

Roca Sanitaryware(Suzhou) Co.,Ltd

RF TEST REPORT

Report Type:

FCC Part 15.249 & ISED RSS-210 RF report

Model:

ZS880200151A

REPORT NUMBER:

240700262HAN-001

ISSUE DATE:

January 11, 2025

DOCUMENT CONTROL NUMBER:

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Applicant: Roca Sanitaryware(Suzhou) Co.,Ltd
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Manufacturer: Same as applicant

Factory: Same as applicant

FCC ID: 2BKHX-A80313600C

IC: 32908-A80313600C

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2020): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-210 Issue 11 (June 2024): Licence-Exempt Radio Apparatus: Category I Equipment

RSS-Gen Issue 5 (April 2018): General Requirements for Compliance of Radio Apparatus

PREPARED BY:

REVIEWED BY:



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Reviewer
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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
240700262HAN-001	Rev. 01	Initial issue of report	January 11, 2025

Measurement result summary

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Radiated emission	15.249 & 15.209	RSS-210 Issue 11 Clause B.10	Pass
Power line conducted emission	15.207	RSS-Gen Issue 5 Clause 8.8	NA
Assigned bandwidth (20dB bandwidth)	15.215(c)	RSS-Gen Issue 5 Clause 6.7	Pass
Antenna requirement	15.203	-	Pass

Notes: 1: NA =Not Applicable

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Remote controller
Type/Model:	ZS880200151A
PMN:	ZS880200151A
HVIN:	ZS880200151A
Description of EUT:	The EUT covered in the report is RF remote controller with 2.4GHz as carrier.
Rating:	DC 3V
Category of EUT:	Class B
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Software Version:	/
Hardware Version:	DR-B577-V1.0
Sample received date:	November 1, 2024
Date of test:	November 20, 2024 ~ November 30, 2024

1.2 Technical Specification

Frequency Range:	2405MHz ~ 2470MHz
Support Standards:	SRD
Type of Modulation:	GFSK
Product Type:	<input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Channel Number:	4
Antenna Information:	PCB antenna, 2dBi

TEST REPORT**1.3 Description of Test Facility**

Name : Intertek Testing Services (Shanghai FTZ) Co., Ltd.
Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R.
China
Telephone : 86 21 61278200
Telefax : 86 21 54262353

The test facility is : CNAS Accreditation Lab
recognized, certified, Registration No. CNAS L21189
or accredited by these FCC Accredited Lab
organizations Designation Number: CN0175
IC Registration Lab
CAB identifier.: CN0014
VCCI Registration Lab
Member No: 3598 (Registration No.: R-14243, G-10845, C-14723, T-
12252)
A2LA Accreditation Lab
Certificate Number: 3309.02

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2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2023): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2020): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-210 Issue 11 (June 2024): Licence-Exempt Radio Apparatus: Category I Equipment

RSS-Gen Issue 5 (April 2018): General Requirements for Compliance of Radio Apparatus

2.2 Mode of operation during the test

The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as “max hold” continuously and the highest reading among the whole test procedure was recorded.

While testing the transmitting mode of EUT, the internal modulation and continuous transmission were applied.

- 1) Radiated test mode: EUT transmitted signal with RF antenna.
- 2) Conducted test mode: EUT transmitted signal from RF port connected directly.

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	24000 ~ 2483.5
Channel	Frequency (MHz)
0	2405
1	2422
2	2450
3	2470

The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

Test software and Power Setting parameter			
Test Software	EMI_Test_Tool		
Working Mode	SRD		
Test Channel	2405MHz	2450MHz	2470MHz
Power Setting	Default	Default	Default

TEST REPORT

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	SKET Auto EMC Test Software	Keleto	V3.0
Radiated emission	SKET Auto EMC Test Software	Keleto	V3.0

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
/	/	/	/
/	/	/	/

2.5 Test environment condition:

Test items	Temperature	Humidity
Fundamental & spurious emission & Restrict band radiated emission	24°C	53% RH
Power line conducted emission	NA	NA
Emission bandwidth & Transmission Time	24°C	49% RH

TEST REPORT

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Test Receiver	R&S	ESR7	EC 6194	2025-02-27
<input type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	EC 3119	2025-11-18
<input type="checkbox"/>	Attenuator	Hua Xiang	Ts5-10db-6g	EC 6194-1	2024-12-07
<input type="checkbox"/>	Shielded room	Zhongyu	-	EC 2838	2025-01-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2025-08-18
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112B	EC 6411	2025-09-11
<input checked="" type="checkbox"/>	Pre-amplifier	tonscend	tap01018050	EC 6432-1	2024-12-07
<input checked="" type="checkbox"/>	Horn antenna	tonscend	bha9120d	EC 6432-2	2025-03-20
<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2025-09-13
<input type="checkbox"/>	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2026-09-12
<input type="checkbox"/>	Pre-amplifier	R&S	AFS42-00301800-25-S-42	EC 5262	2025-06-14
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2026-07-11
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2025-03-05
<input checked="" type="checkbox"/>	Power sensor	Agilent	U2021XA	EC 5338-1	2025-03-05
<input checked="" type="checkbox"/>	Vector Signal Generator	Agilent	N5182B	EC 5175	2025-03-05
<input checked="" type="checkbox"/>	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2025-03-09
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESCI 7	EC 4501	2025-03-09
<input type="checkbox"/>	Climate chamber	GWS	MT3065	EC 6021	2025-03-07
<input type="checkbox"/>	Spectrum Analyzer	Keysight	N9030b	EC 6078	2025-03-18
<input type="checkbox"/>	Universal Radio Communication Tester	R&S	CMW500	EC 6209	2025-01-30
<input type="checkbox"/>	Signal generator	Agilent	N5182A	EC 6172	2025-08-06
<input type="checkbox"/>	Signal generator	Agilent	N5181A	EC 6171	2025-08-06
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Therom-Hygrograph	Testo	175h1	EC 6644	2025-08-29
<input checked="" type="checkbox"/>	Pressure meter	YM3	Shanghai Mengde	EC 3320	2025-08-16

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2.7 Measurement uncertainty

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

Test item	Measurement uncertainty
Maximum peak output power	$\pm 0.68\text{dB}$
Radiated Emissions in restricted frequency bands below 1GHz	$\pm 4.90\text{dB}$
Radiated Emissions in restricted frequency bands above 1GHz	$\pm 4.80\text{dB}$
Emission outside the frequency band	$\pm 4.80\text{dB}$
Power line conducted emission	$\pm 2.7\text{dB}$

TEST REPORT

3 Radiated emission

Test result: PASS

3.1 Limit

Fundamental Frequency (MHz)	Fundamental limit (dB μ V/m)	Harmonic limit (dB μ V/m)
<input type="checkbox"/> 902 - 928	94	54
<input checked="" type="checkbox"/> 2400 - 2483.5	94	54
<input type="checkbox"/> 5725 - 5875	94	54
<input type="checkbox"/> 24000 - 24250	108	68

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
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

3.2 Measurement Procedure

For Radiated emission below 30MHz:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- Both X and Y axes of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

TEST REPORT**For Radiated emission above 30MHz:**

- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

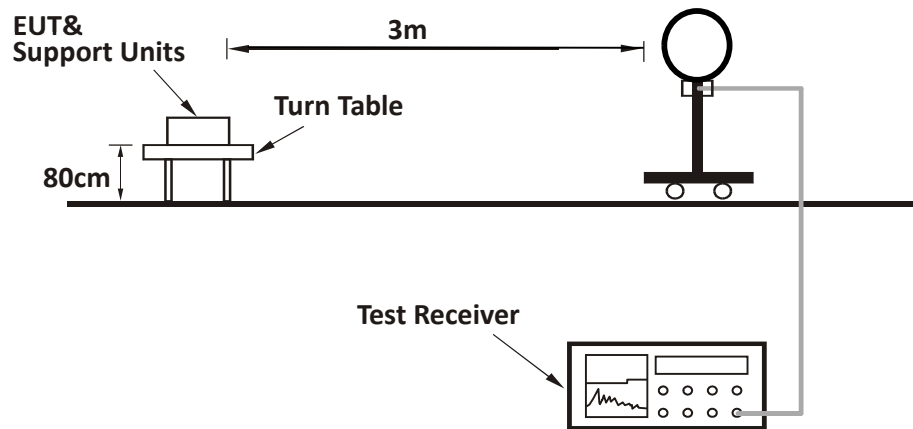
Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or $3 \times \text{RBW}$ (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported

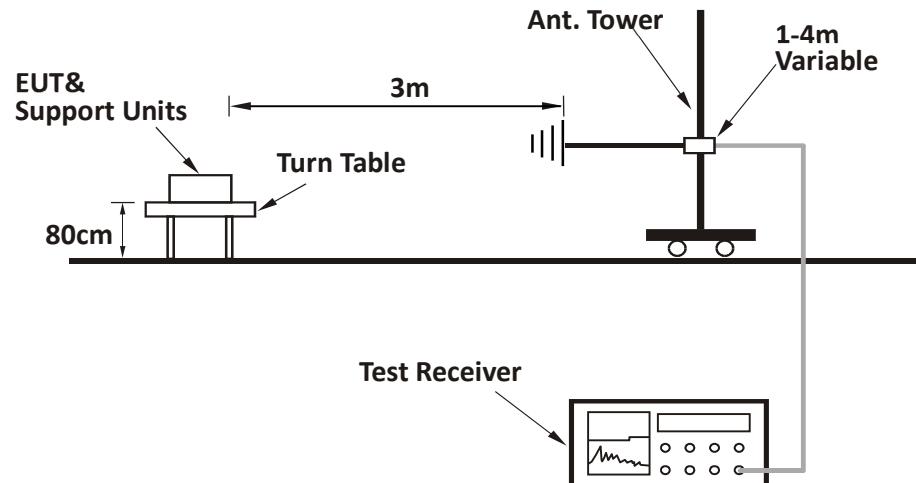
TEST REPORT

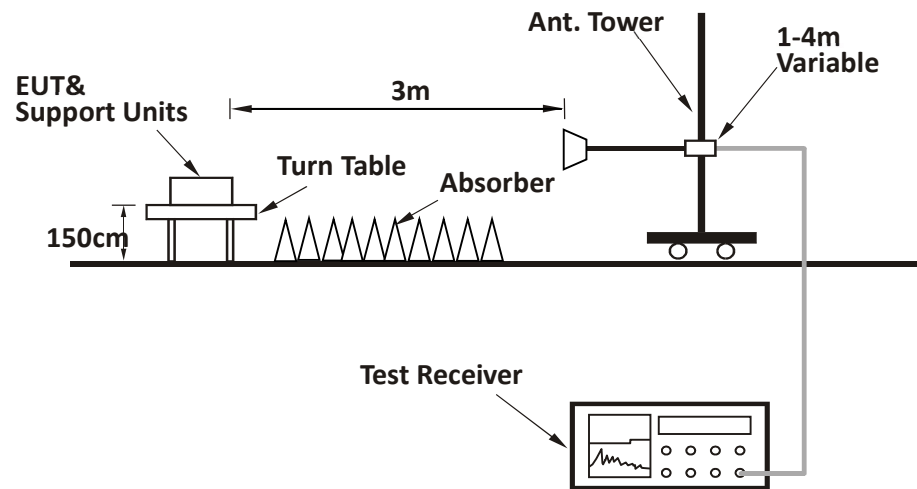
3.3 Test Configuration

For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



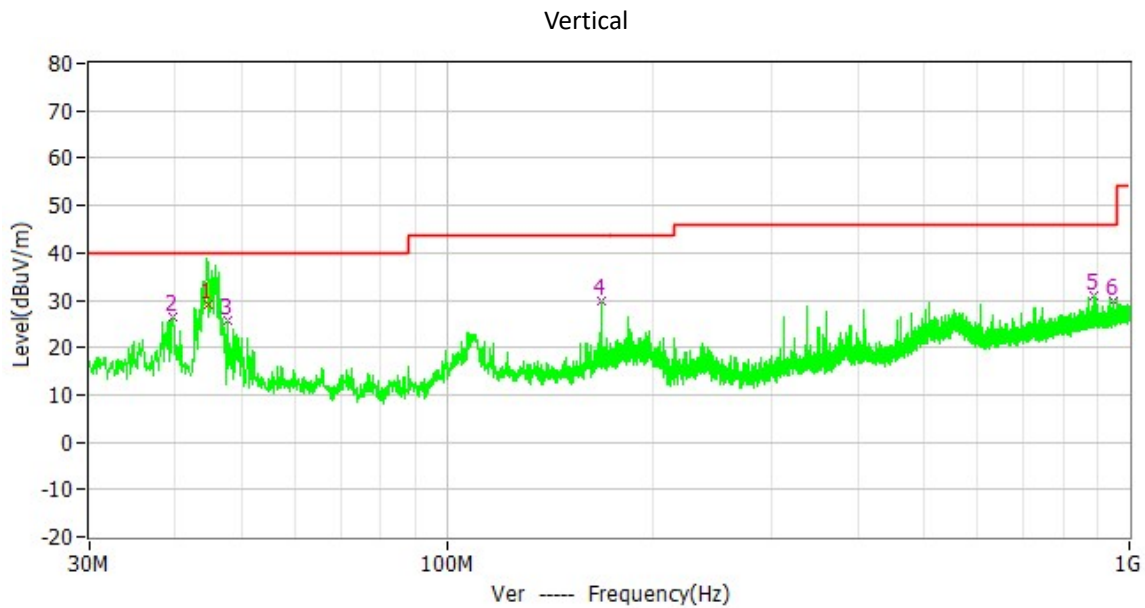
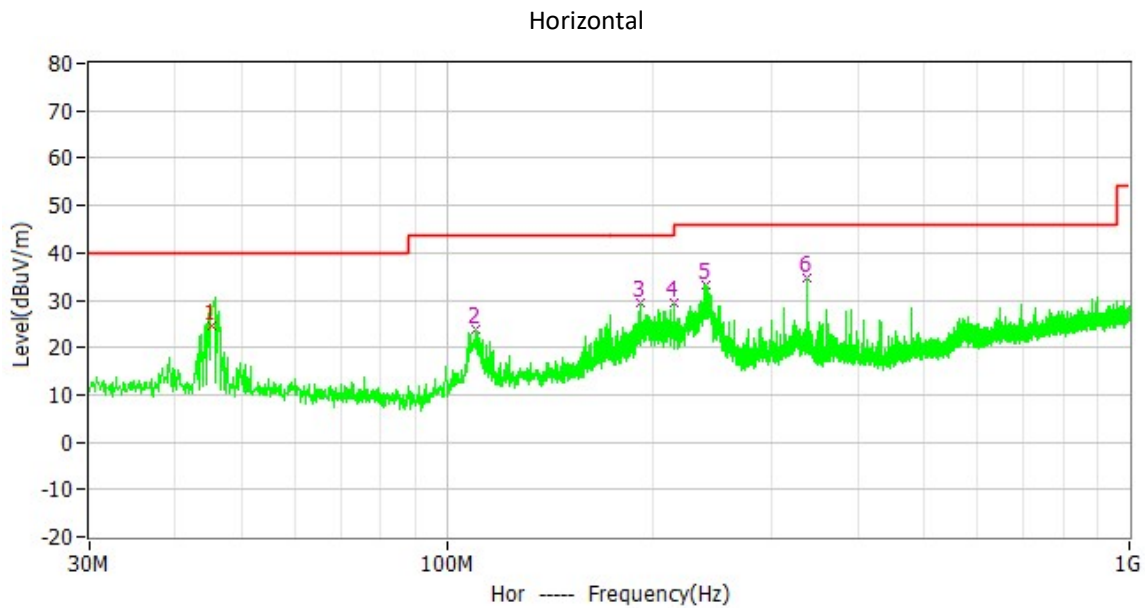
TEST REPORT**For Radiated emission above 1GHz:**

TEST REPORT

3.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:



TEST REPORT

Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dB μ V/m)	Correct Factor (dB/m)	Limit (dB μ V/m)	Margin (dB)	Detector
H	45.423	24.52	14.30	40.00	15.48	PK
H	110.316	23.72	11.19	43.50	19.78	PK
H	191.990	29.28	12.22	43.50	14.22	PK
H	215.949	29.31	12.19	43.50	14.19	PK
H	239.423	33.23	13.16	46.00	12.77	PK
H	337.490	34.57	16.27	46.00	11.43	PK
V	44.650	29.17	14.20	40.00	10.83	PK
V	39.700	26.55	13.91	40.00	13.45	PK
V	47.751	25.68	14.43	40.00	14.32	PK
V	168.807	29.83	14.15	43.50	13.67	PK
V	885.928	31.04	26.95	46.00	14.96	PK
V	948.784	29.73	27.51	46.00	16.27	PK

- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = Limit - Corrected Reading
 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

TEST REPORT

Test result above 1GHz:

CH	Antenna	Frequency (MHz)	Corrected Reading (dBμV/m)	Correct Factor (dB/m)	Limit (dBμV/m)	Margin (dB)	Detector
L	H	2390.00	35.42	31.71	74.00	38.58	PK
	V	2390.00	40.92	31.71	74.00	33.08	PK
	H	2405.00	104.51	31.75	114.00	9.49	PK
	H	2405.00	74.42	31.75	94.00	19.58	AV
	V	2405.00	103.20	31.75	114.00	10.80	PK
	V	2405.00	73.11	31.75	94.00	20.89	AV
	H	4810.00	57.62	-15.14	74.00	16.38	PK
	H	4810.00	26.23	-15.14	54.00	27.77	AV
	V	4810.00	57.54	-15.14	74.00	16.46	PK
	V	4810.00	25.44	-15.14	54.00	28.56	AV
	H	7215.00	63.72	-9.04	74.00	10.28	PK
	H	7215.00	28.31	-9.04	54.00	25.69	AV
	V	7215.00	63.80	-9.04	74.00	10.20	PK
	V	7215.00	29.13	-9.04	54.00	24.87	AV
M	H	2450.00	104.54	31.78	114.00	9.46	PK
	H	2450.00	74.45	31.78	94.00	19.55	AV
	V	2450.00	102.34	31.78	114.00	11.66	PK
	V	2450.00	72.25	31.78	94.00	21.75	AV
	H	4900.00	57.62	-15.07	74.00	16.38	PK
	H	4900.00	25.21	-15.07	54.00	28.79	AV
	V	4900.00	51.74	-15.07	74.00	22.26	PK
	H	7350.00	63.86	-8.83	74.00	10.14	PK
	H	7350.00	28.65	-8.83	54.00	25.35	AV
	V	7350.00	64.01	-8.83	74.00	9.99	PK
H	V	7350.00	28.69	-8.83	54.00	25.31	AV
	H	2470.00	104.61	31.84	114.00	9.39	PK
	H	2470.00	74.52	31.84	94.00	19.48	AV
	V	2470.00	102.55	31.84	114.00	11.45	PK
	V	2470.00	72.46	31.84	94.00	21.54	AV
	H	2483.50	34.10	31.88	74.00	39.90	PK
	V	2483.50	50.50	31.88	74.00	23.50	PK
	H	4940.00	57.79	-15.03	74.00	16.21	PK
	H	4940.00	26.04	-15.03	54.00	27.96	AV

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	V	4940.00	52.24	-15.03	74.00	21.76	PK
	H	7410.00	64.35	-8.75	74.00	9.65	PK
	H	7410.00	28.90	-8.75	54.00	25.10	AV
	V	7410.00	64.09	-8.75	74.00	9.91	PK
	V	7410.00	29.80	-8.75	54.00	24.20	AV

- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (- Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = Limit - Corrected Reading
 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

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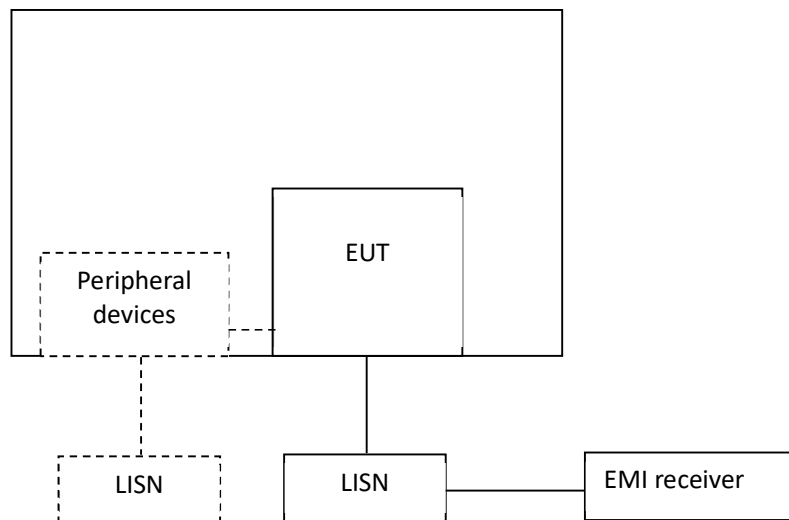
4 Power line conducted emission

Test result: NA

4.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	QP	AV
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.		

4.2 Test Configuration



TEST REPORT**4.3 Measurement Procedure**

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

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4.4 Test Results of Power line conducted emission

NA

TEST REPORT**5 Assigned bandwidth (20dB bandwidth)**

Test result: **PASS**

5.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band.

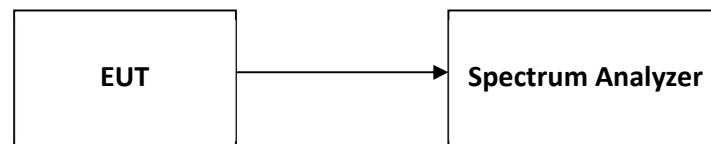
5.2 Measurement Procedure

The 20dB Bandwidth is measured using the Spectrum Analyzer.

Set Span = 2 to 3 times the 20 dB bandwidth, RBW = approximately 1% of the 20 dB bandwidth,

VBW>RBW, Sweep = auto, Detector = peak, Trace = max hold.

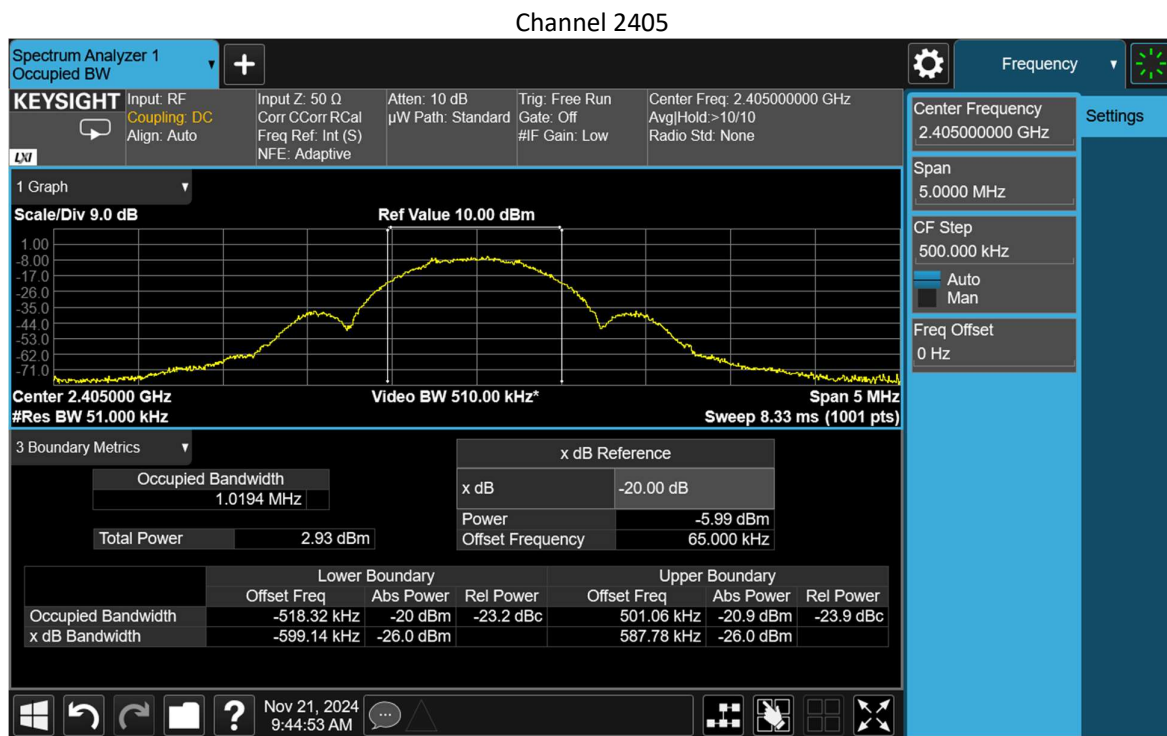
The test was performed at 2 channels (lowest and highest channel).

5.3 Test Configuration

TEST REPORT

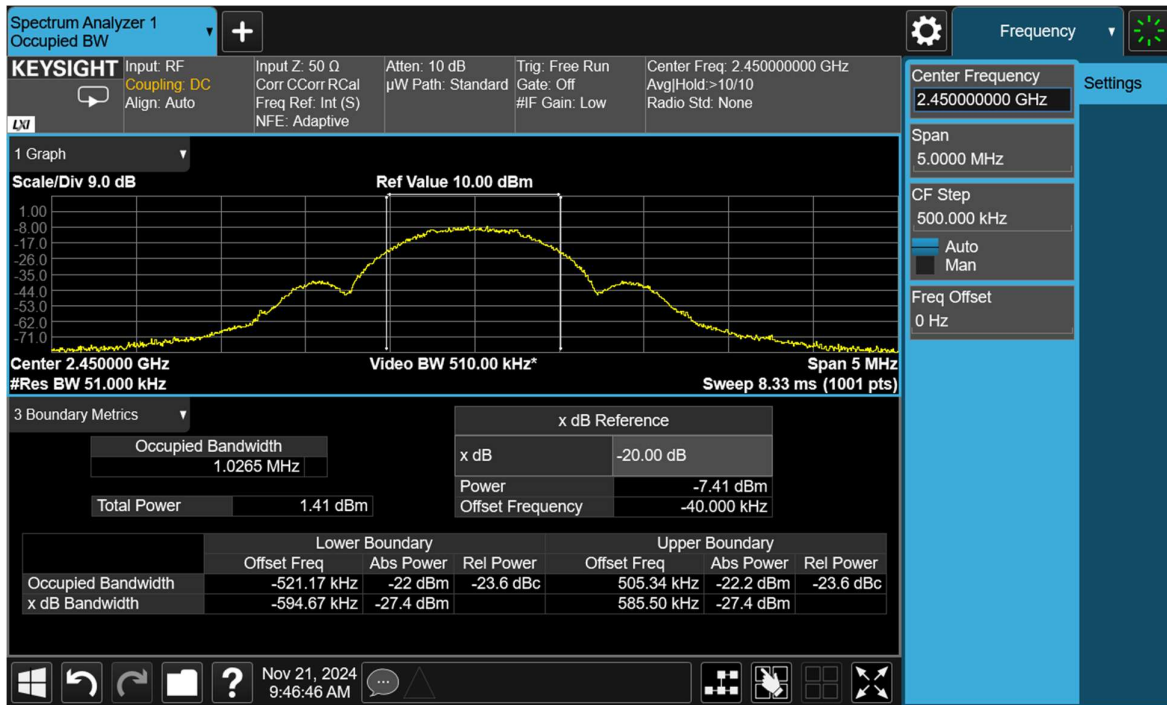
5.4 The results

Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	F _L at 20dB BW (MHz)	F _H at 20dB BW (MHz)
2405	1.1869	1.0194	>2400.00	/
2450	1.1802	1.0265	/	/
2470	1.1698	1.0236	/	<2483.50
Limit	N/A	N/A	F _L > 2400	F _H < 2483.5
Result	Complied			



Channel 2450

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Channel 2470



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6 Antenna requirement

Requirement:

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.

Result:

EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

END of the report