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

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **Boopoo Technology LLC**

Address: 8 The Green Suite B Dover, Delaware, United States

FCC ID: **2BC2PBC2**

Product Name: **Smart Baby Monitor**

Standard(s): **47 CFR Part 15, Subpart E(15.407)**
ANSI C63.10-2013
KDB 789033 D02 General U-NII Test Procedures New Rules v02r01

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: **CR231063791-00C**

Date Of Issue: **2024/2/27**

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

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

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

This report cannot be reproduced except in full, without prior written approval of the Company.

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

This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".

CONTENTS

DOCUMENT REVISION HISTORY **5**
1. GENERAL INFORMATION **6**
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) **6**
1.2 DESCRIPTION OF TEST CONFIGURATION **7**
1.2.1 EUT Operation Condition 7
1.2.2 Support Equipment List and Details 7
1.2.3 Support Cable List and Details 7
1.2.4 Block Diagram of Test Setup 8
1.3 MEASUREMENT UNCERTAINTY **9**
2. SUMMARY OF TEST RESULTS **10**
3. REQUIREMENTS AND TEST PROCEDURES **11**
3.1 AC LINE CONDUCTED EMISSIONS **11**
3.1.1 Applicable Standard 11
3.1.2 EUT Setup 12
3.1.3 EMI Test Receiver Setup 12
3.1.4 Test Procedure 13
3.1.5 Corrected Amplitude & Margin Calculation 13
3.2 RADIATION SPURIOUS EMISSIONS **14**
3.2.1 Applicable Standard 14
3.2.2 EUT Setup 15
3.2.3 EMI Test Receiver & Spectrum Analyzer Setup 16
3.2.4 Test Procedure 16
3.2.5 Corrected Amplitude & Margin Calculation 17
3.3 EMISSION BANDWIDTH **18**
3.3.1 Applicable Standard 18
3.3.2 EUT Setup 18
3.3.3 Test Procedure 18
3.4 MAXIMUM CONDUCTED OUTPUT POWER **20**
3.4.1 Applicable Standard 20
3.4.2 EUT Setup 20
3.4.3 Test Procedure 20
3.5 MAXIMUM POWER SPECTRAL DENSITY **21**
3.5.1 Applicable Standard 21
3.5.2 EUT Setup 21
3.5.3 Test Procedure 22
3.7 DUTY CYCLE **23**
3.7.1 EUT Setup 23
3.7.2 Test Procedure 23
3.8 ANTENNA REQUIREMENT **24**
3.8.1 Applicable Standard 24
3.8.2 Judgment 24

4. Test DATA AND RESULTS 25
4.1 AC LINE CONDUCTED EMISSIONS 25
4.2 RADIATION SPURIOUS EMISSIONS 28
4.3 EMISSION BANDWIDTH 58
4.4 MAXIMUM CONDUCTED OUTPUT POWER 65
4.5 MAXIMUM POWER SPECTRAL DENSITY 66
4.6 DUTY CYCLE 70
5. RF EXPOSURE EVALUATION 72
5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE) 72
5.1.1 Applicable Standard 72
5.1.2 Procedure 72
5.1.3 Calculated Result 72
6. EUT PHOTOGRAPHS 73
7. TEST SETUP PHOTOGRAPHS 74

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR231063791-00C	Original Report	2024/2/27

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

1.1.1 General Information

EUT Name:	Smart Baby Monitor
EUT Model:	BC2
Operation Frequency:	5180-5240 MHz (802.11a/n ht20/ac vht20) 5190-5230 MHz (802.11n ht40/ac vht40) 5210 MHz (802.11ac vht80)
Maximum Average Output Power (Conducted):	12.15dBm (5150-5250 MHz)
Modulation Type:	802.11a/n/ac: OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
Rated Input Voltage:	DC 4.5-5.5V, Typical: DC 5V from AC/DC Adapter
Serial Number:	2CWK-1 (for Emission Test) 2CWK-2 (for RF Conducted Test)
EUT Received Date:	2023/11/4
EUT Received Status:	Good

1.1.2 Operation Frequency Detail

5150-5250MHz Band			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
36	5180	38	5190
40	5200	42	5210
44	5220	46	5230
48	5240	/	/
Per section 15.31(m), the below frequencies were performed the test:			
36	5180	38	5190
40	5200	42	5210
46	5230	48	5240

1.1.3 Antenna Information Detail▲:

Antenna Type	**input impedance (Ohm)**	**Frequency Range**	**Antenna Gain (dBi)**
FPC Antenna	50	5.15~5.25GHz	2.66dBi

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.

1.1.4 Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
AC/DC Adapter	SHENZHEN TEKA TECHNOLOGY CO., LTD.	TEKA-TA050100US	**Input:** 100~240V~50/60Hz 0.3A MAX **Output:** 5.0V ⎓ 1.0A

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.
Equipment Modifications:	No
EUT Exercise Software:	CRT.exe

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

5150-5250MHz Band:

Test Modes	Test Channels	Test Frequency (MHz)	Data rate	Power Level Setting
802.11a	Lowest	5180	6Mbps	40
	Middle	5200	6Mbps	40
	Highest	5240	6Mbps	40
802.11n ht20	Lowest	5180	MCS0	40
	Middle	5200	MCS0	40
	Highest	5240	MCS0	40
802.11n ht40	Lowest	5190	MCS0	40
	Highest	5230	MCS0	40
802.11ac vht80	Middle	5210	MCS0	40

Note:
1. The system support 802.11a/n ht20/n ht40/ac vht20/vht40/vht80, the vht20/vht40 were reduced since the identical parameters with 802.11n ht20 and ht40.
2. 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.
3. The device only support SISO mode.

1.2.2 Support Equipment List and Details

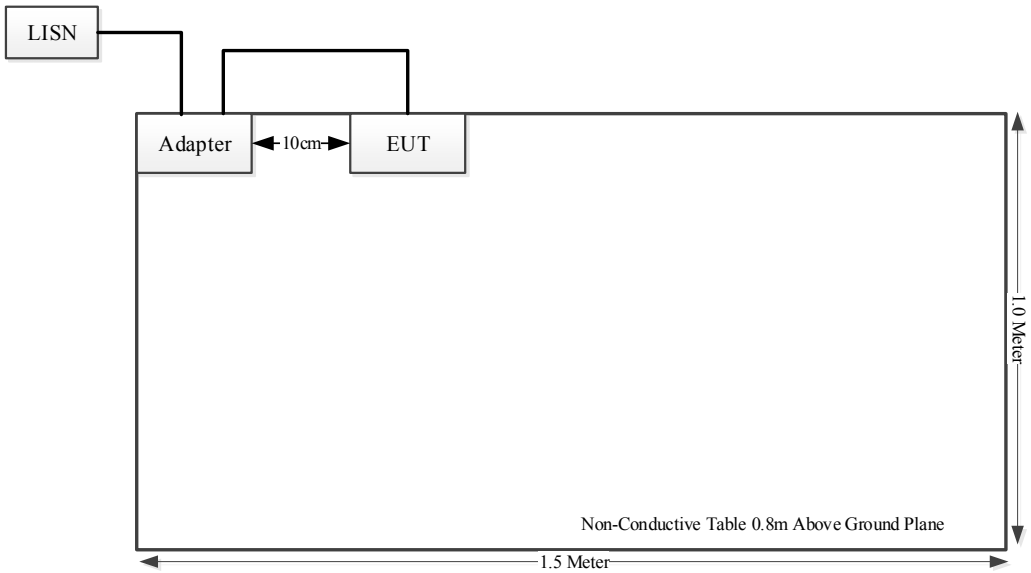
Manufacturer	Description	Model	Serial Number
TEkA	Adapter	TEKA-TA050100US	Unknown

1.2.3 Support Cable List and Details

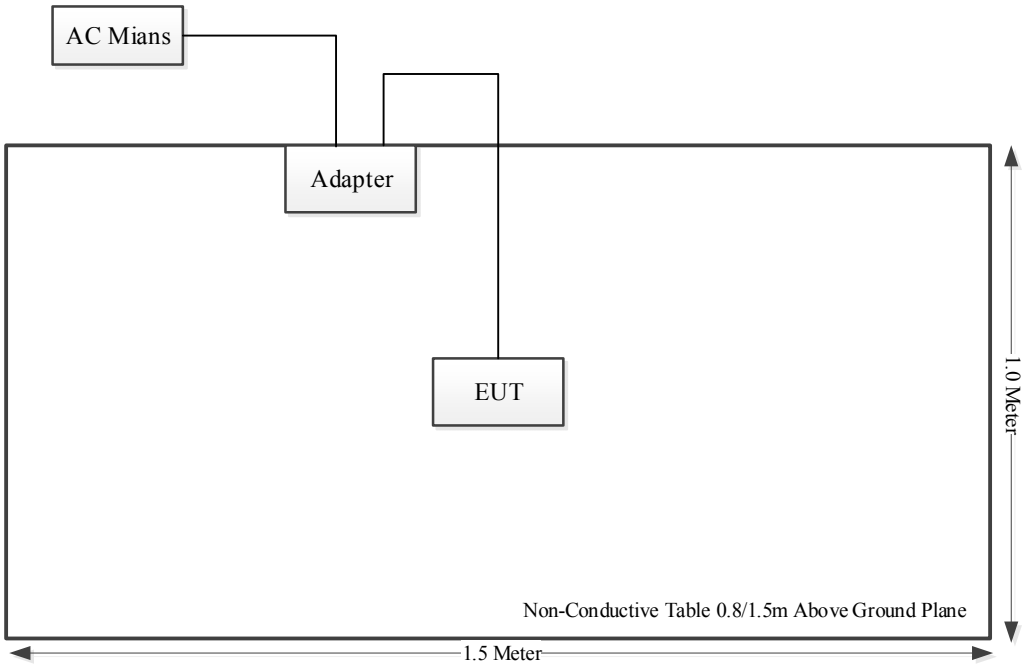
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
AC/DC Adapter Cable	No	No	3	Adapter	EUT

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
FCC §15.207(a)	AC line conducted emissions	Compliant
FCC §15.205& §15.209 &§15.407(b)	Radiated Spurious Emissions	Compliant
FCC §15.407(a) (e)	Emission Bandwidth	Compliant
FCC §15.407(a)	Maximum Conducted Output Power	Compliant
FCC §15.407 (a)	Power Spectral Density	Compliant
FCC§15.407 (c)	Automatically Discontinue Transmission	Compliant*
FCC§15.407 (g)	Frequency Stability	Compliant**
FCC §15.203	Antenna Requirement	Compliant
FCC §1.1307 & §2.1093	RF Exposure Evaluation	Compliant

Note:
Compliant*: *During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. the EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.*
Compliant**: *Grantee ensure that the product meets e-CFR Title 47 section 15.407(g) and KDB 789033 D02v02r01 frequency stability such that the emissions are maintained within the band of operation under all conditions of normal operation as specified in the user's manual.*

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:

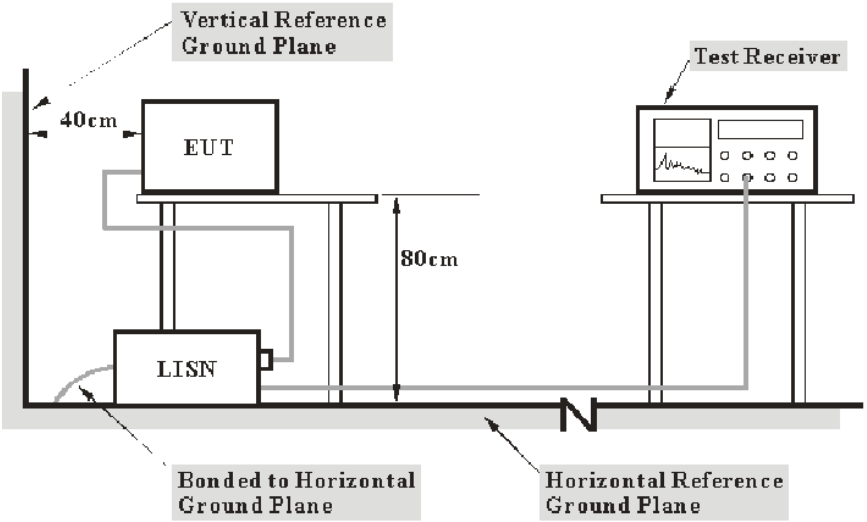
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(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

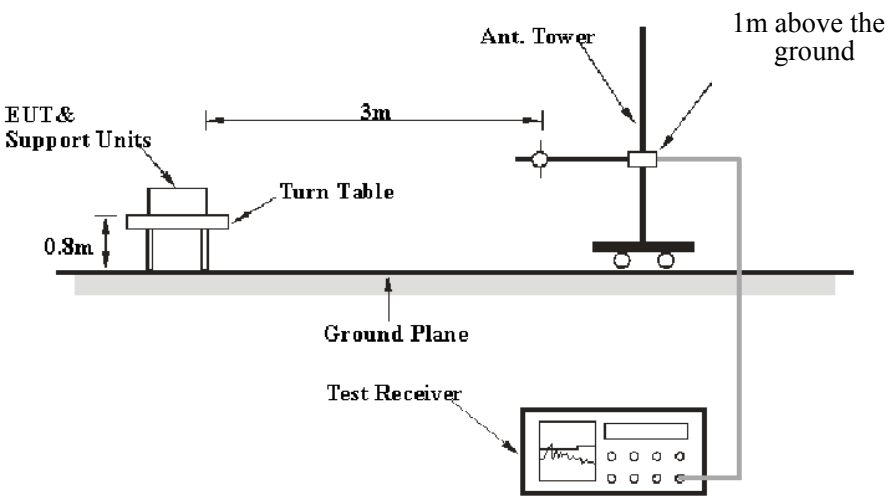
3.2.1 Applicable Standard

FCC §15.407 (b);

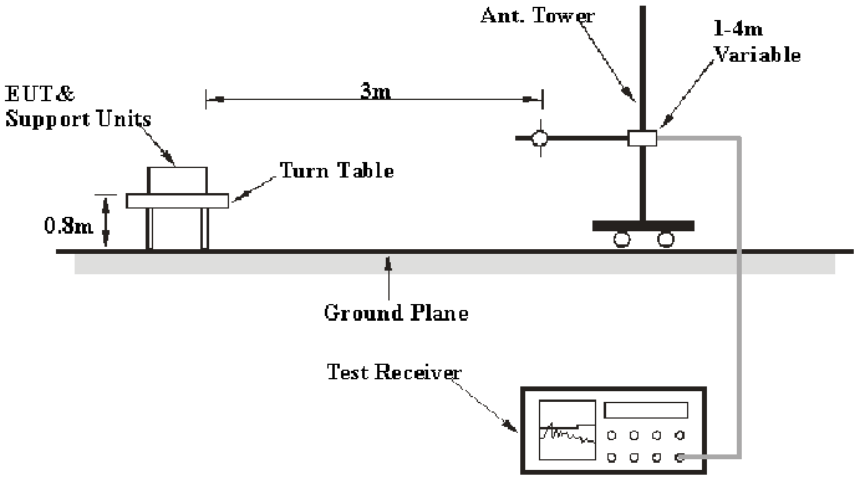
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(4) For transmitters operating solely in the 5.725-5.850 GHz band:
(i) All emissions shall be limited to a level of – 27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
(8) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(9) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in § 15.207.
(10) The provisions of § 15.205 apply to intentional radiators operating under this section.
(11) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.
(c) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

3.2.2 EUT Setup

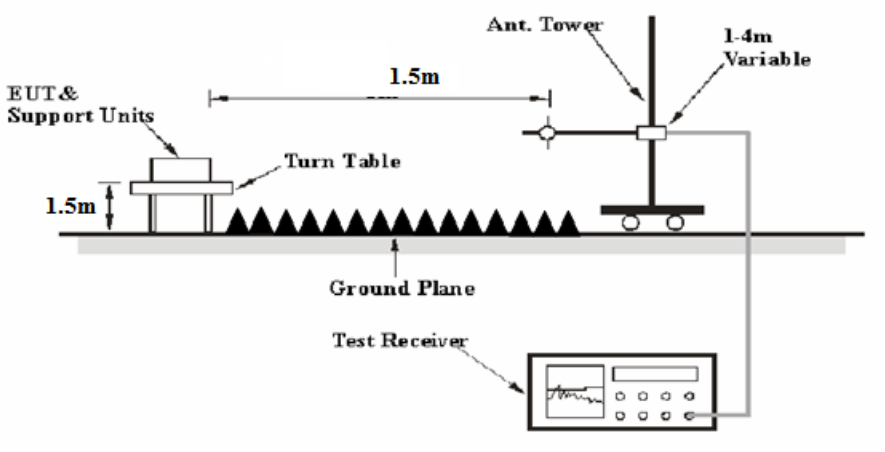
9 kHz-30MHz:



30MHz-1GHz:



1-40 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was FCC 15.209, FCC 15.407 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.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 40 GHz.

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

9 kHz -1000 MHz:

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- 40GHz:

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

During the radiated emission test, the adapter was connected to the first AC floor outlet.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

All emissions under the average limit and under the noise floor have not recorded in the report.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Factor = Antenna Factor + Cable Loss- Amplifier Gain

For 30MHz-1GHz:
Result = Reading + Factor

For 1GHz-40GHz
Result = Reading + Factor-Distance extrapolation Factor

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

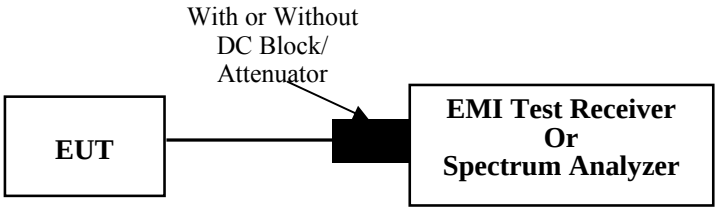
3.3 Emission Bandwidth

3.3.1 Applicable Standard

FCC §15.407 (a),(h)
(h)(2) Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

FCC §15.407 (e)
Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.3.2 EUT Setup



3.3.3 Test Procedure

26dB Emission Bandwidth:

According to ANSI C63.10-2013 Section 12.4.1

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = peak.
d) Trace mode = max hold
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6 dB emission bandwidth:

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

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.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

99% Occupied Bandwidth:

According to ANSI C63.10-2013 Section 12.4.2&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).

3.4 Maximum Conducted Output Power

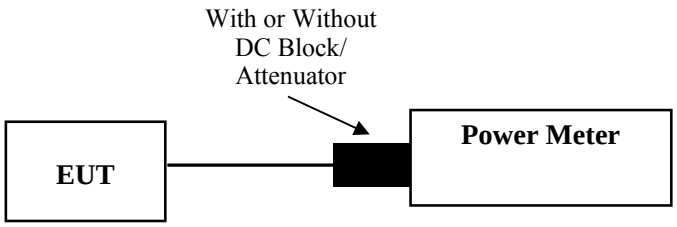
3.4.1 Applicable Standard

FCC §15.407(a) (1)(iv)
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (2)
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (3)(i)
For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.4.2 EUT Setup



3.4.3 Test Procedure

According to ANSI C63.10-2013 Section 12.3.3.1

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

3.5 Maximum Power Spectral Density

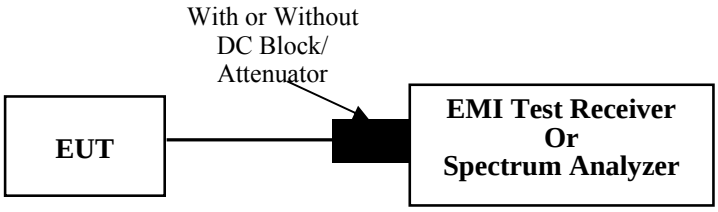
3.5.1 Applicable Standard

FCC §15.407(a) (1)(iv)
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (2)
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (3)(i)
For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.5.2 EUT Setup



3.5.3 Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Duty cycle ⩾98%

KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-1 should be applied.

Duty cycle <98%, duty cycle variations are less than ±2%

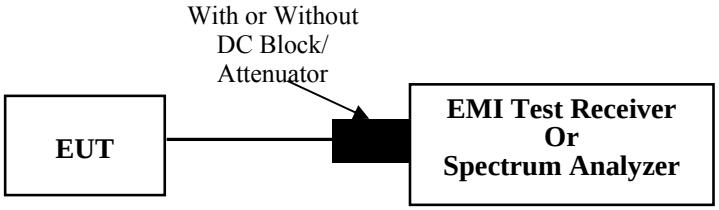
KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 should be applied.

Duty cycle <98%, duty cycle variations exceed ±2%

KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-3 should be applied.

3.7 Duty Cycle

3.7.1 EUT Setup



3.7.2 Test Procedure

According to ANSI C63.10-2013 Section 12.2

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.)

3.8 Antenna Requirement

3.8.1 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.

3.8.2 Judgment

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

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Serial Number:	2CWK-1	Test Date:	2023/11/21
Test Site:	CE	Test Mode:	Transmitting
Tester:	David Huang	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	25.8	Relative Humidity: (%)	47	ATM Pressure: (kPa)	101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101132	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

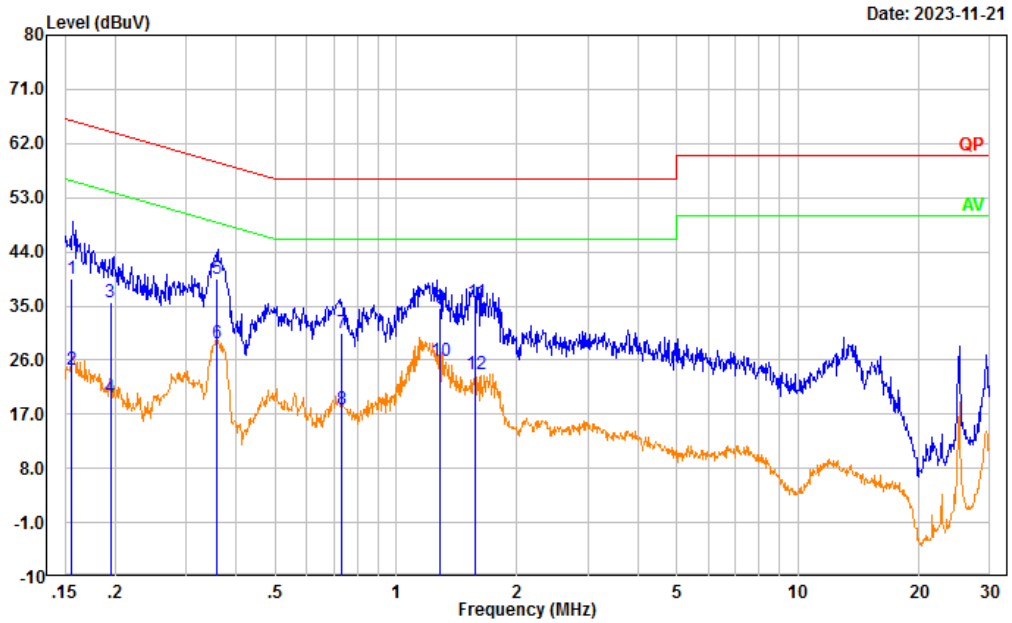
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Tested at maximum output power mode: ***802.11n ht40 mode, highest channel****.*

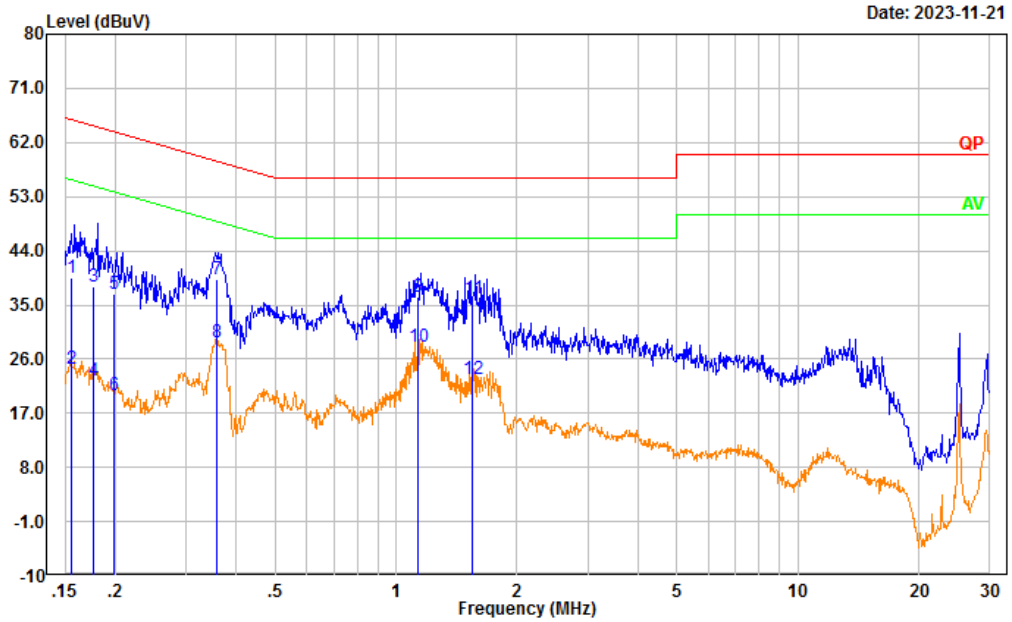
Please refers to following test plots.

Project No.: CR231063791-RF
Tester: David Huang
Port: Line
Note: Transmitting(5G WIFI)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.156	29.88	9.61	39.49	65.68	26.19	QP
2	0.156	14.84	9.61	24.45	55.68	31.23	Average
3	0.195	25.93	9.61	35.54	63.84	28.30	QP
4	0.195	10.26	9.61	19.87	53.84	33.97	Average
5	0.359	29.87	9.61	39.48	58.75	19.27	QP
6	0.359	19.06	9.61	28.67	48.75	20.08	Average
7	0.730	20.93	9.62	30.55	56.00	25.45	QP
8	0.730	8.21	9.62	17.83	46.00	28.17	Average
9	1.289	24.91	9.62	34.53	56.00	21.47	QP
10	1.289	16.35	9.62	25.97	46.00	20.03	Average
11	1.577	25.90	9.63	35.53	56.00	20.47	QP
12	1.577	13.94	9.63	23.57	46.00	22.43	Average

Project No.: CR231063791-RF
Tester: David Huang
Port: neutral
Note: Transmitting(5G WIFI)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.155	29.88	9.61	39.49	65.72	26.23	QP
2	0.155	14.74	9.61	24.35	55.72	31.37	Average
3	0.177	28.52	9.61	38.13	64.63	26.50	QP
4	0.177	12.95	9.61	22.56	54.63	32.07	Average
5	0.199	27.10	9.61	36.71	63.66	26.95	QP
6	0.199	10.44	9.61	20.05	53.66	33.61	Average
7	0.359	29.74	9.61	39.35	58.75	19.40	QP
8	0.359	19.11	9.61	28.72	48.75	20.03	Average
9	1.132	26.64	9.62	36.26	56.00	19.74	QP
10	1.132	18.48	9.62	28.10	46.00	17.90	Average
11	1.553	26.36	9.63	35.99	56.00	20.01	QP
12	1.553	13.09	9.63	22.72	46.00	23.28	Average

4.2 Radiation Spurious Emissions

Serial Number:	2CWK-1	Test Date:	2023/11/22-2024/2/24
Test Site:	966-1, 966-2	Test Mode:	Transmitting
Tester:	Carl Xue, Tao Zhu	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	23.2~25.2	Relative Humidity: (%)	45~54	ATM Pressure: (kPa)	101~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiation Spurious Emissions Below 1GHz					
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
Radiation Spurious Emissions Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	9912-5985	2023/12/6	2026/12/5
R&S	Spectrum Analyzer	FSV40	101591	2023/3/31	2024/3/30
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2024/1/15	2025/1/14
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2024/1/15	2025/1/14
A.H	Preamplifier	PAM-0118P	628	2024/1/15	2025/1/14
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2024/2/4	2027/2/3
Quinstar	Preamplifier	QLW-18405536-JO	15964001005	2024/1/15	2025/1/14
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2024/1/15	2025/1/14
E-Microwave	Band Rejection Filter	5150-5850MHz	OE01902423	2023/8/6	2024/8/5
Mini Circuits	High Pass Filter	VHF-6010+	31119	2023/8/6	2024/8/5
PASTERNACK	Horn Antenna	PE9850/2F-20	072001	2024/2/4	2027/2/3

** 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 was Y axes. Please refer to the below table and plots.

1) Radiation Spurious Emissions for 9kHz~30MHz

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

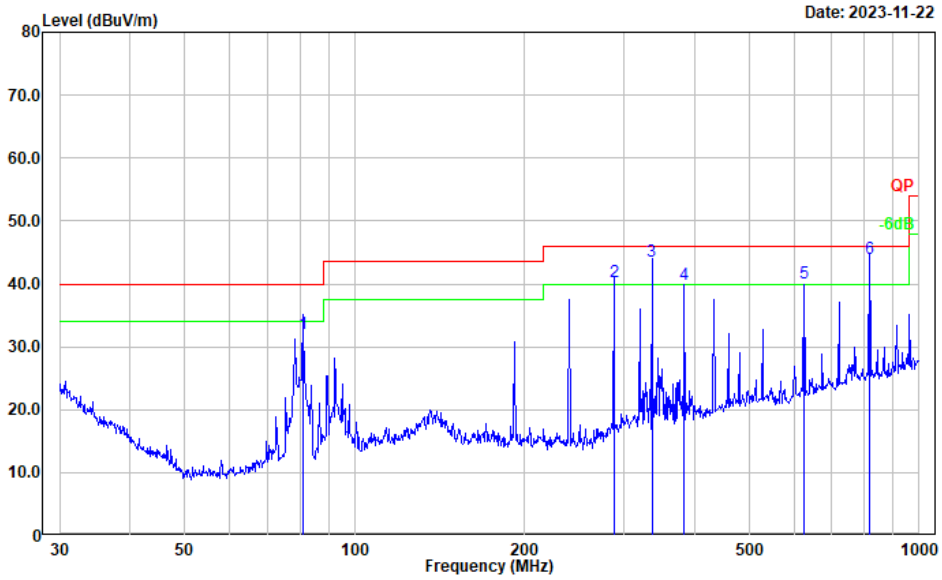
2) Radiation Spurious Emissions for 30MHz-1GHz

Tested at maximum output power mode: ***802.11n ht40 mode.***

Please refer to the below test plots.

802.11n ht40 mode Lowest Channel - Horizontal

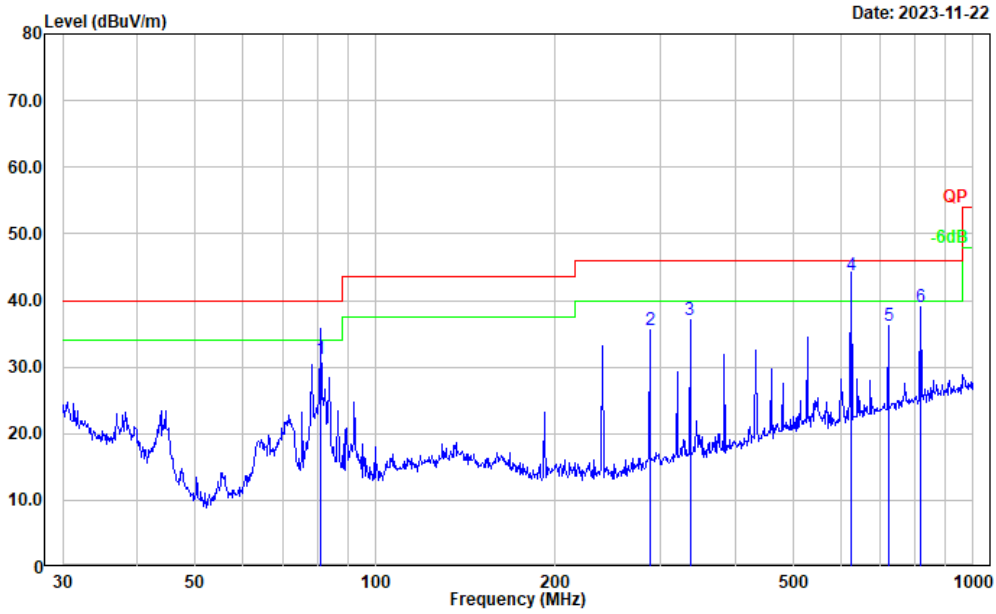
Project No.: CR231063791-RF
Tester: Carl Xue
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	81.099	49.48	-17.38	32.10	40.00	7.90	QP
2	288.025	51.54	-11.19	40.35	46.00	5.65	QP
3	335.995	53.79	-10.13	43.66	46.00	2.34	QP
4	383.932	49.02	-9.03	39.99	46.00	6.01	Peak
5	624.005	44.81	-4.66	40.15	46.00	5.85	QP
6	816.033	45.81	-1.82	43.99	46.00	2.01	QP

802.11n ht40 mode Lowest Channel - Vertical

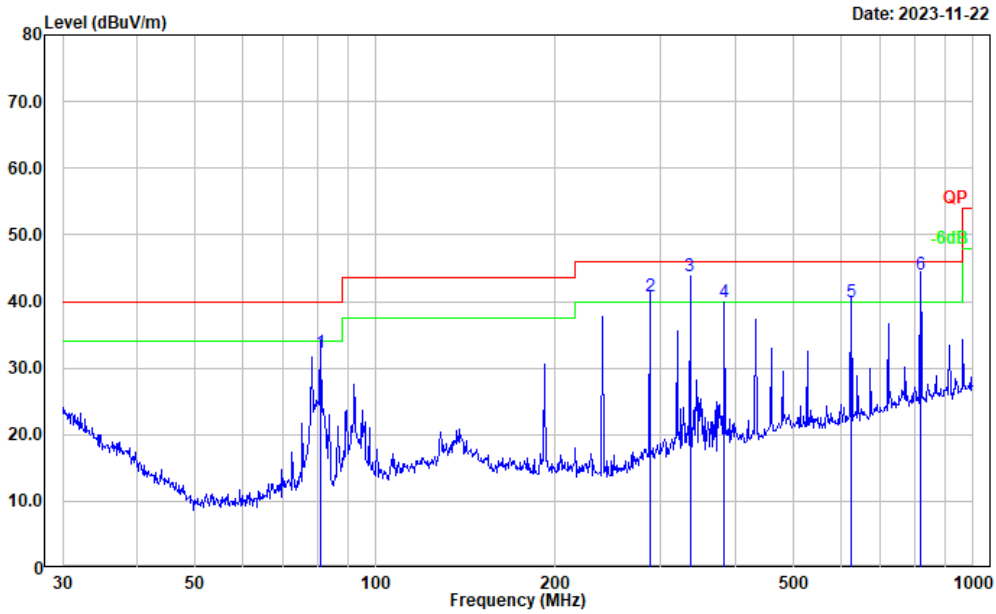
Project No.: CR231063791-RF
Tester: Carl Xue
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	81.153	48.54	-17.37	31.17	40.00	8.83	QP
2	287.990	46.77	-11.19	35.58	46.00	10.42	Peak
3	336.035	47.25	-10.13	37.12	46.00	8.88	Peak
4	624.005	48.53	-4.66	43.87	46.00	2.13	QP
5	721.726	39.58	-3.32	36.26	46.00	9.74	Peak
6	815.968	40.76	-1.82	38.94	46.00	7.06	Peak

802.11n ht40 mode Highest Channel - Horizontal

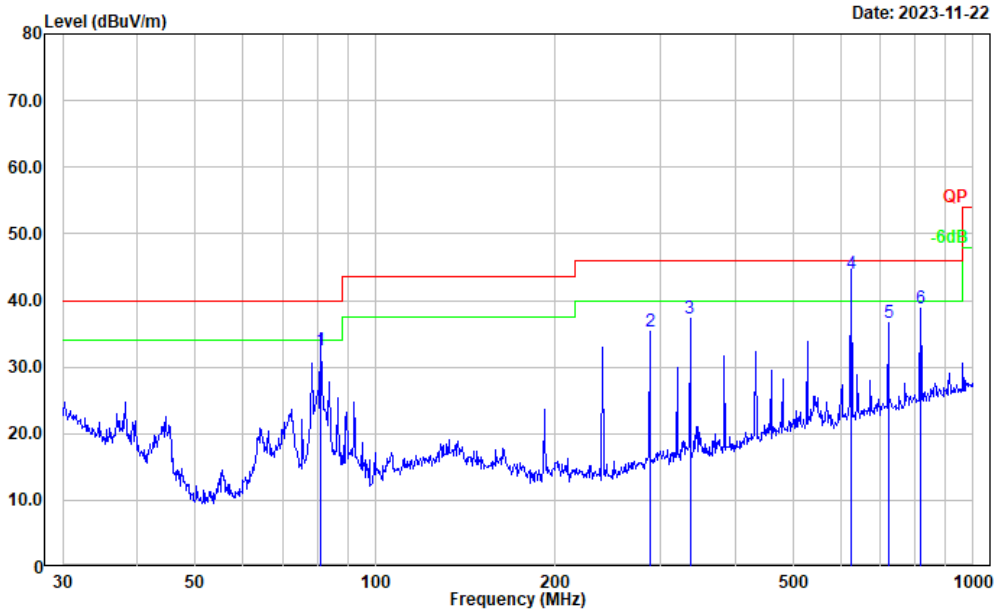
Project No.: CR231063791-RF
Tester: Carl Xue
Polarization: horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	81.122	49.60	-17.37	32.23	40.00	7.77	QP
2	288.002	52.00	-11.19	40.81	46.00	5.19	QP
3	336.009	53.86	-10.13	43.73	46.00	2.27	QP
4	383.932	48.98	-9.03	39.95	46.00	6.05	Peak
5	624.005	44.61	-4.66	39.95	46.00	6.05	QP
6	816.000	45.85	-1.82	44.03	46.00	1.97	QP

802.11n ht40 mode Highest Channel - Vertical

Project No.: CR231063791-RF
Tester: Carl Xue
Polarization: vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	81.131	49.81	-17.37	32.44	40.00	7.56	QP
2	287.990	46.56	-11.19	35.37	46.00	10.63	Peak
3	336.035	47.32	-10.13	37.19	46.00	8.81	Peak
4	624.005	48.64	-4.66	43.98	46.00	2.02	QP
5	721.726	39.99	-3.32	36.67	46.00	9.33	Peak
6	815.968	40.74	-1.82	38.92	46.00	7.08	Peak

3) Radiation Spurious Emissions for 1-40GHz:

802.11a Mode:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel:				5180	MHz		
10360.000	43.36	PK	H	4.40	47.76	68.20	20.44
10360.000	42.82	PK	V	4.40	47.22	68.20	20.98
15540.000	43.78	PK	H	4.82	48.60	74.00	25.40
15540.000	30.64	AV	H	4.82	35.46	54.00	18.54
15540.000	43.68	PK	V	4.82	48.50	74.00	25.50
15540.000	30.18	AV	V	4.82	35.00	54.00	19.00
Middle Channel:				5200	MHz		
10400.000	42.07	PK	H	4.52	46.59	68.20	21.61
10400.000	42.21	PK	V	4.52	46.73	68.20	21.47
15600.000	43.48	PK	H	4.91	48.39	74.00	25.61
15600.000	30.63	AV	H	4.91	35.54	54.00	18.46
15600.000	43.20	PK	V	4.91	48.11	74.00	25.89
15600.000	30.55	AV	V	4.91	35.46	54.00	18.54
High Channel:				5240	MHz		
10480.000	43.28	PK	H	4.51	47.79	68.20	20.41
10480.000	43.11	PK	V	4.51	47.62	68.20	20.58
15720.000	44.15	PK	H	4.71	48.86	74.00	25.14
15720.000	31.72	AV	H	4.71	36.43	54.00	**17.57**
15720.000	44.12	PK	V	4.71	48.83	74.00	25.17
15720.000	31.25	AV	V	4.71	35.96	54.00	18.04

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:				5180	MHz		
10360.000	42.93	PK	H	4.40	47.33	68.20	20.87
10360.000	42.54	PK	V	4.40	46.94	68.20	21.26
15540.000	42.92	PK	H	4.82	47.74	74.00	26.26
15540.000	30.10	AV	H	4.82	34.92	54.00	19.08
15540.000	41.82	PK	V	4.82	46.64	74.00	27.36
15540.000	29.67	AV	V	4.82	34.49	54.00	19.51
Middle Channel:				5200	MHz		
10400.000	43.62	PK	H	4.52	48.14	68.20	20.06
10400.000	43.28	PK	V	4.52	47.80	68.20	20.40
15600.000	43.12	PK	H	4.91	48.03	74.00	25.97
15600.000	30.23	AV	H	4.91	35.14	54.00	18.86
15600.000	42.87	PK	V	4.91	47.78	74.00	26.22
15600.000	30.17	AV	V	4.91	35.08	54.00	18.92

High Channel:				5240	MHz		
10480.000	42.23	PK	H	4.51	46.74	68.20	21.46
10480.000	42.10	PK	V	4.51	46.61	68.20	21.59
15720.000	44.88	PK	H	4.71	49.59	74.00	24.41
15720.000	31.20	AV	H	4.71	35.91	54.00	18.09
15720.000	43.82	PK	V	4.71	48.53	74.00	25.47
15720.000	30.82	AV	V	4.71	35.53	54.00	18.47

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:				5190	MHz		
10380.000	42.69	PK	H	4.46	47.15	68.20	21.05
10380.000	42.32	PK	V	4.46	46.78	68.20	21.42
15570.000	42.81	PK	H	4.86	47.67	74.00	26.33
15570.000	30.10	AV	H	4.86	34.96	54.00	19.04
15570.000	42.66	PK	V	4.86	47.52	74.00	26.48
15570.000	29.94	AV	V	4.86	34.80	54.00	19.20
High Channel:				5230	MHz		
10460.000	42.32	PK	H	4.51	46.83	68.20	21.37
10460.000	41.68	PK	V	4.51	46.19	68.20	22.01
15690.000	43.72	PK	H	4.67	48.39	74.00	25.61
15690.000	30.55	AV	H	4.67	35.22	54.00	18.78
15690.000	43.37	PK	V	4.67	48.04	74.00	25.96
15690.000	30.52	AV	V	4.67	35.19	54.00	18.81

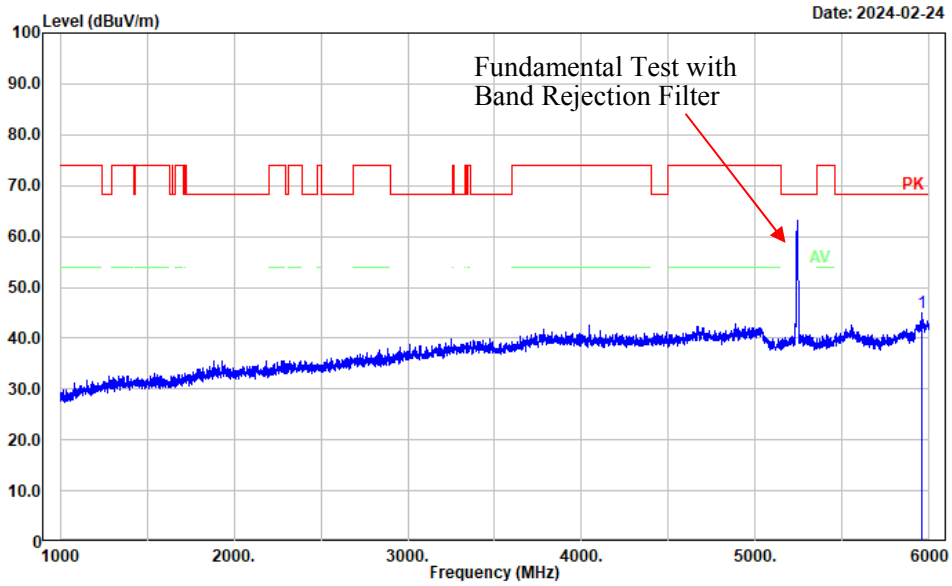
802.11ac vht80 Mode:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Middle Channel:				5210	MHz		
10420.000	41.65	PK	H	4.51	46.16	68.20	22.04
10420.000	41.87	PK	V	4.51	46.38	68.20	21.82
15630.000	43.52	PK	H	4.83	48.35	74.00	25.65
15630.000	30.50	AV	H	4.83	35.33	54.00	18.67
15630.000	43.52	PK	V	4.83	48.35	74.00	25.65
15630.000	30.23	AV	V	4.83	35.06	54.00	18.94

Worst Radiation Spurious Emissions Margin Test Plots

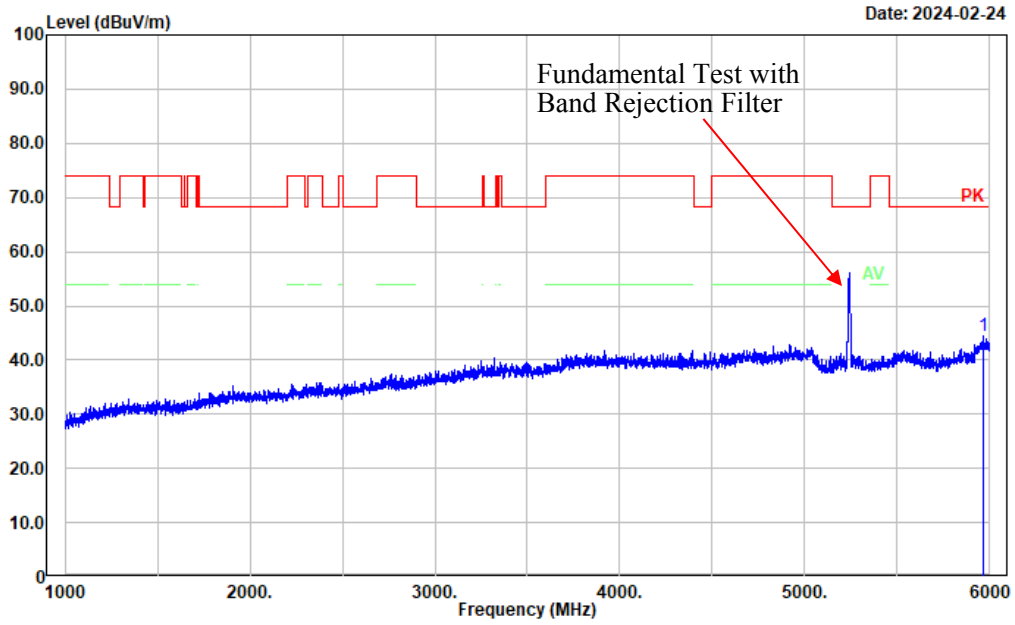
802.11a Mode highest channel was the worst case:

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: horizontal
Note:



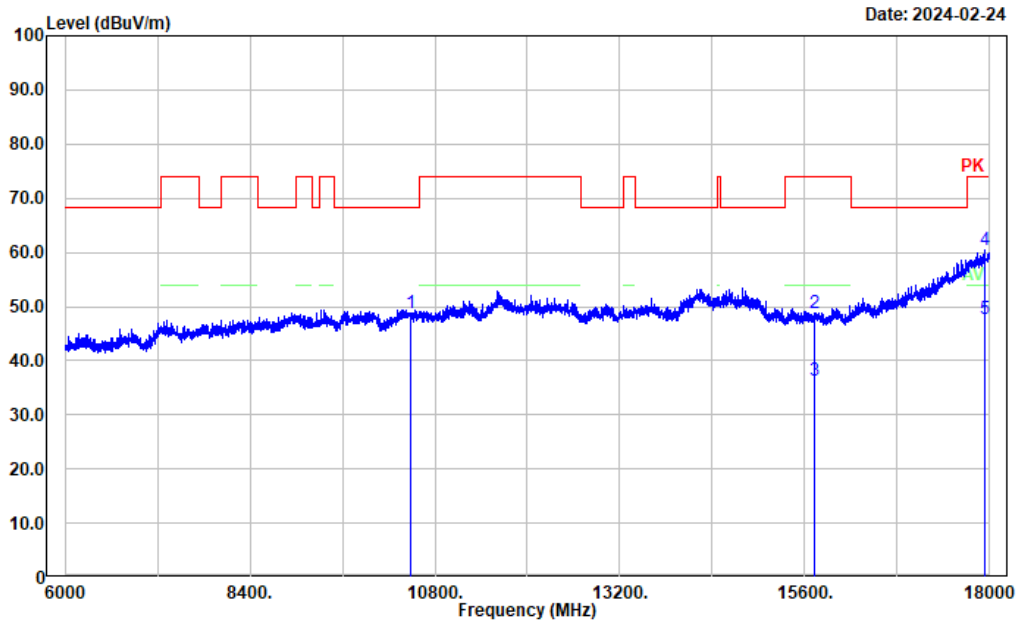
No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	5958.000	48.01	-3.11	44.90	68.20	23.30	Peak

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: vertical
Note:



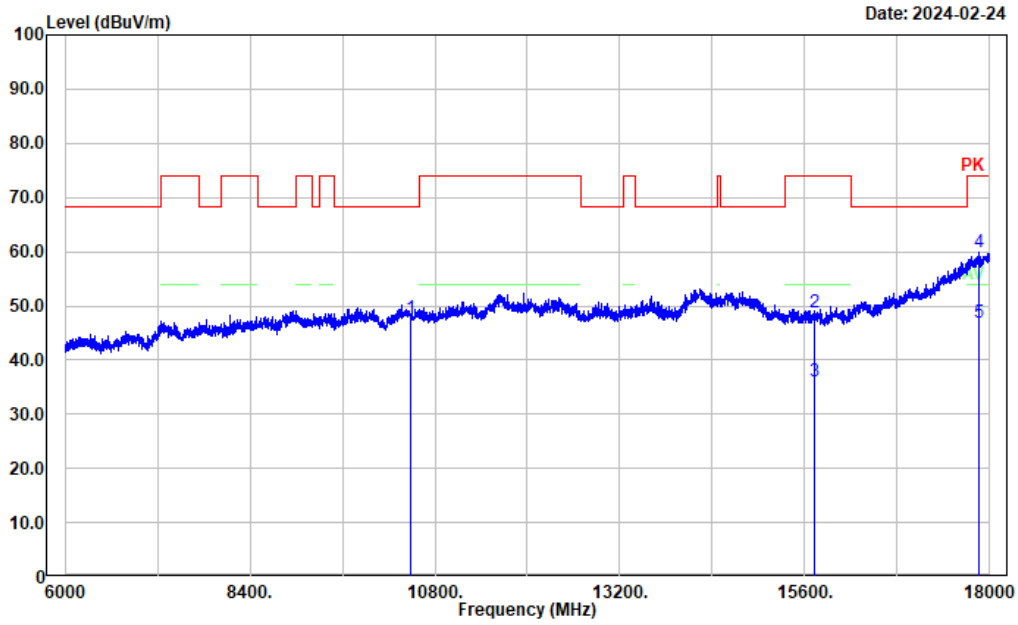
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5966.000	47.53	-3.13	44.40	68.20	23.80	Peak

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: horizontal
Note:



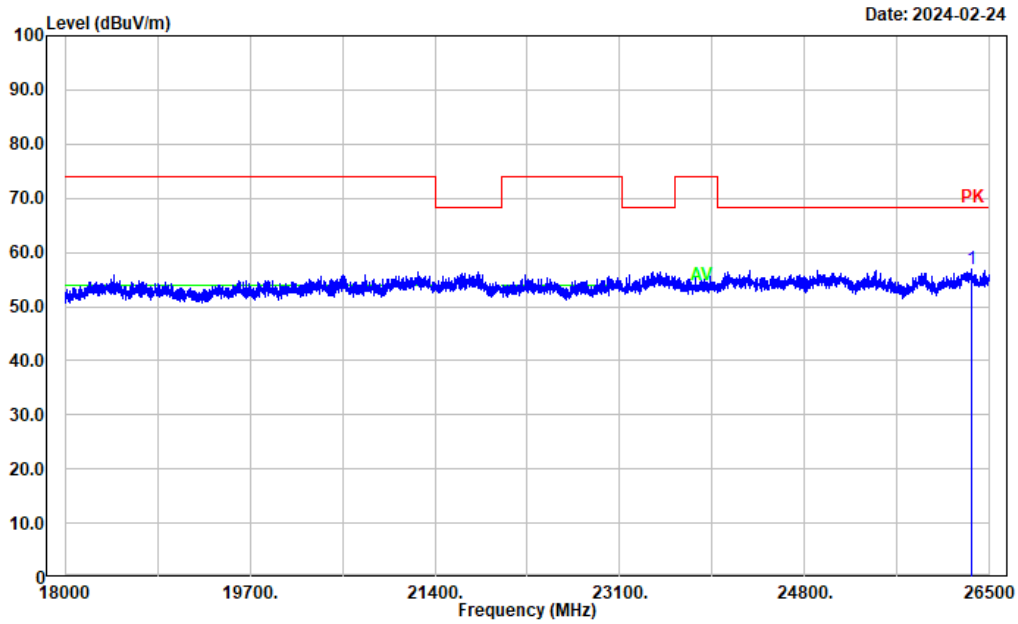
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	10480.000	44.35	4.51	48.86	68.20	19.34	Peak
2	15720.000	44.15	4.71	48.86	74.00	25.14	Peak
3	15720.000	31.72	4.71	36.43	54.00	17.57	Average
4	17932.800	44.41	16.05	60.46	74.00	13.54	Peak
5	17932.800	31.58	16.05	47.63	54.00	6.37	Average

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: vertical
Note:



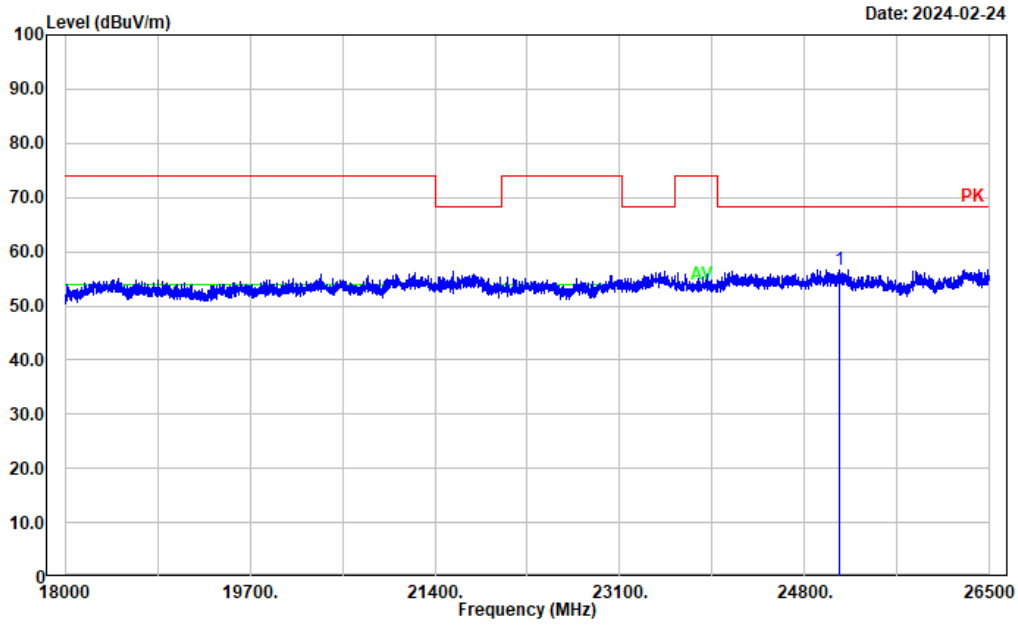
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	10480.000	43.11	4.51	47.62	68.20	20.58	Peak
2	15720.000	44.12	4.71	48.83	74.00	25.17	Peak
3	15720.000	31.25	4.71	35.96	54.00	18.04	Average
4	17860.800	43.78	16.09	59.87	74.00	14.13	Peak
5	17860.800	30.83	16.09	46.92	54.00	7.08	Average

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



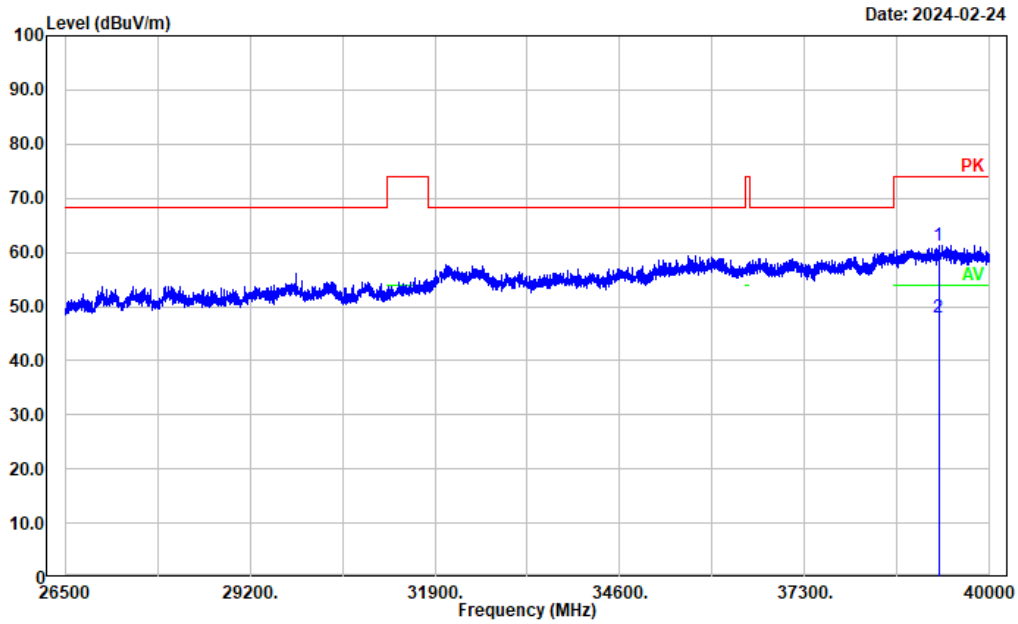
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	26328.300	49.94	6.87	56.81	68.20	11.39	Peak

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: vertical
Note:



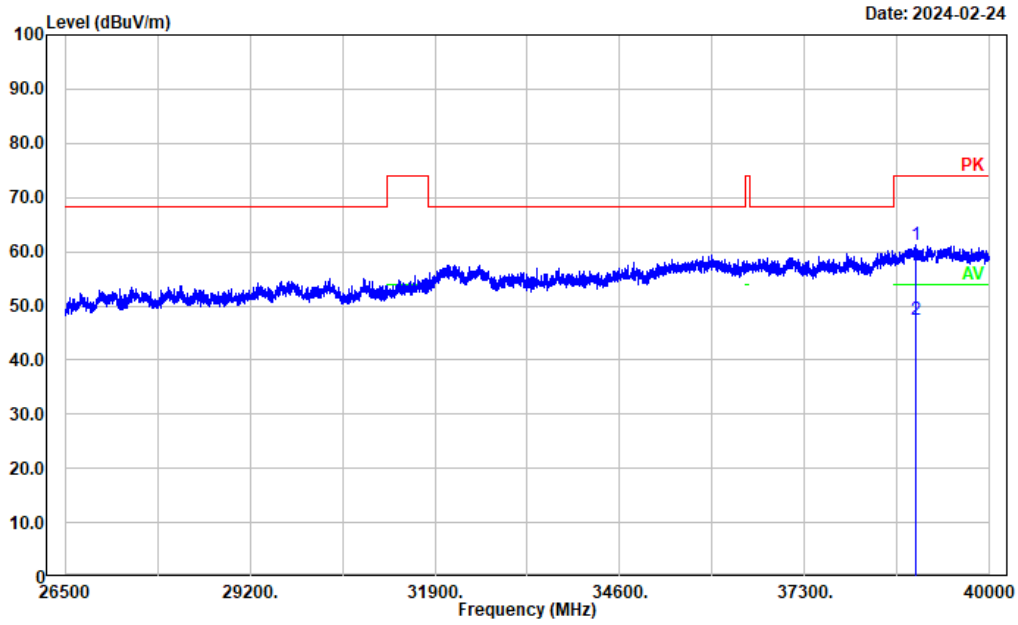
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	25116.200	49.93	6.83	56.76	68.20	11.44	Peak

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	39252.100	51.18	10.18	61.36	74.00	12.64	Peak
2	39252.100	37.68	10.18	47.86	54.00	6.14	Average

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:

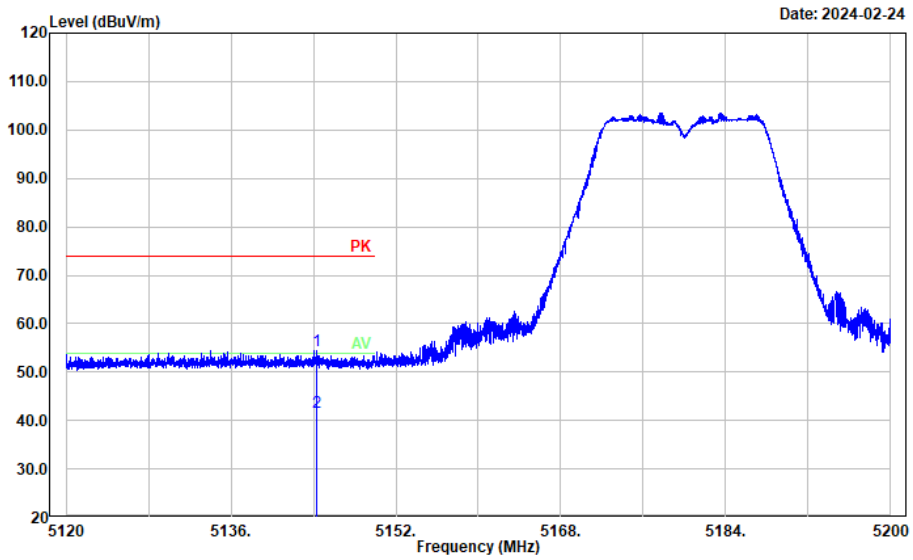


No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	38928.100	50.86	10.27	61.13	74.00	12.87	Peak
2	38928.100	37.28	10.27	47.55	54.00	6.45	Average

Band Edge Measurements (Radiated) Test Plots:

802.11a			
Test Channel:	**5180MHz**	**Ant. Polar. :**	**Horizontal**

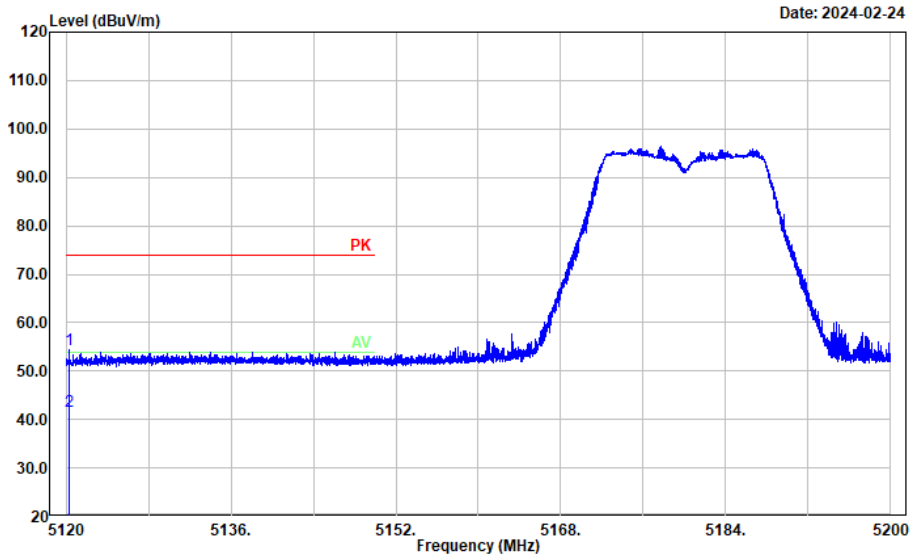
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5144.256	58.87	-4.42	54.45	74.00	19.55	Peak
2	5144.256	46.00	-4.42	41.58	54.00	12.42	Average

802.11a			
Test Channel:	**5180MHz**	**Ant. Polar. :**	**Vertical**

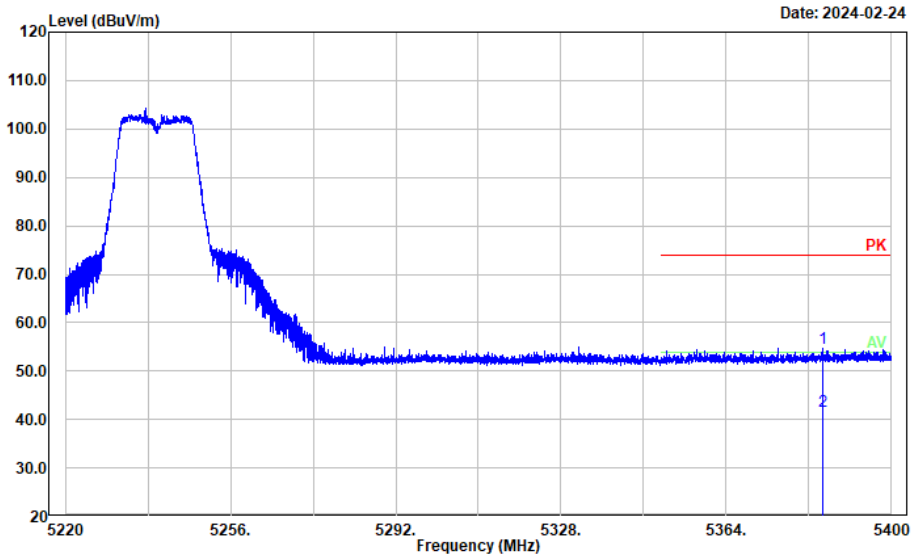
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5120.352	58.83	-4.49	54.34	74.00	19.66	Peak
2	5120.352	46.14	-4.49	41.65	54.00	12.35	Average

802.11a			
Test Channel:	**5240MHz**	**Ant. Polar. :**	**Horizontal**

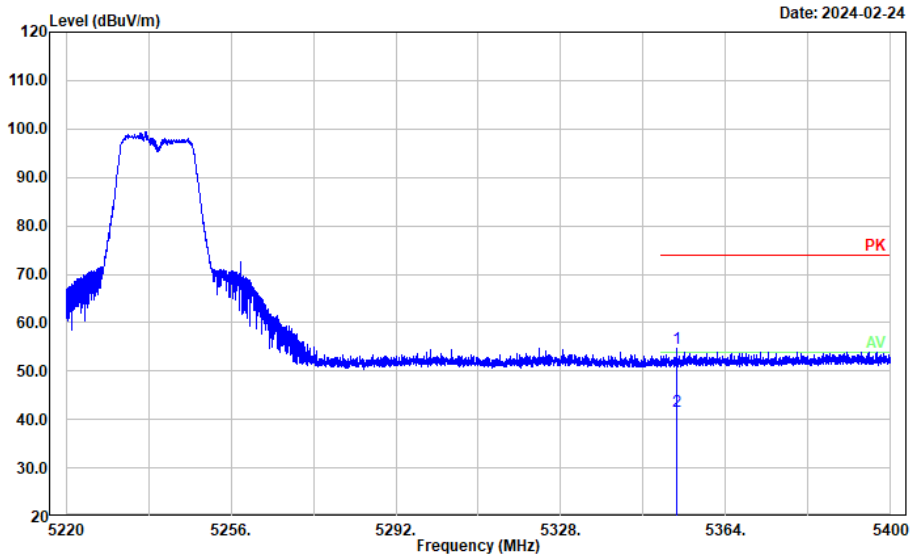
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5384.916	58.82	-4.00	54.82	74.00	19.18	Peak
2	5384.916	45.80	-4.00	41.80	54.00	12.20	Average

802.11a			
Test Channel:	**5240MHz**	**Ant. Polar. :**	**Vertical**

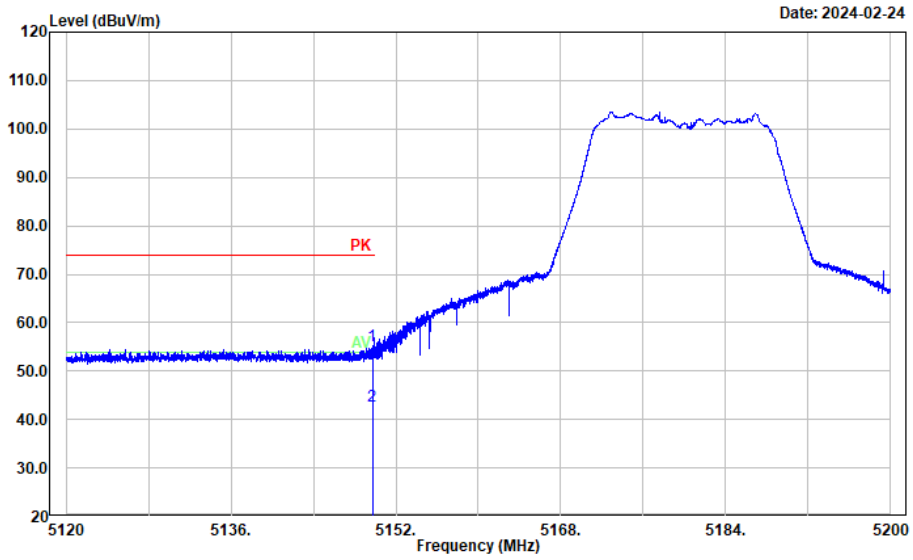
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5353.200	59.15	-4.38	54.77	74.00	19.23	Peak
2	5353.200	46.07	-4.38	41.69	54.00	12.31	Average

802.11n ht20			
Test Channel:	**5180MHz**	**Ant. Polar. :**	**Horizontal**

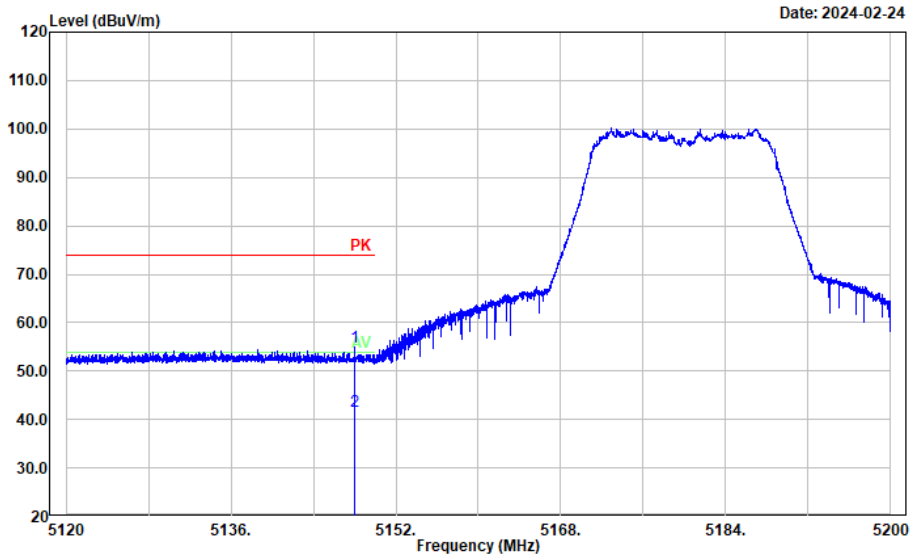
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5149.712	59.51	-4.40	55.11	74.00	18.89	Peak
2	5149.712	47.11	-4.40	42.71	54.00	11.29	Average

802.11n ht20			
Test Channel:	**5180MHz**	**Ant. Polar. :**	**Vertical**

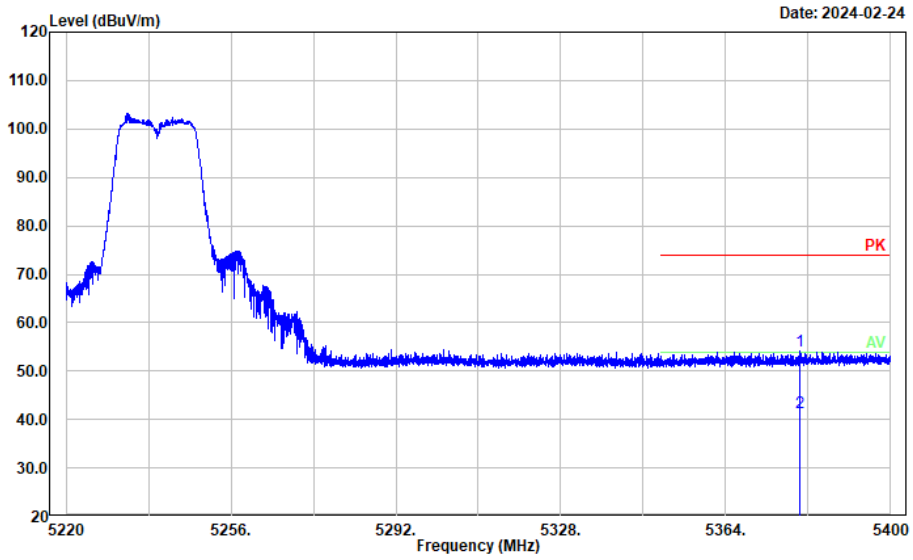
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5147.968	59.26	-4.41	54.85	74.00	19.15	Peak
2	5147.968	46.03	-4.41	41.62	54.00	12.38	Average

802.11n ht20			
Test Channel:	**5240MHz**	**Ant. Polar. :**	**Horizontal**

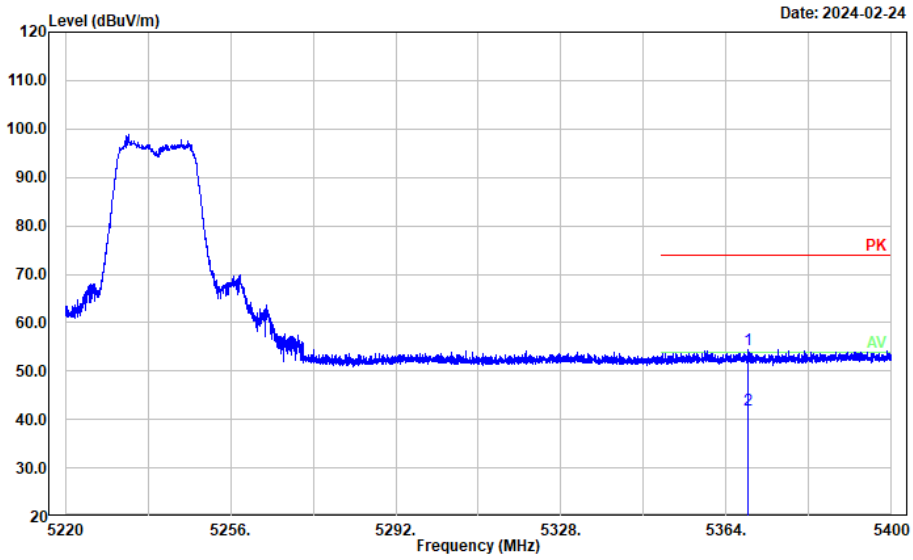
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5380.056	58.07	-4.05	54.02	74.00	19.98	Peak
2	5380.056	45.58	-4.05	41.53	54.00	12.47	Average

802.11n ht20			
Test Channel:	**5240MHz**	**Ant. Polar. :**	**Vertical**

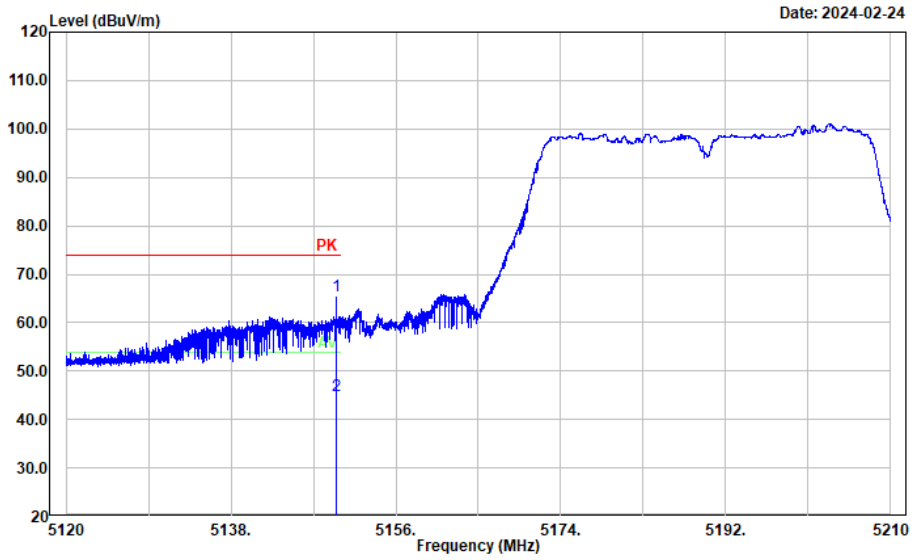
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	5368.644	58.53	-4.19	54.34	74.00	19.66	Peak
2	5368.644	46.20	-4.19	42.01	54.00	11.99	Average

802.11n ht40			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Horizontal**

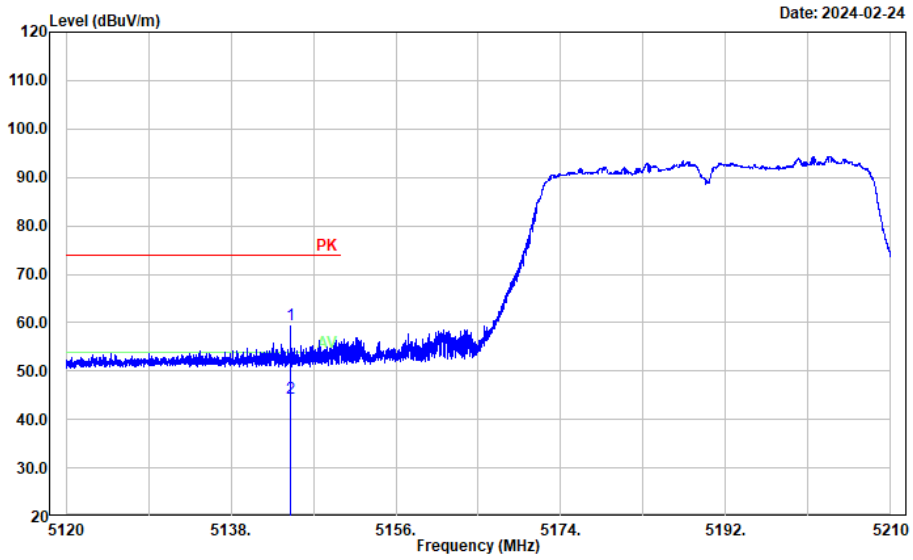
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5149.430	69.89	-4.40	65.49	74.00	8.51	Peak
2	5149.430	49.23	-4.40	44.83	54.00	9.17	Average

802.11n ht40			
Test Channel:	**5190MHz**	**Ant. Polar. :**	**Vertical**

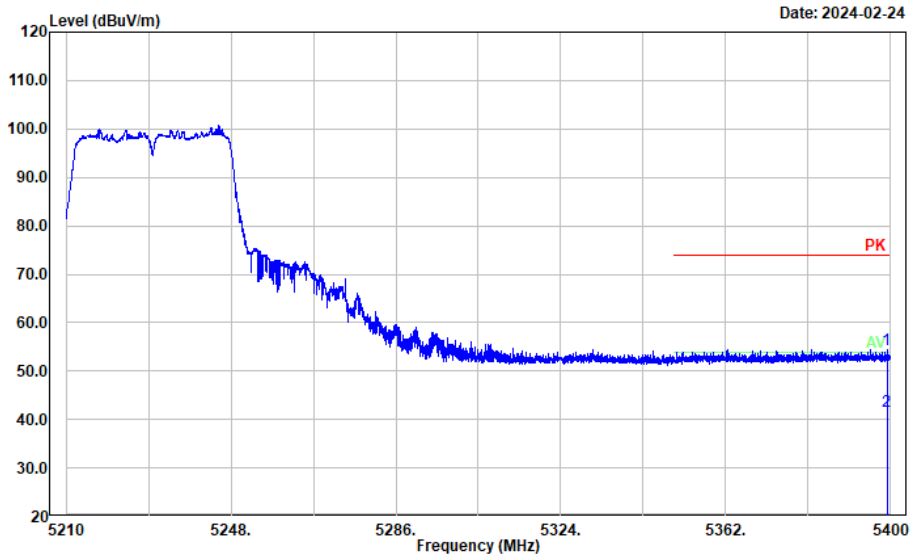
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5144.480	64.04	-4.42	59.62	74.00	14.38	Peak
2	5144.480	48.80	-4.42	44.38	54.00	9.62	Average

802.11n ht40			
Test Channel:	**5230MHz**	**Ant. Polar. :**	**Horizontal**

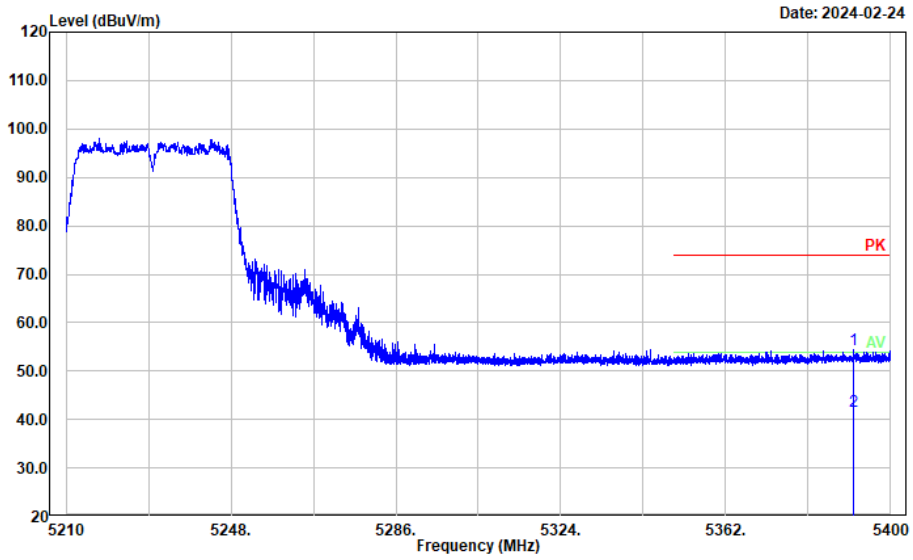
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5399.126	58.30	-3.81	54.49	74.00	19.51	Peak
2	5399.126	45.43	-3.81	41.62	54.00	12.38	Average

802.11n ht40			
Test Channel:	**5230MHz**	**Ant. Polar. :**	**Vertical**

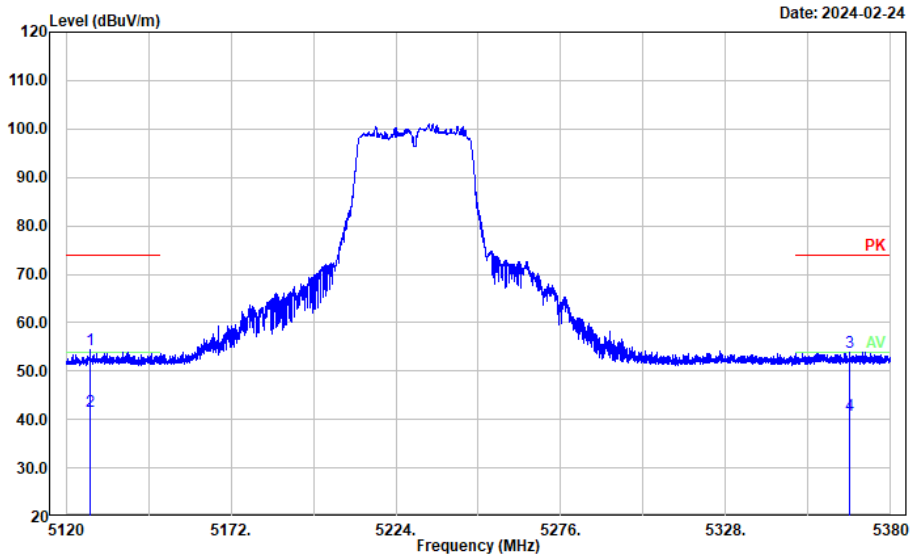
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5391.374	58.25	-3.91	54.34	74.00	19.66	Peak
2	5391.374	45.46	-3.91	41.55	54.00	12.45	Average

802.11ac vht80			
Test Channel:	**5210MHz**	**Ant. Polar. :**	**Horizontal**

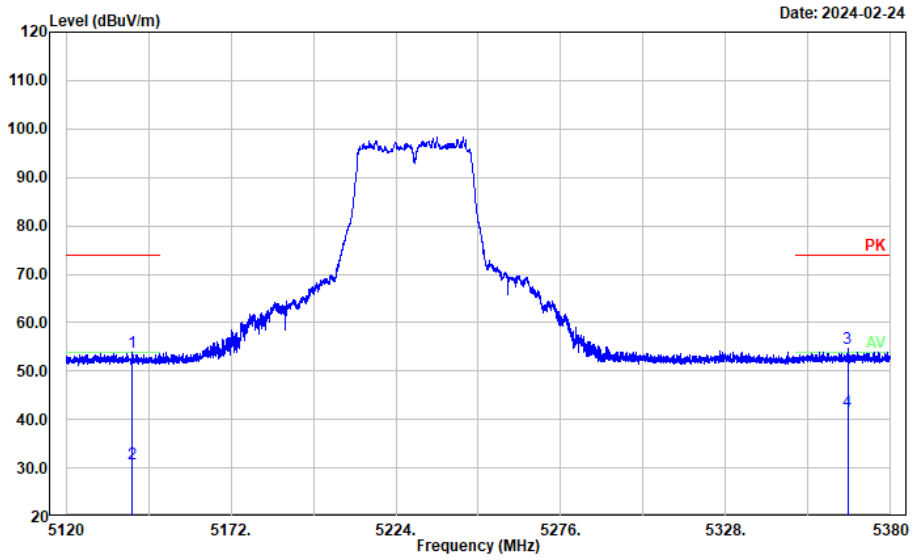
Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Horizontal
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5127.644	58.80	-4.47	54.33	74.00	19.67	Peak
2	5127.644	46.19	-4.47	41.72	54.00	12.28	Average
3	5367.104	58.16	-4.22	53.94	74.00	20.06	Peak
4	5367.104	45.04	-4.22	40.82	54.00	13.18	Average

802.11ac vht80			
Test Channel:	**5210MHz**	**Ant. Polar. :**	**Vertical**

Project No.: CR231063791-RF
Tester: Tao Zhu
Polarization: Vertical
Note:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	5140.748	58.25	-4.44	53.81	74.00	20.19	Peak
2	5140.748	35.26	-4.44	30.82	54.00	23.18	Average
3	5366.428	59.03	-4.22	54.81	74.00	19.19	Peak
4	5366.428	45.77	-4.22	41.55	54.00	12.45	Average

4.3 Emission Bandwidth

Serial Number:	2CWK-2	Test Date:	2023/11/16
Test Site:	RF	Test Mode:	Transmitting
Tester:	LingLing Li		

Environmental Conditions:					
Temperature: (℃)	24.1	Relative Humidity: (%)	65	ATM Pressure: (kPa)	101.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	100147	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

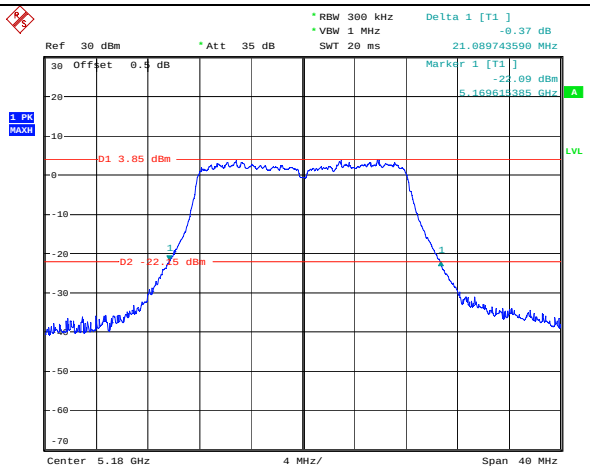
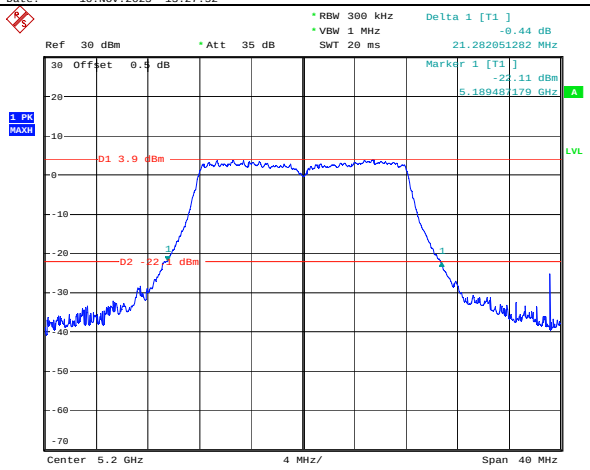
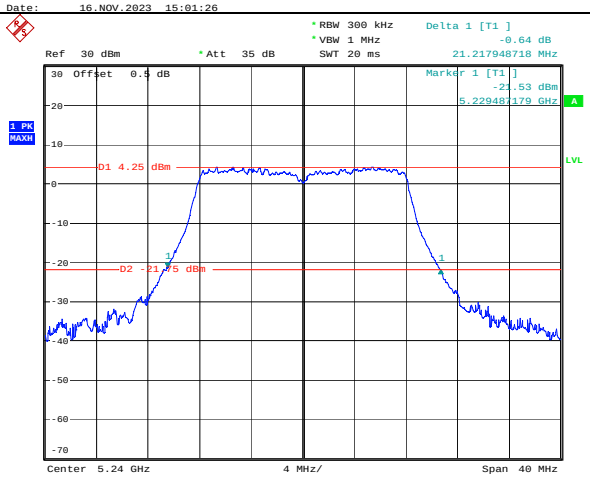
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

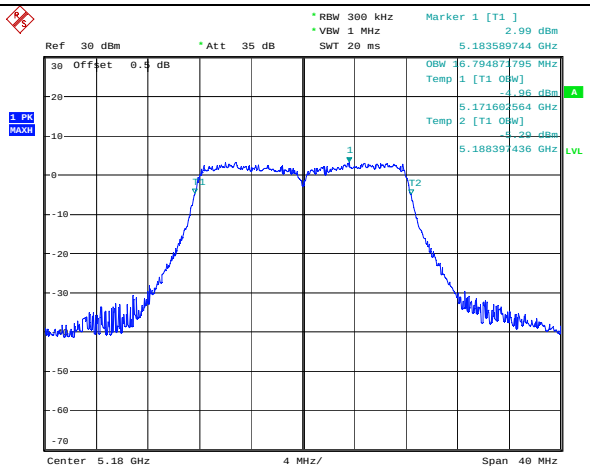
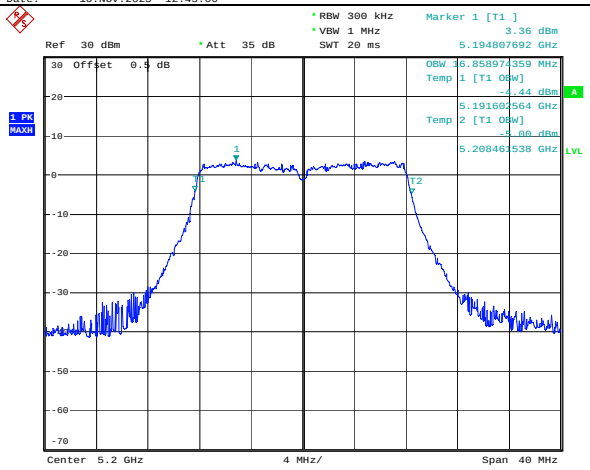
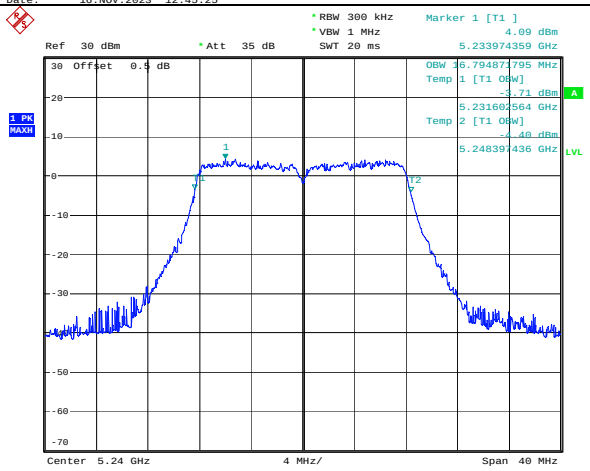
Test Modes	Test Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180	21.09	16.795
	5200	21.282	16.859
	5240	21.218	16.795
802.11n ht20	5180	21.731	17.821
	5200	21.731	17.885
	5240	21.603	17.885
802.11n ht40	5190	42.564	36.538
	5230	42.308	36.410
802.11ac vht80	5210	82.308	75.641

Note:
The 99% Occupied Bandwidth have not fall into the band 5250-5350MHz, please refer to the test plots of 99% Occupied Bandwidth

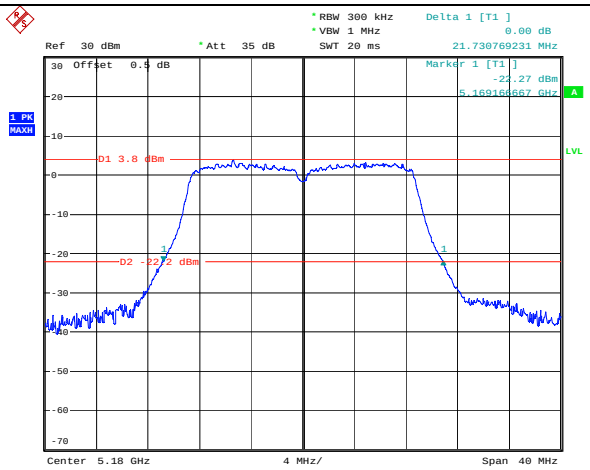
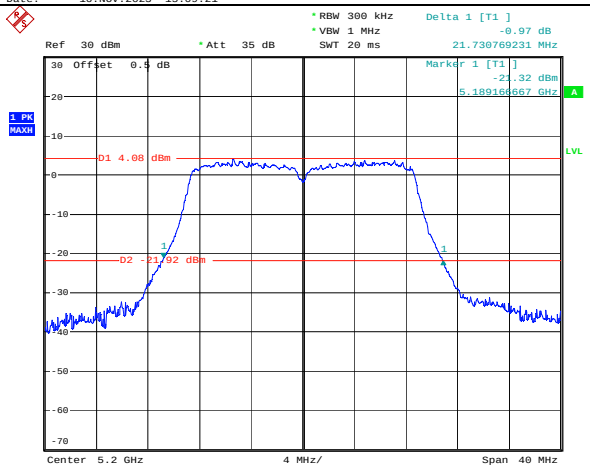
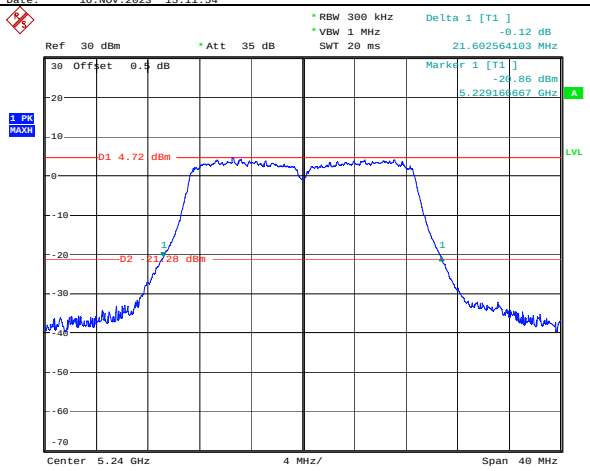
26dB Emission Bandwidth

802.11a Lowest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 13:27:52
802.11a Middle Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 15:01:26
802.11a Highest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 15:06:34

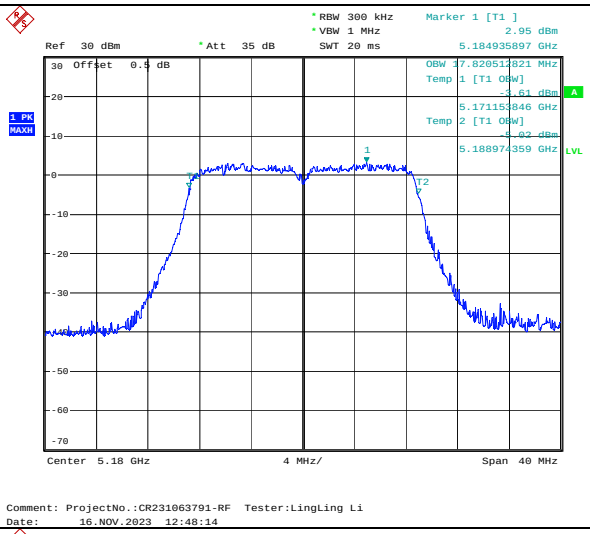
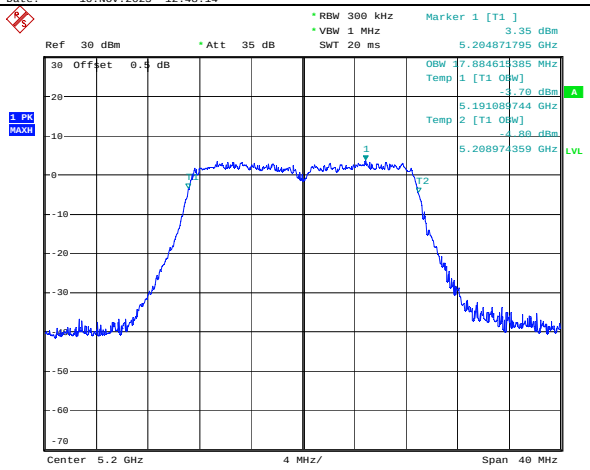
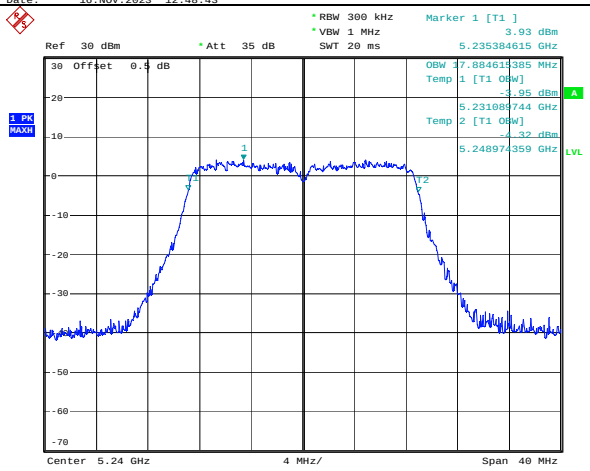
99% Emission Bandwidth

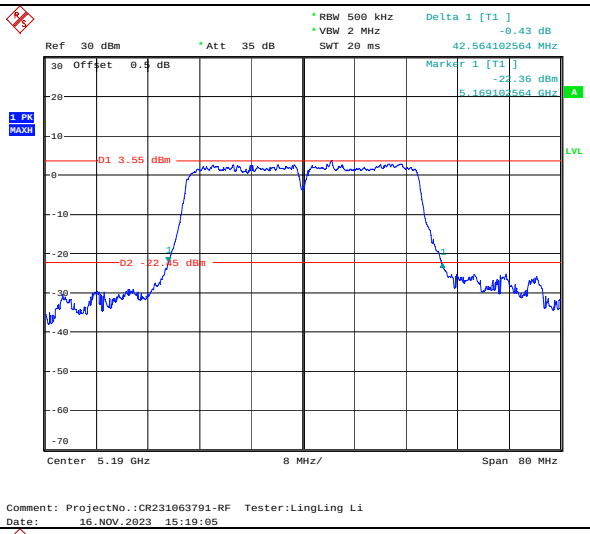
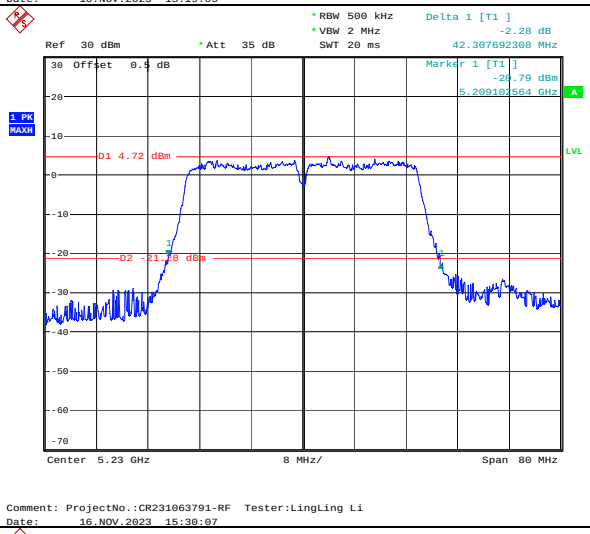
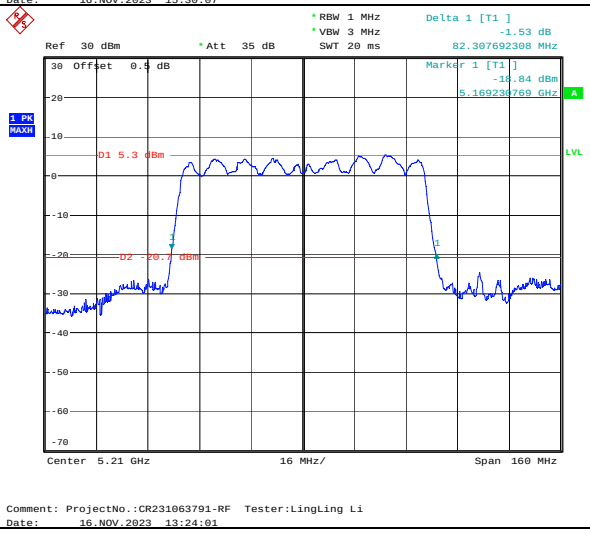
802.11a Lowest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:45:00
802.11a Middle Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:45:25
802.11a Highest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:44:14

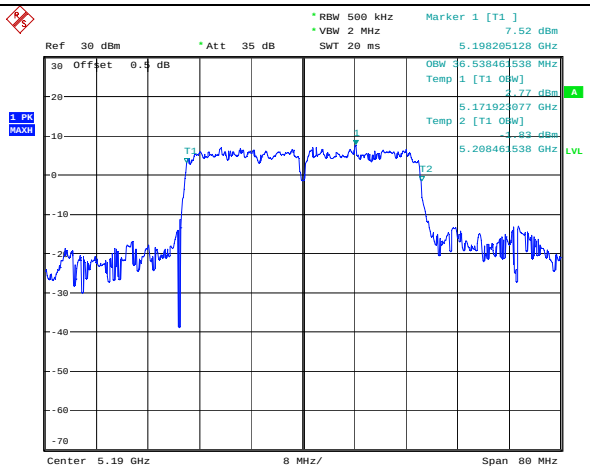
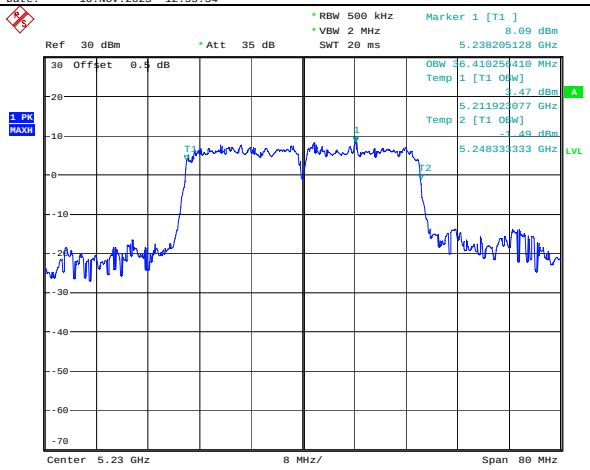
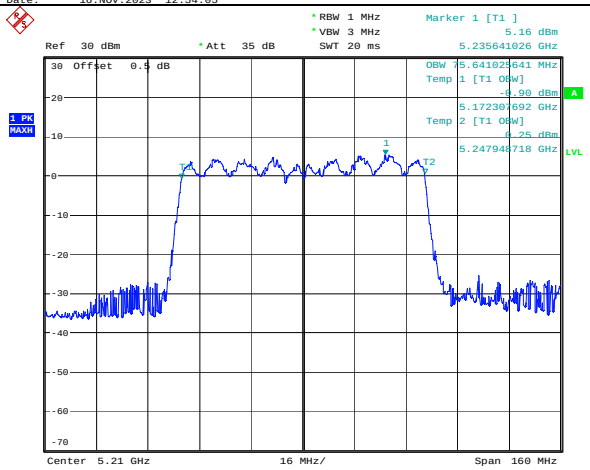
26dB Emission Bandwidth

802.11n ht20 Lowest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 15:09:21
802.11n ht20 Middle Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 15:11:54
802.11n ht20 Highest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 15:13:24

99% Emission Bandwidth

802.11n ht20 Lowest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:48:14
802.11n ht20 Middle Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:48:43
802.11n ht20 Highest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:49:07

26dB Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

99% Emission Bandwidth	
802.11n ht40 Lowest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:55:34
802.11n ht40 Highest Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:54:05
802.11ac vht80 Middle Channel	 Comment: ProjectNo.:CR231063791-RF Tester:LingLing Li Date: 16.NOV.2023 12:56:29

4.4 Maximum Conducted Output Power

Serial Number:	2CWK-2	Test Date:	2023/11/16
Test Site:	RF	Test Mode:	Transmitting
Tester:	LingLing Li	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	24.1	Relative Humidity: (%)	65	ATM Pressure: (kPa)	101.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A
Anritsu	Power Meter	ML2495A	1106009	2023/8/4	2024/8/3
Anritsu	Pulse Power Sensor	MA2411A	10780	2023/8/4	2024/8/3

** 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)	Max. Conducted Average Output Power (dBm)	
		Result	Limit
802.11a	5180	11.17	24
	5200	11.28	24
	5240	11.64	24
802.11n ht20	5180	11.16	24
	5200	11.27	24
	5240	11.72	24
802.11n ht40	5190	11.52	24
	5230	**12.15**	24
802.11ac vht80	5210	11.96	24
Note: The device is a client device.			

4.5 Maximum Power Spectral Density

Serial Number:	2CWK-2	Test Date:	2023/11/16
Test Site:	RF	Test Mode:	Transmitting
Tester:	LingLing Li	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	24.1	Relative Humidity: (%)	65	ATM Pressure: (kPa)	101.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	100147	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

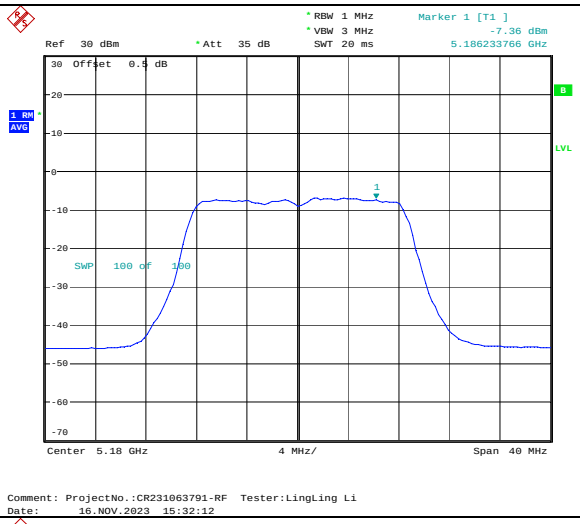
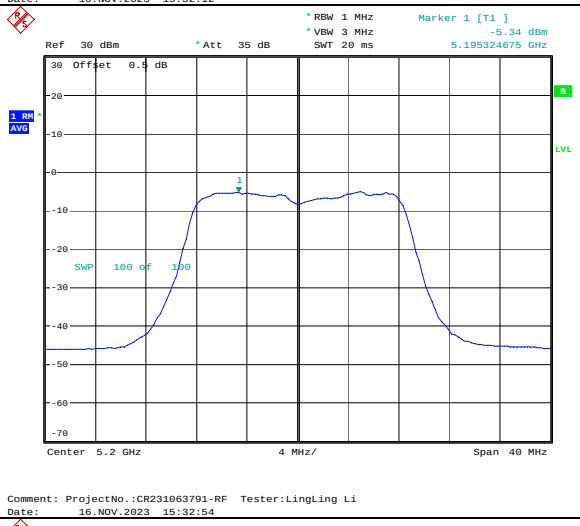
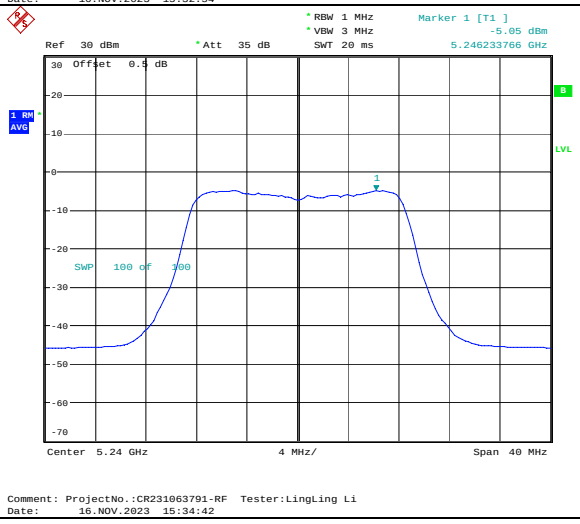
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

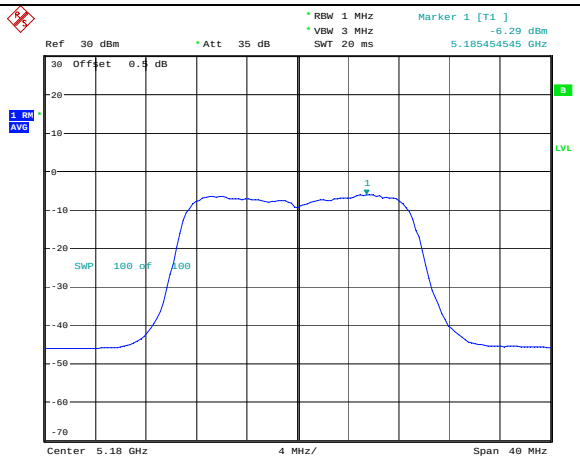
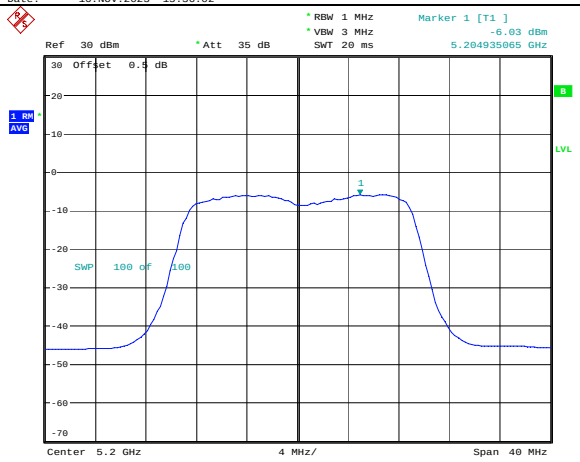
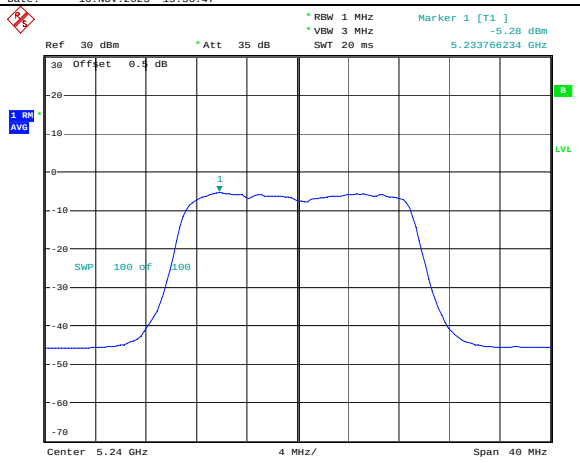
Test Data:

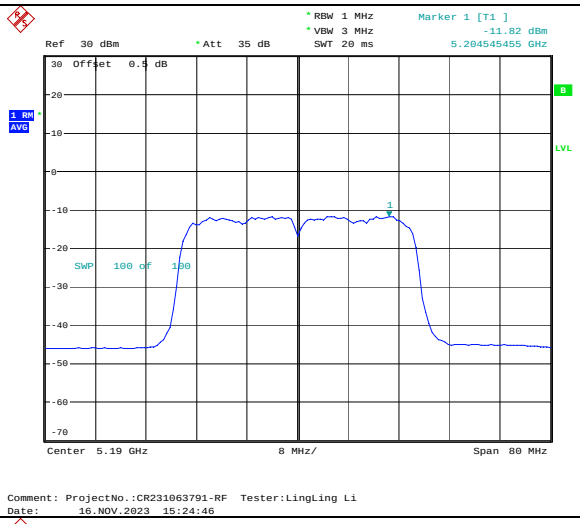
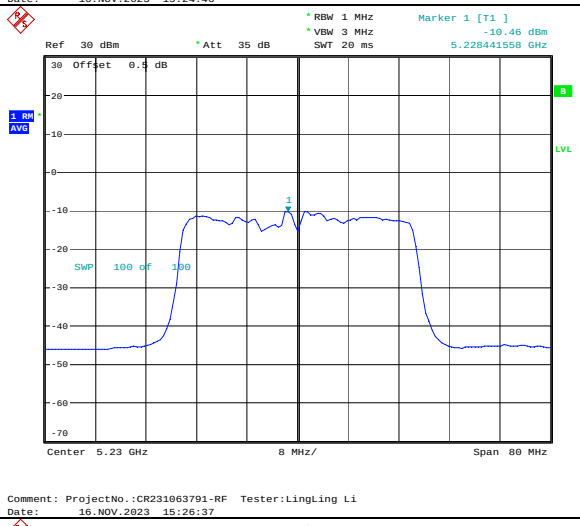
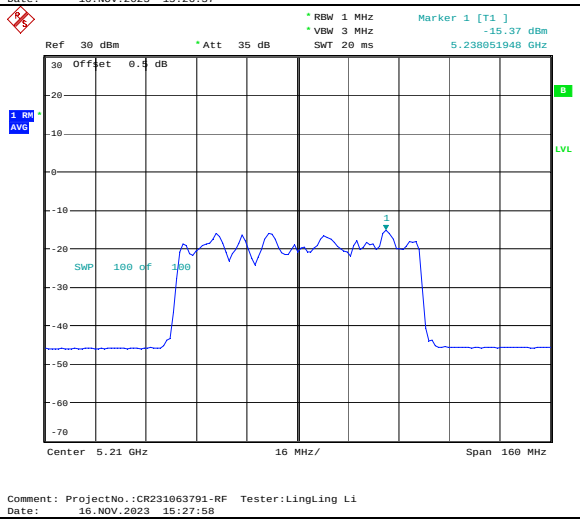
5150-5250 MHz:

Test Modes	Test Frequency (MHz)	Reading (dBm/MHz)	Duty Cycle Factor (dB)	Maximum Power Spectral Density (dBm/MHz)	
				Result	Limit
802.11a	5180	-7.36	6.46	-0.90	11
	5200	-5.34	6.46	1.12	11
	5240	-5.05	6.46	1.41	11
802.11n ht20	5180	-6.29	6.82	0.53	11
	5200	-6.03	6.82	0.79	11
	5240	-5.28	6.82	1.54	11
802.11n ht40	5190	-11.82	9.79	-2.03	11
	5230	-10.46	9.79	-0.67	11
802.11ac vht80	5210	-15.37	12.39	-2.98	11

Note:
Duty cycle <98%, and duty cycle variations are less than ±2%, KDB 789033 D02 General UNII Test Procedures New Rules v02r01 Method SA-2 was used.
For Duty cycle<98%, and Duty cycle be considered to be constant (variations are less than ±2%), the duty cycle factor was added into the result.

Maximum Power Spectral Density	
802.11a Lowest Channel	
802.11a Middle Channel	
802.11a 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 Highest Channel	
802.11ac vht80 Middle Channel	

4.6 Duty Cycle

Serial Number:	2CWK-2	Test Date:	2023/11/16
Test Site:	RF	Test Mode:	Transmitting
Tester:	LingLing Li		

Environmental Conditions:					
Temperature: (℃)	24.1	Relative Humidity: (%)	65	ATM Pressure: (kPa)	101.7

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU26	100147	2023/3/31	2024/3/30
zhuoxiang	Coaxial Cable	SMA-178	211003	Each time	N/A

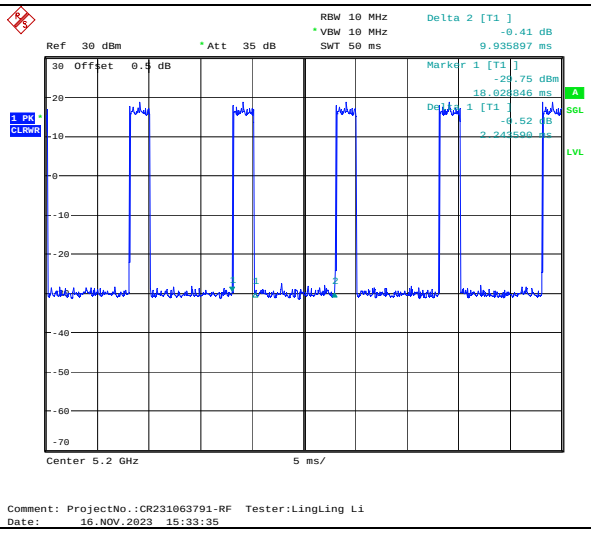
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

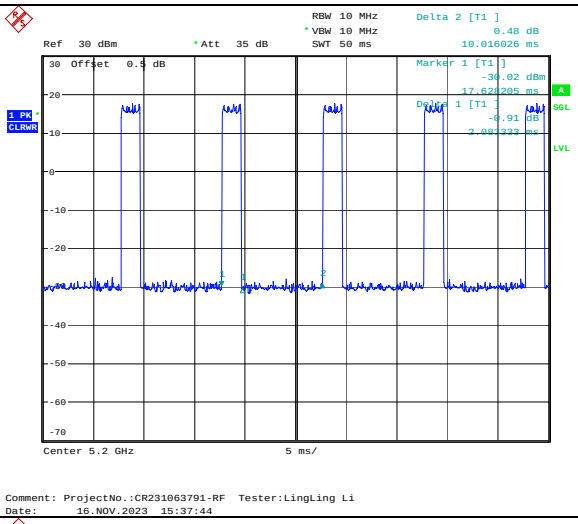
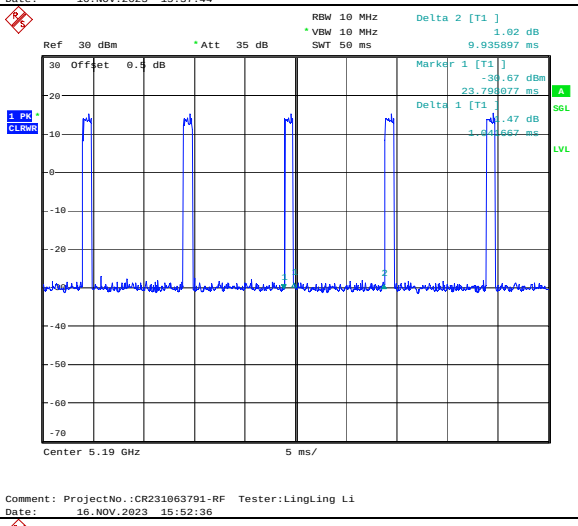
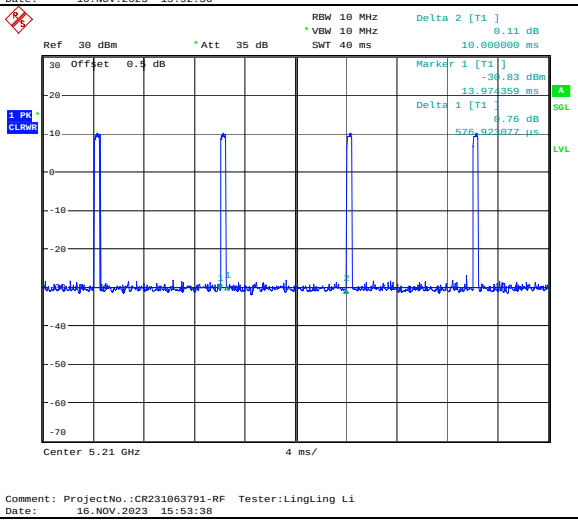
Test Data:

Test Modes	Ton (ms)	Ton+off (ms)	Duty cycle (%)	1/T (Hz)	Duty Cycle Factor (dB)	VBW Setting (kHz)
802.11a	2.244	9.936	22.58	446	6.46	0.5
802.11n ht20	2.083	10.016	20.80	480	6.82	0.5
802.11n ht40	1.042	9.936	10.49	960	9.79	1
802.11ac vht80	0.577	10	5.77	1733	12.39	2

Duty Cycle

802.11a



Duty Cycle	
802.11n ht20	
802.11n ht40	
802.11ac vht80	

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

FCC §1.1310 & §2.1091

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

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

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

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

5.1.2 Procedure

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.1.3 Calculated Result

Mode	Frequency Range (MHz)	Antenna Gain		Conducted Output Power Including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm2)	MPE Limit (mW/cm2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE 1Mbps	2402-2480	4.18	2.618	2.0	1.58	20	0.001	1
2.4GHz WLAN	2412-2462	4.18	2.618	19.5	89.13	20	0.046	1
5.2GHz WLAN	5150~5250	2.66	1.845	12.5	17.78	20	0.007	1

Note:
1.Non simultaneously transmission in the band 2.4GHz, 5.2GHz.
2.The Maximum Conducted Power including Tune-up Tolerance was declared by manufacturer.

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

6. EUT PHOTOGRAPHS

Please refer to the attachment CR231063791-EXP EUT EXTERNAL PHOTOGRAPHS and CR231063791-INP EUT INTERNAL PHOTOGRAPHS

7. TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR231063791-00C-TSP TEST SETUP PHOTOGRAPHS.

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