REPORT No.: SZ24030075W01

TEST REPORT

APPLICANT	:	Shenzhen Rayzeek Tech.LTD
PRODUCT NAME	:	Wireless Motion Sensor Controller Kits
MODEL NAME	:	Refer to section 1.2
BRAND NAME	:	Rayzeek
FCC ID	:	2BFMX-RZ016W
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2024-03-28
TEST DATE	:	2024-04-09 to 2024-04-12
ISSUE DATE	:	2024-05-15

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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DIRECTORY

Change History		
Version	**Date**	**Reason for change**
1.0	2024-05-15	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Shenzhen Rayzeek Tech.LTD
Applicant Address:	522,Building D,Huayuan Innovation Park,Baoyuan Road,Xixiang Street, Bao'an District,Shenzhen,china
Manufacturer:	Shenzhen Bester Tech Ltd
Manufacturer Address:	6F,Building B1,Hengfeng Industrial City,Xixiang,Baoan District, Shenzhen

1.2. Equipment Under Test (EUT) Description

Product Name:	Wireless Motion Sensor Controller Kits	
Model Name:	RZ016A, RZ016W, RZ016-1A1W, RZ016-1A2W, LED1661A1W, LED1661A1W-2, LED1661A2W, LED1661A2W-2, LED1601A1W, LED1601A1W-2, LED1601A2W, LED1601A2W-2, RZ017A, LED1761A1W, LED1761A1W-2, LED1761A2W, LED1761A2W-2, LED1701A1W, LED1701A1W-2, LED1701A2W, LED1701A2W-2, RZ020A, RZ021A, RZ022A, RZ023A, RZ036A, RZ022W, RZ023W, RZ022WG, RZ023WG, RZ060R, RZ060S, RZ061R, RZ061S, RZ062S, RZ063S, RZ064S, RZ065S	
Sample No.:	17#	
Hardware Version:	V1.0	
Software Version:	V1.0	
Operating Frequency:	433.92 MHz	
Channel Number:	1	
Antenna Type:	PCB Antenna	
Antenna Gain:	-8.44 dBi	
Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	SHC-SP1202500HUS
	Serial No.:	N/A
	Rated Output:	12V⎓2.5A

	Rated Input:	100-240V~50/60Hz, 0.7A
	Manufacturer:	Shenzhen Shenghuacheng Technology Co., Ltd

Note 1: According to the certificate holder, they declared that the product have these models: RZ016A, RZ016W, RZ016-1A1W, RZ016-1A2W, LED1661A1W, LED1661A1W-2, LED1661A2W, LED1661A2W-2, LED1601A1W, LED1601A1W-2, LED1601A2W, LED1601A2W-2, RZ017A, LED1761A1W, LED1761A1W-2, LED1761A2W, LED1761A2W-2, LED1701A1W, LED1701A1W-2, LED1701A2W, LED1701A2W-2, RZ020A, RZ021A, RZ022A, RZ023A, RZ036A, RZ022W, RZ023W, RZ022WG, RZ023WG, RZ060R, RZ060S, RZ061R, RZ061S, RZ062S, RZ063S, RZ064S, RZ065S

The transmitter models are: RZ016W, RZ022W, RZ023W, RZ022WG, RZ023WG, RZ060S, RZ061S, RZ062S, RZ063S, RZ064S, RZ065S. The transmitting terminal product are the same products. These models only differ in model name.

The receiving end models are: RZ016A, RZ017A, RZ020A, RZ021A, RZ022A, RZ023A, RZ036A, RZ060R, RZ061R. The receiving terminal product are the same products. These models only differ in model name.

Models that include receiving and transmitting are: RZ016-1A1W, RZ016-1A2W, LED1661A1W, LED1661A1W-2, LED1661A2W, LED1661A2W-2, LED1601A1W, LED1601A1W-2, LED1601A2W, LED1601A2W-2, LED1761A1W, LED1761A1W-2, LED1761A2W, LED1761A2W-2, LED1701A1W, LED1701A1W-2, LED1701A2W, LED1701A2W-2. The receiving end product is the same product, the transmitting end is the same product, they are only different on the model name.

Except for the differences shown above, their electrical circuit design, layout, components used and internal wiring are identical. No other changes.

The main measuring model is RZ016W, only the results for RZ016W were recorded in this report.

Note 2: The test results of all conducted test items please refer to the module FCC test report (Report No.:SZ21080037W01). We only recorded the radiated test result in this report.

1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	15.231 (a)(1)	The Max Transmission Time	N/A	N/A	N/A$_{Note1}$	N/A
3	15.231(c)	20dB Bandwidth	N/A	N/A	N/A$_{Note1}$	N/A
4	15.207	Conducted Emission	N/A	N/A	N/A$_{Note2}$	N/A
5	15.231(b) 15.209(a)	Radiated Emission	Apr. 12, 2024	Gao Jianrou	PASS	No deviation

Note 1: The test results of all conducted test items please refer to the module FCC test report (Report No.:SZ21080037W01). We only recorded the radiated test result in this report.

Note 2: 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.

Note 3: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.

Note 4: Additions to, deviation, or exclusions from the method shall be judged in the “method determination” column of add, deviate or exclude from the specific method shall be explained in the “Remark” of the above table.

Note 5: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15–35
Relative Humidity (%):	30–60
Atmospheric Pressure (kPa):	86–106

2. 47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to 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.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Conducted Emission

2.2.1. Requirement

According to FCC section 15.207, 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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15–0.50	66 to 56	56 to 46
0.50–5	56	46
5–30	60	50

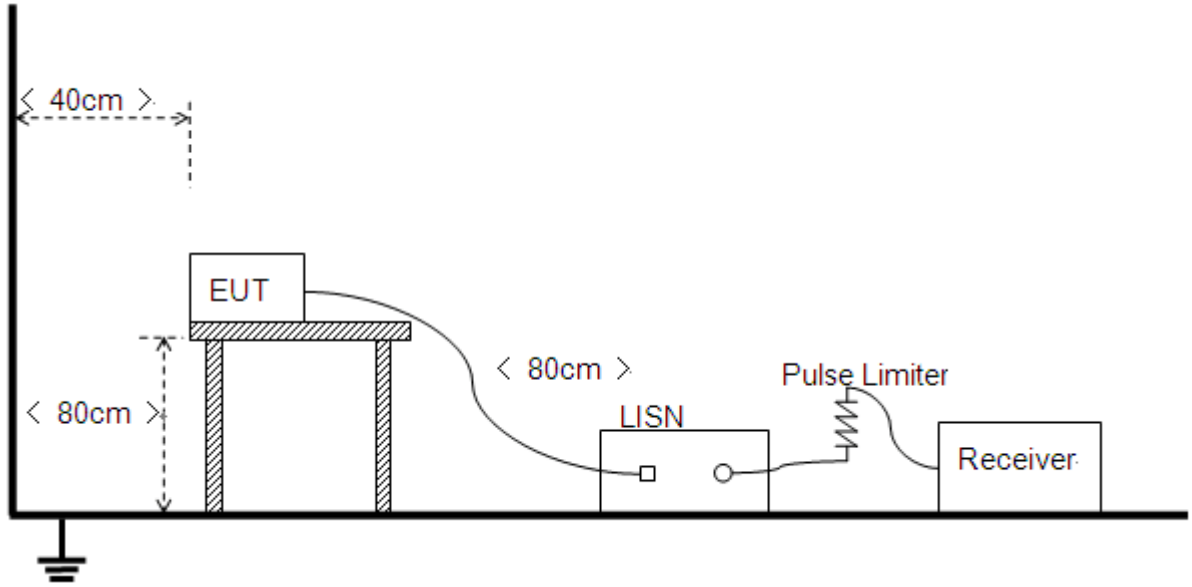
Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15–0.50 MHz.

2.2.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80 cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

2.2.3. Test Result

This test case does not apply this kind of EUT.

2.3. Radiated Emission

2.3.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009–0.490	2400/F (kHz)	300
0.490–1.705	24000/F (kHz)	30
1.705–30.0	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

FCC Part 15.231(b)

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66–40.70	2250	225
70–130	1250	125
130–174	1250 to 3750	125 to 375
174–260	3750	375
260–47	3750 to 12500	375 to 1250
Above 470	12500	1250

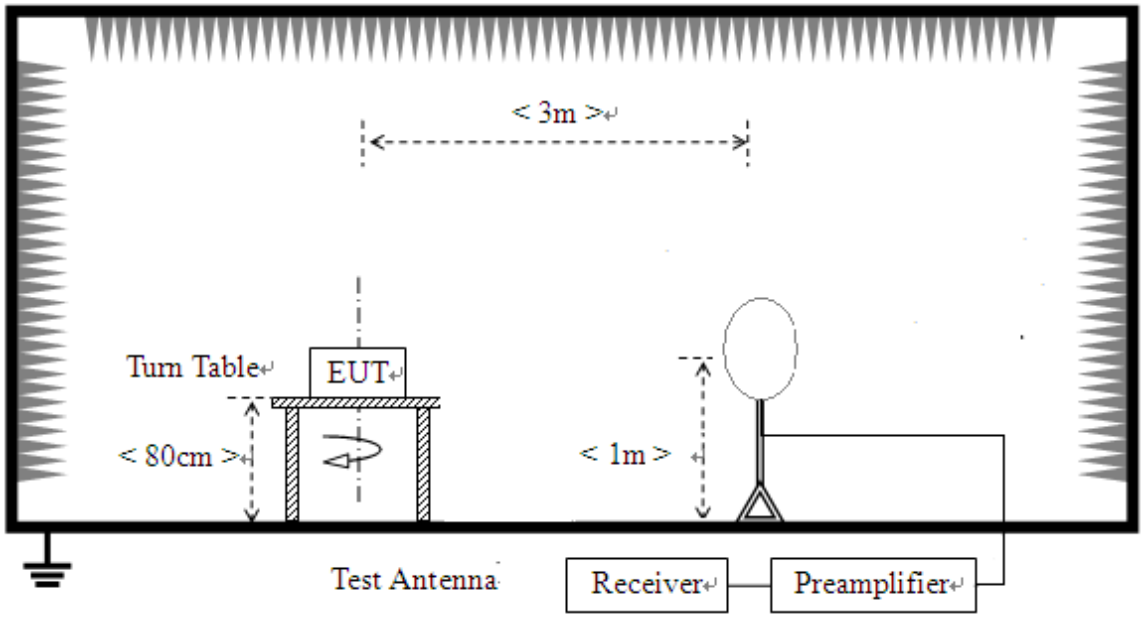
Note 1: For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
Note 2: For above 1000 MHz, limit field strength of harmonics: 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

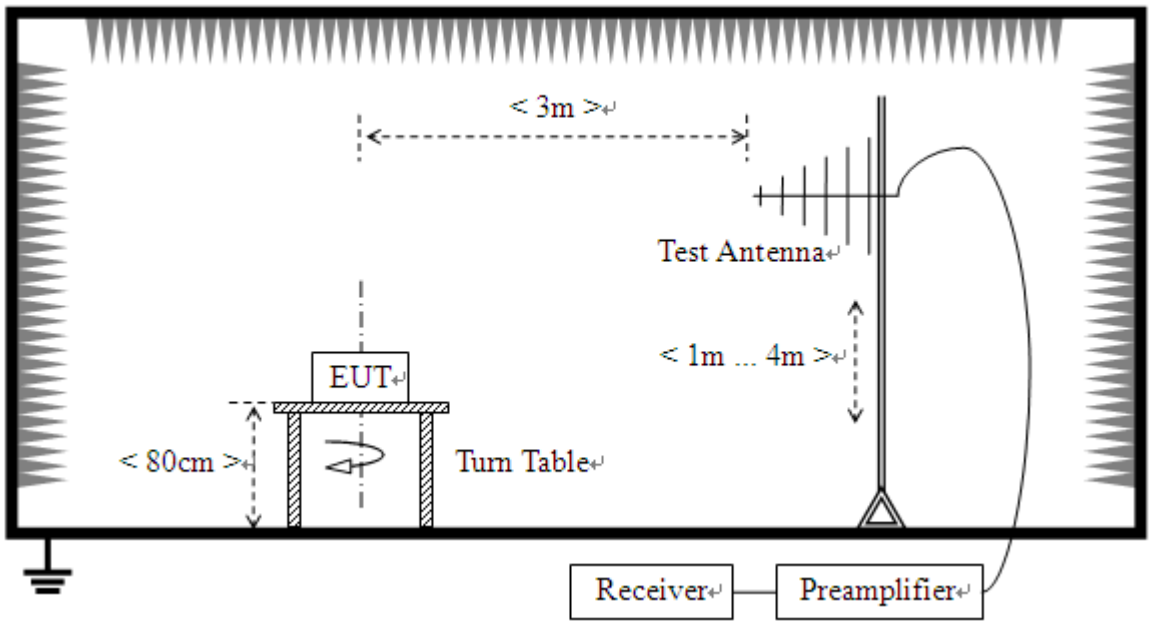
2.3.2. Test Description

Test Setup:

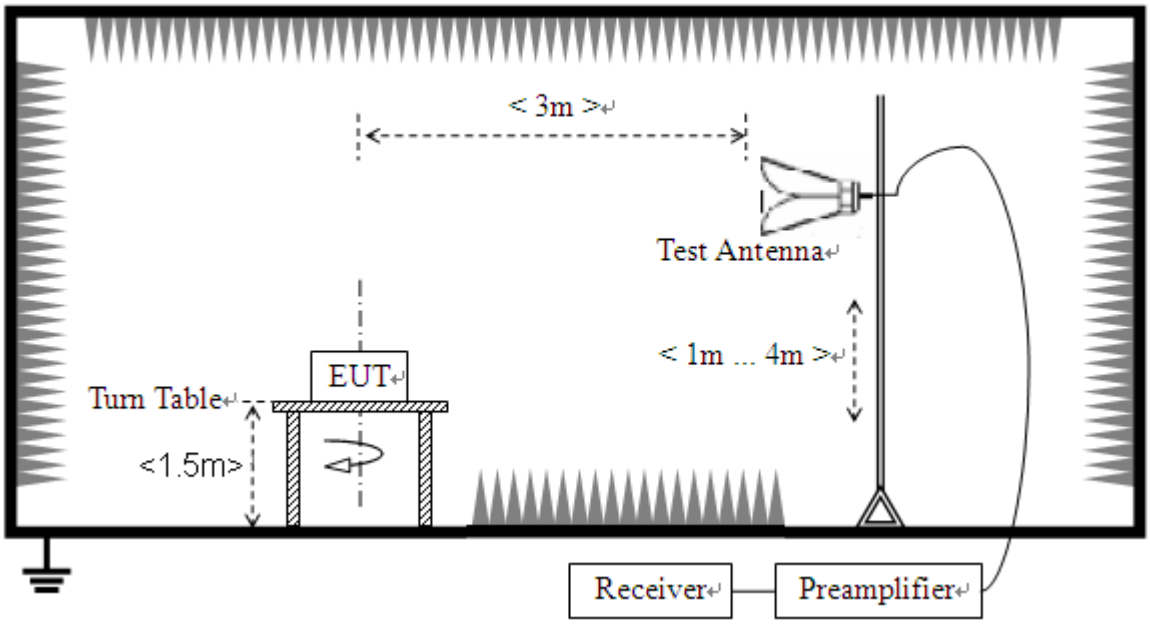
1) For radiated emissions from 9 kHz to 30 MHz



2) For radiated emissions from 30 MHz to1 GHz



3) For radiated emissions above 1 GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1 GHz; 1.5 m above the ground plane for measurement above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30 MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9 kHz to 90 kHz, 110 kHz to 490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, the video band width is set to 3 MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

2.3.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3 m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

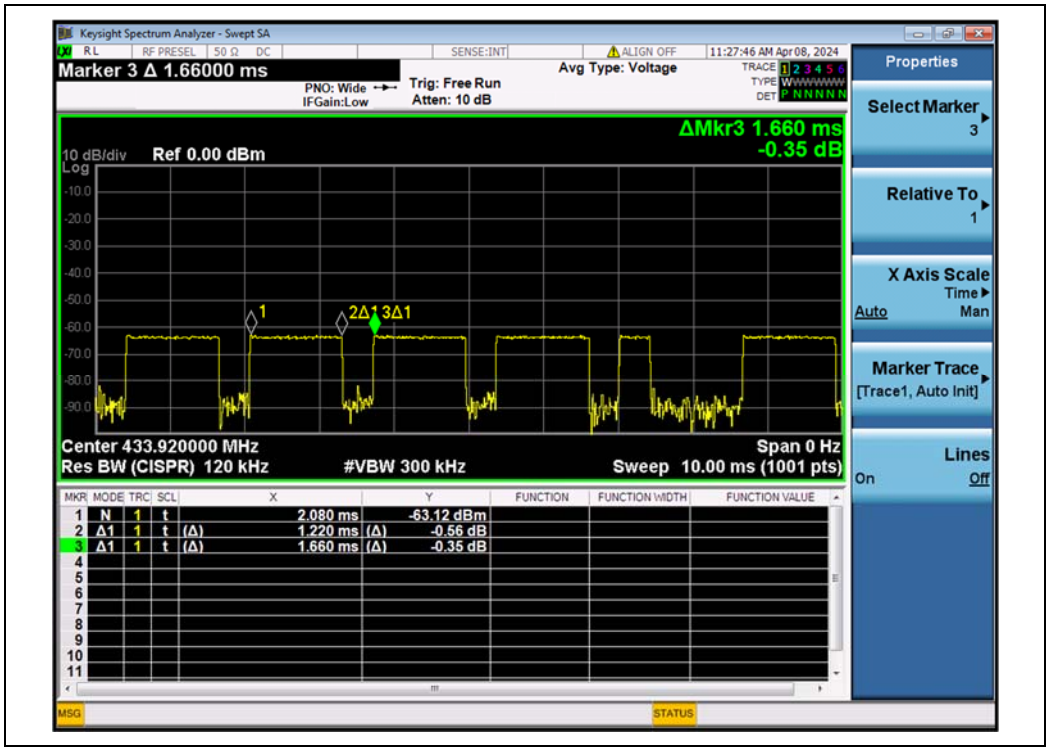
Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis (Y axis) test condition was recorded in this test report.

Note2: For the frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit was not recorded.

The duty cycle is simply the on-time divided by the period:

The duration of one cycle (ms):	1.22
Effective period of the cycle (ms):	1.66
Duty cycle (%):	73.49

Therefore, the average factor is found by 20log(Duty cycle) = -2.67



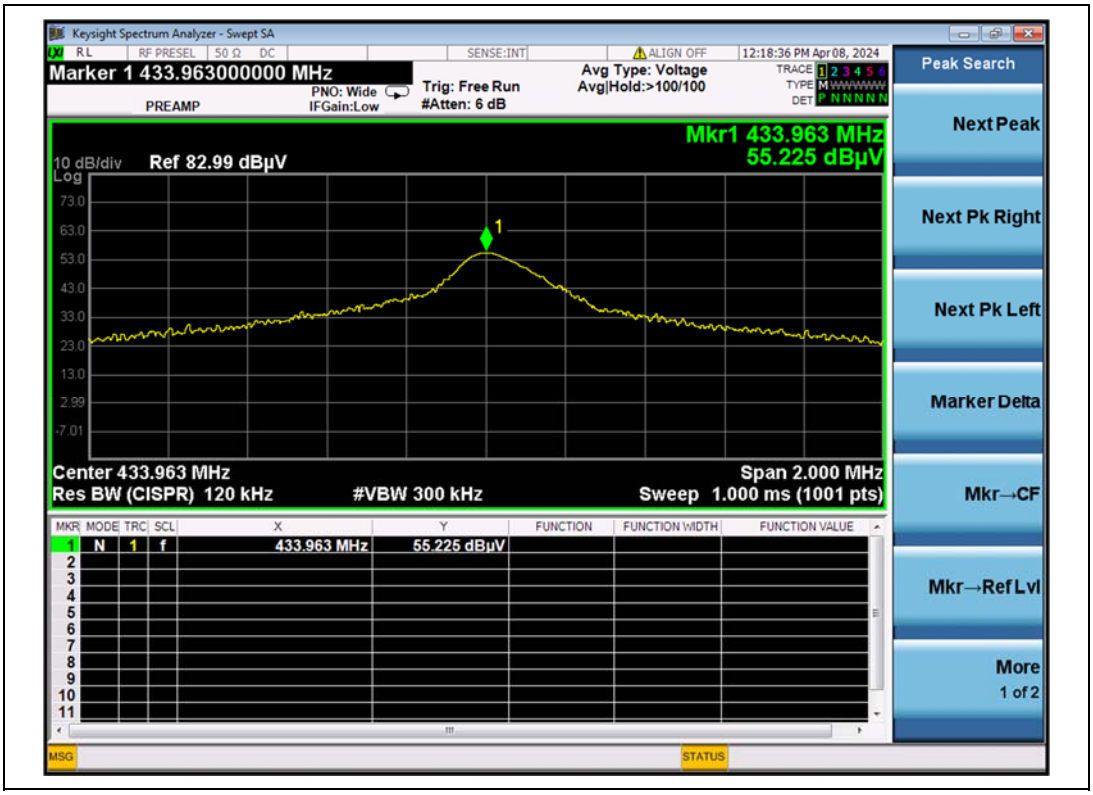
(Release Time)

A. Field strength of fundamental

Fre. (MHz)	ANT	Receiver Reading U_R(PK) (dBuV)	A_T (dB)	A_{Factor} (dB@ 3m)	Final Emission _PK (dBuV/m)	Limit-PK (dBμV/m)	AV factor (dB)	Final Emission _AV (dBuV/m)	Limit-AV (dBμV/m)	Verdict
433.92	H	54.05	6.42	15.6	76.07	100.83	-2.67	73.40	80.83	PASS
433.92	V	55.24	6.42	15.6	77.25	100.83	-2.67	74.58	80.83	PASS

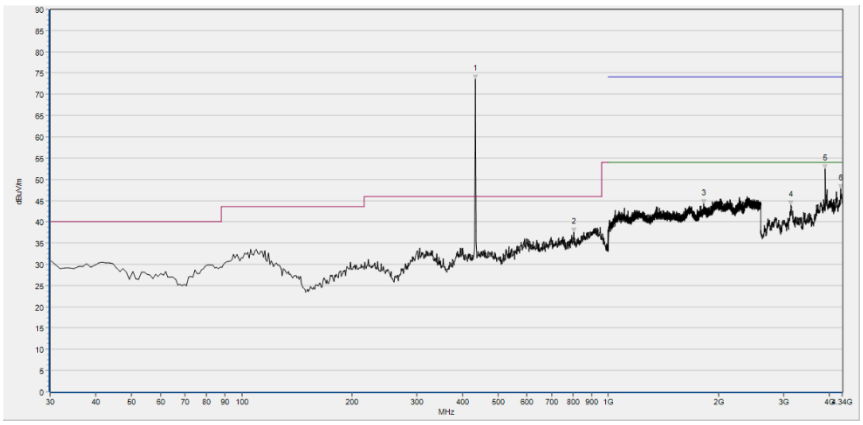
Test Plot:

(Antenna Horizontal)



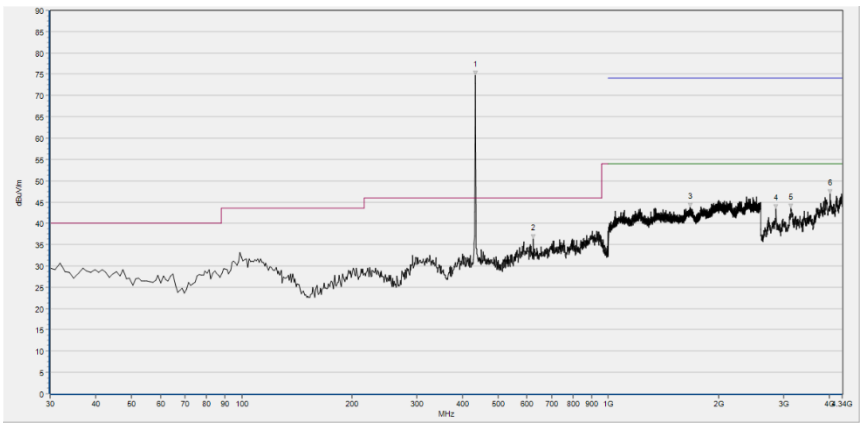
(Antenna Vertical)

B. Radiated emission



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
433.520	73.63	N/A	N/A	N/A	46.00	N/A	Horizontal	N/A
804.060	37.48	N/A	N/A	76.00	N/A	56.00	Horizontal	PASS
1817.067	44.32	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3148.240	43.95	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
3905.920	52.52	N/A	45.81	74.00	N/A	54.00	Horizontal	PASS
4303.240	47.80	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(433.92 MHz, Antenna Horizontal, 30 MHz to 5 GHz)



Fre. (MHz)	Pk (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
433.520	74.67	N/A	N/A	N/A	46.00	N/A	Vertical	N/A
624.610	36.31	N/A	N/A	76.00	N/A	56.00	Vertical	PASS
1667.733	43.71	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
2864.880	43.36	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
3145.160	43.61	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
4019.880	46.98	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(433.92 MHz, Antenna Vertical, 30 MHz to 5 GHz)

Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test Items	Uncertainty
Radiated Emission	±2.95 dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

4. Test Equipment List

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2023.06.21	2024.06.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2023.06.26	2024.06.25
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2023.07.01	2024.06.30
Test Antenna – Horn	BBHA9170 #773	BBHA9170	Schwarzbeck	2023.07.01	2024.06.30
Preamplifier (10MHz-6GHz)	46732	S10M100L3802	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (2GHz-18GHz)	61171/61172	S020180L3203	LUCIX CORP.	2023.06.27	2024.06.26
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-40C-S	Decentest	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2023.06.27	2024.06.26
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KKF-2	Qualwave	2023.07.04	2024.07.03
RF Coaxial Cable (DC-18GHz)	22120181	QA500-18-NN-5	Qualwave	2023.07.04	2024.07.03
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.05.10	2025.05.09
Software Version: V1.2					

END OF REPORT