

TEST REPORT

Report No.: SHE24120030-01AE

Date: 2024-12-23

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Applicant : Hangzhou Rock Machinery Manufacture Co., Ltd.
Address of Applicant : No.1, 1st Road, Dongzhou Industrial Zone,
Fuyang 311400, Hangzhou, China

Product Name : wireless winch remote control
Brand Name : BADLAND
Model Name : 71280(193175542595)
Sample No. : E24120030-01#01

FCC ID : 2ANRDFEWL-13
Standards : FCC CFR47 Part 15, Subpart C Section 15.231

Date of Receipt : 2024-12-13
Date of Test : 2024-12-18~2024-12-20
Date of Issue : 2024-12-23

Remark:
This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Erik Yang (Erik Yang)
Reviewed by: Jennifer Zhou (Jennifer Zhou)
Approved by: Echo Mu (Authorized signatory: Echo Mu)

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298, Pingan Road, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	Hangzhou Rock Machinery Manufacture Co., Ltd.
Address	No.1, 1st Road, Dongzhou Industrial Zone, Fuyang 311400, Hangzhou, China
Contact Person	Chunhong Jiang
Telephone	0086-571-87191226
Email	rockwinch@gmail.com
Manufacturer Company Name	Hangzhou Rock Machinery Manufacture Co., Ltd.
Address	No.1, 1st Road, Dongzhou Industrial Zone,Fuyang 311400, Hangzhou, China
Factory Company Name	Hangzhou Rock Machinery Manufacture Co., Ltd.
Address	No.1, 1st Road, Dongzhou Industrial Zone,Fuyang 311400, Hangzhou, China

1.3 Details of EUT

Product Name	wireless winch remote control
Brand Name	BADLAND
Model Name Under Test	71280(193175542595)
FCC ID	2ANRDFEWL-13
Operation Frequency	315MHz
Field Strength(3m)	84.86dBuV/m(peak)@3m
Modulation Type	ASK
Number of channels	1
Hardware version	V1.3
Software version	V1.0
Antenna Type	Integral Antenna (Met 15.203 Antenna requirement)
Antenna Gain	0dBi
Power Supply	DC 12V by battery

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1.4 Test Methodology

47 CFR Part 15, Subpart C	Telecommunication-Radio Frequency Devices-Intentional Radiators
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	§15.203	PASS
Manually operated transmitter	§15.231(a)(1)	PASS
Average Factor	§15.231(b)	PASS
Field Strength of Fundamental and Spurious Emission	§15.231(b) & §15.209	PASS
20dB Bandwidth	§15.231(c)	PASS
AC power-line conducted emissions	§15.207	N/A

Note(s): The EUT is powered by battery

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	15-35
Humidity (%RH)	30-60
Barometric Pressure (mbar)	860-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020A	MY54101709	2024-06-26	2025-06-25
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2024-06-04	2025-06-03
Signal Generator	Rohde & Schwarz	SMR27	100184	2024-06-26	2025-06-25
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2024-06-04	2025-06-03
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2023-03-22	2025-03-21
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2023-06-13	2025-06-12
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2023-06-09	2025-06-08
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2024-06-04	2025-06-03
EMC chamber 9*6*6(L*W*H)	CHANGNING	966	N/A	2023-06-09	2025-06-08
Test Software	BL	BL410_E	Version:2.1.1.436	N/A	N/A

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI. The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95.45%.

Parameter		Uncertainty
Antenna Port Conducted Emission		$\pm 1.04\text{dB}$
Radiated Emission	< 1GHz	$\pm 5.00\text{dB}$
	> 1GHz	$\pm 5.46\text{dB}$
Duty Cycle		$\pm 2.00\%$
Occupied Channel Bandwidth		$\pm 39.26\text{KHz}$

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Channel	Frequency
1	315MHz

Note(s): For Radiated Emission, 3axis were chosen for testing for each applicable mode.

3.2 Special Accessories and Auxiliary Equipment

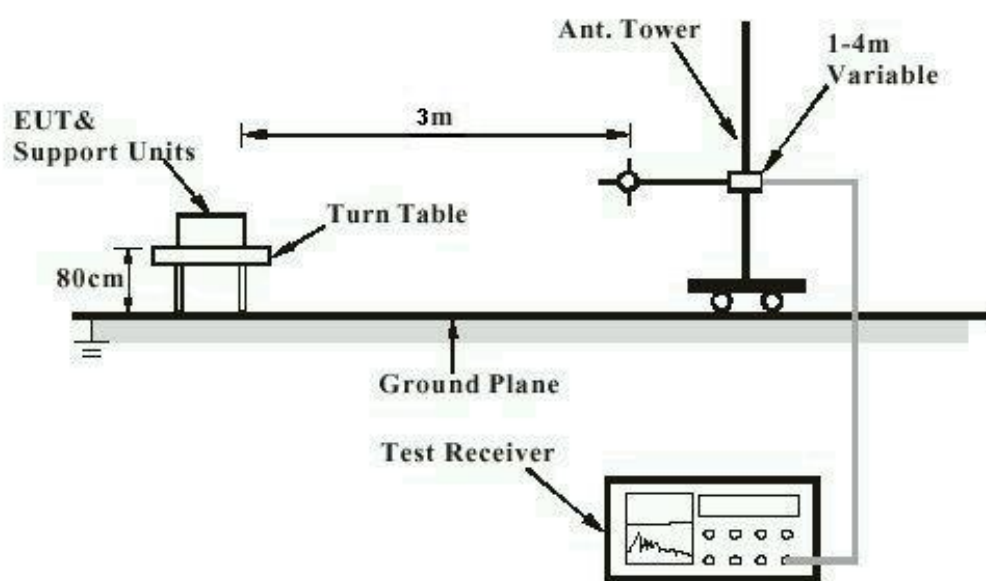
Description	Manufacturer	Model Name	Serial No.
N/A	N/A	N/A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
N/A	N/A	N/A

3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: Part 15.203
Requirement	: The use of approved antennas only with directional gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with a gain of 0dBi. The antenna is an Integral antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Provision For Momentary Operation

RESULT:

PASS

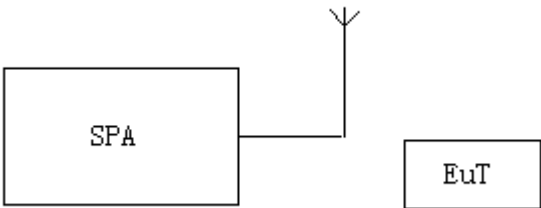
Test standard

: §15.231(a)(1)

Requirement

: ANSI C63.10-2013

Test Setup:



Measurement Procedure:

- Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=100kHz, VBW=300KHz
Span: 0Hz
Sweep time: 10s
- Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
- Record the data.

Test Data:

Channel Frequency	The time of stopping transmission	Limit	Result
315MHz	480ms	<5s	Pass

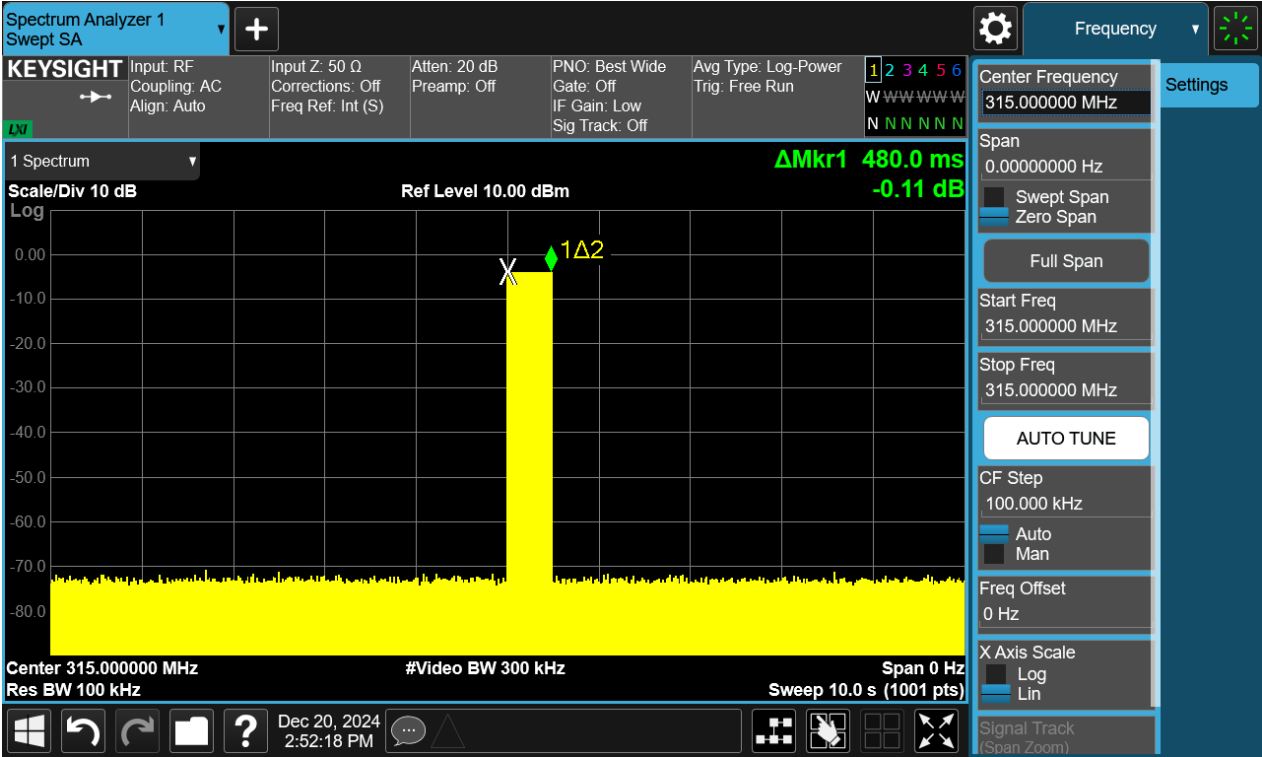
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Test plots of 315MHz



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4.1.3 Duty Cycle Correction Factor

RESULT:

PASS

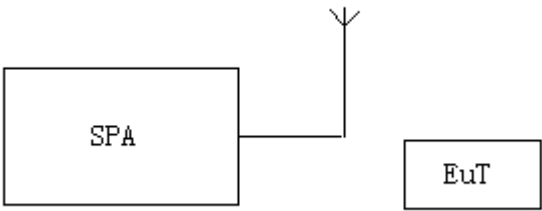
Test standard

: §15.231(b)

Requirement

: ANSI C63.10-2013

Test Setup



Measurement Procedure

- Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=100KHz; VBW=300KHz
Span: 0Hz
Sweep time: more than two pulse trains or more than each type of pulse occupancy time
- Set the EUT to transmit. Use the “Delta mark” function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
- Record the plots and Reported.

Test Data:

Channel Frequency	T(period)	Total On time	Duty Cycle	Duty cycle Correction Factor
315MHz	100ms	0.20x55+0.7x20=25ms	0.25	-12.04

Note: $\delta(\text{dB}) = 20\log(\Delta)$; δ is the duty cycle correction factor (dB); Δ is the duty cycle (dimensionless)

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Test plots of 315MHz—Period>100ms



Test plots of 315MHz—On time(1)



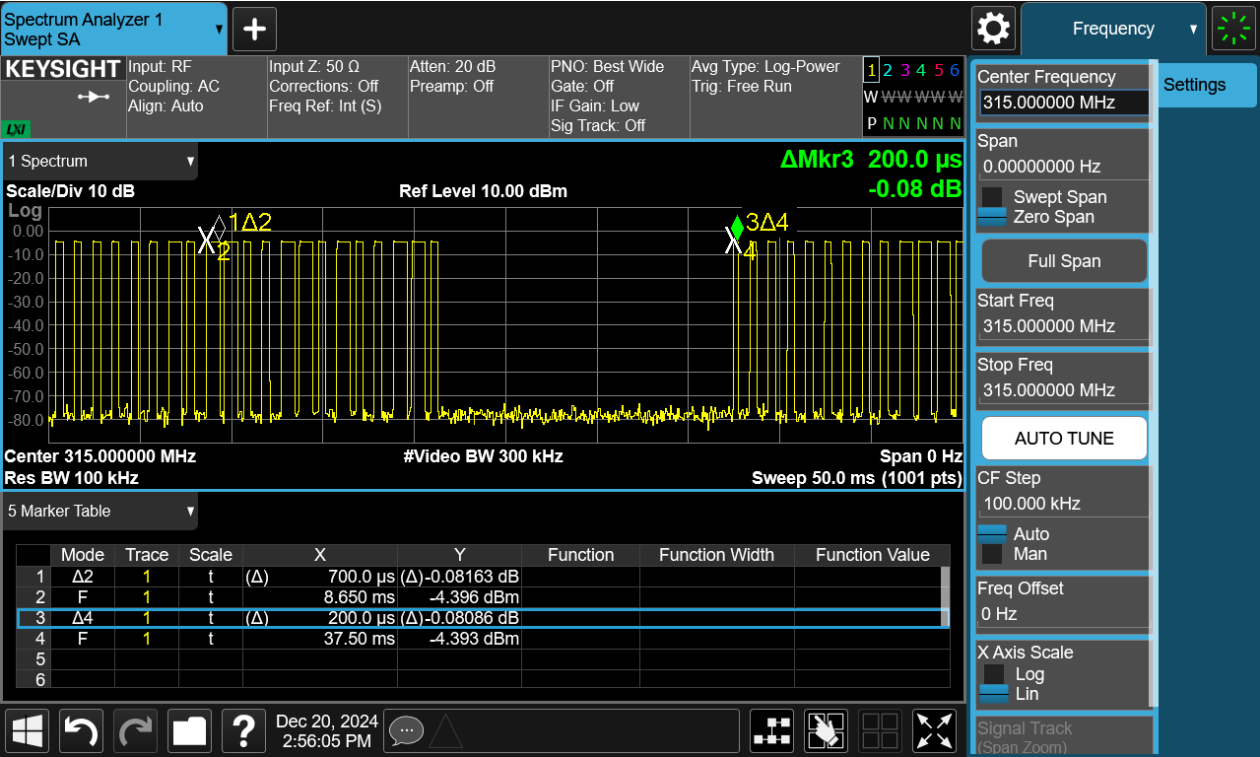
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Test plots of 315MHz—On time(2)



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4.1.4 Radiated Emission

RESULT: PASS

Test standard : §15.231(b),§15.209
Requirement : ANSI C63.10-2013
Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Diagram : Clause 3.4
Operation Mode : Transmitting mode
Ambient temperature : 25.1°C
Relative humidity : 47%

Note(s): In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

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

*Linear interpolations

The above field strength limits are specified at a distance of 3 meters.
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CI SPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

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Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start Frequency	1000MHz
Stop Frequency	10 th carrier harmonic
RB / VB (emission in restricted band)	1MHz/1MHz for Peak, 1MHz/10Hz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

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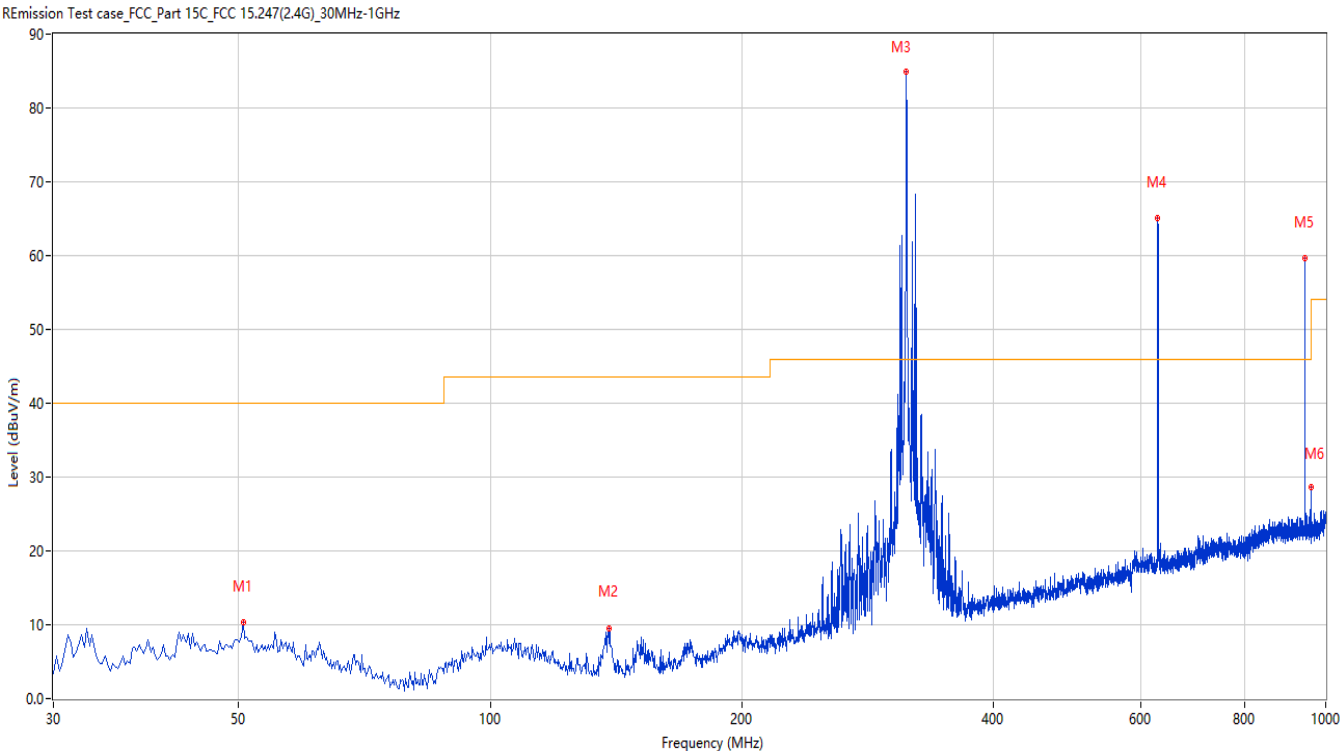
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Test Data

Radiated Emission Below 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

Radiated Emission Below 1GHz-Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	50.607	10.29	-25.19	40.0	29.71	Peak	214.70	100	Horizontal	Pass
2	138.855	9.56	-29.94	43.5	33.94	Peak	117.40	100	Horizontal	Pass
3	314.866	84.86	-23.01	95.62	10.76	Peak	0.00	100	Horizontal	Pass
3*	314.866	72.82	-23.01	75.62	2.80	AV	0.00	100	Horizontal	Pass
4	629.795	65.03	-14.89	75.62	10.59	Peak	204.50	100	Horizontal	Pass
4*	629.795	52.99	-14.89	55.62	2.63	AV	204.50	100	Horizontal	Pass
5	944.966	59.63	-8.83	75.62	15.99	Peak	213.50	100	Horizontal	Pass
5*	944.966	47.59	-8.83	55.62	8.03	AV	213.50	100	Horizontal	Pass
6	959.513	28.60	-8.94	53.15	17.40	Peak	217.80	100	Horizontal	Pass

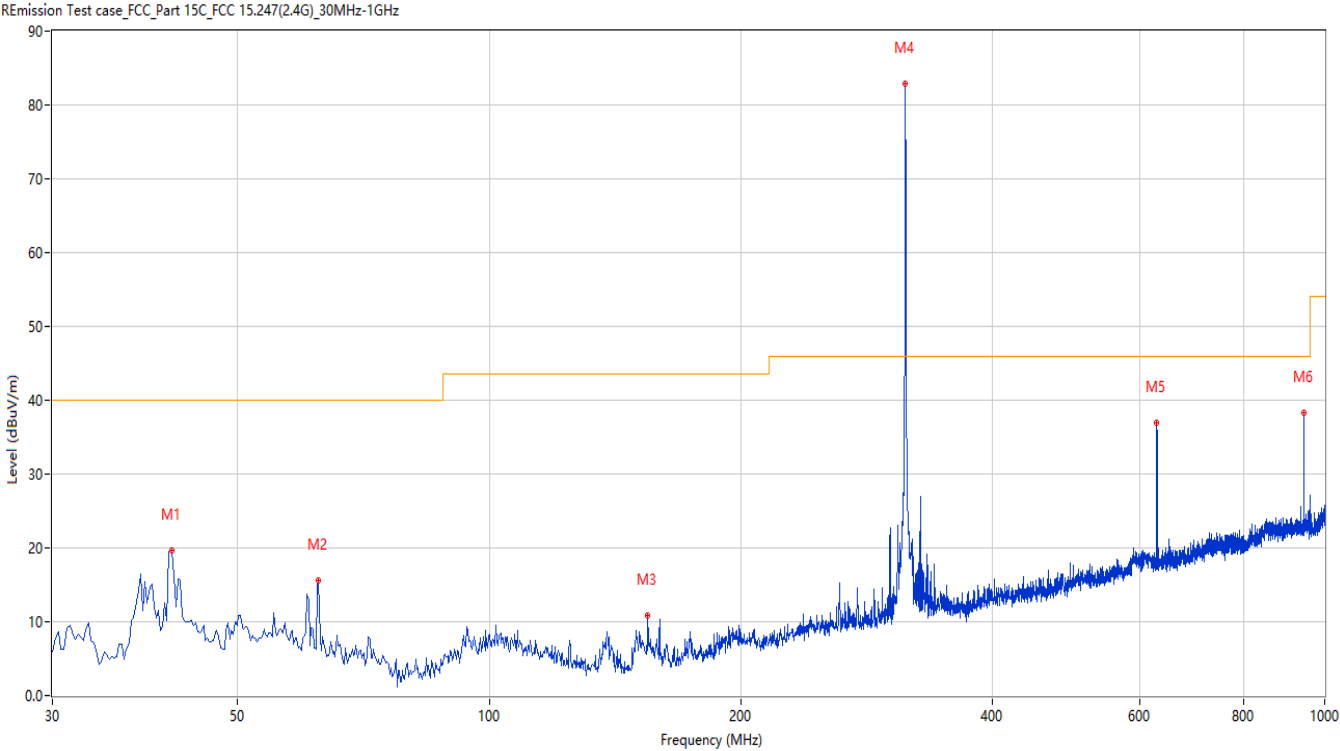
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Radiated Emission Below 1GHz-Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	41.637	19.65	-26.00	40.0	20.35	Peak	106.10	100	Vertical	Pass
2	62.487	15.53	-26.94	40.0	24.47	Peak	228.40	100	Vertical	Pass
3	154.856	10.81	-29.46	43.5	32.69	Peak	146.20	100	Vertical	Pass
4	314.866	82.81	-23.01	95.62	12.81	Peak	133.30	100	Vertical	Pass
4*	314.866	70.77	-23.01	75.62	4.85	AV	133.30	100	Vertical	Pass
5	629.795	36.88	-14.89	75.62	38.74	Peak	124.30	100	Vertical	Pass
5*	629.795	24.84	-14.89	55.62	30.78	AV	124.30	100	Vertical	Pass
6	944.966	38.27	-8.83	75.62	37.35	Peak	183.90	100	Vertical	Pass
6*	944.966	26.23	-8.83	55.62	29.39	AV	183.90	100	Vertical	Pass

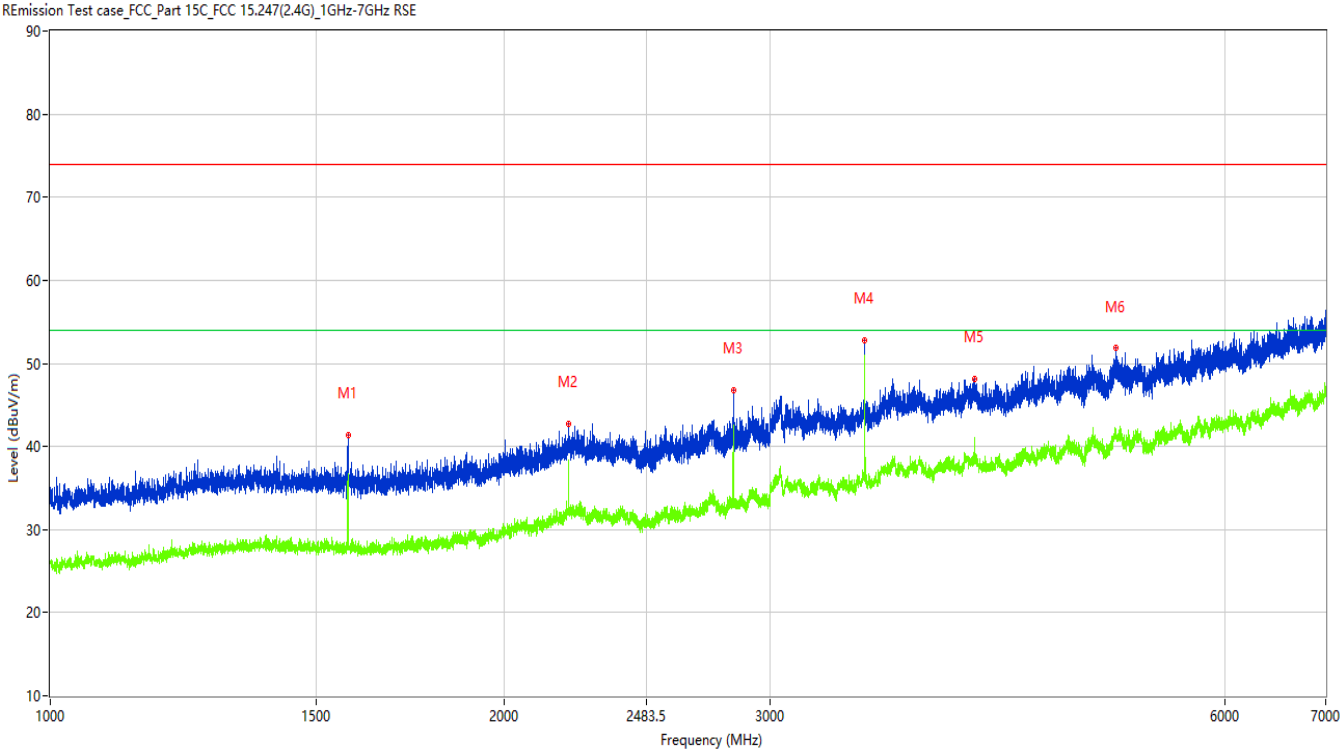
Result: Pass

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Results- Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.
3. AV Value is Peak + Duty cycle Correction Factor.

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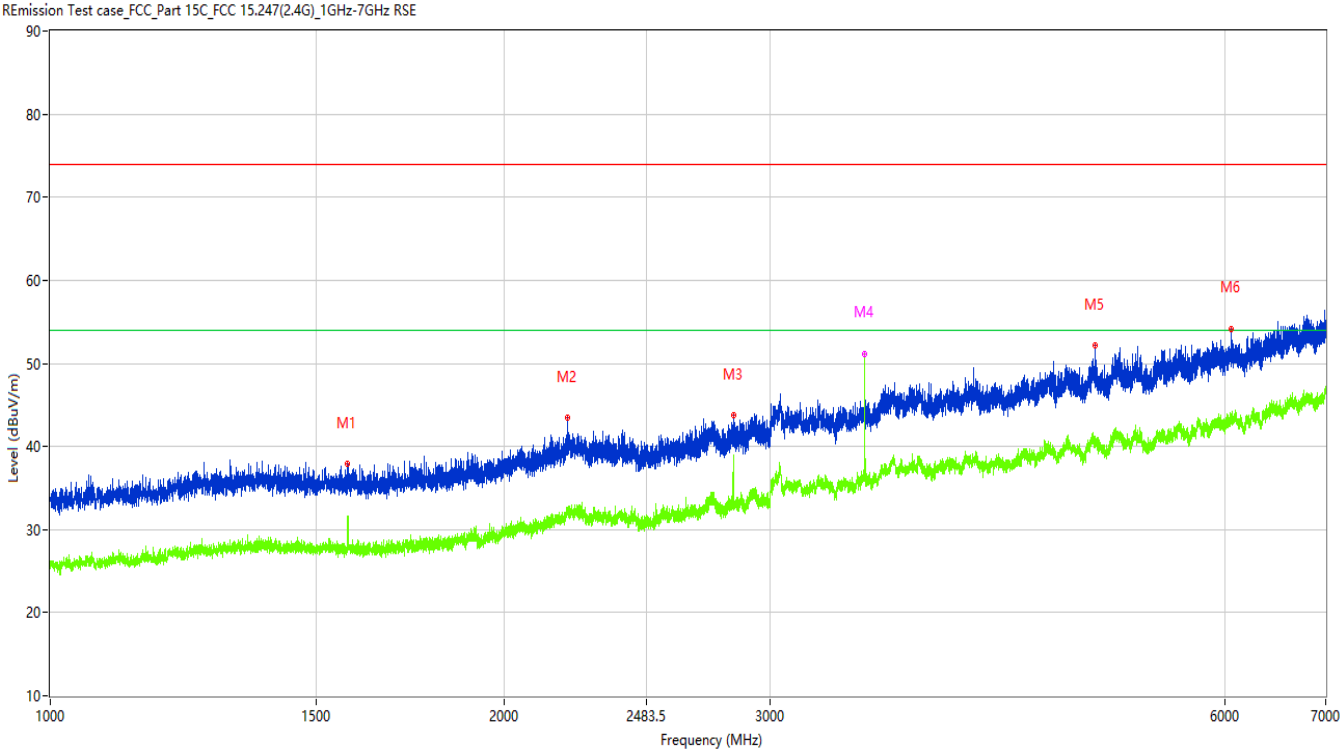
Radiated Emission above 1GHz-Horizontal



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1575.000	41.44	-15.54	75.62	34.18	Peak	266.40	100	Horizontal	Pass
1**	1575.000	29.40	-15.54	55.62	26.22	AV	266.40	100	Horizontal	Pass
2	2205.250	42.76	-10.88	75.62	32.86	Peak	173.10	100	Horizontal	Pass
2**	2205.250	30.72	-10.88	55.62	24.90	AV	173.10	100	Horizontal	Pass
3	2835.500	46.84	-8.77	75.62	28.78	Peak	16.10	100	Horizontal	Pass
3**	2835.500	34.80	-8.77	55.62	20.82	AV	16.10	100	Horizontal	Pass
4	3465.000	52.83	-5.09	75.62	22.79	Peak	360.00	100	Horizontal	Pass
4**	3465.000	40.79	-5.09	55.62	14.83	AV	360.00	100	Horizontal	Pass
5	4095.500	48.16	-1.56	75.62	27.46	Peak	311.80	100	Horizontal	Pass
5**	4095.500	36.12	-1.56	55.62	19.50	AV	311.80	100	Horizontal	Pass
6	5084.500	51.86	0.78	74.0	22.14	Peak	209.30	100	Horizontal	Pass
6**	5084.500	39.82	0.78	54.0	14.18	AV	209.30	100	Horizontal	Pass

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Radiated Emission above 1GHz-Vertical



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1574.500	37.93	-15.57	75.62	37.69	Peak	0.60	100	Vertical	Pass
1**	1574.500	25.89	-15.57	55.62	29.73	AV	0.60	100	Vertical	Pass
2	2201.000	43.44	-10.91	75.62	32.18	Peak	203.00	100	Vertical	Pass
2**	2201.000	31.40	-10.91	55.62	24.22	AV	203.00	100	Vertical	Pass
3	2834.750	43.70	-8.79	75.62	31.92	Peak	118.10	100	Vertical	Pass
3**	2834.750	31.66	-8.79	55.62	23.96	AV	118.10	100	Vertical	Pass
4	3465.000	48.64	-5.09	75.62	26.98	Peak	360.00	100	Vertical	Pass
4**	3465.000	36.60	-5.09	55.62	19.02	AV	360.00	100	Vertical	Pass
5	4924.000	52.11	-0.23	74.0	21.89	Peak	345.20	100	Vertical	Pass
5**	4924.000	40.07	-0.23	54.0	13.93	AV	345.20	100	Vertical	Pass
6	6056.000	54.06	1.71	74.0	19.94	Peak	177.50	100	Vertical	Pass
6**	6056.000	42.02	1.71	54.0	11.98	AV	177.50	100	Vertical	Pass

Result: Pass

Note:

- 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin= Results- Limit.
- 2. The “Factor” value can be calculated automatically by software of measurement system.
- 3. AV Value is Peak + Duty cycle Correction Factor.

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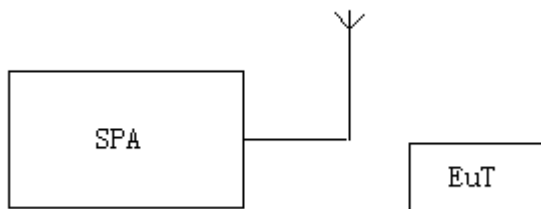
4.1.5 20dB Bandwidth

RESULT:

PASS

Test standard : §15.231(c)
Requirement : ANSI C63.10-2013

Test setup



Test procedure

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=1KHz
VBW=3KHz
Span: 100KHz
Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
3. Record the plots and Reported.

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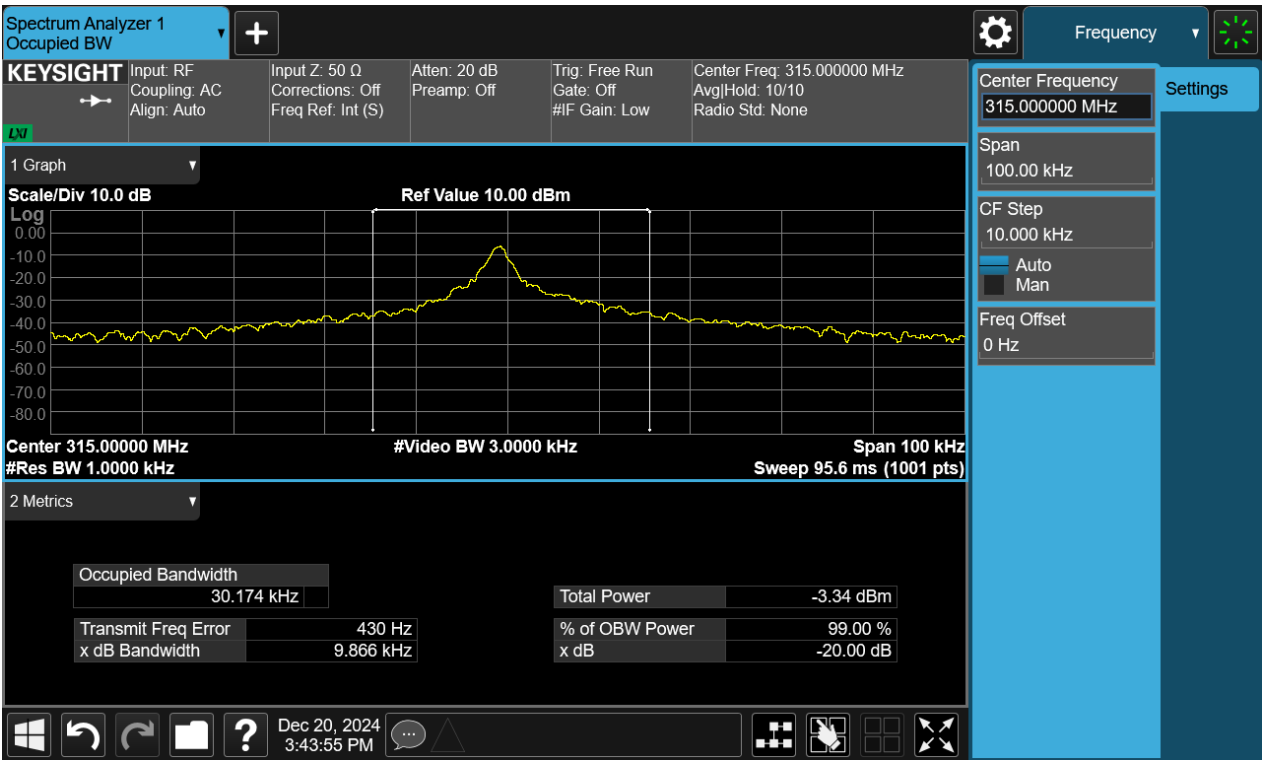
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Channel Frequency	20dB Bandwidth	Limit	Result
315MHz	9.866KHz	787.5KHz	Pass

Note: Limit= Operation Frequency ×0.25%

Test plots of 315MHz



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5 Appendixes

5.1 Photographs of the Sample

All view of EUT



Top view of EUT



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Bottom view of EUT



Front view of EUT



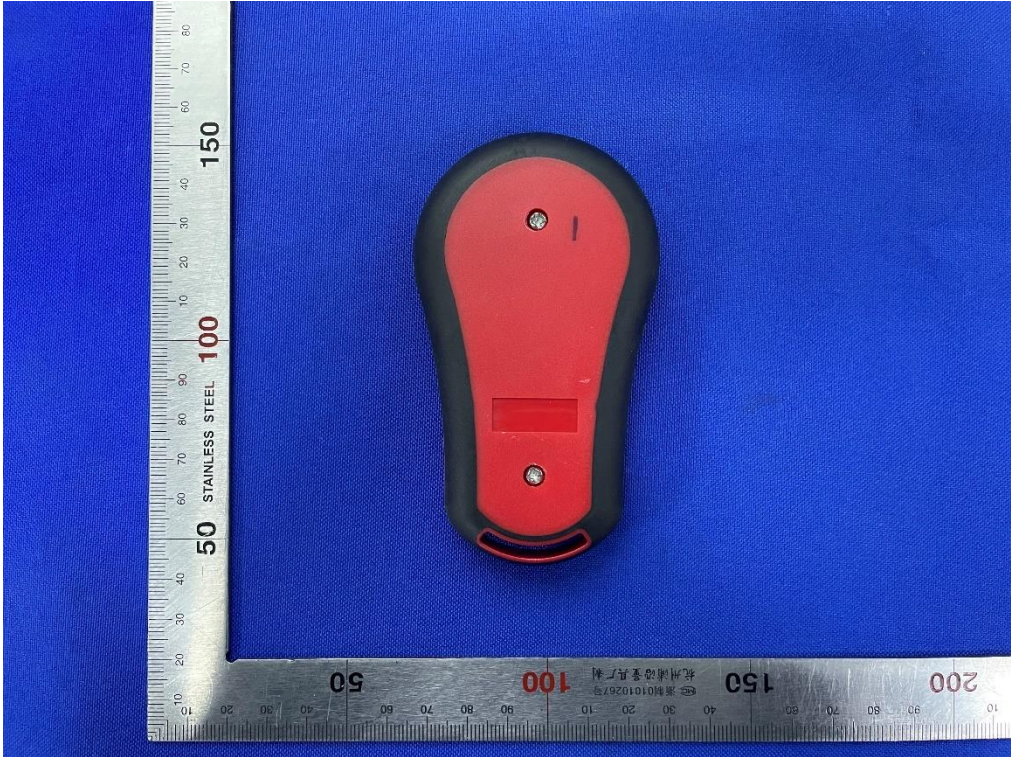
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Back view of EUT



Left view of EUT



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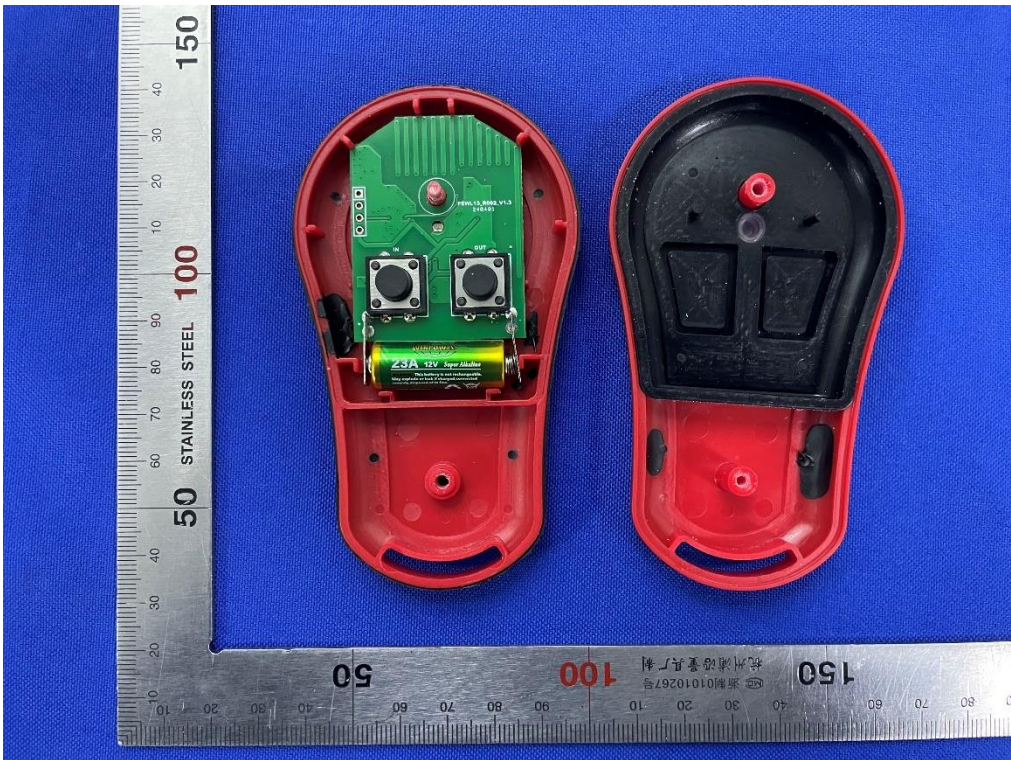
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Right view of EUT



Open view of EUT



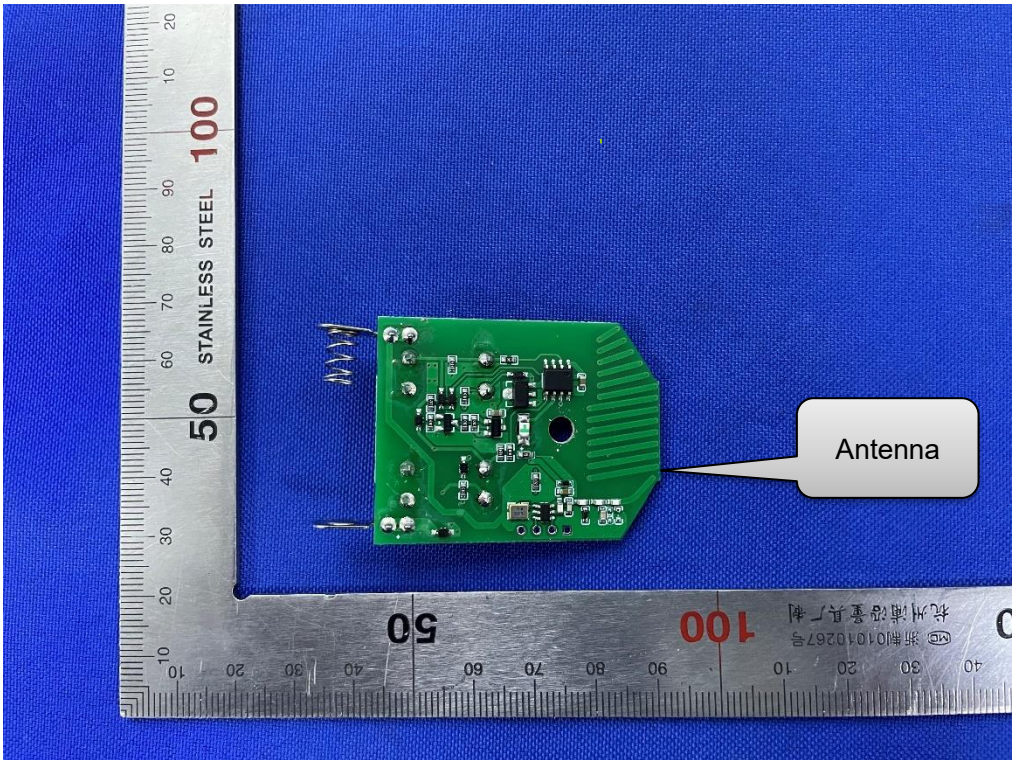
TEST REPORT

Report No.: SHE24120030-01AE

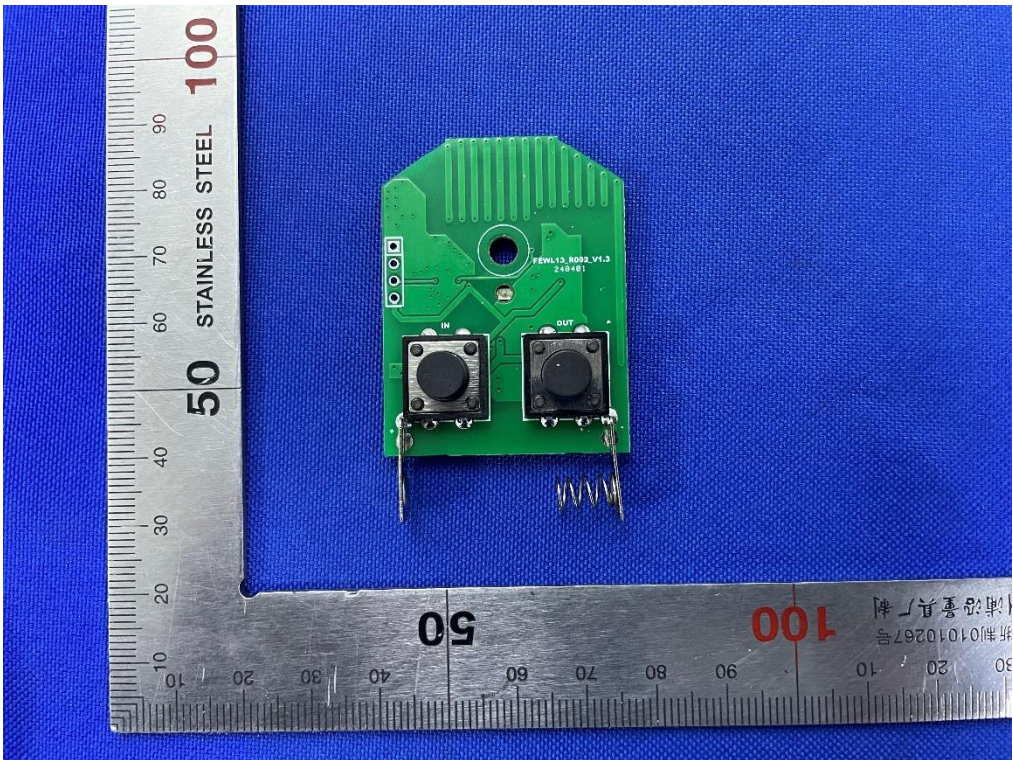
Date: 2024-12-23

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Internal view of EUT-1



Internal view of EUT-2



TEST REPORT

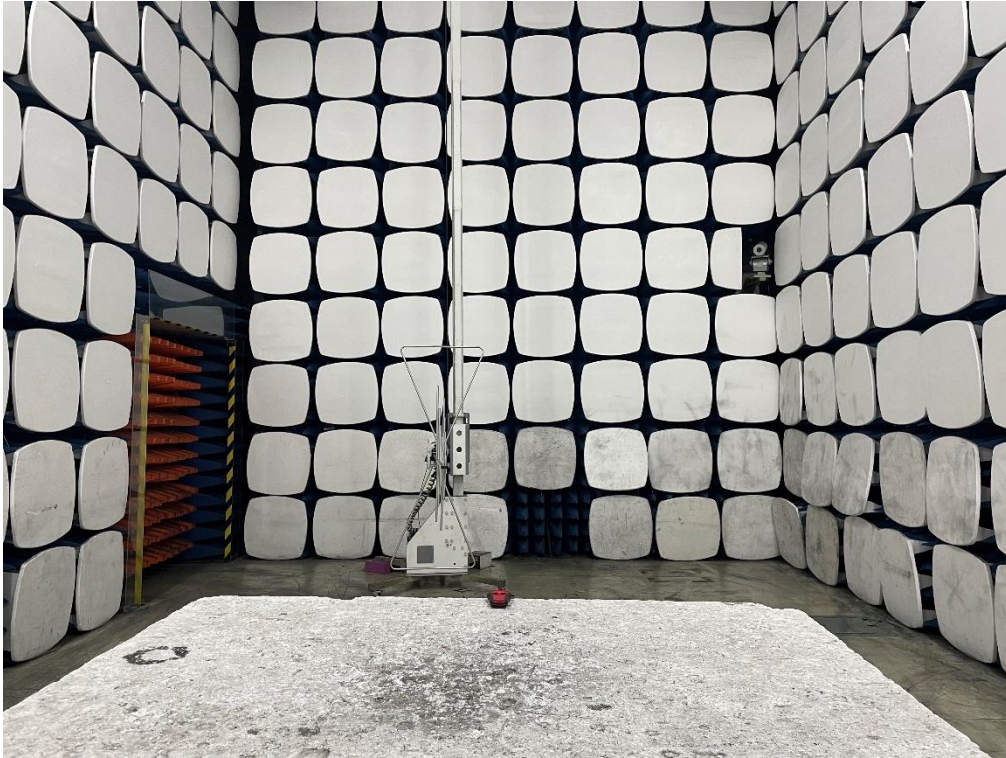
Report No.: SHE24120030-01AE

Date: 2024-12-23

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5.2 Photographs of the Test Set-up

FCC Radiated Emission Test Setup-below 1GHz



FCC Radiated Emission Test Setup-above 1GHz



End of the report