Appendix A: DTS Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.648	2401.660	2402.308	0.5	PASS
		2440	0.644	2439.664	2440.308	0.5	PASS
		2480	0.652	2479.656	2480.308	0.5	PASS

Test Graphs

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

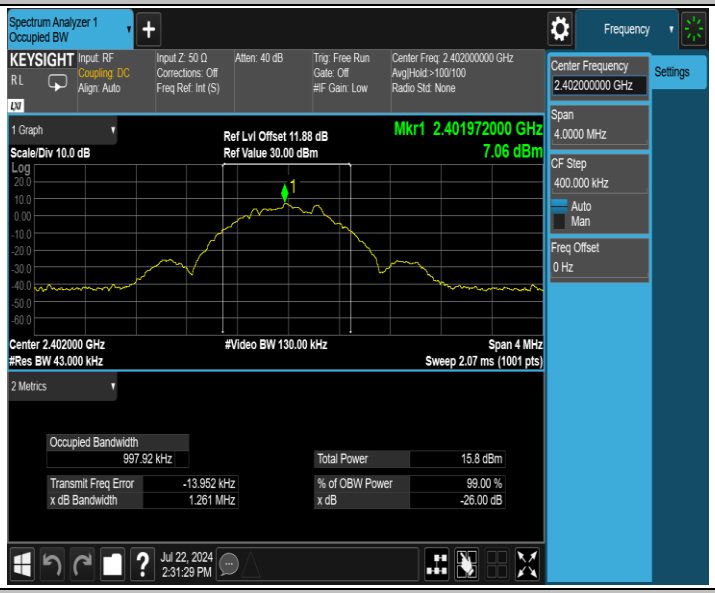

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
#Atten: 40 dB
PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 11.66 dB
Ref Level 30.00 dBm
ΔMkr3 652 kHz
0.09 dB
Center 2.480000 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Span 4.000 MHz
Sweep 1.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.479 656 GHz 2.119 dBm
2 N 1 f 2.480 232 GHz 8.050 dBm
3 Δ1 1 f (Δ) 652 kHz (Δ) 0.09140 dB
Jul 22, 2024
2:47:59 PM
Frequency
Settings
Center Frequency
2.480000000 GHz
Span
4.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.478000000 GHz
Stop Freq
2.482000000 GHz
AUTO TUNE
CF Step
400.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)

Appendix B: Occupied Channel Bandwidth

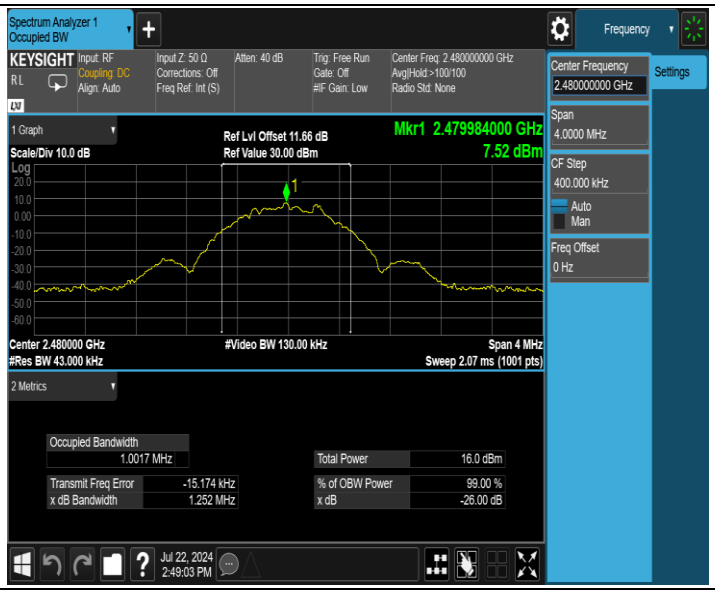
Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.99872	2401.4868	2402.4855	---	---
		2440	1.0064	2439.4823	2440.4887	---	---
		2480	1.0041	2479.4837	2480.4878	---	---

Test Graphs

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440

BLE_1M_Ant1_2480

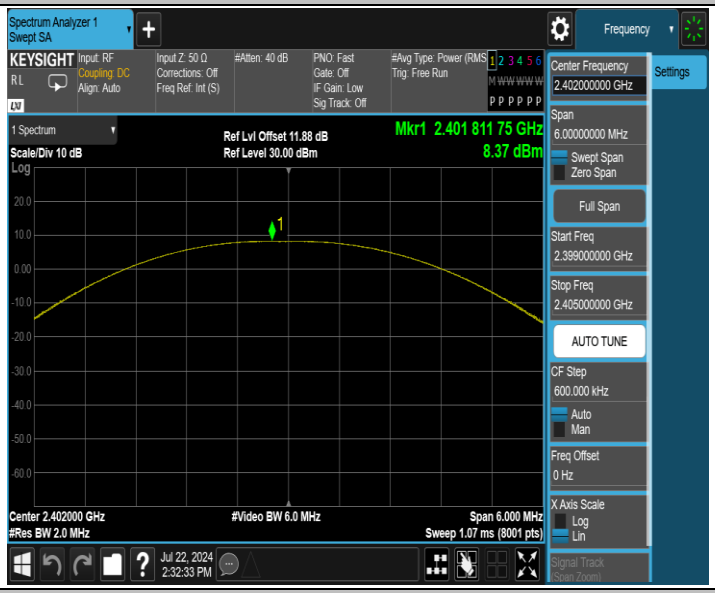
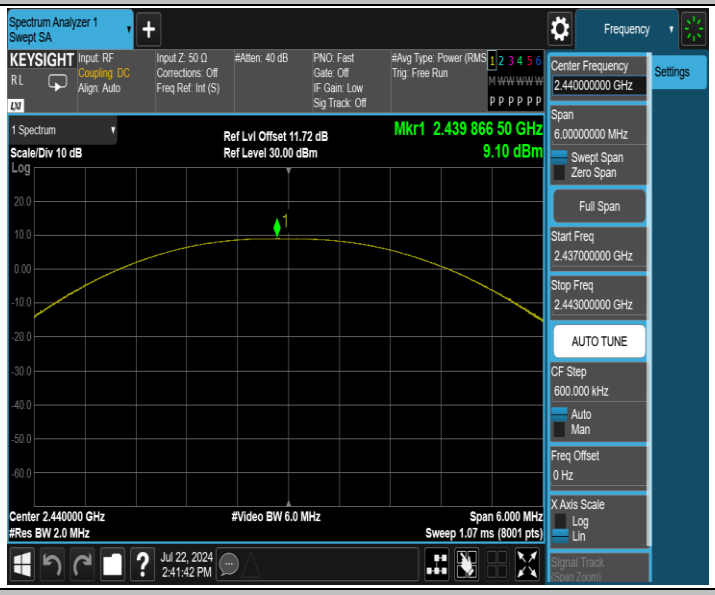

Spectrum Analyzer 1
Occupied BW
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
#IF Gain: Low
Center Freq: 2.480000000 GHz
Avg|Hold:>100/100
Radio Std: None
Frequency
Center Frequency
2.480000000 GHz
Settings
Span
4.0000 MHz
CF Step
400.000 kHz
Auto
Man
Freq Offset
0 Hz
1 Graph
Ref Lvl Offset 11.66 dB
Ref Value 30.00 dBm
Mkr1 2.479984000 GHz
7.52 dBm
Scale/Div 10.0 dB
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 2.480000 GHz
#Res BW 43.000 kHz
#Video BW 130.00 kHz
Span 4 MHz
Sweep 2.07 ms (1001 pts)
2 Metrics
Occupied Bandwidth
1.0017 MHz
Total Power
16.0 dBm
Transmit Freq Error
-15.174 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.252 MHz
x dB
-26.00 dB
Jul 22, 2024
2:49:03 PM

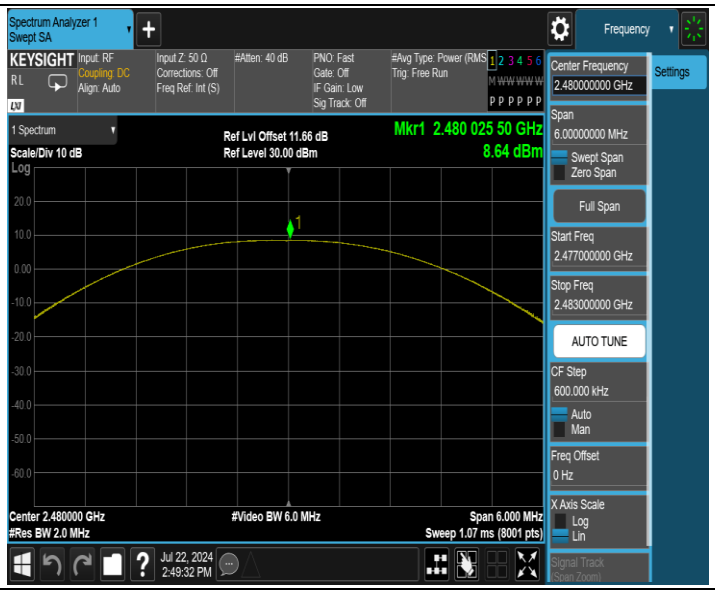
Appendix C: Maximum conducted output power

Test Result Peak

TestMode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
BLE_1M	Ant1	2402	8.37	≤30	11.79	≤36	PASS
		2440	9.10	≤30	12.52	≤36	PASS
		2480	8.64	≤30	12.06	≤36	PASS

Test Graphs Peak

BLE_1M_Ant1_2402

BLE_1M_Ant1_2440

BLE_1M_Ant1_2480


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
#Atten: 40 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 11.66 dB
Ref Level 30.00 dBm
Mkr1 2.480 025 50 GHz
8.64 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 2.480000 GHz
#Res BW 2.0 MHz
#Video BW 6.0 MHz
Span 6.000 MHz
Sweep 1.07 ms (8001 pts)
Jul 22, 2024
2:49:32 PM
Frequency
Settings
Center Frequency
2.480000000 GHz
Span
6.00000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.477000000 GHz
Stop Freq
2.483000000 GHz
AUTO TUNE
CF Step
600.000 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)

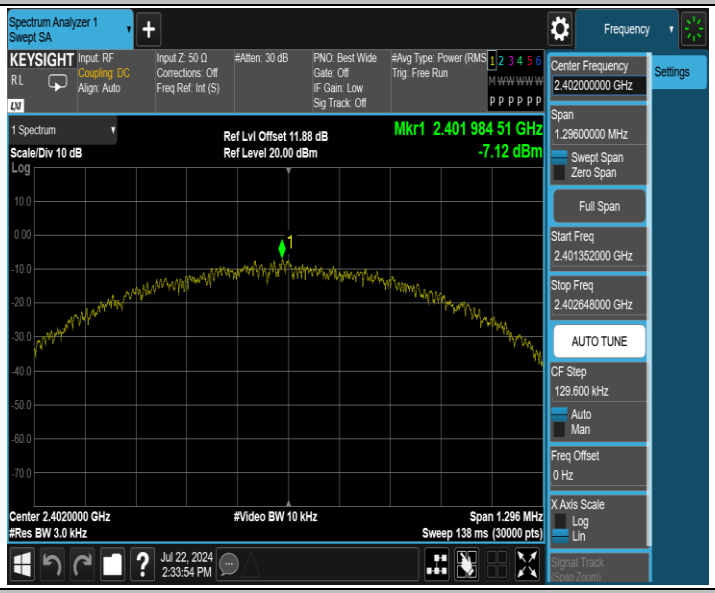
Appendix D: Maximum power spectral density

Test Result

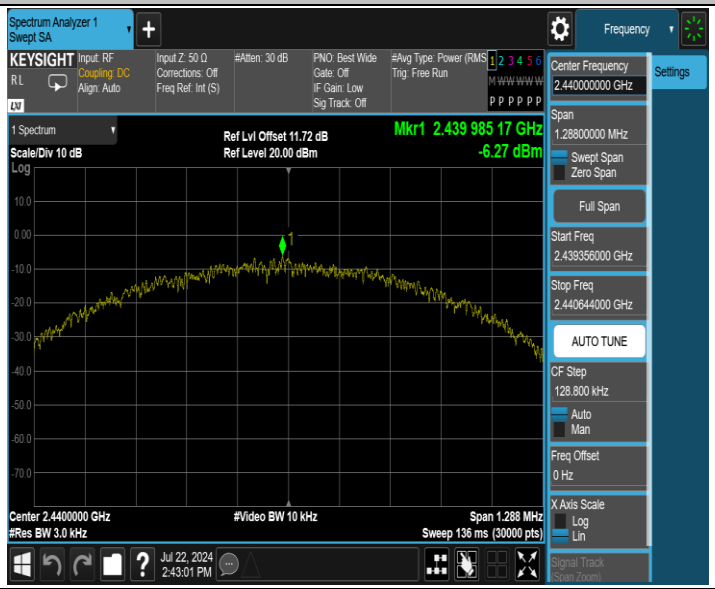
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-7.12	≤8.00	PASS
		2440	-6.27	≤8.00	PASS
		2480	-6.93	≤8.00	PASS

Test Graphs

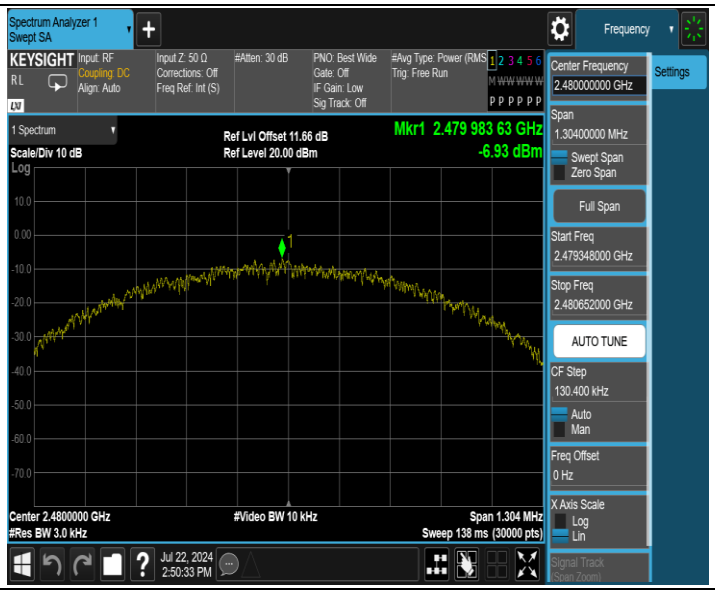
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
#Atten: 30 dB
PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 11.66 dB
Ref Level 20.00 dBm
Mkr1 2.479 983 63 GHz
-6.93 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.4800000 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz
Span 1.304 MHz
Sweep 138 ms (30000 pts)
Jul 22, 2024
2:50:33 PM
Frequency
Settings
Center Frequency
2.480000000 GHz
Span
1.30400000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.479348000 GHz
Stop Freq
2.480652000 GHz
AUTO TUNE
CF Step
130.400 kHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)

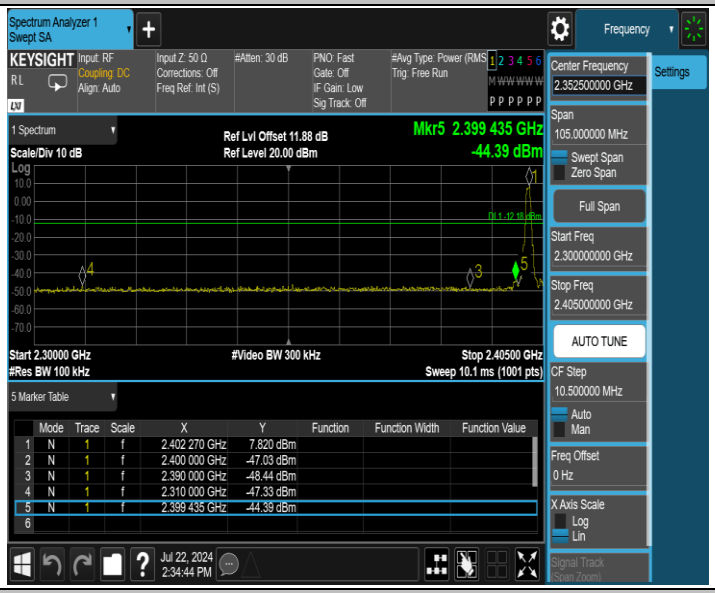
Appendix E: Band edge measurements

Test Result

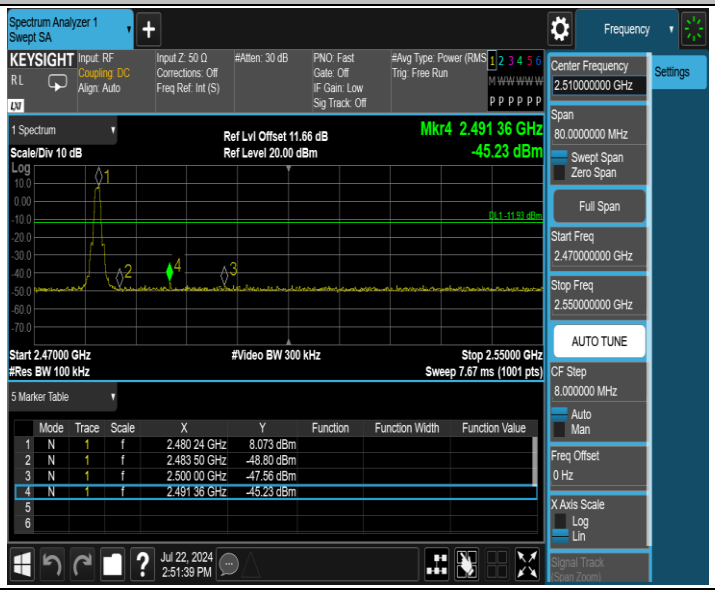
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	7.82	-44.39	≤-12.18	PASS
		High	2480	8.07	-45.24	≤-11.93	PASS

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480

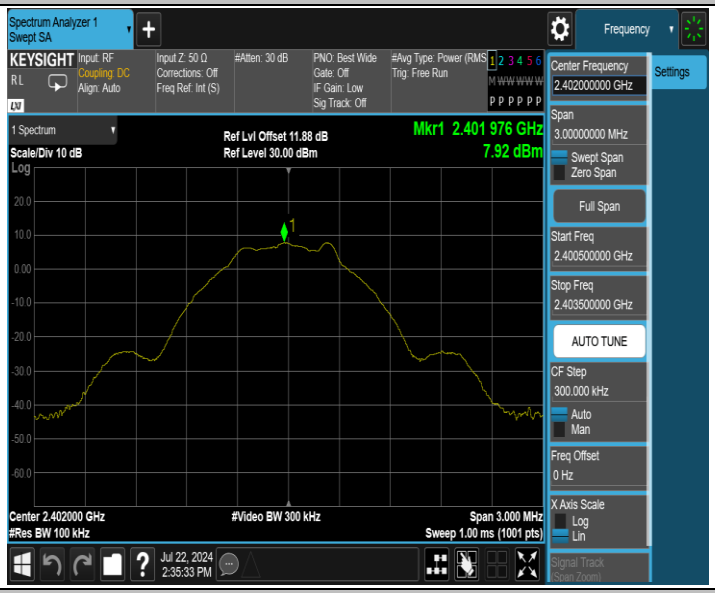
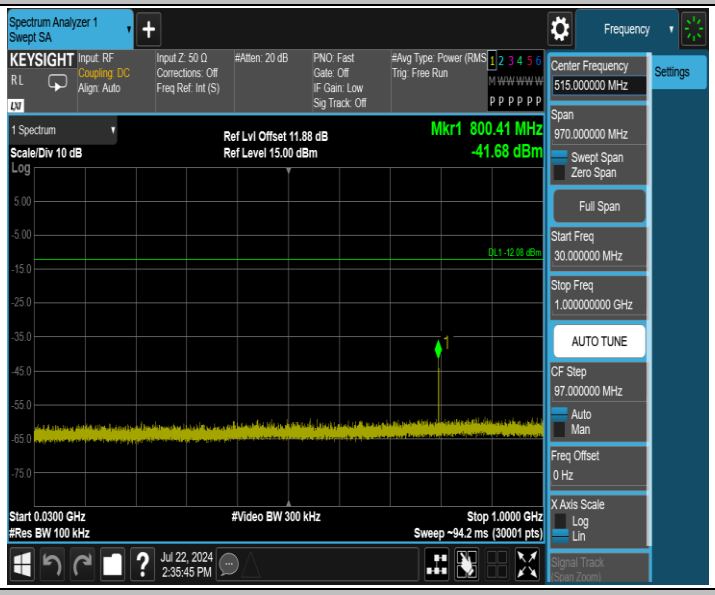


Appendix F: Conducted Spurious Emission

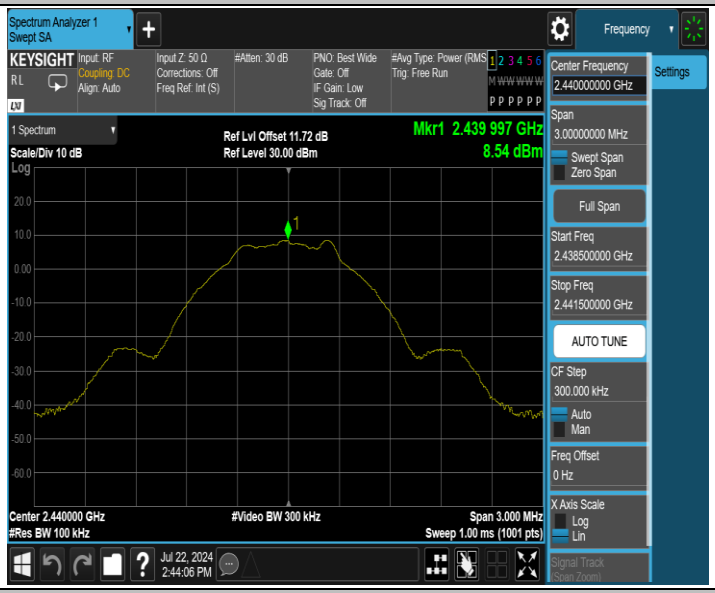
Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	7.92	7.92	---	PASS
			30~1000	7.92	-41.68	≤-12.08	PASS
			1000~26500	7.92	-43.67	≤-12.08	PASS
		2440	Reference	8.54	8.54	---	PASS
			30~1000	8.54	-41.42	≤-11.46	PASS
			1000~26500	8.54	-45.18	≤-11.46	PASS
		2480	Reference	8.12	8.12	---	PASS
			30~1000	8.12	-41.54	≤-11.88	PASS
			1000~26500	8.12	-47.83	≤-11.88	PASS

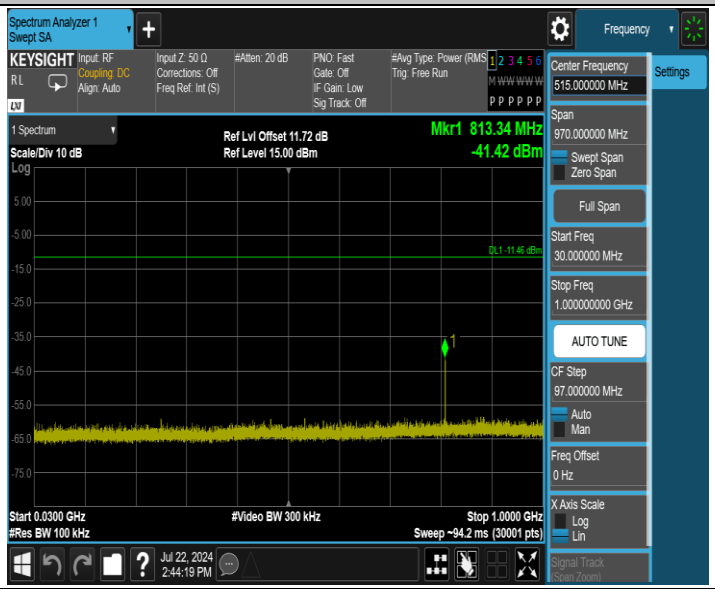
Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000

BLE_1M_Ant1_2402_1000~26500

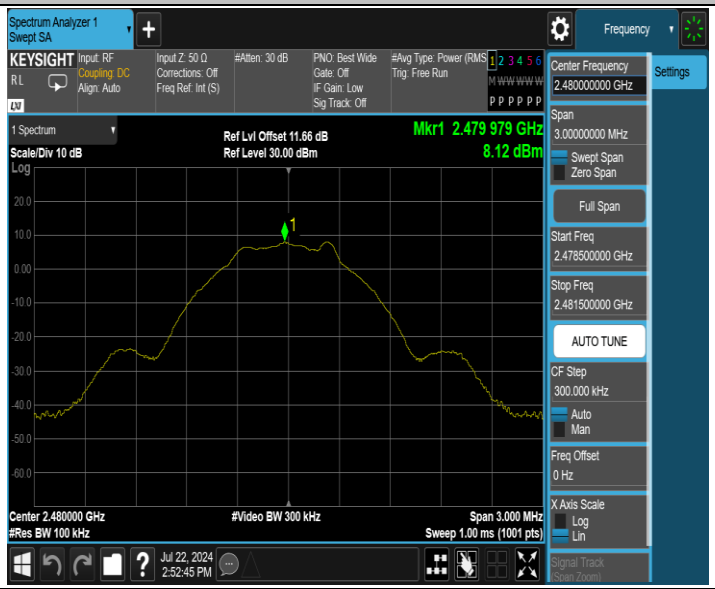
BLE_1M_Ant1_2440_0~Reference

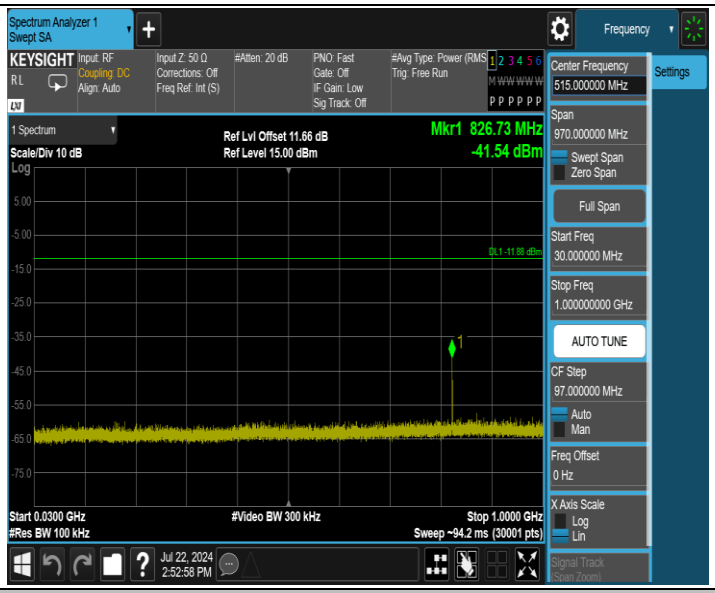


BLE_1M_Ant1_2440_30~1000



BLE_1M_Ant1_2440_1000~26500

BLE_1M_Ant1_2480_0~Reference

BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500

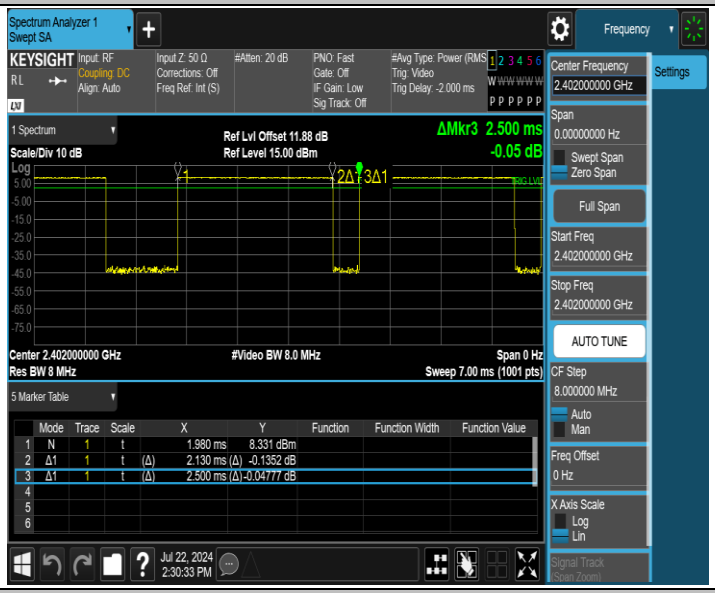
Appendix G: Duty Cycle

Test Result

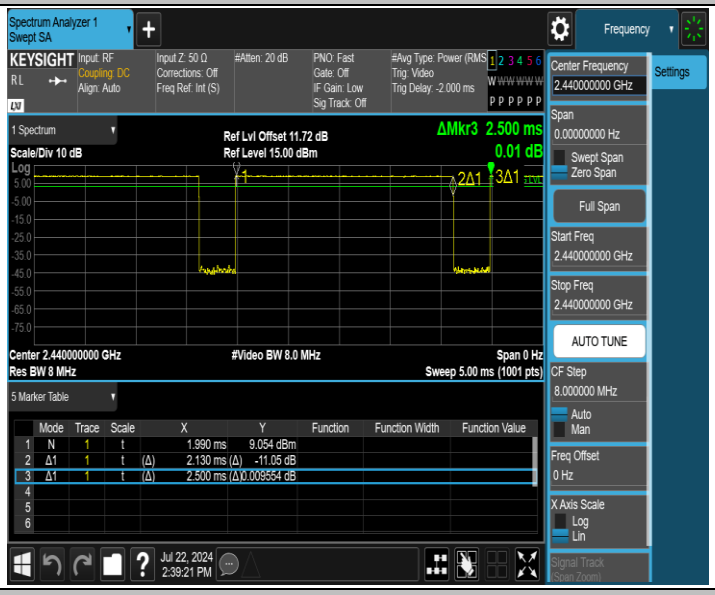
TestMode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	Duty Cycle Factor[dB]
BLE_1M	Ant1	2402	2.13	2.50	85.20	0.70
		2440	2.13	2.50	85.20	0.70
		2480	2.13	2.50	85.20	0.70

Test Graphs

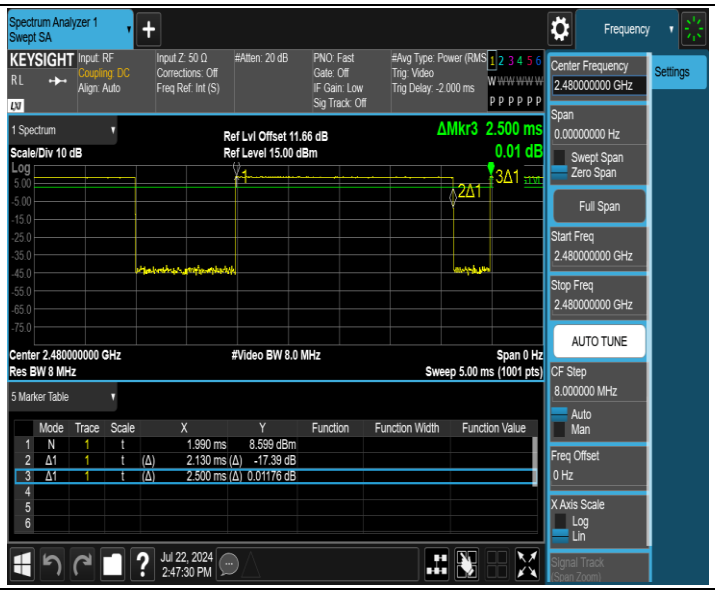
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
#Atten: 20 dB
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
#Avg Type: Power (RMS)
Trig: Video
Trig Delay: -2.000 ms
1 Spectrum
Ref Lvl Offset 11.66 dB
Ref Level 15.00 dBm
ΔMkr3 2.500 ms
0.01 dB
Scale/Div 10 dB
Log
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Center 2.480000000 GHz
Res BW 8 MHz
#Video BW 8.0 MHz
Span 0 Hz
Sweep 5.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 t 1.990 ms 8.599 dBm
2 Δ1 1 t (Δ) 2.130 ms (Δ) -17.39 dB
3 Δ1 1 t (Δ) 2.500 ms (Δ) 0.01176 dB
4
5
6
Jul 22, 2024
2:47:30 PM
Frequency
Settings
Center Frequency
2.480000000 GHz
Span
0.00000000 Hz
Swept Span
Zero Span
Full Span
Start Freq
2.480000000 GHz
Stop Freq
2.480000000 GHz
AUTO TUNE
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)

Appendix H: Emissions in Restricted Bands

Test Result

Mode:	BLE 1M-2402

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2310	48.30	8.10	74.00	25.70	150	11	Vertical	PASS
2	2321.92	49.39	8.11	74.00	24.61	150	108	Vertical	PASS
3	2333.36	49.49	8.14	74.00	24.51	150	61	Vertical	PASS
4	2344.08	49.26	8.15	74.00	24.74	150	319	Vertical	PASS
5	2371.84	49.28	8.35	74.00	24.72	150	46	Vertical	PASS
6	2390	48.70	8.50	74.00	25.30	150	99	Vertical	PASS

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2310	49.66	8.10	74.00	24.34	150	13	Horizontal	PASS
2	2318.4	50.37	8.11	74.00	23.63	150	111	Horizontal	PASS
3	2337.28	49.95	8.14	74.00	24.05	150	97	Horizontal	PASS
4	2348.24	50.33	8.16	74.00	23.67	150	341	Horizontal	PASS
5	2366.56	50.09	8.31	74.00	23.91	150	97	Horizontal	PASS
6	2390	49.63	8.50	74.00	24.37	150	216	Horizontal	PASS

Mode:	BLE 1M-2480

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2483.5	49.02	9.16	74.00	24.98	150	125	Vertical	PASS
2	2488.49	51.25	9.19	74.00	22.75	150	170	Vertical	PASS
3	2489.98	52.29	9.21	74.00	21.71	150	7	Vertical	PASS
4	2494.09	50.61	9.24	74.00	23.39	150	104	Vertical	PASS
5	2497.55	50.53	9.25	74.00	23.47	150	211	Vertical	PASS
6	2500	50.39	9.27	74.00	23.61	150	26	Vertical	PASS

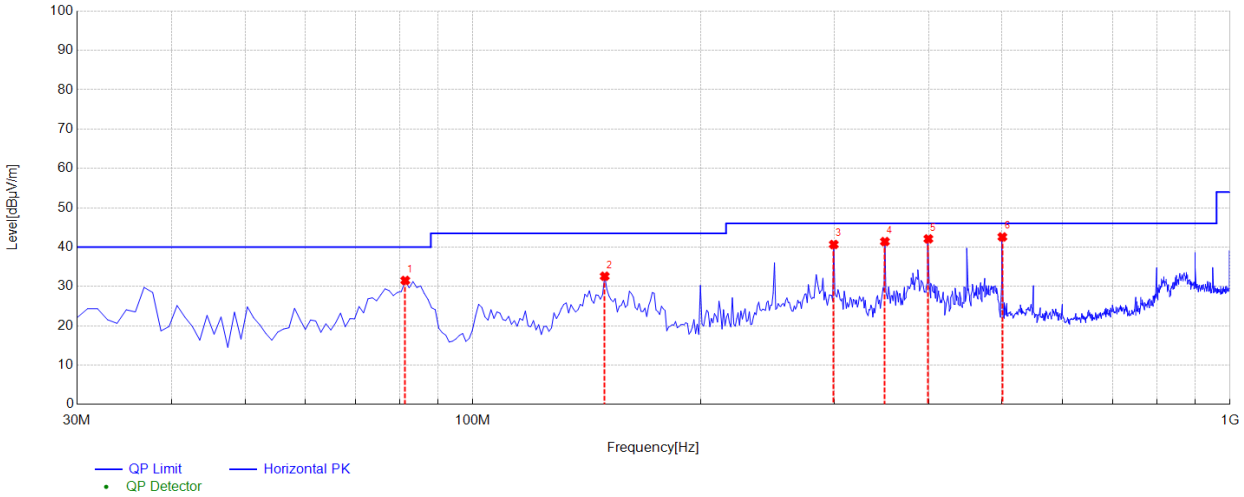
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2483.5	51.92	9.16	74.00	22.08	150	17	Horizontal	PASS
2	2483.83	54.83	9.17	74.00	19.17	150	348	Horizontal	PASS
3	2484.16	53.71	9.17	74.00	20.29	150	201	Horizontal	PASS
4	2487.37	51.99	9.19	74.00	22.01	150	0	Horizontal	PASS
5	2492.80	51.46	9.22	74.00	22.54	150	3	Horizontal	PASS
6	2500	50.26	9.27	74.00	23.74	150	5	Horizontal	PASS

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	2483.83	48.77	9.17	54.00	5.23	150	348	Horizontal	PASS

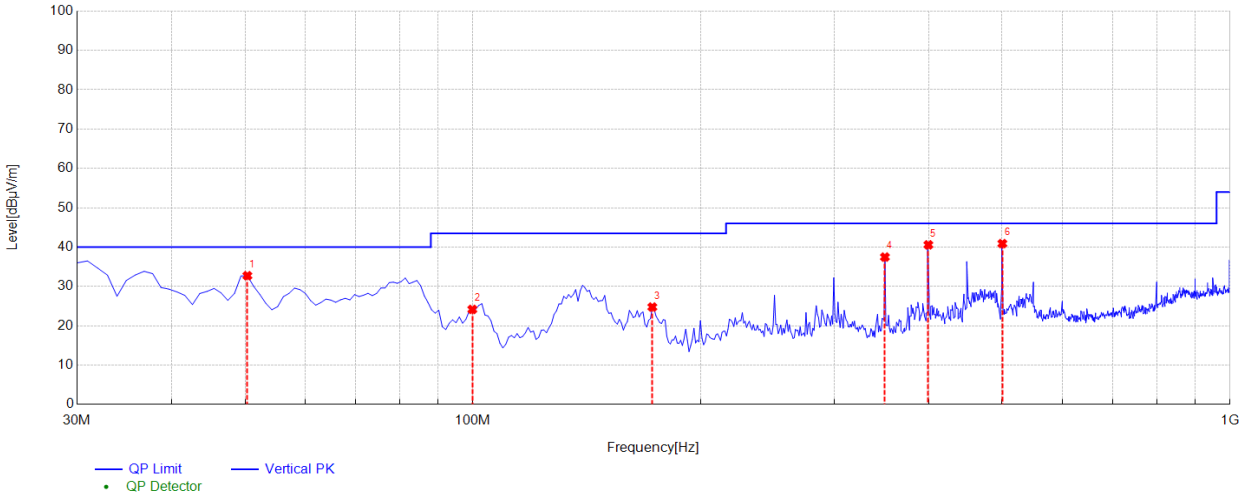
Note：

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



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	81.4100	31.53	-20.32	40.00	8.47	100	12	Horizontal	PASS
2	149.310	32.60	-16.38	43.50	10.90	100	192	Horizontal	PASS
3	299.660	40.67	-16.17	46.00	5.33	100	234	Horizontal	PASS
4	350.100	41.41	-14.60	46.00	4.59	100	29	Horizontal	PASS
5	399.570	42.10	-12.91	46.00	3.90	100	48	Horizontal	PASS
6	500.450	42.59	-10.89	46.00	3.41	100	12	Horizontal	PASS



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	50.3700	32.74	-15.98	40.00	7.26	100	212	Vertical	PASS
2	99.8400	24.17	-19.35	43.50	19.33	100	337	Vertical	PASS
3	172.590	24.77	-17.64	43.50	18.73	100	345	Vertical	PASS
4	350.100	37.47	-14.60	46.00	8.53	100	348	Vertical	PASS
5	399.570	40.58	-12.91	46.00	5.42	100	131	Vertical	PASS
6	500.450	40.90	-10.89	46.00	5.10	100	348	Vertical	PASS

Mode:	BLE 1M-2402

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1100	45.30	1.25	74.00	28.70	150	360	Vertical	PASS
2	1914	45.64	5.67	74.00	28.36	150	169	Vertical	PASS
3	3891	42.55	-16.67	74.00	31.45	150	324	Vertical	PASS
4	5205	45.29	-14.01	74.00	28.71	150	55	Vertical	PASS
5	6027	44.77	-12.77	74.00	29.23	150	99	Vertical	PASS
6	11391	48.06	-5.58	74.00	25.94	150	116	Vertical	PASS

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1200	43.57	2.14	74.00	30.43	150	195	Horizontal	PASS
2	2022	45.55	5.96	74.00	28.45	150	262	Horizontal	PASS
3	3204	46.15	-18.16	74.00	27.85	150	31	Horizontal	PASS
4	6765	44.46	-12.09	74.00	29.54	150	119	Horizontal	PASS
5	10173	46.61	-7.34	74.00	27.39	150	91	Horizontal	PASS
6	14355	49.61	-0.77	74.00	24.39	150	101	Horizontal	PASS

Mode:	BLE 1M-2440

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1100	43.35	1.25	74.00	30.65	150	355	Vertical	PASS
2	2208	45.96	6.52	74.00	28.04	150	63	Vertical	PASS
3	4746	42.94	-14.52	74.00	31.06	150	39	Vertical	PASS
4	6036	43.62	-12.94	74.00	30.38	150	78	Vertical	PASS
5	9198	45.49	-8.71	74.00	28.51	150	39	Vertical	PASS
6	13182	48.88	-2.44	74.00	25.12	150	235	Vertical	PASS

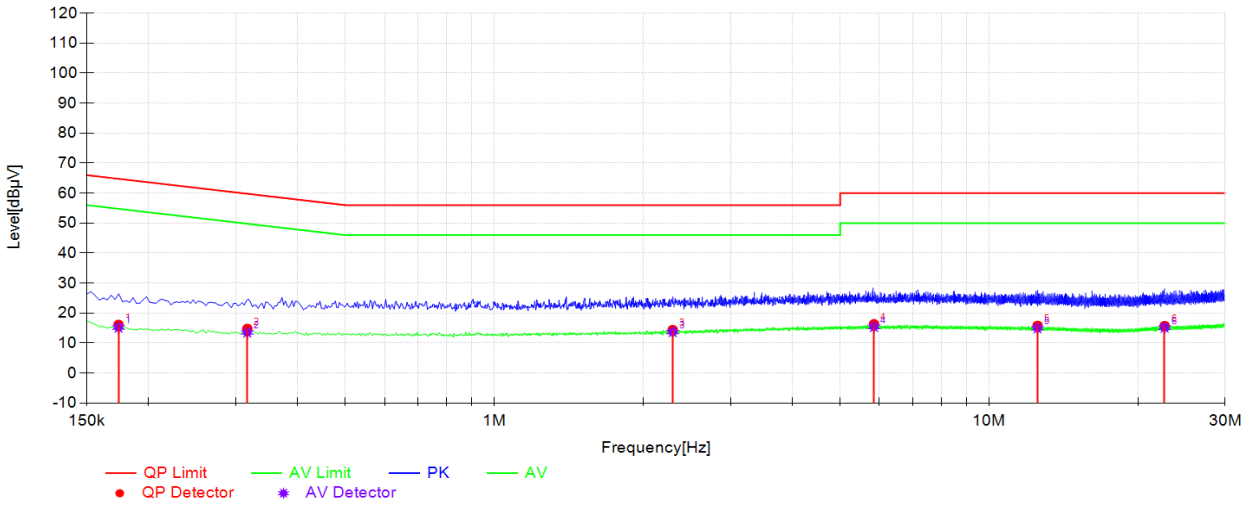
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1200	43.14	2.14	74.00	30.86	150	266	Horizontal	PASS
2	1912	46.13	5.67	74.00	27.87	150	266	Horizontal	PASS
3	3252	44.93	-18.46	74.00	29.07	150	208	Horizontal	PASS
4	5205	43.50	-14.01	74.00	30.50	150	110	Horizontal	PASS
5	9579	46.14	-8.48	74.00	27.86	150	75	Horizontal	PASS
6	14352	49.28	-0.74	74.00	24.72	150	122	Horizontal	PASS

Mode:	BLE 1M-2480

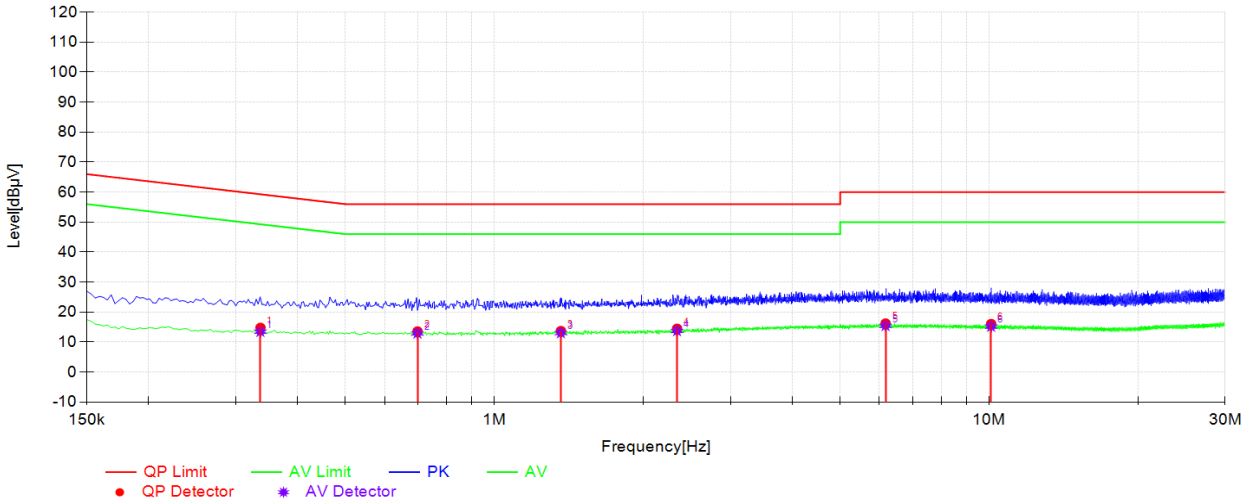
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1100	43.97	1.25	74.00	30.03	150	352	Vertical	PASS
2	1250	42.78	2.18	74.00	31.22	150	246	Vertical	PASS
3	4755	44.44	-14.48	74.00	29.56	150	188	Vertical	PASS
4	6453	44.13	-12.54	74.00	29.87	150	350	Vertical	PASS
5	8880	45.20	-10.10	74.00	28.80	150	174	Vertical	PASS
6	13554	48.80	-2.26	74.00	25.20	150	69	Vertical	PASS

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Verdict
1	1200	44.31	2.14	74.00	29.69	150	270	Horizontal	PASS
2	1906	46.66	5.68	74.00	27.34	150	328	Horizontal	PASS
3	3306	44.43	-18.18	74.00	29.57	150	356	Horizontal	PASS
4	5283	43.43	-13.87	74.00	30.57	150	185	Horizontal	PASS
5	10005	46.96	-7.59	74.00	27.04	150	295	Horizontal	PASS
6	12777	47.88	-3.73	74.00	26.12	150	248	Horizontal	PASS

Appendix J: Conducted emission AC power port



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]	Type	Verdict
1	0.1738	10.25	16.21	64.78	48.57	15.16	54.78	39.62	L1	PASS
2	0.3165	10.25	14.86	59.80	44.94	13.54	49.80	36.26	L1	PASS
3	2.2930	10.28	14.46	56.00	41.54	13.67	46.00	32.33	L1	PASS
4	5.8529	10.37	16.41	60.00	43.59	15.38	50.00	34.62	L1	PASS
5	12.5302	10.50	15.87	60.00	44.13	14.94	50.00	35.06	L1	PASS
6	22.6422	10.64	15.80	60.00	44.20	15.12	50.00	34.88	L1	PASS



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]	Type	Verdict
1	0.3365	10.25	14.85	59.29	44.44	13.47	49.29	35.82	N	PASS
2	0.6990	10.26	13.64	56.00	42.36	12.89	46.00	33.11	N	PASS
3	1.3627	10.27	13.78	56.00	42.22	13.02	46.00	32.98	N	PASS
4	2.3401	10.30	14.55	56.00	41.45	13.71	46.00	32.29	N	PASS
5	6.1764	10.41	16.28	60.00	43.72	15.41	50.00	34.59	N	PASS
6	10.0951	10.44	16.14	60.00	43.86	15.17	50.00	34.83	N	PASS