

Fig. 33 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10 GHz)

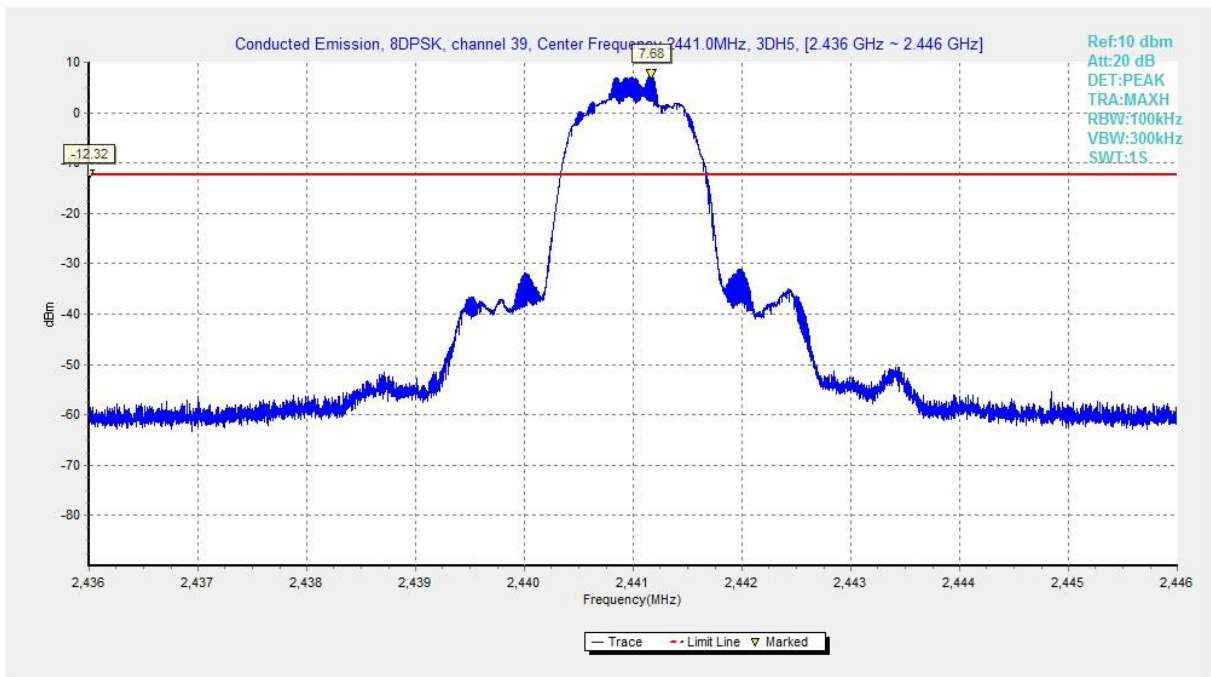


Fig. 34 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

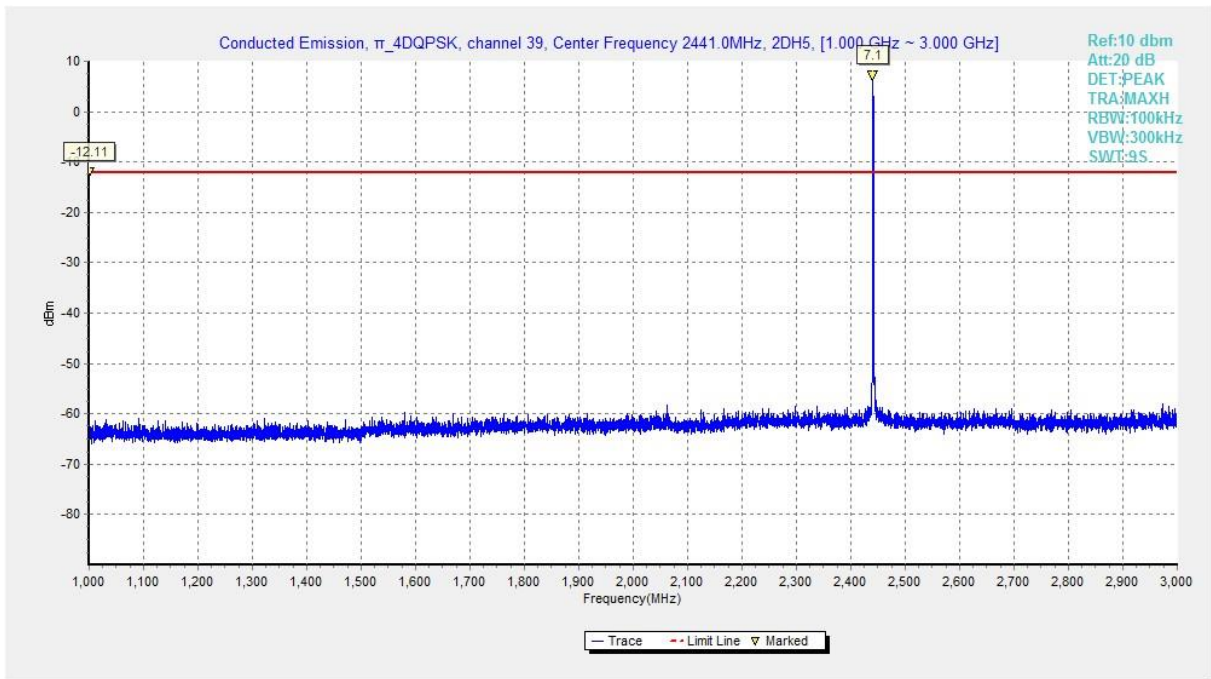


Fig. 35 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3 GHz)

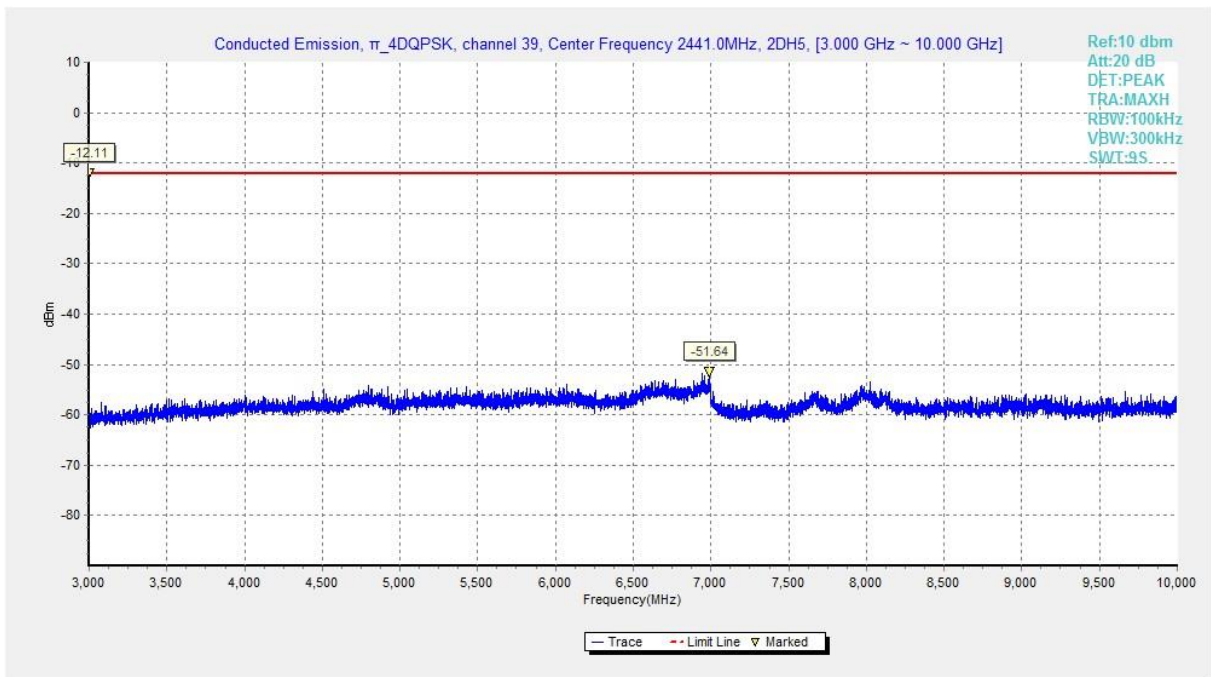


Fig. 36 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10 GHz)

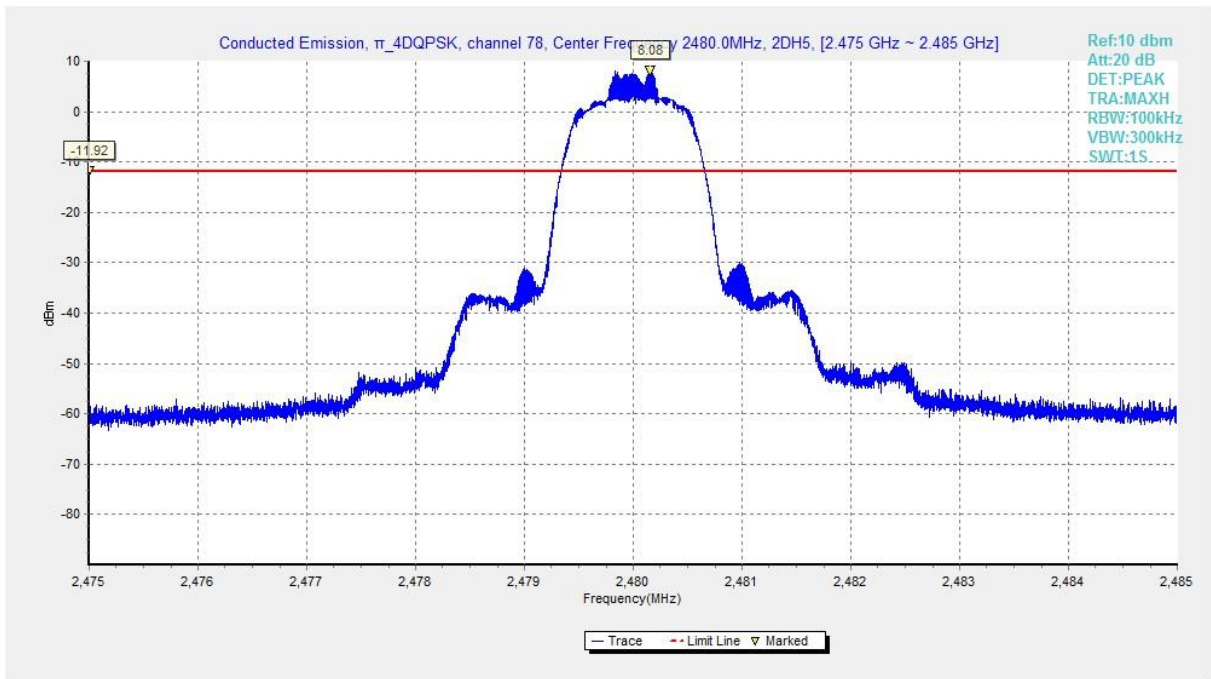


Fig. 37 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

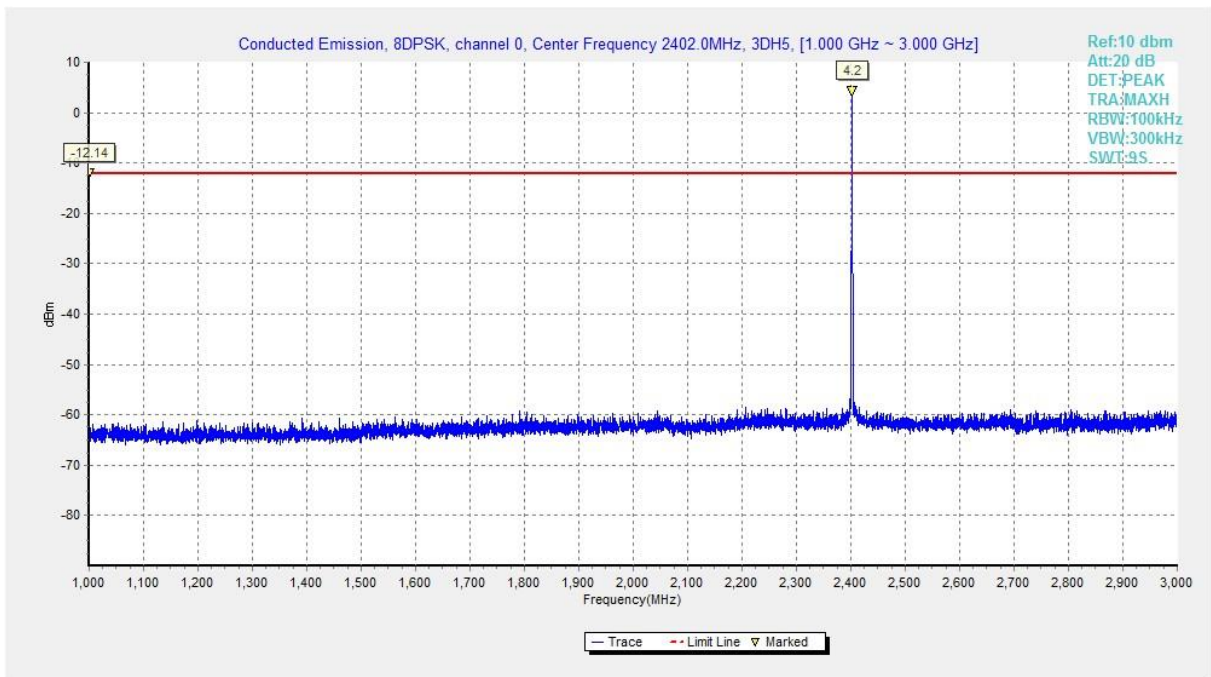


Fig. 38 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3 GHz)

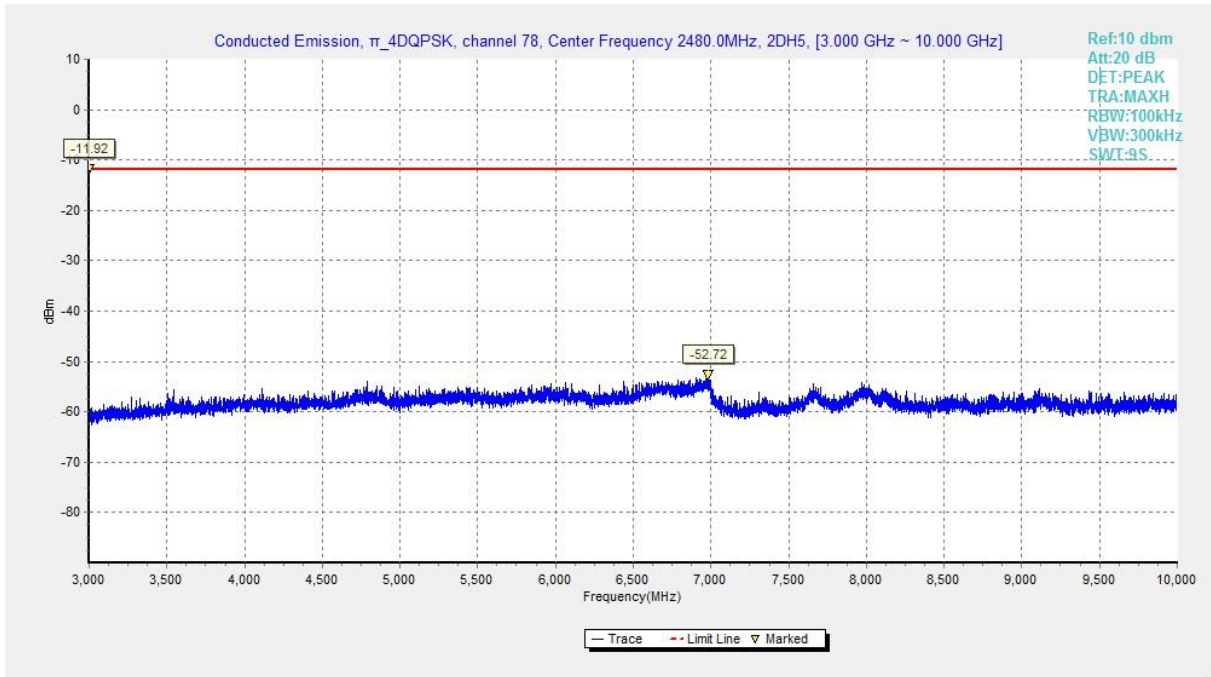


Fig. 39 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10 GHz)

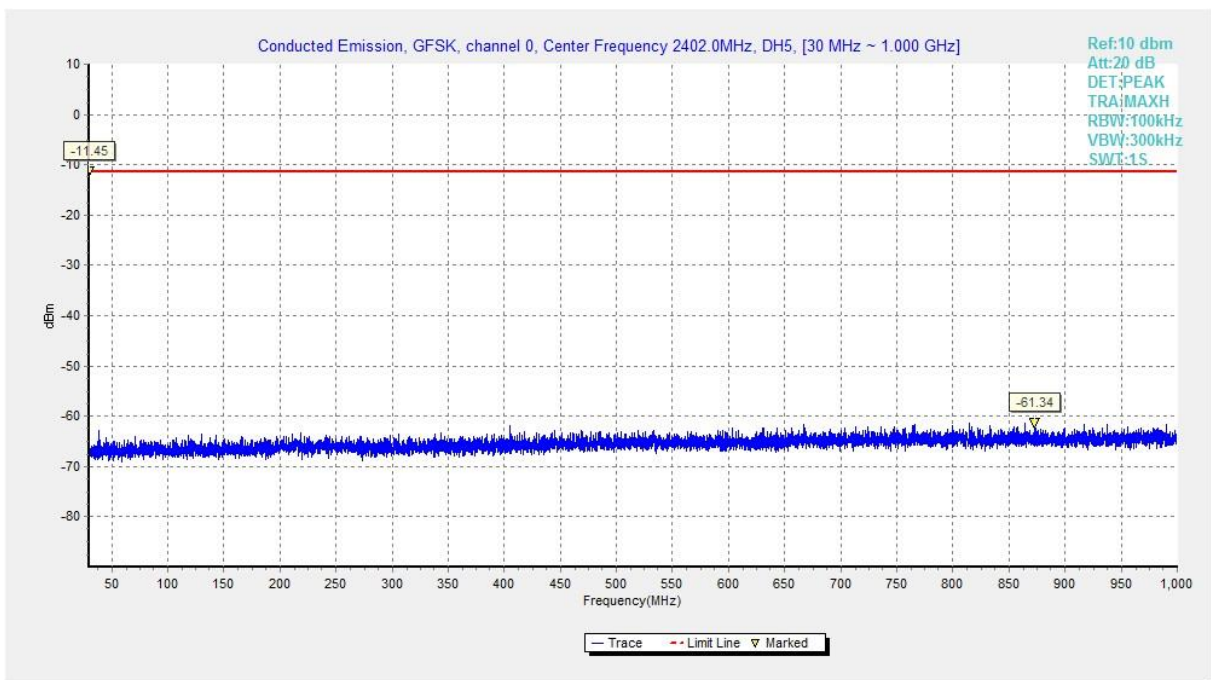


Fig. 40 Conducted Spurious Emission (All channel, 30 MHz-1 GHz)

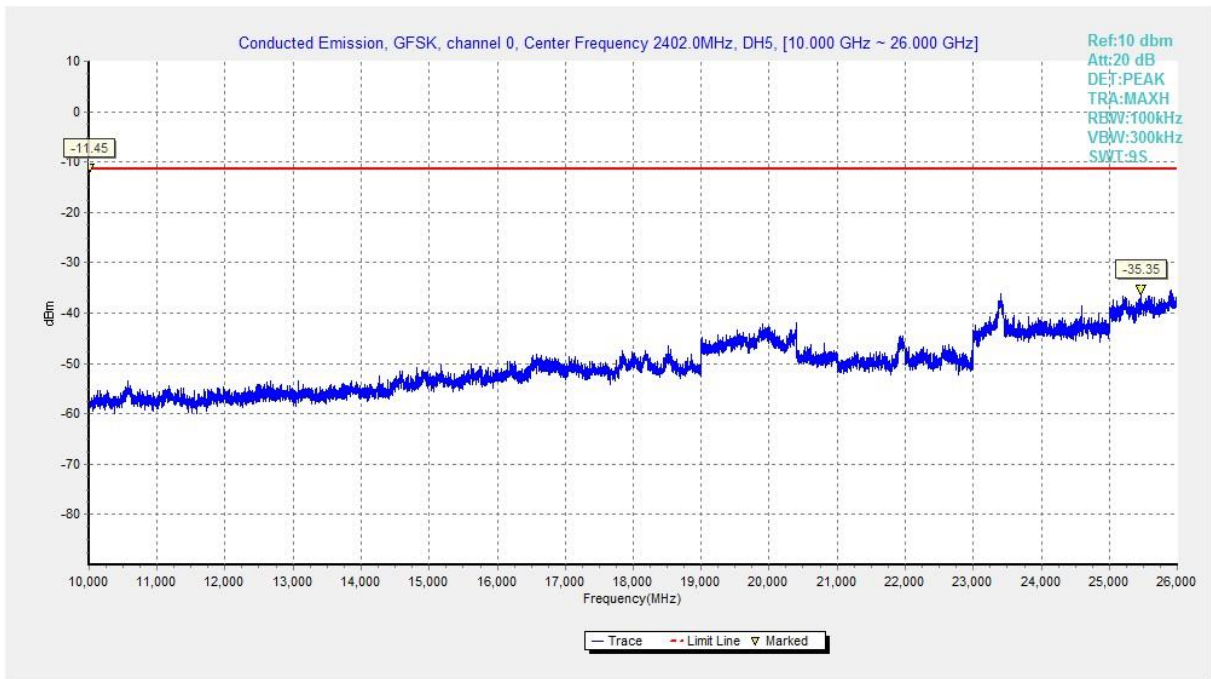


Fig. 41 Conducted Spurious Emission All channel, 10 GHz-26 GHz,)

A.4 Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB 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(μ V/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.

Measurement Results:

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	1 GHz ~18 GHz	Fig.42	P
	39	1 GHz ~18 GHz	Fig.43	P
	78	1 GHz ~18 GHz	Fig.44	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.45	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.46	P
$\pi/4$ DQPSK	0	1 GHz ~18 GHz	Fig.47	P
	39	1 GHz ~18 GHz	Fig.48	P
	78	1 GHz ~18 GHz	Fig.49	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.50	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.51	P
8DPSK	0	1 GHz ~18 GHz	Fig.52	P
	39	1 GHz ~18 GHz	Fig.53	P
	78	1 GHz ~18 GHz	Fig.54	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.55	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.56	P
/	All channels	9 kHz ~30 MHz	Fig.57	P
		30 MHz ~1 GHz	Fig.58	P
		18 GHz ~26.5 GHz	Fig.59	P

Worst Case Result
GFSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
5972.50000	52.74	---	74.00	21.26	V	16.3
13586.9375	49.88	---	74.00	24.12	V	11.7
14534.1250	49.93	---	74.00	24.07	H	12.7
15765.2500	51.06	---	74.00	22.94	V	14.8
16763.1875	52.66	---	74.00	21.34	H	16.3
17979.8750	51.97	---	74.00	22.03	H	17.0
4804.00000	---	42.15	54.00	11.85	V	12.4
13392.6875	---	37.20	54.00	16.80	H	12.0
14504.3750	---	37.99	54.00	16.01	V	12.6
15757.8125	---	39.75	54.00	14.25	H	14.8
16985.0000	---	40.46	54.00	13.54	V	16.5
17956.6875	---	40.66	54.00	13.34	H	16.9

$\pi/4$ DQPSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
6258.00000	52.45	---	74.00	21.55	V	17.3
13516.5000	48.88	---	74.00	25.12	V	11.9
14605.8750	49.33	---	74.00	24.67	H	12.7
15787.5625	50.78	---	74.00	23.22	H	15.0
16981.9375	52.00	---	74.00	22.00	V	16.4
17973.3125	52.59	---	74.00	21.41	V	17.0
6199.00000	---	41.37	54.00	12.63	V	17.8
13397.5000	---	37.04	54.00	16.96	H	12.0
14542.0000	---	37.94	54.00	16.06	H	12.7
15768.3125	---	39.49	54.00	14.51	H	14.8
17010.3750	---	40.14	54.00	13.86	H	16.5
17967.6250	---	40.64	54.00	13.36	H	17.0

8DPSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol	Corr. (dB)
6167.00000	53.16	---	74.00	20.84	V	17.6
13426.8125	48.74	---	74.00	25.26	V	12.0
14678.9375	49.54	---	74.00	24.46	H	12.7
15925.8125	50.76	---	74.00	23.24	H	15.0
16766.2500	51.04	---	74.00	22.96	H	16.3
17800.9375	51.24	---	74.00	22.76	V	16.7
4960.50000	---	41.02	54.00	12.98	V	12.6
13400.1250	---	37.18	54.00	16.82	H	12.0
14510.0625	---	37.86	54.00	16.14	V	12.6
15780.5625	---	39.27	54.00	14.73	H	14.9
16966.6250	---	39.83	54.00	14.17	H	16.4
17963.2500	---	40.44	54.00	13.56	H	17.0

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

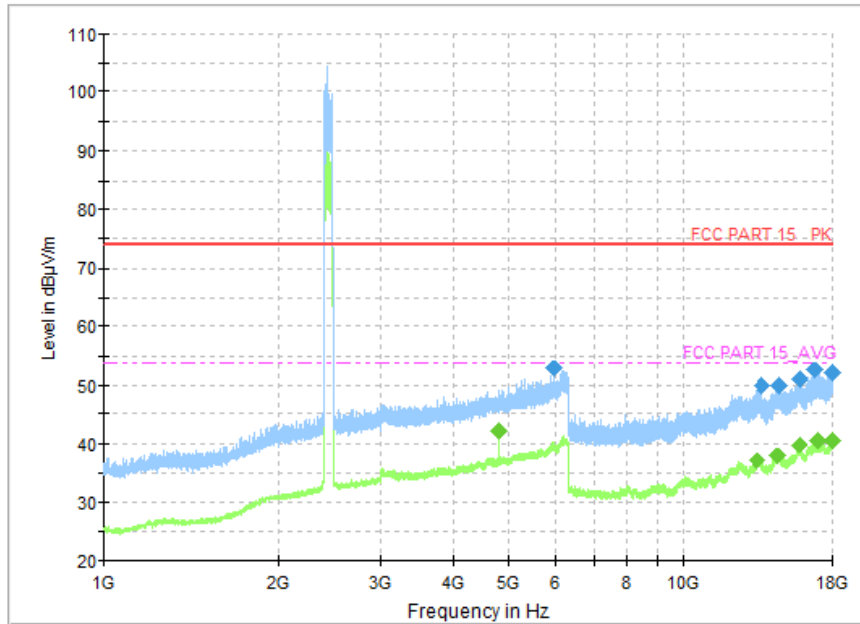


Fig. 42 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~18 GHz)

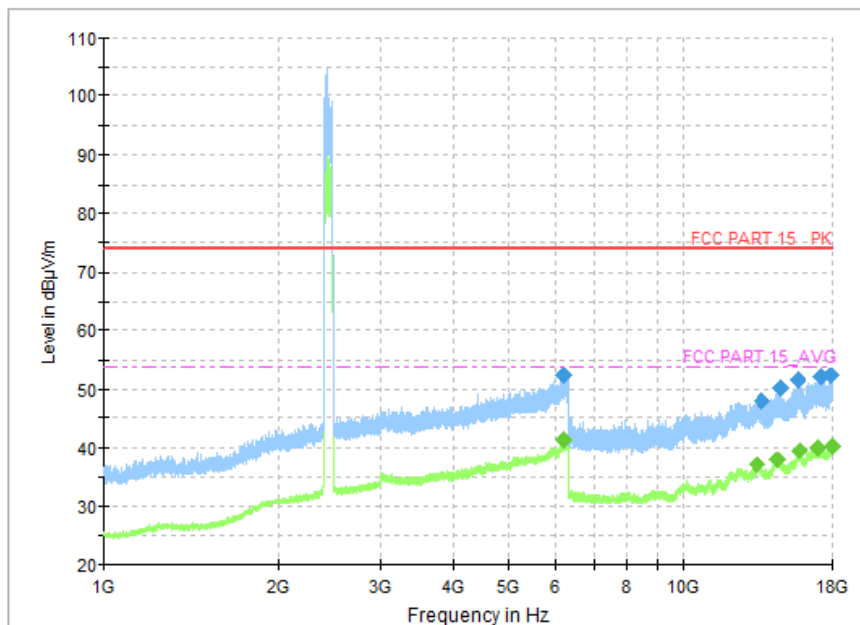


Fig. 43 Radiated Spurious Emission (GFSK, Ch39, 1 GHz ~18 GHz)

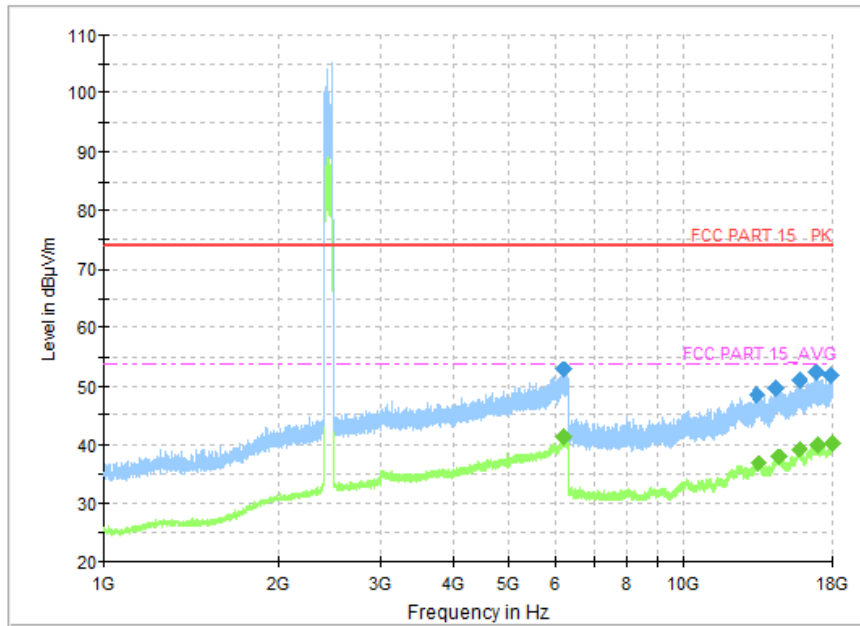


Fig. 44 Radiated Spurious Emission (GFSK, Ch78, 1 GHz ~18 GHz)

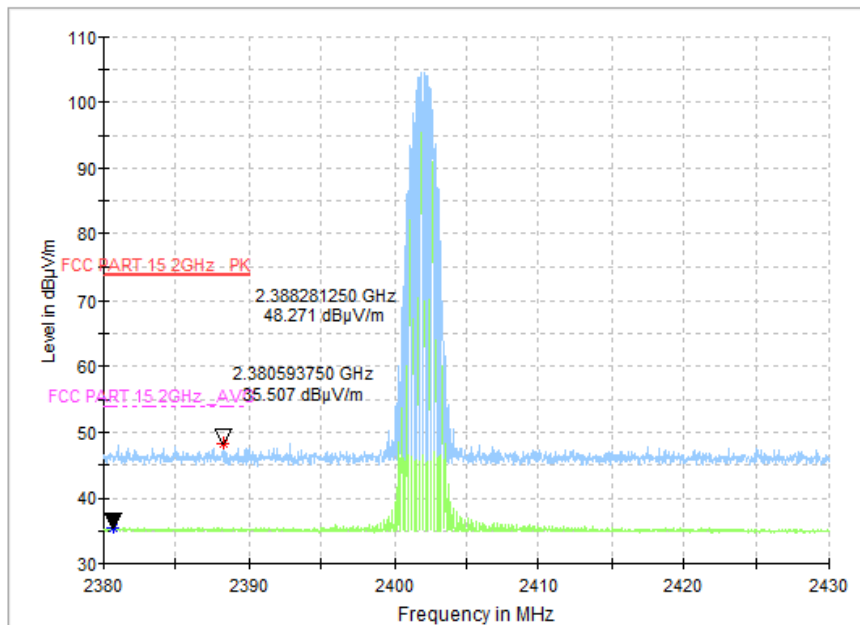


Fig. 45 Radiated Band Edges (GFSK, Ch0, 2380GHz~2450GHz)

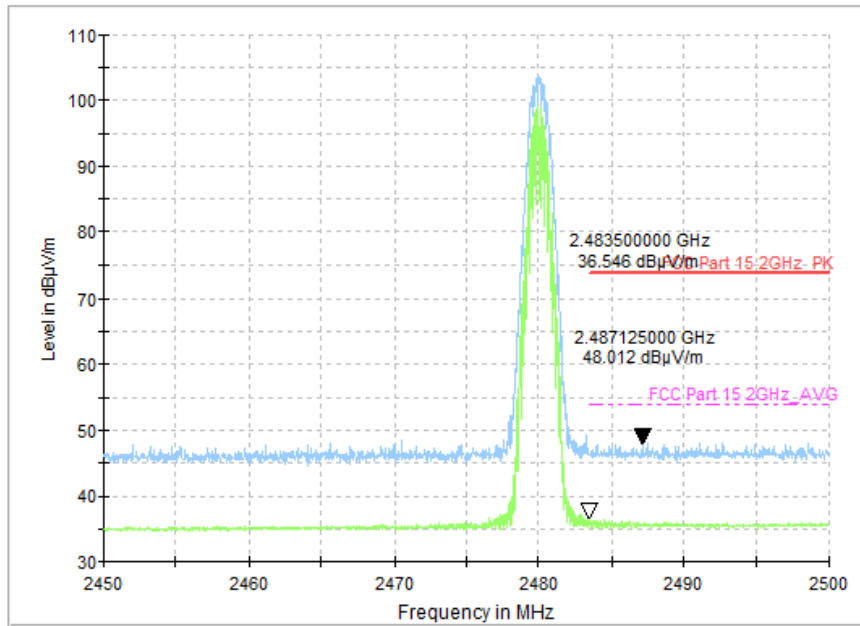


Fig. 46 Radiated Band Edges (GFSK, Ch78, 2450GHz~2500GHz)

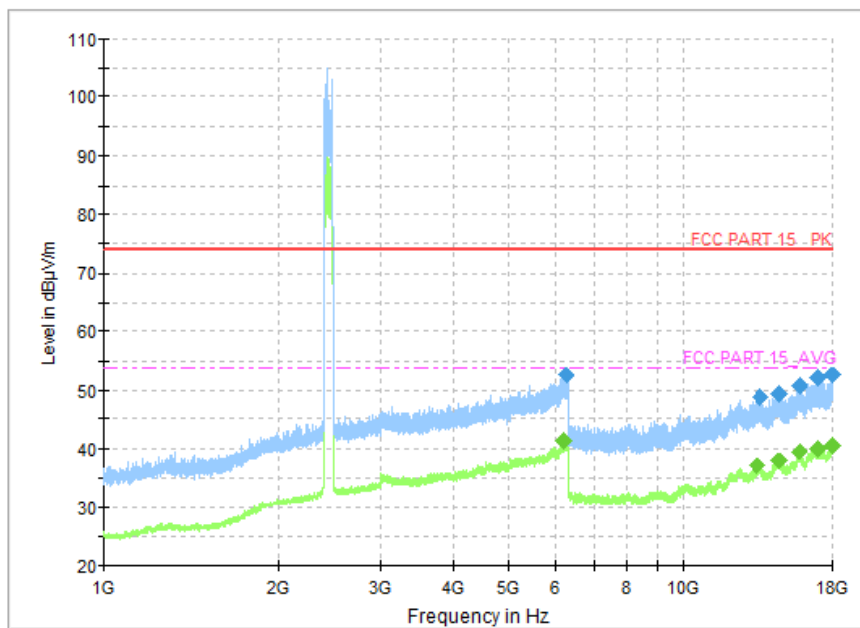


Fig. 47 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch0, 1 GHz ~18 GHz)

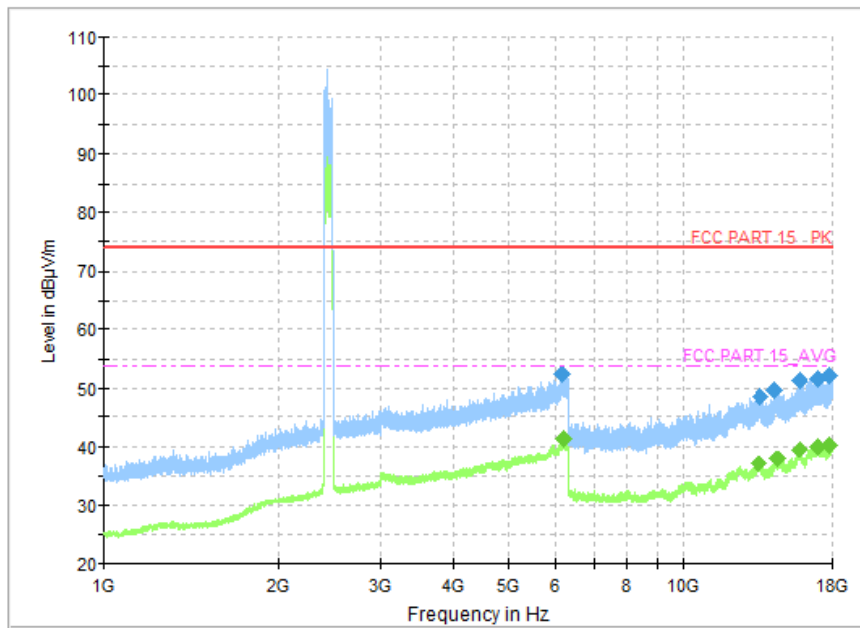


Fig. 48 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch39, 1 GHz ~18 GHz)

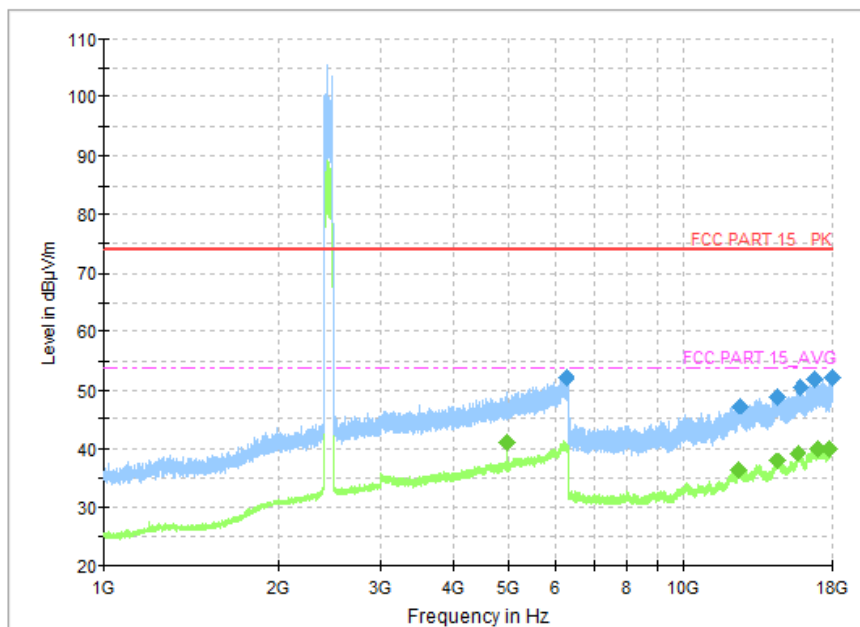


Fig. 49 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch78, 1 GHz ~18 GHz)

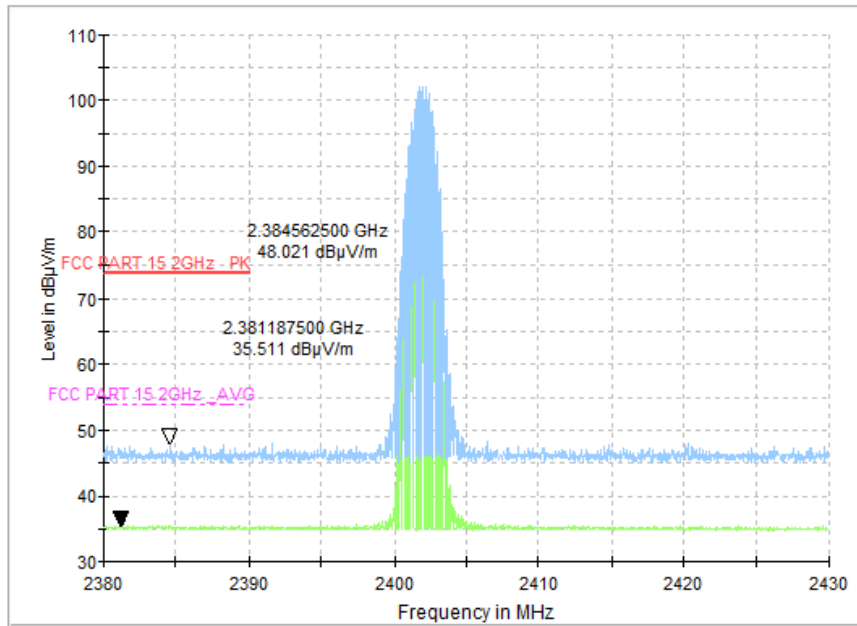


Fig. 50 Radiated Band Edges ($\pi/4$ DQPSK, Ch0, 2380GHz~2450GHz)

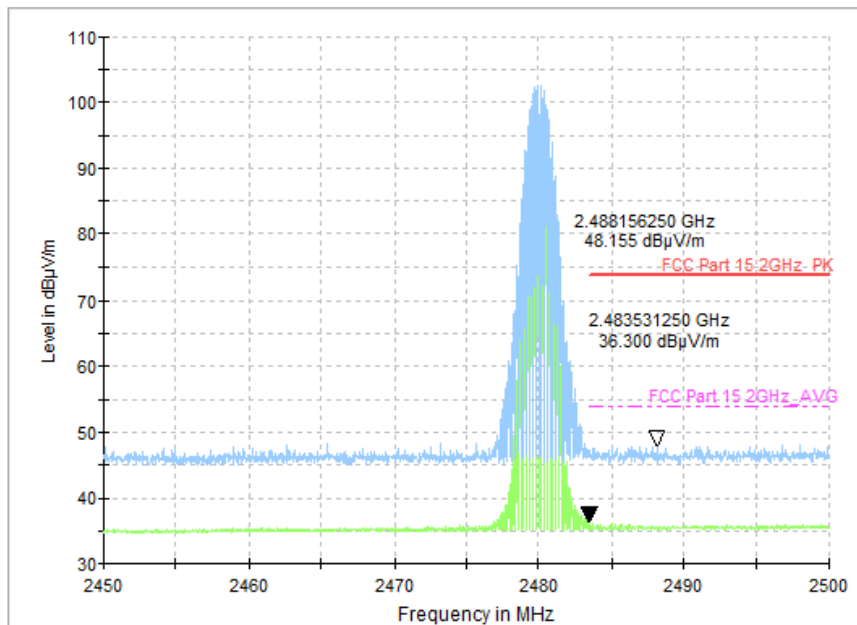


Fig. 51 Radiated Band Edges ($\pi/4$ DQPSK, Ch78, 2450GHz~2500GHz)

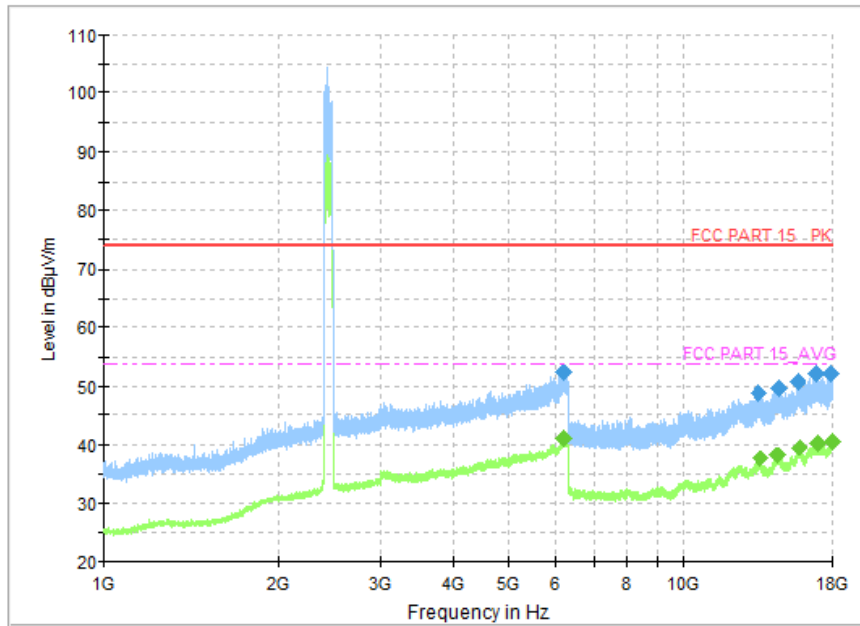


Fig. 52 Radiated Spurious Emission (8DPSK, Ch0, 1 GHz ~18 GHz)

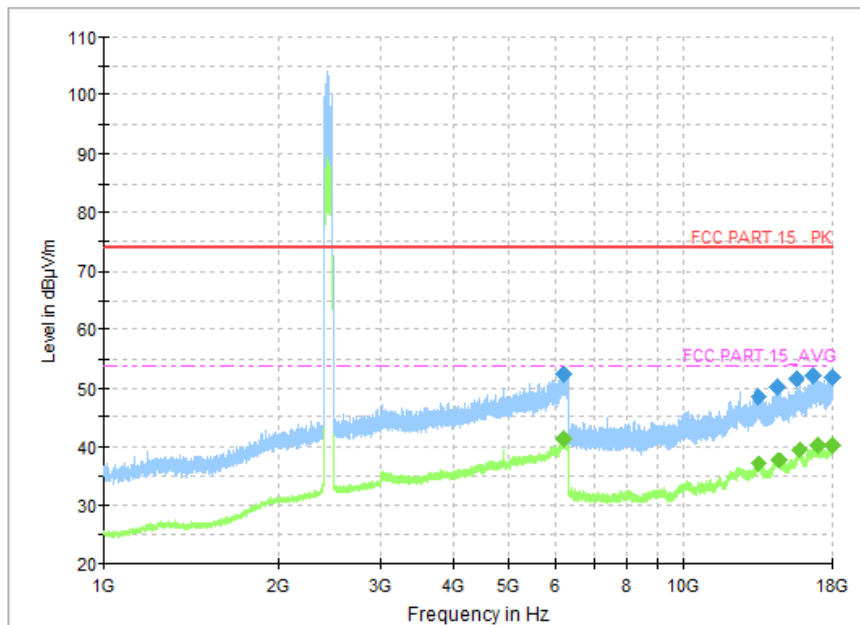


Fig. 53 Radiated Spurious Emission (8DPSK, Ch39, 1 GHz ~18 GHz)

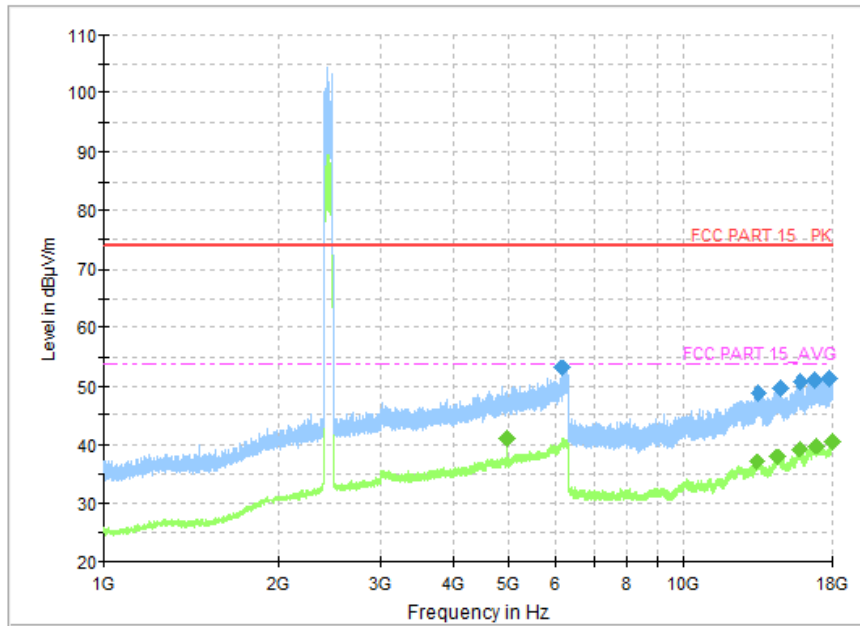


Fig. 54 Radiated Spurious Emission (8DPSK, Ch78, 1 GHz ~18 GHz)

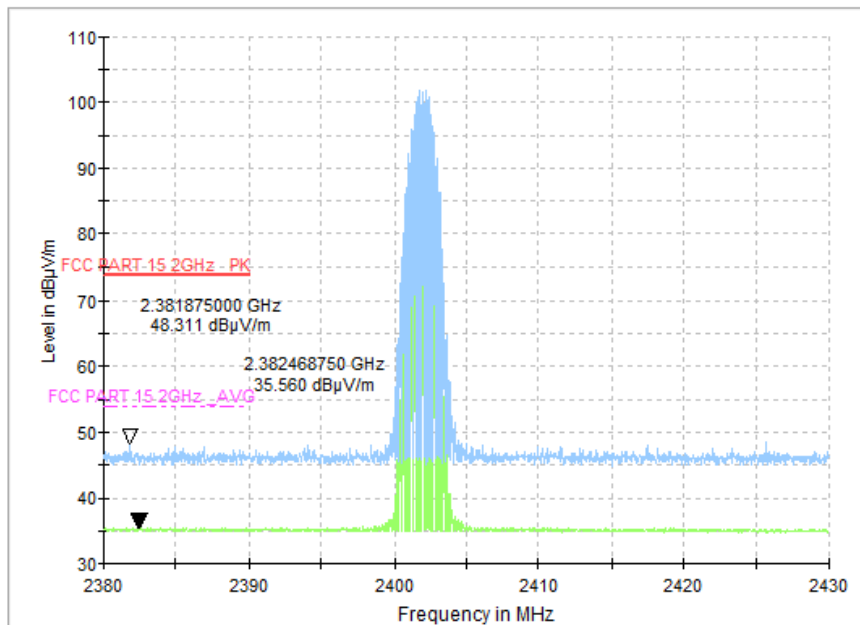


Fig. 55 Radiated Band Edges (8DPSK, Ch0, 2380GHz~2450GHz)

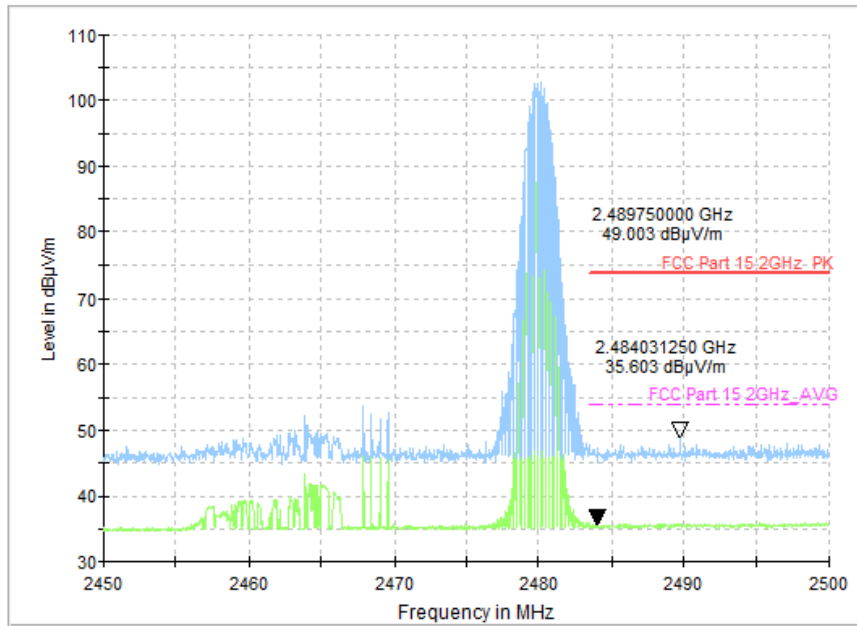


Fig. 56 Radiated Band Edges (8DPSK, Ch78, 2450GHz~2500GHz)

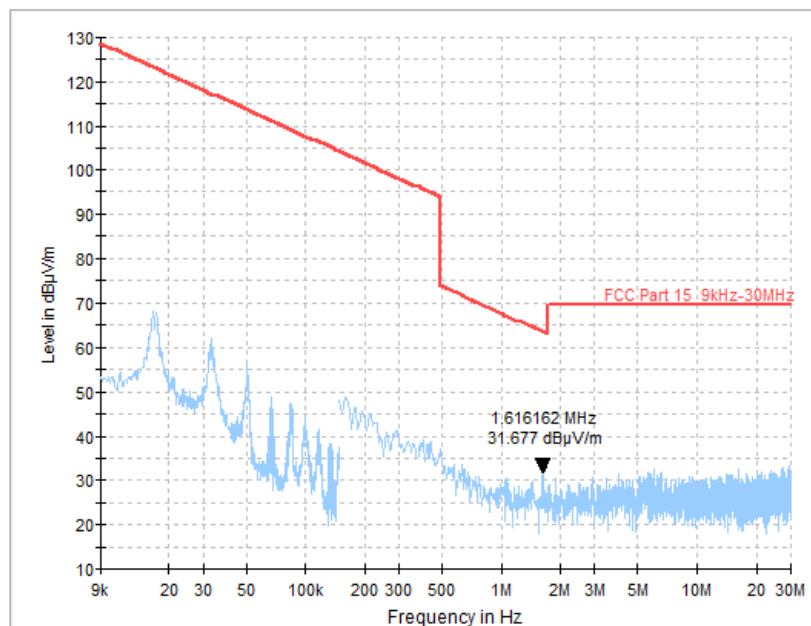


Fig. 57 Radiated Spurious Emission (All Channels, 9 kHz ~30 MHz)

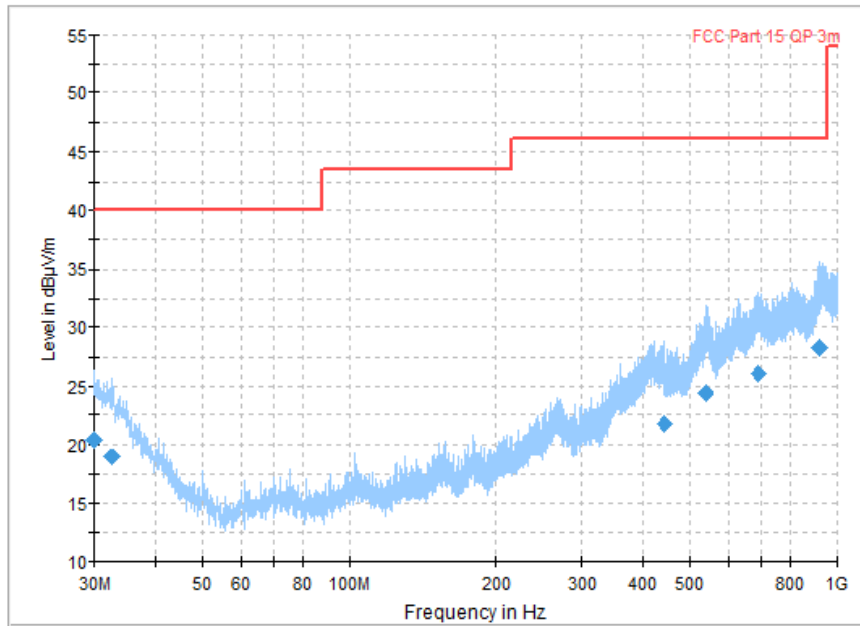


Fig. 58 Radiated Spurious Emission (All Channels, 30 MHz ~1 GHz)

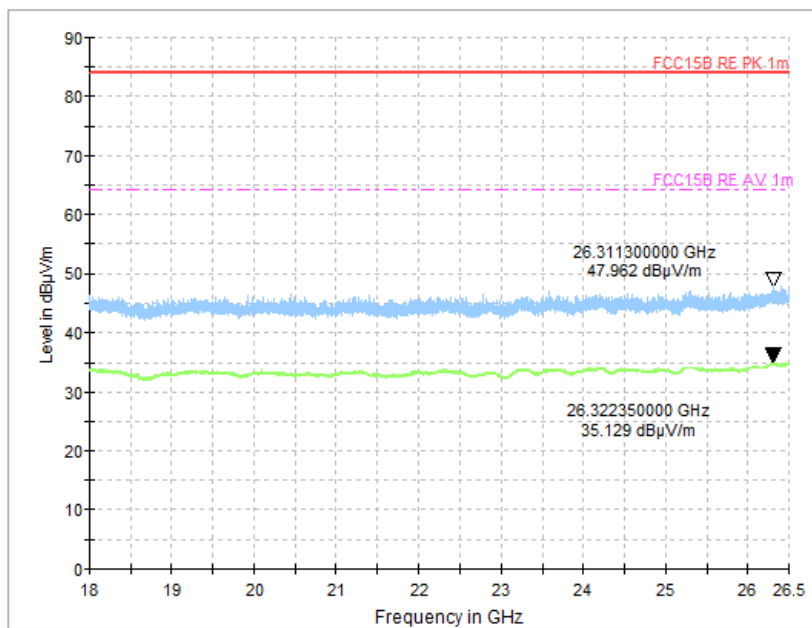


Fig. 59 Radiated Spurious Emission (All Channels, 18 GHz ~26.5 GHz)

A.5 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	/

Measurement Result:

Mode	Channel	20dB Bandwidth (kHz)		conclusion
		Fig.	Value	
GFSK	0	Fig.60	1030.50	/
	39	Fig.61	1022.25	
	78	Fig.62	1025.25	
$\pi/4$ DQPSK	0	Fig.63	1233.75	/
	39	Fig.64	1231.50	
	78	Fig.65	1263.75	
8DPSK	0	Fig.66	1239.00	/
	39	Fig.67	1246.50	
	78	Fig.68	1237.50	

See below for test graphs.

Conclusion: PASS

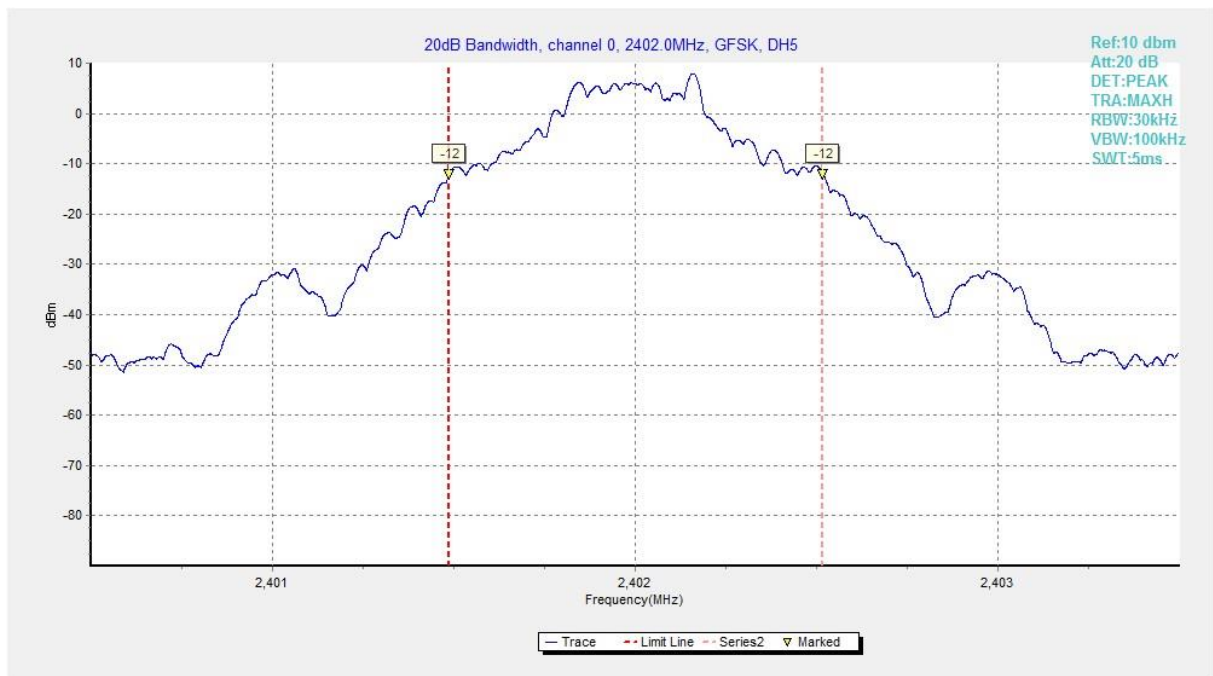


Fig. 60 20dB Bandwidth (GFSK, Ch 0)

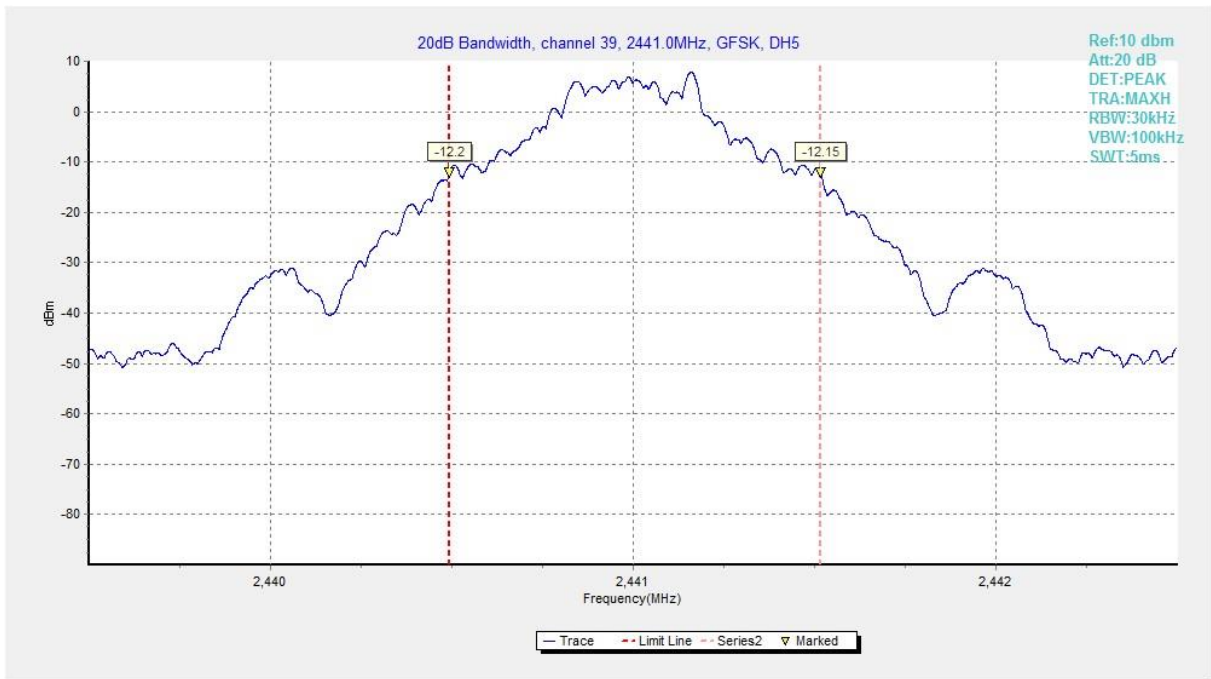


Fig. 61 20dB Bandwidth (GFSK, Ch 39)

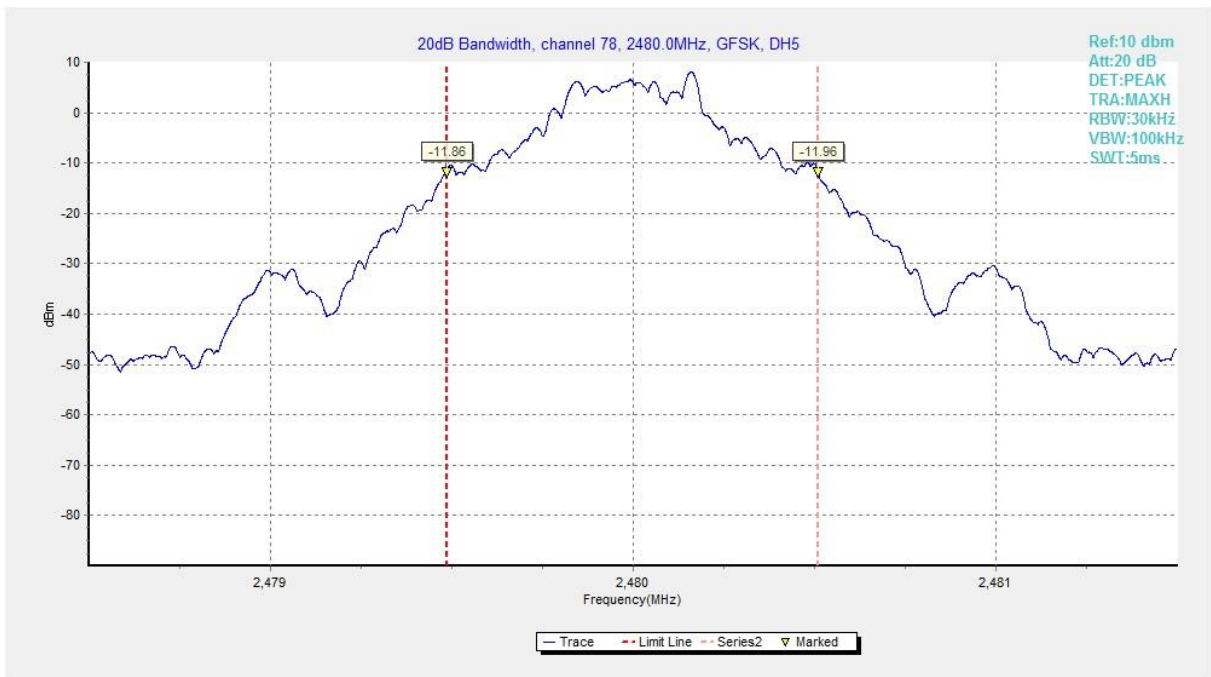


Fig. 62 20dB Bandwidth (GFSK, Ch 78)

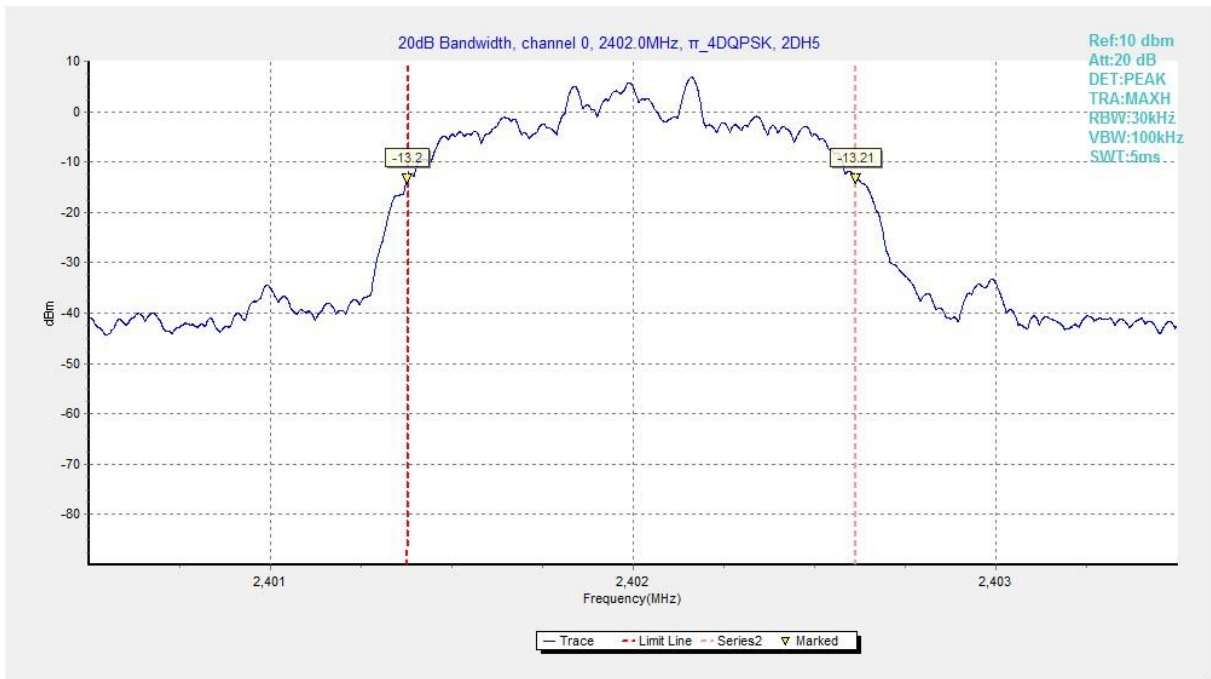


Fig. 63 20dB Bandwidth ($\pi/4$ DQPSK, Ch 0)

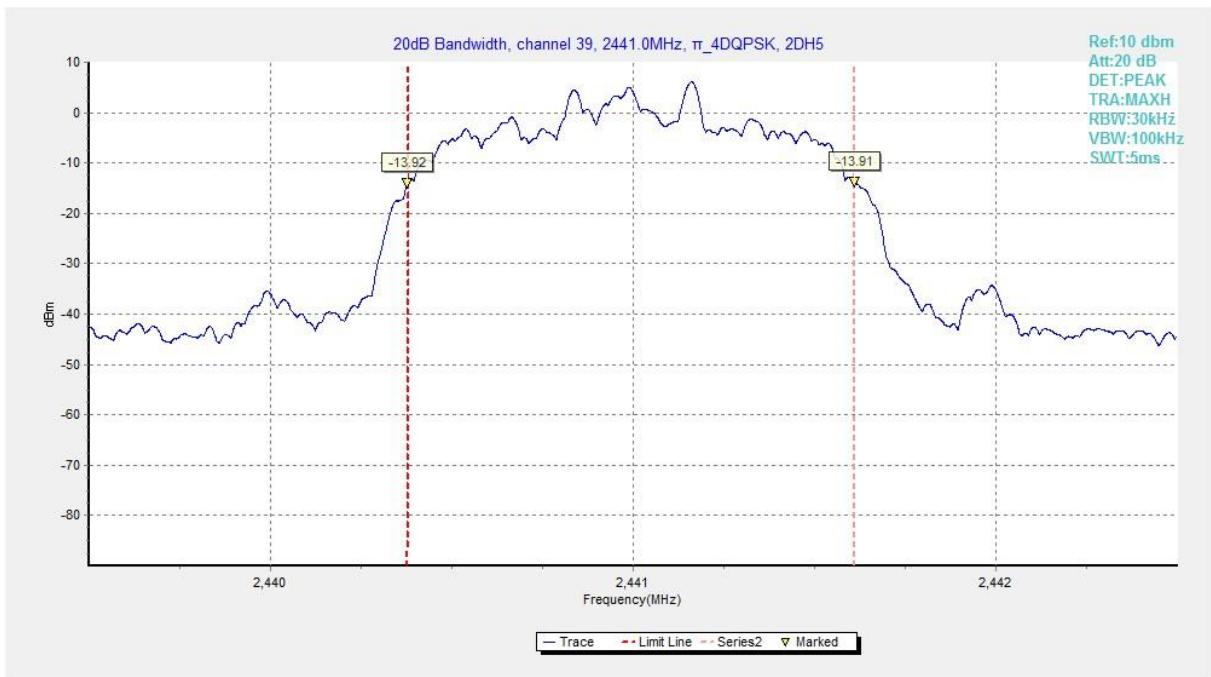


Fig. 64 20dB Bandwidth ($\pi/4$ DQPSK, Ch 39)

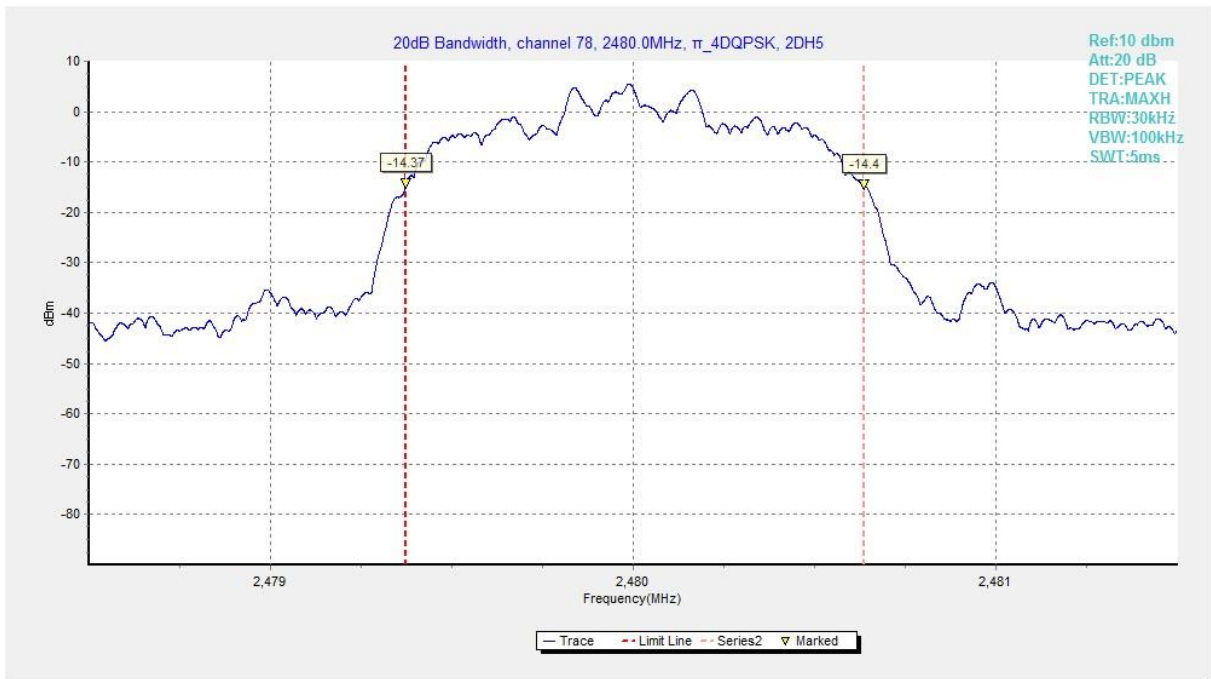


Fig. 65 20dB Bandwidth ($\pi/4$ DQPSK, Ch 78)

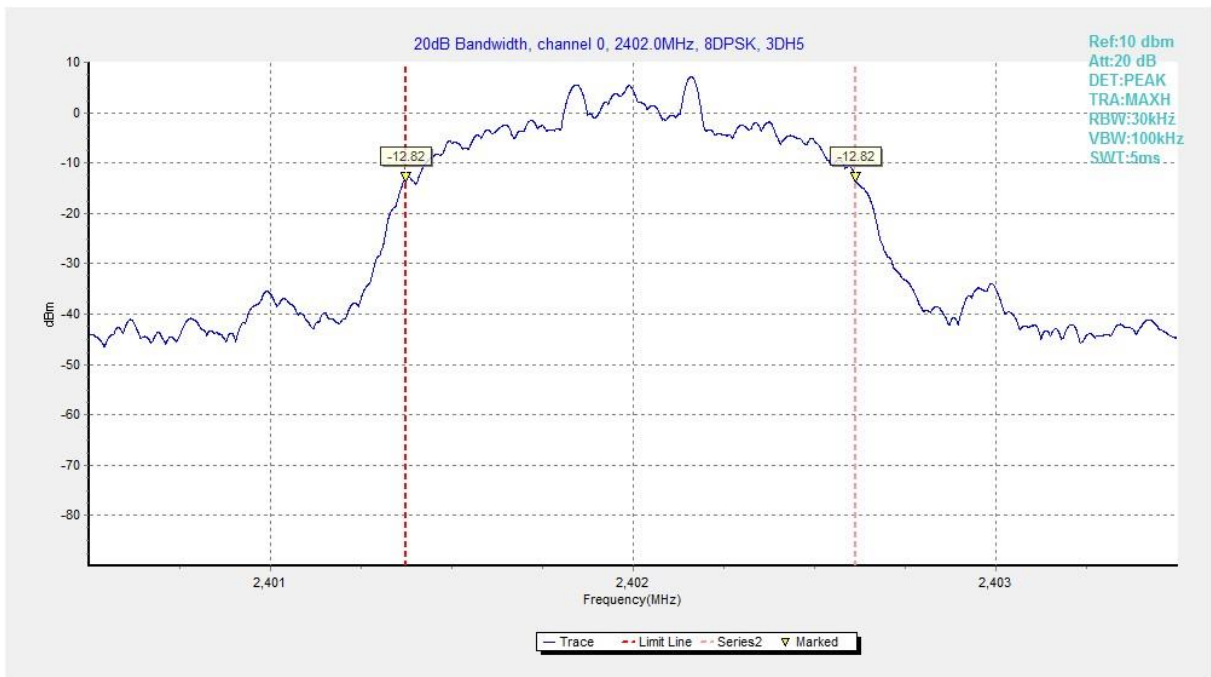


Fig. 66 20dB Bandwidth (8DPSK, Ch 0)

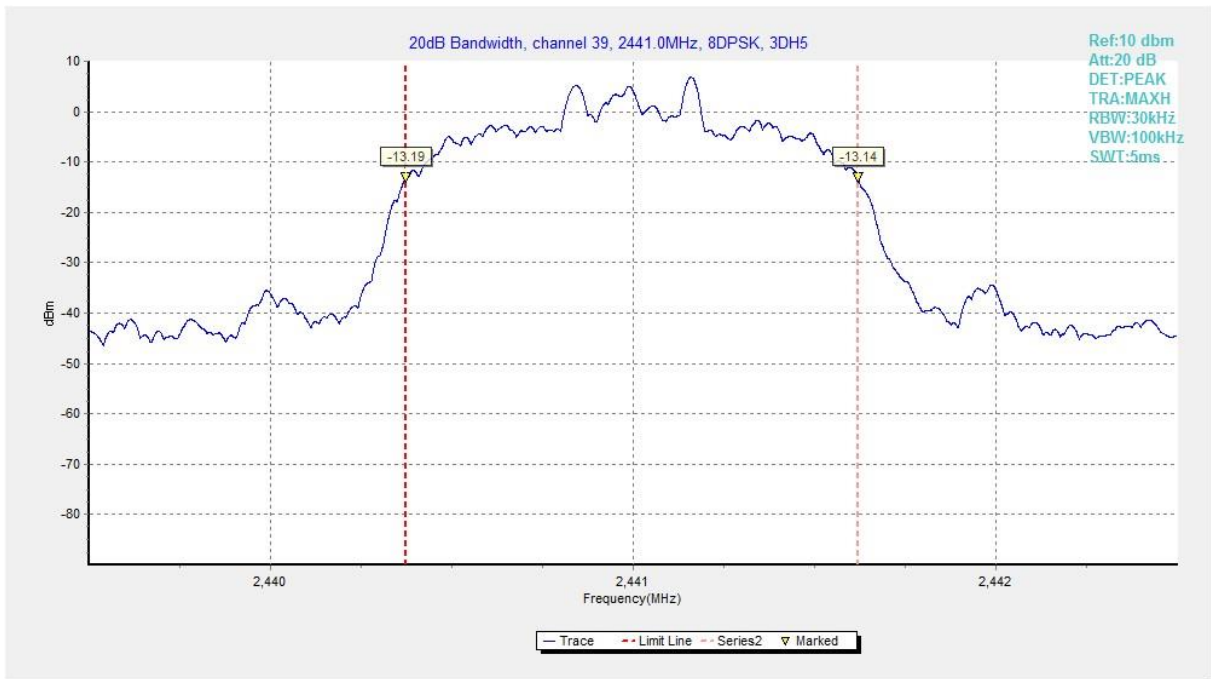


Fig. 67 20dB Bandwidth (8DPSK, Ch 39)

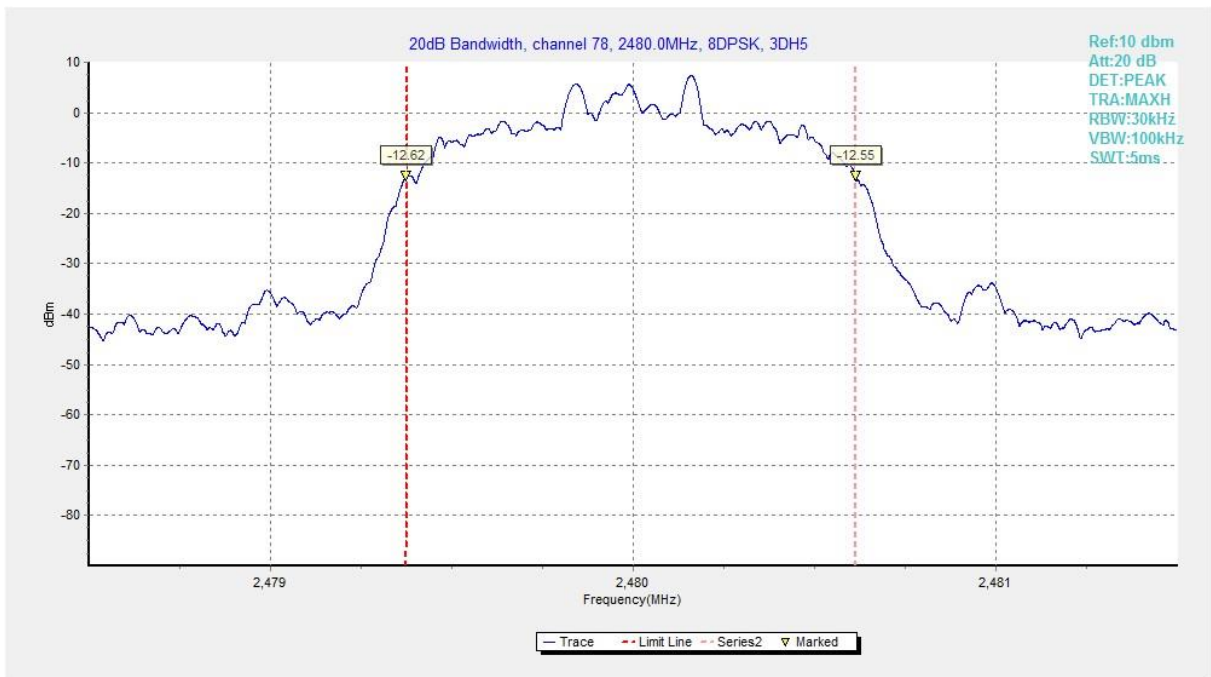


Fig. 68 20dB Bandwidth (8DPSK, Ch 78)



A.6 Time of Occupancy (Dwell Time)

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	< 400 ms

Measurement Results:

Mode	Channel	Packet	Dwell Time(ms)		Conclusion
GFSK	39	DH5	Fig.69	307.28	P
			Fig.70		
$\pi/4$ DQPSK	39	2-DH5	Fig.71	307.10	P
			Fig.72		
8DPSK	39	3-DH5	Fig.73	306.98	P
			Fig.74		

See below for test graphs.

Conclusion: Pass

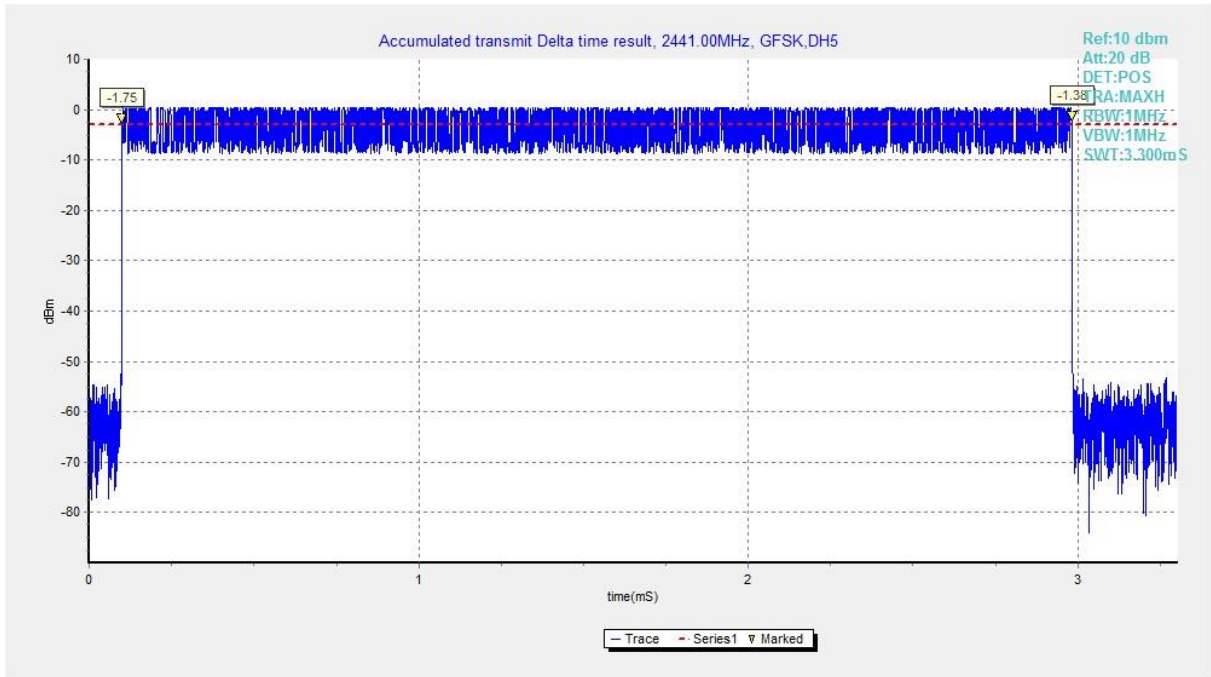


Fig. 69 Time of Occupancy(Dwell Time) (GFSK, Ch39)

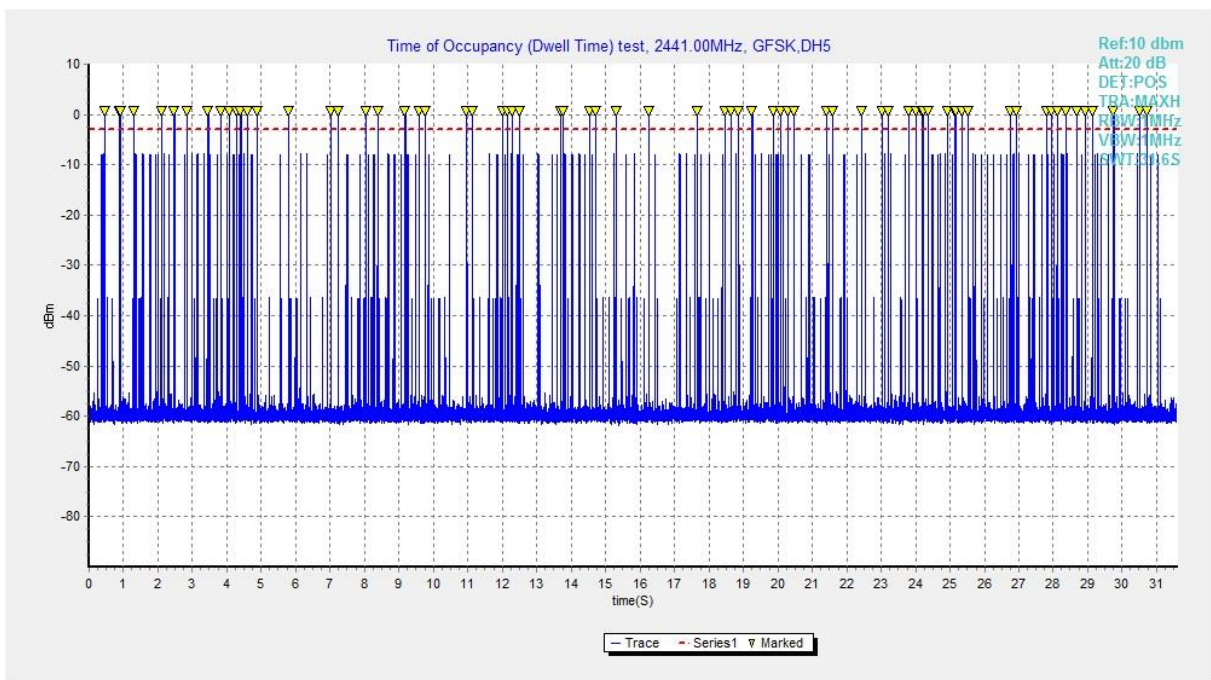


Fig. 70 Time of Occupancy(Dwell Time) (GFSK, Ch39)

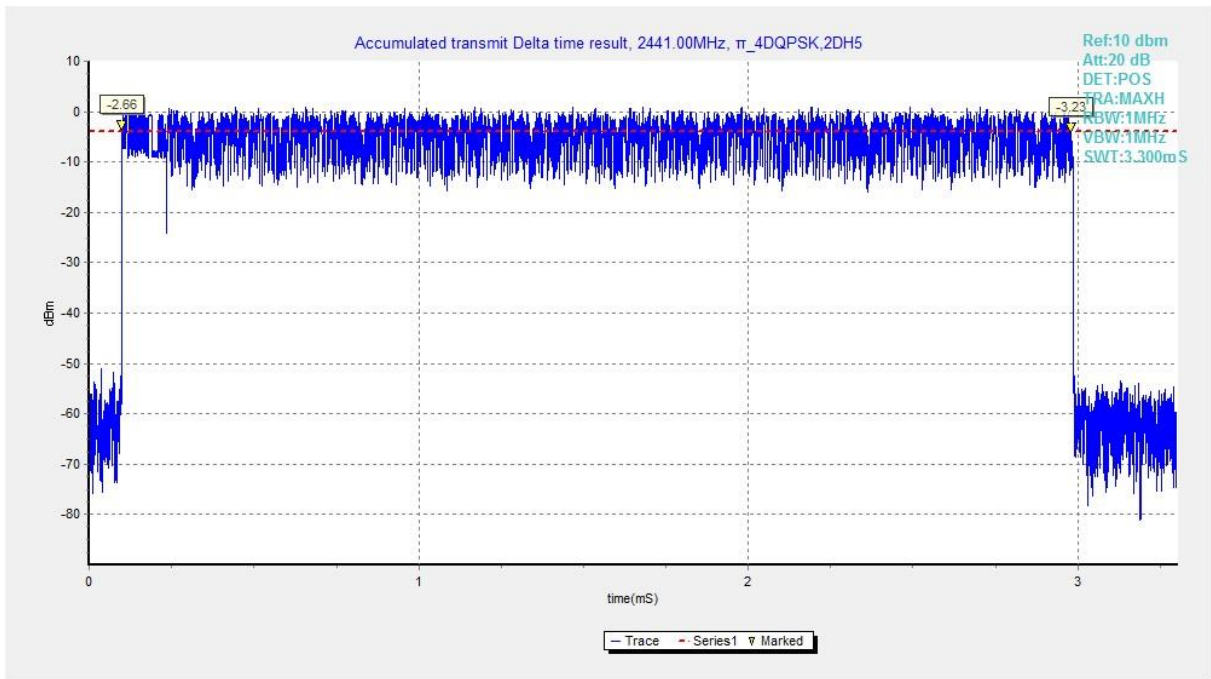


Fig. 71 Time of Occupancy(Dwell Time) (π /4 DQPSK, Ch39)

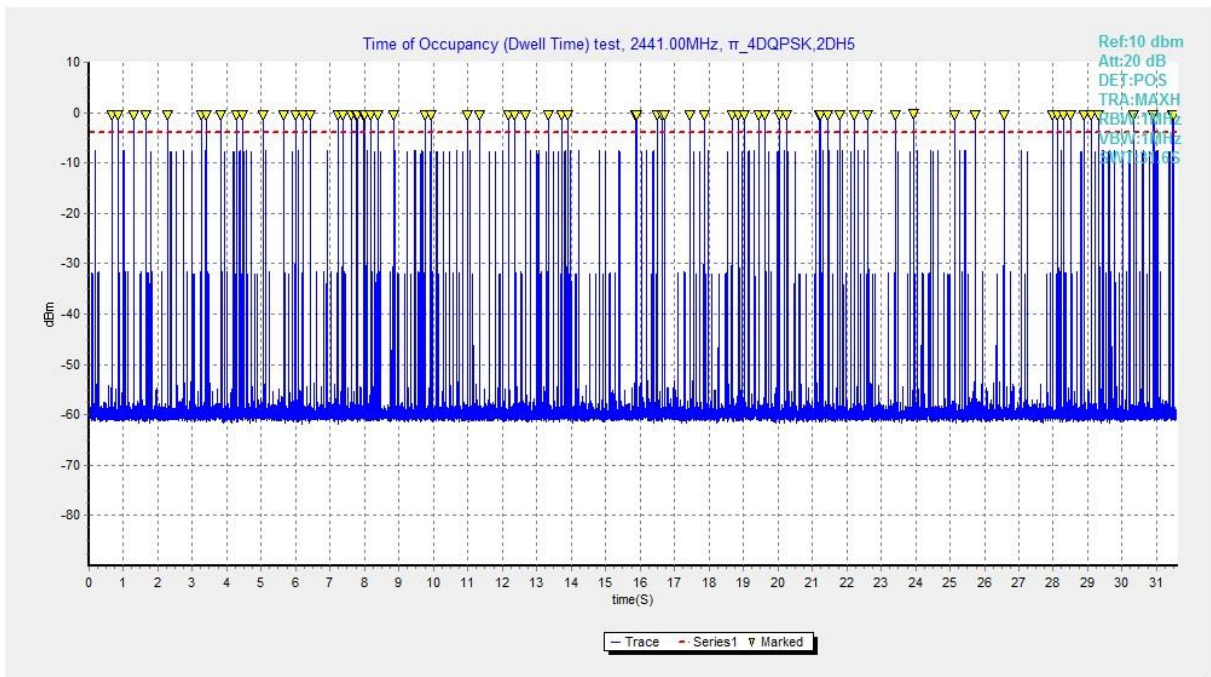


Fig. 72 Time of Occupancy(Dwell Time) (π /4 DQPSK, Ch39)

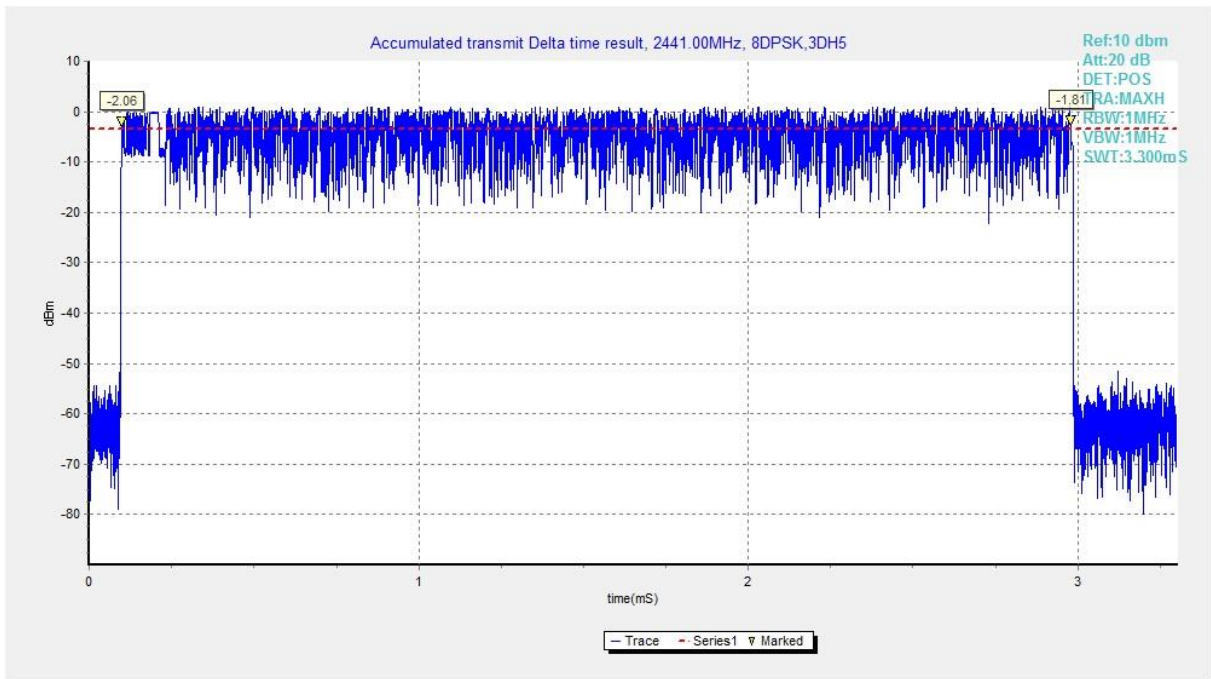


Fig. 73 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

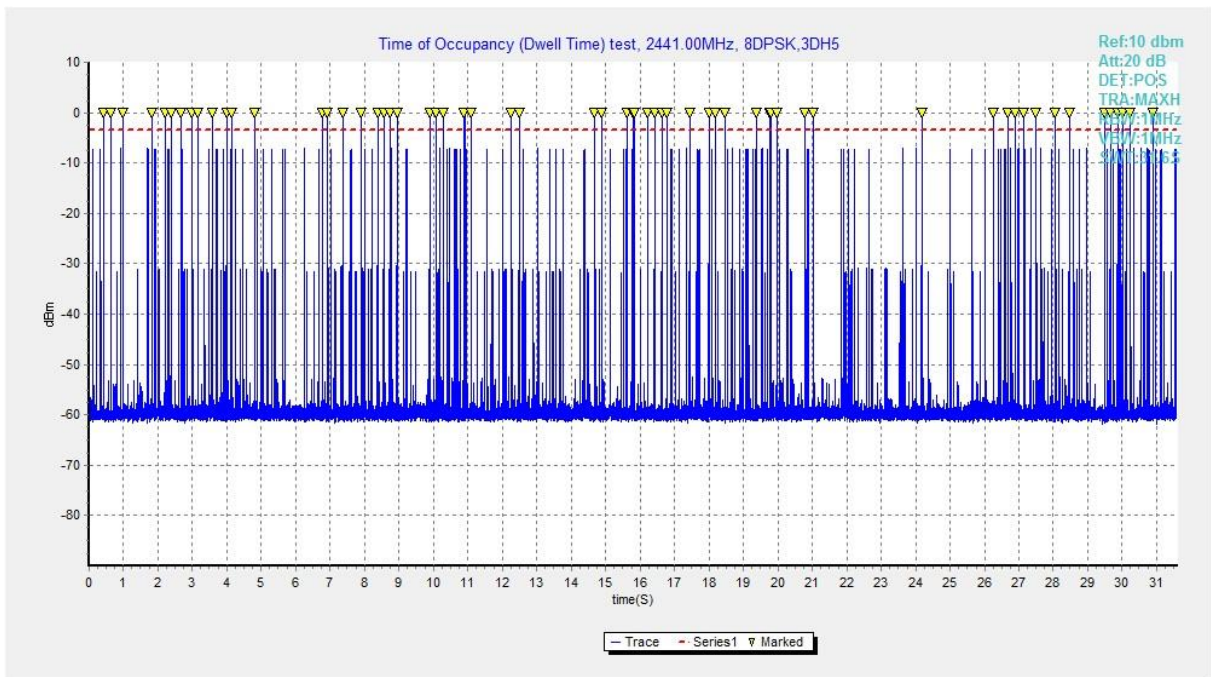


Fig. 74 Time of Occupancy(Dwell Time) (8DPSK, Ch39)



A.7 Number of Hopping Channels

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	At least 15 non-overlapping channels

Measurement Results:

Mode	Packet	Number of hopping		Test result	Conclusion
GFSK	DH5	Fig.75	Fig.76	79	P
$\pi/4$ DQPSK	2-DH5	Fig.77	Fig.78	79	P
8DPSK	3-DH5	Fig.79	Fig.80	79	P

See below for test graphs.

Conclusion: Pass

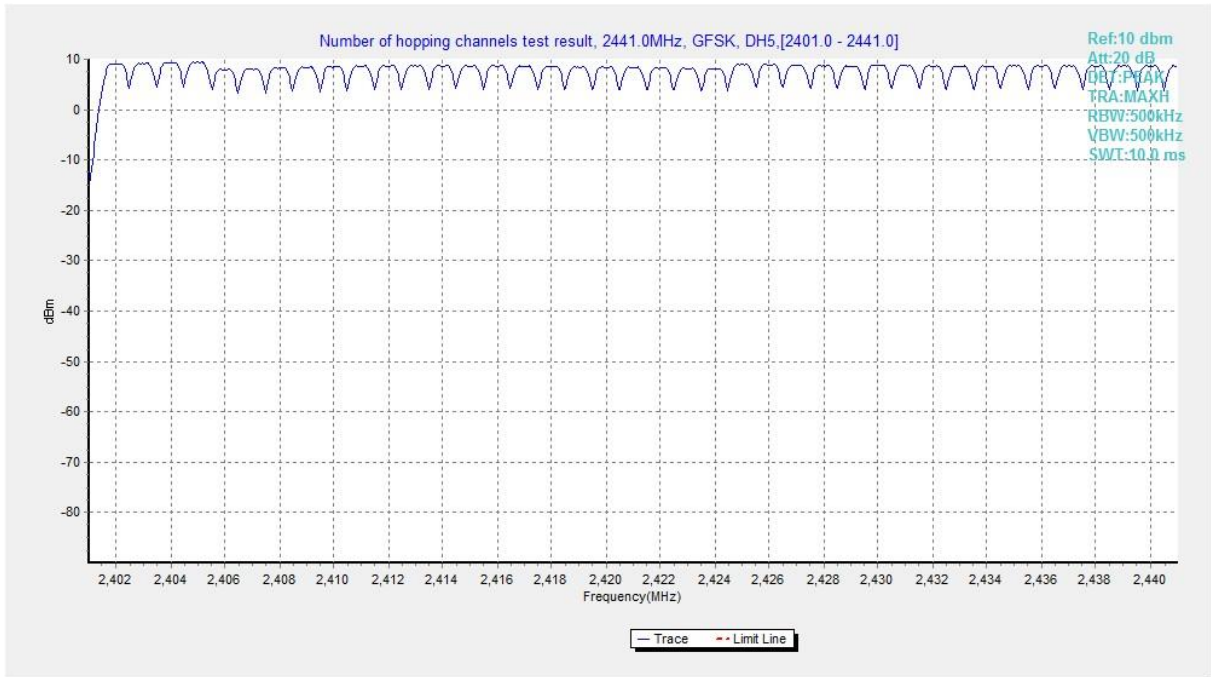


Fig. 75 Hopping channel ch0~39 (GFSK, Ch39)

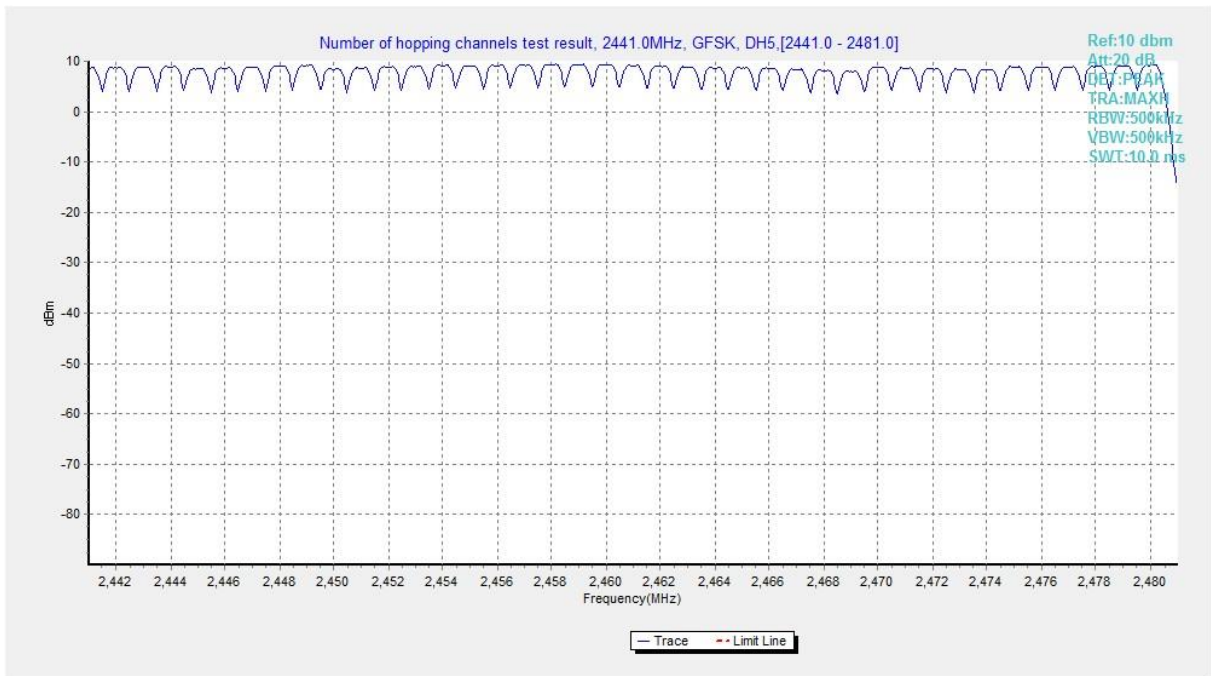


Fig. 76 Hopping channel ch39~78 (GFSK, Ch39)

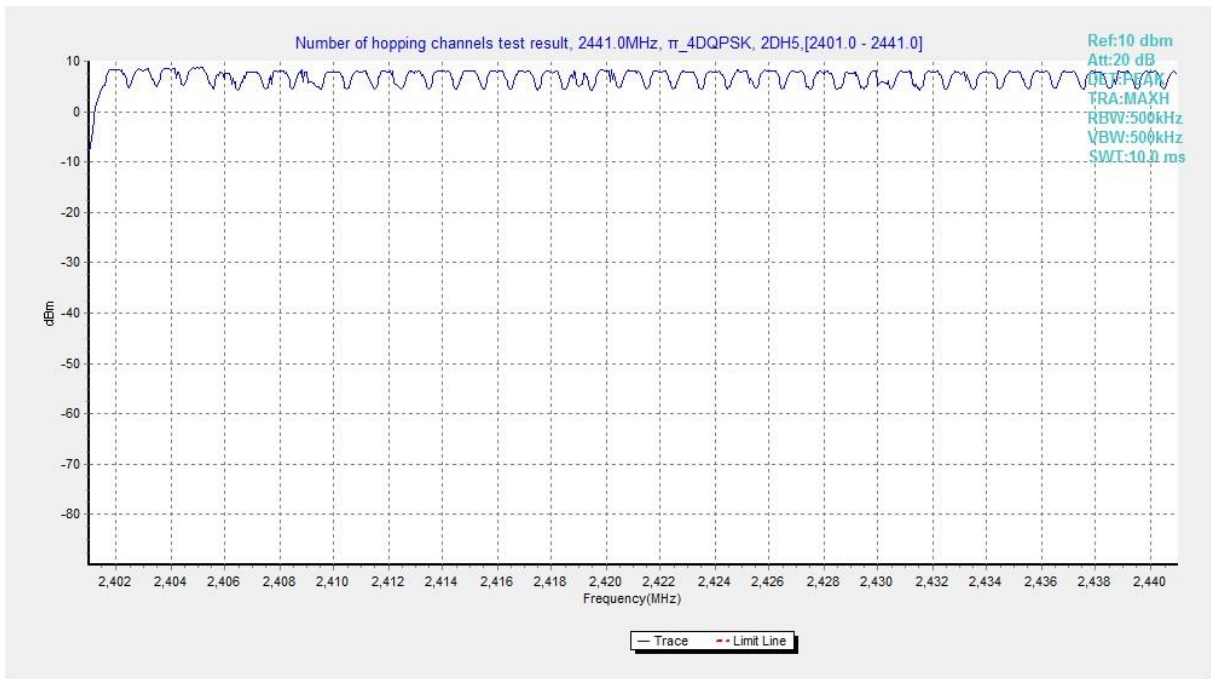


Fig. 77 Hopping channel ch0~39 ($\pi/4$ DQPSK, Ch39)

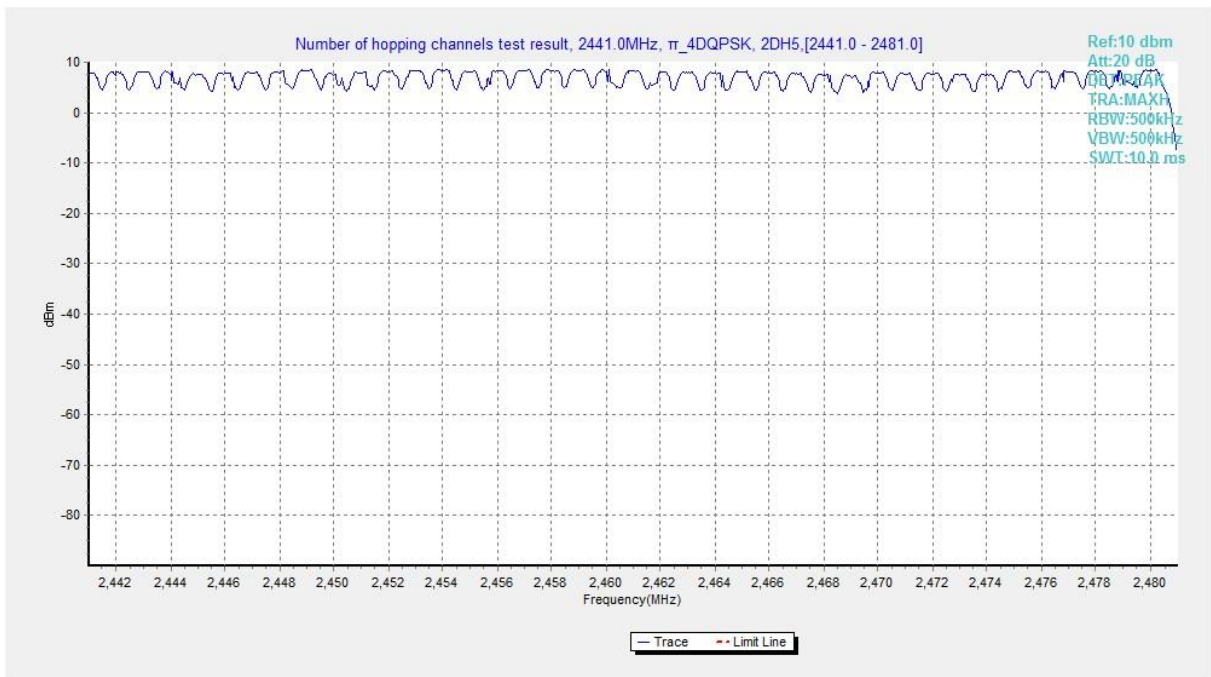


Fig. 78 Hopping channel ch39~78 ($\pi/4$ DQPSK, Ch39)

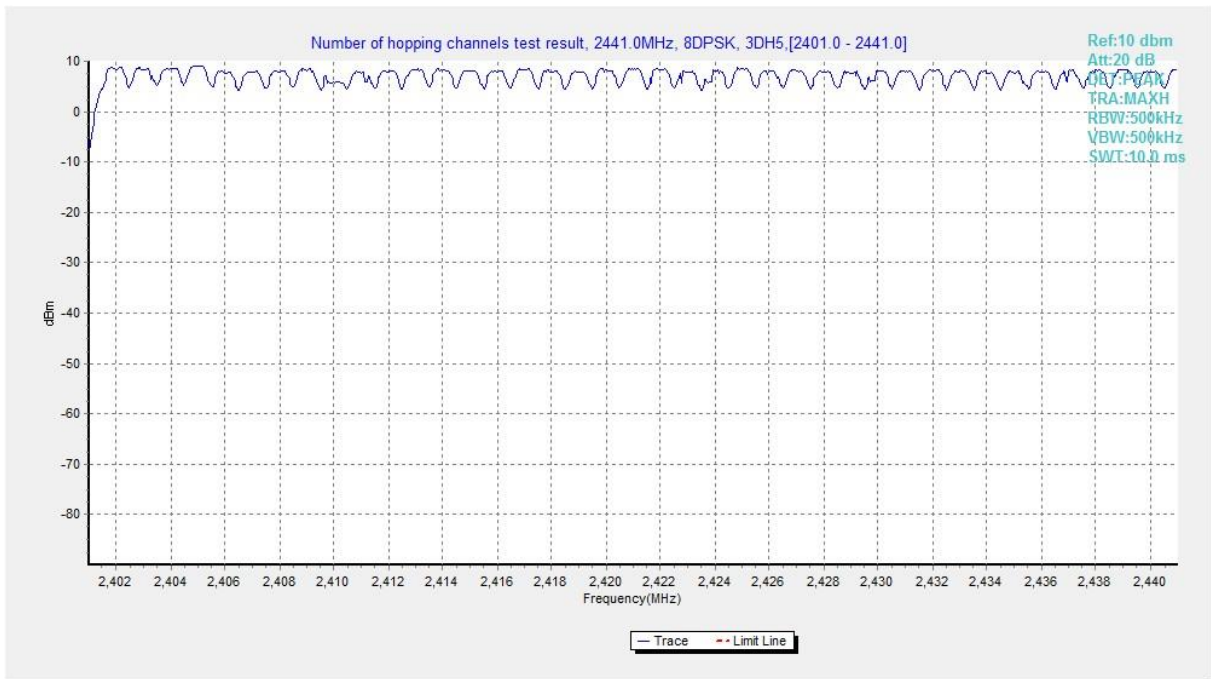


Fig. 79 Hopping channel ch0~39 (8DPSK, Ch39)

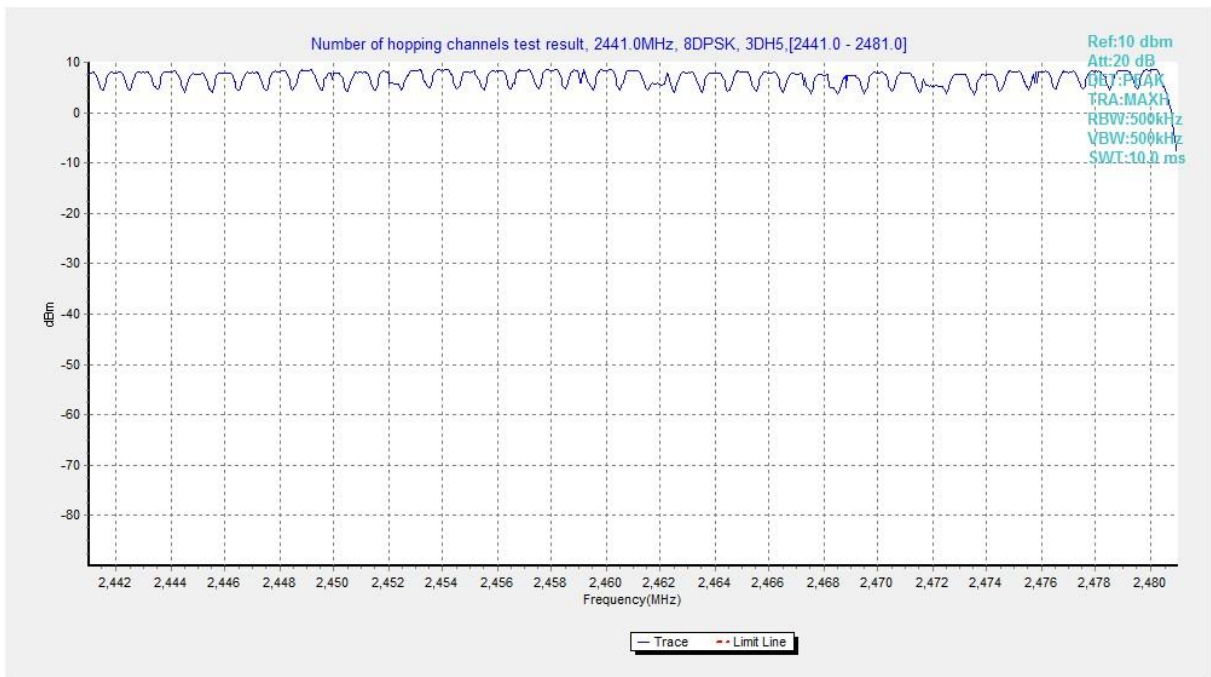


Fig. 80 Hopping channel ch39~78 (8DPSK, Ch39)

A.8 Carrier Frequency Separation

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

Measurement Results:

Mode	Channel	Packet	Separation of hopping channels	Test result (kHz)	Conclusion
GFSK	39	DH5	Fig.81	1008.75	P
$\pi/4$ DQPSK	39	2-DH5	Fig.82	1003.50	P
8DPSK	39	3-DH5	Fig.83	999.00	P

See below for test graphs.

Conclusion: Pass

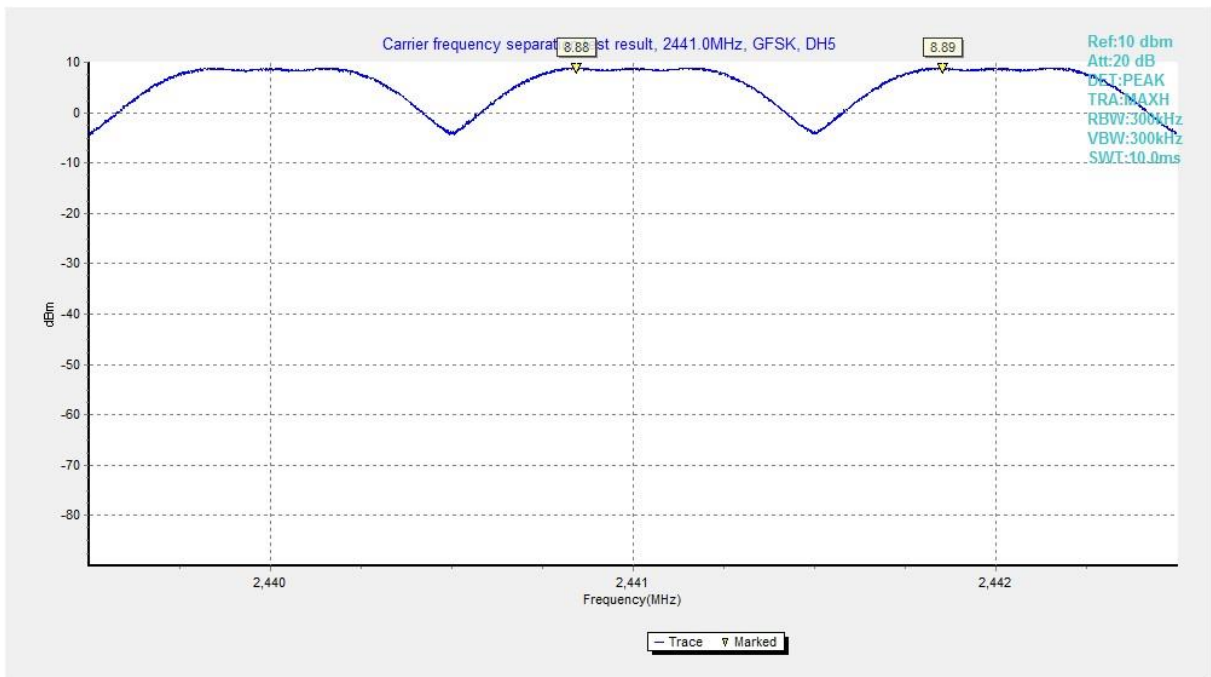


Fig. 81 Carrier Frequency Separation (GFSK, Ch39)

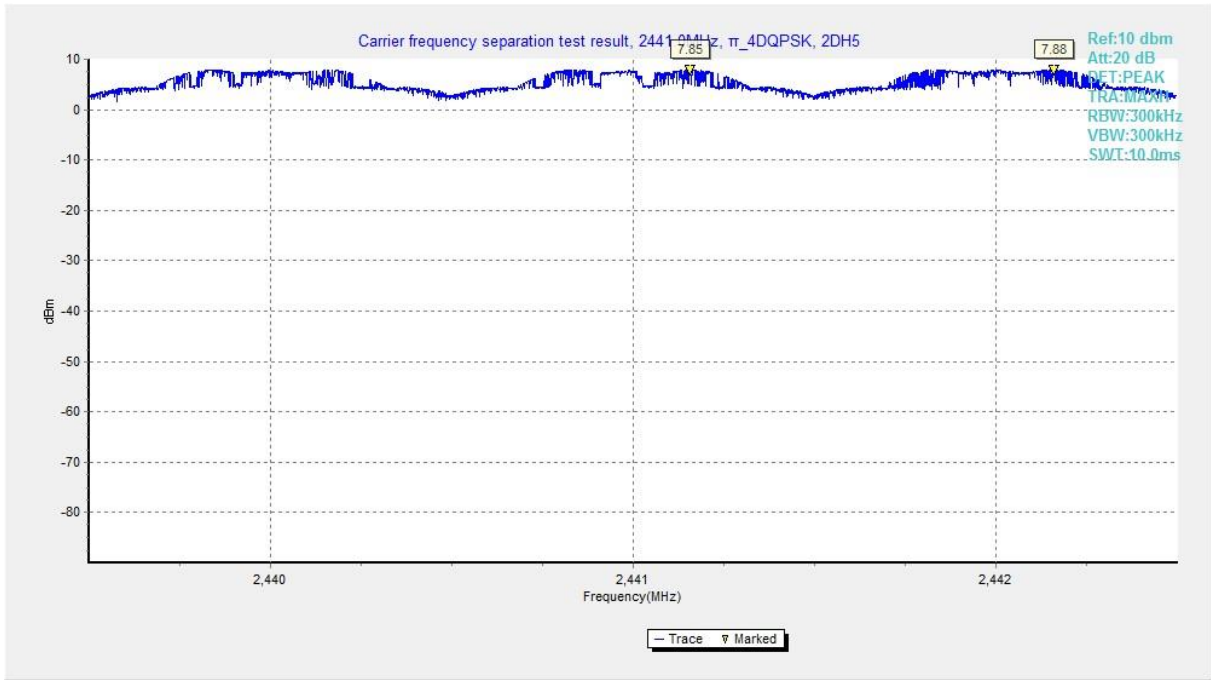


Fig. 82 Carrier Frequency Separation ($\pi/4$ DQPSK, Ch39)

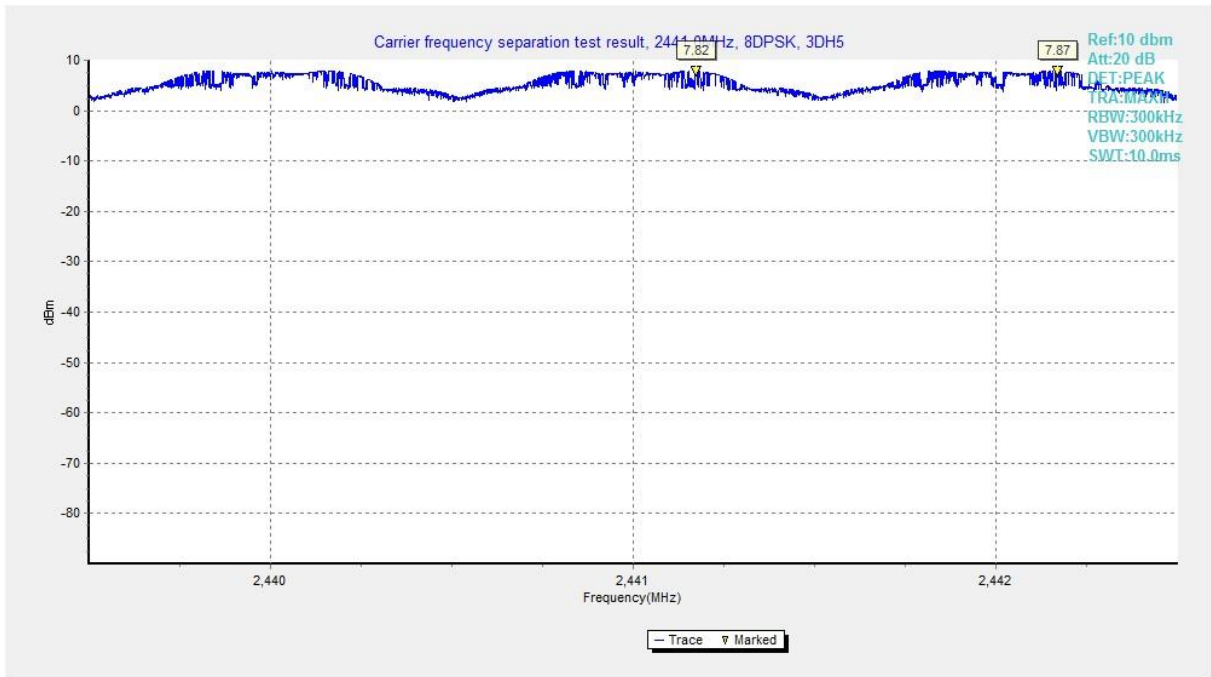


Fig. 83 Carrier Frequency Separation (8DPSK, Ch39)