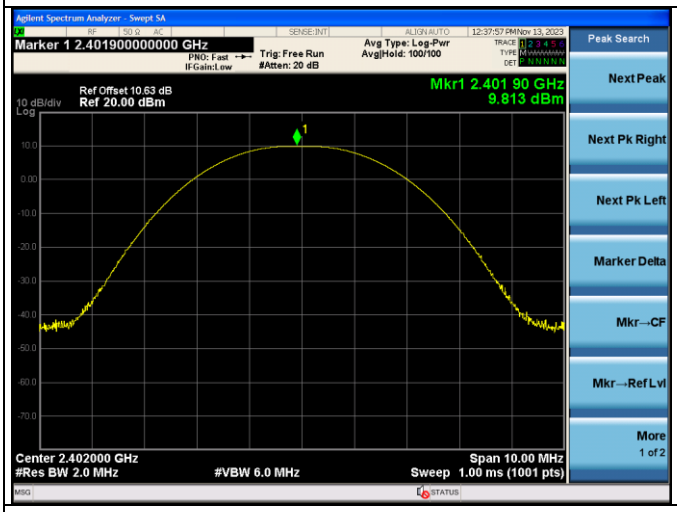
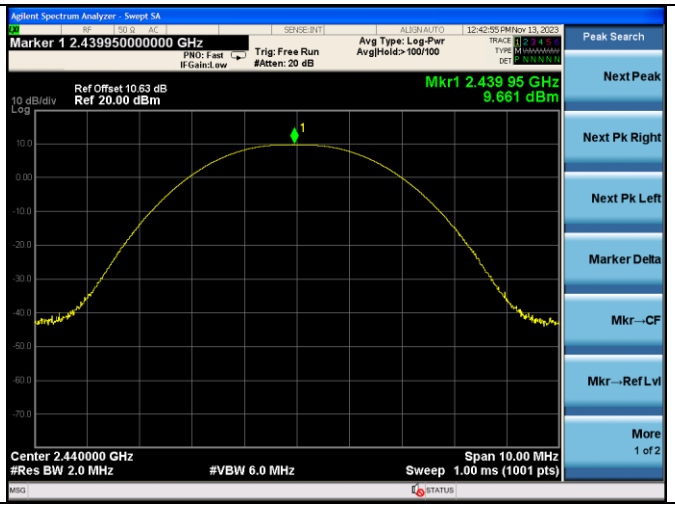
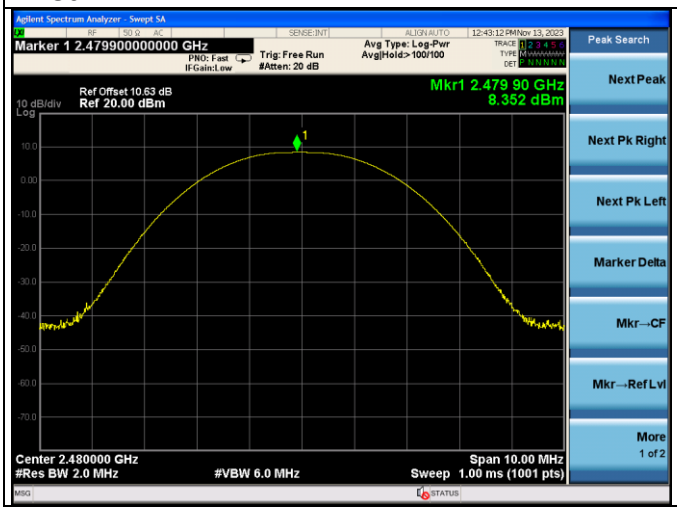
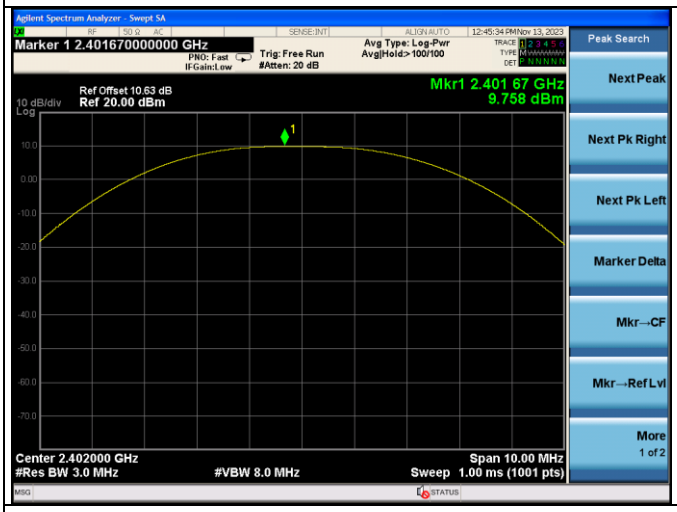
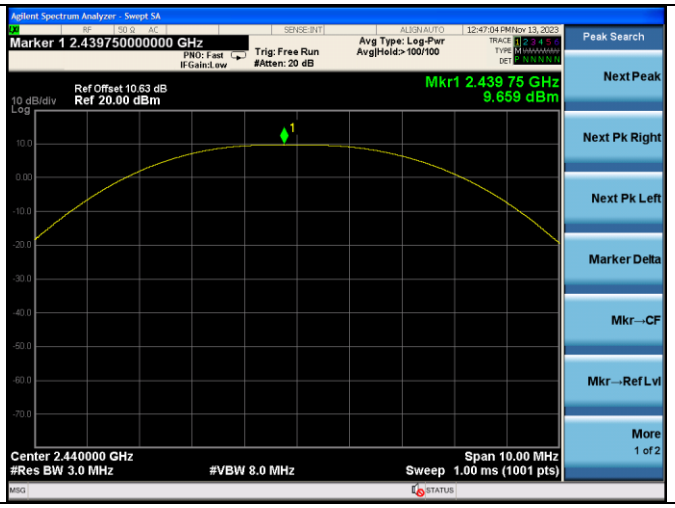
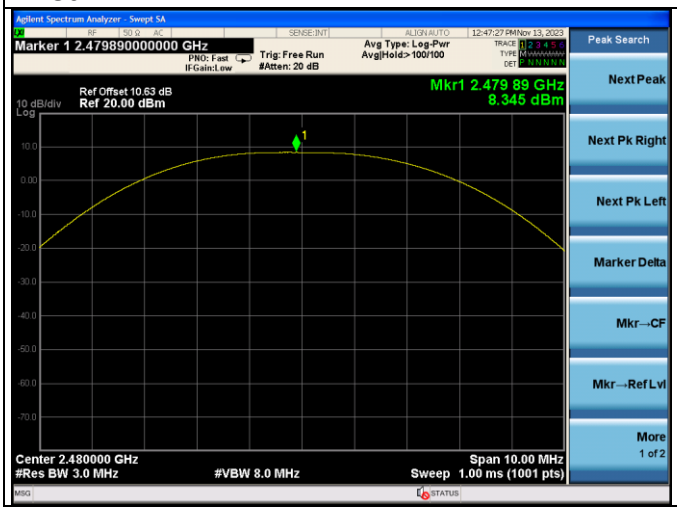
BLE-1Mbps:

GFSK	
2402MHz	2440MHz
	
2480MHz	---
	---

BLE-2Mbps:

GFSK	
2402MHz	2440MHz
	
2480MHz	---
	---

8. BAND EDGE COMPLIANCE TEST

8.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3mChamber(Svswr)	AUDIX	N/A	N/A	Aug.09,22	3Year
2.	3mChamber(SE)	AUDIX	N/A	N/A	Sep.16,22	3Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Apr.01,23	1 Year
4.	Amplifier	EMCI	EMC0518A45SE	980965	Aug.25,23	1 Year
5.	RF Cable	Shanghaichaoyu	SFT205-NMSM-10.00M	689241	Aug.25,23	1 Year
6.	Test Software	AUDIX	e3	6.100913a	N/A	N/A
7.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	Aug.23,23	1 Year
Note: N/A means Not applicable.						

8.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

8.3. Test Produce

Use the test method descried in ANSI C63.10 clause 6.10:

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz）from the band-edge use below produce:

1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

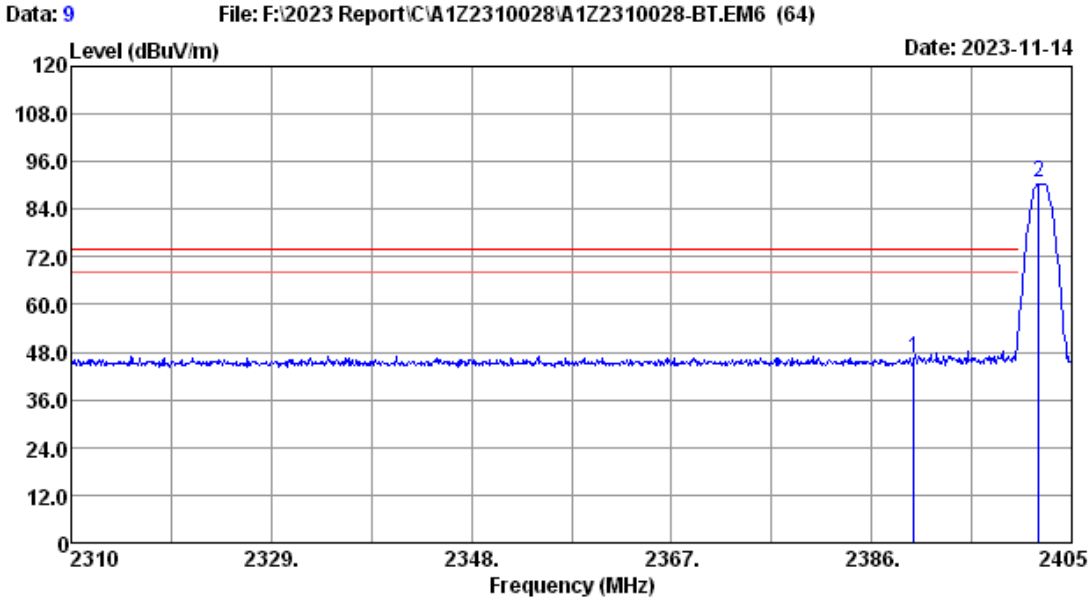
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
   (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
   (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

8.4. Test Results

Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

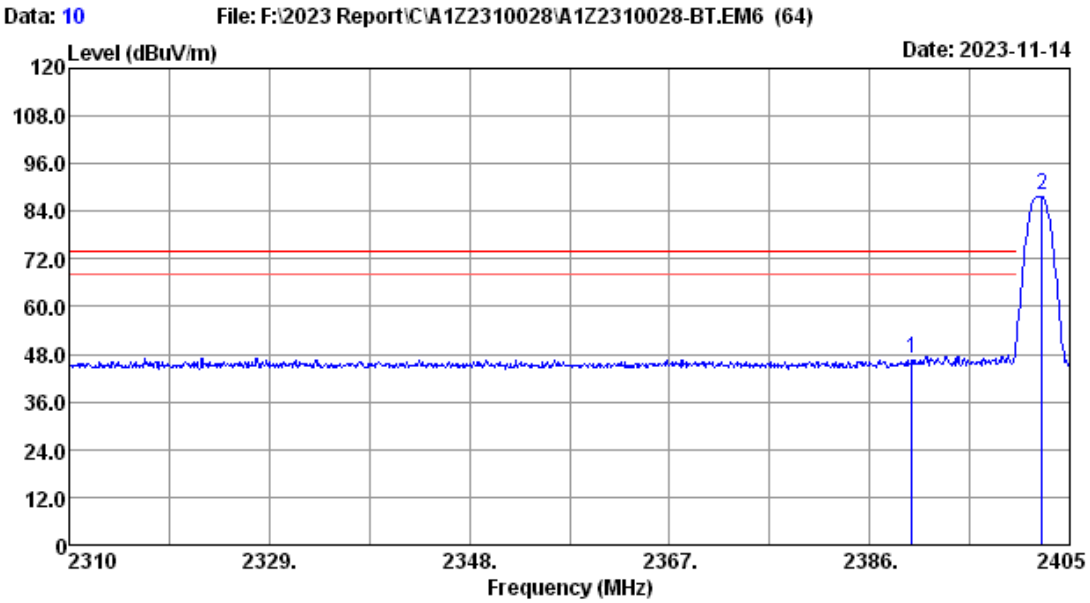
BLE-1Mbps:



Site no. : 3m Chamber Data no. : 9
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE1M 2402MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	2.83	48.45	32.23	46.67	74.00	27.33	Peak
2	2401.87	27.61	2.84	92.47	32.22	90.70	------	------	Peak

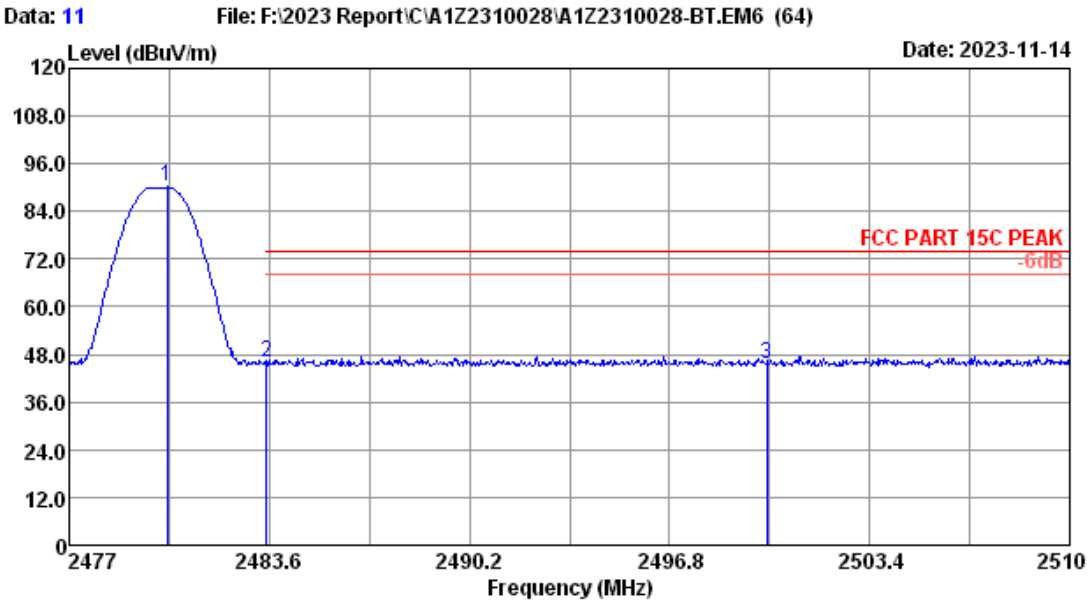
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.



Site no. : 3m Chamber Data no. : 10
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE1M 2402MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	2.83	48.68	32.23	46.90	74.00	27.10	Peak
2	2402.34	27.61	2.84	89.72	32.22	87.95	------	------	Peak

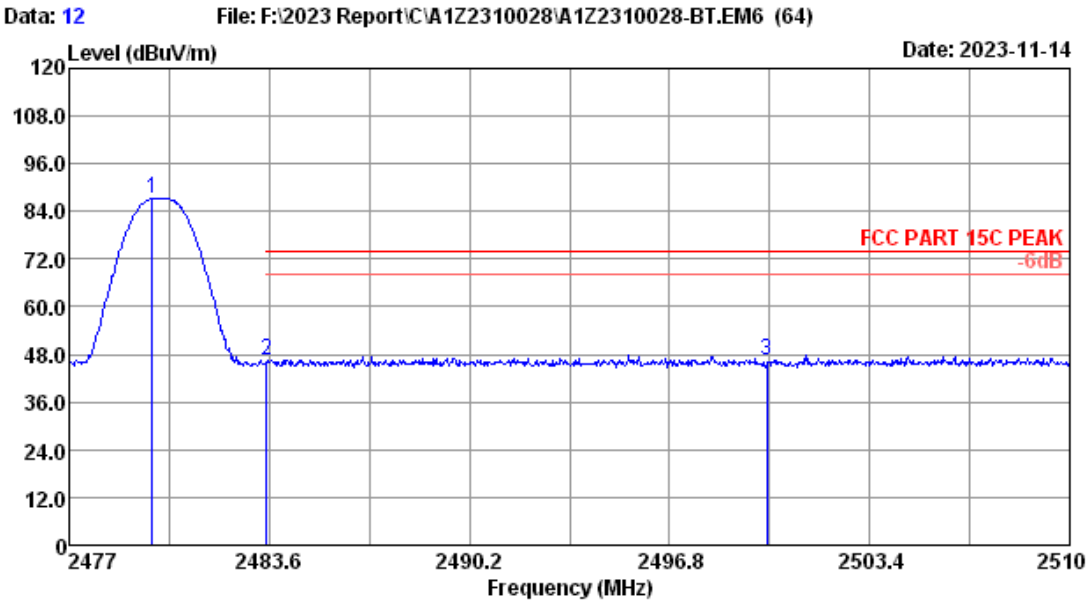
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.



Site no. : 3m Chamber Data no. : 11
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE1M 2480MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.23	27.80	2.88	91.84	32.16	90.36	------	------	Peak
2	2483.50	27.80	2.88	47.44	32.16	45.96	74.00	28.04	Peak
3	2500.00	27.80	2.88	47.29	32.15	45.82	74.00	28.18	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.

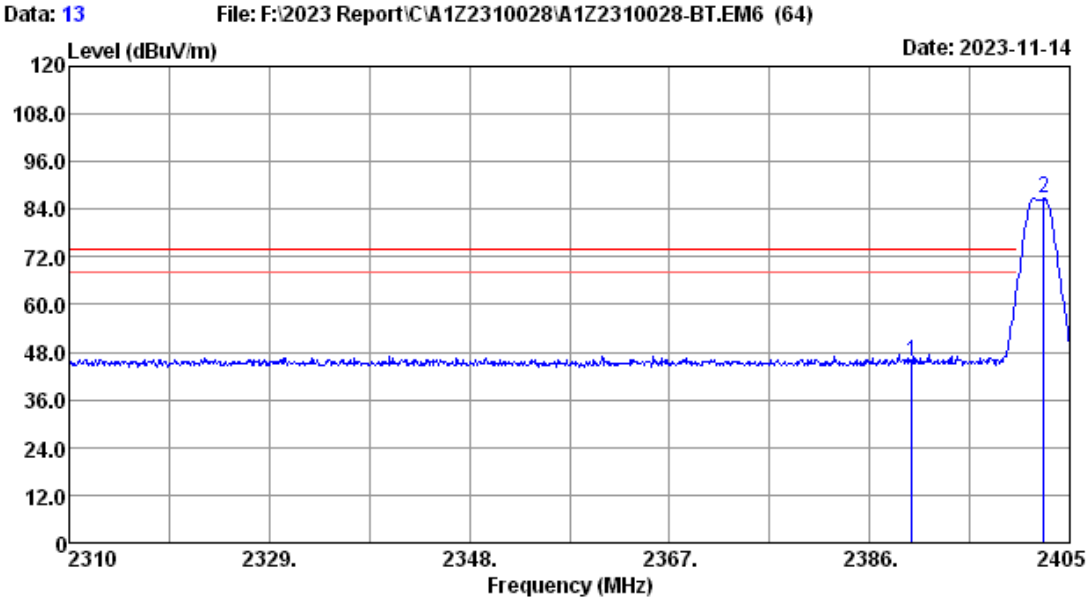


Site no. : 3m Chamber Data no. : 12
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE1M 2480MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.74	27.80	2.88	88.90	32.16	87.42	------	------	Peak
2	2483.50	27.80	2.88	47.85	32.16	46.37	74.00	27.63	Peak
3	2500.00	27.80	2.88	47.76	32.15	46.29	74.00	27.71	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.

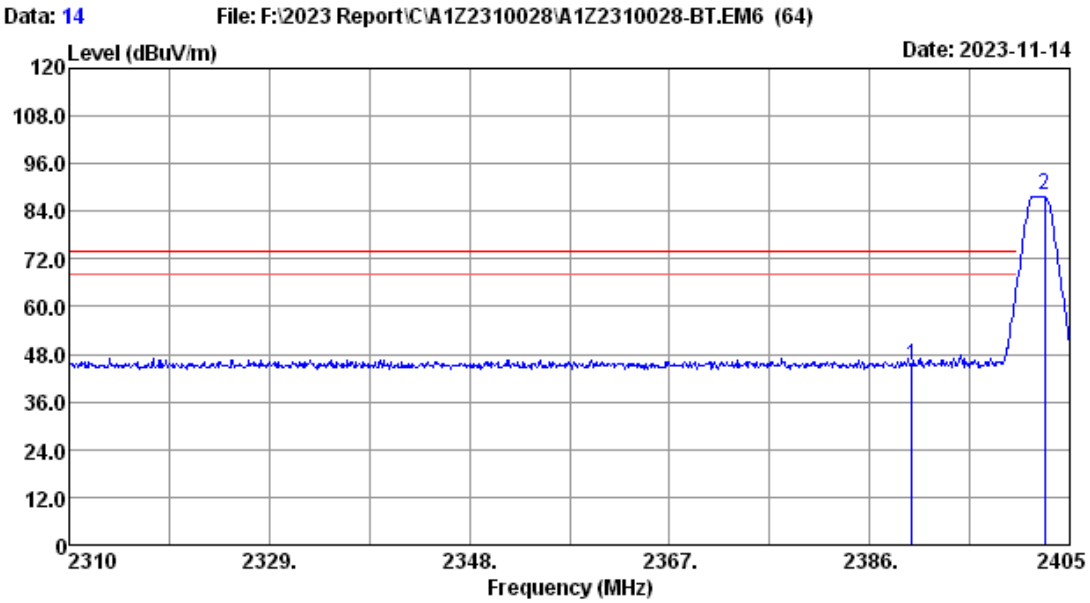
BLE-2Mbps:



Site no. : 3m Chamber Data no. : 13
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE2M 2402MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	2.83	47.49	32.23	45.71	74.00	28.29	Peak
2	2402.53	27.61	2.84	88.68	32.22	86.91	------	------	Peak

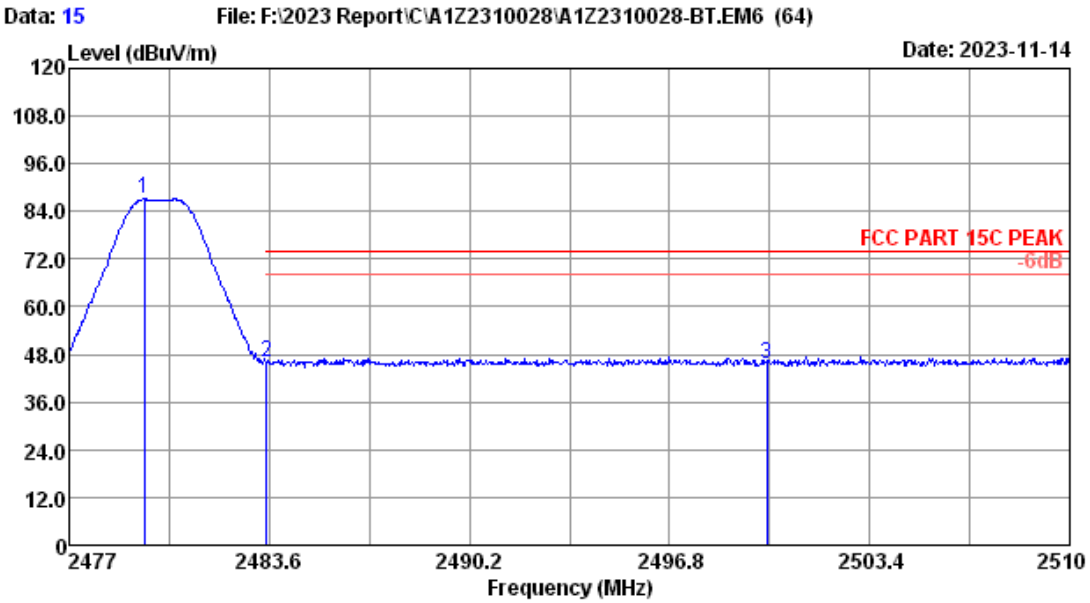
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.



Site no. : 3m Chamber Data no. : 14
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE2M 2402MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.62	2.83	47.02	32.23	45.24	74.00	28.76	Peak
2	2402.63	27.61	2.84	89.86	32.22	88.09	------	------	Peak

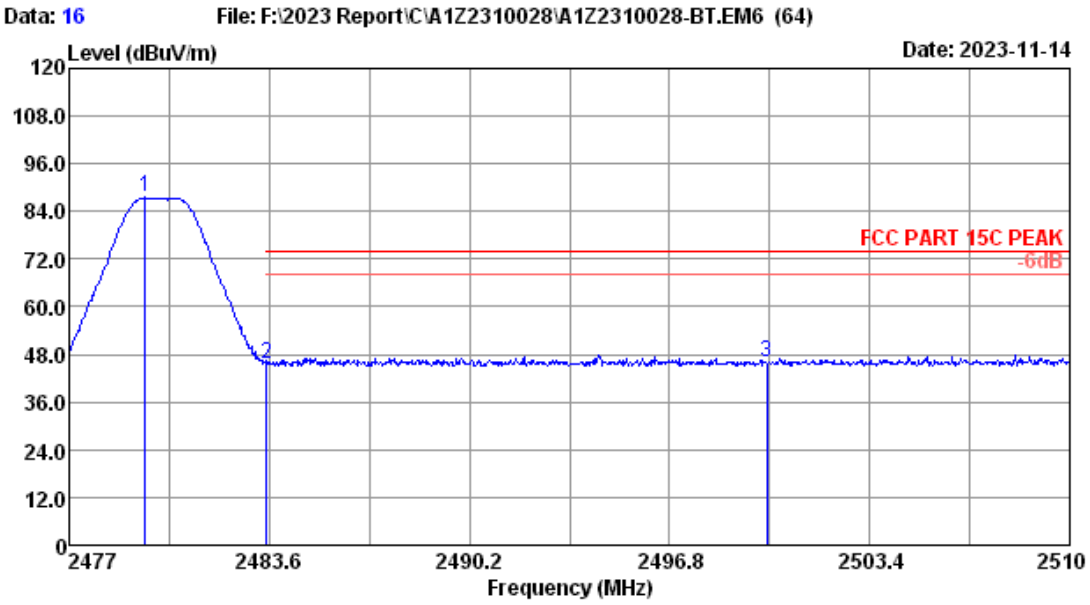
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.



Site no. : 3m Chamber Data no. : 15
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE2M 2480MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.48	27.80	2.88	88.79	32.16	87.31	------	------	Peak
2	2483.50	27.80	2.88	47.39	32.16	45.91	74.00	28.09	Peak
3	2500.00	27.80	2.88	47.19	32.15	45.72	74.00	28.28	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.



Site no. : 3m Chamber Data no. : 16
Dis. / Ant. : 3m 2023 MCTD1209-3006 Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 21.2*C/51.3% Engineer : nier
Test Mode : BLE2M 2480MHz TX

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.51	27.80	2.88	89.19	32.16	87.71	------	------	Peak
2	2483.50	27.80	2.88	47.01	32.16	45.53	74.00	28.47	Peak
3	2500.00	27.80	2.88	47.40	32.15	45.93	74.00	28.07	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
-Amp factor.

9. POWER SPECTRAL DENSITY TEST

9.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.01,23	1 Year
2.	RF Cable	HUBER+SUHNER	SUCOFLEX-106	505238/6	Apr.02,23	1 Year
3.	Attenuator(10dB)	eastsheep	2W-SMA-JK-6G-10dB	No. 4	Sep.19,23	1 Year

9.2. Block Diagram of Test Setup

Please reference to section 2.4.

9.3. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

9.4. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.10.2:

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.

9.5. Test Results

EUT: Wi-Fi Module		
M/N: U9W44		
Test date: 2023-11-14	Pressure: 101.3±1.0 kpa	Humidity: 52.4±3.0%
Tested by: Lili	Test site: RF site	Temperature: 23.1±0.6℃

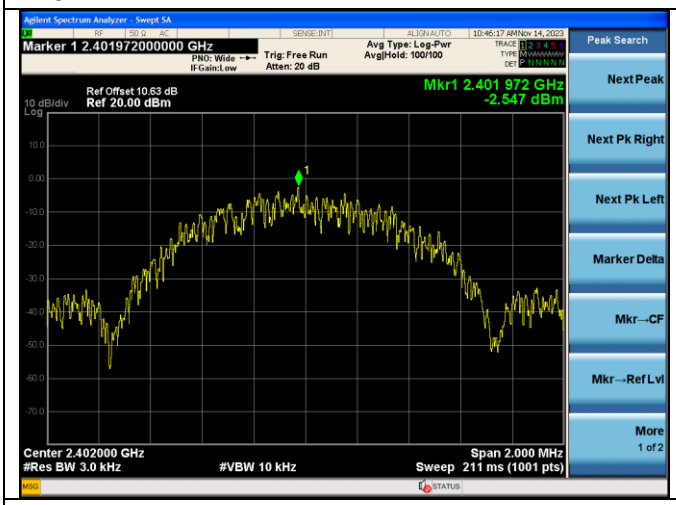
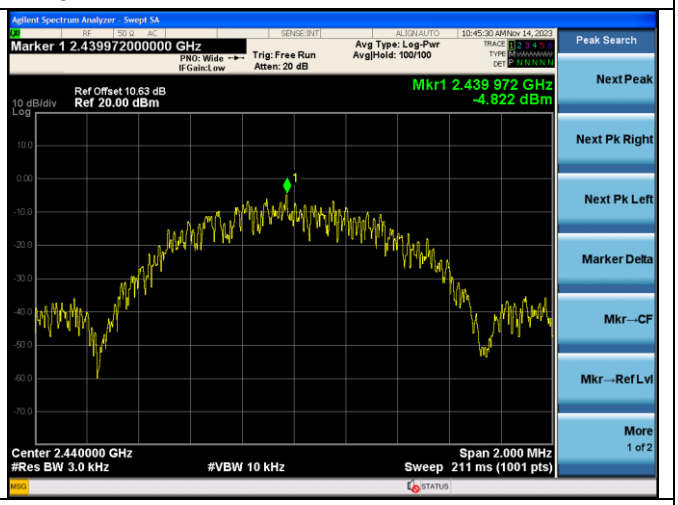
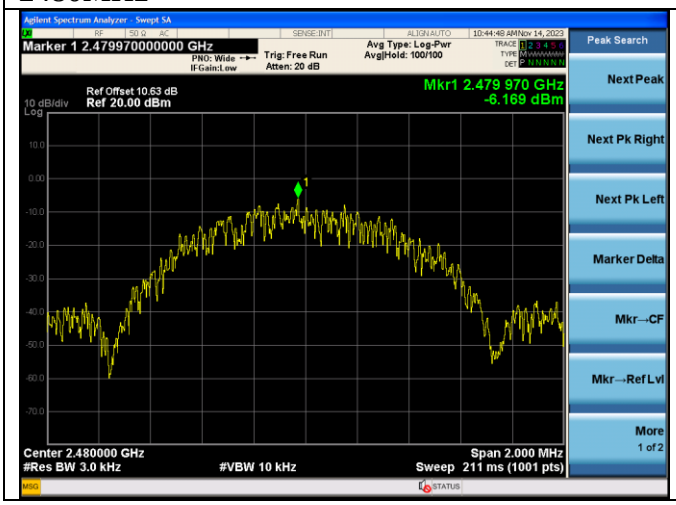
BLE-1Mbps:

Test Mode	Frequency (MHz)	Power density (dBm/3KHz)	Limit (dBm/3KHz)
GFSK	2402	-2.547	8
	2440	-4.822	8
	2480	-6.169	8
Conclusion：PASS			

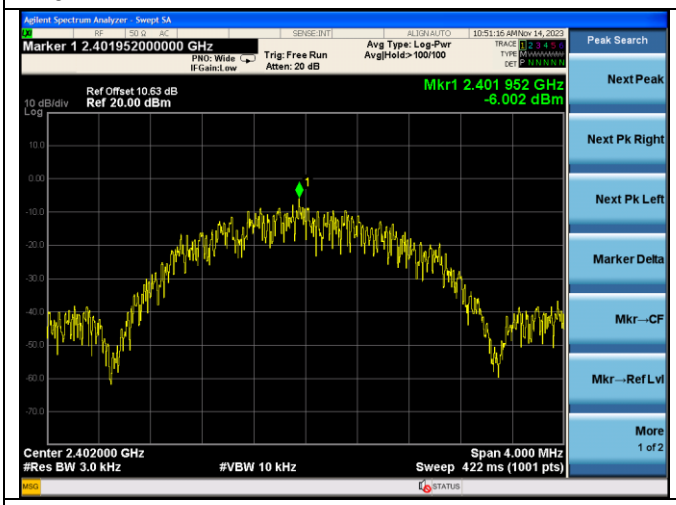
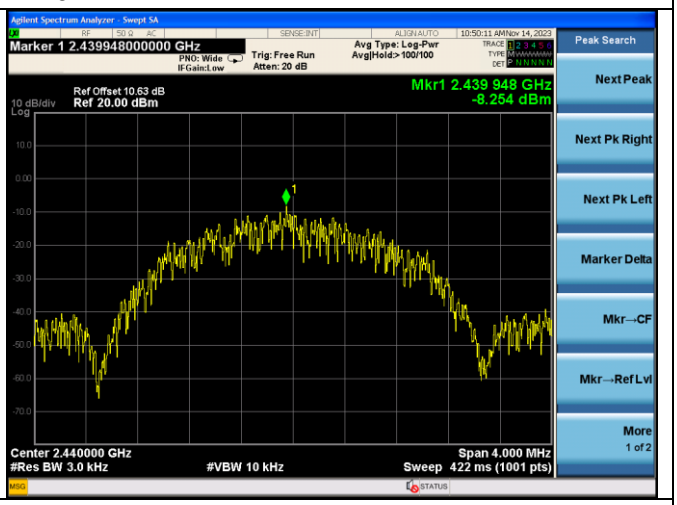
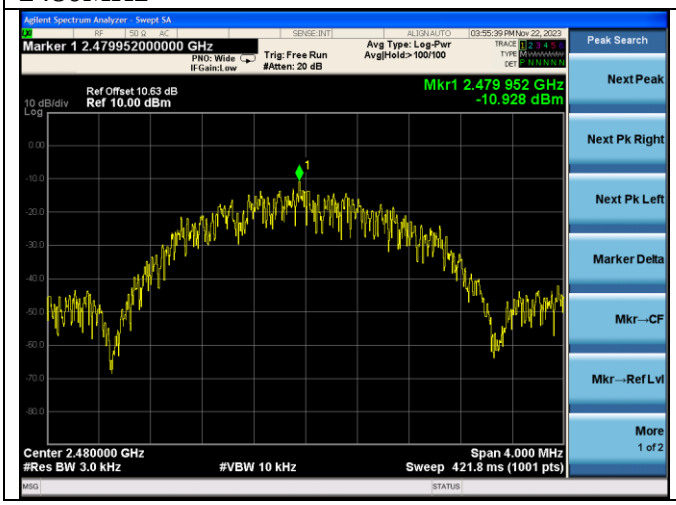
BLE-2Mbps:

Test Mode	Frequency (MHz)	Power density (dBm/3KHz)	Limit (dBm/3KHz)
GFSK	2402	-6.002	8
	2440	-8.254	8
	2480	-10.928	8
Conclusion：PASS			

BLE-1Mbps:

GFSK	
2402MHz	2440MHz
	
2480MHz	---
	---

BLE-2Mbps:

GFSK	
2402MHz	2440MHz
	
2480MHz	---
	---

10. ANTENNA REQUIREMENT

10.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. ANTENNA CONNECTED CONSTRUCTION

The antennas used for this product are Internal External PCB Antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is -0.42dBi max.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END