



RF MEASUREMENT REPORT

FCC ID: 2BACM-ZN2101
Applicant: XIAMEN OLT CO.,LTD.
Product: Intelligent Toilet Seat
Model No.: ZN2101-001
Family Model: ZN2101-002
FCC Classification: Part 15 Low Power Communication Device Transmitter (DXX)
FCC Rule Part(s): Part 15.249
Test Procedure(s): ANSI C63.10 - 2013
Result: Complies
Test Date: 2023-03-08 ~ 2023-03-14

Reviewed By:

Vincent Yu

Approved By:

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2303RSU014-U1	V01	Initial Report	2023-05-17	Invalid
2303RSU014-U1	V02	Revise Typo Error	2023-05-26	Invalid
2303RSU014-U1	V03	Revise EUT Information	2023-05-31	Valid

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant	5
1.2. Manufacturer	5
1.3. Testing Facility	5
1.4. Product Information	6
1.5. Radio Specification	6
2. Test Configuration	7
2.1. Test Mode	7
2.2. Test Configuration	7
2.3. Test Environment Condition	7
2.4. Duty Cycle	8
3. Antenna Requirements	9
4. Measuring Instrument	10
5. Measurement Uncertainty	11
6. Test Result	12
6.1. Summary	12
6.2. AC Conducted Emissions Measurement	13
6.2.1. Test Limit	13
6.2.2. Test Setup	13
6.2.3. Test Result	14
6.3. Radiated Emission	16
6.3.1. Test Limit	16
6.3.2. Test Procedure	17
6.3.3. Test Setting	17
6.3.4. Test Setup	20
6.3.5. Test Result	22
6.4. Radiated Restricted Band Edge Measurement	26
6.4.1. Test Limit	26
6.4.2. Test Procedure	27
6.4.3. Test Setting	27
6.4.4. Test Setup	28
6.4.5. Test Result	29
6.5. 20dB Spectrum Bandwidth Measurement	33
6.5.1. Test Limit	33
6.5.2. Test Procedure	33
6.5.3. Test Setting	33
6.5.4. Test Setup	34

6.5.5. Test Result	35
Appendix A - Test Setup Photograph	36
Appendix B - EUT Photograph	37

1. General Information

1.1. Applicant

XIAMEN OLT CO.,LTD.

Room 501, Building 1, No. 950, Tonglong 2nd Road, Xiamen Torch High-tech Zone (Xiang'an) Industrial Zone, Xiamen City, China

1.2. Manufacturer

XIAMEN OLT CO.,LTD.

Room 501, Building 1, No. 950, Tonglong 2nd Road, Xiamen Torch High-tech Zone (Xiang'an) Industrial Zone, Xiamen City, China

1.3. Testing Facility

☒	Test Site – MRT Suzhou Laboratory Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China Laboratory Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐ R-20025 ☐ G-20034 ☐ C-20020 ☐ T-20020 ☐ R-20141 ☐ G-20134 ☐ C-20103 ☐ T-20104
☐	Test Site – MRT Shenzhen Laboratory Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China Laboratory Accreditations A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
☐	Test Site – MRT Taiwan Laboratory Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) Laboratory Accreditations TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	Intelligent Toilet Seat
Model No.	ZN2101-001
Family Model	ZN2101-002
EUT Identification No.	20230306Sample#04
Power Supply	120Vac
Notes: 1. The two models are the same except that the model ZN2101-002 lacks the flip module. 2. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification

Frequency Range	24.00 ~ 24.25GHz
Type of Modulation	FMCW
Declared Chirp Width	200MHz
Declared Chirp Time	2130μs
Antenna Type	Integrated Antenna

2. Test Configuration

2.1. Test Mode

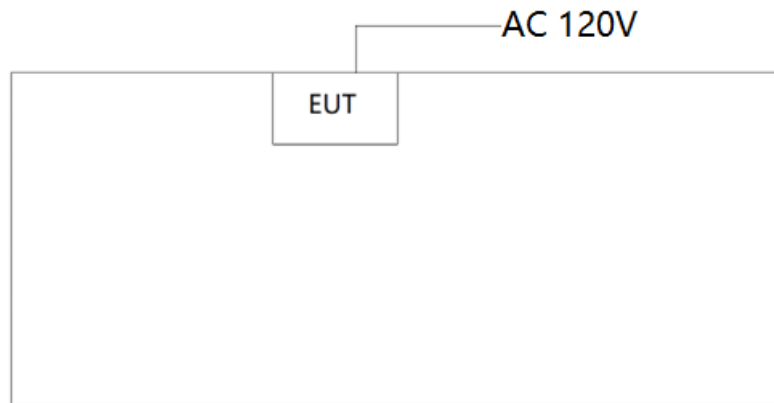
Mode 1: Transmitter (Tx) and Receiver (Rx) Work Simultaneously at 24GHz

Note: The test sample was provided by the manufacturer, which was configured into Collocated Tx/Rx continuous transmit after power on.

2.2. Test Configuration

This device was tested per the guidance ANSI C63.10:2013 was used to reference the appropriate EUT setup for radiated emissions testing.

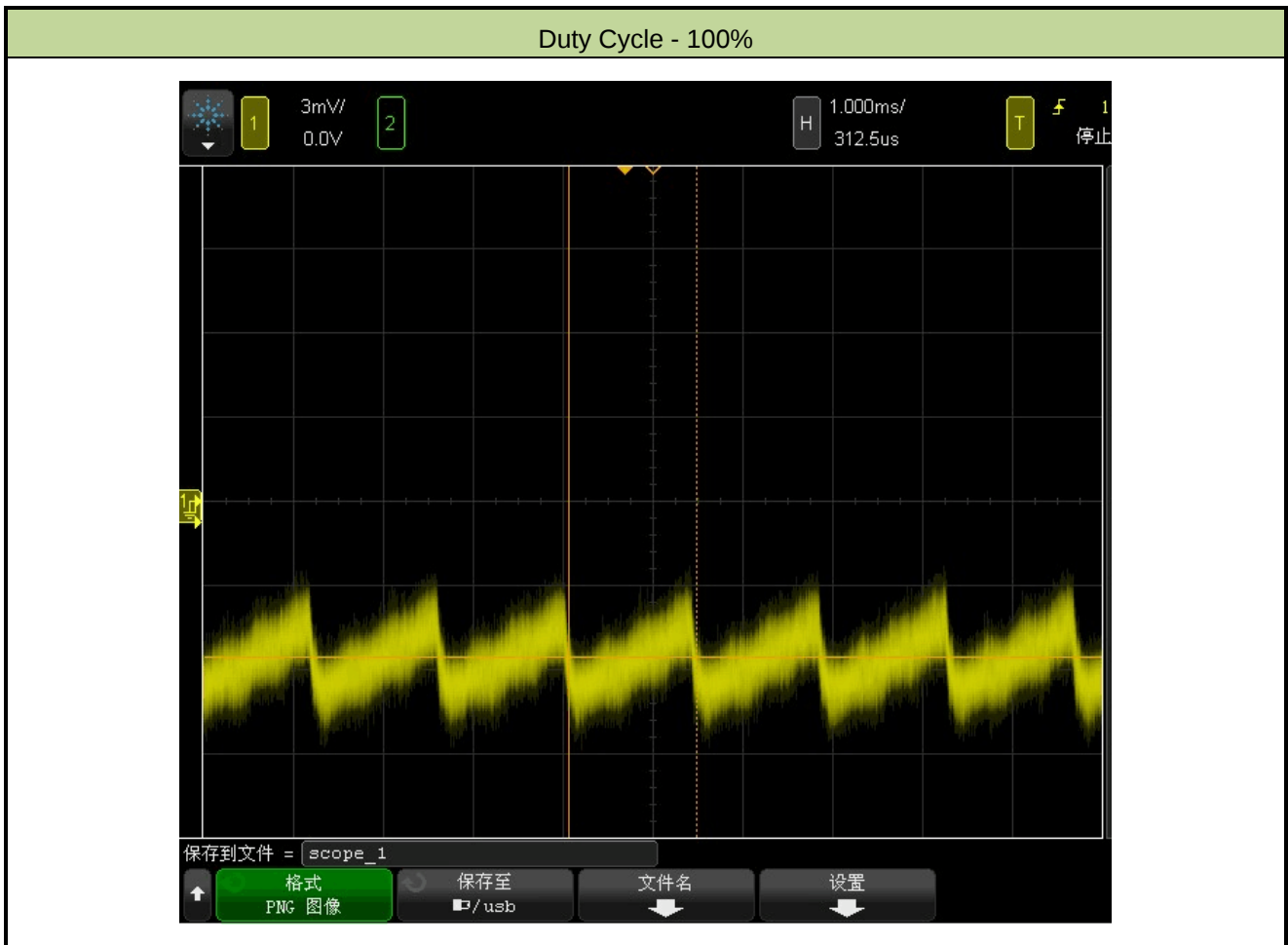
Connection Diagram



2.3. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

2.4. Duty Cycle



3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

This unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2023-12-28	SIP-AC1
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2023-12-22	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2023-11-01	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06620	1 year	2023-11-27	SIP-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2023-07-30	SIP-AC1
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2024-02-26	SIP-AC1
Waveguide Harmonic Mixer	Keysight	M1970V	MRTSUE06271	3 years	2025-09-22	SIP-AC1
Waveguide Harmonic Mixer	Keysight	M1970W	MRTSUE06272	3 years	2025-09-29	SIP-AC1
mmWave Antenna	MI-WWAVE	261U-25/383	MRTSUE06273	N/A ^{Note1}	N/A	SIP-AC1
mmWave Antenna	A-INFO	LB-15-25-A	MRTSUE06409	N/A ^{Note1}	N/A	SIP-AC1
mmWave Antenna	A-INFO	LB-10-25-A	MRTSUE06410	N/A ^{Note1}	N/A	SIP-AC1
Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2023-07-08	SIP-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2023-06-01	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2023-11-05	SIP-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2023-10-10	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06623	1 year	2023-11-27	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2023-11-27	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2023-12-22	SIP-AC2
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2023-06-08	SIP-AC3
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2023-10-13	SIP-AC3
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2023-10-25	SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2023-07-30	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2023-11-01	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2023-11-27	SIP-AC3
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2024-01-12	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2023-12-22	SIP-AC3
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2023-06-01	SIP-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2023-06-01	SIP-SR2
Thermohygrometer	testo	608-H1	MRTSUE06621	1 year	2023-11-27	SIP-SR2
Shielding Room	MIX-BEP	SIP-SR2	MRTSUE06949	5 years	2024-10-23	SIP-SR2

Note 1: Standard gain horns need not be periodically calibrated. Antenna appearance and connector were checked and no damage.

Software	Version	Function
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & turntable

5. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement	
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):	
9kHz~150kHz: 3.58dB	
150kHz~30MHz: 3.20dB	
Radiated Emission Measurement	
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):	
Coaxial:	9kHz~30MHz: 2.59dB
Coplanar:	9kHz~30MHz: 2.60dB
Horizontal:	30MHz~200MHz: 3.85dB
	200MHz~1GHz: 4.36dB
	1GHz~40GHz: 4.98dB
Vertical:	30MHz~200MHz: 4.06dB
	200MHz~1GHz: 5.28dB
	1GHz~40GHz: 4.91dB

6. Test Result

6.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass
15.209 15.249	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Radiated	Pass
15.215(c)	20dB Spectrum Bandwidth	Radiated	Pass

Notes:

1. The radiation measurements are performed in X, Y, Z axis positioning. The test results shown in the following sections represent the worst-case emissions.
2. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

6.2. AC Conducted Emissions Measurement

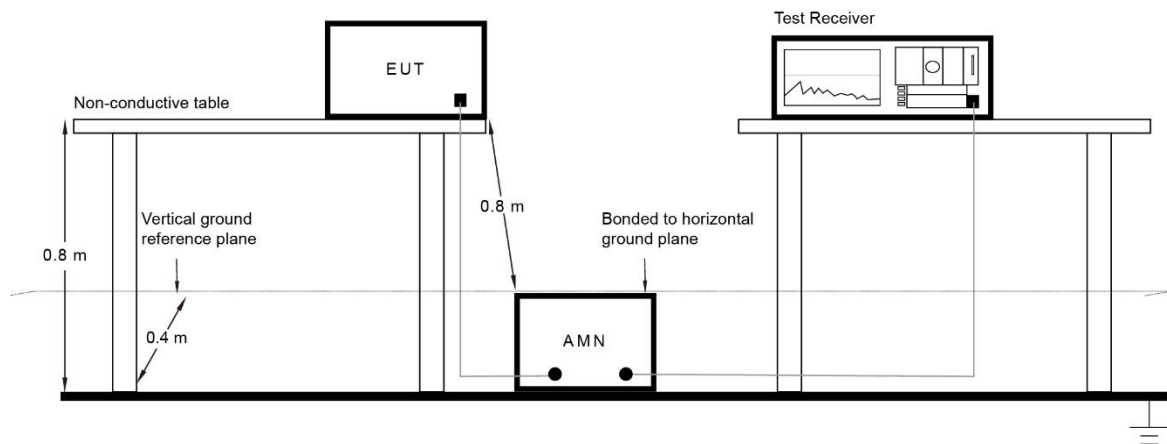
6.2.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dB μ V)	Average (dB μ V)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

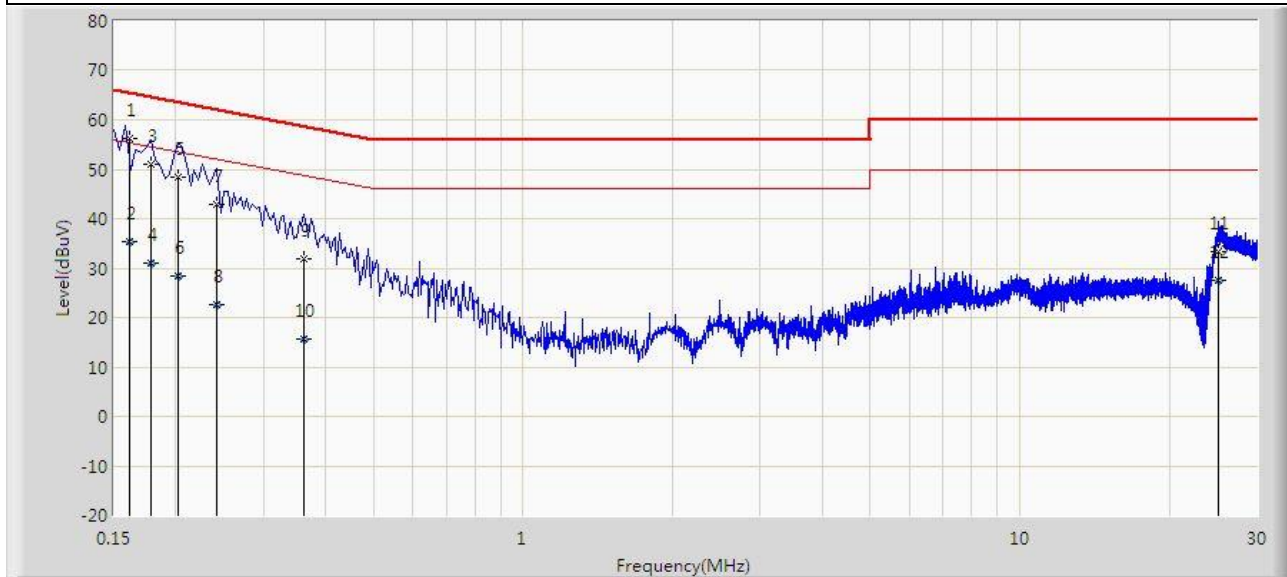
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

6.2.2. Test Setup



6.2.3. Test Result

Site: SIP-SR2	Test Date: 2023-03-14
Temperature: 19.2°C	Humidity: 35.9%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Miron Ding
Probe: SIP-SR2-ENV216_101684_E	Polarity: Line
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



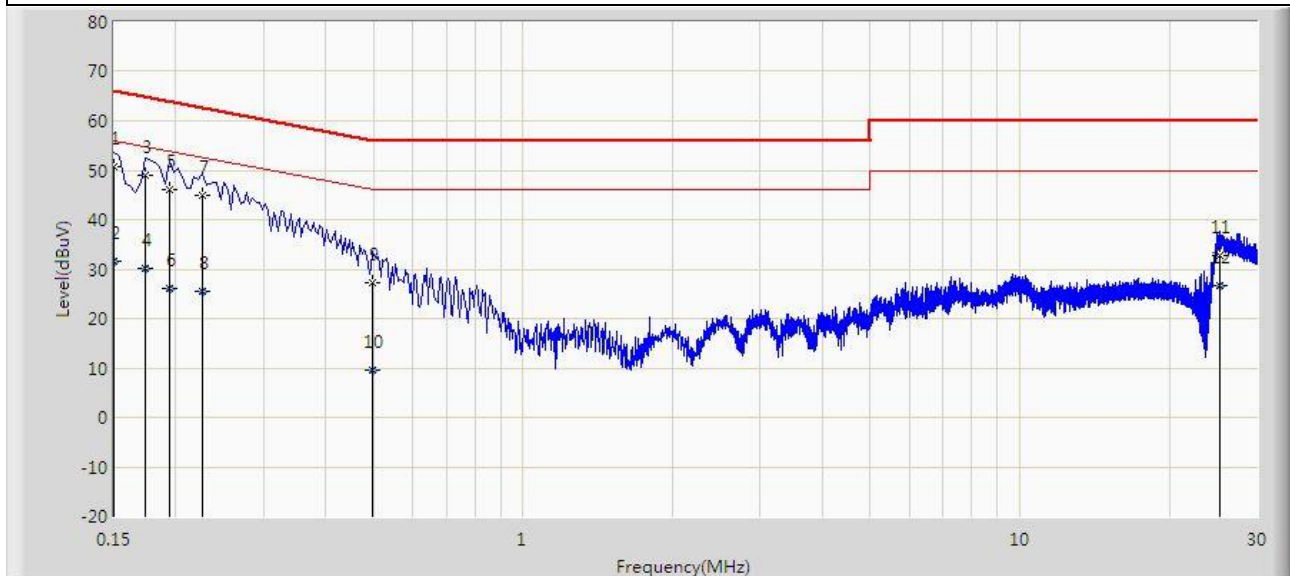
No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1	*	0.161	56.280	46.500	-9.132	65.412	9.780	QP
2		0.161	35.380	25.600	-20.032	55.412	9.780	AV
3		0.178	51.103	41.323	-13.475	64.578	9.780	QP
4		0.178	31.155	21.375	-23.423	54.578	9.780	AV
5		0.202	48.397	38.587	-15.131	63.528	9.810	QP
6		0.202	28.540	18.730	-24.988	53.528	9.810	AV
7		0.242	43.007	33.167	-19.020	62.027	9.840	QP
8		0.242	22.508	12.668	-29.519	52.027	9.840	AV
9		0.362	31.978	22.127	-26.704	58.682	9.851	QP
10		0.362	15.687	5.836	-32.995	48.682	9.851	AV
11		25.094	33.285	22.119	-26.715	60.000	11.166	QP
12		25.094	27.427	16.261	-22.573	50.000	11.166	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Note 3: Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SIP-SR2	Test Date: 2023-03-14
Temperature: 19.2°C	Humidity: 35.9%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Miron Ding
Probe: SIP-SR2-ENV216_101684_E	Polarity: Neutral
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1	*	0.150	50.692	40.900	-15.308	66.000	9.792	QP
2		0.150	31.592	21.800	-24.408	56.000	9.792	AV
3		0.174	48.927	39.137	-15.840	64.767	9.790	QP
4		0.174	30.043	20.253	-24.724	54.767	9.790	AV
5		0.194	46.207	36.398	-17.656	63.864	9.809	QP
6		0.194	26.007	16.198	-27.856	53.864	9.809	AV
7		0.226	44.967	35.126	-17.628	62.595	9.841	QP
8		0.226	25.531	15.690	-27.065	52.595	9.841	AV
9		0.498	27.238	17.367	-28.796	56.033	9.870	QP
10		0.498	9.508	-0.363	-36.525	46.033	9.870	AV
11		25.278	32.676	21.410	-27.324	60.000	11.266	QP
12		25.278	26.654	15.388	-23.346	50.000	11.266	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Note 3: Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

6.3. Radiated Emission

6.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902 ~ 928	50	500
2400 ~ 2483.5	50	500
5725 ~ 5875	50	500
24000 ~ 24250	250	2500
Note: FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.		

FCC Part 15 Subpart C Paragraph 15.209		
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
Note 1: The lower limit shall apply at the transition frequency.		
Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.		
Note 3: E field strength (dBμV/m) = 20 log E field strength (μV/m).		

6.3.2. Test Procedure

ANSI C63.10-2013 Section 6.3

ANSI C63.10-2013 Section 6.4

ANSI C63.10-2013 Section 6.5

ANSI C63.10-2013 Section 6.6

ANSI C63.10-2013 Section 9.10

Note: Far-field boundary calculation as below.

According to ANSI C63.10-2013, Clause 9, All measurements shall be made in the far-field of the measurement antenna. The far-field boundary for mm-wave antennas is $2D^2/\lambda$.

- For spurious and harmonic emissions testing, D is the largest antenna dimension of the measurement antenna in m;

For fundamental or out-of-band emissions, D is the largest antenna dimension of the EUT antenna or measurement antenna, whichever is largest.
- λ is the wavelength in m.

Far-field boundary calculation			
Frequency Range (GHz)	λ (m)	D (m)	$R_{(\text{Far Field})}$ (m)
24.00 ~ 24.25	0.012	0.096	1.536
40.00 ~ 50.00	0.006	0.046	0.705
50.00 ~ 75.00	0.004	0.036	0.648
75.00 ~ 100.00	0.003	0.026	0.451

For 24.00 ~ 24.25GHz, Our measurement is performed at a minimum distance of 3.0m > $R_{(\text{Far Field})}$.

For 40.00 ~ 100.00GHz, Our measurement is performed at a minimum distance of 1.0m > $R_{(\text{Far Field})}$.

6.3.3. Test Setting

Measurement of harmonic and spurious emissions above 40 GHz

1. Connect the test antenna covering the appropriate frequency range to a spectrum analyzer via an external mixer.
2. Set spectrum analyzer RBW = 1MHz, VBW = 3MHz, peak & average detector.
3. Maximize all observed emissions. Note the maximum power indicated on the spectrum analyzer. Adjust this reading, if necessary, by the conversion loss of the external mixer used at the frequency under investigation and the external mixer IF cable loss.
4. Calculate the maximum field strength of the emission at the measurement distance.

5. Calculate the power density at the distance specified by the limit from the field strength at the distance specified by the limit.
6. Repeat the preceding sequence for every emission observed in the frequency band under investigation.

Measurement of harmonic and spurious emissions below 40 GHz

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3 x RBW
4. Detector = Peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

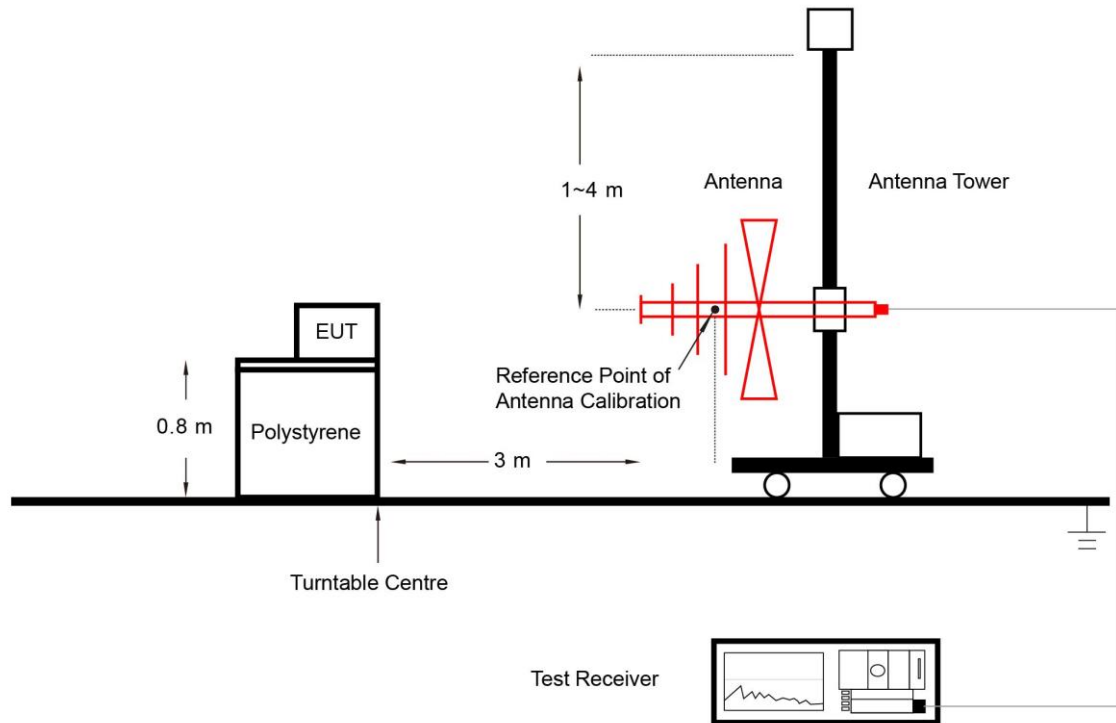
Frequency	RBW
9 ~ 150 kHz	200 Hz
0.15 ~ 30 MHz	9 kHz
30 ~ 1000 MHz	120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

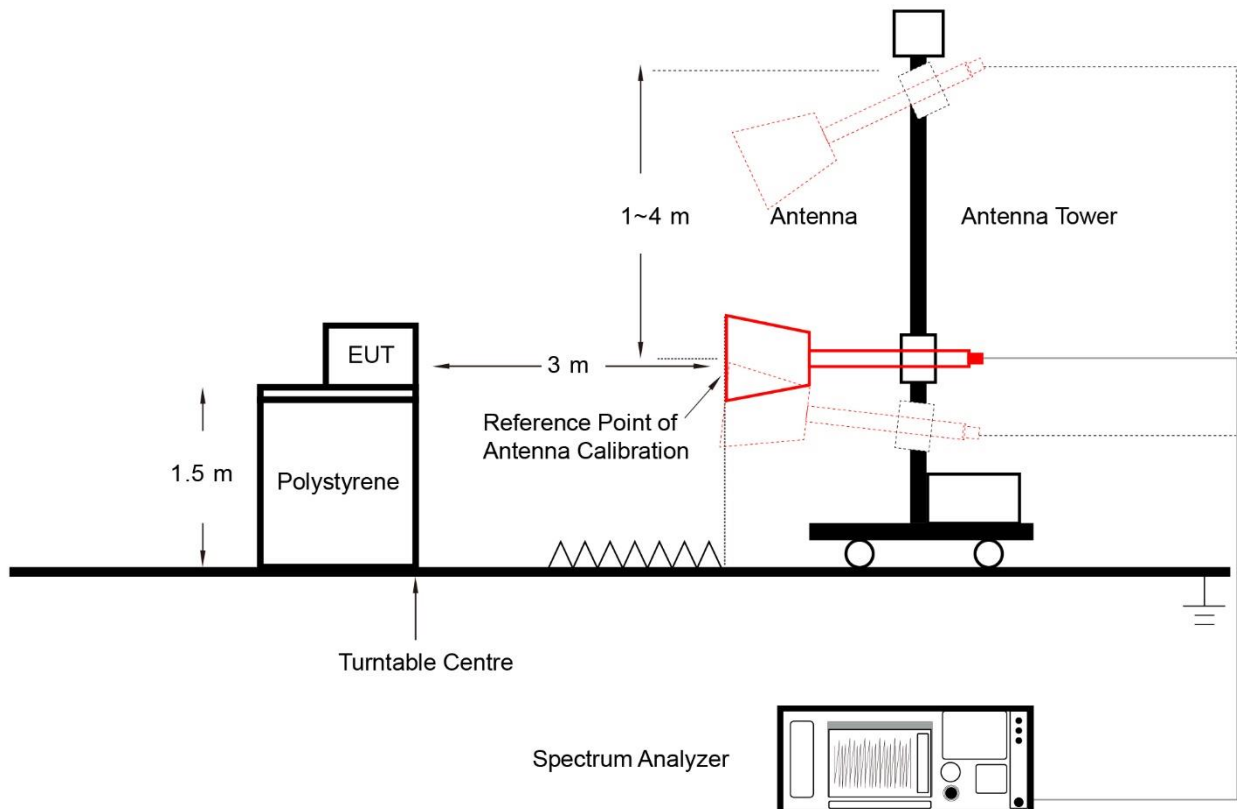
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. Set the VBW $\geq 3 \times$ RBW
4. Detector function = Average
5. Sweep time $\geq$ (number of points in sweep) $\times$ (transmission symbol period).
6. Trace mode = Average
7. Allow max hold to run for suitable traces until the trace tend to stabilize.

6.3.4. Test Setup

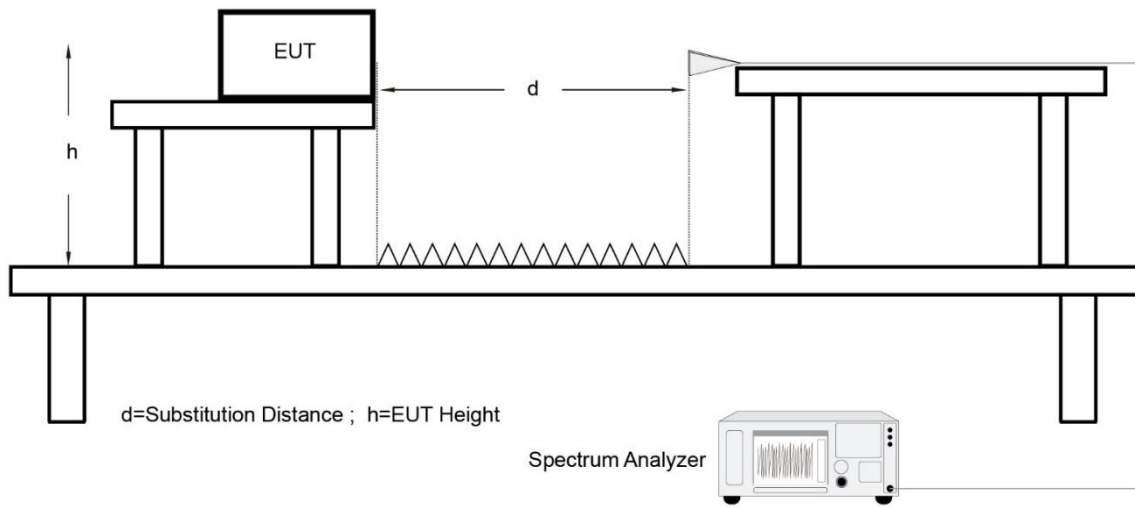
Below 1GHz Test Setup:



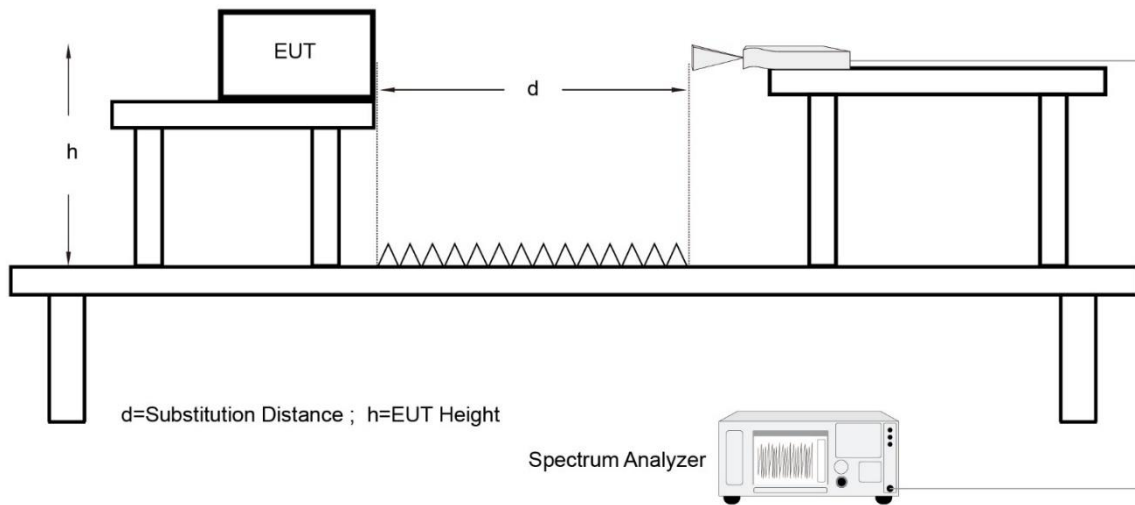
1GHz ~ 40GHz Test Setup:



40GHz ~ 50GHz Test Setup:



Above 50GHz Test Setup:



6.3.5. Test Result

Test Site	SIP-AC2	Test Date	2023-03-14
Test Engineer	Mero Zhou	Test Mode	Mode 1

Frequency Band (GHz)	FMCW Chirp Width (MHz)	FMCW Chirp Time (μs)	Chirp Rate (MHz/μs)	RBW (MHz)	Normalized Sweep Rate	Desensitization Factor (dB)
FMCW desensitization factor						
24.00 ~ 24.25	200	2130	0.094	1	0.094	0

Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

Frequency Band (GHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level @3m (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Result
Fundamental Radiated Emission							
24.00 ~ 24.25	95.195	-9.125	86.715	128	-41.930	Peak	Pass
	75.930	-9.284	66.705	108	-41.354	Average	Pass

Notes:

- Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
- The Vertical and Horizontal polarization were evaluated, only the worst-case test results are shown in the table.

Test Site	SIP-AC1	Test Date	2023-03-08
Test Engineer	Arvin Ding	Test Mode	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Between 30MHz ~ 1GHz							
73.2	16.0	15.2	31.2	40.0	-8.8	Peak	Horizontal
92.1	18.1	12.4	30.5	43.5	-13.0	Peak	Horizontal
132.8	13.4	16.8	30.2	43.5	-13.3	Peak	Horizontal
154.2	14.5	18.2	32.7	43.5	-10.8	Peak	Horizontal
302.6	7.5	18.5	26.0	46.0	-20.0	Peak	Horizontal
866.6	1.4	28.6	30.0	46.0	-16.0	Peak	Horizontal
30.5	14.3	17.0	31.3	40.0	-8.7	Peak	Vertical
73.2	15.0	15.2	30.2	40.0	-9.8	Peak	Vertical
125.5	10.3	16.0	26.3	43.5	-17.2	Peak	Vertical
148.8	13.5	18.2	31.7	43.5	-11.8	Peak	Vertical
752.7	0.0	28.2	28.2	46.0	-17.8	Peak	Vertical
921.4	-0.7	29.9	29.2	46.0	-16.8	Peak	Vertical

Note:

- Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
- The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.
- QP measurement was not performed when peak measure level was lower than the QP limit.

Test Site	SIP-AC3	Test Date	2023-03-08
Test Engineer	Wayne Wang	Test Mode	Mode 1

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Between 1GHz ~ 40GHz							
2334.5	60.0	-13.8	46.2	74.0	-27.8	Peak	Horizontal
2836.0	58.6	-12.6	46.0	74.0	-28.0	Peak	Horizontal
5666.5	53.7	-7.8	45.9	74.0	-28.1	Peak	Horizontal
2334.5	56.9	-13.8	43.1	74.0	-30.9	Peak	Vertical
2836.0	58.1	-12.6	45.5	74.0	-28.5	Peak	Vertical
5675.0	54.5	-8.0	46.5	74.0	-27.5	Peak	Vertical
27812.0	58.0	-7.8	50.2	74.0	-23.8	Peak	Horizontal
27812.0	50.3	-7.8	42.5	54.0	-11.5	Average	Horizontal
36194.0	57.3	-4.1	53.2	74.0	-20.8	Peak	Horizontal
36194.0	49.7	-4.1	45.6	54.0	-8.4	Average	Horizontal
39286.0	42.3	0.5	42.8	54.0	-11.2	Peak	Horizontal
39296.0	54.0	0.4	54.4	74.0	-19.6	Average	Horizontal
26624.0	57.0	-7.4	49.6	74.0	-24.4	Peak	Vertical
26624.0	49.0	-7.4	41.6	54.0	-12.4	Average	Vertical
36095.0	58.0	-4.5	53.5	74.0	-20.5	Peak	Vertical
36095.0	50.3	-4.5	45.8	54.0	-8.2	Average	Vertical
38284.0	56.4	-1.9	54.5	74.0	-19.5	Peak	Vertical
38284.0	48.8	-1.9	46.9	54.0	-7.1	Average	Vertical

Notes:

- Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)
Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre-Amplifier Gain (dB)
- Average measurement was not performed when the peak level lower than average limit.

Test Site	SIP-AC1	Test Date	2023-03-13
Test Engineer	Wayne Wang	Test Mode	Mode 1

Frequency (GHz)	Measure Level @1m (dBμV/m)	Measure Level @3m (dBμV/m)	Limit @3m (dBμV/m)	Margin (dB)	Detector	Result	Polarity
Above 40GHz							
48.126	67.530	57.988	88.000	-30.012	Peak	Pass	Horizontal
48.126	49.417	39.875	68.000	-28.125	Average	Pass	Horizontal
48.126	68.220	58.678	88.000	-29.322	Peak	Pass	Vertical
48.126	49.192	39.650	68.000	-28.350	Average	Pass	Vertical
72.189	74.200	64.658	88.000	-23.342	Peak	Pass	Horizontal
72.189	64.162	54.620	68.000	-13.380	Average	Pass	Horizontal
72.189	73.140	63.598	88.000	-24.402	Peak	Pass	Vertical
72.189	63.983	54.441	68.000	-13.559	Average	Pass	Vertical
96.252	77.390	67.848	88.000	-20.152	Peak	Pass	Horizontal
96.252	69.277	59.735	68.000	-8.265	Average	Pass	Horizontal
96.252	79.480	69.938	88.000	-18.062	Peak	Pass	Vertical
96.252	69.376	59.834	68.000	-8.166	Average	Pass	Vertical

Notes:

1. Measure Level @3m = Measure Level @1.0m + 20 * log(1.0m / 3m)
2. The distance of testing is 1m.

6.4. Radiated Restricted Band Edge Measurement

6.4.1. Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [$\mu\text{V}/\text{m}$]	Measured Distance [Meter]
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

6.4.2. Test Procedure

ANSI C63.10-2013 Section 6.3

ANSI C63.10-2013 Section 6.6

ANSI C63.10-2013 Section 6.10

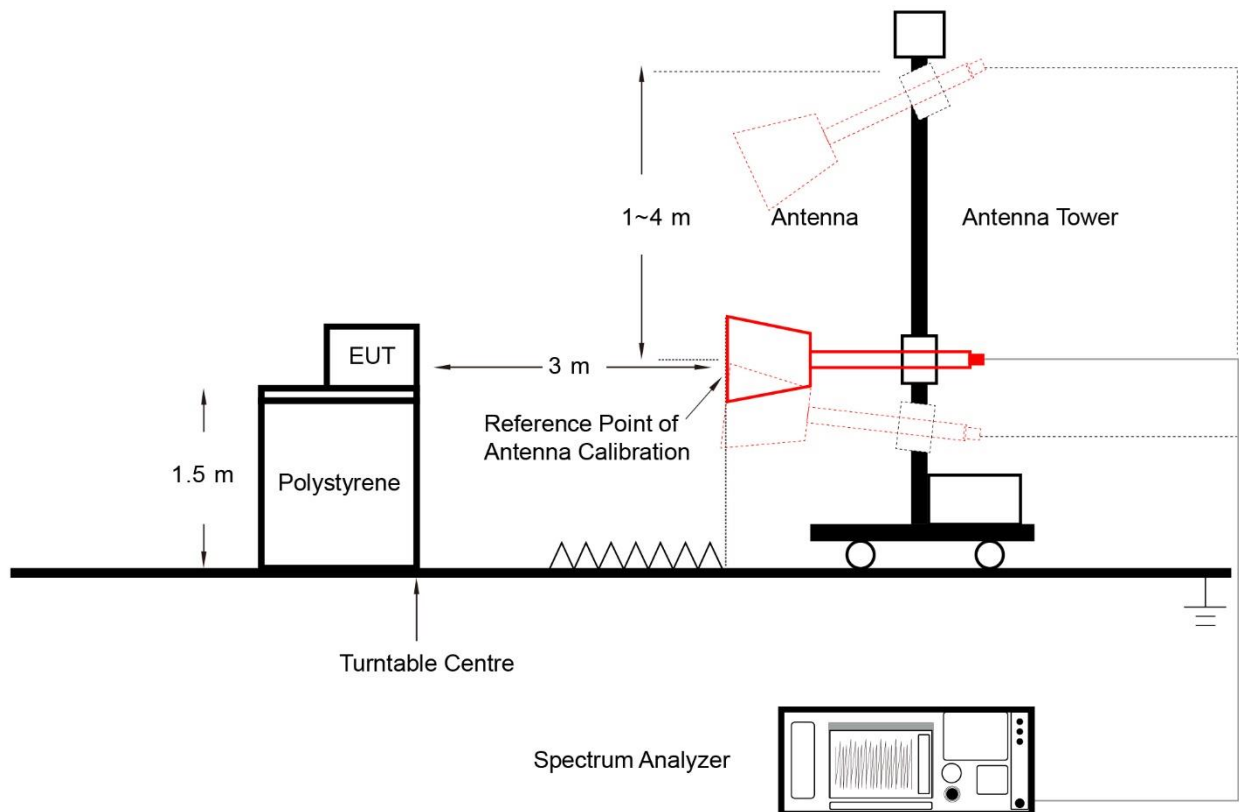
6.4.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

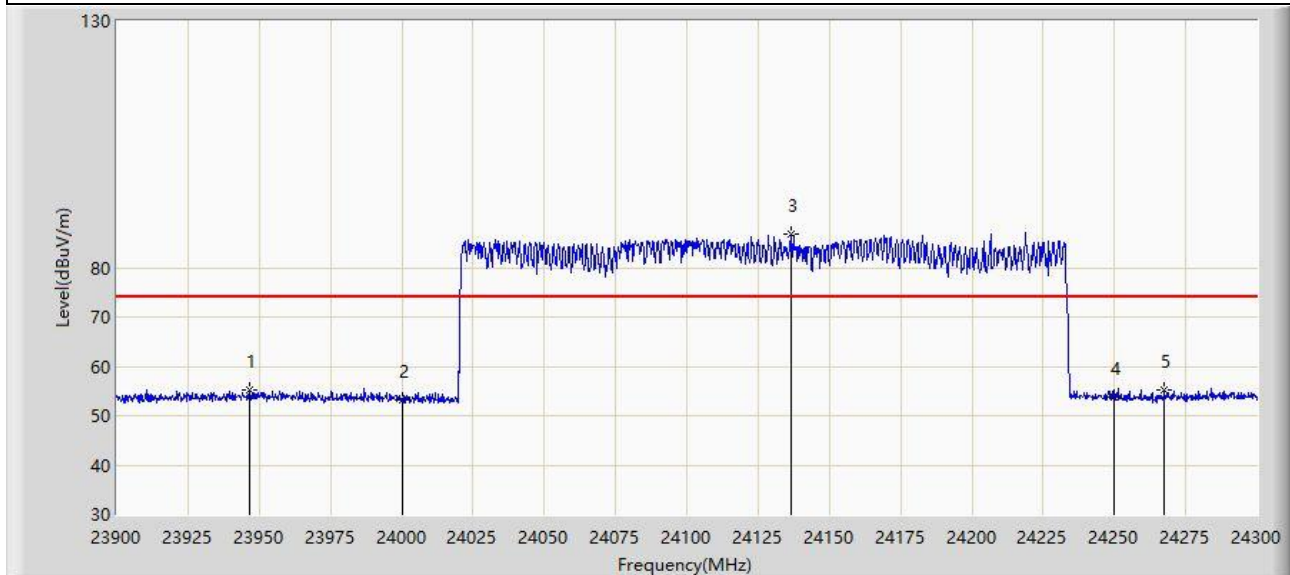
Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. Set the VBW $\geq 3 \times$ RBW
4. Detector function = Average
5. Sweep time $\geq$ (number of points in sweep) $\times$ (transmission symbol period).
6. Trace mode = Average
7. Allow max hold to run for suitable traces until the trace tend to stabilize.

6.4.4. Test Setup

6.4.5. Test Result

Site: SIP-AC2	Test Date: 2023-03-14
Limit: FCC_Part15.249_Bandedge(3m)	Engineer: Mero Zhou
Probe: BBHA 9170_00934_18-40GHz	Polarity: Horizontal
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



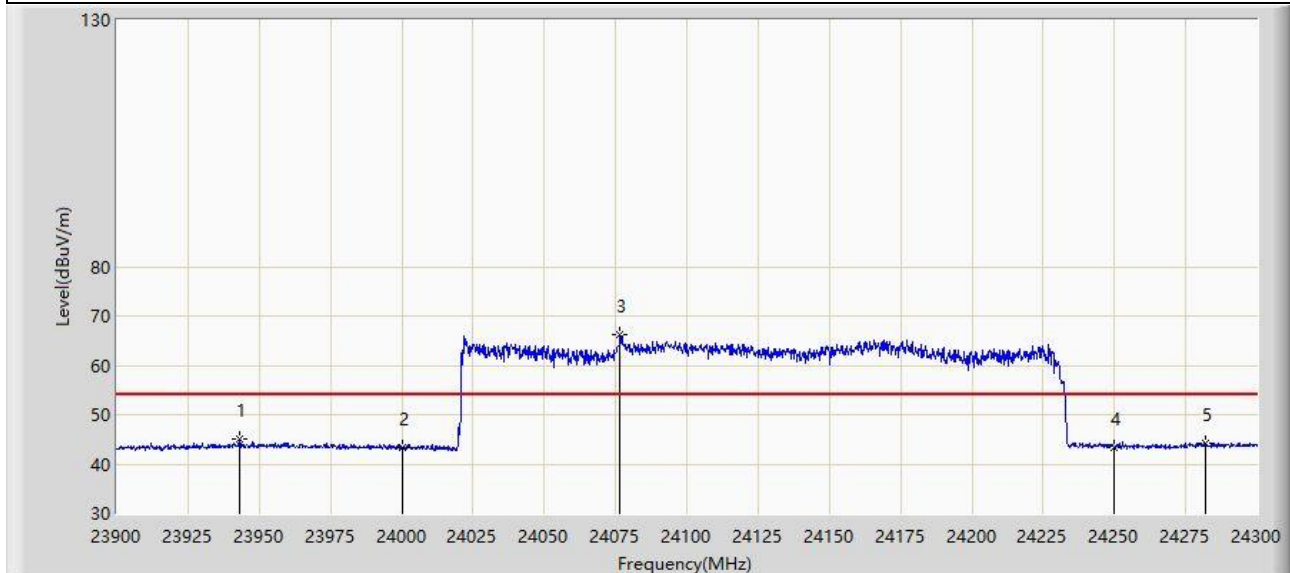
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	23946.600	55.352	64.300	-18.648	74.000	-8.947	PK
2		24000.000	53.309	62.680	-20.691	74.000	-9.371	PK
3		24136.400	86.715	95.910	N/A	N/A	-9.195	PK
4		24250.000	53.647	62.801	-20.353	74.000	-9.154	PK
5		24267.600	55.127	64.414	-18.873	74.000	-9.287	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC2	Test Date: 2023-03-14
Limit: FCC_Part15.249_Bandedge(3m)	Engineer: Mero Zhou
Probe: BBHA 9170_00934_18-40GHz	Polarity: Horizontal
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



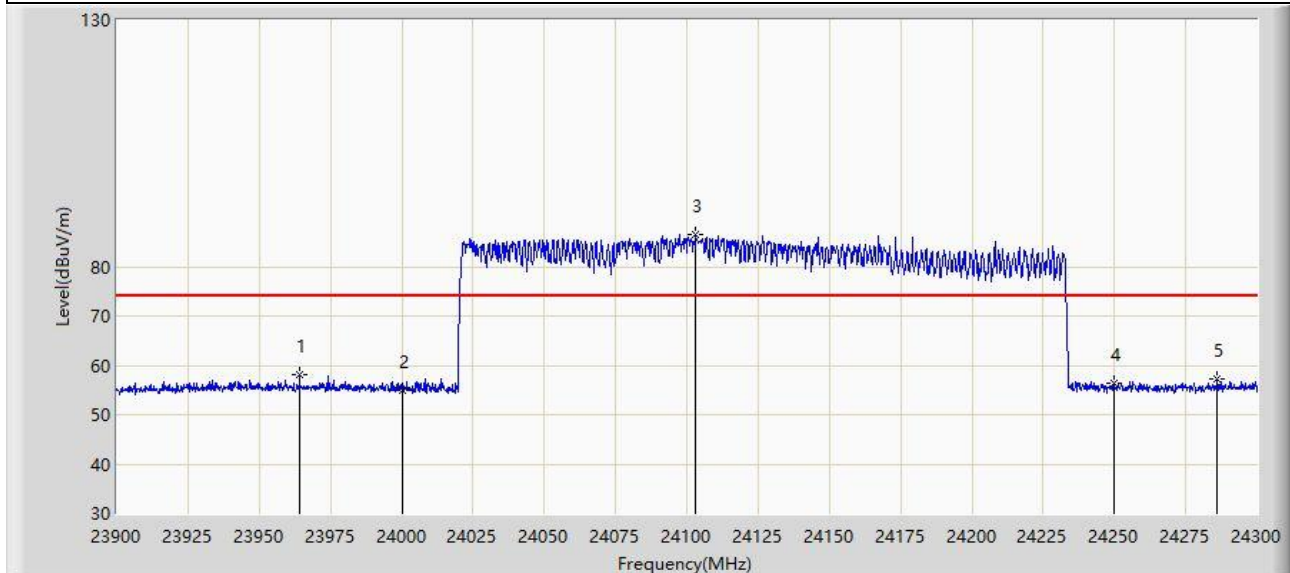
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	23943.199	44.938	53.876	-9.062	54.000	-8.937	AV
2		24000.000	43.222	52.593	-10.778	54.000	-9.371	AV
3		24076.600	66.087	75.372	N/A	N/A	-9.285	AV
4		24250.000	43.456	52.610	-10.544	54.000	-9.154	AV
5		24282.000	44.224	53.331	-9.776	54.000	-9.107	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC2	Test Date: 2023-03-14
Limit: FCC_Part15.249_Bandedge(3m)	Engineer: Mero Zhou
Probe: BBHA 9170_00934_18-40GHz	Polarity: Vertical
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



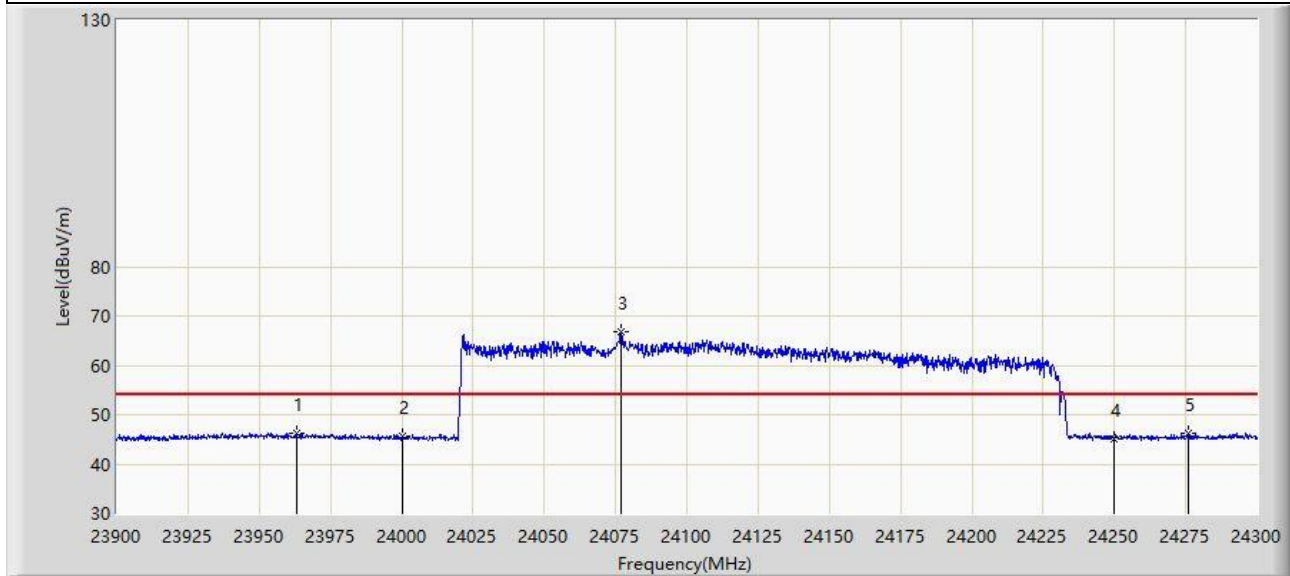
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	23964.199	58.187	67.200	-15.813	74.000	-9.013	PK
2		24000.000	54.855	64.226	-19.145	74.000	-9.371	PK
3		24103.199	86.462	95.638	N/A	N/A	-9.175	PK
4		24250.000	56.247	65.401	-17.753	74.000	-9.154	PK
5		24286.199	57.105	66.143	-16.895	74.000	-9.038	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Site: SIP-AC2	Test Date: 2023-03-14
Limit: FCC_Part15.249_Bandedge(3m)	Engineer: Mero Zhou
Probe: BBHA 9170_00934_18-40GHz	Polarity: Vertical
EUT: Intelligent Toilet Seat	Power: AC 120V/60Hz
Test Mode 1	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	23963.199	46.313	55.318	-7.687	54.000	-9.006	AV
2		24000.000	45.692	55.063	-8.308	54.000	-9.371	AV
3		24077.000	66.705	75.985	N/A	N/A	-9.280	AV
4		24250.000	45.177	54.331	-8.823	54.000	-9.154	AV
5		24276.000	46.143	55.349	-7.857	54.000	-9.206	AV

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

6.5. 20dB Spectrum Bandwidth Measurement

6.5.1. Test Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission in the specific band.

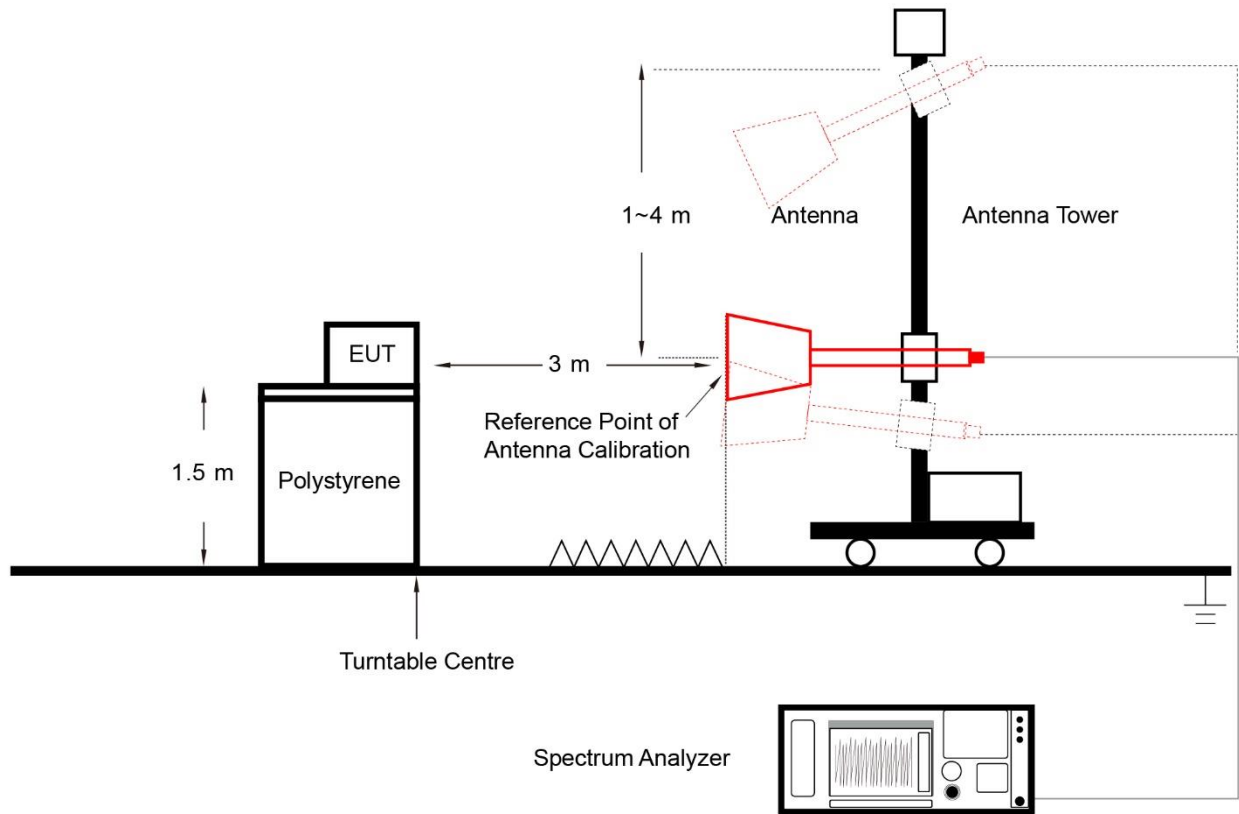
6.5.2. Test Procedure

ANSI C63.10-2013 Clause 6.9.2

6.5.3. Test Setting

1. Set the spectrum span range to overlap the nominal center frequency
2. Set RBW = 1% ~ 5% of the OBW
3. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize and marker the highest level
8. Use Occupied BW function to determine two frequencies, one at the lowest frequency and the other at the highest frequency

6.5.4. Test Setup



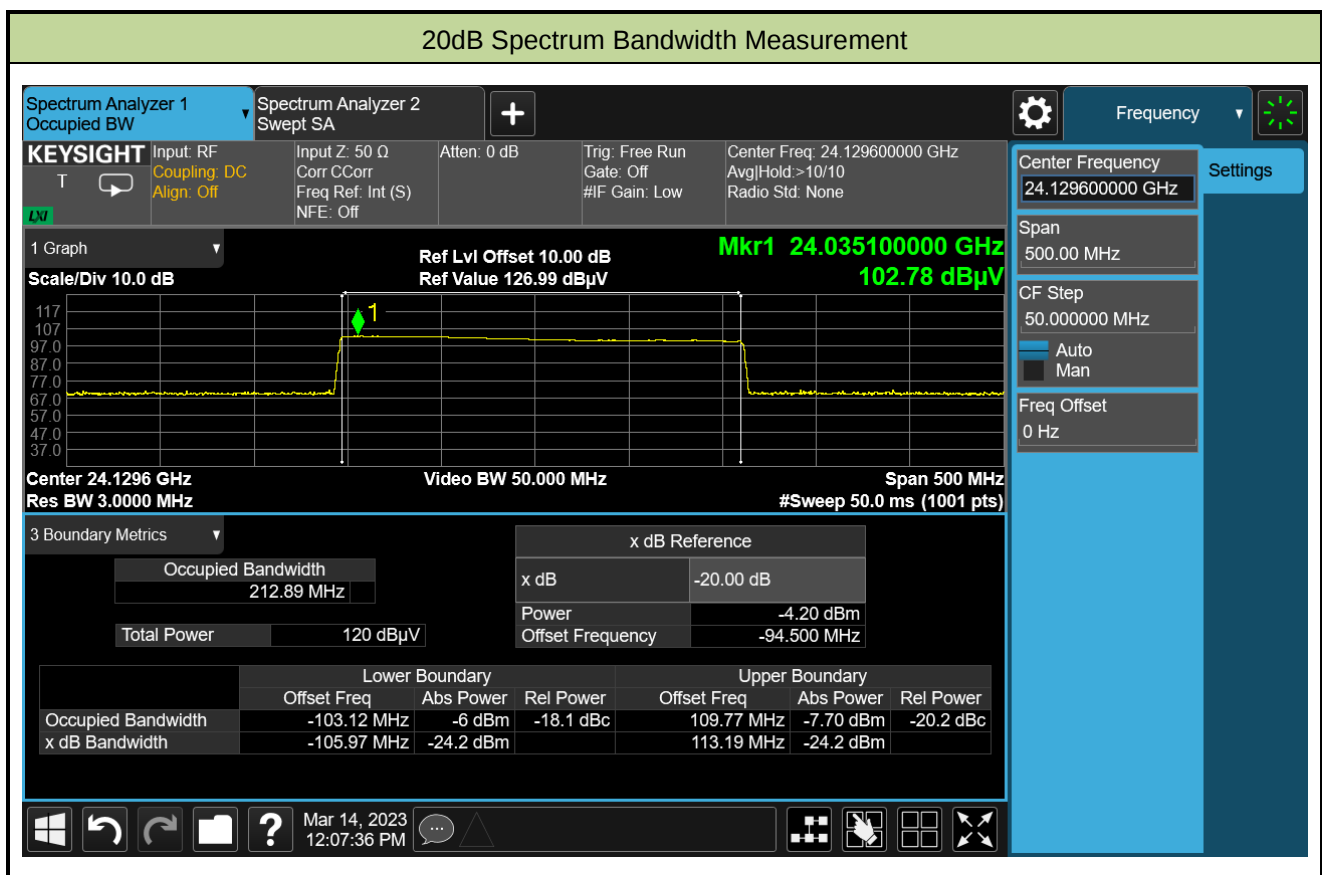
6.5.5. Test Result

Test Site	SIP-AC3	Test Date	2023-03-14
Test Engineer	Mero Zhou		

20dB Bandwidth (MHz)	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)	Result
219.16	24023.63	≥ 24000	24242.79	≤ 24250	Pass

Note: Low Frequency (F_L) = Center Frequency + Lower Boundary;

High Frequency (F_H) = Center Frequency + Upper Boundary



Appendix A - Test Setup Photograph

Refer to “2303RSU014-UT” file.

Appendix B - EUT Photograph

Refer to “2303RSU014-UE” file.