

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

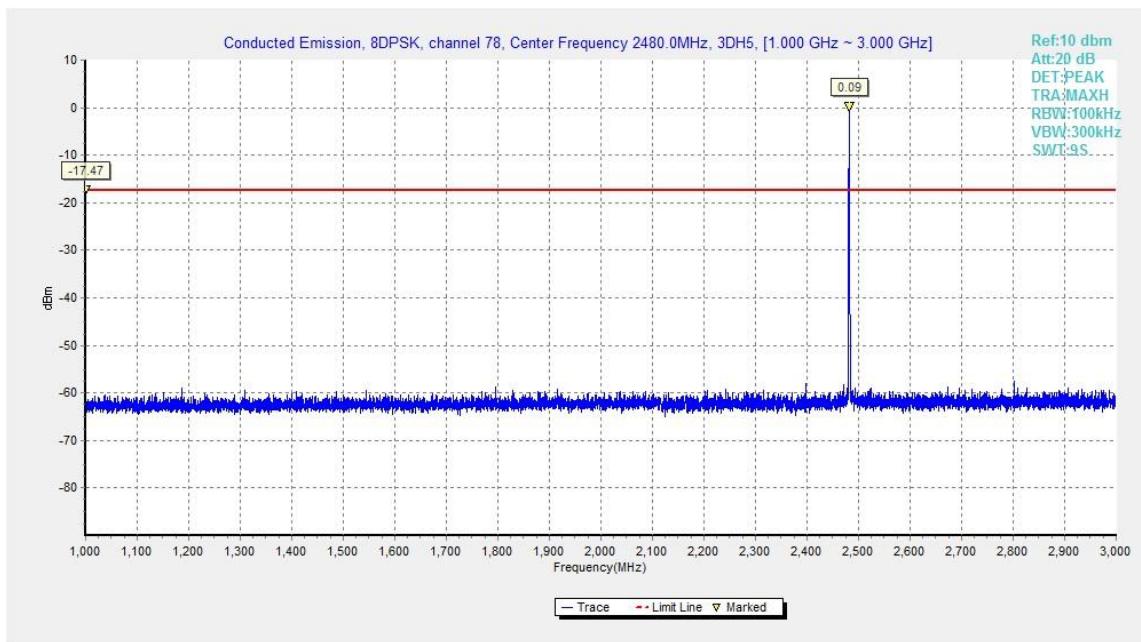


Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

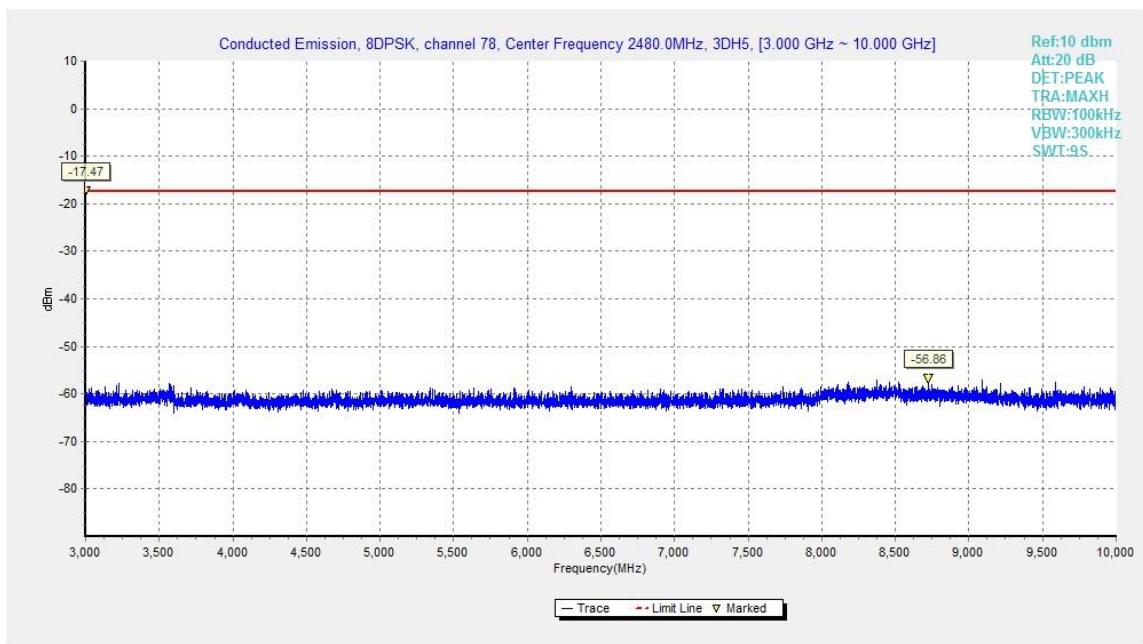


Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

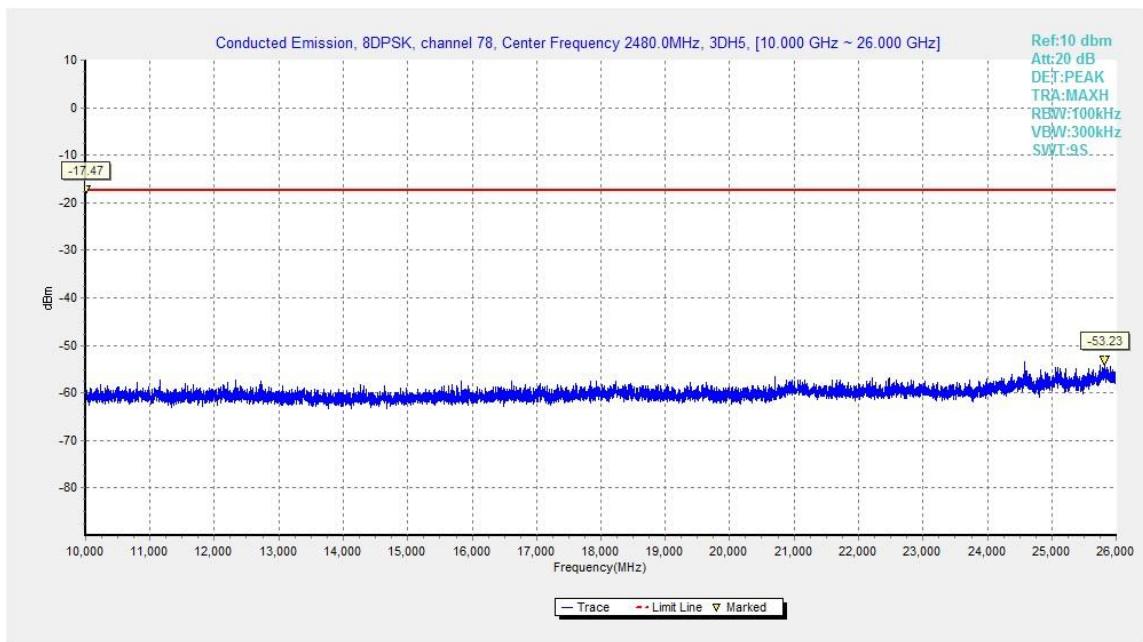


Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

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:

Result= $P_{Mea}+ARPL$

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
Ch 39 2441 MHz	9 kHz ~ 30 MHz	--	--
	30 MHz ~ 1 GHz	--	--
	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
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	--	--

For π/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
Ch 39 2441 MHz	30 MHz ~ 1 GHz	--	--
	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
	30 MHz ~ 1 GHz	--	--
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
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	--	--

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
Ch 39 2441 MHz	30 MHz ~ 1 GHz	--	--
	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
	30 MHz ~ 1 GHz	--	--
Ch 78 2480 MHz	1 GHz ~ 3 GHz	--	--
	3 GHz ~ 18 GHz	--	--
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	--	--

GFSK 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)
2385.670	46.61	2.9	32.0	11.73	54.0	7.4	H	155	28
2386.740	46.56	2.9	32.0	11.69	54.0	7.4	H	155	48
4804.000	35.16	-32.9	34.5	33.51	54.0	18.8	H	155	64
7206.000	38.06	-31.6	36.1	33.59	54.0	15.9	H	155	16
9608.000	38.82	-30.0	37.0	31.87	54.0	15.2	H	155	218
12010.000	42.90	-29.8	39.3	33.43	54.0	11.1	H	155	92

GFSK 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)
2381.800	46.62	2.9	32.0	11.72	54.0	7.4	H	155	6
2486.200	46.84	2.9	32.7	11.22	54.0	7.2	H	155	49
4882.000	35.24	-32.7	34.5	33.45	54.0	18.8	H	155	8
7323.000	38.11	-31.9	36.1	33.96	54.0	15.9	H	155	108
9764.000	38.82	-30.6	37.2	32.19	54.0	15.2	H	155	94
12205.000	42.92	-29.4	39.2	33.13	54.0	11.1	H	155	42

GFSK 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)
2483.640	46.81	2.9	32.8	11.12	54.0	7.2	H	155	98
2484.406	46.88	2.9	32.7	11.21	54.0	7.1	H	155	104
4960.000	35.32	-33.4	34.5	34.20	54.0	18.7	H	155	4
7440.000	38.43	-31.8	36.0	34.17	54.0	15.6	H	155	74
9920.000	38.95	-29.9	37.4	31.48	54.0	15.1	H	155	48
12400.000	42.87	-29.5	39.1	33.24	54.0	11.1	H	155	246

$\pi/4$ 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)
2381.520	46.65	2.9	32.0	11.74	54.0	7.4	H	155	42
2388.740	46.69	2.9	32.0	11.84	54.0	7.3	H	155	68
4804.000	35.09	-32.9	34.5	33.44	54.0	18.9	H	155	118
7206.000	38.27	-31.6	36.1	33.80	54.0	15.7	H	155	354
9608.000	38.94	-30.0	37.0	31.99	54.0	15.1	H	155	18
12010.000	42.95	-29.8	39.3	33.47	54.0	11.1	H	155	38

 $\pi/4$ 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)
2388.650	46.67	2.9	32.0	11.82	54.0	7.3	H	155	180
2486.780	46.79	2.9	32.7	11.18	54.0	7.2	H	155	200
4882.000	35.18	-32.7	34.5	33.40	54.0	18.8	H	155	225
7323.000	38.38	-31.9	36.1	34.22	54.0	15.6	H	155	202
9764.000	38.91	-30.6	37.2	32.28	54.0	15.1	H	155	245
12205.000	42.92	-29.4	39.2	33.13	54.0	11.1	H	155	268

 $\pi/4$ 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)
2483.750	47.12	2.9	32.8	11.43	54.0	6.9	H	155	92
2486.060	46.76	2.9	32.7	11.13	54.0	7.2	H	155	104
4960.000	35.30	-33.4	34.5	34.17	54.0	18.7	H	155	135
7440.000	38.18	-31.8	36.0	33.92	54.0	15.8	H	155	168
9920.000	38.86	-29.9	37.4	31.39	54.0	15.1	H	155	184
12400.000	42.90	-29.5	39.1	33.27	54.0	11.1	H	155	202

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)
2387.802	46.67	2.9	32.0	11.80	54.0	7.3	H	155	84
2384.930	46.55	2.9	32.0	11.66	54.0	7.5	H	155	204
4804.000	35.27	-32.9	34.5	33.62	54.0	18.7	H	155	222
7206.000	38.00	-31.6	36.1	33.53	54.0	16.0	H	155	245
9608.000	38.84	-30.0	37.0	31.89	54.0	15.2	H	155	72
12010.000	42.91	-29.8	39.3	33.44	54.0	11.1	H	155	94

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)
2385.470	46.65	2.9	32.0	11.77	54.0	7.4	H	155	268
2484.780	47.00	2.9	32.7	11.34	54.0	7.0	H	155	290
4882.000	35.05	-32.7	34.5	33.26	54.0	19.0	H	155	312
7323.000	38.18	-31.9	36.1	34.02	54.0	15.8	H	155	46
9764.000	38.81	-30.6	37.2	32.18	54.0	15.2	H	155	70
12205.000	42.94	-29.4	39.2	33.15	54.0	11.1	H	155	92

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)
2483.760	47.72	2.9	32.8	12.03	54.0	6.3	H	155	48
2484.730	47.15	2.9	32.7	11.49	54.0	6.9	H	155	18
4960.000	35.64	-33.4	34.5	34.51	54.0	18.4	H	155	92
7440.000	38.41	-31.8	36.0	34.15	54.0	15.6	H	155	112
9920.000	38.97	-29.9	37.4	31.50	54.0	15.0	H	155	136
12400.000	42.90	-29.5	39.1	33.27	54.0	11.1	H	155	156

GFSK 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)
2383.178	60.56	2.9	32.0	25.67	74.0	13.4	H	155	22
2387.756	59.97	2.9	32.0	25.11	74.0	14.0	H	155	44
4804.000	41.13	-32.9	34.5	39.48	74.0	32.9	V	155	66
7206.000	43.29	-31.6	36.1	38.82	74.0	30.7	H	155	22
9608.000	43.02	-30.0	37.0	36.07	74.0	31.0	H	155	228
12010.000	47.65	-29.8	39.3	38.18	74.0	26.3	H	155	88

GFSK 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)
2384.400	47.91	-24.4	32.0	40.31	74.0	26.1	H	155	0
2494.000	49.69	-23.0	32.5	40.23	74.0	24.3	H	155	44
4882.000	41.40	-32.7	34.5	39.61	74.0	32.6	V	155	0
7323.000	42.77	-31.9	36.1	38.61	74.0	31.2	H	155	110
9764.000	43.47	-30.6	37.2	36.84	74.0	30.5	V	155	88
12205.000	47.14	-29.4	39.2	37.35	74.0	26.9	V	155	22

GFSK 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)
2486.360	60.07	2.9	32.7	24.45	74.0	13.9	H	155	88
2490.410	59.91	2.9	32.6	24.41	74.0	14.1	H	155	110
4960.000	41.57	-33.4	34.5	40.44	74.0	32.4	H	155	0
7440.000	42.45	-31.8	36.0	38.19	74.0	31.5	V	155	66
9920.000	45.05	-29.9	37.4	37.58	74.0	29.0	V	155	44
12400.000	47.09	-29.5	39.1	37.46	74.0	26.9	H	155	242

$\pi/4$ 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)
2350.546	59.89	2.8	31.7	25.39	74.0	14.1	H	155	44
2389.850	59.78	2.9	32.0	24.93	74.0	14.2	H	155	66
4804.000	40.95	-32.9	34.5	39.30	74.0	33.1	H	155	110
7206.000	43.29	-31.6	36.1	38.82	74.0	30.7	V	155	0
9608.000	43.32	-30.0	37.0	36.37	74.0	30.7	H	155	22
12010.000	47.62	-29.8	39.3	38.15	74.0	26.4	H	155	44

 $\pi/4$ 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)
2378.600	48.34	-26.4	32.1	42.67	74.0	25.7	H	155	176
2492.000	49.56	-20.1	32.5	37.13	74.0	24.4	H	155	198
4882.000	40.33	-32.7	34.5	38.54	74.0	33.7	H	155	220
7323.000	42.28	-31.9	36.1	38.13	74.0	31.7	H	155	198
9764.000	43.46	-30.6	37.2	36.83	74.0	30.5	V	155	242
12205.000	46.54	-29.4	39.2	36.75	74.0	27.5	H	155	264

 $\pi/4$ 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)
2492.710	60.01	2.9	32.5	24.57	74.0	14.0	H	155	88
2495.870	60.32	2.9	32.4	24.97	74.0	13.7	H	155	110
4960.000	42.01	-33.4	34.5	40.88	74.0	32.0	V	155	132
7440.000	43.09	-31.8	36.0	38.83	74.0	30.9	V	155	154
9920.000	45.32	-29.9	37.4	37.84	74.0	28.7	H	155	176
12400.000	47.55	-29.5	39.1	37.92	74.0	26.5	V	155	198

8DPSK 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)
2388.554	59.75	2.9	32.0	24.90	74.0	14.2	H	155	88
2385.502	59.56	2.9	32.0	24.68	74.0	14.4	H	155	198
4804.000	41.16	-32.9	34.5	39.51	74.0	32.8	H	155	220
7206.000	42.57	-31.6	36.1	38.10	74.0	31.4	V	155	242
9608.000	42.79	-30.0	37.0	35.83	74.0	31.2	H	155	66
12010.000	47.16	-29.8	39.3	37.69	74.0	26.8	H	155	88

8DPSK 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)
2375.460	49.14	-26.6	32.1	43.66	74.0	24.9	H	155	264
2498.780	49.14	-26.0	32.3	42.85	74.0	24.9	H	155	286
4882.000	40.94	-32.7	34.5	39.16	74.0	33.1	V	155	308
7323.000	42.61	-31.9	36.1	38.45	74.0	31.4	H	155	44
9764.000	42.90	-30.6	37.2	36.27	74.0	31.1	H	155	66
12205.000	46.74	-29.4	39.2	36.95	74.0	27.3	V	155	88

8DPSK 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)
2487.760	60.67	2.9	32.6	25.10	74.0	13.3	H	155	44
2495.160	60.65	2.9	32.4	25.28	74.0	13.4	H	155	22
4960.000	40.56	-33.4	34.5	39.43	74.0	33.4	H	155	88
7440.000	42.90	-31.8	36.0	38.64	74.0	31.1	H	155	110
9920.000	45.69	-29.9	37.4	38.22	74.0	28.3	H	155	132
12400.000	47.69	-29.5	39.1	38.06	74.0	26.3	H	155	154

Conclusion: PASS**Test graphs as below:**

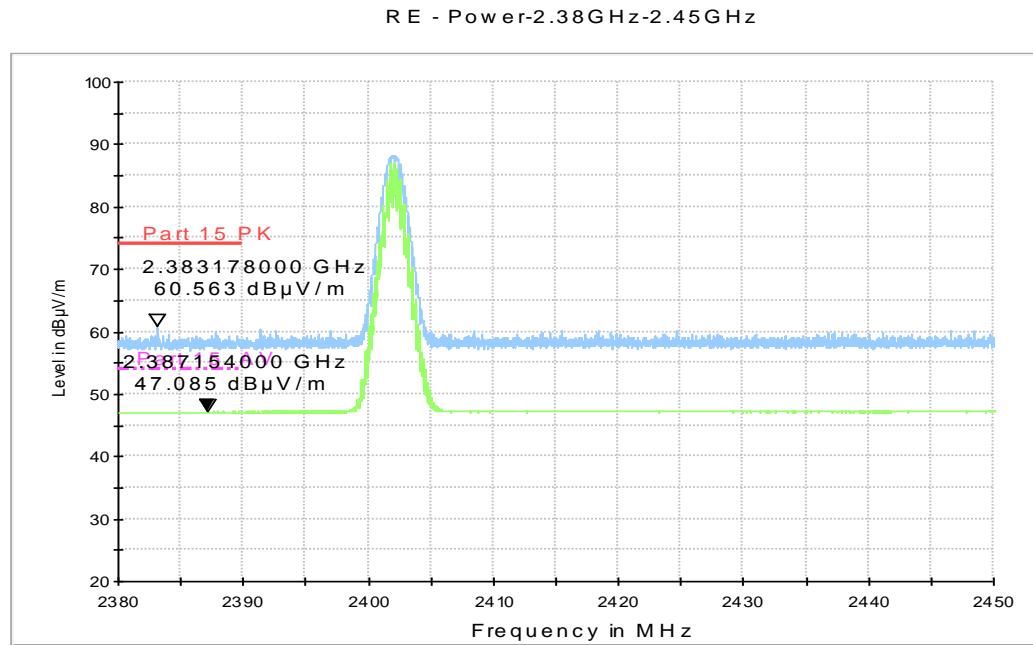


Fig.58. Radiated emission (Power): GFSK, low channel

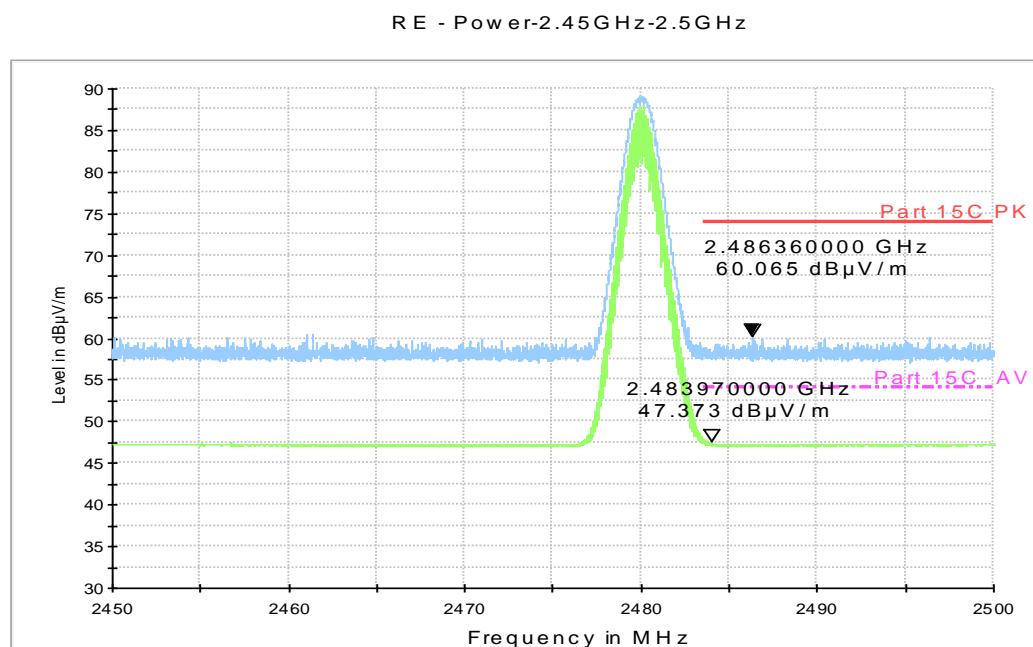


Fig.59. Radiated emission (Power) GFSK, high channel

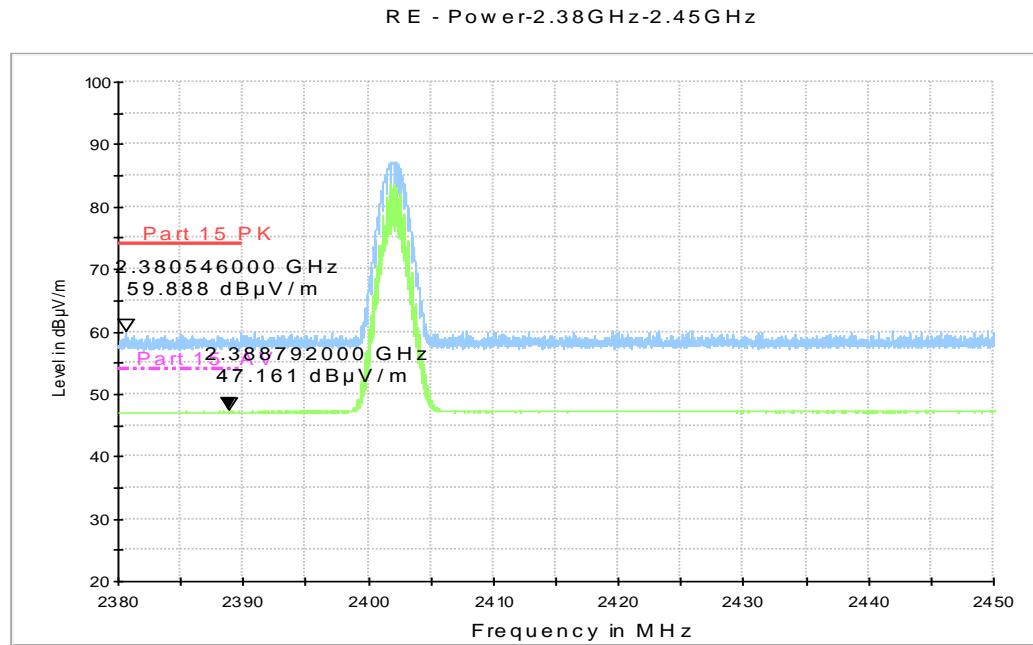


Fig.60. Radiated emission (Power): $\pi/4$ DQPSK, low channel

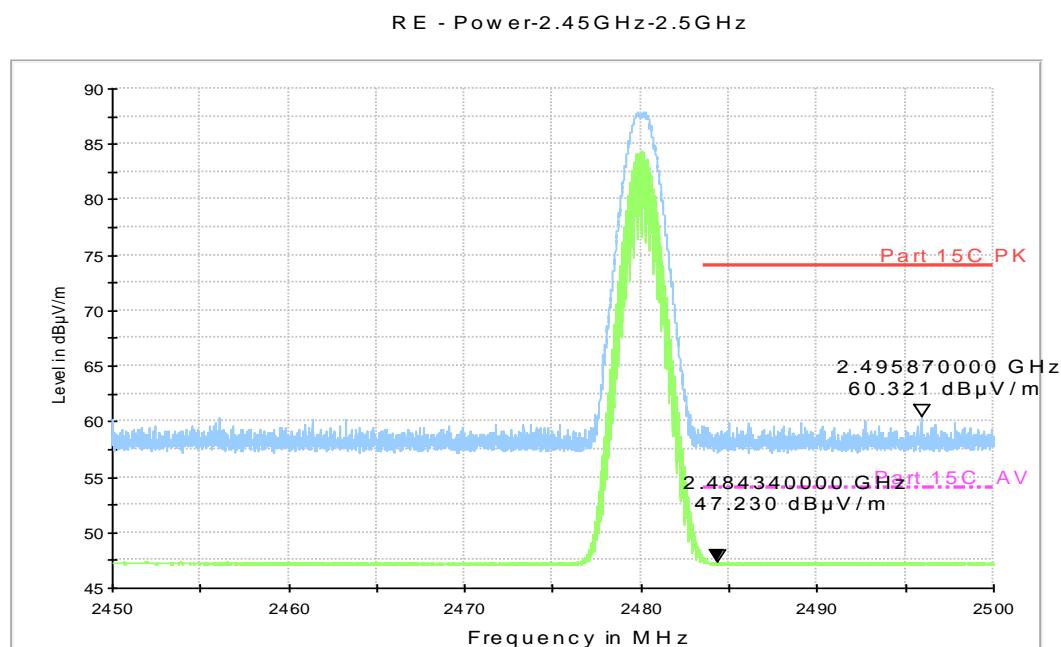


Fig.61. Radiated emission (Power): $\pi/4$ DQPSK, high channel

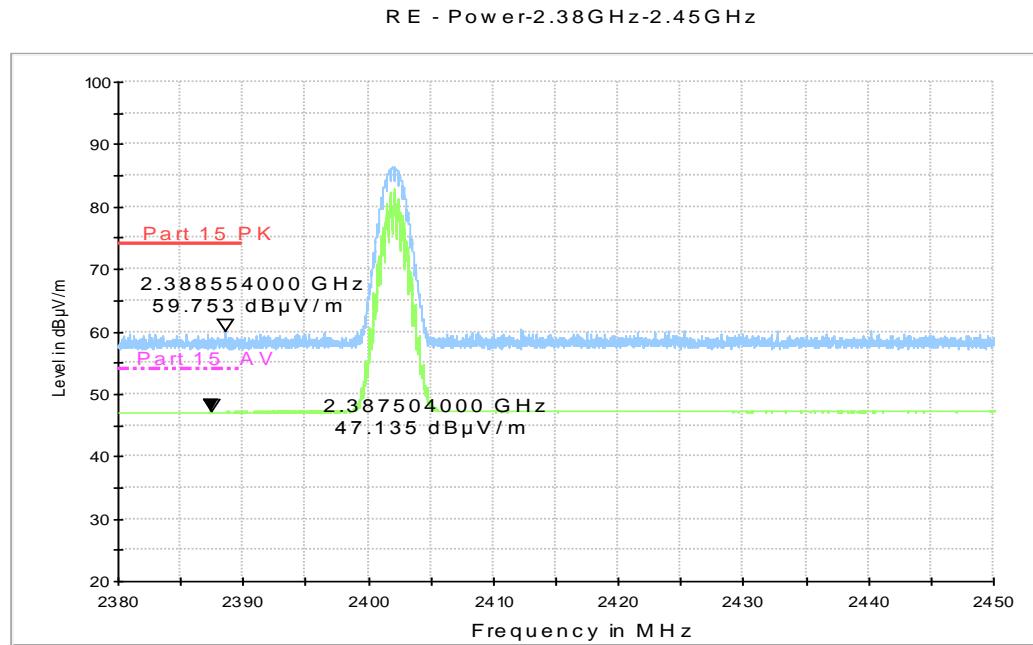


Fig.62. Radiated emission (Power): 8DPSK, low channel

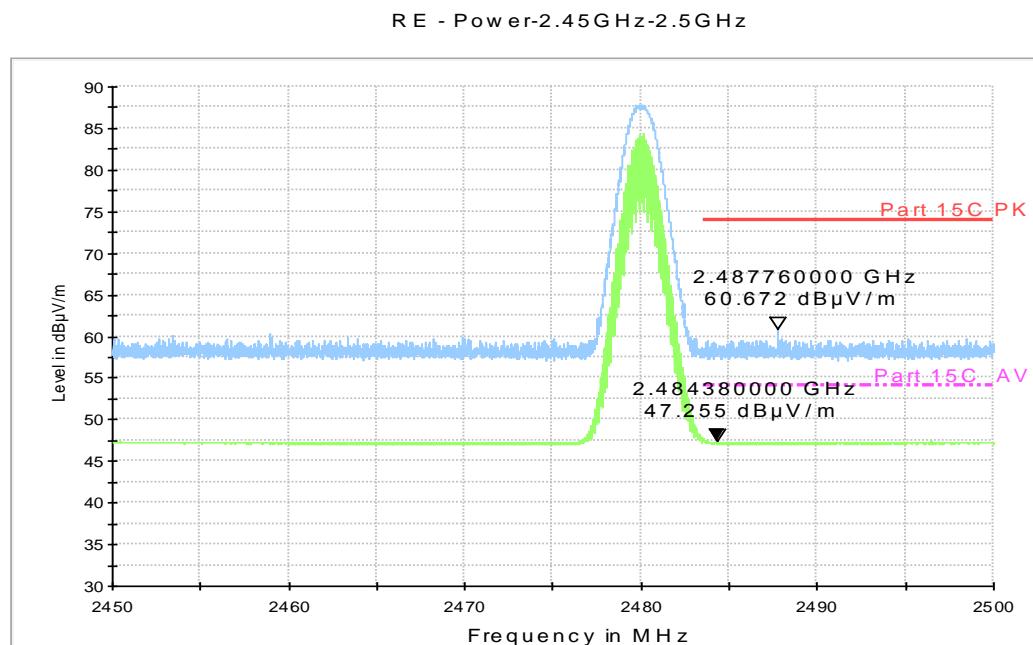


Fig.63. Radiated emission (Power): 8DPSK, high channel

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	121.59	P
		Fig.65		
	DH3	Fig.66	160.44	P
		Fig.67		
	DH5	Fig.68	138.49	P
		Fig.69		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.70	124.26	P
		Fig.71		
	DH3	Fig.72	178.66	P
		Fig.73		
	DH5	Fig.74	158.80	P
		Fig.75		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.76	122.99	P
		Fig.77		
	DH3	Fig.78	181.81	P
		Fig.79		

	DH5	Fig.80 Fig.81	193.56	P
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Conclusion: PASS

Test graphs as below:

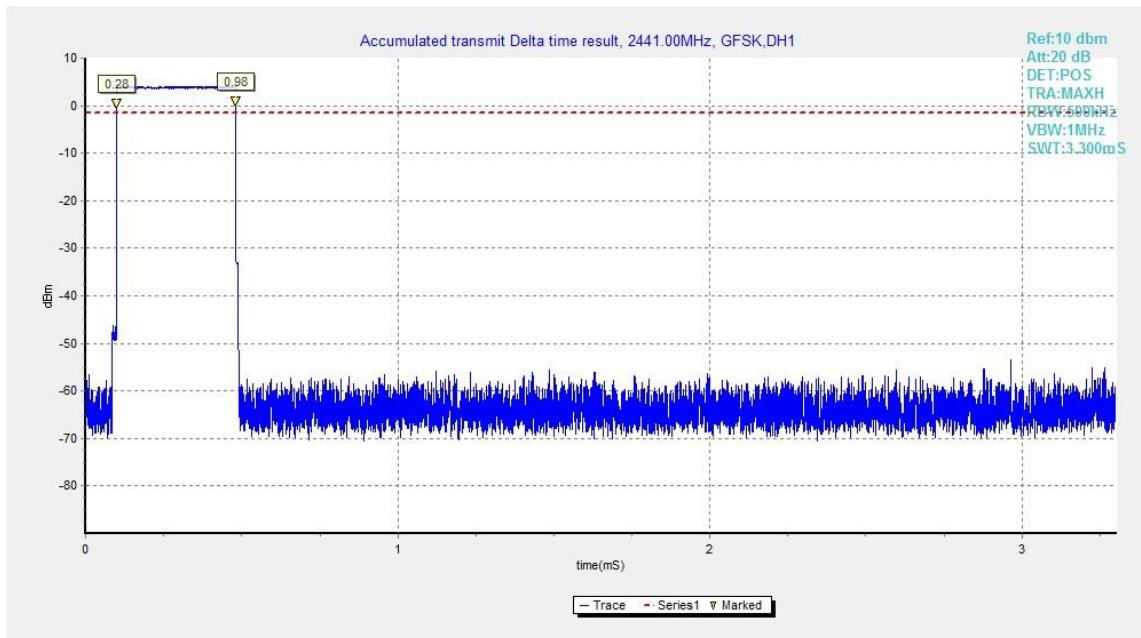


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

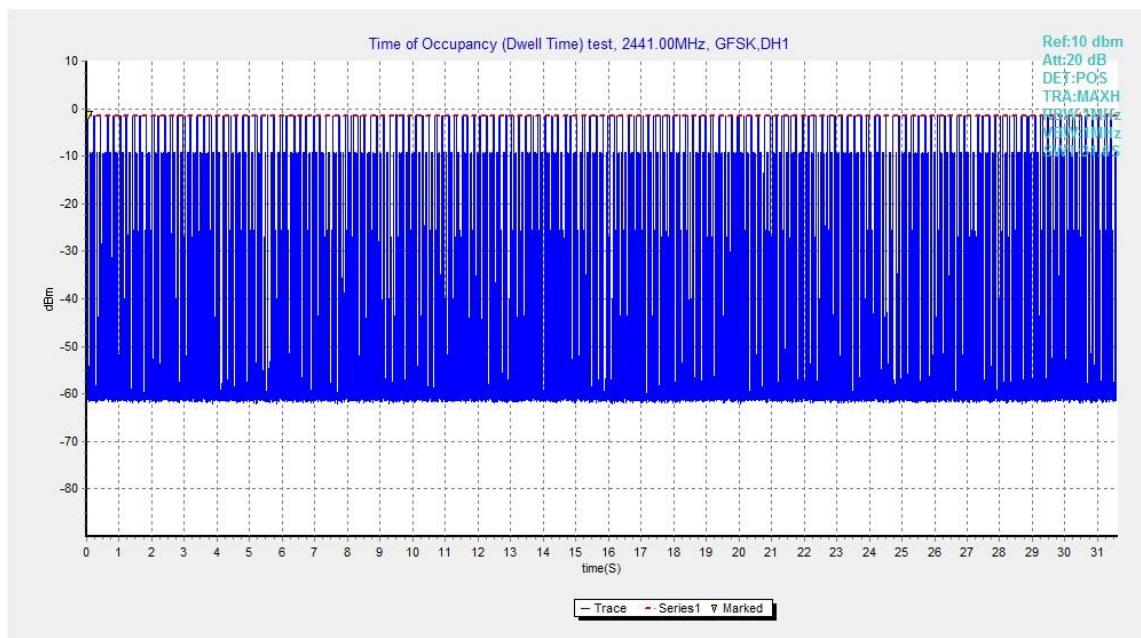


Fig.65. Number of Transmissions Measurement:Channel 39,Packet DH1

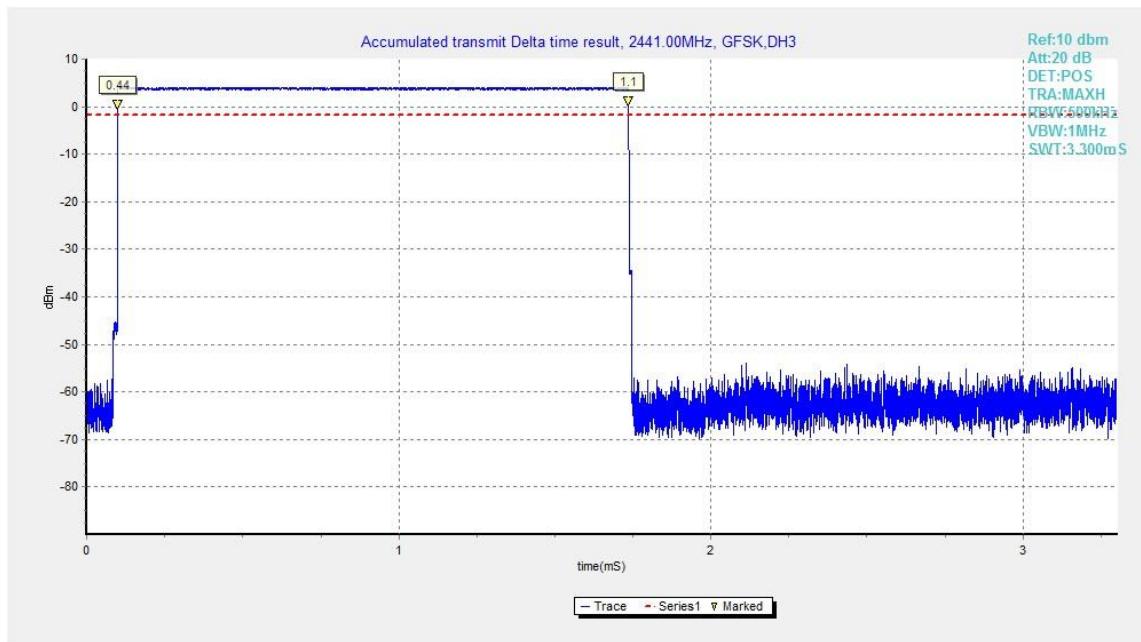


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

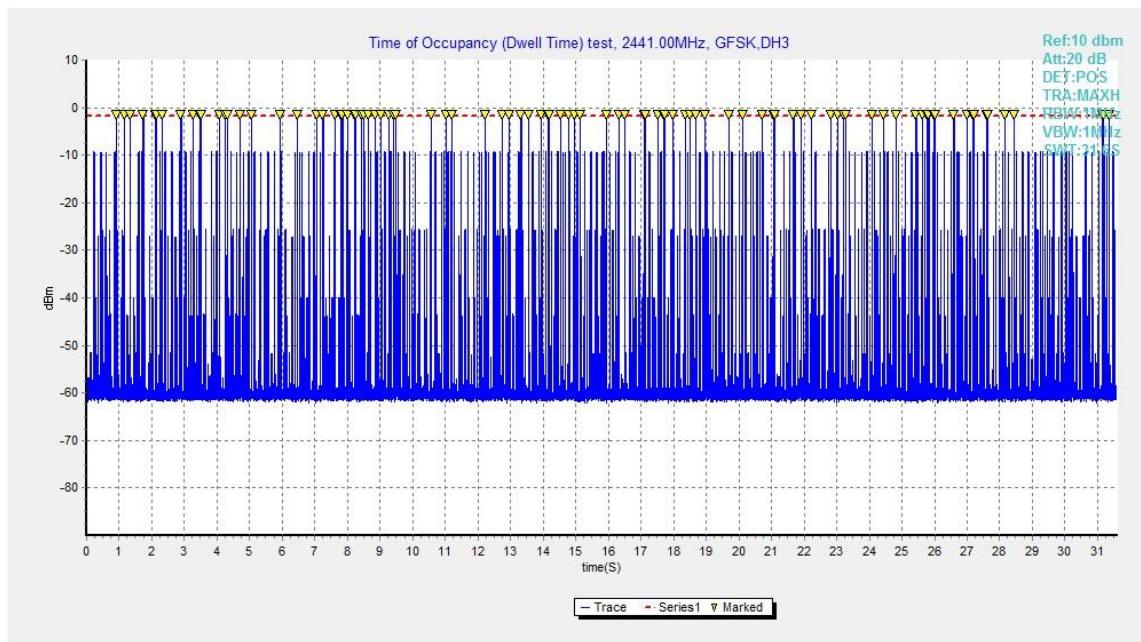


Fig.67. Number of Transmissions Measurement:Channel 39,Packet DH3

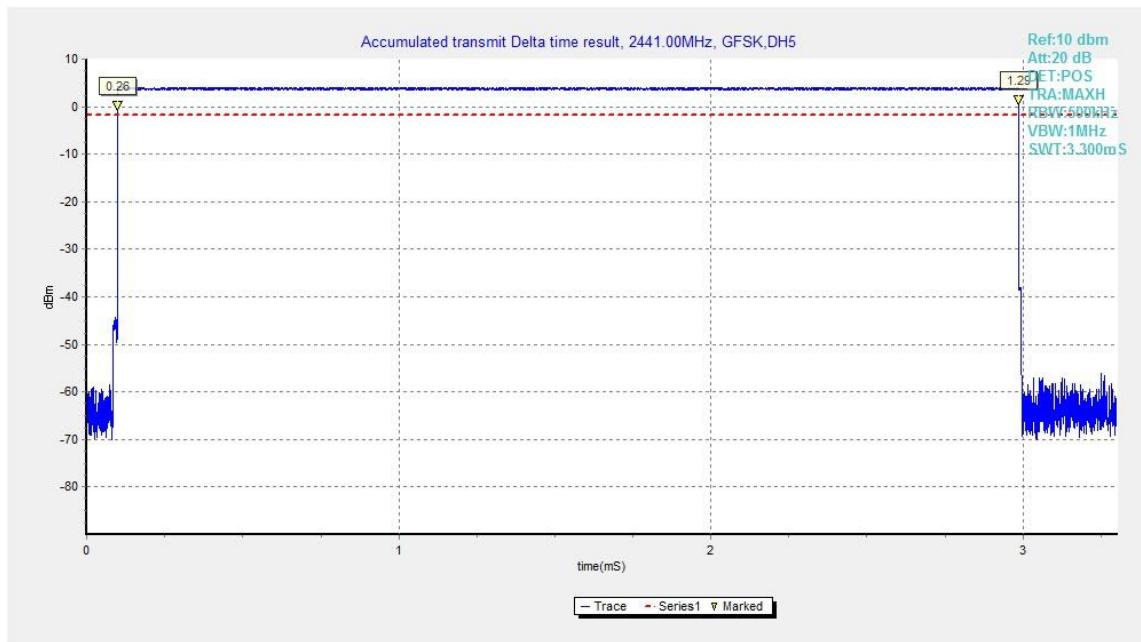


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

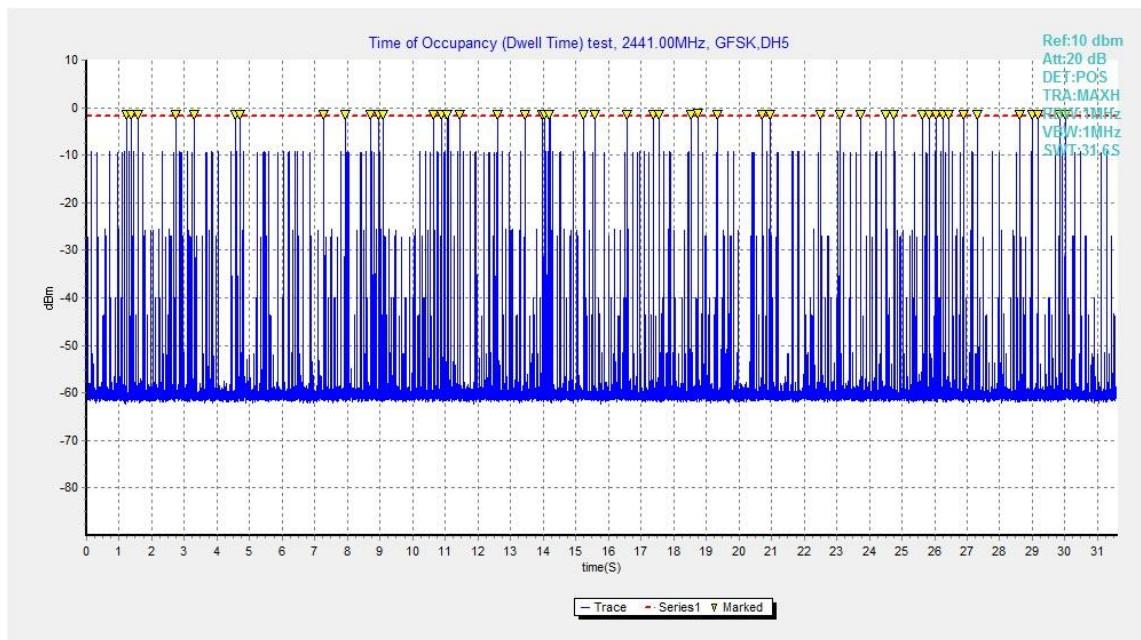


Fig.69. Number of Transmissions Measurement:Channel 39,Packet DH5

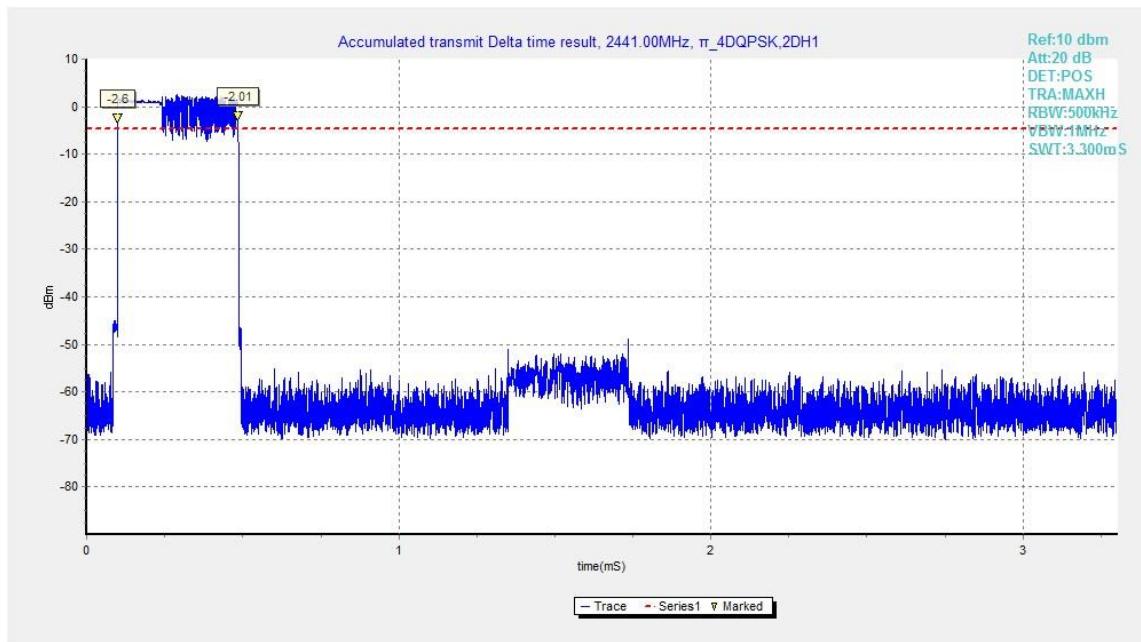


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

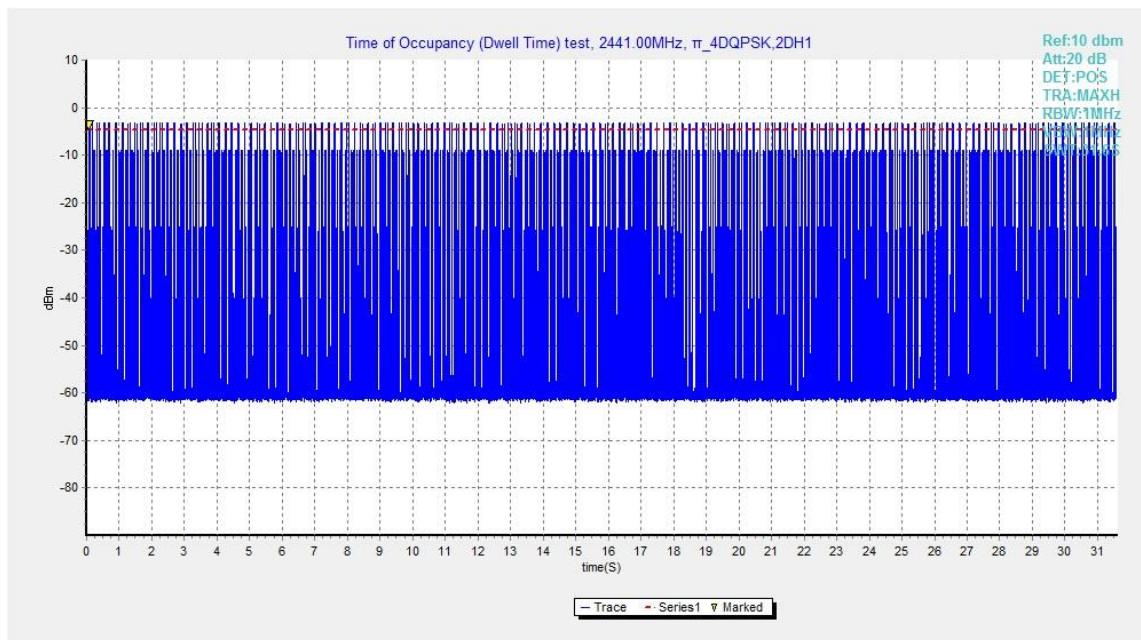


Fig.71. Number of Transmissions Measurement:Channel 39,Packet 2-DH1

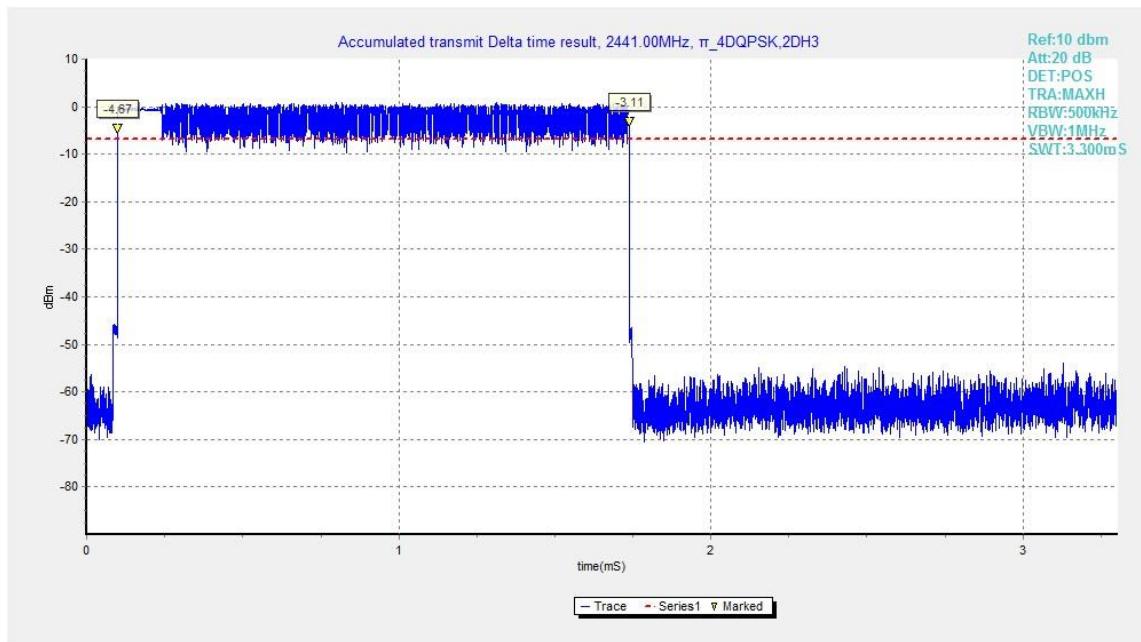


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

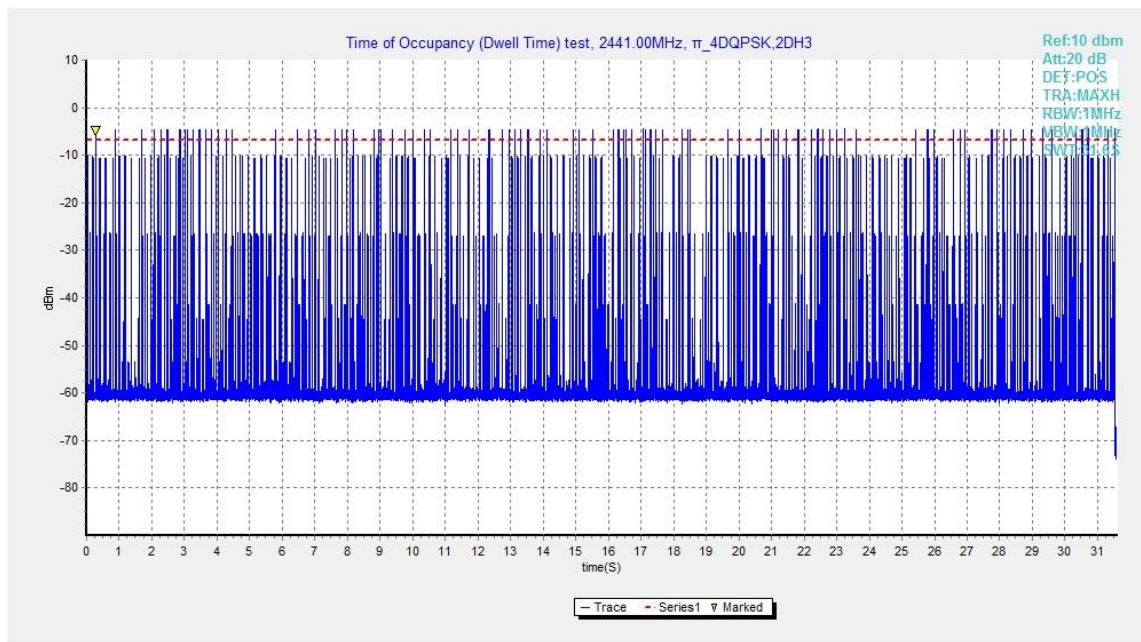


Fig.73. Number of Transmissions Measurement:Channel 39,Packet 2-DH3

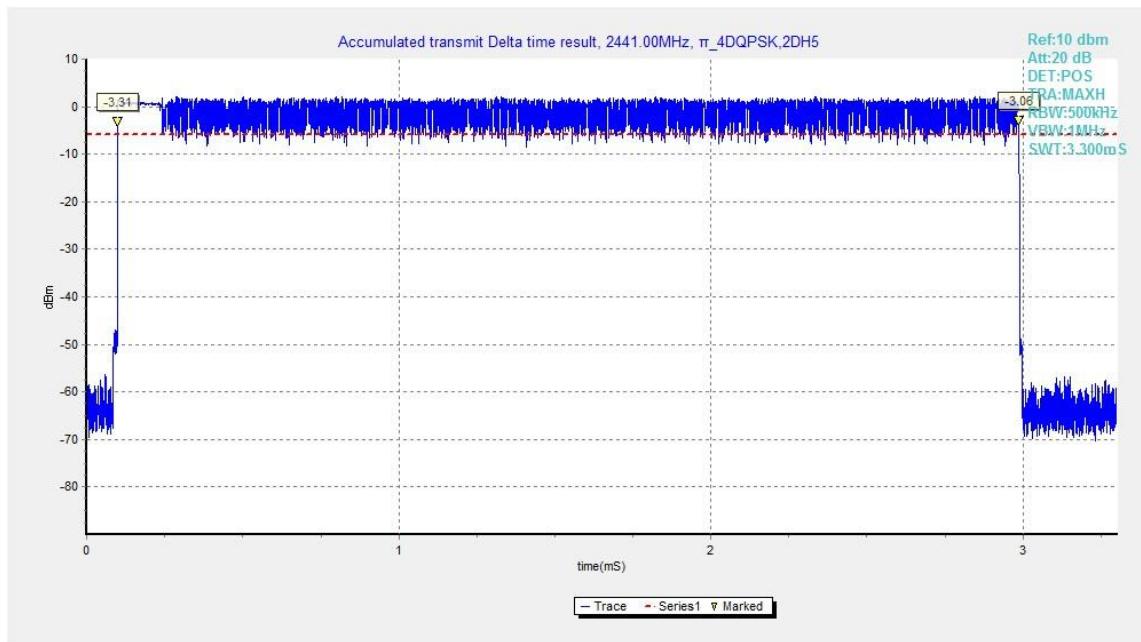


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

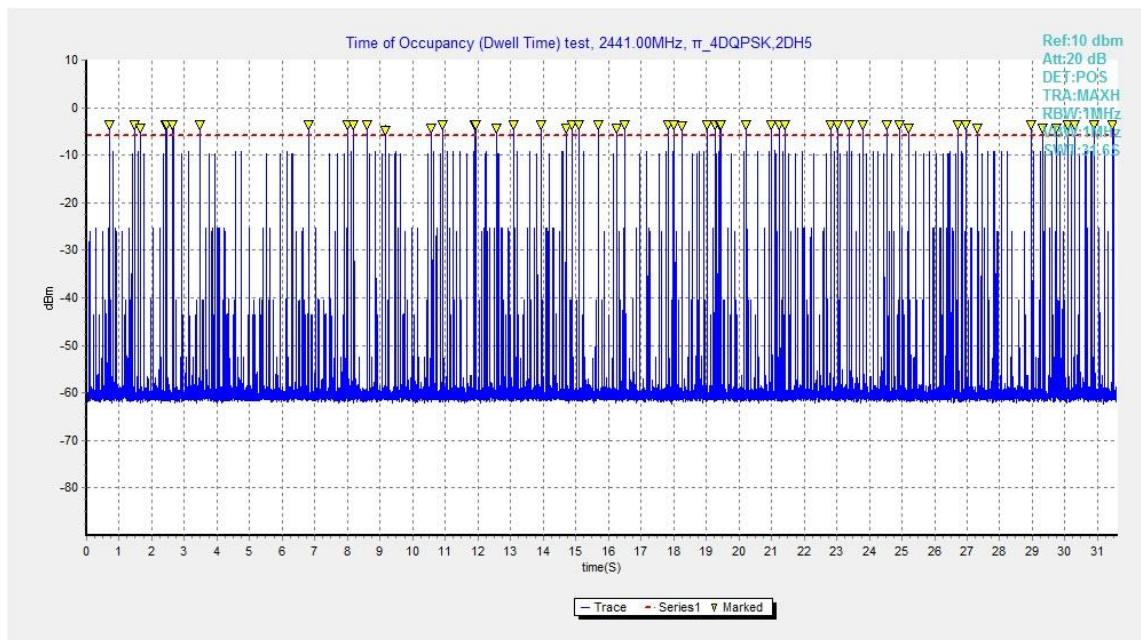


Fig.75. Number of Transmissions Measurement:Channel 39,Packet 2-DH5

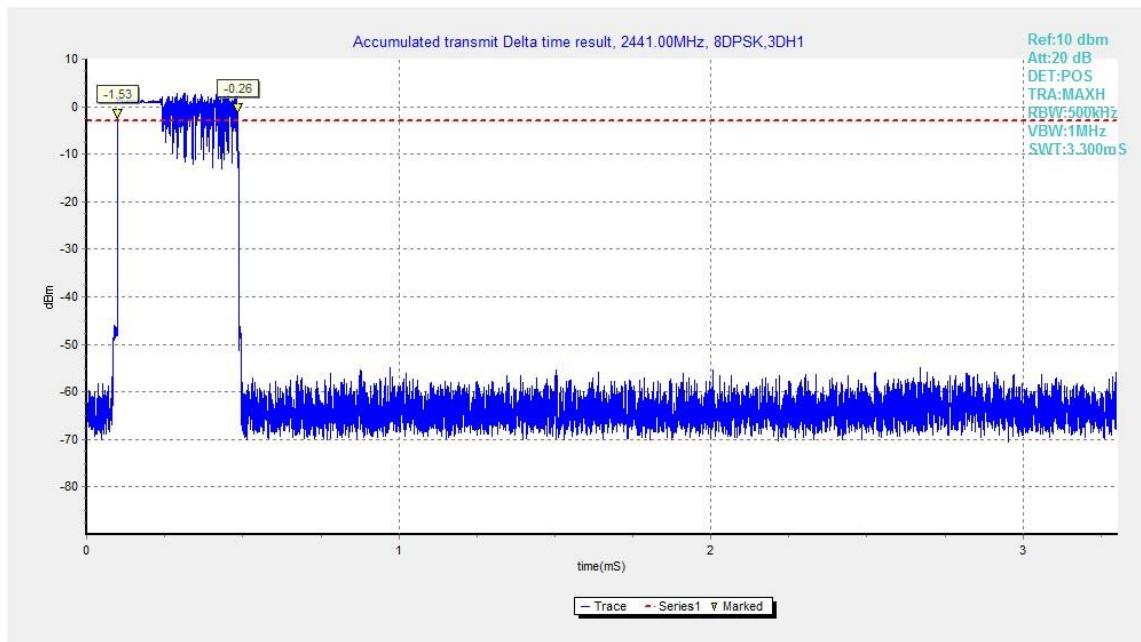


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

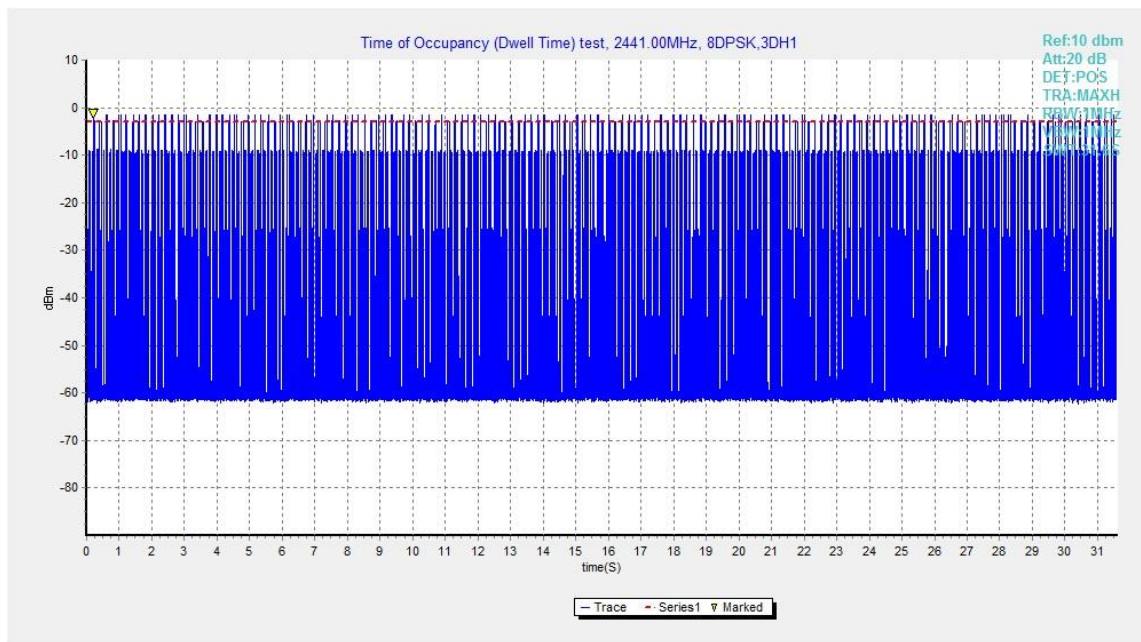


Fig.77. Number of Transmissions Measurement:Channel 39,Packet 3-DH1

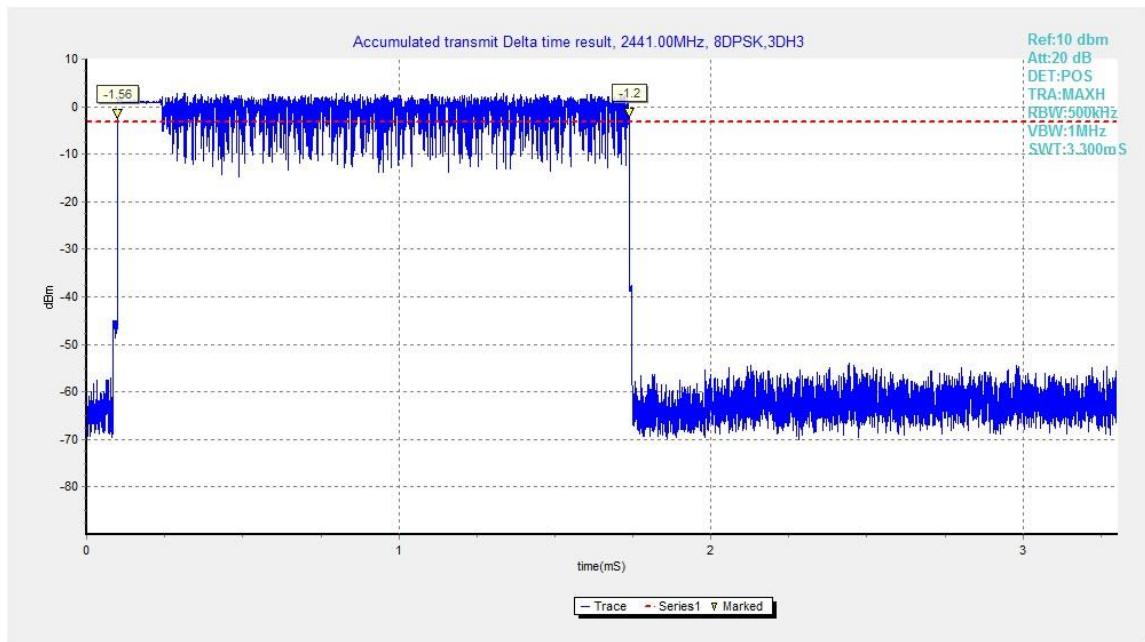


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

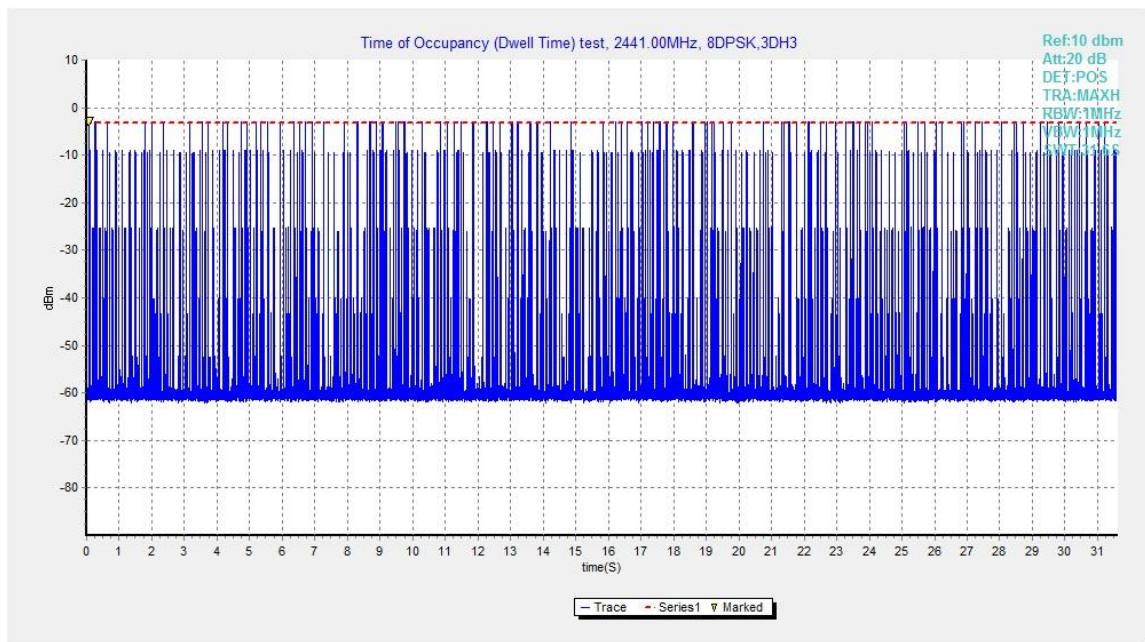


Fig.79. Number of Transmissions Measurement:Channel 39,Packet 3-DH3

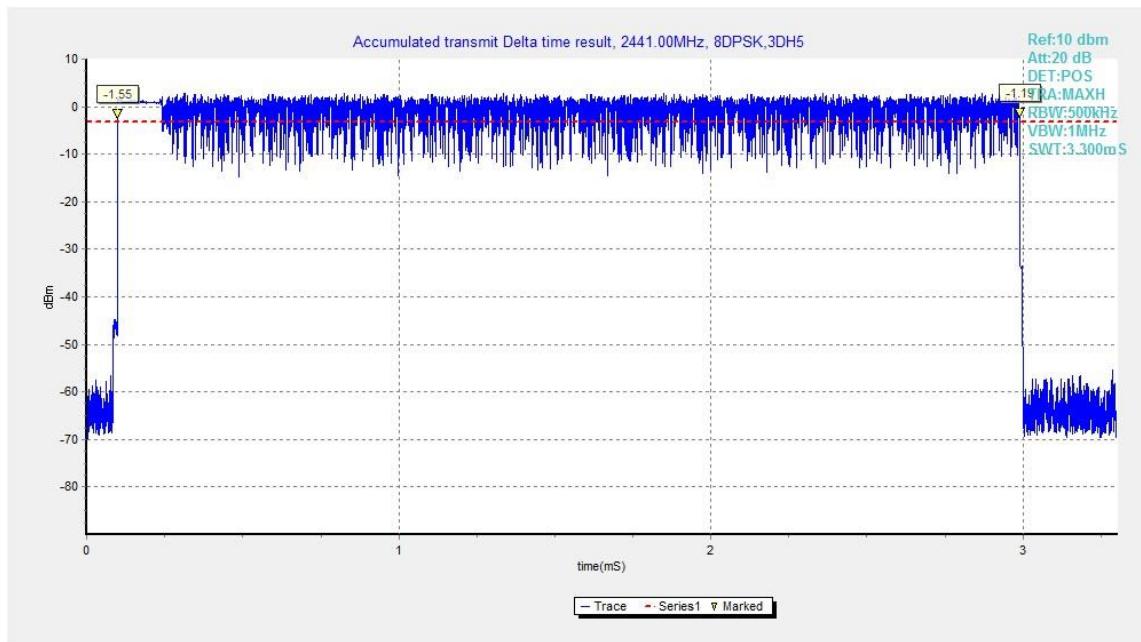


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

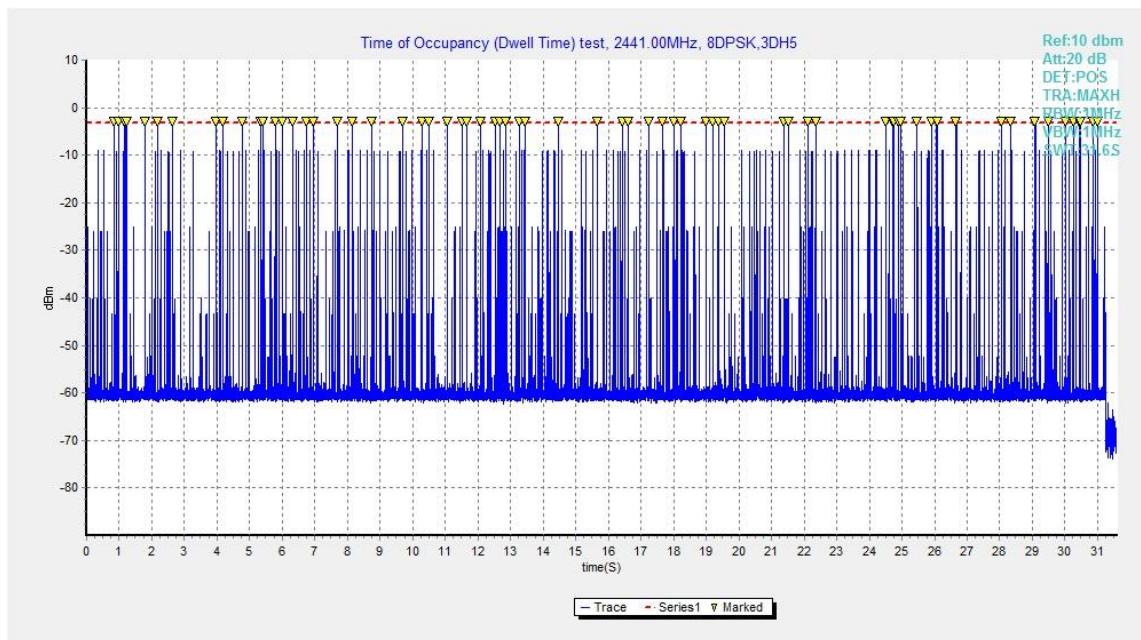


Fig.81. Number of Transmissions Measurement:Channel 39,Packet 3-DH5

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	946.50	NA
39	Fig.83	922.50	NA
78	Fig.84	894.75	NA

For π/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1286.25	NA
39	Fig.86	1279.50	NA
78	Fig.87	1290.00	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1296.00	NA
39	Fig.89	1279.50	NA
78	Fig.90	1293.75	NA

Conclusion: NA

Test graphs as below:

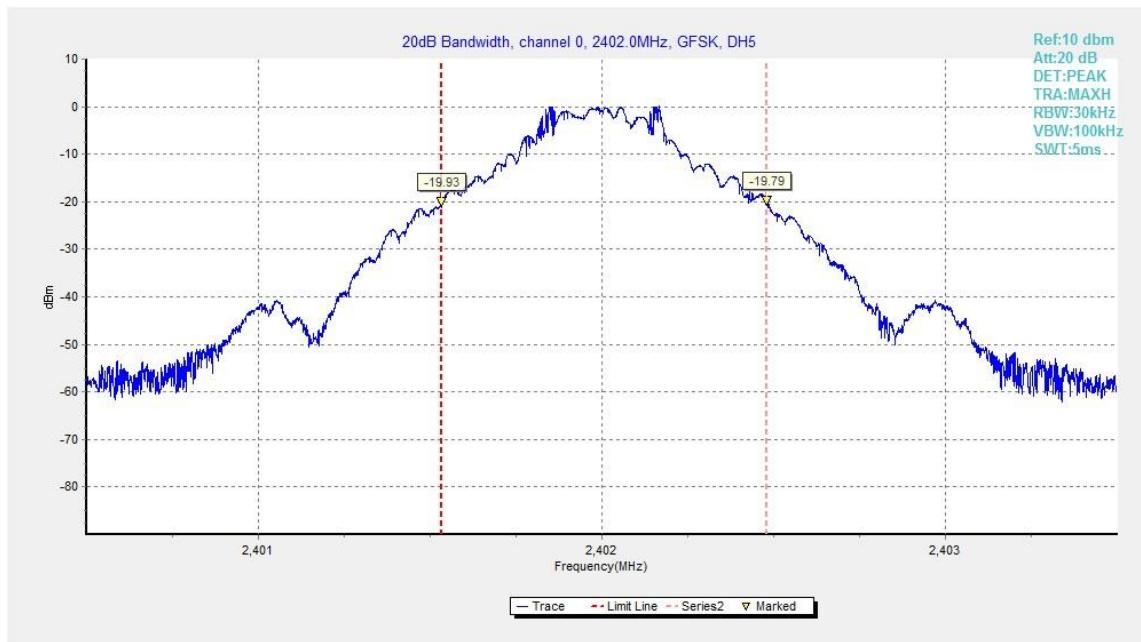


Fig.82. 20dB Bandwidth: GFSK, Channel 0

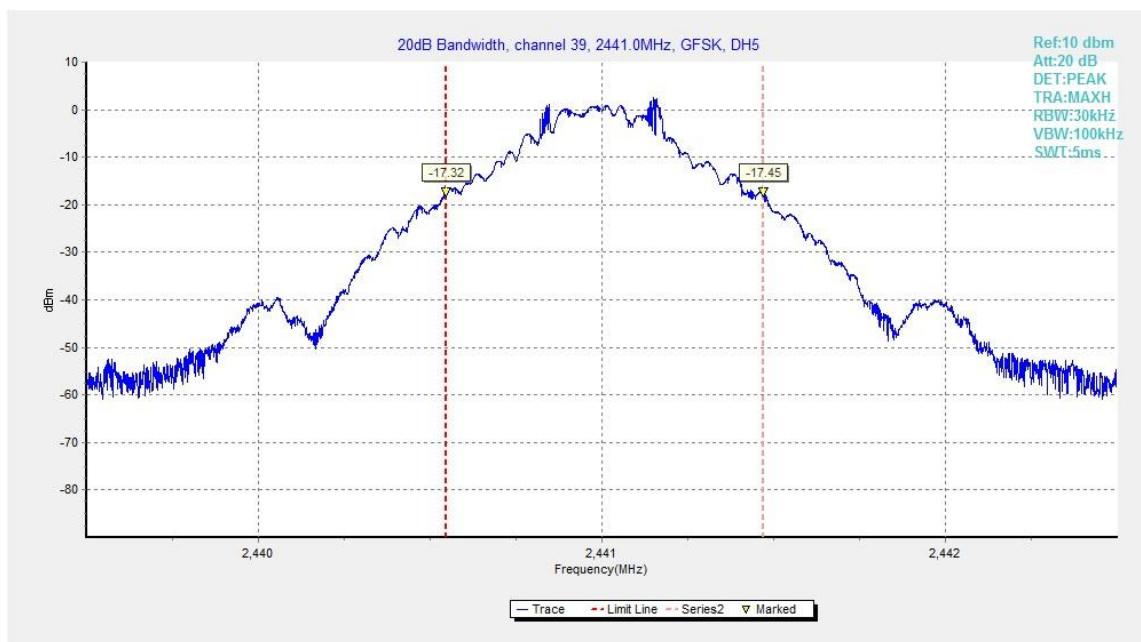


Fig.83. 20dB Bandwidth: GFSK, Channel 39

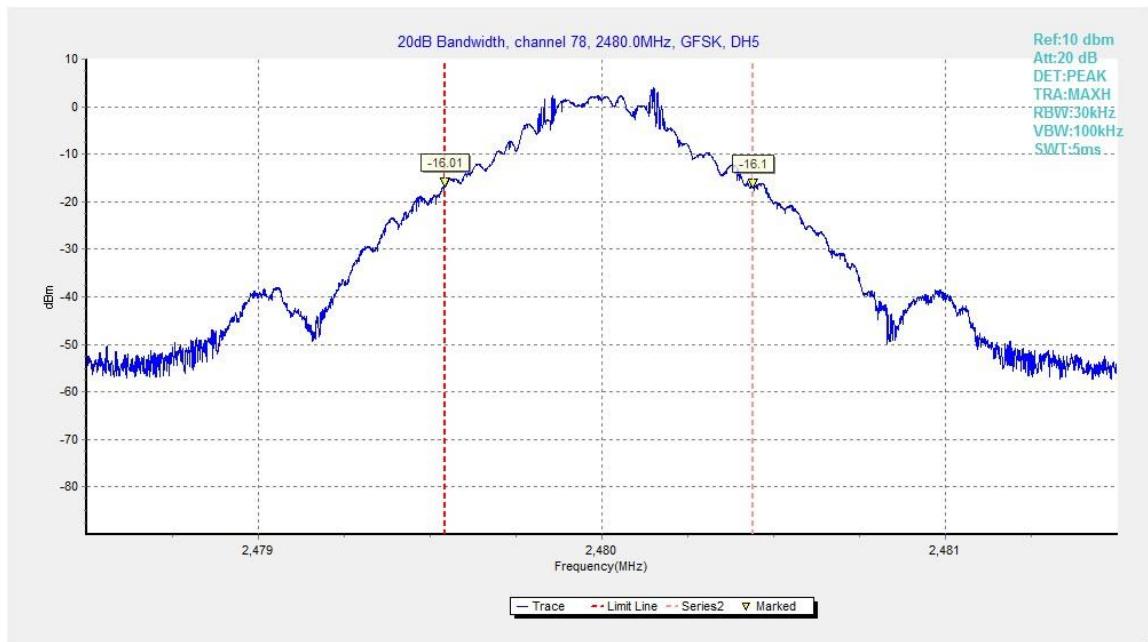


Fig.84. 20dB Bandwidth: GFSK, Channel 78

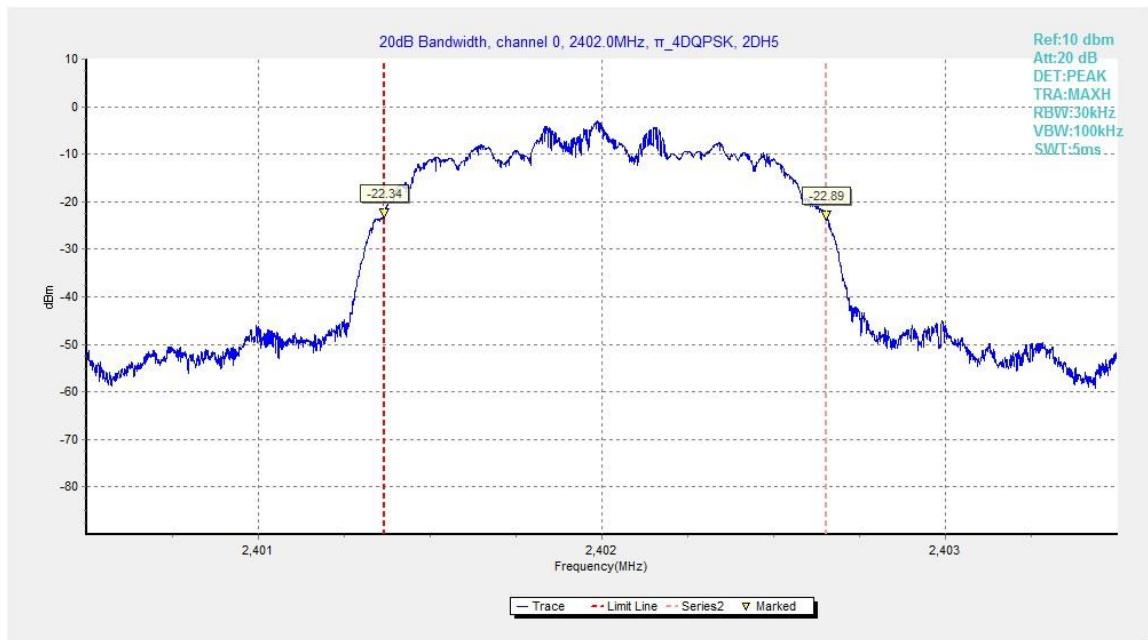


Fig.85. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 0

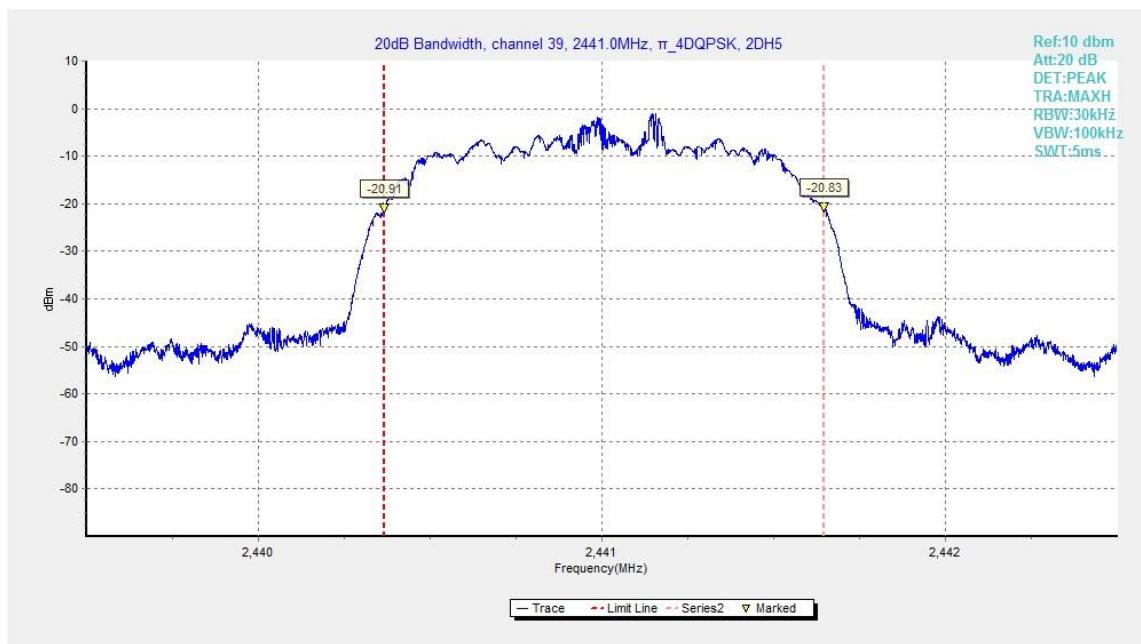


Fig.86. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

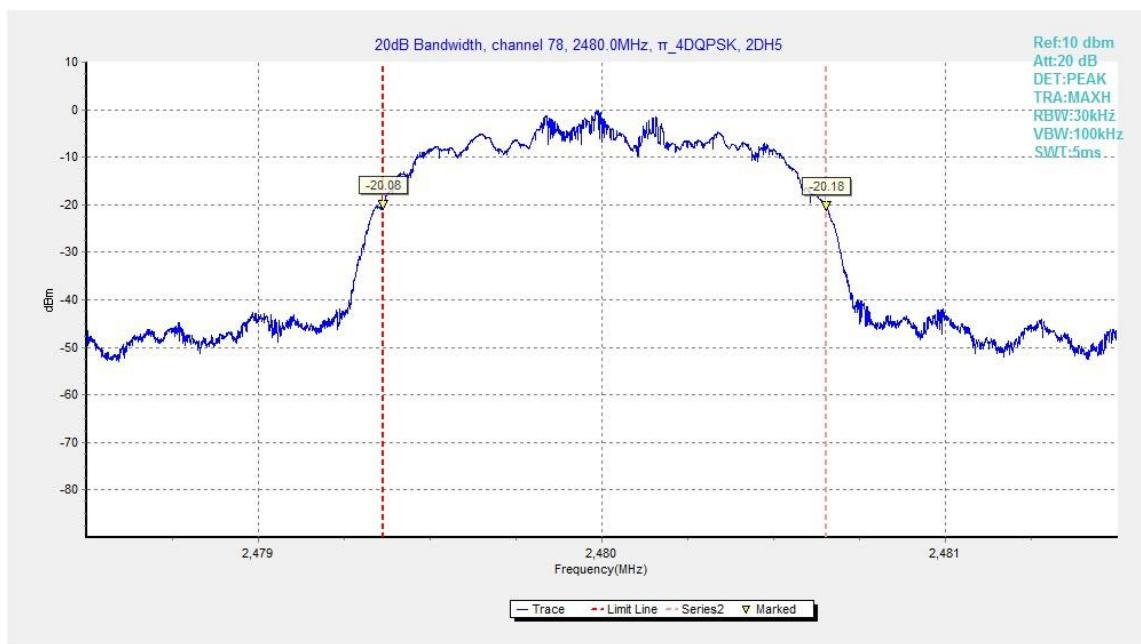


Fig.87. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

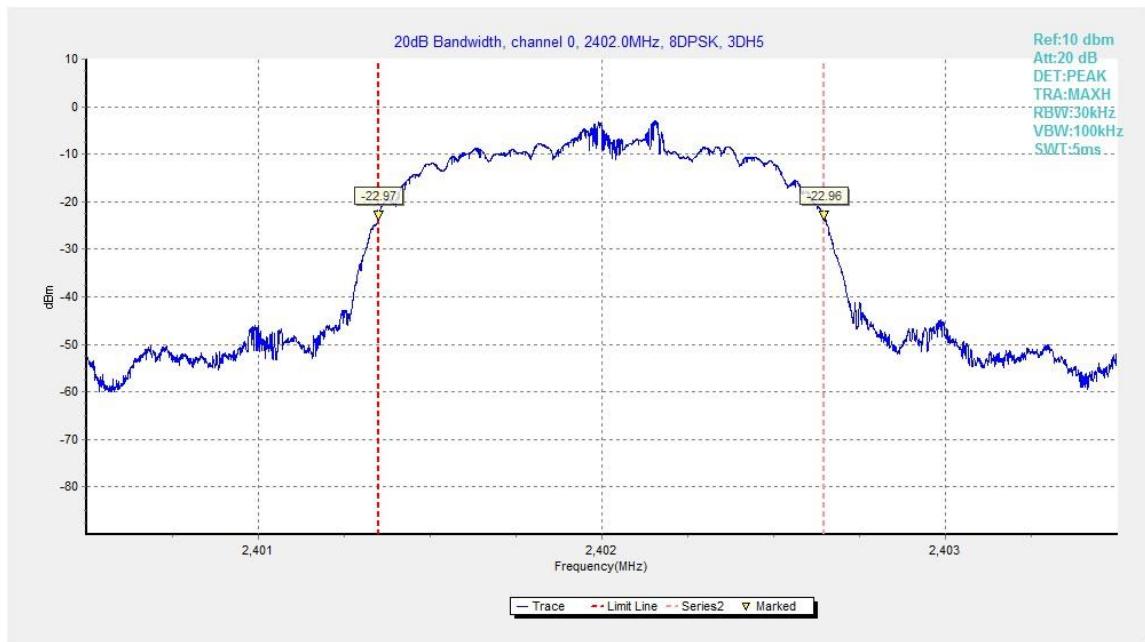


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

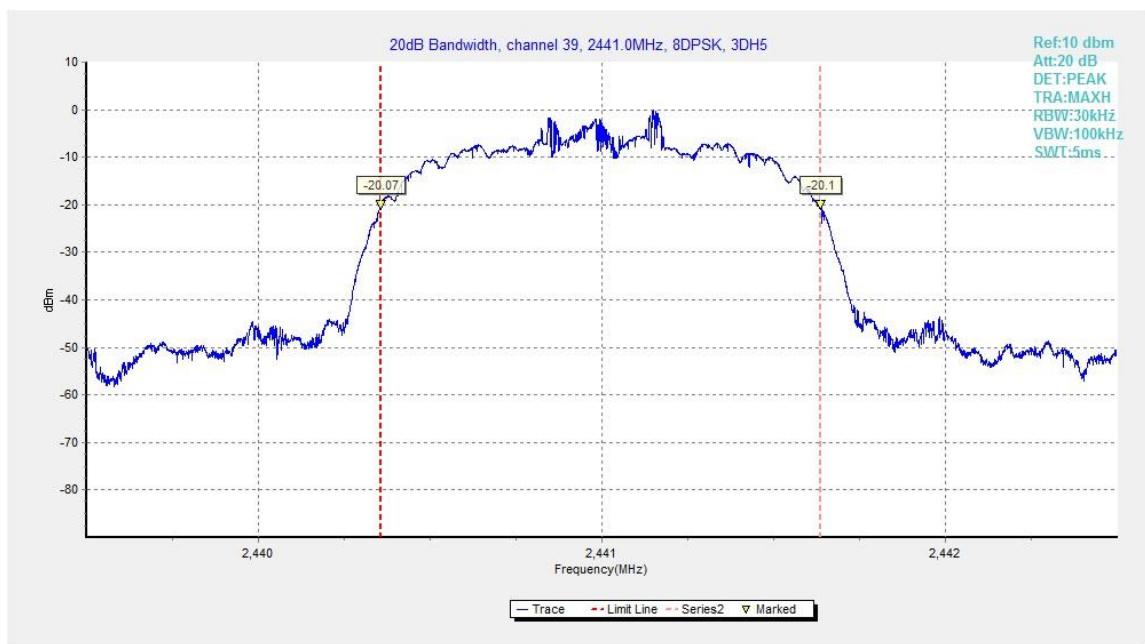


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

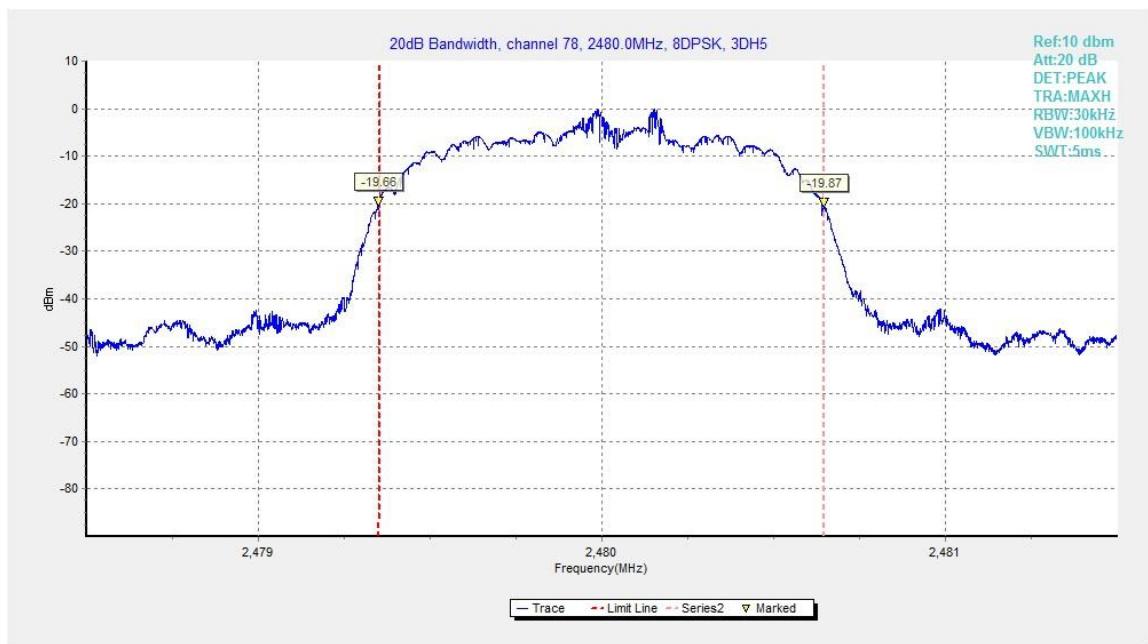


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

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	1138.50	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.92	990.75	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.93	1009.50	P

Conclusion: PASS

Test graphs as below:

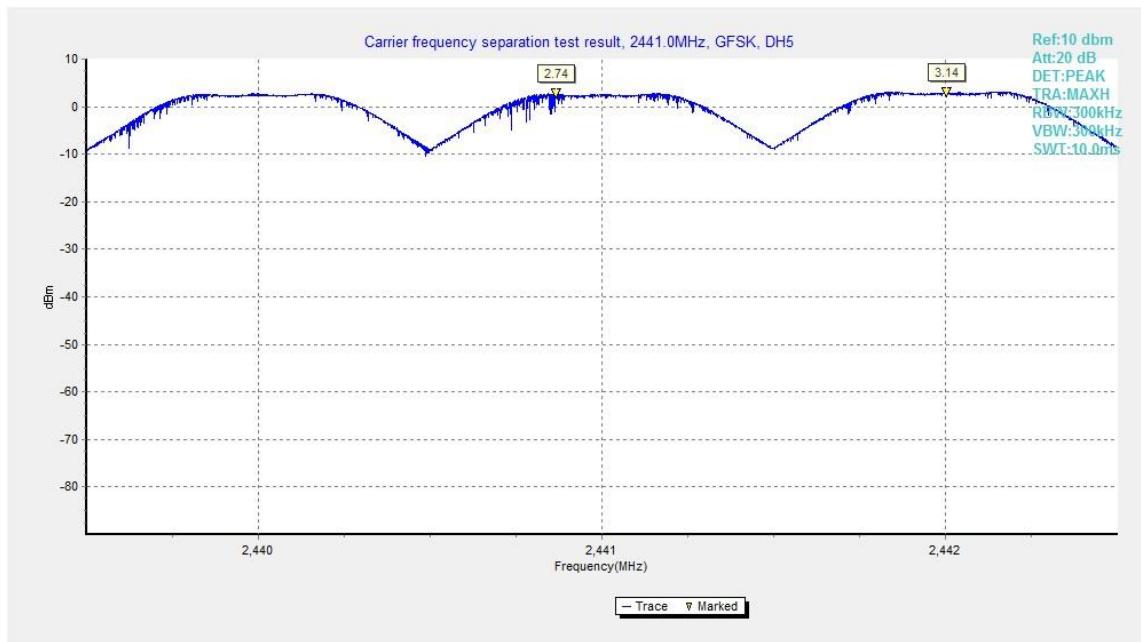


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

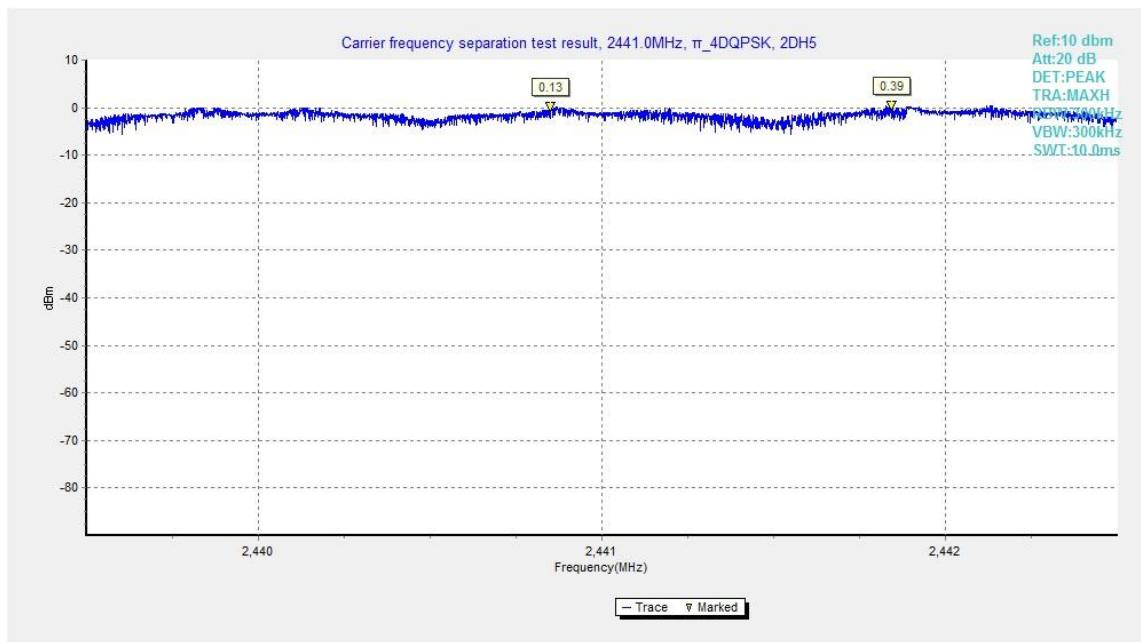


Fig.92. Carrier frequency separation measurement: $\pi/4$ DQPSK, Channel 39

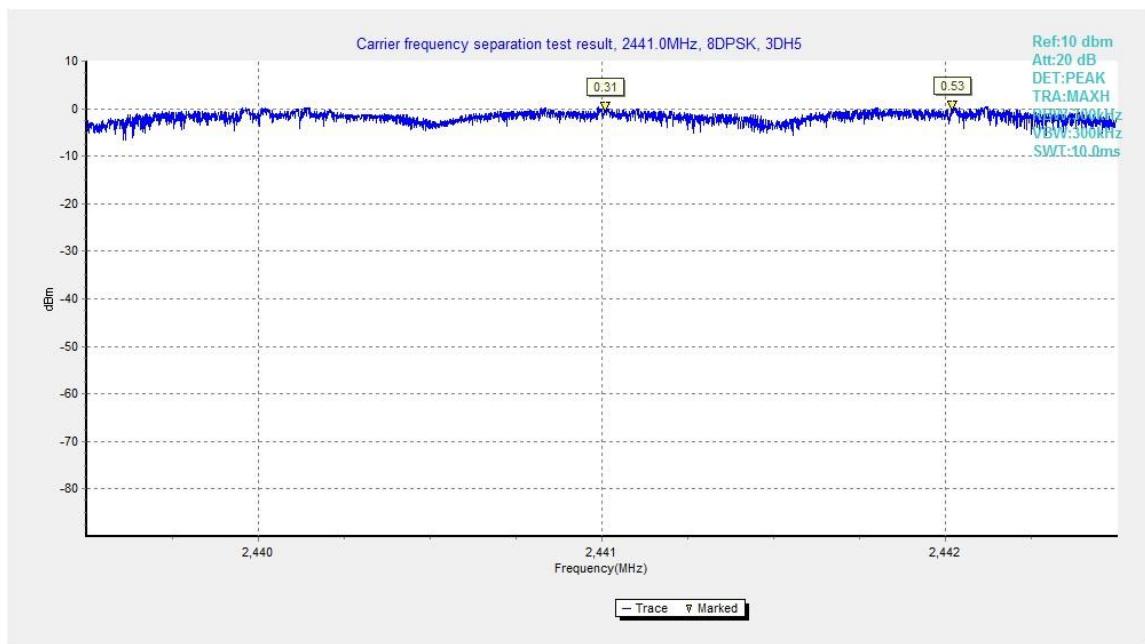


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

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	
40~78	Fig.95	P

For π/4 DQPSK

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

For 8DPSK

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

Conclusion: PASS

Test graphs as below:

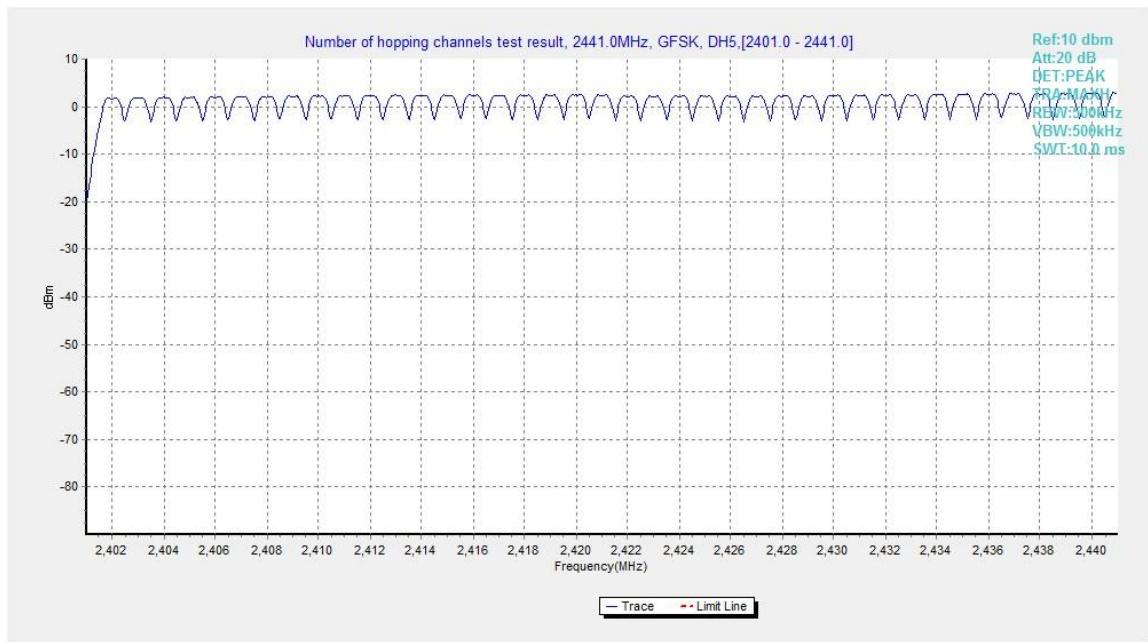


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

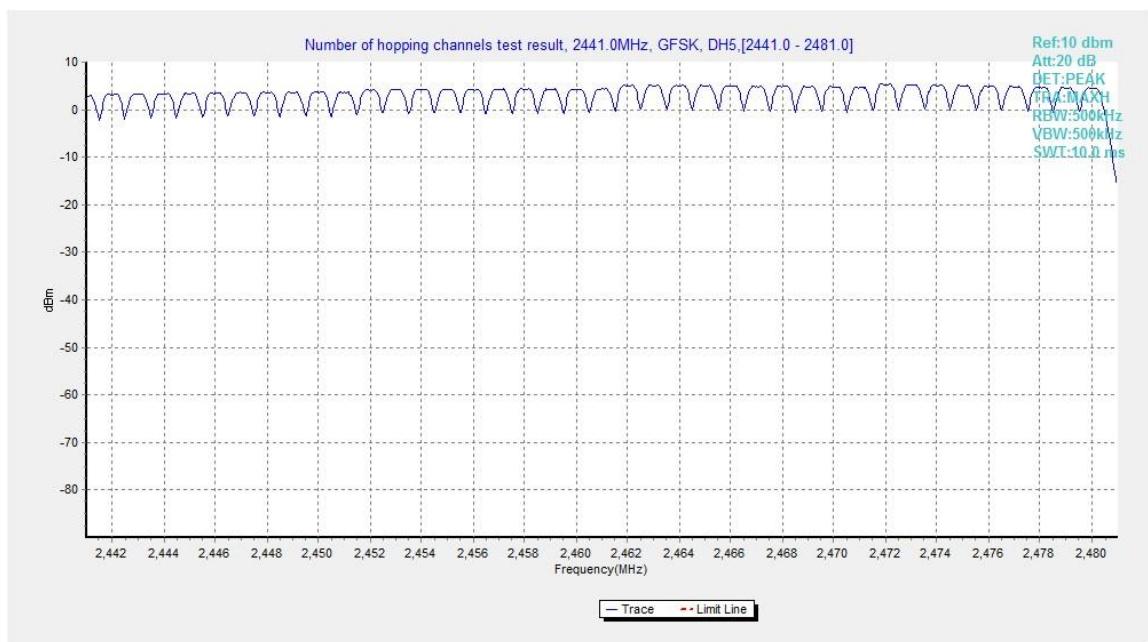


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

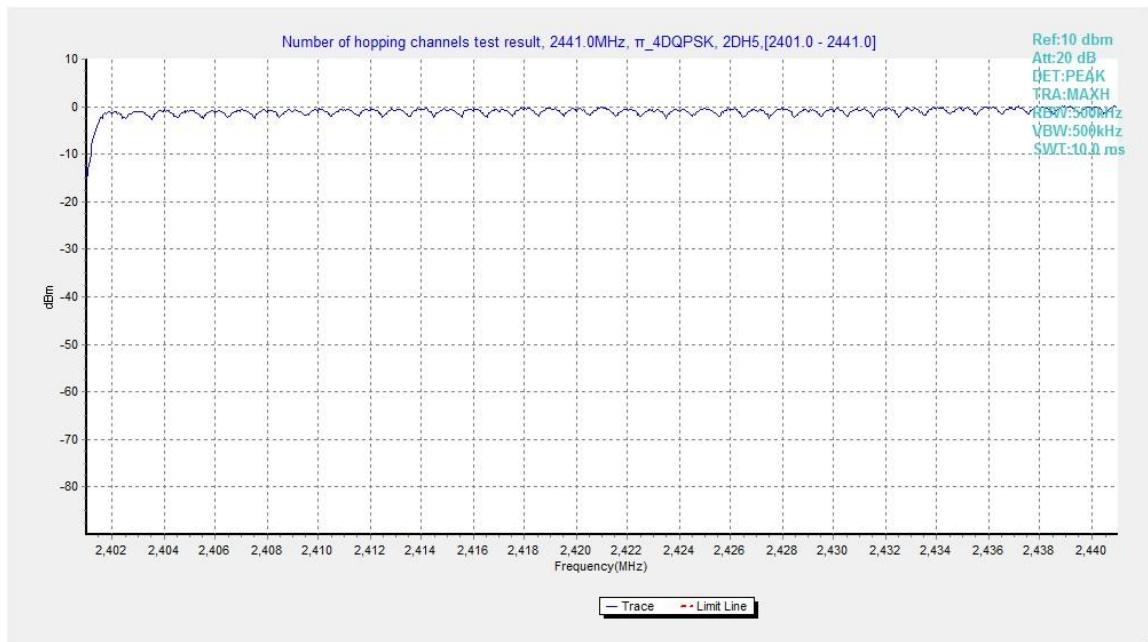


Fig.96. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 0 - 39

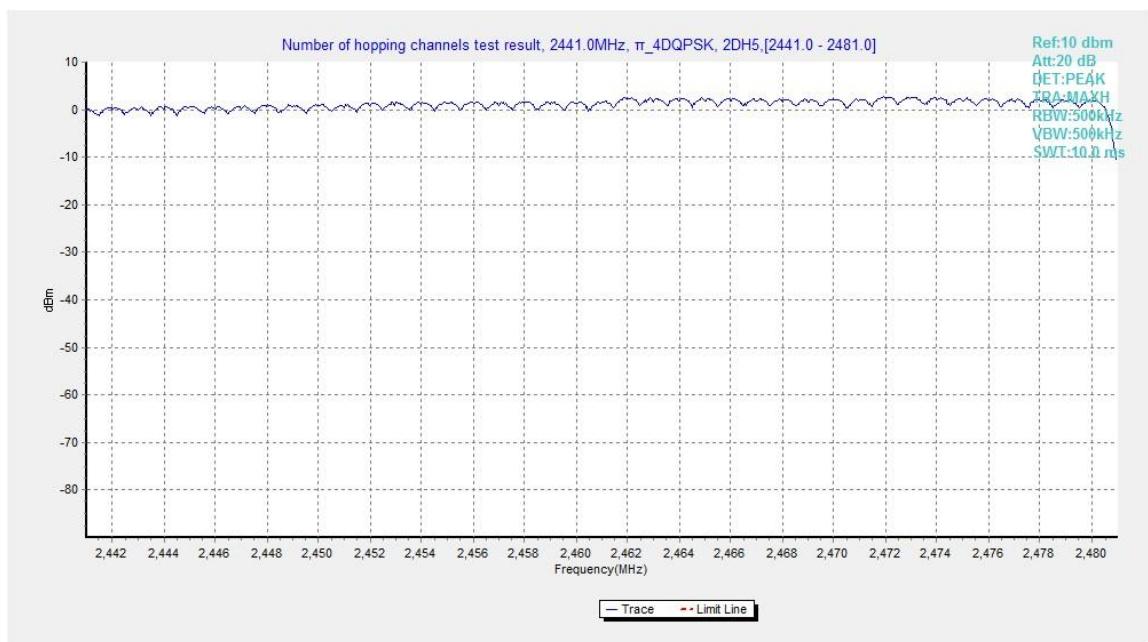


Fig.97. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 40 - 78

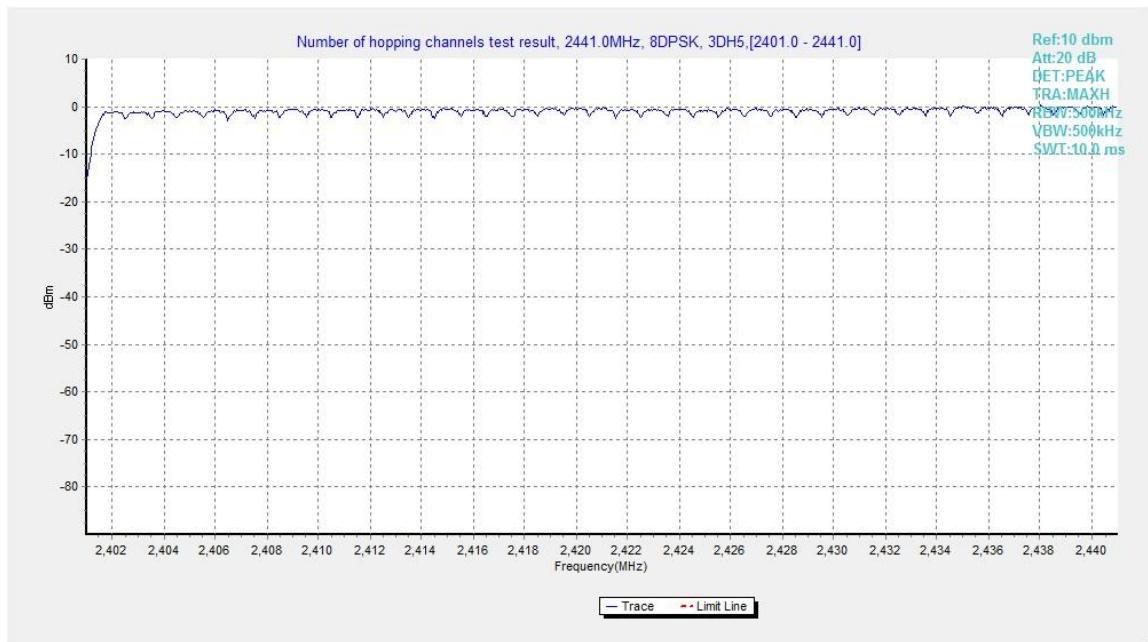


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

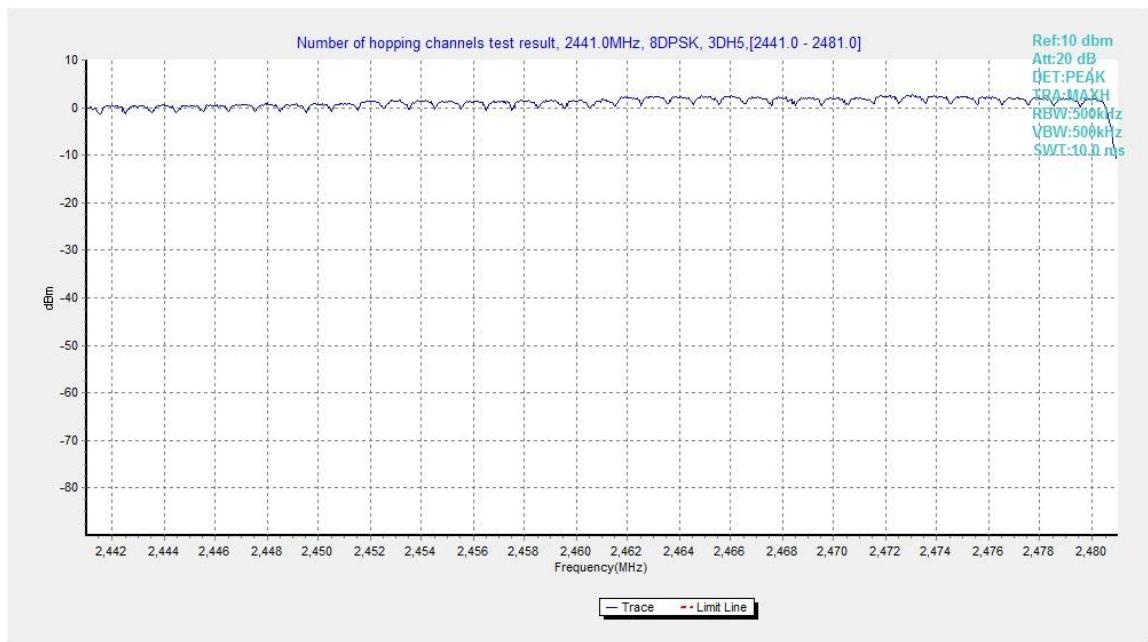


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

A.10. AC Powerline Conducted Emission

Method of Measurement: See ANSI C63.10-clause 6.2

1. the one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
2. If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
3. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
4. If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.
5. If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements.³⁶ Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

Test Condition

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Conclusion
0.15 to 0.5	66 to 56	P
0.5 to 5	56	
5 to 30	60	

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Bluetooth (Average Limit)

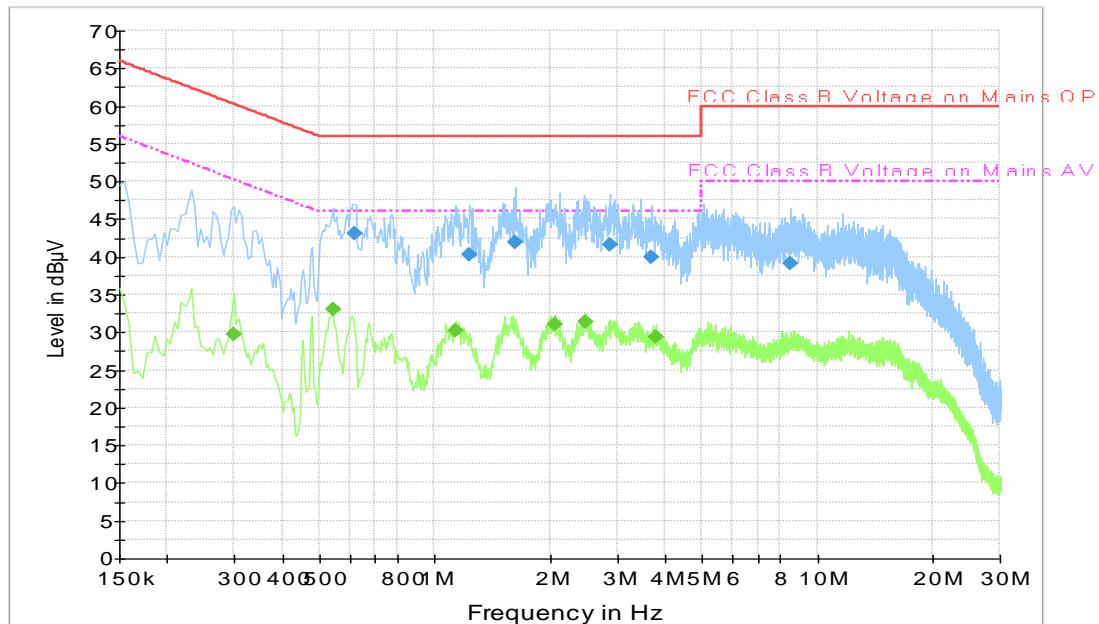
Frequency range (MHz)	Average Limit (dB μ V)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10

Conclusion: PASS

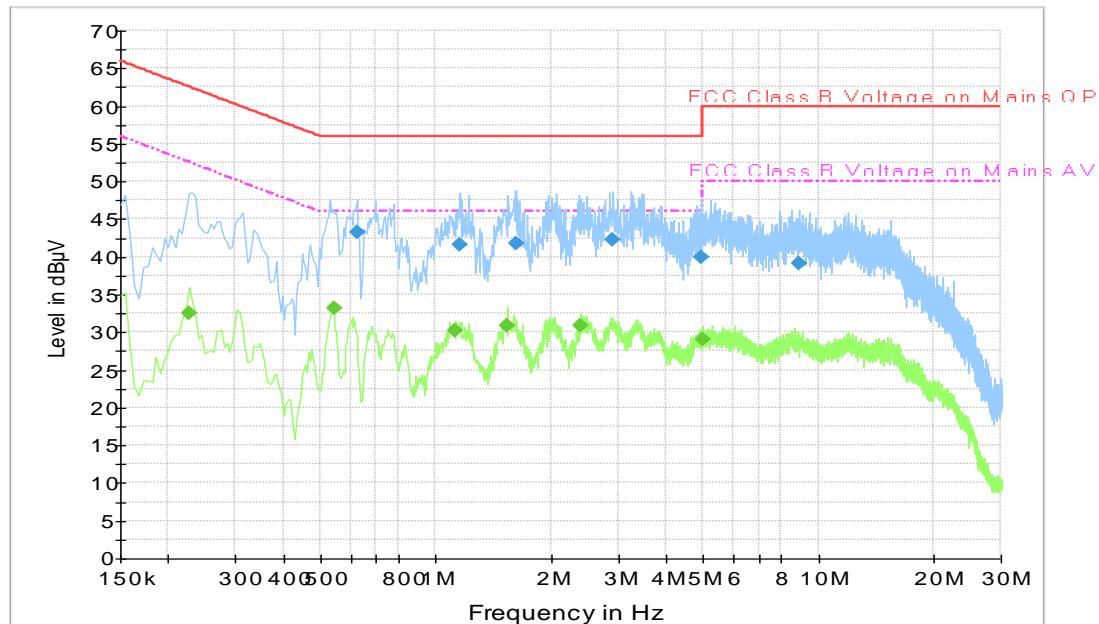
Test graphs as below:

Traffic:

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.618000	43.1	2000.0	9.000	On	L1	19.8	12.9	56.0
1.234500	40.3	2000.0	9.000	On	L1	19.6	15.7	56.0
1.626000	41.9	2000.0	9.000	On	L1	19.7	14.1	56.0
2.863500	41.6	2000.0	9.000	On	L1	19.7	14.4	56.0
3.673500	40.0	2000.0	9.000	On	L1	19.6	16.0	56.0
8.475000	39.2	2000.0	9.000	On	L1	19.8	20.8	60.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.298500	29.8	2000.0	9.000	On	L1	19.8	20.5	50.3
0.541500	33.0	2000.0	9.000	On	L1	19.9	13.0	46.0
1.140000	30.1	2000.0	9.000	On	L1	19.6	15.9	46.0
2.067000	31.0	2000.0	9.000	On	L1	19.7	15.0	46.0
2.476500	31.3	2000.0	9.000	On	L1	19.7	14.7	46.0
3.781500	29.3	2000.0	9.000	On	L1	19.6	16.7	46.0

Idle:


Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.622500	43.3	2000.0	9.000	On	L1	19.8	12.7	56.0
1.153500	41.7	2000.0	9.000	On	L1	19.6	14.3	56.0
1.621500	41.8	2000.0	9.000	On	L1	19.7	14.2	56.0
2.913000	42.3	2000.0	9.000	On	L1	19.7	13.7	56.0
4.938000	40.0	2000.0	9.000	On	L1	19.6	16.0	56.0
8.907000	39.2	2000.0	9.000	On	L1	19.8	20.8	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.226500	32.5	2000.0	9.000	On	L1	19.8	20.1	52.6
0.541500	33.2	2000.0	9.000	On	L1	19.9	12.8	46.0
1.126500	30.3	2000.0	9.000	On	L1	19.6	15.7	46.0
1.540500	30.9	2000.0	9.000	On	L1	19.7	15.1	46.0
2.400000	30.9	2000.0	9.000	On	L1	19.7	15.1	46.0
4.969500	29.0	2000.0	9.000	On	L1	19.6	17.0	46.0



ANNEX E: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT

Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2017-08-22 through 2018-09-30

Effective Dates



For the National Voluntary Laboratory Accreditation Program

END OF REPORT