TEST REPORT
On behalf of

Mettler-Toledo (ChangZhou) Measurement Technology Ltd

Product Name: SWI331 wireless

Model No.: SWI331 wireless-002, SWI331 wireless-008, SWI331 wireless-020

FCC ID: 2ALAI24MT108

Prepared For: Mettler-Toledo (ChangZhou) Measurement Technology Ltd
No.111 Taihu West Road Changzhou City, Jiangsu Province, China.

Prepared By: Audix Technology (Shanghai) Co., Ltd.
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TESTING
NVLAP LAB CODE 200371-0

File No. : C1D2412026
Report No. : ACI-F25022
Date of Test : 2025.01.23-02.08
Date of Report : 2025.03.13

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

TABLE OF CONTENTS

Page

TEST REPORT

Applicant	:	Mettler-Toledo (ChangZhou) Measurement Technology Ltd
EUT Description	:	SWI331 wireless
(A) Model No.	:	Refer to Sec.2.1
(B) Power Supply	:	DC 3V
(C) Test Voltage	:	DC 3.3V from text fixture

Test Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C
AND ANSI C63.10-2013

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.

This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

Date of Test : 2025.01.23-02.08 Date of Report : 2025.03.13

Producer : Huimin Yan
HUIMIN YAN / Assistant

Review : Lvy lv
LVY LV / Deputy Assistant Manager

AUDIX® For and on behalf of Audix Technology (Shanghai) Co., Ltd.

Signatory : Kamp. Chen.
Authorized Signature(s)
KAMP CHEN/Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The result is determined according to the decision rules of customer selection in the ASC-403 application service form.
1. According to IEC GUIDE 115 Procedure 2 and ILAC-G8, the uncertainties value is not used in determining the PASS/FAIL results.
2. If the required specification or standard already contains the decision rules, it will be carried out in accordance with the regulations or standard documents or the requirements of the competent units. If the required specification or standard does not contain a decision rule, the same paragraph 1.
3. If your company has a required decision rule, it will be implemented in accordance with the requirements and ISO/IEC Guide 98-4 specifications.

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
6 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(a)(2)
Maximum Peak Output Power Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(b)(3)
Emission Limitations Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Band Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(d)
Power Spectral Density Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.247(e)
Antenna Requirement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.203
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : SWI331 wireless

Type of EUT : ☑ Production ☐ Pre-product ☐ Pro-type

Model Number : SWI331 wireless-002, SWI331 wireless-008, SWI331 wireless-020

Note : There are all the same except weighing Resolution different.

CODE	CAPACITY	
SWI331 wireless-002	2 Kg	5 lb
SWI331 wireless-008	8 Kg	25 lb
SWI331 wireless-020	20 Kg	50 lb

Radio Tech : Bluetooth Low Energy.

Channel Freq. : BLE: 2402MHz-2480MHz.

Modulation : BLE: GFSK;

Antenna Info. : TX Type: 1T1X;
Antenna Type: PCB Antenna;
Antenna Gain: 3.4 dBi

Applicant : Mettler-Toledo (ChangZhou) Measurement Technology Ltd
No.111 Taihu West Road Changzhou City, Jiangsu Province, China.

Manufacturer : same as Applicant

Factory : same as Applicant

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation	Data Rate(Mbps)
BLE	GFSK	Up to 1

Channel List			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
…	…	…	…
…	…	…	…
…	…	…	…
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

2.3 Test Information

The test software " Atmosic RF Tool" was used to control EUT work in TX mode, Tx Power Setting and select test channel.

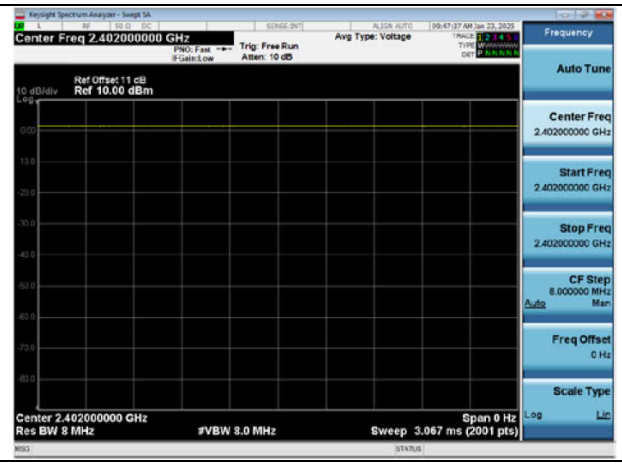
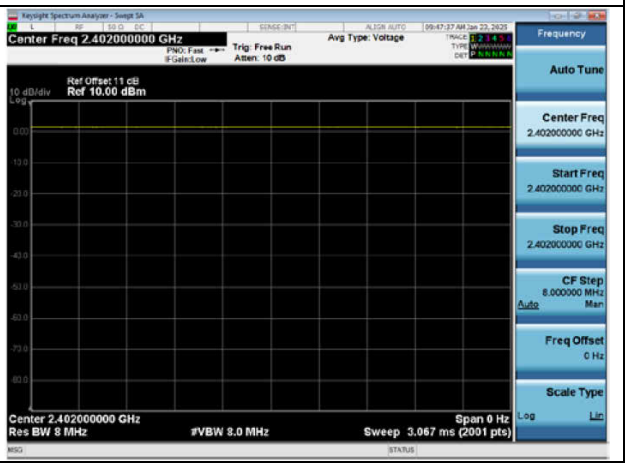
Mode	data rate (Mbps)	Tx Power Setting	Test Channel		Frequency (MHz)
BLE	1	7	Low:	00	2402
		7	Middle:	20	2442
		7	High:	39	2480

The EUT was tested under the following conditions:

No.	Model Number	Remark
1	SWI331 wireless-002	Recorded
2	SWI331 wireless-008	Pre-tested
3	SWI331 wireless-020	Pre-tested
All the Models were pre-tested, the worst case model (1) recorded in current report.		

2.4 Duty Cycle Check

Mode	Transmission Duration (ms)	Transmission Period (ms)	Duty Cycle (%)
BLE	3	3	100

Mode	Ton	Ton+off
BLE		

2.5 Sample Description

Test Item	Model Number	Sample Number	Date of receipted
Radiated Emission	SWI331 wireless-002	E20241213821-01/04	2024.12.13
Conducted RF Test	SWI331 wireless-002	E20241213821-04/04	2024.12.13

2.6 Supported equipment

Brand	:	Acer
Product Name:	:	Notebook PC
Model Number	:	N22C6
S/N	:	NXEGYCN004311014CD3400
Product Name	:	Test Fixture
Product Function	:	USB to TTL

2.7 Description of Test Facility

Name of Firm	:	Audix Technology (Shanghai) Co., Ltd.
Site Location	:	3F, Building 34, No. 680 Guiping Rd., Caohejing, Hi-Tech Park, Shanghai 200233, China
Accredited by NVLAP, Lab Code	:	200371-0
FCC Designation Number	:	CN5027
Test Firm Registration Number	:	954668

3 RADIATED EMISSION TEST

3.1 Test Equipment

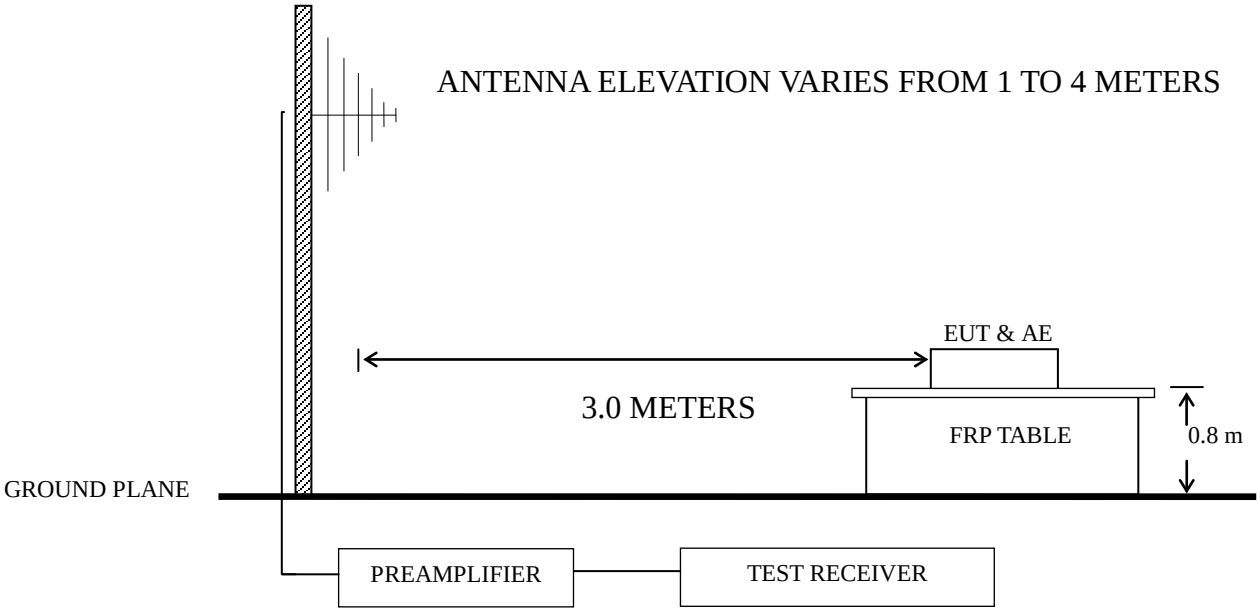
The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2024.02.22	1 Year
2.	Preamplifier	HP	8449B	3008A00864	2024.02.22	1 Year
3.	EXA Signal Analyzer	Agilent	N9010A	MY52221182	2024.07.25	1 Year
4.	Test Receiver	R&S	ESCI	101303	2024.02.22	1 Year
5.	Bilog Antenna+ 6dB Attenuator	Schwarzbeck	VULB 9168+ EMCI-N-6-06	708+AT-N0638	2024.03.08	1 Year
6.	Horn Antenna	EMCO	3115	96074878	2024.08.09	1 Year
7.	Horn Antenna	EMCO	3116	00062643	2024.01.30	2 Year
8.	Cavity Band Rejection Filter	Microwave	WT-A3882-R10	WT200312-1-1	2024.02.22	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6200655086	2024.02.22	1 Year
10.	Coaxial Cable	SCHAFFNER	RG 212U-MIL C 17+N1K50-EW06 30-N1K50-15m-1	RE-10m-001/ RE-15m-002	2024.02.22	1 Year
11.	Software	Audix	e3	v9.210616	--	--

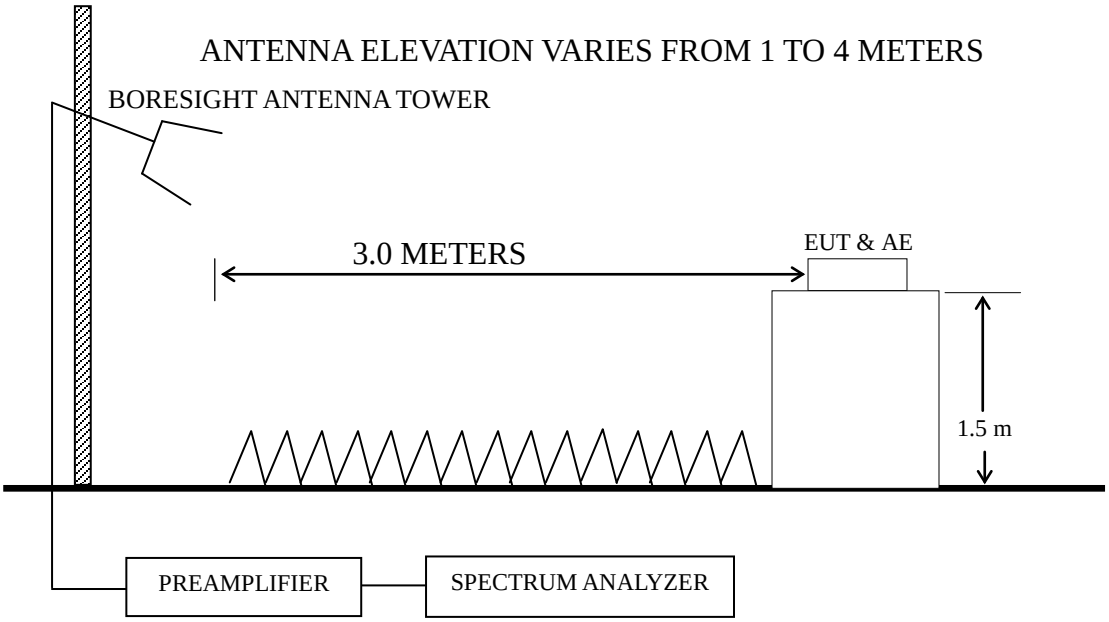
3.2 Block Diagram of Test Setup

3.2.1 EUT & Peripherals

3.2.2 Below 1GHz



3.2.3 Above 1GHz



3.3 Radiated Emission Limit (§15.209)

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)
NOTE 2 - The tighter limit applies at the band edges.
NOTE 3 - 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 4 - The limits shown are based on Quasi-peak value detector below or equal to 1GHz and Average value detector above 1GHz.
NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Connect the EUT and the TTL terminal of Test Fixture through three HCI cables of EUT, as follows (VCC to 3V3, TX to RXD, RX to TXD, P13 to CTS, P11 to RTS, GND to GND). Plug the USB terminal of Test Fixture to the USB port of Notebook PC.

3.5.3 Use the software as section 2.3 to select the test mode, and then test.

3.5.4 Repeat step 3.5.2 and 3.5.5, until the test of all modes finished.

3.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna

were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 25 GHz (Up to 10^{th} harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Frequency range: below 1GHz (Worst case emission)

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	39	2480 MHz	P15-16

Frequency range: above 1GHz

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P17-18
2.			20	2442 MHz	P19-20
3.			39	2480 MHz	P21-22

Band-Edge and Restricted bands:

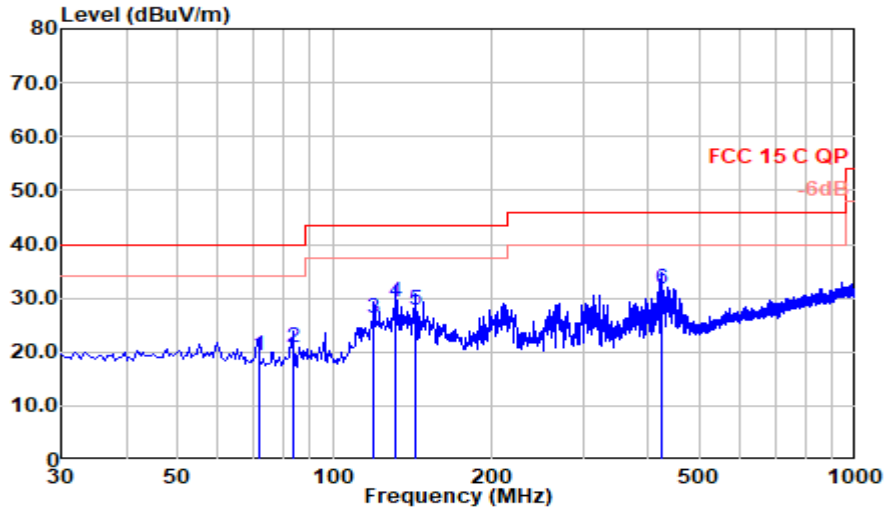
No.	Operation	Mode	Channel	Frequency	Data Page
1.	Transmitting	BLE	00	2402 MHz	P23-24
2.			39	2480 MHz	P25-26

NOTE 1 – Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin = Limits - Emission Level.
NOTE 2 – “QP” means “Quasi-Peak” values.
NOTE 3 – 0°was the table front facing the antenna. Degree is calculated from 0°clockwise facing the antenna.
NOTE 4 – The emission levels which not reported are too low against the official limit.
NOTE 5 – The emission levels recorded below is data of EUT configured in Lying direction, for this direction was the maximum emission direction during the test. The data of Side & Standing direction are too low against the official limit to be reported.
NOTE 6 – All reading are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.
For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
NOTE 7 – The frequency range 2310-2390MHz & 2483.5-2500MHz were tested for Restricted bands.

Radiated emission < 1GHz

Test Date:	2025.02.08	Temp./Hum.:	22℃/51%RH	Test By:	Jarey

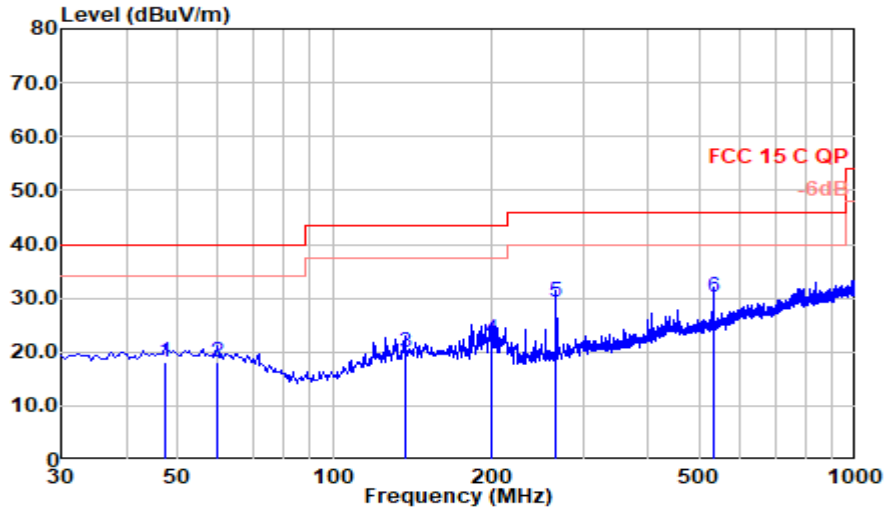
Mode: BLE CH2480MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
71.710	29.97	17.73	0.97	29.40	19.27	40.00	20.73	QP
83.350	34.36	14.83	1.06	29.38	20.86	40.00	19.14	QP
119.240	36.75	17.42	1.29	29.20	26.26	43.50	17.24	QP
131.365	38.89	18.30	1.34	29.20	29.33	43.50	14.17	QP
143.005	36.37	19.10	1.39	29.20	27.66	43.50	15.84	QP
422.850	36.28	22.37	2.41	29.39	31.67	46.00	14.33	QP

Mode: BLE CH2480MHz



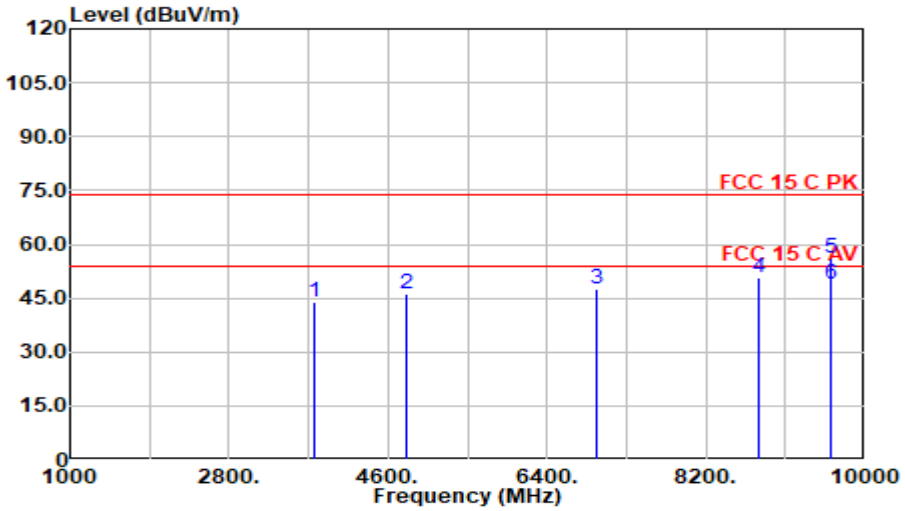
Polarization at Vertical

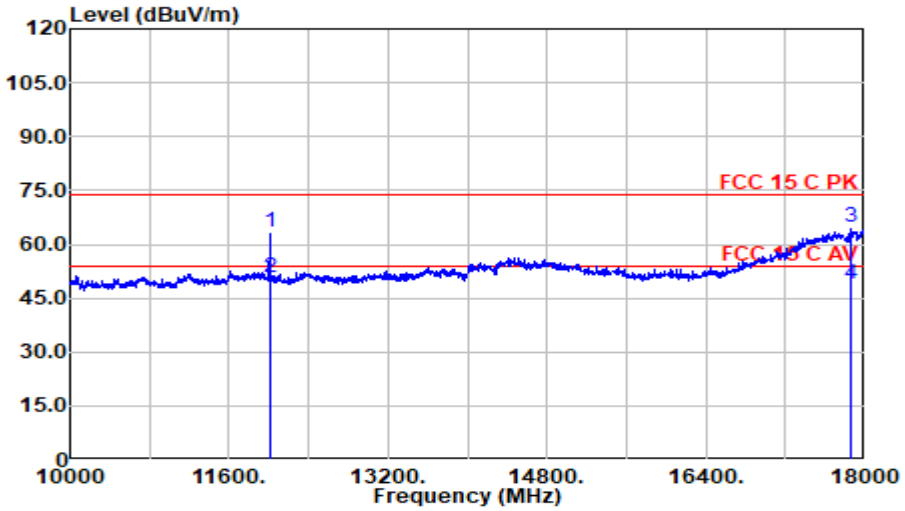
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
47.460	26.98	19.65	0.81	29.40	18.04	40.00	21.96	QP
59.585	27.48	19.24	0.90	29.40	18.22	40.00	21.78	QP
136.700	29.00	18.67	1.37	29.20	19.84	43.50	23.66	QP
200.720	33.46	16.26	1.64	28.90	22.46	43.50	21.04	QP
266.680	37.78	18.30	1.93	28.70	29.31	46.00	16.69	QP
532.945	33.14	24.00	2.76	29.80	30.09	46.00	15.91	QP

Radiated Emission > 1GHz

Test Date:	2025.02.06	Temp./Hum.:	22℃/51%RH	Test By:	Jarey

Mode: BLE CH2402MHz

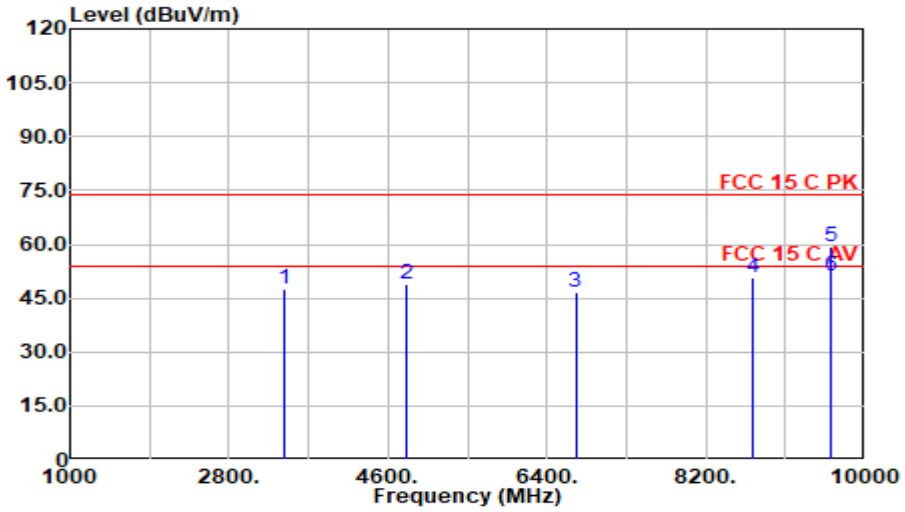


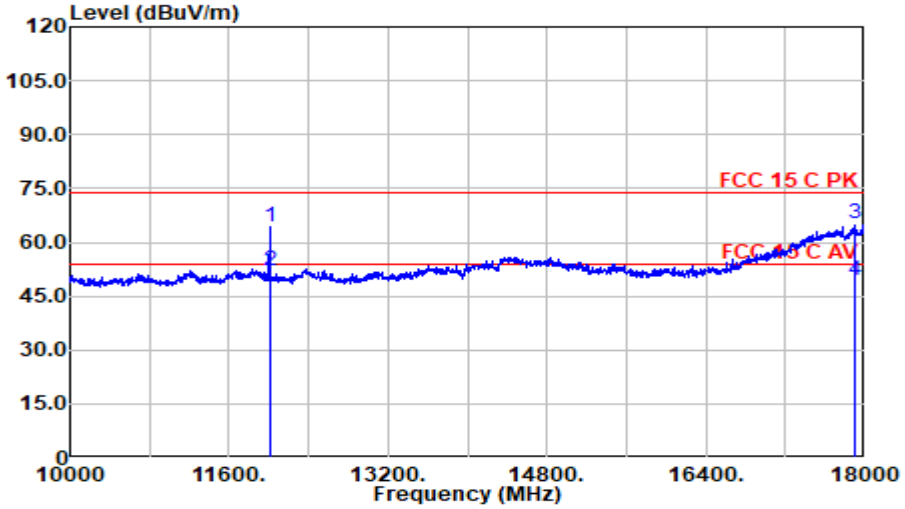


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3758.250	40.90	32.42	6.42	35.99	43.75	74.00	30.25	Peak
4803.750	41.03	33.29	7.47	35.41	46.39	74.00	27.61	Peak
6954.250	38.15	35.68	9.09	35.49	47.44	74.00	26.56	Peak
8807.250	37.70	38.31	10.45	35.60	50.86	74.00	23.14	Peak
9610.500	42.43	38.12	11.01	35.41	56.15	74.00	17.85	Peak
9610.500	35.24	38.12	11.01	35.41	48.96	54.00	5.04	Average
12007.500	46.81	39.08	12.28	35.00	63.18	74.00	10.82	Peak
12007.500	34.48	39.08	12.28	35.00	50.85	54.00	3.15	Average
17851.250	36.15	45.65	15.95	33.04	64.70	74.00	9.30	Peak
17851.250	20.51	45.65	15.95	33.04	49.07	54.00	4.93	Average

Mode: BLE CH2402MHz

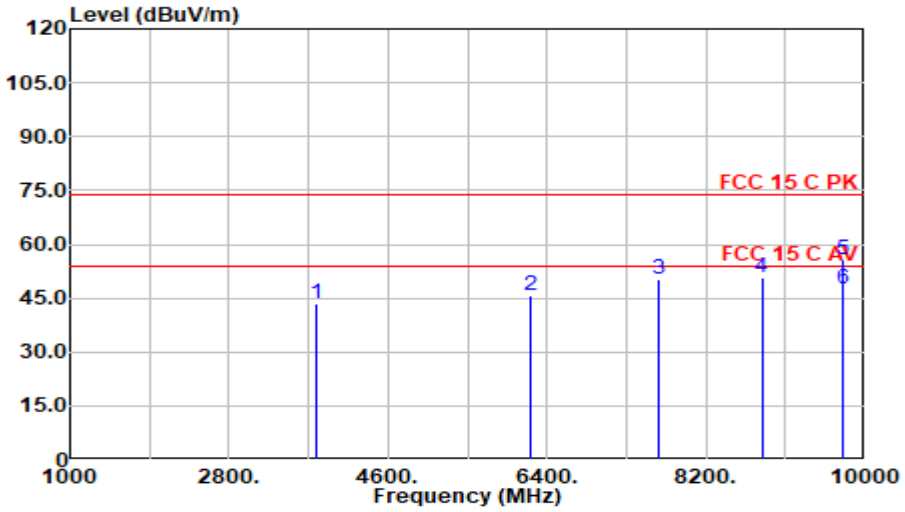


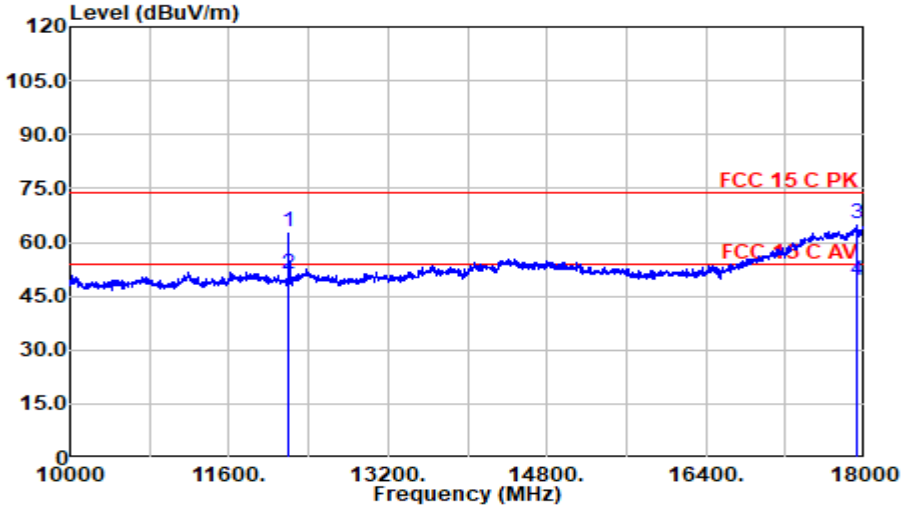


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3418.250	46.22	31.30	6.12	36.12	47.52	74.00	26.48	Peak
4803.750	43.44	33.29	7.47	35.41	48.80	74.00	25.20	Peak
6724.750	37.96	35.25	8.90	35.45	46.66	74.00	27.34	Peak
8726.500	37.66	38.33	10.42	35.60	50.81	74.00	23.19	Peak
9606.250	45.57	38.11	11.01	35.41	59.28	74.00	14.72	Peak
9606.250	37.66	38.11	11.01	35.41	51.36	54.00	2.64	Average
12011.750	47.78	39.08	12.29	35.00	64.14	74.00	9.86	Peak
12011.750	35.58	39.08	12.29	35.00	51.94	54.00	2.06	Average
17902.250	36.44	45.80	16.02	33.03	65.23	74.00	8.77	Peak
17902.250	20.34	45.80	16.02	33.03	49.13	54.00	4.87	Average

Mode: BLE CH2440MHz

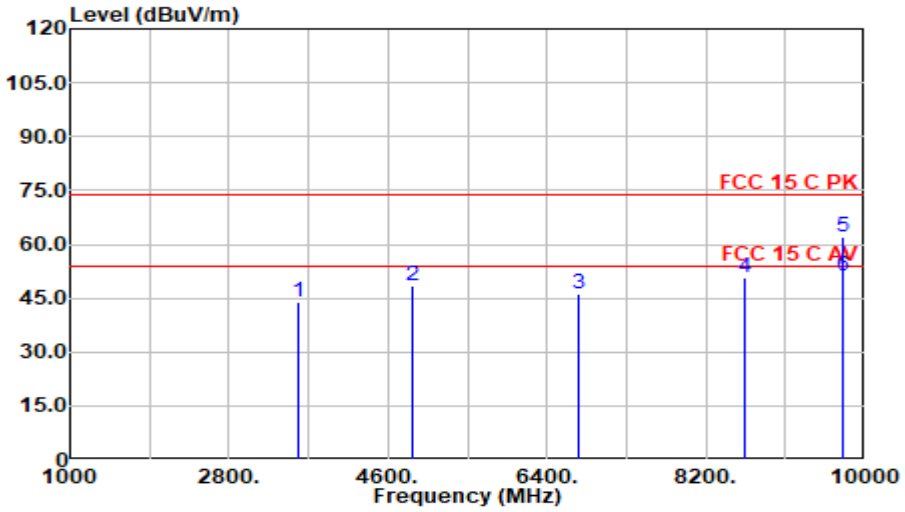


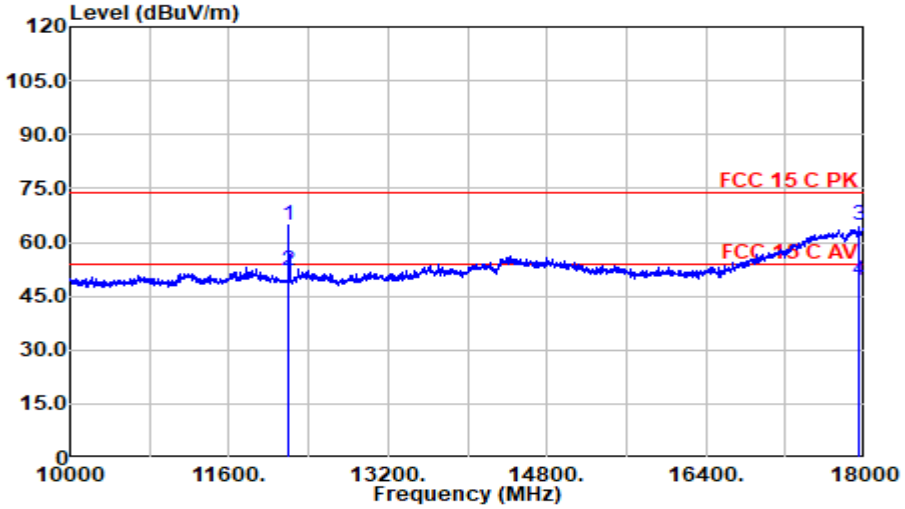


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3779.500	40.69	32.46	6.44	35.98	43.61	74.00	30.39	Peak
6210.500	38.16	34.58	8.47	35.34	45.86	74.00	28.14	Peak
7668.250	38.87	36.96	9.84	35.57	50.10	74.00	23.90	Peak
8832.750	37.72	38.37	10.46	35.60	50.94	74.00	23.06	Peak
9759.250	41.86	38.07	11.13	35.37	55.70	74.00	18.30	Peak
9759.250	33.69	38.07	11.13	35.37	47.52	54.00	6.48	Average
12203.000	46.59	38.80	12.39	34.92	62.86	74.00	11.14	Peak
12203.000	34.76	38.80	12.39	34.92	51.03	54.00	2.97	Average
17910.750	36.34	45.78	16.04	33.03	65.13	74.00	8.87	Peak
17910.750	20.54	45.78	16.04	33.03	49.33	54.00	4.67	Average

Mode: BLE CH2440MHz

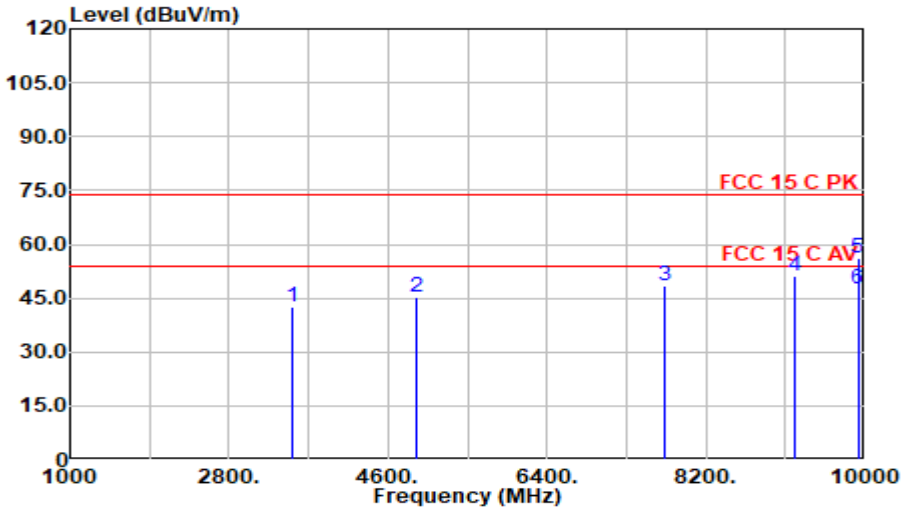


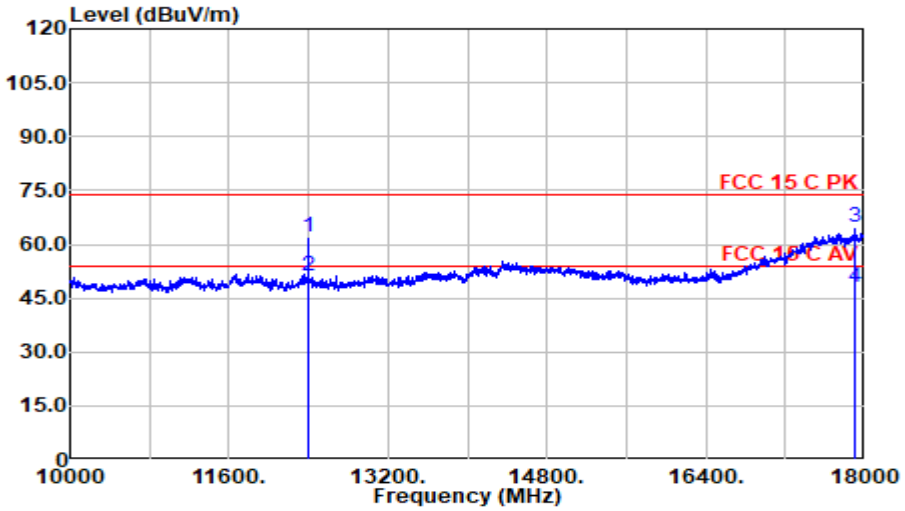


Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3588.250	42.21	31.42	6.27	36.05	43.85	74.00	30.15	Peak
4880.250	43.03	33.26	7.55	35.37	48.48	74.00	25.52	Peak
6758.750	37.48	35.32	8.93	35.45	46.27	74.00	27.73	Peak
8633.000	37.53	38.40	10.39	35.60	50.72	74.00	23.28	Peak
9759.250	48.13	38.07	11.13	35.37	61.96	74.00	12.04	Peak
9759.250	37.51	38.07	11.13	35.37	51.35	54.00	2.65	Average
12203.000	48.43	38.80	12.39	34.92	64.69	74.00	9.31	Peak
12203.000	35.84	38.80	12.39	34.92	52.11	54.00	1.89	Average
17936.250	35.79	45.73	16.07	33.02	64.58	74.00	9.42	Peak
17936.250	20.48	45.73	16.07	33.02	49.26	54.00	4.74	Average

Mode: BLE CH2480MHz

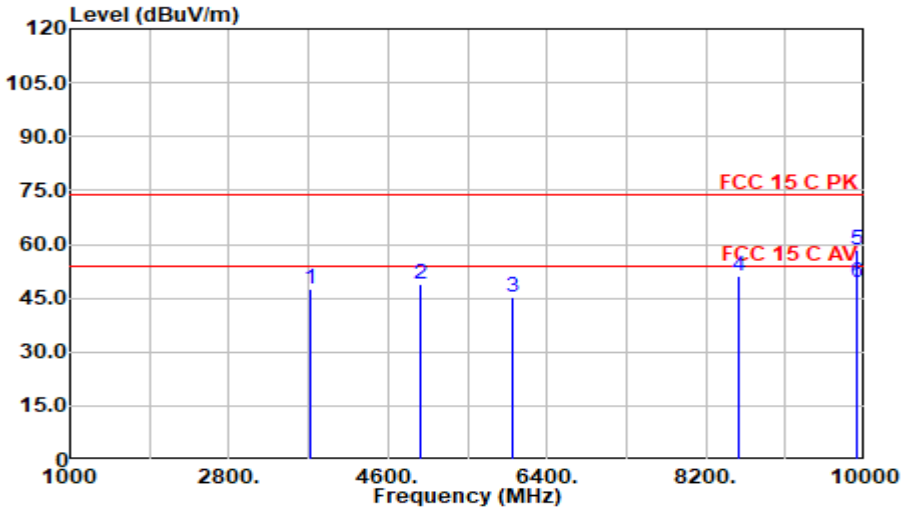


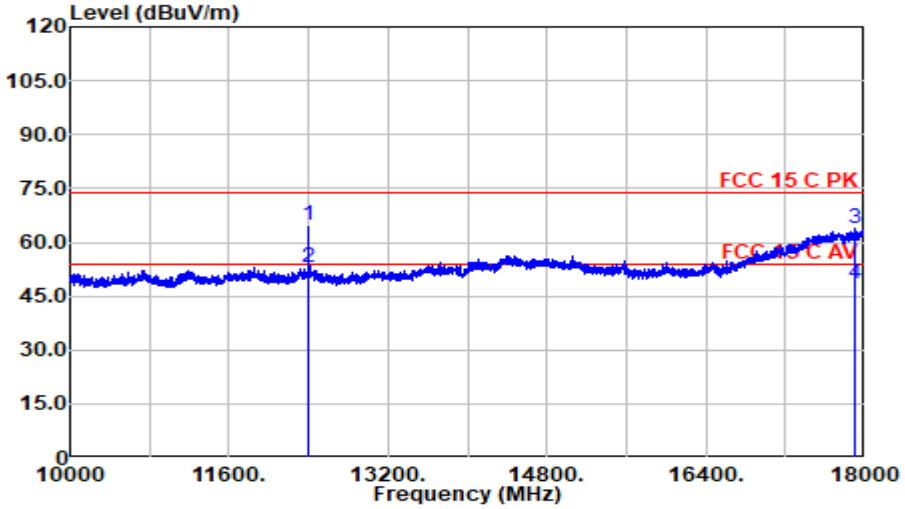


Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3524.500	41.17	31.40	6.21	36.08	42.71	74.00	31.29	Peak
4914.250	39.47	33.36	7.59	35.35	45.07	74.00	28.93	Peak
7732.000	37.35	36.96	9.91	35.57	48.64	74.00	25.36	Peak
9198.250	37.71	38.21	10.67	35.54	51.05	74.00	22.95	Peak
9920.750	42.08	38.27	11.27	35.32	56.28	74.00	17.72	Peak
9920.750	33.45	38.27	11.27	35.32	47.66	54.00	6.34	Average
12398.500	45.50	38.80	12.49	34.84	61.95	74.00	12.05	Peak
12398.500	34.57	38.80	12.49	34.84	51.02	54.00	2.98	Average
17902.250	35.82	45.80	16.02	33.03	64.61	74.00	9.39	Peak
17902.250	19.28	45.80	16.02	33.03	48.07	54.00	5.93	Average

Mode: BLE CH2480MHz





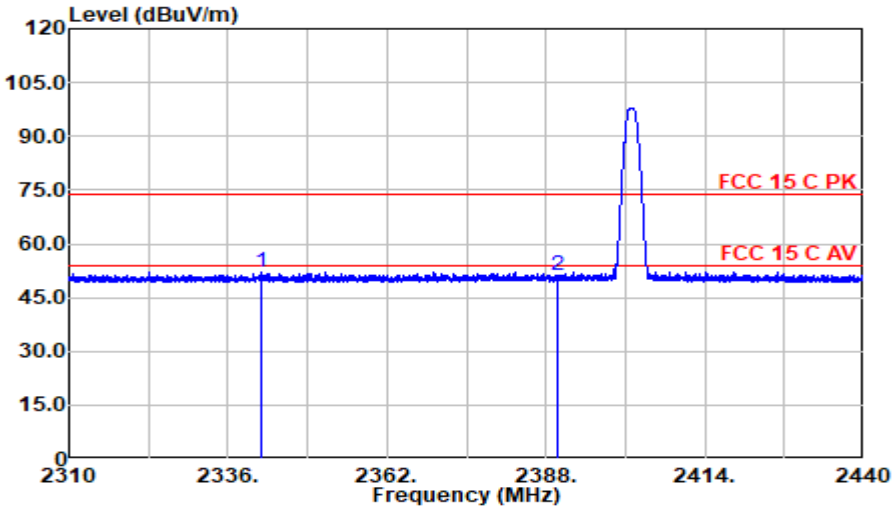
Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
3724.250	45.06	32.25	6.39	36.00	47.70	74.00	26.30	Peak
4958.875	42.99	33.48	7.64	35.32	48.79	74.00	25.21	Peak
6015.000	38.22	34.26	8.30	35.30	45.48	74.00	28.52	Peak
8573.500	37.94	38.40	10.37	35.60	51.12	74.00	22.88	Peak
9918.625	44.26	38.25	11.26	35.32	58.45	74.00	15.55	Peak
9918.625	35.10	38.25	11.26	35.32	49.29	54.00	4.71	Average
12400.630	48.48	38.80	12.49	34.84	64.93	74.00	9.07	Peak
12400.630	36.47	38.80	12.49	34.84	52.92	54.00	1.08	Average
17891.630	34.93	45.77	16.01	33.03	63.68	74.00	10.32	Peak
17891.630	19.59	45.77	16.01	33.03	48.34	54.00	5.66	Average

Band-Edge and Restricted bands:

Test Date:	2025.02.06	Temp./Hum.:	22℃/51%RH	Test By:	Jarey

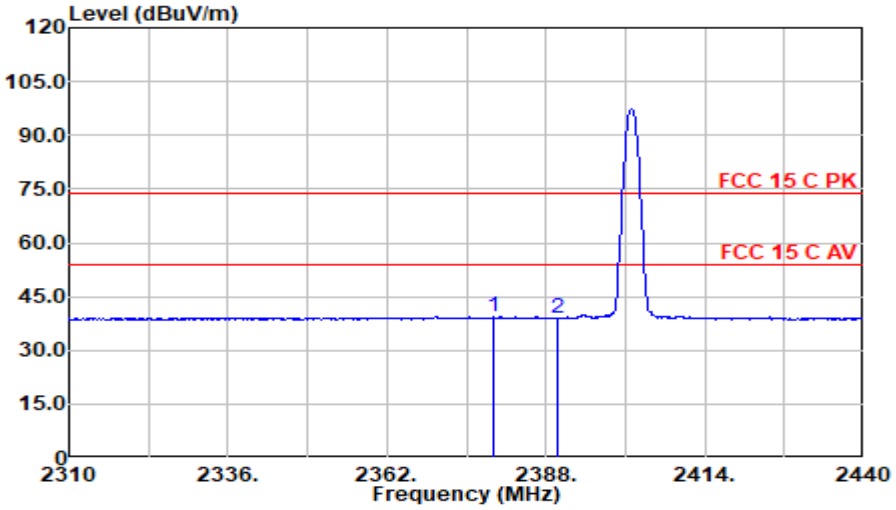
Mode: BLE CH2402MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2341.427	55.40	28.45	5.18	36.91	52.13	74.00	21.87	Peak
2390.000	54.12	28.58	5.23	36.86	51.06	74.00	22.94	Peak

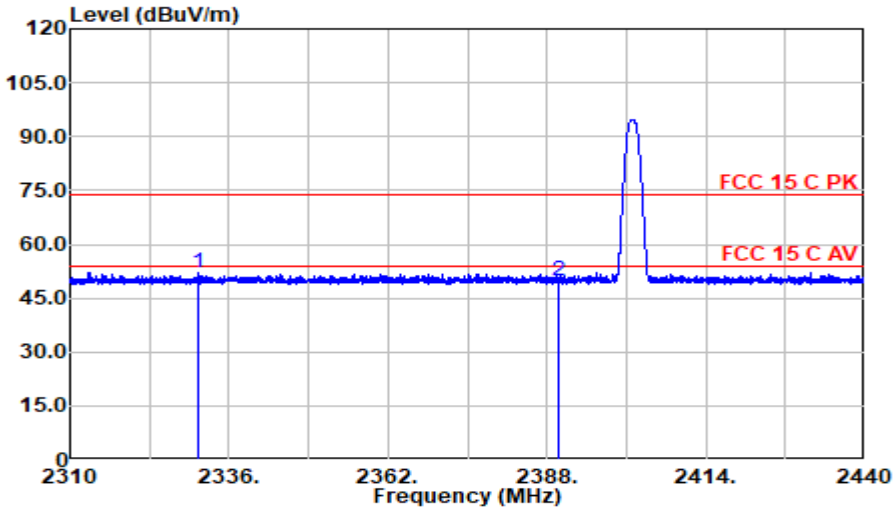
Mode: BLE CH2402MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2379.420	42.40	28.56	5.22	36.87	39.31	54.00	14.69	Average
2390.000	41.91	28.58	5.23	36.86	38.85	54.00	15.15	Average

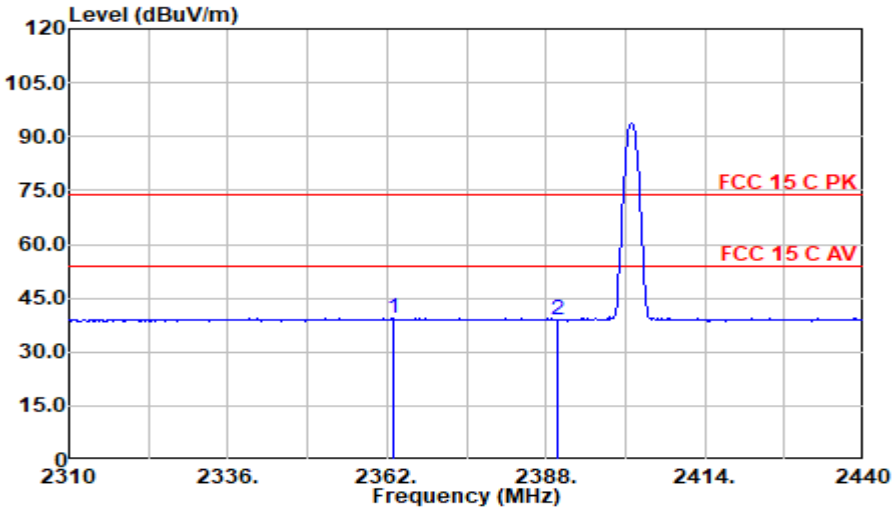
Mode: BLE CH2402MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2330.995	55.47	28.39	5.17	36.92	52.11	74.00	21.89	Peak
2390.000	52.69	28.58	5.23	36.86	49.63	74.00	24.37	Peak

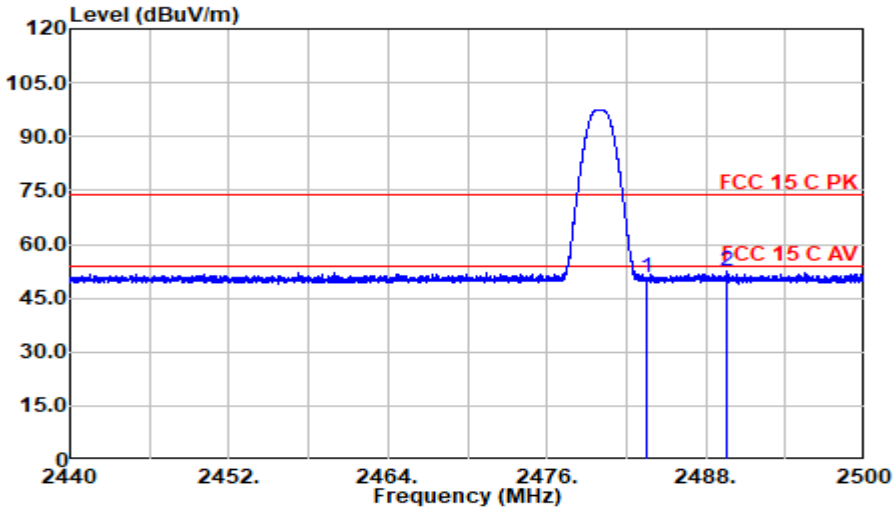
Mode: BLE CH2402MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2362.910	42.63	28.53	5.20	36.89	39.47	54.00	14.53	Average
2390.000	41.99	28.58	5.23	36.86	38.94	54.00	15.06	Average

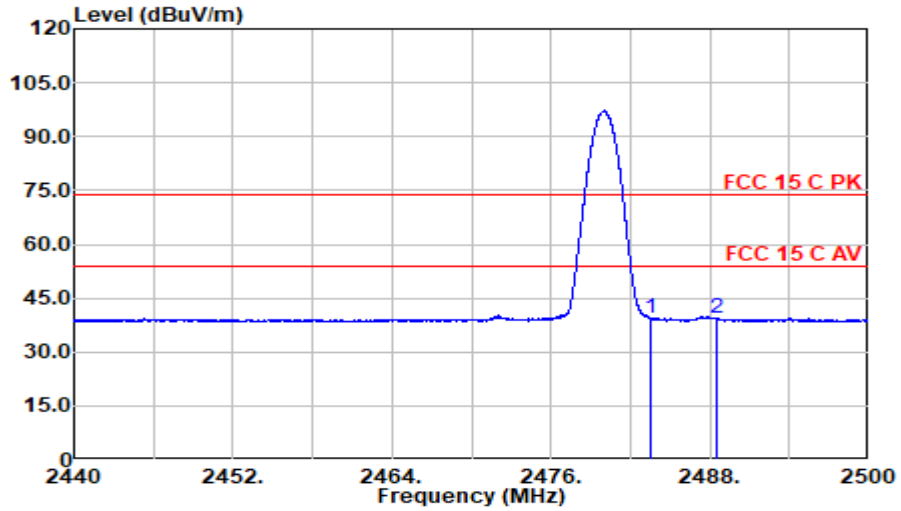
Mode: BLE CH2480MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	53.65	28.50	5.31	36.77	50.69	74.00	23.31	Peak
2489.515	55.47	28.50	5.31	36.76	52.52	74.00	21.48	Peak

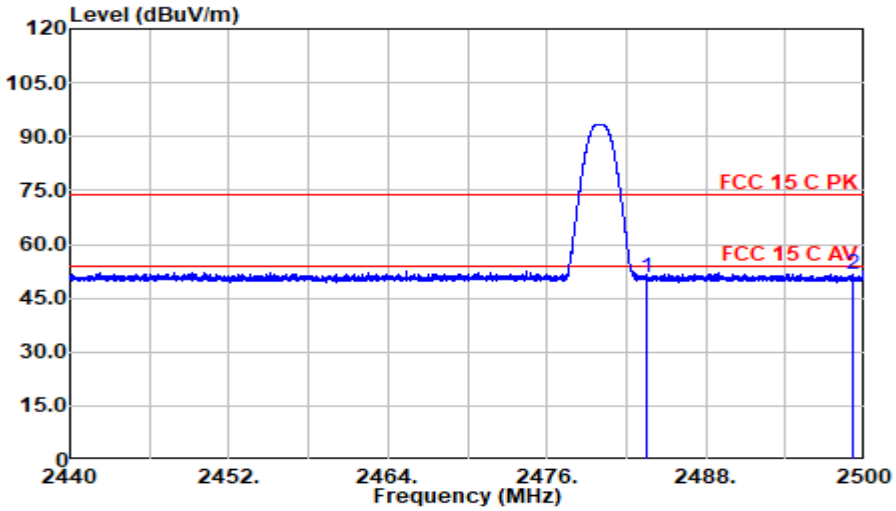
Mode: BLE CH2480MHz



Polarization at Horizontal

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	42.27	28.50	5.31	36.77	39.31	54.00	14.69	Average
2488.540	42.20	28.50	5.31	36.76	39.25	54.00	14.75	Average

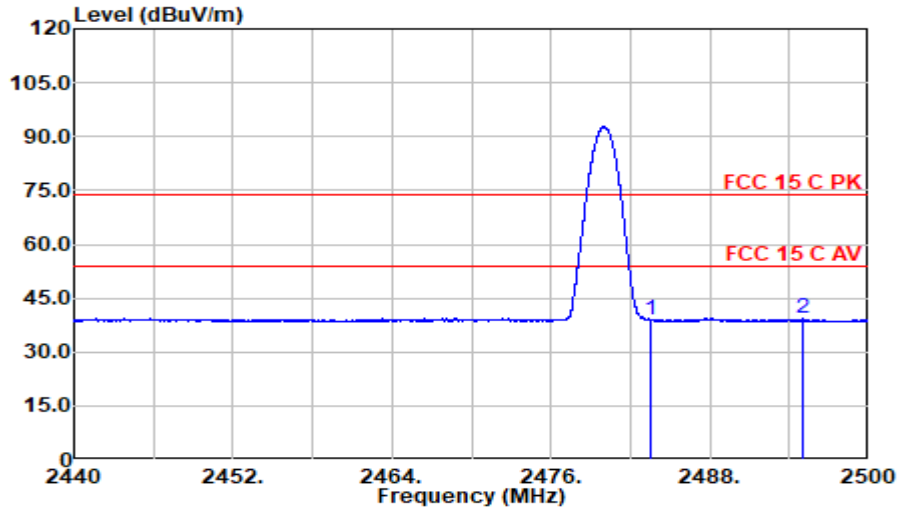
Mode: BLE CH2480MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	53.52	28.50	5.31	36.77	50.56	74.00	23.44	Peak
2499.025	54.68	28.50	5.32	36.75	51.75	74.00	22.25	Peak

Mode: BLE CH2480MHz



Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
2483.500	41.73	28.50	5.31	36.77	38.77	54.00	15.23	Average
2494.960	42.13	28.50	5.32	36.75	39.20	54.00	14.80	Average

4 6 dB BANDWIDTH MEASUREMENT

4.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2024.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2024.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2024.08.09	1 Year

4.2 Block Diagram of Test Setup

4.3 Specification Limits (§15.247(a)(2))

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

4.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

4.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 100kHz, VBW ≥ 3 × RBW.

The 6 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 6 dB .

The test procedure is defined in ANSI C63.10-2013 (the 11.8.2 Measurement Procedure “Option 2” was used).

4.6 Test Results

PASSED.

All the test results are attached in next pages.

(Test Date: 2025.01.23 Temperature: 23℃ Humidity: 51 %)

Mode	Channel	Frequency (MHz)	**6dB Bandwidth (kHz)**	Limit
BLE	00	2402	**710**	500 kHz
	20	2442	**719.5**	500 kHz
	39	2480	**728.1**	500 kHz

BLE

CH2402

CH2442

CH2480

5 MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2024.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SM SM+	22022838	2024.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2024.08.09	1 Year

5.2 Block Diagram of Test Setup

The Same as Section. 5.2.

5.3 Specification Limits ((§15.247(b)(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5 MHz is: 1 Watt. (30 dBm)

5.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:
a) RBW ≥ DTS Bandwidth.
b) VBW ≥ [3 × RBW].
c) Span ≥ [3 × RBW].
d) Sweep time = auto.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

The test procedure is defined in ANSI C63.10-2013 (11.9.1.1 Measurement Procedure " RBW □ DTS bandwidth" was used).

5.6 Test Results

PASSED.

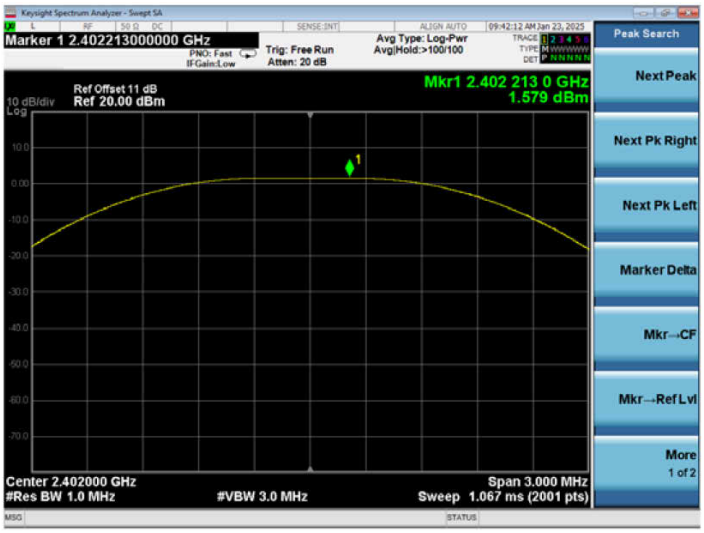
All the test results are listed below.

(Test Date: 2025.01.23 Temperature: 23℃ Humidity: 51 %)

Mode	Channel	Frequency (MHz)	**Peak Output Power (dBm)**	Limit
BLE	00	2402	**1.579**	30 dBm
	20	2442	**1.358**	30 dBm
	39	2480	**1.134**	30 dBm

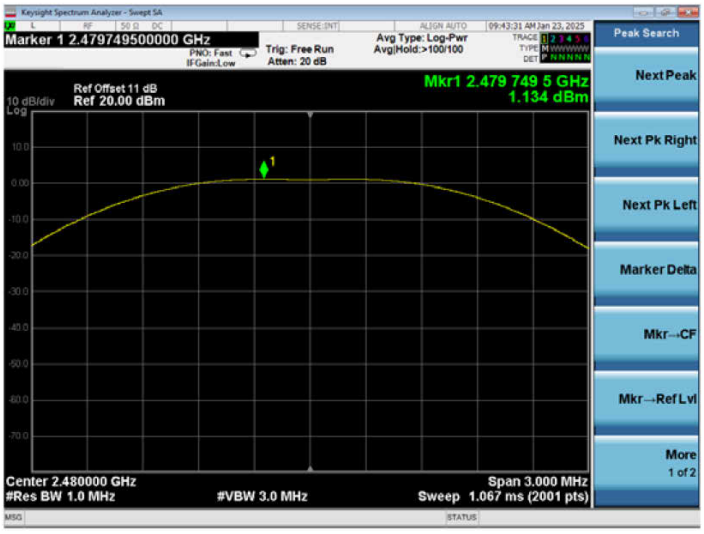
BLE

CH2402



CH2442

CH2480



6 EMISSION LIMITATIONS MEASUREMENT

6.1 Test Equipment

The following test equipment was used during the emission limitations test:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2024.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SMSM+	22022838	2024.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2024.08.09	1 Year

6.2 Block Diagram of Test Setup

The Same as Section. 5.2.

6.3 Specification Limits (§15.247(d))

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)). (※This test result attaching to Section. 3.7)

6.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

6.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Scan up through 10^{th} harmonic.

The test procedure is defined in ANSI C63.10-2013 (11.11.2 Reference level measurement and 11.11.3 Emission level measurement was used).

6.6 Test Results

PASSED.

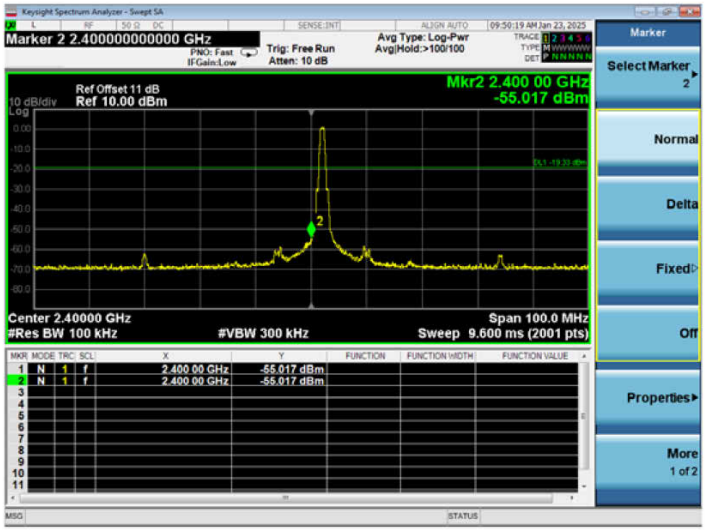
The test data was attached in the next pages.

(Test Date: 2025.01.23 Temperature: 23℃ Humidity: 51 %)

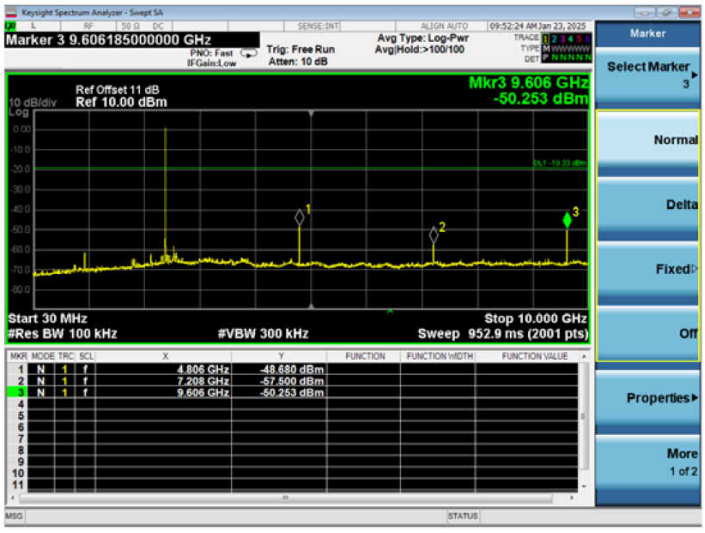
Mode	Channel	Frequency (MHz)	Data Page
BLE	00	2402	P36
	20	2442	P37
	39	2480	P38

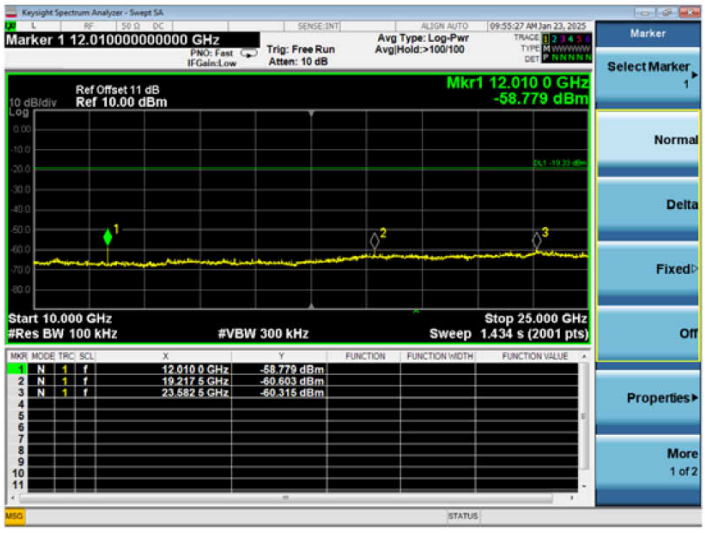
BLE

CH2402

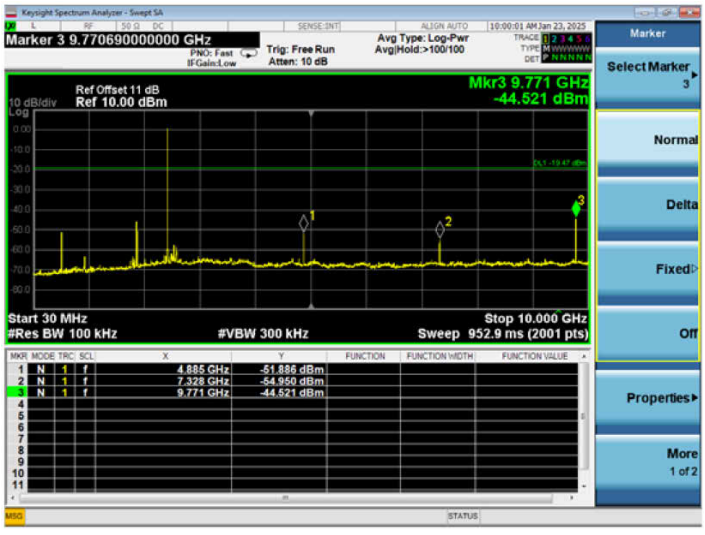
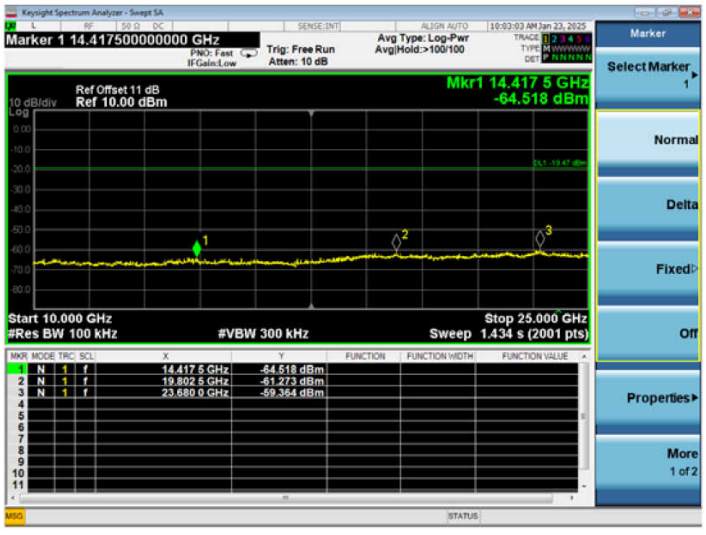
Reference Level	Lower Edge
	

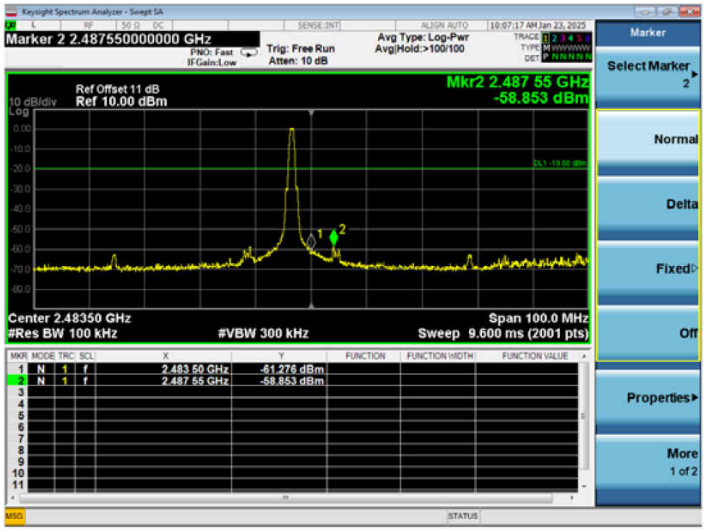
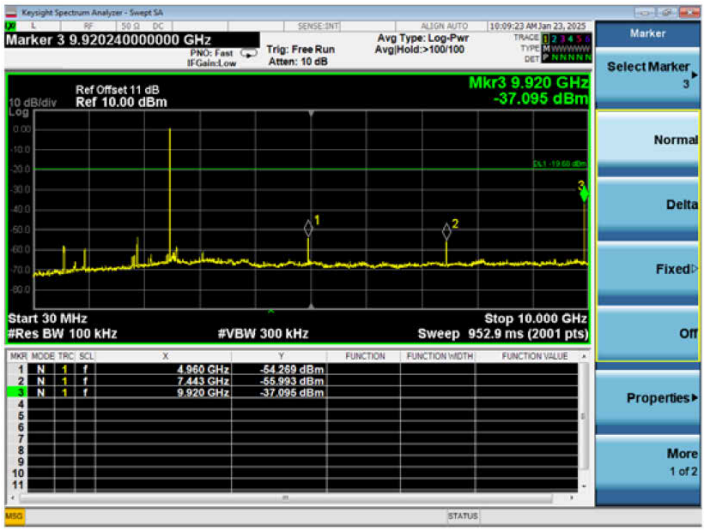
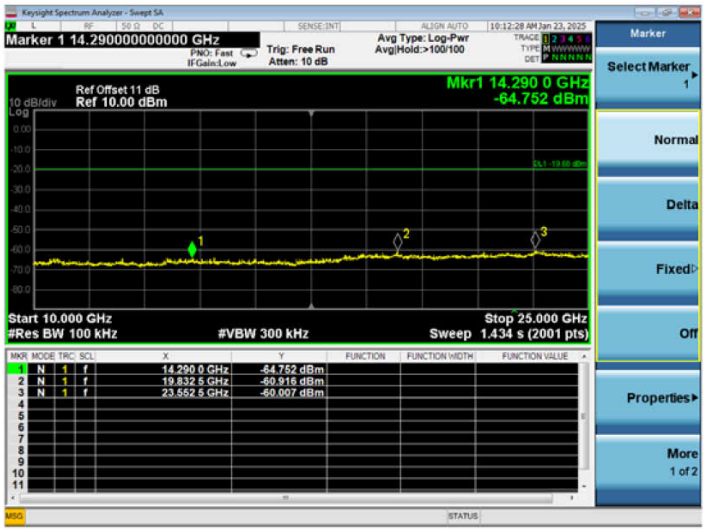
Emission Level





BLE
CH2442
Reference Level

Emission Level
 

BLE	
CH2480	
Reference Level	Higher Edge
	
Emission Level	
	

7 POWER SPECTRAL DENSITY MEASUREMENT

7.1 Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2024.08.09	1 Year
2.	RF Cable	Mini-Circuits	FLC-3FT-SMSM+	22022838	2024.08.09	1 Year
3.	10 dB Attenuator	Mini-Circuits	BW-S10W2+	001	2024.08.09	1 Year

7.2 Block Diagram of Test Setup

The Same as section 5.2.

7.3 Specification Limits (§15.247(e))

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

7.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

7.5 Test Procedure

The transmitter output was connected to the spectrum analyzer.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ [3 × RBW].
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

The test procedure is defined in ANSI C63.10-2013 (11.10.2 Measurement Procedure “Method PKPSD (peak PSD)” was used).

7.6 Test Results

PASSED.

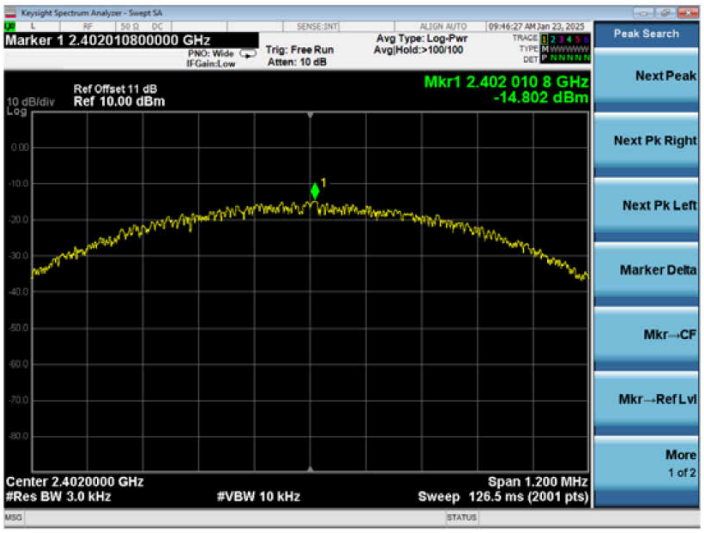
All the test results are attached in next pages.

(Test Date: 2025.01.23 Temperature: 23℃ Humidity: 51 %)

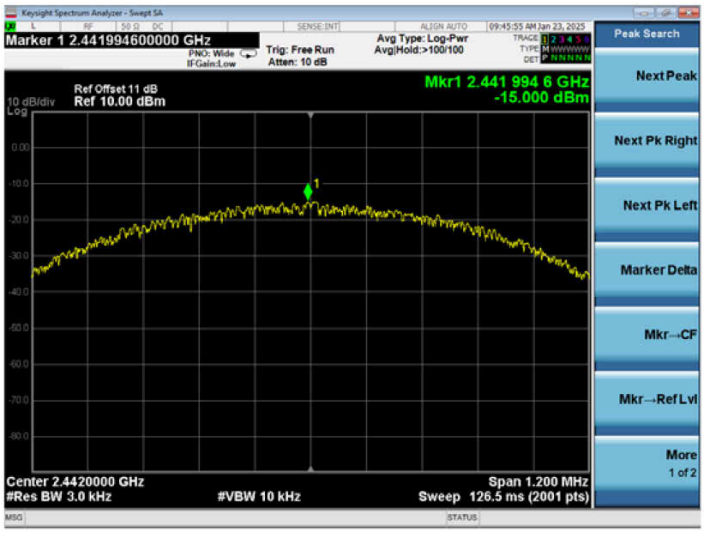
Mode	Channel	Frequency (MHz)	**Power Spectral Density (dBm)**	Limit
BLE	00	2402	**-14.802**	8 dBm
	20	2442	**-15**	8 dBm
	39	2480	**-15.18**	8 dBm

BLE

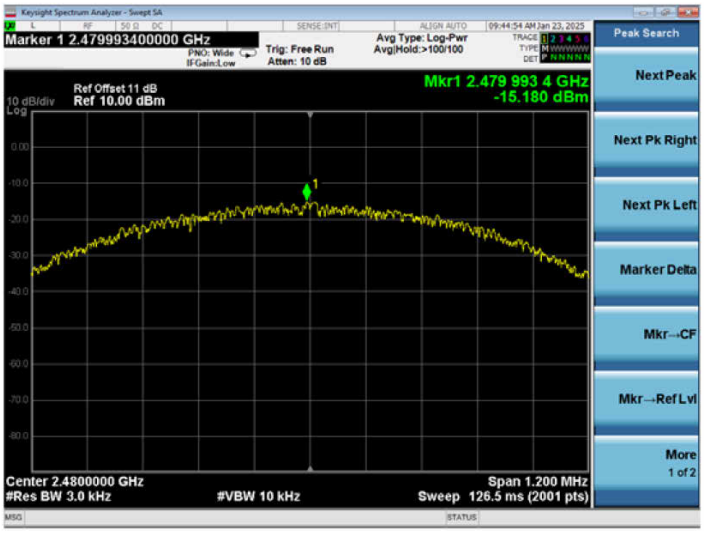
CH2402



CH2442



CH2480



8 ANTENNA REQUIREMENT

8.1 Specification Limits (§15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 Result

According to KDB 353028 D1, the following describes the three ways that can be used to demonstrate compliance to Section 15.203: a) Antenna permanently attached. b) Unique (non-standard) antenna connector. c) Professional installation.
For this product, the antenna is: ☑ Antenna permanently attached ☐ Unique (non-standard) antenna connector ☐ Professional installation ☐ not meet any of ways list above that ☑ compliant ☐ not compliant with the requirement of Section 15.203.

9 DEVIATION TO TEST SPECIFICATIONS

None.

10 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2.
The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Conducted Emission No.3 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Radiated Emission	30MHz~200MHz, Horizontal	±3.8 dB
	30MHz~200MHz, Vertical	±4.1 dB
	200MHz~1000MHz, Horizontal	±3.6 dB
	200MHz~1000MHz, Vertical	±5.1 dB
	1GHz~6GHz	±5.3 dB
	6GHz~18GHz	±5.3 dB
	18GHz~40GHz	±3.5 dB
Output Power Test	50MHz~18GHz	0.77 dB
Power Density Test	9kHz~6GHz	1.08 dB
RF Frequency Test	9kHz~40GHz	$6*10^{-4}$
Bandwidth Test	9kHz~6GHz	$1.5*10^{-3}$
RF Radiated Power Test	30MHz~1000MHz	3.06 dB
Conducted Output Power Test	50MHz~18GHz	0.83 dB
AC Voltage(<10kHz) Test	120V~230V	0.04 %
DC Power Test	0V~30V	0.4 %
Temperature	-40℃~+100℃	0.52 ℃
Humidity	30%~95%	2.6 %