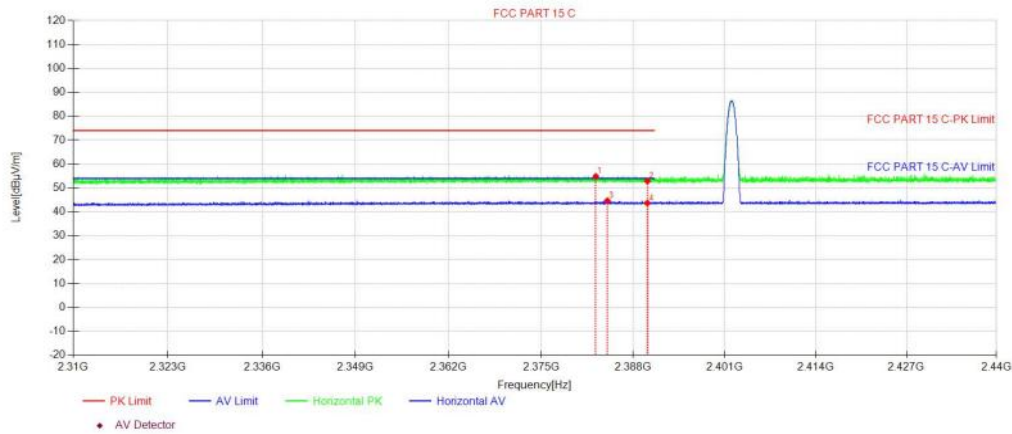
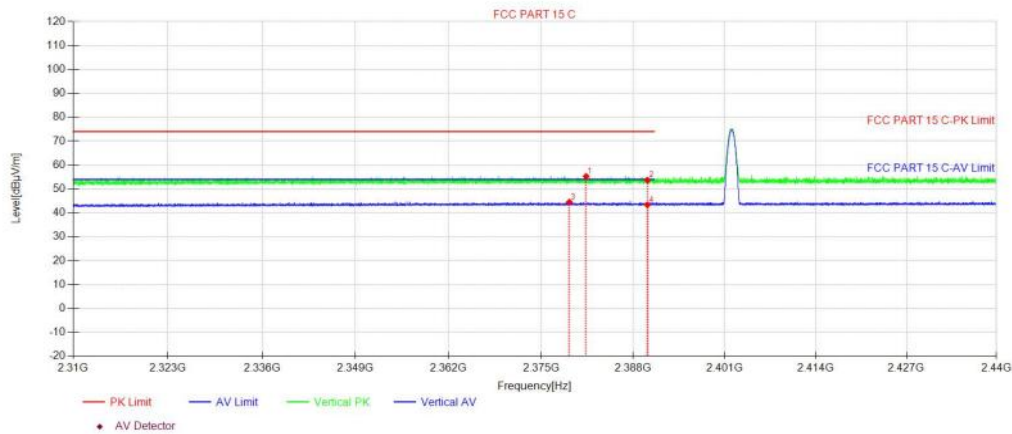


**Test Date**
BLE 1M 2402MHz

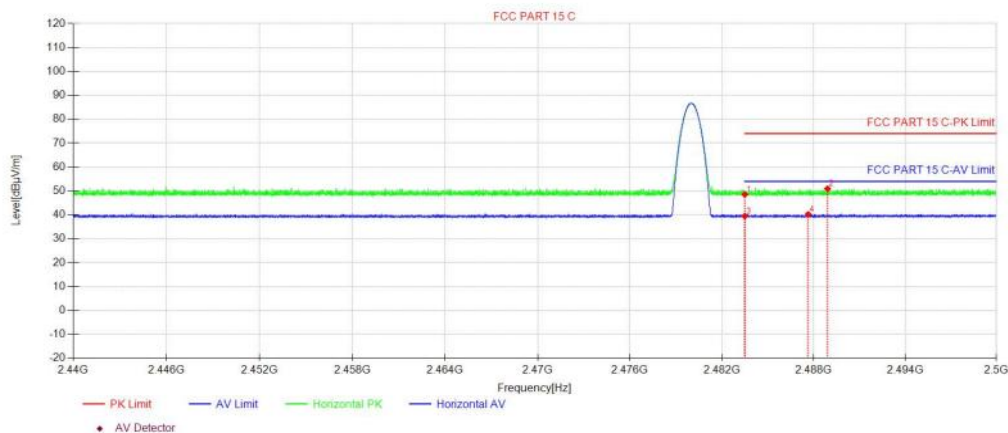
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2382.72	55.69	-0.83	54.86	74.00	19.14	150	100	PK	H
2	2390.01	53.65	-0.80	52.85	74.00	21.15	150	305	PK	H
3	2384.34	45.48	-0.82	44.66	54.00	9.34	150	360	AV	H
4	2390.01	44.52	-0.80	43.72	54.00	10.28	150	339	AV	H



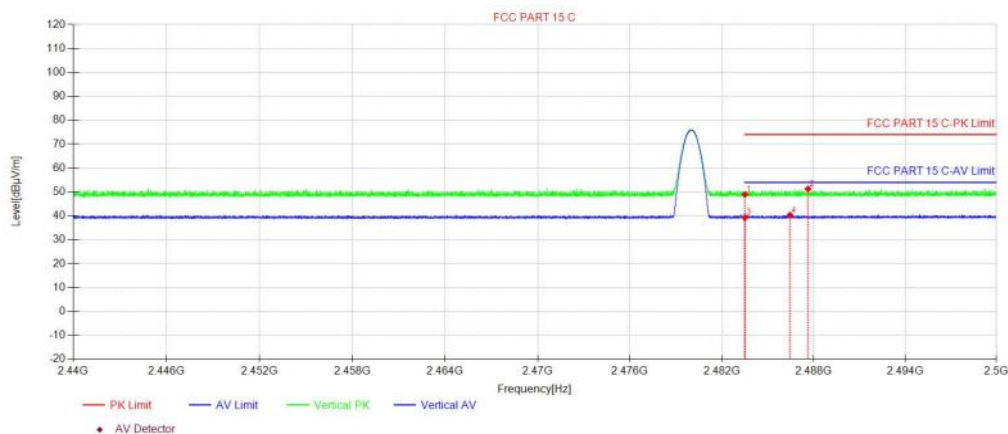
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity
1	2381.35	56.08	-0.83	55.25	74.00	18.75	150	123	PK	V
2	2390.01	54.50	-0.80	53.70	74.00	20.30	150	346	PK	V
3	2378.98	45.32	-0.84	44.48	54.00	9.52	150	292	AV	V
4	2390.01	44.17	-0.80	43.37	54.00	10.63	150	113	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	48.81	-0.29	48.52	74.00	25.48	150	118	PK	H
2	2488.92	51.15	-0.24	50.91	74.00	23.09	150	51	PK	H
3	2483.50	39.75	-0.29	39.46	54.00	14.54	150	291	AV	H
4	2487.65	40.48	-0.26	40.22	54.00	13.78	150	209	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	2483.51	49.26	-0.29	48.97	74.00	25.03	150	59	PK	V
2	2487.64	51.53	-0.26	51.27	74.00	22.73	150	289	PK	V
3	2483.51	39.56	-0.29	39.27	54.00	14.73	150	59	AV	V
4	2486.46	40.57	-0.26	40.31	54.00	13.69	150	205	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:

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: 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:N/A

Neutral Line:N/A

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

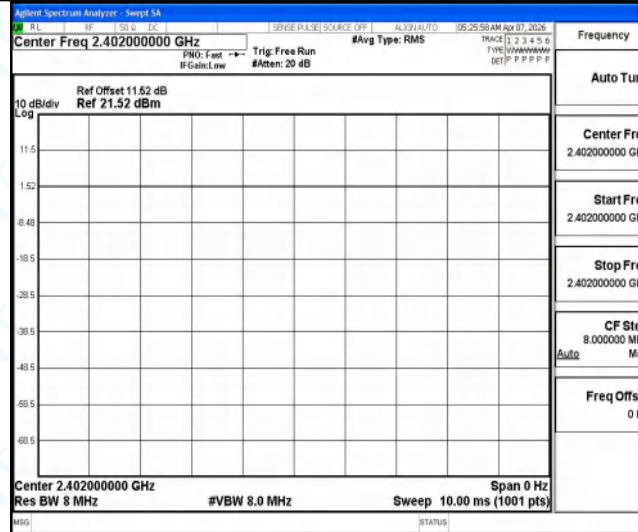
Test Result

TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.00	0.00	100	0
BLE_1M	Ant1	2440	0.00	0.00	100	0
BLE_1M	Ant1	2480	0.00	0.00	100	0
BLE_2M	Ant1	2402	0.00	0.00	100	0
BLE_2M	Ant1	2440	0.00	0.00	100	0
BLE_2M	Ant1	2480	0.00	0.00	100	0

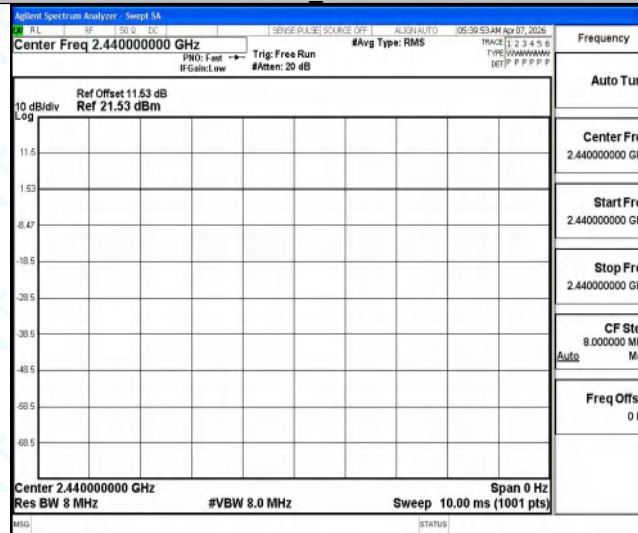


Test Graphs

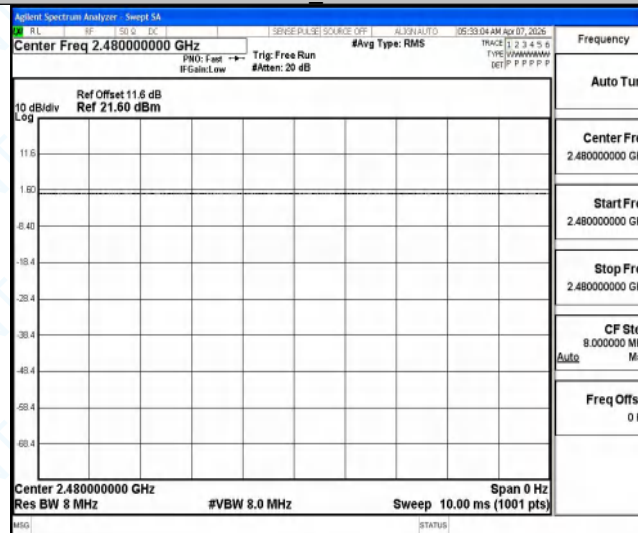
NTNV-BLE_1M-Ant1-2402



NTNV-BLE_1M-Ant1-2440

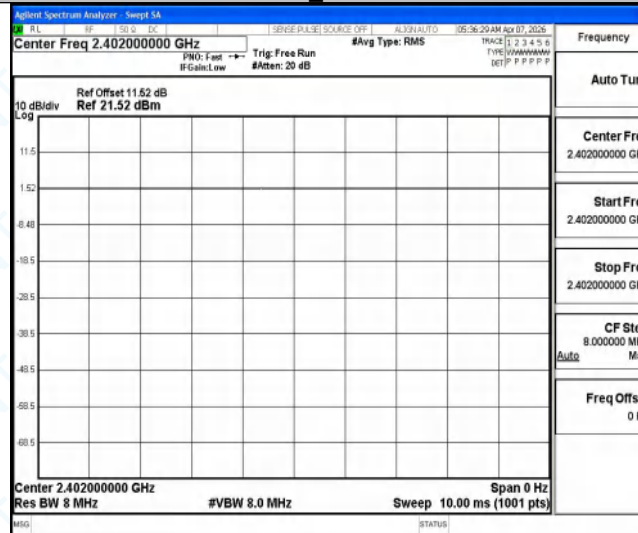


NTNV-BLE_1M-Ant1-2480

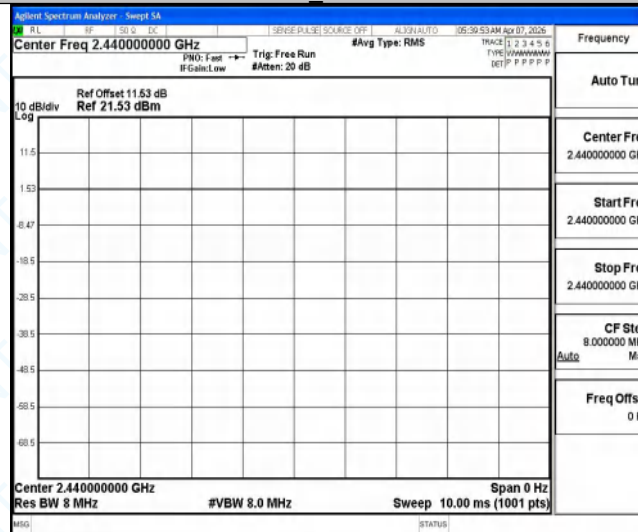




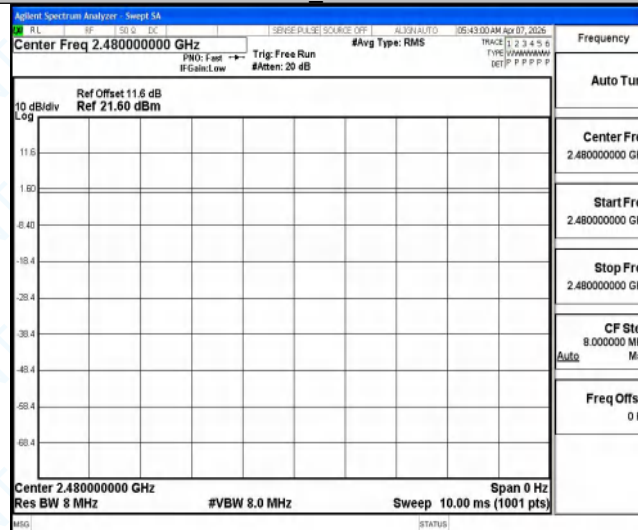
NTNV-BLE_2M-Ant1-2402



NTNV-BLE_2M-Ant1-2440



NTNV-BLE_2M-Ant1-2480





Appendix B: DTS Bandwidth

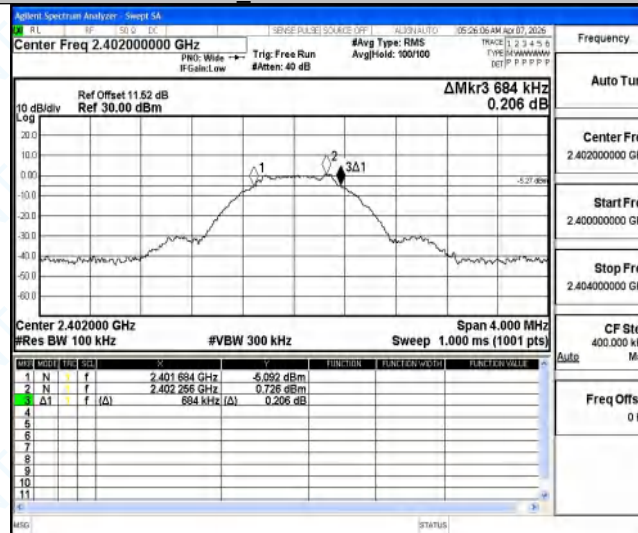
Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.684	2401.684	2402.368	0.5	PASS
BLE_1M	Ant1	2440	0.660	2439.692	2440.352	0.5	PASS
BLE_1M	Ant1	2480	0.684	2479.688	2480.372	0.5	PASS
BLE_2M	Ant1	2402	1.344	2401.368	2402.712	0.5	PASS
BLE_2M	Ant1	2440	1.308	2439.368	2440.676	0.5	PASS
BLE_2M	Ant1	2480	1.292	2479.408	2480.700	0.5	PASS

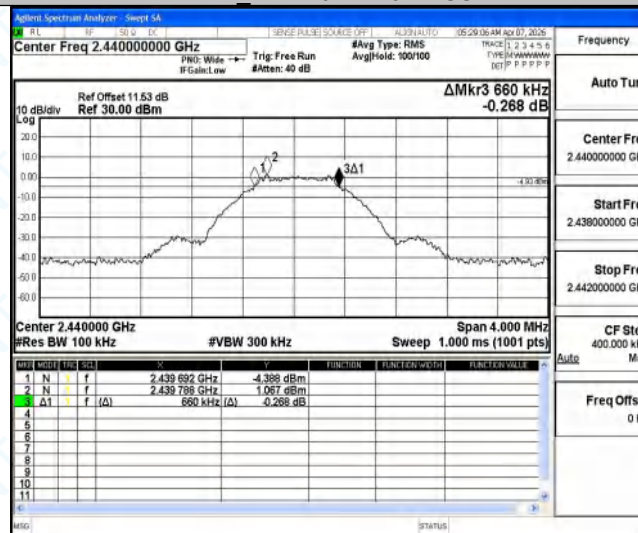


Test Graphs

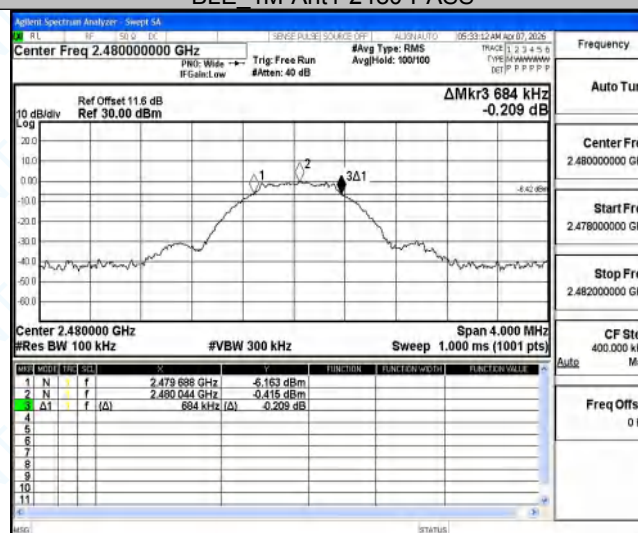
BLE 1M-Ant1-2402-PASS



BLE 1M-Ant1-2440-PASS

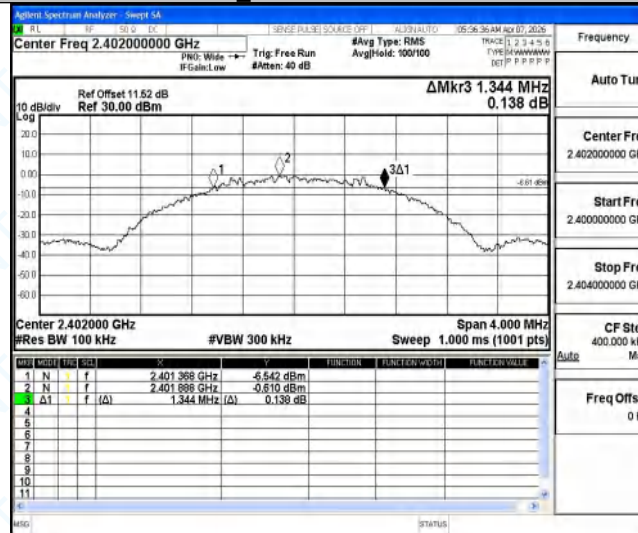


BLE 1M-Ant1-2480-PASS

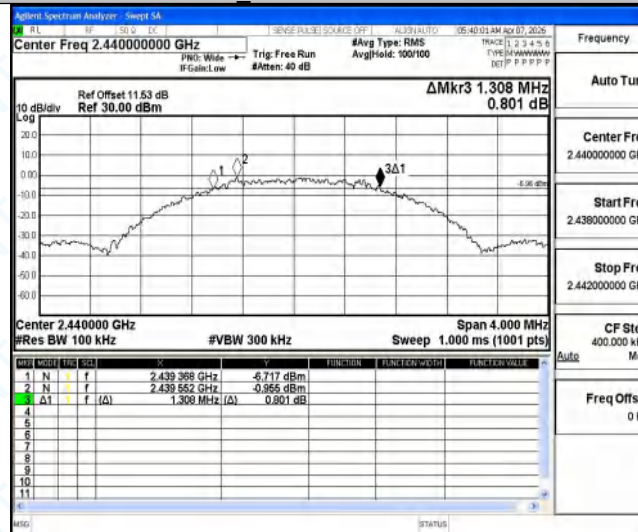




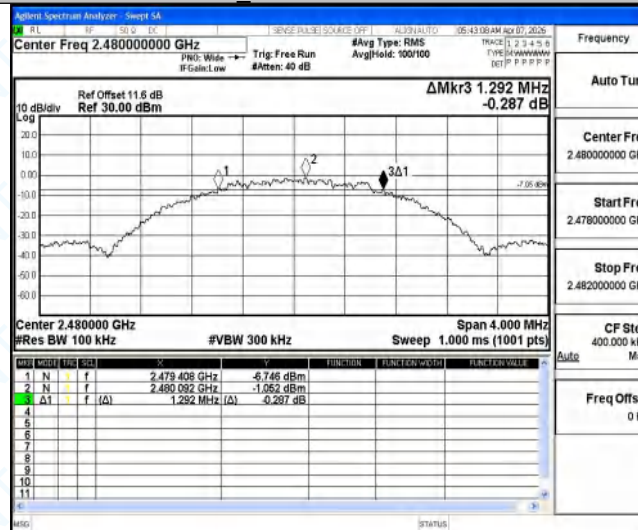
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix C: Maximum conducted output power

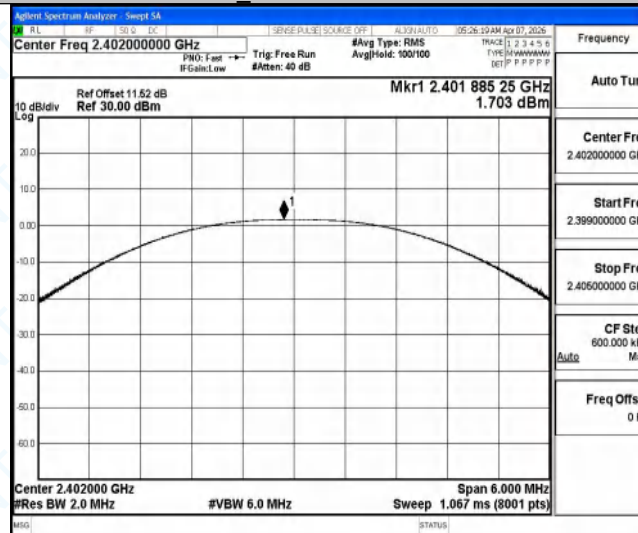
Test Result

TestMode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	1.70	≤30	PASS
BLE_1M	Ant1	2440	1.62	≤30	PASS
BLE_1M	Ant1	2480	0.93	≤30	PASS
BLE_2M	Ant1	2402	1.76	≤30	PASS
BLE_2M	Ant1	2440	1.67	≤30	PASS
BLE_2M	Ant1	2480	1.00	≤30	PASS

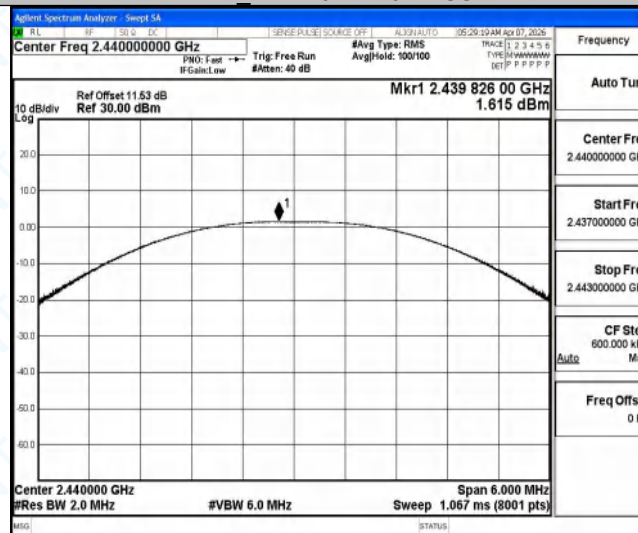


Test Graphs

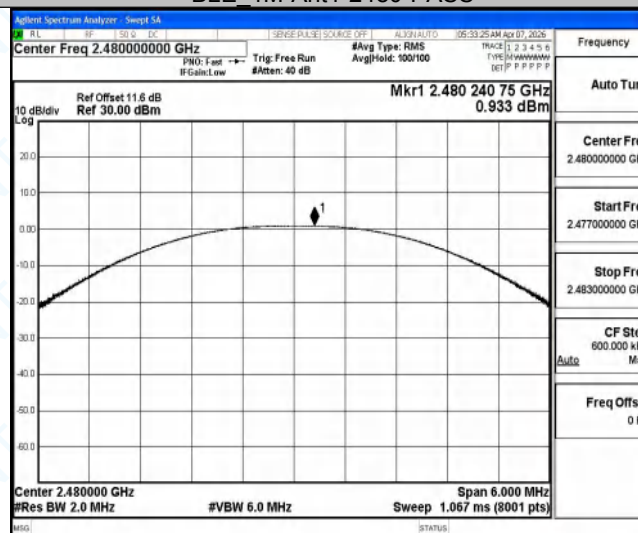
BLE 1M-Ant1-2402-PASS



BLE 1M-Ant1-2440-PASS

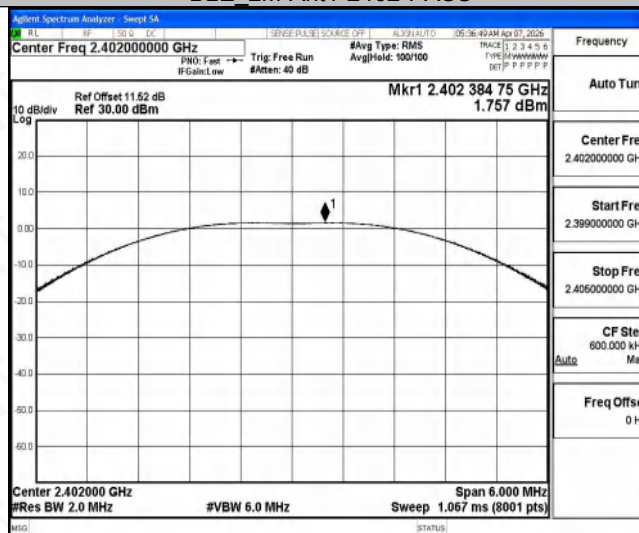


BLE 1M-Ant1-2480-PASS

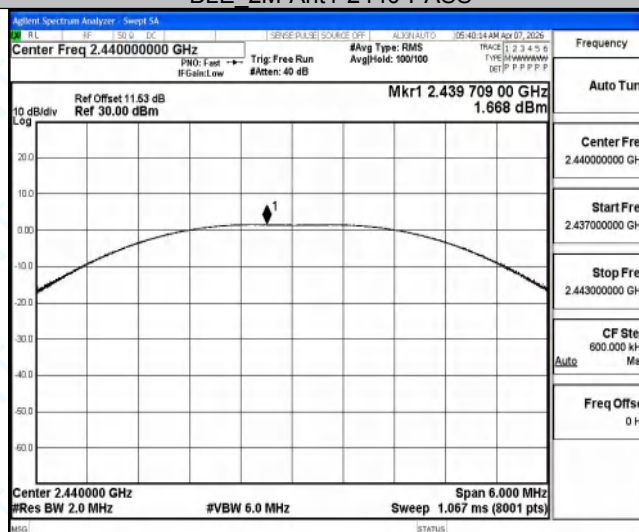




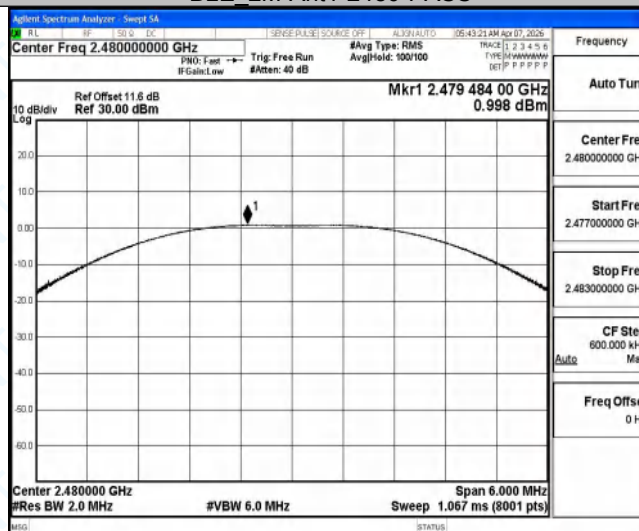
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix D: Maximum power spectral density

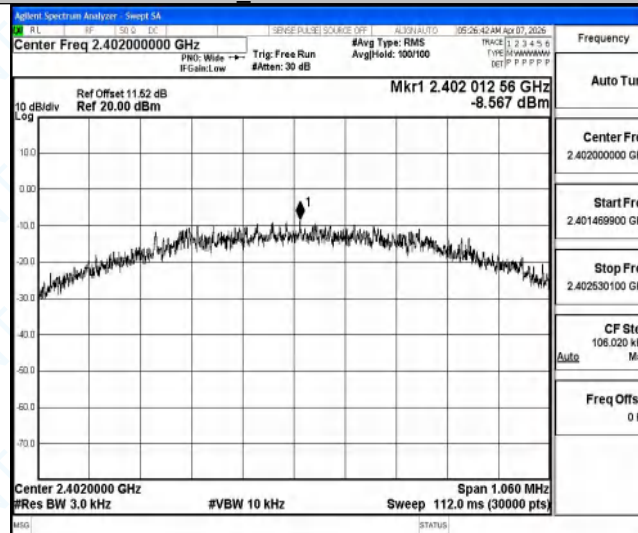
Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-8.57	≤8.00	PASS
BLE_1M	Ant1	2440	-6.84	≤8.00	PASS
BLE_1M	Ant1	2480	-9.20	≤8.00	PASS
BLE_2M	Ant1	2402	-10.34	≤8.00	PASS
BLE_2M	Ant1	2440	-11.64	≤8.00	PASS
BLE_2M	Ant1	2480	-10.66	≤8.00	PASS

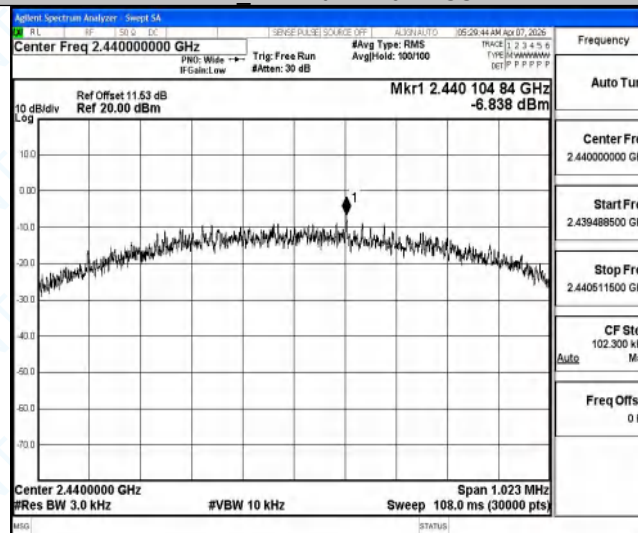


Test Graphs

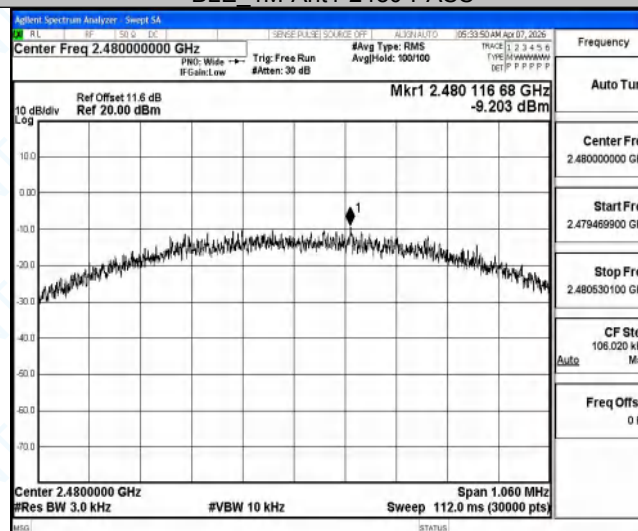
BLE 1M-Ant1-2402-PASS



BLE 1M-Ant1-2440-PASS

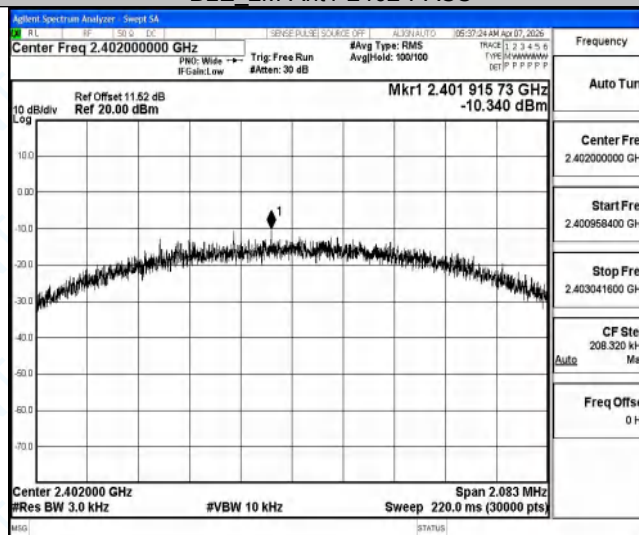


BLE 1M-Ant1-2480-PASS

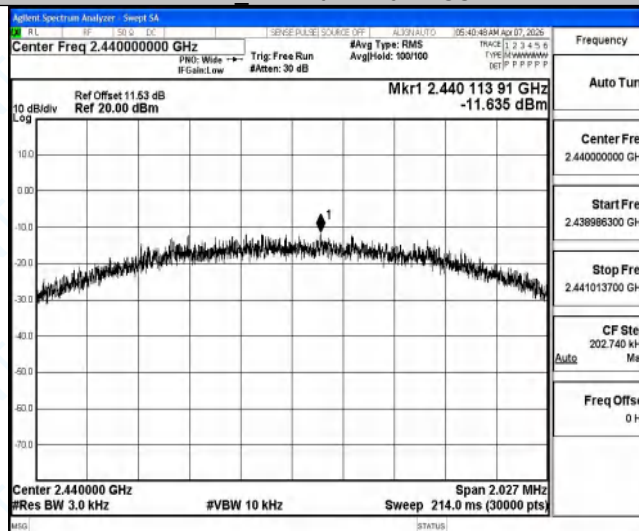




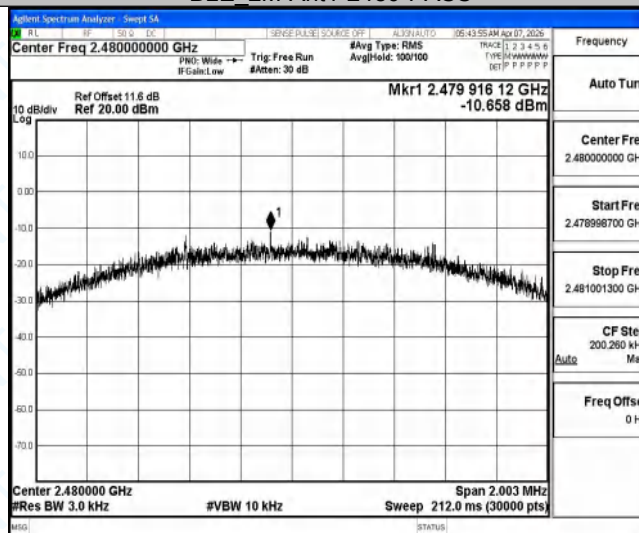
BLE_2M-Ant1-2402-PASS



BLE_2M-Ant1-2440-PASS



BLE_2M-Ant1-2480-PASS





Appendix E: Band edge measurements

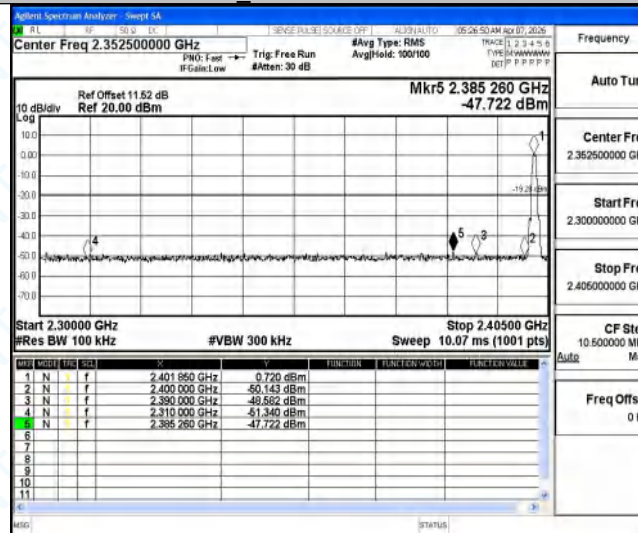
Test Result

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	0.72	-47.72	≤-19.28	PASS
BLE_1M	Ant1	High	2480	0.56	-47.7	≤-19.44	PASS
BLE_2M	Ant1	Low	2402	-0.55	-35.41	≤-20.55	PASS
BLE_2M	Ant1	High	2480	-1.45	-47.72	≤-21.45	PASS

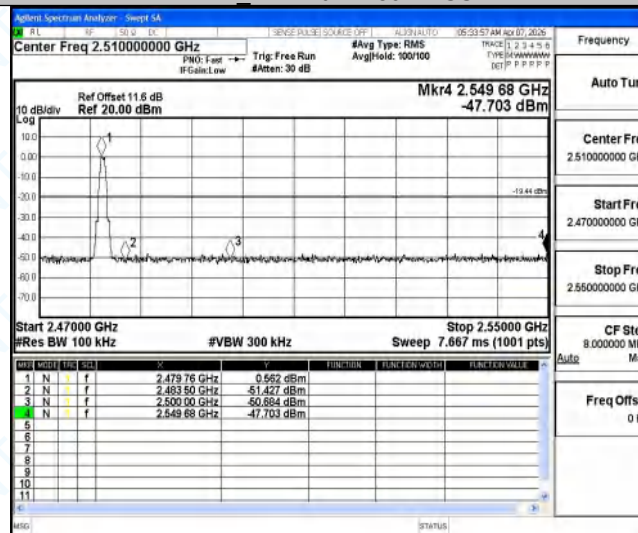


Test Graphs

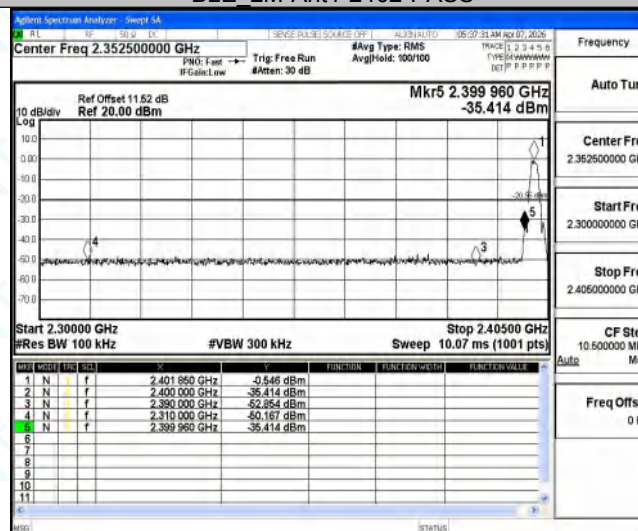
BLE_1M-Ant1-2402-PASS



BLE_1M-Ant1-2480-PASS

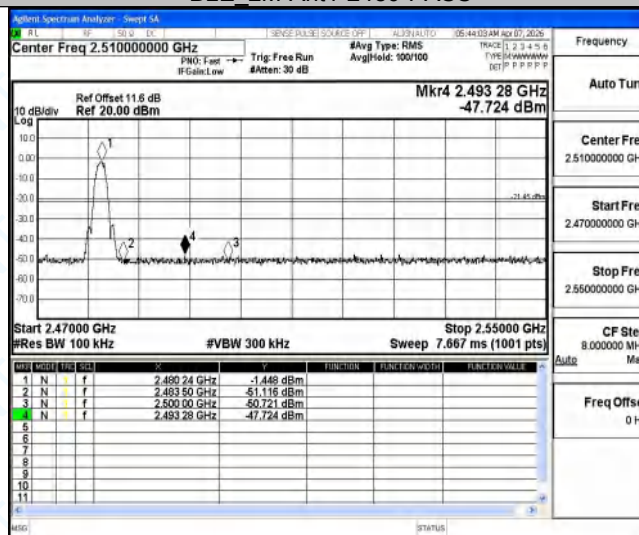


BLE_2M-Ant1-2402-PASS





BLE_2M-Ant1-2480-PASS





Appendix F: Conducted Spurious Emission

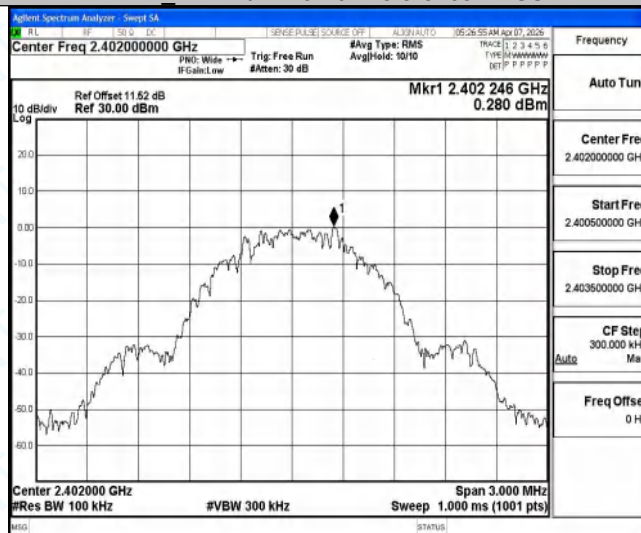
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	0~Reference	0.28	0.28	---	PASS
BLE_1M	Ant1	2402	30~1000	0.28	-59.52	≤ -19.72	PASS
BLE_1M	Ant1	2402	1000~26500	0.28	-49.46	≤ -19.72	PASS
BLE_1M	Ant1	2440	0~Reference	-0.35	-0.35	---	PASS
BLE_1M	Ant1	2440	30~1000	-0.35	-59.79	≤ -20.35	PASS
BLE_1M	Ant1	2440	1000~26500	-0.35	-50.17	≤ -20.35	PASS
BLE_1M	Ant1	2480	0~Reference	-0.82	-0.82	---	PASS
BLE_1M	Ant1	2480	30~1000	-0.82	-59.96	≤ -20.82	PASS
BLE_1M	Ant1	2480	1000~26500	-0.82	-49.73	≤ -20.82	PASS
BLE_2M	Ant1	2402	0~Reference	-1.40	-1.40	---	PASS
BLE_2M	Ant1	2402	30~1000	-1.40	-60.12	≤ -21.4	PASS
BLE_2M	Ant1	2402	1000~26500	-1.40	-49.48	≤ -21.4	PASS
BLE_2M	Ant1	2440	0~Reference	-1.32	-1.32	---	PASS
BLE_2M	Ant1	2440	30~1000	-1.32	-60.01	≤ -21.32	PASS
BLE_2M	Ant1	2440	1000~26500	-1.32	-50.08	≤ -21.32	PASS
BLE_2M	Ant1	2480	0~Reference	-1.88	-1.88	---	PASS
BLE_2M	Ant1	2480	30~1000	-1.88	-58.99	≤ -21.88	PASS
BLE_2M	Ant1	2480	1000~26500	-1.88	-48.37	≤ -21.88	PASS

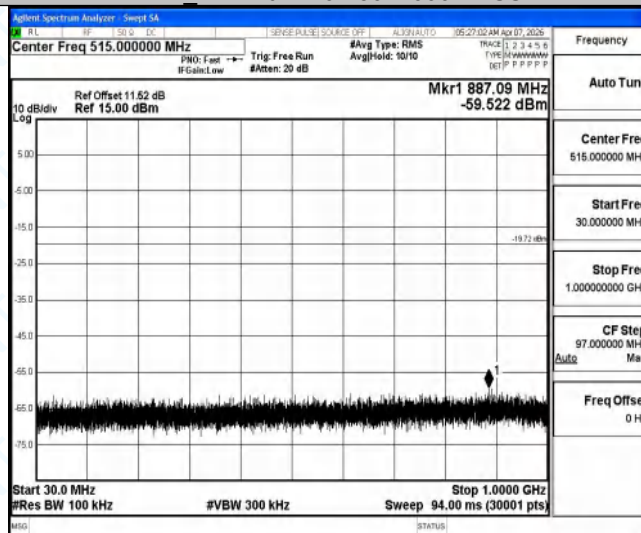


Test Graphs

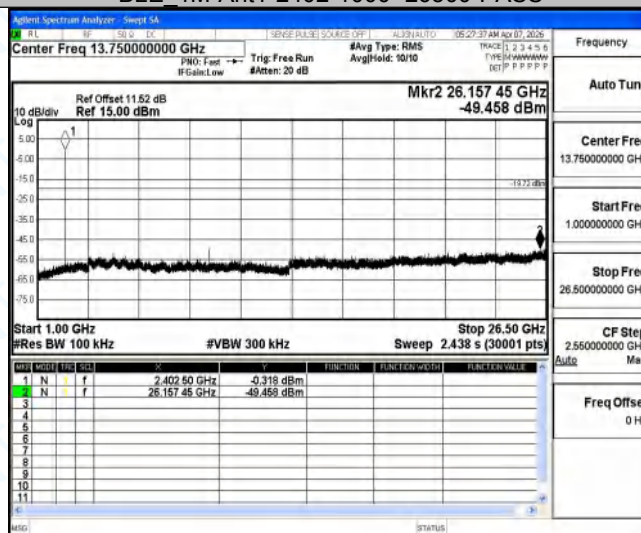
BLE_1M-Ant1-2402-0~Reference-PASS



BLE_1M-Ant1-2402-30~1000-PASS

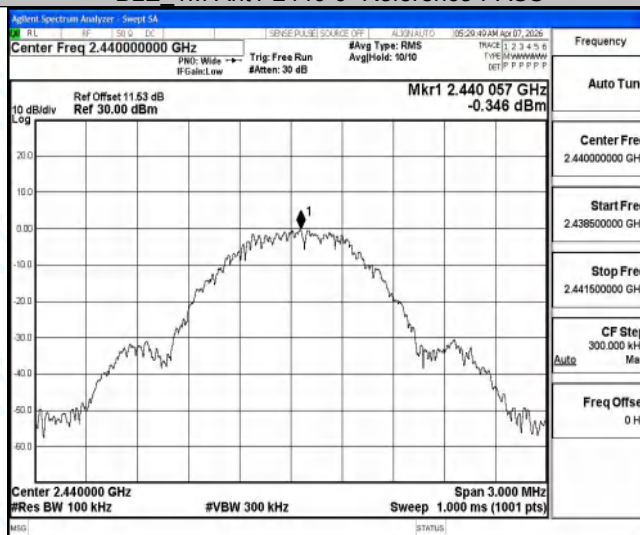


BLE_1M-Ant1-2402-1000~26500-PASS

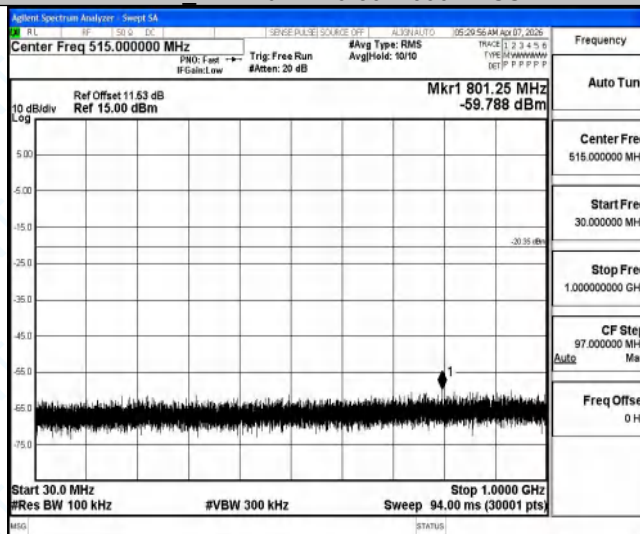




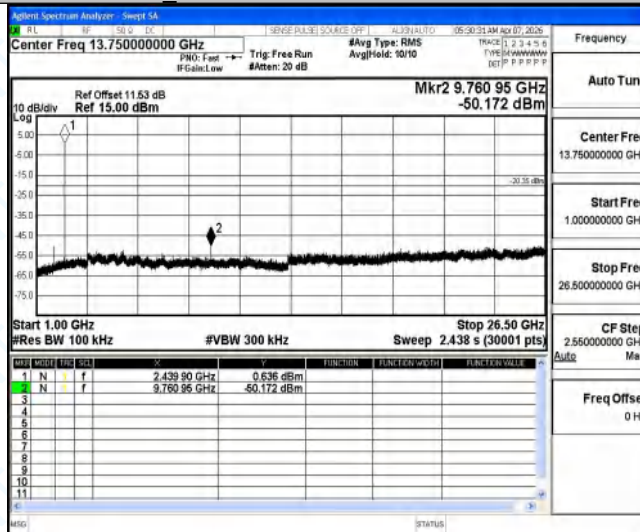
BLE_1M-Ant1-2440-0~Reference-PASS



BLE_1M-Ant1-2440-30~1000-PASS

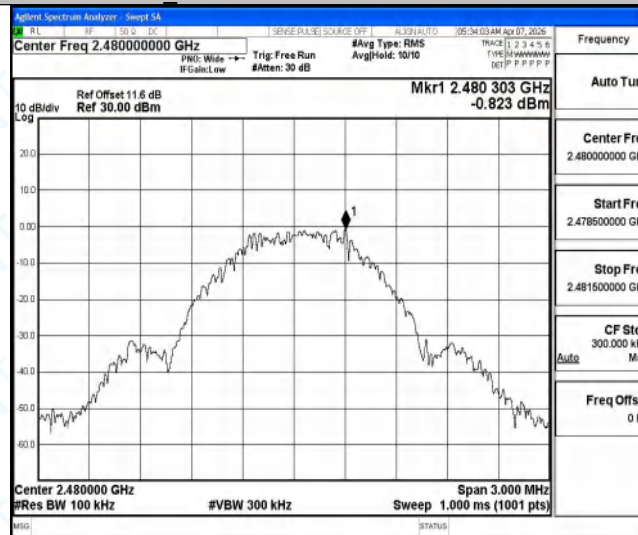


BLE_1M-Ant1-2440-1000~26500-PASS

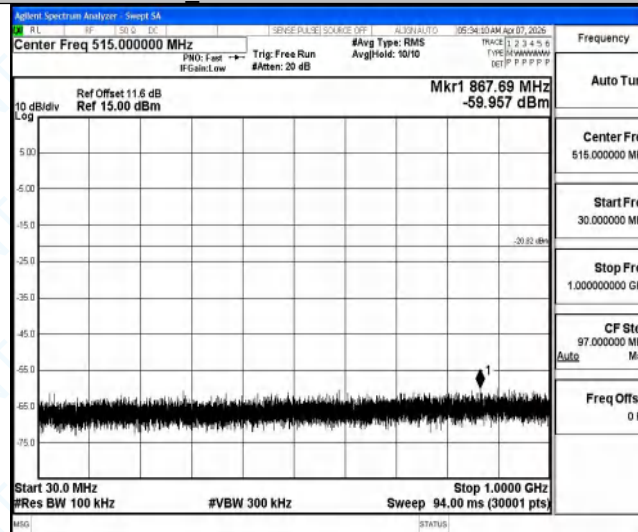




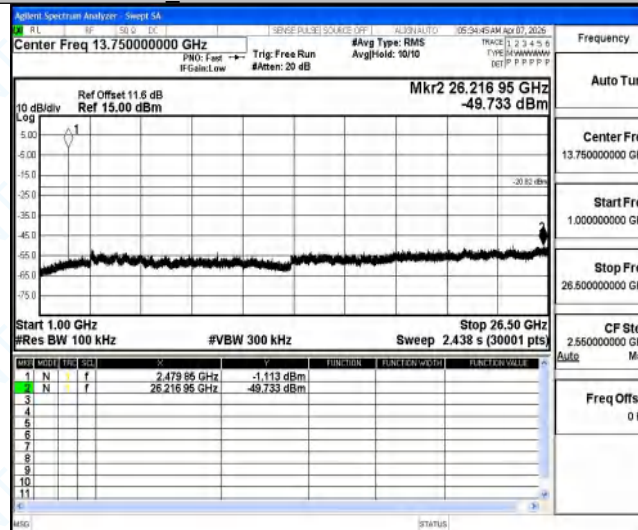
BLE_1M-Ant1-2480-0~Reference-PASS



BLE_1M-Ant1-2480-30~1000-PASS

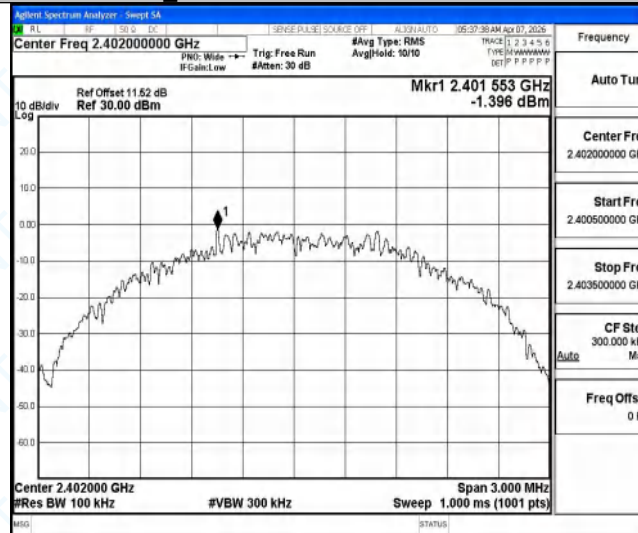


BLE_1M-Ant1-2480-1000~26500-PASS

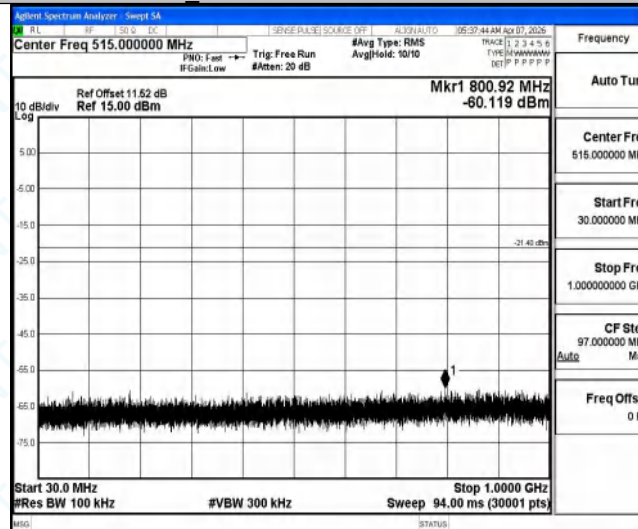




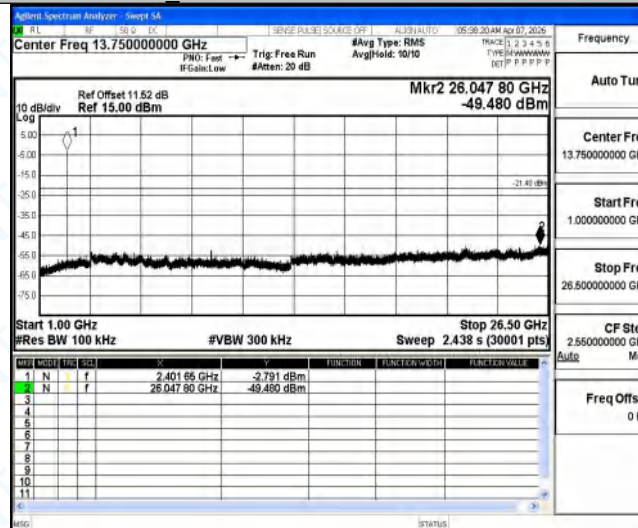
BLE_2M-Ant1-2402-0~Reference-PASS



BLE_2M-Ant1-2402-30~1000-PASS

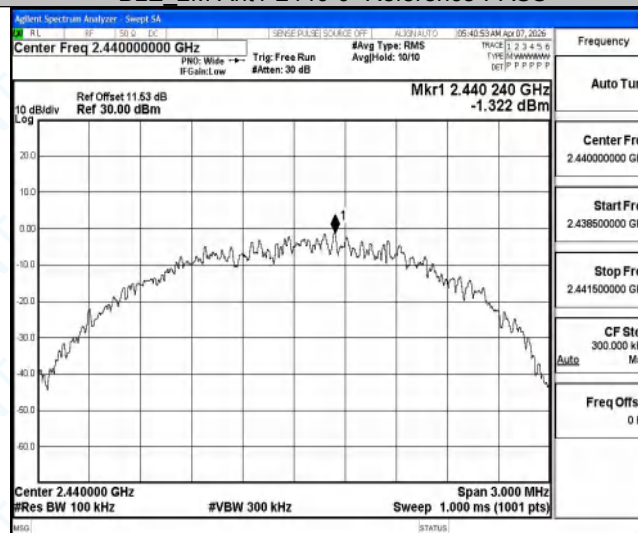


BLE_2M-Ant1-2402-1000~26500-PASS

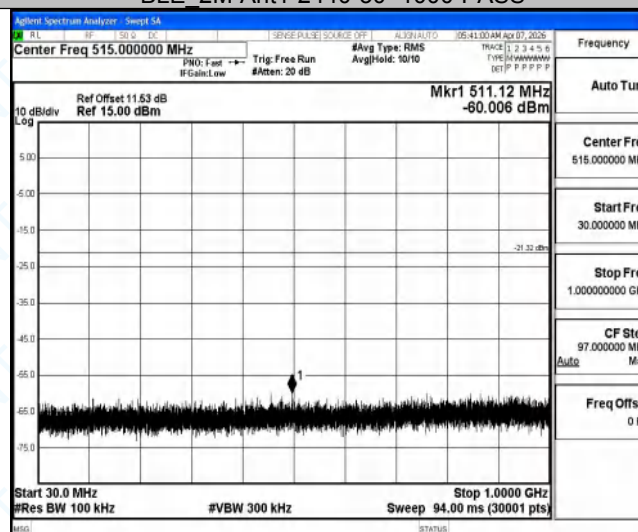




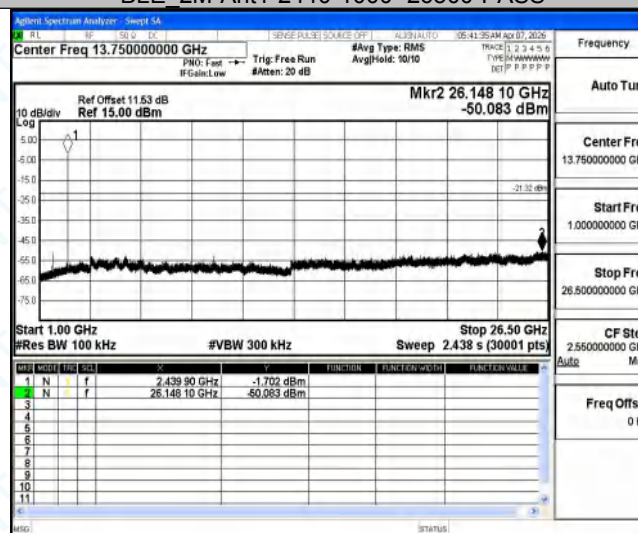
BLE_2M-Ant1-2440-0~Reference-PASS



BLE_2M-Ant1-2440-30~1000-PASS

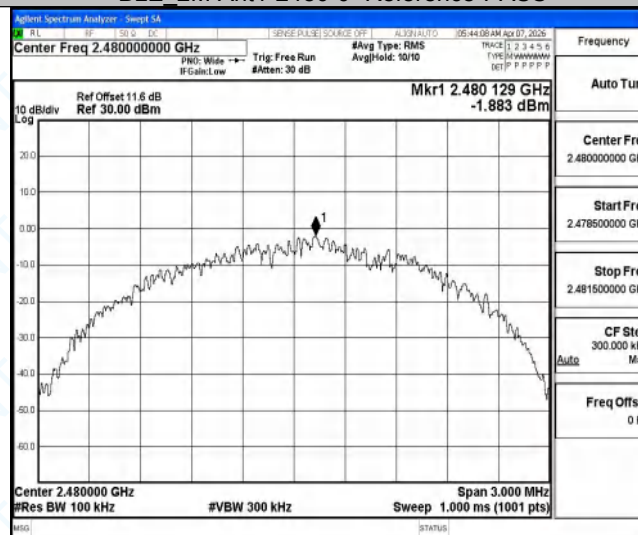


BLE_2M-Ant1-2440-1000~26500-PASS

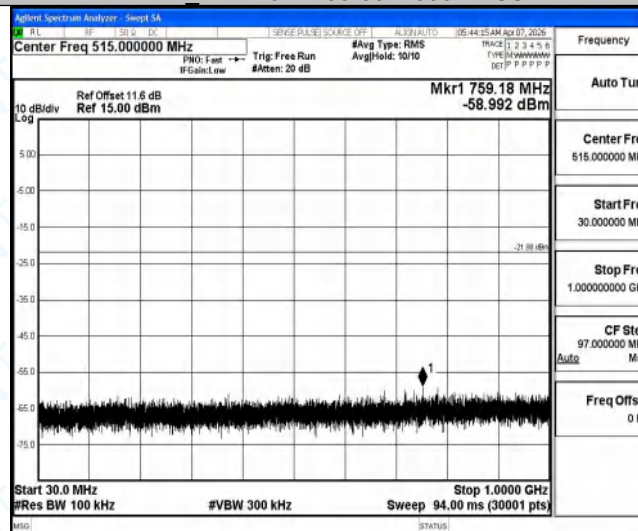




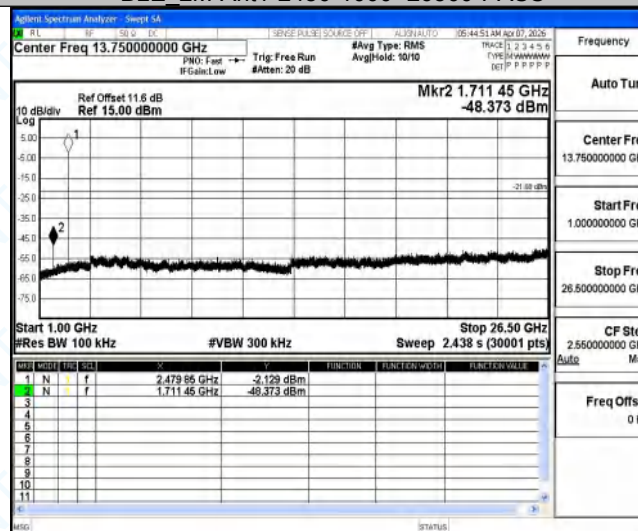
BLE_2M-Ant1-2480-0~Reference-PASS



BLE_2M-Ant1-2480-30~1000-PASS



BLE_2M-Ant1-2480-1000~26500-PASS



The End Report

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