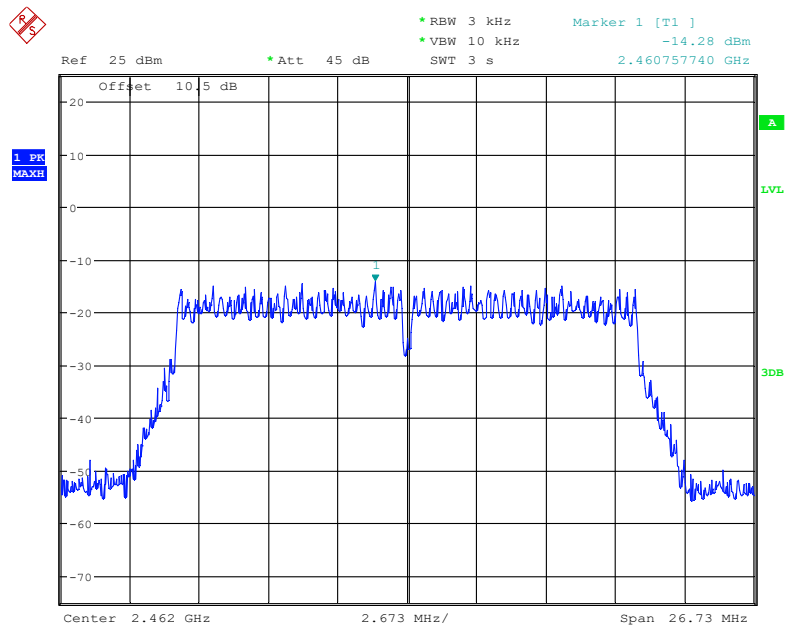
Date: 19.JAN.2022 17:37:45

Power Spectral Density, Middle Channel



Date: 19.JAN.2022 17:38:30

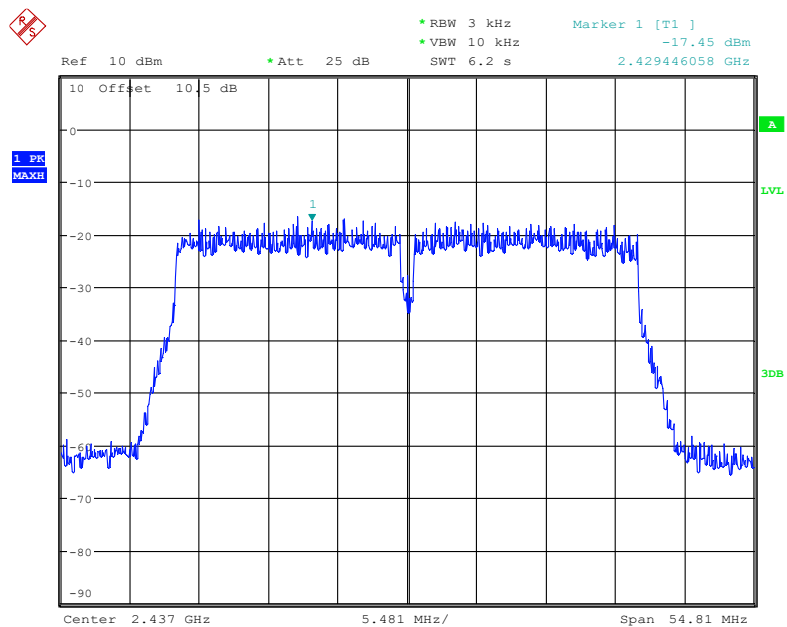
Power Spectral Density, High Channel



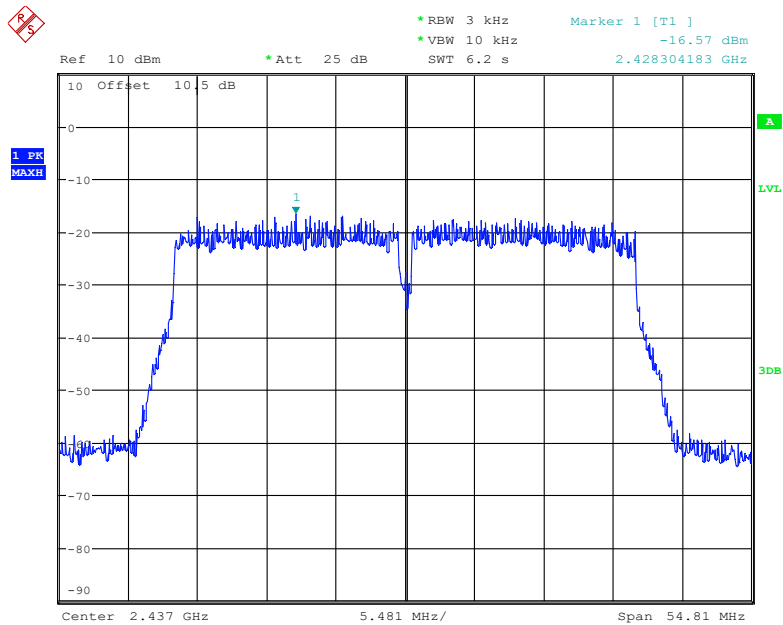
Date: 19.JAN.2022 17:39:10

802.11n-40 mode:

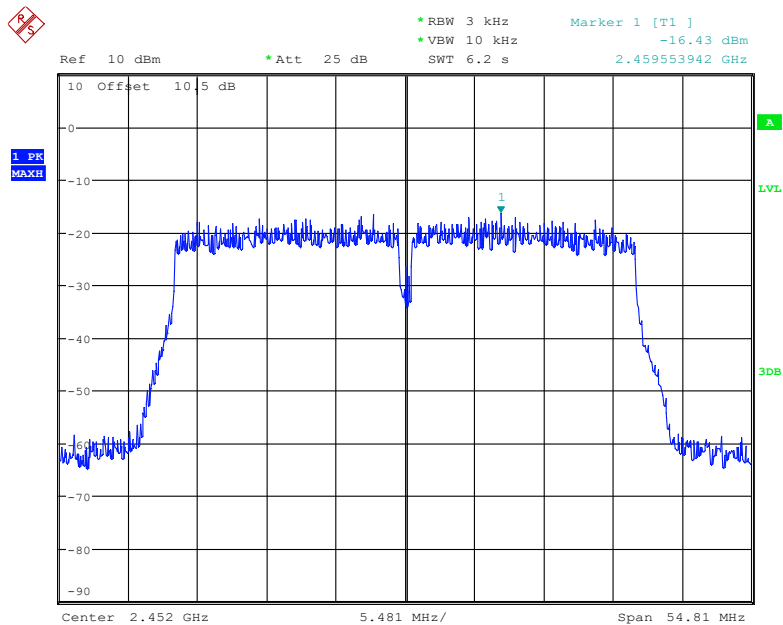
Power Spectral Density, Low Channel



Date: 19.JAN.2022 17:43:50

Power Spectral Density, Middle Channel

Date: 19.JAN.2022 17:43:56

Power Spectral Density, High Channel

Date: 19.JAN.2022 17:44:53

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