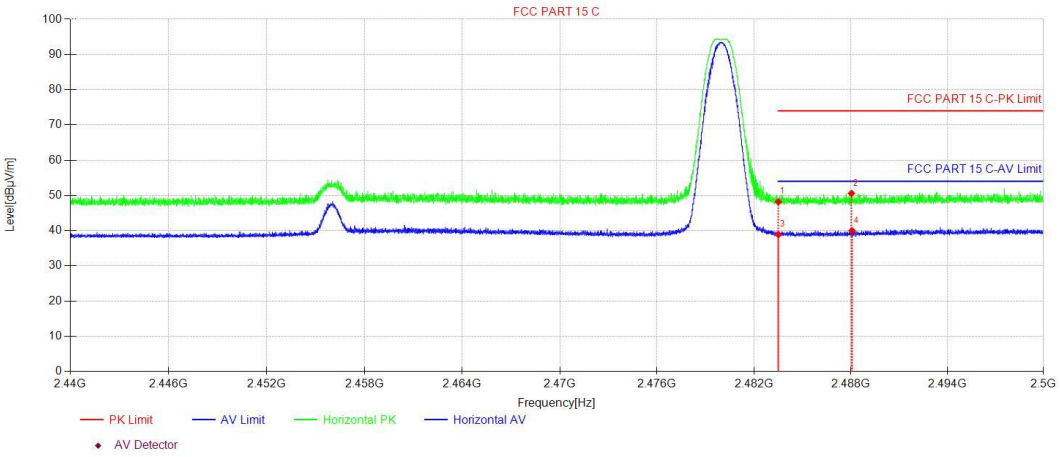
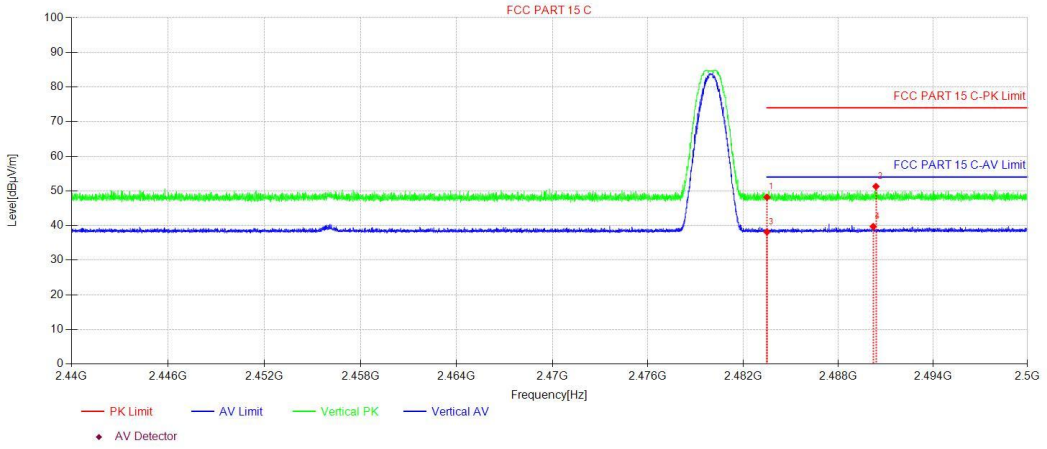
BLE 2480MHz



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	AV Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2483.51	48.46	-0.29	48.17	74.00	25.83	150	279	PK	Horizontal
2	2488.05	50.83	-0.26	50.57	74.00	23.43	150	191	PK	Horizontal
3	2483.51	39.17	-0.29	38.88	54.00	15.12	150	289	AV	Horizontal
4	2488.08	40.24	-0.26	39.98	54.00	14.02	150	313	AV	Horizontal



NO.	Freq. [MHz]	Reading Level [dBµV]	Correct Factor [dB/m]	Result Level [dBµV/m]	AV Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2483.50	48.47	-0.29	48.18	74.00	25.82	150	357	PK	Vertical
2	2490.39	51.53	-0.24	51.29	74.00	22.71	150	139	PK	Vertical
3	2483.50	38.44	-0.29	38.15	54.00	15.85	150	232	AV	Vertical
4	2490.22	39.96	-0.24	39.72	54.00	14.28	150	26	AV	Vertical

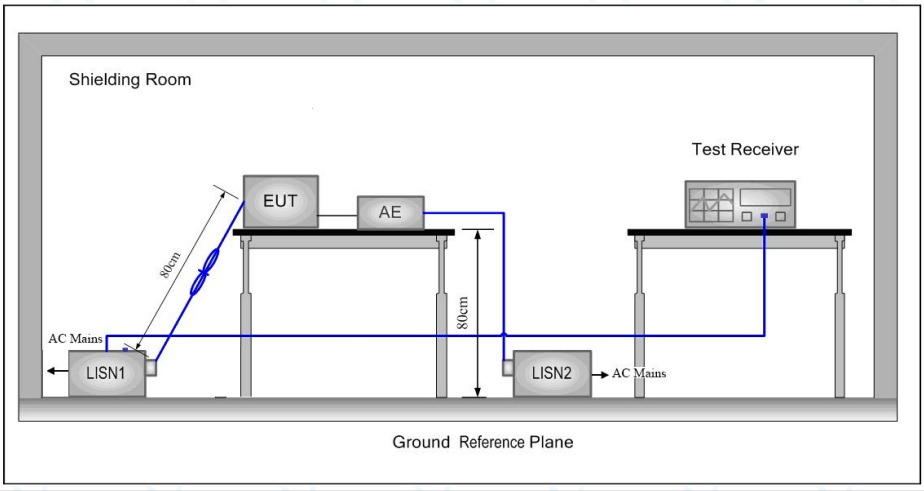
Note:

1. The BLE 1M is the worse case.

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:

Result Level= Reading Level + Correct Factor(including Ant.Factor ,Cable Factor etc.)

3.10AC Power Line Conducted Emissions

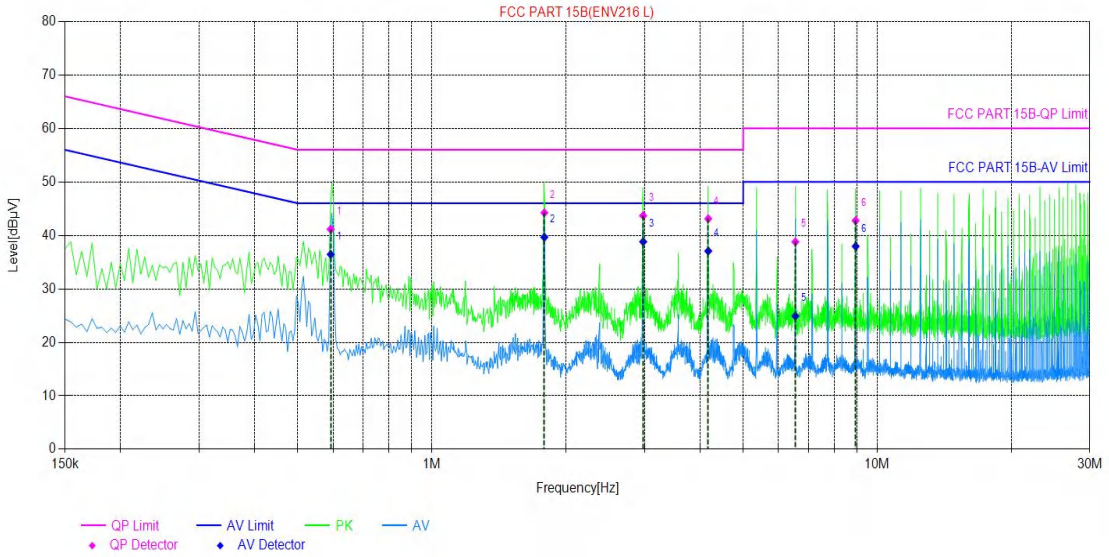
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	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 50Ω/50μH + 5Ω 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 2013 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:	Pass

Measurement Data

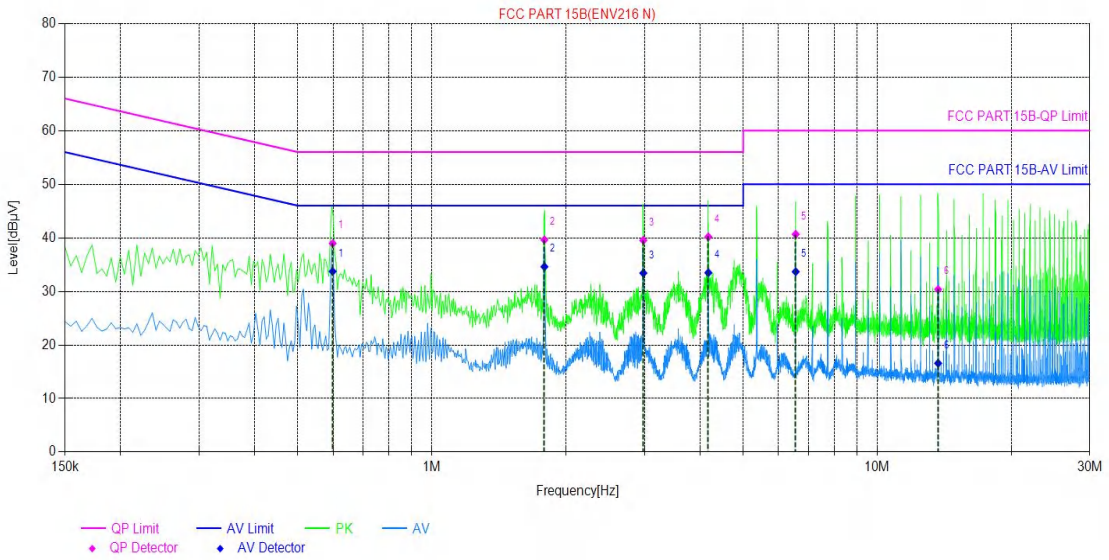
An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live Line:



Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.5925	9.82	41.14	56.00	14.86	36.45	46.00	9.55	PASS
2	1.7886	9.73	44.23	56.00	11.77	39.66	46.00	6.34	PASS
3	2.9807	9.74	43.69	56.00	12.31	38.81	46.00	7.19	PASS
4	4.1741	9.75	43.12	56.00	12.88	37.07	46.00	8.93	PASS
5	6.5489	9.86	38.79	60.00	21.21	24.91	50.00	25.09	PASS
6	8.9427	9.87	42.76	60.00	17.24	37.95	50.00	12.05	PASS

Neutral Line:



Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.5985	9.78	38.95	56.00	17.05	33.73	46.00	12.27	PASS
2	1.7891	9.75	39.62	56.00	16.38	34.60	46.00	11.40	PASS
3	2.9831	9.87	39.53	56.00	16.47	33.42	46.00	12.58	PASS
4	4.1756	9.96	40.18	56.00	15.82	33.48	46.00	12.52	PASS
5	6.5598	9.99	40.66	60.00	19.34	33.67	50.00	16.33	PASS
6	13.6983	9.90	30.38	60.00	29.62	16.59	50.00	33.41	PASS

Remark:

1. The BLE 1M is the worse case.

2. 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:

Result Level= Reading Level + Correct Factor(including LISN Factor, Cable Factor etc.)

4 Appendix

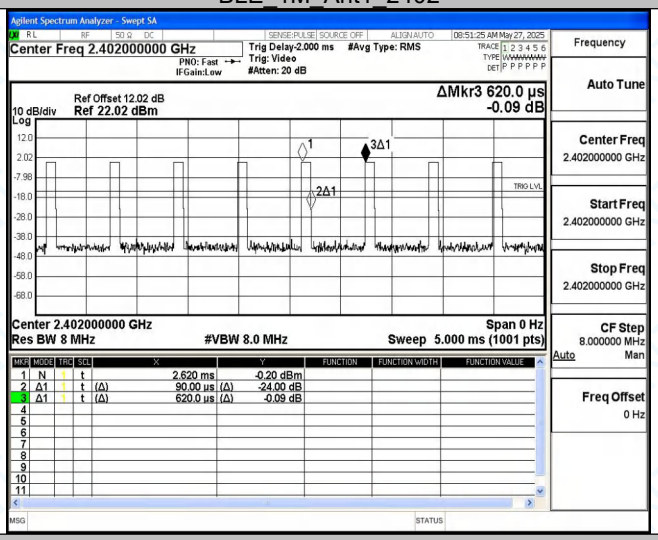
Appendix A: Duty Cycle

Test Result

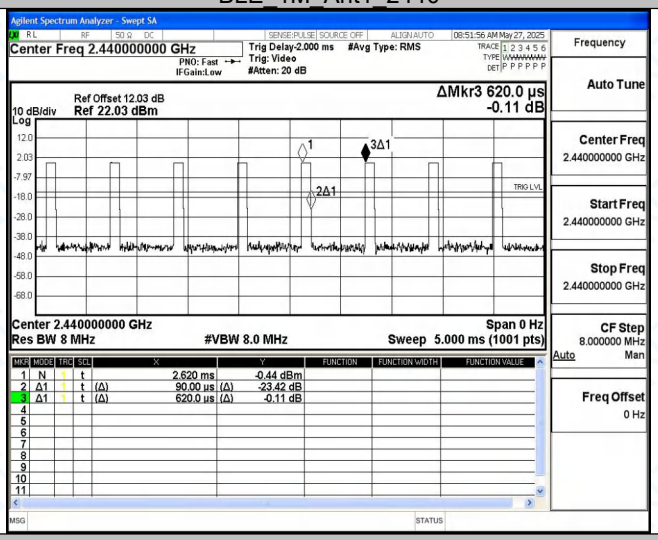
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	0.09	0.62	0.1452	14.52	8.38	---	---
		2440	0.09	0.62	0.1452	14.52	8.38	---	---
		2480	0.09	0.62	0.1452	14.52	8.38	---	---
BLE_2M	Ant1	2402	0.05	0.62	0.0806	8.06	10.94	---	---
		2440	0.06	0.63	0.0952	9.52	10.21	---	---
		2480	0.05	0.62	0.0806	8.06	10.94	---	---

Test Graphs

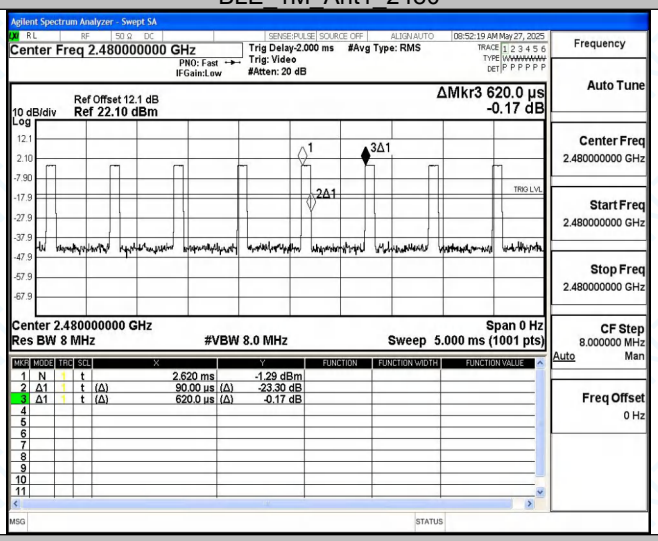
BLE_1M_Ant1_2402



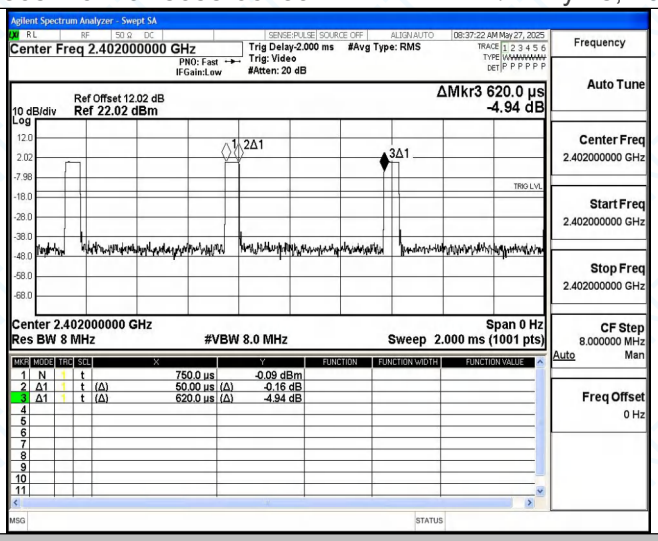
BLE_1M_Ant1_2440



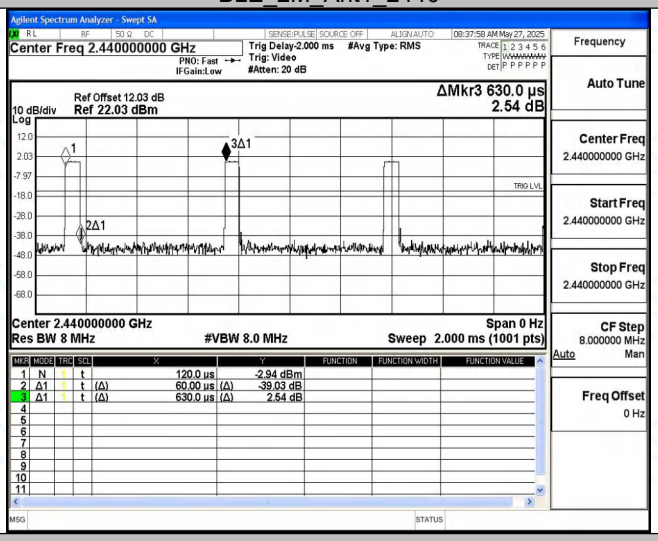
BLE_1M_Ant1_2480



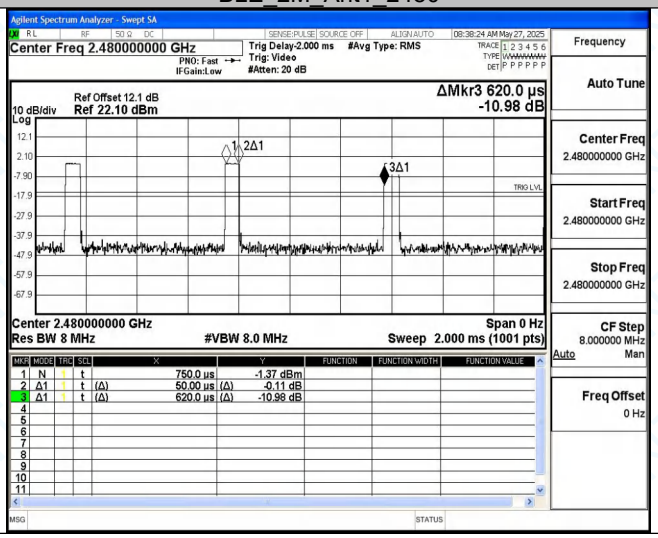
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



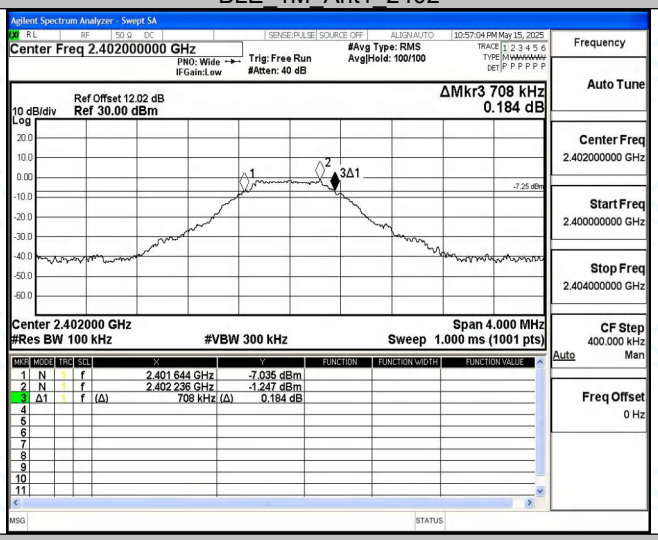
Appendix B: DTS Bandwidth

Test Result

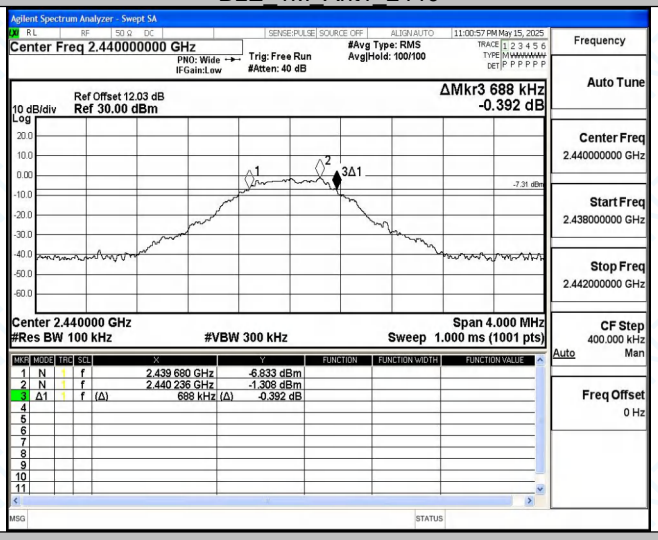
TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.708	2401.644	2402.352	0.5	PASS
		2440	0.688	2439.680	2440.368	0.5	PASS
		2480	0.700	2479.668	2480.368	0.5	PASS
BLE_2M	Ant1	2402	1.256	2401.332	2402.588	0.5	PASS
		2440	1.124	2439.428	2440.552	0.5	PASS
		2480	1.228	2479.372	2480.600	0.5	PASS

Test Graphs

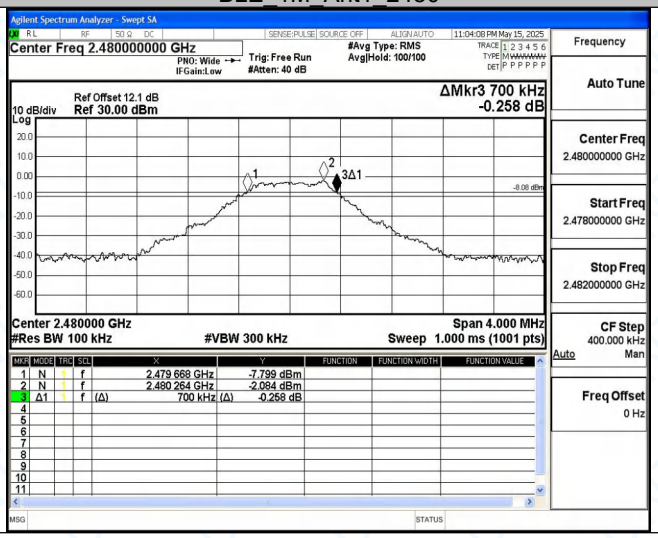
BLE_1M_Ant1_2402



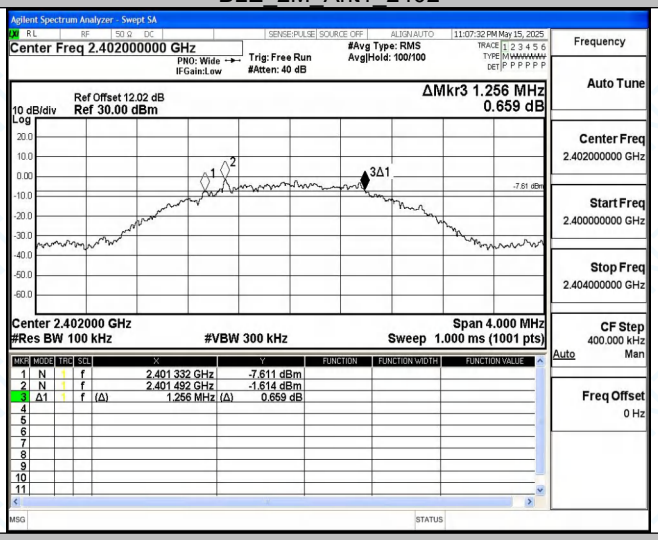
BLE_1M_Ant1_2440



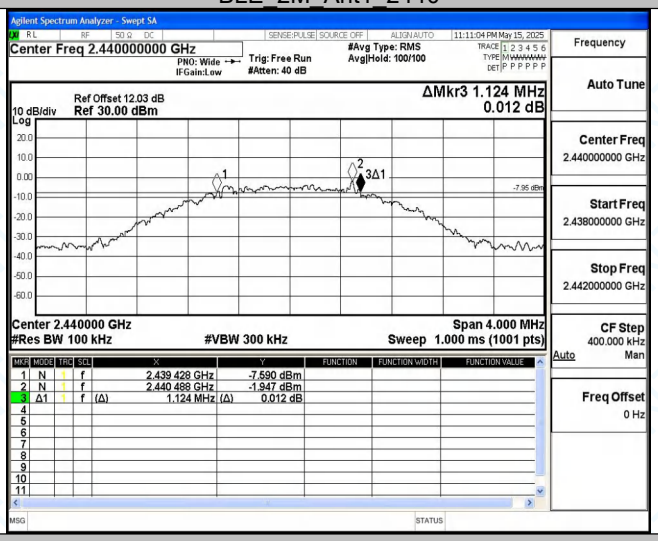
BLE_1M_Ant1_2480



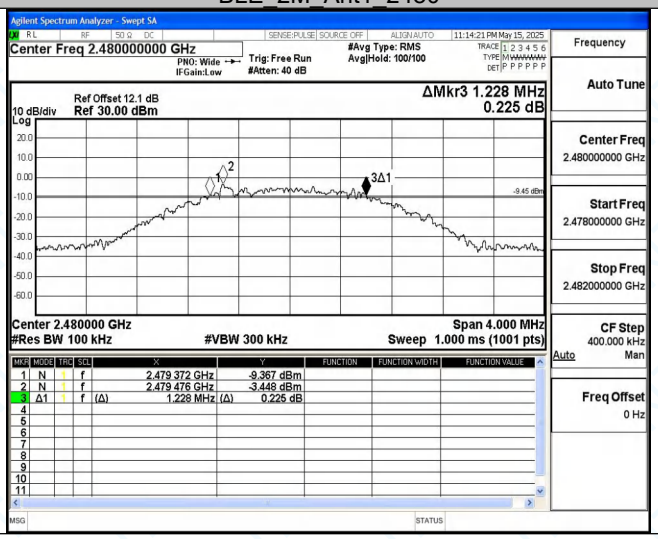
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



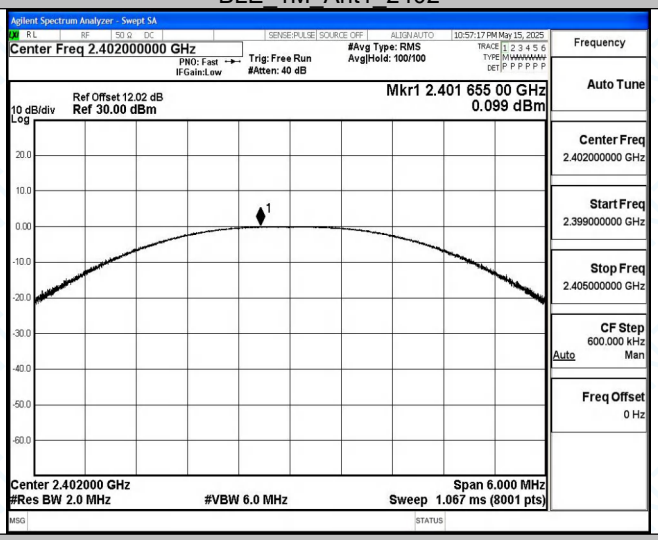
Appendix C: Maximum conducted output power

Test Result

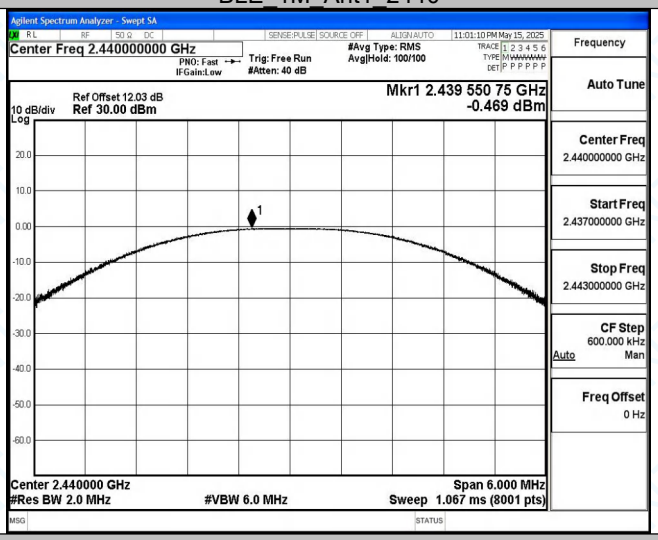
TestMode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0.10	≤30	PASS
		2440	-0.47	≤30	PASS
		2480	-1.18	≤30	PASS
BLE_2M	Ant1	2402	0.15	≤30	PASS
		2440	-0.33	≤30	PASS
		2480	-1.16	≤30	PASS

Test Graphs

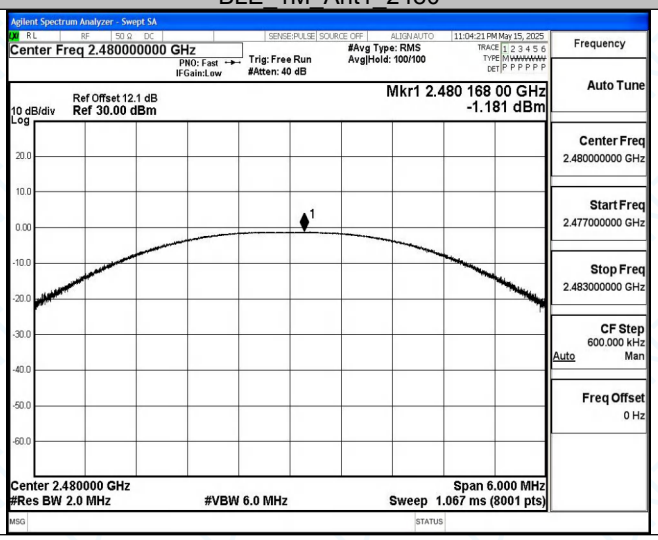
BLE_1M_Ant1_2402



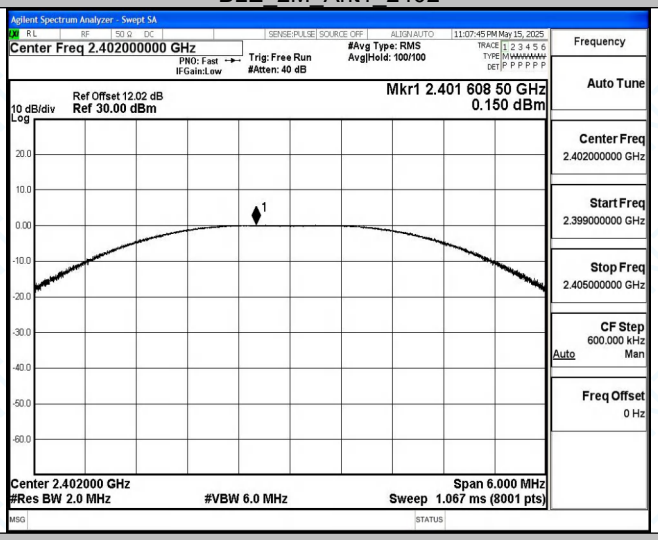
BLE_1M_Ant1_2440



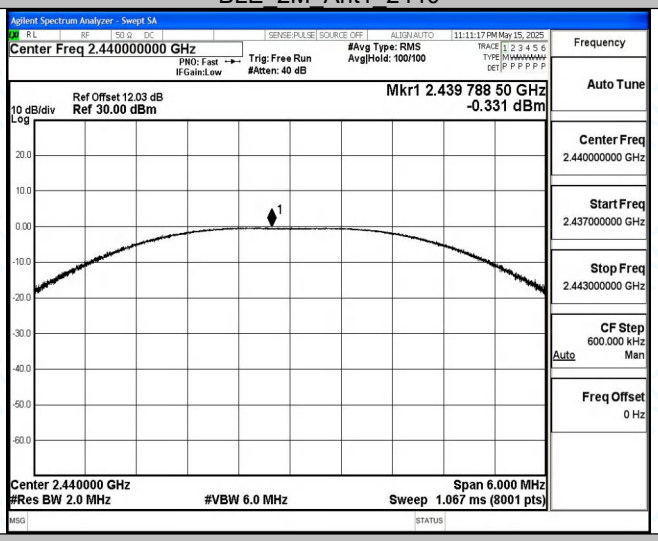
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480