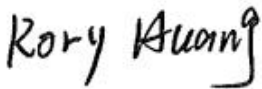


TEST REPORT

Report No.	CISRR24041609302
Project No.	CISRR240416093
FCC ID	2BFYD-W007
Applicant	Shenzhen Herun Silver Technology Co., Ltd.
Address	3rd Floor, Building C, Yongfa High tech Industrial Park, Bao'an District, Shenzhen, Guangdong, China
Manufacturer	Shenzhen Herun Silver Technology Co., Ltd.
Address	3rd Floor, Building C, Yongfa High tech Industrial Park, Bao'an District, Shenzhen, Guangdong, China
Product Name	Wireless Two-Way Mouse
Trade Mark	
Model/Type reference	W007
Listed Model(s)	BS-02, BS-05, BS06, BS-07, BS-08, BS-09, BS-256, BS-257, BS258, BS259
Standard	Part 15 Subpart C Section 15.249
Test date	April 16, 2024 ~ April 27, 2024
Issue date	April 28, 2024
Test result	Complied



Prepared by: Rory Huang



Approved by: Genry Long

The test results relate only to the tested samples.

The test report should not be reproduced except in full without the written approval of Shenzhen Bangce Testing Technology Co., Ltd.

Contents

1. REPORT VERSION	3
2. SUMMARY OF TEST RESULT	4
3. SUMMARY	5
3.1. Product Description	5
3.2. Radio Specification Description	5
3.3. Modification of EUT	7
3.4. Testing Site	7
3.5. Field Strength Calculation	7
3.6. DISTURBANCE Calculation	7
4. TEST CONFIGURATION	8
4.1. Test frequency list	8
4.2. Test mode	8
4.3. Support unit used in test configuration and system	8
4.4. Test sample information	8
4.5. Testing environmental condition	9
4.6. Statement of the measurement uncertainty	9
4.7. Equipment Used during the Test	10
5. TEST CONDITIONS AND RESULTS	11
5.1. Antenna Requirement	11
5.2. AC Conducted Emission	12
5.3. 20 dB Bandwidth	13
5.4. Radiated Band edge Emission	15
5.5. Radiated Spurious Emission	17
6. TEST SETUP PHOTOS	22
7. EXTERNAL AND INTERNAL PHOTOS	23

1. REPORT VERSION

Version No.	Issue date	Description
00	April 28, 2024	Original

2. SUMMARY OF TEST RESULT

Report clause	Test Item	Standard Requirement	Result
5.1	Antenna Requirement	15.203/15.247 (c)	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	20 dB Bandwidth	15.215 (c)	PASS
5.4	Radiated Band Edge Emission	15.205/15.209	PASS
5.5	Radiated Spurious Emission	15.249(a)(c)/15.205/15.209	PASS

Note:

- The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Product Description

Main unit information:	
Product Name:	Wireless Two-Way Mouse
Trade Mark:	
Model No.:	W007
Listed Model(s):	BS-02, BS-05, BS06, BS-07, BS-08, BS-09, BS-256, BS-257, BS258, BS259
Power supply:	DC 1.5V from Battery
Hardware version:	V1.4
Software version:	V1.0

3.2. Radio Specification Description

Technology:	2.4G
Modulation:	GFSK
Operation frequency:	2405MHz~2470MHz
Channel number:	16
Antenna type:	PCB Antenna
Antenna gain:	-2.36dBi

Channel list:

1CH	2405 MHz
2CH	2409 MHz
3CH	2413 MHz
4CH	2417 MHz
5CH	2422 MHz
6CH	2426 MHz
7CH	2430 MHz
8CH	2435 MHz
9CH	2440 MHz
10CH	2445 MHz
11CH	2450 MHz
12CH	2455 MHz
13CH	2460 MHz
14CH	2465 MHz
15CH	2467 MHz
16CH	2470 MHz

3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen, Guangdong, China
FCC registration number	736346

3.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

3.6. DISTURBANCE Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$CD \text{ (dBuV)} = RA \text{ (dBuV)} + PL \text{ (dB)} + CL \text{ (dB)}$$

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4. TEST CONFIGURATION

4.1. Test frequency list

Channel	Frequency (MHz)
CH-L	2405
CH-M	2440
CH-H	2470

4.2. Test mode

For RF test items:

The engineering prototype is provided with key switching channel to realize EUT continuous transmission..Power setting Default.

Test Item	Modulation
Conducted test item	GFSK
Radiated test item	GFSK

Remark:

- The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.
1	Adapter	Huawei	HW-05002000C

4.4. Test sample information

Type	sample no.
Engineer sample	CISR240416093-1#
Normal sample	CISR240416093-2#

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	1.63dB
2	Peak Output Power	1.34dB
3	Power Spectral Density	1.34dB
4	6dB Bandwidth	0.002%
5	99% Occupied Bandwidth	0.002%
6	Duty cycle	-
7	Conducted Band Edge and Spurious Emission	1.93dB
8	Radiated Band Edge Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz
9	Radiated Spurious Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

4.7. Equipment Used during the Test

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2021.10.15	3Year
Spectrum analyzer	Agilent	N9020A	MY50530263	2024.01.08	1Year
Receiver	ROHDE&SCHWARZ	ESCI	100853	2024.01.08	1Year
Spectrum analyzer	R&S	FSV-40N	/	2024.01.08	1Year
Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023.01.09	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023.01.09	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023.01.09	2Year
RF Cable	Tonscend	Cable 1	/	2024.01.08	1Year
RF Cable	Tonscend	Cable 2	/	2024.01.08	1Year
RF Cable	SKET	Cable 3	/	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP9K3G32	AP21G806153	2024.01.08	1Year
Pre-amplifier	Tonscend	TAP01018050	AP22E806229	2024.01.08	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2024.01.08	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	2024.01.08	1Year
Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023.01.09	2 Year
Preamplifier	Tonscend	TAP18040048	AP21C806126	2024.01.08	1Year
variable-frequency power source	Pinhong	PH1110	/	2024.01.08	1Year
6dB Attenuator	SKET	DC-6G	/	N/A	N/A
Artificial power network	Schwarzbeck	NSLK8127	8127-01096	2024.01.08	1Year
EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024.01.08	1Year
8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	8158-00337	2024.01.08	1Year
Artificial power network	Schwarzbeck	ENV216	/	2024.01.08	1Year
Antenna tower	SKET	Bk-4AT-BS	AT2021040101-V1	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Standard Applicable

FCC CFR Title 47 Part 15 Subpart C Section 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, 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.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Description

The antenna type is a PCB antenna, Refer to the below antenna photo.

Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Shenzhen Bangce Testing Technology Co., Ltd. does not assume any responsibility.

5.2. AC Conducted Emission

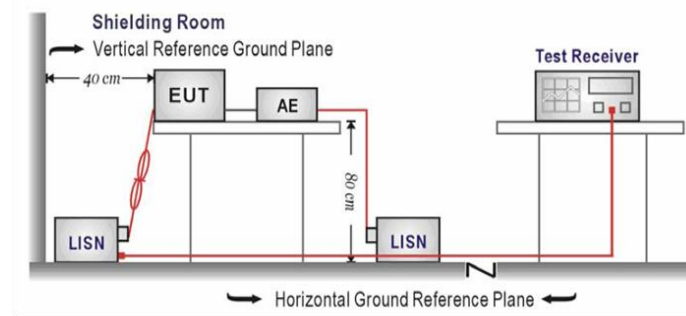
Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	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.

Test configuration:



Test procedure:

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

Test mode:

Refer to the clause 4.3

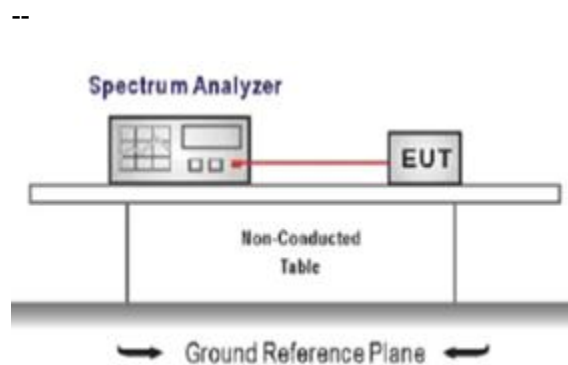
Result:

N/A

5.3. 20 dB Bandwidth

Limit:

Test configuration:



Test procedure:

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

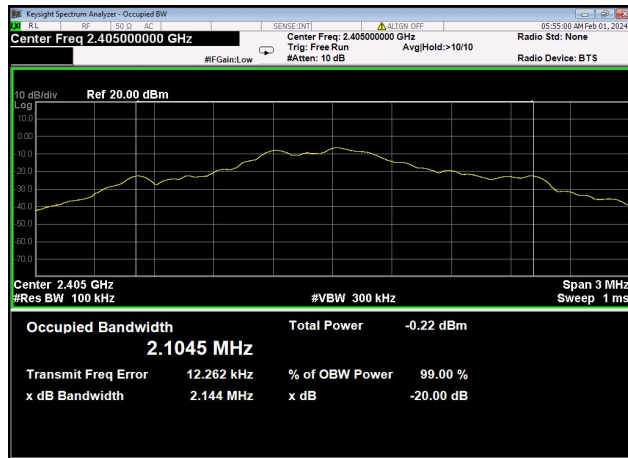
Test mode:

Refer to the clause 4.3

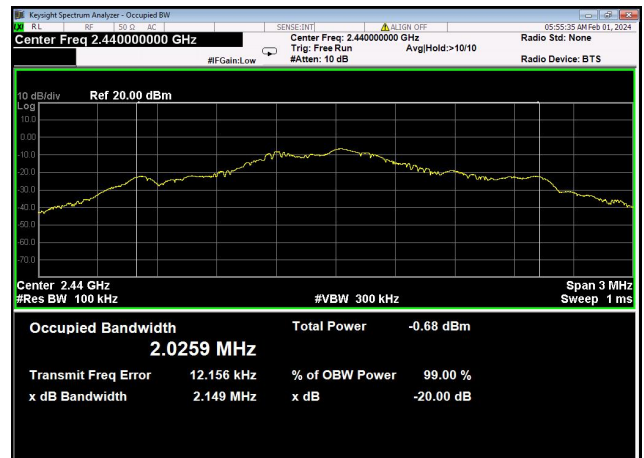
Result:

Passed

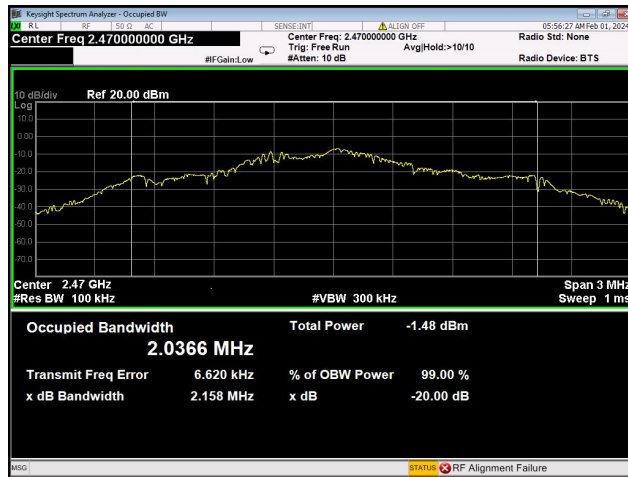
20dB Bandwidth



2405MHz



2440MHz



2470MHz

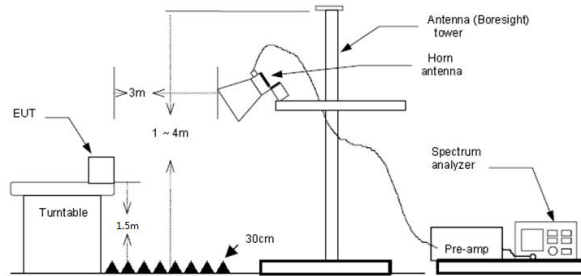
5.4. Radiated Band edge Emission

Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

Test configuration:



Test procedure:

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)

Averager level = Peak level + DCCF

Test mode:

Refer to the clause 4.3

Result:

Passed

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Margin = Limit - Level
- 3) Average measurement was not performed if peak level is lower than average limit
- 4) The other emission levels were very low against the limit.

Test channel:CH01									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
2390.00	69.10	28.62	4.08	38.62	-5.92	74	10.82	Peak	Horizontal
2390.00	50.71	28.62	4.08	38.62	-5.92	54	9.21	Average	Horizontal
2390.00	70.13	28.62	4.08	38.62	-5.92	74	9.79	Peak	Vertical
2390.00	51.23	28.62	4.08	38.62	-5.92	54	8.69	Average	Vertical

Test channel:CH16									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre- amplifier (dB)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
2483.50	70.65	29.45	3.91	40.17	-6.81	74	10.16	Peak	Horizontal
2483.50	49.13	29.45	3.91	40.17	-6.81	54	11.68	Average	Horizontal
2483.50	66.62	29.45	3.91	40.17	-6.81	74	14.19	Peak	Vertical
2483.50	49.29	29.45	3.91	40.17	-6.81	54	11.52	Average	Vertical

5.5. Radiated Spurious Emission

Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

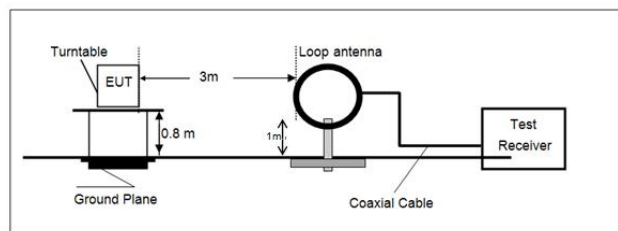
Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)

Limit dBuV/m @3m = Limit dBuV/m @30m + 40*log(30/3)

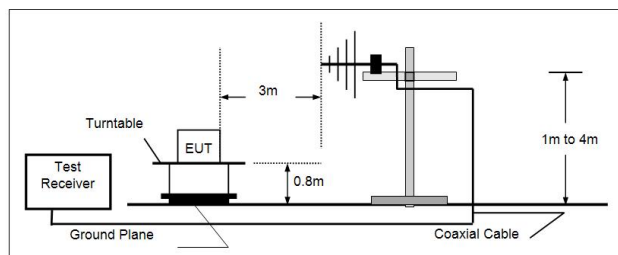
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

Test configuration:

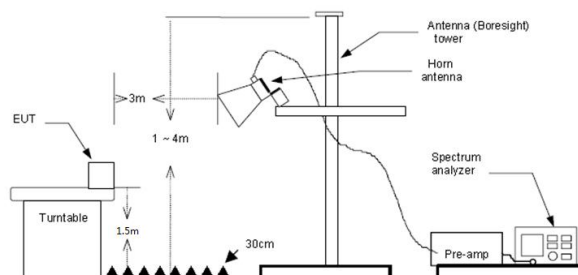
9kHz~30MHz



30 MHz ~ 1 GHz



Above 1 GHz



Test procedure:

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
For average measurement: use duty cycle correction factor method (DCCF)
Averager level = Peak level + DCCF

Test mode:

Refer to the clause 4.3

Result:**Passed**

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level– Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

For 9 kHz ~ 30 MHz

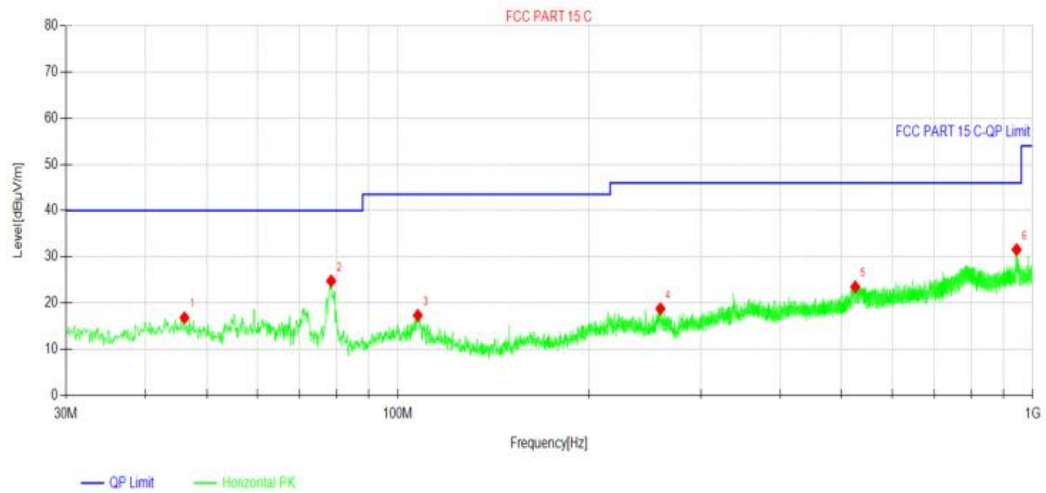
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

For 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH1 which it was worst case, so only show the worst case's data on this report.

Polarization:

Horizontal

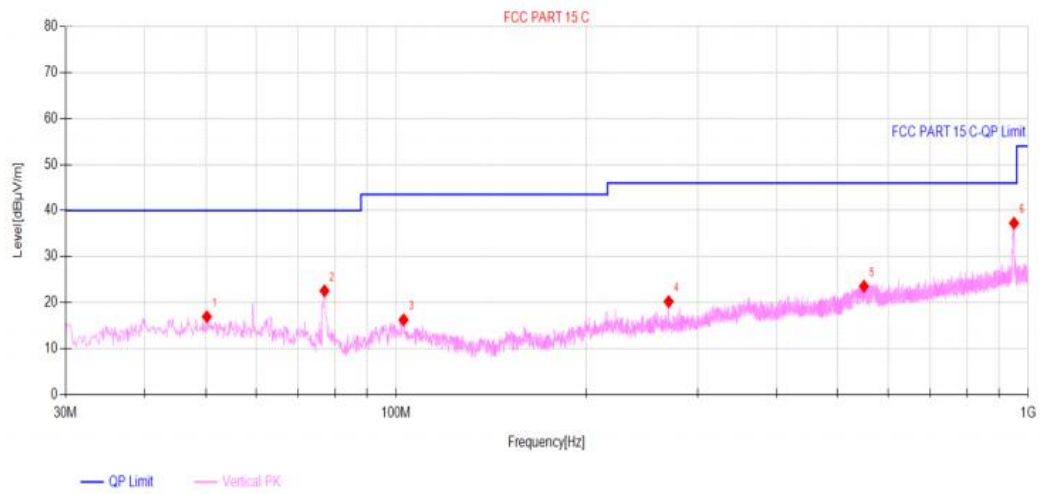


Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	46.102	16.81	15.53	40.00	23.19	Horizontal	PASS
2	78.5	24.77	9.97	40.00	15.23	Horizontal	PASS
3	107.503	17.33	13.63	43.50	26.17	Horizontal	PASS
4	259.114	18.76	14.81	46.00	27.24	Horizontal	PASS
5	525.379	23.49	20.17	46.00	22.51	Horizontal	PASS
6	943.352	31.56	25.85	46.00	14.44	Horizontal	PASS

Polarization:

Vertical



Suspected Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Polarity	Verdict
1	50.176	16.95	15.48	40.00	23.05	Vertical	PASS
2	77.045	22.56	10.26	40.00	17.44	Vertical	PASS
3	102.75	16.27	13.66	43.50	27.23	Vertical	PASS
4	269.978	20.22	14.94	46.00	25.78	Vertical	PASS
5	550.017	23.56	20.64	46.00	22.44	Vertical	PASS
6	950.142	37.27	25.81	46.00	8.73	Vertical	PASS

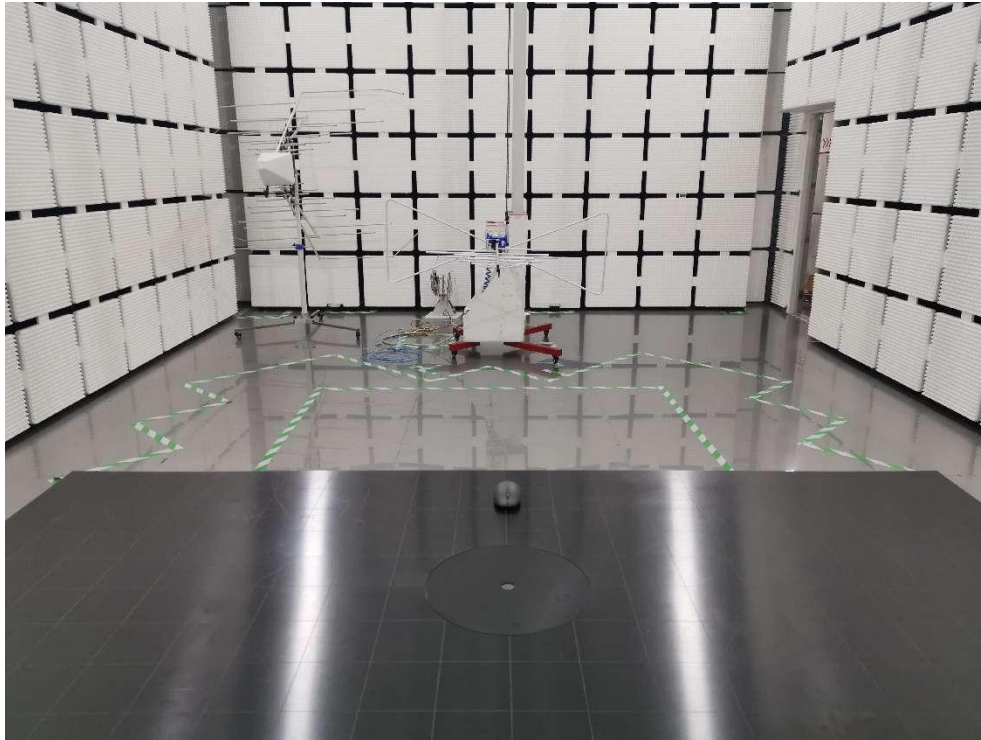
For 1 GHz ~ 25 GHz

Field Strength of Fundamental					2405MHz				
Frequency (MHz)	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Polarity				
2405.00	89.86	76.90	114	94	Horizontal				
2405.00	79.82	65.45	114	94	Vertical				
Test channel:2405MHz									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
4808.00	67.93	31.33	4.23	38.62	-3.06	74	9.13	Peak	Horizontal
4808.00	50.16	31.33	4.23	38.62	-3.06	54	6.90	Average	Horizontal
4808.00	66.82	31.33	4.23	38.62	-3.06	74	10.24	Peak	Vertical
4808.00	50.53	31.33	4.23	38.62	-3.06	54	6.53	Average	Vertical
Field Strength of Fundamental					2440MHz				
Frequency (MHz)	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Polarity				
2440.00	90.12	77.27	114	94	Horizontal				
2440.00	80.09	65.99	114	94	Vertical				
Test channel:2440MHz									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
4880.00	70.23	30.26	4.09	38.29	-3.94	74	7.71	Peak	Horizontal
4880.00	51.51	30.26	4.09	38.29	-3.94	54	6.43	Average	Horizontal
4880.00	66.54	30.26	4.09	38.29	-3.94	74	11.40	Peak	Vertical
4880.00	50.61	30.26	4.09	38.29	-3.94	54	7.33	Average	Vertical
Field Strength of Fundamental					2470MHz				
Frequency (MHz)	Measure Result (PK, dBuV/m)	Measure Result (AVG, dBuV/m)	Peak Limit (dBuV/m)	AVG Limit (dBuV/m)	Polarity				
2470.00	90.87	78.21	114	94	Horizontal				
2470.00	80.52	64.78	114	94	Vertical				
Test channel:2470MHz									
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
4940.00	64.80	31.97	4.11	38.47	-2.39	74	11.59	Peak	Horizontal
4940.00	50.13	31.97	4.11	38.47	-2.39	54	6.26	Average	Horizontal
4940.00	65.61	31.97	4.11	38.47	-2.39	74	10.78	Peak	Vertical
4940.00	49.59	31.97	4.11	38.47	-2.39	54	6.80	Average	Vertical

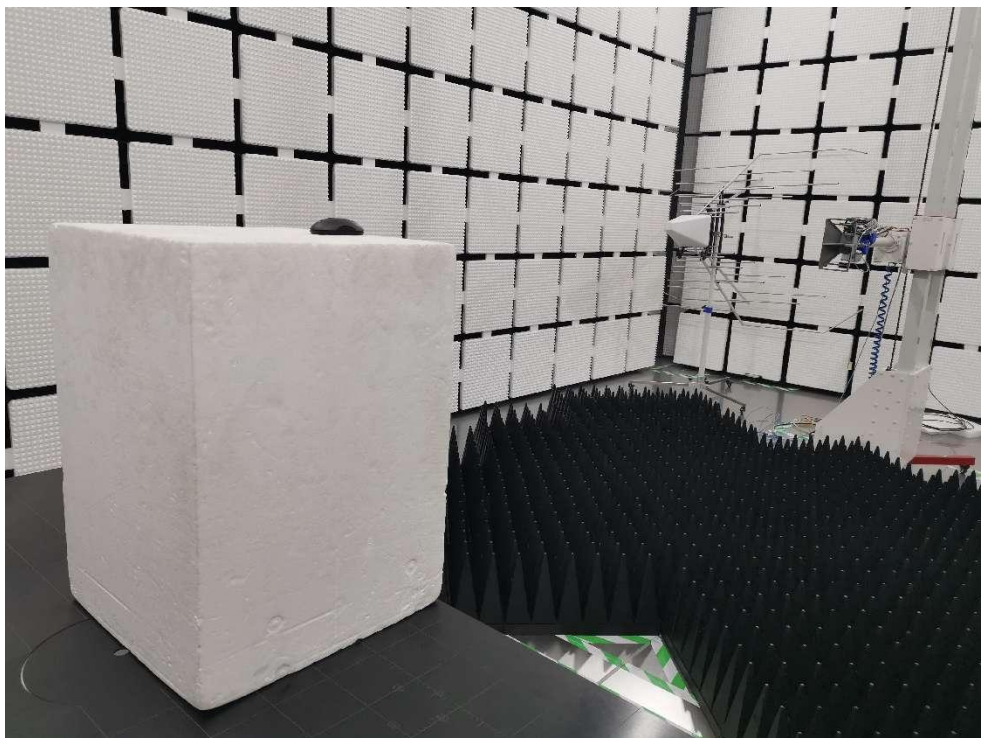
6. TEST SETUP PHOTOS

Radiated Emission

Below 1GHz:



Above 1GHz:



7. EXTERNAL AND INTERNAL PHOTOS

Please refer to the Report: CISRR24041609301

-----End of the report-----