

RF MEASUREMENT REPORT

FCC ID: 2APPT-314
Applicant: Airthings ASA
Product: AT-314
Model No.: 314
Brand Name: Airthings
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
Result: Complies
Received Date: 2023-07-03
Test Date: 2023-07-24 ~ 2023-07-28

Reviewed By:

Sunny Sun

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
2307RSU008-U4	V01	Initial Report	2023-08-09	Valid

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1.4. Product Information

Product	AT-314
Model No.	314
EUT Identification No.	CERT_C9_13
Bluetooth Specification	v5.1 Single Mode (BLE)
SmartLink Specification	905.6 ~ 926MHz
Sidewalk Specification	902.2 ~ 915.8MHz
Antenna Information	Refer to clause 1.5.
Operating Temp.	-30 ~ 60°C
Working Voltage	2x AA batteries giving max 3.6V
Note: 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 under Test

Bluetooth Frequency	2402 ~ 2480MHz
Channel Number	40
Type of modulation	GFSK
Data Rate	1Mbps & 2Mbps
Antenna Type	Fixed Internal Antenna
Antenna Gain	2.8 dBi

1.6. Working Frequencies

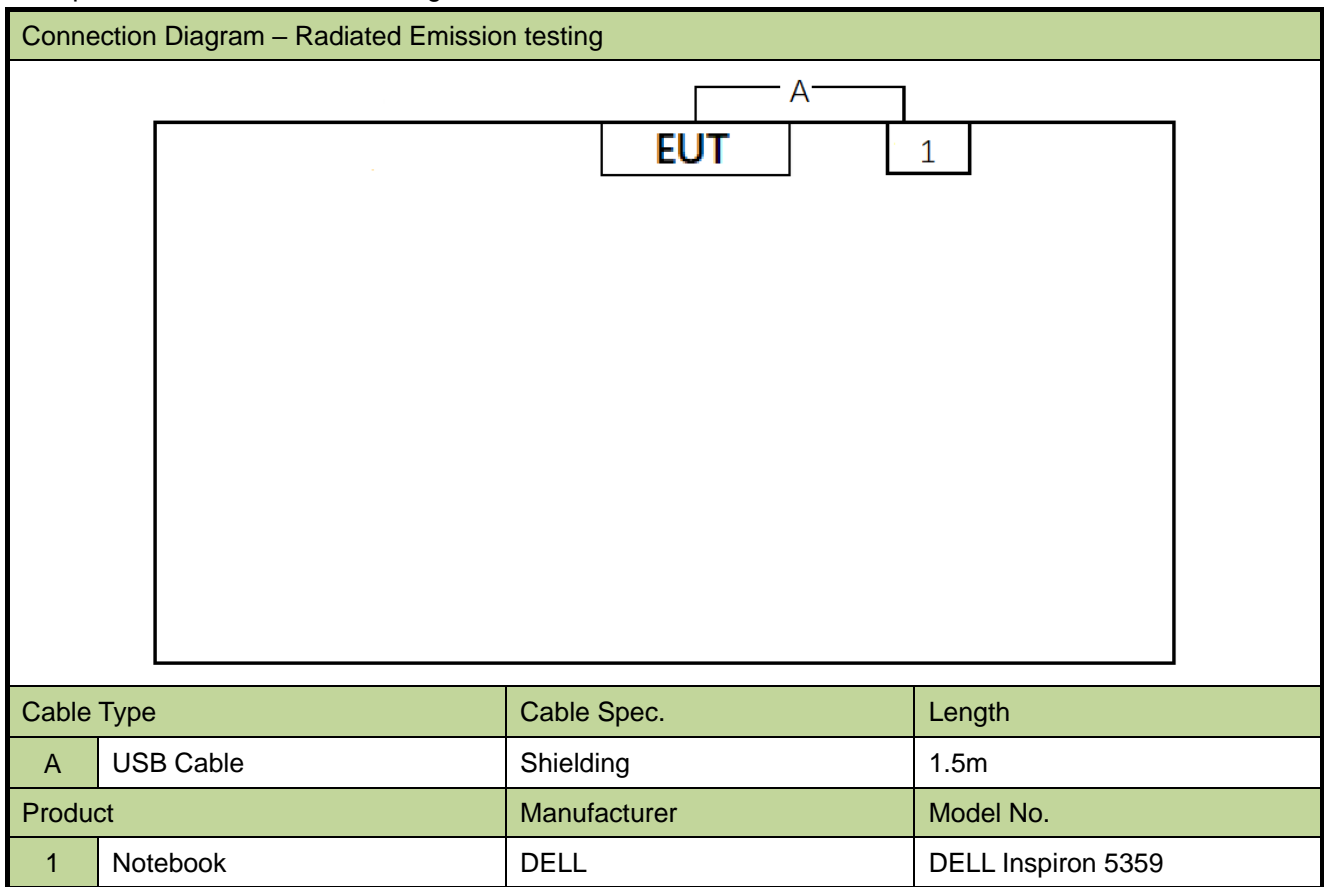
Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 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 Test Mode

Mode 1: Transmit by BLE-1Mbps
Mode 2: Transmit by BLE-2Mbps

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.



2.3. Test Software

The test utility software used during testing was “IPOP”, and the version was 4.1.

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

2. 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**.

Conclusion:

The unit complies with the requirement of §15.203.

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2023-12-28	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2023-08-22	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2024-05-07	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2024-06-09	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2024-04-20	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2024-05-31	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2023-12-28	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE11039	1 year	2023-11-01	WZ-AC1
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2023-09-29	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2023-11-05	WZ-AC1
Preamplifier	EMCI	EMC184045SE	MRTSUE06640	1 year	2024-01-12	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06457	1 year	2024-05-23	WZ-SR5
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2024-05-31	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
USB Power Sensor	Keysight	U2021XA	MRTSUE06446	1 year	2024-05-23	WZ-SR5
Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2024-02-29	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11093	1 year	2024-06-08	WZ

Software	Version	Function
EMI Software	V3.0.0	EMI Test Software
Controller_MF 7802	2.03C	RE Antenna & Turntable
Agilent Power Analyzer/Agilent Power Panel	V R03.09.00	Power

4. Decision Rules and Measurement Uncertainty

4.1. 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.)

4.2. 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
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.58dB 150kHz~30MHz: 3.20dB
Radiated Disturbance
The maximum measurement uncertainty is evaluated as: 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
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.5dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 2.3dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 3.2%

5. Test Result

5.1. 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	N/A

Notes:

- 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.
- 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.
- “N/A” means that this item is not applicable, and the detail information refer to relevant section.

5.2. 6dB Bandwidth Measurement

5.2.1. Test Limit

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

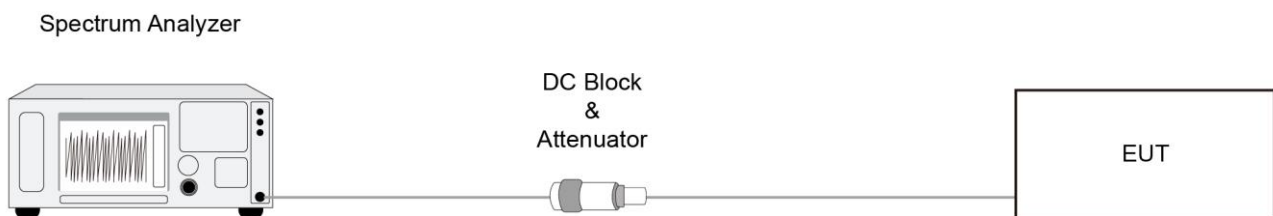
5.2.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.8

5.2.3. 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 $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

5.2.4. Test Setup



5.2.5. Test Result

Refer to Appendix A.2.

5.3. Output Power Measurement

5.3.1. 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.

5.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.9.1.3(Peak Power)

ANSI C63.10 - 2013 - Section 11.9.2.3.2(Average Power)

5.3.3. Test Setting

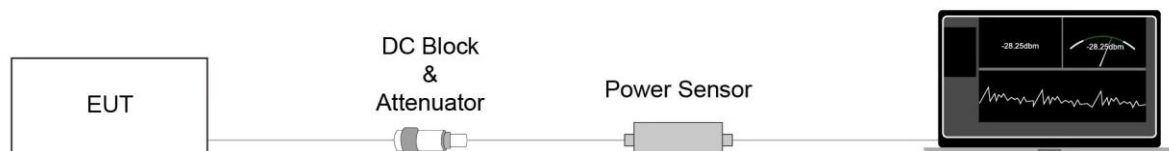
Method PKPM1 (Peak Power Measurement of Signals with DTS BW \leq 50MHz)

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.

5.3.4. Test Setup



5.3.5. Test Result

Refer to Appendix A.3.

5.4. Power Spectral Density Measurement

5.4.1. 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.

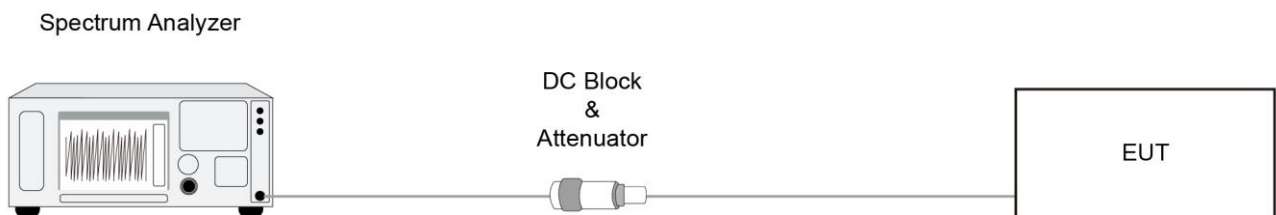
5.4.2. Test Procedure

ANSI C63.10-2013 Section 11.10.2

5.4.3. 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

5.4.4. Test Setup



5.4.5. Test Result

Refer to Appendix A.4.

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

5.5.1. 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.

5.5.2. Test Procedure

ANSI C63.10-2013 - Section 11.11

5.5.3. Test Setting

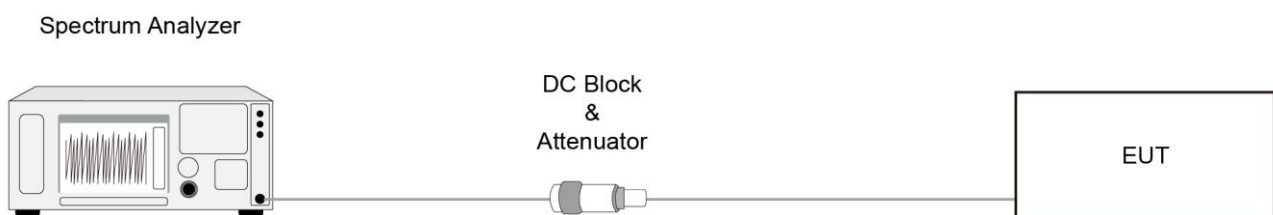
Reference level measurement

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 $\geq 3 \times$ 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 $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

5.5.4. Test Setup



5.5.5. Test Result

Refer to Appendix A.5.

5.6. Radiated Spurious Emission Measurement

5.6.1. 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

5.6.2. 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)

5.6.3. 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

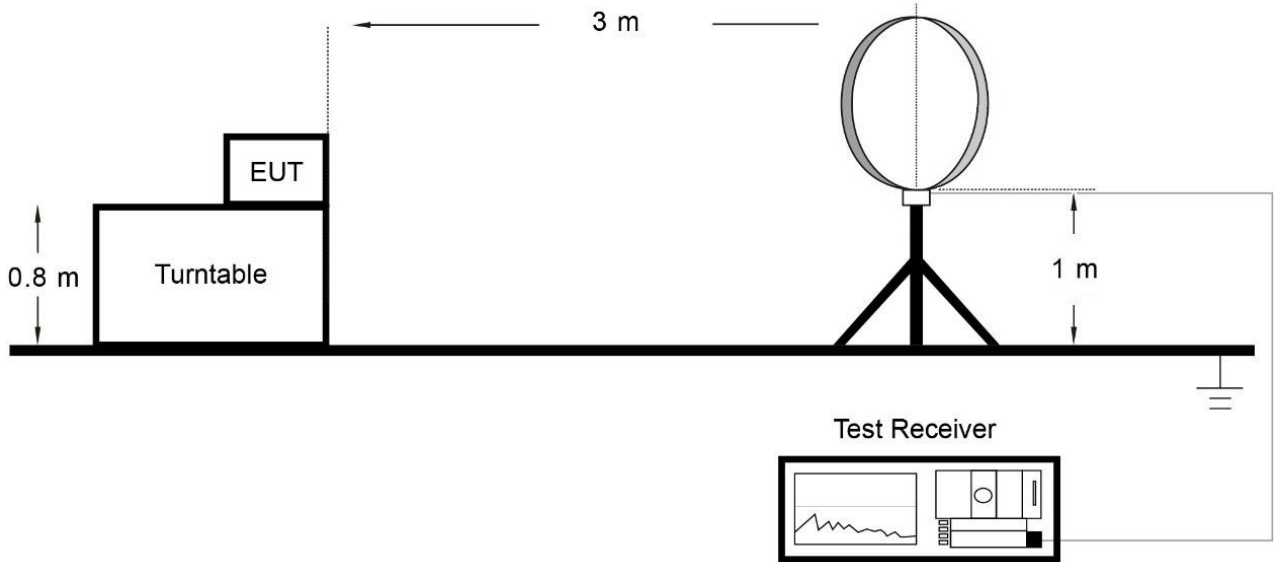
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

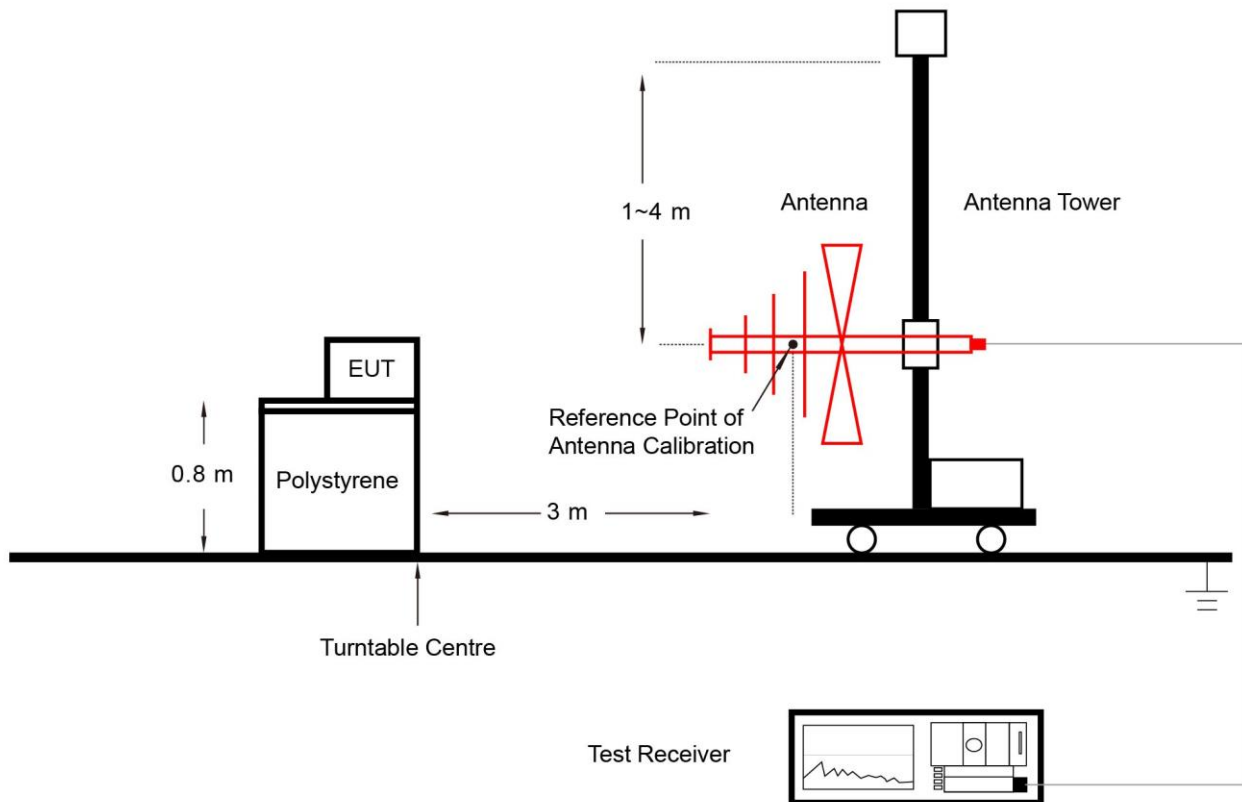
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

5.6.4. Test Setup

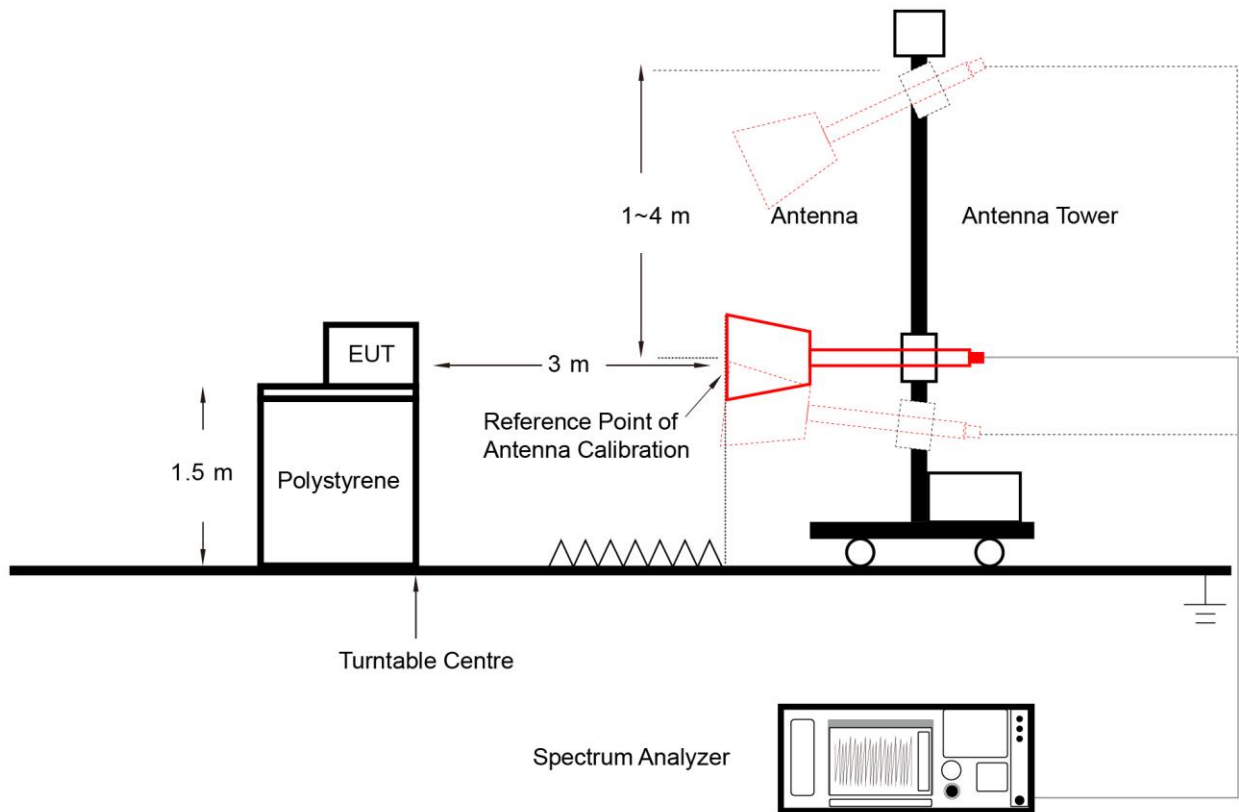
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.6.5. Test Result

Refer to Appendix A.6.

5.7. Radiated Restricted Band Edge Measurement

5.7.1. 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

5.7.2. Test Procedure

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

5.7.3. Test Setting

Peak Field Strength Measurements

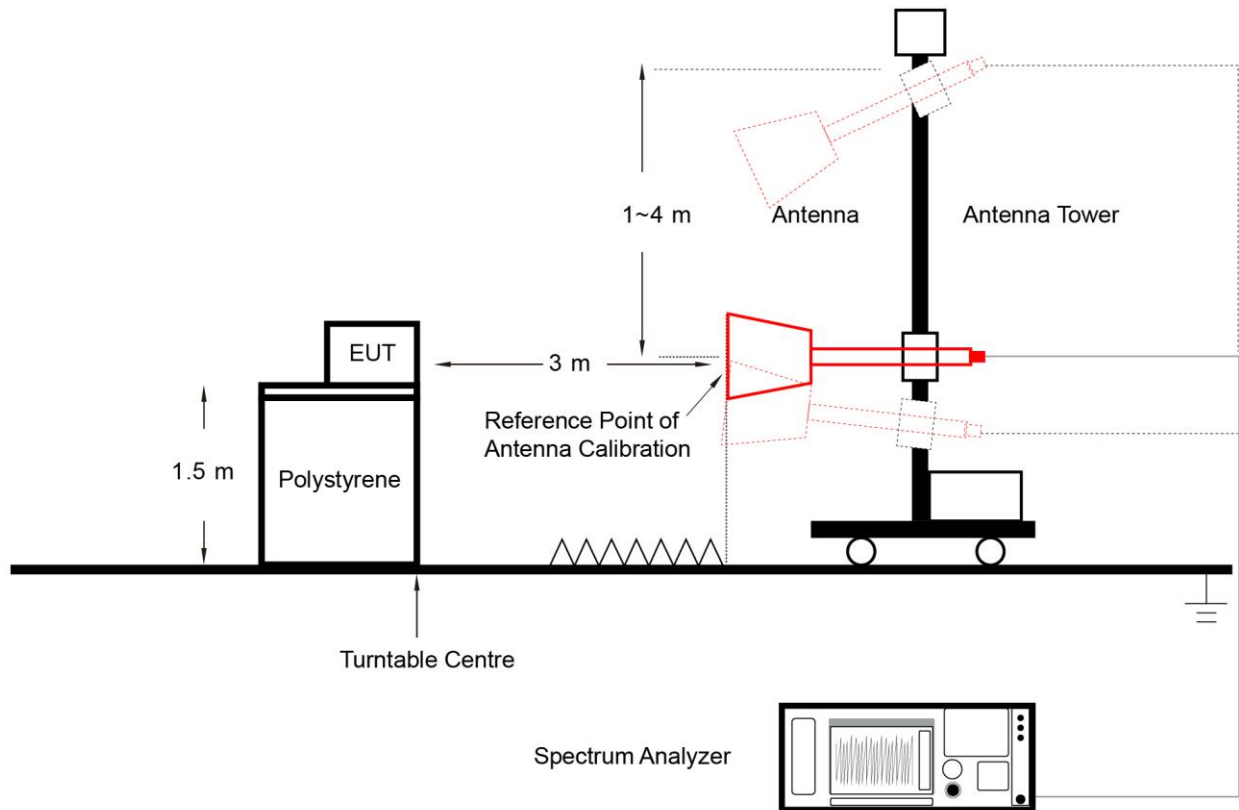
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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 $\geq 1/T$
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

5.7.4. Test Setup



5.7.5. Test Result

Refer to Appendix A.7.

5.8. AC Conducted Emissions Measurement

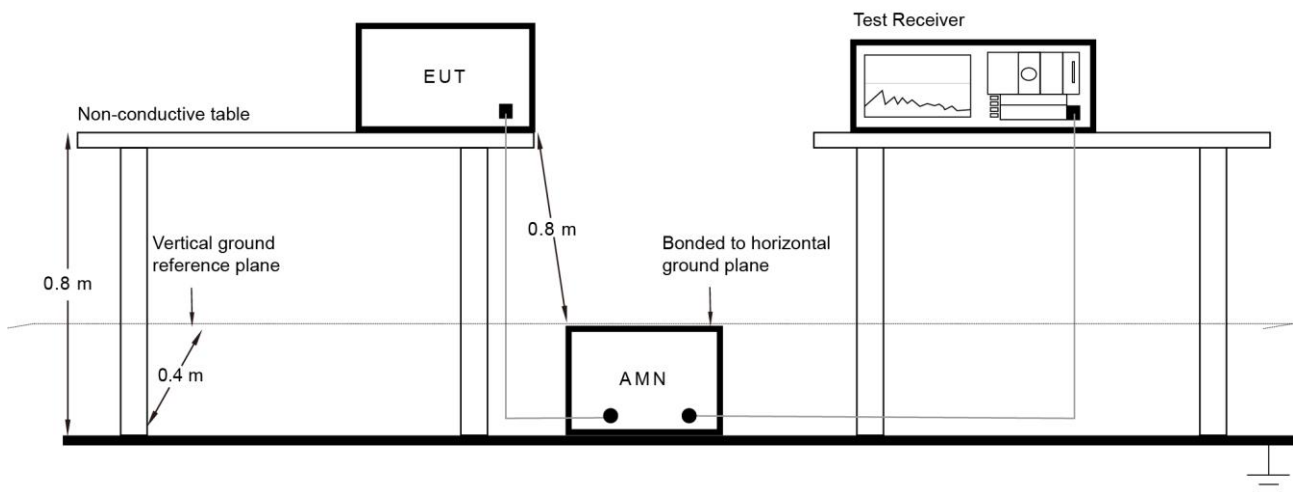
5.8.1. Test Limit

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.

5.8.2. Test Setup



5.8.3. Test Result

The EUT is powered by battery, so this item is not applicable.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-28		

Test Mode	Duty Cycle
BLE-1Mbps	100.0%
BLE-2Mbps	100.0%

Duty Cycle



A.2 6dB Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-24		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
BLE	1Mbps	00	2402	0.6887	≥ 0.5
BLE	1Mbps	19	2440	0.6748	≥ 0.5
BLE	1Mbps	39	2480	0.6792	≥ 0.5
BLE	2Mbps	00	2402	1.395	≥ 0.5
BLE	2Mbps	19	2440	1.434	≥ 0.5
BLE	2Mbps	39	2480	1.373	≥ 0.5

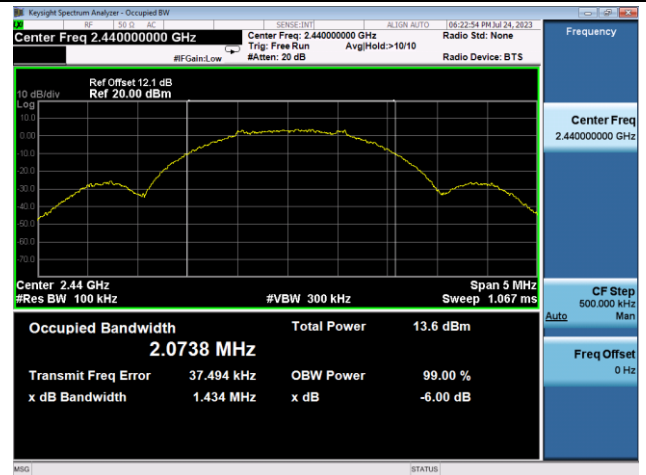


BLE-2Mbps 6dB Bandwidth

Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



A.3 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-24		

Test Result of Peak Output Power

Test Mode	Data Rate	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	5.74	≤ 30.00	Pass
BLE	1Mbps	19	2440	5.64	≤ 30.00	Pass
BLE	1Mbps	39	2480	5.48	≤ 30.00	Pass
BLE	2Mbps	00	2402	5.84	≤ 30.00	Pass
BLE	2Mbps	19	2440	5.70	≤ 30.00	Pass
BLE	2Mbps	39	2480	5.50	≤ 30.00	Pass

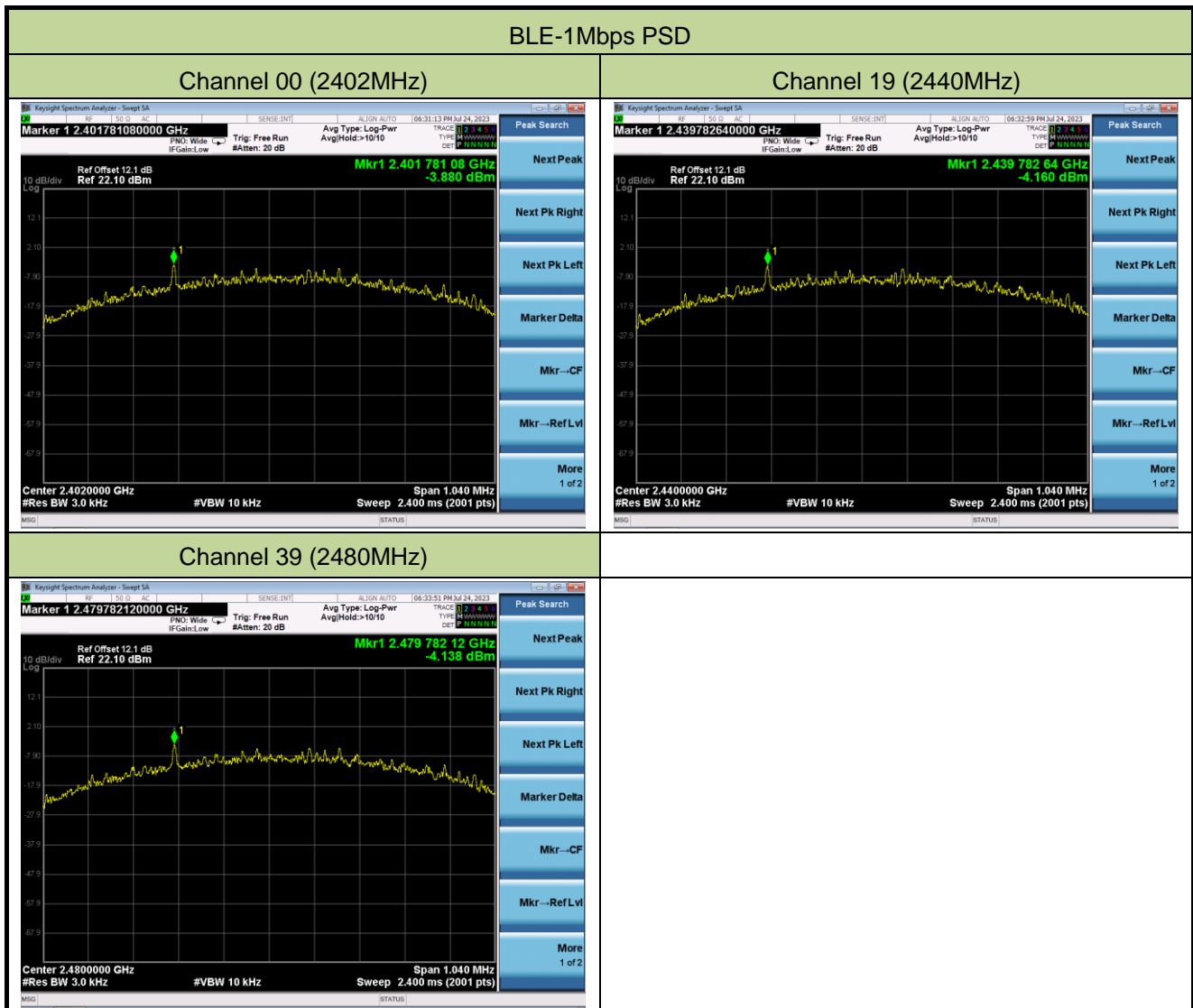
Test Result of Average Output Power (Reporting Only)

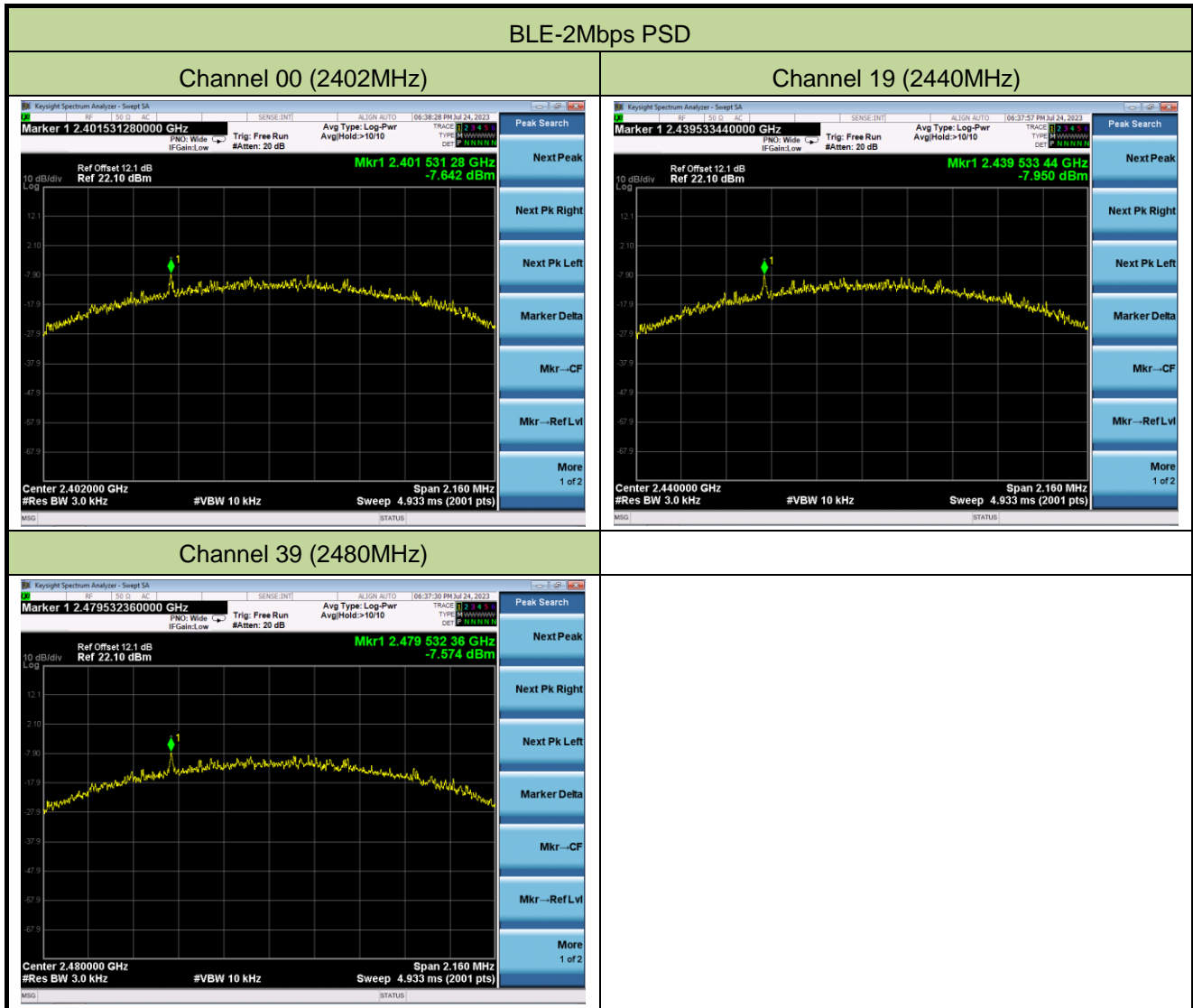
Test Mode	Data Rate	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1Mbps	00	2402	5.64	≤ 30.00	Pass
BLE	1Mbps	19	2440	5.54	≤ 30.00	Pass
BLE	1Mbps	39	2480	5.37	≤ 30.00	Pass
BLE	2Mbps	00	2402	5.72	≤ 30.00	Pass
BLE	2Mbps	19	2440	5.59	≤ 30.00	Pass
BLE	2Mbps	39	2480	5.38	≤ 30.00	Pass

A.4 Power Spectral Density Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-24		

Test Mode	Data Rate	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1Mbps	00	2402	-3.880	≤ 8.00	Pass
BLE	1Mbps	19	2440	-4.160	≤ 8.00	Pass
BLE	1Mbps	39	2480	-4.138	≤ 8.00	Pass
BLE	2Mbps	00	2402	-7.642	≤ 8.00	Pass
BLE	2Mbps	19	2440	-7.950	≤ 8.00	Pass
BLE	2Mbps	39	2480	-7.574	≤ 8.00	Pass

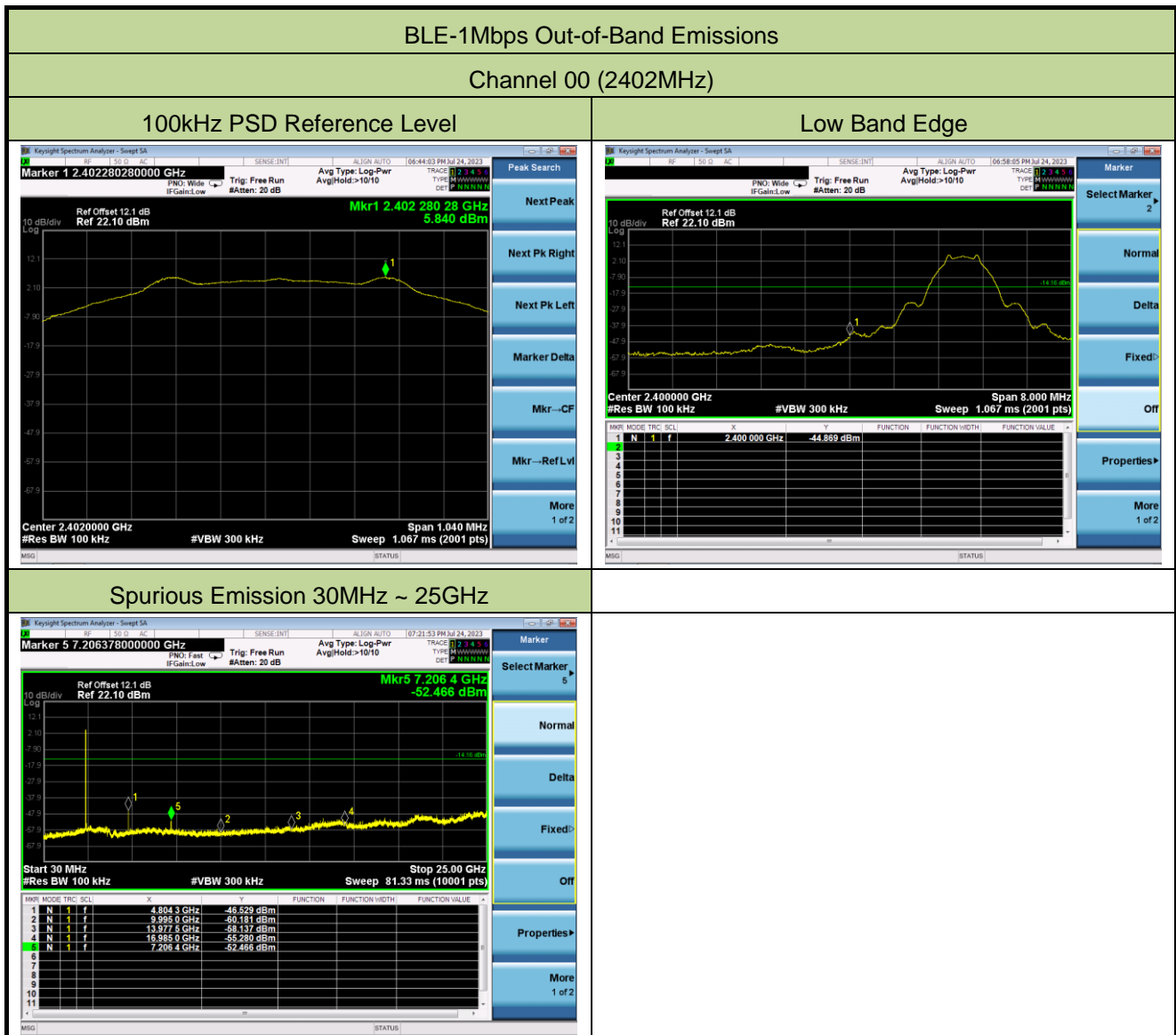




A.5 Conducted Band Edge and Out-of-Band Emissions Test Result

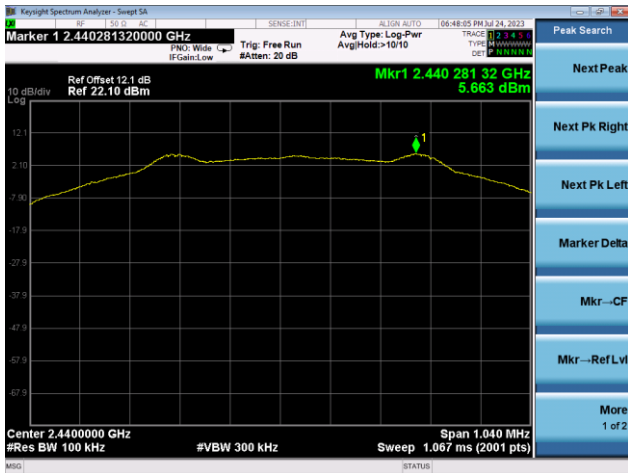
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2023-07-24		

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	2	00	2402	20	Pass
BLE	2	19	2440	20	Pass
BLE	2	39	2480	20	Pass

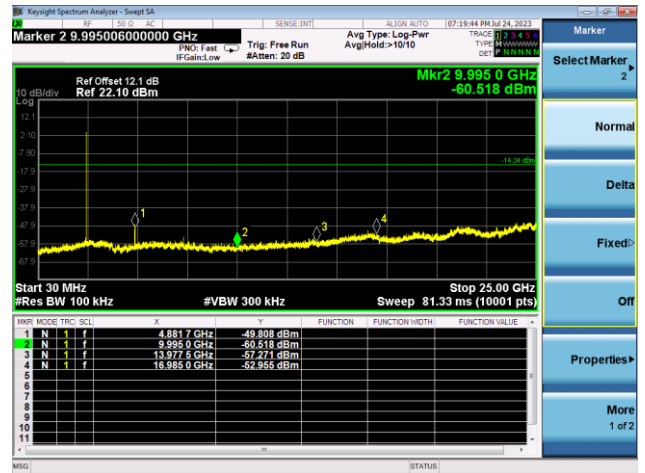


Channel 19 (2440MHz)

100kHz PSD Reference Level

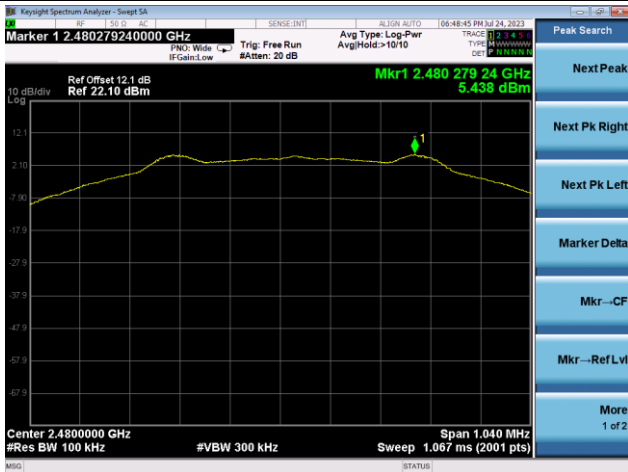


Spurious Emission 30MHz ~ 25GHz

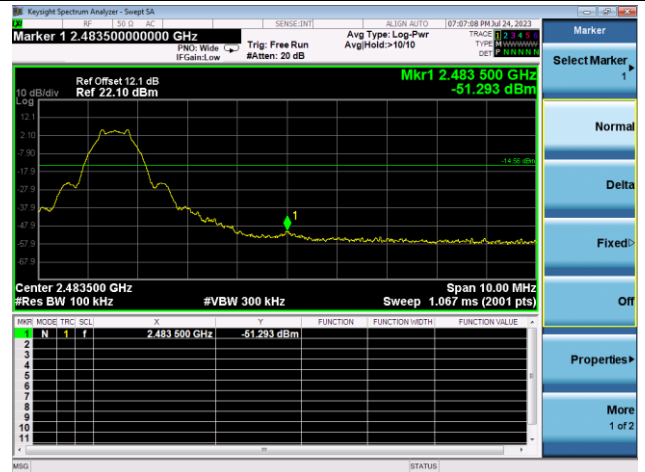


Channel 39 (2480MHz)

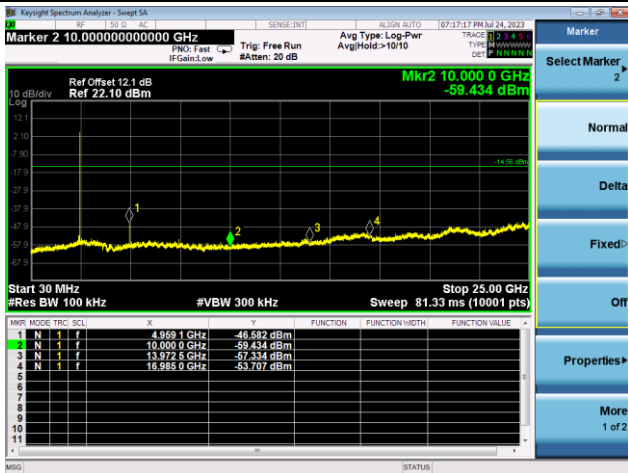
100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



BLE-2Mbps Out-of-Band Emissions

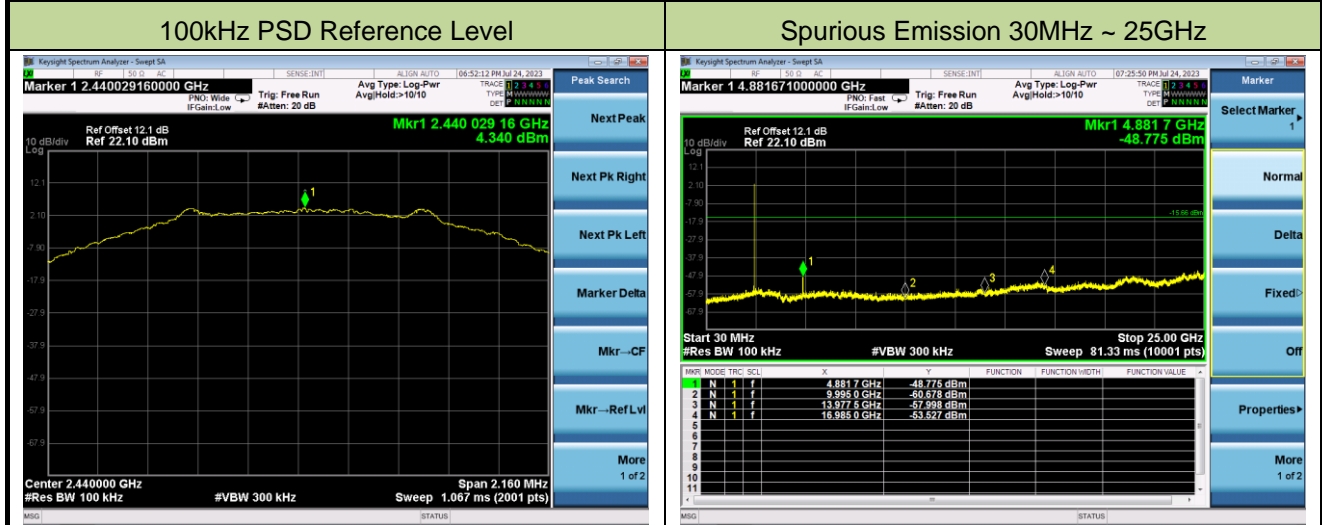
Channel 00 (2402MHz)



Spurious Emission 30MHz ~ 25GHz

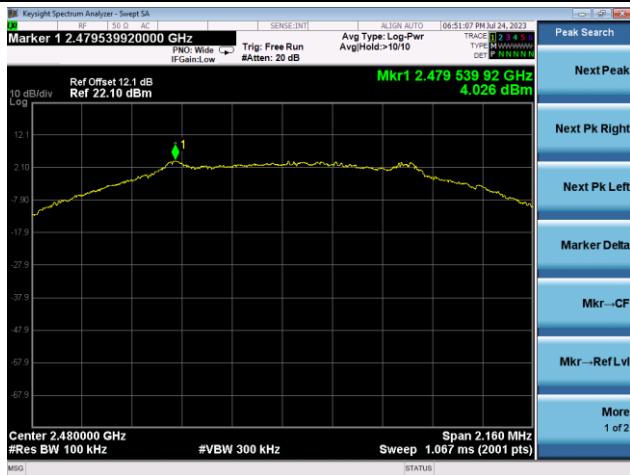


Channel 19 (2440MHz)

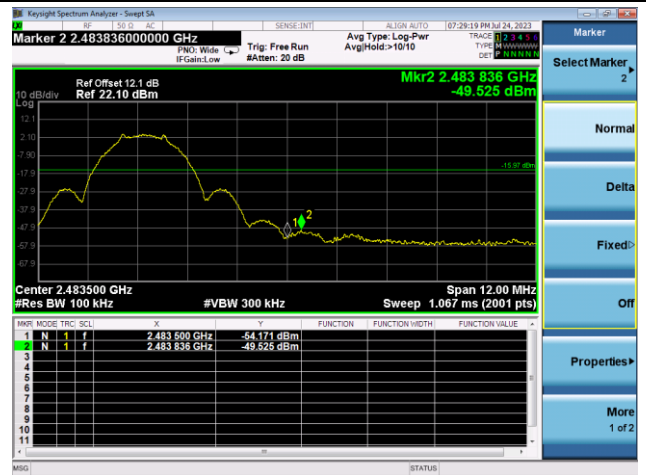


Channel 39 (2480MHz)

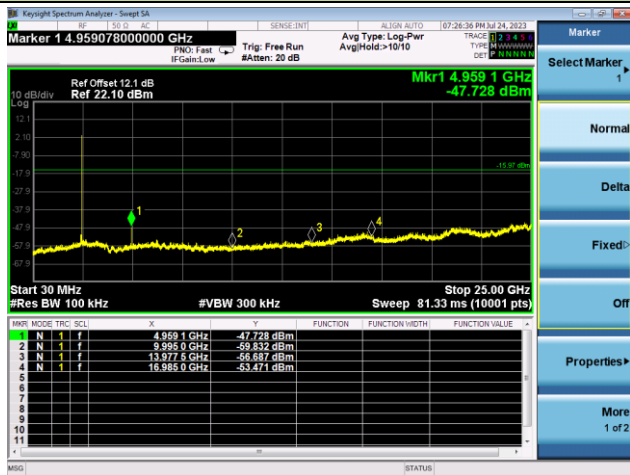
100kHz PSD Reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



A.6 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Ajin Fan
Test Date	2023-07-24~2023-07-27	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 shown 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	7383.5	36.7	8.4	45.1	74.0	-28.9	Peak	Horizontal
	8437.5	37.6	8.9	46.5	74.0	-27.5	Peak	Horizontal
	11004.5	36.7	13.8	50.5	74.0	-23.5	Peak	Horizontal
	4799.5	41.8	3.1	44.9	74.0	-29.1	Peak	Vertical
	8182.5	37.2	8.7	45.9	74.0	-28.1	Peak	Vertical
	10953.5	36.8	13.6	50.4	74.0	-23.6	Peak	Vertical
19	7545.0	37.2	8.5	45.7	74.0	-28.3	Peak	Horizontal
	8259.0	36.9	8.6	45.5	74.0	-28.5	Peak	Horizontal
	11030.0	37.0	13.5	50.5	74.0	-23.5	Peak	Horizontal
	7324.0	37.7	8.1	45.8	74.0	-28.2	Peak	Vertical
	8208.0	37.1	8.7	45.8	74.0	-28.2	Peak	Vertical
	11387.0	37.4	12.9	50.3	74.0	-23.7	Peak	Vertical
39	7392.0	36.8	8.4	45.2	74.0	-28.8	Peak	Horizontal
	8386.5	37.1	8.8	45.9	74.0	-28.1	Peak	Horizontal
	11242.5	37.1	12.8	49.9	74.0	-24.1	Peak	Horizontal
	7664.0	36.3	7.9	44.2	74.0	-29.8	Peak	Vertical
	8174.0	37.4	8.8	46.2	74.0	-27.8	Peak	Vertical
	11489.0	37.3	13.2	50.5	74.0	-23.5	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)

Test Site	WZ-AC1	Test Engineer	Ajin Fan
Test Date	2023-07-24~2023-07-27	Test Mode:	BLE-2Mbps
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 shown in the report.		

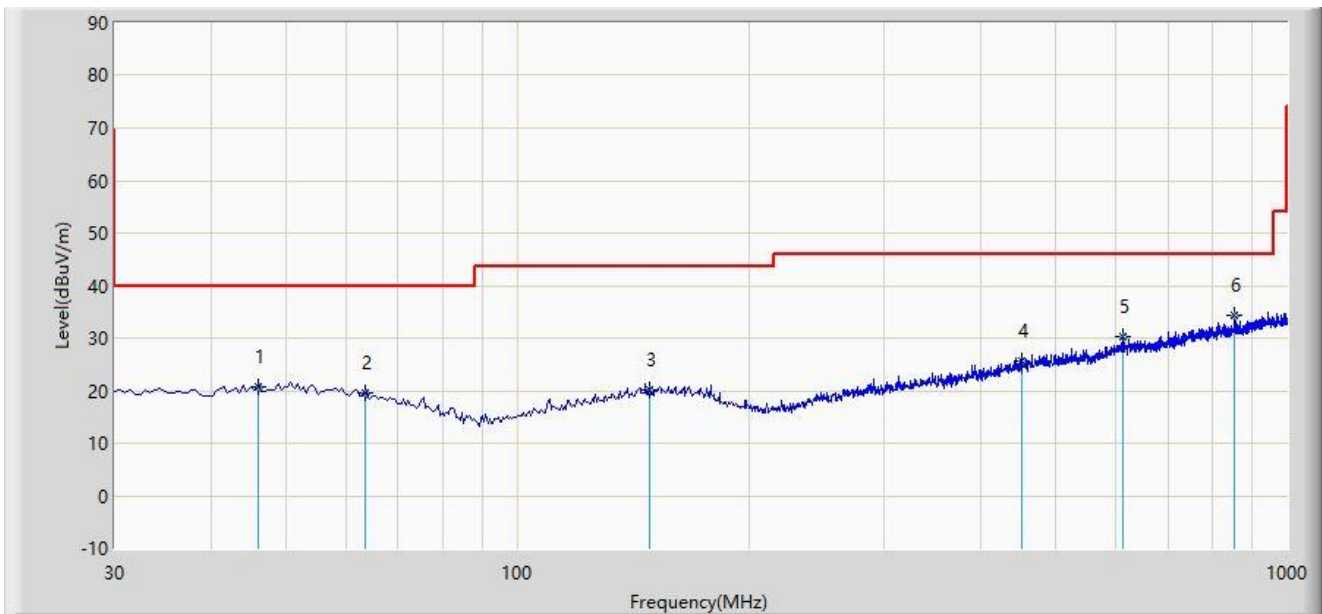
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
00	7587.5	36.8	8.2	45.0	74.0	-29.0	Peak	Horizontal
	8276.0	37.1	8.4	45.5	74.0	-28.5	Peak	Horizontal
	11336.0	37.1	12.8	49.9	74.0	-24.1	Peak	Horizontal
	7307.0	36.3	8.2	44.5	74.0	-29.5	Peak	Vertical
	8318.5	37.2	8.6	45.8	74.0	-28.2	Peak	Vertical
	11463.5	36.7	12.9	49.6	74.0	-24.4	Peak	Vertical
19	7366.5	36.4	8.4	44.8	74.0	-29.2	Peak	Horizontal
	8403.5	36.7	8.9	45.6	74.0	-28.4	Peak	Horizontal
	11310.5	37.2	12.6	49.8	74.0	-24.2	Peak	Horizontal
	7468.5	35.7	8.5	44.2	74.0	-29.8	Peak	Vertical
	8403.5	36.4	8.9	45.3	74.0	-28.7	Peak	Vertical
	11166.0	36.4	13.1	49.5	74.0	-24.5	Peak	Vertical
39	7409.0	36.0	8.3	44.3	74.0	-29.7	Peak	Horizontal
	8242.0	35.1	8.6	43.7	74.0	-30.3	Peak	Horizontal
	11132.0	37.7	12.9	50.6	74.0	-23.4	Peak	Horizontal
	7392.0	36.2	8.4	44.6	74.0	-29.4	Peak	Vertical
	8259.0	36.9	8.6	45.5	74.0	-28.5	Peak	Vertical
	10681.5	36.3	13.8	50.1	74.0	-23.9	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: WZ-AC1	Time: 2023-07-27
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE-1M at channel 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		46.140	20.641	2.140	-19.359	40.000	18.500	QP
2		63.465	19.513	2.010	-20.487	40.000	17.504	QP
3		148.841	20.186	2.120	-23.314	43.500	18.066	QP
4		451.465	25.695	3.250	-20.305	46.000	22.445	QP
5		611.030	30.155	4.140	-15.845	46.000	26.014	QP
6	*	853.540	34.316	5.120	-11.684	46.000	29.196	QP

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

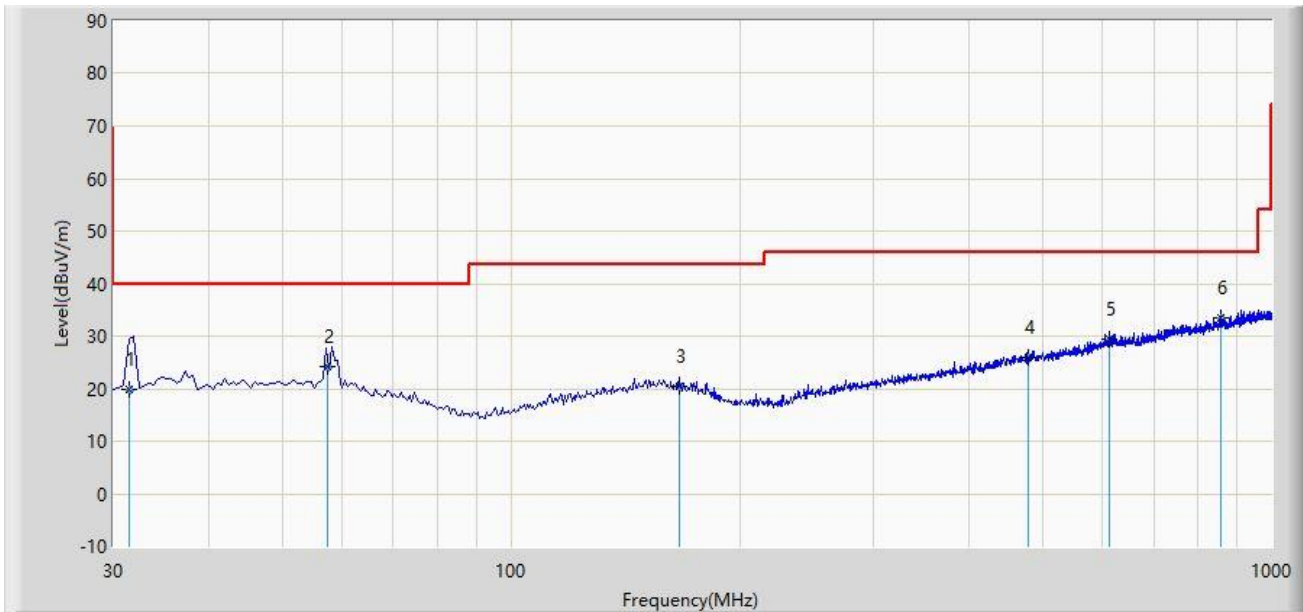
Note 2: Measure Level (dB μ V/m) = Reading Level (dB μ V) + Factor (dB/m).

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: WZ-AC1	Time: 2023-07-27
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE-1M at channel 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		31.420	19.760	2.400	-20.240	40.000	17.360	QP
2		57.270	24.209	5.969	-15.791	40.000	18.240	QP
3		166.785	20.432	2.340	-23.068	43.500	18.091	QP
4		478.685	26.041	3.120	-19.959	46.000	22.921	QP
5		611.515	29.508	3.480	-16.492	46.000	26.028	QP
6	*	855.955	33.378	4.140	-12.622	46.000	29.238	QP

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

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

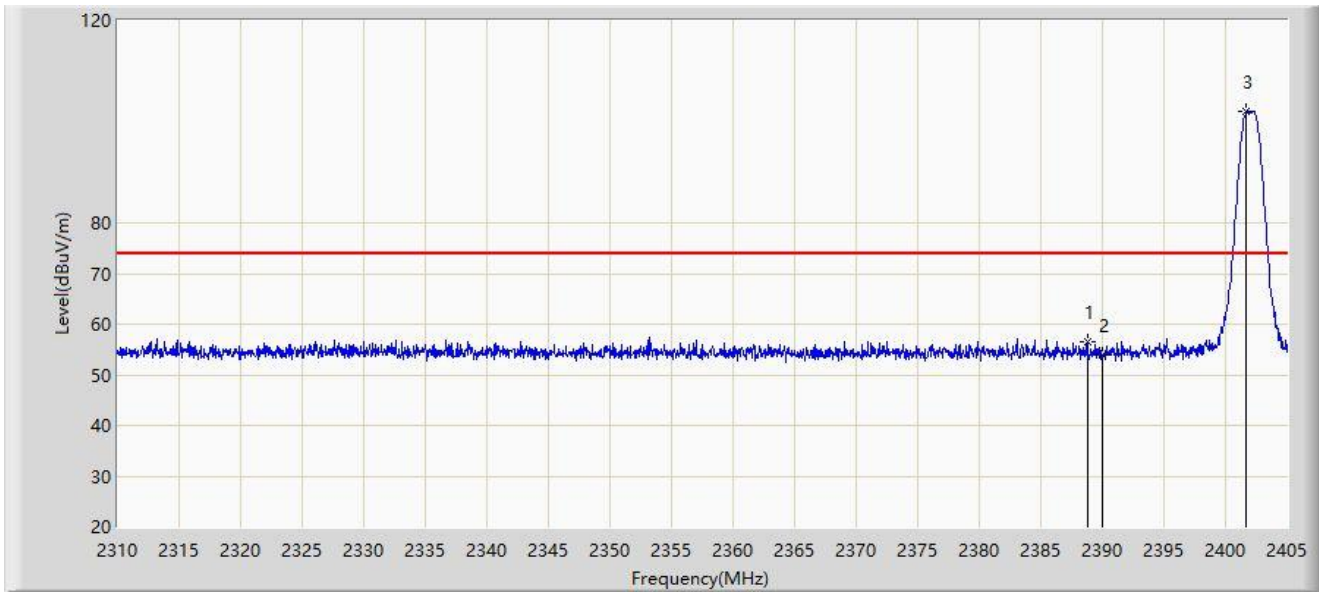
Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)

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: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2388.755	56.496	25.337	-17.504	74.000	31.159	PK
2		2390.000	53.796	22.638	-20.204	74.000	31.158	PK
3		2401.722	101.963	70.811	N/A	N/A	31.152	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2402MHz	



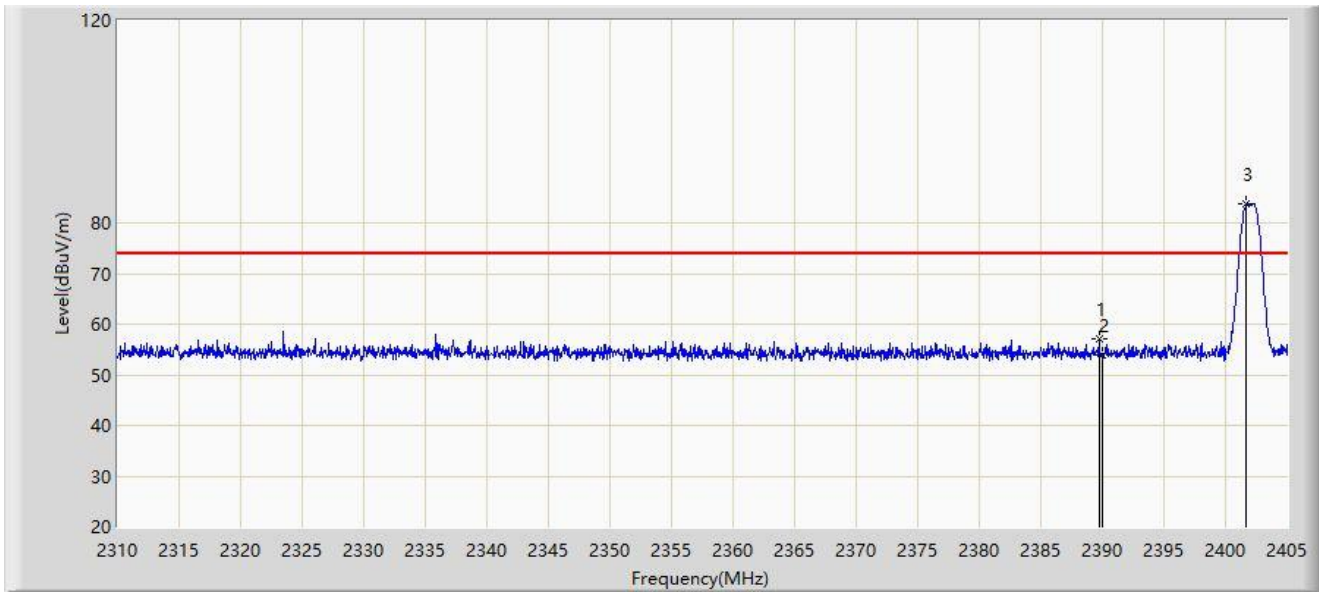
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2388.565	39.342	8.183	-14.658	54.000	31.159	AV
2		2390.000	39.006	7.848	-14.994	54.000	31.158	AV
3		2401.960	101.050	69.898	N/A	N/A	31.152	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2402MHz	



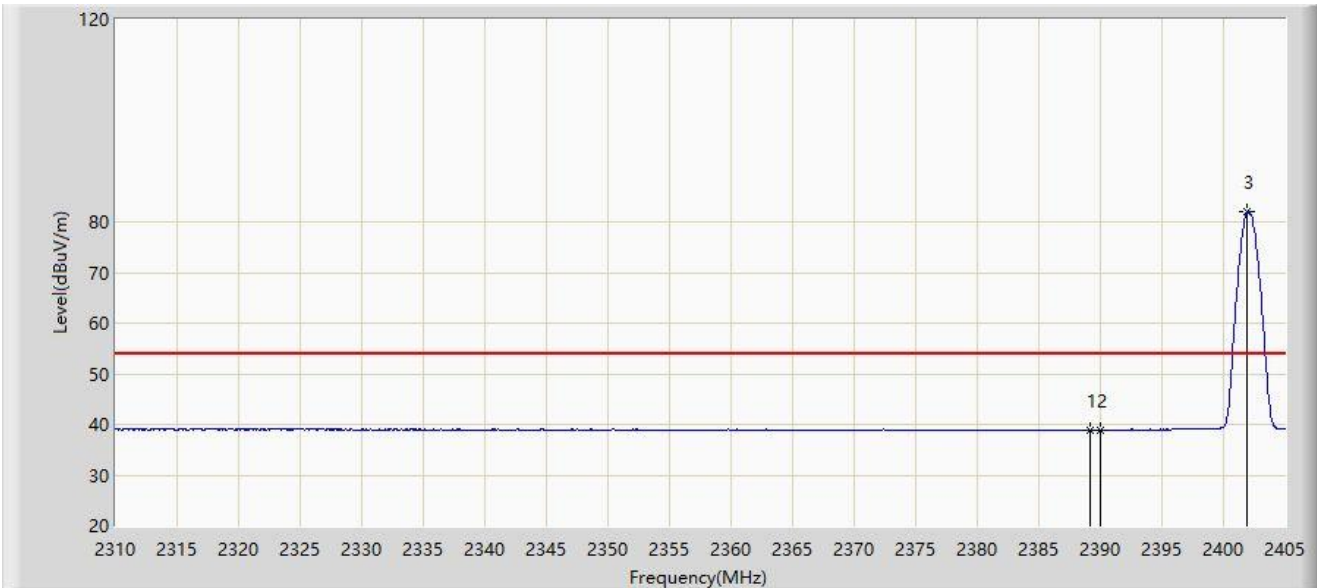
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.705	57.018	25.860	-16.982	74.000	31.158	PK
2		2390.000	53.997	22.839	-20.003	74.000	31.158	PK
3		2401.675	83.624	52.472	N/A	N/A	31.152	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2402MHz	



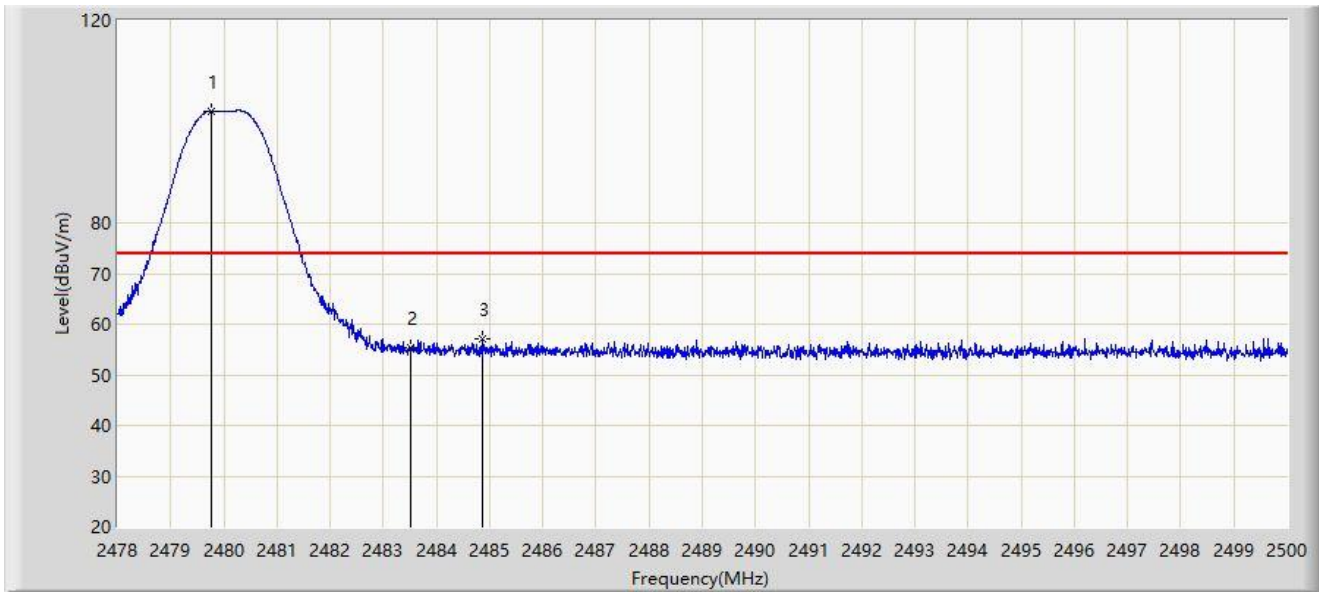
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.183	38.976	7.817	-15.024	54.000	31.158	AV
2		2390.000	38.850	7.692	-15.150	54.000	31.158	AV
3		2401.960	82.093	50.941	N/A	N/A	31.152	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2480MHz	



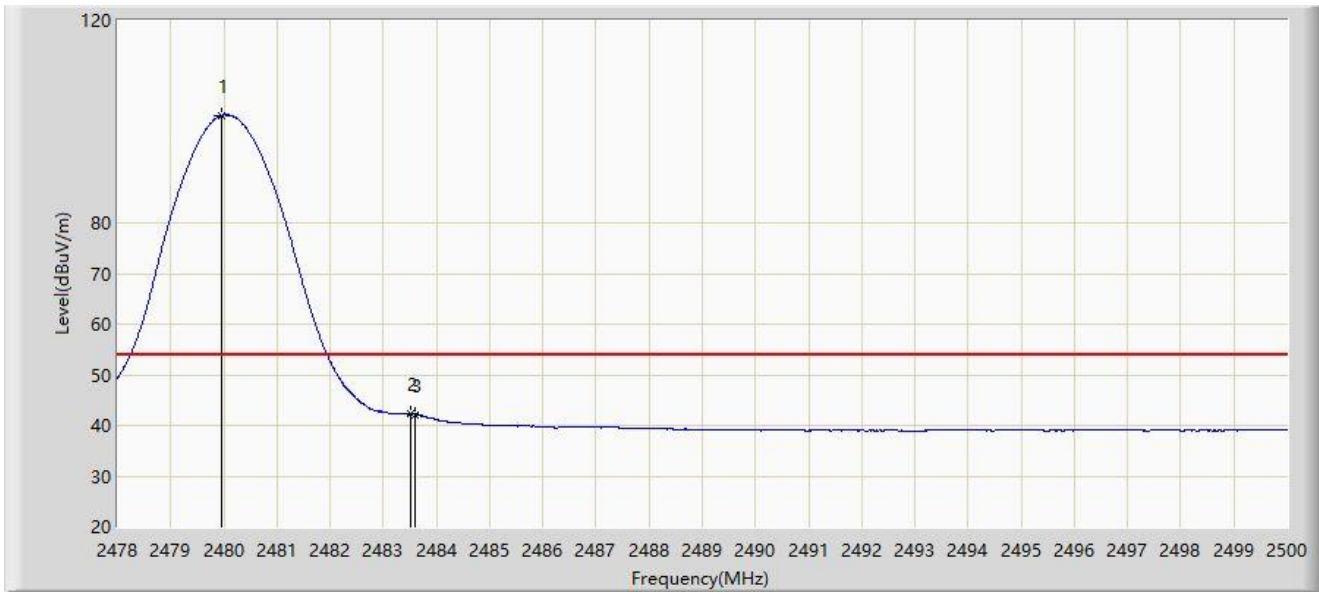
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2479.771	102.144	71.054	N/A	N/A	31.089	PK
2		2483.500	55.228	24.135	-18.772	74.000	31.093	PK
3	*	2484.853	57.069	25.975	-16.931	74.000	31.094	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2480MHz	



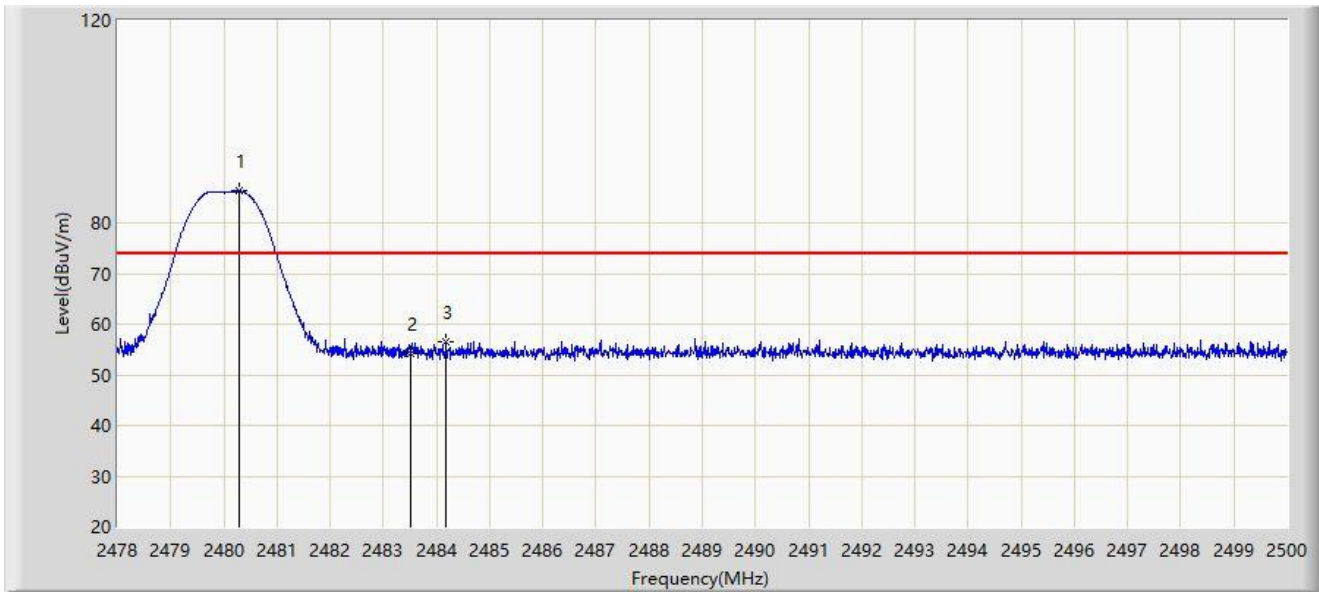
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2479.969	101.233	70.143	N/A	N/A	31.090	AV
2	*	2483.500	42.230	11.137	-11.770	54.000	31.093	AV
3		2483.599	42.155	11.062	-11.845	54.000	31.093	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2480MHz	



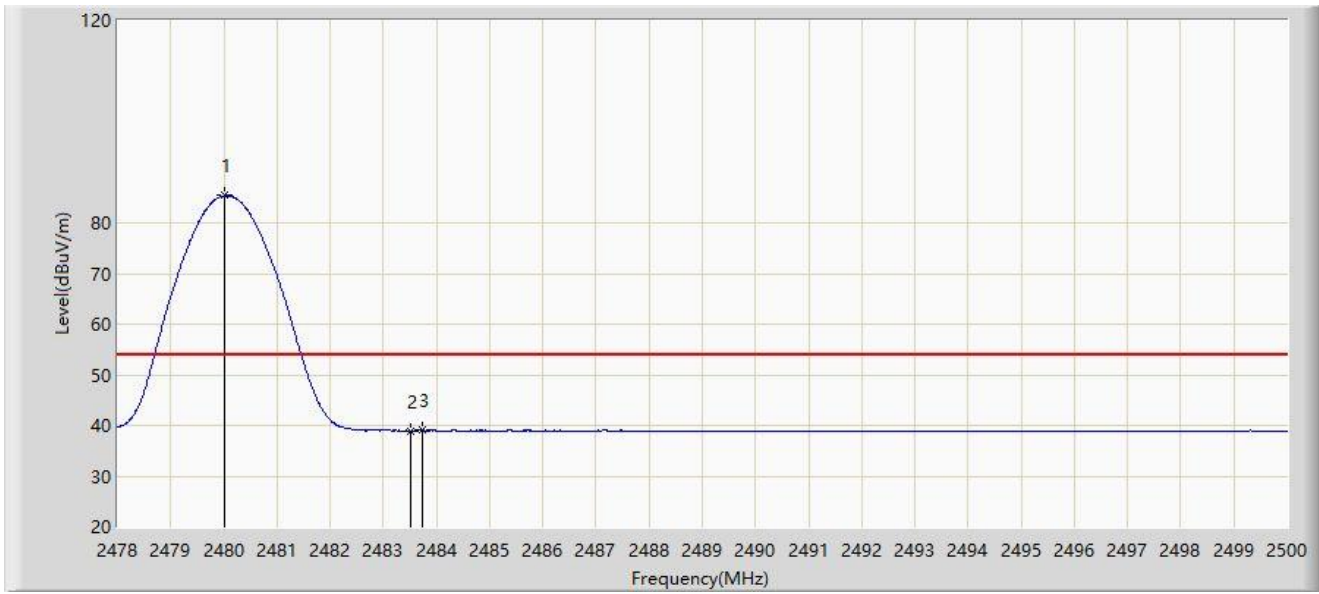
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2480.299	86.358	55.268	N/A	N/A	31.090	PK
2		2483.500	54.307	23.214	-19.693	74.000	31.093	PK
3	*	2484.182	56.479	25.386	-17.521	74.000	31.094	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 1M at 2480MHz	



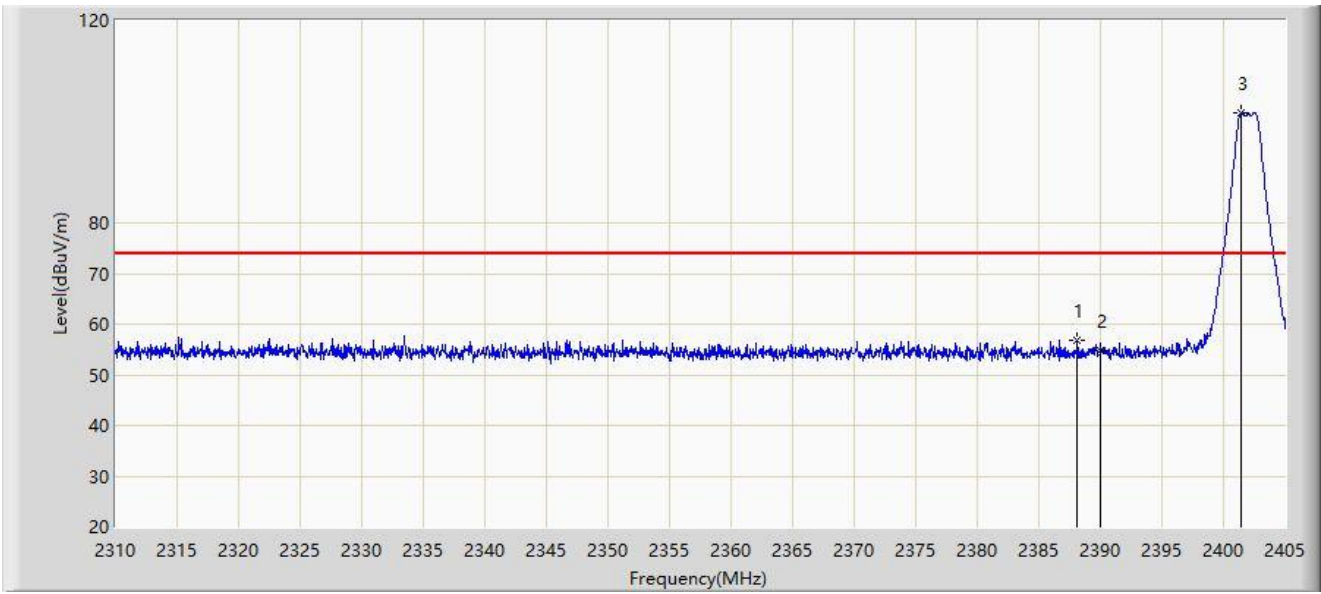
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2480.024	85.383	54.293	N/A	N/A	31.090	AV
2		2483.500	38.960	7.867	-15.040	54.000	31.093	AV
3	*	2483.742	39.109	8.016	-14.891	54.000	31.093	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2402MHz	



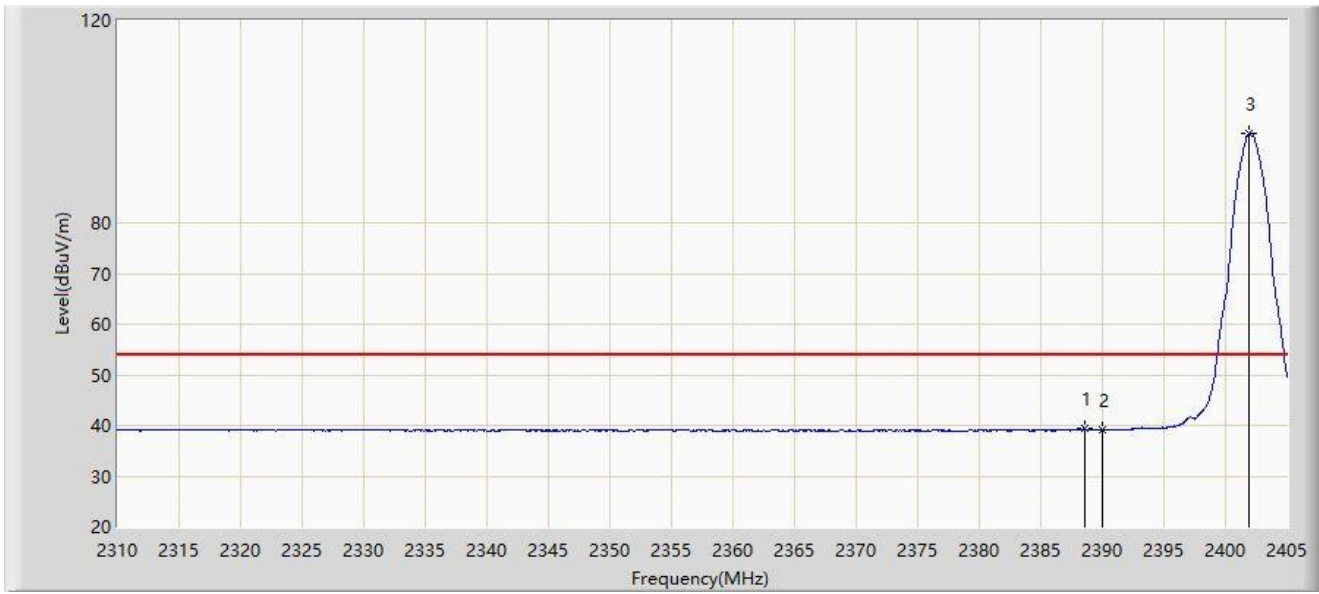
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2388.137	56.683	25.524	-17.317	74.000	31.160	PK
2		2390.000	54.870	23.712	-19.130	74.000	31.158	PK
3		2401.485	101.867	70.715	N/A	N/A	31.152	PK

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: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2402MHz	



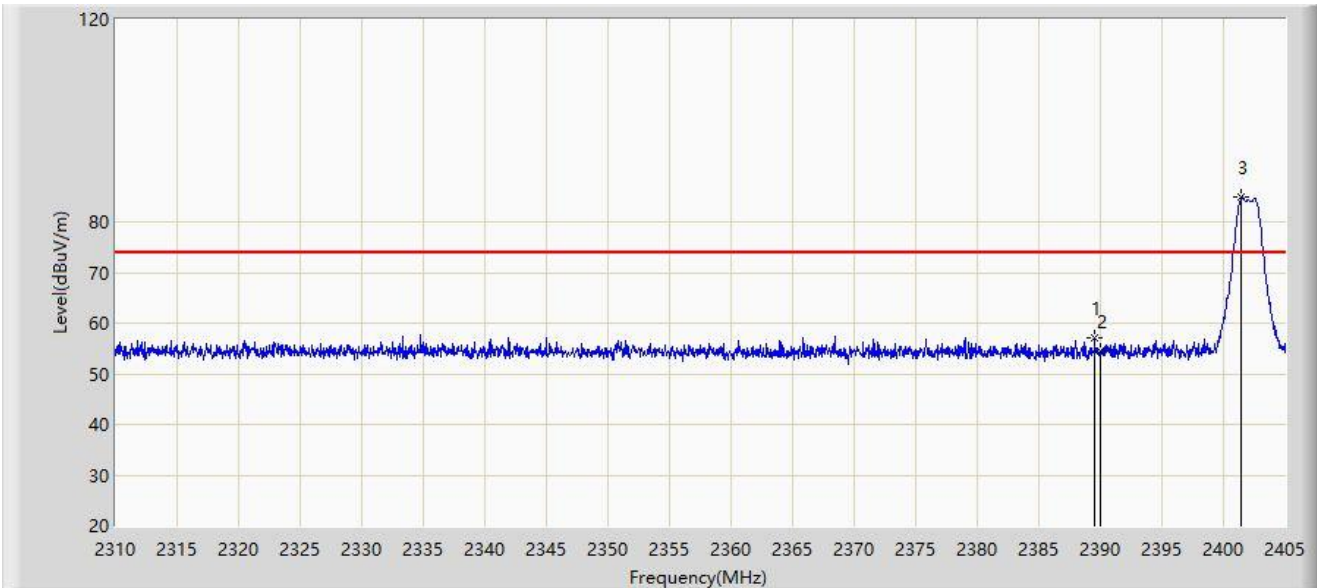
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2388.518	39.293	8.134	-14.707	54.000	31.159	AV
2		2390.000	38.994	7.836	-15.006	54.000	31.158	AV
3		2401.913	97.613	66.461	N/A	N/A	31.152	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2402MHz	



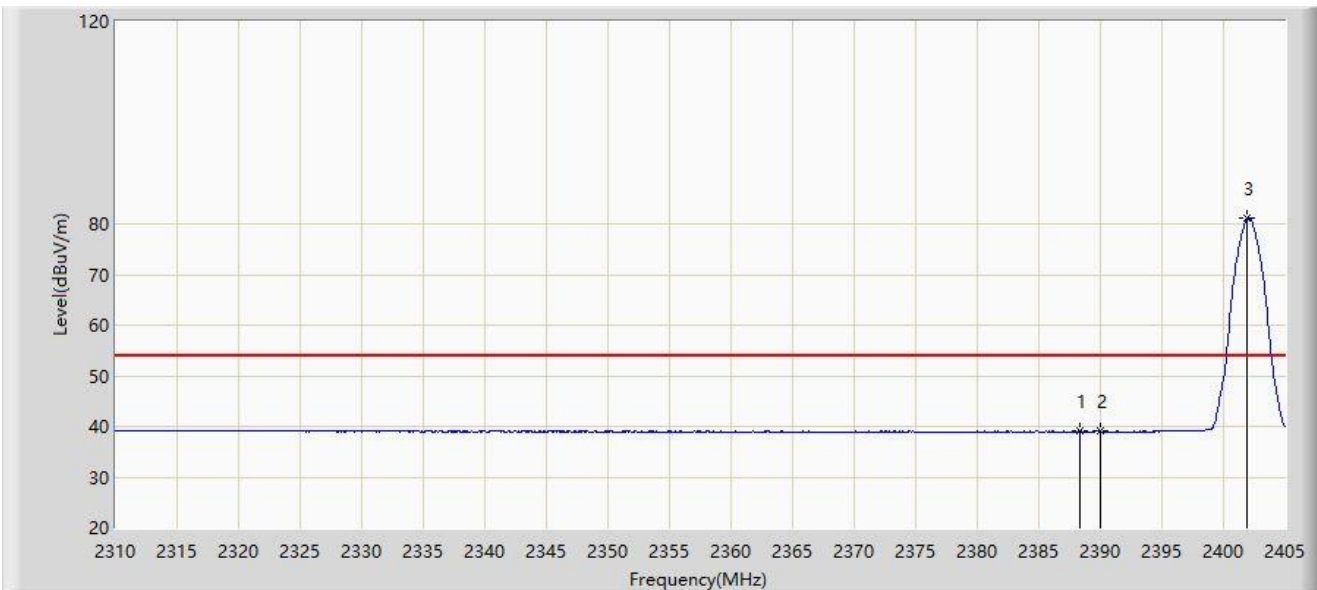
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.515	57.215	26.057	-16.785	74.000	31.158	PK
2		2390.000	54.504	23.346	-19.496	74.000	31.158	PK
3		2401.485	84.905	53.753	N/A	N/A	31.152	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2402MHz	



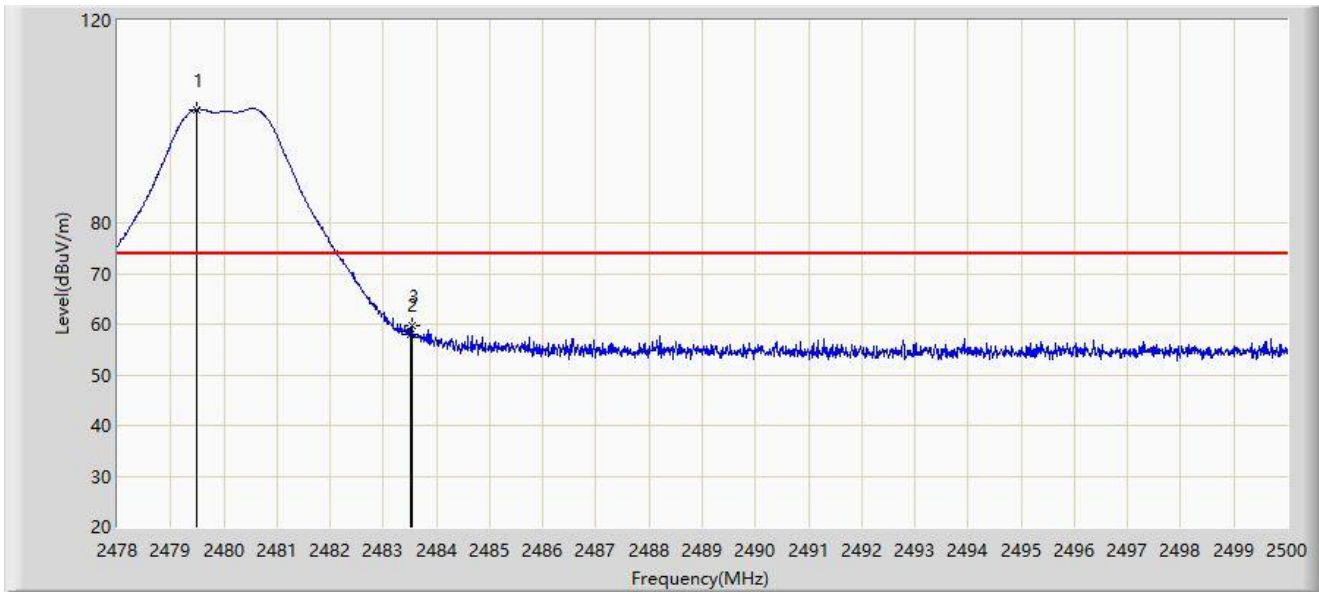
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2388.375	39.024	7.865	-14.976	54.000	31.159	AV
2		2390.000	39.008	7.850	-14.992	54.000	31.158	AV
3		2401.913	81.045	49.893	N/A	N/A	31.152	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2480MHz	



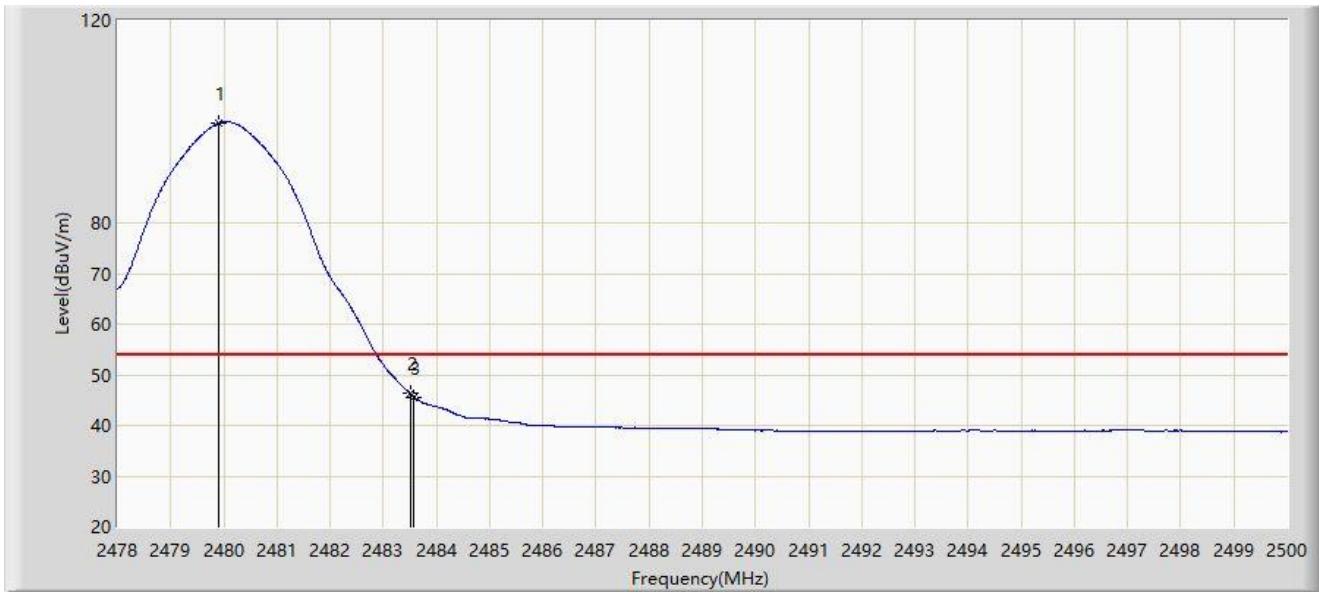
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2479.496	102.459	71.370	N/A	N/A	31.089	PK
2		2483.500	58.064	26.971	-15.936	74.000	31.093	PK
3	*	2483.544	59.766	28.673	-14.234	74.000	31.093	PK

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Horizontal
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2480MHz	



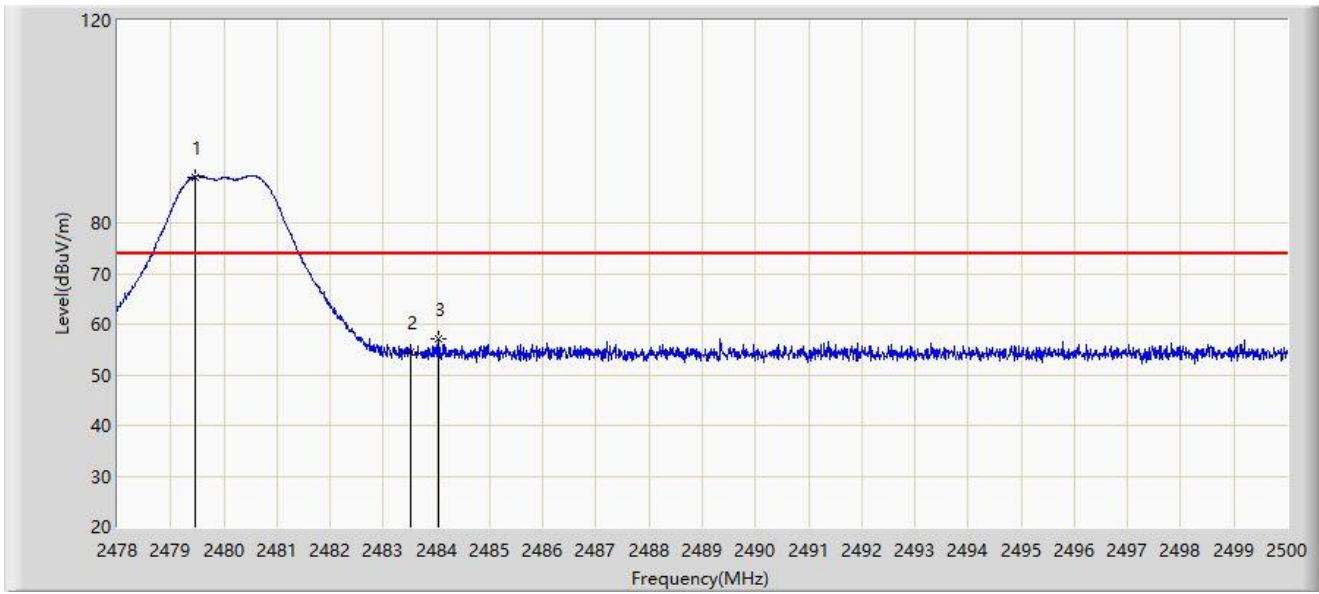
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1		2479.903	99.674	68.584	N/A	N/A	31.090	AV
2	*	2483.500	46.347	15.254	-7.653	54.000	31.093	AV
3		2483.577	45.626	14.533	-8.374	54.000	31.093	AV

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

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

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

Site: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2480MHz	



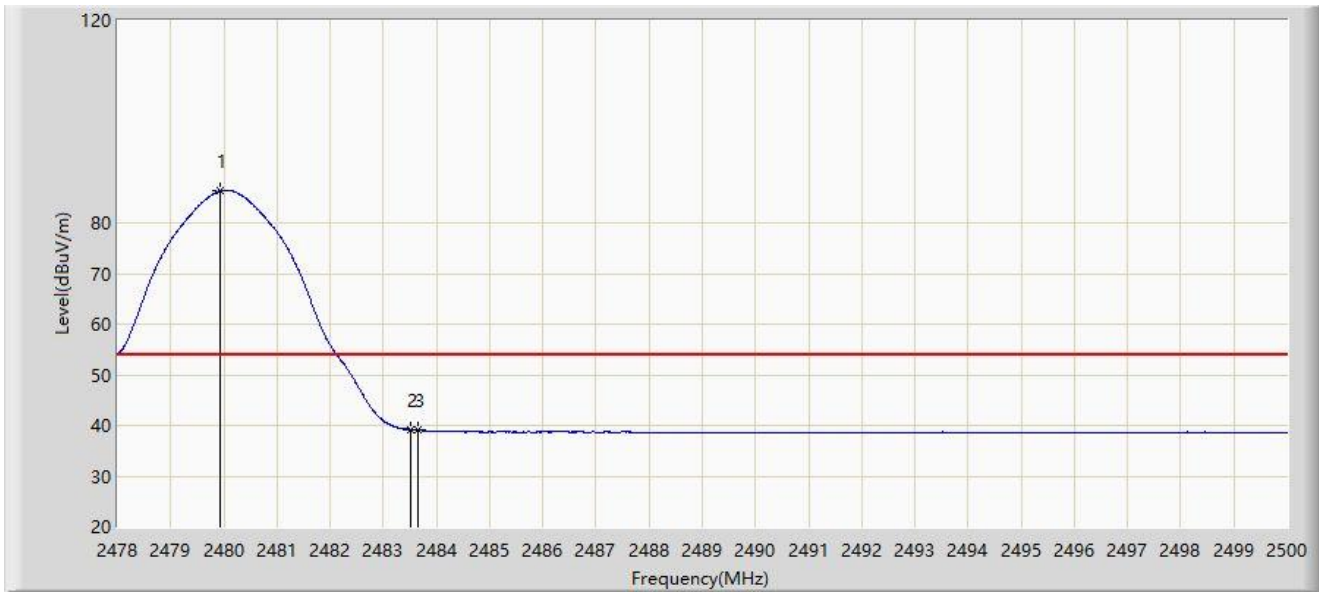
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		2479.452	89.103	58.014	N/A	N/A	31.089	PK
2		2483.500	54.461	23.368	-19.539	74.000	31.093	PK
3	*	2484.050	57.072	25.979	-16.928	74.000	31.094	PK

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: WZ-AC1	Test Date: 2023-07-24
Limit: FCC_2.4G_RE(3m)	Engineer: Ajin Fan
Probe: BBHA9120D_1167_1-18GHz	Polarity: Vertical
EUT: AT-314	Power: By Battery
Test Mode: Transmit by BLE 2M at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		2479.936	86.319	55.229	N/A	N/A	31.090	AV
2	*	2483.500	39.124	8.031	-14.876	54.000	31.093	AV
3		2483.643	39.044	7.951	-14.956	54.000	31.093	AV

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

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

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

Appendix B - Test Setup Photograph

Refer to "2307RSU008-UT" file.

Appendix C - EUT Photograph

Refer to "2307RSU008-UE" file.

————— The End —————