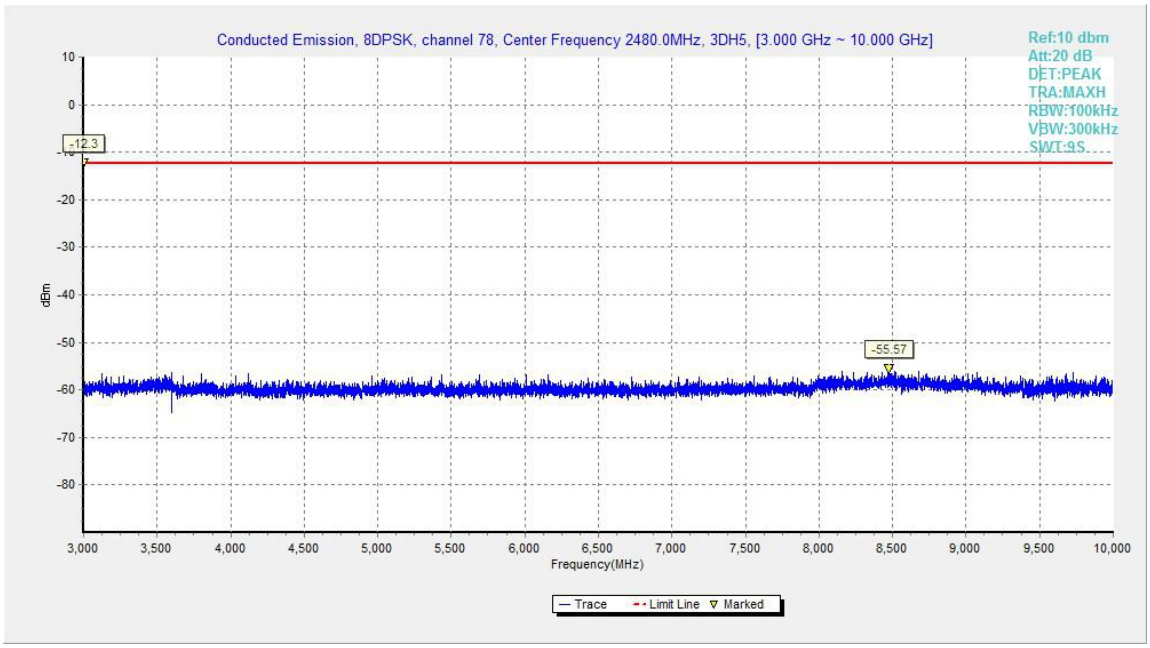


Fig.56. Conducted spurious emission: 8DPSK, Channel 78, 3GHz - 10GHz

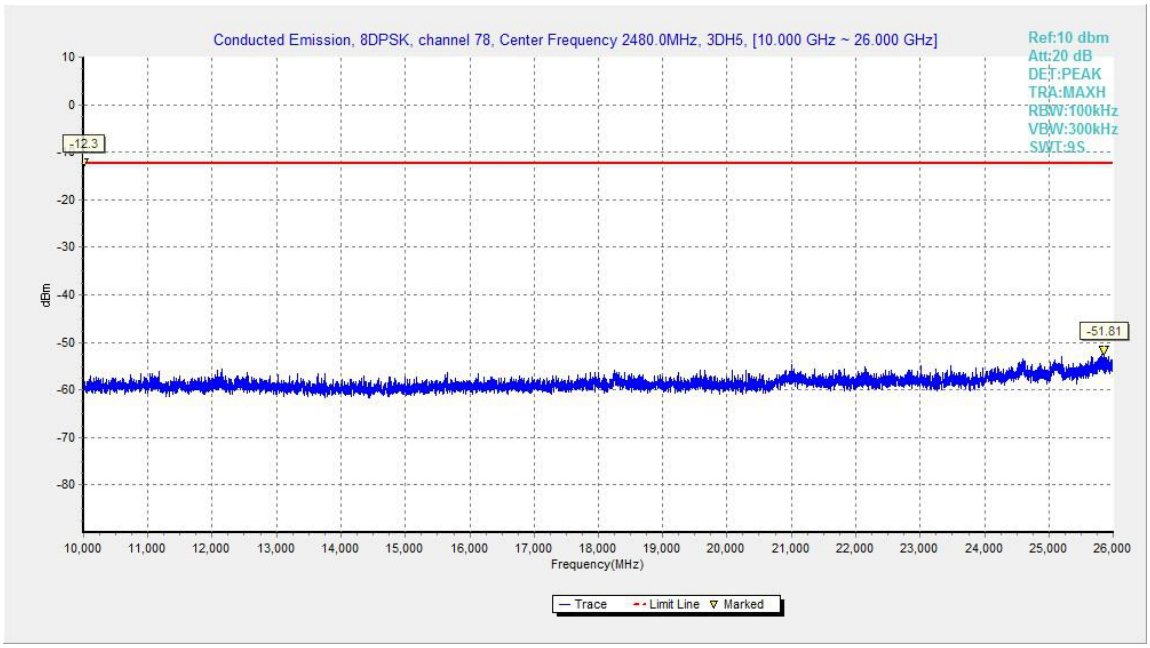


Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

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:

Result=P_{Mea}+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

Forπ/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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2387.700	46.05	2.9	32.0	11.23	54.0	8.0	H	155	40
2389.300	46.07	2.9	32.0	11.25	54.0	7.9	H	155	65
4804.000	35.39	-35.0	34.1	36.33	54.0	18.6	H	155	84
7206.000	37.50	-32.4	35.8	34.09	54.0	16.5	H	155	107
9608.000	43.26	-29.7	36.7	36.19	54.0	10.7	H	155	135
12010.000	42.33	-30.5	38.9	33.92	54.0	11.7	H	155	151

GFSK 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)	Antenna Height (cm)	Turntable angle (deg)
2431.800	46.10	2.9	32.0	11.23	54.0	7.9	H	155	268
2448.800	46.21	2.9	32.0	11.32	54.0	7.8	H	155	138
4882.000	35.64	-35.5	34.1	37.09	54.0	18.4	H	155	104
7323.000	38.78	-31.3	35.8	34.29	54.0	15.2	H	155	40
9764.000	40.31	-31.4	36.9	34.80	54.0	13.7	H	155	28
12205.000	44.20	-28.8	39.0	34.07	54.0	9.8	H	155	8

GFSK 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)	Antenna Height (cm)	Turntable angle (deg)
2483.500	48.66	2.9	32.0	13.73	54.0	5.3	H	155	268
2483.600	48.55	2.9	32.0	13.62	54.0	5.5	H	155	138
4959.000	34.72	-34.9	34.1	35.51	54.0	19.3	H	155	104
7440.000	37.78	-32.2	35.8	34.16	54.0	16.2	H	155	40
9920.000	41.89	-29.7	37.1	34.45	54.0	12.1	H	155	28
12400.000	43.51	-30.0	39.1	34.49	54.0	10.5	H	155	8

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)	Antenna Height (cm)	Turntable angle (deg)
2389.300	46.07	2.9	32.0	11.24	54.0	7.9	H	155	40
2390.000	46.01	2.9	32.0	11.19	54.0	8.0	H	155	65
4804.000	33.84	-35.0	34.1	34.78	54.0	20.2	H	155	84
7206.000	37.55	-32.4	35.8	34.14	54.0	16.4	H	155	107
9608.000	43.45	-29.7	36.7	36.38	54.0	10.6	H	155	135
12010.000	42.33	-30.5	38.9	33.92	54.0	11.7	H	155	151

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)	Antenna Height (cm)	Turntable angle (deg)
2431.800	46.14	2.9	32.0	11.27	54.0	7.9	H	155	16
2479.900	46.78	2.9	32.0	11.86	54.0	7.2	H	155	48
4882.000	34.19	-35.5	34.1	35.63	54.0	19.8	H	155	80
7323.000	38.80	-31.3	35.8	34.31	54.0	15.2	H	155	8
9764.000	40.42	-31.4	36.9	34.91	54.0	13.6	H	155	102
12205.000	44.15	-28.8	39.0	34.02	54.0	9.8	H	155	118

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)	Antenna Height (cm)	Turntable angle (deg)
2483.600	47.64	2.9	32.0	12.71	54.0	6.4	H	155	48
2483.800	47.49	2.9	32.0	12.57	54.0	6.5	H	155	6
4960.000	34.30	-34.9	34.1	35.09	54.0	19.7	H	155	312
7440.000	37.83	-32.2	35.8	34.21	54.0	16.2	H	155	48
9920.000	41.97	-29.7	37.1	34.53	54.0	12.0	H	155	68
12400.000	43.56	-30.0	39.1	34.53	54.0	10.4	H	155	80

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)	Antenna Height (cm)	Turntable angle (deg)
2387.500	46.05	2.9	32.0	11.23	54.0	8.0	H	155	6
2389.300	46.06	2.9	32.0	11.23	54.0	7.9	H	155	48
4804.000	33.77	-35.0	34.1	34.70	54.0	20.2	H	155	92
7206.000	37.54	-32.4	35.8	34.13	54.0	16.5	H	155	48
9608.000	43.47	-29.7	36.7	36.40	54.0	10.5	H	155	68
12010.000	42.35	-30.5	38.9	33.94	54.0	11.7	H	155	92

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)	Antenna Height (cm)	Turntable angle (deg)
2432.100	46.17	2.9	32.0	11.30	54.0	7.8	H	155	28
2449.600	46.16	2.9	32.0	11.27	54.0	7.8	H	155	46
4881.000	34.02	-35.5	34.1	35.47	54.0	20.0	H	155	8
7323.000	38.83	-31.3	35.8	34.34	54.0	15.2	H	155	6
9764.000	40.35	-31.4	36.9	34.84	54.0	13.6	H	155	24
12205.000	44.27	-28.8	39.0	34.13	54.0	9.7	H	155	185

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)	Antenna Height (cm)	Turntable angle (deg)
2483.500	48.83	2.9	32.0	13.90	54.0	5.2	H	155	170
2483.600	47.88	2.9	32.0	12.95	54.0	6.1	H	155	150
4960.000	34.38	-34.9	34.1	35.17	54.0	19.6	H	155	20
7440.000	37.84	-32.2	35.8	34.22	54.0	16.2	H	155	180
9920.000	42.16	-29.7	37.1	34.72	54.0	11.8	H	155	202
12400.000	43.59	-30.0	39.1	34.56	54.0	10.4	H	155	8

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)	Antenna Height (cm)	Turntable angle (deg)
2379.356	59.72	2.9	32.0	24.90	74.0	14.3	H	155	88
2382.114	59.88	2.9	32.0	25.07	74.0	14.1	H	155	110
4804.000	42.69	-35.0	34.1	43.63	74.0	31.3	H	155	88
7206.000	43.54	-32.4	35.8	40.13	74.0	30.5	V	155	110
9608.000	49.79	-29.7	36.7	42.72	74.0	24.2	V	155	132
12010.000	45.88	-30.5	38.9	37.47	74.0	28.1	H	155	154

GFSK Ch 39 - 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)	Antenna Height (cm)	Turntable angle (deg)
2362.400	47.59	-27.4	31.9	43.08	74.0	26.4	H	155	264
2496.200	49.45	-25.0	32.0	42.40	74.0	24.6	H	155	132
4881.500	43.56	-35.5	34.1	45.00	74.0	30.4	H	155	110
7232.000	44.46	-32.4	35.8	41.10	74.0	29.5	H	155	44
9764.000	44.44	-31.4	36.9	38.92	74.0	29.6	H	155	22
12205.000	47.98	-28.8	39.0	37.84	74.0	26.0	V	155	0

GFSK Ch 78 - 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)	Antenna Height (cm)	Turntable angle (deg)
2485.095	60.71	2.9	32.0	25.78	74.0	13.3	H	155	264
2490.432	60.98	2.9	32.0	26.04	74.0	13.0	H	155	132
4960.000	41.28	-34.9	34.1	42.07	74.0	32.7	H	155	110
7440.000	44.08	-32.2	35.8	40.45	74.0	29.9	H	155	44
9920.000	46.78	-29.7	37.1	39.33	74.0	27.2	H	155	22
12400.000	45.98	-30.0	39.1	36.96	74.0	28.0	V	155	0

π/4 DQPSK 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)	Antenna Height (cm)	Turntable angle (deg)
2369.640	59.75	2.9	32.0	24.94	74.0	14.3	V	155	44
2359.210	60.45	2.8	31.9	25.65	74.0	13.6	H	155	66
4804.000	44.28	-35.0	34.1	45.22	74.0	29.7	H	155	88
7206.000	42.92	-32.4	35.8	39.51	74.0	31.1	V	155	110
9608.000	47.99	-29.7	36.7	40.92	74.0	26.0	V	155	132
12010.000	45.84	-30.5	38.9	37.43	74.0	28.2	H	155	154

π/4 DQPSK Ch 39 - 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)	Antenna Height (cm)	Turntable angle (deg)
2380.600	49.38	-26.0	32.0	43.48	74.0	24.6	H	155	22
2496.400	48.07	-25.1	32.0	41.15	74.0	25.9	H	155	66
4882.000	42.20	-35.5	34.1	43.65	74.0	31.8	V	155	88
7323.000	44.54	-31.3	35.8	40.06	74.0	29.5	V	155	0
9764.000	44.66	-31.4	36.9	39.15	74.0	29.3	H	155	110
12205.000	48.67	-28.8	39.0	38.53	74.0	25.3	H	155	132

π/4 DQPSK Ch 78 - 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)	Antenna Height (cm)	Turntable angle (deg)
2483.905	59.76	2.9	32.0	24.83	74.0	14.2	H	155	0
2484.675	59.88	2.9	32.0	24.95	74.0	14.1	H	155	22
4960.000	41.31	-34.9	34.1	42.10	74.0	32.7	V	155	308
7440.000	42.13	-32.2	35.8	38.50	74.0	31.9	H	155	44
9920.000	47.32	-29.7	37.1	39.88	74.0	26.7	V	155	66
12400.000	46.22	-30.0	39.1	37.19	74.0	27.8	H	155	88

8DPSK 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)	Antenna Height (cm)	Turntable angle (deg)
2387.028	59.96	2.9	32.0	25.14	74.0	14.0	H	155	0
2371.488	59.61	2.9	32.0	24.80	74.0	14.4	H	155	44
4804.000	41.70	-35.0	34.1	42.64	74.0	32.3	V	155	88
7206.000	43.30	-32.4	35.8	39.89	74.0	30.7	V	155	44
9608.000	47.61	-29.7	36.7	40.54	74.0	26.4	V	155	66
12010.000	46.32	-30.5	38.9	37.91	74.0	27.7	H	155	88

8DPSK Ch 39 - 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)	Antenna Height (cm)	Turntable angle (deg)
2372.400	47.10	-26.8	32.0	41.98	74.0	26.9	H	155	22
2499.000	48.42	-26.1	32.0	42.52	74.0	25.6	H	155	44
4882.000	40.89	-35.5	34.1	42.33	74.0	33.1	V	155	0
7323.000	45.75	-31.3	35.8	41.26	74.0	28.2	H	155	0
9764.000	44.86	-31.4	36.9	39.34	74.0	29.1	V	155	22
12205.000	47.29	-28.8	39.0	37.15	74.0	26.7	H	155	176

8DPSK Ch 78 - 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)	Antenna Height (cm)	Turntable angle (deg)
2483.690	59.79	2.9	32.0	24.86	74.0	14.2	H	155	264
2483.910	59.53	2.9	32.0	24.60	74.0	14.5	H	155	286
4960.000	42.32	-34.9	34.1	43.11	74.0	31.7	V	155	22
7440.000	42.49	-32.2	35.8	38.86	74.0	31.5	V	155	176
9920.000	47.35	-29.7	37.1	39.91	74.0	26.6	H	155	198
12400.000	46.92	-30.0	39.1	37.89	74.0	27.1	H	155	0

Conclusion: PASS

Test graphs as below:

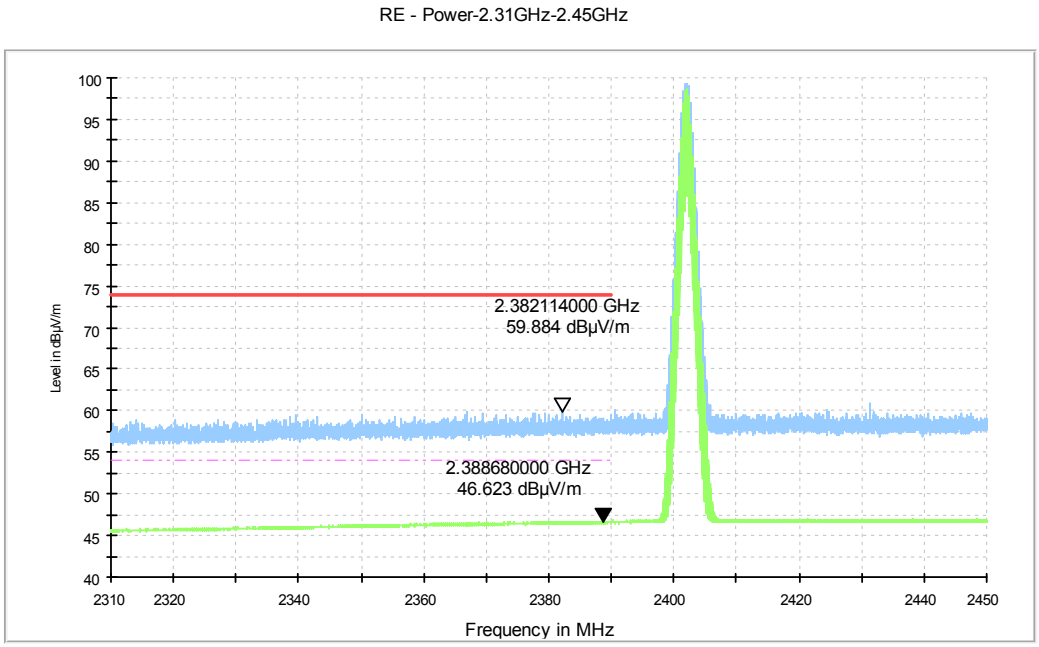


Fig.58. Radiated emission (Power): GFSK, low channel

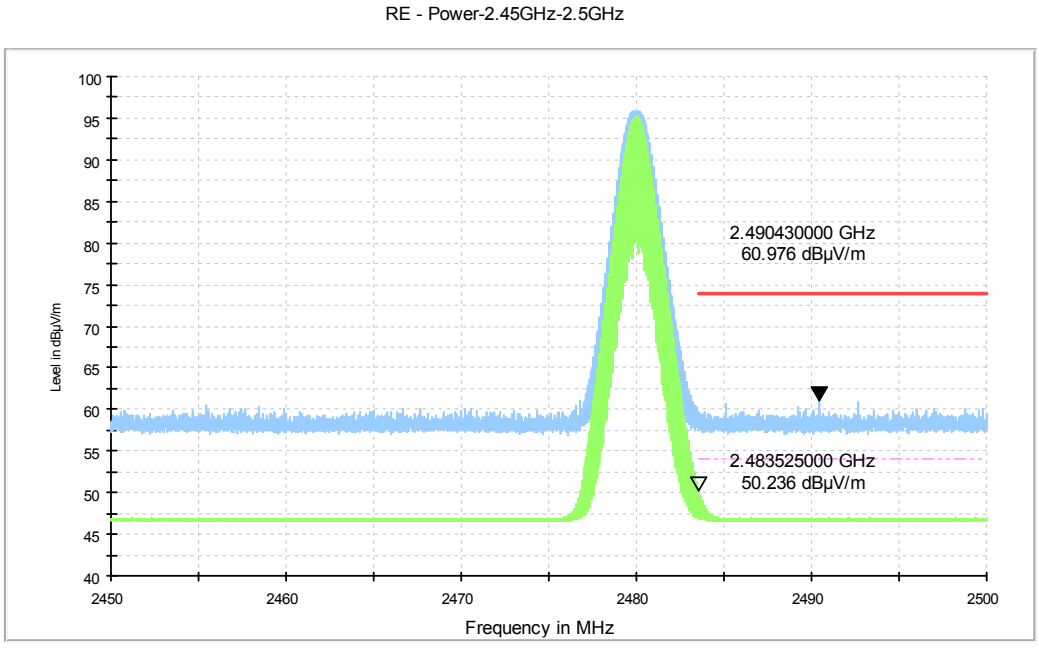


Fig.59. Radiated emission (Power) GFSK, high channel

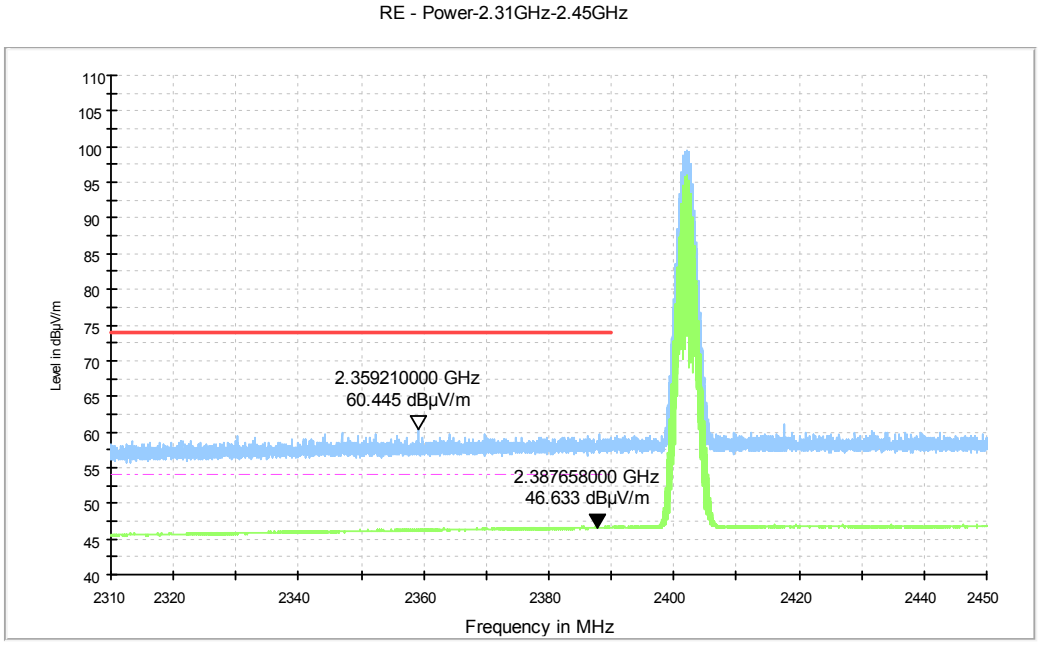


Fig.60. Radiated emission (Power): π/4 DQPSK, low channel

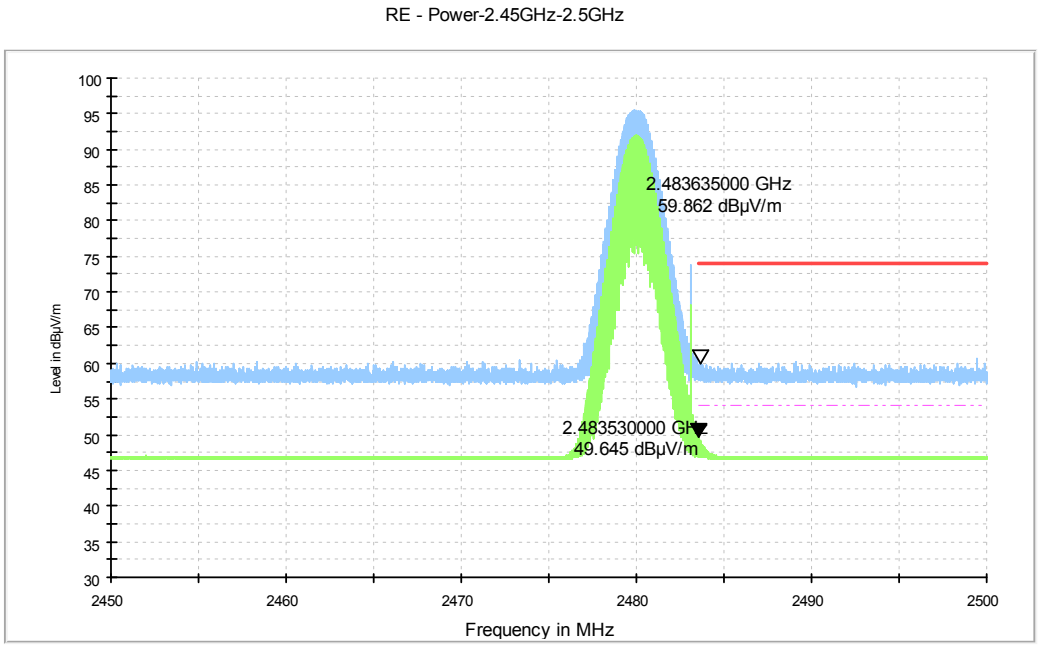


Fig.61. Radiated emission (Power): π/4 DQPSK, high channel

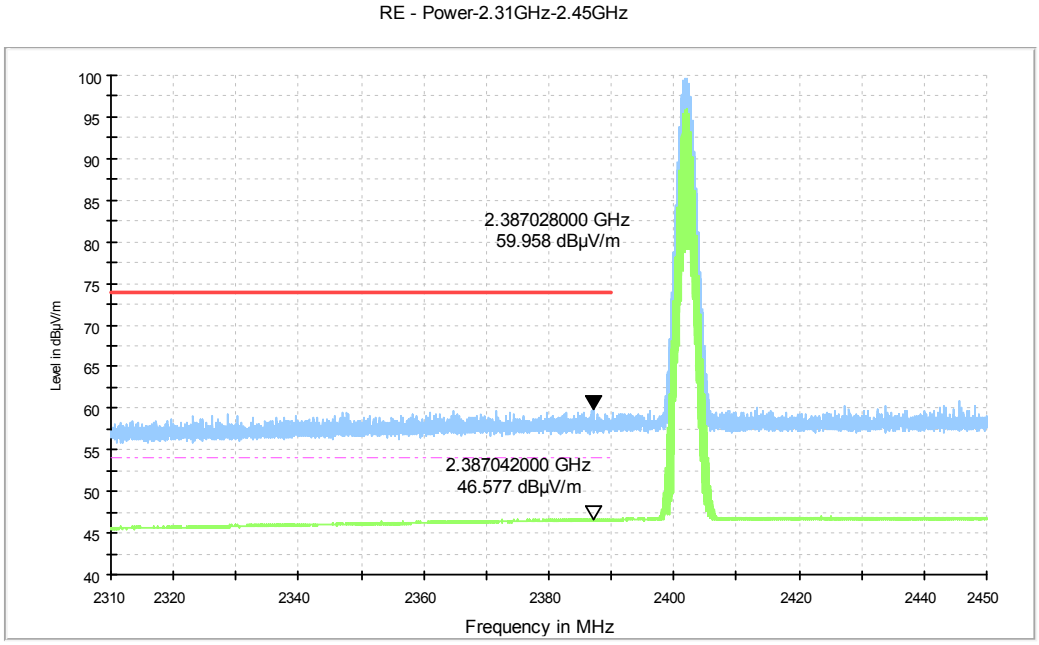


Fig.62. Radiated emission (Power): 8DPSK, low channel

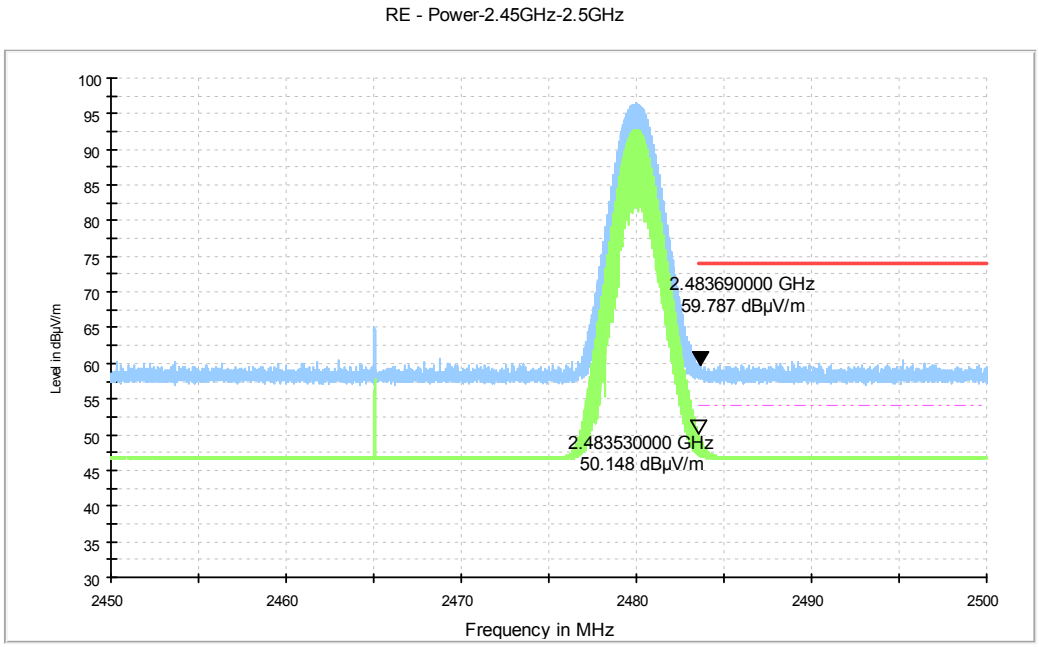


Fig.63. Radiated emission (Power): 8DPSK, high channel

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 ≥ 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	121.59	P
		Fig.65		
	DH3	Fig.66	165.35	P
		Fig.67		
	DH5	Fig.68	213.52	P
		Fig.69		

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.70	123.82	P
		Fig.71		
	2DH3	Fig.72	158.99	P
		Fig.73		
	2DH5	Fig.74	181.91	P
		Fig.75		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.76	123.82	P
		Fig.77		

	3DH3	Fig.78	199.83	P
		Fig.79		
	3DH5	Fig.80	179.13	P
		Fig.81		

Conclusion: PASS

Test graphs as below:

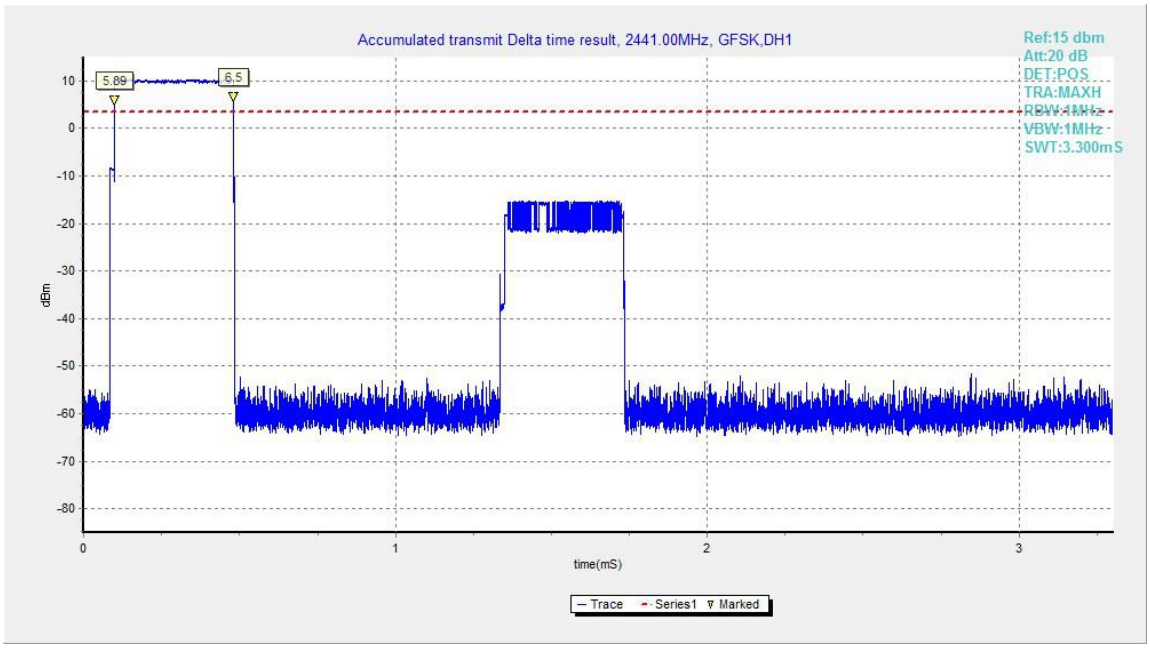


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

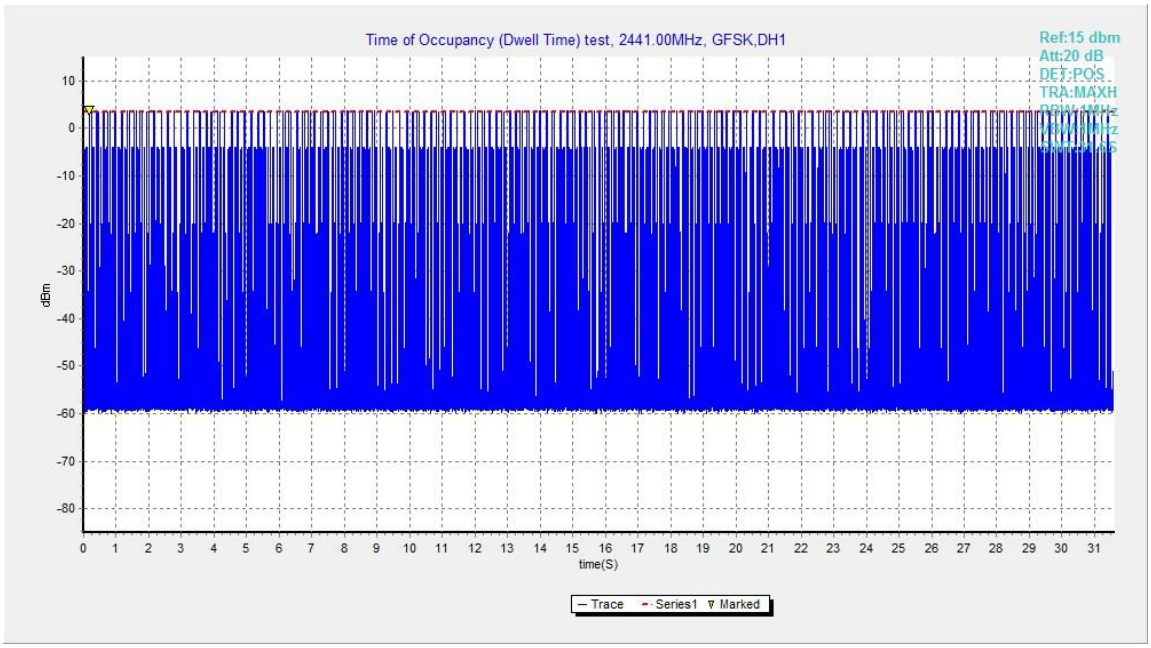


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

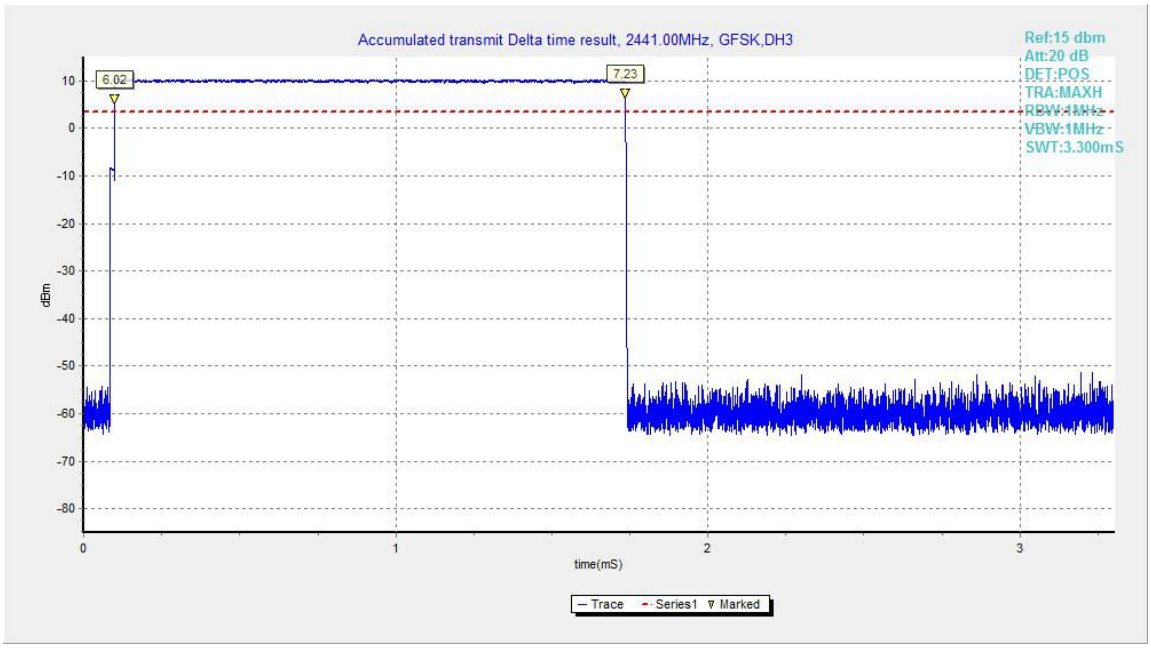


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

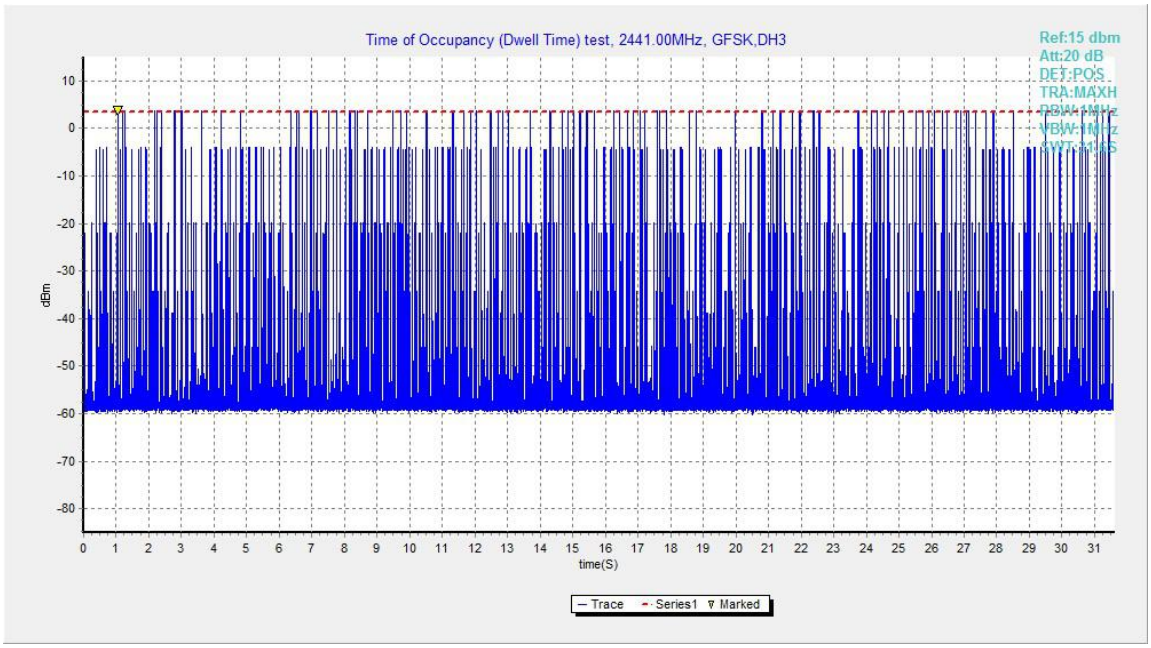


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

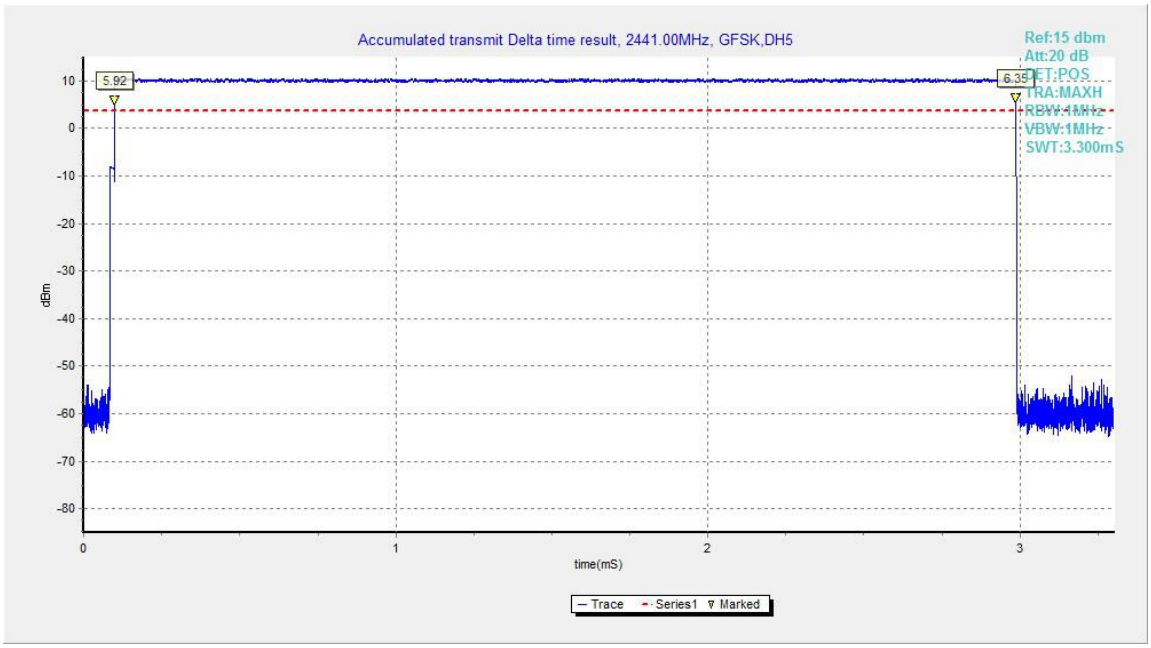


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

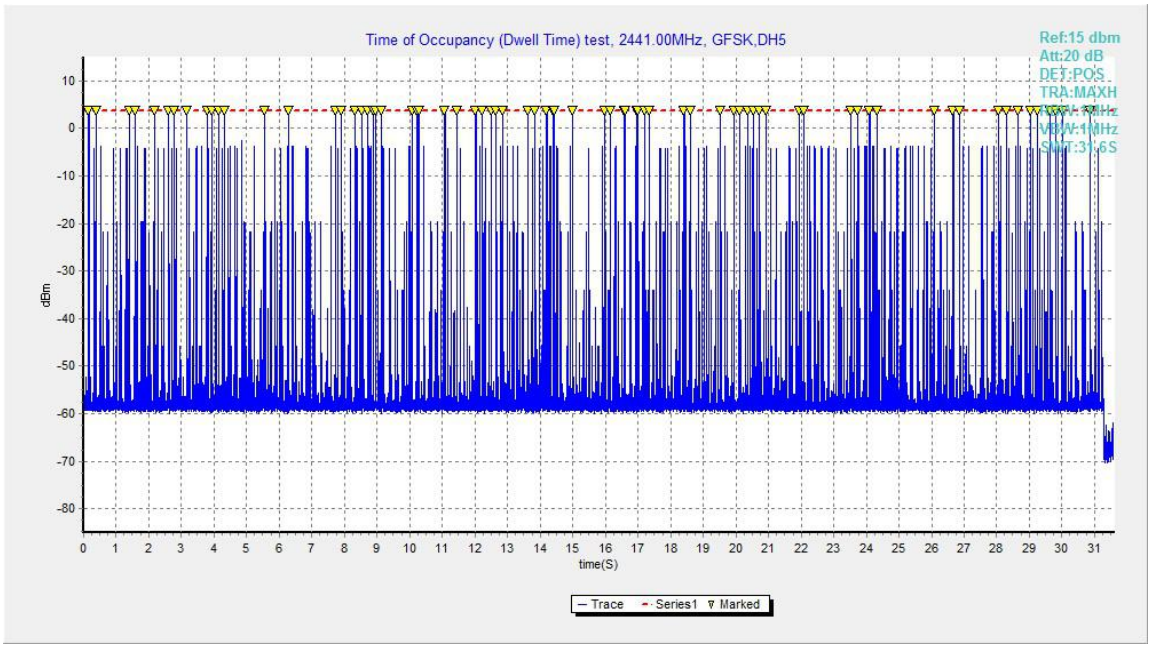


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

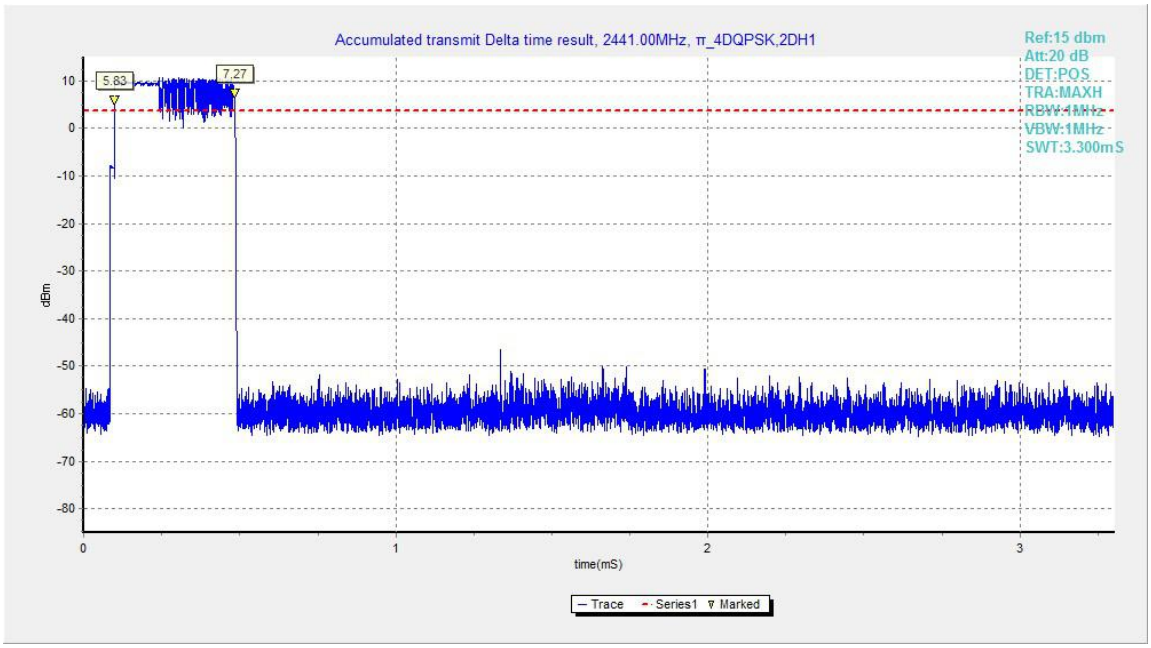


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

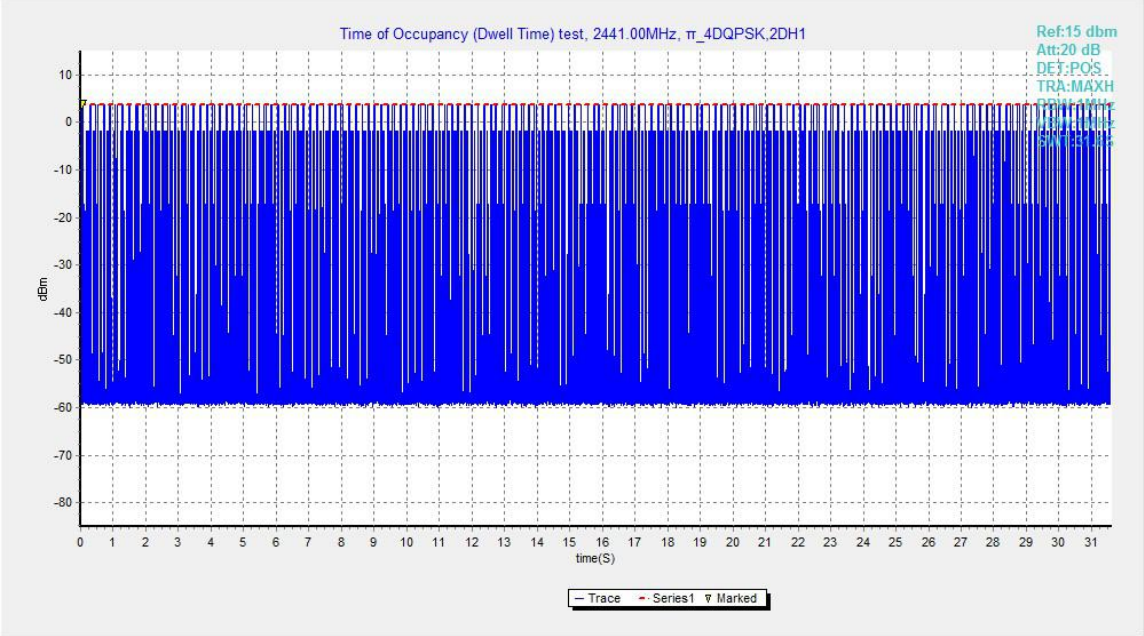


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

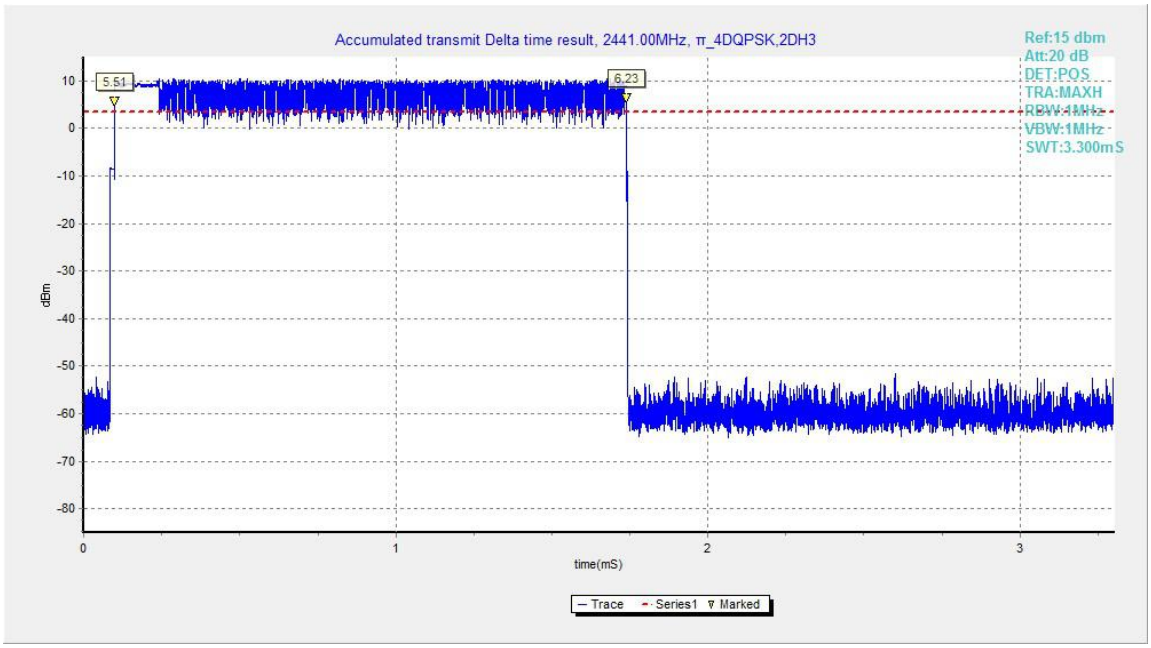


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

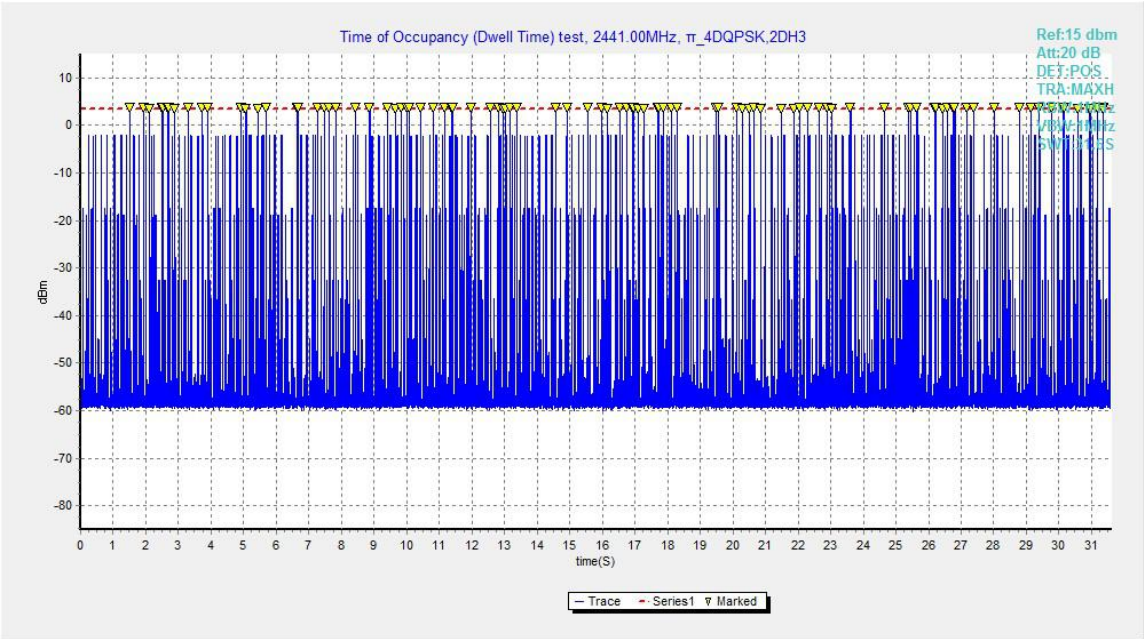


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

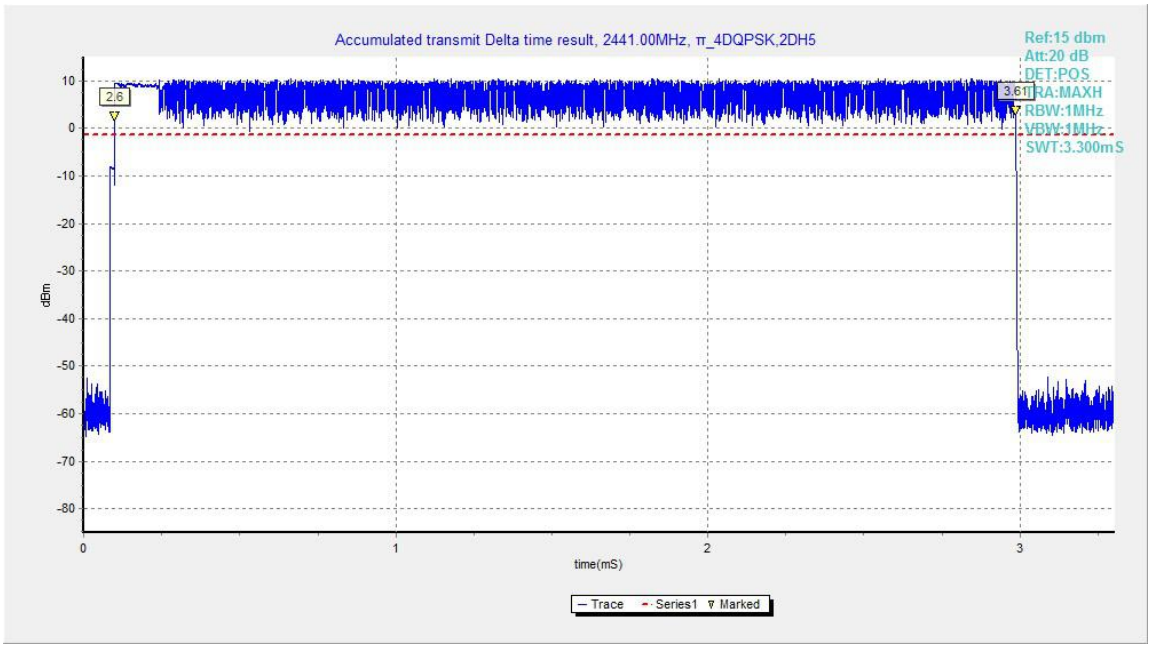


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

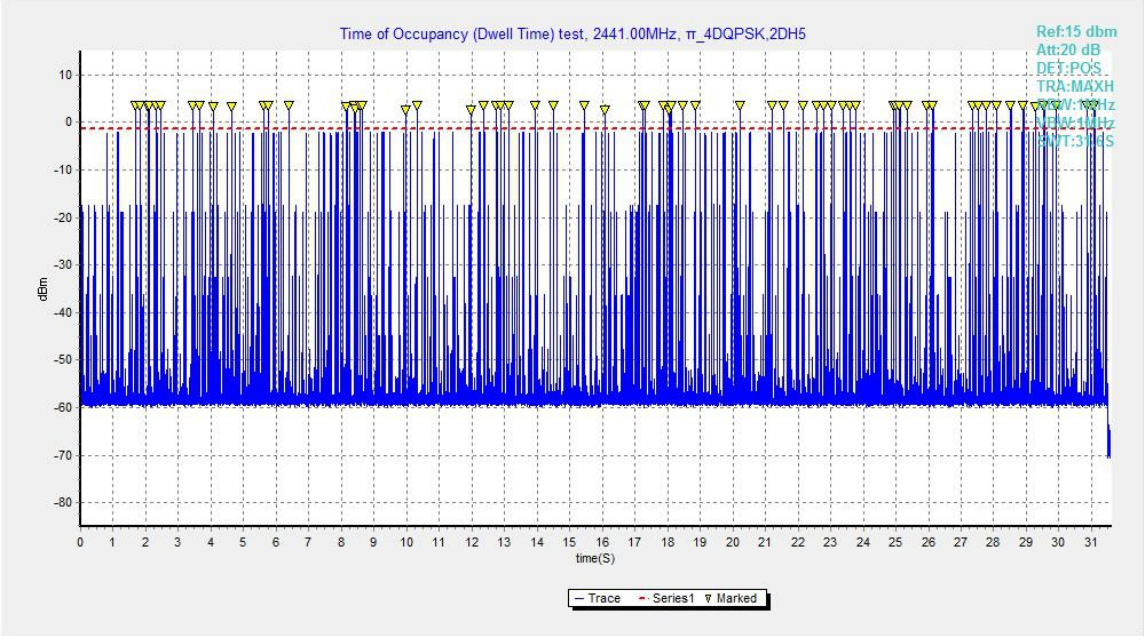


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

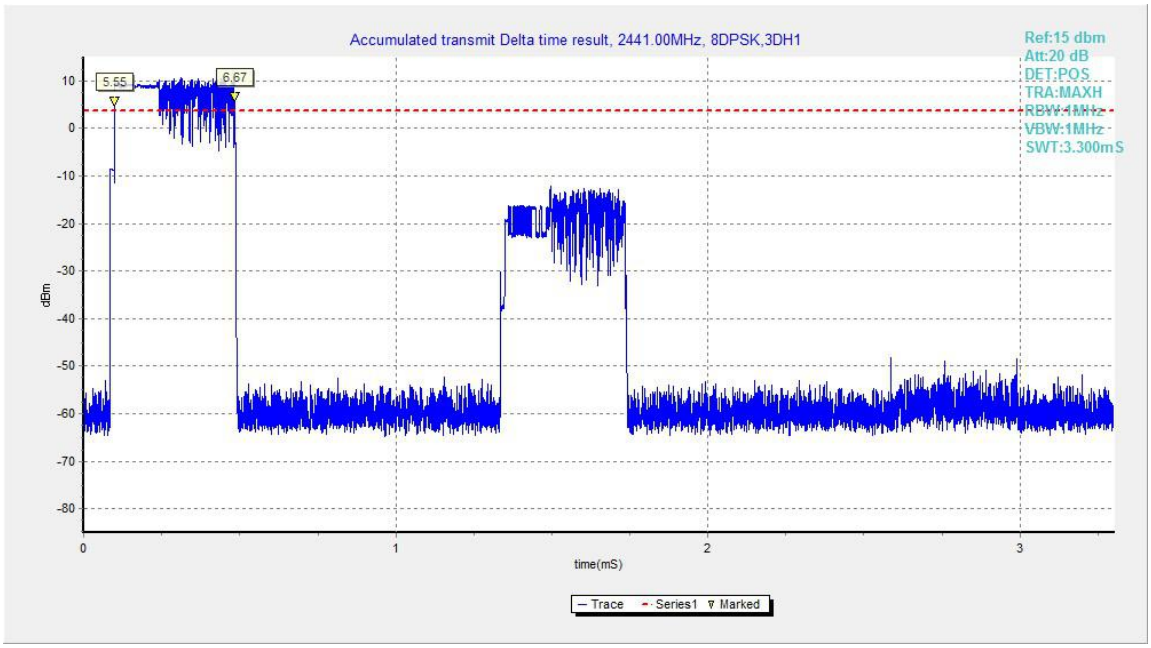


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

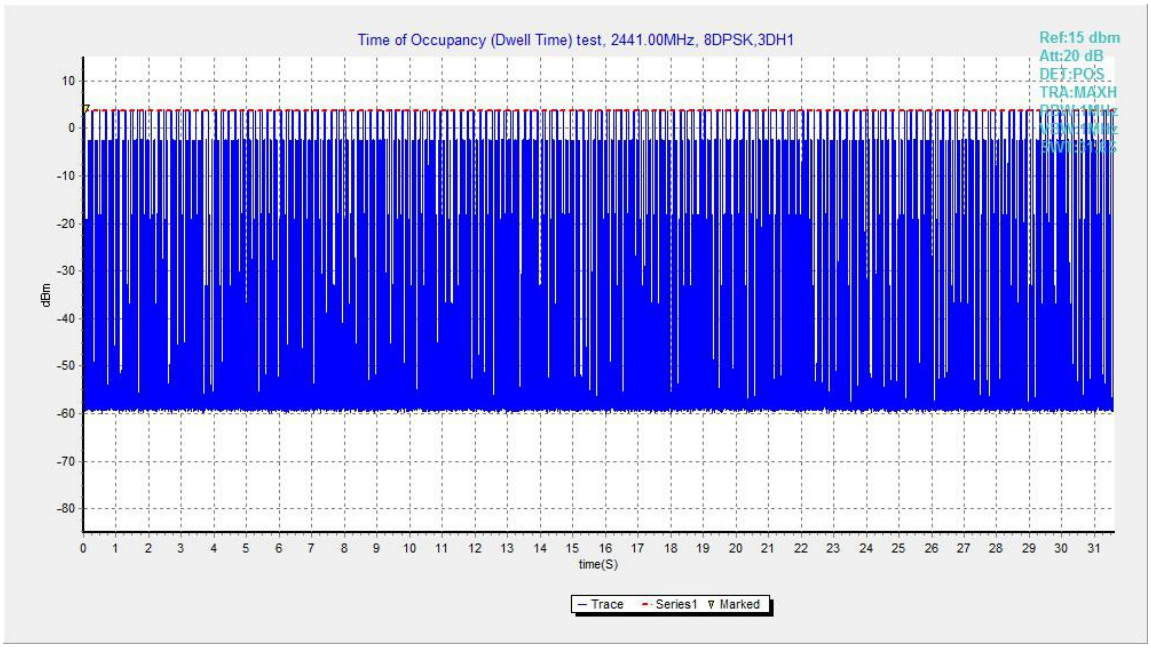


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

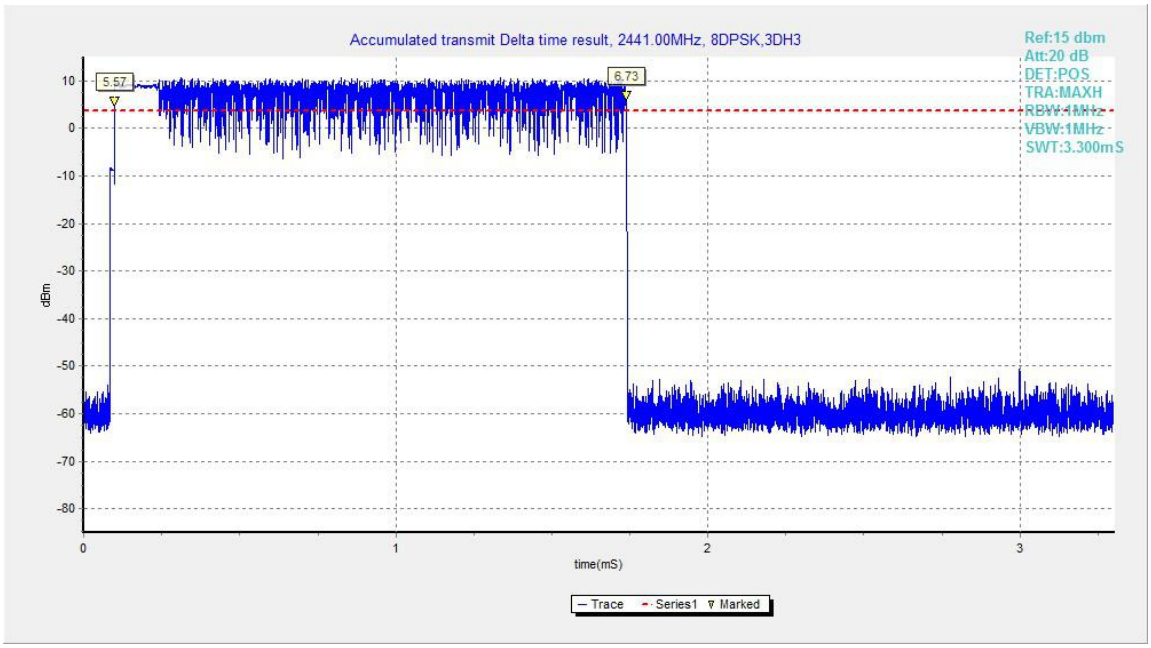


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

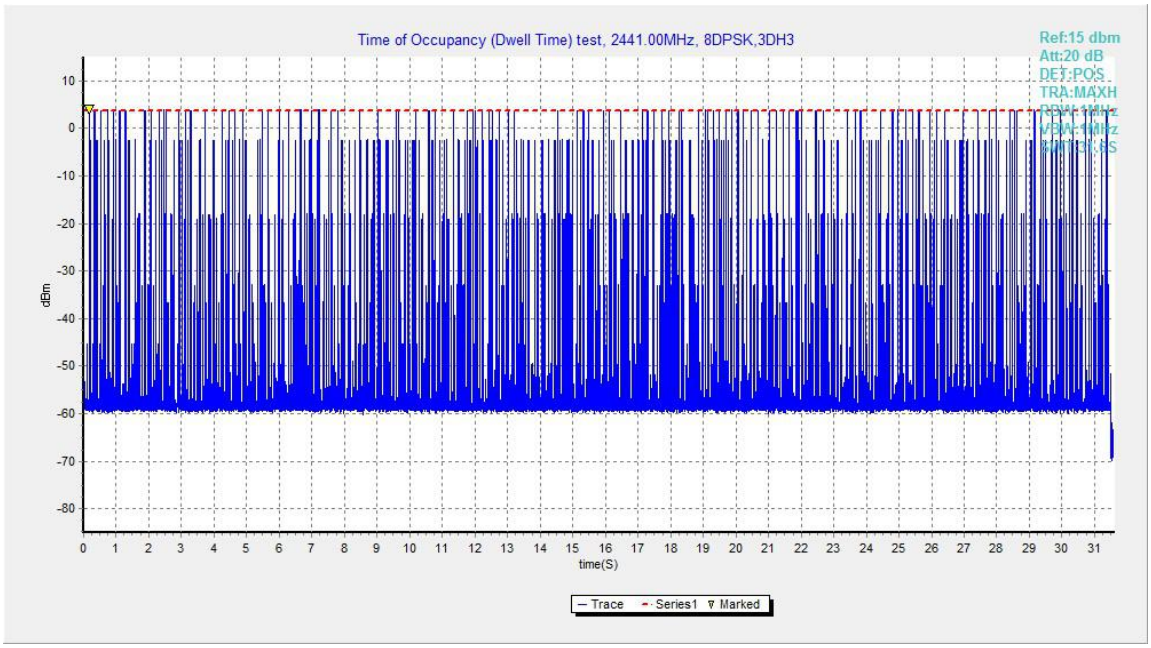


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

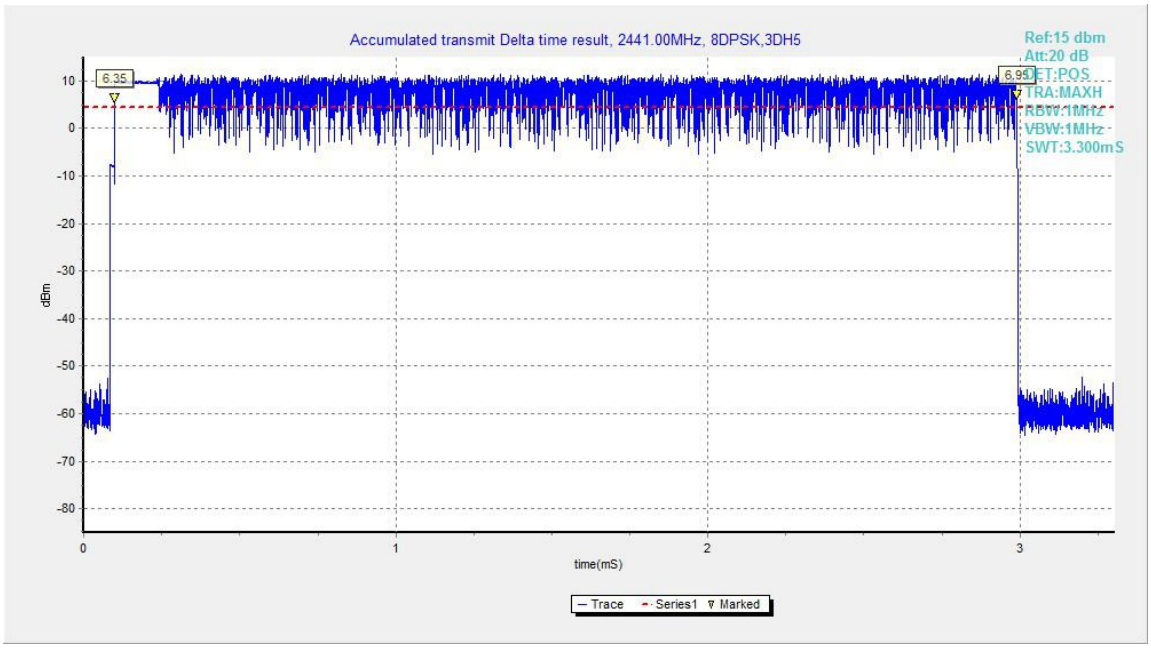


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

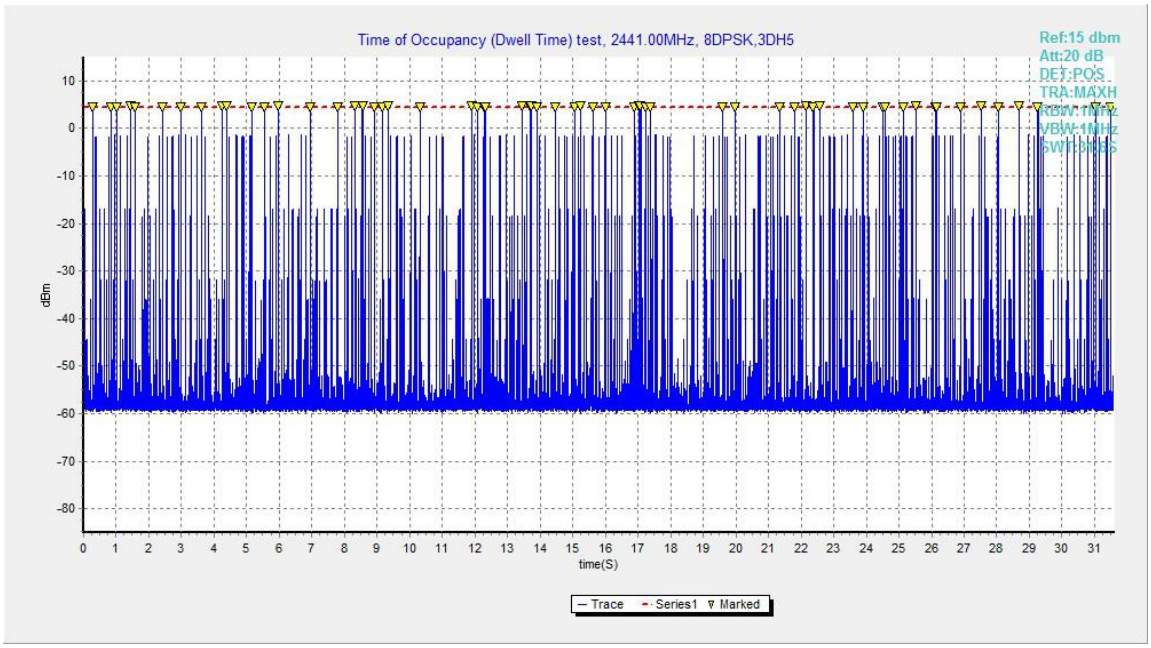


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

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	943.50	NA
39	Fig.83	945.00	NA
78	Fig.84	942.75	NA

For π/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1314.75	NA
39	Fig.86	1278.00	NA
78	Fig.87	1280.25	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1276.50	NA
39	Fig.89	1278.00	NA
78	Fig.90	1276.50	NA

Conclusion: NA

Test graphs as below:

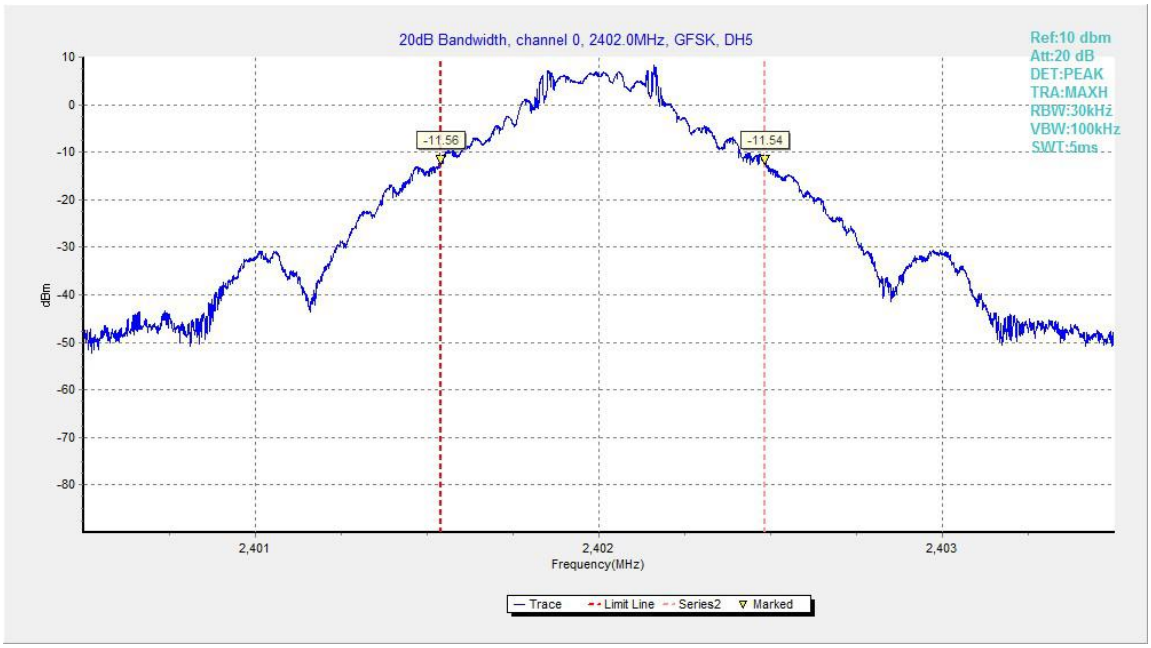


Fig.82. 20dB Bandwidth: GFSK, Channel 0

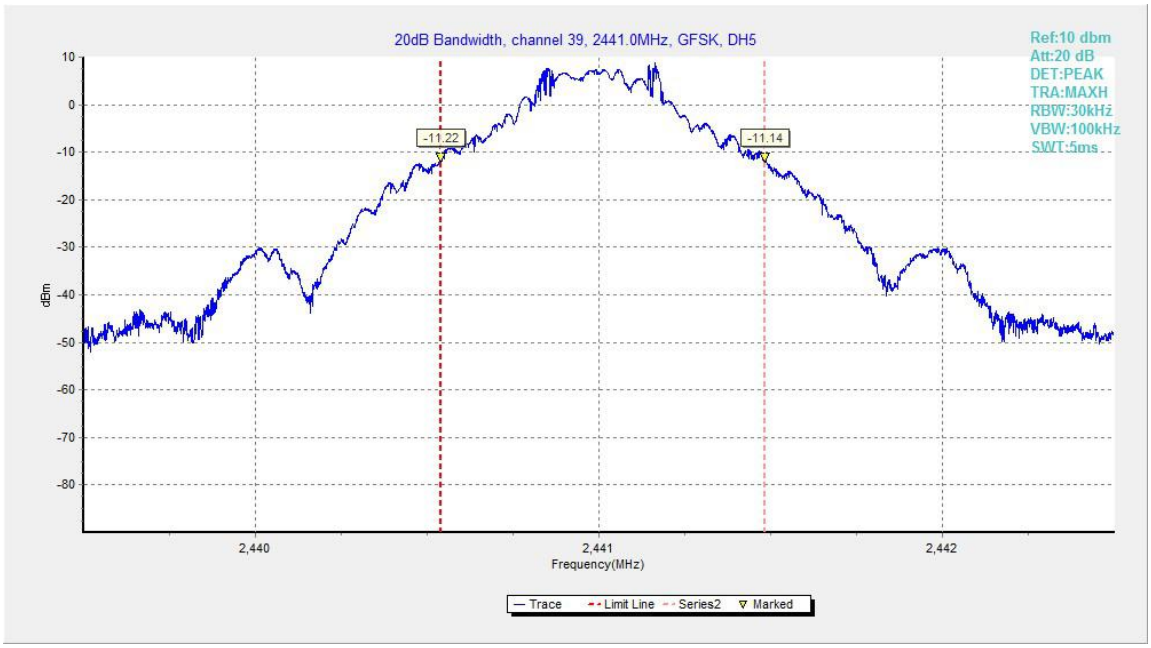


Fig.83. 20dB Bandwidth: GFSK, Channel 39

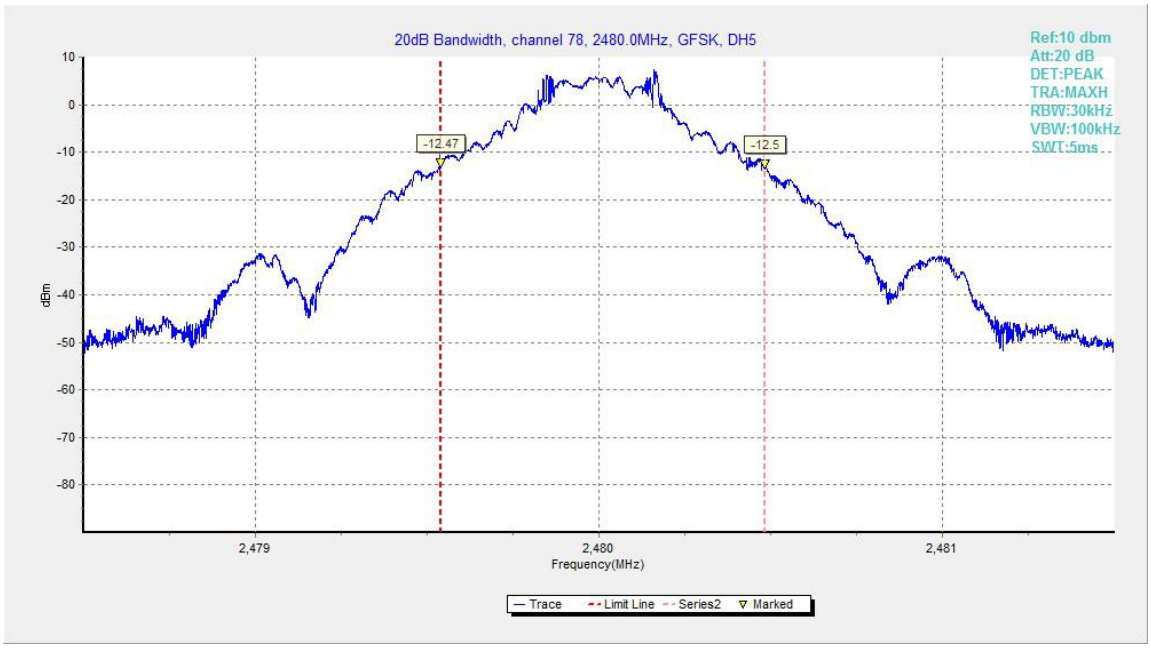


Fig.84. 20dB Bandwidth: GFSK, Channel 78

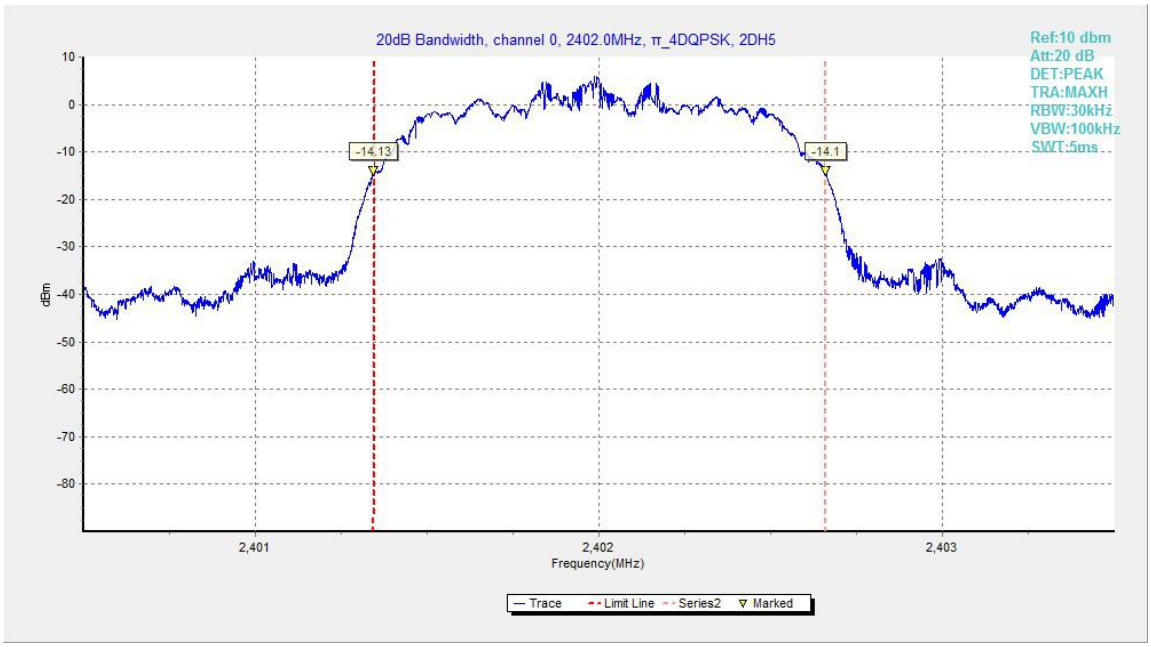


Fig.85. 20dB Bandwidth: π/4 DQPSK, Channel 0

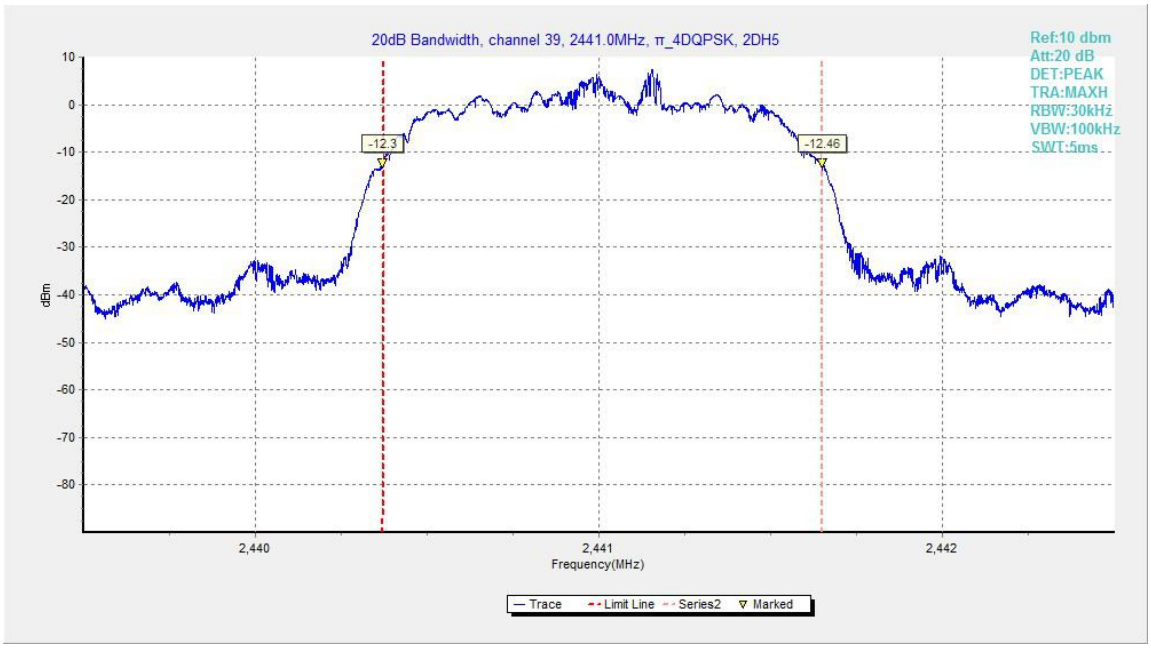


Fig.86. 20dB Bandwidth: π/4 DQPSK, Channel 39

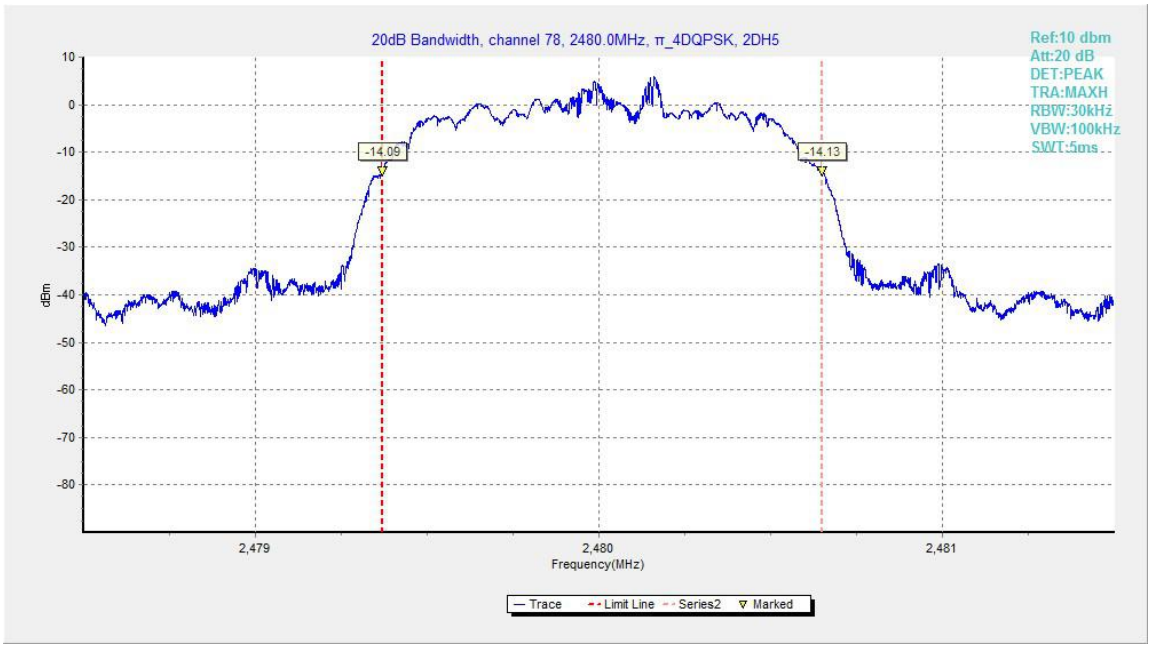


Fig.87. 20dB Bandwidth: π/4 DQPSK, Channel 78

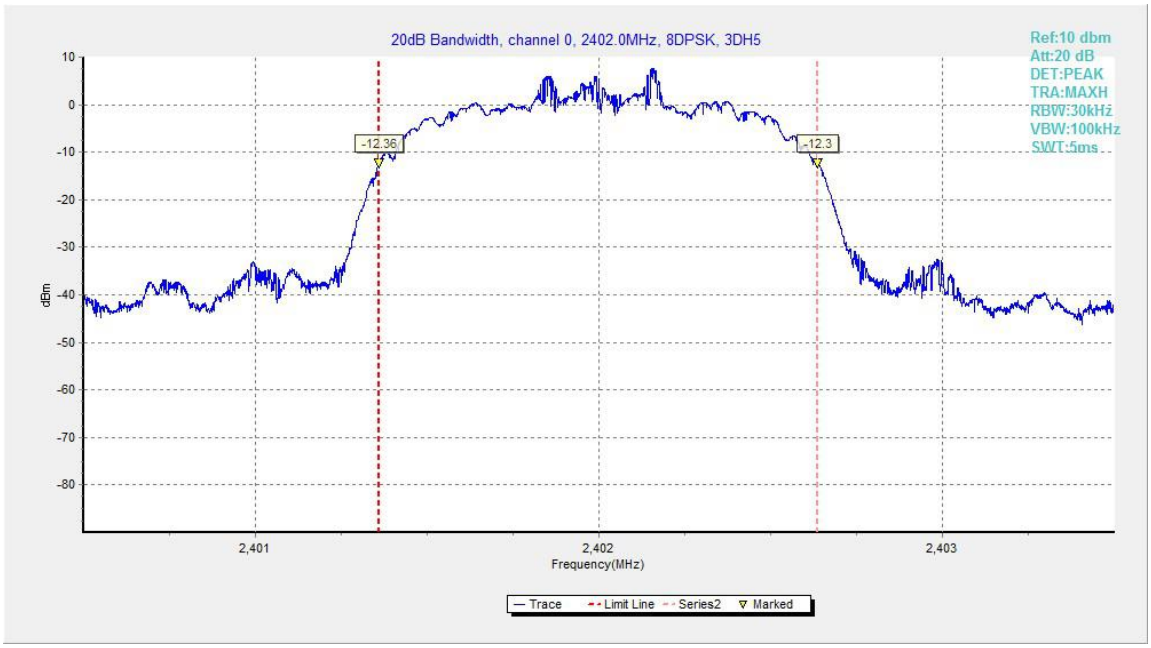


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

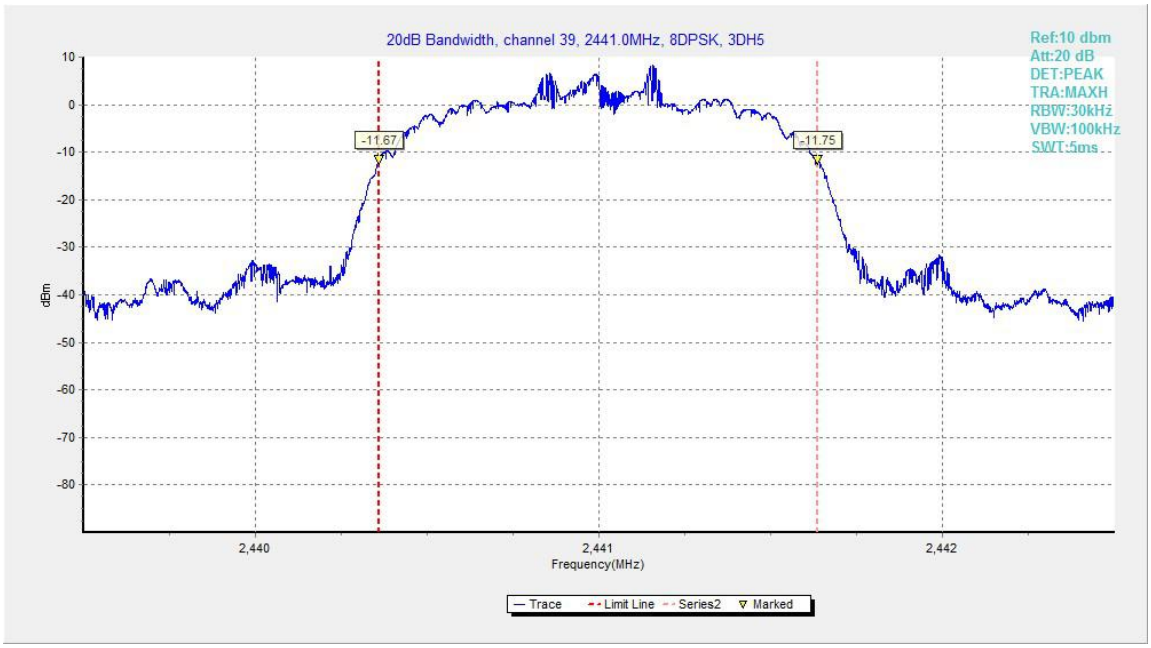


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

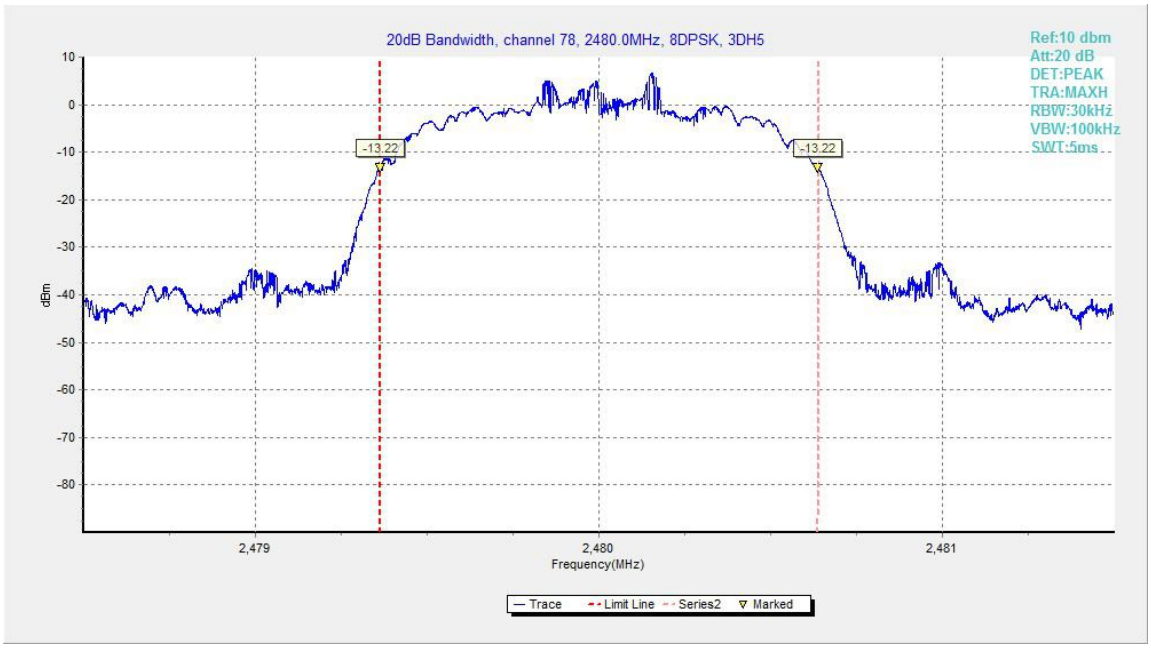


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

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) * 20dB bandwidth, whichever is greater.

Measurement Limit:

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

Measurement Result:

For GFSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.91	1018.50	P

For π/4 DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.92	1026.00	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.93	970.50	P

Conclusion: PASS

Test graphs as below:

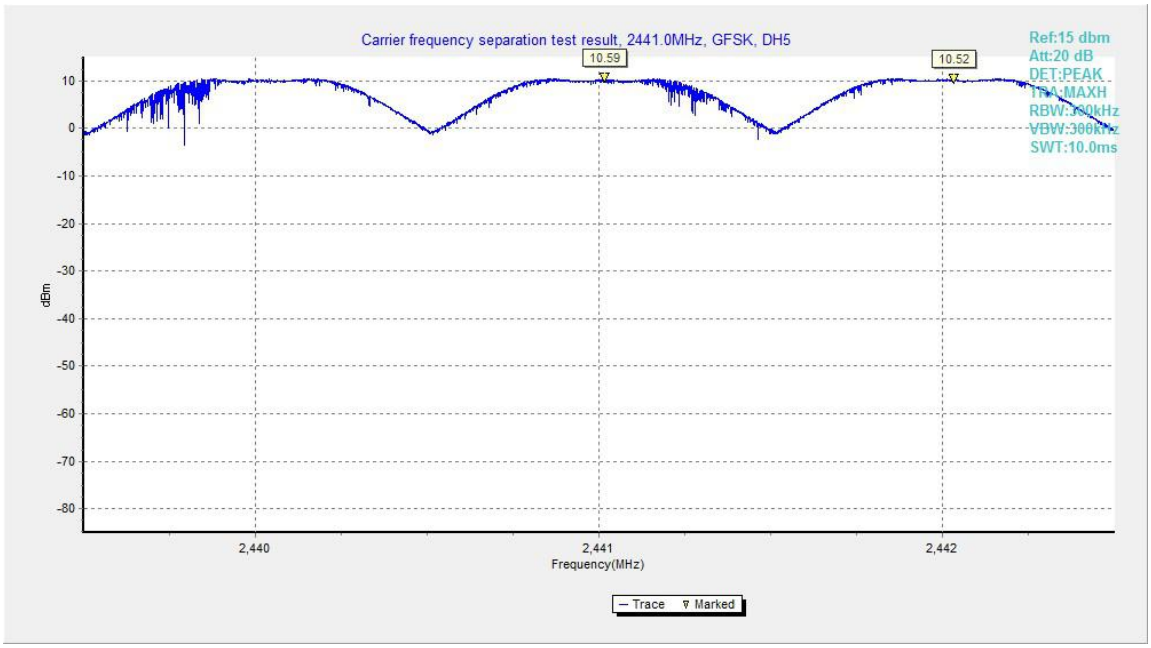


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

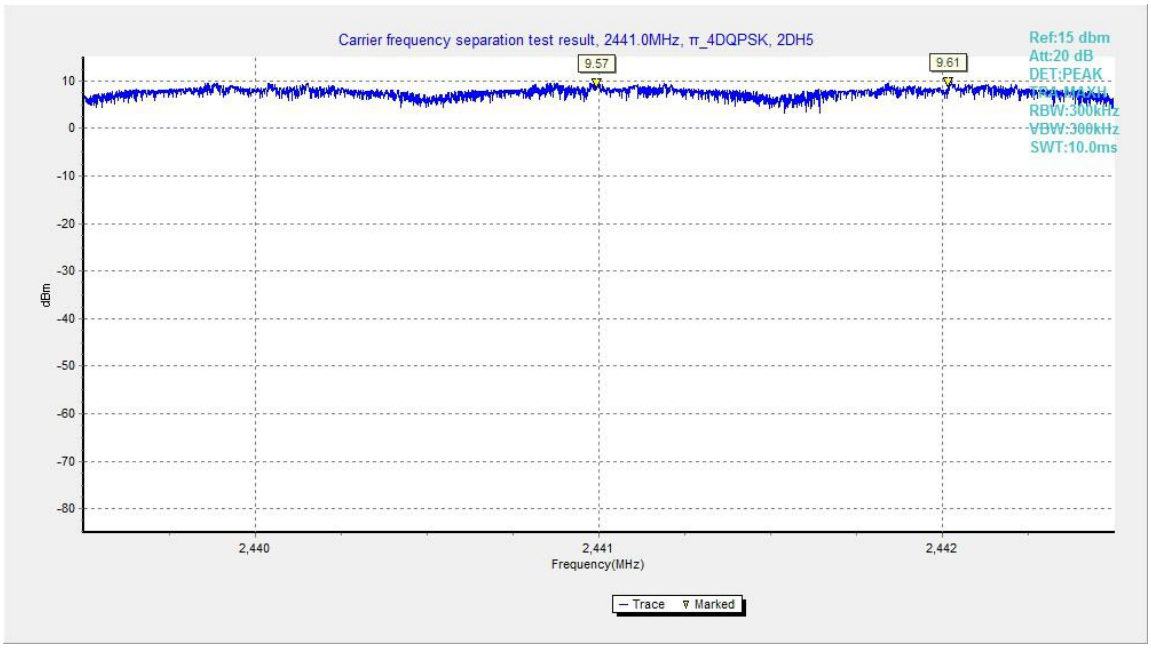


Fig.92. Carrier frequency separation measurement: π/4 DQPSK, Channel 39

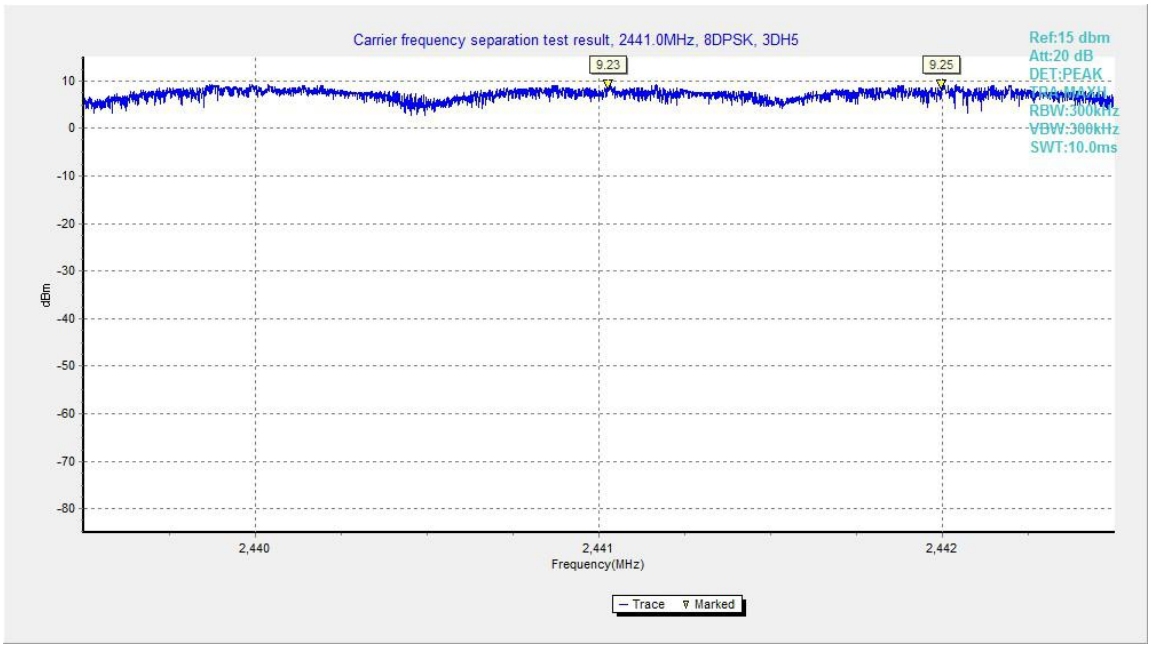


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

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	79	P
40~78	Fig.95		

Forπ/4 DQPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.96	79	P
40~78	Fig.97		

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.98	79	P
40~78	Fig.99		

Conclusion: PASS

Test graphs as below:

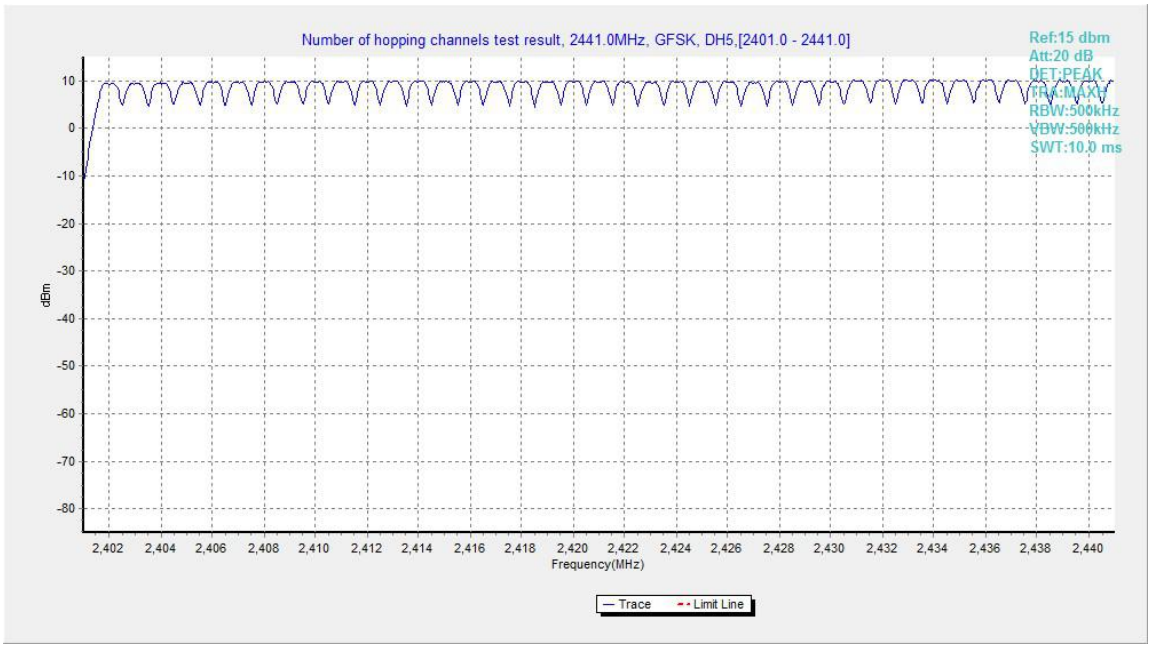


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

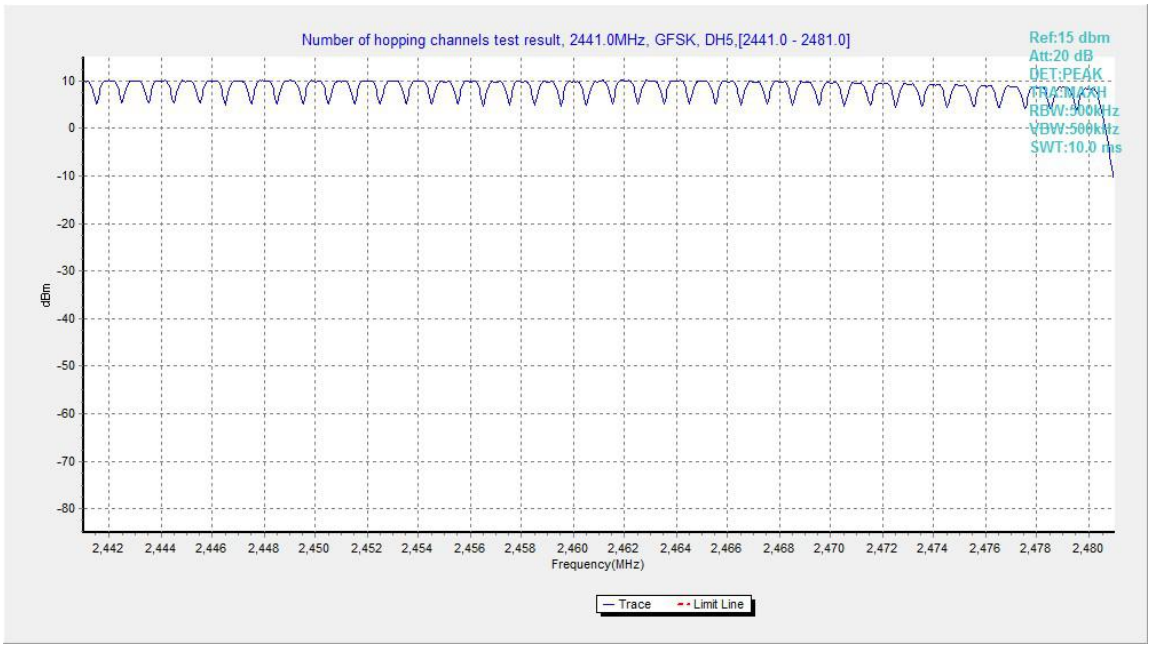


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

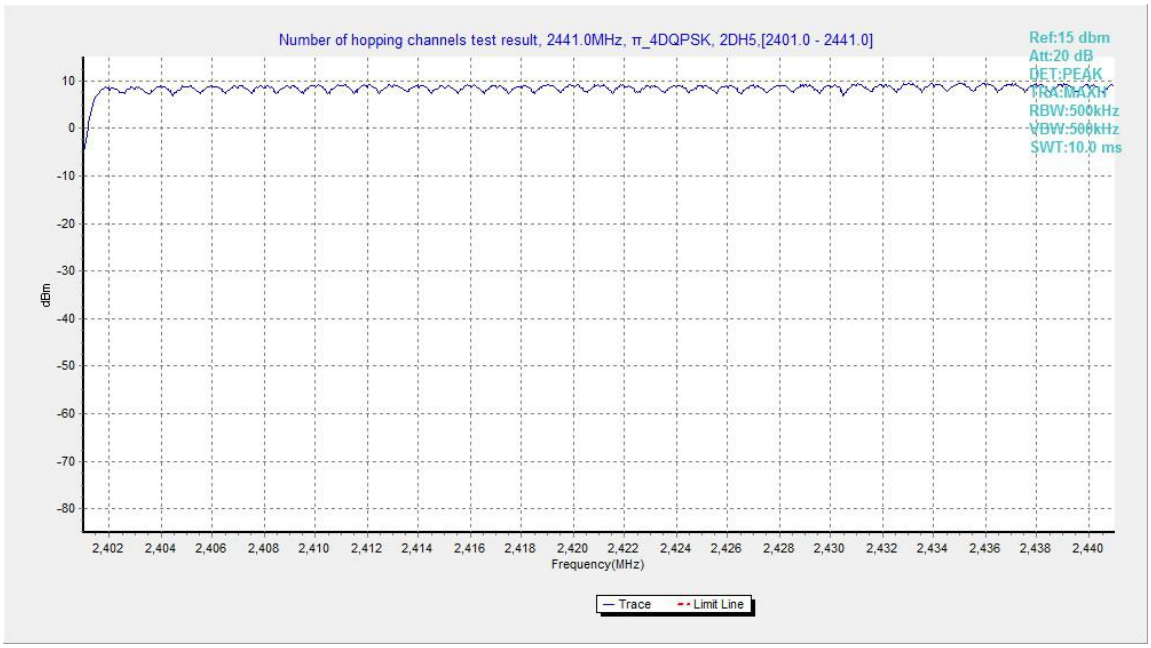


Fig.96. Number of hopping frequencies: π/4 DQPSK, Channel 0 - 39

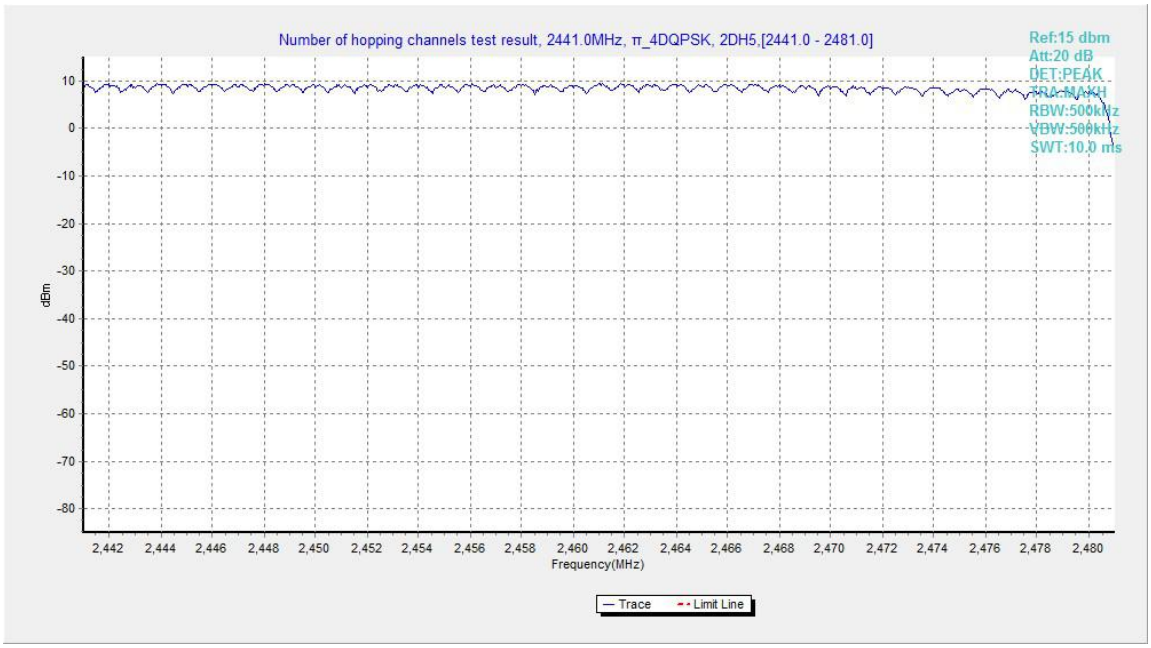


Fig.97. Number of hopping frequencies: π/4 DQPSK, Channel 40 - 78

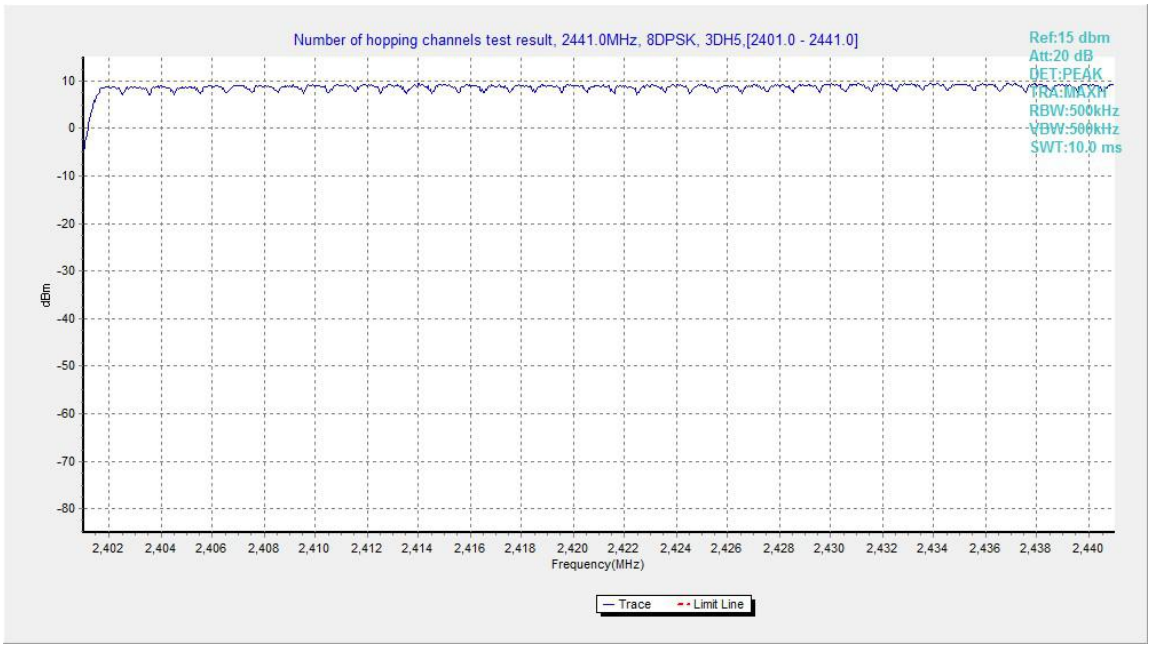


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

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.36 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 (dBμV)	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)

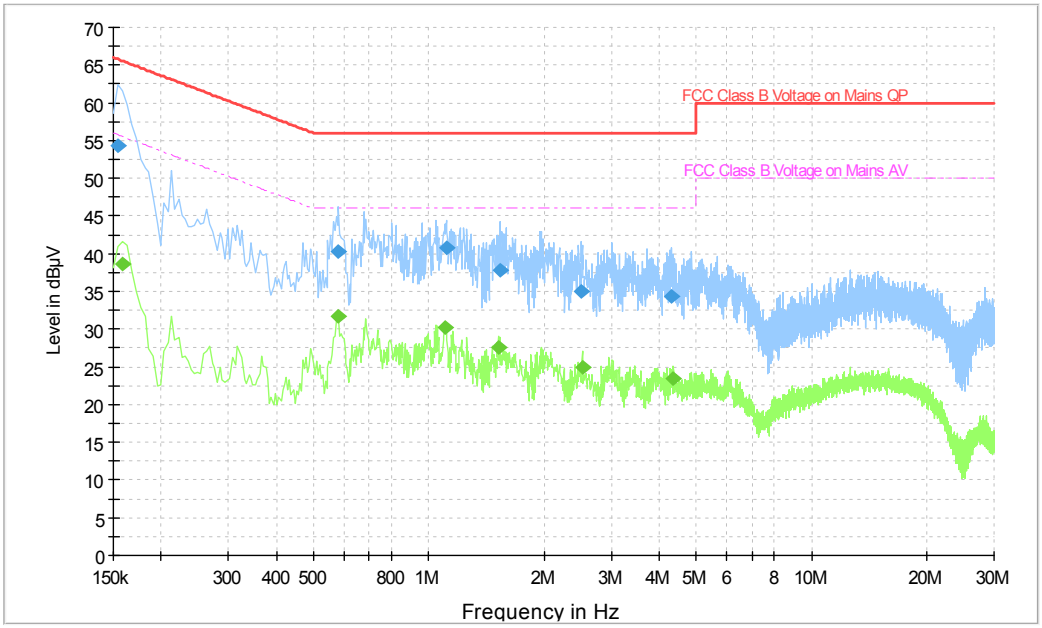
Frequency range (MHz)	Average Limit (dBμV)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.		

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

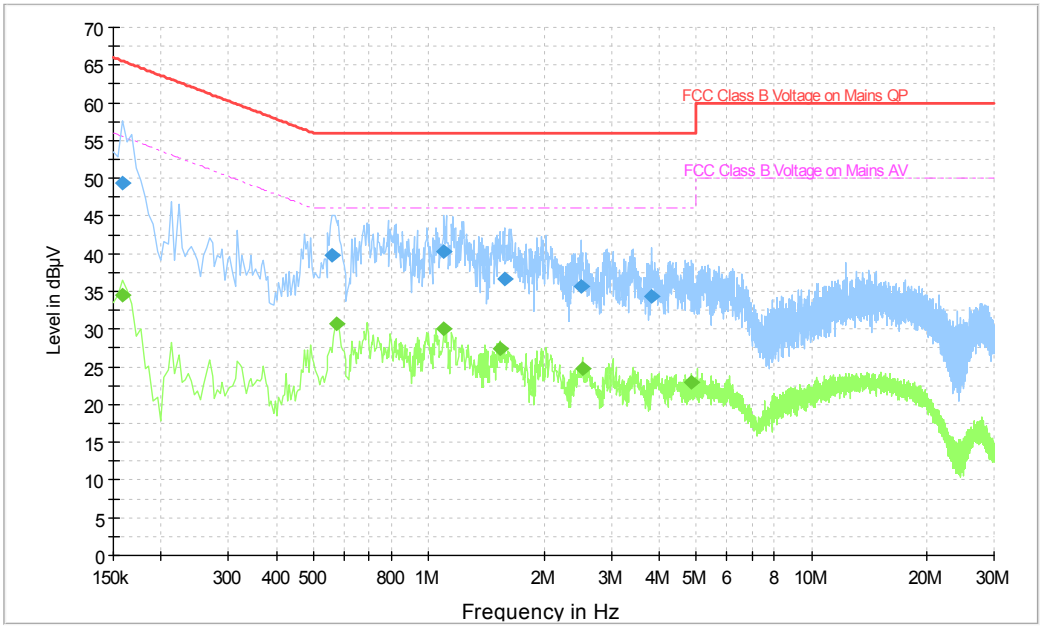
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154500	54.3	1000.0	9.000	On	L1	29.7	11.5	65.8
0.582000	40.4	1000.0	9.000	On	L1	19.8	15.6	56.0
1.113000	40.8	1000.0	9.000	On	L1	19.7	15.2	56.0
1.536000	37.8	1000.0	9.000	On	L1	19.6	18.2	56.0
2.499000	35.0	1000.0	9.000	On	L1	19.6	21.0	56.0
4.317000	34.3	1000.0	9.000	On	L1	19.6	21.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	38.6	1000.0	9.000	On	L1	28.7	16.9	55.5
0.577500	31.7	1000.0	9.000	On	L1	19.8	14.3	46.0
1.099500	30.2	1000.0	9.000	On	L1	19.7	15.8	46.0
1.518000	27.5	1000.0	9.000	On	L1	19.6	18.5	46.0
2.517000	24.8	1000.0	9.000	On	L1	19.6	21.2	46.0
4.366500	23.5	1000.0	9.000	On	L1	19.6	22.5	46.0

Note: The measurement results showed here are worst cases of the combinations of different USB cables.

Idle (With AE3):



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

Final Result 1

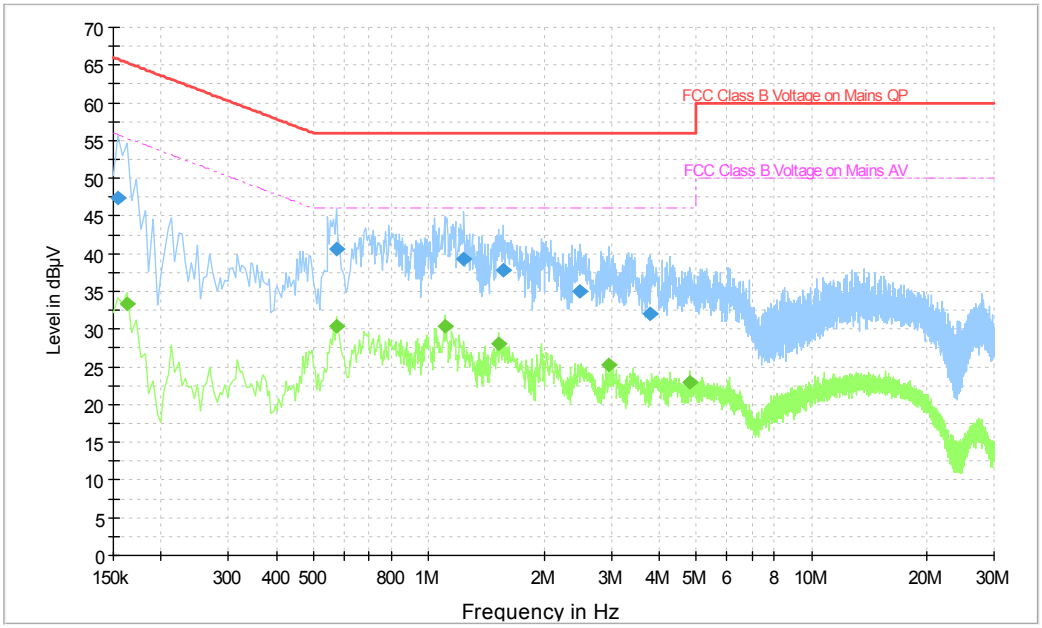
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	49.3	1000.0	9.000	On	N	28.7	16.2	65.5
0.559500	39.8	1000.0	9.000	On	L1	19.8	16.2	56.0
1.095000	40.3	1000.0	9.000	On	L1	19.7	15.7	56.0
1.576500	36.7	1000.0	9.000	On	L1	19.6	19.3	56.0
2.499000	35.7	1000.0	9.000	On	L1	19.6	20.3	56.0
3.826500	34.3	1000.0	9.000	On	L1	19.6	21.7	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	34.4	1000.0	9.000	On	N	28.7	21.1	55.5
0.573000	30.7	1000.0	9.000	On	L1	19.8	15.3	46.0
1.095000	30.0	1000.0	9.000	On	L1	19.7	16.0	46.0
1.536000	27.4	1000.0	9.000	On	L1	19.6	18.6	46.0
2.517000	24.8	1000.0	9.000	On	L1	19.6	21.2	46.0
4.875000	23.0	1000.0	9.000	On	L1	19.6	23.0	46.0

Note: The measurement results showed here are worst cases of the combinations of different USB cables.

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)
0.154500	47.3	1000.0	9.000	On	L1	29.7	18.4	65.8
0.573000	40.7	1000.0	9.000	On	L1	19.8	15.3	56.0
1.234500	39.3	1000.0	9.000	On	L1	19.6	16.7	56.0
1.567500	37.8	1000.0	9.000	On	L1	19.6	18.2	56.0
2.490000	34.9	1000.0	9.000	On	L1	19.6	21.1	56.0
3.799500	32.0	1000.0	9.000	On	L1	19.6	24.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	33.4	1000.0	9.000	On	L1	27.7	21.9	55.3
0.573000	30.4	1000.0	9.000	On	L1	19.8	15.6	46.0
1.099500	30.4	1000.0	9.000	On	L1	19.7	15.6	46.0
1.518000	28.0	1000.0	9.000	On	L1	19.6	18.0	46.0
2.967000	25.2	1000.0	9.000	On	L1	19.6	20.8	46.0
4.821000	22.9	1000.0	9.000	On	L1	19.6	23.1	46.0

Note: The measurement results showed here are worst cases of the combinations of different USB cables.

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

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 Communique dated January 2009).

2019-09-26 through 2020-09-30
Effective Dates

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program

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