

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

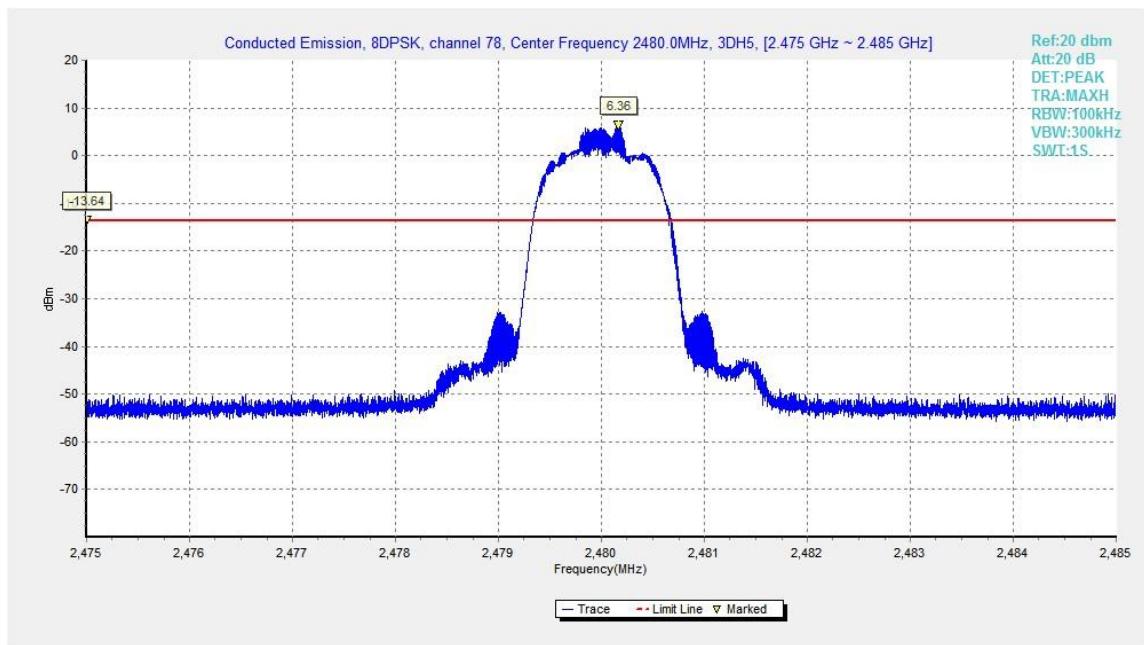


Fig.59. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

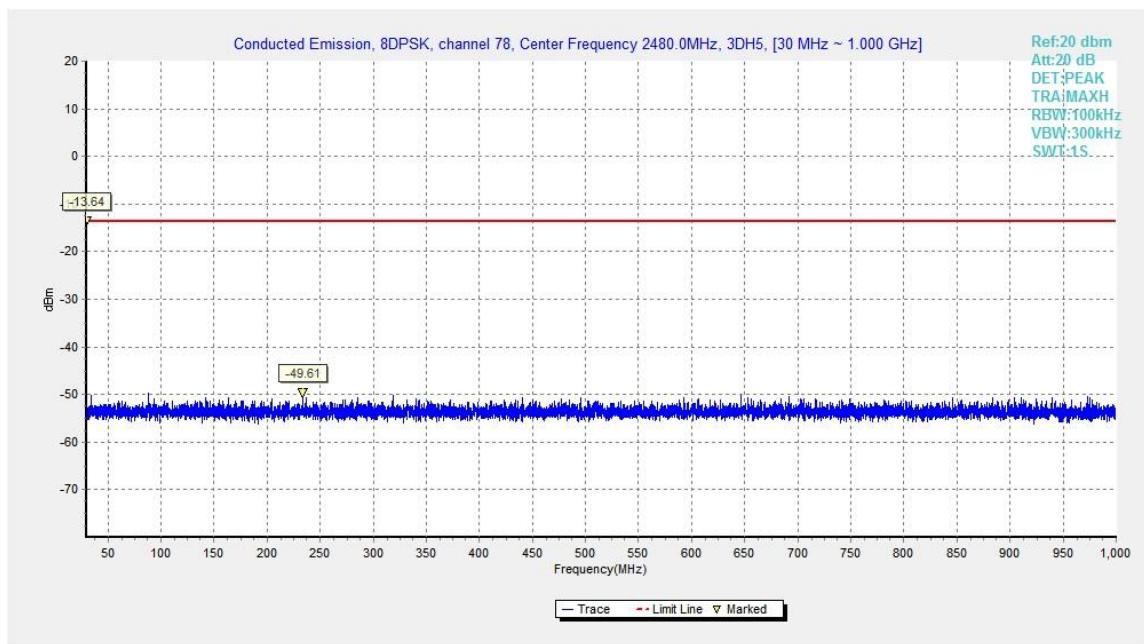


Fig.60. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

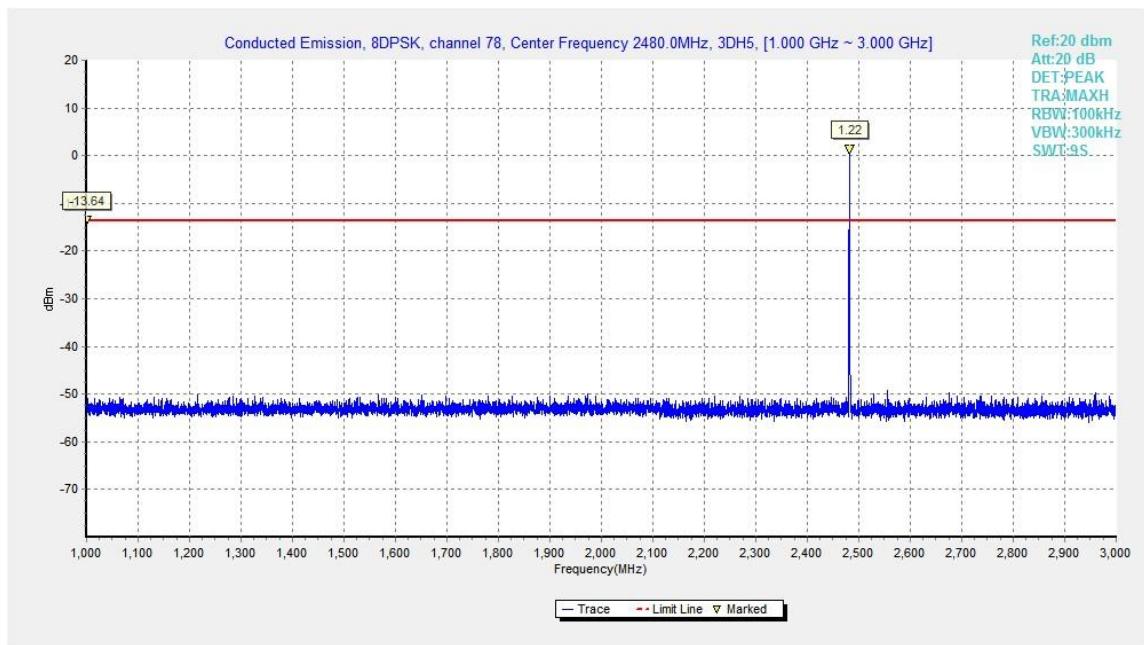


Fig.61. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

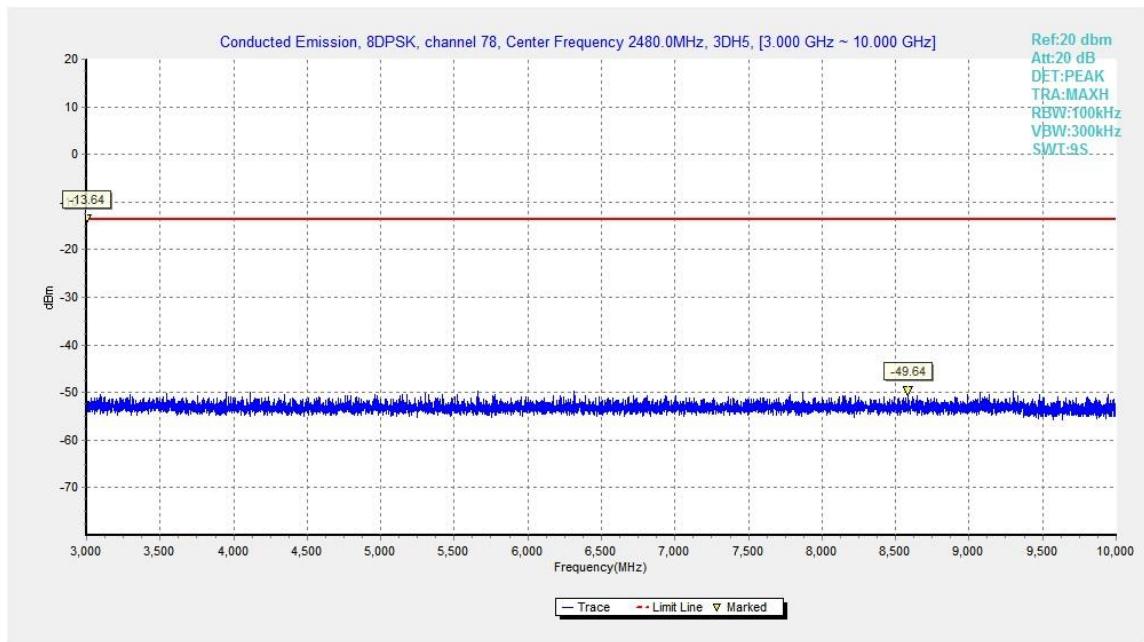


Fig.62. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

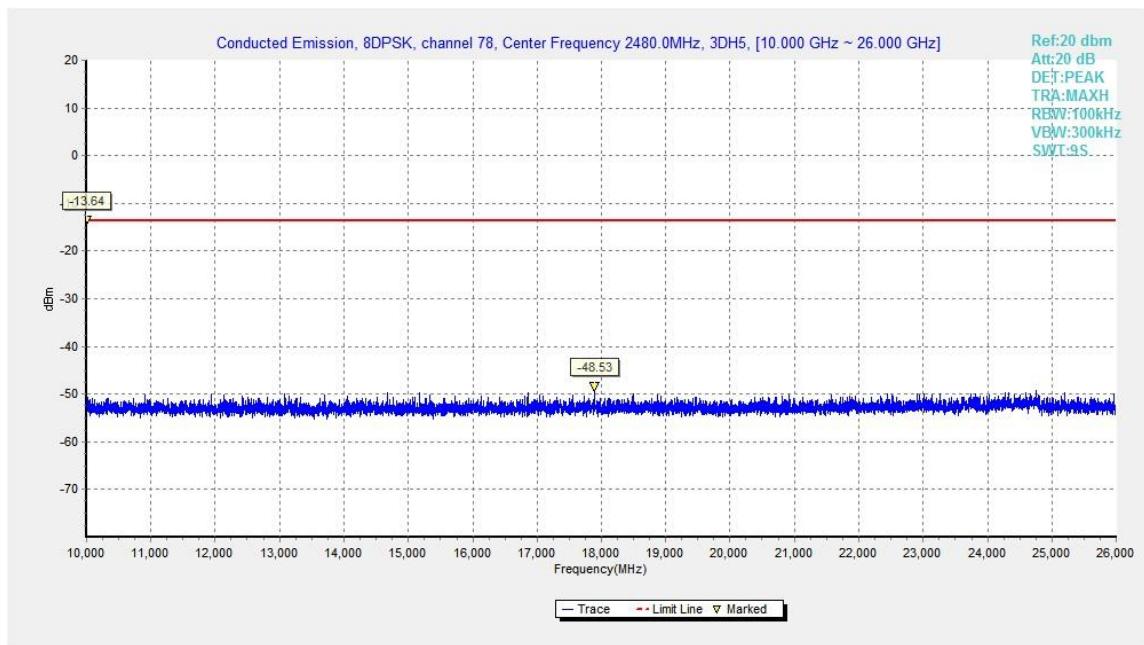


Fig.63. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

## 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( $\mu$ 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(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

**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.

**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.

**The receiver references:**

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100KHz/300KHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

**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 show 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)
2372.062	60.00	2.85	31.98	25.17	74.00	14.00	V
2386.384	60.39	2.86	32.00	25.53	74.00	13.61	H
4804.500	42.85	-33.27	34.12	41.99	74.00	31.15	H
7206.000	41.10	-31.17	35.78	36.48	74.00	32.90	H
9608.000	41.69	-30.55	36.65	35.59	74.00	32.31	V
12010.000	45.40	-28.93	38.71	35.62	74.00	28.60	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)
2363.800	43.68	-35.34	31.97	47.04	74.00	30.32	H
2508.200	45.20	-34.95	32.12	48.04	74.00	28.80	H
4882.000	40.69	-33.32	34.15	39.85	74.00	33.31	H
7323.000	40.33	-30.91	35.83	35.41	74.00	33.67	H
9764.000	41.13	-30.33	36.87	34.59	74.00	32.87	V
12205.000	44.11	-28.02	38.82	33.31	74.00	29.89	H

**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)
2484.470	60.59	2.93	32.09	25.57	74.00	13.41	V
2498.115	60.77	2.94	32.10	25.73	74.00	13.23	V
4960.000	43.20	-33.60	34.18	42.61	74.00	30.80	V
7440.000	39.53	-31.69	35.88	35.34	74.00	34.47	V
9920.000	41.84	-30.00	37.09	34.75	74.00	32.16	H
12400.000	45.57	-28.10	38.94	34.73	74.00	28.43	H

**π/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)
2377.214	60.51	2.86	31.99	25.67	74.00	13.49	V
2387.994	60.23	2.86	32.00	25.37	74.00	13.77	H
4804.000	41.04	-33.27	34.12	40.18	74.00	32.96	H
7206.000	42.27	-31.17	35.78	37.66	74.00	31.73	H
9608.000	42.64	-30.55	36.65	36.54	74.00	31.36	H
12010.000	45.63	-28.93	38.71	35.85	74.00	28.37	H

**π/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)
2369.980	43.74	-35.34	31.98	47.11	74.00	30.26	H
2516.200	44.86	-34.83	32.13	47.56	74.00	29.14	H
4882.000	42.80	-33.32	34.15	41.96	74.00	31.20	V
7323.000	41.80	-30.91	35.83	36.87	74.00	32.20	V
9764.000	42.26	-30.33	36.87	35.72	74.00	31.74	V
12205.000	45.08	-28.02	38.82	34.27	74.00	28.92	V

**π/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)
2485.455	60.90	2.93	32.09	25.88	74.00	13.10	H
2496.675	60.99	2.94	32.10	25.95	74.00	13.01	H
4960.000	41.75	-33.60	34.18	41.17	74.00	32.25	H
7440.000	41.11	-31.69	35.88	36.93	74.00	32.89	H
9920.000	42.99	-30.00	37.09	35.90	74.00	31.01	H
12400.000	46.40	-28.10	38.94	35.55	74.00	27.60	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)
2387.406	59.67	2.86	32.00	24.81	74.00	14.33	V
2388.946	59.91	2.87	32.00	25.04	74.00	14.09	V
4804.500	43.51	-33.27	34.12	42.65	74.00	30.49	V
7206.000	41.83	-31.17	35.78	37.21	74.00	32.17	H
9608.000	41.36	-30.55	36.65	35.25	74.00	32.64	V
12010.000	45.16	-28.93	38.71	35.38	74.00	28.84	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)
2362.000	43.35	-35.33	31.97	46.71	74.00	30.65	H
2512.800	43.93	-34.88	32.13	46.69	74.00	30.07	H
4882.000	41.07	-33.32	34.15	40.24	74.00	32.93	V
7323.000	42.26	-30.91	35.83	37.33	74.00	31.74	V
9764.000	42.08	-30.33	36.87	35.54	74.00	31.92	H
12205.000	45.69	-28.02	38.82	34.88	74.00	28.31	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)
2485.975	59.58	2.93	32.09	24.56	74.00	14.42	H
2486.990	60.21	2.93	32.09	25.18	74.00	13.79	V
4960.000	42.49	-33.60	34.18	41.90	74.00	31.51	H
7440.000	40.43	-31.69	35.88	36.25	74.00	33.57	H
9920.000	42.96	-30.00	37.09	35.87	74.00	31.04	H
12400.000	45.35	-28.10	38.94	34.51	74.00	28.65	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)
2389.260	46.33	2.87	32.00	11.47	54.00	7.67	V
2389.440	46.31	2.87	32.00	11.45	54.00	7.69	V
4803.000	33.35	-33.27	34.12	32.50	54.00	20.65	H
7206.000	28.29	-31.17	35.78	23.67	54.00	25.71	H
9607.500	29.63	-30.55	36.65	23.53	54.00	24.37	V
12010.500	32.55	-28.93	38.71	22.77	54.00	21.45	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)
2434.500	46.43	2.90	32.04	11.50	54.00	7.57	V
2447.580	46.47	2.91	32.05	11.51	54.00	7.53	V
4881.000	30.96	-33.32	34.15	30.12	54.00	23.04	H
7323.000	29.38	-30.91	35.83	24.46	54.00	24.62	H
9763.500	30.02	-30.33	36.87	23.49	54.00	23.98	V
12205.500	33.00	-28.02	38.82	22.19	54.00	21.00	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)
2483.520	49.31	2.93	32.09	14.30	54.00	4.69	V
2483.580	49.02	2.93	32.09	14.01	54.00	4.98	V
4959.000	32.19	-33.60	34.18	31.60	54.00	21.81	H
7440.000	28.59	-31.69	35.88	24.41	54.00	25.41	H
9919.500	30.35	-30.00	37.09	23.26	54.00	23.65	V
12400.500	32.74	-28.10	38.94	21.89	54.00	21.26	H

**π/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)
2389.920	46.25	2.87	32.00	11.39	54.00	7.75	V
2389.950	46.25	2.87	32.00	11.39	54.00	7.75	V
4803.700	32.94	-33.27	34.12	32.09	54.00	21.06	H
7205.800	29.69	-31.17	35.78	25.07	54.00	24.31	V
9607.900	30.52	-30.55	36.65	24.41	54.00	23.48	H
12010.000	33.32	-28.93	38.71	23.54	54.00	20.68	V

**π/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)
2434.020	46.42	2.90	32.04	11.49	54.00	7.58	V
2447.580	46.44	2.91	32.05	11.48	54.00	7.56	V
4882.000	30.89	-33.32	34.15	30.05	54.00	23.11	H
7322.800	30.11	-30.91	35.83	25.18	54.00	23.89	V
9763.600	30.96	-30.33	36.87	24.42	54.00	23.04	V
12205.300	33.66	-28.02	38.82	22.86	54.00	20.34	V

**π/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)
2483.520	48.31	2.93	32.09	13.30	54.00	5.69	V
2483.580	47.99	2.93	32.09	12.98	54.00	6.01	V
4960.300	31.80	-33.60	34.18	31.21	54.00	22.20	V
7439.800	29.55	-31.69	35.88	25.36	54.00	24.45	H
9920.200	31.47	-30.00	37.09	24.38	54.00	22.53	V
12399.700	33.54	-28.09	38.94	22.69	54.00	20.46	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	46.28	2.86	32.00	11.41	54.00	7.72	V
2389.860	46.25	2.87	32.00	11.39	54.00	7.75	V
4803.700	33.13	-33.27	34.12	32.27	54.00	20.87	V
7205.800	29.85	-31.17	35.78	25.23	54.00	24.15	V
9607.900	30.73	-30.55	36.65	24.63	54.00	23.27	V
12010.000	33.51	-28.93	38.71	23.74	54.00	20.49	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)
2433.900	46.43	2.90	32.04	11.49	54.00	7.57	V
2446.680	46.41	2.91	32.05	11.45	54.00	7.59	V
4882.000	30.73	-33.32	34.15	29.89	54.00	23.27	H
7322.800	30.18	-30.91	35.83	25.26	54.00	23.82	V
9763.600	30.98	-30.33	36.87	24.44	54.00	23.02	V
12010.000	33.52	-28.93	38.71	23.74	54.00	20.48	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)
2483.520	47.16	2.93	32.09	12.14	54.00	6.84	V
2483.580	47.00	2.93	32.09	11.98	54.00	7.00	V
4960.300	30.88	-33.60	34.18	30.29	54.00	23.12	H
7439.800	29.65	-31.69	35.88	25.47	54.00	24.35	V
9920.200	31.61	-30.00	37.09	24.52	54.00	22.39	V
12399.700	33.54	-28.09	38.94	22.70	54.00	20.46	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	320	121.6	P
	DH3	Fig.66	1.63	Fig.67	100	163	P
	DH5	Fig.68	2.88	Fig.69	62	178.56	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	113	185.32	P
	2DH5	Fig.74	2.88	Fig.75	76	218.88	P

#### For 8DPSK

Channel	Packet	Pulse time (ms)		Number of Transmissions		Dwell Time (ms)	Conclusion
39	3DH1	Fig.76	0.39	Fig.77	320	124.8	P
	3DH3	Fig.78	1.64	Fig.79	107	175.48	P
	3DH5	Fig.80	2.89	Fig.81	72	208.08	P

**Conclusion: PASS**

**Test graphs as below:**

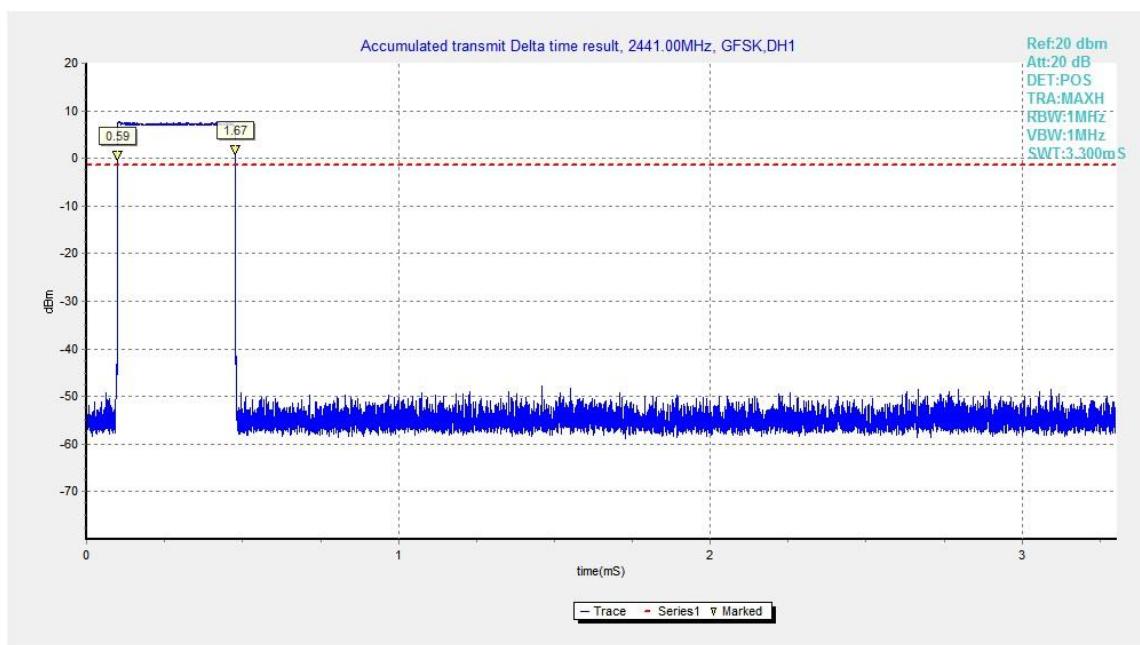


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

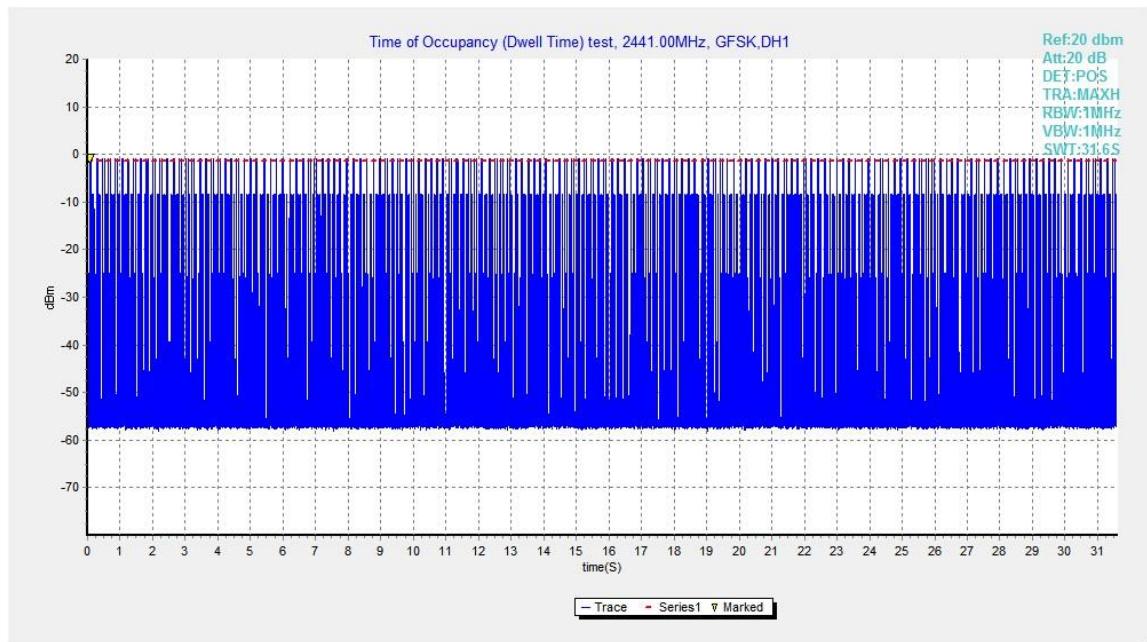


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

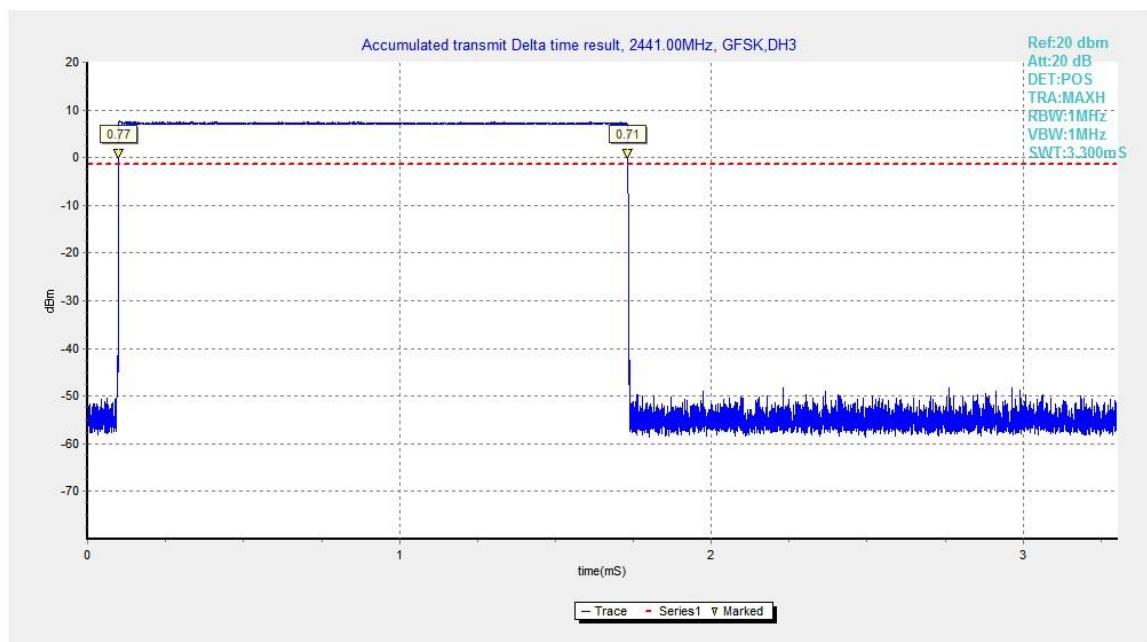


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

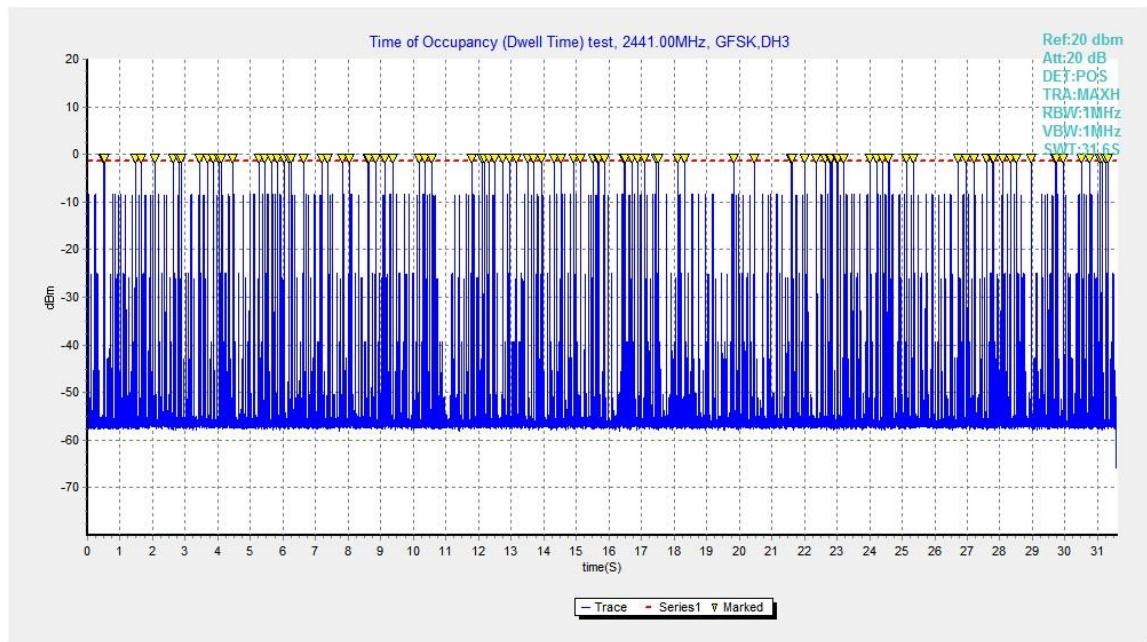


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

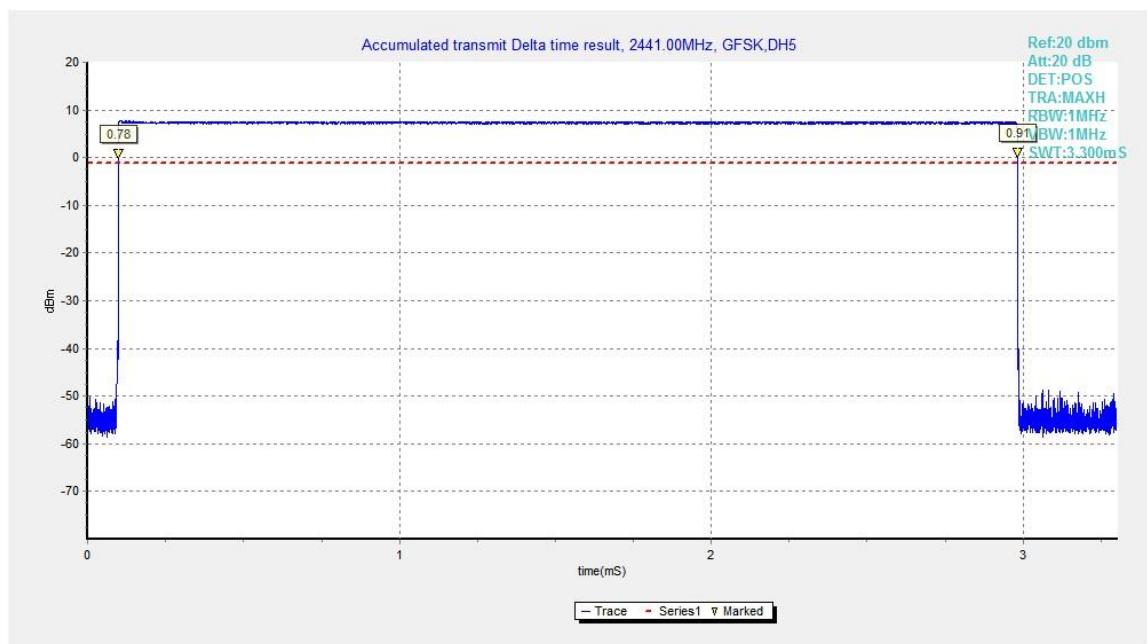


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

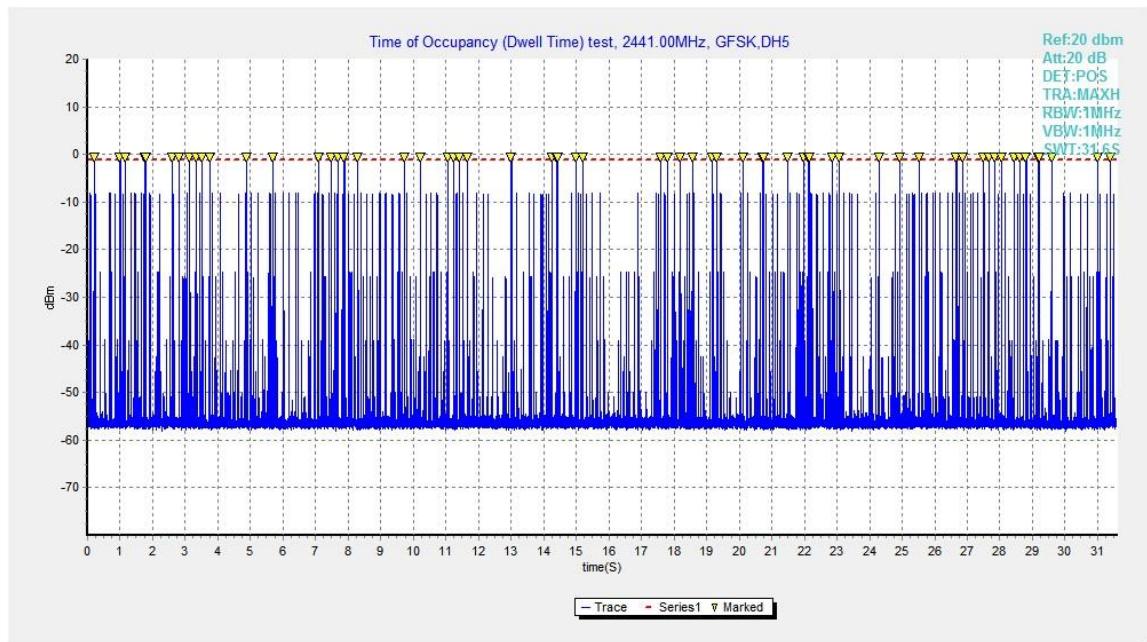


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

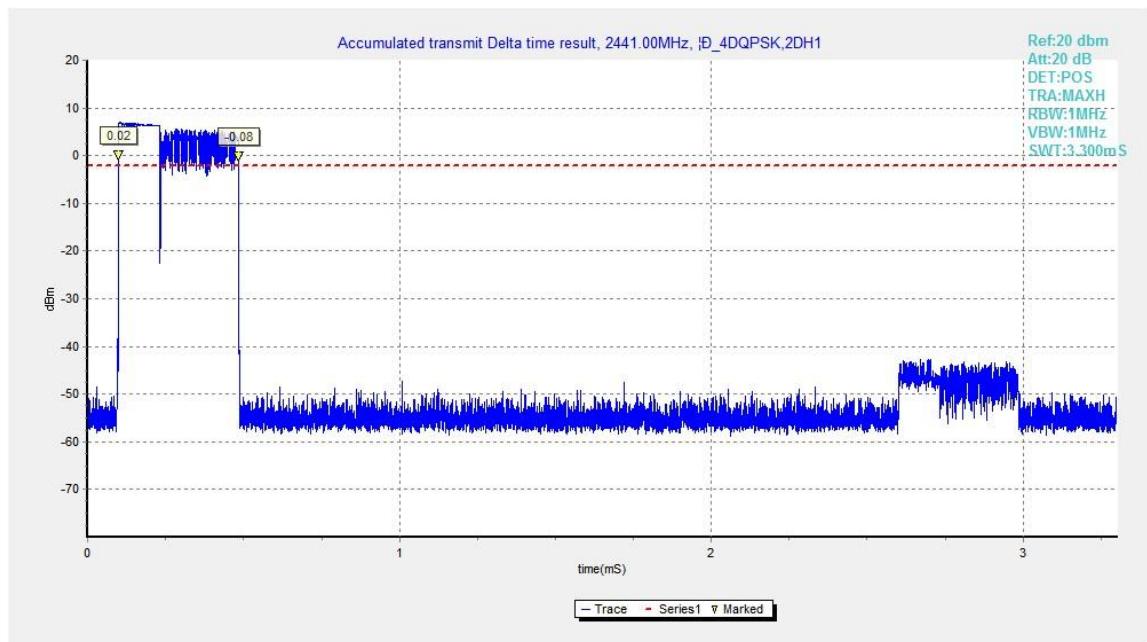


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

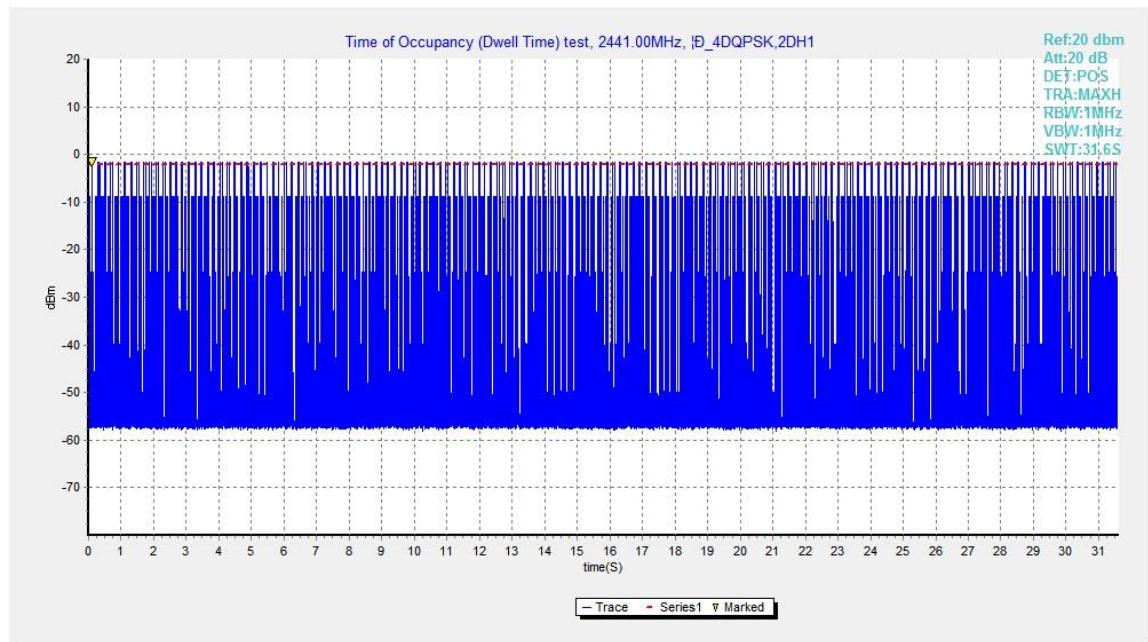


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

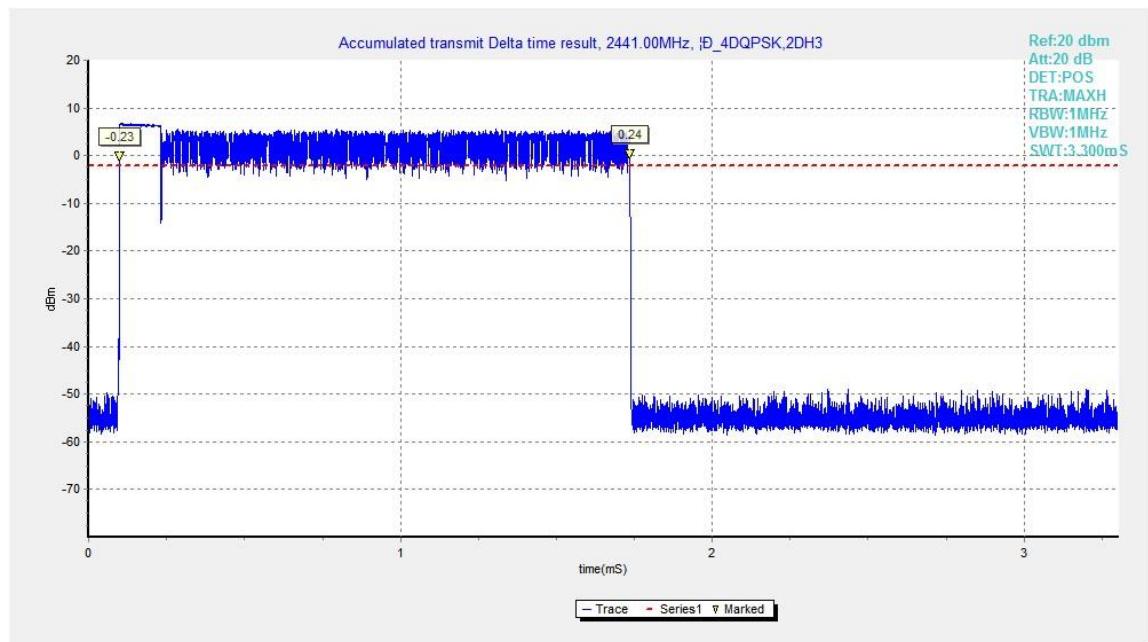


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

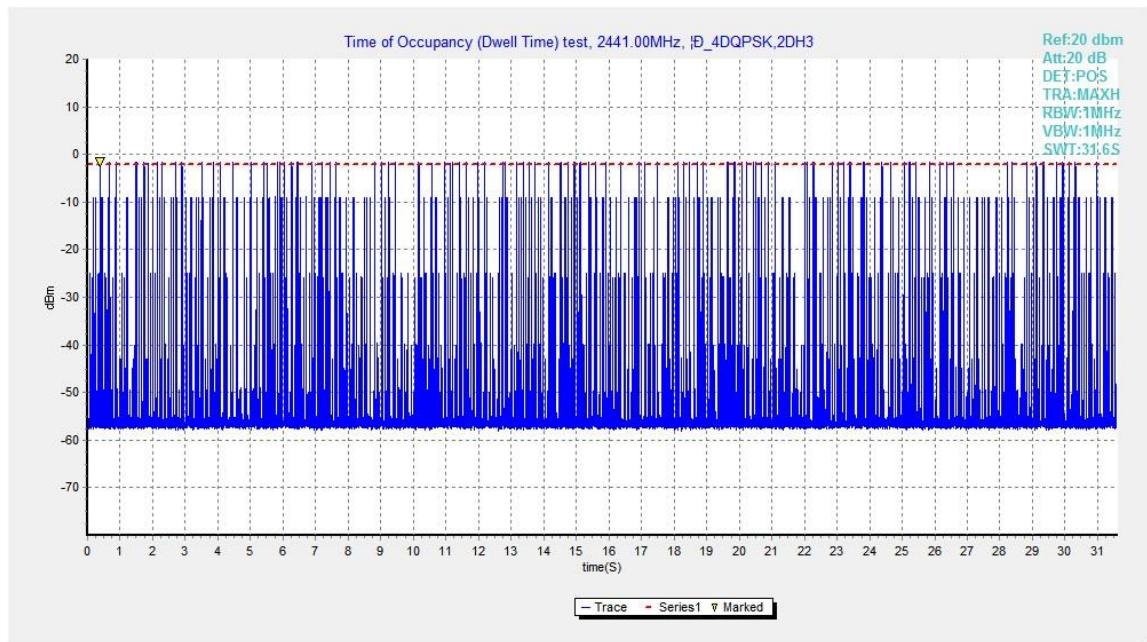


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

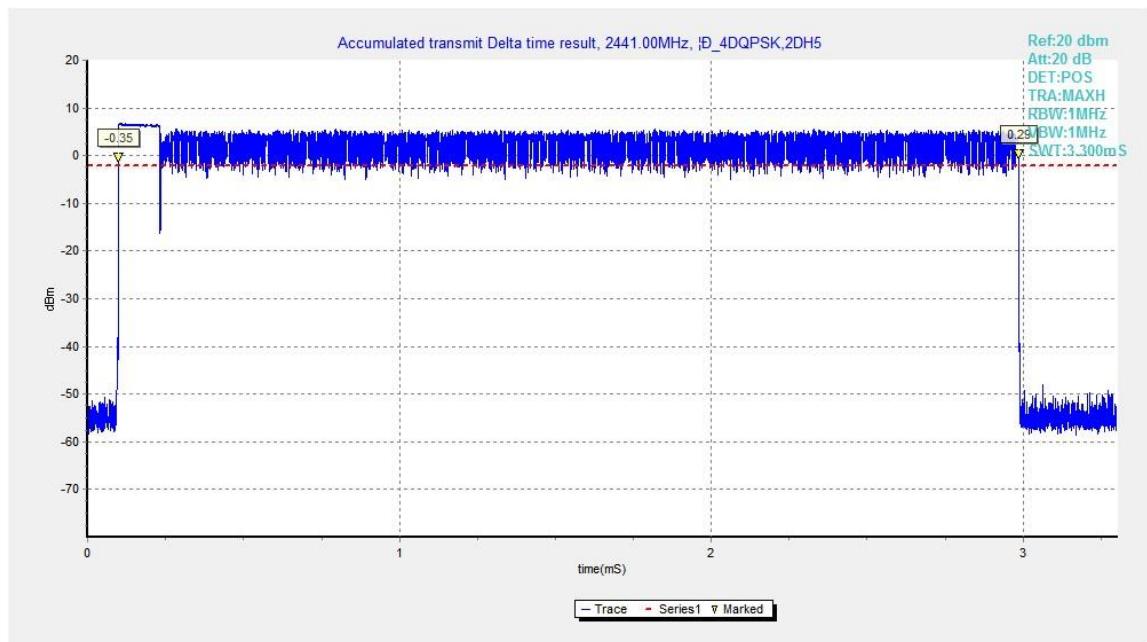


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

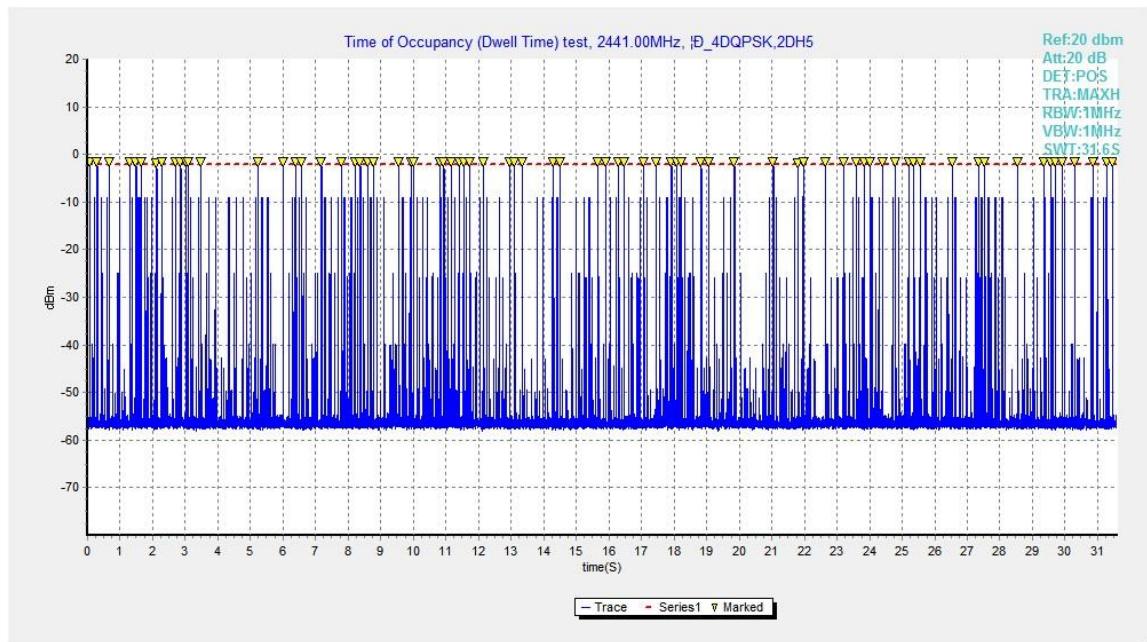


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

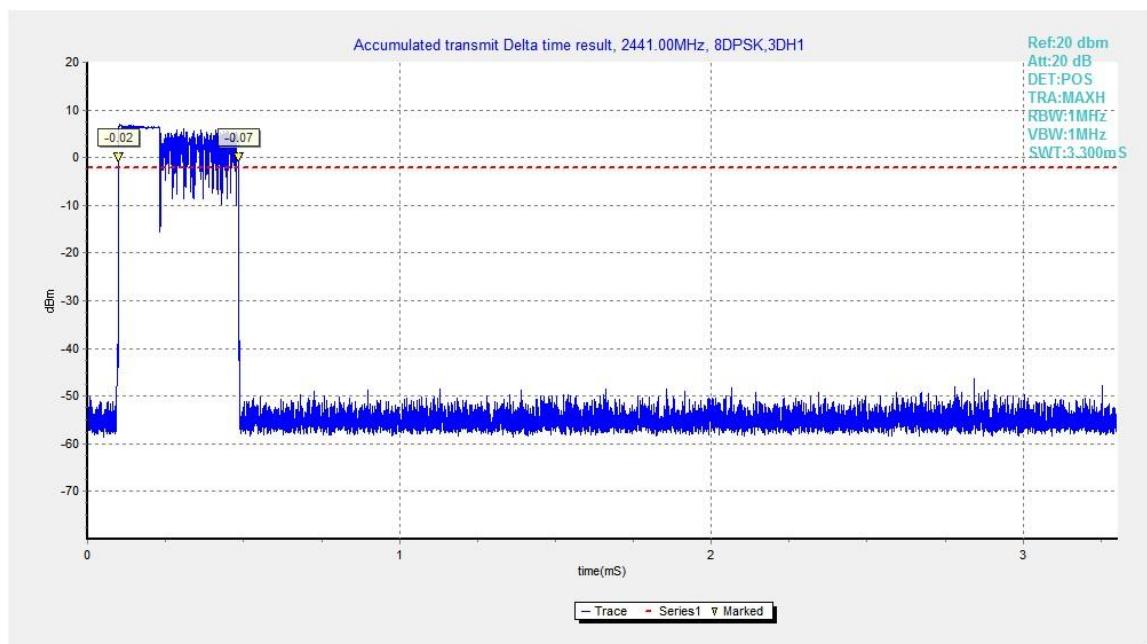


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

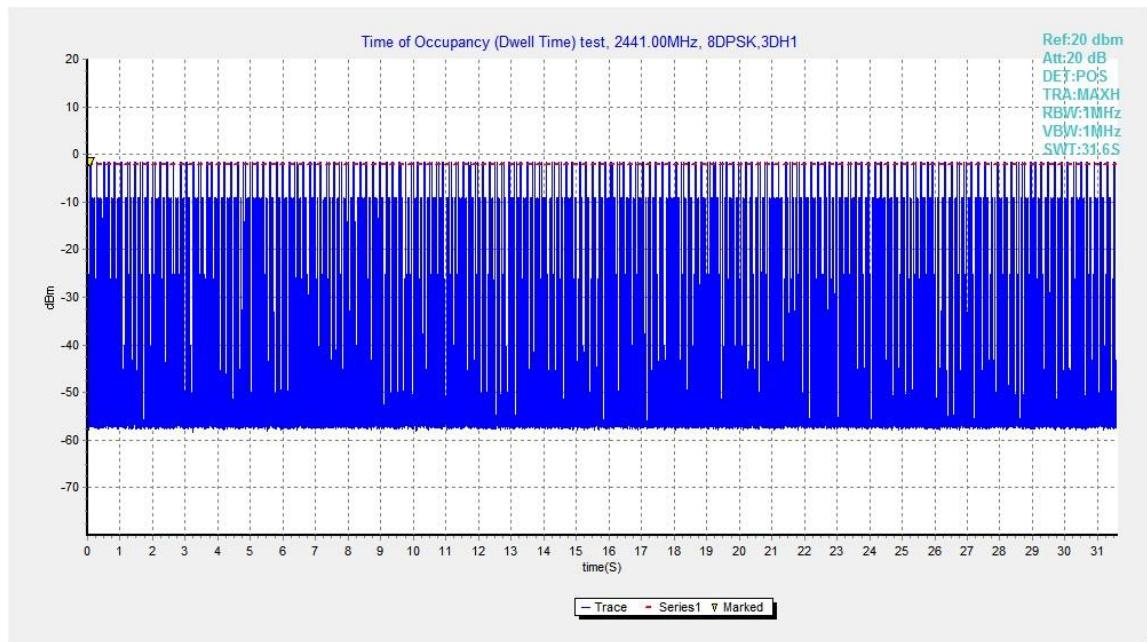


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

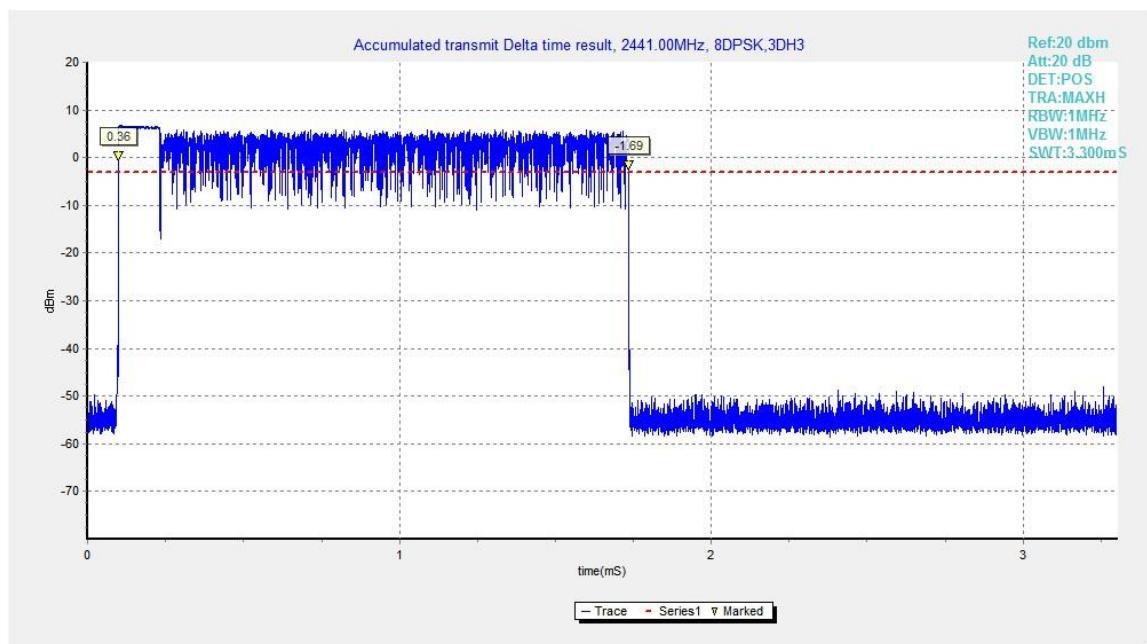


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

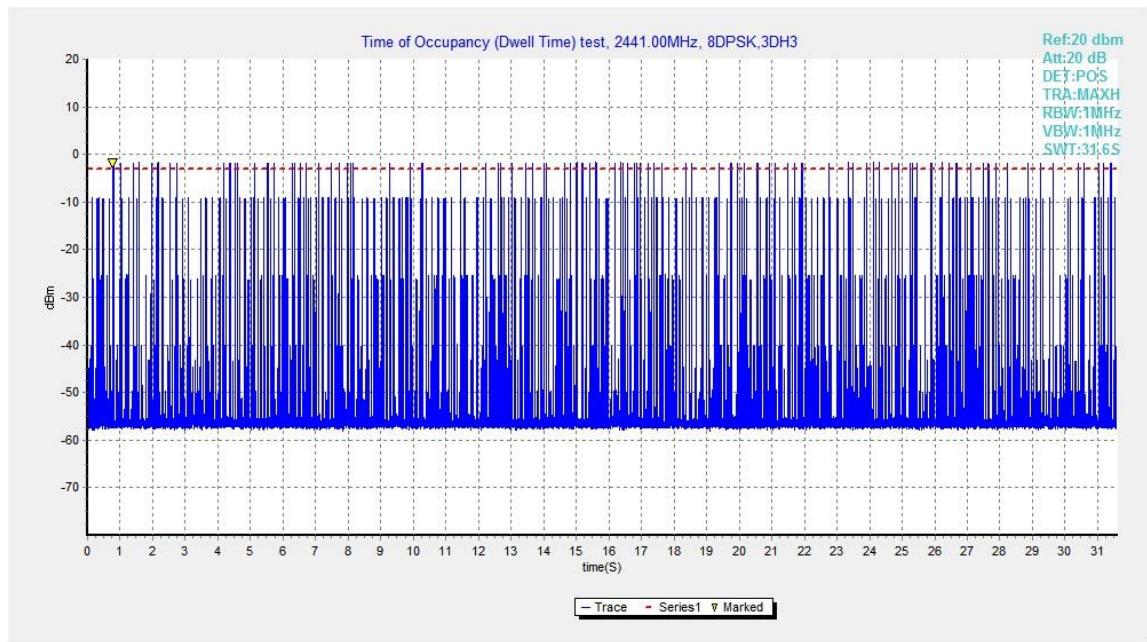


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

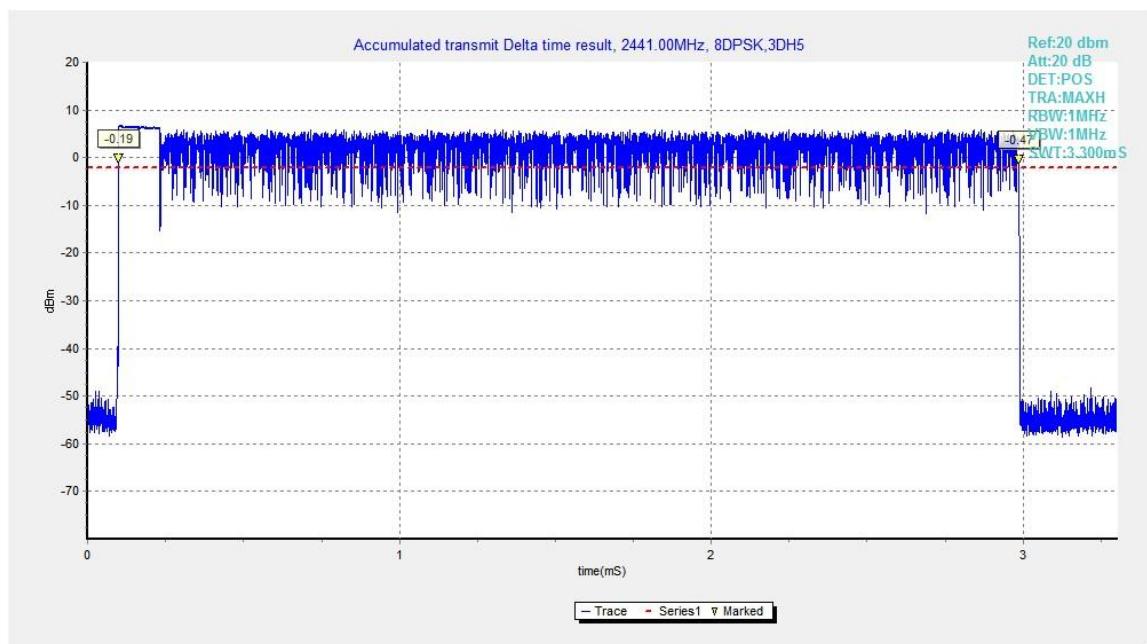


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

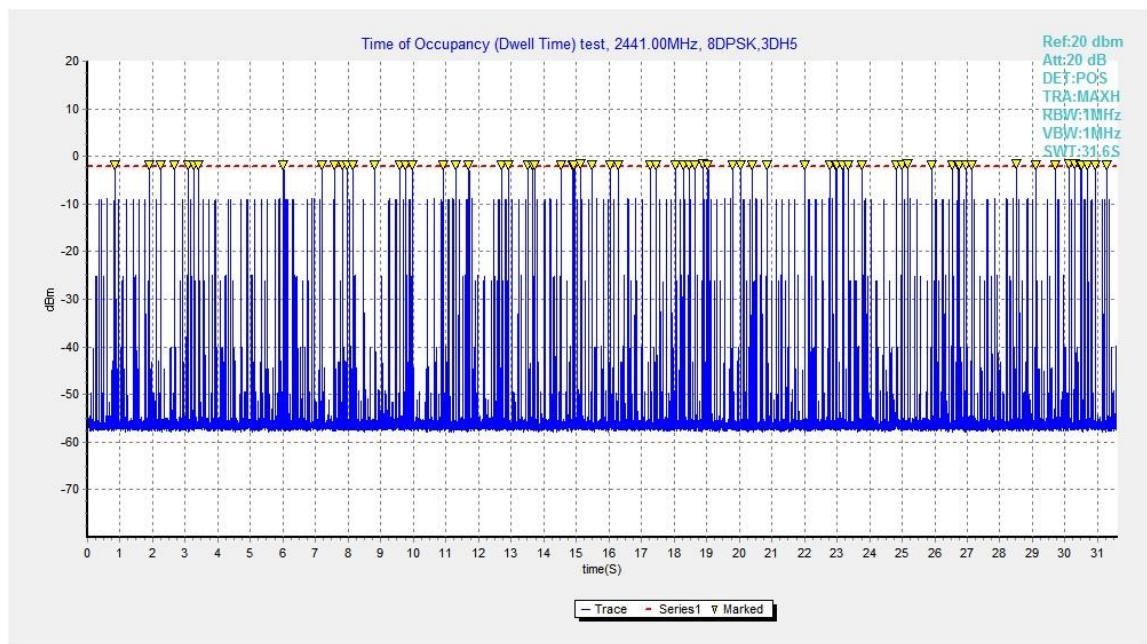


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

## 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	941.25	NA
39	Fig.83	945.00	NA
78	Fig.84	942.75	NA

**For  $\pi/4$  DQPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1257.75	NA
39	Fig.86	1212.00	NA
78	Fig.87	1222.50	NA

**For 8DPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1275.00	NA
39	Fig.89	1257.75	NA
78	Fig.90	1204.50	NA

**Conclusion: NA**

**Test graphs as below:**

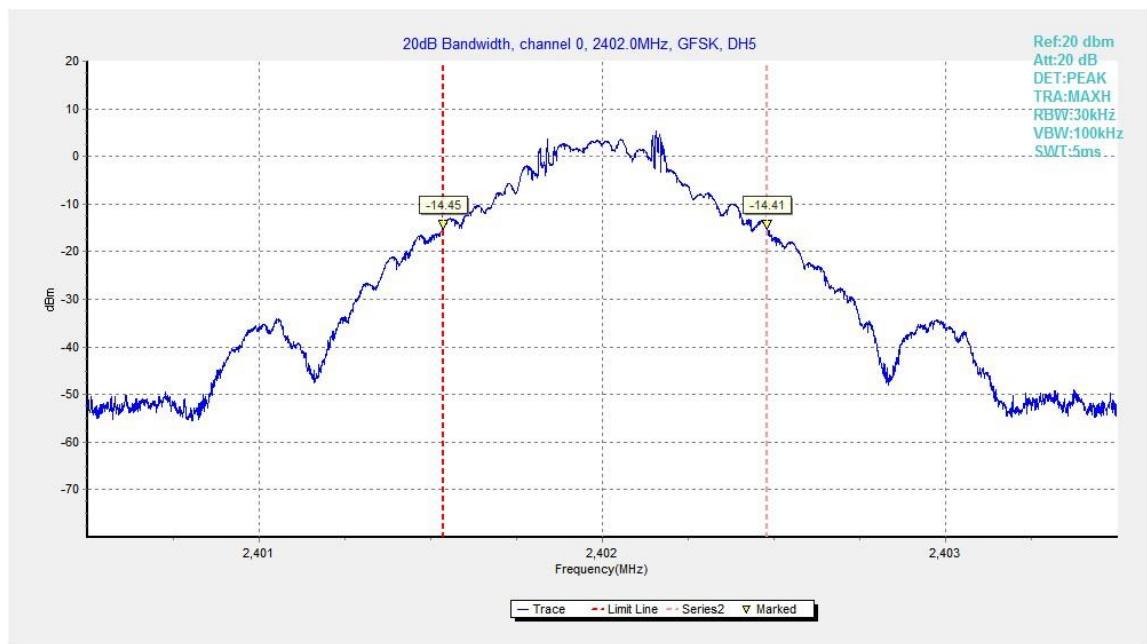


Fig.82. 20dB Bandwidth: GFSK, Channel 0

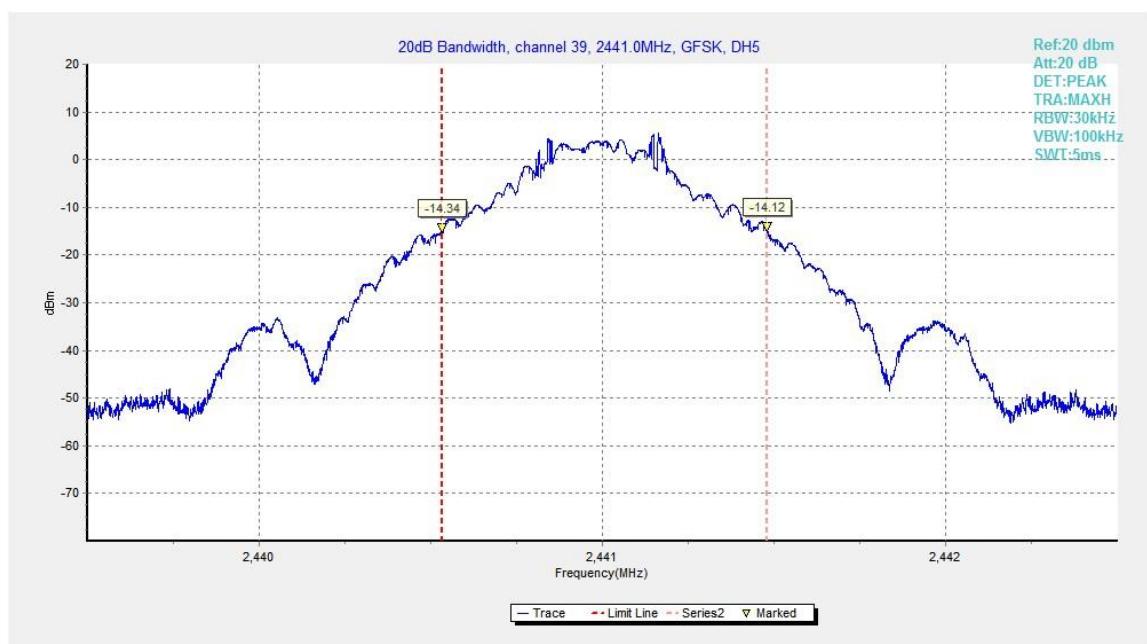


Fig.83. 20dB Bandwidth: GFSK, Channel 39

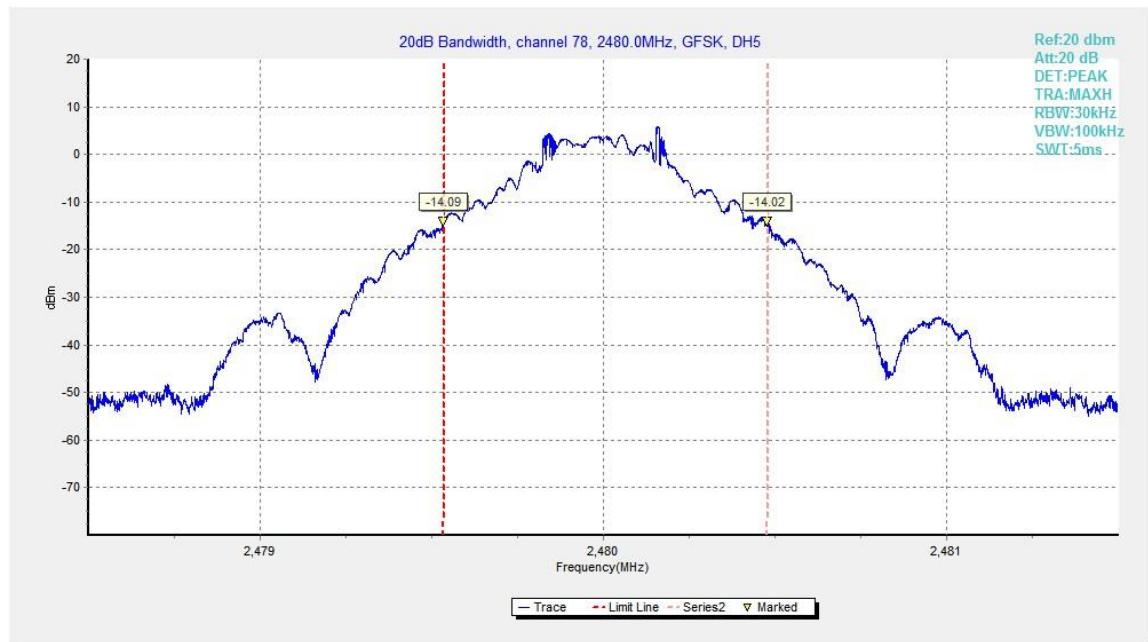


Fig.84. 20dB Bandwidth: GFSK, Channel 78

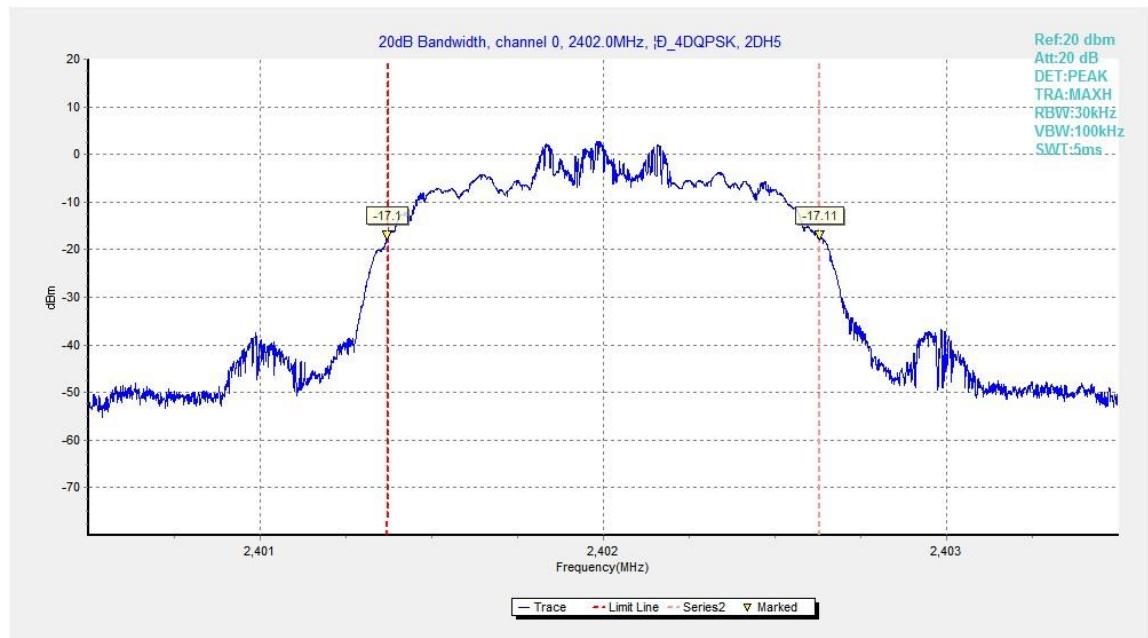


Fig.85. 20dB Bandwidth: π/4 DQPSK, Channel 0

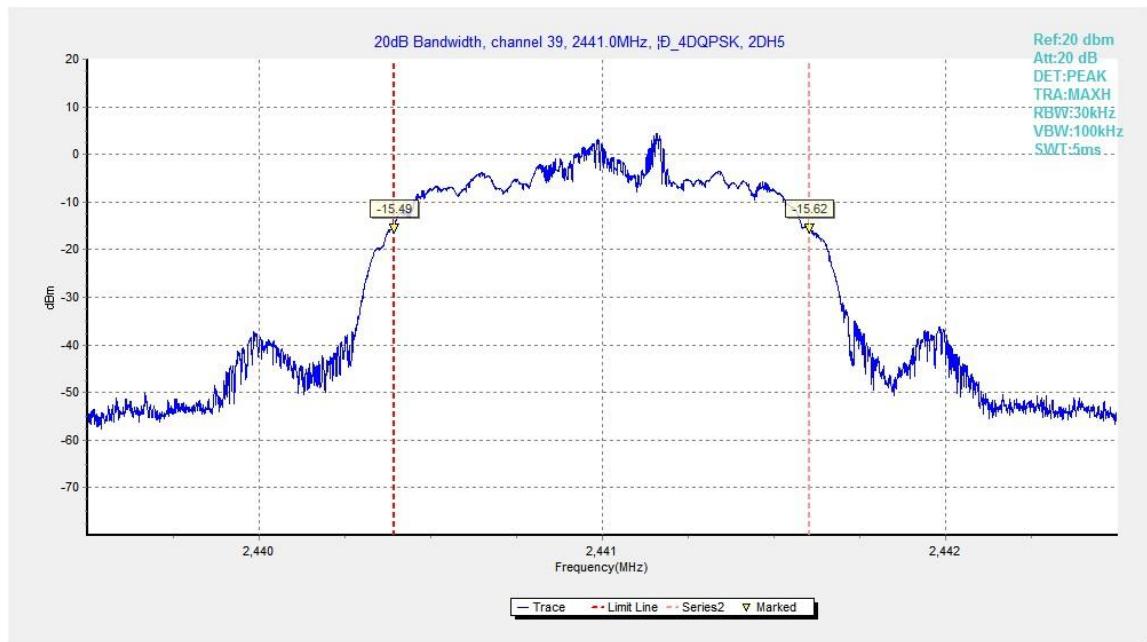


Fig.86. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39

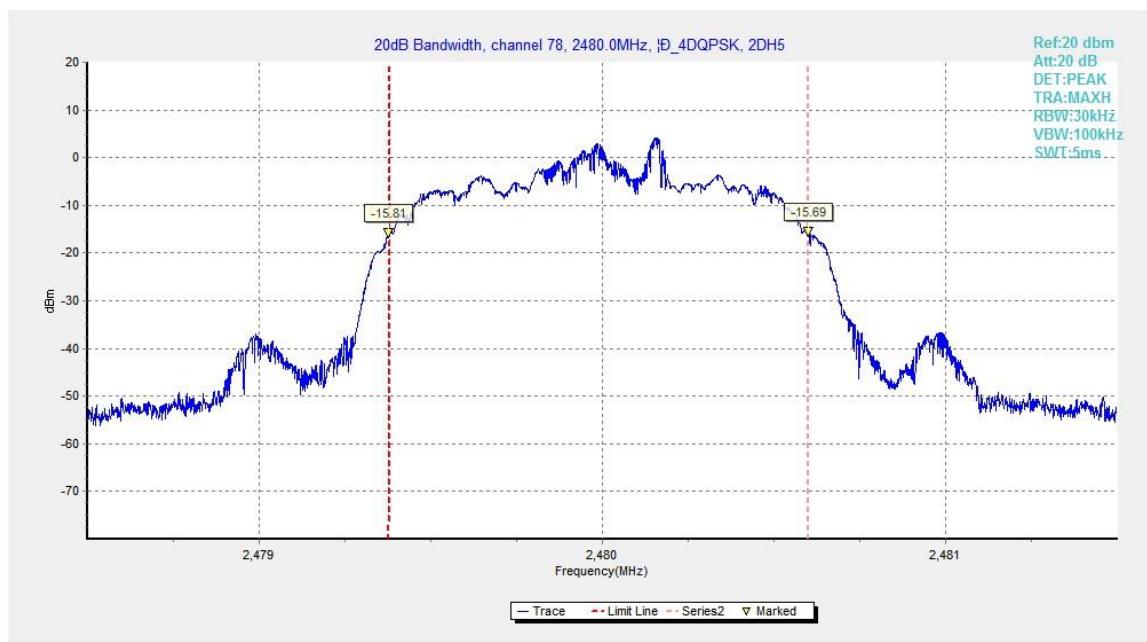


Fig.87. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



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

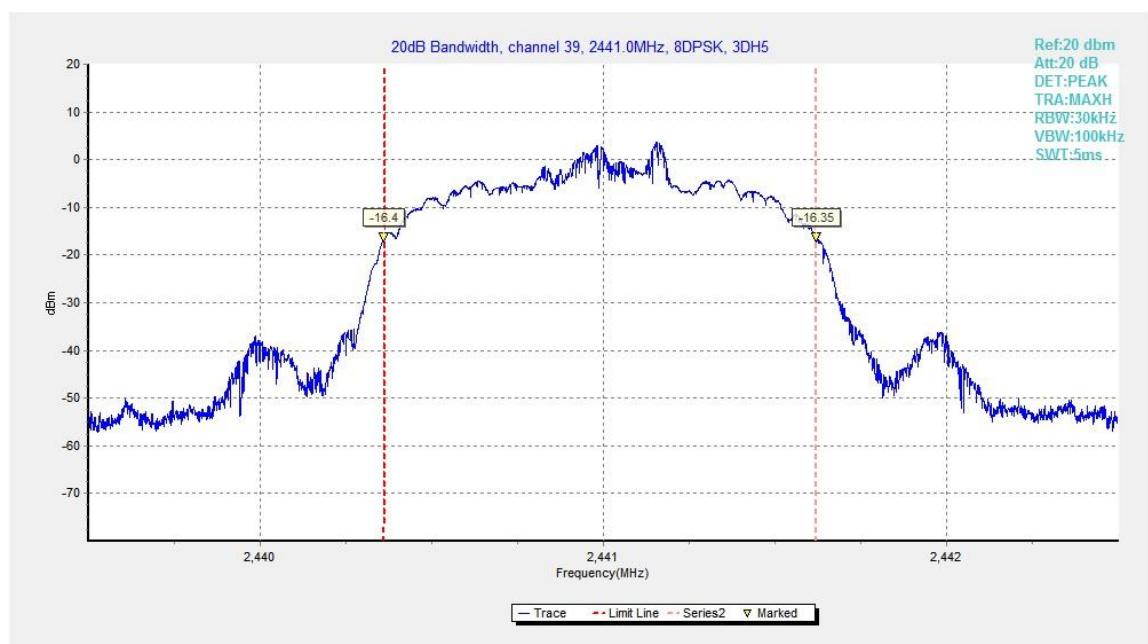


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

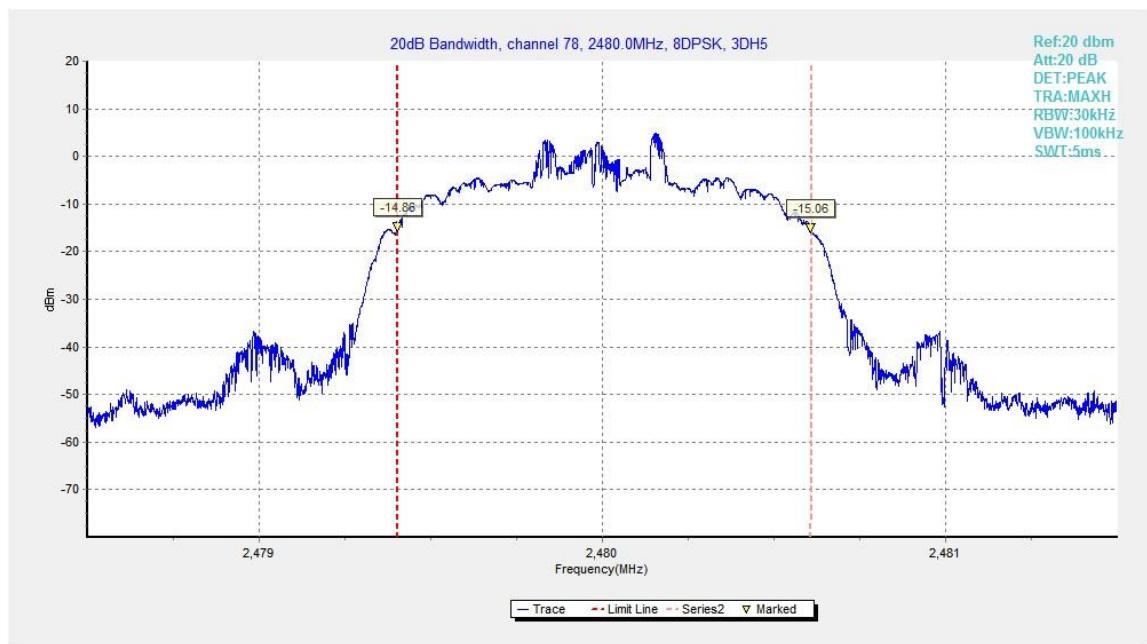


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

## 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  $(2/3) * 20$ dB bandwidth, whichever is greater.

### Measurement Limit:

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

### Measurement Result:

#### For GFSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.91	849.75	P

#### For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.92	1296.75	P

#### For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.93	1149.00	P

**Conclusion: PASS**

**Test graphs as below:**

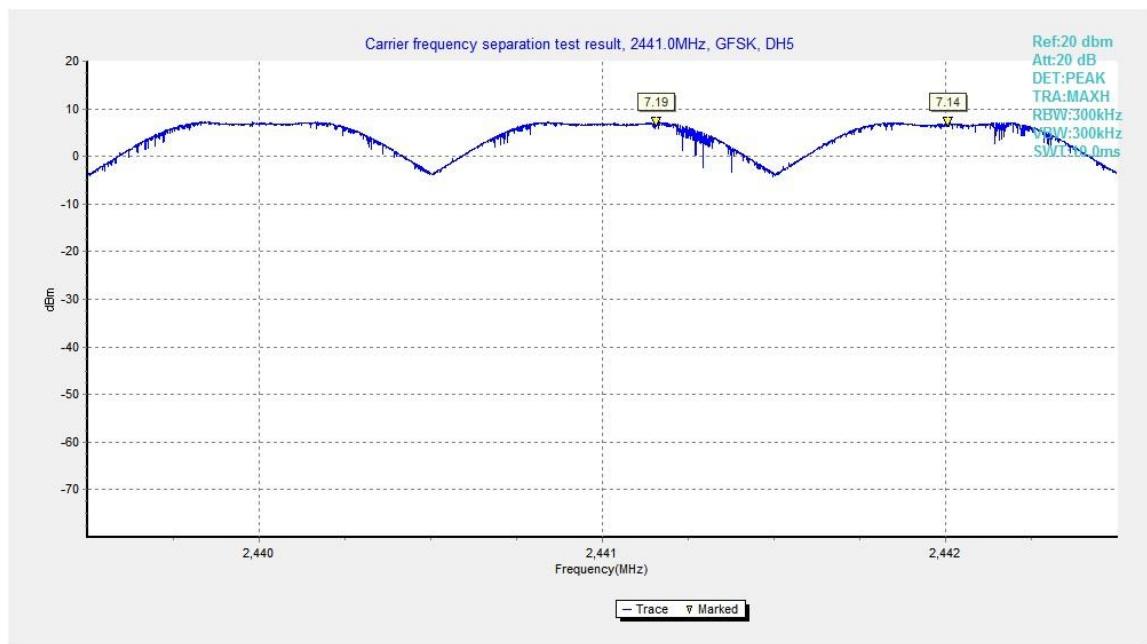


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

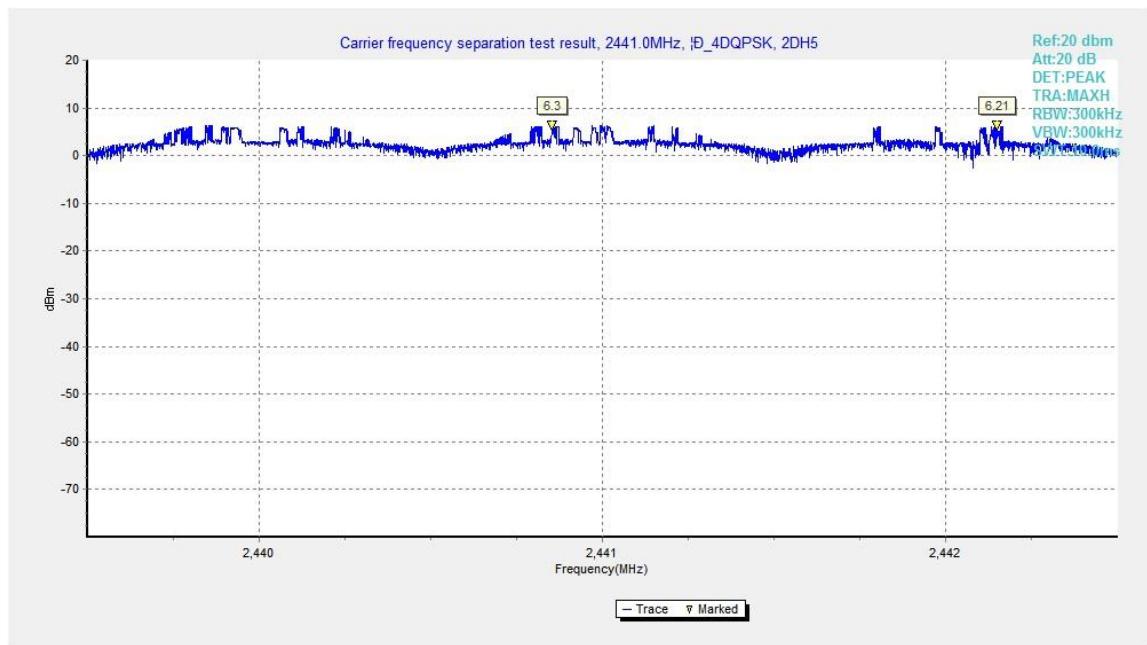


Fig.92. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39

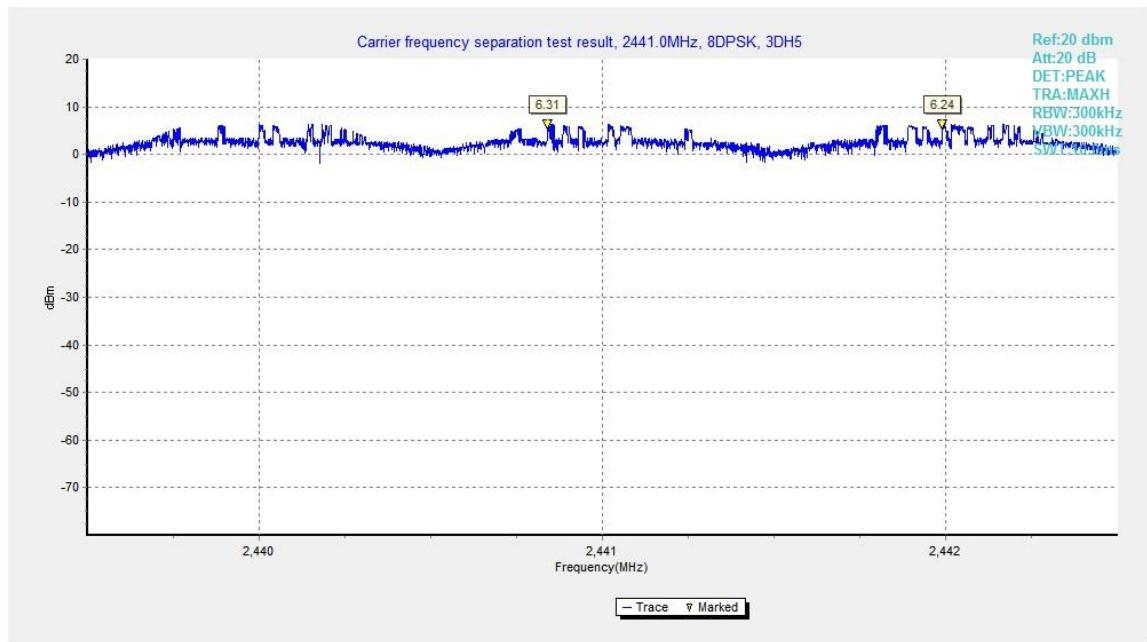


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

## 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	
40~78	Fig.95	P

#### For 1/4 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:**

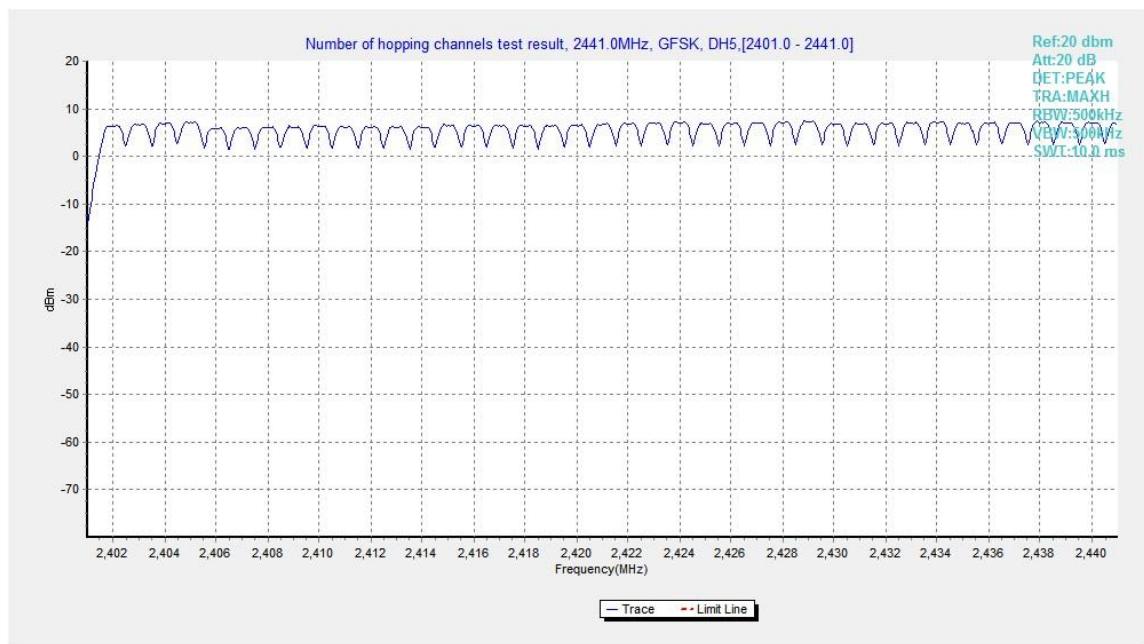


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

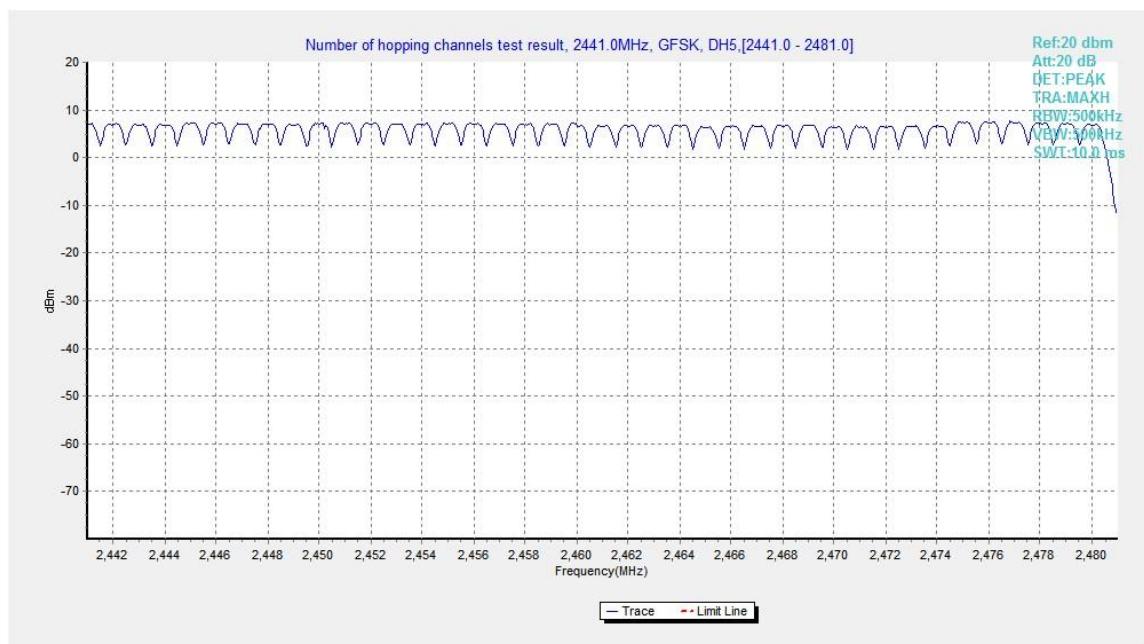


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

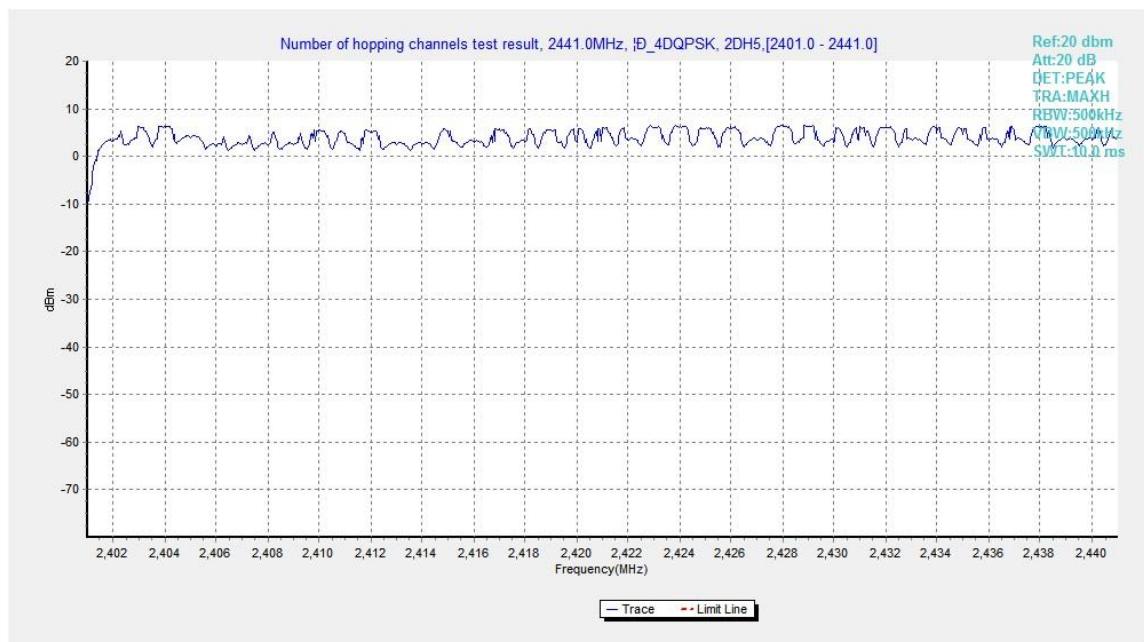


Fig.96. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39

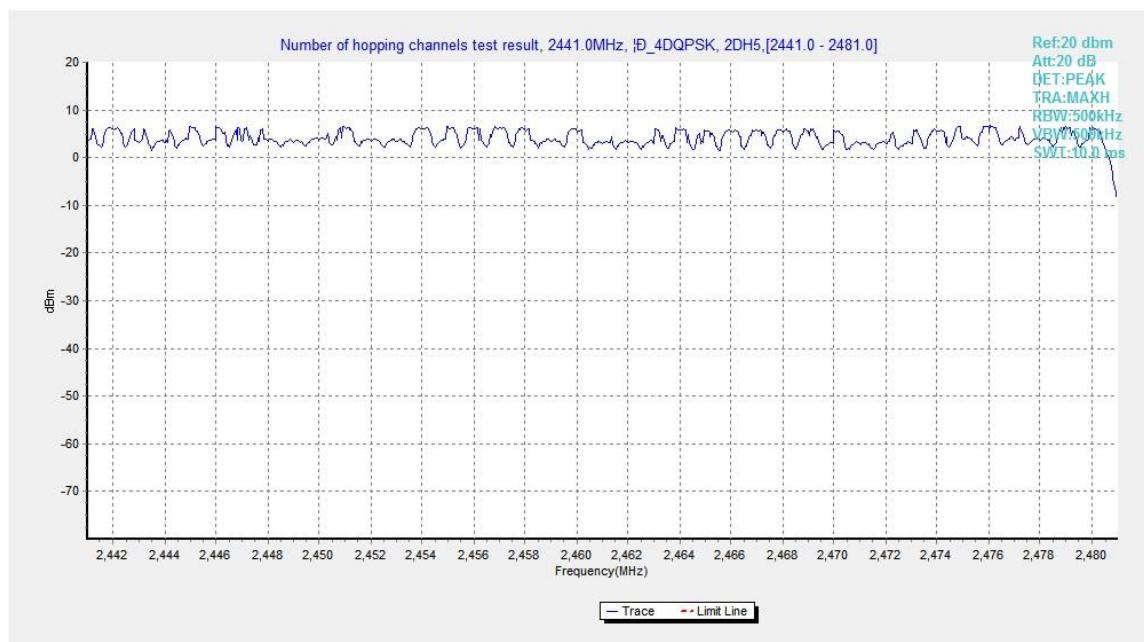


Fig.97. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78

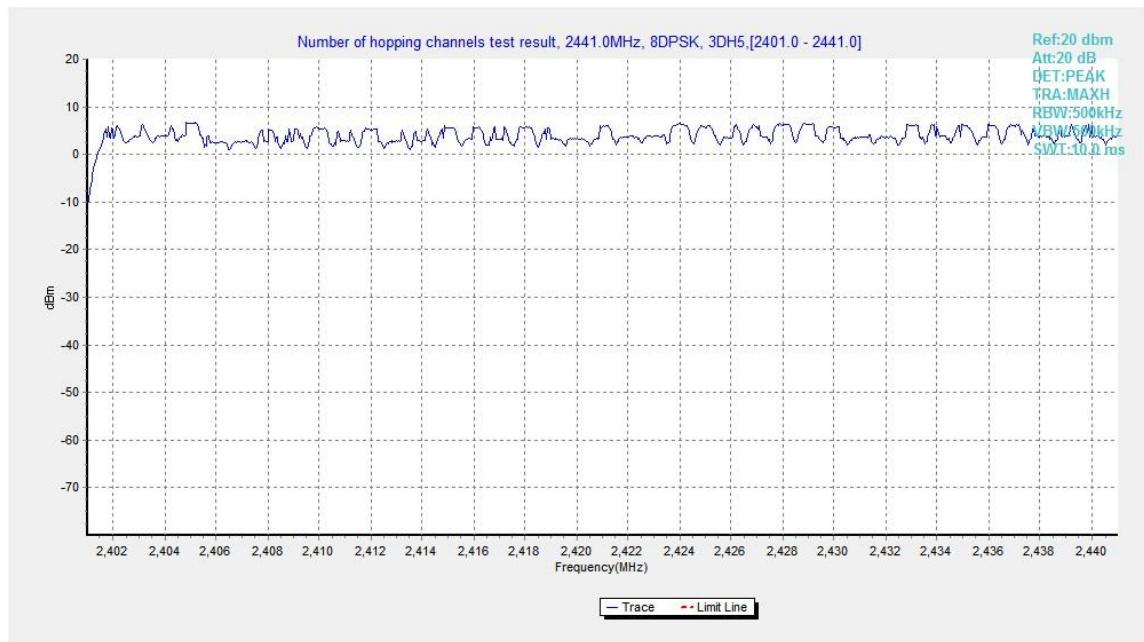


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

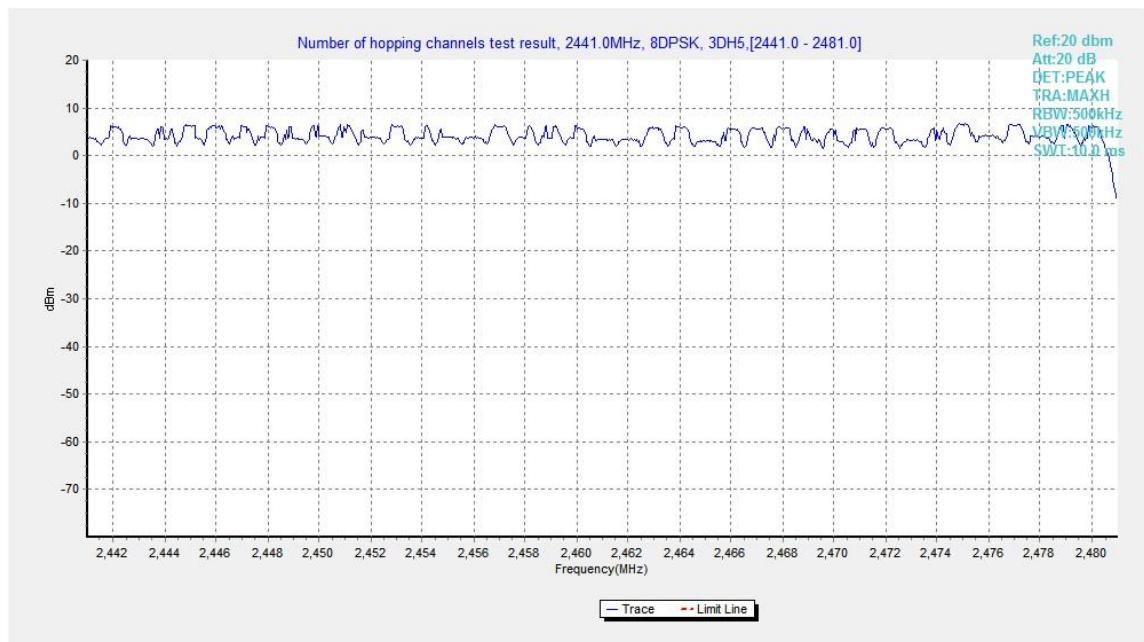


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

## B.11. 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.<sup>36</sup> 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:**
**EUT ID: UT13a**

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ 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.

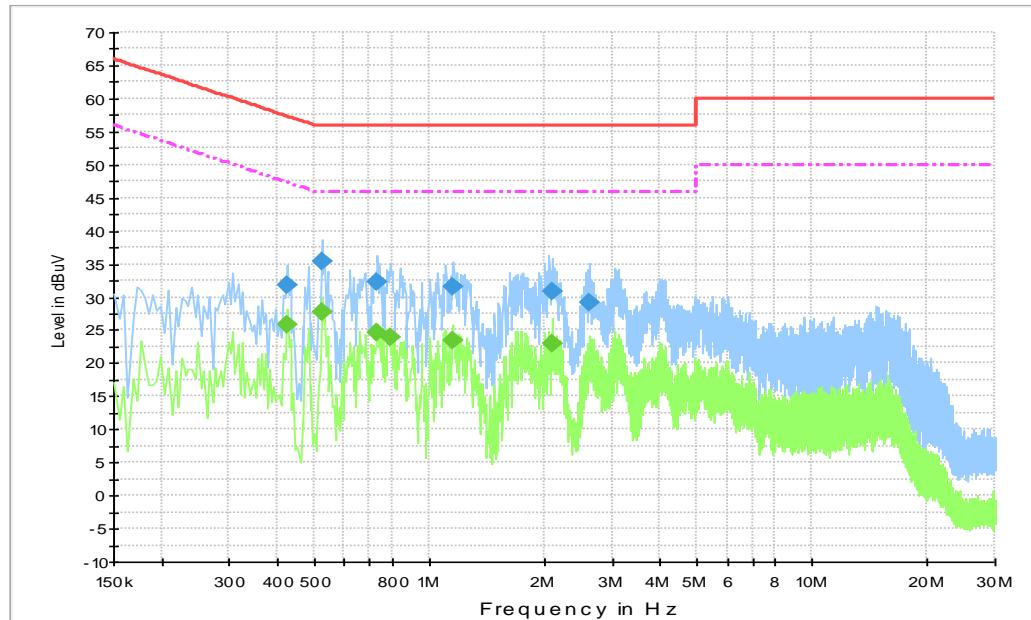
Bluetooth (Average Limit)

Frequency range (MHz)	Average Limit (dB $\mu$ V)	Result (dB $\mu$ 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.

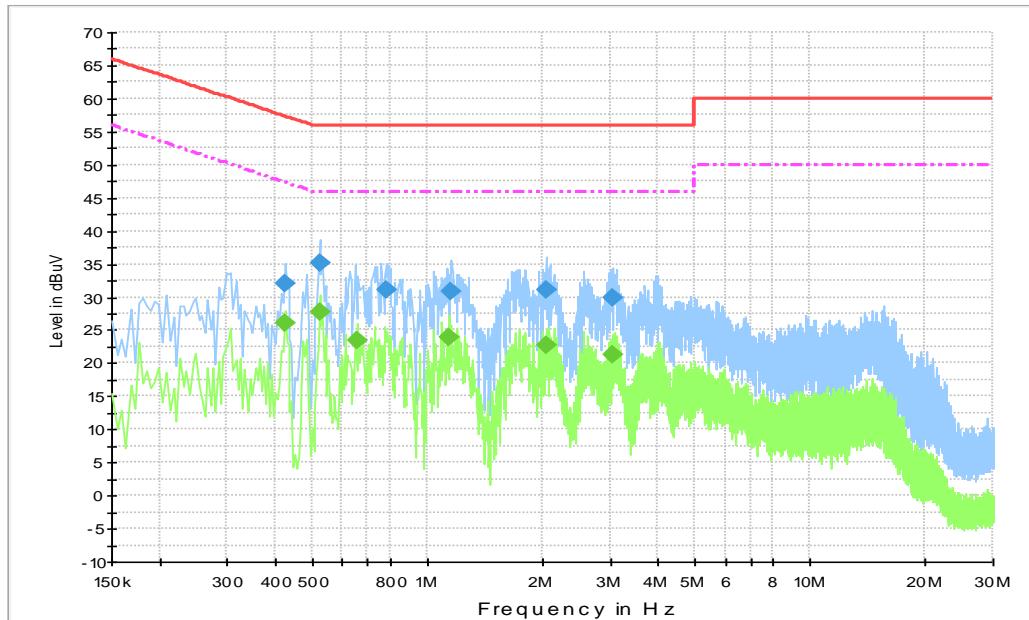
### Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.424500	31.8	1000.	9.000	L1	9.9	25.6	57.4
0.523500	35.4	1000.	9.000	L1	9.9	20.6	56.0
0.730500	32.3	1000.	9.000	L1	9.8	23.7	56.0
1.149000	31.5	1000.	9.000	L1	9.8	24.5	56.0
2.094000	30.9	1000.	9.000	L1	9.7	25.1	56.0
2.616000	29.2	1000.	9.000	L1	9.7	26.8	56.0

### Final Result 2

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.424500	25.8	1000.0	9.000	L1	9.9	21.5	47.4
0.523500	27.6	1000.0	9.000	L1	9.9	18.4	46.0
0.730500	24.6	1000.0	9.000	L1	9.8	21.4	46.0
0.789000	23.9	1000.0	9.000	L1	9.8	22.1	46.0
1.149000	23.4	1000.0	9.000	L1	9.8	22.6	46.0
2.094000	23.1	1000.0	9.000	L1	9.7	22.9	46.0

Note2: The measurement results showed here are worst cases of the combinations of different chargers.



**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)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.424500	31.9	1000.	9.000	L1	9.9	25.4	57.4
0.523500	35.2	1000.	9.000	L1	9.9	20.8	56.0
0.780000	31.0	1000.	9.000	L1	9.8	25.0	56.0
1.158000	30.8	1000.	9.000	L1	9.8	25.2	56.0
2.040000	31.0	1000.	9.000	L1	9.7	25.0	56.0
3.052500	29.8	1000.	9.000	L1	9.7	26.2	56.0

### Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.424500	26.0	1000.0	9.000	L1	9.9	21.3	47.4
0.523500	27.8	1000.0	9.000	L1	9.9	18.2	46.0
0.658500	23.4	1000.0	9.000	L1	9.9	22.6	46.0
1.140000	23.9	1000.0	9.000	L1	9.8	22.1	46.0
2.049000	22.7	1000.0	9.000	L1	9.7	23.3	46.0
3.052500	21.3	1000.0	9.000	L1	9.7	24.7	46.0

Note2: The measurement results showed here are worst cases of the combinations of different chargers.

**ANNEX C: Accreditation Certificate**

United States Department of Commerce  
National Institute of Standards and Technology

**Certificate of Accreditation to ISO/IEC 17025:2017**

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**

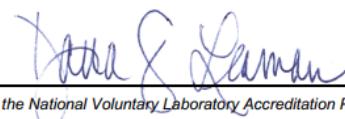
*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2020-09-29 through 2021-09-30

*Effective Dates*



*For the National Voluntary Laboratory Accreditation Program*



A handwritten signature in blue ink that reads "Della S. Laman".

**\*\*\*END OF REPORT\*\*\***