

A.5. Radiated Emission

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/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

Measurement Results:

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

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.58	P
	3 GHz ~ 18 GHz	Fig.59	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.60	P
	1 GHz ~ 3 GHz	Fig.61	P
	3 GHz ~ 18 GHz	Fig.62	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.63	P
	3 GHz ~ 18 GHz	Fig.64	P
Power	2.45GHz~2.5GHz---H	Fig.65	P
Power	18 GHz ~ 26 GHz	Fig.66	P
For all channels		Fig.67	

Form/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.68	P
	3 GHz ~ 18 GHz	Fig.69	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.70	P
	1 GHz ~ 3 GHz	Fig.71	P
	3 GHz ~ 18 GHz	Fig.72	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.73	P
	3 GHz ~ 18 GHz	Fig.74	P
Power	2.38GHz~2.4GHz---L	Fig.75	P
Power	2.45GHz~2.5GHz---H	Fig.76	P
For all channels	18 GHz ~ 26 GHz	Fig.77	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	Fig.78	P
	3 GHz ~ 18 GHz	Fig.79	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	Fig.80	P
	1 GHz ~ 3 GHz	Fig.81	P
	3 GHz ~ 18 GHz	Fig.82	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	Fig.83	P
	3 GHz ~ 18 GHz	Fig.84	P
Power	2.38GHz~2.4GHz---L	Fig.85	P
Power	2.45GHz~2.5GHz---H	Fig.86	P
For all channels	18 GHz ~ 26 GHz	Fig.87	P

GFSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2382.900	46.1	2.9	32.0	11.2	54.0	7.9	H
2385.800	46.1	2.9	32.0	11.2	54.0	7.9	H
4804.000	27.8	-32.9	34.5	26.2	54.0	26.2	H
7206.000	30.3	-31.6	36.1	25.9	54.0	23.7	H
9608.000	32.9	-30.0	37.0	26.0	54.0	21.1	H
12010.000	35.7	-29.8	39.3	26.2	54.0	18.3	H

GFSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2341.000	46.4	2.8	31.5	12.1	54.0	7.6	H
2543.900	46.8	3.0	33.0	10.8	54.0	7.2	H
4882.000	28.2	-32.7	34.5	26.4	54.0	25.8	H

7323.000	30.1	-31.9	36.1	26.0	54.0	23.9	H
9764.000	32.7	-30.6	37.2	26.1	54.0	21.3	H
12205.000	35.5	-29.4	39.2	25.7	54.0	18.5	H

GFSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2483.500	48.8	2.9	32.8	13.1	54.0	5.2	H
2484.400	47.1	2.9	32.7	11.5	54.0	6.9	H
4960.000	27.5	-33.4	34.5	26.4	54.0	26.5	H
7440.000	30.1	-31.8	36.0	25.8	54.0	23.9	H
9920.000	34.0	-29.9	37.4	26.5	54.0	20.0	H
12400.000	34.8	-29.5	39.1	25.1	54.0	19.2	H

 $\pi/4$ DQPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2386.900	46.1	2.9	32.0	11.2	54.0	7.9	H
2389.100	46.1	2.9	32.0	11.3	54.0	7.9	H
4804.000	28.1	-32.9	34.5	26.4	54.0	25.9	H
7206.000	30.4	-31.6	36.1	26.0	54.0	23.6	H
9608.000	33.1	-30.0	37.0	26.2	54.0	20.9	H
12010.000	35.8	-29.8	39.3	26.3	54.0	18.2	H

 $\pi/4$ DQPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2344.300	46.5	2.8	31.5	12.1	54.0	7.5	H
2539.500	47.1	3.0	32.9	11.2	54.0	6.9	H
4882.000	28.4	-32.7	34.5	26.7	54.0	25.6	H
7323.000	30.3	-31.9	36.1	26.2	54.0	23.7	H
9764.000	32.9	-30.6	37.2	26.2	54.0	21.1	H
12205.000	35.6	-29.4	39.2	25.8	54.0	18.4	H

 $\pi/4$ DQPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2483.600	47.8	2.9	32.8	12.1	54.0	6.2	H
2483.800	47.7	2.9	32.8	12.0	54.0	6.3	H
4960.000	27.6	-33.4	34.5	26.5	54.0	26.4	H
7440.000	30.3	-31.8	36.0	26.0	54.0	23.7	H

9920.000	34.1	-29.9	37.4	26.6	54.0	19.9	H
12400.000	34.9	-29.5	39.1	25.2	54.0	19.1	H

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)
2382.300	46.2	2.9	32.0	11.3	54.0	7.8	H
2388.800	46.2	2.9	32.0	11.3	54.0	7.8	H
4804.000	28.1	-32.9	34.5	26.5	54.0	25.9	H
7206.000	30.5	-31.6	36.1	26.1	54.0	23.5	H
9608.000	33.2	-30.0	37.0	26.2	54.0	20.8	H
12010.000	35.8	-29.8	39.3	26.3	54.0	18.2	H

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)
2342.700	46.8	2.8	31.5	12.4	54.0	7.2	H
2538.000	47.0	3.0	32.9	11.1	54.0	7.0	H
4882.000	28.5	-32.7	34.5	26.7	54.0	25.5	H
7323.000	30.4	-31.9	36.1	26.2	54.0	23.7	H
9764.000	32.8	-30.6	37.2	26.2	54.0	21.2	H
12205.000	35.6	-29.4	39.2	25.8	54.0	18.4	H

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)
2483.500	48.6	2.9	32.8	12.9	54.0	5.4	H
2484.200	47.2	2.9	32.7	11.5	54.0	6.8	H
4960.000	27.7	-33.4	34.5	26.6	54.0	26.3	H
7440.000	30.3	-31.8	36.0	26.0	54.0	23.7	H
9920.000	34.0	-29.9	37.4	26.5	54.0	20.0	H
12400.000	34.9	-29.5	39.1	25.2	54.0	19.1	H

GFSK Ch 0 – Peak

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)
2384.172	59.1	2.9	32.0	24.2	74.0	14.9	H
2389.520	59.1	2.9	32.0	24.3	74.0	14.9	V
17801.250	53.2	-23.1	41.0	35.4	74.0	20.8	V
17809.500	52.7	-23.0	41.0	34.7	74.0	21.3	V
17771.250	52.5	-23.6	41.0	35.2	74.0	21.5	V

17840.250	52.4	-23.4	40.9	34.9	74.0	21.6	V
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GFSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2361.600	49.3	-27.5	31.9	44.9	74.0	24.7	H
2656.200	52.7	-26.7	33.6	45.8	74.0	21.3	H
17809.500	53.1	-23.0	41.0	35.2	74.0	20.9	V
17822.250	52.9	-23.2	40.9	35.1	74.0	21.1	V
17811.000	52.9	-23.0	41.0	34.9	74.0	21.1	H
17805.000	52.5	-23.1	41.0	34.6	74.0	21.5	H

GFSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2487.880	60.1	2.9	32.6	24.5	74.0	13.9	H
2494.240	60.3	2.9	32.5	24.9	74.0	13.7	V
17781.750	53.3	-23.4	41.0	35.8	74.0	20.7	H
17903.250	52.8	-24.3	40.9	36.2	74.0	21.2	H
17875.500	52.7	-23.9	40.9	35.6	74.0	21.3	H
17823.750	52.6	-23.2	40.9	34.9	74.0	21.4	H

 $\pi/4$ DQPSK Ch 0 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2381.050	59.2	2.9	32.1	24.3	74.0	14.8	H
2387.500	59.6	2.9	32.0	24.8	74.0	14.4	H
17808.750	52.9	-23.0	41.0	35.0	74.0	21.1	V
17806.500	52.9	-23.0	41.0	35.0	74.0	21.1	V
17811.000	52.6	-23.0	41.0	34.7	74.0	21.4	V
17853.750	52.6	-23.6	40.9	35.2	74.0	21.4	V

 $\pi/4$ DQPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2332.400	48.8	-27.7	31.3	45.1	74.0	25.2	H
2569.600	51.3	-26.8	33.0	45.1	74.0	22.7	H
17803.500	53.5	-23.1	41.0	35.6	74.0	20.5	H
17766.750	52.7	-23.7	41.0	35.5	74.0	21.3	H
17806.500	52.6	-23.0	41.0	34.7	74.0	21.4	H
17805.750	52.5	-23.1	41.0	34.6	74.0	21.5	V

$\pi/4$ DQPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2484.150	59.7	2.9	32.7	24.1	74.0	14.3	H
2489.510	60.0	2.9	32.6	24.5	74.0	14.0	H
17811.000	52.9	-23.0	41.0	35.0	74.0	21.1	V
17812.500	52.8	-23.0	40.9	34.9	74.0	21.2	V
17809.500	52.7	-23.0	41.0	34.8	74.0	21.3	V
17803.500	52.7	-23.1	41.0	34.9	74.0	21.3	V

8DPSK Ch 0 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2383.598	59.8	2.9	32.0	24.9	74.0	14.2	H
2388.414	59.0	2.9	32.0	24.1	74.0	15.0	H
17804.250	53.1	-23.1	41.0	35.2	74.0	20.9	V
17807.250	53.0	-23.0	41.0	35.0	74.0	21.0	H
17811.000	52.9	-23.0	41.0	35.0	74.0	21.1	H
17925.750	52.6	-24.6	40.9	36.2	74.0	21.4	H

8DPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2298.600	48.1	-27.9	31.0	44.9	74.0	25.9	H
2660.800	51.9	-26.7	33.6	45.1	74.0	22.1	H
17804.250	53.3	-23.1	41.0	35.5	74.0	20.7	V
17778.750	53.0	-23.5	41.0	35.5	74.0	21.0	H
17809.500	52.8	-23.0	41.0	34.8	74.0	21.2	V
17802.750	52.7	-23.1	41.0	34.8	74.0	21.3	V

8DPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
2483.720	63.7	2.9	32.8	28.0	74.0	10.3	H
2490.220	60.1	2.9	32.6	24.6	74.0	13.9	H
17824.500	53.1	-23.2	40.9	35.4	74.0	20.9	H
17803.500	52.8	-23.1	41.0	34.9	74.0	21.2	V
17801.250	52.8	-23.1	41.0	34.9	74.0	21.2	V
17797.500	52.6	-23.2	41.0	34.9	74.0	21.4	V

Conclusion: PASS
Test graphs as below:

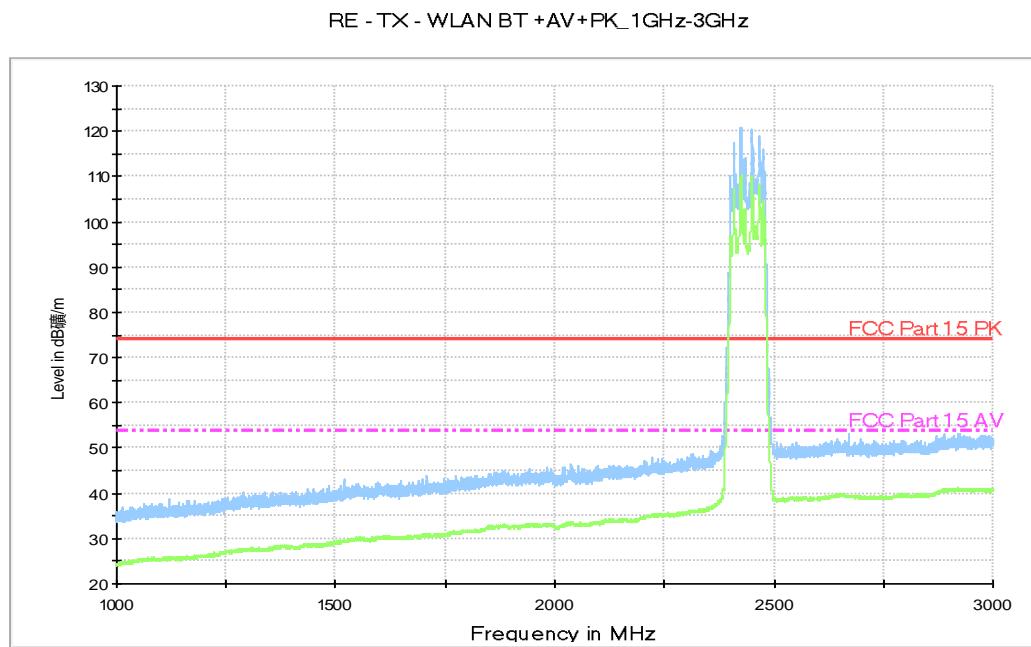


Fig.58. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz

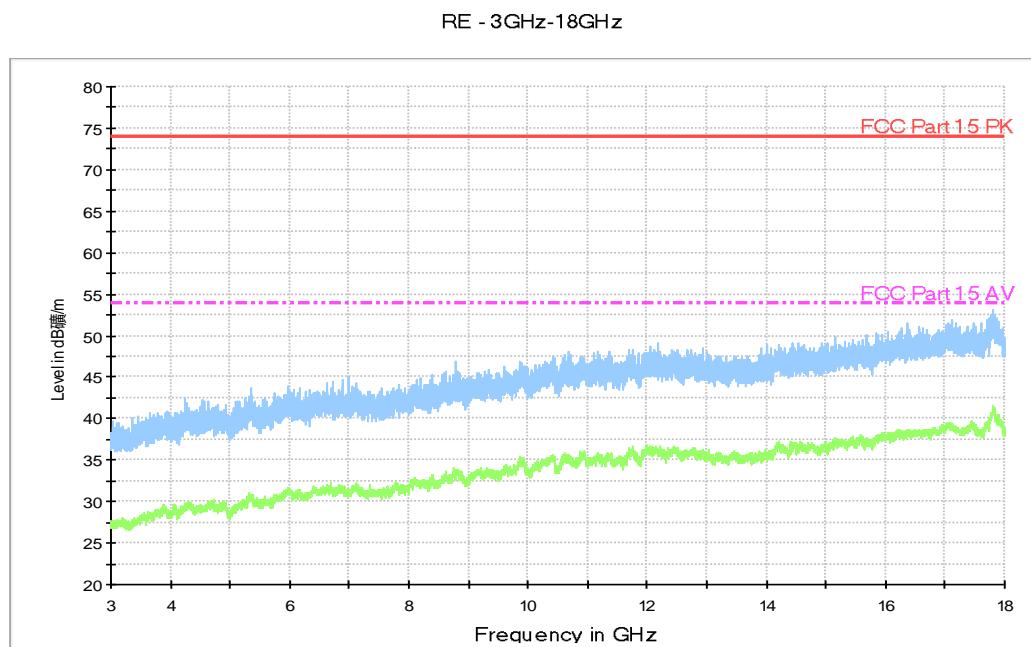


Fig.59. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

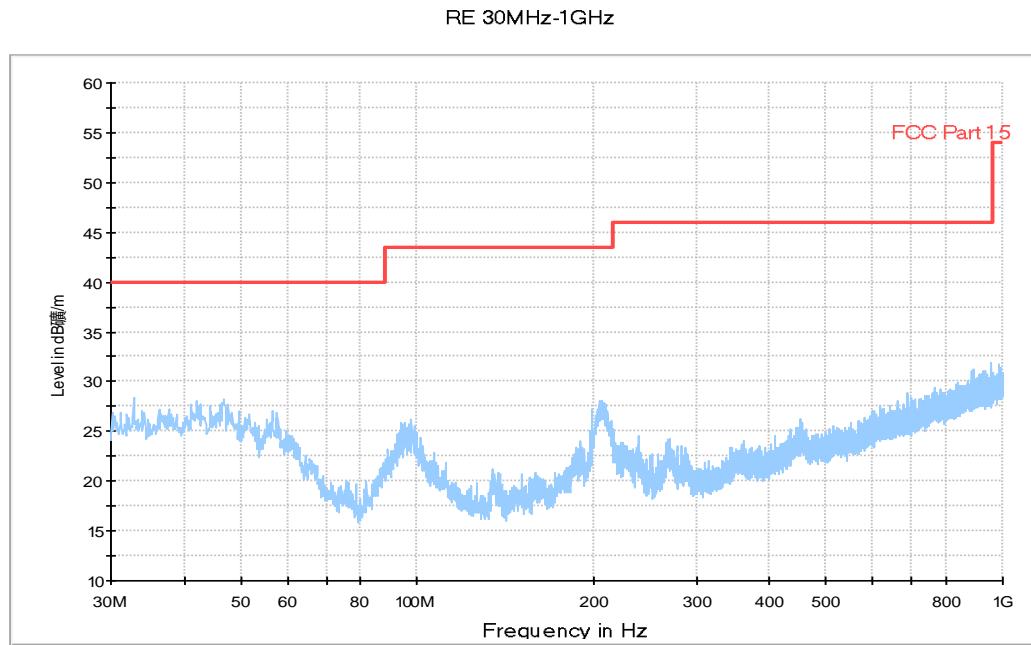


Fig.60. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

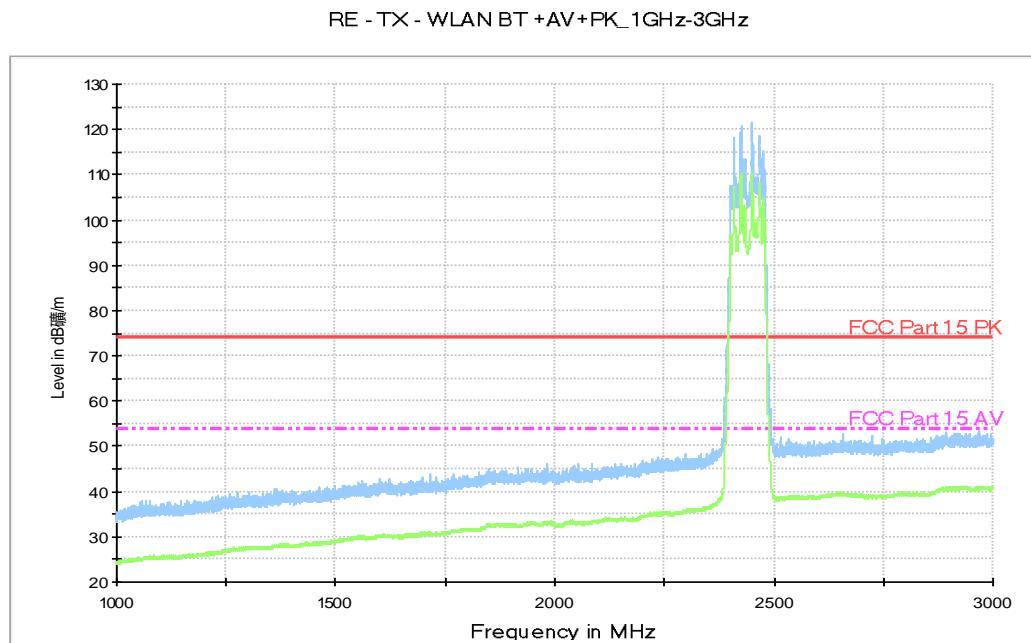


Fig.61. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

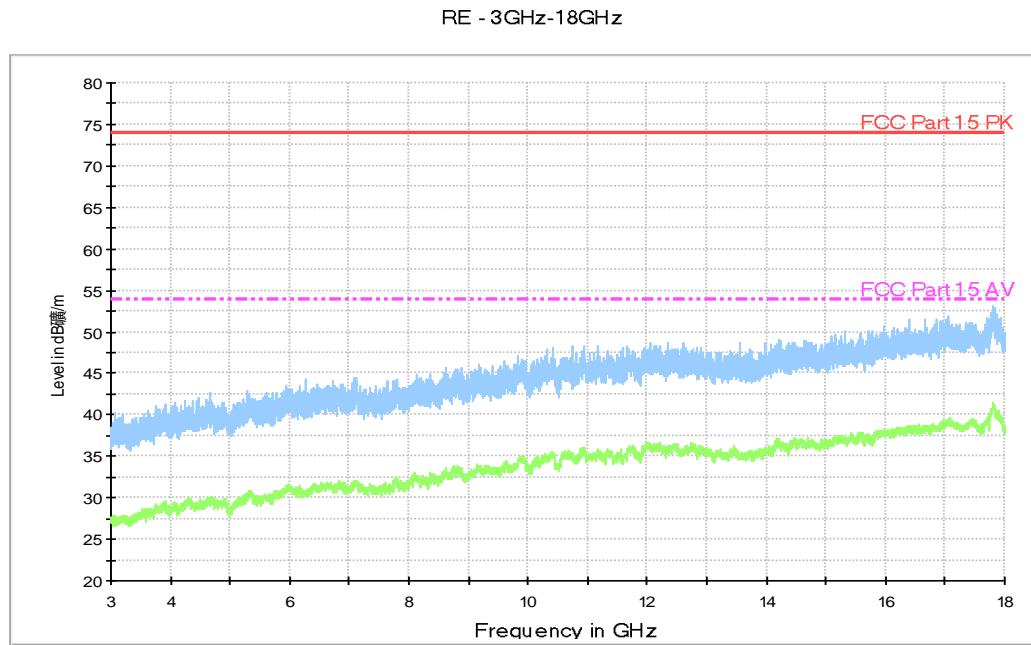


Fig.62. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

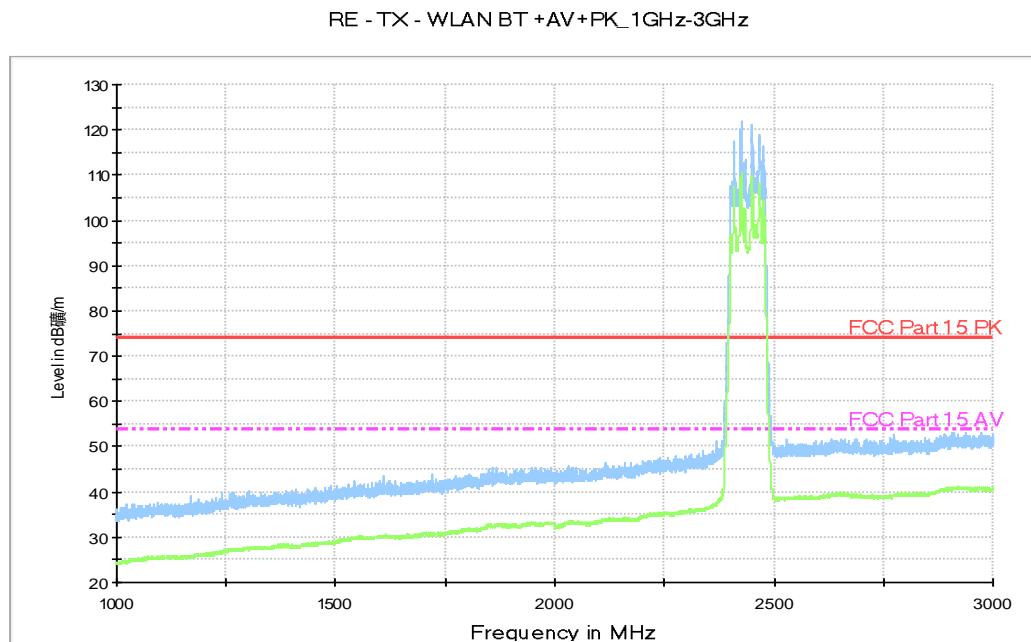


Fig.63. Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

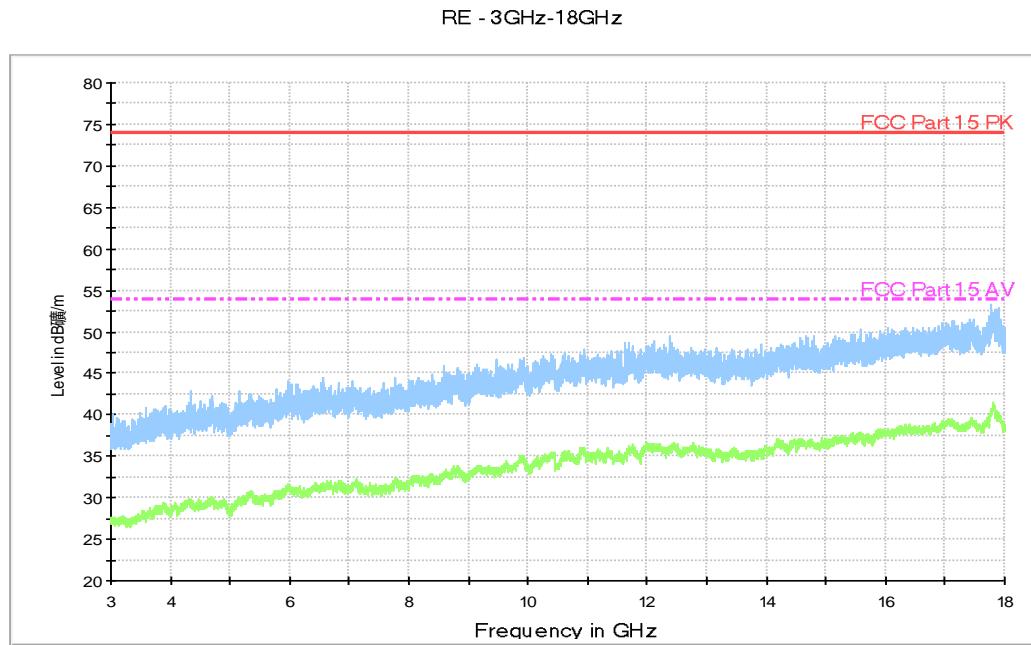


Fig.64. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

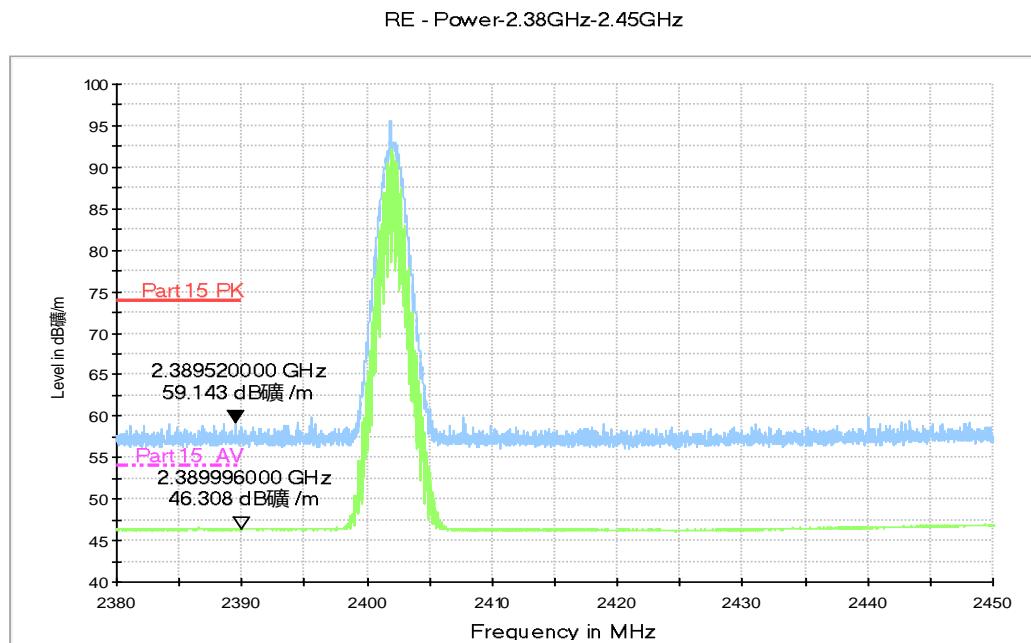


Fig.65. Radiated emission (Power): GFSK, low channel

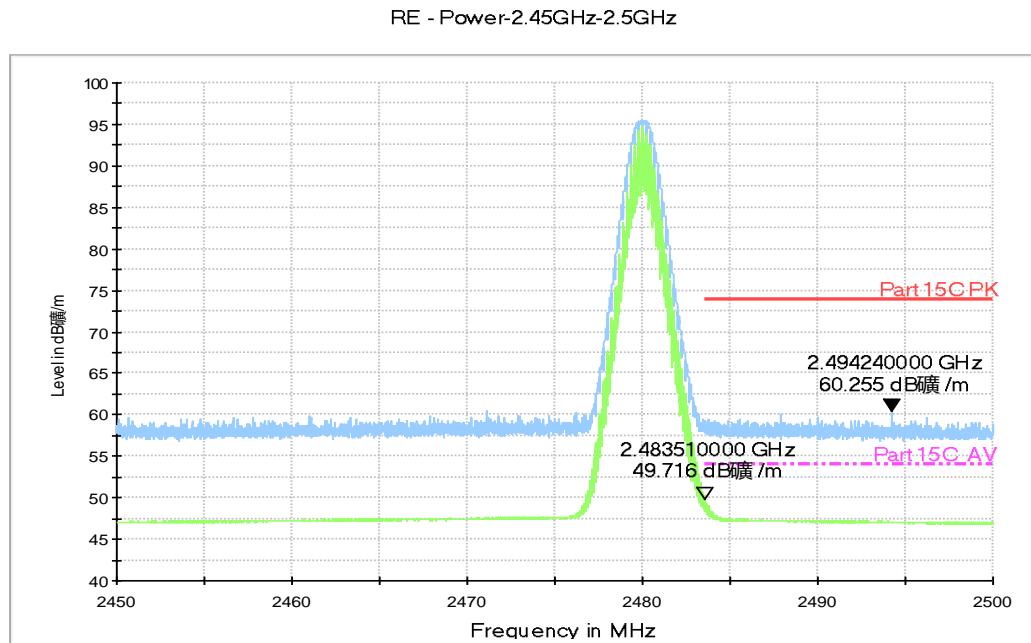


Fig.66. Radiated emission (Power) GFSK, high channel

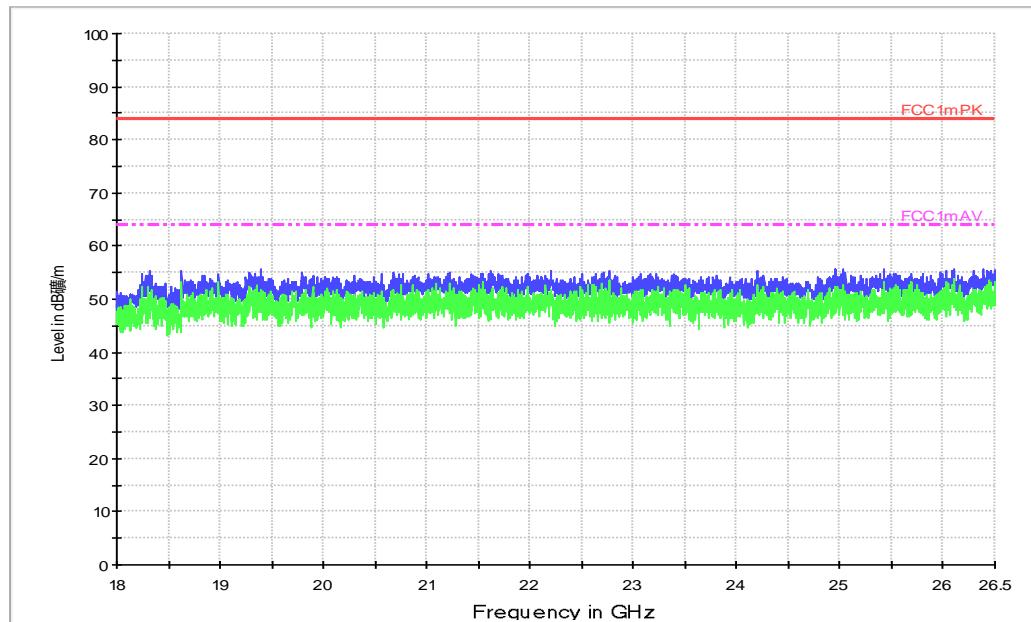


Fig.67. Radiated emission: GFSK, 18 GHz - 26 GHz

RE - TX - WLAN BT +AV+PK_1GHz-3GHz

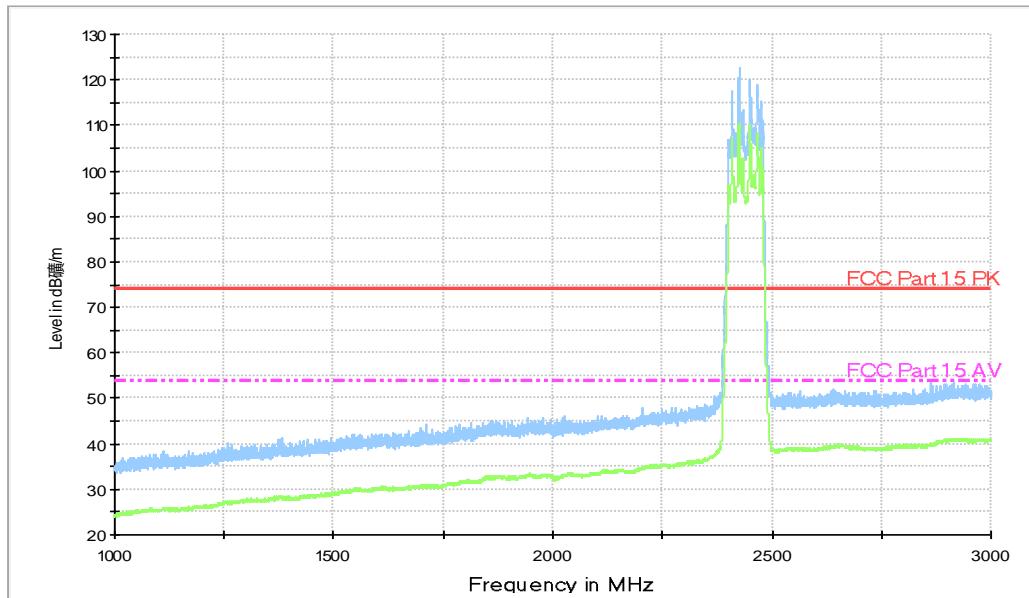


Fig.68. Radiated emission: $\pi/4$ DQPSK, Channel 0, 1 GHz - 3 GHz

RE - 3GHz-18GHz

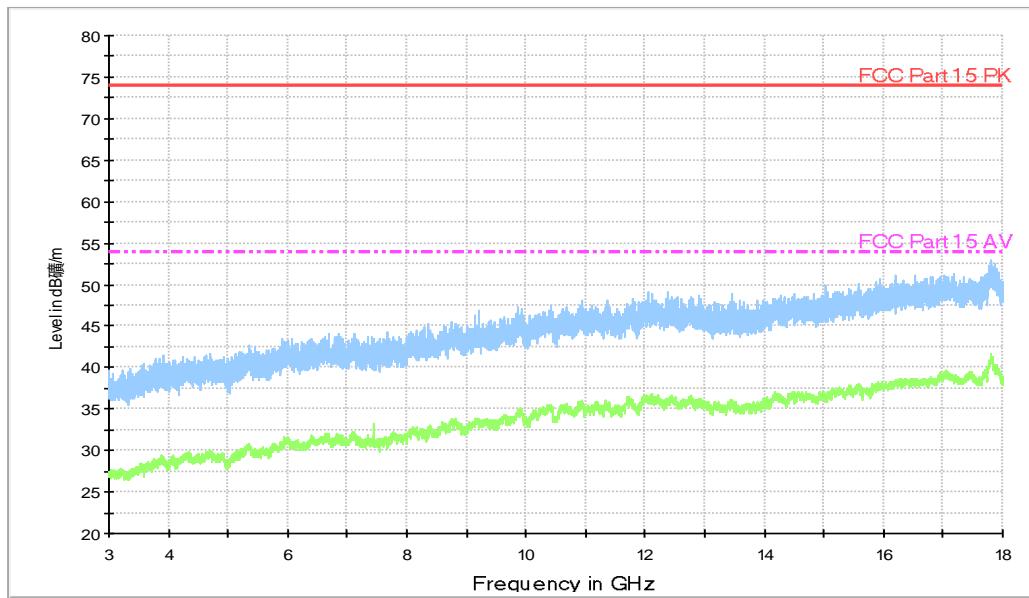


Fig.69. Radiated emission: $\pi/4$ DQPSK, Channel 0, 3 GHz - 18 GHz

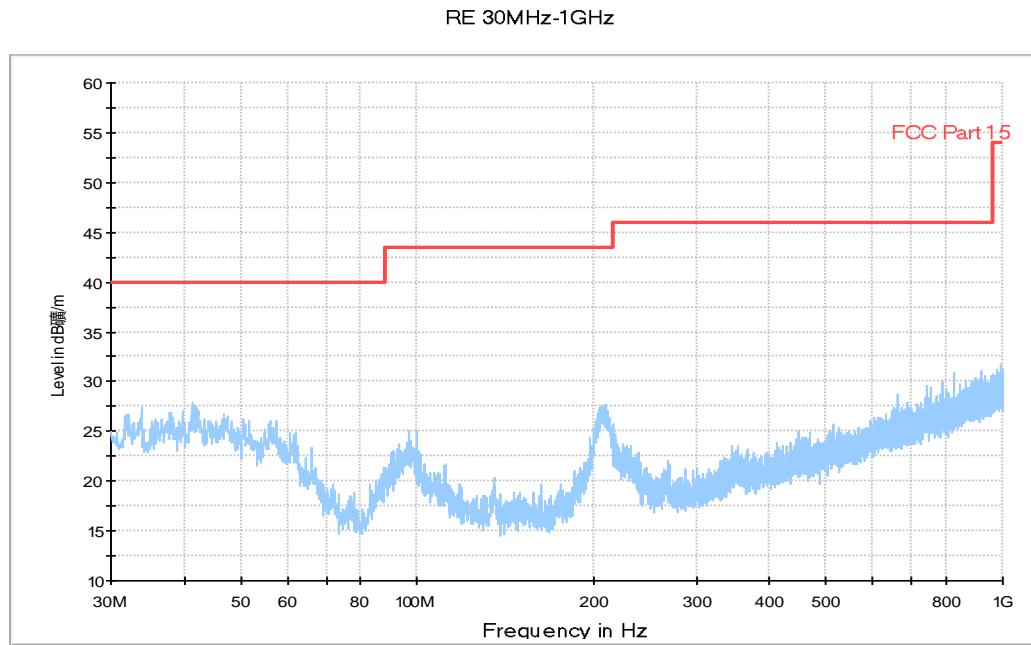


Fig.70. Radiated emission: $\pi/4$ DQPSK, Channel 39, 30 MHz - 1 GHz

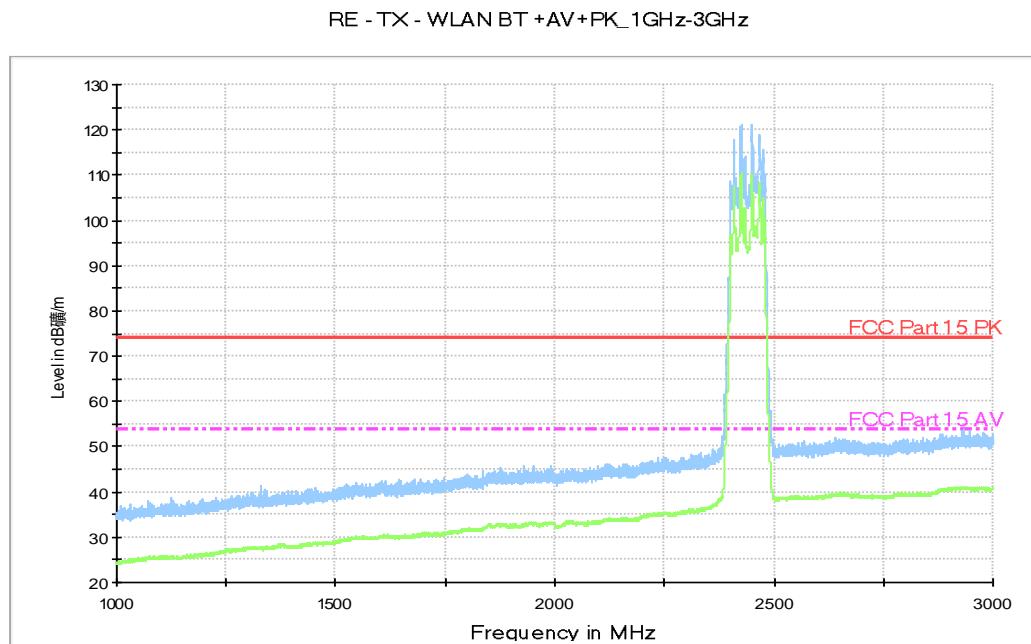


Fig.71. Radiated emission: $\pi/4$ DQPSK, Channel 39, 1 GHz - 3 GHz

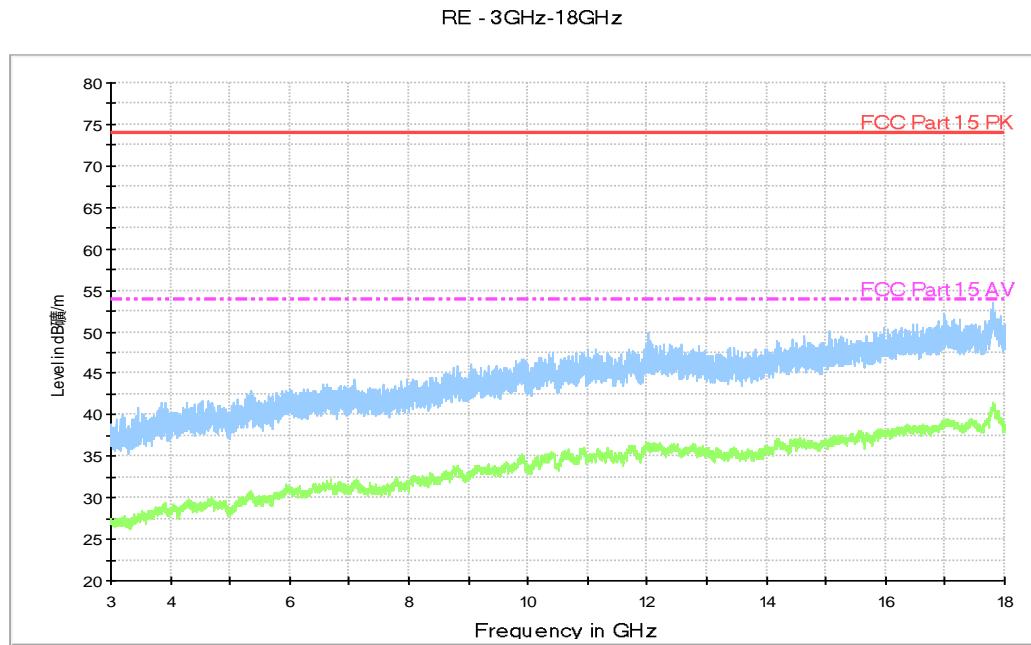


Fig.72. Radiated emission: $\pi/4$ DQPSK, Channel 39, 3 GHz - 18 GHz

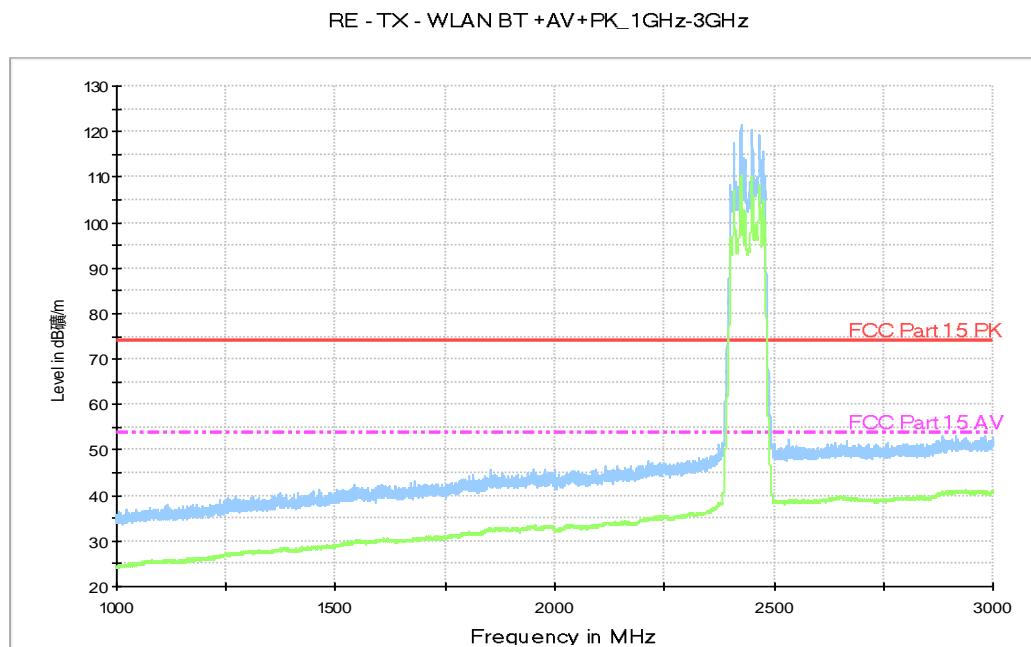


Fig.73. Radiated emission: $\pi/4$ DQPSK, Channel 78, 1 GHz - 3 GHz

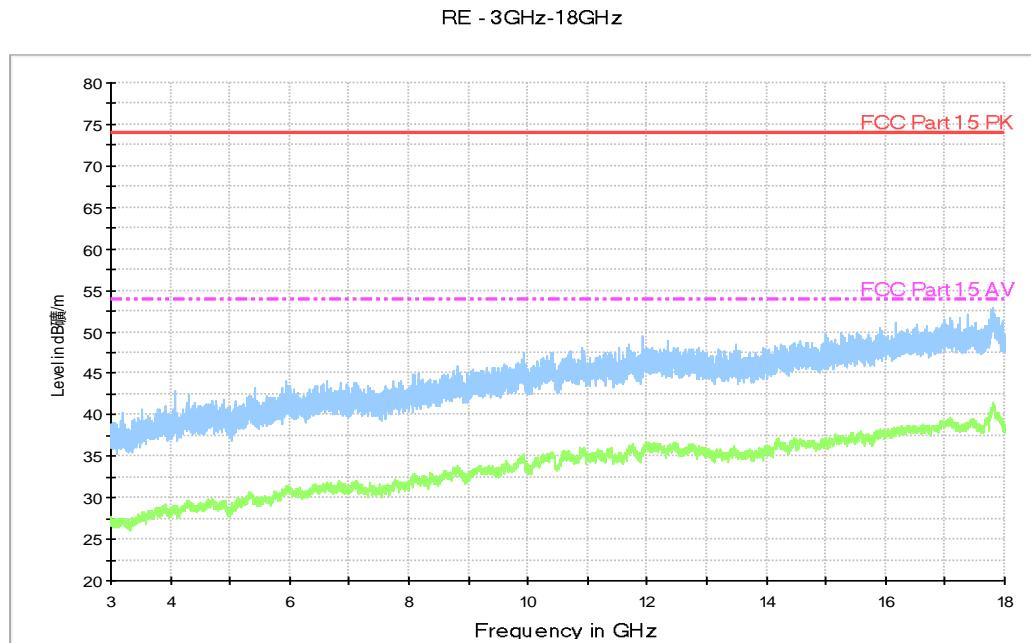


Fig.74. Radiated emission: $\pi/4$ DQPSK, Channel 78, 3 GHz - 18 GHz

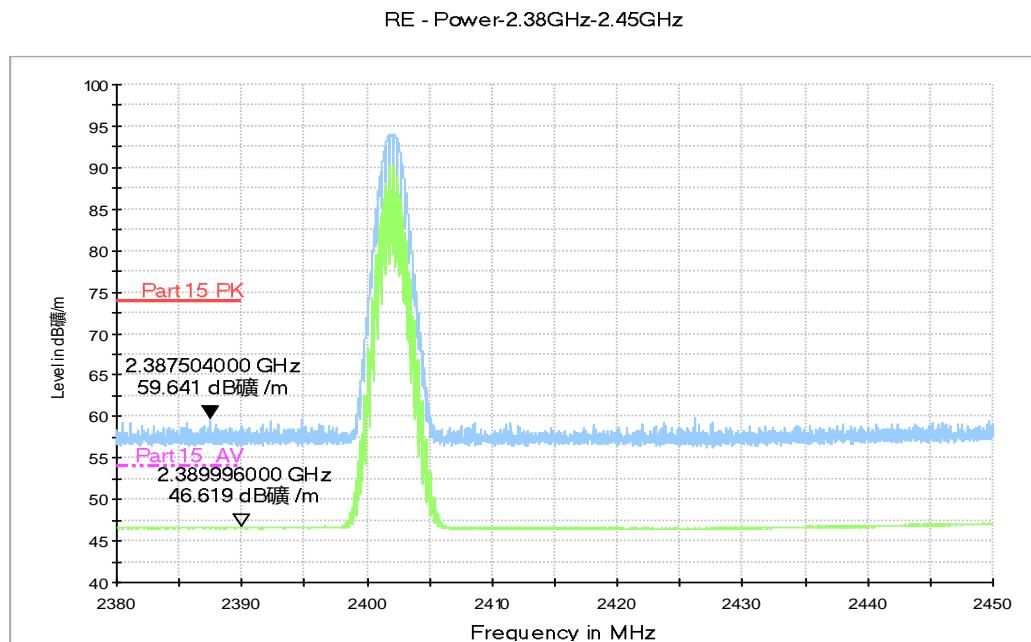


Fig.75. Radiated emission (Power): $\pi/4$ DQPSK, low channel

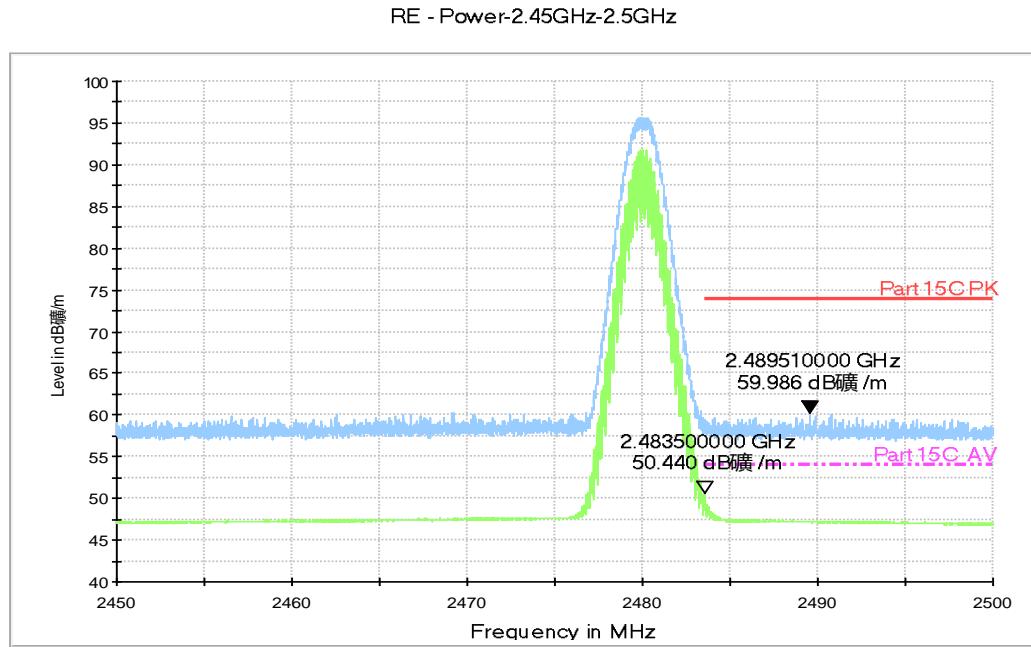


Fig.76. Radiated emission (Power): $\pi/4$ DQPSK, high channel

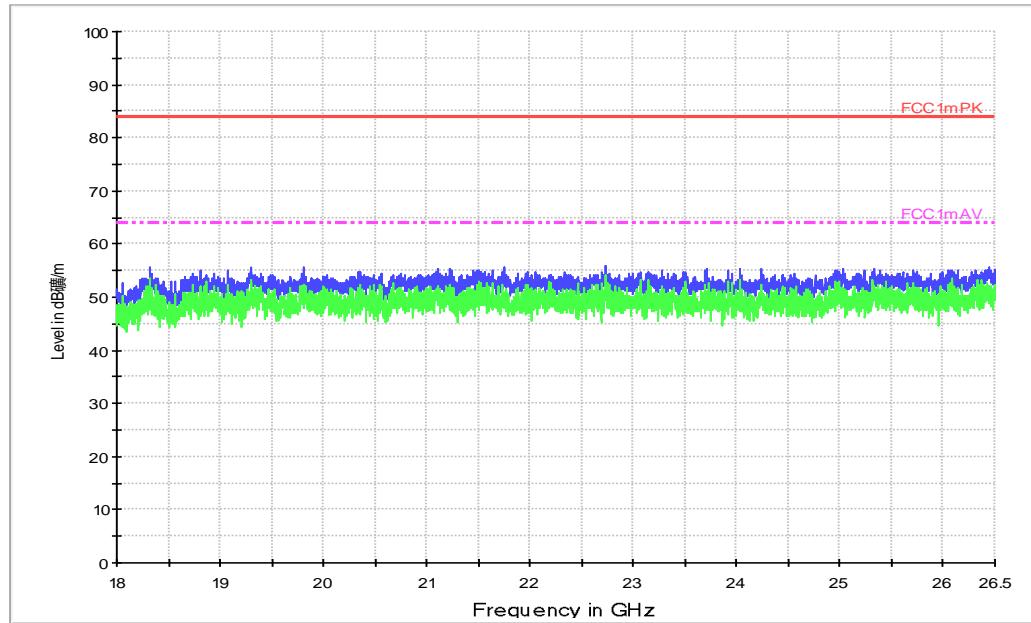


Fig.77. Radiated emission: $\pi/4$ DQPSK, 18 GHz - 26 GHz

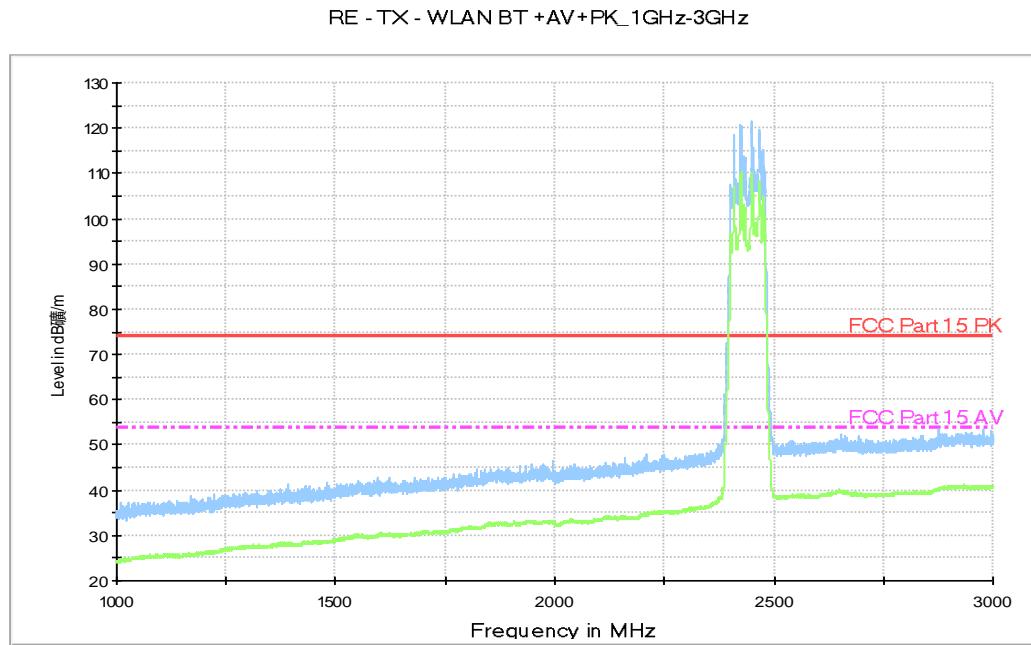


Fig.78. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

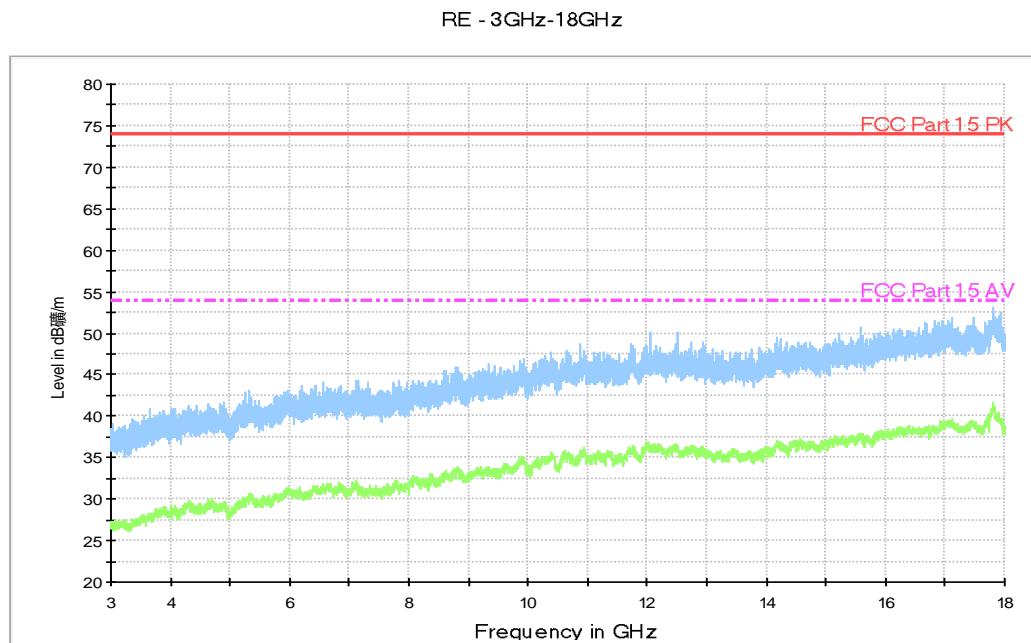


Fig.79. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

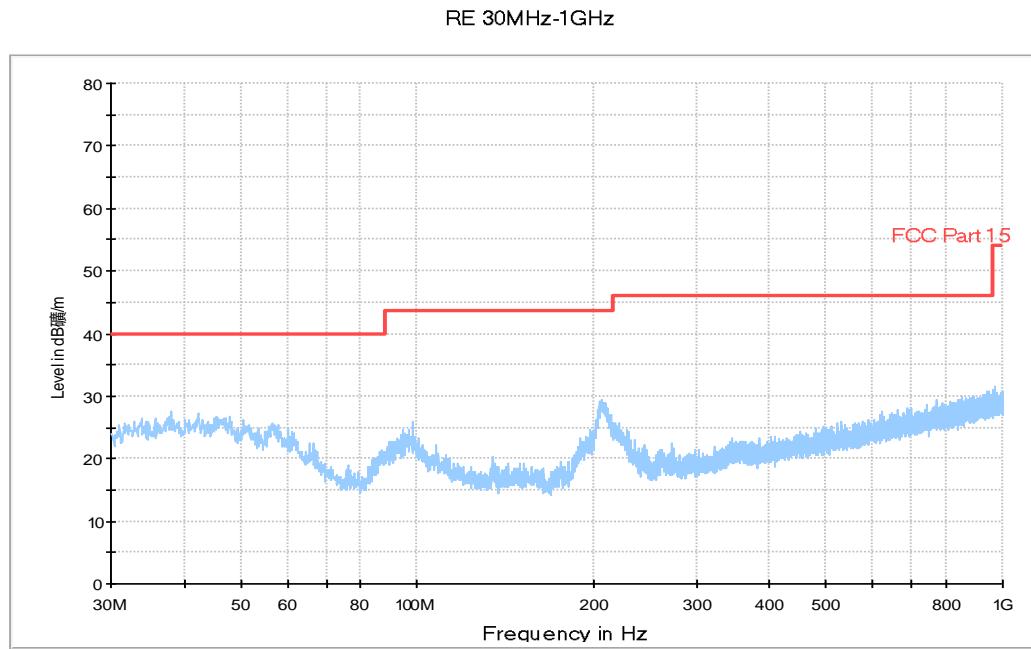


Fig.80. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

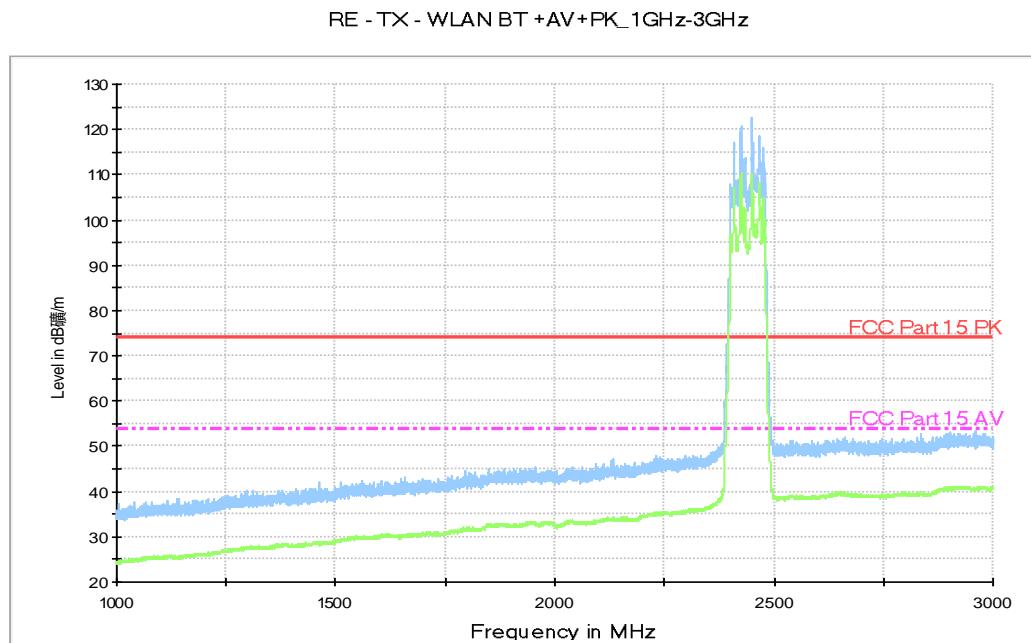


Fig.81. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

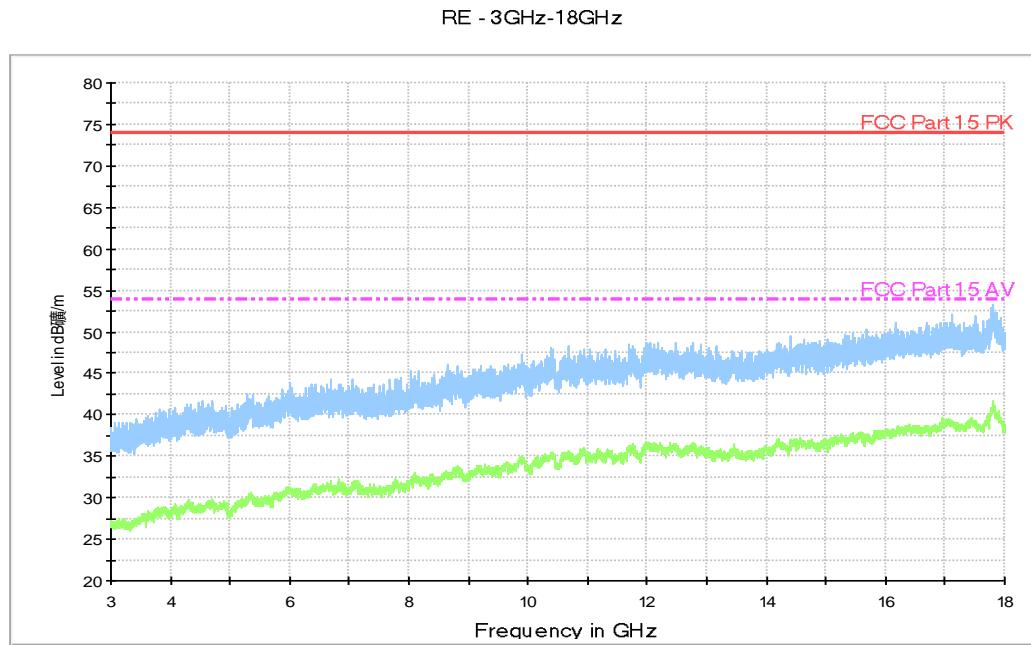


Fig.82. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

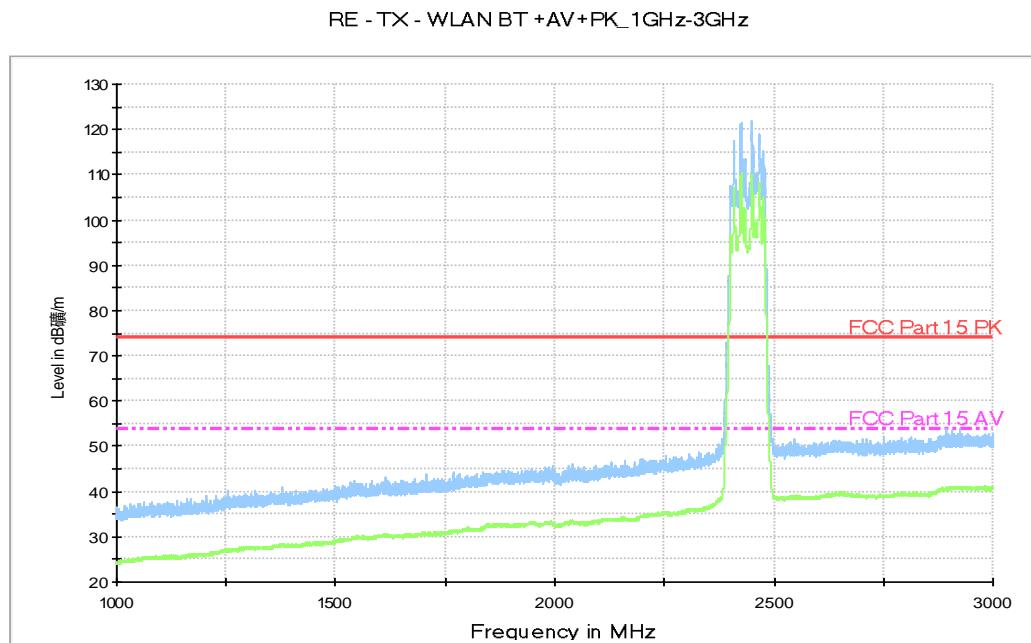


Fig.83. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

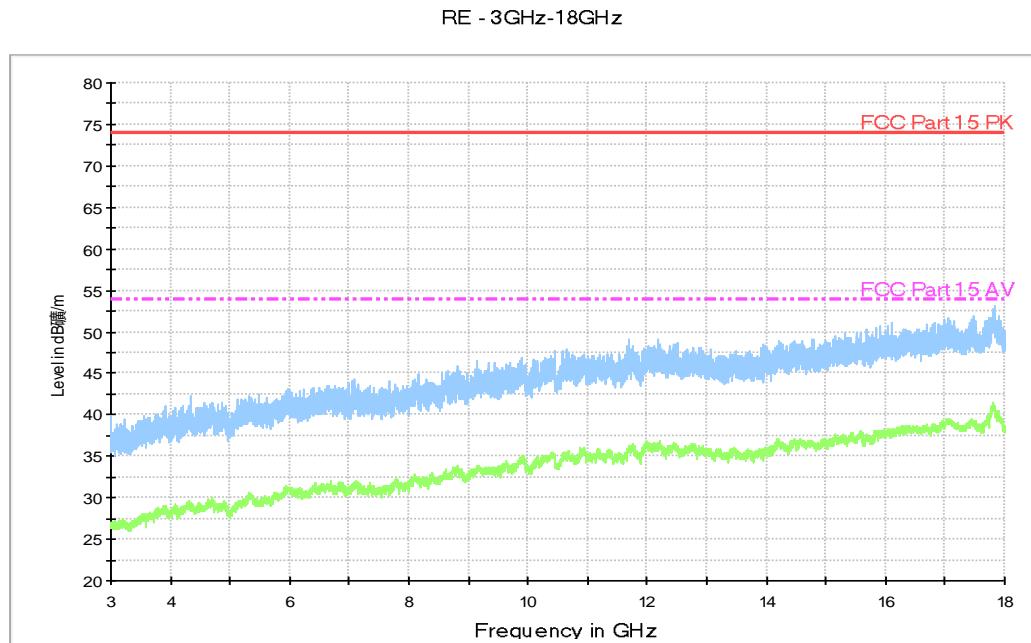


Fig.84. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

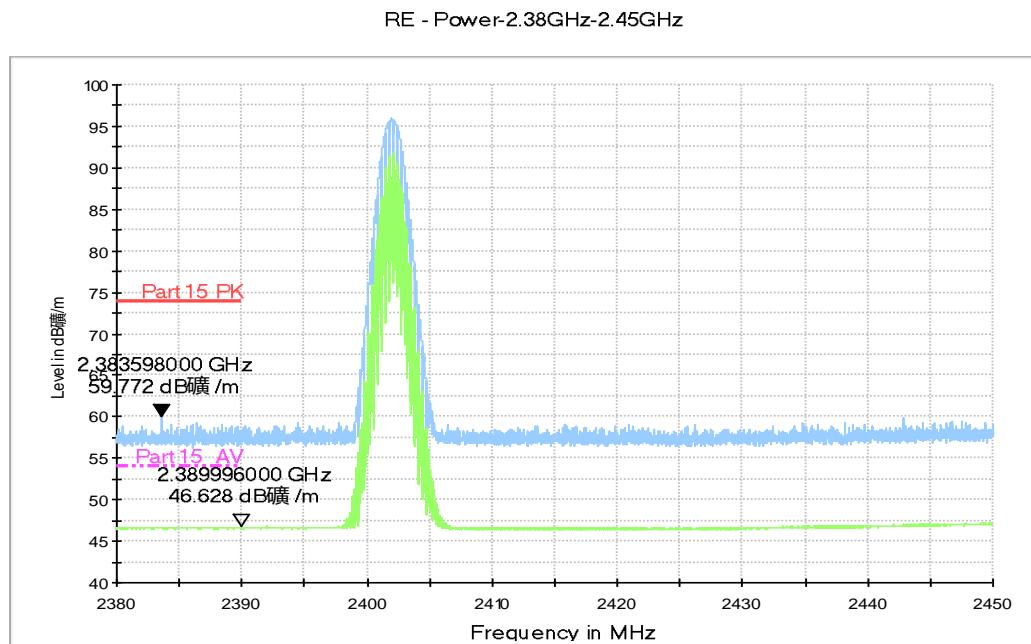


Fig.85. Radiated emission (Power): 8DPSK, low channel

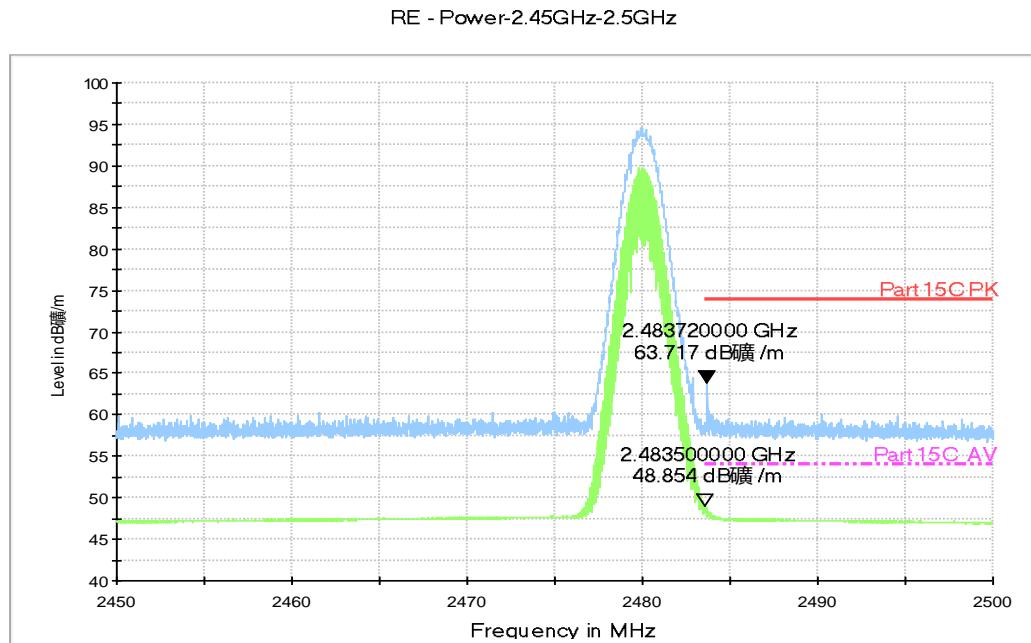


Fig.86. Radiated emission (Power): 8DPSK, high channel

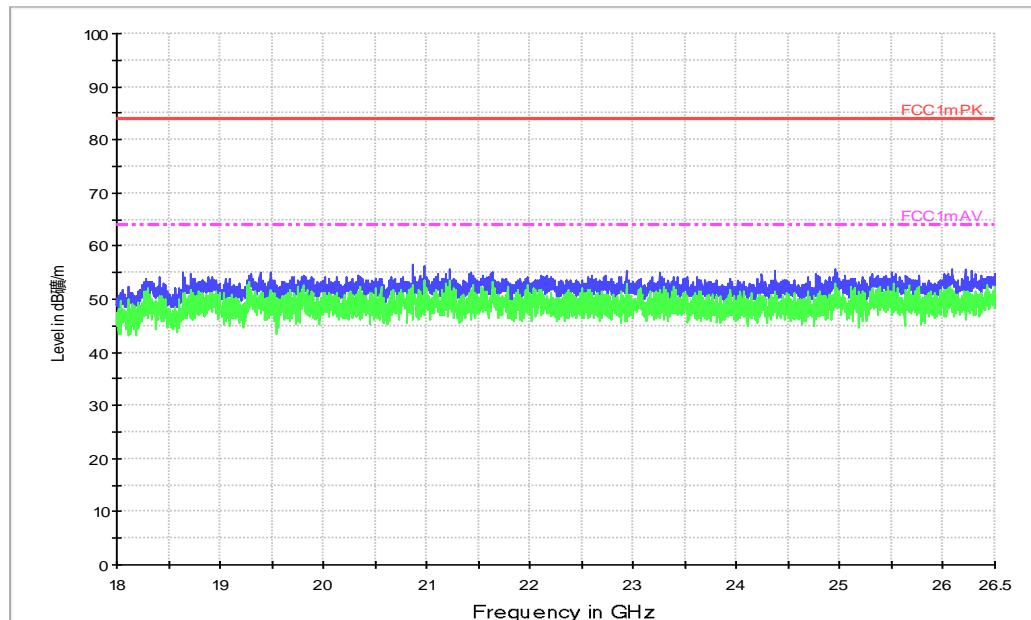


Fig.87. Radiated emission: 8DPSK, 18 GHz - 26 GHz

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.88	121.21	P
		Fig.89		
	DH3	Fig.90	188.27	P
		Fig.91		
	DH5	Fig.92	178.88	P
		Fig.93		

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.94	122.27	P
		Fig.95		
	DH3	Fig.96	157.34	P
		Fig.97		
	DH5	Fig.98	193.43	P
		Fig.99		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.100	122.99	P
		Fig.101		
	DH3	Fig.102	176.90	P

		Fig.103		
	DH5	Fig.104		
		Fig.105	193.56	P

Conclusion: PASS

Test graphs as below:

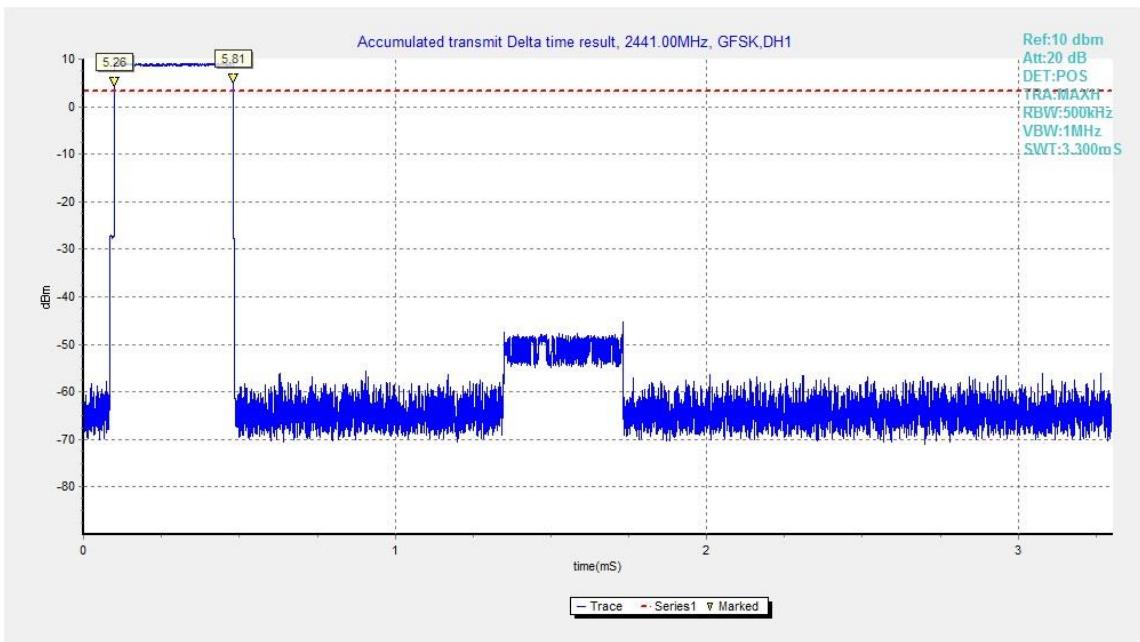


Fig.88. Time of occupancy (Dwell Time): Channel 39, Packet DH1

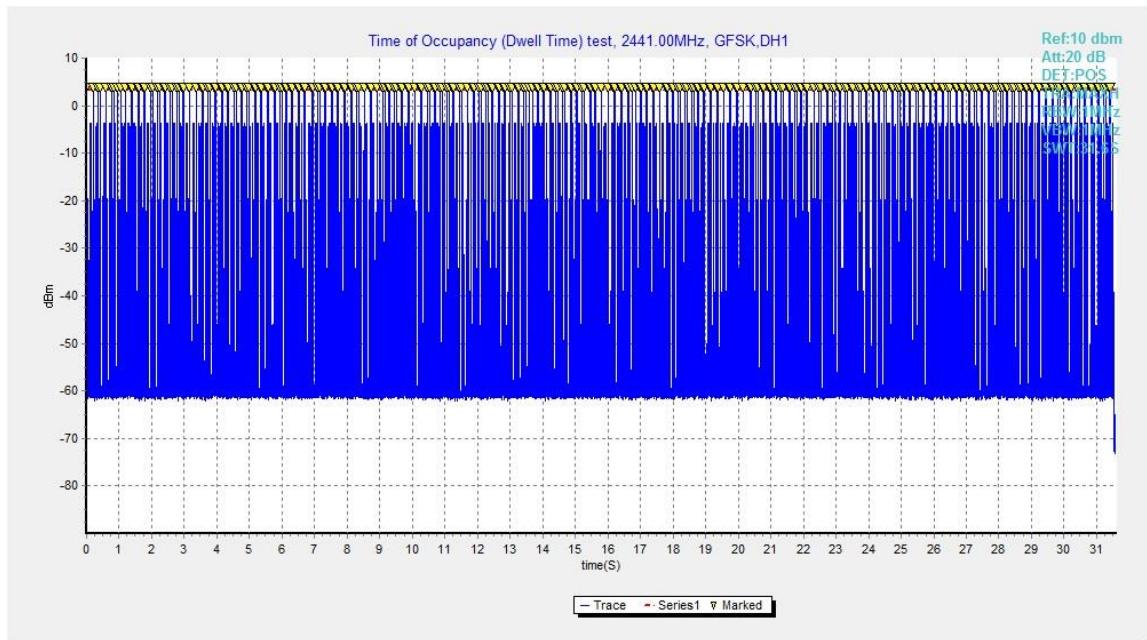


Fig.89. Number of Transmissions Measurement:Channel 39,Packet DH1

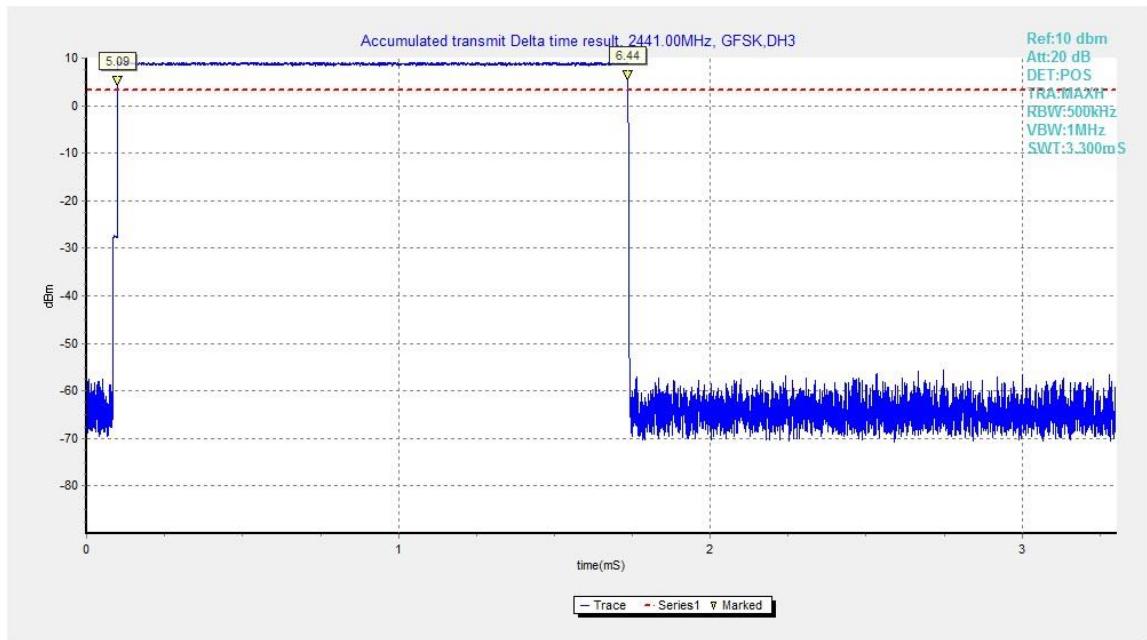


Fig.90. Time of occupancy (Dwell Time): Channel 39, Packet DH3

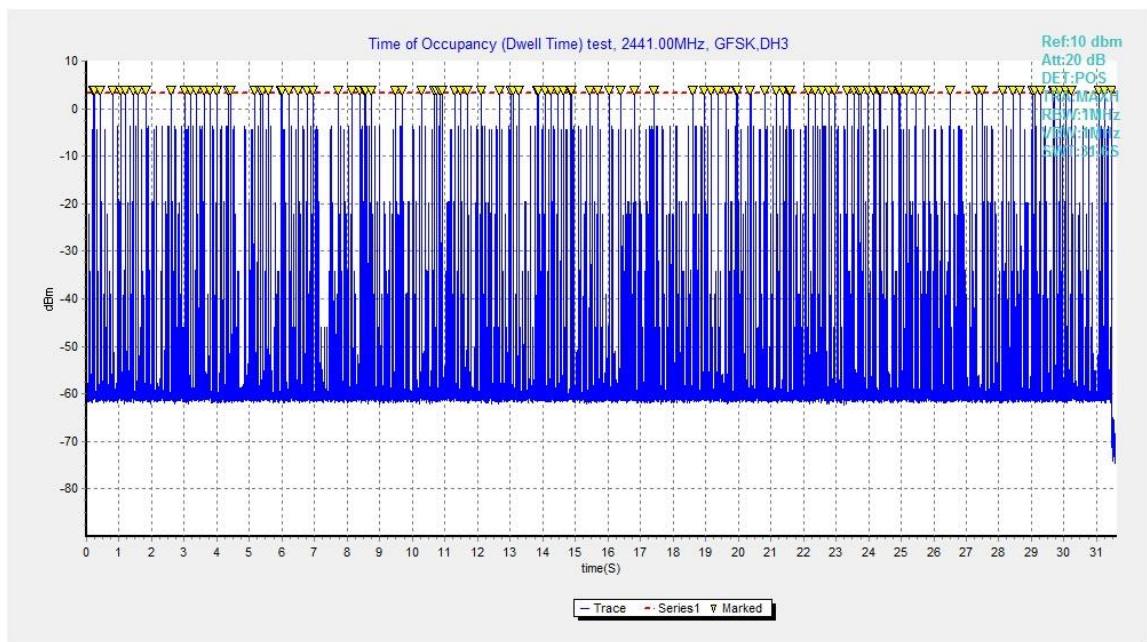


Fig.91. Number of Transmissions Measurement:Channel 39,Packet DH3



Fig.92. Time of occupancy (Dwell Time): Channel 39, Packet DH5

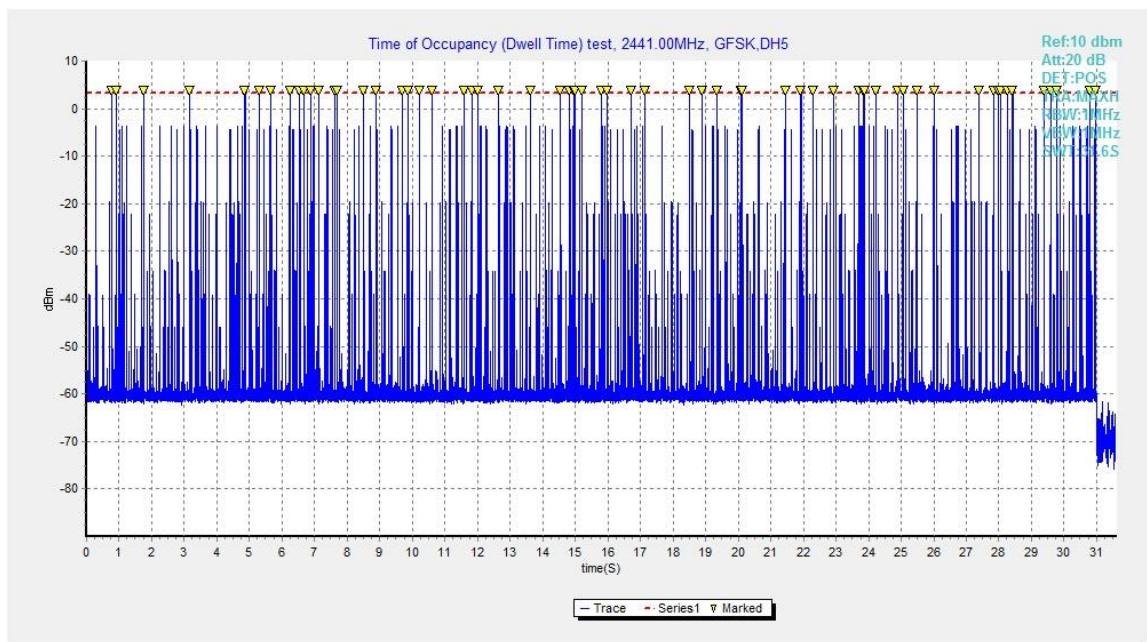


Fig.93. Number of Transmissions Measurement:Channel 39,Packet DH5

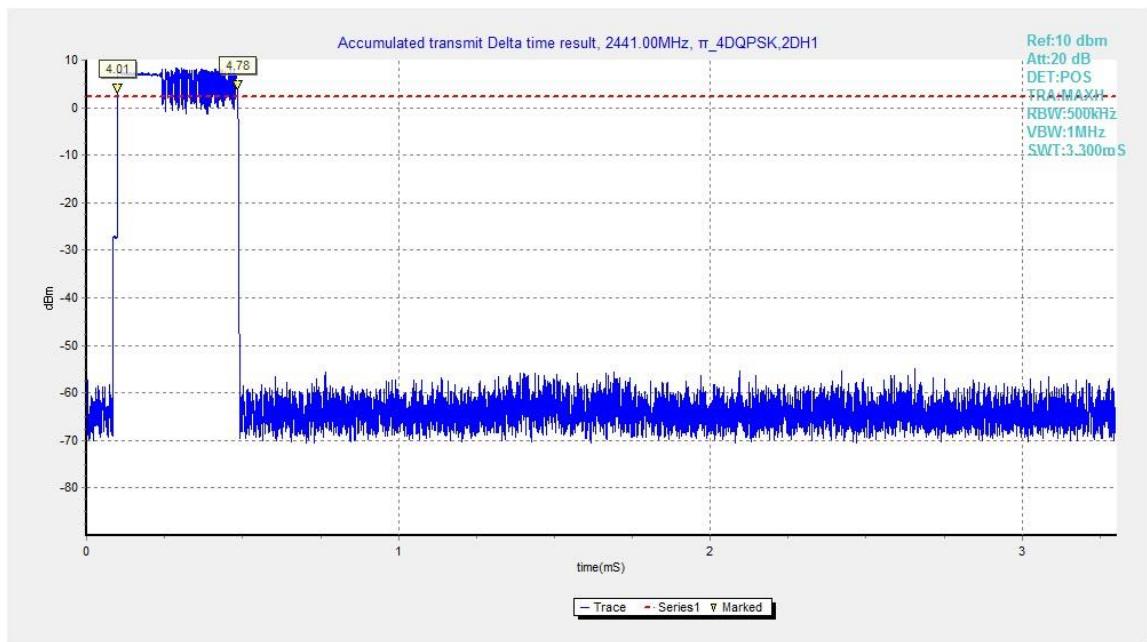


Fig.94. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

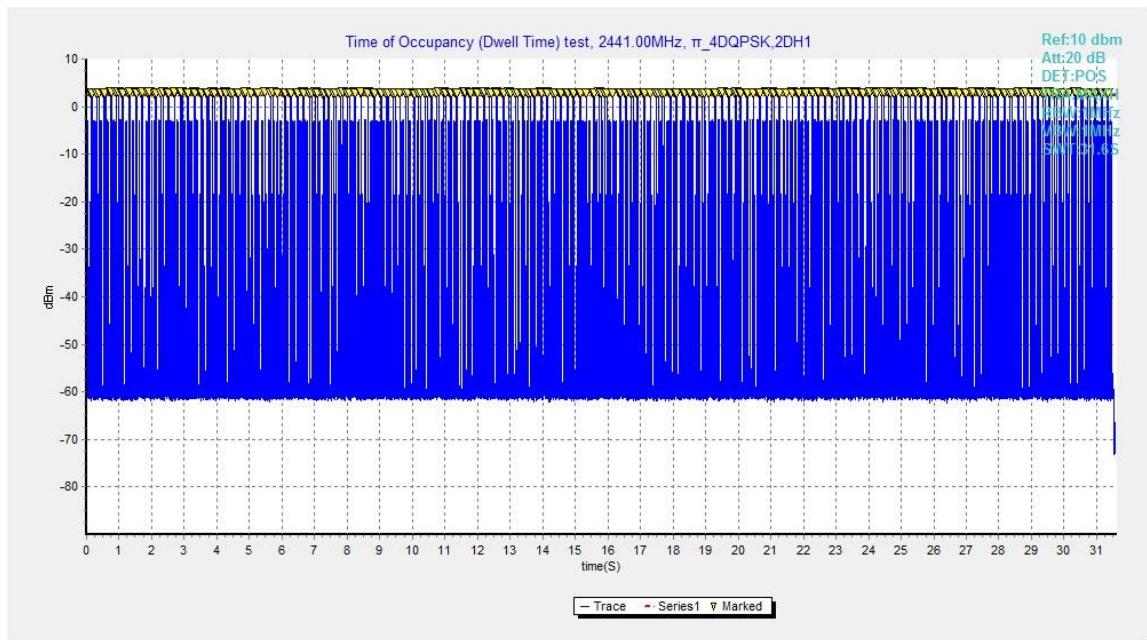


Fig.95. Number of Transmissions Measurement: Channel 39, Packet 2-DH1

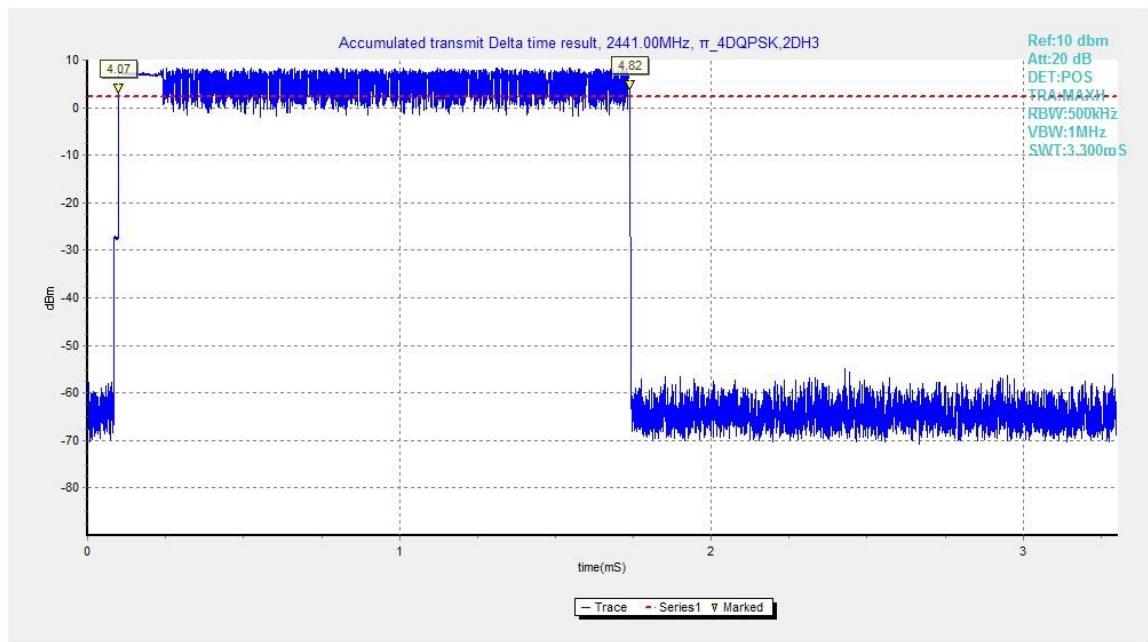


Fig.96. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

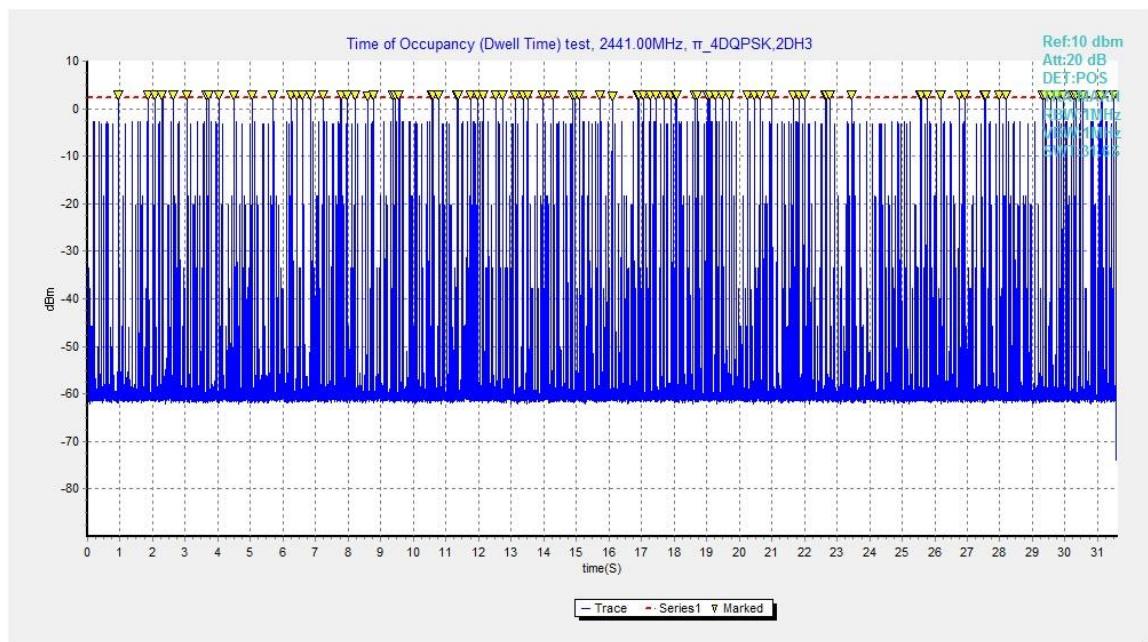


Fig.97. Number of Transmissions Measurement: Channel 39, Packet 2-DH3

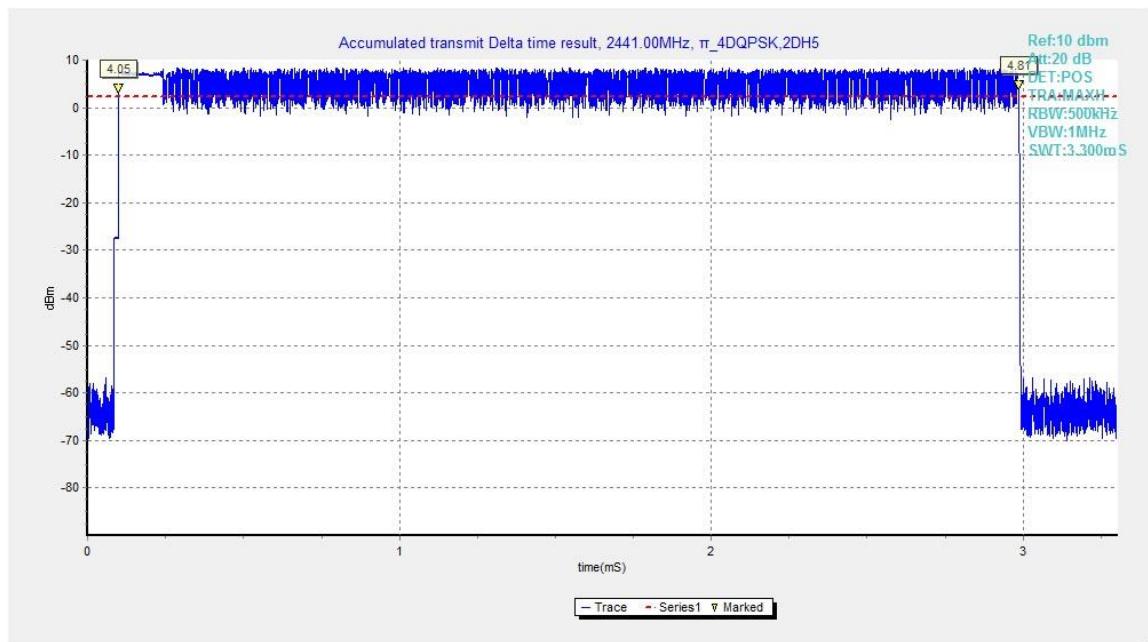


Fig.98. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

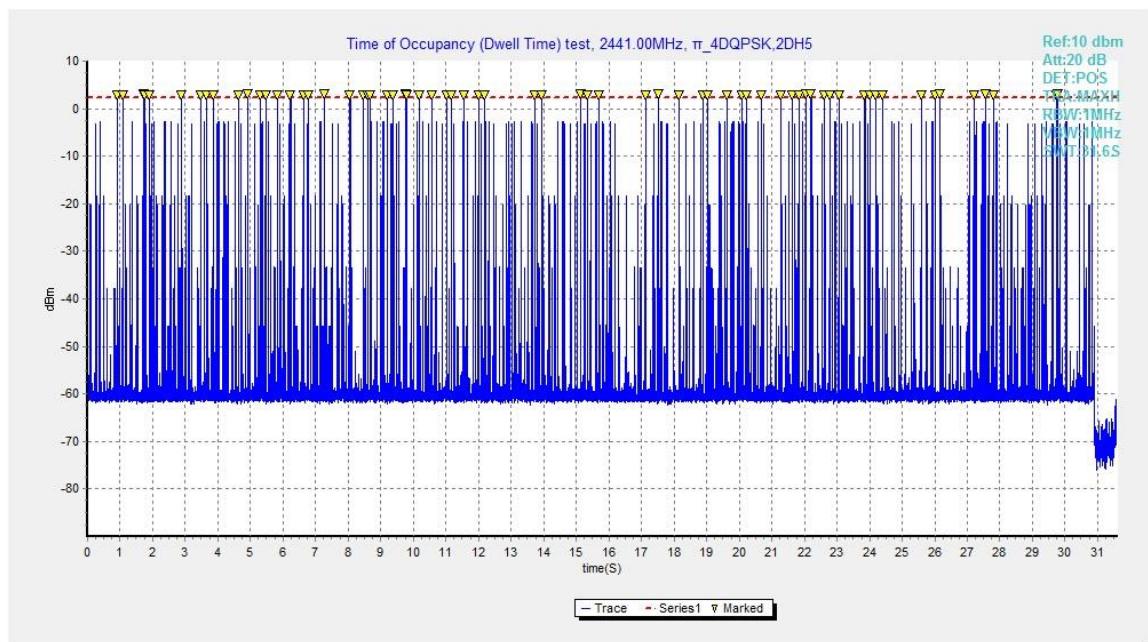


Fig.99. Number of Transmissions Measurement: Channel 39, Packet 2-DH5

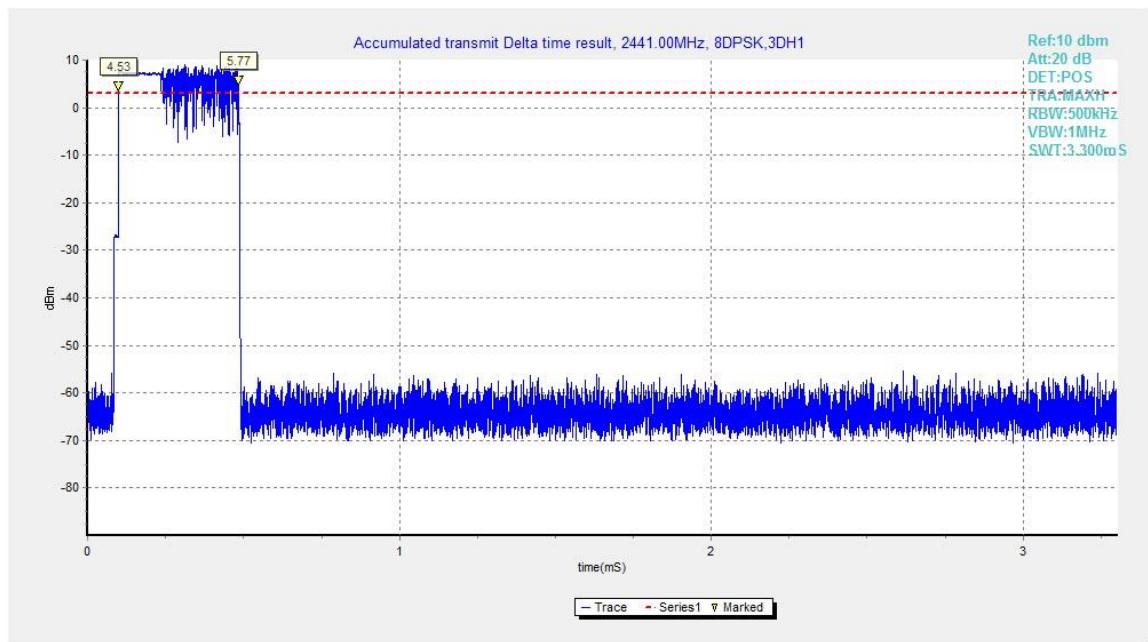


Fig.100. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

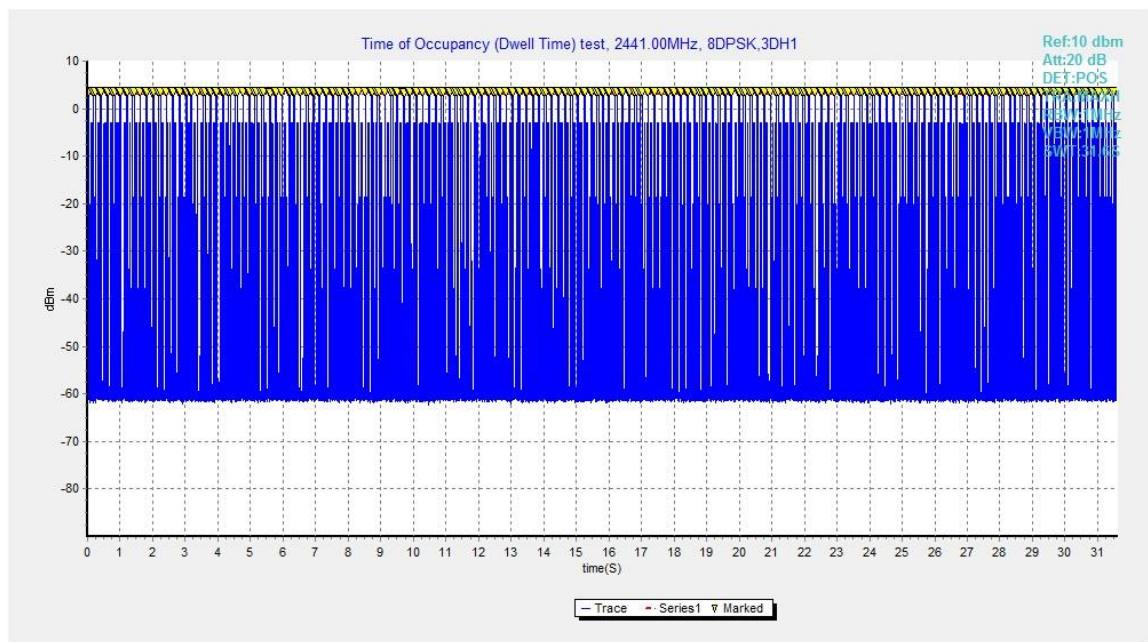


Fig.101. Number of Transmissions Measurement:Channel 39,Packet 3-DH1

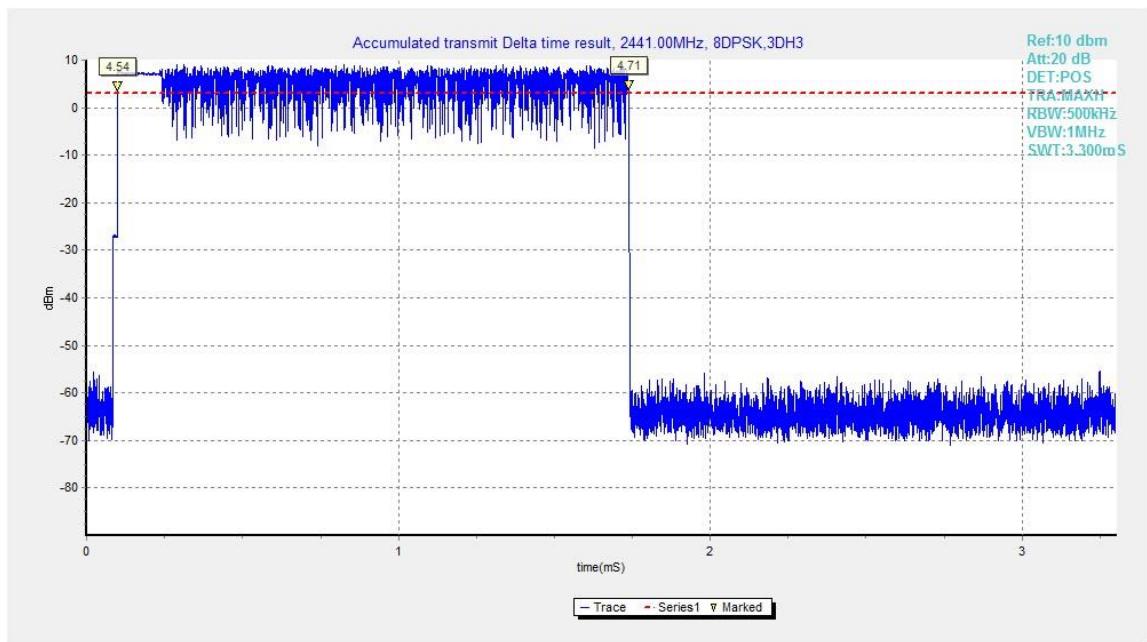


Fig.102. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

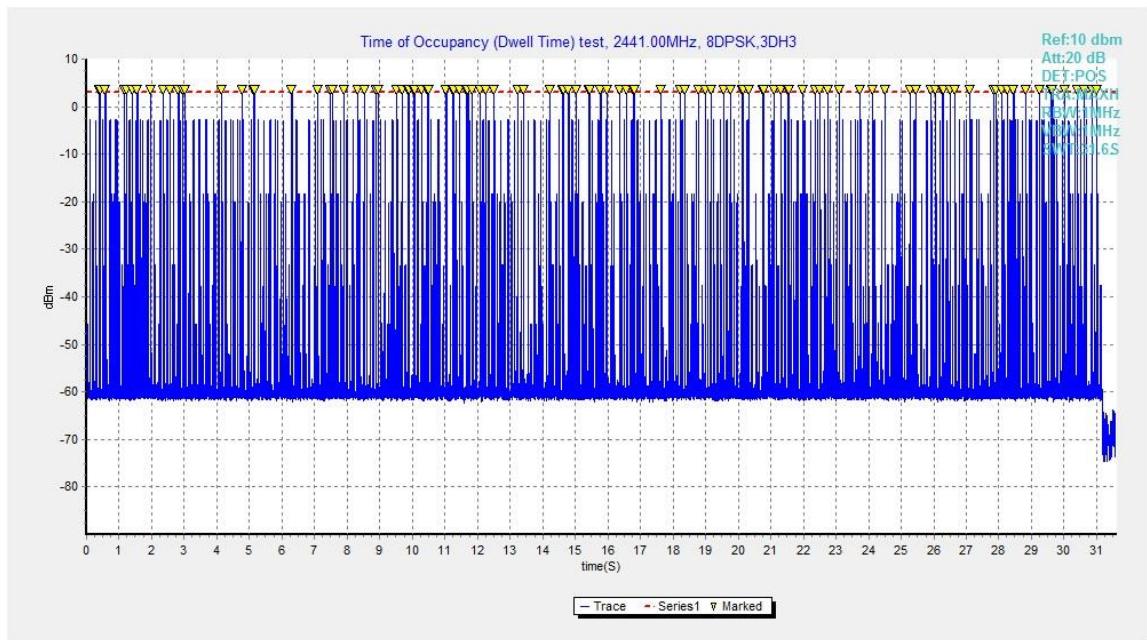


Fig.103. Number of Transmissions Measurement:Channel 39,Packet 3-DH3

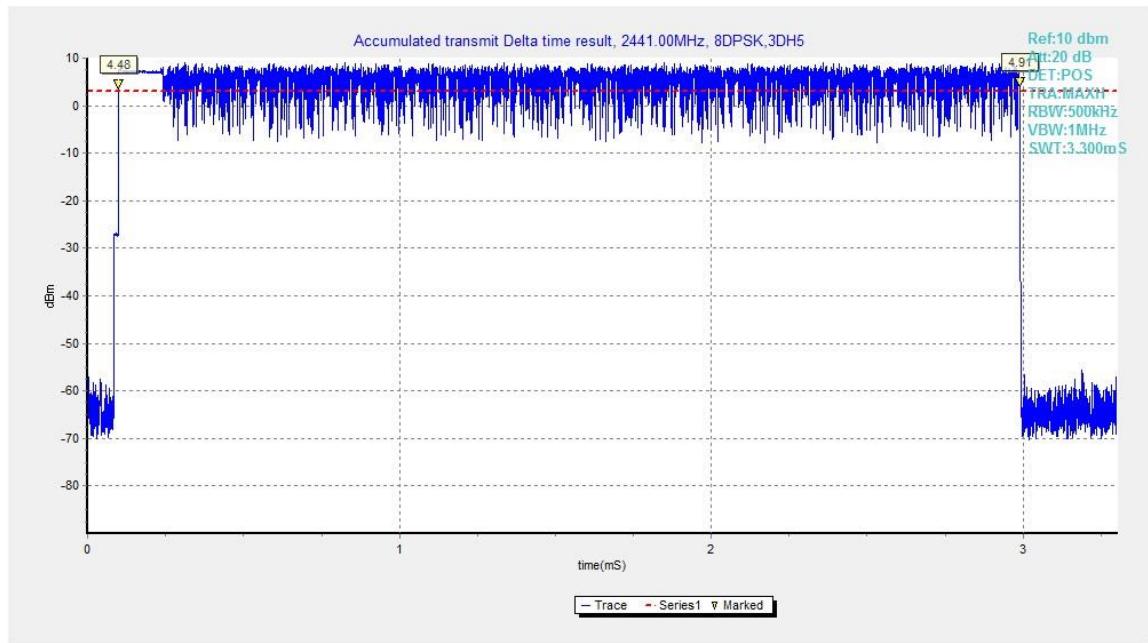


Fig.104. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

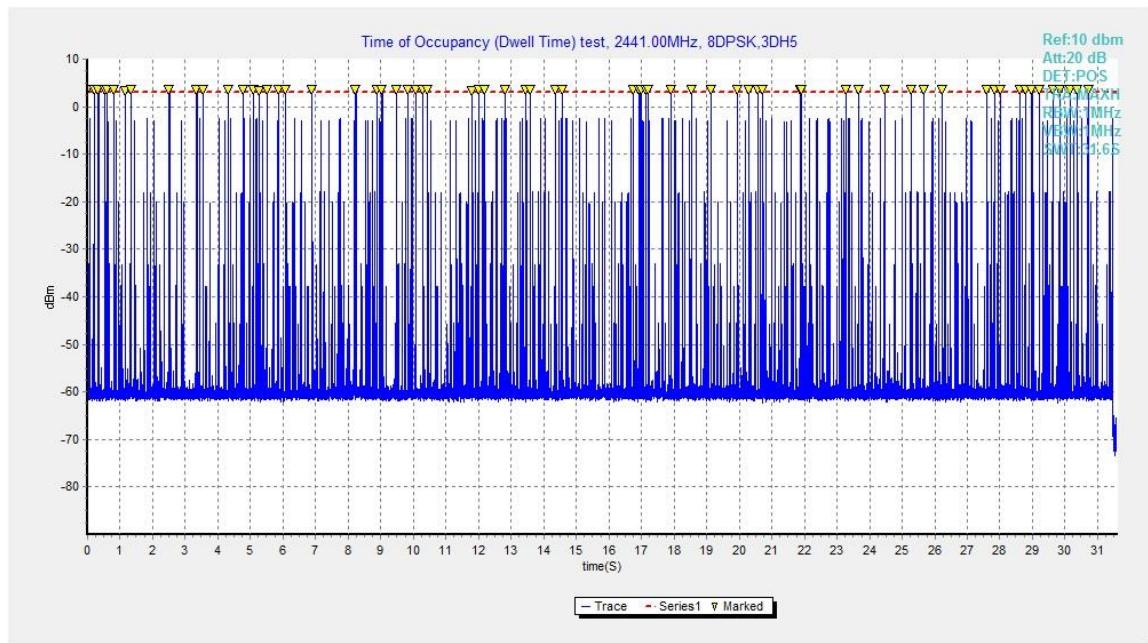


Fig.105. Number of Transmissions Measurement:Channel 39,Packet 3-DH5

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.106	936.75	NA
39	Fig.107	949.50	NA
78	Fig.108	944.25	NA

For π/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.109	1293.00	NA
39	Fig.110	1290.75	NA
78	Fig.111	1291.50	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.112	1295.25	NA
39	Fig.113	1296.00	NA
78	Fig.114	1274.25	NA

Conclusion: NA

Test graphs as below:

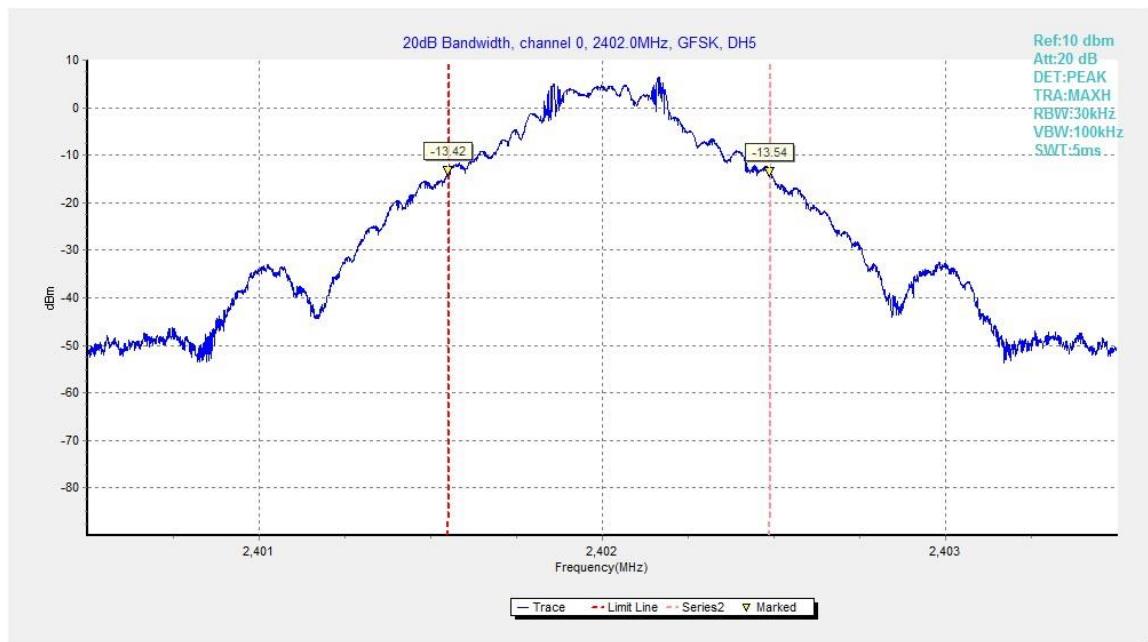


Fig.106. 20dB Bandwidth: GFSK, Channel 0

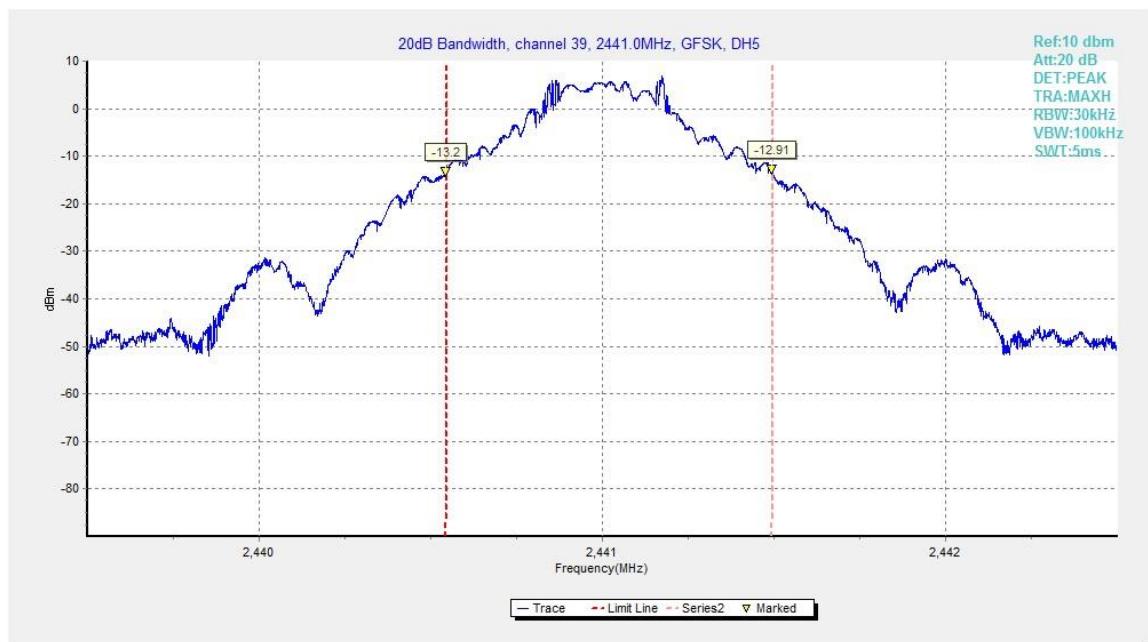


Fig.107. 20dB Bandwidth: GFSK, Channel 39

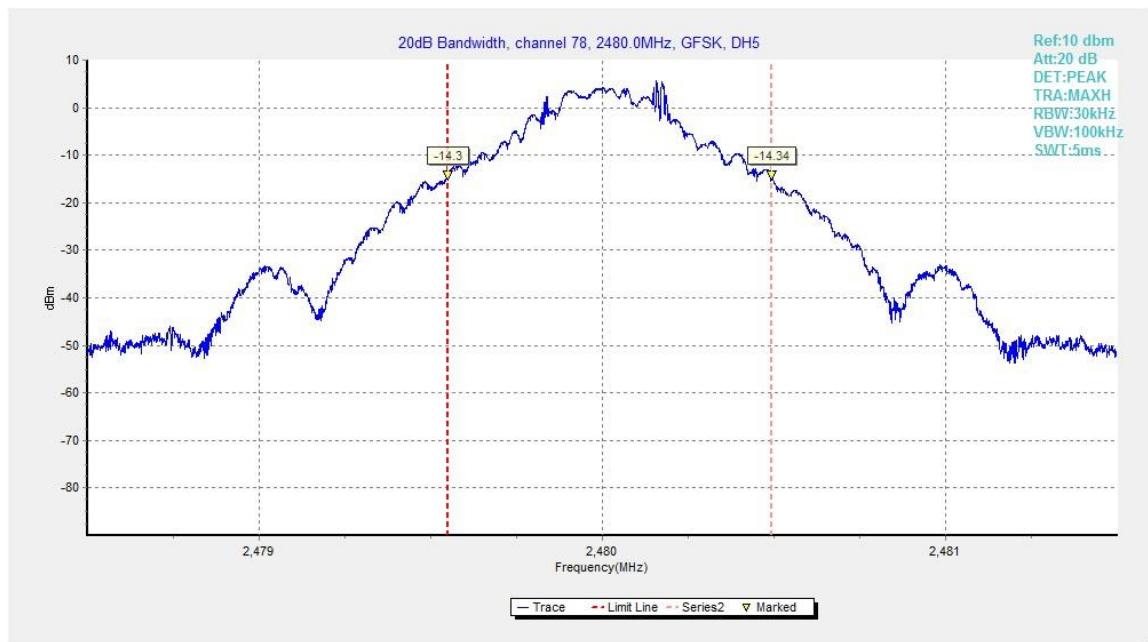


Fig.108. 20dB Bandwidth: GFSK, Channel 78

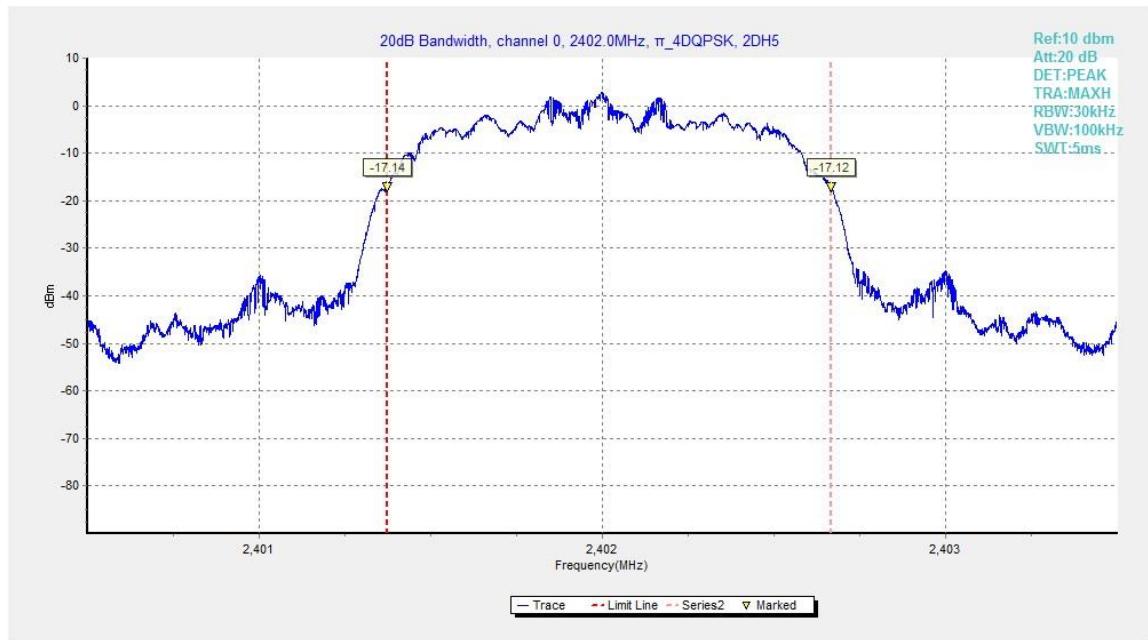


Fig.109. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 0

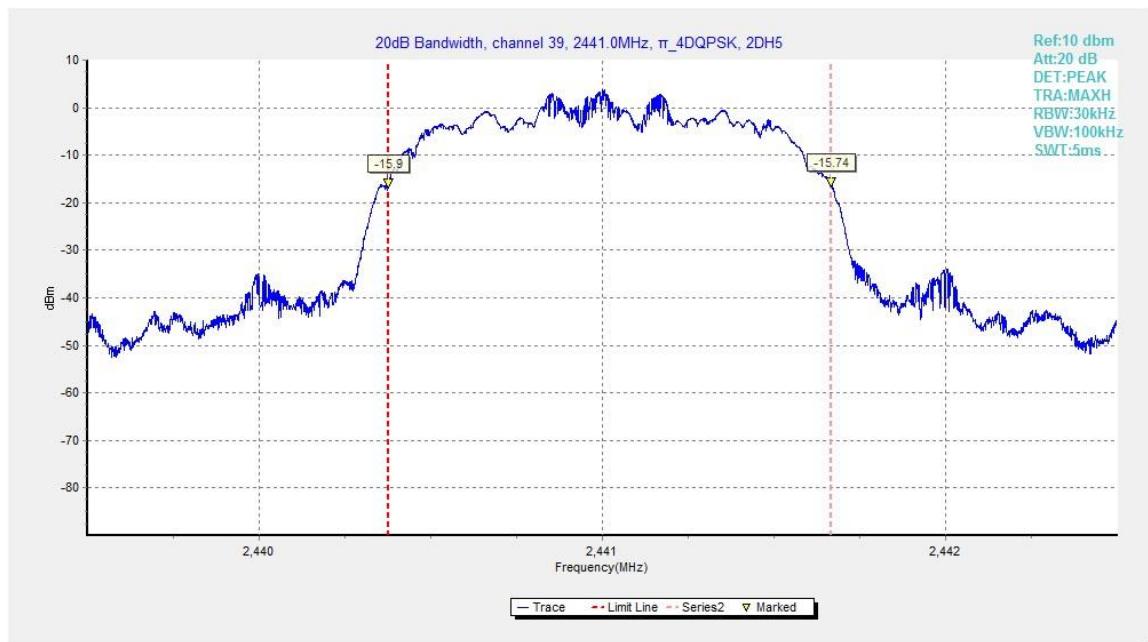


Fig.110. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

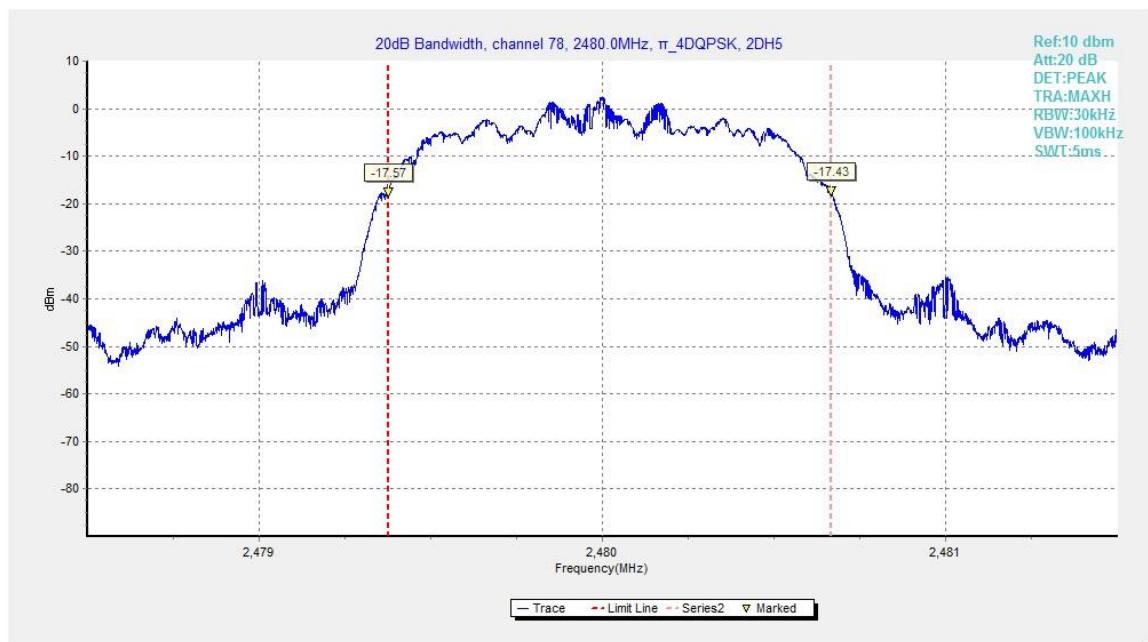


Fig.111. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

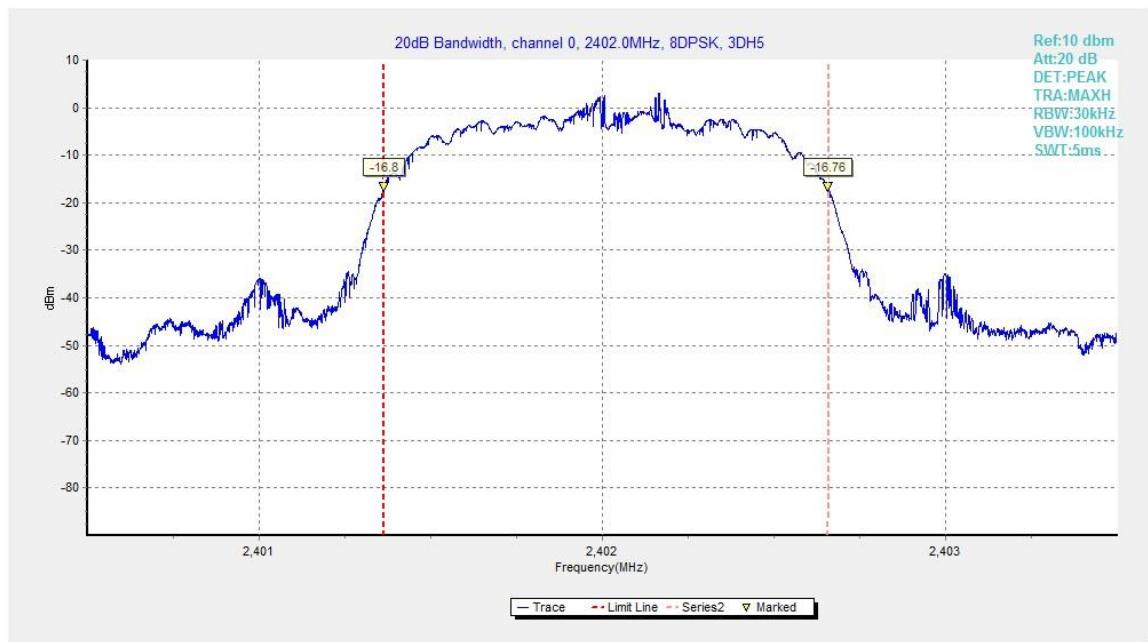


Fig.112. 20dB Bandwidth: 8DPSK, Channel 0

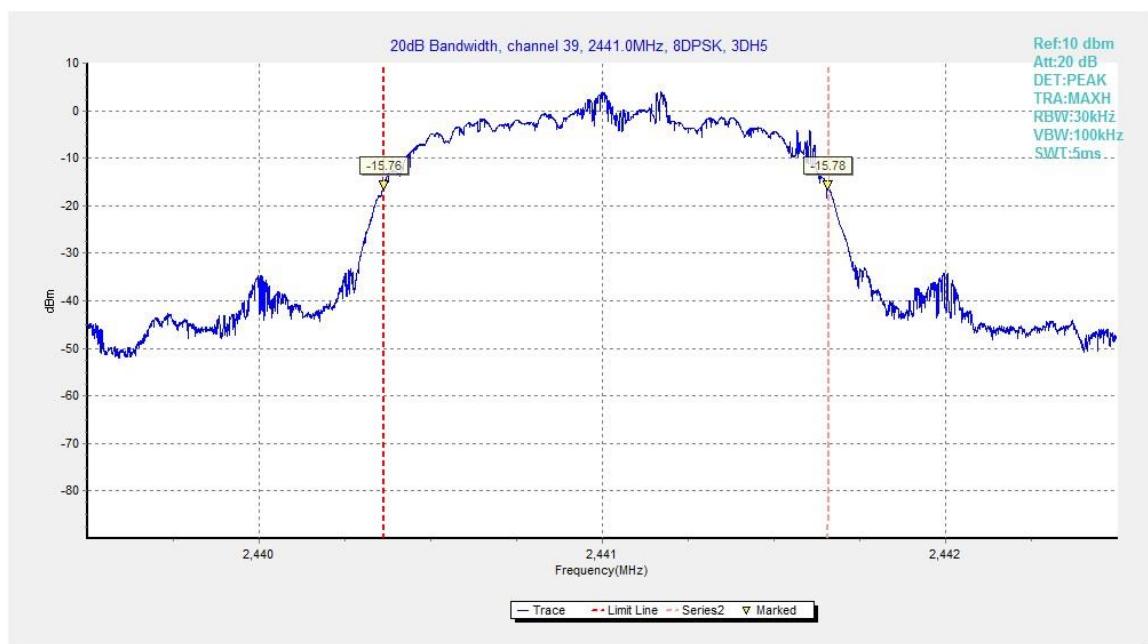


Fig.113. 20dB Bandwidth: 8DPSK, Channel 39

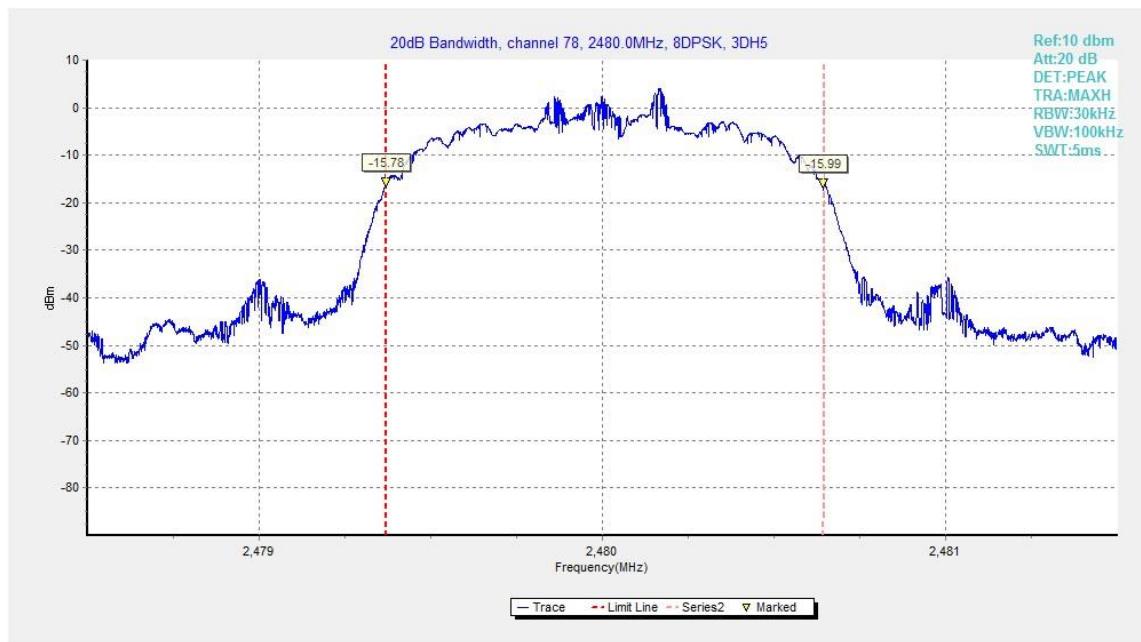


Fig.114. 20dB Bandwidth: 8DPSK, Channel 78

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.115	1015.50	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.116	1014.00	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.117	1001.25	P

Conclusion: PASS

Test graphs as below:

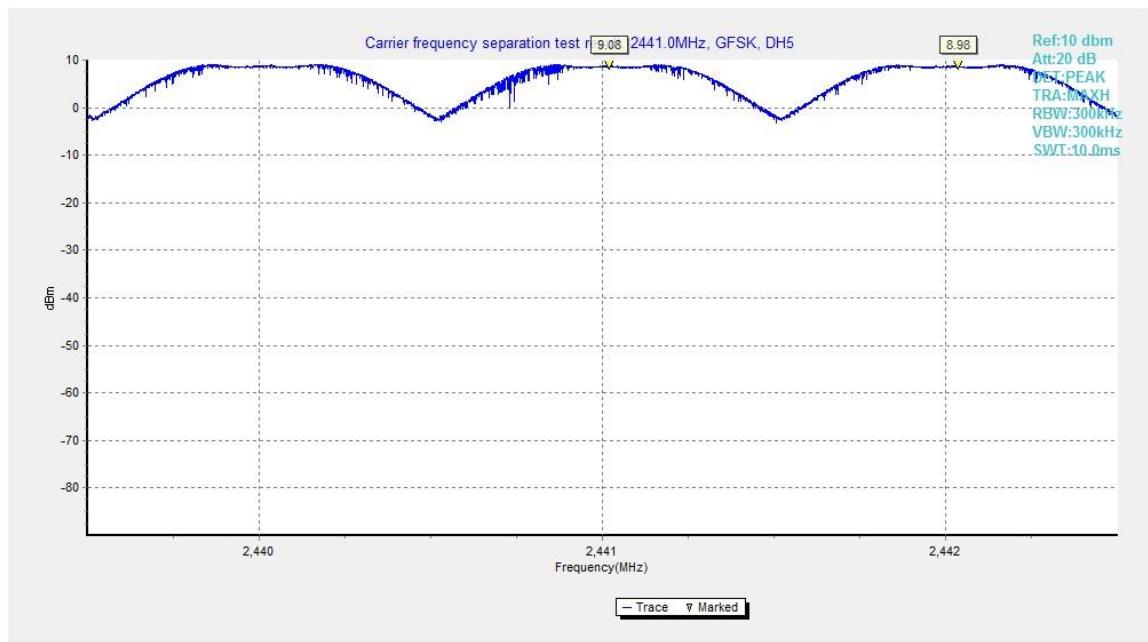


Fig.115. Carrier frequency separation measurement: GFSK, Channel 39

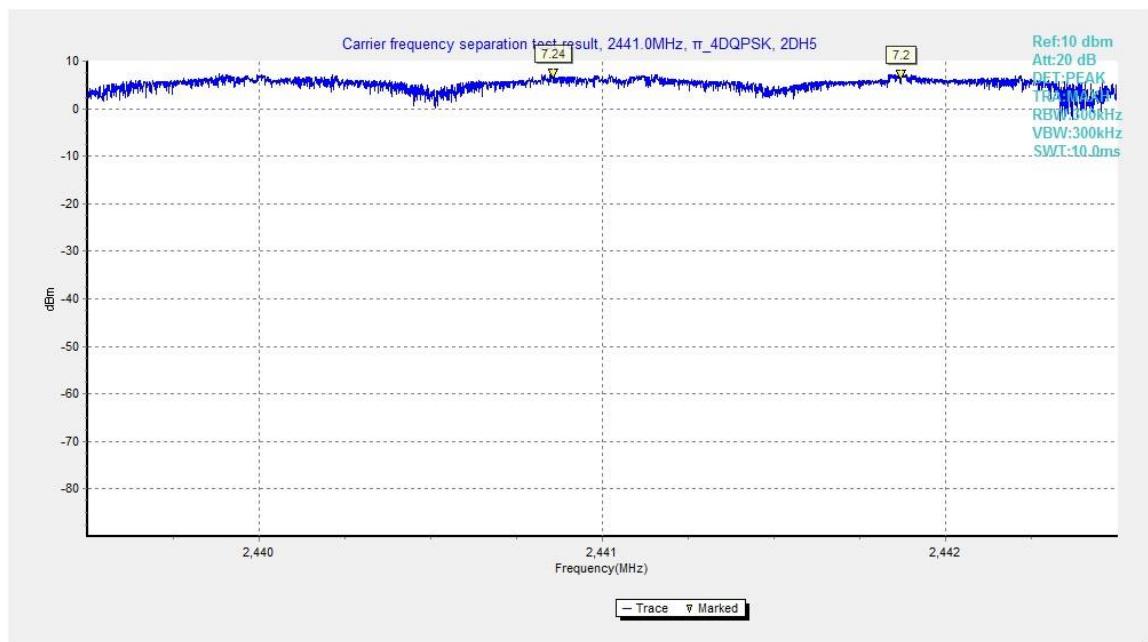


Fig.116. Carrier frequency separation measurement: π/4 DQPSK, Channel 39

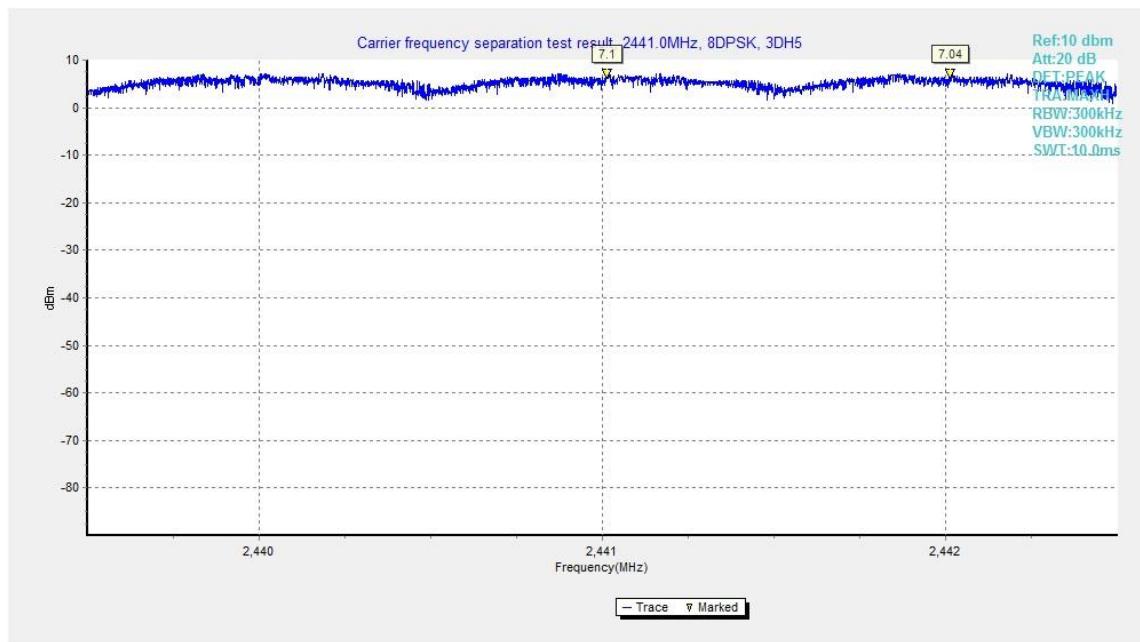


Fig.117. Carrier frequency separation measurement: 8DPSK, Channel 39

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.118	
40~78	Fig.119	P

For 4 DQPSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.120	
40~78	Fig.121	P

For 8DPSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.122	
40~78	Fig.123	P

Conclusion: PASS

Test graphs as below:

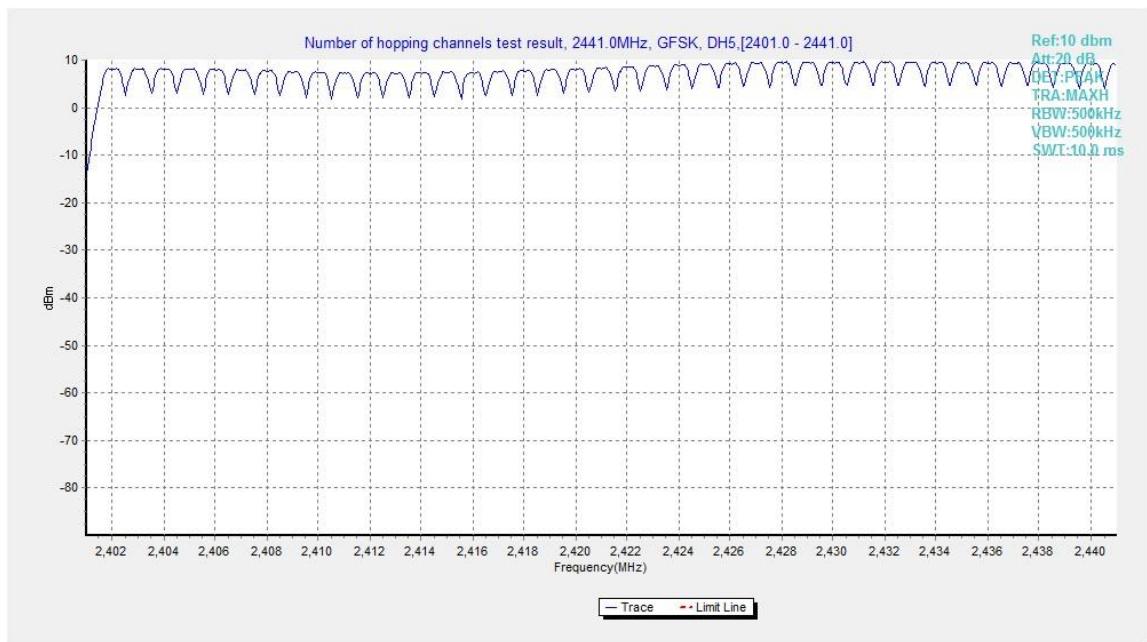


Fig.118. Number of hopping frequencies: GFSK, Channel 0 - 39

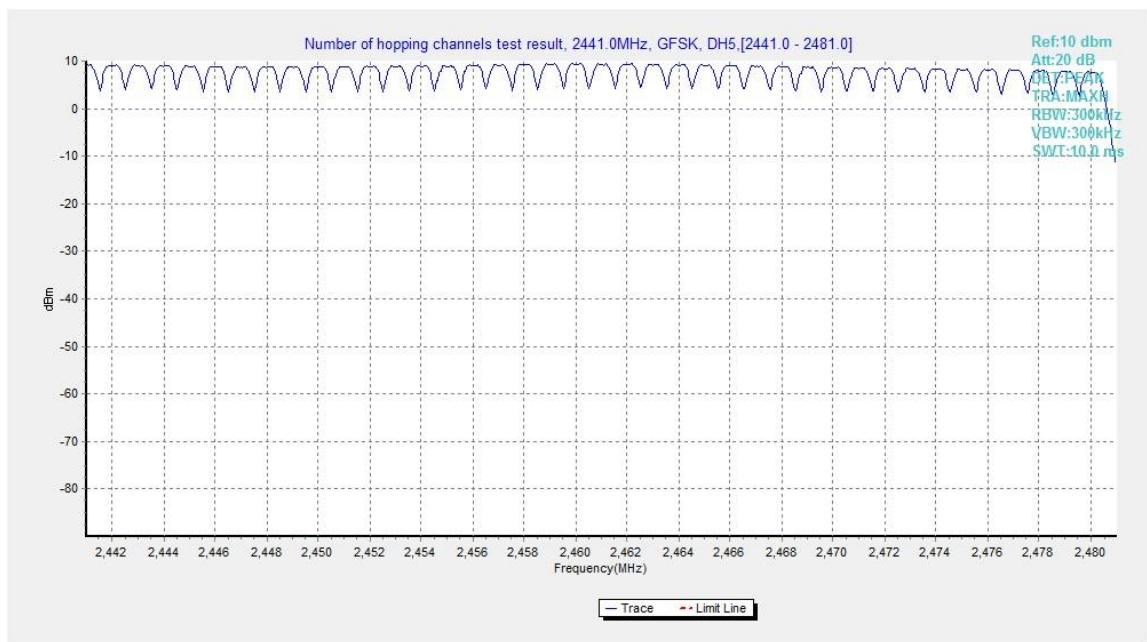


Fig.119. Number of hopping frequencies: GFSK, Channel 40 - 78

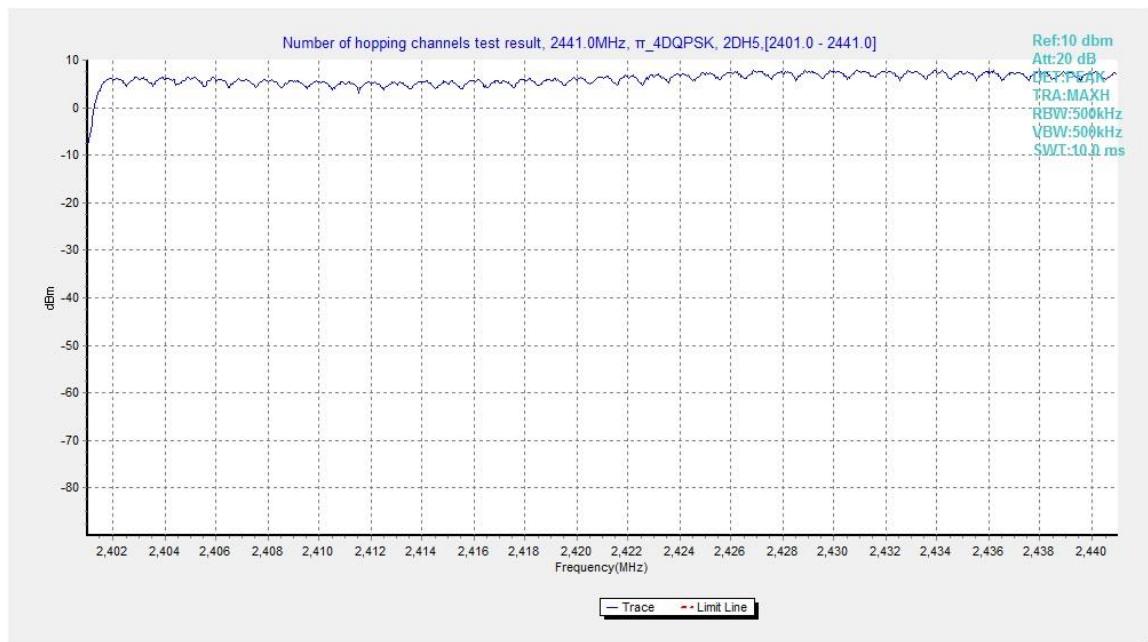


Fig.120. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 0 - 39



Fig.121. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 40 - 78

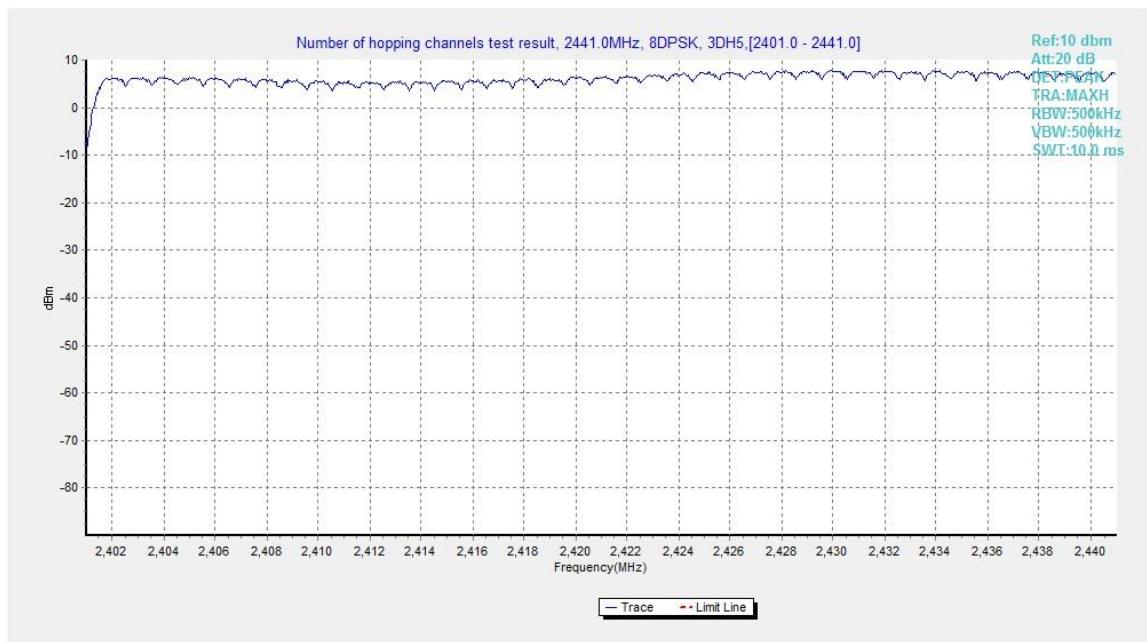


Fig.122. Number of hopping frequencies: 8DPSK, Channel 0 - 39

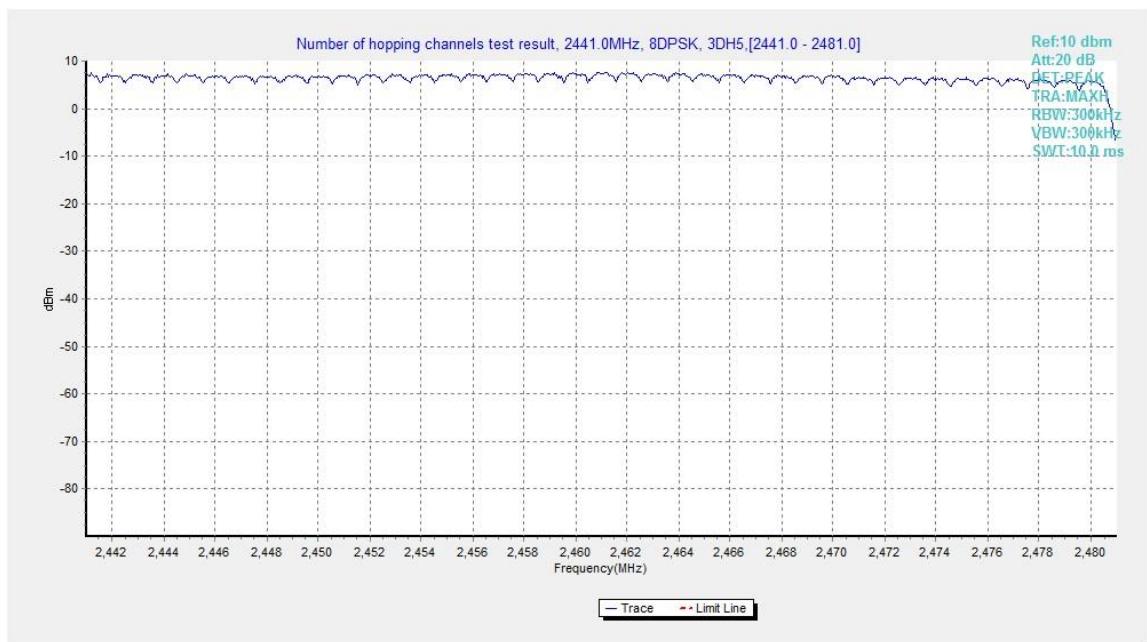


Fig.123. Number of hopping frequencies: 8DPSK, Channel 40 - 78

A.10. AC Powerline Conducted Emission

Test Condition

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

Bluetooth (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ 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)

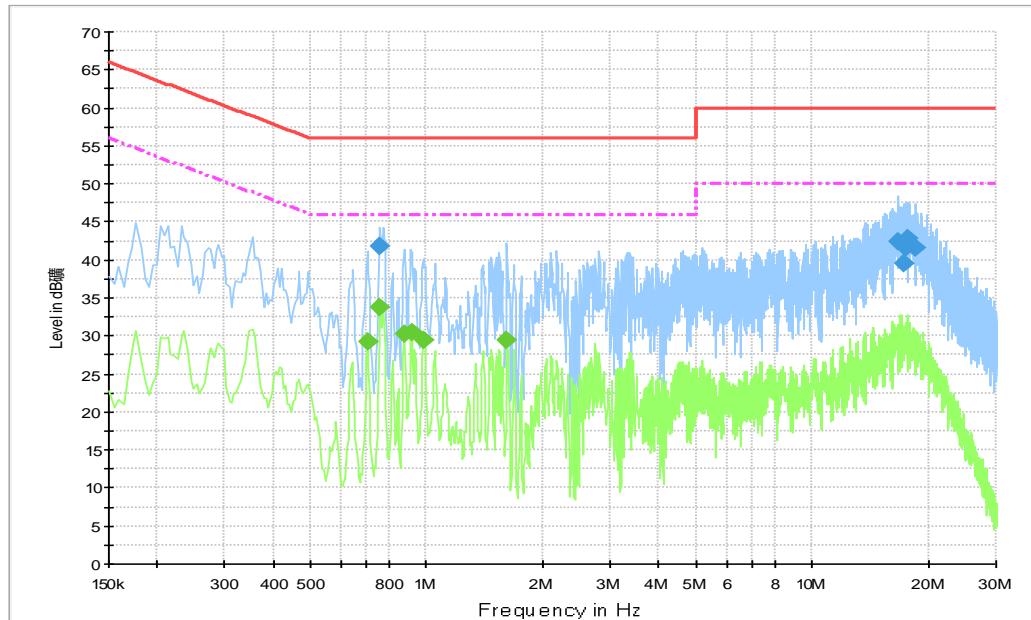
Frequency range (MHz)	Average Limit (dB μ V)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	

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:

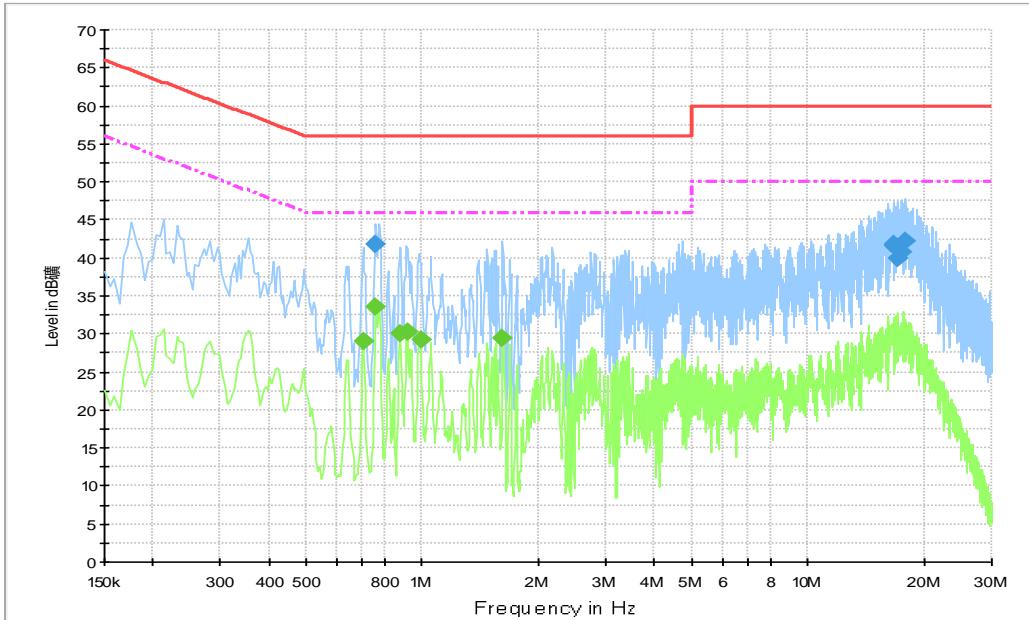
Traffic:


Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.757500	41.9	GND	L1	10.7	14.1	56.0
16.719000	42.5	GND	L1	11.2	17.5	60.0
17.371500	39.5	GND	L1	11.2	20.5	60.0
17.421000	41.6	GND	L1	11.2	18.4	60.0
17.767500	42.8	GND	L1	11.2	17.2	60.0
18.586500	41.6	GND	L1	11.2	18.4	60.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.703500	29.3	GND	L1	10.7	16.7	46.0
0.757500	33.7	GND	L1	10.7	12.3	46.0
0.874500	30.2	GND	L1	10.7	15.8	46.0
0.915000	30.5	GND	L1	10.7	15.5	46.0
0.982500	29.4	GND	L1	10.7	16.6	46.0
1.617000	29.4	GND	L1	10.7	16.6	46.0

Idle:


Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.757500	41.8	GND	L1	10.7	14.2	56.0
16.719000	41.9	GND	L1	11.2	18.1	60.0
16.773000	41.6	GND	L1	11.2	18.4	60.0
17.047500	39.9	GND	L1	11.2	20.1	60.0
17.412000	40.8	GND	L1	11.2	19.2	60.0
17.956500	42.3	GND	L1	11.2	17.7	60.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.703500	29.0	GND	L1	10.7	17.0	46.0
0.757500	33.6	GND	L1	10.7	12.4	46.0
0.874500	30.0	GND	L1	10.7	16.0	46.0
0.915000	30.3	GND	L1	10.7	15.7	46.0
0.991500	29.2	GND	L1	10.7	16.8	46.0
1.617000	29.4	GND	L1	10.7	16.6	46.0

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