

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

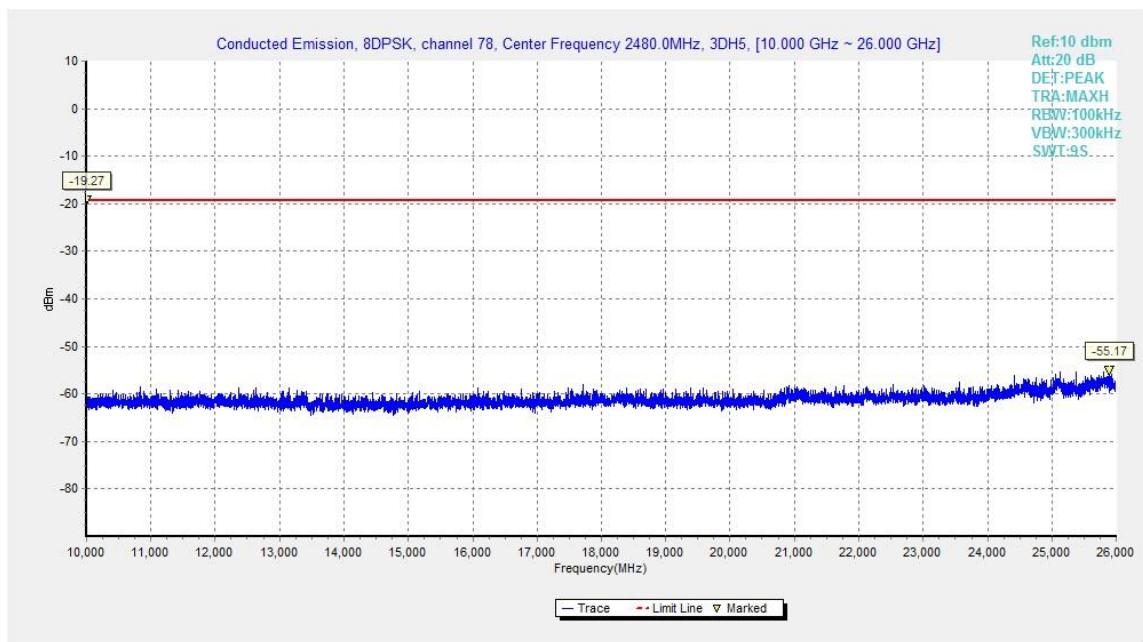


Fig.57. Conducted spurious emission: 8DPSK, Channel 78, 10GHz - 26GHz

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

Measurement Results:

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

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 39 2440 MHz	9 kHz ~ 30 MHz	--	P
	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.58	P
Power	2.45GHz~2.5GHz---H	Fig.59	P

For all channels	18 GHz ~ 26 GHz	--	P
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For π/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch 0 2402 MHz	1 GHz ~ 3 GHz	--	P
	3 GHz ~ 18 GHz	--	P
Ch 39 2440 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 2440 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 μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2388.100	46.29	2.9	32.0	11.43	54.0	7.7	H	155	354
2390.000	46.30	2.9	32.0	11.45	54.0	7.7	H	155	28
4803.700	36.14	-32.9	34.5	34.50	54.0	17.9	H	155	348
7205.800	38.52	-31.6	36.1	34.05	54.0	15.5	H	155	345
9607.900	38.19	-30.0	37.0	31.23	54.0	15.8	H	155	184
12010.000	43.40	-29.8	39.3	33.93	54.0	10.6	H	155	182

GFSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2389.600	46.32	2.9	32.0	11.47	54.0	7.7	H	155	142
2483.900	47.10	2.9	32.7	11.42	54.0	6.9	H	155	168
4882.000	36.07	-32.7	34.5	34.29	54.0	17.9	H	155	90
7322.800	38.46	-31.9	36.1	34.31	54.0	15.5	H	155	102
9763.600	38.76	-30.6	37.2	32.13	54.0	15.2	H	155	118
12205.300	43.98	-29.4	39.2	34.19	54.0	10.0	H	155	94

GFSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	47.27	2.9	32.8	11.58	54.0	6.7	H	155	98
2485.900	47.05	2.9	32.7	11.43	54.0	6.9	H	155	135
4960.300	36.16	-33.4	34.5	35.03	54.0	17.8	H	155	4
7439.800	38.26	-31.8	36.0	34.00	54.0	15.7	H	155	74
9920.200	40.95	-29.9	37.4	33.48	54.0	13.1	H	155	48
12399.700	44.17	-29.5	39.1	34.54	54.0	9.8	H	155	246

**GFSK Ch 0 – Peak**

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2388.624	59.01	2.9	32.0	24.15	74.0	15.0	H	155	0
2389.338	59.14	2.9	32.0	24.29	74.0	14.9	H	155	22
4803.700	42.02	-32.9	34.5	40.37	74.0	32.0	V	155	352
7205.800	43.74	-31.6	36.1	39.27	74.0	30.3	V	155	352
9607.900	45.92	-30.0	37.0	38.97	74.0	28.1	V	155	176
12010.000	48.47	-29.8	39.3	39.00	74.0	25.5	V	155	176

GFSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2355.200	47.80	-32.9	31.7	48.97	74.0	26.2	H	155	22
2558.800	49.33	-32.6	33.1	48.91	74.0	24.7	H	155	44
4882.000	41.88	-32.7	34.5	40.09	74.0	32.1	H	155	88
7322.800	43.85	-31.9	36.1	39.69	74.0	30.2	V	155	110
9763.600	46.00	-30.6	37.2	39.37	74.0	28.0	V	155	110
12205.300	48.46	-29.4	39.2	38.67	74.0	25.5	V	155	88

GFSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.530	61.29	2.9	32.8	25.60	74.0	12.7	H	155	88
2483.810	60.33	2.9	32.8	24.65	74.0	13.7	H	155	132
4960.300	41.89	-33.4	34.5	40.77	74.0	32.1	H	155	0
7439.800	43.00	-31.8	36.0	38.74	74.0	31.0	V	155	66
9920.200	46.11	-29.9	37.4	38.64	74.0	27.9	V	155	44
12399.700	48.55	-29.5	39.1	38.93	74.0	25.4	H	155	242

$\pi/4$ DQPSK Ch 0 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2382.000	46.29	2.9	32.0	11.39	54.0	7.7	H	155	92
2386.700	46.29	2.9	32.0	11.42	54.0	7.7	H	155	68
4803.700	36.13	-32.9	34.5	34.48	54.0	17.9	H	155	118
7205.800	38.44	-31.6	36.1	33.97	54.0	15.6	H	155	354
9607.900	38.15	-30.0	37.0	31.20	54.0	15.9	H	155	18
12010.000	43.38	-29.8	39.3	33.91	54.0	10.6	H	155	38

$\pi/4$ DQPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2388.900	46.34	2.9	32.0	11.49	54.0	7.7	H	155	20
2484.400	47.05	2.9	32.7	11.38	54.0	6.9	H	155	18
4882.000	36.11	-32.7	34.5	34.33	54.0	17.9	H	155	90
7322.800	38.33	-31.9	36.1	34.17	54.0	15.7	H	155	114
9763.600	38.76	-30.6	37.2	32.13	54.0	15.2	H	155	36
12205.300	44.02	-29.4	39.2	34.23	54.0	10.0	H	155	2

$\pi/4$ DQPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	47.36	2.9	32.8	11.67	54.0	6.6	H	155	8
2485.900	47.10	2.9	32.7	11.47	54.0	6.9	H	155	46
4960.300	36.05	-33.4	34.5	34.92	54.0	18.0	H	155	20
7639.800	38.32	-31.4	36.0	33.77	54.0	15.7	H	155	118
9920.200	40.80	-29.9	37.4	33.33	54.0	13.2	H	155	82
12399.700	44.23	-29.5	39.1	34.60	54.0	9.8	H	155	46

$\pi/4$ DQPSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2386.706	59.01	2.9	32.0	24.14	74.0	15.0	H	155	88
2389.184	59.62	2.9	32.0	24.77	74.0	14.4	H	155	66
4803.700	42.22	-32.9	34.5	40.57	74.0	31.8	H	155	110
7205.800	43.45	-31.6	36.1	38.97	74.0	30.6	V	155	0
9607.900	45.62	-30.0	37.0	38.67	74.0	28.4	H	155	22
12010.000	49.00	-29.8	39.3	39.53	74.0	25.0	H	155	44

 $\pi/4$ DQPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2372.600	48.62	-32.6	32.1	49.16	74.0	25.4	H	155	132
2505.200	49.09	-32.1	32.4	48.78	74.0	24.9	H	155	154
4882.000	42.12	-32.7	34.5	40.33	74.0	31.9	H	155	88
7322.800	42.86	-31.9	36.1	38.70	74.0	31.1	V	155	110
9763.600	45.68	-30.6	37.2	39.05	74.0	28.3	V	155	44
12205.300	48.98	-29.4	39.2	39.19	74.0	25.0	H	155	0

 $\pi/4$ DQPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2491.320	60.09	2.9	32.5	24.61	74.0	13.9	H	155	0
2493.220	60.01	2.9	32.5	24.58	74.0	14.0	H	155	44
4960.300	41.75	-33.4	34.5	40.62	74.0	32.3	V	155	22
7639.800	42.62	-31.4	36.0	38.07	74.0	31.4	H	155	110
9920.200	45.87	-29.9	37.4	38.40	74.0	28.1	H	155	88
12399.700	48.55	-29.5	39.1	38.92	74.0	25.4	H	155	44

**8DPSK Ch 0 - Average**

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2383.000	46.30	2.9	32.0	11.40	54.0	7.7	H	155	4
2386.700	46.30	2.9	32.0	11.43	54.0	7.7	H	155	26
4803.700	36.16	-32.9	34.5	34.51	54.0	17.8	H	155	6
7205.800	38.54	-31.6	36.1	34.07	54.0	15.5	H	155	274
9607.900	38.13	-30.0	37.0	31.18	54.0	15.9	H	155	272
12010.000	43.40	-29.8	39.3	33.93	54.0	10.6	H	155	245

8DPSK Ch 39 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2389.900	46.28	2.9	32.0	11.44	54.0	7.7	H	155	135
2484.100	47.05	2.9	32.7	11.37	54.0	7.0	H	155	164
4882.000	35.93	-32.7	34.5	34.14	54.0	18.1	H	155	102
7322.800	38.36	-31.9	36.1	34.20	54.0	15.6	H	155	112
9763.600	38.75	-30.6	37.2	32.12	54.0	15.3	H	155	115
12205.300	43.91	-29.4	39.2	34.12	54.0	10.1	H	155	92

8DPSK Ch 78 - Average

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2483.500	47.23	2.9	32.8	11.54	54.0	6.8	H	155	24
2486.800	46.98	2.9	32.7	11.38	54.0	7.0	H	155	46
4960.300	36.06	-33.4	34.5	34.94	54.0	17.9	H	155	6
7439.800	38.27	-31.8	36.0	34.01	54.0	15.7	H	155	5
9920.200	40.90	-29.9	37.4	33.43	54.0	13.1	H	155	25
12399.700	44.18	-29.5	39.1	34.55	54.0	9.8	H	155	184

8DPSK Ch 0 – Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2381.862	59.72	2.9	32.0	24.81	74.0	14.3	H	155	0
2386.286	58.98	2.9	32.0	24.11	74.0	15.0	H	155	22
4803.700	41.76	-32.9	34.5	40.11	74.0	32.2	H	155	0
7205.800	43.66	-31.6	36.1	39.19	74.0	30.3	V	155	264
9607.900	45.81	-30.0	37.0	38.86	74.0	28.2	H	155	264
12010.000	48.63	-29.8	39.3	39.16	74.0	25.4	H	155	242

8DPSK Ch 39 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2356.800	48.09	-32.8	31.8	49.12	74.0	25.9	H	155	22
2509.200	48.96	-32.2	32.4	48.72	74.0	25.0	H	155	44
4882.000	41.83	-32.7	34.5	40.04	74.0	32.2	H	155	88
7322.800	43.58	-31.9	36.1	39.42	74.0	30.4	V	155	110
9763.600	46.02	-30.6	37.2	39.39	74.0	28.0	V	155	110
12205.300	49.17	-29.4	39.2	39.38	74.0	24.8	H	155	88

8DPSK Ch 78 - Peak

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)	Antenna Height (cm)	Turntable angle (deg)
2485.070	60.04	2.9	32.7	24.39	74.0	14.0	H	155	22
2491.570	59.90	2.9	32.5	24.43	74.0	14.1	H	155	44
4960.300	41.82	-33.4	34.5	40.69	74.0	32.2	V	155	0
7439.800	43.50	-31.8	36.0	39.24	74.0	30.5	H	155	0
9920.200	45.92	-29.9	37.4	38.45	74.0	28.1	V	155	22
12399.700	49.00	-29.5	39.1	39.37	74.0	25.0	H	155	176

Conclusion: PASS

Test graphs as below for Set.10:

R E - Power-2.38GHz-2.45GHz

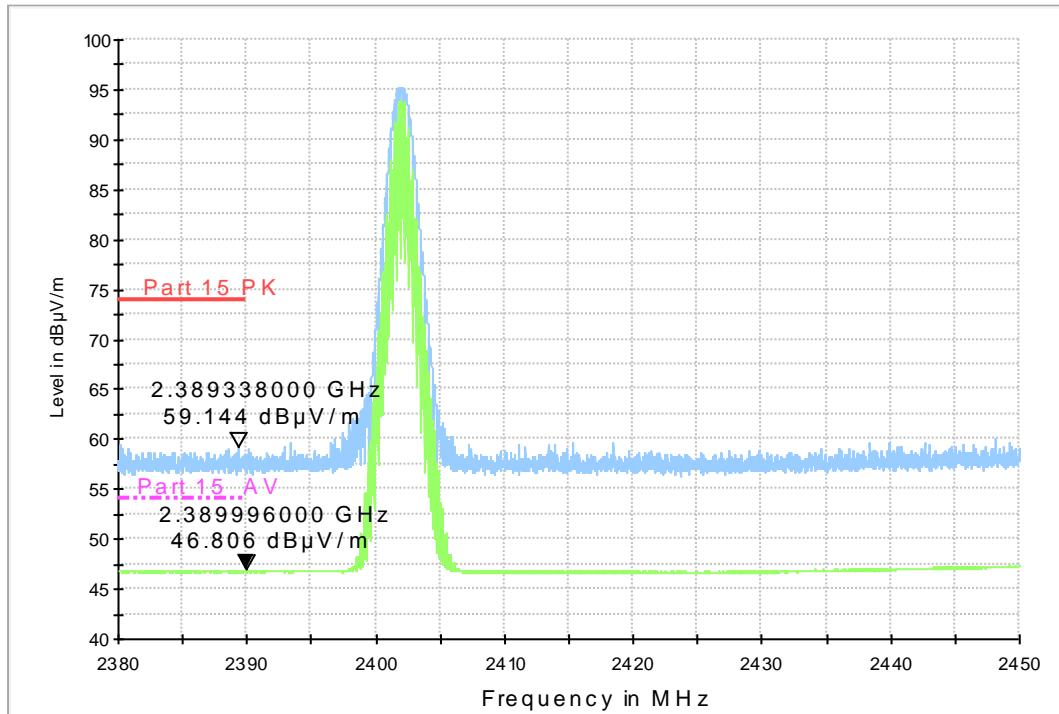


Fig.58. Radiated emission (Power): GFSK, low channel

R E - Power-2.45GHz-2.5GHz

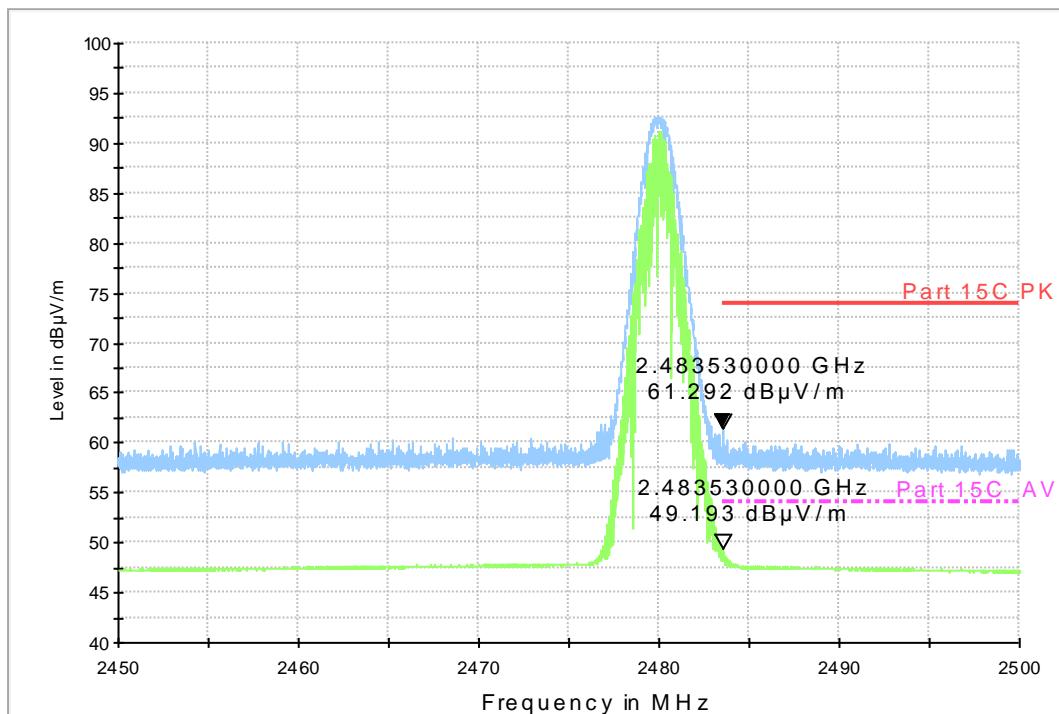


Fig.59. Radiated emission (Power) GFSK, high channel

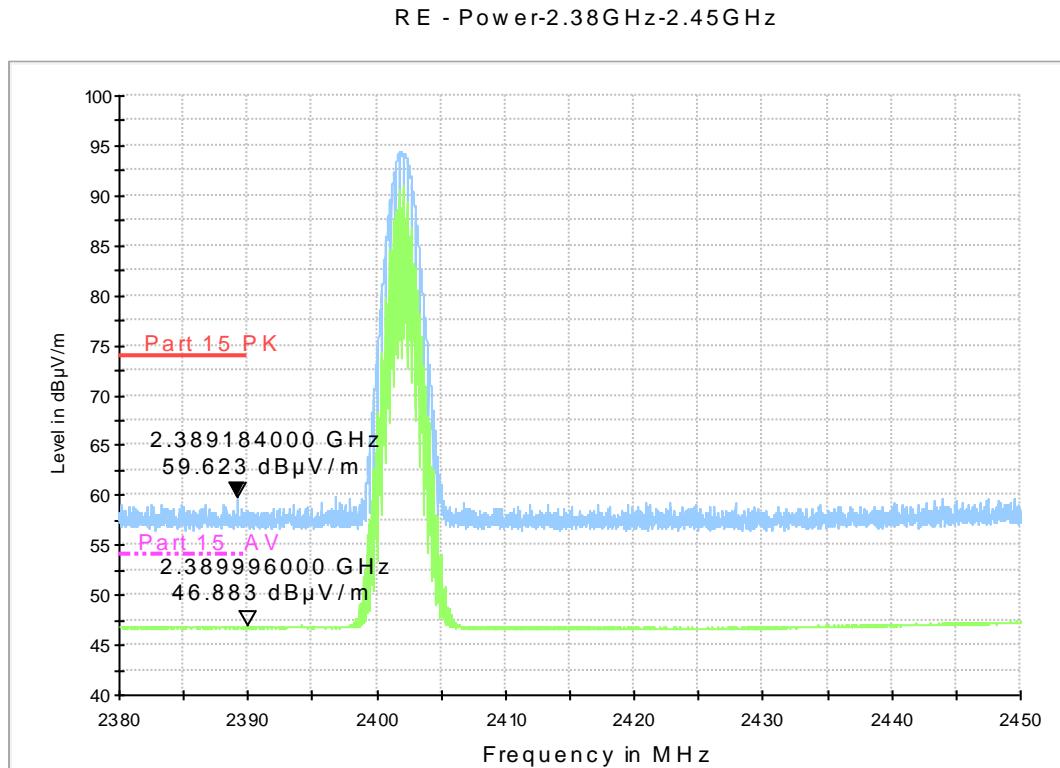


Fig.60. Radiated emission (Power): $\pi/4$ DQPSK, low channel

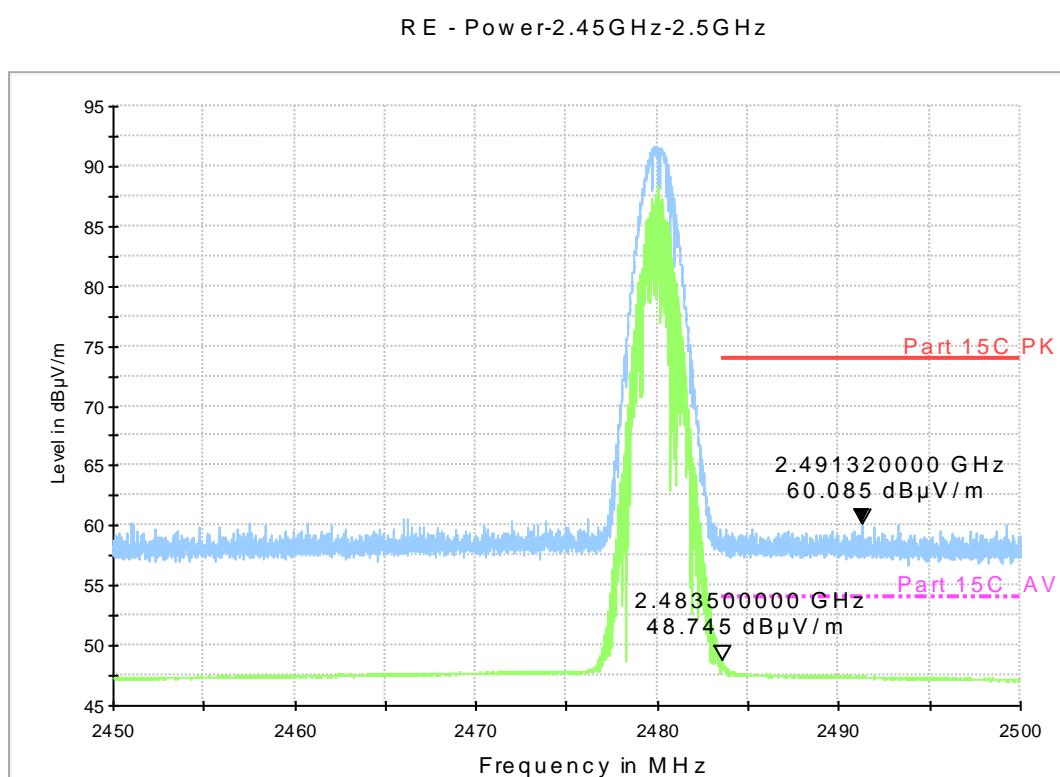


Fig.61. Radiated emission (Power): $\pi/4$ DQPSK, high channel

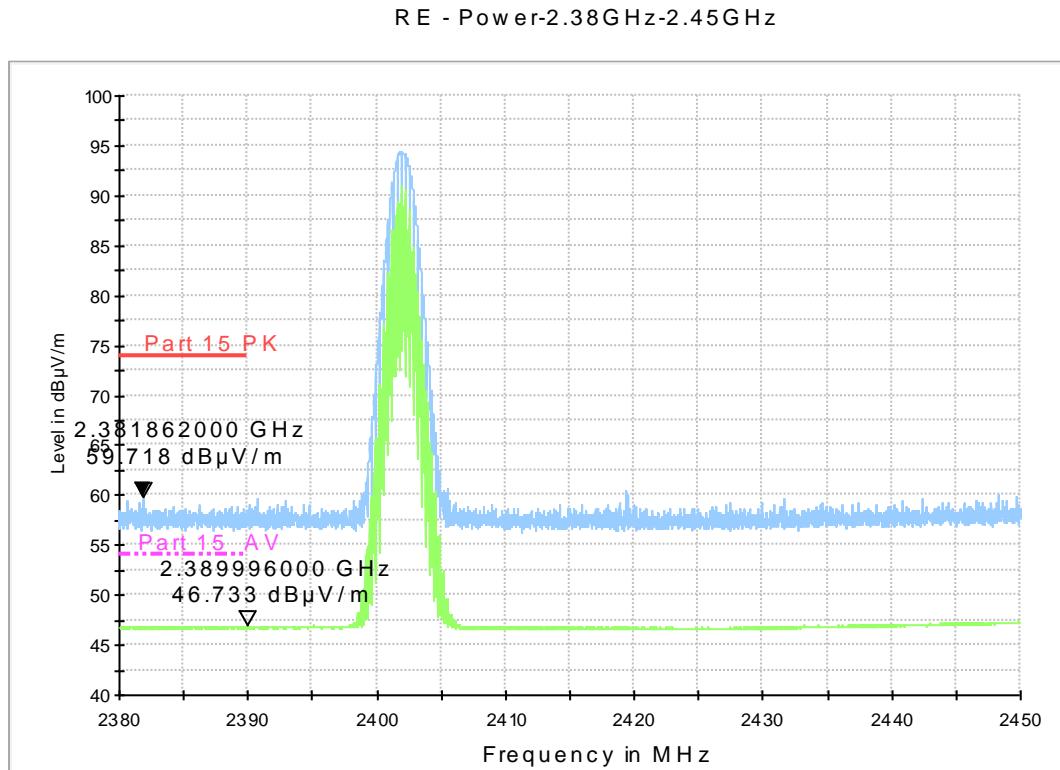


Fig.62. Radiated emission (Power): 8DPSK, low channel

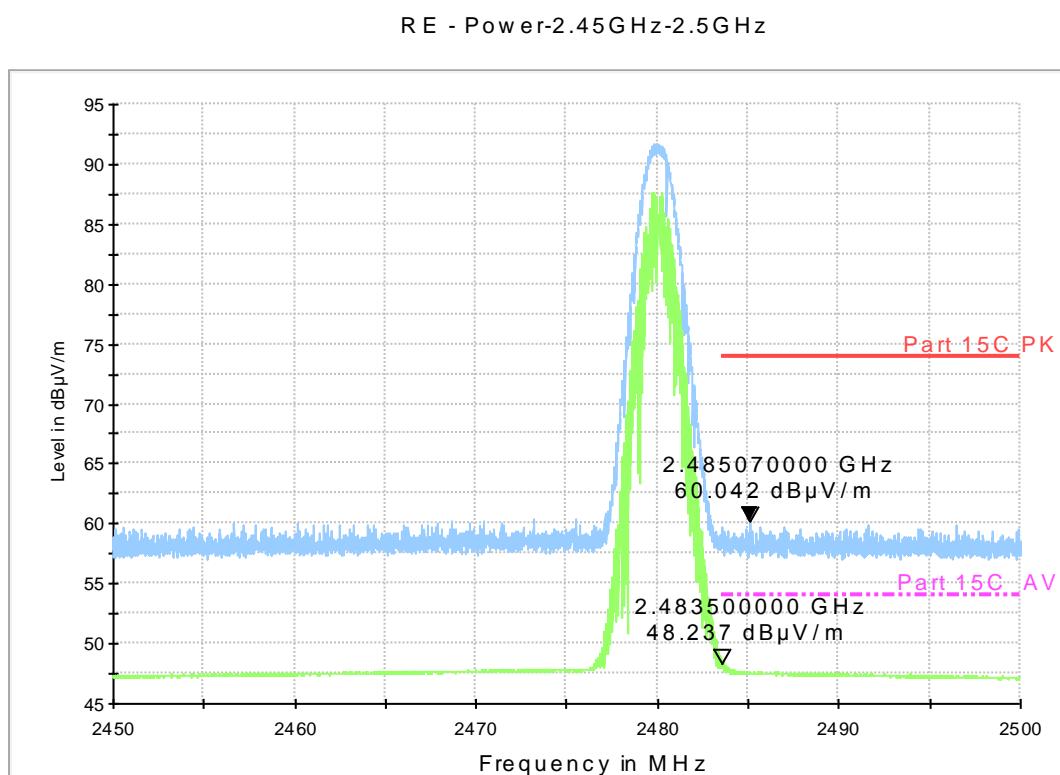


Fig.63. Radiated emission (Power): 8DPSK, high channel

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 \geq RBW
- Sweep = as necessary to capture the entire dwell time per hopping channel
- Detector function = peak
- Trace = max hold

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

Measurement Limit:

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

Measurement Result:

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.64	117.22	P
		Fig.65		
	DH3	Fig.66	186.98	P
		Fig.67		
	DH5	Fig.68	158.06	P
		Fig.69		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.70	120.27	P
		Fig.71		
	DH3	Fig.72	174.31	P
		Fig.73		
	DH5	Fig.74	146.73	P
		Fig.75		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.76	121.45	P
		Fig.77		
	DH3	Fig.78	162.84	P

		Fig.79		
	DH5	Fig.80	201.56	P
		Fig.81		

Conclusion: PASS

Test graphs as below:

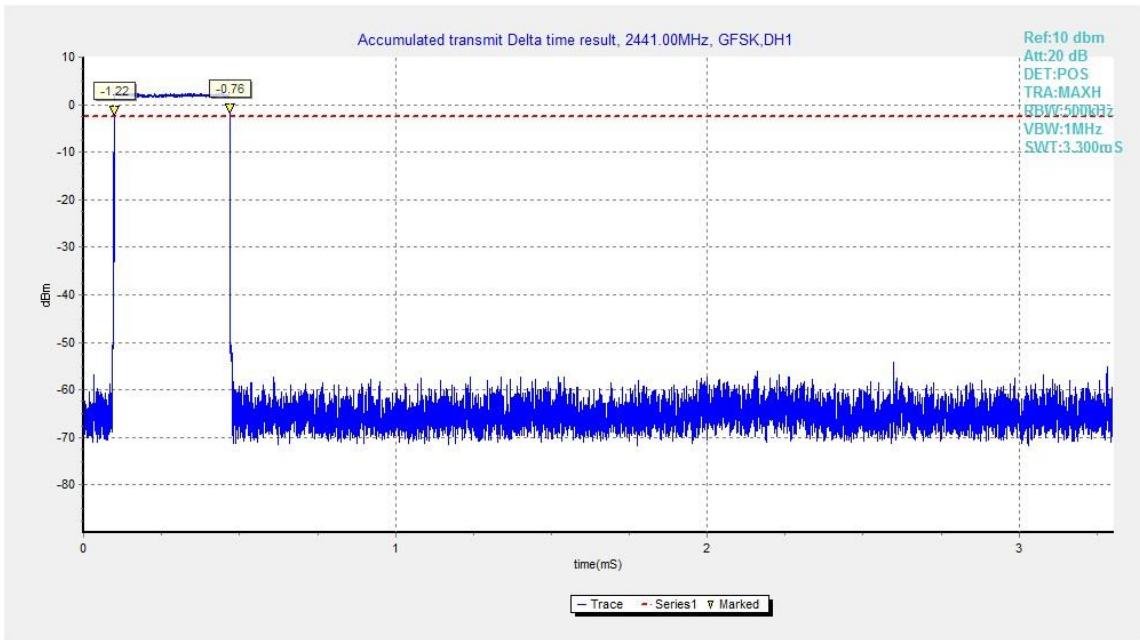


Fig.64. Time of occupancy (Dwell Time): Channel 39, Packet DH1

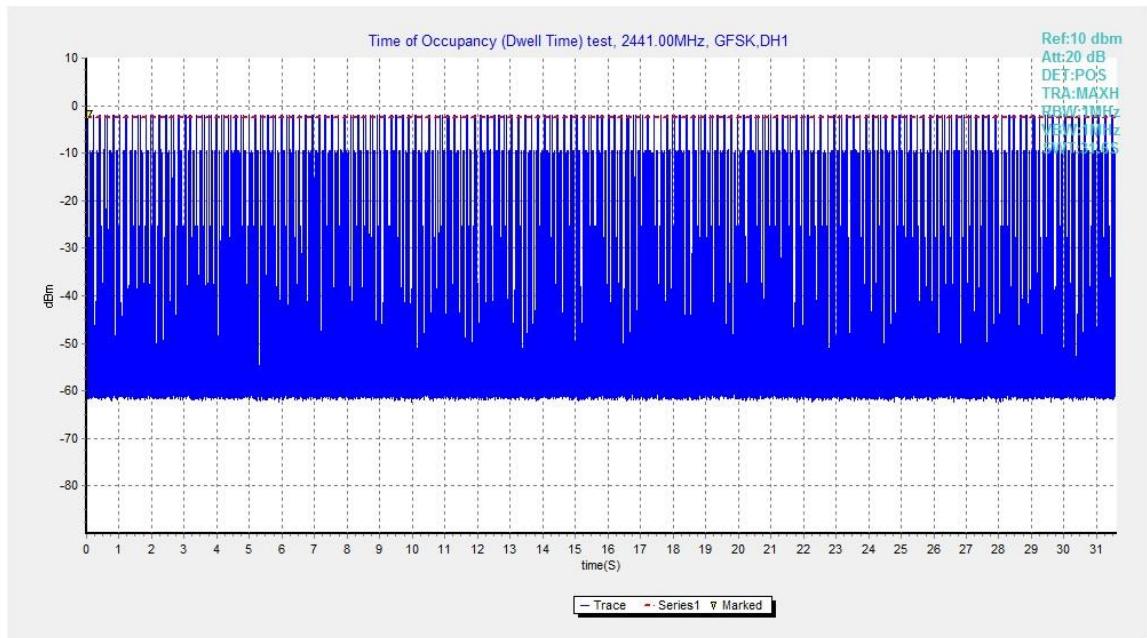


Fig.65. Number of Transmissions Measurement: Channel 39,Packet DH1

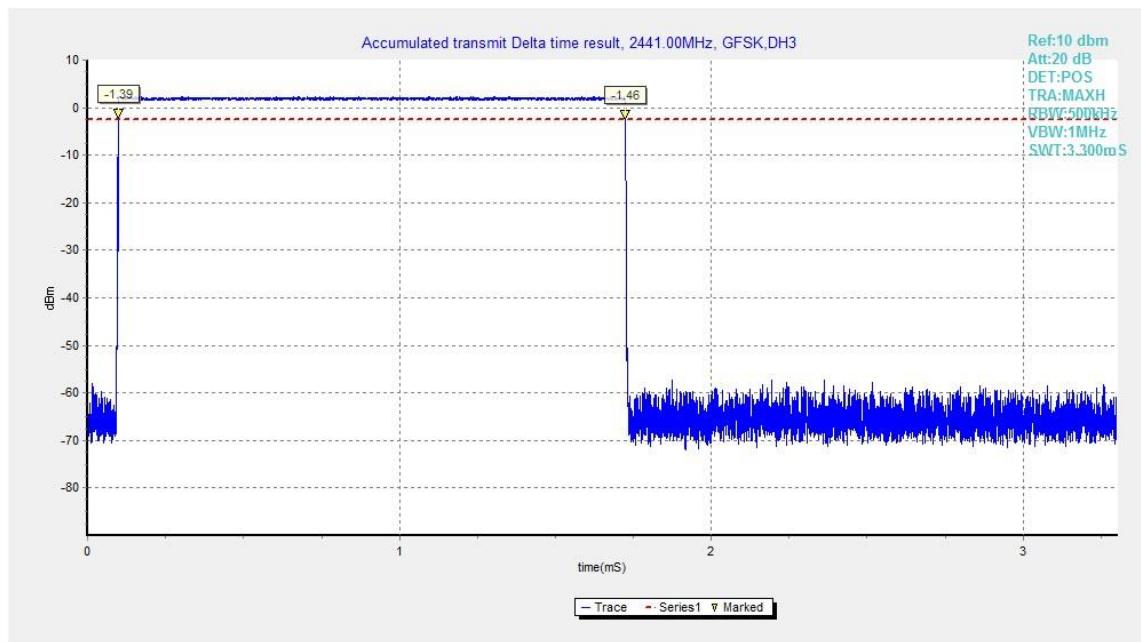


Fig.66. Time of occupancy (Dwell Time): Channel 39, Packet DH3

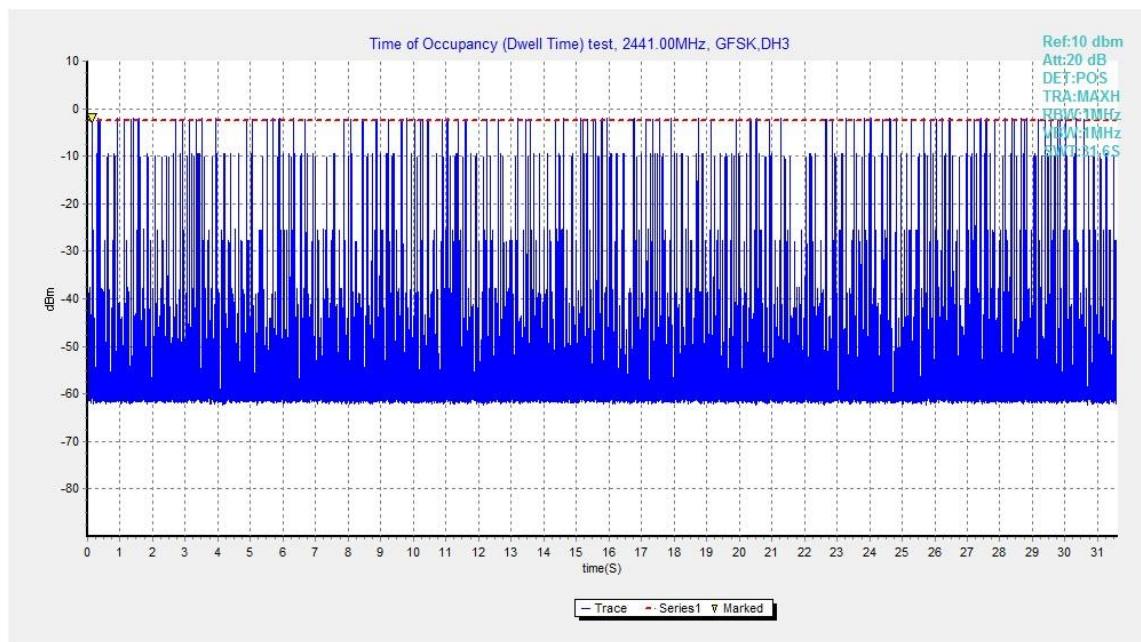


Fig.67. Number of Transmissions Measurement: Channel 39,Packet DH3

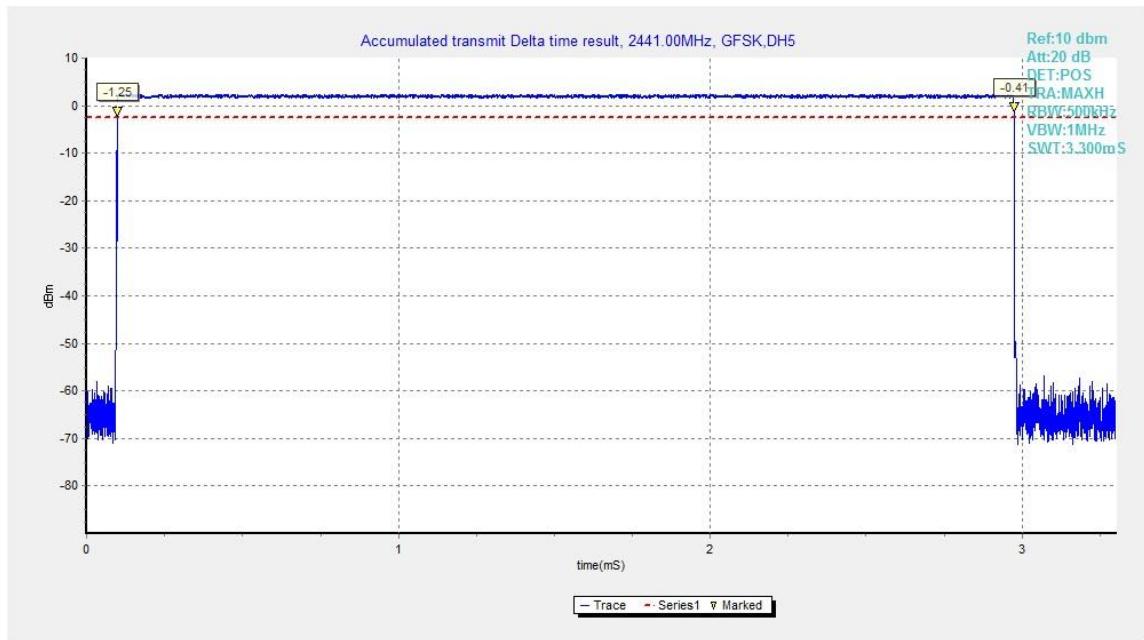


Fig.68. Time of occupancy (Dwell Time): Channel 39, Packet DH5

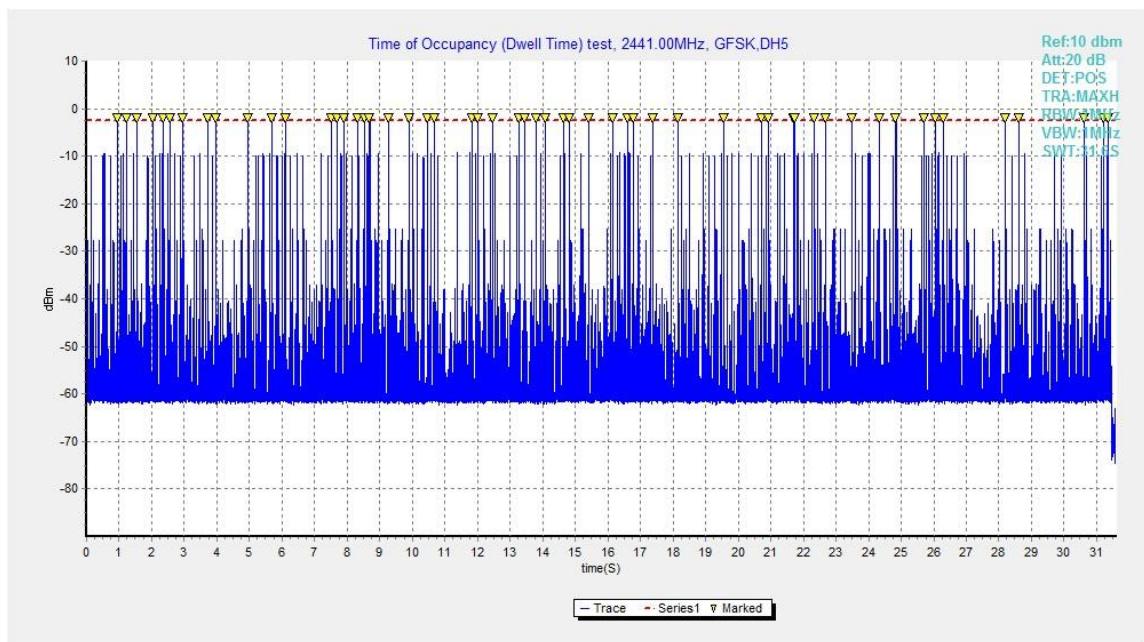


Fig.69. Number of Transmissions Measurement: Channel 39,Packet DH5

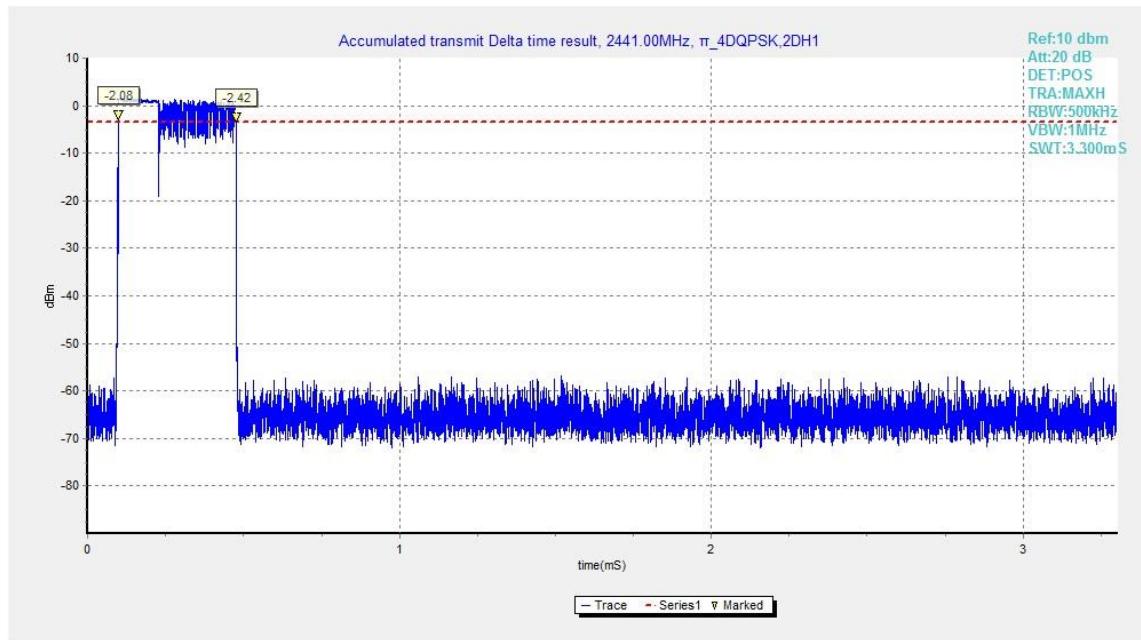


Fig.70. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

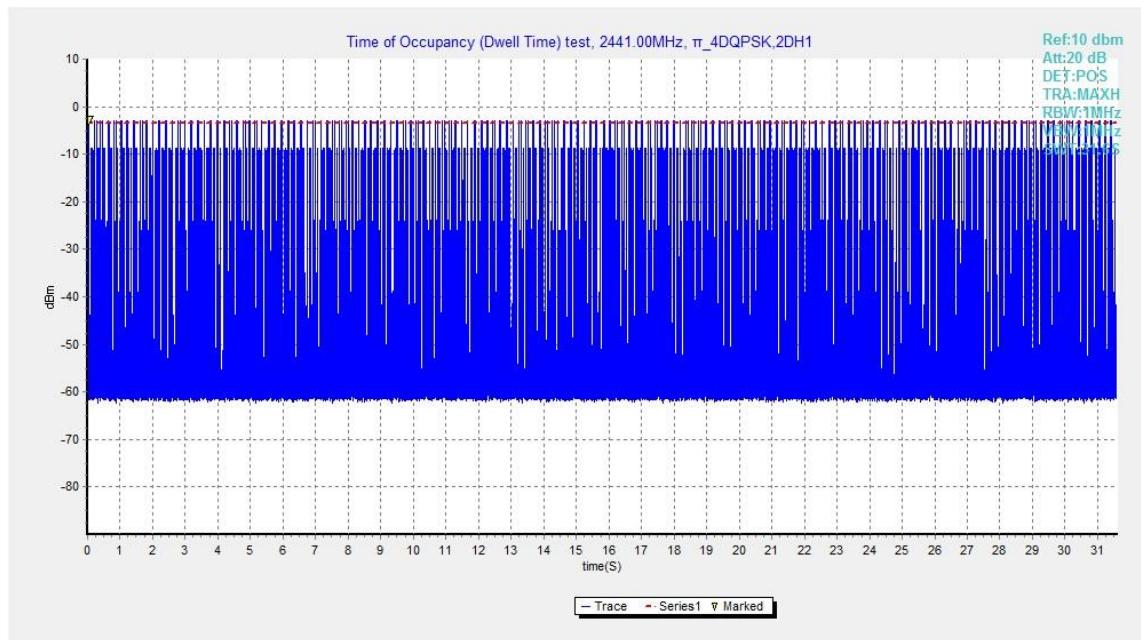


Fig.71. Number of Transmissions Measurement: Channel 39,Packet 2-DH1

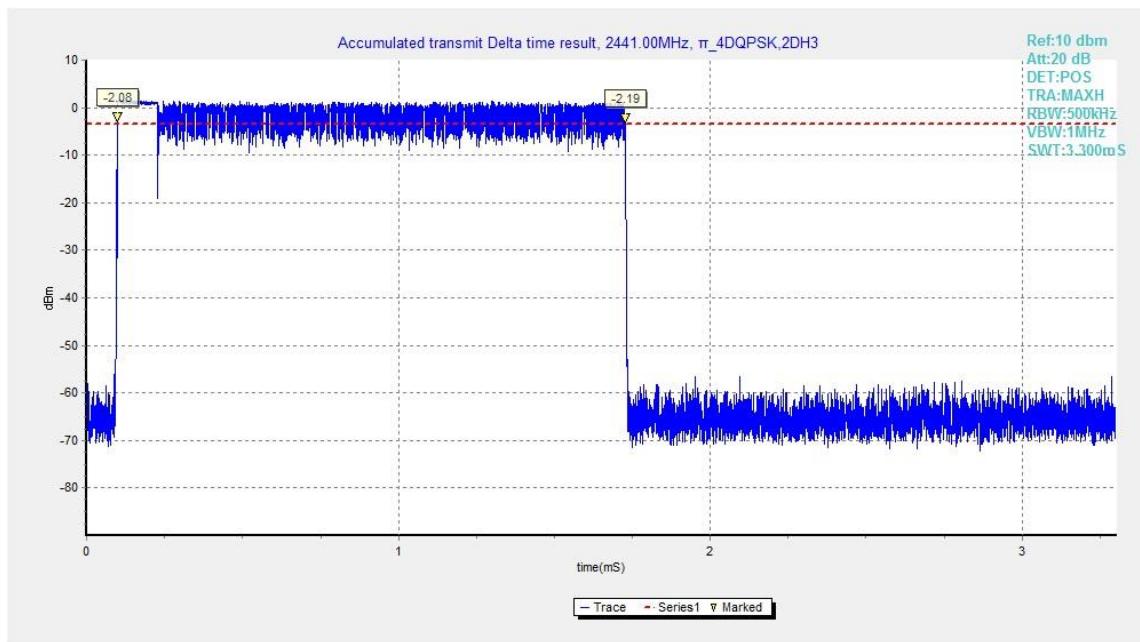


Fig.72. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3

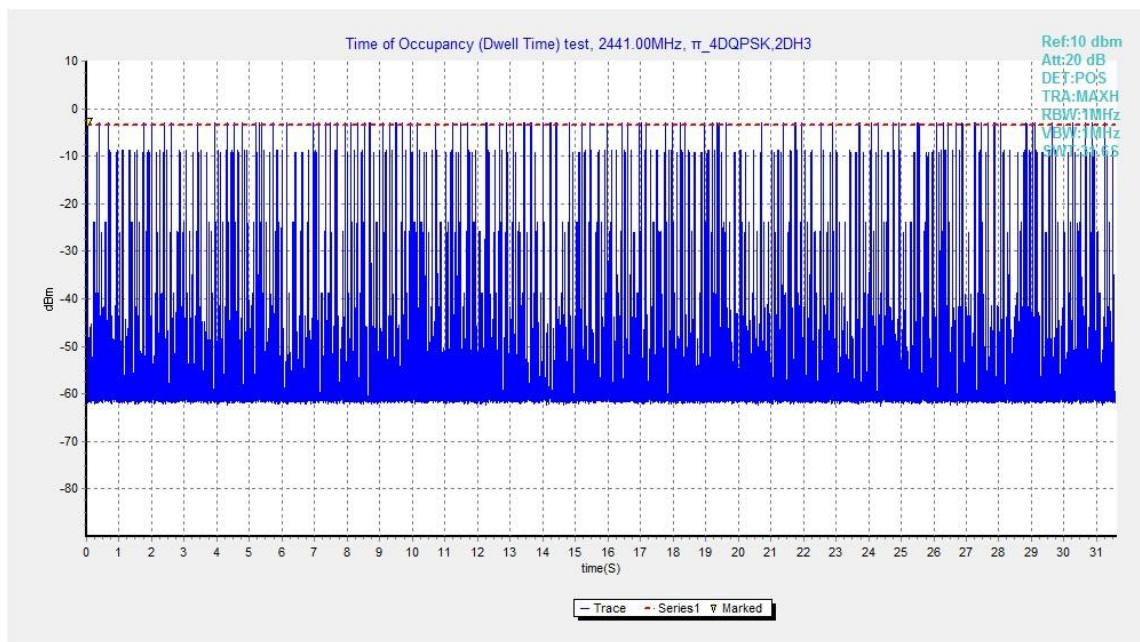


Fig.73. Number of Transmissions Measurement: Channel 39,Packet 2-DH3

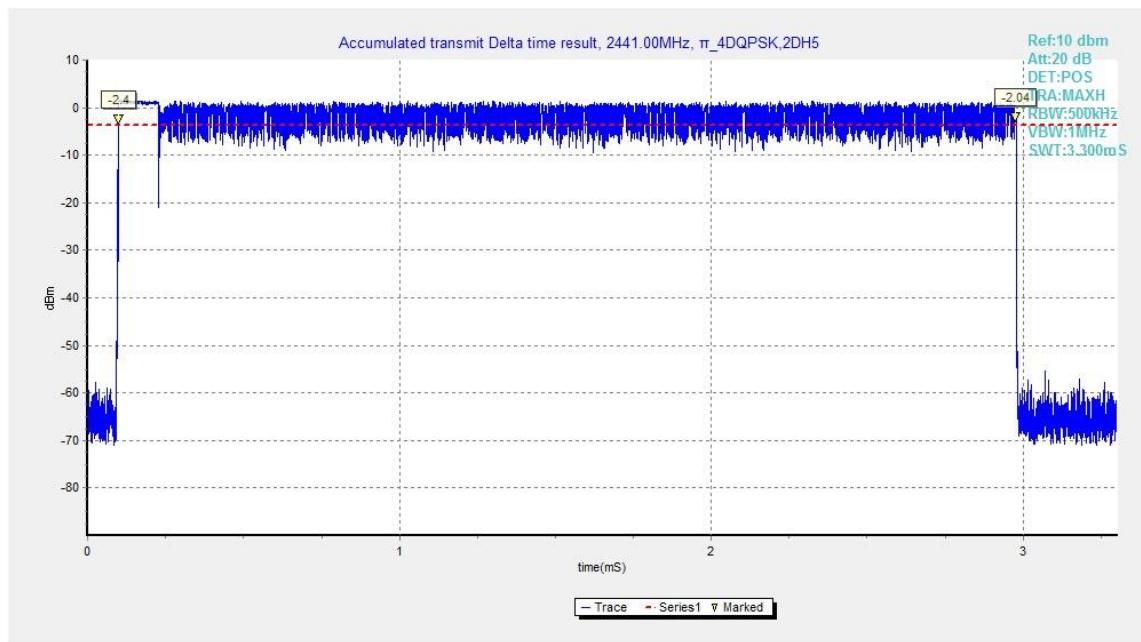


Fig.74. Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

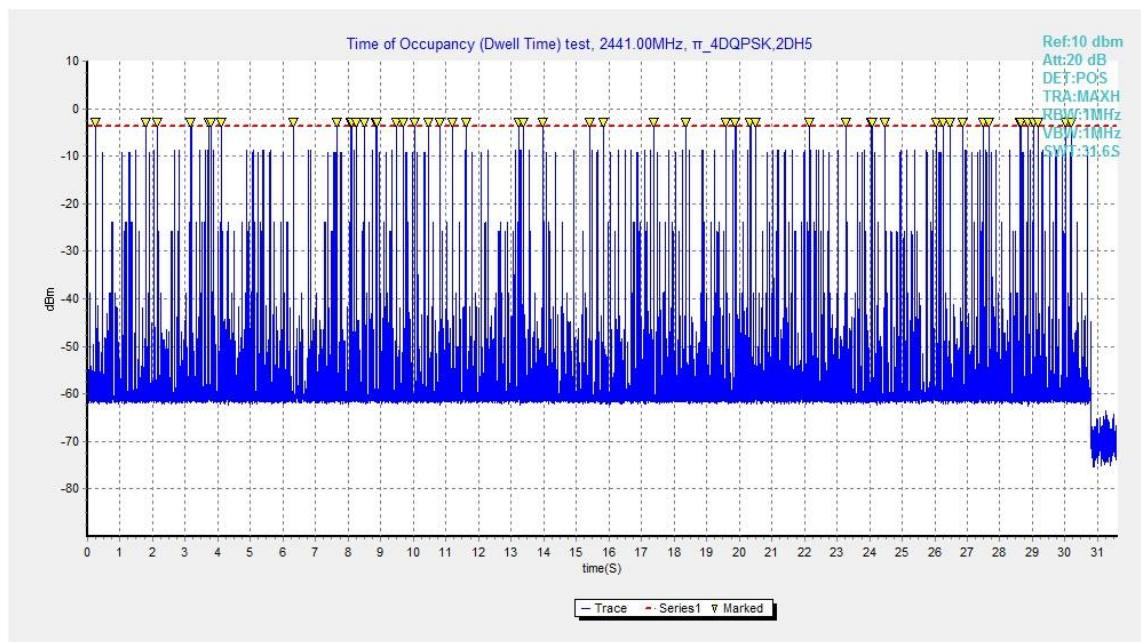


Fig.75. Number of Transmissions Measurement: Channel 39,Packet 2-DH5

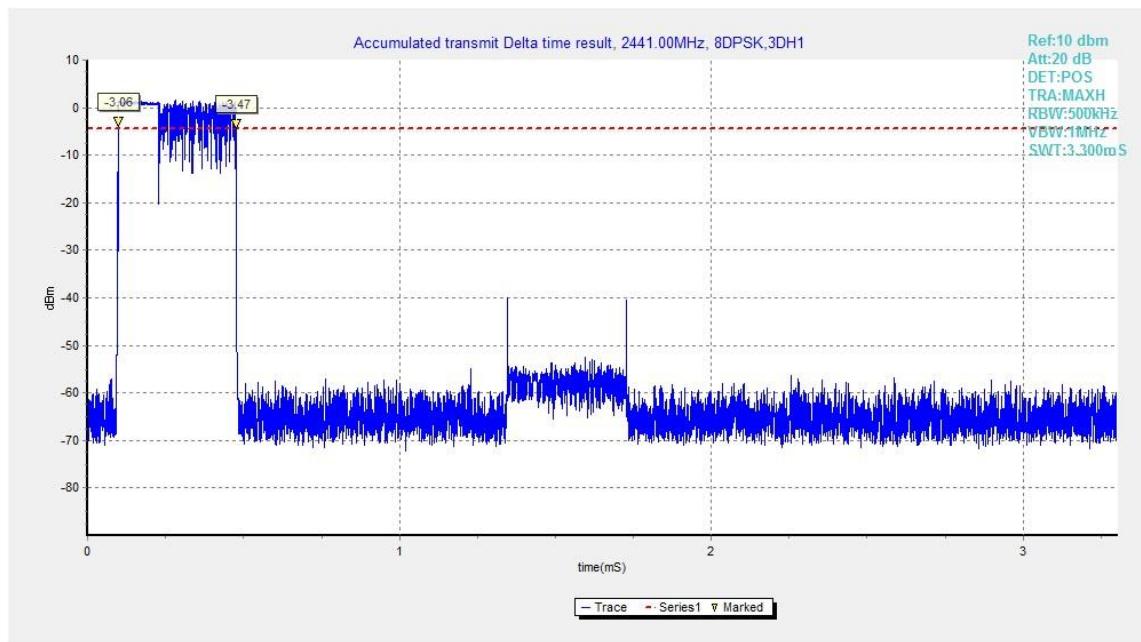


Fig.76. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

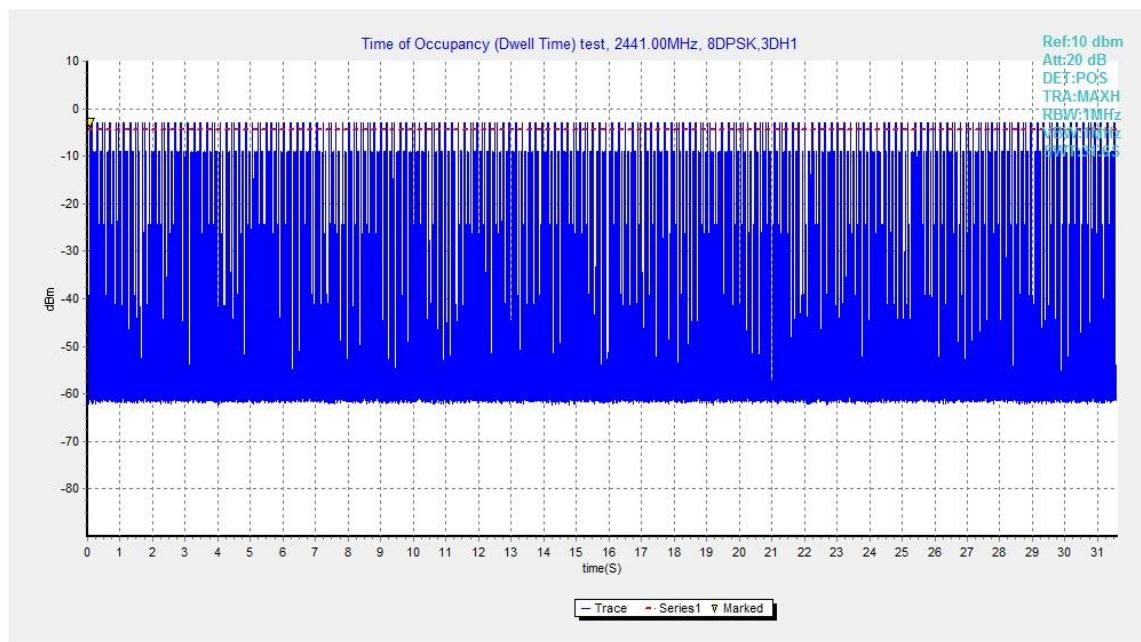


Fig.77. Number of Transmissions Measurement: Channel 39,Packet 3-DH1

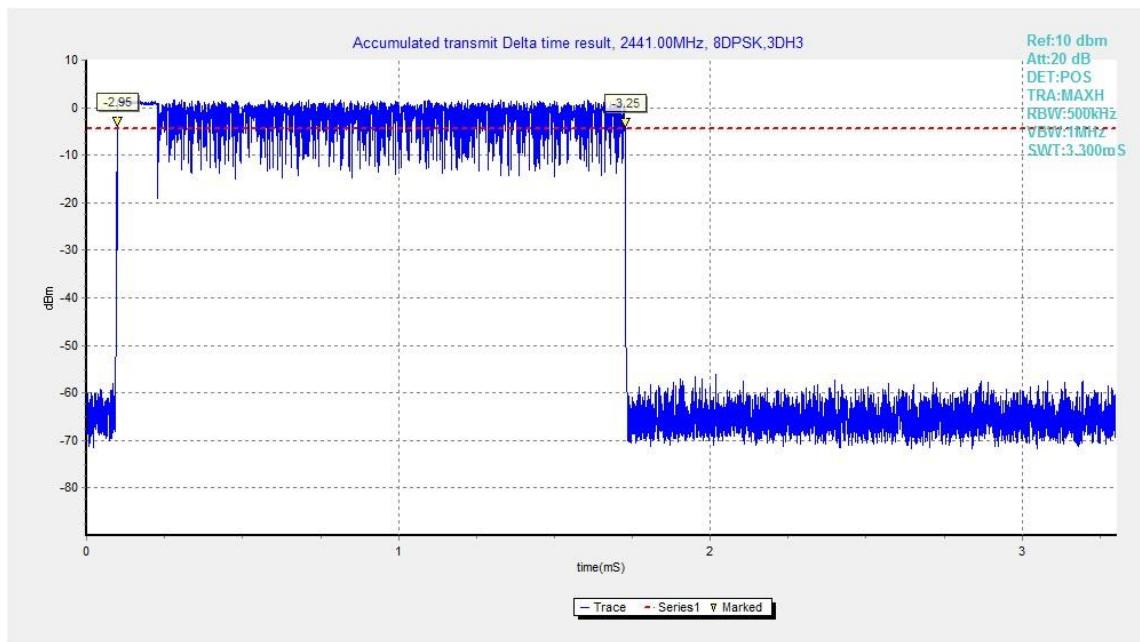


Fig.78. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3

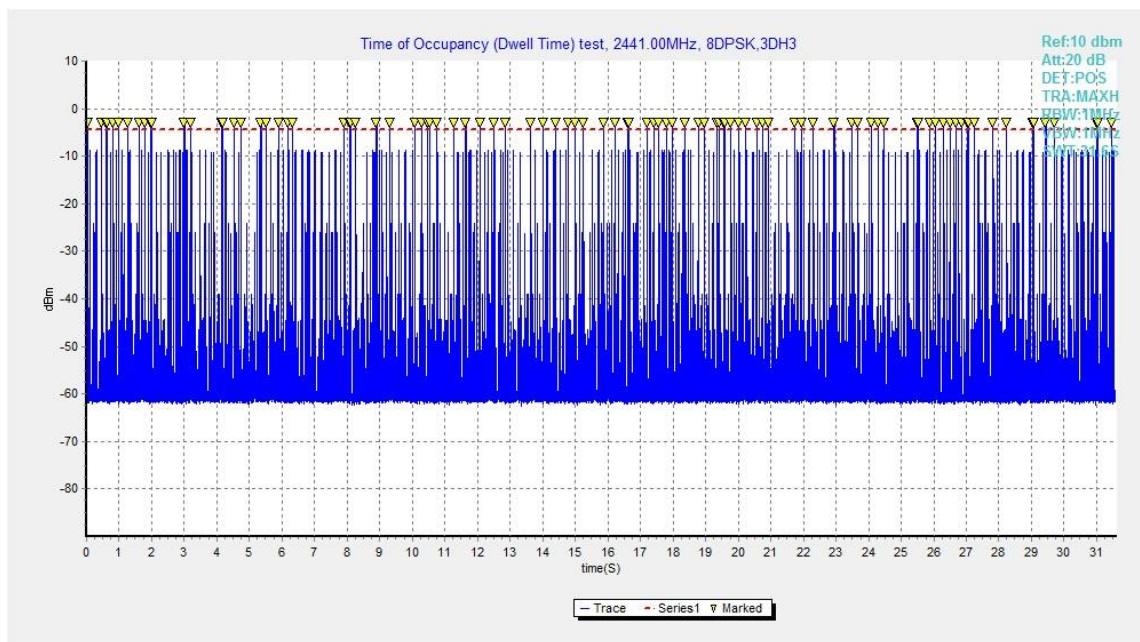


Fig.79. Number of Transmissions Measurement: Channel 39,Packet 3-DH3

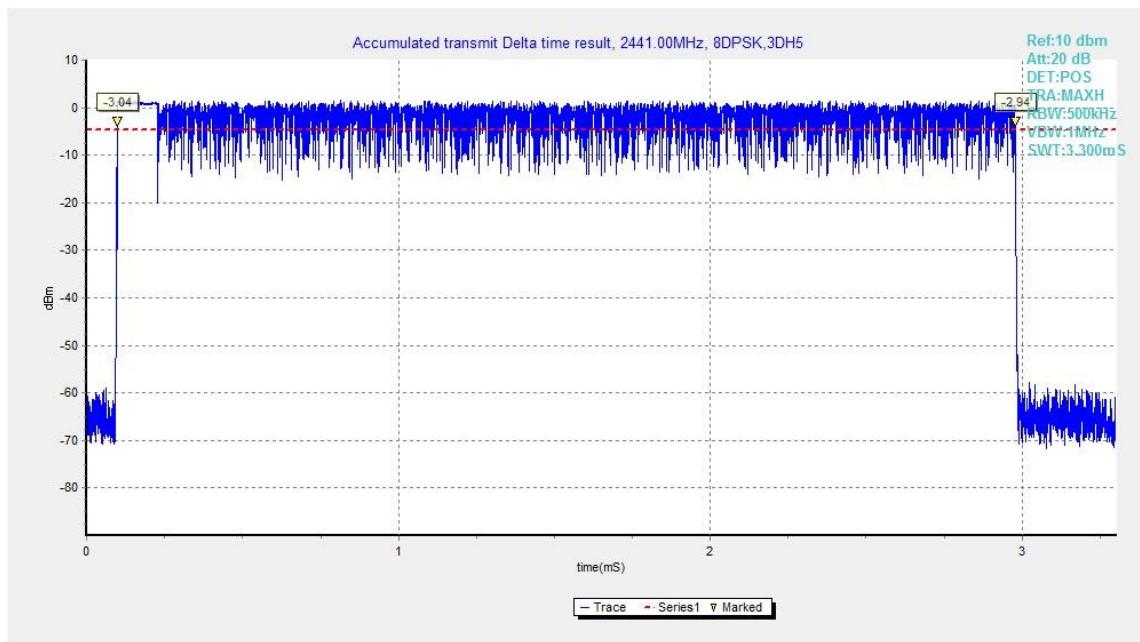


Fig.80. Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

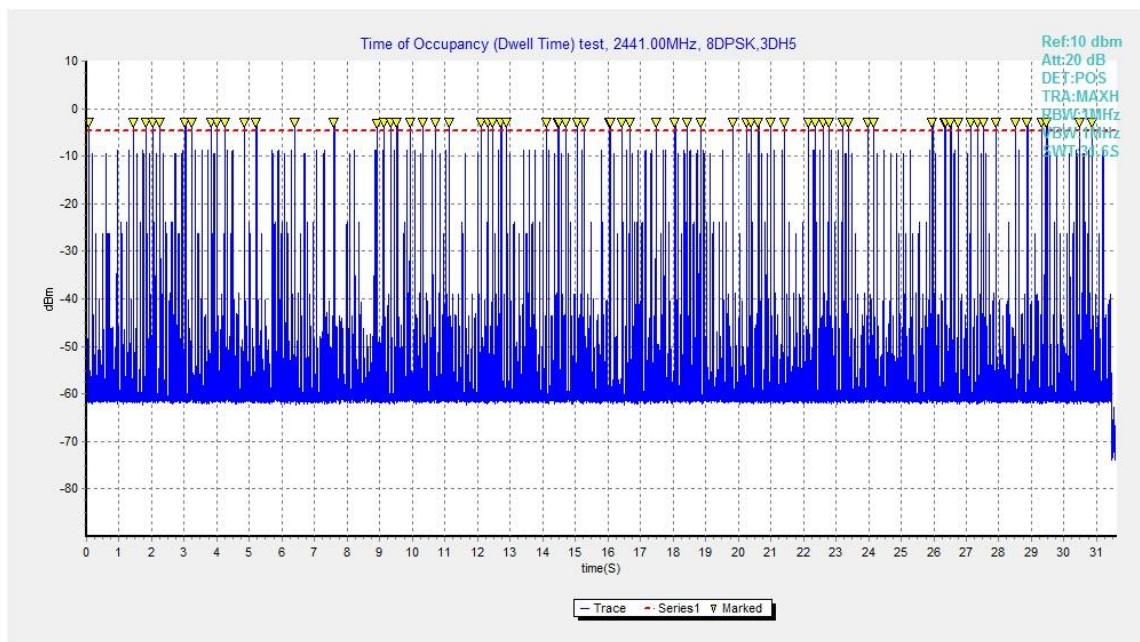


Fig.81. Number of Transmissions Measurement: Channel 39,Packet 3-DH5

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	1021.50	NA
39	Fig.83	939.75	NA
78	Fig.84	948.75	NA

For π/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.85	1282.50	NA
39	Fig.86	1283.25	NA
78	Fig.87	1284.00	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.88	1287.00	NA
39	Fig.89	1263.75	NA
78	Fig.90	1260.75	NA

Conclusion: NA

Test graphs as below:

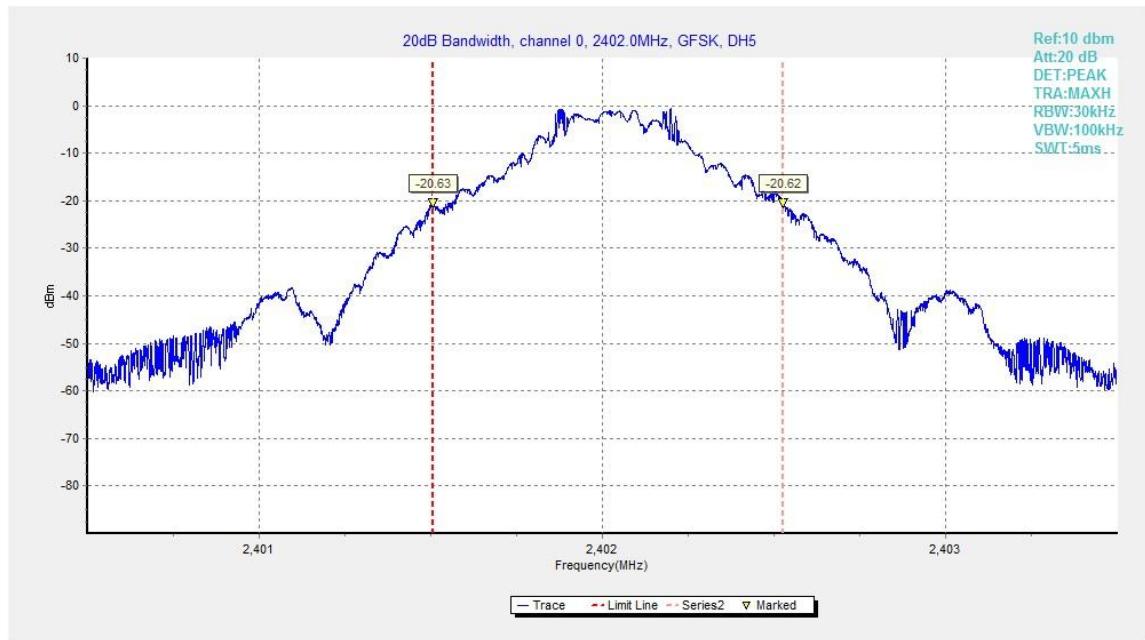


Fig.82. 20dB Bandwidth: GFSK, Channel 0

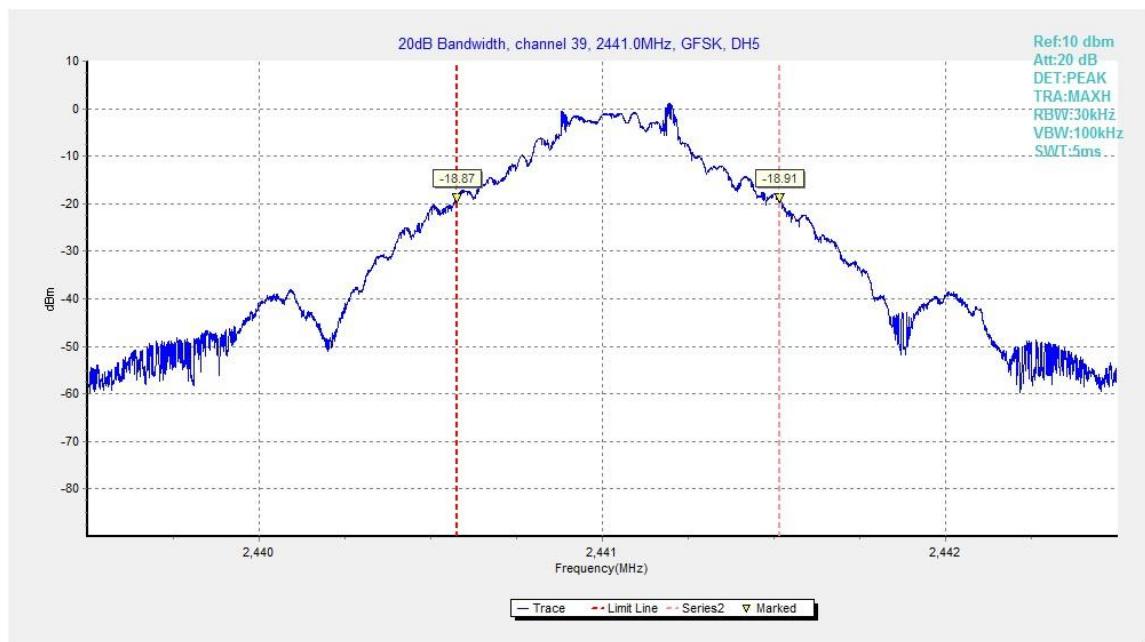


Fig.83. 20dB Bandwidth: GFSK, Channel 39

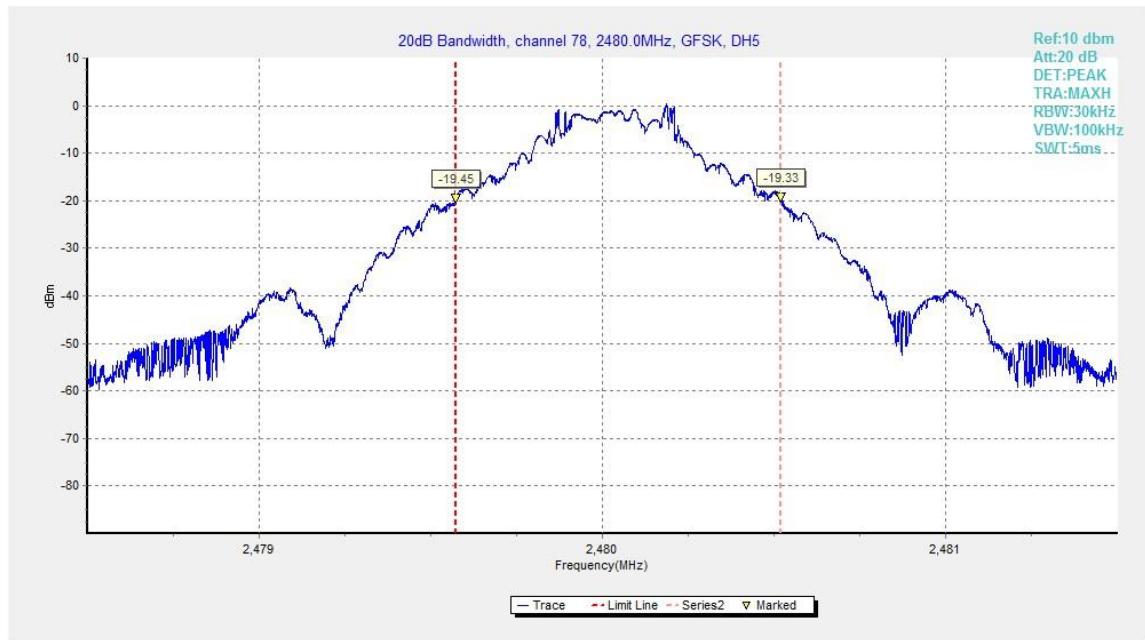


Fig.84. 20dB Bandwidth: GFSK, Channel 78

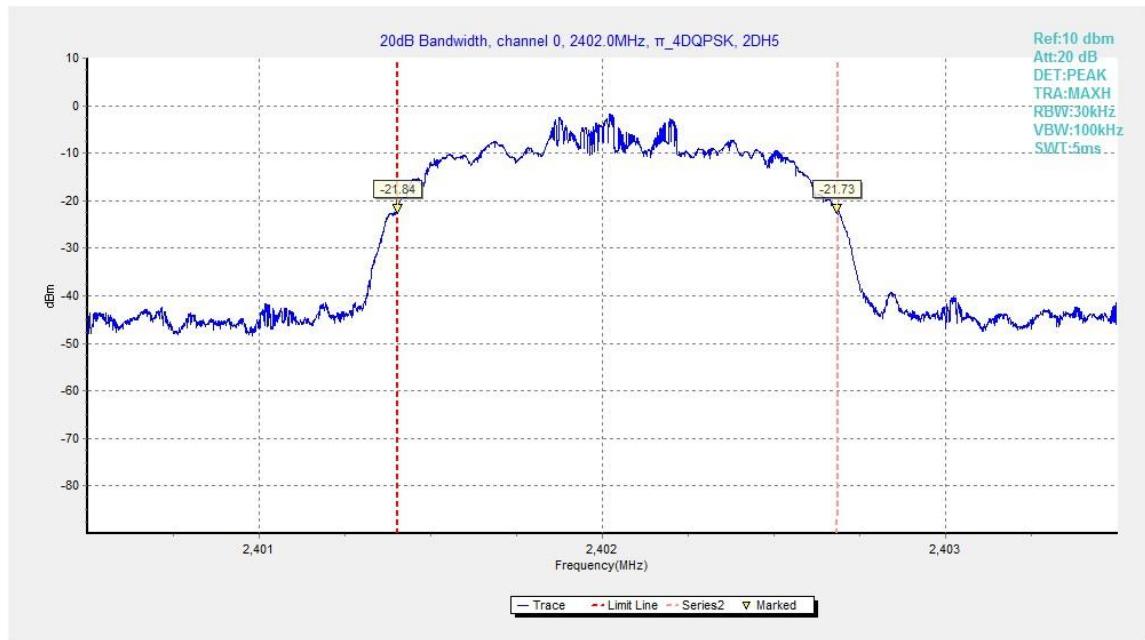


Fig.85. 20dB Bandwidth: π/4 DQPSK, Channel 0

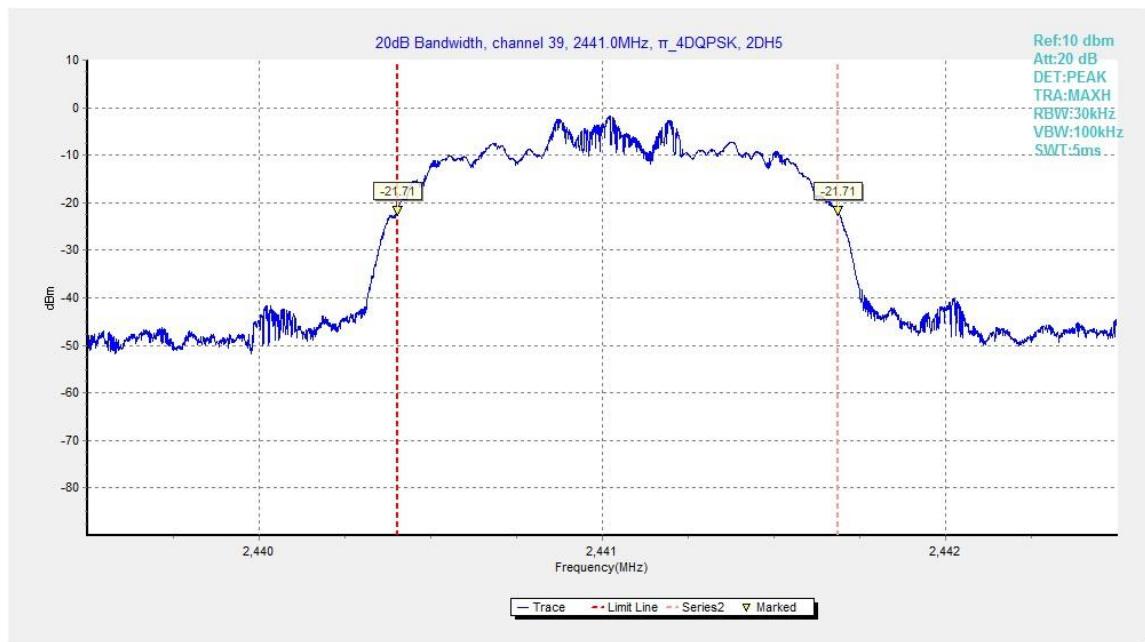


Fig.86. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 39

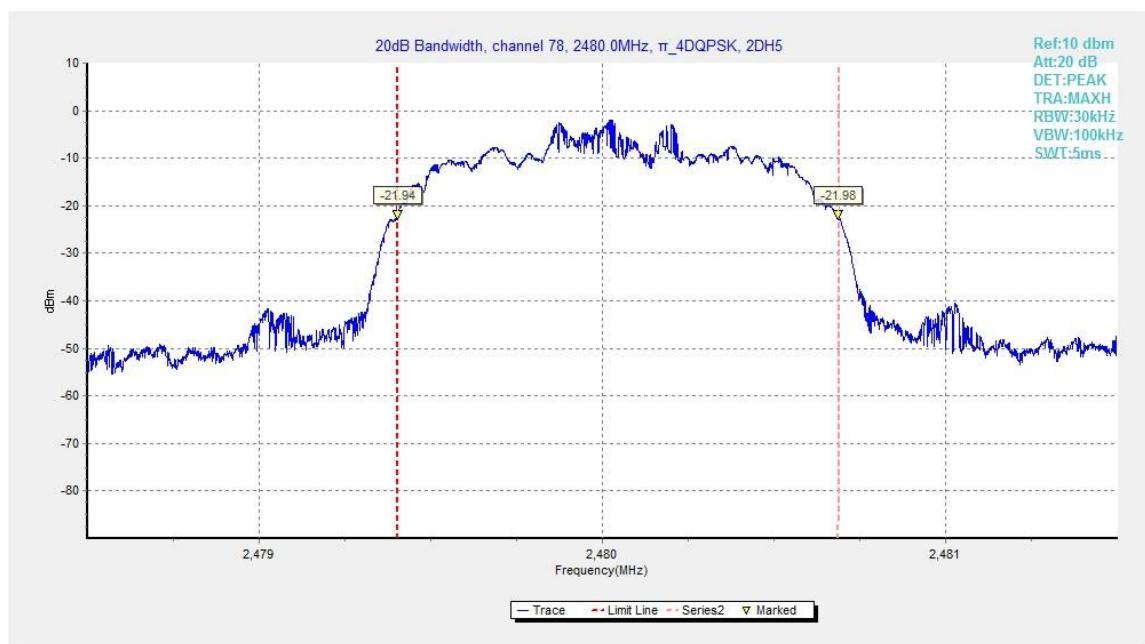


Fig.87. 20dB Bandwidth: $\pi/4$ DQPSK, Channel 78

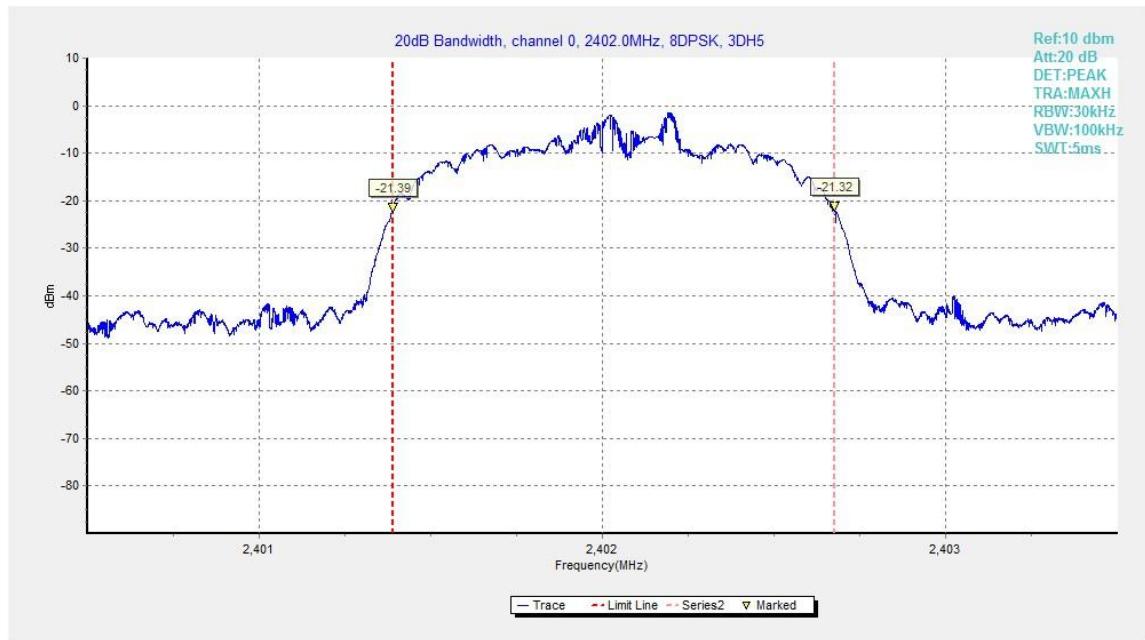


Fig.88. 20dB Bandwidth: 8DPSK, Channel 0

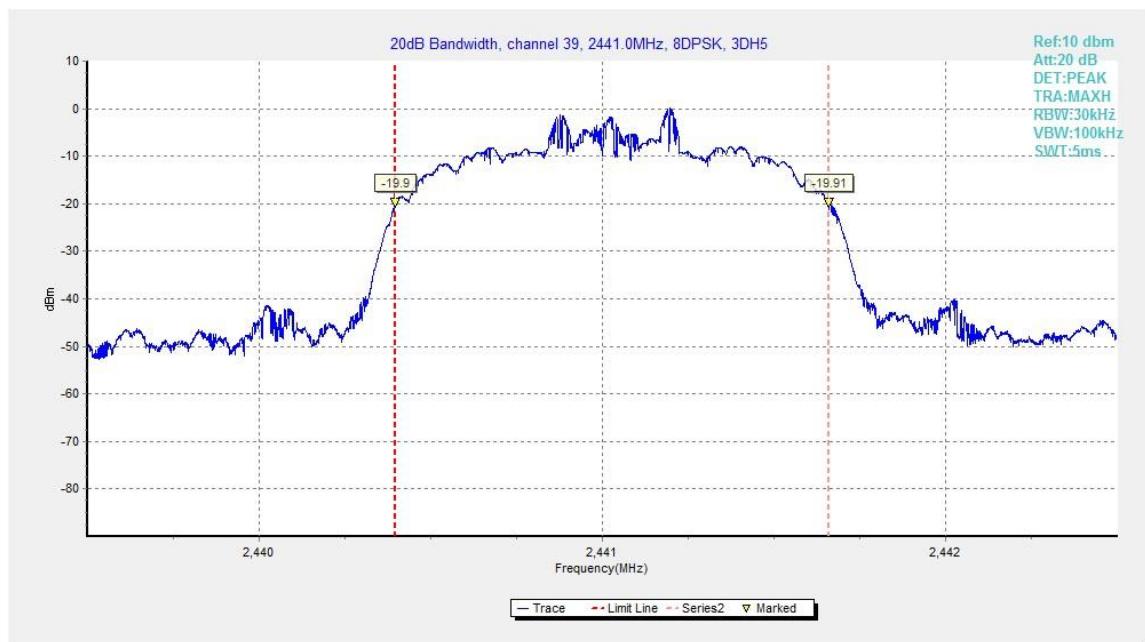


Fig.89. 20dB Bandwidth: 8DPSK, Channel 39

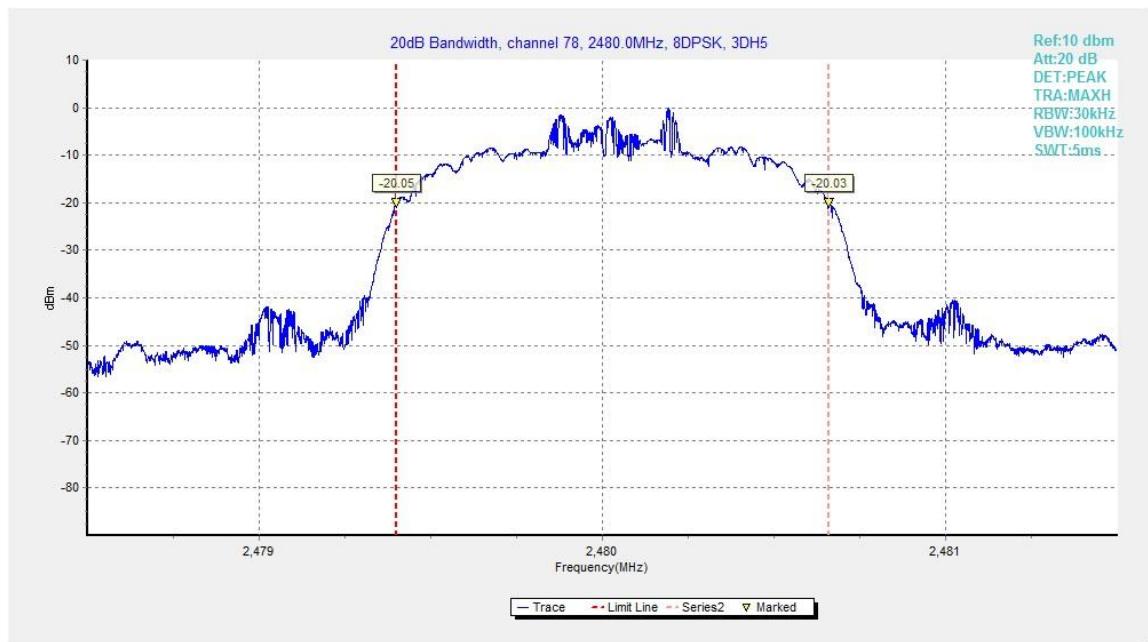


Fig.90. 20dB Bandwidth: 8DPSK, Channel 78

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	1290.75	P

For $\pi/4$ DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.92	985.50	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.93	966.00	P

Conclusion: PASS

Test graphs as below:

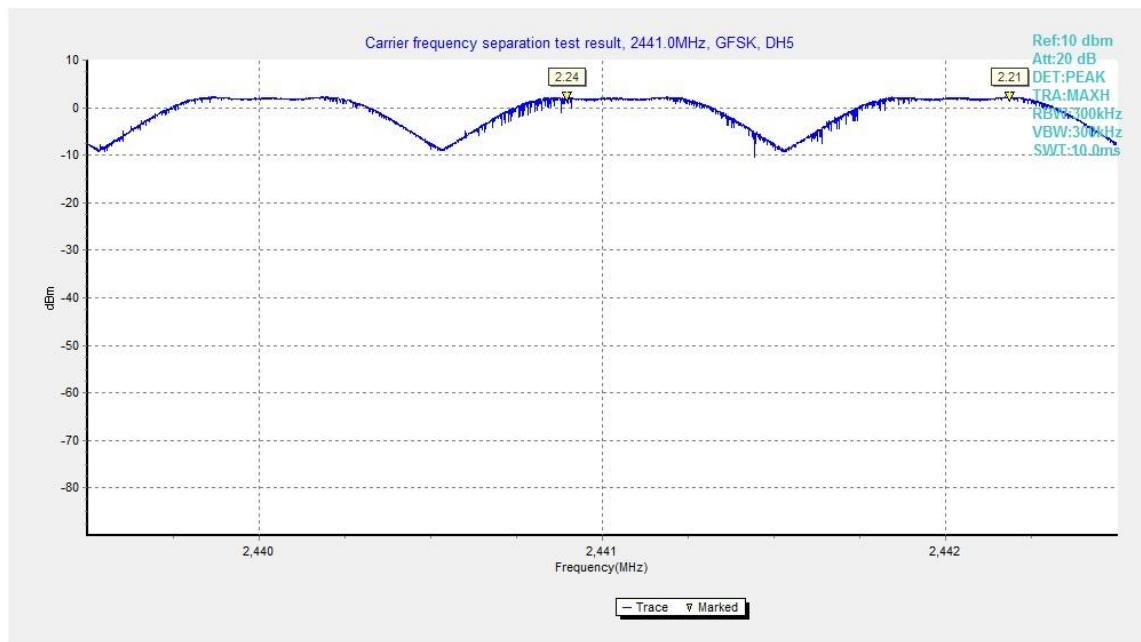


Fig.91. Carrier frequency separation measurement: GFSK, Channel 39

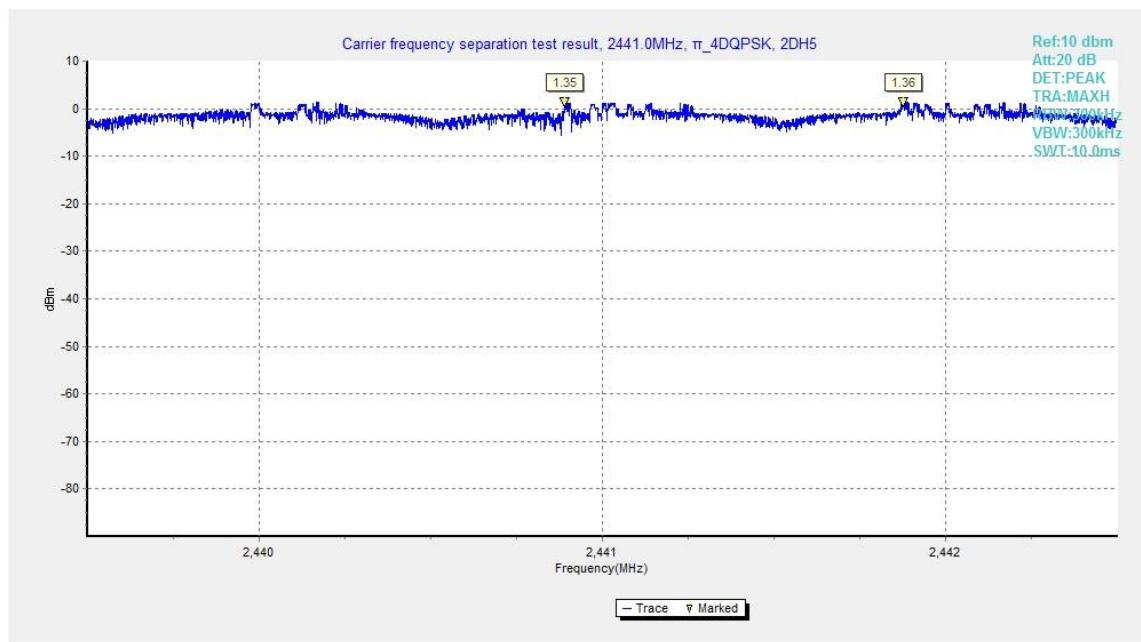


Fig.92. Carrier frequency separation measurement: π/4 DQPSK, Channel 39

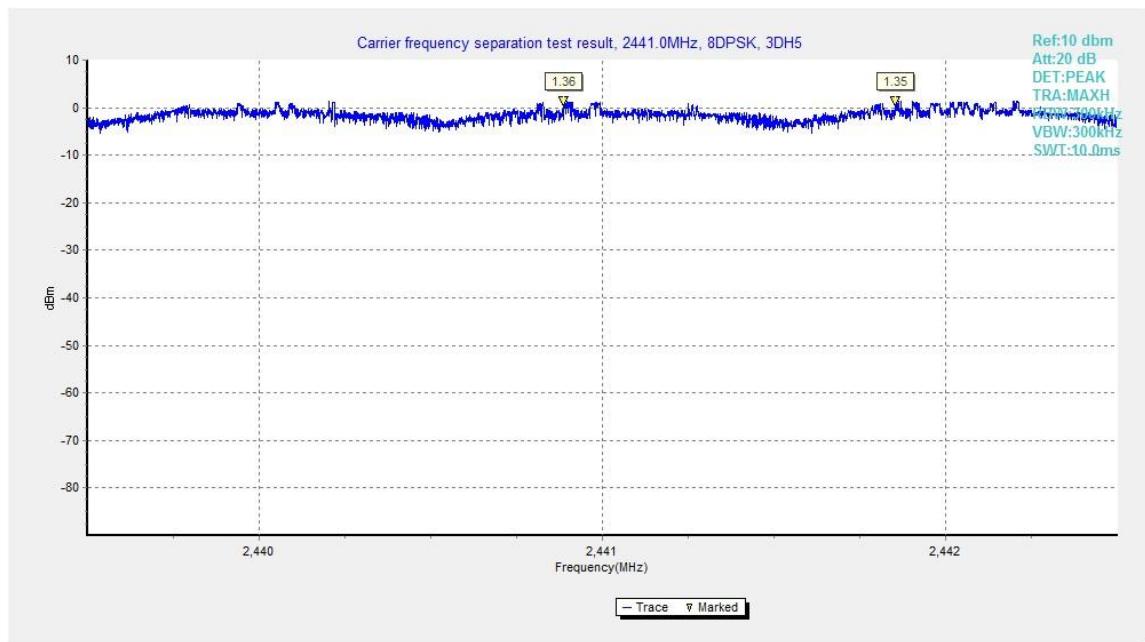


Fig.93. Carrier frequency separation measurement: 8DPSK, Channel 39

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	
40~78	Fig.95	P

For 4 DQPSK

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

For 8DPSK

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

Conclusion: PASS

Test graphs as below:

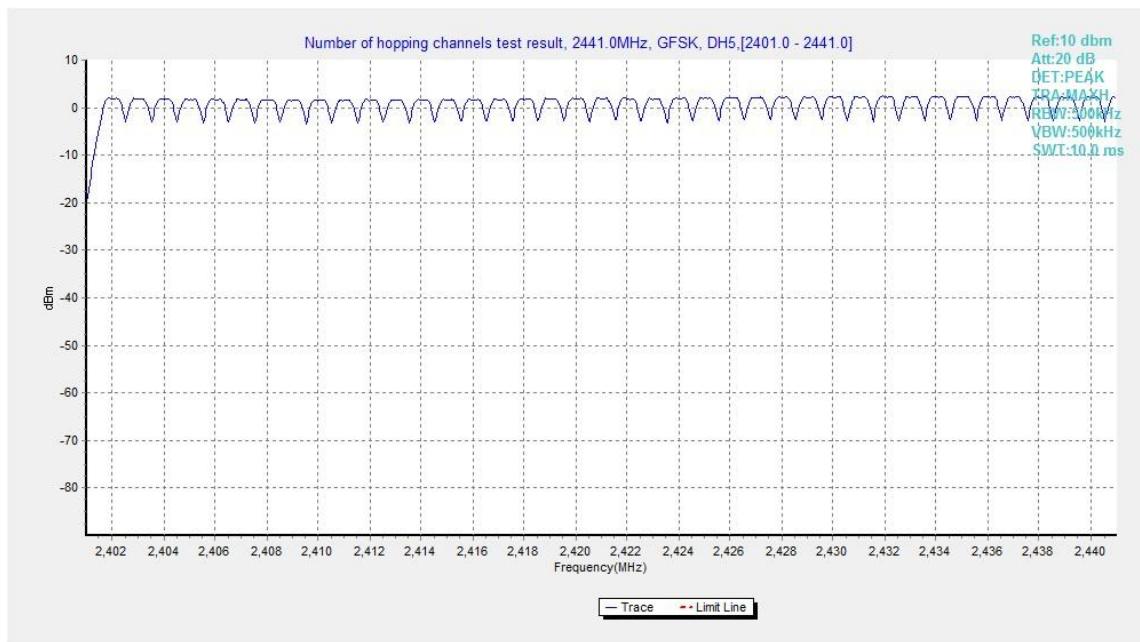


Fig.94. Number of hopping frequencies: GFSK, Channel 0 - 39

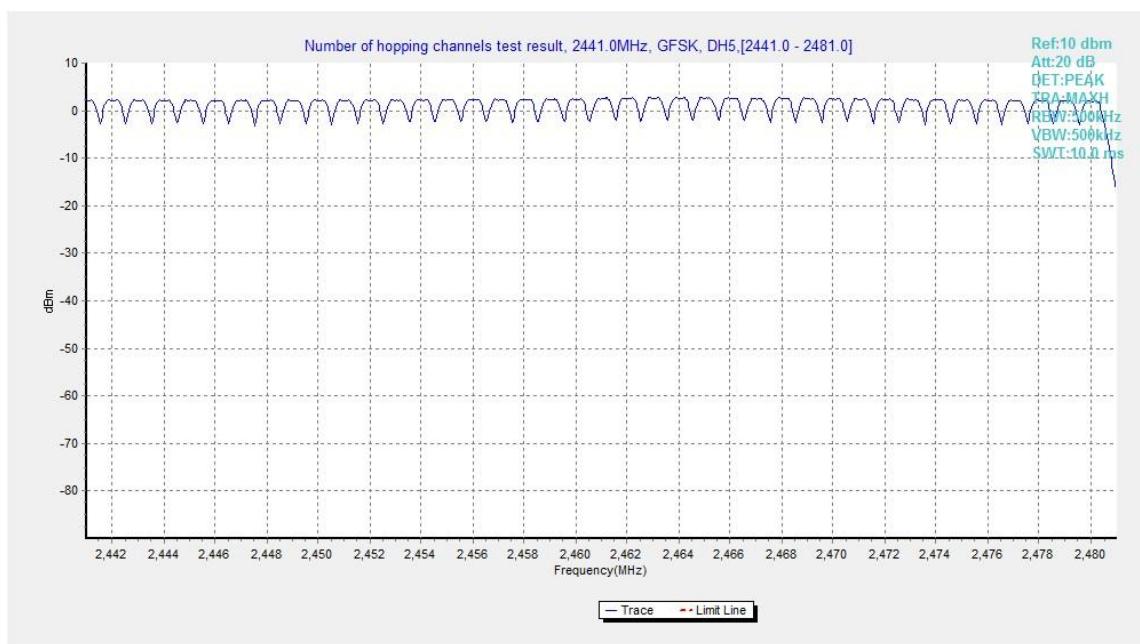


Fig.95. Number of hopping frequencies: GFSK, Channel 40 - 78

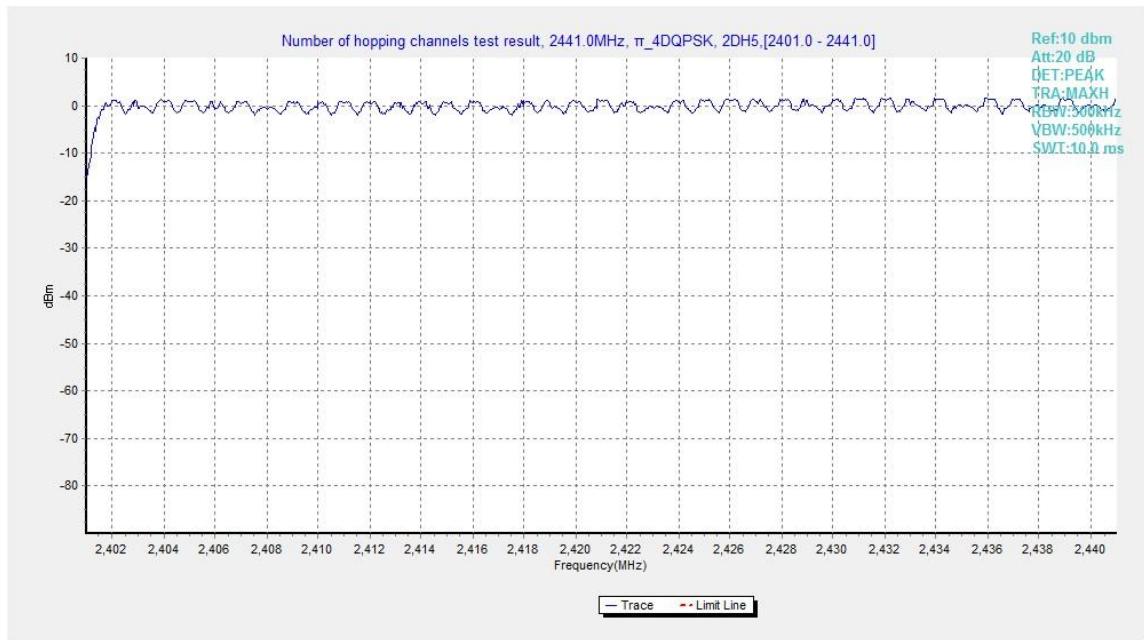


Fig.96. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 0 - 39

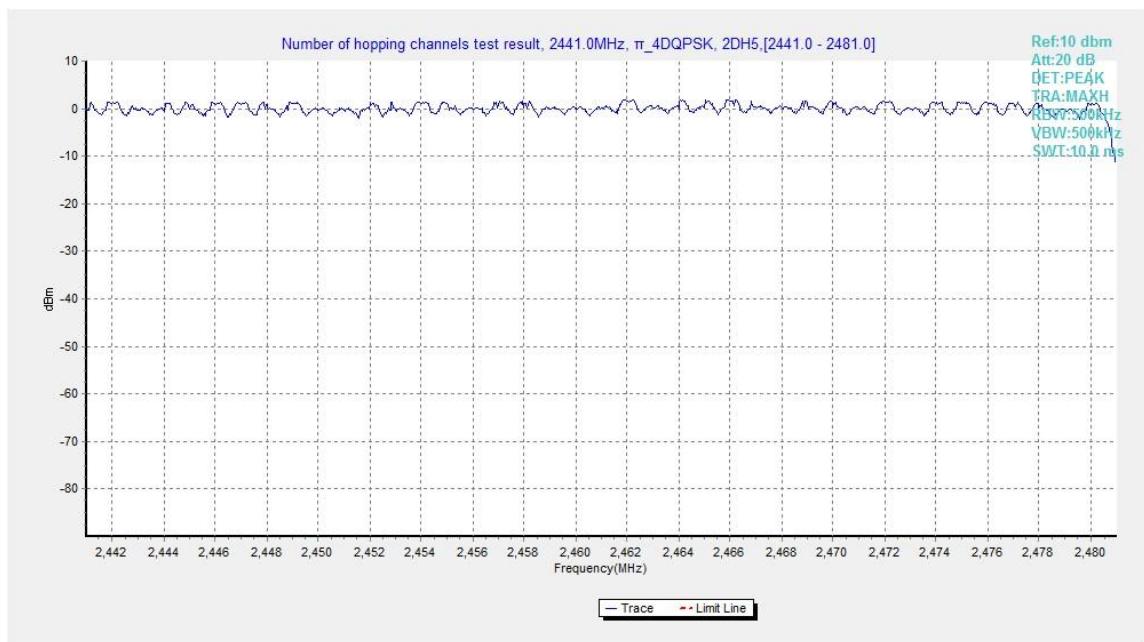


Fig.97. Number of hopping frequencies: $\pi/4$ DQPSK, Channel 40 - 78

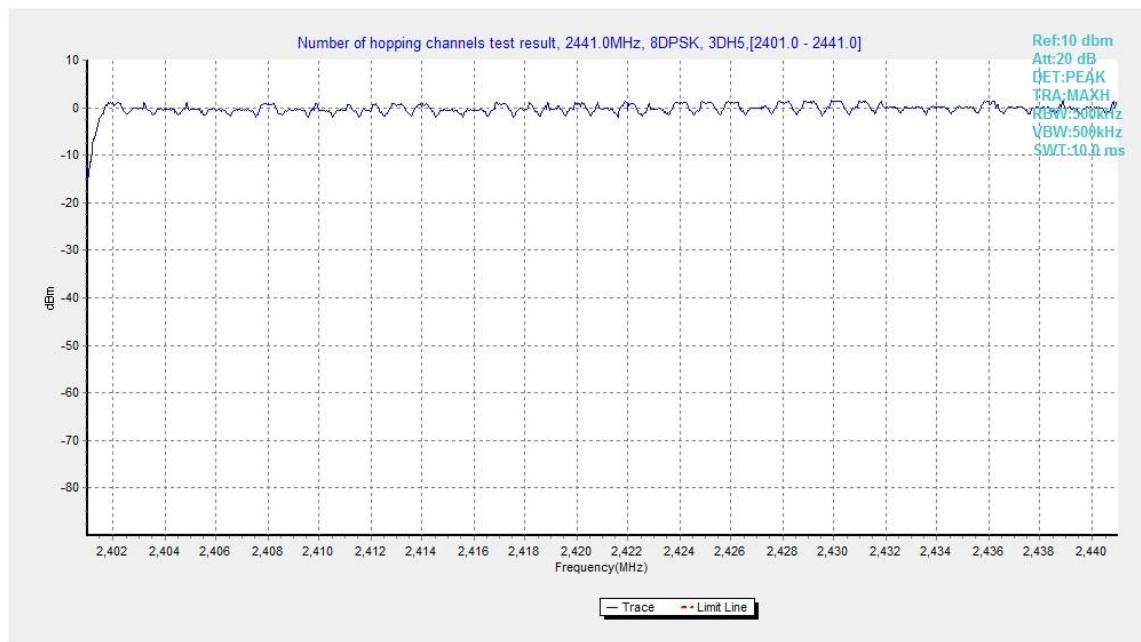


Fig.98. Number of hopping frequencies: 8DPSK, Channel 0 - 39

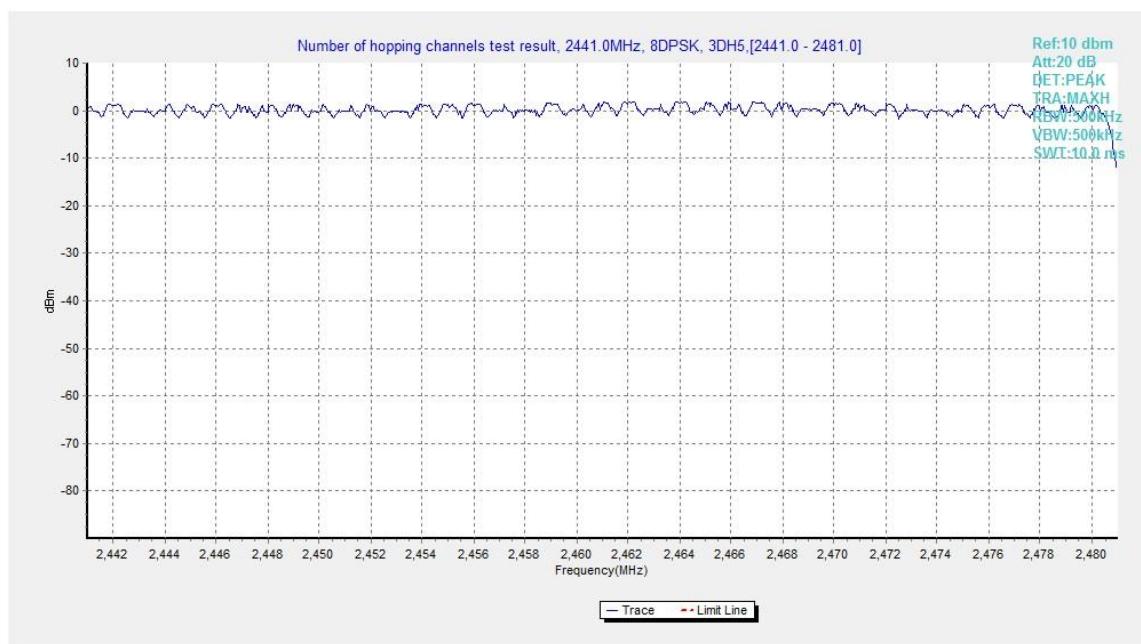


Fig.99. Number of hopping frequencies: 8DPSK, Channel 40 - 78

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.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 (dB μ V)	Conclusion
0.15 to 0.5	66 to 56	P
0.5 to 5	56	
5 to 30	60	

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

Bluetooth (Average Limit)

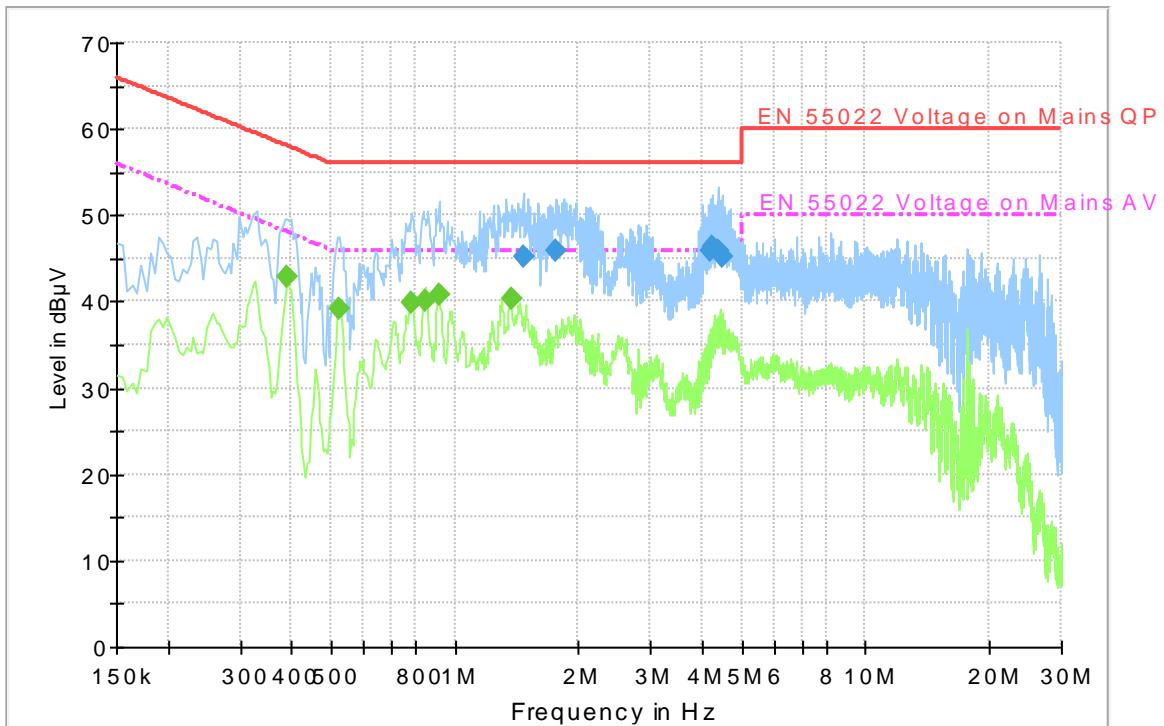
Frequency range (MHz)	Average Limit (dB μ V)	Conclusion
0.15 to 0.5	56 to 46	P
0.5 to 5	46	
5 to 30	50	

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

The measurement is made according to ANSI C63.10

Conclusion: PASS

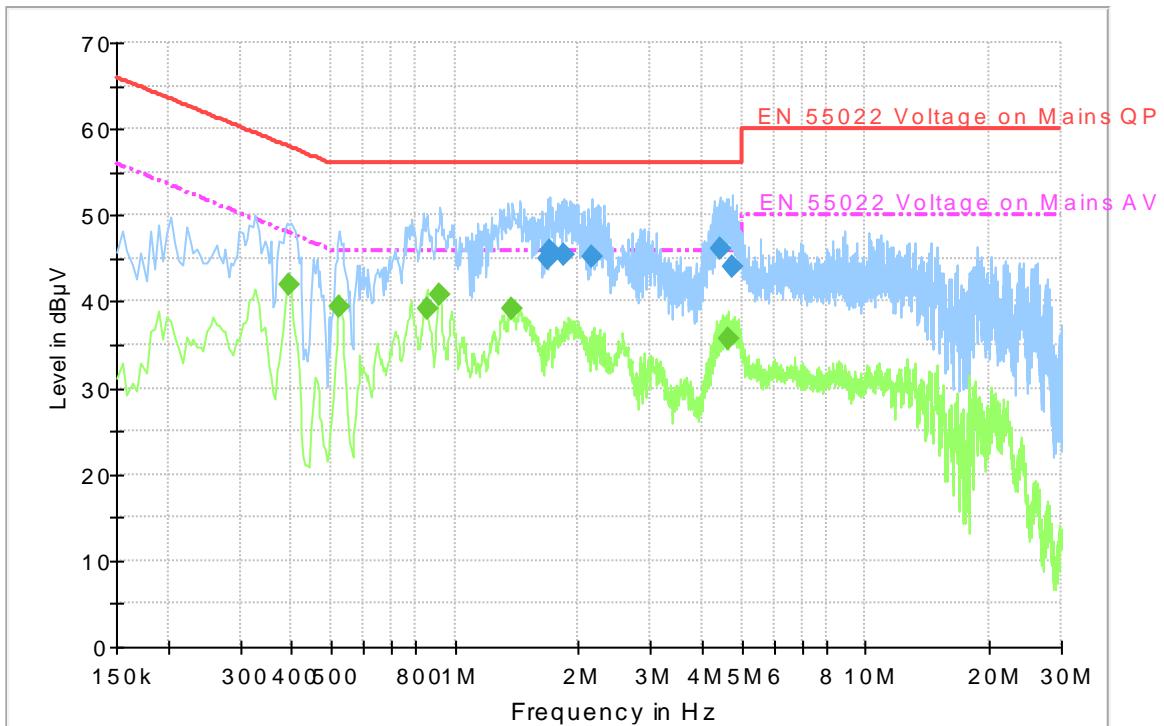
Test graphs as below:

Traffic: Set.10

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
1.464000	45.2	2000.0	9.000	N	10.2	10.8	56.0
1.770000	45.9	2000.0	9.000	L1	10.2	10.1	56.0
4.177500	45.8	2000.0	9.000	L1	10.3	10.2	56.0
4.245000	46.3	2000.0	9.000	L1	10.3	9.7	56.0
4.362000	45.9	2000.0	9.000	L1	10.3	10.1	56.0
4.461000	45.2	2000.0	9.000	L1	10.3	10.8	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.388500	42.9	2000.0	9.000	N	10.2	5.2	48.1
0.523500	39.2	2000.0	9.000	N	10.2	6.8	46.0
0.780000	40.0	2000.0	9.000	N	10.2	6.0	46.0
0.852000	40.2	2000.0	9.000	N	10.2	5.8	46.0
0.915000	40.9	2000.0	9.000	N	10.2	5.1	46.0
1.369500	40.3	2000.0	9.000	N	10.2	5.7	46.0

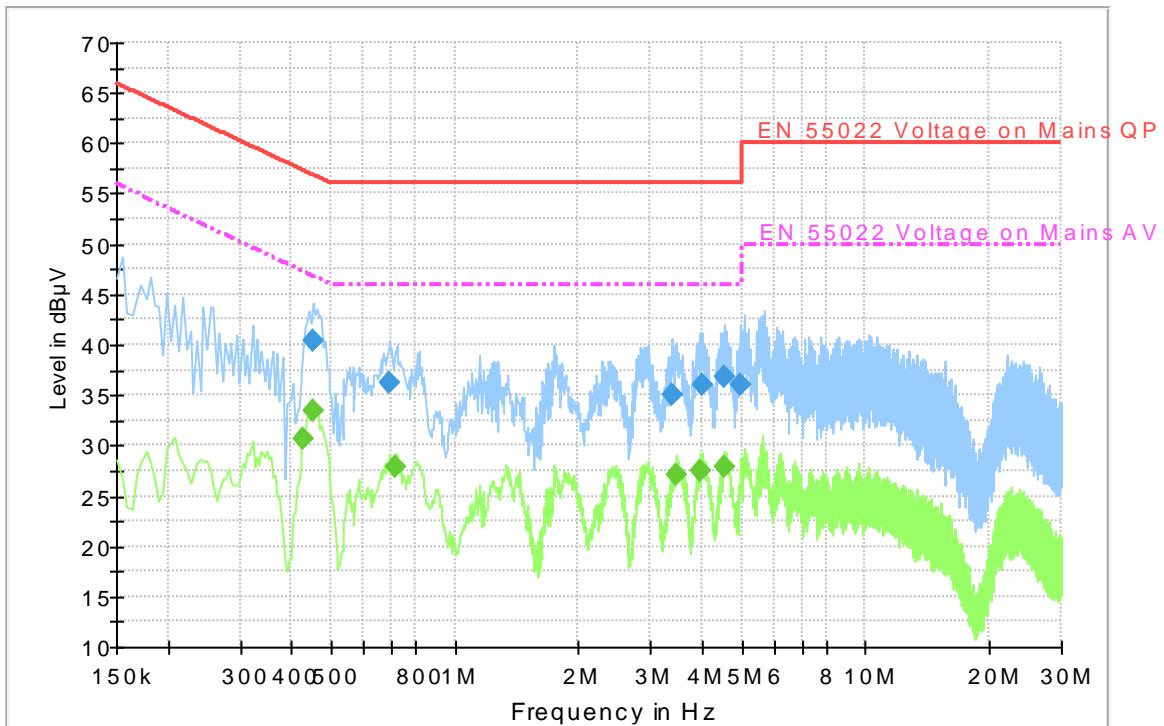
Idle: Set.10


Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
1.680000	45.0	2000.0	9.000	L1	10.2	11.0	56.0
1.707000	45.9	2000.0	9.000	L1	10.2	10.1	56.0
1.842000	45.5	2000.0	9.000	L1	10.2	10.5	56.0
2.161500	45.3	2000.0	9.000	L1	10.2	10.7	56.0
4.411500	46.0	2000.0	9.000	L1	10.3	10.0	56.0
4.731000	43.9	2000.0	9.000	L1	10.3	12.1	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.393000	42.1	2000.0	9.000	N	10.2	5.9	48.0
0.523500	39.3	2000.0	9.000	N	10.2	6.7	46.0
0.856500	39.2	2000.0	9.000	N	10.2	6.8	46.0
0.915000	40.7	2000.0	9.000	N	10.2	5.3	46.0
1.378500	39.1	2000.0	9.000	N	10.2	6.9	46.0
4.614000	35.6	2000.0	9.000	L1	10.3	10.4	46.0

Traffic: Set.11


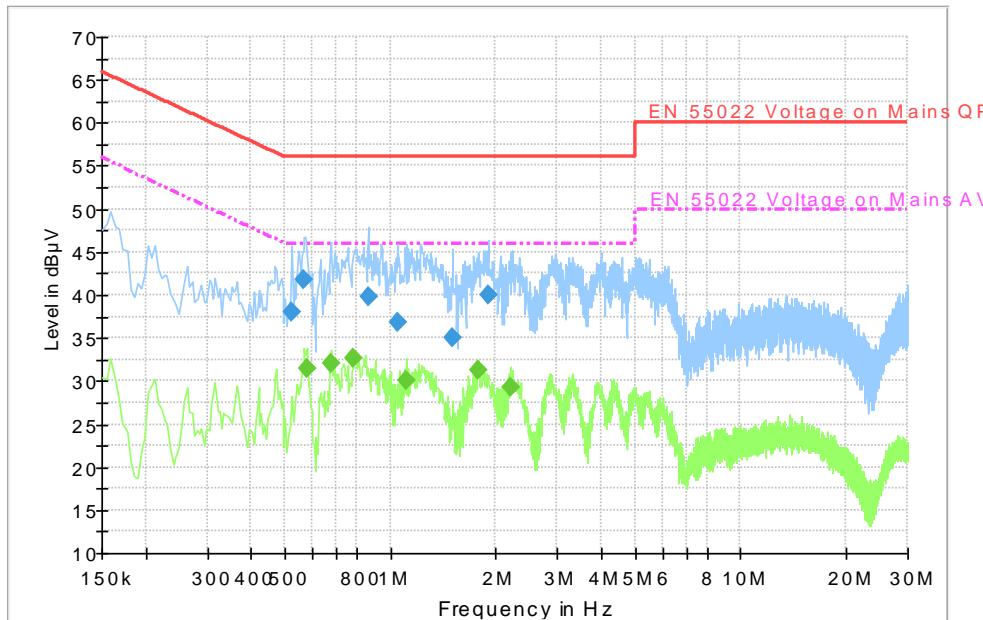
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.451500	40.5	2000.0	9.000	L1	10.2	16.4	56.8
0.694500	36.3	2000.0	9.000	L1	10.2	19.7	56.0
3.367500	35.0	2000.0	9.000	L1	10.3	21.0	56.0
3.984000	36.0	2000.0	9.000	L1	10.3	20.0	56.0
4.515000	36.7	2000.0	9.000	L1	10.3	19.3	56.0
4.983000	36.0	2000.0	9.000	L1	10.3	20.0	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.429000	30.6	2000.0	9.000	N	10.2	16.7	47.3
0.451500	33.5	2000.0	9.000	N	10.2	13.3	46.8
0.712500	27.9	2000.0	9.000	L1	10.2	18.1	46.0
3.475500	27.0	2000.0	9.000	L1	10.3	19.0	46.0
3.975000	27.4	2000.0	9.000	L1	10.3	18.6	46.0
4.551000	27.9	2000.0	9.000	L1	10.3	18.1	46.0

Traffic: Set.21



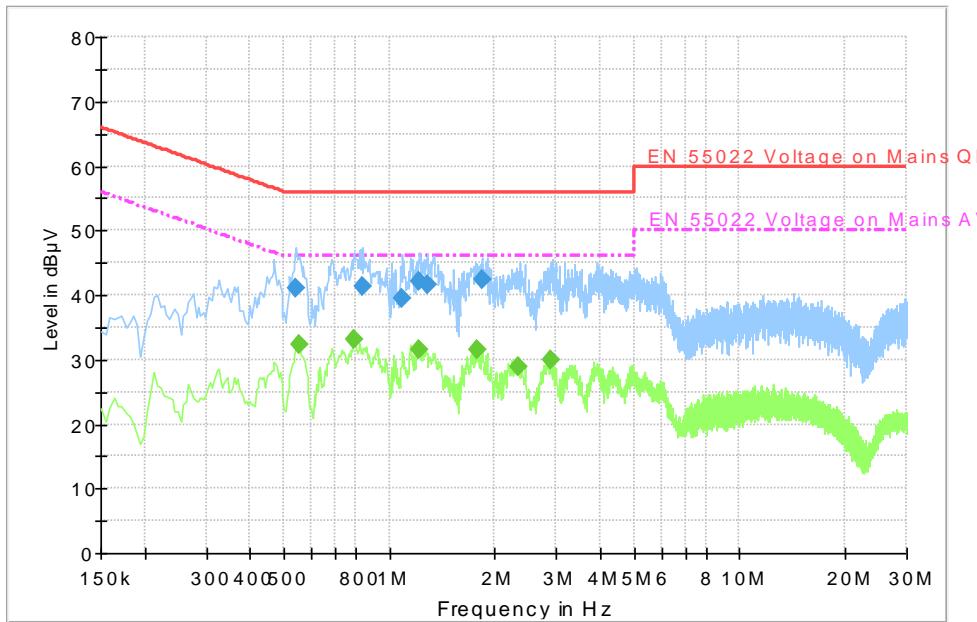
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.523500	38.0	2000.0	9.000	N	10.2	18.0	56.0
0.568500	41.9	2000.0	9.000	L1	10.2	14.1	56.0
0.865500	39.9	2000.0	9.000	N	10.2	16.1	56.0
1.045500	36.9	2000.0	9.000	N	10.2	19.1	56.0
1.509000	34.9	2000.0	9.000	N	10.2	21.1	56.0
1.900500	40.1	2000.0	9.000	N	10.3	15.9	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.577500	31.5	2000.0	9.000	L1	10.2	14.5	46.0
0.681000	32.1	2000.0	9.000	L1	10.2	13.9	46.0
0.784500	32.7	2000.0	9.000	L1	10.2	13.3	46.0
1.113000	30.0	2000.0	9.000	L1	10.2	16.0	46.0
1.788000	31.3	2000.0	9.000	L1	10.2	14.7	46.0
2.206500	29.2	2000.0	9.000	L1	10.2	16.8	46.0

Traffic: Set.22



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.541500	41.2	2000.0	9.000	N	10.2	14.8	56.0
0.843000	41.2	2000.0	9.000	N	10.2	14.8	56.0
1.090500	39.5	2000.0	9.000	N	10.2	16.5	56.0
1.221000	42.1	2000.0	9.000	L1	10.2	13.9	56.0
1.279500	41.5	2000.0	9.000	N	10.2	14.5	56.0
1.833000	42.3	2000.0	9.000	N	10.3	13.7	56.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.550500	32.3	2000.0	9.000	L1	10.2	13.7	46.0
0.789000	33.0	2000.0	9.000	L1	10.2	13.0	46.0
1.221000	31.6	2000.0	9.000	L1	10.2	14.4	46.0
1.774500	31.5	2000.0	9.000	L1	10.2	14.5	46.0
2.323500	28.9	2000.0	9.000	L1	10.2	17.1	46.0
2.877000	30.0	2000.0	9.000	N	10.3	16.0	46.0



ANNEX E: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology



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 Communiqué dated January 2009).*

2016-09-29 through 2017-09-30

Effective Dates



For the National Voluntary Laboratory Accreditation Program

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