

Appendix A: DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.692	2401.664	2402.356	0.5	PASS
		2440	0.684	2439.668	2440.352	0.5	PASS
		2480	0.680	2479.668	2480.348	0.5	PASS

BLE_1M_Ant1_2402

Spectrum Analyzer 1
Swept SA

KEYSIGHT Input RF: Coupling DC, Align: Auto, Corrections: Off, Freq Ref: Int (S), Input Z: 50 Ω , #Atten: 40 dB, PNO: Best Wide Gate: Off, IF Gain: Low, Sig Track: Off, #Avg Type: Power (RMS), Trig: Free Run, 1 2 3 4 5 6, M W W W W W W W, P P P P P P

1 Spectrum, Ref Lvl Offset 11.88 dB, Ref Level 30.00 dBm, Δ Mkr3 692 kHz, -0.15 dB, 23.1 - 8.08 dBm

Scale/Div 10 dB, Log, 20.0, 10.0, 0.00, -10.0, -20.0, -30.0, -40.0, -50.0, -60.0

Center 2.402000 GHz, #Video BW 300 kHz, Span 4.000 MHz, Sweep 1.00 ms (1001 pts), #Res BW 100 kHz

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.401 664 GHz	-7.525 dBm		
2	N	1	f	2.402 028 GHz	-2.078 dBm		
3	Δ 1	1	f	(Δ) 692 kHz (Δ)	-0.1494 dB		
4							
5							
6							

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BLE_1M_Ant1_2440

Spectrum Analyzer 1
Swept SA

KEYSIGHT Input RF: Coupling DC, Align: Auto, Corrections: Off, Freq Ref: Int (S), Input Z: 50 Ω , #Atten: 40 dB, PNO: Best Wide Gate: Off, IF Gain: Low, Sig Track: Off, #Avg Type: Power (RMS), Trig: Free Run, 1 2 3 4 5 6, M W W W W W W W, P P P P P P

1 Spectrum, Ref Lvl Offset 11.72 dB, Ref Level 30.00 dBm, Δ Mkr3 684 kHz, -0.01 dB, 23.1 - 8.29 dBm

Scale/Div 10 dB, Log, 20.0, 10.0, 0.00, -10.0, -20.0, -30.0, -40.0, -50.0, -60.0

Center 2.440000 GHz, #Video BW 300 kHz, Span 4.000 MHz, Sweep 1.00 ms (1001 pts), #Res BW 100 kHz

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.439 668 GHz	-8.227 dBm		
2	N	1	f	2.440 024 GHz	-2.269 dBm		
3	Δ 1	1	f	(Δ) 684 kHz (Δ)	-0.0704 dB		
4							
5							
6							

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BLE_1M_Ant1_2480



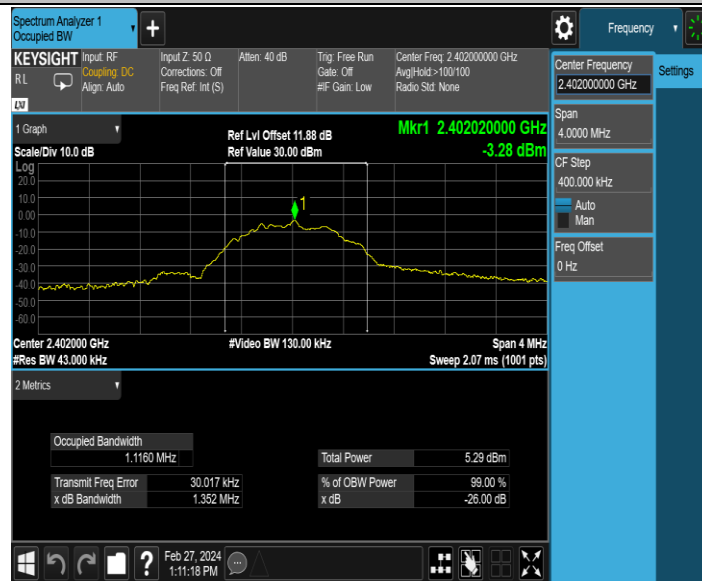
Appendix B: Occupied Channel Bandwidth

Test Result

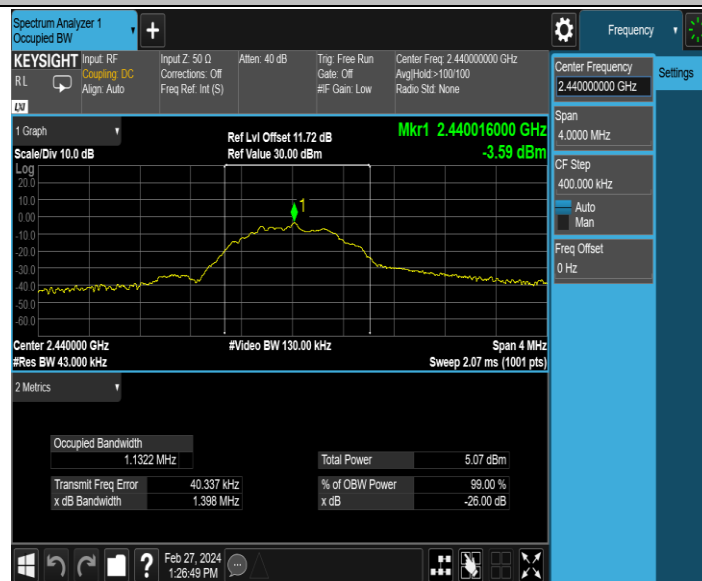
TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.1111	2401.4742	2402.5853	---	---
		2440	1.1241	2439.4758	2440.5999	---	---
		2480	1.1264	2479.4749	2480.6013	---	---

Test Graphs

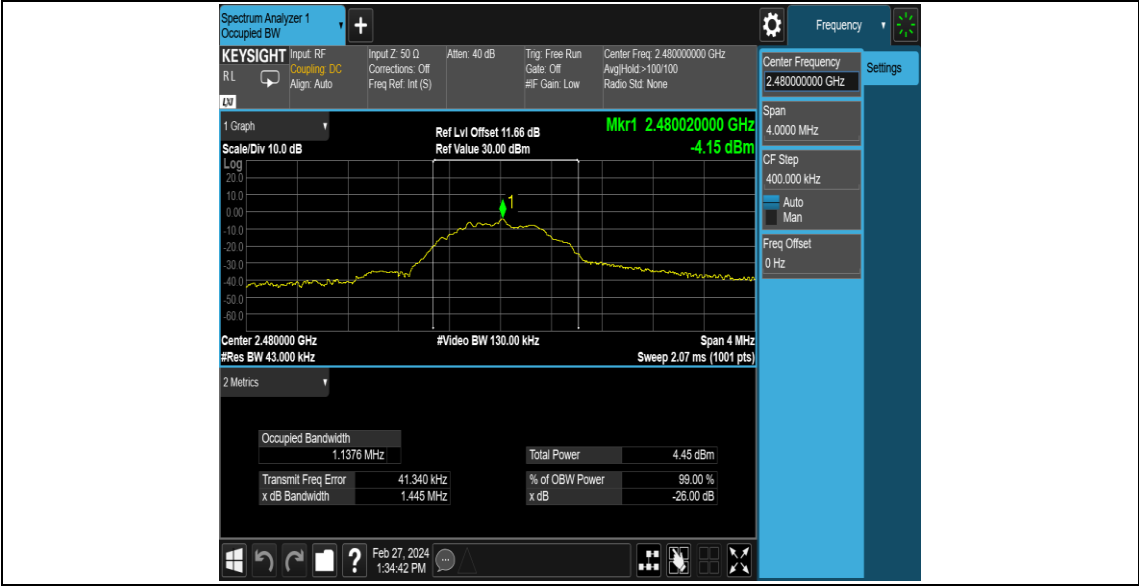
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

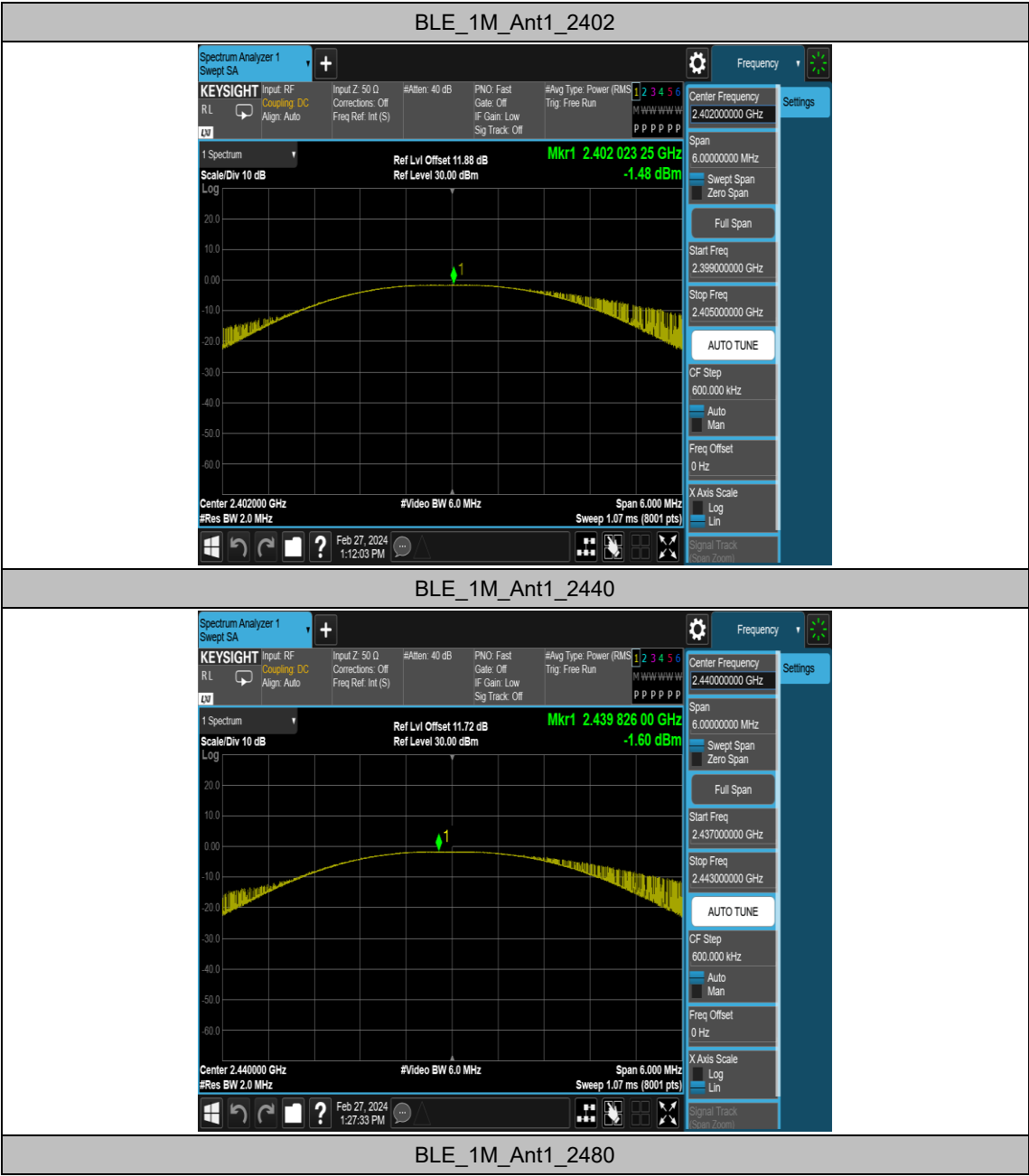


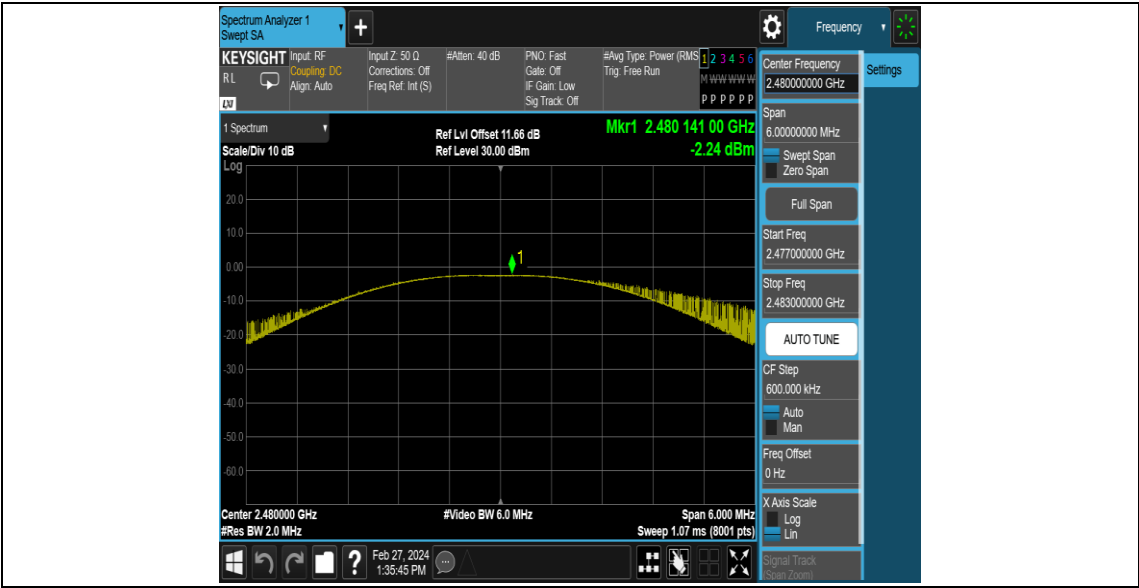
Appendix C: Maximum conducted output power

Test Result Peak

TestMode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-1.48	≤30	-2.72	≤36	PASS
		2440	-1.60	≤30	-2.84	≤36	PASS
		2480	-2.24	≤30	-3.48	≤36	PASS

Test Graphs Peak



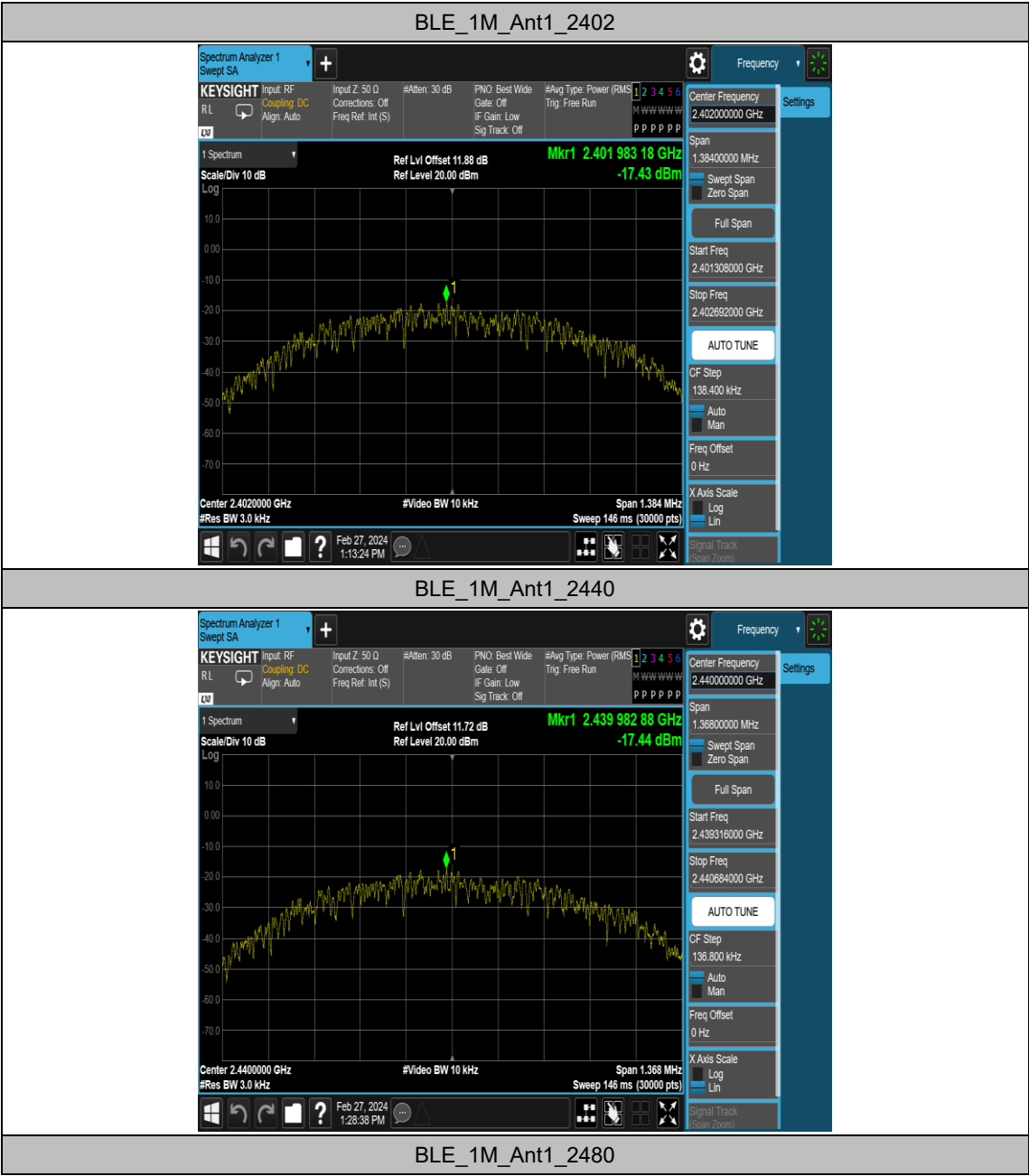


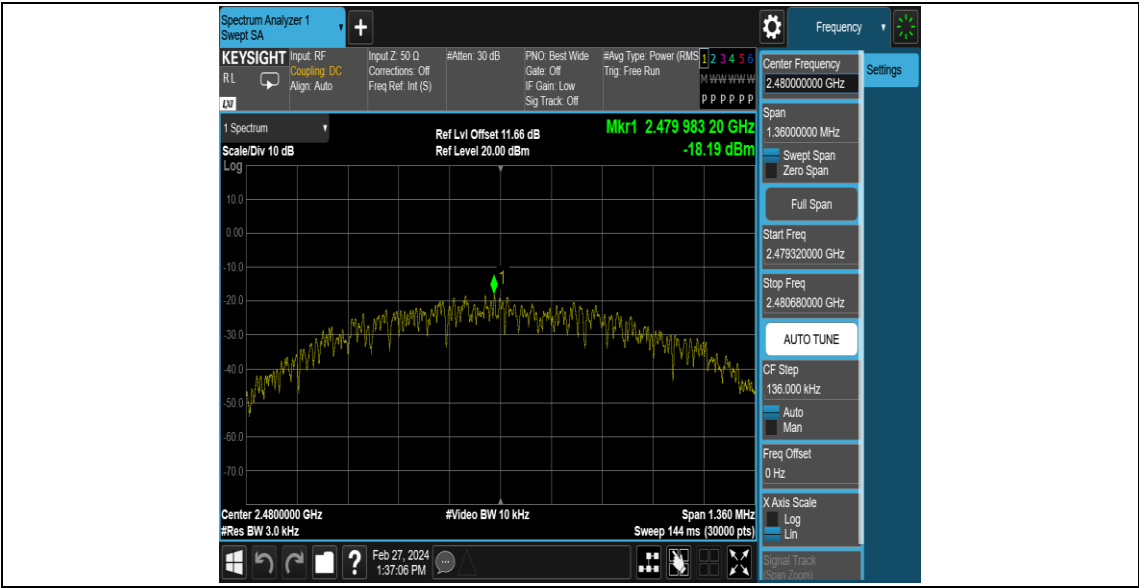
Appendix D: Maximum power spectral density

Test Result

TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-17.43	≤8.00	PASS
		2440	-17.44	≤8.00	PASS
		2480	-18.20	≤8.00	PASS

Test Graphs





Appendix E: Band edge measurements

Test Result

TestMode	Antenna	Channel	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-1.90	-39.58	≤-21.9	PASS
		High	2480	-2.84	-42.45	≤-22.84	PASS

Test Graphs

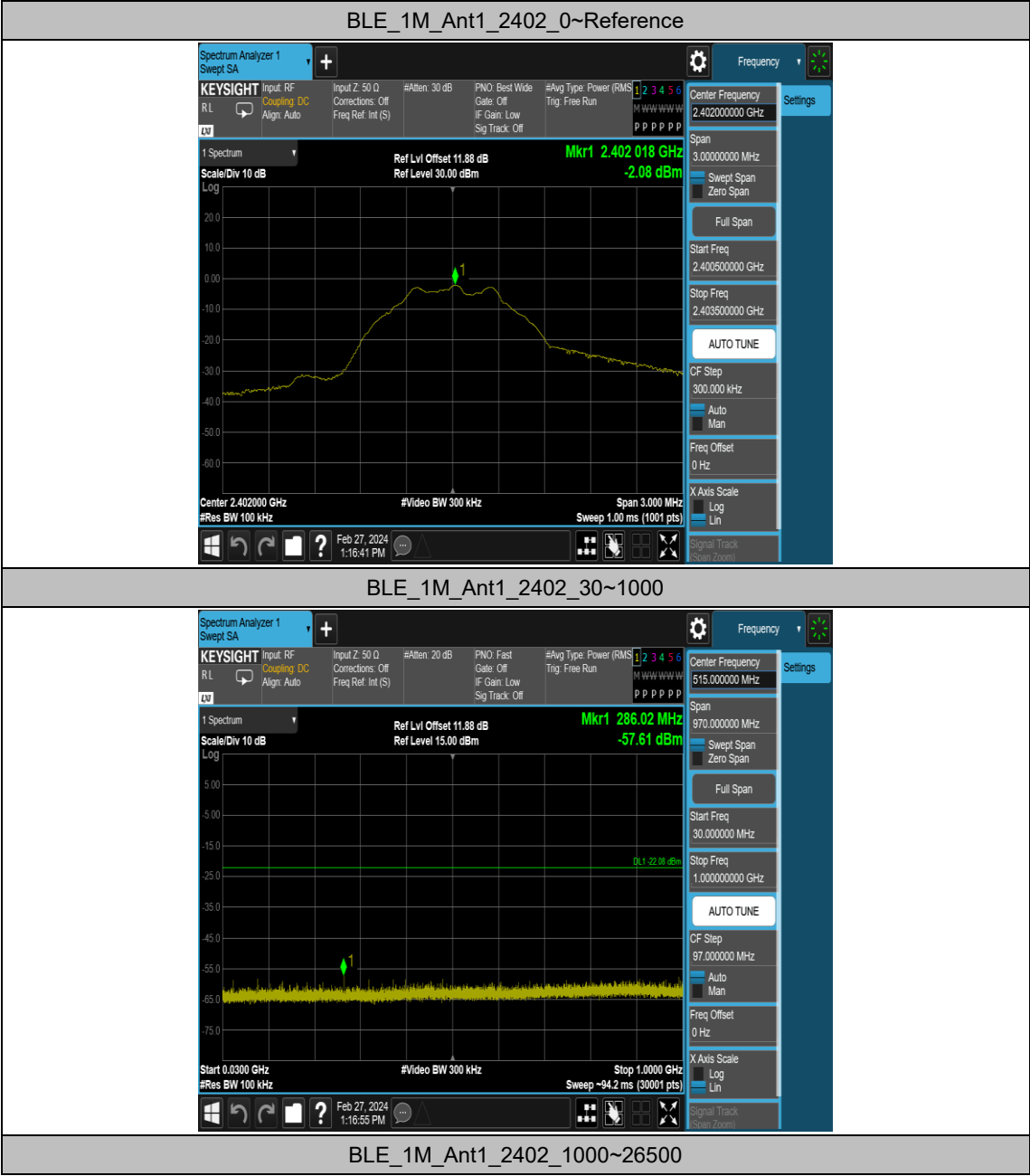


Appendix F: Conducted Spurious Emission

Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-2.08	-2.08	---	PASS
			30~1000	-2.08	-57.61	≤-22.08	PASS
			1000~26500	-2.08	-50.27	≤-22.08	PASS
		2440	Reference	-2.23	-2.23	---	PASS
			30~1000	-2.23	-57.78	≤-22.23	PASS
			1000~26500	-2.23	-50.38	≤-22.23	PASS
		2480	Reference	-2.85	-2.85	---	PASS
			30~1000	-2.85	-57.58	≤-22.85	PASS
			1000~26500	-2.85	-50.57	≤-22.85	PASS

Test Graphs

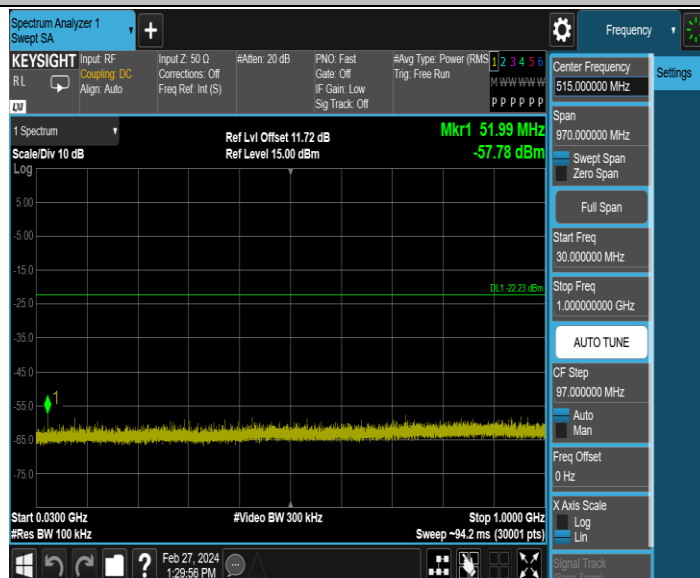




BLE_1M_Ant1_2440_0~Reference



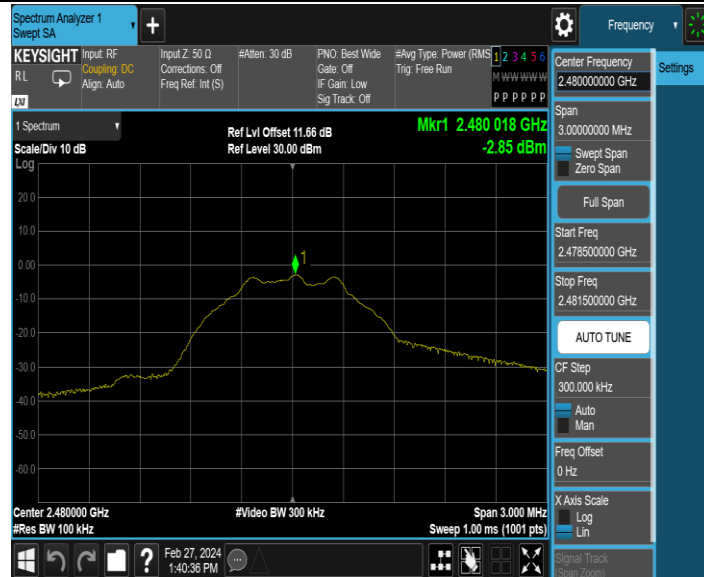
BLE_1M_Ant1_2440_30~1000



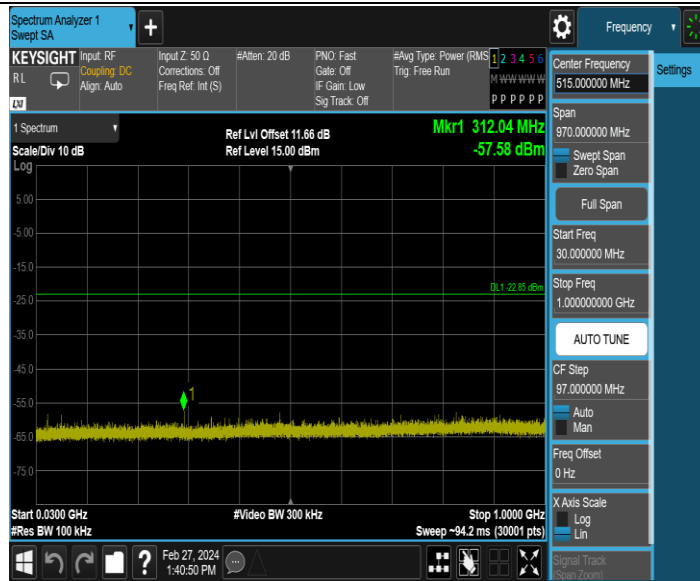
BLE_1M_Ant1_2440_1000~26500



BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



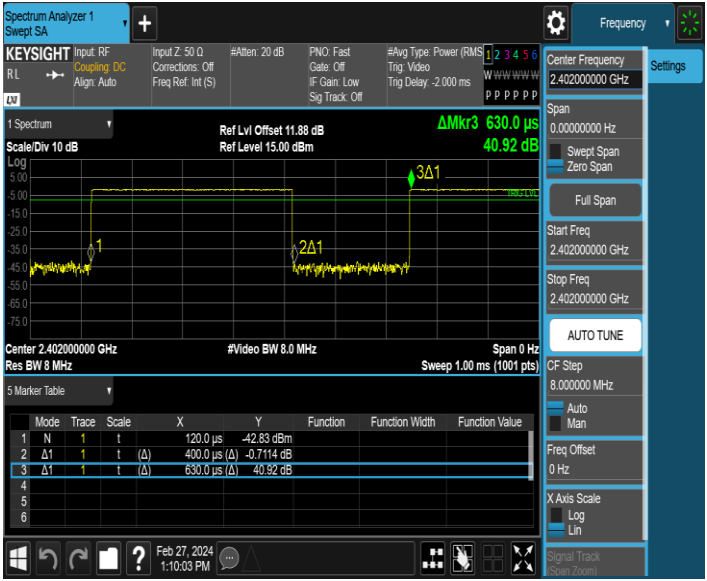
Appendix G: Duty Cycle

Test Result

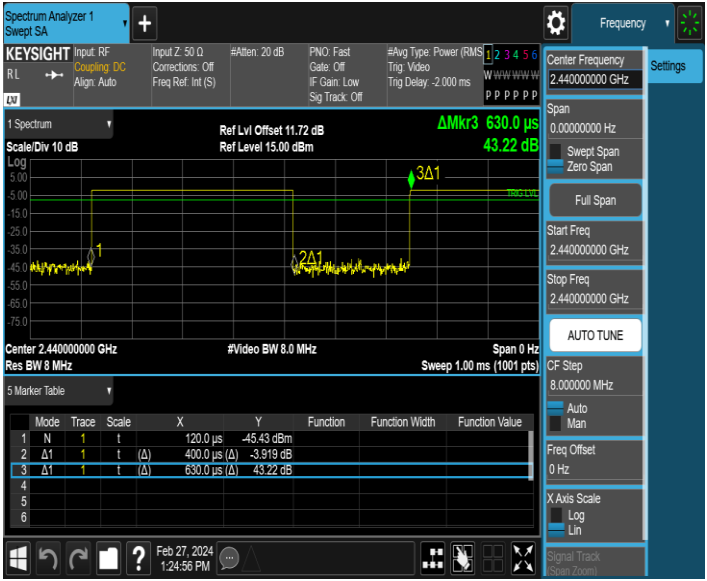
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	0.40	0.63	63.49	1.97
		2440	0.40	0.63	63.49	1.97
		2480	0.40	0.63	63.49	1.97

Test Graphs

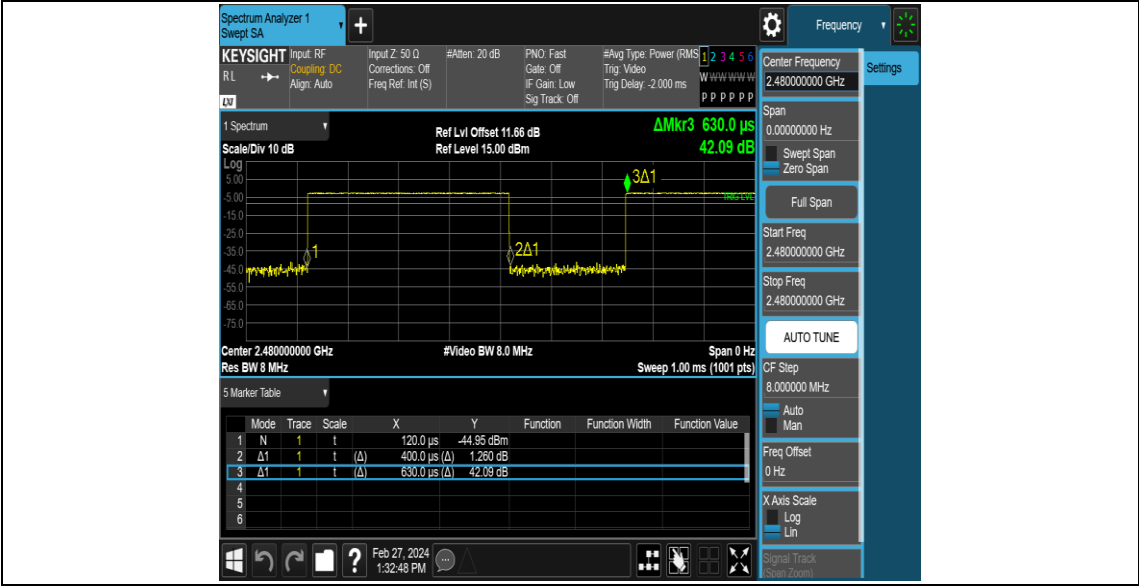
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



Appendix H: Emissions in Restricted Bands

Test Result

Mode:	BLE 1M-2402
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Final Data List												
NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2310.0000	9.07	46.33	74.00	27.67	42.73	54.00	11.27	150	90	Horizontal	PASS
2	2373.5197	9.70	38.92	74.00	35.08	37.84	54.00	16.16	118	272.7	Horizontal	PASS
3	2378.32	9.86	38.93	74.00	35.07	37.94	54.00	16.06	126.4	331	Horizontal	PASS
4	2380.7998	9.91	39.29	74.00	34.71	38.16	54.00	15.84	135.6	272.6	Horizontal	PASS
5	2385.3603	10.17	39.65	74.00	34.35	38.51	54.00	15.49	134.8	284.2	Horizontal	PASS
6	2390.0000	10.38	54.10	74.00	19.90	49.68	54.00	4.32	150	123	Horizontal	PASS

Final Data List												
NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2310.0000	9.07	45.78	74.00	28.22	43.60	54.00	10.40	150	82	Vertical	PASS
2	2365.5998	9.49	38.79	74.00	35.21	37.94	54.00	16.06	100.1	179.8	Vertical	PASS
3	2374.6398	9.77	39.06	74.00	34.94	37.89	54.00	16.11	149.3	135.3	Vertical	PASS
4	2382.5596	10.00	39.48	74.00	34.52	38.11	54.00	15.89	155.9	257.7	Vertical	PASS
5	2388.0796	10.22	39.66	74.00	34.34	38.69	54.00	15.31	121.5	323.5	Vertical	PASS
6	2390.0000	10.38	53.62	74.00	20.38	50.12	54.00	3.88	150	155	Vertical	PASS

Mode:	BLE 1M-2480
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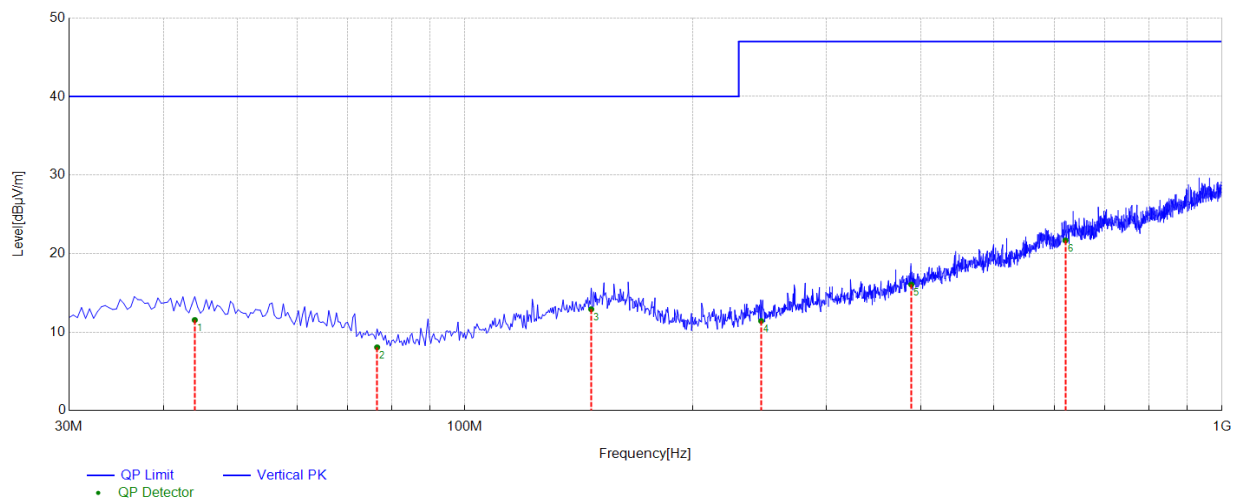
Final Data List												
NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2483.5002	10.62	43.39	74.00	30.61	41.20	54.00	12.80	104.3	137.6	Horizontal	PASS
2	2483.7971	10.58	41.62	74.00	32.38	40.04	54.00	13.96	136.6	199	Horizontal	PASS
3	2484.9022	10.50	42.52	74.00	31.48	40.58	54.00	13.42	146.4	137.3	Horizontal	PASS
4	2485.2822	10.47	42.48	74.00	31.52	40.52	54.00	13.48	149.6	249.1	Horizontal	PASS
5	2486.503	10.36	40.67	74.00	33.33	39.45	54.00	14.55	149.9	196	Horizontal	PASS
6	2500	10.10	52.84	74.00	21.16	49.59	54.00	4.41	150	115	Horizontal	PASS

Final Data List												
NO.	Freq. [MHz]	Factor [dB/m]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2483.5002	10.62	41.92	74.00	32.08	40.20	54.00	13.80	107.3	157.4	Vertical	PASS
2	2484.2096	10.54	42.10	74.00	31.90	40.24	54.00	13.76	174.8	160.9	Vertical	PASS
3	2485.3648	10.46	41.17	74.00	32.83	39.67	54.00	14.33	107.4	177.7	Vertical	PASS
4	2486.1067	10.38	41.25	74.00	32.75	39.66	54.00	14.34	120.3	166.3	Vertical	PASS
5	2486.7508	10.35	40.94	74.00	33.06	39.52	54.00	14.48	146.4	168.1	Vertical	PASS
6	2500	10.10	49.87	74.00	24.13	46.36	54.00	7.64	150	155	Vertical	PASS

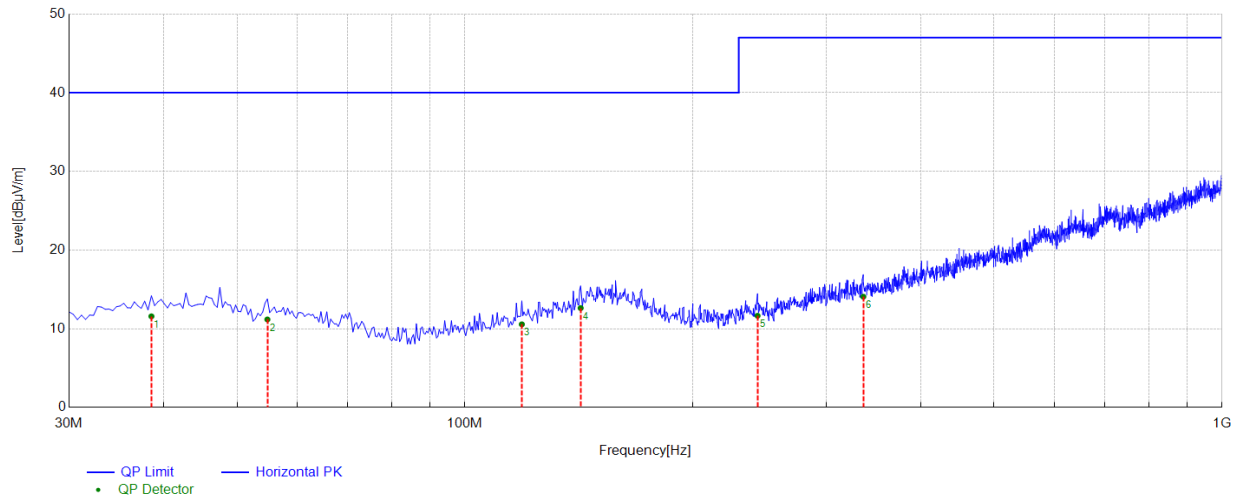
Note:

1. The Antenna Gain is compensated in the graph.
2. The limit in dBm for average detector is conversion from 54dBuV/m, according to 15.209(a). The limit in dBm for peak detector is 20dB above the limit of average detector in dBm.

Appendix I: Spurious emissions



QP Final Data List									
NO.	Freq. [MHz]	Factor [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	43.9736	-15.77	11.55	40.00	28.45	200	256	Vertical	PASS
2	76.5786	-19.91	8.07	40.00	31.93	100	318	Vertical	PASS
3	146.8347	-15.98	12.92	40.00	27.08	200	70	Vertical	PASS
4	246.2025	-17.94	11.42	47.00	35.58	100	84	Vertical	PASS
5	388.6555	-13.71	16.06	47.00	30.94	100	304	Vertical	PASS
6	621.1605	-8.06	21.68	47.00	25.32	100	95	Vertical	PASS



QP Final Data List									
NO.	Freq. [MHz]	Factor [dB/m]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	38.5394	-15.68	11.59	40.00	28.41	200	301	Horizontal	PASS
2	54.8419	-16.72	11.19	40.00	28.81	100	21	Horizontal	PASS
3	118.8876	-18.06	10.57	40.00	29.43	100	165	Horizontal	PASS
4	142.1769	-16.53	12.64	40.00	27.36	200	58	Horizontal	PASS
5	243.4854	-18.03	11.66	47.00	35.34	200	155	Horizontal	PASS
6	335.8663	-15.00	14.08	47.00	32.92	200	323	Horizontal	PASS

Mode:	BLE 1M-2402
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NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1214	41.72	1.09	74.00	32.28	150	270	Horizontal	PASS
2	1794	43.00	4.15	74.00	31.00	150	299	Horizontal	PASS
3	4804.55	44.68	-14.86	74.00	29.32	150	255	Horizontal	PASS
4	6102.51	44.25	-12.44	74.00	29.75	150	309	Horizontal	PASS
5	8251.79	44.89	-10.24	74.00	29.11	150	334	Horizontal	PASS
6	11785.9	48.05	-5.00	74.00	25.95	150	137	Horizontal	PASS

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1294	41.58	1.17	74.00	32.42	150	260	Vertical	PASS
2	1706	43.18	3.22	74.00	30.82	150	287	Vertical	PASS
3	4741.60	47.47	-14.68	74.00	26.53	150	129	Vertical	PASS
4	7097.72	46.33	-11.47	74.00	27.67	150	147	Vertical	PASS
5	9208.03	45.27	-8.75	74.00	28.73	150	180	Vertical	PASS
6	11441.2	47.43	-5.45	74.00	26.57	150	283	Vertical	PASS

Mode:	BLE 1M-2440
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NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1556	41.75	1.86	74.00	32.25	150	141	Horizontal	PASS
2	2022	45.12	6.22	74.00	28.88	150	224	Horizontal	PASS
3	4879.49	44.19	-14.70	74.00	29.81	150	253	Horizontal	PASS
4	6165.46	43.75	-12.85	74.00	30.25	150	1	Horizontal	PASS
5	9750.59	45.61	-7.85	74.00	28.39	150	190	Horizontal	PASS
6	13863.3	49.04	-2.40	74.00	24.96	150	274	Horizontal	PASS

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1190	43.16	2.07	74.00	30.84	150	222	Vertical	PASS
2	1852	44.88	5.37	74.00	29.12	150	257	Vertical	PASS
3	3938.24	44.38	-17.10	74.00	29.62	150	98	Vertical	PASS
4	5272.18	44.83	-13.95	74.00	29.17	150	109	Vertical	PASS
5	7871.10	44.07	-11.18	74.00	29.93	150	105	Vertical	PASS
6	11423.2	47.17	-5.37	74.00	26.83	150	140	Vertical	PASS

Mode:	BLE 1M-2480
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NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1338	43.69	2.15	74.00	30.31	150	8	Horizontal	PASS
2	1856	45.02	5.39	74.00	28.98	150	318	Horizontal	PASS
3	5038.36	43.76	-14.36	74.00	30.24	150	175	Horizontal	PASS
4	6411.27	44.13	-12.12	74.00	29.87	150	8	Horizontal	PASS
5	9025.17	44.40	-9.82	74.00	29.60	150	56	Horizontal	PASS
6	11818.9	47.87	-4.48	74.00	26.13	150	67	Horizontal	PASS

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1284	42.71	2.31	74.00	31.29	150	330	Vertical	PASS
2	1990	45.22	5.87	74.00	28.78	150	202	Vertical	PASS
3	3947.24	43.62	-17.24	74.00	30.38	150	120	Vertical	PASS
4	4885.49	44.35	-14.54	74.00	29.65	150	6	Vertical	PASS
5	9076.13	44.78	-9.85	74.00	29.22	150	22	Vertical	PASS
6	11866.9	48.33	-4.47	74.00	25.67	150	134	Vertical	PASS