RF MEASUREMENT REPORT

FCC ID:	2AL4G-002
Applicant:	AXENT Intelligence Inc.
Product:	Intelligent Toilet
Model No.:	TS026-3
Brand Name:	Axent-mint
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Result:	Complies
Received Date:	2023-10-08
Test Date:	2023-10-17 ~ 2023-11-11

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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
2310RSU010-U2	V01	Initial Report	2023-12-29	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 under Test 6
1.6. Working Frequencies 7

2. Test Configuration 8

2.1. Test Mode 8
2.2. Test System Connection Diagram 8
2.3. Test Software 9
2.4. Applied Standards 9
2.5. Test Environment Condition 9

3. Antenna Requirements 10

4. Measuring Instrument 11

5. Decision Rules and Measurement Uncertainty 13

5.1. Decision Rules 13
5.2. Measurement Uncertainty 13

6. Test Result 14

6.1. Summary 14
6.2. 6dB Bandwidth Measurement 15
6.2.1. Test Limit 15
6.2.2. Test Procedure 15
6.2.3. Test Setting 15
6.2.4. Test Setup 15
6.2.5. Test Result 15
6.3. Output Power Measurement 16
6.3.1. Test Limit 16
6.3.2. Test Procedure 16
6.3.3. Test Setting 16
6.3.4. Test Setup 16
6.3.5. Test Result 16
6.4. Power Spectral Density Measurement 17
6.4.1. Test Limit 17
6.4.2. Test Procedure 17

6.4.3. Test Setting 17
6.4.4. Test Setup 17
6.4.5. Test Result 17
6.5. Conducted Band Edge and Out-of-Band Emissions Measurement 18
6.5.1. Test Limit 18
6.5.2. Test Procedure 18
6.5.3. Test Settitng 18
6.5.4. Test Setup 18
6.5.5. Test Result 19
6.6. Radiated Spurious Emission Measurement 20
6.6.1. Test Limit 20
6.6.2. Test Procedure 20
6.6.3. Test Setting 20
6.6.4. Test Setup 22
6.6.5. Test Result 23
6.7. Radiated Restricted Band Edge Measurement 24
6.7.1. Test Limit 24
6.7.2. Test Procedure 25
6.7.3. Test Setting 25
6.7.4. Test Setup 26
6.7.5. Test Result 26
6.8. AC Conducted Emissions Measurement 27
6.8.1. Test Limit 27
6.8.2. Test Setup 27
6.8.3. Test Result 27

Appendix A - Test Result 28

A.1 Duty Cycle Test Result 28
A.2 6dB Bandwidth Test Result 29
A.3 Output Power Test Result 30
A.4 Power Spectral Density Test Result 31
A.5 Conducted Band Edge and Out-of-Band Emissions Test Result 32
A.6 Radiated Spurious Emission Test Result 34
A.7 Radiated Restricted Band Edge Test Result 37
A.8 AC Conducted Emissions Test Result 45

Appendix B - Test Setup Photograph 47

Appendix C - EUT Photograph 48

1. General Information

1.1. Applicant

AXENT Intelligence Inc.

3 Musick Irvine, CA 92618, USA

1.2. Manufacturer

AXENT Intelligence Inc.

3 Musick Irvine, CA 92618, USA

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: 3261				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	Intelligent Toilet
Model No.	TS026-3
EUT Identification No.	20231008Sample#19
SRD Specification	2411MHz(Only Receiver)
Radar Specification	24.0-24.25 GHz
Bluetooth Specification	Bluetooth-LE 1M Only
Power Type	120V, 60Hz
Operating Temp.	4-40℃

Remark:

1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.
2. The manufacturer declared the differences between the test sample and the final sample are the control switch in the control PCBA and different module bracket. Only the test sample was tested by the lab, and the final sample photos were provided by the manufacturer.

1.5. Radio Specification under Test

Bluetooth Frequency	2402 ~ 2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps
Antenna Type	PCB Antenna
Antenna Gain	0.53 dBi

1.6. Working Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

2. Test Configuration

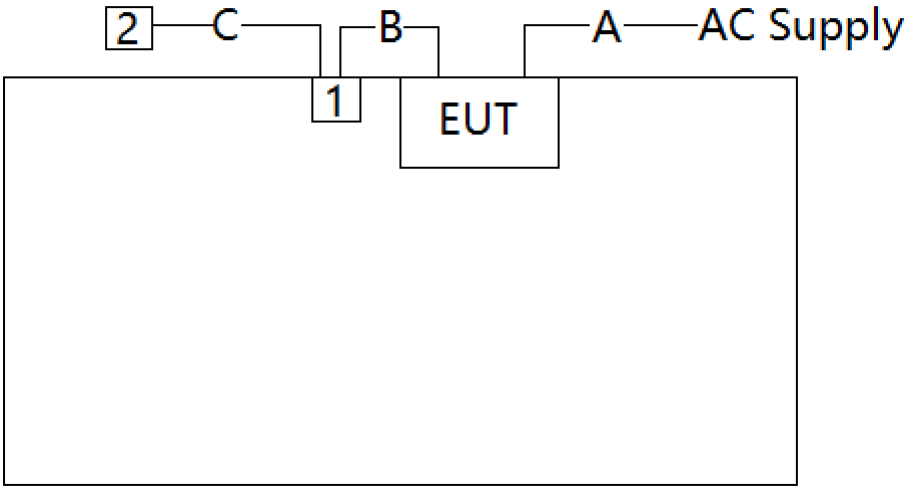
2.1. Test Mode

Mode 1: Transmit by BLE-1Mbps

2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram – Radiated Emission testing & AC Conducted Emissions



No.	Cable Type	Cable Spec.	Length
A	Power Cable	Non-Shielding	2.0m
B	Coaxial Cable	Non-Shielding	0.5m
C	USB Cable	Shielding	1.0m
No.	Product	Manufacturer	Model No.
1	Serial Tool	N/A	Telink
2	Notebook	ThinkPad	E495

2.3. Test Software

The test utility software used during testing was “EMI_Test_Tool.exe”, and the version was v1.5.

2.4. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.5. Test Environment Condition

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

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:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2023-12-22	SIP-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2024-09-24	SIP-AC1
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2024-11-02	SIP-AC1
Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2024-06-17	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06616	1 year	2024-10-28	SIP-AC1
Thermohygrometer	testo	608-H1	MRTSUE06620	1 year	2024-11-03	SIP-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06645	1 year	2024-07-13	SIP-AC1
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2023-12-28	SIP-AC1/SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2024-05-23	SIP-AC1/SIP-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2024-10-09	SIP-AC1/SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2024-09-27	SIP-AC1/SIP-AC2
Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2024-10-23	SIP-AC1/SIP-AC2
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2024-05-23	SIP-AC1/SIP-AC2
Preamplifier	EMCI	EMC001330	MRTSUE06643	1 year	2024-01-12	SIP-AC1/SIP-AC2
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2024-02-26	SIP-AC1/SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2024-10-23	SIP-AC1/SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2024-11-04	SIP-AC2
Preamplifier	EMCI	EMC051845SE	MRTSUE06601	1 year	2023-11-22	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2023-11-27	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2023-11-27	SIP-AC2
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06647	1 year	2024-06-17	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06648	1 year	2024-10-21	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2023-12-22	SIP-AC2
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2024-05-23	SIP-SR2
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2024-05-23	SIP-SR2
Four-Line V-Network	R&S	ENV432	MRTSUE06614	1 year	2023-11-27	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
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2024-02-12	SIP-TR1
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2024-07-31	SIP-TR1
Signal Analyzer	Keysight	N9010B	MRTSUE07036	1 year	2024-02-29	SIP-TR1

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
BenchVue Power Meter	2019	Power

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.

(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. 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
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Emission Measurement
The maximum measurement uncertainty is evaluated as: Coaxial: 9kHz~30MHz: 2.61dB Coplanar: 9kHz~30MHz: 2.62dB Horizontal: 30MHz~200MHz: 3.79dB 200MHz~1GHz: 3.91dB 1GHz~40GHz: 4.99dB Vertical: 30MHz~200MHz: 4.06dB 200MHz~1GHz: 5.21dB 1GHz~40GHz: 4.90dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.2dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.4dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.2dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 2.7%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(2)	6dB Bandwidth	Conducted	Pass
15.247(b)(3)	Output Power		Pass
15.247(e)	Power Spectral Density		Pass
15.247(d)	Band Edge / Out-of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Notes:

1. 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.
2. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.

6.2. 6dB Bandwidth Measurement

6.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

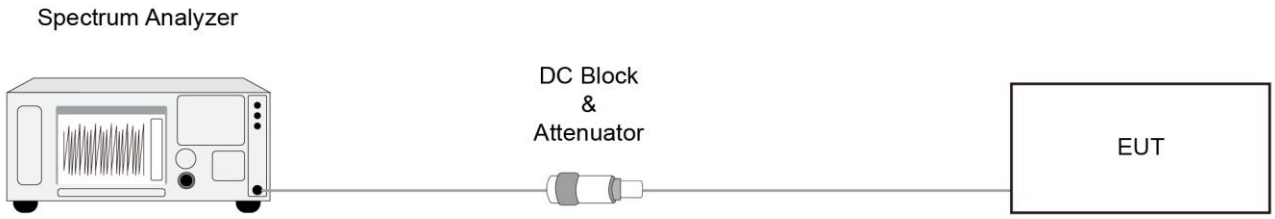
6.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

6.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.9.1.3

ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.3.3. Test Setting

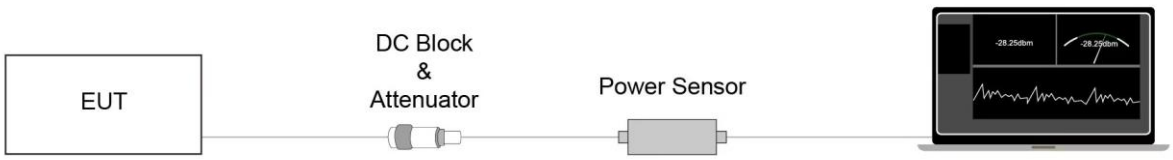
Method PKPM1 (Peak Power Measurement of Signals with DTS BW ≤ 50MHz)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.3.4. Test Setup



6.3.5. Test Result

Refer to Appendix A.3.

6.4. Power Spectral Density Measurement

6.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

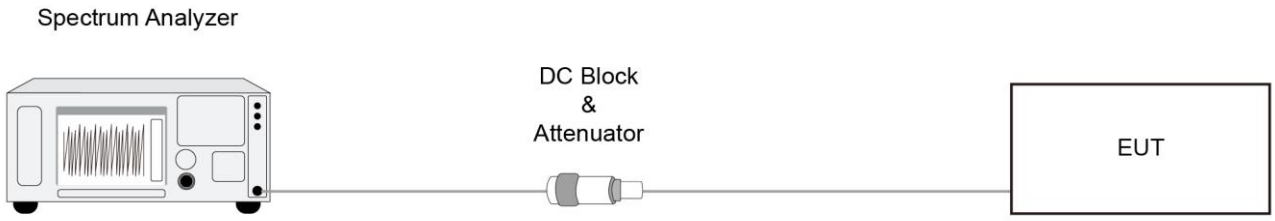
6.4.2. Test Procedure

ANSI C63.10-2013 Section 11.10.2

6.4.3. Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.4.

6.5. Conducted Band Edge and Out-of-Band Emissions Measurement

6.5.1. Test Limit

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth per the PSD procedure.

6.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

6.5.3. Test Settitng

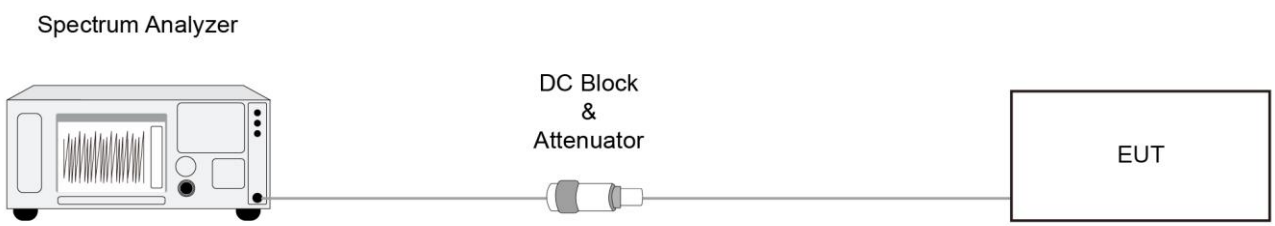
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

6.5.4. Test Setup



6.5.5. Test Result

Refer to Appendix A.5.

6.6. Radiated Spurious Emission Measurement

6.6.1. Test Limit

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 [uV/m]	Measured Distance [Meters]
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

6.6.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

6.6.3. Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000MHz	1MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. Span was set greater than 1MHz

3. RBW = as specified in Table 1

4. Detector = CISPR quasi-peak

5. Sweep time = auto couple

6. Trace was allowed to stabilize

Peak Measurements above 1GHz

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 Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW = 1MHz

3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.

If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.

4. Detector = Peak

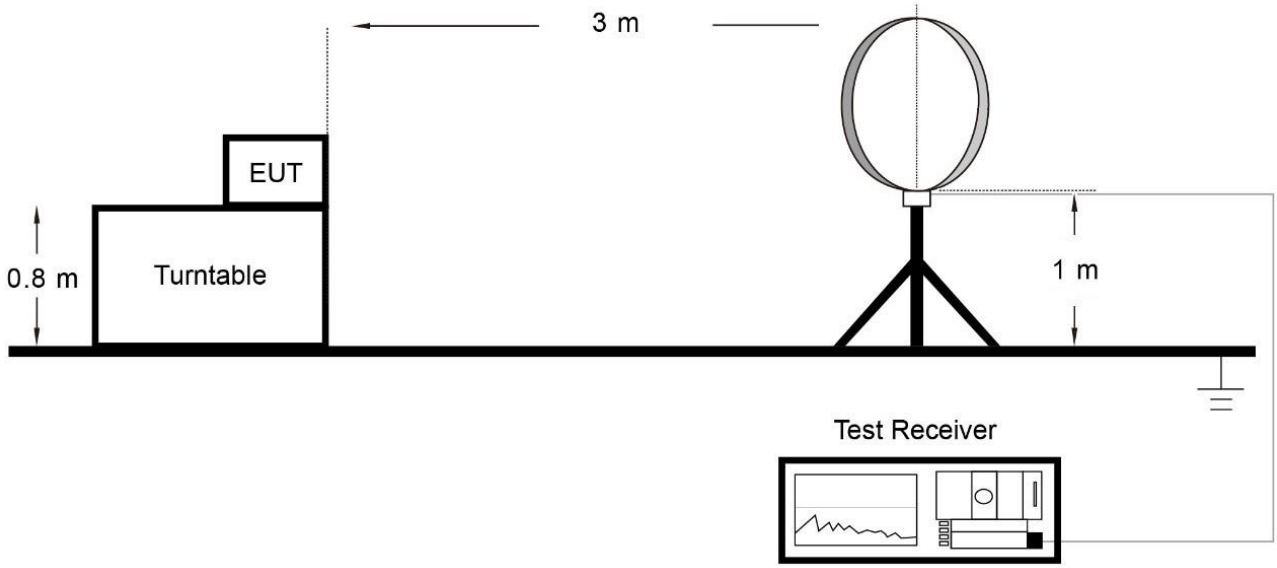
5. Sweep time = auto

6. Trace mode = max hold

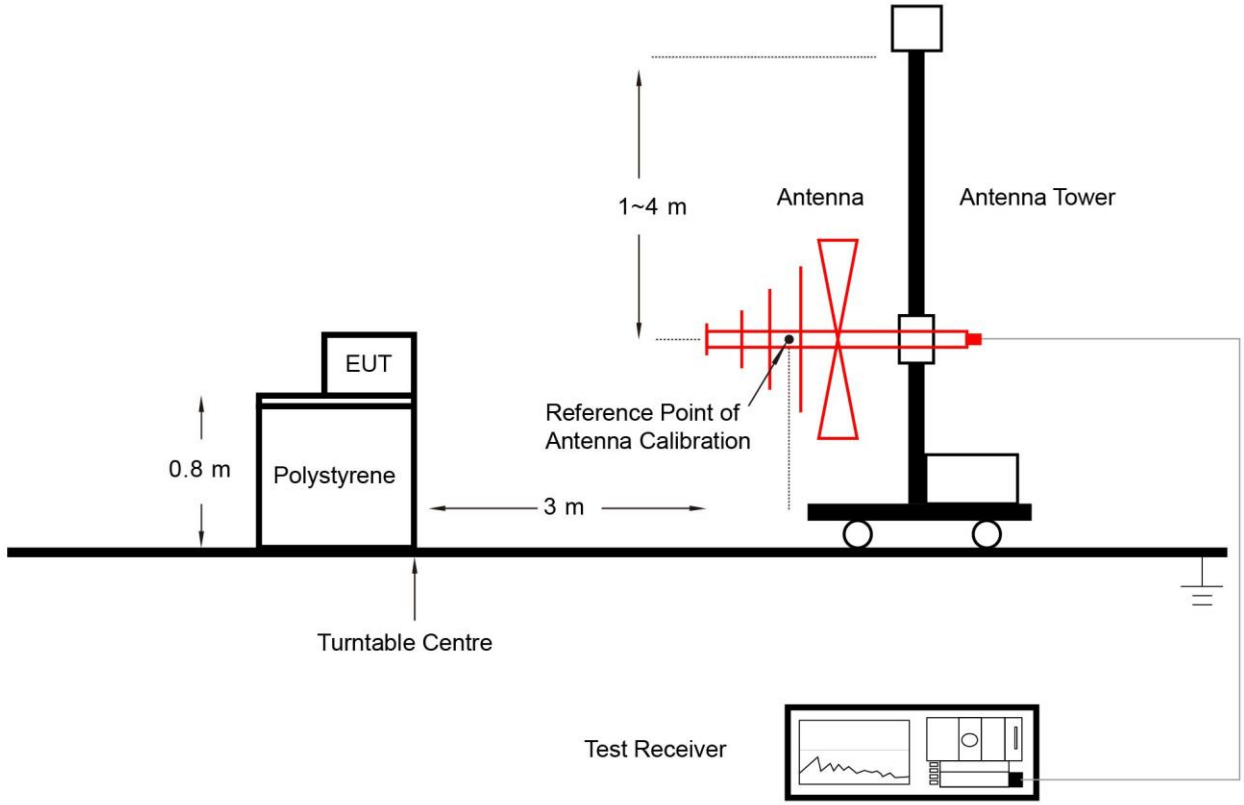
7. Trace was allowed to stabilize

6.6.4. Test Setup

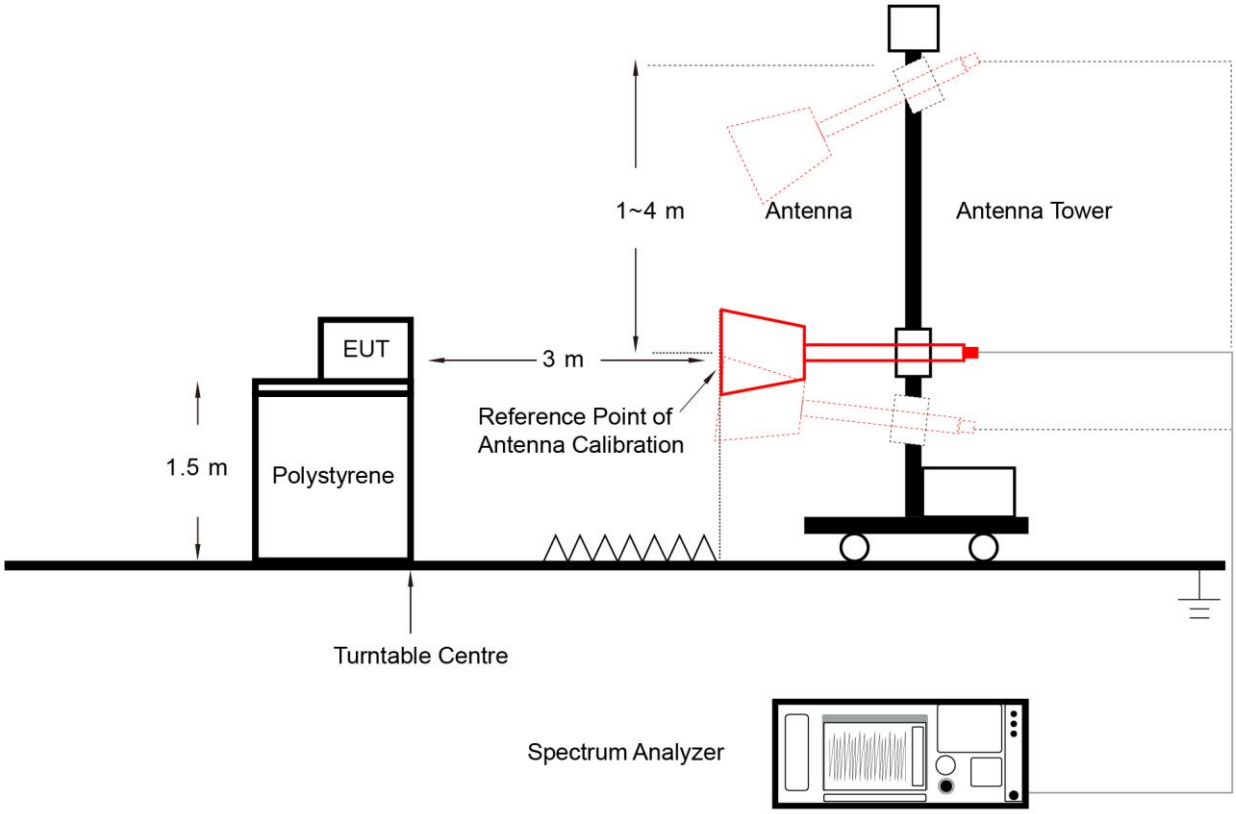
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.6.5. Test Result

Refer to Appendix A.6.

6.7. Radiated Restricted Band Edge Measurement

6.7.1. 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 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
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

6.7.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 11.13

6.7.3. Test Setting

Peak Field Strength Measurements

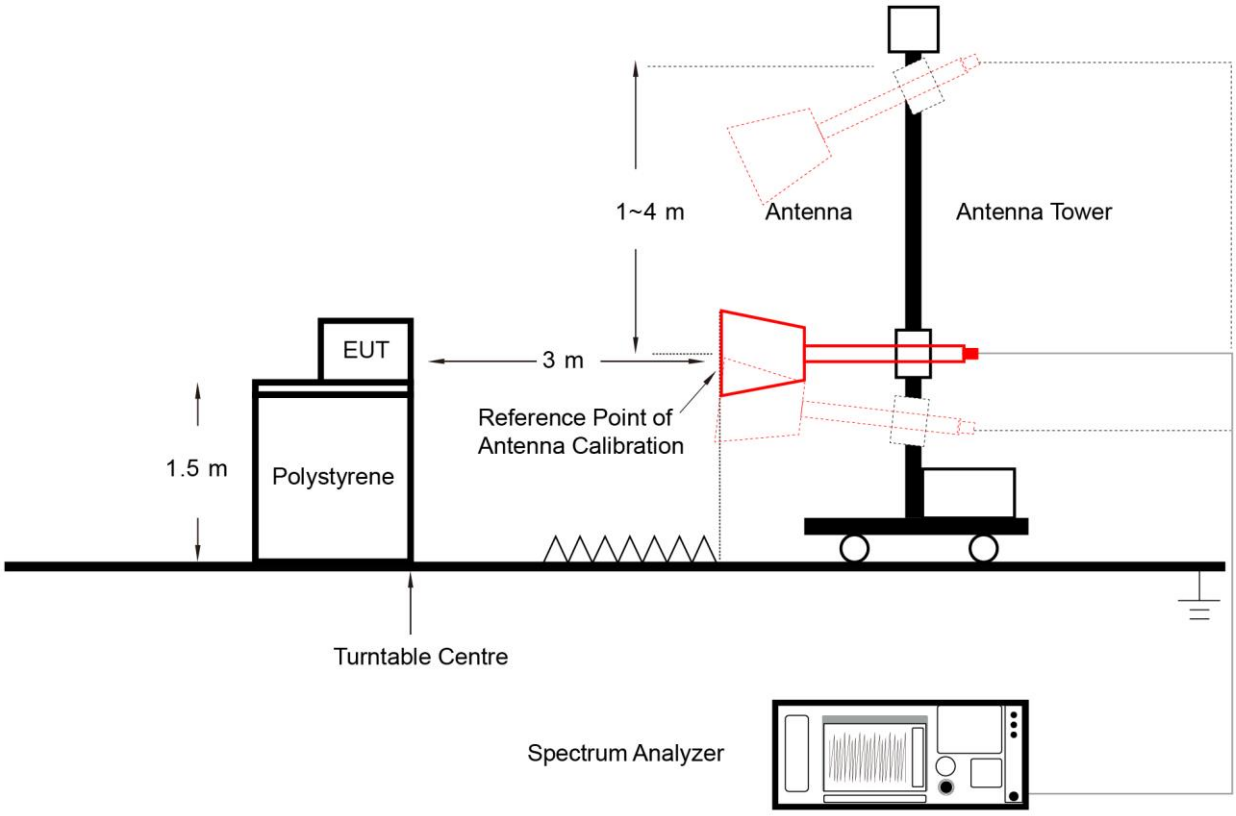
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak

6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

6.7.4. Test Setup



6.7.5. Test Result

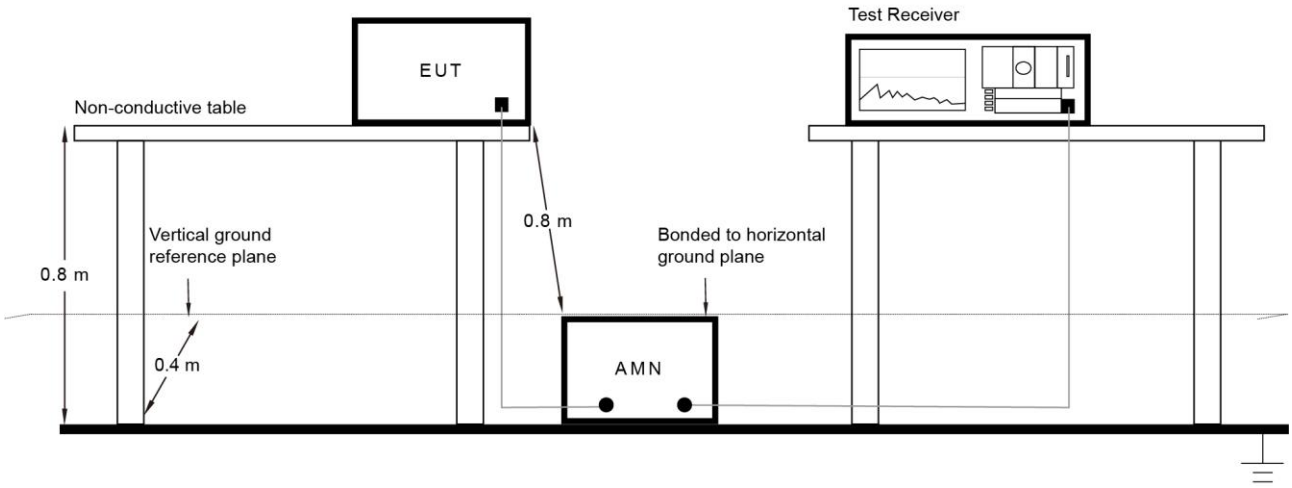
Refer to Appendix A.7.

6.8. AC Conducted Emissions Measurement

6.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
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.		

6.8.2. Test Setup



6.8.3. Test Result

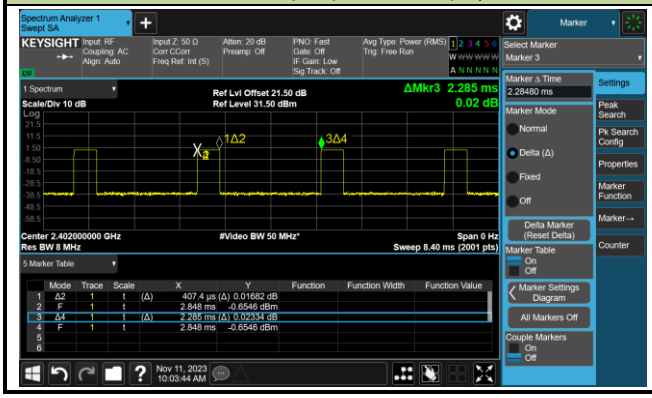
Refer to Appendix A.8.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-11-11		

Test Mode	Duty Cycle
BLE-1Mbps	17.83%
Duty Cycle (T = Transmission Duration)	
BLE-1Mbps (T = 407.4μs)	



A.2 6dB Bandwidth Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-11-11		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6768	≥ 0.5
BLE	1Mbps	19	2440	0.6753	≥ 0.5
BLE	1Mbps	39	2480	0.6806	≥ 0.5

BLE-1Mbps 6dB Bandwidth

Channel 00 (2402MHz)

Channel 19 (2440MHz)

Channel 39 (2480MHz)

A.3 Output Power Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-11-11		

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	1.37	≤ 30.00	Pass
BLE	1Mbps	19	2440	1.39	≤ 30.00	Pass
BLE	1Mbps	39	2480	1.35	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	-0.64	≤ 30.00	Pass
BLE	1Mbps	19	2440	-0.66	≤ 30.00	Pass
BLE	1Mbps	39	2480	-0.72	≤ 30.00	Pass

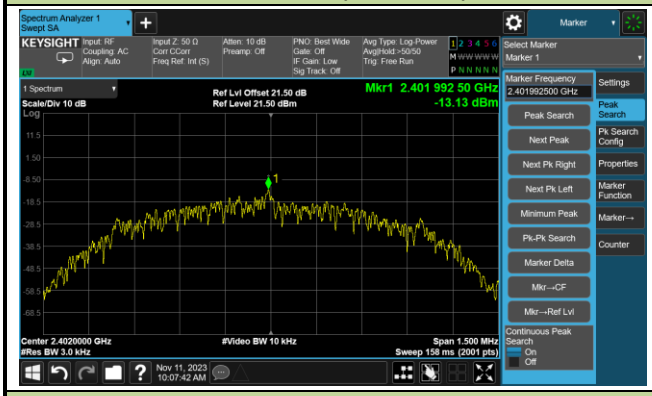
A.4 Power Spectral Density Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-11-11		

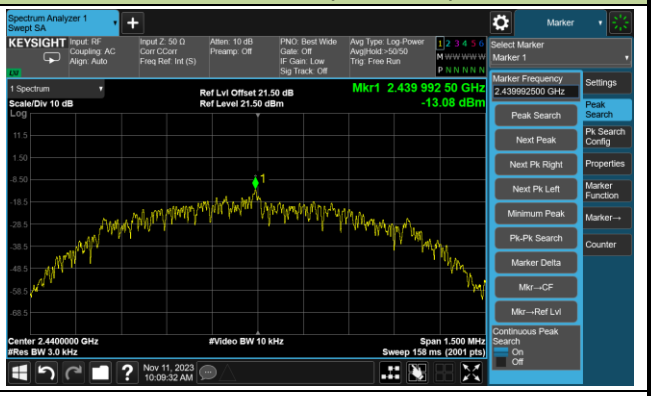
Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-13.13	≤ 8.00	Pass
BLE	1Mbps	19	2440	-13.08	≤ 8.00	Pass
BLE	1Mbps	39	2480	-13.07	≤ 8.00	Pass

BLE-1Mbps PSD

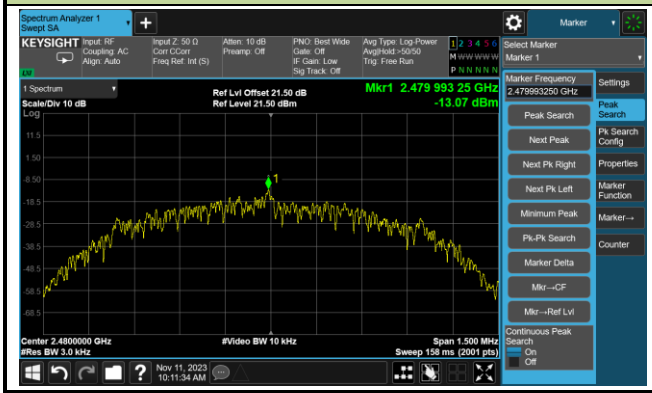
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

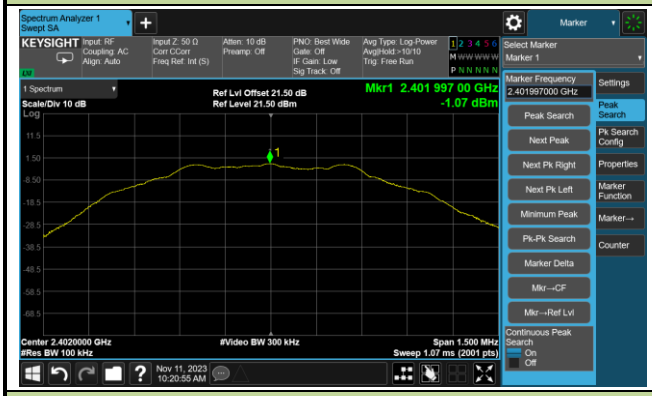
Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-11-11		

Test Mode	Data Rate / Mbps	Channel No.	Frequency (MHz)	Limit (dBc)	Result
BLE	1	00	2402	20	Pass
BLE	1	19	2440	20	Pass
BLE	1	39	2480	20	Pass

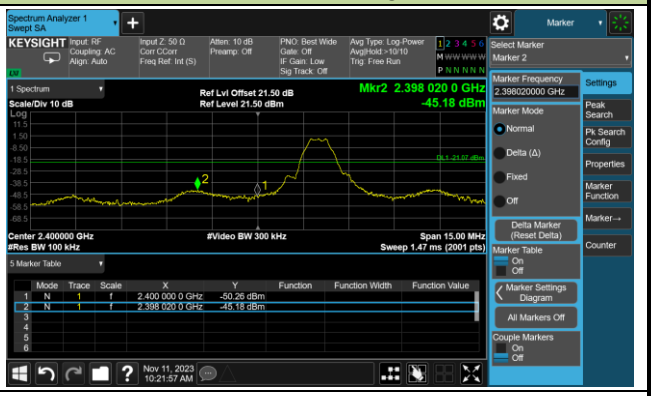
BLE-1Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

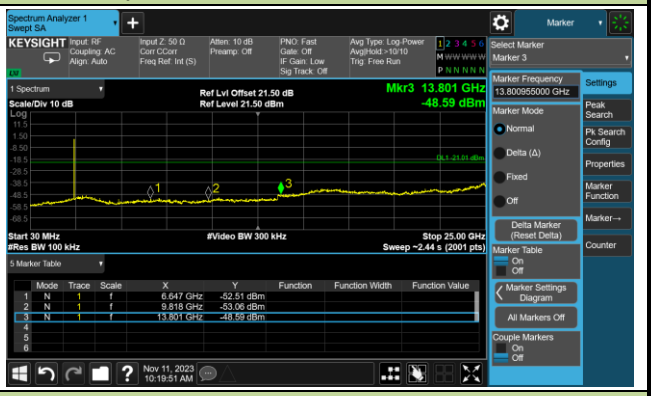
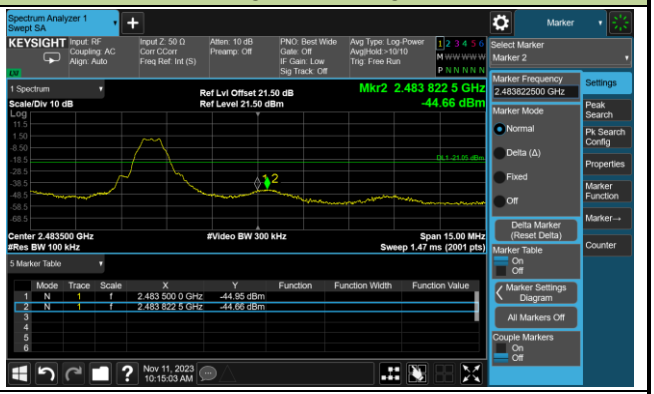
100kHz PSD Reference Level



Low Band Edge



Spurious Emission 30MHz ~ 25GHz

Channel 19 (2440MHz)	
100kHz PSD Reference Level	Spurious Emission 30MHz ~ 25GHz
	
Channel 39 (2480MHz)	
100kHz PSD Reference Level	High Band Edge
	
Spurious Emission 30MHz ~ 25GHz	

A.6 Radiated Spurious Emission Test Result

Test Site	SIP-AC1	Test Engineer	Barry Wu
Test Date	2023-11-08	Test Mode	BLE-1Mbps
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

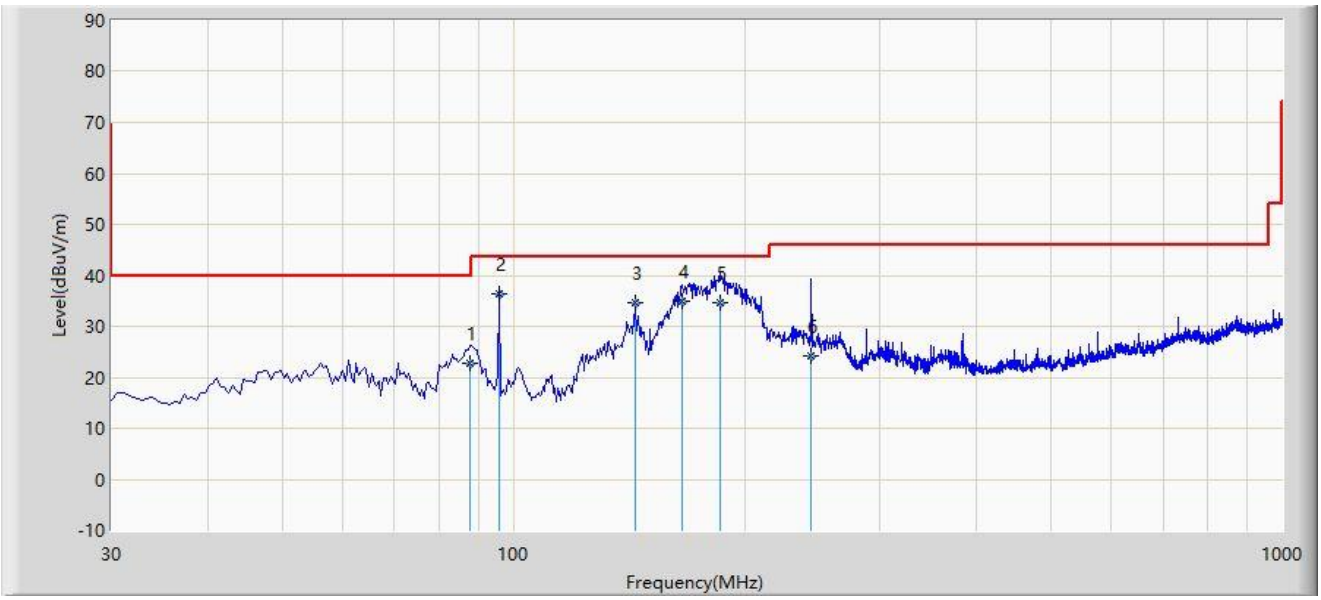
Test Channel	Frequency (MHz)	Reading Level (dBµV)	Factor (dB/m)	Measure Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Polarization
00	4808.0	46.5	4.6	51.1	74.0	-22.9	Peak	Horizontal
	4808.0	40.1	4.6	44.7	54.0	-9.3	Average	Horizontal
	8208.0	37.0	8.0	45.0	74.0	-29.0	Peak	Horizontal
	11812.0	34.1	12.8	46.9	74.0	-27.1	Peak	Horizontal
	4799.5	46.7	4.7	51.4	74.0	-22.6	Peak	Vertical
	4799.5	43.0	4.7	47.7	54.0	-6.3	Average	Vertical
	8480.0	36.5	8.0	44.5	74.0	-29.5	Peak	Vertical
	11378.5	34.7	12.6	47.3	74.0	-26.7	Peak	Vertical
19	4876.0	44.1	4.7	48.8	74.0	-25.2	Peak	Horizontal
	8471.5	36.6	7.9	44.5	74.0	-29.5	Peak	Horizontal
	11659.0	33.9	12.5	46.4	74.0	-27.6	Peak	Horizontal
	4876.0	44.3	4.7	49.0	74.0	-25.0	Peak	Vertical
	8497.0	35.8	7.8	43.6	74.0	-30.4	Peak	Vertical
	11574.0	34.6	12.4	47.0	74.0	-27.0	Peak	Vertical
39	4961.0	43.4	5.1	48.5	74.0	-25.5	Peak	Horizontal
	8233.5	35.6	8.1	43.7	74.0	-30.3	Peak	Horizontal
	10843.0	35.0	12.0	47.0	74.0	-27.0	Peak	Horizontal
	4961.0	44.9	5.1	50.0	74.0	-24.0	Peak	Vertical
	8318.5	36.2	7.8	44.0	74.0	-30.0	Peak	Vertical
	12075.5	33.6	12.6	46.2	74.0	-27.8	Peak	Vertical

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

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The Result of Radiated Emission below 1GHz:

Site: SIP-AC2	Test Date: 2023-11-09
Limit: FCC_Part15.209_RSE(3m)	Engineer: Mero Zhou
Probe: VULB 9168_00998_25-2000MHz	Polarity: Horizontal
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1M at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		87.715	22.848	10.200	-17.152	40.000	12.648	QP
2	*	95.960	36.419	23.400	-7.081	43.500	13.019	QP
3		143.975	34.688	16.700	-8.812	43.500	17.989	QP
4		165.800	35.015	16.900	-8.485	43.500	18.115	QP
5		186.170	34.778	18.800	-8.722	43.500	15.978	QP
6		243.885	24.123	7.200	-21.877	46.000	16.923	QP

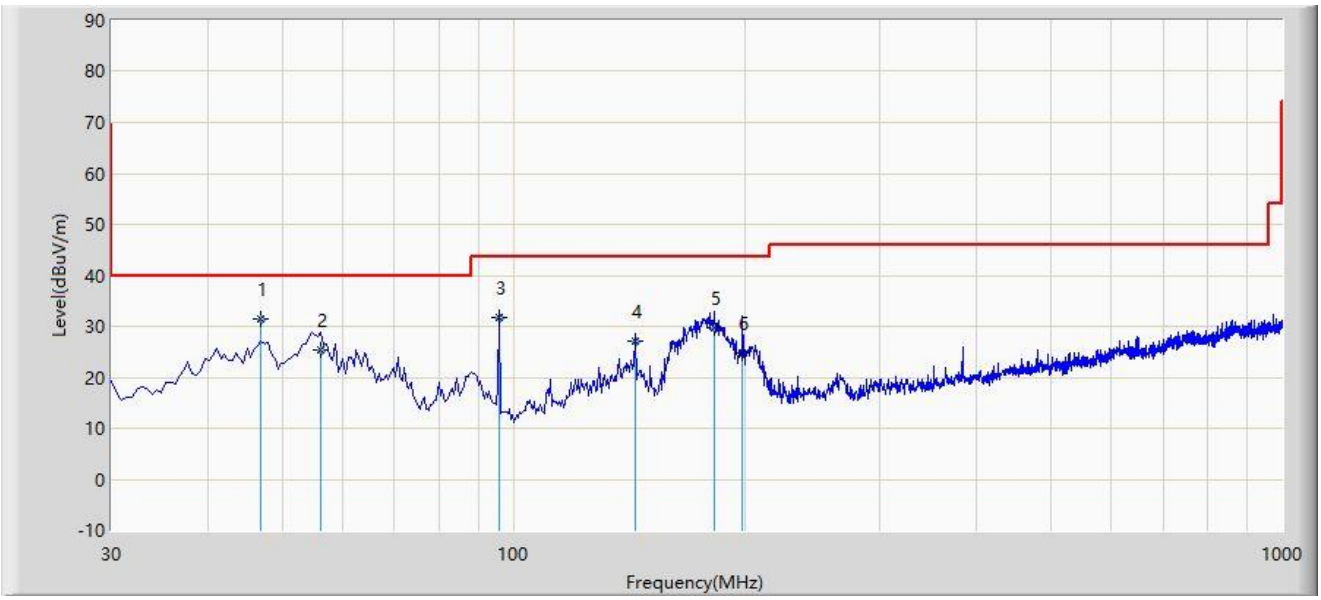
Note 1: " * ", means this data is the worst emission level.

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

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

Note 4: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) 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.

Site: SIP-AC2	Test Date: 2023-11-09
Limit: FCC_Part15.209_RSE(3m)	Engineer: Mero Zhou
Probe: VULB 9168_00998_25-2000MHz	Polarity: Vertical
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1M at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	46.975	31.431	13.000	-8.569	40.000	18.431	QP
2		56.190	25.320	7.200	-14.680	40.000	18.120	QP
3		95.960	31.819	18.800	-11.681	43.500	13.019	QP
4		143.975	27.188	9.200	-16.312	43.500	17.989	QP
5		182.775	29.649	13.200	-13.851	43.500	16.449	QP
6		198.780	24.686	9.500	-18.814	43.500	15.186	QP

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

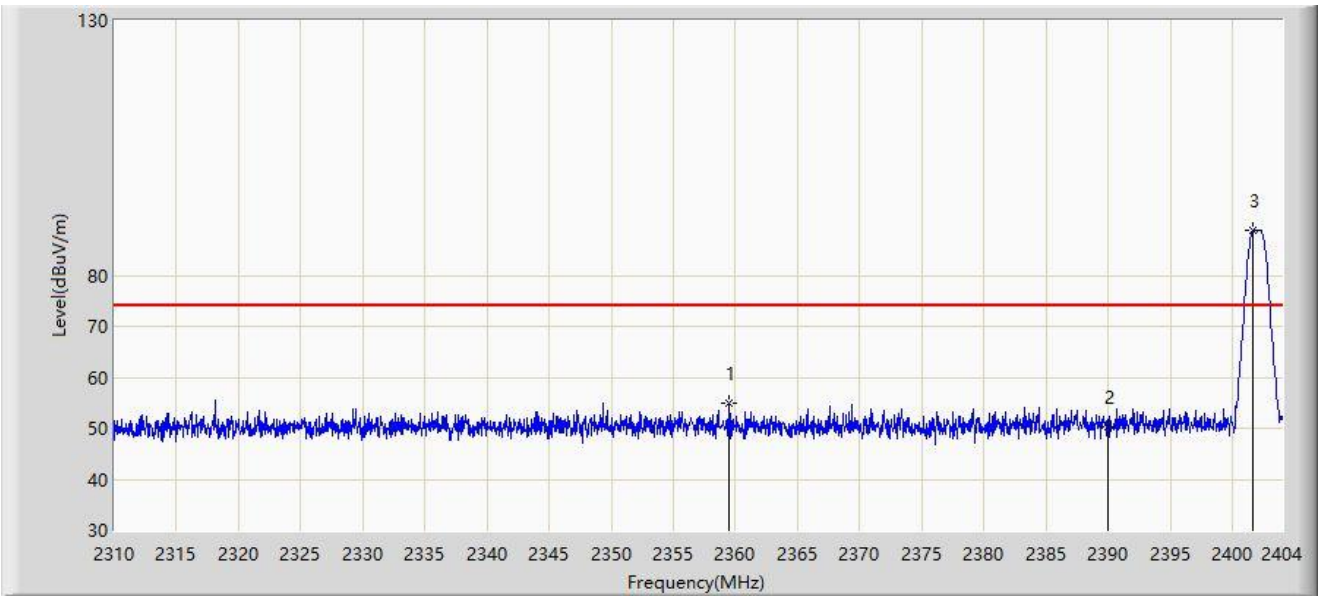
Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

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

Note 4: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) 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.

A.7 Radiated Restricted Band Edge Test Result

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



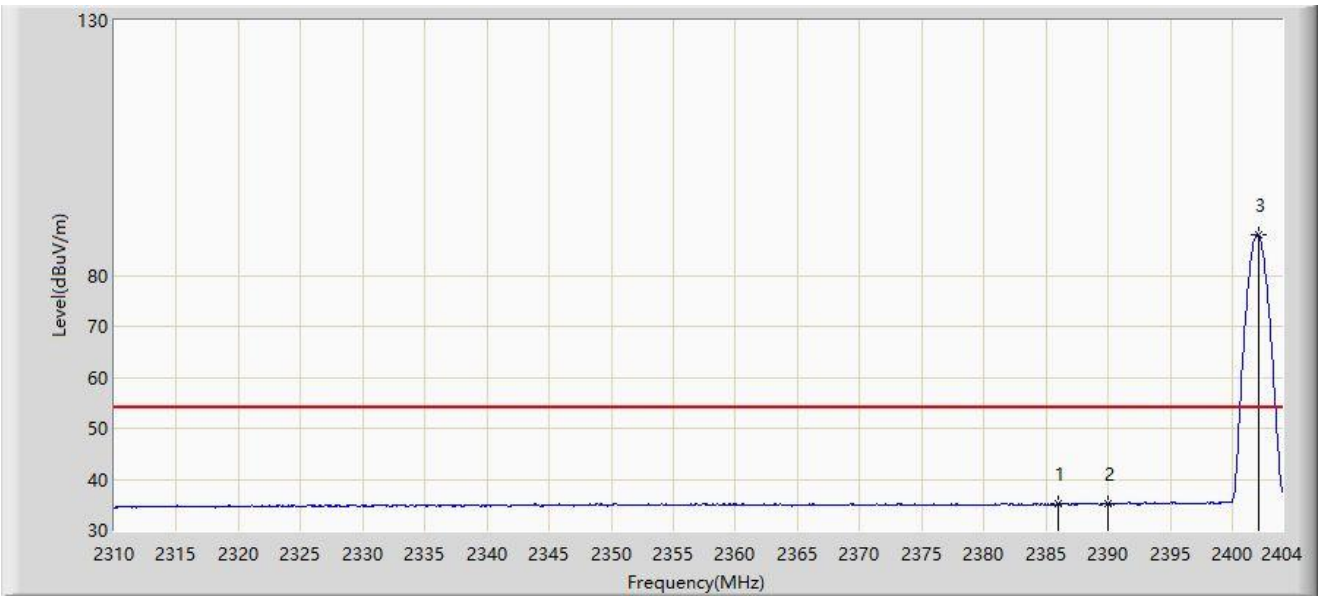
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2359.491	54.864	23.301	-19.136	74.000	31.563	PK
2		2390.000	50.293	18.578	-23.707	74.000	31.715	PK
3		2401.697	88.862	57.067	N/A	N/A	31.795	PK

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



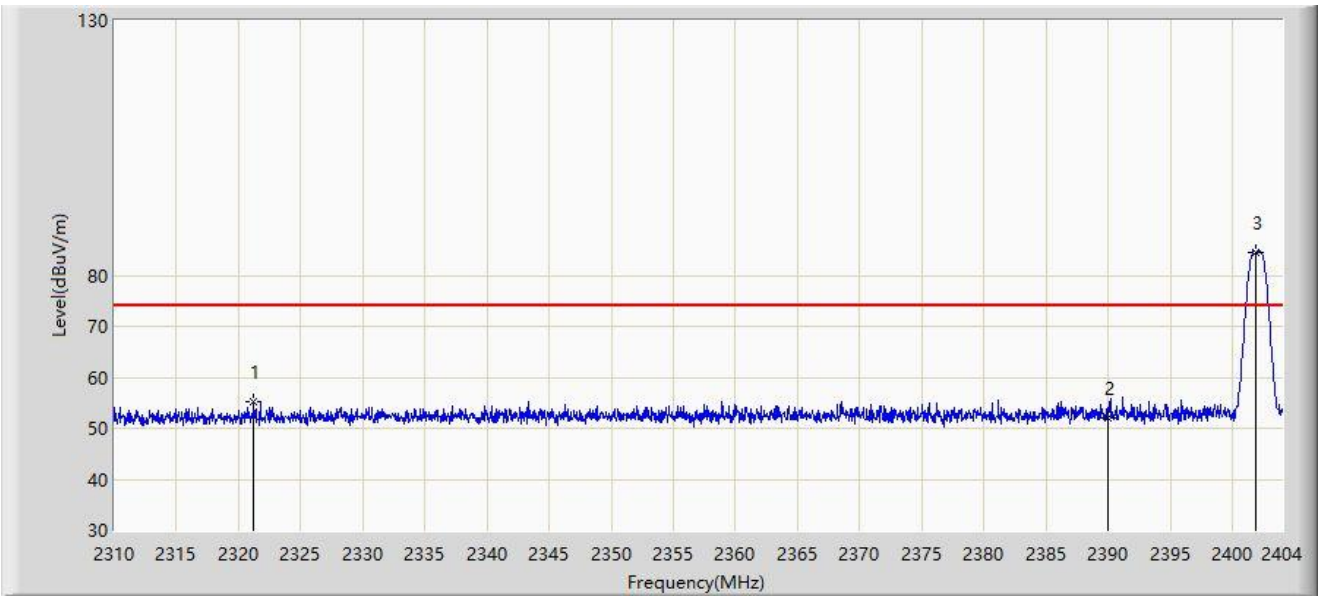
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2385.999	35.181	3.538	-18.819	54.000	31.643	AV
2		2390.000	35.126	3.411	-18.874	54.000	31.715	AV
3		2402.073	87.953	56.158	N/A	N/A	31.795	AV

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Vertical
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



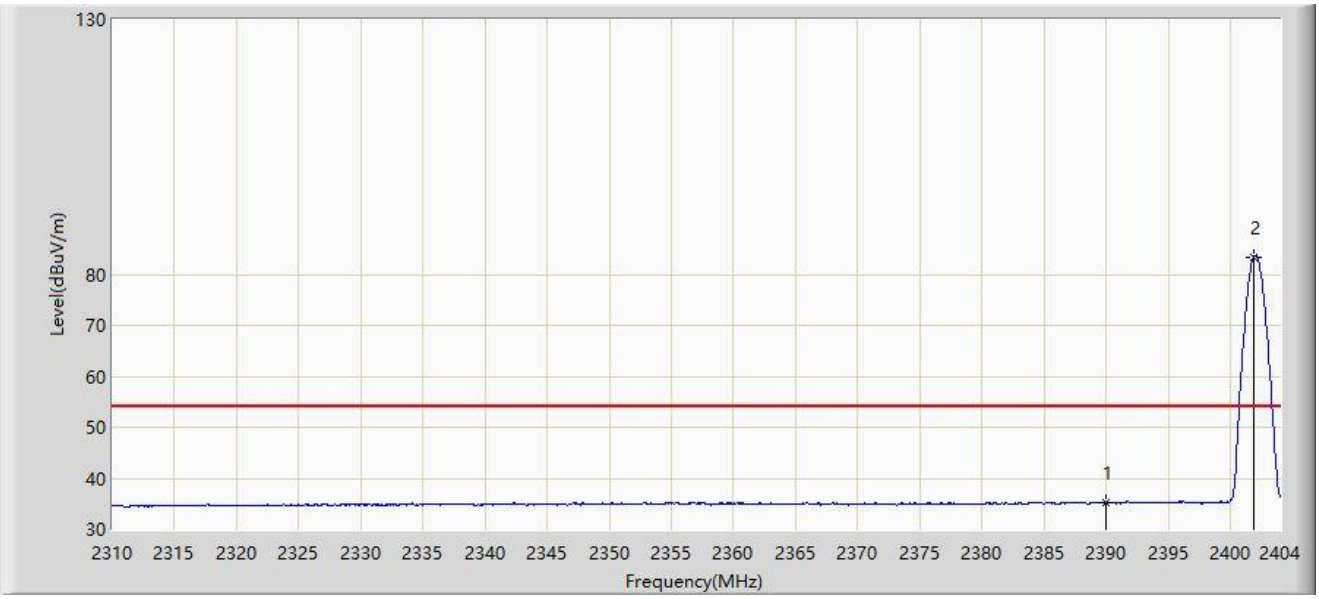
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2321.186	55.180	23.736	-18.820	74.000	31.444	PK
2		2390.000	51.974	20.259	-22.026	74.000	31.715	PK
3		2401.885	84.600	52.805	N/A	N/A	31.796	PK

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Vertical
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2402MHz	



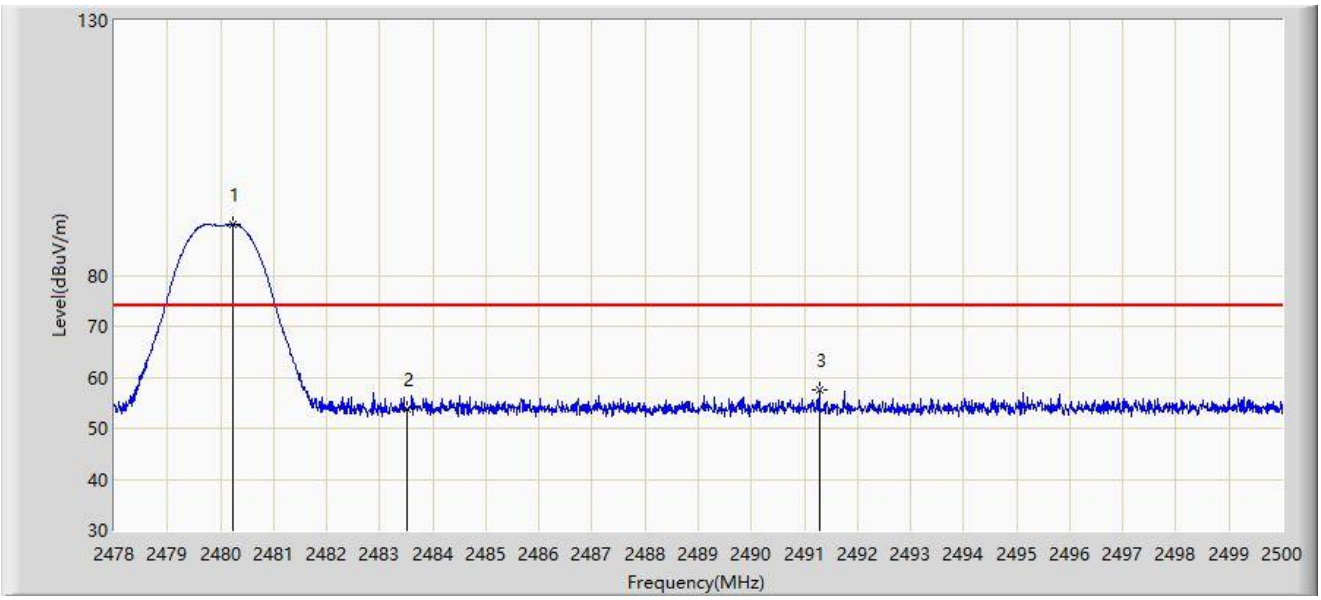
No	Mark	Frequency (MHz)	Measure Level (dBµV/m)	Reading Level (dBµV)	Margin (dB)	Limit (dBµV/m)	Factor (dB/m)	Type
1	*	2390.000	35.193	3.478	-18.807	54.000	31.715	AV
2		2401.885	83.351	51.556	N/A	N/A	31.796	AV

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



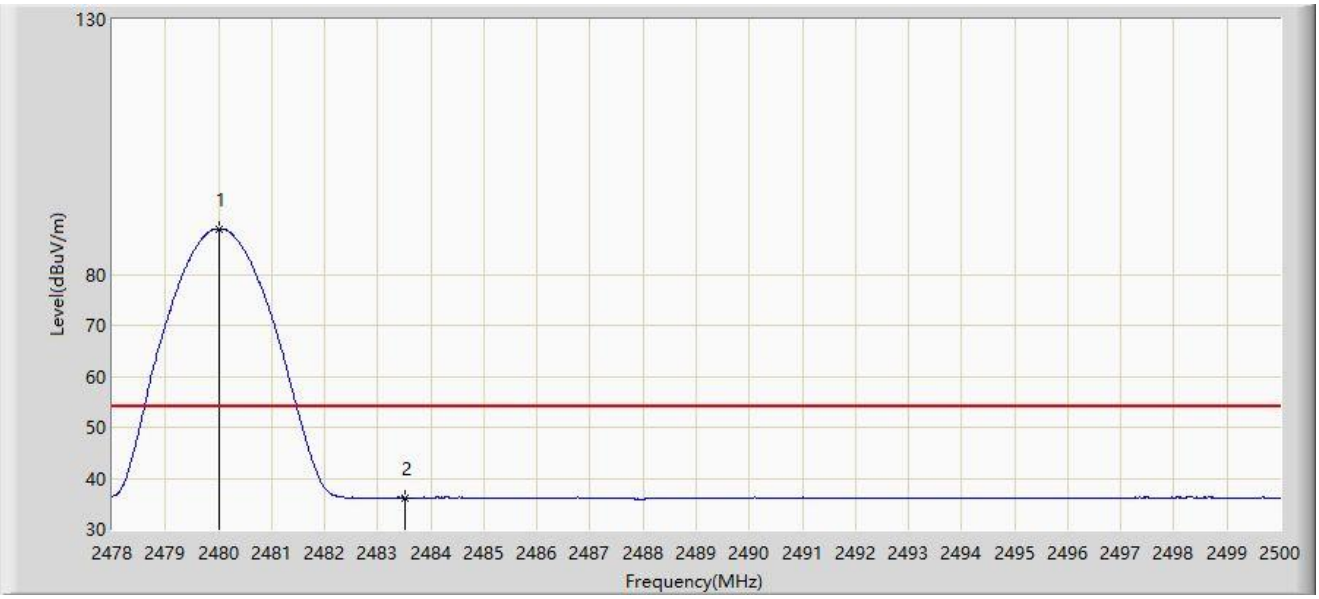
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.244	90.007	57.922	N/A	N/A	32.085	PK
2		2483.500	53.674	21.584	-20.326	74.000	32.090	PK
3	*	2491.277	57.508	25.408	-16.492	74.000	32.100	PK

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Horizontal
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



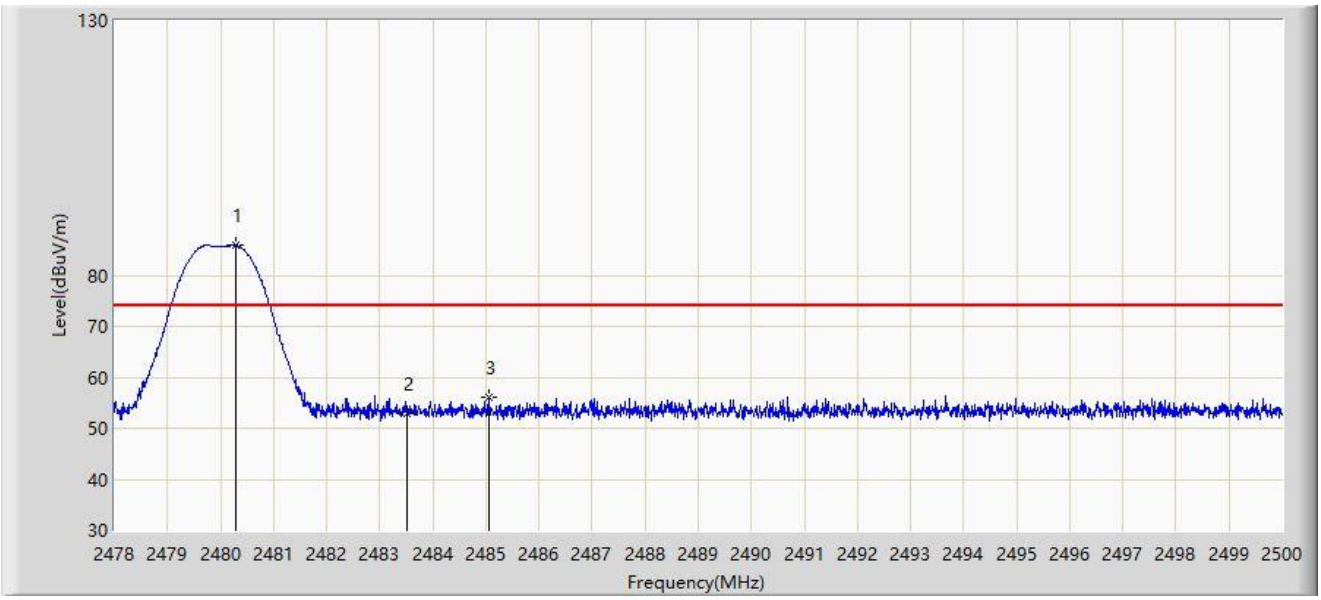
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.024	88.943	56.858	N/A	N/A	32.084	AV
2	*	2483.500	36.180	4.090	-17.820	54.000	32.090	AV

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Vertical
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



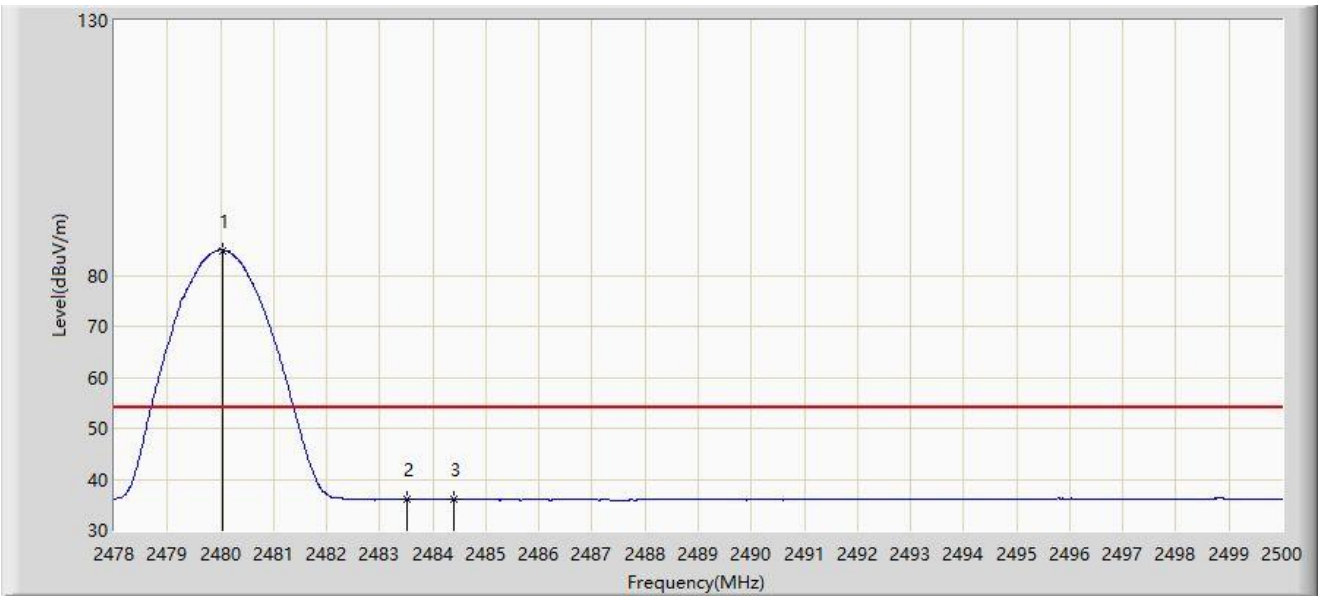
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.277	85.887	53.802	N/A	N/A	32.086	PK
2		2483.500	52.788	20.698	-21.212	74.000	32.090	PK
3	*	2485.062	56.185	24.093	-17.815	74.000	32.091	PK

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).

Site: SIP-AC1	Test Date: 2023-11-08
Limit: FCC_2.4G_RE(3m)	Engineer: Mero Zhou
Probe: HF907_102862_1-18GHz	Polarity: Vertical
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2480.046	84.923	52.838	N/A	N/A	32.085	AV
2		2483.500	36.010	3.920	-17.990	54.000	32.090	AV
3	*	2484.391	36.139	4.048	-17.861	54.000	32.090	AV

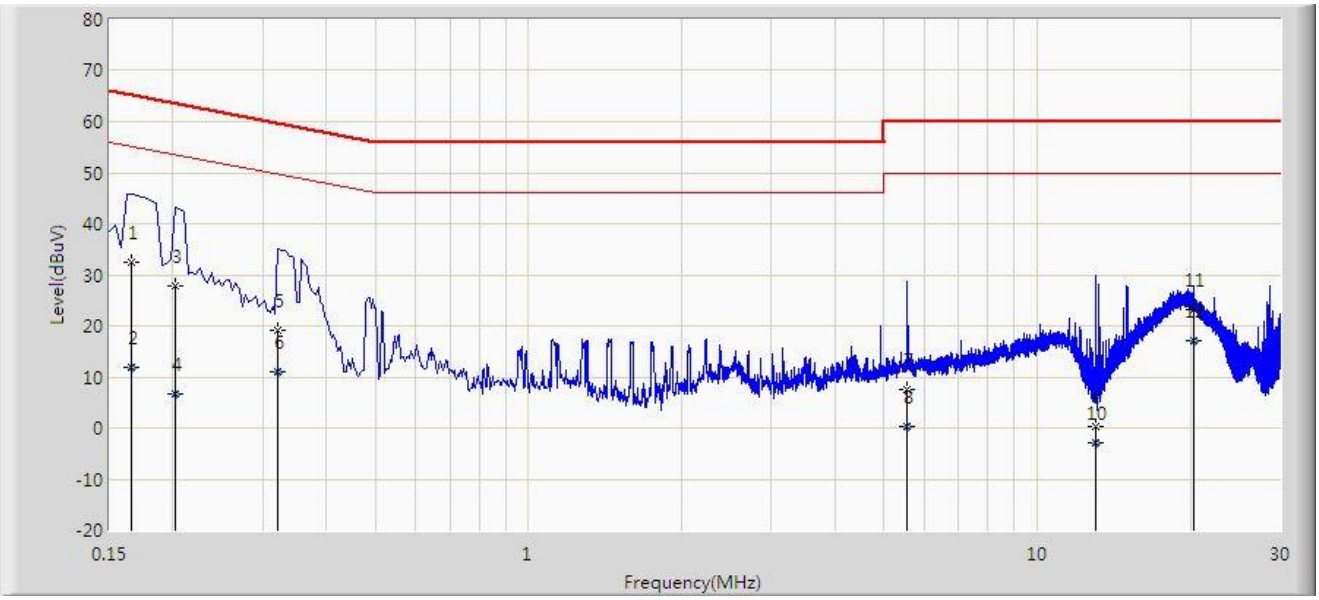
Note 1: " * ", means this data is the worst emission level.

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

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

A.8 AC Conducted Emissions Test Result

Site: SIP-SR2	Test Date: 2023-10-17
Temperature: 24.1°C	Humidity: 59.7%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Mark Long
Probe: SIP-SR2-ENV216_101684_C	Polarity: Line
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1M at 2402MHz	



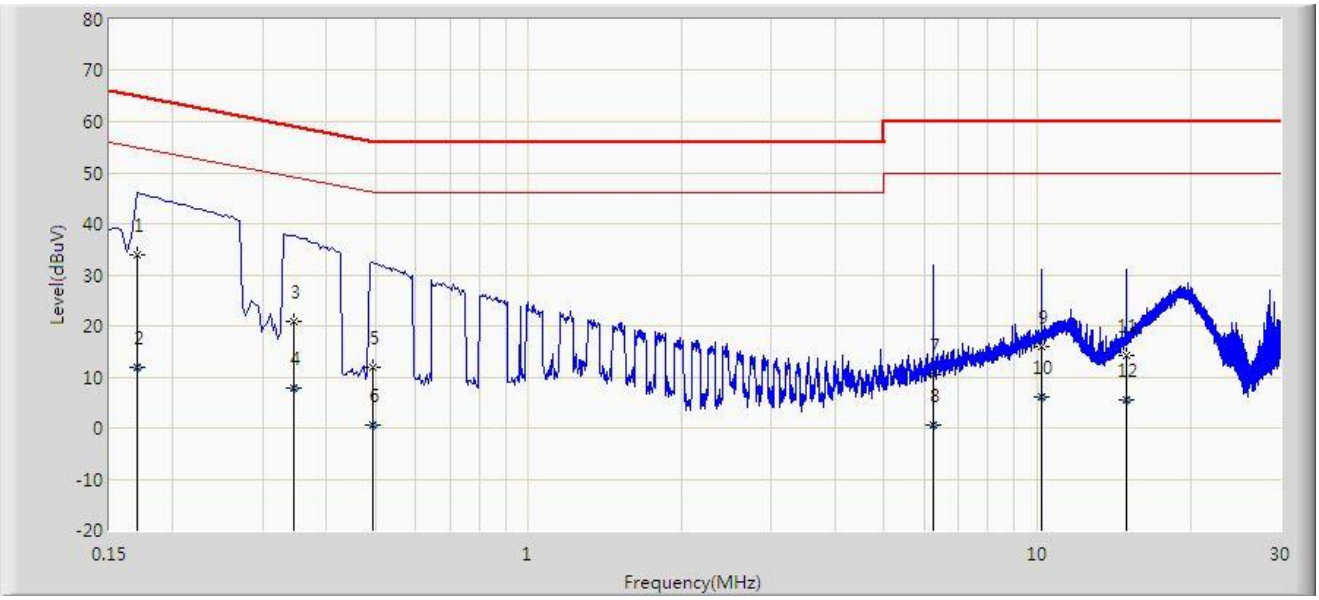
No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1		0.166	32.331	22.377	-32.827	65.158	9.954	QP
2		0.166	11.979	2.025	-43.179	55.158	9.954	AV
3		0.202	27.779	17.735	-35.749	63.528	10.044	QP
4		0.202	6.767	-3.277	-46.761	53.528	10.044	AV
5		0.322	19.132	9.384	-40.523	59.655	9.749	QP
6		0.322	11.140	1.391	-38.515	49.655	9.749	AV
7		5.558	7.400	-2.518	-52.600	60.000	9.918	QP
8		5.558	0.257	-9.661	-49.743	50.000	9.918	AV
9		13.026	0.369	-9.803	-59.631	60.000	10.172	QP
10		13.026	-2.919	-13.091	-52.919	50.000	10.172	AV
11		20.258	23.092	12.686	-36.908	60.000	10.406	QP
12	*	20.258	17.191	6.786	-32.809	50.000	10.406	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: 2023-10-17
Temperature: 24.1°C	Humidity: 59.7%
Limit: FCC_Part15.207_CE_AC Power	Engineer: Mark Long
Probe: SIP-SR2-ENV216_101684_C	Polarity: Neutral
EUT: Intelligent Toilet	Power: AC 120V/60Hz
Test Mode: Transmit by BLE 1M at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV)	Factor (dB)	Type
1	*	0.170	33.936	24.296	-31.025	64.960	9.640	QP
2		0.170	11.911	2.271	-43.050	54.960	9.640	AV
3		0.346	20.947	11.242	-38.111	59.058	9.704	QP
4		0.346	7.903	-1.801	-41.155	49.058	9.704	AV
5		0.494	11.937	2.227	-44.164	56.100	9.710	QP
6		0.494	0.689	-9.021	-45.411	46.100	9.710	AV
7		6.250	10.417	0.508	-49.583	60.000	9.909	QP
8		6.250	0.553	-9.356	-49.447	50.000	9.909	AV
9		10.178	15.806	5.743	-44.194	60.000	10.063	QP
10		10.178	6.061	-4.002	-43.939	50.000	10.063	AV
11		14.970	14.149	3.939	-45.851	60.000	10.210	QP
12		14.970	5.640	-4.569	-44.360	50.000	10.210	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).

Appendix B - Test Setup Photograph

Refer to “2310RSU010-UT” file.

Appendix C - EUT Photograph

Refer to “2310RSU010-UE” file.

The End