5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.02,23	1Year
2.	RF Cable	eastsheep	141-SMA-JJ -1000	NO.1	Jul.01,22	1Year

5.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30dB instead of 20dB.

5.3. Test Procedure

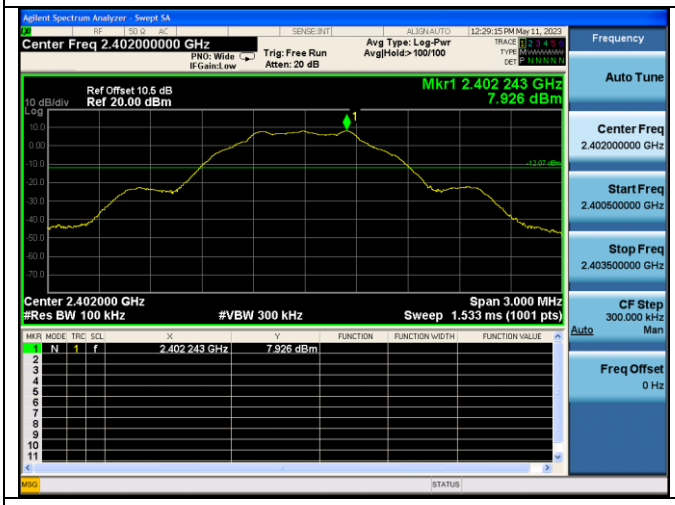
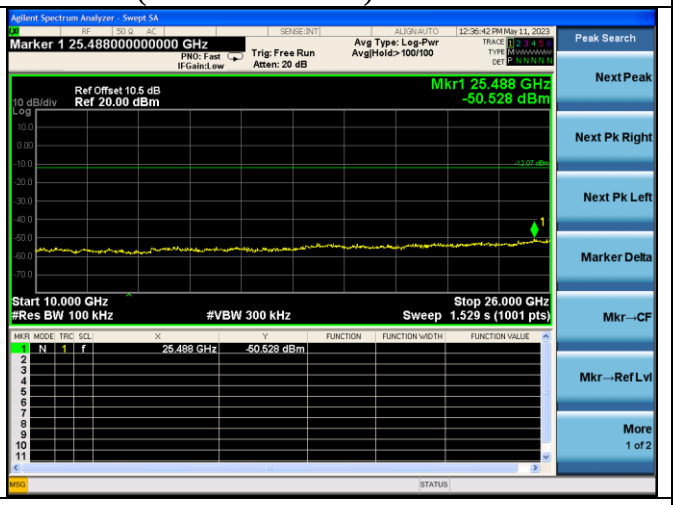
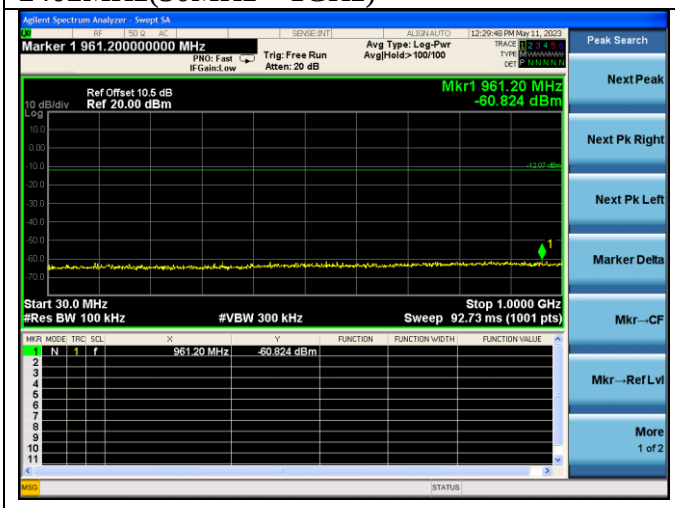
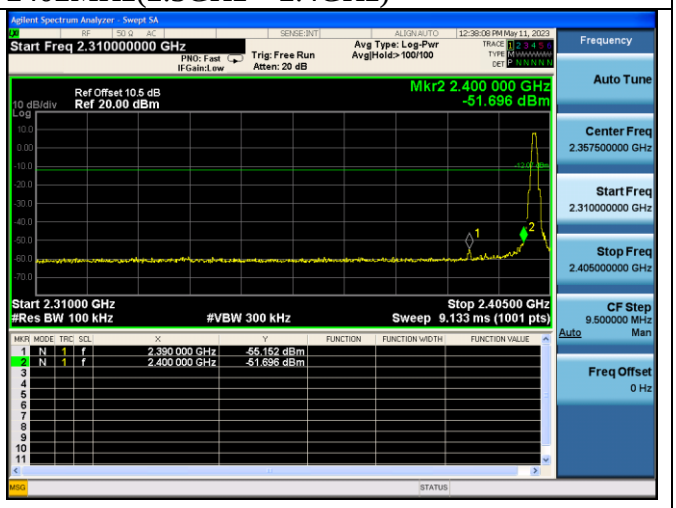
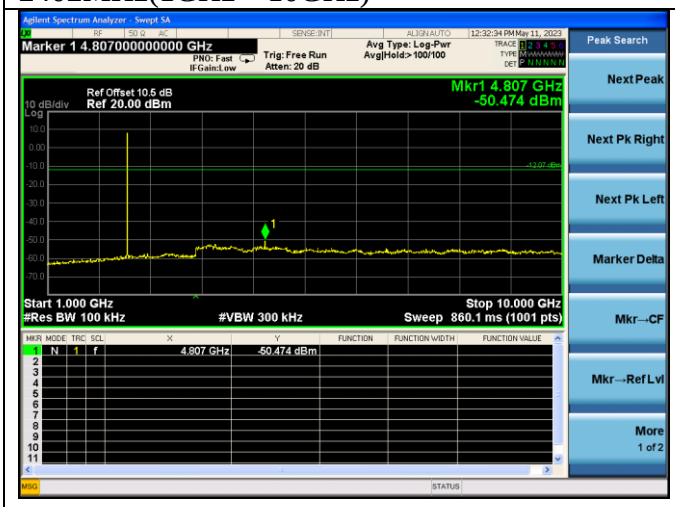
Use the test method descried in ANSI C63.10:
The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

5.4. Test result

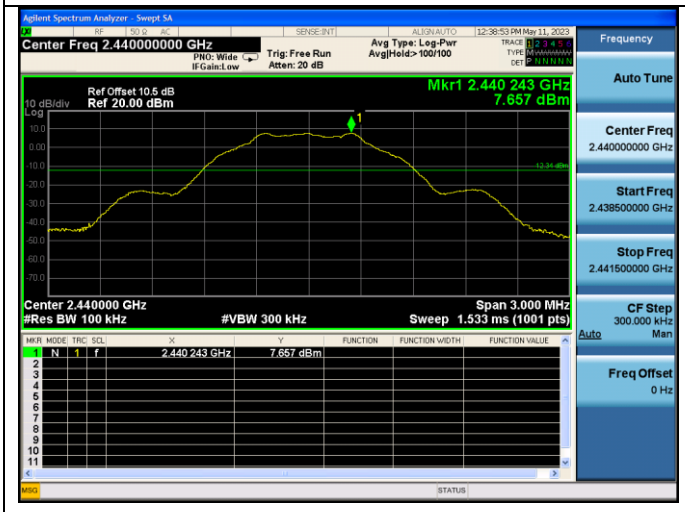
PASS (The testing data was attached in the next pages.)

EUT: DELL Wireless Headset		
M/N: HS2403		
Test date: 2023-05-11	Pressure: 101.3±1.0 kpa	Humidity: 53.5±3.0%
Tested by: lili	Test site: RF site	Temperature:25.4±0.6 ℃

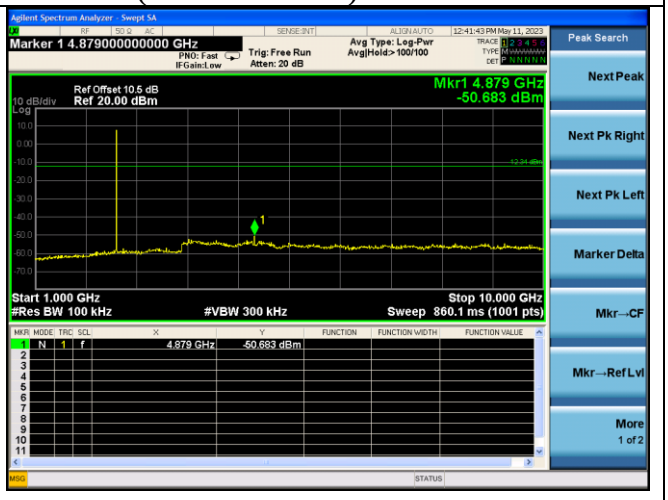
1Mbps:

GFSK	
2402MHz	2402MHz(10GHz – 26GHz)
	
2402MHz(30MHz – 1GHz)	2402MHz(2.3GHz – 2.4GHz)
	
2402MHz(1GHz – 10GHz)	---
	---

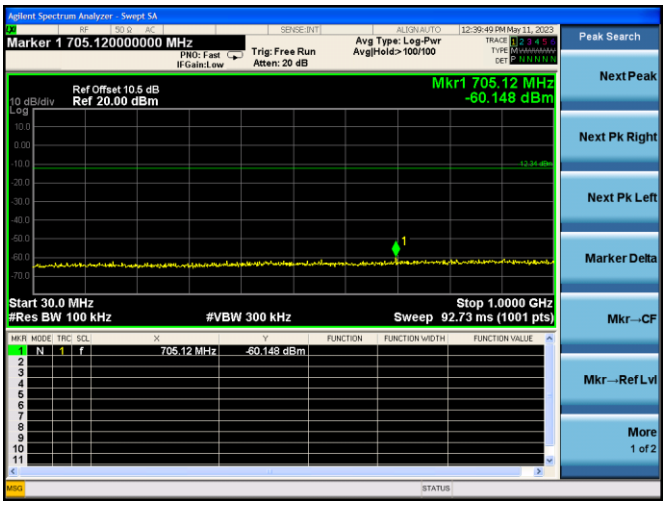
2440MHz



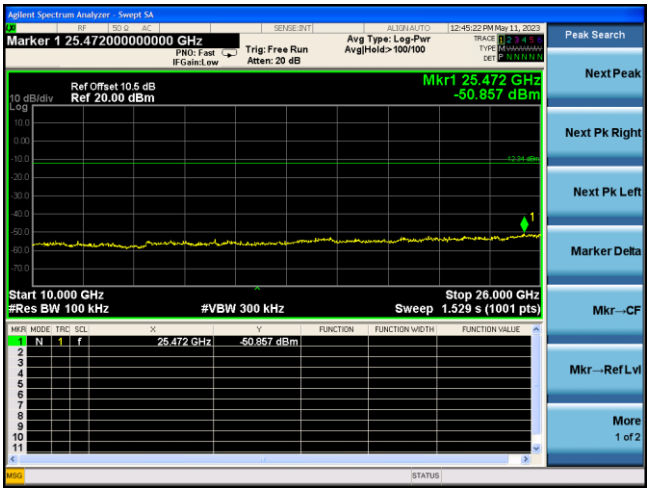
2440MHz(1GHz – 10GHz)

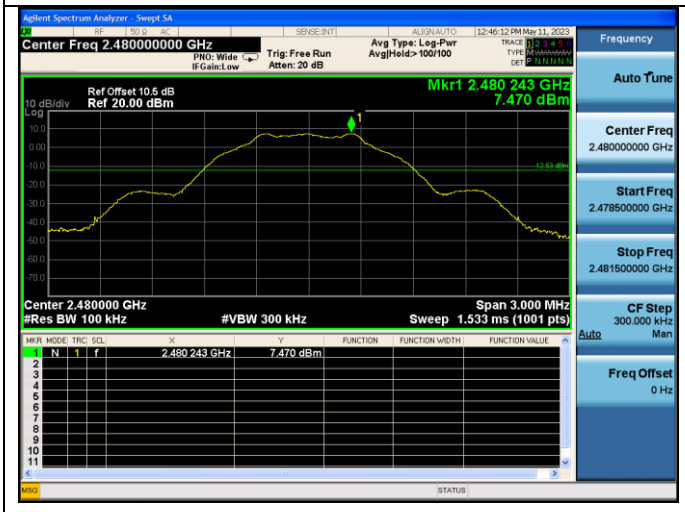
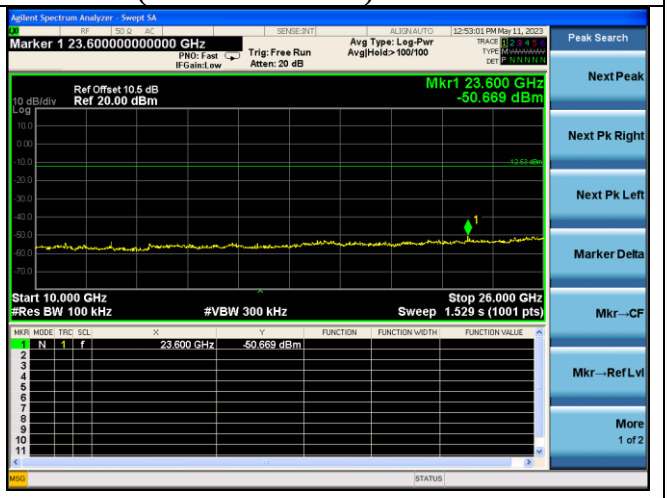
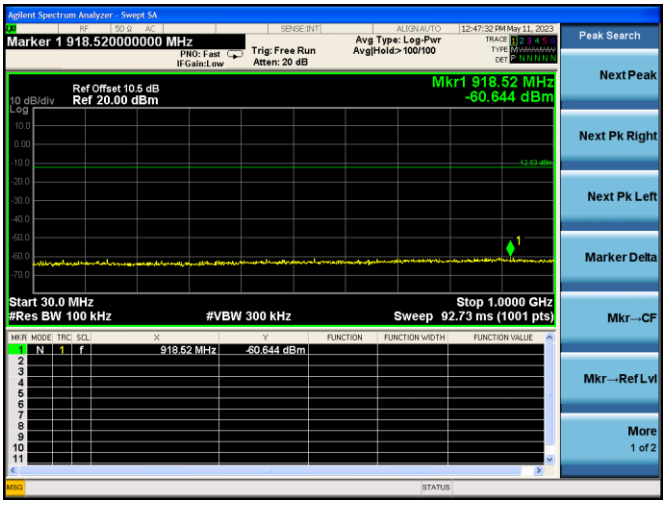
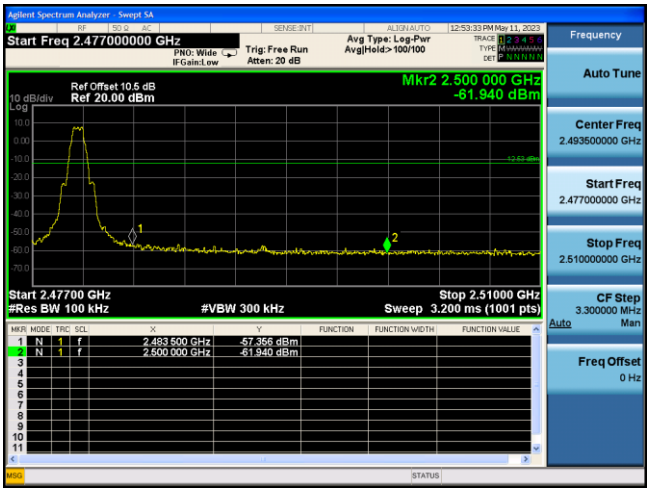
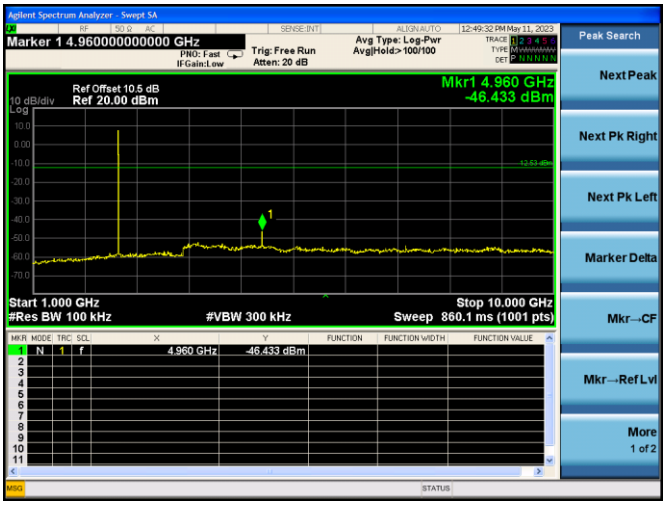


2440MHz(30MHz – 1GHz)

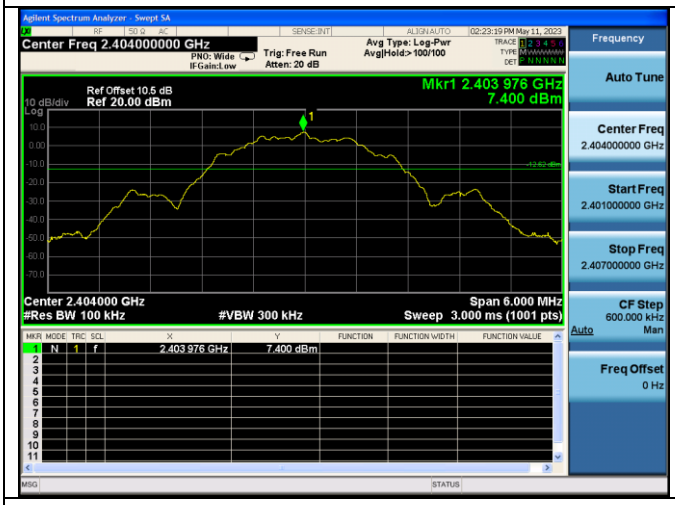
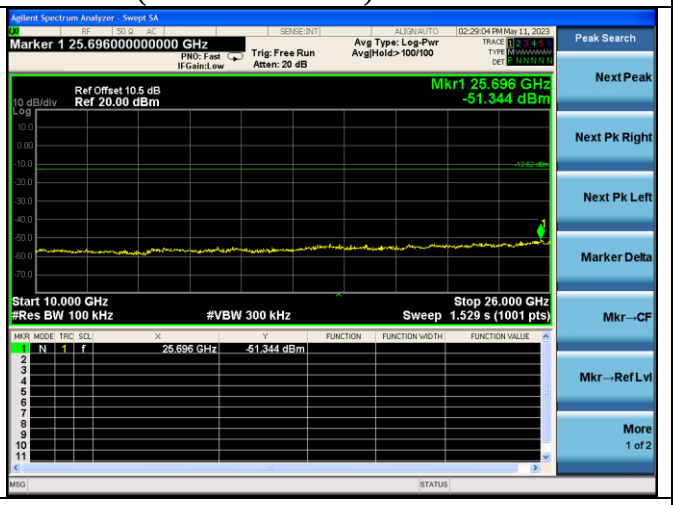
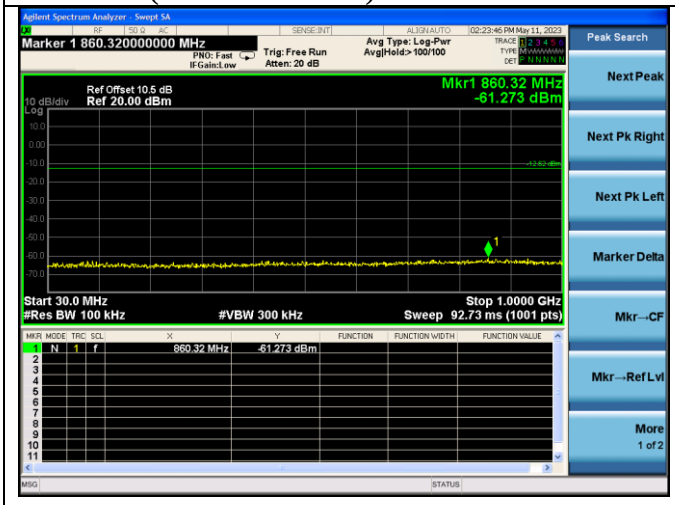
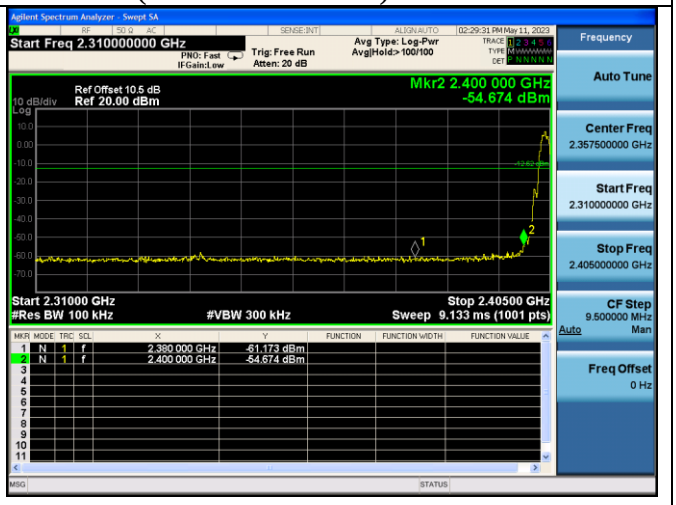
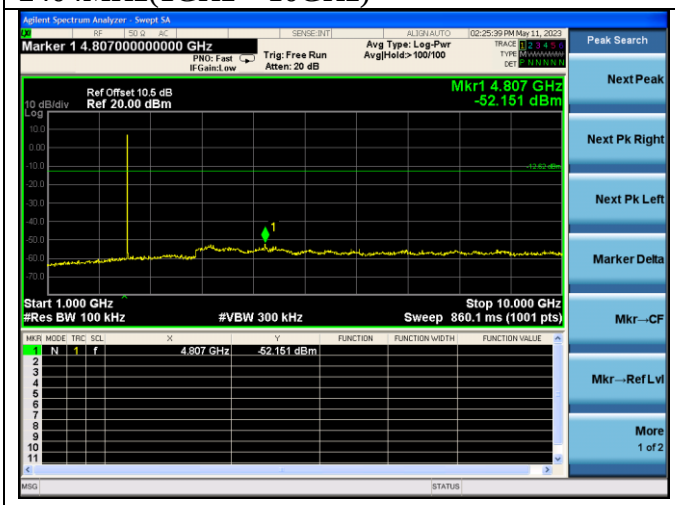


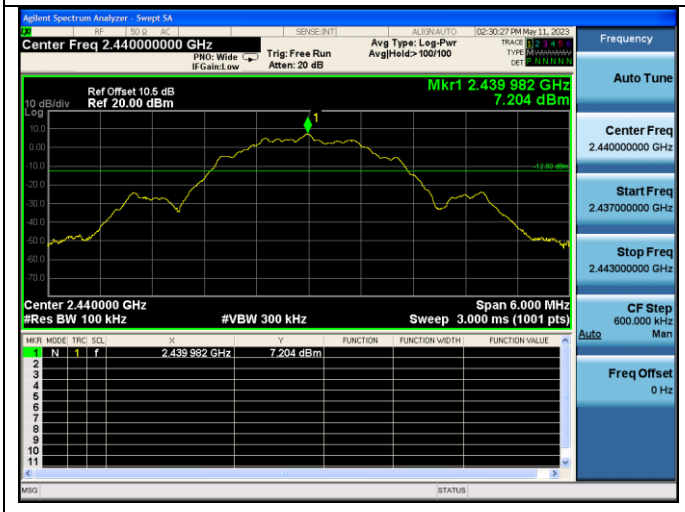
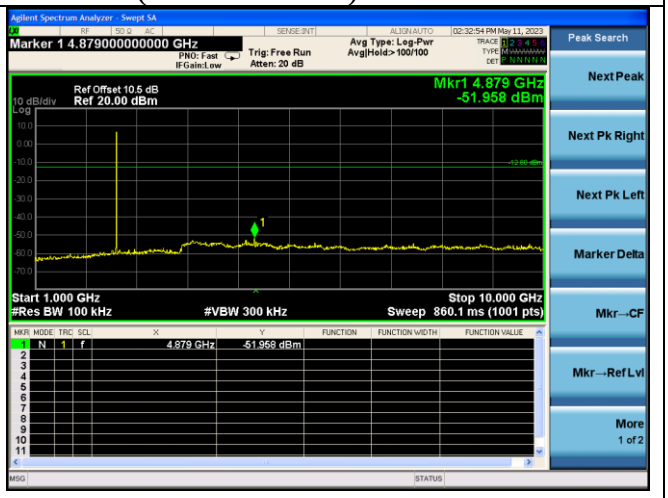
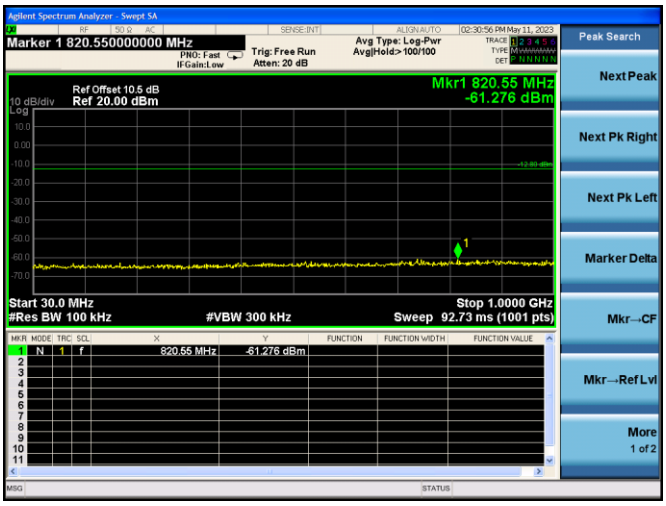
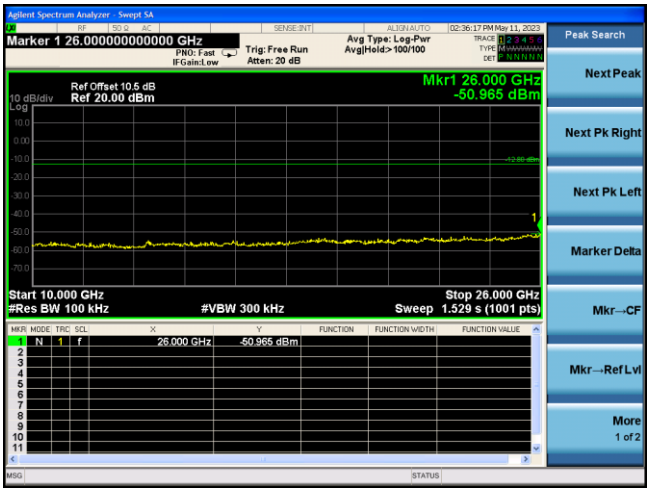
2440MHz(10GHz – 26GHz)

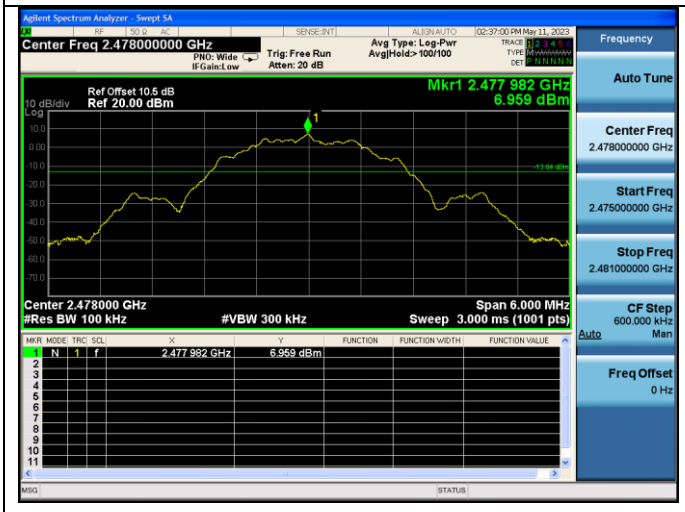
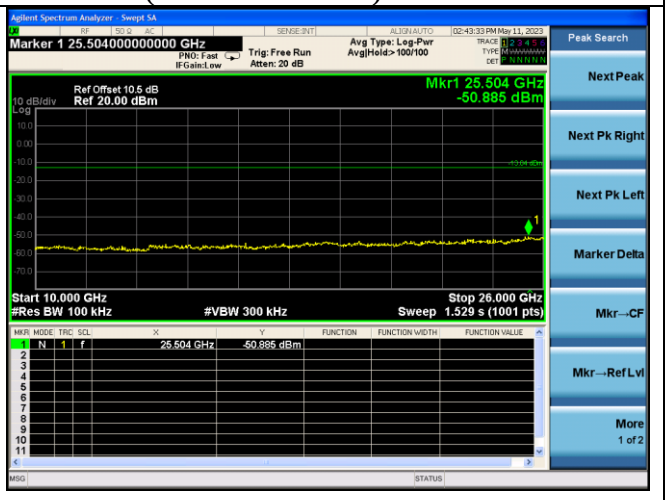
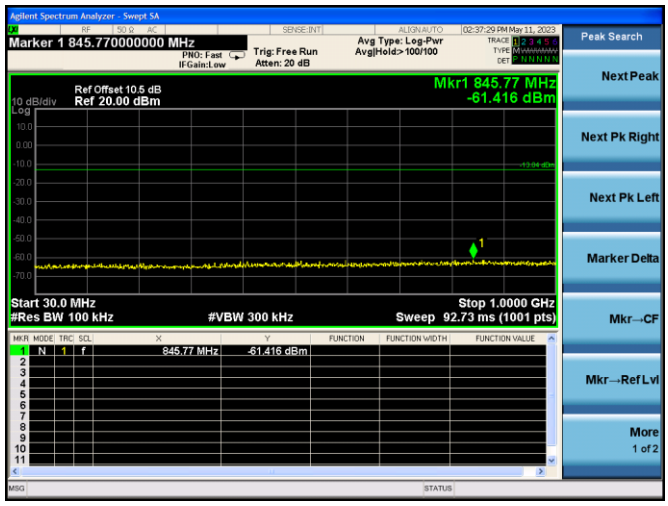
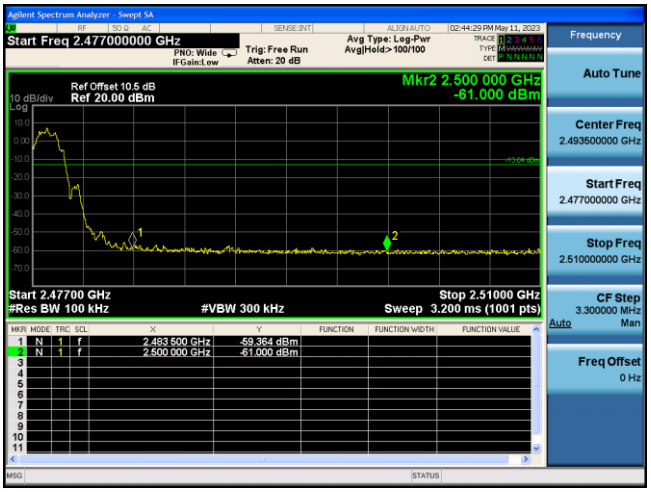
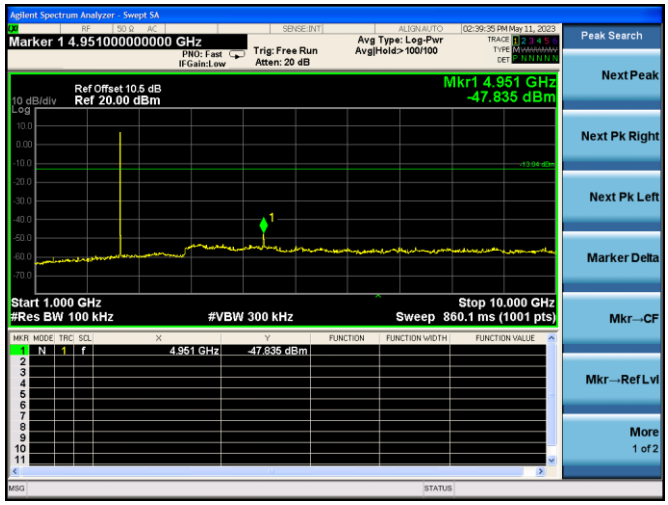


2480MHz	2480MHz(10GHz – 26GHz)
	
2480MHz(30MHz – 1GHz)	2480MHz(2.4GHz – 2.5GHz)
	
2480MHz(1GHz – 10GHz)	---
	---

2Mbps:

GFSK	
2404MHz	2404MHz(10GHz – 26GHz)
	
2404MHz(30MHz – 1GHz)	2404MHz(2.3GHz – 2.4GHz)
	
2404MHz(1GHz – 10GHz)	---
	---

2440MHz	2440MHz(1GHz – 10GHz)
	
2440MHz(30MHz – 1GHz)	2440MHz(10GHz – 26GHz)
	

2478MHz	2478MHz (10GHz – 26GHz)
	
2478MHz (30MHz – 1GHz)	2478MHz (2.4GHz – 2.5GHz)
	
2478MHz (1GHz – 10GHz)	---
	---

6. 6DB & 99% BANDWIDTH TEST

6.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.02,23	1 Year
2.	RF Cable	eastsheep	141-SMA-J J-1000	NO.1	Jul.01,22	1Year

6.2. Block Diagram of Test Setup

Please reference to section 2.4.

6.3. Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz.

6.4. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.8.2:
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥6 dB.

Use the test method descried in ANSI C63.10 clause 6.9.2:
The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.5. Test Results

EUT: DELL Wireless Headset		
M/N: HS2403		
Test date: 2023-04-28~05-09	Pressure: 102.1±1.0 kpa	Humidity: 52.2±3.0%
Tested by: lili	Test Site: RF site	Temperature:23.3±0.6℃

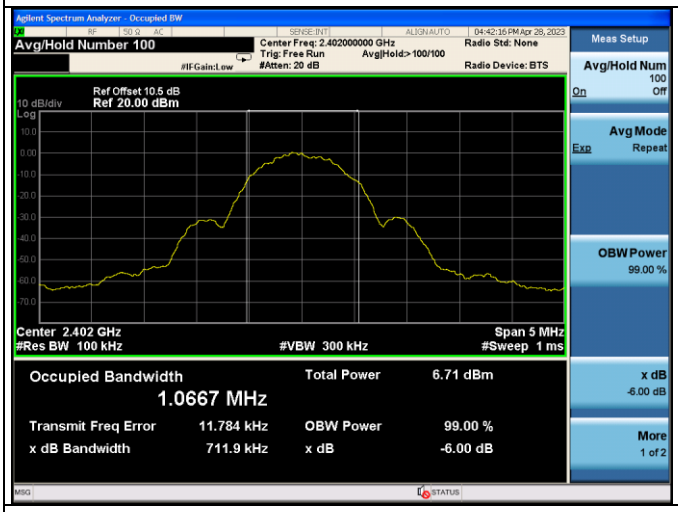
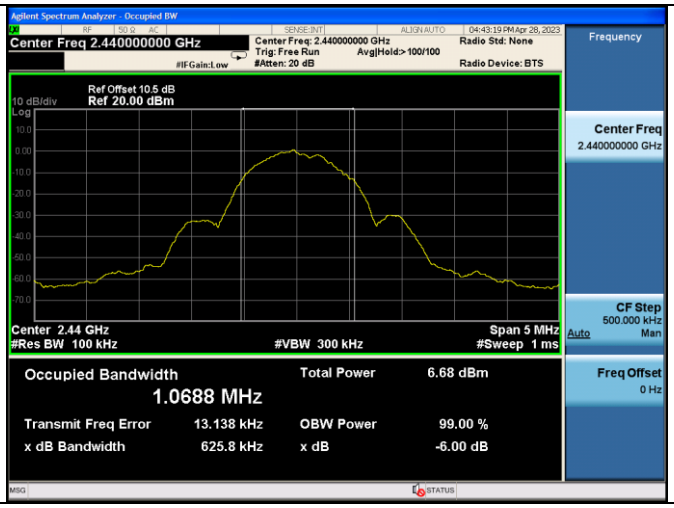
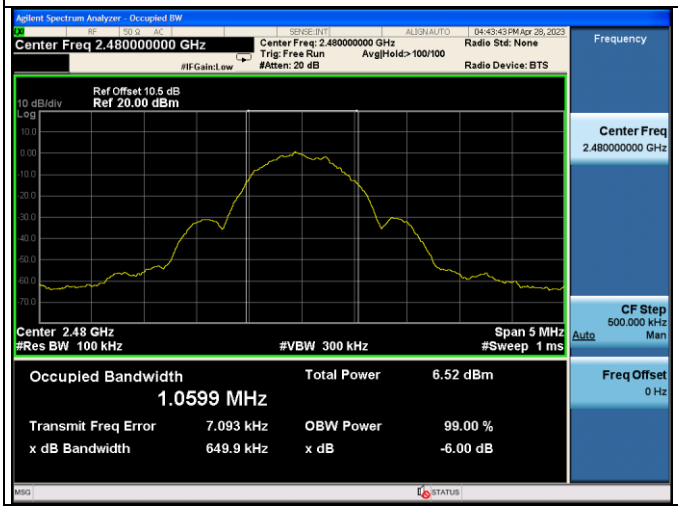
1Mbps:

Test Mode	Frequency (MHz)	-6dB Bandwidth (KHz)	Limit (KHz)
GFSK	2402	711.9	≥500
	2440	625.8	≥500
	2480	649.9	≥500
Conclusion：PASS			

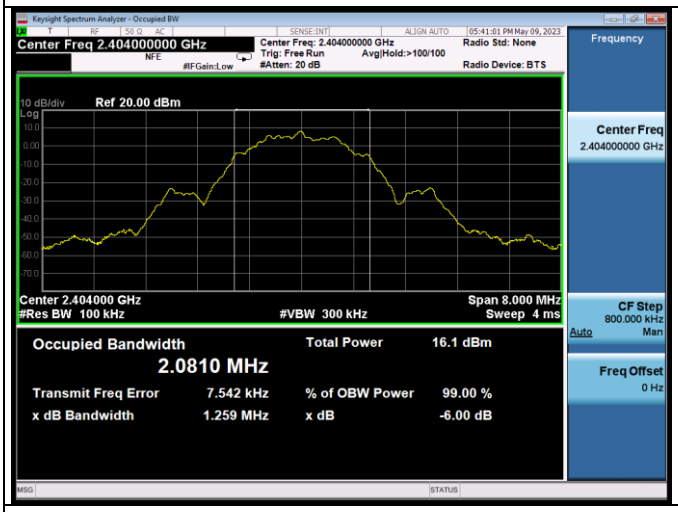
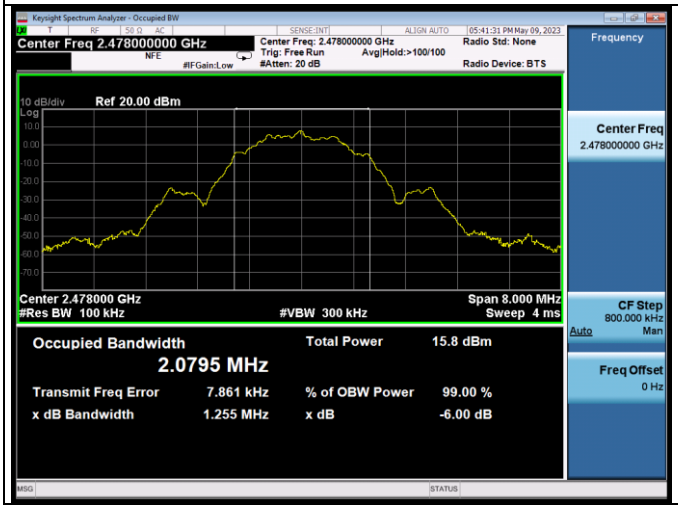
2Mbps:

Test Mode	Frequency (MHz)	-6dB Bandwidth (MHz)	Limit (KHz)
GFSK	2404	1.259	≥500
	2440	1.253	≥500
	2478	1.255	≥500
Conclusion：PASS			

1Mbps:

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

2Mbps:

GFSK	
2404MHz	2440MHz
	
2478MHz	---
	---

EUT: DELL Wireless Headset		
M/N: HS2403		
Test date: 2023-04-28~05-09	Pressure: 102.1±1.0 kpa	Humidity: 52.2±3.0%
Tested by: lili	Test Site: RF site	Temperature:23.3±0.6℃

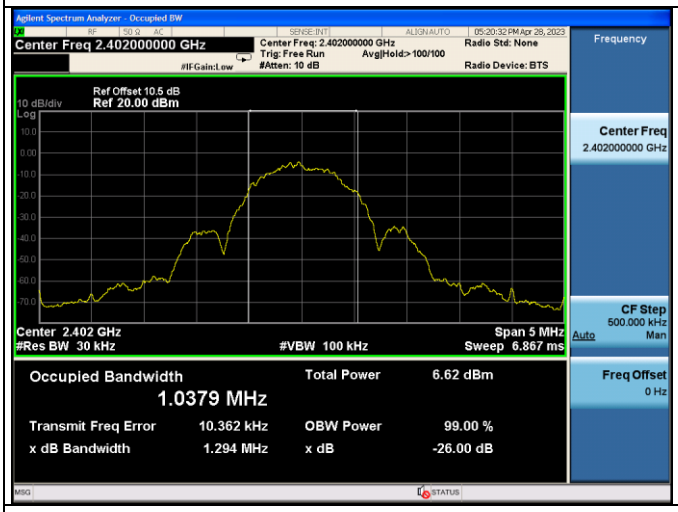
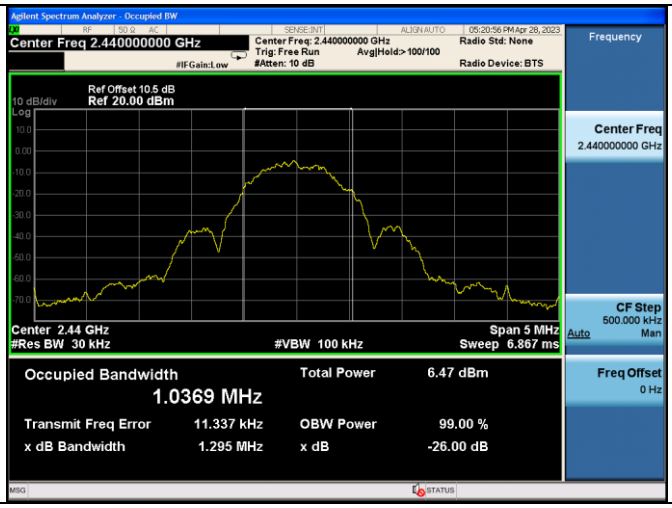
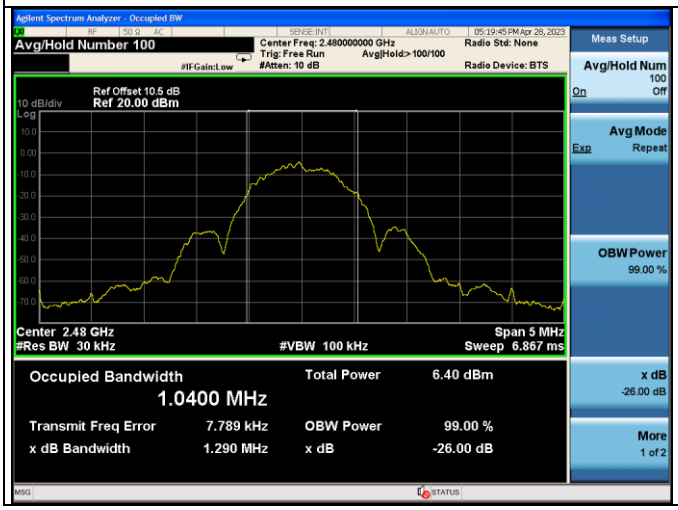
1Mbps:

Test Mode	Frequency (MHz)	99%Bandwidth (MHz)	Limit (MHz)
GFSK	2402	1.0379	N/A
	2440	1.0369	
	2480	1.0400	
Conclusion:Pass			

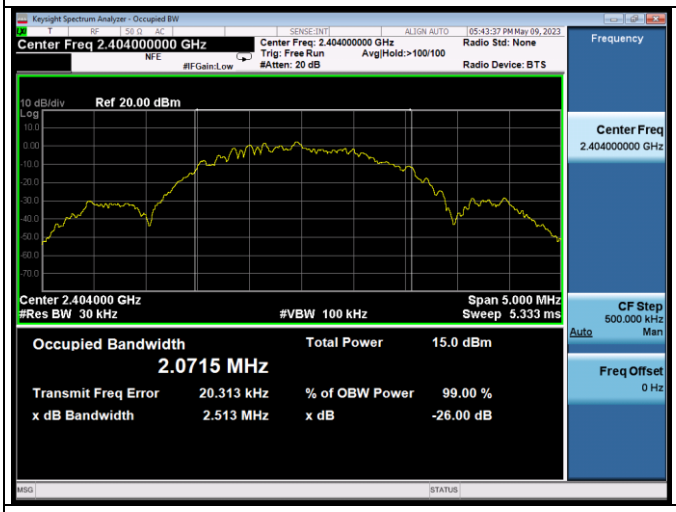
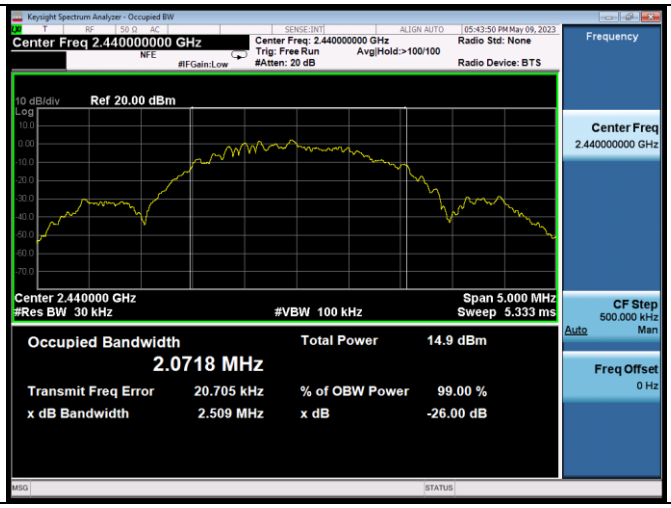
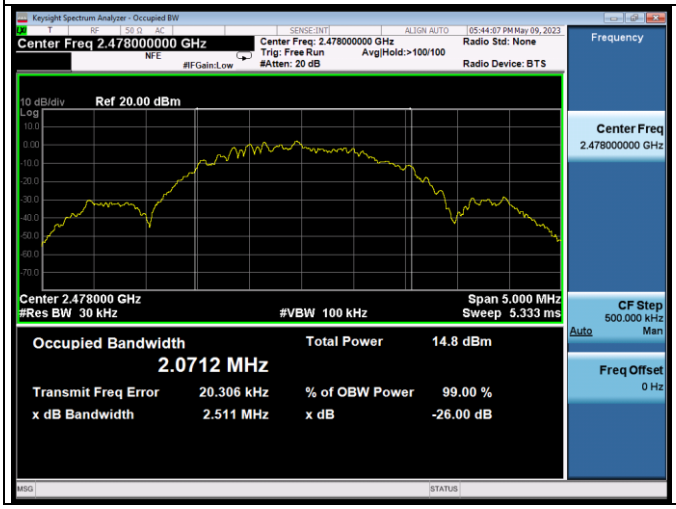
2Mbps:

Test Mode	Frequency (MHz)	99%Bandwidth (MHz)	Limit (MHz)
GFSK	2402	2.0715	N/A
	2440	2.0718	
	2478	2.0712	
Conclusion:Pass			

1Mbps:

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

2Mbps:

GFSK	
2404MHz	2440MHz
	
2478MHz	---
	---

7. MAXIMUM PEAK OUTPUT POWER TEST

7.1. 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.	Power meter	Anritsu	ML2487A	6K00002472	Jul.01,22	1 Year
3.	Power sensor	Anritsu	MA2491A	033005	Jul.01,22	1 Year
4.	RF Cable	eastsheep	141-SMA-J J-1000	NO.1	Jul.01,22	1Year

7.2. Limit

For systems using digital modulation in the 2400—2483.5MHz, The Peak out put Power shall not exceed 1W(30dBm).

7.3. Test Procedure

Use the test method descried in ANSI C63.10 clause 11.9.1.1:

7.4. Test Results

EUT: DELL Wireless Headset		
M/N: HS2403		
Test date: 2023-05-10	Pressure: 102.1±1.0 kpa	Humidity: 52.2±3.0%
Tested by: lili	Test Site: RF site	Temperature:23.3±0.6℃

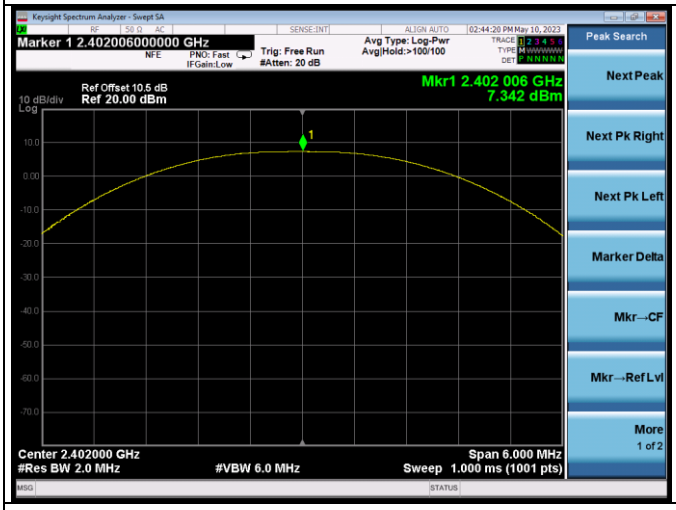
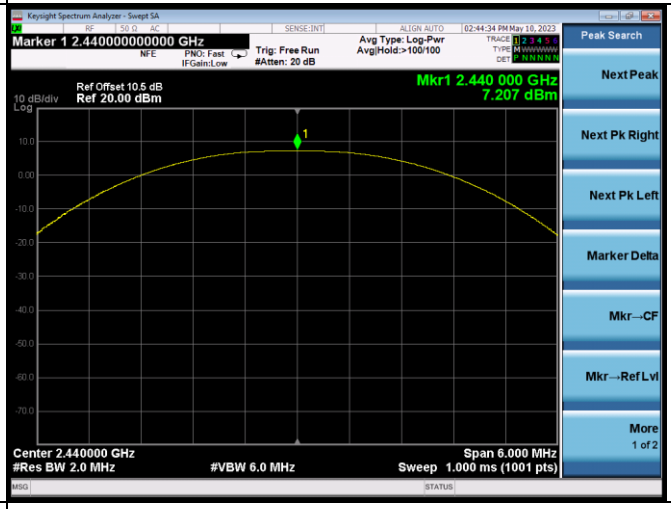
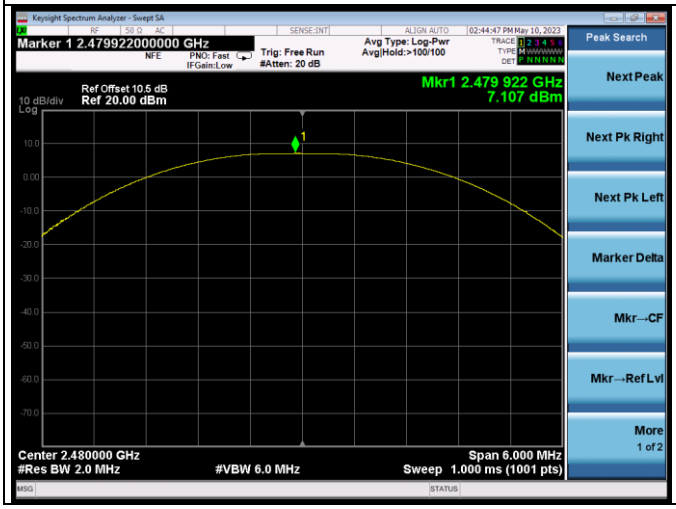
1Mbps:

Test Mode	Frequency (MHz)	Peak output Power （dBm）	Limit (dBm)
GFSK	2402	7.342	30
	2440	7.207	30
	2480	7.107	30
Conclusion: PASS			

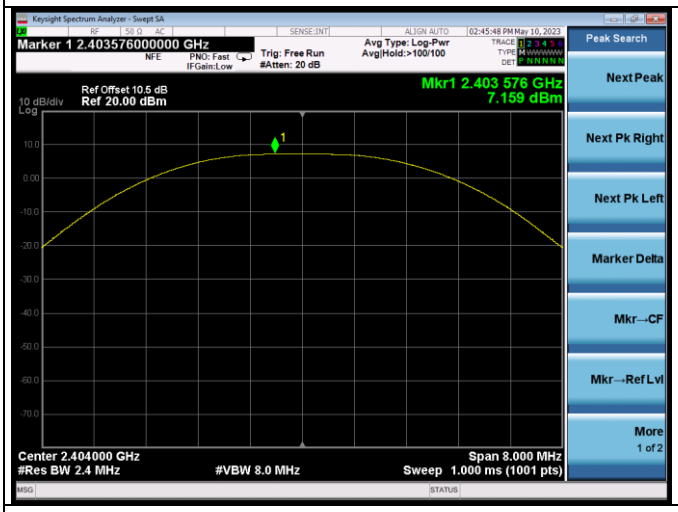
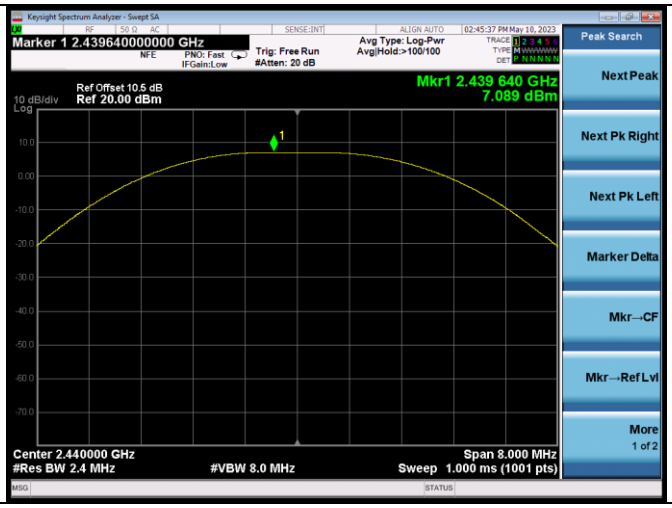
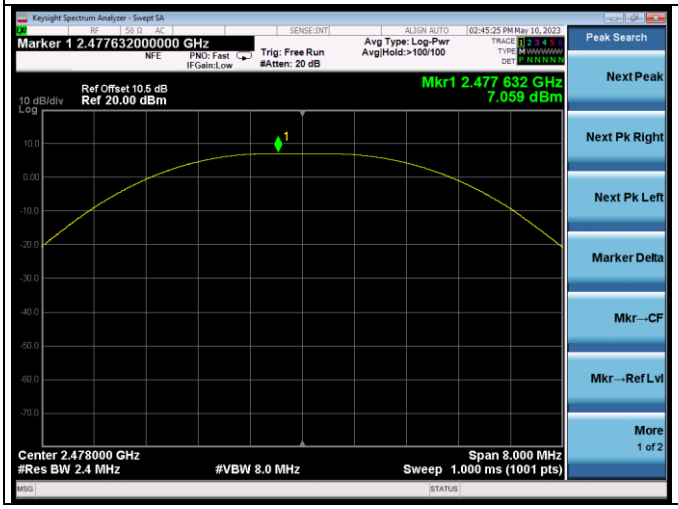
2Mbps:

Test Mode	Frequency (MHz)	Peak output Power （dBm）	Limit (dBm)
GFSK	2404	7.159	30
	2440	7.089	30
	2478	7.059	30
Conclusion: PASS			

1Mbps:

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

2Mbps:

GFSK	
2404MHz	2440MHz
	
2478MHz	---
	---

8. BAND EDGE COMPLIANCE TEST

8.1. 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.	Amplifier	Agilent	8449B	3008A02495	Apr.02,23	1 Year
3.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	Aug.12,22	1 Year
4.	RF Cable	eastsheep	141-SMA-JJ-1000	NO.1	Jul.01,22	1Year

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:

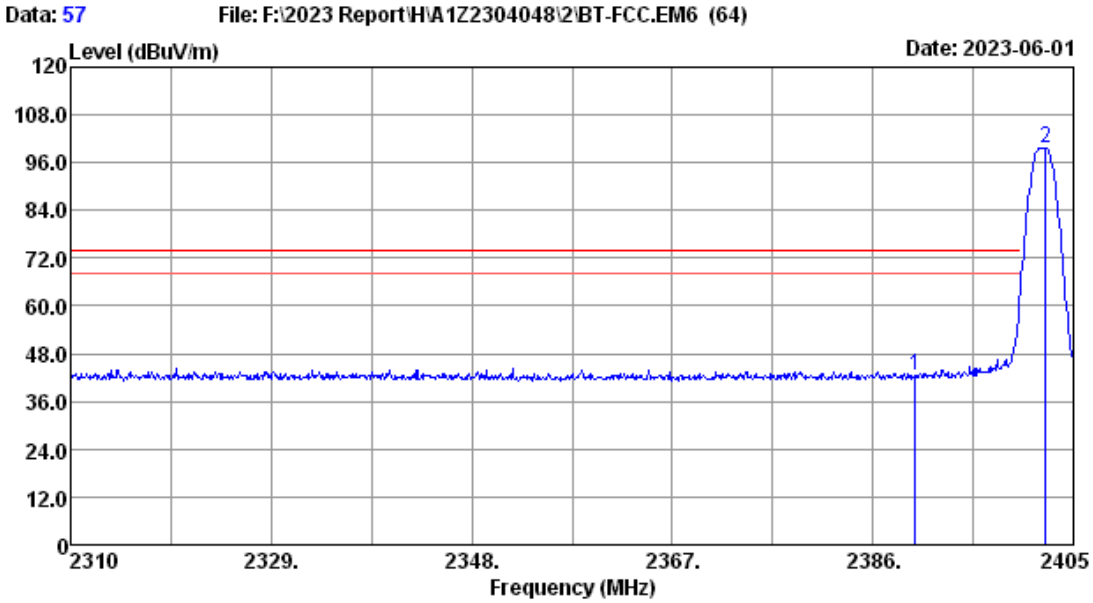
1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out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

1Mbps:

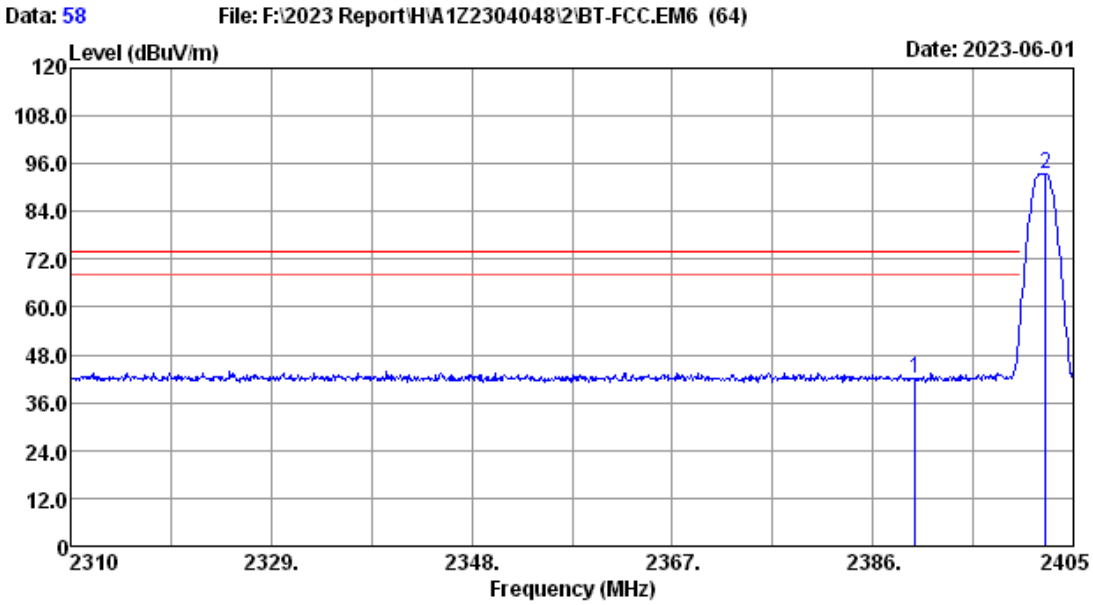


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE1M 2402 MHz TX
:

Data no. : 57
Ant. pol. : HORIZONTAL
Pressure : 101.7kPa
Engineer : nier

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	27.70	2.29	46.68	34.36	42.31	74.00	31.69	Peak
2	2402.34	27.70	2.29	104.17	34.36	99.80	------	------	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

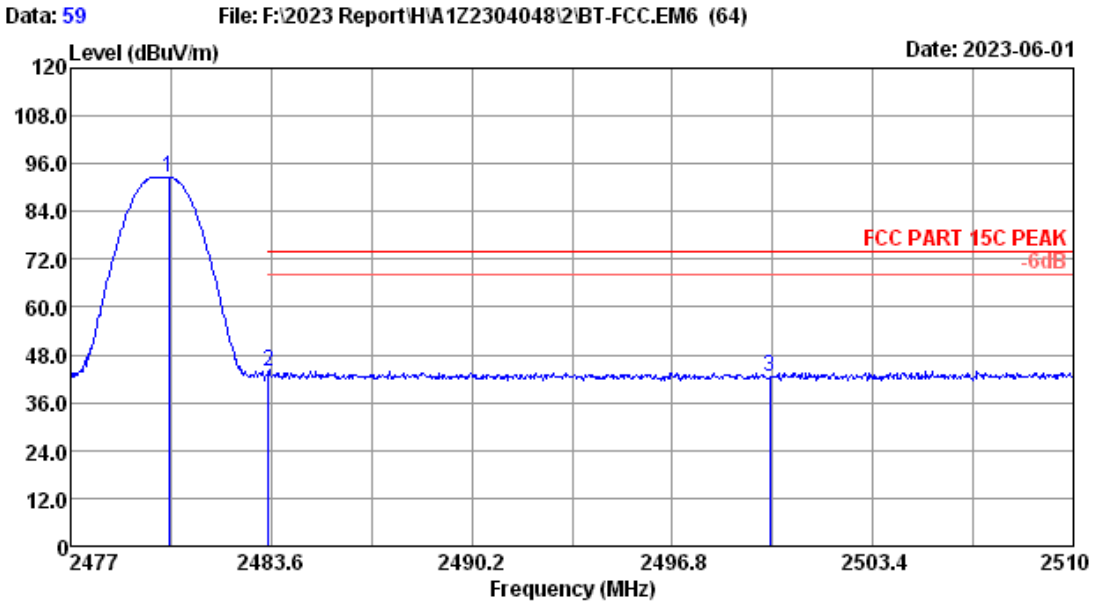


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE1M 2402 MHz TX
:

Data no. : 58
Ant. pol. : VERTICAL
Pressure : 101.7kPa
Engineer : nier

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	27.70	2.29	46.31	34.36	41.94	74.00	32.06	Peak
2	2402.34	27.70	2.29	98.00	34.36	93.63	------	------	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

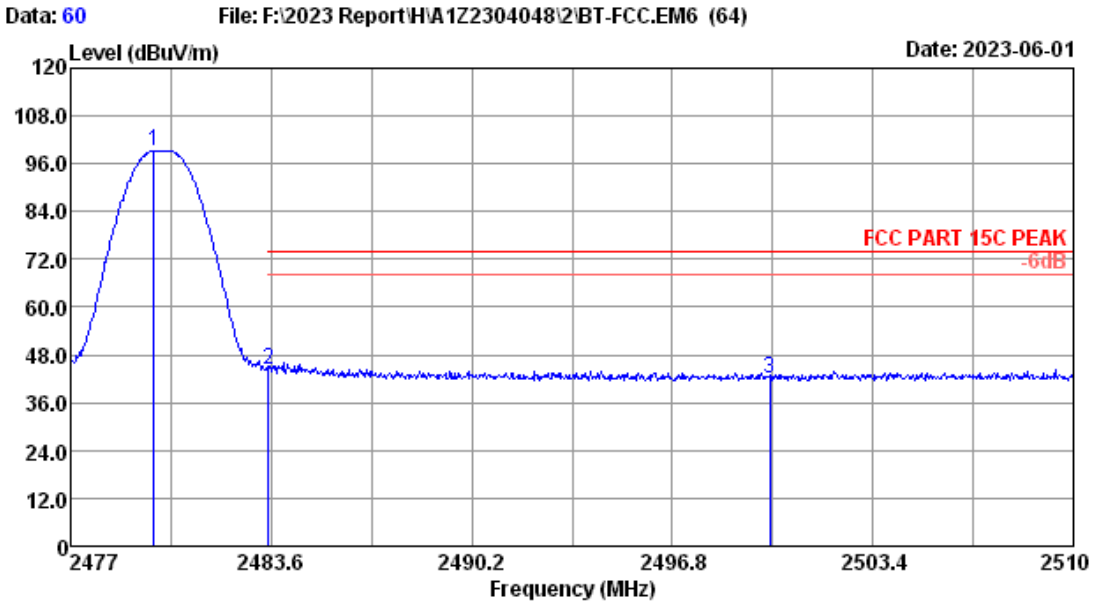


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE1M 2480 MHz TX
:

Data no. : 59
Ant. pol. : VERTICAL
Pressure : 101.7kPa
Engineer : nier

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	2.34	96.71	34.35	92.50	------	------	Peak
2	2483.50	27.80	2.34	48.10	34.35	43.89	74.00	30.11	Peak
3	2500.00	27.80	2.35	46.66	34.35	42.46	74.00	31.54	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.



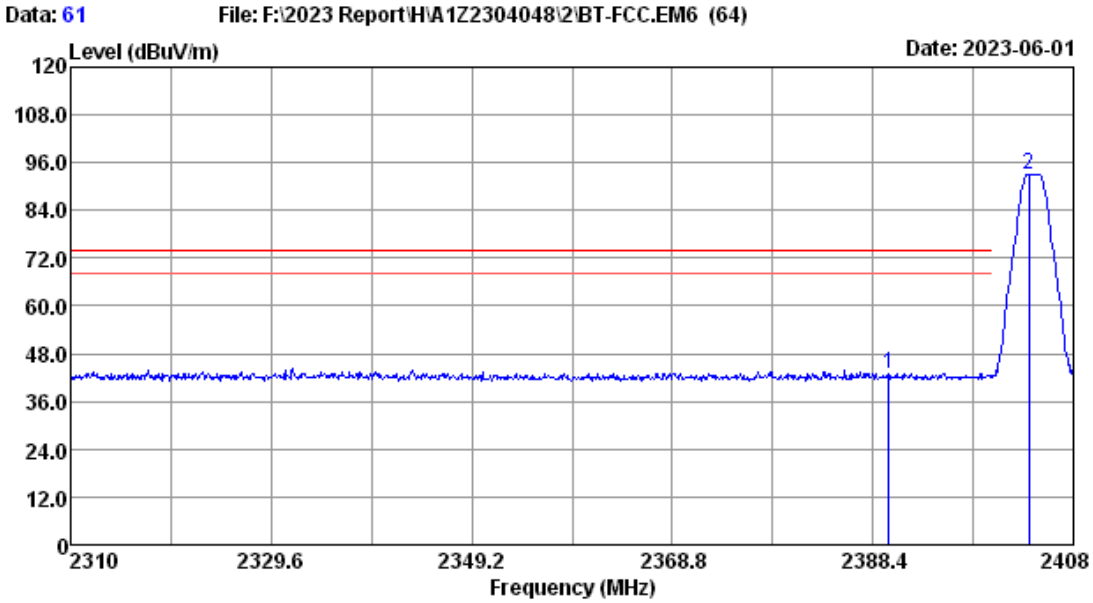
Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE1M 2480 MHz TX
:

Data no. : 60
Ant. pol. : HORIZONTAL
Pressure : 101.7kPa
Engineer : nier

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	2.34	103.36	34.35	99.15	------	------	Peak
2	2483.50	27.80	2.34	48.63	34.35	44.42	74.00	29.58	Peak
3	2500.00	27.80	2.35	46.25	34.35	42.05	74.00	31.95	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

2Mbps:

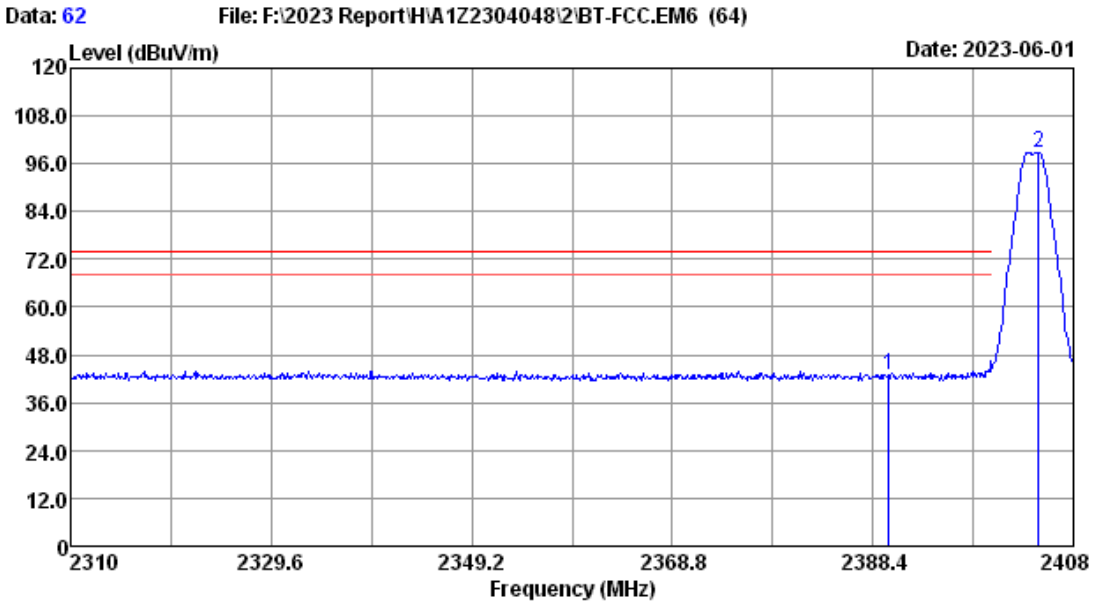


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE2M 2404 MHz TX
:

Data no. : 61
Ant. pol. : VERTICAL
Pressure : 101.7kPa
Engineer : nier

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	27.70	2.29	47.11	34.36	42.74	74.00	31.26	Peak
2	2403.69	27.73	2.30	97.54	34.36	93.21	------	------	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

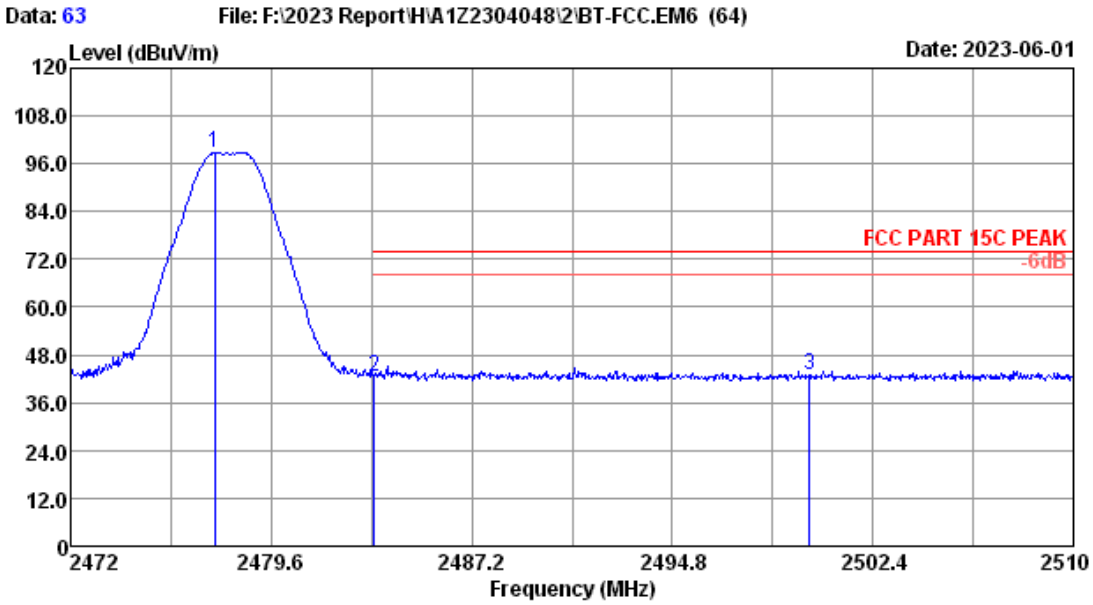


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE2M 2404 MHz TX
:

Data no. : 62
Ant. pol. : HORIZONTAL
Pressure : 101.7kPa
Engineer : nier

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	27.70	2.29	47.39	34.36	43.02	74.00	30.98	Peak
2	2404.57	27.73	2.30	103.14	34.36	98.81	------	------	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

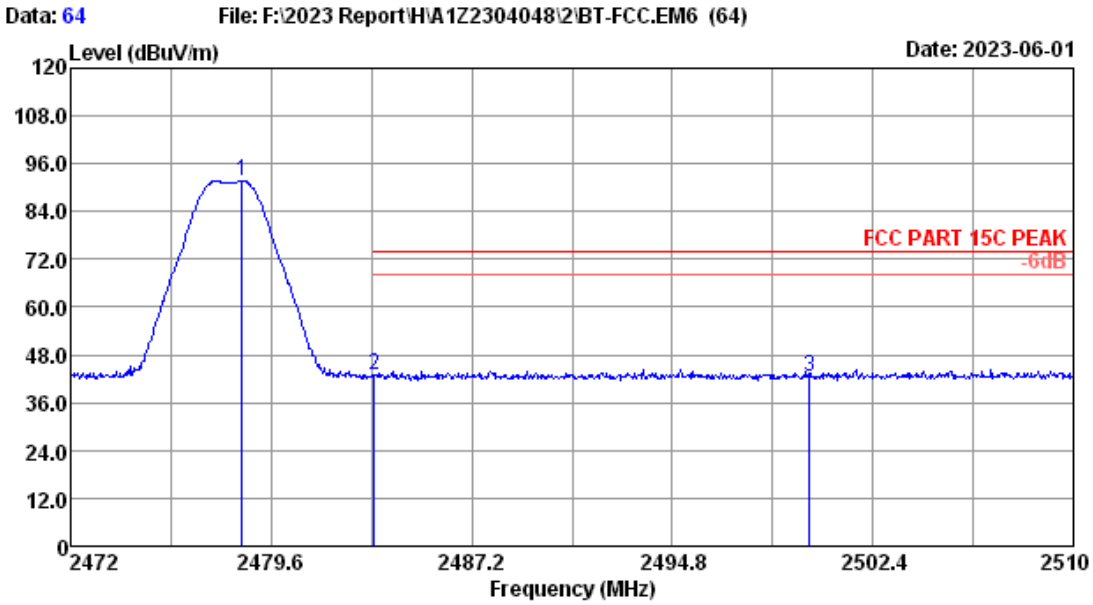


Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE2M 2478 MHz TX
:

Data no. : 63
Ant. pol. : HORIZONTAL
Pressure : 101.7kPa
Engineer : nier

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	2477.47	27.80	2.34	103.04	34.35	98.83	------	------	Peak
2	2483.50	27.80	2.34	46.92	34.35	42.71	74.00	31.29	Peak
3	2500.00	27.80	2.35	47.12	34.35	42.92	74.00	31.08	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : RF Chamber
Dis. / Ant. : 3m 2022 MCTD1209-3006
Limit : FCC PART 15C PEAK
Env. / Ins. : 23.2*C/52.5%
Power Rating :
Test Mode : BLE2M 2478 MHz TX
:

Data no. : 64
Ant. pol. : VERTICAL
Pressure : 101.7kPa
Engineer : nier

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	2478.50	27.80	2.34	95.89	34.35	91.68	------	------	Peak
2	2483.50	27.80	2.34	47.11	34.35	42.90	74.00	31.10	Peak
3	2500.00	27.80	2.35	46.57	34.35	42.37	74.00	31.63	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
2. The emission levels that are 20dB below the official limit are not reported.

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.02,23	1 Year
2.	RF Cable	eastsheep	141-SMA-JJ-1000	NO.1	Jul.01,22	1Year

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: DELL Wireless Headset		
M/N: HS2403		
Test date: 2023-05-10	Pressure: 102.1±1.0 kpa	Humidity: 52.2±3.0%
Tested by: lili	Test Site: RF site	Temperature:23.3±0.6℃

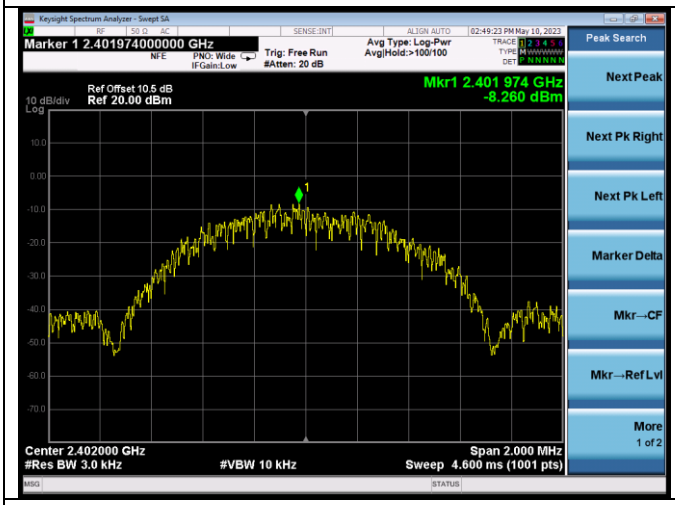
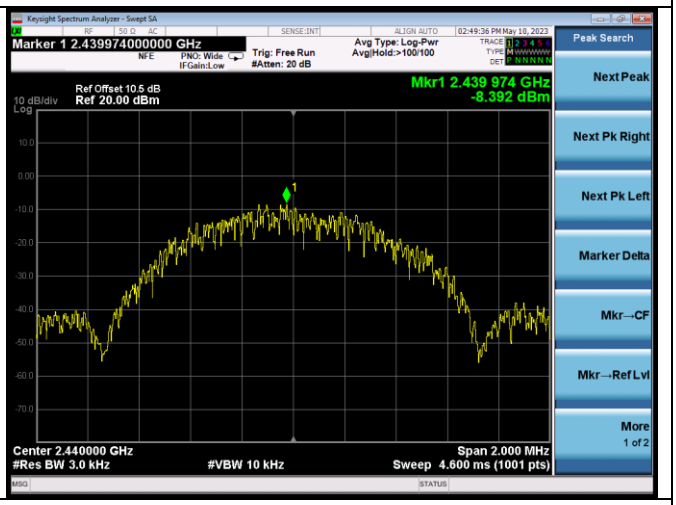
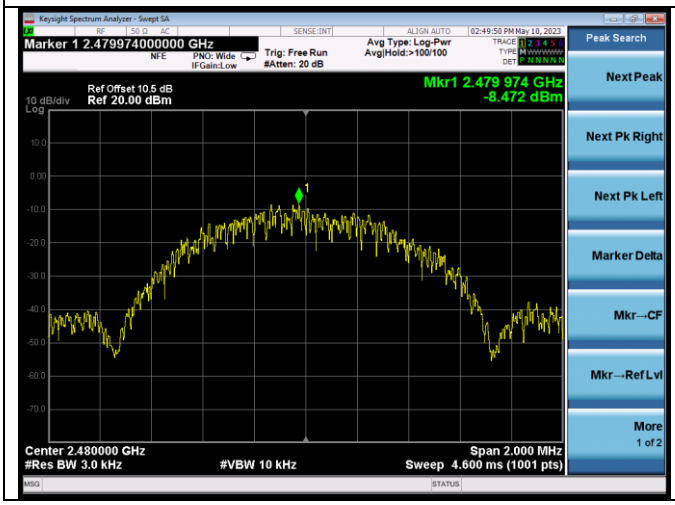
1Mbps:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/MHz)
GFSK	2402	-8.260	8
	2440	-8.392	8
	2480	-8.472	8
Conclusion：PASS			

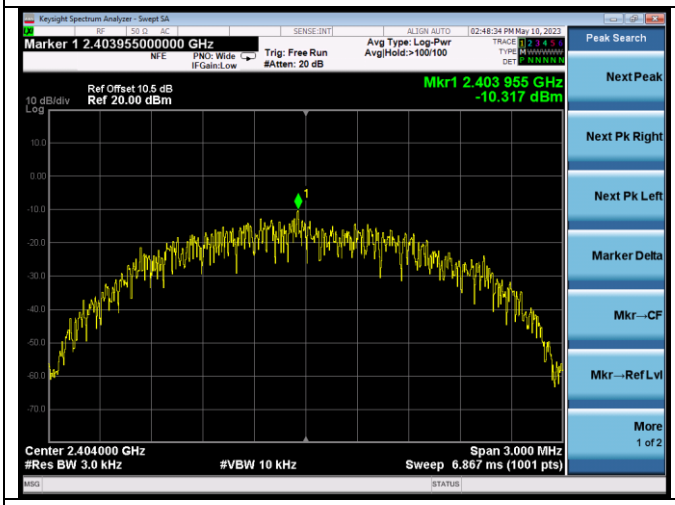
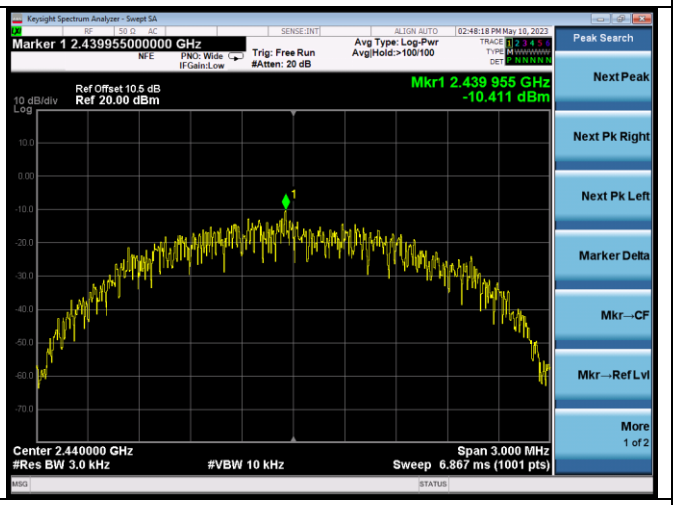
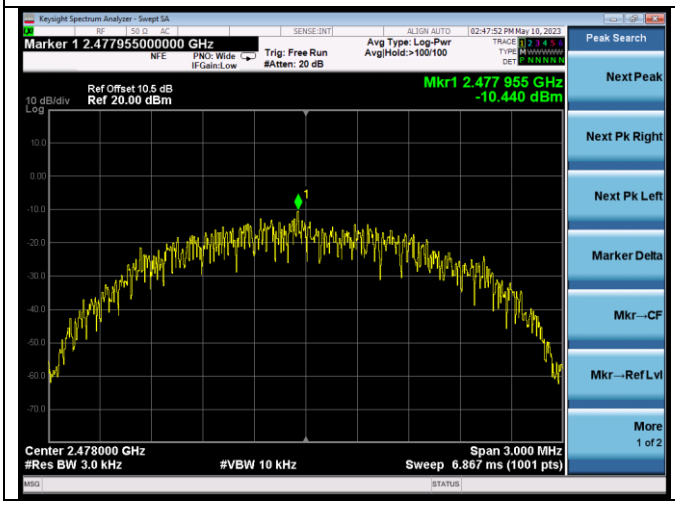
2Mbps:

Test Mode	Frequency (MHz)	Power Spectral Density (dBm/3KHz)	Limit (dBm/MHz)
GFSK	2404	-10.317	8
	2440	-10.411	8
	2478	-10.440	8
Conclusion：PASS			

1Mbps:

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

2Mbps:

GFSK	
2404MHz	2440MHz
	
2478MHz	---
	---

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 Dipole 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 2.87dBi.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]

THE END