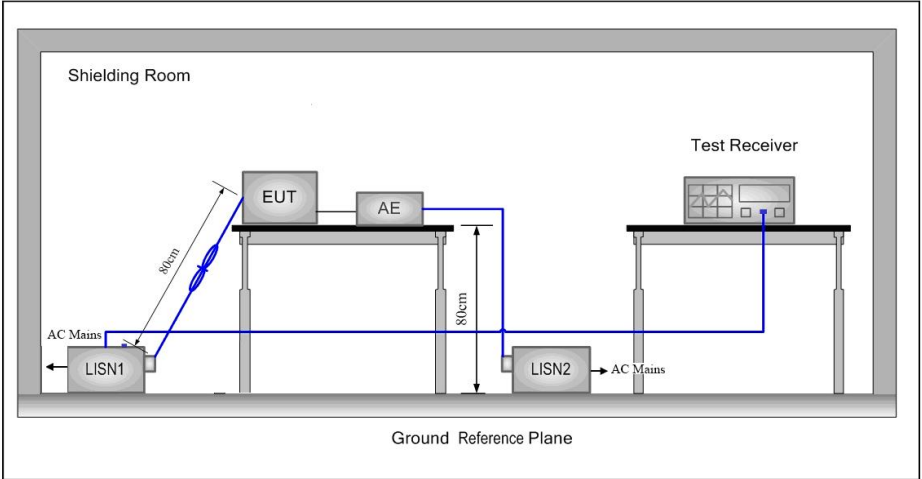




3.10AC Power Line Conducted Emissions

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:	<p>1) The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>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.</p> <p>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,</p> <p>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.</p>		
Test Setup:			

Exploratory Test Mode:

Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.

Dongguan DN Testing Co., Ltd.

Add: No. 1, West Fourth Street, Xingfa South Road, Wusha Community, Chang 'an Town, Dongguan City, Guangdong P.R.China

Web: www.dn-testing.com

Tel: +86-769-88087383

E-mail: service@dn-testing.com



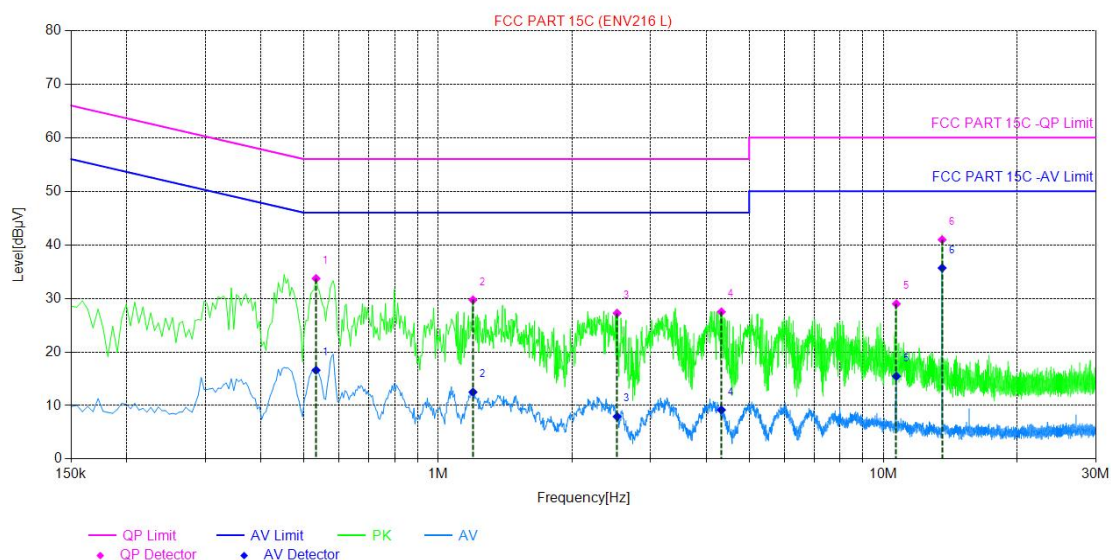
	Charge + Transmitting mode.
Final Test Mode:	Through Pre-scan, find the the worst case of GFSK
Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass

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:

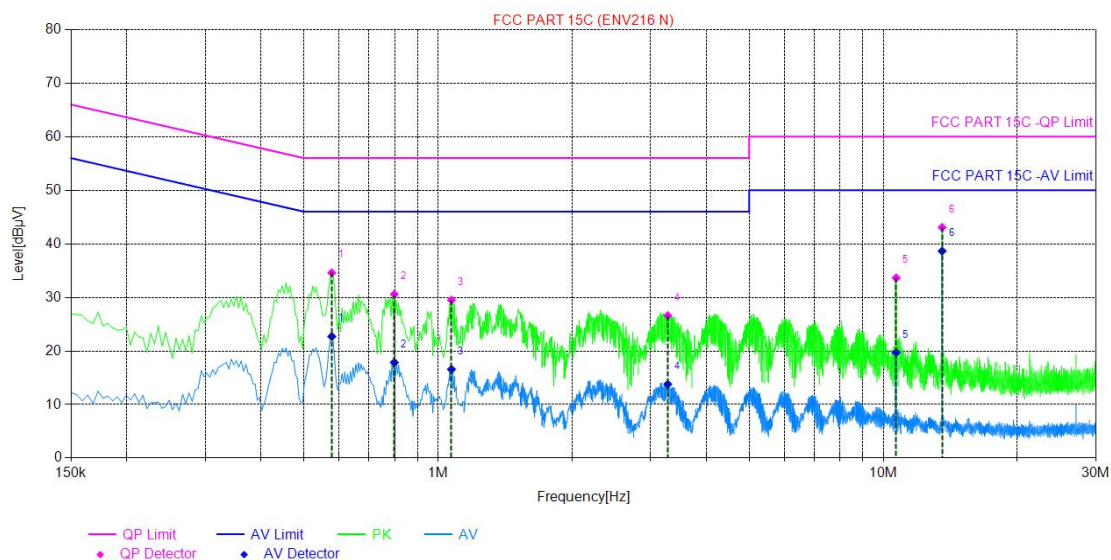


Final Data List

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	0.5325	9.86	33.71	56.00	22.29	16.59	46.00	29.41	PASS
2	1.1985	9.72	29.71	56.00	26.29	12.50	46.00	33.50	PASS
3	2.526	9.74	27.23	56.00	28.77	7.94	46.00	38.06	PASS
4	4.3305	9.77	27.48	56.00	28.52	9.18	46.00	36.82	PASS
5	10.7025	9.88	28.98	60.00	31.02	15.47	50.00	34.53	PASS
6	13.56	9.95	40.95	60.00	19.05	35.68	50.00	14.32	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	0.5775	9.77	34.58	56.00	21.42	22.70	46.00	23.30	PASS
2	0.798	9.80	30.58	56.00	25.42	17.86	46.00	28.14	PASS
3	1.0725	9.69	29.50	56.00	26.50	16.58	46.00	29.42	PASS
4	3.282	9.90	26.60	56.00	29.40	13.79	46.00	32.21	PASS
5	10.6935	9.82	33.63	60.00	26.37	19.71	50.00	30.29	PASS
6	13.56	9.90	43.05	60.00	16.95	38.64	50.00	11.36	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. 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

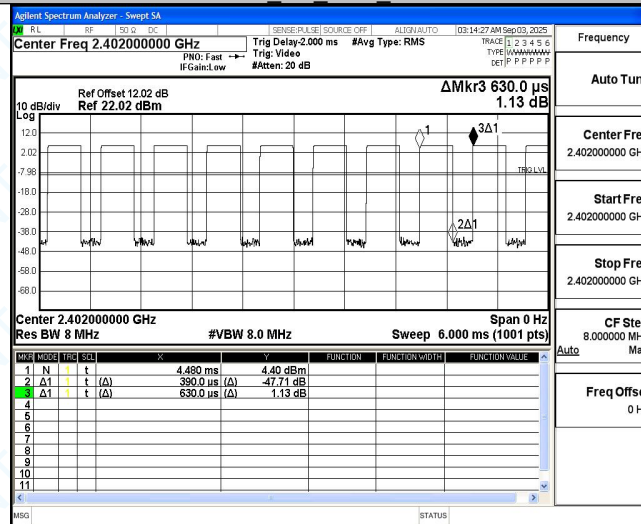
Test Result

TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	0.39	0.63	0.6190	61.90	2.08	---	---
		2440	0.38	0.62	0.6129	61.29	2.13	---	---
		2480	0.39	0.63	0.6190	61.90	2.08	---	---
BLE_2M	Ant1	2402	0.24	0.62	0.3871	38.71	4.12	---	---
		2440	0.24	0.63	0.3810	38.10	4.19	---	---
		2480	0.24	0.62	0.3871	38.71	4.12	---	---

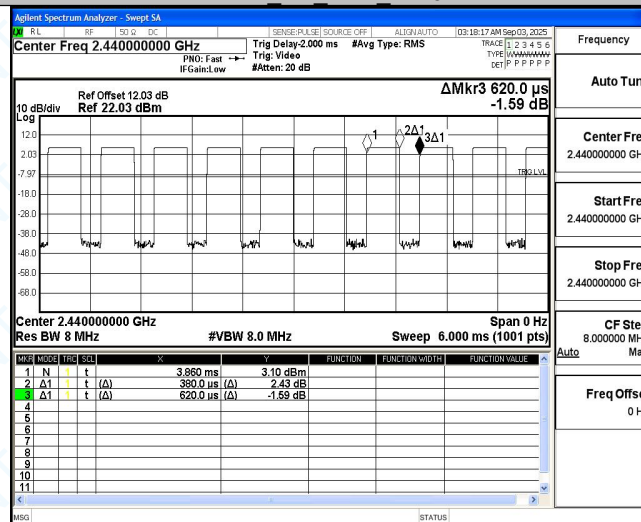


Test Graphs

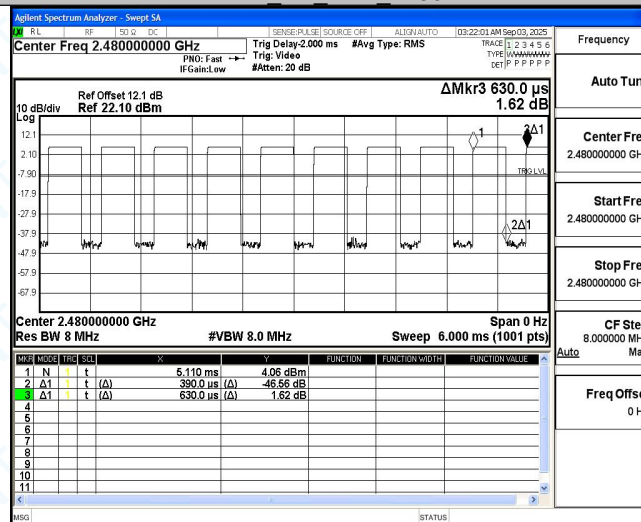
BLE 1M Ant1 2402



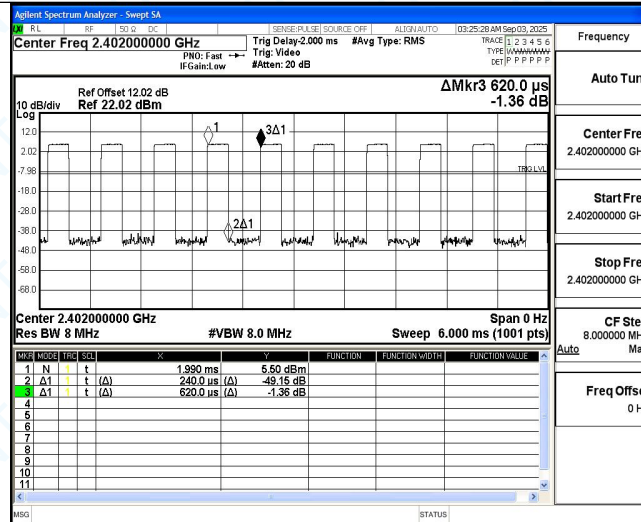
BLE 1M Ant1 2440



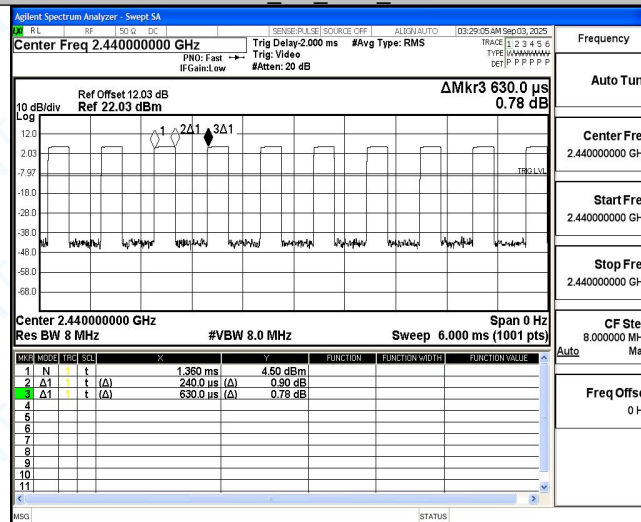
BLE 1M Ant1 2480



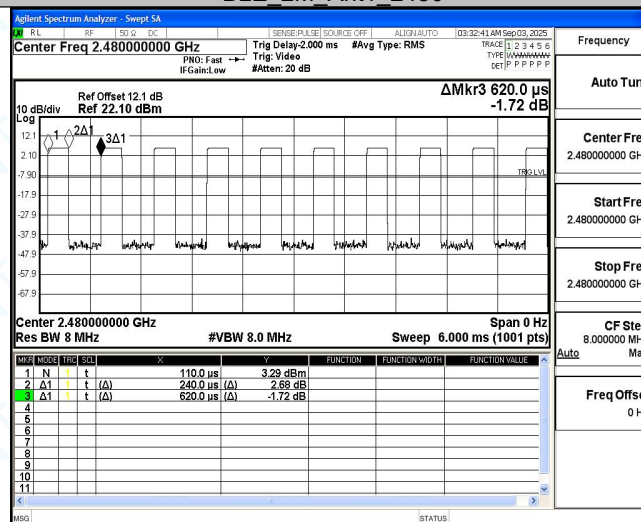
BLE 2M Ant1 2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480





Appendix B: DTS Bandwidth

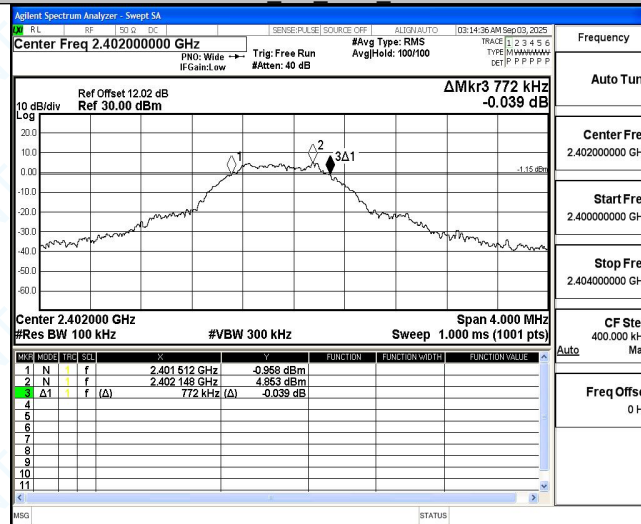
Test Result

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.772	2401.512	2402.284	0.5	PASS
		2440	0.776	2439.508	2440.284	0.5	PASS
		2480	0.744	2479.528	2480.272	0.5	PASS
BLE_2M	Ant1	2402	1.184	2401.260	2402.444	0.5	PASS
		2440	1.244	2439.228	2440.472	0.5	PASS
		2480	1.216	2479.252	2480.468	0.5	PASS

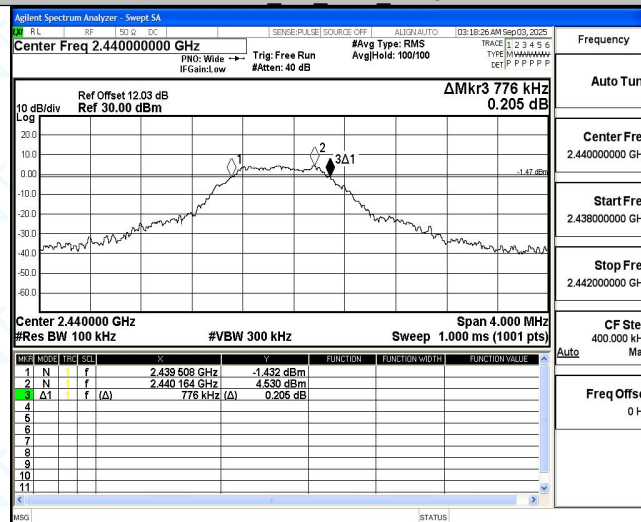


Test Graphs

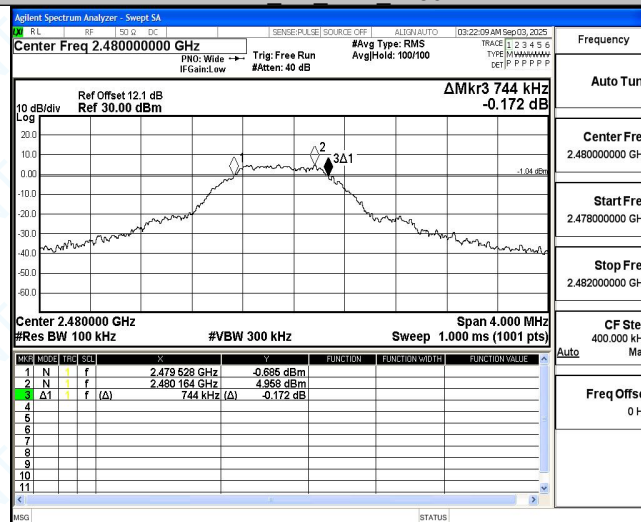
BLE 1M Ant1 2402



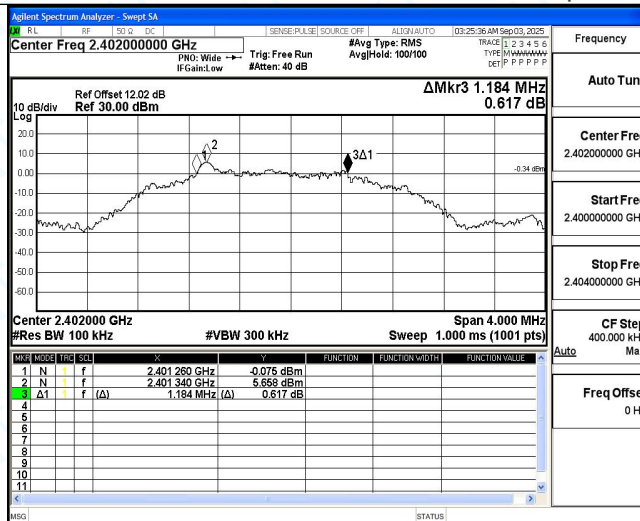
BLE 1M Ant1 2440



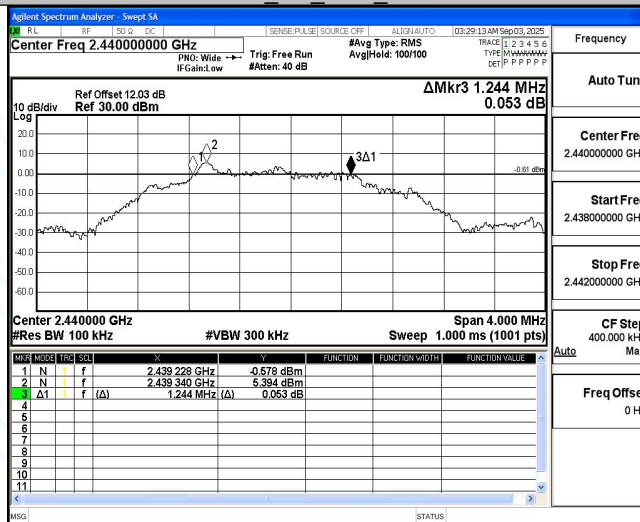
BLE 1M Ant1 2480



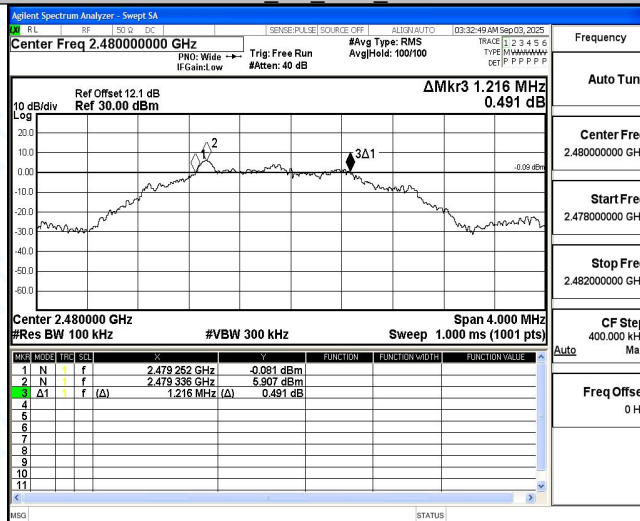
BLE 2M Ant1 2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480





Appendix C: Maximum conducted output power

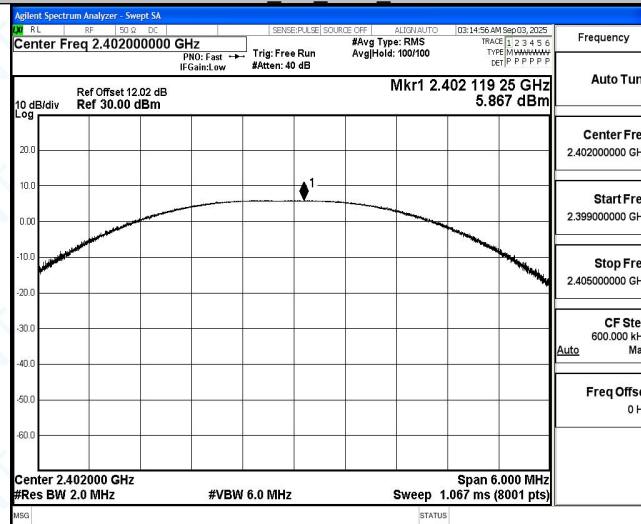
Test Result

TestMode	Antenna	Freq(MHz)	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	5.87	≤30	PASS
		2440	5.69	≤30	PASS
		2480	6.14	≤30	PASS
BLE_2M	Ant1	2402	5.89	≤30	PASS
		2440	5.64	≤30	PASS
		2480	6.16	≤30	PASS

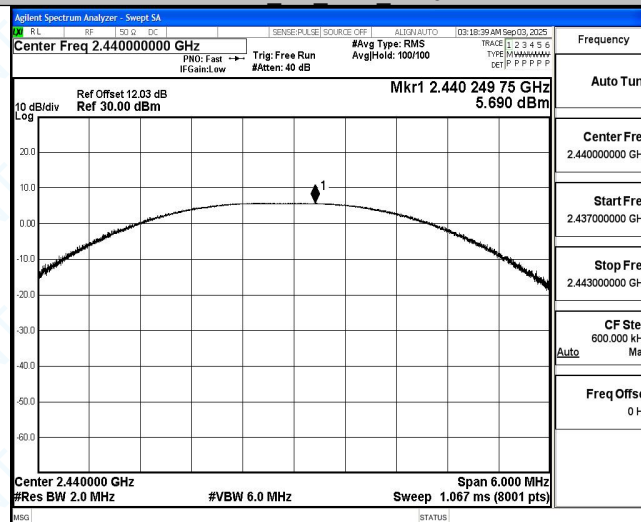


Test Graphs

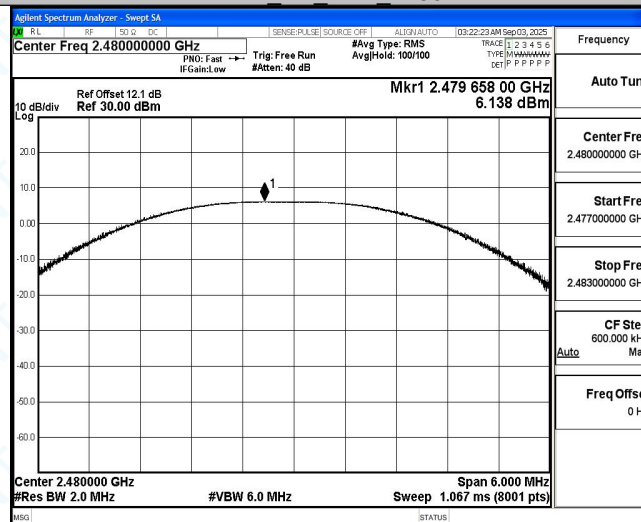
BLE 1M Ant1 2402



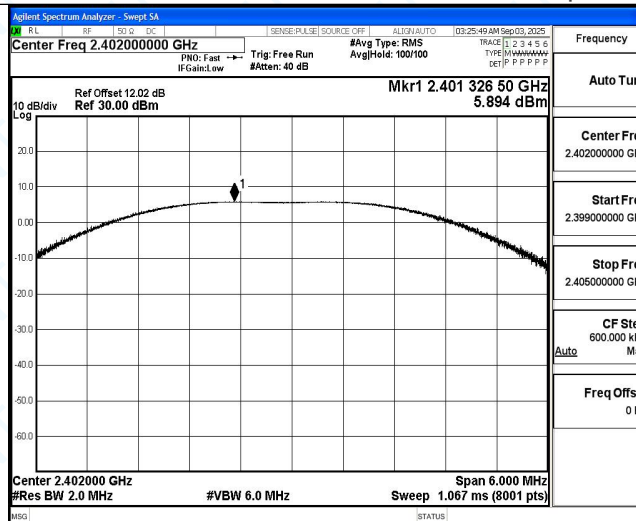
BLE 1M Ant1 2440



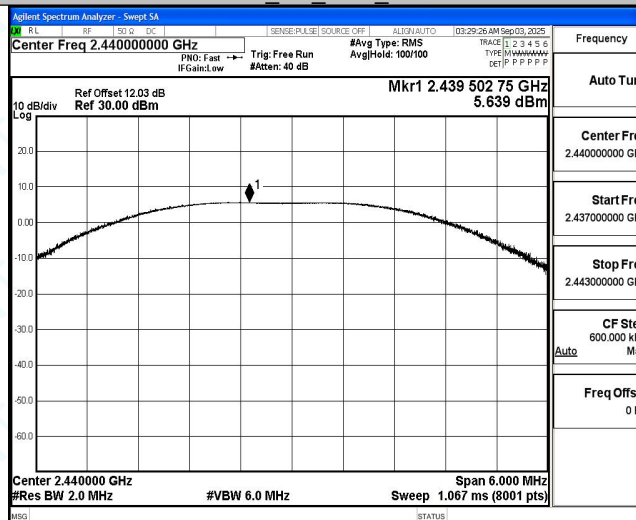
BLE 1M Ant1 2480



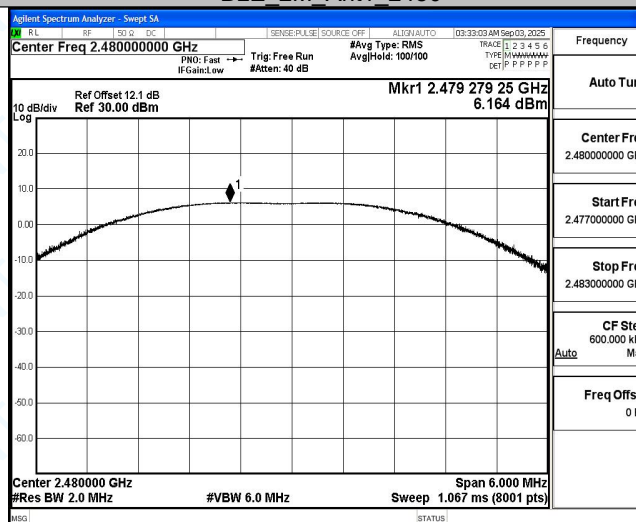
BLE 2M Ant1 2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480





Appendix D: Maximum power spectral density

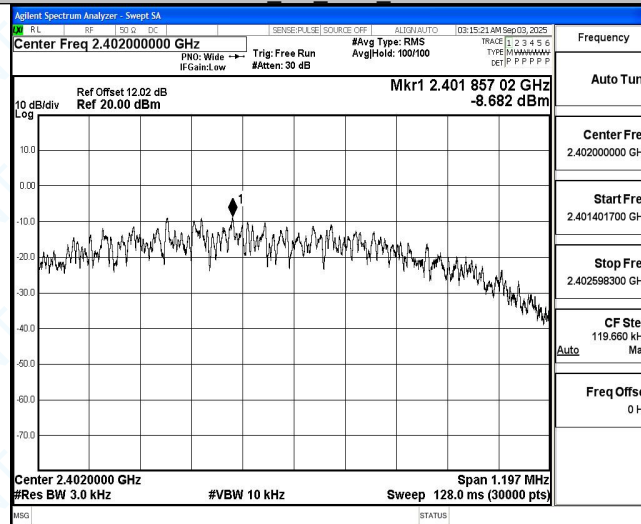
Test Result

TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.68	≤8.00	PASS
		2440	-8.40	≤8.00	PASS
		2480	-8.04	≤8.00	PASS
BLE_2M	Ant1	2402	-7.60	≤8.00	PASS
		2440	-7.68	≤8.00	PASS
		2480	-7.17	≤8.00	PASS

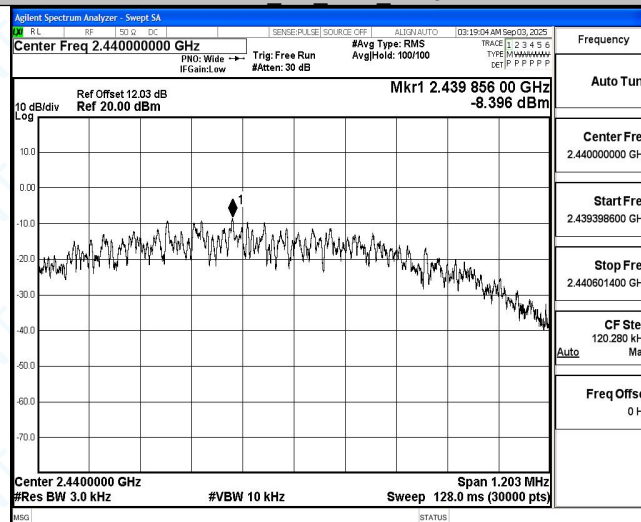


Test Graphs

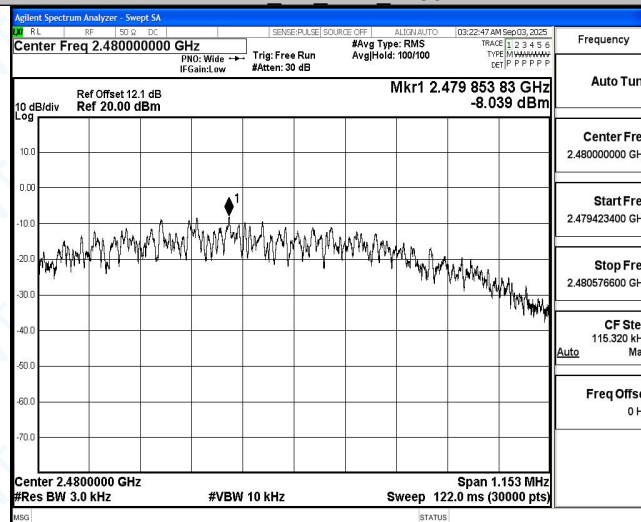
BLE 1M Ant1 2402



BLE 1M Ant1 2440



BLE 1M Ant1 2480



BLE 2M Ant1 2402