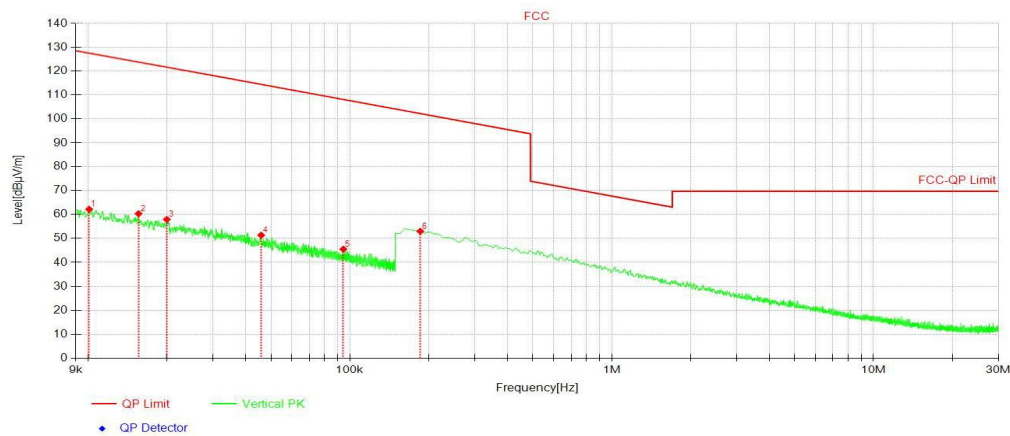


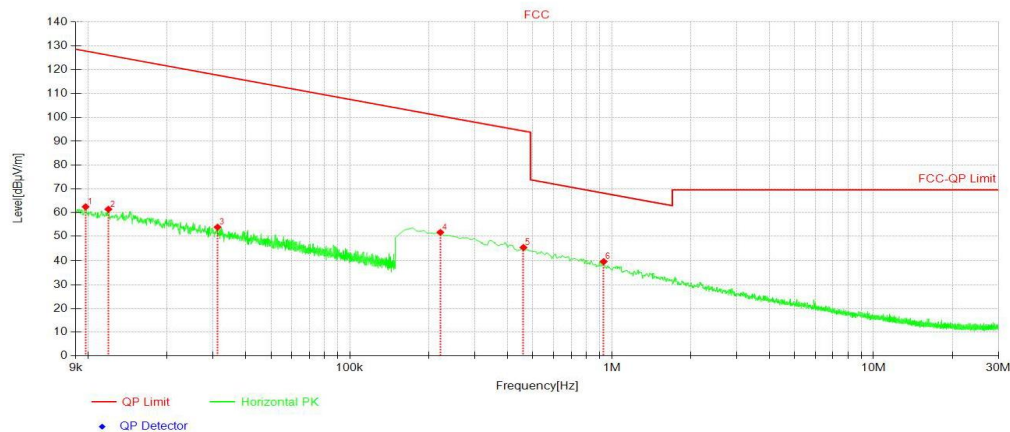


Test data

For 9KHz-30MHz



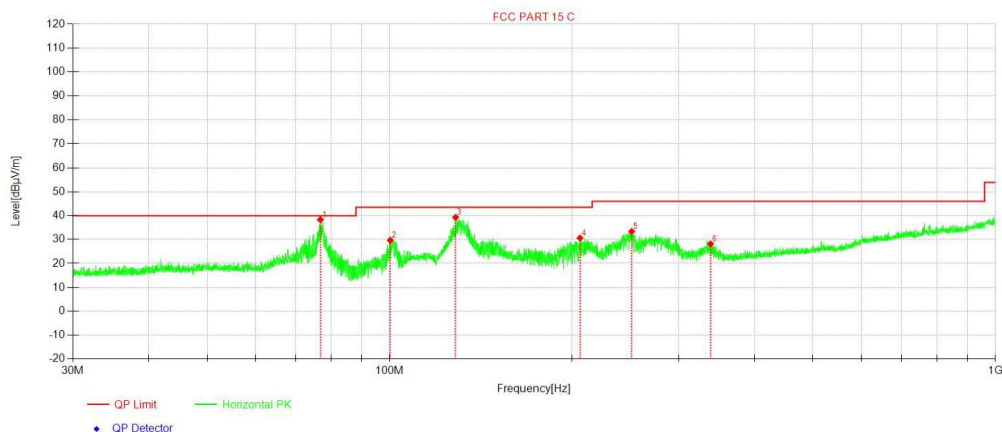
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	0.0101	43.38	18.73	62.11	127.52	65.41	100	349	PK	Vertical
2	0.0156	43.96	16.31	60.27	123.74	63.47	100	269	PK	Vertical
3	0.0200	43.50	14.37	57.87	121.58	63.71	100	331	PK	Vertical
4	0.0459	39.60	11.72	51.32	114.37	63.05	100	322	PK	Vertical
5	0.0945	34.49	10.99	45.48	108.09	62.61	100	331	PK	Vertical
6	0.1858	42.18	10.77	52.95	102.22	49.27	100	237	PK	Vertical



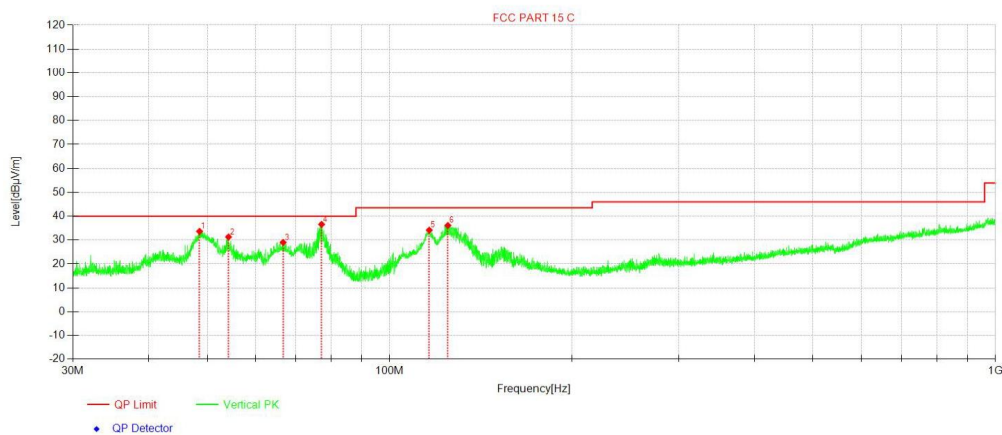
NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	0.0098	43.54	18.96	62.50	127.79	65.29	100	76	PK	Horizontal
2	0.0120	43.55	17.90	61.45	126.05	64.60	100	252	PK	Horizontal
3	0.0313	41.26	12.59	53.85	117.71	63.86	100	235	PK	Horizontal
4	0.2217	40.90	10.74	51.64	100.69	49.05	100	4	PK	Horizontal
5	0.4605	34.86	10.67	45.53	94.34	48.81	100	106	PK	Horizontal
6	0.9322	29.04	10.61	39.65	68.21	28.56	100	287	PK	Horizontal



For 30-1000MHz



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	76.86	50.00	-11.70	38.30	40.00	1.70	100	197	PK	H
2	100.23	42.23	-12.60	29.63	43.50	13.87	100	105	PK	H
3	128.52	48.86	-9.55	39.31	43.50	4.19	100	128	PK	H
4	206.18	41.60	-11.02	30.58	43.50	12.92	100	58	AV	H
5	251.00	42.29	-8.91	33.38	46.00	12.62	100	360	AV	H
6	338.76	34.01	-5.90	28.11	46.00	17.89	100	314	AV	H

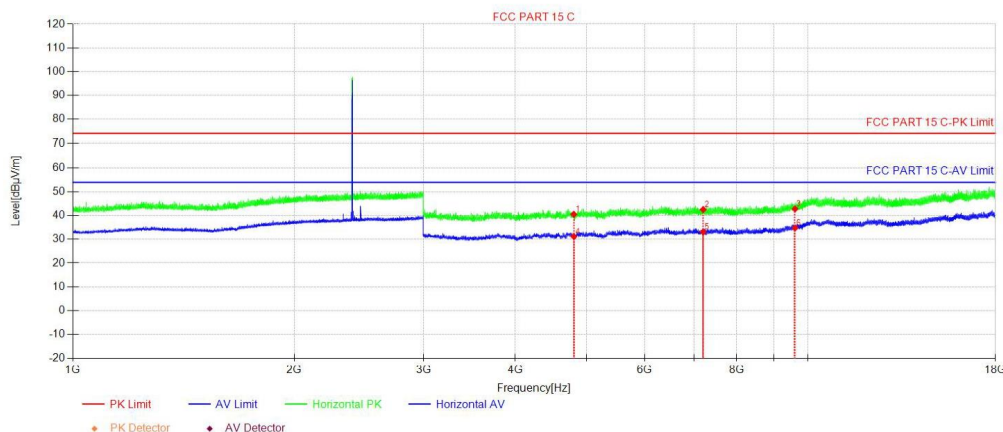


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	48.55	41.68	-8.08	33.60	40.00	6.40	100	46	PK	V
2	54.20	39.46	-8.22	31.24	40.00	8.76	100	297	PK	V
3	66.71	38.49	-9.56	28.93	40.00	11.07	100	117	PK	V
4	77.21	48.37	-11.81	36.56	40.00	3.44	100	216	AV	V
5	116.25	44.69	-10.59	34.10	43.50	9.40	100	74	AV	V
6	124.79	45.96	-9.88	36.08	43.50	7.42	100	36	AV	V

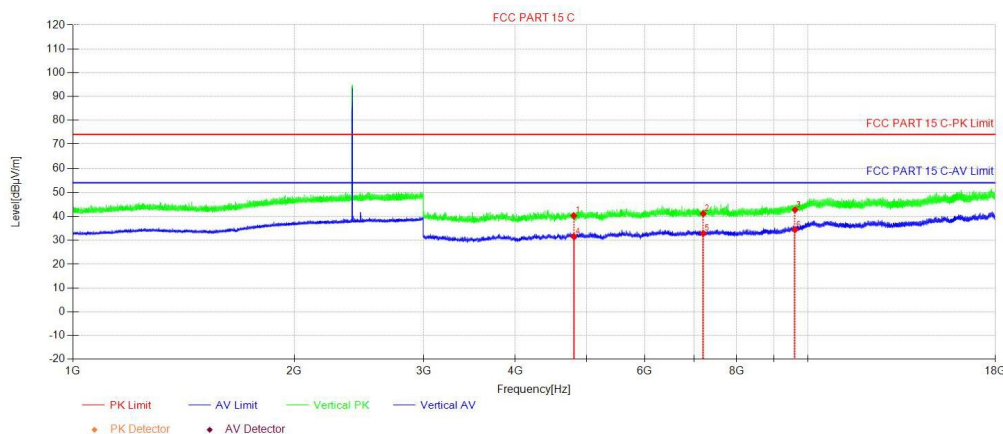


For above 1GHz

BLE 1M 2402MHz



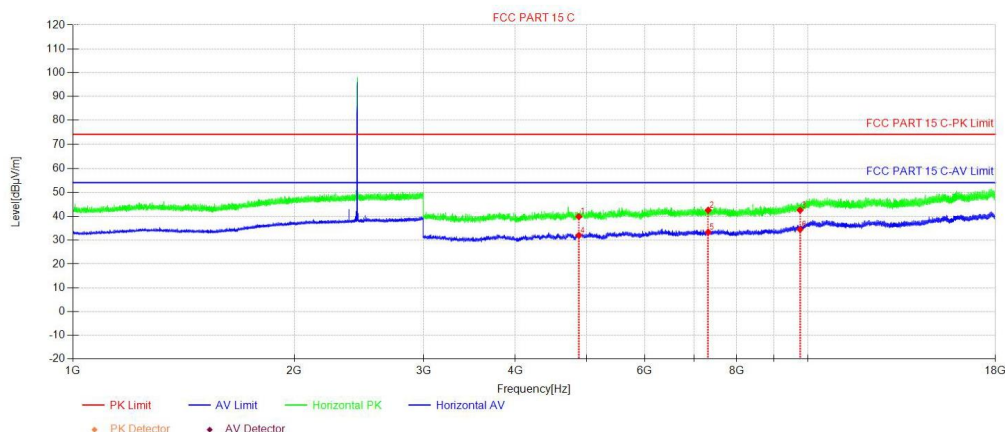
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4804.00	45.12	-4.61	40.51	74.00	33.49	150	238	PK	H
2	7206.00	44.28	-1.76	42.52	74.00	31.48	150	359	PK	H
3	9608.00	41.89	0.88	42.77	74.00	31.23	150	283	PK	H
4	4804.00	35.79	-4.61	31.18	54.00	22.82	150	64	AV	H
5	7206.00	34.81	-1.76	33.05	54.00	20.95	150	151	AV	H
6	9608.00	33.88	0.88	34.76	54.00	19.24	150	43	AV	H



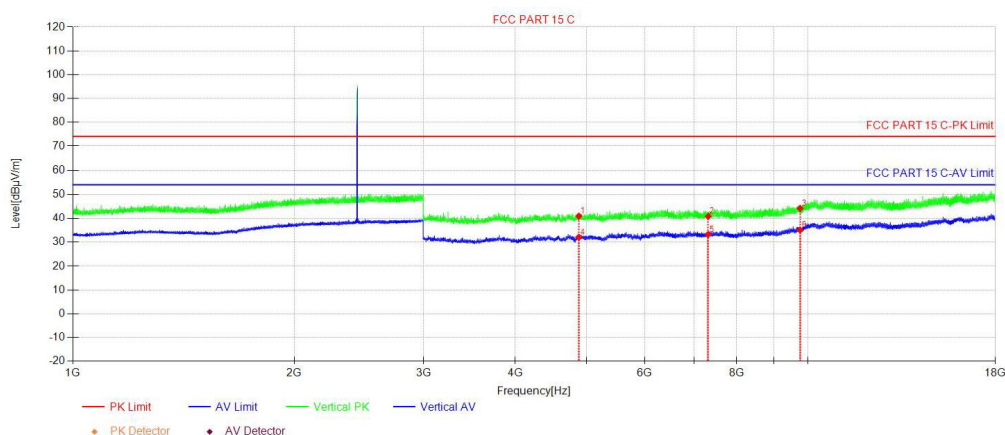
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4804.00	44.99	-4.61	40.38	74.00	33.62	150	348	PK	V
2	7206.00	42.99	-1.76	41.23	74.00	32.77	150	239	PK	V
3	9608.00	41.93	0.88	42.81	74.00	31.19	150	259	PK	V
4	4804.00	36.27	-4.61	31.66	54.00	22.34	150	283	AV	V
5	7206.00	34.74	-1.76	32.98	54.00	21.02	150	85	AV	V
6	9608.00	33.60	0.88	34.48	54.00	19.52	150	359	AV	V



BLE 1M 2440MHz



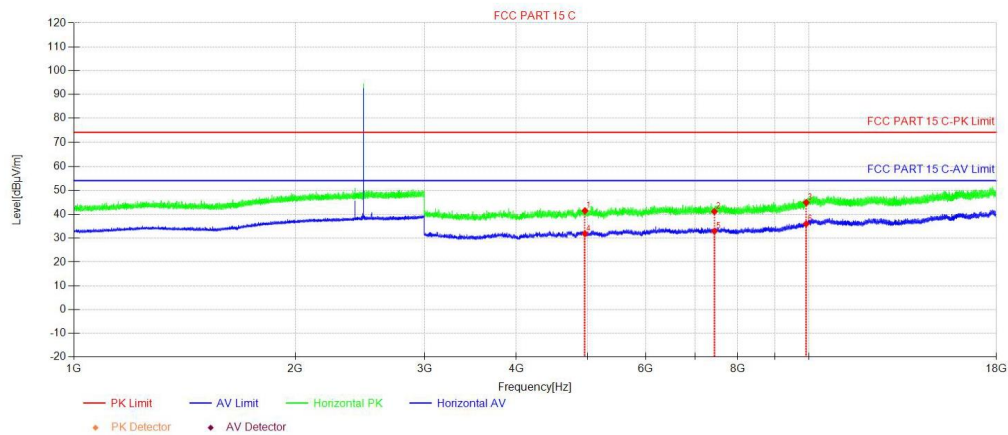
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4880.00	44.65	-4.71	39.94	74.00	34.06	150	85	PK	H
2	7320.00	44.09	-1.49	42.60	74.00	31.40	150	108	PK	H
3	9760.00	40.99	1.62	42.61	74.00	31.39	150	43	PK	H
4	4880.00	36.80	-4.71	32.09	54.00	21.91	150	348	AV	H
5	7320.00	34.89	-1.49	33.40	54.00	20.60	150	195	AV	H
6	9760.00	32.92	1.62	34.54	54.00	19.46	150	195	AV	H



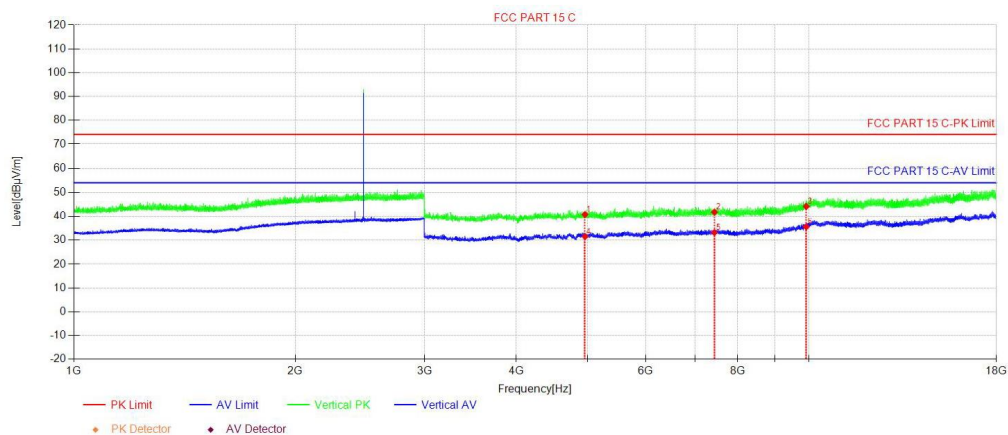
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4880.00	45.74	-4.71	41.03	74.00	32.97	150	110	PK	V
2	7320.00	42.43	-1.49	40.94	74.00	33.06	150	218	PK	V
3	9760.00	42.64	1.62	44.26	74.00	29.74	150	174	PK	V
4	4880.00	36.73	-4.71	32.02	54.00	21.98	150	110	AV	V
5	7320.00	34.69	-1.49	33.20	54.00	20.80	150	194	AV	V
6	9760.00	33.39	1.62	35.01	54.00	18.99	150	110	AV	V



BLE 1M 2480MHz



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4960.00	46.41	-4.86	41.55	74.00	32.45	150	239	PK	H
2	7440.00	42.56	-1.34	41.22	74.00	32.78	150	173	PK	H
3	9920.00	42.70	2.27	44.97	74.00	29.03	150	3	PK	H
4	4960.00	36.78	-4.86	31.92	54.00	22.08	150	345	AV	H
5	7440.00	34.31	-1.34	32.97	54.00	21.03	150	3	AV	H
6	9920.00	33.82	2.27	36.09	54.00	17.91	150	108	AV	H



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4960.00	45.73	-4.86	40.87	74.00	33.13	150	45	PK	V
2	7440.00	43.22	-1.34	41.88	74.00	32.12	150	306	PK	V
3	9920.00	41.92	2.27	44.19	74.00	29.81	150	282	PK	V
4	4960.00	36.35	-4.86	31.49	54.00	22.51	150	359	AV	V
5	7440.00	34.50	-1.34	33.16	54.00	20.84	150	45	AV	V
6	9920.00	33.25	2.27	35.52	54.00	18.48	150	67	AV	V



Note:

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:
$$\text{Result Level} = \text{Reading Level} + \text{Correct Factor}(\text{including Ant.Factor, Cable Factor etc.})$$
2. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
3. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be report.
4. All channels had been pre-test, BLE_1M is the worst case, only the worst case was reported



3.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2020 Section 11.12		
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

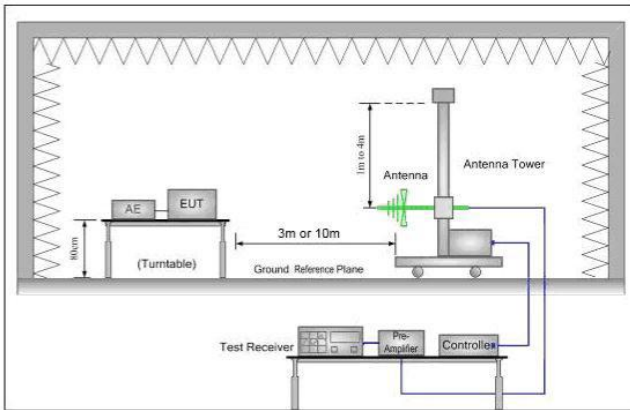


Figure 1. 30MHz to 1GHz

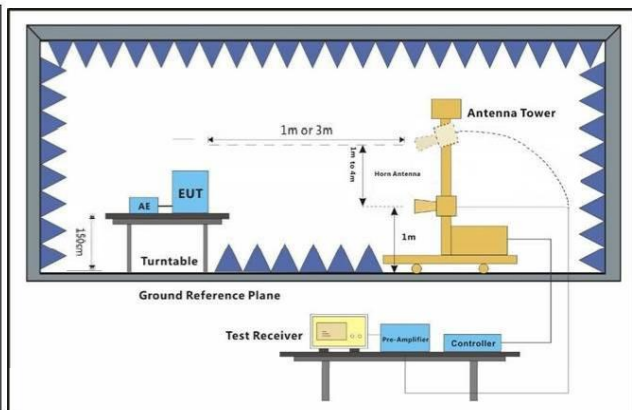


Figure 2. Above 1 GHz

Test Procedure:	- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. - For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. - The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. - Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel - Test the EUT in the lowest channel , the Highest channel - The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. - Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz

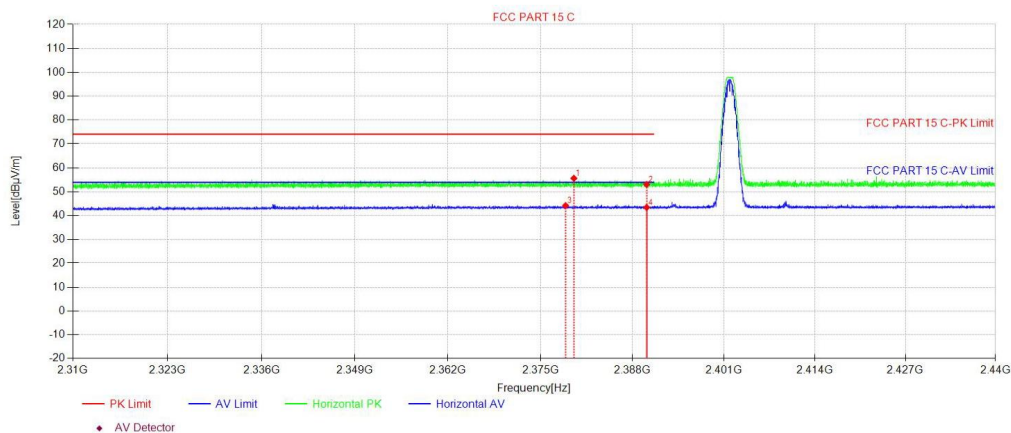
Dongguan DN Testing Co., Ltd.



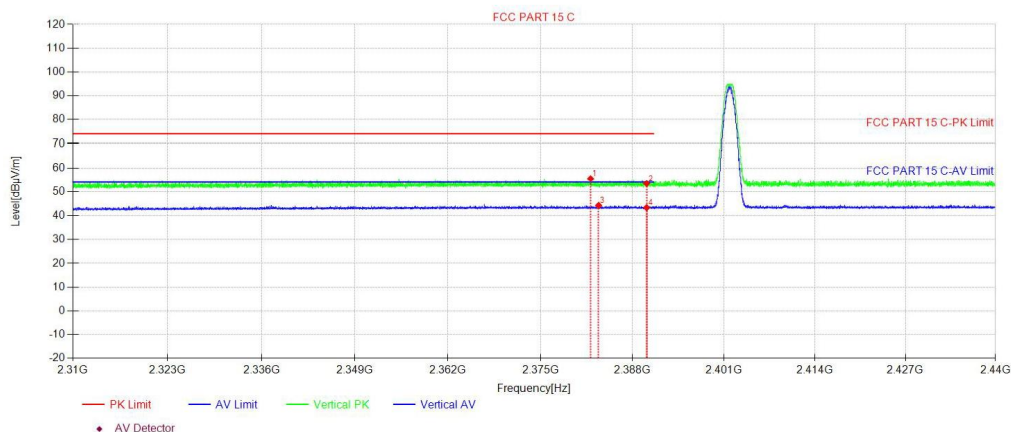
	• RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW $\geq$ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the worst case of GFSK Only the worst case is recorded in the report.
Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass



Test Date
BLE 1M 2402MHz



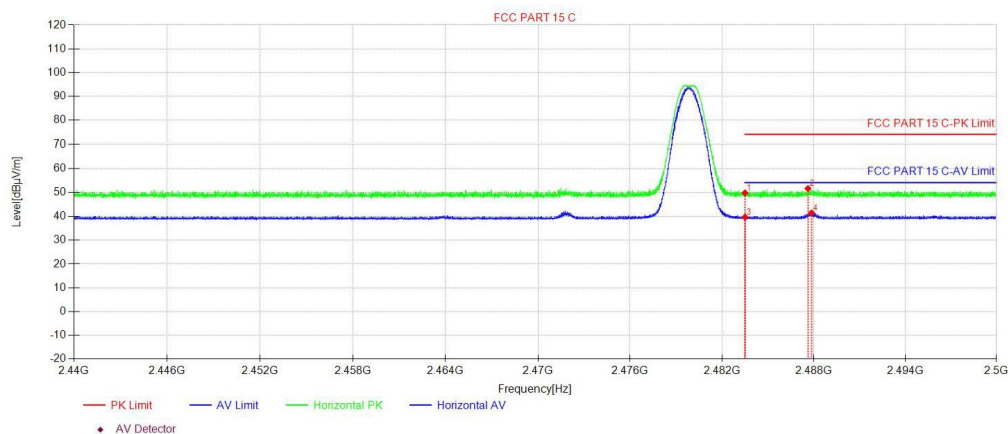
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2379.71	56.50	-0.84	55.66	74.00	18.34	150	2	PK	H
2	2390.01	53.91	-0.80	53.11	74.00	20.89	150	59	PK	H
3	2378.54	45.02	-0.84	44.18	54.00	9.82	150	86	AV	H
4	2390.01	44.20	-0.80	43.40	54.00	10.60	150	356	AV	H



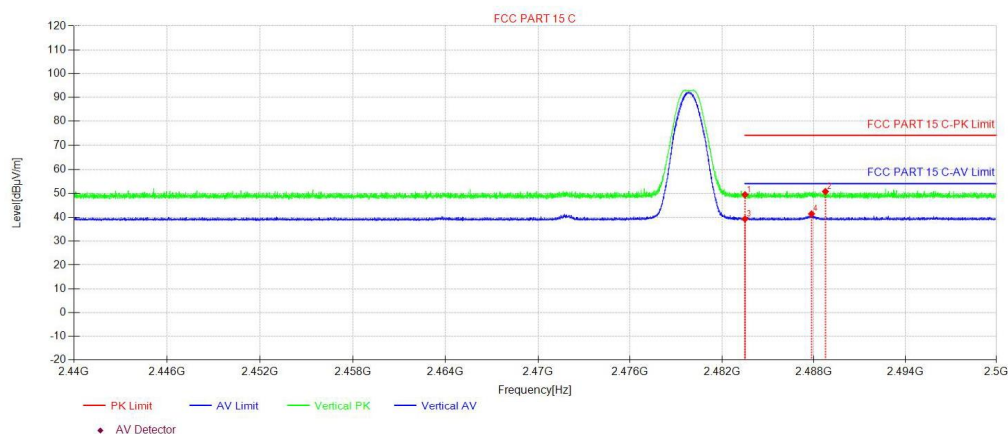
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2382.08	56.39	-0.83	55.56	74.00	18.44	150	199	PK	V
2	2390.01	54.19	-0.80	53.39	74.00	20.61	150	318	PK	V
3	2383.21	45.14	-0.83	44.31	54.00	9.69	150	59	AV	V
4	2390.01	44.17	-0.80	43.37	54.00	10.63	150	343	AV	V



BLE 2480MHz



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2483.50	50.00	-0.29	49.71	74.00	24.29	150	310	PK	H
2	2487.63	51.80	-0.26	51.54	74.00	22.46	150	230	PK	H
3	2483.50	40.03	-0.29	39.74	54.00	14.26	150	220	AV	H
4	2487.86	41.72	-0.26	41.46	54.00	12.54	150	230	AV	H



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2483.50	49.70	-0.29	49.41	74.00	24.59	150	163	PK	V
2	2488.77	50.98	-0.24	50.74	74.00	23.26	150	225	PK	V
3	2483.50	39.69	-0.29	39.40	54.00	14.60	150	59	AV	V
4	2487.86	41.75	-0.26	41.49	54.00	12.51	150	163	AV	V

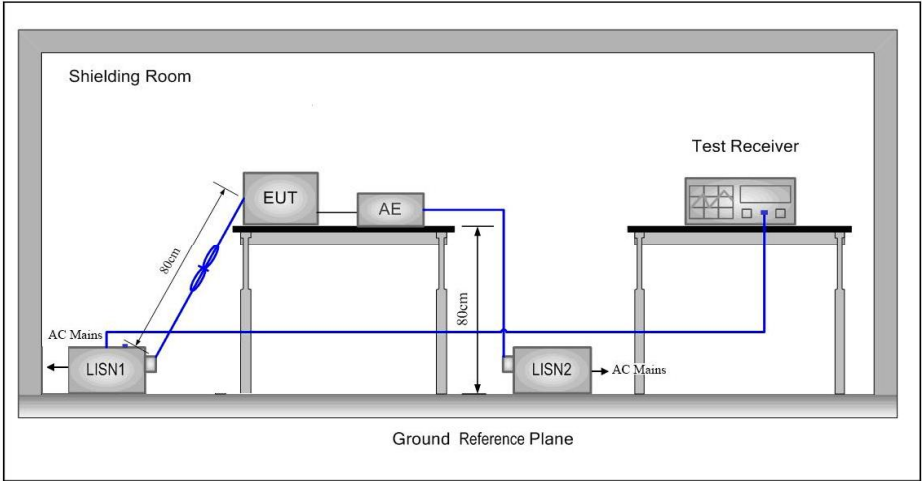
Note:

1. All channels had been pre-test, BLE_1M is the worst case, only the worst case was reported
2. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

$$\text{Result Level} = \text{Reading Level} + \text{Correct Factor}(\text{including Ant.Factor, Cable Factor etc.})$$



3.10AC Power Line Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2020		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 2020 on conducted measurement.		
Test Setup:			



Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.
Final Test Mode:	Through Pre-scan, find the the worst case of GFSK
Instruments Used:	Refer to section 2.9 for details
Test Results:	N/A

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:

Neutral Line:

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
3. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including LISN Factor and the Cable Factor etc.), The basic equation is as follows:
$$\text{Result Level} = \text{Reading Level} + \text{Correct Factor}(\text{including LISN Factor, Cable Factor etc.})$$



4 Appendix

Appendix A: Duty Cycle

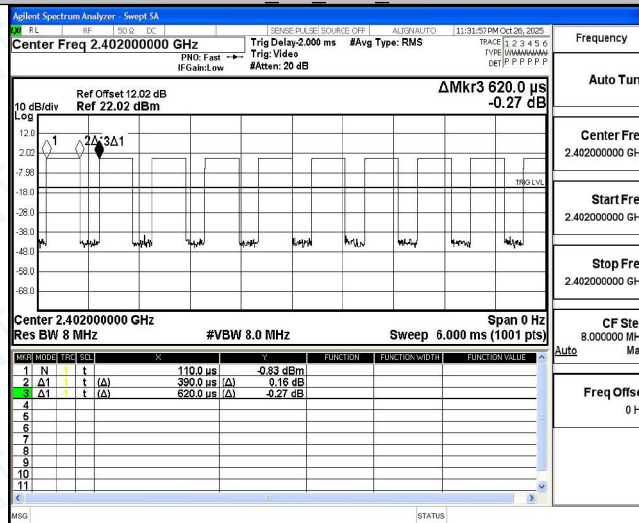
Test Result

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	0.39	0.62	0.6290	62.90	2.01	---	---
		2440	0.39	0.62	0.6290	62.90	2.01	---	---
		2480	0.39	0.62	0.6290	62.90	2.01	---	---
BLE_2M	Ant1	2402	0.21	0.63	0.3333	33.33	4.77	---	---
		2440	0.21	0.63	0.3333	33.33	4.77	---	---
		2480	0.20	0.62	0.3226	32.26	4.91	---	---

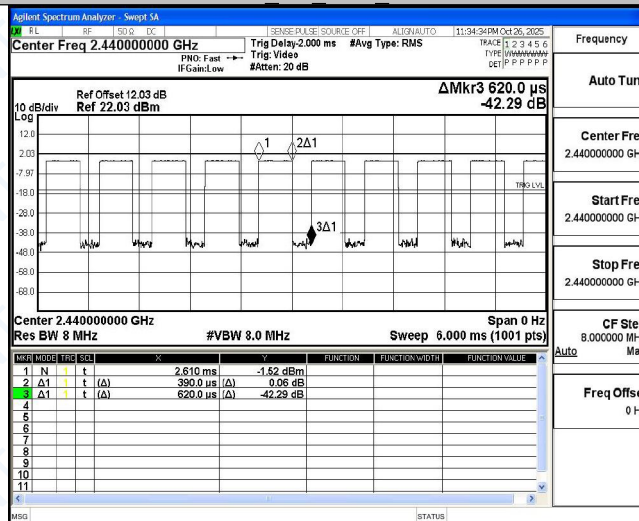


Test Graphs

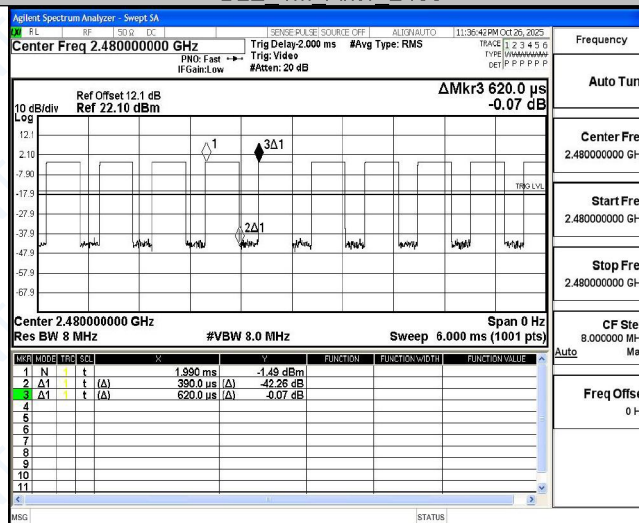
BLE 1M Ant1 2402



BLE 1M Ant1 2440

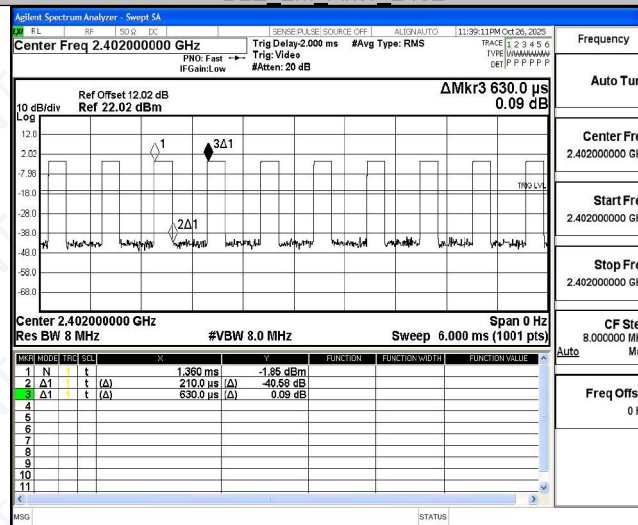


BLE 1M Ant1 2480

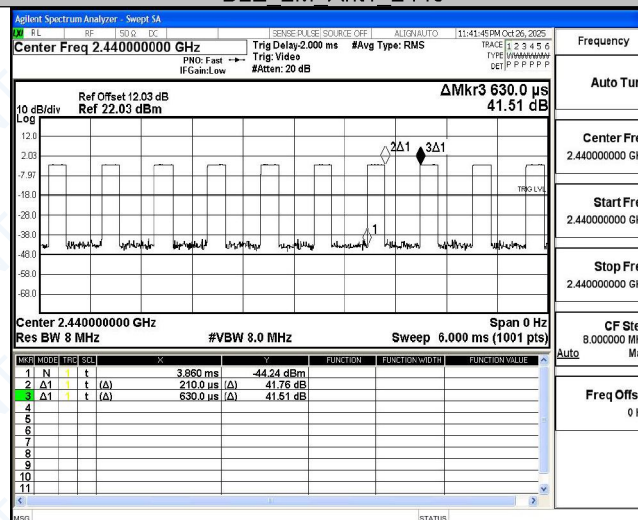




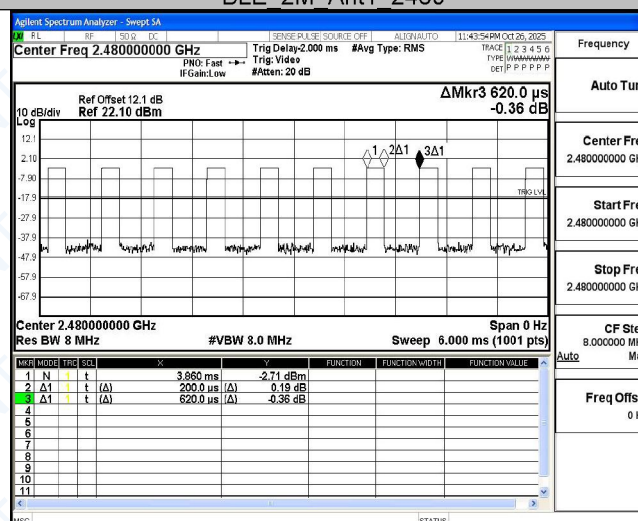
BLE 2M Ant1 2402



BLE 2M Ant1 2440



BLE 2M Ant1 2480





Appendix B: DTS Bandwidth

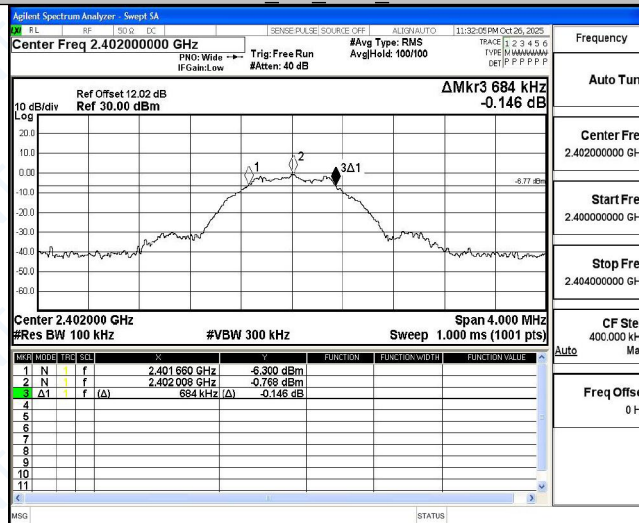
Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.684	2401.660	2402.344	0.5	PASS
		2440	0.688	2439.660	2440.348	0.5	PASS
		2480	0.688	2479.664	2480.352	0.5	PASS
BLE_2M	Ant1	2402	1.084	2401.452	2402.536	0.5	PASS
		2440	1.108	2439.452	2440.560	0.5	PASS
		2480	1.120	2479.460	2480.580	0.5	PASS

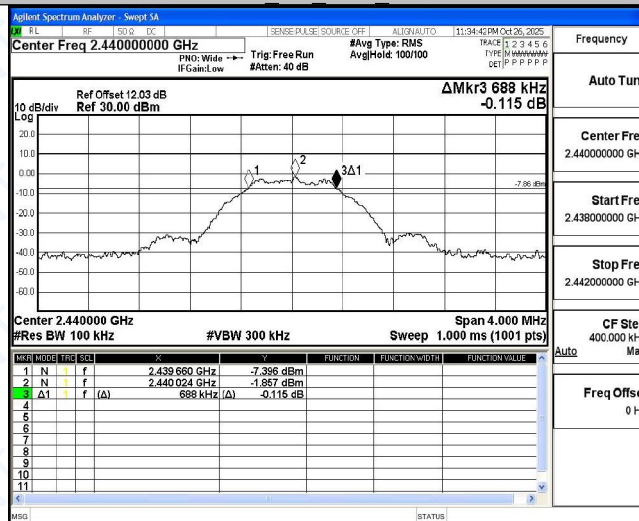


Test Graphs

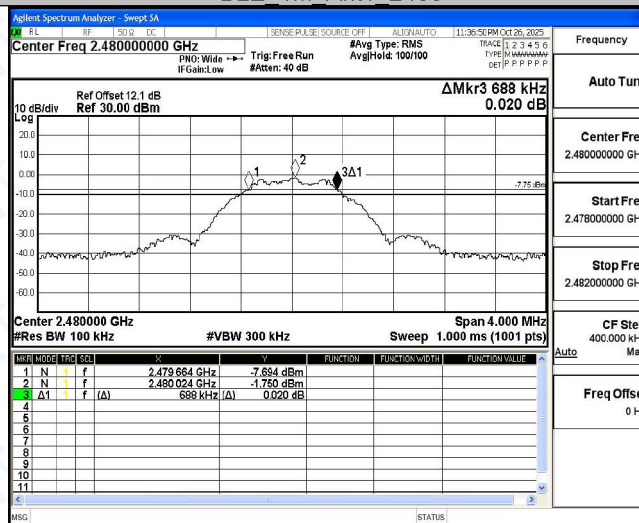
BLE 1M Ant1 2402



BLE 1M Ant1 2440

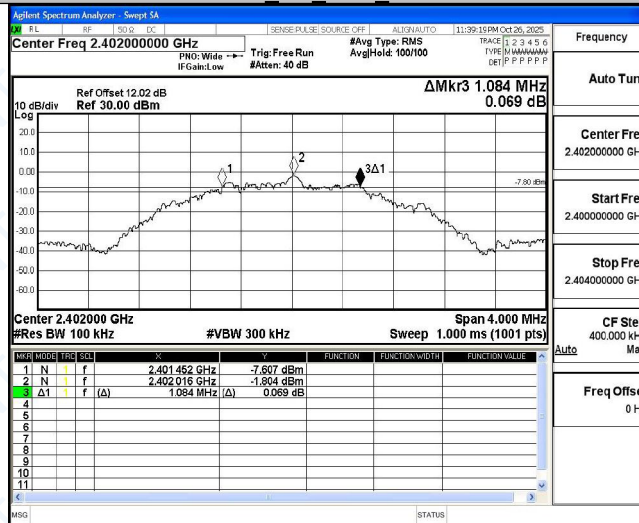


BLE 1M Ant1 2480

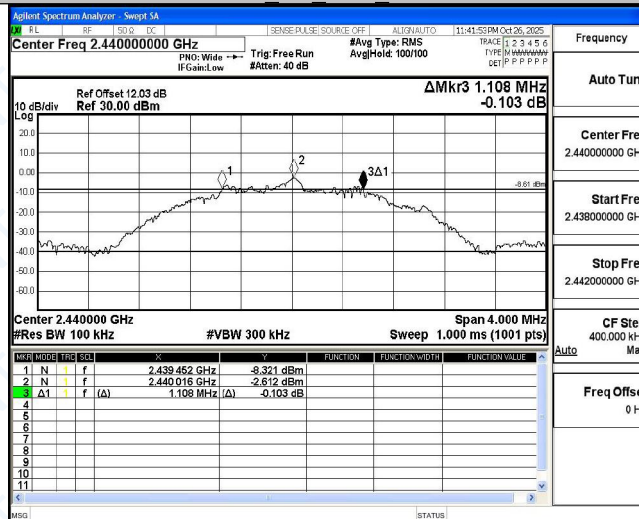




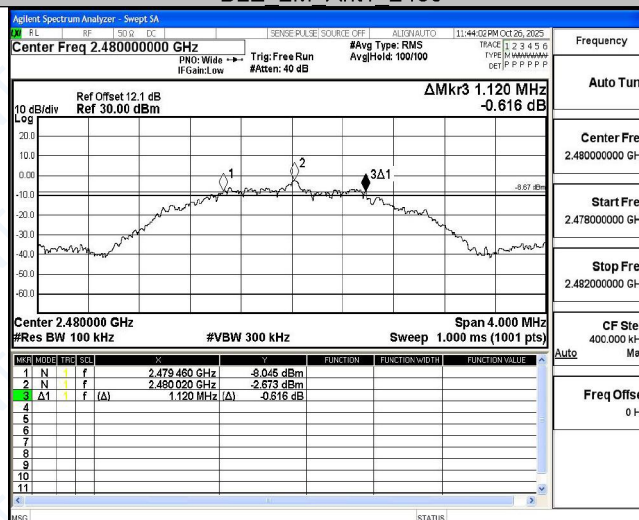
BLE 2M Ant1 2402



BLE 2M Ant1 2440



BLE 2M Ant1 2480





Appendix C: Maximum conducted output power

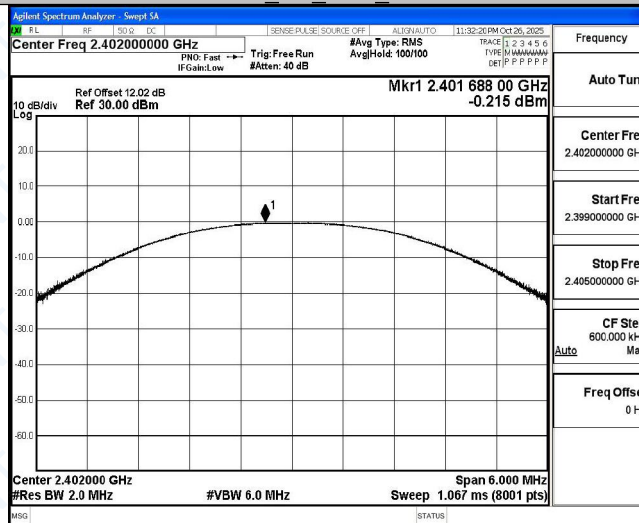
Test Result

TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-0.22	≤30	PASS
		2440	-1.11	≤30	PASS
		2480	-1.03	≤30	PASS
BLE_2M	Ant1	2402	-1.32	≤30	PASS
		2440	-2.16	≤30	PASS
		2480	-2.07	≤30	PASS

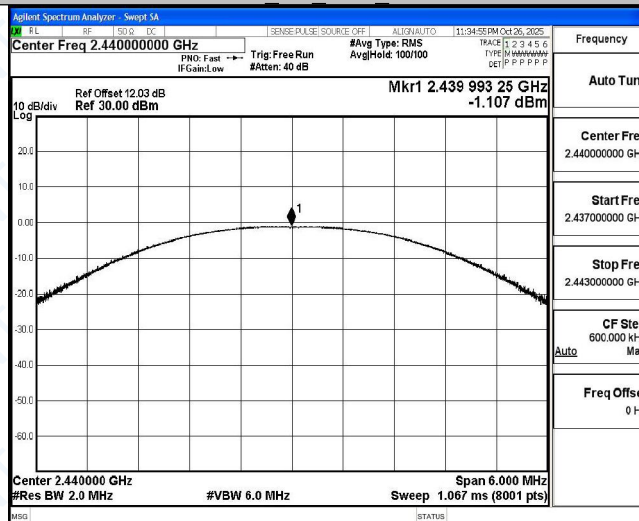


Test Graphs

BLE 1M Ant1 2402



BLE 1M Ant1 2440



BLE 1M Ant1 2480

