

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

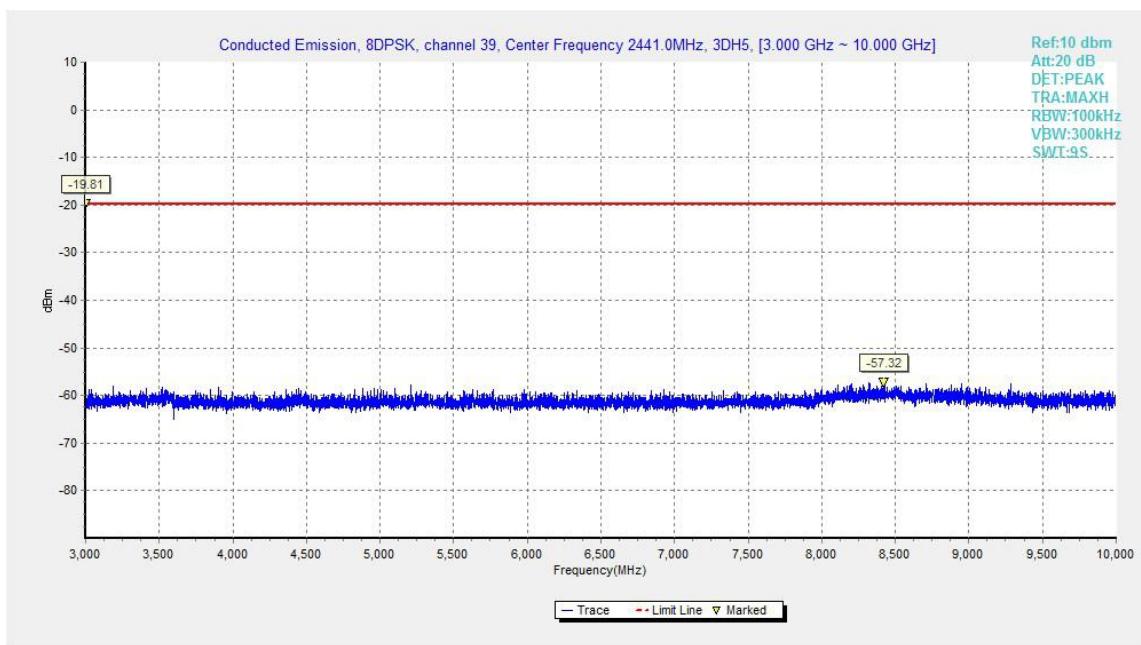


Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

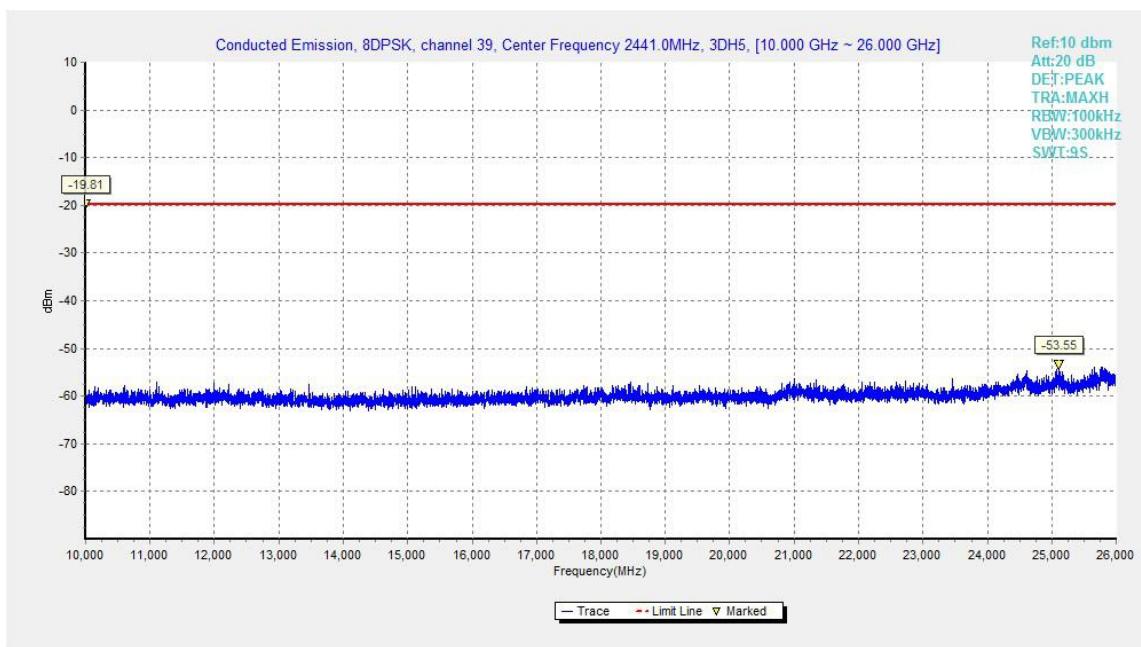


Fig.52. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

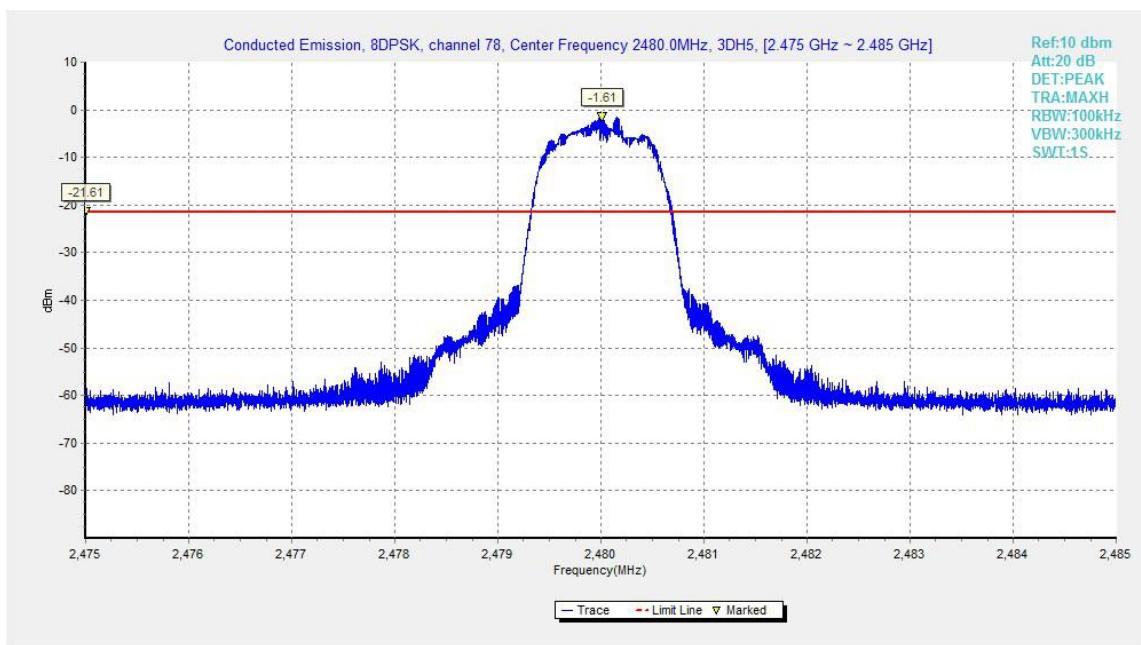


Fig.53. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

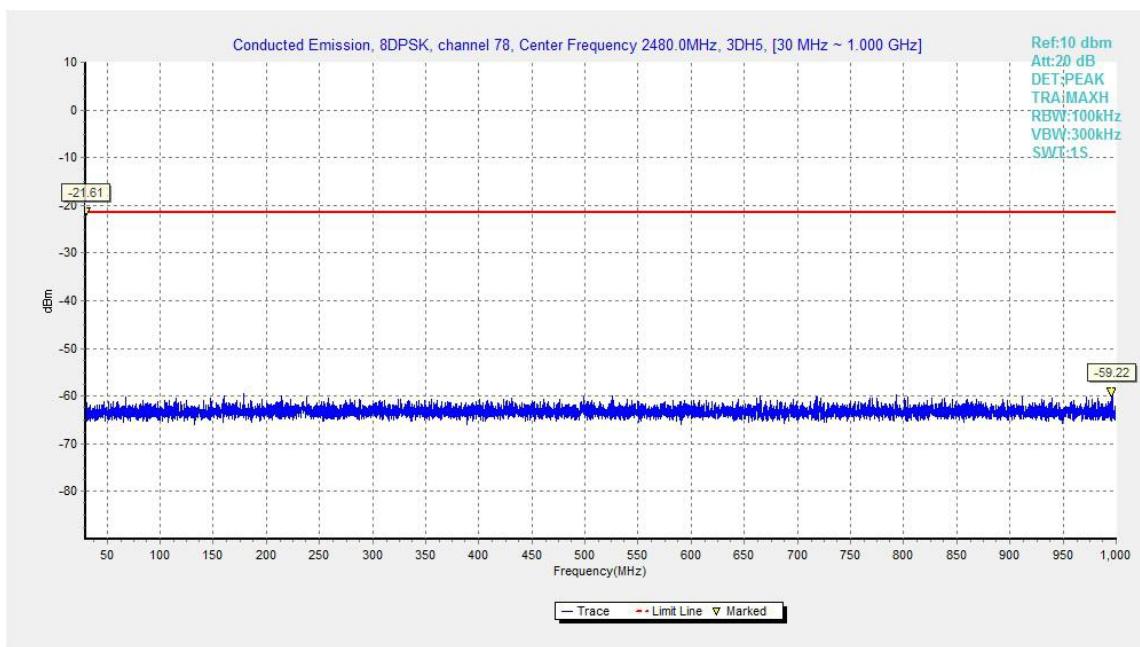


Fig.54. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

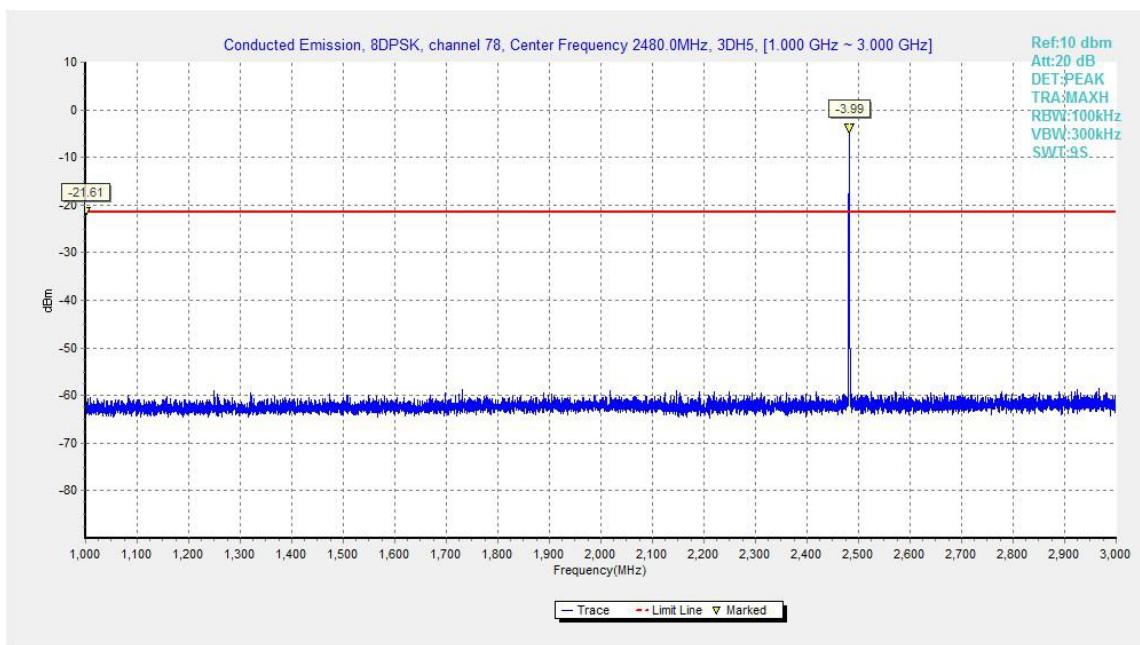


Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

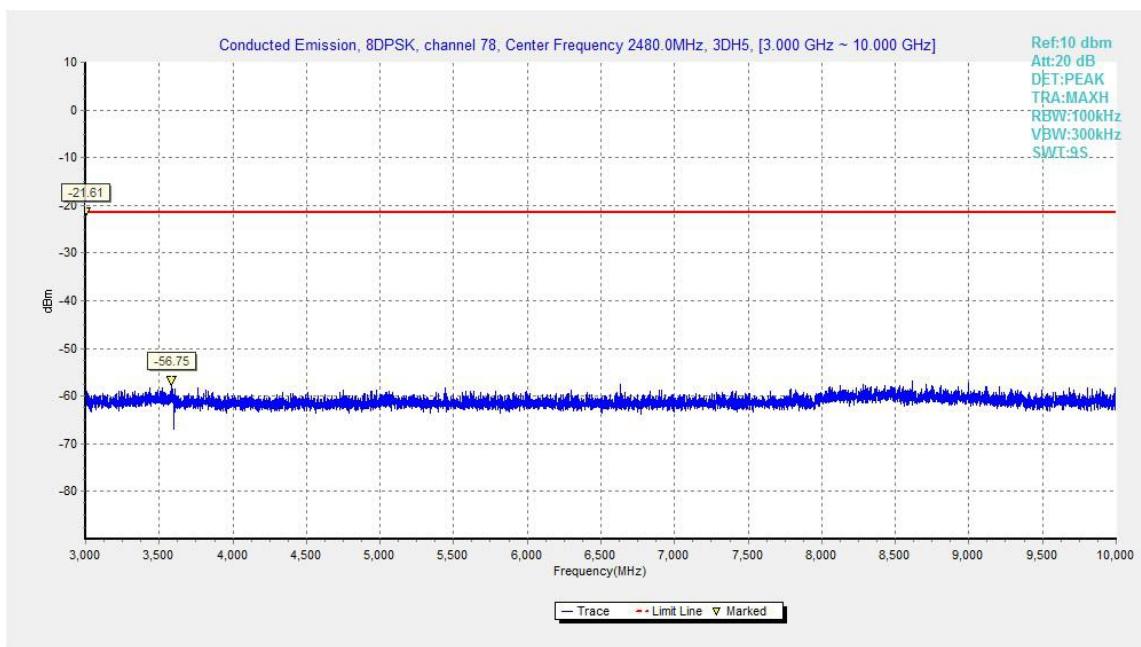


Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

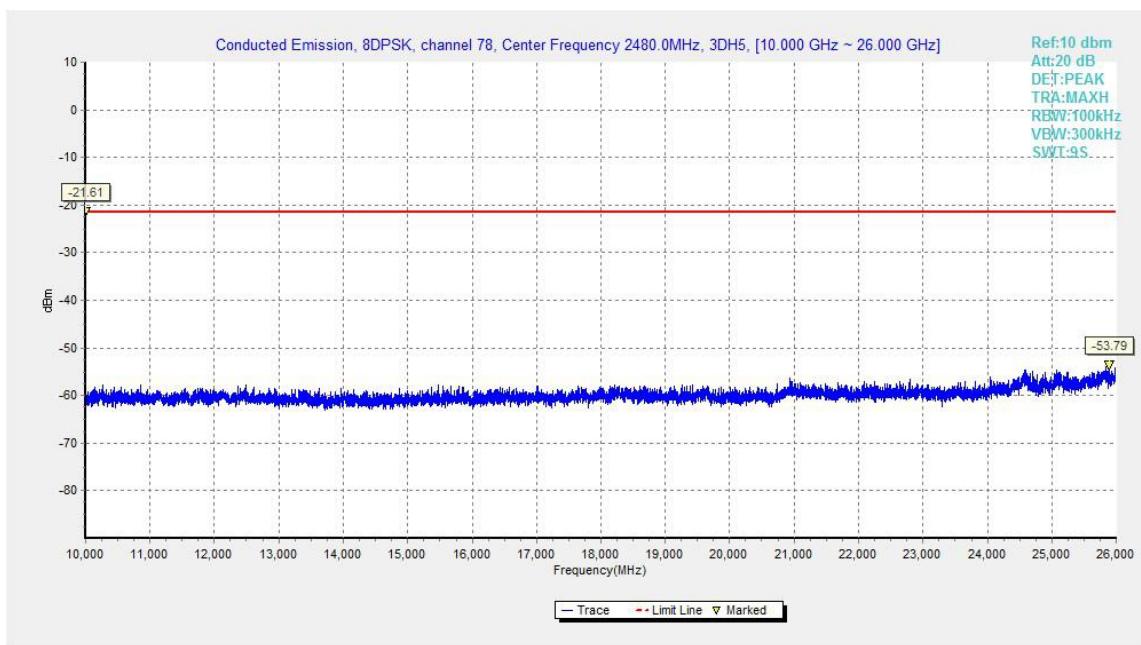


Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

### A.5. Transmitter Spurious Emission - Radiated

#### Measurement Limit:

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

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

The measurement is made according to ANSI C63.10

#### Limit in restricted band:

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

#### Test Condition

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

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

#### Measurement Results:

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

#### For GFSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.4GHz---L	Fig.58	P
Power	2.45GHz~2.5GHz---H	Fig.59	P

#### For π/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.4GHz---L	Fig.60	P
Power	2.45GHz~2.5GHz---H	Fig.61	P

#### For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.4GHz---L	Fig.62	P
Power	2.45GHz~2.5GHz---H	Fig.63	P

**GFSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17971.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
17986.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
17979	35.2	-25.5	43.4	17.3	54.0	18.8	H
17980.5	35.2	-25.5	43.4	17.3	54.0	18.8	H
17982	35.2	-25.5	43.4	17.3	54.0	18.8	V
2383.4	39	-14.2	27.2	26	54.0	15.0	V

**GFSK Ch 39 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994	35.4	-25.5	43.4	17.5	54.0	18.6	H
17965.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17983.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17986.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17881.5	35.2	-25.5	43.4	17.3	54.0	18.8	V
17887.5	35.2	-25.5	43.4	17.3	54.0	18.8	H

**GFSK Ch 78 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994	35.5	-25.5	43.4	17.6	54.0	18.5	V
17989.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17991	35.3	-25.5	43.4	17.4	54.0	18.7	V
17820	35.2	-25.5	43.4	17.3	54.0	18.8	V
17890.5	35.2	-25.5	43.4	17.3	54.0	18.8	H
2496.4	39.2	-14.2	27.2	26.2	54.0	14.8	V

**π/4 DQPSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17968.5	35.5	-25.5	43.4	17.6	54.0	18.5	H
17875.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17890.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
17911.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17974.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
2383.9	39.1	-14.2	27.2	26.1	54.0	14.9	H

**π/4 DQPSK Ch 39 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17982	35.5	-25.5	43.4	17.6	54.0	18.5	V
17964	35.4	-25.5	43.4	17.5	54.0	18.6	V
17967	35.4	-25.5	43.4	17.5	54.0	18.6	V
17880	35.3	-25.5	43.4	17.4	54.0	18.7	H
17910	35.3	-25.5	43.4	17.4	54.0	18.7	V
17950.5	35.3	-25.5	43.4	17.4	54.0	18.7	V

**π/4 DQPSK Ch 78 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17974.5	35.5	-25.5	43.4	17.6	54.0	18.5	V
17970	35.3	-25.5	43.4	17.4	54.0	18.7	H
17973	35.3	-25.5	43.4	17.4	54.0	18.7	H
17976	35.3	-25.5	43.4	17.4	54.0	18.7	H
17977.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
2486.1	39.1	-14.2	27.2	26.1	54.0	14.9	V

**8DPSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17980.5	35.5	-25.5	43.4	17.6	54.0	18.5	H
17958	35.4	-25.5	43.4	17.5	54.0	18.6	V
17983.5	35.4	-25.5	43.4	17.5	54.0	18.6	V
17988	35.4	-25.5	43.4	17.5	54.0	18.6	V
17947.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
2380	39	-14.2	27.2	26	54.0	15.0	V

**8DPSK Ch 39 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17881.5	35.5	-25.5	43.4	17.6	54.0	18.5	V
17893.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17919	35.3	-25.5	43.4	17.4	54.0	18.7	V
17959.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
17962.5	35.3	-25.5	43.4	17.4	54.0	18.7	V
17965.5	35.3	-25.5	43.4	17.4	54.0	18.7	V

**8DPSK Ch 78 - Average**

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17982	35.5	-25.5	43.4	17.6	54.0	18.5	V
17988	35.5	-25.5	43.4	17.6	54.0	18.5	V
17976	35.4	-25.5	43.4	17.5	54.0	18.6	H
17985	35.4	-25.5	43.4	17.5	54.0	18.6	H
17899.5	35.3	-25.5	43.4	17.4	54.0	18.7	H
2491.3	39.2	-14.2	27.2	26.2	54.0	14.8	V

**GFSK Ch 0 – Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17854.5	47.7	-25.5	43.4	29.8	74.0	26.3	H
17916	47.7	-25.5	43.4	29.8	74.0	26.3	H
17971.5	47.6	-25.5	43.4	29.7	74.0	26.4	H
17863.5	47.5	-25.5	43.4	29.6	74.0	26.5	H
17991	47.5	-25.5	43.4	29.6	74.0	26.5	V
2384.3	52.1	-14.2	27.2	39.1	74.0	21.9	V

**GFSK Ch 39 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17560.5	48.6	-26.9	43.4	32.1	74.0	25.4	H
17928	47.9	-25.5	43.4	30	74.0	26.1	V
17988	47.7	-25.5	43.4	29.8	74.0	26.3	H
17664	47.5	-25.7	43.4	29.8	74.0	26.5	V
17475	47.4	-26.9	43.4	30.9	74.0	26.6	V
17526	47.4	-26.9	43.4	30.9	74.0	26.6	H

**GFSK Ch 78 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17955	48	-25.5	43.4	30.1	74.0	26.0	H
17785.5	47.9	-25.5	43.4	30	74.0	26.1	H
17443.5	47.8	-26.9	43.4	31.3	74.0	26.2	H
17886	47.6	-25.5	43.4	29.7	74.0	26.4	H
17917.5	47.6	-25.5	43.4	29.7	74.0	26.4	H
2485	56.1	-14.2	27.2	43.1	74.0	17.9	H

**$\pi/4$  DQPSK Ch 0 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17853	47.9	-25.5	43.4	30	74.0	26.1	H
17991	47.9	-25.5	43.4	30	74.0	26.1	V
17895	47.8	-25.5	43.4	29.9	74.0	26.2	V
17796	47.7	-25.5	43.4	29.8	74.0	26.3	H
17854.5	47.5	-25.5	43.4	29.6	74.0	26.5	H
2384.7	52.8	-14.2	27.2	39.8	74.0	21.2	H

 **$\pi/4$  DQPSK Ch 39 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17803.5	48.8	-25.5	43.4	30.9	74.0	25.2	V
17884.5	47.8	-25.5	43.4	29.9	74.0	26.2	H
17817	47.5	-25.5	43.4	29.6	74.0	26.5	V
17976	47.5	-25.5	43.4	29.6	74.0	26.5	V
17857.5	47.4	-25.5	43.4	29.5	74.0	26.6	H
17955	47.4	-25.5	43.4	29.5	74.0	26.6	H

 **$\pi/4$  DQPSK Ch 78 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17775	47.9	-25.5	43.4	30	74.0	26.1	H
17964	47.9	-25.5	43.4	30	74.0	26.1	V
17853	47.7	-25.5	43.4	29.8	74.0	26.3	V
17965.5	47.7	-25.5	43.4	29.8	74.0	26.3	V
17446.5	47.5	-26.9	43.4	31	74.0	26.5	V
2499.2	52.2	-13.9	28.4	37.7	74.0	21.8	H

**8DPSK Ch 0 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17814	49.1	-25.5	43.4	31.2	74.0	24.9	H
17421	47.8	-26.9	43.4	31.3	74.0	26.2	V
17671.5	47.6	-25.7	43.4	29.9	74.0	26.4	H
17875.5	47.6	-25.5	43.4	29.7	74.0	26.4	H
17949	47.6	-25.5	43.4	29.7	74.0	26.4	V
2389.6	51.9	-14.2	27.2	38.9	74.0	22.1	V

**8DPSK Ch 39 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17905.5	48.3	-25.5	43.4	30.4	74.0	25.7	H
17781	47.5	-25.5	43.4	29.6	74.0	26.5	H
17784	47.5	-25.5	43.4	29.6	74.0	26.5	V
17896.5	47.5	-25.5	43.4	29.6	74.0	26.5	H
17958	47.4	-25.5	43.4	29.5	74.0	26.6	H
17493	47.3	-26.9	43.4	30.8	74.0	26.7	H

**8DPSK Ch 78 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)
17893.5	48.6	-25.5	43.4	30.7	74.0	25.4	V
17964	47.8	-25.5	43.4	29.9	74.0	26.2	V
17310	47.7	-25.9	40.1	33.5	74.0	26.3	H
17953.5	47.7	-25.5	43.4	29.8	74.0	26.3	H
17976	47.7	-25.5	43.4	29.8	74.0	26.3	H
2489.2	52.5	-14.2	27.2	39.5	74.0	21.5	H

**Conclusion: PASS**

**Test graphs as below:**

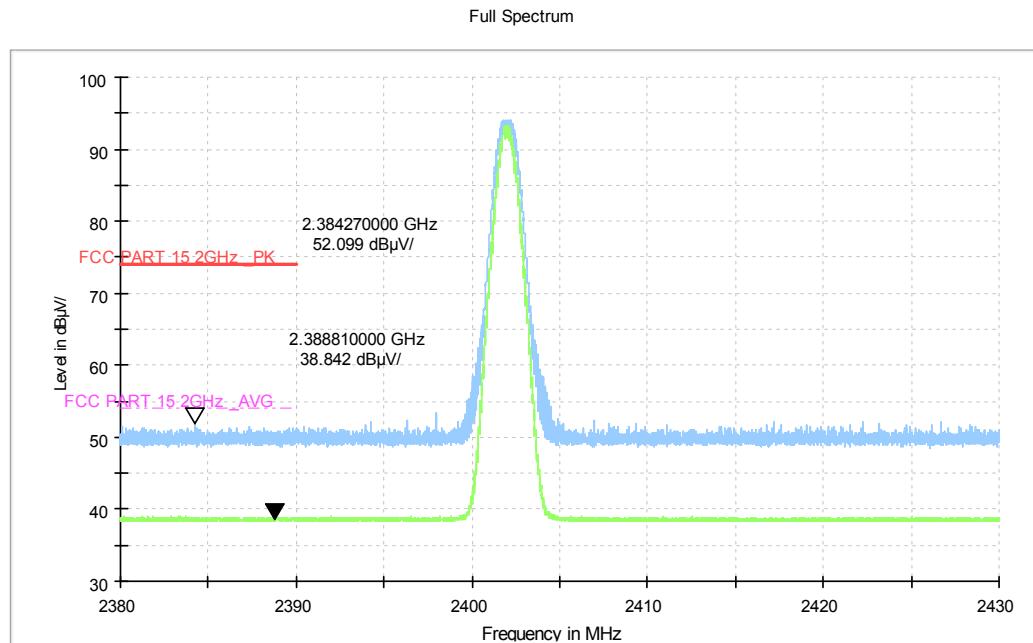


Fig.58. Radiated emission (Power): GFSK, low channel

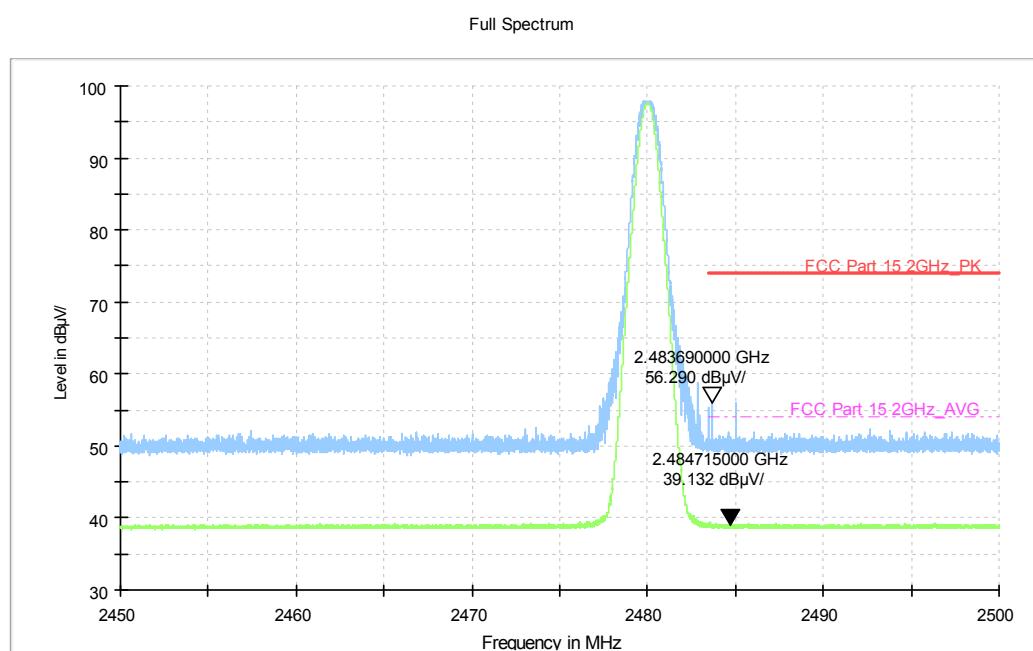


Fig.59. Radiated emission (Power) GFSK, high channel

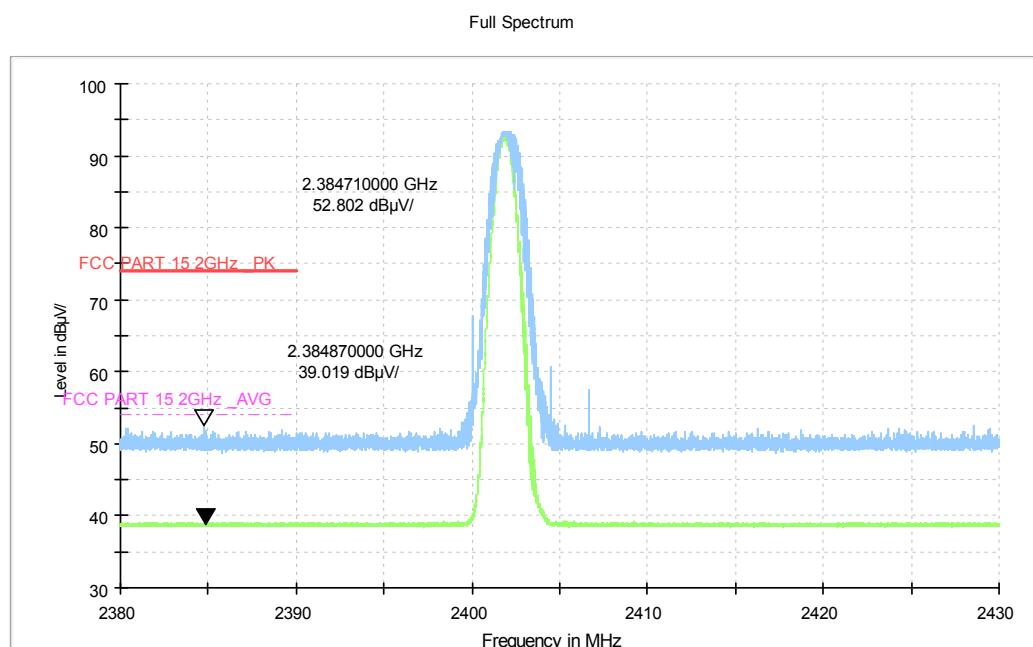


Fig.60. Radiated emission (Power):  $\pi/4$  DQPSK, low channel

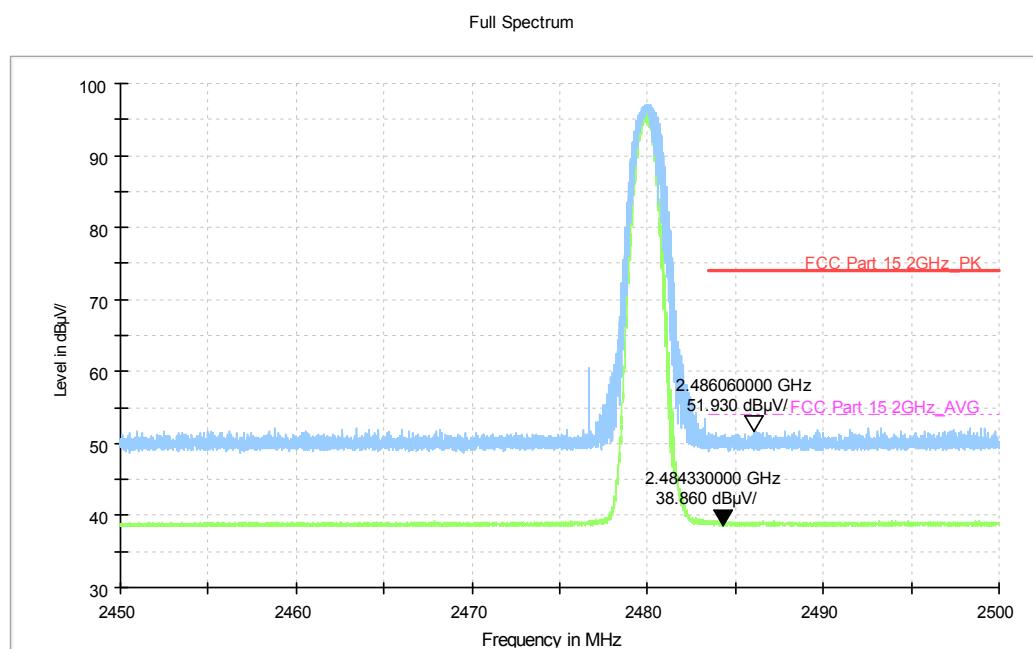


Fig.61. Radiated emission (Power):  $\pi/4$  DQPSK, high channel

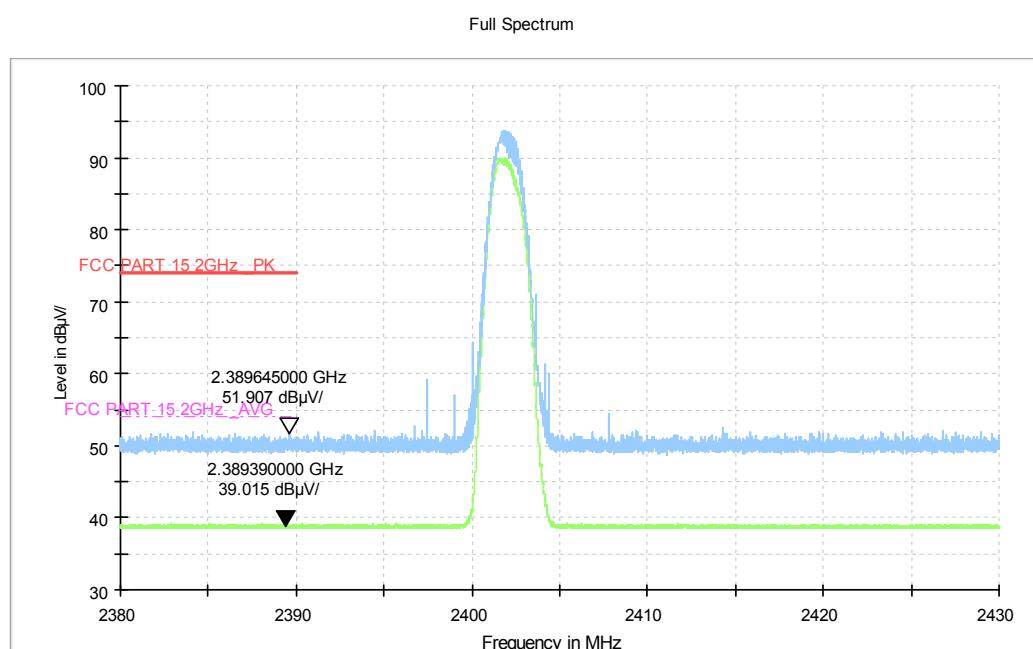


Fig.62. Radiated emission (Power): 8DPSK, low channel

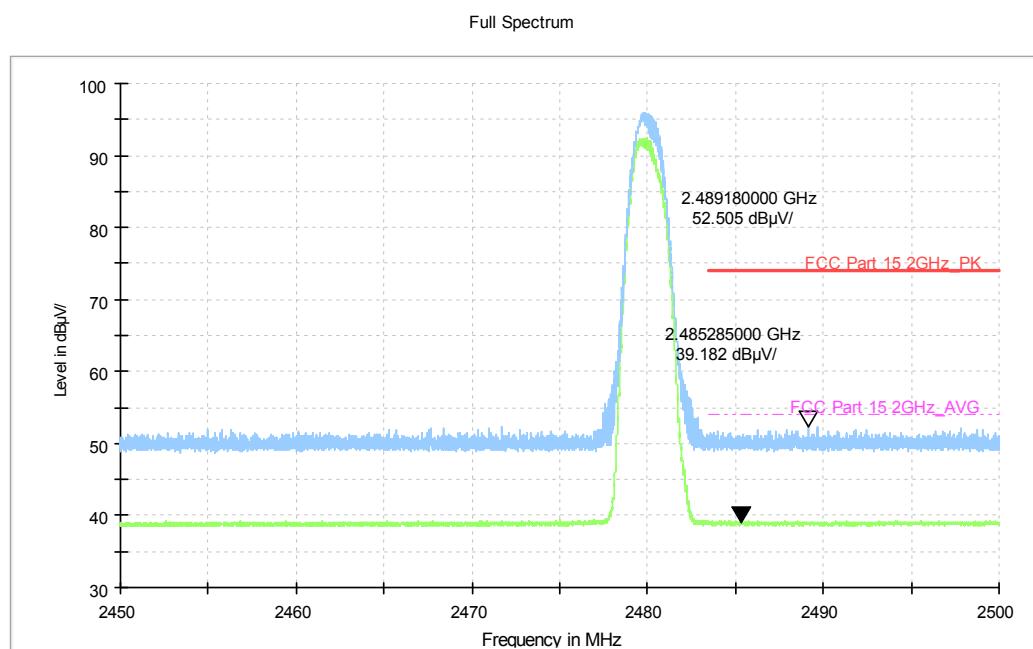


Fig.63. Radiated emission (Power): 8DPSK, high channel

## A.6. Time of Occupancy (Dwell Time)

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

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

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

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

### Measurement Limit:

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

### Measurement Result:

#### For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.64	120.82	P
		Fig.65		
	DH3	Fig.66	188.27	P
		Fig.67		
	DH5	Fig.68	196.19	P
		Fig.69		

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

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.70	122.99	P
		Fig.71		
	DH3	Fig.72	178.65	P
		Fig.73		
	DH5	Fig.74	199.20	P
		Fig.75		

#### For 8DPSK

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

	DH3	Fig.78	176.88	P
		Fig.79		
	DH5	Fig.80	225.34	P
		Fig.81		

**Conclusion: PASS**

**Test graphs as below:**

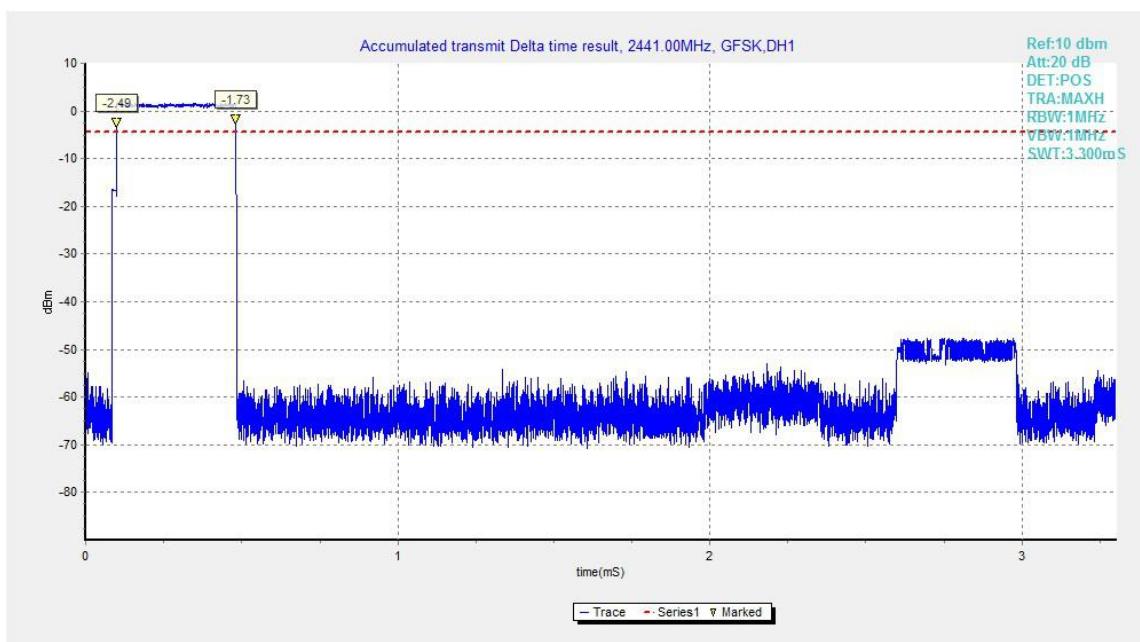


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

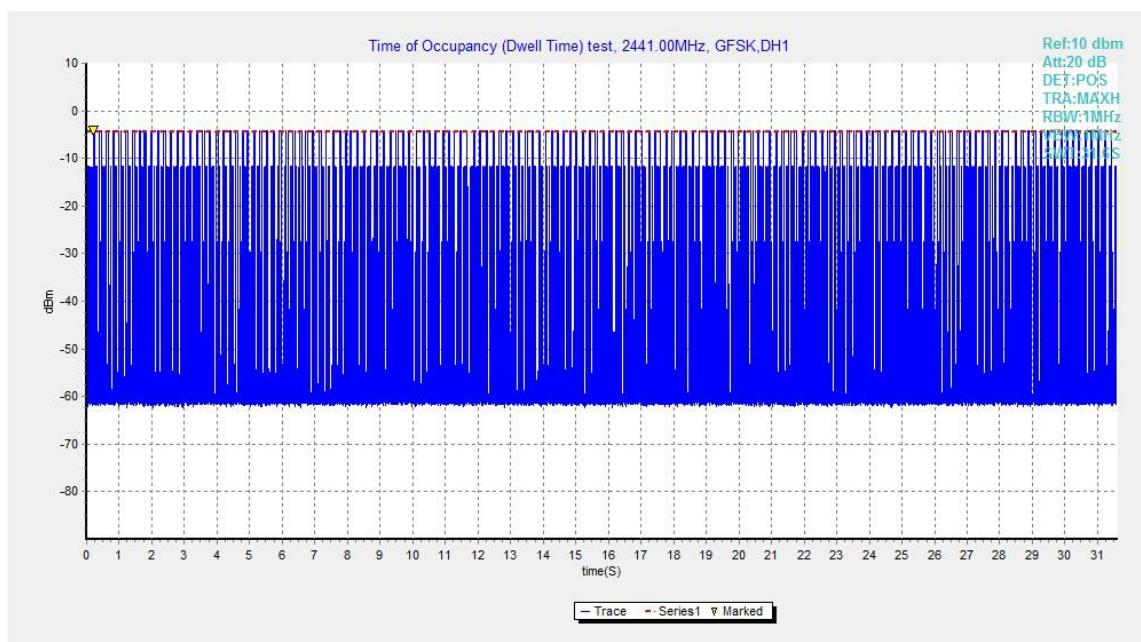


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

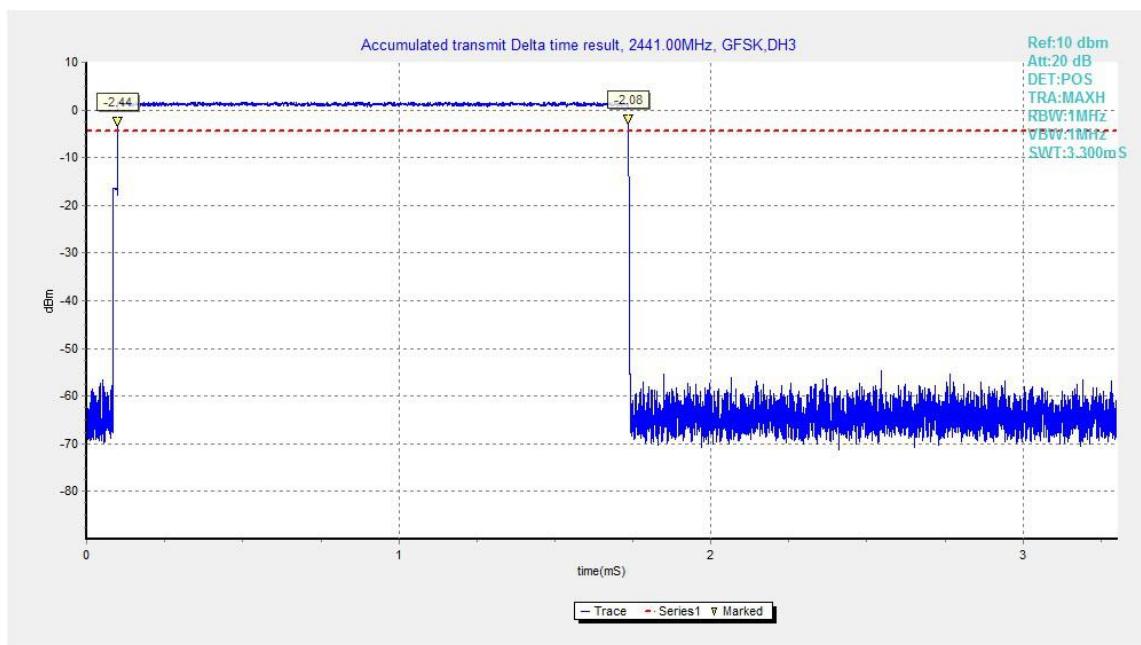


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

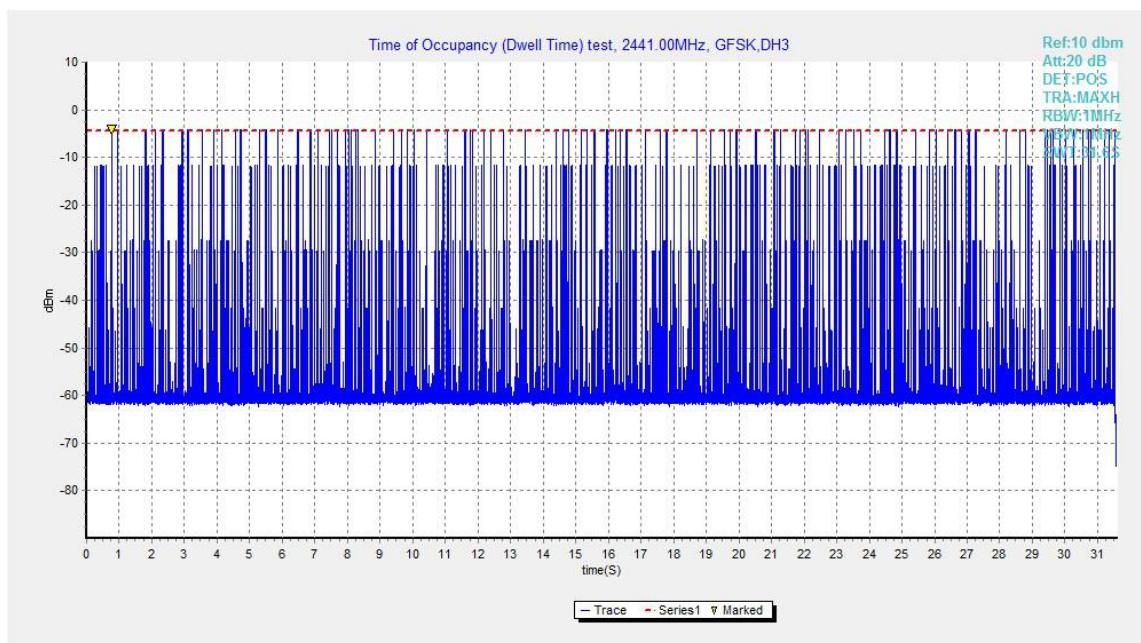


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

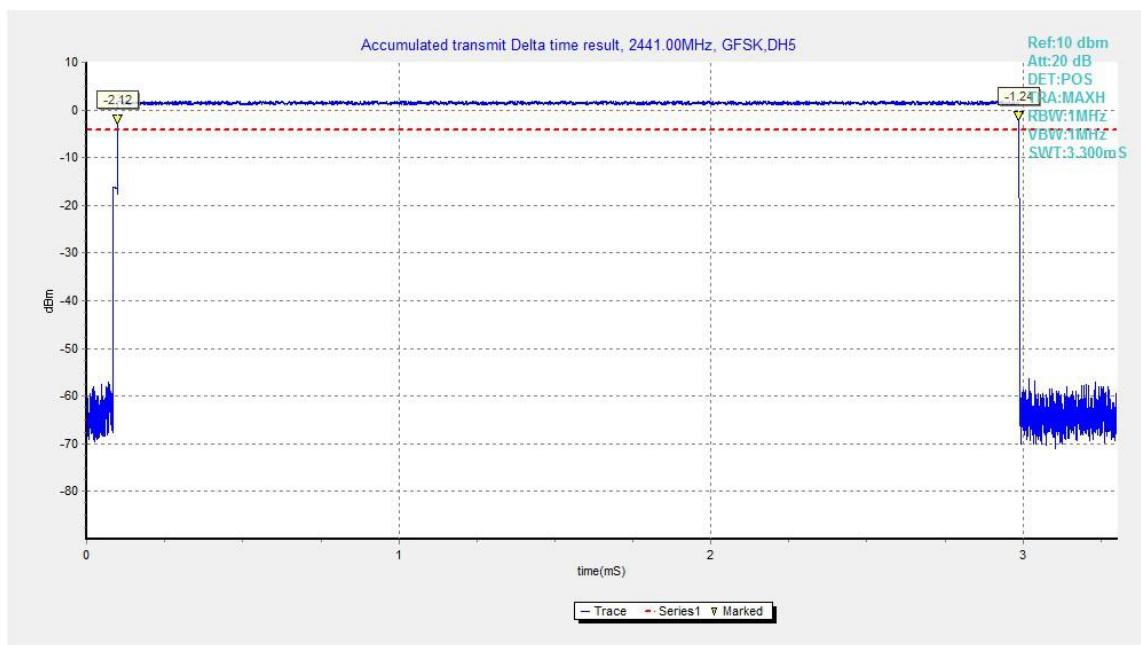


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

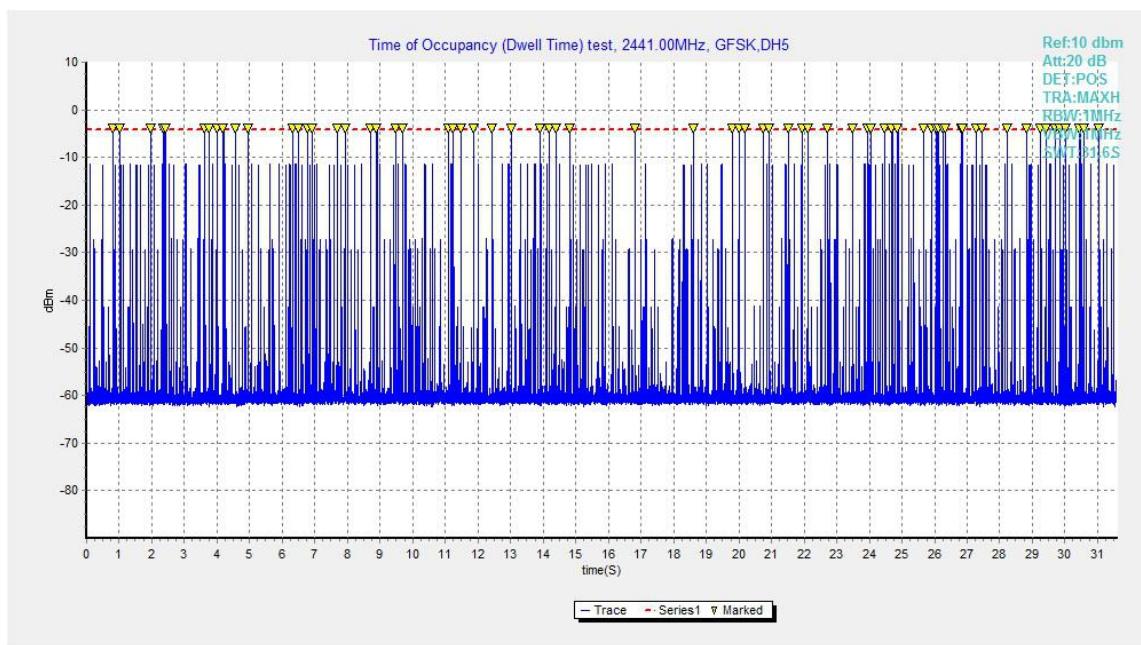


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

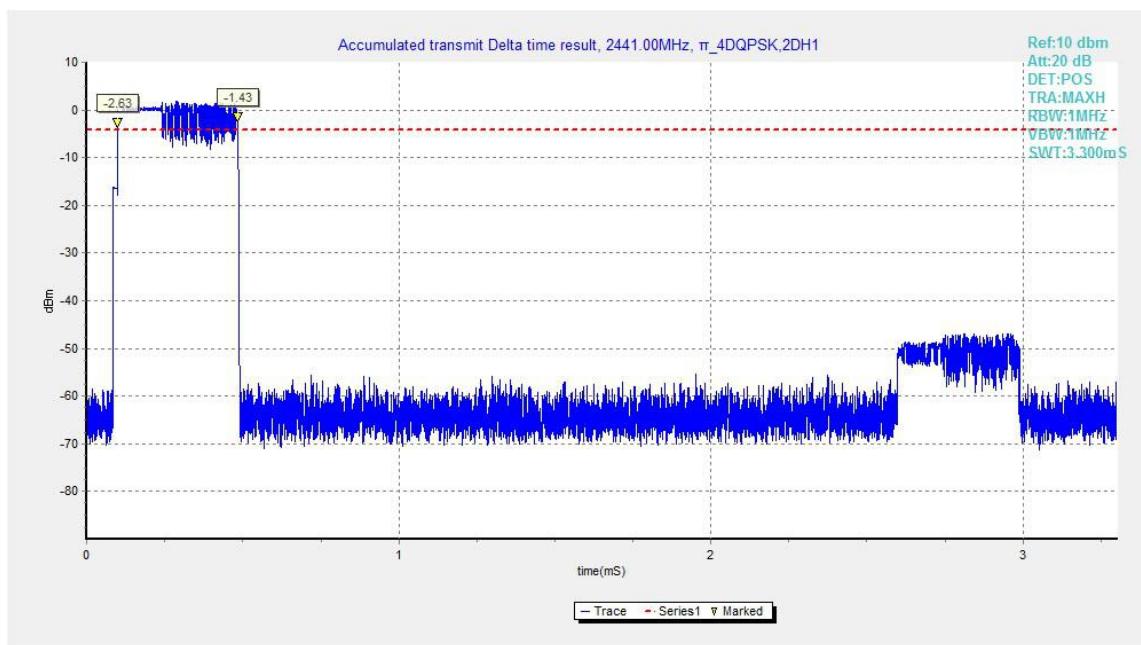


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

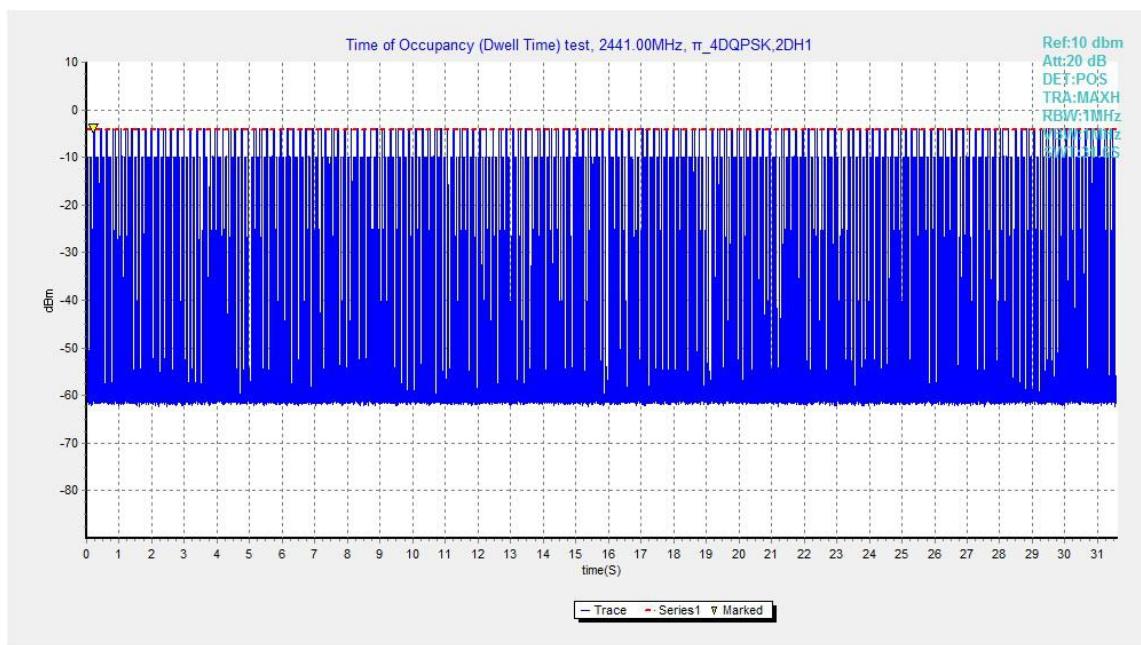


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

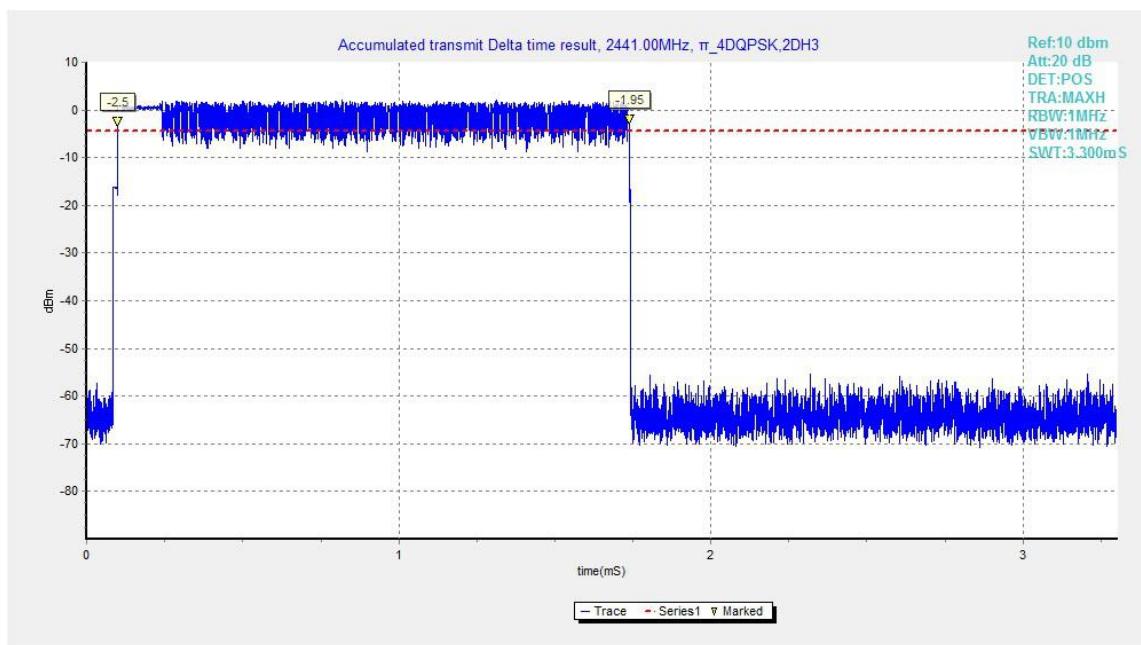


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

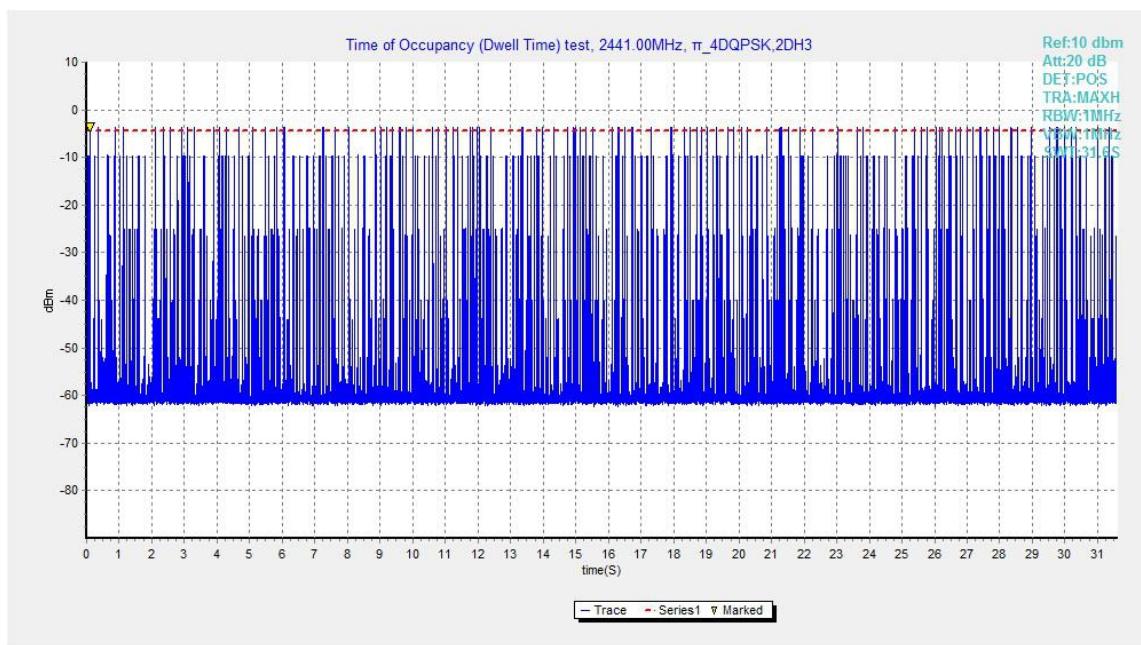


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

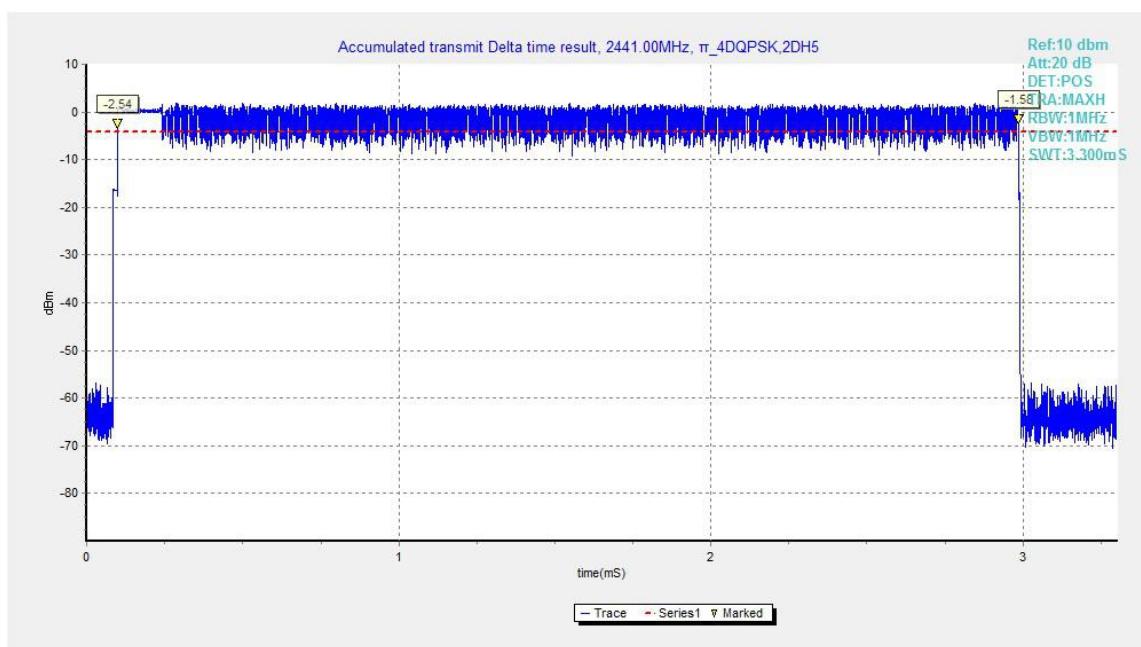


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

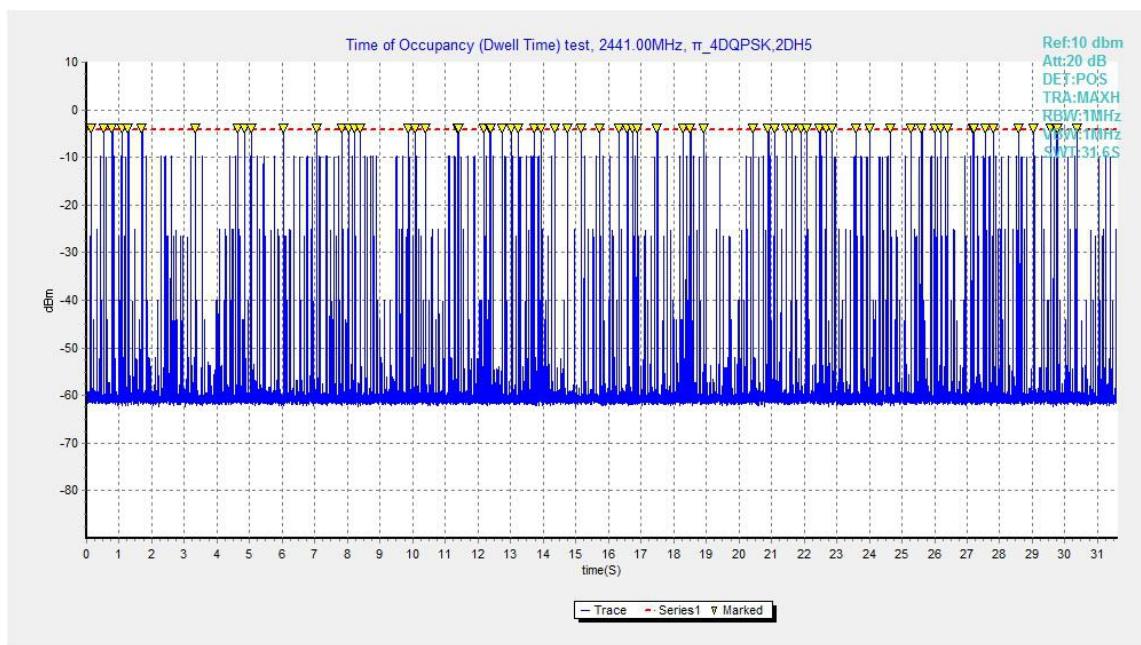


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

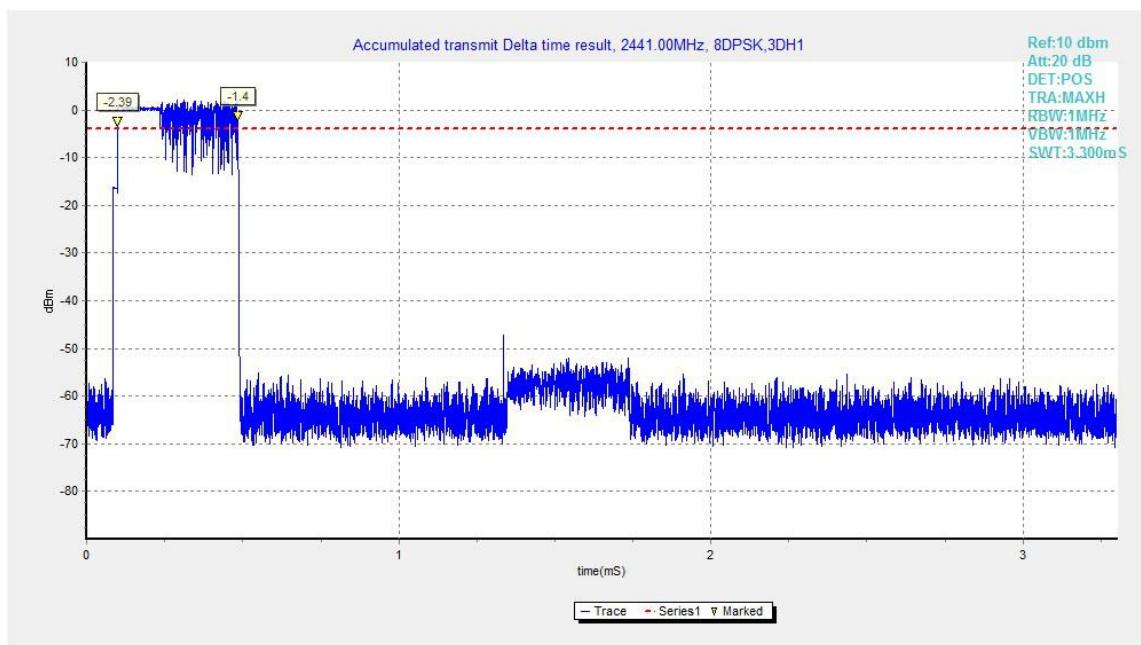


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

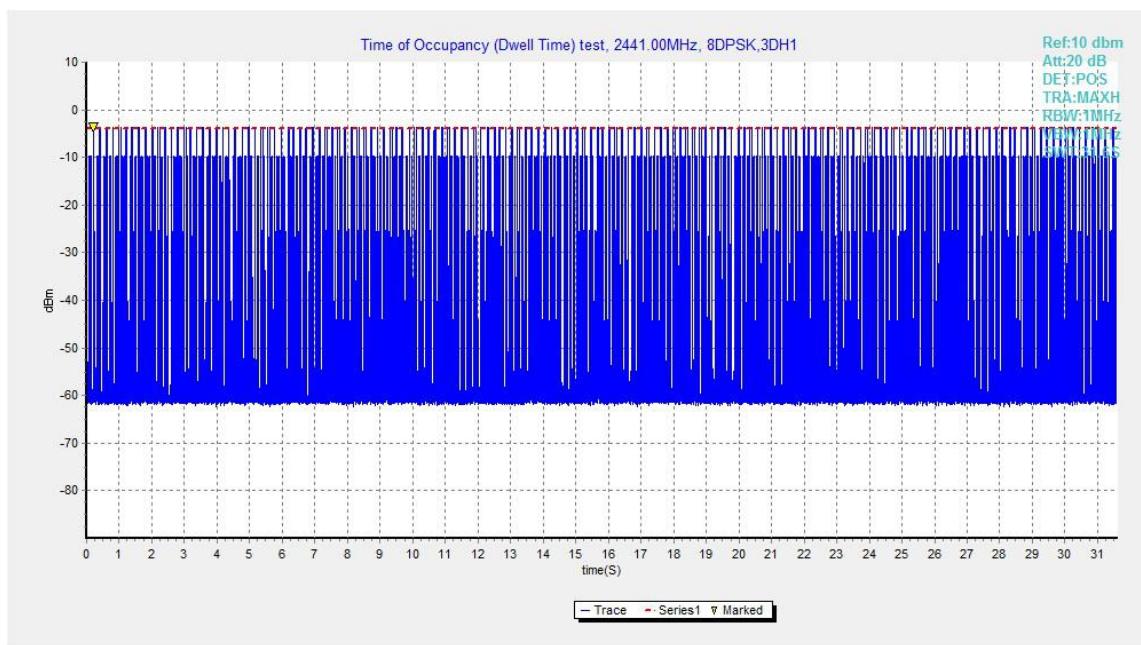


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

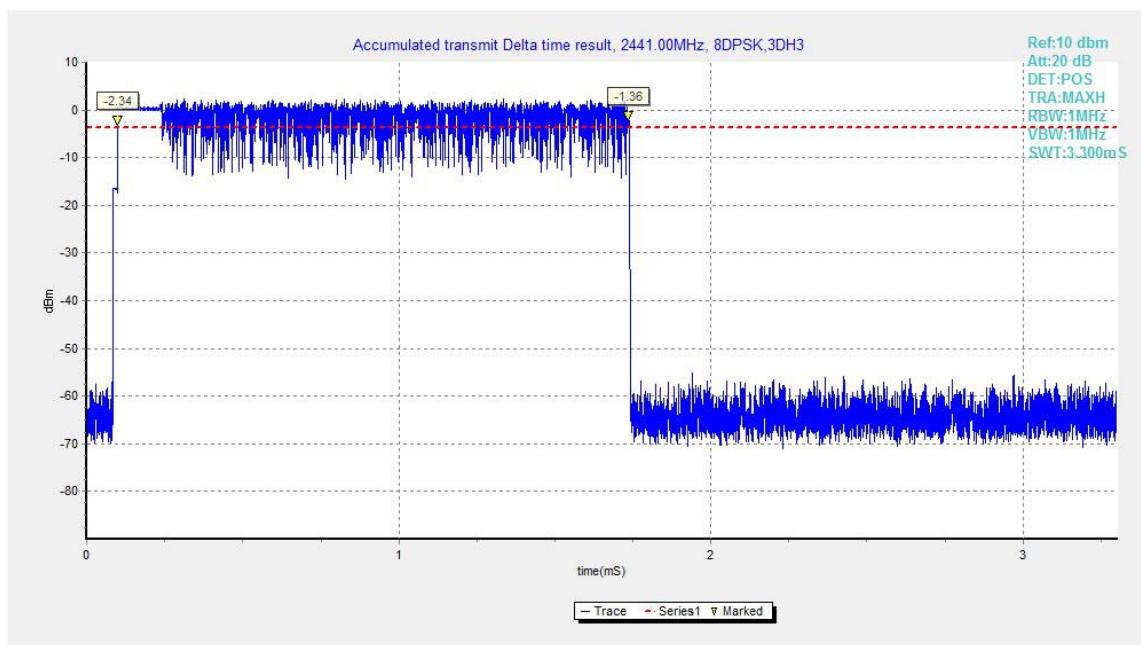


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

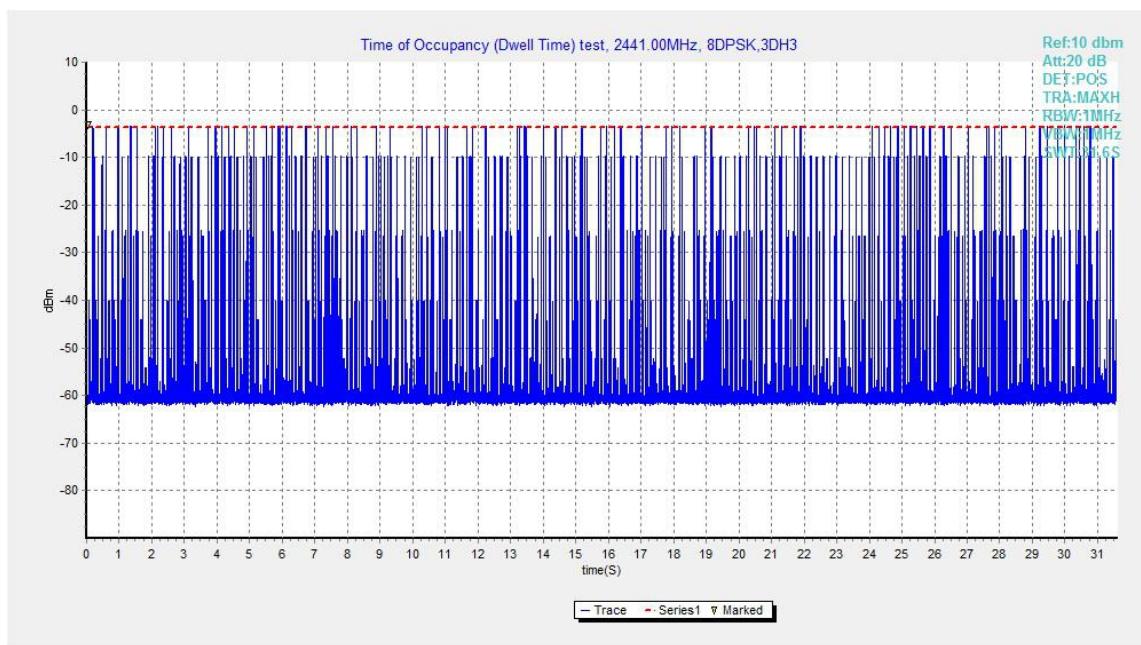


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

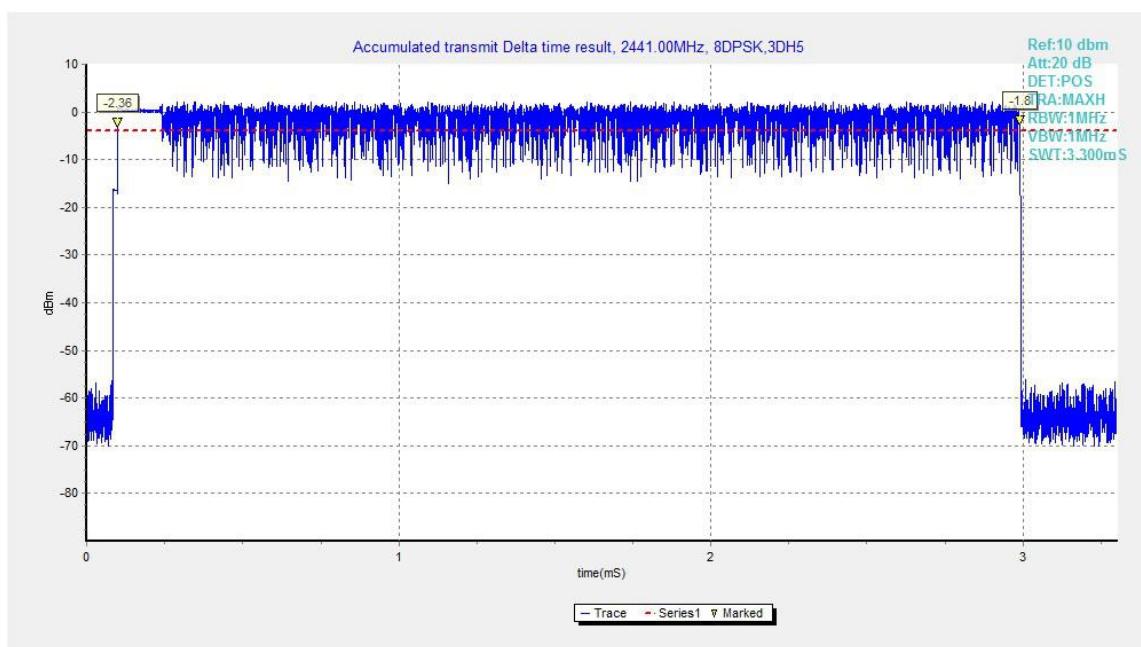


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

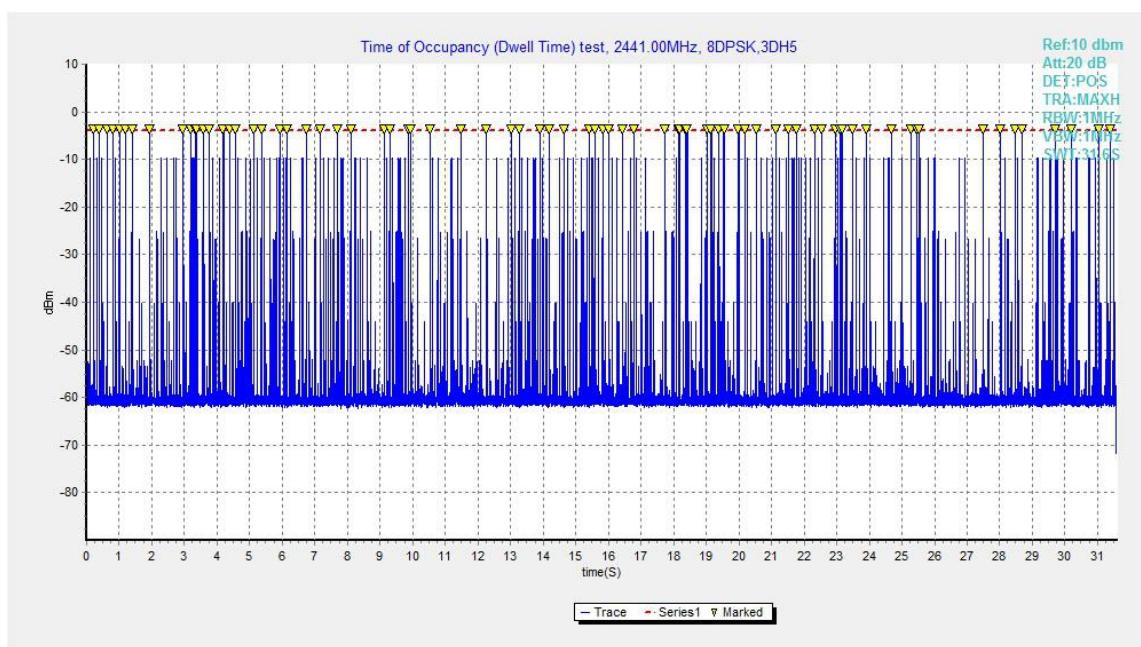


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

### A.7. 20dB Bandwidth

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

Measurement Procedure - Unwanted Emissions

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

**Measurement Limit:**

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

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

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

**Measurement Results:**

**For GFSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.82	946.50	NA
39	Fig.83	940.50	NA
78	Fig.84	939.75	NA

**For π/4 DQPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1282.50	NA
39	Fig.86	1296.00	NA
78	Fig.87	1281.75	NA

**For 8DPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1277.25	NA
39	Fig.89	1296.00	NA
78	Fig.90	1296.00	NA

**Conclusion: NA**

**Test graphs as below:**

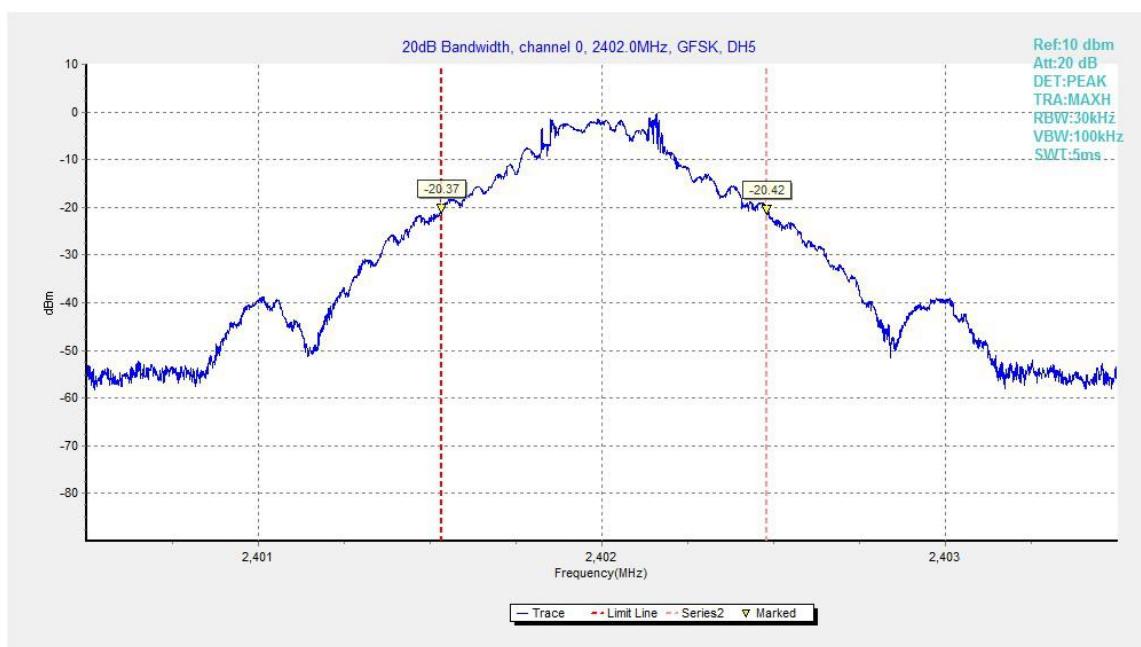


Fig.82. 20dB Bandwidth: GFSK, Channel 0

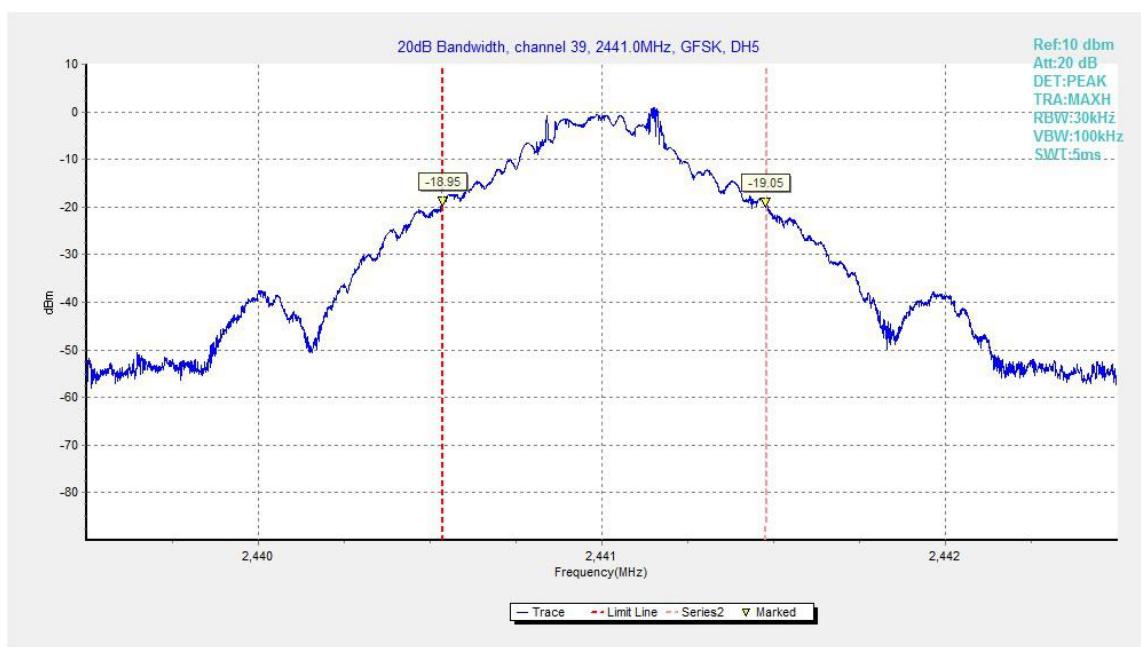


Fig.83. 20dB Bandwidth: GFSK, Channel 39

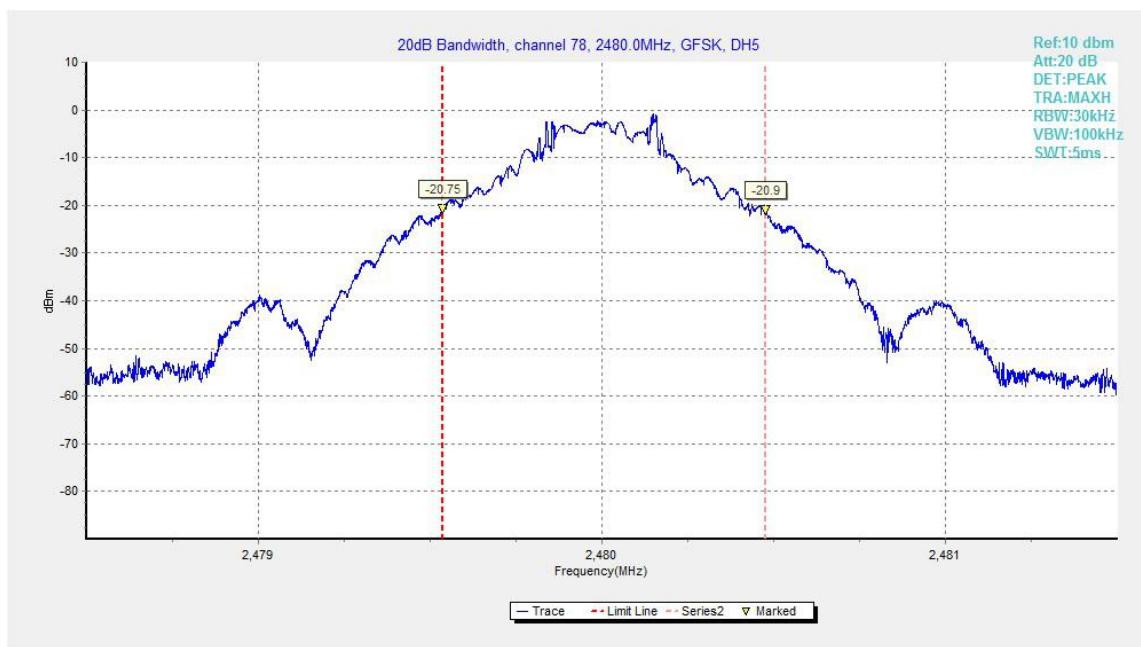


Fig.84. 20dB Bandwidth: GFSK, Channel 78

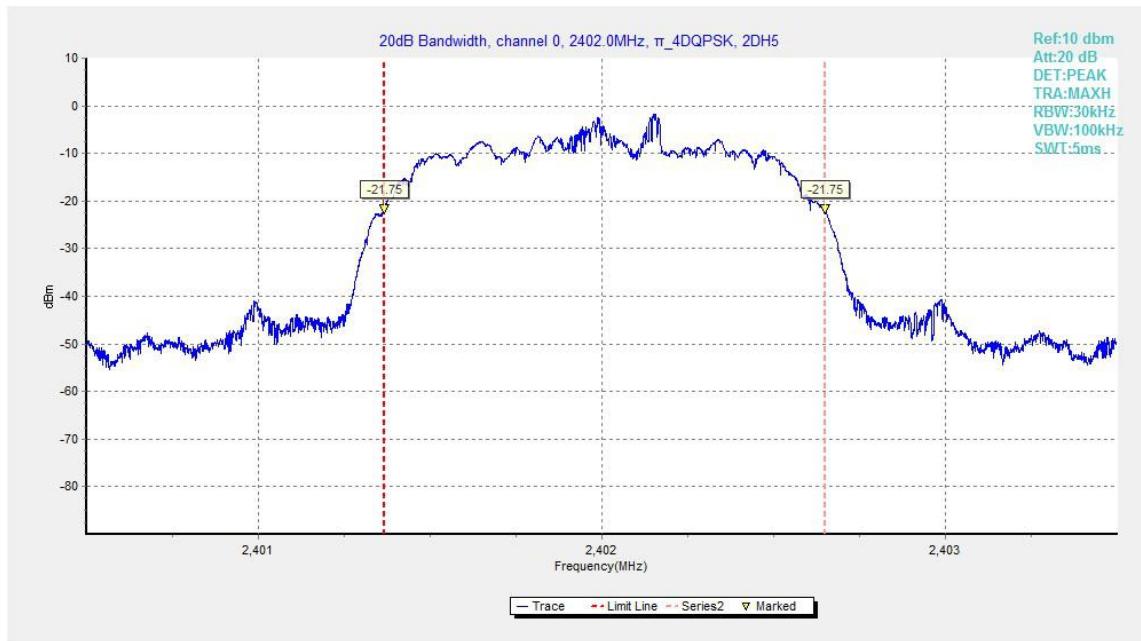


Fig.85. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0

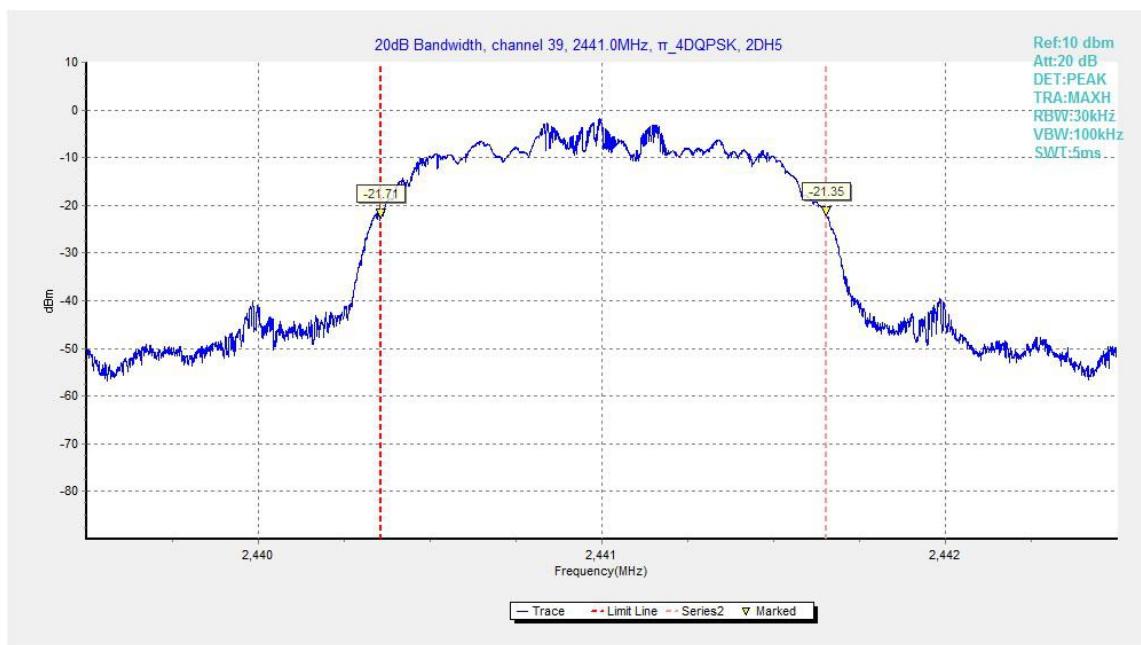


Fig.86. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39

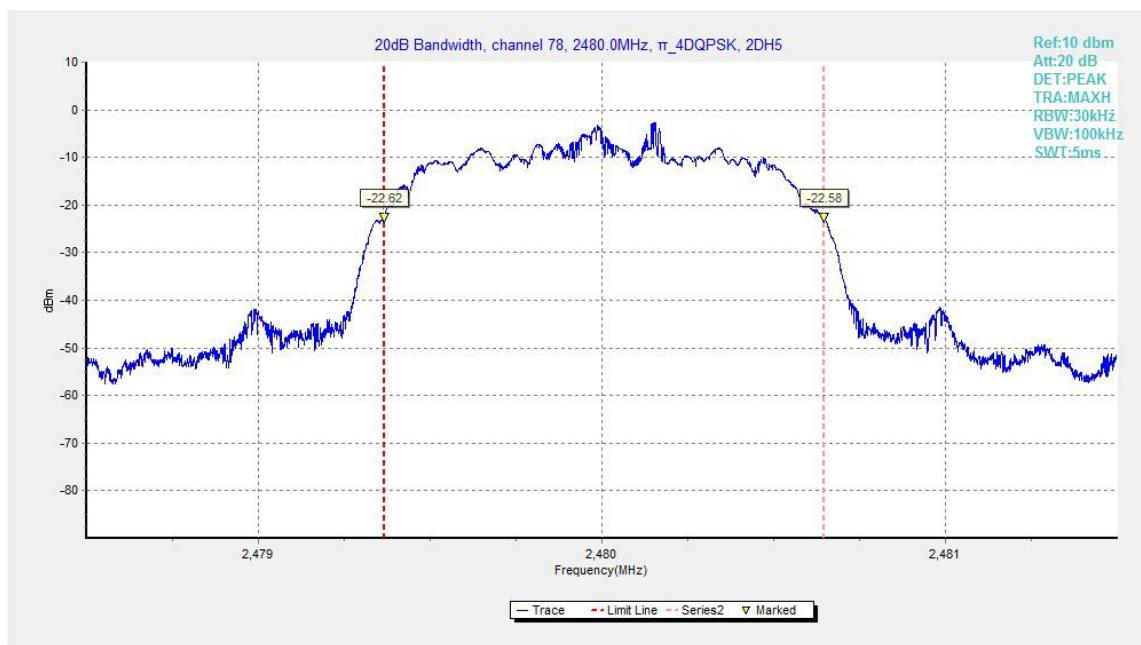


Fig.87. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78

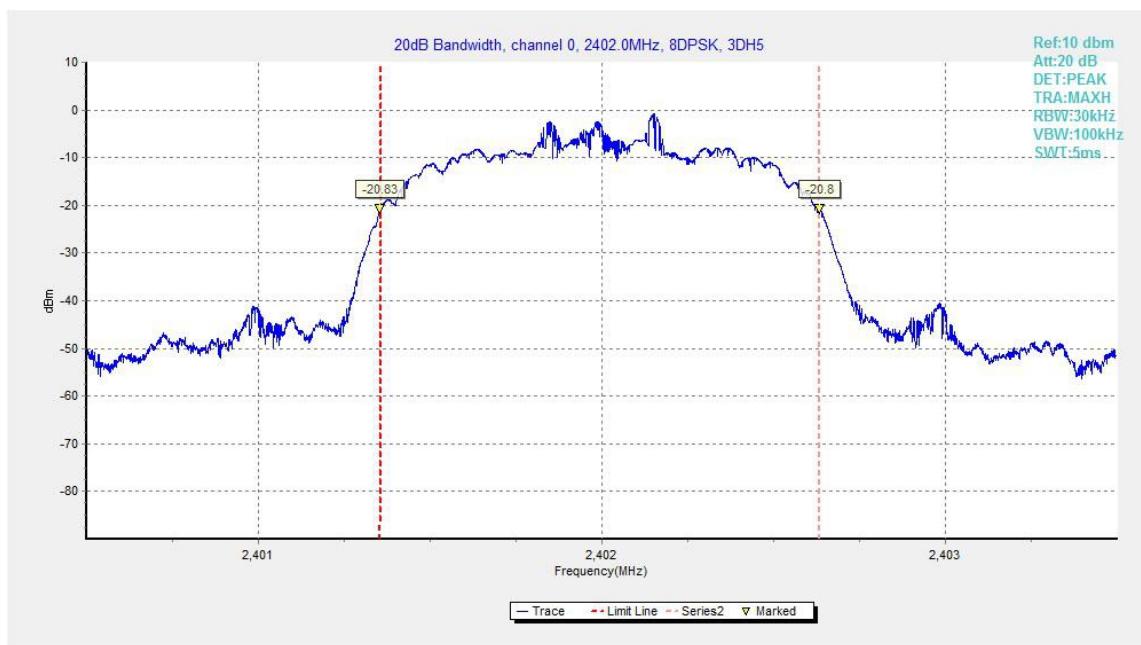


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

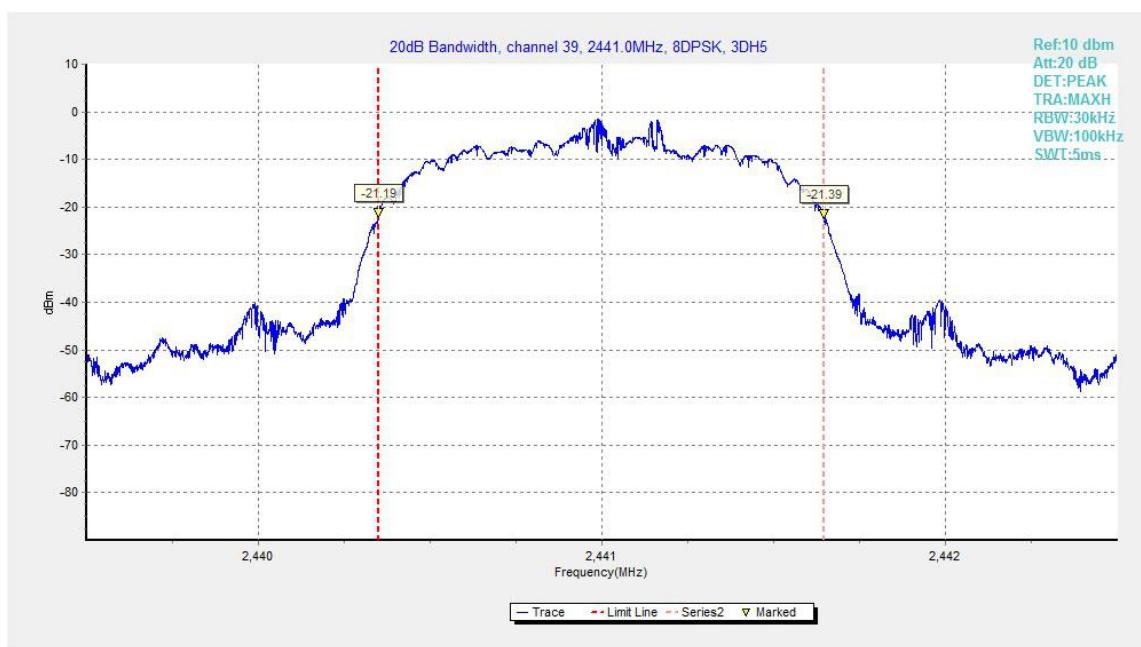


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

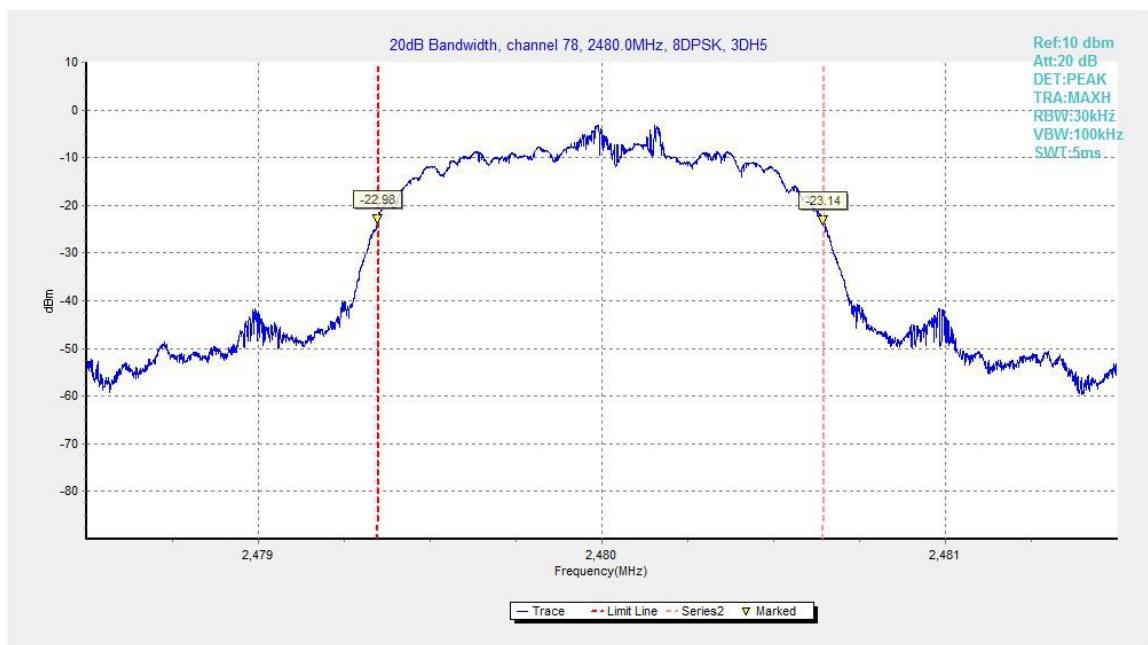


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

## A.8. Carrier Frequency Separation

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

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

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

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

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

### Measurement Limit:

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

### Measurement Result:

#### For GFSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.91	1124.25

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

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.92	1147.50

#### For 8DPSK

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.93	1007.25

**Conclusion: PASS**

**Test graphs as below:**

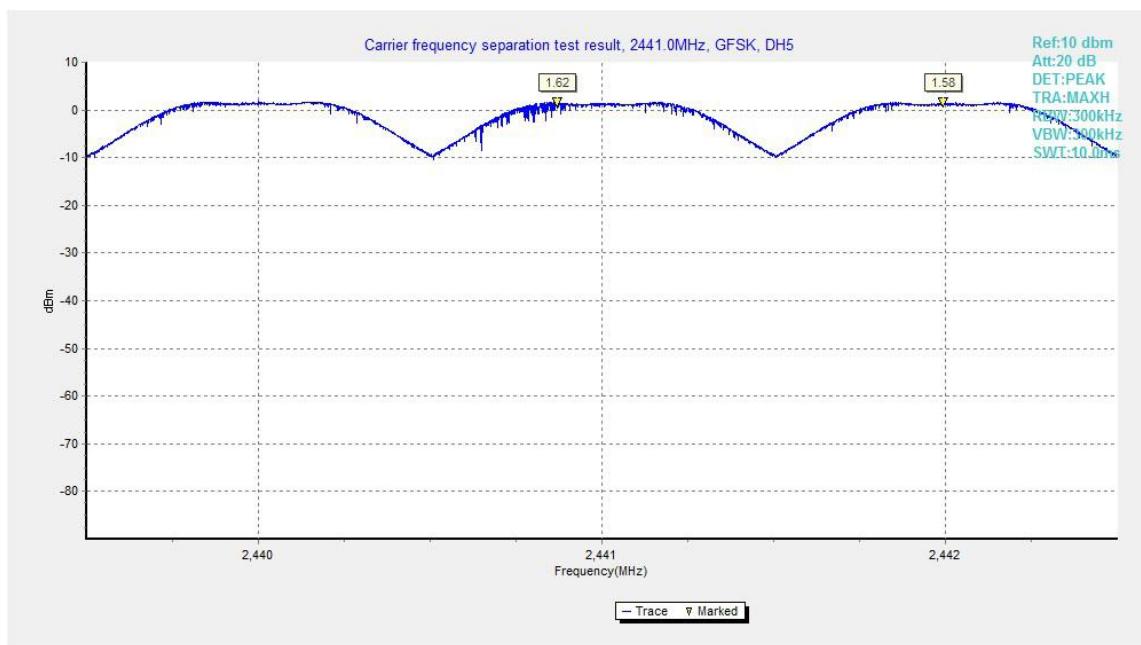


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

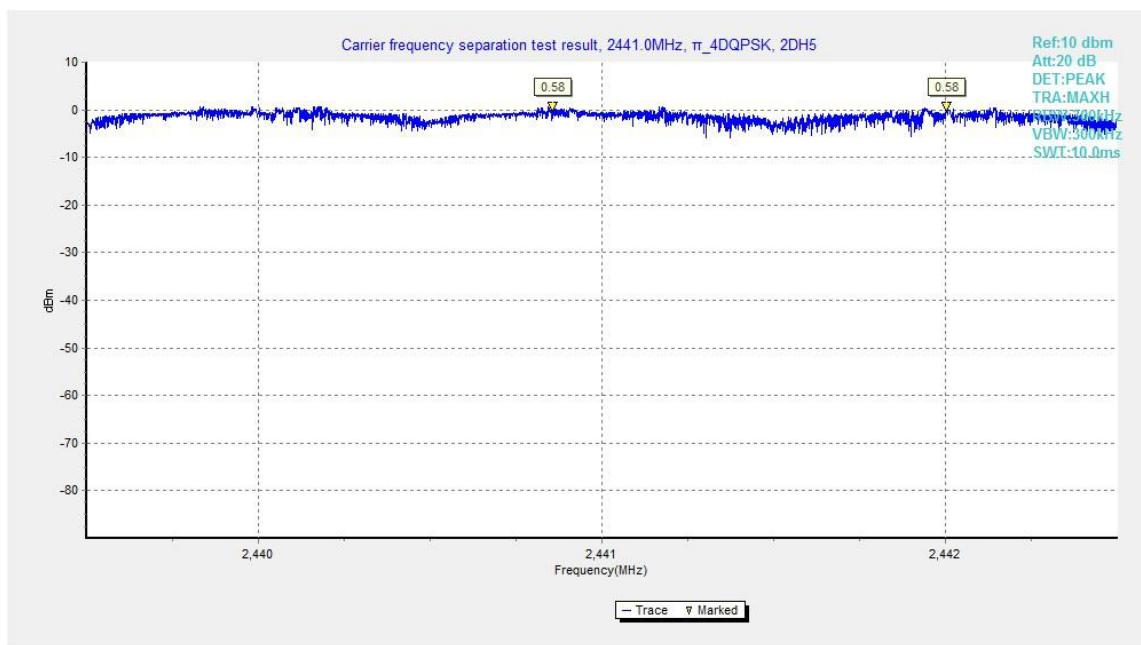


Fig.92. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39

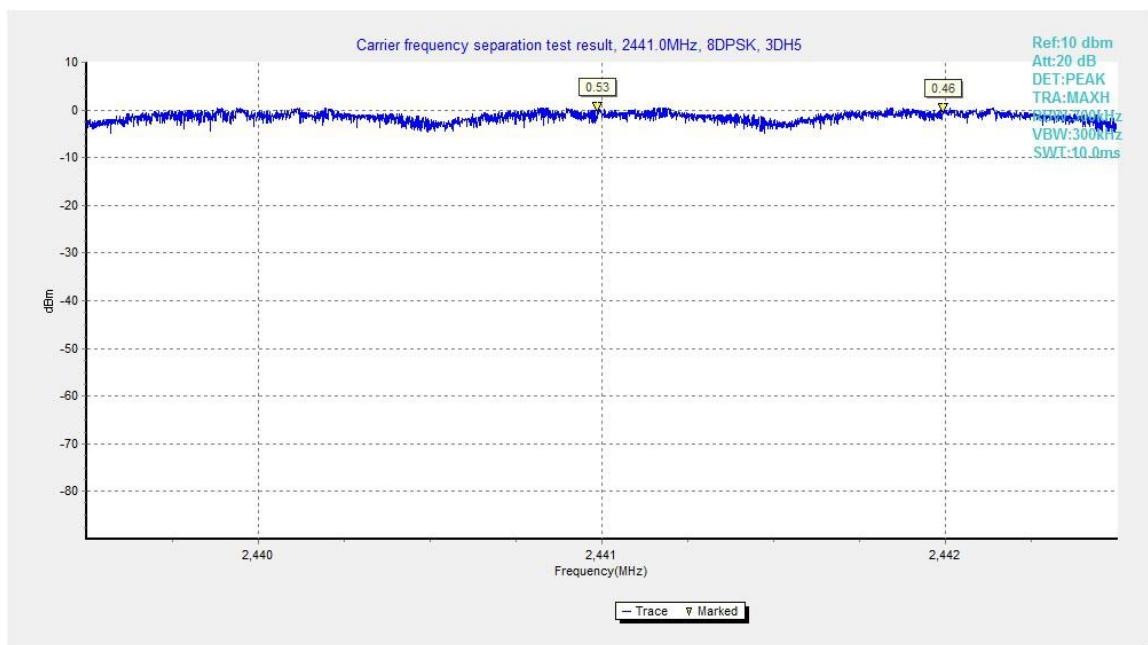


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

## A.9. Number of Hopping Channels

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

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

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

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

### Measurement Limit:

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

### Measurement Result:

#### For GFSK

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

#### For π/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:**

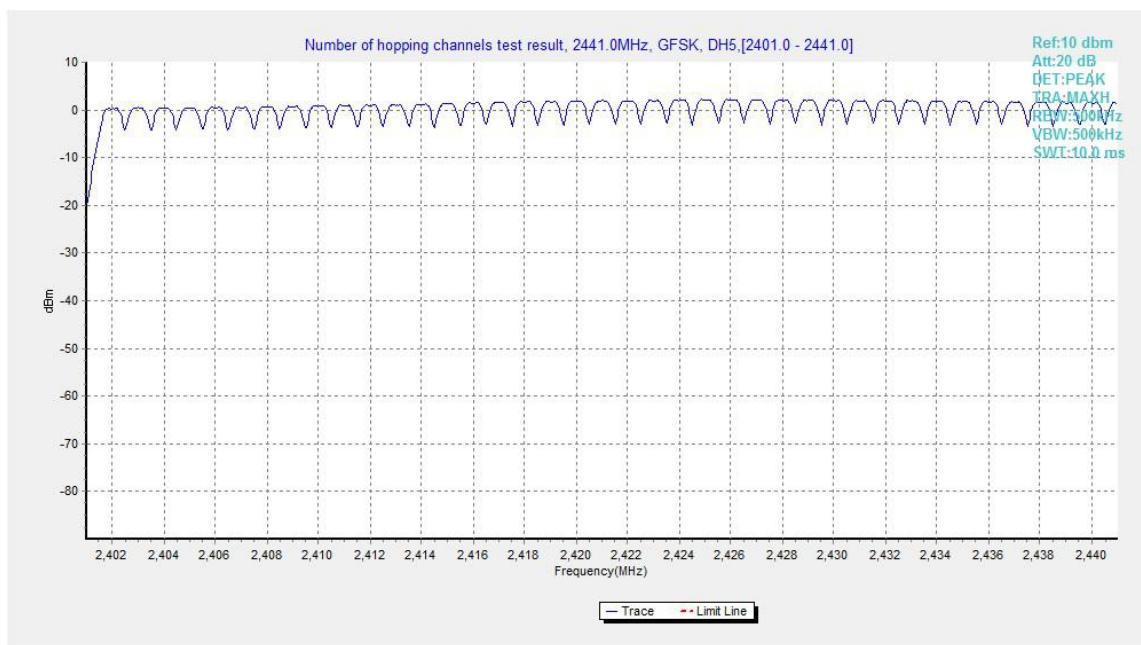


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

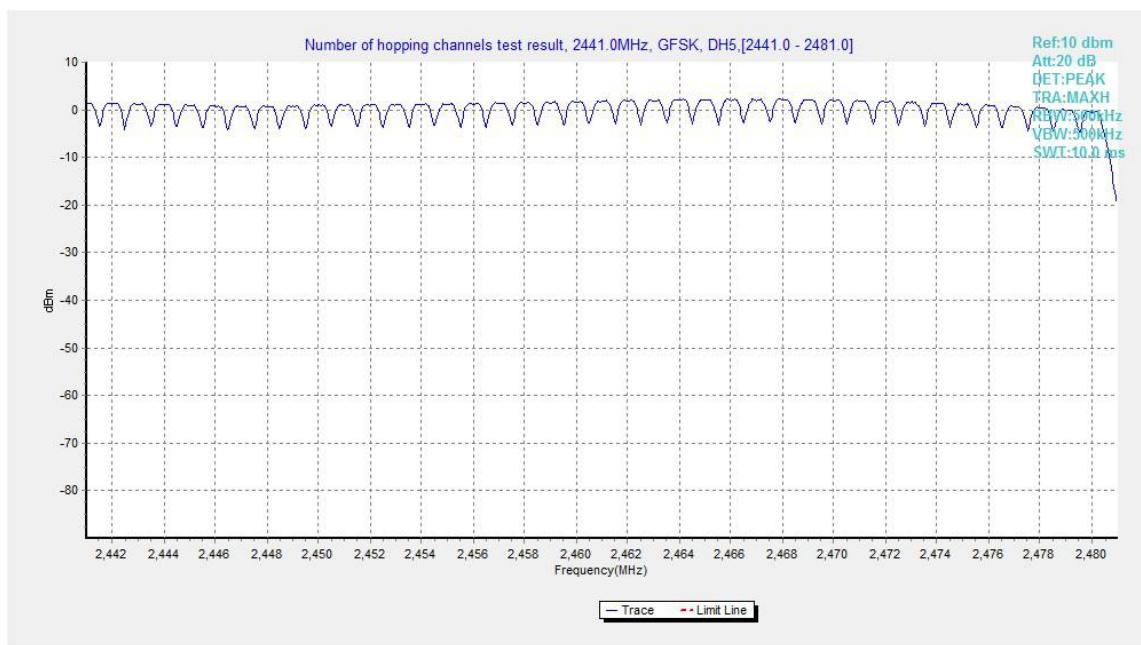


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

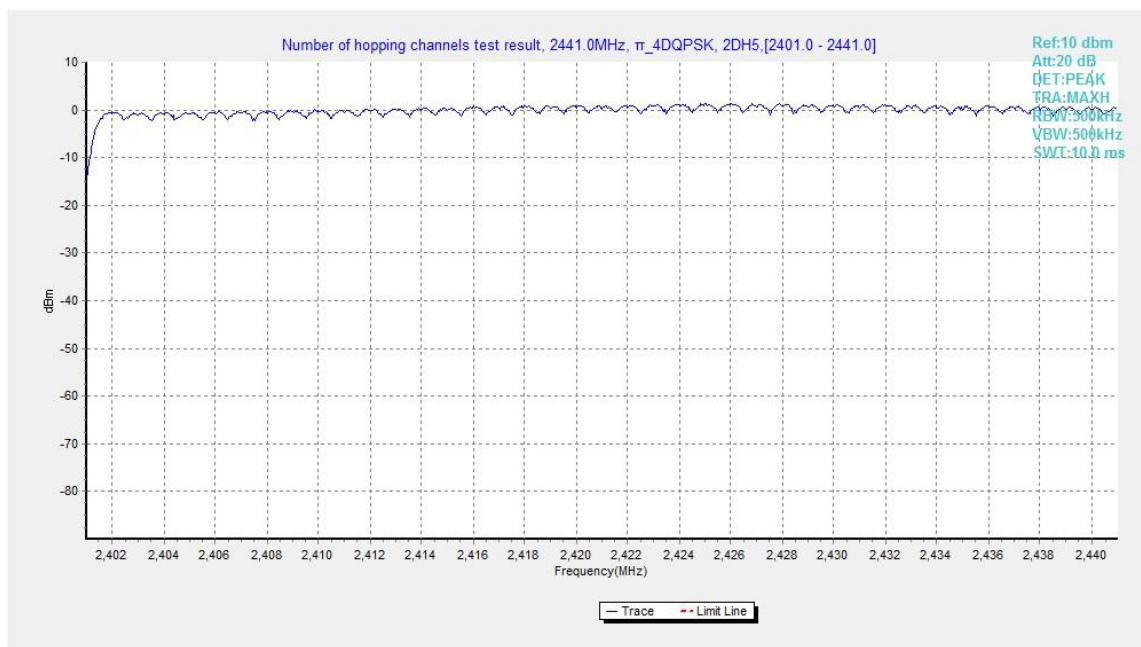


Fig.96. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39

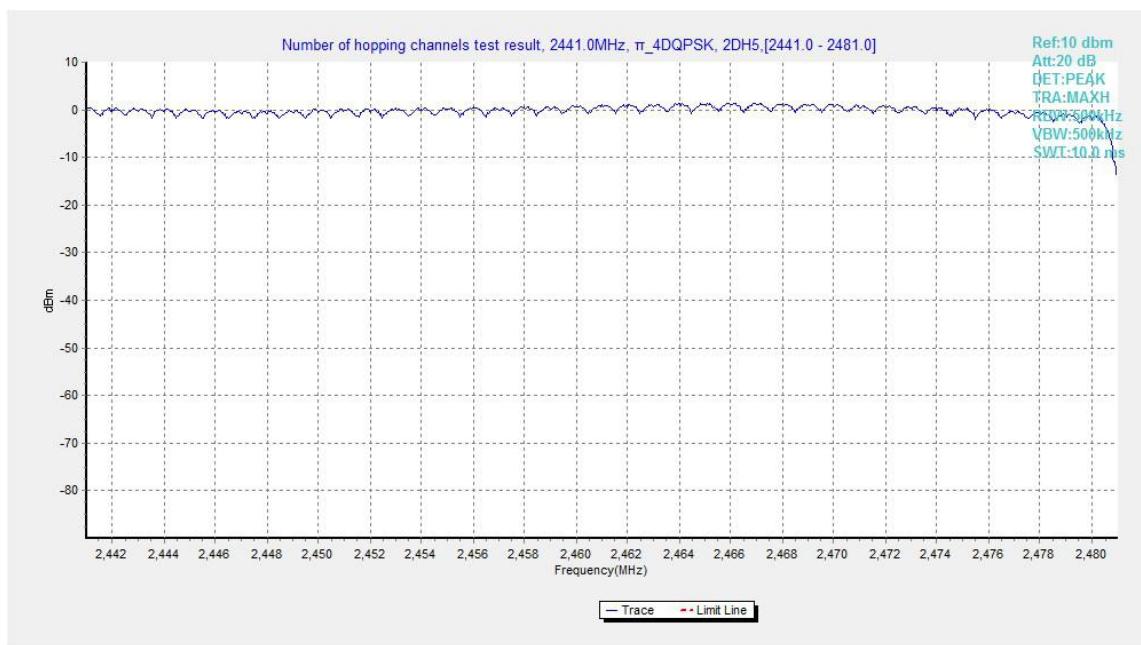


Fig.97. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78

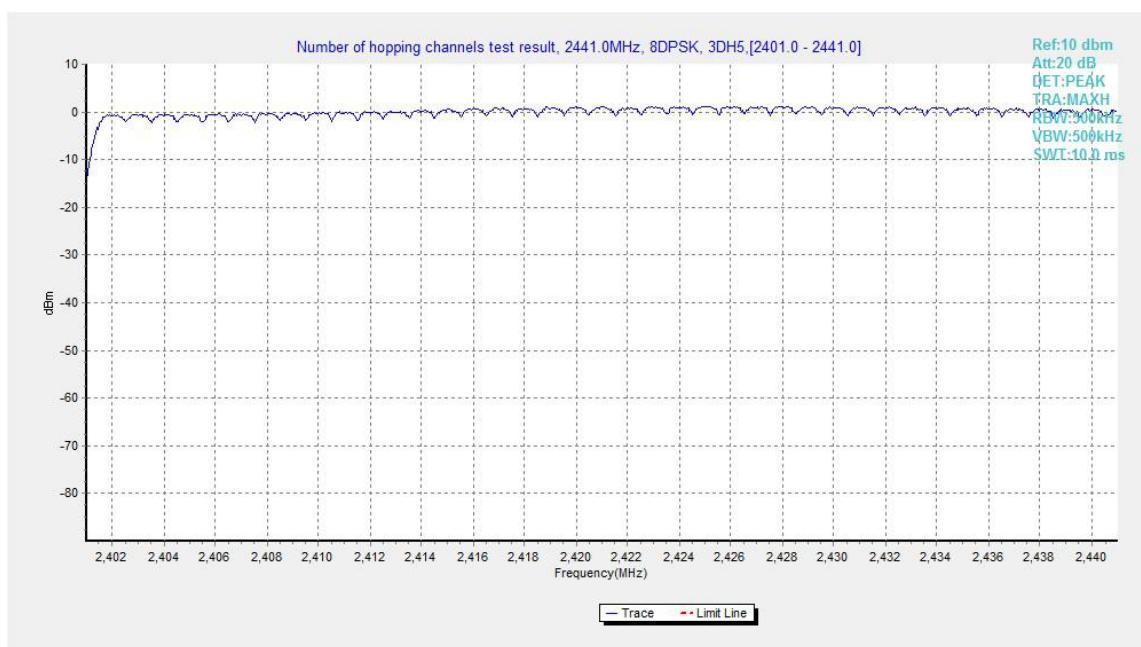


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

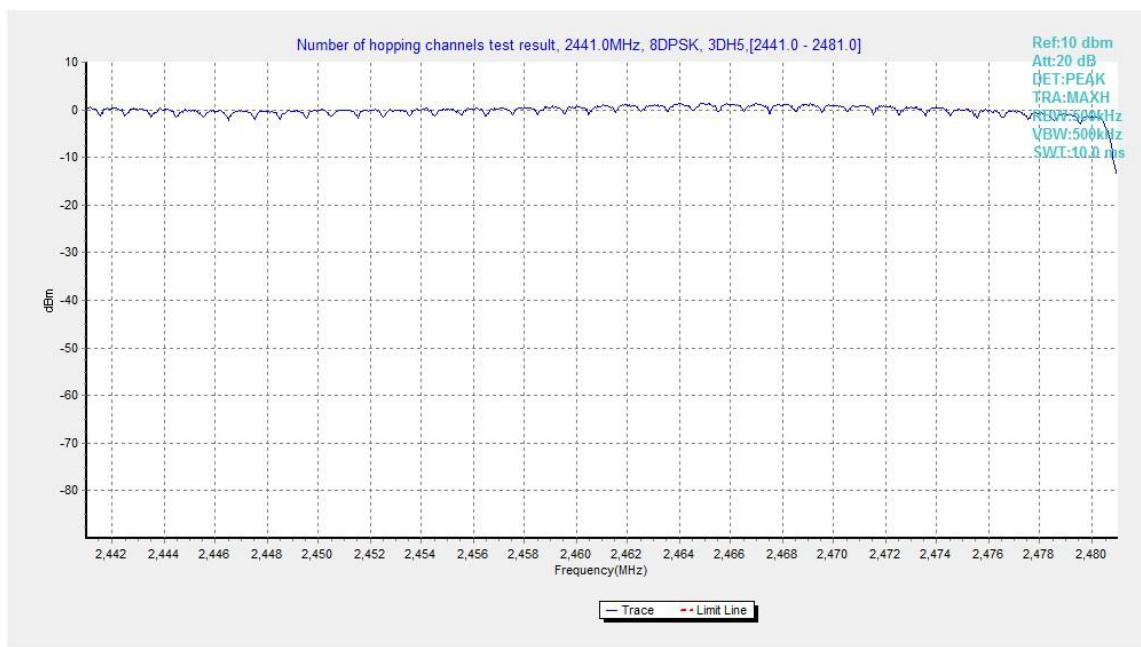


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

## A.10. AC Powerline Conducted Emission

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

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

#### Bluetooth (Quasi-peak Limit)

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

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

**Bluetooth (Average Limit)**

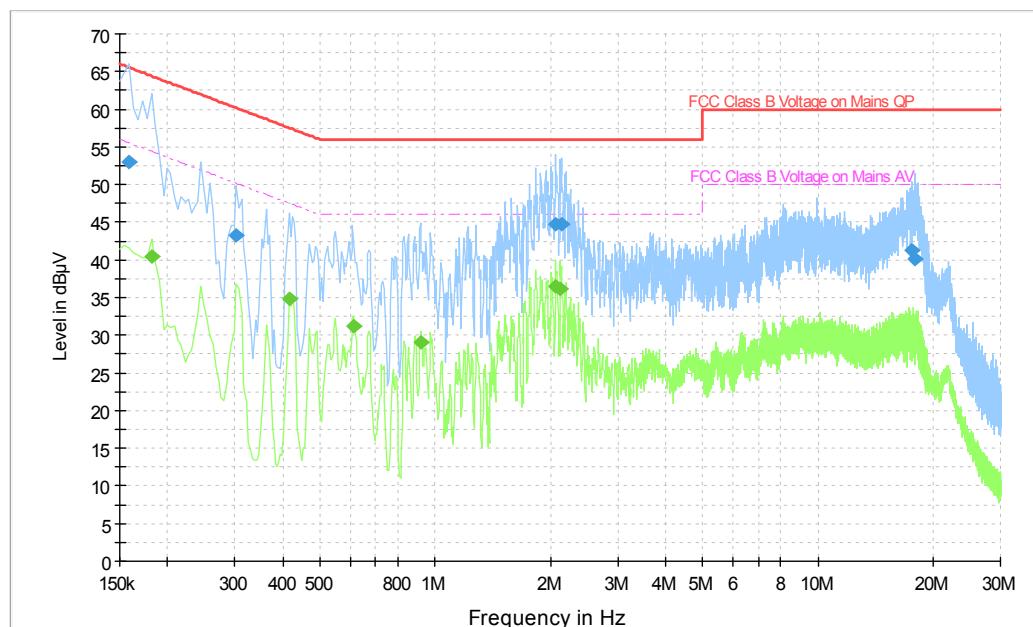
Frequency range (MHz)	Average Limit (dB $\mu$ V)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	

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

The measurement is made according to ANSI C63.10

**Conclusion: PASS**

**Test graphs as below:**

**Traffic (With AE3):**


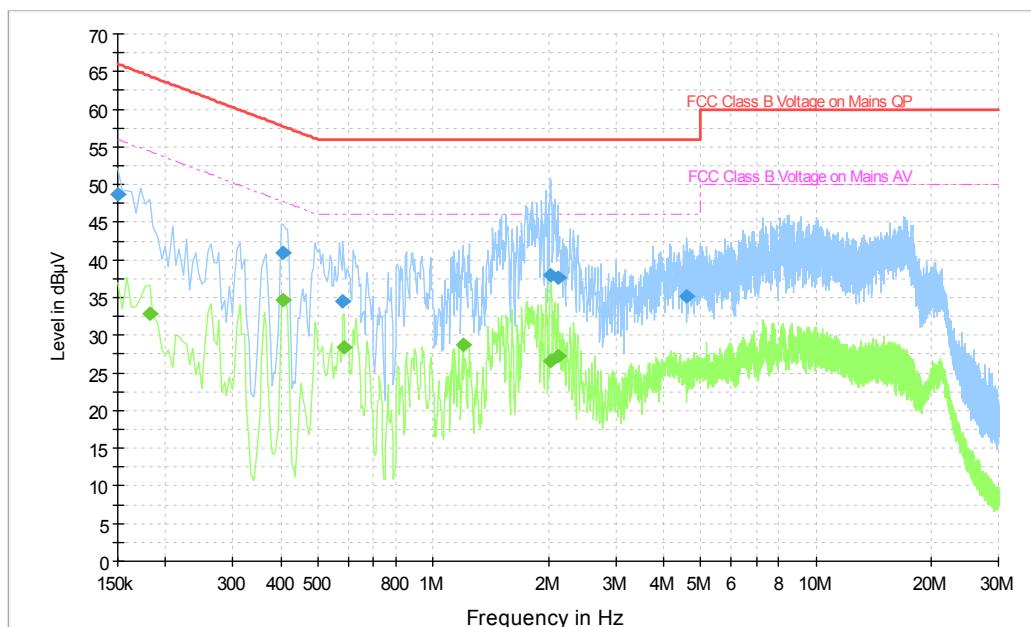
Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

## Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	53.1	2000.0	9.000	On	L1	28.7	12.5	65.5
0.303000	43.2	2000.0	9.000	On	L1	19.8	17.0	60.2
2.067000	44.7	2000.0	9.000	On	L1	19.6	11.3	56.0
2.139000	44.7	2000.0	9.000	On	L1	19.6	11.3	56.0
17.524500	41.3	2000.0	9.000	On	L1	19.8	18.7	60.0
17.992500	40.2	2000.0	9.000	On	L1	19.8	19.8	60.0

## Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	40.5	2000.0	9.000	On	L1	23.8	14.0	54.4
0.415500	34.8	2000.0	9.000	On	L1	19.8	12.7	47.5
0.613500	31.2	2000.0	9.000	On	L1	19.8	14.8	46.0
0.915000	29.1	2000.0	9.000	On	L1	19.7	16.9	46.0
2.067000	36.5	2000.0	9.000	On	L1	19.6	9.5	46.0
2.125500	36.2	2000.0	9.000	On	L1	19.6	9.8	46.0

**Idle (With AE3):**


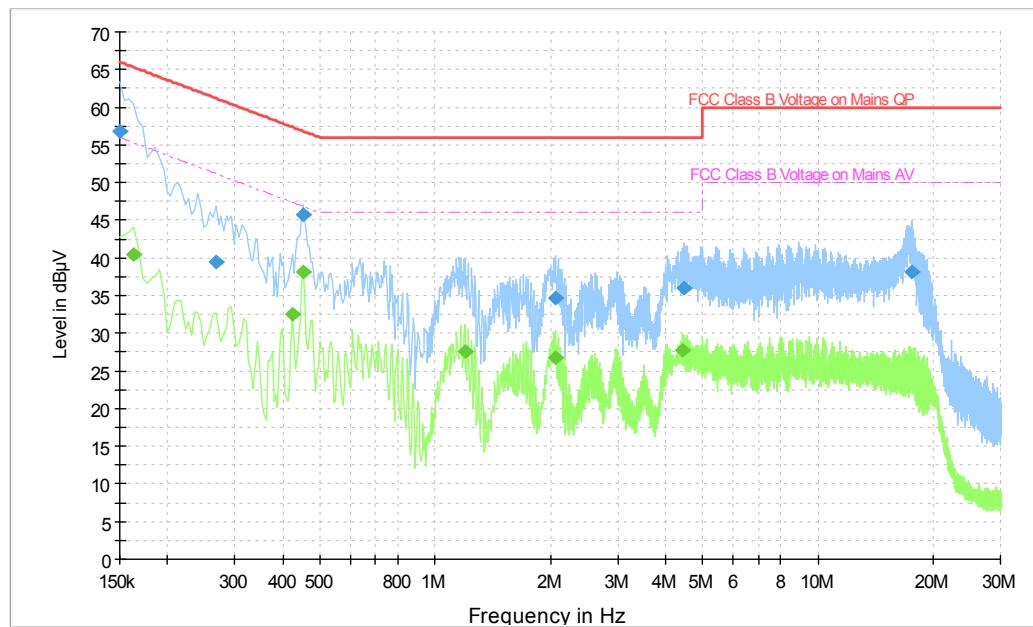
Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

## Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	48.7	2000.0	9.000	On	N	30.6	17.3	66.0
0.406500	41.0	2000.0	9.000	On	L1	19.8	16.8	57.7
0.582000	34.5	2000.0	9.000	On	L1	19.8	21.5	56.0
2.031000	37.9	2000.0	9.000	On	L1	19.6	18.1	56.0
2.125500	37.7	2000.0	9.000	On	L1	19.6	18.3	56.0
4.596000	35.2	2000.0	9.000	On	L1	19.6	20.8	56.0

## Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	32.9	2000.0	9.000	On	L1	23.8	21.5	54.4
0.406500	34.8	2000.0	9.000	On	L1	19.8	13.0	47.7
0.586500	28.4	2000.0	9.000	On	L1	19.8	17.6	46.0
1.194000	28.7	2000.0	9.000	On	L1	19.7	17.3	46.0
2.031000	26.6	2000.0	9.000	On	L1	19.6	19.4	46.0
2.125500	27.2	2000.0	9.000	On	L1	19.6	18.8	46.0

**Traffic (With AE4):**


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)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	56.8	2000.0	9.000	On	L1	30.7	9.2	66.0
0.267000	39.5	2000.0	9.000	On	L1	19.8	21.7	61.2
0.451500	45.8	2000.0	9.000	On	L1	19.8	11.1	56.8
2.067000	34.6	2000.0	9.000	On	L1	19.6	21.4	56.0
4.483500	35.9	2000.0	9.000	On	L1	19.6	20.1	56.0
17.542500	38.1	2000.0	9.000	On	L1	19.8	21.9	60.0

## Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	40.4	2000.0	9.000	On	L1	27.7	14.9	55.3
0.424500	32.6	2000.0	9.000	On	L1	19.8	14.8	47.4
0.451500	38.1	2000.0	9.000	On	L1	19.8	8.8	46.8
1.194000	27.6	2000.0	9.000	On	L1	19.7	18.4	46.0
2.067000	26.7	2000.0	9.000	On	L1	19.6	19.3	46.0
4.425000	27.7	2000.0	9.000	On	L1	19.6	18.3	46.0

## ANNEX B: Accreditation Certificate

United States Department of Commerce  
National Institute of Standards and Technology



### Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

**Telecommunication Technology Labs, CAICT**

Beijing  
China

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

**Electromagnetic Compatibility & Telecommunications**

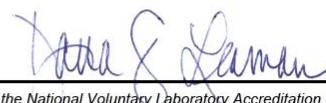
*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2019-09-26 through 2020-09-30

Effective Dates



For the National Voluntary Laboratory Accreditation Program



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