

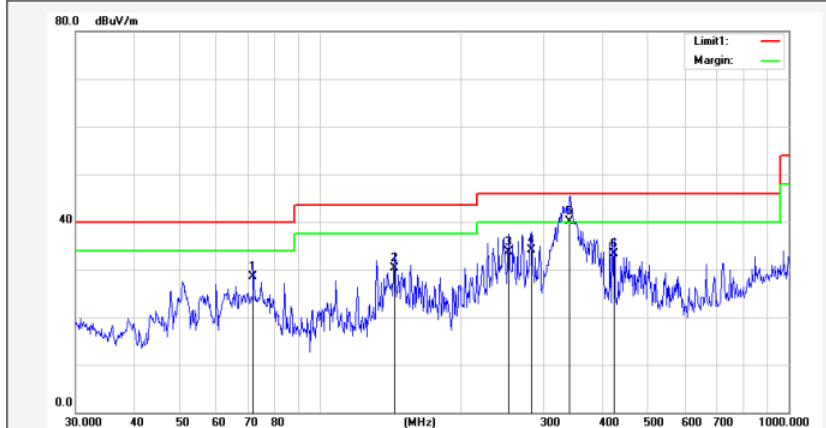
Appendix A: Test Results of BLE

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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									
									
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	71.8320	47.08	-18.67	28.41	40.00	-11.59			QP
2	143.8294	43.11	-12.85	30.26	43.50	-13.24			QP
3	252.0627	47.09	-13.37	33.72	46.00	-12.28			QP
4	281.9945	45.34	-11.26	34.08	46.00	-11.92			QP
5*	340.5270	50.33	-10.28	40.05	46.00	-5.95			QP
6	423.5403	41.12	-7.83	33.29	46.00	-12.71			QP

Vertical									
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	46.57	-17.83	28.74	40.00	-11.26			QP
2	50.7637	47.99	-18.63	29.36	40.00	-10.64			QP
3*	143.8294	46.71	-12.85	33.86	43.50	-9.64			QP
4	150.0107	46.14	-13.07	33.07	43.50	-10.43			QP
5	340.7817	45.48	-10.27	35.21	46.00	-10.79			QP
6	570.6100	38.37	-4.99	33.38	46.00	-12.62			QP

Correction Factor = insertion loss of LISN + cable loss;

Reading = Reading Amplitude in the instrument;

Result = Correction Factor + Reading;

Margin = Result – Limit.

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	3686	59.54	-16.14	43.4	74	-30.6	peak
2	3686	44.65	-16.14	28.51	54	-25.49	AVG
3	4808	62.16	-13.33	48.83	74	-25.17	peak
4	4808	45.8	-13.33	32.47	54	-21.53	AVG
5	6134	57.78	-9.98	47.8	74	-26.2	peak
6	6134	42.94	-9.98	32.96	54	-21.04	AVG
7	7188	58.65	-8.03	50.62	74	-23.38	peak
8	7188	44.52	-8.03	36.49	54	-17.51	AVG
9	8378	56.54	-7.1	49.44	74	-24.56	peak
10	8378	40.25	-7.1	33.15	54	-20.85	AVG
11	10520	55.35	-3.25	52.1	74	-21.9	peak
12	10520	38.73	-3.25	35.48	54	-18.52	AVG

GFSK-Low Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2836	60.87	-19.95	40.92	74	-33.08	peak
2	2836	44.26	-19.95	24.31	54	-29.69	AVG
3	3856	59.78	-15.7	44.08	74	-29.92	peak
4	3856	44.71	-15.7	29.01	54	-24.99	AVG
5	4808	60.77	-13.33	47.44	74	-26.56	peak
6	4808	47.08	-13.33	33.75	54	-20.25	AVG
7	5658	59.16	-11.88	47.28	74	-26.72	peak
8	5658	43.44	-11.88	31.56	54	-22.44	AVG
9	7188	62.9	-8.03	54.87	74	-19.13	peak
10	7188	57.7	-8.03	49.67	54	-4.33	AVG
11	10146	55.62	-4.02	51.6	74	-22.4	peak
12	10146	39.56	-4.02	35.54	54	-18.46	AVG

GFSK- Middle Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3890	59.69	-15.36	44.33	74	-29.67	peak
2	3890	44.05	-15.36	28.69	54	-25.31	AVG
3	4876	63.58	-13	50.58	74	-23.42	peak
4	4876	49.13	-13	36.13	54	-17.87	AVG
5	6134	56.54	-9.98	46.56	74	-27.44	peak
6	6134	40.45	-9.98	30.47	54	-23.53	AVG
7	7324	57.72	-7.38	50.34	74	-23.66	peak
8	7324	43.25	-7.38	35.87	54	-18.13	AVG
9	9398	57.53	-7.29	50.24	74	-23.76	peak
10	9398	40.76	-7.29	33.47	54	-20.53	AVG
11	10486	56.77	-3.53	53.24	74	-20.76	peak
12	10486	41.14	-3.53	37.61	54	-16.39	AVG

GFSK-Middle Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3992	59.51	-15.01	44.5	74	-29.5	peak
2	3992	43.34	-15.01	28.33	54	-25.67	AVG
3	4876	60.89	-13	47.89	74	-26.11	peak
4	4876	45.57	-13	32.57	54	-21.43	AVG
5	6134	56.59	-9.98	46.61	74	-27.39	peak
6	6134	41.46	-9.98	31.48	54	-22.52	AVG
7	7324	61.34	-7.38	53.96	74	-20.04	peak
8	7324	55.96	-7.38	48.58	54	-5.42	AVG
9	8344	57.8	-7.2	50.6	74	-23.4	peak
10	8344	41.41	-7.2	34.21	54	-19.79	AVG
11	11302	56.31	-2.14	54.17	74	-19.83	peak
12	11302	40.59	-2.14	38.45	54	-15.55	AVG

GFSK-High Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3278	60.84	-18.55	42.29	74	-31.71	peak
2	3278	46.24	-18.55	27.69	54	-26.31	AVG
3	4298	58.99	-14.54	44.45	74	-29.55	peak
4	4298	44.43	-14.54	29.89	54	-24.11	AVG
5	4944	62.13	-12.85	49.28	74	-24.72	peak
6	4944	46.97	-12.85	34.12	54	-19.88	AVG
7	6134	56.93	-9.98	46.95	74	-27.05	peak
8	6134	38.92	-9.98	28.94	54	-25.06	AVG
9	7426	58.87	-7.09	51.78	74	-22.22	peak
10	7426	42.55	-7.09	35.46	54	-18.54	AVG
11	8378	56.67	-7.1	49.57	74	-24.43	peak
12	8378	40.58	-7.1	33.48	54	-20.52	AVG

GFSK-High Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3584	60.87	-16.33	44.54	74	-29.46	peak
2	3584	45.24	-16.33	28.91	54	-25.09	AVG
3	3890.255	59.38	-15.36	44.02	74	-29.98	peak
4	3890.255	44.03	-15.36	28.67	54	-25.33	AVG
5	4944	60.15	-12.85	47.3	74	-26.7	peak
6	4944	45.86	-12.85	33.01	54	-20.99	AVG
7	6168	57.09	-9.92	47.17	74	-26.83	peak
8	6168	41.5	-9.92	31.58	54	-22.42	AVG
9	7426	59.98	-7.09	52.89	74	-21.11	peak
10	7426	45.54	-7.09	38.45	54	-15.55	AVG
11	8412	56.97	-7.14	49.83	74	-24.17	peak
12	8412	40.61	-7.14	33.47	54	-20.53	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	2348	62.52	-21.2	41.32	74	-32.68	peak
2	2348	46.89	-21.2	25.69	54	-28.31	AVG
3	2390	61.21	-21.03	40.18	74	-33.82	peak
4	2390	45.34	-21.03	24.31	54	-29.69	AVG

Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2331	62.39	-21.23	41.16	74	-32.84	peak
2	2331	47.17	-21.23	25.94	54	-28.06	AVG
3	2390	60.81	-21.03	39.78	74	-34.22	peak
4	2390	44.5	-21.03	23.47	54	-30.53	AVG

GFSK-High

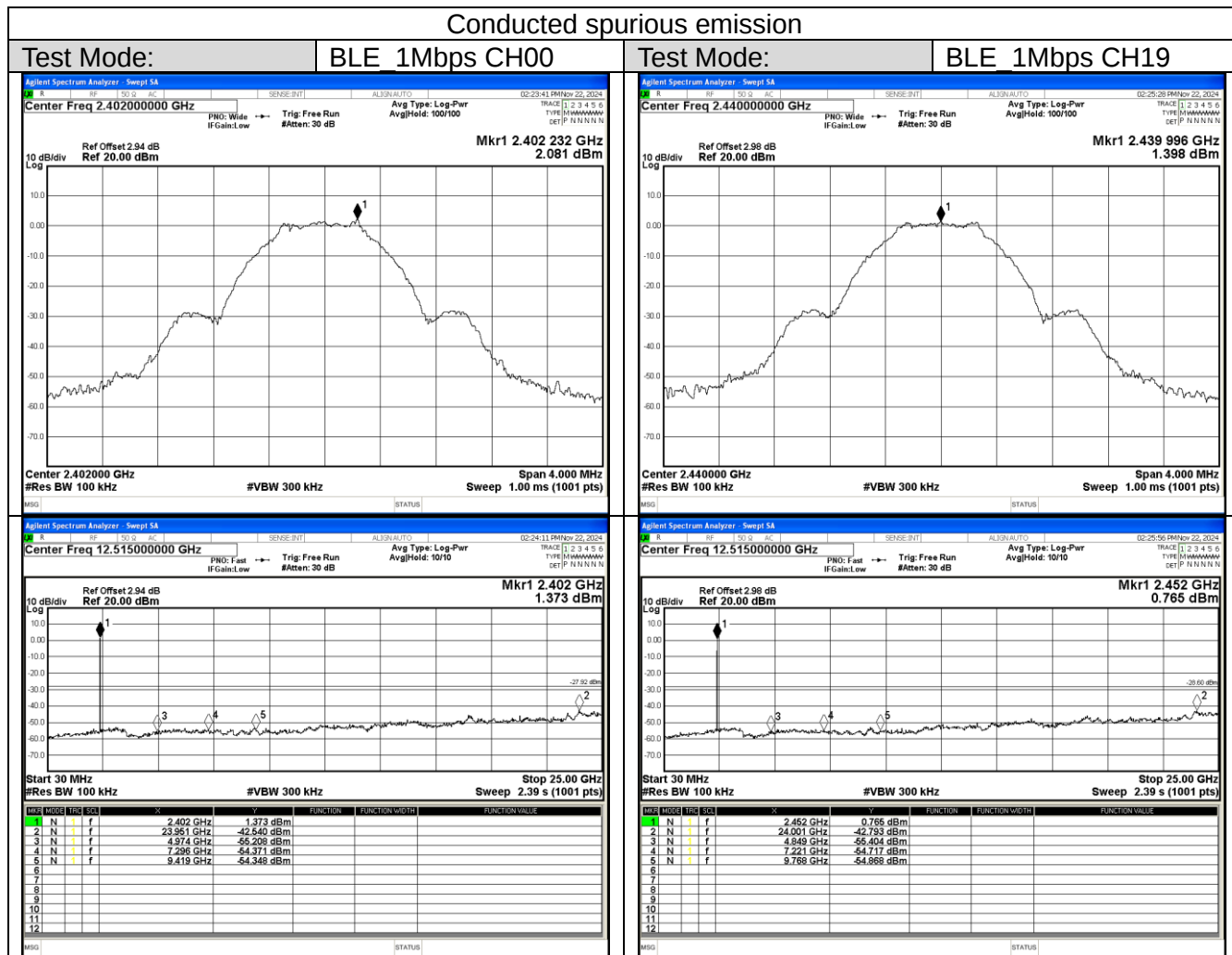
Horizontal

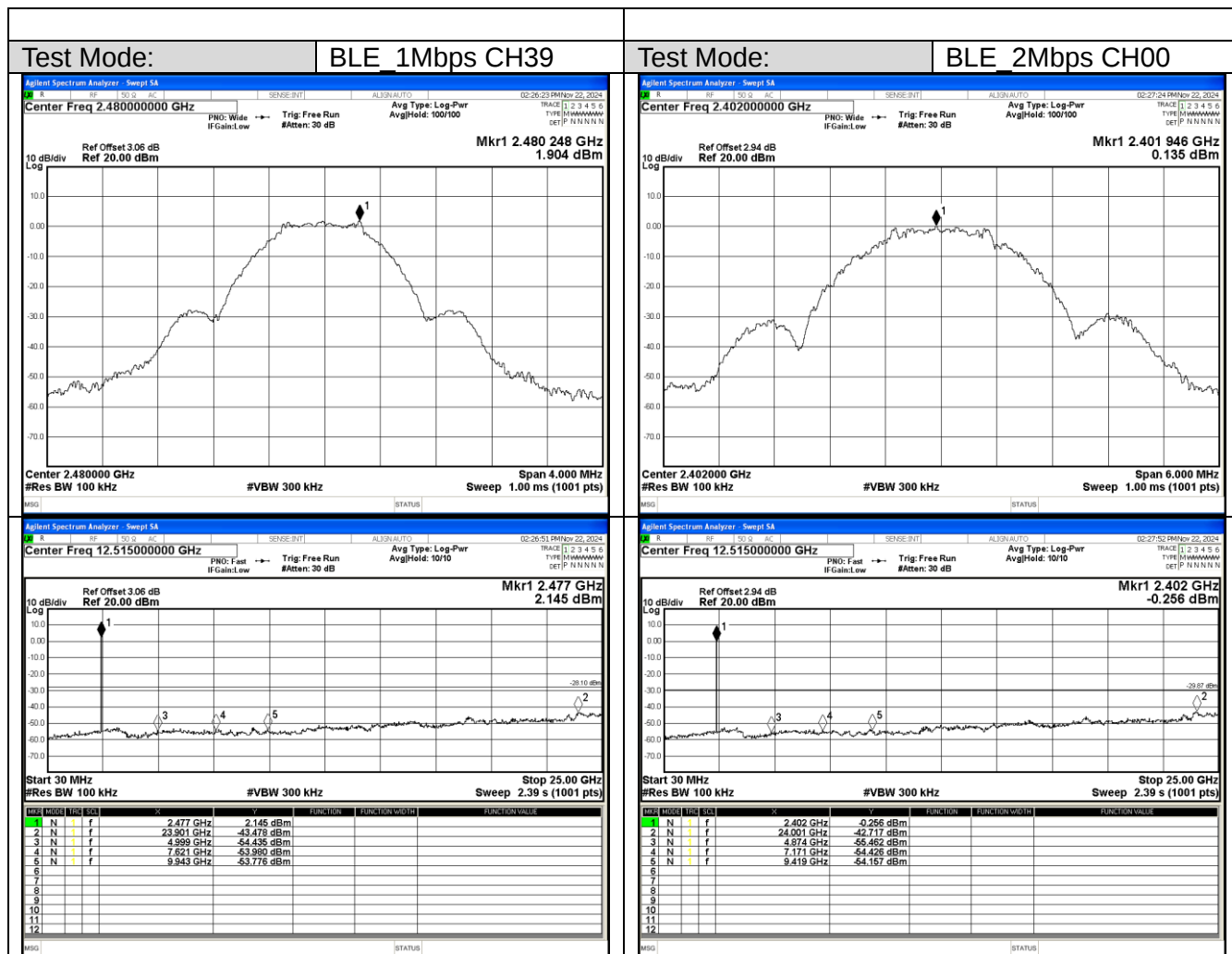
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5	67.83	-20.91	46.92	74	-27.08	peak
2	2483.5	51.9	-20.91	30.99	54	-23.01	AVG
3	2498.98	64.77	-20.92	43.85	74	-30.15	peak
4	2498.98	48.22	-20.92	27.3	54	-26.7	AVG

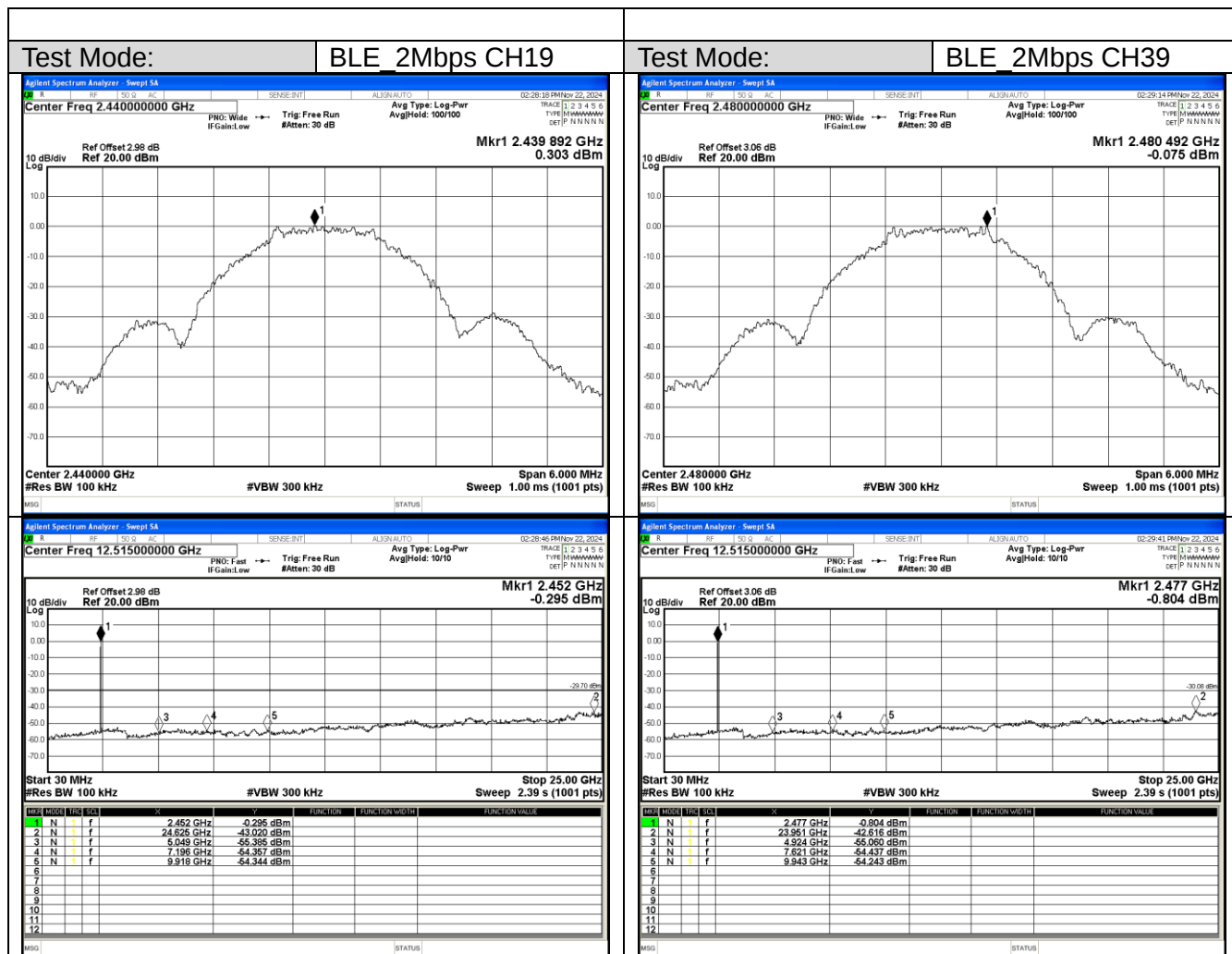
Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.5	62.18	-20.91	41.27	74	-32.73	peak
2	2483.5	46.39	-20.91	25.48	54	-28.52	AVG
3	2497.96	63.7	-20.92	42.78	74	-31.22	peak
4	2497.96	47.49	-20.92	26.57	54	-27.43	AVG

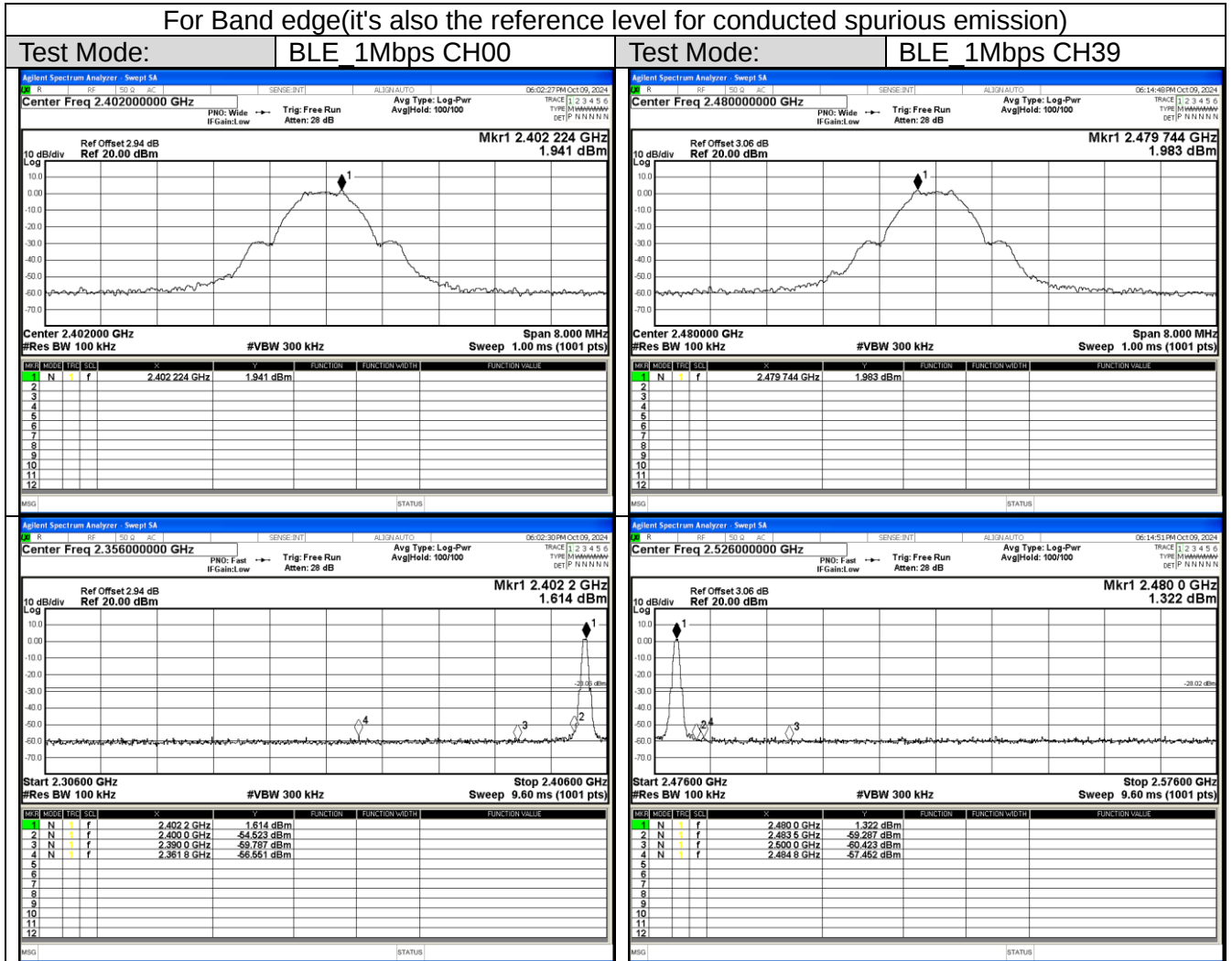
Appendix A.2 Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

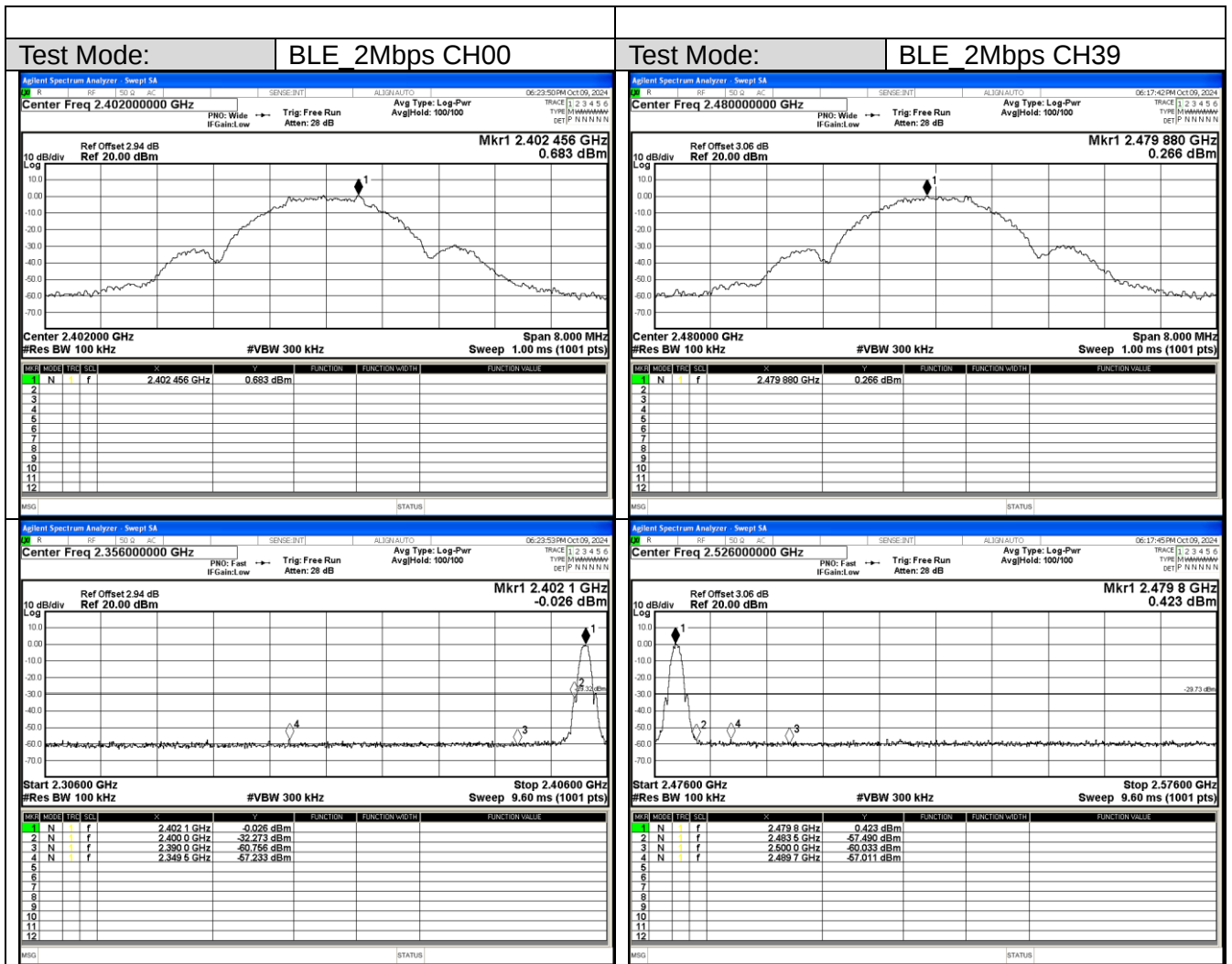






For Band edge(it's also the reference level for conducted spurious emission)

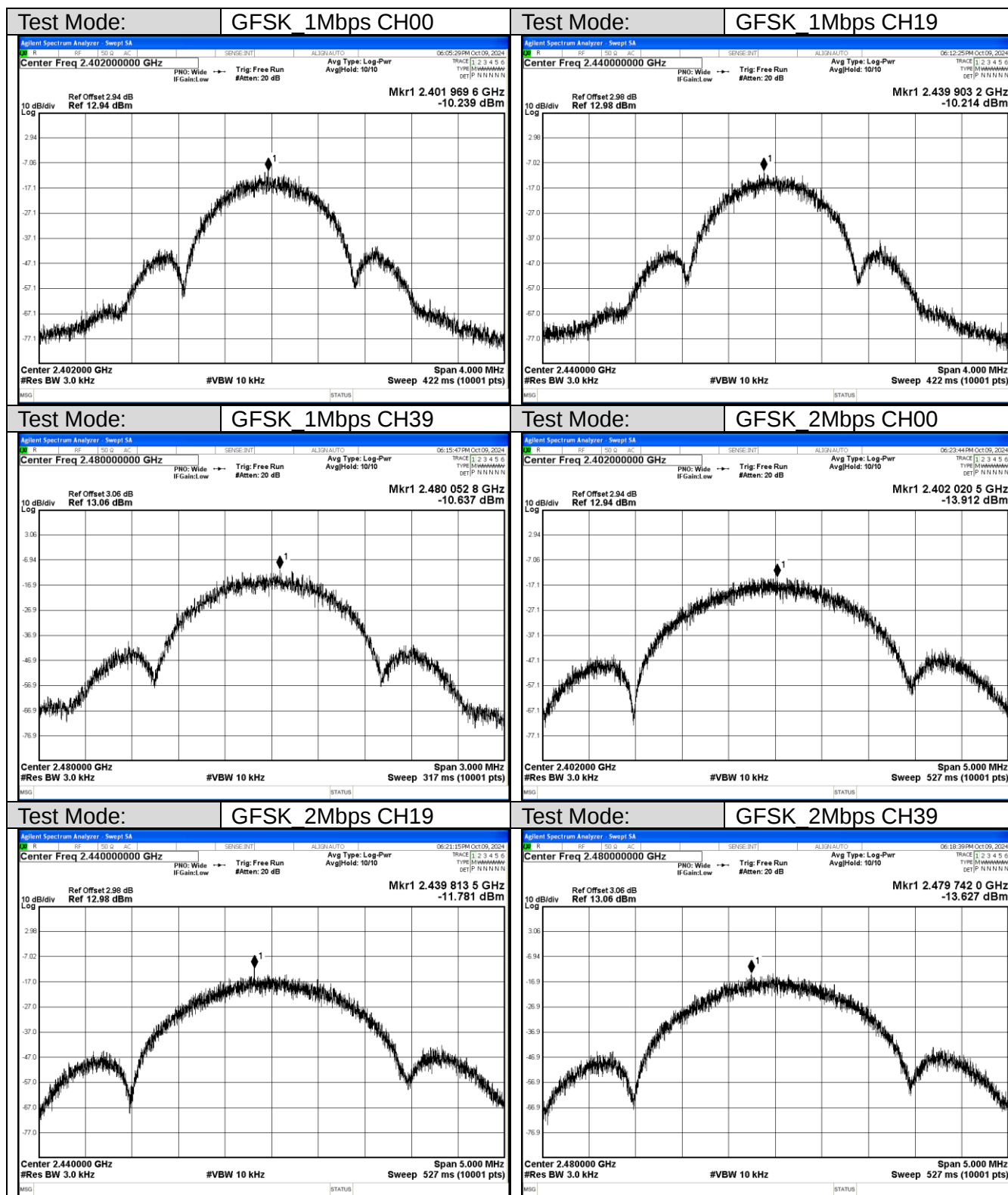




Appendix A.3 Test Results of Conducted Power Spectral Density

GFSK_1Mbps			
Frequency	Power Density	Limit (dBm/3KHz)	Result
	(dBm/3kHz)		
CH00	-10.239	8	Pass
CH19	-10.214	8	Pass
CH39	-10.637	8	Pass

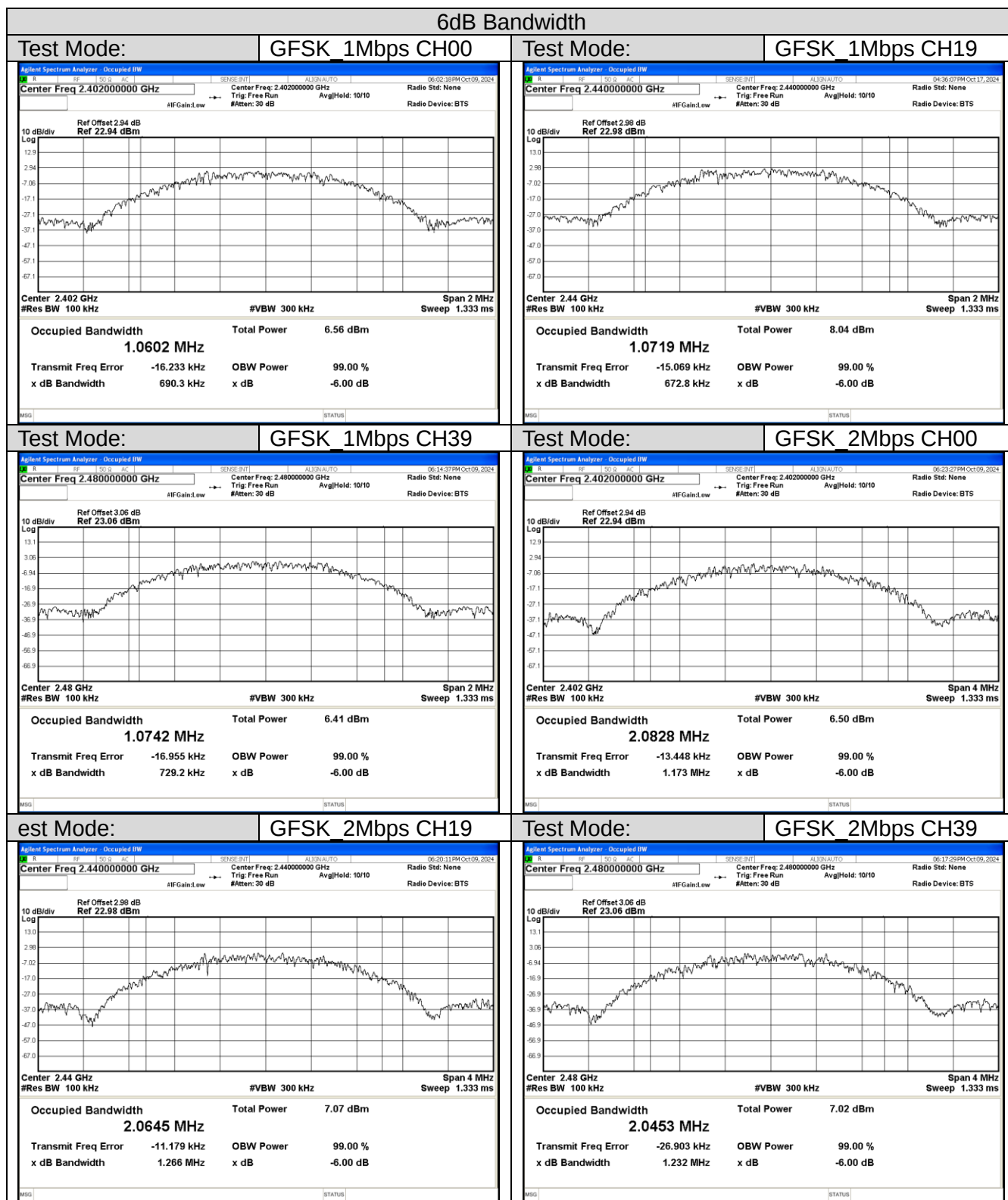
GFSK_2Mbps			
Frequency	Power Density	Limit (dBm/3KHz)	Result
	(dBm/3kHz)		
CH00	-13.912	8	Pass
CH19	-11.781	8	Pass
CH39	-13.627	8	Pass



Appendix A.4 Test Results of 6dB BANDWIDTH

GFSK_1Mbps			
Frequency	Bandwidth (MHz)	6dB limit (KHz)	Result
	6dB		
CH00	0.6903	0.5	Pass
CH19	0.6728	0.5	Pass
CH39	0.7292	0.5	Pass

GFSK_2Mbps			
Frequency	Bandwidth (MHz)	6dB limit (KHz)	Result
	6dB		
CH00	0.1173	0.5	Pass
CH19	0.1266	0.5	Pass
CH39	0.1232	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	1.744	0.0015	≤ 1.0
	2440	1.842	0.0015	≤ 1.0
	2480	1.795	0.0015	≤ 1.0
BLE_2Mbps	2402	2.56	0.0018	≤ 1.0
	2440	2.51	0.0018	≤ 1.0
	2480	2.39	0.0017	≤ 1.0

Note:

- 1) The cable loss is taken into account in results.
 - 2) Antenna gain(G) BLE: 1.84 dBi
- e.i.r.p.=P(AVG power)+ G, which is far below the 4 W