

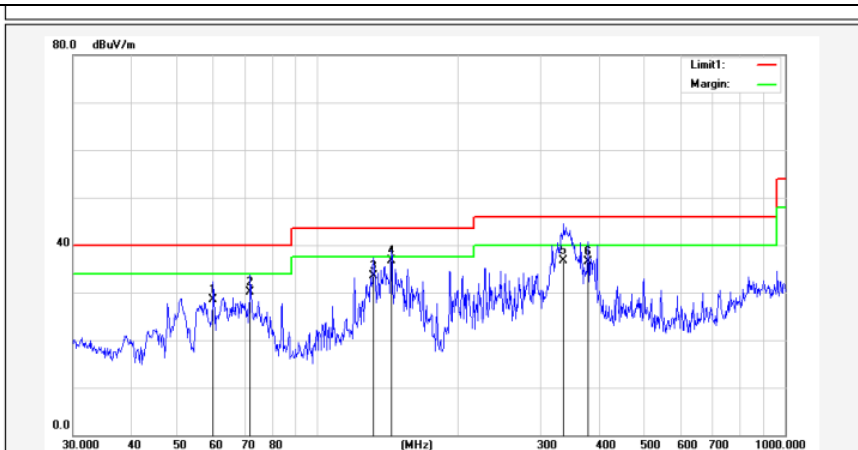
Appendix A: Test Results of BLE

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Appendix A.1 Test Results of Radiated Spurious Emission

All modes have been tested, and the report only reflects the worst mode

Below 1GHz:

Test Mode:		Mode 2(worst mode)							
Horizontal									
 The graph shows the radiated spurious emission for the horizontal mode. The y-axis represents the reading in dBuV/m, ranging from 0.0 to 80.0. The x-axis represents the frequency in MHz, ranging from 30.000 to 1000.000. A red line indicates the limit, and a green line indicates the margin. The blue line represents the measured signal. Several peaks are identified and numbered 1 through 6.									
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	59.8588	47.20	-18.78	28.42	40.00	-11.58			QP
2	71.8320	48.73	-18.67	30.06	40.00	-9.94			QP
3	131.7575	45.64	-12.11	33.53	43.50	-9.97			QP
4*	143.9957	49.64	-12.87	36.77	43.50	-6.73			QP
5	336.1340	47.02	-10.37	36.65	46.00	-9.35			QP
6	378.5842	45.82	-9.24	36.58	46.00	-9.42			QP

Vertical									
The graph shows the radiated spurious emission for the vertical mode. The y-axis represents the reading in dBuV/m, ranging from 0.0 to 80.0. The x-axis represents the frequency in MHz, ranging from 30.000 to 1000.000. A red line indicates the limit, and a green line indicates the margin. The blue line represents the measured signal. Several peaks are identified and numbered 1 through 6.									
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	47.9940	48.10	-17.83	30.27	40.00	-9.73			QP
2	51.1208	46.51	-18.70	27.81	40.00	-12.19			QP
3	56.5930	45.28	-18.94	26.34	40.00	-13.66			QP
4	172.5988	44.29	-13.70	30.59	43.50	-12.91			QP
5	336.0351	45.68	-10.37	35.31	46.00	-10.69			QP
6*	499.4246	41.91	-5.62	36.29	46.00	-9.71			QP

Above 1GHz:

All modes have been tested, and the report only reflects the worst mode(1Mbps)

GFSK-Low Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3992	57.98	-15.01	42.97	74	-31.03	peak
2	3992	45.69	-15.01	30.68	54	-23.32	AVG
3	4808	62.53	-13.33	49.2	74	-24.8	peak
4	4808	56.06	-13.33	42.73	54	-11.27	AVG
5	6134	56.87	-9.98	46.89	74	-27.11	peak
6	6134	43.7	-9.98	33.72	54	-20.28	AVG
7	7188	56.33	-8.03	48.3	74	-25.7	peak
8	7188	35.75	-8.03	27.72	54	-26.28	AVG
9	7494	55.13	-7.13	48	74	-26	peak
10	7494	37.24	-7.13	30.11	54	-23.89	AVG
11	9976	54.95	-4.98	49.97	74	-24.03	peak
12	9976	34.5	-4.98	29.52	54	-24.48	AVG

GFSK-Low Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3992	60.79	-15.01	45.78	74	-28.22	peak
2	3992	48.52	-15.01	33.51	54	-20.49	AVG
3	4808	57.97	-13.33	44.64	74	-29.36	peak
4	4808	50.75	-13.33	37.42	54	-16.58	AVG
5	5964	56.58	-10.23	46.35	74	-27.65	peak
6	5964	44.08	-10.23	33.85	54	-20.15	AVG
7	6950	55.49	-8.79	46.7	74	-27.3	peak
8	6950	42.4	-8.79	33.61	54	-20.39	AVG
9	7392	54.75	-7.13	47.62	74	-26.38	peak
10	7392	38.32	-7.13	31.19	54	-22.81	AVG
11	8378	54.98	-7.1	47.88	74	-26.12	peak
12	8378	39.14	-7.1	32.04	54	-21.96	AVG

GFSK- Middle Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2360	68.03	-21.16	46.87	74	-27.13	peak
2	2360	59.33	-21.16	38.17	54	-15.83	AVG
3	2496	64.99	-20.92	44.07	74	-29.93	peak
4	2496	57.76	-20.92	36.84	54	-17.16	AVG
5	4876	60.27	-13	47.27	74	-26.73	peak
6	4876	53.72	-13	40.72	54	-13.28	AVG
7	6882	55.38	-8.82	46.56	74	-27.44	peak
8	6882	41.58	-8.82	32.76	54	-21.24	AVG
9	7596	55.47	-7.26	48.21	74	-25.79	peak
10	7596	38.17	-7.26	30.91	54	-23.09	AVG
11	8310	55.21	-7.28	47.93	74	-26.07	peak
12	8310	42.22	-7.28	34.94	54	-19.06	AVG

GFSK-Middle Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3958	58.35	-15.09	43.26	74	-30.74	peak
2	3958	48.17	-15.09	33.08	54	-20.92	AVG
3	4876	58.06	-13	45.06	74	-28.94	peak
4	4876	52.63	-13	39.63	54	-14.37	AVG
5	6508	55.85	-10.16	45.69	74	-28.31	peak
6	6508	43.72	-10.16	33.56	54	-20.44	AVG
7	7494	55.52	-7.13	48.39	74	-25.61	peak
8	7494	41.22	-7.13	34.09	54	-19.91	AVG
9	8446	54.95	-7.38	47.57	74	-26.43	peak
10	8446	42.23	-7.38	34.85	54	-19.15	AVG
11	9908	53.75	-5.28	48.47	74	-25.53	peak
12	9908	37.31	-5.28	32.03	54	-21.97	AVG

GFSK-High Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3992	58.82	-15.01	43.81	74	-30.19	peak
2	3992	48.94	-15.01	33.93	54	-20.07	AVG
3	4944	63.11	-12.85	50.26	74	-23.74	peak
4	4944	53.6	-12.85	40.75	54	-13.25	AVG
5	6066	56.18	-10.07	46.11	74	-27.89	peak
6	6066	44.33	-10.07	34.26	54	-19.74	AVG
7	6916	56.11	-8.8	47.31	74	-26.69	peak
8	6916	41.95	-8.8	33.15	54	-20.85	AVG
9	7494	54.68	-7.13	47.55	74	-26.45	peak
10	7494	40.77	-7.13	33.64	54	-20.36	AVG
11	8412	55.59	-7.14	48.45	74	-25.55	peak
12	8412	39.86	-7.14	32.72	54	-21.28	AVG

GFSK-High Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3958	58.39	-15.09	43.3	74	-30.7	peak
2	3958	49.6	-15.09	34.51	54	-19.49	AVG
3	4944	59.04	-12.85	46.19	74	-27.81	peak
4	4944	51.61	-12.85	38.76	54	-15.24	AVG
5	5522	57.08	-12.1	44.98	74	-29.02	peak
6	5522	44.41	-12.1	32.31	54	-21.69	AVG
7	5998	56.47	-10.12	46.35	74	-27.65	peak
8	5998	43.79	-10.12	33.67	54	-20.33	AVG
9	7426	55.61	-7.09	48.52	74	-25.48	peak
10	7426	37.72	-7.09	30.63	54	-23.37	AVG
11	9772	55.79	-6.07	49.72	74	-24.28	peak
12	9772	40.41	-6.07	34.34	54	-19.66	AVG

Node:

- 1、 Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported..
- 2、 Radiated emissions measured in frequency above 1GHz were made with an instrument using peak/average detector mode.
- 3、 Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
- 4、 Margin (dB), result in dBuV/m – limit in dBuV/m.

Restricted band Requirements

GFSK Low

All modes have been tested, and the report only reflects the worst mode(1Mbps)

Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.06	75.33	-21.15	54.18	74	-19.82	peak
2	2362.06	67.4	-21.15	46.25	54	-7.75	AVG
3	2390	58.8	-21.03	37.77	74	-36.23	peak
4	2390	51.5	-21.03	30.47	54	-23.53	AVG

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2362.06	64.39	-21.15	43.24	74	-30.76	peak
2	2362.06	53.93	-21.15	32.78	54	-21.22	AVG
3	2390	61.5	-21.03	40.47	74	-33.53	peak
4	2390	55.12	-21.03	34.09	54	-19.91	AVG

GFSK-High

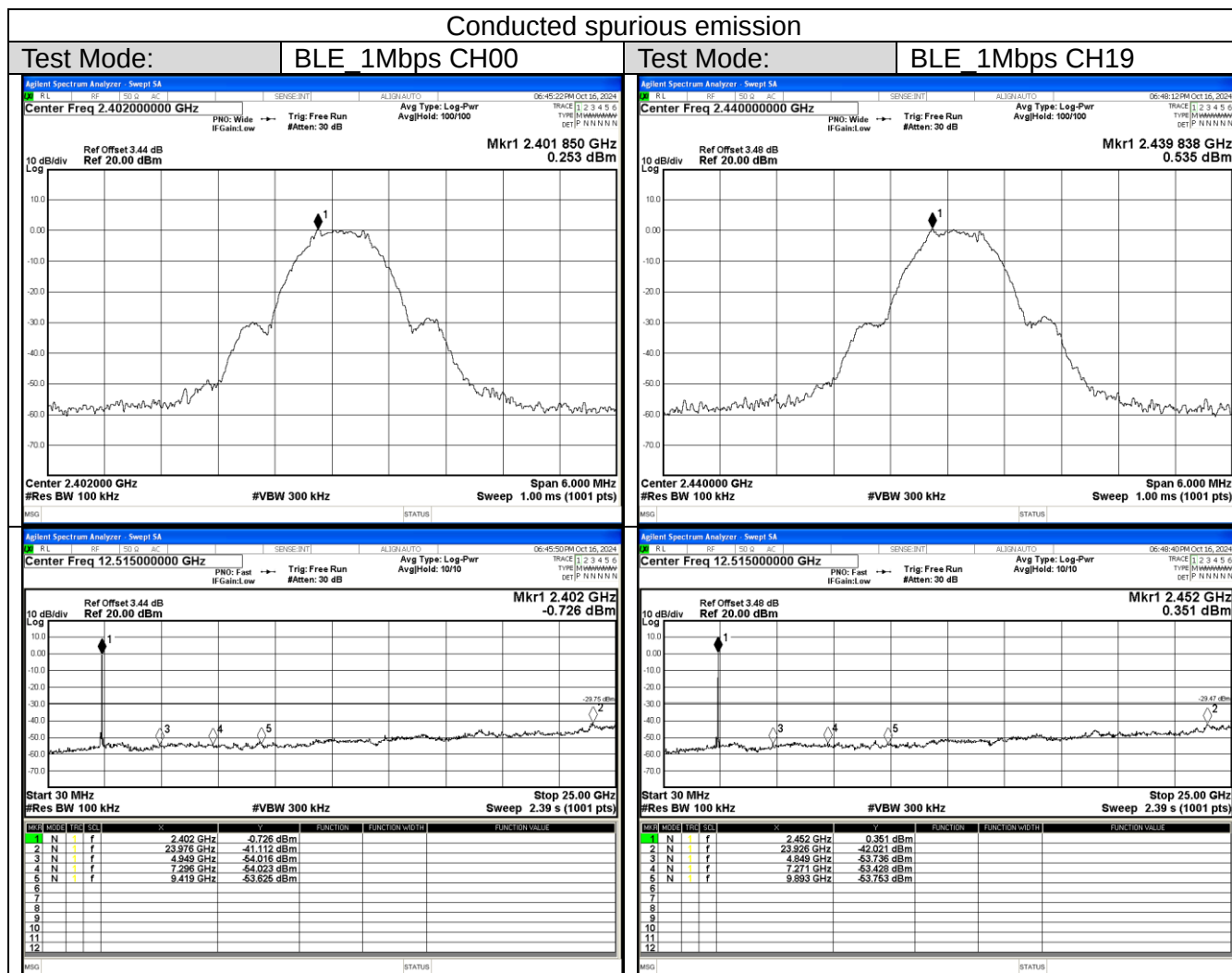
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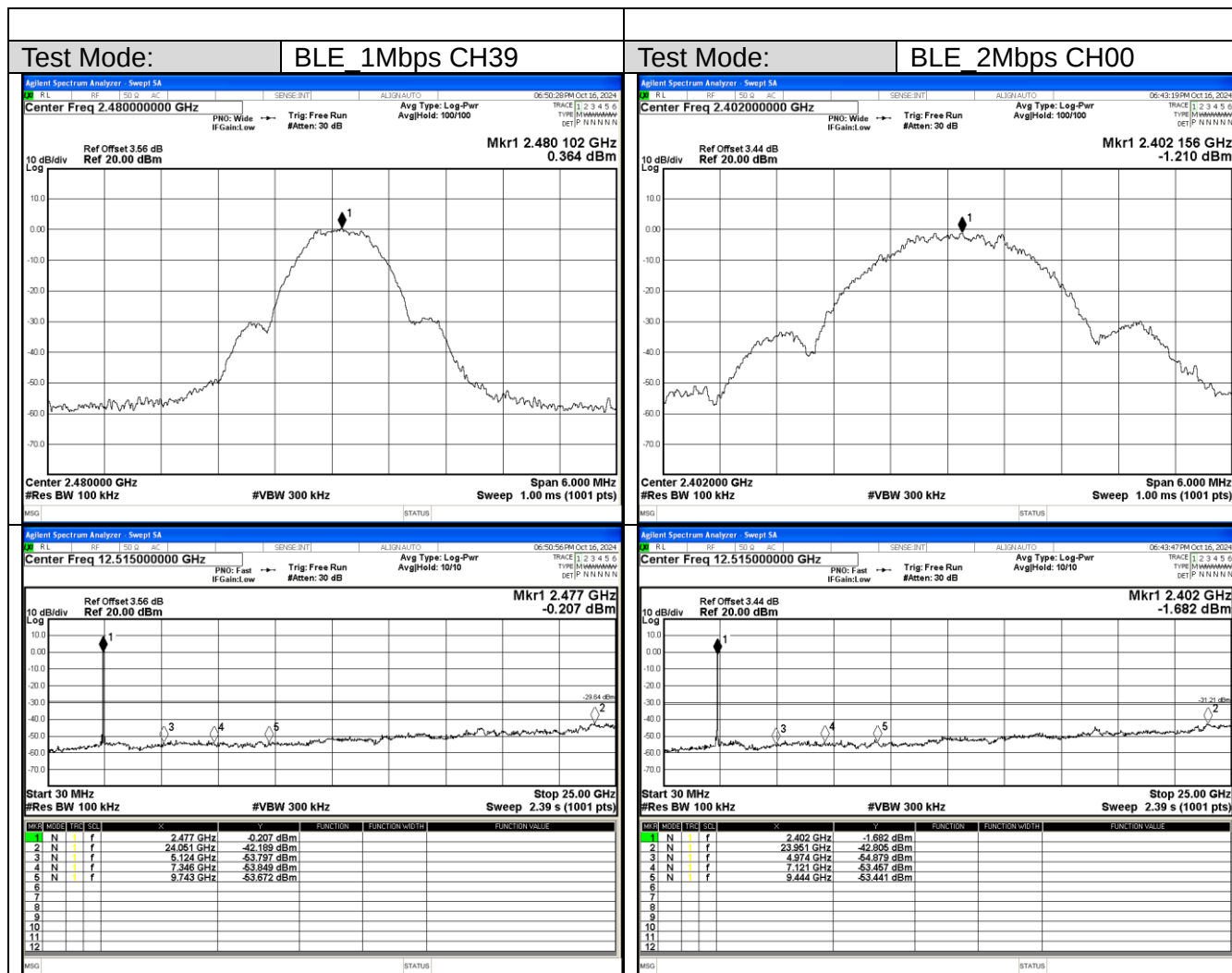
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5	62	-20.91	41.09	74	-32.91	peak
2	2483.5	53.58	-20.91	32.67	54	-21.33	AVG
3	2492.85	63.74	-20.92	42.82	74	-31.18	peak
4	2492.85	51.11	-20.92	30.19	54	-23.81	AVG

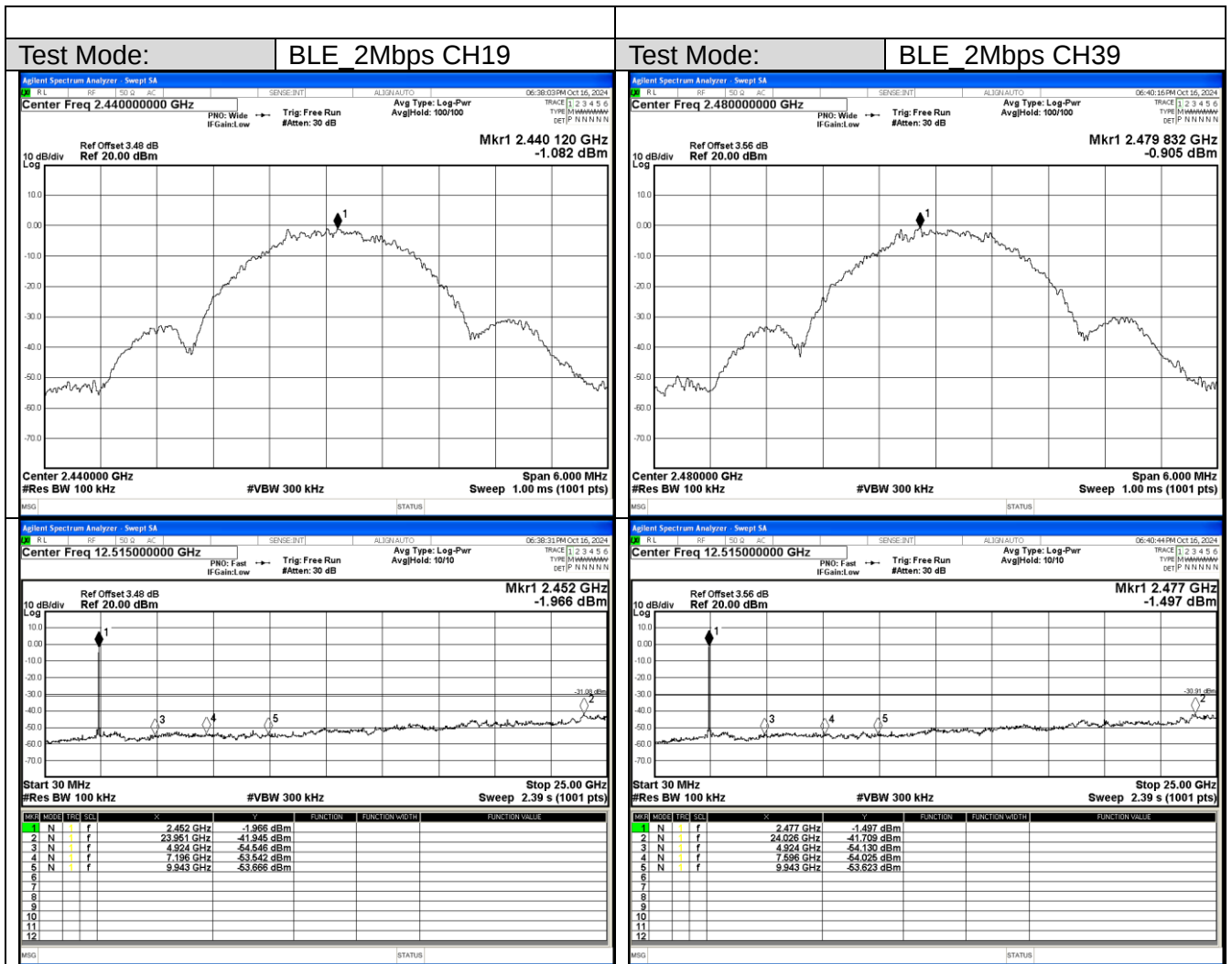
Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5	61.4	-20.91	40.49	74	-33.51	peak
2	2483.5	52.92	-20.91	32.01	54	-21.99	AVG
3	2490.25	69.12	-20.92	48.2	74	-25.8	peak
4	2490.25	54.57	-20.92	33.65	54	-20.35	AVG

Appendix A.2 Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

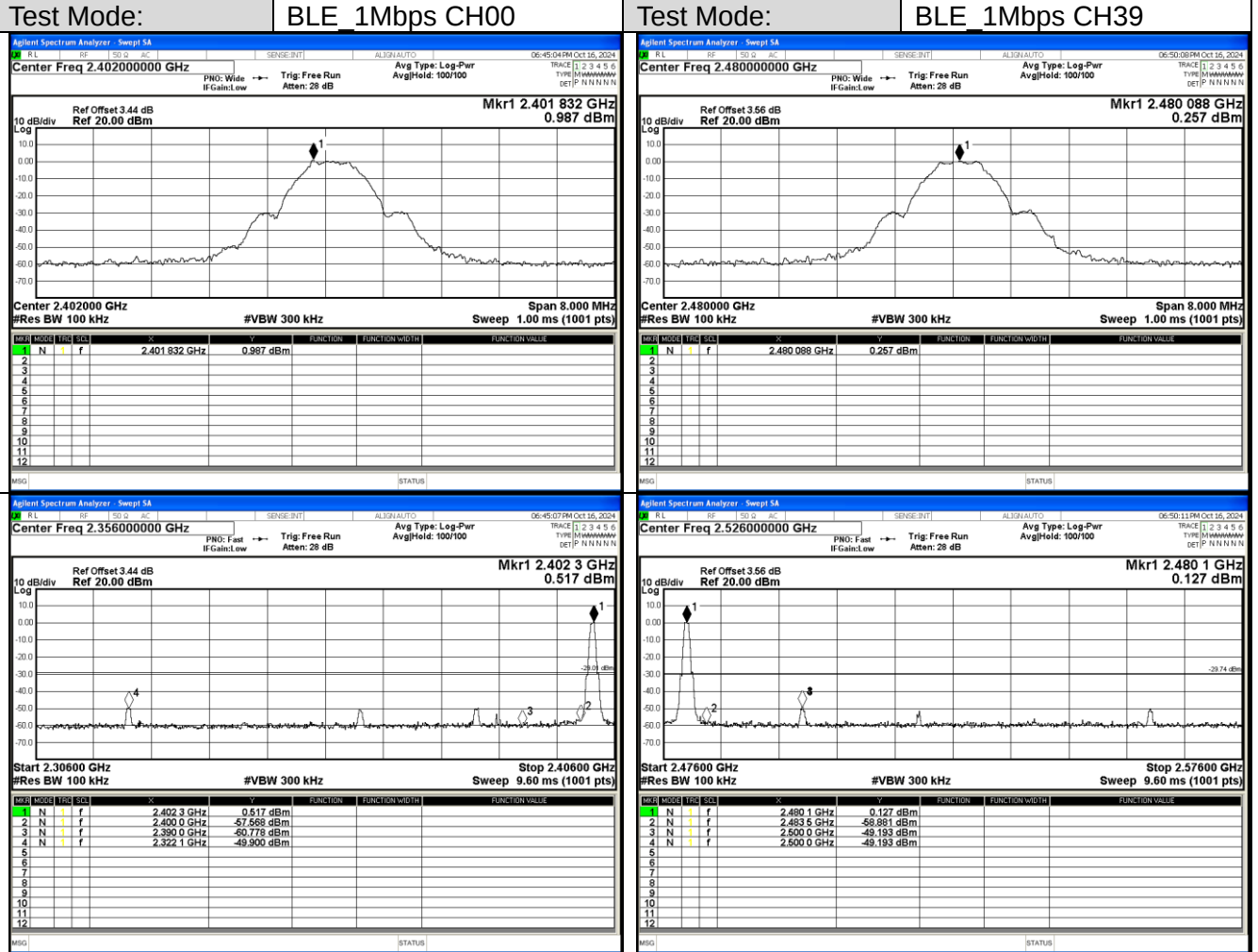


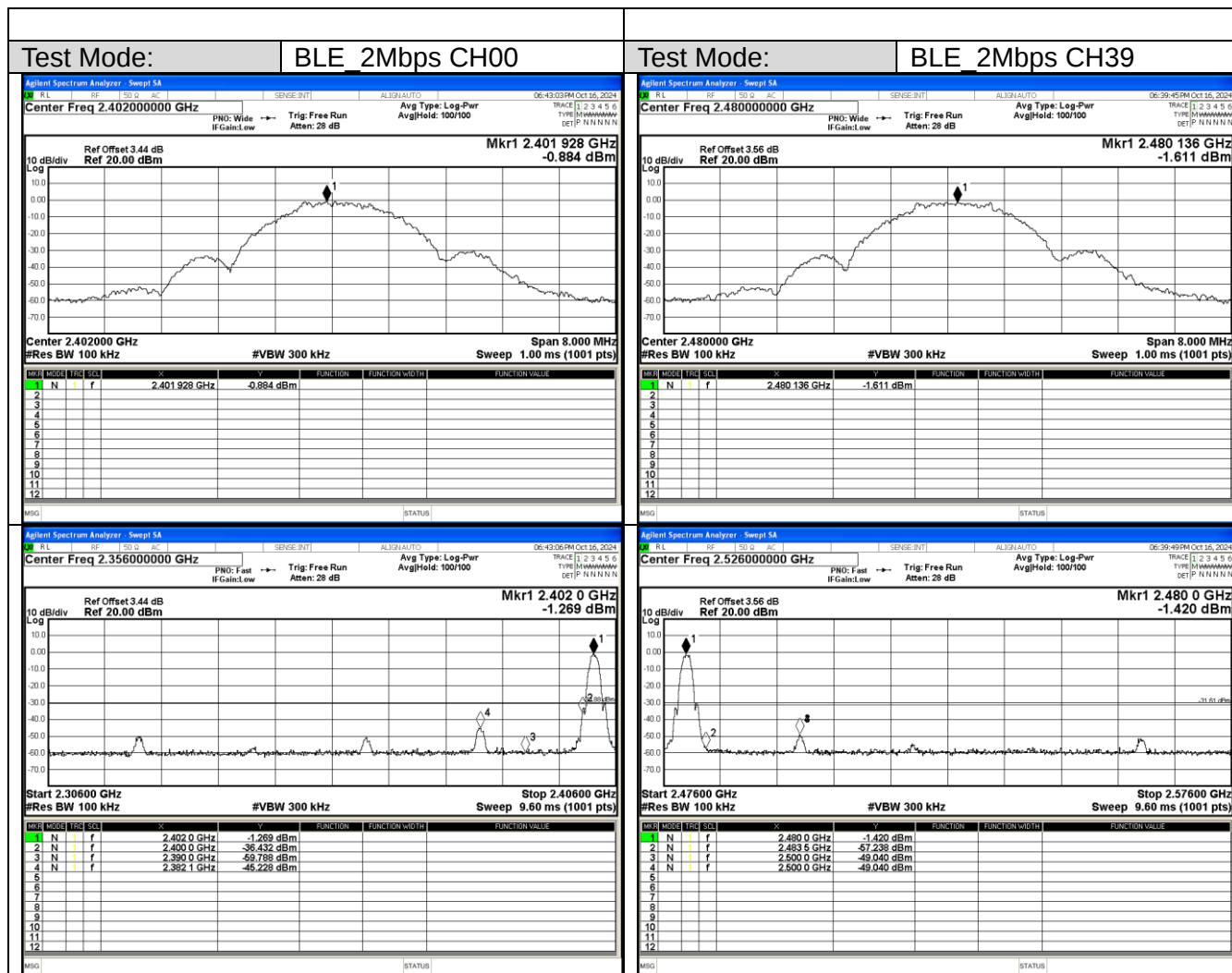






For Band edge(it's also the reference level for conducted spurious emission)

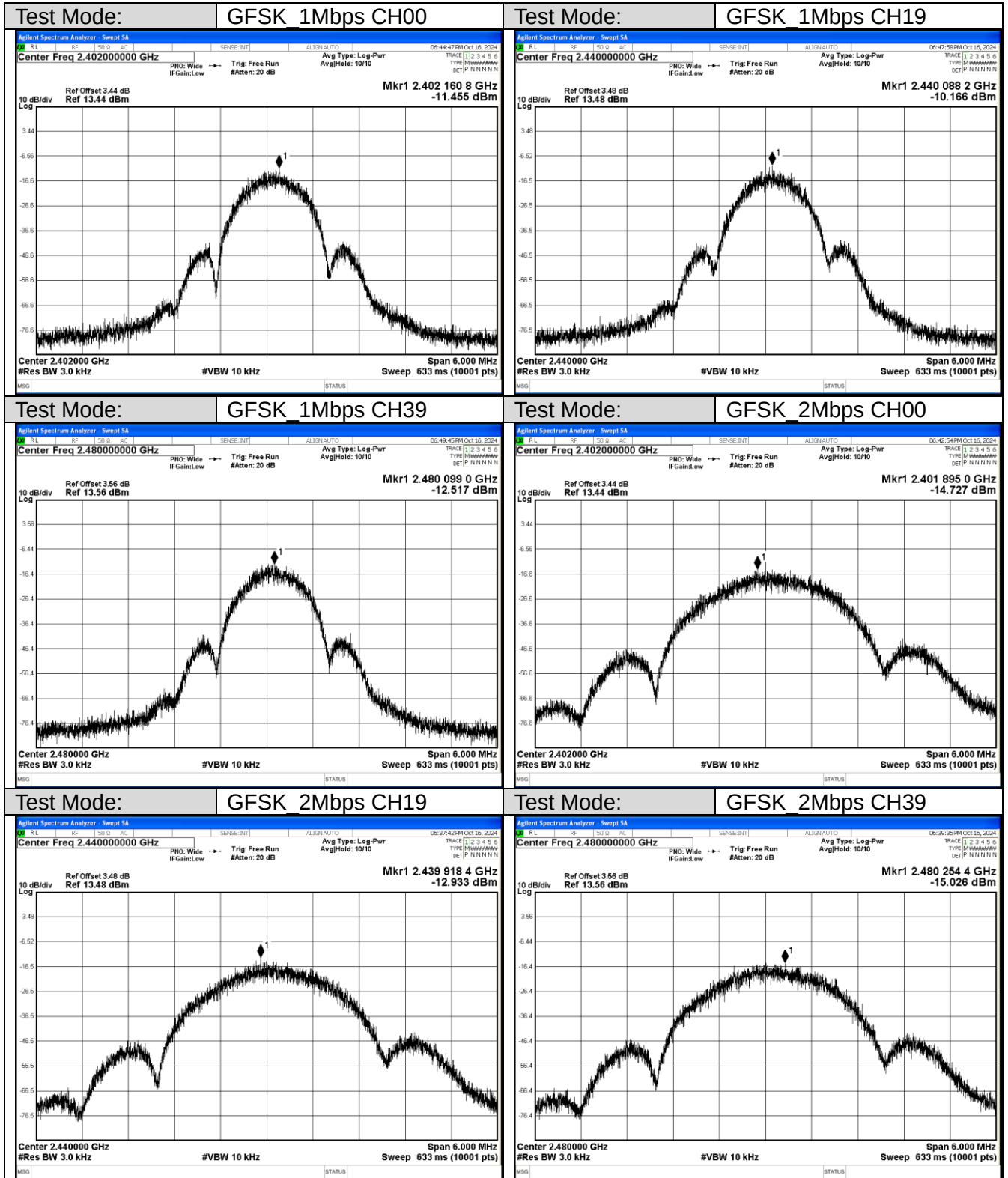




Appendix A.3 Test Results of Conducted Power Spectral Density

GFSK_1Mbps			
Frequency	Power Density	Limit (dBm/3KHz)	Result
	(dBm/3kHz)		
CH00	-11.455	8	Pass
CH19	-10.166	8	Pass
CH39	-12.517	8	Pass

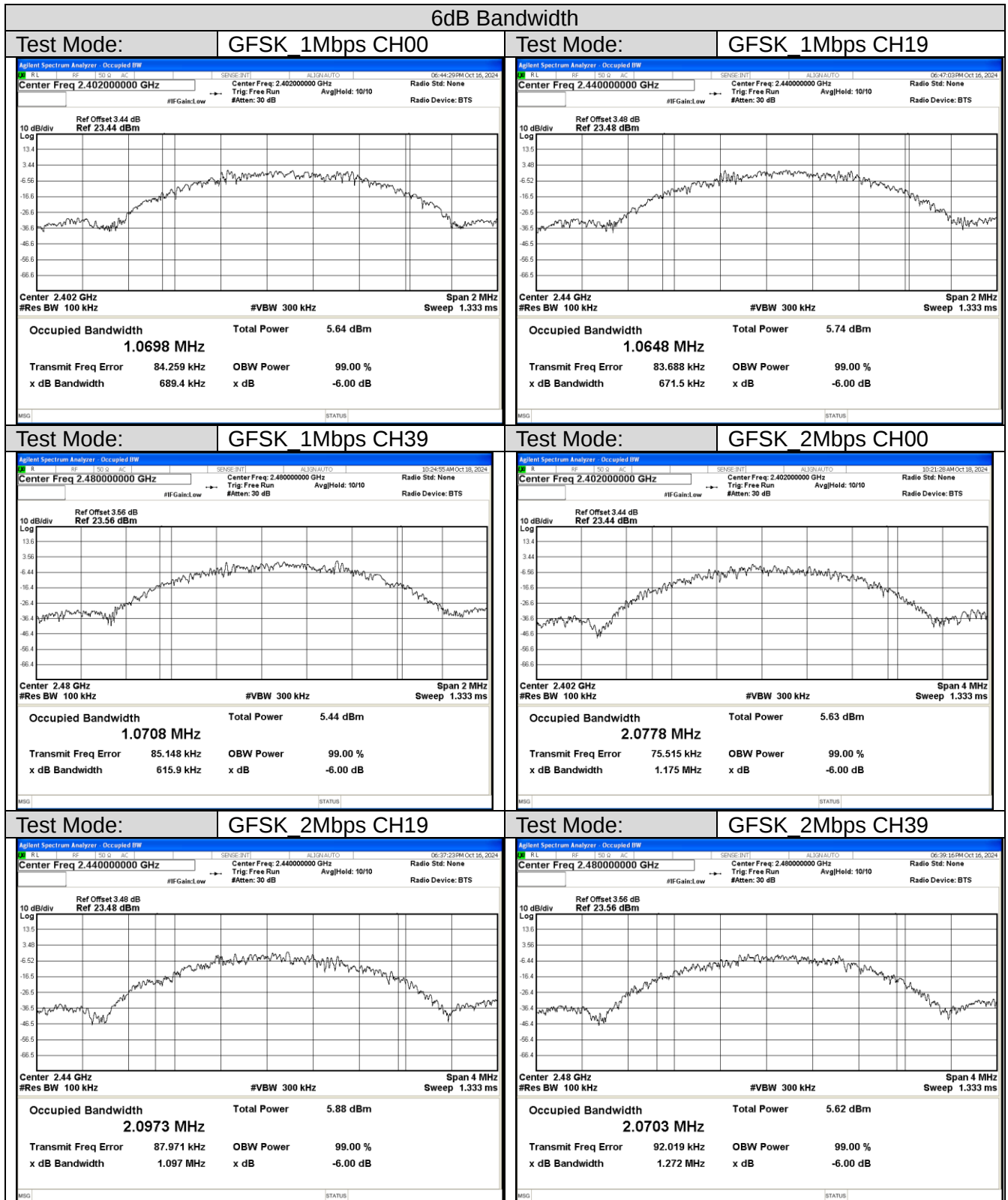
GFSK_2Mbps			
Frequency	Power Density	Limit (dBm/3KHz)	Result
	(dBm/3kHz)		
CH00	-14.727	8	Pass
CH19	-12.933	8	Pass
CH39	-15.026	8	Pass



Appendix A.4 Test Results of 6dB BANDWIDTH

GFSK_1Mbps			
Frequency	Bandwidth (MHz)	6dB limit (MHz)	Result
	6dB		
CH00	0.6894	0.5	Pass
CH19	0.6715	0.5	Pass
CH39	0.6159	0.5	Pass

GFSK_2Mbps			
Frequency	Bandwidth (MHz)	6dB limit (MHz)	Result
	6dB		
CH00	1.175	0.5	Pass
CH19	1.097	0.5	Pass
CH39	1.272	0.5	Pass



Appendix A.5 Test Results of Maximum Conducted Power

For FCC:

Mode	Frequency [MHz]	Measured of Average Power		Limit [W]
		Conducted [dBm]	W	
BLE_1Mbps	2402	0.714	0.0012	≤ 1.0
	2440	0.75	0.0012	≤ 1.0
	2480	0.681	0.0012	≤ 1.0
BLE_2Mbps	2402	3.205	0.0021	≤ 1.0
	2440	3.249	0.0021	≤ 1.0
	2480	3.171	0.0021	≤ 1.0

Note:

- 1) The cable loss is taken into account in results.
 - 2) Antenna gain(G) BLE: -0.85 dBi
- e.i.r.p.=P(AVG power)+ G, which is far below the 4 W