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

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

TEST REPORT

Applicant: **D-ROBOTICS HOLDING LIMITED**

Address: SUITE 603,6/F LAWS COMM PLAZA 788 CHEUNG SHA WAN RD KLN HONG KONG

FCC ID: **2BGUG-RDKX5K**

Product Name: **RDK X5**

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

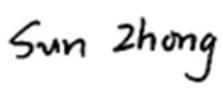
The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **2403Z107562E-RF-00B**

Date Of Issue: **2024/12/20**

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

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



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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.

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Each test item follows the test standard(s) without deviation.

CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2403Z107562E-RF-00B	Original Report	2024/12/20

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

1.1.1 General

EUT Name:	RDK X5
EUT Model:	RDK X5 8G
Multiple Model:	RDK X5 4G
Operation Frequency:	2402-2480 MHz
Maximum Peak Output Power (Conducted):	4.35dBm
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Rated Input Voltage:	DC 5V from Type-C Port
Sample Number:	RF:2V9E-1(RDK X5 8G) CE&RE: 2V9E-2(RDK X5 8G), 2V9E-3(RDK X5 4G)
EUT Received Date:	2024/11/29
EUT Received Status:	Good
Note: The multiple models are electrically identical with the test model. Please refer to the declaration letter for more detail, which was provided by manufacturer.	

1.1.2 Operation Frequency Detail

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	41	2443
…	…	…	…
…	…	…	…
…	…	78	2480
39	2441		

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

Test Channel	Frequency (MHz)
Lowest	2402
Middle	2441
Highest	2480

1.1.3 Antenna Information Detail▲

Antenna Type	input impedance (Ohm)	Frequency Range (MHz)	Antenna Gain (dBi)
Chip	50	2400-2500	0.43

The Method of §15.203 Compliance either:

☒ 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
/	/	/

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:	MobaXterm.exe

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

Test Modes	Power Level Setting		
	Lowest Channel	**Middle Channel**	**Highest Channel**
GFSK	**default**	**default**	**default**
π/4-DQPSK	**default**	**default**	**default**
8DPSK	**default**	**default**	**default**

1.2.2 Support Equipment List and Details

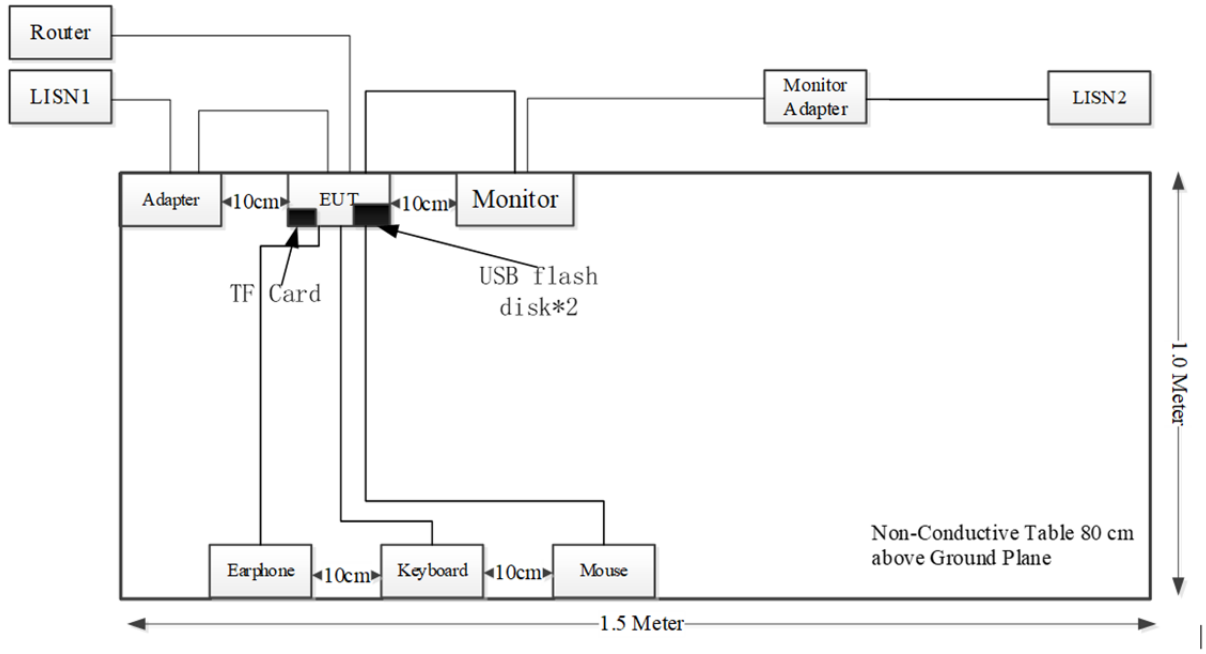
Manufacturer	Description	Model	Serial Number
PHILIPS	Keyboard	SPT6234	K234210510746
PHILIPS	Mouse	SPT6234	C234210506222
Tenda	Router	RX12 Pro	ED331010215000033
Fangxin	Adapter	HT-PD27W-CN	AD220930001
HP	USB Disk	HPFD206W-32	PAA6918477
HP	USB Disk	HPFD206W-32	PAA6902271
ViewSonic	Monitor	VX1630-4K-HD	W9F203900071
IPRO	Earphone	Phonenix 5.0s	EP221126001
SanDisk	TF Card	32 GB	521005904698
Hytera	Monitor Adapter	HKA01212010-XQ	PS1014

1.2.3 Support Cable List and Details

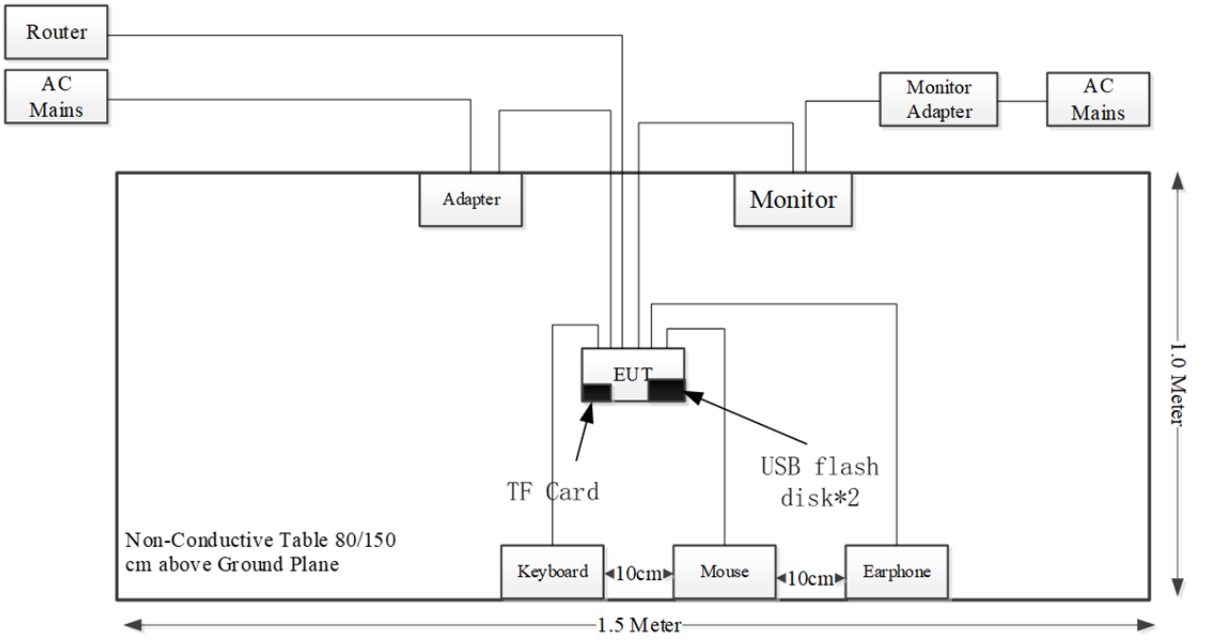
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Keyboard Cable	NO	NO	1.2	EUT	Keyboard
Mouse Cable	NO	NO	1.2	EUT	Mouse
Power Cable	NO	NO	1.2	Adapter	EUT
RJ45 Cable	NO	NO	3	Router	EUT
HDMI Cable	NO	NO	1.2	EUT	Monitor
Earphone Cable	NO	NO	1.2	EUT	Earphone
Power Cable	NO	NO	1.5	Monitor Adapter	Monitor

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

FCC Rules	Description of Test	Result
FCC §15.203	Antenna Requirement	PASS
FCC §15.207(a)	AC Line Conducted Emissions	PASS
FCC §15.205, §15.209, §15.247(d)	Radiated Spurious Emission	PASS
FCC §15.247(a)(1)	20 dB Emission Bandwidth	PASS
FCC §15.247(a)(1)	Channel Separation	PASS
FCC §15.247(a)(1)(iii)	Number of Hopping Frequency	PASS
FCC §15.247(a)(1)(iii)	Time of Occupancy (dwell time)	PASS
FCC §15.247(b)(1)	Maximum Conducted Output Power	PASS
FCC §15.247(d)	100 kHz Bandwidth of Frequency Band Edge	PASS

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:

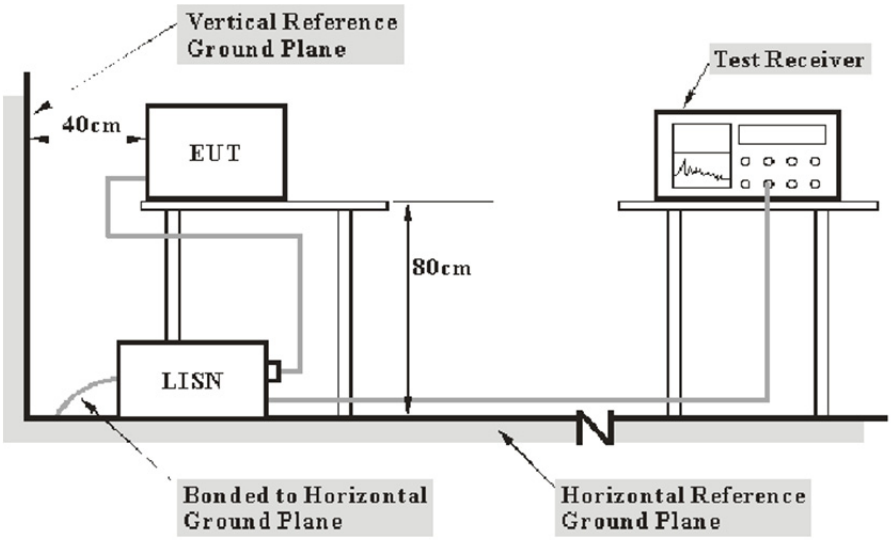
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(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, obtaining 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 10cm.

3.1.3 EMI Test Receiver Setup

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

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 Radiated Spurious Emissions

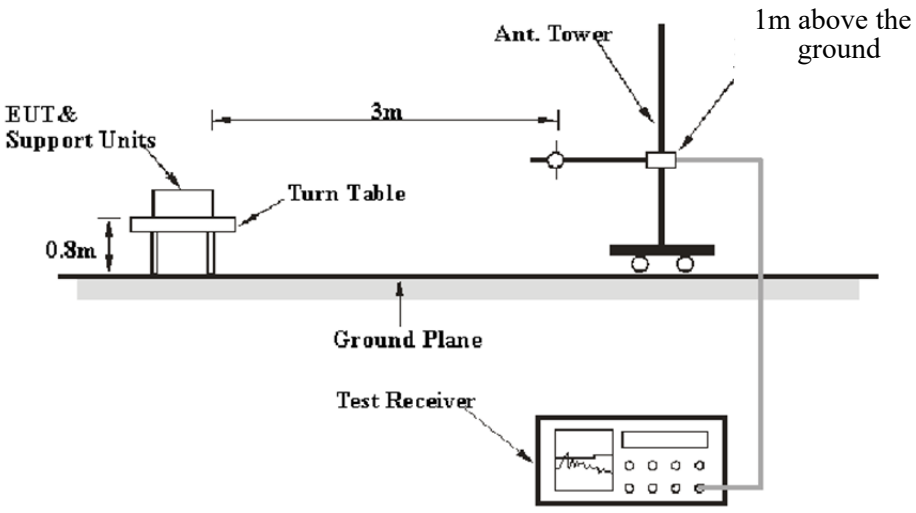
3.2.1 Applicable Standard

FCC §15.247 (d);

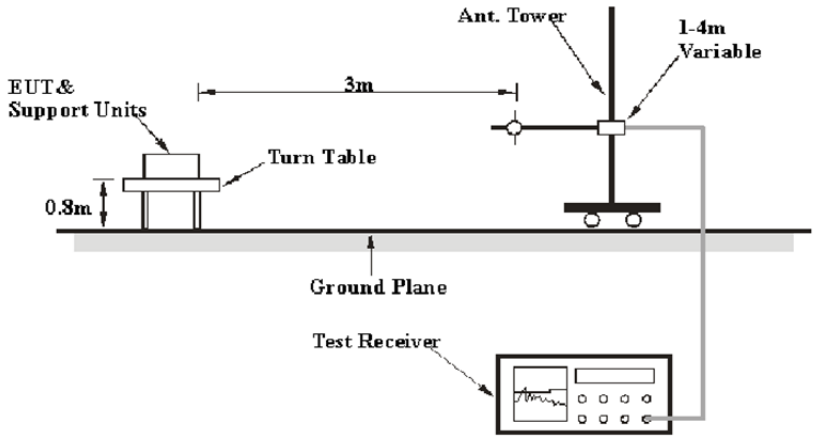
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the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

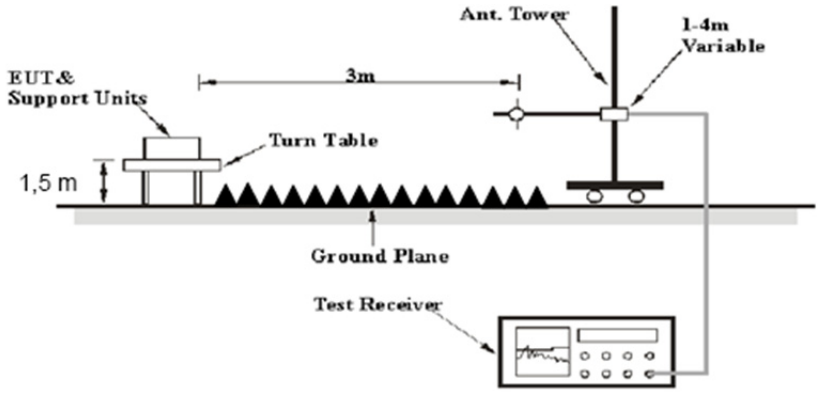
9kHz - 30MHz:



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 limits.

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

The spacing between the peripherals was 10cm.

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:

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

1GHz – 25GHz:
Pre-scan:

Measurement	RBW	Video B/W	Detector
PK	1MHz	3 MHz	Peak
AV	1MHz	5 kHz	Peak

Final measurement for emission identified during the pre-scan:

Measurement	RBW	Video B/W	Detector
PK	1MHz	3 MHz	Peak
AV	1MHz	10 Hz	Peak

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

The spurious emissions which below the limit more than 20dB was not be recorded.

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 except 9–90 kHz, 110–490 kHz, employing an average detector, peak and Average detection modes for frequencies above 1 GHz.

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:

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

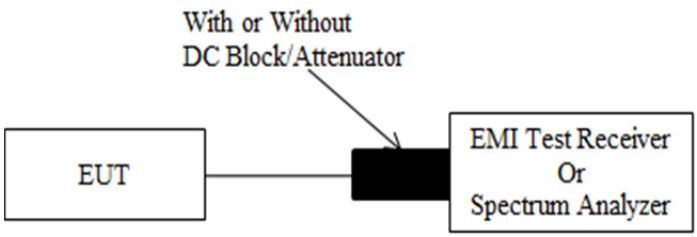
3.3 20 dB Emission Bandwidth

3.3.1 Applicable Standard

FCC §15.247 (a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

3.3.2 EUT Setup



3.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five 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 video bandwidth (VBW) shall be approximately three times 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) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) 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).

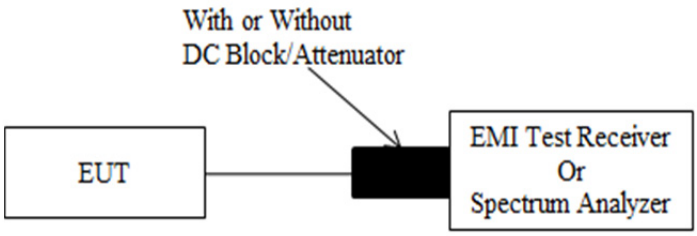
3.4 Channel Separation

3.4.1 Applicable Standard

FCC §15.247 (a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

3.4.2 EUT Setup



3.4.3 Test Procedure

According to ANSI C63.10-2013 Section 7.8.2

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

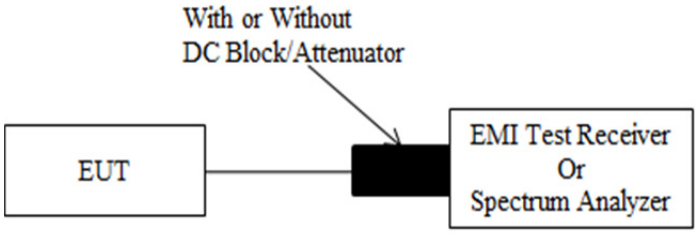
3.5 Number Of Hopping Frequency

3.5.1 Applicable Standard

FCC §15.247 (a)(1)(iii)

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

3.5.2 EUT Setup



3.5.3 Test Procedure

According to ANSI C63.10-2013 Section 7.8.3

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize

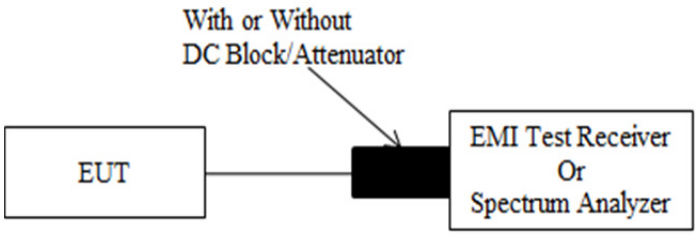
It might prove necessary to break the span up into sub ranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

3.6 Time Of Occupancy (Dwell Time)

3.6.1 Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

3.6.2 EUT Setup



3.6.3 Test Procedure

According to ANSI C63.10-2013 Section 7.8.4

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / *T*, where *T* is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) =
(number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)

The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

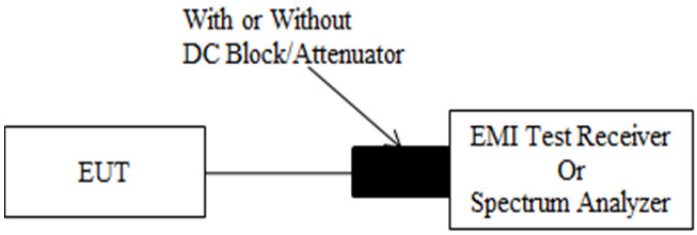
3.7 Maximum Conducted Output Power

3.7.1 Applicable Standard

FCC §15.247 (b)(1)

For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band:0.125watts

3.7.2 EUT Setup



3.7.3 Test Procedure

According to ANSI C63.10-2013 Section 7.8.5

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation, Offset the Insertion loss of the RF cable, DC Block/ Attenuator into the spectrum analyzer. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
e) A plot of the test results and setup description shall be included in the test report.

NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

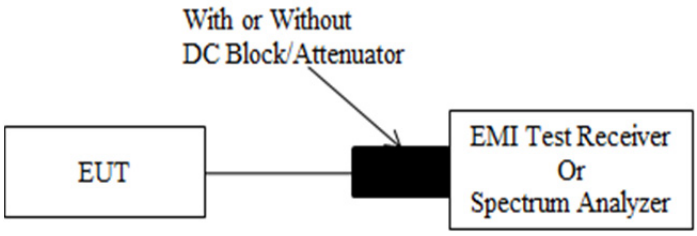
3.8 100 kHz Bandwidth of Frequency Band Edge

3.8.1 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)).

3.8.2 EUT Setup



3.8.3 Test Procedure

According to ANSI C63.10-2013 Section 7.8.6

For band-edge measurements, use the band-edge procedure in 6.10. Band-edge measurements shall be tested both on single channels, and with the EUT hopping.

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. Report the three highest emissions relative to the limit.

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

Sample Number:	2V9E-2, 2V9E-3	Test Date:	2024/12/16
Test Site:	CE	Test Mode:	Transmitting (maximum output power mode, DH1 low channel)
Tester:	David Huang	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	21.9	Relative Humidity: (%)	26	ATM Pressure: (kPa)	101.7

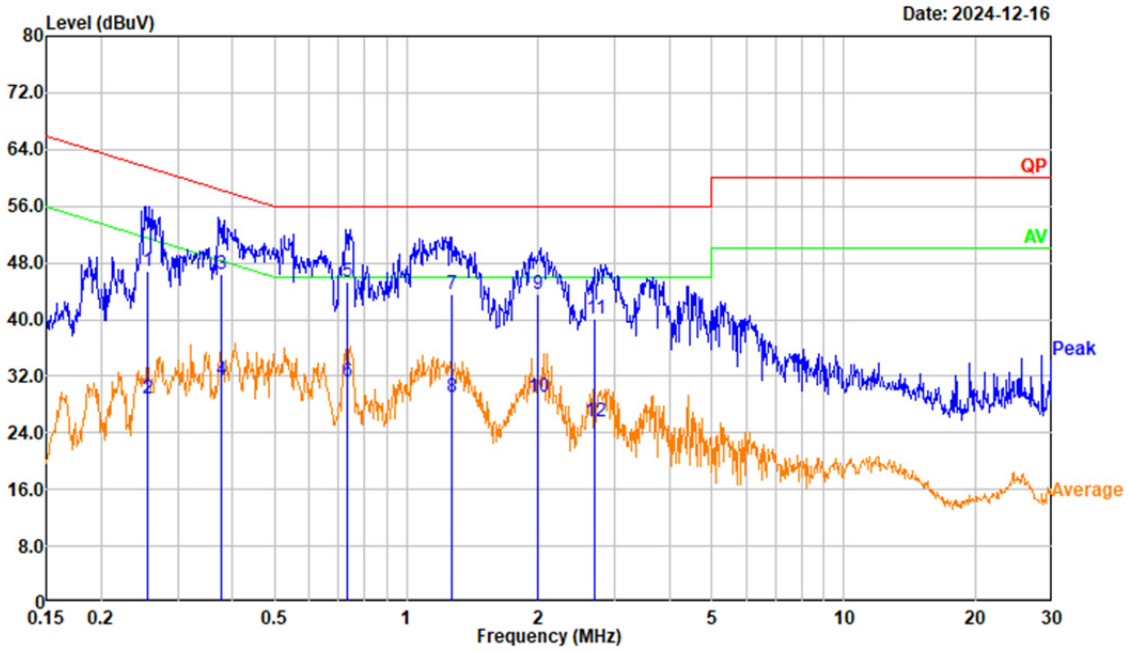
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101132	2024/4/1	2025/3/31
R&S	EMI Test Receiver	ESR3	103104	2024/5/10	2025/5/9
MICRO-COAX	Coaxial Cable	UTIFLEX	C-0200-01	2024/1/15	2025/1/14
Audix	Test Software	E3	191218 (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).*

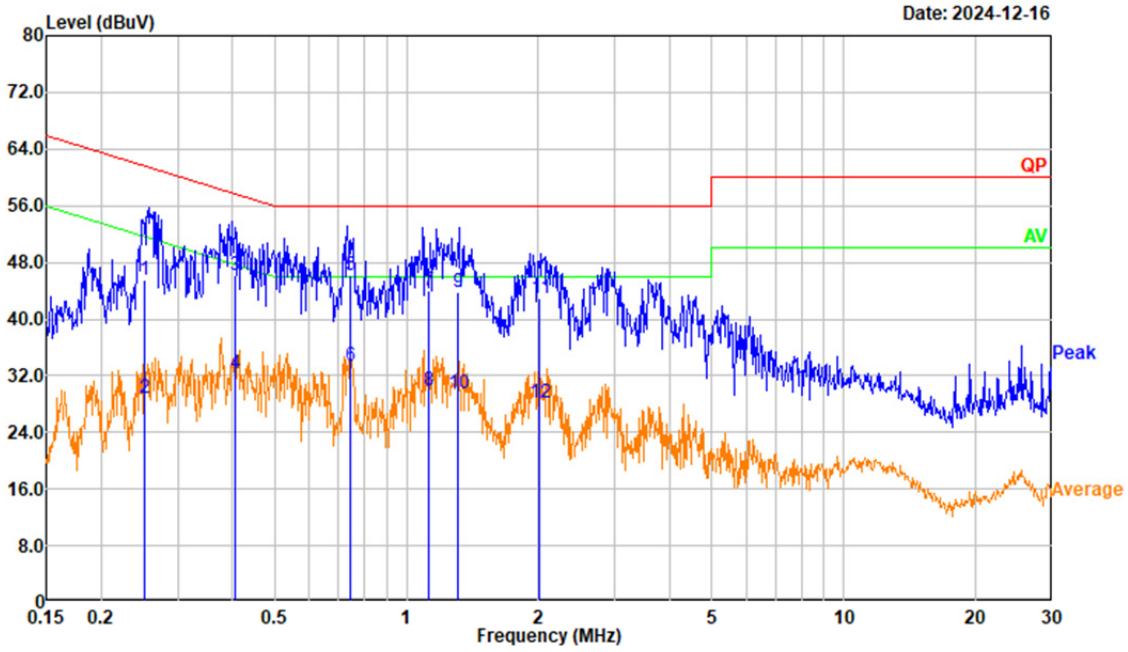
RDK X5 4G

Project No.: 2403Z107562E-RF
Tester: David Huang
Condition: IFBW:9 kHz Meas Time:0.025sec
Port: Line
Note: Transmitting BT(4G)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.255	36.69	10.10	46.79	61.59	14.80	QP
2	0.255	18.71	10.10	28.81	51.59	22.78	Average
3	0.376	36.14	10.30	46.44	58.36	11.92	QP
4	0.376	21.05	10.30	31.35	48.36	17.01	Average
5	0.734	34.54	10.70	45.24	56.00	10.76	QP
6	0.734	20.42	10.70	31.12	46.00	14.88	Average
7	1.272	33.02	10.48	43.50	56.00	12.50	QP
8	1.272	18.47	10.48	28.95	46.00	17.05	Average
9	2.000	33.54	10.13	43.67	56.00	12.33	QP
10	2.000	18.86	10.13	28.99	46.00	17.01	Average
11	2.703	29.97	10.21	40.18	56.00	15.82	QP
12	2.703	15.38	10.21	25.59	46.00	20.41	Average

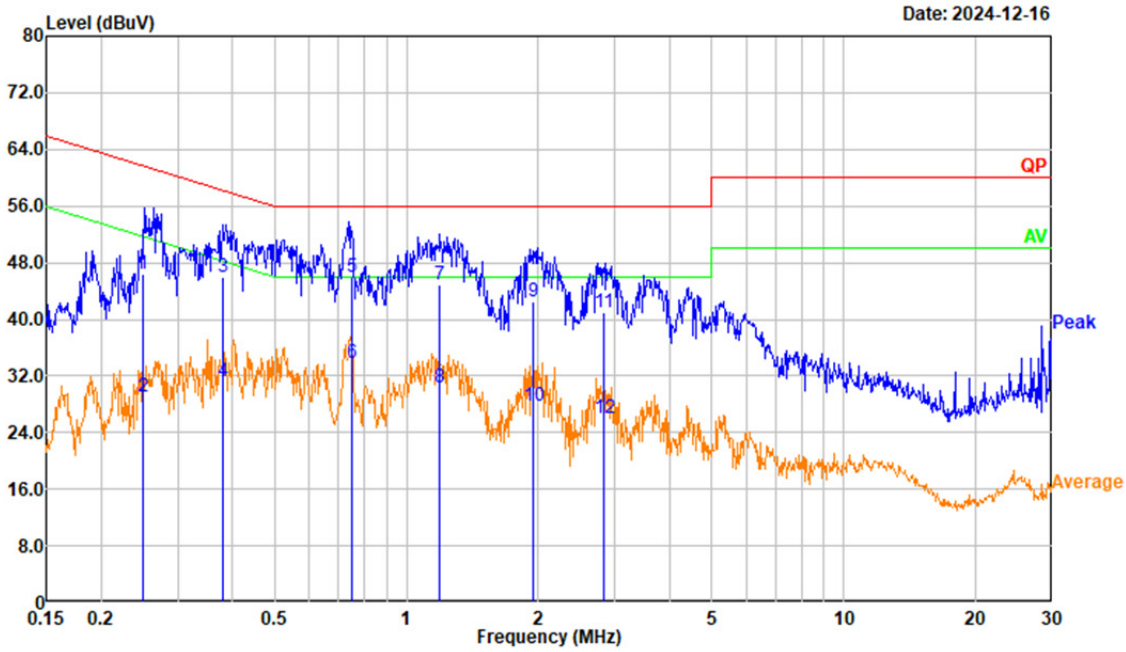
Project No.: 2403Z107562E-RF
Tester: David Huang
Condition: IFBW:9 kHz Meas Time:0.025sec
Port: neutral
Note: Transmitting BT(4G)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.251	35.26	10.34	45.60	61.72	16.12	QP
2	0.251	18.60	10.34	28.94	51.72	22.78	Average
3	0.407	35.75	10.45	46.20	57.71	11.51	QP
4	0.407	21.89	10.45	32.34	47.71	15.37	Average
5	0.747	35.82	10.26	46.08	56.00	9.92	QP
6	0.747	23.10	10.26	33.36	46.00	12.64	Average
7	1.123	33.49	10.50	43.99	56.00	12.01	QP
8	1.123	19.43	10.50	29.93	46.00	16.07	Average
9	1.307	33.24	10.46	43.70	56.00	12.30	QP
10	1.307	19.07	10.46	29.53	46.00	16.47	Average
11	2.017	32.58	10.33	42.91	56.00	13.09	QP
12	2.017	17.87	10.33	28.20	46.00	17.80	Average

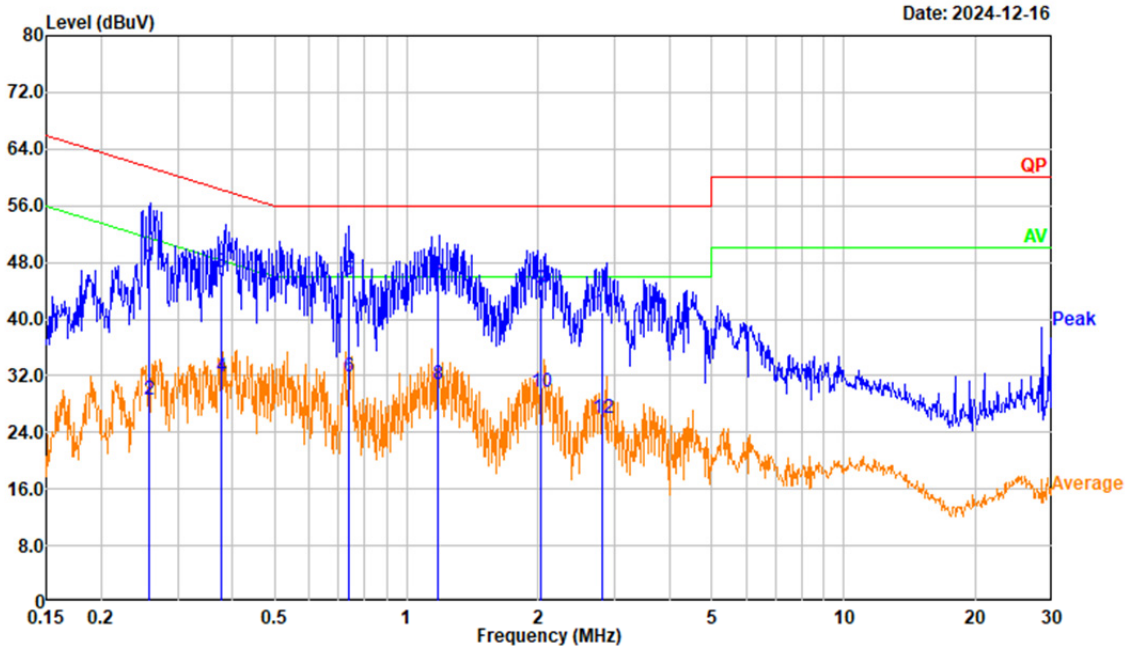
RDK X5 8G

```
Project No.: 2403Z107562E-RF
     Tester: David Huang
  Condition: IFBW:9    kHz   Meas Time:0.025sec
       Port: Line
       Note: Transmitting BT(8G)
```



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.250	36.23	10.09	46.32	61.75	15.43	QP
2	0.250	19.06	10.09	29.15	51.75	22.60	Average
3	0.381	35.68	10.31	45.99	58.26	12.27	QP
4	0.381	20.98	10.31	31.29	48.26	16.97	Average
5	0.747	35.22	10.69	45.91	56.00	10.09	QP
6	0.747	23.09	10.69	33.78	46.00	12.22	Average
7	1.187	34.37	10.53	44.90	56.00	11.10	QP
8	1.187	19.73	10.53	30.26	46.00	15.74	Average
9	1.949	32.42	10.16	42.58	56.00	13.42	QP
10	1.949	17.49	10.16	27.65	46.00	18.35	Average
11	2.819	30.77	10.22	40.99	56.00	15.01	QP
12	2.819	15.74	10.22	25.96	46.00	20.04	Average

Project No.: 2403Z107562E-RF
Tester: David Huang
Condition: IFBW:9 kHz Meas Time:0.025sec
Port: neutral
Note: Transmitting BT(8G)



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1	0.259	37.04	10.35	47.39	61.47	14.08	QP
2	0.259	18.25	10.35	28.60	51.47	22.87	Average
3	0.377	36.08	10.43	46.51	58.35	11.84	QP
4	0.377	21.43	10.43	31.86	48.35	16.49	Average
5	0.739	35.19	10.25	45.44	56.00	10.56	QP
6	0.739	21.52	10.25	31.77	46.00	14.23	Average
7	1.178	34.57	10.48	45.05	56.00	10.95	QP
8	1.178	20.26	10.48	30.74	46.00	15.26	Average
9	2.027	33.86	10.33	44.19	56.00	11.81	QP
10	2.027	19.47	10.33	29.80	46.00	16.20	Average
11	2.811	30.77	10.26	41.03	56.00	14.97	QP
12	2.811	15.76	10.26	26.02	46.00	19.98	Average

4.2 Radiated Spurious Emissions

4.2.1 9 kHz – 1 GHz:

Sample Number:	2V9E-2,2V9E-3	Test Date:	2024/12/18
Test Site:	966-2	Test Mode:	Transmitting (maximum output power mode, DH1 low channel)
Tester:	Carl Xue	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.6	Relative Humidity: (%)	59	ATM Pressure: (kPa)	101.5

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2023/12/1	2026/11/30
BACL	Loop Antenna	1313-1A	3110611	2023/12/4	2026/12/3
Daruikang	Coaxial Cable	BNC-JJ-RG58	C-0300-01	2024/1/11	2025/1/10
Daruikang	Coaxial Cable	BNC-JJ-RG58	C-0500-01	2024/1/11	2025/1/10
R&S	EMI Test Receiver	ESR3	102724	2024/2/29	2025/2/28
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0100-03	2024/12/3	2025/12/2
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0370-01	2024/12/3	2025/12/2
XQY	Coaxial Cable	XQY-CMR400UF-NJ-NJ-7M	24056379	2024/6/11	2025/6/10
Sonoma	Amplifier	310N	186165	2024/12/3	2025/12/2
Audix	Test Software	E3	191218 (V9)	N/A	N/A

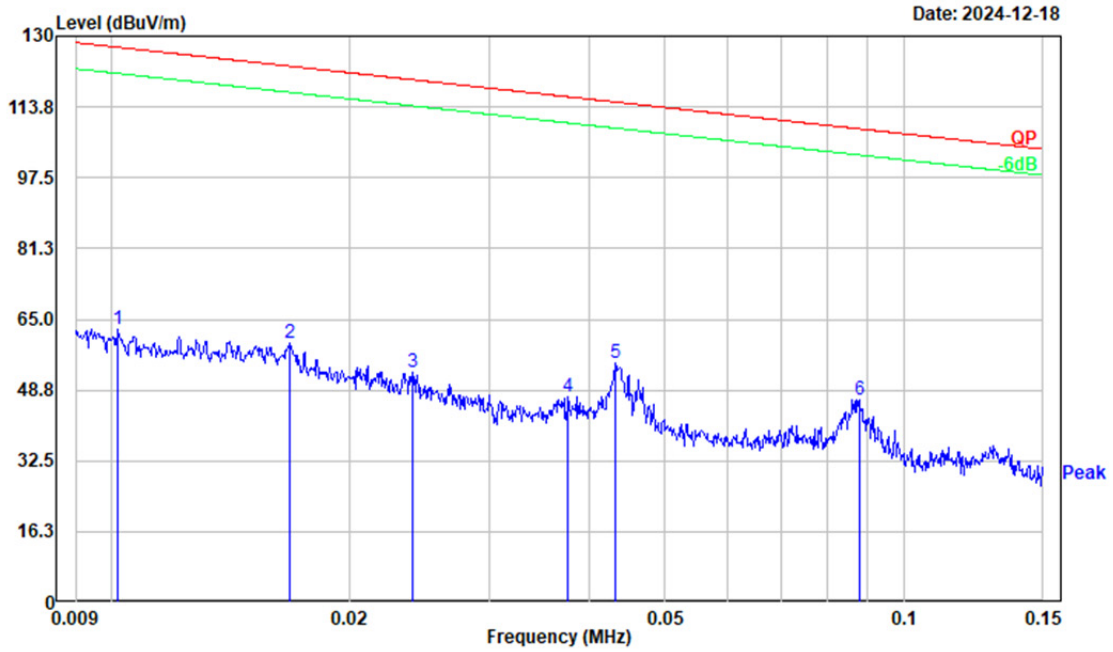
** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

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

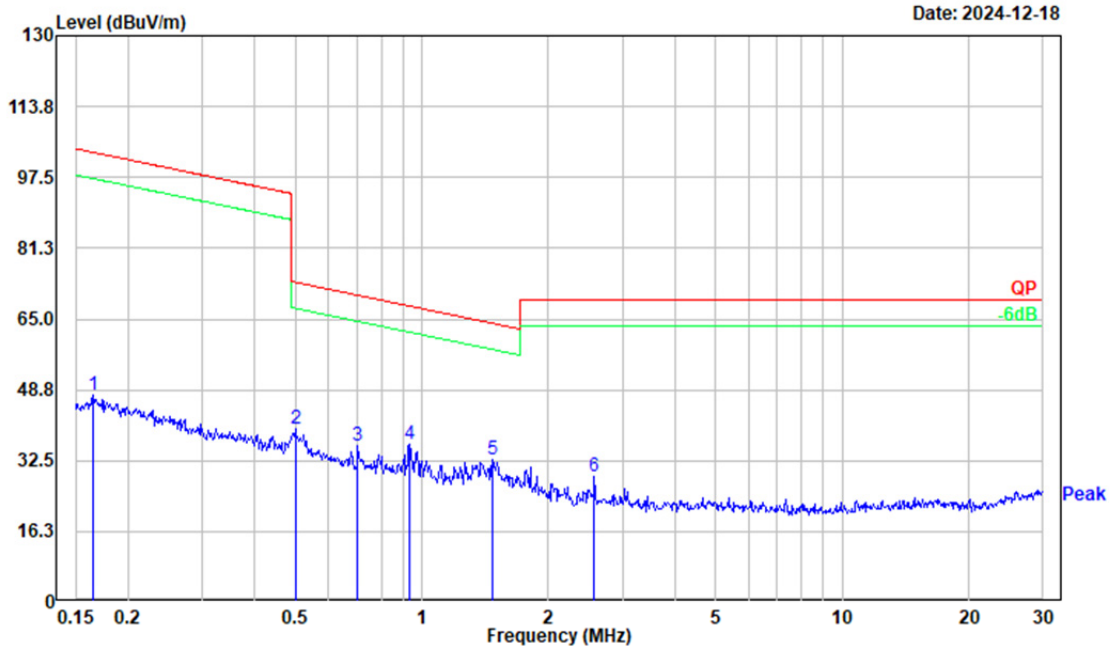
RDK X5 4G

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:0.3 kHz VBW:1 kHz SWT:0.1 sec
Polarization: Parallel
Note: Transmitting BT



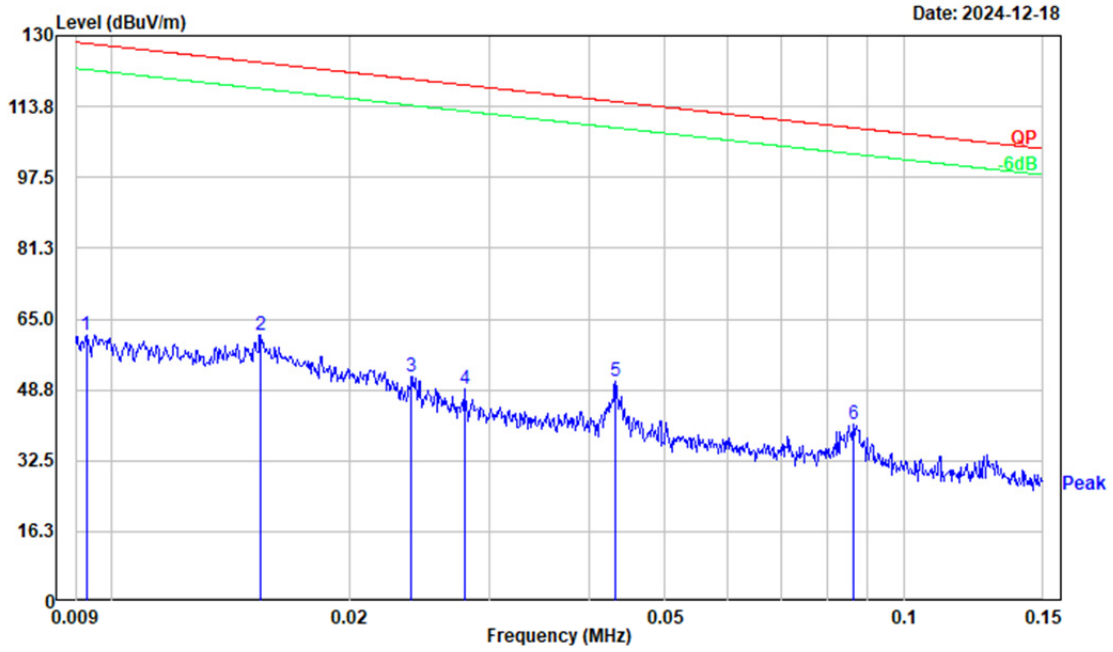
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.010	28.33	34.34	62.67	127.44	64.77	Peak
2	0.017	28.29	31.09	59.38	123.09	63.71	Peak
3	0.024	25.21	27.59	52.80	120.02	67.22	Peak
4	0.038	24.13	23.02	47.15	116.08	68.93	Peak
5	0.043	32.98	21.85	54.83	114.88	60.05	Peak
6	0.088	31.00	15.66	46.66	108.73	62.07	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:10 kHz VBW:30 kHz SWT:0.1 sec
Polarization: Parallel
Note: Transmitting BT



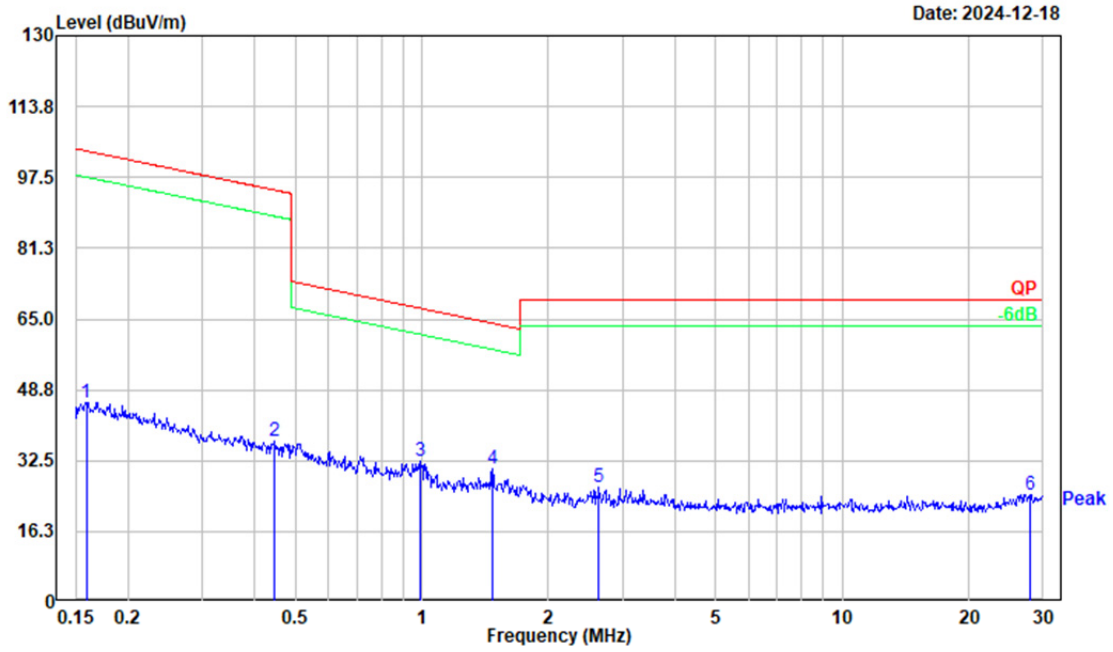
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.165	35.79	11.62	47.41	103.25	55.84	Peak
2	0.499	38.79	0.97	39.76	73.63	33.87	Peak
3	0.705	37.40	-1.42	35.98	70.58	34.60	Peak
4	0.933	39.89	-3.64	36.25	68.09	31.84	Peak
5	1.472	38.55	-5.89	32.66	64.04	31.38	Peak
6	2.567	36.98	-8.07	28.91	69.54	40.63	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:0.3 kHz VBW:1 kHz SWT:0.1 sec
Polarization: Perpendicular
Note: Transmitting BT



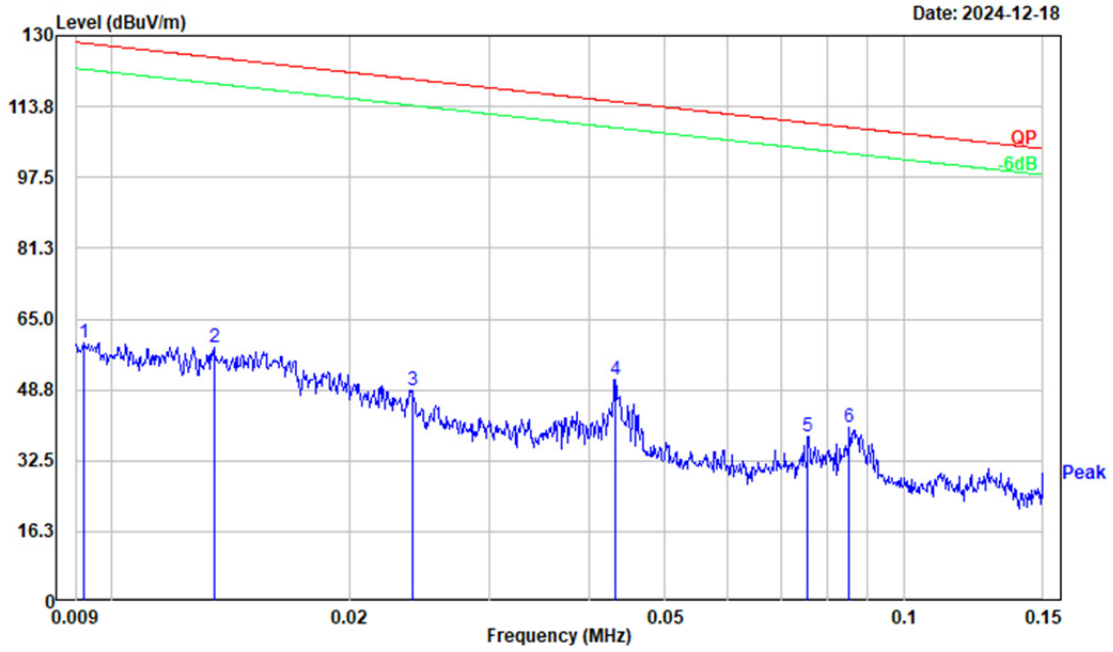
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.009	26.09	35.36	61.45	128.25	66.80	Peak
2	0.015	29.58	31.78	61.36	123.85	62.49	Peak
3	0.024	24.27	27.62	51.89	120.04	68.15	Peak
4	0.028	23.27	25.66	48.93	118.70	69.77	Peak
5	0.043	28.98	21.85	50.83	114.88	64.05	Peak
6	0.086	25.17	15.78	40.95	108.87	67.92	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:10 kHz VBW:30 kHz SWT:0.1 sec
Polarization: Perpendicular
Note: Transmitting BT



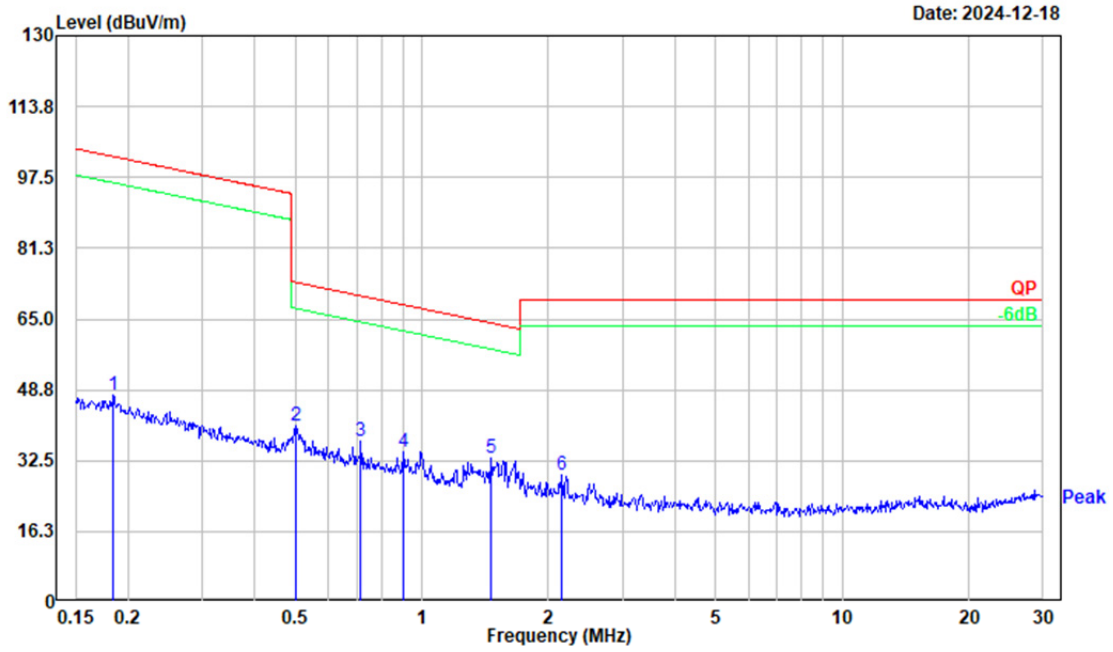
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.159	34.03	11.90	45.93	103.58	57.65	Peak
2	0.447	34.88	2.12	37.00	94.60	57.60	Peak
3	0.994	36.53	-4.16	32.37	67.52	35.15	Peak
4	1.472	36.62	-5.89	30.73	64.04	33.31	Peak
5	2.636	34.46	-8.11	26.35	69.54	43.19	Peak
6	27.855	32.17	-7.45	24.72	69.54	44.82	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:0.3 kHz VBW:1 kHz SWT:0.1 sec
Polarization: Ground-parallel
Note: Transmitting BT



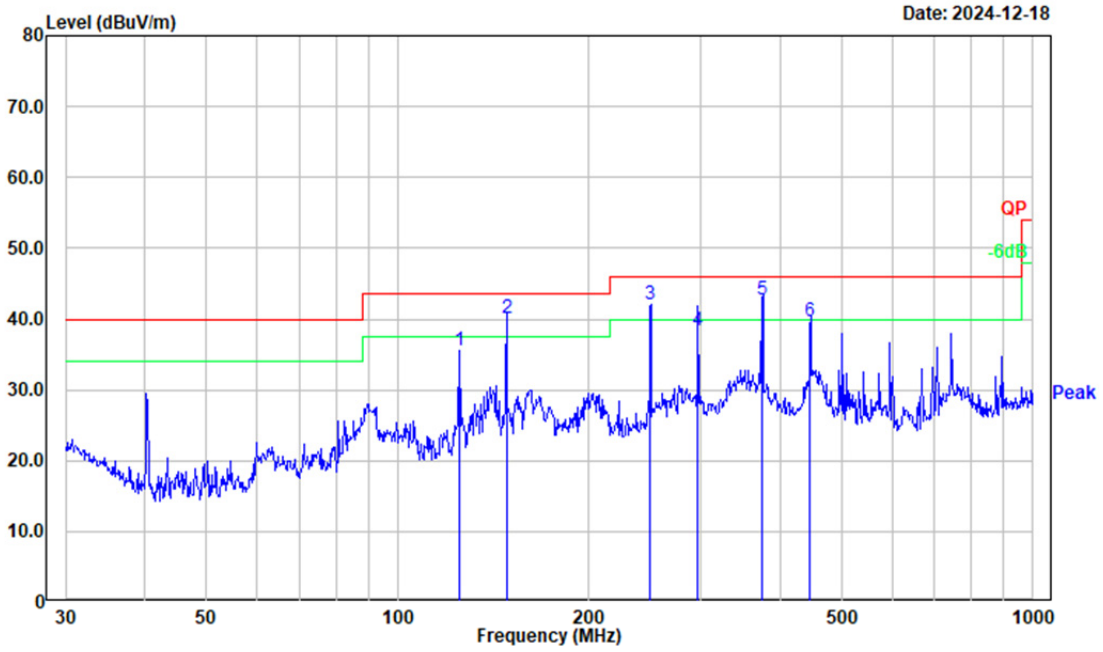
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.009	24.18	35.46	59.64	128.32	68.68	Peak
2	0.013	25.80	32.74	58.54	125.03	66.49	Peak
3	0.024	21.10	27.59	48.69	120.02	71.33	Peak
4	0.043	29.34	21.85	51.19	114.88	63.69	Peak
5	0.076	21.29	16.92	38.21	110.02	71.81	Peak
6	0.085	24.30	15.87	40.17	108.97	68.80	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:10 kHz VBW:30 kHz SWT:0.1 sec
Polarization: Ground-parallel
Note: Transmitting BT



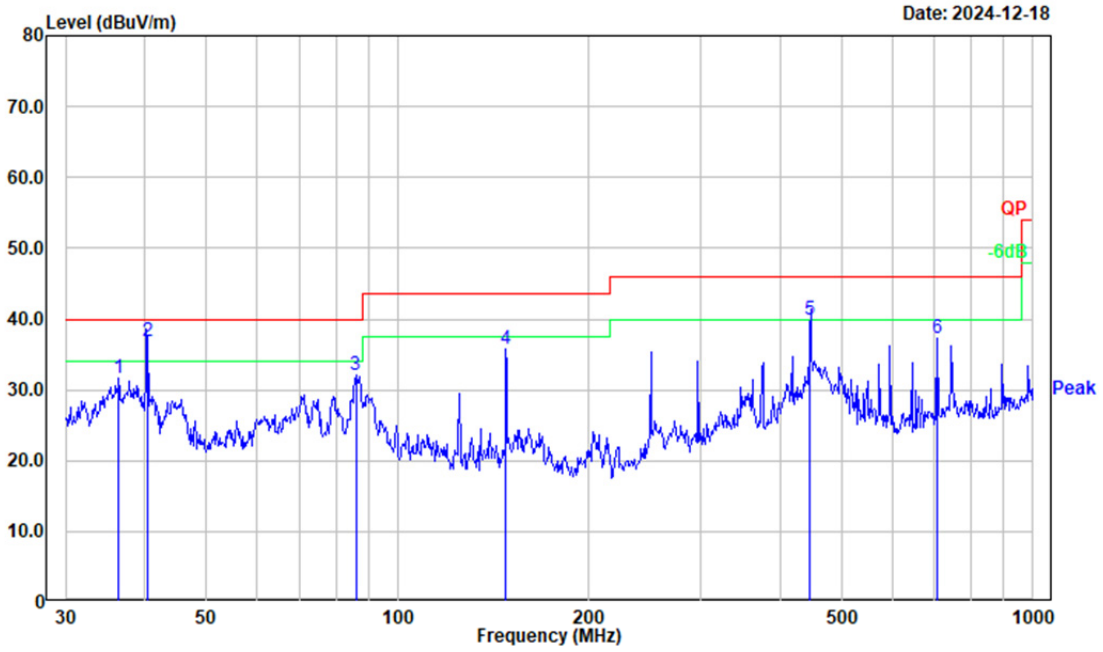
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.184	36.71	10.71	47.42	102.29	54.87	Peak
2	0.499	39.43	0.97	40.40	73.63	33.23	Peak
3	0.716	38.60	-1.55	37.05	70.44	33.39	Peak
4	0.904	37.94	-3.39	34.55	68.37	33.82	Peak
5	1.464	39.14	-5.86	33.28	64.09	30.81	Peak
6	2.155	37.17	-7.84	29.33	69.54	40.21	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:100 kHz VBW:300 kHz SWT:0.1 sec
Polarization: horizontal
Note: Transmitting BT



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	125.007	46.57	-11.00	35.57	43.50	7.93	Peak
2	148.518	52.21	-12.20	40.01	43.50	3.49	QP
3	250.011	54.99	-12.95	42.04	46.00	3.96	QP
4	297.034	48.97	-10.54	38.43	46.00	7.57	QP
5	375.007	51.78	-9.15	42.63	46.00	3.37	QP
6	445.505	46.70	-7.01	39.69	46.00	6.31	QP

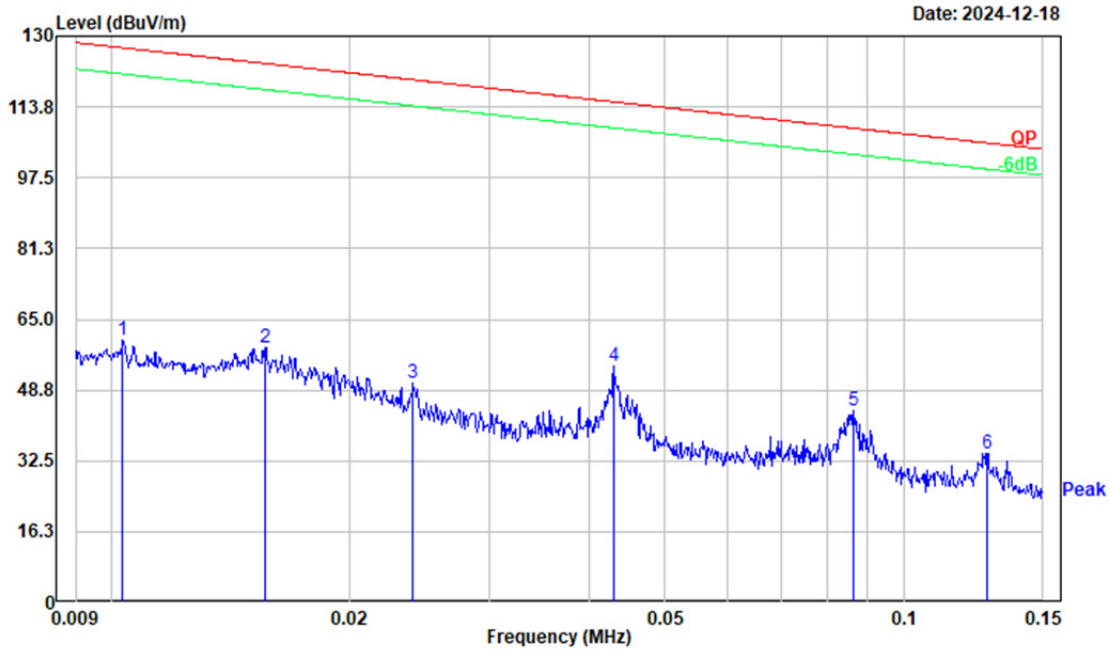
Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:100 kHz VBW:300 kHz SWT:0.1 sec
Polarization: vertical
Note: Transmitting BT



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	36.381	40.22	-8.50	31.72	40.00	8.28	Peak
2	40.412	48.30	-11.48	36.82	40.00	3.18	QP
3	85.898	49.34	-17.27	32.07	40.00	7.93	Peak
4	147.921	48.05	-12.23	35.82	43.50	7.68	Peak
5	445.558	46.96	-7.01	39.95	46.00	6.05	QP
6	706.700	40.18	-2.87	37.31	46.00	8.69	Peak

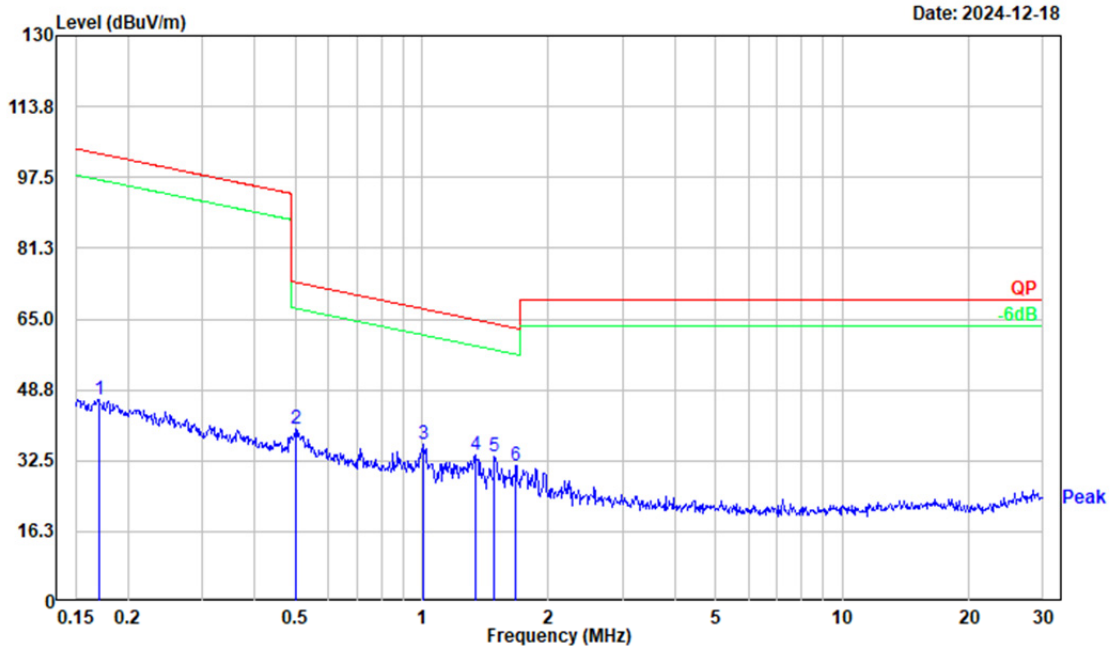
RDK X5 8G

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:0.3 kHz VBW:1 kHz SWT:0.1 sec
Polarization: Parallel
Note: Transmitting BT



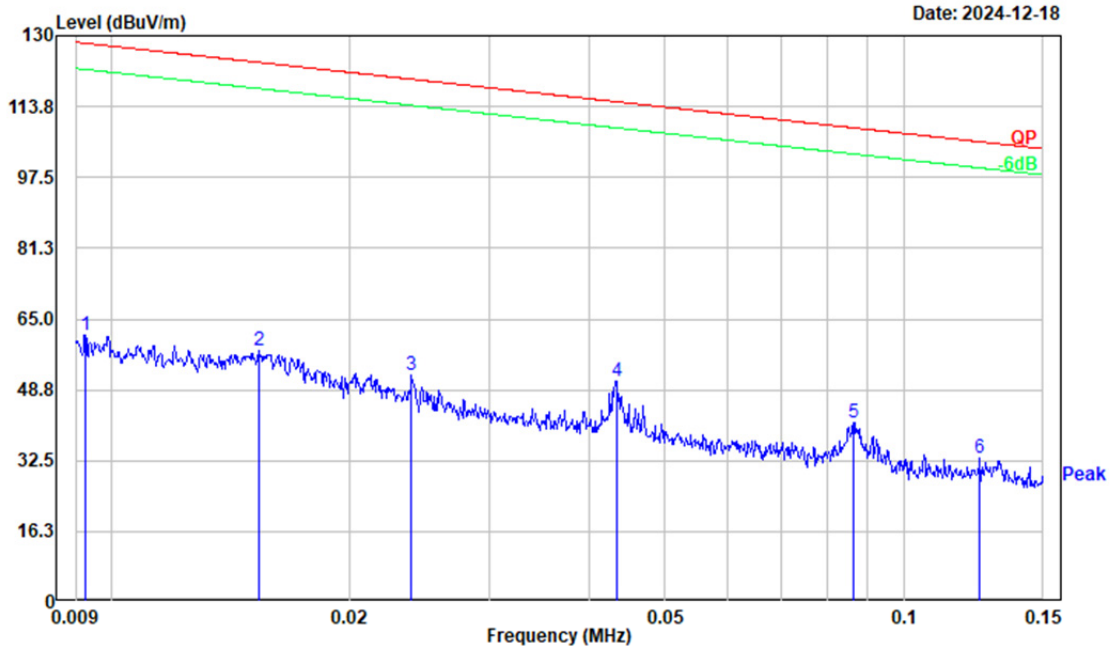
No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.010	25.86	34.27	60.13	127.32	67.19	Peak
2	0.016	26.95	31.68	58.63	123.73	65.10	Peak
3	0.024	22.75	27.56	50.31	119.99	69.68	Peak
4	0.043	32.20	21.90	54.10	114.93	60.83	Peak
5	0.086	28.13	15.78	43.91	108.87	64.96	Peak
6	0.127	20.98	13.37	34.35	105.50	71.15	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:10 kHz VBW:30 kHz SWT:0.1 sec
Polarization: Parallel
Note: Transmitting BT



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.170	35.29	11.37	46.66	102.98	56.32	Peak
2	0.499	38.80	0.97	39.77	73.63	33.86	Peak
3	1.010	40.53	-4.25	36.28	67.38	31.10	Peak
4	1.338	39.38	-5.41	33.97	64.89	30.92	Peak
5	1.487	39.30	-5.94	33.36	63.95	30.59	Peak
6	1.671	38.06	-6.60	31.46	62.92	31.46	Peak

Project No.: 2403Z107562E-RF
Tester: Carl Xue
Condition: RBW:0.3 kHz VBW:1 kHz SWT:0.1 sec
Polarization: Perpendicular
Note: Transmitting BT



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	0.009	26.01	35.40	61.41	128.28	66.87	Peak
2	0.015	25.88	31.82	57.70	123.90	66.20	Peak
3	0.024	24.39	27.62	52.01	120.04	68.03	Peak
4	0.043	28.86	21.82	50.68	114.86	64.18	Peak
5	0.086	25.30	15.78	41.08	108.87	67.79	Peak
6	0.125	19.46	13.48	32.94	105.67	72.73	Peak