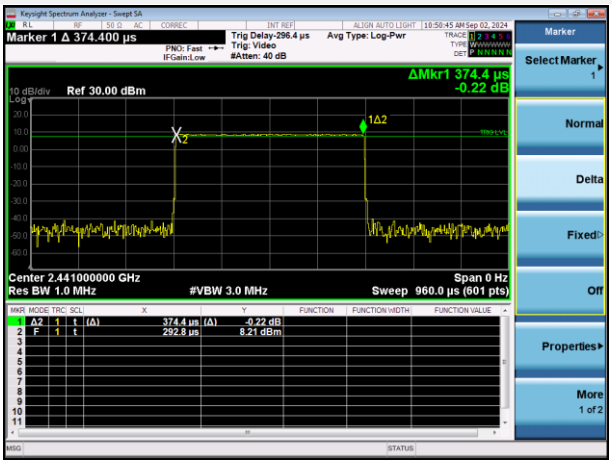
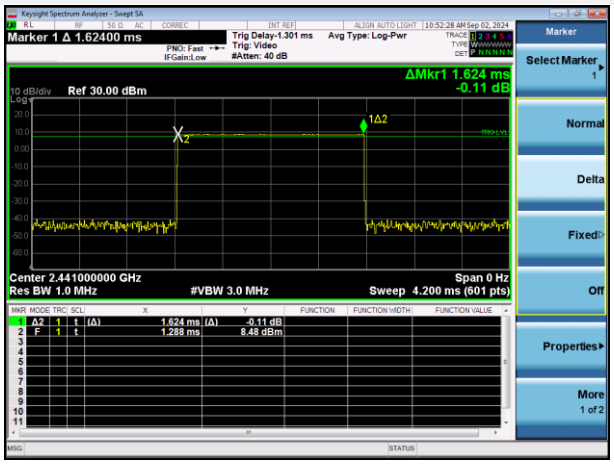
Test Plots

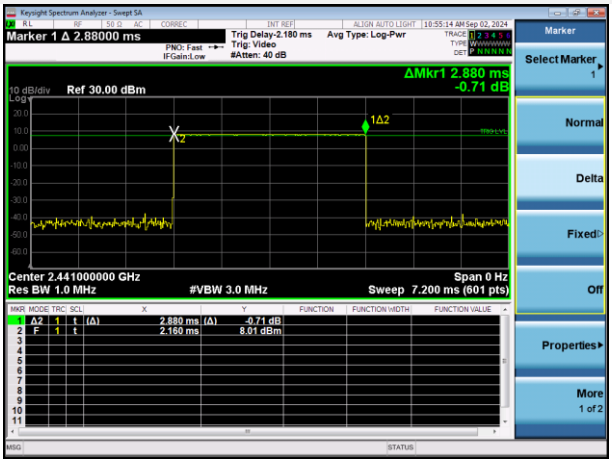
GFSK DH1



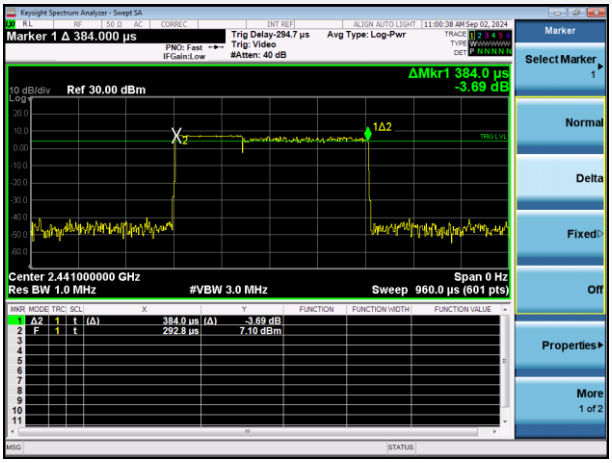
GFSK DH3



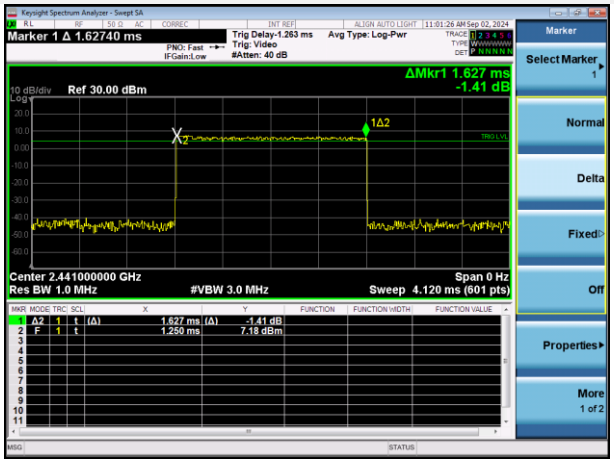
GFSK DH5



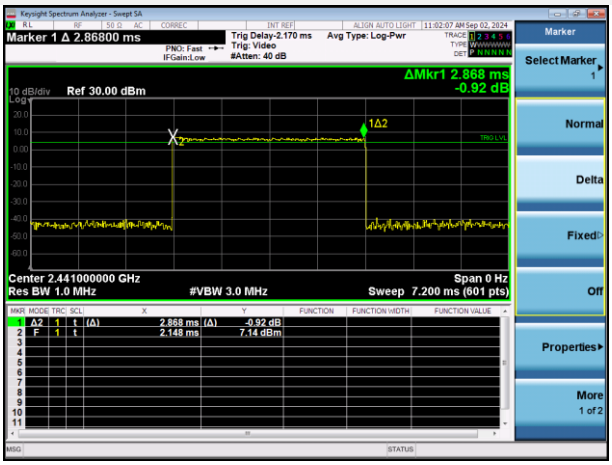
8-DPSK DH1



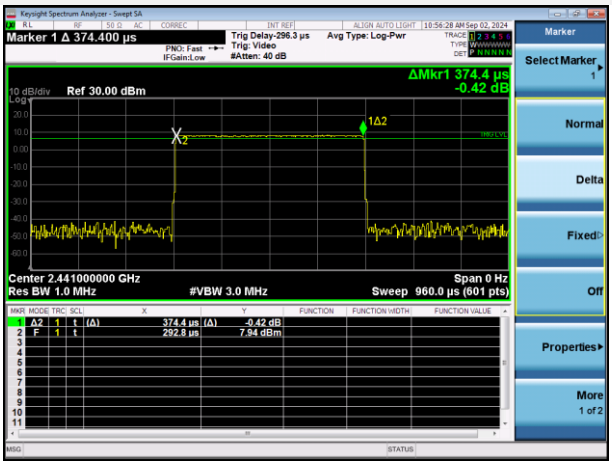
8-DPSK DH3



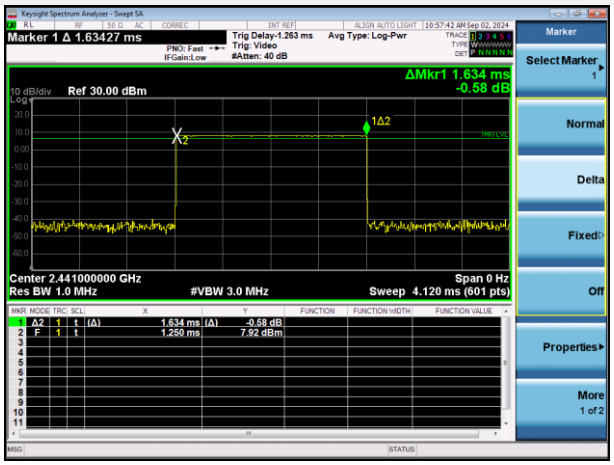
8-DPSK DH5



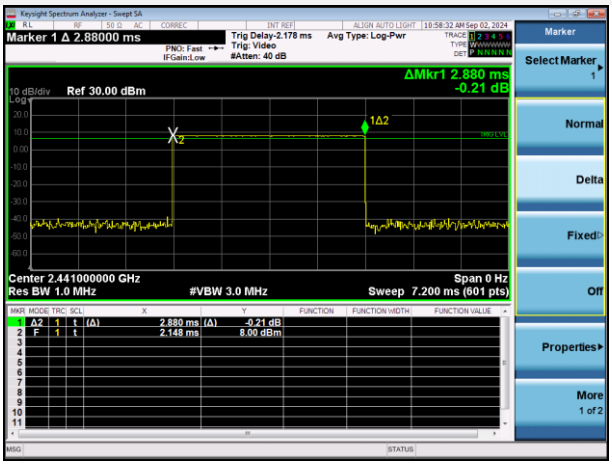
AFH Mode DH1



AFH Mode DH3



AFH Mode DH5



A.6 Conducted Spurious Emissions & Authorized-band band-edge

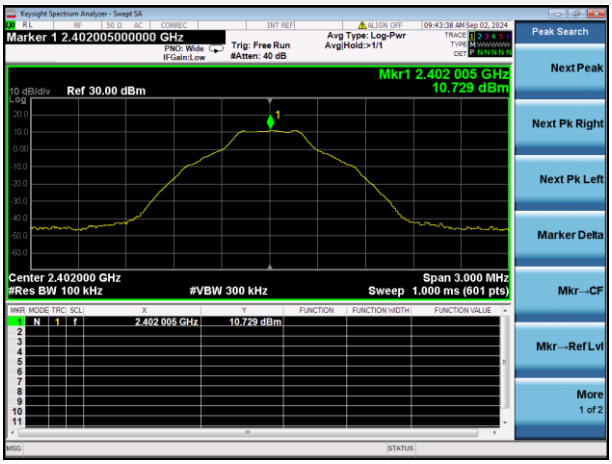
Test Data

GFSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-37.11	10.73	-9.27	Pass
Middle	-38.01	7.54	-12.46	Pass
High	-37.81	14.00	-6.00	Pass
8-DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-36.53	9.72	-10.28	Pass
Middle	-37.58	6.80	-13.20	Pass
High	-37.17	13.93	-6.07	Pass

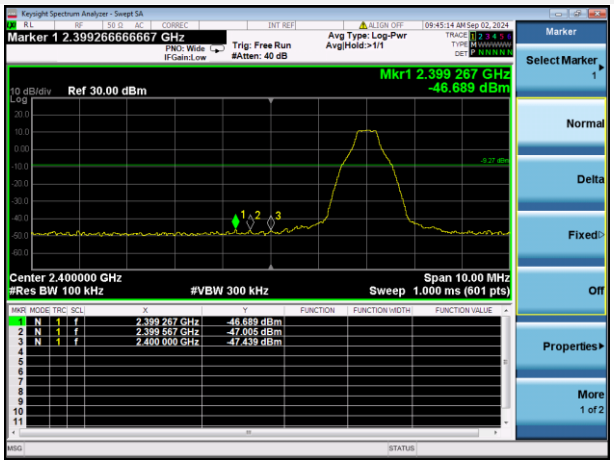
Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-36.69	13.97	-6.03	Pass
8-DPSK	-36.79	13.47	-6.53	Pass

Test Plots

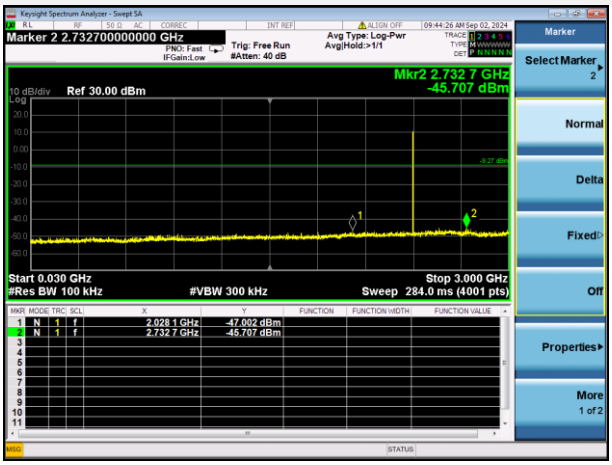
GFSK LOW CHANNEL, CARRIER LEVEL



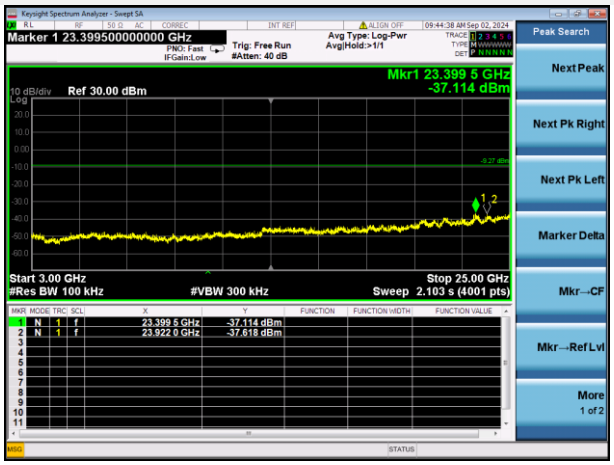
GFSK LOW CHANNEL, BAND EDGE



GFSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

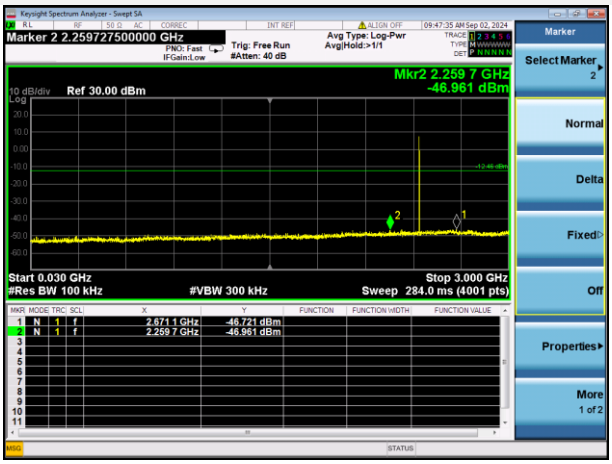


GFSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

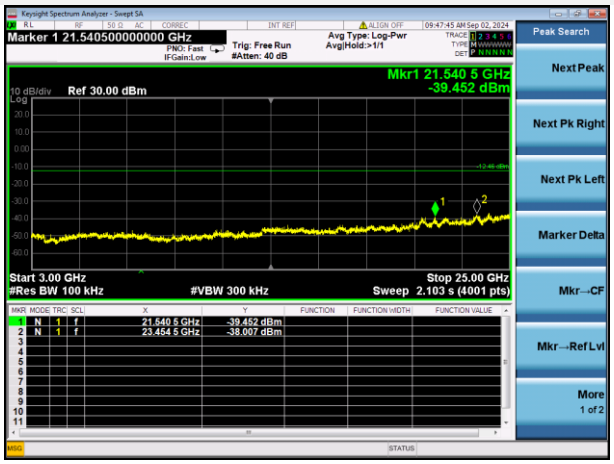


GFSK MIDDLE CHANNEL, CARRIER LEVEL

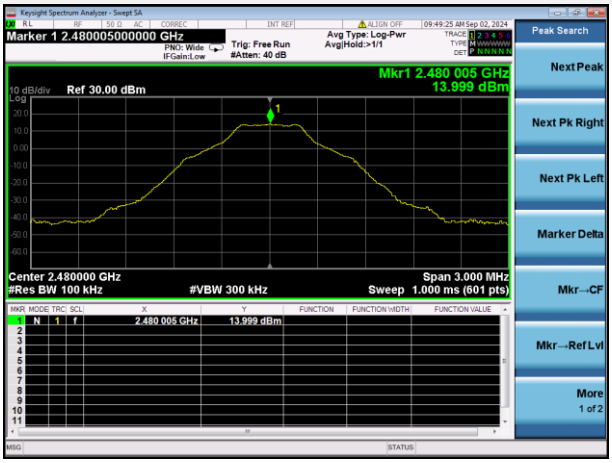
GFSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



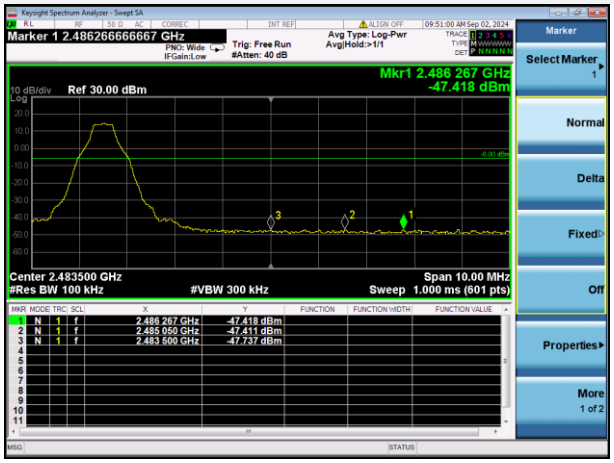
GFSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



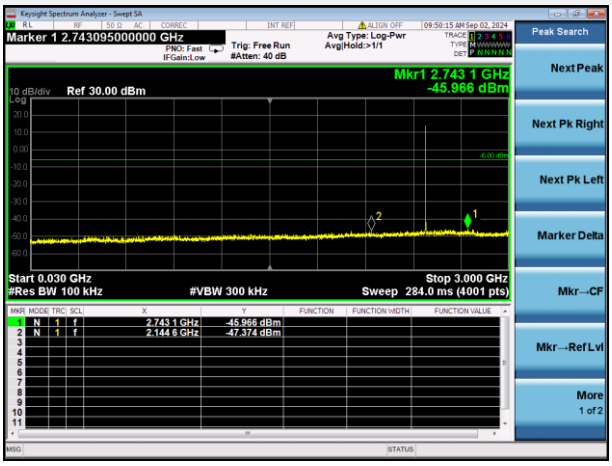
GFSK HIGH CHANNEL, CARRIER LEVEL



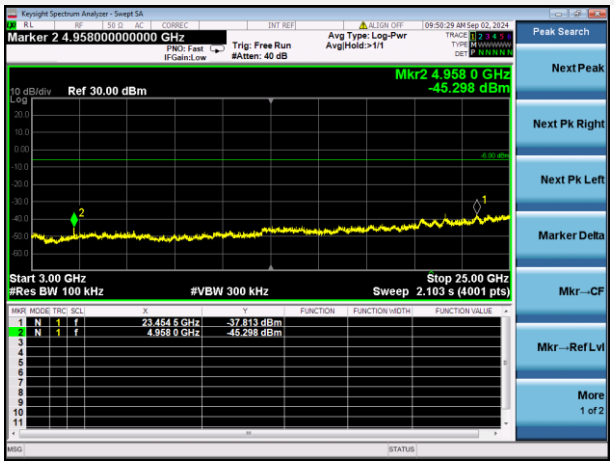
GFSK HIGH CHANNEL, BAND EDGE



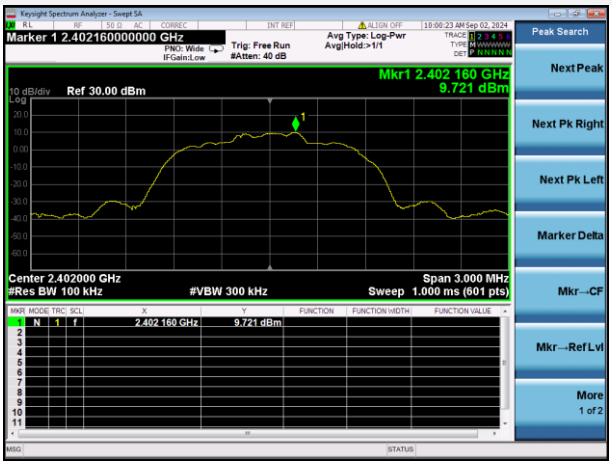
GFSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



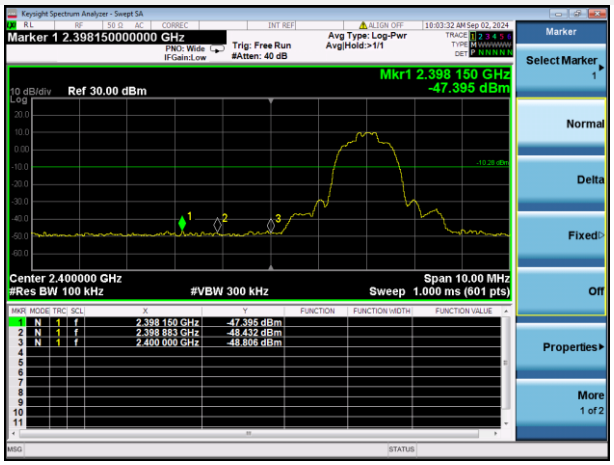
GFSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



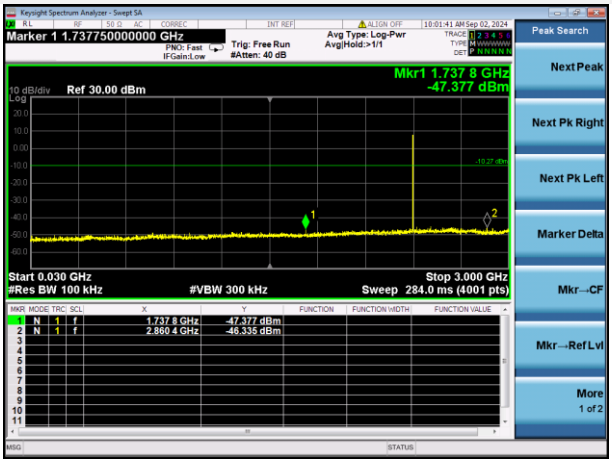
8-DPSK LOW CHANNEL, CARRIER LEVEL



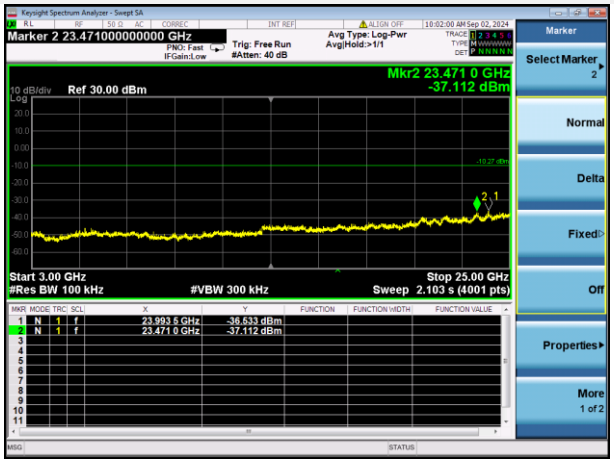
8-DPSK LOW CHANNEL, BAND EDGE



8-DPSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

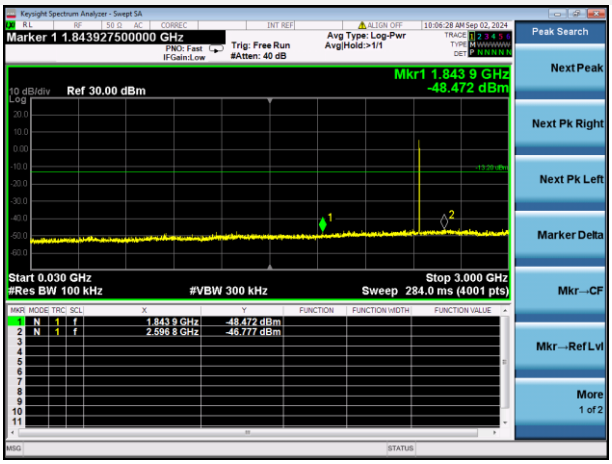


8-DPSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

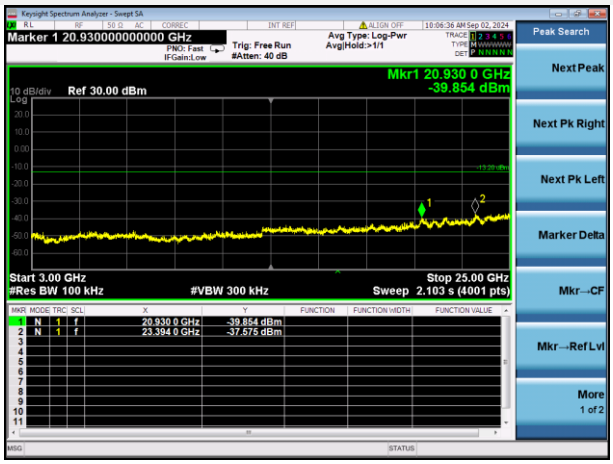


8-DPSK MIDDLE CHANNEL, CARRIER LEVEL

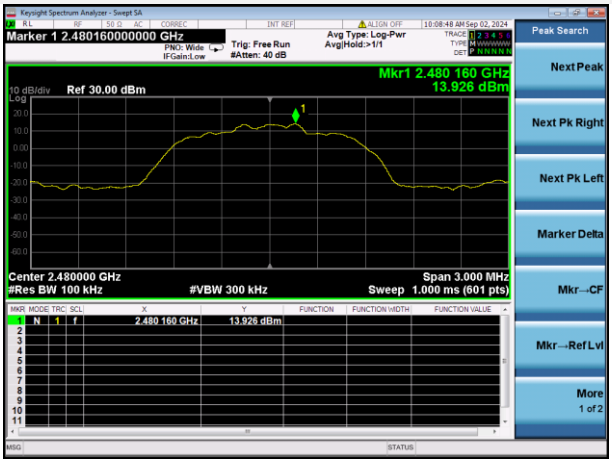
8-DPSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



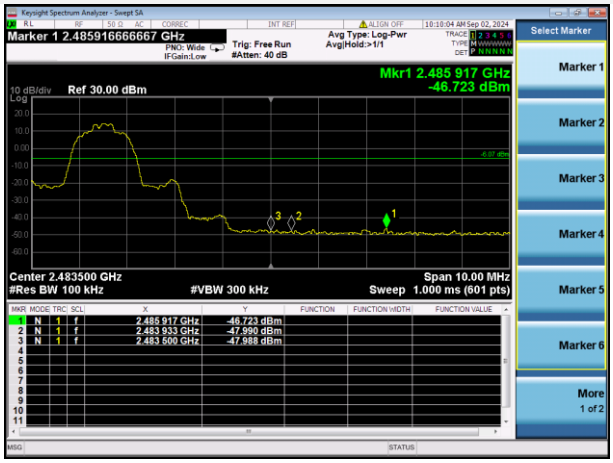
8-DPSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



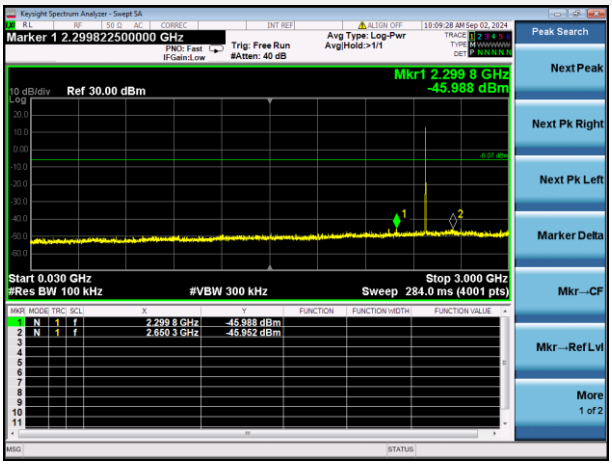
8-DPSK HIGH CHANNEL, CARRIER LEVEL



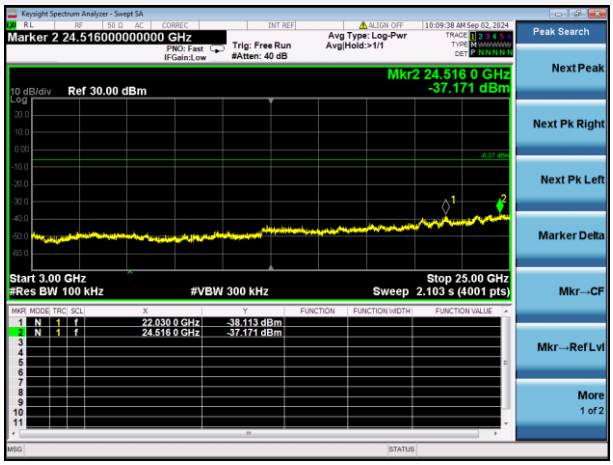
8-DPSK HIGH CHANNEL, BAND EDGE



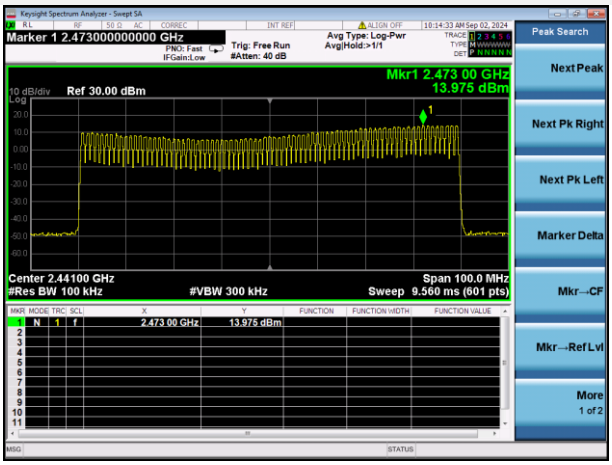
8-DPSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



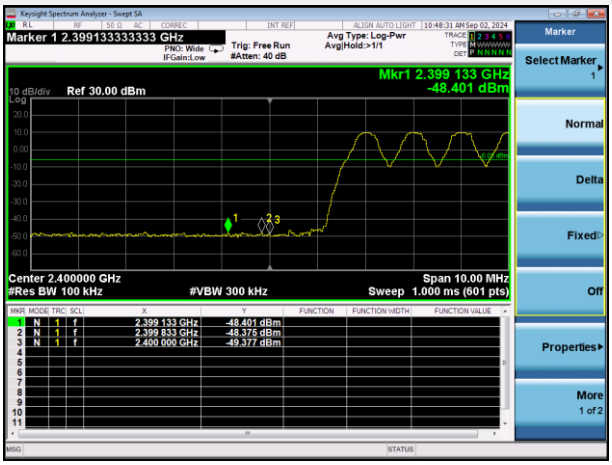
8-DPSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



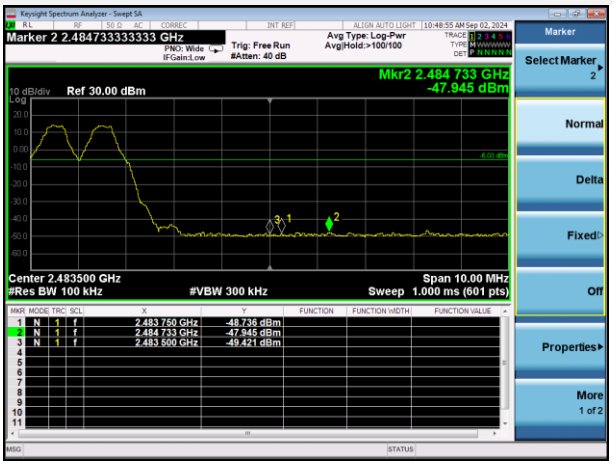
GFSK HOPPING, CARRIER LEVEL



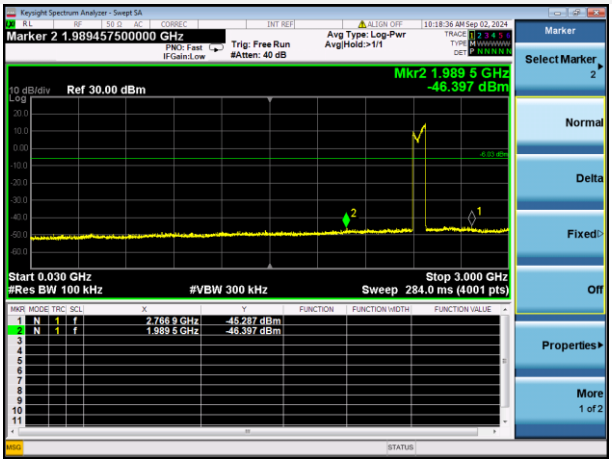
GFSK HOPPING BAND EDGE (LOW)



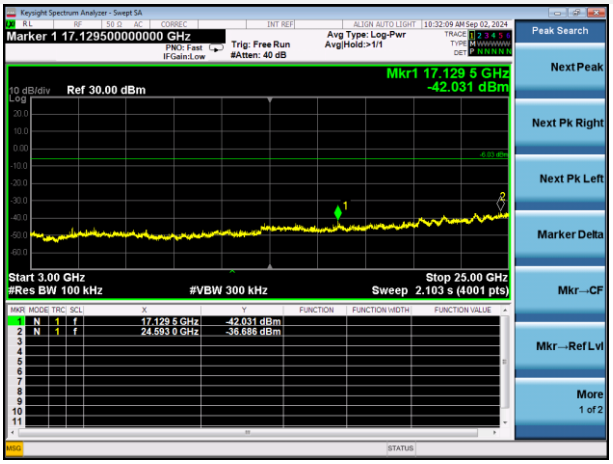
GFSK HOPPING BAND EDGE (HIGH)



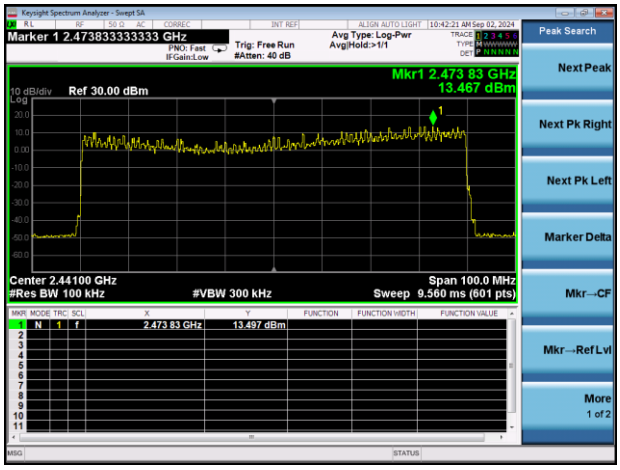
GFSK Hopping Mode, SPURIOUS
30 MHz ~ 3 GHz



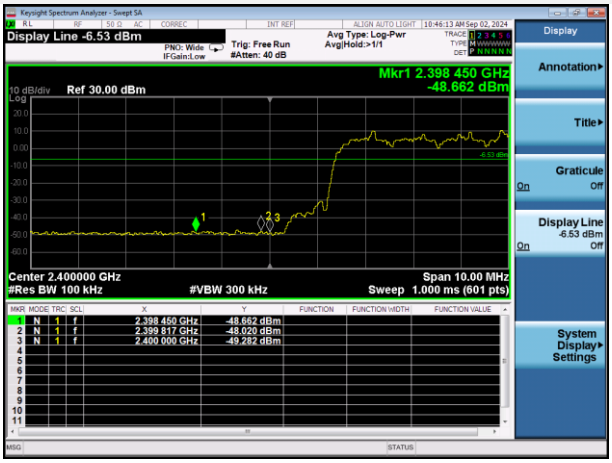
GFSK Hopping Mode, SPURIOUS
3GHz ~ 25 GHz



8-DPSK HOPPING, CARRIER LEVEL

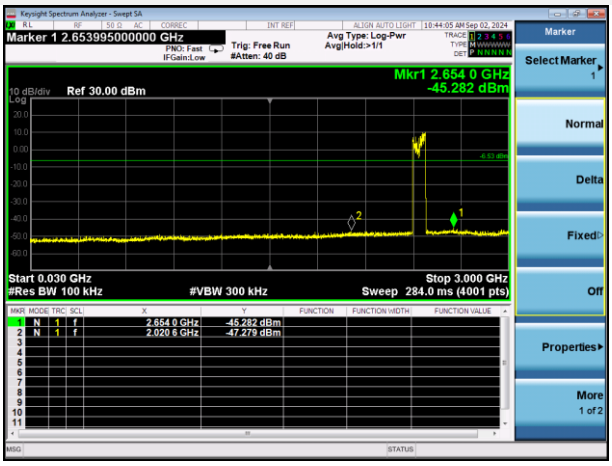


8-DPSK Hopping BAND EDGE (LOW)

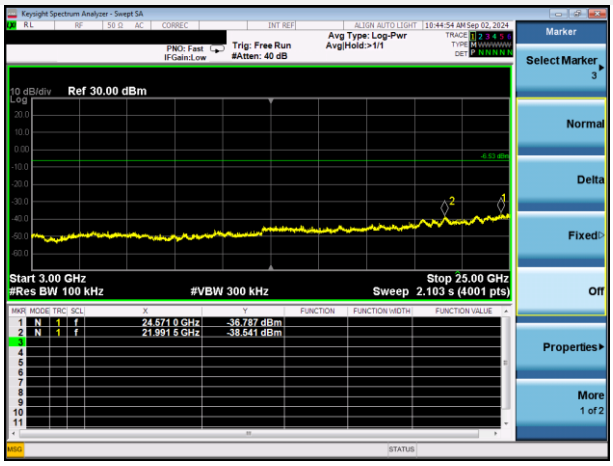


8-DPSK Hopping BAND EDGE (HIGH)

8-DPSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



8-DPSK Hopping Mode, SPURIOUS 3GHz ~ 25 GHz



A.7 Conducted Emissions

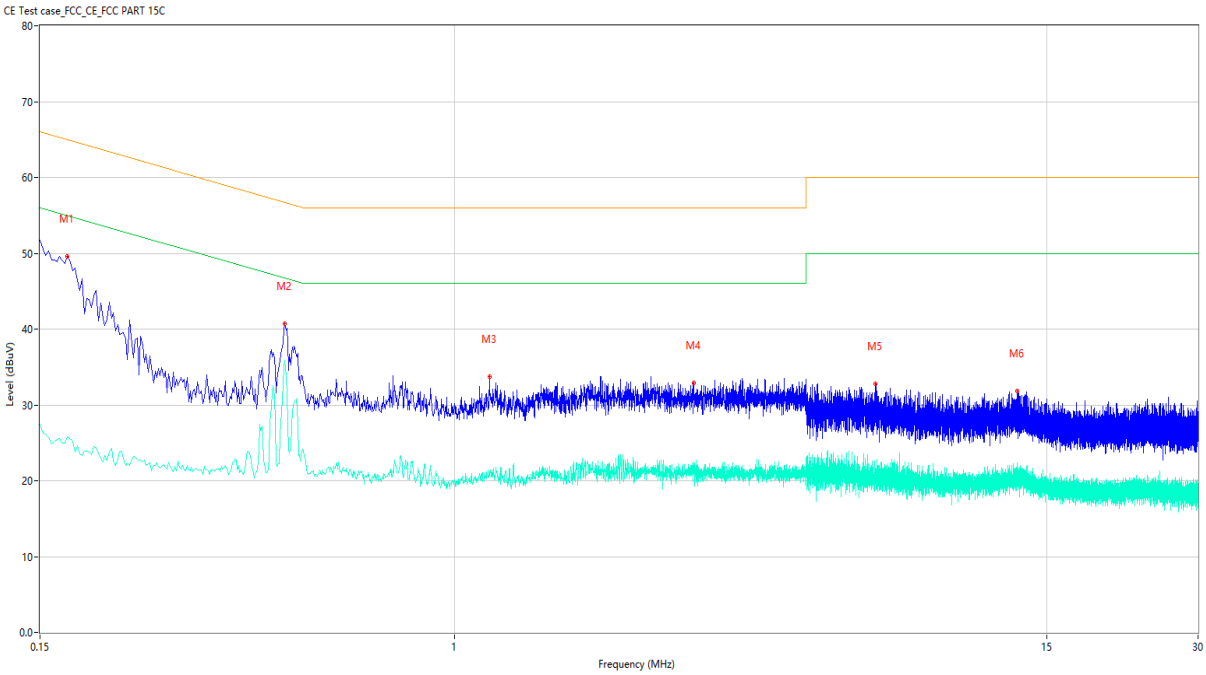
Note [1]: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

Note [2]: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Note [3]: Results (dBuV) = Original reading level of Spectrum Analyzer (dBuV) + Factor (dB)

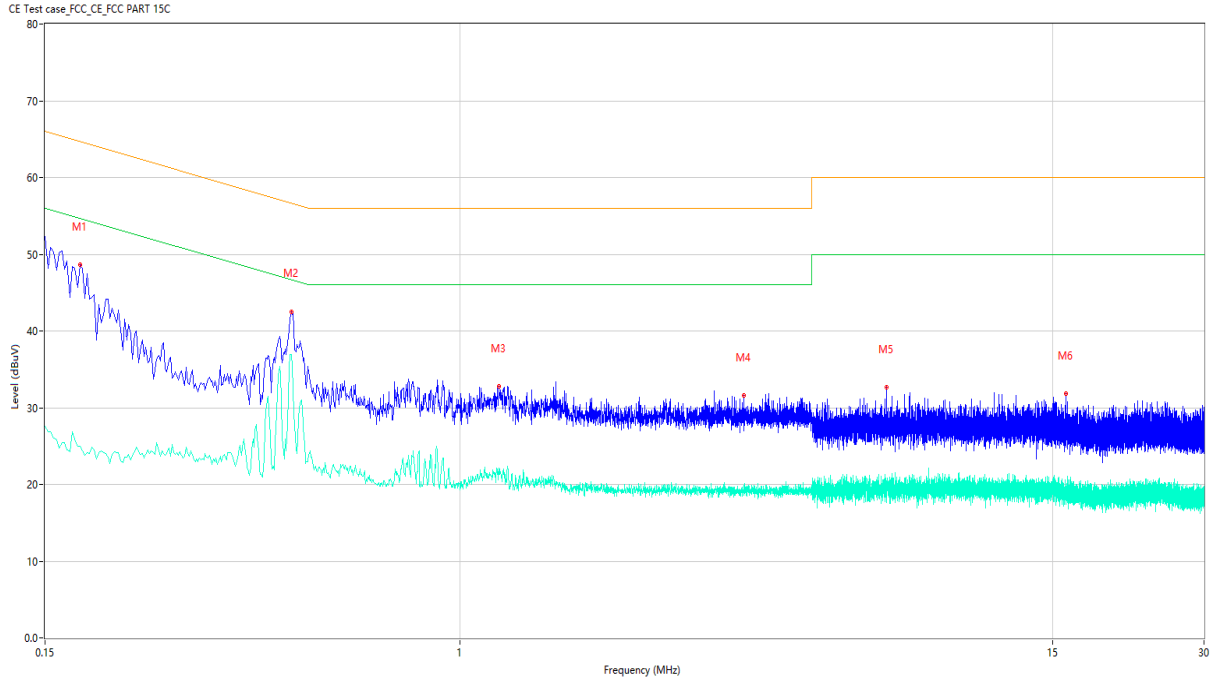
Test Data and Plots

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.170	49.53	9.75	64.96	15.43	Peak	L	Pass
1**	0.170	25.85	9.75	54.96	29.11	AV	L	Pass
2	0.460	40.65	9.74	56.69	16.04	Peak	L	Pass
2**	0.460	35.83	9.74	46.69	10.86	AV	L	Pass
3	1.172	33.72	9.70	56.00	22.28	Peak	L	Pass
3**	1.172	21.16	9.70	46.00	24.84	AV	L	Pass
4	2.988	32.93	9.66	56.00	23.07	Peak	L	Pass
4**	2.988	22.13	9.66	46.00	23.87	AV	L	Pass
5	6.850	32.79	9.58	60.00	27.21	Peak	L	Pass
5**	6.850	21.57	9.58	50.00	28.43	AV	L	Pass
6	13.112	31.82	9.34	60.00	28.18	Peak	L	Pass
6**	13.112	20.70	9.34	50.00	29.30	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.176	48.60	9.75	64.67	16.07	Peak	N	Pass
1**	0.176	24.96	9.75	54.67	29.71	AV	N	Pass
2	0.462	42.54	9.74	56.66	14.12	Peak	N	Pass
2**	0.462	36.95	9.74	46.66	9.71	AV	N	Pass
3	1.196	32.79	9.70	56.00	23.21	Peak	N	Pass
3**	1.196	22.08	9.70	46.00	23.92	AV	N	Pass
4	3.660	31.58	9.66	56.00	24.42	Peak	N	Pass
4**	3.660	19.30	9.66	46.00	26.70	AV	N	Pass
5	7.022	32.63	9.58	60.00	27.37	Peak	N	Pass
5**	7.022	19.95	9.58	50.00	30.05	AV	N	Pass
6	15.948	31.78	9.19	60.00	28.22	Peak	N	Pass
6**	15.948	19.79	9.19	50.00	30.21	AV	N	Pass

A.8 Radiated Spurious Emission

Note [1]: The symbol of "--" in the table which means not application.

Note [2]: For the test data above 1 GHz, according the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

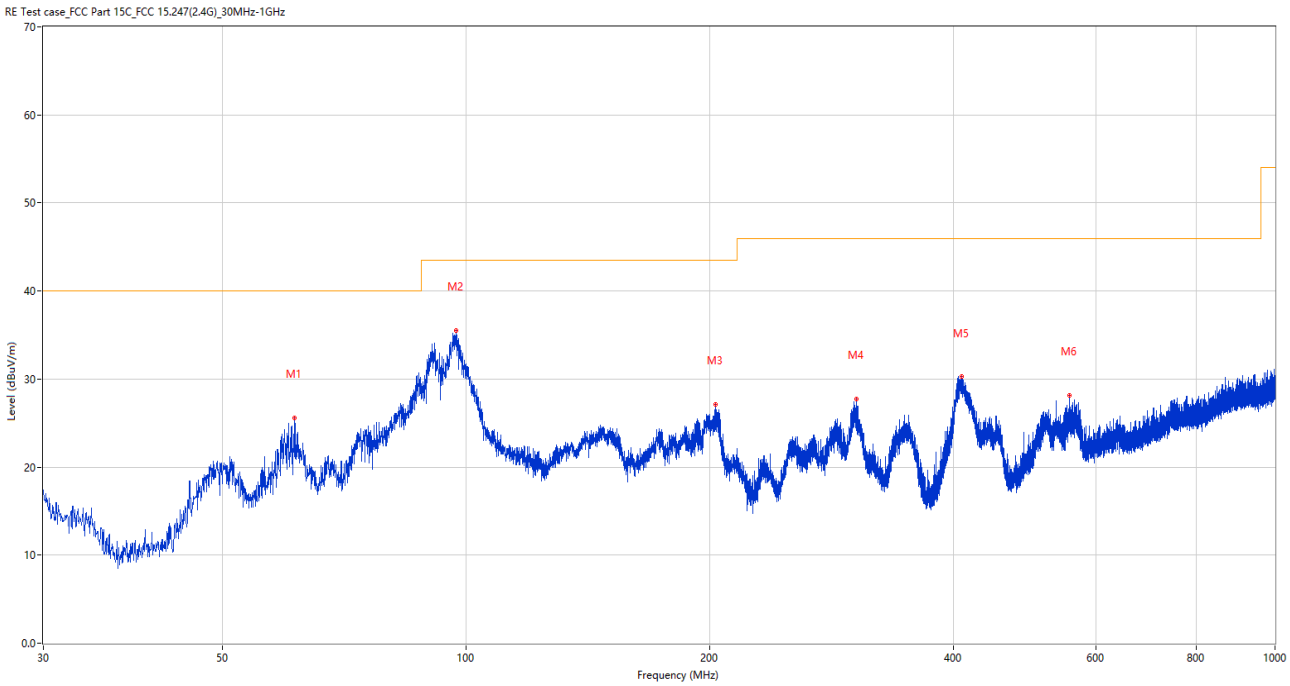
Note [3]: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested and DH5-Hopping mode is the worst.

Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

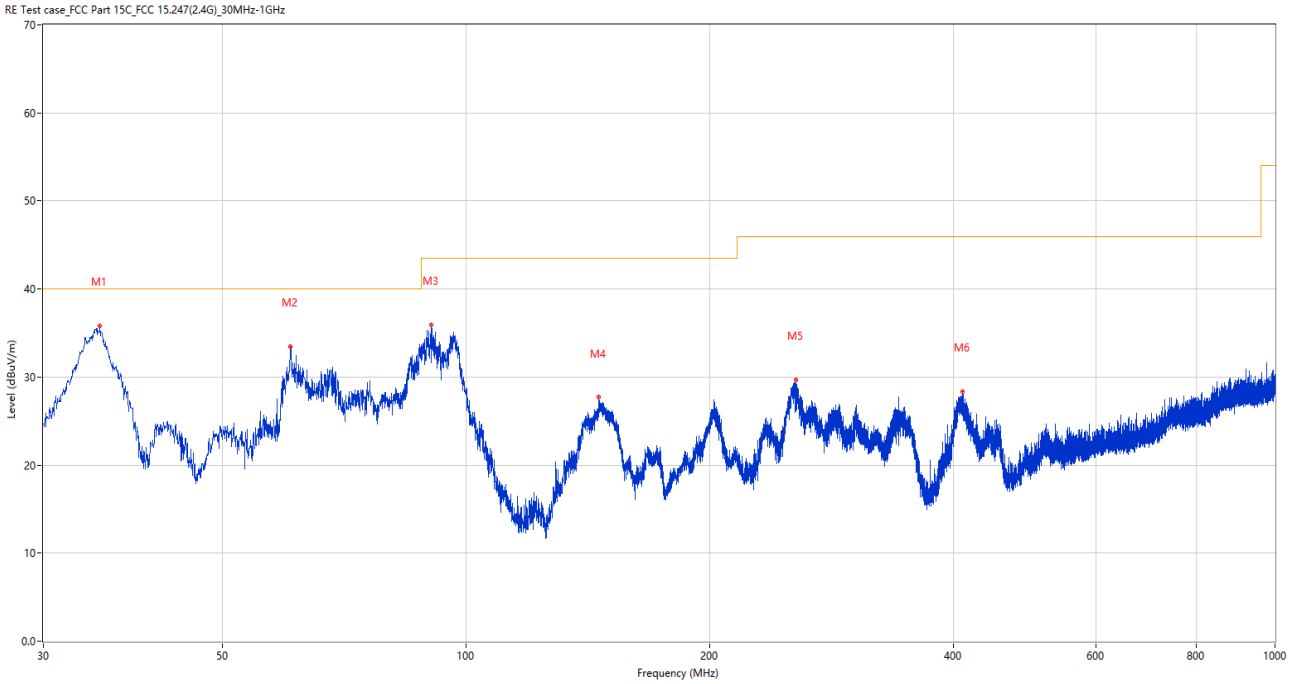
Test Data and Plots

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	61.380	25.56	-26.36	40.0	14.44	Peak	205.00	200	Horizontal	Pass
2	97.173	35.52	-26.34	43.5	7.98	Peak	80.00	200	Horizontal	Pass
3	203.194	27.10	-26.21	43.5	16.40	Peak	88.00	100	Horizontal	Pass
4	303.685	27.70	-23.26	46.0	18.30	Peak	273.00	200	Horizontal	Pass
5	409.561	30.25	-20.16	46.0	15.75	Peak	9.00	100	Horizontal	Pass
6	557.244	28.13	-16.82	46.0	17.87	Peak	37.00	200	Horizontal	Pass

30 MHz to 1 GHz, ANT V

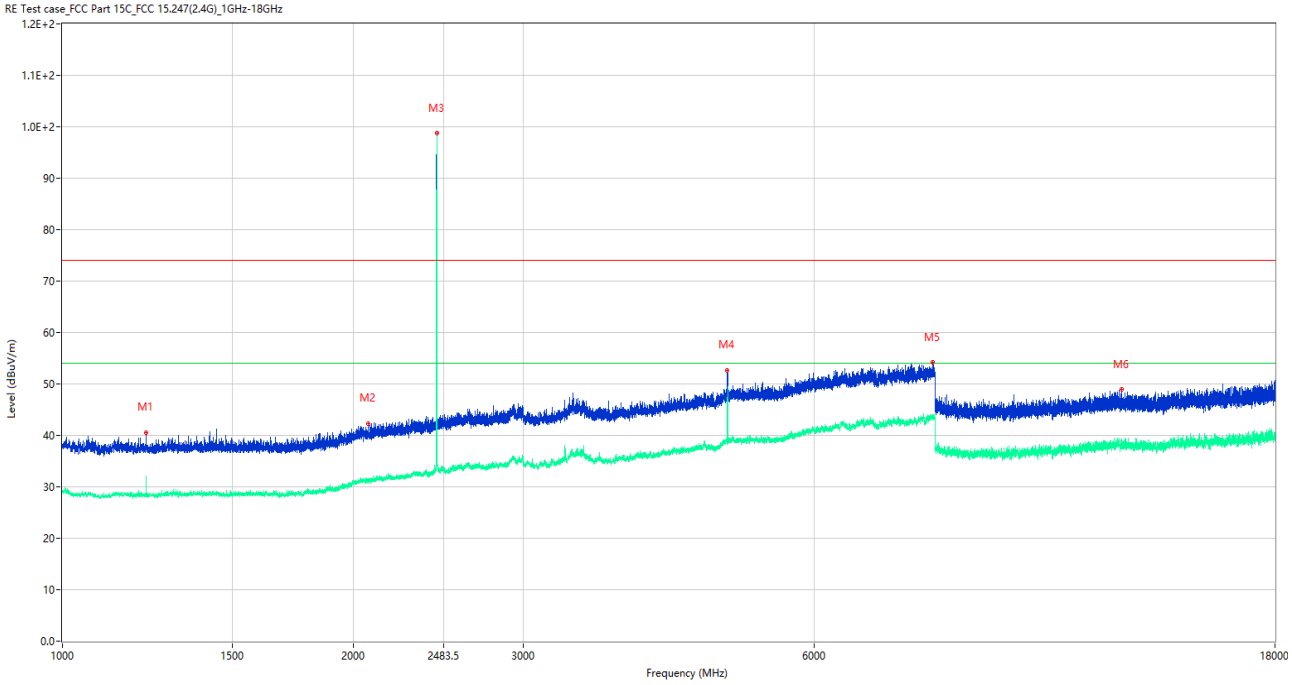


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	35.238	35.84	-27.66	40.0	4.16	Peak	75.00	100	Vertical	Pass
2	60.652	33.47	-26.18	40.0	6.53	Peak	124.00	100	Vertical	Pass
3	90.625	35.94	-27.88	43.5	7.56	Peak	118.00	100	Vertical	Pass
4	145.964	27.69	-29.58	43.5	15.81	Peak	107.00	200	Vertical	Pass
5	255.428	29.66	-24.08	46.0	16.34	Peak	112.00	100	Vertical	Pass
6	410.337	28.33	-20.18	46.0	17.67	Peak	181.00	200	Vertical	Pass

Note 1: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

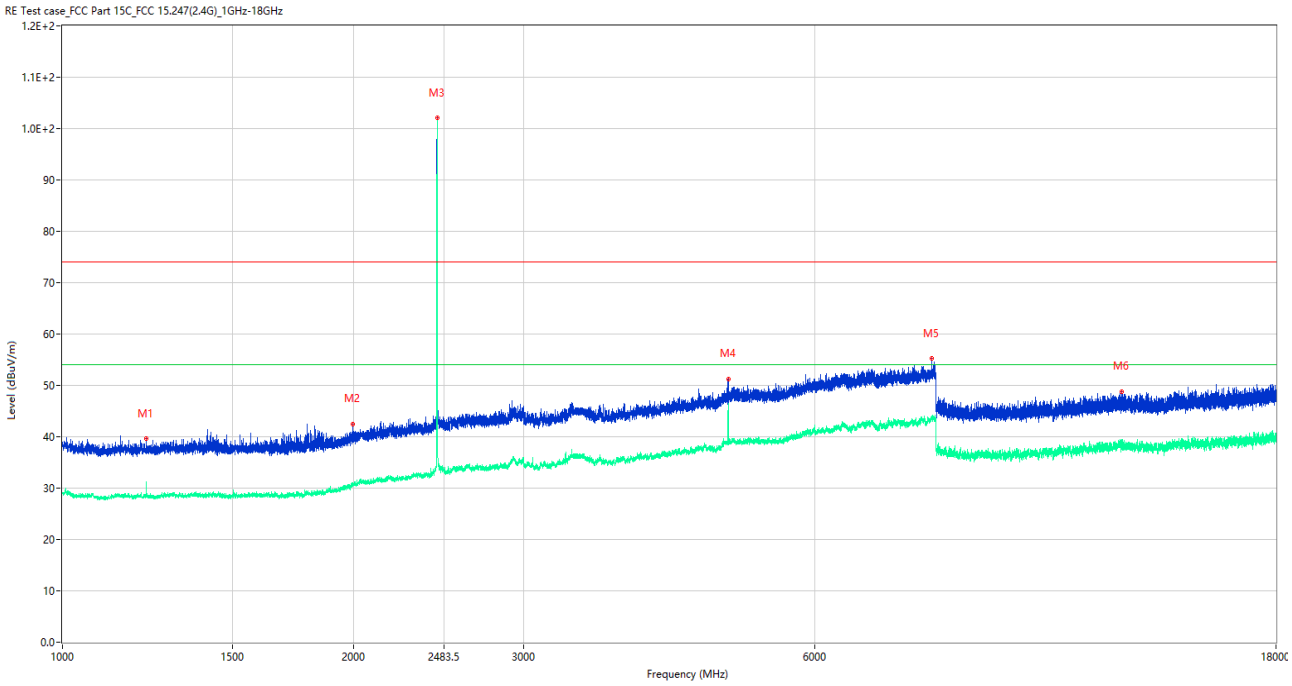
Note 2: The spurious from 18GHz-25GHz is noise only, do not show on the report.

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



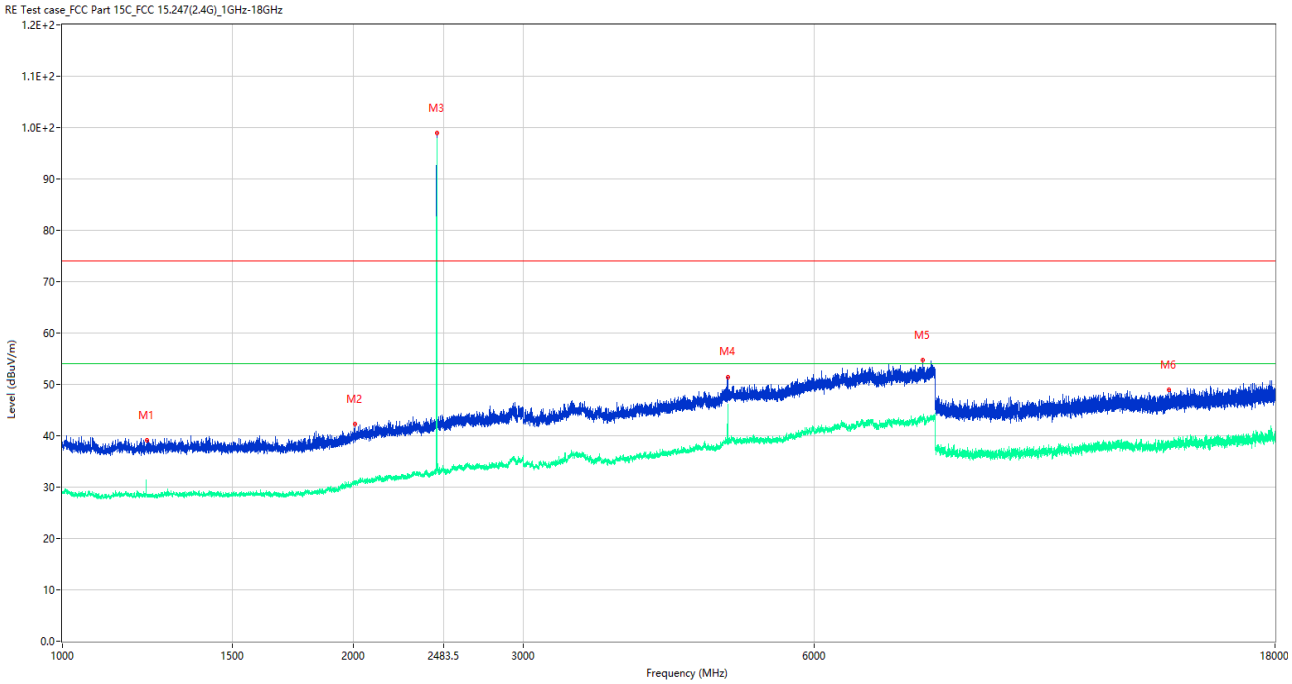
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1221.000	40.60	-15.98	74.0	33.40	Peak	187.00	150	Horizontal	Pass
1**	1221.000	30.41	-15.98	54.0	23.59	AV	187.00	150	Horizontal	Pass
2	2072.500	42.31	-13.74	74.0	31.69	Peak	168.00	150	Horizontal	Pass
2**	2072.500	31.16	-13.74	54.0	22.84	AV	168.00	150	Horizontal	Pass
3	2440.750	98.76	-12.38	74.0	-24.76	Peak	205.00	150	Horizontal	N/A
3**	2440.750	97.46	-12.38	54.0	-43.46	AV	205.00	150	Horizontal	N/A
4	4881.500	52.68	-2.31	74.0	21.32	Peak	68.00	150	Horizontal	Pass
4**	4881.500	45.45	-2.31	54.0	8.55	AV	68.00	150	Horizontal	Pass
5	7961.000	54.20	2.35	74.0	19.80	Peak	323.00	150	Horizontal	Pass
5**	7961.000	43.81	2.35	54.0	10.19	AV	323.00	150	Horizontal	Pass
6	12486.500	48.88	-2.50	74.0	25.12	Peak	249.00	150	Horizontal	Pass
6**	12486.500	38.28	-2.50	54.0	15.72	AV	249.00	150	Horizontal	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



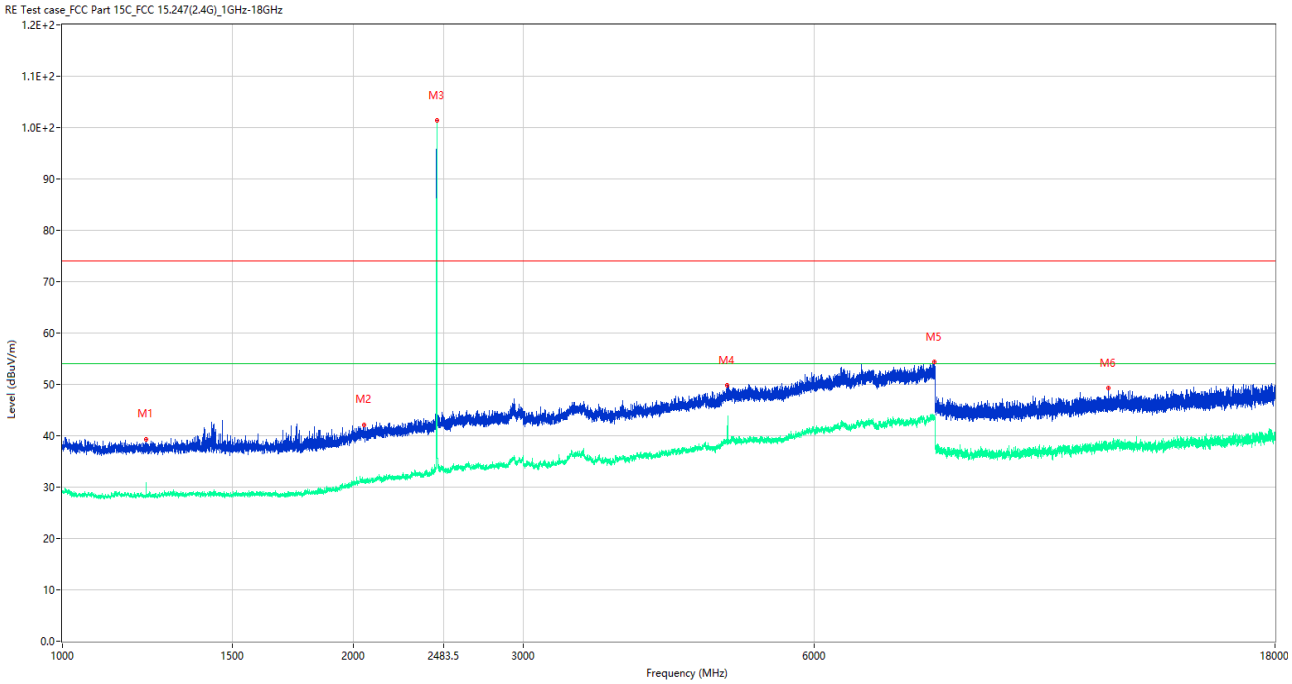
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1220.250	39.71	-15.97	74.0	34.29	Peak	360.00	150	Vertical	Pass
1**	1220.250	30.86	-15.97	54.0	23.14	AV	360.00	150	Vertical	Pass
2	1994.750	42.44	-14.56	74.0	31.56	Peak	360.00	150	Vertical	Pass
2**	1994.750	30.29	-14.56	54.0	23.71	AV	360.00	150	Vertical	Pass
3	2441.000	102.10	-12.39	74.0	-28.10	Peak	162.00	150	Vertical	N/A
3**	2441.000	101.84	-12.39	54.0	-47.84	AV	162.00	150	Vertical	N/A
4	4882.000	50.89	-2.31	74.0	23.11	Peak	0.00	150	Vertical	Pass
4**	4882.000	46.48	-2.31	54.0	7.52	AV	0.00	150	Vertical	Pass
5	7933.500	55.19	2.08	74.0	18.81	Peak	0.00	150	Vertical	Pass
5**	7933.500	43.66	2.08	54.0	10.34	AV	0.00	150	Vertical	Pass
6	12460.000	48.79	-2.29	74.0	25.21	Peak	322.00	150	Vertical	Pass
6**	12460.000	38.96	-2.29	54.0	15.04	AV	322.00	150	Vertical	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1223.750	39.13	-15.99	74.0	34.87	Peak	251.00	150	Horizontal	Pass
1**	1223.750	28.62	-15.99	54.0	25.38	AV	251.00	150	Horizontal	Pass
2	2007.500	42.20	-14.24	74.0	31.80	Peak	351.00	150	Horizontal	Pass
2**	2007.500	30.86	-14.24	54.0	23.14	AV	351.00	150	Horizontal	Pass
3	2441.000	98.87	-12.39	74.0	-24.87	Peak	197.00	150	Horizontal	N/A
3**	2441.000	97.98	-12.39	54.0	-43.98	AV	197.00	150	Horizontal	N/A
4	4882.000	51.48	-2.31	74.0	22.52	Peak	66.00	150	Horizontal	Pass
4**	4882.000	44.03	-2.31	54.0	9.97	AV	66.00	150	Horizontal	Pass
5	7781.000	54.66	1.34	74.0	19.34	Peak	255.00	150	Horizontal	Pass
5**	7781.000	43.27	1.34	54.0	10.73	AV	255.00	150	Horizontal	Pass
6	13984.000	48.93	-1.83	74.0	25.07	Peak	95.00	150	Horizontal	Pass
6**	13984.000	38.38	-1.83	54.0	15.62	AV	95.00	150	Horizontal	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



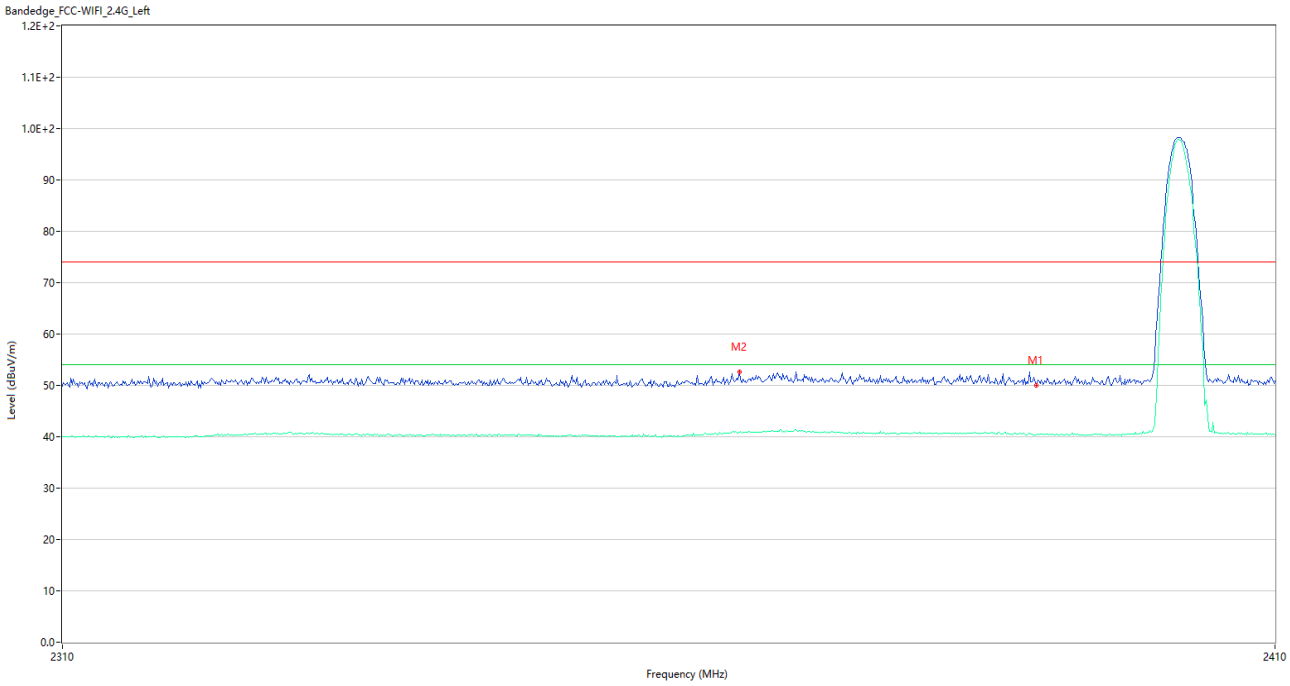
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1220.500	39.27	-15.97	74.0	34.73	Peak	305.00	150	Vertical	Pass
1**	1220.500	30.21	-15.97	54.0	23.79	AV	305.00	150	Vertical	Pass
2	2054.250	42.15	-13.76	74.0	31.85	Peak	273.00	150	Vertical	Pass
2**	2054.250	31.29	-13.76	54.0	22.71	AV	273.00	150	Vertical	Pass
3	2441.000	101.40	-12.39	74.0	-27.40	Peak	141.00	150	Vertical	N/A
3**	2441.000	100.73	-12.39	54.0	-46.73	AV	141.00	150	Vertical	N/A
4	4881.500	49.80	-2.31	74.0	24.20	Peak	0.00	150	Vertical	Pass
4**	4881.500	40.20	-2.31	54.0	13.80	AV	0.00	150	Vertical	Pass
5	7989.500	54.31	1.78	74.0	19.69	Peak	35.00	150	Vertical	Pass
5**	7989.500	43.49	1.78	54.0	10.51	AV	35.00	150	Vertical	Pass
6	12103.500	49.30	-3.08	74.0	24.70	Peak	360.00	150	Vertical	Pass
6**	12103.500	37.74	-3.08	54.0	16.26	AV	360.00	150	Vertical	Pass

A.9 Band Edge (Restricted-band band-edge)

Note [1]: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.
Note [2]: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.
Note [3]: According the ANSI C63.10-2013, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
Note [4]: The Level (dBuV/m) has been corrected by factor.

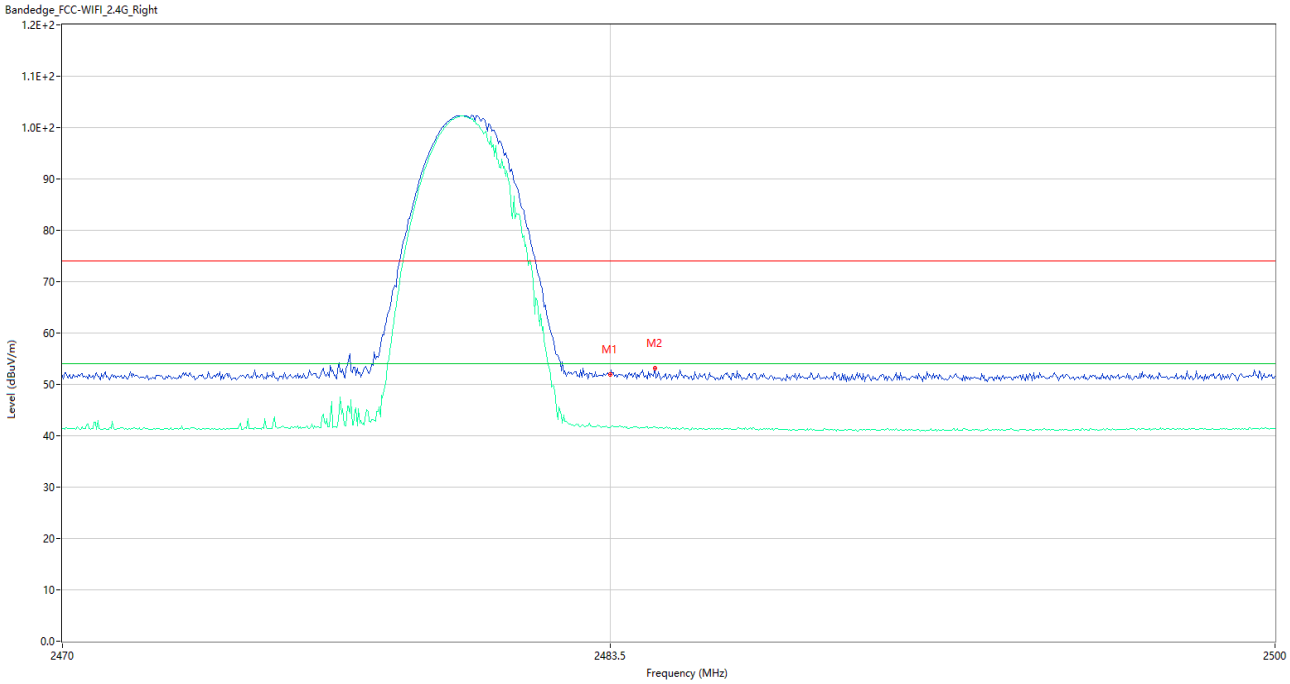
Test Data and Plots

GFSK LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2390.000	49.93	-4.87	74.0	24.07	Peak	232.16	150	Horizontal	Pass
1**	2390.000	40.43	-4.87	54.0	13.57	AV	232.16	150	Horizontal	Pass
2	2365.300	52.62	-4.51	74.0	21.38	Peak	360.00	150	Horizontal	Pass
2**	2365.300	40.80	-4.51	54.0	13.20	AV	360.00	150	Horizontal	Pass

GFSK HIGH CHANNEL

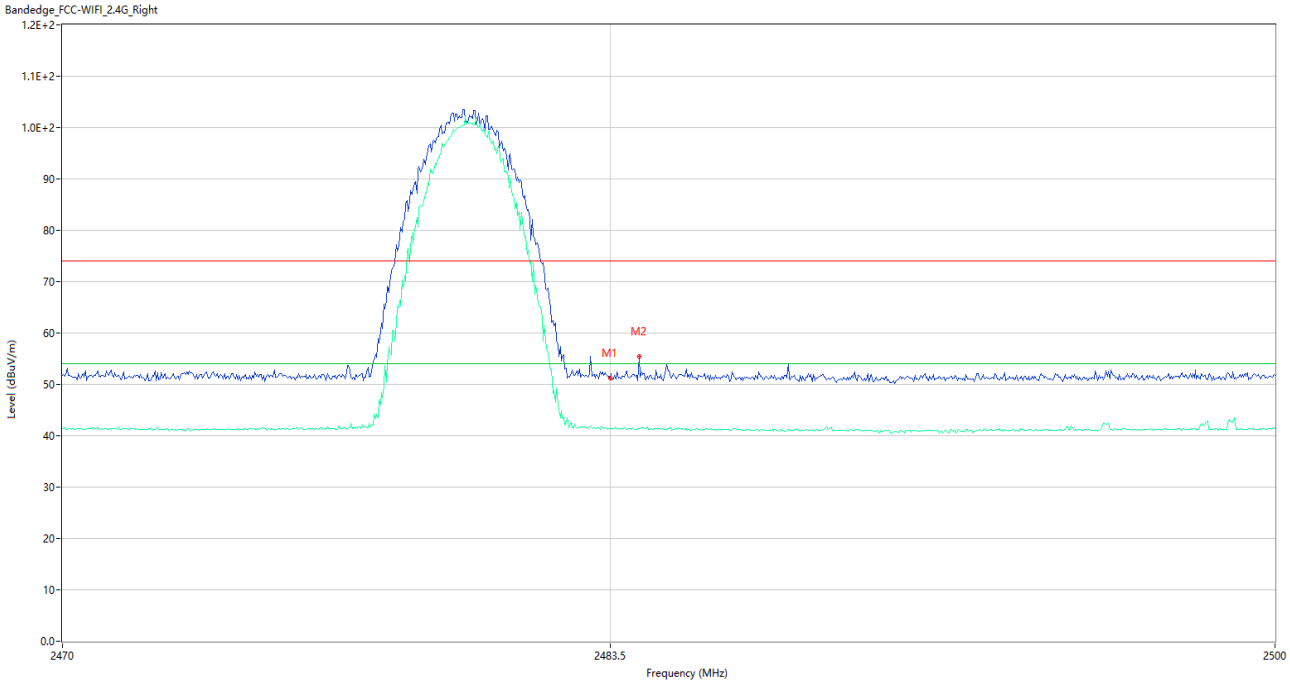


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	51.90	-3.78	74.0	22.10	Peak	297.00	150	Vertical	Pass
1**	2483.500	41.62	-3.78	54.0	12.38	AV	297.00	150	Vertical	Pass
2	2484.610	53.16	-3.78	74.0	20.84	Peak	242.00	150	Vertical	Pass
2**	2484.610	41.70	-3.78	54.0	12.30	AV	242.00	150	Vertical	Pass

8-DPSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2390.000	51.77	-4.87	74.0	22.23	Peak	230.89	150	Vertical	Pass
1**	2390.000	40.60	-4.87	54.0	13.40	AV	230.89	150	Vertical	Pass
2	2371.300	53.15	-4.04	74.0	20.85	Peak	0.00	150	Vertical	Pass
2**	2371.300	40.97	-4.04	54.0	13.03	AV	0.00	150	Vertical	Pass

8-DPSK HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	51.30	-3.78	74.0	22.70	Peak	20.00	150	Vertical	Pass
1**	2483.500	41.44	-3.78	54.0	12.56	AV	20.00	150	Vertical	Pass
2	2484.220	55.43	-3.78	74.0	18.57	Peak	105.00	150	Vertical	Pass
2**	2484.220	41.40	-3.78	54.0	12.60	AV	105.00	150	Vertical	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SH2480553-AR-1.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SH2480553-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SH2480553-AI.PDF”.

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--END OF REPORT--