

Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

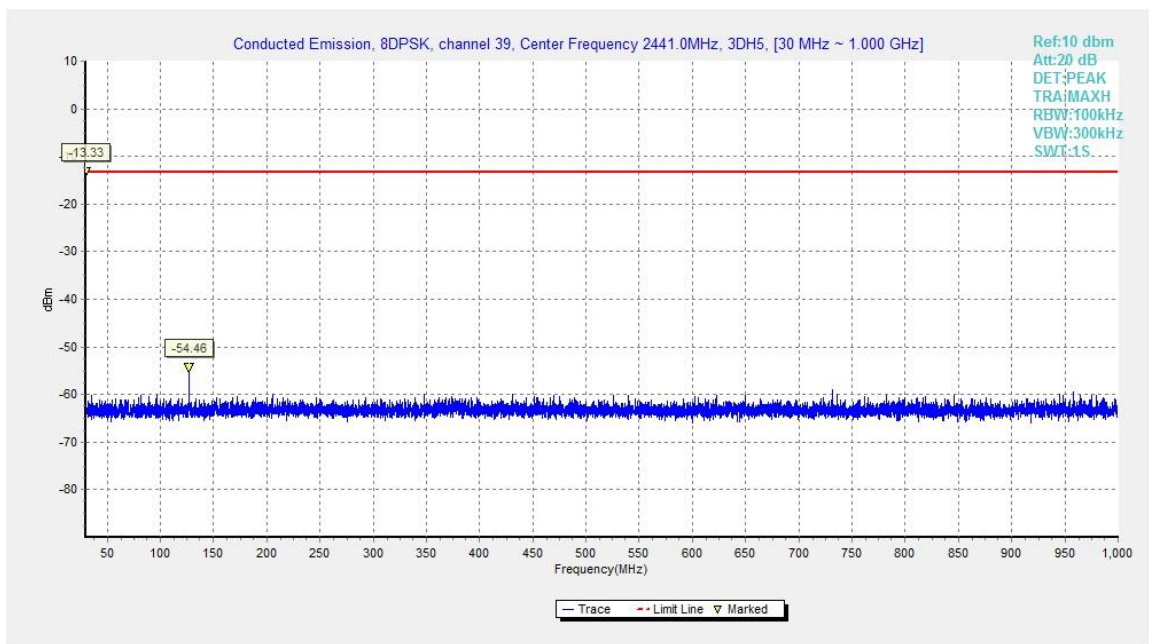


Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz

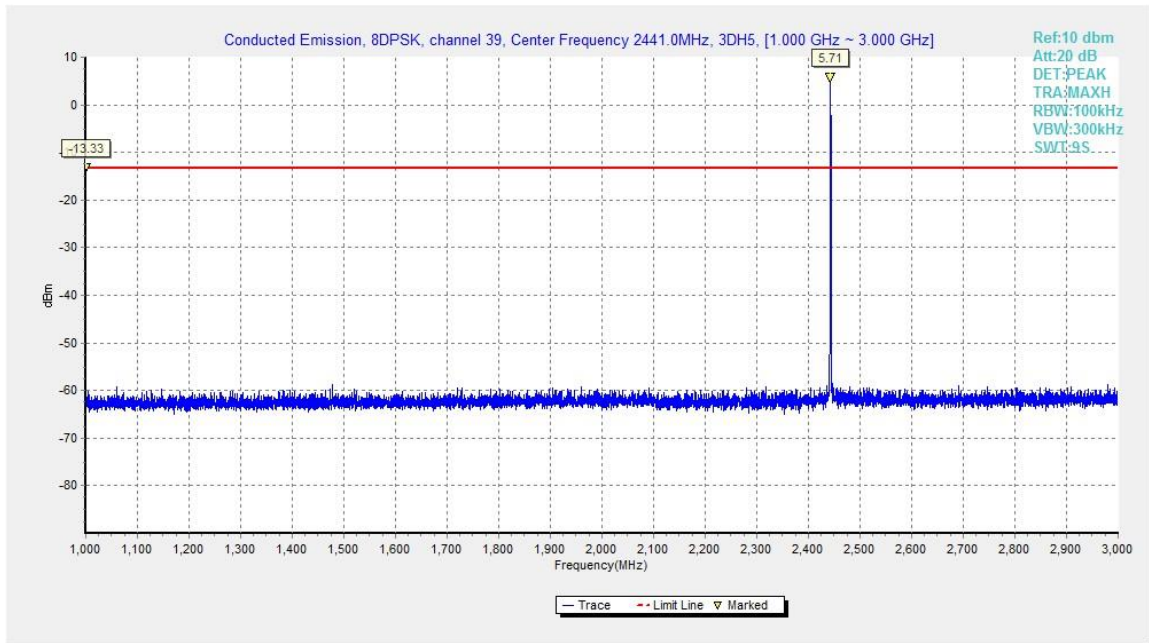


Fig.50. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz

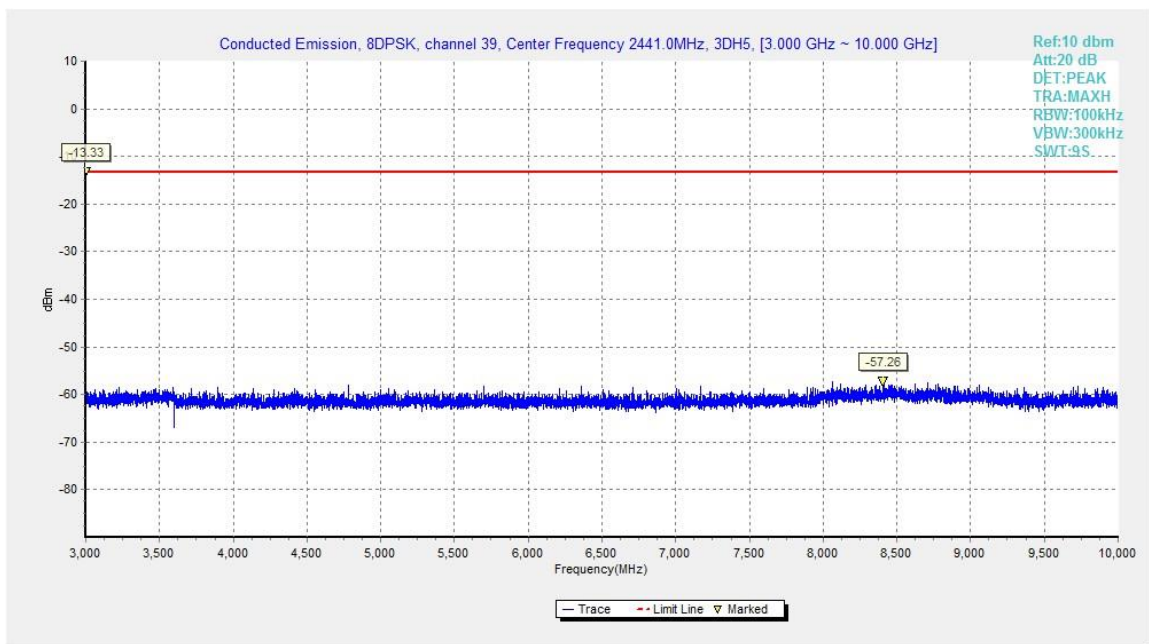


Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

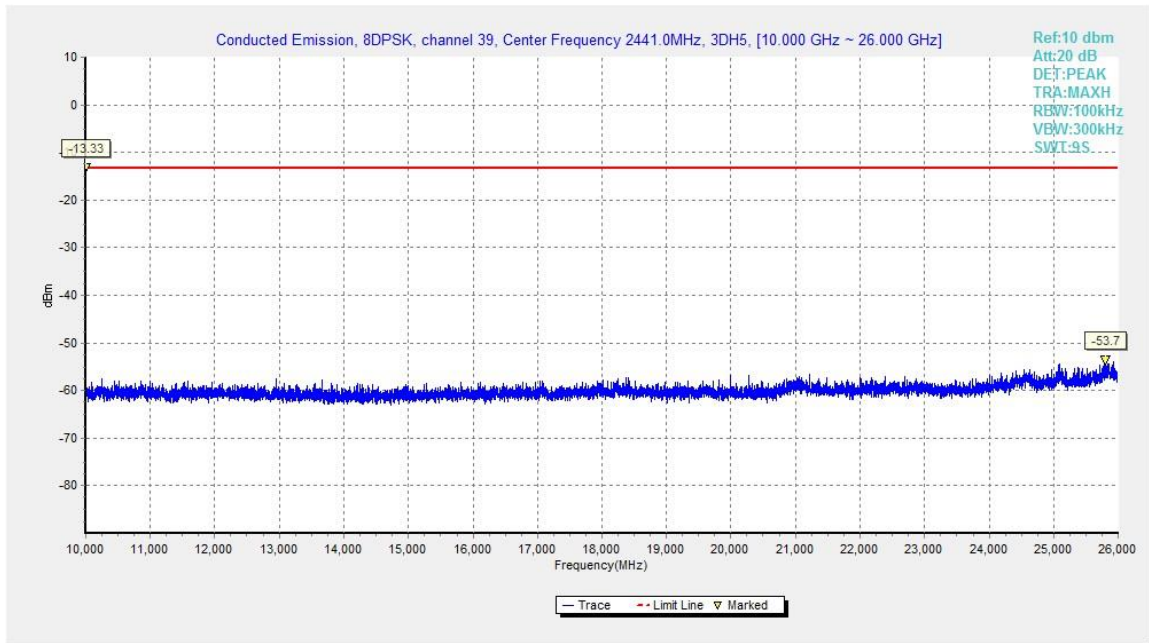


Fig.52. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

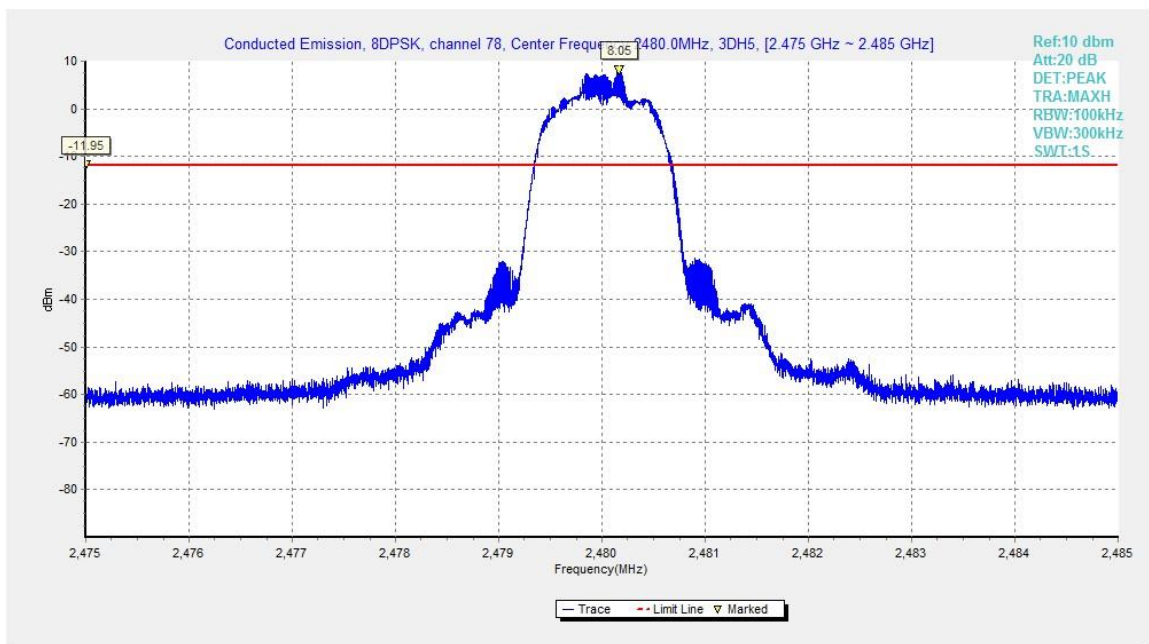


Fig.53. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

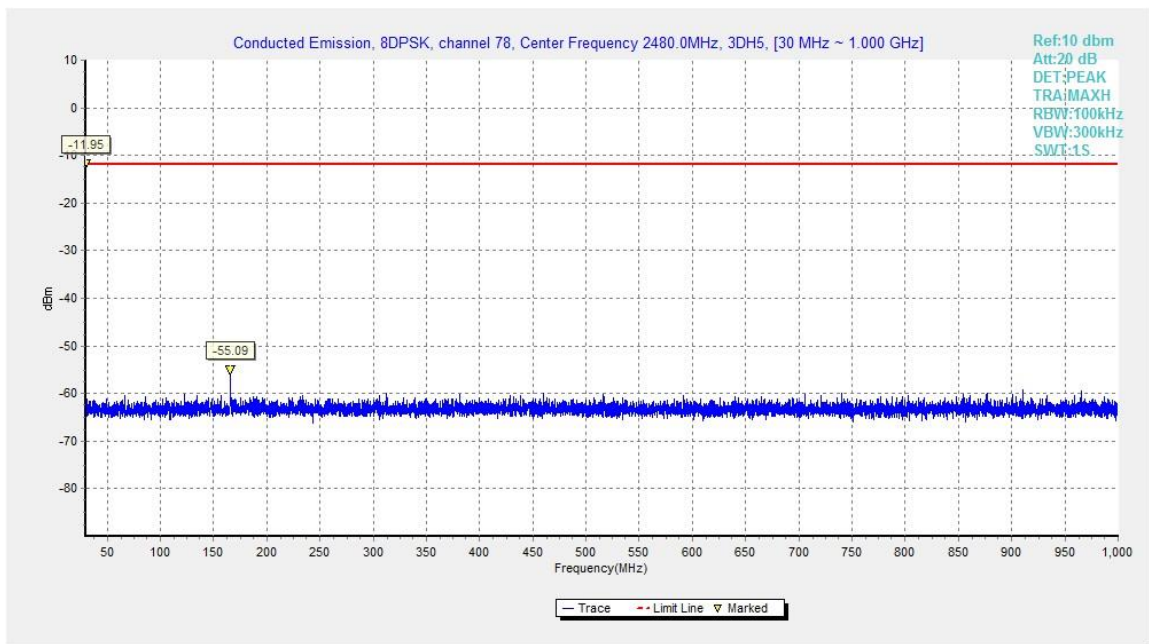


Fig.54. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

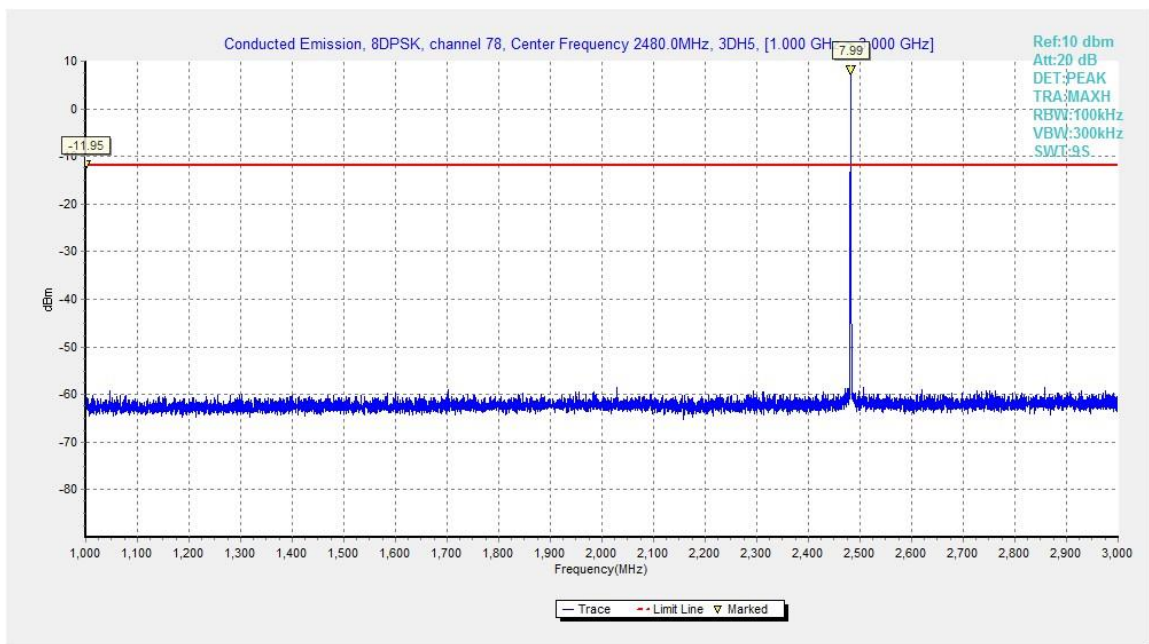


Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

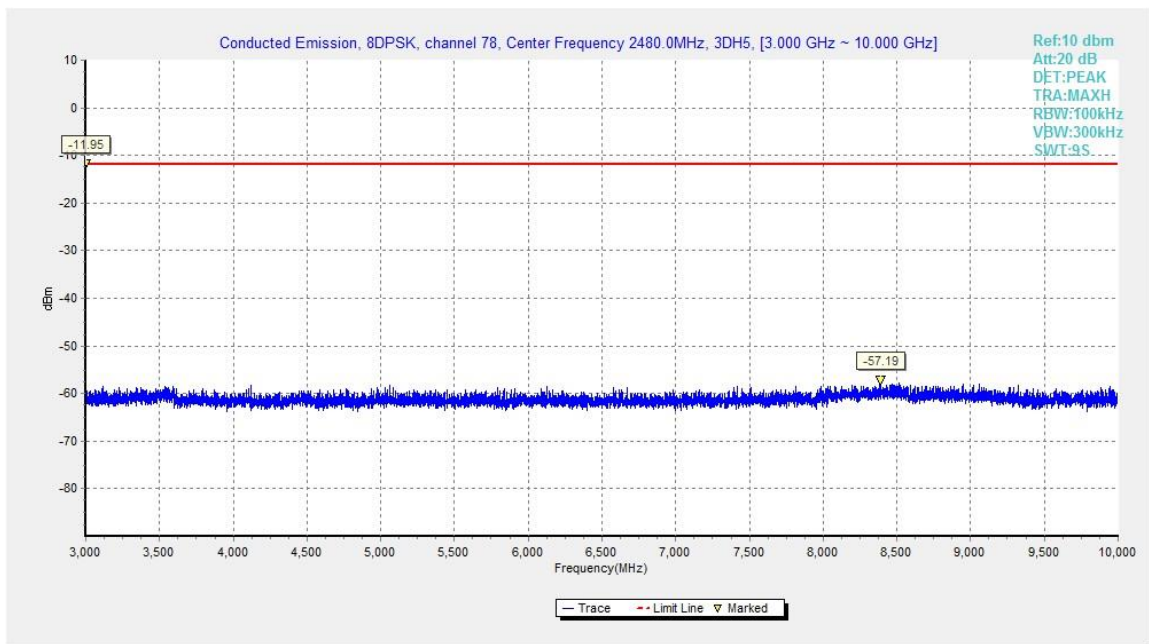


Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

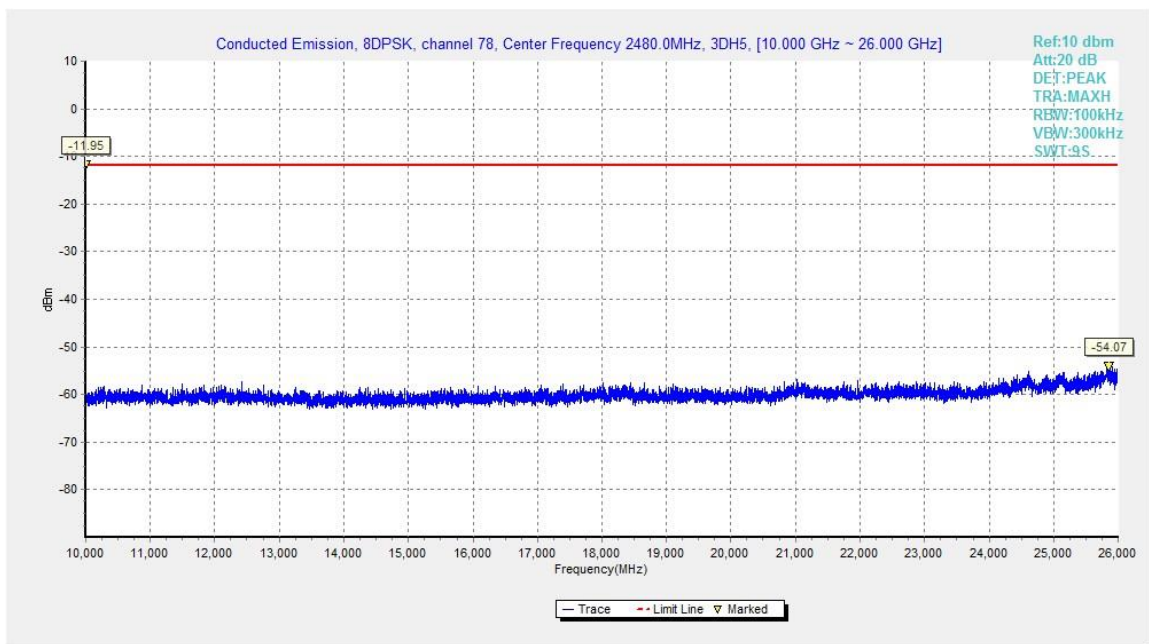


Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

A.5. Transmitter Spurious Emission - Radiated

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)).

The measurement is made according to ANSI C63.10

Limit in restricted band:

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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	100KHz/300KHz	5
1000-4000	1MHz/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

Measurement Results:

$$\text{Result} = P_{\text{Mea}} + \text{ARPL}$$

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 39 2440 MHz	9 kHz ~ 30 MHz	--	P
	30 MHz ~ 1 GHz	--	P
	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Power	2.38GHz~2.4GHz---L	Fig.58	P
Power	2.45GHz~2.5GHz---H	Fig.59	P

For all channels	18 GHz ~ 26 GHz	--	P
------------------	-----------------	----	---

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 39 2440 MHz	30 MHz ~ 1 GHz	--	P
	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Power	2.38GHz~2.4GHz---L	Fig.60	P
Power	2.45GHz~2.5GHz---H	Fig.61	P
For all channels	18 GHz ~ 26 GHz	--	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 39 2440 MHz	30 MHz ~ 1 GHz	--	P
	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Power	2.38GHz~2.4GHz---L	Fig.62	P
Power	2.45GHz~2.5GHz---H	Fig.63	P
For all channels	18 GHz ~ 26 GHz	--	P

GFSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2383.100	46.56	2.9	32.0	11.66	54.0	7.4	H	155	4
2388.500	46.60	2.9	32.0	11.74	54.0	7.4	H	155	26
4804.500	35.25	-32.8	34.5	33.60	54.0	18.7	H	155	356
7206.000	38.06	-31.6	36.1	33.59	54.0	15.9	H	155	348
9607.500	37.85	-30.0	37.0	30.90	54.0	16.1	H	155	174
12010.500	42.92	-29.8	39.3	33.44	54.0	11.1	H	155	112

GFSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2433.600	46.70	2.9	31.9	11.88	54.0	7.3	H	155	226
2447.800	46.71	2.9	32.3	11.51	54.0	7.3	H	155	92
4882.500	35.20	-32.7	34.5	33.42	54.0	18.8	H	155	70
7323.000	37.88	-31.9	36.1	33.73	54.0	16.1	H	155	8
9763.500	38.38	-30.6	37.2	31.75	54.0	15.6	H	155	48
12205.500	43.70	-29.4	39.2	33.91	54.0	10.3	H	155	246

GFSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	47.16	2.9	32.8	11.47	54.0	6.8	H	155	4
2484.700	46.73	2.9	32.7	11.07	54.0	7.3	H	155	348
4960.500	35.10	-33.4	34.5	33.98	54.0	18.9	H	155	28
7440.000	37.84	-31.8	36.0	33.58	54.0	16.2	H	155	356
9919.500	40.59	-29.9	37.4	33.12	54.0	13.4	H	155	24
12400.500	44.14	-29.5	39.1	34.51	54.0	9.9	H	155	2

GFSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2387.910	59.93	2.9	32.0	25.07	74.0	14.1	H	155	0
2388.540	59.89	2.9	32.0	25.04	74.0	14.1	V	155	22
4803.750	37.74	-32.9	34.5	36.09	74.0	36.3	V	155	352
7206.000	41.26	-31.6	36.1	36.79	74.0	32.7	V	155	352
9608.250	40.27	-30.0	37.0	33.31	74.0	33.7	V	155	176
12009.750	44.96	-29.8	39.3	35.49	74.0	29.0	V	155	110

GFSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2375.600	48.00	-26.6	32.1	42.51	74.0	26.0	H	155	220
2510.000	48.42	-26.5	32.5	42.45	74.0	25.6	V	155	88
4881.750	39.84	-32.7	34.5	38.05	74.0	34.2	H	155	66
7323.000	40.58	-31.9	36.1	36.43	74.0	33.4	H	155	0
9764.250	41.55	-30.6	37.2	34.92	74.0	32.5	H	155	44
12204.750	45.56	-29.4	39.2	35.77	74.0	28.4	V	155	242

GFSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.830	59.45	2.9	32.8	23.77	74.0	14.6	H	155	0
2486.160	59.72	2.9	32.7	24.10	74.0	14.3	V	155	352
4959.750	38.89	-33.4	34.5	37.76	74.0	35.1	V	155	22
7440.000	39.42	-31.8	36.0	35.16	74.0	34.6	H	155	352
9920.250	43.17	-29.9	37.4	35.70	74.0	30.8	V	155	22
12399.750	45.48	-29.5	39.1	35.85	74.0	28.5	V	155	0

$\pi/4$ DQPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2387.900	46.57	2.9	32.0	11.71	54.0	7.4	H	155	202
2389.800	46.57	2.9	32.0	11.73	54.0	7.4	H	155	225
4804.500	35.17	-32.8	34.5	33.52	54.0	18.8	H	155	174
7206.000	38.19	-31.6	36.1	33.72	54.0	15.8	H	155	4
9607.500	37.84	-30.0	37.0	30.89	54.0	16.2	H	155	172
12010.500	42.95	-29.8	39.3	33.48	54.0	11.1	H	155	194

$\pi/4$ DQPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2427.600	46.71	2.9	31.8	12.05	54.0	7.3	H	155	192
2451.000	46.73	2.9	32.4	11.44	54.0	7.3	H	155	180
4882.500	35.07	-32.7	34.5	33.28	54.0	18.9	H	155	108
7323.000	37.91	-31.9	36.1	33.75	54.0	16.1	H	155	4
9763.500	38.37	-30.6	37.2	31.75	54.0	15.6	H	155	26
12205.500	43.66	-29.4	39.2	33.87	54.0	10.3	H	155	48

$\pi/4$ DQPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	46.74	2.9	32.8	11.05	54.0	7.3	H	155	171
2485.000	46.68	2.9	32.7	11.03	54.0	7.3	H	155	79
4960.500	35.26	-33.4	34.5	34.14	54.0	18.7	H	155	4
7440.000	38.06	-31.8	36.0	33.80	54.0	15.9	H	155	62
9919.500	40.59	-29.9	37.4	33.11	54.0	13.4	H	155	135
12400.500	44.08	-29.5	39.1	34.45	54.0	9.9	H	155	94

$\pi/4$ DQPSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2385.628	59.47	2.9	32.0	24.60	74.0	14.5	H	155	198
2388.288	59.51	2.9	32.0	24.66	74.0	14.5	H	155	220
4803.750	38.05	-32.9	34.5	36.40	74.0	36.0	V	155	176
7206.000	40.72	-31.6	36.1	36.25	74.0	33.3	V	155	0
9608.250	40.00	-30.0	37.0	33.04	74.0	34.0	H	155	176
12009.750	45.97	-29.8	39.3	36.50	74.0	28.0	V	155	198

$\pi/4$ DQPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2372.600	47.58	-26.8	32.1	42.34	74.0	26.4	H	155	88
2562.800	48.87	-26.8	33.0	42.64	74.0	25.1	H	155	66
4881.750	39.38	-32.7	34.5	37.60	74.0	34.6	V	155	110
7323.000	41.08	-31.9	36.1	36.93	74.0	32.9	H	155	0
9764.250	40.99	-30.6	37.2	34.36	74.0	33.0	H	155	22
12204.750	45.79	-29.4	39.2	36.00	74.0	28.2	V	155	44

$\pi/4$ DQPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.580	59.19	2.9	32.8	23.50	74.0	14.8	H	155	176
2483.970	59.59	2.9	32.7	23.91	74.0	14.4	V	155	88
4959.750	39.05	-33.4	34.5	37.92	74.0	35.0	V	155	0
7440.000	40.63	-31.8	36.0	36.37	74.0	33.4	H	155	66
9920.250	44.35	-29.9	37.4	36.88	74.0	29.6	H	155	132
12399.750	46.51	-29.5	39.1	36.88	74.0	27.5	V	155	88

8DPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2383.300	46.54	2.9	32.0	11.64	54.0	7.5	H	155	5
2388.400	46.60	2.9	32.0	11.75	54.0	7.4	H	155	25
4804.500	35.30	-32.8	34.5	33.64	54.0	18.7	H	155	356
7206.000	38.14	-31.6	36.1	33.67	54.0	15.9	H	155	350
9607.500	37.87	-30.0	37.0	30.92	54.0	16.1	H	155	185
12010.500	42.90	-29.8	39.3	33.42	54.0	11.1	H	155	187

8DPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2629.800	46.66	3.0	33.4	10.26	54.0	7.3	H	155	25
2454.700	46.72	2.9	32.5	11.33	54.0	7.3	H	155	49
4882.500	35.13	-32.7	34.5	33.35	54.0	18.9	H	155	4
7323.000	37.97	-31.9	36.1	33.82	54.0	16.0	H	155	6
9763.500	38.42	-30.6	37.2	31.79	54.0	15.6	H	155	25
12205.500	43.69	-29.4	39.2	33.91	54.0	10.3	H	155	186

8DPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	47.25	2.9	32.8	11.55	54.0	6.8	H	155	20
2487.700	46.66	2.9	32.6	11.08	54.0	7.3	H	155	45
4960.500	35.23	-33.4	34.5	34.11	54.0	18.8	H	155	240
7440.000	37.98	-31.8	36.0	33.72	54.0	16.0	H	155	180
9919.500	40.59	-29.9	37.4	33.12	54.0	13.4	H	155	85
12400.500	44.08	-29.5	39.1	34.45	54.0	9.9	H	155	25

8DPSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2383.850	59.76	2.9	32.0	24.87	74.0	14.2	H	155	0
2389.716	59.26	2.9	32.0	24.41	74.0	14.7	H	155	22
4803.750	38.22	-32.9	34.5	36.57	74.0	35.8	H	155	352
7206.000	41.98	-31.6	36.1	37.51	74.0	32.0	V	155	352
9608.250	39.59	-30.0	37.0	32.64	74.0	34.4	V	155	176
12009.750	44.94	-29.8	39.3	35.47	74.0	29.1	V	155	176

8DPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2378.600	48.69	-26.4	32.1	43.02	74.0	25.3	H	155	22
2500.000	49.30	-26.3	32.3	43.26	74.0	24.7	V	155	44
4881.750	39.58	-32.7	34.5	37.80	74.0	34.4	H	155	0
7323.000	40.65	-31.9	36.1	36.50	74.0	33.3	H	155	0
9764.250	41.02	-30.6	37.2	34.38	74.0	33.0	H	155	22
12204.750	45.16	-29.4	39.2	35.37	74.0	28.8	H	155	176

8DPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.940	59.68	2.9	32.7	24.00	74.0	14.3	H	155	22
2484.720	60.09	2.9	32.7	24.43	74.0	13.9	H	155	44
4959.750	39.58	-33.4	34.5	38.45	74.0	34.4	H	155	242
7440.000	40.61	-31.8	36.0	36.35	74.0	33.4	H	155	176
9920.250	44.93	-29.9	37.4	37.46	74.0	29.1	H	155	88
12399.750	45.14	-29.5	39.1	35.52	74.0	28.9	V	155	22

Conclusion: PASS

Test graphs as below:

RE - Power-2.38GHz-2.45GHz

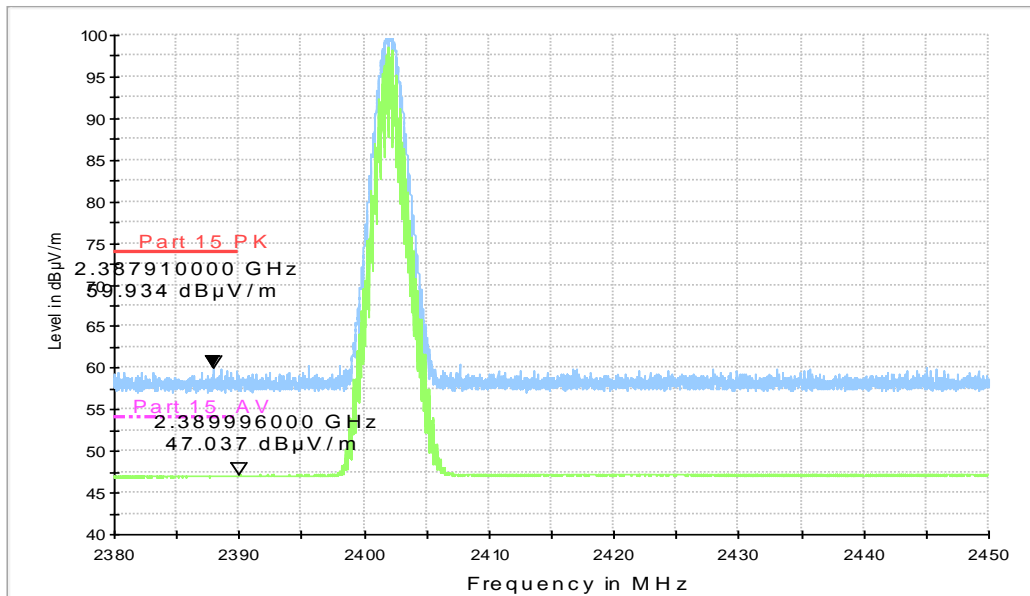


Fig.58. Radiated emission (Power): GFSK, low channel

RE - Power-2.45GHz-2.5GHz

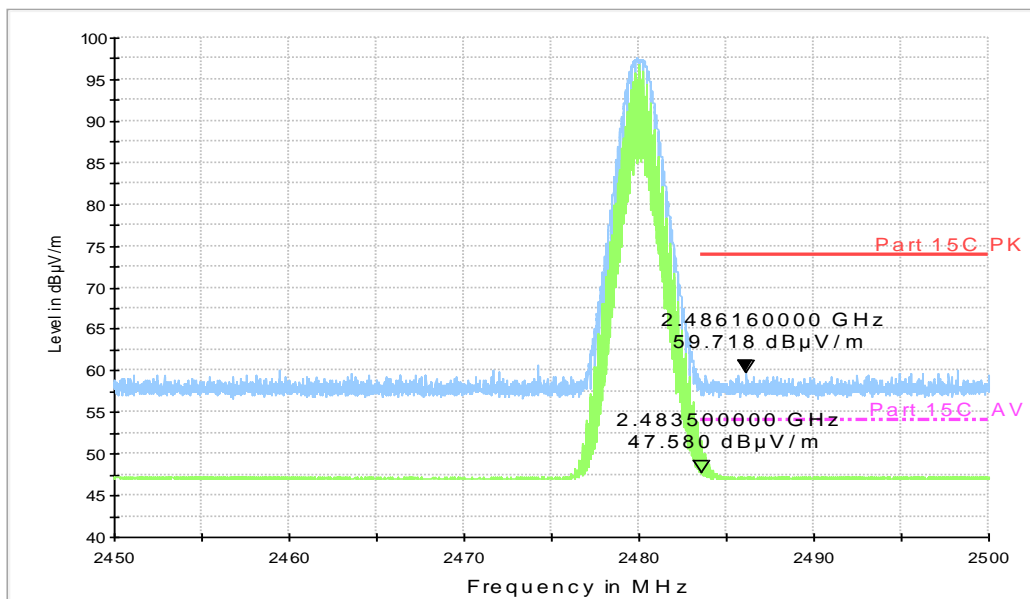


Fig.59. Radiated emission (Power) GFSK, high channel

RE - Power-2.38GHz-2.45GHz

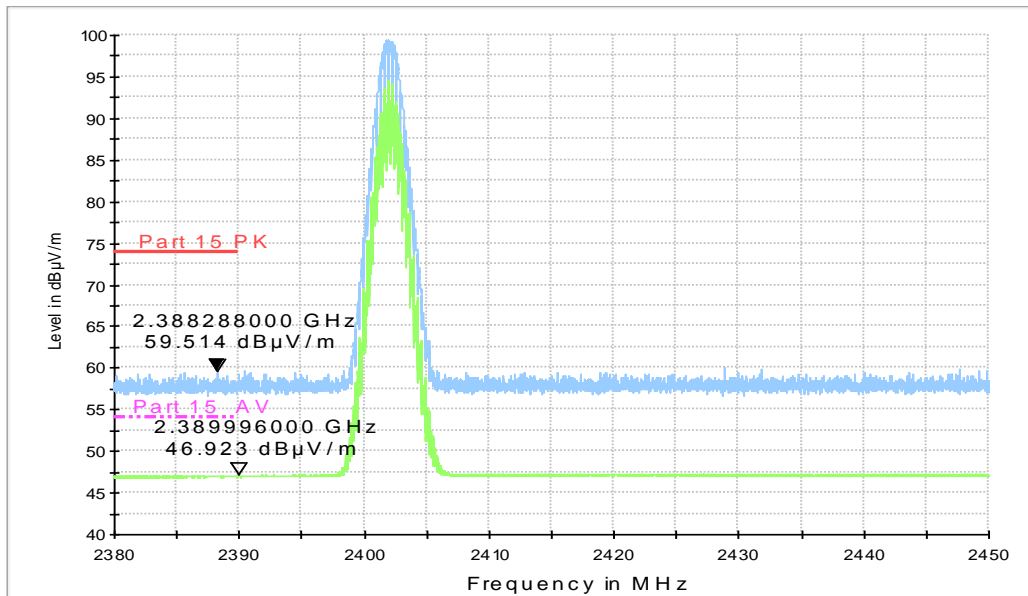


Fig.60. Radiated emission (Power): $\pi/4$ DQPSK, low channel

RE - Power-2.45GHz-2.5GHz

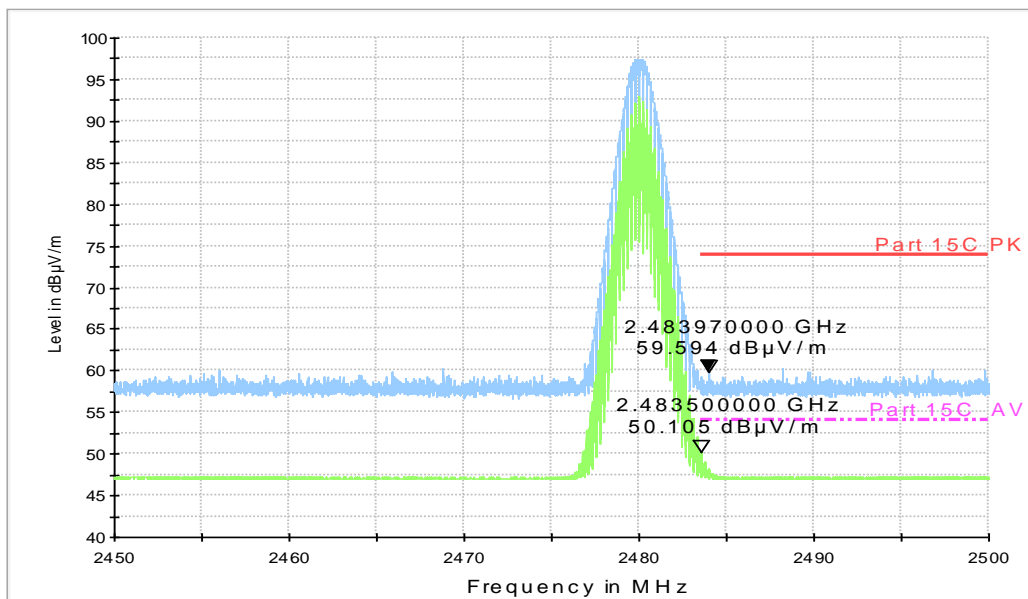


Fig.61. Radiated emission (Power): $\pi/4$ DQPSK, high channel

RE - Power-2.38GHz-2.45GHz

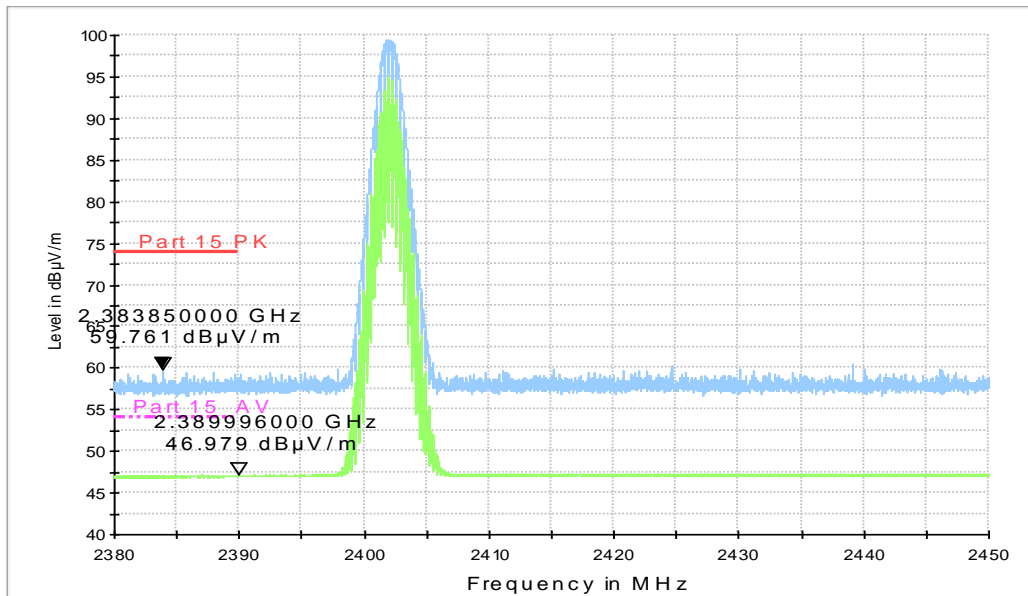


Fig.62. Radiated emission (Power): 8DPSK, low channel

RE - Power-2.45GHz-2.5GHz

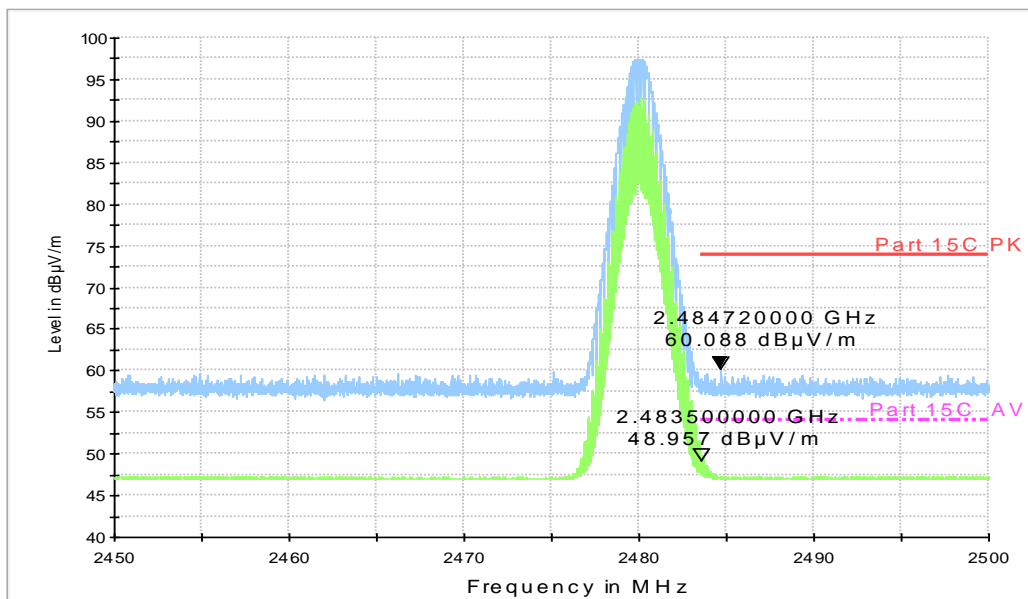


Fig.63. Radiated emission (Power): 8DPSK, high channel

A.6. Time of Occupancy (Dwell Time)

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = zero span, centered on a hopping channel
- RBW = 1 MHz
- VBW \geq RBW
- Sweep = as necessary to capture the entire dwell time per hopping channel
- Detector function = peak
- Trace = max hold

Measure a pulse time in time domain at middle frequency and then count the hopping number in 31.6s(which equals with 0.4 multiply 79) of middle frequency ,then multiply the pulse time and hopping number and record them.

Measurement Limit:

Standard	Limit (ms)
FCC 47 CFR Part 15.247(a) (1)(iii)	< 400

Measurement Result:

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.64	119.52	P
		Fig.65		
	DH3	Fig.66	160.03	P
		Fig.67		
	DH5	Fig.68	212.91	P
		Fig.69		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.70	122.53	P
		Fig.71		
	DH3	Fig.72	176.70	P
		Fig.73		
	DH5	Fig.74	161.52	P
		Fig.75		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.76	123.24	P
		Fig.77		
	DH3	Fig.78	143.88	P

		Fig.79		
	DH5	Fig.80	198.87	P
		Fig.81		

Conclusion: PASS

Test graphs as below:

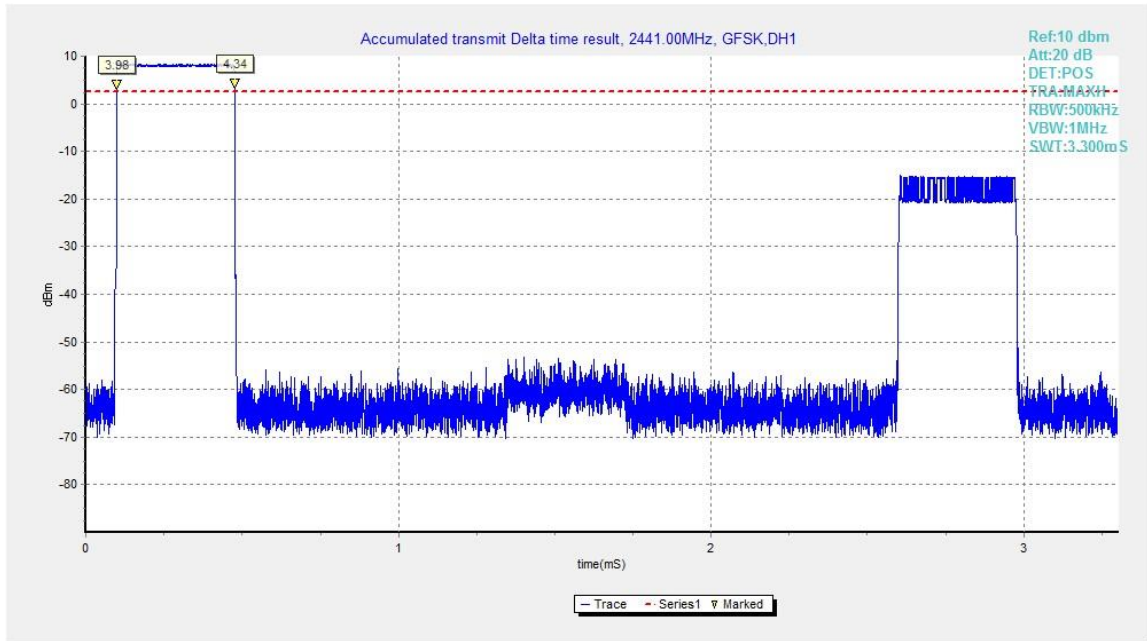


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

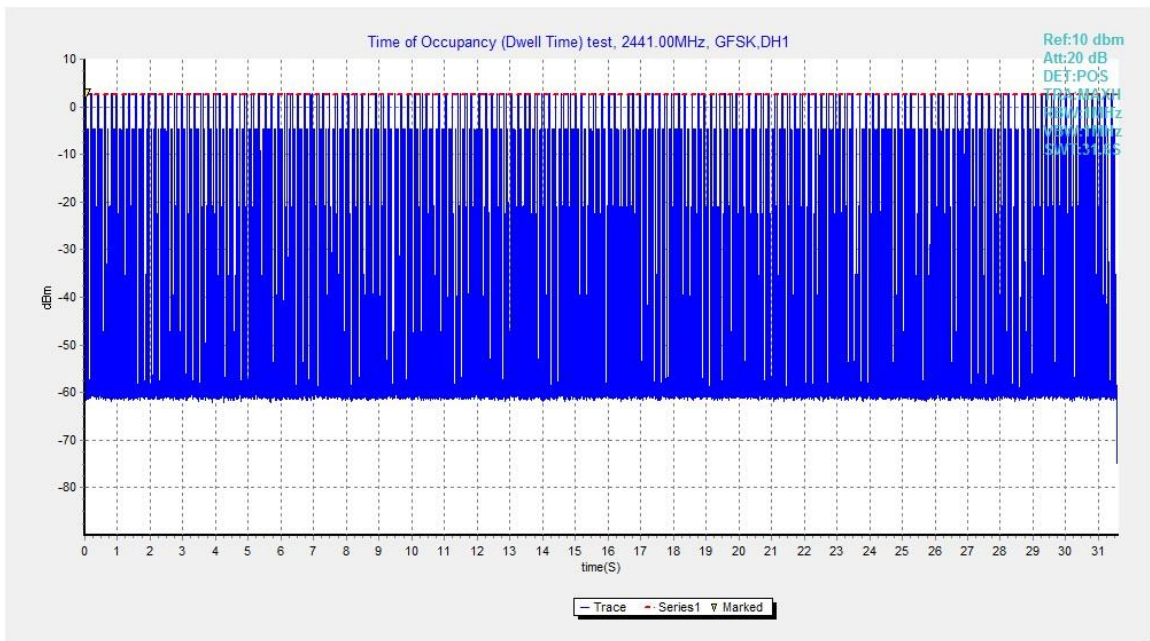


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

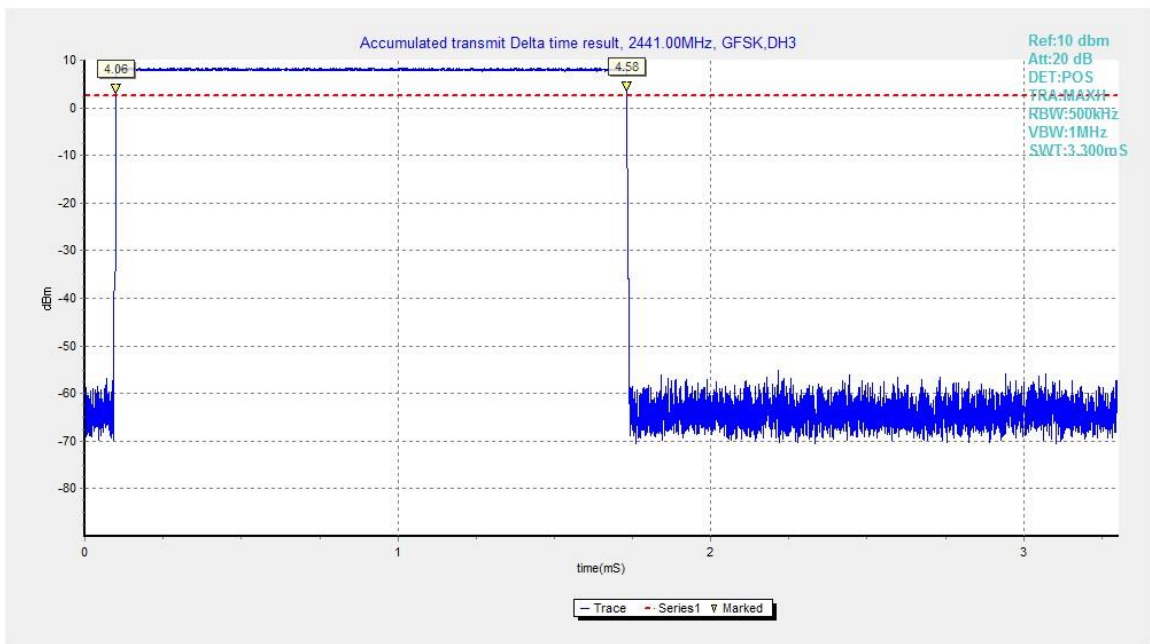


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

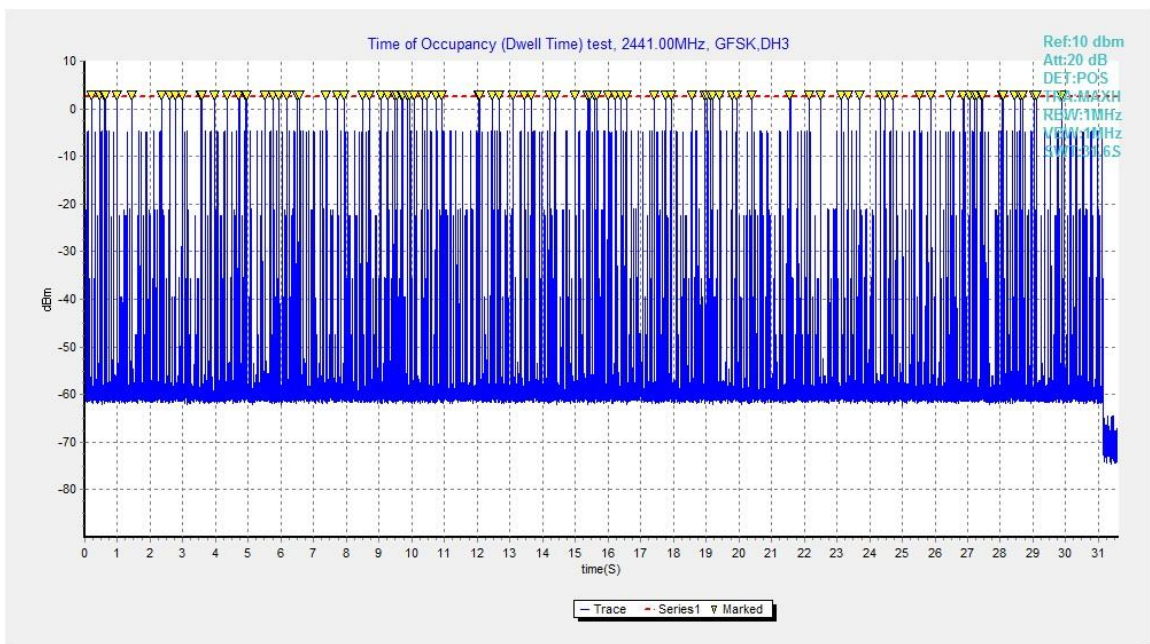


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

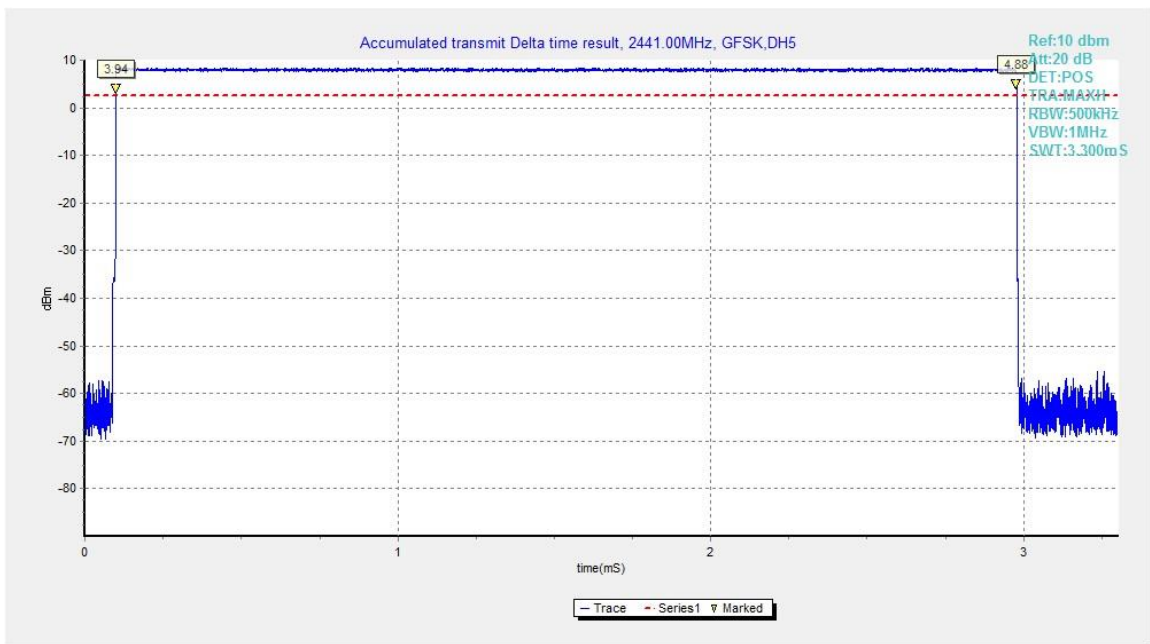


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

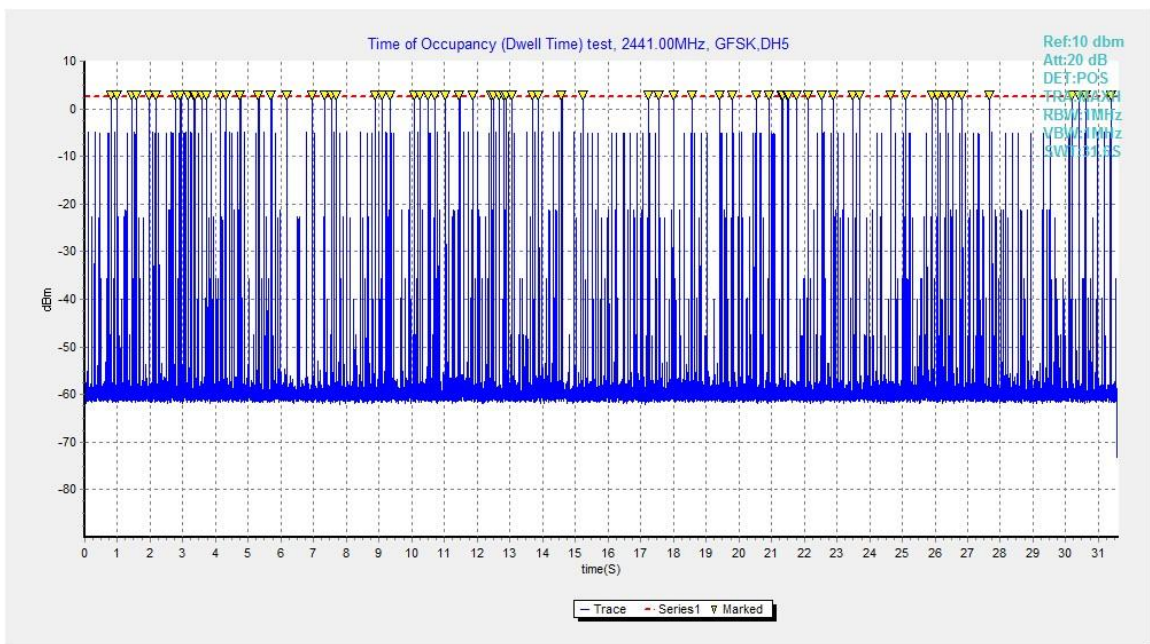


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

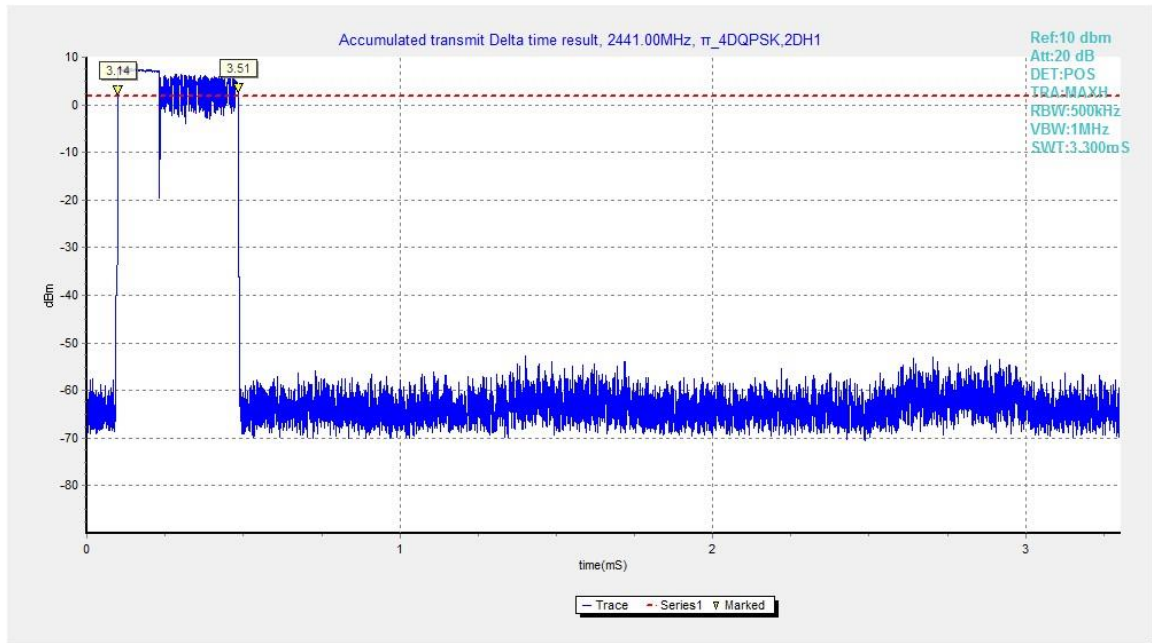


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

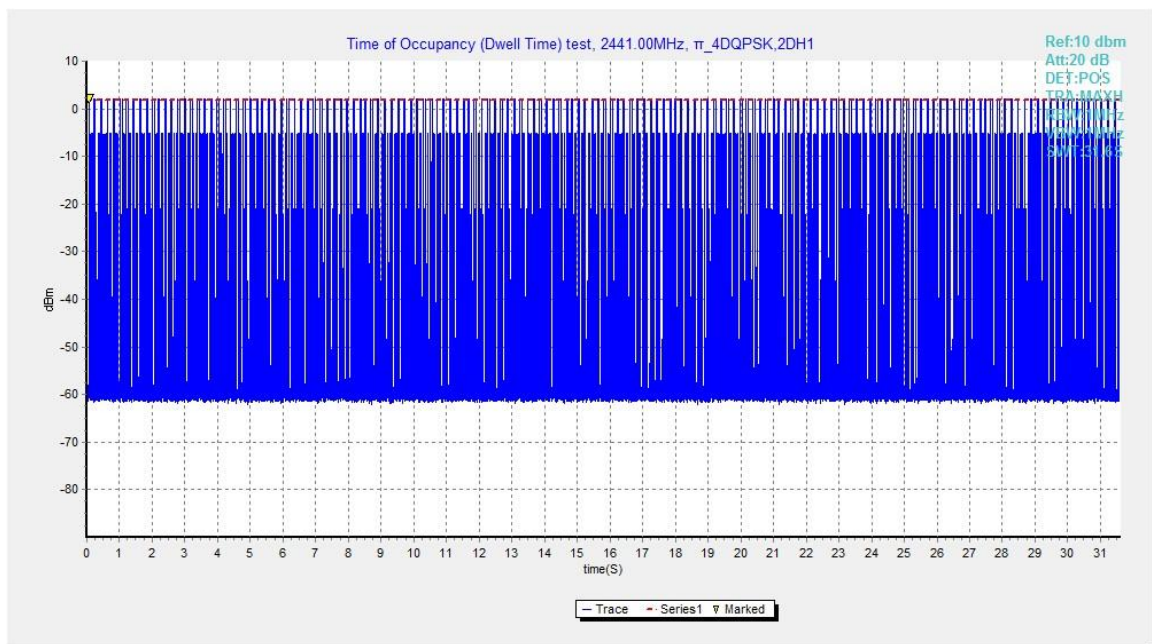


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

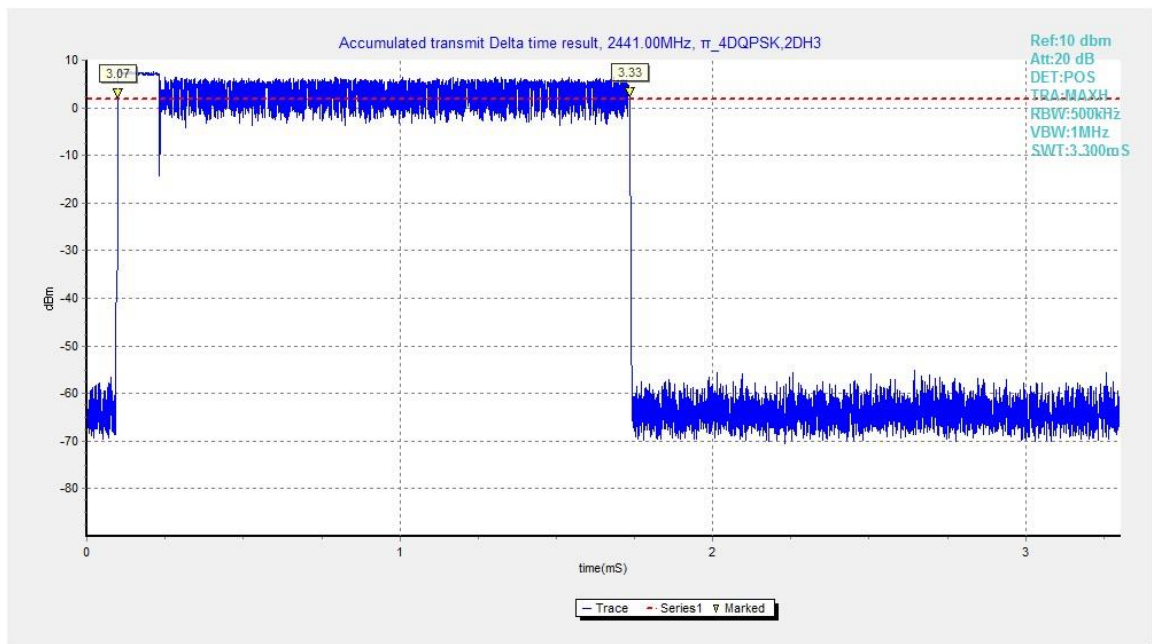


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

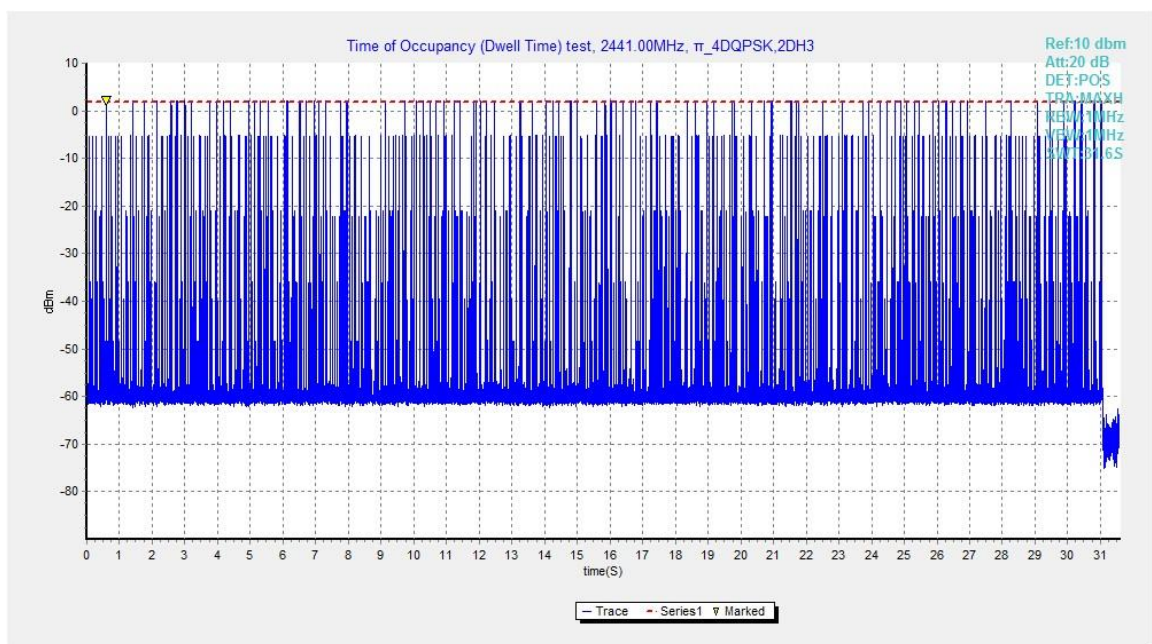


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

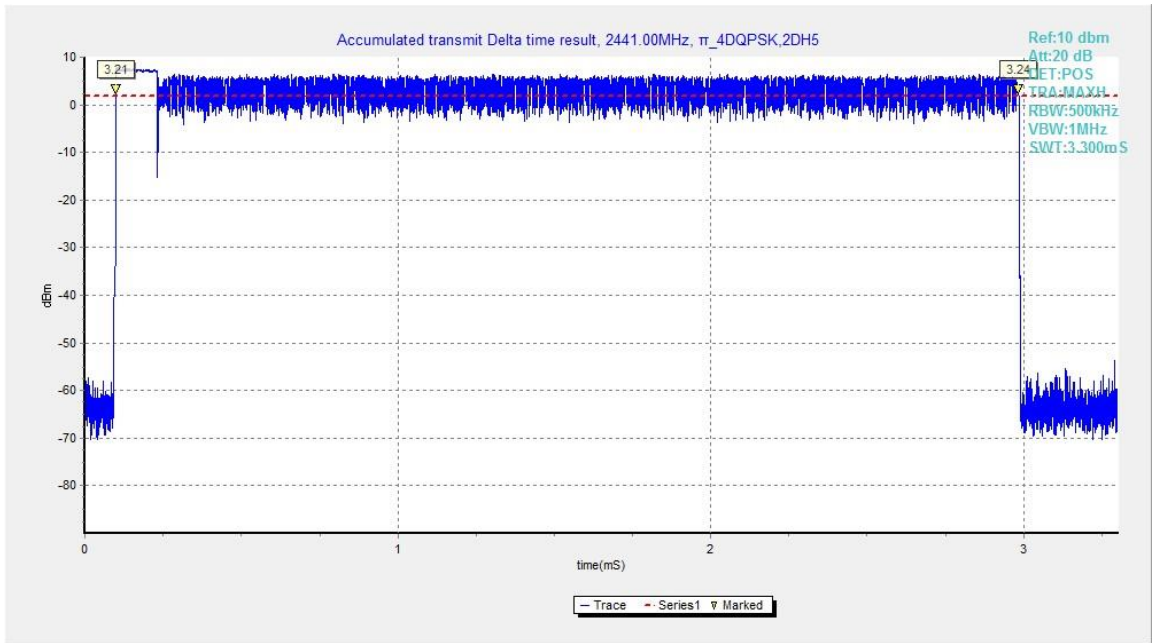


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

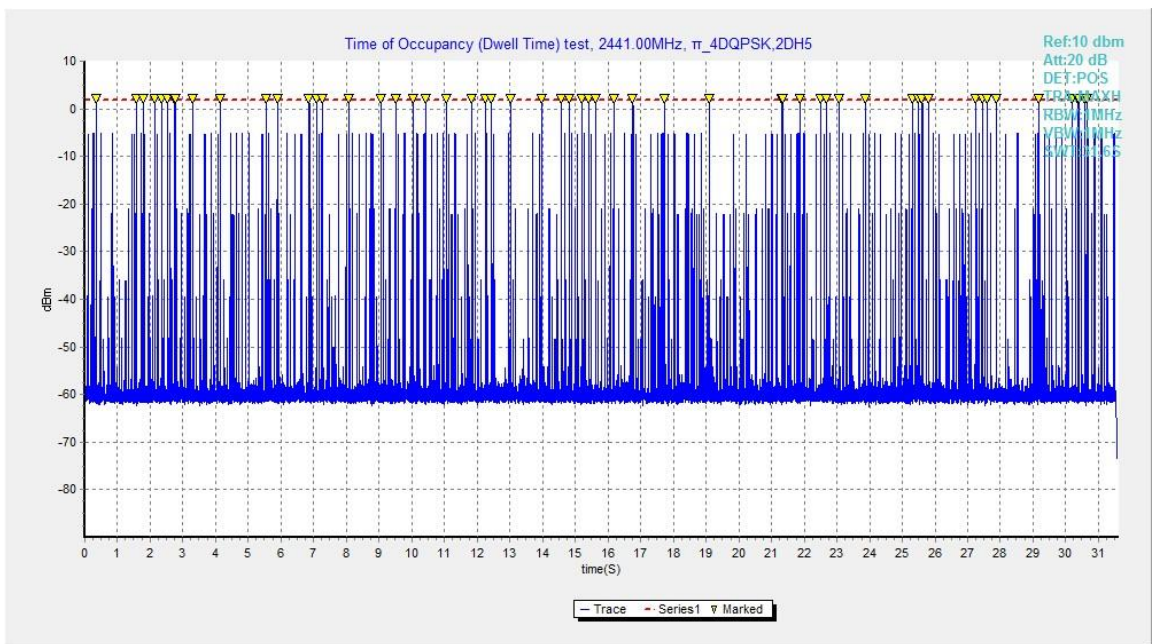


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

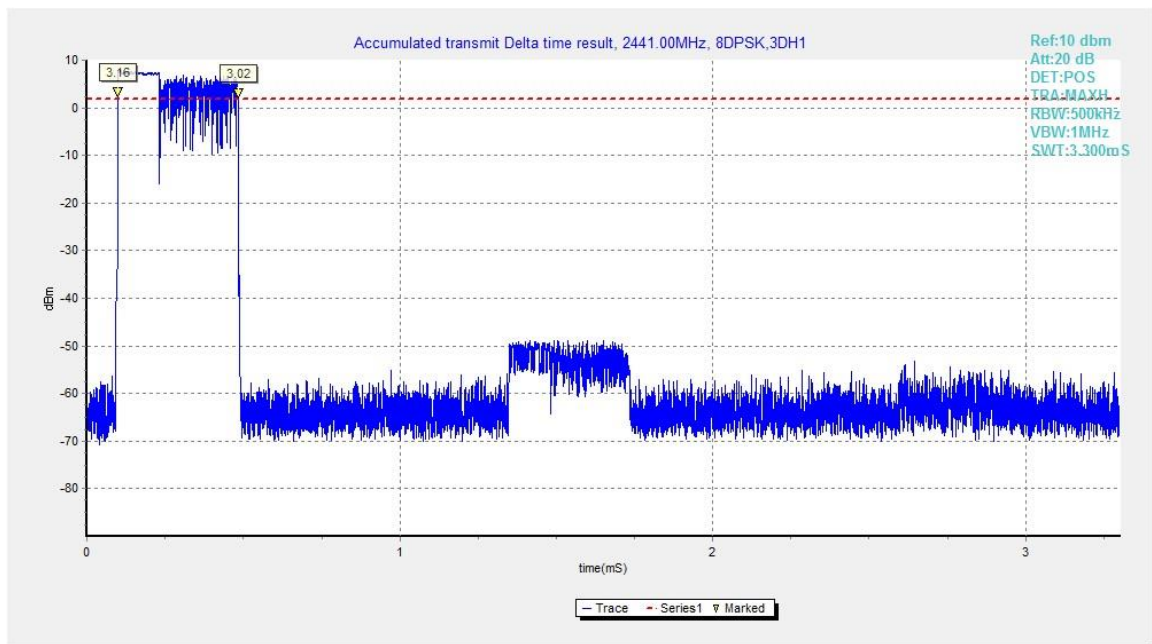


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

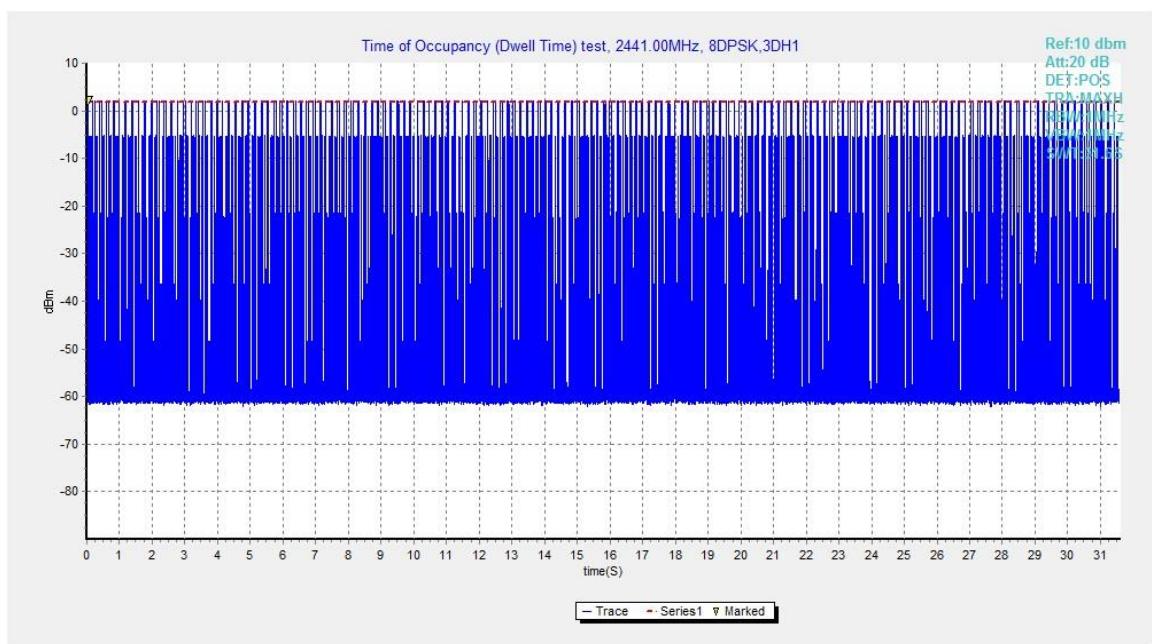


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

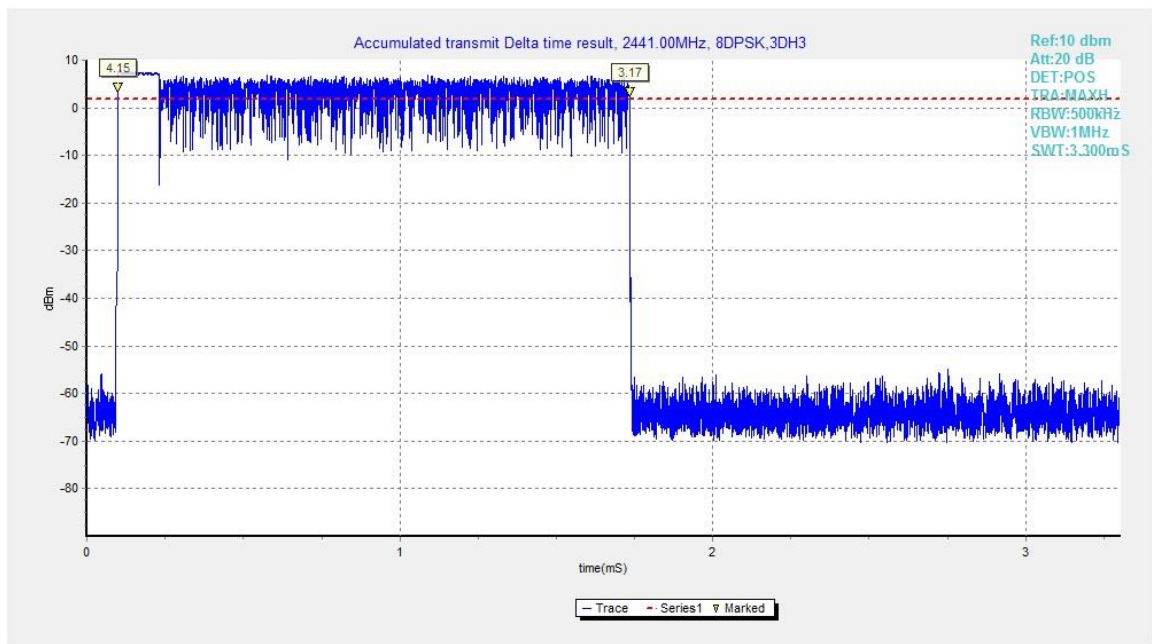


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

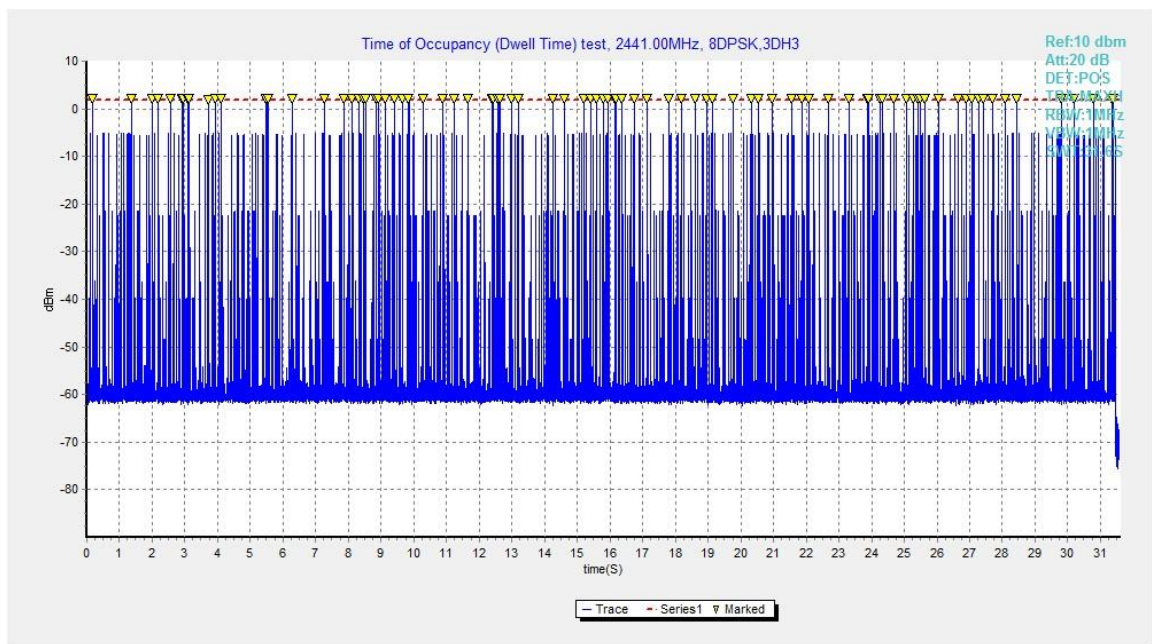


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

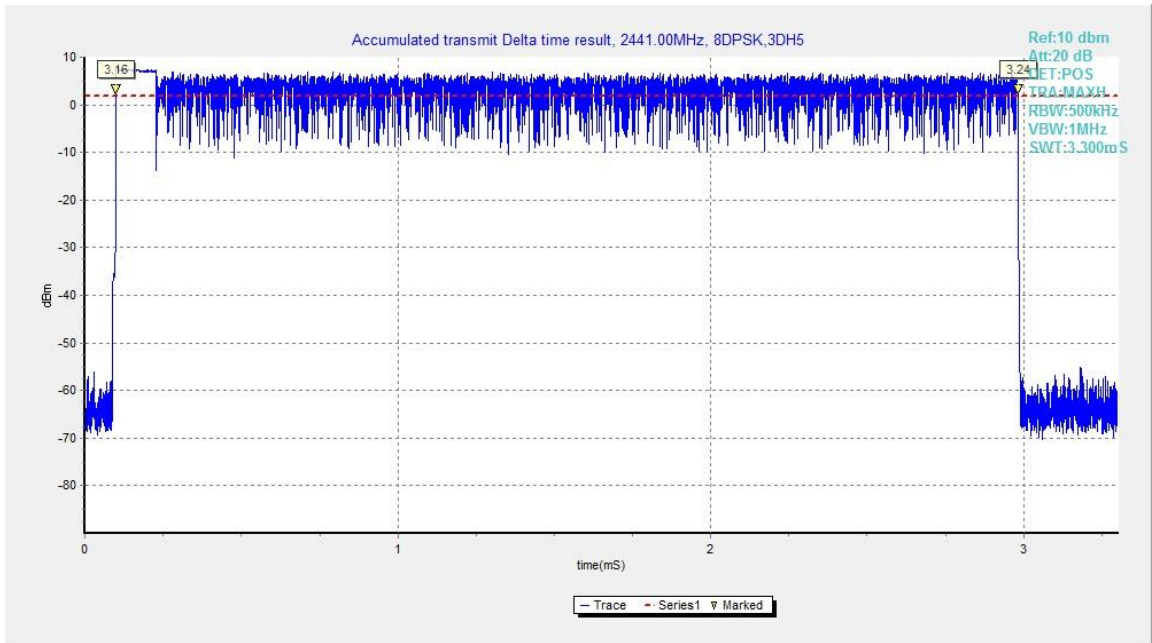


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

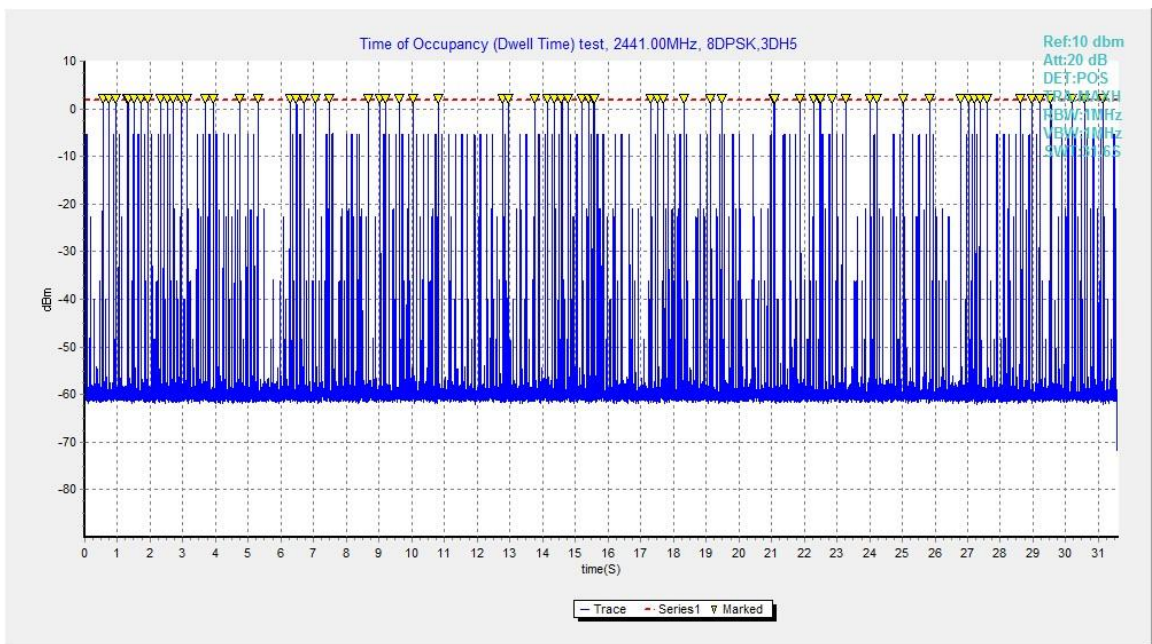


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5



A.7. 20dB Bandwidth

Method of Measurement: See ANSI C63.10-clause 6.9.2

Measurement Procedure - Unwanted Emissions

1. Set RBW = 30kHz.
2. Set VBW = 100 kHz.
3. Set span to 3MHz
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize (this may take some time, depending on the extent of the span).

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)(1)	NA *

Use NdB Down function of the SA to measure the 20dB Bandwidth

* Comment: This test case is not required according to the latest FCC 47 CFR Part 15.247. But the test results are necessary for “carrier frequency separation” test case, in Annex A.8.

Measurement Results:

For GFSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.82	942.75	NA
39	Fig.83	942.00	NA
78	Fig.84	942.00	NA

For π/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1225.50	NA
39	Fig.86	1222.50	NA
78	Fig.87	1254.75	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1206.75	NA
39	Fig.89	1263.00	NA
78	Fig.90	1205.25	NA

Conclusion: NA

Test graphs as below:

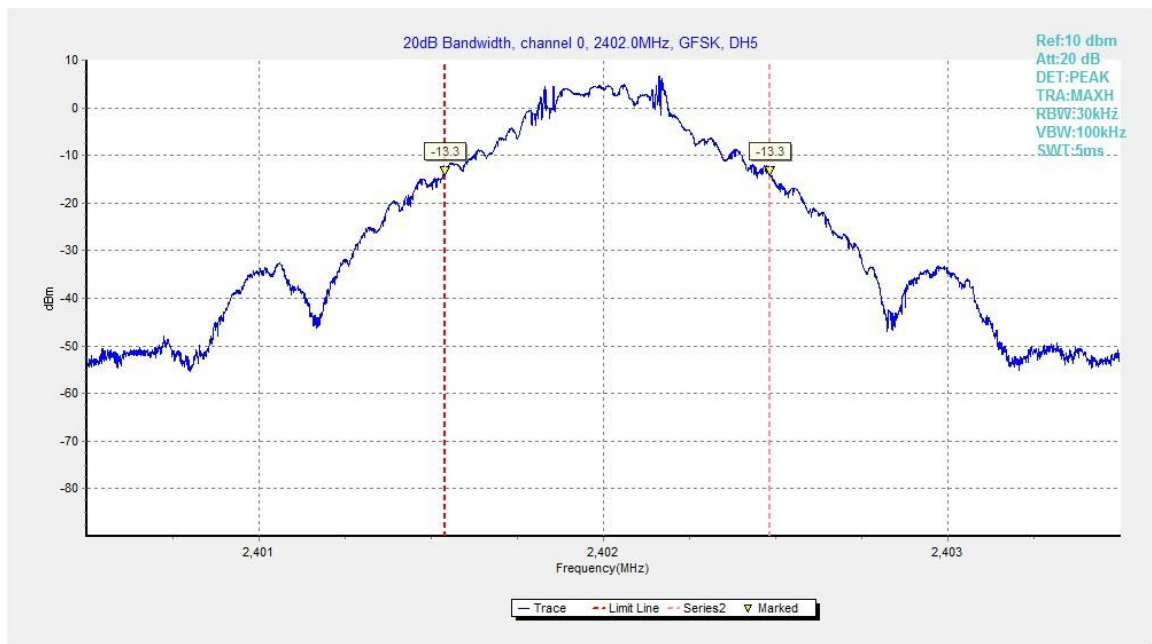


Fig.82. 20dB Bandwidth: GFSK, Channel 0

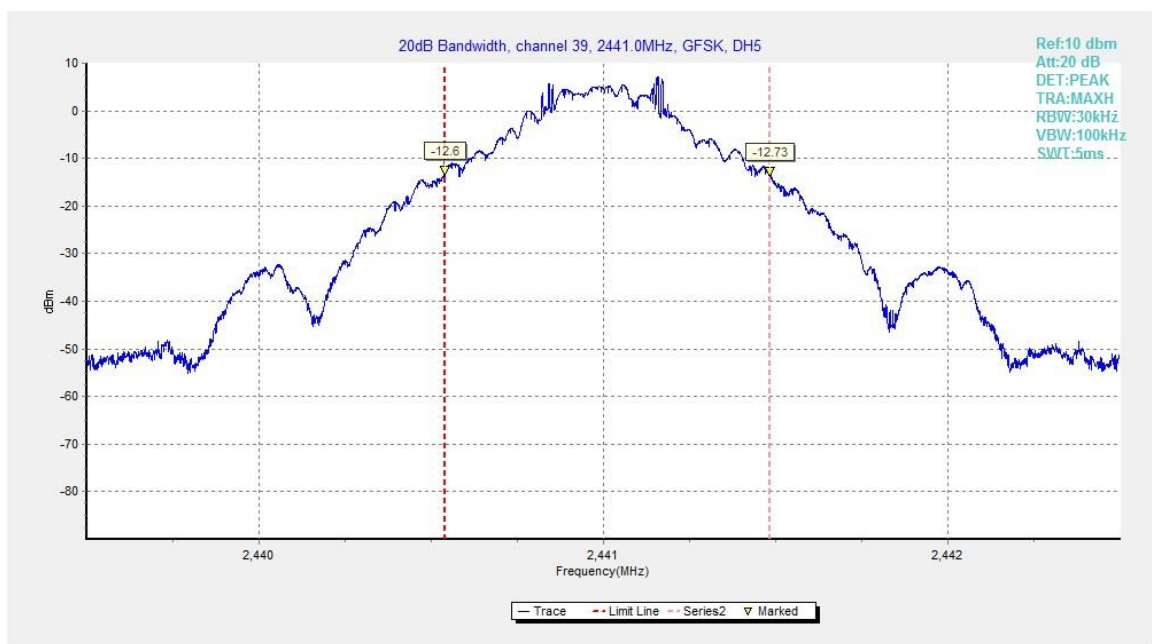


Fig.83. 20dB Bandwidth: GFSK, Channel 39

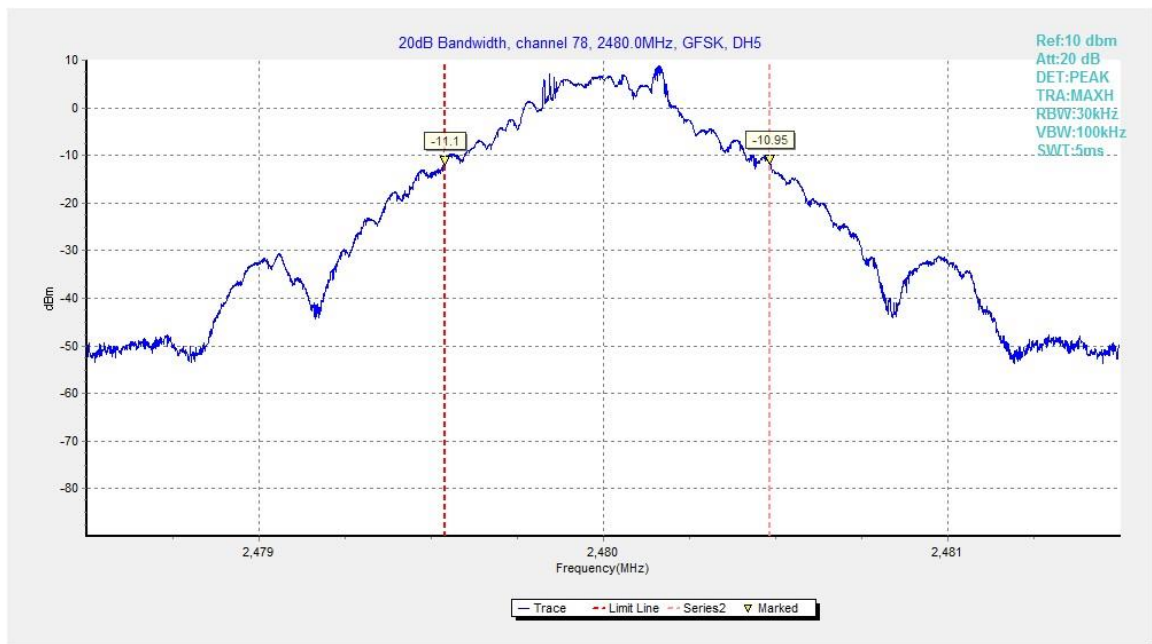


Fig.84. 20dB Bandwidth: GFSK, Channel 78

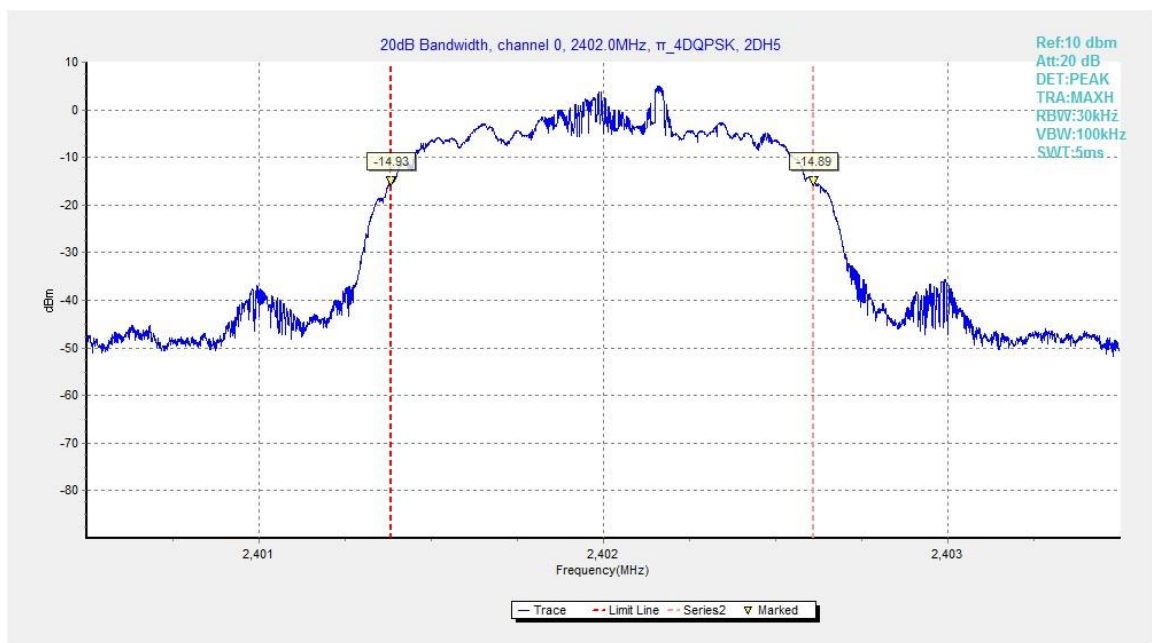


Fig.85. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 0

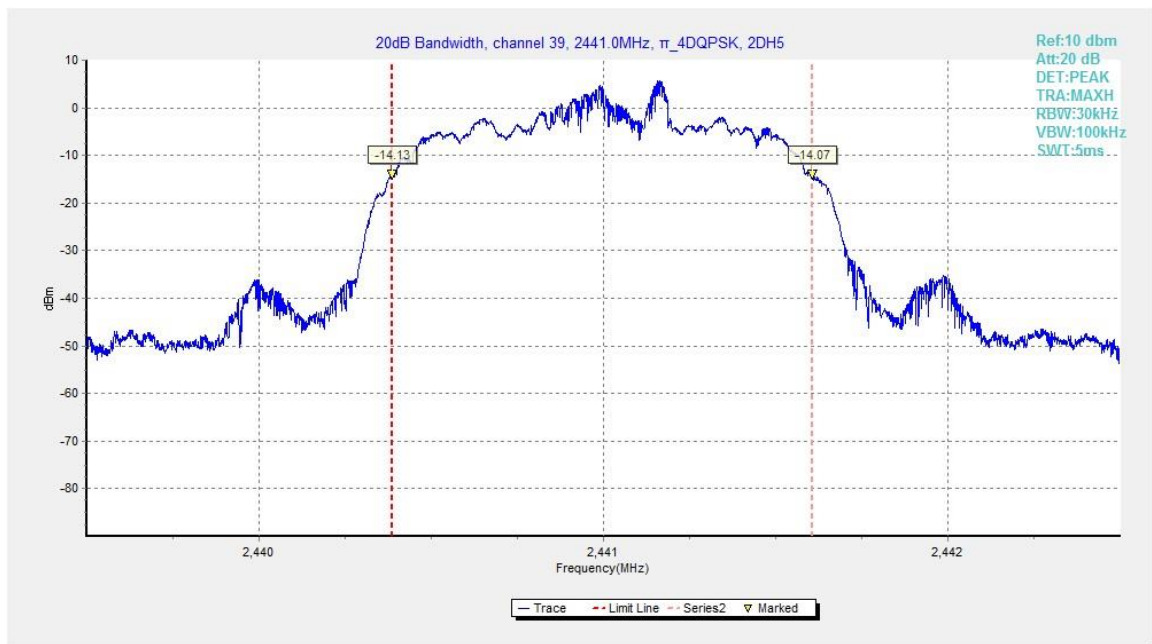


Fig.86. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

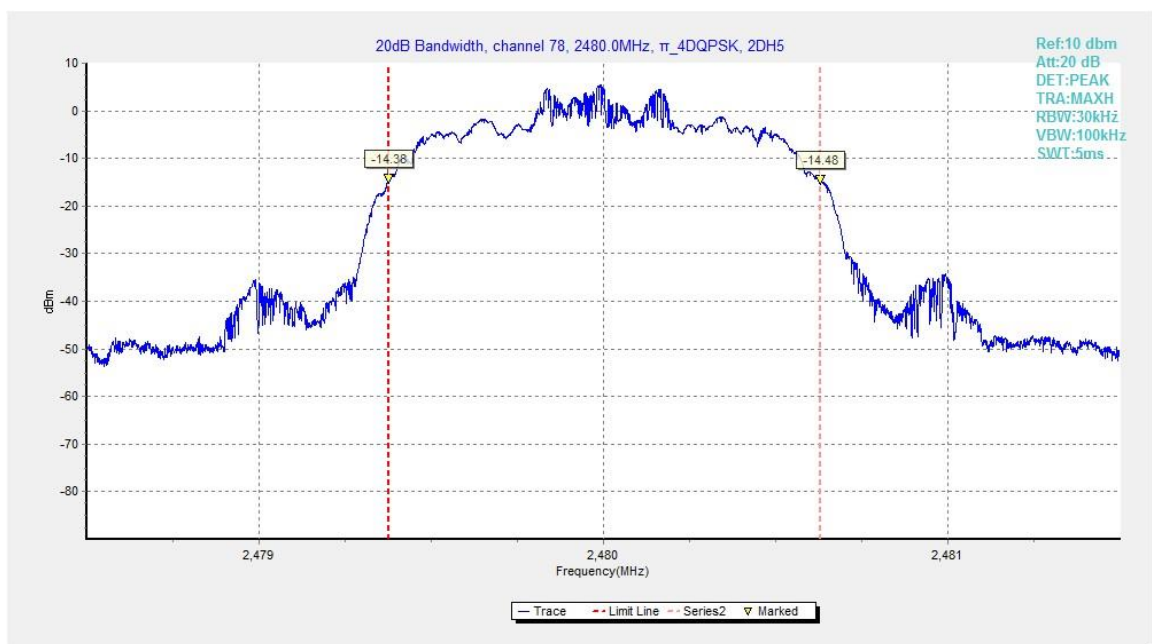


Fig.87. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

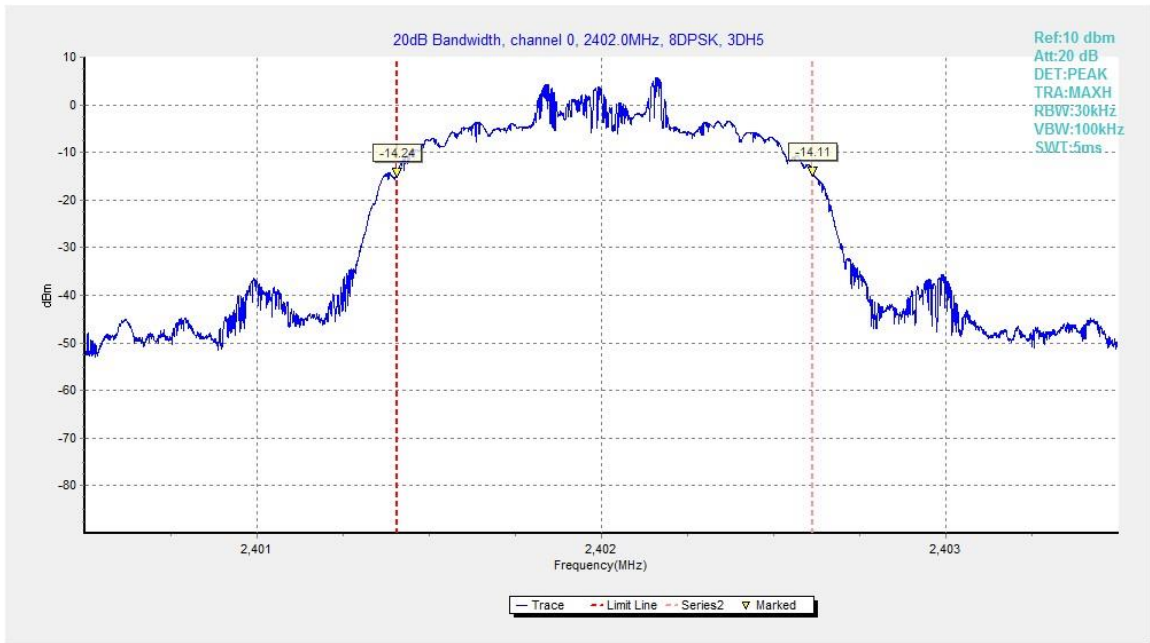


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

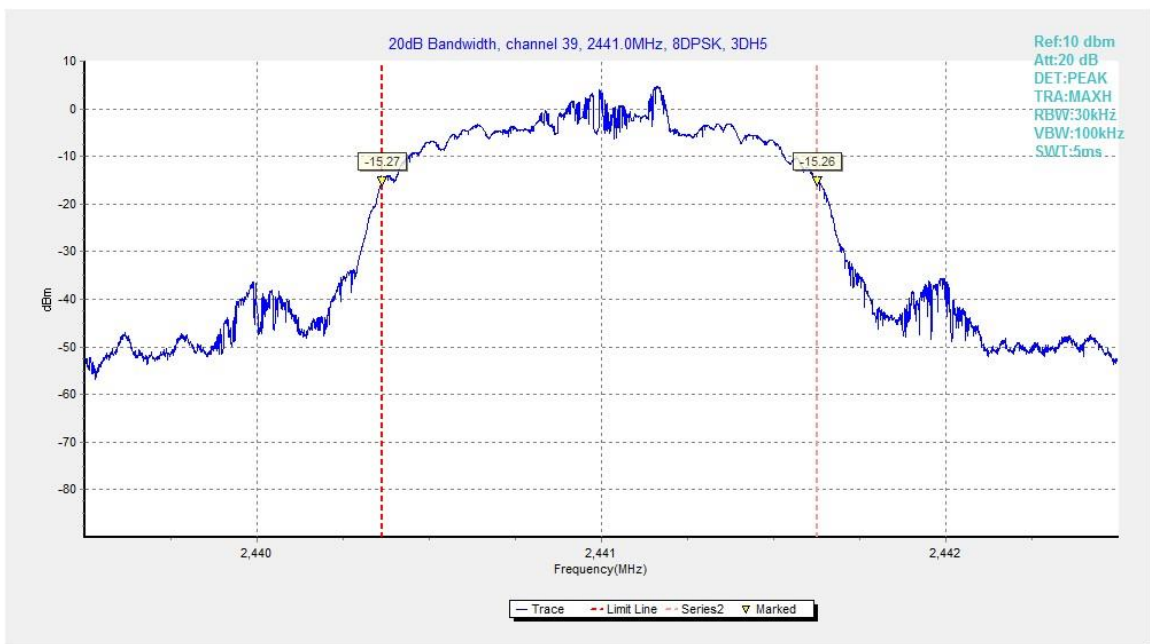


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

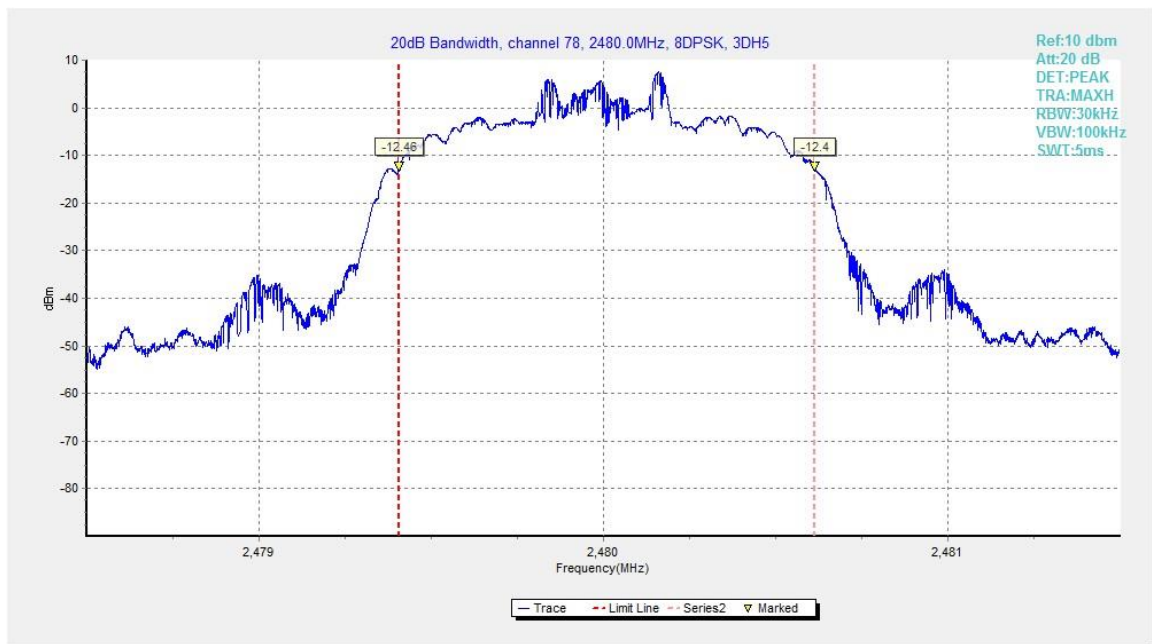


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

A.8. Carrier Frequency Separation

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = 3MHz
- RBW=300kHz
- VBW=300kHz
- Sweep = auto
- Detector function = peak
- Trace = max hold
- Allow the trace to stabilize

Search the peak marks of the middle frequency and adjacent channel, then record the separation between them.

* Comment: This limit should be over 25 kHz or $(2/3) * 20\text{dB}$ bandwidth, whichever is greater.

Measurement Limit:

Standard	Limit(kHz)
FCC 47 CFR Part 15.247(a)(1)	over 25 kHz or $(2/3) * 20\text{dB}$ bandwidth

Measurement Result:

For GFSK

Channel	Carrier frequency separation (kHz)	Conclusion	
39	Fig.91	1176.75	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)	Conclusion	
39	Fig.92	1064.25	P

For 8DPSK

Channel	Carrier frequency separation (kHz)	Conclusion	
39	Fig.93	1163.25	P

Conclusion: PASS

Test graphs as below:

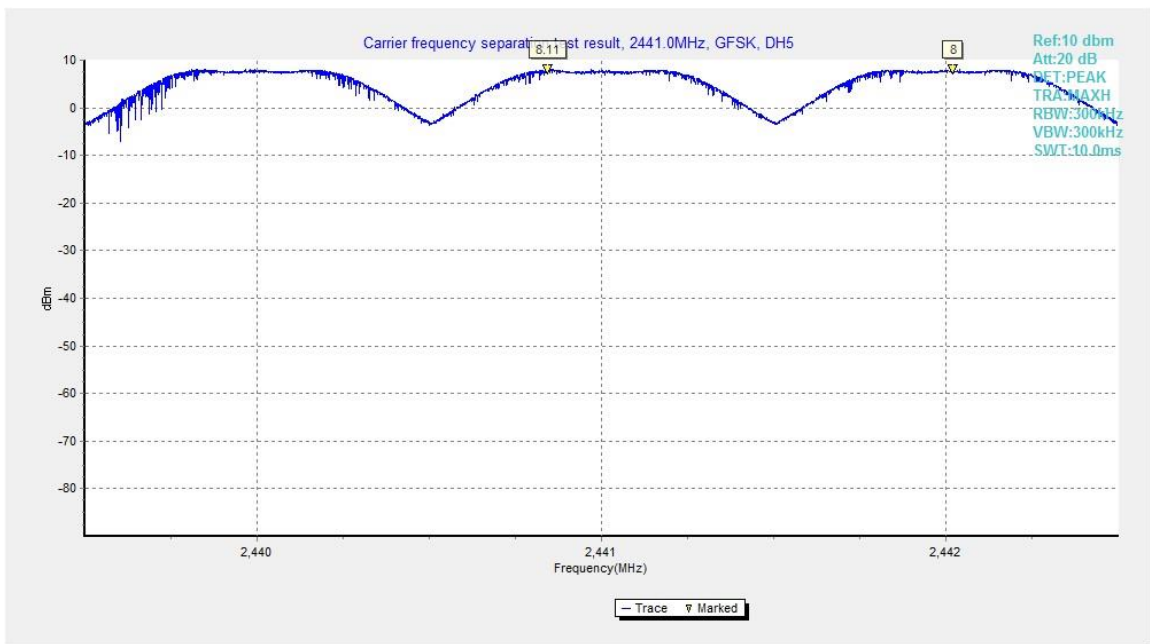


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

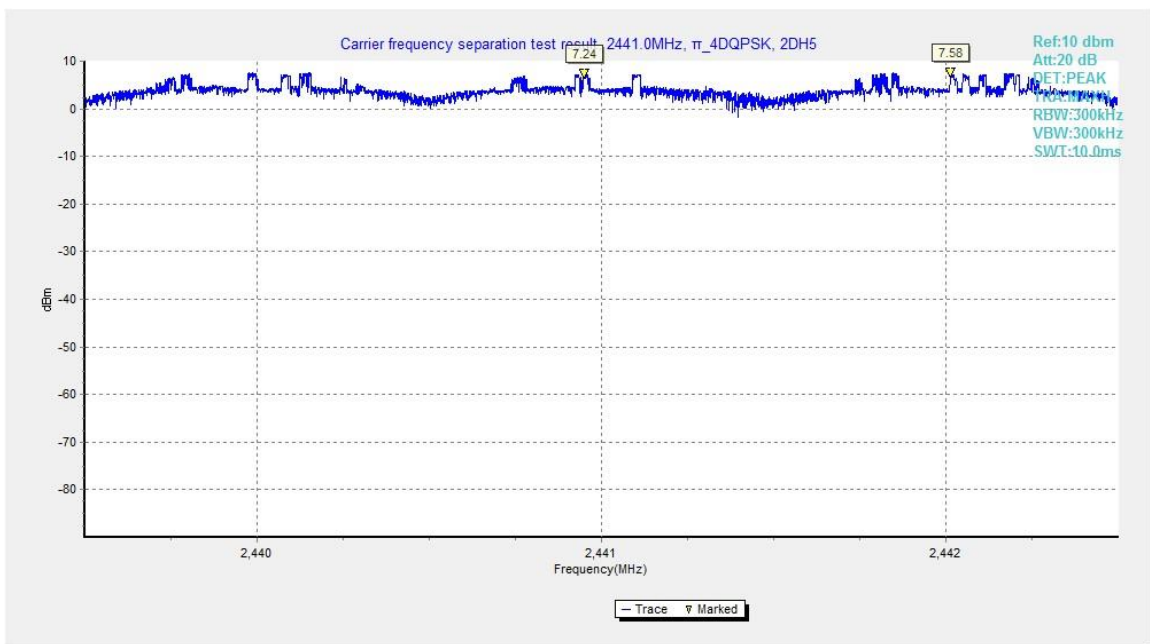


Fig.92. Carrier frequency separation measurement: $\pi/4$ DQPSK, Channel 39

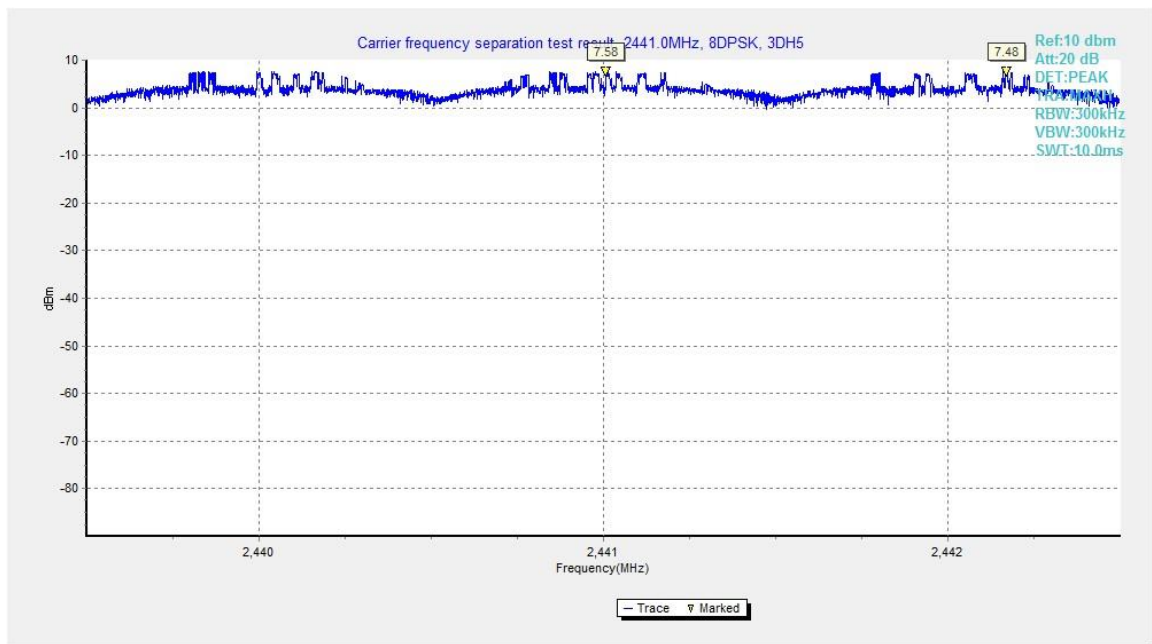


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

A.9. Number of Hopping Channels

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

- Span = the frequency band of operation
- RBW = 500kHz
- VBW = 500kHz
- Sweep = auto
- Detector function = peak
- Trace = max hold
- Allow the trace to stabilize

It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a) (1)(iii)	At least 15 non-overlapping channels

Measurement Result:

For GFSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.94	79 P
40~78	Fig.95	

For $\pi/4$ DQPSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.96	79 P
40~78	Fig.97	

For 8DPSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.98	79 P
40~78	Fig.99	

Conclusion: PASS

Test graphs as below: