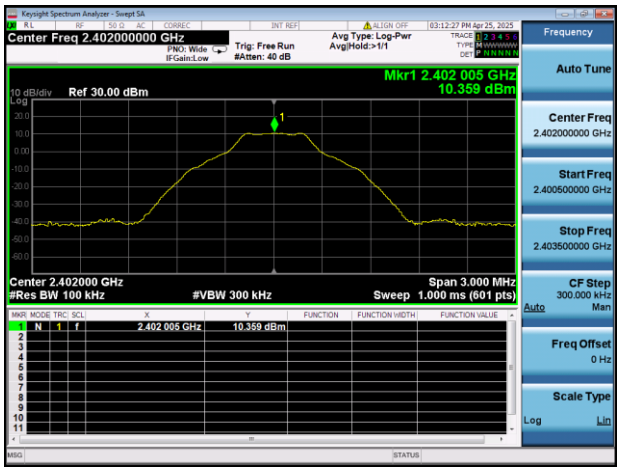
A.6 Conducted Spurious Emissions & Authorized-band band-edge

Test Data

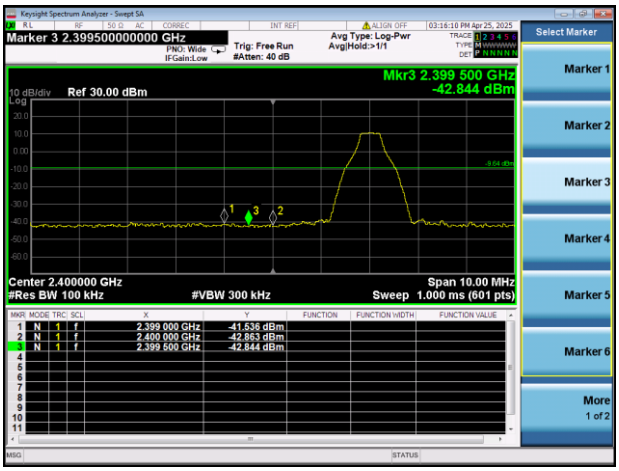
GFSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-29.99	10.36	-9.64	Pass
Middle	-30.92	11.58	-8.42	Pass
High	-31.17	15.45	-4.55	Pass
8-DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-30.81	9.79	-10.21	Pass
Middle	-31.27	11.06	-8.94	Pass
High	-30.92	15.53	-4.47	Pass
Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-30.88	13.18	-6.82	Pass
8-DPSK	-32.32	12.77	-7.23	Pass

Test Plots

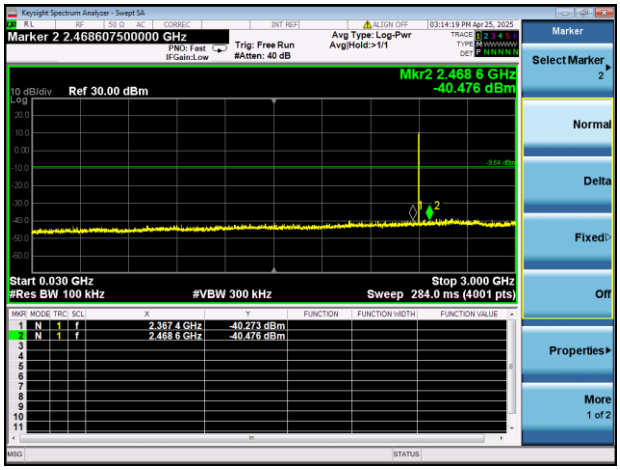
GFSK LOW CHANNEL, CARRIER LEVEL



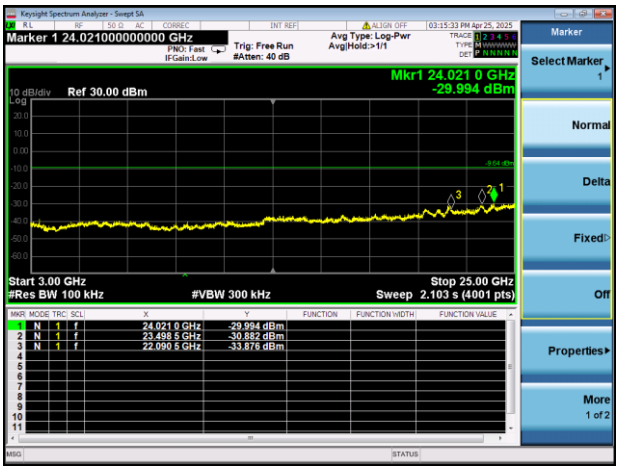
GFSK LOW CHANNEL, BAND EDGE



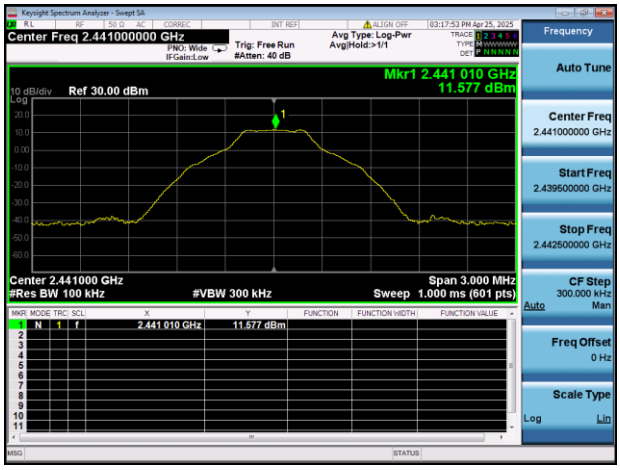
GFSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



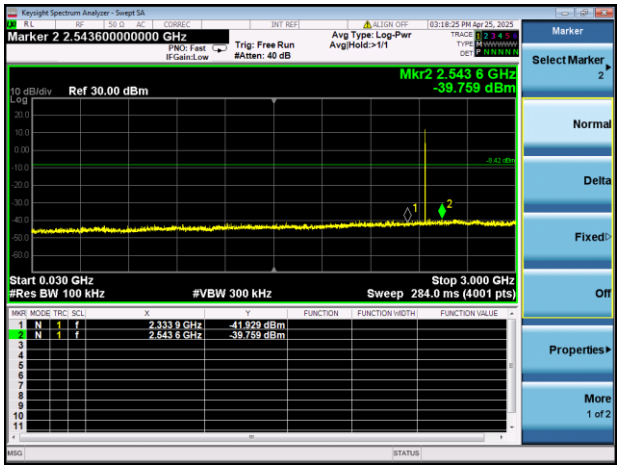
GFSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



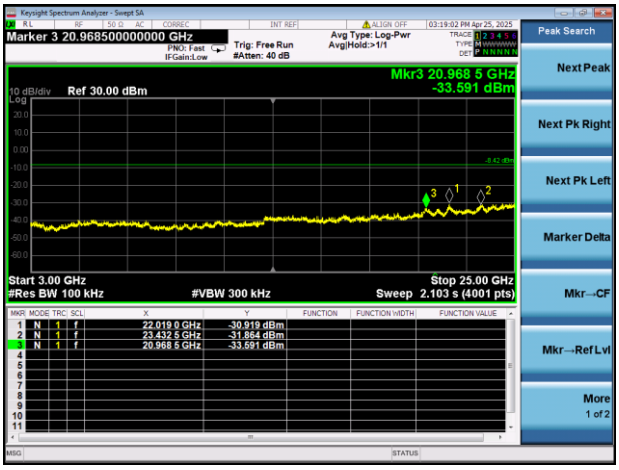
GFSK MIDDLE CHANNEL, CARRIER LEVEL



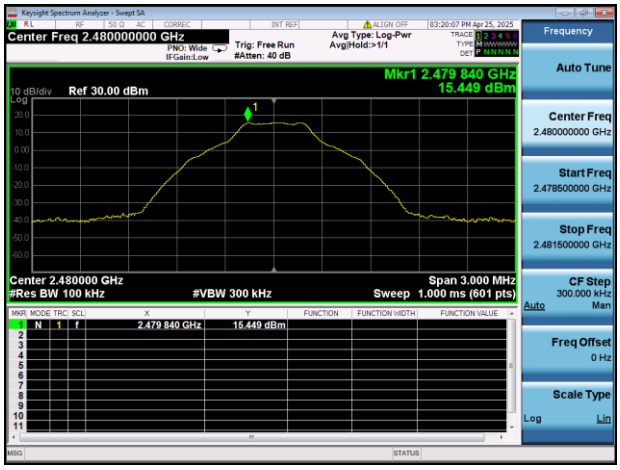
GFSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



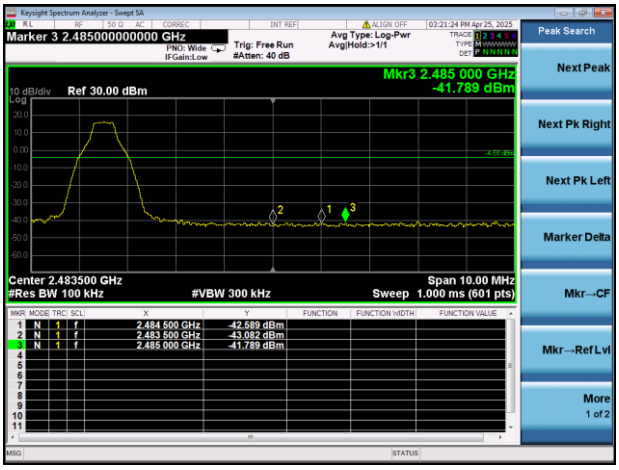
GFSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



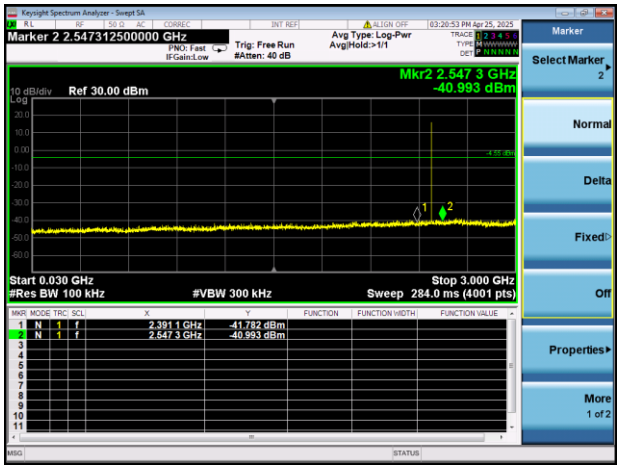
GFSK HIGH CHANNEL, CARRIER LEVEL



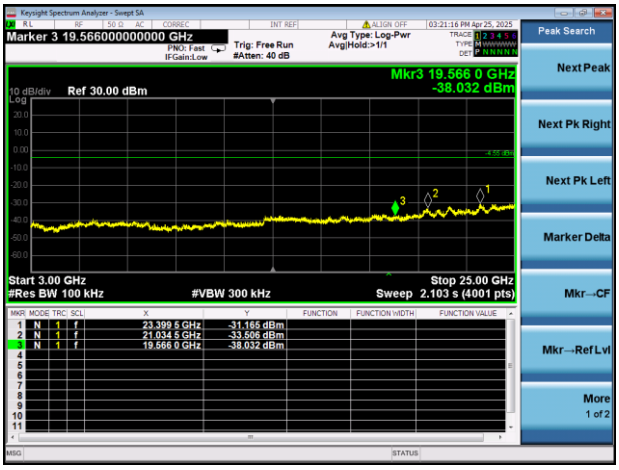
GFSK HIGH CHANNEL, BAND EDGE



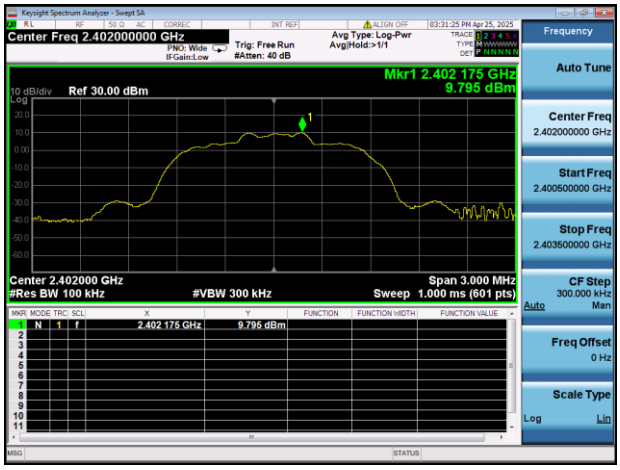
GFSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



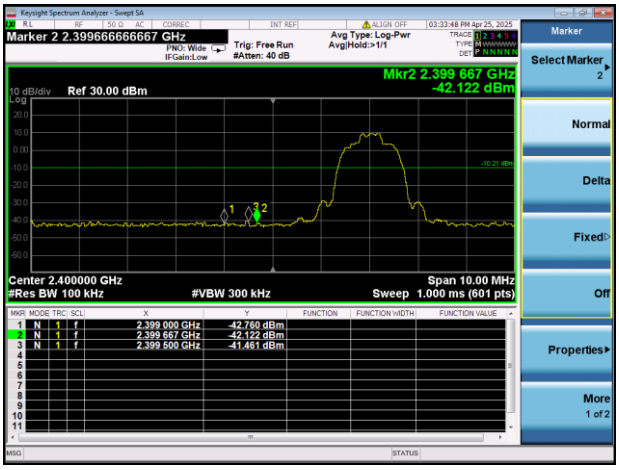
GFSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



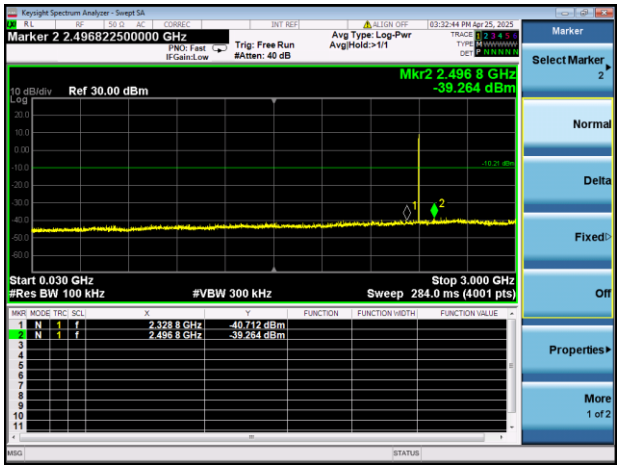
8-DPSK LOW CHANNEL, CARRIER LEVEL



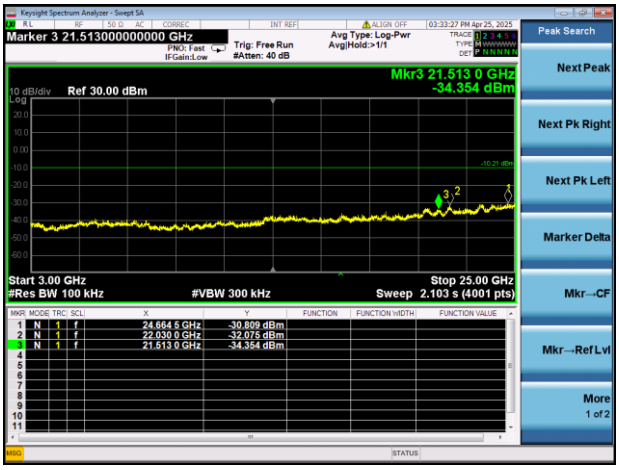
8-DPSK LOW CHANNEL, BAND EDGE



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

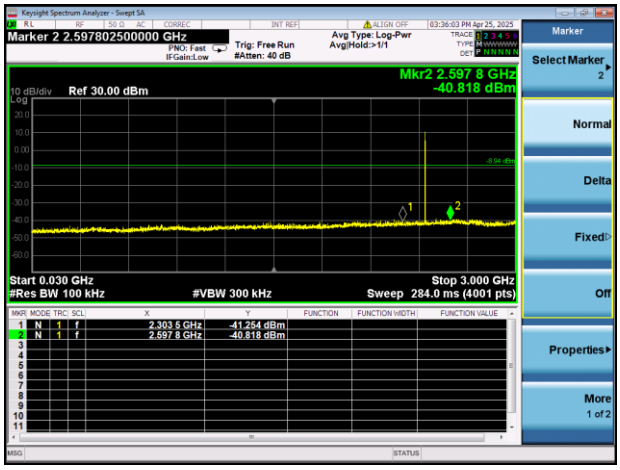


8-DPSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

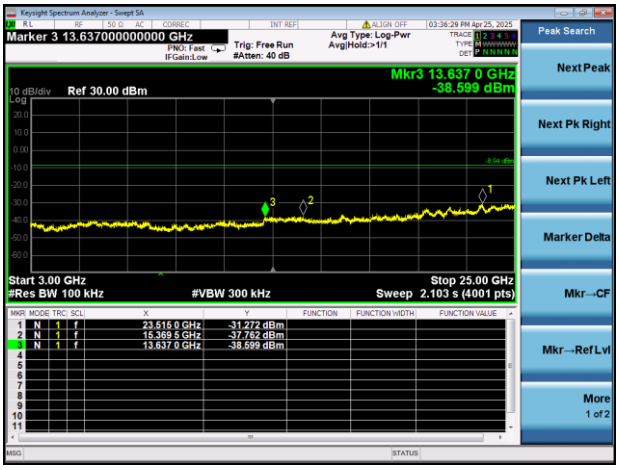


8-DPSK MIDDLE CHANNEL, CARRIER LEVEL

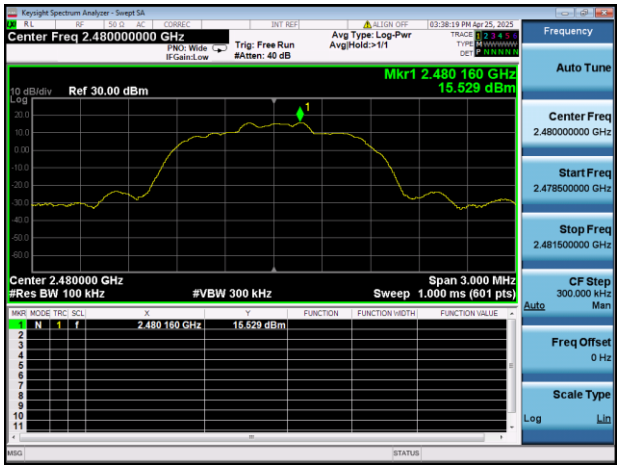
8-DPSK MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



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

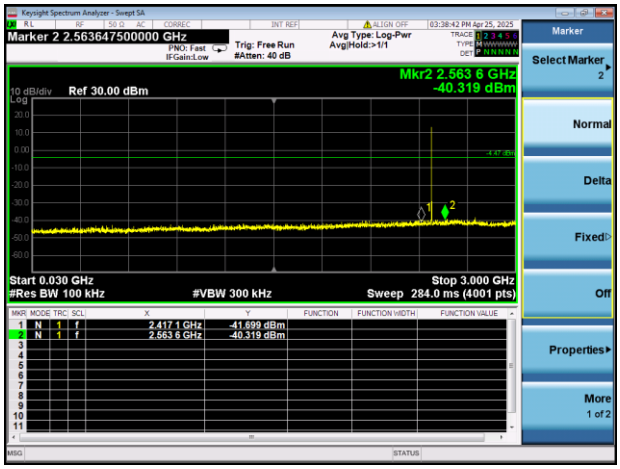


8-DPSK HIGH CHANNEL, CARRIER LEVEL

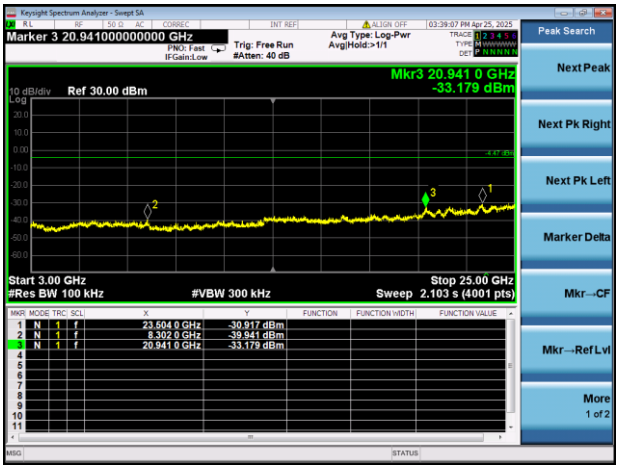


8-DPSK HIGH CHANNEL, BAND EDGE

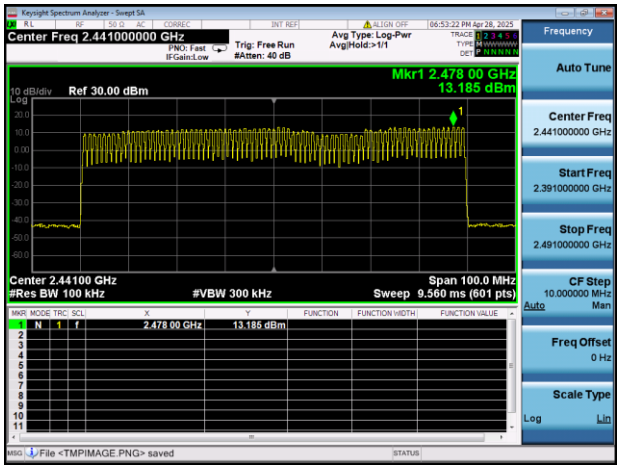
8-DPSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



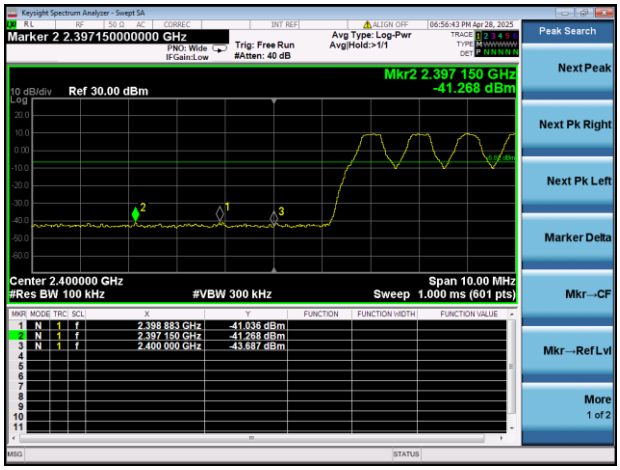
8-DPSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



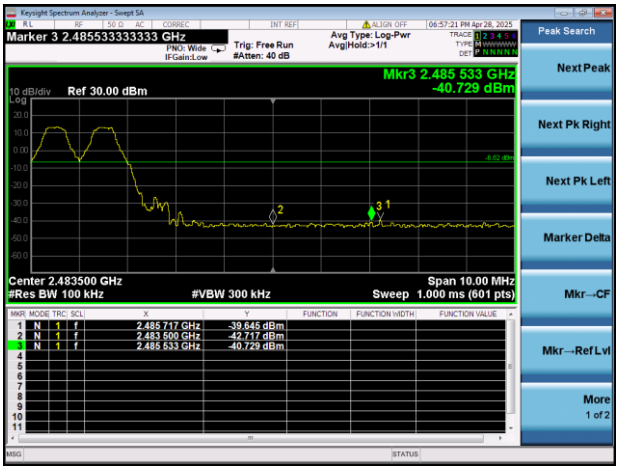
GFSK HOPPING, CARRIER LEVEL



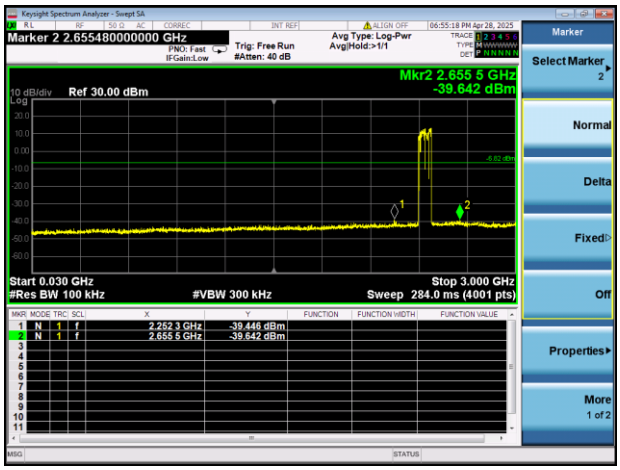
GFSK HOPPING BAND EDGE (LOW)



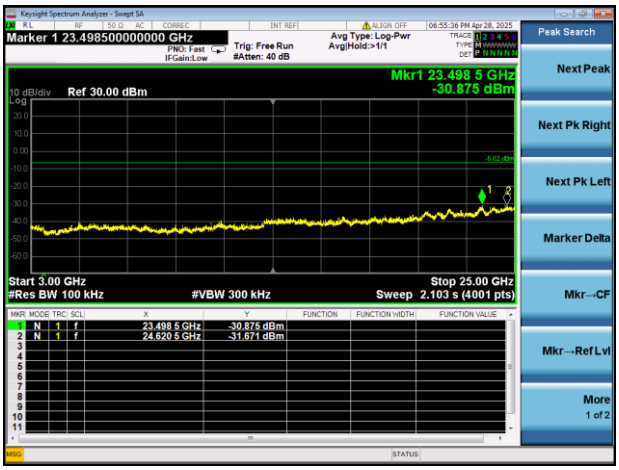
GFSK HOPPING BAND EDGE (HIGH)



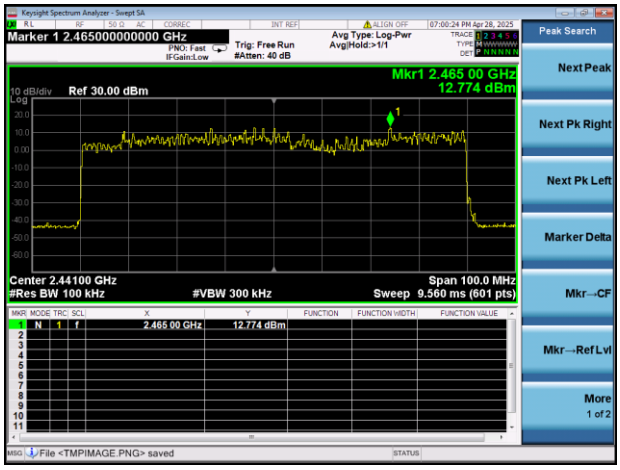
GFSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



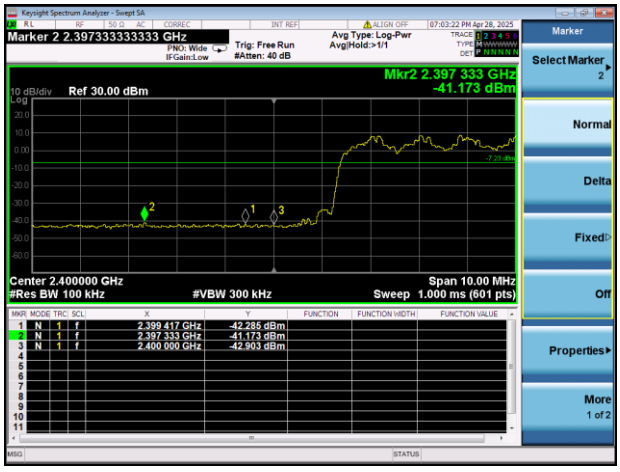
GFSK Hopping Mode, SPURIOUS 3GHz ~ 25 GHz



8-DPSK HOPPING, CARRIER LEVEL

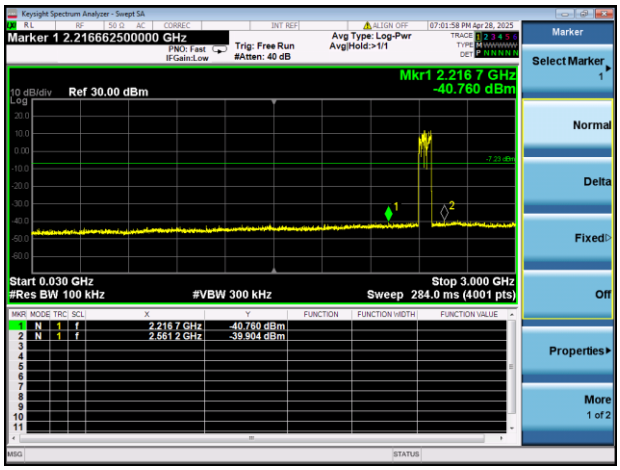


8-DPSK Hopping BAND EDGE (LOW)

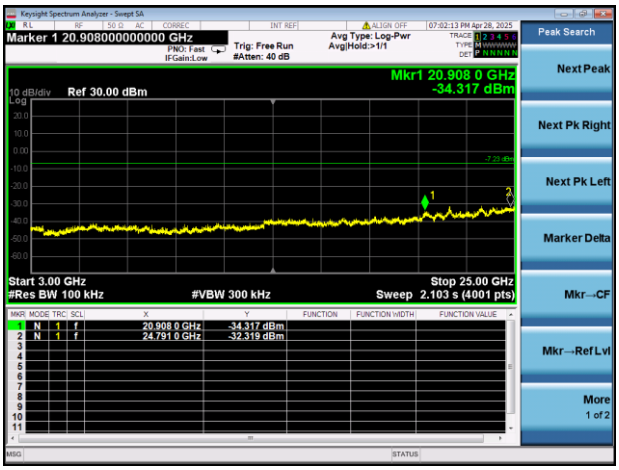


8-DPSK Hopping BAND EDGE (HIGH)

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



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



A.7 Conducted Emission

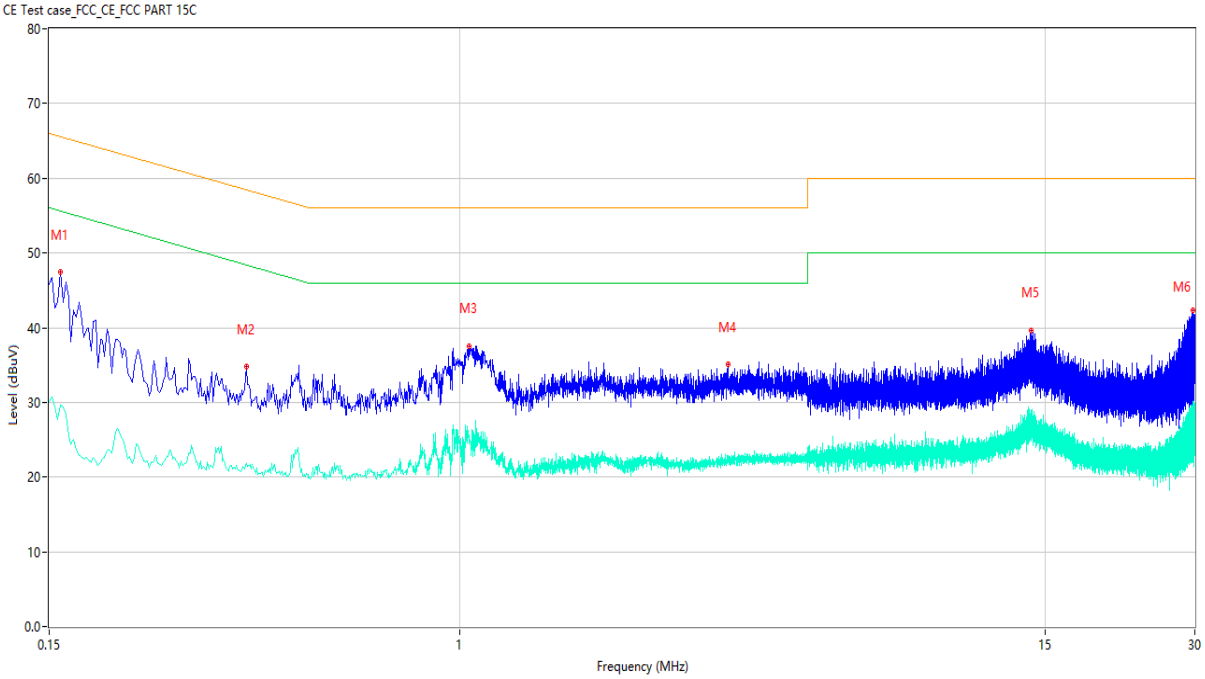
Note 1: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

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)

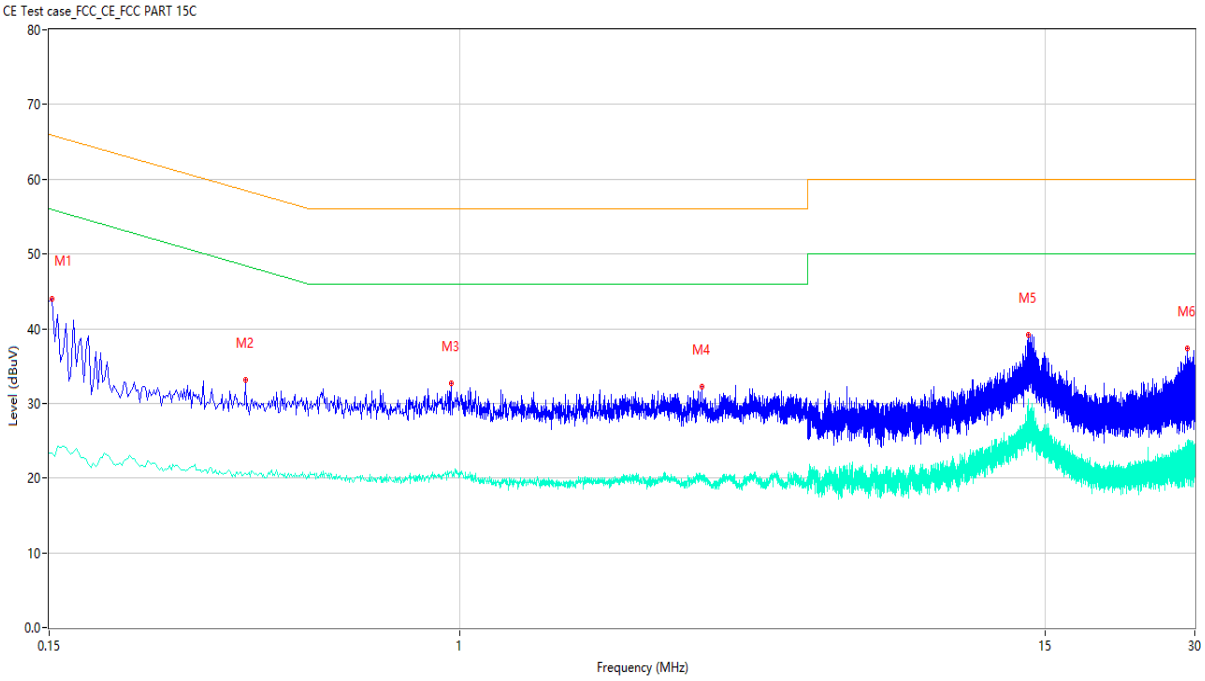
Test Data and Plots

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.158	47.39	9.82	65.57	18.18	Peak	L	Pass
1**	0.158	29.74	9.82	55.57	25.83	AV	L	Pass
2	0.374	34.78	9.77	58.41	23.63	Peak	L	Pass
2**	0.374	21.87	9.77	48.41	26.54	AV	L	Pass
3	1.048	37.57	9.78	56.00	18.43	Peak	L	Pass
3**	1.048	25.59	9.78	46.00	20.41	AV	L	Pass
4	3.460	35.03	9.62	56.00	20.97	Peak	L	Pass
4**	3.460	22.92	9.62	46.00	23.08	AV	L	Pass
5	14.058	39.68	8.97	60.00	20.32	Peak	L	Pass
5**	14.058	28.02	8.97	50.00	21.98	AV	L	Pass
6	29.790	42.28	8.44	60.00	17.72	Peak	L	Pass
6**	29.790	27.21	8.44	50.00	22.79	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.152	44.07	9.73	65.89	21.82	Peak	N	Pass
1**	0.152	23.28	9.73	55.89	32.61	AV	N	Pass
2	0.372	33.18	9.74	58.46	25.28	Peak	N	Pass
2**	0.372	20.70	9.74	48.46	27.76	AV	N	Pass
3	0.962	32.70	9.72	56.00	23.30	Peak	N	Pass
3**	0.962	20.79	9.72	46.00	25.21	AV	N	Pass
4	3.066	32.20	9.70	56.00	23.80	Peak	N	Pass
4**	3.066	19.91	9.70	46.00	26.09	AV	N	Pass
5	13.916	39.19	9.02	60.00	20.81	Peak	N	Pass
5**	13.916	28.86	9.02	50.00	21.14	AV	N	Pass
6	29.034	37.32	8.52	60.00	22.68	Peak	N	Pass
6**	29.034	24.94	8.52	50.00	25.06	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.

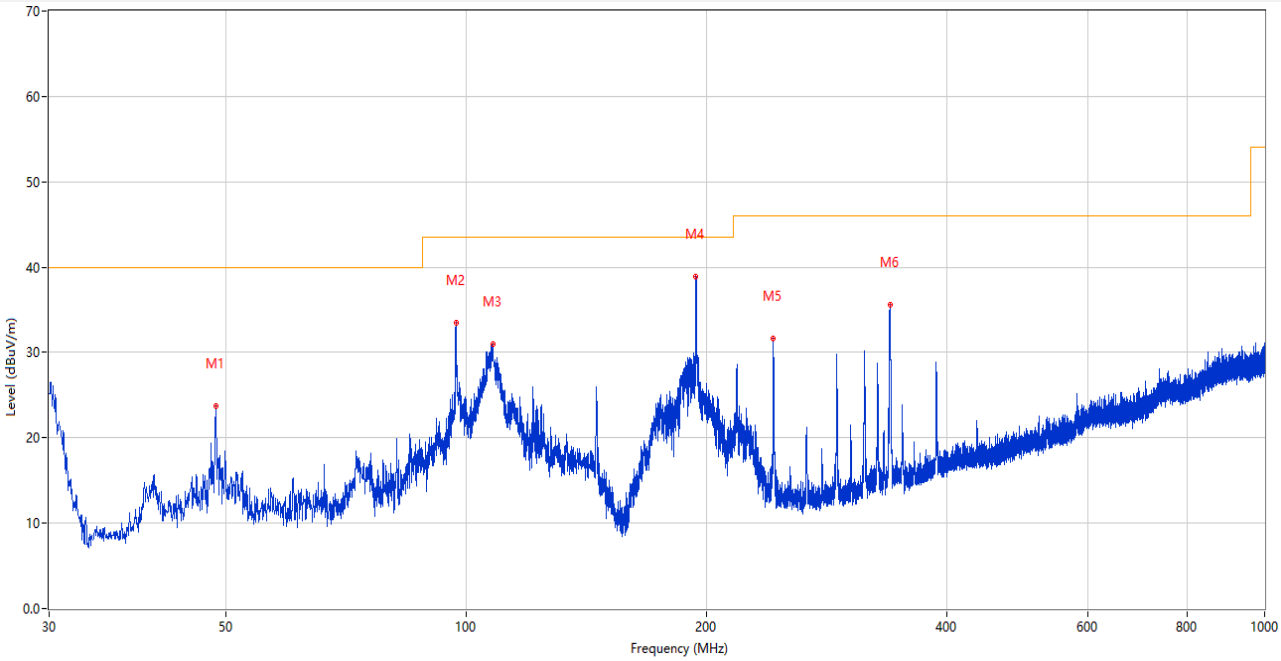
Note 3: The EUT is working in the Normal link mode below 1 GHz. All modes have been tested.

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

Note 5: 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.

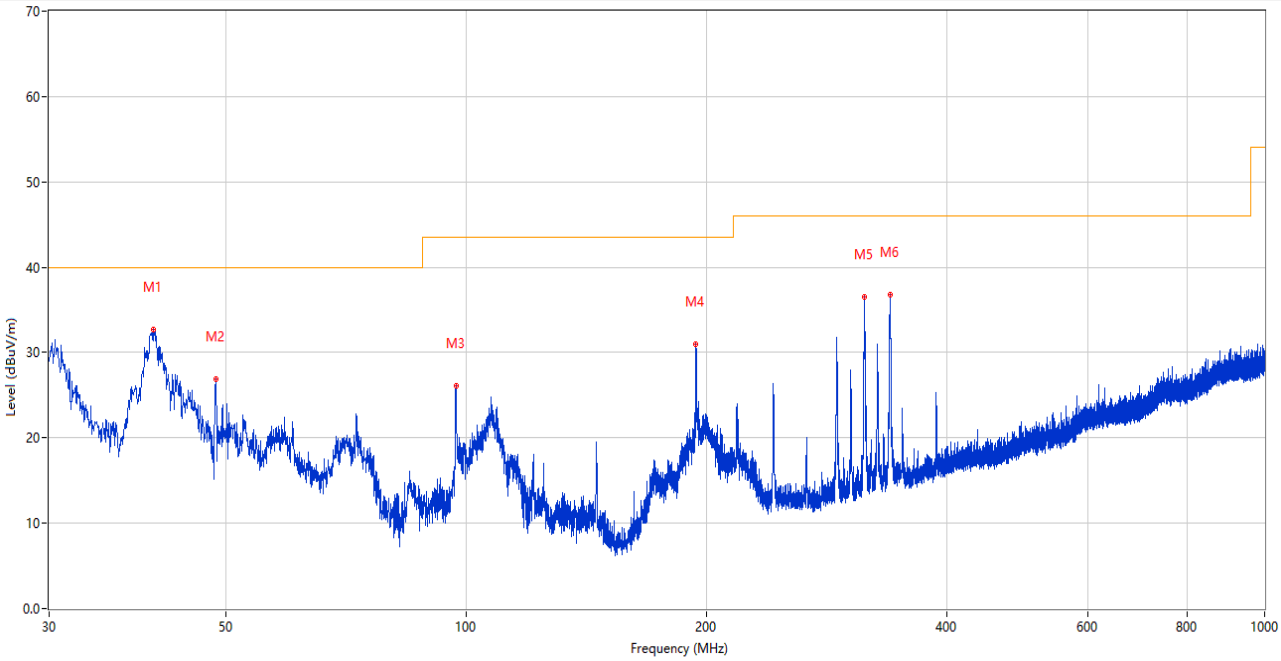
Test Data and Plots

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	48.527	23.78	-24.50	40.0	16.22	Peak	133.00	200	Horizontal	Pass
2	97.027	33.49	-26.36	43.5	10.01	Peak	280.00	200	Horizontal	Pass
3	108.036	31.00	-26.47	43.5	12.50	Peak	230.00	100	Horizontal	Pass
4	193.882	38.87	-25.71	43.5	4.63	Peak	78.00	100	Horizontal	Pass
5	242.333	31.65	-24.33	46.0	14.35	Peak	80.00	200	Horizontal	Pass
6	339.478	35.57	-21.96	46.0	10.43	Peak	268.00	200	Horizontal	Pass

30 MHz to 1 GHz, ANT V

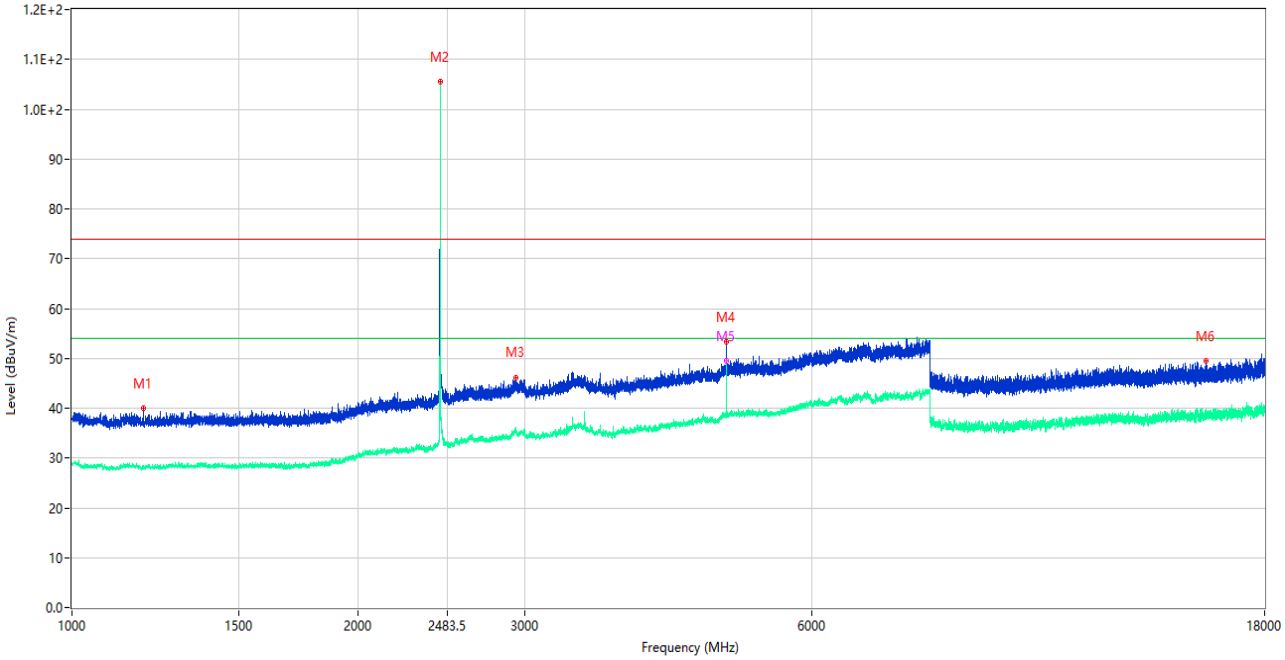


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	40.525	32.67	-25.76	40.0	7.33	Peak	200.00	100	Vertical	Pass
2	48.478	26.85	-24.51	40.0	13.15	Peak	169.00	100	Vertical	Pass
3	97.027	26.11	-26.36	43.5	17.39	Peak	300.00	100	Vertical	Pass
4	193.882	30.67	-25.71	43.5	12.83	Peak	0.00	200	Vertical	Pass
5	315.228	36.51	-22.97	46.0	9.49	Peak	82.00	100	Vertical	Pass
6	339.236	36.83	-21.99	46.0	9.17	Peak	108.00	100	Vertical	Pass

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

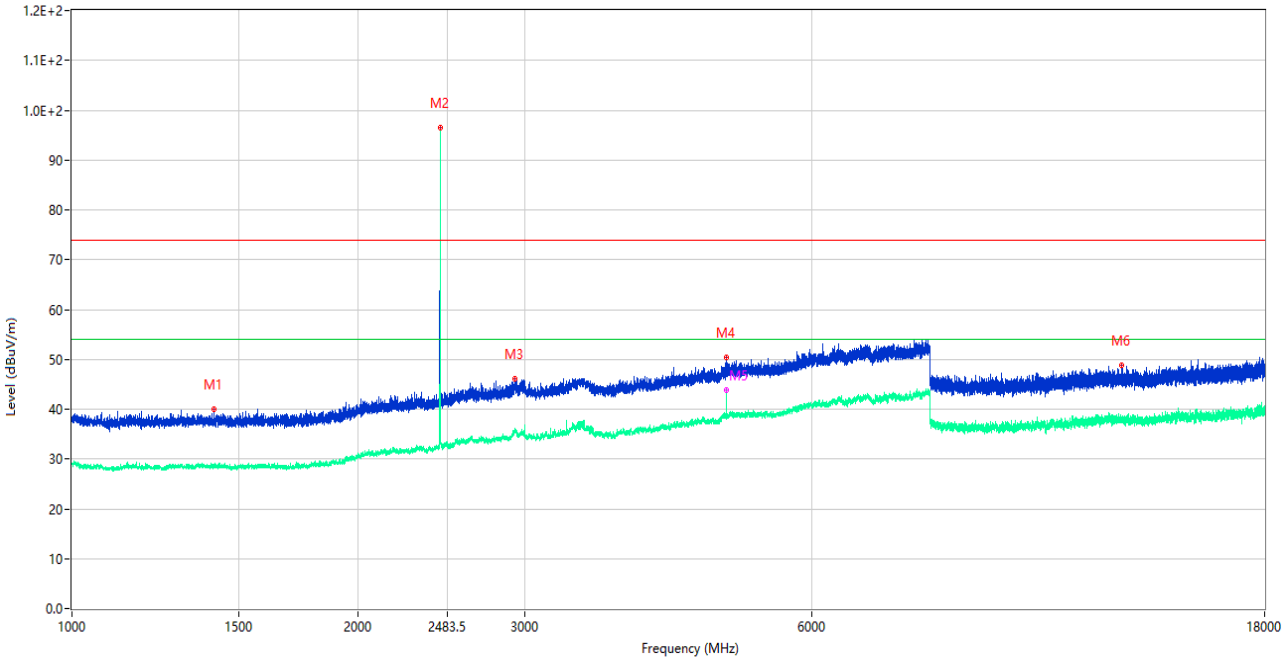
Note 2: The spurious from 18GHz-25GHz is noise only, do not show on the report.

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



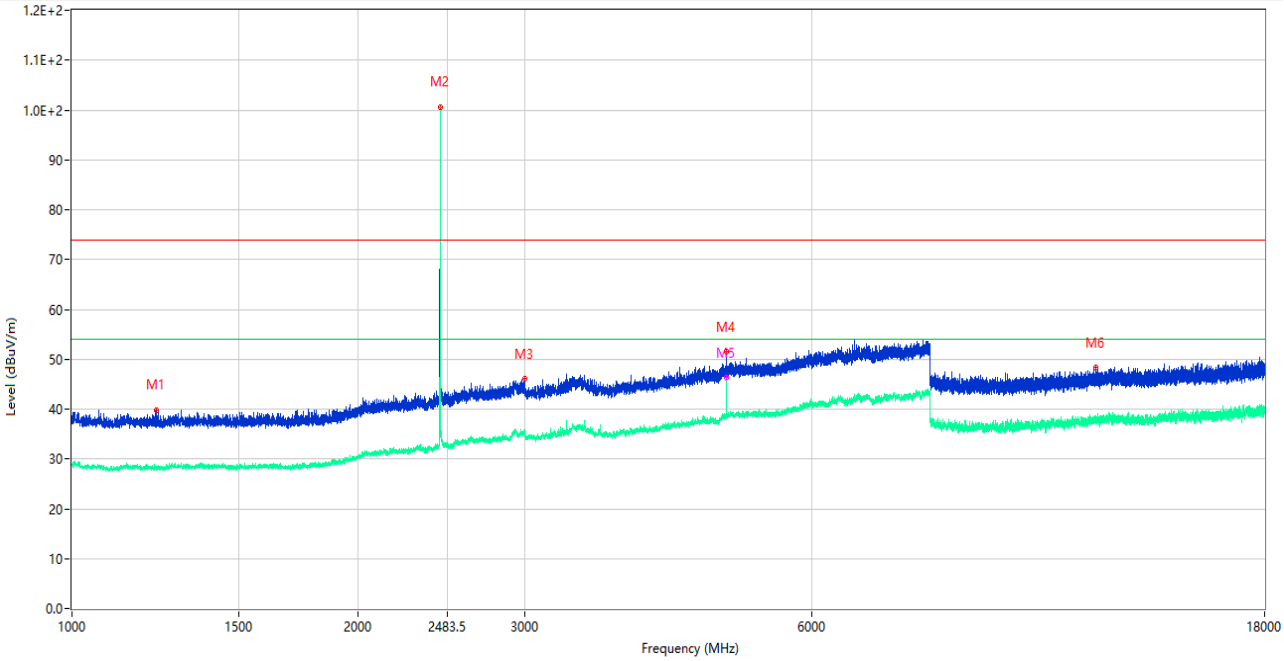
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1188.250	40.08	-15.91	74.0	33.92	Peak	93.00	150	Horizontal	Pass
1**	1188.250	28.43	-15.91	54.0	25.57	AV	93.00	150	Horizontal	Pass
2	2440.750	105.53	-12.38	74.0	-31.53	Peak	12.00	150	Horizontal	N/A
2**	2440.750	103.95	-12.38	54.0	-49.95	AV	12.00	150	Horizontal	N/A
3	2929.000	46.20	-7.96	74.0	27.80	Peak	353.00	150	Horizontal	Pass
3**	2929.000	35.57	-7.96	54.0	18.43	AV	353.00	150	Horizontal	Pass
4	4881.500	53.37	-2.31	74.0	20.63	Peak	210.00	150	Horizontal	Pass
4**	4881.500	45.61	-2.31	54.0	8.39	AV	210.00	150	Horizontal	Pass
5	4882.000	52.50	-2.31	74.0	21.50	Peak	210.00	150	Horizontal	Pass
5**	4882.000	49.52	-2.31	54.0	4.48	AV	210.00	150	Horizontal	Pass
6	15633.000	49.48	-1.84	74.0	24.52	Peak	148.00	150	Horizontal	Pass
6**	15633.000	38.69	-1.84	54.0	15.31	AV	148.00	150	Horizontal	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



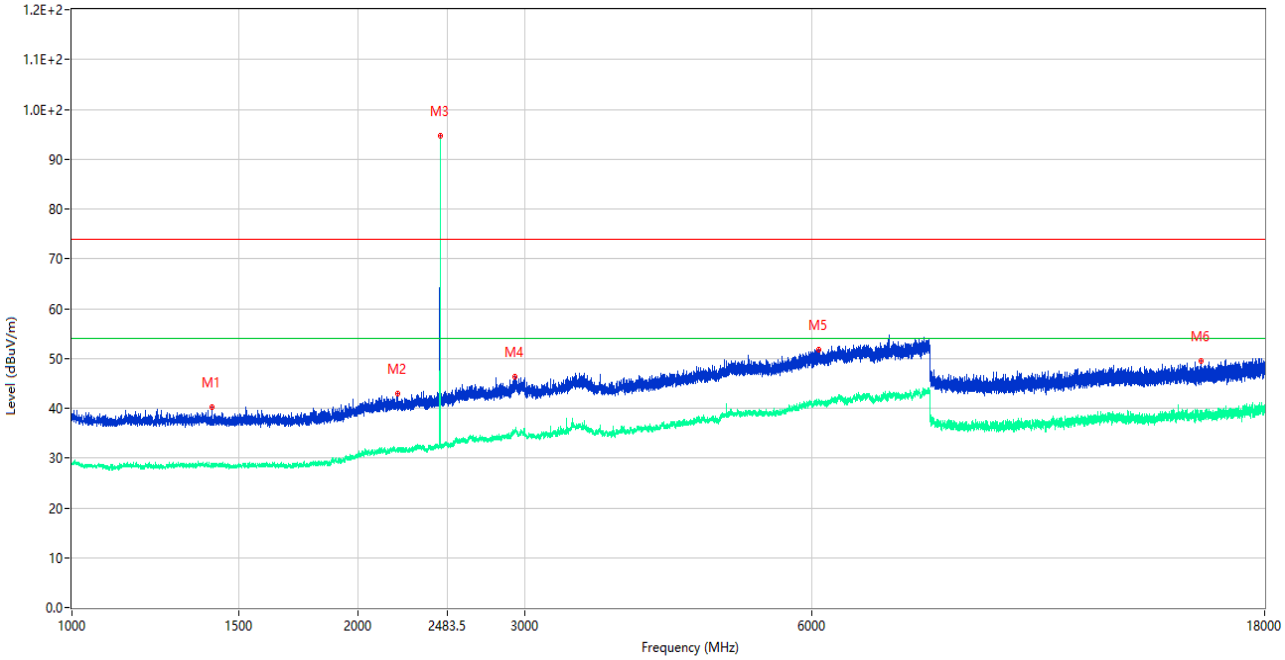
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1412.000	39.90	-15.97	74.0	34.10	Peak	212.00	150	Vertical	Pass
1**	1412.000	28.75	-15.97	54.0	25.25	AV	212.00	150	Vertical	Pass
2	2440.750	96.57	-12.38	74.0	-22.57	Peak	21.00	150	Vertical	N/A
2**	2440.750	94.97	-12.38	54.0	-40.97	AV	21.00	150	Vertical	N/A
3	2924.750	46.10	-8.22	74.0	27.90	Peak	252.00	150	Vertical	Pass
3**	2924.750	35.31	-8.22	54.0	18.69	AV	252.00	150	Vertical	Pass
4	4882.000	50.38	-2.31	74.0	23.62	Peak	162.00	150	Vertical	Pass
4**	4882.000	43.79	-2.31	54.0	10.21	AV	162.00	150	Vertical	Pass
5	4882.000	50.38	-2.31	74.0	23.62	Peak	162.00	150	Vertical	Pass
5**	4882.000	43.79	-2.31	54.0	10.21	AV	162.00	150	Vertical	Pass
6	12731.000	48.75	-3.21	74.0	25.25	Peak	360.00	150	Vertical	Pass
6**	12731.000	37.96	-3.21	54.0	16.04	AV	360.00	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	1227.500	39.86	-15.99	74.0	34.14	Peak	338.00	150	Horizontal	Pass
1**	1227.500	27.73	-15.99	54.0	26.27	AV	338.00	150	Horizontal	Pass
2	2441.000	100.67	-12.39	74.0	-26.67	Peak	16.00	150	Horizontal	N/A
2**	2441.000	99.96	-12.39	54.0	-45.96	AV	16.00	150	Horizontal	N/A
3	2999.000	46.05	-8.75	74.0	27.95	Peak	360.00	150	Horizontal	Pass
3**	2999.000	35.45	-8.75	54.0	18.55	AV	360.00	150	Horizontal	Pass
4	4882.000	51.55	-2.31	74.0	22.45	Peak	179.00	150	Horizontal	Pass
4**	4882.000	43.78	-2.31	54.0	10.22	AV	179.00	150	Horizontal	Pass
5	4882.500	50.62	-2.31	74.0	23.38	Peak	179.00	150	Horizontal	Pass
5**	4882.500	46.37	-2.31	54.0	7.63	AV	179.00	150	Horizontal	Pass
6	11965.000	48.42	-3.30	74.0	25.58	Peak	148.00	150	Horizontal	Pass
6**	11965.000	38.23	-3.30	54.0	15.77	AV	148.00	150	Horizontal	Pass

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



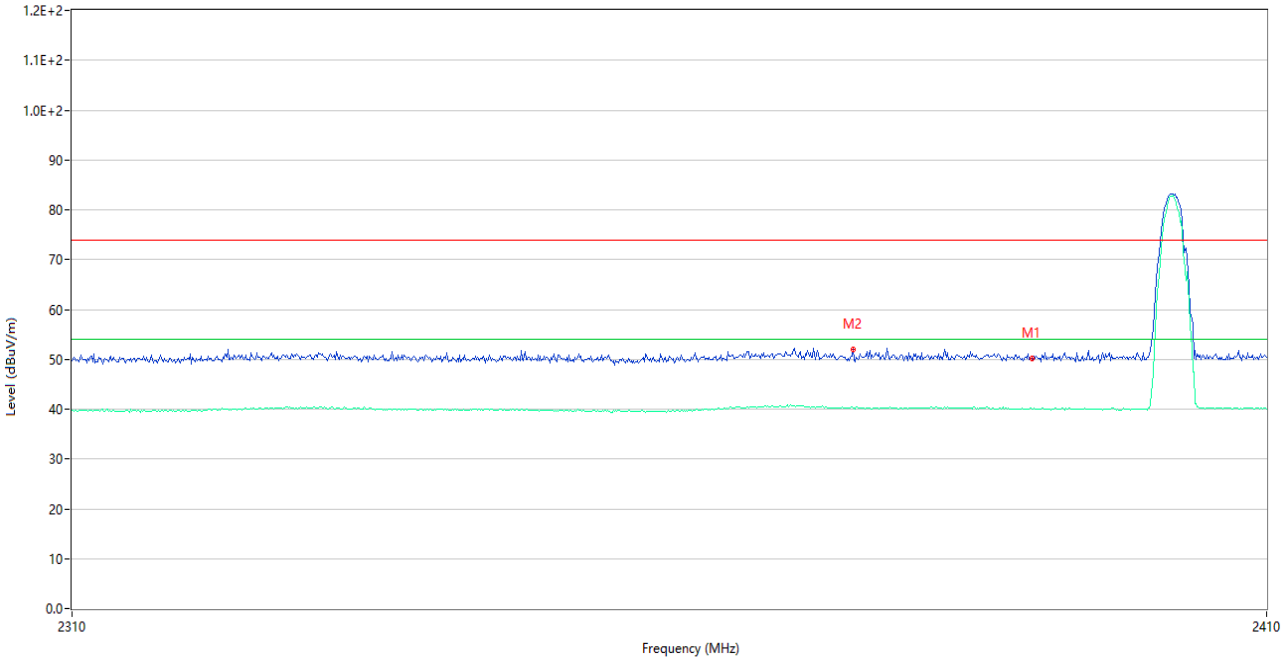
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1404.000	40.18	-15.97	74.0	33.82	Peak	359.00	150	Vertical	Pass
1**	1404.000	28.76	-15.97	54.0	25.24	AV	359.00	150	Vertical	Pass
2	2201.250	42.84	-13.33	74.0	31.16	Peak	157.00	150	Vertical	Pass
2**	2201.250	31.48	-13.33	54.0	22.52	AV	157.00	150	Vertical	Pass
3	2441.000	94.58	-12.39	74.0	-20.58	Peak	143.00	150	Vertical	N/A
3**	2441.000	93.86	-12.39	54.0	-39.86	AV	143.00	150	Vertical	N/A
4	2923.250	46.29	-8.34	74.0	27.71	Peak	349.00	150	Vertical	Pass
4**	2923.250	35.14	-8.34	54.0	18.86	AV	349.00	150	Vertical	Pass
5	6116.000	51.82	-0.07	74.0	22.18	Peak	43.00	150	Vertical	Pass
5**	6116.000	41.22	-0.07	54.0	12.78	AV	43.00	150	Vertical	Pass
6	15421.000	49.46	-1.93	74.0	24.54	Peak	64.00	150	Vertical	Pass
6**	15421.000	38.14	-1.93	54.0	15.86	AV	64.00	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.

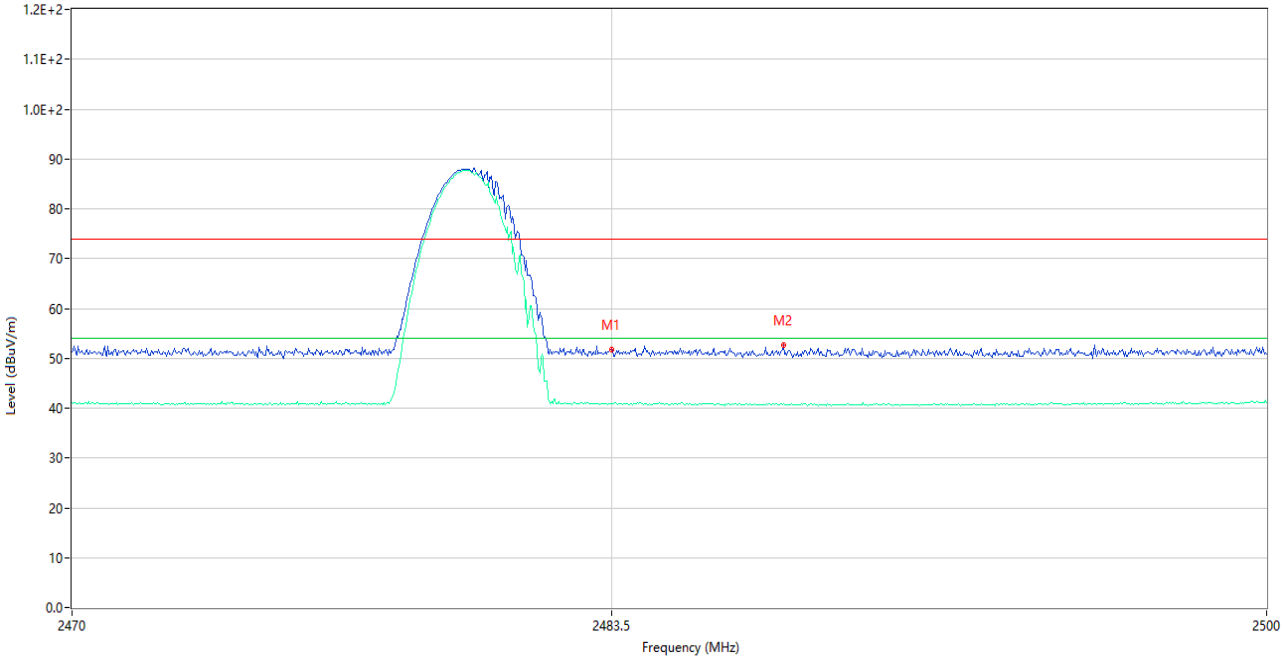
Test Data and Plots

GFSK LOW CHANNEL



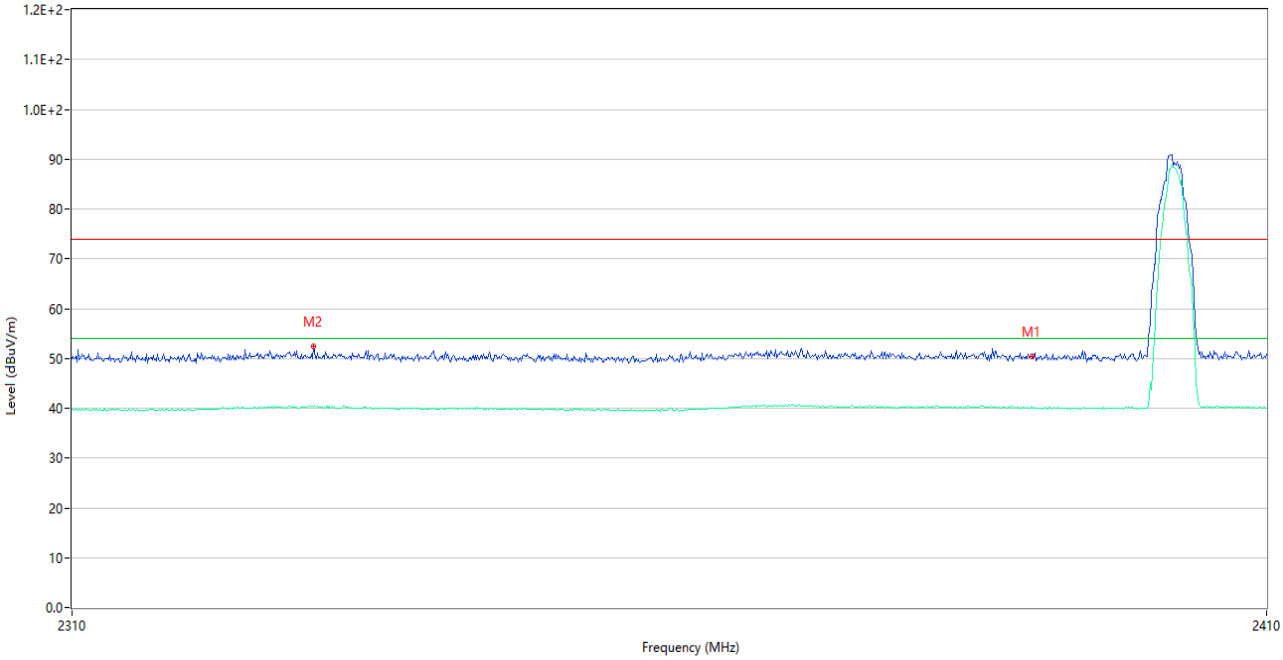
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2390.000	50.26	-4.87	74.0	23.74	Peak	58.98	150	Vertical	Pass
1**	2390.000	40.04	-4.87	54.0	13.96	AV	58.98	150	Vertical	Pass
2	2374.900	52.03	-4.15	74.0	21.97	Peak	5.00	150	Vertical	Pass
2**	2374.900	40.26	-4.15	54.0	13.74	AV	5.00	150	Vertical	Pass

GFSK HIGH CHANNEL



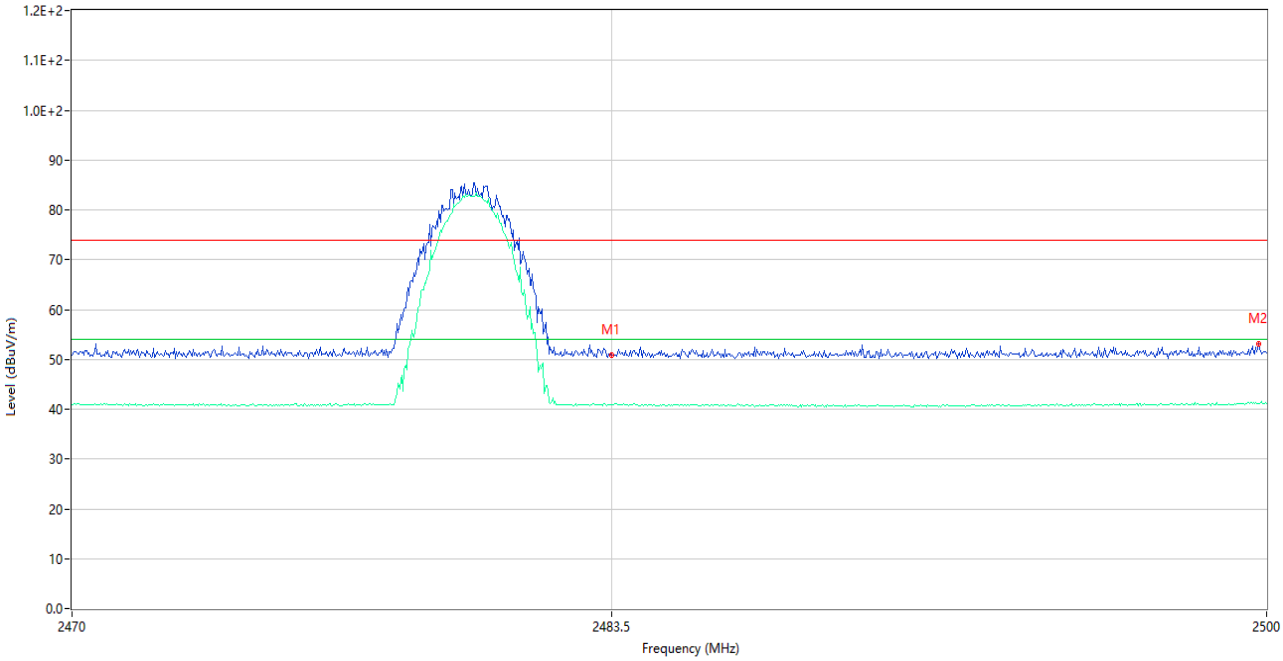
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	51.83	-3.78	74.0	22.17	Peak	0.00	150	Vertical	Pass
1**	2483.500	41.00	-3.78	54.0	13.00	AV	0.00	150	Vertical	Pass
2	2487.820	52.76	-3.81	74.0	21.24	Peak	319.00	150	Vertical	Pass
2**	2487.820	40.81	-3.81	54.0	13.19	AV	319.00	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	50.31	-4.87	74.0	23.69	Peak	142.82	150	Horizontal	Pass
1**	2390.000	40.16	-4.87	54.0	13.84	AV	142.82	150	Horizontal	Pass
2	2329.900	52.52	-4.10	74.0	21.48	Peak	307.00	150	Horizontal	Pass
2**	2329.900	40.26	-4.10	54.0	13.74	AV	307.00	150	Horizontal	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	50.92	-3.78	74.0	23.08	Peak	323.00	150	Vertical	Pass
1**	2483.500	40.94	-3.78	54.0	13.06	AV	323.00	150	Vertical	Pass
2	2499.790	53.02	-3.99	74.0	20.98	Peak	264.00	150	Vertical	Pass
2**	2499.790	41.22	-3.99	54.0	12.78	AV	264.00	150	Vertical	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SH2530301-AR-1.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SH2530301-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SH2530301-AI.PDF”.

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--END OF REPORT--