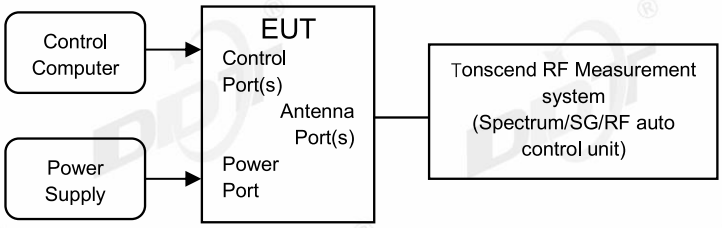
9. RF Conducted Spurious Emissions

9.1. Block diagram of test setup



9.2. Limits

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

9.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

Center frequency	Test frequency
RBW:	100 kHz
VBW:	300 kHz
Span	Wide enough to capture the peak level of the in-band emission
Detector Mode:	Peak
Sweep time:	Auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

(4) Set the spectrum analyzer as follows:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Number of measurement points	≥Span/RBW
Detector Mode:	Peak
Sweep time:	Auto
Trace mode	Max hold

Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

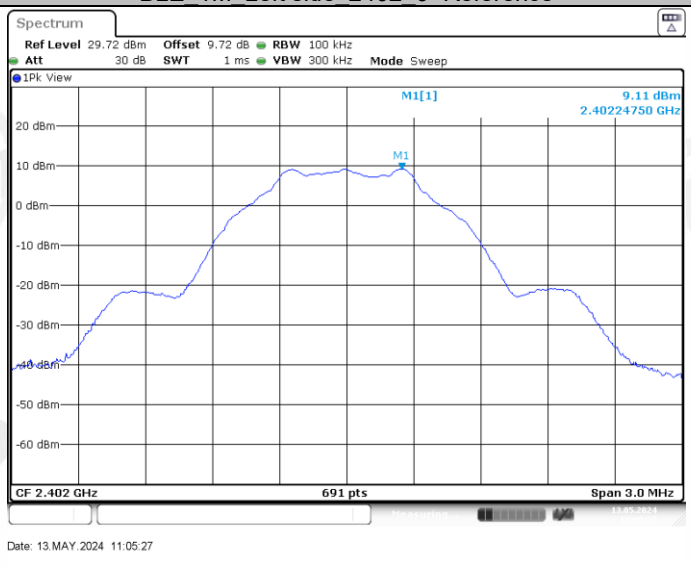
9.4. Test result

Test Engineer:	Zhongyao	Test Site:	RF Measurement System 3#
Ambient Condition:	24.4-25.3℃,47.5-47.9%RH	Test Date:	2024.05.07-2024.05.08
Test Power Supply:	Battery	Sample Number:	S24020411-012

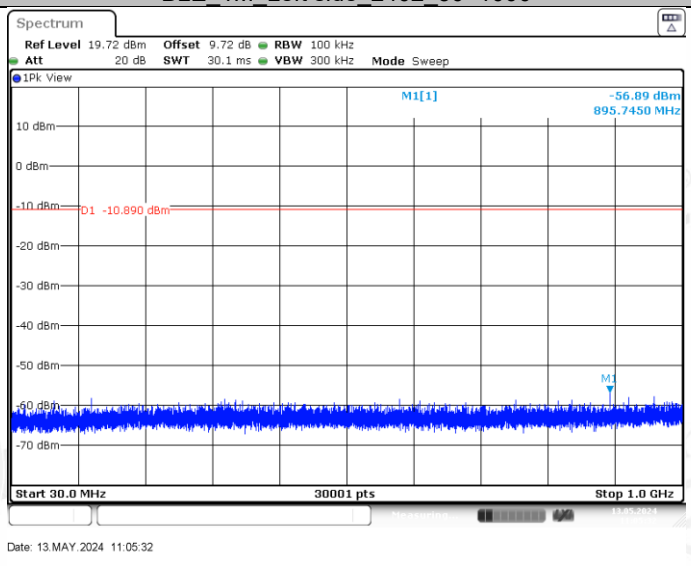
Mode	Freq. (MHz)	Verdict
GFSK 1M	2402	Pass
	2440	Pass
	2480	Pass
GFSK 2M	2404	Pass
	2440	Pass
	2478	Pass

9.5. Test graphs

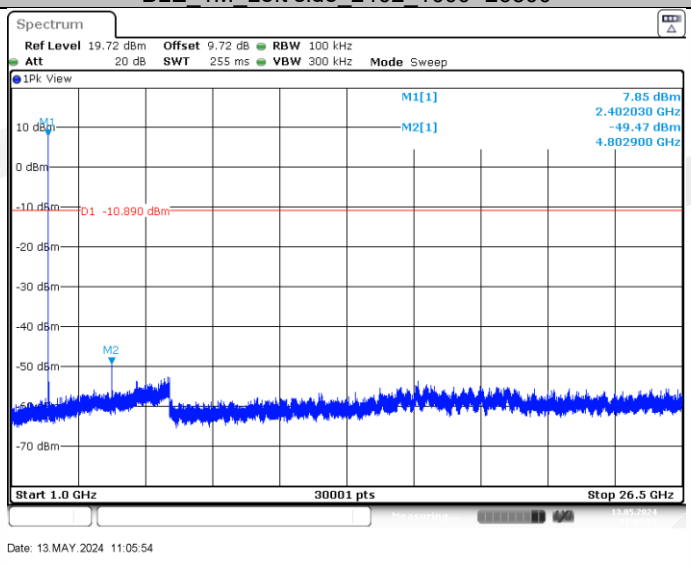
BLE_1M_Left side_2402_0~Reference



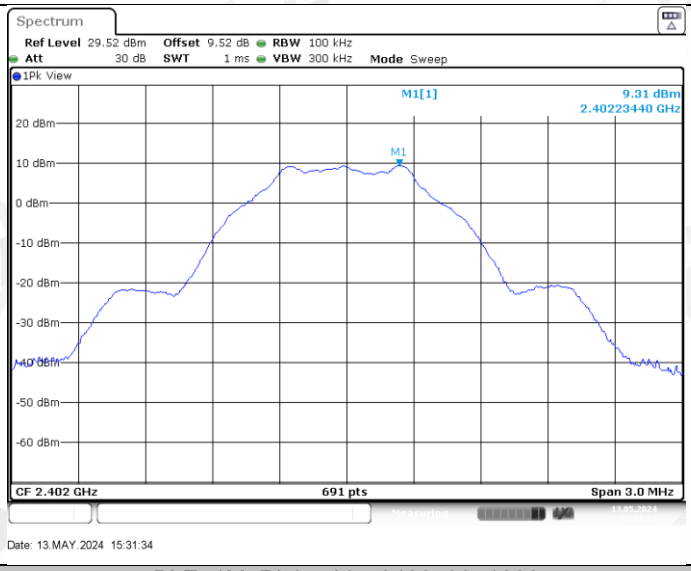
BLE_1M_Left side_2402_30~1000



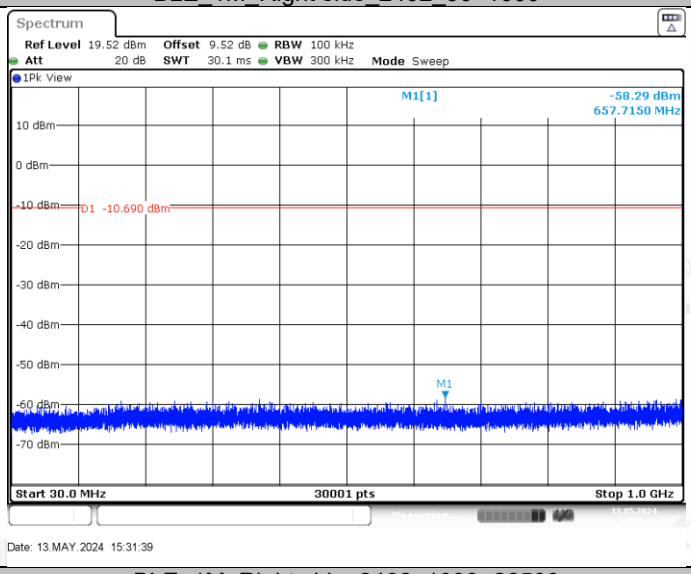
BLE_1M_Left side_2402_1000~26500



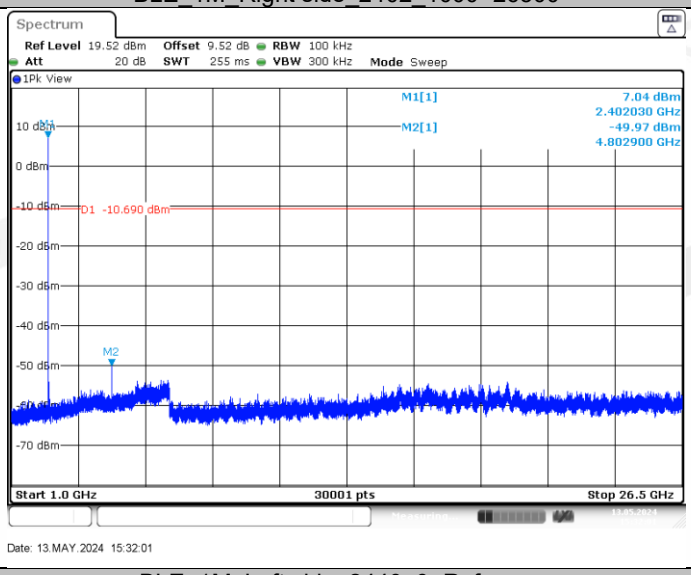
BLE_1M_Right side_2402_0~Reference



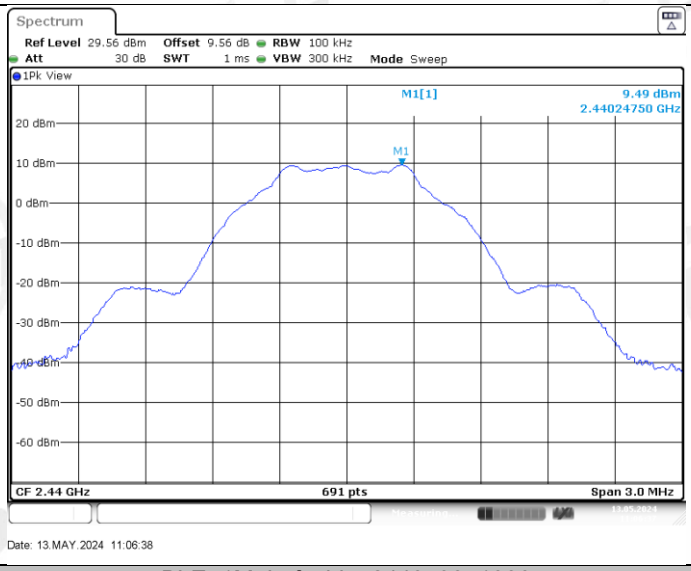
BLE_1M_Right side_2402_30~1000



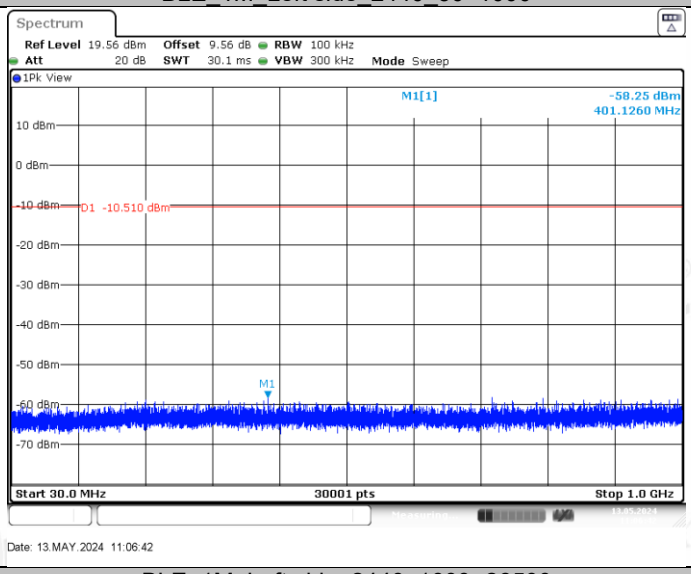
BLE_1M_Right side_2402_1000~26500



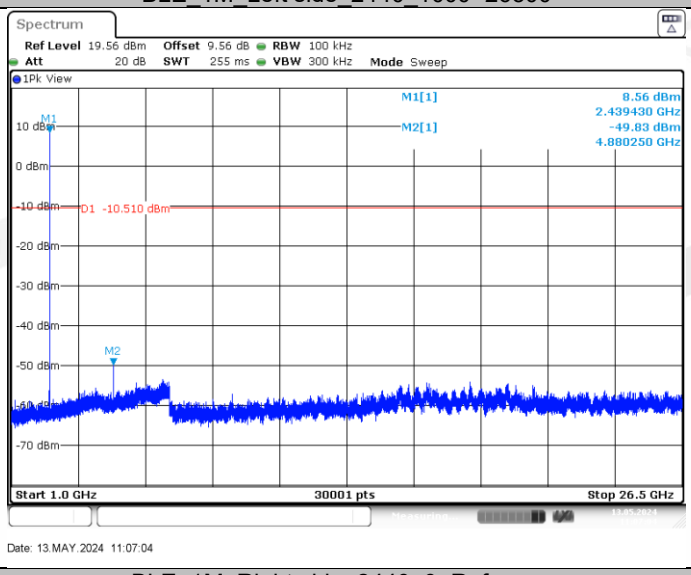
BLE_1M_Left side_2440_0~Reference



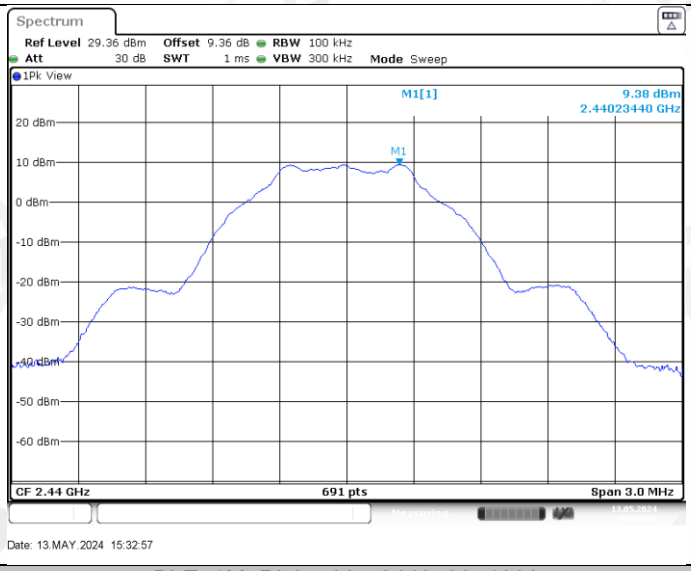
BLE_1M_Left side_2440_30~1000



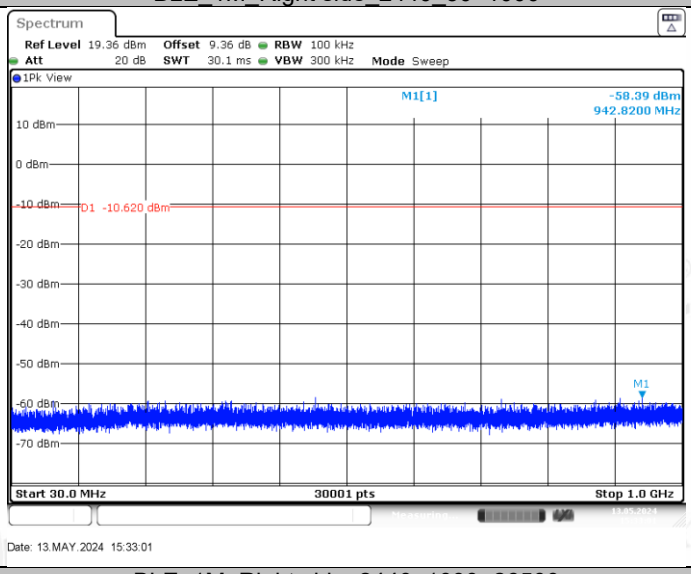
BLE_1M_Left side_2440_1000~26500



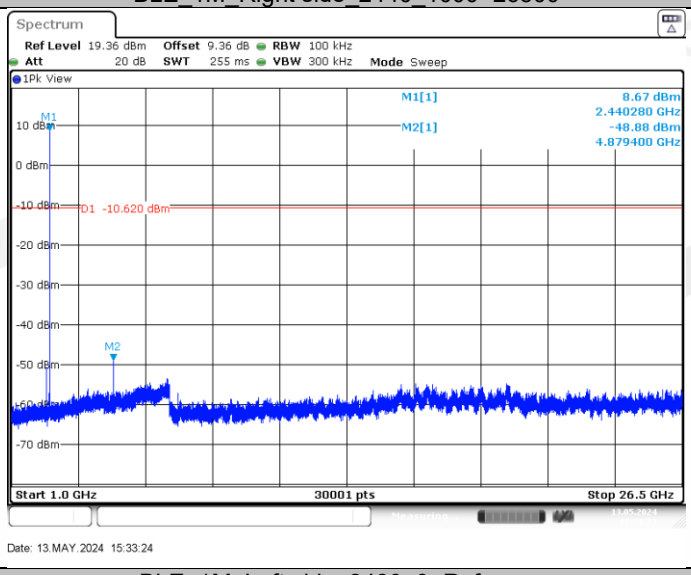
BLE_1M_Right side_2440_0~Reference



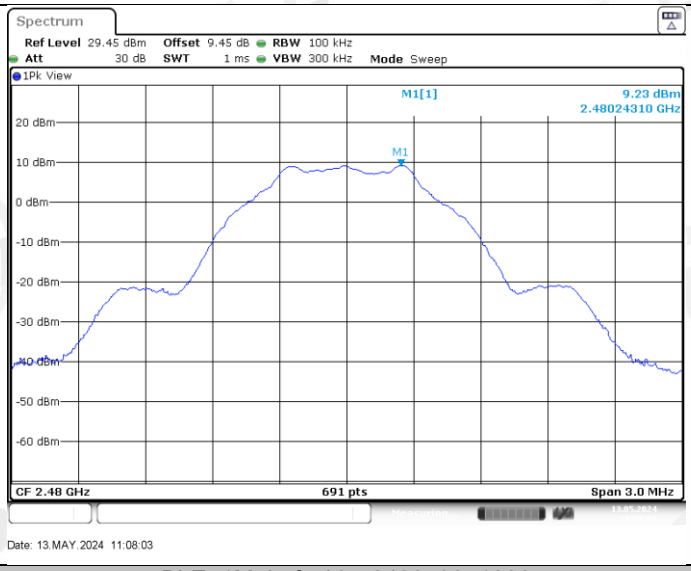
BLE_1M_Right side_2440_30~1000



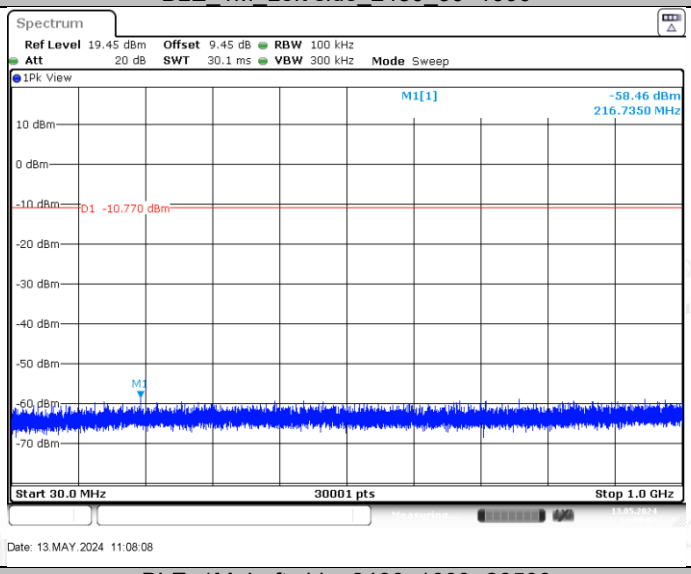
BLE_1M_Right side_2440_1000~26500



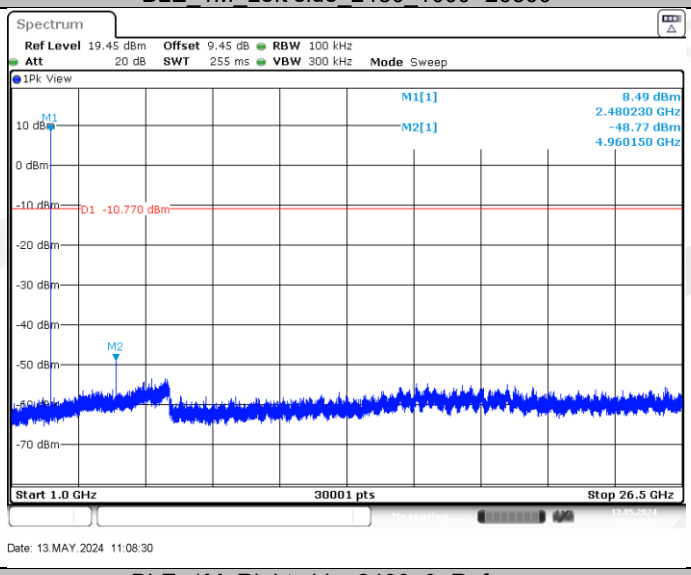
BLE_1M_Left side_2480_0~Reference



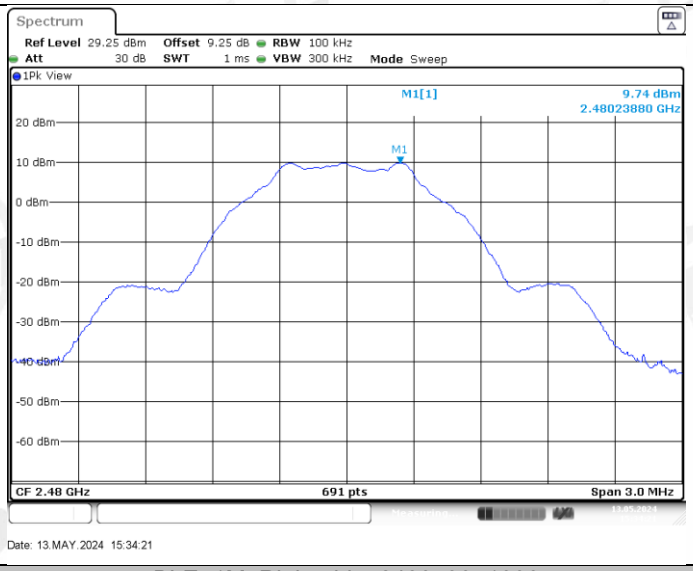
BLE_1M_Left side_2480_30~1000



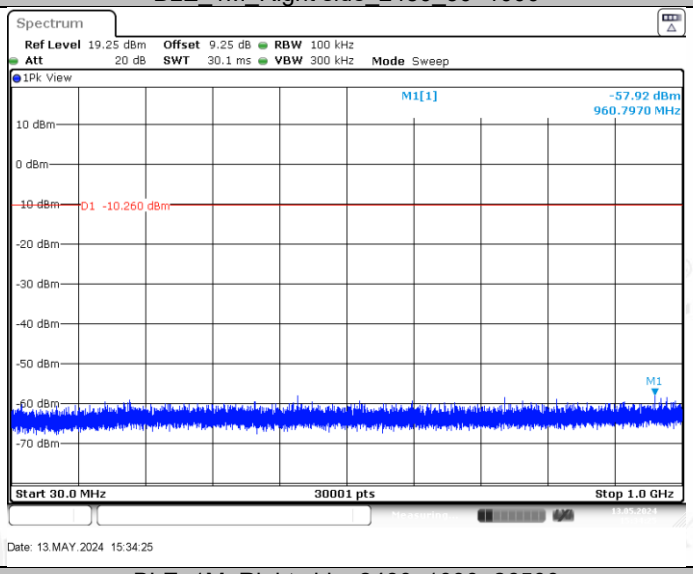
BLE_1M_Left side_2480_1000~26500



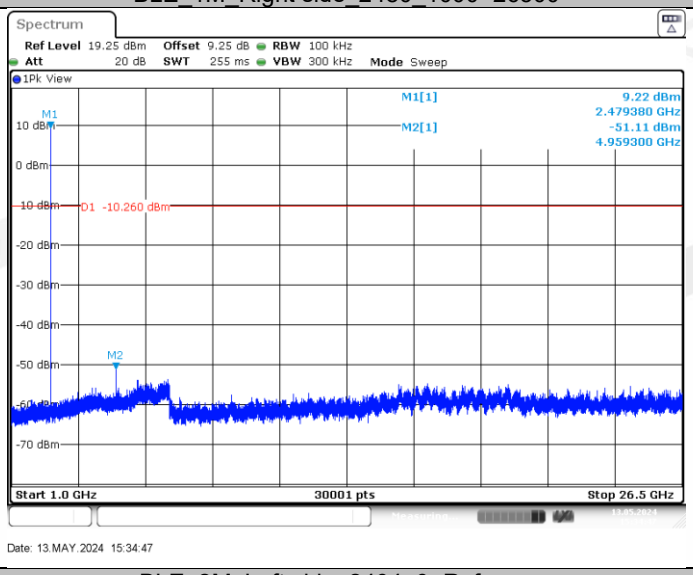
BLE_1M_Right side_2480_0~Reference



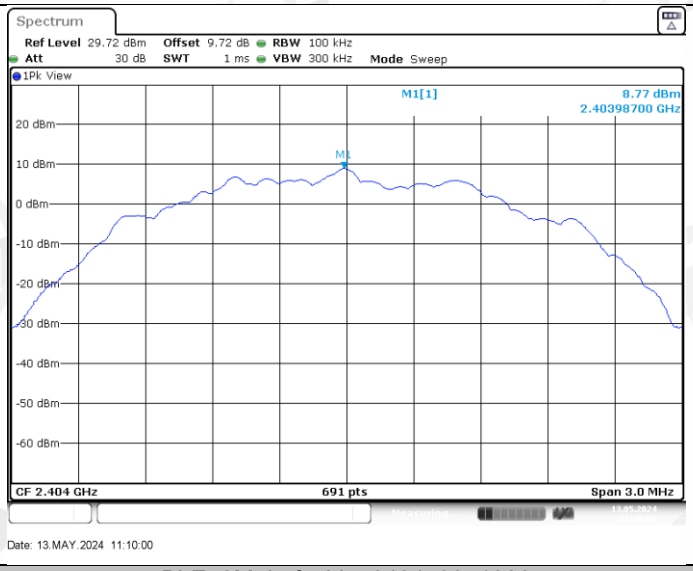
BLE_1M_Right side_2480_30~1000



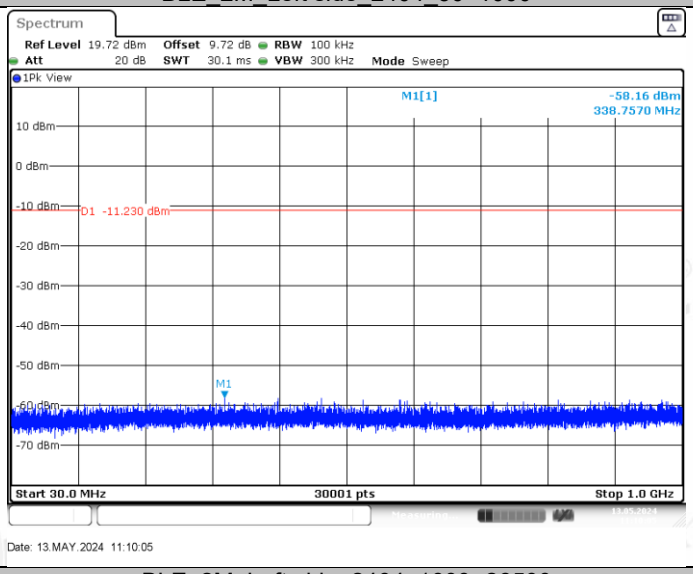
BLE_1M_Right side_2480_1000~26500



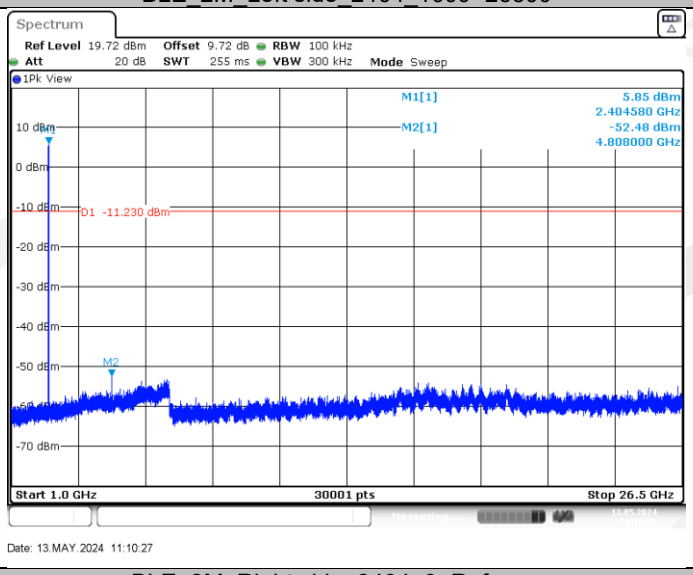
BLE_2M_Left side_2404_0~Reference



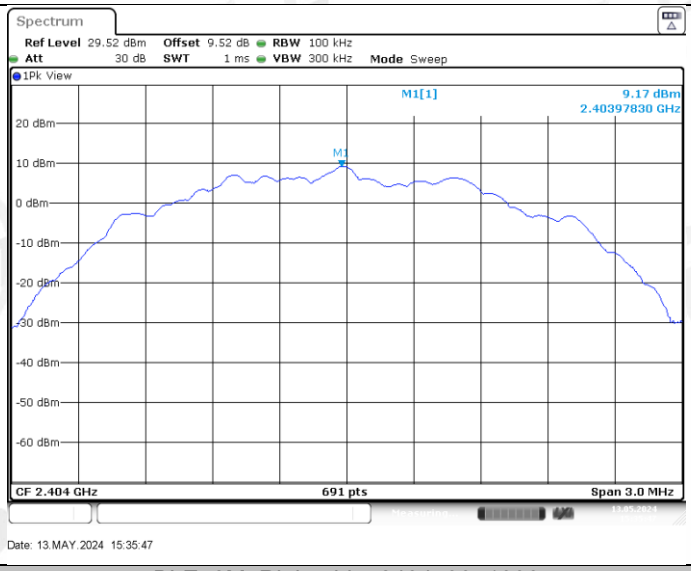
BLE_2M_Left side_2404_30~1000



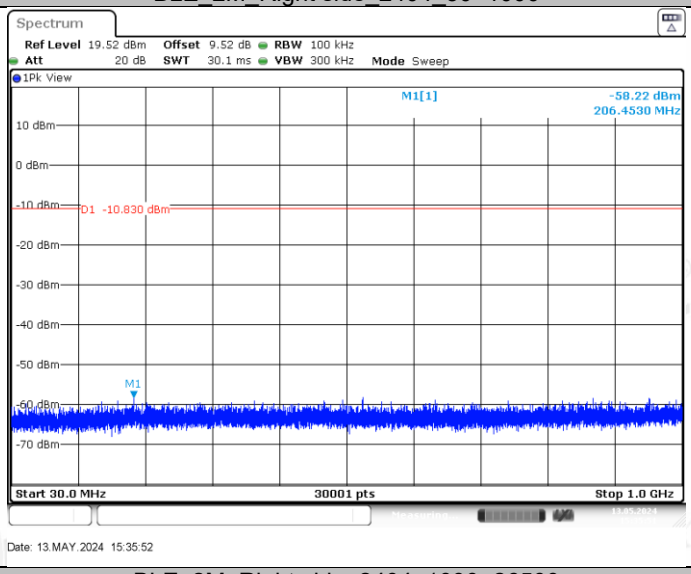
BLE_2M_Left side_2404_1000~26500



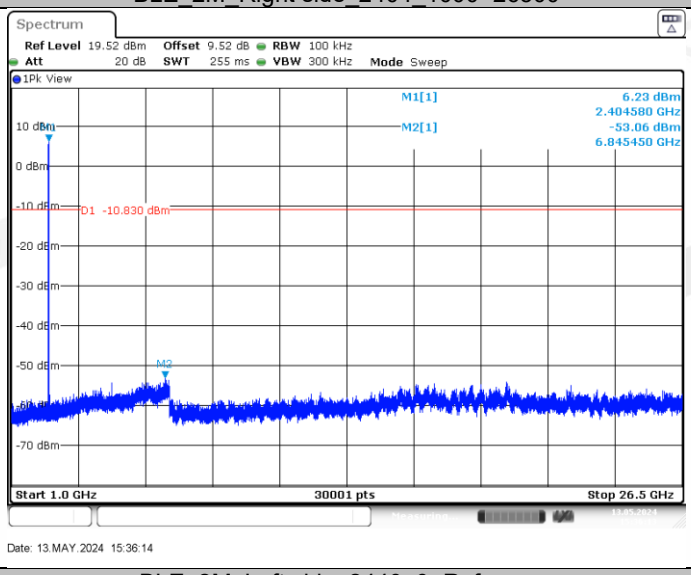
BLE_2M_Right side_2404_0~Reference



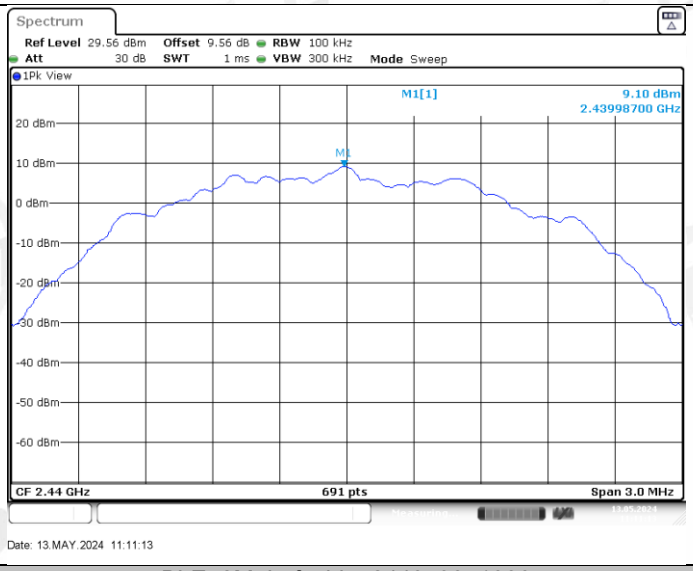
BLE_2M_Right side_2404_30~1000



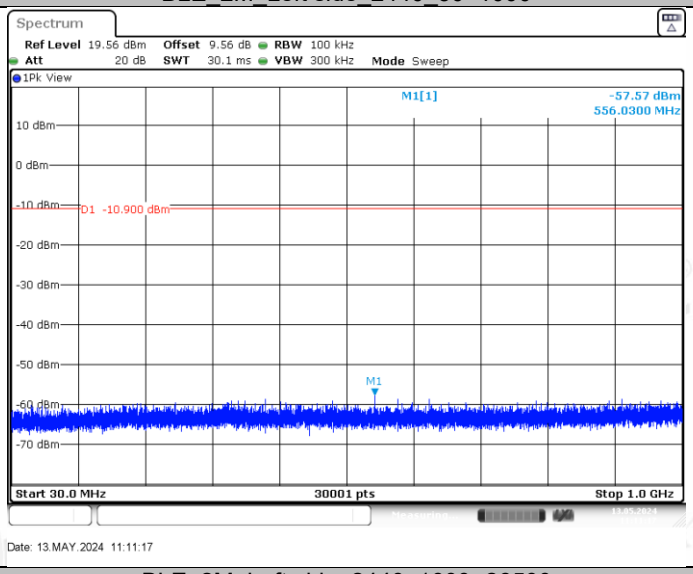
BLE_2M_Right side_2404_1000~26500



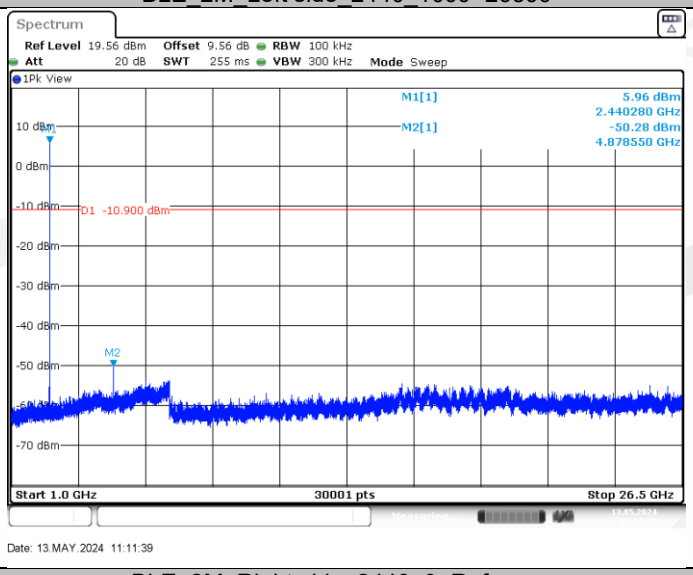
BLE_2M_Left side_2440_0~Reference



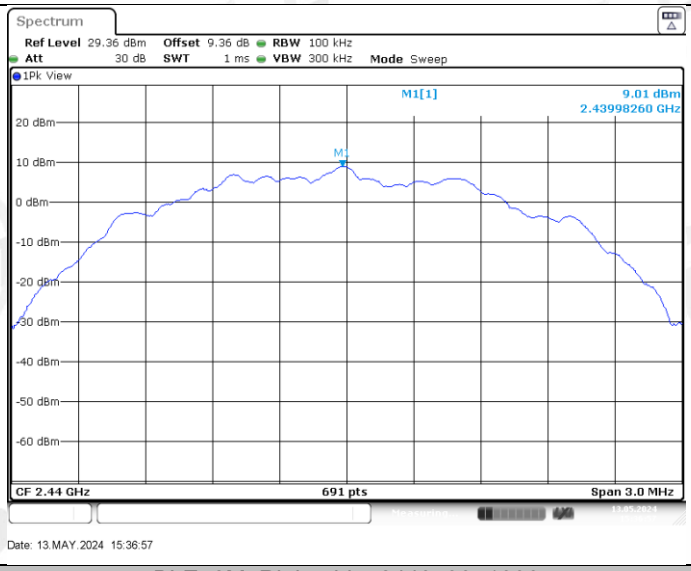
BLE_2M_Left side_2440_30~1000



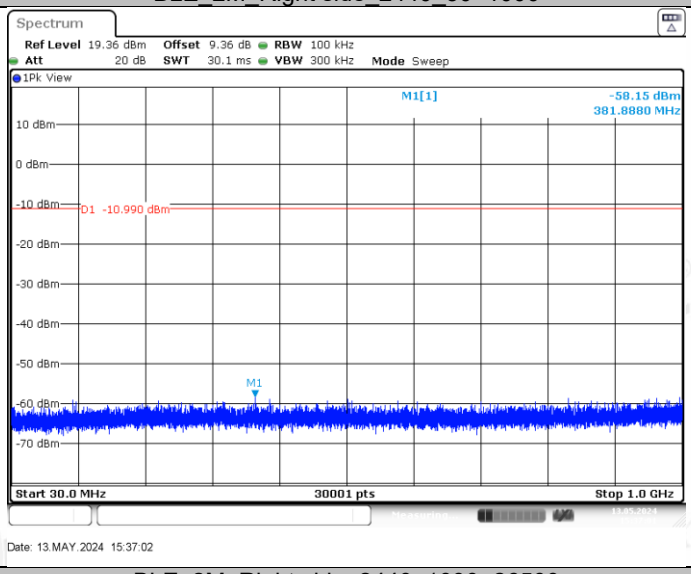
BLE_2M_Left side_2440_1000~26500



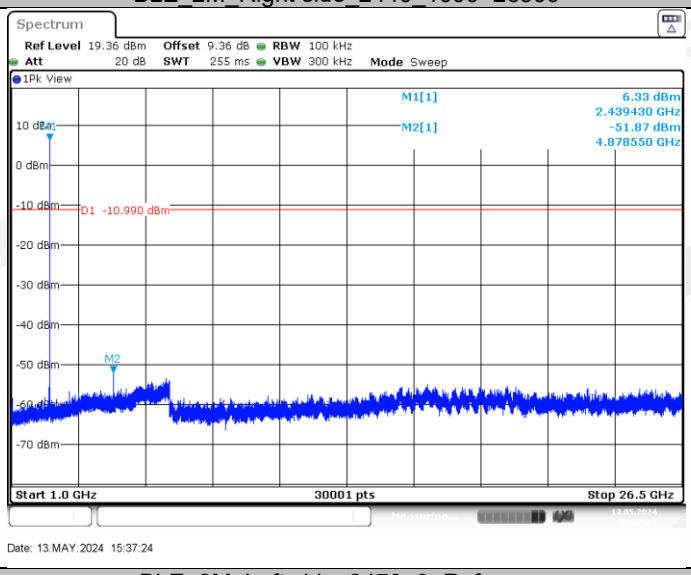
BLE_2M_Right side_2440_0~Reference



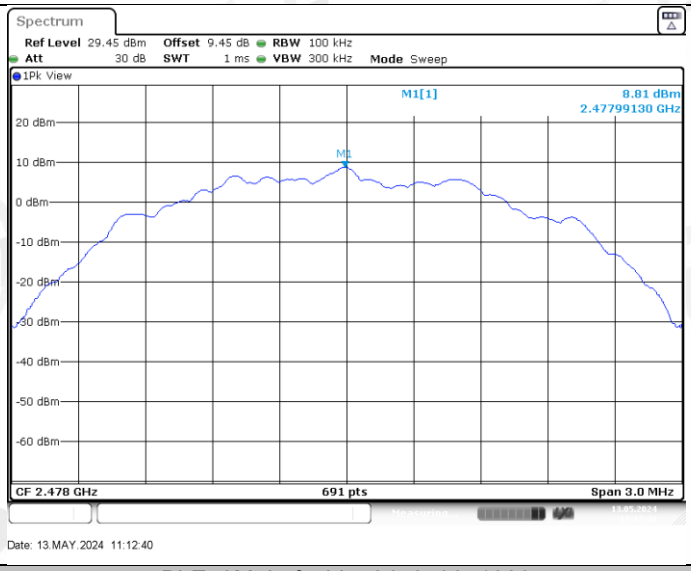
BLE_2M_Right side_2440_30~1000



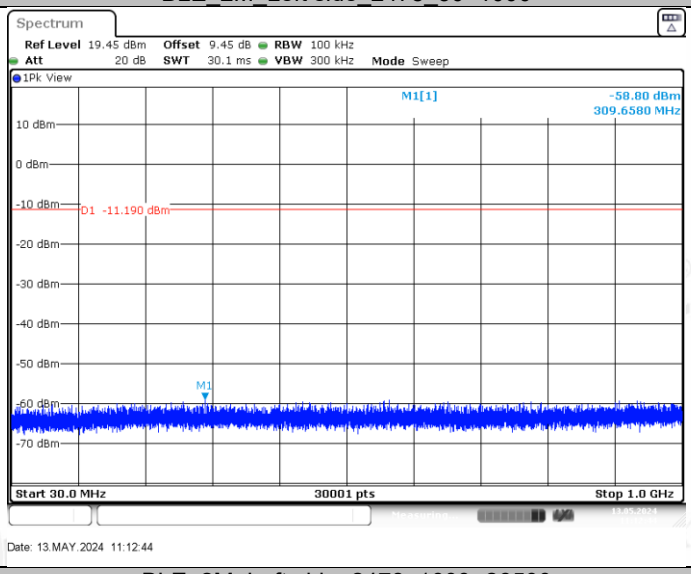
BLE_2M_Right side_2440_1000~26500



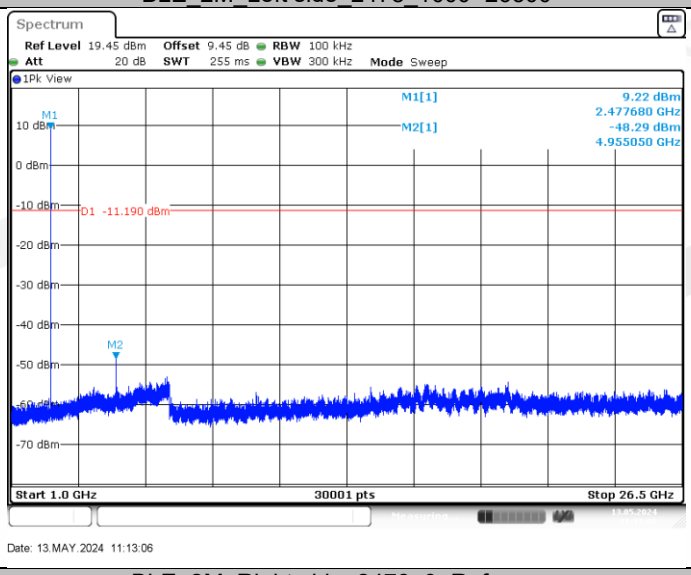
BLE_2M_Left side_2478_0~Reference



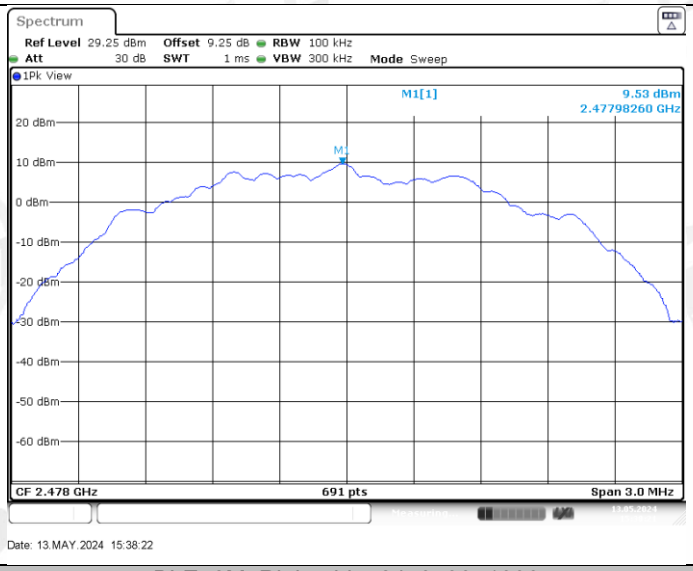
BLE_2M_Left side_2478_30~1000



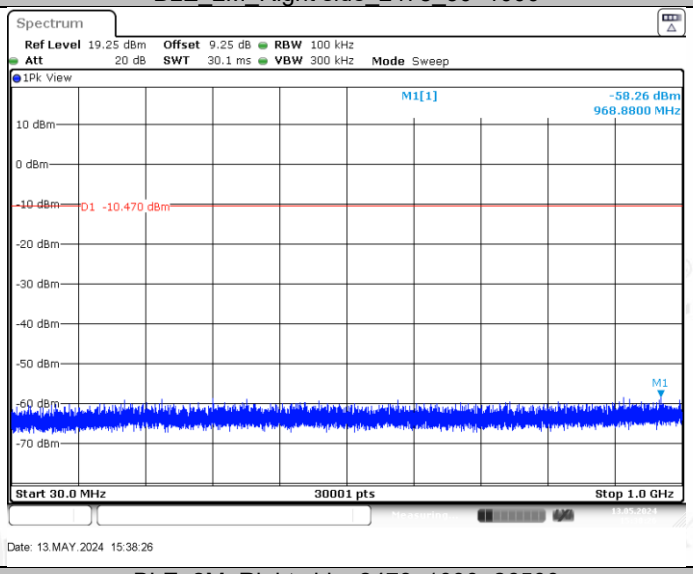
BLE_2M_Left side_2478_1000~26500



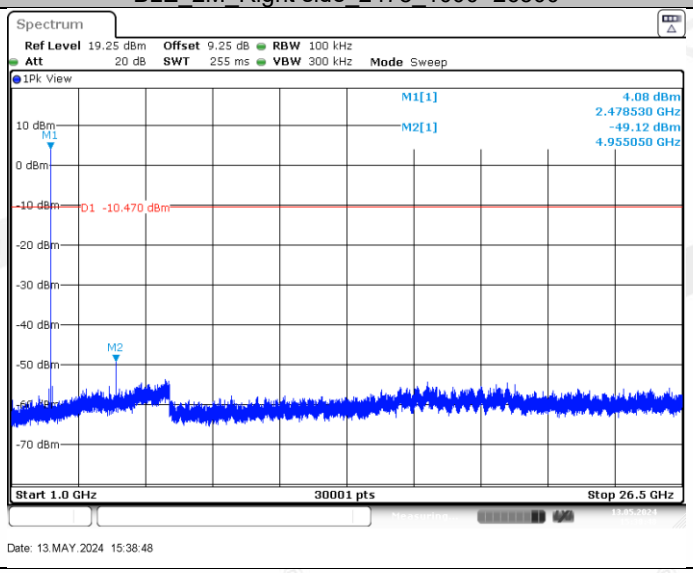
BLE_2M_Right side_2478_0~Reference



BLE_2M_Right side_2478_30~1000

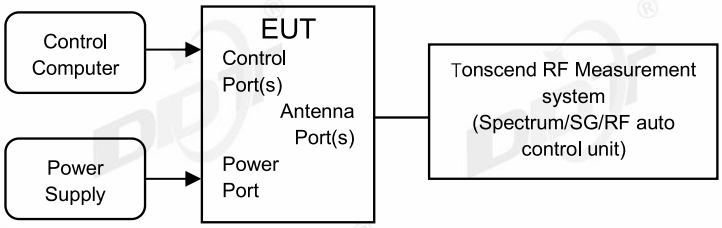


BLE_2M_Right side_2478_1000~26500



10. Duty Cycle

10.1. Block diagram of test setup



10.2. Limit

Just for Report.

10.3. Test procedure

(1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, The cable loss and attenuator loss have been put into spectrum analyzer as amplitude offset.
set the Spectrum Analyzer as below:
Centre Frequency: The centre frequency of the middle hopping channel.
Resolution BW: 10 MHz.
Video BW: 10 MHz.
Span: Zero span.
Detector: Peak.
Trace Mode: Clear Write.
Sweep: Video Trigger

(2) When the trace is complete, measure the sending time of 1 burst and the duty cycle of 1 burst cycle.

(3) Calculate dwell time follow below formula:
Duty cycle= Pulse's on time / Burst cycle

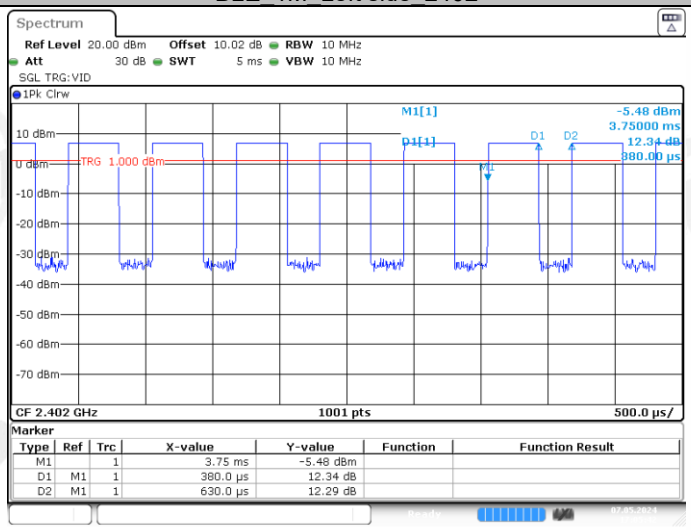
10.4. Test result

Test Engineer:	Zhongyao	Test Site:	RF Measurement System 3#
Ambient Condition:	24.4-25.3℃,47.5-47.9%RH	Test Date:	2024.05.07-2024.05.08
Test Power Supply:	Battery	Sample Number:	S24020411-012

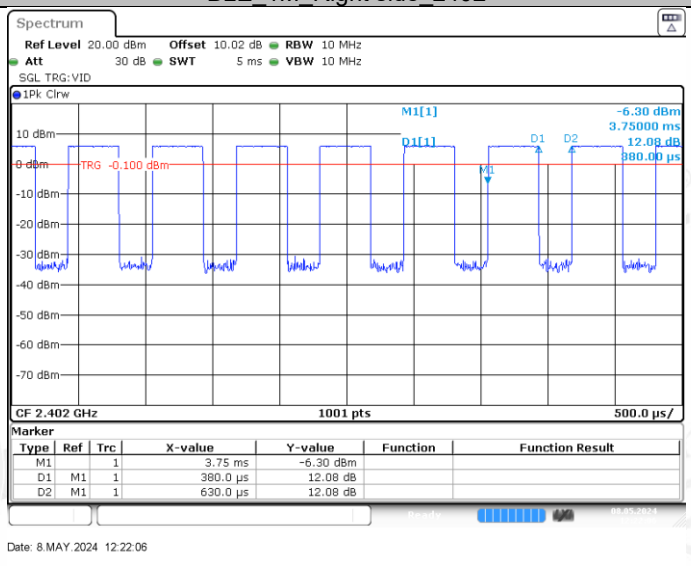
Test Mode	Antenna	Frequency [MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Left side	2402	0.38	0.63	60.32	2.20
	Right side	2402	0.38	0.63	60.32	2.20
	Left side	2440	0.38	0.63	60.32	2.20
	Right side	2440	0.38	0.63	60.32	2.20
	Left side	2480	0.38	0.63	60.32	2.20
	Right side	2480	0.38	0.63	60.32	2.20
BLE_2M	Left side	2404	0.20	0.63	31.75	4.98
	Right side	2404	0.20	0.63	31.75	4.98
	Left side	2440	0.20	0.63	31.75	4.98
	Right side	2440	0.20	0.63	31.75	4.98
	Left side	2478	0.20	0.63	31.75	4.98
	Right side	2478	0.20	0.63	31.75	4.98

10.5. Test graphs

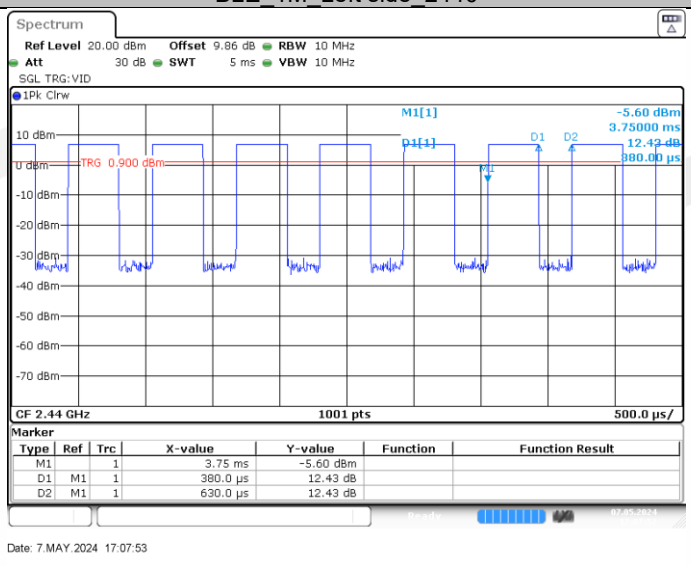
BLE_1M_Left side_2402



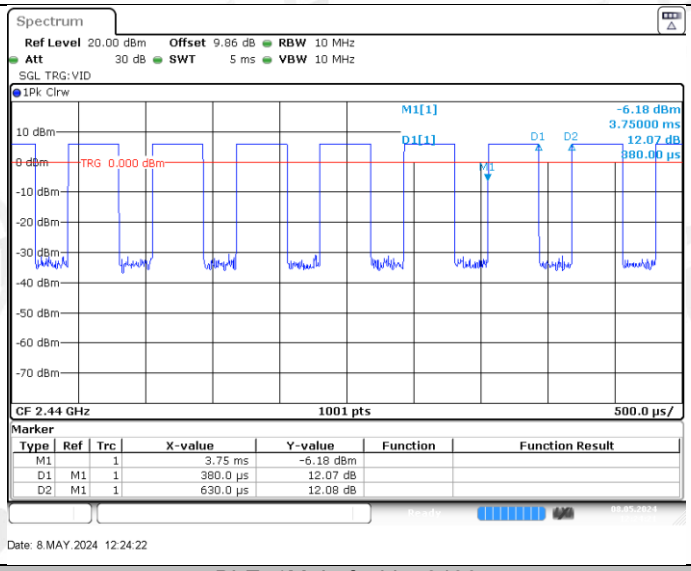
BLE_1M_Right side_2402



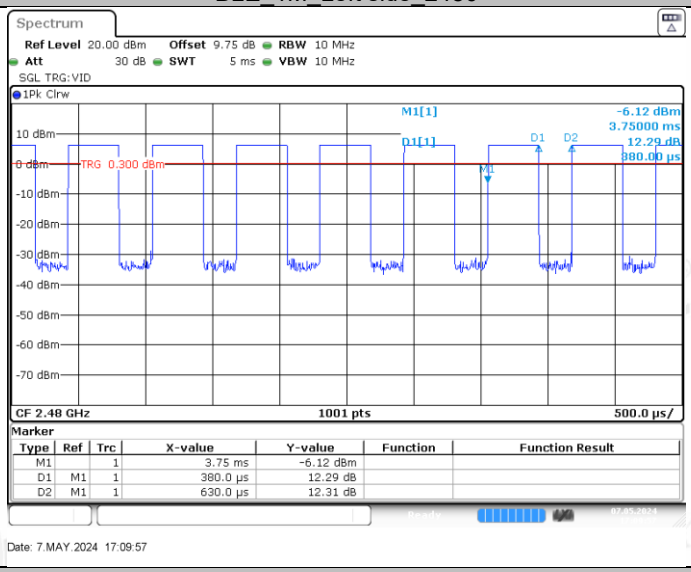
BLE_1M_Left side_2440



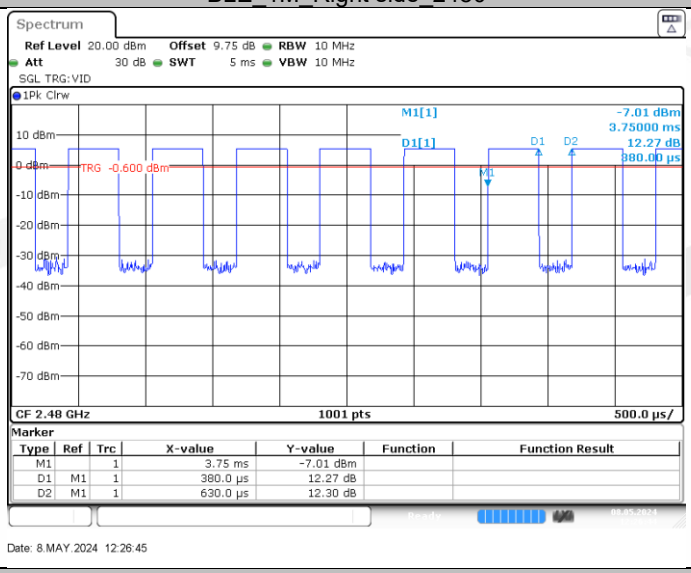
BLE_1M_Right side_2440



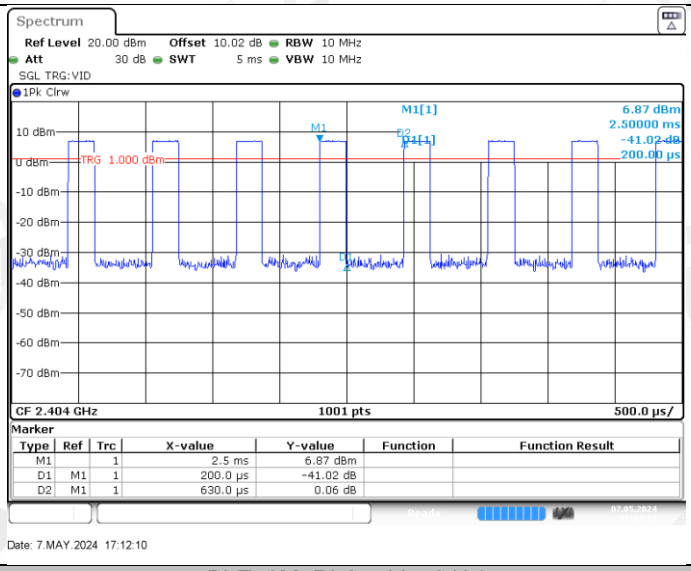
BLE_1M_Left side_2480



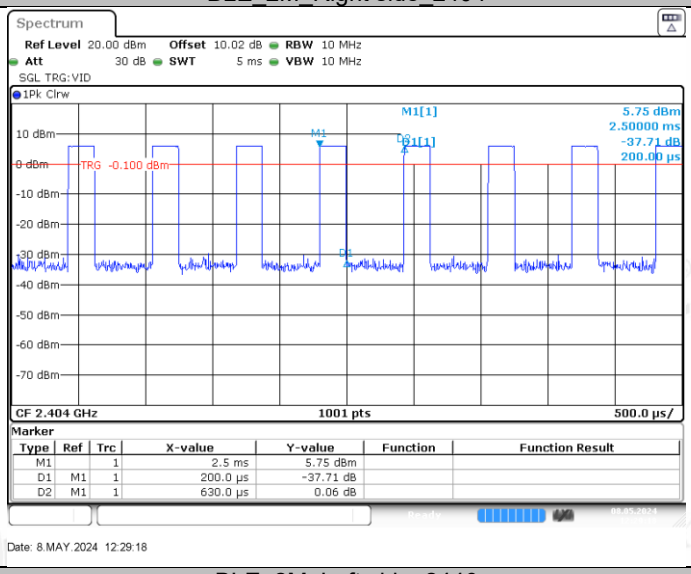
BLE_1M_Right side_2480



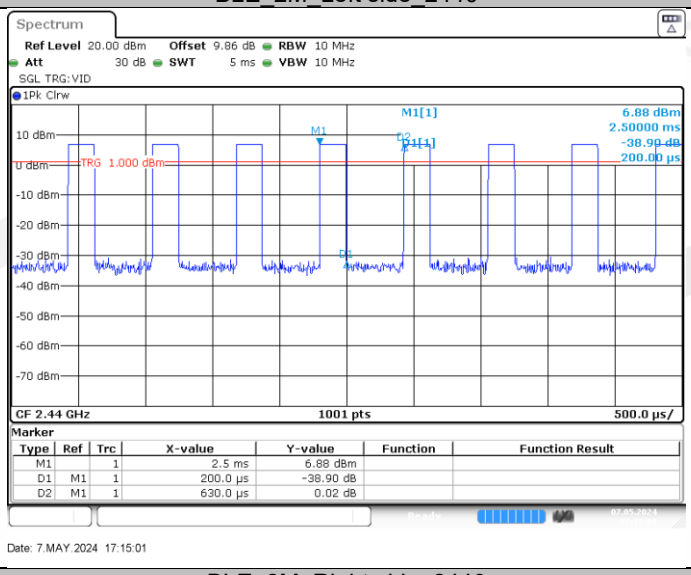
BLE_2M_Left side_2404



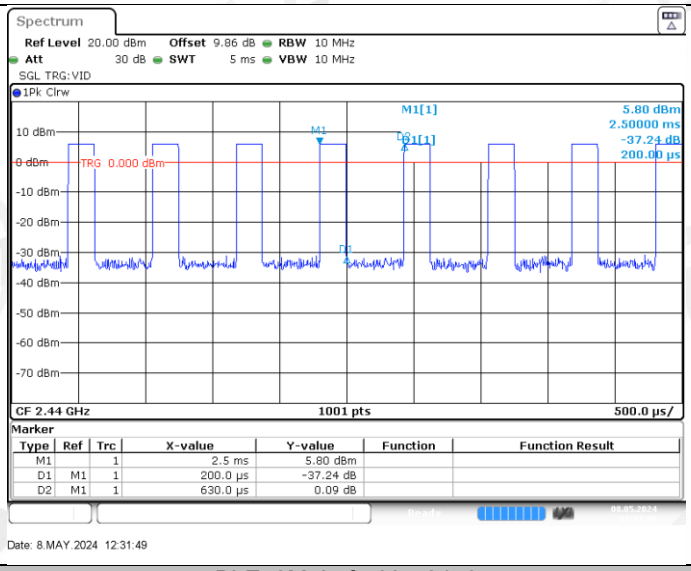
BLE_2M_Right side_2404



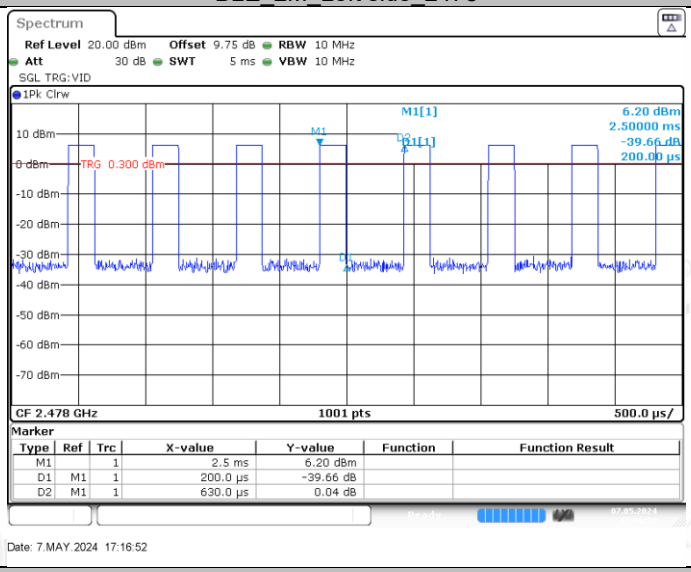
BLE_2M_Left side_2440



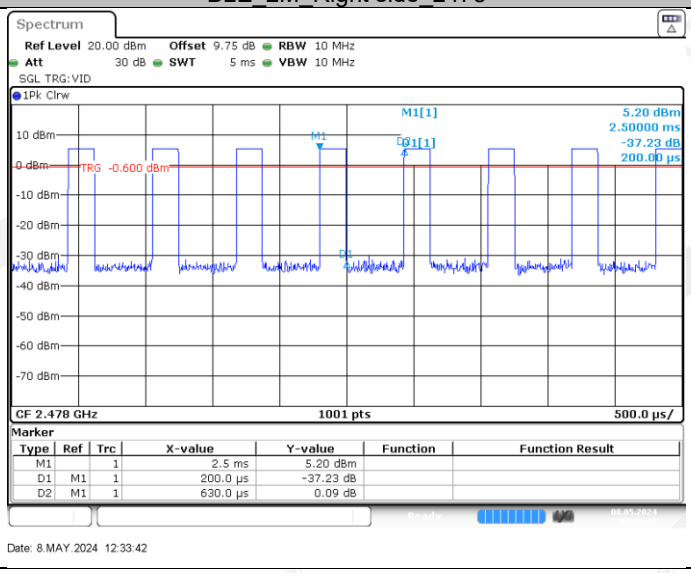
BLE_2M_Right side_2440



BLE_2M_Left side_2478



BLE_2M_Right side_2478



11. Antenna Requirements

11.1. Limit

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 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For intentional device, according to RSS-Gen issue 5 section 6.8.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

11.2. Result

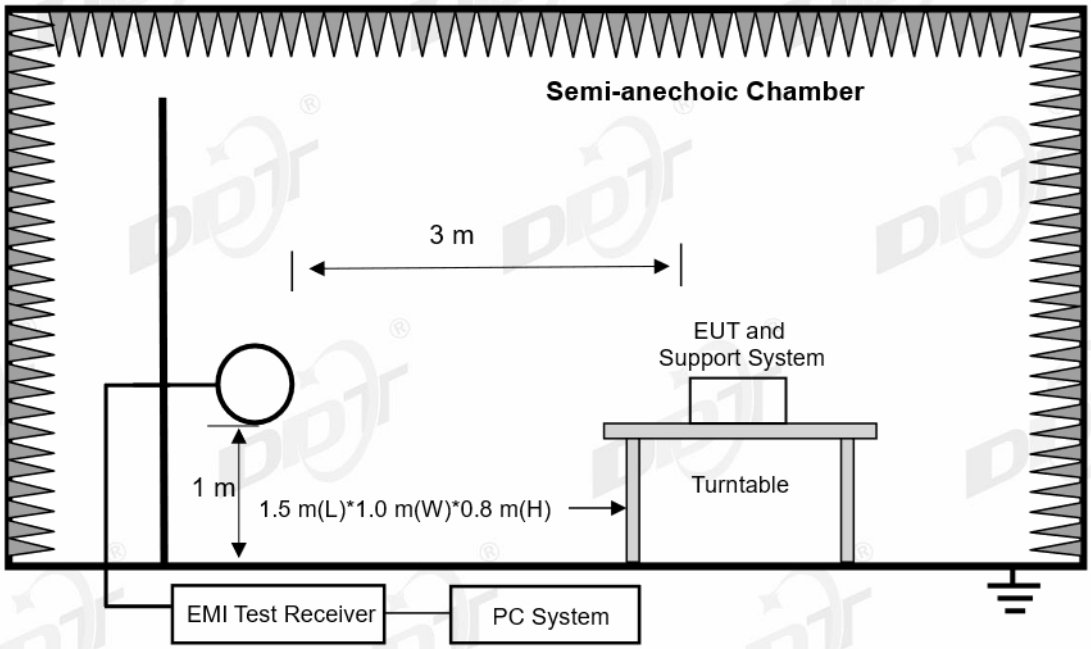
The antenna used for this product as Antenna information described in section 2.1 of the report, and there is no other antenna than that furnished by the responsible party shall be used with the device.

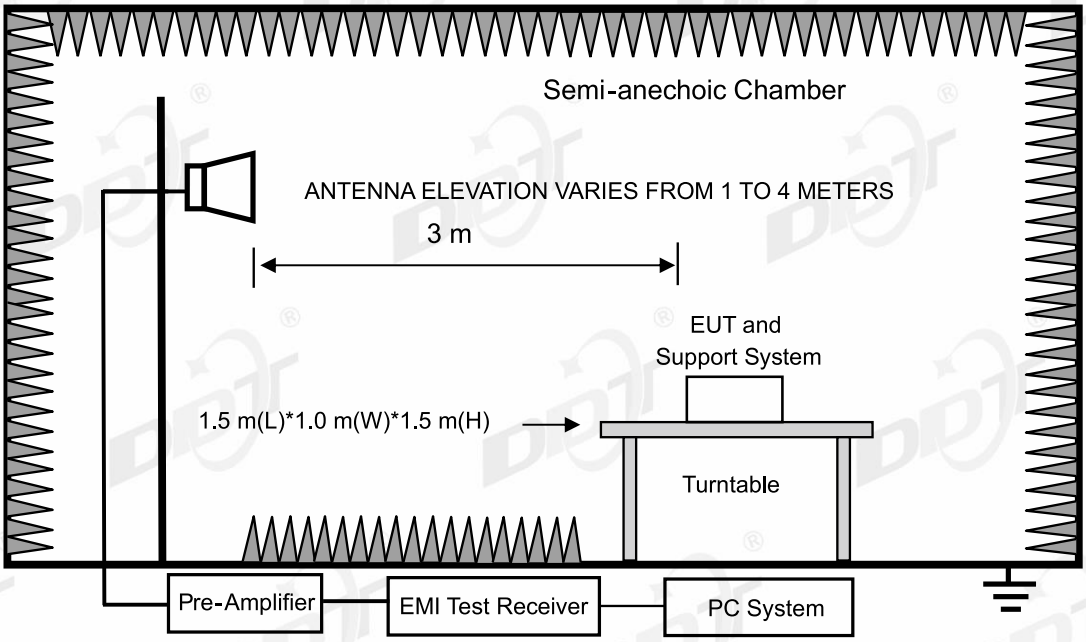
12.Radiated Emission

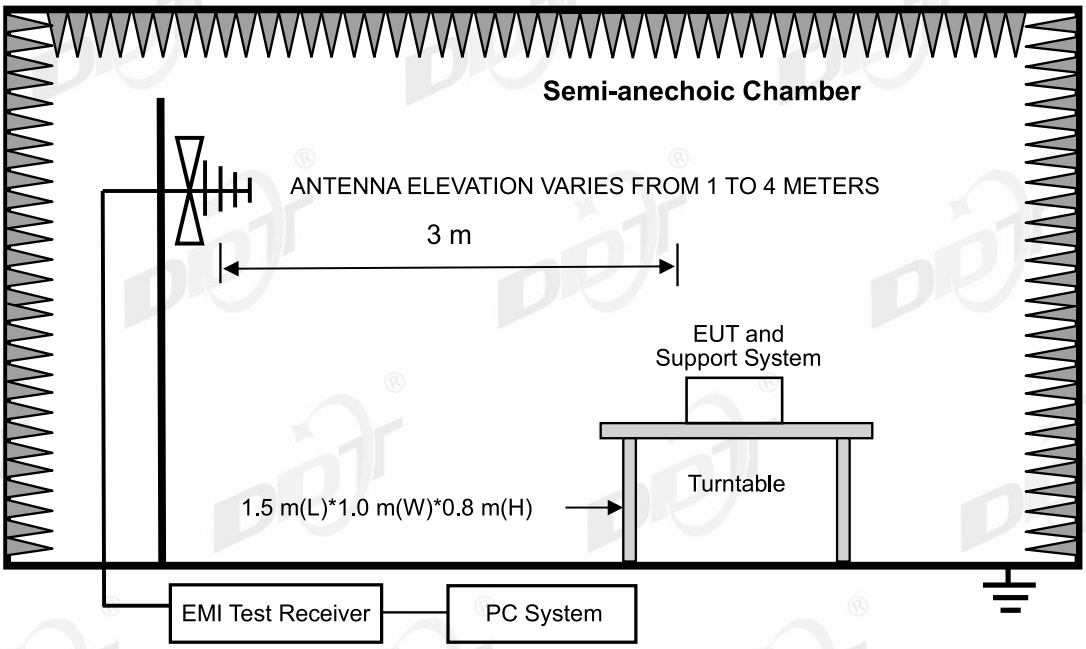
12.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
EMI TEST RECEIVER	R&S	ESU26	100472	2025/03/31
PSA Series Spectrum Analyzer	Agilent	E4447A	MY50180031	2025/03/31
Active Loop Antenna	Schwarzbeck	FMZB-1519	1519-038	2025/09/10
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	01429	2025/07/11
Double Ridged Horn Antenna	Schwarzbeck	BBHA 9120 D	02468	2024/09/17
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	2025/04/25
Pre-amplifier	COM-POWER	PAM-118A	18040084	2024/07/14
Pre-amplifier	COM-POWER	PAM-840A	461369	2025/03/31
RE Cable	N/A	W23.02 CP1-X2 + W23.09 AP1-X8+ JCT26S-NJ-NJ-1.5M	4.5M+8M+1.5M	2025/03/31
RF Cable	Yuhu	JCTB810-NJ-NJ-9M+ ZT26S-SMAJ-SMAJ-1M	21123964	2025/03/31
Band Reject Filter(2400-2500 MHz)	REBES	BRM50702	G555	N/A
Band Reject Filter(5150-5880 MHz)	REBES	BRM50716	G392	N/A
High Pass Filter(8000-25000 MHz)	XB	XBLBQ-GTA67	210820-2-3	N/A
Test Software	Tonscend	JS32-RE	V 5.0.0.1	N/A
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2025/04/01
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2025/04/22

12.2. Block diagram of test setup







12.3. Limits

(1) FCC 15.205 Restricted frequency band

MHz	MHz	MHz	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
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&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			

1Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2Above 38.6

RSS-Gen section 8.10 Restricted frequency bands*

MHz	**MHz**	**MHz**	**GHz**
0.090-0.110	12.51975-12.52025	240-285	3.5-4.4
0.495-0.505	12.57675-12.57725	322-335.4	4.5-5.15
2.1735-2.1905	13.36-13.41	399.9-410	5.35-5.46
3.020-3.026	16.42-16.423	608-614	7.25-7.75
4.125-4.128	16.69475-16.69525	960-1427	8.025-8.5
4.1772&4.17775	16.80425-16.80475	1435-1626.5	9.0-9.2
4.2072&4.20775	25.5-25.67	1645.5-1646.5	9.3-9.5
5.677-5.683	37.5-38.25	1660-1710	10.6-12.7
6.215-6.218	73-74.6	1718.8-1722.2	13.25-13.4
6.26775-6.26825	74.8-75.2	2200-2300	14.47-14.5
6.31175-6.31225	108-138	2310-2390	15.35-16.2
8.291-8.294	149.9-150.05	2483.5-2500	17.7-21.4
8.362-8.366	156.52475-156.52525	2655-2900	22.01-23.12
8.37625-8.38675	156.7-156.9	3260-3267	23.6-24.0
8.41425-8.41475	162.0125-167.17	3332-3339	31.2-31.8
12.29-12.293	167.72-173.2	3345.8-3358	36.43-36.5
			Above 38.6

* Certain frequency bands listed in table and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

(2) FCC 15.209 Limit & RSS-Gen section 8.9 Limit

FREQUENCY MHz			DISTANCE Meters	FIELD STRENGTHS LIMIT	
				mV/m	dB(mV)/m
0.009 ~ 0.490			300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705			30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0			30	30	29.54
30	~	88	3	100	40.0
88	~	216	3	150	43.5
216	~	960	3	200	46.0
960	~	1000	3	500	54.0
Above		1000	3	74.0 dB(mV)/m (Peak) 54.0 dB(mV)/m (Average)	

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz and above 1000 MHz, radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$Limit_{3m}(dBuV/m) = Limit_{30m}(dBuV/m) + 40Log(30m/3m)$$

(3) Limit for this EUT

The emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, and the emissions appearing within RSS-Gen section 8.10 Restricted frequency bands shall not exceed the limits shown in RSS-Gen section 8.9, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits and RSS-Gen section 8.9 limits.

12.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

12.5. Test procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1G and 150 cm above the ground plane inside a fully-anechoic chamber for above 1G.

(2) Test antenna was located 3 m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9 kHz - 30 MHz	Active Loop antenna	3 m
30 MHz - 1 GHz	Trilog Broadband Antenna	3 m
1 GHz - 18 GHz	Double Ridged Horn Antenna(1 GHz-18 GHz)	3 m
18 GHz - 40 GHz	Horn Antenna(18 GHz-40 GHz)	1 m

According ANSI C63.10:2013 clause 6.4.6 and 6.5.3, for measurements below 30 MHz, Antenna was located 3 m from EUT, the loop antenna was positioned in three antenna orientations (parallel, perpendicular, and round-parallel), for each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable, and the lowest height of the magnetic antenna shall be 1 m above the ground. For measurement above 30MHz, the trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 25 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18 GHz to 25 GHz, so below final test was performed with frequency range from 9 kHz to 18 GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz, for emissions from 9 kHz - 90 kHz,110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9 kHz - 150 kHz	200 Hz
150 kHz - 30 MHz	9 kHz
30 MHz - 1 GHz	120 kHz

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; According ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure.

(8) For portable device, X axis, Y axis, Z axis are tested, and worse setup is reported.

12.6. Test result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9 kHz to 25 GHz were comply with 15.209 limits and RSS-Gen section 8.9 limits.

Note1: According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

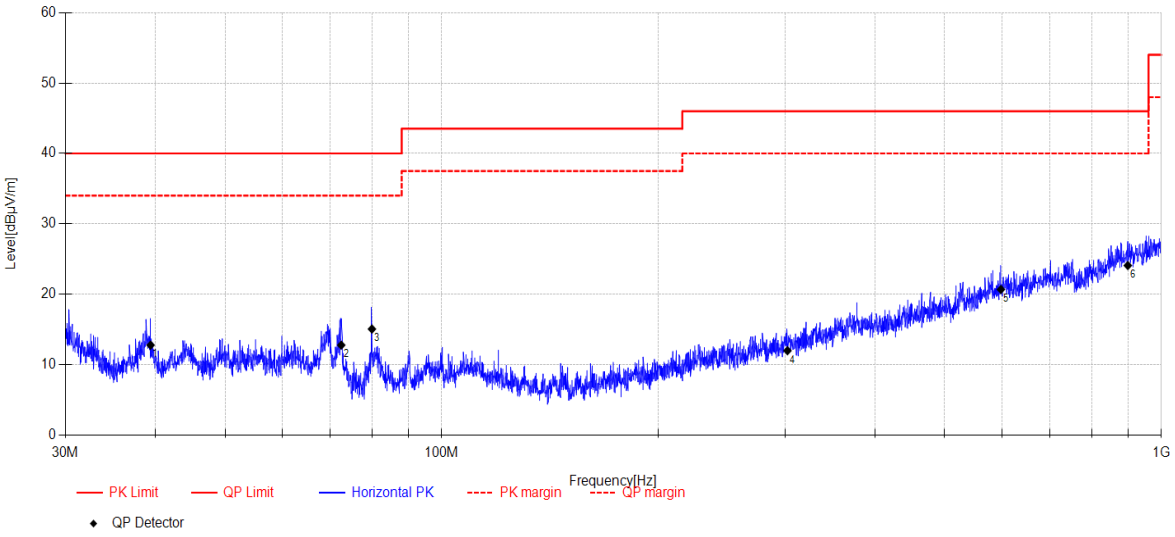
Note2: For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in Left side GFSK 1M/2M, Tx 2440 MHz mode and Right side GFSK 1M Tx 2480, GFSK 2M Tx 2478 MHz mode.

Note3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

12.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113601_H		
Memo:	Left side Sample Number: S24020411-002		



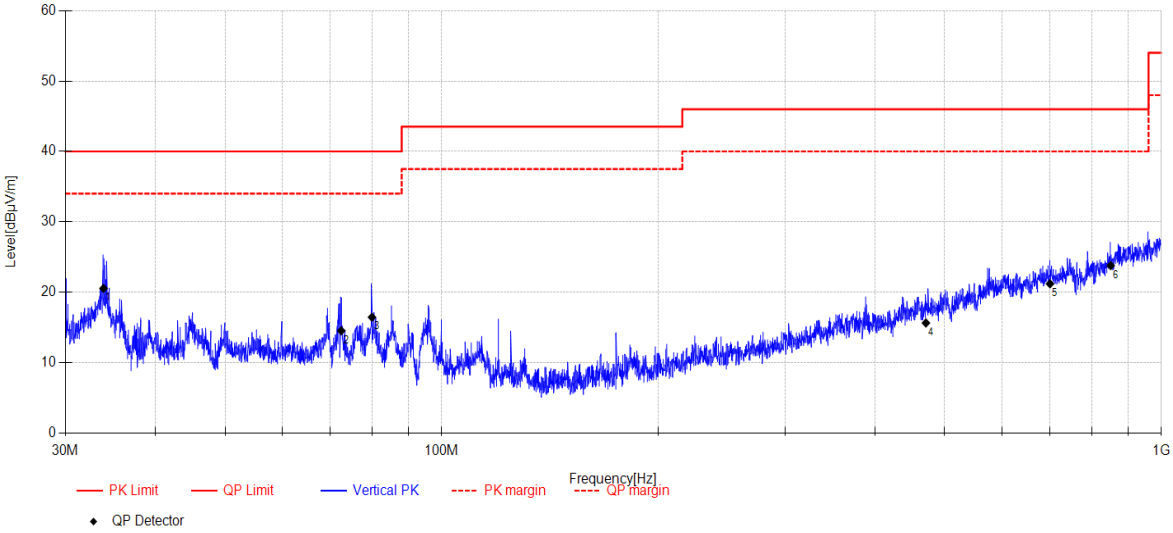
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	39.407	28.08	11.70	3.82	-30.86	12.74	40.00	27.26	QP	Horizontal
2	72.528	29.86	9.39	4.04	-30.55	12.74	40.00	27.26	QP	Horizontal
3	80.009	32.74	8.70	4.09	-30.50	15.03	40.00	24.97	QP	Horizontal
4	302.341	23.32	13.70	5.23	-30.30	11.95	46.00	34.05	QP	Horizontal
5	598.543	25.12	19.08	6.36	-29.90	20.66	46.00	25.34	QP	Horizontal
6	898.275	24.22	21.66	7.20	-29.02	24.06	46.00	21.94	QP	Horizontal

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113621_V		
Memo:	Left side Sample Number: S24020411-002		



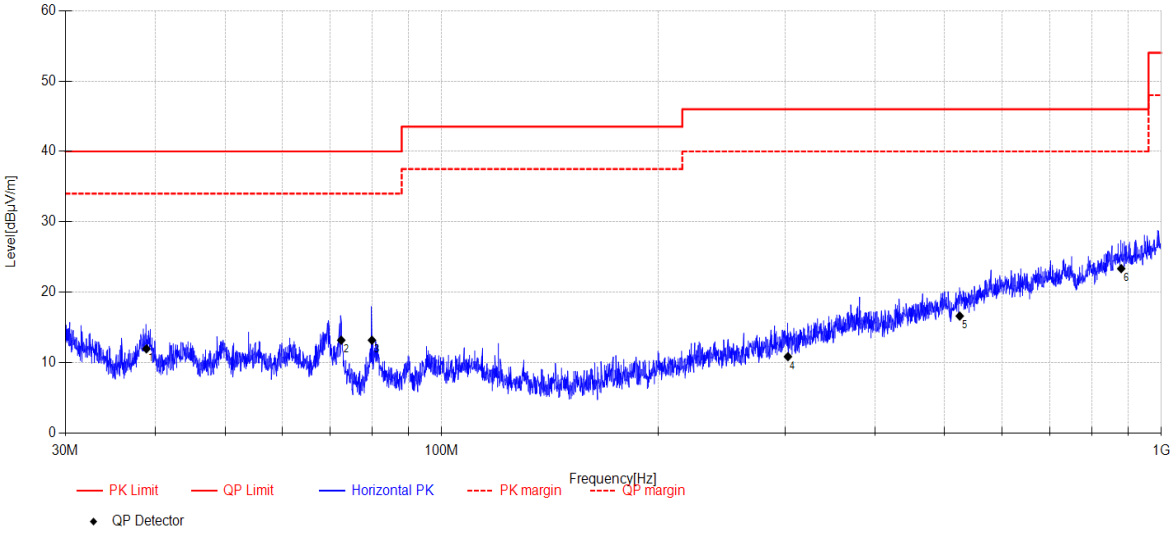
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	33.893	36.21	11.48	3.78	-30.94	20.53	40.00	19.47	QP	Vertical
2	72.528	31.62	9.39	4.04	-30.55	14.50	40.00	25.50	QP	Vertical
3	80.009	34.14	8.70	4.09	-30.50	16.43	40.00	23.57	QP	Vertical
4	470.924	23.79	15.89	5.89	-29.96	15.61	46.00	30.39	QP	Vertical
5	700.336	24.78	19.61	6.69	-29.90	21.18	46.00	24.82	QP	Vertical
6	850.466	24.94	21.19	7.08	-29.45	23.76	46.00	22.24	QP	Vertical

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 2M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113508_H		
Memo:	Left side Sample Number: S24020411-002		



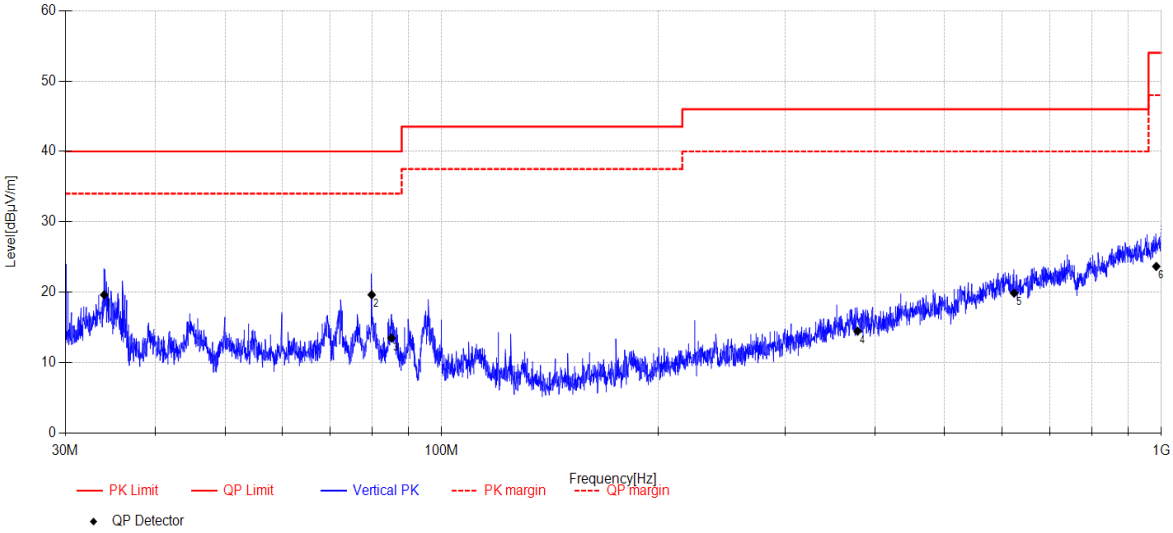
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	38.886	27.5	11.49	3.81	-30.87	11.93	40.00	28.07	QP	Horizontal
2	72.528	30.28	9.39	4.04	-30.55	13.16	40.00	26.84	QP	Horizontal
3	80.009	30.87	8.70	4.09	-30.50	13.16	40.00	26.84	QP	Horizontal
4	302.766	22.18	13.70	5.23	-30.29	10.82	46.00	35.18	QP	Horizontal
5	524.622	22.98	17.42	6.09	-29.90	16.59	46.00	29.41	QP	Horizontal
6	879.577	24.04	21.32	7.15	-29.18	23.33	46.00	22.67	QP	Horizontal

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 2M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113528_V		
Memo:	Left side Sample Number: S24020411-002		



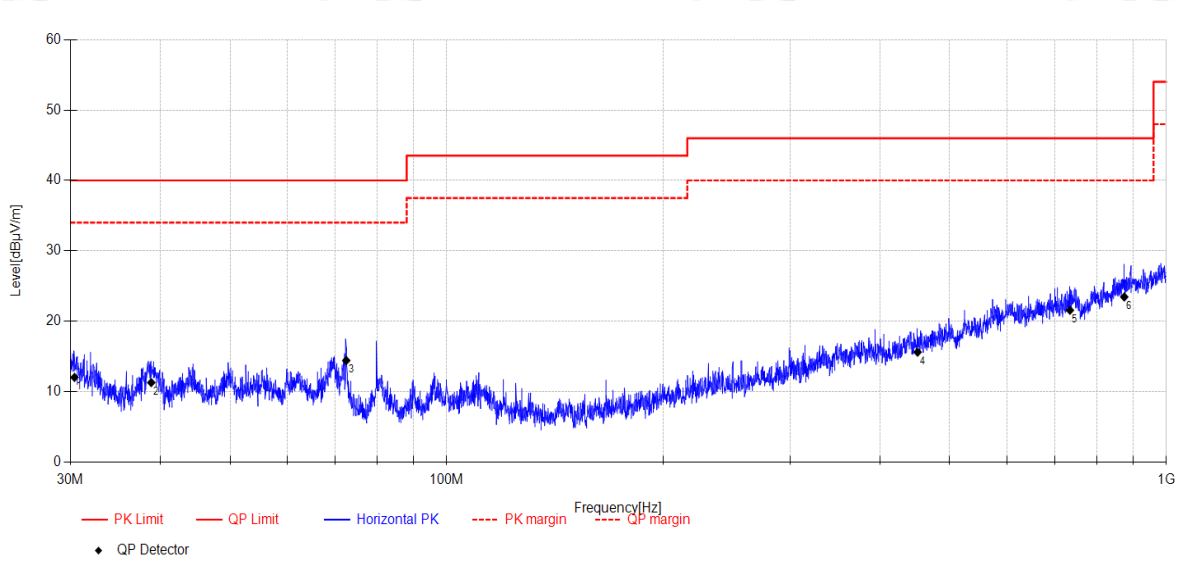
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	33.964	35.24	11.53	3.78	-30.94	19.61	40.00	20.39	QP	Vertical
2	79.953	37.34	8.68	4.09	-30.50	19.61	40.00	20.39	QP	Vertical
3	85.161	30.82	9.14	4.12	-30.60	13.48	40.00	26.52	QP	Vertical
4	378.392	23.58	15.47	5.53	-30.14	14.44	46.00	31.56	QP	Vertical
5	624.261	24.84	18.46	6.45	-29.90	19.85	46.00	26.15	QP	Vertical
6	984.002	22.53	21.94	7.42	-28.24	23.65	54.00	30.35	QP	Vertical

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113309_H		
Memo:	Right side Sample Number: S24020411-002		



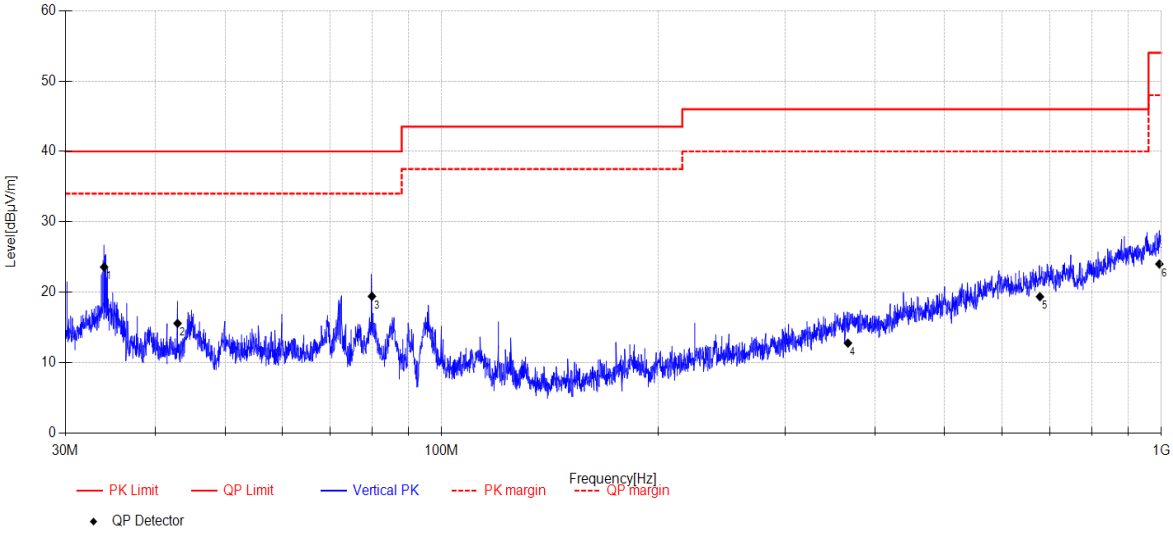
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	30.402	28.89	10.34	3.76	-30.99	12.00	40.00	28.00	QP	Horizontal
2	38.859	26.83	11.49	3.81	-30.87	11.26	40.00	28.74	QP	Horizontal
3	72.528	31.51	9.39	4.04	-30.55	14.39	40.00	25.61	QP	Horizontal
4	451.207	23.92	15.85	5.81	-30.00	15.58	46.00	30.42	QP	Horizontal
5	734.537	24.67	19.99	6.78	-29.90	21.54	46.00	24.46	QP	Horizontal
6	874.044	24.04	21.48	7.14	-29.23	23.43	46.00	22.57	QP	Horizontal

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113330_V		
Memo:	Right side Sample Number: S24020411-002		

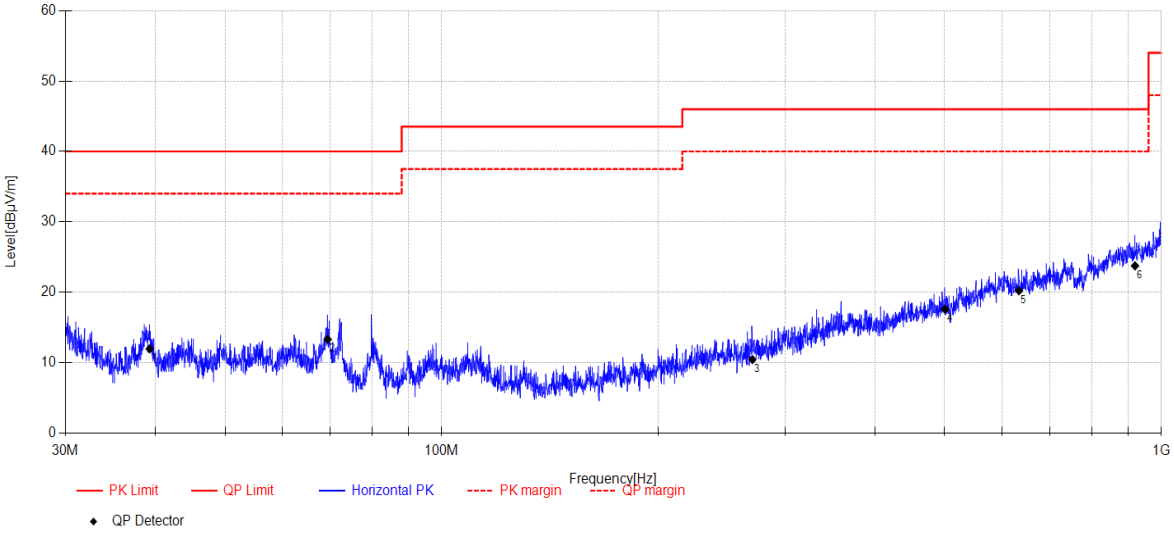


Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable Loss [dB]**	**AMP [dB]**	**Result [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	33.964	39.19	11.53	3.78	-30.94	23.56	40.00	16.44	QP	Vertical
2	42.957	29.71	12.81	3.84	-30.81	15.55	40.00	24.45	QP	Vertical
3	80.009	37.1	8.70	4.09	-30.50	19.39	40.00	20.61	QP	Vertical
4	366.897	22.18	15.24	5.49	-30.17	12.74	46.00	33.26	QP	Vertical
5	678.108	23.4	19.22	6.62	-29.90	19.34	46.00	26.66	QP	Vertical
6	993.709	22.24	22.47	7.44	-28.16	23.99	54.00	30.01	QP	Vertical

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 2M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113408_H		
Memo:	Right side Sample Number: S24020411-002		



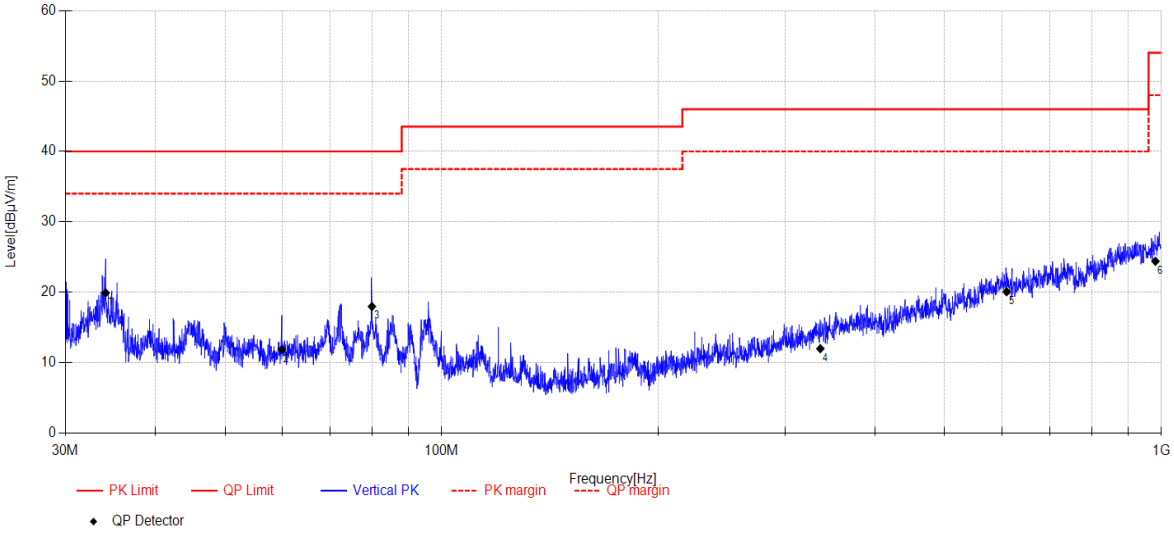
Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	39.297	27.32	11.65	3.82	-30.86	11.93	40.00	28.07	QP	Horizontal
2	69.443	29.64	10.19	4.02	-30.57	13.28	40.00	26.72	QP	Horizontal
3	270.256	23.22	12.50	5.08	-30.39	10.41	46.00	35.59	QP	Horizontal
4	500.546	24.39	17.06	6.00	-29.90	17.55	46.00	28.45	QP	Horizontal
5	633.965	25.05	18.56	6.48	-29.90	20.19	46.00	25.81	QP	Horizontal
6	919.302	23.52	21.79	7.25	-28.83	23.73	46.00	22.27	QP	Horizontal

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-22	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 2M Tx mode	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC BELOW 1G\20240522-113429_V		
Memo:	Right side Sample Number: S24020411-002		



Data List

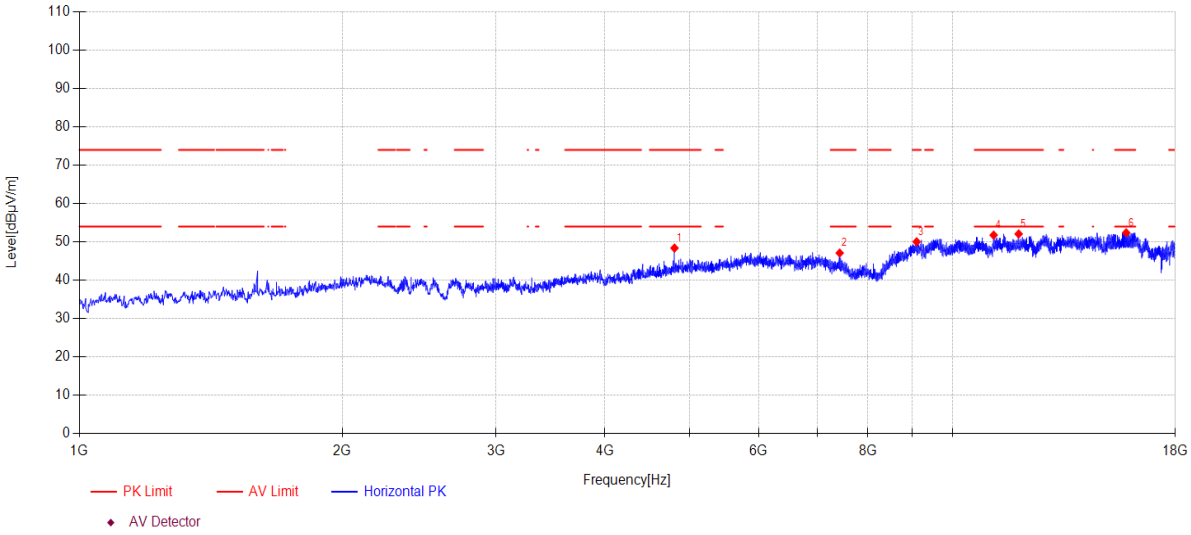
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	34.131	35.49	11.56	3.78	-30.94	19.89	40.00	20.11	QP	Vertical
2	59.977	25.72	12.79	3.95	-30.63	11.83	40.00	28.17	QP	Vertical
3	80.009	35.66	8.70	4.09	-30.50	17.95	40.00	22.05	QP	Vertical
4	335.873	22.33	14.50	5.36	-30.23	11.96	46.00	34.04	QP	Vertical
5	609.554	24.19	19.36	6.40	-29.90	20.05	46.00	25.95	QP	Vertical
6	981.246	23.19	22.05	7.41	-28.27	24.38	54.00	29.62	QP	Vertical

Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2402MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\7		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



Data List

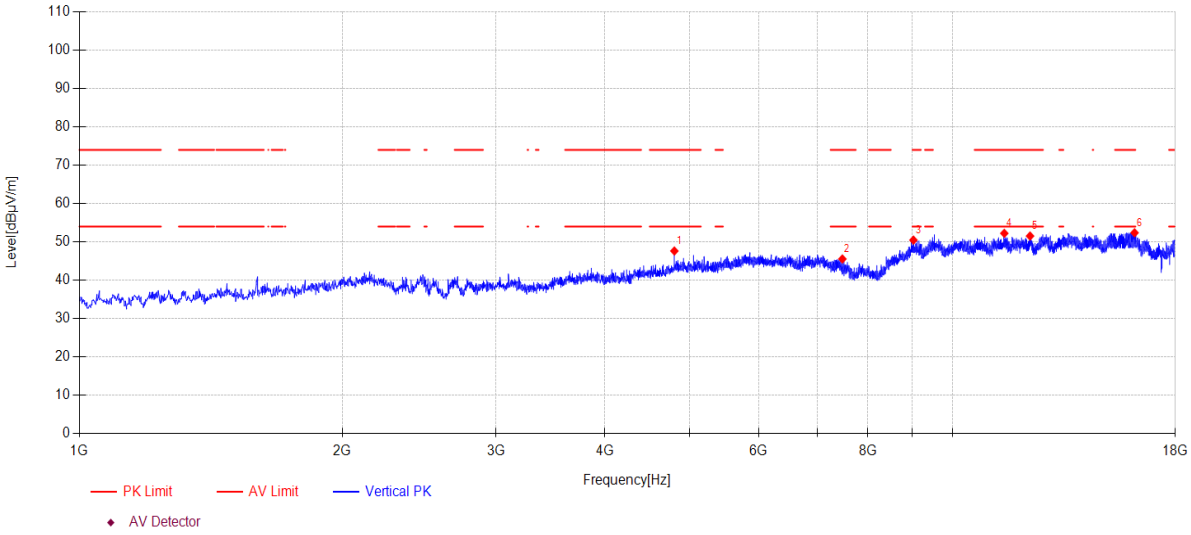
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	4804.600	48.45	32.62	7.48	-40.15	48.40	74.00	25.60	PK	Horizontal
2	7427.700	44.60	36.64	7.64	-41.77	47.11	74.00	26.89	PK	Horizontal
3	9098.800	41.57	38.50	8.75	-38.78	50.04	74.00	23.96	PK	Horizontal
4	11147.300	41.91	39.25	9.78	-39.16	51.78	74.00	22.22	PK	Horizontal
5	11907.200	42.21	38.92	10.46	-39.52	52.07	74.00	21.93	PK	Horizontal
6	15812.100	38.32	38.28	15.03	-39.25	52.38	74.00	21.62	PK	Horizontal

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2402MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\8		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



Data List

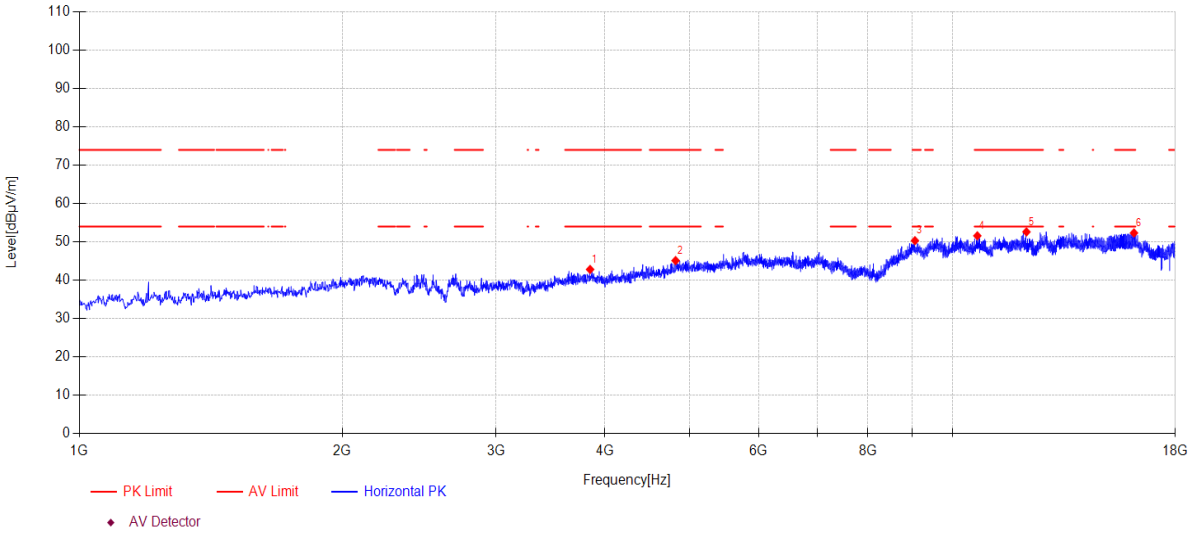
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	4802.900	47.74	32.58	7.47	-40.15	47.64	74.00	26.36	PK	Vertical
2	7480.400	43.27	36.54	7.64	-41.90	45.55	74.00	28.45	PK	Vertical
3	9022.300	42.19	38.34	8.73	-38.79	50.47	74.00	23.53	PK	Vertical
4	11465.200	42.26	39.23	10.06	-39.31	52.24	74.00	21.76	PK	Vertical
5	12271.000	41.36	39.30	10.54	-39.67	51.53	74.00	22.47	PK	Vertical
6	16165.700	38.81	37.83	15.23	-39.49	52.38	74.00	21.62	PK	Vertical

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2440MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\9		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



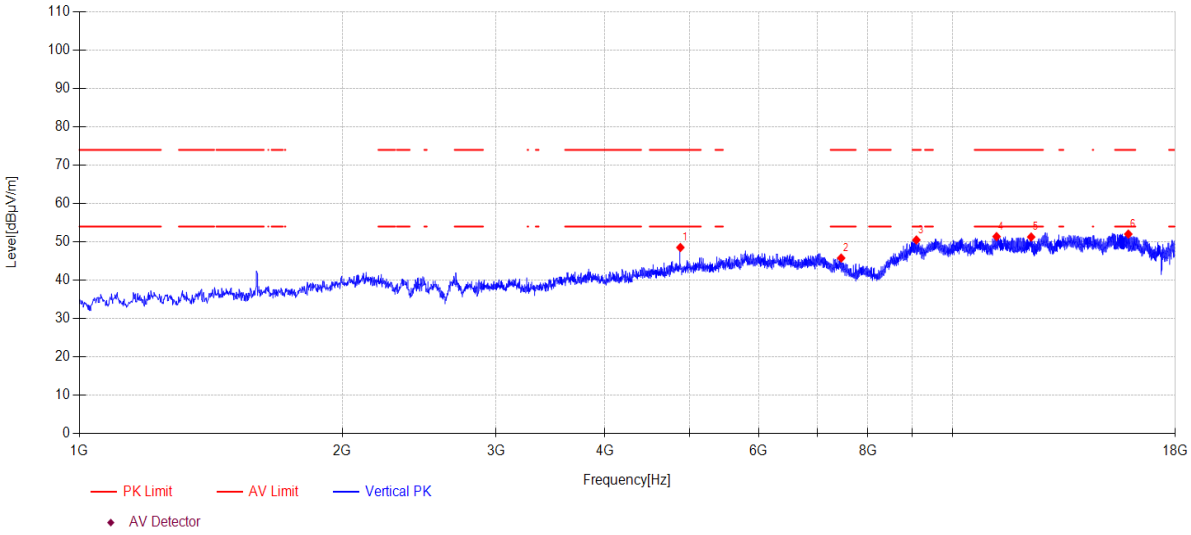
Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable loss [dB]**	**AMP [dB]**	**Level [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	3845.800	46.49	30.88	5.82	-40.36	42.83	74.00	31.17	PK	Horizontal
2	4818.200	44.82	32.97	7.50	-40.15	45.14	74.00	28.86	PK	Horizontal
3	9058.000	41.96	38.42	8.74	-38.79	50.33	74.00	23.67	PK	Horizontal
4	10678.100	41.78	39.36	9.42	-38.97	51.59	74.00	22.41	PK	Horizontal
5	12155.400	42.40	39.30	10.54	-39.62	52.62	74.00	21.38	PK	Horizontal
6	16140.200	38.61	37.86	15.33	-39.47	52.33	74.00	21.67	PK	Horizontal

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2440MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\10		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



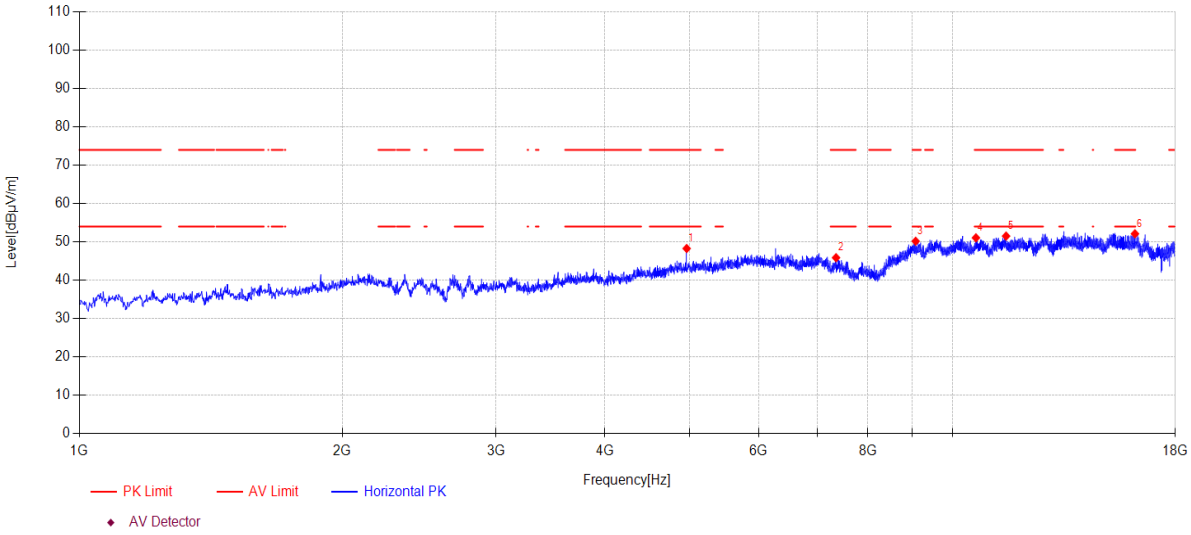
Data List										
NO.	**Freq. [MHz]**	**Reading [dBµV/m]**	**Antenna Factor [dB]**	**Cable loss [dB]**	**AMP [dB]**	**Level [dBµV/m]**	**Limit [dBµV/m]**	**Margin [dB]**	**Detector**	**Polarity**
1	4879.400	47.71	33.33	7.63	-40.12	48.55	74.00	25.45	PK	Vertical
2	7456.600	43.41	36.59	7.64	-41.84	45.80	74.00	28.20	PK	Vertical
3	9093.700	42.05	38.49	8.75	-38.78	50.51	74.00	23.49	PK	Vertical
4	11234.000	41.54	39.20	9.86	-39.20	51.40	74.00	22.60	PK	Vertical
5	12308.400	41.12	39.30	10.54	-39.68	51.28	74.00	22.72	PK	Vertical
6	15900.500	37.82	38.10	15.43	-39.30	52.05	74.00	21.95	PK	Vertical

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2480MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\11		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



Data List

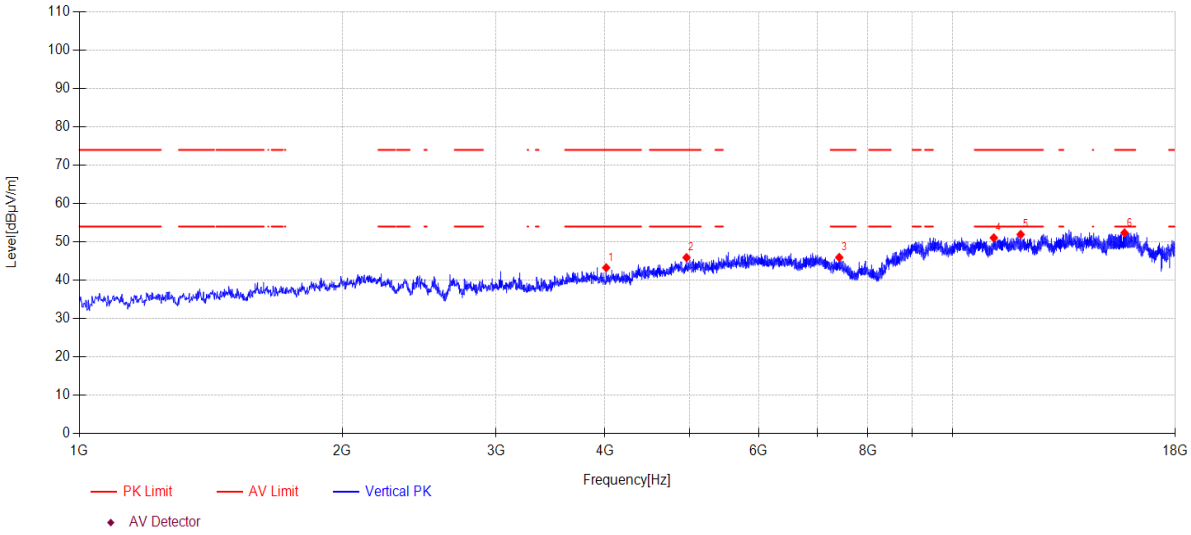
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	4961.000	47.47	33.12	7.79	-40.09	48.29	74.00	25.71	PK	Horizontal
2	7356.300	43.06	36.79	7.63	-41.59	45.89	74.00	28.11	PK	Horizontal
3	9075.000	41.76	38.45	8.75	-38.78	50.18	74.00	23.82	PK	Horizontal
4	10639.000	41.36	39.28	9.39	-38.96	51.07	74.00	22.93	PK	Horizontal
5	11519.600	41.58	39.16	10.11	-39.33	51.52	74.00	22.48	PK	Horizontal
6	16181.000	38.64	37.82	15.17	-39.51	52.12	74.00	21.88	PK	Horizontal

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:	2024-05-14	**Tested By**:	Genliu
EUT:	BLUETOOTH HEADSET	**Model Number**:	WAVE BEAM 2
Test Mode:	BLE 1M TX 2480MHz	**Power Supply**:	Battery
Condition:	Temp:23.4°C;Humi:62.3%	**Test Site**:	DDT 3# Chamber
File Path:	d:\ts\2024 report data\Q24020411-2E\FCC ABOVE 1G\12		
Memo:	Left side Sample Number: S24020411-002		

Test Graph



Data List

NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	4012.400	46.92	30.92	5.88	-40.45	43.27	74.00	30.73	PK	Vertical
2	4959.300	45.12	33.12	7.79	-40.10	45.93	74.00	28.07	PK	Vertical
3	7419.200	43.40	36.66	7.64	-41.75	45.95	74.00	28.05	PK	Vertical
4	11152.400	41.17	39.25	9.79	-39.16	51.05	74.00	22.95	PK	Vertical
5	11971.800	41.87	39.12	10.51	-39.55	51.95	74.00	22.05	PK	Vertical
6	15742.400	38.45	38.42	14.71	-39.21	52.37	74.00	21.63	PK	Vertical

Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.