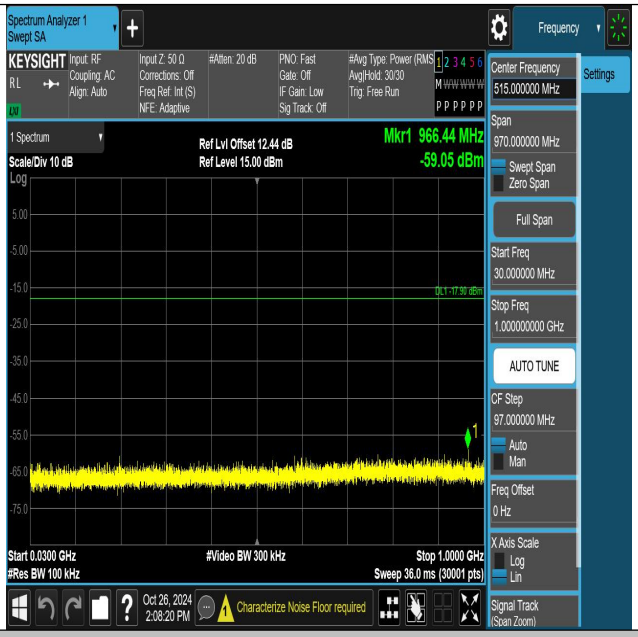
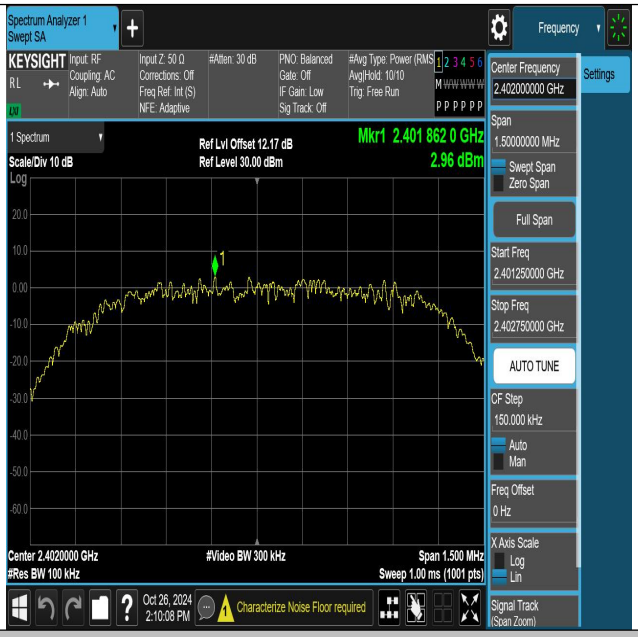
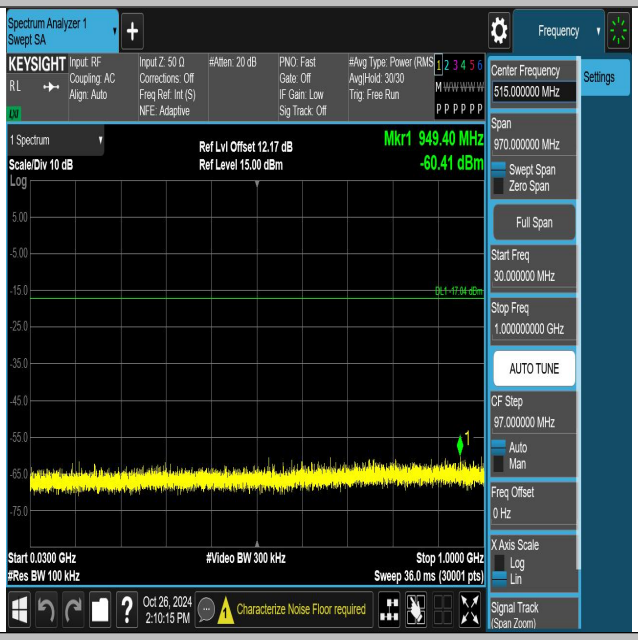


2DH5-Ant8-2480-30~1000-PASS

2DH5-Ant8-2480-1000~26500-PASS

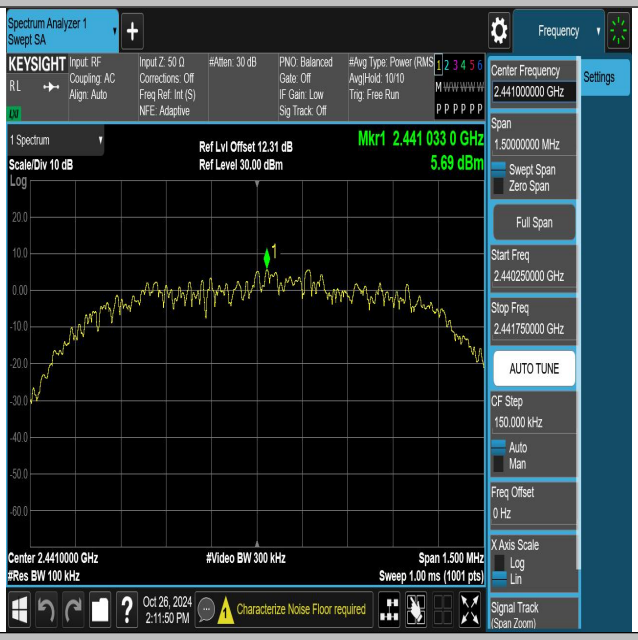


3DH5-Ant8-2402-0~Reference-PASS

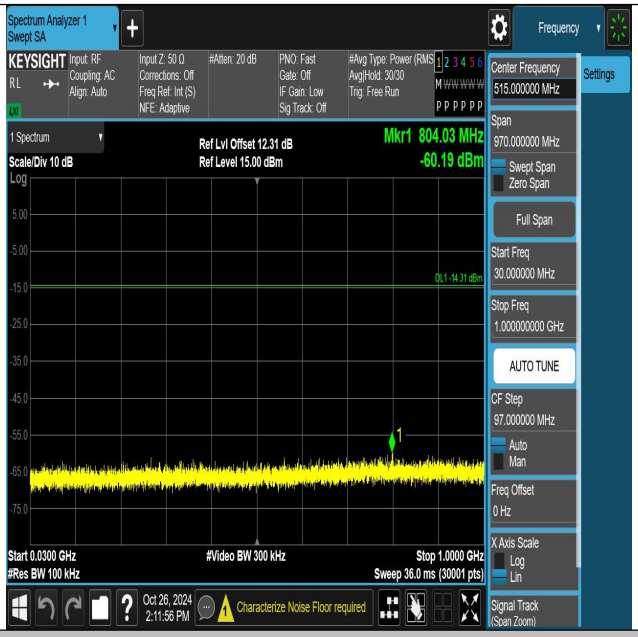


3DH5-Ant8-2402-30~1000-PASS

3DH5-Ant8-2402-1000~26500-PASS

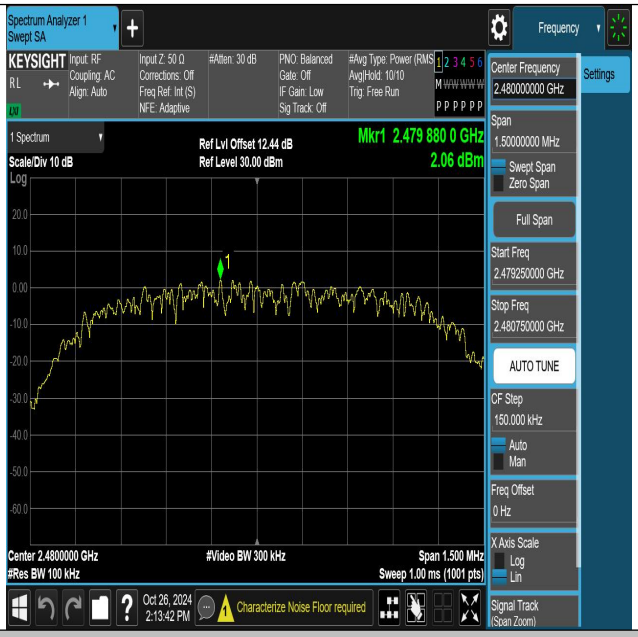


3DH5-Ant8-2441-0~Reference-PASS

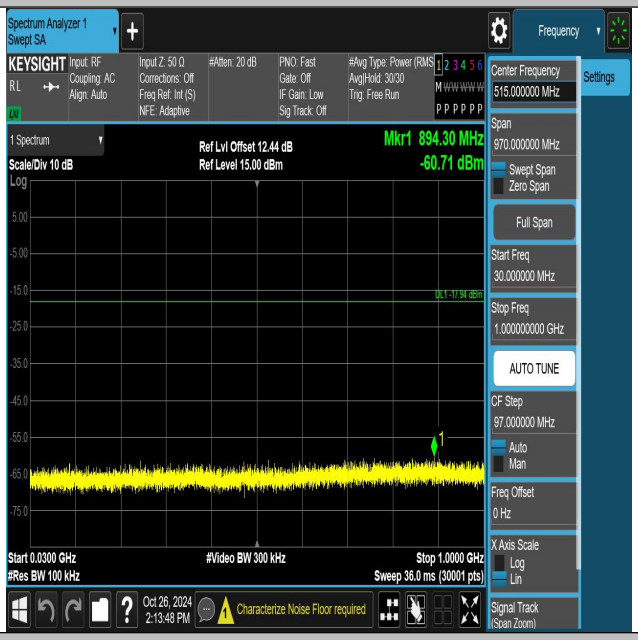


3DH5-Ant8-2441-30~1000-PASS

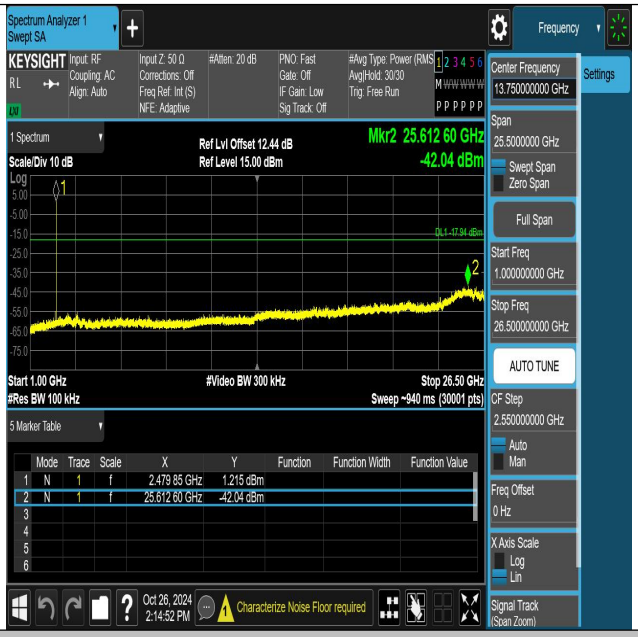
3DH5-Ant8-2441-1000~26500-PASS



3DH5-Ant8-2480-0~Reference-PASS



3DH5-Ant8-2480-30~1000-PASS



3DH5-Ant8-2480-1000~26500-PASS

A.4 Radiated Emission

Method of Measurement: See ANSI C63.10-clause 6.3&6.4&6.5&6.6.

Measurement Limit:

Standard	Limit (dBm)
FCC 47 CFR Part 15.247, 15.205, 15.209 & RSS-247 section 5.5/RSS-Gen section 6.13	20dBm below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements. For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases were recorded in this report.

Measurement Results:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
GFSK	2402(CH0)	1 GHz ~18 GHz	Fig.1	P
	2441(CH39)	1 GHz ~18 GHz	Fig.2	P
	2480(CH78)	1 GHz ~18 GHz	Fig.3	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.4	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.5	P
π/4 DQPSK	2402(CH0)	1 GHz ~18 GHz	Fig.6	P
	2441(CH39)	1 GHz ~18 GHz	Fig.7	P
	2480(CH78)	1 GHz ~18 GHz	Fig.8	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.9	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.10	P
8DPSK	2402(CH0)	1 GHz ~18 GHz	Fig.11	P
	2441(CH39)	1 GHz ~18 GHz	Fig.12	P
	2480(CH78)	1 GHz ~18 GHz	Fig.13	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.14	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.15	P
/	All channels	9 kHz ~30 MHz	Fig.16	P
		30 MHz ~1 GHz	Fig.17	P
		18 GHz ~26.5 GHz	Fig.18	P

Worst Case Result

GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5490.600000	51.08	74.00	22.92	V	7.1
9049.285714	46.16	74.00	27.84	V	7.9
10659.857143	48.12	74.00	25.88	H	9.9
12793.285714	50.04	74.00	23.96	V	12.8
16553.571429	53.64	74.00	20.36	V	18.7
17692.714286	55.36	74.00	18.64	H	20.6

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5490.600000	38.24	54.00	15.76	V	7.1
9049.285714	33.32	54.00	20.68	V	7.9
10659.857143	35.28	54.00	18.72	H	9.9
12793.285714	37.37	54.00	16.63	V	12.8
16553.571429	41.74	54.00	12.26	V	18.7
17692.714286	43.36	54.00	10.64	H	20.6

π/4 DQPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5536.200000	50.56	74.00	23.44	V	7.0
7323.857143	47.19	74.00	26.81	H	6.4
9214.285714	47.49	74.00	26.51	H	7.9
11079.000000	48.22	74.00	25.78	V	11.0
13422.857143	50.15	74.00	23.85	V	13.0
17485.714286	55.01	74.00	18.99	H	20.2

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5536.200000	38.14	54.00	15.86	V	7.0
7323.857143	35.54	54.00	18.46	H	6.4
9214.285714	34.45	54.00	19.55	H	7.9
11079.000000	35.52	54.00	18.48	V	11.0
13422.857143	37.78	54.00	16.22	V	13.0
17485.714286	42.49	54.00	11.51	H	20.2

8DPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5484.600000	50.64	74.00	23.36	H	7.2
8118.428572	45.98	74.00	28.02	V	6.9
9317.571429	47.19	74.00	26.81	H	8.2
11032.285714	47.63	74.00	26.37	V	10.8
12908.571429	50.18	74.00	23.82	H	12.7
16749.428571	55.59	74.00	18.41	V	18.8

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
5484.600000	38.18	54.00	15.82	H	7.2
8118.428572	33.39	54.00	20.61	V	6.9
9317.571429	34.66	54.00	19.34	H	8.2
11032.285714	34.78	54.00	19.22	V	10.8
12908.571429	37.30	54.00	16.70	H	12.7
16749.428571	42.56	54.00	11.44	V	18.8

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and Antenna Factor, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument. The measurement results are obtained as described below:

Result= P_{Mea} +Cable Loss +Antenna Factor-Gain of the preamplifier.

See below for test graphs.

Conclusion: Pass

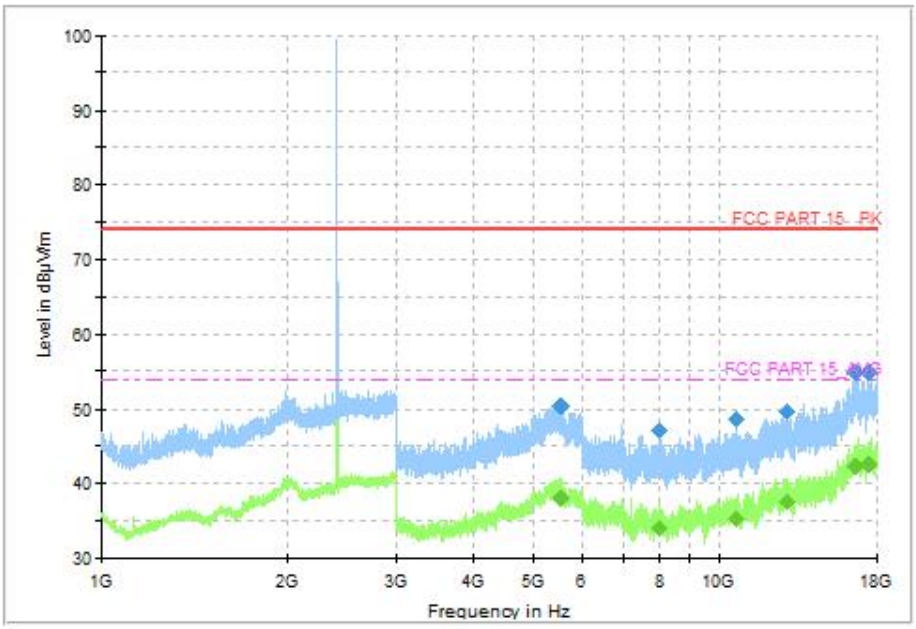


Fig. 1 Radiated Spurious Emission (GFSK, CH0, 1GHz ~18GHz)

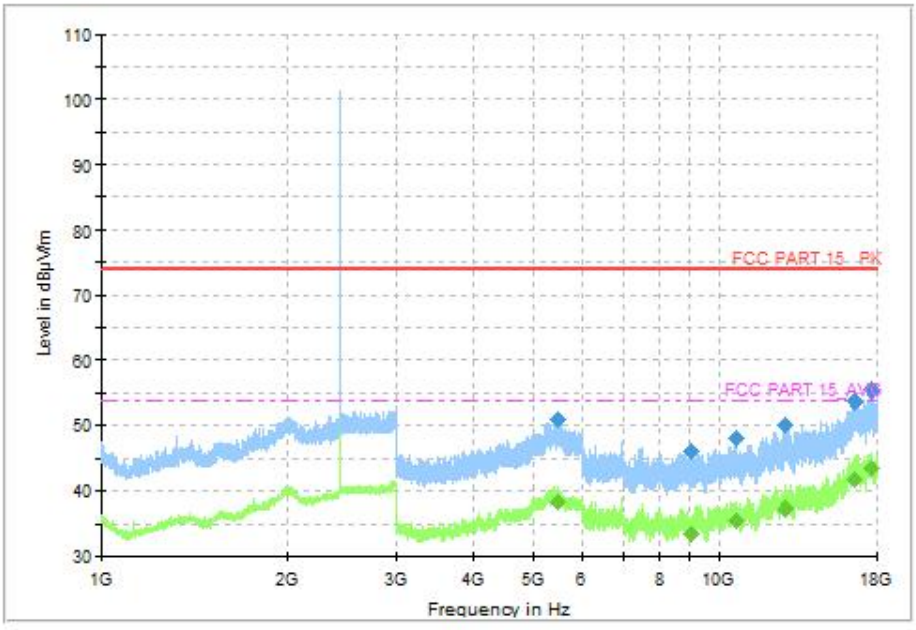


Fig. 2 Radiated Spurious Emission (GFSK, CH39, 1GHz ~18GHz)

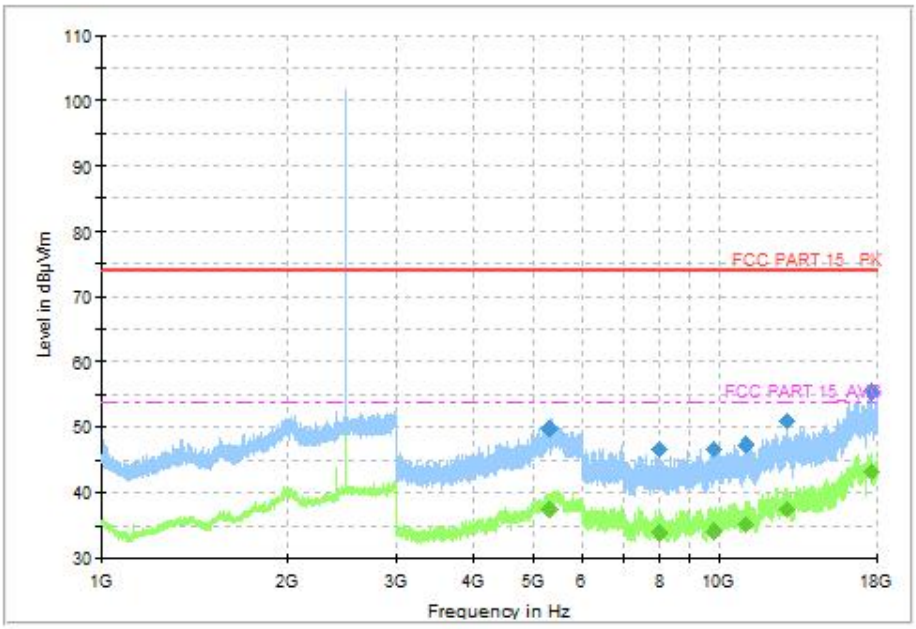


Fig. 3 Radiated Spurious Emission (GFSK, CH78, 1GHz ~18GHz)

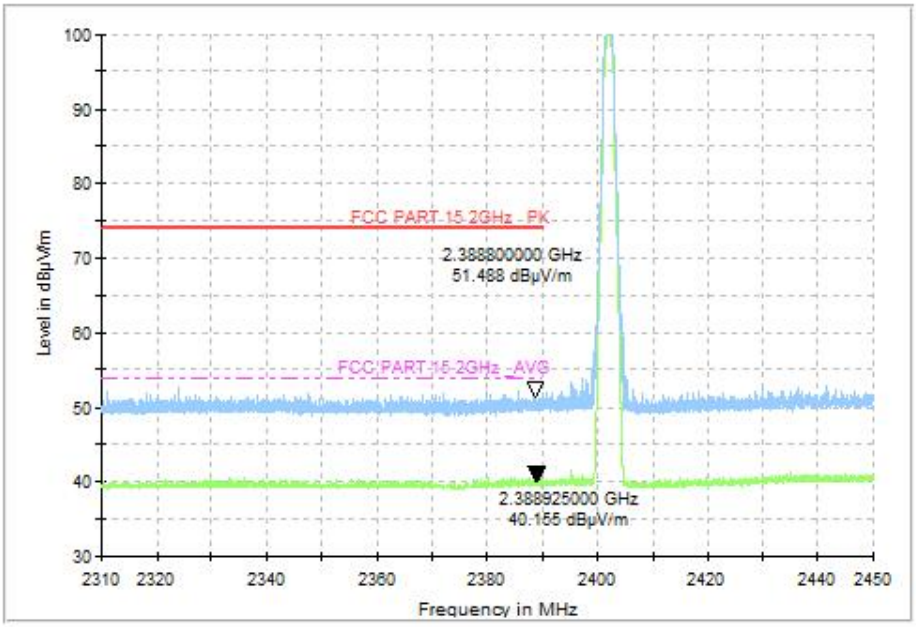


Fig. 4 Radiated Band Edges (GFSK, CH0, 2.38GHz~2.45GHz)

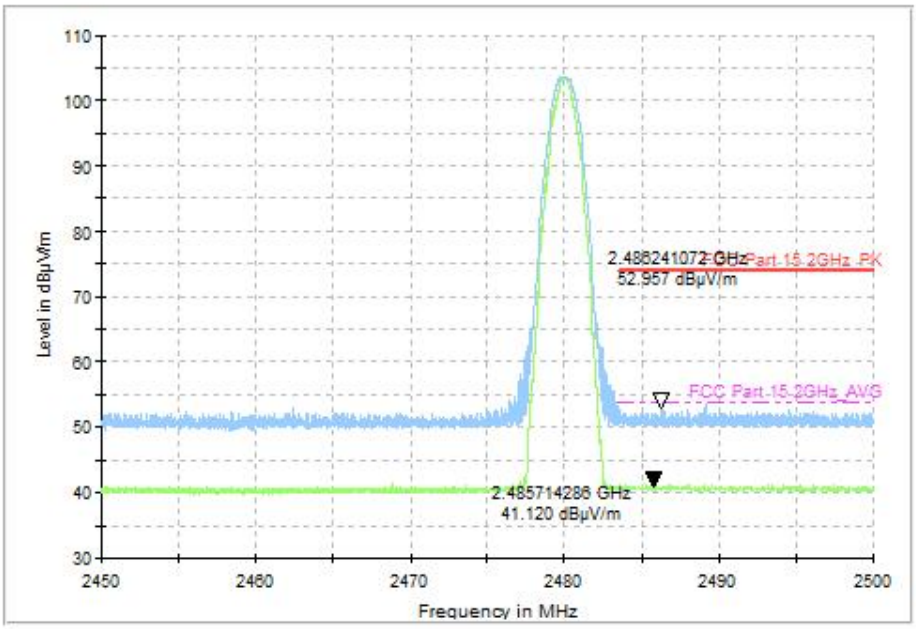


Fig. 5 Radiated Band Edges (GFSK, CH78, 2.45GHz~2.50GHz)

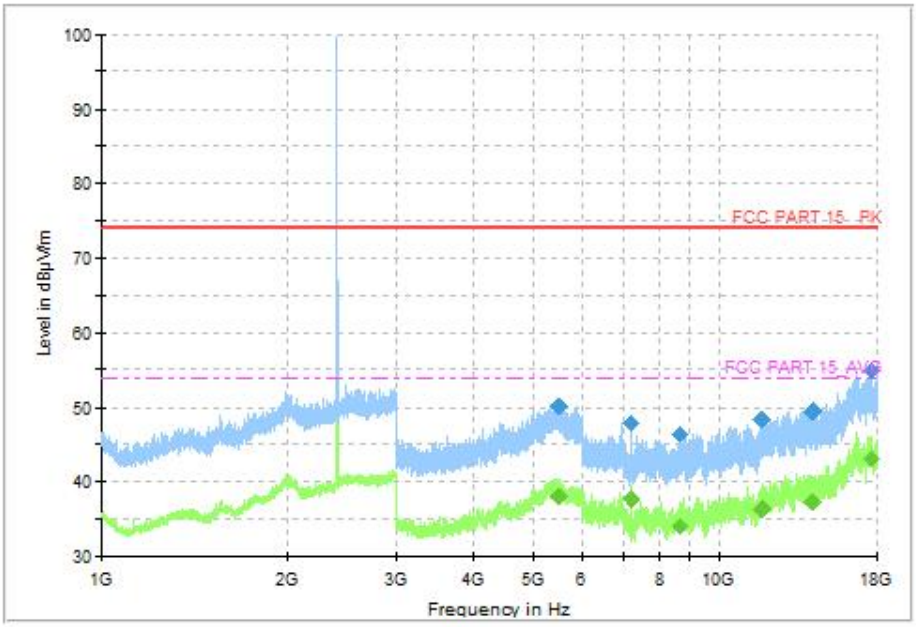


Fig. 6 Radiated Spurious Emission (π/4 DQPSK, CH0, 1GHz ~18GHz)

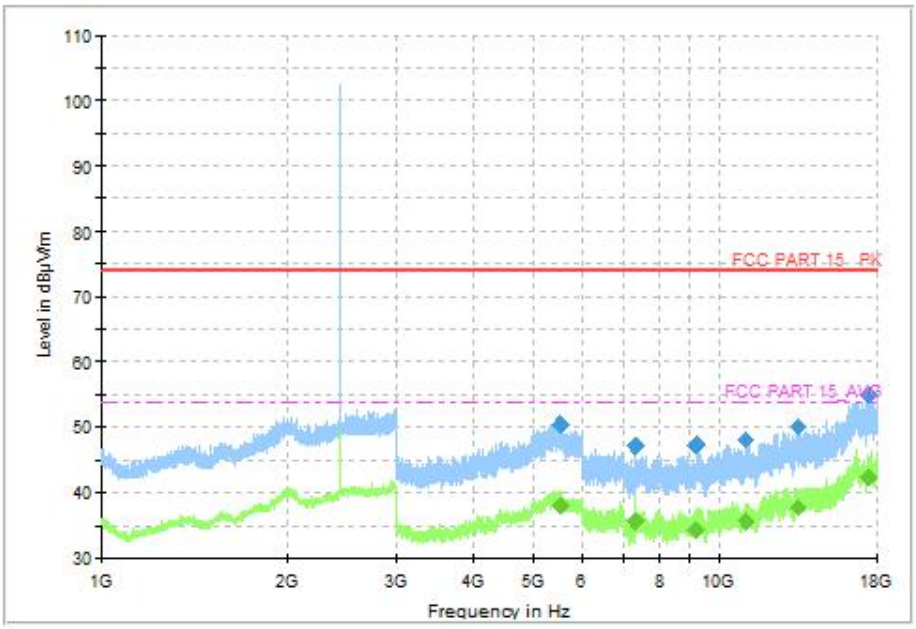


Fig. 7 Radiated Spurious Emission (π/4 DQPSK, CH39, 1GHz ~18GHz)

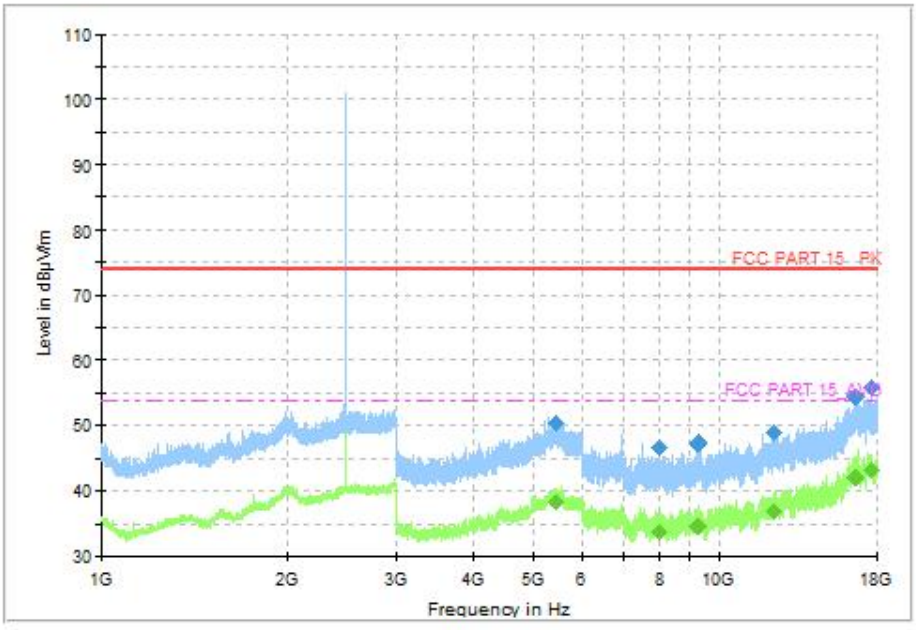


Fig. 8 Radiated Spurious Emission (π/4 DQPSK, CH78, 1GHz ~18GHz)

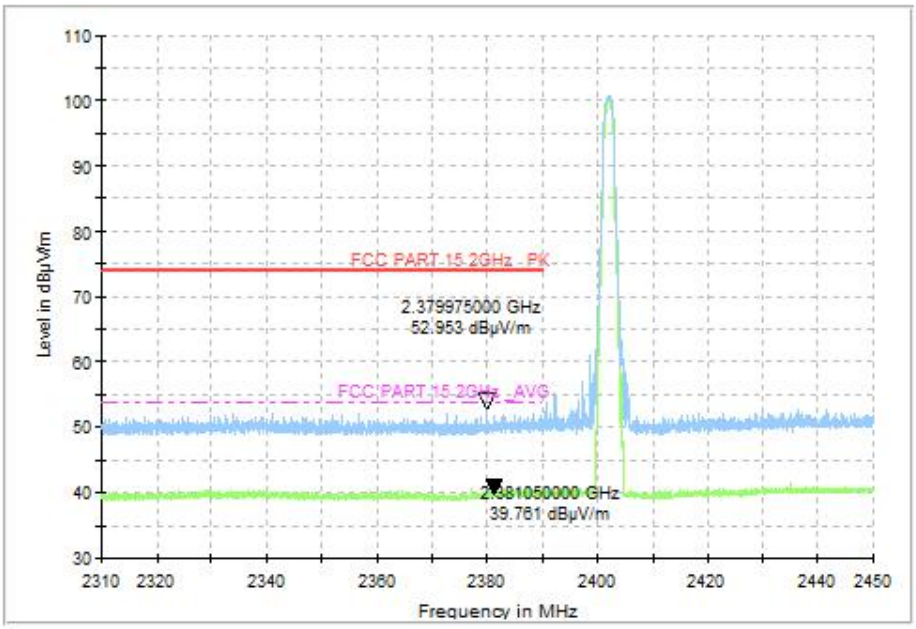


Fig. 9 Radiated Band Edges (π/4 DQPSK, CH0, 2.38GHz~2.45GHz)

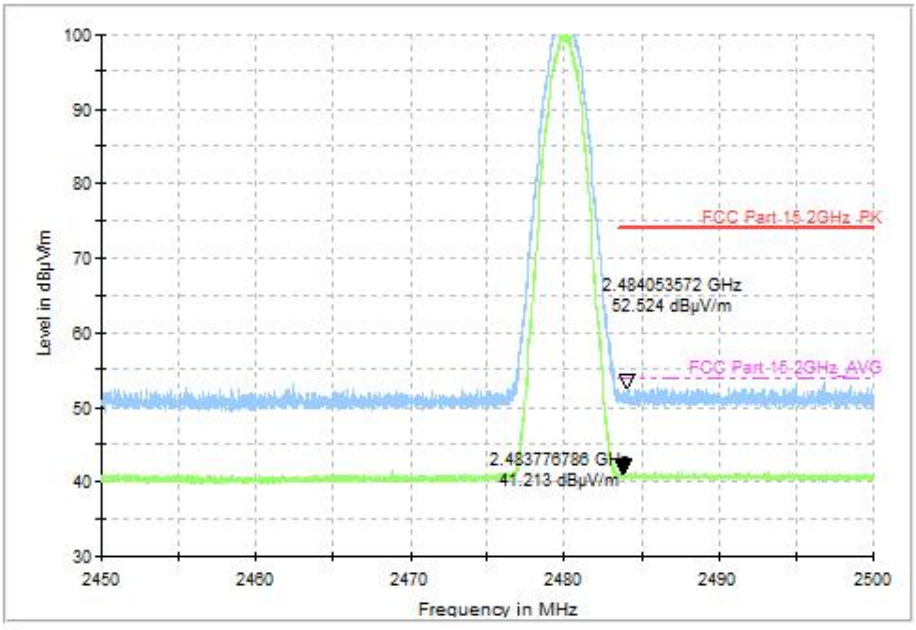


Fig. 10 Radiated Band Edges (π/4 DQPSK, CH78, 2.45GHz~2.50GHz)

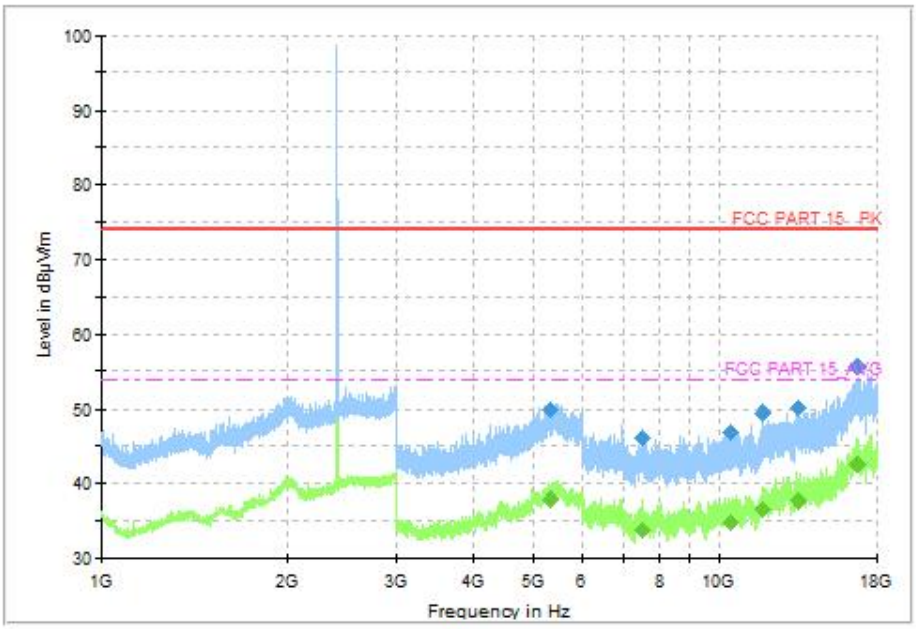


Fig. 11 Radiated Spurious Emission (8DPSK, CH0, 1GHz ~18GHz)

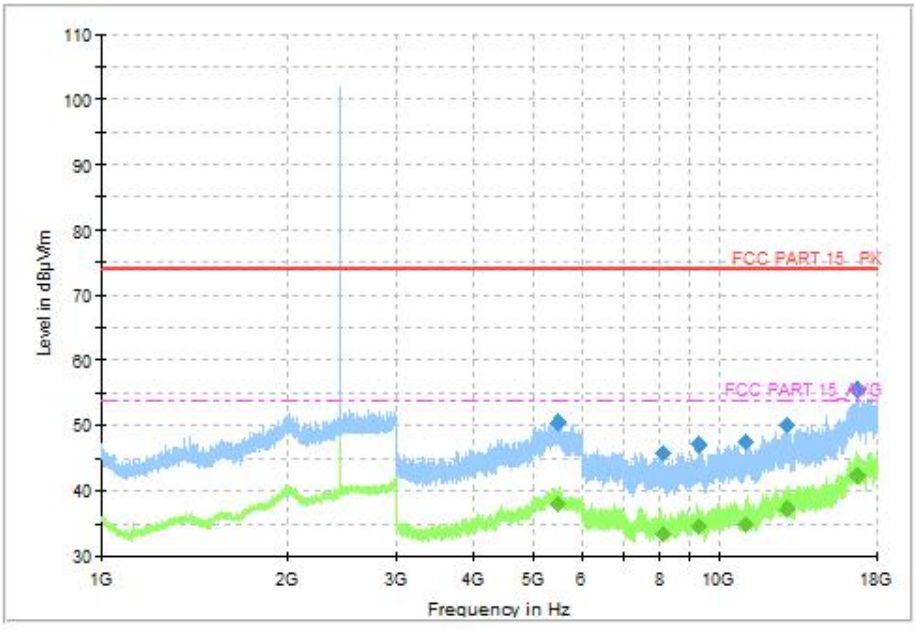


Fig. 12 Radiated Spurious Emission (8DPSK, CH39, 1GHz ~18GHz)

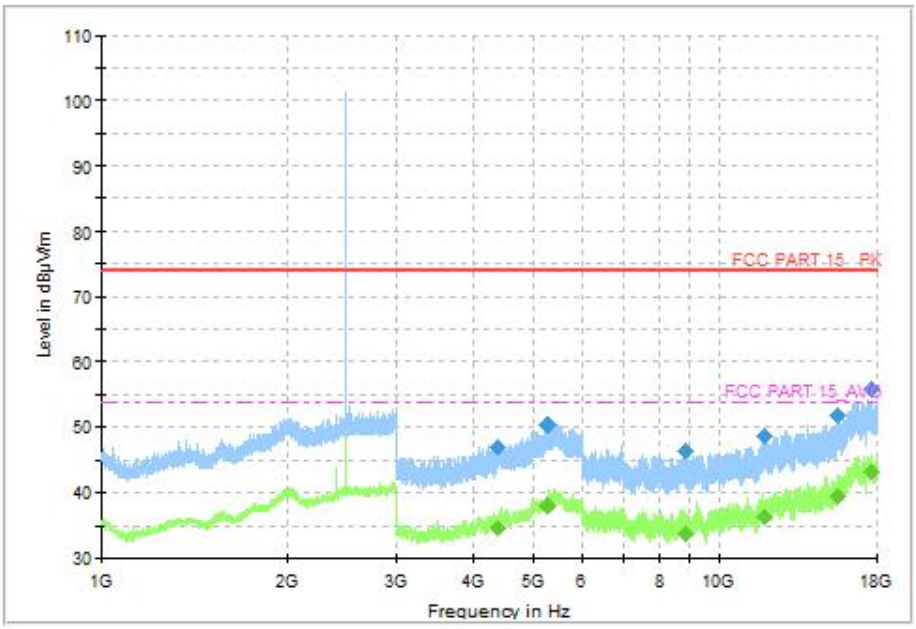


Fig. 13 Radiated Spurious Emission (8DPSK, CH78, 1GHz ~18GHz)

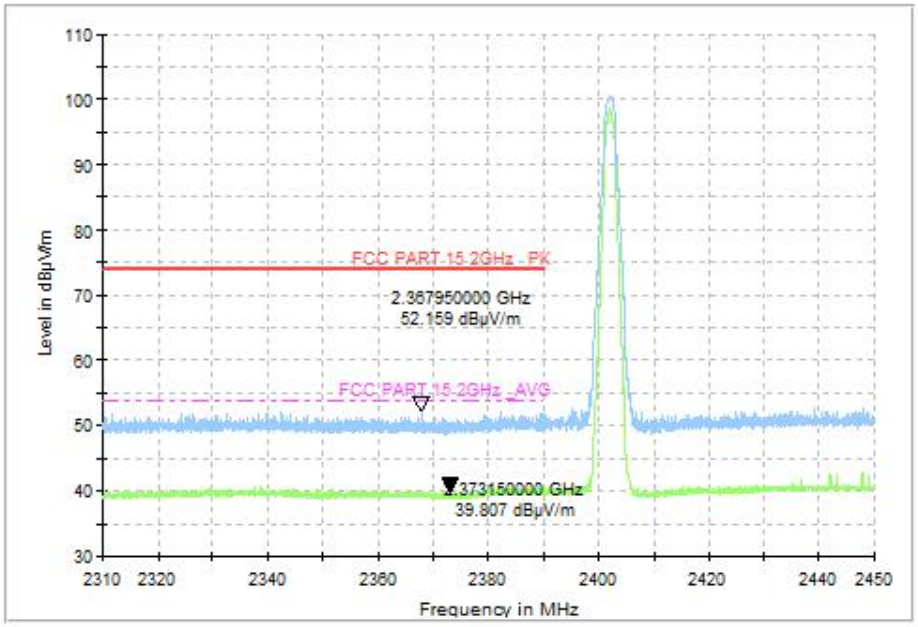


Fig. 14 Radiated Band Edges (8DPSK, CH0, 2.38GHz~2.45GHz)

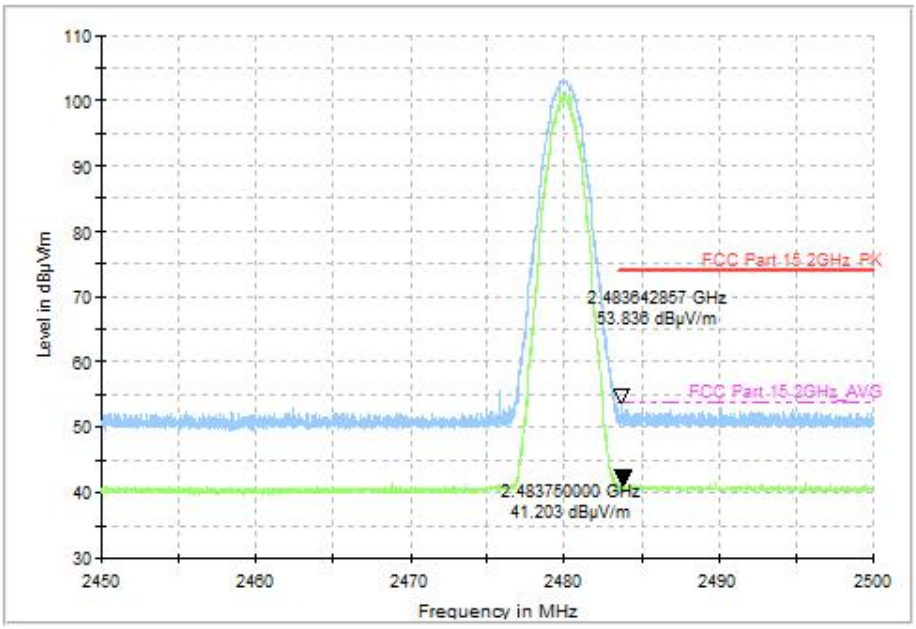


Fig. 15 Radiated Band Edges (8DPSK, CH78, 2.45GHz~2.50GHz)

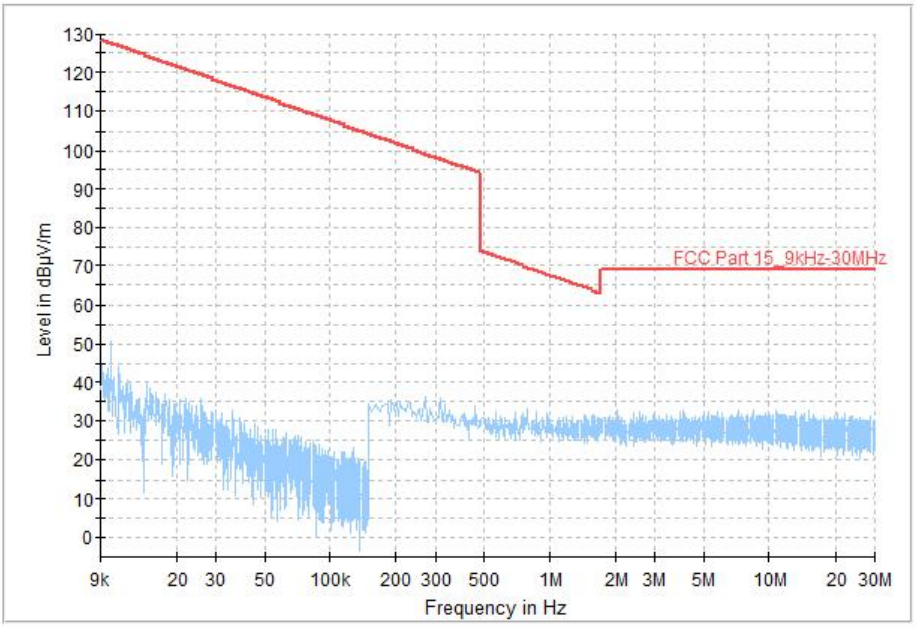


Fig. 16 Radiated Spurious Emission (All Channels, 9kHz ~30MHz)

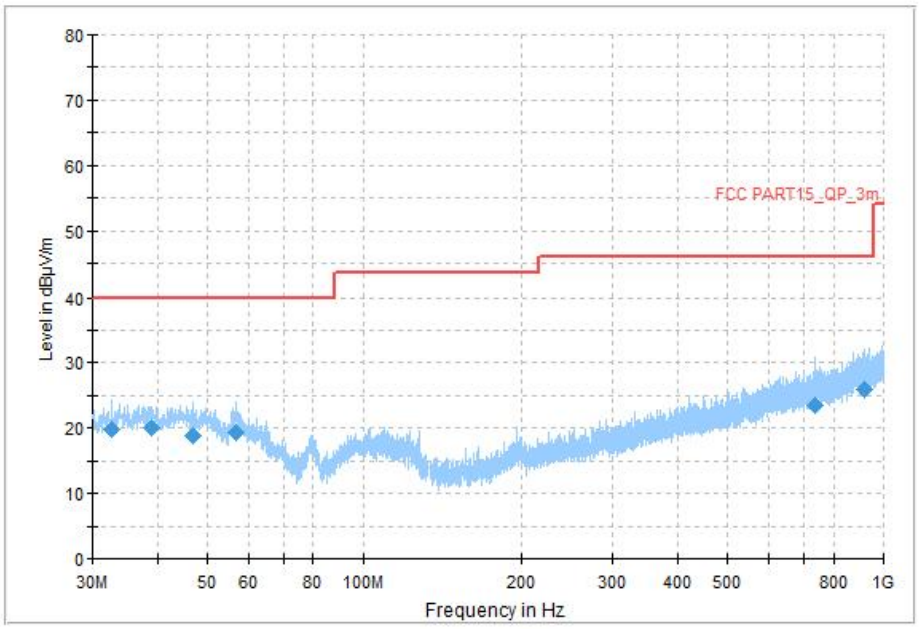


Fig. 17 Radiated Spurious Emission (All Channels, 30MHz ~1GHz)

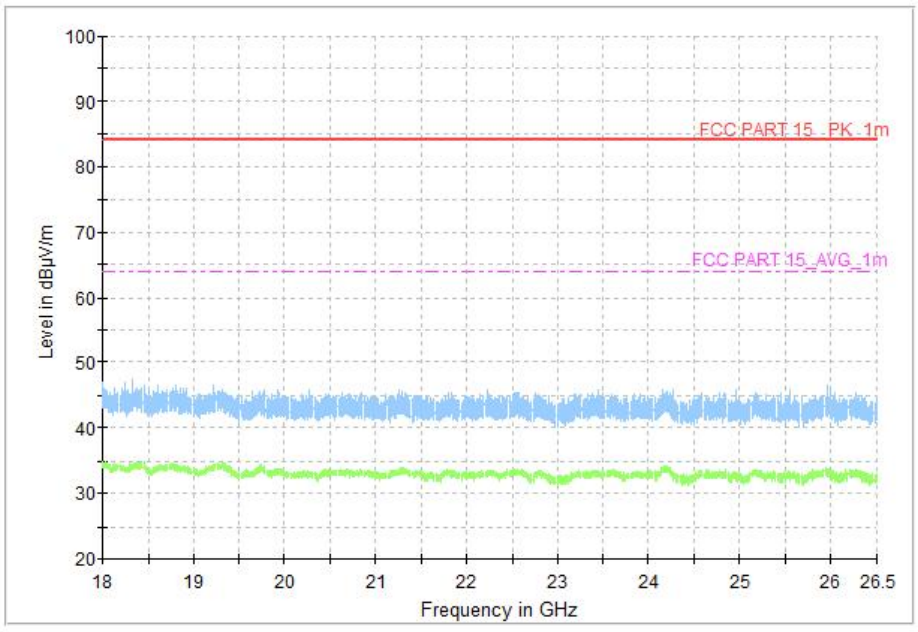


Fig. 18 Radiated Spurious Emission (All Channels, 18GHz ~26.5GHz)

A.5 20dB Bandwidth

Method of Measurement: See ANSI C63.10-clause 7.8.7.

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.247 (a) & RSS-247 Section 5.1	/

Measurement Result:

TestMode	Antenna	Frequency [MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant8	2402	0.945	2401.565	2402.510	---	---
DH5	Ant8	2441	0.945	2440.568	2441.513	---	---
DH5	Ant8	2480	0.945	2479.568	2480.513	---	---
2DH5	Ant8	2402	1.353	2401.358	2402.711	---	---
2DH5	Ant8	2441	1.350	2440.358	2441.708	---	---
2DH5	Ant8	2480	1.320	2479.373	2480.693	---	---
3DH5	Ant8	2402	1.326	2401.367	2402.693	---	---
3DH5	Ant8	2441	1.311	2440.379	2441.690	---	---
3DH5	Ant8	2480	1.311	2479.379	2480.690	---	---

See below for test graphs.

DH5-Ant8-2402

DH5-Ant8-2441

DH5-Ant8-2480

2DH5-Ant8-2402

2DH5-Ant8-2441

2DH5-Ant8-2480

3DH5-Ant8-2402

3DH5-Ant8-2441

3DH5-Ant8-2480

A.6 Time of Occupancy (Dwell Time)

Method of Measurement: See ANSI C63.10-clause 7.8.4.

Measurement Limit:

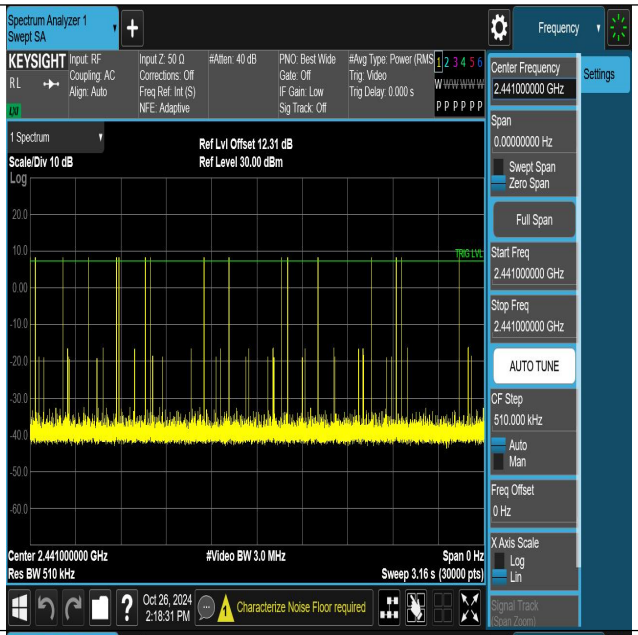
Standard	Limit (s)
FCC 47 CFR Part 15.247(a) & RSS-247 Section 5.1	≤ 0.4

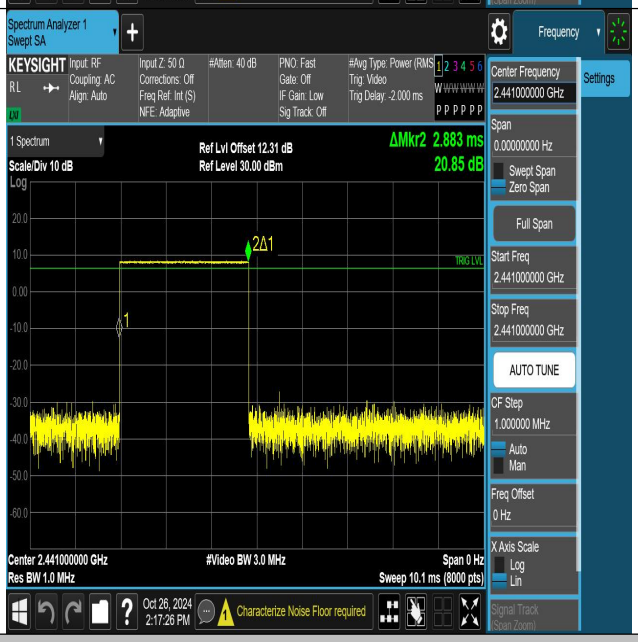
Measurement Results:

TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant8	Hop	2.883	130	0.375	≤0.4	PASS
2DH5	Ant8	Hop	2.884	100	0.288	≤0.4	PASS
3DH5	Ant8	Hop	2.887	90	0.26	≤0.4	PASS

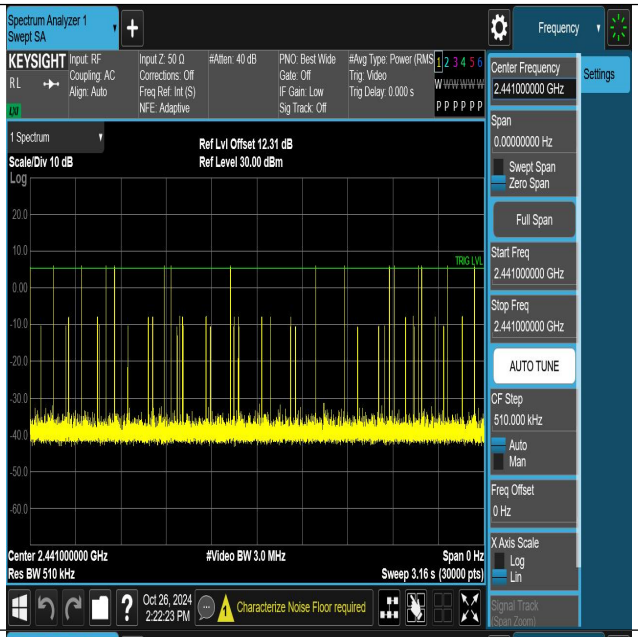
See below for test graphs.

Conclusion: Pass

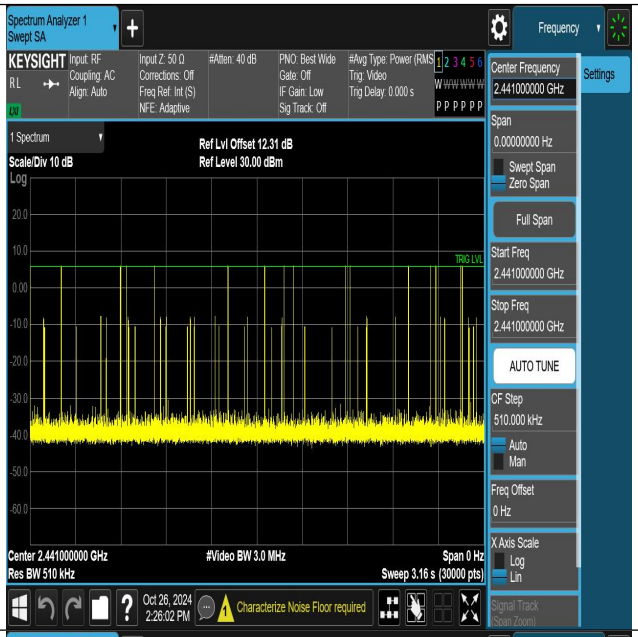




DH5-Ant8-Hop-PASS



2DH5-Ant8-Hop-PASS



3DH5-Ant8-Hop-PASS

A.7 Number of Hopping Channels

Method of Measurement: See ANSI C63.10-clause 7.8.3.

Measurement Limit:

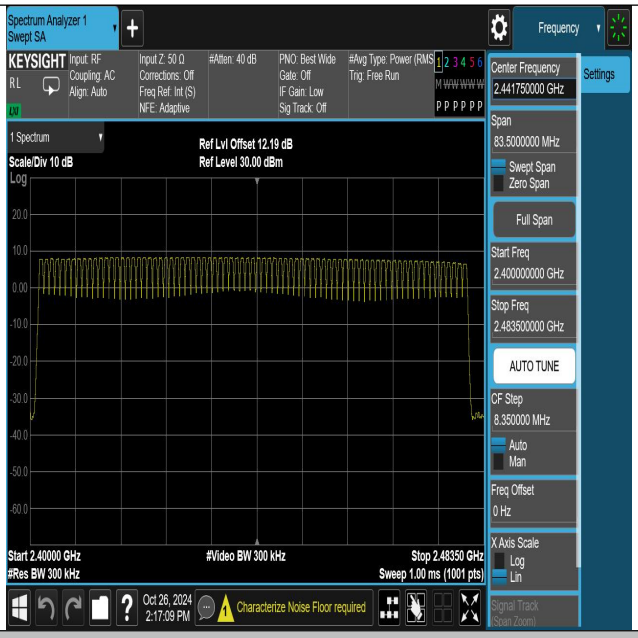
Standard	Limit (Num)
FCC 47 CFR Part 15.247(a) & RSS-247 Section 5.1	At least 15 non-overlapping channels

Measurement Results:

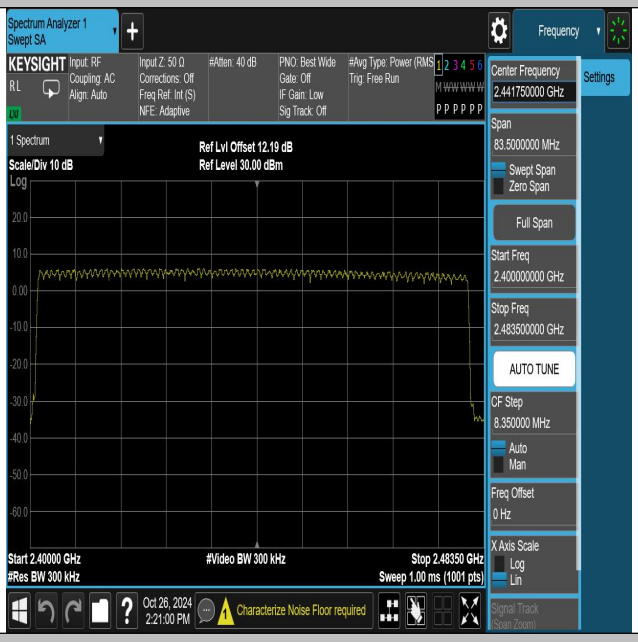
TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant8	Hop	79	≥15	PASS
2DH5	Ant8	Hop	79	≥15	PASS
3DH5	Ant8	Hop	79	≥15	PASS

See below for test graphs.

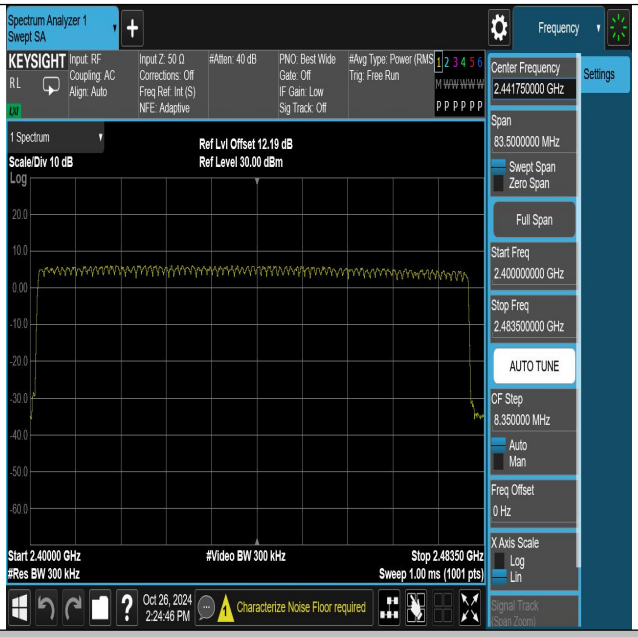
Conclusion: Pass



DH5-Ant8-Hop-PASS



2DH5-Ant8-Hop-PASS



3DH5-Ant8-Hop-PASS

A.8 Carrier Frequency Separation

Method of Measurement: See ANSI C63.10-clause 7.8.2.

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247(a)) & RSS-247 Section 5.1	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Measurement Results:

TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant8	Hop	0.998	≥0.945	PASS
2DH5	Ant8	Hop	1.162	≥0.902	PASS
3DH5	Ant8	Hop	1.292	≥0.884	PASS

See below for test graphs.

Conclusion: Pass