A.5 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	/

Measurement Result:

Mode	Channel	20dB Bandwidth (kHz)		conclusion
GFSK	0	Fig.69	936.00	/
	39	Fig.70	936.75	
	78	Fig.71	937.50	
π /4 DQPSK	0	Fig.72	1284.75	/
	39	Fig.73	1283.25	
	78	Fig.74	1293.00	
8DPSK	0	Fig.75	1271.25	/
	39	Fig.76	1281.75	
	78	Fig.77	1279.50	

See below for test graphs.

Conclusion: PASS

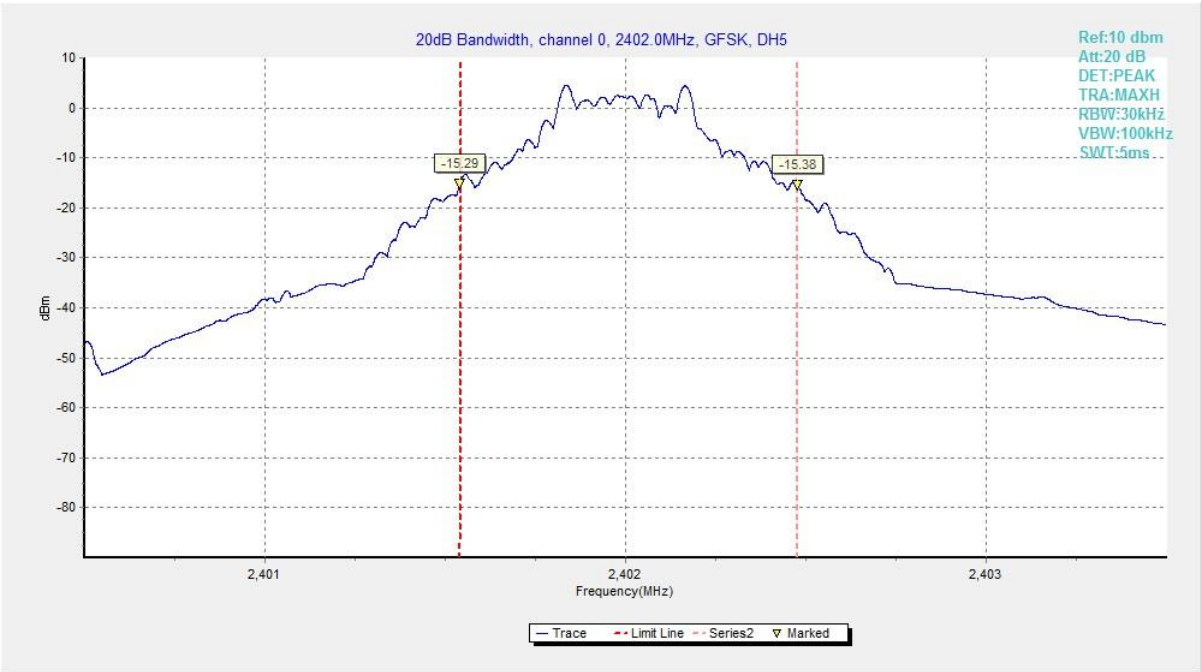

Fig. 69 20dB Bandwidth (GFSK, Ch 0)

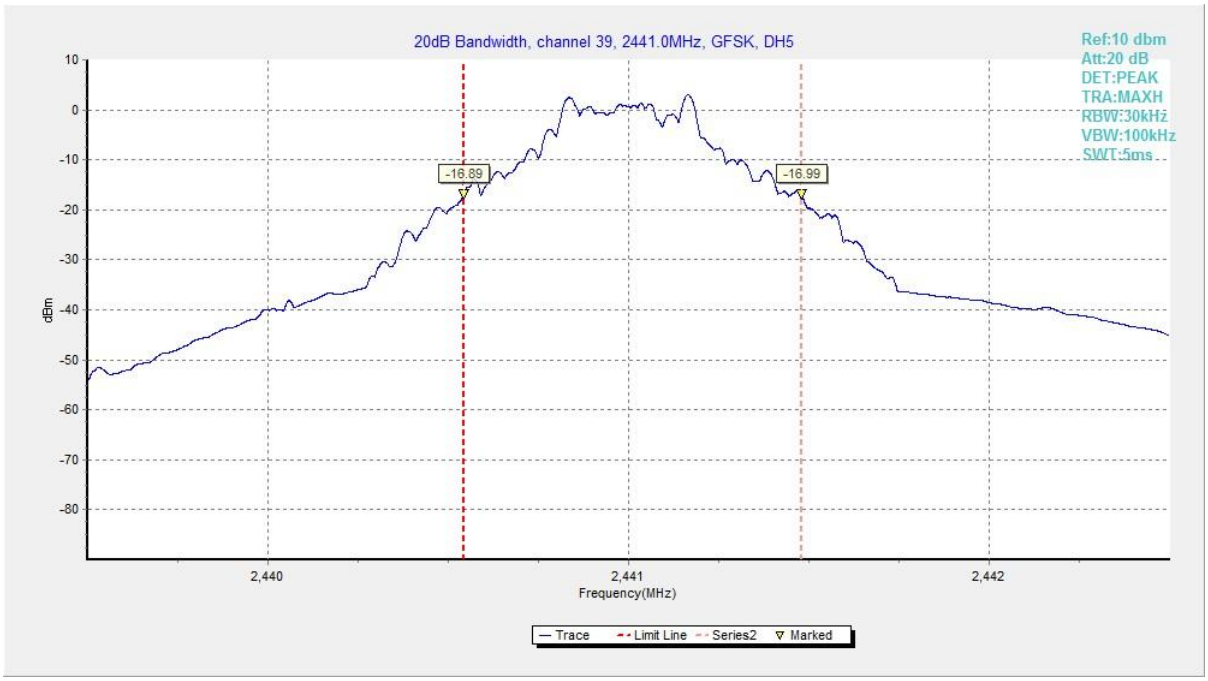

Fig. 70 20dB Bandwidth (GFSK, Ch 39)

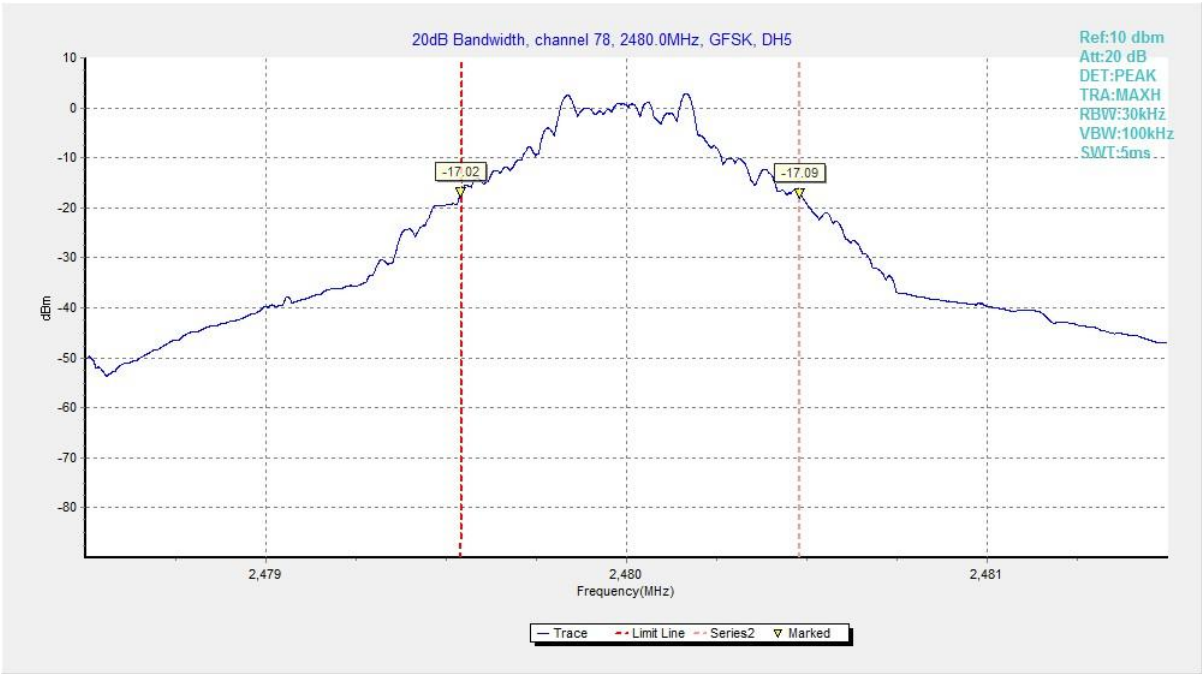

Fig. 71 20dB Bandwidth (GFSK, Ch 78)

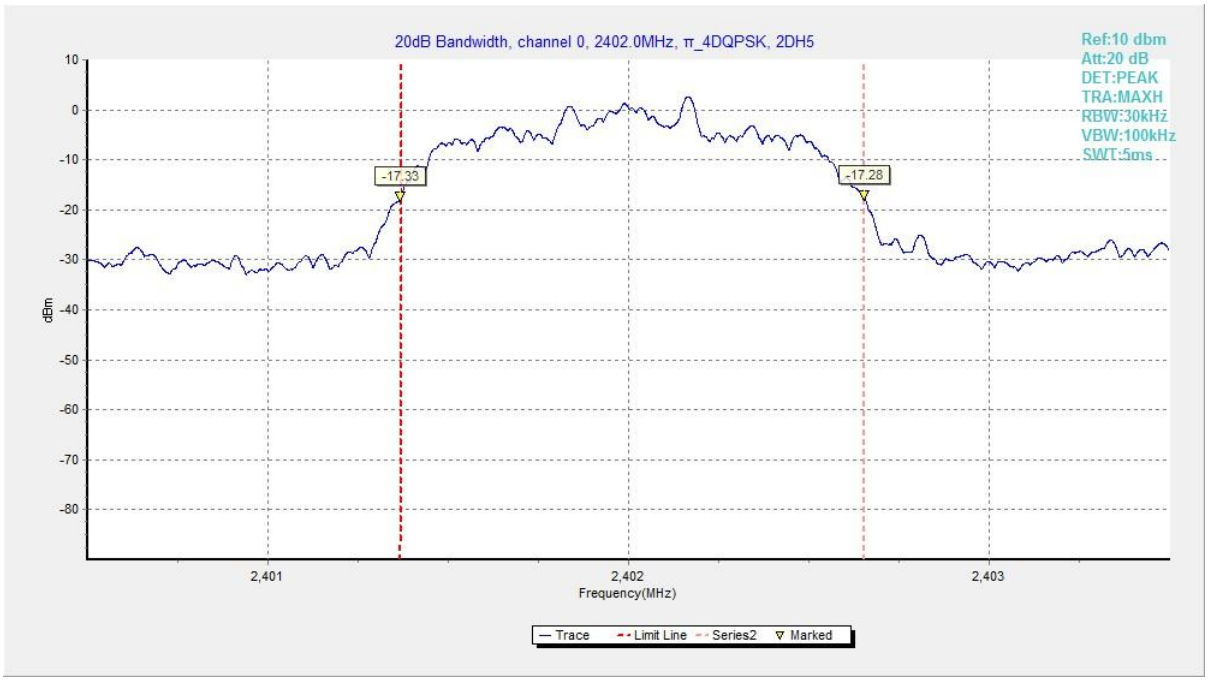

Fig. 72 20dB Bandwidth (π /4 DQPSK, Ch 0)

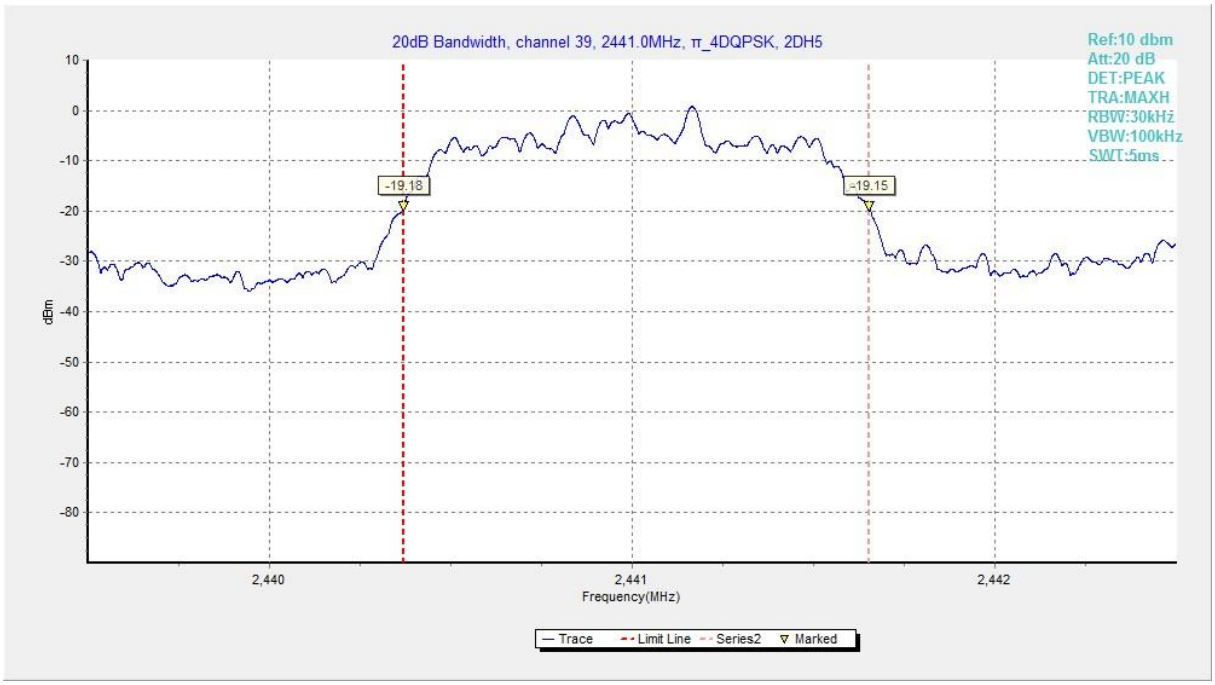

Fig. 73 20dB Bandwidth (π /4 DQPSK, Ch 39)

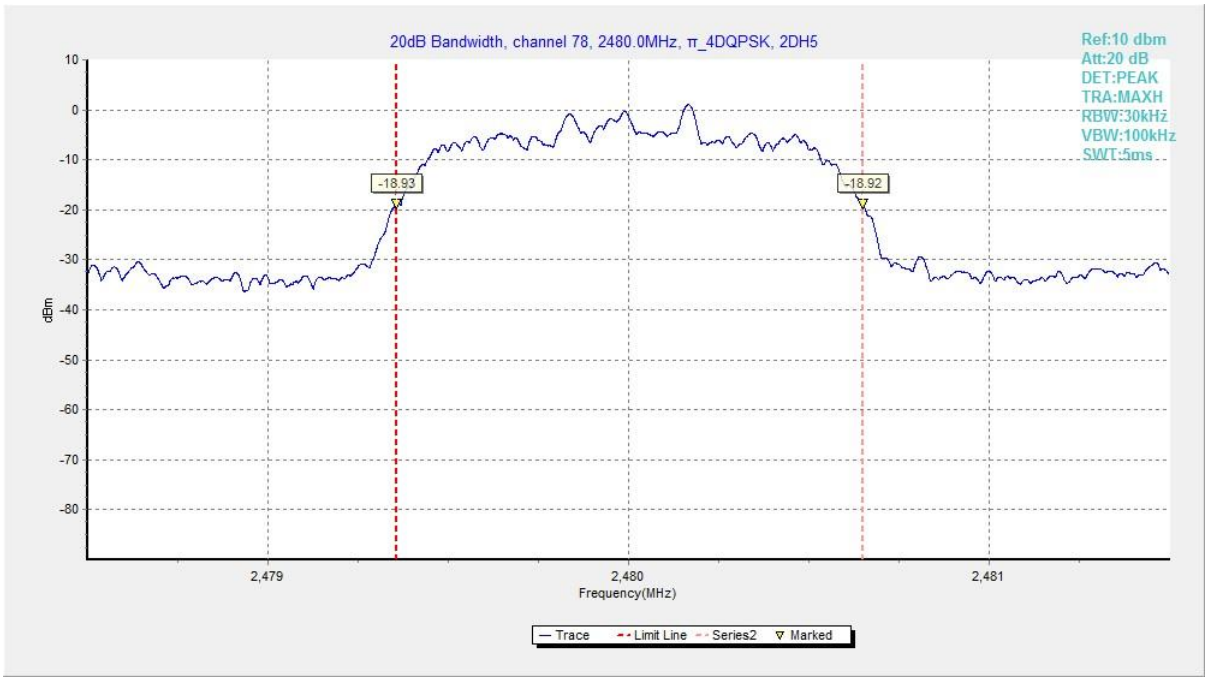

Fig. 74 20dB Bandwidth (π /4 DQPSK, Ch 78)

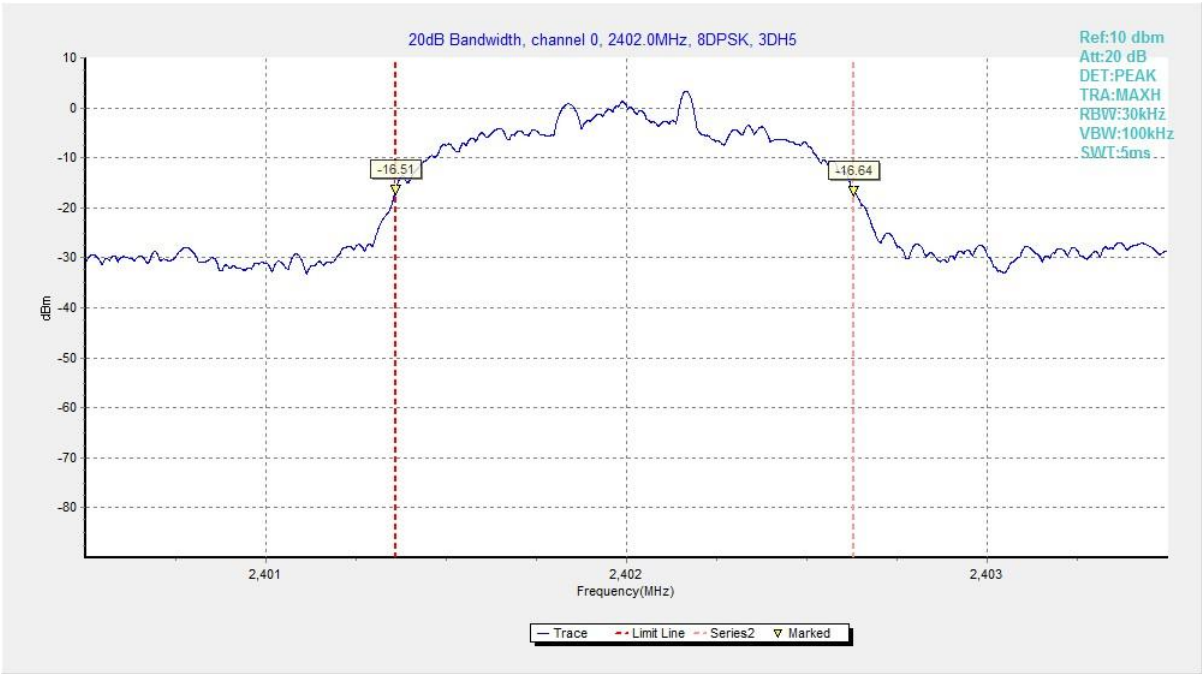

Fig. 75 20dB Bandwidth (8DPSK, Ch 0)

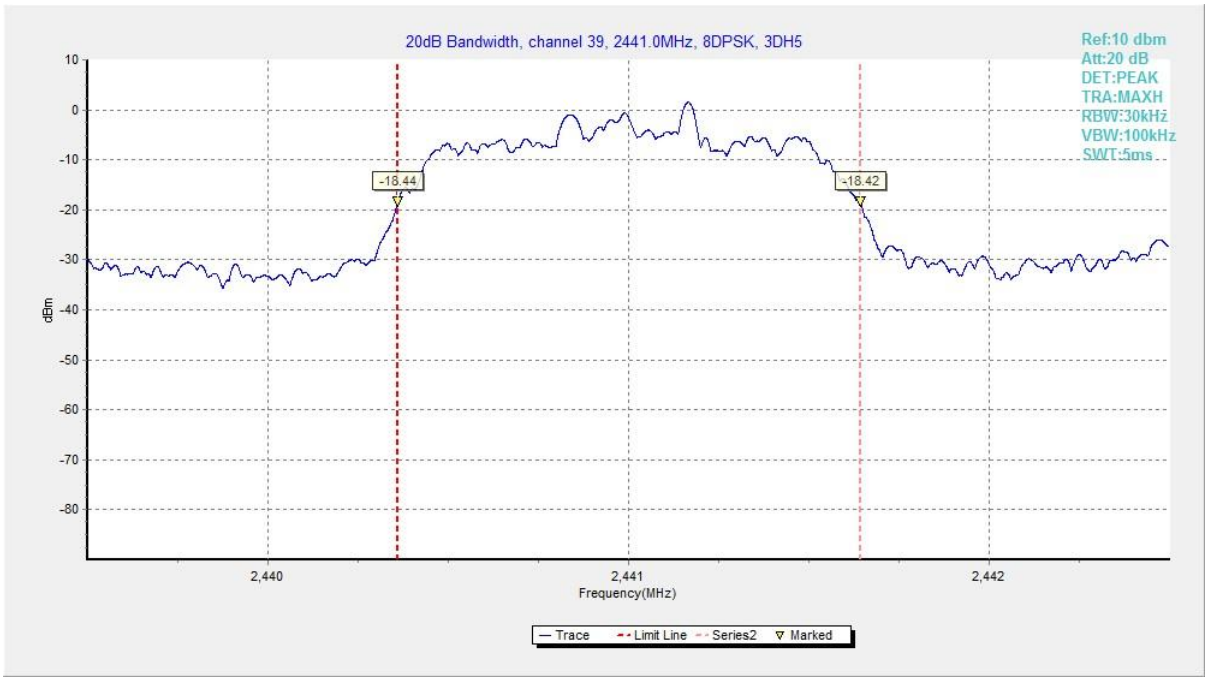

Fig. 76 20dB Bandwidth (8DPSK, Ch 39)

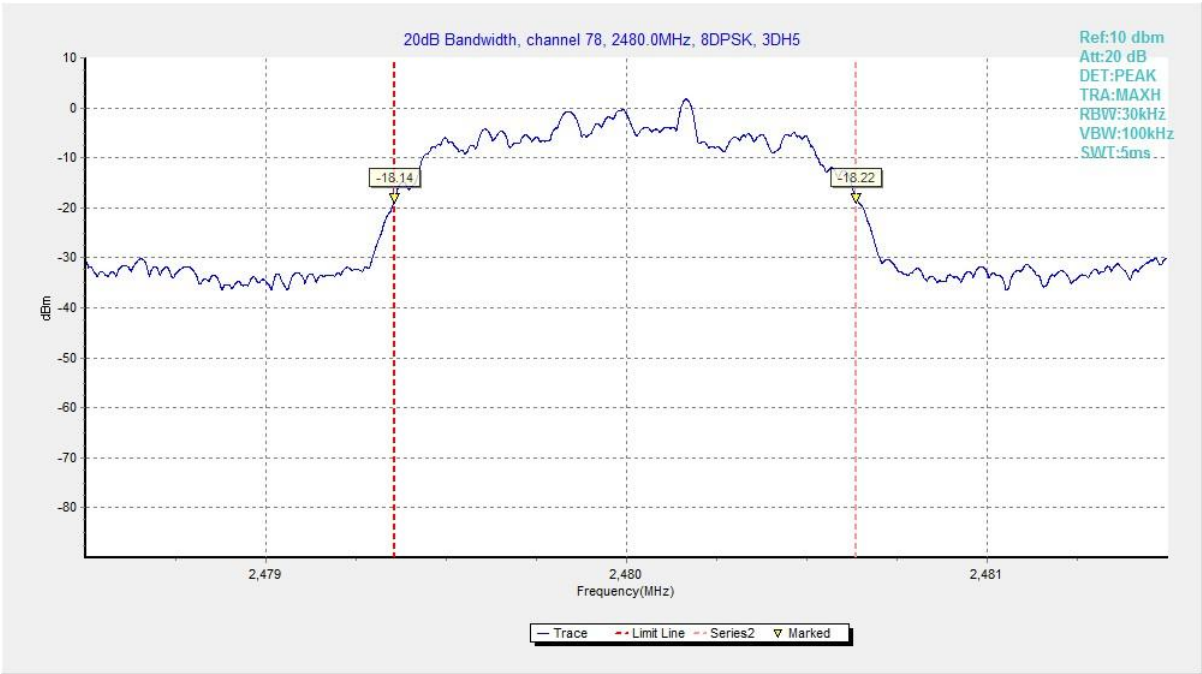

Fig. 77 20dB Bandwidth (8DPSK, Ch 78)

A.6 Time of Occupancy (Dwell Time)

Measurement Limit:

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

Measurement Results:

Mode	Channel	Packet	Dwell Time(ms)		Conclusion
GFSK	39	DH5	Fig.78	159.28	**P**
			Fig.79		
π /4 DQPSK	39	2-DH5	Fig.80	161.38	**P**
			Fig.81		
8DPSK	39	3-DH5	Fig.82	224.69	**P**
			Fig.83		

See below for test graphs.

Conclusion: Pass

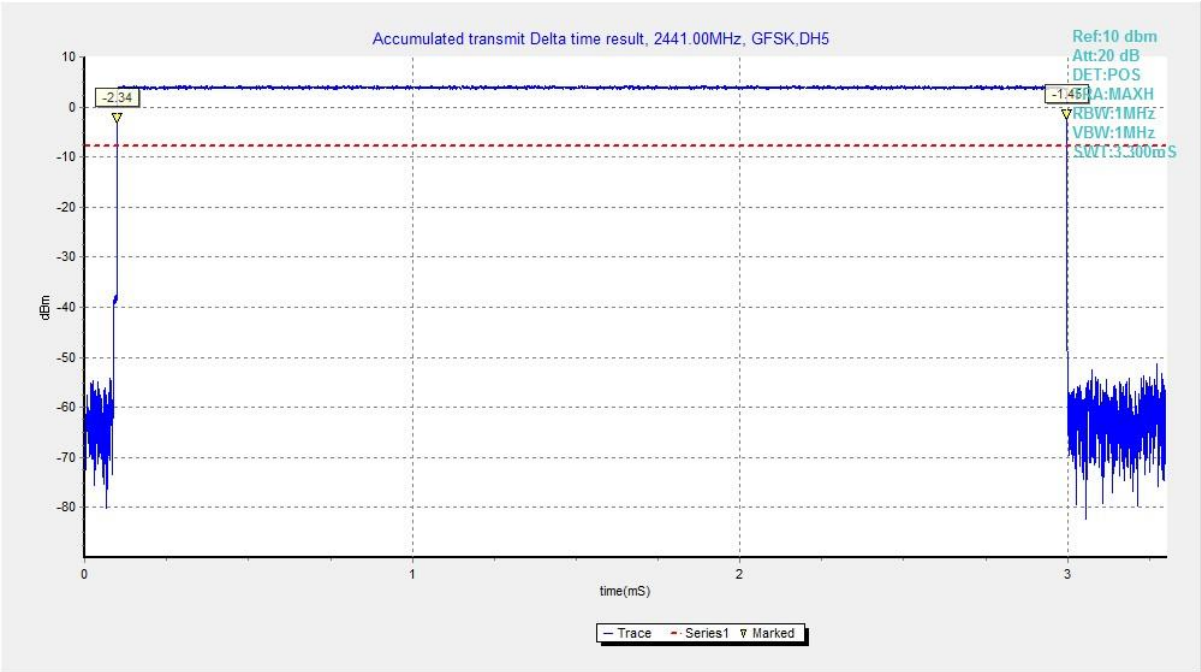

Fig. 78 Time of Occupancy(Dwell Time) (GFSK, Ch39)

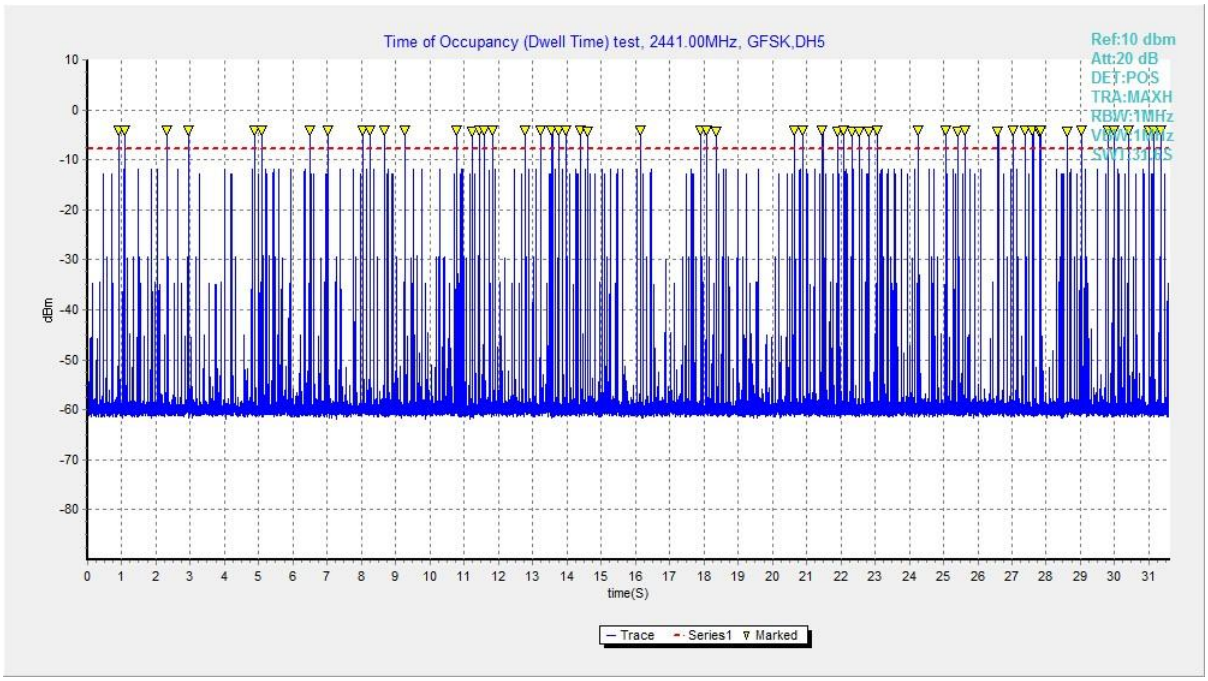

Fig. 79 Time of Occupancy(Dwell Time) (GFSK, Ch39)

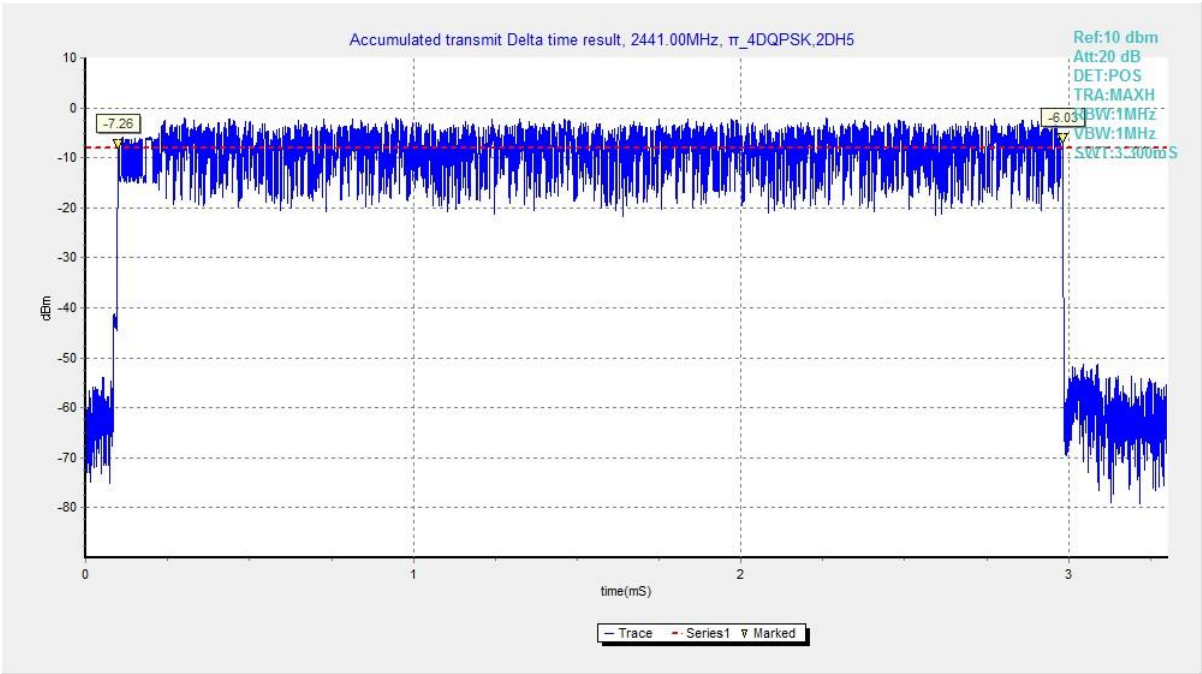

Fig. 80 Time of Occupancy(Dwell Time) (π /4 DQPSK, Ch39)

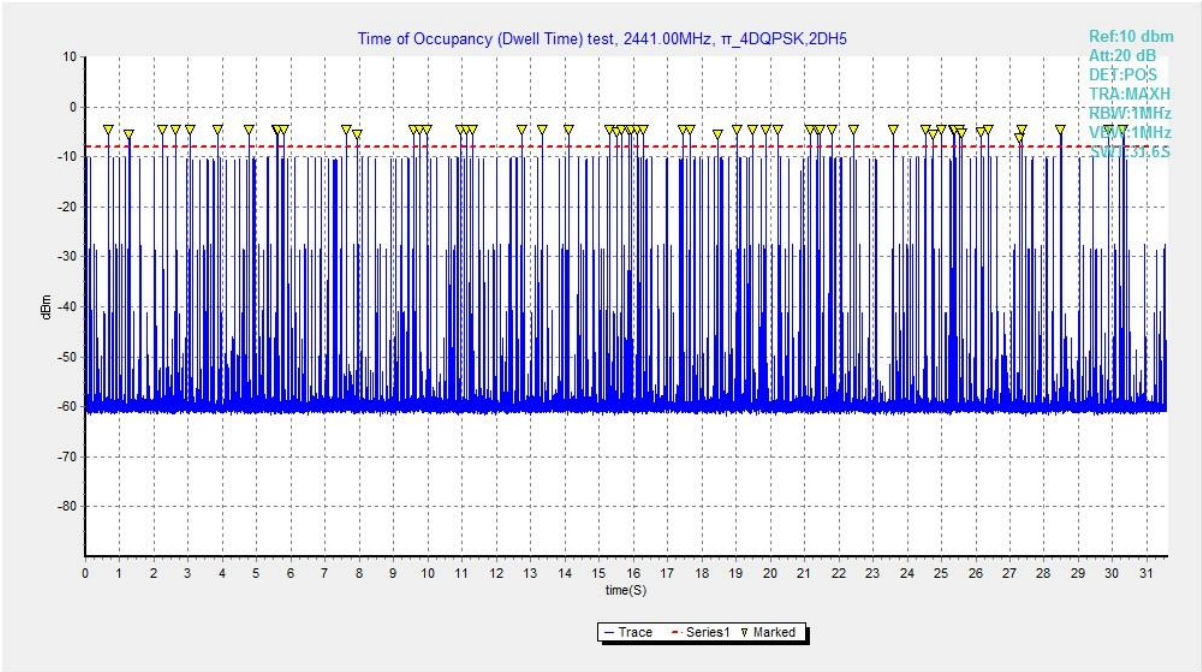

Fig. 81 Time of Occupancy(Dwell Time) (π /4 DQPSK, Ch39)

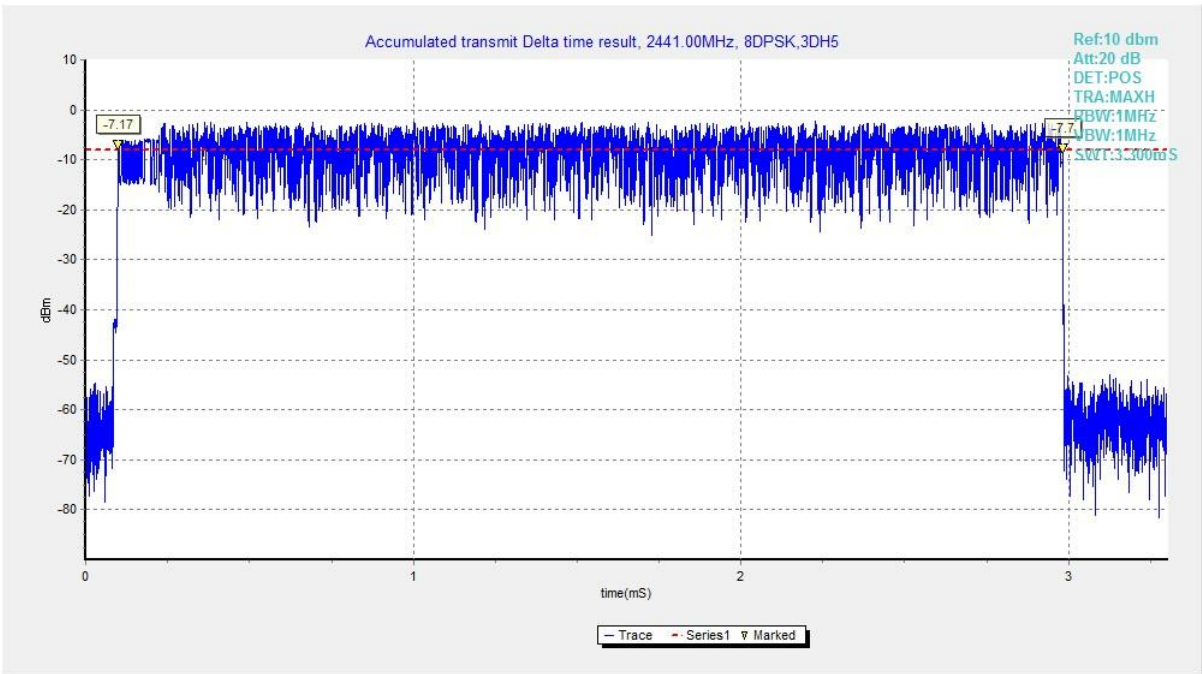

Fig. 82 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

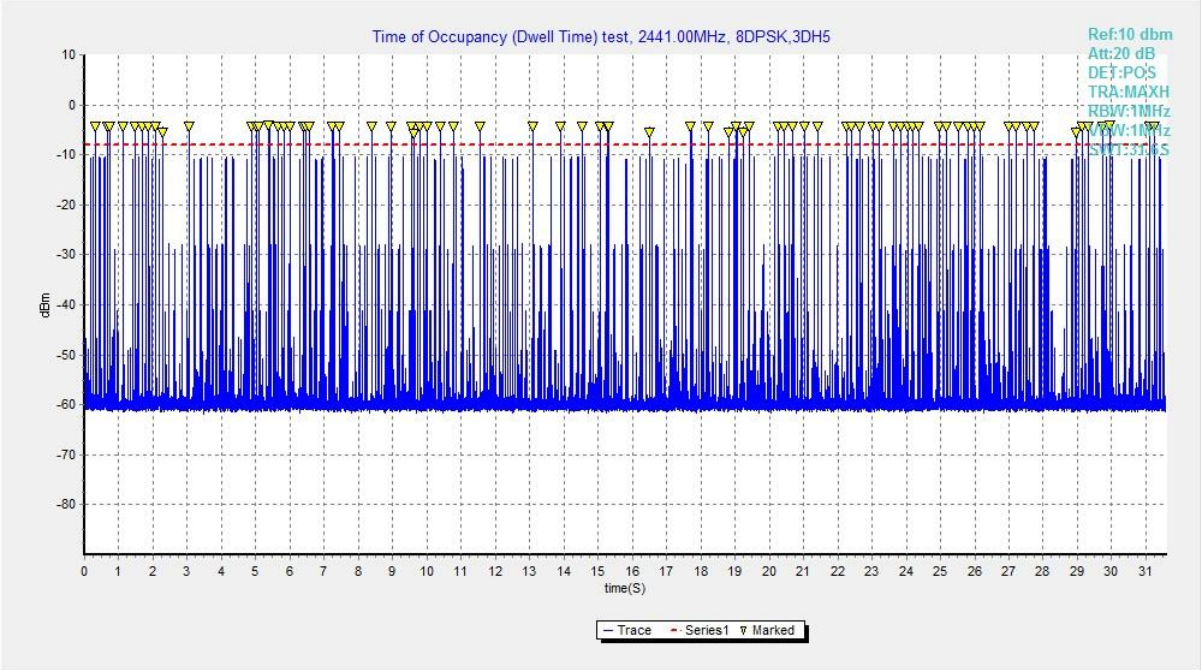

Fig. 83 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

A.7 Number of Hopping Channels

Measurement Limit:

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

Measurement Results:

Mode	Packet	Number of hopping channels		Test result	Conclusion
GFSK	DH5	Fig.84	Fig.85	79	**P**
π /4 DQPSK	2-DH5	Fig.86	Fig.87	79	**P**
8DPSK	3-DH5	Fig.88	Fig.89	79	**P**

See below for test graphs.

Conclusion: Pass

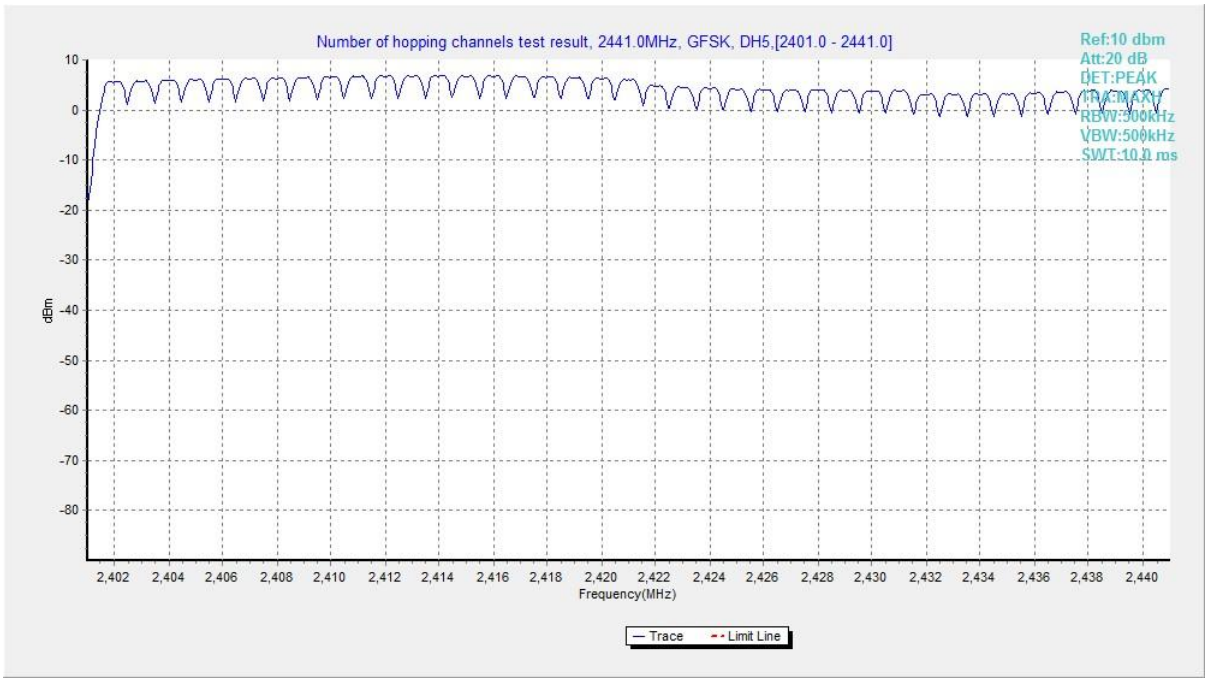

Fig. 84 Hopping channel ch0~39 (GFSK, Ch39)

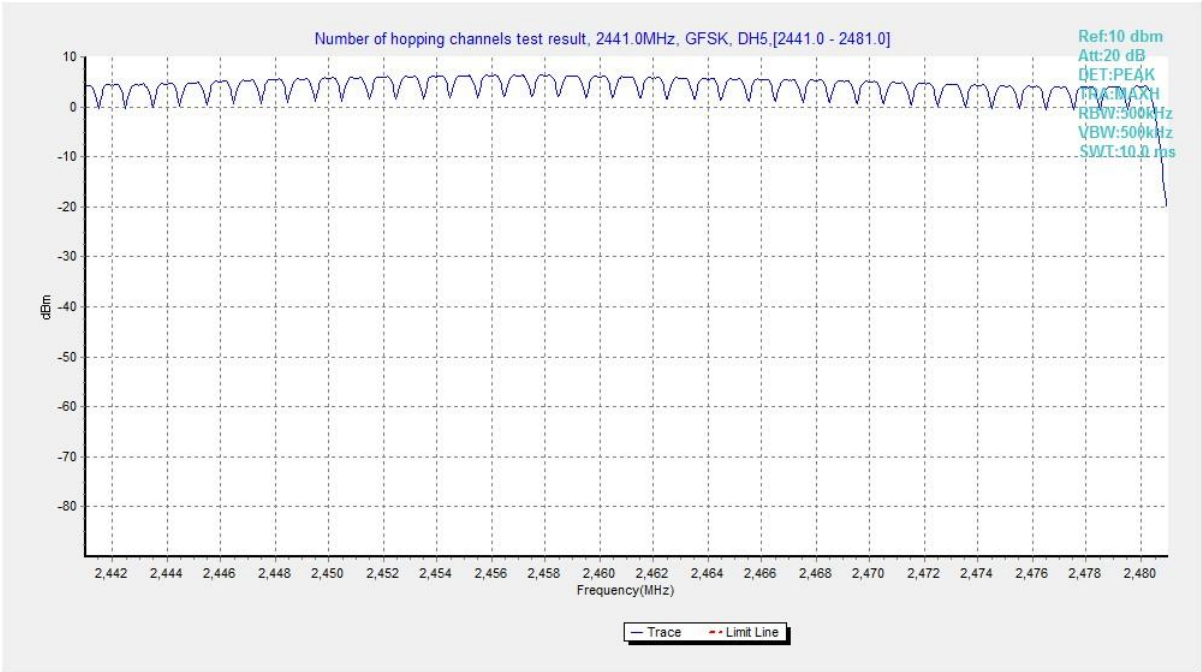

Fig. 85 Hopping channel ch40~78 (GFSK, Ch39)

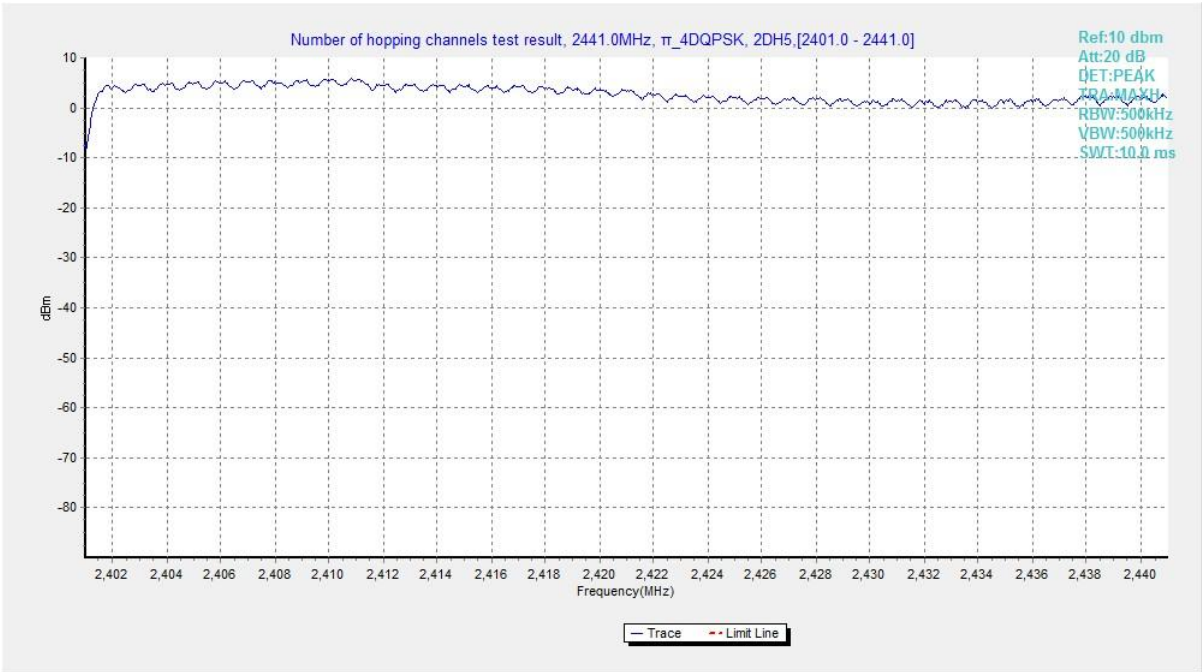

Fig. 86 Hopping channel ch0~39 (π /4 DQPSK, Ch39)

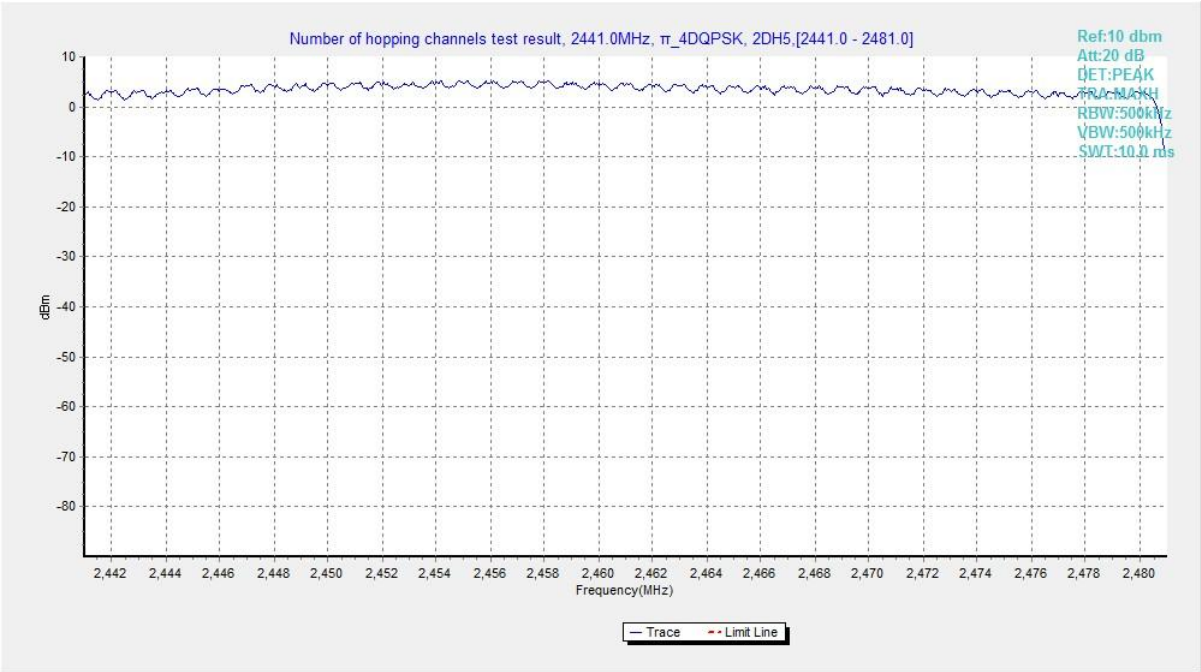

Fig. 87 Hopping channel ch40~78 (π /4 DQPSK, Ch39)

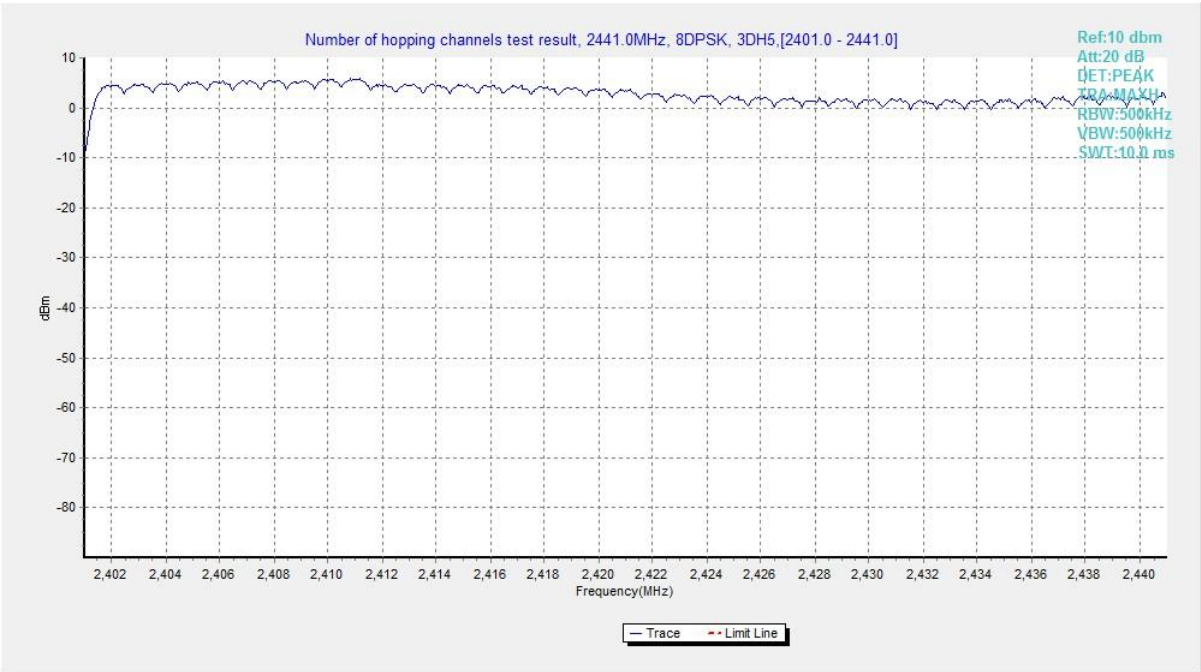

Fig. 88 Hopping channel ch0~39 (8DPSK, Ch39)

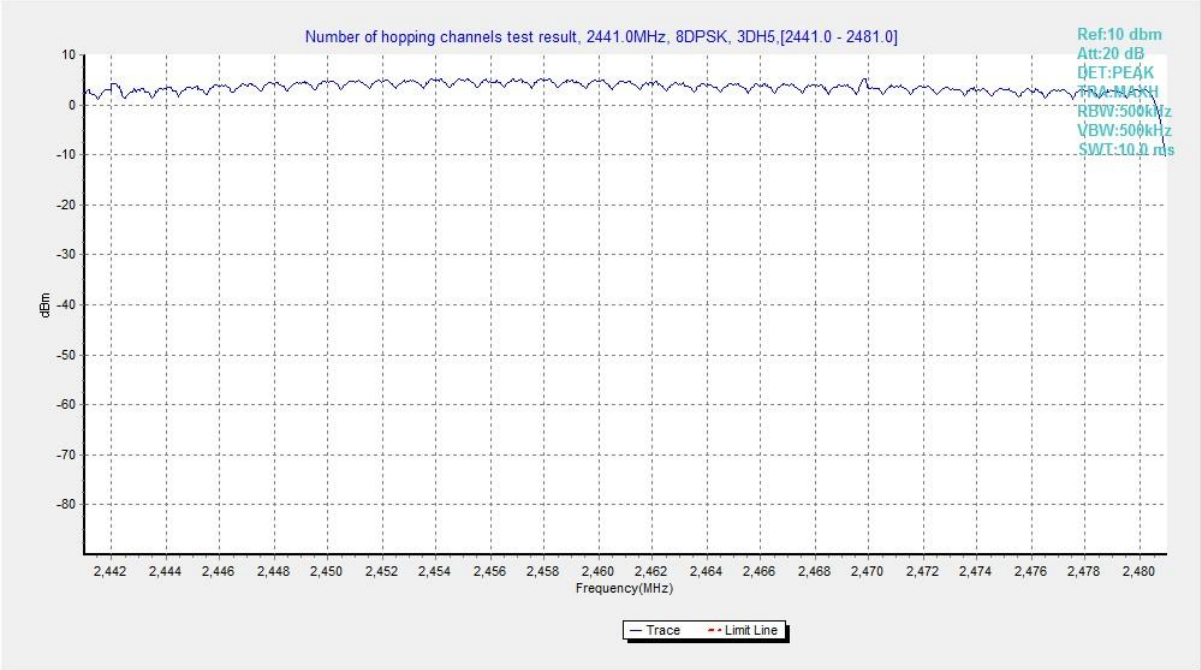

Fig. 89 Hopping channel ch40~78 (8DPSK, Ch39)

A.8 Carrier Frequency Separation

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a)	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

Measurement Results:

Mode	Channel	Packet	Separation of hopping channels	Test result (MHz)	Conclusion
GFSK	39	DH5	Fig.90	1.00	**P**
π /4 DQPSK	39	2-DH5	Fig.91	1.02	**P**
8DPSK	39	3-DH5	Fig.92	1.00	**P**

See below for test graphs.

Conclusion: Pass

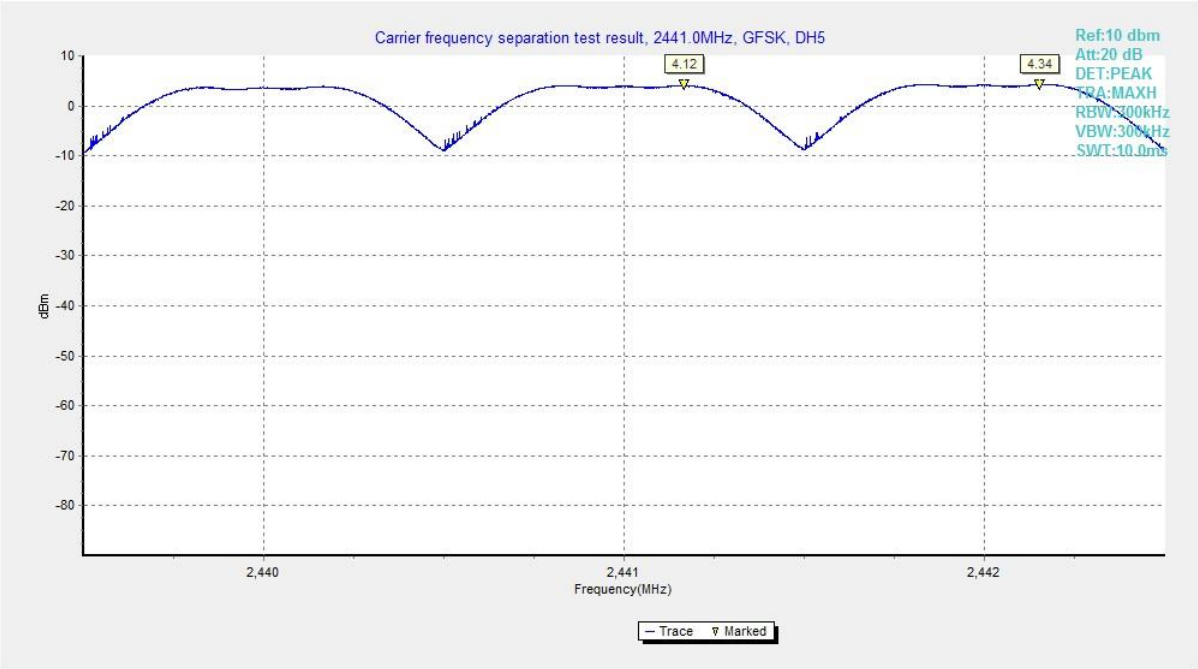

Fig. 90 Carrier Frequency Separation (GFSK, Ch39)

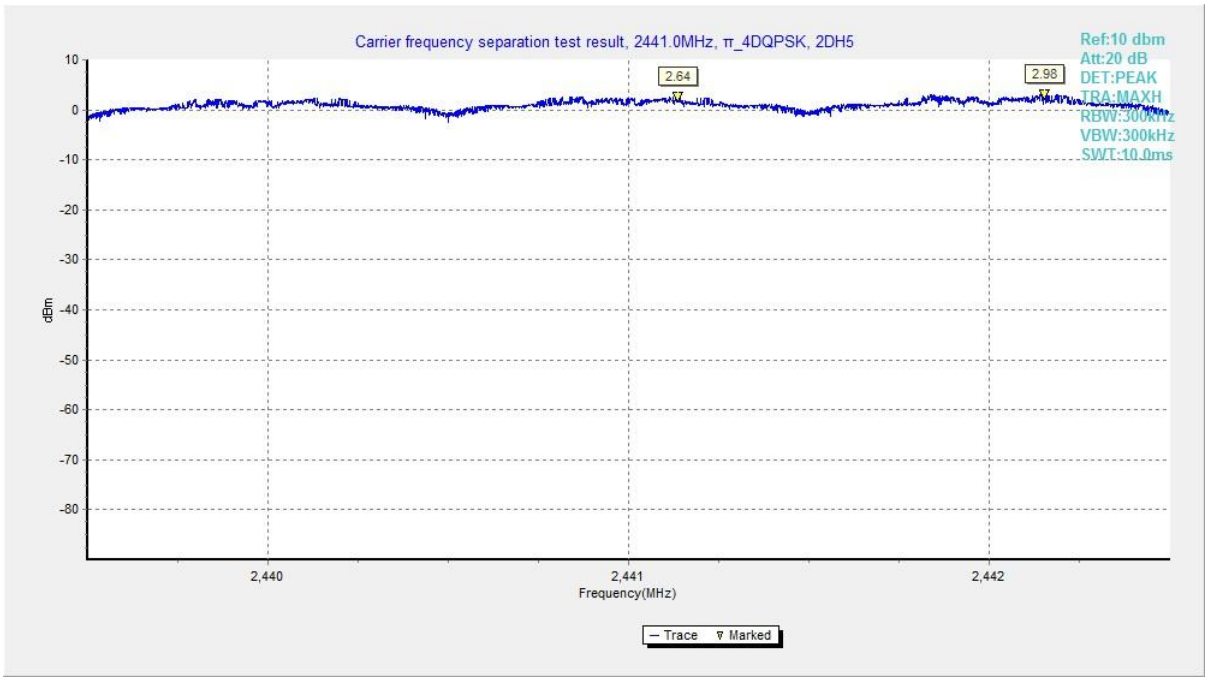

Fig. 91 Carrier Frequency Separation (π /4 DQPSK, Ch39)

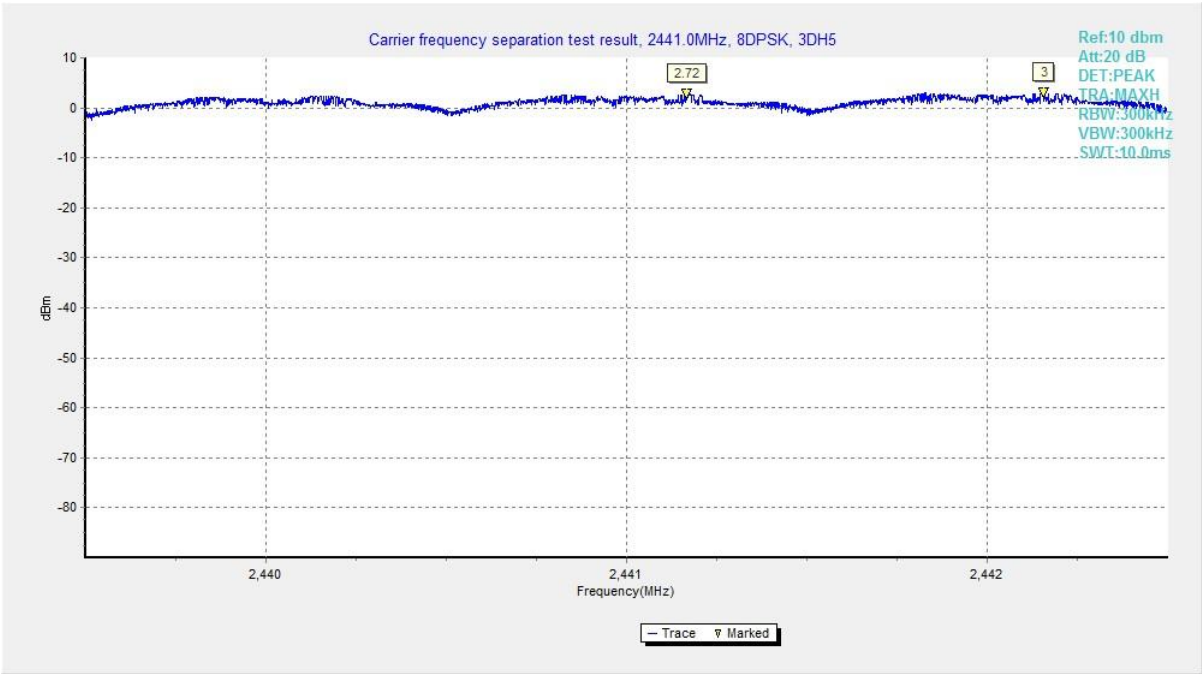

Fig. 92 Carrier Frequency Separation (8DPSK, Ch39)

A.9 AC Power line Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

BT (Quasi-peak Limit) - AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.93	Fig.94	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.				

BT (Average Limit) - AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.93	Fig.94	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.				

Test Condition:

Voltage (V)	Frequency (Hz)
240	60

Measurement Result and limit:

BT (Quasi-peak Limit) - AE3

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.95	Fig.96	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.				

BT (Average Limit) - AE3

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	

0.15 to 0.5	56 to 46	Fig.95	Fig.96	**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.				

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: Pass

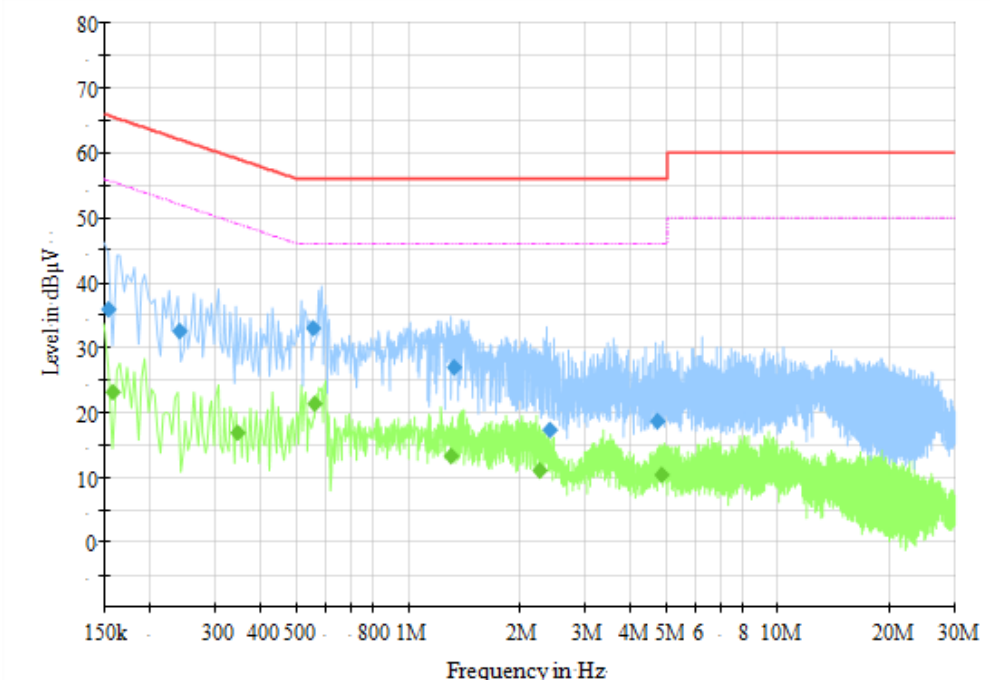

Fig. 93 AC Powerline Conducted Emission (Traffic, AE3, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154	35.99	65.78	29.79	N	ON	9.6
0.240	32.49	62.10	29.60	N	ON	9.6
0.552	33.08	56.00	22.92	N	ON	9.6
1.320	26.94	56.00	29.06	L1	ON	9.7
2.404	17.25	56.00	38.75	N	ON	9.7
4.712	18.62	56.00	37.38	N	ON	9.7

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158	23.10	55.57	32.47	N	ON	9.6
0.344	16.96	49.11	32.14	N	ON	9.6
0.556	21.24	46.00	24.76	N	ON	9.6
1.296	13.25	46.00	32.75	L1	ON	9.7
2.252	11.00	46.00	35.00	N	ON	9.7
4.824	10.35	46.00	35.65	N	ON	9.7

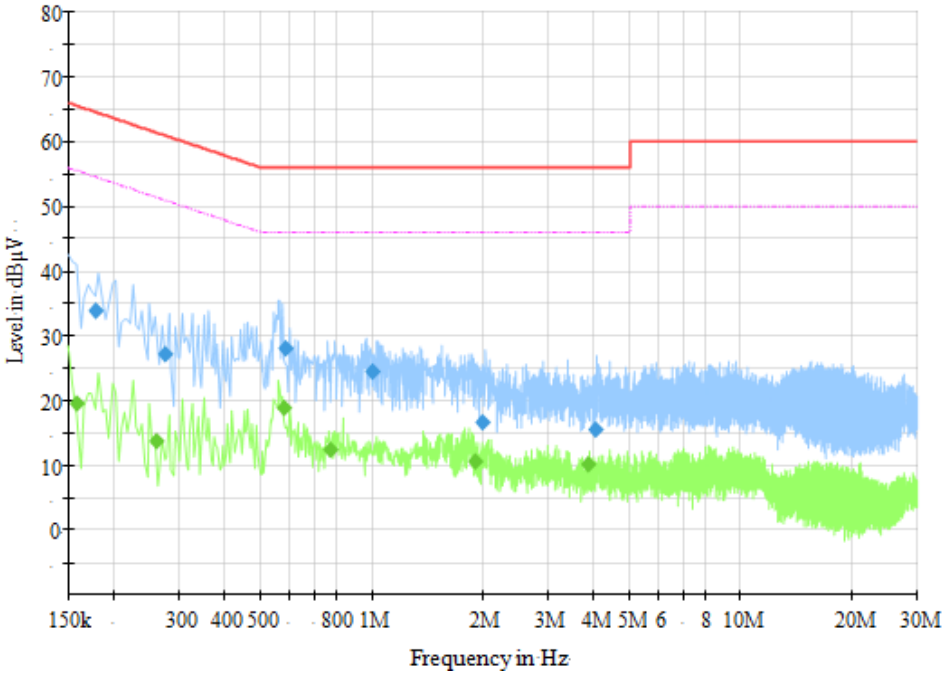

Fig. 94 AC Power line Conducted Emission (Idle, AE3, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.178	33.86	64.58	30.72	N	ON	9.6
0.276	27.22	60.94	33.72	N	ON	9.6
0.580	28.13	56.00	27.87	N	ON	9.6
1.004	24.49	56.00	31.51	L1	ON	9.7
1.984	16.73	56.00	39.27	L1	ON	9.7
4.016	15.52	56.00	40.48	L1	ON	9.7

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158	19.48	55.57	36.08	N	ON	9.6
0.260	13.71	51.43	37.72	N	ON	9.6
0.576	18.82	46.00	27.18	N	ON	9.6
0.768	12.46	46.00	33.54	N	ON	9.6
1.904	10.57	46.00	35.43	N	ON	9.7
3.852	10.16	46.00	35.84	N	ON	9.7

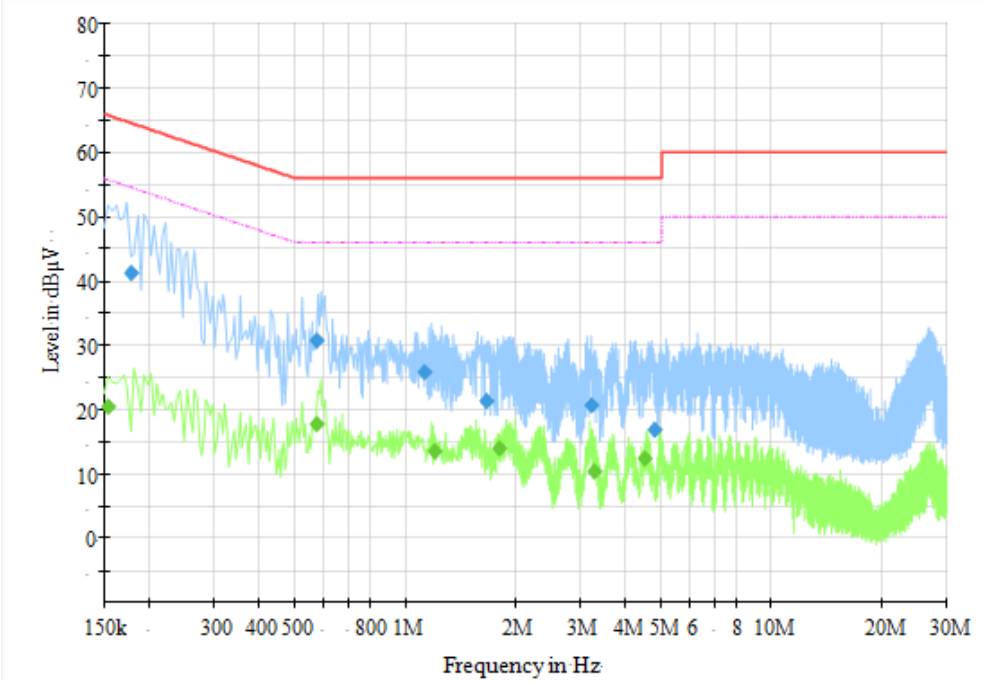

Fig. 95 AC Powerline Conducted Emission (Traffic, AE3, 240V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.178	41.37	64.58	23.21	L1	ON	9.6
0.572	30.65	56.00	25.35	N	ON	9.6
1.124	25.73	56.00	30.27	L1	ON	9.7
1.656	21.26	56.00	34.74	N	ON	9.7
3.228	20.59	56.00	35.41	L1	ON	9.7
4.780	16.89	56.00	39.11	L1	ON	9.7

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154	20.38	55.78	35.40	N	ON	9.6
0.572	17.78	46.00	28.22	N	ON	9.6
1.204	13.45	46.00	32.55	L1	ON	9.7
1.796	13.85	46.00	32.15	N	ON	9.7
3.264	10.33	46.00	35.67	N	ON	9.7
4.496	12.46	46.00	33.54	N	ON	9.7

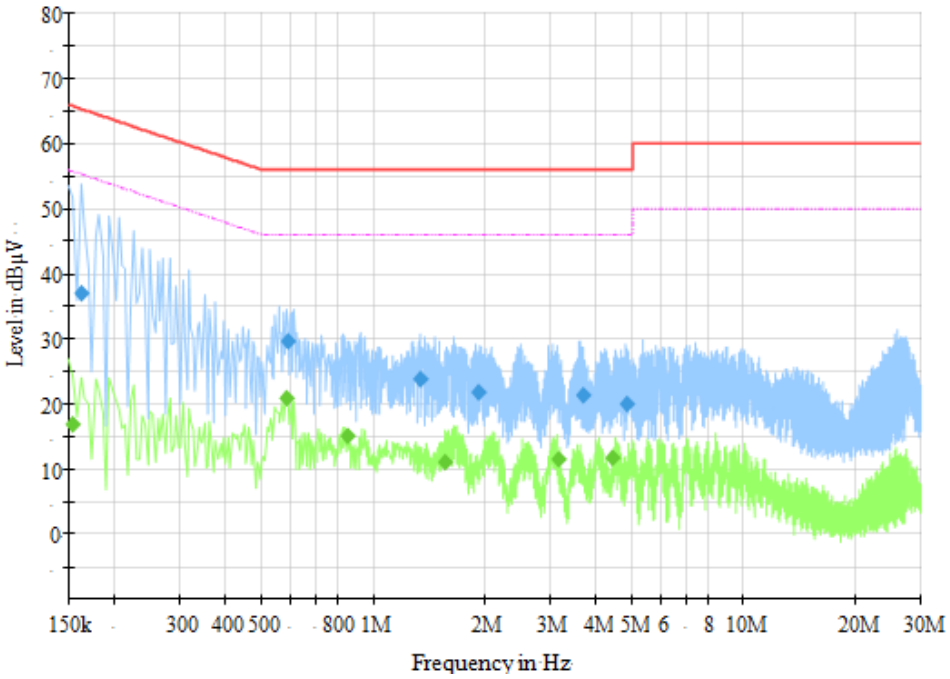

Fig. 96 AC Power line Conducted Emission (Idle, AE3, 240V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.162	36.96	65.36	28.40	N	ON	9.6
0.588	29.71	56.00	26.29	N	ON	9.6
1.340	23.90	56.00	32.10	L1	ON	9.7
1.920	21.88	56.00	34.12	L1	ON	9.7
3.680	21.36	56.00	34.64	L1	ON	9.7
4.832	20.04	56.00	35.96	L1	ON	9.7

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154	16.93	55.78	38.85	N	ON	9.6
0.580	20.90	46.00	25.10	L1	ON	9.6
0.848	15.06	46.00	30.94	L1	ON	9.7
1.564	10.97	46.00	35.03	N	ON	9.7
3.156	11.49	46.00	34.51	N	ON	9.7
4.412	11.75	46.00	34.25	N	ON	9.7

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