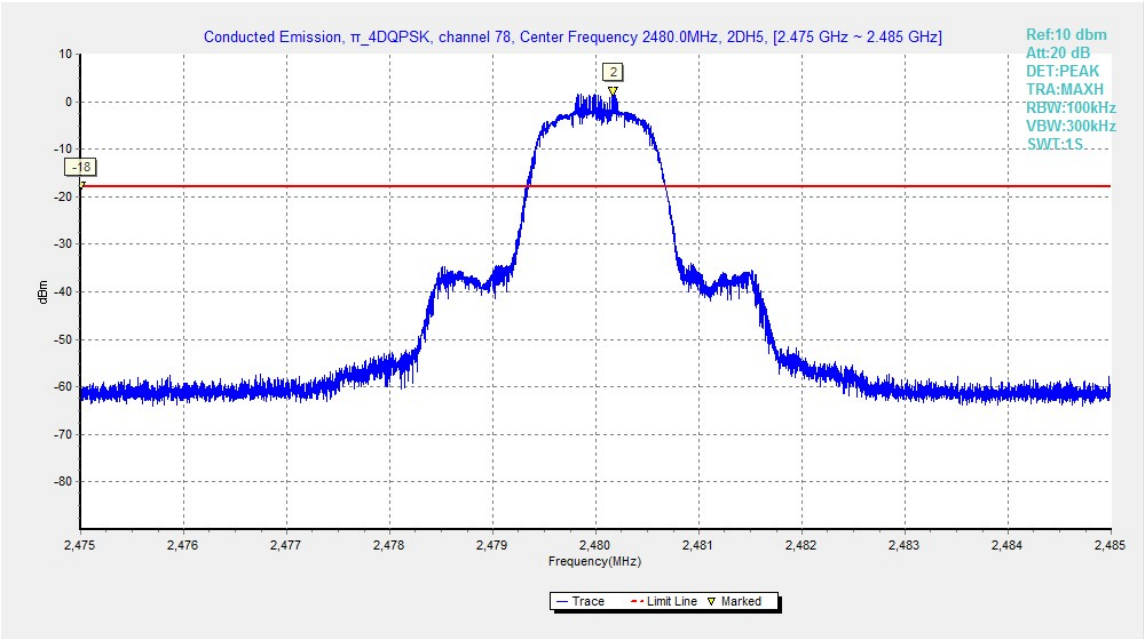

Fig.38. Conducted spurious emission: π/4 DQPSK, Channel 78, 2480MHz

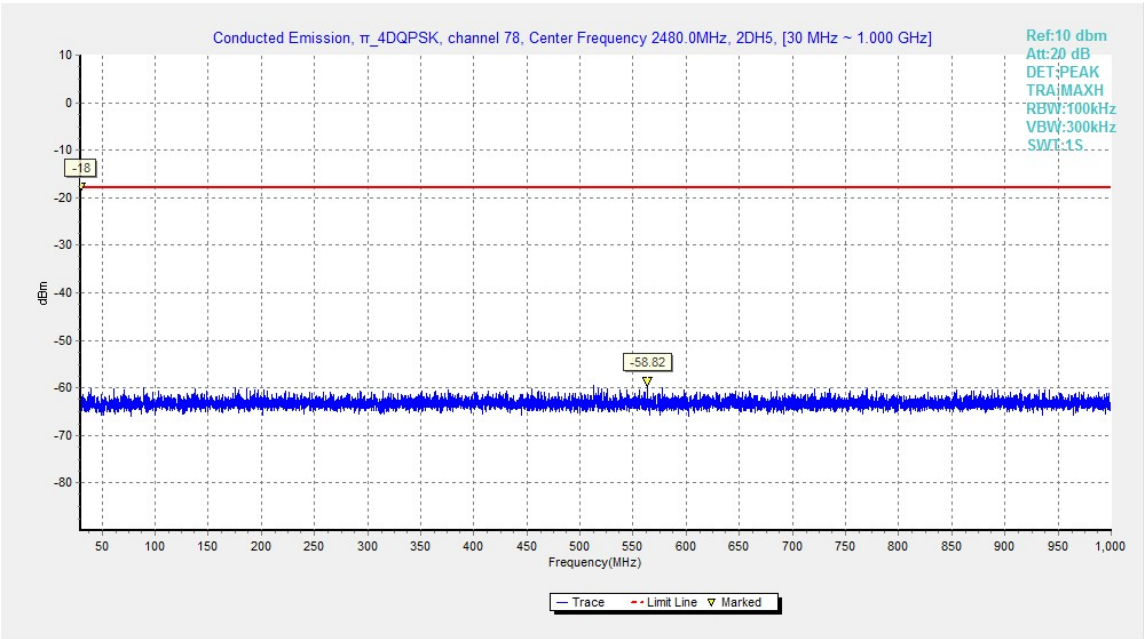

Fig.39. Conducted spurious emission: π/4 DQPSK, Channel 78, 30MHz - 1GHz

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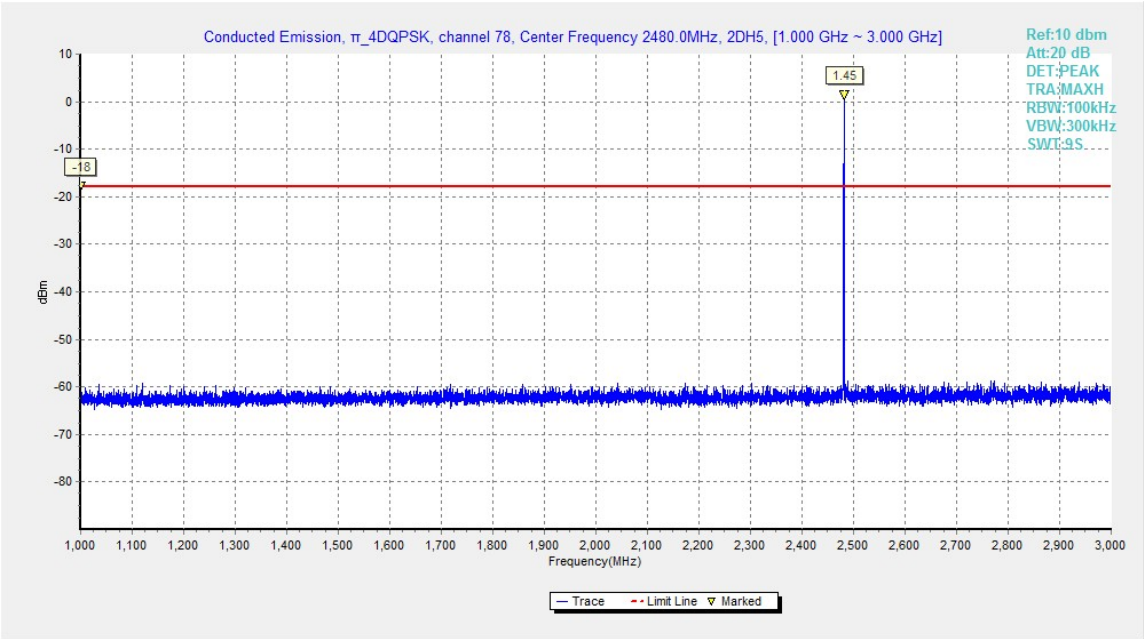

Fig.40. Conducted spurious emission: π/4 DQPSK, Channel 78, 1GHz - 3GHz

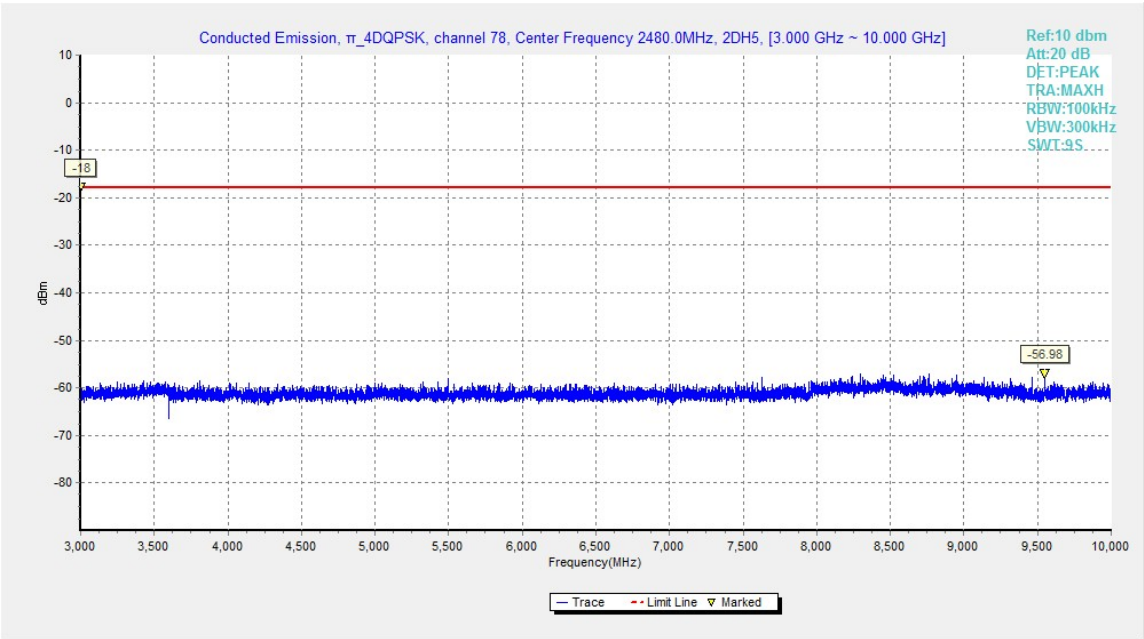

Fig.41. Conducted spurious emission: π/4 DQPSK, Channel 78, 3GHz - 10GHz

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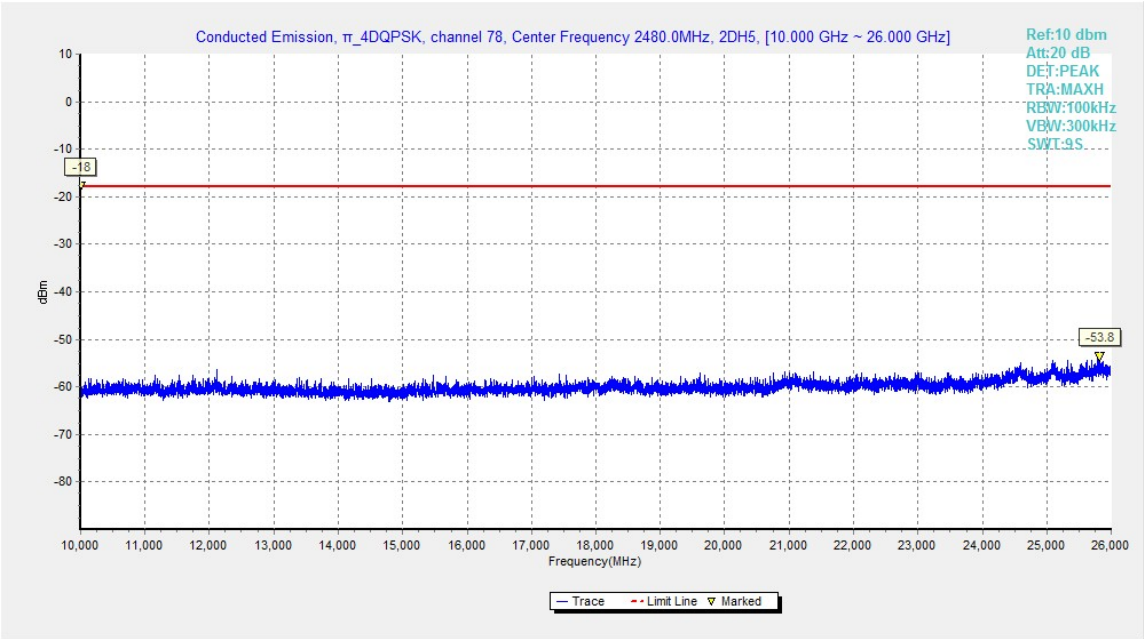

Fig.42. Conducted spurious emission: π/4 DQPSK, Channel 78, 10GHz - 26GHz

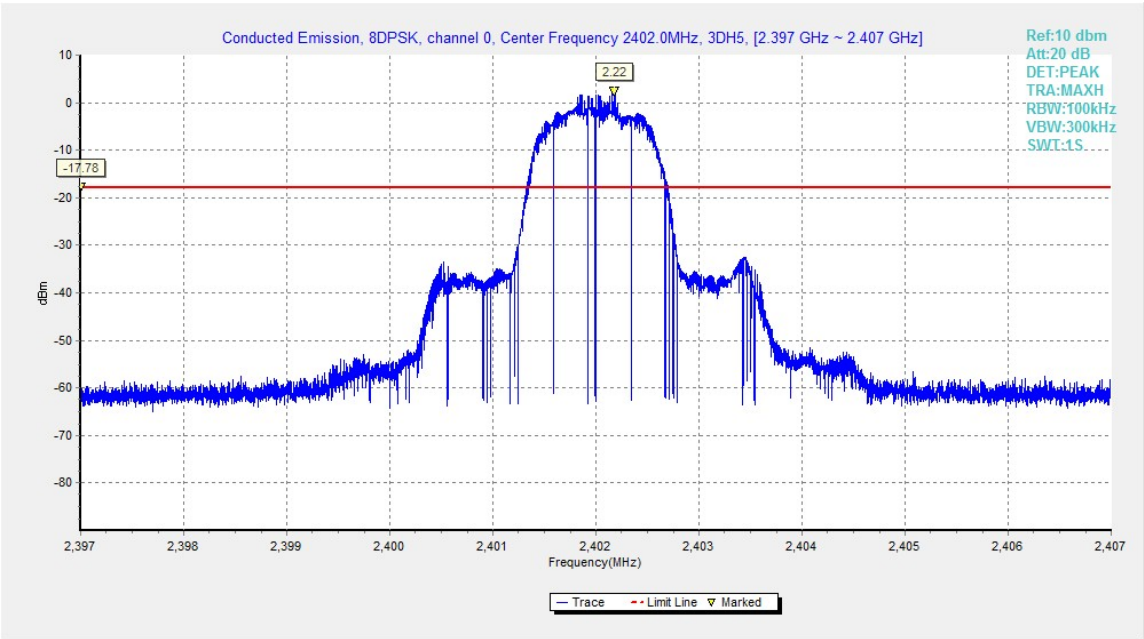

Fig.43. Conducted spurious emission: 8DPSK, Channel 0,2402MHz

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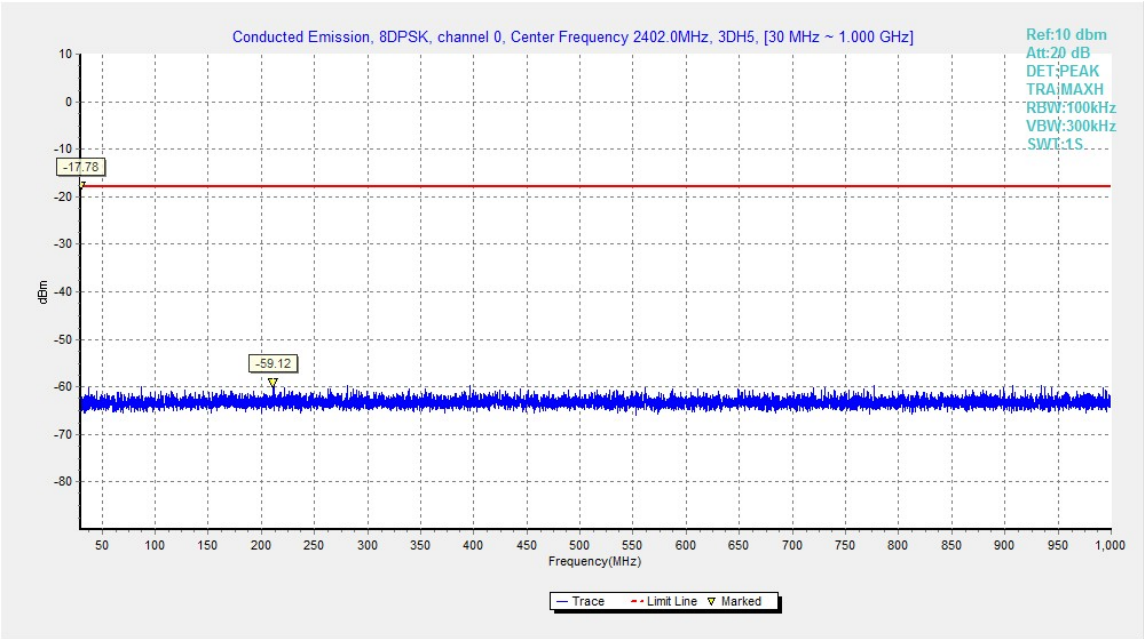

Fig.44. Conducted spurious emission: 8DPSK, Channel 0, 30MHz - 1GHz

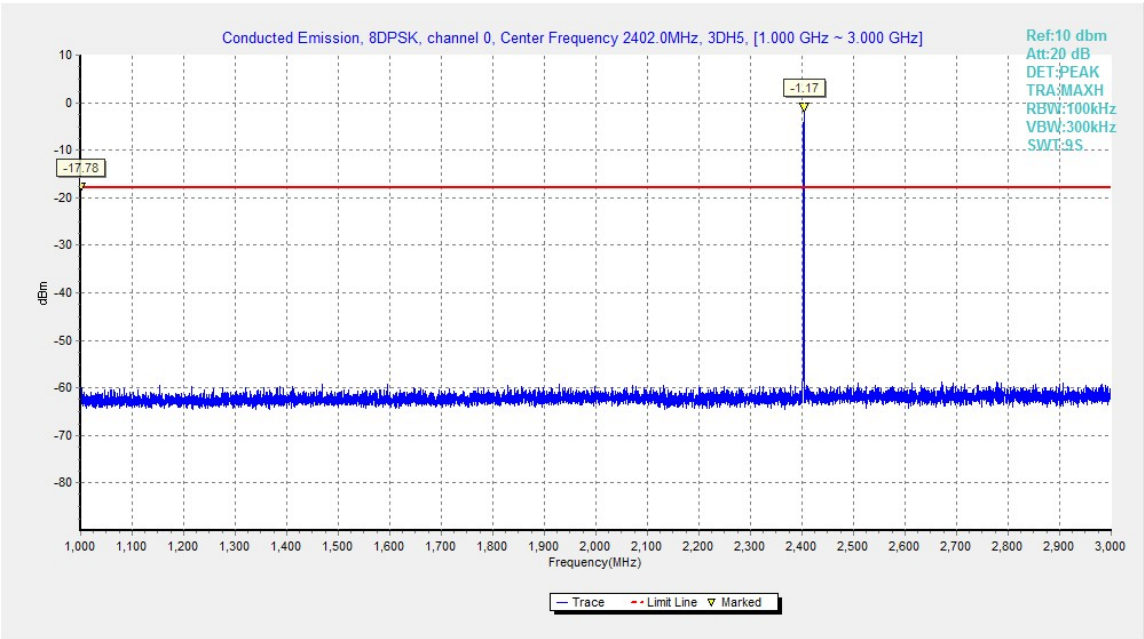

Fig.45. Conducted spurious emission: 8DPSK, Channel 0, 1GHz - 3GHz

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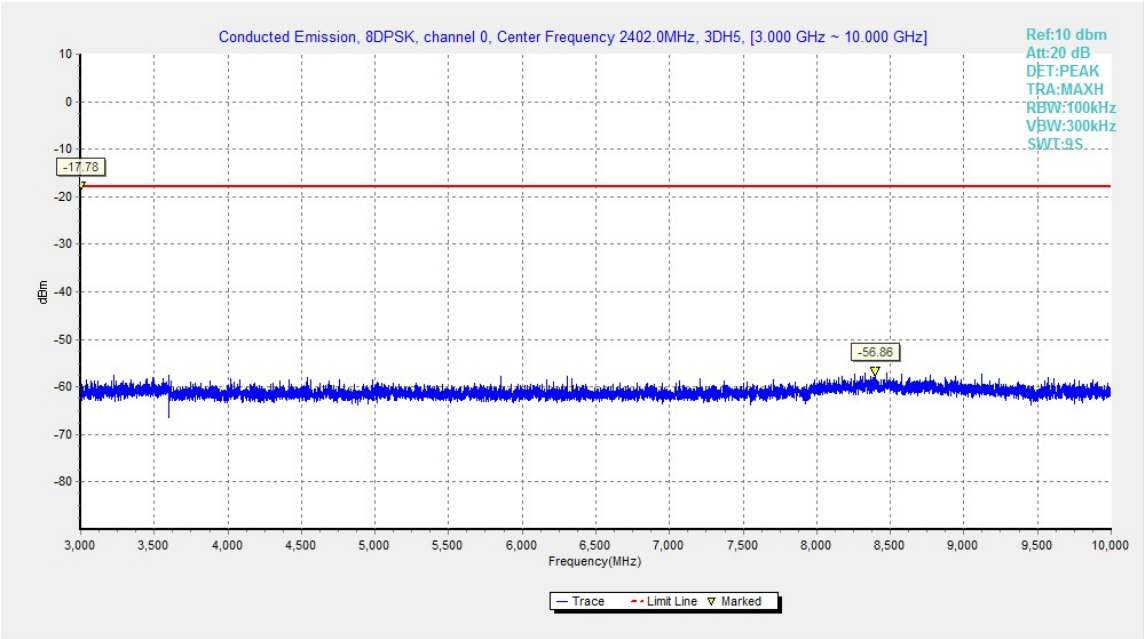

Fig.46. Conducted spurious emission: 8DPSK, Channel 0, 3GHz - 10GHz

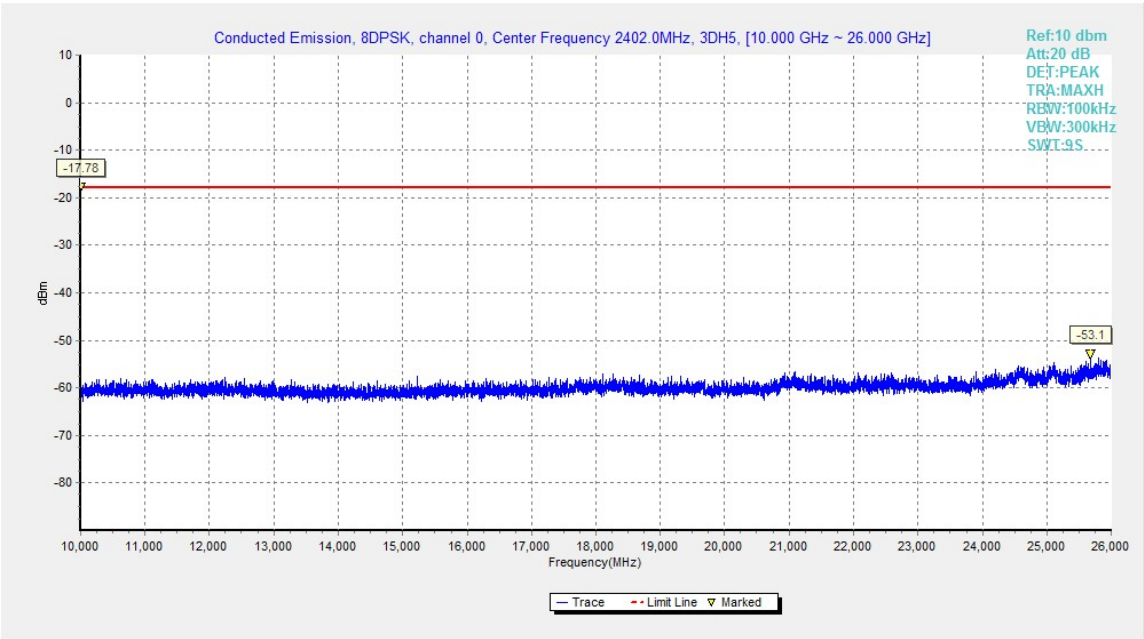

Fig.47. Conducted spurious emission: 8DPSK, Channel 0,10GHz - 26GHz

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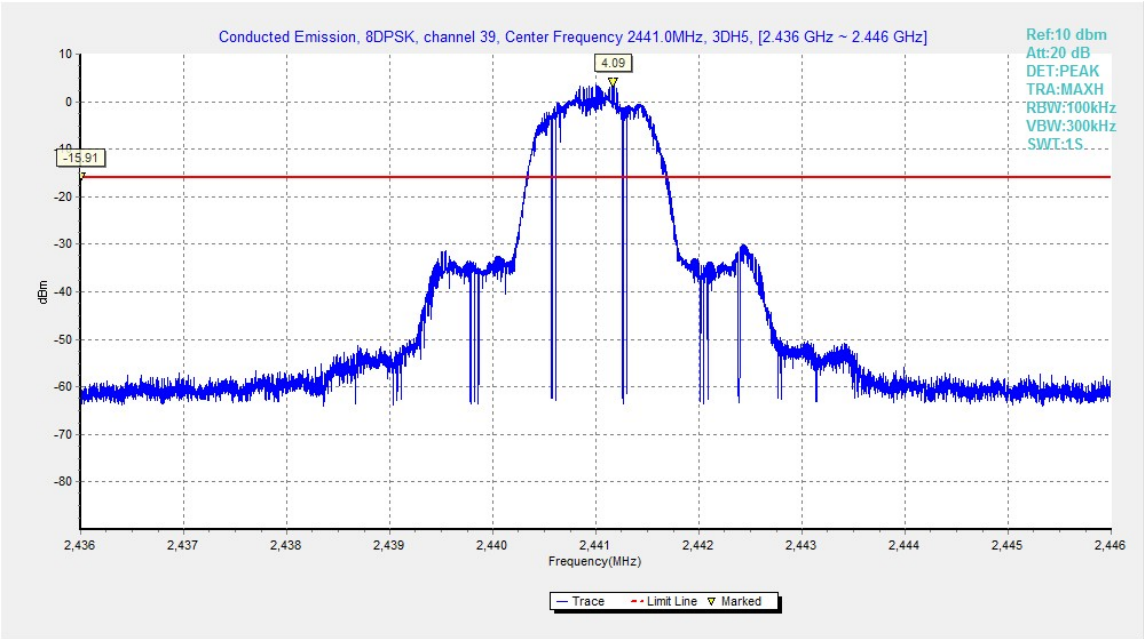

Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

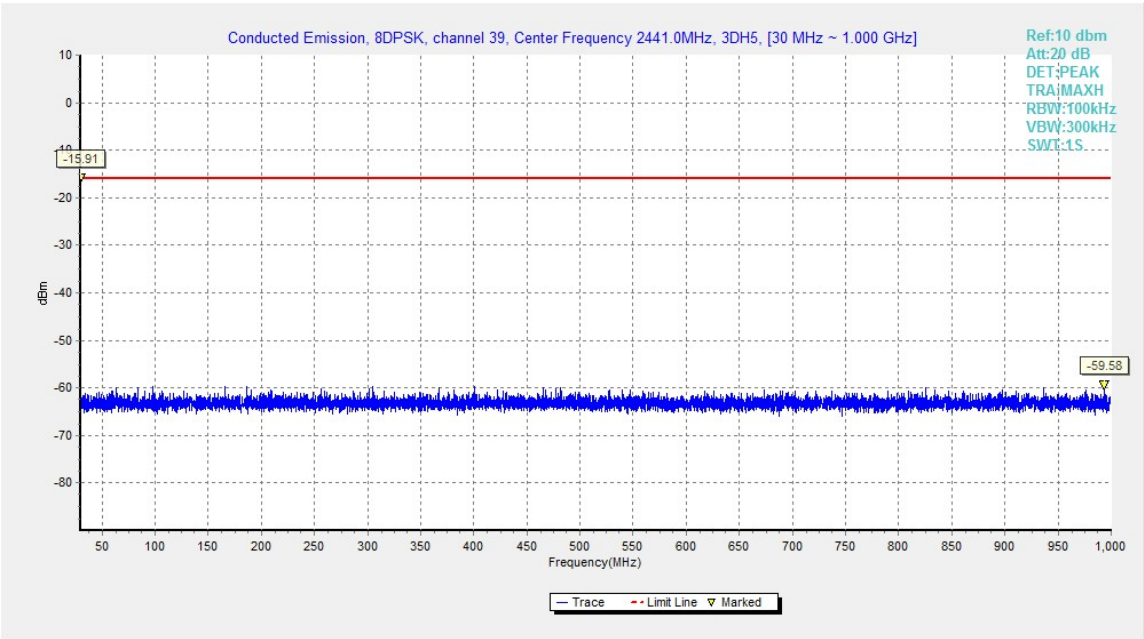

Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz

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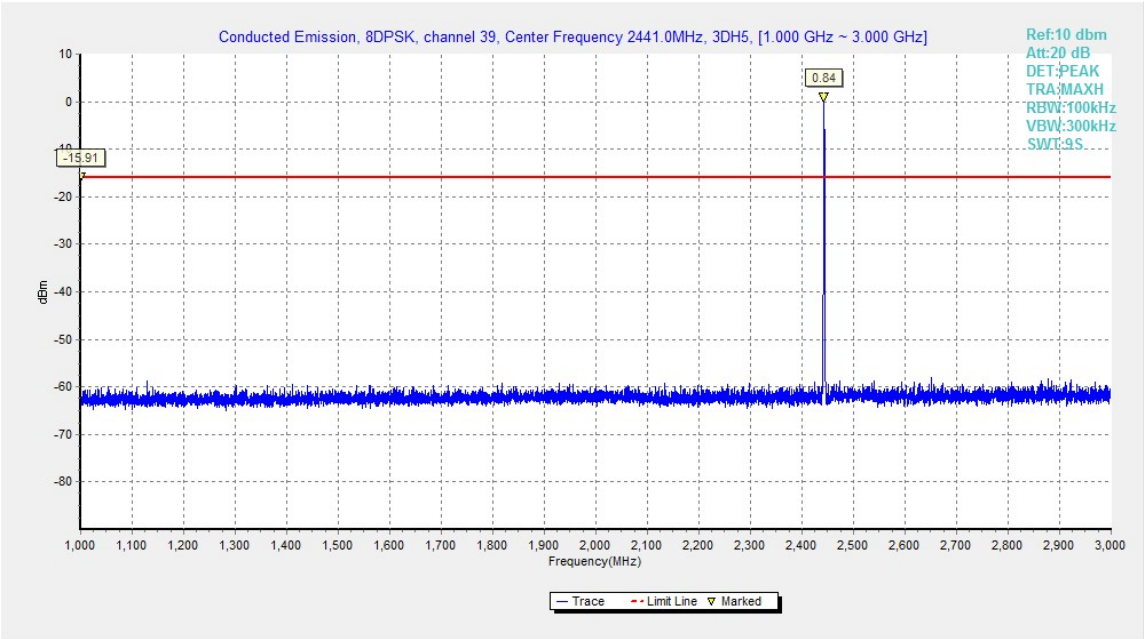

Fig.50. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz

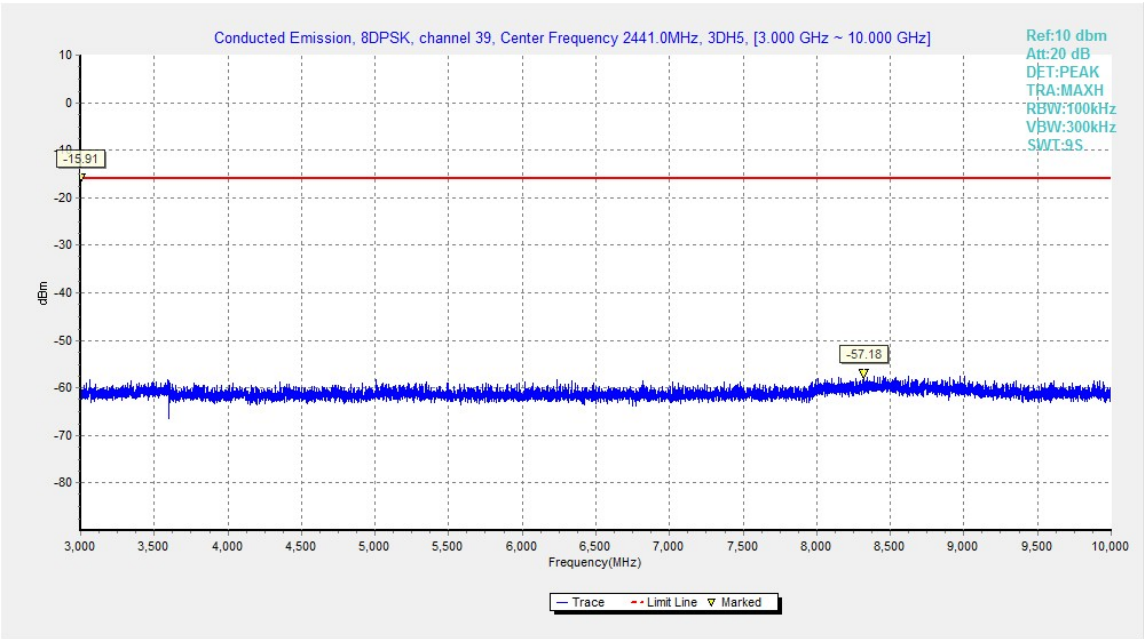

Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

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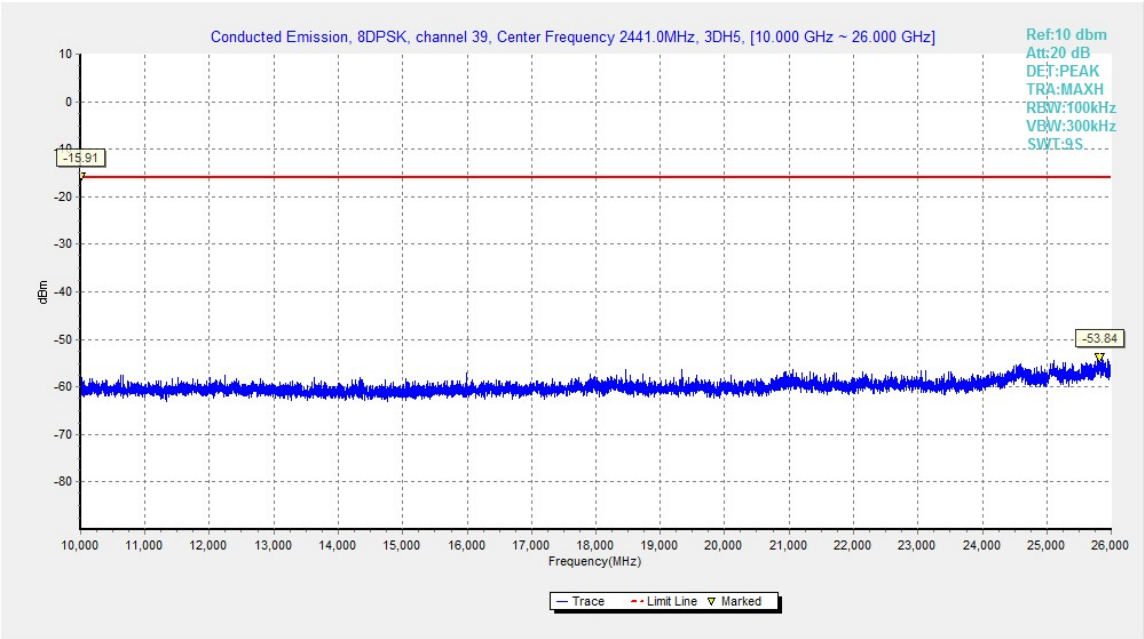

Fig.52. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

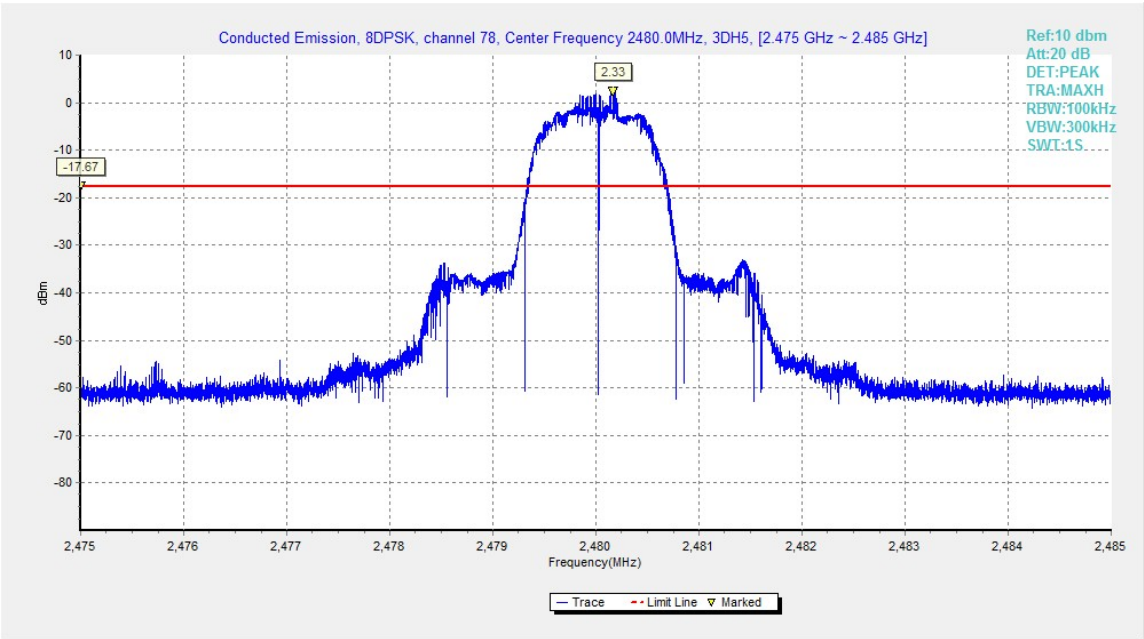

Fig.53. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

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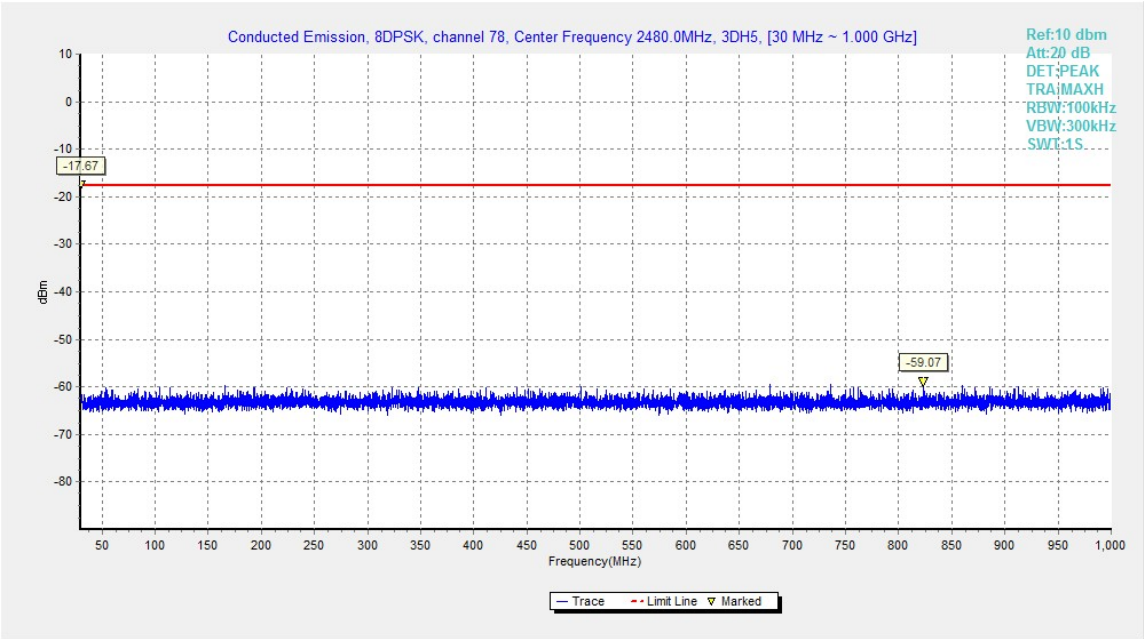

Fig.54. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

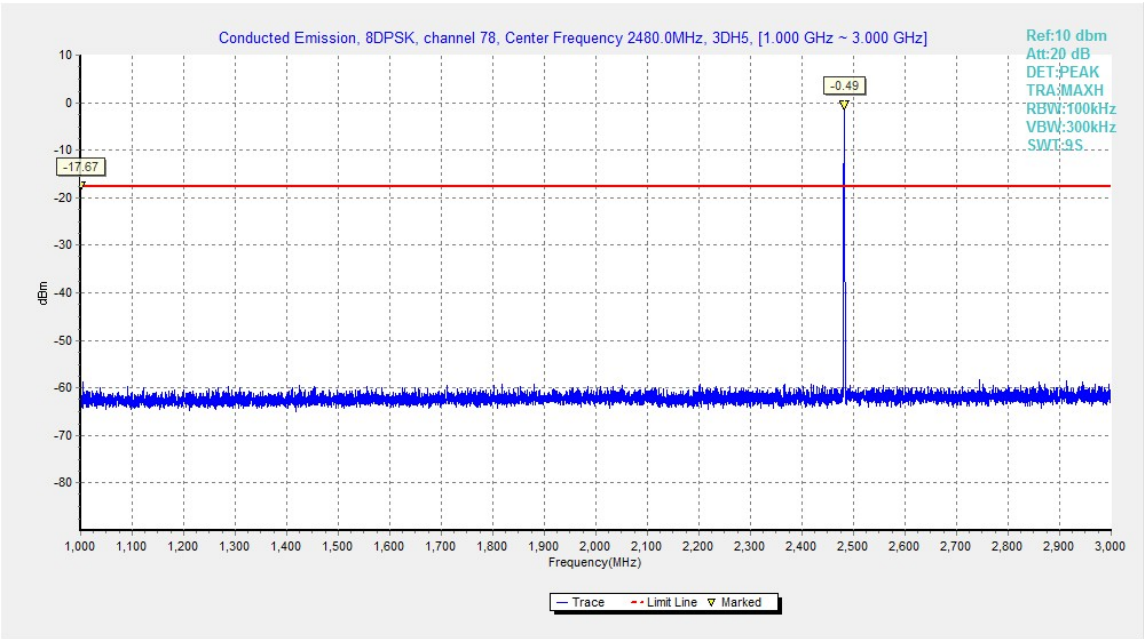

Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

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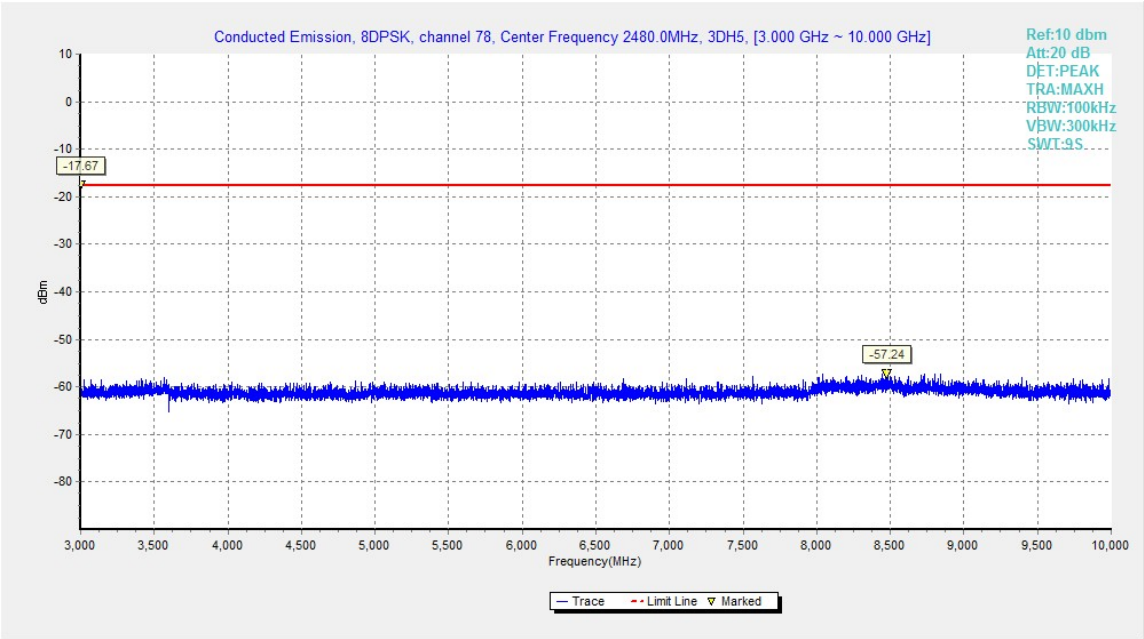

Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

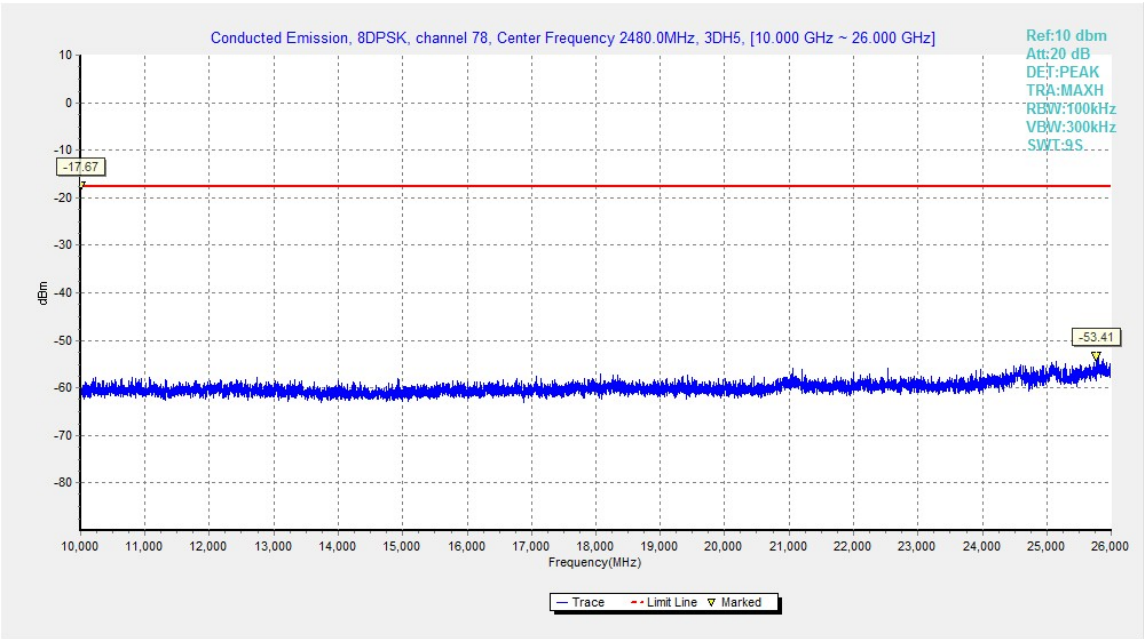

Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

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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:

Result=P_{Mea}+ARPL

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.43GHz---L	Fig.1	P
Power	2.45GHz~2.50GHz---H	Fig.2	P

Forπ/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.43GHz---L	Fig.3	P
Power	2.45GHz~2.50GHz---H	Fig.4	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Power	2.31GHz~2.43GHz---L	Fig.5	P
Power	2.45GHz~2.50GHz---H	Fig.6	P

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GFSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17949.0	35.0	-25.5	43.4	17.1	V
17970.0	35.0	-25.5	43.4	17.1	H
17898.0	34.9	-25.5	43.4	17.0	V
17953.5	34.9	-25.5	43.4	17.0	V
17956.5	34.9	-25.5	43.4	17.0	V
2318.8	39.6	-14.5	27.2	26.9	V

GFSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17967.0	35.2	-25.5	43.4	17.3	V
17971.5	35.1	-25.5	43.4	17.2	V
17952.0	35.0	-25.5	43.4	17.1	V
17965.5	35.0	-25.5	43.4	17.1	V
17983.5	35.0	-25.5	43.4	17.1	V
17992.5	35.0	-25.5	43.4	17.1	V

GFSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17974.5	35.3	-25.5	43.4	17.4	V
17973.0	35.2	-25.5	43.4	17.3	V
17979.0	35.2	-25.5	43.4	17.3	V
17908.5	35.1	-25.5	43.4	17.2	V
17997.0	35.1	-25.5	43.4	17.2	V
2486.7	40.0	-14.2	27.2	27.0	H

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π/4 DQPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17979.0	35.2	-25.5	43.4	17.3	V
17997.0	35.2	-25.5	43.4	17.3	V
17961.0	35.1	-25.5	43.4	17.2	V
17974.5	35.1	-25.5	43.4	17.2	V
17983.5	35.1	-25.5	43.4	17.2	V
2321.4	40.0	-14.5	27.2	27.3	H

π/4 DQPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17976.0	35.3	-25.5	43.4	17.4	V
17983.5	35.2	-25.5	43.4	17.3	V
17986.5	35.2	-25.5	43.4	17.3	V
17994.0	35.2	-25.5	43.4	17.3	V
17782.5	35.1	-25.5	43.4	17.2	V
17878.5	35.1	-25.5	43.4	17.2	V

π/4 DQPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17997.0	35.3	-25.5	43.4	17.4	V
17878.5	35.2	-25.5	43.4	17.3	V
17976.0	35.2	-25.5	43.4	17.3	V
17985.0	35.2	-25.5	43.4	17.3	H
17988.0	35.2	-25.5	43.4	17.3	V
2489.1	39.8	-14.2	27.2	26.8	H

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8DPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17995.5	35.3	-25.5	43.4	17.4	V
17986.5	35.2	-25.5	43.4	17.3	V
17992.5	35.2	-25.5	43.4	17.3	V
17776.5	35.1	-25.5	43.4	17.2	V
17883.0	35.1	-25.5	43.4	17.2	V
2314.1	40.0	-14.5	27.2	27.3	V

8DPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17970.0	35.3	-25.5	43.4	17.4	V
17976.0	35.3	-25.5	43.4	17.4	V
17881.5	35.2	-25.5	43.4	17.3	H
17961.0	35.2	-25.5	43.4	17.3	V
17973.0	35.2	-25.5	43.4	17.3	V
17983.5	35.2	-25.5	43.4	17.3	V

8DPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17988.0	35.4	-25.5	43.4	17.5	V
17985.0	35.3	-25.5	43.4	17.4	V
17895.0	35.2	-25.5	43.4	17.3	V
17964.0	35.2	-25.5	43.4	17.3	H
17967.0	35.2	-25.5	43.4	17.3	V
2491.5	40.0	-14.2	27.2	27.0	H

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GFSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17971.5	47.9	-25.5	43.4	30.0	V
17761.5	47.8	-25.5	43.4	29.9	V
17631.0	47.3	-25.7	43.4	29.6	H
17842.5	47.2	-25.5	43.4	29.3	V
17980.5	47.2	-25.5	43.4	29.3	H
2369.3	51.8	-14.3	27.2	38.9	V

GFSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17964.0	47.9	-25.5	43.4	30.0	V
17952.0	47.5	-25.5	43.4	29.6	V
17401.5	47.1	-26.9	43.4	30.6	H
17805.0	47.1	-25.5	43.4	29.2	H
17832.0	47.1	-25.5	43.4	29.2	H
17971.5	47.1	-25.5	43.4	29.2	V

GFSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17959.5	47.7	-25.5	43.4	29.8	V
17749.5	47.5	-25.5	43.4	29.6	V
17509.5	47.3	-26.9	43.4	30.8	V
17982.0	47.3	-25.5	43.4	29.4	H
17641.5	47.2	-25.7	43.4	29.5	H
2489.1	51.8	-14.2	27.2	38.8	H

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π/4 DQPSK Ch 0 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17502.0	48.0	-26.9	43.4	31.5	V
17938.5	47.7	-25.5	43.4	29.8	V
17908.5	47.5	-25.5	43.4	29.6	V
17973.0	47.5	-25.5	43.4	29.6	H
17821.5	47.4	-25.5	43.4	29.5	H
2336.8	52.4	-14.6	27.2	39.8	H

π/4 DQPSK Ch 39 -Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17862.0	47.9	-25.5	43.4	30.0	V
17907.0	47.6	-25.5	43.4	29.7	V
17976.0	47.6	-25.5	43.4	29.7	V
17833.5	47.2	-25.5	43.4	29.3	H
17839.5	47.2	-25.5	43.4	29.3	V
17913.0	47.1	-25.5	43.4	29.2	V

π/4 DQPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17968.5	47.6	-25.5	43.4	29.7	H
17719.5	47.5	-25.7	43.4	29.8	V
17911.5	47.3	-25.5	43.4	29.4	V
17470.5	47.2	-26.9	43.4	30.7	H
17740.5	47.2	-25.5	43.4	29.3	V
2494.6	51.1	-14.2	27.2	38.1	V

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8DPSK Ch 0 -Peak

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Antenna Pol. (H/V)
17950.5	47.7	-25.5	43.4	29.8	H
17922.0	47.6	-25.5	43.4	29.7	V
17974.5	47.4	-25.5	43.4	29.5	H
17800.5	47.2	-25.5	43.4	29.3	H
17871.0	47.2	-25.5	43.4	29.3	H
2325.4	52.0	-14.5	27.2	39.3	H

8DPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Antenna Pol. (H/V)
17848.5	47.9	-25.5	43.4	30.0	V
17523.0	47.5	-26.9	43.4	31.0	H
17520.0	47.2	-26.9	43.4	30.7	V
17937.0	47.2	-25.5	43.4	29.3	H
17962.5	47.2	-25.5	43.4	29.3	V
17556.0	47.1	-26.9	43.4	30.6	V

8DPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Antenna Pol. (H/V)
17961.0	47.7	-25.5	43.4	29.8	V
17890.5	47.6	-25.5	43.4	29.7	V
17964.0	47.5	-25.5	43.4	29.6	H
17980.5	47.4	-25.5	43.4	29.5	H
17428.5	47.2	-26.9	43.4	30.7	V
2487.9	51.8	-14.2	27.2	38.8	V

Conclusion: PASS

Test graphs as below:

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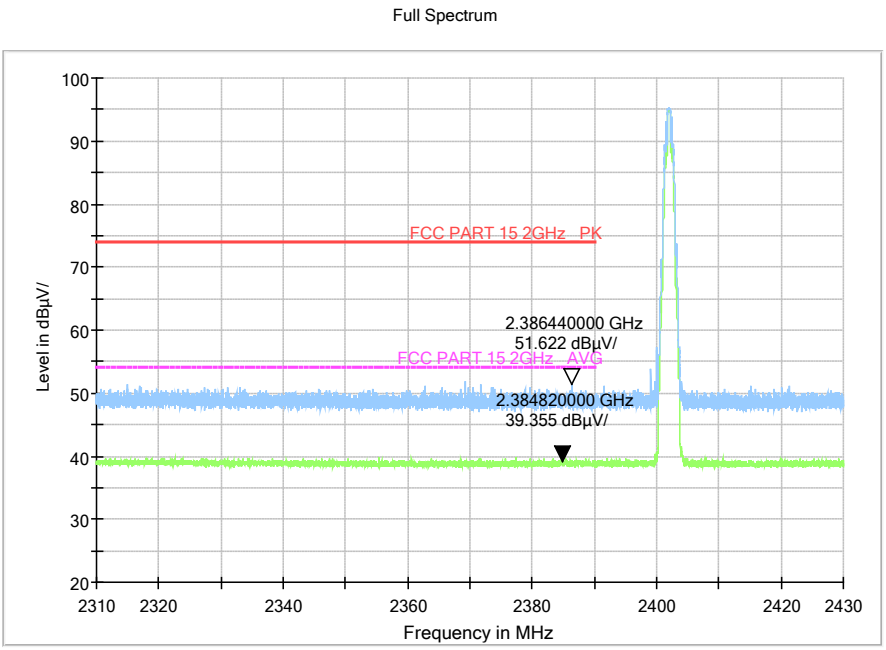

Fig.58. Radiated emission (Power): GFSK, low channel

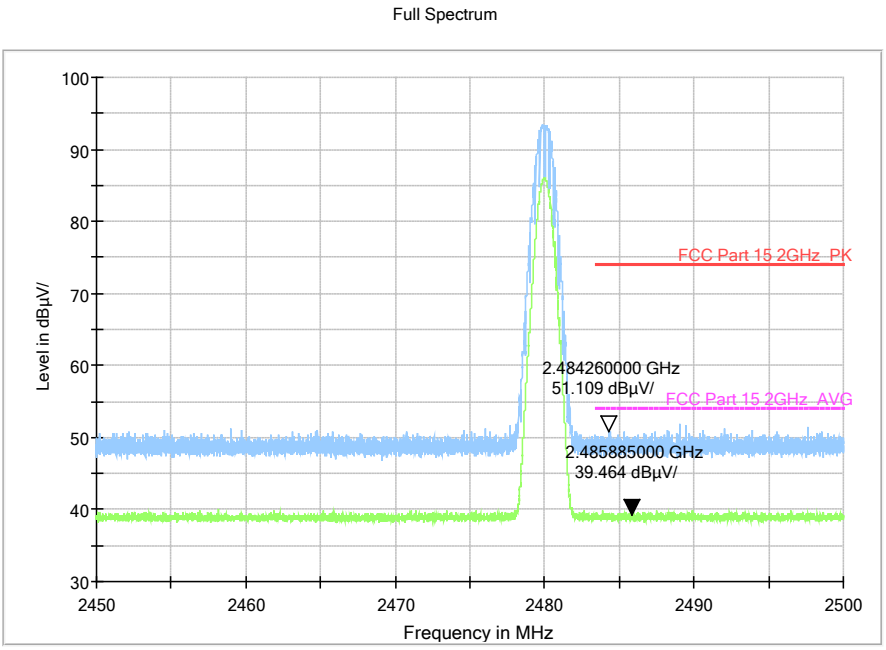

Fig.59. Radiated emission (Power) GFSK, high channel

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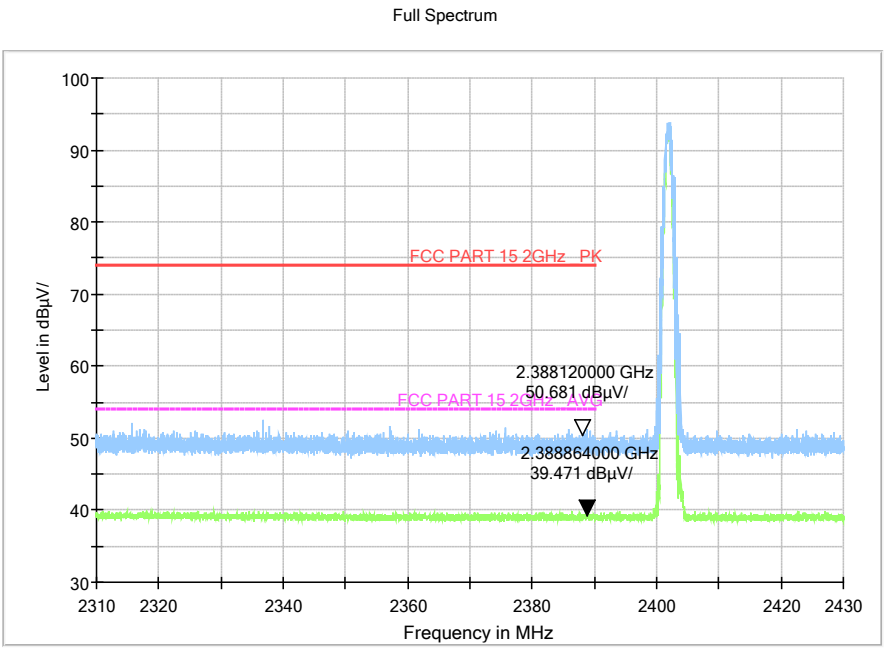

Fig.60. Radiated emission (Power): π/4 DQPSK, low channel

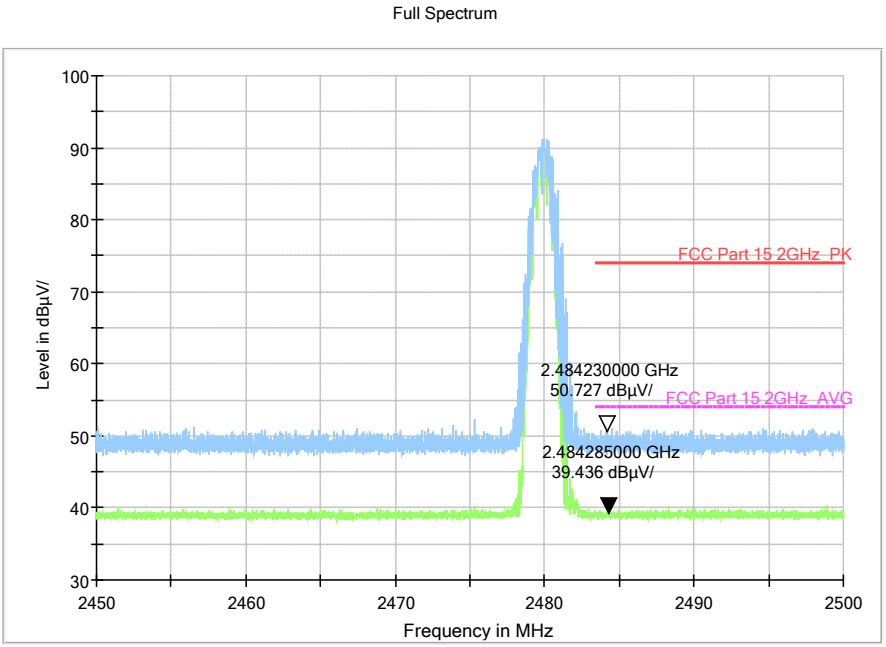

Fig.61. Radiated emission (Power): π/4 DQPSK, high channel

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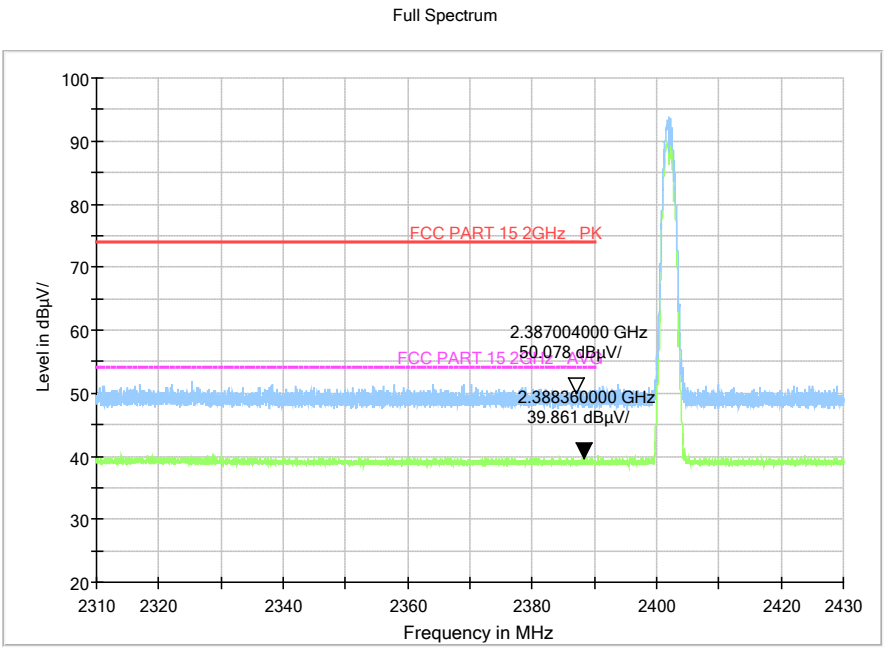

Fig.62. Radiated emission (Power): 8DPSK, low channel

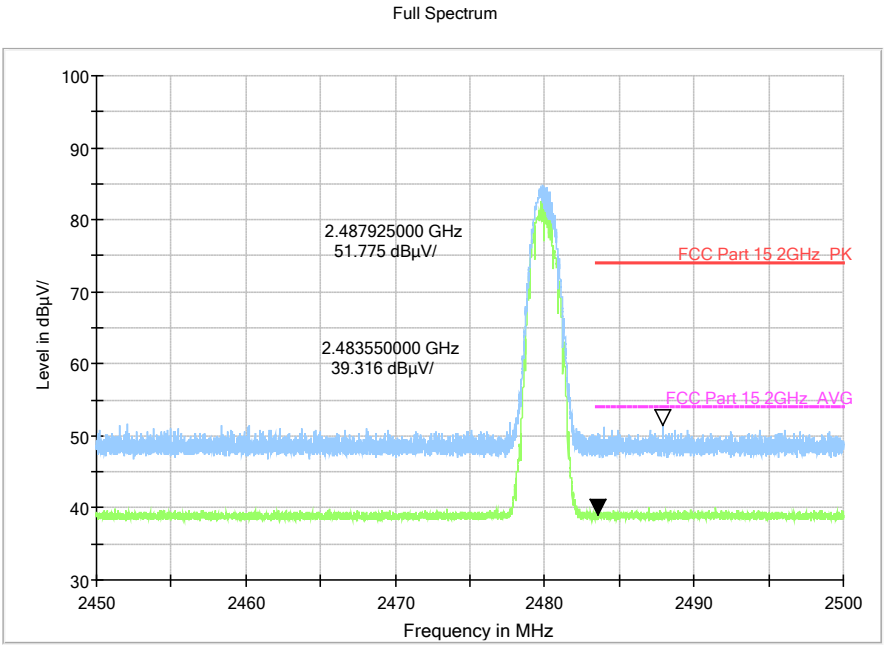

Fig.63. Radiated emission (Power): 8DPSK, high channel

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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 ≥ 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.7	116.93	P
		Fig.8		
	DH3	Fig.9	194.37	P
		Fig.10		
	DH5	Fig.11	193.05	P
		Fig.12		

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.13	121.87	P
		Fig.14		
	DH3	Fig.15	165.28	P
		Fig.16		
	DH5	Fig.17	175.96	P
		Fig.18		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.19	121.03	P
		Fig.20		

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	DH3	Fig.21	178.27	P
		Fig.22		
	DH5	Fig.23	199.17	P
		Fig.24		

Conclusion: PASS

Test graphs as below:

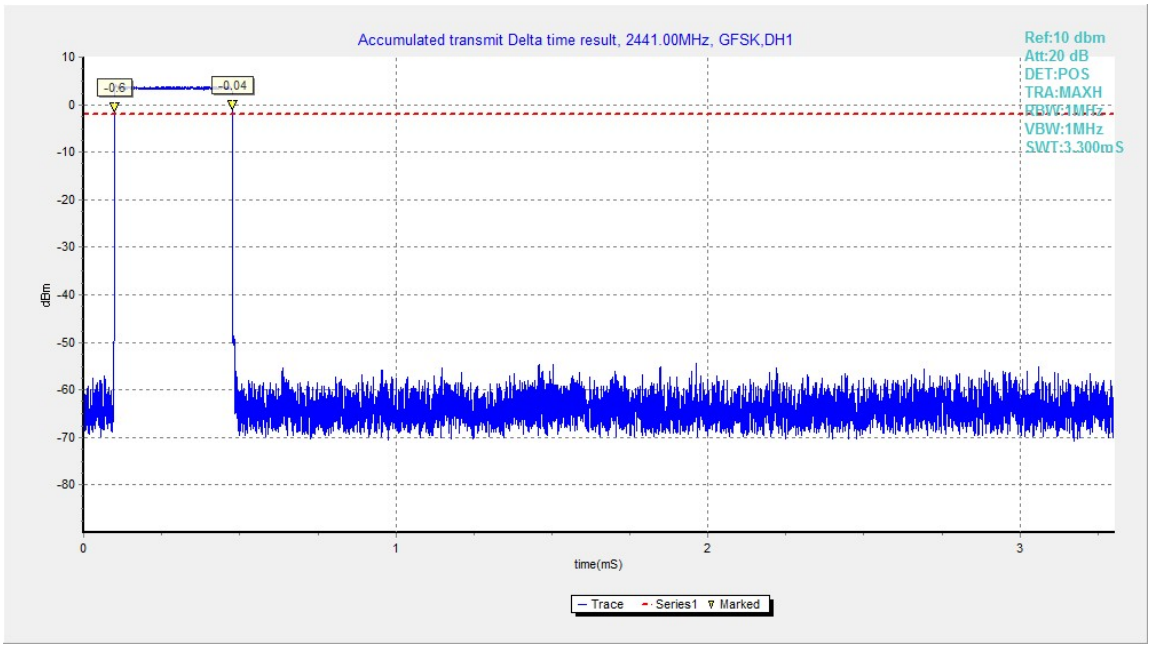

Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

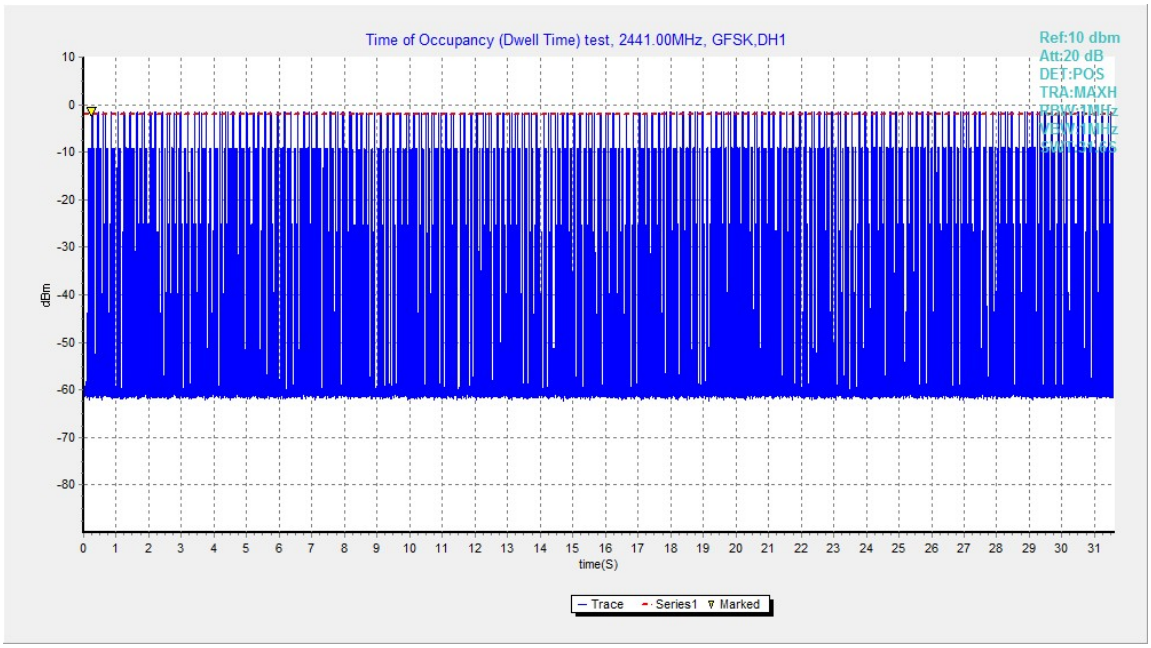

Fig.65. Number of Transmissions Measurement:Channel 39,Packet DH1

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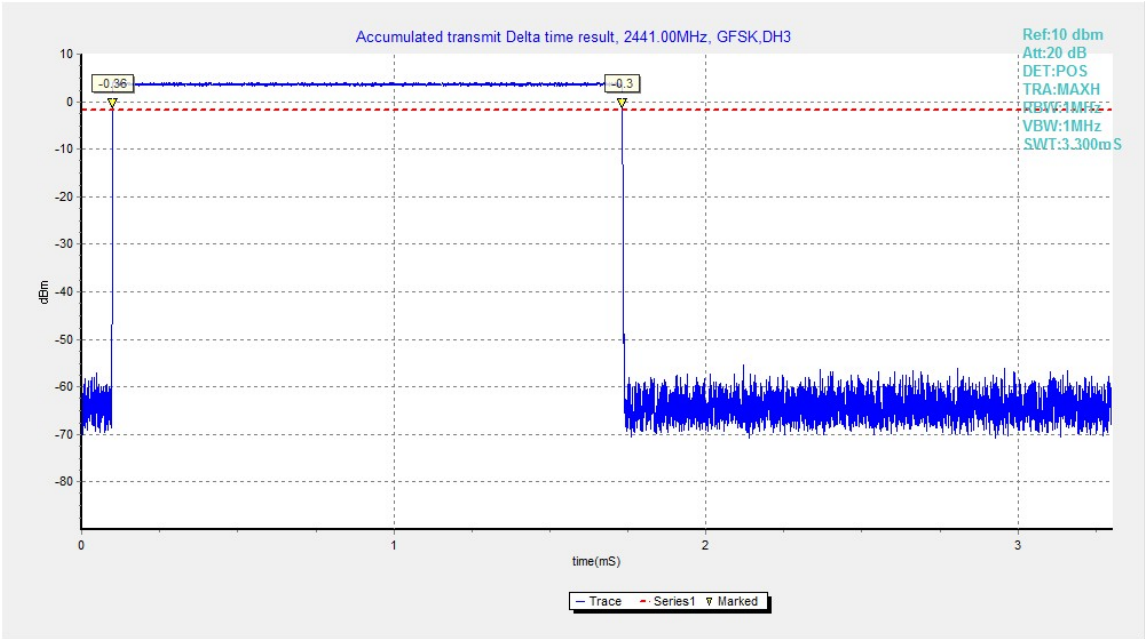

Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

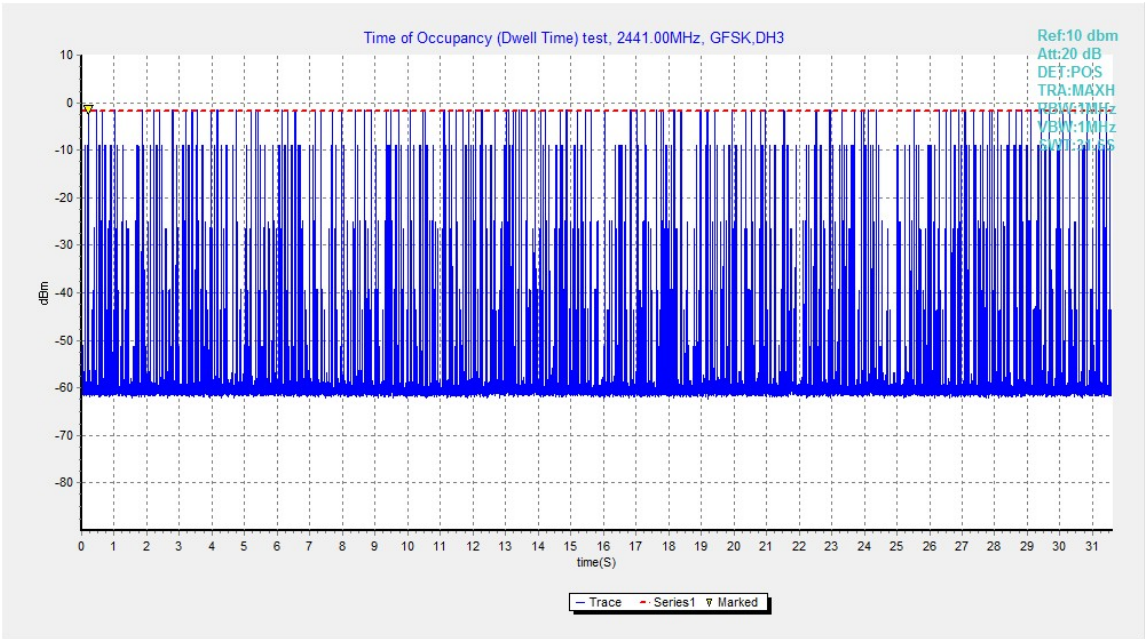

Fig.67. Number of Transmissions Measurement:Channel 39,Packet DH3

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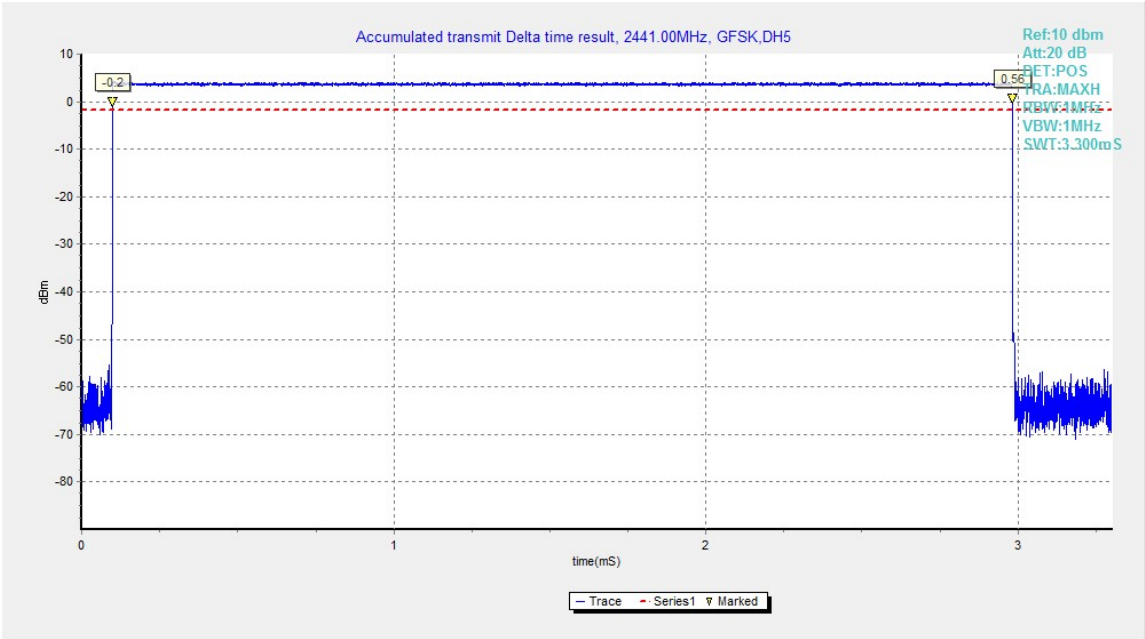

Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

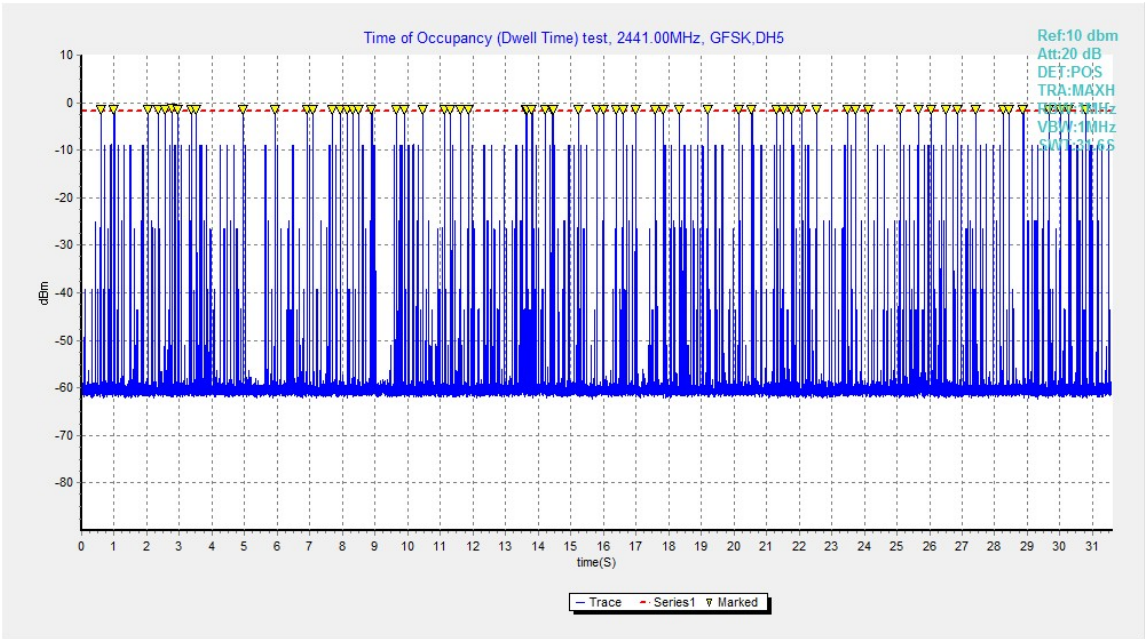

Fig.69. Number of Transmissions Measurement:Channel 39,Packet DH5

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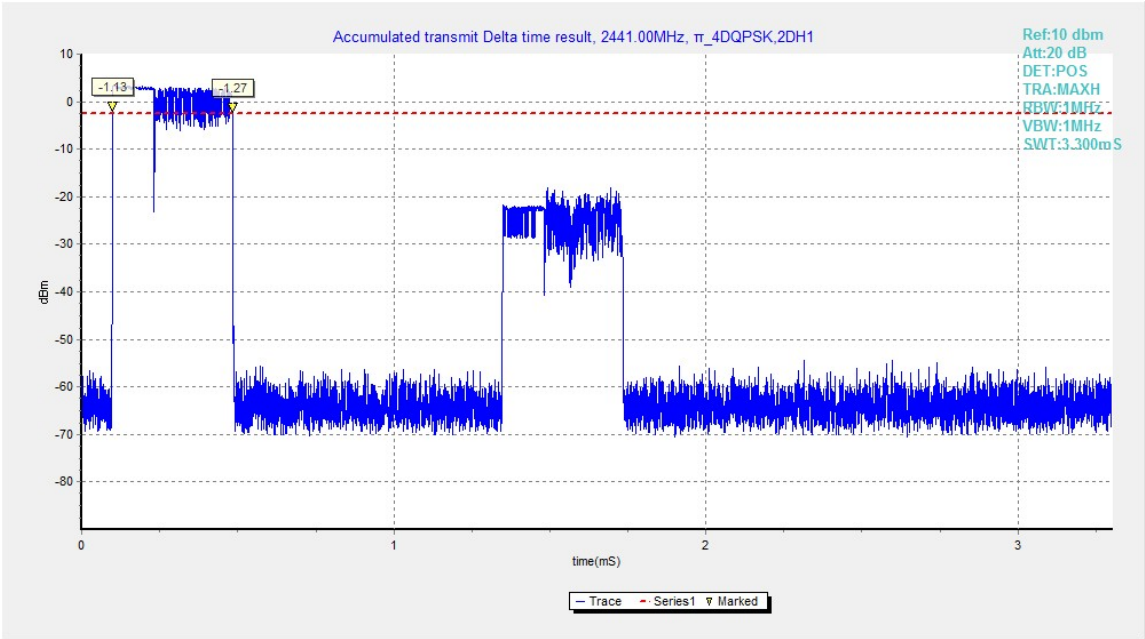

Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

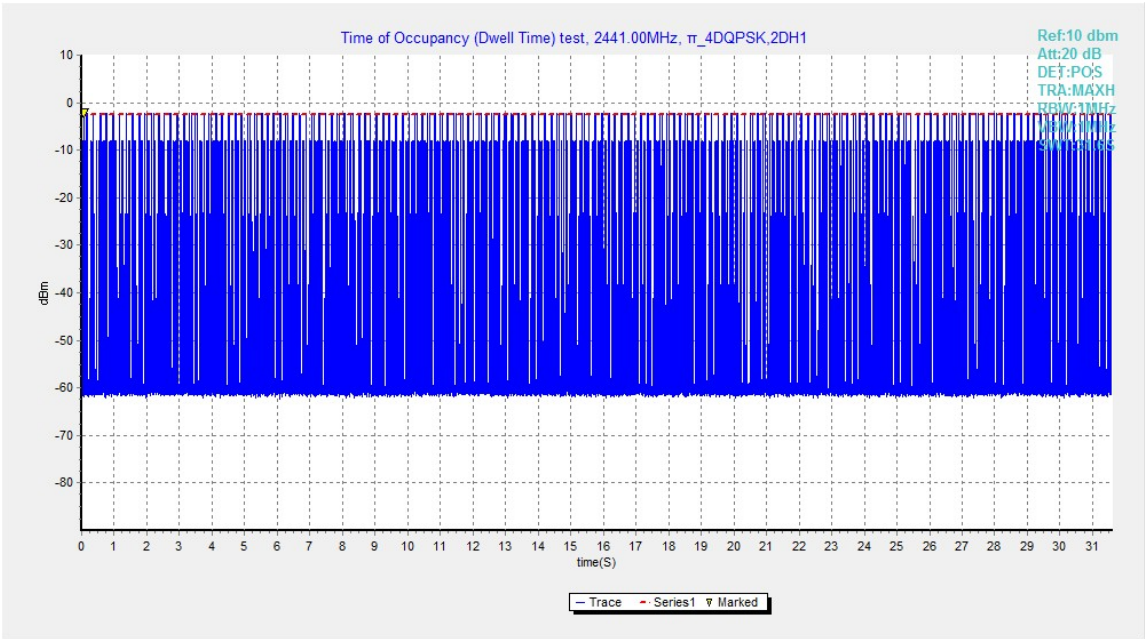

Fig.71. Number of Transmissions Measurement:Channel 39,Packet 2-DH1

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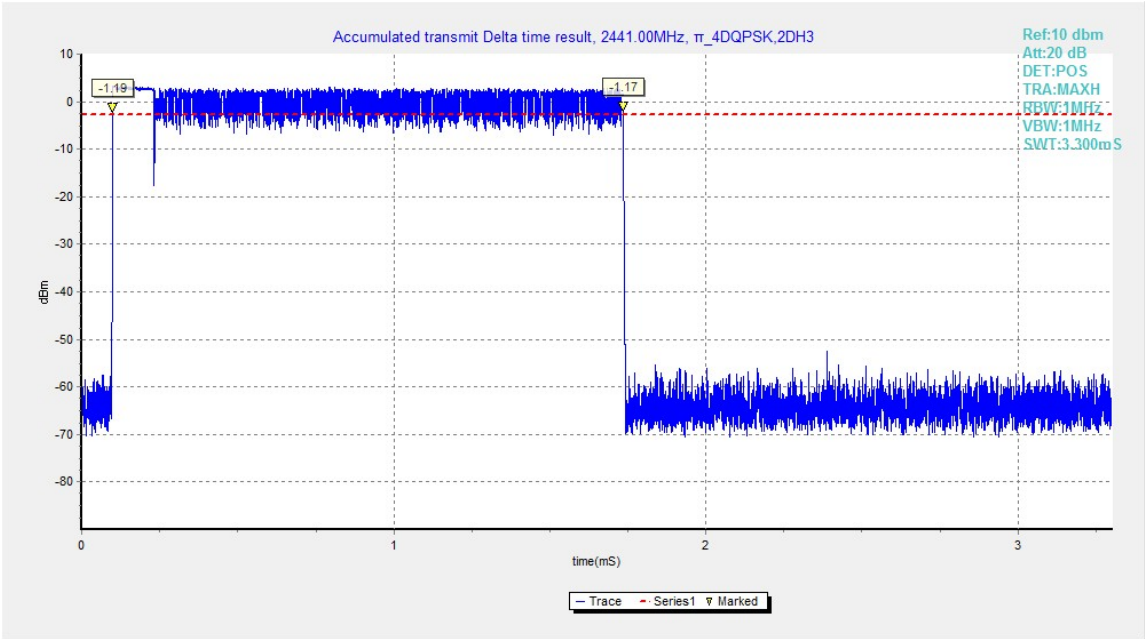

Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

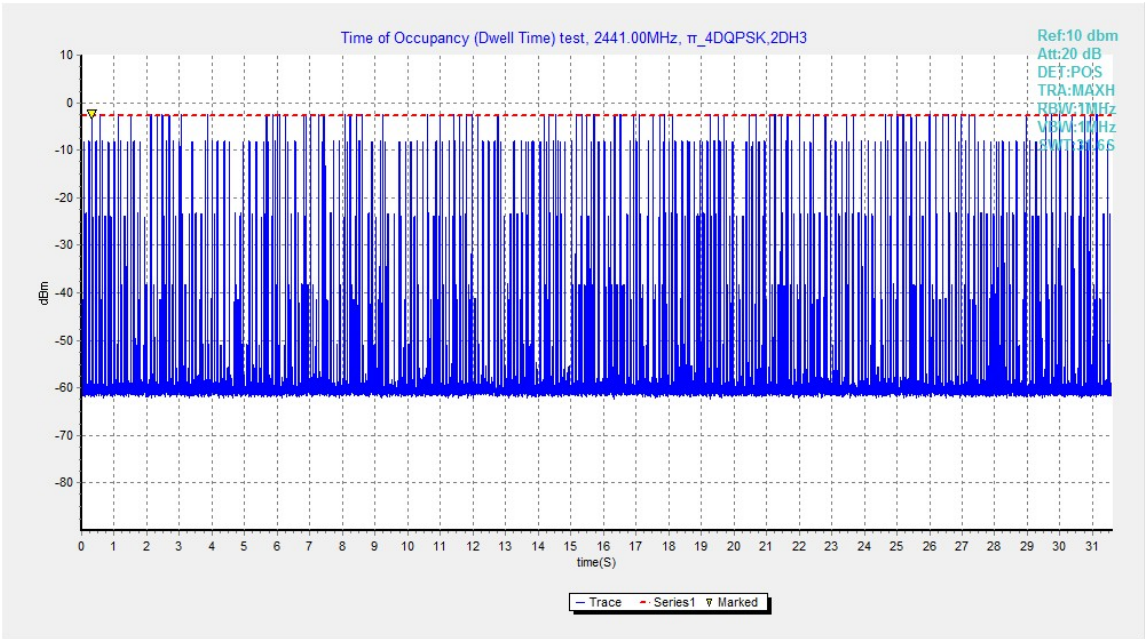

Fig.73. Number of Transmissions Measurement:Channel 39,Packet 2-DH3

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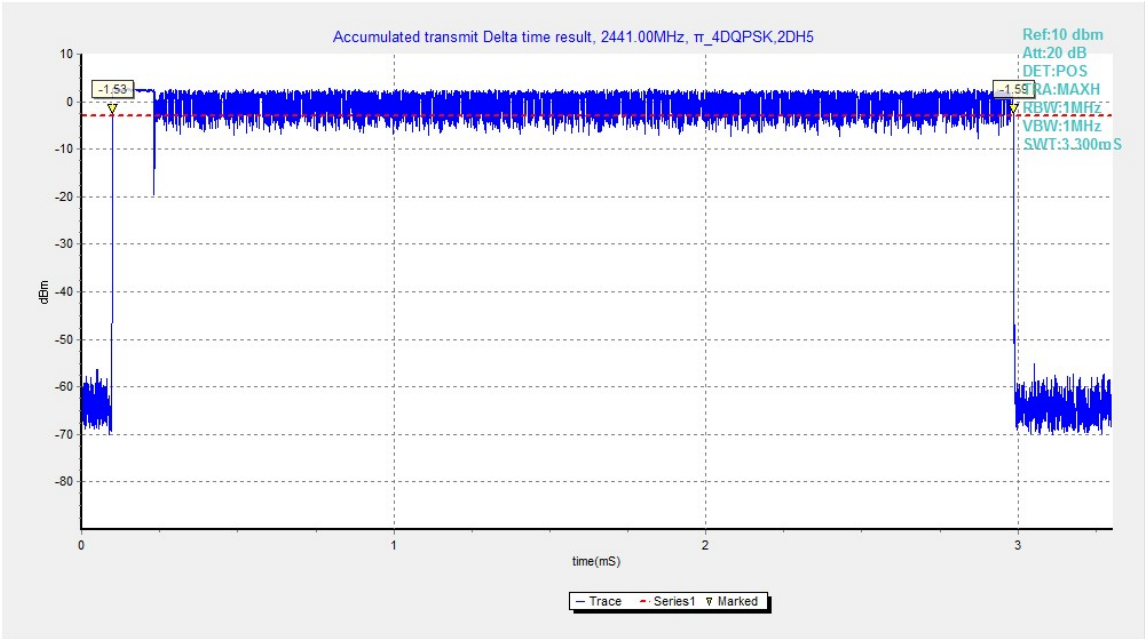

Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

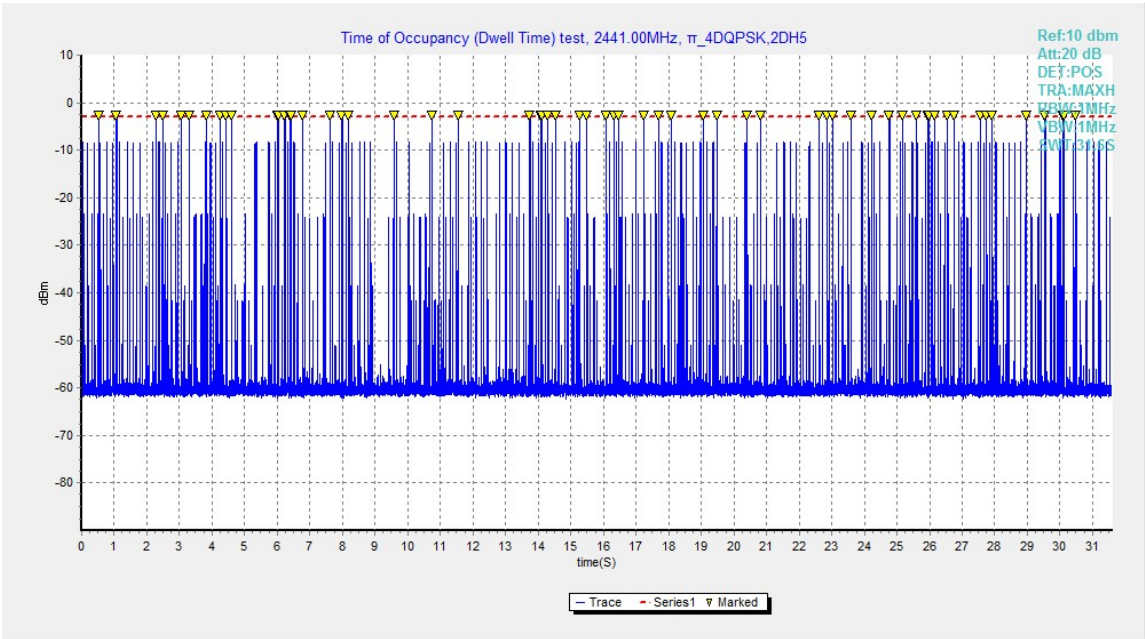

Fig.75. Number of Transmissions Measurement:Channel 39,Packet 2-DH5

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