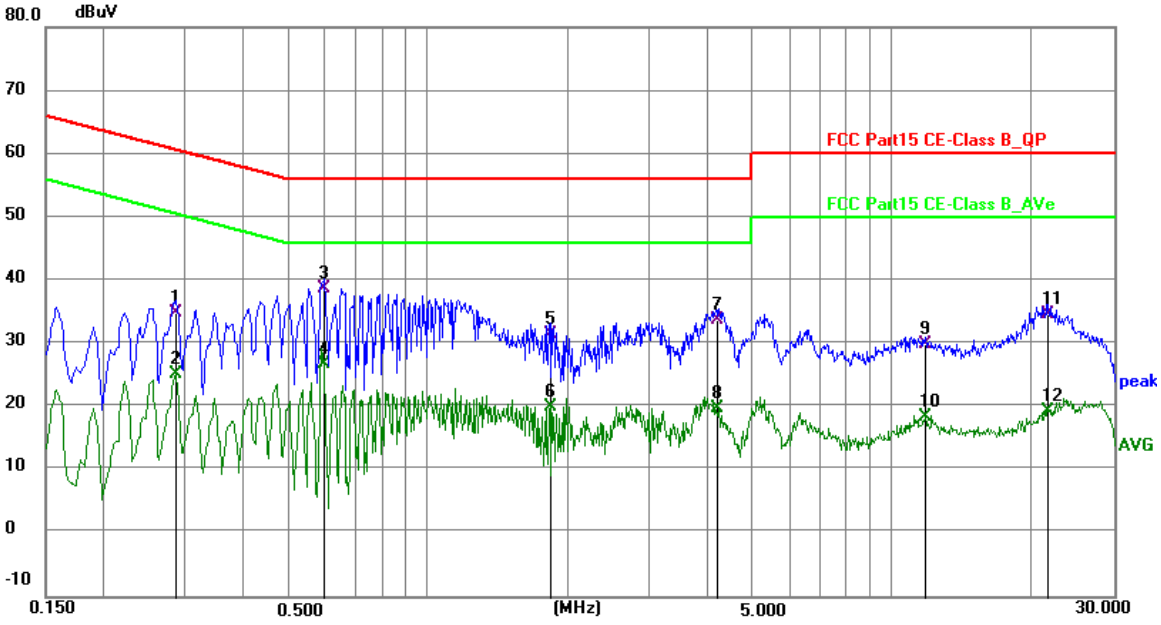
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS

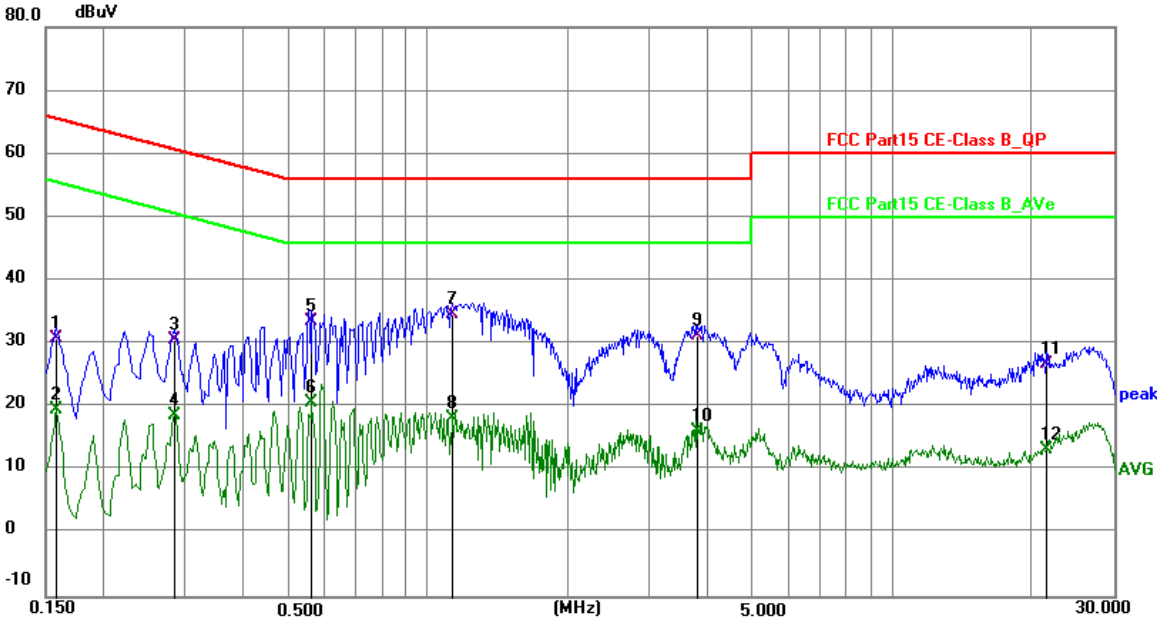
Only show the worst mode: GFSK 1M 2402MHz:

Polarization: Line



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2859	25.25	9.66	34.91	60.64	-25.73	QP	P	
2	0.2859	15.54	9.66	25.20	50.64	-25.44	AVG	P	
3 *	0.5979	28.32	10.28	38.60	56.00	-17.40	QP	P	
4	0.5979	16.49	10.28	26.77	46.00	-19.23	AVG	P	
5	1.8300	21.70	9.82	31.52	56.00	-24.48	QP	P	
6	1.8300	10.20	9.82	20.02	46.00	-25.98	AVG	P	
7	4.2339	23.58	10.11	33.69	56.00	-22.31	QP	P	
8	4.2339	9.74	10.11	19.85	46.00	-26.15	AVG	P	
9	11.7858	19.55	10.30	29.85	60.00	-30.15	QP	P	
10	11.7858	8.27	10.30	18.57	50.00	-31.43	AVG	P	
11	21.6700	24.25	10.41	34.66	60.00	-25.34	QP	P	
12	21.6700	8.86	10.41	19.27	50.00	-30.73	AVG	P	

Polarization: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	21.29	9.65	30.94	65.57	-34.63	QP	P	
2	0.1580	9.96	9.65	19.61	55.57	-35.96	AVG	P	
3	0.2819	20.89	9.64	30.53	60.76	-30.23	QP	P	
4	0.2819	9.00	9.64	18.64	50.76	-32.12	AVG	P	
5	0.5620	23.40	10.21	33.61	56.00	-22.39	QP	P	
6	0.5620	10.60	10.21	20.81	46.00	-25.19	AVG	P	
7 *	1.1339	25.01	9.71	34.72	56.00	-21.28	QP	P	
8	1.1339	8.58	9.71	18.29	46.00	-27.71	AVG	P	
9	3.8020	21.22	9.98	31.20	56.00	-24.80	QP	P	
10	3.8020	6.33	9.98	16.31	46.00	-29.69	AVG	P	
11	21.5060	16.57	10.33	26.90	60.00	-33.10	QP	P	
12	21.5060	2.99	10.33	13.32	50.00	-36.68	AVG	P	

APPENDIX B - RADIATED EMISSION -9 KHZ TO 30 MHZ

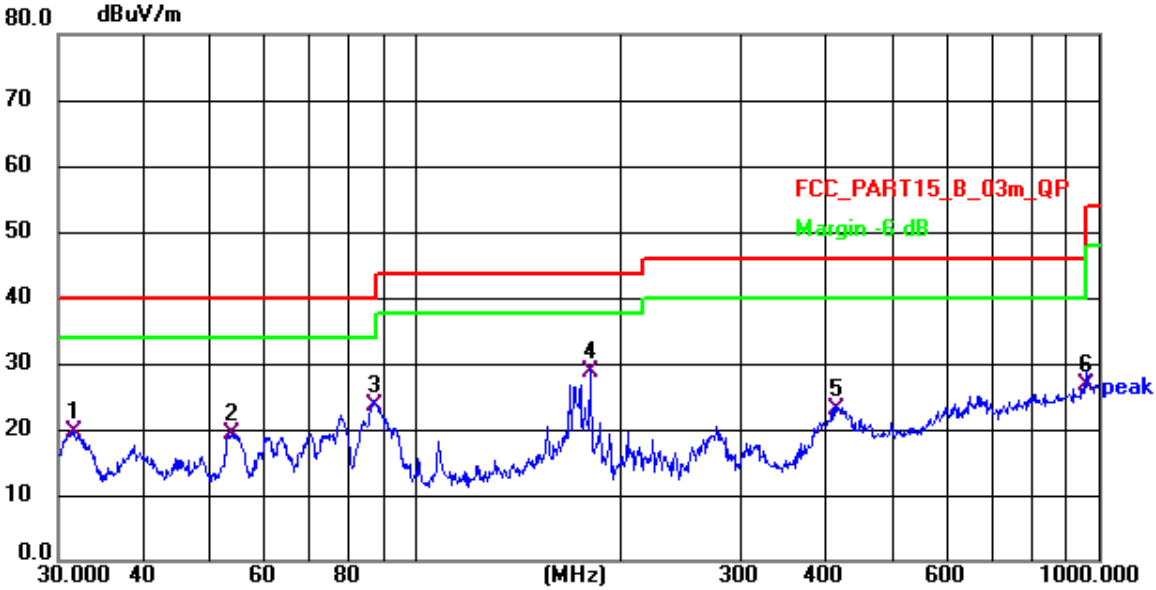
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

APPENDIX C - RADIATED EMISSION-30 MHZ TO 1000 MHZ

Only show the worst mode:

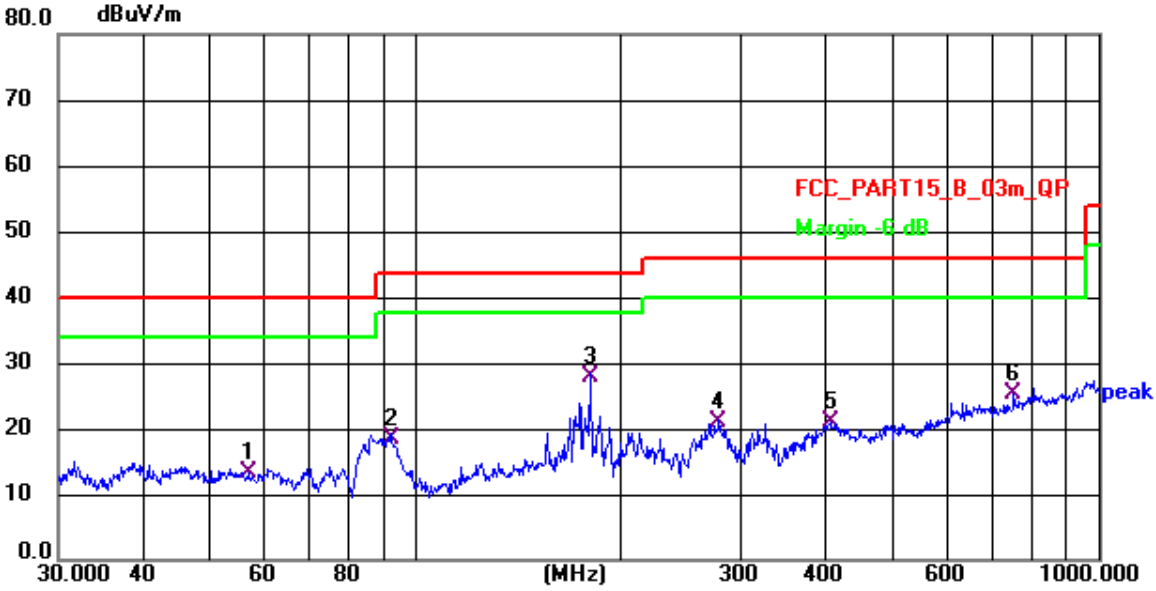
Test Mode	TX Mode_1Mbps Channel 00	Polarization	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	31.731	38.99	-19.42	19.57	40.00	-20.43	QP	100	170	P	
2	53.882	38.32	-18.98	19.34	40.00	-20.66	QP	100	5	P	
3	87.112	45.77	-22.30	23.47	40.00	-16.53	QP	100	90	P	
4 *	180.016	48.29	-19.60	28.69	43.50	-14.81	QP	110	180	P	
5	414.722	37.25	-14.39	22.86	46.00	-23.14	QP	100	0	P	
6	958.794	31.64	-4.90	26.74	46.00	-19.26	QP	100	181	P	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX Mode_1Mbps Channel 00	Polarization	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	57.191	31.90	-18.75	13.15	40.00	-26.85	QP	200	90	P	
2	92.139	40.90	-22.43	18.47	43.50	-25.03	QP	200	0	P	
3 *	180.016	47.56	-19.60	27.96	43.50	-15.54	QP	200	90	P	
4	278.067	38.74	-17.87	20.87	46.00	-25.13	QP	200	10	P	
5	404.666	35.62	-14.72	20.90	46.00	-25.10	QP	200	180	P	
6	750.108	32.94	-7.61	25.33	46.00	-20.67	QP	200	180	P	

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ

Test Result of RADIATED EMISSION-1000MHz TO 25GHz, Only show the worst mode: GFSK 1M

1Mbps:

Test Mode :GFSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	88.74	-27.15	61.59	74	-12.41	Peak
2	4804	V	69.47	-27.15	42.32	54	-11.68	Avg
3	7206	--	--	--		--		--
4	9608	--	--	--		--		--
5	4804	H	90.43	-27.15	63.28	74	-10.72	Peak
6	4804	H	68.51	-27.15	41.36	54	-12.64	Avg
7	7206	--	--	--		--		--
8	9608	--	--	--		--		--
Test Mode :GFSK TX Mid								
1	4880	V	90.54	-27.83	62.71	74	-11.29	Peak
2	4880	V	70.29	-27.83	42.46	54	-11.54	Avg
3	7320	--	--	--		--		--
4	9760	--	--	--		--		--
5	4880	H	90.96	-27.83	63.13	74	-10.87	Peak
6	4880	H	71.62	-27.83	43.79	54	-10.21	Avg
7	7320	--	--	--		--		--
8	9760	--	--	--		--		--
Test Mode :GFSK TX High								
1	4960	V	90.51	-28.45	62.06	74	-11.94	Peak
2	4960	V	70.04	-28.45	41.59	54	-12.41	Avg
3	7440	--	--	--		--		--
4	9920	--	--	--		--		--
5	4960	H	90.97	-28.45	62.52	74	-11.48	Peak
6	4960	H	69.80	-28.45	41.35	54	-12.65	Avg
7	7440	--	--	--		--		--
8	9920	--	--	--		--	--	--

Test Result of Radiated Spurious at Band edges
Only show the worst mode: GFSK 1M

Test Results				PASS				
Frequency Range				2310MHz~2410MHz				
Test Mode				1Mbps: GFSK TX 2402MHz				
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	75.16	-21.47	53.69	74.00	-20.31	Peak
2	2390	H	--	-21.47	--	54.00	--	Avg
3	2400	H	79.48	-26.12	53.36	74.00	-20.64	Peak
4	2400	H	--	-26.12	--	54.00	--	Avg
1	2390	V	74.28	-21.47	52.81	74.00	-21.19	Peak
2	2390	V	--	-21.47	--	54.00	--	Avg
3	2400	V	78.69	-26.12	52.57	74.00	-21.43	Peak
4	2400	V	--	-26.12	--	54.00	--	Avg
Test Results				PASS				
Frequency Range				2450MHz~2550MHz				
Test Mode				1Mbps: GFSK TX 2480MHz				
1	2483.5	H	78.37	-25.29	53.08	74.00	-20.92	Peak
2	2483.5	H	--	-25.29	--	54.00	--	Avg
1	2483.5	V	78.52	-25.29	53.23	74.00	-20.77	Peak
2	2483.5	V	--	-25.29	--	54.00	--	Avg

Note: 1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.

2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.

Result=Reading + Correct Factor.

Margin= Result-Limit.

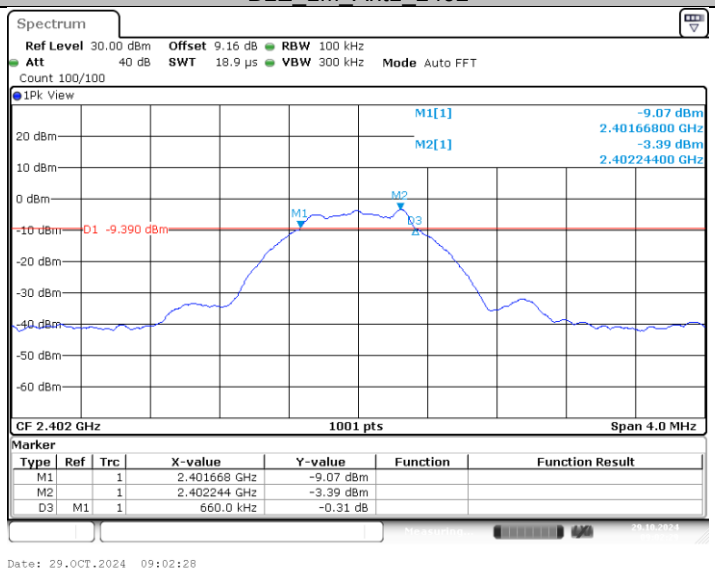
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

APPENDIX E - BANDWIDTH

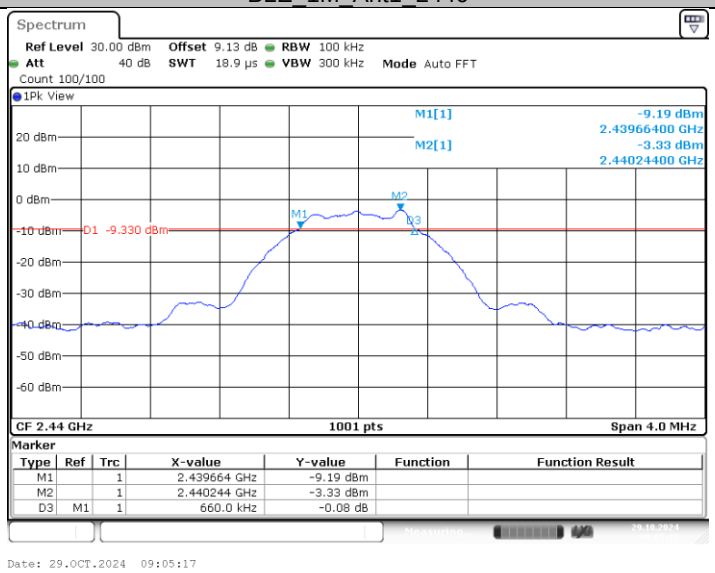
-6dB Bandwidth

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.66	2401.67	2402.33	0.5	PASS
		2440	0.66	2439.66	2440.32	0.5	PASS
		2480	0.67	2479.66	2480.33	0.5	PASS
BLE_2M	Ant1	2402	1.14	2401.44	2402.58	0.5	PASS
		2440	1.17	2439.41	2440.58	0.5	PASS
		2480	1.14	2479.43	2480.58	0.5	PASS

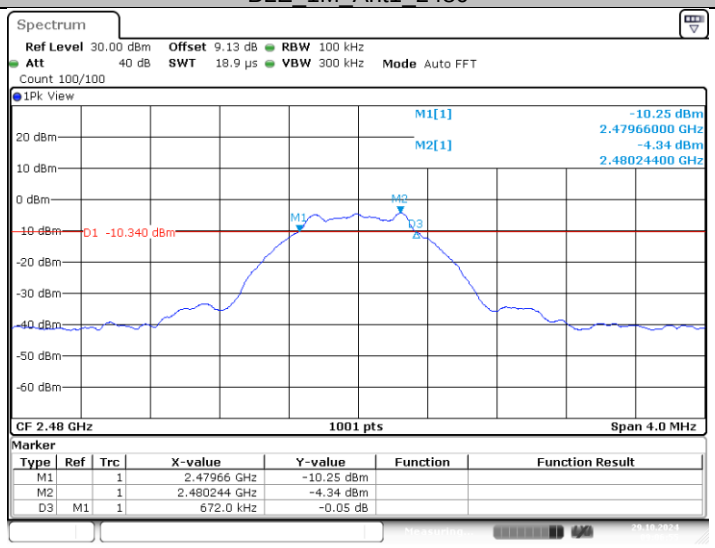
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

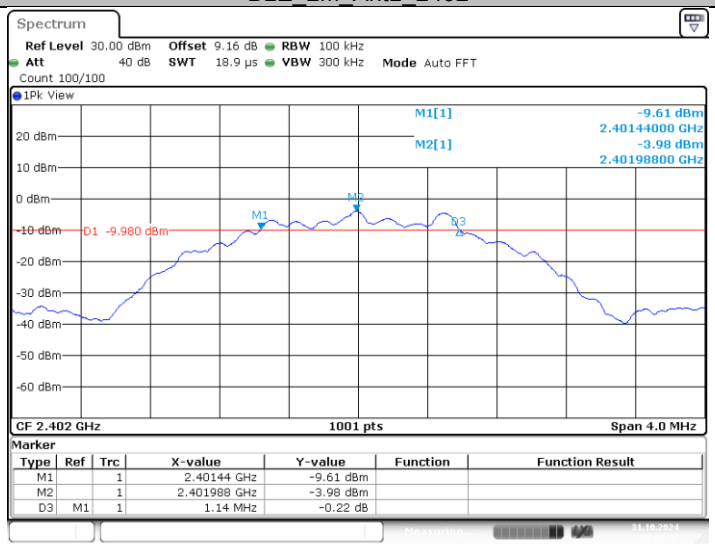


BLE_1M_Ant1_2480



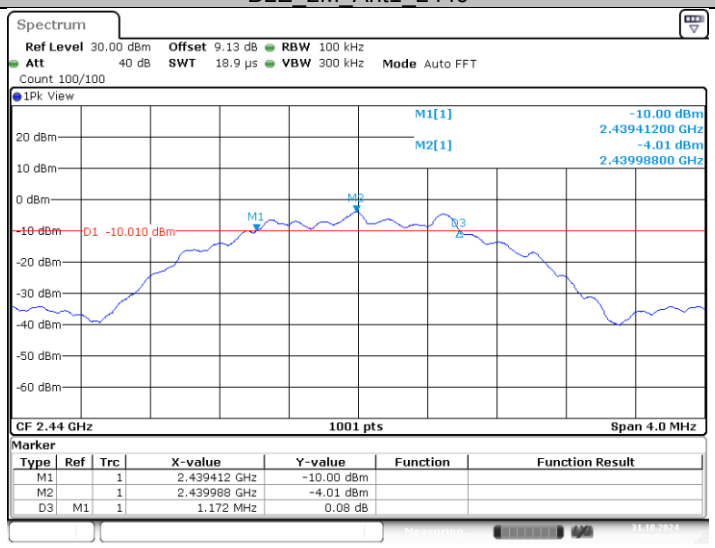
Date: 29.OCT.2024 09:06:56

BLE_2M_Ant1_2402



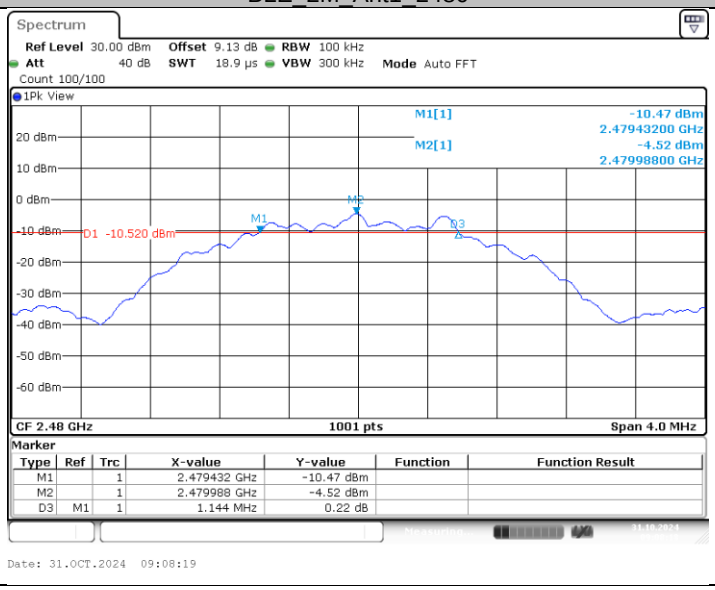
Date: 31.OCT.2024 09:03:47

BLE_2M_Ant1_2440



Date: 31.OCT.2024 09:06:42

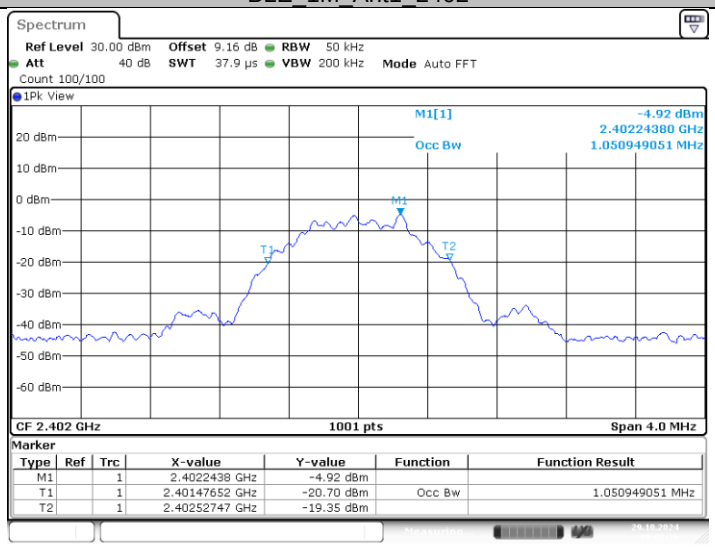
BLE_2M_Ant1_2480



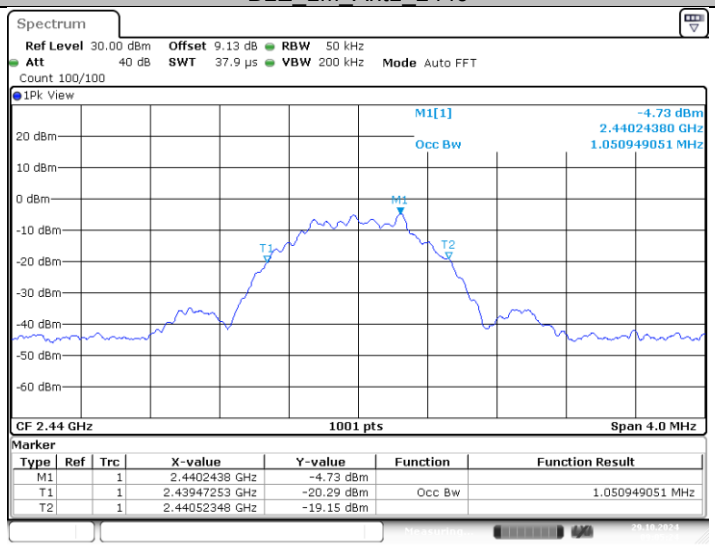
99% Occupied Bandwidth

TestMode	Antenna	Freq(MHz)	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.051	2401.4765	2402.5275	---	---
		2440	1.051	2439.4725	2440.5235	---	---
		2480	1.051	2479.4725	2480.5235	---	---
BLE_2M	Ant1	2402	2.082	2400.9770	2403.0589	---	---
		2440	2.074	2438.9770	2441.0509	---	---
		2480	2.082	2478.9690	2481.0509	---	---

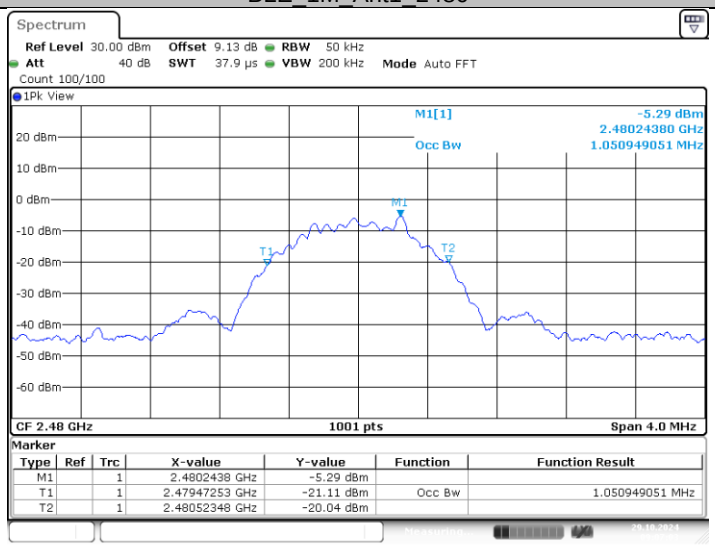
BLE_1M_Ant1_2402



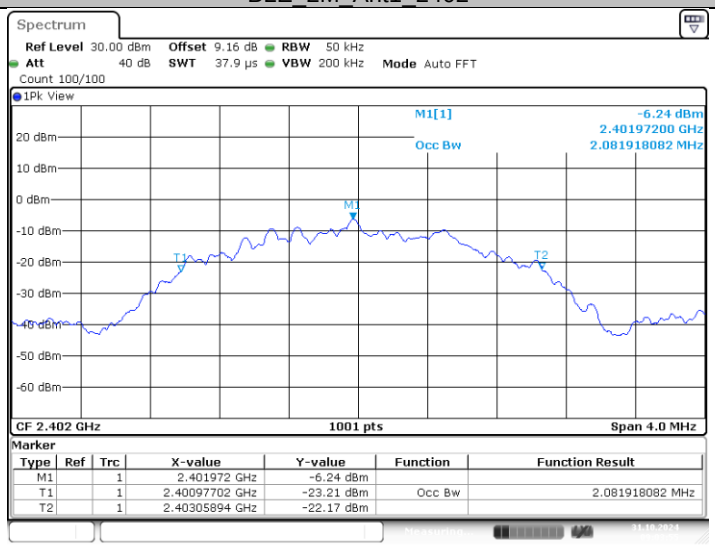
BLE_1M_Ant1_2440



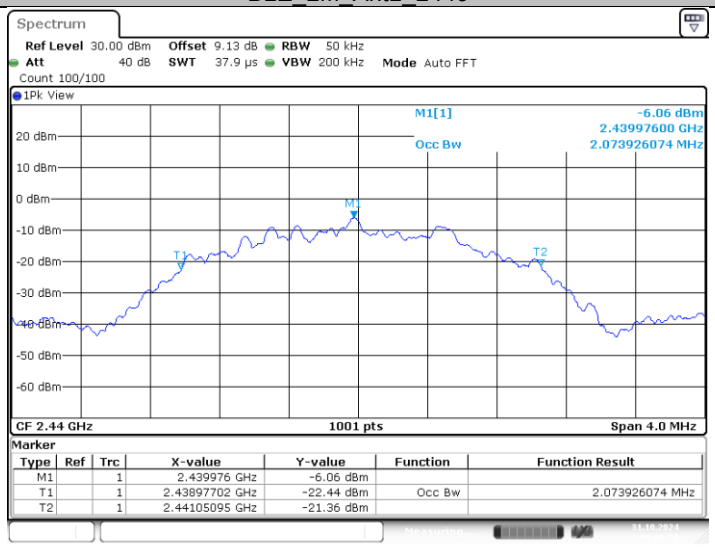
BLE_1M_Ant1_2480



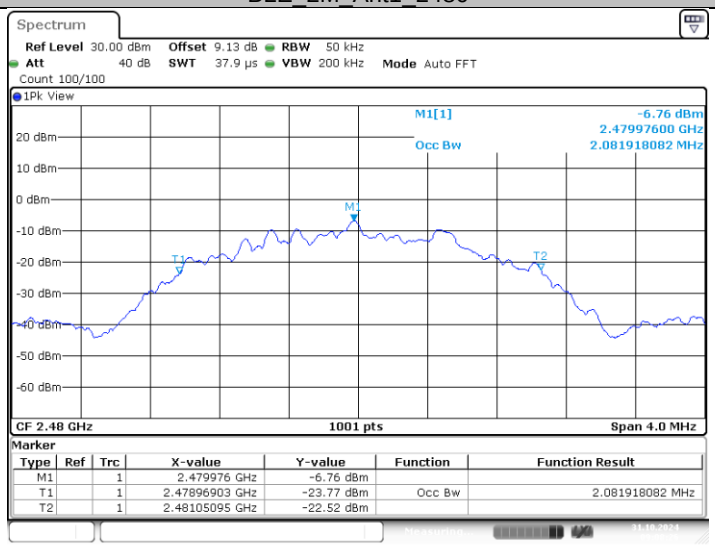
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



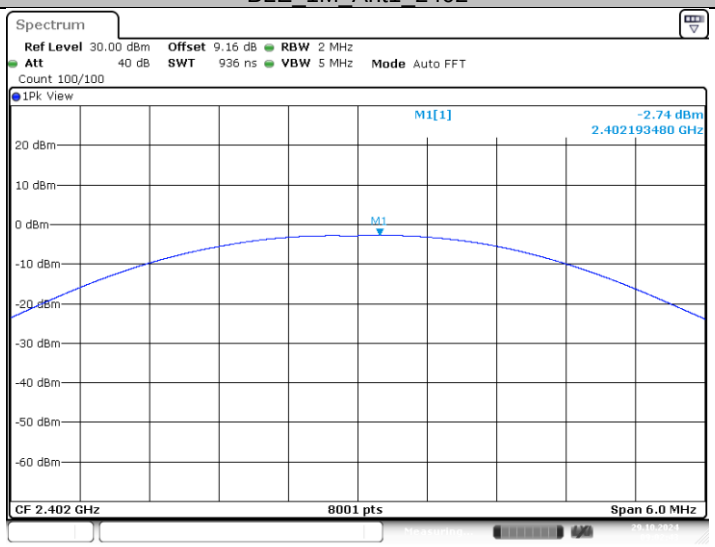
BLE_2M_Ant1_2480



APPENDIX F - MAXIMUM OUTPUT POWER

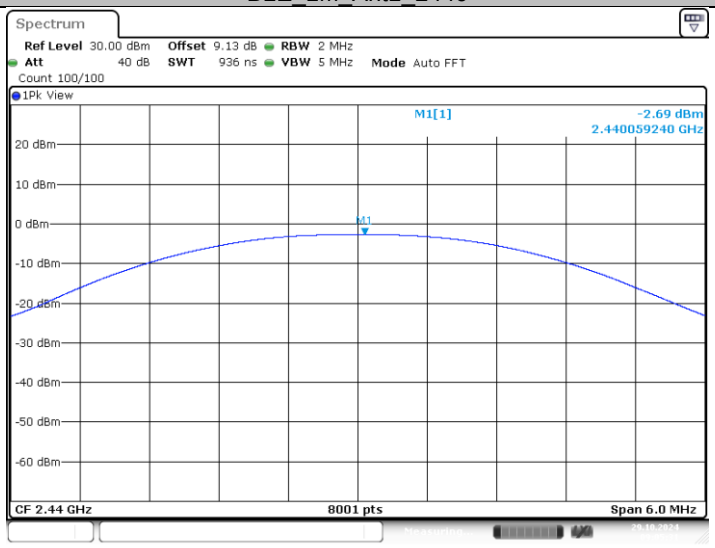
TestMode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-2.74	≤30	PASS
		2440	-2.69	≤30	PASS
		2480	-3.51	≤30	PASS
BLE_2M	Ant1	2402	-2.76	≤30	PASS
		2440	-2.65	≤30	PASS
		2480	-3.39	≤30	PASS

BLE_1M_Ant1_2402



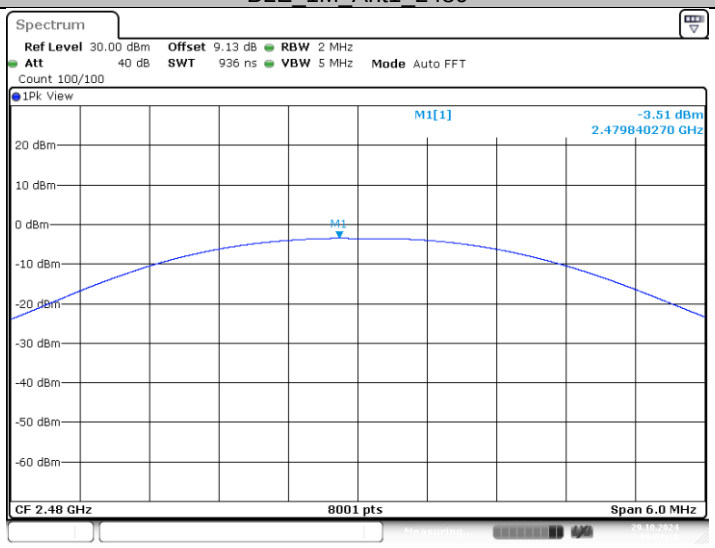
Date: 29.OCT.2024 09:02:44

BLE_1M_Ant1_2440



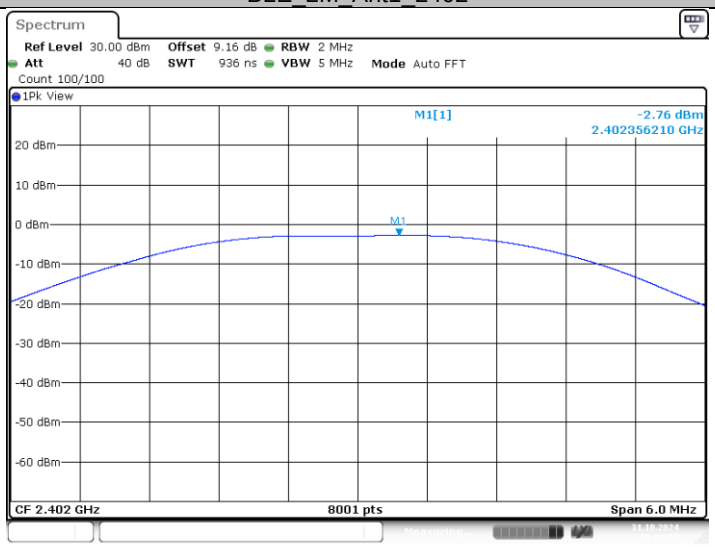
Date: 29.OCT.2024 09:05:32

BLE_1M_Ant1_2480

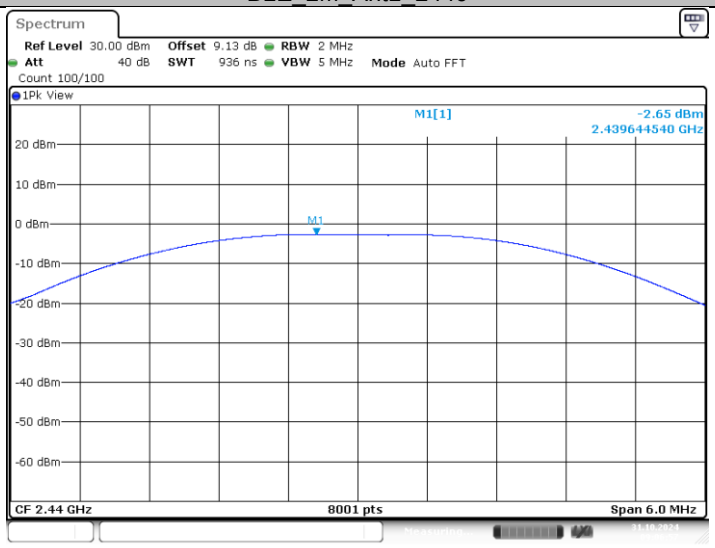


Date: 29.OCT.2024 09:07:10

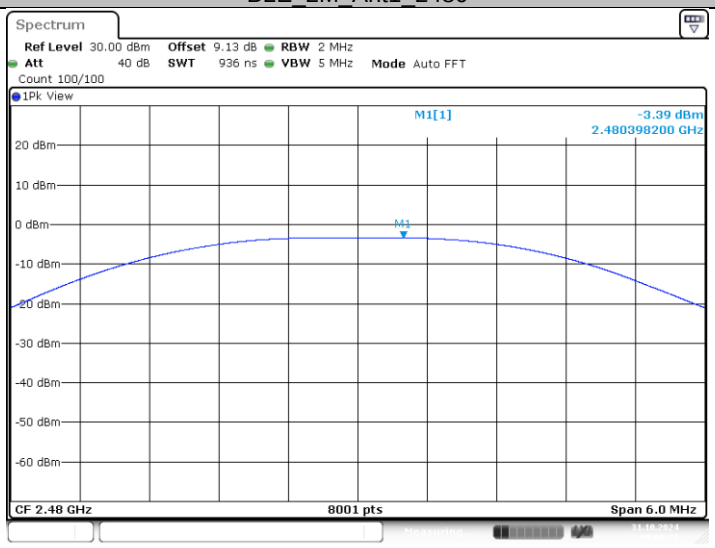
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480

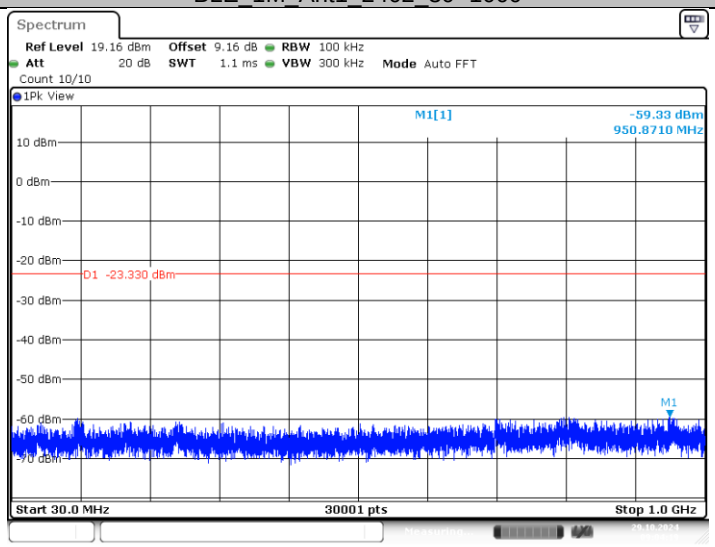


APPENDIX G - CONDUCTED SPURIOUS EMISSION

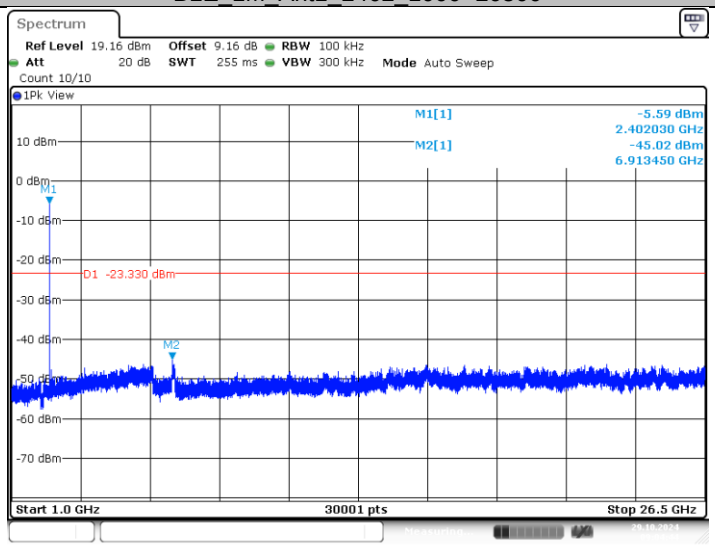
Spurious Emission

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	30~1000	-3.33	-59.33	≤-23.33	PASS
			1000~26500	-3.33	-45.02	≤-23.33	PASS
		2440	30~1000	-3.27	-58.86	≤-23.27	PASS
			1000~26500	-3.27	-45.09	≤-23.27	PASS
		2480	30~1000	-4.24	-58.17	≤-24.24	PASS
			1000~26500	-4.24	-44.06	≤-24.24	PASS
BLE_2M	Ant1	2402	30~1000	-3.83	-59.27	≤-23.83	PASS
			1000~26500	-3.83	-40.89	≤-23.83	PASS
		2440	30~1000	-3.84	-58.2	≤-23.84	PASS
			1000~26500	-3.84	-44.86	≤-23.84	PASS
		2480	30~1000	-4.60	-58.16	≤-24.6	PASS
			1000~26500	-4.60	-45.82	≤-24.6	PASS

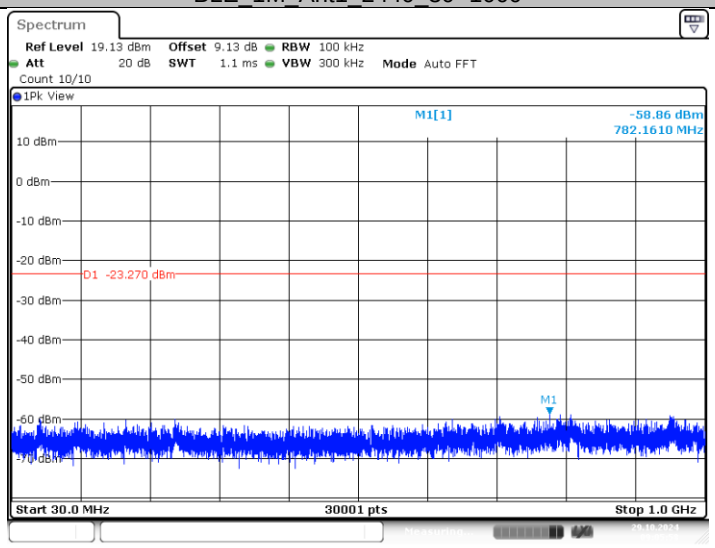
BLE_1M_Ant1_2402_30~1000



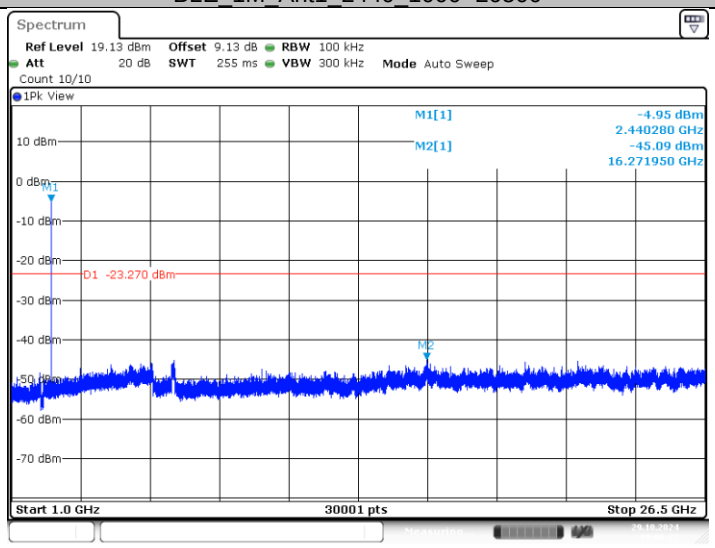
BLE_1M_Ant1_2402_1000~26500



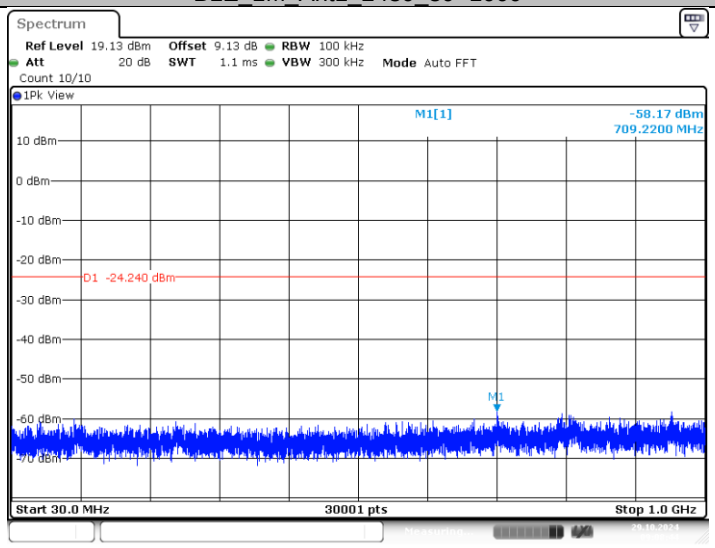
BLE_1M_Ant1_2440_30~1000



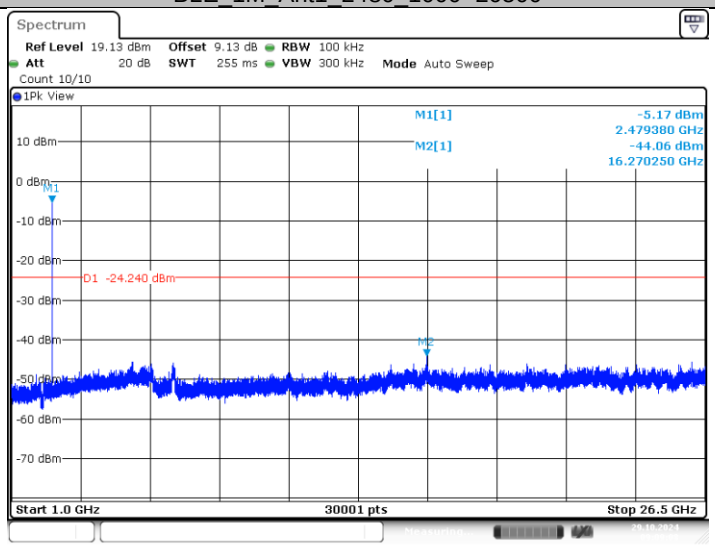
BLE_1M_Ant1_2440_1000~26500



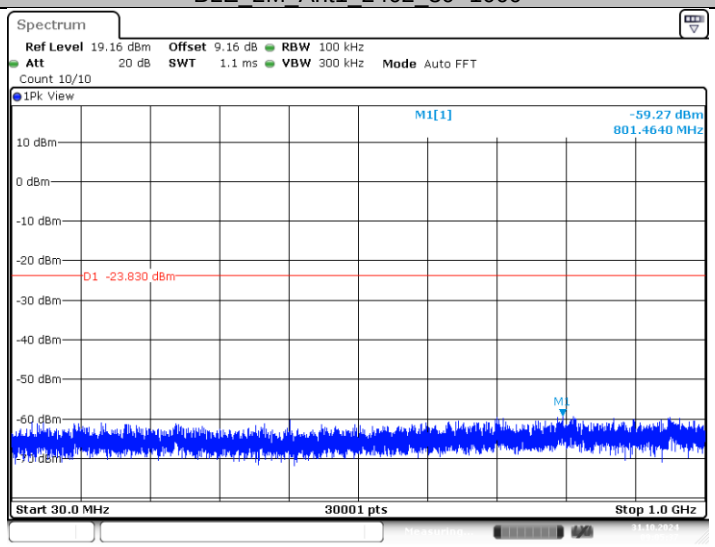
BLE_1M_Ant1_2480_30~1000



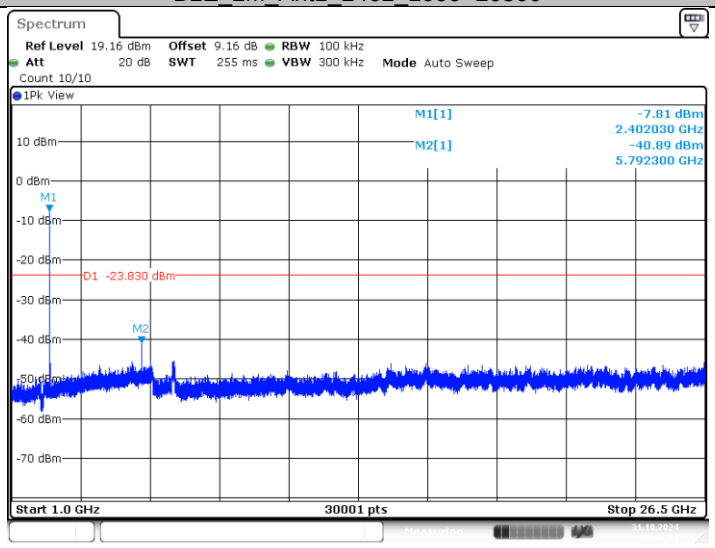
BLE_1M_Ant1_2480_1000~26500



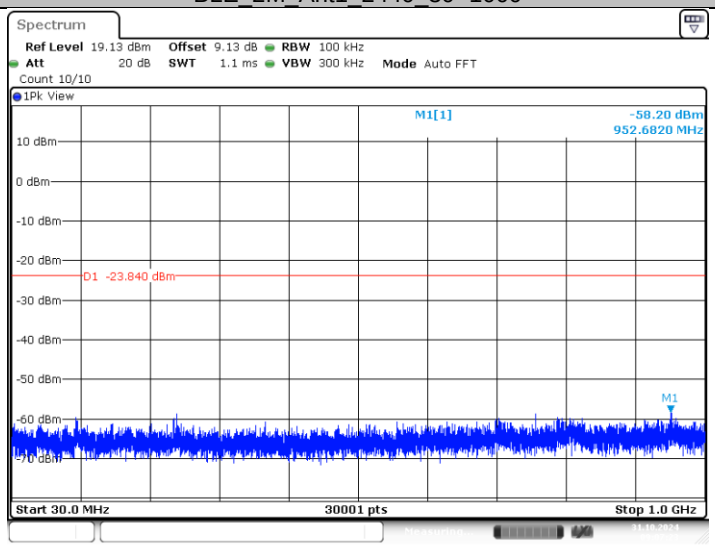
BLE_2M_Ant1_2402_30~1000



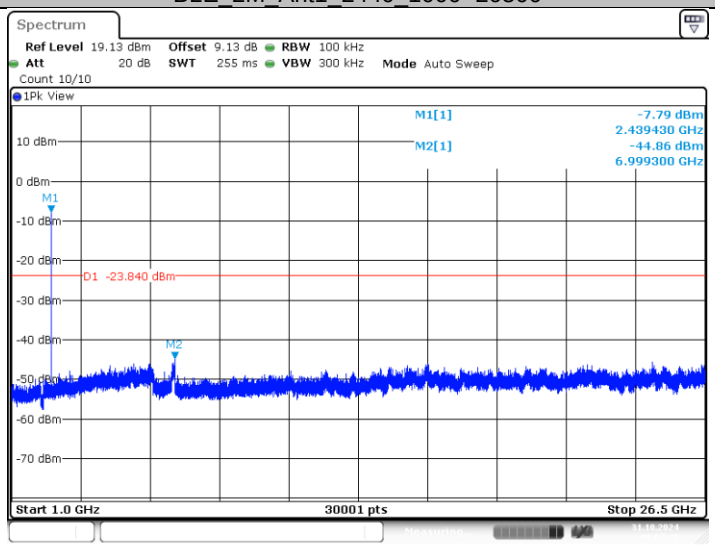
BLE_2M_Ant1_2402_1000~26500



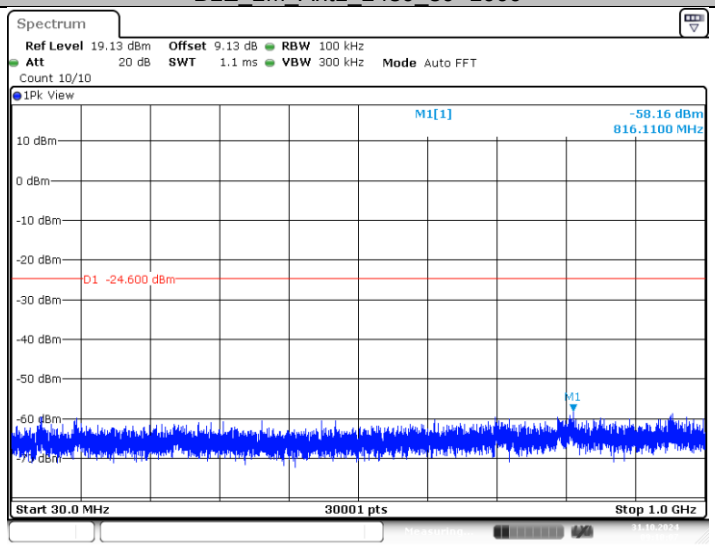
BLE_2M_Ant1_2440_30~1000



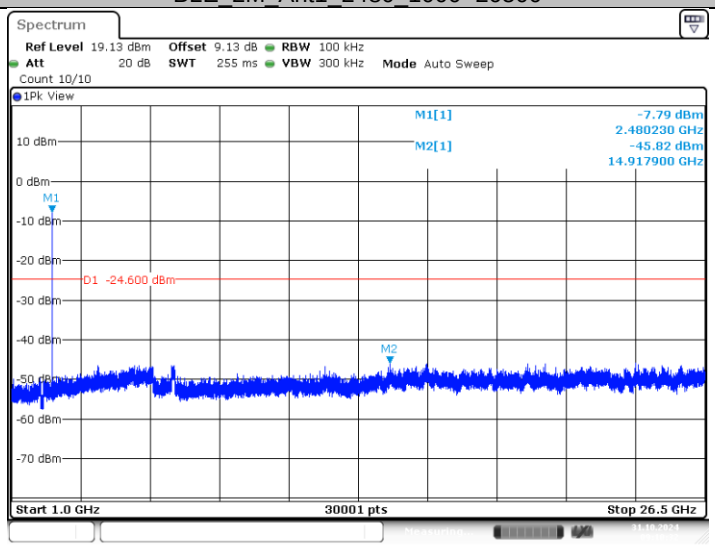
BLE_2M_Ant1_2440_1000~26500



BLE_2M_Ant1_2480_30~1000



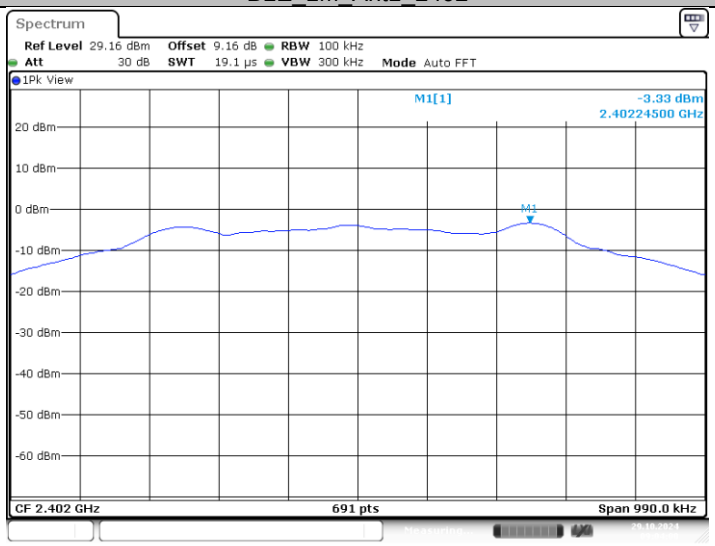
BLE_2M_Ant1_2480_1000~26500



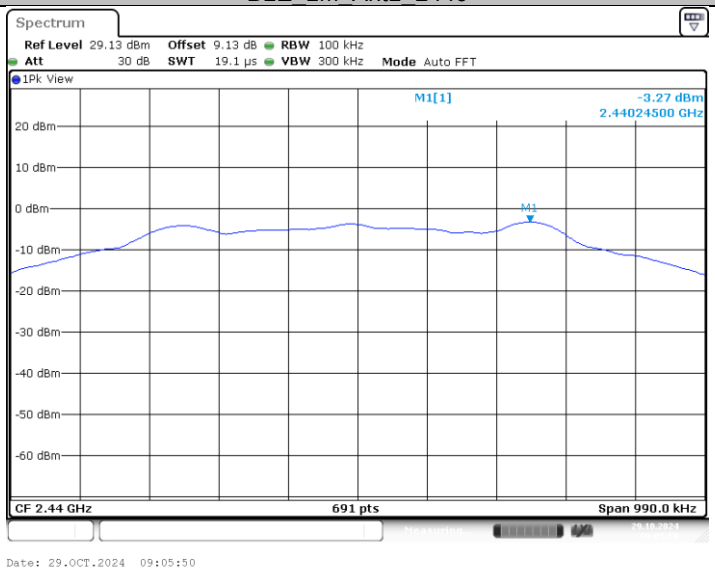
Reference level measurement

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
BLE_1M	Ant1	2402	2402.25	-3.33
		2440	2440.25	-3.27
		2480	2480.24	-4.24
BLE_2M	Ant1	2402	2401.99	-3.83
		2440	2439.99	-3.84
		2480	2479.99	-4.60

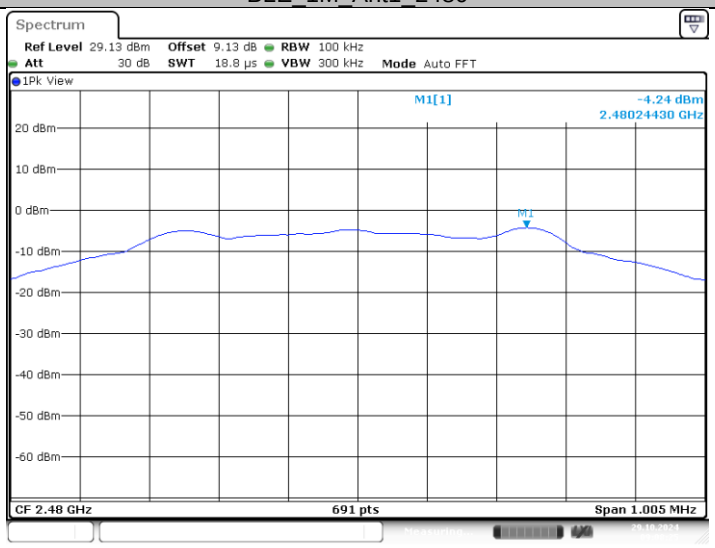
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

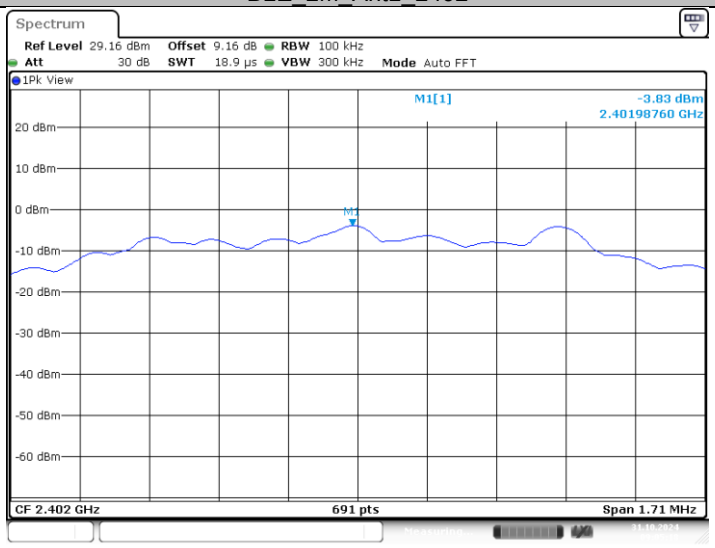


BLE_1M_Ant1_2480



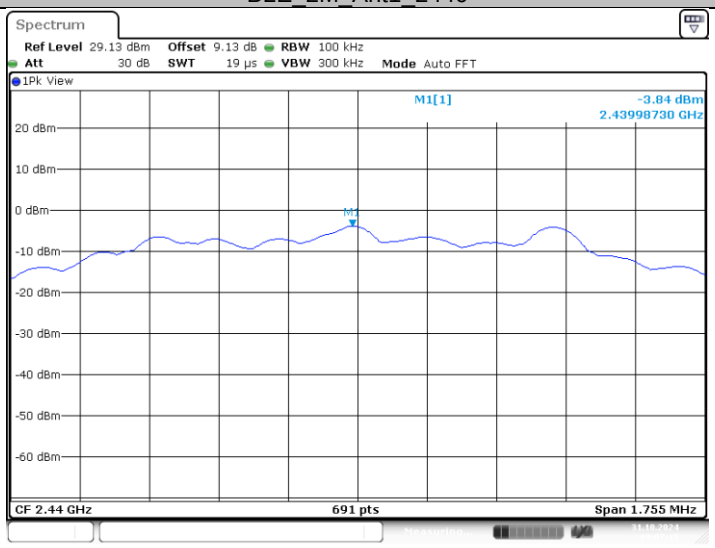
Date: 29.OCT.2024 09:08:25

BLE_2M_Ant1_2402



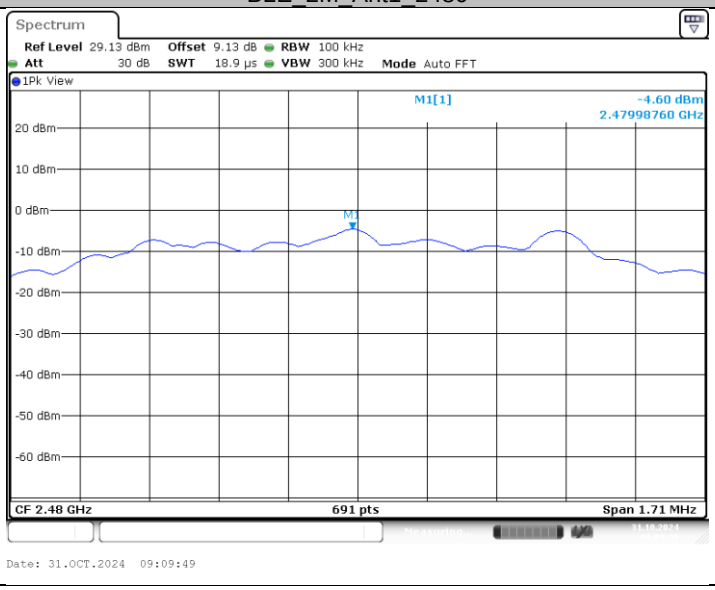
Date: 31.OCT.2024 09:05:18

BLE_2M_Ant1_2440



Date: 31.OCT.2024 09:07:15

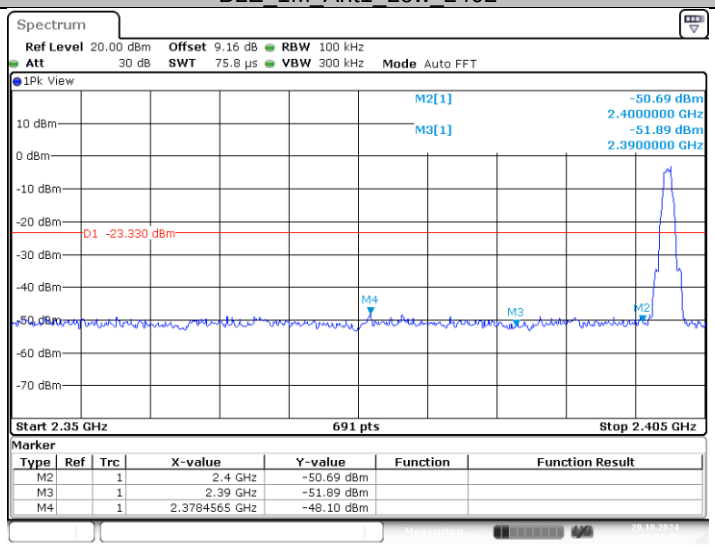
BLE_2M_Ant1_2480



Band edge measurements

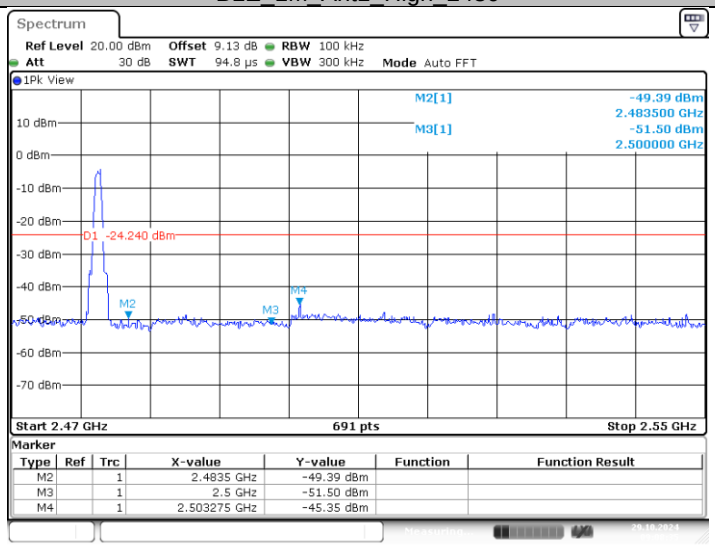
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-3.33	-48.1	≤-23.33	PASS
		High	2480	-4.24	-45.35	≤-24.24	PASS
BLE_2M	Ant1	Low	2402	-3.83	-38.39	≤-23.83	PASS
		High	2480	-4.60	-47.46	≤-24.6	PASS

BLE_1M_Ant1_Low_2402



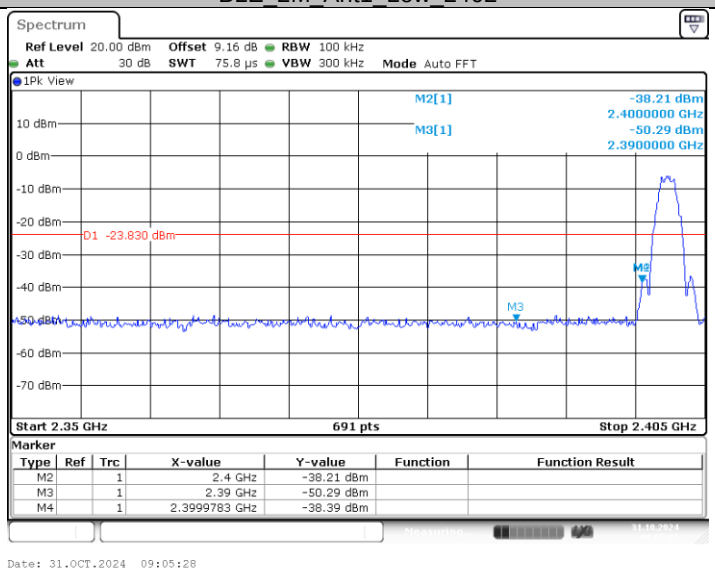
Date: 29.OCT.2024 09:04:09

BLE_1M_Ant1_High_2480

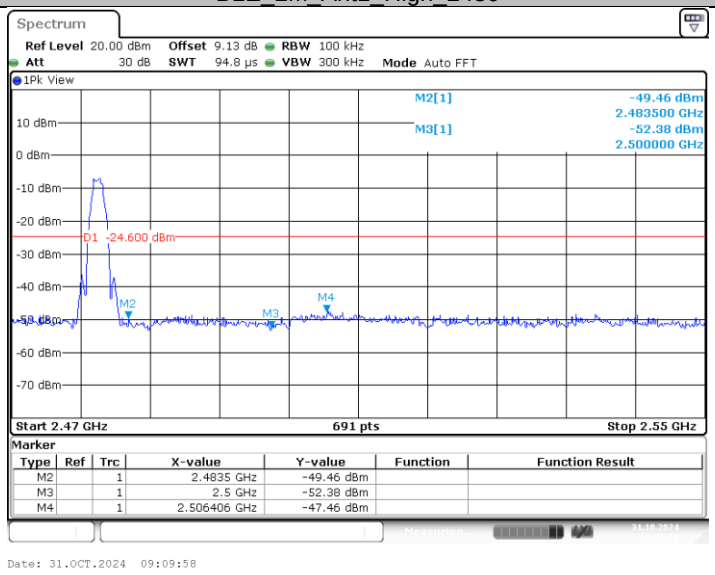


Date: 29.OCT.2024 09:08:35

BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480

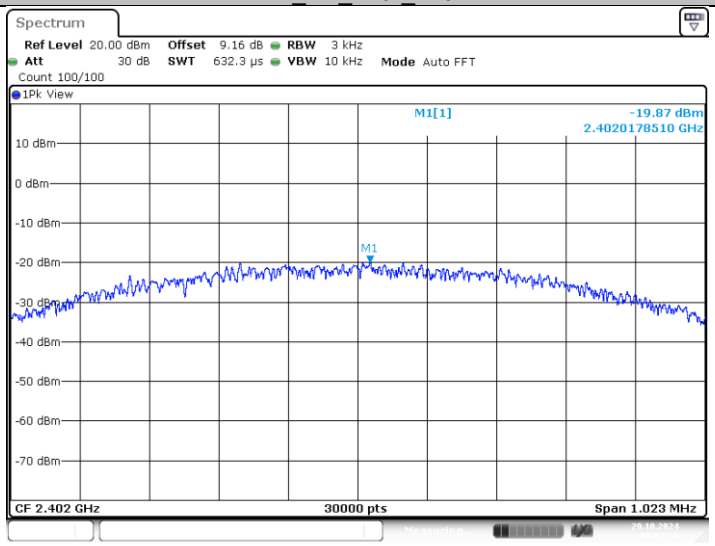


APPENDIX H- POWER SPECTRAL DENSITY

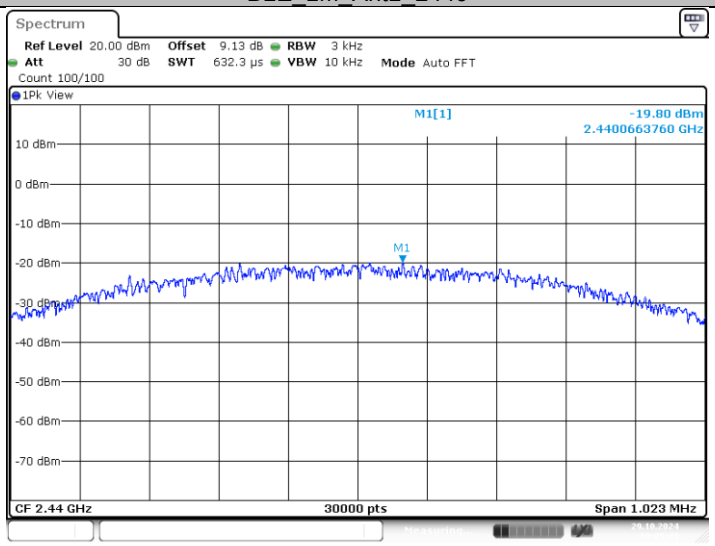
Power Spectral Density

TestMode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-19.87	≤8.00	PASS
		2440	-19.80	≤8.00	PASS
		2480	-20.72	≤8.00	PASS
BLE_2M	Ant1	2402	-22.53	≤8.00	PASS
		2440	-22.56	≤8.00	PASS
		2480	-22.92	≤8.00	PASS

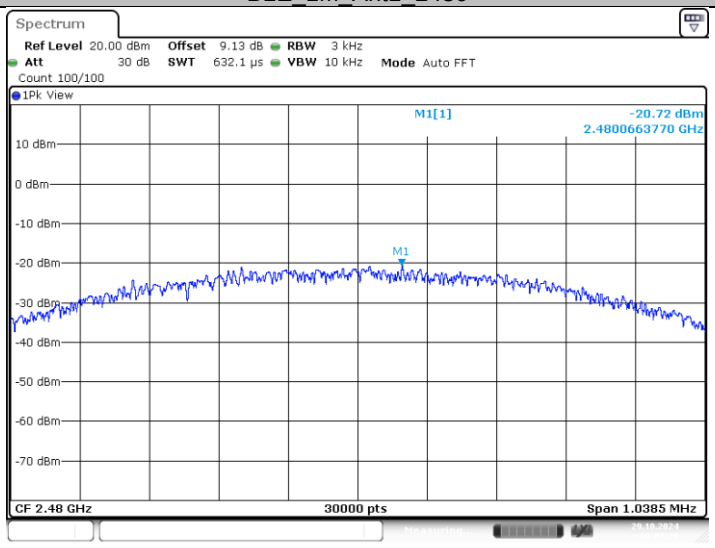
BLE_1M_Ant1_2402



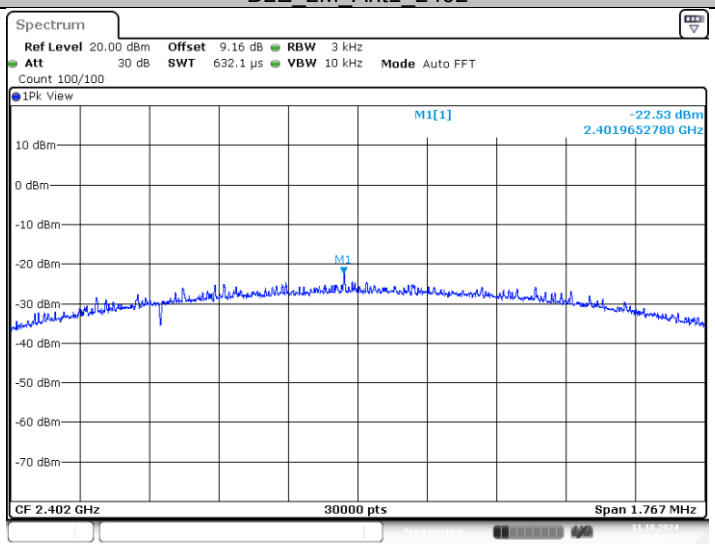
BLE_1M_Ant1_2440



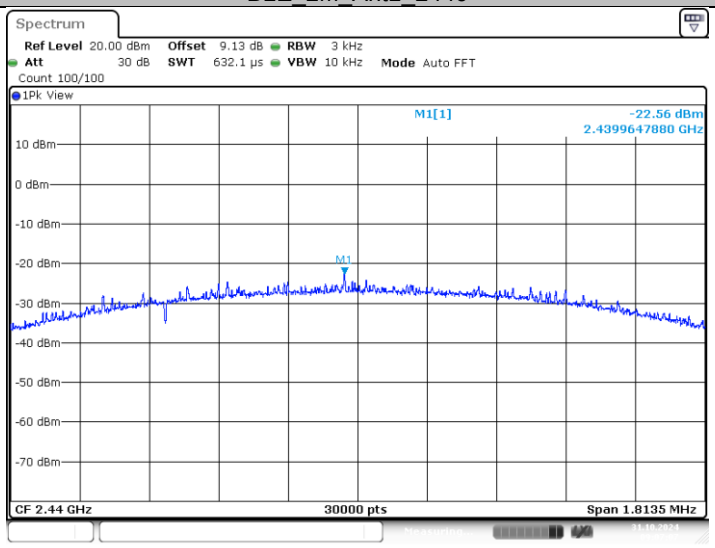
BLE_1M_Ant1_2480



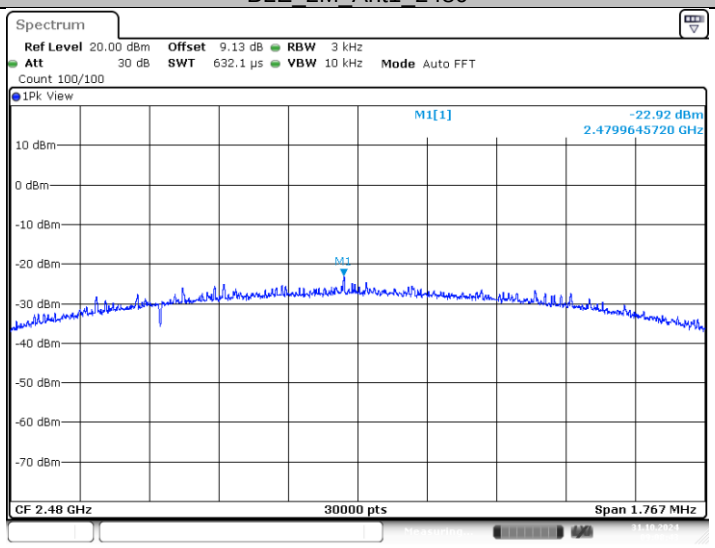
BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



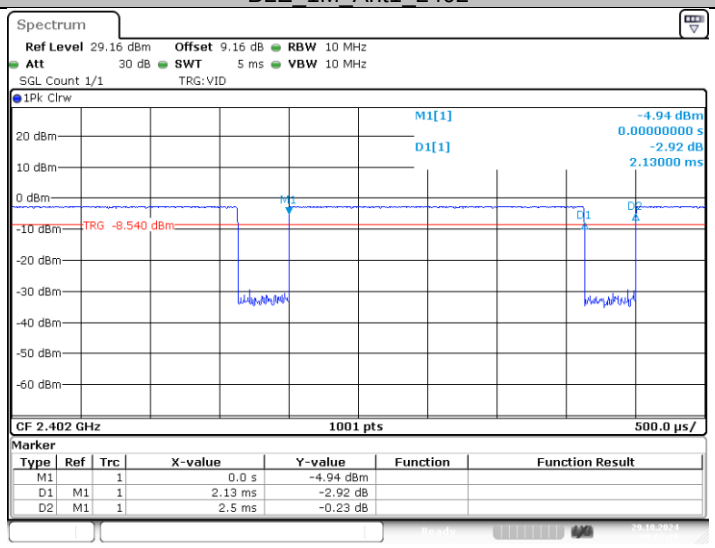
BLE_2M_Ant1_2480



APPENDIX I DUTY CYCLE

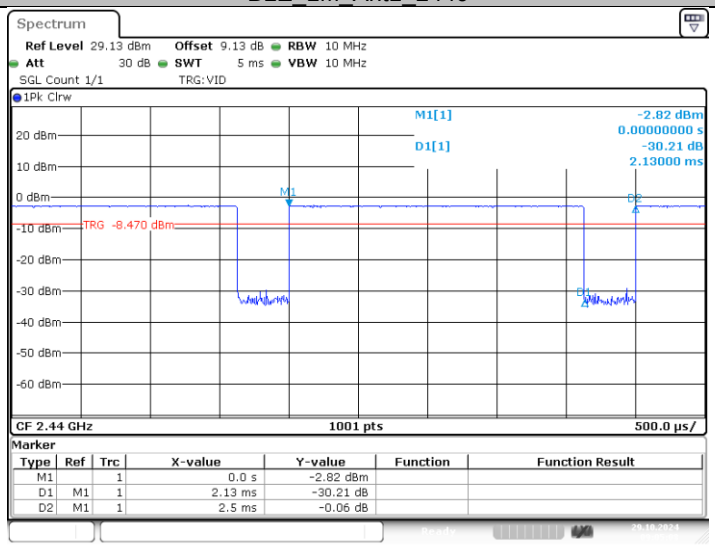
TestMode	Antenna	Freq(MHz)	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2402	2.13	2.50	0.8520	85.20	0.70	---	---
		2440	2.13	2.50	0.8520	85.20	0.70	---	---
		2480	2.13	2.50	0.8520	85.20	0.70	---	---
BLE_2M	Ant1	2402	1.07	1.88	0.5691	56.91	2.45	---	---
		2440	1.07	1.88	0.5691	56.91	2.45	---	---
		2480	1.07	1.88	0.5691	56.91	2.45	---	---

BLE_1M_Ant1_2402



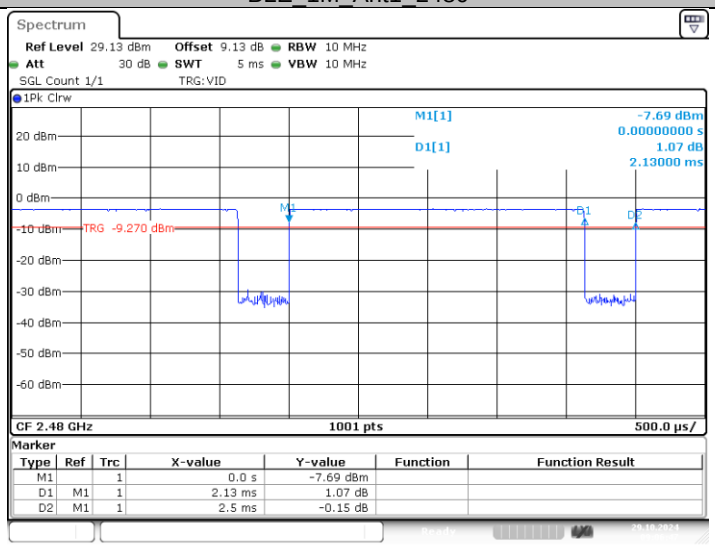
Date: 29.OCT.2024 09:02:19

BLE_1M_Ant1_2440



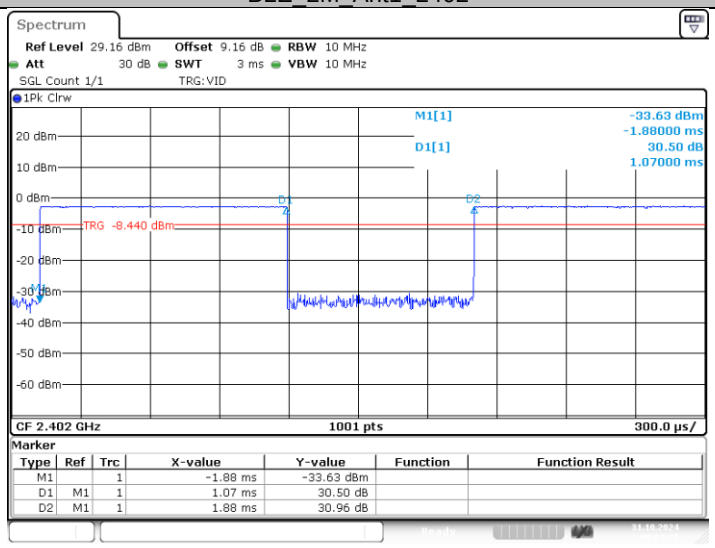
Date: 29.OCT.2024 09:05:08

BLE_1M_Ant1_2480



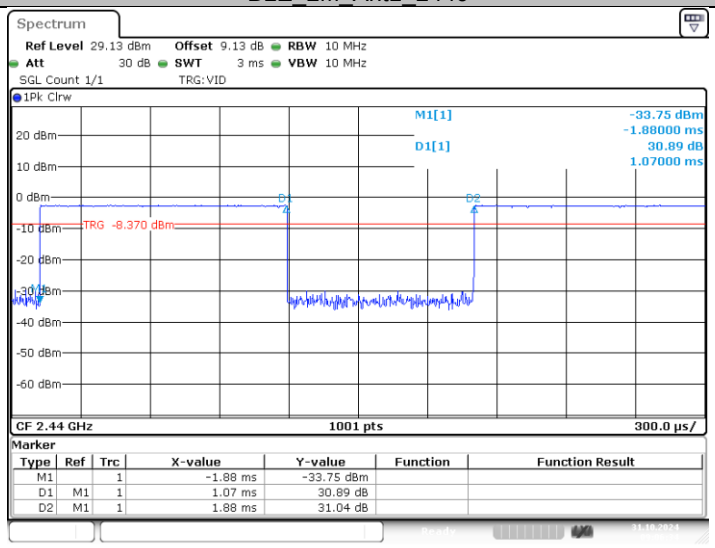
Date: 29.OCT.2024 09:06:47

BLE_2M_Ant1_2402



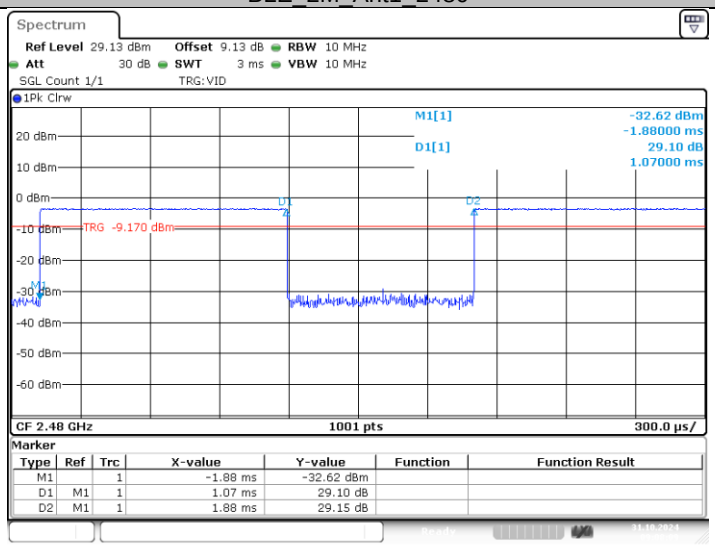
Date: 31.OCT.2024 09:03:37

BLE_2M_Ant1_2440



Date: 31.OCT.2024 09:06:33

BLE_2M_Ant1_2480



Date: 31.OCT.2024 09:08:10

End of Test Report