



For all channels	18 GHz ~ 26 GHz	/	P
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**For  $\pi/4$  DQPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	/	P
	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Power	2.38GHz~2.4GHz---L	Fig.60	P
Power	2.45GHz~2.5GHz---H	Fig.61	P
For all channels	18 GHz ~ 26 GHz	/	P

**For 8DPSK**

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Ch 39 2441 MHz	30 MHz ~ 1 GHz	/	P
	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Ch 78 2480 MHz	1 GHz ~ 3 GHz	/	P
	3 GHz ~ 18 GHz	/	P
Power	2.38GHz~2.4GHz---L	Fig.62	P
Power	2.45GHz~2.5GHz---H	Fig.63	P
For all channels	18 GHz ~ 26 GHz	/	P

**GFSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2385.700	46.49	2.9	32.0	11.61	54.0	7.5	H	155	16
2390.000	46.41	2.9	32.0	11.57	54.0	7.6	H	155	48
4803.000	37.60	-32.9	34.5	35.95	54.0	16.4	H	155	80
7206.000	38.08	-31.6	36.1	33.61	54.0	15.9	H	155	8
9608.000	45.54	-30.0	37.0	38.59	54.0	8.5	H	155	102
12010.000	45.79	-29.8	39.3	36.31	54.0	8.2	H	155	118

**GFSK Ch 39 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2436.300	46.67	2.9	32.0	11.77	54.0	7.3	H	155	28
2447.400	46.65	2.9	32.3	11.46	54.0	7.4	H	155	46
4882.000	36.65	-32.7	34.5	34.86	54.0	17.4	H	155	8
7323.000	37.88	-31.9	36.1	33.72	54.0	16.1	H	155	6
9764.000	42.69	-30.6	37.2	36.05	54.0	11.3	H	155	24
12205.000	44.30	-29.4	39.2	34.51	54.0	9.7	H	155	185

**GFSK Ch 78 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	53.52	2.9	32.8	17.83	54.0	0.5	H	155	28
2483.700	49.64	2.9	32.8	13.95	54.0	4.4	H	155	248
4960.000	37.98	-33.4	34.5	36.85	54.0	16.0	H	155	38
7440.000	37.86	-31.8	36.0	33.60	54.0	16.1	H	155	98
9920.000	48.97	-29.9	37.4	41.50	54.0	5.0	H	155	183
12400.000	44.00	-29.5	39.1	34.37	54.0	10.0	H	155	356

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2386.600	46.50	2.9	32.0	11.63	54.0	7.5	H	155	354
2390.000	46.44	2.9	32.0	11.60	54.0	7.6	H	155	28
4804.000	37.45	-32.9	34.5	35.80	54.0	16.5	H	155	348
7206.000	38.15	-31.6	36.1	33.68	54.0	15.9	H	155	345
9608.000	48.08	-30.0	37.0	41.12	54.0	5.9	H	155	184
12010.000	43.23	-29.8	39.3	33.76	54.0	10.8	H	155	182

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2436.200	46.62	2.9	32.0	11.72	54.0	7.4	H	155	142
2448.900	46.61	2.9	32.3	11.38	54.0	7.4	H	155	168
4882.000	35.60	-32.7	34.5	33.81	54.0	18.4	H	155	90
7323.000	37.90	-31.9	36.1	33.74	54.0	16.1	H	155	102
9764.000	49.86	-30.6	37.2	43.22	54.0	4.1	H	155	118
12205.000	43.78	-29.4	39.2	33.99	54.0	10.2	H	155	94

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	51.82	2.9	32.8	16.13	54.0	2.2	H	155	98
2483.800	49.32	2.9	32.8	13.64	54.0	4.7	H	155	135
4960.000	36.55	-33.4	34.5	35.42	54.0	17.4	H	155	4
7440.000	37.97	-31.8	36.0	33.71	54.0	16.0	H	155	74
9920.000	51.43	-29.9	37.4	43.96	54.0	2.6	H	155	48
12400.000	44.20	-29.5	39.1	34.57	54.0	9.8	H	155	246

**8DPSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2389.100	46.47	2.9	32.0	11.62	54.0	7.5	H	155	28
2390.000	46.39	2.9	32.0	11.55	54.0	7.6	H	155	49
4803.000	36.31	-32.9	34.5	34.66	54.0	17.7	H	155	246
7206.000	38.17	-31.6	36.1	33.70	54.0	15.8	H	155	182
9608.000	48.88	-30.0	37.0	41.92	54.0	5.1	H	155	94
12011.000	44.62	-29.8	39.3	35.14	54.0	9.4	H	155	42

**8DPSK Ch 39 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2435.400	46.65	2.9	32.0	11.78	54.0	7.4	H	155	26
2446.300	46.72	2.9	32.3	11.55	54.0	7.3	H	155	48
4882.000	35.51	-32.7	34.5	33.72	54.0	18.5	H	155	68
7323.000	38.07	-31.9	36.1	33.92	54.0	15.9	H	155	44
9765.000	44.82	-30.6	37.2	38.18	54.0	9.2	H	155	8
12205.000	43.76	-29.4	39.2	33.97	54.0	10.2	H	155	102

**8DPSK Ch 78 - Average**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	51.59	2.9	32.8	15.89	54.0	2.4	H	155	132
2483.800	49.20	2.9	32.8	13.52	54.0	4.8	H	155	28
4959.000	37.58	-33.4	34.5	36.45	54.0	16.4	H	155	38
7440.000	37.99	-31.8	36.0	33.73	54.0	16.0	H	155	65
9921.000	50.79	-29.9	37.4	43.33	54.0	3.2	H	155	4
12400.000	44.19	-29.5	39.1	34.56	54.0	9.8	H	155	24

**GFSK Ch 0 – Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2385.432	59.34	2.9	32.0	24.46	74.0	14.7	H	155	22
2388.750	59.65	2.9	32.0	24.80	74.0	14.4	H	155	44
4803.750	45.30	-32.9	34.5	43.66	74.0	28.7	V	155	88
7206.000	42.01	-31.6	36.1	37.54	74.0	32.0	V	155	0
9608.250	50.68	-30.0	37.0	43.72	74.0	23.3	H	155	110
12009.750	47.58	-29.8	39.3	38.11	74.0	26.4	H	155	132

**GFSK Ch 39 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2372.800	47.97	-26.8	32.1	42.71	74.0	26.0	H	155	22
2503.000	48.70	-26.3	32.3	42.69	74.0	25.3	H	155	44
4882.000	41.27	-32.7	34.5	39.49	74.0	32.7	V	155	0
7323.000	41.41	-31.9	36.1	37.25	74.0	32.6	H	155	0
9764.250	52.55	-30.6	37.2	45.91	74.0	21.5	V	155	22
12204.750	45.60	-29.4	39.2	35.81	74.0	28.4	H	155	176

**GFSK Ch 78 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2484.190	59.78	2.9	32.7	24.10	74.0	14.2	H	155	22
2487.610	60.37	2.9	32.6	24.79	74.0	13.6	H	155	242
4959.750	43.45	-33.4	34.5	42.32	74.0	30.6	V	155	44
7440.000	42.02	-31.8	36.0	37.76	74.0	32.0	H	155	88
9920.250	54.07	-29.9	37.4	46.61	74.0	19.9	V	155	176
12400.500	46.63	-29.5	39.1	37.00	74.0	27.4	H	155	0

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2387.588	60.58	2.9	32.0	25.72	74.0	13.4	H	155	0
2389.996	59.52	2.9	32.0	24.68	74.0	14.5	H	155	22
4804.500	44.96	-32.8	34.5	43.31	74.0	29.0	V	155	352
7206.000	42.05	-31.6	36.1	37.58	74.0	32.0	V	155	352
9608.250	53.09	-30.0	37.0	46.13	74.0	20.9	V	155	176
12010.500	47.32	-29.8	39.3	37.84	74.0	26.7	V	155	176

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2362.400	47.91	-27.4	31.9	43.48	74.0	26.1	H	155	132
2499.000	48.64	-26.1	32.3	42.42	74.0	25.4	V	155	154
4881.750	41.65	-32.7	34.5	39.87	74.0	32.3	H	155	88
7323.000	41.78	-31.9	36.1	37.63	74.0	32.2	V	155	110
9764.250	53.06	-30.6	37.2	46.43	74.0	20.9	V	155	110
12205.500	46.77	-29.4	39.2	36.98	74.0	27.2	V	155	88

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

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	59.04	2.9	32.8	23.35	74.0	15.0	H	155	88
2483.720	59.19	2.9	32.8	23.51	74.0	14.8	H	155	132
4959.750	43.46	-33.4	34.5	42.33	74.0	30.5	H	155	0
7440.000	40.51	-31.8	36.0	36.25	74.0	33.5	V	155	66
9920.250	51.23	-29.9	37.4	43.76	74.0	22.8	V	155	44
12400.500	46.35	-29.5	39.1	36.72	74.0	27.6	H	155	242

**8DPSK Ch 0 - Peak**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Limit (dB $\mu$ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2380.994	59.79	2.9	32.1	24.88	74.0	14.2	H	155	22
2387.462	59.30	2.9	32.0	24.44	74.0	14.7	H	155	44
4803.000	45.44	-32.9	34.5	43.79	74.0	28.6	V	155	242
7206.000	42.33	-31.6	36.1	37.86	74.0	31.7	H	155	176
9608.250	52.99	-30.0	37.0	46.04	74.0	21.0	V	155	88
12010.500	49.95	-29.8	39.3	40.48	74.0	24.0	V	155	22

**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)
2368.000	48.15	-27.1	32.0	43.29	74.0	25.9	H	155	22
2501.600	48.34	-26.3	32.3	42.32	74.0	25.7	H	155	44
4881.750	40.34	-32.7	34.5	38.55	74.0	33.7	V	155	66
7323.000	42.00	-31.9	36.1	37.84	74.0	32.0	V	155	22
9764.250	45.94	-30.6	37.2	39.31	74.0	28.1	V	155	0
12204.750	46.26	-29.4	39.2	36.47	74.0	27.7	V	155	88

**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)
2483.510	59.67	2.9	32.8	23.97	74.0	14.3	H	155	110
2486.780	59.62	2.9	32.7	24.02	74.0	14.4	H	155	22
4959.750	45.03	-33.4	34.5	43.90	74.0	29.0	V	155	44
7440.000	41.23	-31.8	36.0	36.97	74.0	32.8	V	155	66
9920.250	55.97	-29.9	37.4	48.50	74.0	18.0	V	155	0
12399.750	46.59	-29.5	39.1	36.96	74.0	27.4	H	155	22

**Conclusion: PASS**

**Test graphs as below:**

RE - Power-2.38GHz-2.45GHz

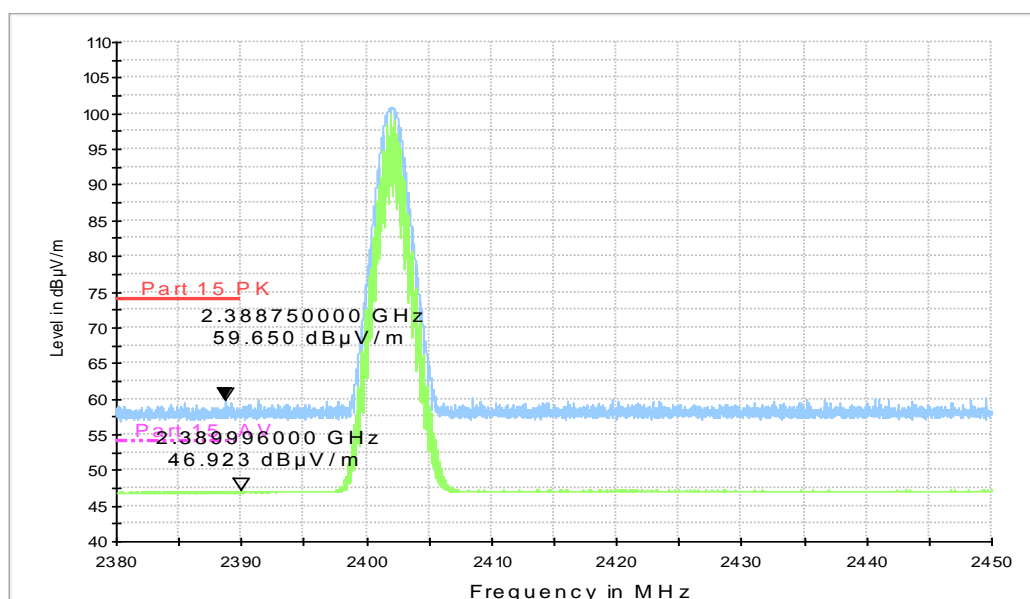


Fig.58. Radiated emission (Power): GFSK, low channel

RE - Power-2.45GHz-2.5GHz

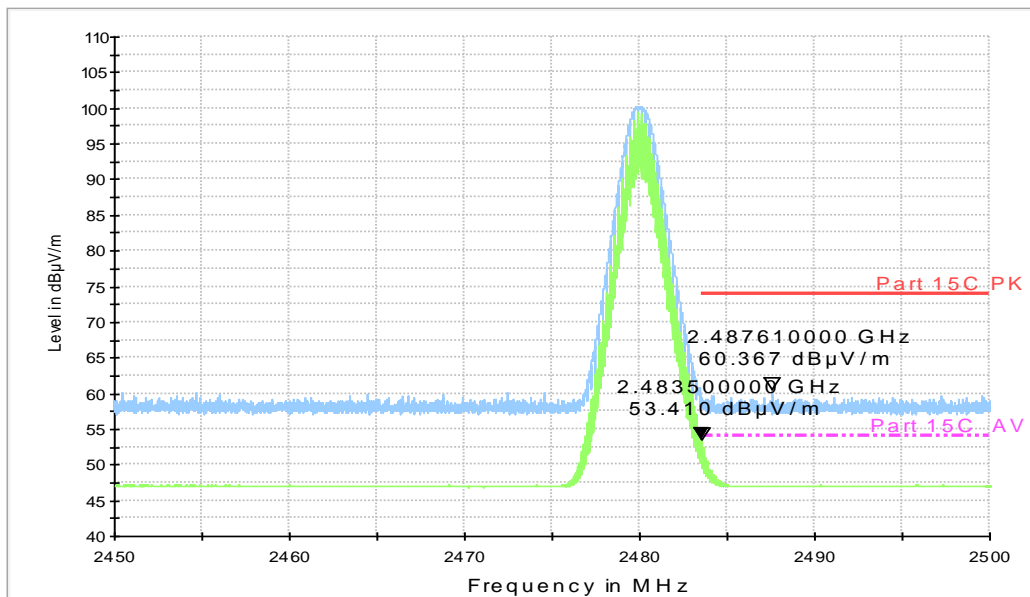


Fig.59. Radiated emission (Power) GFSK, high channel

RE - Power-2.38GHz-2.45GHz

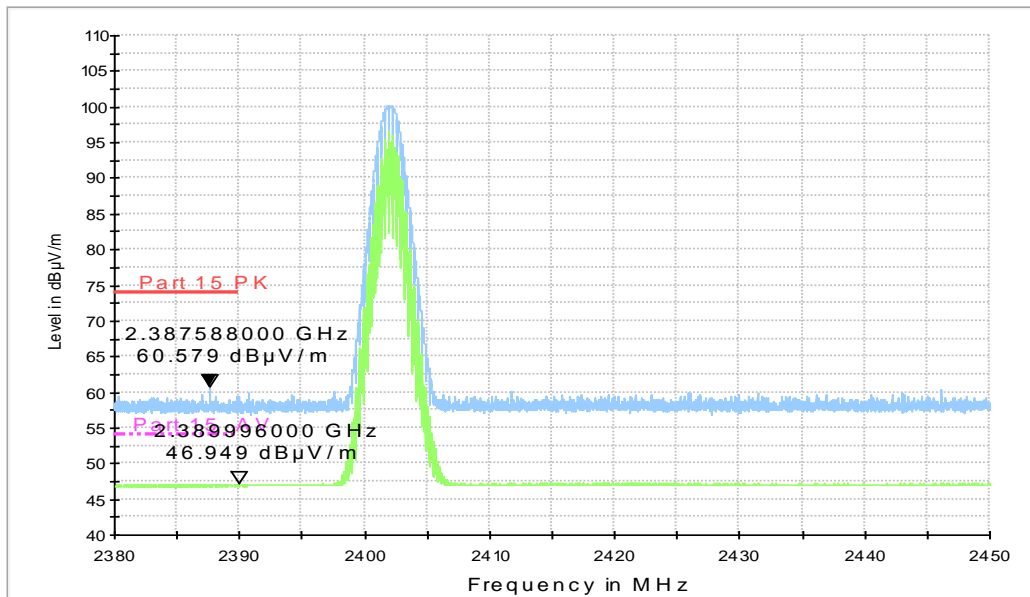


Fig.60. Radiated emission (Power):  $\pi/4$  DQPSK, low channel



RE - Power-2.45GHz-2.5GHz

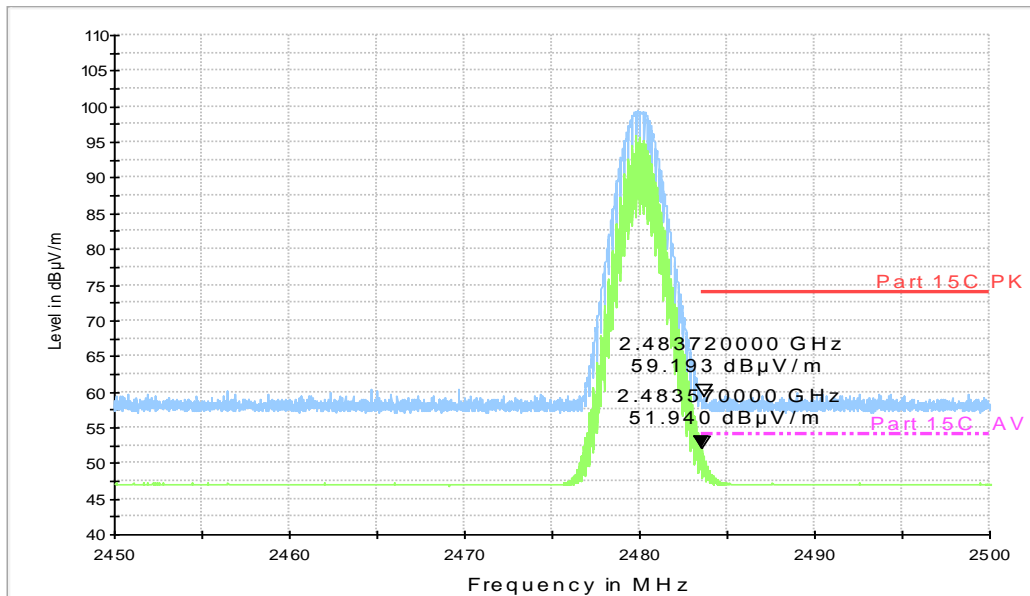


Fig.61. Radiated emission (Power):  $\pi/4$  DQPSK, high channel

RE - Power-2.38GHz-2.45GHz

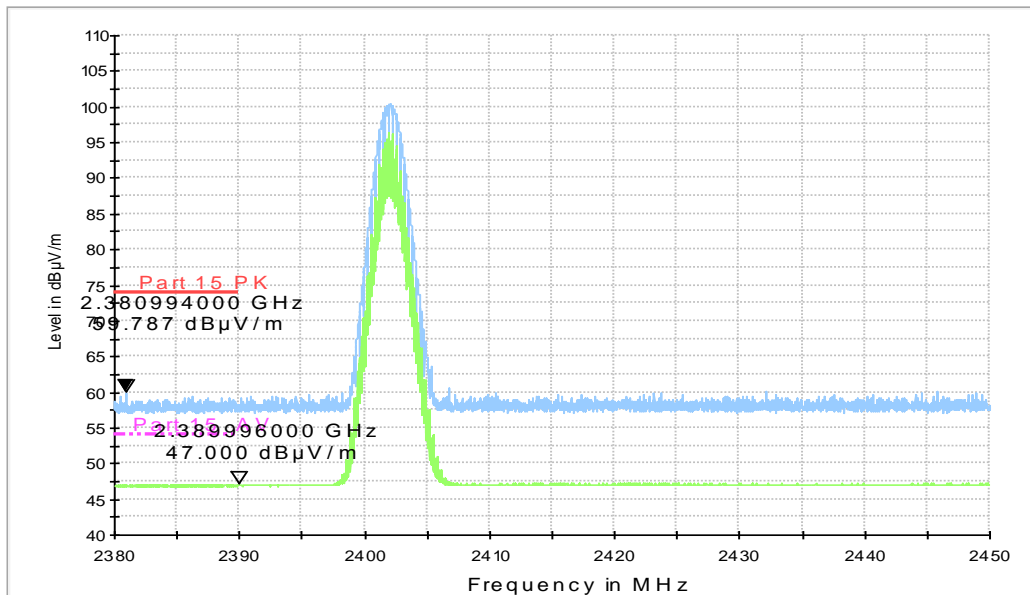


Fig.62. Radiated emission (Power): 8DPSK, low channel

RE - Power-2.45GHz-2.5GHz

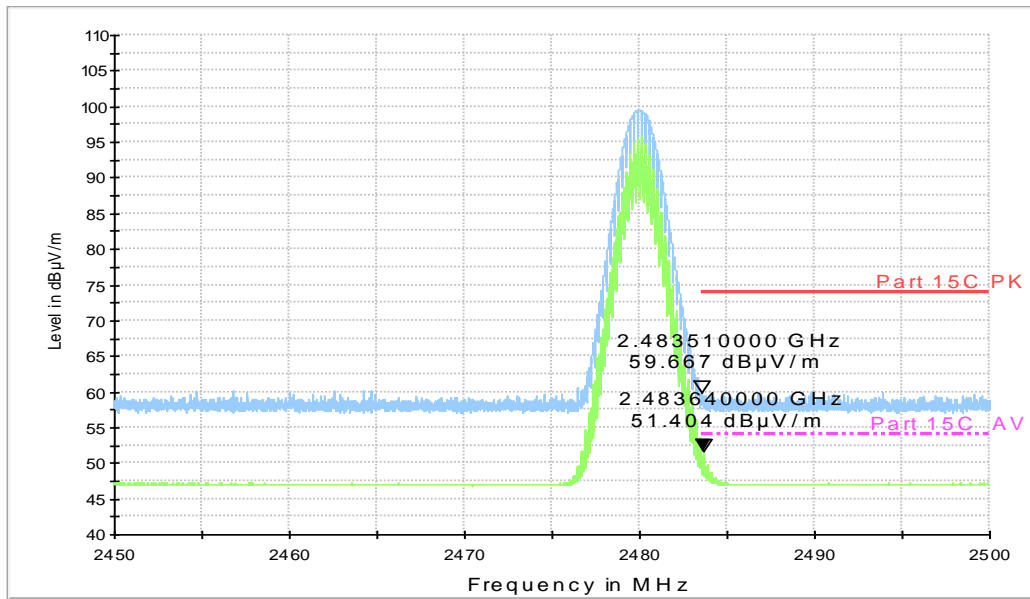


Fig.63. Radiated emission (Power): 8DPSK, high channel

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

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

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

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

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

**Measurement Limit:**

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

**Measurement Result:**

**For GFSK**

Channel	Packet	Dwell Time (ms)		Conclusion
		Fig.	Value	
39	DH1	Fig.64	121.53	P
		Fig.65		
	DH3	Fig.66	176.81	P
		Fig.67		
	DH5	Fig.68	176.00	P
		Fig.69		

**For  $\pi/4$  DQPSK**

Channel	Packet	Dwell Time (ms)		Conclusion
		Fig.	Value	
39	DH1	Fig.70	123.82	P
		Fig.71		
	DH3	Fig.72	147.62	P
		Fig.73		
	DH5	Fig.74	221.10	P
		Fig.75		

**For 8DPSK**

Channel	Packet	Dwell Time (ms)		Conclusion
		Fig.	Value	
39	DH1	Fig.76	123.76	P
		Fig.77		
	DH3	Fig.78	183.43	P

		Fig.79		
	DH5	Fig.80	158.89	P
		Fig.81		

**Conclusion: PASS**

**Test graphs as below:**

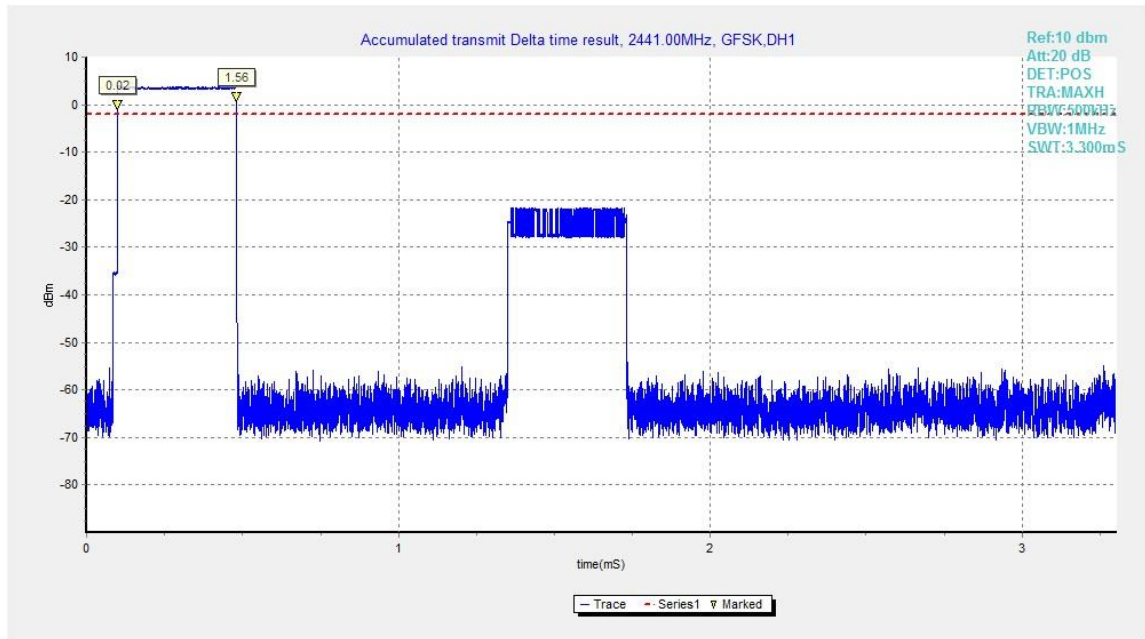


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

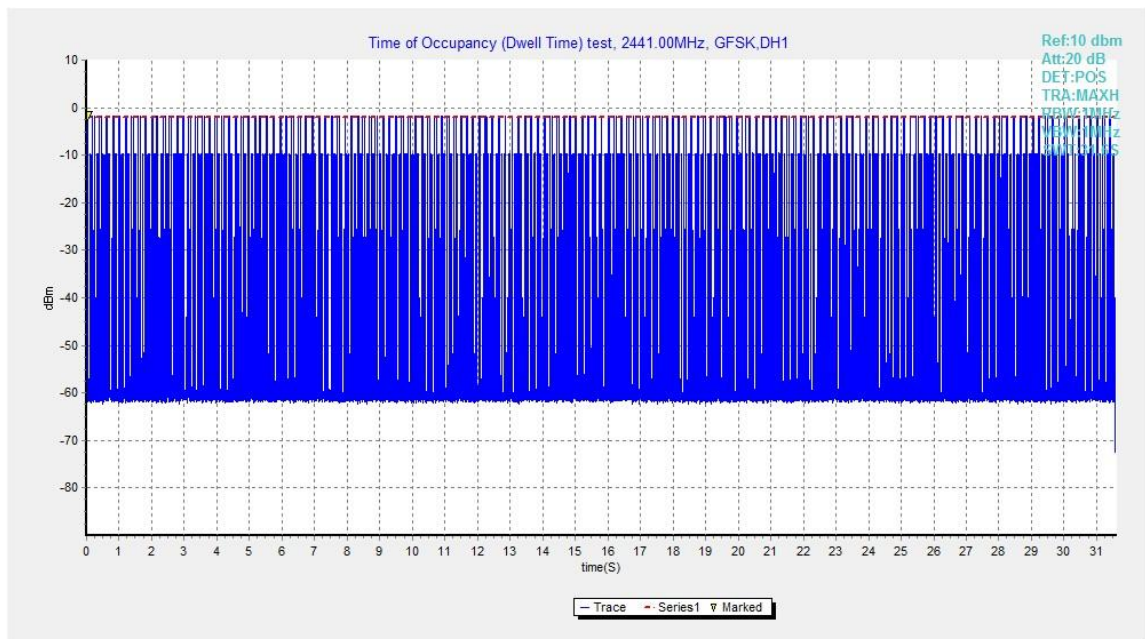


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

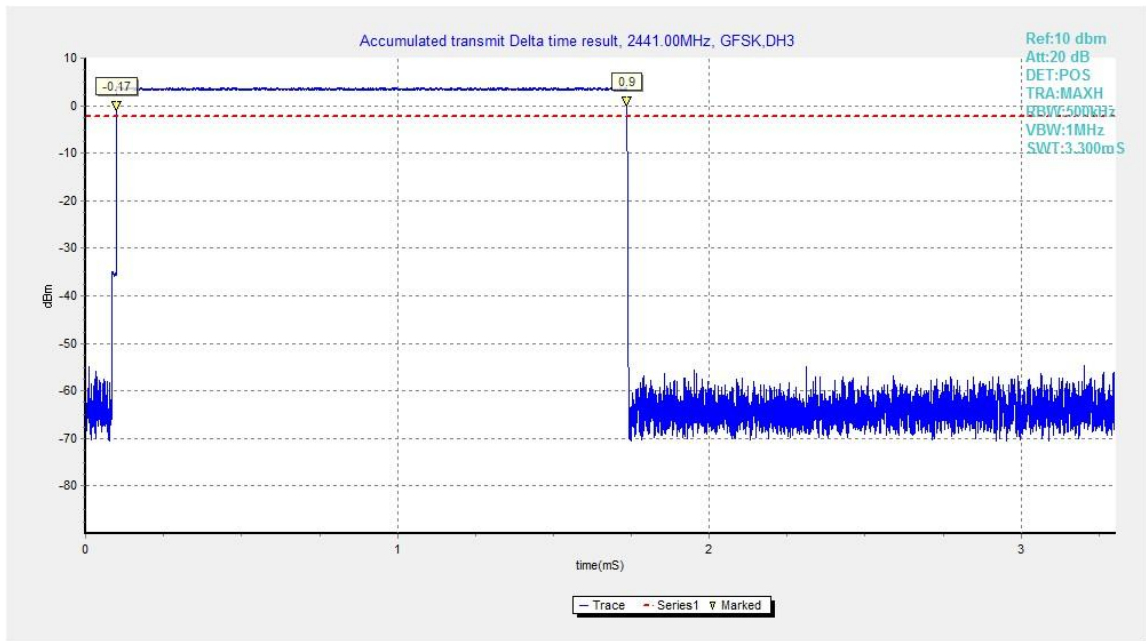


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

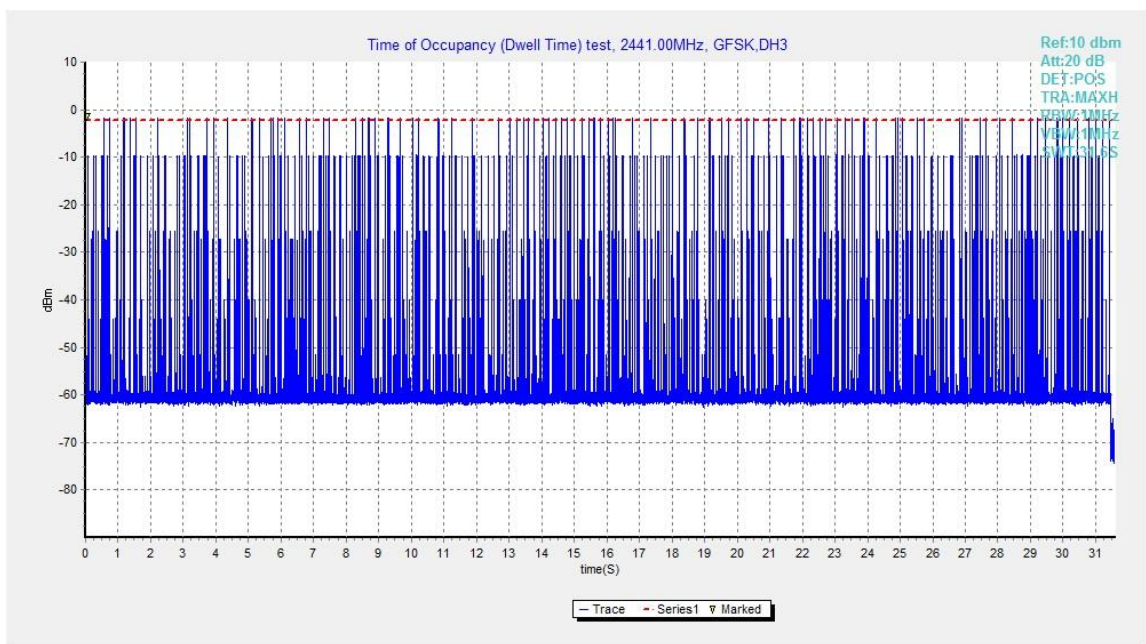


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

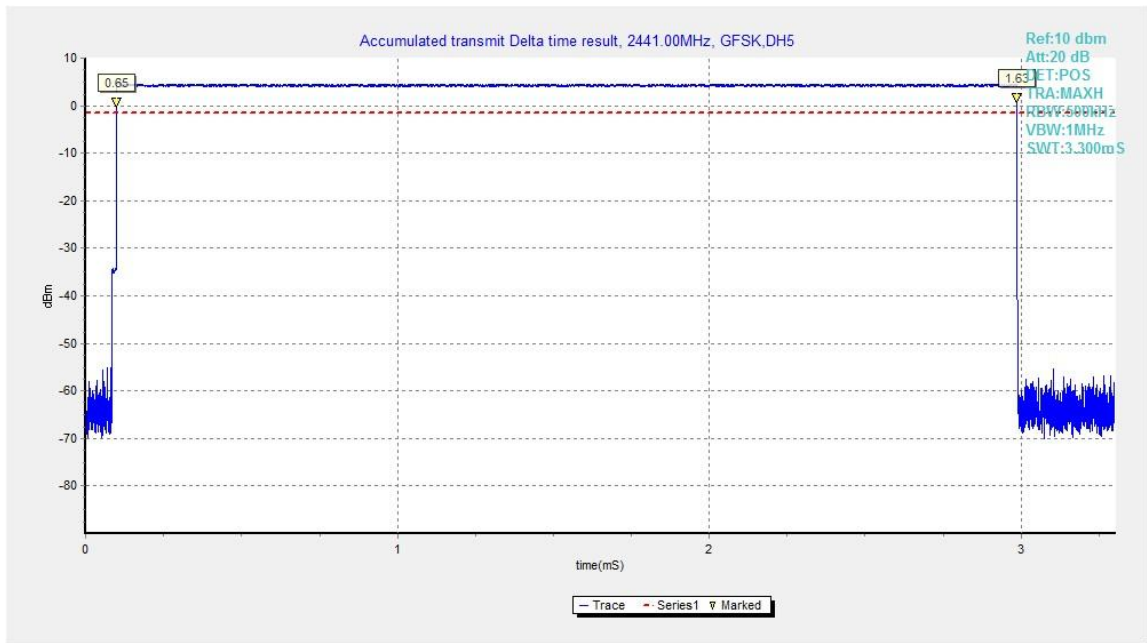


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

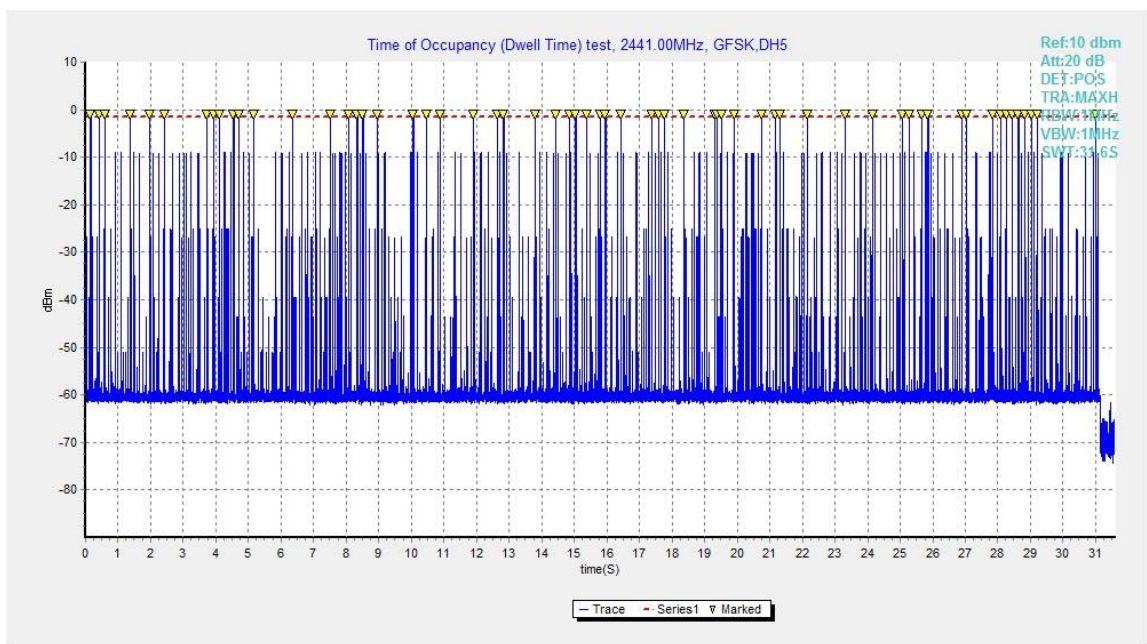


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5



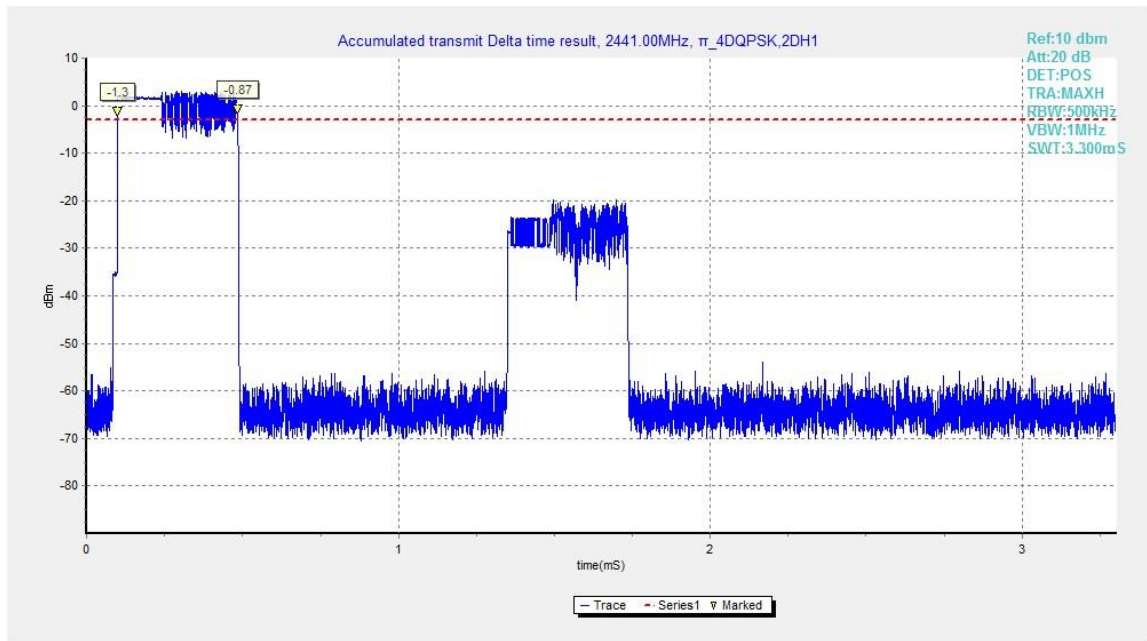


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

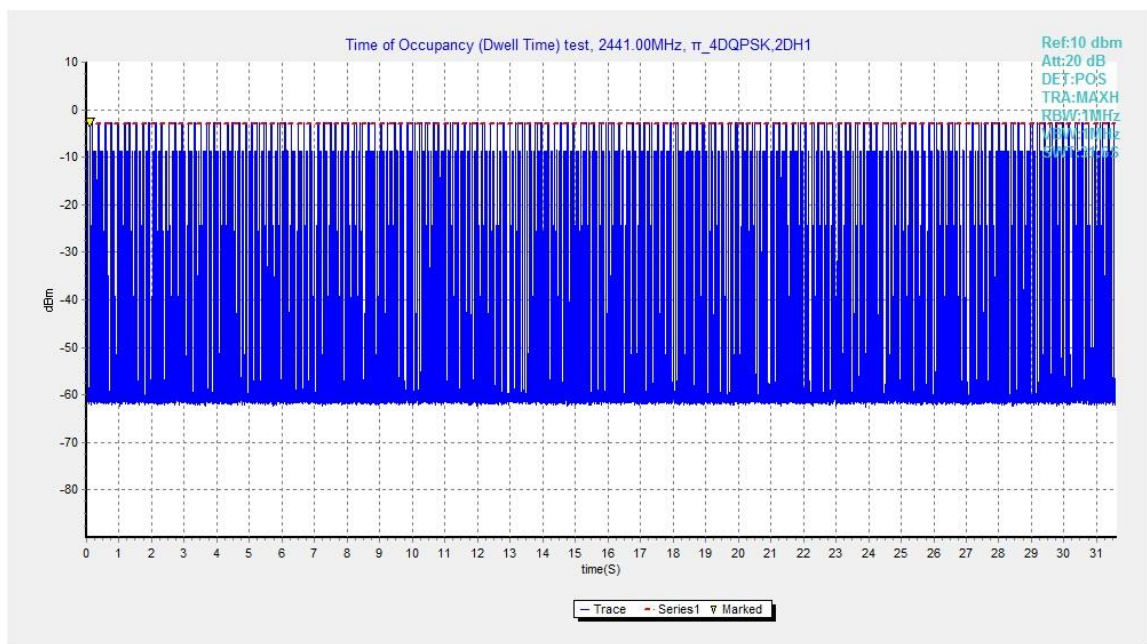


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

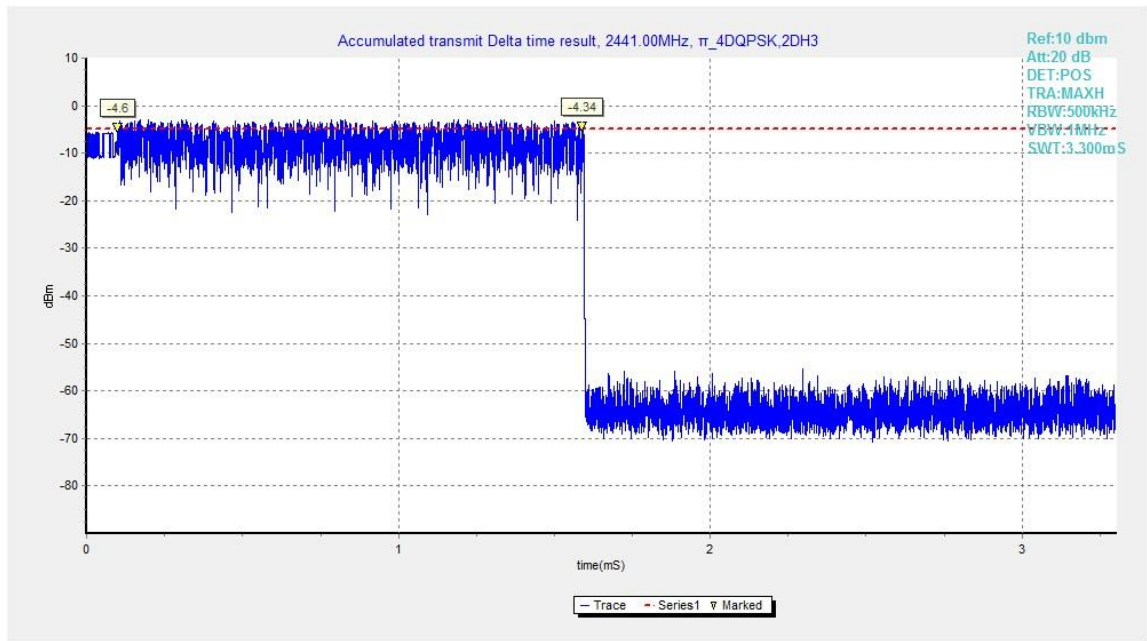


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

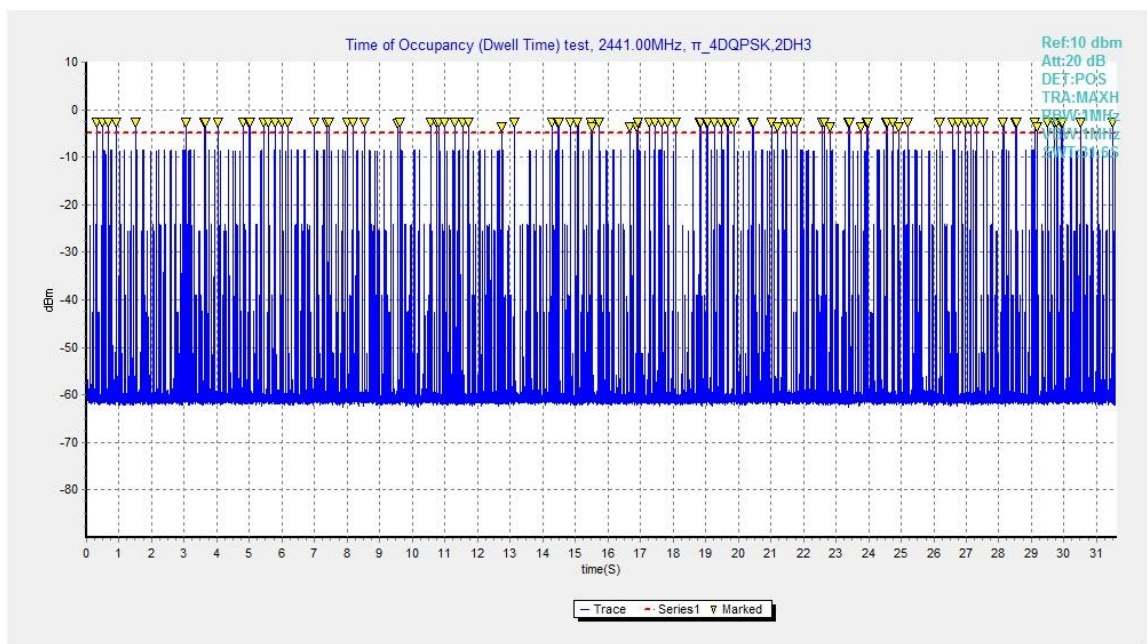


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3



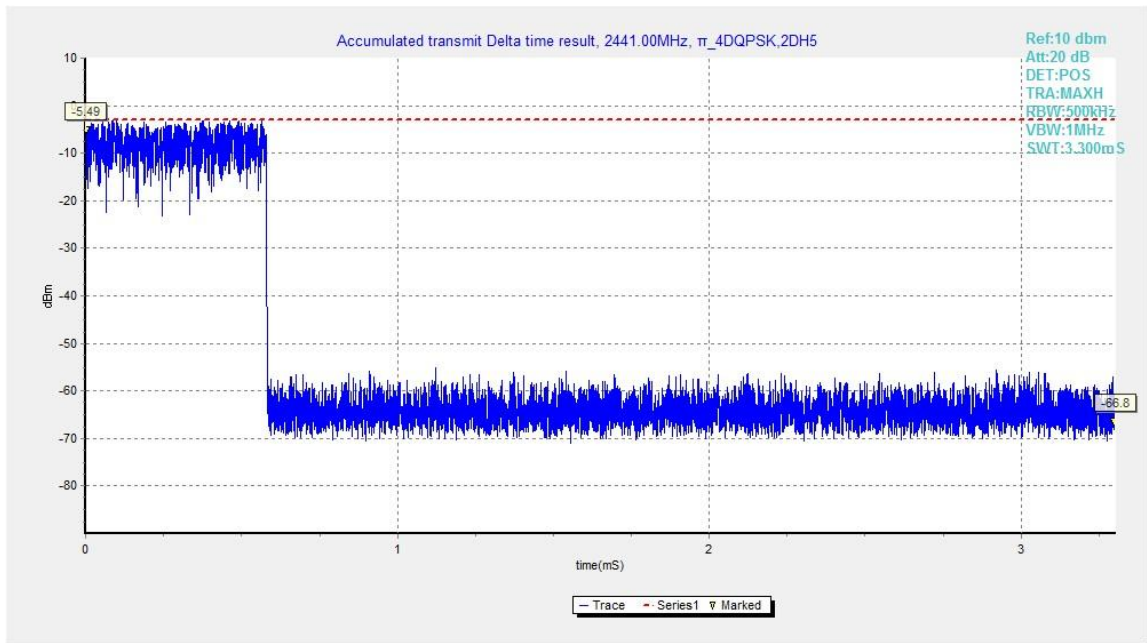


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

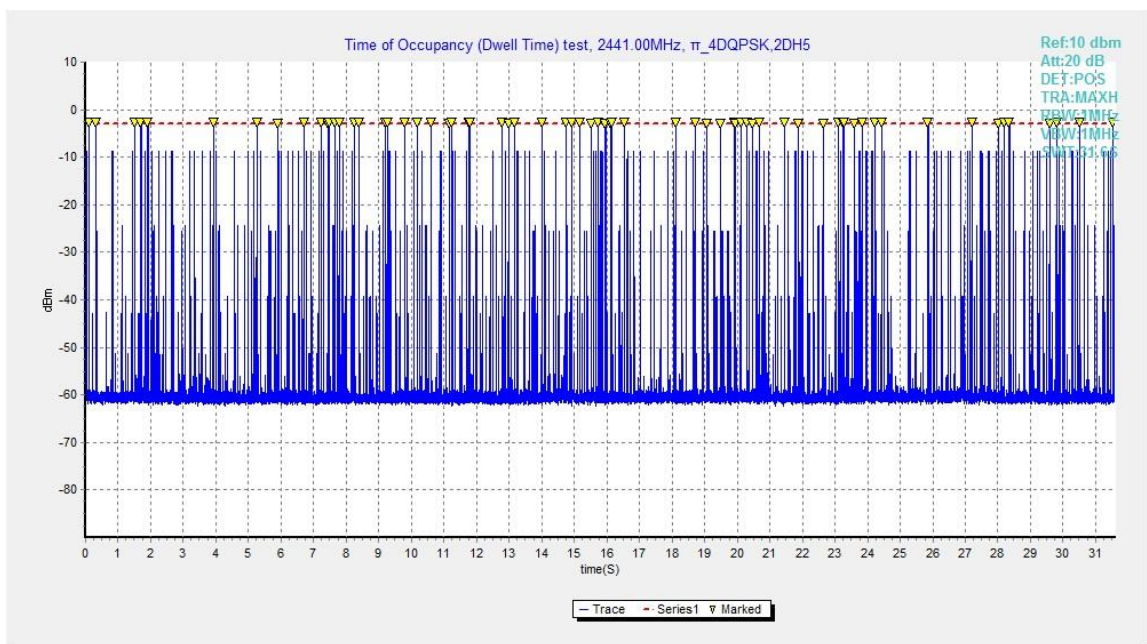


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

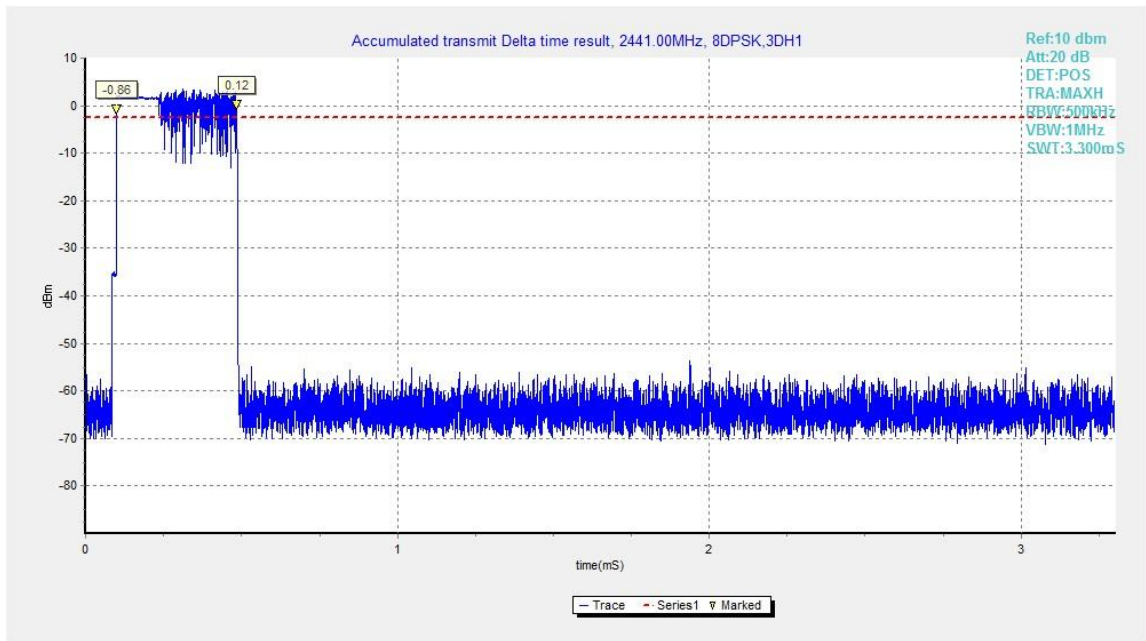


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

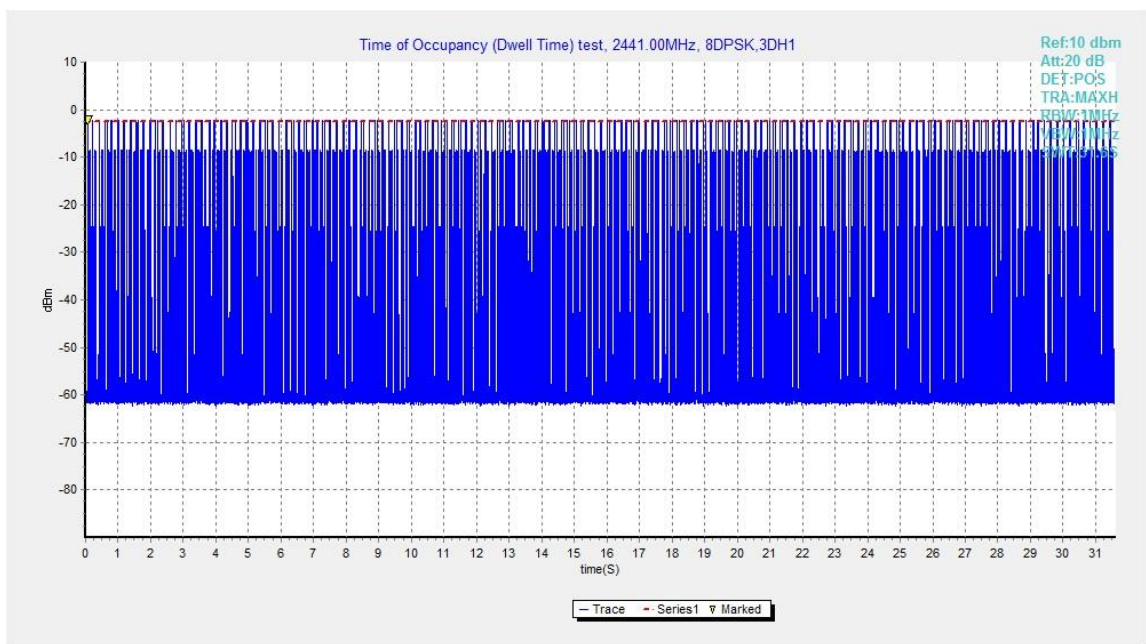


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

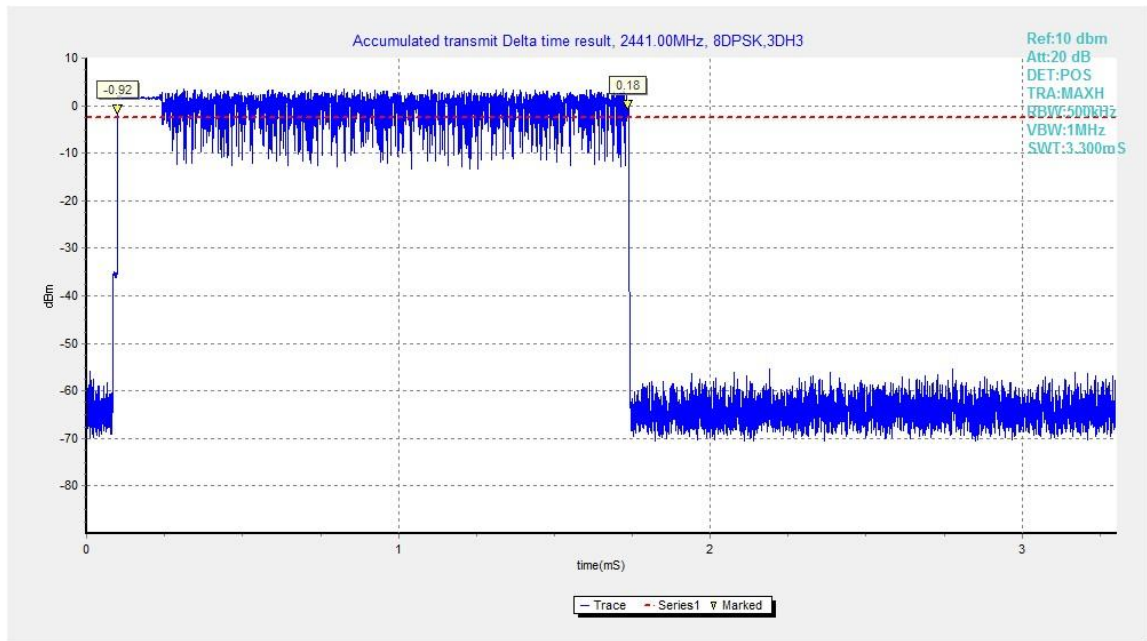


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

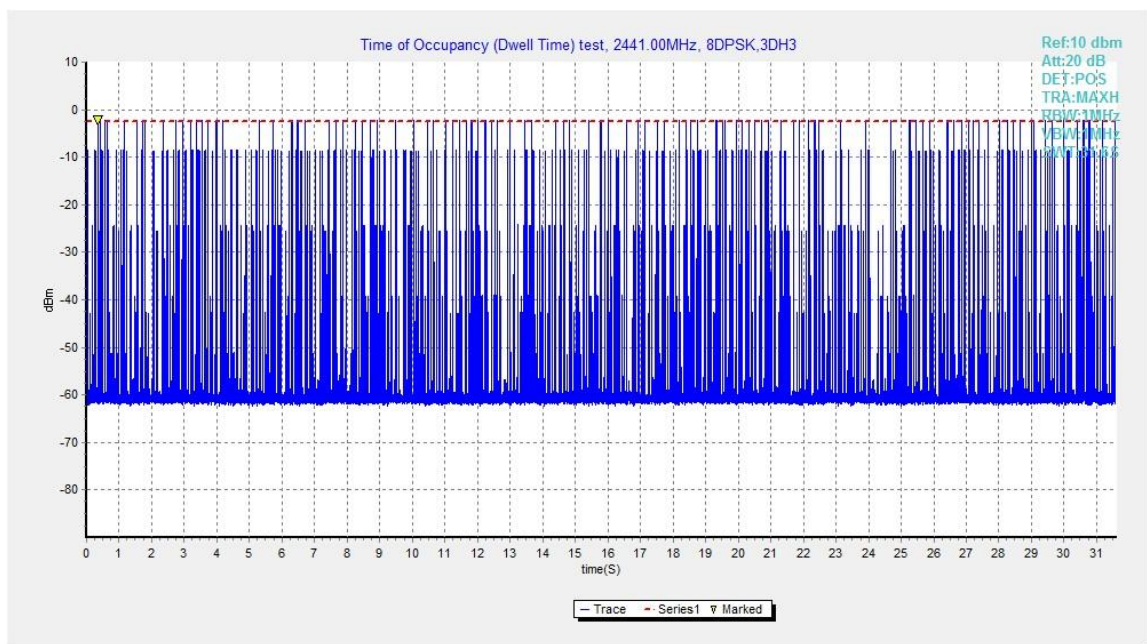


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

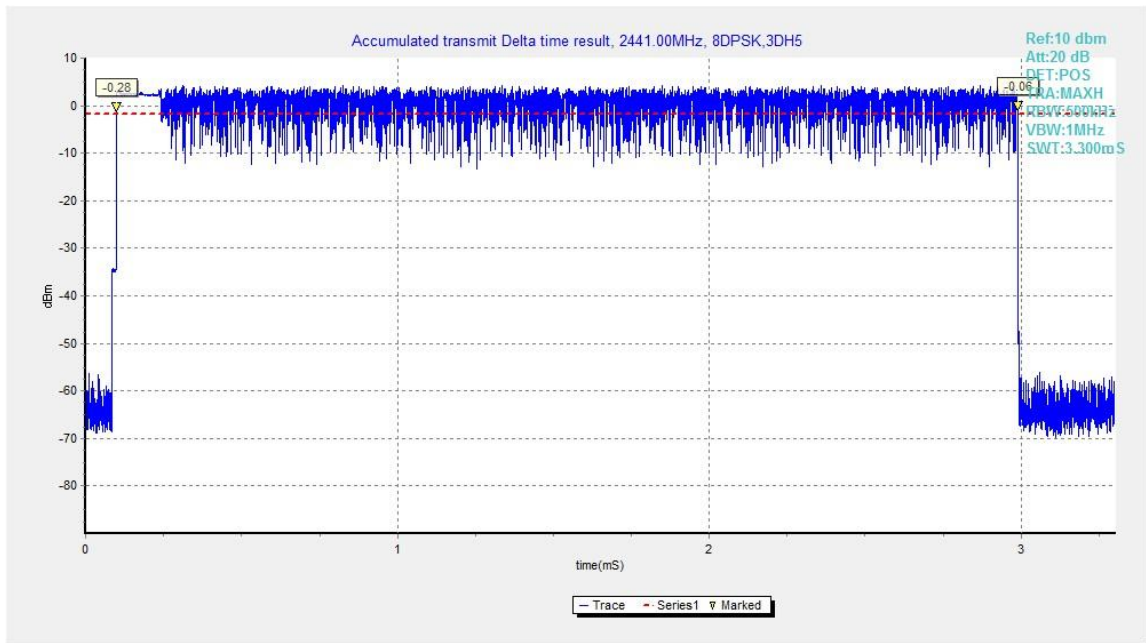


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

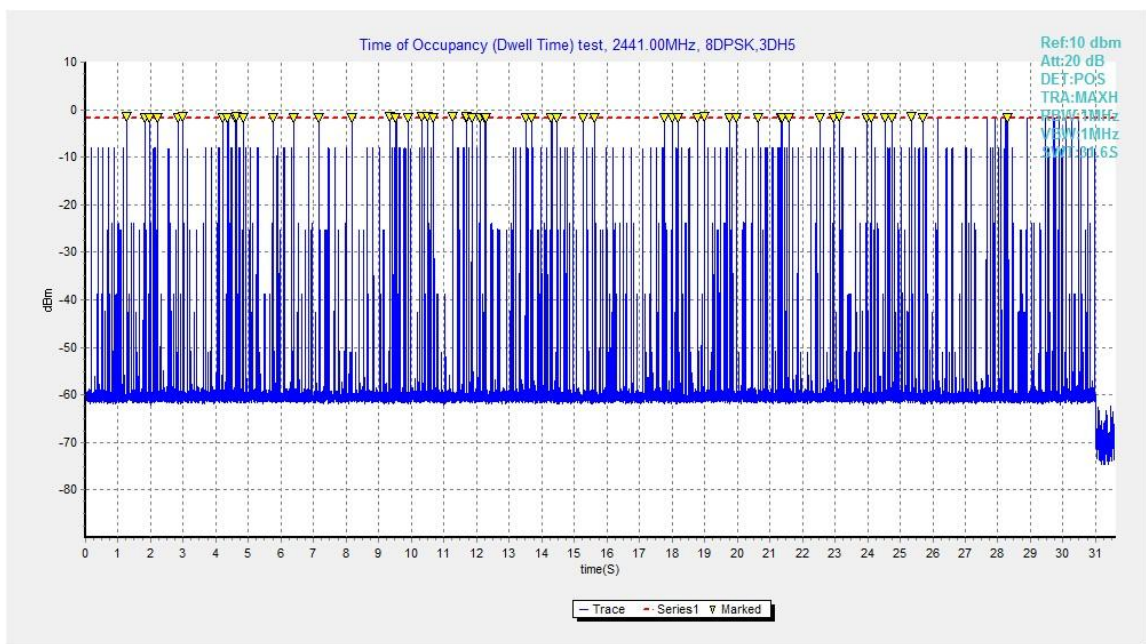


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5





### 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	936.75	NA
39	Fig.83	937.50	NA
78	Fig.84	945.00	NA

**For  $\pi/4$  DQPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1277.25	NA
39	Fig.86	1278.75	NA
78	Fig.87	1308.75	NA

**For 8DPSK**

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1280.25	NA
39	Fig.89	1277.25	NA
78	Fig.90	1295.25	NA

**Conclusion: NA**

**Test graphs as below:**

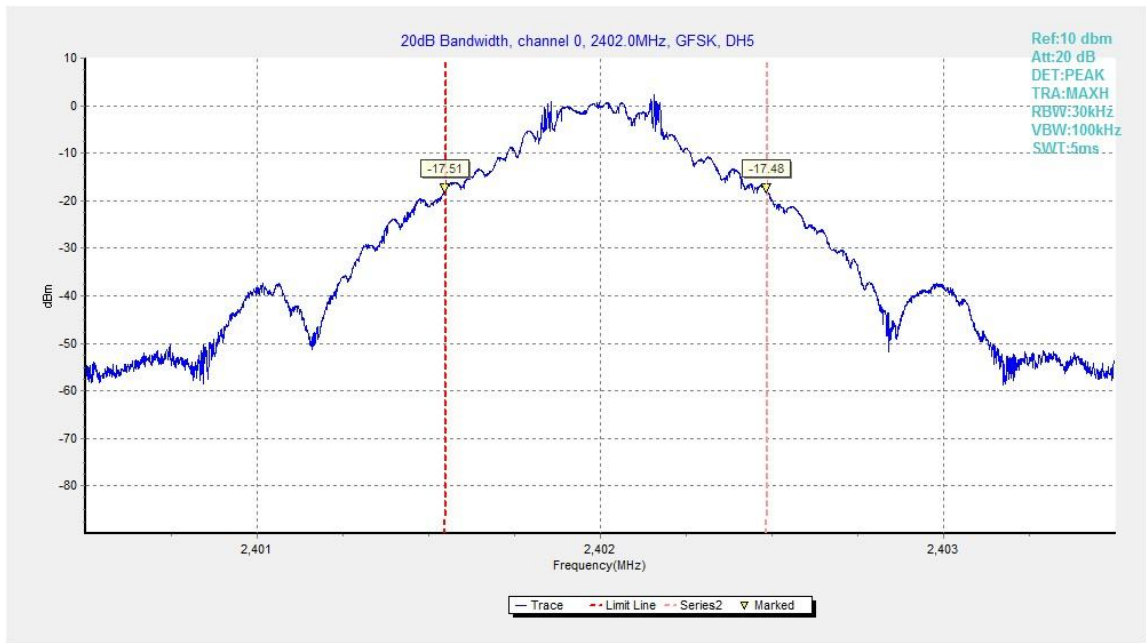


Fig.82. 20dB Bandwidth: GFSK, Channel 0

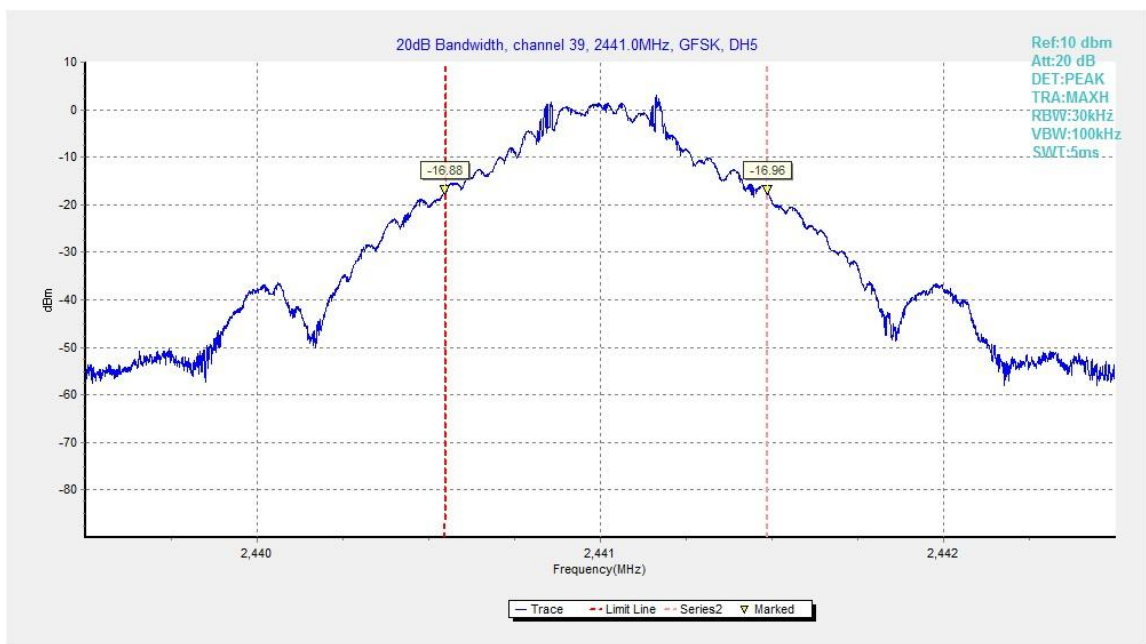


Fig.83. 20dB Bandwidth: GFSK, Channel 39

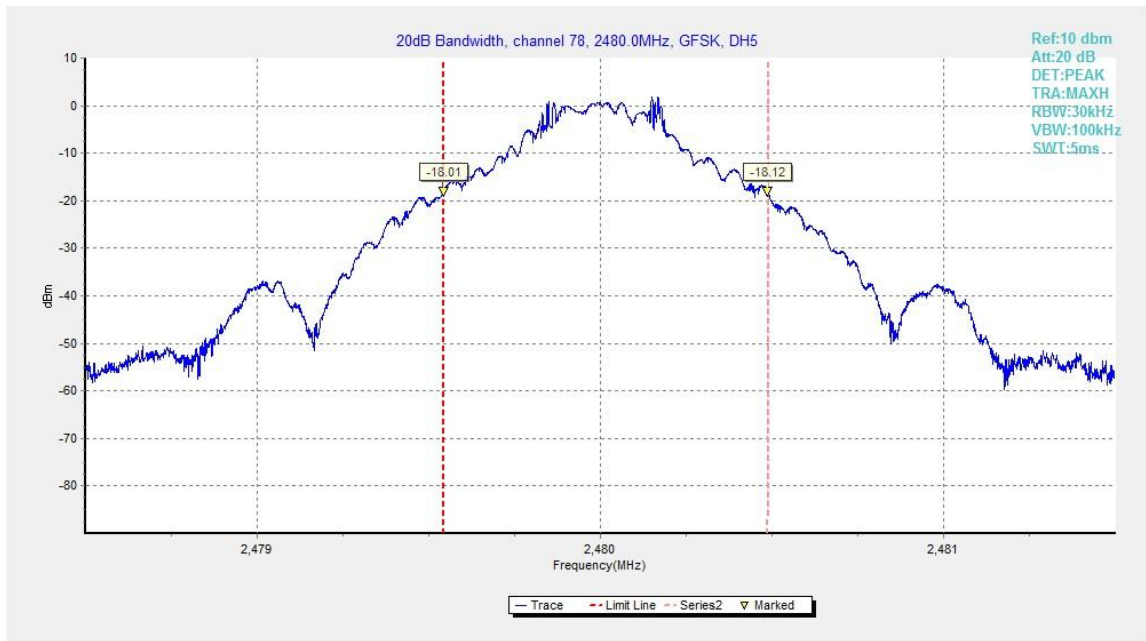


Fig.84. 20dB Bandwidth: GFSK, Channel 78

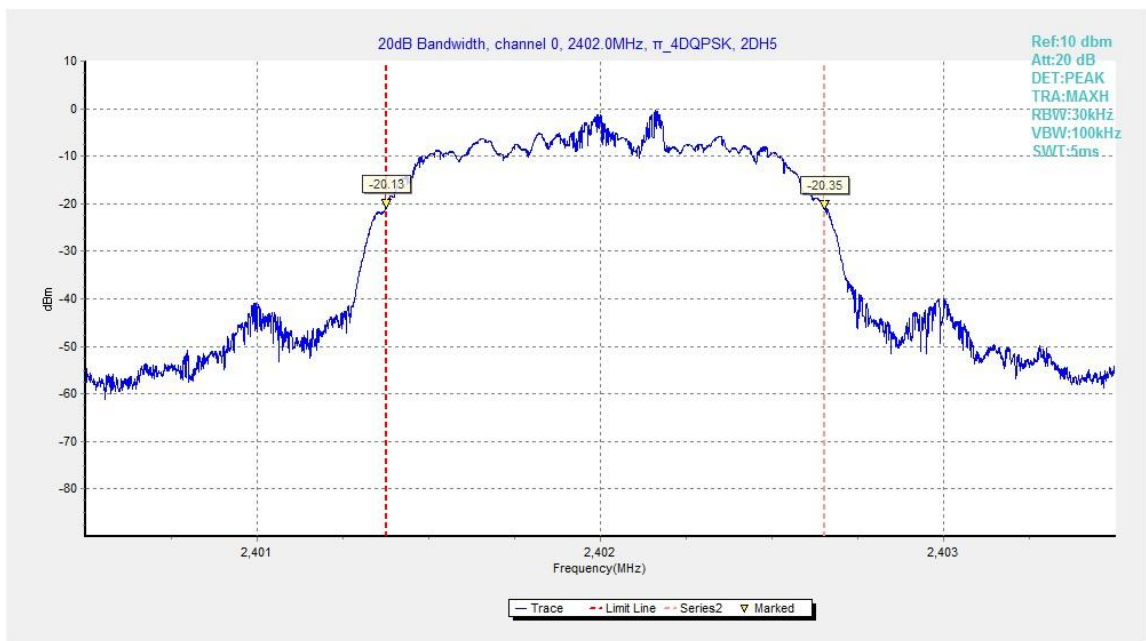


Fig.85. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 0

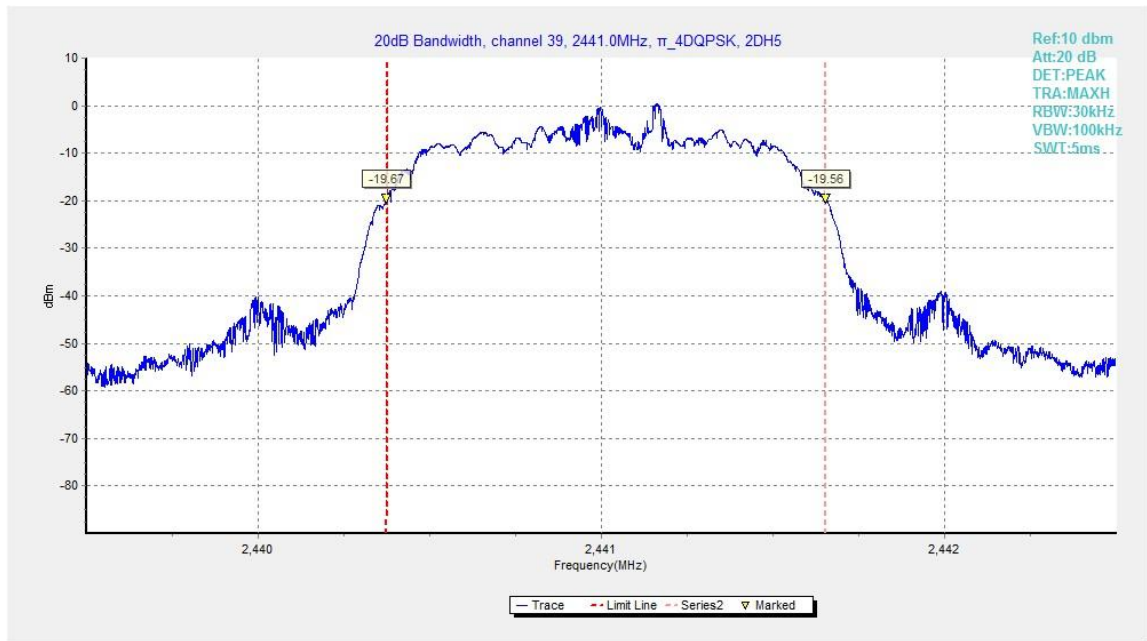


Fig.86. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 39

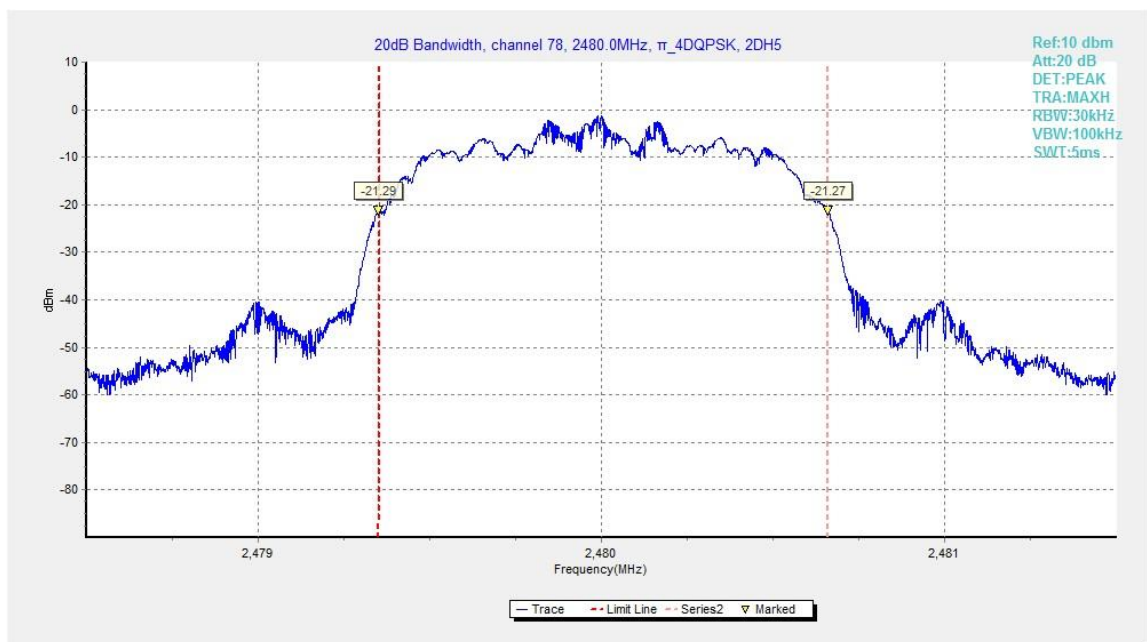


Fig.87. 20dB Bandwidth:  $\pi/4$  DQPSK, Channel 78



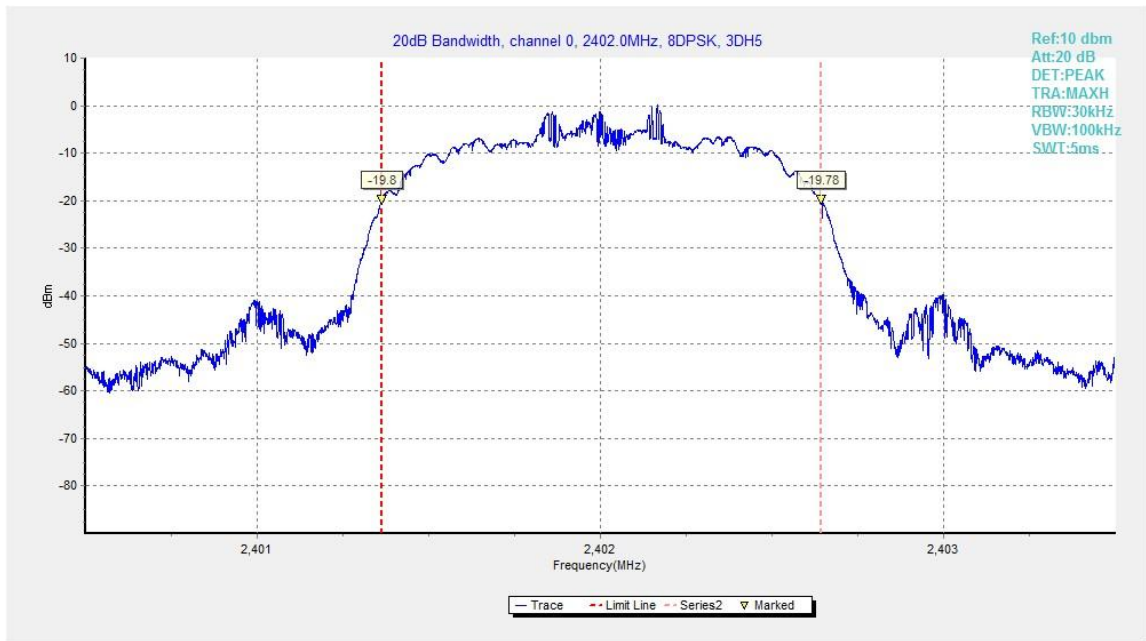


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

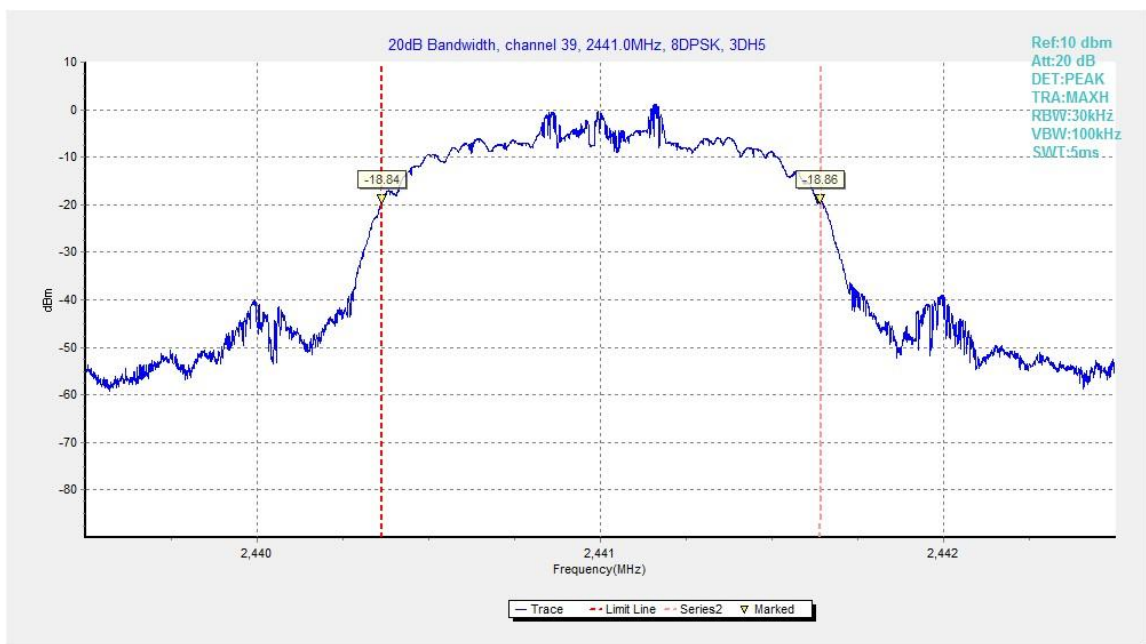


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

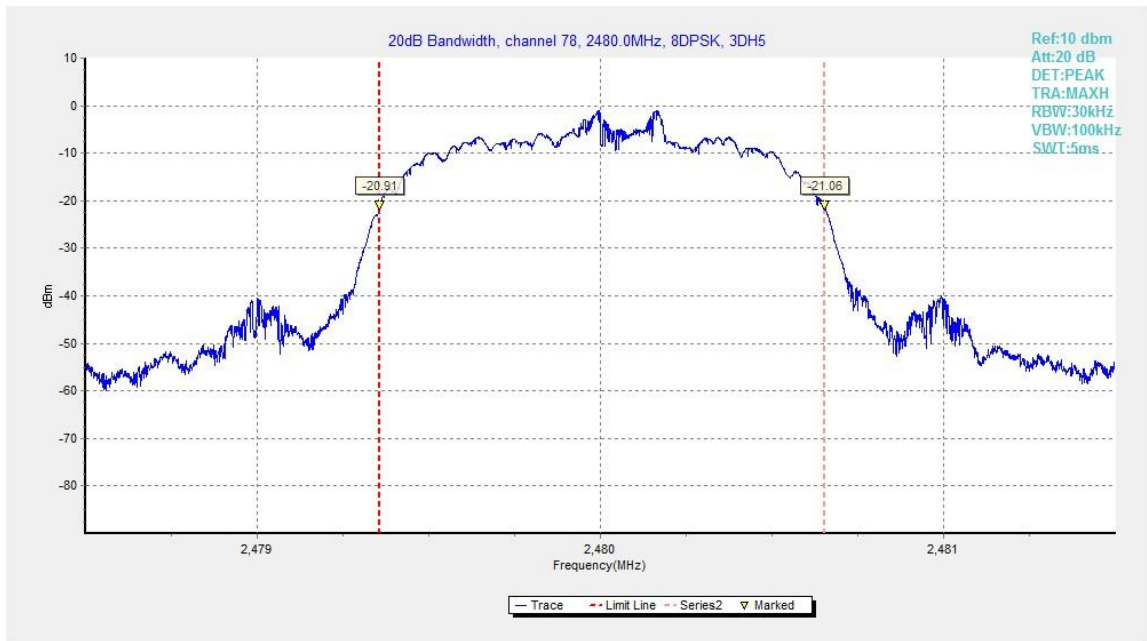


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

### A.8. Carrier Frequency Separation

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

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

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

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

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

**Measurement Limit:**

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

**Measurement Result:**

**For GFSK**

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.91 840.75	P

**For  $\pi/4$  DQPSK**

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.92 1021.50	P

**For 8DPSK**

Channel	Carrier frequency separation (kHz)	Conclusion
39	Fig.93 980.25	P

**Conclusion: PASS**

**Test graphs as below:**

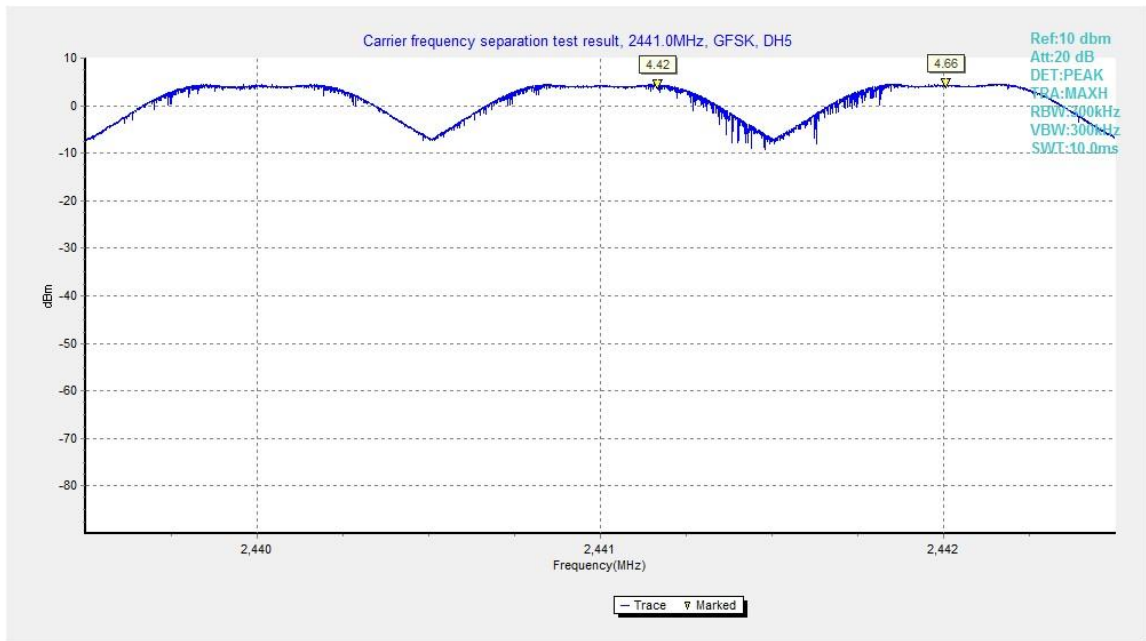


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

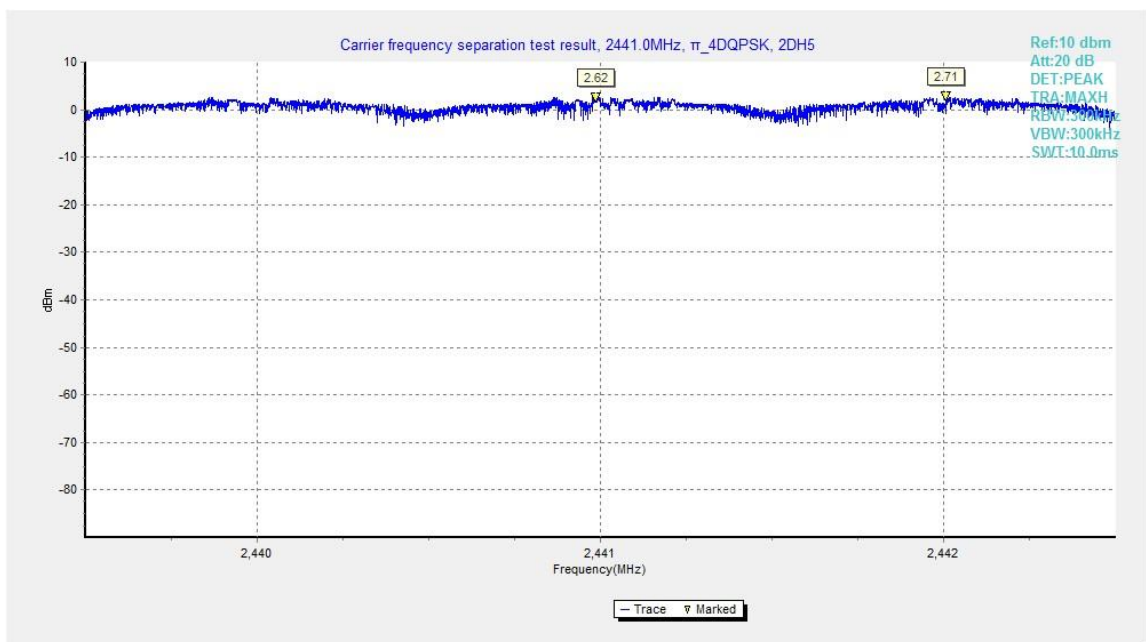


Fig.92. Carrier frequency separation measurement:  $\pi/4$  DQPSK, Channel 39

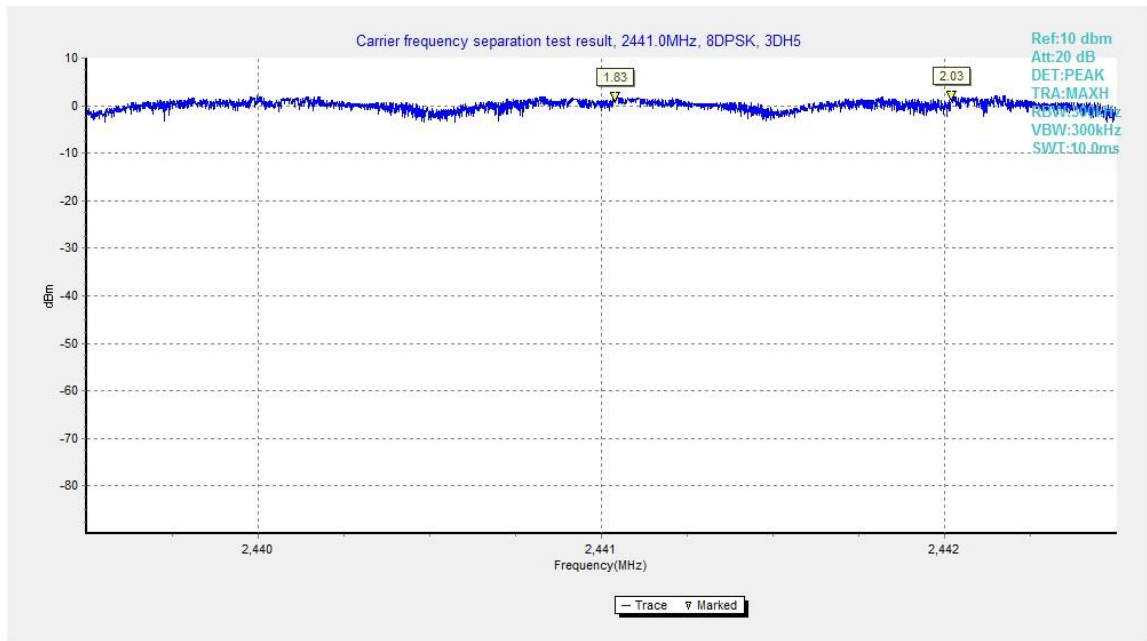


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

## A.9. Number of Hopping Channels

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

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

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

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

### Measurement Limit:

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

### Measurement Result:

#### For GFSK

Channel	Number of hopping channels	Conclusion
0~39	Fig.94	79 P
40~78	Fig.95	

#### For $\pi/4$ 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

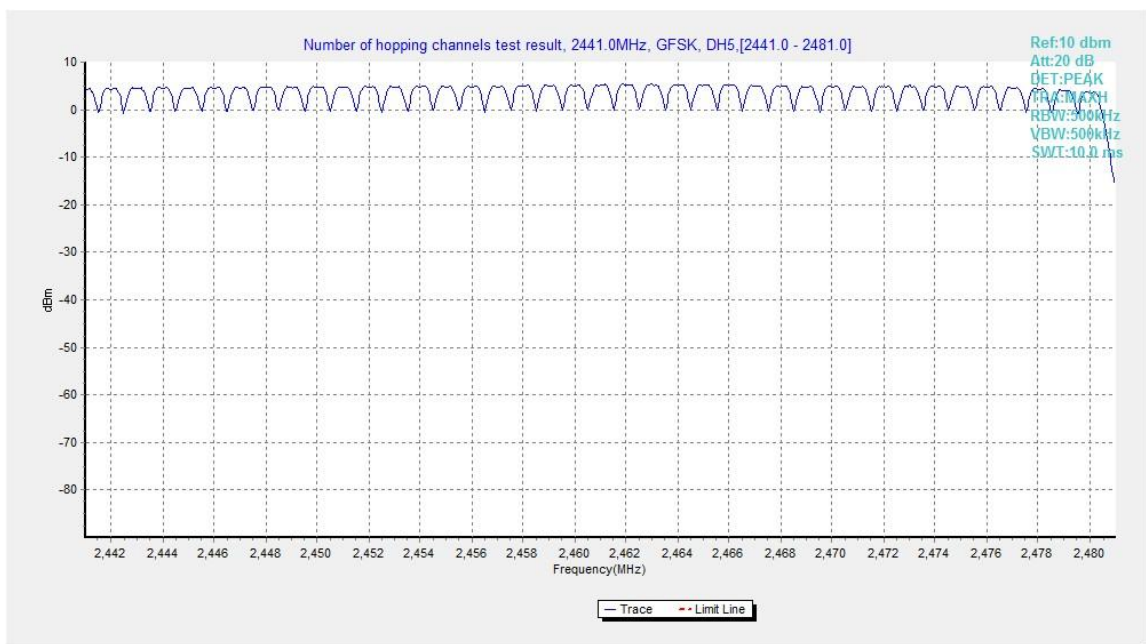


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78



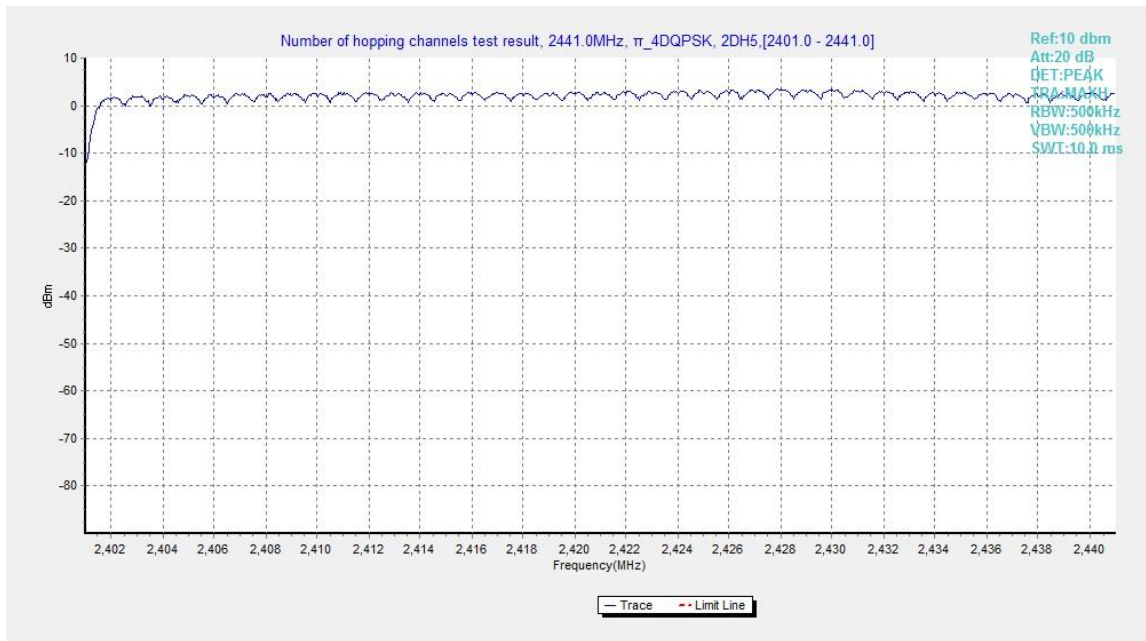


Fig.96. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 0 - 39

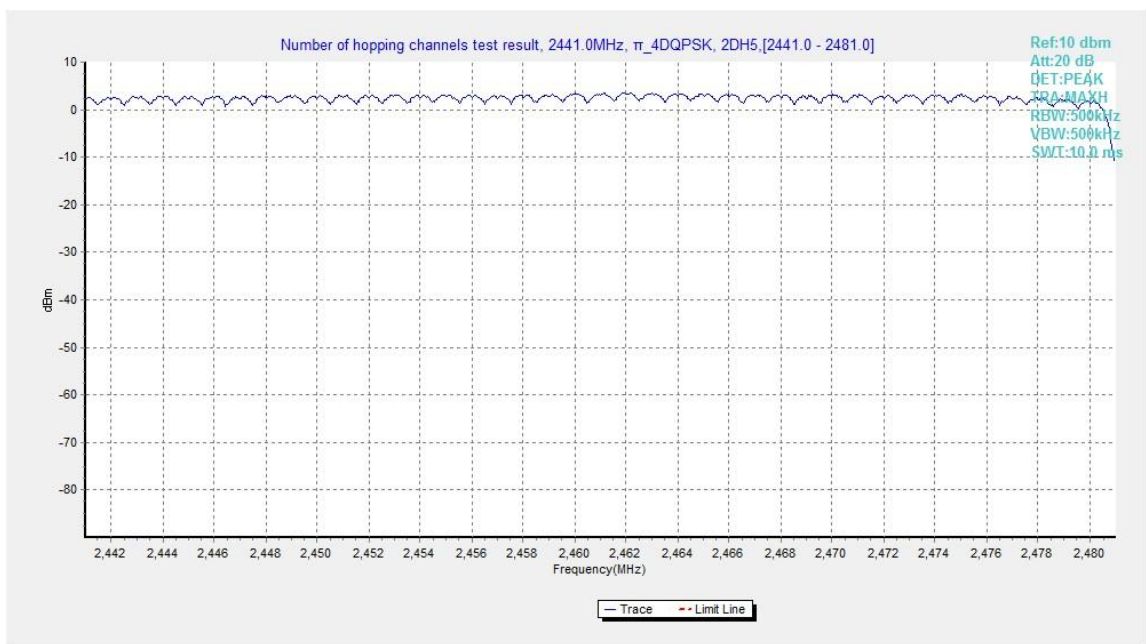


Fig.97. Number of hopping frequencies:  $\pi/4$  DQPSK, Channel 40 - 78



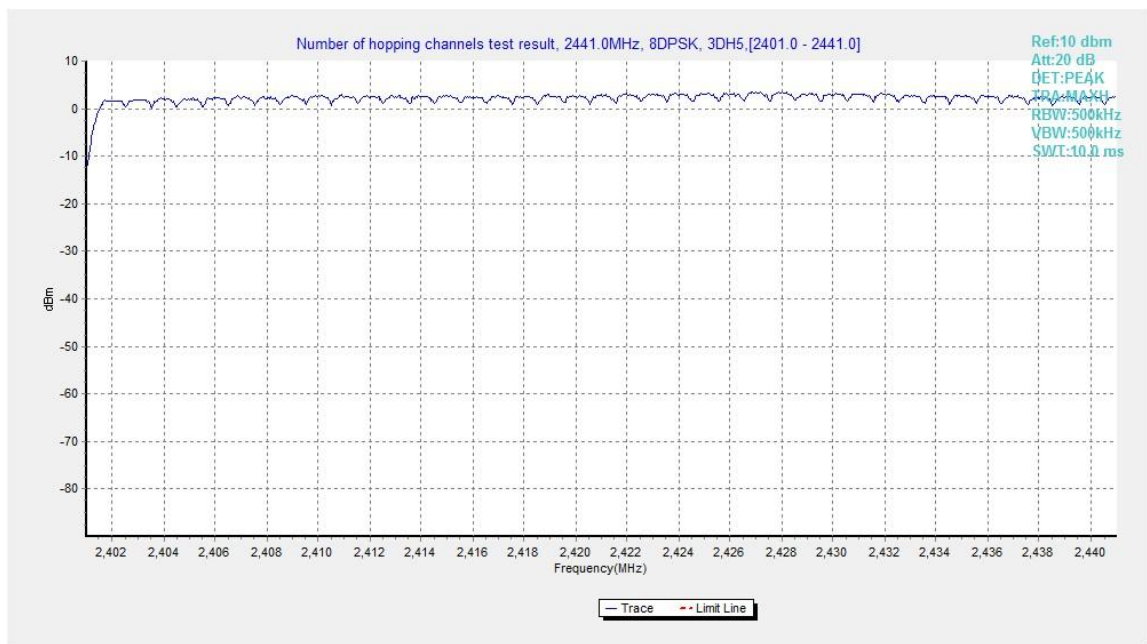


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

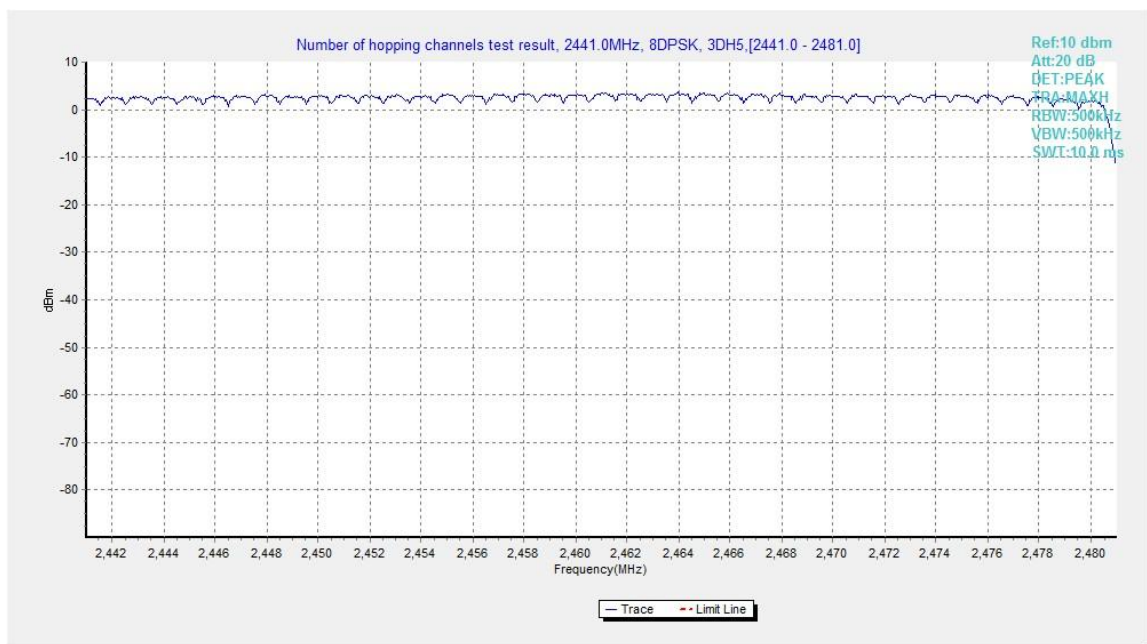


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

## A.10. AC Powerline Conducted Emission

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

1. the one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
2. If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
3. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
4. If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.
5. If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.<sup>36</sup> Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

### Test Condition

Voltage (V)	Frequency (Hz)
120	60

### Measurement Result and limit:

#### Bluetooth (Quasi-peak Limit)

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

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



**Bluetooth (Average Limit)**

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

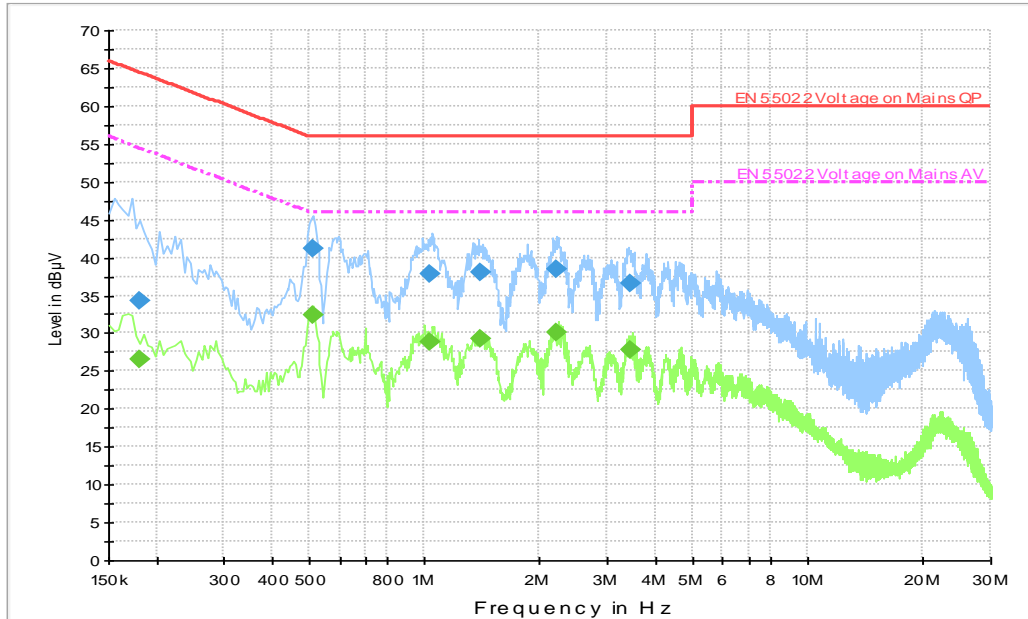
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10

**Conclusion: PASS**

**Test graphs as below:**

Traffic:



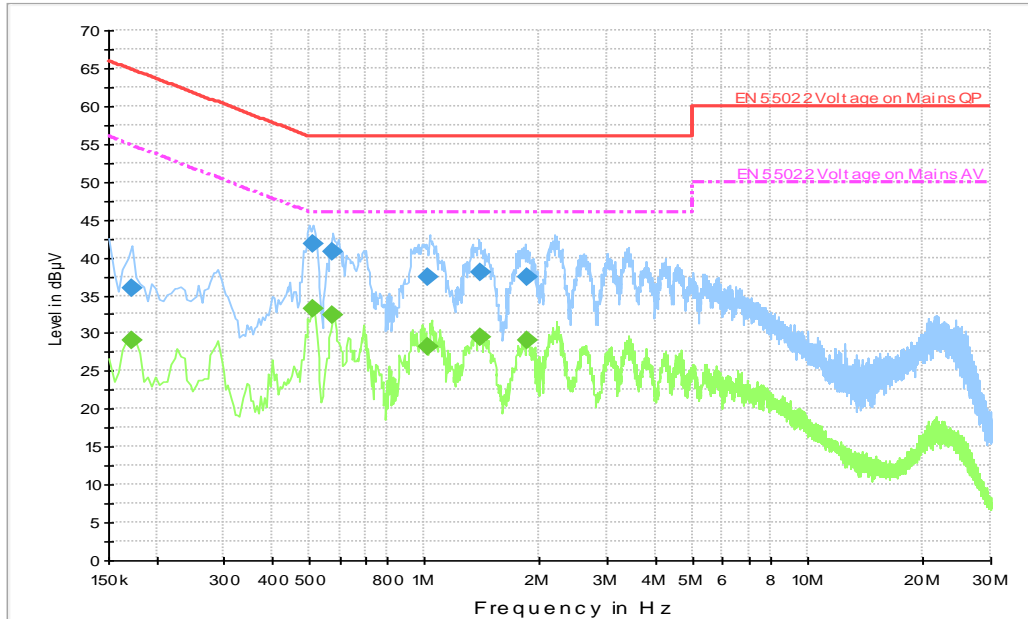
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	34.3	2000.0	9.000	L1	10.8	30.1	64.4
0.514500	41.2	2000.0	9.000	L1	10.6	14.8	56.0
1.027500	37.9	2000.0	9.000	L1	10.9	18.1	56.0
1.405500	38.1	2000.0	9.000	N	10.7	17.9	56.0
2.220000	38.5	2000.0	9.000	N	10.7	17.5	56.0
3.435000	36.6	2000.0	9.000	N	10.6	19.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.181500	26.6	2000.0	9.000	L1	10.8	27.8	54.4
0.514500	32.4	2000.0	9.000	L1	10.6	13.6	46.0
1.027500	28.9	2000.0	9.000	L1	10.9	17.1	46.0
1.405500	29.3	2000.0	9.000	L1	10.7	16.7	46.0
2.220000	30.1	2000.0	9.000	N	10.7	15.9	46.0
3.435000	27.8	2000.0	9.000	L1	10.4	18.2	46.0

Idle:





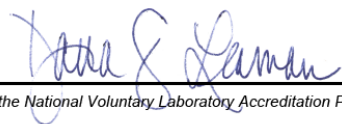

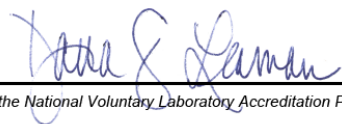

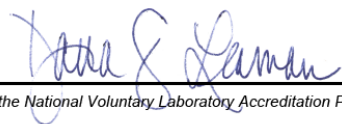
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	36.0	2000.0	9.000	L1	10.8	28.9	64.8
0.510000	41.7	2000.0	9.000	L1	10.6	14.3	56.0
0.577500	40.8	2000.0	9.000	N	10.7	15.2	56.0
1.018500	37.4	2000.0	9.000	L1	10.9	18.6	56.0
1.401000	38.0	2000.0	9.000	N	10.7	18.0	56.0
1.864500	37.5	2000.0	9.000	N	10.9	18.5	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	29.1	2000.0	9.000	L1	10.8	25.8	54.8
0.510000	33.3	2000.0	9.000	L1	10.6	12.7	46.0
0.577500	32.4	2000.0	9.000	N	10.7	13.6	46.0
1.018500	28.3	2000.0	9.000	L1	10.9	17.7	46.0
1.401000	29.4	2000.0	9.000	N	10.7	16.6	46.0
1.864500	29.0	2000.0	9.000	N	10.9	17.0	46.0

## ANNEX E: Accreditation Certificate

<p>United States Department of Commerce National Institute of Standards and Technology</p>  <hr/> <p><b>Certificate of Accreditation to ISO/IEC 17025:2005</b></p> <hr/> <p>NVLAP LAB CODE: 600118-0</p> <p><b>Telecommunication Technology Labs, CAICT</b> Beijing China</p> <p><i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i></p> <p><b>Electromagnetic Compatibility &amp; Telecommunications</b></p> <p><i>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).</i></p> <hr/> <table border="0" style="width: 100%;"><tr><td style="width: 40%; text-align: center;"><p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p></td><td style="width: 20%; text-align: center;"></td><td style="width: 40%; text-align: center;"> <i>For the National Voluntary Laboratory Accreditation Program</i></td></tr></table>		<p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p>		 <i>For the National Voluntary Laboratory Accreditation Program</i>
<p>2016-09-29 through 2017-09-30 <i>Effective Dates</i></p>		 <i>For the National Voluntary Laboratory Accreditation Program</i>		

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