

Fig.54. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

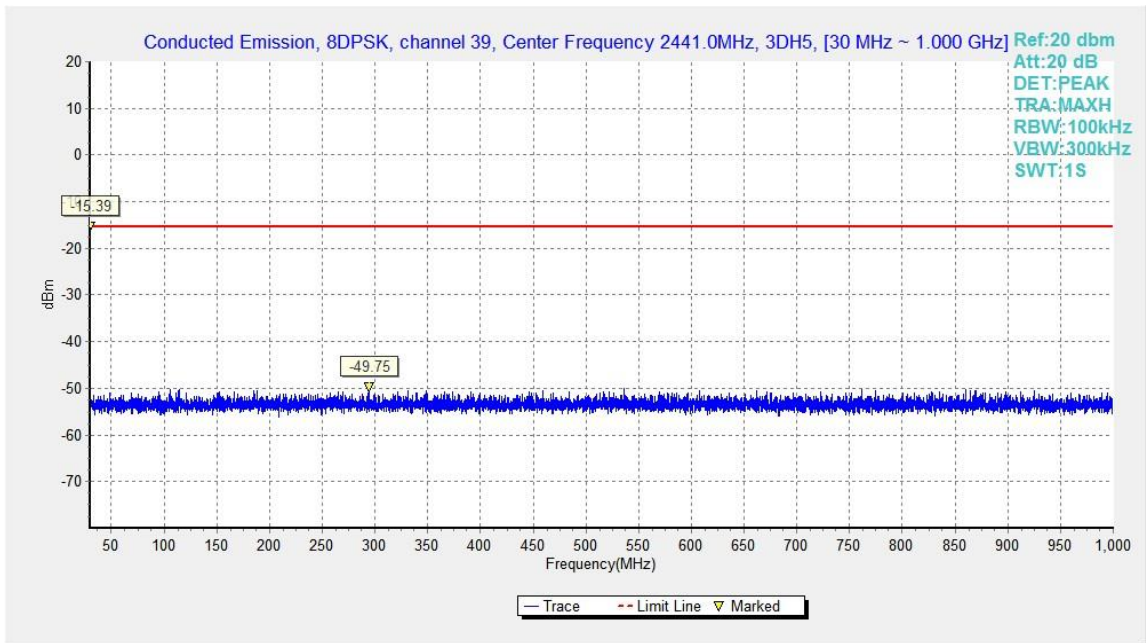


Fig.55. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz

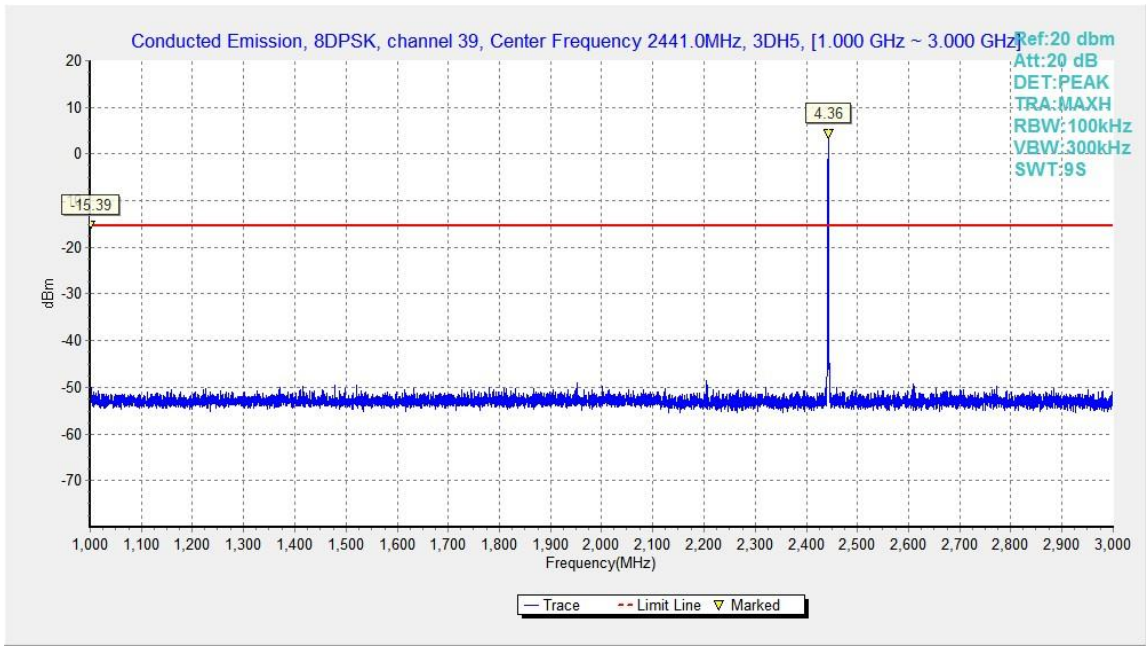


Fig.56. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz

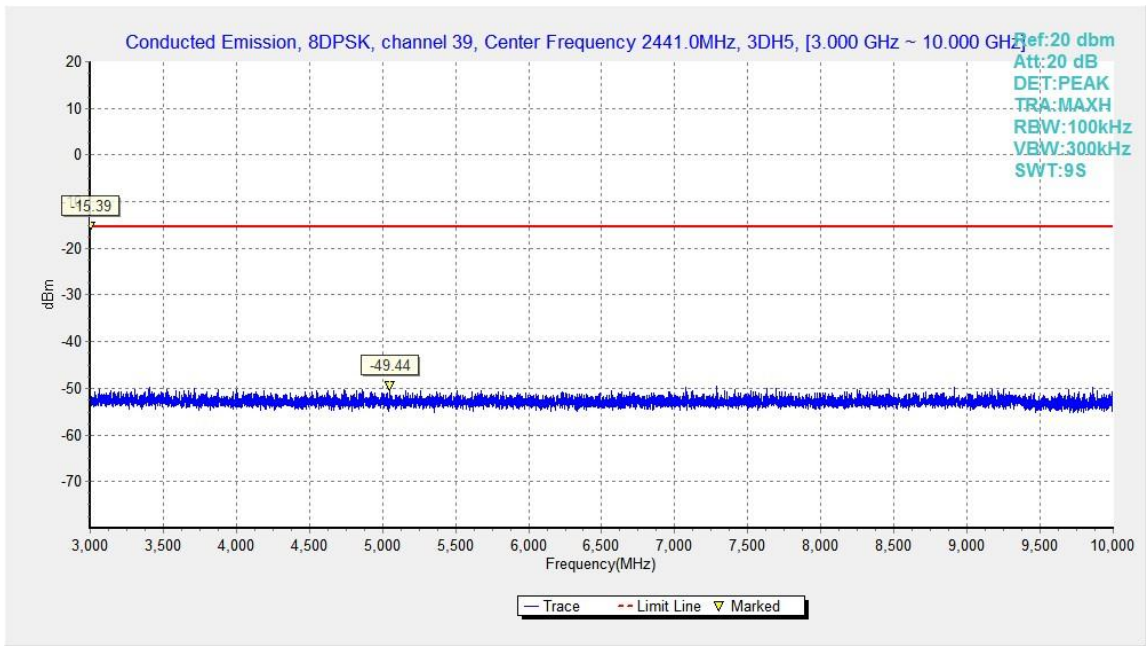


Fig.57. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

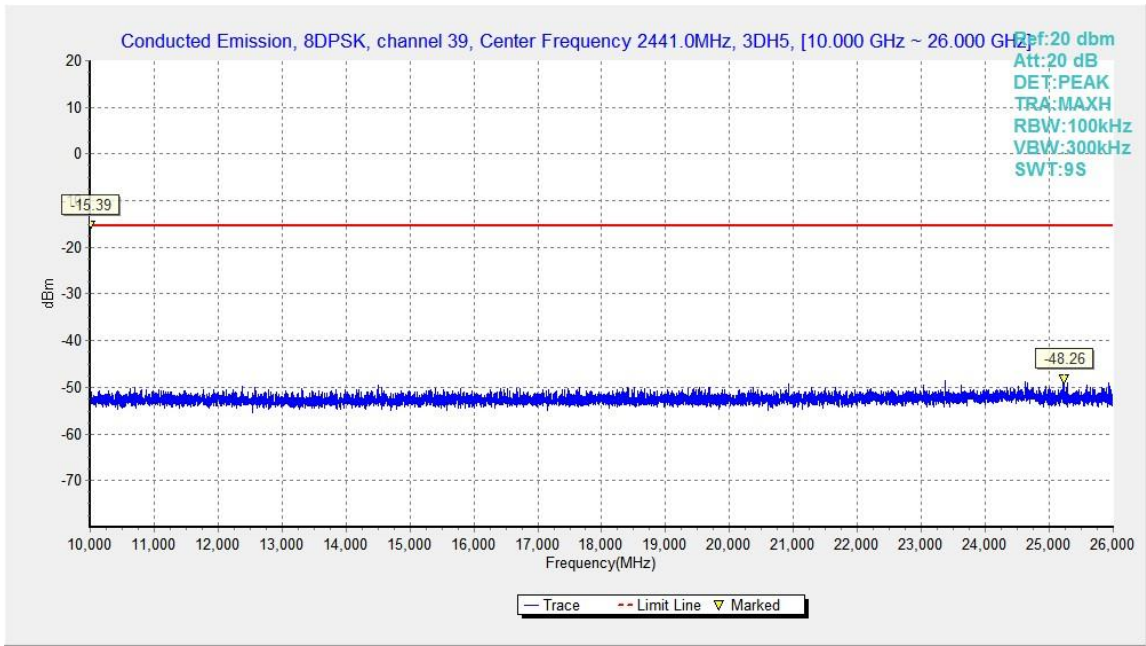


Fig.58. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

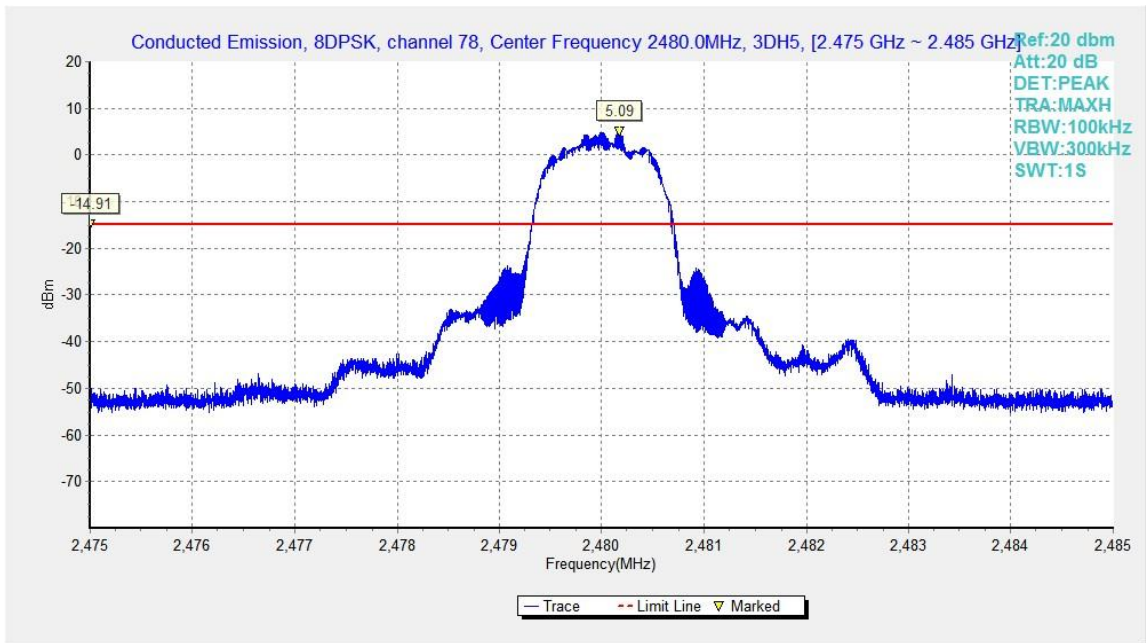


Fig.59. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

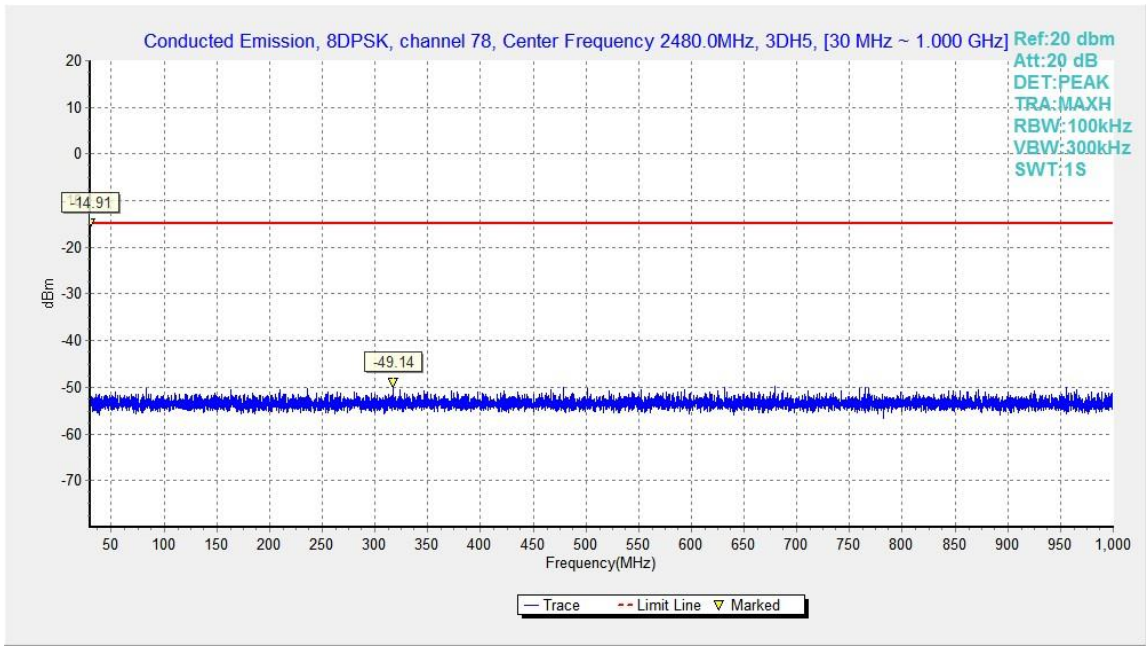


Fig.60. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

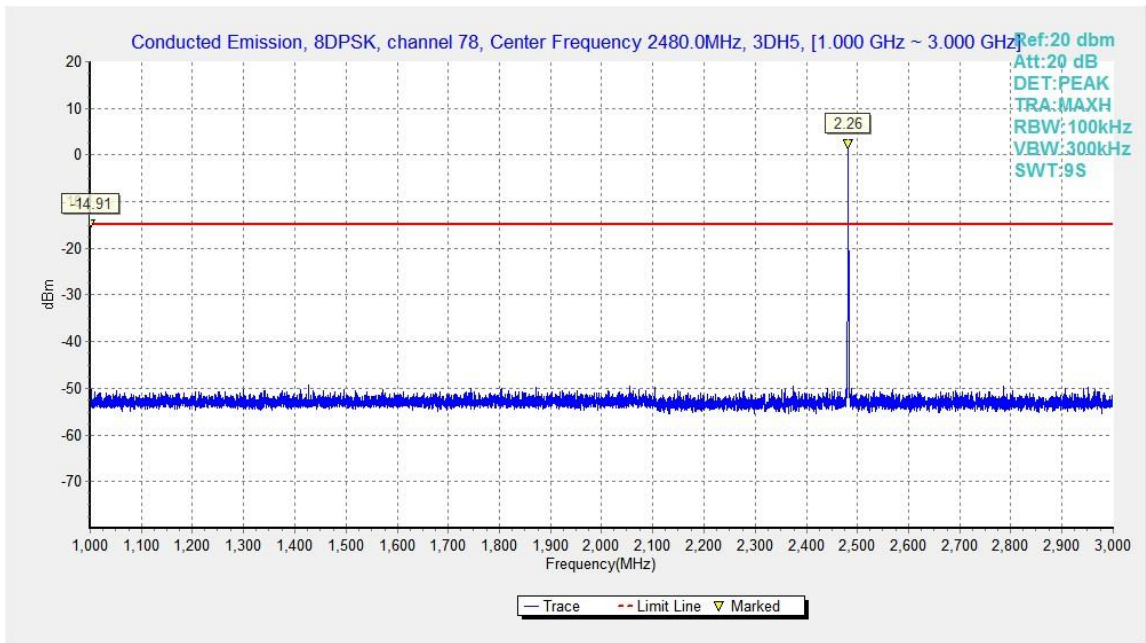


Fig.61. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

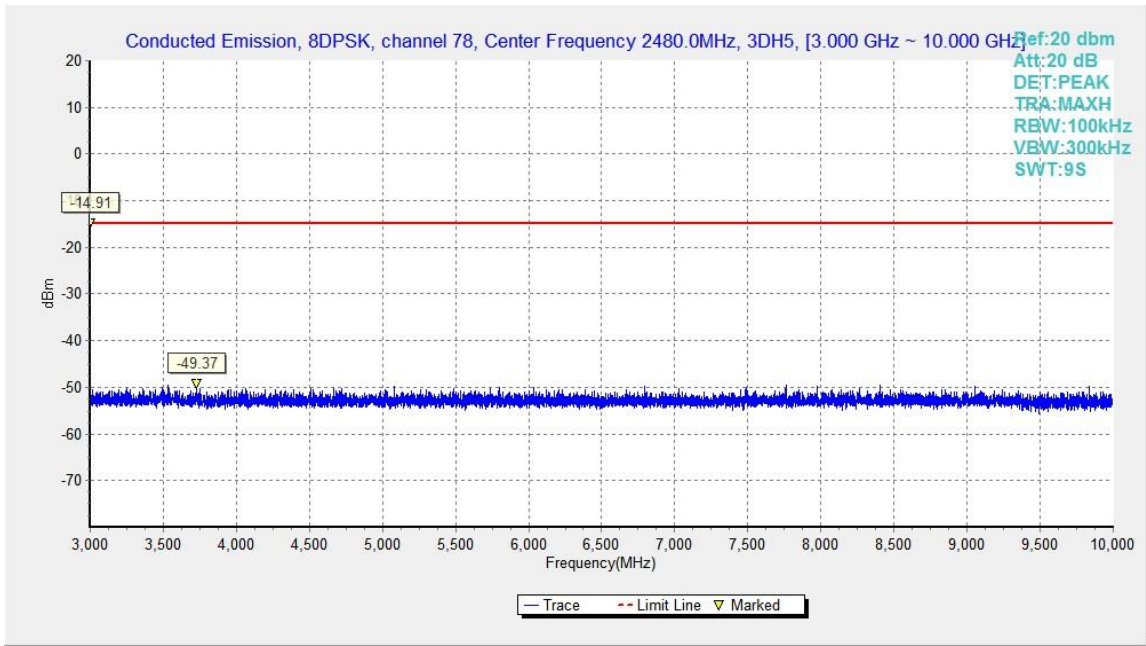


Fig.62. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

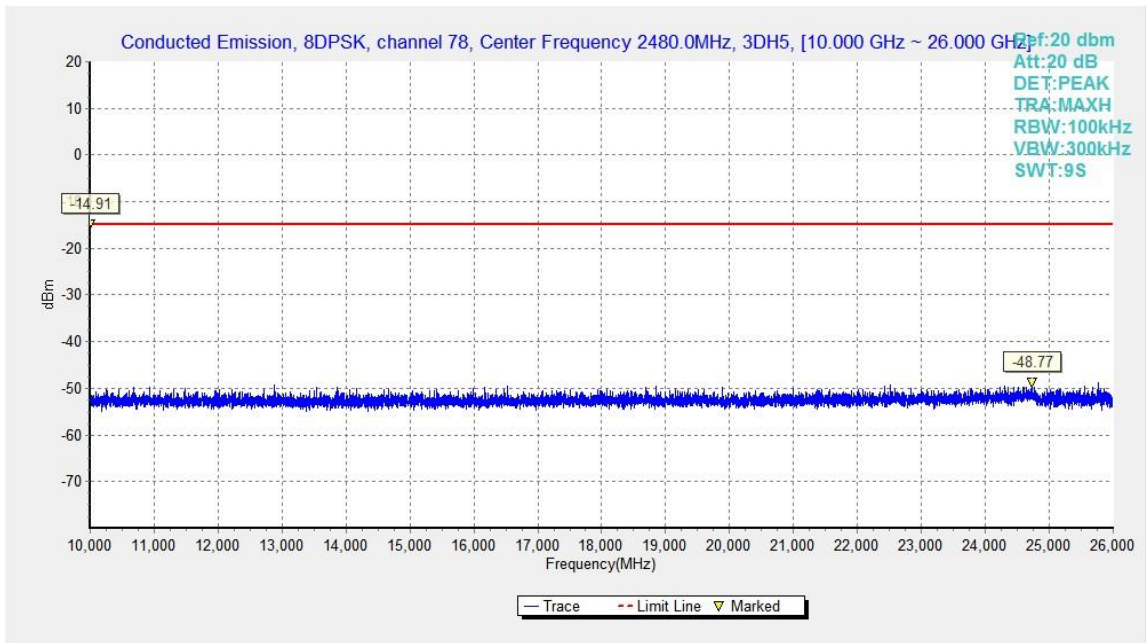


Fig.63. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

B.6. Transmitter Spurious Emission - Radiated

Method of Measurement: See ANSI C63.10-2013-clause 6.4 & 6.5 & 6.6

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

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 (MHz)	Field strength(μ V/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength (μ V/m)	Field strength (dBuV/m)	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m

The EUT and transmitting antenna shall be centered on the turntable.

Note:

1. A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, 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= $P_{Mea}+A_{Rpl}= P_{Mea}+Cable Loss+Antenna Factor$

2. The range of evaluated frequency is from 9 kHz to 26GHz. Measurement value showed here only up to 6 maximum emissions noted.

Peak Measurement results
GFSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2376.300	60.99	2.62	27.65	30.72	74.00	13.01	V
2386.090	60.39	2.62	27.66	30.11	74.00	13.61	H
4804.219	41.72	-37.55	32.01	47.26	74.00	32.28	V
7206.094	43.21	-36.97	35.70	44.47	74.00	30.79	H
9607.969	45.23	-36.06	37.80	43.49	74.00	28.77	V
12009.844	47.38	-34.85	39.09	43.14	74.00	26.62	H

GFSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2136.875	38.27	-40.93	27.56	51.64	74.00	35.73	V
2800.000	39.44	-39.92	28.51	50.85	74.00	34.56	H
4882.031	40.79	-37.86	32.21	46.45	74.00	33.21	H
7322.812	43.25	-37.05	35.98	44.32	74.00	30.75	V
9764.062	45.50	-35.31	37.80	43.02	74.00	28.50	V
12204.844	48.40	-34.72	38.98	44.15	74.00	25.60	V

GFSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2487.556	60.81	2.68	27.70	30.44	74.00	13.19	H
2492.812	60.72	2.72	27.70	30.30	74.00	13.28	H
4959.844	39.50	-38.13	32.40	45.23	74.00	34.50	H
7440.000	44.19	-36.86	36.26	44.79	74.00	29.81	H
9920.156	45.27	-35.82	37.80	43.29	74.00	28.73	V
12399.844	47.48	-34.57	38.86	43.19	74.00	26.52	H

$\pi/4$ DQPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2383.168	60.29	2.62	27.66	30.01	74.00	13.71	V
2386.265	60.67	2.62	27.66	30.39	74.00	13.33	V
4804.219	41.13	-37.55	32.01	46.68	74.00	32.87	H
7206.094	43.88	-36.97	35.70	45.14	74.00	30.12	V
9607.969	45.20	-36.06	37.80	43.46	74.00	28.80	V
12009.844	46.99	-34.85	39.09	42.75	74.00	27.01	V

 $\pi/4$ DQPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2227.125	38.12	-40.35	27.60	50.87	74.00	35.88	H
2783.125	39.77	-39.91	28.46	51.21	74.00	34.23	V
4882.031	40.72	-37.86	32.21	46.37	74.00	33.28	H
7322.812	43.40	-37.05	35.98	44.47	74.00	30.60	V
9764.062	46.44	-35.31	37.80	43.95	74.00	27.56	H
12204.844	48.40	-34.72	38.98	44.15	74.00	25.60	V

 $\pi/4$ DQPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2483.994	60.08	2.65	27.69	29.73	74.00	13.92	H
2484.887	60.32	2.66	27.69	29.97	74.00	13.68	H
4959.844	41.02	-38.13	32.40	46.75	74.00	32.98	H
7440.000	44.45	-36.86	36.26	45.05	74.00	29.55	V
9920.156	46.37	-35.82	37.80	44.39	74.00	27.63	H
12399.844	46.59	-34.57	38.86	42.30	74.00	27.41	H

8DPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2382.782	61.07	2.62	27.66	30.79	74.00	12.93	V
2386.948	60.88	2.62	27.66	30.60	74.00	13.12	V
4804.219	40.76	-37.55	32.01	46.31	74.00	33.24	V
7206.094	43.16	-36.97	35.70	44.42	74.00	30.84	V
9607.969	44.79	-36.06	37.80	43.05	74.00	29.21	H
12009.844	47.47	-34.85	39.09	43.23	74.00	26.53	H

8DPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2367.875	38.86	-39.57	27.65	50.78	74.00	35.14	H
2517.375	39.11	-39.73	27.75	51.09	74.00	34.89	V
4882.031	41.46	-37.86	32.21	47.11	74.00	32.54	H
7322.812	42.36	-37.05	35.98	43.43	74.00	31.64	H
9764.062	47.62	-35.31	37.80	45.13	74.00	26.38	V
12204.844	47.78	-34.72	38.98	43.53	74.00	26.22	H

8DPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2485.062	60.95	2.66	27.69	30.60	74.00	13.05	V
2487.875	61.09	2.68	27.70	30.71	74.00	12.91	V
4959.844	40.38	-38.13	32.40	46.11	74.00	33.62	V
7440.000	43.33	-36.86	36.26	43.93	74.00	30.67	V
9920.156	45.67	-35.82	37.80	43.69	74.00	28.33	V
12399.844	48.16	-34.57	38.86	43.87	74.00	25.84	H

Average Measurement results
GFSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2434.975	45.93	2.63	27.68	15.62	54.00	8.07	H
2446.150	46.10	2.63	27.68	15.79	54.00	7.90	V
4803.750	33.37	-37.55	32.01	38.92	54.00	20.63	V
7206.250	31.25	-36.97	35.71	32.51	54.00	22.75	H
9608.125	33.47	-36.06	37.80	31.73	54.00	20.53	H
12010.000	35.58	-34.85	39.09	31.34	54.00	18.42	V

GFSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2434.625	45.96	2.63	27.68	15.65	54.00	8.04	H
2442.575	46.05	2.63	27.68	15.74	54.00	7.95	H
4881.875	31.45	-37.86	32.21	37.10	54.00	22.55	H
7323.125	31.39	-37.05	35.98	32.46	54.00	22.61	H
9763.750	34.46	-35.31	37.80	31.98	54.00	19.54	V
12205.000	36.51	-34.72	38.98	32.26	54.00	17.49	V

GFSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2485.075	46.03	2.66	27.69	15.68	54.00	7.97	V
2487.075	46.01	2.67	27.70	15.64	54.00	7.99	V
4960.000	30.51	-38.13	32.40	36.24	54.00	23.49	H
7440.000	32.46	-36.86	36.26	33.06	54.00	21.54	V
9920.000	34.05	-35.82	37.80	32.07	54.00	19.95	H
12400.000	35.62	-34.57	38.86	31.33	54.00	18.38	V

$\pi/4$ DQPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2387.650	45.86	2.62	27.66	15.58	54.00	8.14	V
2388.750	45.83	2.62	27.66	15.55	54.00	8.17	H
4803.750	31.60	-37.55	32.01	37.15	54.00	22.40	H
7206.250	31.46	-36.97	35.71	32.72	54.00	22.54	H
9608.125	33.89	-36.06	37.80	32.15	54.00	20.11	V
12010.000	35.64	-34.85	39.09	31.40	54.00	18.36	V

 $\pi/4$ DQPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2434.975	45.98	2.63	27.68	15.67	54.00	8.02	V
2448.400	45.96	2.63	27.68	15.64	54.00	8.04	V
4881.875	29.89	-37.86	32.21	35.55	54.00	24.11	H
7323.125	31.40	-37.05	35.98	32.47	54.00	22.60	V
9763.750	34.57	-35.31	37.80	32.09	54.00	19.43	H
12205.000	36.43	-34.72	38.98	32.18	54.00	17.57	H

 $\pi/4$ DQPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2487.725	46.06	2.68	27.70	15.69	54.00	7.94	V
2490.375	46.12	2.70	27.70	15.73	54.00	7.88	V
4960.000	31.10	-38.13	32.40	36.83	54.00	22.90	V
7440.000	32.34	-36.86	36.26	32.94	54.00	21.66	V
9920.000	34.42	-35.82	37.80	32.43	54.00	19.58	H
12400.000	35.85	-34.57	38.86	31.56	54.00	18.15	H

8DPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2388.000	45.91	2.62	27.66	15.63	54.00	8.09	V
2389.325	45.89	2.62	27.66	15.61	54.00	8.11	H
4803.750	30.51	-37.55	32.01	36.06	54.00	23.49	H
7206.250	31.60	-36.97	35.71	32.86	54.00	22.40	V
9608.125	33.76	-36.06	37.80	32.02	54.00	20.24	H
12010.000	35.48	-34.85	39.09	31.24	54.00	18.52	H

8DPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2437.650	45.96	2.63	27.68	15.65	54.00	8.04	V
2446.050	45.95	2.63	27.68	15.63	54.00	8.05	V
4881.875	30.00	-37.86	32.21	35.66	54.00	24.00	V
7323.125	31.38	-37.05	35.98	32.45	54.00	22.62	V
9763.750	34.70	-35.31	37.80	32.21	54.00	19.30	H
12205.000	36.51	-34.72	38.98	32.25	54.00	17.49	H

8DPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
2483.525	46.03	2.64	27.69	15.69	54.00	7.97	V
2484.440	46.09	2.65	27.69	15.74	54.00	7.91	V
4960.000	30.26	-38.13	32.40	35.99	54.00	23.74	H
7440.000	32.37	-36.86	36.26	32.97	54.00	21.63	H
9920.000	34.19	-35.82	37.80	32.21	54.00	19.81	V
12400.000	35.86	-34.57	38.86	31.57	54.00	18.14	H

Conclusion: Pass

B.7. 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	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
		Fig.	Value	Fig.	Count		
39	DH1	Fig.64	0.41	Fig.65	317	129.97	P
	DH3	Fig.66	1.66	Fig.67	114	189.24	P
	DH5	Fig.68	2.91	Fig.69	56	162.96	P

For $\pi/4$ DQPSK

Channel	Packet	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
		Fig.	Value	Fig.	Count		
39	2DH1	Fig.70	0.40	Fig.71	320	128	P
	2DH3	Fig.72	1.65	Fig.73	112	184.8	P
	2DH5	Fig.74	2.90	Fig.75	68	197.2	P

For 8DPSK

Channel	Packet	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
39	3DH1	Fig.76	0.40	Fig.77	319	127.6	P
	3DH3	Fig.78	1.65	Fig.79	110	181.5	P
	3DH5	Fig.80	2.90	Fig.81	71	205.9	P

Conclusion: PASS

Test graphs as below:

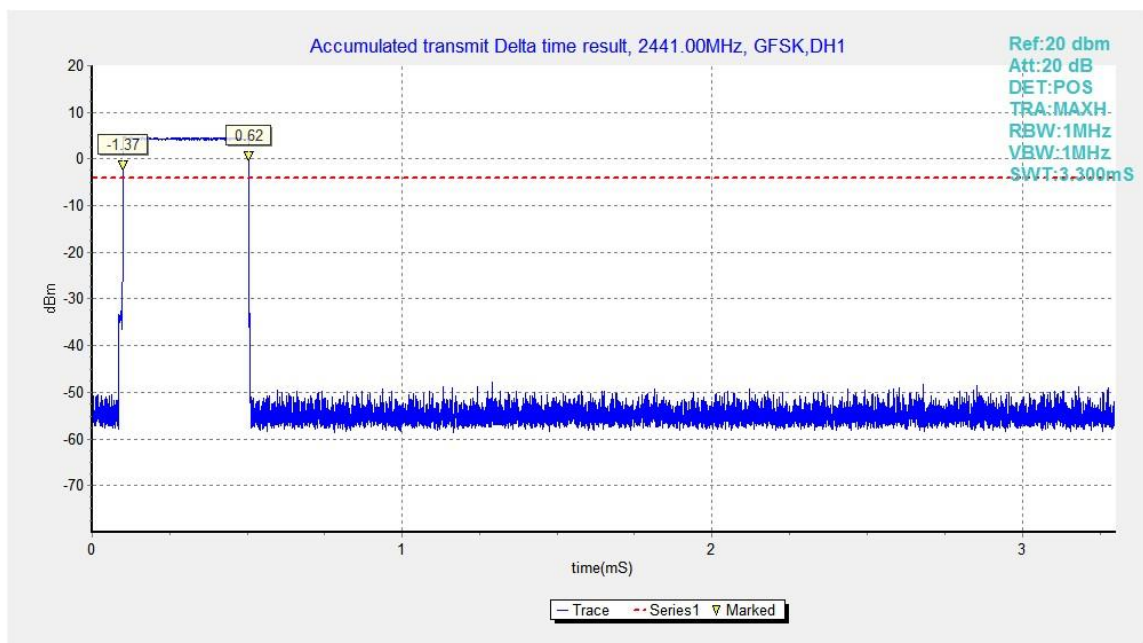


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

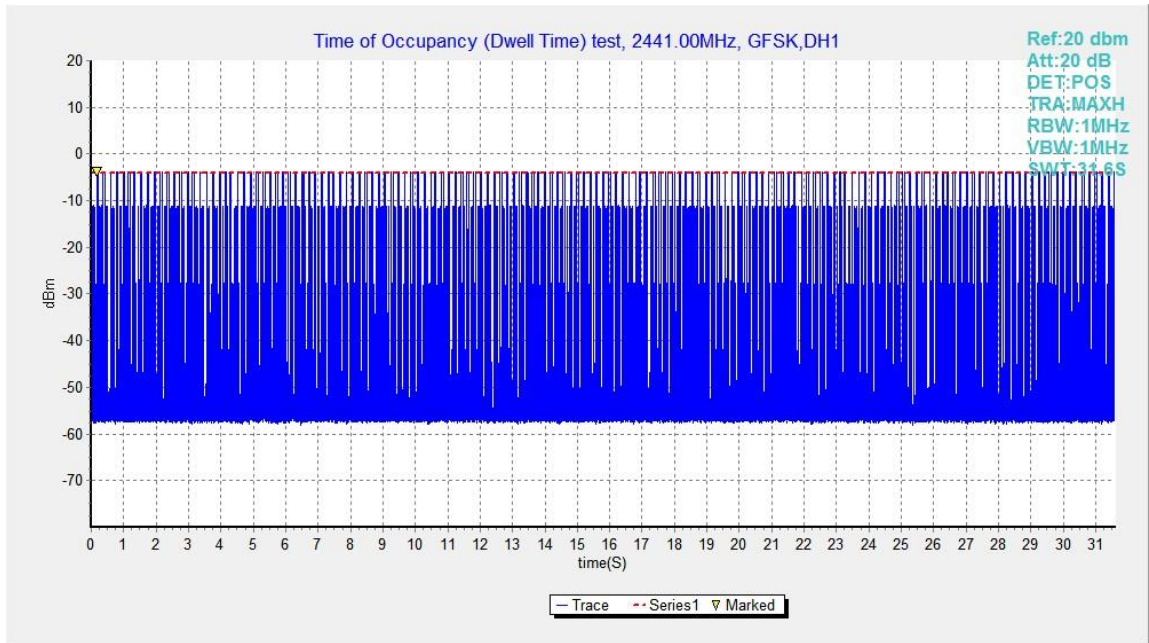


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

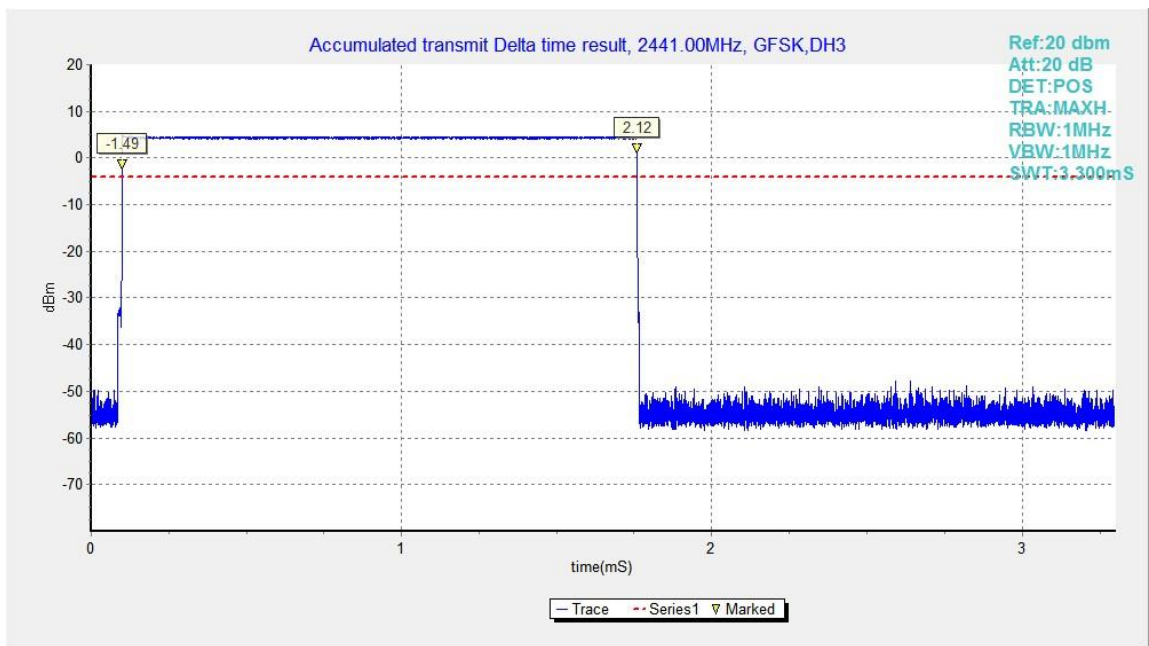


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

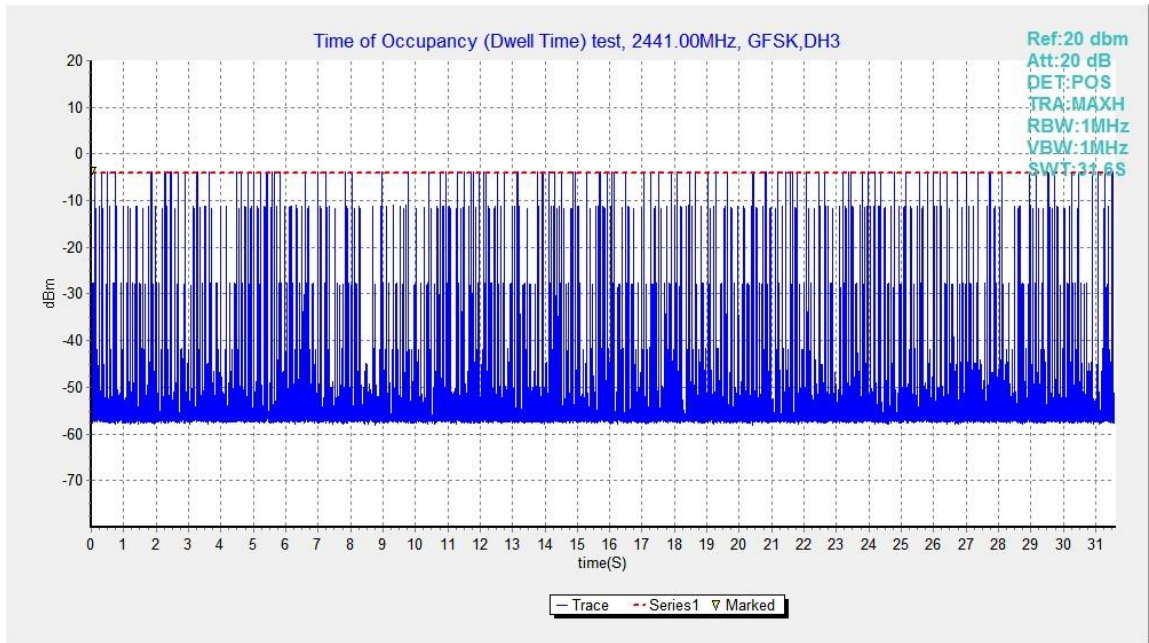


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

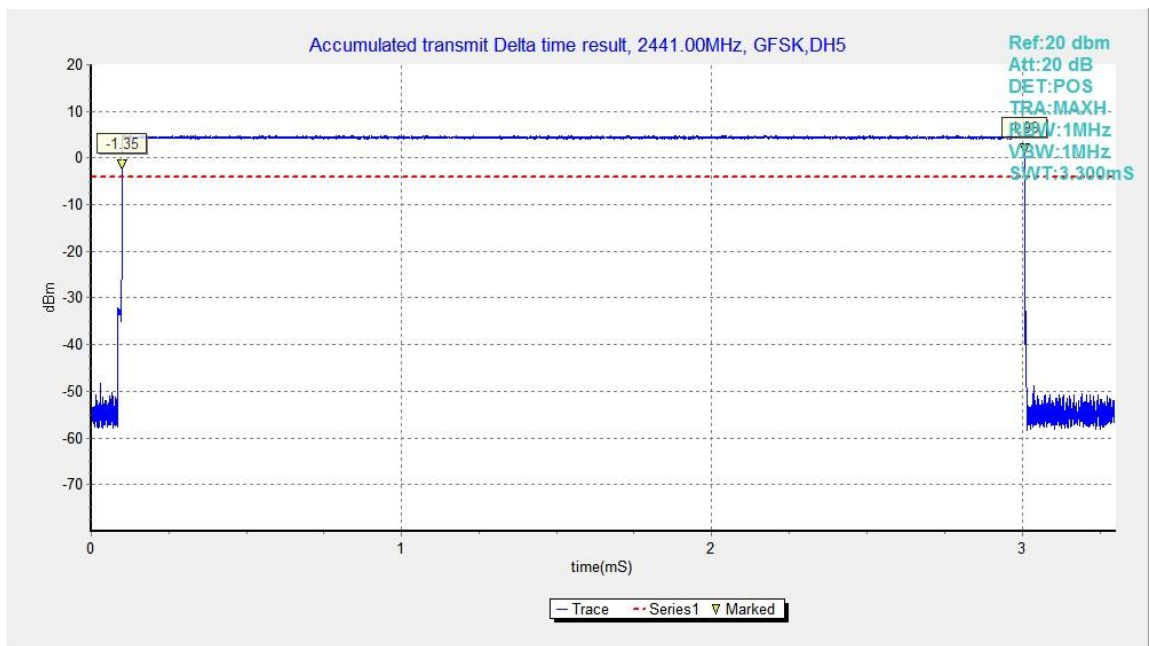


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

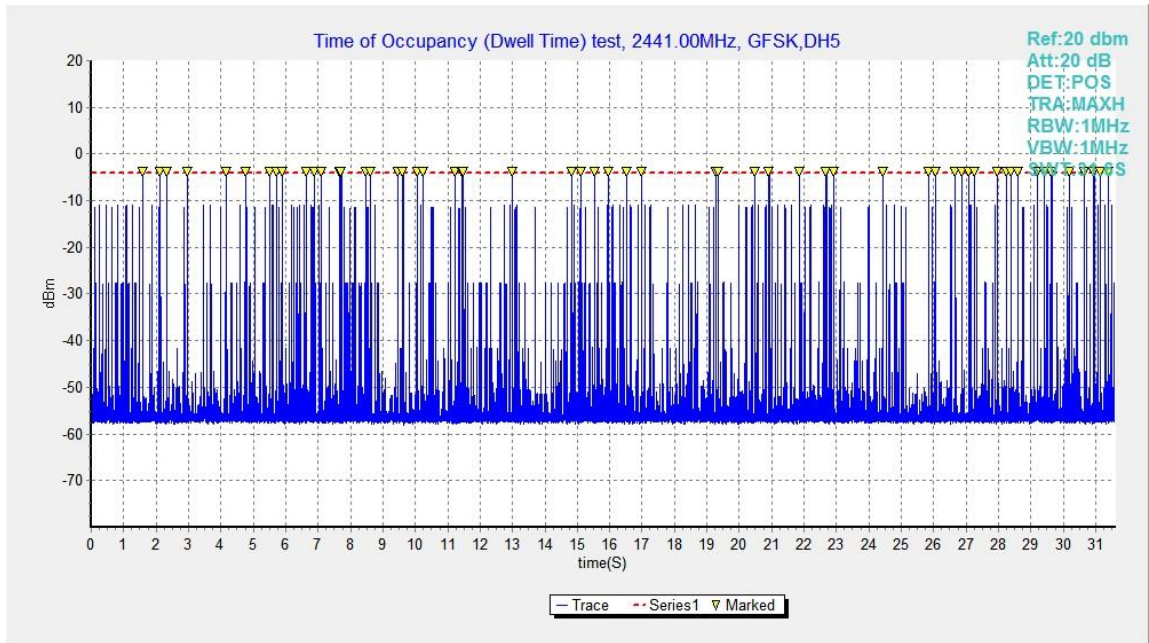


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

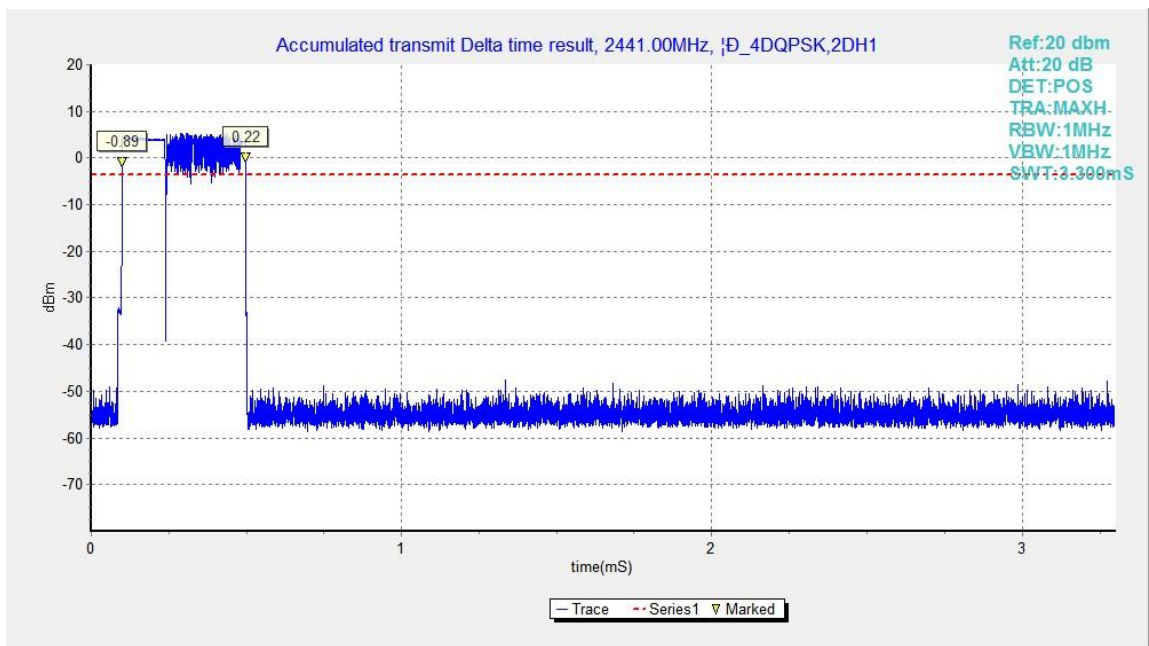


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

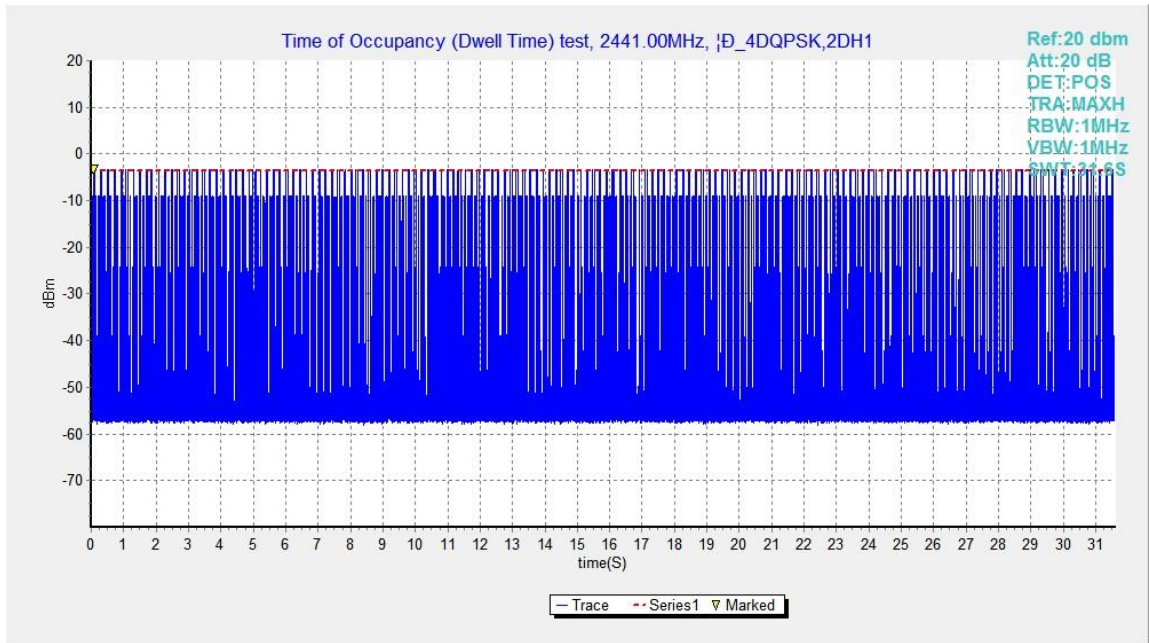


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

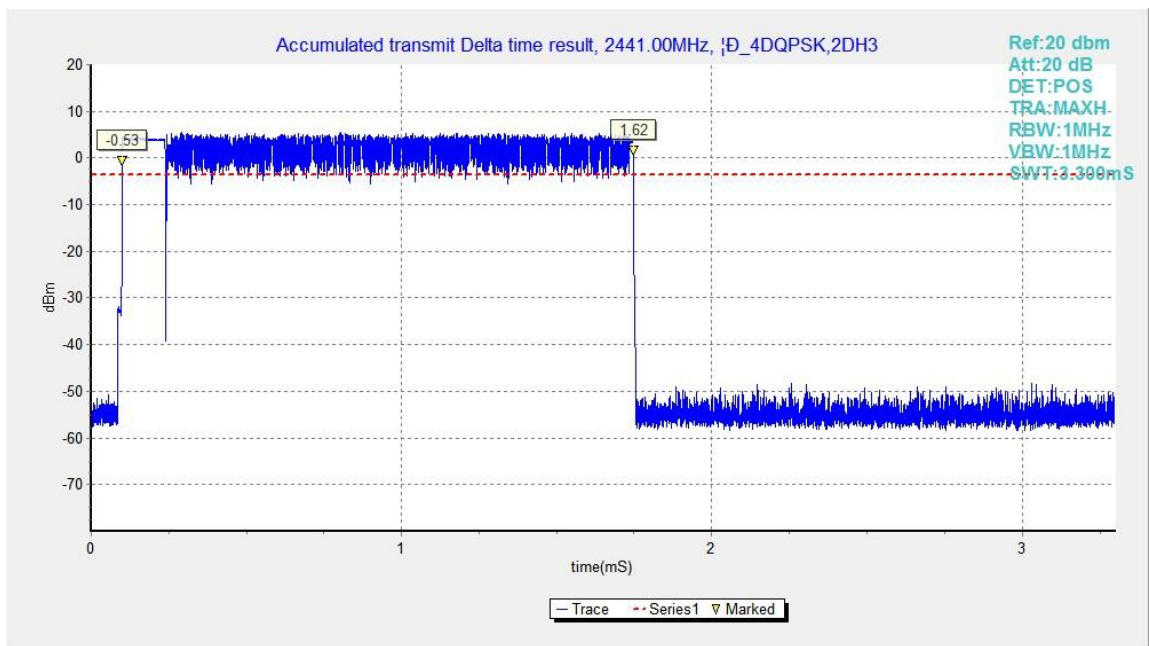


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

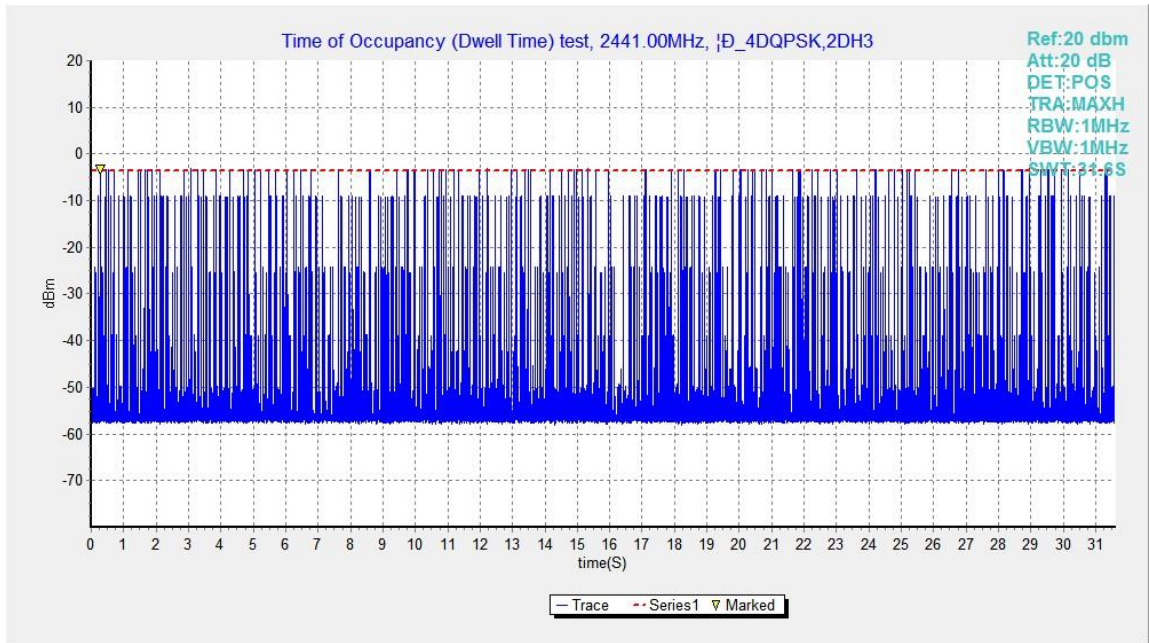


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

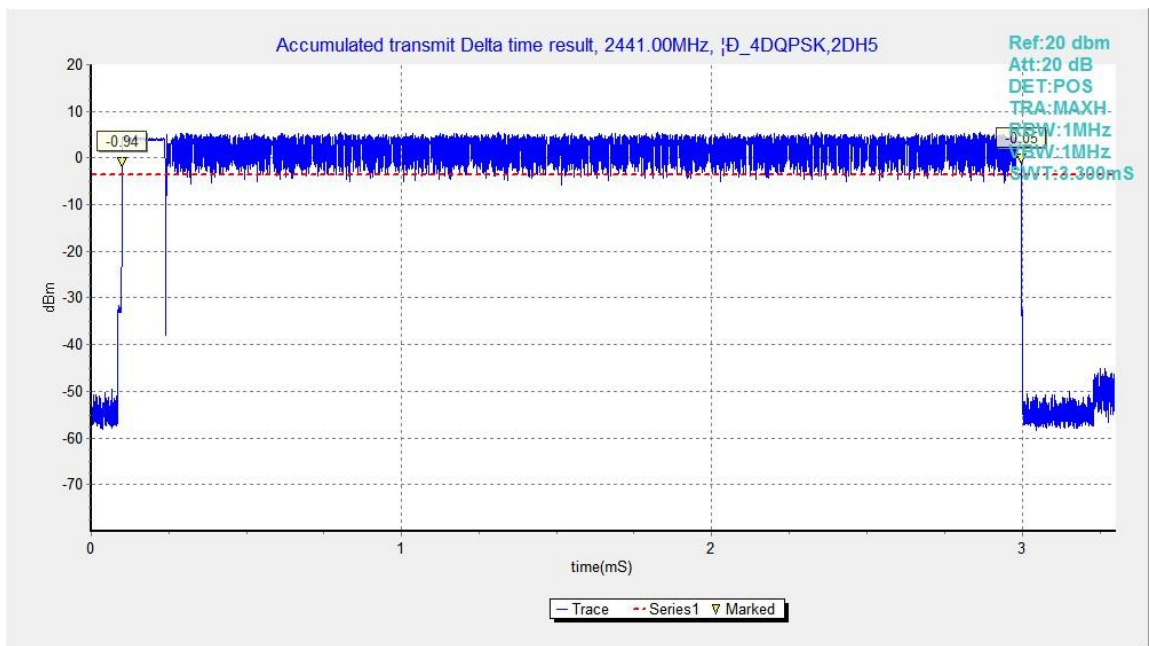


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

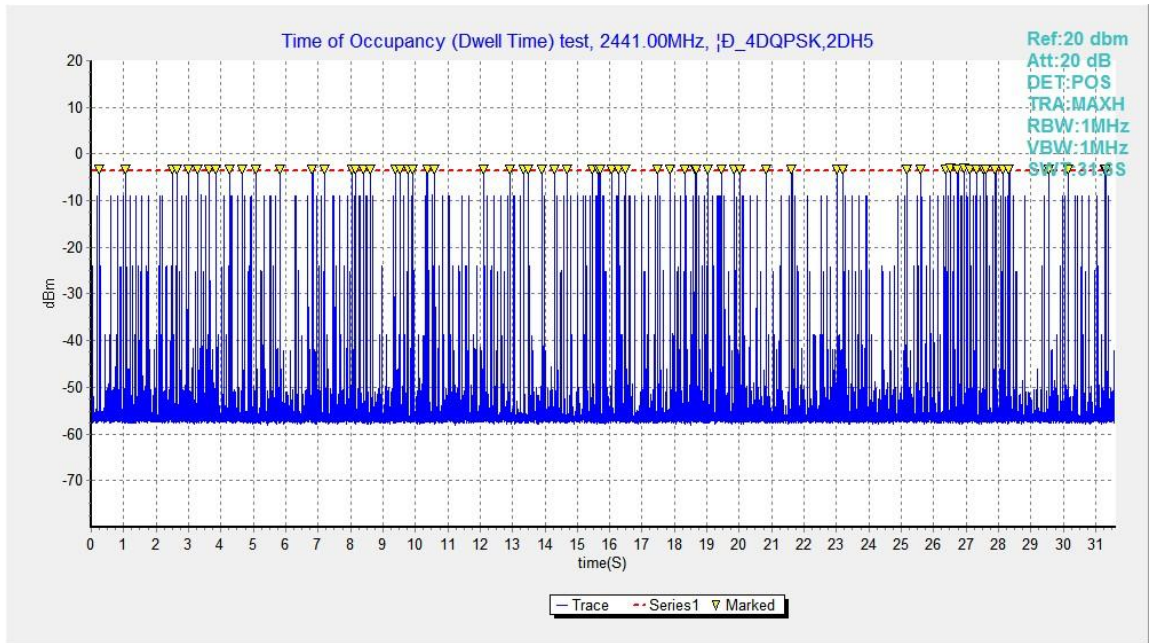


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

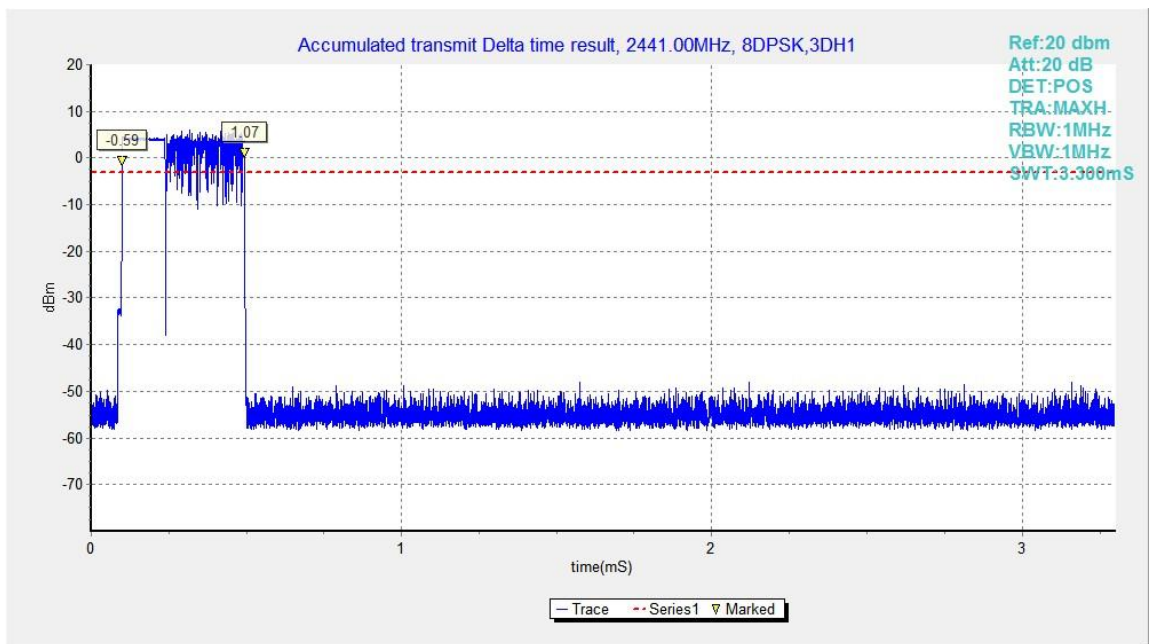


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

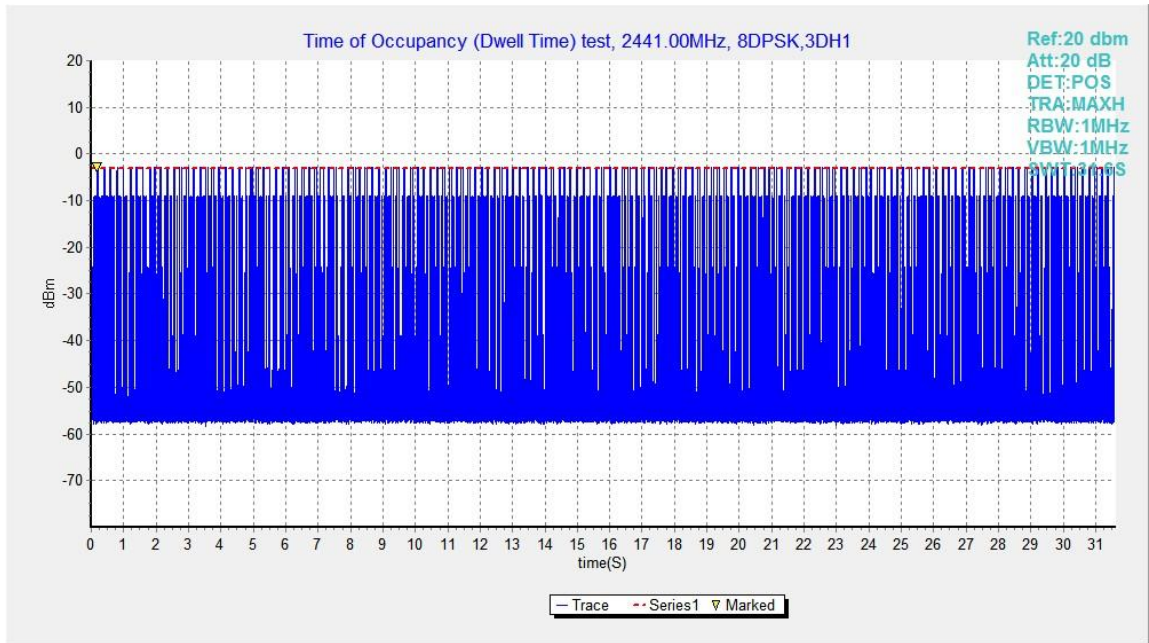


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

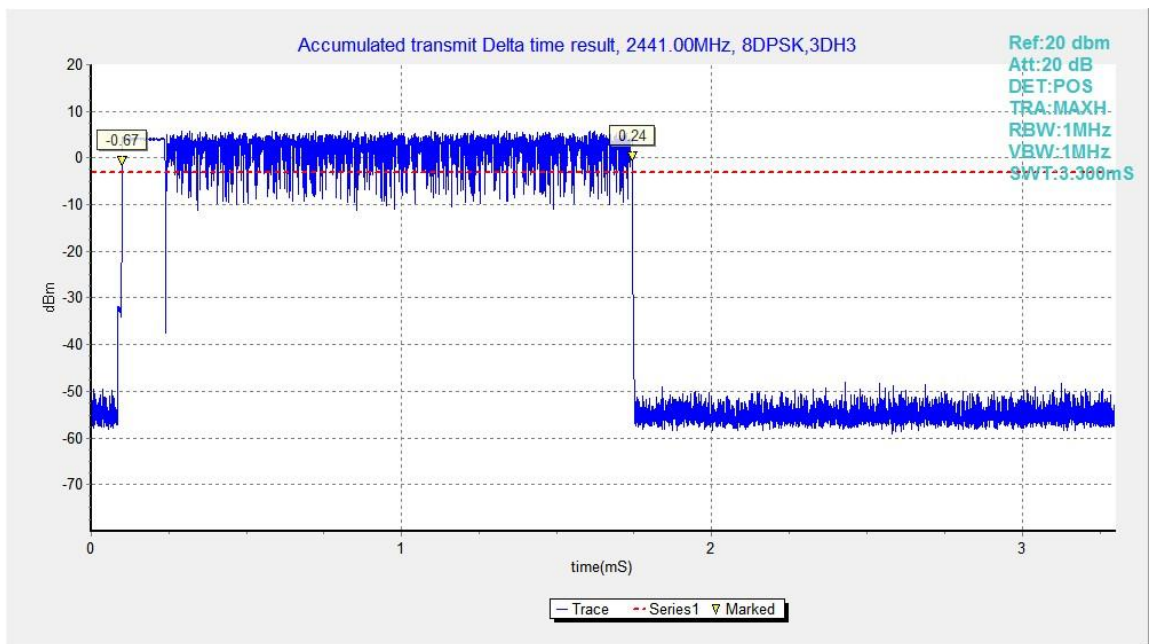


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

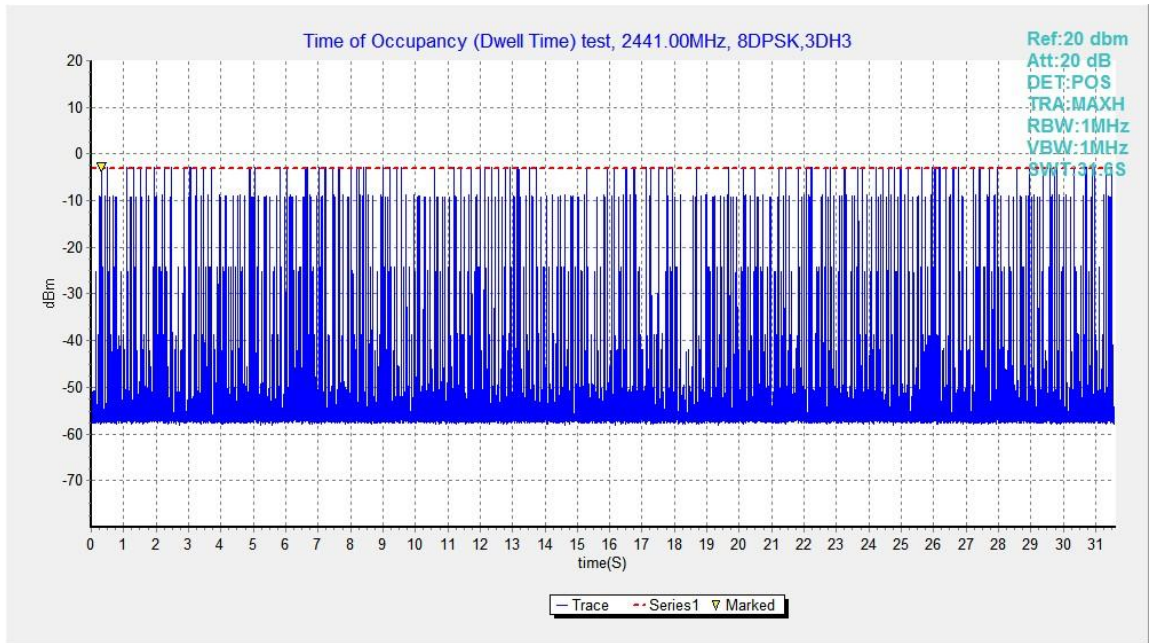


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

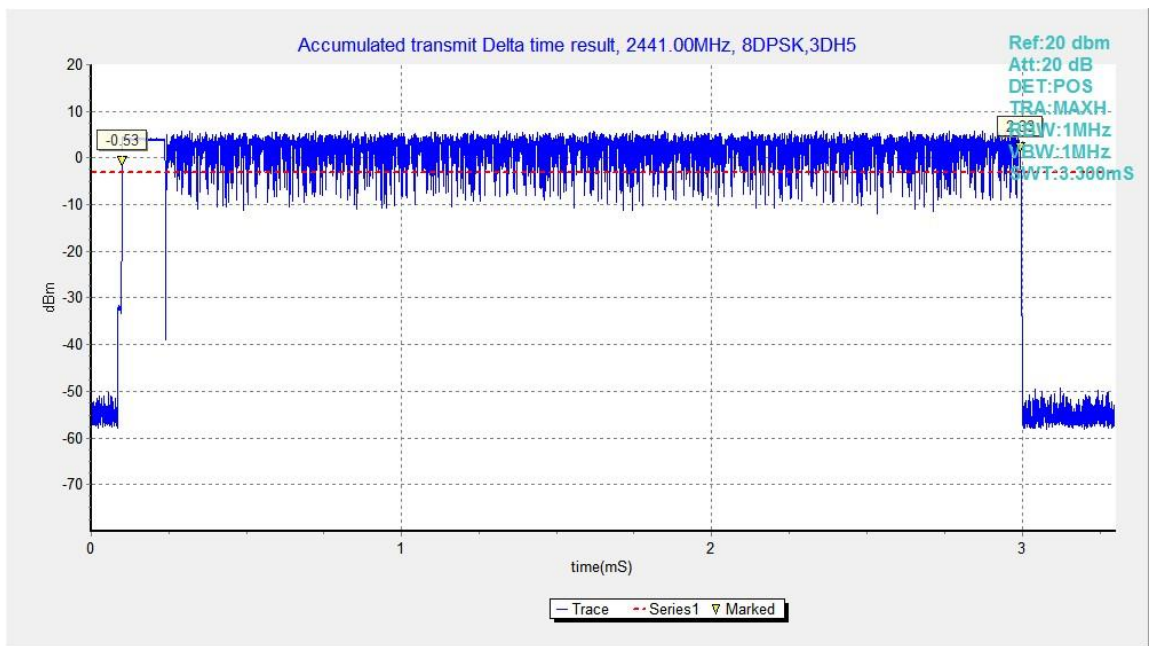


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

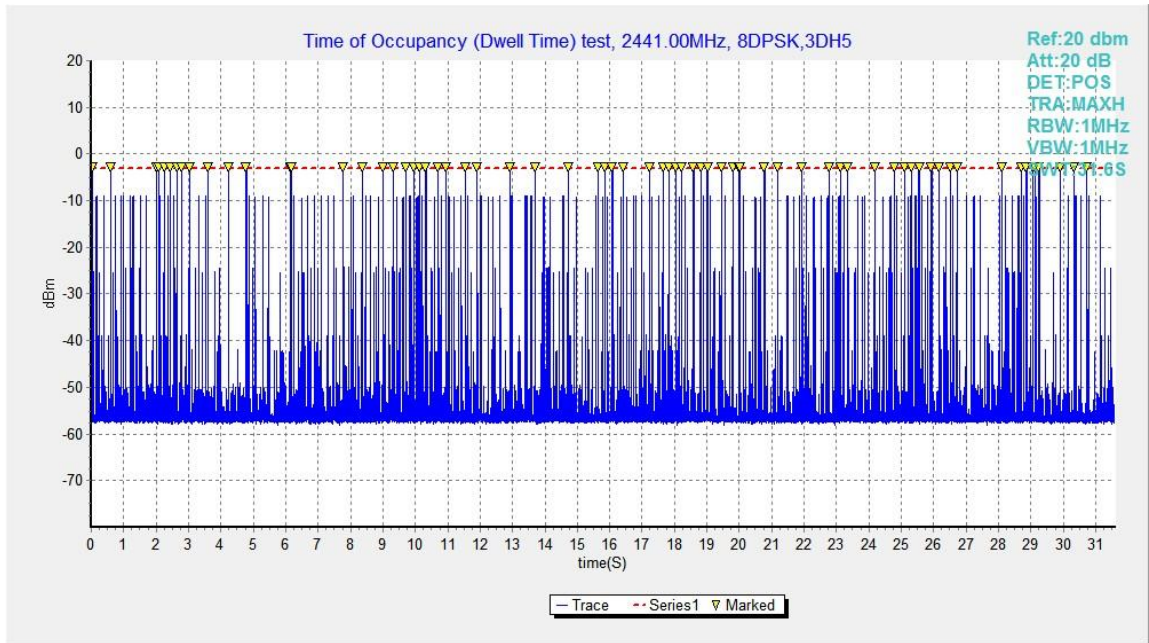


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

B.8. 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	937.50	NA
39	Fig.83	938.25	NA
78	Fig.84	939.00	NA

For $\pi/4$ DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1281.75	NA
39	Fig.86	1281.00	NA
78	Fig.87	1281.00	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1287.00	NA
39	Fig.89	1286.25	NA
78	Fig.90	1302.75	NA

Conclusion: NA

Test graphs as below:

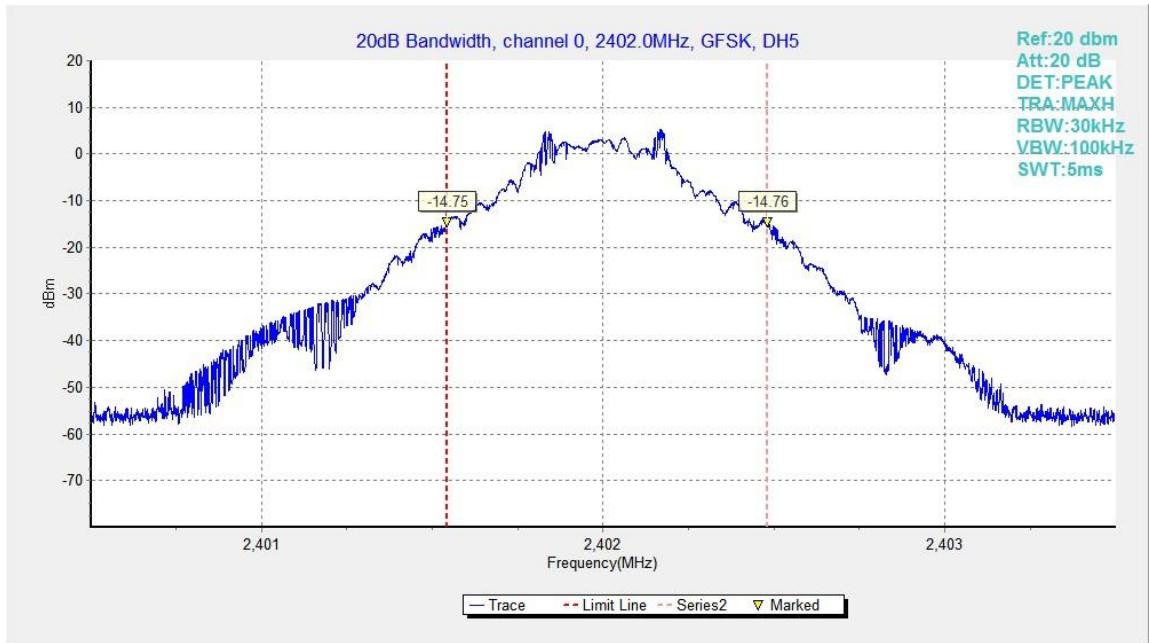


Fig.82. 20dB Bandwidth: GFSK, Channel 0

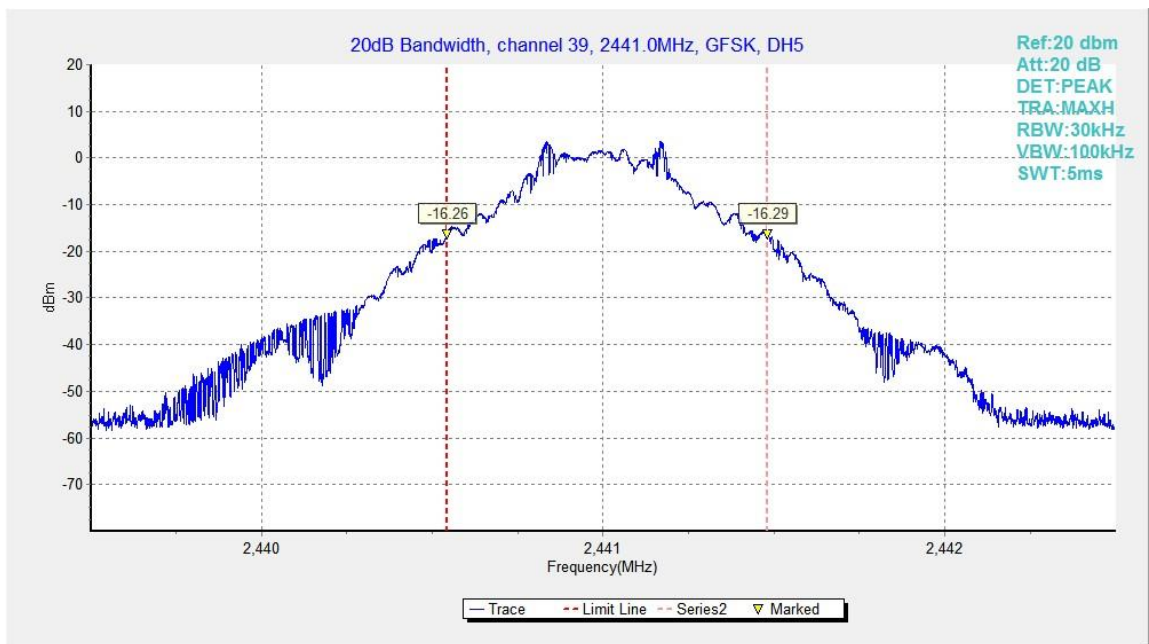


Fig.83. 20dB Bandwidth: GFSK, Channel 39

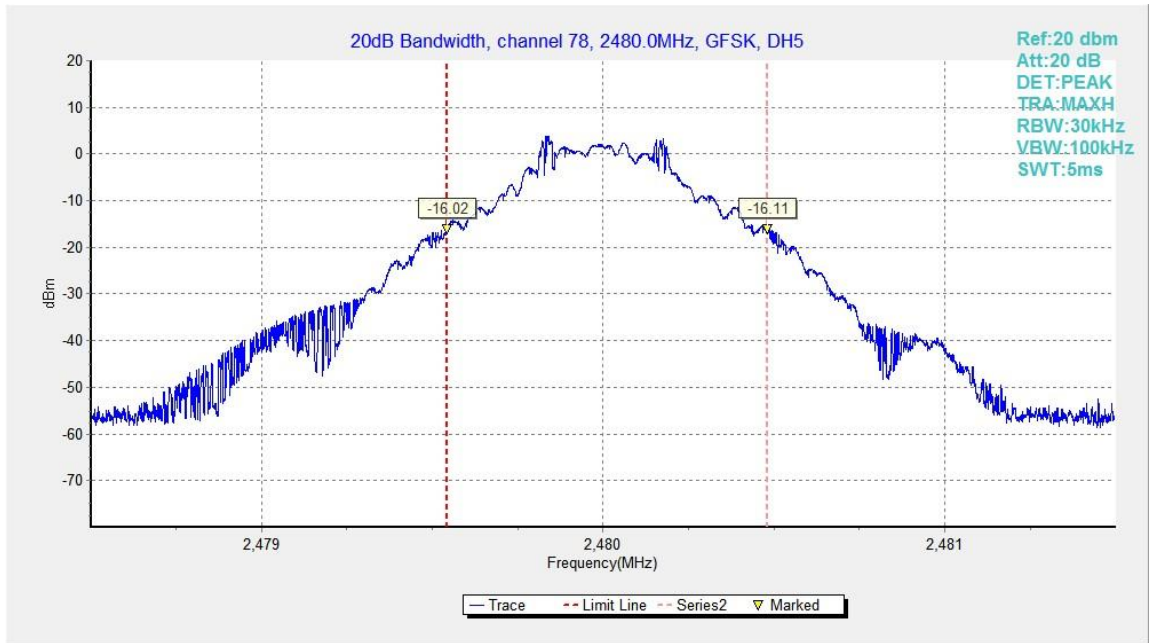


Fig.84. 20dB Bandwidth: GFSK, Channel 78

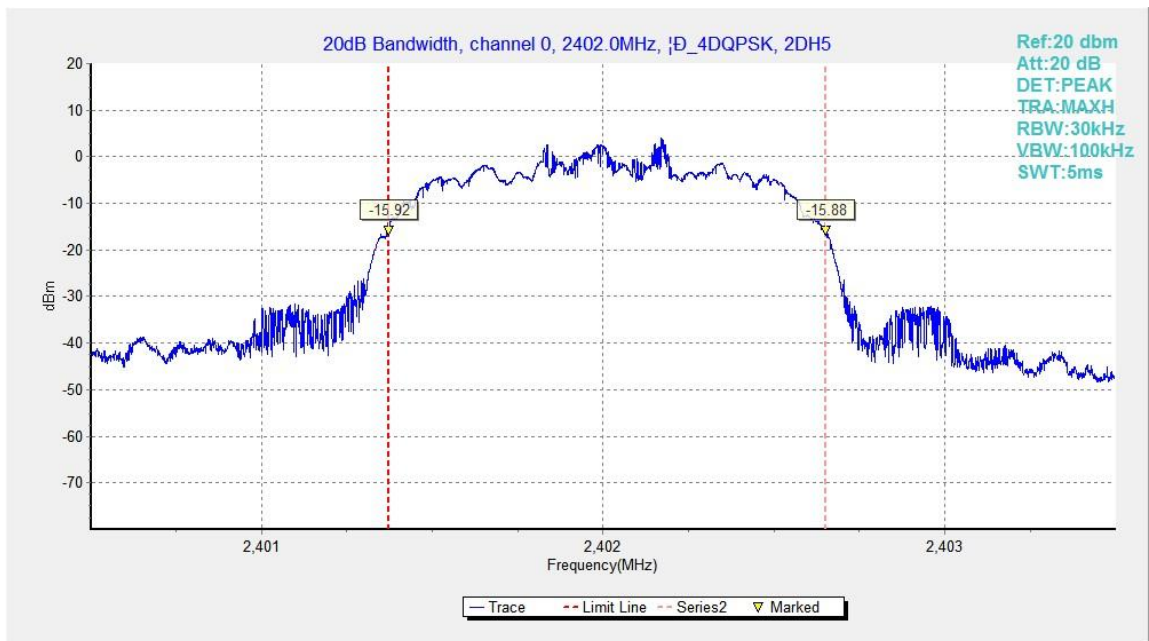


Fig.85. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 0

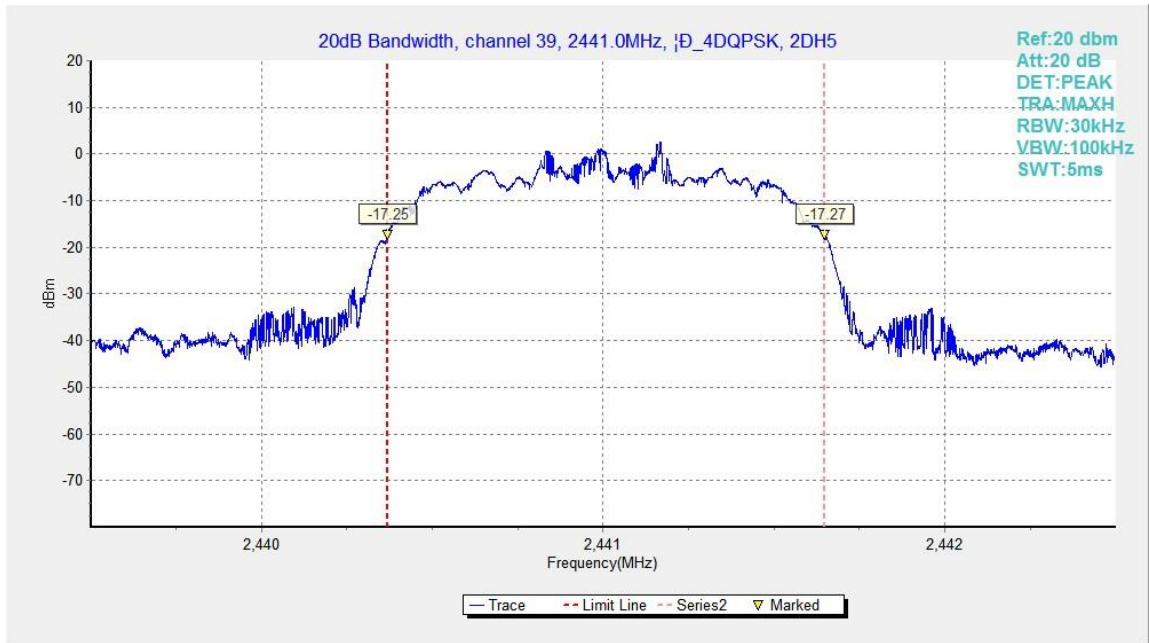


Fig.86. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

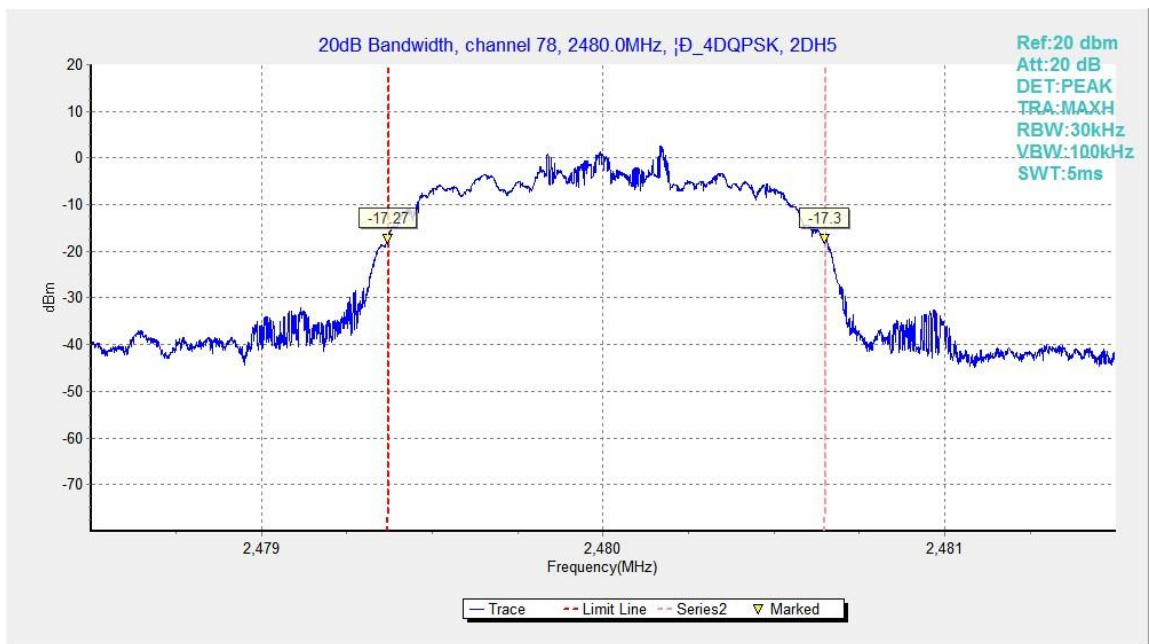


Fig.87. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

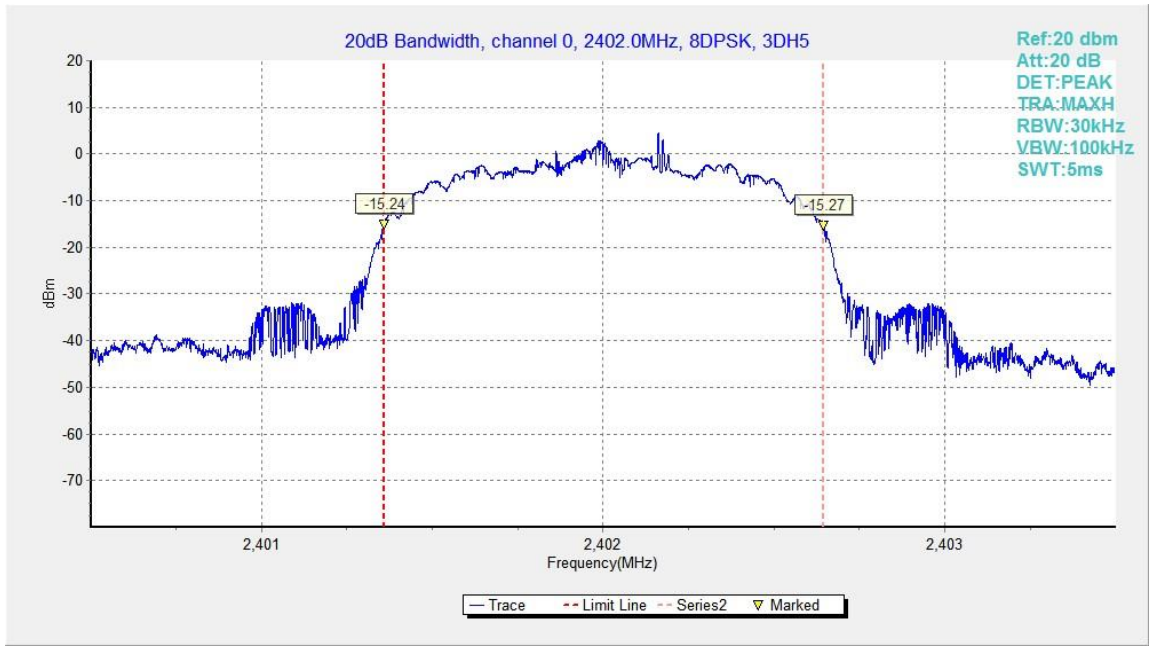


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

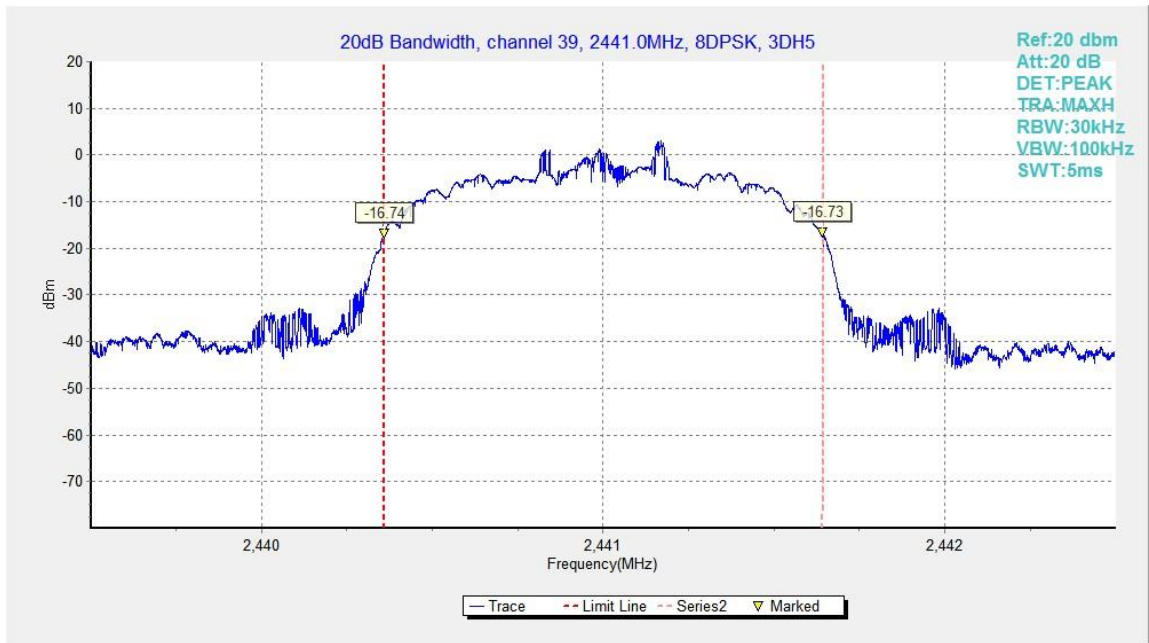


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

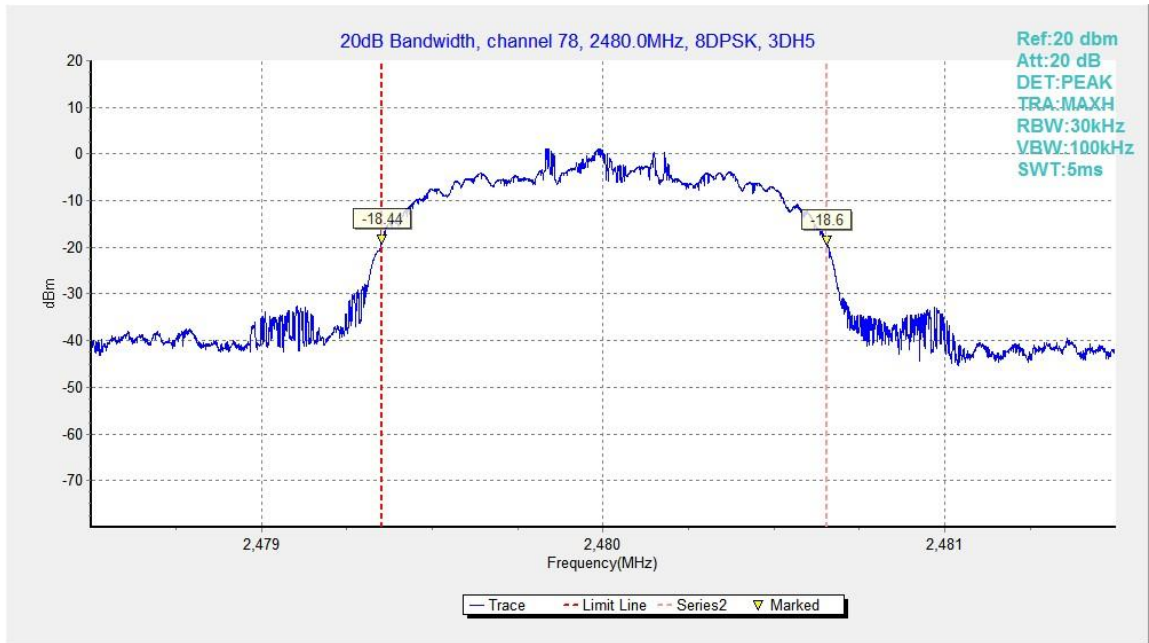


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

B.9. 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	999.00	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)	Conclusion	
39	Fig.92	1101.00	P

For 8DPSK

Channel	Carrier frequency separation (kHz)	Conclusion	
39	Fig.93	1126.50	P

Conclusion: PASS

Test graphs as below:

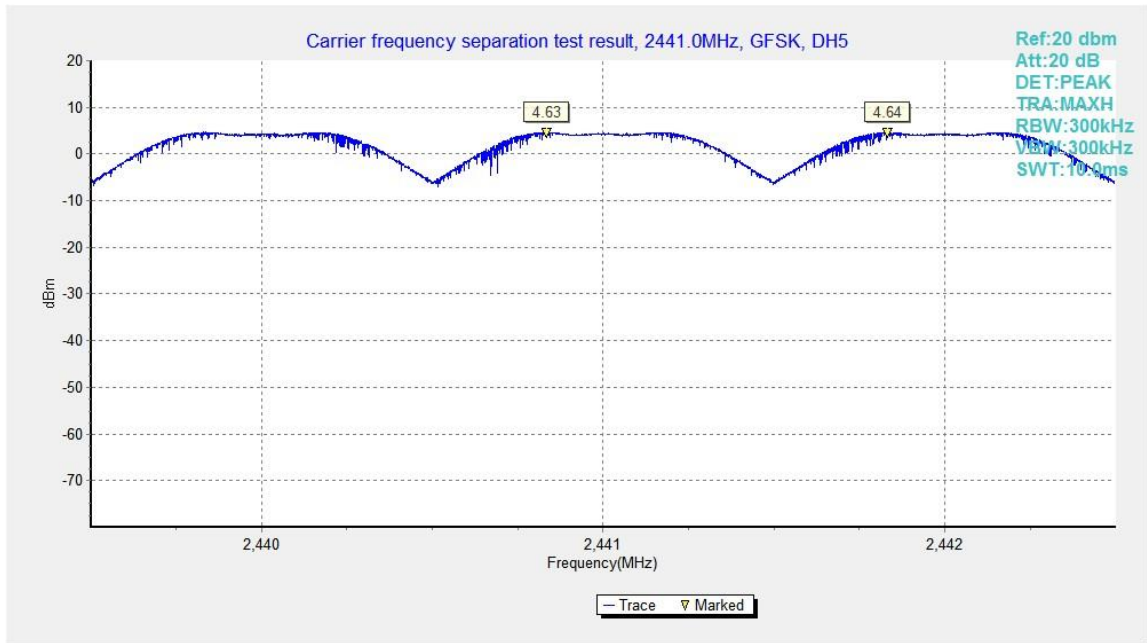


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

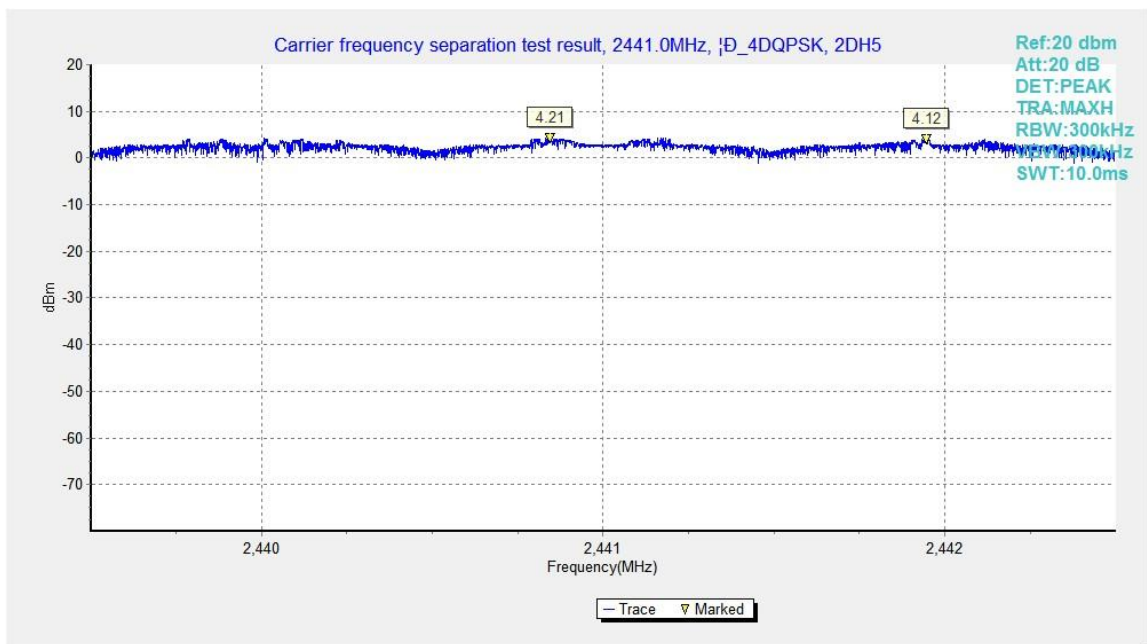


Fig.92. Carrier frequency separation measurement: $\pi/4$ DQPSK, Channel 39

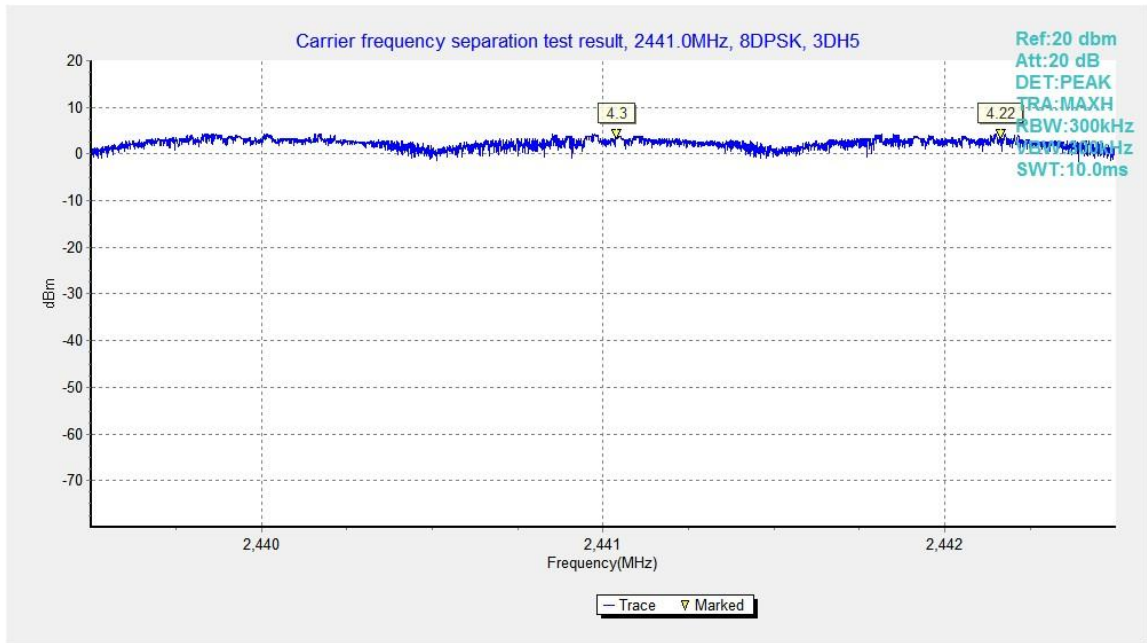


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

B.10. 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	P
40~78	Fig.95	

For $\pi/4$ DQPSK

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

For 8DPSK

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

Conclusion: PASS

Test graphs as below:

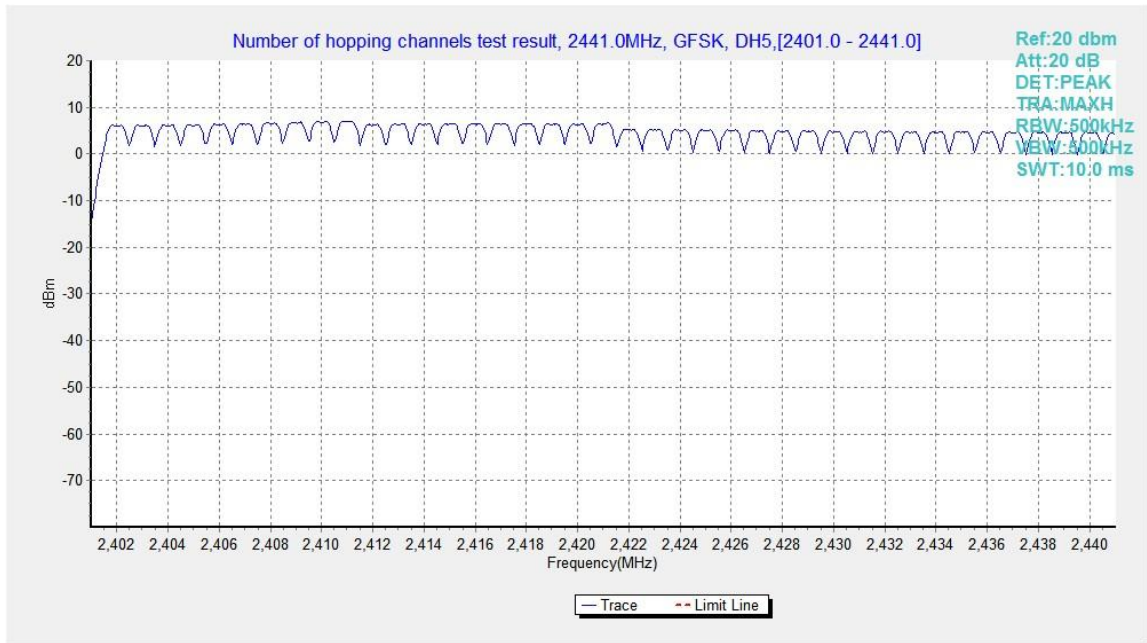


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

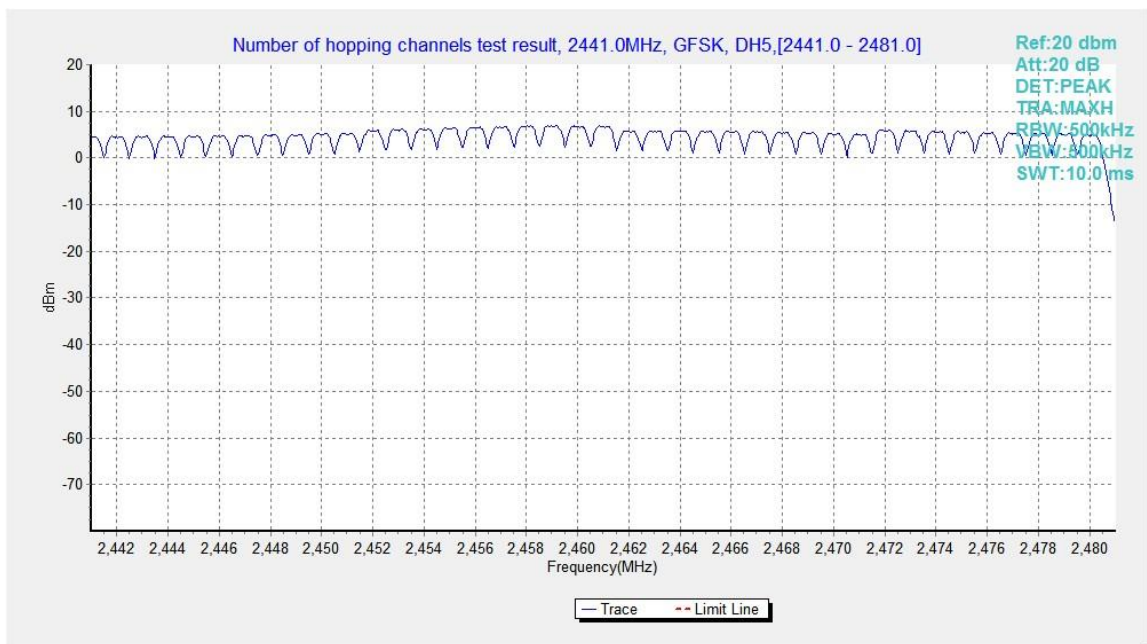


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

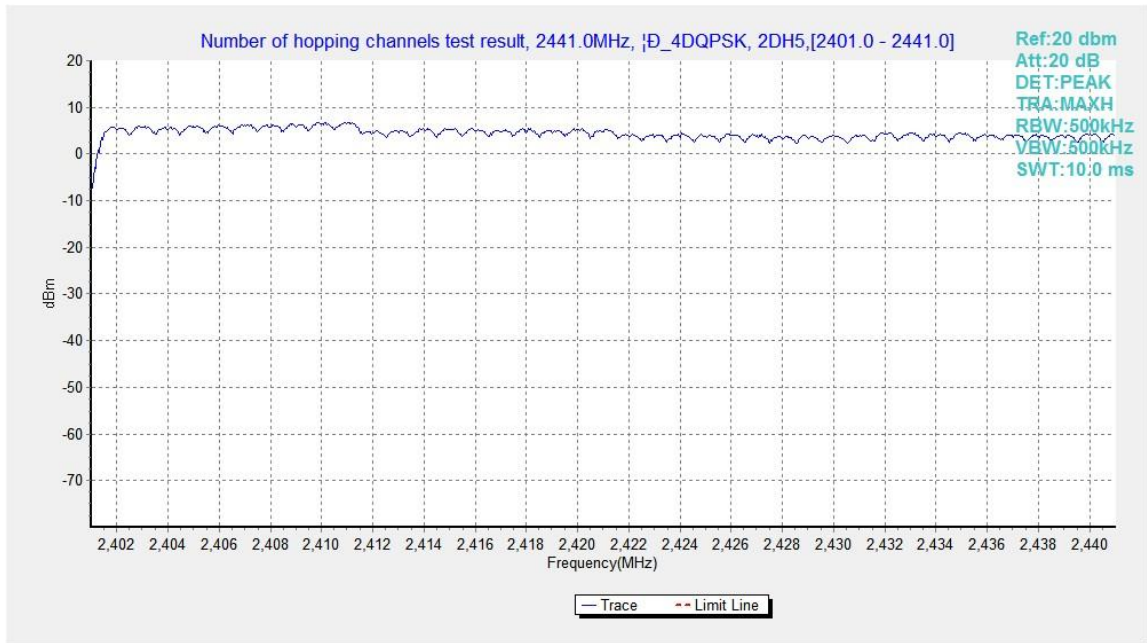


Fig.96. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 0 - 39

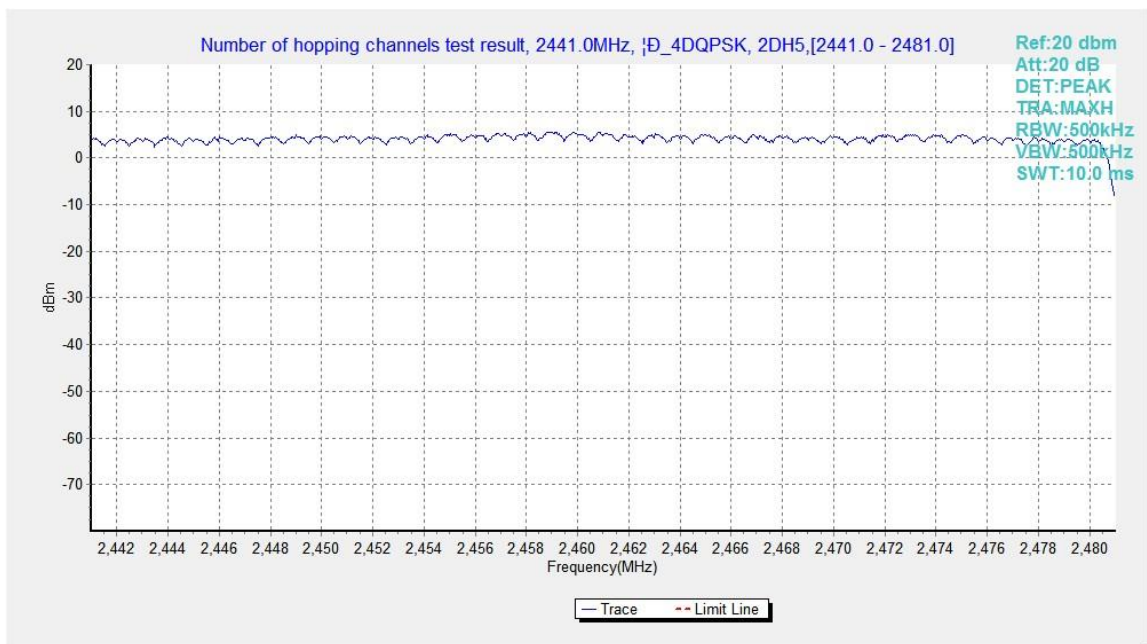


Fig.97. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 40 - 78

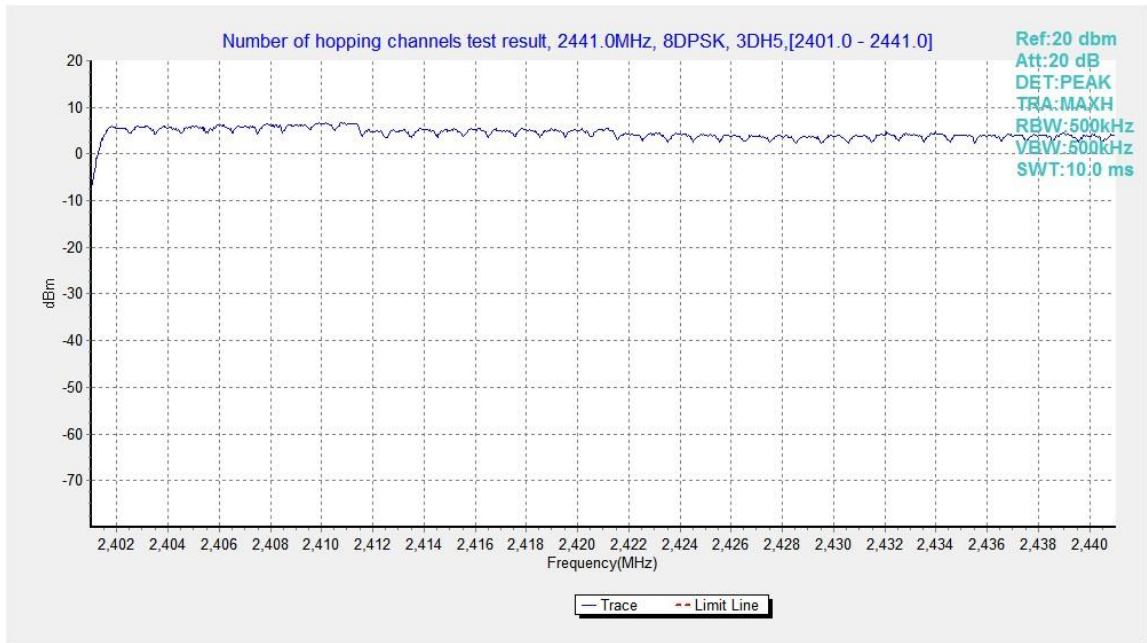


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

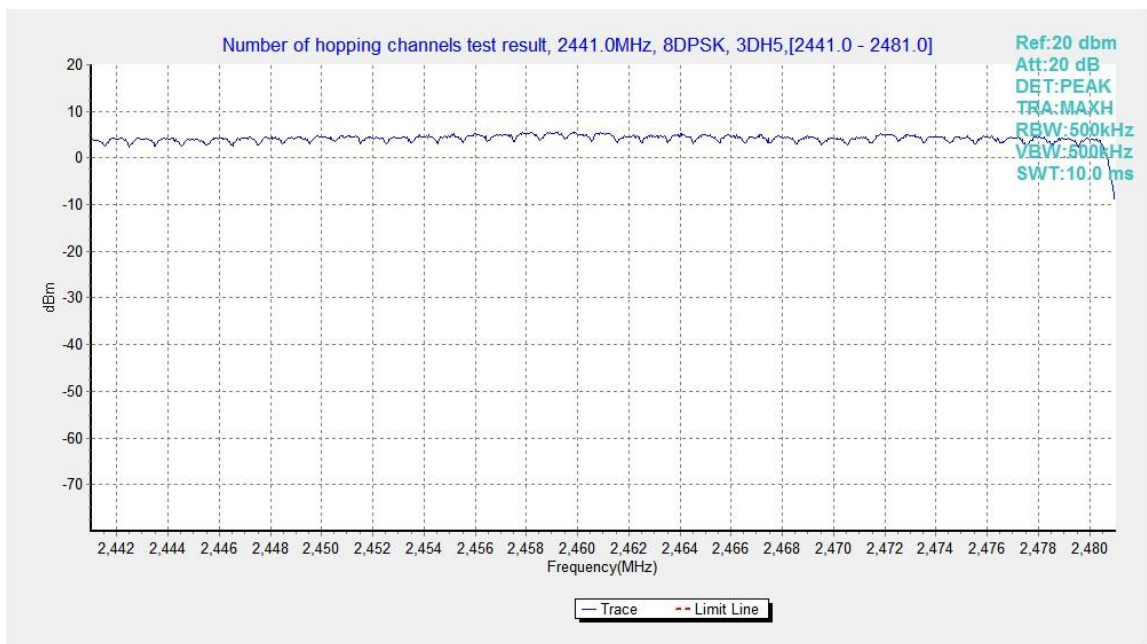


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

B.11. AC Powerline Conducted Emission

Method of Measurement:

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver: Quasi-Peak / Average Detector.

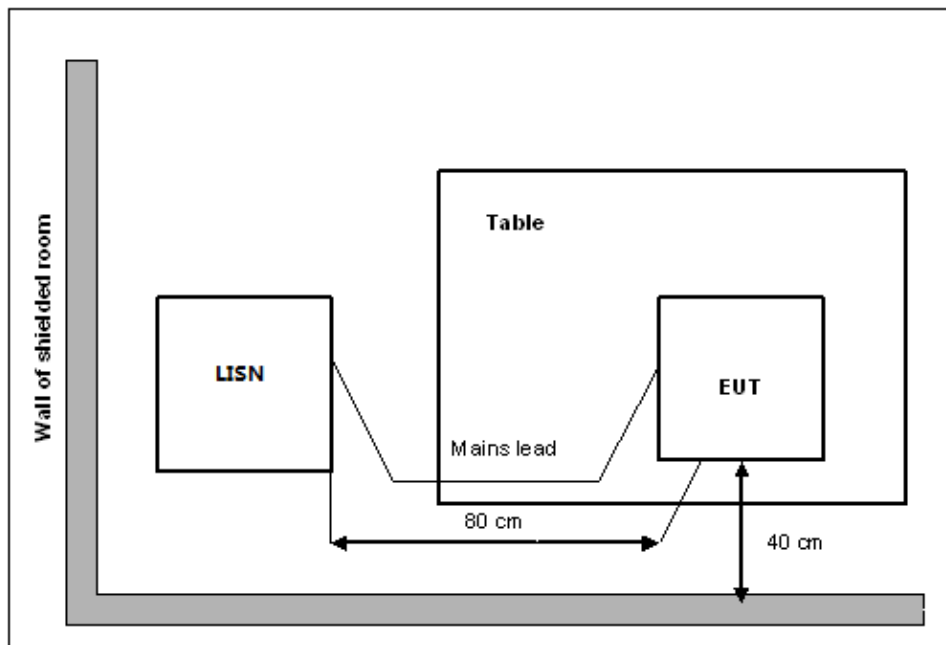
The measurement bandwidth is:

Frequency of Emission (MHz)	RBW/IF bandwidth
0.15-30	9kHz

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Setup



Measurement Result and limit:
EUT ID: UT09a

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		With charger		
		bluetooth	Idle	
0.15 to 0.5	66 to 56	Fig.B.11.1	Fig.B.11.2	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)	Result (dB μ V)		Conclusion
		With charger		
		bluetooth	Idle	
0.15 to 0.5	56 to 46	Fig.B.11.1	Fig.B.11.2	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.

Conclusion: Pass
Test graphs as below:

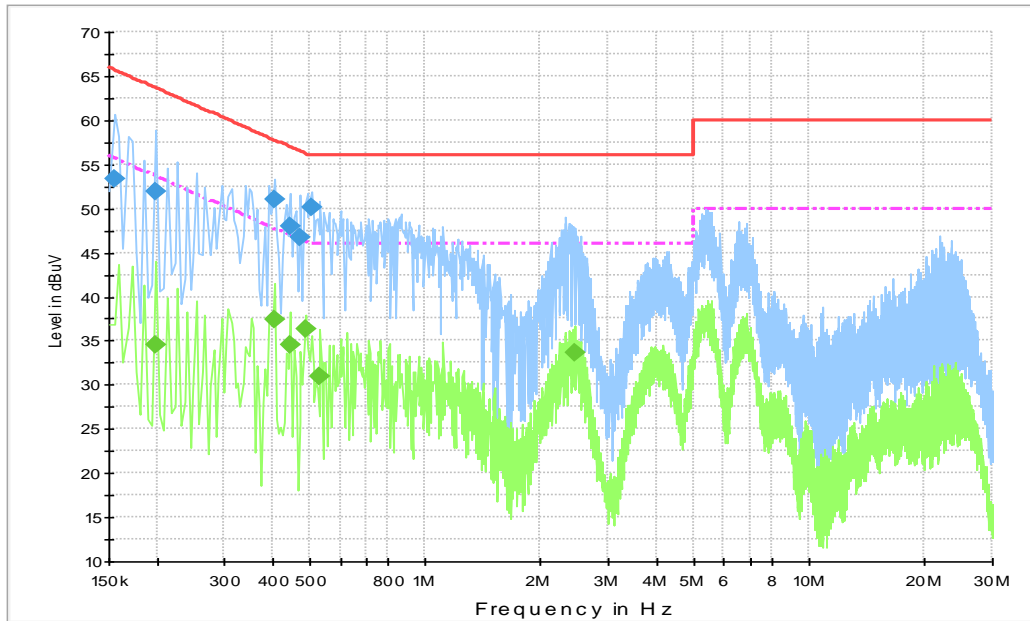


Fig.B.11.1 AC Powerline Conducted Emission- bluetooth

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154500	53.3	3000.0	9.000	On	N	28.9	12.4	65.8
0.199500	51.9	3000.0	9.000	On	L1	27.8	11.7	63.6
0.406500	51.0	3000.0	9.000	On	N	24.4	6.7	57.7
0.447000	48.0	3000.0	9.000	On	N	24.0	9.0	56.9
0.474000	46.8	3000.0	9.000	On	L1	23.7	9.7	56.4
0.505500	50.1	3000.0	9.000	On	N	23.4	5.9	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.199500	34.5	3000.0	9.000	On	L1	27.8	19.1	53.6
0.406500	37.3	3000.0	9.000	On	L1	24.4	10.4	47.7
0.447000	34.6	3000.0	9.000	On	L1	24.0	12.4	46.9
0.487500	36.3	3000.0	9.000	On	L1	23.6	9.9	46.2
0.532500	30.9	3000.0	9.000	On	N	23.2	15.1	46.0
2.463000	33.7	3000.0	9.000	On	L1	19.9	12.3	46.0

Note: The measurement results showed here are worst cases of the combinations of different Adapters.

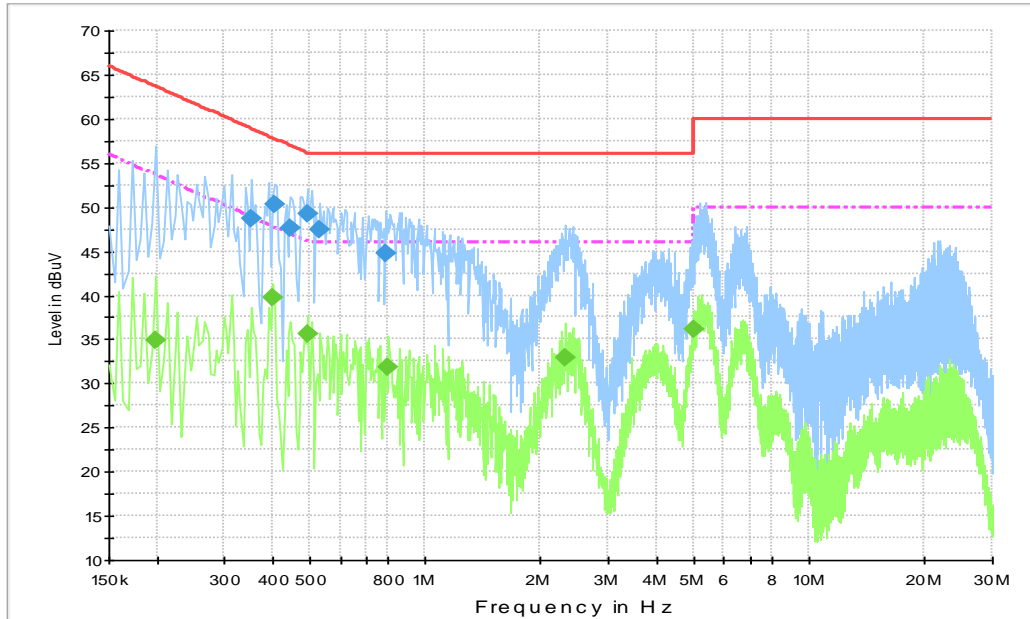


Fig.B.11.2 AC Powerline Conducted Emission-Idle

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.352500	48.7	3000.0	9.000	On	L1	25.1	10.2	58.9
0.406500	50.3	3000.0	9.000	On	L1	24.4	7.4	57.7
0.447000	47.7	3000.0	9.000	On	N	24.0	9.3	56.9
0.492000	49.3	3000.0	9.000	On	N	23.5	6.9	56.1
0.532500	47.5	3000.0	9.000	On	L1	23.2	8.5	56.0
0.789000	44.8	3000.0	9.000	On	N	21.4	11.2	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.199500	34.9	3000.0	9.000	On	L1	27.8	18.8	53.6
0.402000	39.8	3000.0	9.000	On	L1	24.5	8.0	47.8
0.492000	35.6	3000.0	9.000	On	L1	23.6	10.5	46.1
0.802500	31.8	3000.0	9.000	On	L1	21.3	14.2	46.0
2.314500	32.9	3000.0	9.000	On	N	19.9	13.1	46.0
4.987500	36.1	3000.0	9.000	On	L1	19.7	9.9	46.0

Note: The measurement results showed here are worst cases of the combinations of different Adapters.

ANNEX C: Accreditation Certificate

<p>United States Department of Commerce National Institute of Standards and Technology</p>  	
<hr/> Certificate of Accreditation to ISO/IEC 17025:2017 <hr/>	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
<hr/> 2021-09-29 through 2022-09-30 <i>Effective Dates</i>	 For the National Voluntary Laboratory Accreditation Program

END OF REPORT