中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Grandstream Networks, Inc.**
Address: 126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

FCC ID: **YZZGWN7603**

Product Name: **802.11ac wave-2 Wi-Fi Access Point**

Standard(s): **47 CFR Part 15, Subpart C(15.247)**
ANSI C63.10-2013
KDB 558074 D01 15.247 Meas Guidance v05r02

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR231167508-00A**

Date Of Issue: **2024/1/15**

Reviewed By: **Calvin Chen**
Title: RF Engineer

Approved By: **Sun Zhong**
Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
No. 113, Pingkang Road, Dalang Town, Dongguan,
Guangdong, China
Tel: +86-769-82016888

Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

Declarations

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR231167508-00A	Original Report	2024/1/15

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	802.11ac wave-2 Wi-Fi Access Point
EUT Model:	GWN7603
Trade Name:	GRANDSTREAM
Operation Frequency:	2412-2462 MHz(802.11b/g/n ht20) 2422-2452 MHz(802.11n ht40)
Maximum Average Output Power (Conducted):	21.25dBm
Modulation Type:	802.11b:DSSS-DBPSK, DQPSK, CCK 802.11g/n:OFDM-BPSK, QPSK, 16QAM, 64QAM
Rated Input Voltage:	DC 44-57V from PoE or DC 12V, 2A from adapter
Serial Number:	RE/CE: 2DPM-1 RF: 2DPM-2
EUT Received Date:	2023/11/15
EUT Received Status:	Good

Operation Frequency Detail:

For 802.11b/g/n ht20:

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	/	/

Per section 15.31(m)/RSS-Gen, the below frequencies were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2412
Middle	2437
Highest	2462

For 802.11n ht40:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437	/	/

Per section 15.31(m), the below frequencies were performed the test as below:

Test Channel	Frequency (MHz)
Lowest	2422
Middle	2437
Highest	2452

Antenna Information Detail▲:

Antenna Chain	Antenna Type	input impedance (Ohm)	Frequency Range (MHz)	Antenna Gain (dBi)
Chain 0	Dipole	50	2400-2500	3.61
Chain 1	Dipole	50	2400-2500	3.97

The Method of §15.203 Compliance:

☒Antenna was permanently attached to the unit.

☐Antenna use a unique type of connector to attach to the EUT.

☐Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer. According to the test result of Part 15B report, for AC line conducted emission, POE power supply was the worst case select to test; for radiated emission below 1GHz, adapter power supply was the worst case select to test.
Equipment Modifications:	No
EUT Exercise Software:	RTL8852A MP Toolkit.exe

The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer▲:

Test Modes	Test Channels	Test Frequency	Data rate	Power Level Setting	
				Chain 0	Chain 1
802.11b	Lowest	2412	1Mbps	23	22
	Middle	2437	1Mbps	23	23
	Highest	2462	1Mbps	23	20
802.11g	Lowest	2412	6Mbps	1E	20
	Middle	2437	6Mbps	23	23
	Additional	2442	6Mbps	22	22
	Highest	2462	6Mbps	1C	20
802.11n ht20	Lowest	2412	MCS0	23	23
	Middle	2437	MCS0	23	23
	Additional	2442	MCS0	22	22
	Highest	2462	MCS0	1F	1F
802.11n ht40	Lowest	2422	MCS0	1B	1B
	Additional	2432	MCS0	1C	1C
	Middle	2437	MCS0	20	20
	Additional	2442	MCS0	20	20
	Highest	2452	MCS0	1C	1C

Note:
1. The above are the worst-case data rates, which are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.
2. The device supports SISO in all modes, and MIMO 2T2R in 802.11n modes, per pretest, 2T2R mode was the worst mode and reported for 802.11n modes.
3. The device support Beamforming and non-beamforming mode for MIMO, per pretest, Beamforming mode was the worst mode and reported for MIMO.

1.2.2 Support Equipment List and Details

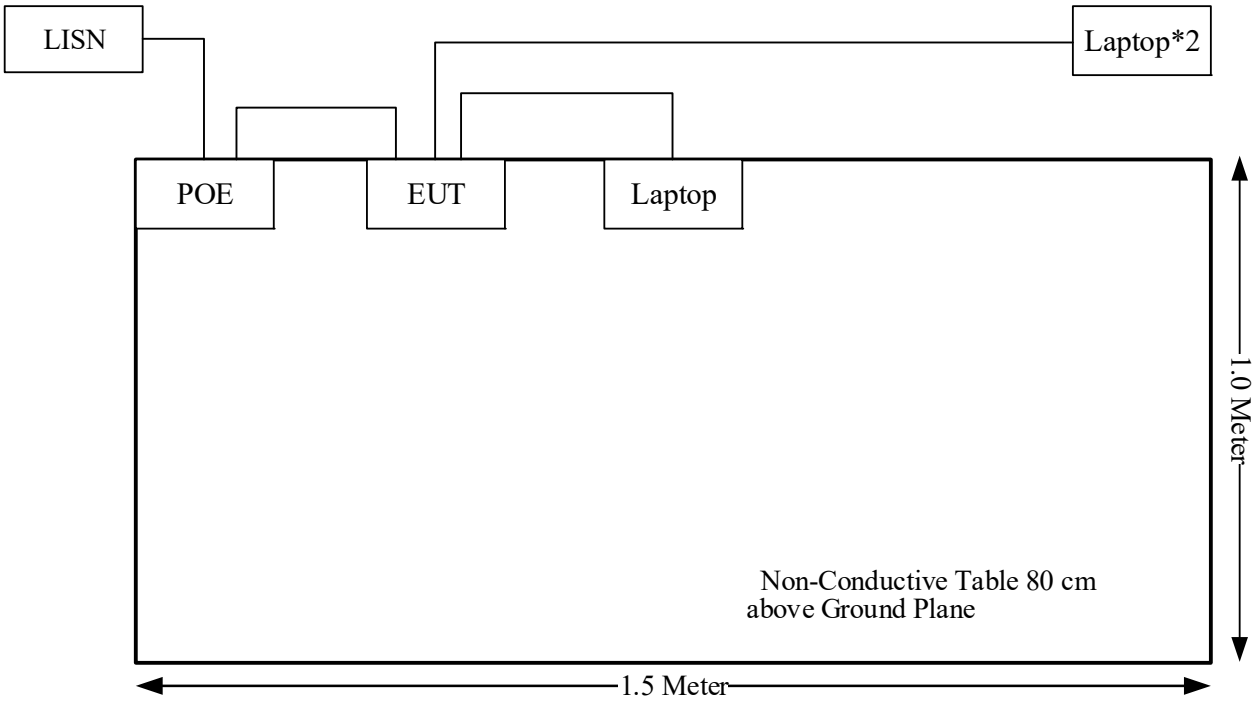
Manufacturer	Description	Model	Serial Number
MASS POWER	Adapter	NBS24J120200HU	N/A
Lenovo	Laptop	T460S	60PDTEK7
Lenovo	Laptop	T460S	60PDTEK8
DELL	Laptop	E6410	GYXJ3 A00 JSD2
Tenda	Wireless Router	RX12 Pro	ED331010215000033
Huawei	Wireless Router	HG8245Q2	HG8245-001
DIGITAL	POE	G0720-480-050	3TV4E338182

1.2.3 Support Cable List and Details

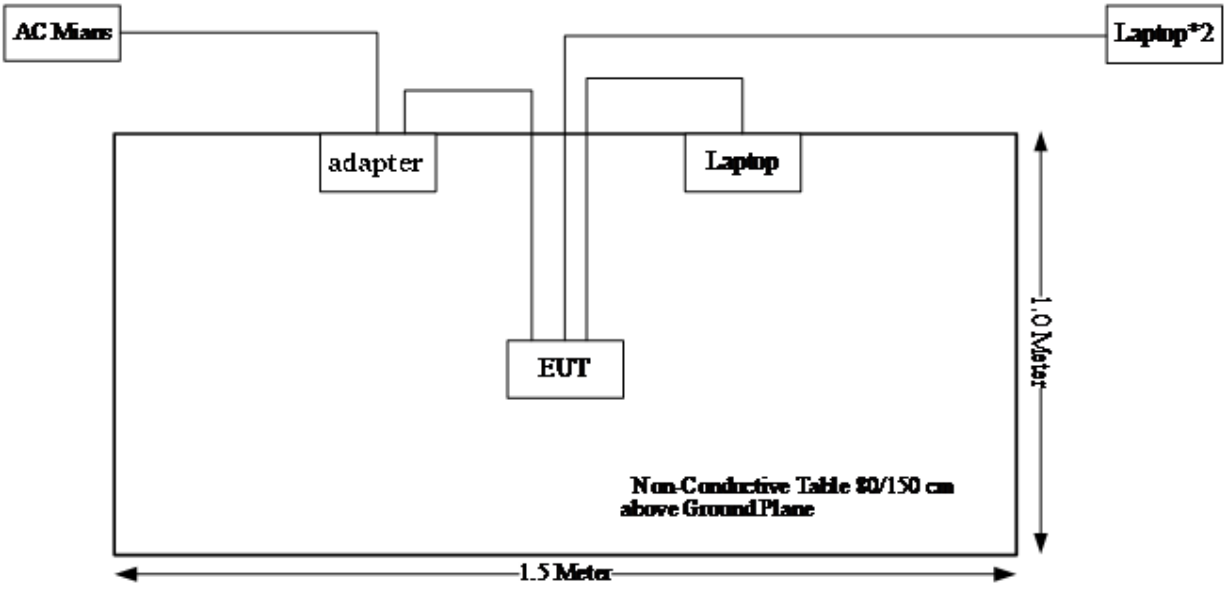
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 cable	NO	NO	2	EUT	Laptop
RJ45 cable*2	NO	NO	10	EUT	Laptop
AC cable	NO	NO	1.2	POE	LISN/AC Mains
DC cable	NO	NO	1.2	EUT	Adapter
RJ45 cable	NO	NO	0.5	EUT	POE

1.2.4 Block Diagram of Test Setup

AC line conducted emissions:



Spurious Emissions:



1.3 Measurement Uncertainty

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

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	9k~30MHz:4.12dB, 30M~200MHz: 4.15 dB,200M~1GHz: 5.61 dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.26 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

2. SUMMARY OF TEST RESULTS

Standard(s) Section	Test Items	Result
§15.207(a)	AC line conducted emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203	Antenna Requirement	Compliant
FCC §2.1091	Maximum Permissible exposure	Compliant

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBμV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

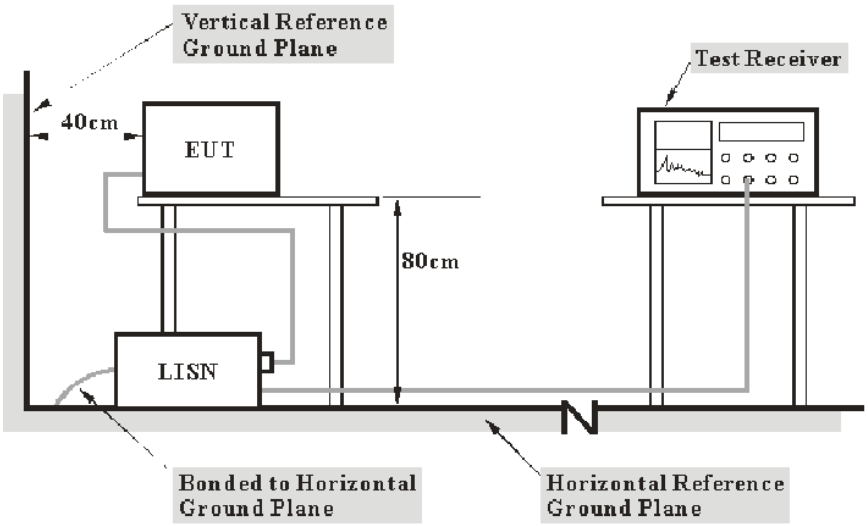
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

3.1.2 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.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

3.1.3 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

3.1.4 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 Radiation Spurious Emissions

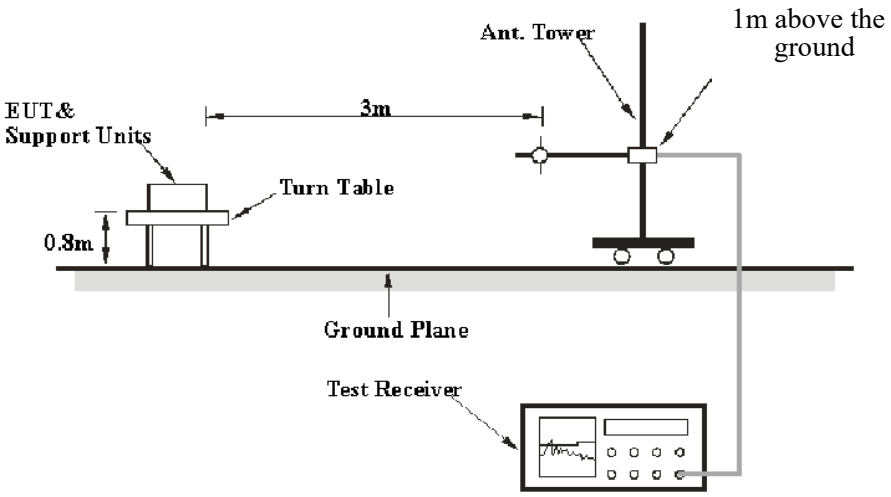
3.2.1 Applicable Standard

FCC §15.247 (d);

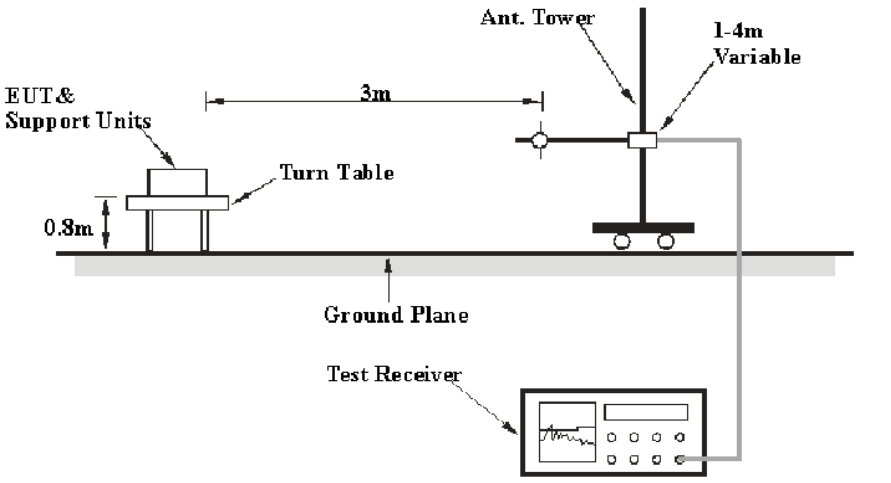
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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)).

3.2.2 EUT Setup

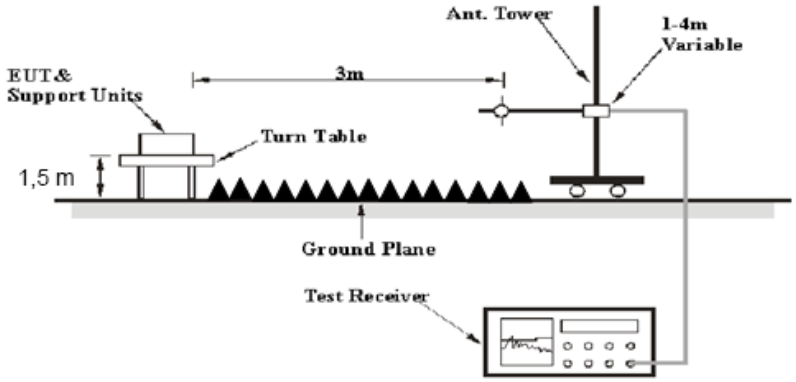
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emissions were performed in the 3 meters distance, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247,RSS-247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For 9kHz-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.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

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

9 kHz-1000MHz:

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

1GHz- 25GHz:

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

Note: T is minimum transmission duration

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

3.2.4 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 9 kHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

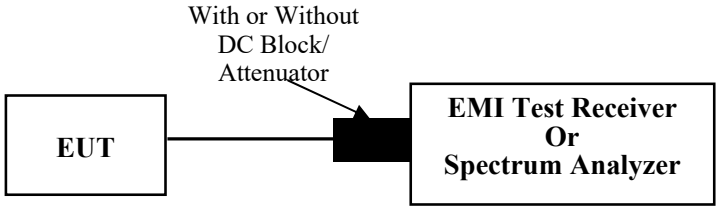
3.3 6 dB Emission Bandwidth:

3.3.1 Applicable Standard

FCC §15.247 (a)(2)

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

3.3.2 EUT Setup



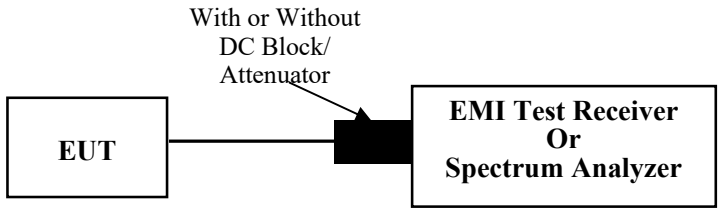
3.3.3 Test Procedure

According to ANSI C63.10-2013 Section 11.8

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

3.4 99% Occupied Bandwidth:

3.4.1 EUT Setup



3.4.2 Test Procedure

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
The following procedure shall be used for measuring 99% power bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

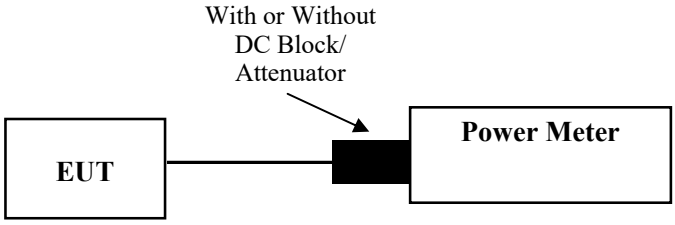
3.5 Maximum conducted output power:

3.5.1 Applicable Standard

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.

3.5.2 EUT Setup



3.5.3 Test Procedure

For Peak output power:

According to ANSI C63.10-2013 Section 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.

For Average output power:

According to ANSI C63.10-2013 Section 11.9.2.3.2

Method AVGPM-G is a measurement using a gated RF average power meter.

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

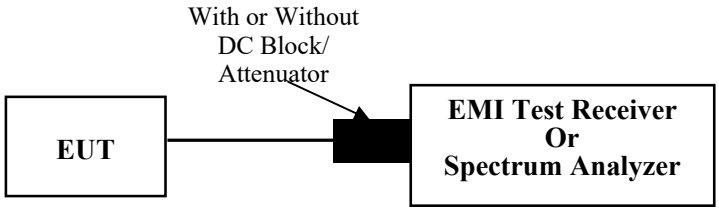
3.6 Maximum power spectral density:

3.6.1 Applicable Standard

FCC §15.247 (e)

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.

3.6.2 EUT Setup



3.6.3 Test Procedure

Duty cycle ≥98%, method ANSI C63.10-2013 Section 11.10.3 was used.

Duty cycle <98%, and duty cycle variations are less than ±2%,method ANSI C63.10-2013 Section 11.10.5 was used.

Duty cycle <98%, and duty cycle variations exceed ±2%, method ANSI C63.10-2013 Section 11.10.7.

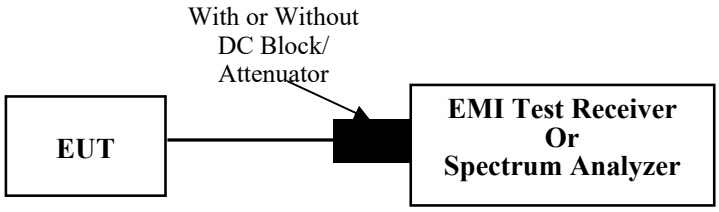
3.7 100 kHz Bandwidth of Frequency Band Edge:

3.7.1 Applicable Standard

FCC §15.247 (d);

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)).

3.7.2 EUT Setup



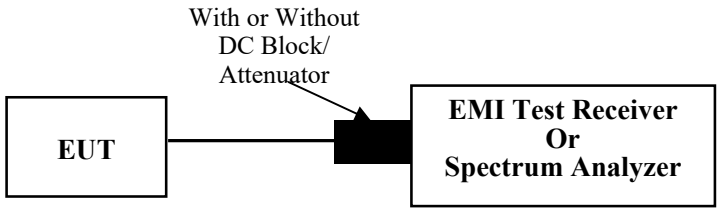
3.7.3 Test Procedure

According to ANSI C63.10-2013 Section 11.11

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

3.8 Duty Cycle:

3.8.1 EUT Setup



3.8.2 Test Procedure

According to ANSI C63.10-2013 Section 11.6

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.
4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if T ≤ 16.7 μs.)

3.9 Antenna Requirement

3.9.1 Applicable Standard

FCC §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 use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

3.9.2 Judgment

Compliant. Please refer to the Antenna Information detail in Section 1.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Serial Number:	2DPM-1	Test Date:	2023/12/13
Test Site:	CE	Test Mode:	Transmitting(Maximum output power mode, 802.11b mode, Low Channel, Chain1)
Tester:	David Huang	Test Result:	Pass

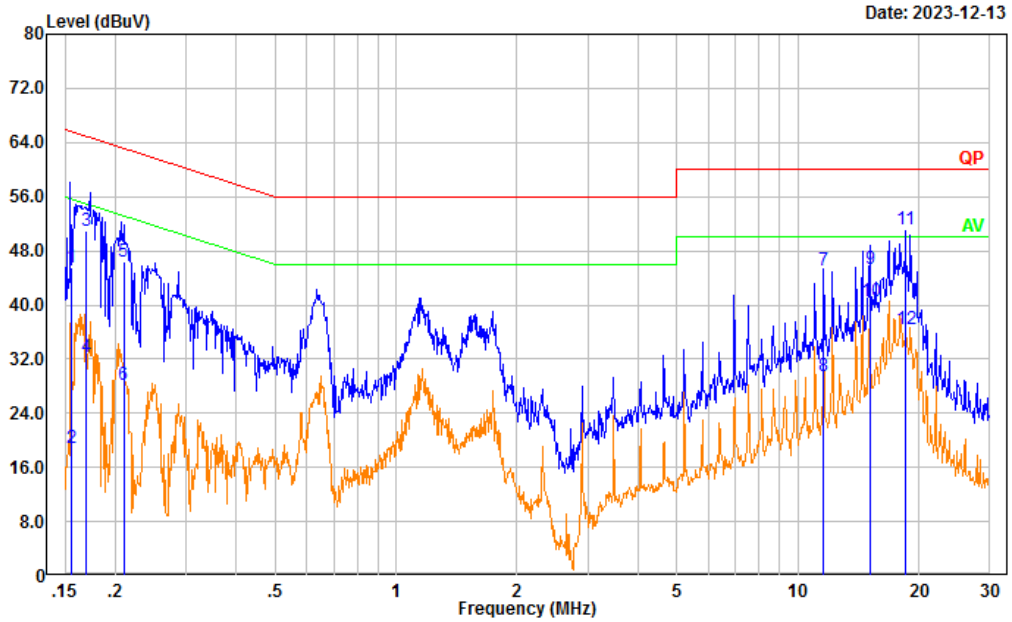
Environmental Conditions:					
Temperature: (℃)	27.5	Relative Humidity: (%)	50	ATM Pressure: (kPa)	100.8

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101134	2023/3/31	2024/3/30
R&S	EMI Test Receiver	ESR3	102726	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2023/8/6	2024/8/5
Audix	Test Software	E3	190306 (V9)	N/A	N/A

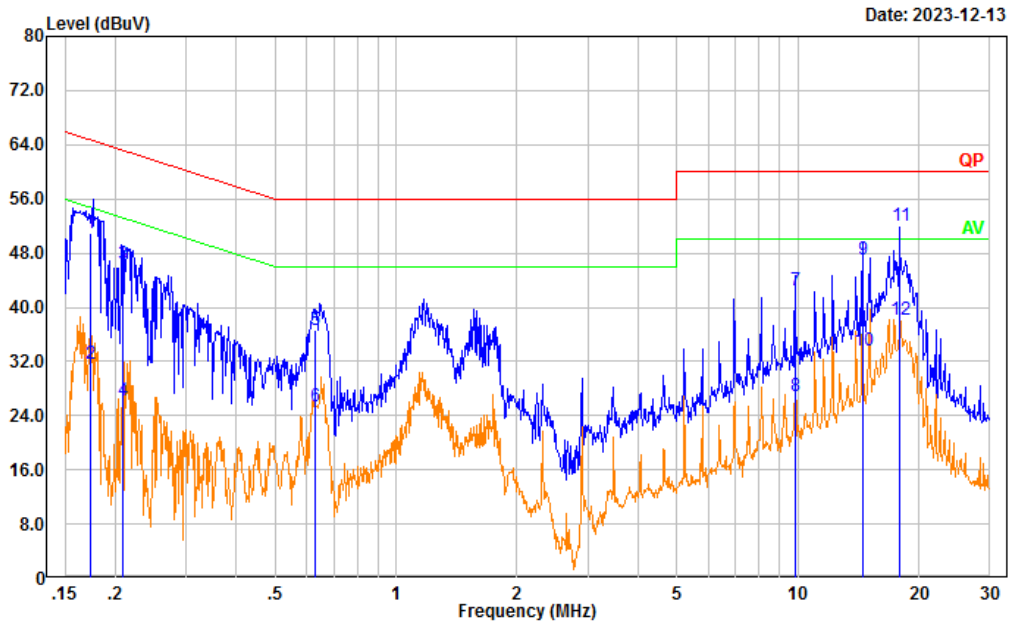
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Project No.: CR231167508-RF
Tester: David Huang
Port: Line
Note: Transmitting(2.4G WIFI)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.156	35.94	9.61	45.55	65.70	20.15	QP
2	0.156	9.26	9.61	18.87	55.70	36.83	Average
3	0.170	41.44	9.61	51.05	64.98	13.93	QP
4	0.170	22.62	9.61	32.23	54.98	22.75	Average
5	0.210	36.85	9.61	46.46	63.21	16.75	QP
6	0.210	18.58	9.61	28.19	53.21	25.02	Average
7	11.580	35.36	9.67	45.03	60.00	14.97	QP
8	11.580	19.86	9.67	29.53	50.00	20.47	Average
9	15.122	35.66	9.69	45.35	60.00	14.65	QP
10	15.122	30.90	9.69	40.59	50.00	9.41	Average
11	18.521	41.35	9.76	51.11	60.00	8.89	QP
12	18.521	26.74	9.76	36.50	50.00	13.50	Average

Project No.: CR231167508-RF
Tester: David Huang
Port: neutral
Note: Transmitting(2.4G WIFI)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.174	41.38	9.61	50.99	64.76	13.77	QP
2	0.174	22.12	9.61	31.73	54.76	23.03	Average
3	0.209	36.70	9.61	46.31	63.24	16.93	QP
4	0.209	16.57	9.61	26.18	53.24	27.06	Average
5	0.630	26.94	9.62	36.56	56.00	19.44	QP
6	0.630	15.68	9.62	25.30	46.00	20.70	Average
7	9.838	32.77	9.67	42.44	60.00	17.56	QP
8	9.838	17.18	9.67	26.85	50.00	23.15	Average
9	14.470	37.32	9.68	47.00	60.00	13.00	QP
10	14.470	24.00	9.68	33.68	50.00	16.32	Average
11	17.948	42.25	9.69	51.94	60.00	8.06	QP
12	17.948	28.52	9.69	38.21	50.00	11.79	Average

4.2 Radiation Spurious Emissions

Serial Number:	2DPM-1	Test Date:	Below 1G: 2023/12/27 Above 1G: 2023/12/30
Test Site:	966-1, 966-2	Test Mode:	Transmitting
Tester:	Vic Du, Mack Huang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	24.2~ 25.2	Relative Humidity: (%)	44~ 54	ATM Pressure: (kPa)	101.2~101.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Below 1G					
Sunol Sciences	Antenna	JB6	A082520-6	2023/9/18	2026/9/17
BACL	Loop Antenna	1313-1P	3092721	2023/10/20	2026/10/19
R&S	EMI Test Receiver	ESR3	102724	2023/3/31	2024/3/30
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2023/7/16	2024/7/15
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2023/7/16	2024/7/15
Sonoma	Amplifier	310N	186165	2023/7/16	2024/7/15
Audix	Test Software	E3	201021 (V9)	N/A	N/A
Above 1G					
AH	Double Ridge Guide Horn Antenna	SAS-571	1394	2023/02/22	2026/02/21
R&S	Spectrum Analyzer	FSV40	101591	2023/03/31	2024/03/30
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2023/08/06	2024/08/05
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2023/08/06	2024/08/05
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2023/11/08	2024/11/07
Audix	Test Software	E3	201021 (V9)	N/A	N/A
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021/02/05	2024/02/04
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2023/09/15	2024/09/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2023/08/06	2024/08/05
E-Microwave	Band Rejection Filter	2400-2483.5MHz	OE01902424	2023/08/06	2024/08/05
Mini Circuits	High Pass Filter	VHF-6010+	31119	2023/08/06	2024/08/05

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

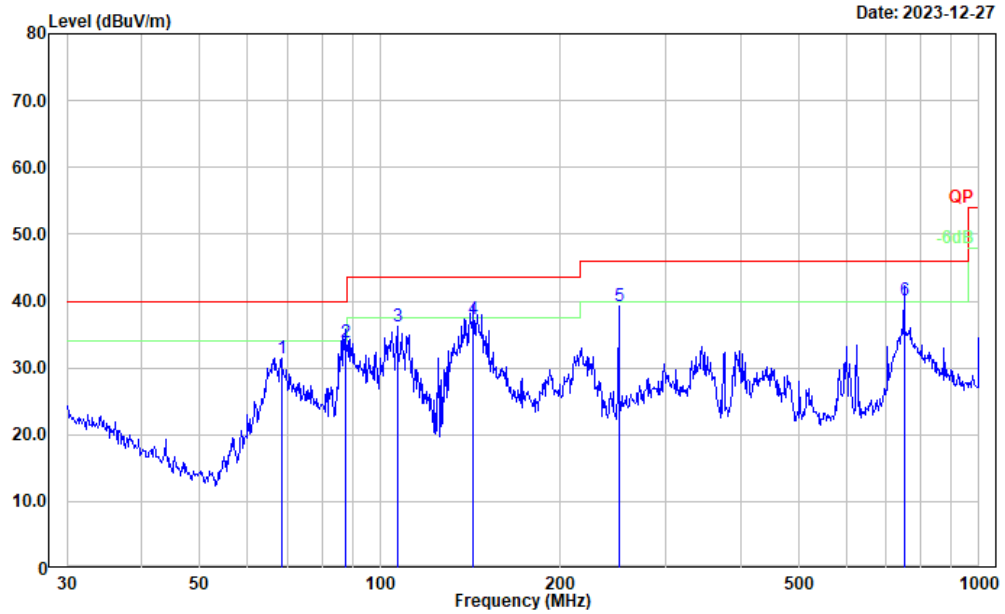
Test Data:

After pre-scan in the X, Y and Z axes of orientation, the worst case is below.

For 9kHz-30MHz, the amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

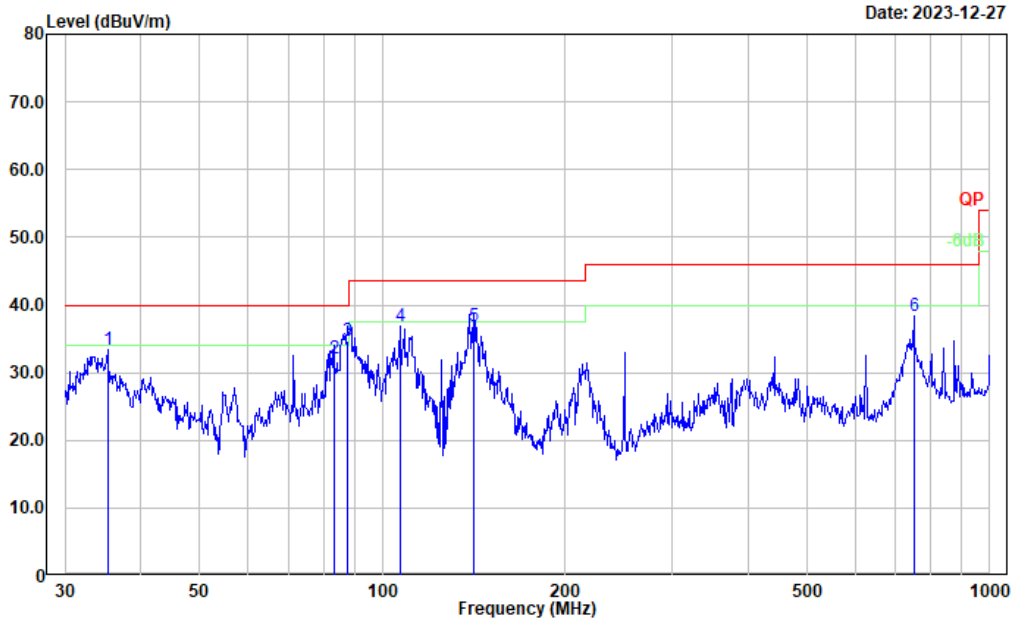
1) 30MHz-1GHz (Maximum output power mode, 802.11b mode, Chain1)
Low channel

Project No.: CR231167508-RF
Tester: Vic Du
Polarization: horizontal
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	68.391	48.52	-17.07	31.45	40.00	8.55	Peak
2	87.418	51.22	-17.40	33.82	40.00	6.18	QP
3	106.759	49.60	-13.29	36.31	43.50	7.19	Peak
4	143.326	49.50	-12.13	37.37	43.50	6.13	QP
5	250.301	52.92	-13.61	39.31	46.00	6.69	Peak
6	750.108	43.53	-3.33	40.20	46.00	5.80	QP

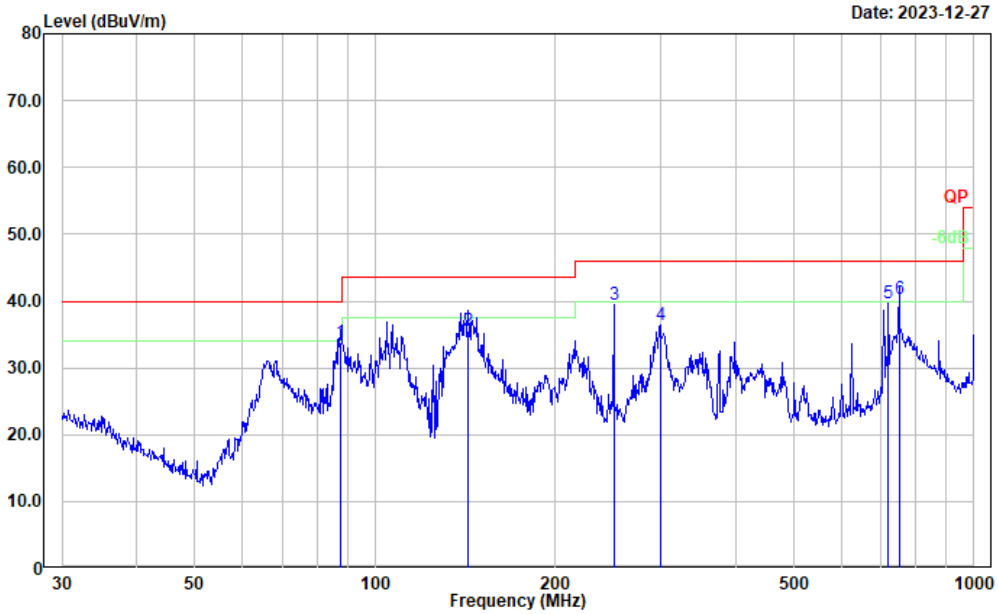
Project No.: CR231167508-RF
Tester: Vic Du
Polarization: vertical
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	35.251	41.43	-8.14	33.29	40.00	6.71	Peak
2	83.230	49.60	-17.58	32.02	40.00	7.98	QP
3	87.725	52.12	-17.37	34.75	40.00	5.25	QP
4	106.759	50.04	-13.29	36.75	43.50	6.75	Peak
5	141.330	49.01	-12.12	36.89	43.50	6.61	QP
6	750.108	41.78	-3.33	38.45	46.00	7.55	Peak

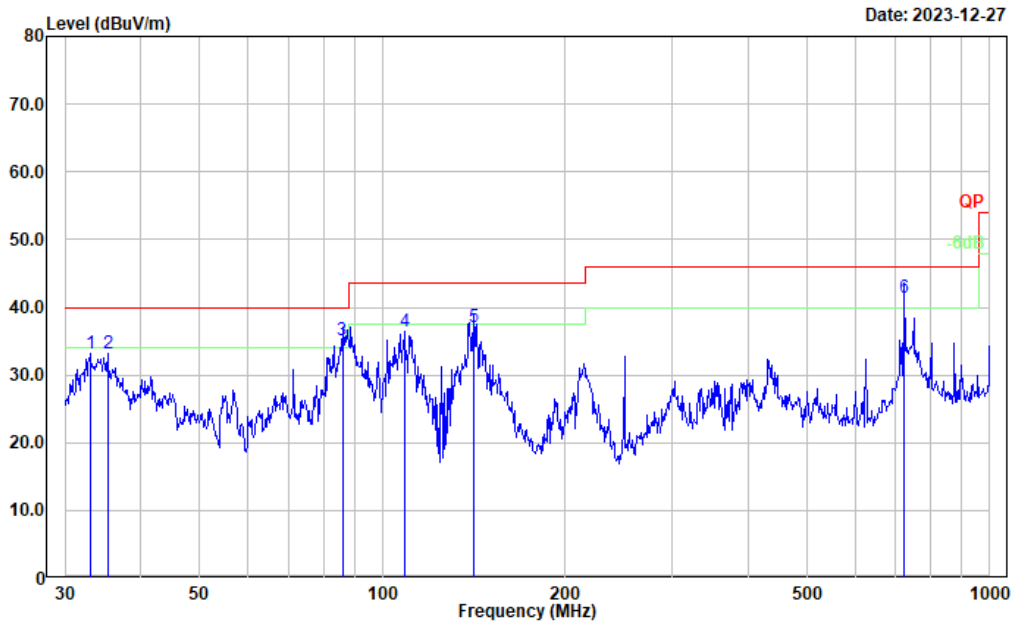
Middle channel

Project No.: CR231167508-RF
Tester: Vic Du
Polarization: horizontal
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	87.418	51.18	-17.40	33.78	40.00	6.22	QP
2	143.326	47.63	-12.13	35.50	43.50	8.00	QP
3	250.301	52.96	-13.61	39.35	46.00	6.65	Peak
4	299.316	47.41	-11.08	36.33	46.00	9.67	Peak
5	719.200	43.24	-3.65	39.59	46.00	6.41	Peak
6	750.108	43.60	-3.33	40.27	46.00	5.73	QP

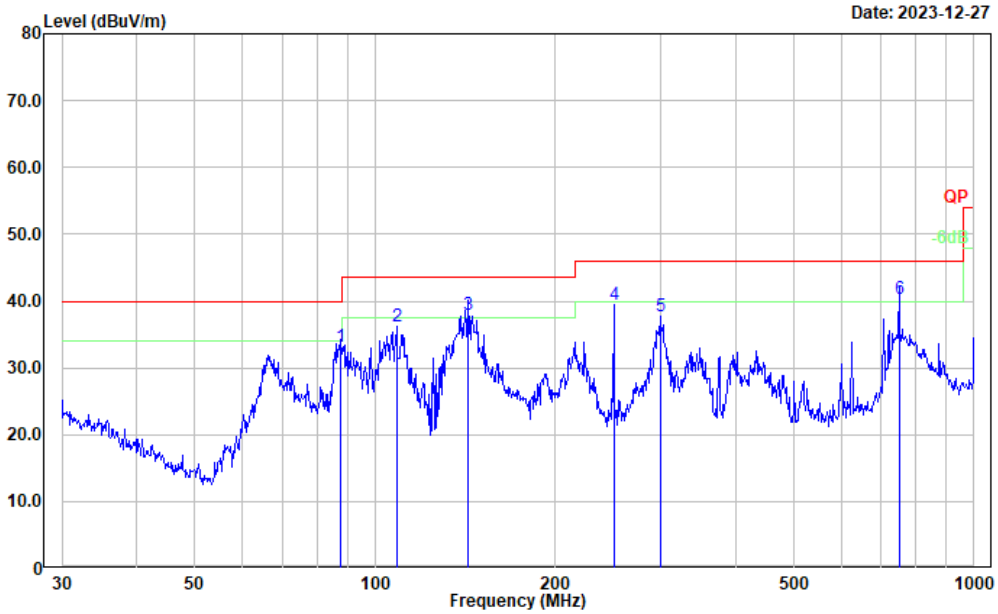
Project No.: CR231167508-RF
Tester: Vic Du
Polarization: vertical
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	32.979	39.59	-6.41	33.18	40.00	6.82	Peak
2	35.251	41.25	-8.14	33.11	40.00	6.89	Peak
3	85.898	52.60	-17.49	35.11	40.00	4.89	QP
4	108.647	49.33	-12.91	36.42	43.50	7.08	Peak
5	141.330	49.25	-12.12	37.13	43.50	6.37	QP
6	724.261	45.10	-3.62	41.48	46.00	4.52	QP

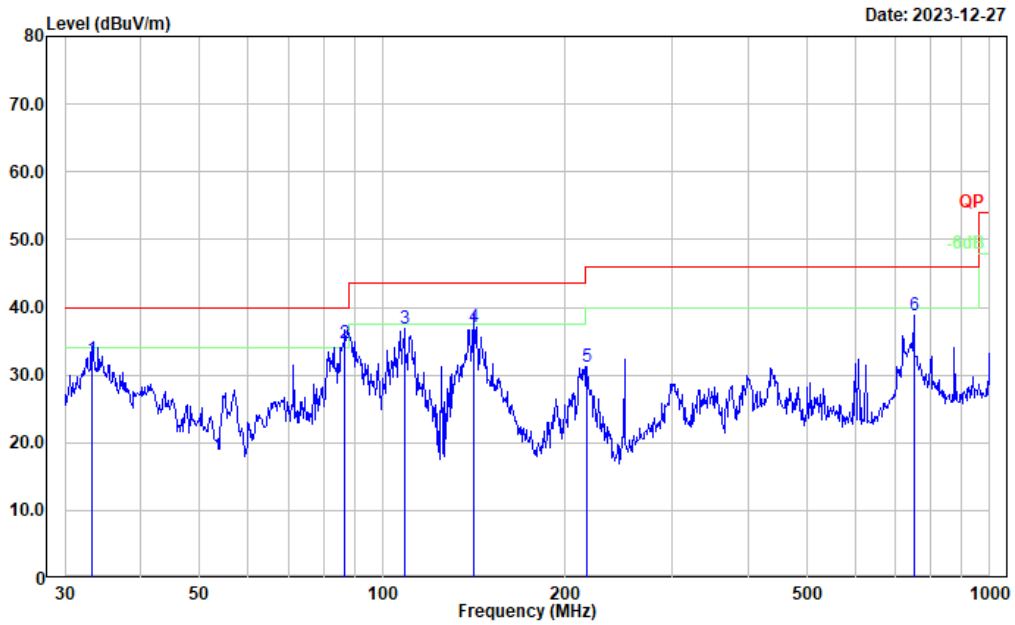
High channel

Project No.: CR231167508-RF
Tester: Vic Du
Polarization: horizontal
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	87.725	50.64	-17.37	33.27	40.00	6.73	QP
2	108.647	49.08	-12.91	36.17	43.50	7.33	Peak
3	143.326	50.16	-12.13	38.03	43.50	5.47	QP
4	250.301	53.07	-13.61	39.46	46.00	6.54	Peak
5	299.316	48.82	-11.08	37.74	46.00	8.26	Peak
6	750.108	43.69	-3.33	40.36	46.00	5.64	QP

Project No.: CR231167508-RF
Tester: Vic Du
Polarization: vertical
Note: Transmitting 2.4g WiFi



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	33.328	38.96	-6.67	32.29	40.00	7.71	QP
2	86.807	52.16	-17.43	34.73	40.00	5.27	QP
3	108.647	49.87	-12.91	36.96	43.50	6.54	Peak
4	141.330	49.16	-12.12	37.04	43.50	6.46	QP
5	217.544	44.42	-13.12	31.30	46.00	14.70	Peak
6	750.108	42.18	-3.33	38.85	46.00	7.15	Peak

1) 1-25GHz:

802.11b Mode Chain 0:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2412 MHz							
2390.000	26.99	PK	H	31.71	58.70	74.00	15.30
2390.000	16.92	AV	H	31.71	48.63	54.00	5.37
2390.000	26.66	PK	V	31.71	58.37	74.00	15.63
2390.000	15.61	AV	V	31.71	47.32	54.00	6.68
4824.000	38.58	PK	H	11.26	49.84	74.00	24.16
4824.000	30.50	AV	H	11.26	41.76	54.00	12.24
4824.000	39.35	PK	V	11.26	50.61	74.00	23.39
4824.000	32.11	AV	V	11.26	43.37	54.00	10.63
Middle Channel: 2437 MHz							
4874.000	37.01	PK	H	11.45	48.46	74.00	25.54
4874.000	25.55	AV	H	11.45	37.00	54.00	17.00
4874.000	36.69	PK	V	11.45	48.14	74.00	25.86
4874.000	25.36	AV	V	11.45	36.81	54.00	17.19
High Channel: 2462 MHz							
2483.500	26.48	PK	H	32.19	58.67	74.00	15.33
2483.500	20.65	AV	H	32.19	52.84	54.00	1.16
2483.500	25.05	PK	V	32.19	57.24	74.00	16.76
2483.500	14.92	AV	V	32.19	47.11	54.00	6.89
4924.000	36.15	PK	H	11.67	47.82	74.00	26.18
4924.000	24.79	AV	H	11.67	36.46	54.00	17.54
4924.000	36.39	PK	V	11.67	48.06	74.00	25.94
4924.000	25.47	AV	V	11.67	37.14	54.00	16.86

802.11b Mode Chain 1:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2412 MHz							
2390.000	28.15	PK	H	31.71	59.86	74.00	14.14
2390.000	17.94	AV	H	31.71	49.65	54.00	4.35
2390.000	26.43	PK	V	31.71	58.14	74.00	15.86
2390.000	16.51	AV	V	31.71	48.22	54.00	5.78
4824.000	40.75	PK	H	11.26	52.01	74.00	21.99
4824.000	36.04	AV	H	11.26	47.30	54.00	6.70
4824.000	41.19	PK	V	11.26	52.45	74.00	21.55
4824.000	36.77	AV	V	11.26	48.03	54.00	5.97
Middle Channel: 2437 MHz							
4874.000	42.90	PK	H	11.45	54.35	74.00	19.65
4874.000	39.49	AV	H	11.45	50.94	54.00	3.06
4874.000	42.17	PK	V	11.45	53.62	74.00	20.38
4874.000	38.51	AV	V	11.45	49.96	54.00	4.04
High Channel: 2462 MHz							
2483.500	28.41	PK	H	32.19	60.60	74.00	13.40
2483.500	18.35	AV	H	32.19	50.54	54.00	3.46
2483.500	26.99	PK	V	32.19	59.18	74.00	14.82
2483.500	17.18	AV	V	32.19	49.37	54.00	4.63
4924.000	39.29	PK	H	11.67	50.96	74.00	23.04
4924.000	33.91	AV	H	11.67	45.58	54.00	8.42
4924.000	39.48	PK	V	11.67	51.15	74.00	22.85
4924.000	34.10	AV	V	11.67	45.77	54.00	8.23

802.11g Mode Chain 0:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2412 MHz							
2390.000	29.01	PK	H	31.71	60.72	74.00	13.28
2390.000	14.96	AV	H	31.71	46.67	54.00	7.33
2390.000	27.85	PK	V	31.71	59.56	74.00	14.44
2390.000	14.85	AV	V	31.71	46.56	54.00	7.44
4824.000	36.70	PK	H	11.26	47.96	74.00	26.04
4824.000	23.19	AV	H	11.26	34.45	54.00	19.55
4824.000	36.86	PK	V	11.26	48.12	74.00	25.88
4824.000	23.48	AV	V	11.26	34.74	54.00	19.26
Middle Channel: 2437 MHz							
4874.000	36.47	PK	H	11.45	47.92	74.00	26.08
4874.000	23.68	AV	H	11.45	35.13	54.00	18.87
4874.000	36.63	PK	V	11.45	48.08	74.00	25.92
4874.000	24.10	AV	V	11.45	35.55	54.00	18.45
High Channel: 2442 MHz							
2483.500	26.50	PK	H	32.19	58.69	74.00	15.31
2483.500	15.16	AV	H	32.19	47.35	54.00	6.65
2483.500	29.12	PK	V	32.19	61.31	74.00	12.69
2483.500	15.24	AV	V	32.19	47.43	54.00	6.57
High Channel: 2462 MHz							
2483.500	34.28	PK	H	32.19	66.47	74.00	7.53
2483.500	15.44	AV	H	32.19	47.63	54.00	6.37
2483.500	33.03	PK	V	32.19	65.22	74.00	8.78
2483.500	15.10	AV	V	32.19	47.29	54.00	6.71
4924.000	36.24	PK	H	11.67	47.91	74.00	26.09
4924.000	22.57	AV	H	11.67	34.24	54.00	19.76
4924.000	36.51	PK	V	11.67	48.18	74.00	25.82
4924.000	22.90	AV	V	11.67	34.57	54.00	19.43

802.11g Mode Chain 1:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2412 MHz							
2390.000	35.08	PK	H	31.71	66.79	74.00	7.21
2390.000	18.06	AV	H	31.71	49.77	54.00	4.23
2390.000	33.85	PK	V	31.71	65.56	74.00	8.44
2390.000	16.45	AV	V	31.71	48.16	54.00	5.84
4824.000	37.57	PK	H	11.26	48.83	74.00	25.17
4824.000	23.70	AV	H	11.26	34.96	54.00	19.04
4824.000	38.02	PK	V	11.26	49.28	74.00	24.72
4824.000	24.48	AV	V	11.26	35.74	54.00	18.26
Middle Channel: 2437 MHz							
4874.000	37.19	PK	H	11.45	48.64	74.00	25.36
4874.000	25.36	AV	H	11.45	36.81	54.00	17.19
4874.000	37.50	PK	V	11.45	48.95	74.00	25.05
4874.000	25.61	AV	V	11.45	37.06	54.00	16.94
High Channel: 2442 MHz							
2483.500	27.02	PK	H	32.19	59.21	74.00	14.79
2483.500	14.66	AV	H	32.19	46.85	54.00	7.15
2483.500	39.04	PK	V	32.19	71.23	74.00	2.77
2483.500	20.58	AV	V	32.19	52.77	54.00	1.23
High Channel: 2462 MHz							
2483.500	40.23	PK	H	32.19	72.42	74.00	1.58
2483.500	20.52	AV	H	32.19	52.71	54.00	1.29
2483.500	38.03	PK	V	32.19	70.22	74.00	3.78
2483.500	17.90	AV	V	32.19	50.09	54.00	3.91
4924.000	36.13	PK	H	11.67	47.80	74.00	26.20
4924.000	22.90	AV	H	11.67	34.57	54.00	19.43
4924.000	36.37	PK	V	11.67	48.04	74.00	25.96
4924.000	23.65	AV	V	11.67	35.32	54.00	18.68

802.11n ht20 Mode:

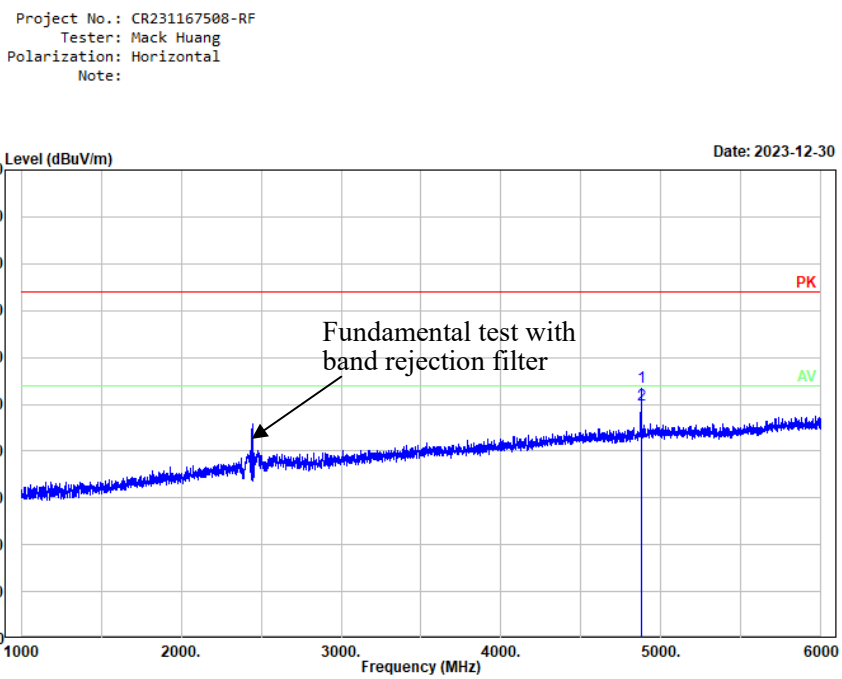
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2412 MHz							
2390.000	36.14	PK	H	31.71	67.85	74.00	6.15
2390.000	20.09	AV	H	31.71	51.80	54.00	2.20
2390.000	34.76	PK	V	31.71	66.47	74.00	7.53
2390.000	18.41	AV	V	31.71	50.12	54.00	3.88
4824.000	36.66	PK	H	11.26	47.92	74.00	26.08
4824.000	23.45	AV	H	11.26	34.71	54.00	19.29
4824.000	37.26	PK	V	11.26	48.52	74.00	25.48
4824.000	23.51	AV	V	11.26	34.77	54.00	19.23
Middle Channel: 2437 MHz							
4874.000	36.71	PK	H	11.45	48.16	74.00	25.84
4874.000	23.47	AV	H	11.45	34.92	54.00	19.08
4874.000	36.85	PK	V	11.45	48.30	74.00	25.70
4874.000	23.76	AV	V	11.45	35.21	54.00	18.79
High Channel: 2442 MHz							
2483.500	28.47	PK	H	32.19	60.66	74.00	13.34
2483.500	14.26	AV	H	32.19	46.45	54.00	7.55
2483.500	30.29	PK	V	32.19	62.48	74.00	11.52
2483.500	14.72	AV	V	32.19	46.91	54.00	7.09
High Channel: 2462 MHz							
2483.500	37.22	PK	H	32.19	69.41	74.00	4.59
2483.500	17.44	AV	H	32.19	49.63	54.00	4.37
2483.500	35.75	PK	V	32.19	67.94	74.00	6.06
2483.500	15.84	AV	V	32.19	48.03	54.00	5.97
4924.000	36.14	PK	H	11.67	47.81	74.00	26.19
4924.000	22.63	AV	H	11.67	34.30	54.00	19.70
4924.000	36.29	PK	V	11.67	47.96	74.00	26.04
4924.000	22.81	AV	V	11.67	34.48	54.00	19.52

802.11n ht40 Mode:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 2422 MHz							
2390.000	35.91	PK	H	31.71	67.62	74.00	6.38
2390.000	17.77	AV	H	31.71	49.48	54.00	4.52
2390.000	34.40	PK	V	31.71	66.11	74.00	7.89
2390.000	16.68	AV	V	31.71	48.39	54.00	5.61
4844.000	36.61	PK	H	11.31	47.92	74.00	26.08
4844.000	23.50	AV	H	11.31	34.81	54.00	19.19
4844.000	36.87	PK	V	11.31	48.18	74.00	25.82
4844.000	23.76	AV	V	11.31	35.07	54.00	18.93
Low Channel: 2432 MHz							
2390.000	36.99	PK	H	31.71	68.70	74.00	5.30
2390.000	21.28	AV	H	31.71	52.99	54.00	1.01
2390.000	34.65	PK	V	31.71	66.36	74.00	7.64
2390.000	18.68	AV	V	31.71	50.39	54.00	3.61
Middle Channel: 2437 MHz							
4874.000	36.39	PK	H	11.45	47.84	74.00	26.16
4874.000	23.66	AV	H	11.45	35.11	54.00	18.89
4874.000	36.68	PK	V	11.45	48.13	74.00	25.87
4874.000	23.81	AV	V	11.45	35.26	54.00	18.74
High Channel: 2442 MHz							
2483.500	37.17	PK	H	32.19	69.36	74.00	4.64
2483.500	20.14	AV	H	32.19	52.33	54.00	1.67
2483.500	33.94	PK	V	32.19	66.13	74.00	7.87
2483.500	17.86	AV	V	32.19	50.05	54.00	3.95
High Channel: 2452 MHz							
2483.500	37.13	PK	H	32.19	69.32	74.00	4.68
2483.500	20.73	AV	H	32.19	52.92	54.00	1.08
2483.500	35.88	PK	V	32.19	68.07	74.00	5.93
2483.500	20.78	AV	V	32.19	52.97	54.00	1.03
4904.000	35.57	PK	H	11.58	47.15	74.00	26.85
4904.000	23.12	AV	H	11.58	34.70	54.00	19.30
4904.000	36.03	PK	V	11.58	47.61	74.00	26.39
4904.000	23.35	AV	V	11.58	34.93	54.00	19.07

Listed with the worst harmonic margin test plot: (802.11b Middle Channel Chain1)

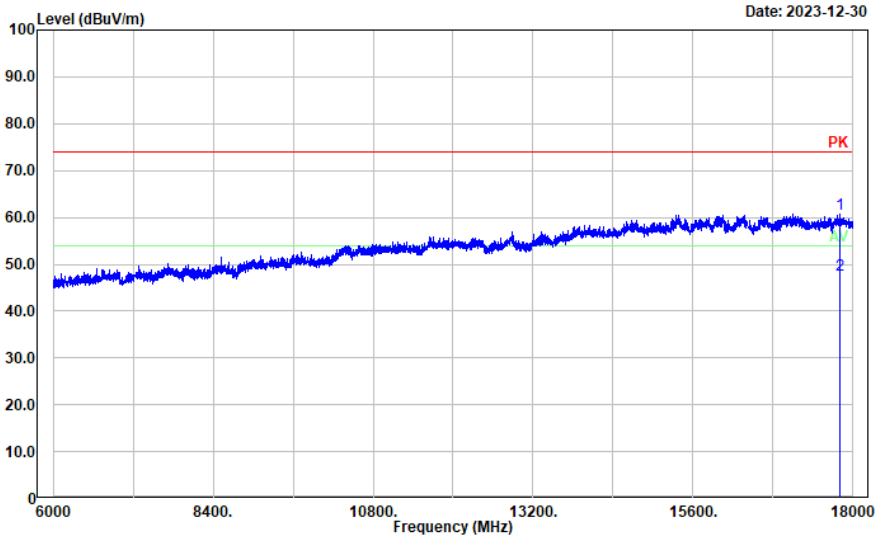
Horizontal	
1-6GHz	



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	4874.000	42.17	11.45	53.62	74.00	20.38	Peak
2	4874.000	38.51	11.45	49.96	54.00	4.04	Average

6-18GHz

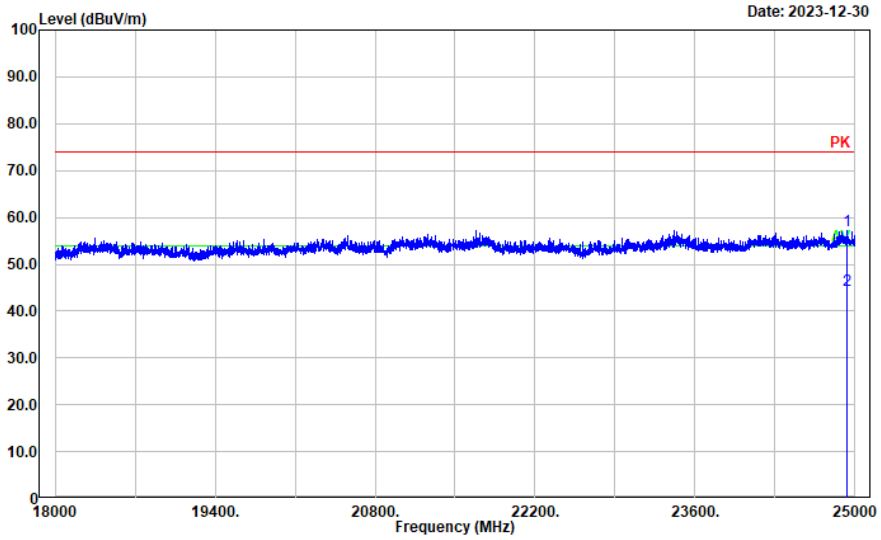
Project No.: CR231167508-RF
Tester: Mack Huang
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	17800.800	29.21	31.62	60.83	74.00	13.17	Peak
2	17800.800	16.01	31.62	47.63	54.00	6.37	Average

18-25GHz

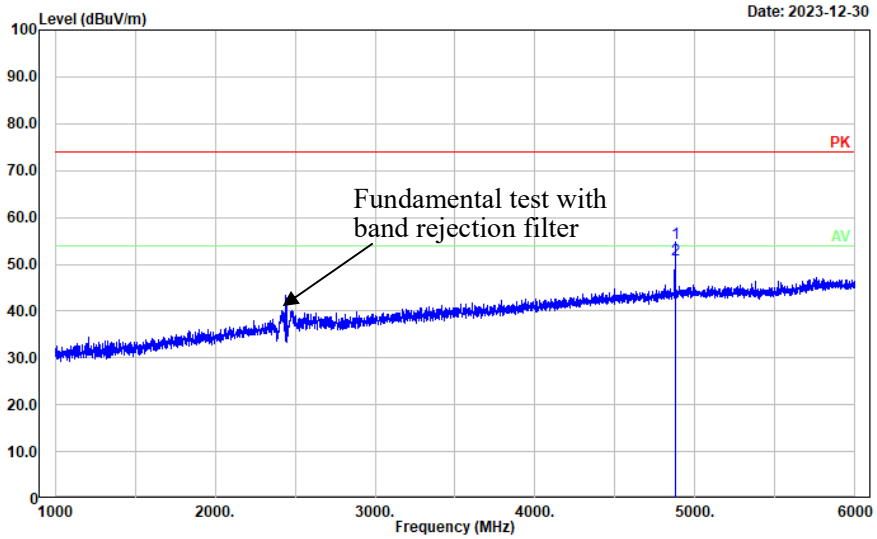
Project No.: CR231167508-RF
Tester: Mack Huang
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	24934.200	50.74	6.45	57.19	74.00	16.81	Peak
2	24934.200	37.87	6.45	44.32	54.00	9.68	Average

Vertical	
1-6GHz	

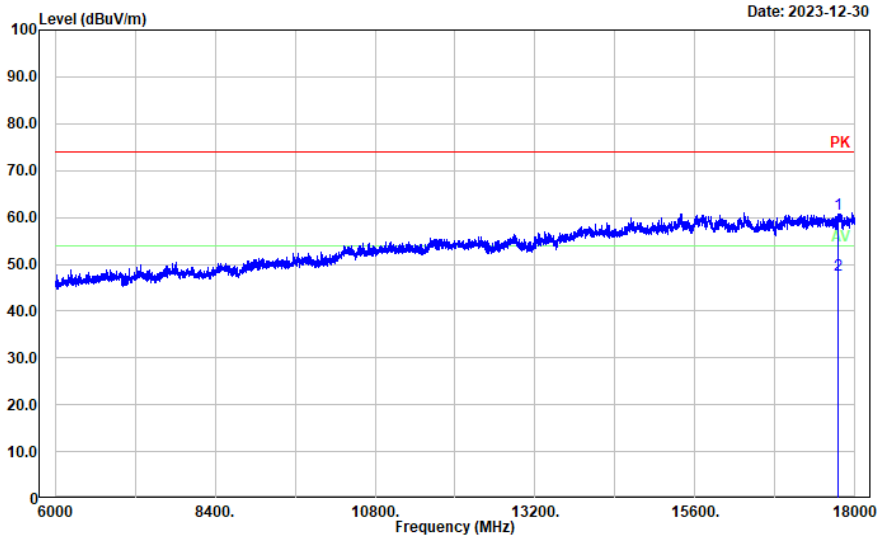
Project No.: CR231167508-RF
Tester: Mack Huang
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	4874.000	42.90	11.45	54.35	74.00	19.65	Peak
2	4874.000	39.49	11.45	50.94	54.00	3.06	Average

6-18GHz

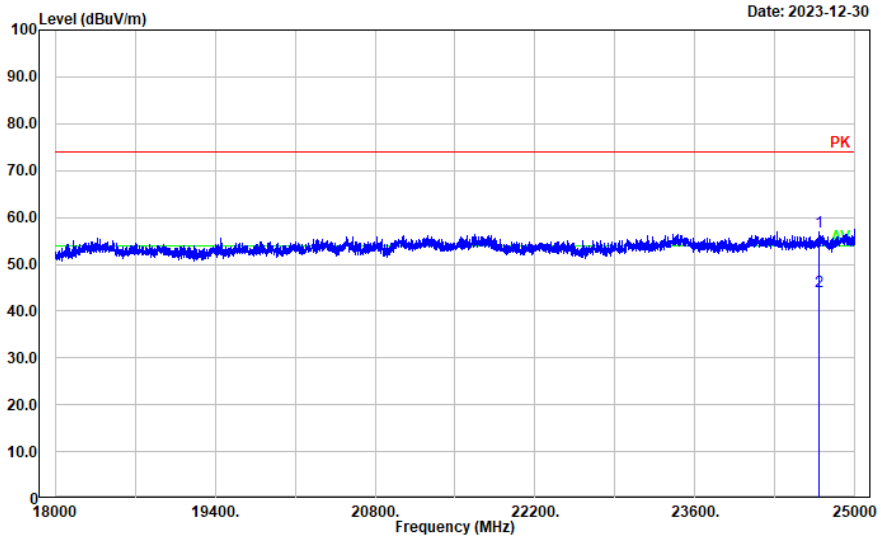
Project No.: CR231167508-RF
Tester: Mack Huang
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	17736.000	29.33	31.39	60.72	74.00	13.28	Peak
2	17736.000	16.32	31.39	47.71	54.00	6.29	Average

18-25GHz

Project No.: CR231167508-RF
Tester: Mack Huang
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	24689.200	51.62	5.39	57.01	74.00	16.99	Peak
2	24689.200	38.73	5.39	44.12	54.00	9.88	Average

4.3 Minimum 6 dB Bandwidth:

Serial Number:	2DPM-2	Test Date:	2023/12/18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	100.2

Test Equipment List and Details:

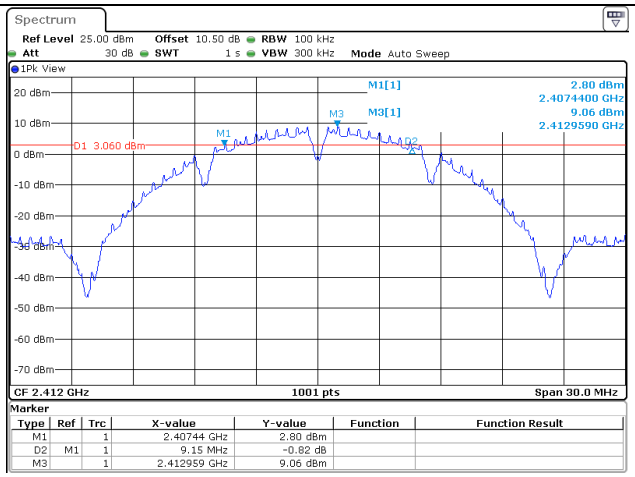
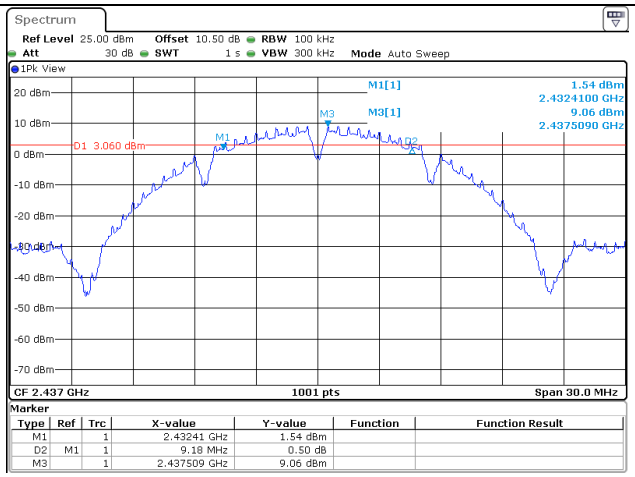
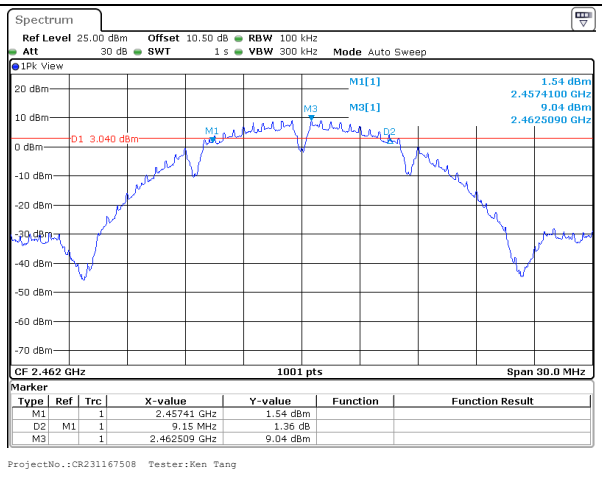
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40-N	102259	2023/4/18	2024/4/17
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

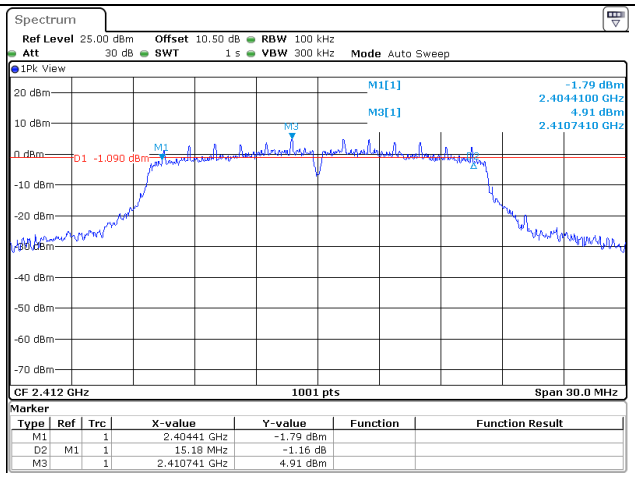
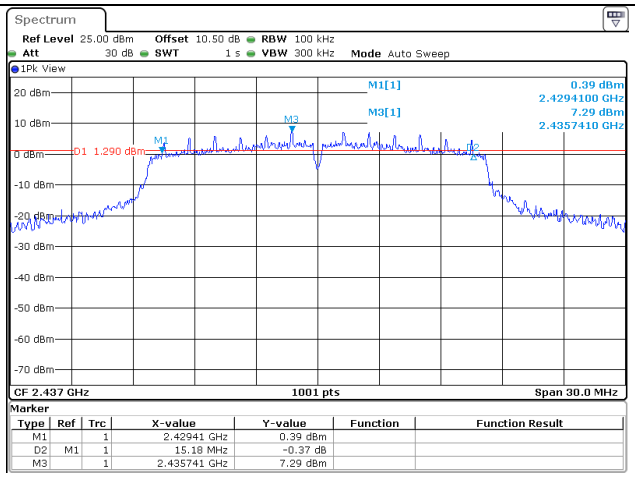
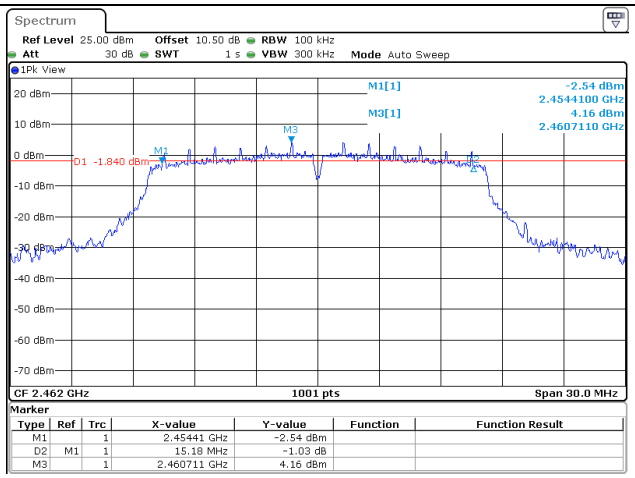
Test Data:

Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	2412	9.15	0.5
	2437	9.18	0.5
	2462	9.15	0.5
802.11g	2412	15.18	0.5
	2437	15.18	0.5
	2462	15.18	0.5
802.11n ht20	2412	15.18	0.5
	2437	15.18	0.5
	2462	15.18	0.5
802.11n ht40	2422	35.22	0.5
	2437	35.22	0.5
	2452	35.28	0.5
Note: Test only was performed at Chain 0.			

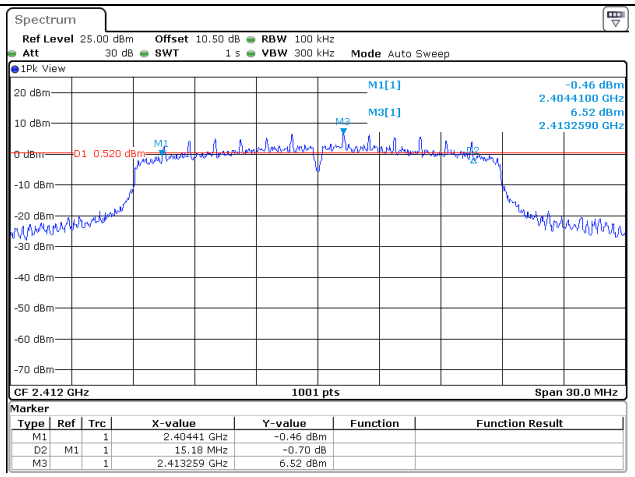
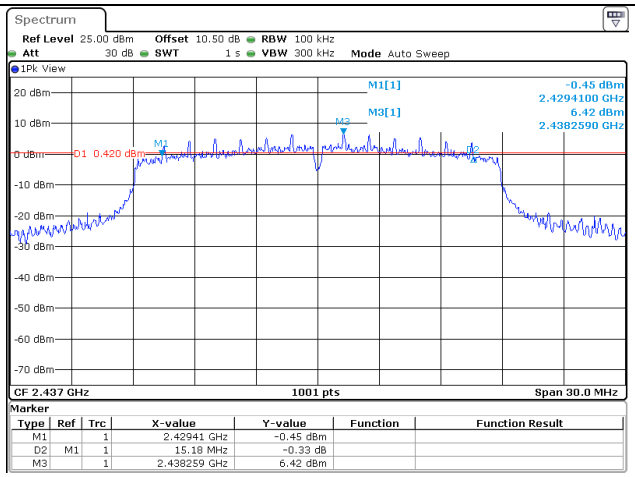
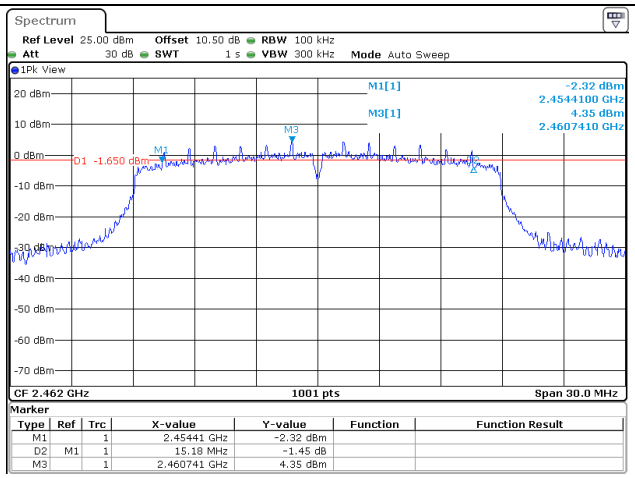
Minimum 6dB Emission Bandwidth

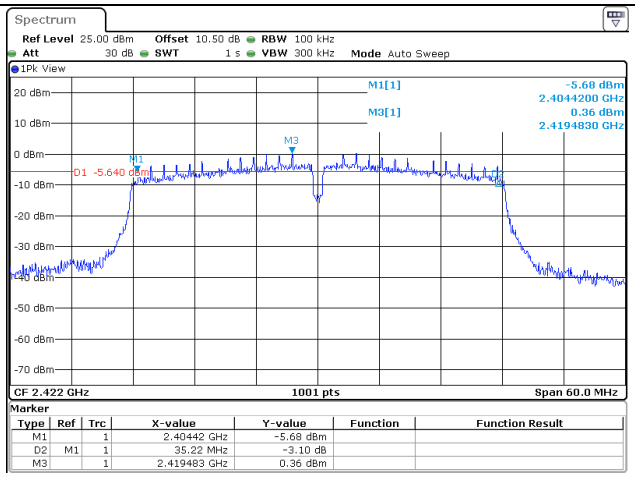
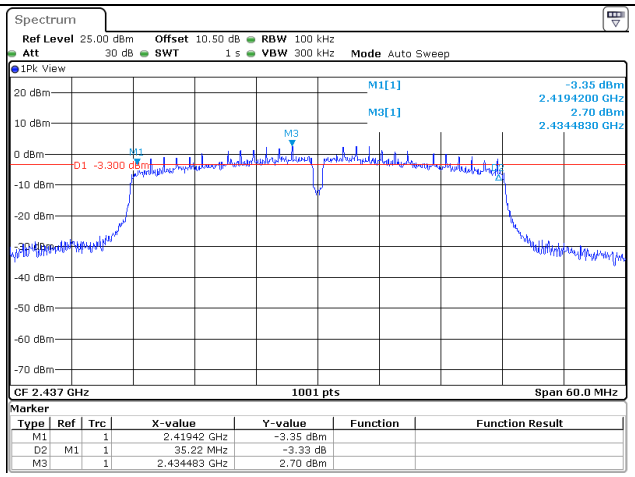
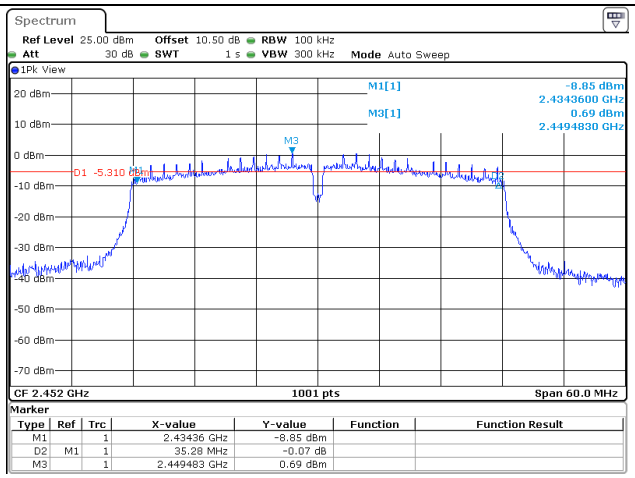
802.11b Lowest Channel	
802.11b Middle Channel	
802.11b Highest Channel	

Minimum 6dB Emission Bandwidth

802.11g Lowest Channel	
802.11g Middle Channel	
802.11g Highest Channel	

Minimum 6dB Emission Bandwidth

802.11n ht20 Lowest Channel	
802.11n ht20 Middle Channel	
802.11n ht20 Highest Channel	

Minimum 6dB Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Middle Channel	
802.11n ht40 Highest Channel	

4.4 99% Occupied Bandwidth:

Serial Number:	2DPM-2	Test Date:	2023/12/18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	100.2

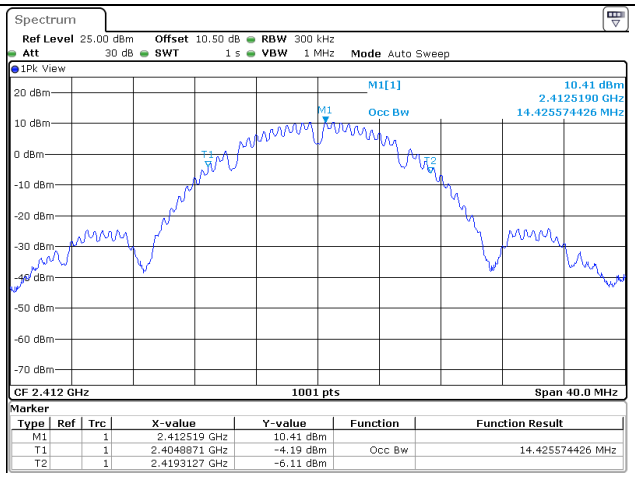
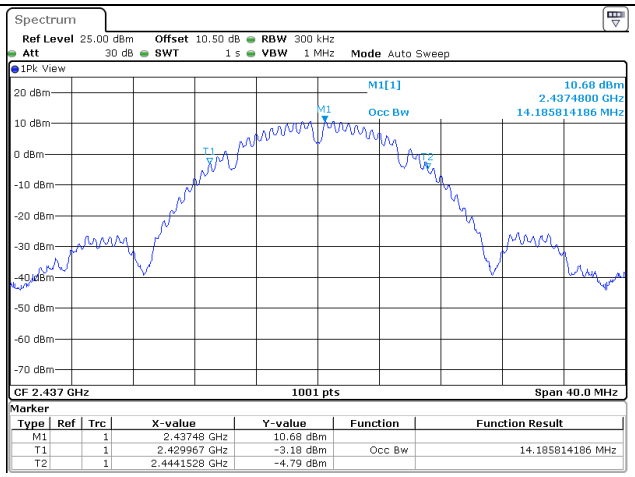
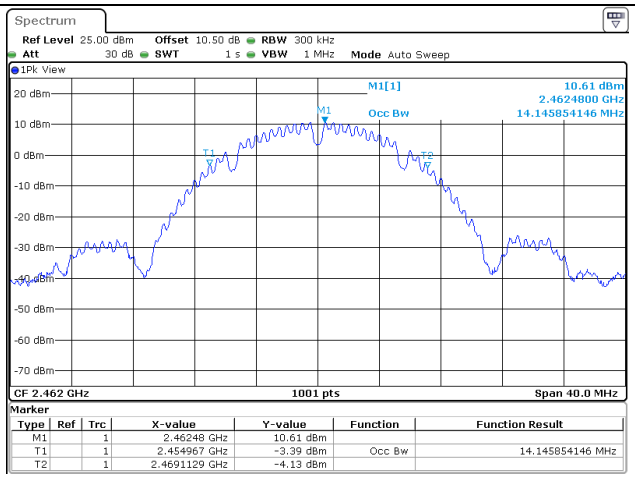
Test Equipment List and Details:

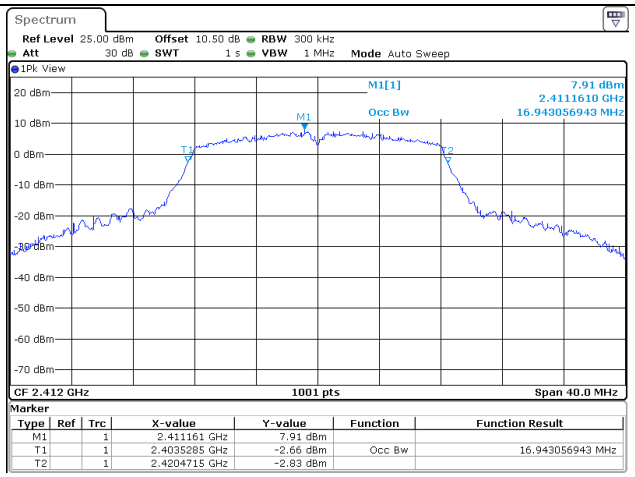
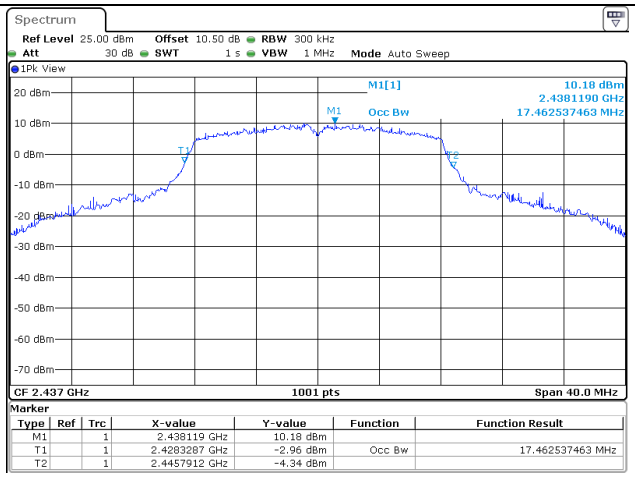
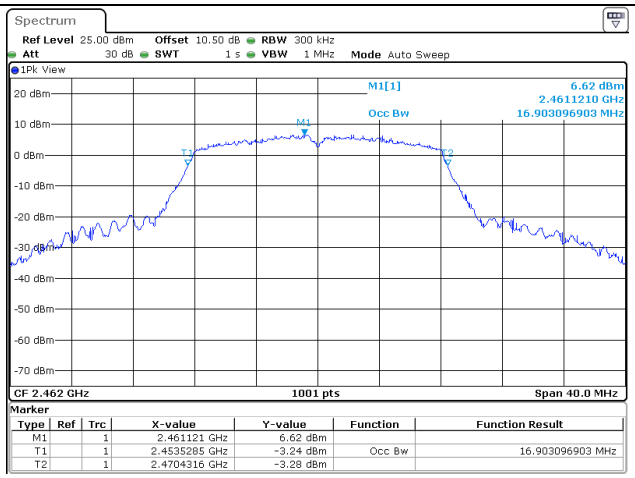
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40-N	102259	2023-04-18	2024-04-17
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

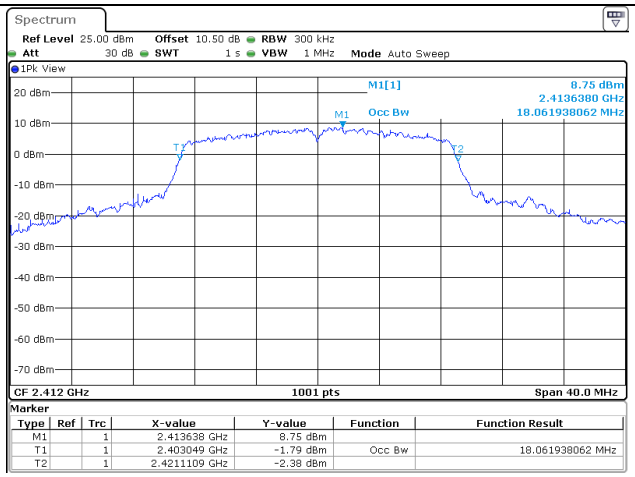
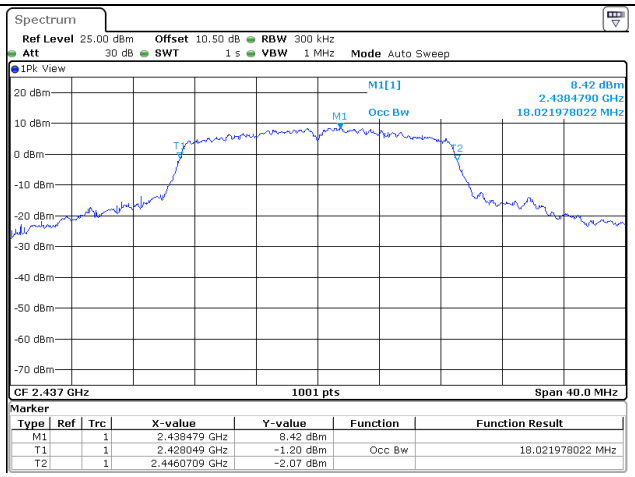
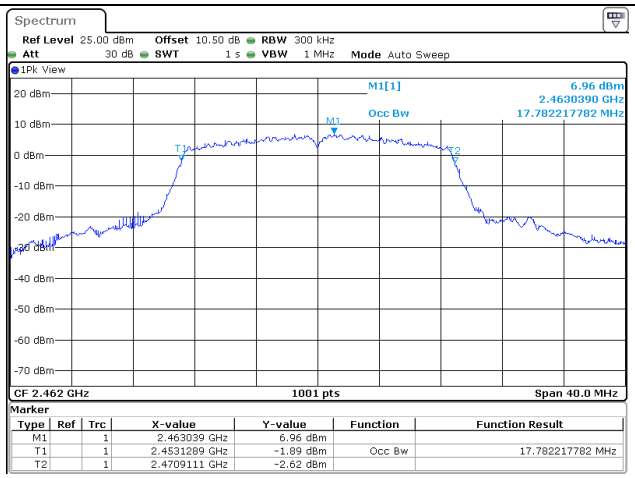
Test Data:

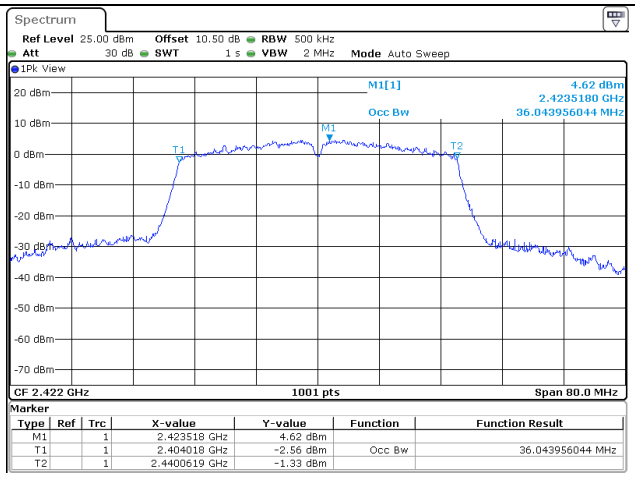
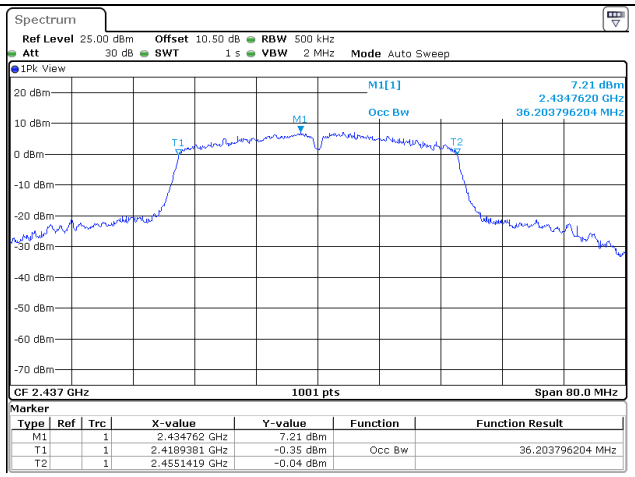
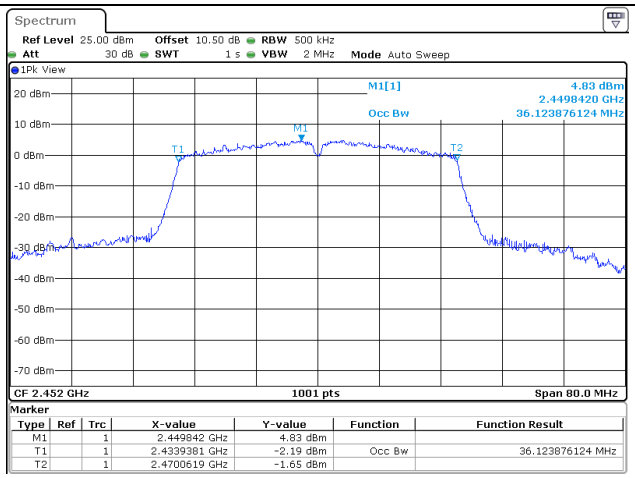
Test Modes	Test Channel	Test Frequency (MHz)	99% Occupied Bandwidth (MHz)
802.11b	Lowest	2412	14.426
	Middle	2437	14.186
	Highest	2462	14.146
802.11g	Lowest	2412	16.943
	Middle	2437	17.463
	Highest	2462	16.903
802.11n ht20	Lowest	2412	18.062
	Middle	2437	18.022
	Highest	2462	17.782
802.11n ht40	Lowest	2422	36.044
	Middle	2437	36.204
	Highest	2452	36.124
Note: Test only was performed at Chain 0.			

99% Occupied Bandwidth	
802.11b Lowest Channel	
802.11b Middle Channel	
802.11b Highest Channel	

99% Occupied Bandwidth	
802.11g Lowest Channel	
802.11g Middle Channel	
802.11g Highest Channel	

99% Occupied Bandwidth

802.11n ht20 Lowest Channel	
802.11n ht20 Middle Channel	
802.11n ht20 Highest Channel	

99% Occupied Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Middle Channel	
802.11n ht40 Highest Channel	

4.5 Maximum Conducted Output Power:

Serial Number:	2DPM-2	Test Date:	2023/12/18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.9	Relative Humidity: (%)	60	ATM Pressure: (kPa)	100.2

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Anritsu	Power Meter	ML2495A	1106009	2023/8/4	2024/8/3
Anritsu	Pulse Power Sensor	MA2411A	10780	2023/8/4	2024/8/3
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Modes	Test Frequency (MHz)	Maximum Conducted Average Output Power (dBm)			Limit (dBm)
		Chain 0	Chain 1	Total	
802.11b	2412	19.93	**21.25**	/	30
	2437	19.79	21.19	/	30
	2462	19.74	21.12	/	30
802.11g	2412	16.77	17.56	/	30
	2437	17.34	18.66	/	30
	2442	16.78	17.32	/	30
	2462	14.49	17.31	/	30
802.11n ht20	2412	17.40	17.81	20.62	29.03
	2437	16.48	17.61	20.09	29.03
	2442	15.73	16.65	19.22	29.03
	2462	14.54	15.83	18.24	29.03
802.11n ht40	2422	12.97	13.99	16.52	29.03
	2432	13.38	14.53	17.00	29.03
	2437	15.31	16.51	18.96	29.03
	2442	14.89	16.12	18.56	29.03
	2452	13.25	14.60	16.99	29.03
Note: The device employed Beam-forming for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB					
Antenna Gain:	3.97	dBi	Directional gain:	6.97	dBi

4.6 Maximum Power Spectral Density:

Serial Number:	2DPM-2	Test Date:	2024/1/12~2024/11/22
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.8-25.1	Relative Humidity: (%)	54-49	ATM Pressure: (kPa)	100.2

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40-N	102259	2023-04-18	2024-04-17
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

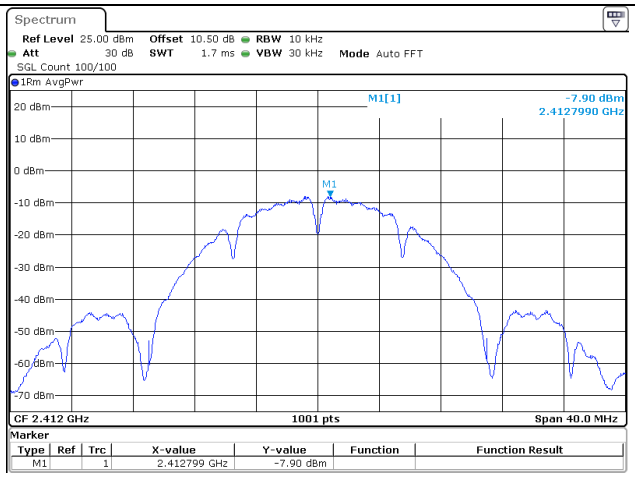
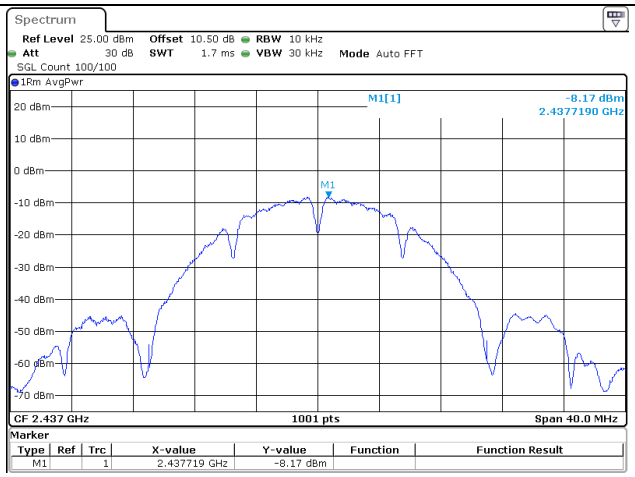
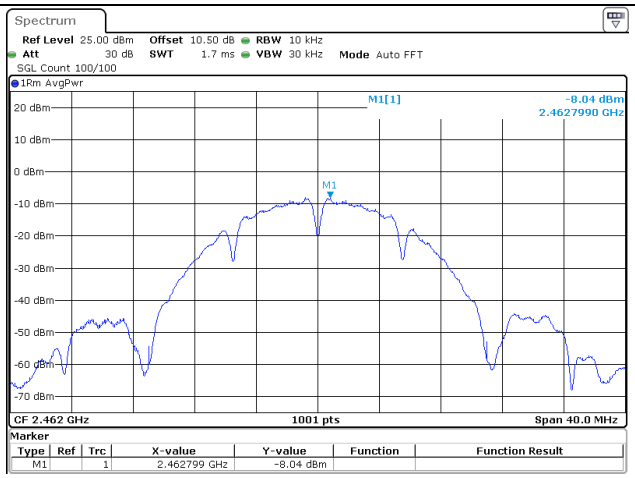
Test Data:

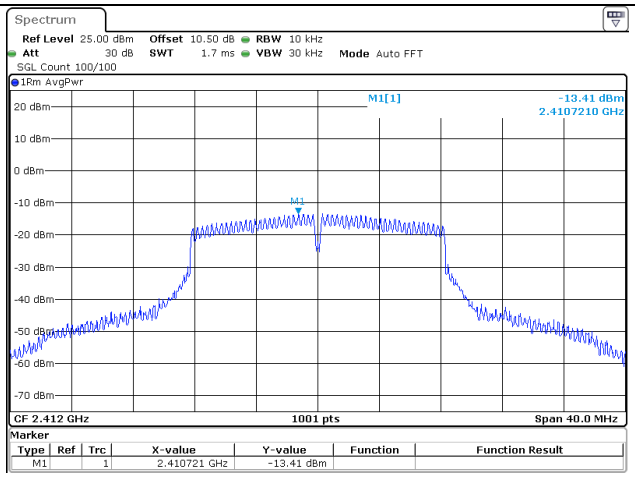
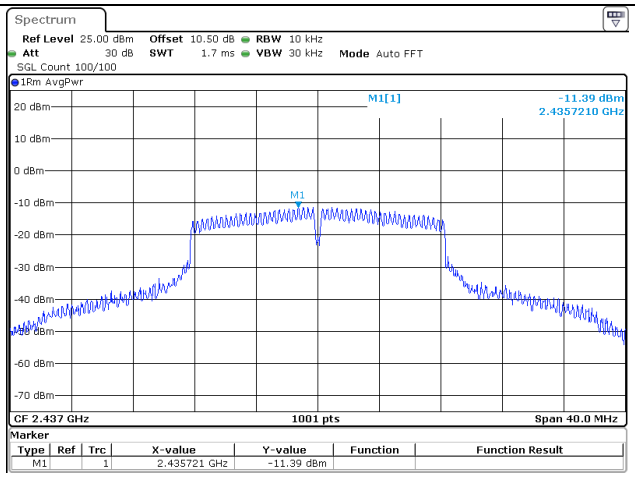
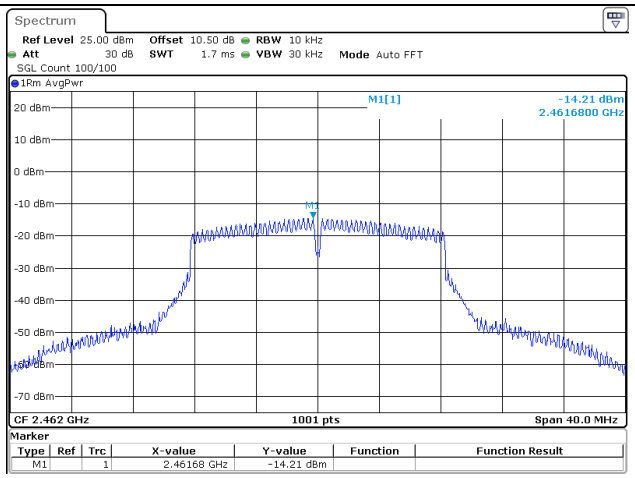
Test Modes	Test Frequency (MHz)	Reading(dBm/10kHz)		Maximum Power Spectral Density (dBm/10kHz)	Limit (dBm/3kHz)
		Chain 0	Chain 1		
802.11b	2412	-7.90	-7.05	-7.05	8.00
	2437	-8.17	-6.48	-6.48	8.00
	2462	-8.04	-7.57	-7.57	8.00
802.11g	2412	-13.41	-11.89	-11.89	8.00
	2437	-11.39	-9.70	-9.70	8.00
	2462	-14.21	-11.06	-11.06	8.00
802.11n ht20	2412	-12.94	-11.76	-9.30	7.03
	2437	-12.34	-10.57	-8.36	7.03
	2462	-14.07	-13.00	-10.49	7.03
802.11n ht40	2422	-19.07	-17.49	-15.20	7.03
	2437	-16.46	-15.53	-12.96	7.03
	2452	-18.27	-16.94	-14.54	7.03

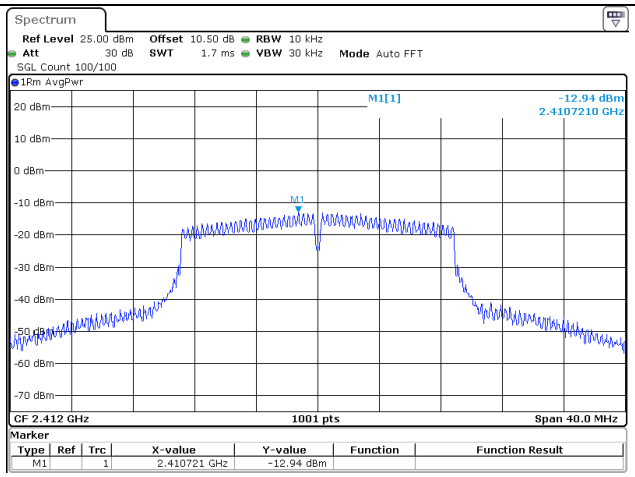
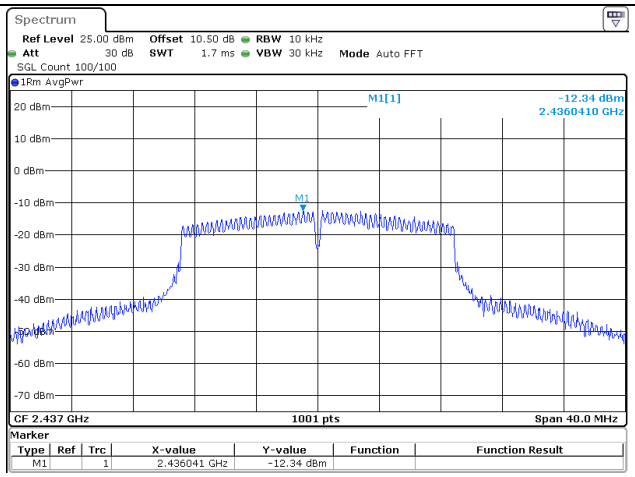
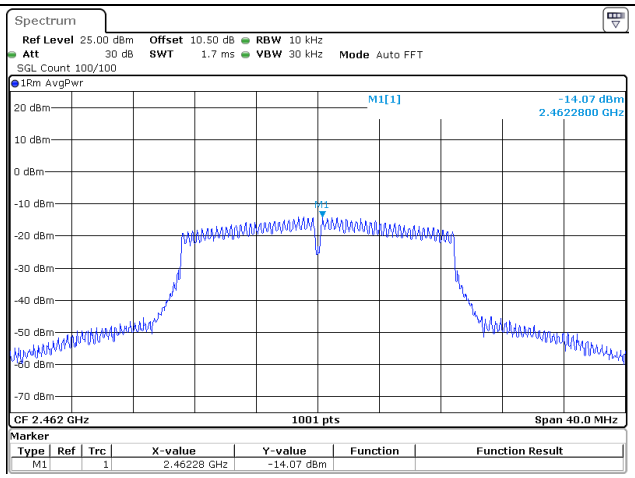
Note: The device employed Beam-forming for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB

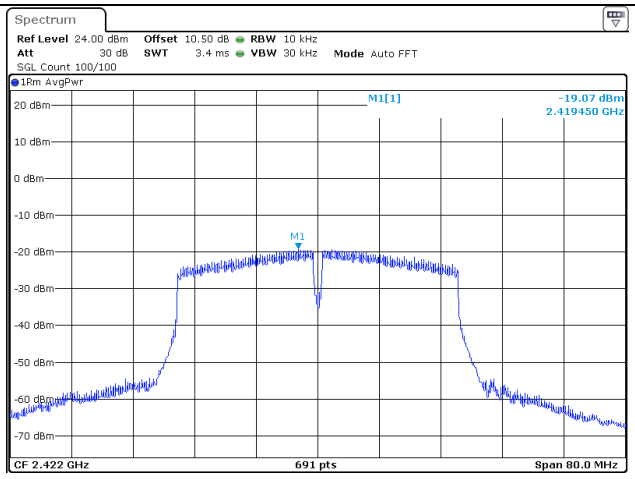
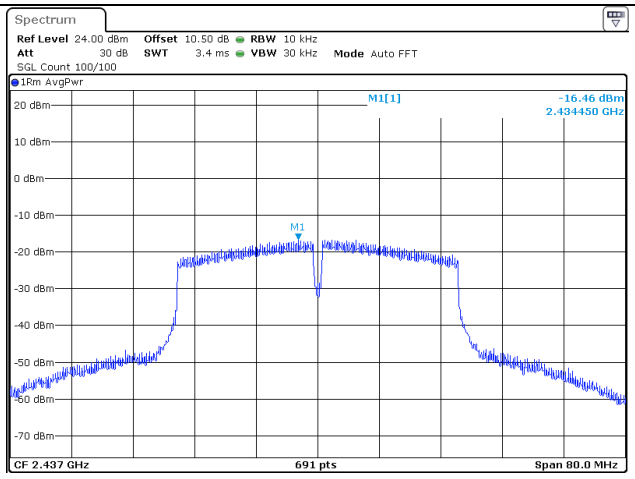
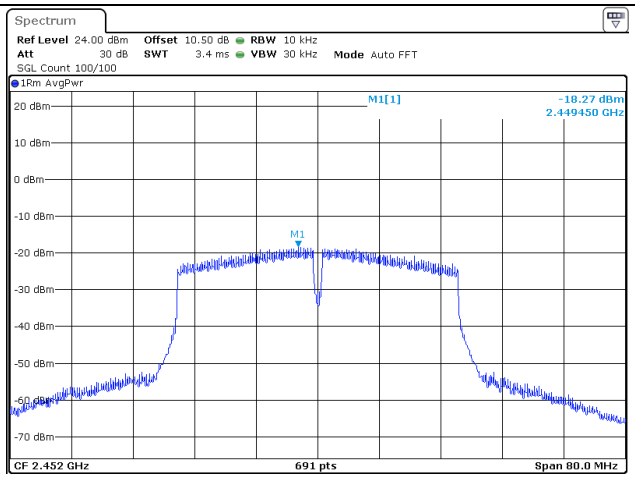
Antenna Gain:	3.97	dBi	Directional gain:	6.97	dBi

Chain 0:

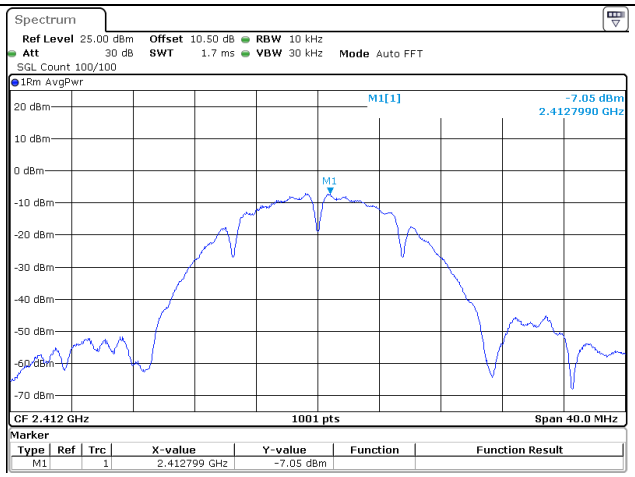
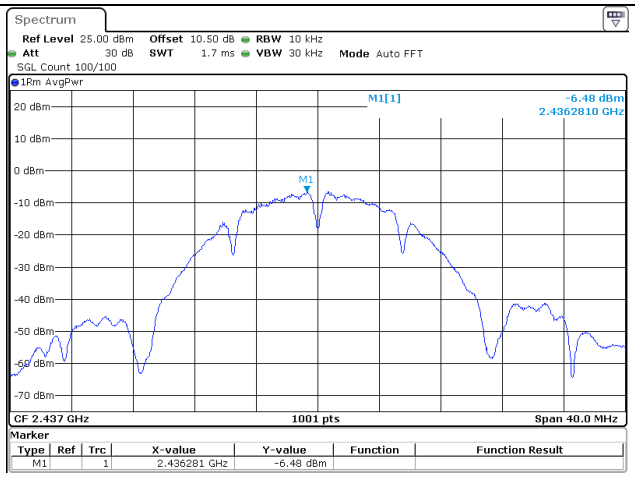
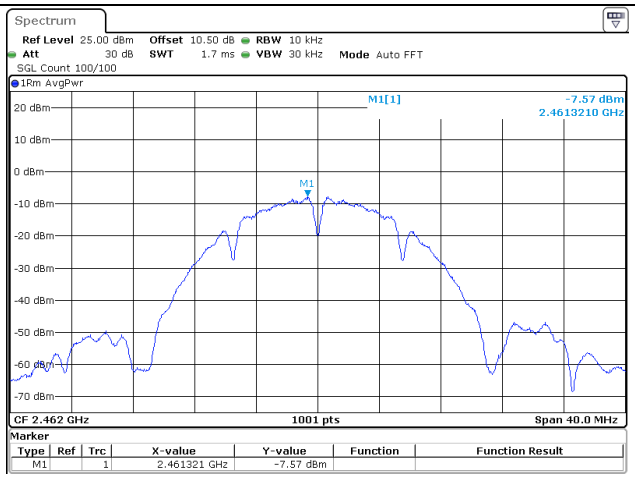
Maximum power spectral density	
802.11b Lowest Channel	
802.11b Middle Channel	
802.11b Highest Channel	

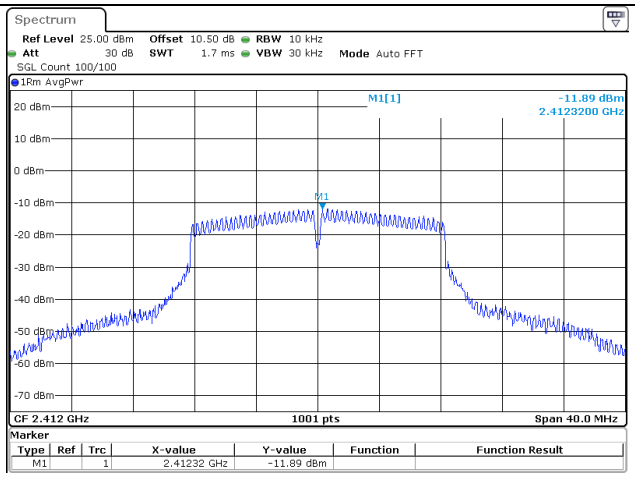
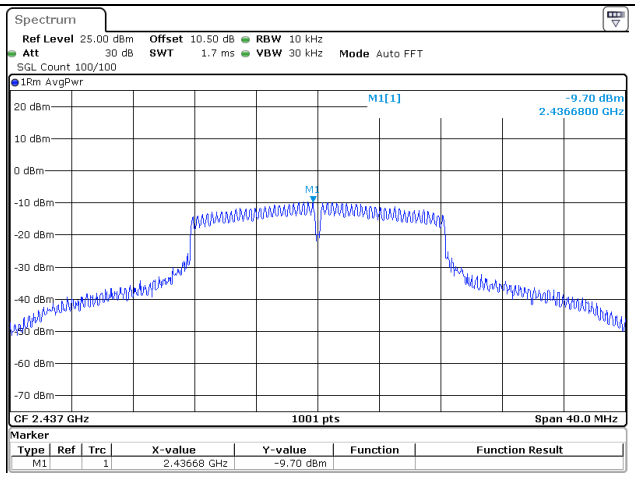
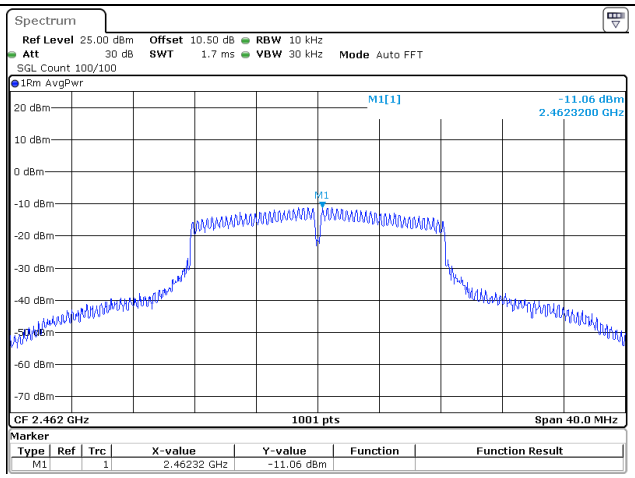
Maximum power spectral density	
802.11g Lowest Channel	
802.11g Middle Channel	
802.11g Highest Channel	

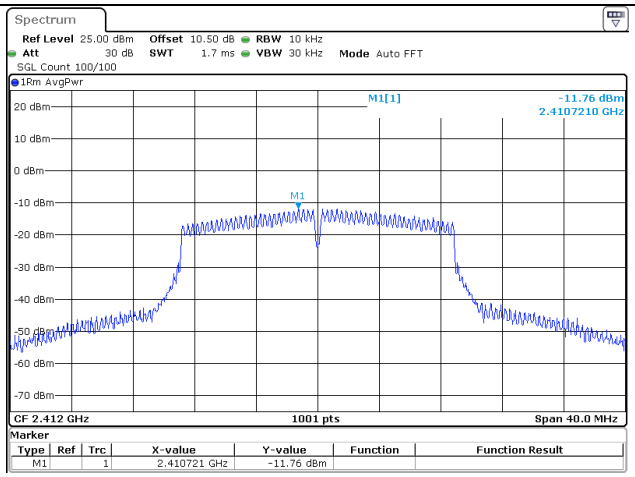
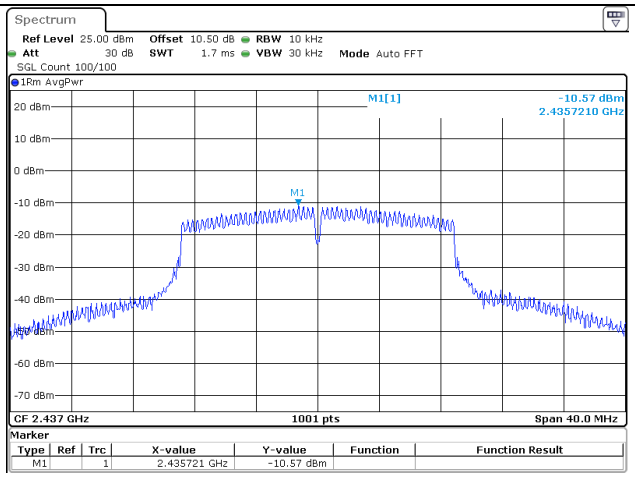
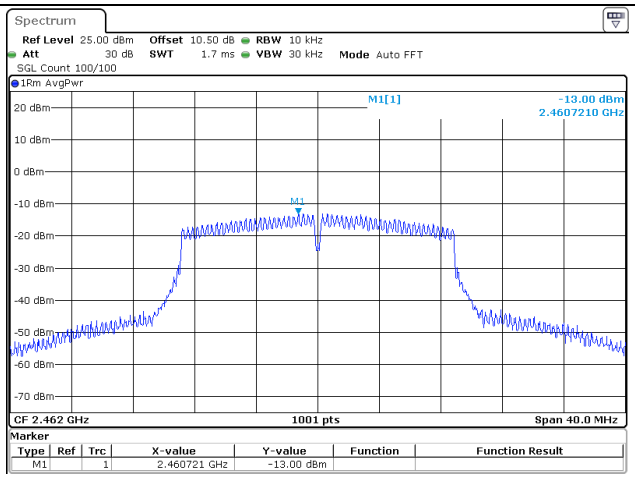
Maximum power spectral density	
802.11n ht20 Lowest Channel	
802.11n ht20 Middle Channel	
802.11n ht20 Highest Channel	

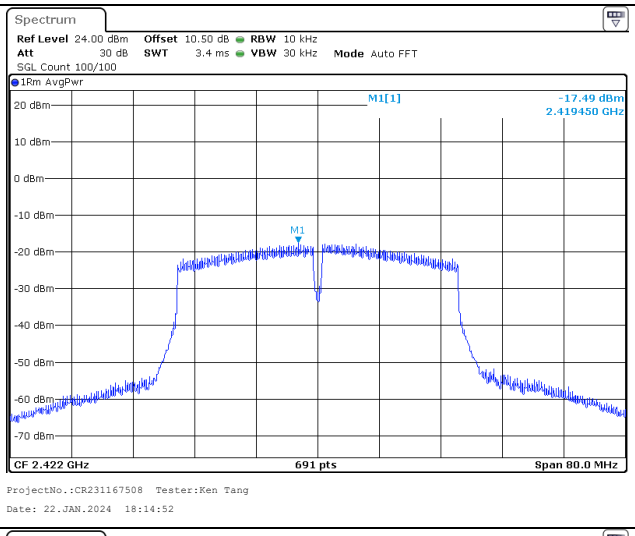
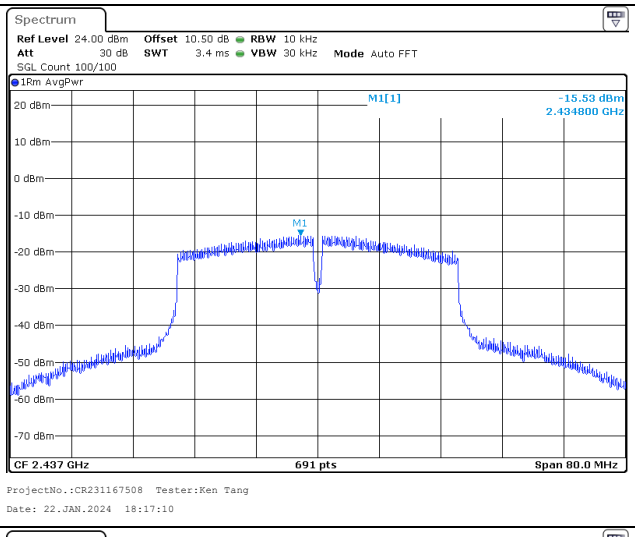
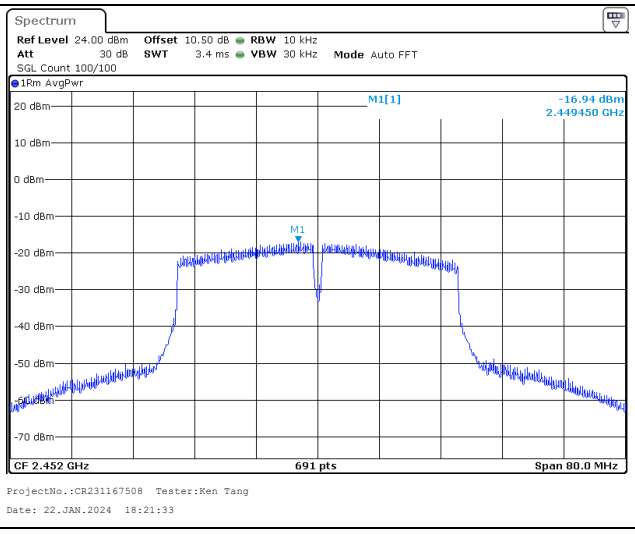
Maximum power spectral density	
802.11n ht40 Lowest Channel	
802.11n ht40 Middle Channel	
802.11n ht40 Highest Channel	

Chain 1:

Maximum power spectral density	
802.11b Lowest Channel	
802.11b Middle Channel	
802.11b Highest Channel	

Maximum power spectral density	
802.11g Lowest Channel	
802.11g Middle Channel	
802.11g Highest Channel	

Maximum power spectral density	
802.11n ht20 Lowest Channel	
802.11n ht20 Middle Channel	
802.11n ht20 Highest Channel	

Maximum power spectral density	
802.11n ht40 Lowest Channel	
802.11n ht40 Middle Channel	
802.11n ht40 Highest Channel	

4.7 100 kHz Bandwidth of Frequency Band Edge:

Serial Number:	2DPM-2	Test Date:	2023/12/20~2023/12/26
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	26.3-25.6	Relative Humidity: (%)	51-56	ATM Pressure: (kPa)	100.2

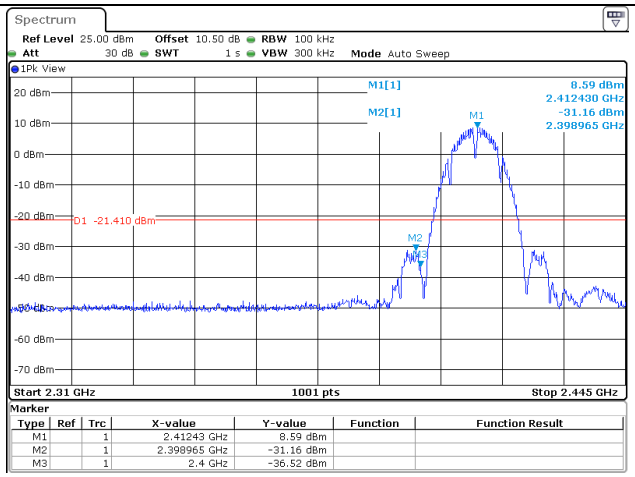
Test Equipment List and Details:

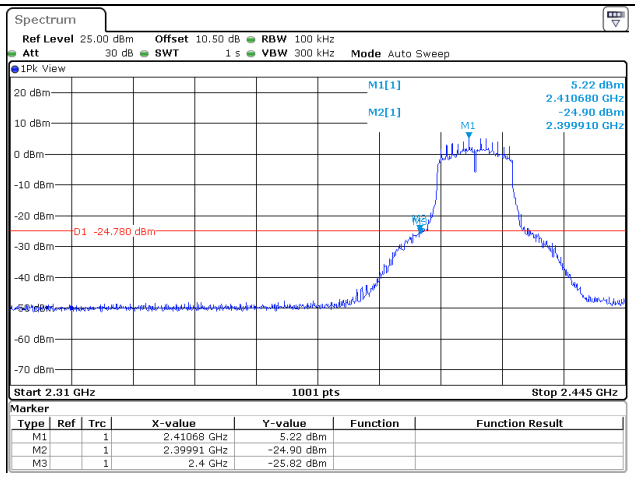
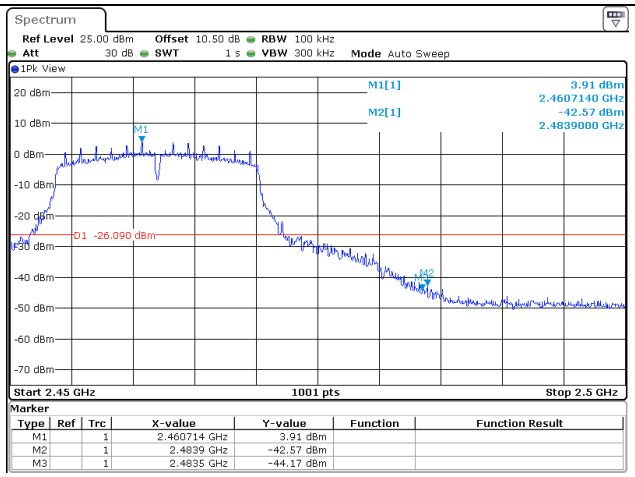
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40-N	102259	2023-04-18	2024-04-17
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

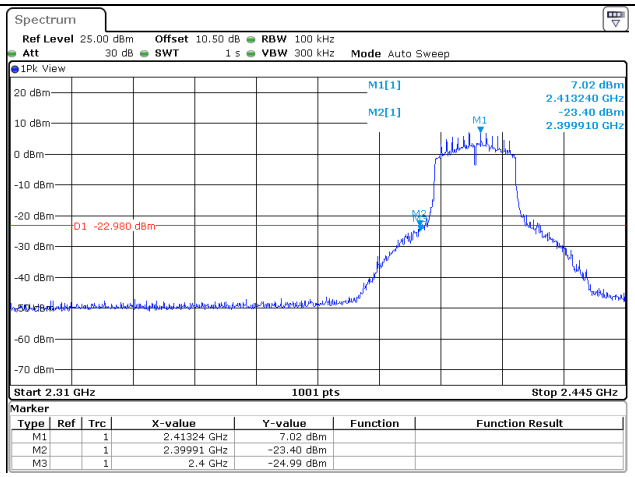
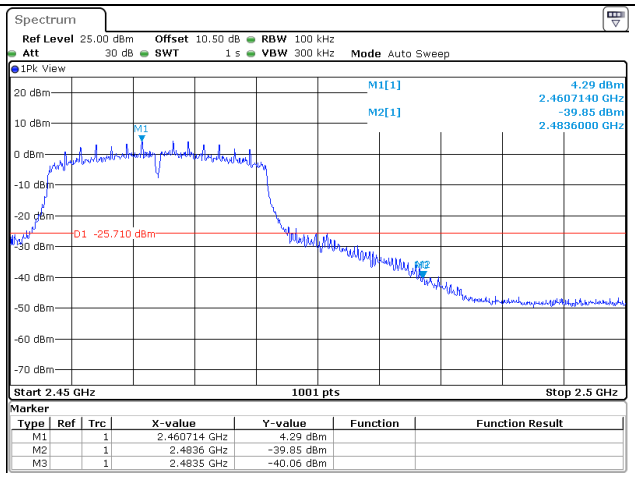
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

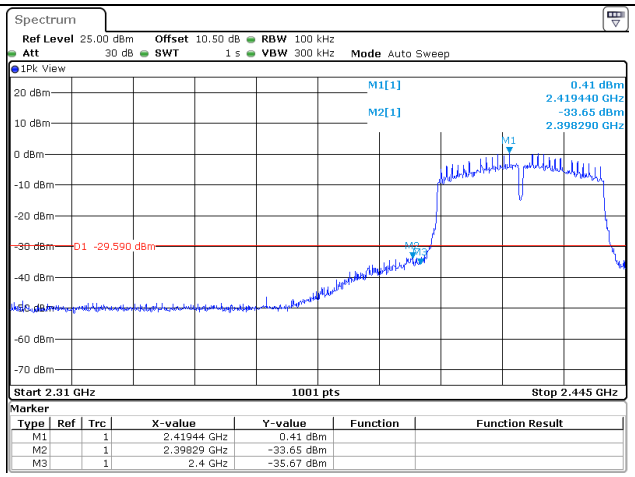
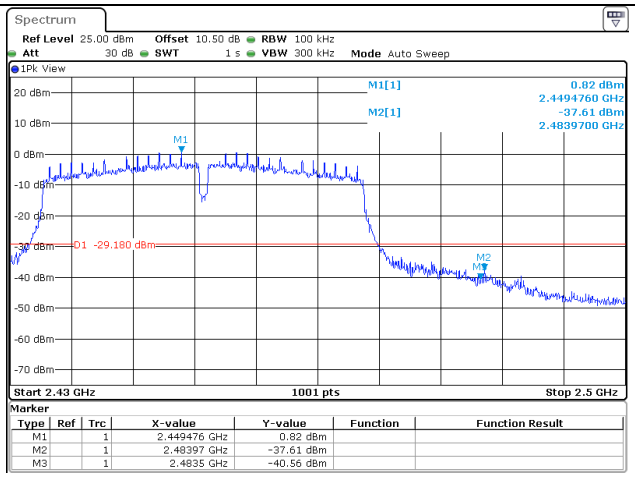
Test Data:

Chain 0:

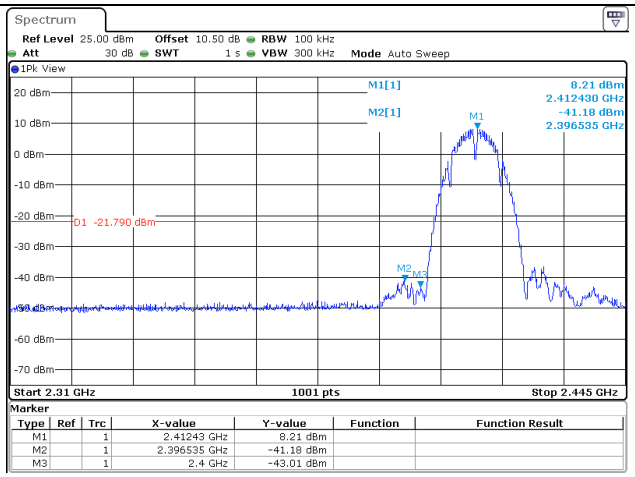
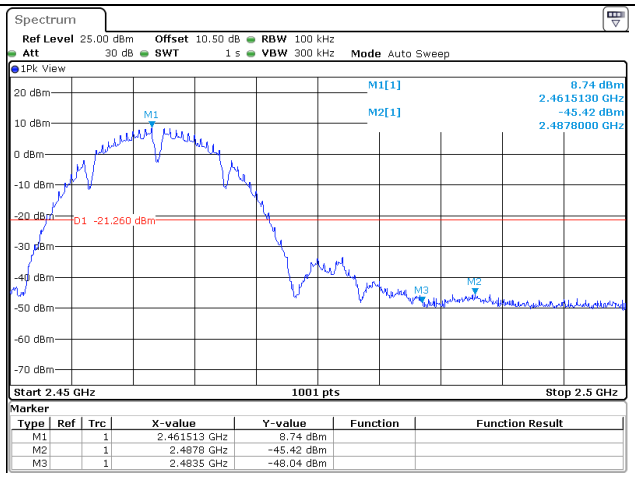
100 kHz Bandwidth of Frequency Band Edge	
802.11b Lowest Band edge	
802.11b Highest Band edge	

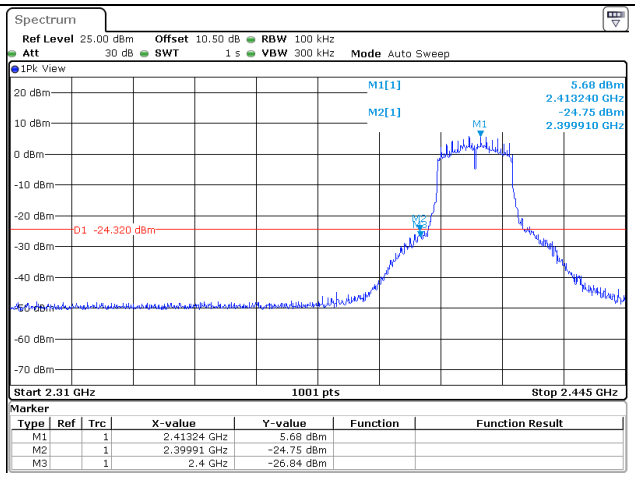
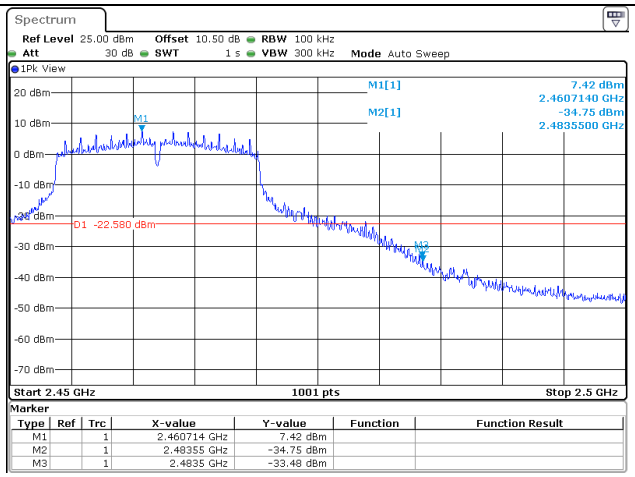
100 kHz Bandwidth of Frequency Band Edge	
802.11g Lowest Band edge	
802.11g Highest Band edge	

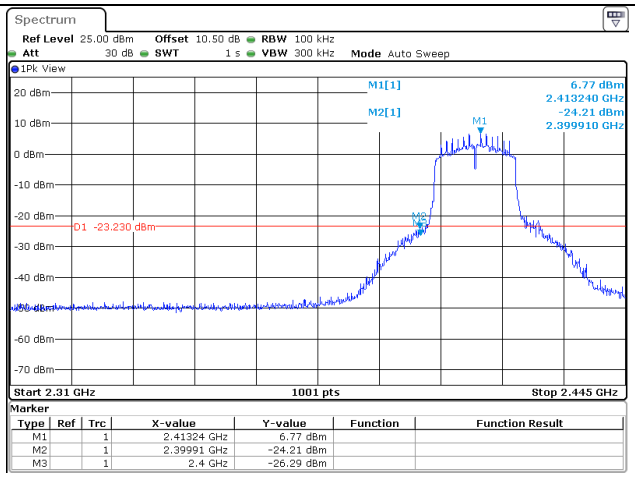
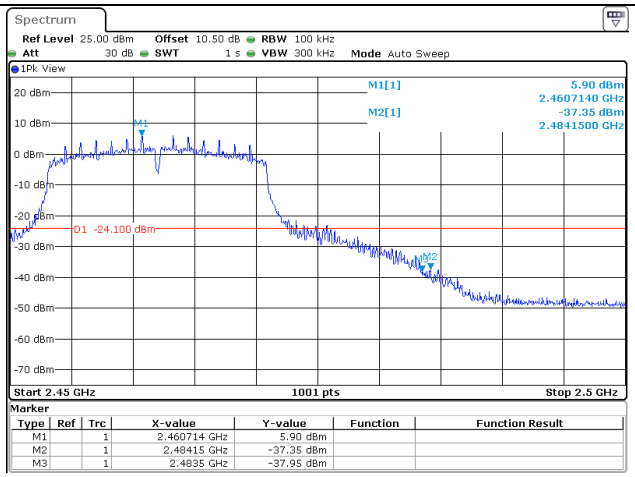
100 kHz Bandwidth of Frequency Band Edge	
802.11n ht20 Lowest Band edge	
802.11n ht20 Highest Band edge	

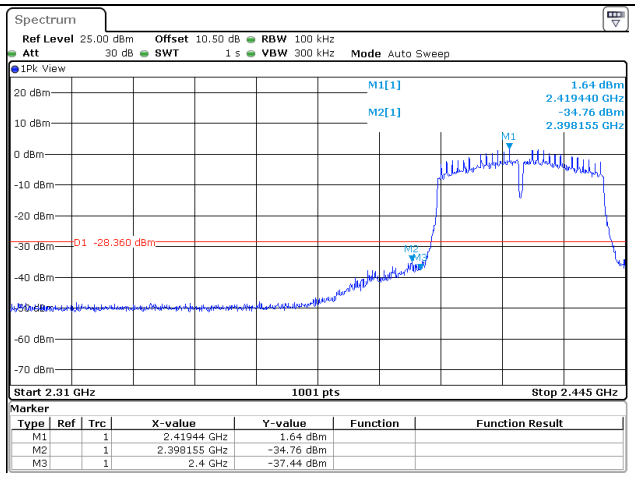
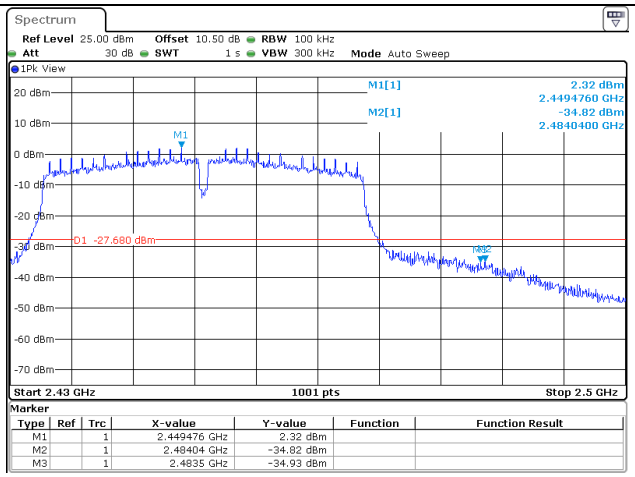
100 kHz Bandwidth of Frequency Band Edge	
802.11n ht40 Lowest Band edge	
802.11n ht40 Highest Band edge	

Chain 1:

100 kHz Bandwidth of Frequency Band Edge	
802.11b Lowest Band edge	
802.11b Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
802.11g Lowest Band edge	
802.11g Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
802.11n ht20 Lowest Band edge	
802.11n ht20 Highest Band edge	

100 kHz Bandwidth of Frequency Band Edge	
802.11n ht40 Lowest Band edge	
802.11n ht40 Highest Band edge	

4.8 Duty Cycle:

Serial Number:	2DPM-2	Test Date:	2023/12/19
Test Site:	RF	Test Mode:	Transmitting
Tester:	Ken Tang	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.5	Relative Humidity: (%)	55	ATM Pressure: (kPa)	100.2

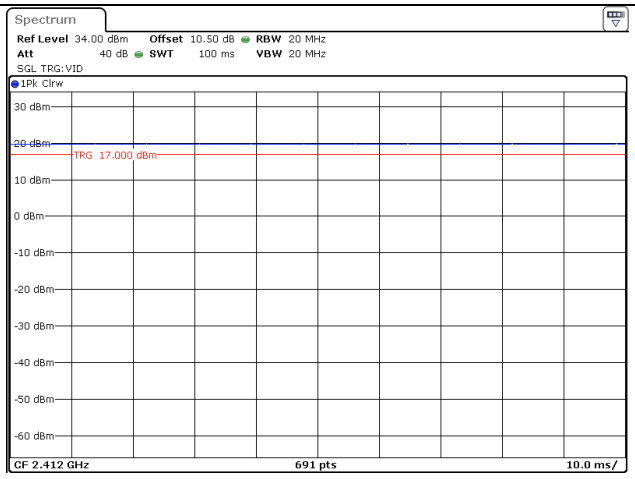
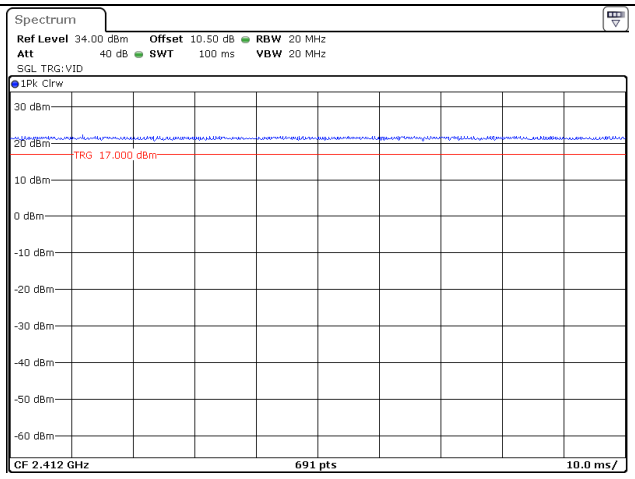
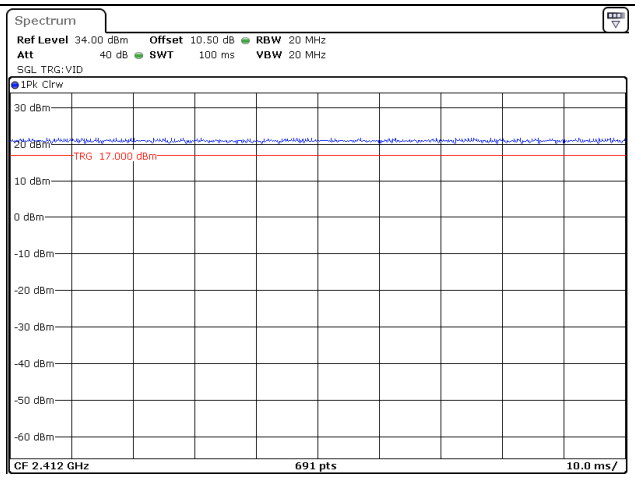
Test Equipment List and Details:

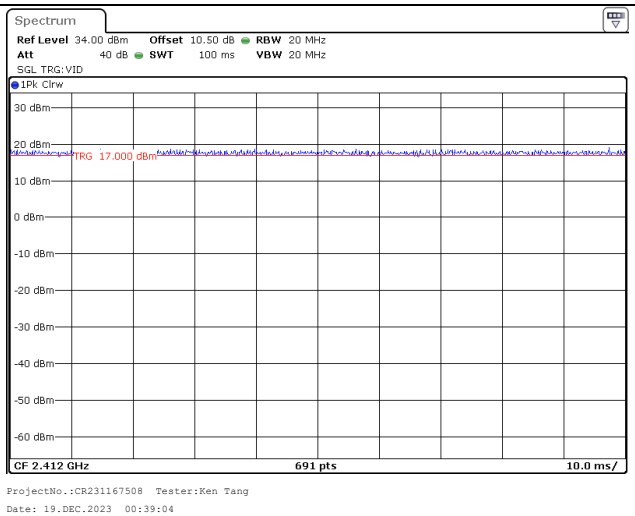
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40-N	102259	2023-04-18	2024-04-17
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Modes	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	1/T (Hz)	Duty Factor (dB)	VBW setting (Hz)
802.11b	100	100	100.00	/	/	10
802.11g	100	100	100.00	/	/	10
802.11n ht20	100	100	100.00	/	/	10
802.11n ht40	100	100	100.00	/	/	10
Note: Test only was performed at Chain 0.						

Duty Cycle	
802.11b	
802.11g	
802.11n ht20	

Duty Cycle	
802.11n ht40	

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

According to subpart 1.1307 (b)(1), 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

5.1.2 Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

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

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

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

Mode	Frequency (MHz)	Tune Up Conducted Power (dBm)	Antenna Gain (dBi) (Note 2)	Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
2.4G Wi-Fi	2412-2462	21.5	6.97	20	0.140	1.0
5G Wi-Fi	5180-5240	20.5	7.55	20	0.127	1.0
	5260-5320	20.0	7.55	20	0.113	1.0
	5500-5700	20.0	7.55	20	0.113	1.0
	5745-5825	20.0	7.55	20	0.113	1.0

Note:

1) The tune up conducted power was declared by the applicant.

2) For the Wi-Fi mode, the antenna gain would be the directional gain.

3) The 2.4G Wi-Fi and 5G Wi-Fi can transmit simultaneously.

The ratio= $MPE_{2.4G\ Wi\text{-}Fi}$/limit+$MPE_{5G\ Wi\text{-}Fi}$/limit =0.140+0.127=0.267＜1.0, simultaneous exposure is not required.

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

Result: Compliance

6. EUT PHOTOGRAPHS

Please refer to the attachment CR231167508-EXP EUT EXTERNAL PHOTOGRAPHS and CR231167508-INP EUT INTERNAL PHOTOGRAPHS.

7. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR231167508-00A-TSP TEST SETUP PHOTOGRAPHS.

===== END OF REPORT =====