

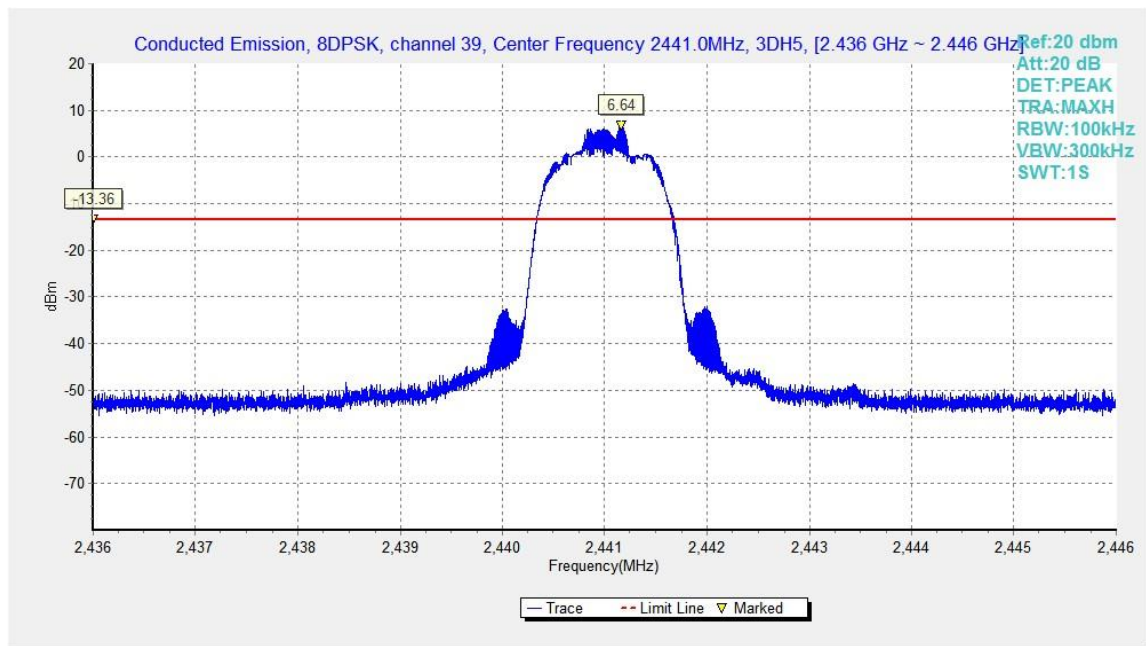


Fig.54. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

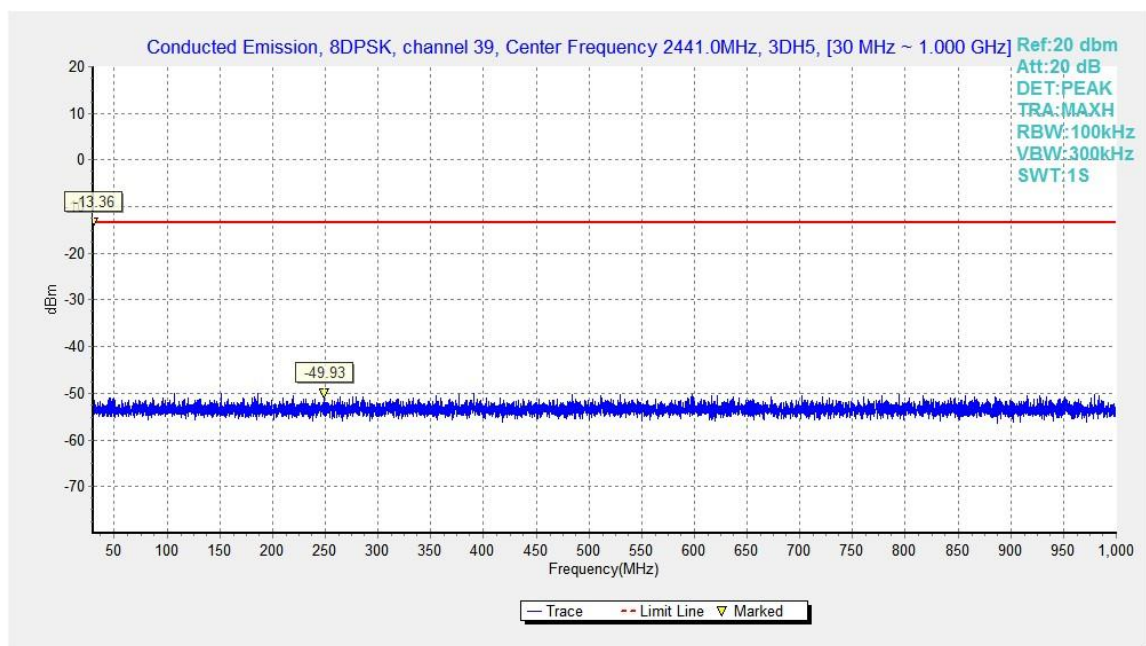


Fig.55. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz

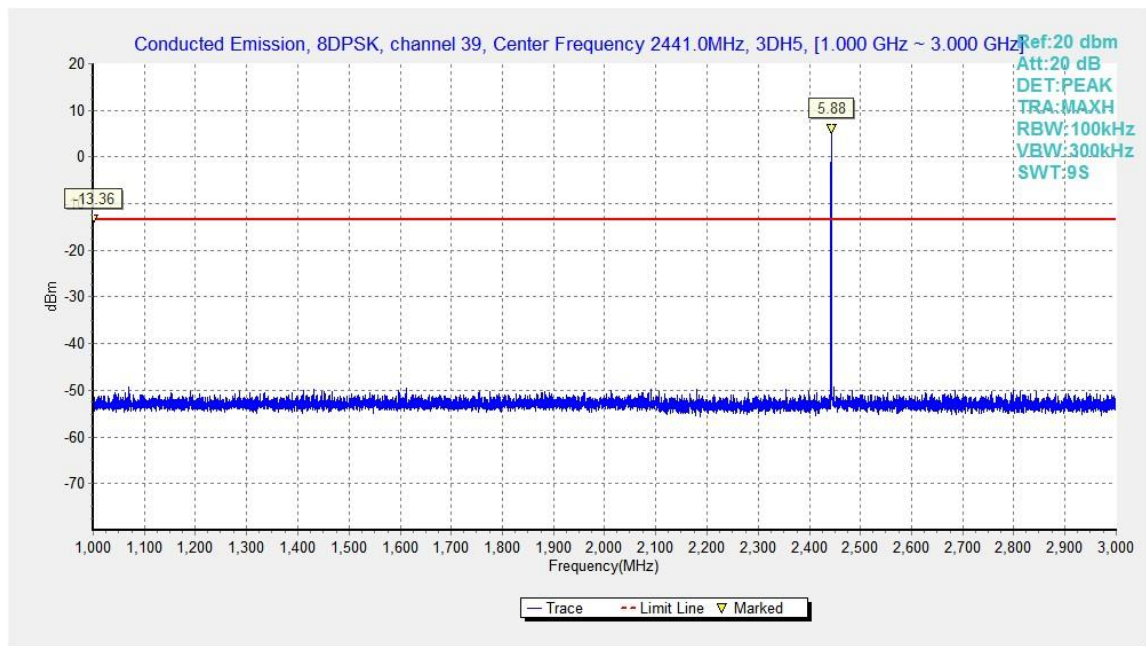


Fig.56. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz

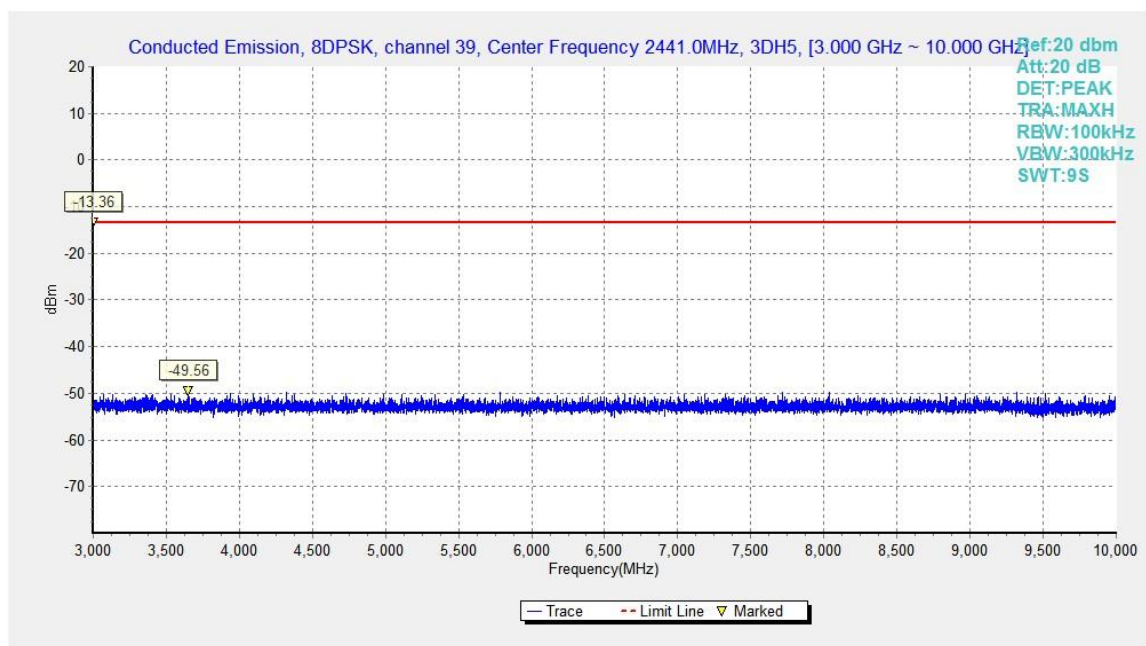


Fig.57. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

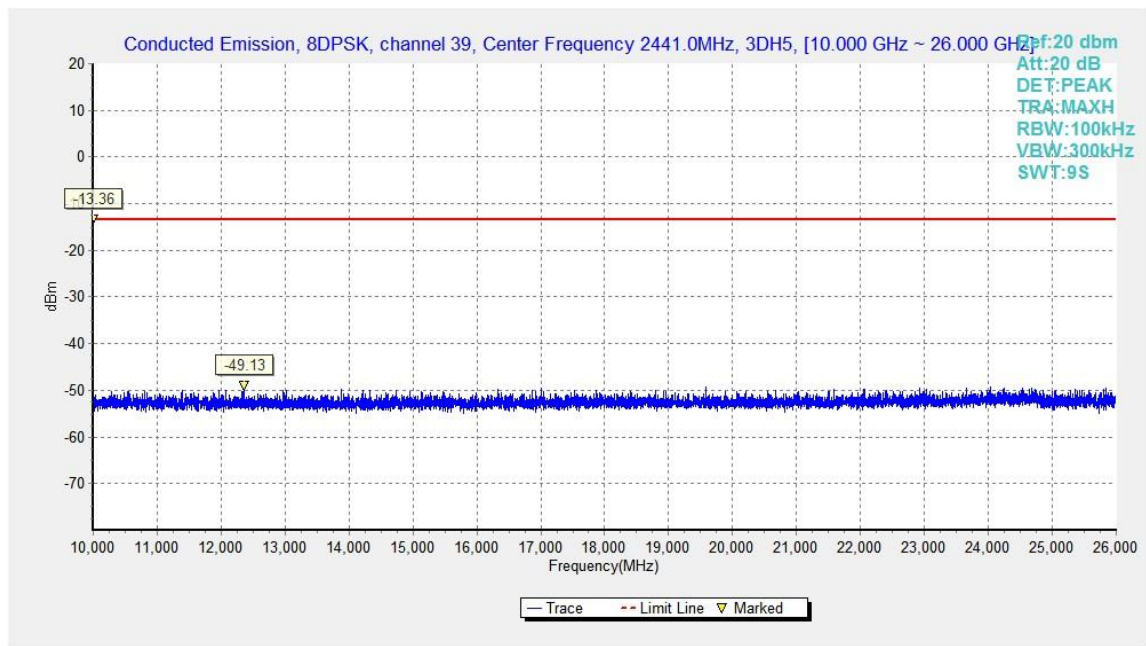


Fig.58. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

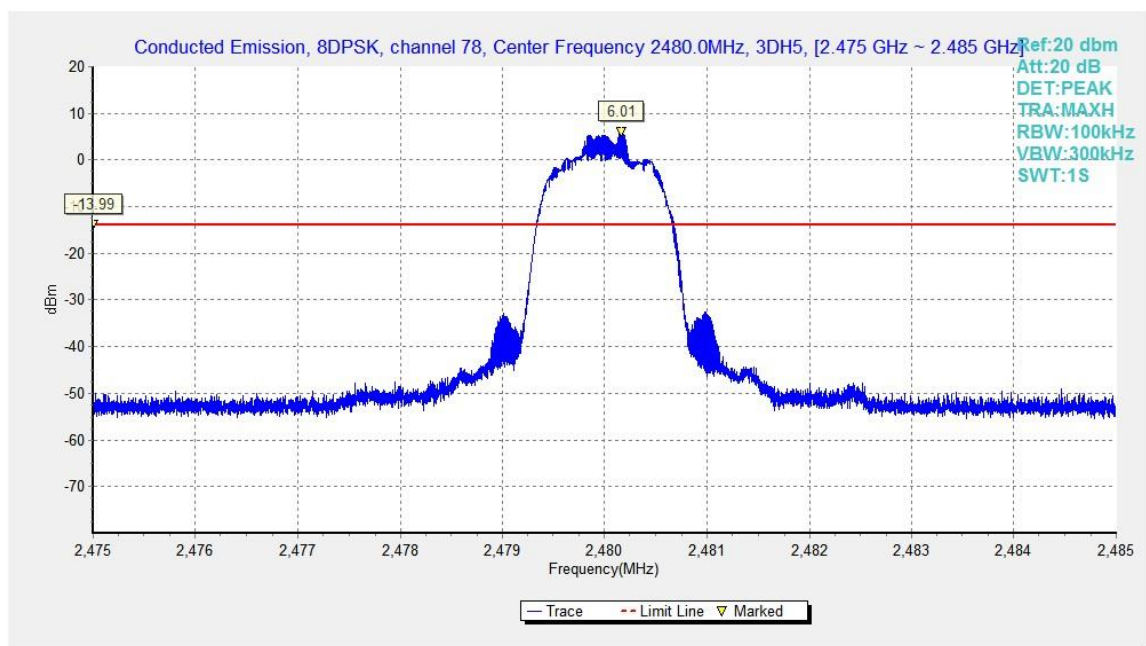


Fig.59. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

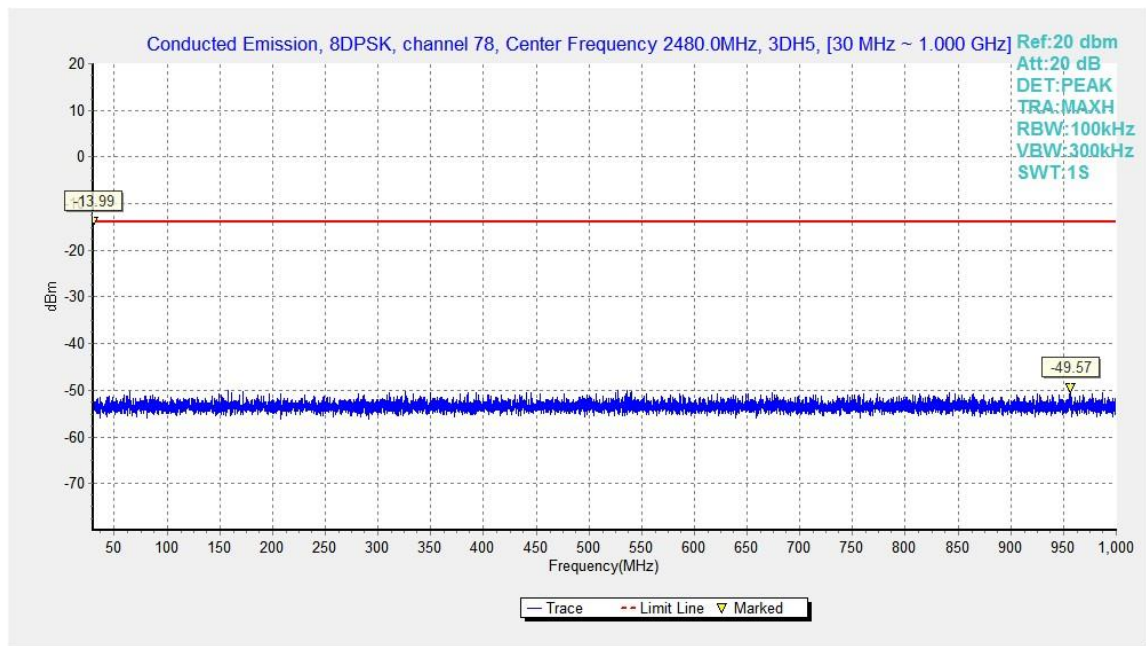


Fig.60. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

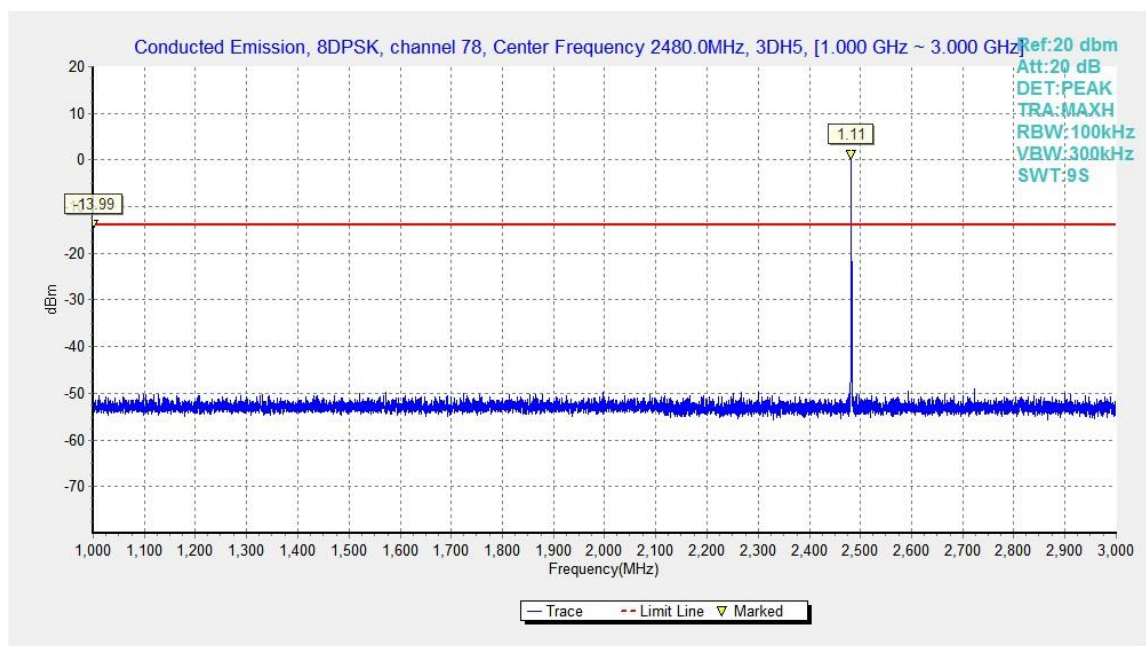


Fig.61. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

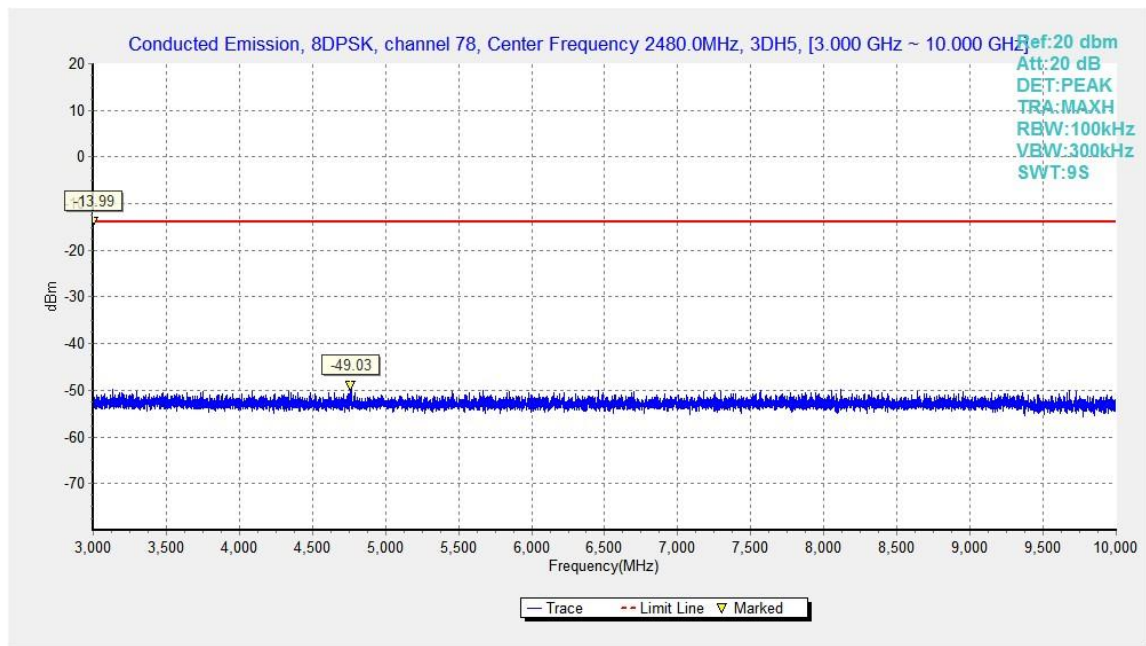


Fig.62. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

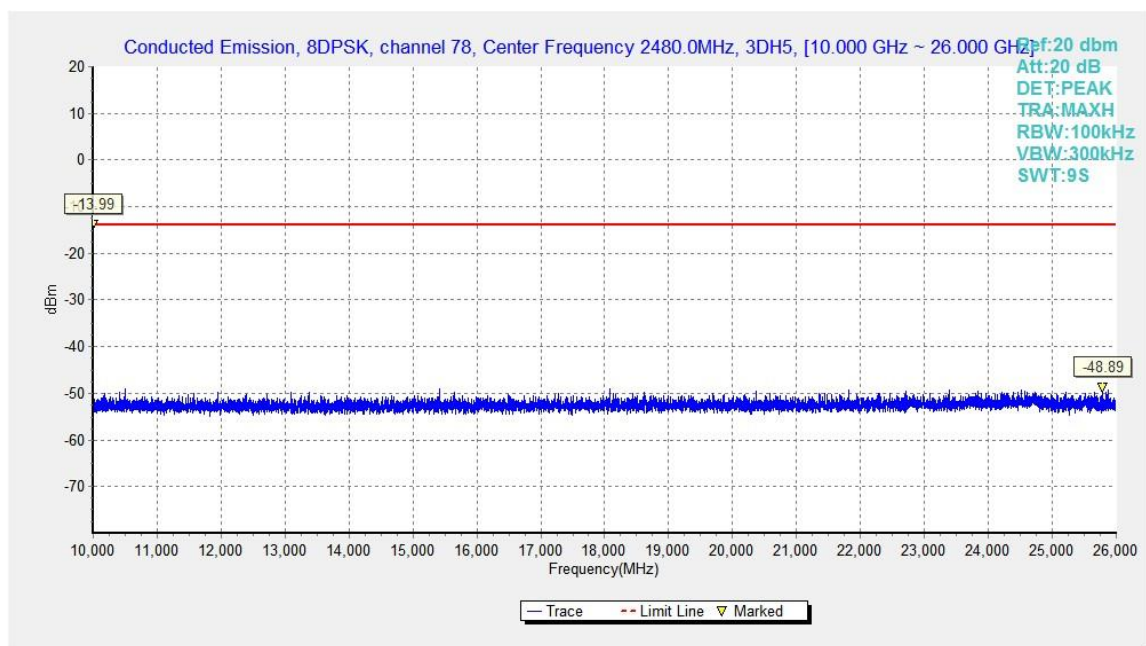


Fig.63. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

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)
2362.570	60.31	2.6	27.6	30.04	74.0	13.7	V
2364.163	60.20	2.6	27.6	29.93	74.0	13.8	V
4804.219	39.30	-37.8	32.0	45.05	74.0	34.7	V
7206.094	42.87	-36.9	35.7	44.11	74.0	31.1	V
9607.969	44.89	-35.8	37.8	42.87	74.0	29.1	V
12009.844	47.70	-34.7	39.1	43.36	74.0	26.3	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)
2340.400	39.13	-40.3	27.6	51.74	74.0	34.9	V
2507.200	39.86	-39.3	27.7	51.44	74.0	34.1	H
4882.031	39.51	-37.8	32.2	45.06	74.0	34.5	V
7322.813	44.23	-36.9	36.0	45.15	74.0	29.8	V
9764.063	44.80	-35.7	37.8	42.67	74.0	29.2	V
12204.844	47.00	-34.8	39.0	42.85	74.0	27.0	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)
2499.181	60.77	2.8	27.7	30.32	74.0	13.2	H
2499.806	60.70	2.8	27.7	30.25	74.0	13.3	H
4959.844	39.09	-37.9	32.4	44.58	74.0	34.9	V
7440.000	43.64	-36.6	36.3	43.98	74.0	30.4	V
9920.156	47.12	-35.6	37.8	44.92	74.0	26.9	V
12399.844	47.33	-34.3	38.9	42.80	74.0	26.7	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)
2335.988	60.44	2.6	27.6	30.22	74.0	13.6	V
2359.263	60.37	2.6	27.6	30.10	74.0	13.6	V
4804.219	40.08	-37.8	32.0	45.82	74.0	33.9	V
7206.094	42.76	-36.9	35.7	44.00	74.0	31.2	H
9607.969	44.29	-35.8	37.8	42.27	74.0	29.7	H
12009.844	46.50	-34.7	39.1	42.15	74.0	27.5	H

$\pi/4$ 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)
2368.000	39.54	-39.6	27.7	51.45	74.0	34.5	H
2510.600	39.42	-39.4	27.7	51.13	74.0	34.6	V
4882.031	39.69	-37.8	32.2	45.25	74.0	34.3	V
7322.813	43.05	-36.9	36.0	43.97	74.0	31.0	V
9764.063	46.01	-35.7	37.8	43.88	74.0	28.0	V
12204.844	47.68	-34.8	39.0	43.53	74.0	26.3	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)
2495.594	61.48	2.7	27.7	31.05	74.0	12.5	V
2496.613	61.08	2.7	27.7	30.64	74.0	12.9	V
4959.844	38.91	-37.9	32.4	44.40	74.0	35.1	H
7440.000	43.30	-36.6	36.3	43.64	74.0	30.7	V
9920.156	44.88	-35.6	37.8	42.68	74.0	29.1	H
12399.844	47.93	-34.3	38.9	43.41	74.0	26.1	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)
2343.530	60.01	2.6	27.6	29.77	74.0	14.0	V
2379.038	60.07	2.6	27.7	29.80	74.0	13.9	V
4804.219	39.64	-37.8	32.0	45.38	74.0	34.4	V
7206.094	43.42	-36.9	35.7	44.67	74.0	30.6	H
9607.969	44.26	-35.8	37.8	42.24	74.0	29.7	V
12009.844	46.51	-34.7	39.1	42.16	74.0	27.5	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)
2367.800	39.22	-39.6	27.7	51.14	74.0	34.8	H
2505.800	39.24	-39.2	27.7	50.76	74.0	34.8	H
4882.031	39.57	-37.8	32.2	45.13	74.0	34.4	H
7322.813	44.02	-36.9	36.0	44.94	74.0	30.0	V
9764.063	45.97	-35.7	37.8	43.84	74.0	28.0	H
12204.844	47.60	-34.8	39.0	43.44	74.0	26.4	V

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)
2497.169	60.45	2.7	27.7	30.01	74.0	13.5	H
2498.831	60.64	2.8	27.7	30.19	74.0	13.4	V
4959.844	39.65	-37.9	32.4	45.15	74.0	34.3	H
7440.000	43.49	-36.6	36.3	43.82	74.0	30.5	H
9920.156	45.28	-35.6	37.8	43.08	74.0	28.7	V
12399.844	47.17	-34.3	38.9	42.64	74.0	26.8	V

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)
2301.500	45.57	2.5	27.6	15.40	54.0	8.4	V
2324.900	45.52	2.6	27.6	15.33	54.0	8.5	V
4803.750	27.97	-37.7	32.0	33.71	54.0	26.0	V
7206.250	31.25	-36.9	35.7	32.49	54.0	22.8	H
9608.125	33.37	-35.8	37.8	31.34	54.0	20.6	V
12010.000	35.01	-34.7	39.1	30.66	54.0	19.0	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)
2360.700	45.57	2.6	27.6	15.30	54.0	8.4	V
2492.925	45.65	2.7	27.7	15.23	54.0	8.4	V
4881.875	28.10	-37.8	32.2	33.66	54.0	25.9	V
7323.125	31.35	-36.9	36.0	32.28	54.0	22.6	V
9763.750	34.22	-35.7	37.8	32.09	54.0	19.8	V
12205.000	30.06	-34.8	39.0	25.90	54.0	23.9	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)
2498.250	45.70	2.8	27.7	15.25	54.0	8.3	V
2499.900	45.71	2.8	27.7	15.26	54.0	8.3	V
4960.000	27.53	-37.9	32.4	33.02	54.0	26.5	H
7440.000	31.95	-36.6	36.3	32.28	54.0	22.1	H
9920.000	33.90	-35.6	37.8	31.70	54.0	20.1	H
12400.000	35.04	-34.3	38.9	30.51	54.0	19.0	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)
2302.425	45.49	2.5	27.6	15.31	54.0	8.5	V
2317.925	45.50	2.6	27.6	15.31	54.0	8.5	V
4803.750	28.10	-37.7	32.0	33.84	54.0	25.9	V
7206.250	31.04	-36.9	35.7	32.28	54.0	23.0	V
9608.125	33.20	-35.8	37.8	31.18	54.0	20.8	V
12010.000	35.15	-34.7	39.1	30.80	54.0	18.9	H

 $\pi/4$ 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)
2307.475	45.58	2.5	27.6	15.40	54.0	8.4	V
2493.075	45.71	2.7	27.7	15.30	54.0	8.3	V
4881.875	27.93	-37.8	32.2	33.48	54.0	26.1	H
7323.125	30.95	-36.9	36.0	31.87	54.0	23.1	H
9763.750	34.35	-35.7	37.8	32.22	54.0	19.7	V
12205.000	35.90	-34.8	39.0	31.74	54.0	18.1	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)
2354.350	45.53	2.6	27.6	15.26	54.0	8.5	V
2497.675	45.63	2.8	27.7	15.18	54.0	8.4	V
4960.000	27.38	-37.9	32.4	32.88	54.0	26.6	V
7440.000	31.80	-36.6	36.3	32.13	54.0	22.2	V
9920.000	33.69	-35.6	37.8	31.48	54.0	20.3	V
12400.000	34.97	-34.3	38.9	30.44	54.0	19.0	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)
2316.875	45.52	2.6	27.6	15.34	54.0	8.5	V
2357.900	45.52	2.6	27.6	15.25	54.0	8.5	V
4803.750	28.13	-37.7	32.0	33.88	54.0	25.9	H
7206.250	31.09	-36.9	35.7	32.33	54.0	22.9	V
9608.125	33.21	-35.8	37.8	31.19	54.0	20.8	H
12010.000	35.02	-34.7	39.1	30.68	54.0	19.0	V

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)
2320.225	45.54	2.6	27.6	15.35	54.0	8.5	V
2499.400	45.75	2.8	27.7	15.30	54.0	8.3	V
4881.875	28.18	-37.8	32.2	33.74	54.0	25.8	H
7323.125	31.23	-36.9	36.0	32.15	54.0	22.8	V
9763.750	34.23	-35.7	37.8	32.10	54.0	19.8	V
12205.000	35.99	-34.8	39.0	31.83	54.0	18.0	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)
2493.900	45.91	2.7	27.7	15.49	54.0	8.1	V
2498.675	45.87	2.8	27.7	15.42	54.0	8.1	V
4960.000	27.40	-37.9	32.4	32.89	54.0	26.6	H
7440.000	31.78	-36.6	36.3	32.12	54.0	22.2	H
9920.000	33.83	-35.6	37.8	31.63	54.0	20.2	H
12400.000	35.29	-34.3	38.9	30.76	54.0	18.7	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
39	DH1	Fig.64	0.38	Fig.65	319	121.22	P
	DH3	Fig.66	1.63	Fig.67	107	174.41	P
	DH5	Fig.68	2.88	Fig.69	77	221.76	P

For $\pi/4$ DQPSK

Channel	Packet	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
39	2DH1	Fig.70	0.38	Fig.71	320	121.6	P
	2DH3	Fig.72	1.64	Fig.73	108	177.12	P
	2DH5	Fig.74	2.88	Fig.75	57	164.16	P

For 8DPSK

Channel	Packet	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
39	3DH1	Fig.76	0.39	Fig.77	316	123.24	P
	3DH3	Fig.78	1.64	Fig.79	101	165.64	P
	3DH5	Fig.80	2.89	Fig.81	69	199.41	P

Conclusion: PASS

Test graphs as below:

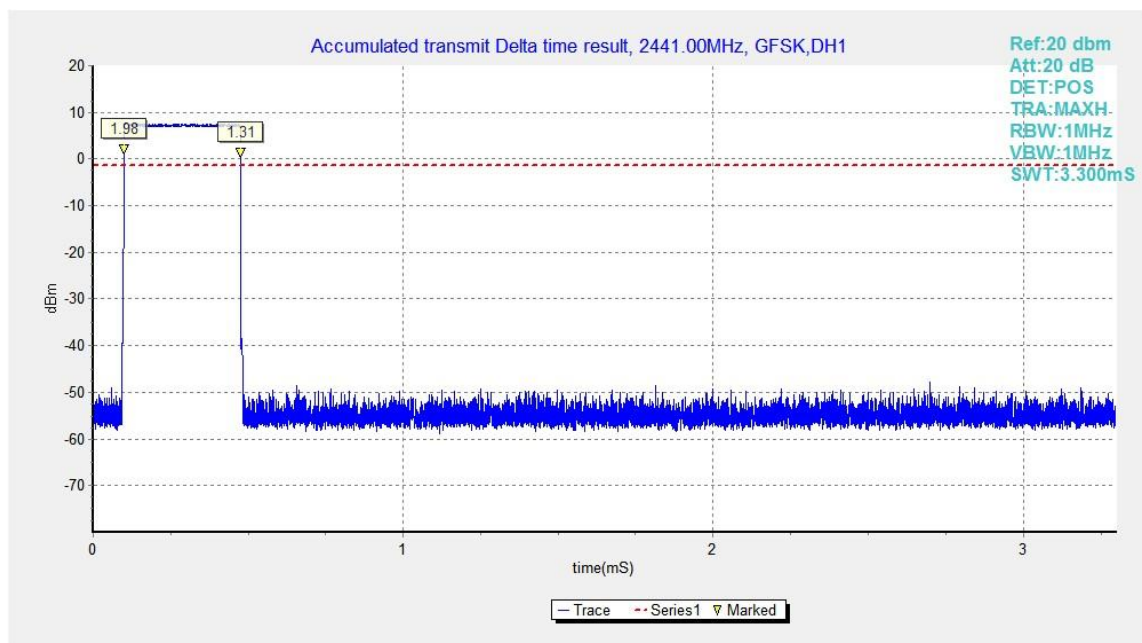


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

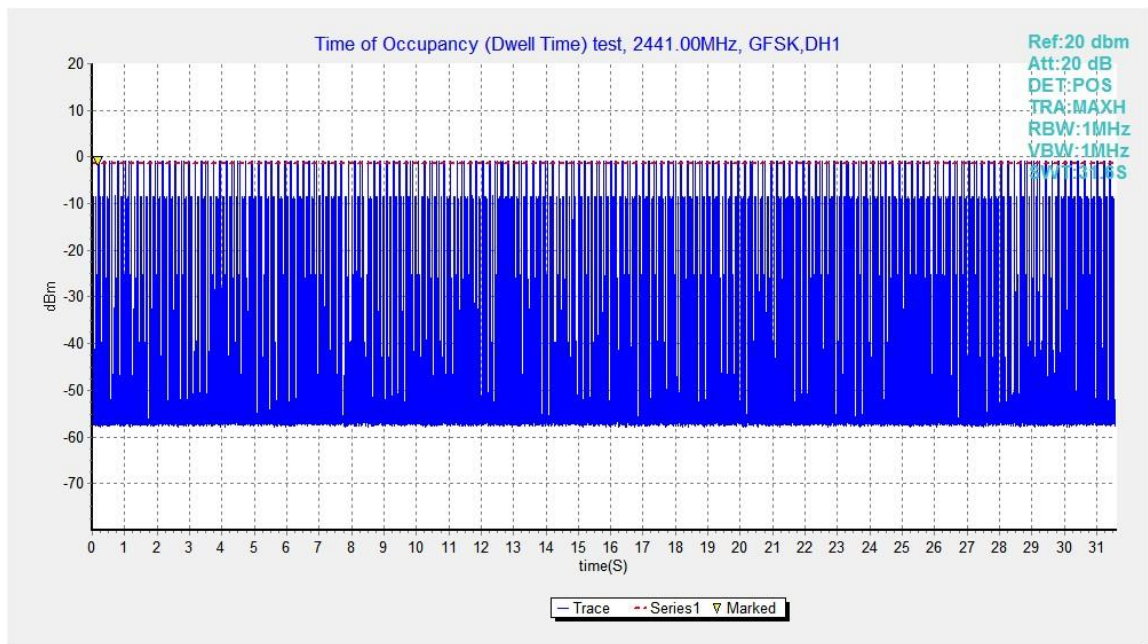


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

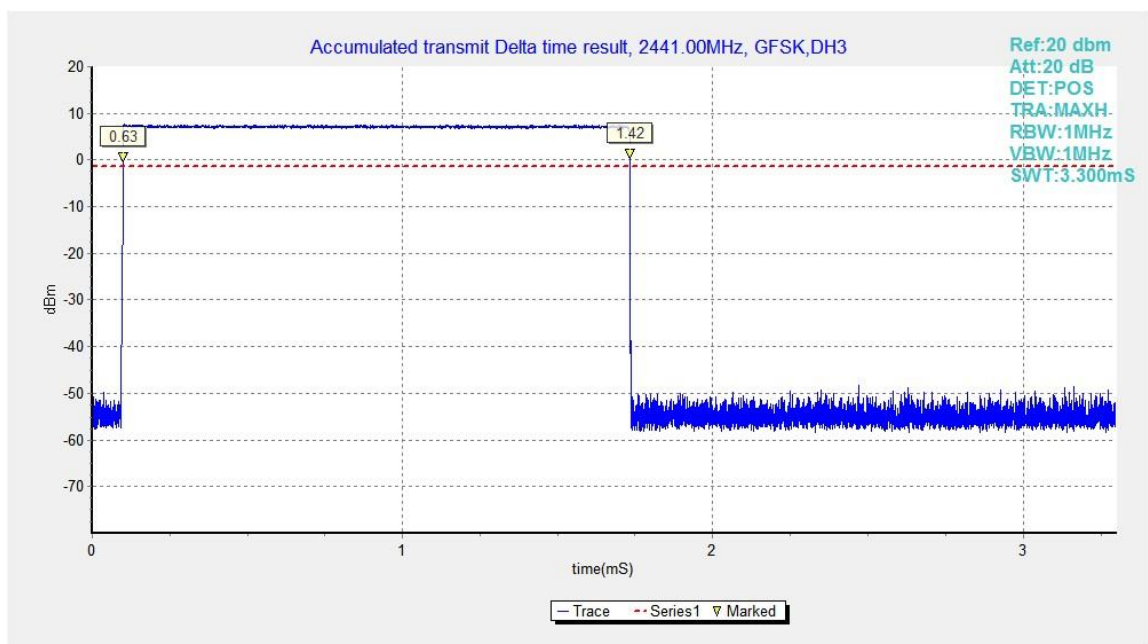


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

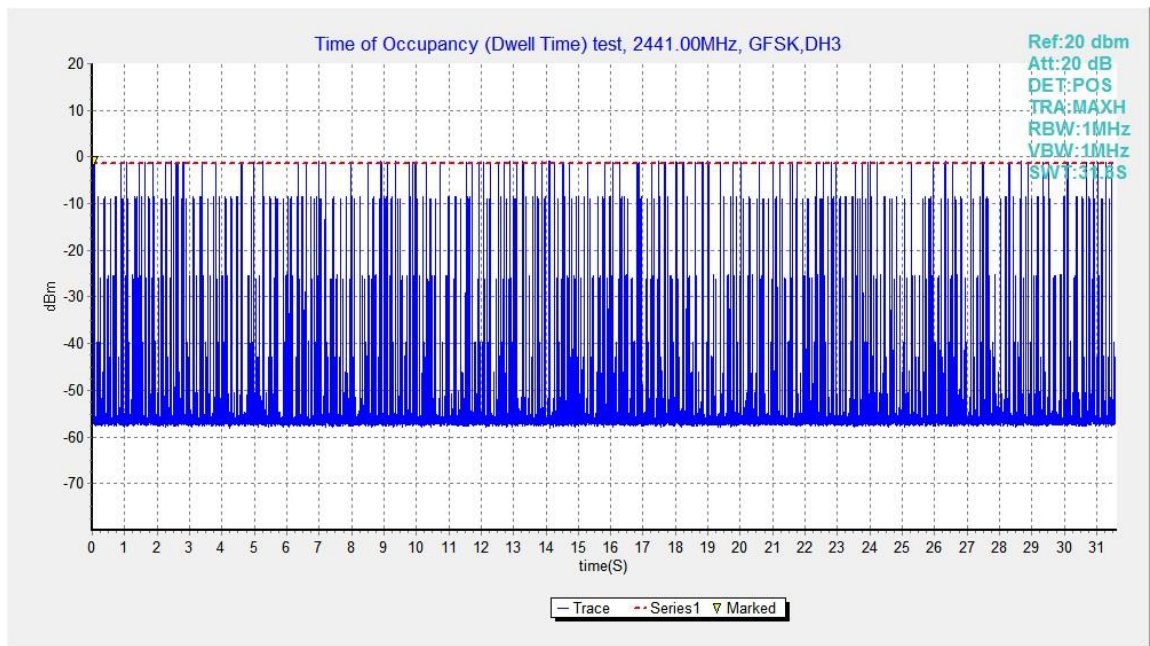


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

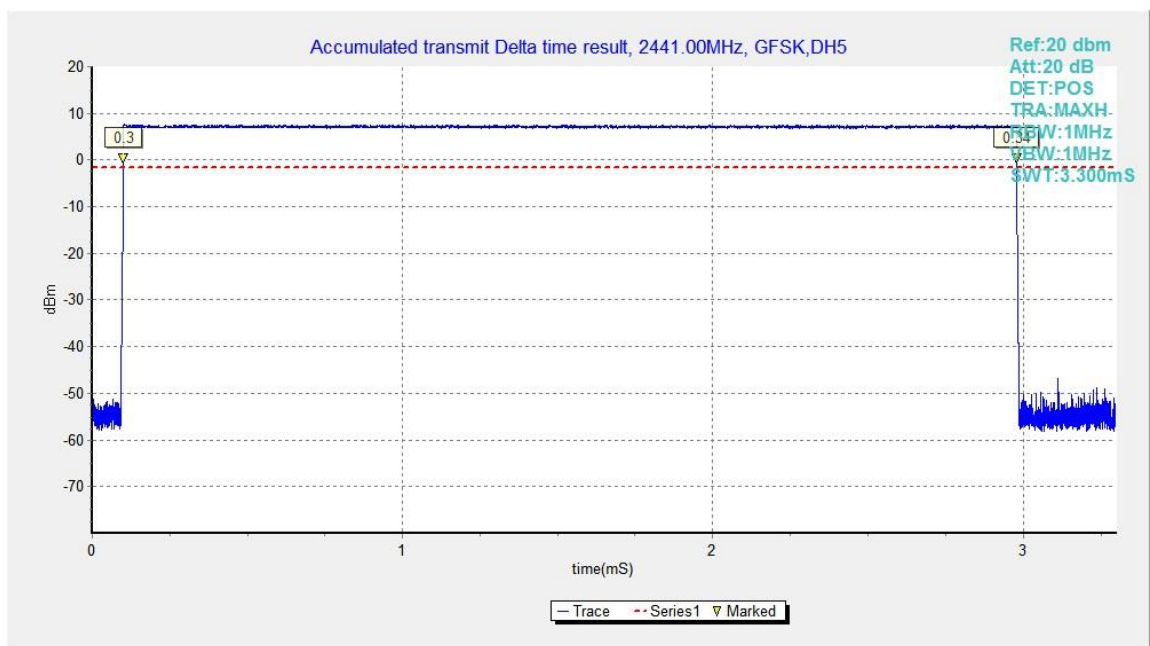


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

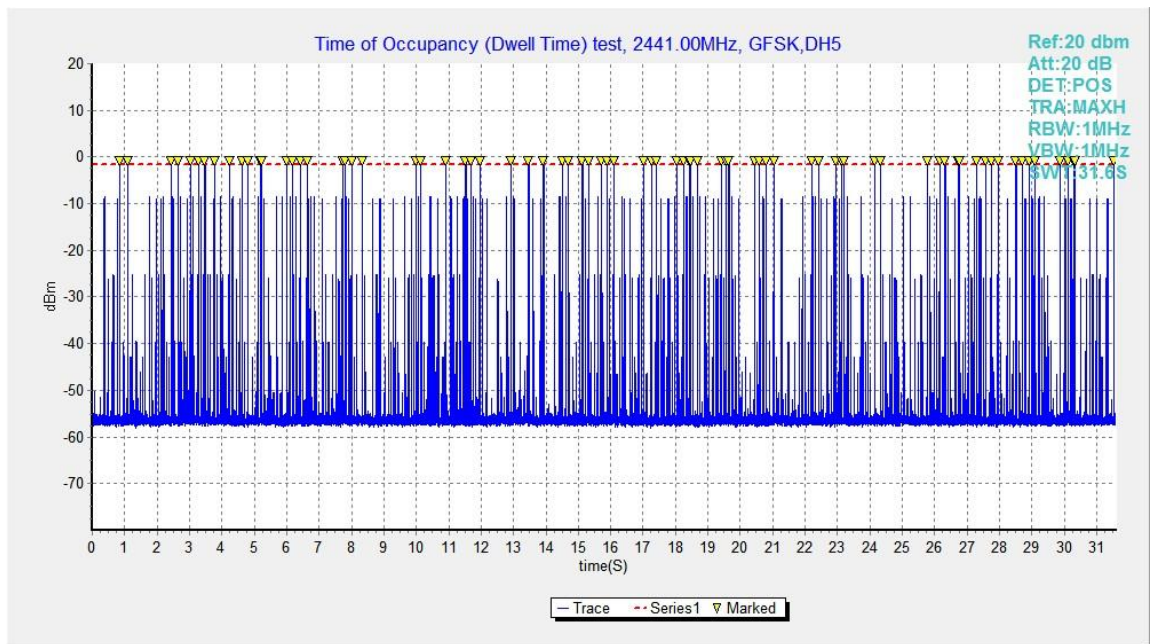


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

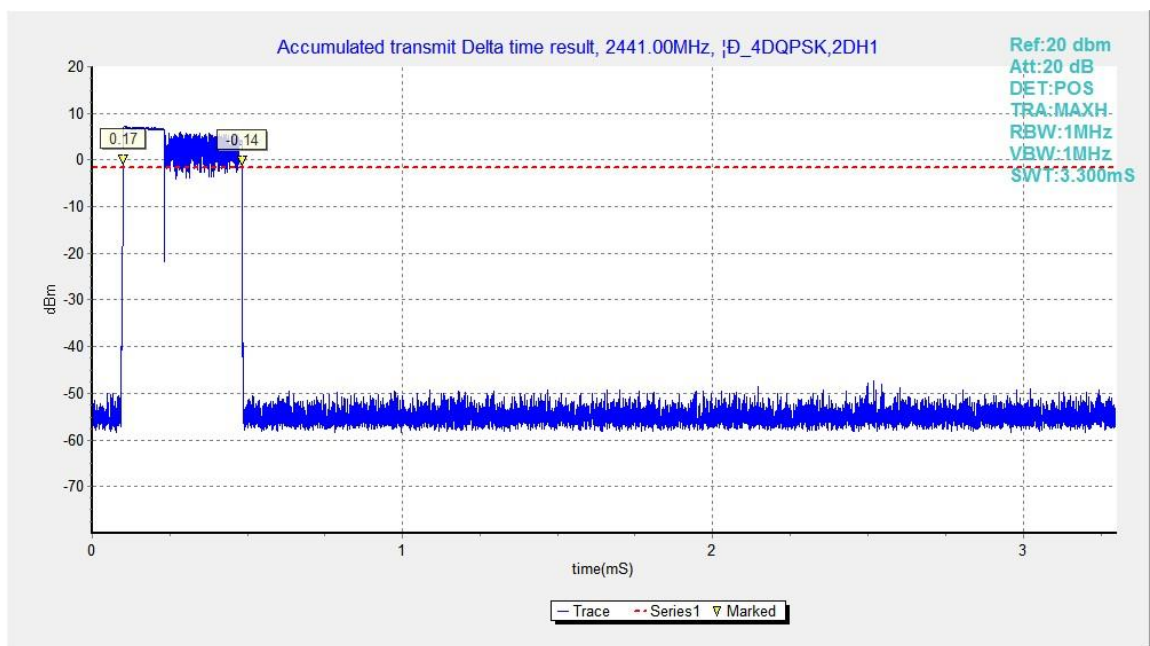


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

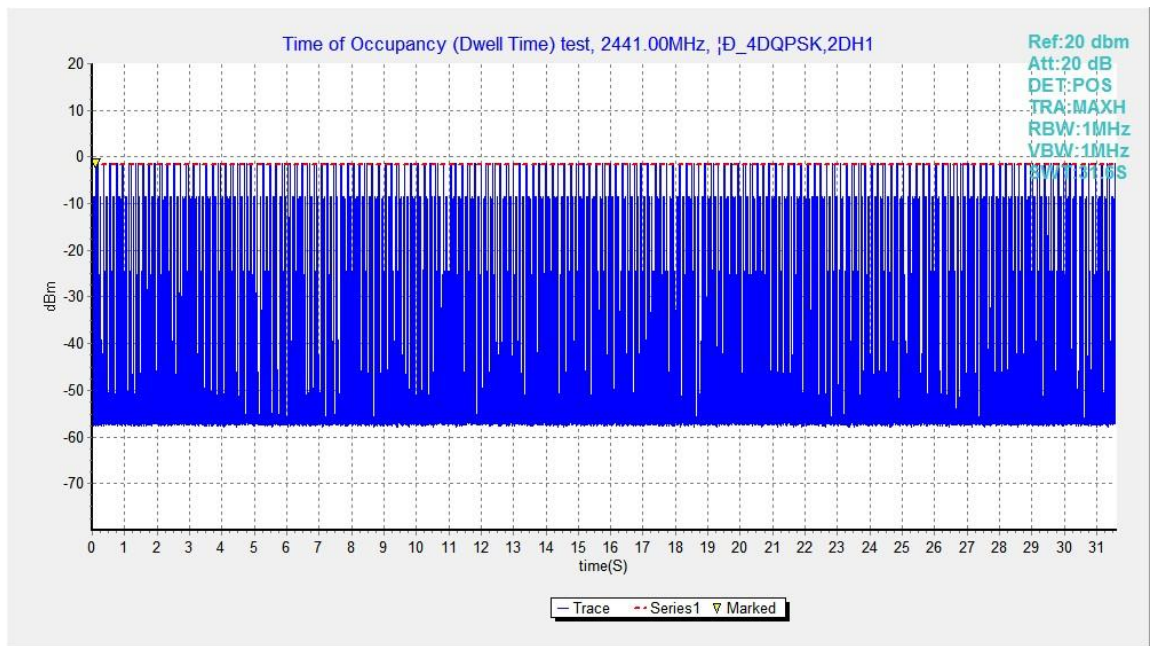


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

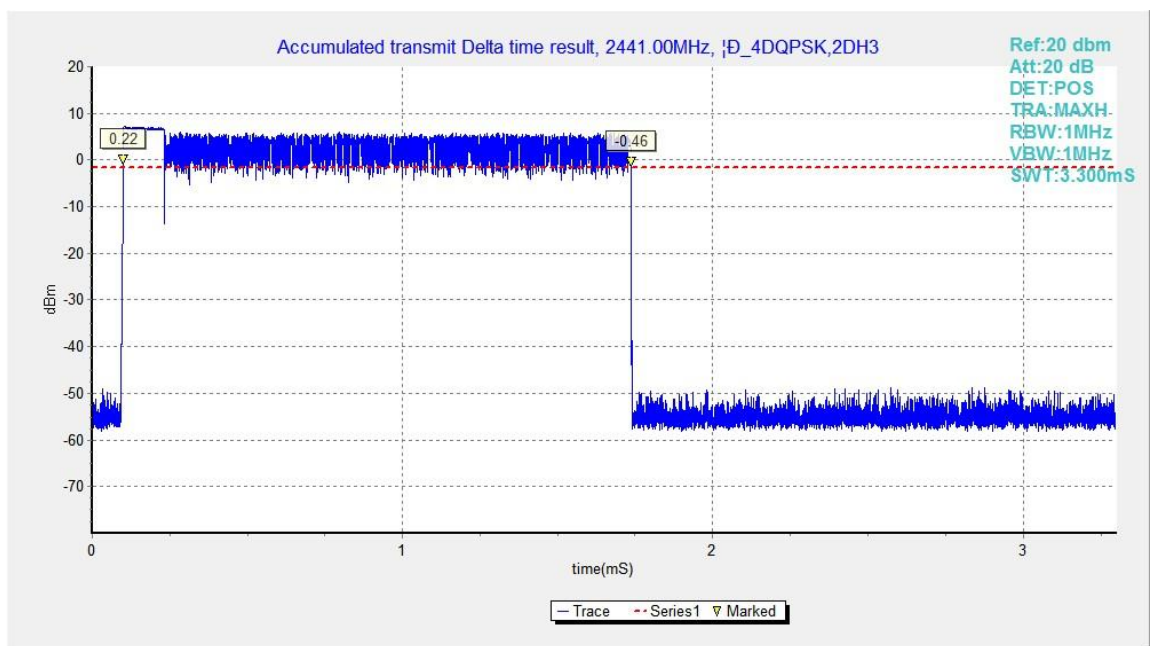


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

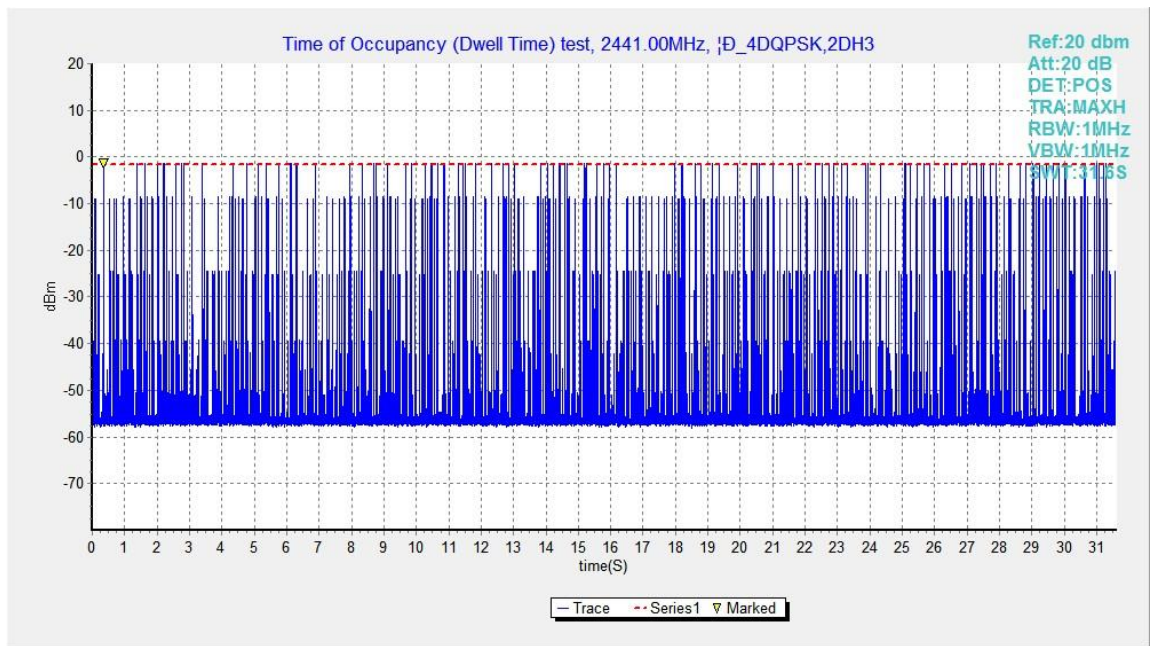


Fig.73. Number of Transmissions Measurement: Channel 39, Packet 2-DH3

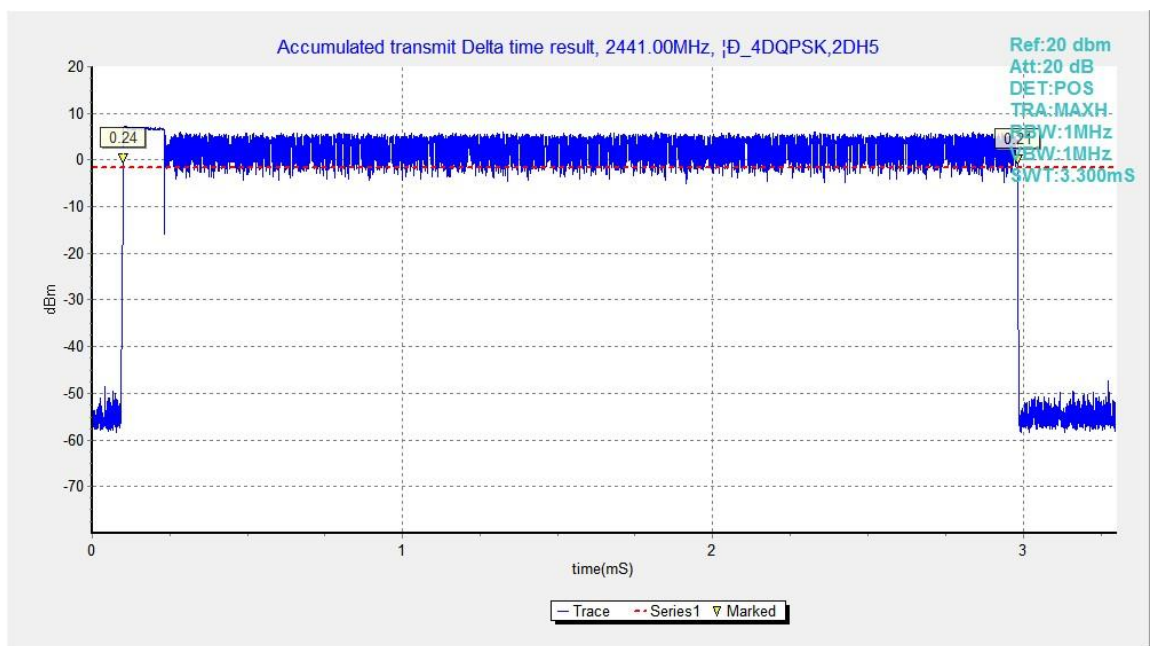


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

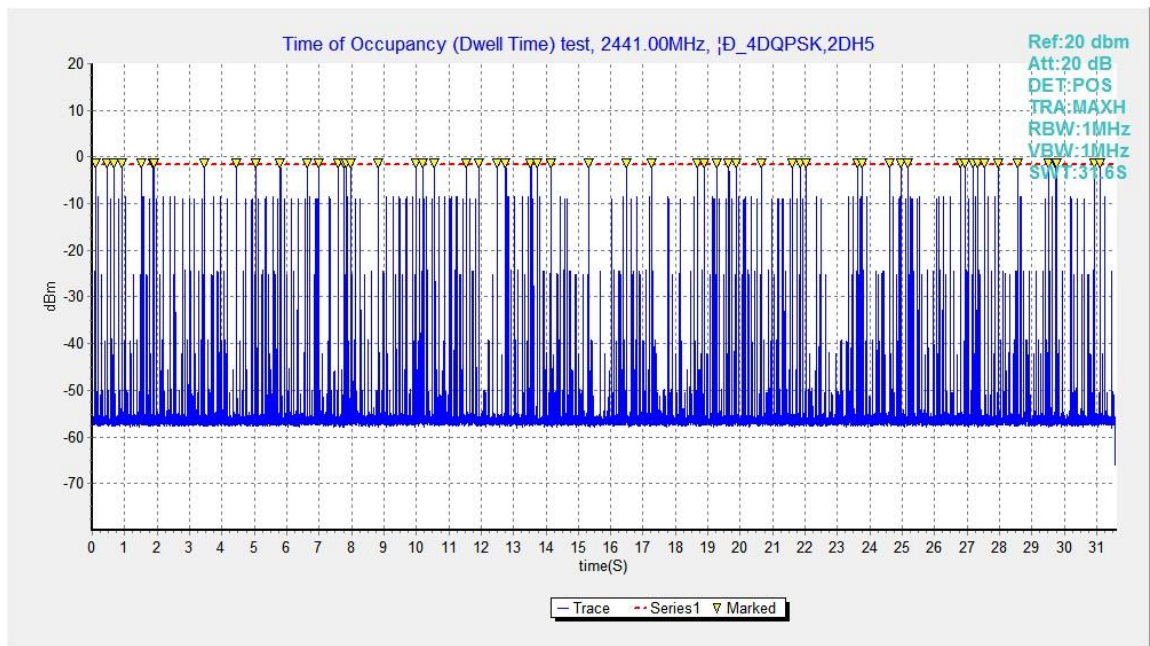


Fig.75. Number of Transmissions Measurement: Channel 39, Packet 2-DH5

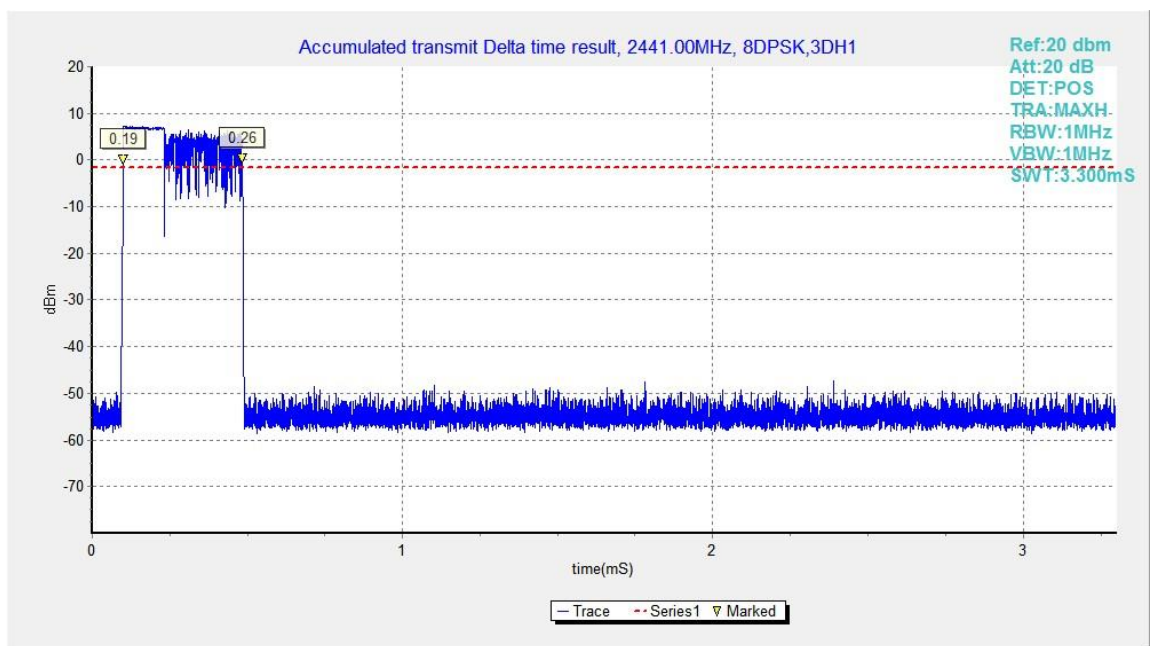


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

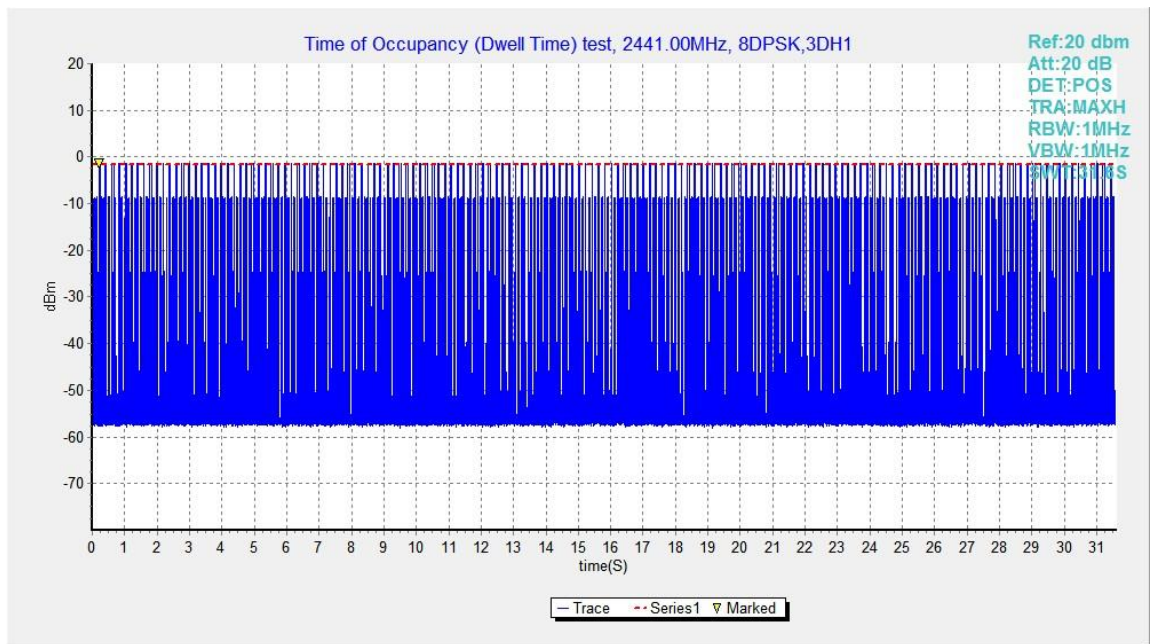


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

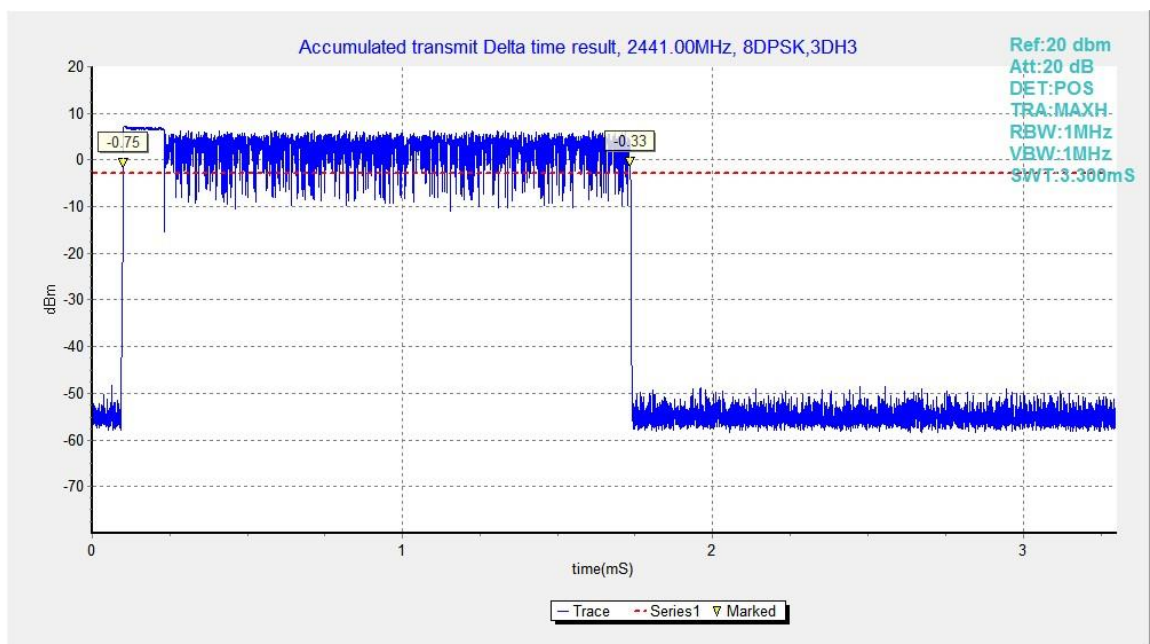


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

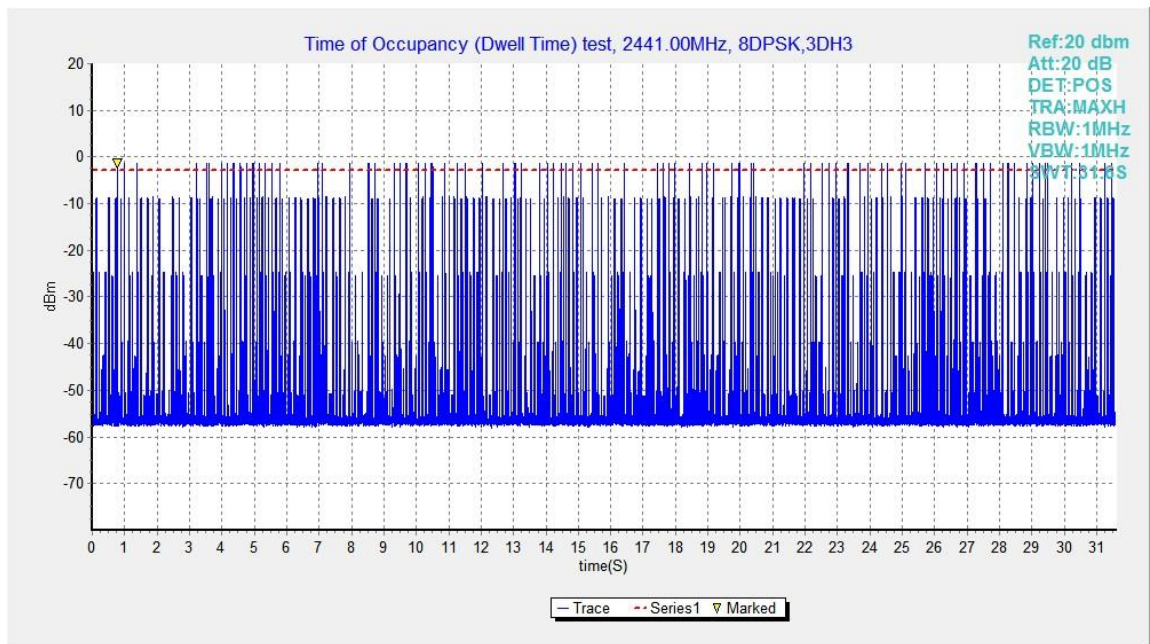


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

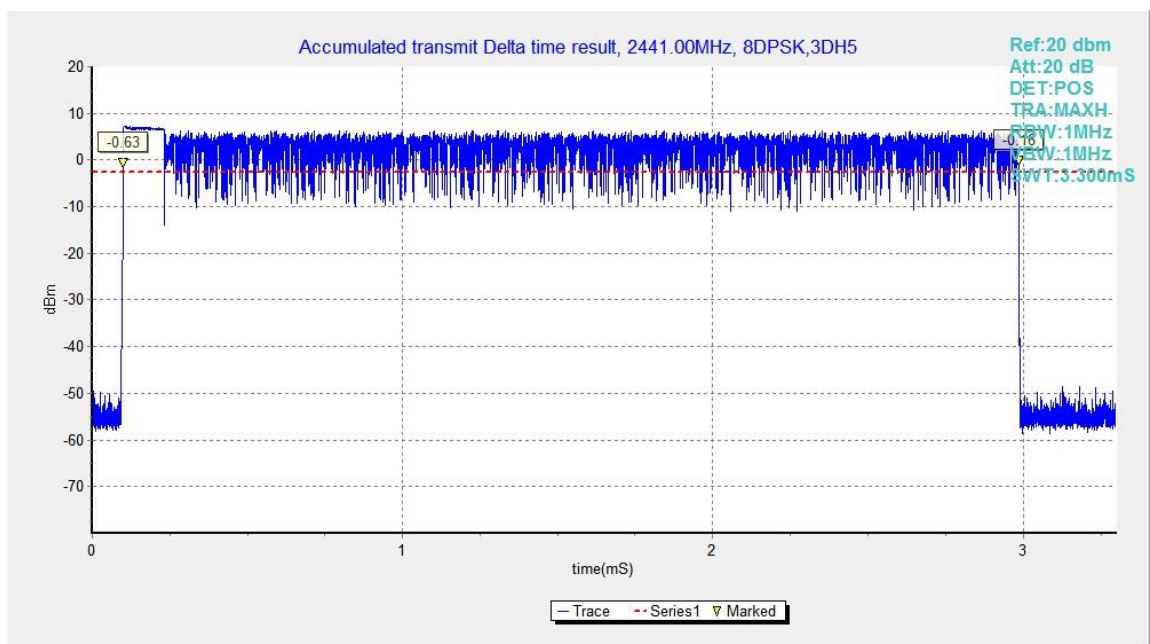


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

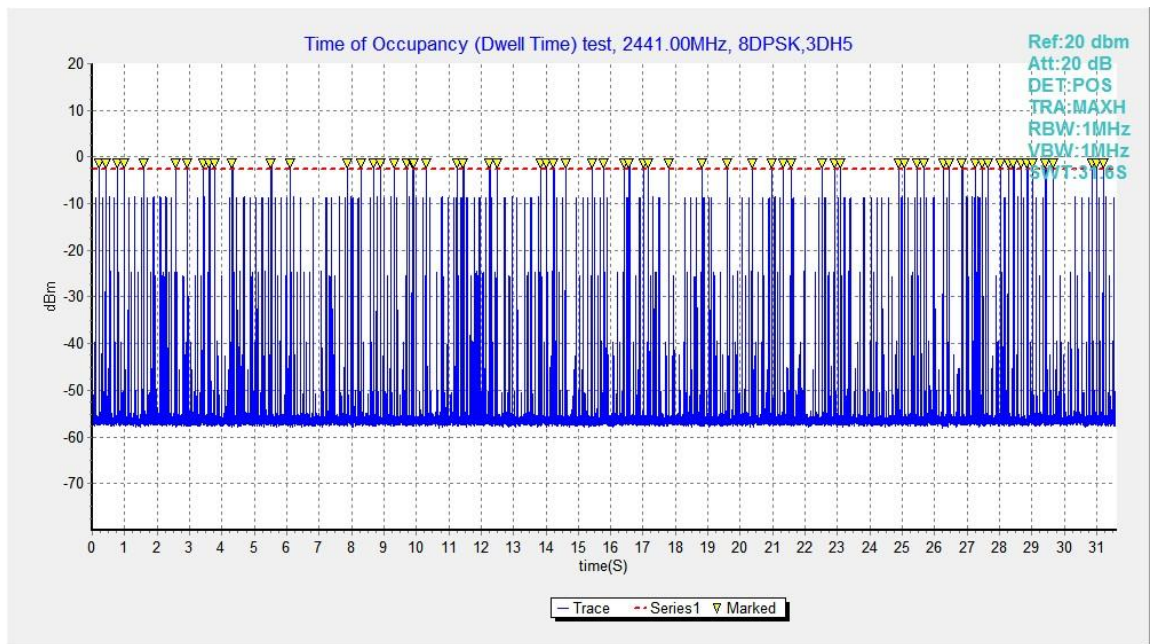


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

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	948.75	NA
39	Fig.83	937.50	NA
78	Fig.84	944.25	NA

For $\pi/4$ DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1209.00	NA
39	Fig.86	1209.00	NA
78	Fig.87	1226.25	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1263.00	NA
39	Fig.89	1203.75	NA
78	Fig.90	1255.50	NA

Conclusion: NA

Test graphs as below:

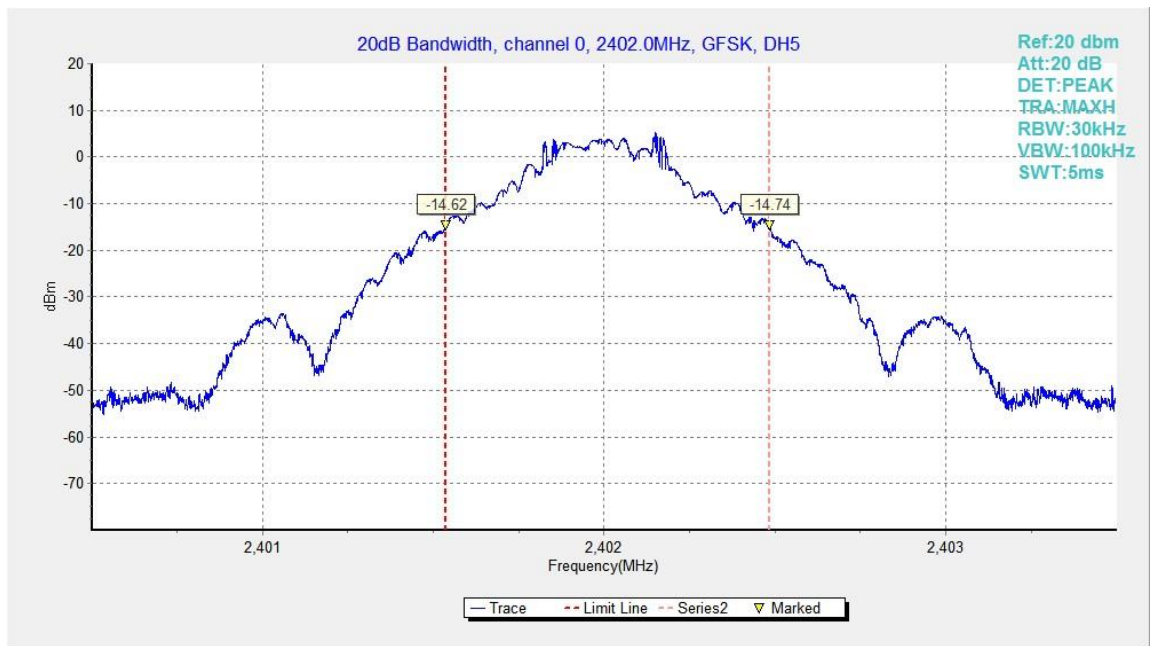


Fig.82. 20dB Bandwidth: GFSK, Channel 0

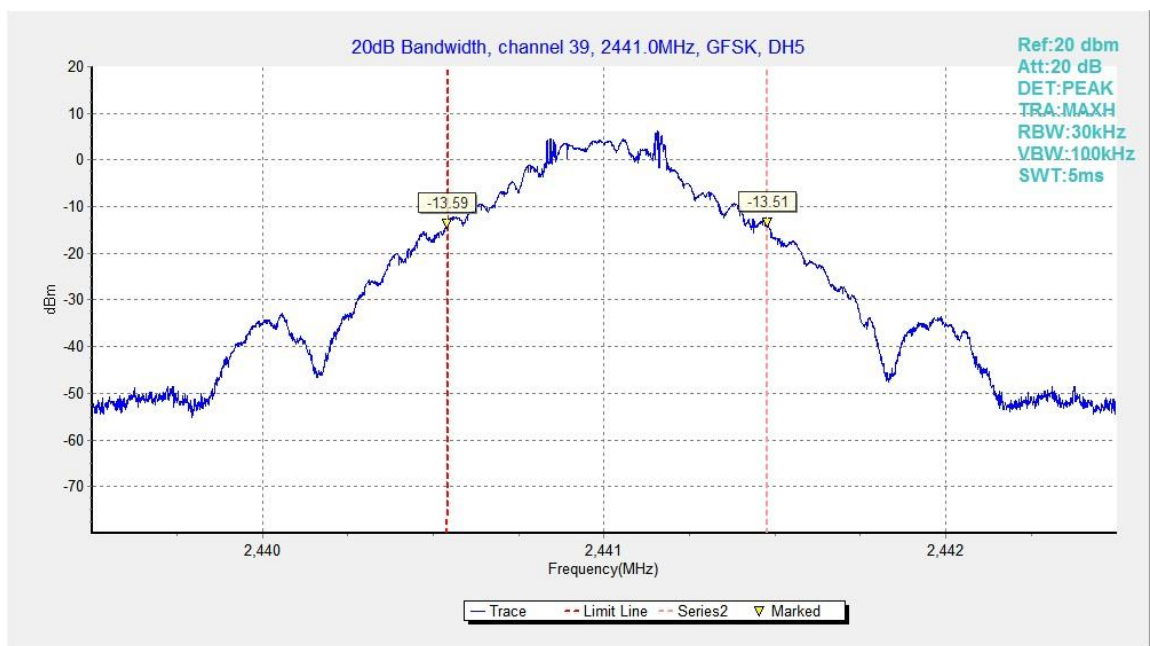


Fig.83. 20dB Bandwidth: GFSK, Channel 39

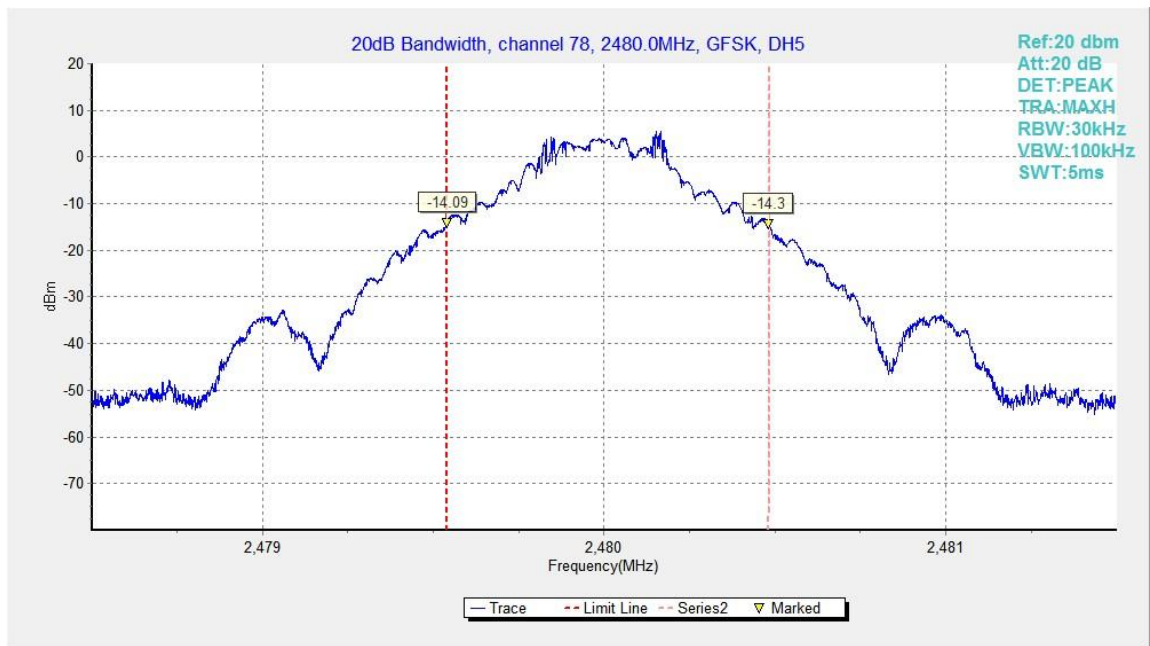


Fig.84. 20dB Bandwidth: GFSK, Channel 78

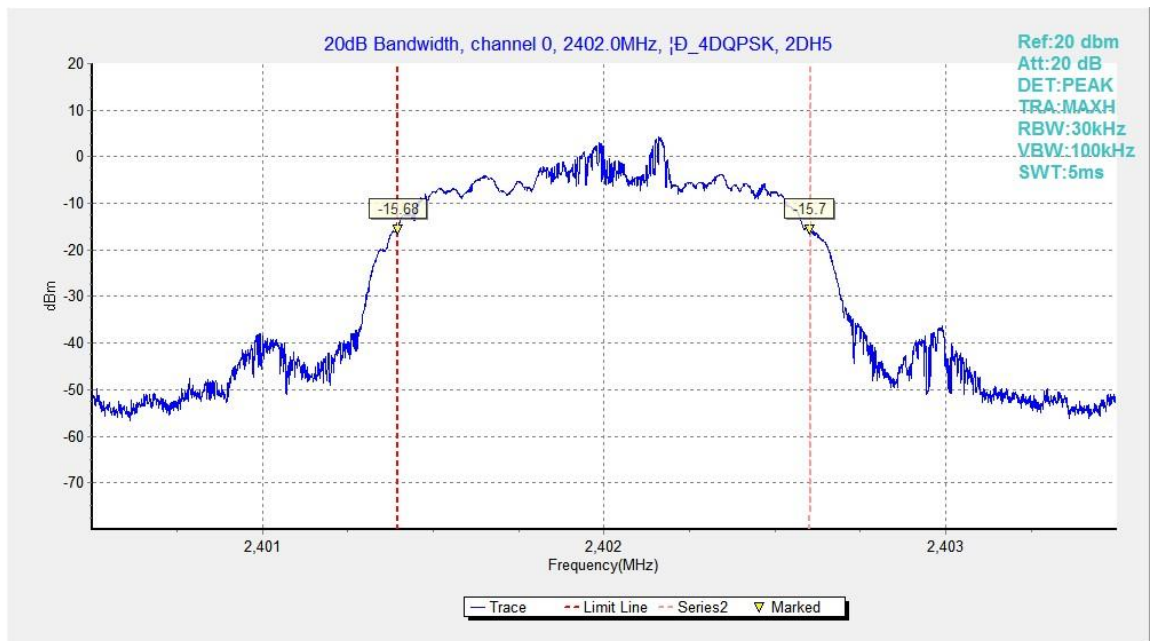


Fig.85. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 0

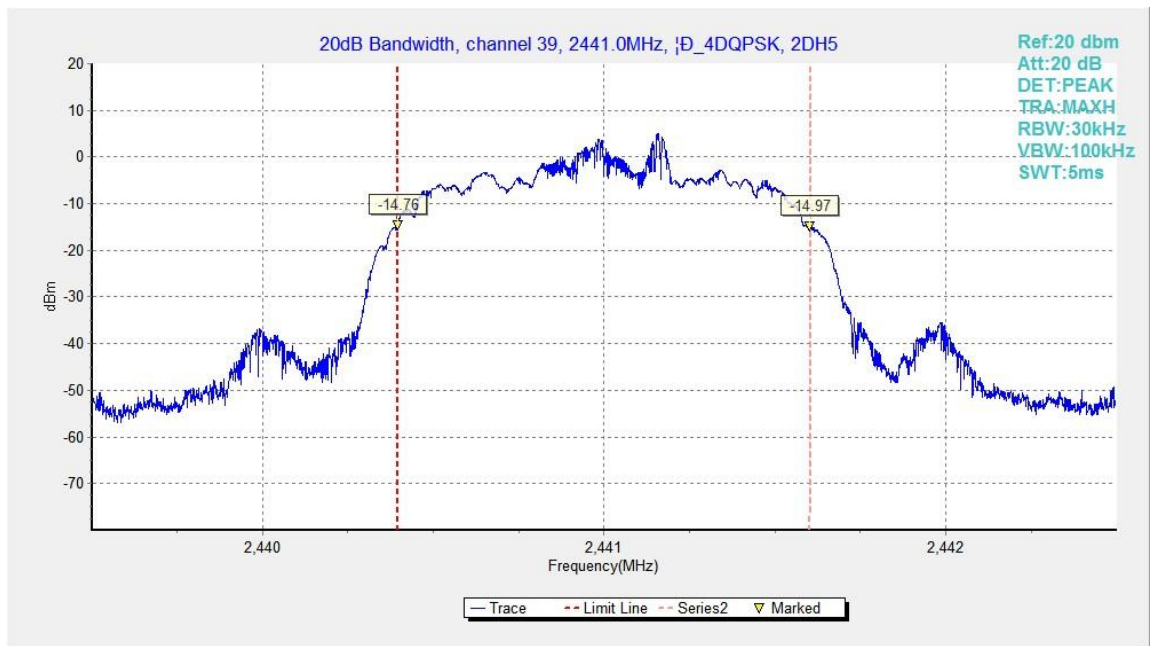


Fig.86. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

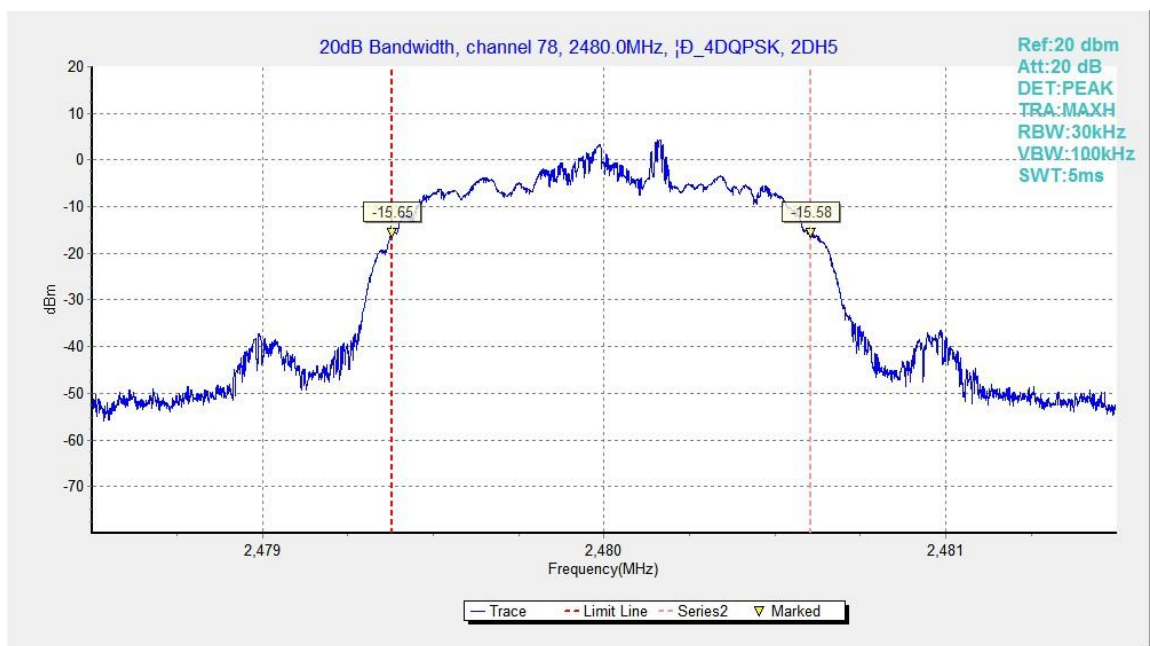


Fig.87. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

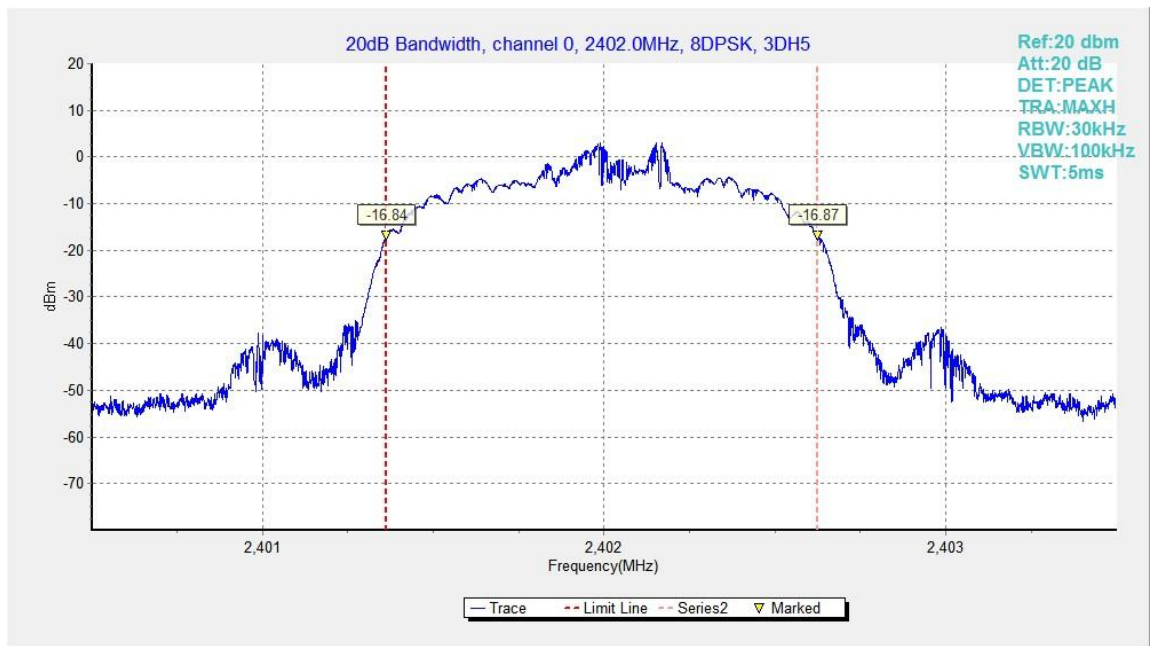


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

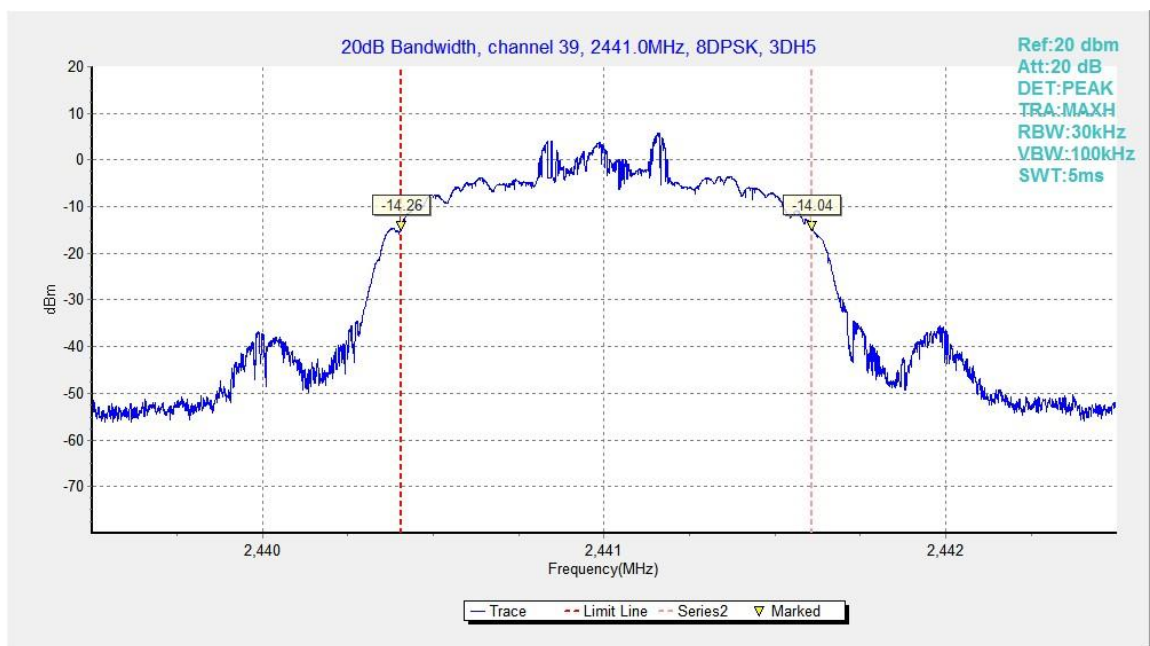


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

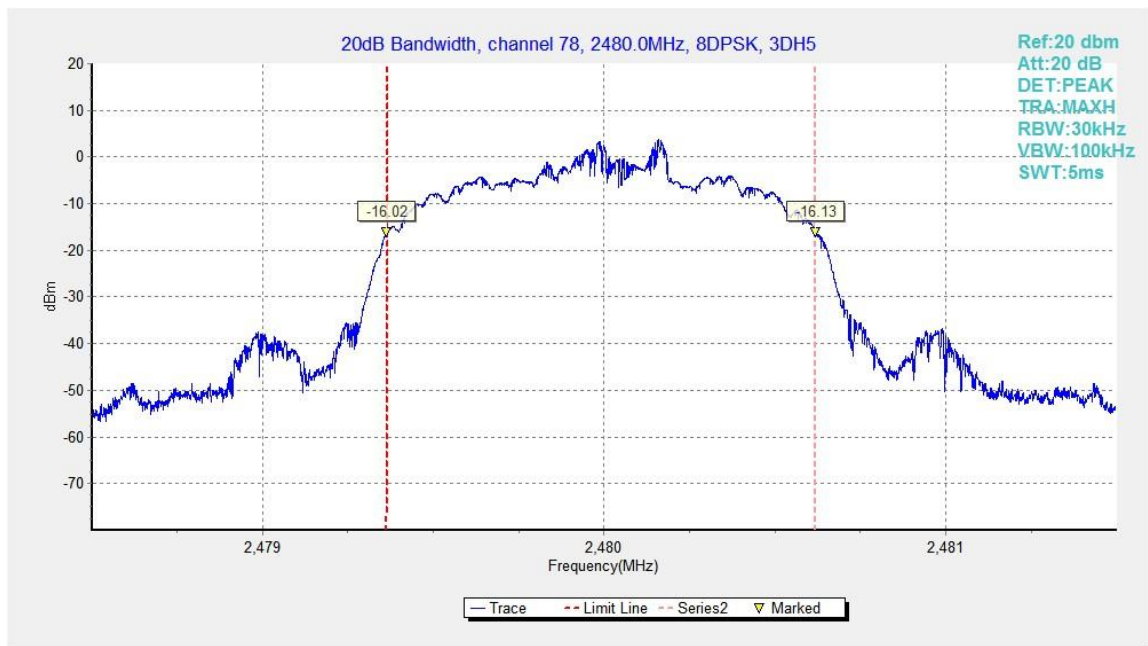


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

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	973.50	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.92	1032.75	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.93	1298.25	P

Conclusion: PASS

Test graphs as below:

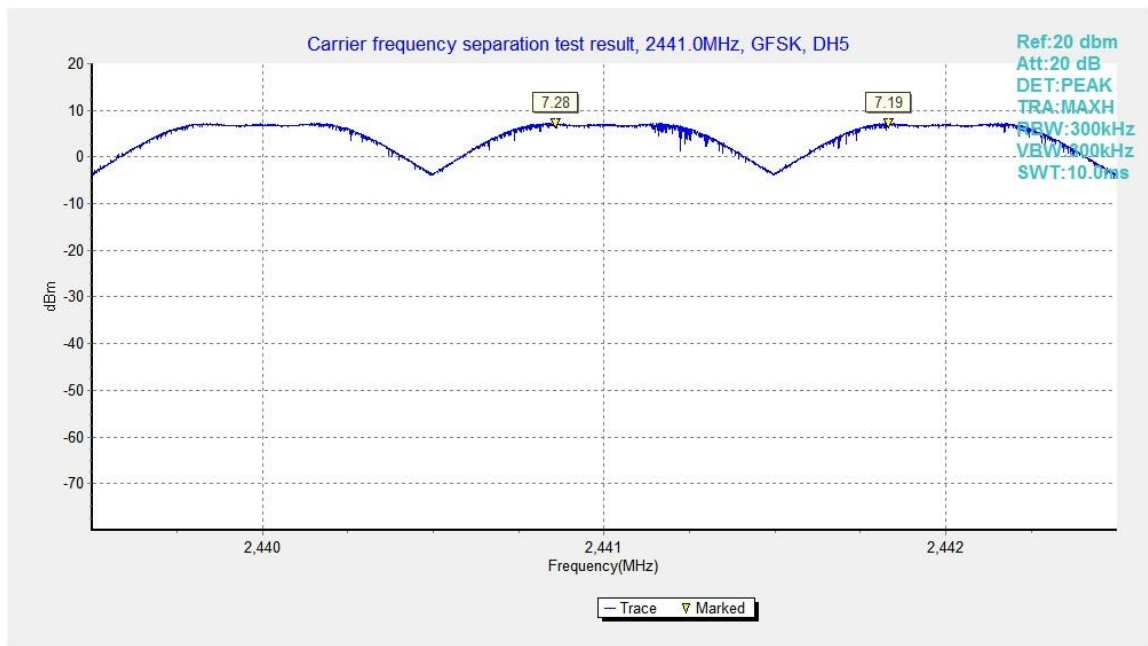


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

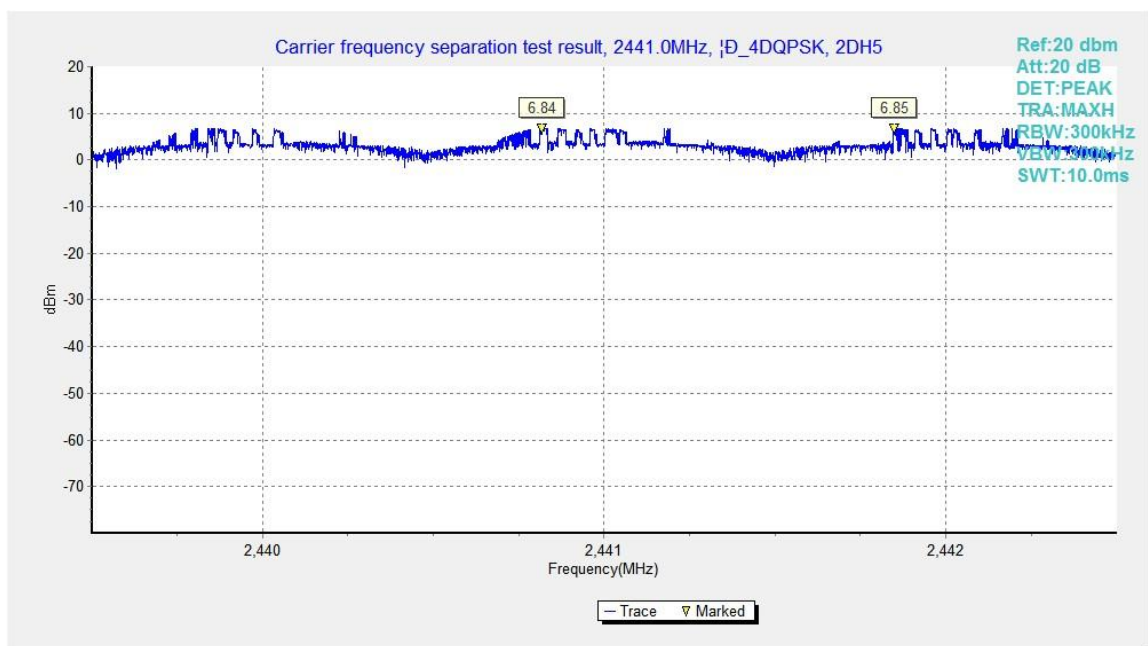


Fig.92. Carrier frequency separation measurement: $\pi/4$ DQPSK, Channel 39

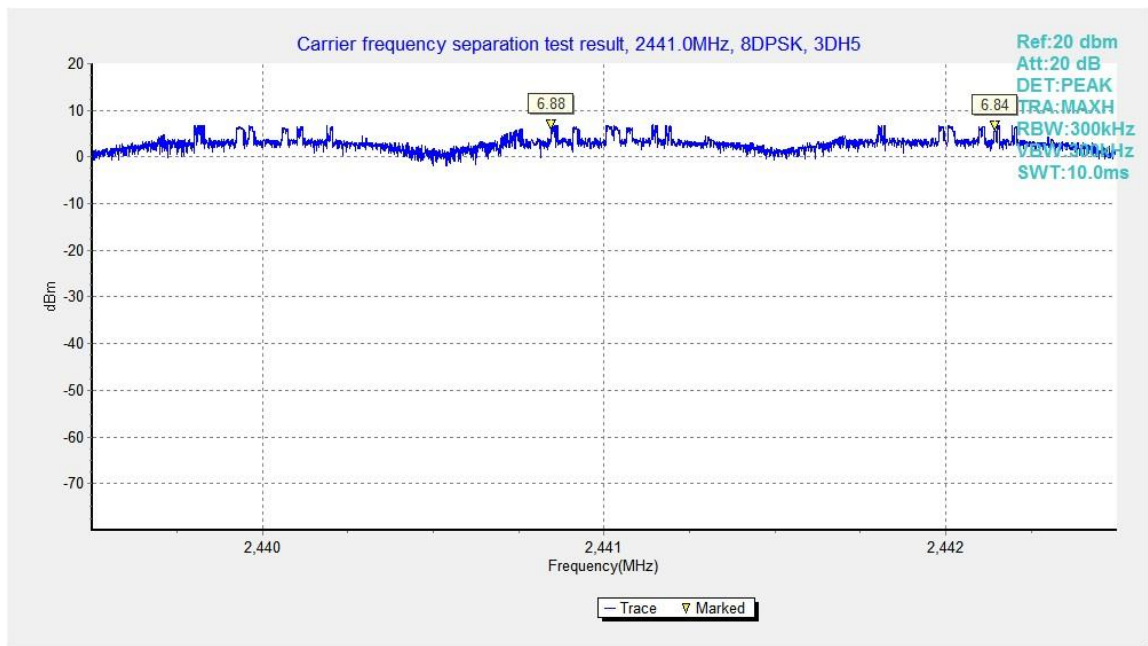


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

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	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:

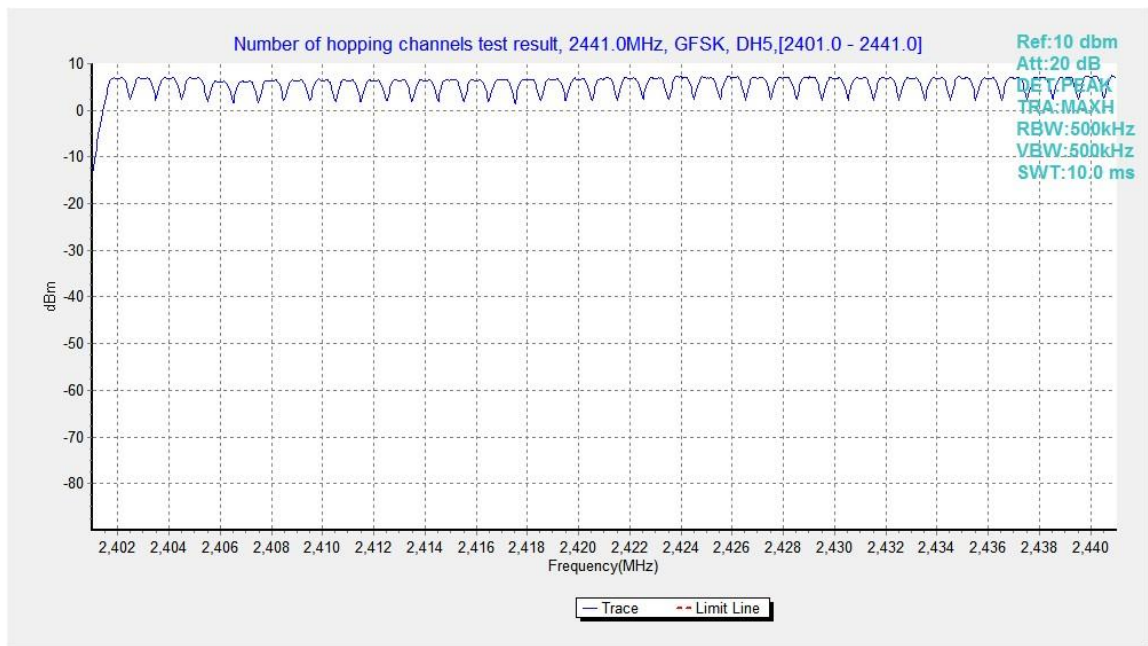


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

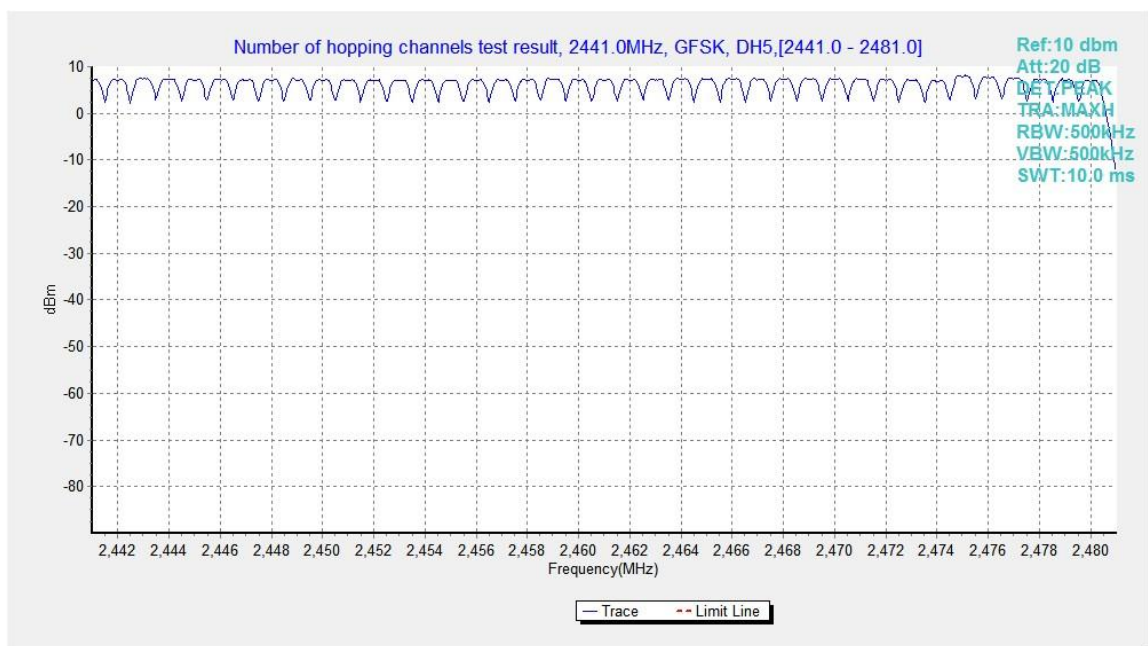


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

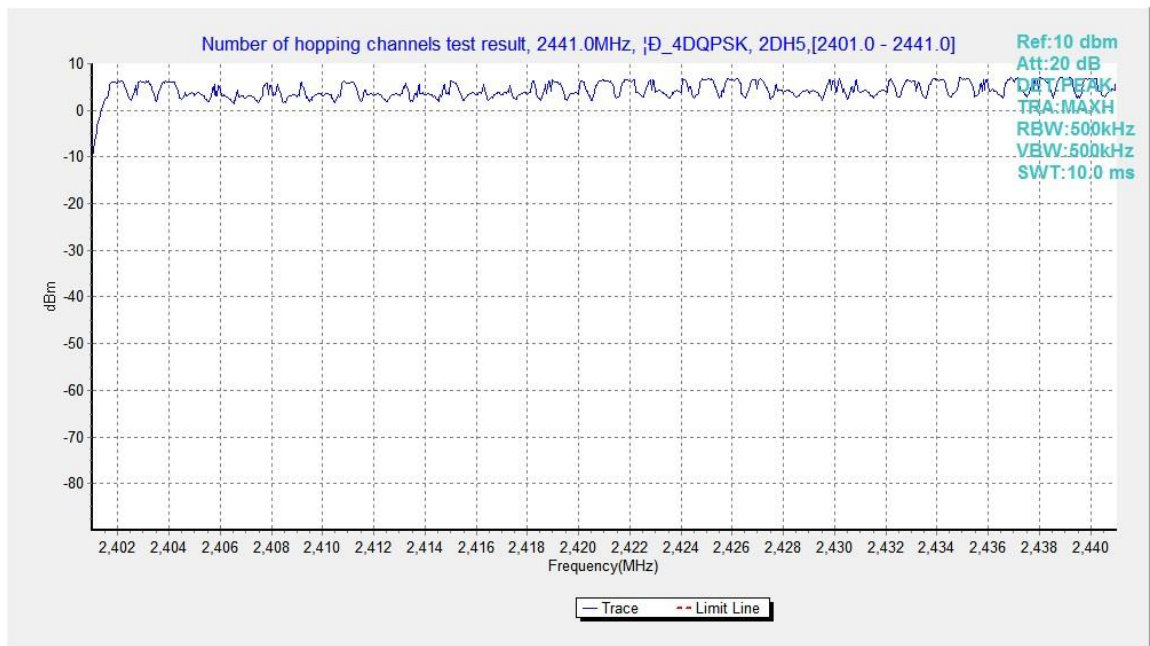


Fig.96. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 0 - 39

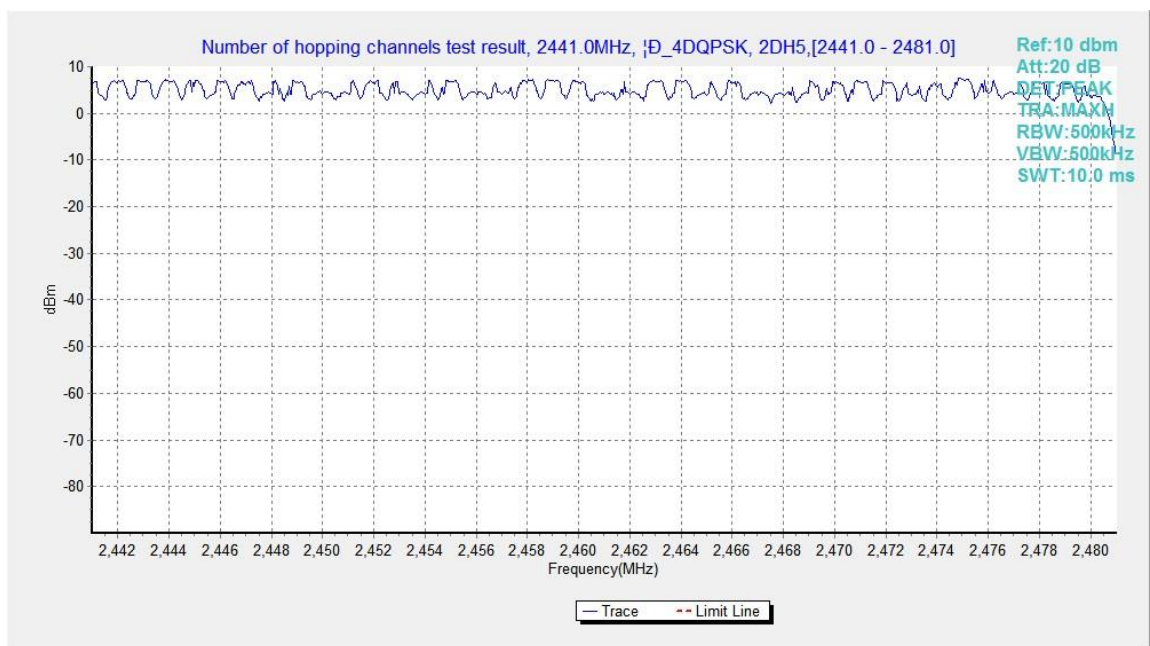


Fig.97. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 40 - 78

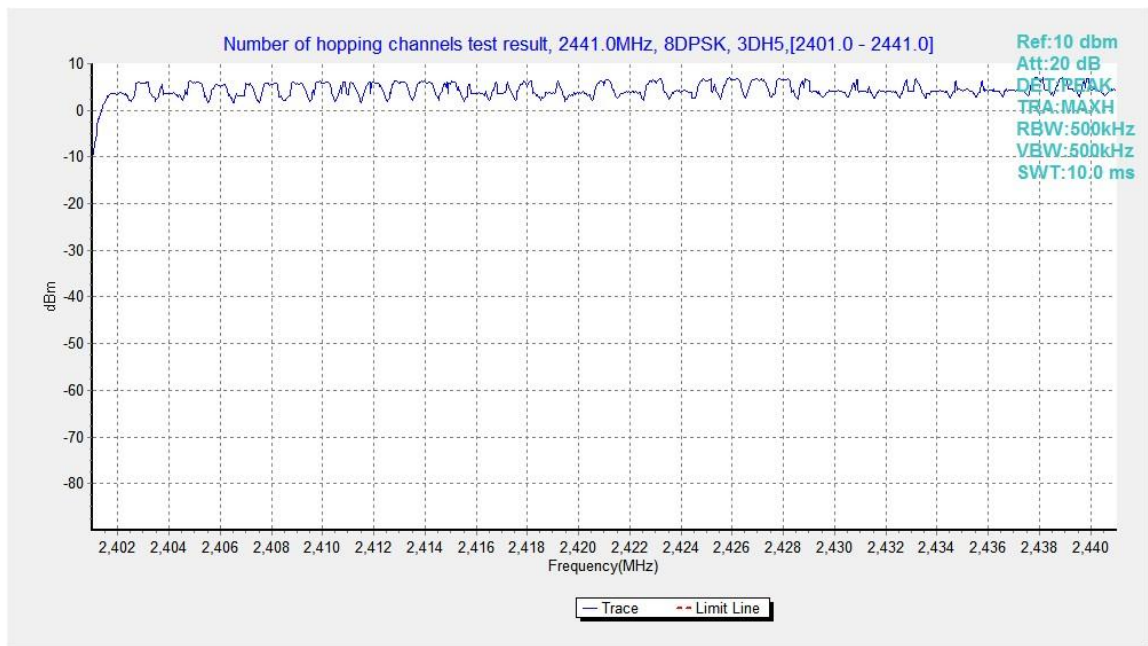


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

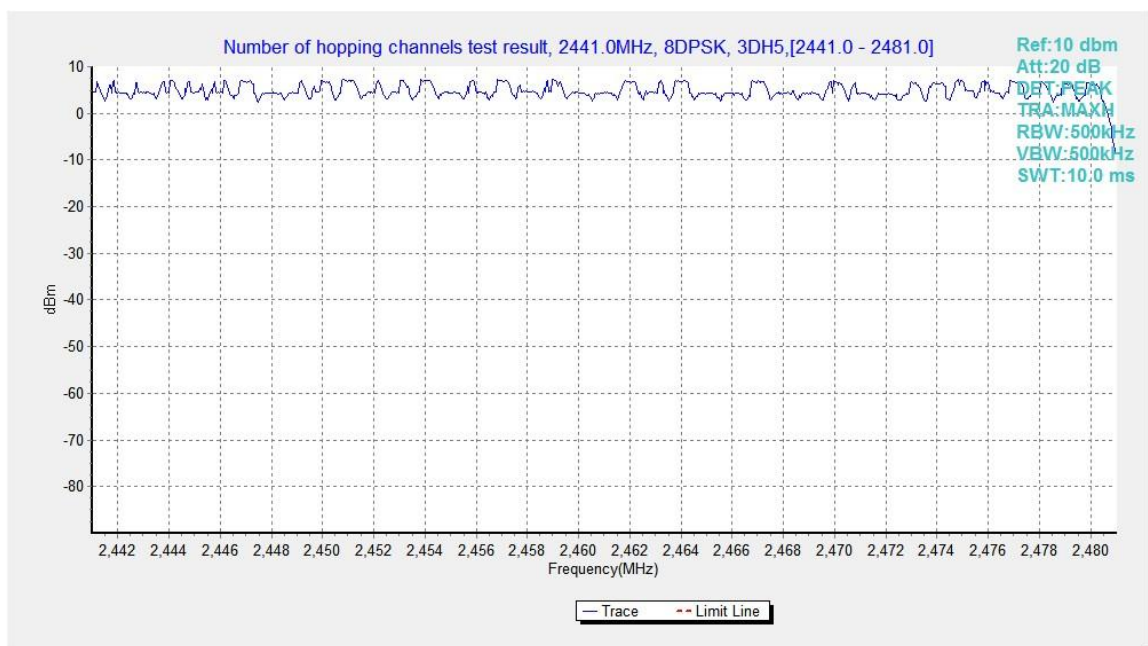


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

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.

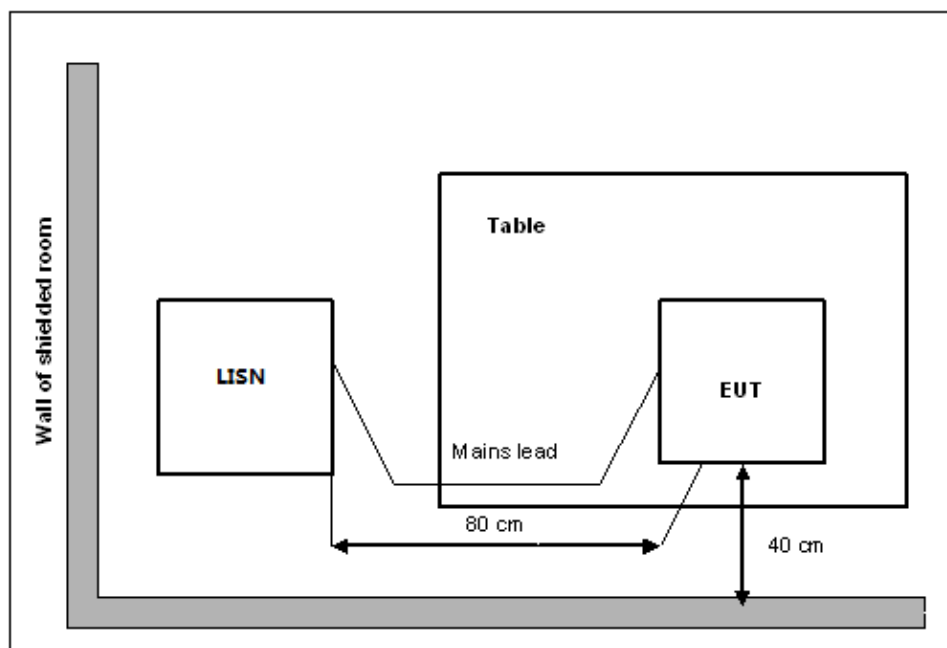
The measurement bandwidth is:

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: UT19a

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		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 (dBμV)	Result (dBμV)		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:

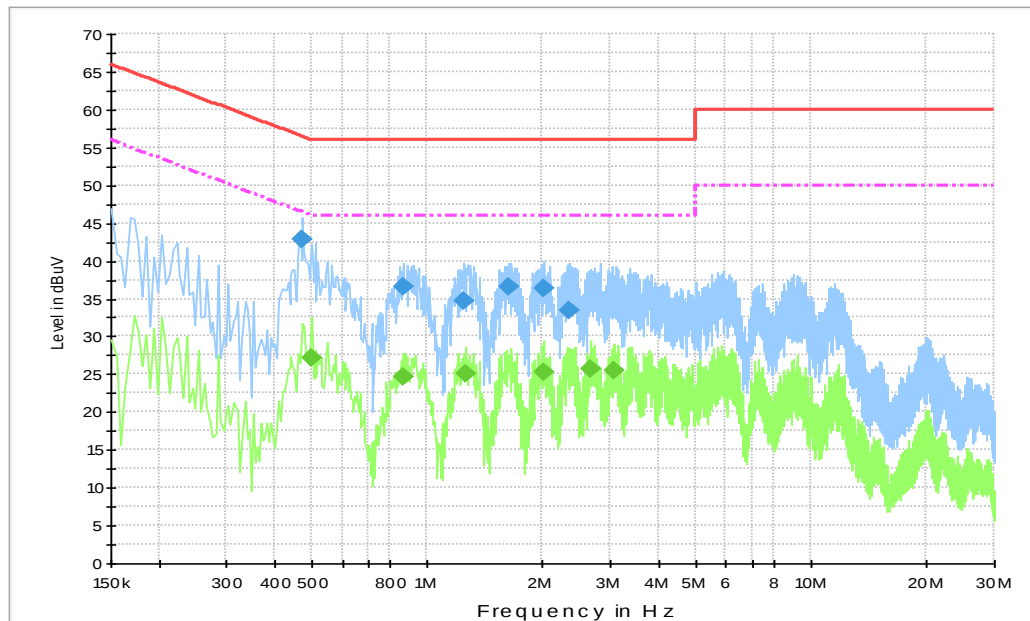


Fig.B.11.1 AC Powerline Conducted Emission- bluetooth

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)
0.474000	42.8	5000.0	9.000	On	L1	19.9	13.6	56.4
0.865500	36.6	5000.0	9.000	On	L1	19.7	19.4	56.0
1.248000	34.7	5000.0	9.000	On	N	19.7	21.3	56.0
1.639500	36.6	5000.0	9.000	On	L1	19.7	19.4	56.0
2.017500	36.3	5000.0	9.000	On	L1	19.7	19.7	56.0
2.346000	33.5	5000.0	9.000	On	N	19.6	22.5	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.501000	27.2	5000.0	9.000	On	N	19.9	18.8	46.0
0.865500	24.7	5000.0	9.000	On	N	19.7	21.3	46.0
1.257000	25.1	5000.0	9.000	On	L1	19.7	20.9	46.0
2.017500	25.4	5000.0	9.000	On	L1	19.7	20.6	46.0
2.679000	25.7	5000.0	9.000	On	N	19.6	20.3	46.0
3.052500	25.6	5000.0	9.000	On	N	19.6	20.4	46.0

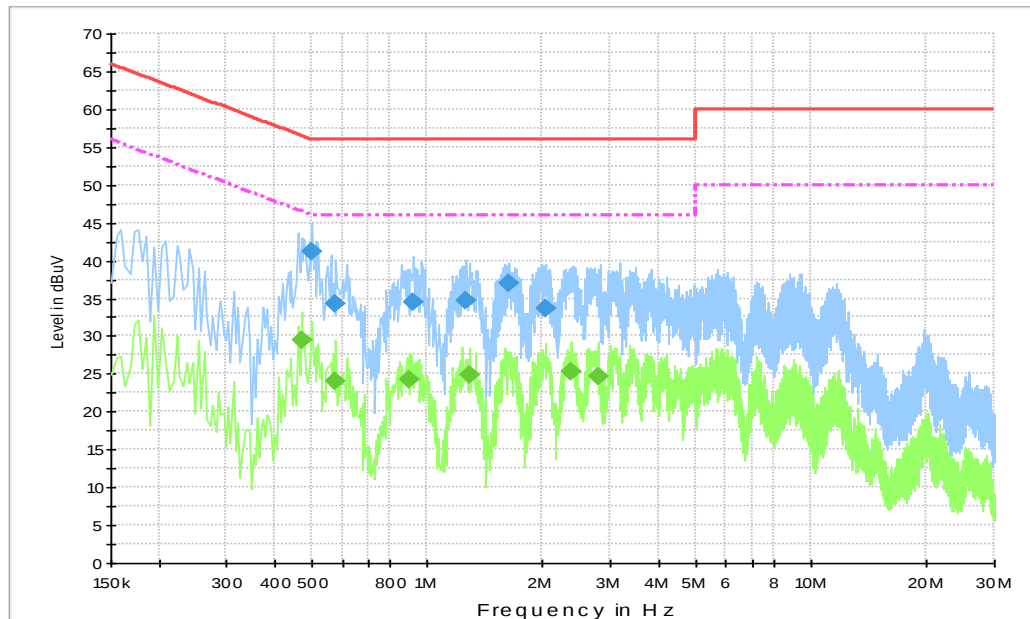


Fig.B.11.2 AC Powerline Conducted Emission-Idle

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.501000	41.1	5000.0	9.000	On	L1	19.9	14.9	56.0
0.577500	34.2	5000.0	9.000	On	N	19.8	21.8	56.0
0.919500	34.4	5000.0	9.000	On	N	19.7	21.6	56.0
1.266000	34.8	5000.0	9.000	On	N	19.7	21.2	56.0
1.621500	36.9	5000.0	9.000	On	L1	19.7	19.1	56.0
2.031000	33.7	5000.0	9.000	On	N	19.7	22.3	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.469500	29.5	5000.0	9.000	On	N	19.9	17.0	46.5
0.577500	24.1	5000.0	9.000	On	L1	19.8	21.9	46.0
0.901500	24.2	5000.0	9.000	On	L1	19.7	21.8	46.0
1.284000	24.9	5000.0	9.000	On	L1	19.7	21.1	46.0
2.373000	25.3	5000.0	9.000	On	L1	19.6	20.7	46.0
2.778000	24.7	5000.0	9.000	On	N	19.6	21.3	46.0

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

ANNEX C: Accreditation Certificate

United States Department of Commerce National Institute of Standards and Technology NVLAP[®]  ILAC-MRA	
Certificate of Accreditation to ISO/IEC 17025:2017	
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 Communiqué dated January 2009).</i>	
2021-09-29 through 2022-09-30 <i>Effective Dates</i>	 DEPARTMENT OF COMMERCE UNITED STATES OF AMERICA  _____ <i>For the National Voluntary Laboratory Accreditation Program</i>

END OF REPORT