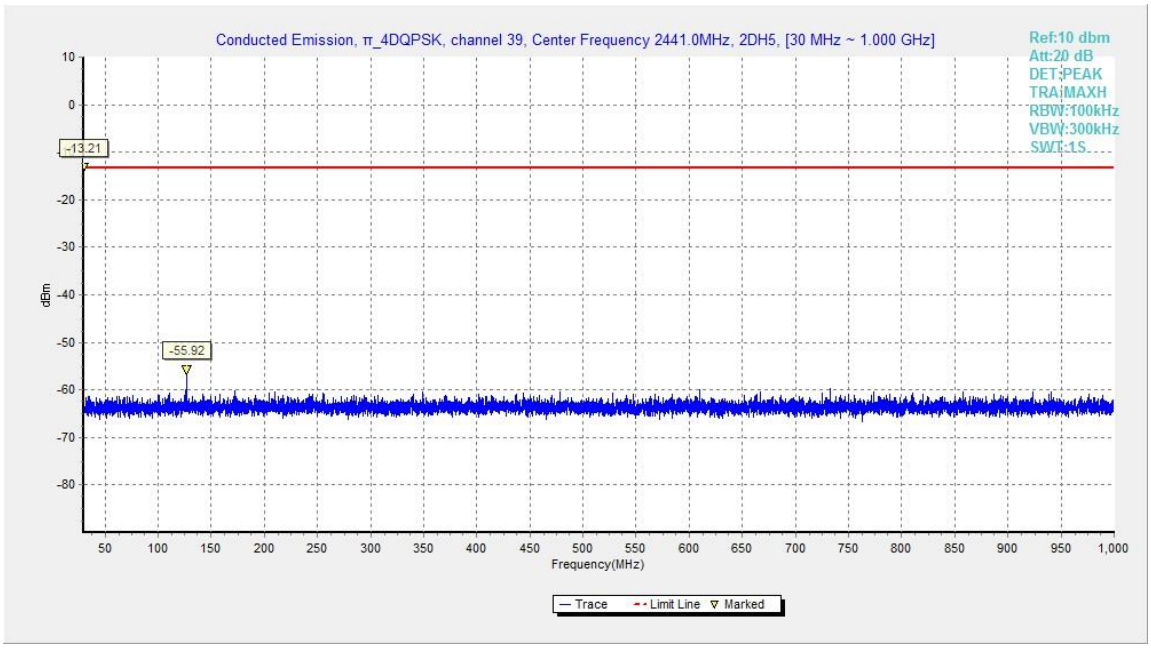

Fig.34. Conducted spurious emission: π/4 DQPSK, Channel 39, 30MHz - 1GHz

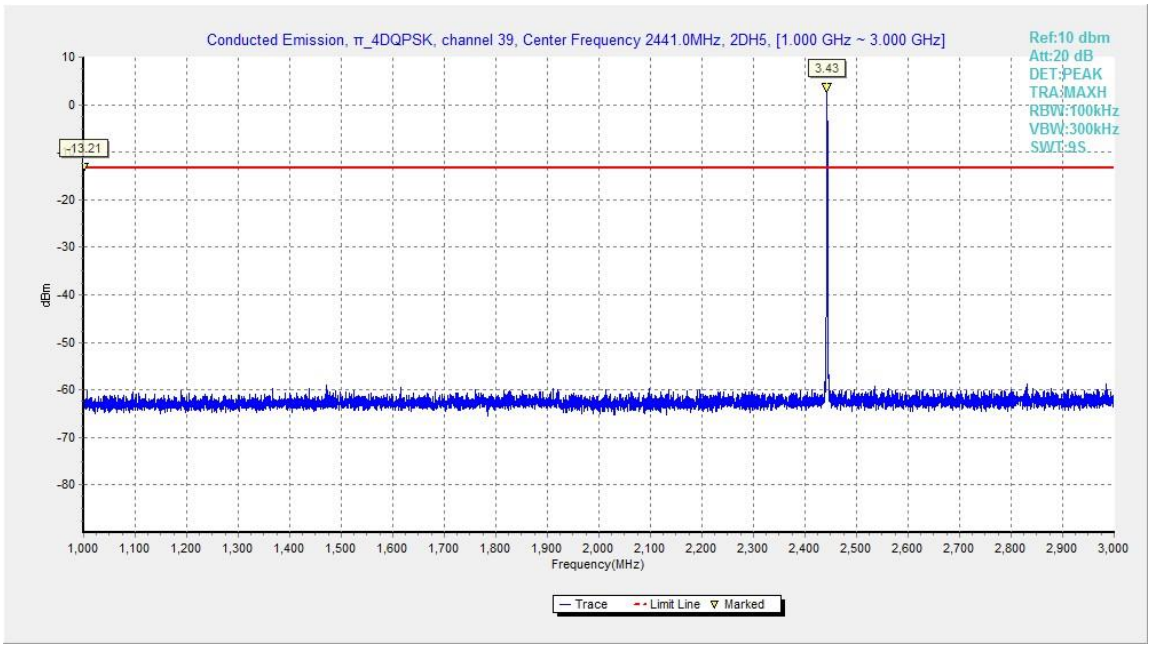

Fig.35. Conducted spurious emission: π/4 DQPSK, Channel 39, 1GHz - 3GHz

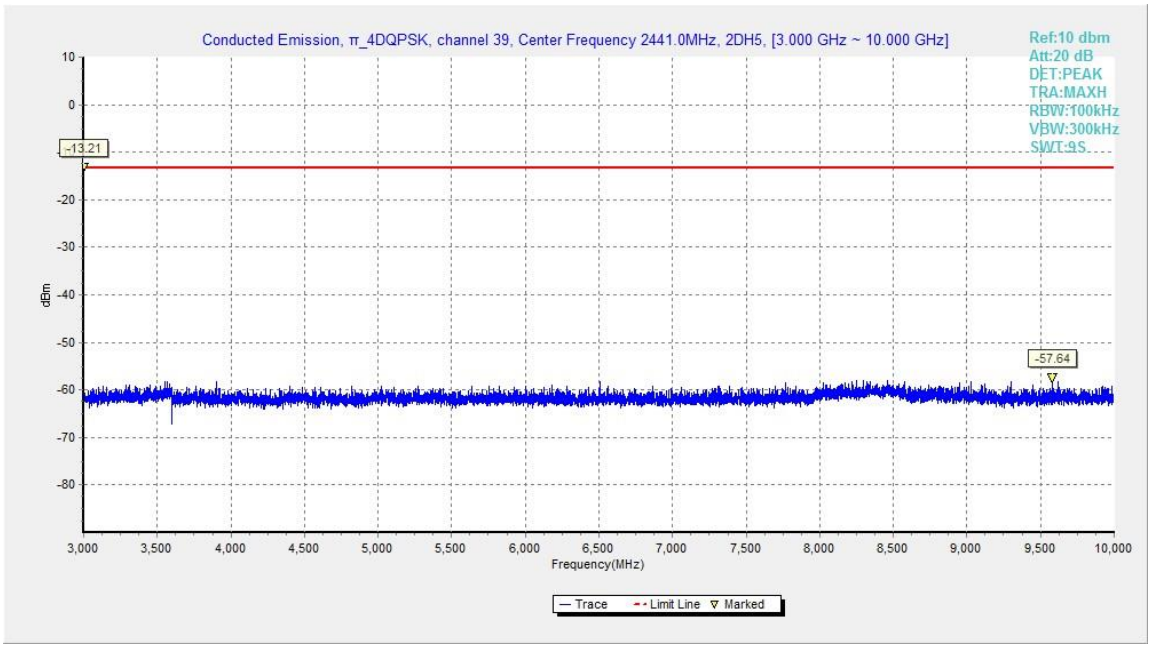

Fig.36. Conducted spurious emission: π/4 DQPSK, Channel 39, 3GHz - 10GHz

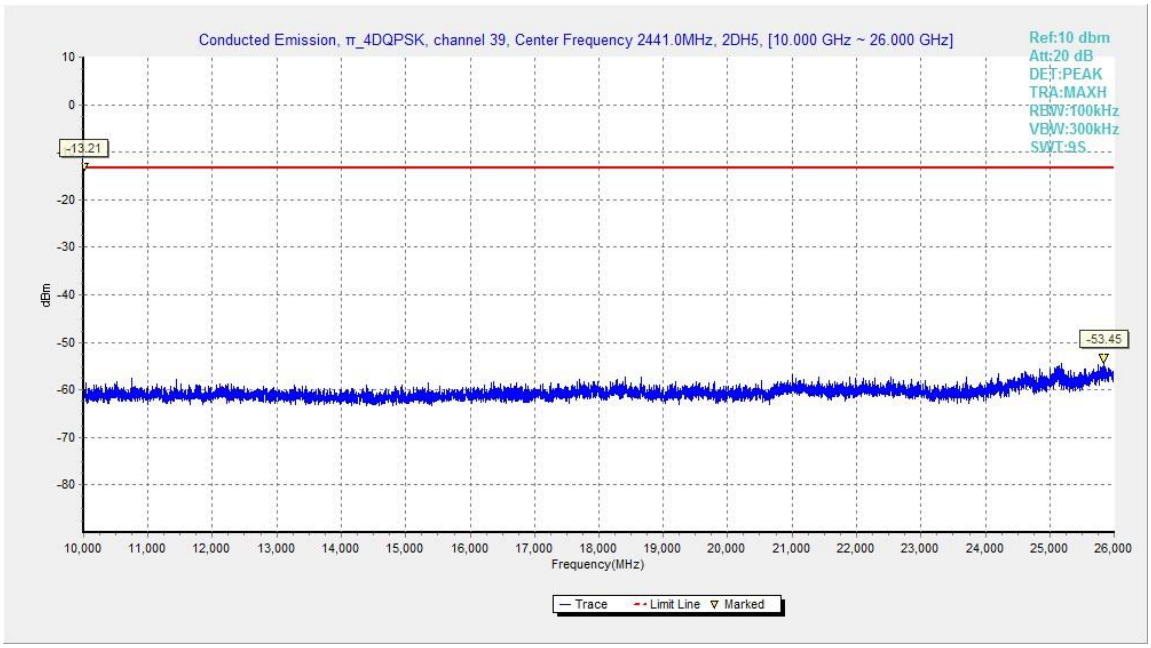

Fig.37. Conducted spurious emission: π/4 DQPSK, Channel 39, 10GHz – 26GHz

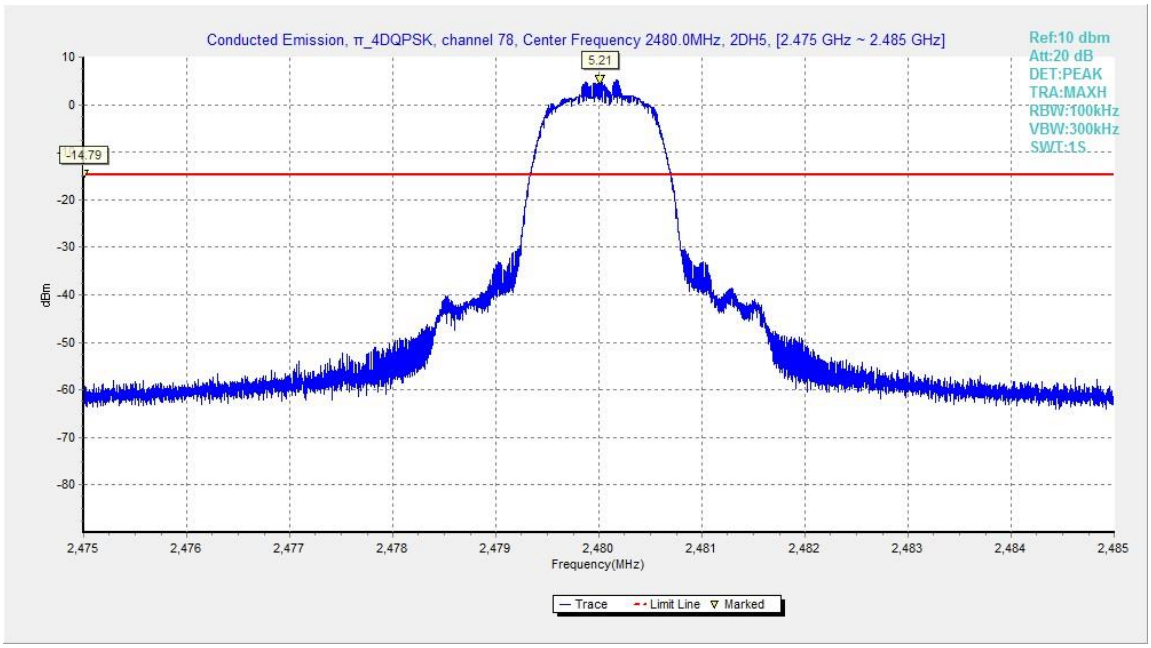

Fig.38. Conducted spurious emission: π/4 DQPSK, Channel 78, 2480MHz

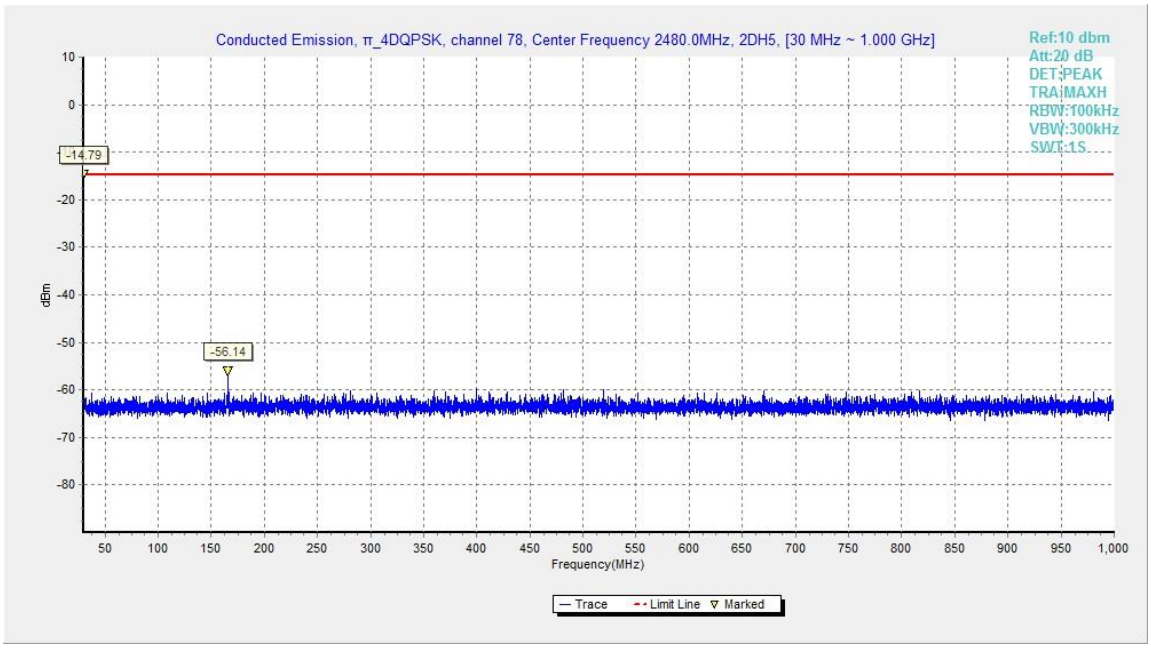

Fig.39. Conducted spurious emission: π/4 DQPSK, Channel 78, 30MHz - 1GHz

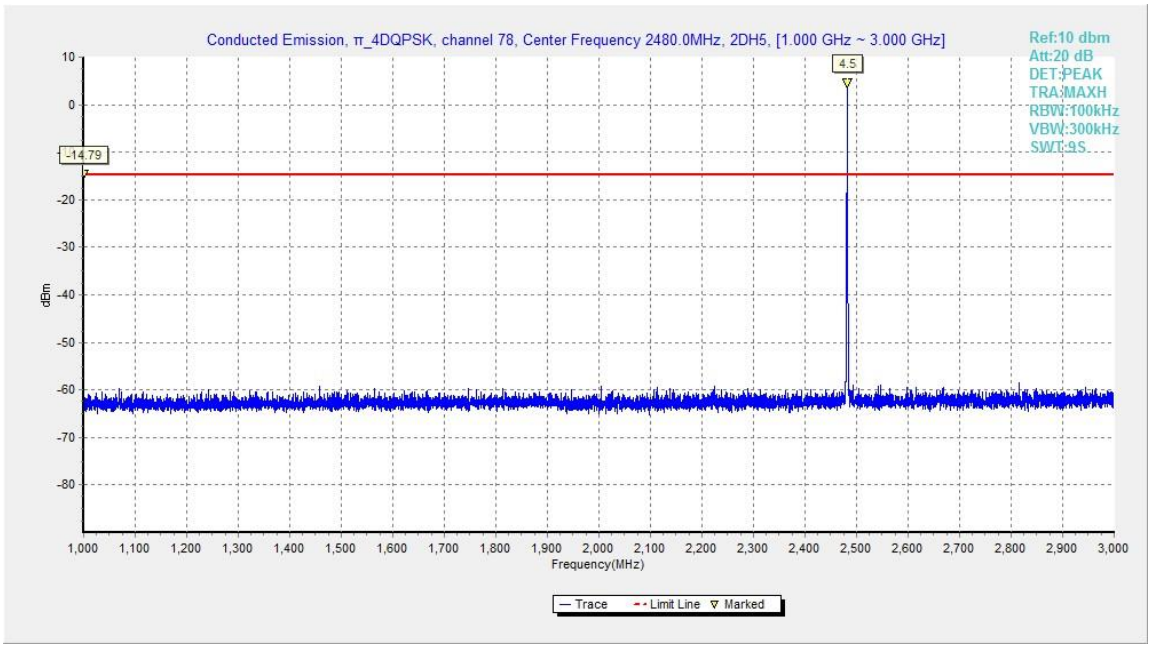

Fig.40. Conducted spurious emission: π/4 DQPSK, Channel 78, 1GHz - 3GHz

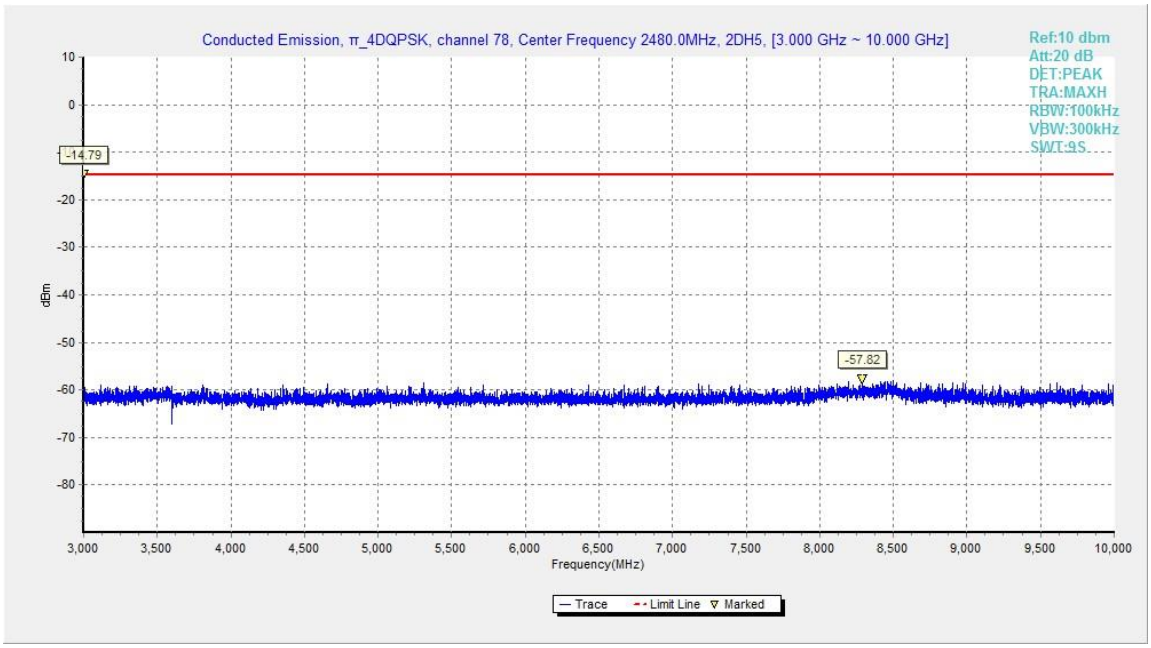

Fig.41. Conducted spurious emission: π/4 DQPSK, Channel 78, 3GHz - 10GHz

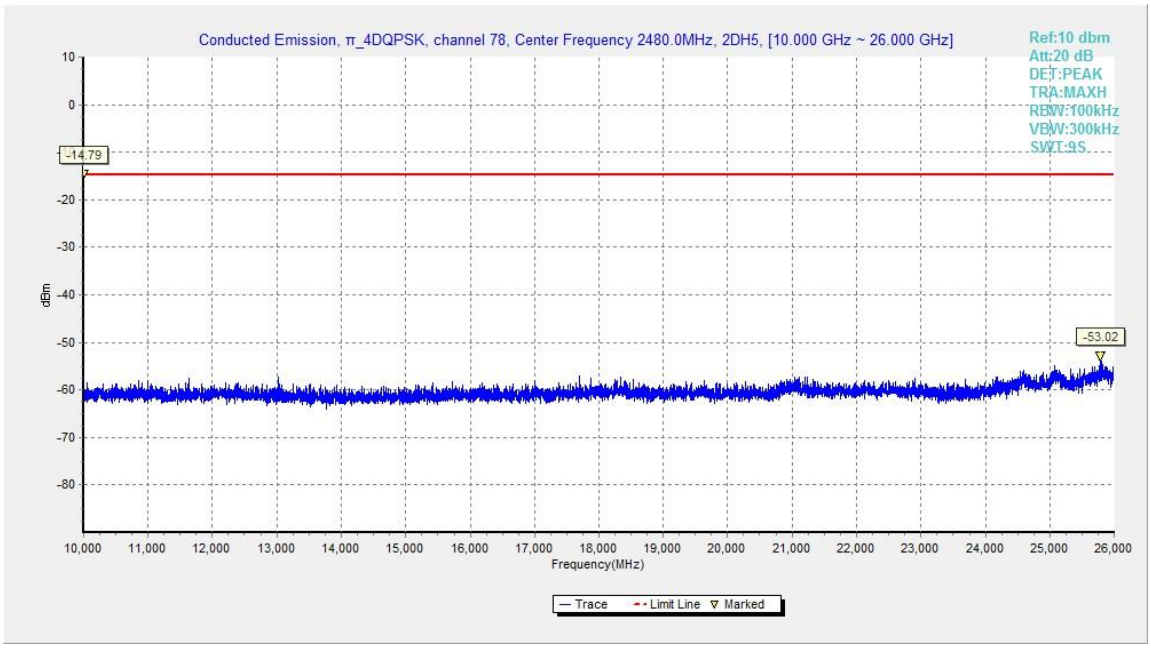

Fig.42. Fig.30 Conducted spurious emission: π/4 DQPSK, Channel 78, 10GHz - 26GHz

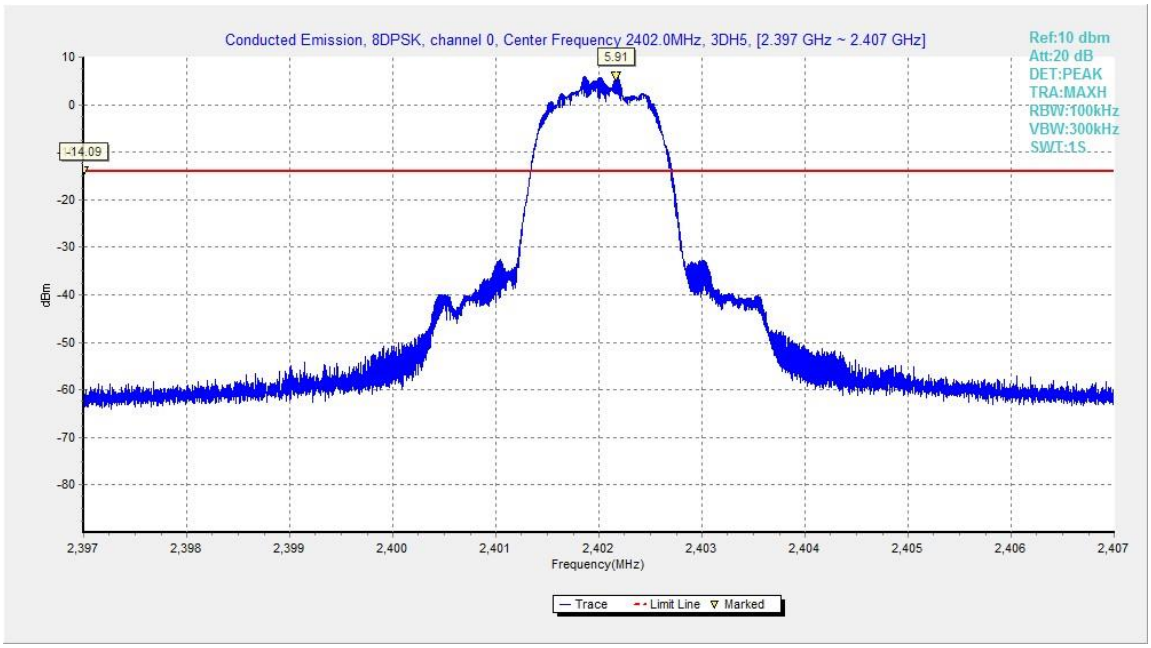

Fig.43. Conducted spurious emission: 8DPSK, Channel 0,2402MHz

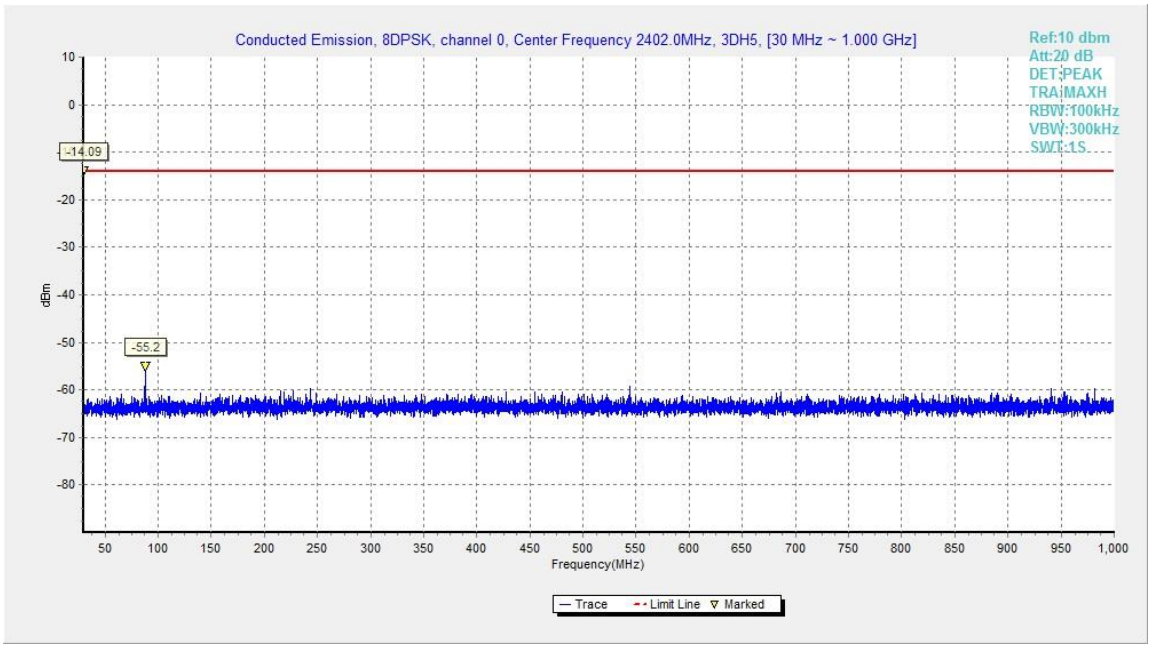

Fig.44. Conducted spurious emission: 8DPSK, Channel 0, 30MHz - 1GHz

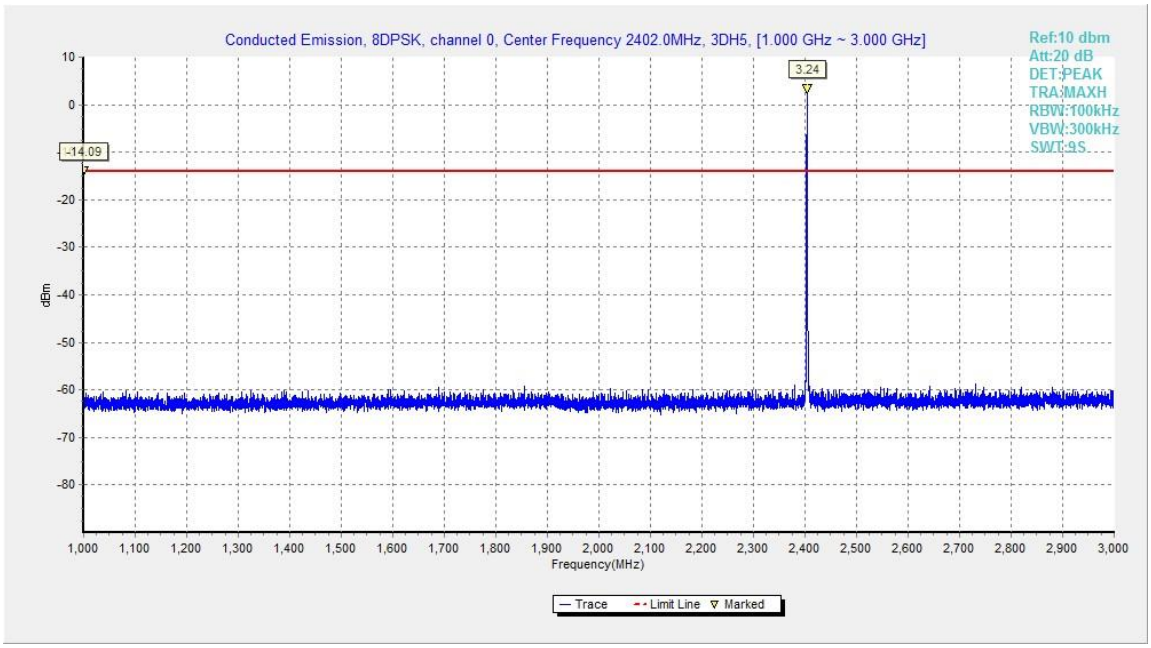

Fig.45. Conducted spurious emission: 8DPSK, Channel 0, 1GHz - 3GHz

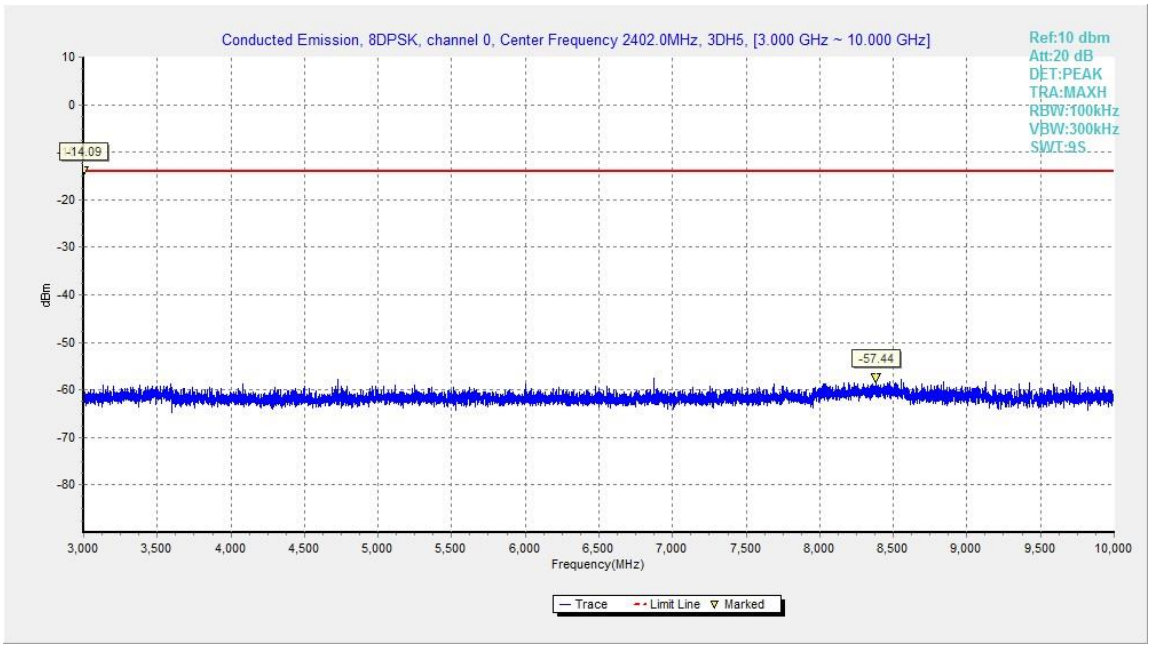

Fig.46. Conducted spurious emission: 8DPSK, Channel 0, 3GHz - 10GHz

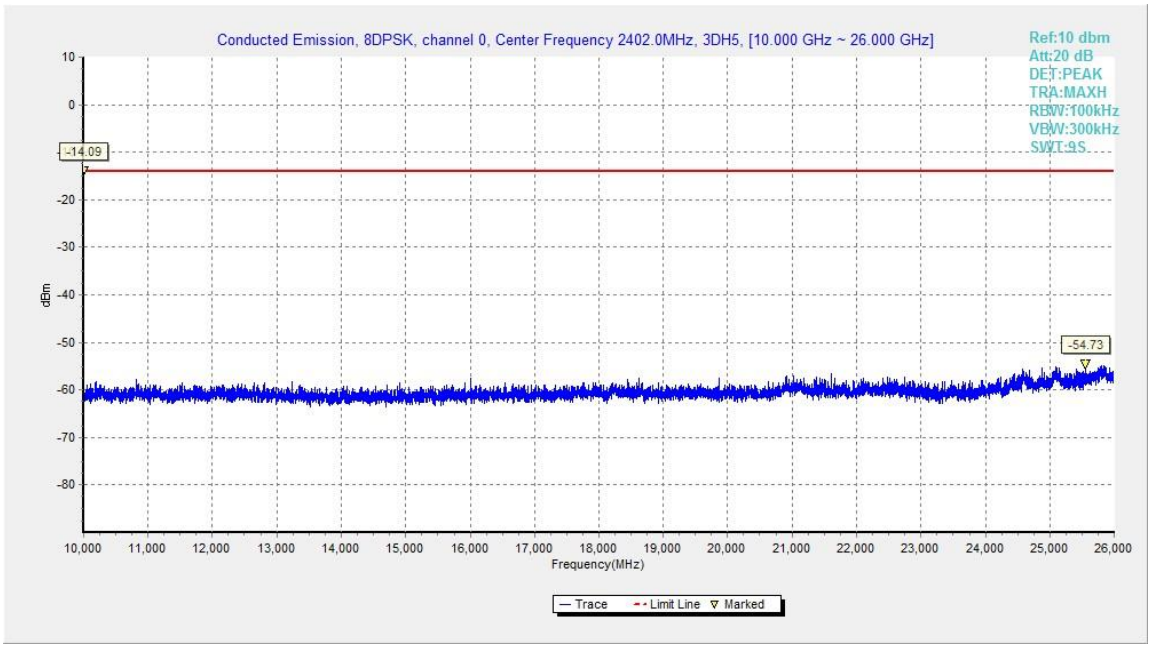

Fig.47. Conducted spurious emission: 8DPSK, Channel 0,10GHz - 26GHz

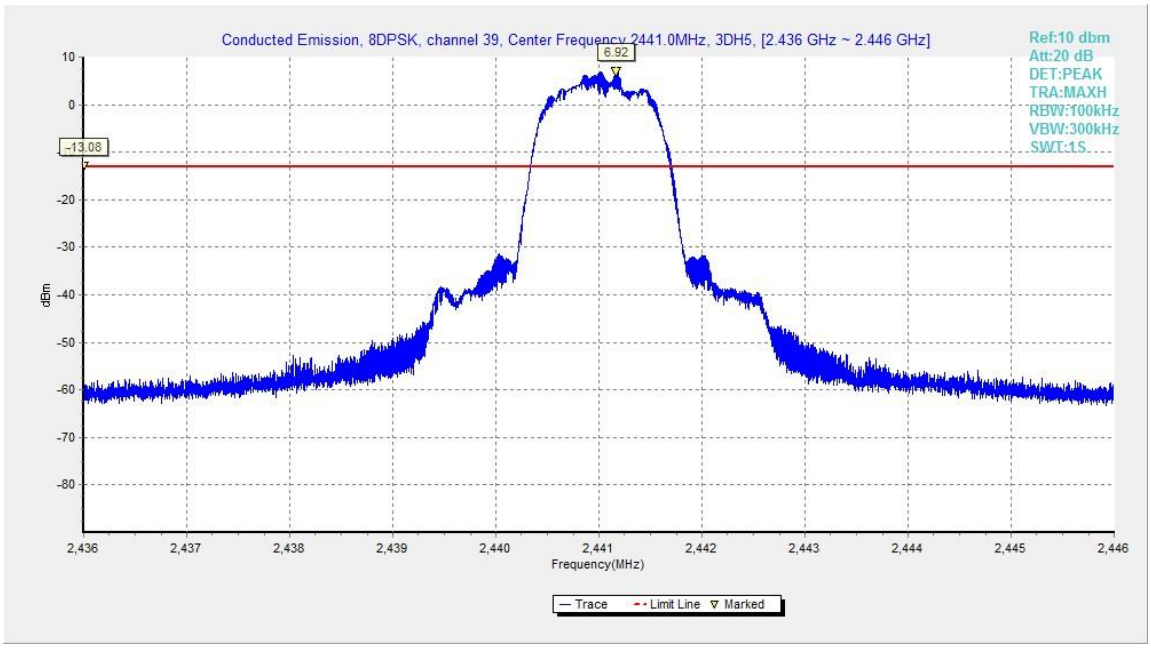

Fig.48. Conducted spurious emission: 8DPSK, Channel 39, 2441MHz

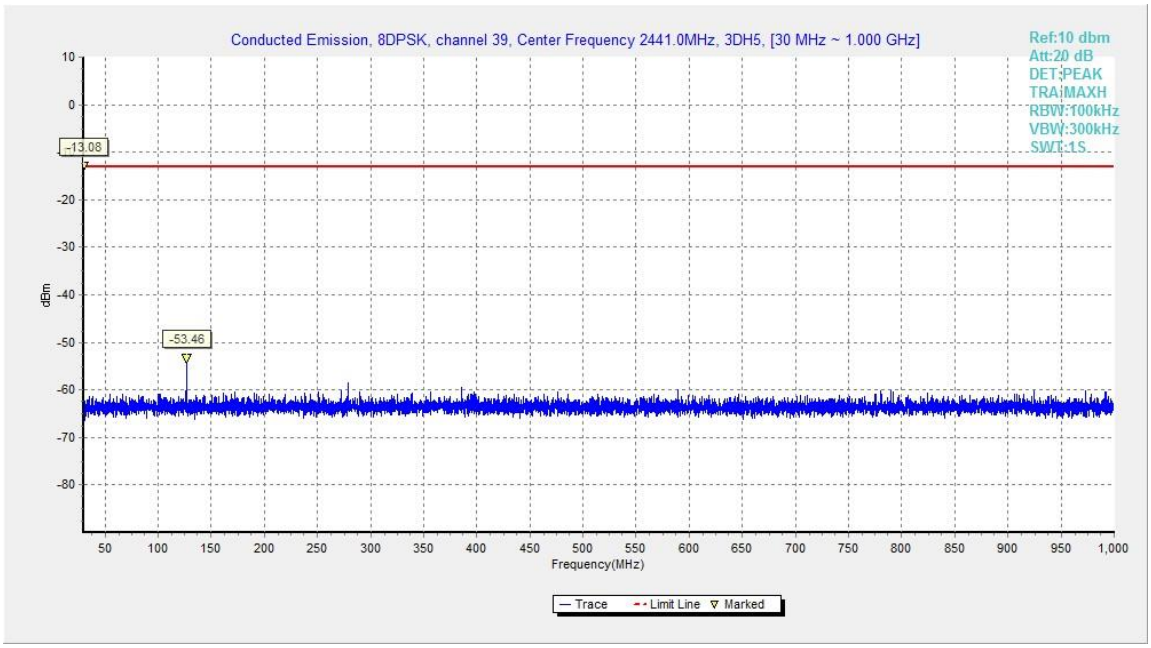

Fig.49. Conducted spurious emission: 8DPSK, Channel 39, 30MHz - 1GHz

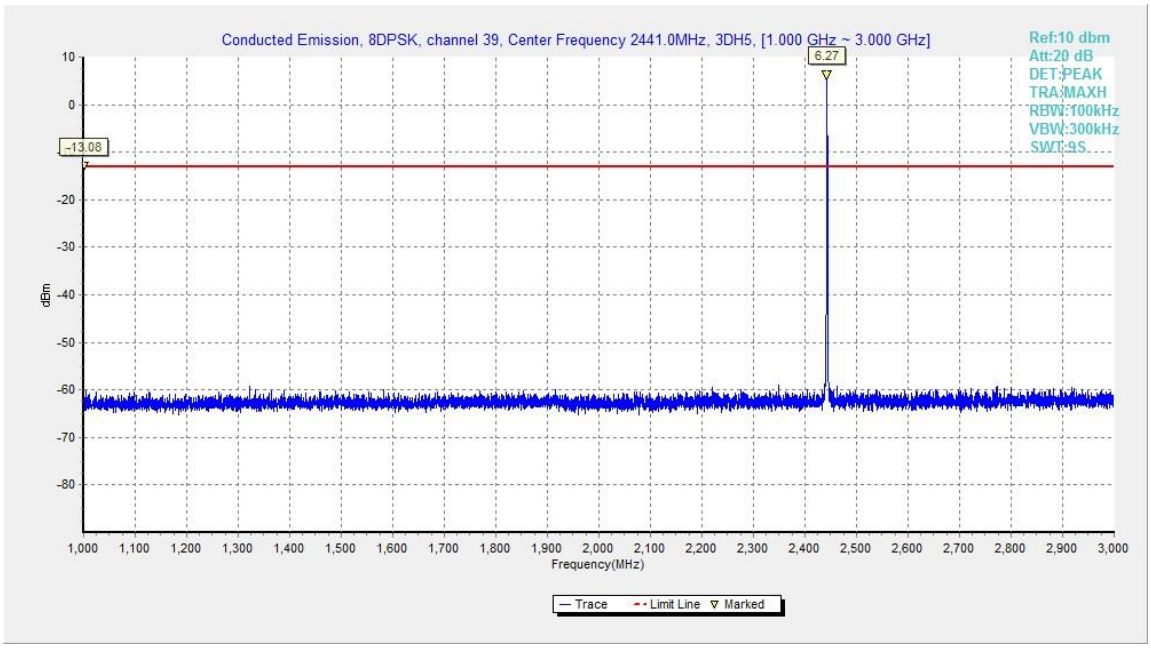

Fig.50. Conducted spurious emission: 8DPSK, Channel 39, 1GHz - 3GHz

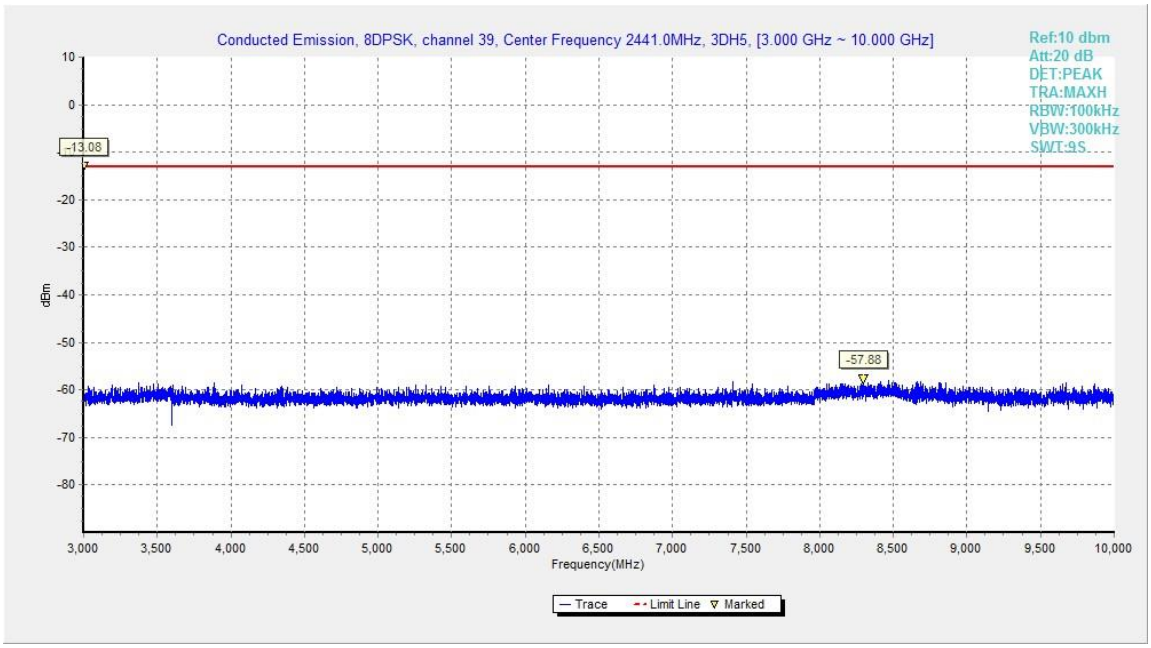

Fig.51. Conducted spurious emission: 8DPSK, Channel 39, 3GHz - 10GHz

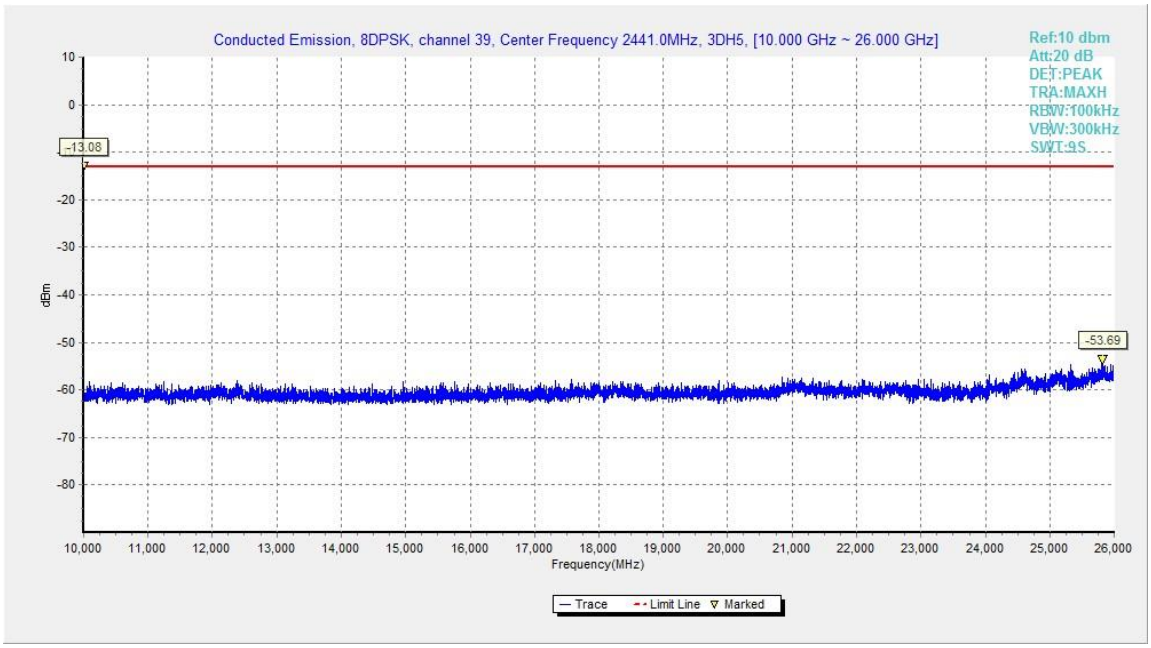

Fig.52. Conducted spurious emission: 8DPSK, Channel 39, 10GHz – 26GHz

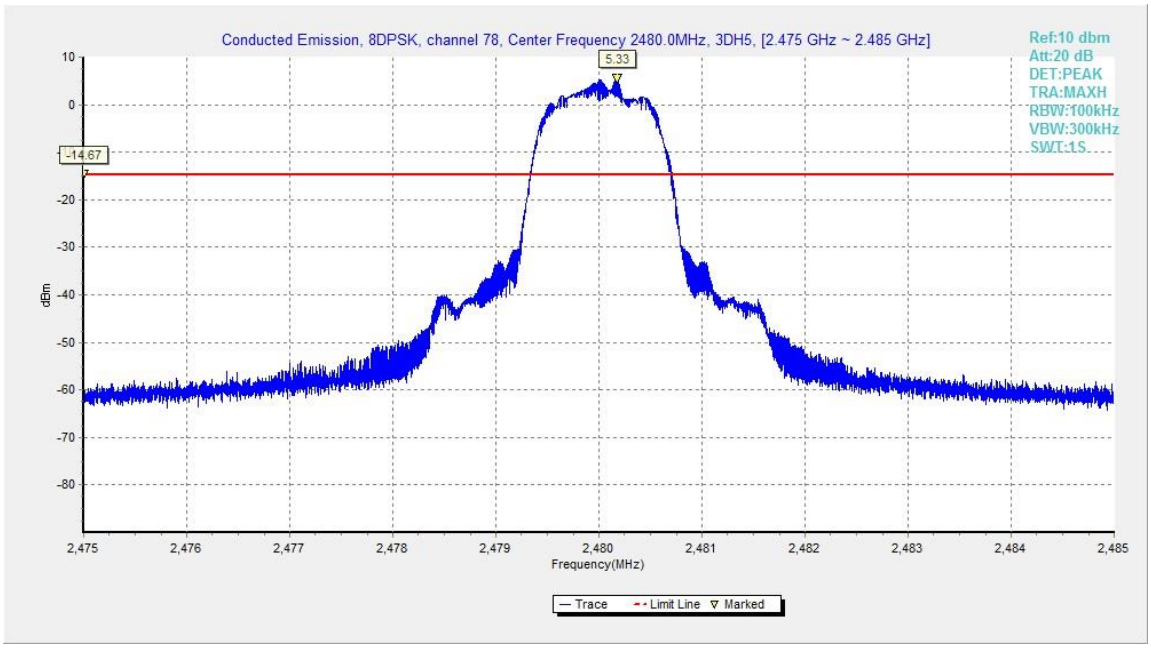

Fig.53. Conducted spurious emission: 8DPSK, Channel 78, 2480MHz

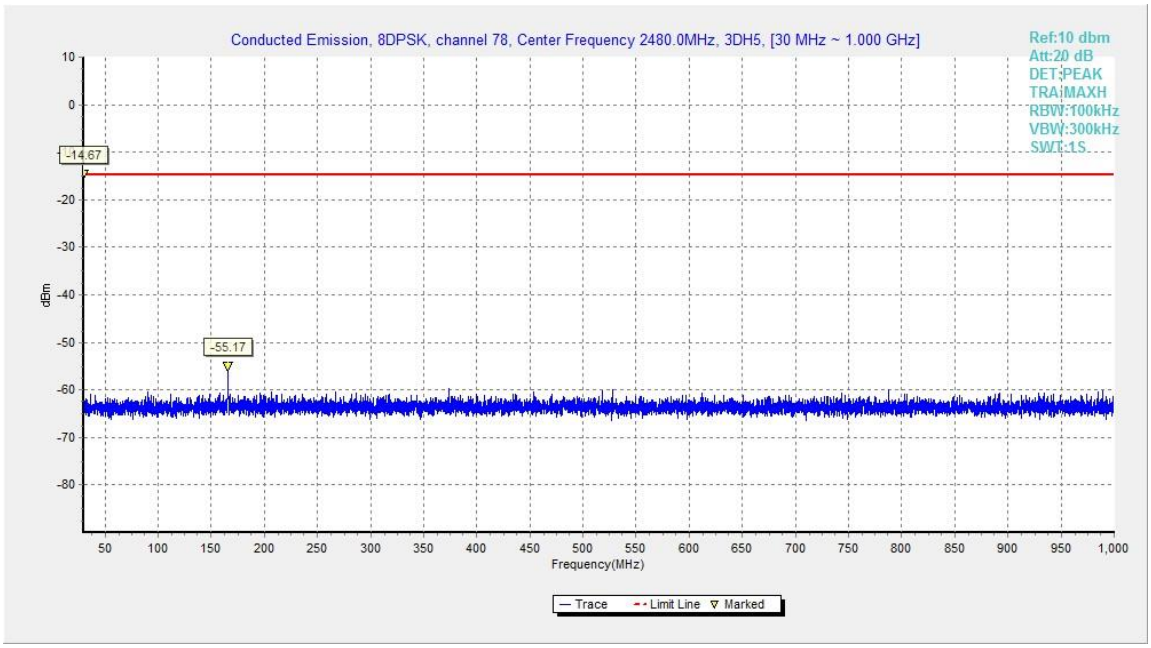

Fig.54. Conducted spurious emission: 8DPSK, Channel 78, 30MHz - 1GHz

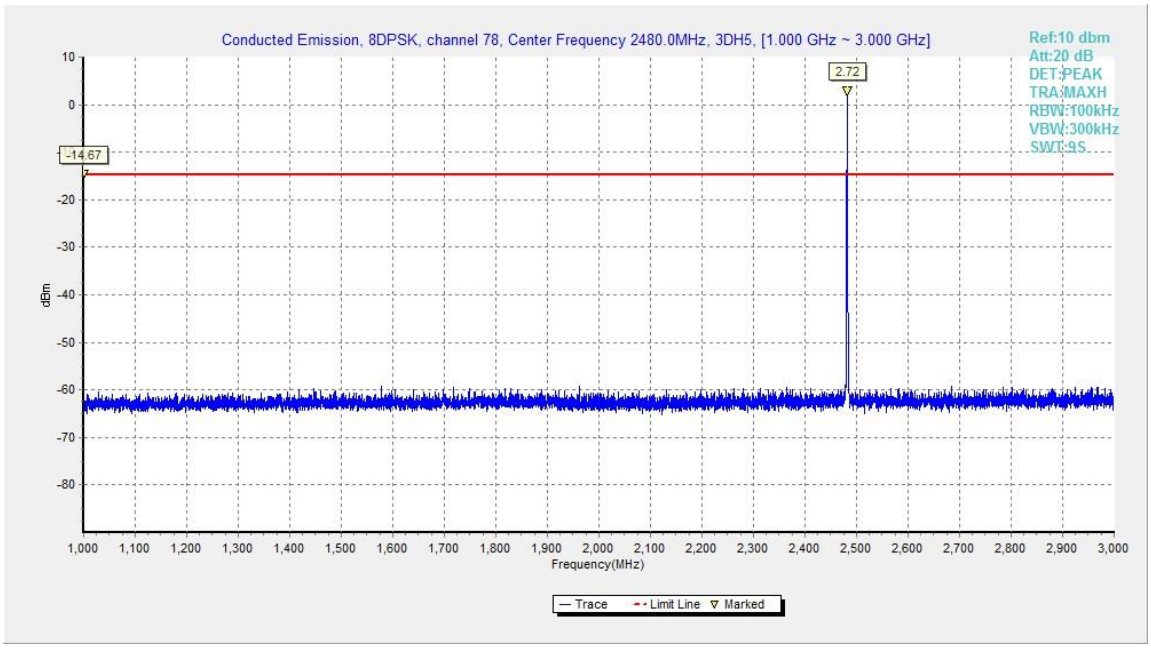

Fig.55. Conducted spurious emission: 8DPSK, Channel 78, 1GHz - 3GHz

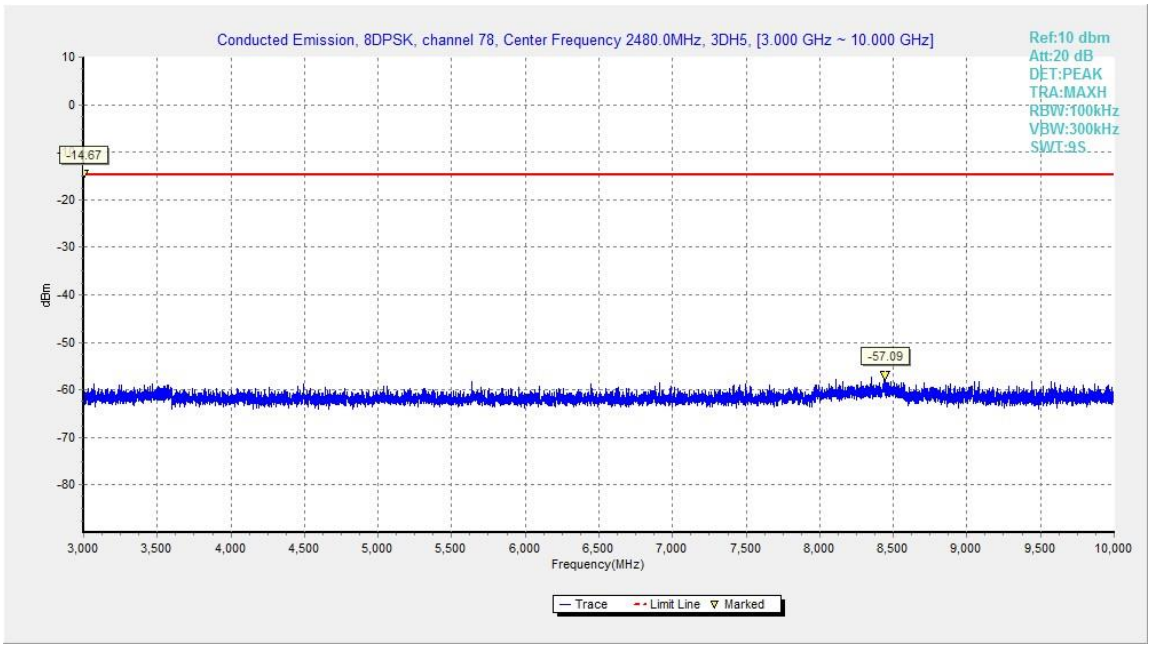

Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

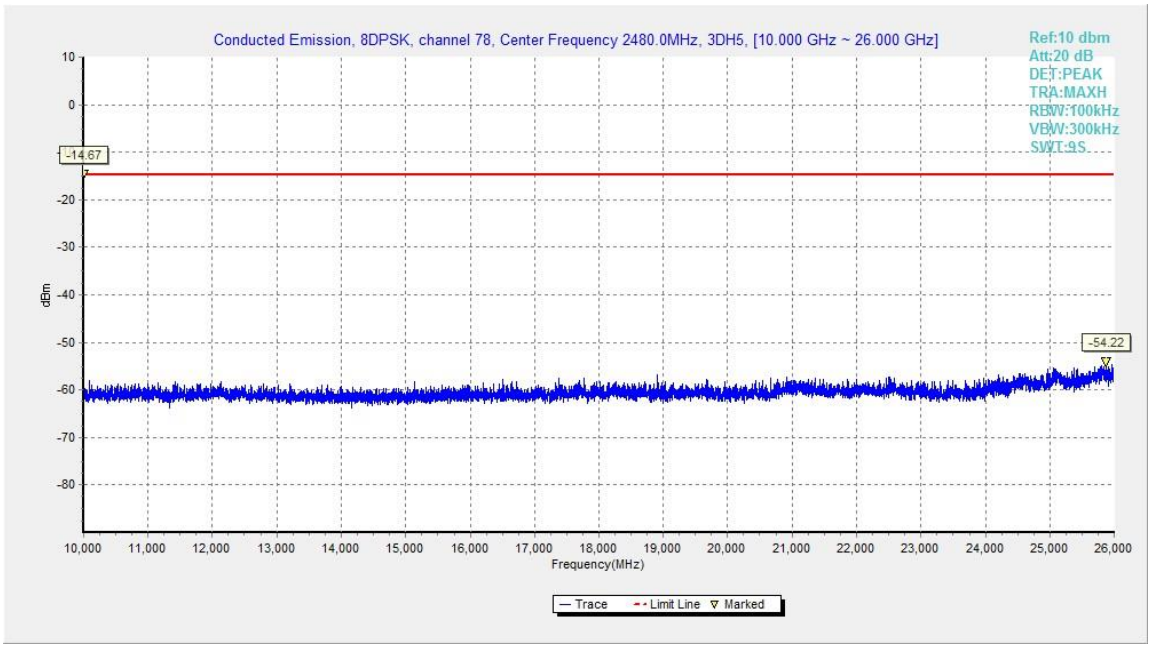

Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

A.5. 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:

Result=P_{Mea}+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	

Forπ/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 (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBµV)	Limit (dBµV/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 (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBµV)	Limit (dBµV/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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 eading (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 eading (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 eading (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 eading (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

GFSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 0 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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

π/4 DQPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver eading (dBμV)	Limit (dBμV/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:

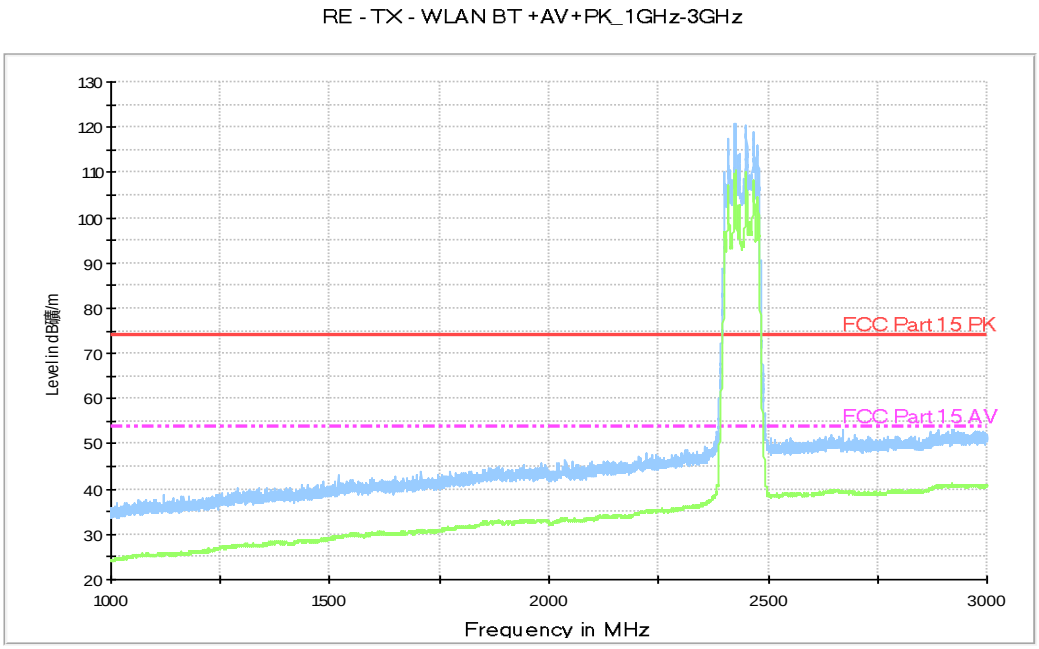

Fig.58. Radiated emission: GFSK, Channel 0, 1 GHz - 3 GHz

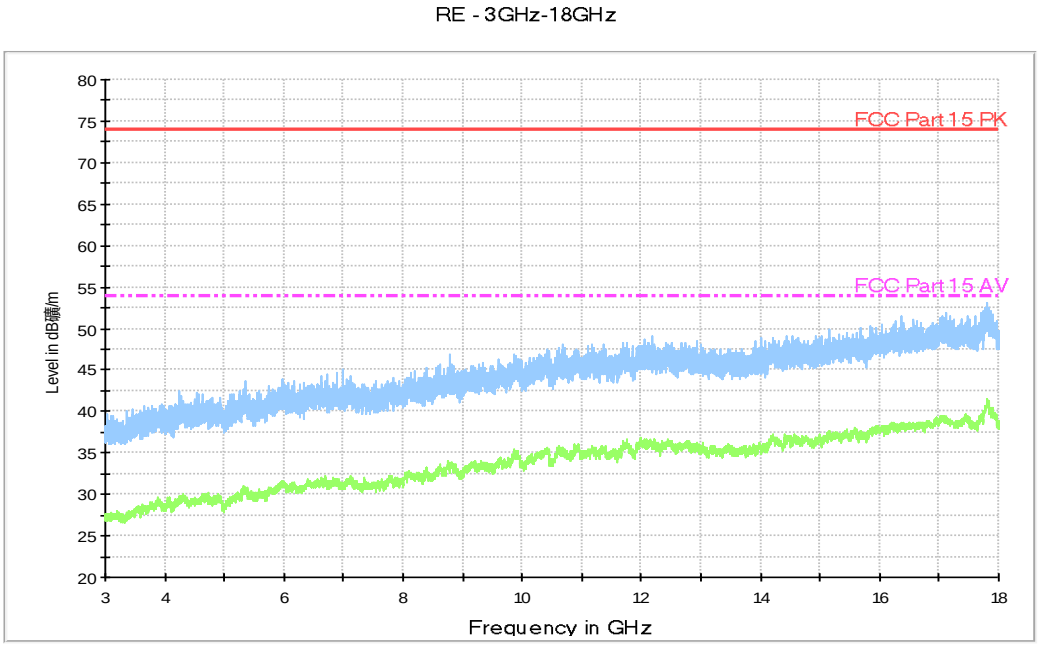

Fig.59. Radiated emission: GFSK, Channel 0, 3 GHz - 18 GHz

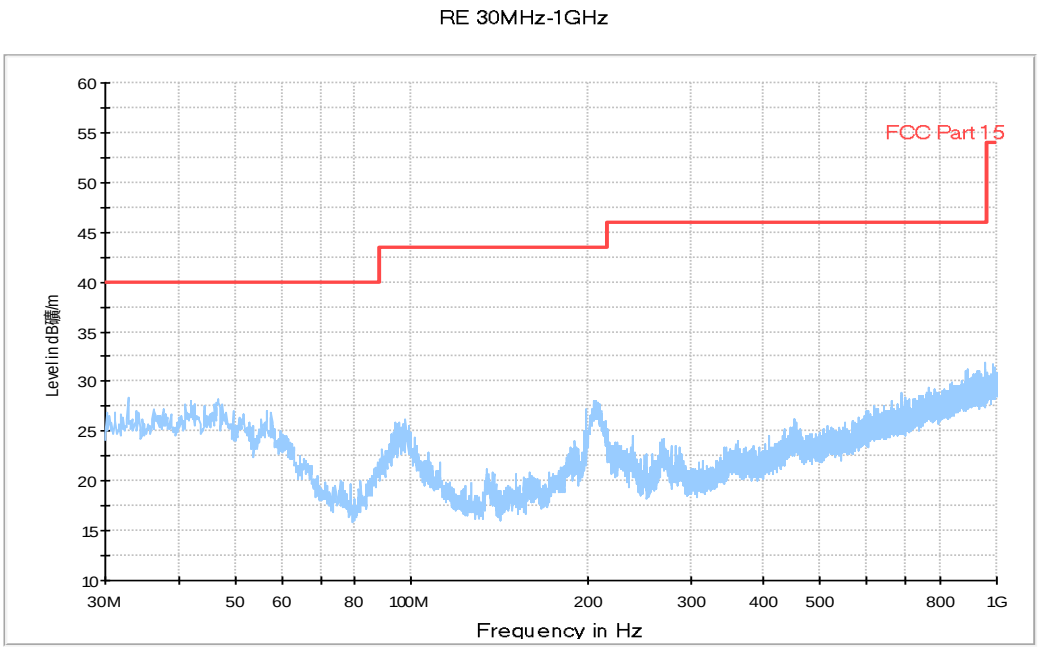

Fig.60. Radiated emission: GFSK, Channel 39, 30 MHz - 1 GHz

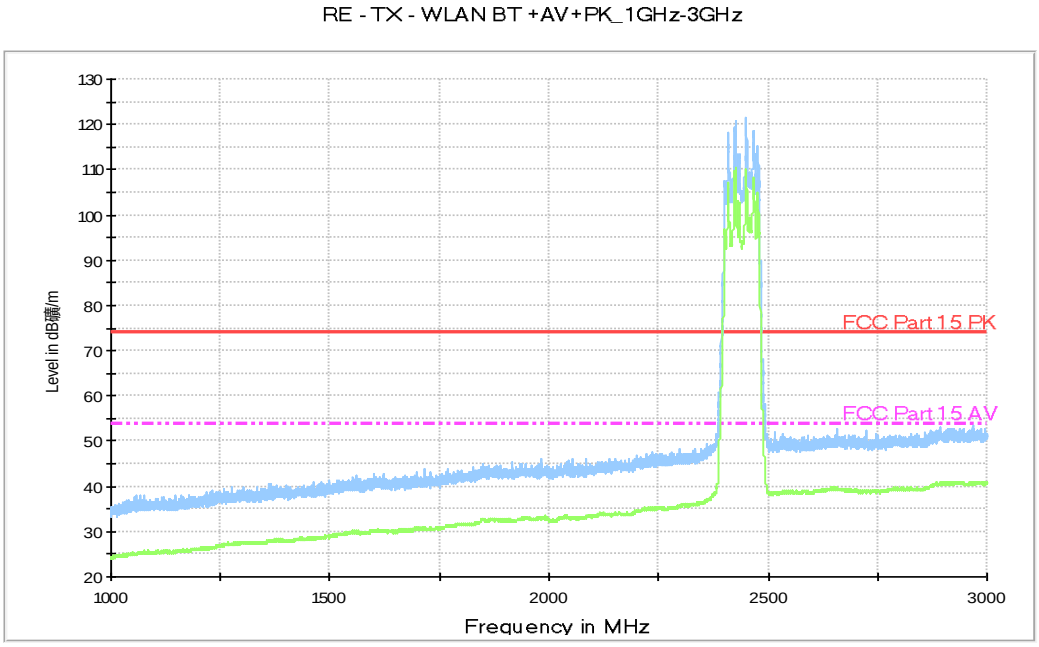

Fig.61. Radiated emission: GFSK, Channel 39, 1 GHz - 3 GHz

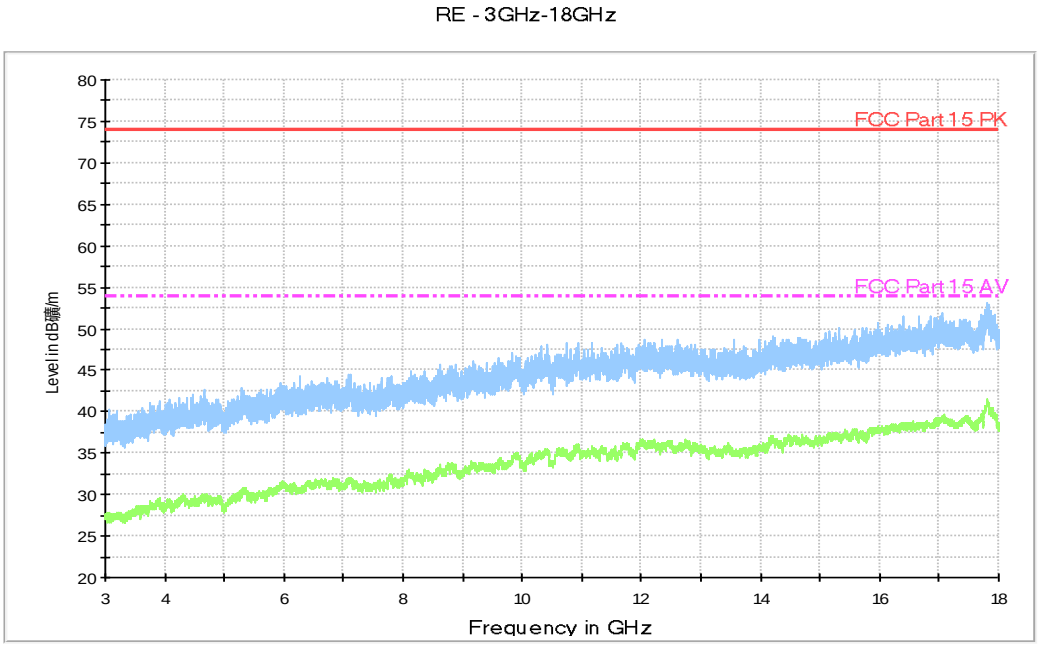

Fig.62. Radiated emission: GFSK, Channel 39, 3 GHz - 18 GHz

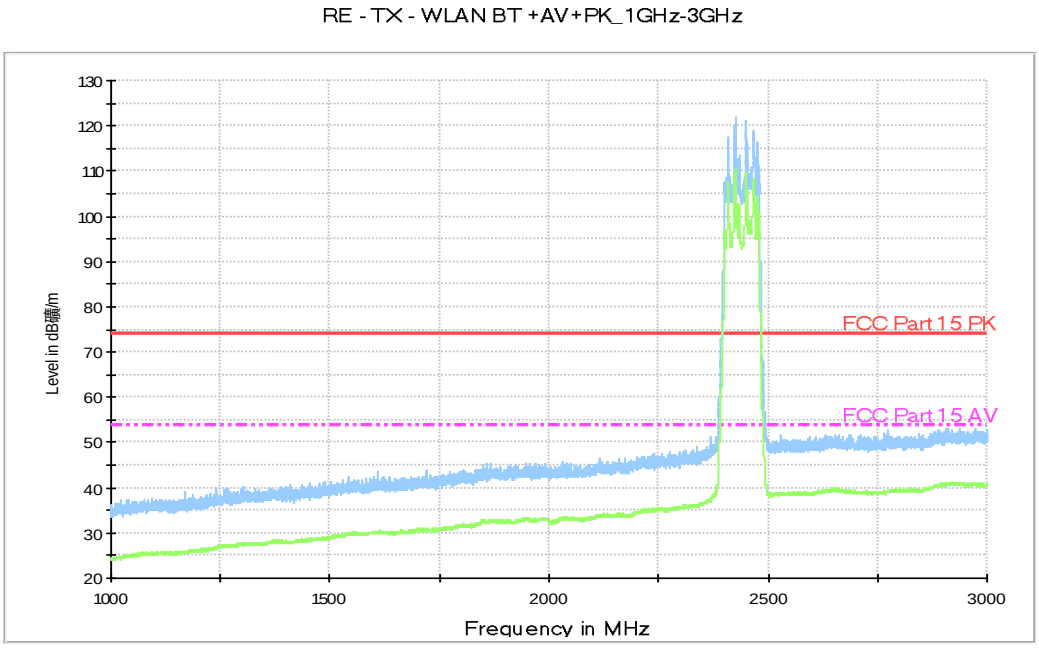

Fig.63. Radiated emission: GFSK, Channel 78, 1 GHz - 3 GHz

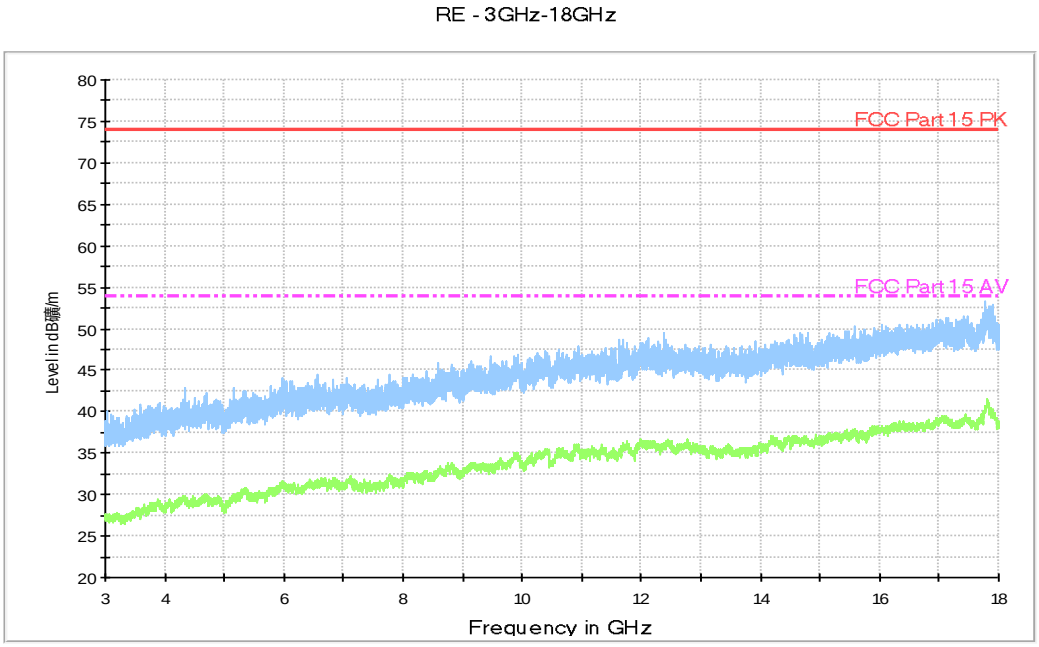

Fig.64. Radiated emission: GFSK, Channel 78, 3 GHz - 18 GHz

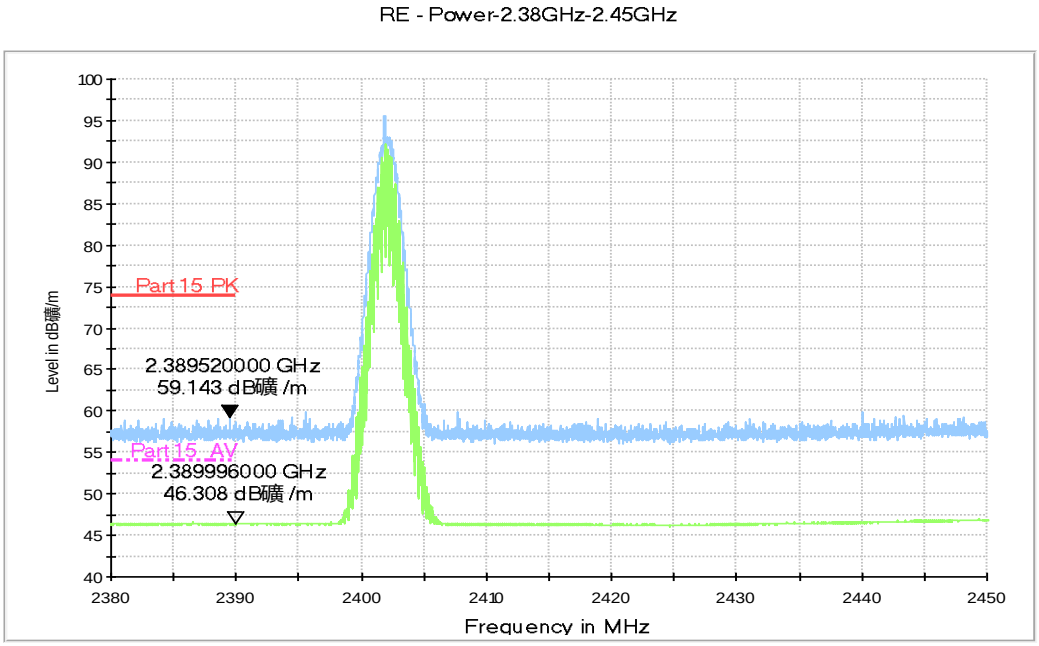

Fig.65. Radiated emission (Power): GFSK, low channel

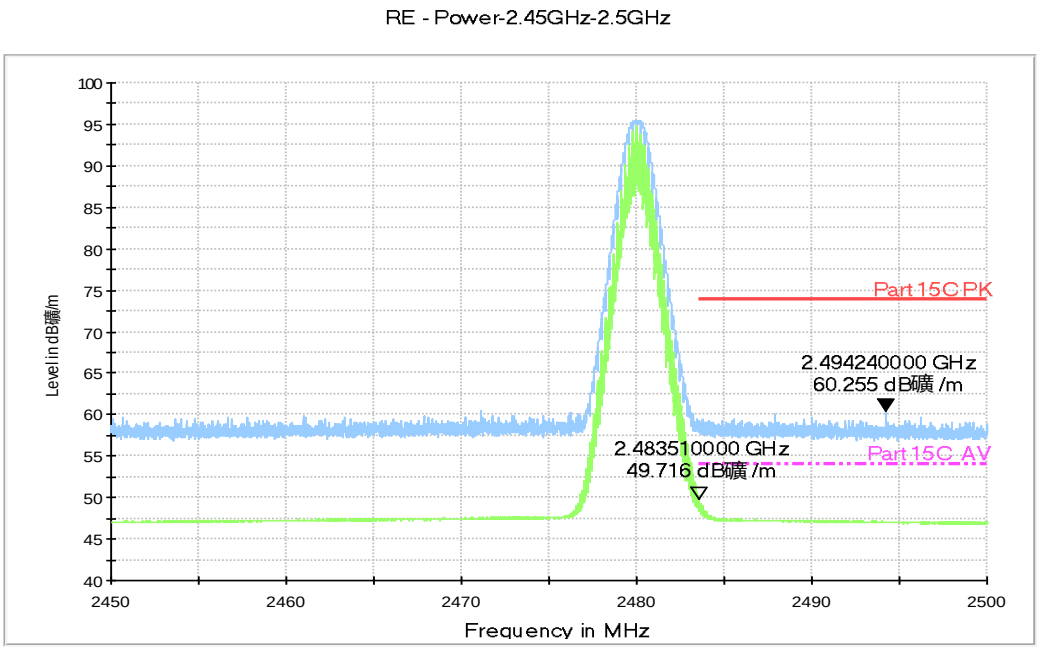

Fig.66. Radiated emission (Power) GFSK, high channel

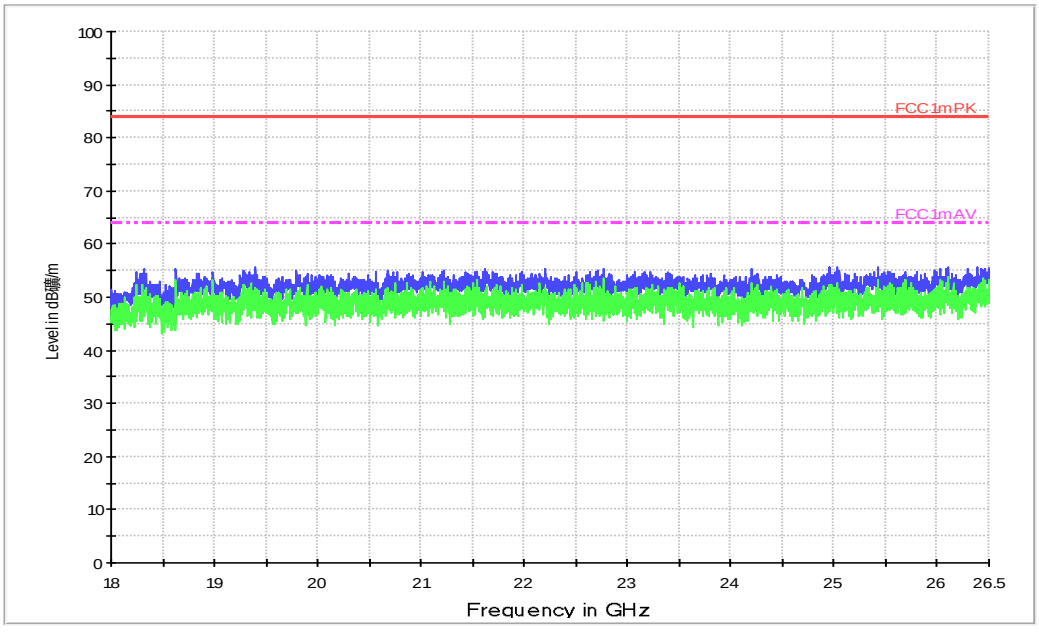

Fig.67. Radiated emission: GFSK, 18 GHz - 26 GHz

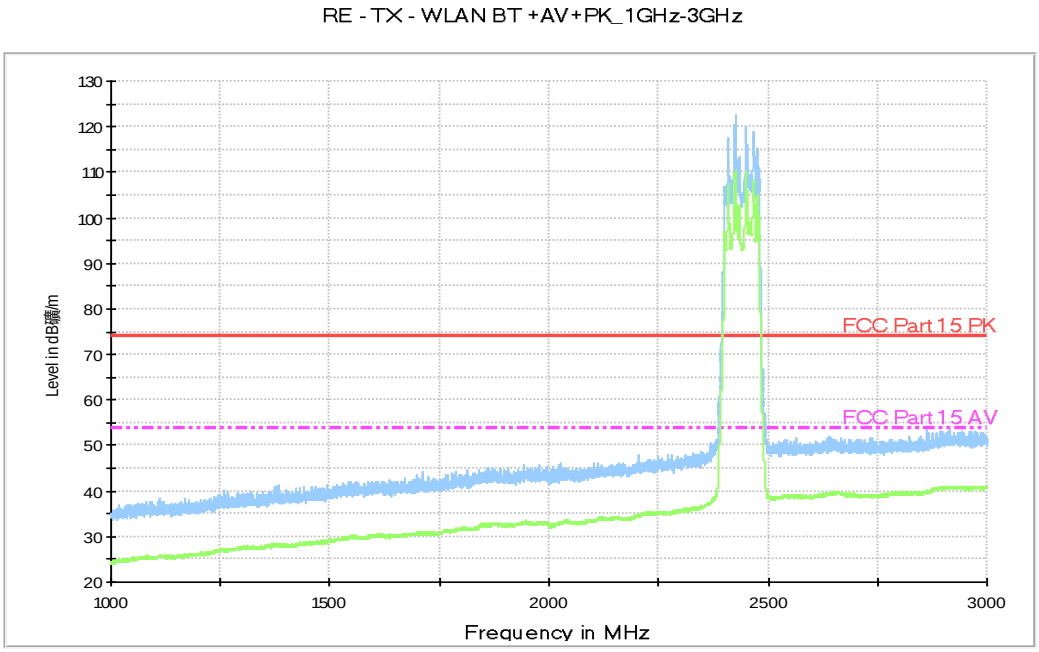

Fig.68. Radiated emission: π/4 DQPSK, Channel 0, 1 GHz - 3 GHz

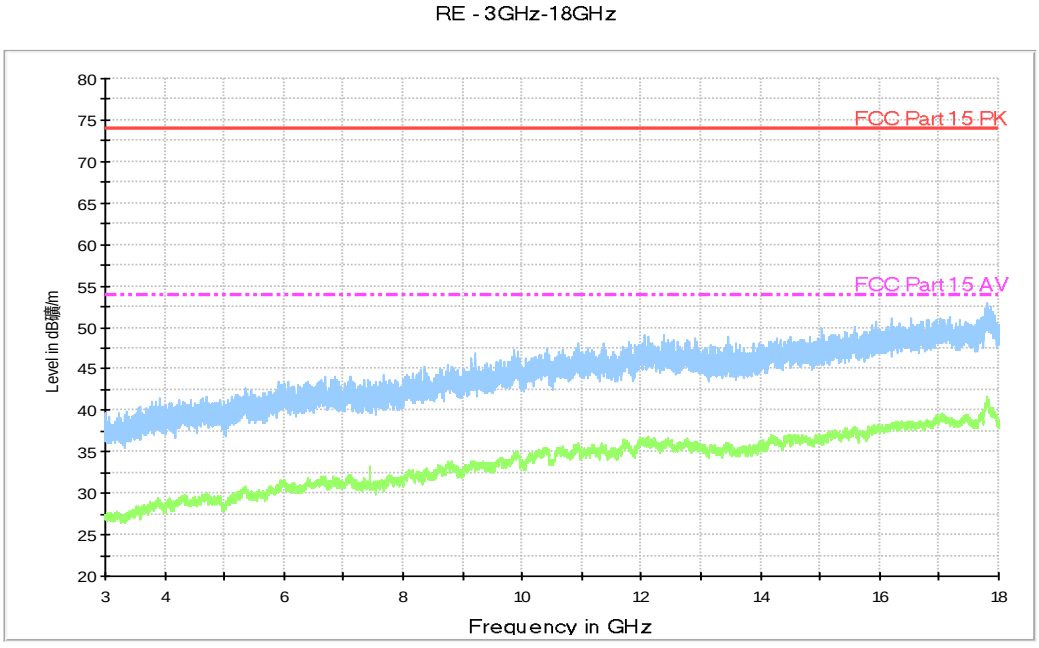

Fig.69. Radiated emission: π/4 DQPSK, Channel 0, 3 GHz - 18 GHz

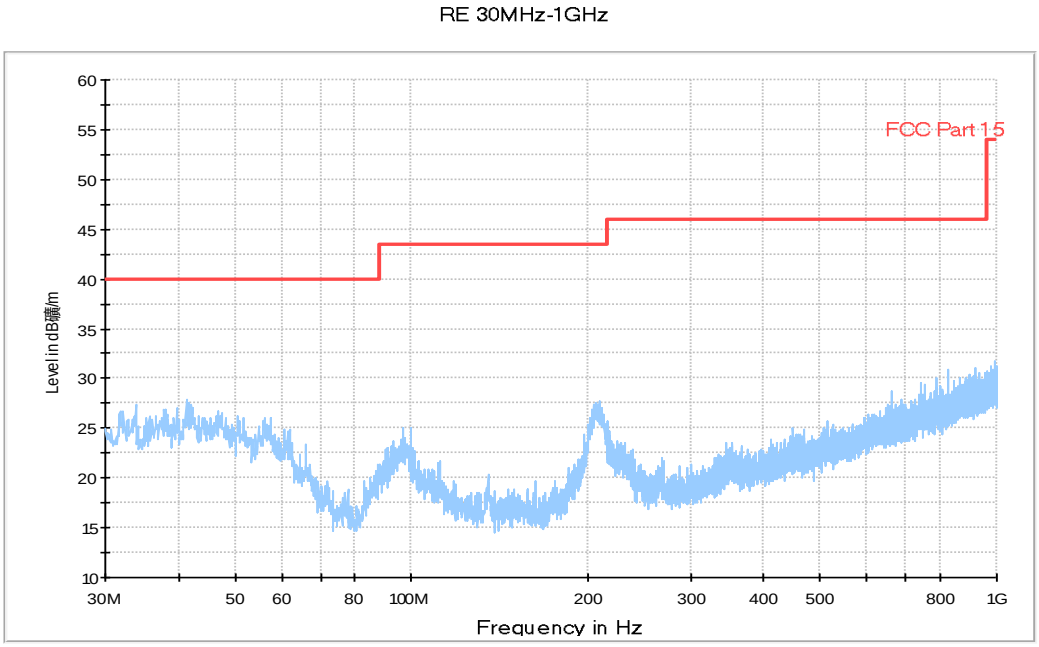

Fig.70. Radiated emission: π/4 DQPSK, Channel 39, 30 MHz - 1 GHz

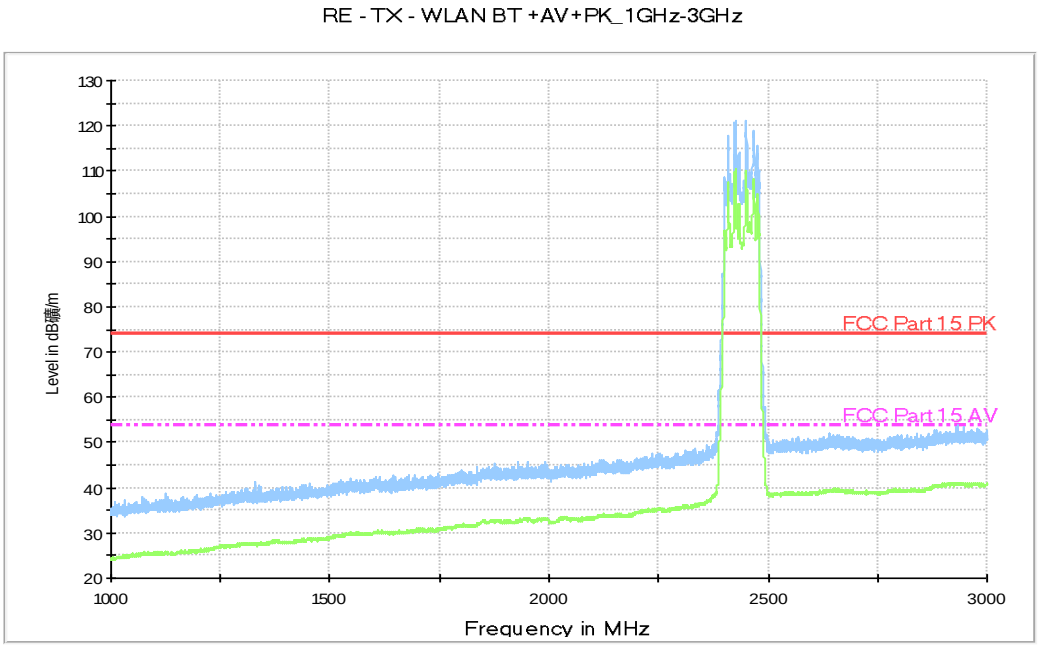

Fig.71. Radiated emission: π/4 DQPSK, Channel 39, 1 GHz - 3 GHz

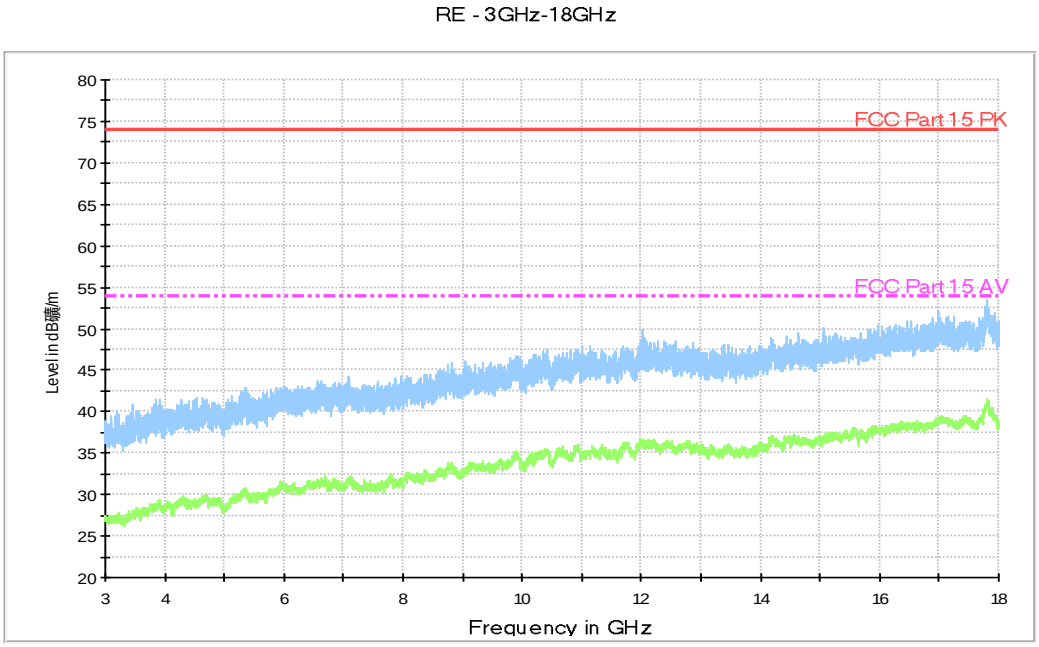

Fig.72. Radiated emission: π/4 DQPSK, Channel 39, 3 GHz - 18 GHz

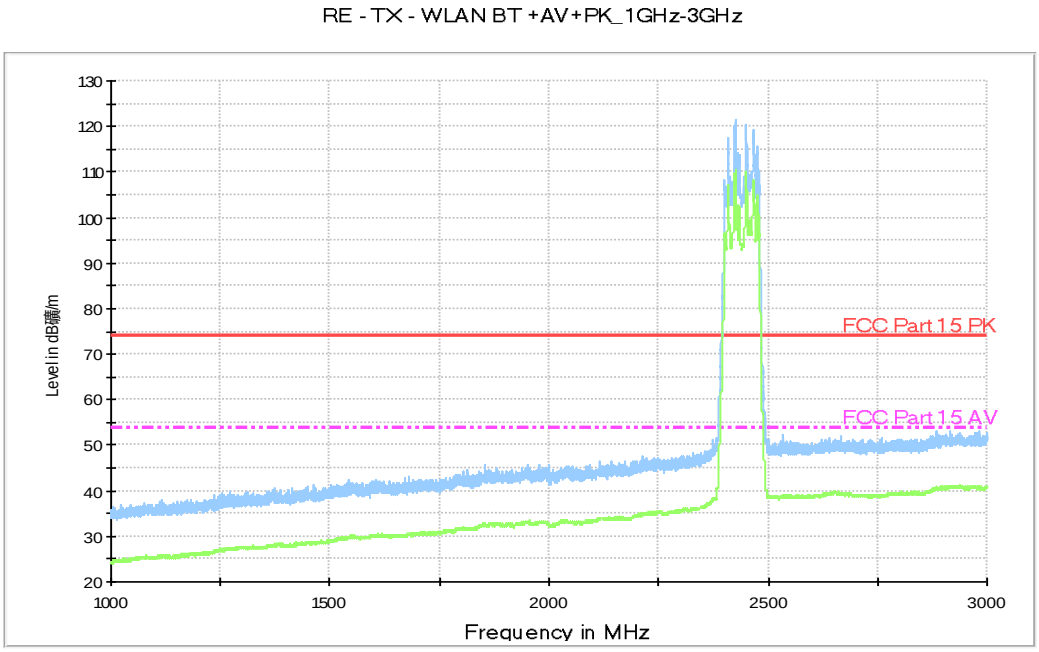

Fig.73. Radiated emission: π/4 DQPSK, Channel 78, 1 GHz - 3 GHz

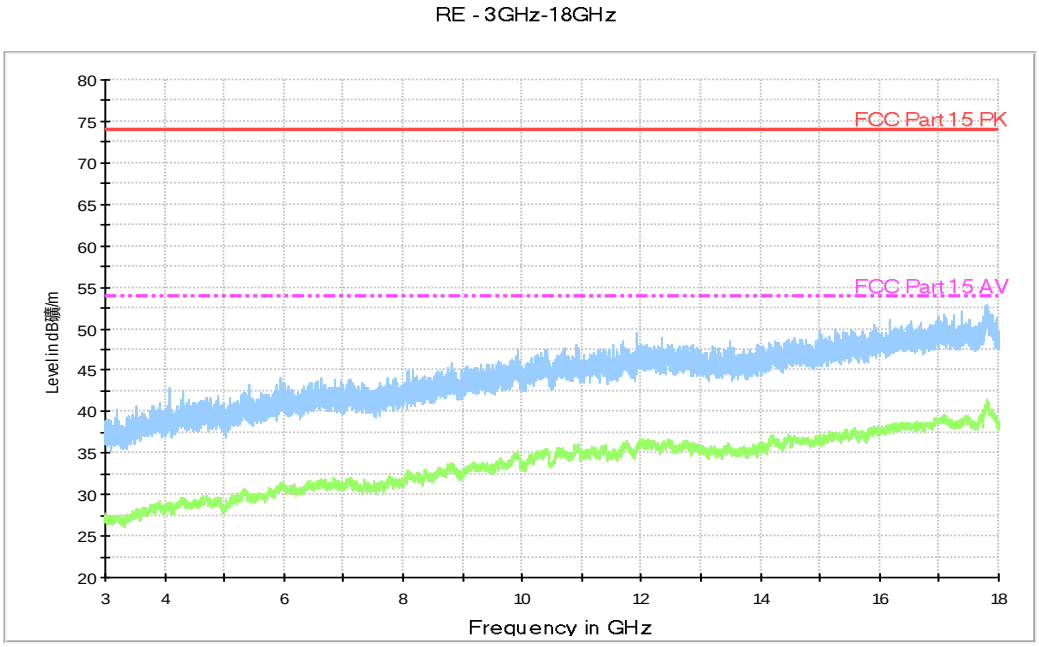

Fig.74. Radiated emission: π/4 DQPSK, Channel 78, 3 GHz - 18 GHz

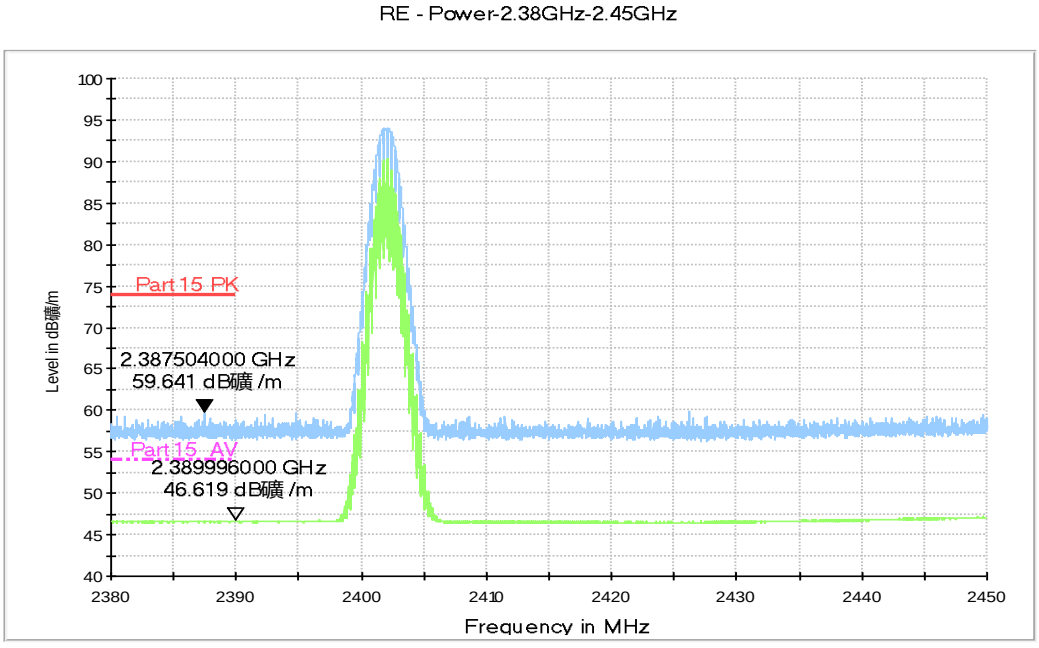

Fig.75. Radiated emission (Power): π/4 DQPSK, low channel

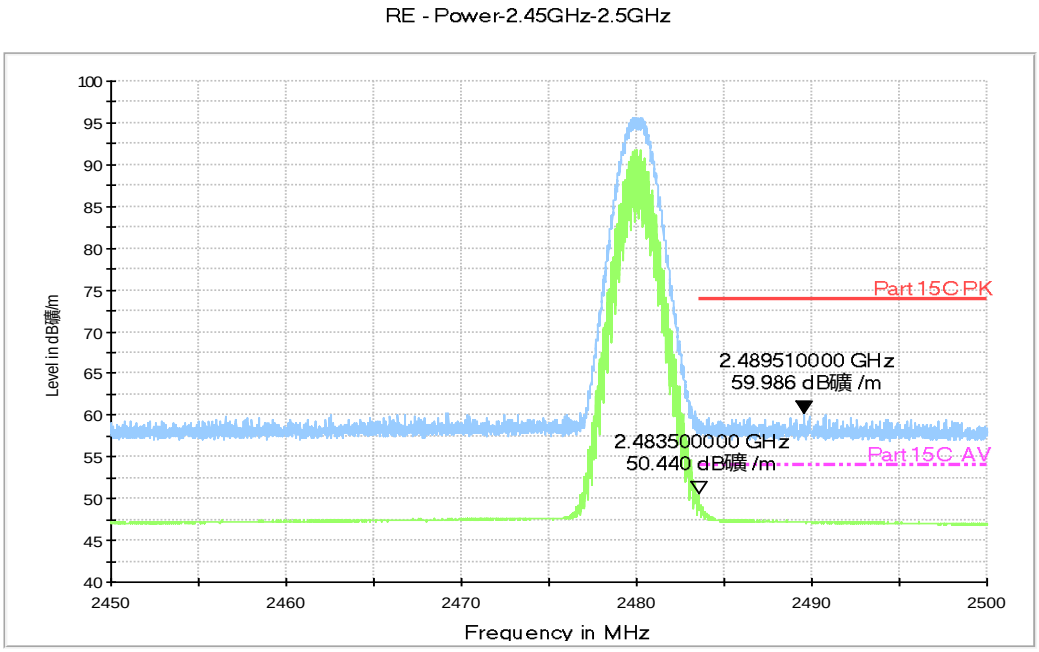

Fig.76. Radiated emission (Power): π/4 DQPSK, high channel

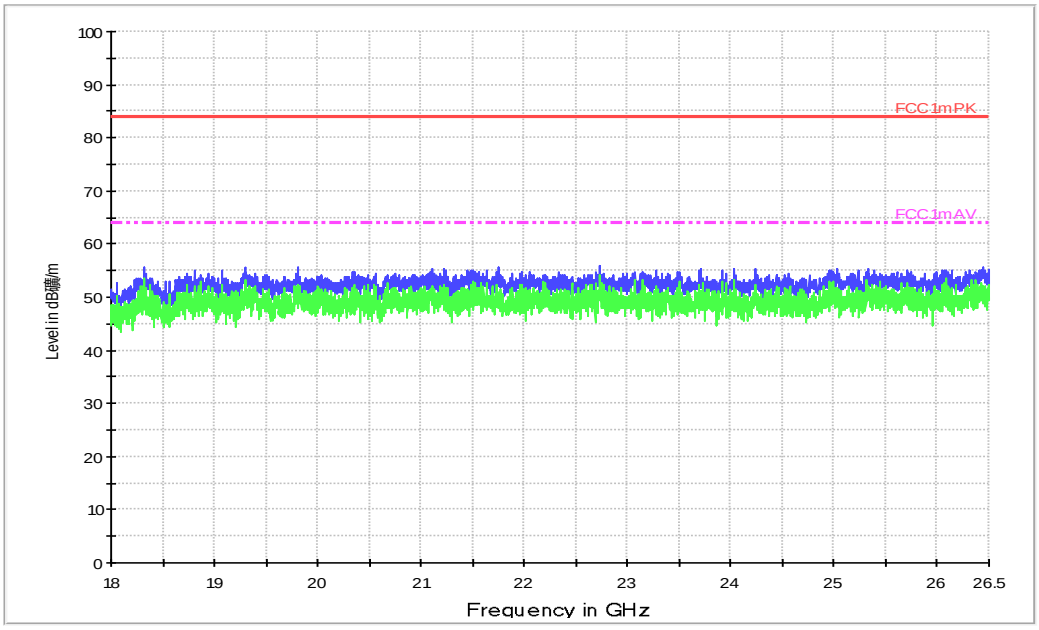

Fig.77. Radiated emission: π/4 DQPSK, 18 GHz - 26 GHz

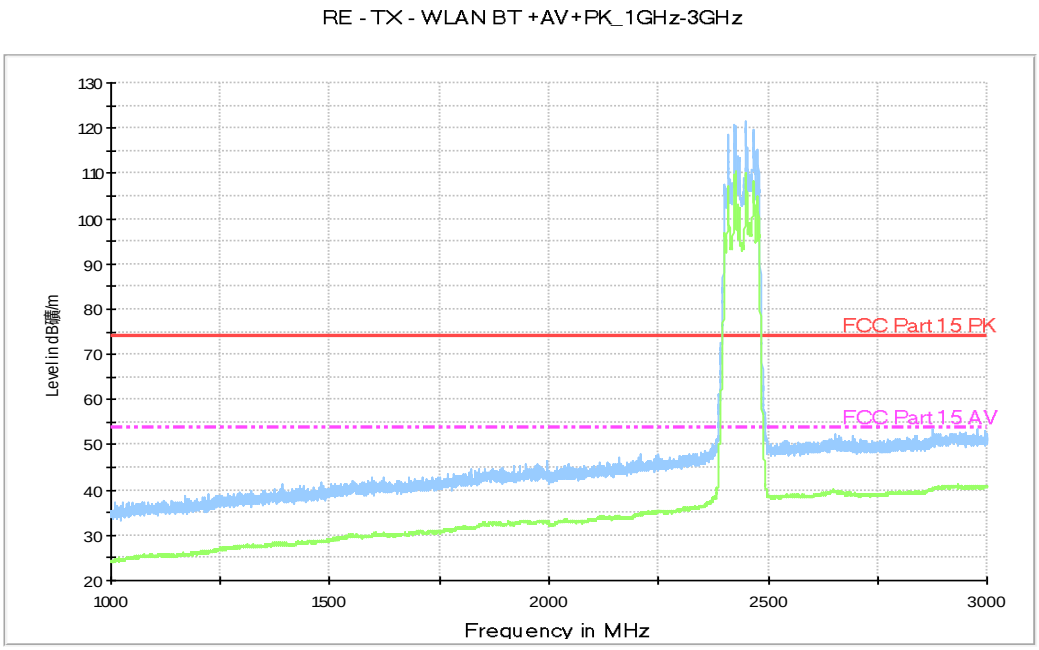

Fig.78. Radiated emission: 8DPSK, Channel 0, 1 GHz - 3 GHz

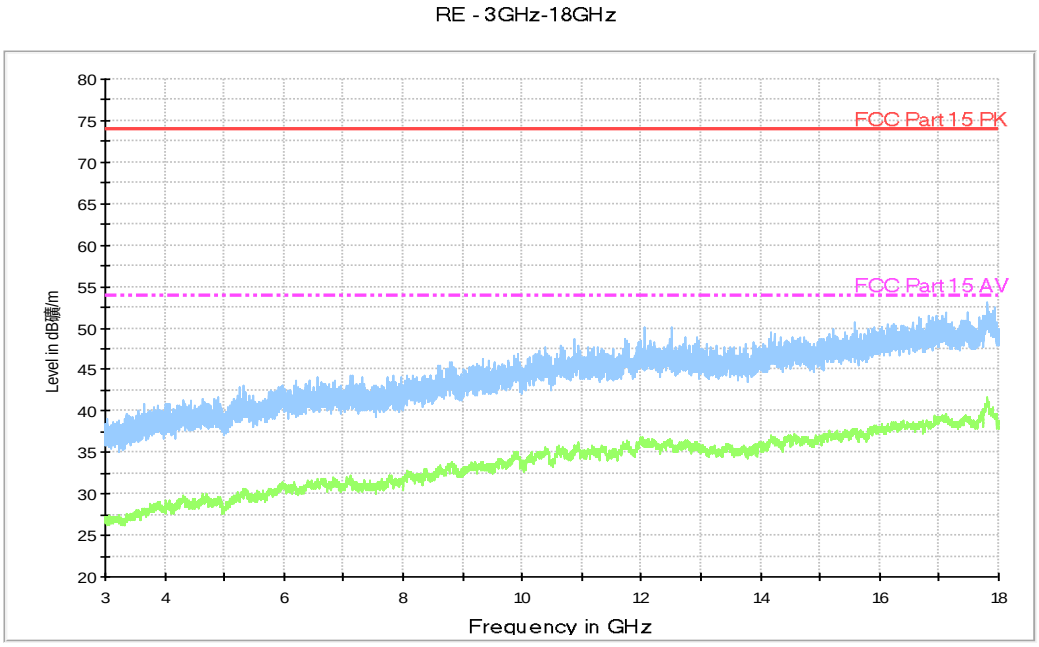

Fig.79. Radiated emission: 8DPSK, Channel 0, 3 GHz - 18 GHz

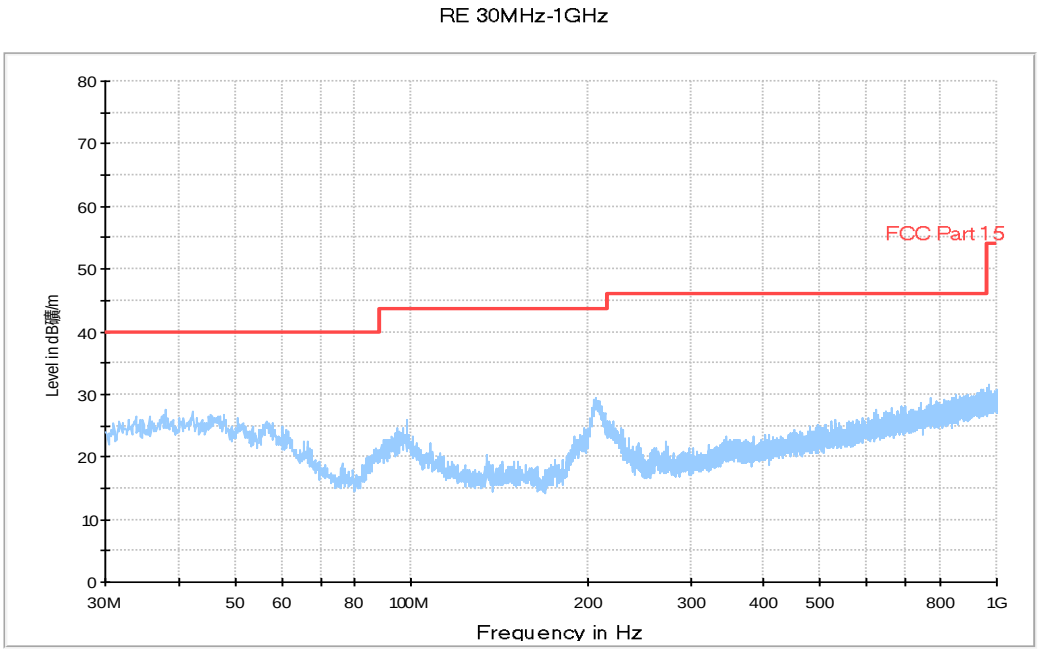

Fig.80. Radiated emission: 8DPSK, Channel 39, 30 MHz - 1 GHz

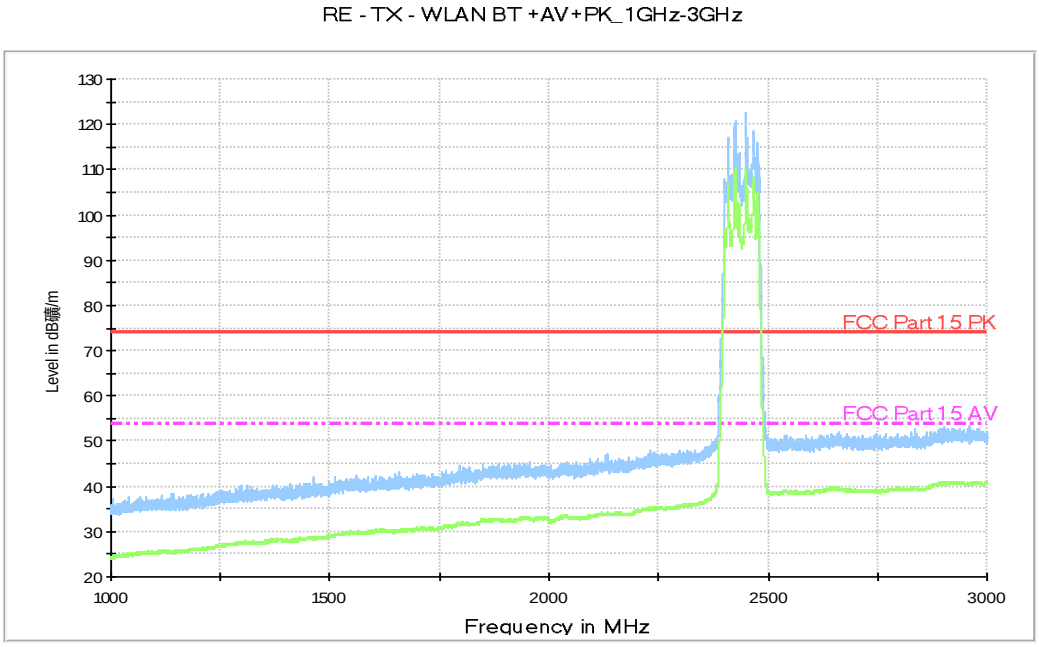

Fig.81. Radiated emission: 8DPSK, Channel 39, 1 GHz - 3 GHz

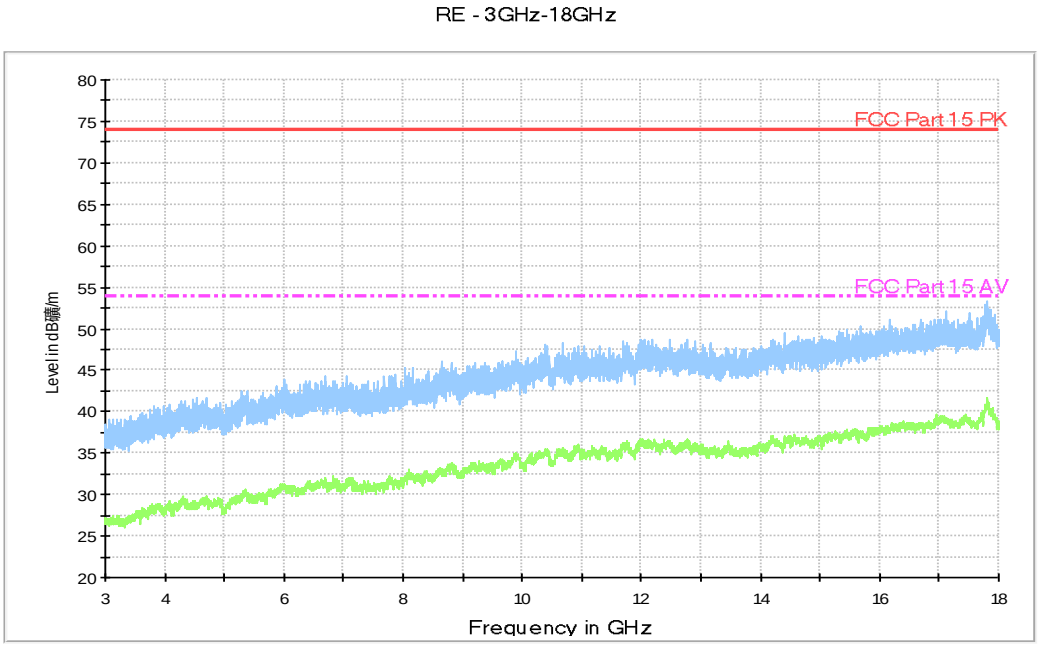

Fig.82. Radiated emission: 8DPSK, Channel 39, 3 GHz - 18 GHz

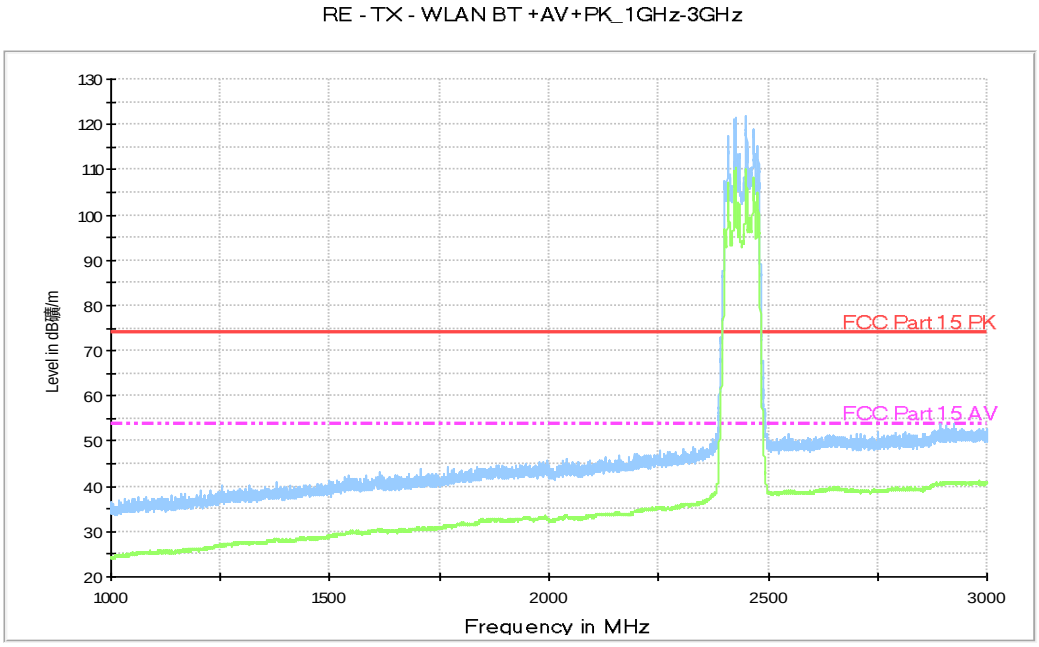

Fig.83. Radiated emission: 8DPSK, Channel 78, 1 GHz - 3 GHz

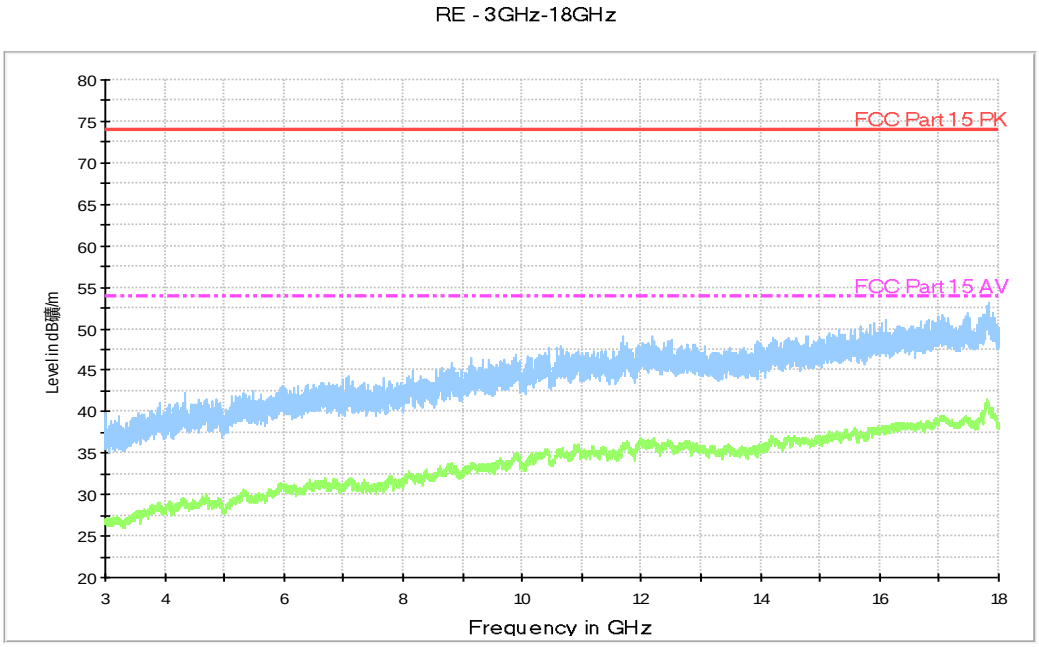

Fig.84. Radiated emission: 8DPSK, Channel 78, 3 GHz - 18 GHz

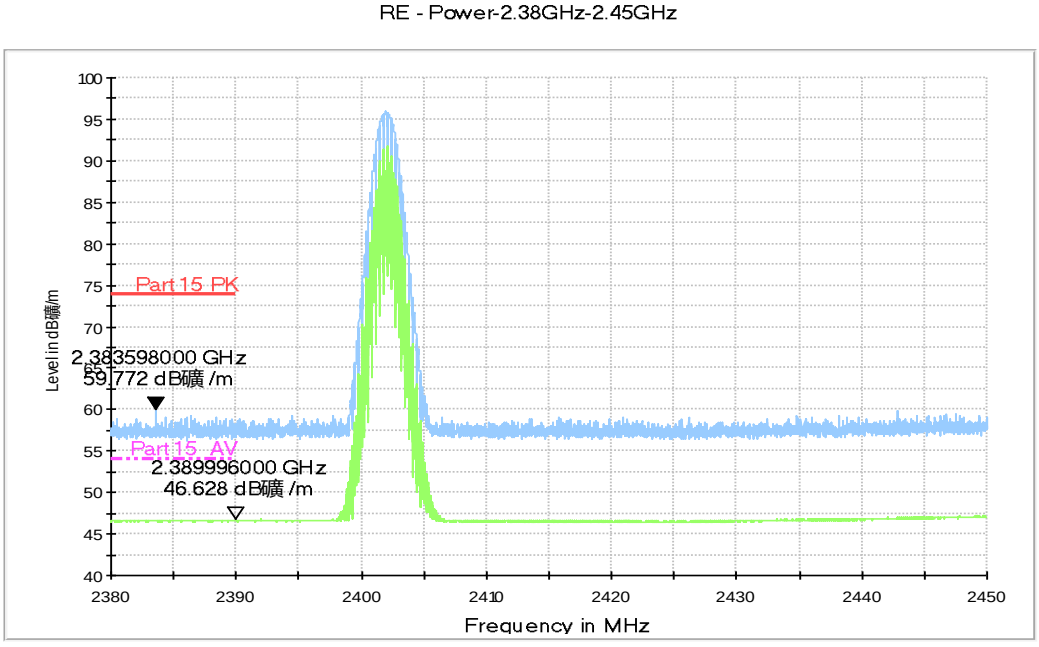

Fig.85. Radiated emission (Power): 8DPSK, low channel

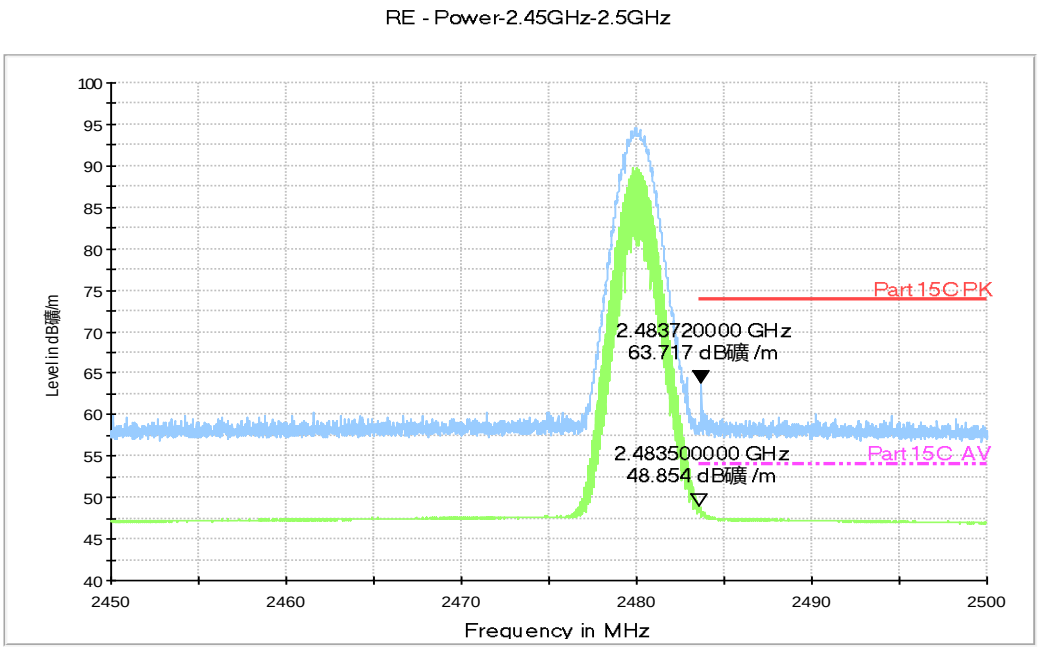

Fig.86. Radiated emission (Power): 8DPSK, high channel

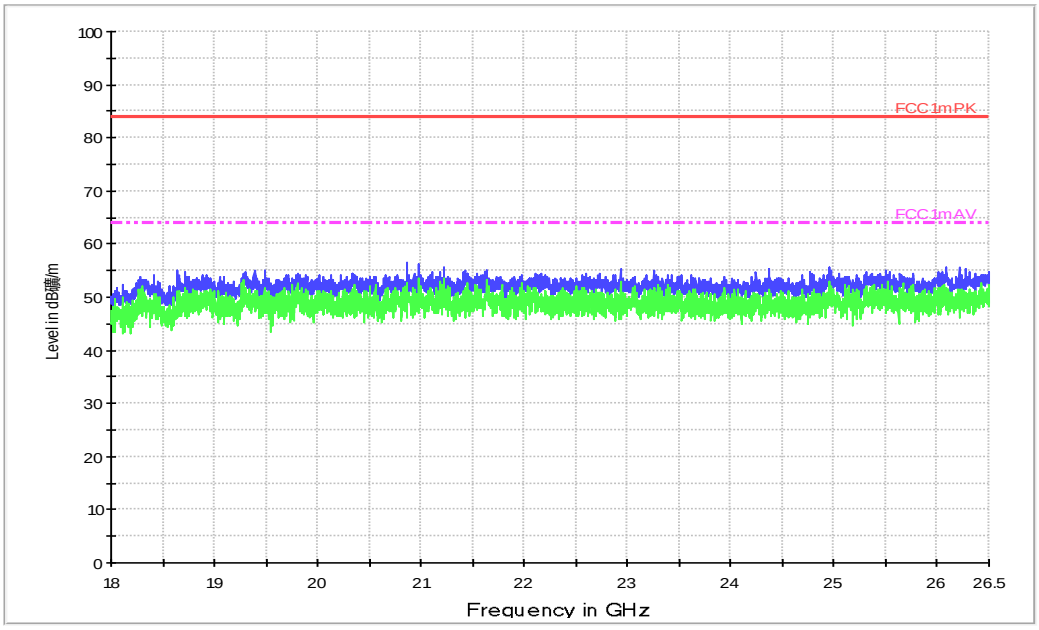

Fig.87. Radiated emission: 8DPSK, 18 GHz - 26 GHz

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 ≥ 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	193.56	P
		Fig.105		

Conclusion: PASS

Test graphs as below:

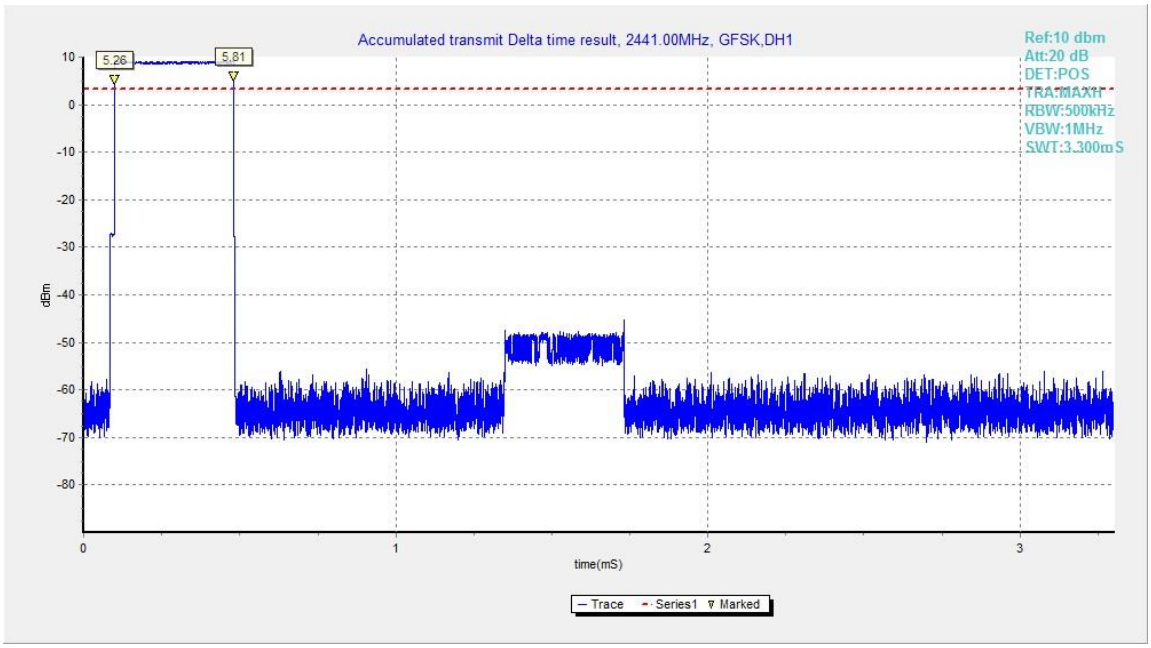

Fig.88. Time of occupancy (Dwell Time): Channel 39, Packet DH1

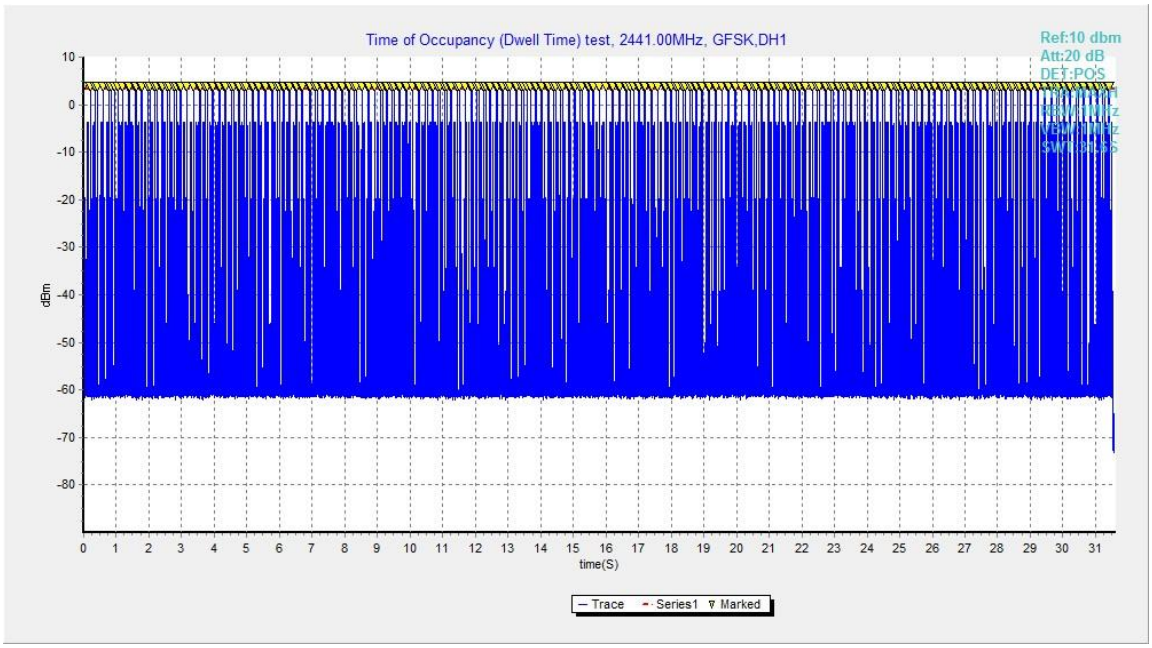

Fig.89. Number of Transmissions Measurement:Channel 39,Packet DH1