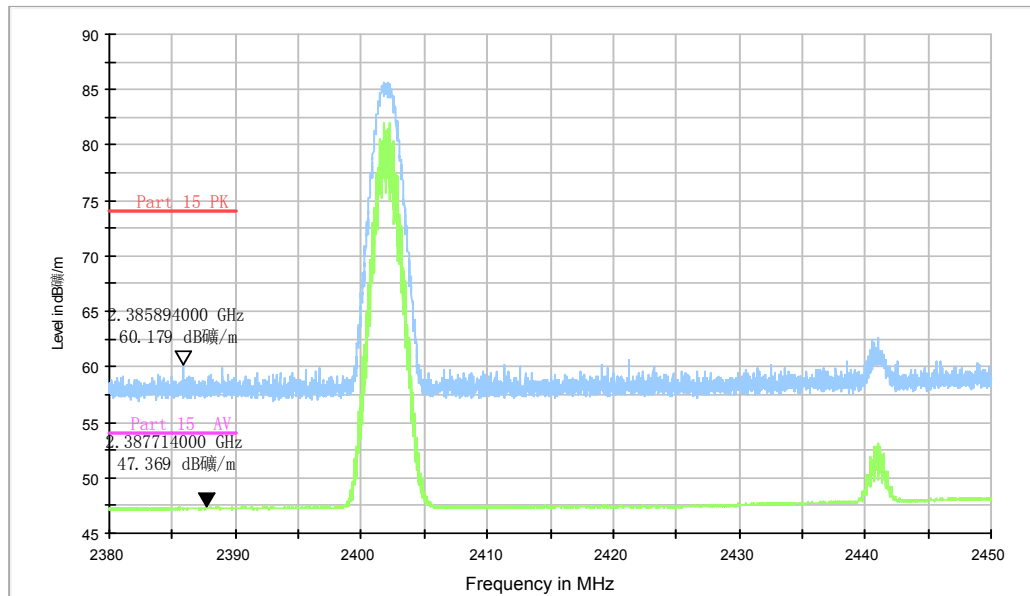RE - Power-2.38GHz-2.45GHz

Fig.86.　Radiated emission (Power): 8DPSK, low channel
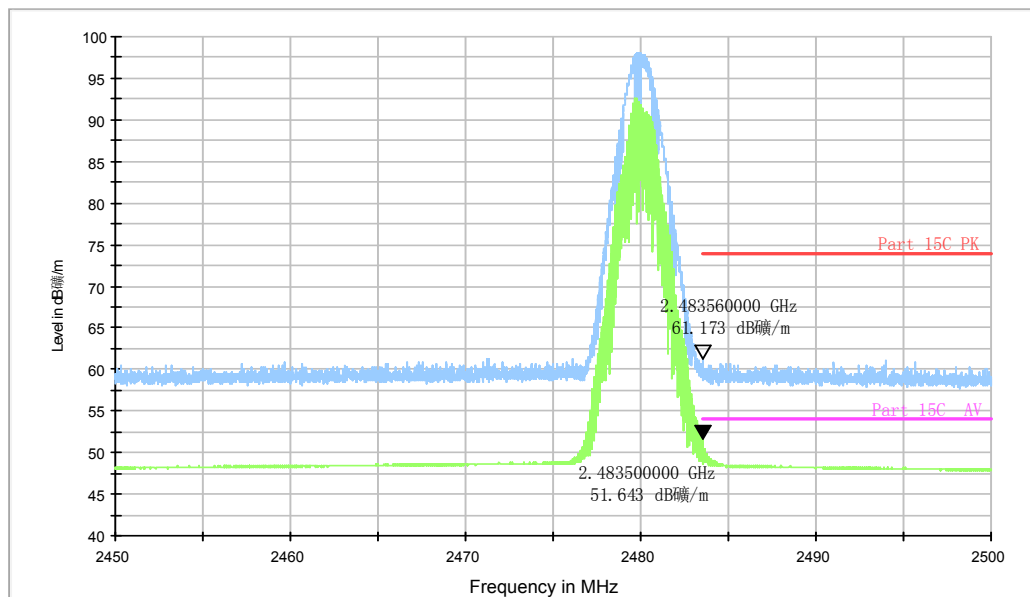
RE - Power-2.45GHz-2.5GHz

Fig.87.　Radiated emission (Power): 8DPSK, high channel
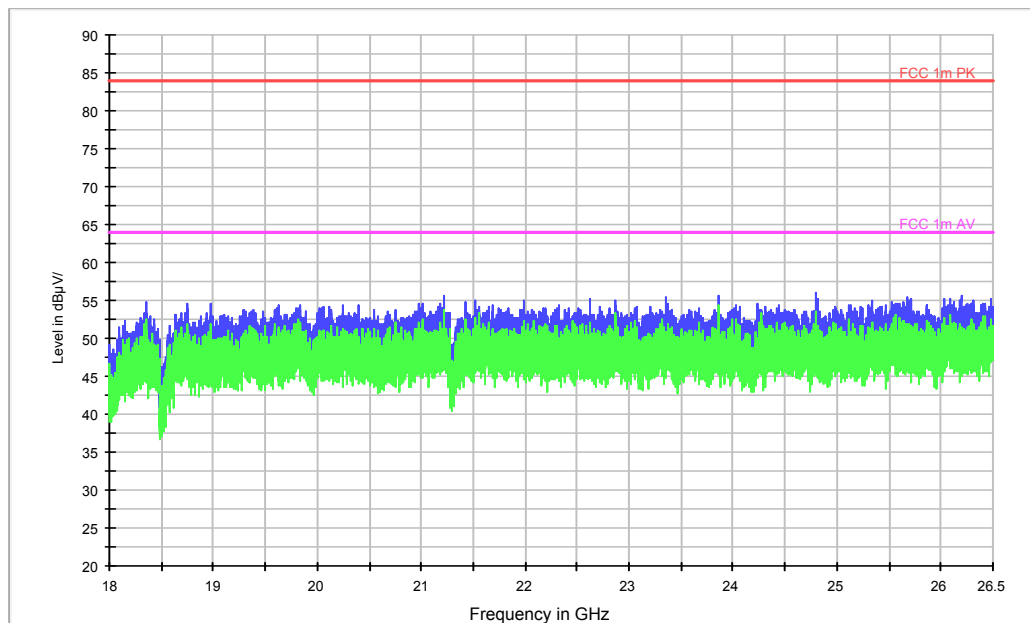
Fig.88.   Radiated emission: 8DPSK, 18 GHz - 26 GHz

A.6. Time of Occupancy (Dwell Time)

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

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

- Span = zero span, centered on a hopping channel

- RBW = 1 MHz

- VBW ≥ RBW

- Sweep = as necessary to capture the entire dwell time per hopping channel

- Detector function = peak

- Trace = max hold

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

Measurement Limit:

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

Measurement Result:

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.89	118.27	P
	DH3	Fig.90	260.12	P
	DH5	Fig.91	306.54	P

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.92	120.54	P
	DH3	Fig.93	260.62	P
	DH5	Fig.94	306.87	P

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.95	120.91	P

	DH3	Fig.96	260.46	P
	DH5	Fig.97	306.70	P

Conclusion: PASS

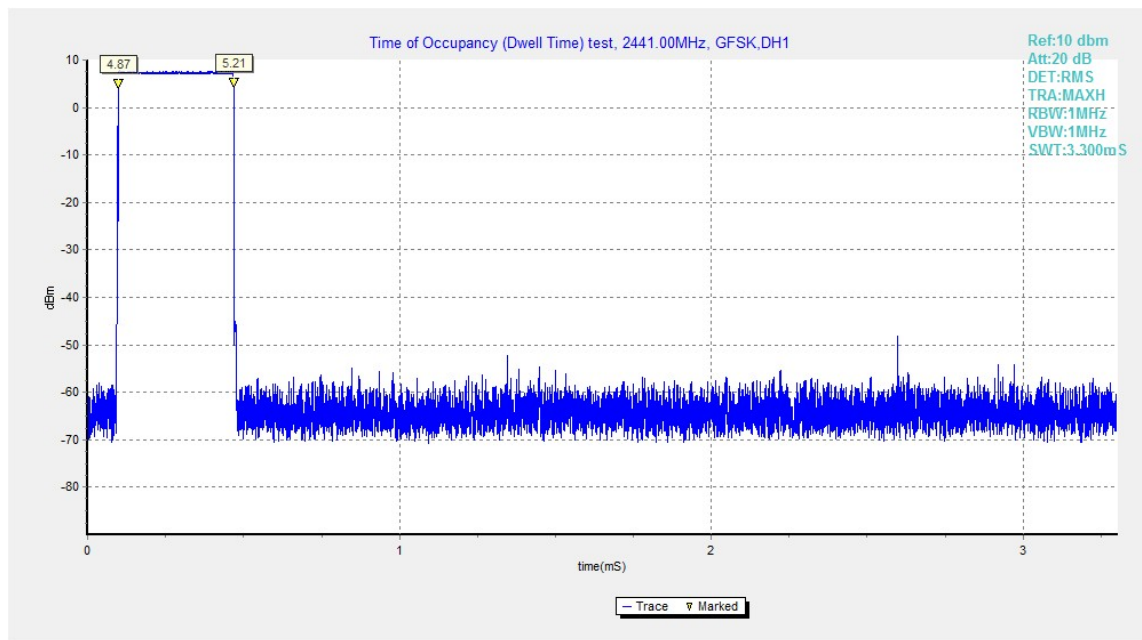**Test graphs as below:**

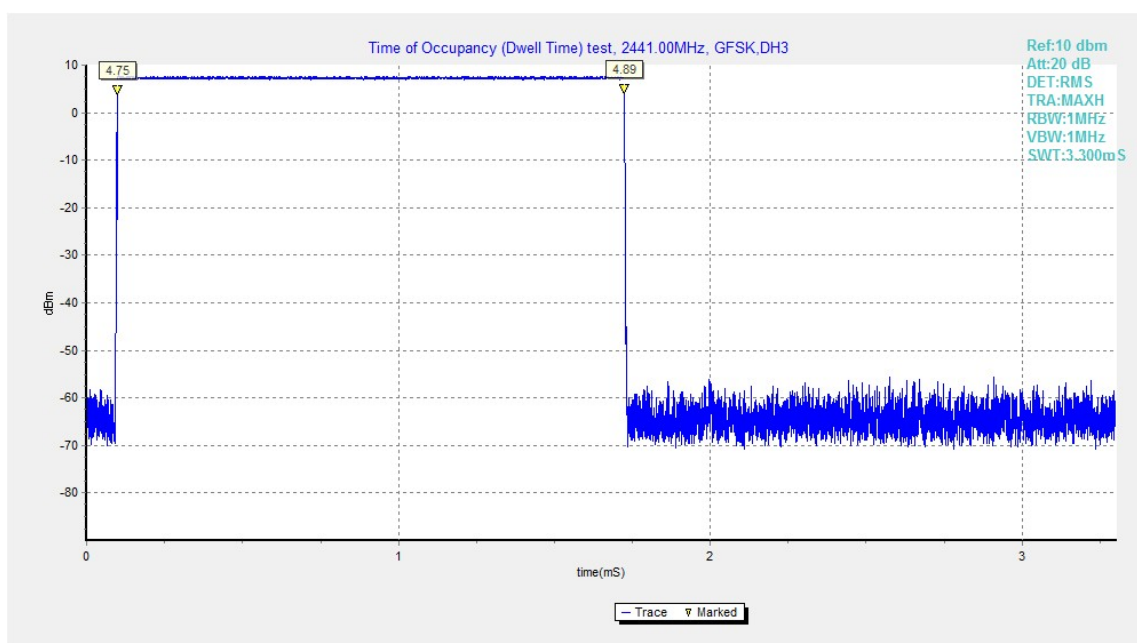Fig.89.   Time of occupancy (Dwell Time): Channel 39, Packet DH1

Fig.90.   Time of occupancy (Dwell Time): Channel 39, Packet DH3

Fig.91.　Time of occupancy (Dwell Time): Channel 39, Packet DH5

Fig.92.　Time of occupancy (Dwell Time): Channel 39, Packet 2-DH1

Fig.93.   Time of occupancy (Dwell Time): Channel 39, Packet 2-DH3
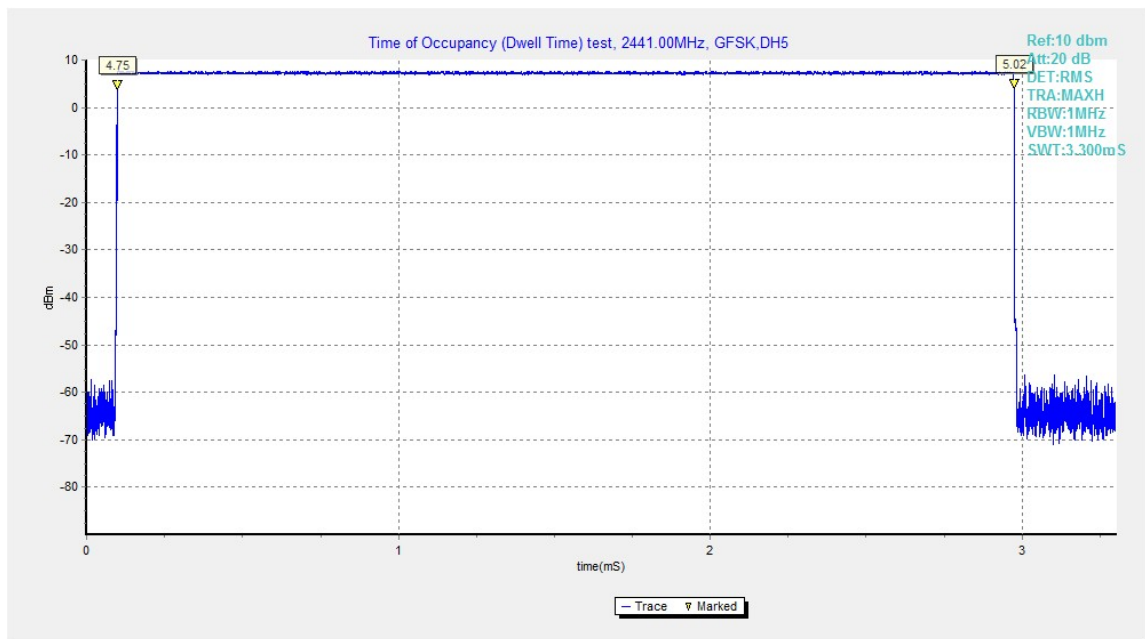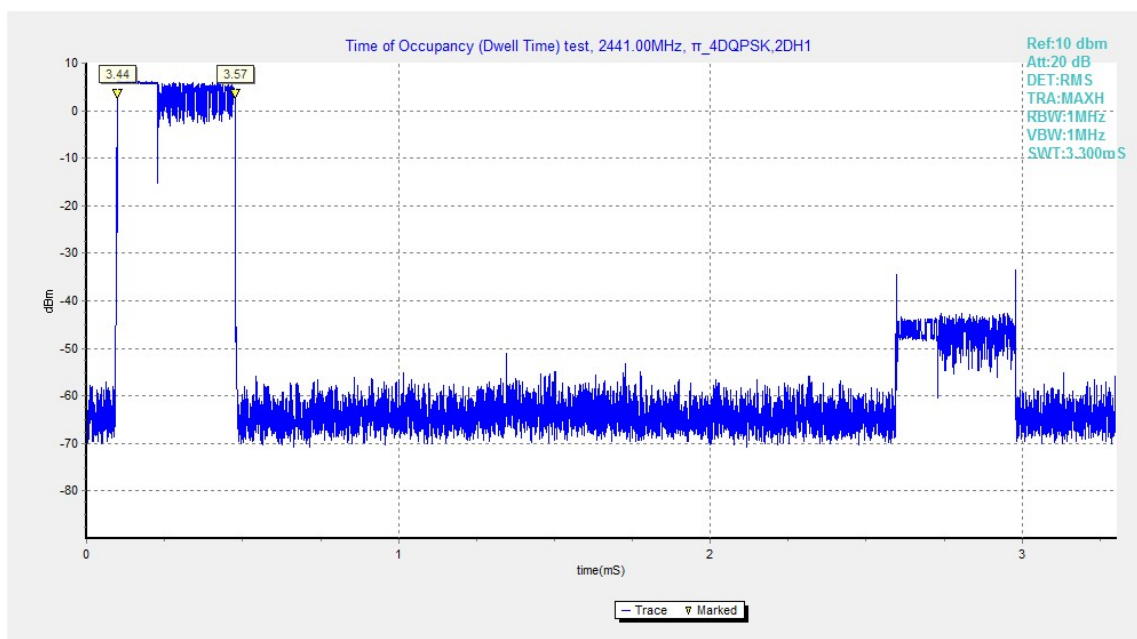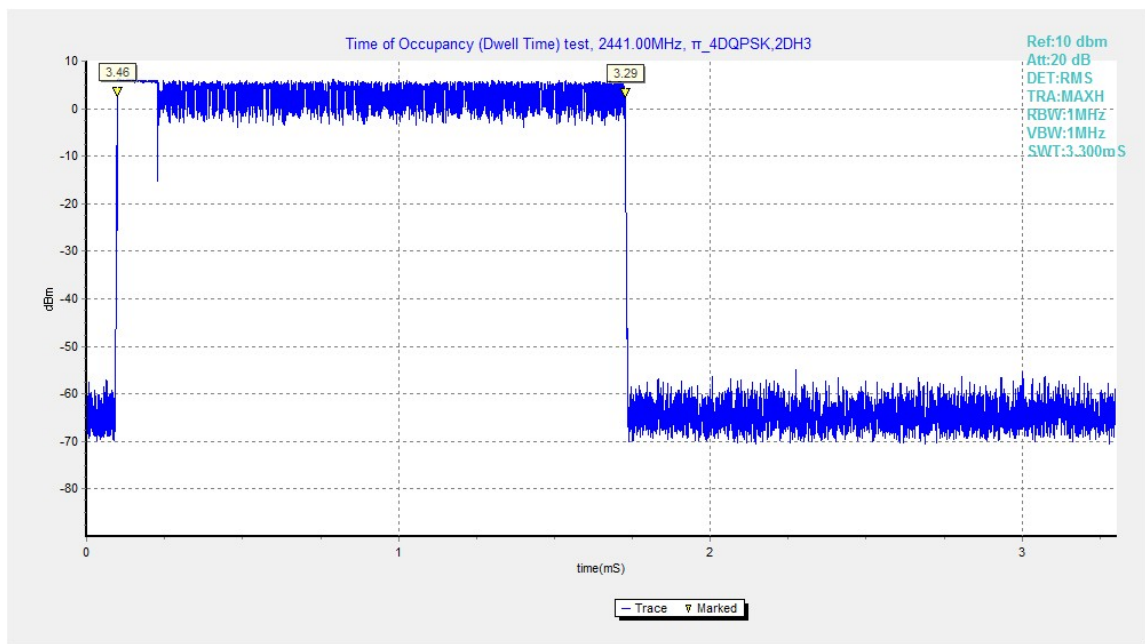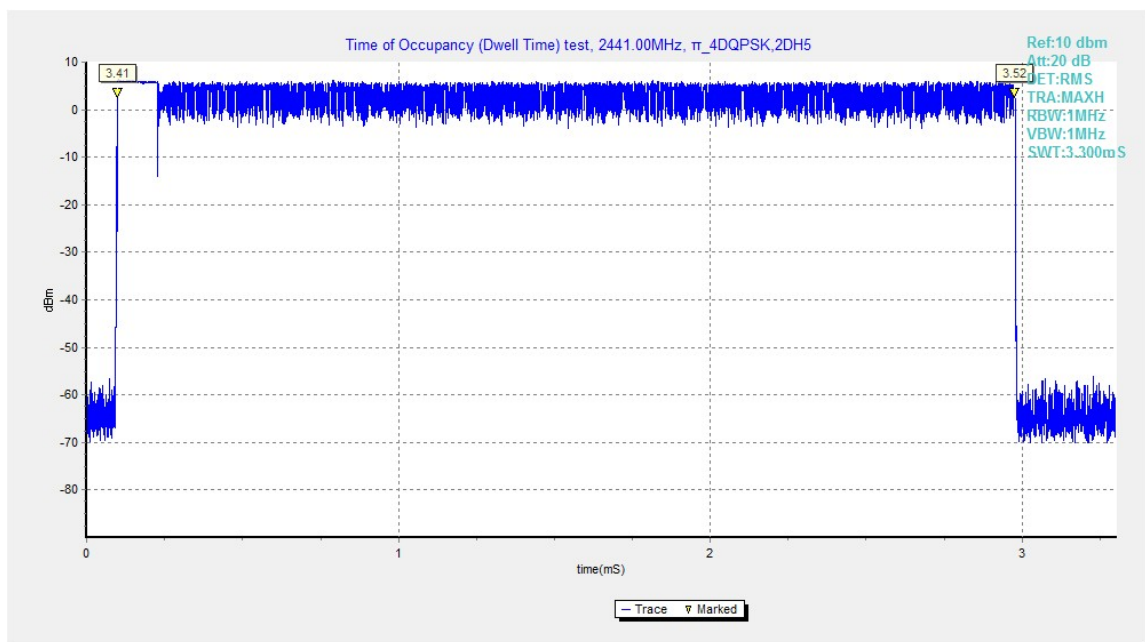

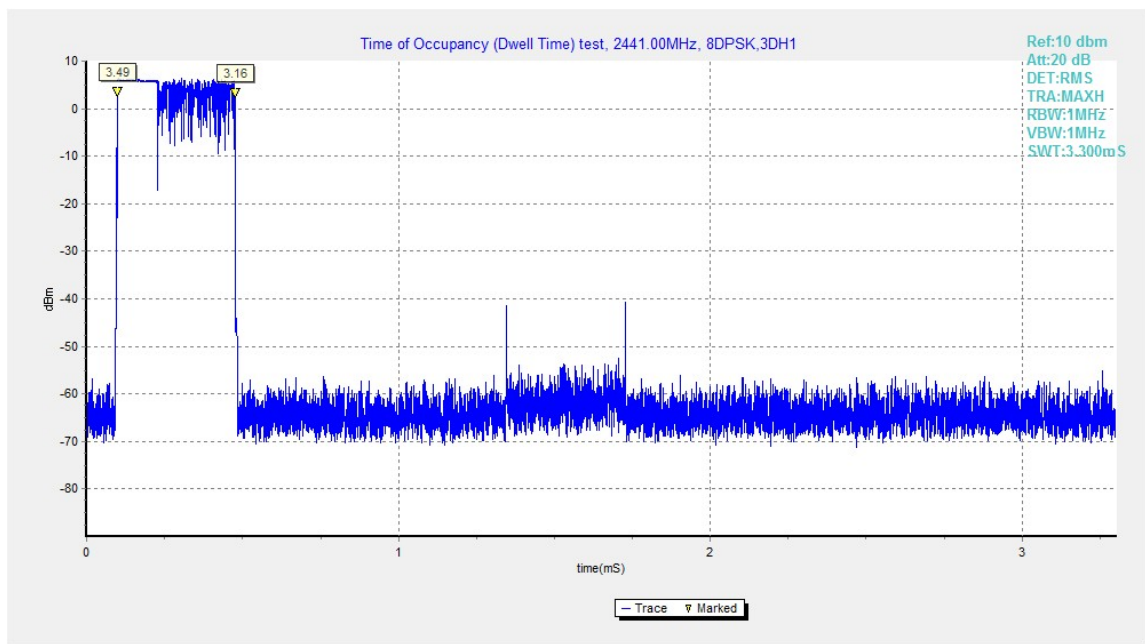Fig.94.   Time of occupancy (Dwell Time): Channel 39, Packet 2-DH5

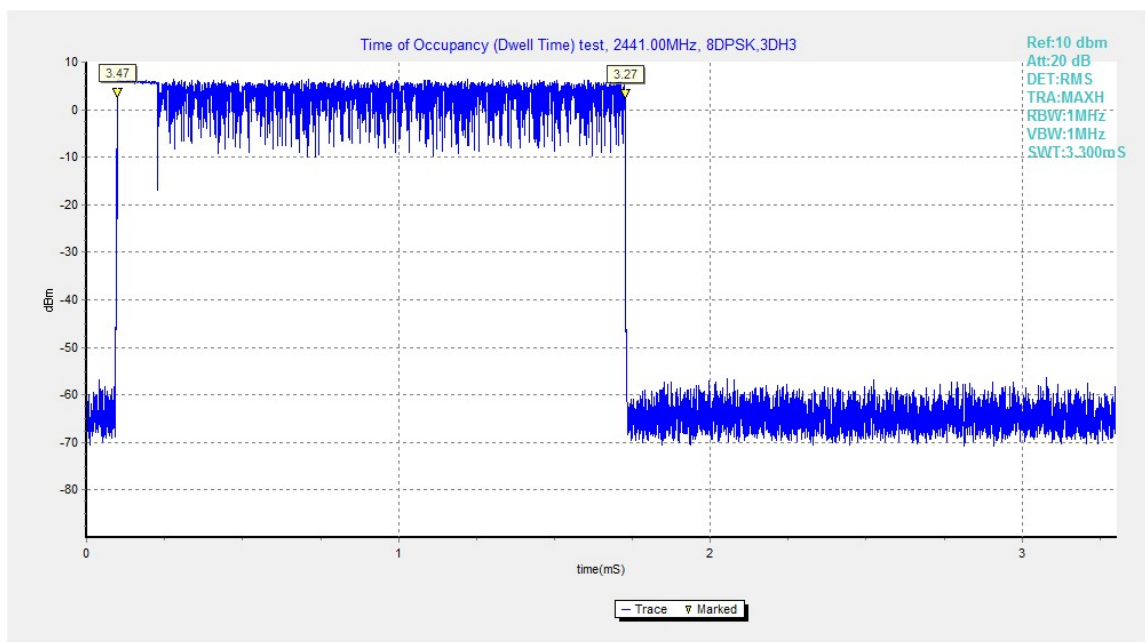Fig.95.   Time of occupancy (Dwell Time): Channel 39, Packet 3-DH1

Fig.96.   Time of occupancy (Dwell Time): Channel 39, Packet 3-DH3
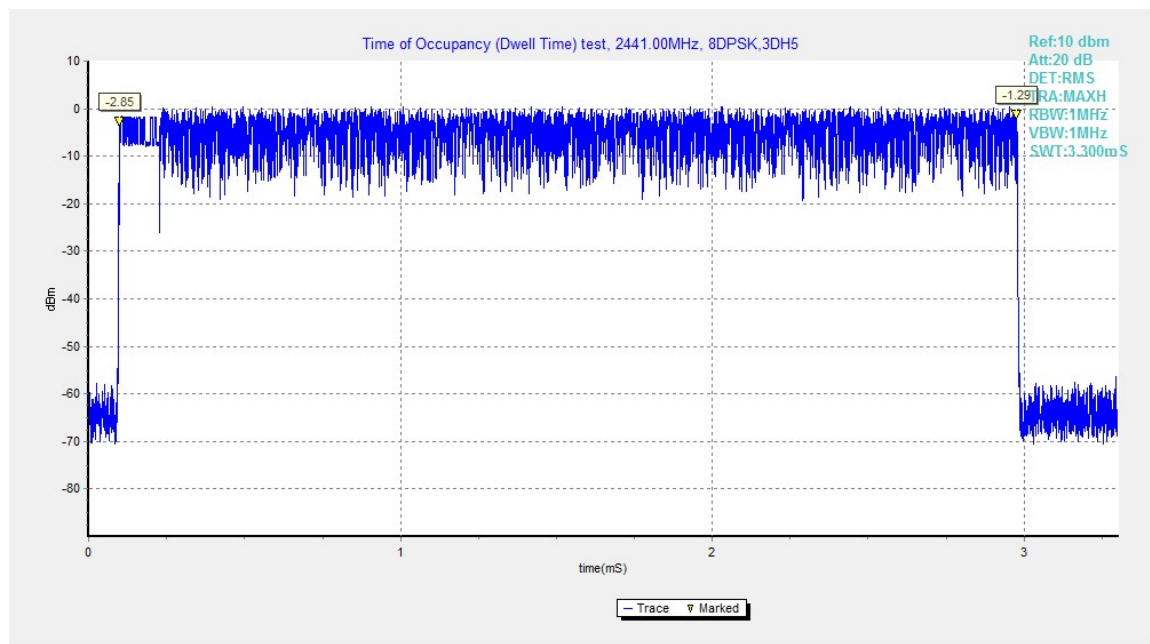
Fig.97.   Time of occupancy (Dwell Time): Channel 39, Packet 3-DH5

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.98	948.00	NA
39	Fig.99	940.00	NA
78	Fig.100	947.00	NA

Forπ/4 DQPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.101	1267.00	NA
39	Fig.102	1283.00	NA
78	Fig.103	1263.00	NA

For 8DPSK

Channel	20dB Bandwidth (kHz)		Conclusion
0	Fig.104	1291.00	NA
39	Fig.105	1265.00	NA
78	Fig.106	1290.00	NA

Conclusion: NA

Test graphs as below:

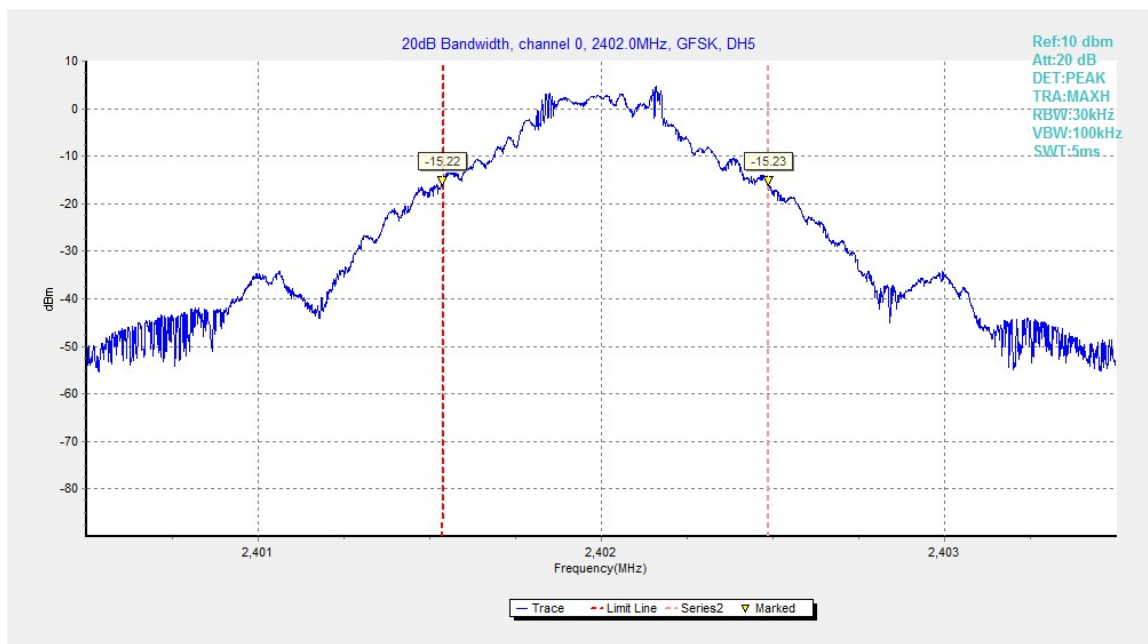Fig.98.   20dB Bandwidth: GFSK, Channel 0

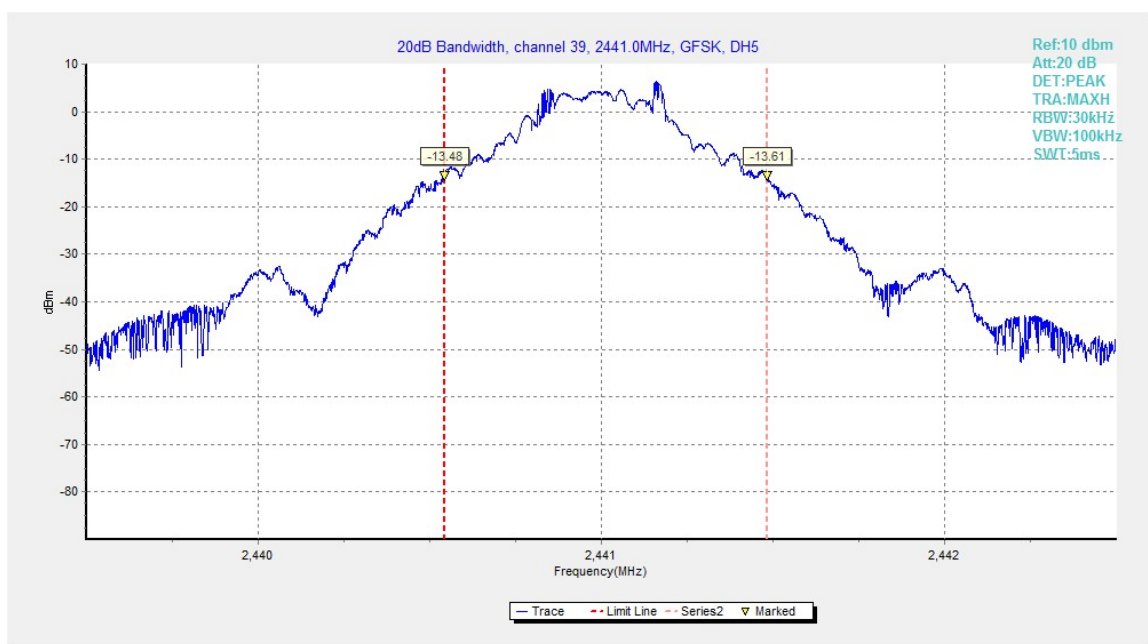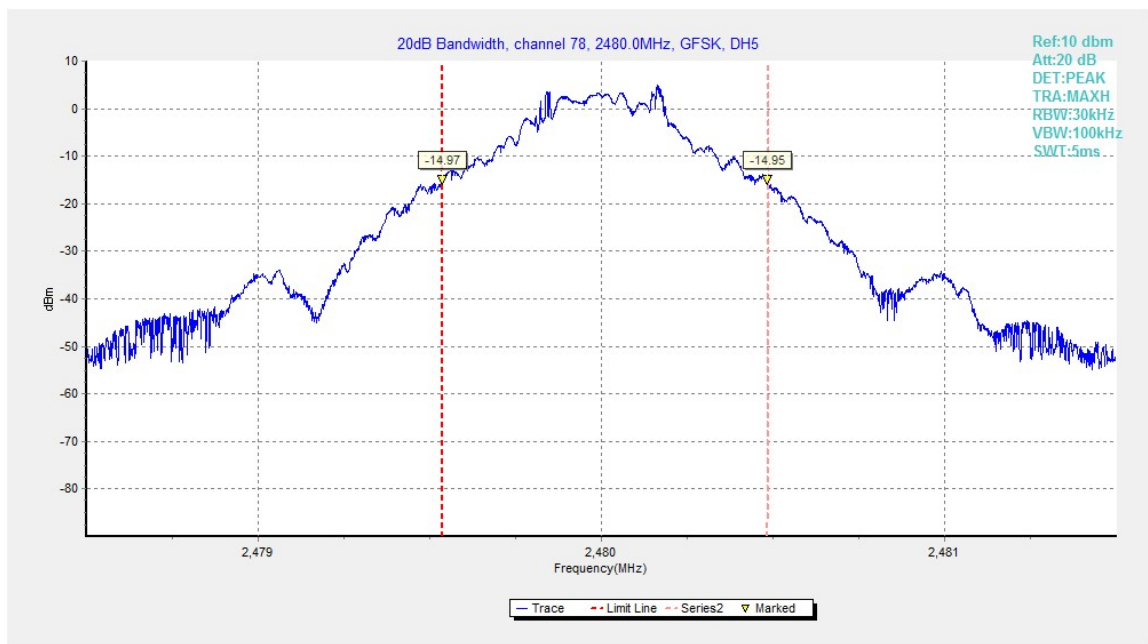

Fig.99.   20dB Bandwidth: GFSK, Channel 39

Fig.100. 20dB Bandwidth: GFSK, Channel 78
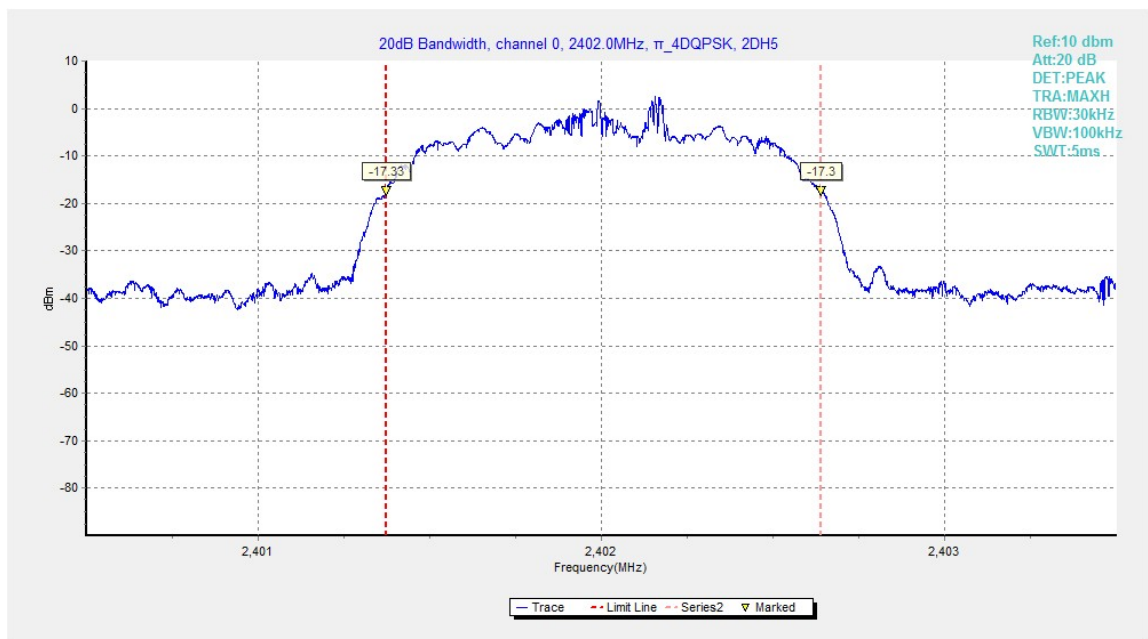
Fig.101. 20dB Bandwidth: π/4 DQPSK, Channel 0
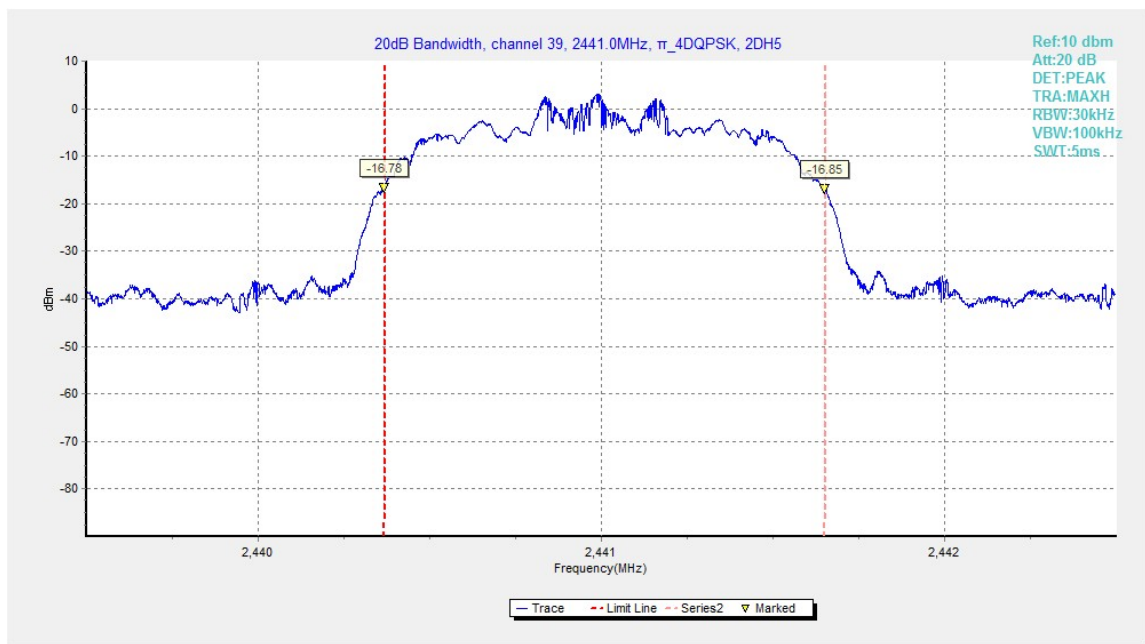
Fig.102. 20dB Bandwidth: π/4 DQPSK, Channel 39
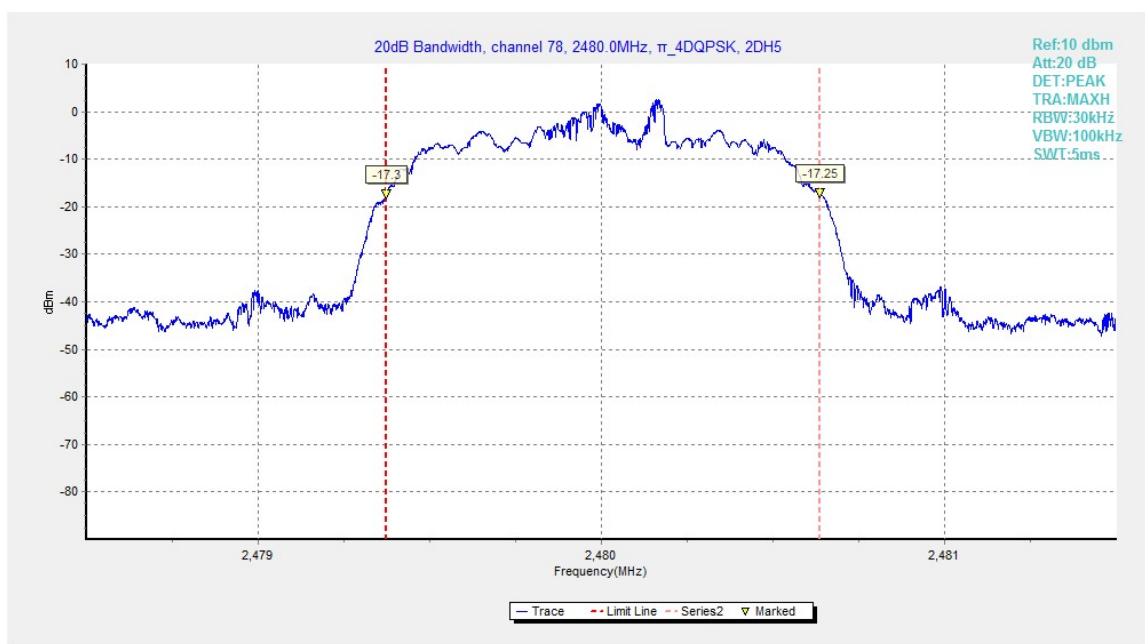
Fig.103. 20dB Bandwidth: π/4 DQPSK, Channel 78
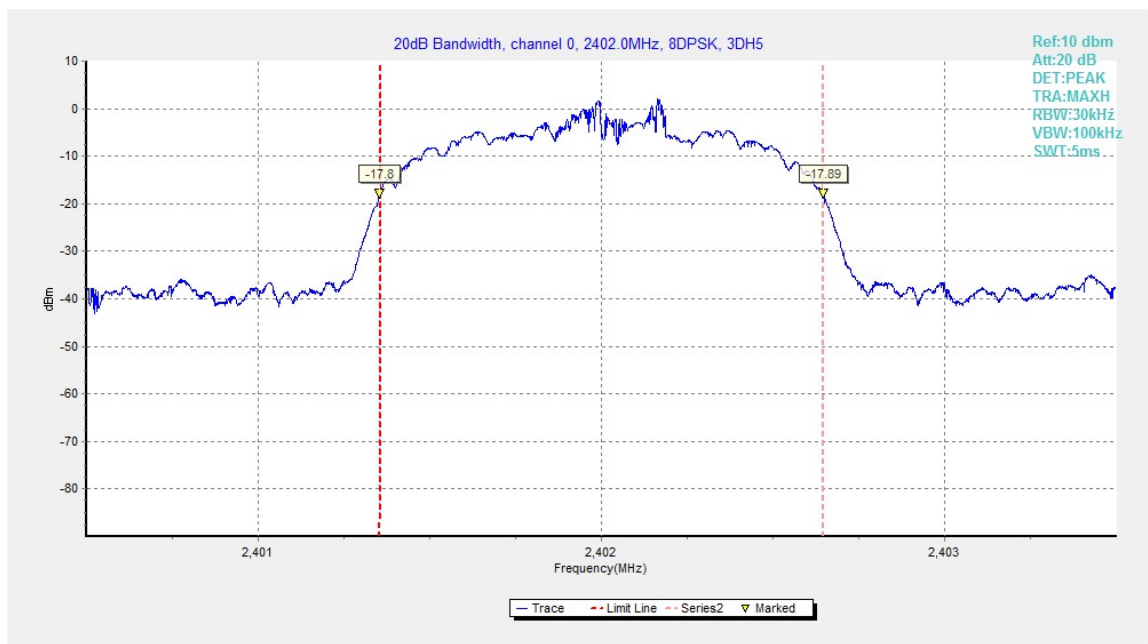
Fig.104. 20dB Bandwidth: 8DPSK, Channel 0
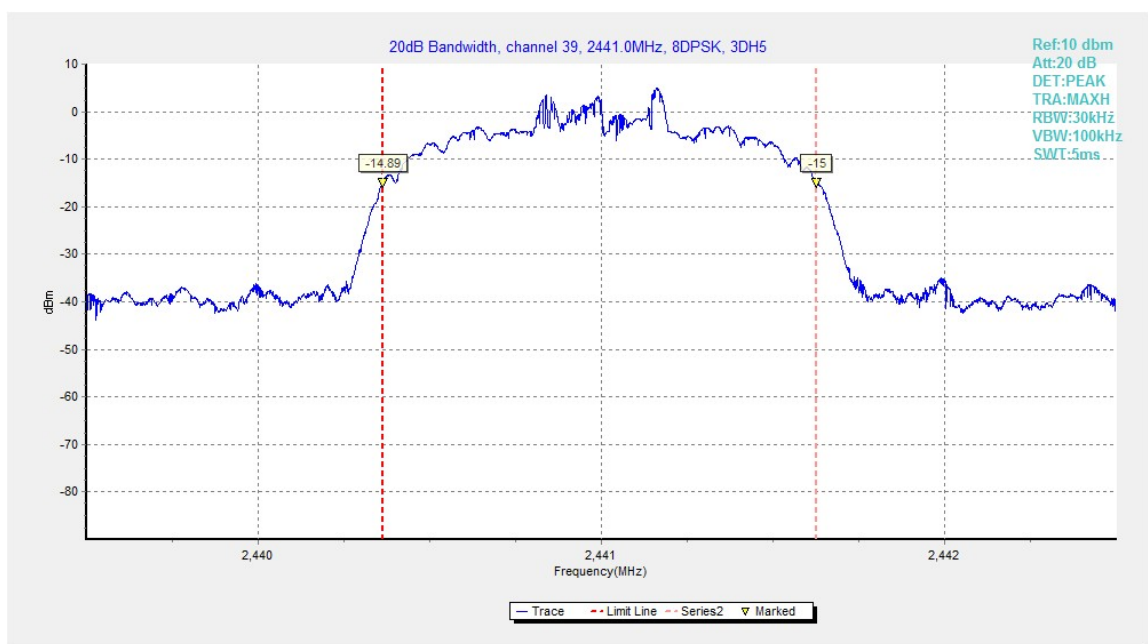
Fig.105. 20dB Bandwidth: 8DPSK, Channel 39
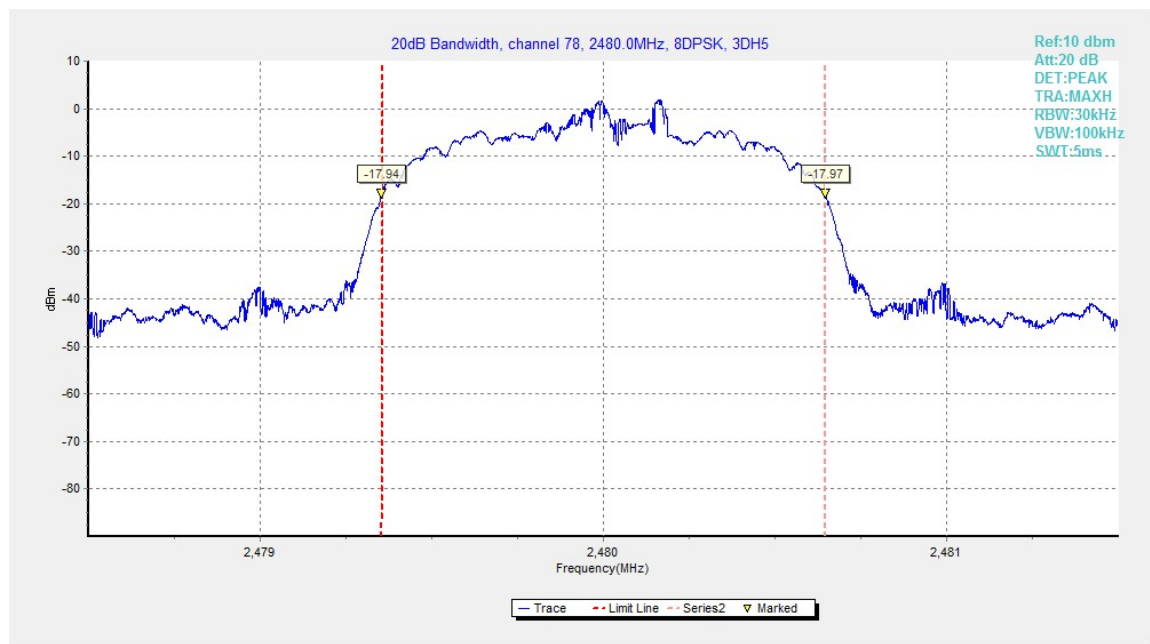
Fig.106. 20dB Bandwidth: 8DPSK, Channel 78

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.107	990.00	P

For π/4 DQPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.108	940.00	P

For 8DPSK

Channel	Carrier frequency separation (kHz)		Conclusion
39	Fig.109	1005.00	P

Conclusion: PASS

Test graphs as below:
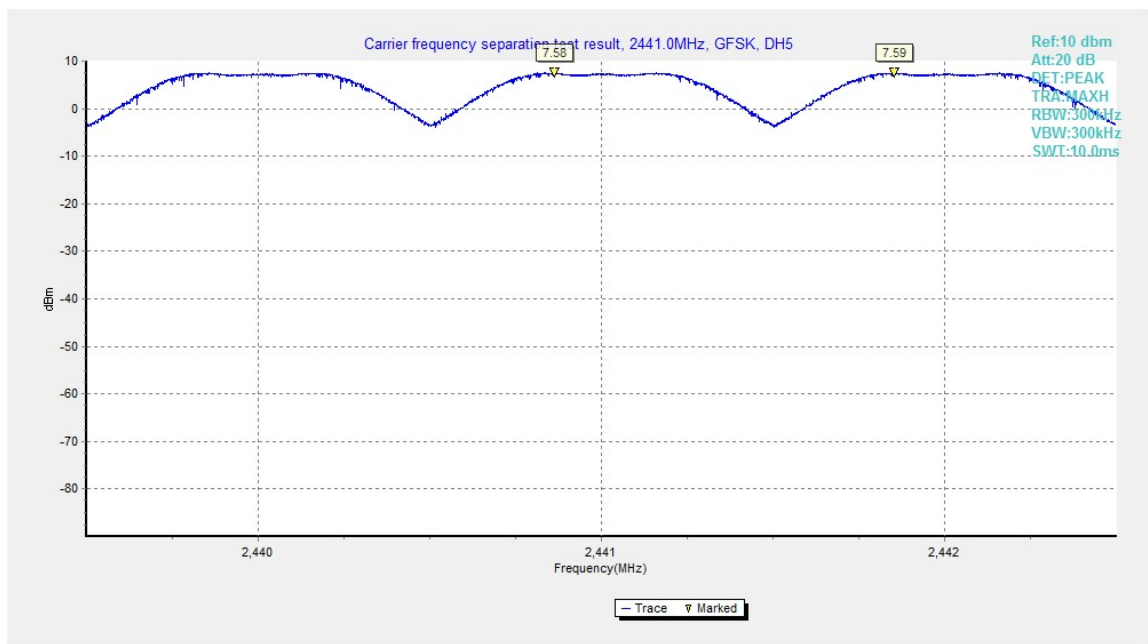
Fig.107. Carrier frequency separation measurement: GFSK, Channel 39
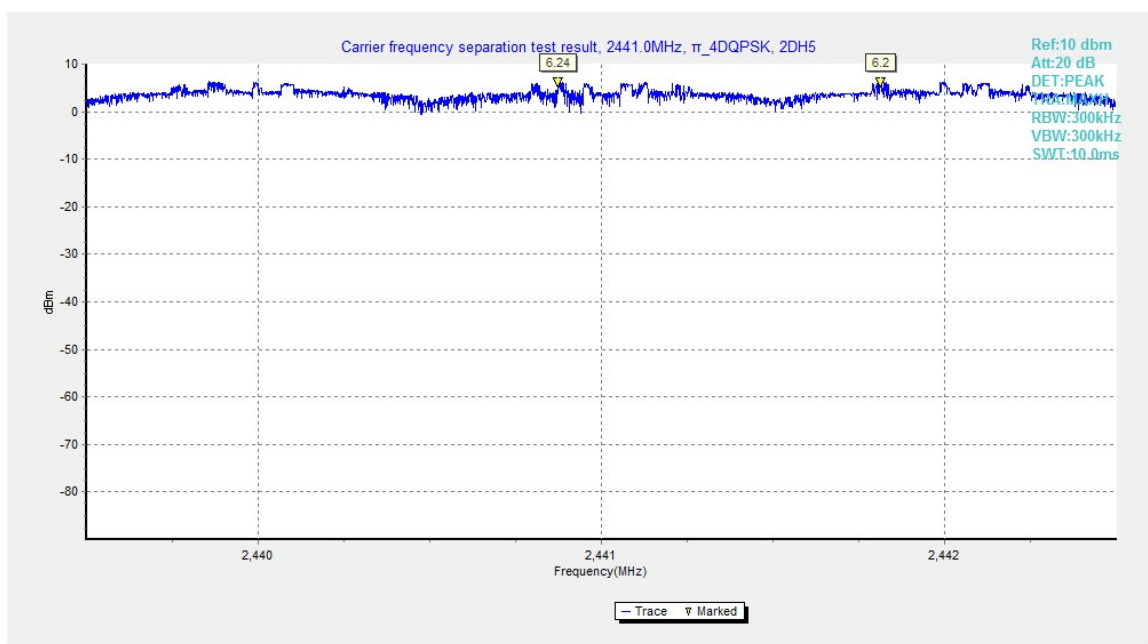
Fig.108. Carrier frequency separation measurement: π/4 DQPSK, Channel 39
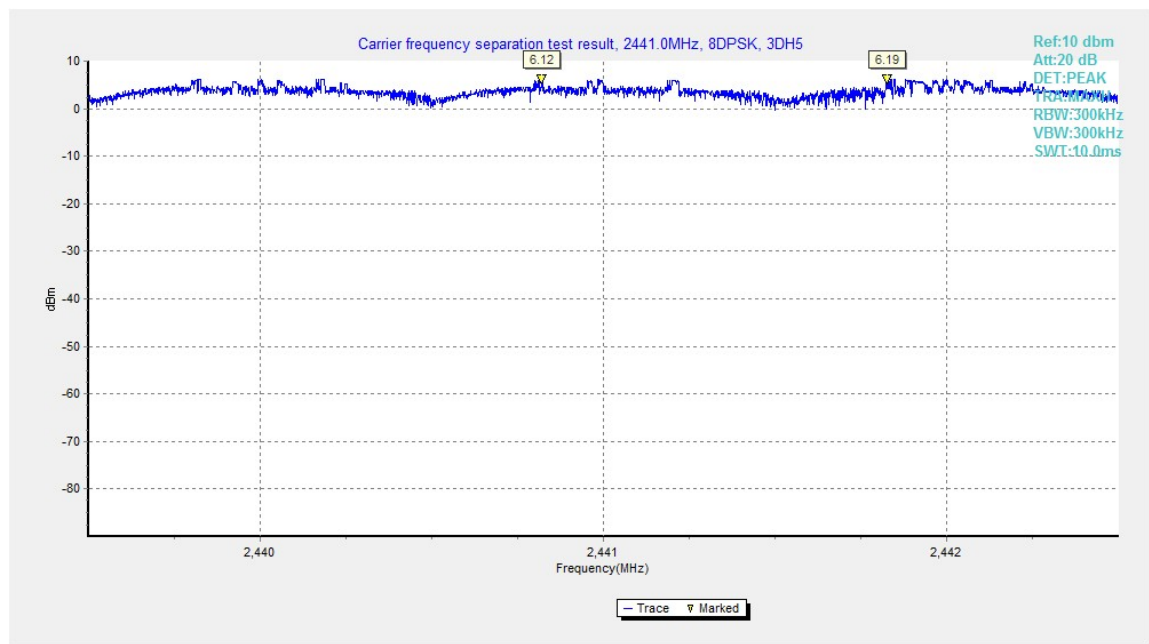
Fig.109. Carrier frequency separation measurement: 8DPSK, Channel 39

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.110	79	P
40~78	Fig.111		

Forπ/4 DQPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.112	79	P
40~78	Fig.113		

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.114	79	P
40~78	Fig.115		

Conclusion: PASS

Test graphs as below:
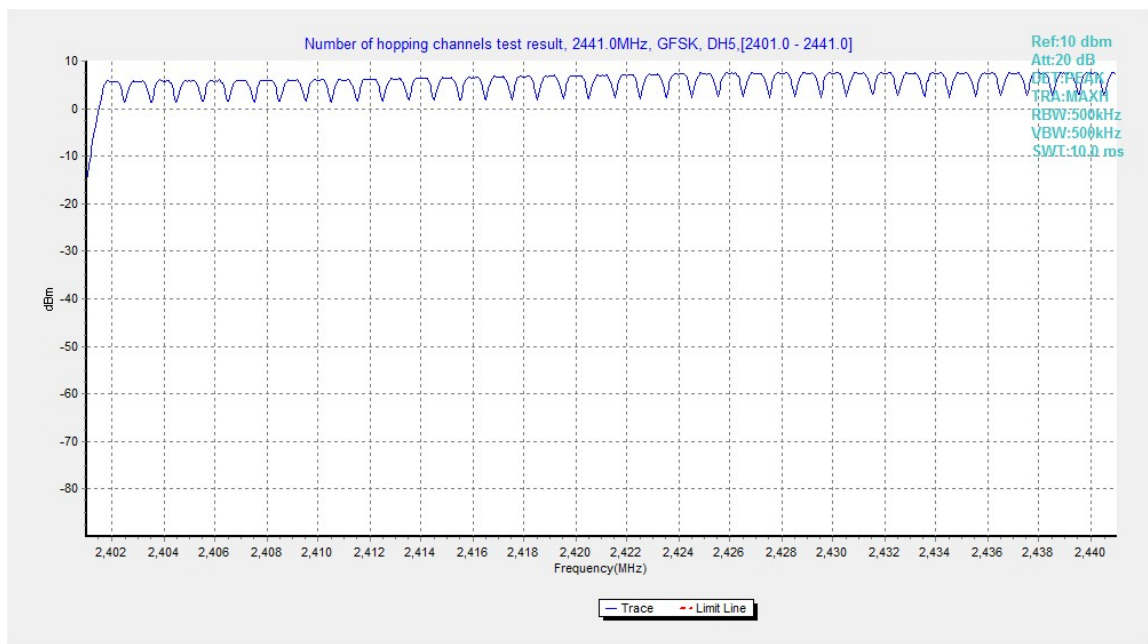
Fig.110. Number of hopping frequencies: GFSK, Channel 0 - 39
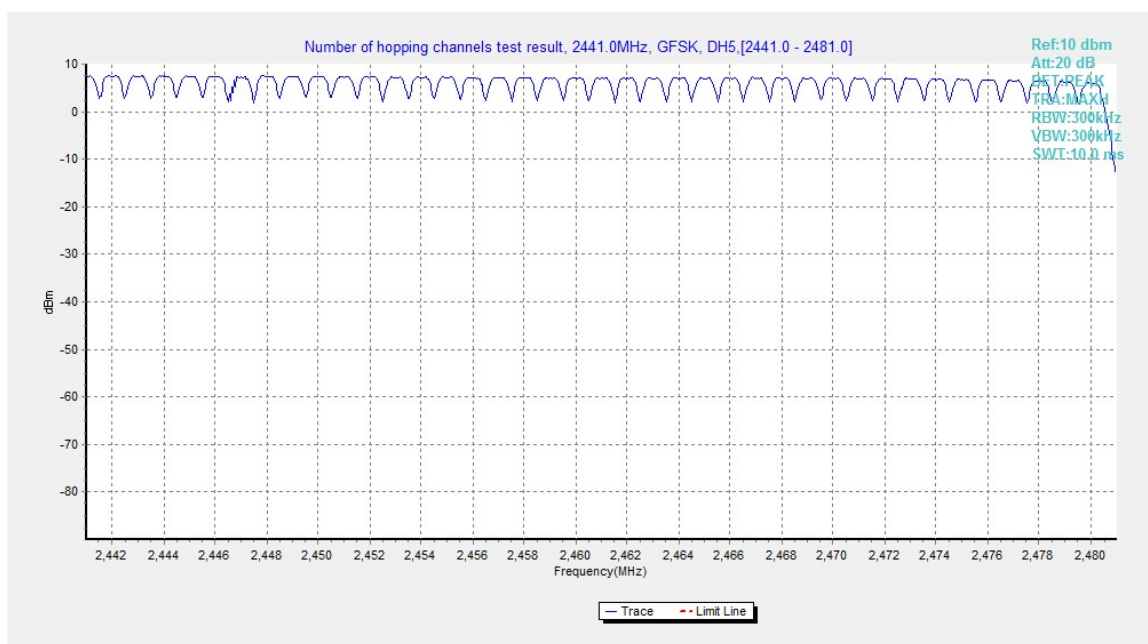
Fig.111. Number of hopping frequencies: GFSK, Channel 40 - 78
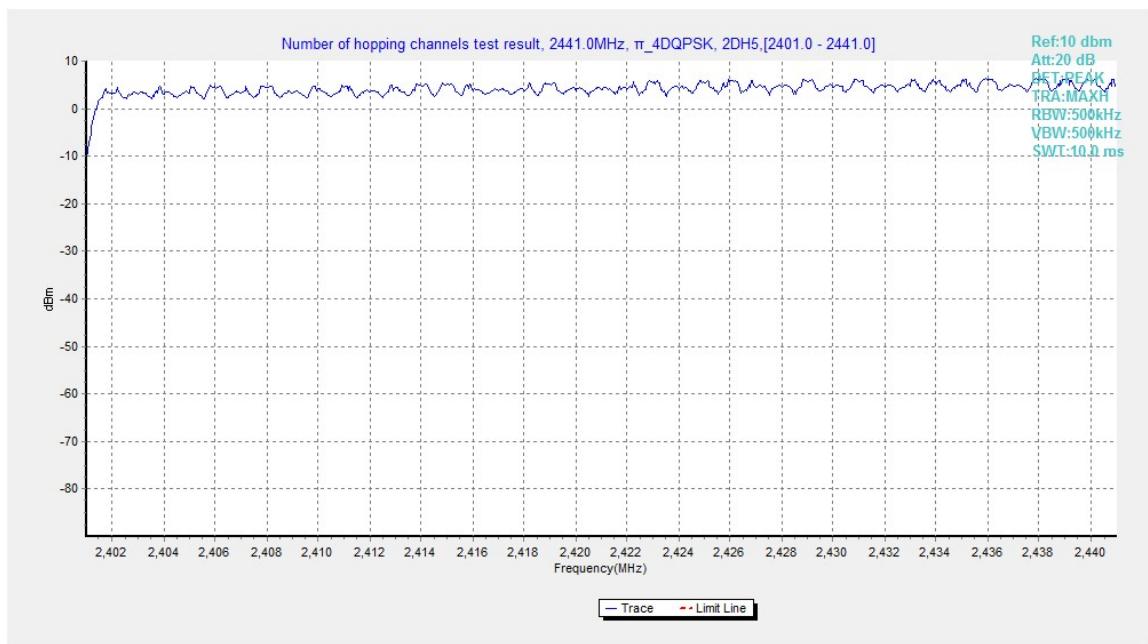
Fig.112. Number of hopping frequencies: π/4 DQPSK, Channel 0 - 39
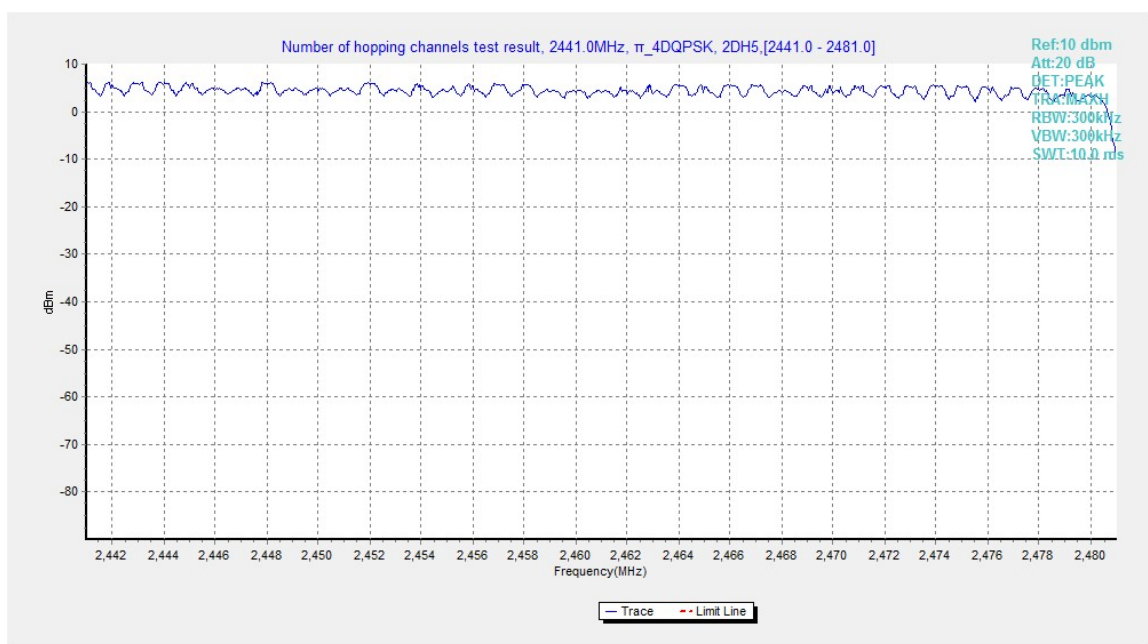
Fig.113. Number of hopping frequencies: π/4 DQPSK, Channel 40 - 78
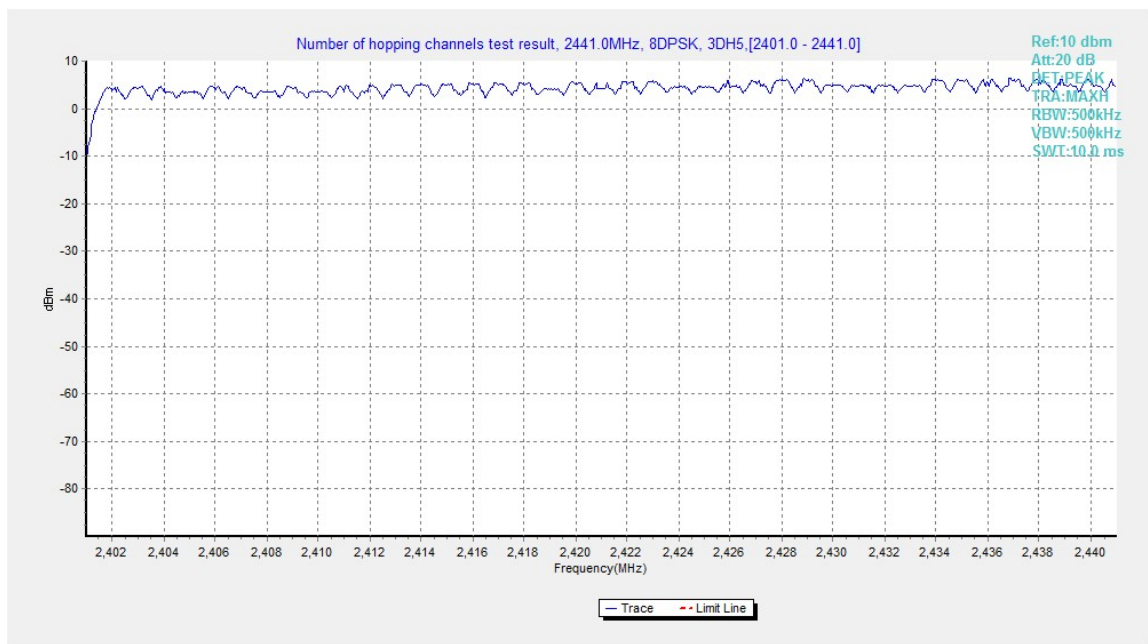
Fig.114. Number of hopping frequencies: 8DPSK, Channel 0 - 39
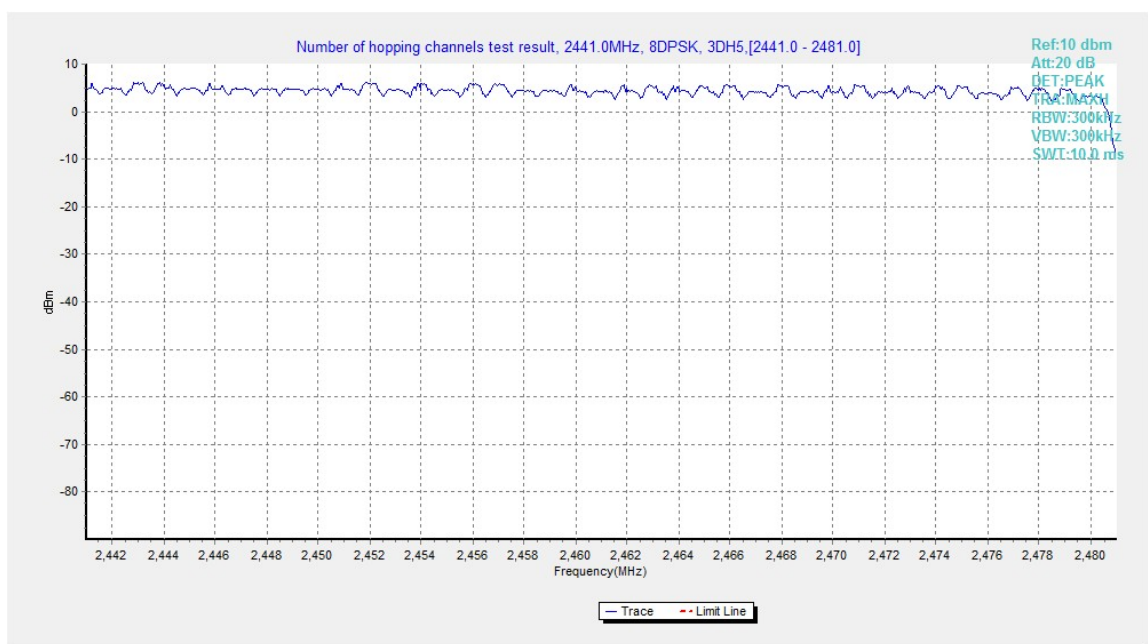
Fig.115. Number of hopping frequencies: 8DPSK, Channel 40 - 78

A.10. AC Powerline Conducted Emission

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	
0.5 to 5	56	P
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	
0.5 to 5	46	P
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: (Charger:CBA3068AGAC1)
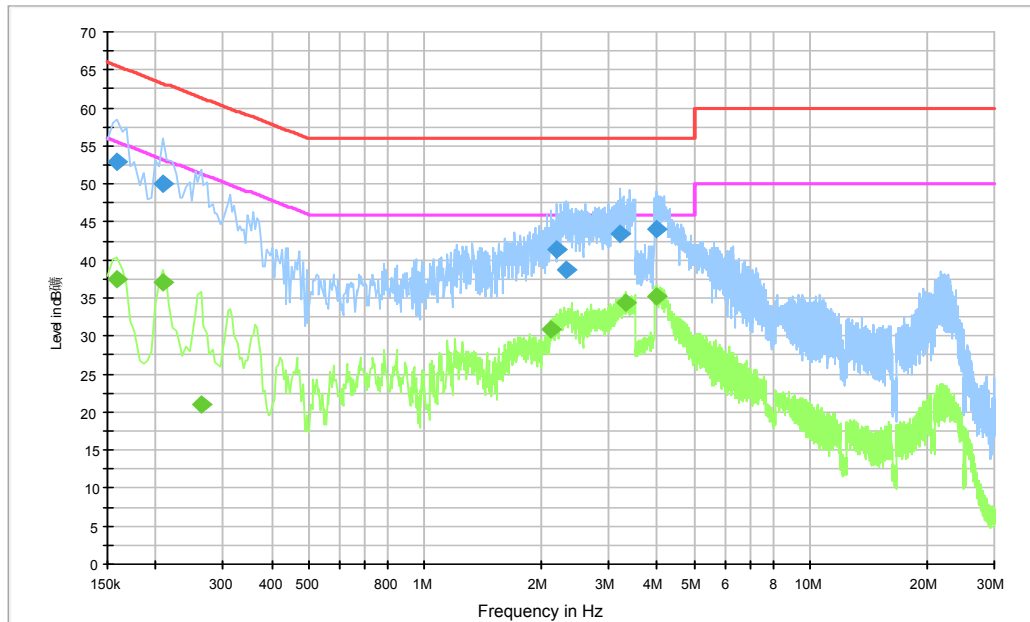
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
0.159000	52.8	GND	L1	10.3	12.7	65.5
0.208500	50.1	GND	L1	10.3	13.2	63.3
2.197500	41.4	GND	L1	10.4	14.6	56.0
2.314500	38.6	GND	L1	10.4	17.4	56.0
3.223500	43.4	GND	L1	10.4	12.6	56.0
3.975000	44.0	GND	L1	10.4	12.0	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
0.159000	37.5	GND	L1	10.3	18.0	55.5
0.208500	37.0	GND	N	10.3	16.2	53.3
0.262500	20.9	GND	N	10.3	30.4	51.4
2.121000	30.8	GND	L1	10.4	15.2	46.0
3.300000	34.3	GND	L1	10.4	11.7	46.0
3.997500	35.1	GND	L1	10.4	10.9	46.0

Idle: (Charger:CBA3068AGAC1)
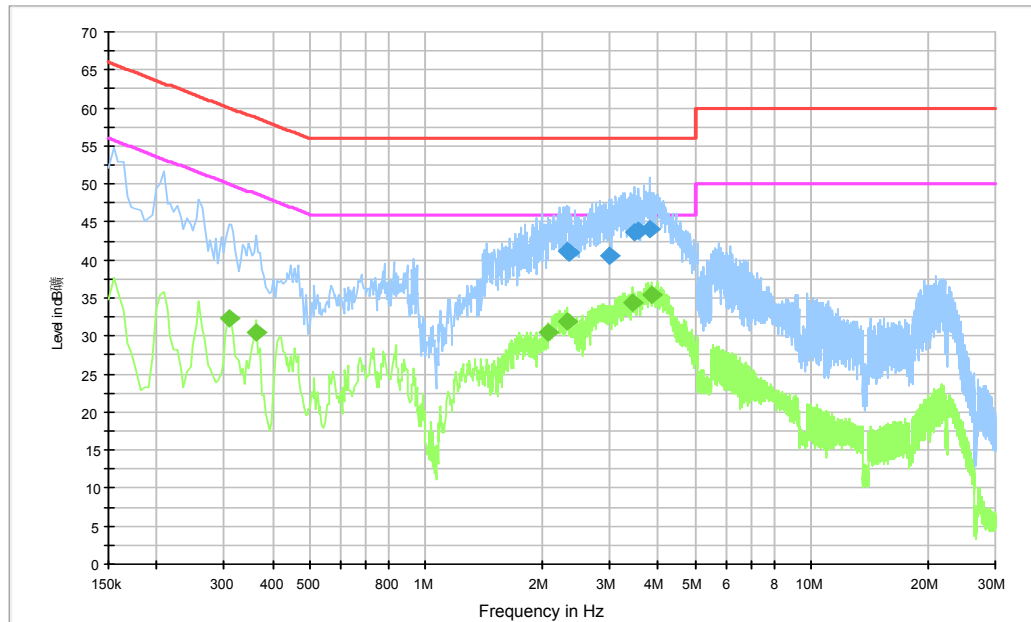
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
2.332500	41.1	GND	L1	10.4	14.9	56.0
2.359500	41.0	GND	L1	10.4	15.0	56.0
2.985000	40.6	GND	L1	10.4	15.4	56.0
3.475500	43.6	GND	L1	10.4	12.4	56.0
3.574500	43.8	GND	L1	10.4	12.2	56.0
3.799500	44.1	GND	L1	10.4	11.9	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
0.307500	32.3	GND	N	10.4	17.7	50.0
0.361500	30.5	GND	N	10.4	18.2	48.7
2.076000	30.4	GND	L1	10.4	15.6	46.0
2.323500	32.0	GND	L1	10.4	14.0	46.0
3.435000	34.3	GND	L1	10.4	11.7	46.0
3.849000	35.4	GND	L1	10.4	10.6	46.0

Traffic: (Charger: CBA3068AGAC3)
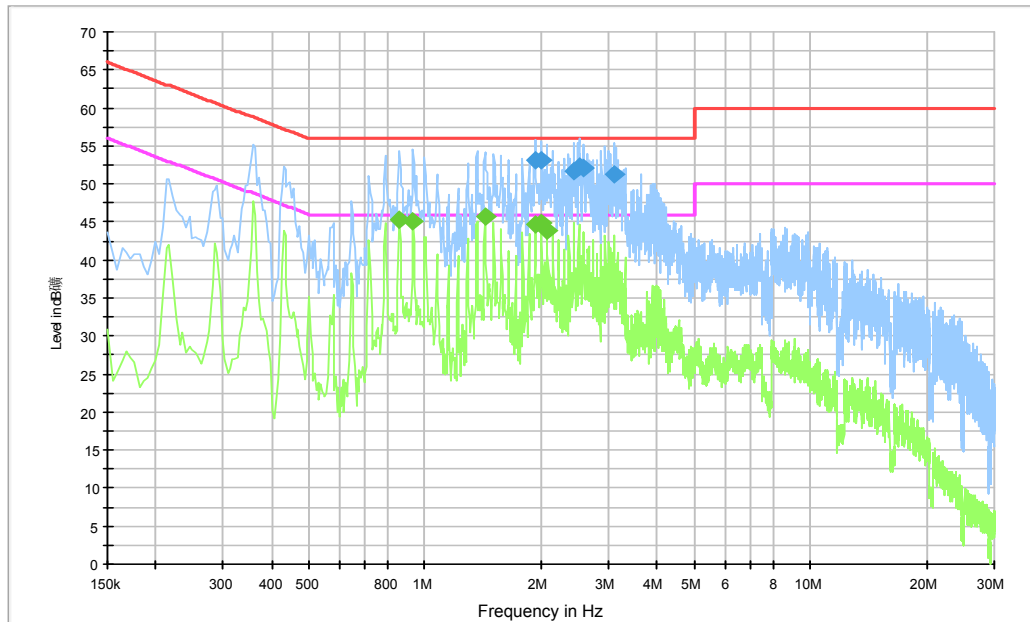
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
1.936500	53.0	GND	L1	10.4	3.0	56.0
2.008500	53.1	GND	L1	10.4	2.9	56.0
2.440500	51.6	GND	L1	10.4	4.4	56.0
2.508000	52.4	GND	L1	10.4	3.6	56.0
2.580000	52.2	GND	L1	10.4	3.9	56.0
3.084000	51.3	GND	L1	10.4	4.7	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
0.861000	45.3	GND	L1	10.3	0.7	46.0
0.933000	45.0	GND	L1	10.3	1.0	46.0
1.432500	45.8	GND	L1	10.3	0.2	46.0
1.936500	44.7	GND	L1	10.4	1.3	46.0
2.008500	44.8	GND	L1	10.4	1.2	46.0
2.080500	43.9	GND	L1	10.4	2.1	46.0

Idle: (Charger: CBA3068AGAC3)
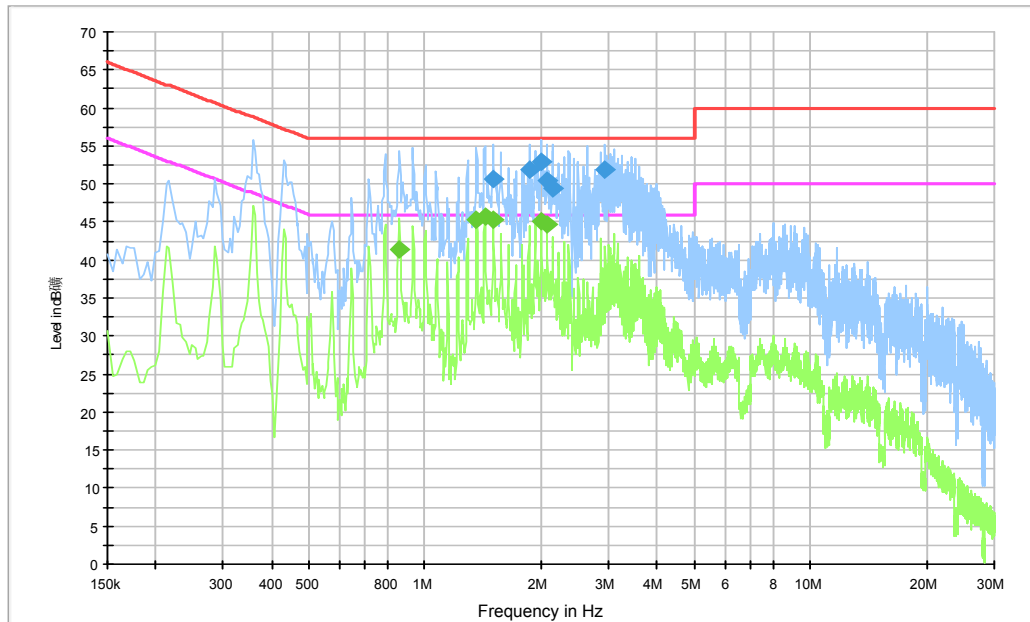
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.504500	50.6	GND	L1	10.3	5.4	56.0
1.864500	51.9	GND	L1	10.4	4.1	56.0
2.008500	52.9	GND	L1	10.4	3.1	56.0
2.071500	50.5	GND	L1	10.4	5.5	56.0
2.143500	49.3	GND	L1	10.4	6.7	56.0
2.940000	51.8	GND	L1	10.4	4.2	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.861000	41.5	GND	L1	10.3	4.5	46.0
1.360500	45.3	GND	L1	10.3	0.7	46.0
1.432500	45.7	GND	L1	10.3	0.3	46.0
1.504500	45.3	GND	L1	10.3	0.7	46.0
2.004000	45.1	GND	L1	10.4	0.9	46.0
2.076000	44.7	GND	L1	10.4	1.3	46.0

Traffic: (Charger: CBA3068AGAC4)
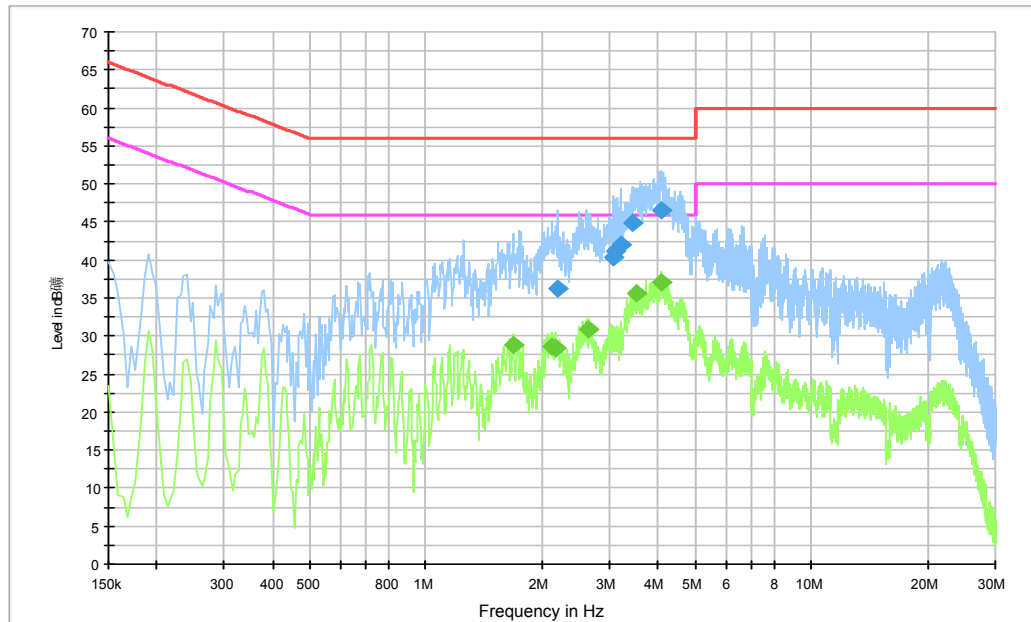
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
2.193000	36.2	GND	N	10.5	19.8	56.0
3.061500	40.3	GND	N	10.5	15.7	56.0
3.088500	41.3	GND	N	10.5	14.8	56.0
3.187500	42.0	GND	N	10.5	14.0	56.0
3.421500	44.8	GND	L1	10.4	11.2	56.0
4.096500	46.6	GND	L1	10.5	9.4	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
1.680000	28.9	GND	L1	10.3	17.1	46.0
2.121000	28.7	GND	L1	10.4	17.3	46.0
2.161500	28.4	GND	L1	10.4	17.6	46.0
2.647500	30.9	GND	L1	10.4	15.1	46.0
3.516000	35.6	GND	L1	10.4	10.4	46.0
4.096500	37.1	GND	L1	10.5	8.9	46.0

Idle: (Charger: CBA3068AGAC4)
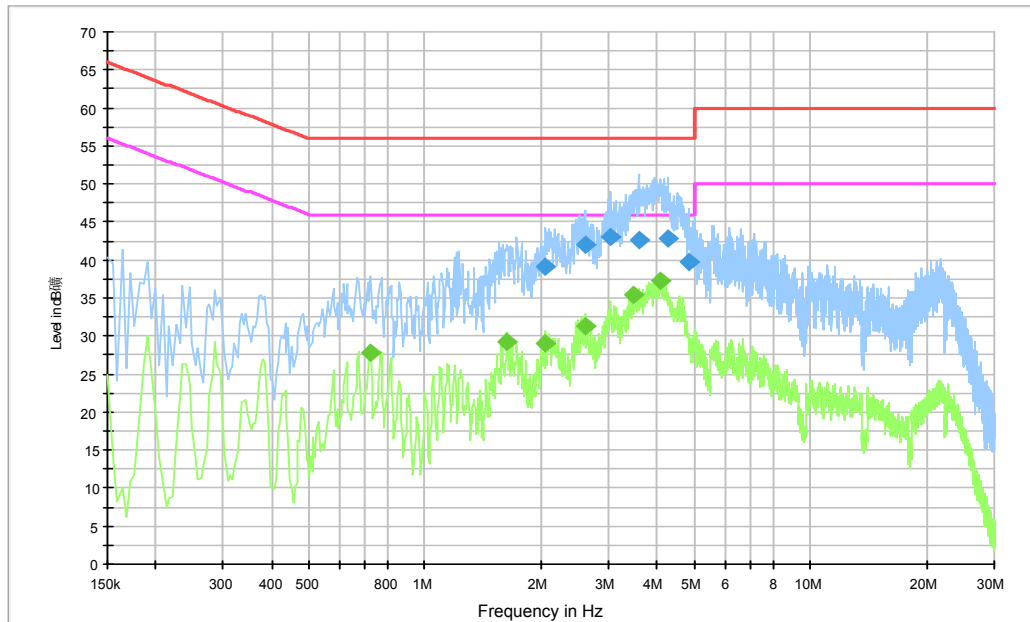
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
2.058000	39.2	GND	L1	10.4	16.8	56.0
2.593500	42.1	GND	L1	10.4	13.9	56.0
3.034500	42.9	GND	L1	10.4	13.1	56.0
3.579000	42.7	GND	N	10.5	13.3	56.0
4.276500	42.9	GND	N	10.5	13.1	56.0
4.825500	39.7	GND	N	10.6	16.3	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBμV)			(dB)	(dB)	(dBμV)
0.721500	27.7	GND	L1	10.3	18.3	46.0
1.635000	29.2	GND	L1	10.3	16.8	46.0
2.058000	29.1	GND	L1	10.4	16.9	46.0
2.593500	31.4	GND	L1	10.4	14.6	46.0
3.462000	35.4	GND	L1	10.4	10.6	46.0
4.087500	37.3	GND	L1	10.5	8.7	46.0

Traffic: (Charger: CBA0066AGAC3)
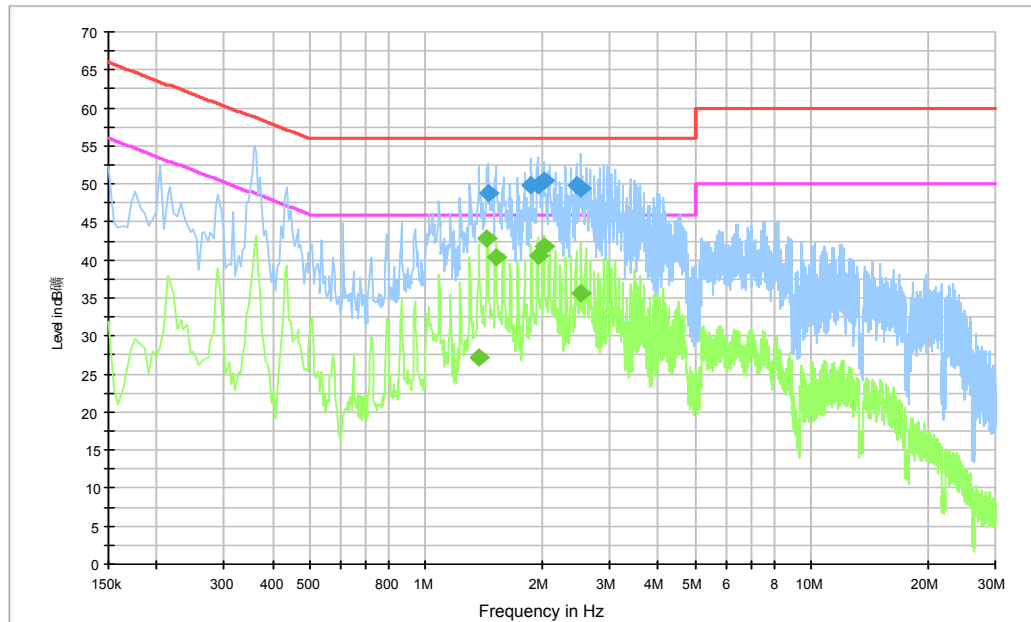
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
1.446000	48.7	GND	L1	10.3	7.3	56.0
1.873500	49.9	GND	L1	10.4	6.1	56.0
1.950000	49.7	GND	L1	10.4	6.3	56.0
2.017500	50.4	GND	L1	10.4	5.6	56.0
2.449500	49.9	GND	L1	10.4	6.1	56.0
2.526000	49.4	GND	L1	10.4	6.6	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
1.374000	27.1	GND	L1	10.3	18.9	46.0
1.441500	42.7	GND	L1	10.3	3.3	46.0
1.518000	40.3	GND	L1	10.3	5.7	46.0
1.950000	40.6	GND	L1	10.4	5.4	46.0
2.017500	41.8	GND	L1	10.4	4.2	46.0
2.526000	35.7	GND	L1	10.4	10.3	46.0

Idle: (Charger: CBA0066AGAC3)
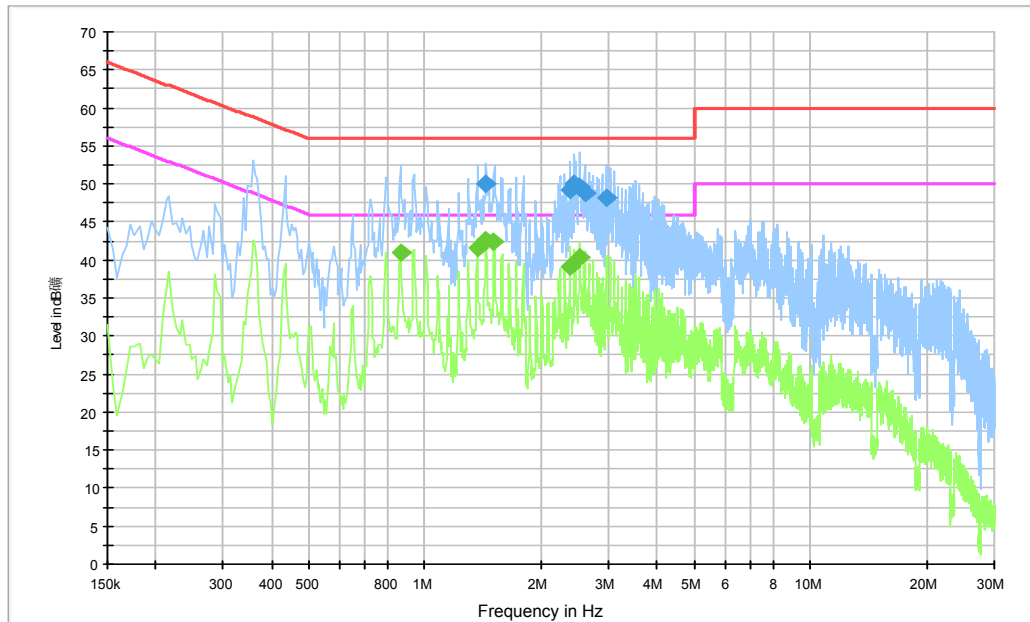
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
1.441500	50.0	GND	L1	10.3	6.0	56.0
2.377500	49.2	GND	L1	10.4	6.8	56.0
2.445000	50.0	GND	L1	10.4	6.0	56.0
2.521500	49.6	GND	L1	10.4	6.4	56.0
2.593500	48.8	GND	L1	10.4	7.2	56.0
2.953500	48.2	GND	L1	10.4	7.8	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
0.865500	41.0	GND	L1	10.3	5.0	46.0
1.369500	41.5	GND	L1	10.3	4.5	46.0
1.437000	42.6	GND	L1	10.3	3.4	46.0
1.509000	42.4	GND	L1	10.3	3.6	46.0
2.377500	39.2	GND	L1	10.4	6.8	46.0
2.521500	40.4	GND	L1	10.4	5.6	46.0

Traffic: (Charger: CBA0066AGAC1)

Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
0.222000	37.6	GND	N	10.3	25.1	62.7
1.819500	32.8	GND	L1	10.4	23.2	56.0
2.760000	35.2	GND	N	10.5	20.8	56.0
4.330500	32.6	GND	L1	10.5	23.4	56.0
4.366500	32.8	GND	L1	10.5	23.2	56.0
4.483500	34.1	GND	L1	10.5	21.9	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
0.429000	28.1	GND	L1	10.3	19.1	47.3
0.433500	27.7	GND	L1	10.3	19.5	47.2
1.837500	22.1	GND	L1	10.4	23.9	46.0
2.166000	23.2	GND	L1	10.4	22.8	46.0
2.782500	25.3	GND	L1	10.4	20.7	46.0
4.582500	26.2	GND	L1	10.5	19.8	46.0

Idle: (Charger: CBA0066AGAC1)
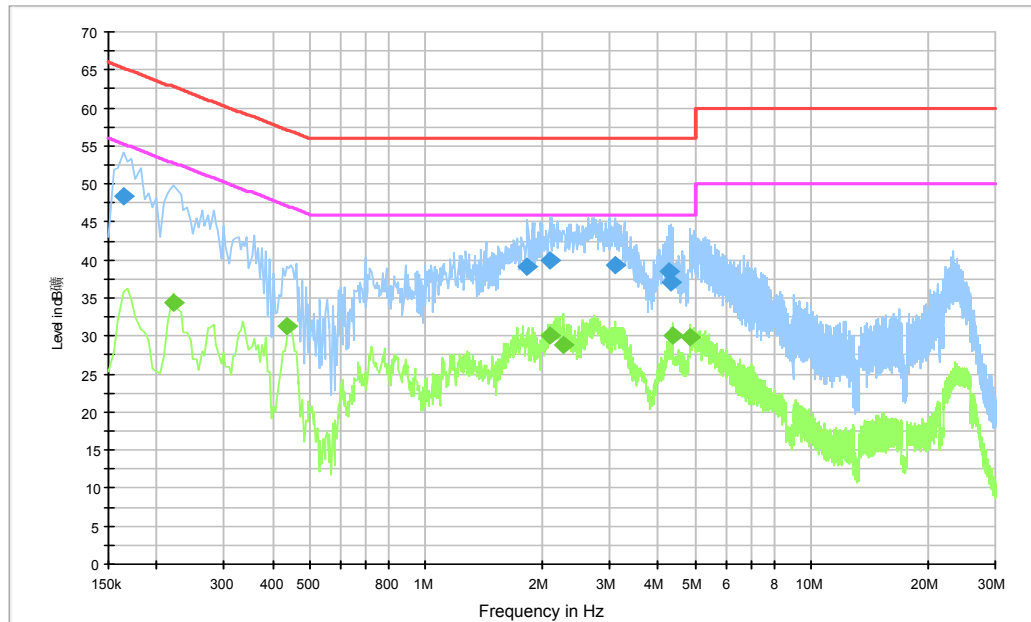
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.163500	48.4	GND	L1	10.3	16.9	65.3
1.837500	39.2	GND	L1	10.4	16.8	56.0
2.098500	40.0	GND	L1	10.4	16.0	56.0
3.079500	39.3	GND	L1	10.4	16.7	56.0
4.272000	38.4	GND	L1	10.5	17.6	56.0
4.312500	37.0	GND	L1	10.5	19.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	34.4	GND	N	10.3	18.4	52.7
0.438000	31.2	GND	N	10.4	15.9	47.1
2.089500	30.0	GND	L1	10.4	16.0	46.0
2.265000	28.7	GND	L1	10.4	17.3	46.0
4.380000	30.1	GND	L1	10.5	15.9	46.0
4.857000	29.9	GND	L1	10.5	16.1	46.0

Traffic: (Charger: CBA0066AGAC5)
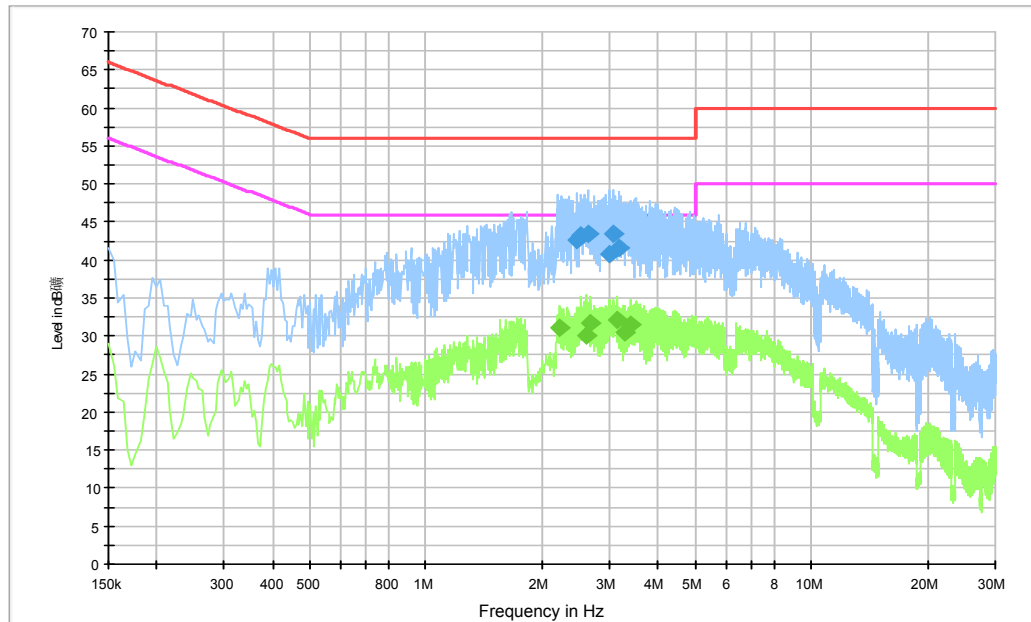
Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
2.472000	42.7	GND	L1	10.4	13.3	56.0
2.530500	43.2	GND	L1	10.4	12.8	56.0
2.625000	43.4	GND	L1	10.4	12.6	56.0
2.998500	40.7	GND	L1	10.4	15.3	56.0
3.057000	43.4	GND	L1	10.4	12.6	56.0
3.156000	41.6	GND	L1	10.4	14.4	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
2.224500	31.1	GND	L1	10.4	14.9	46.0
2.616000	30.1	GND	L1	10.4	15.9	46.0
2.683500	31.7	GND	L1	10.4	14.3	46.0
3.133500	32.0	GND	L1	10.4	14.0	46.0
3.291000	30.5	GND	L1	10.4	15.5	46.0
3.408000	31.6	GND	L1	10.4	14.4	46.0

Idle: (Charger: CBA0066AGAC5)
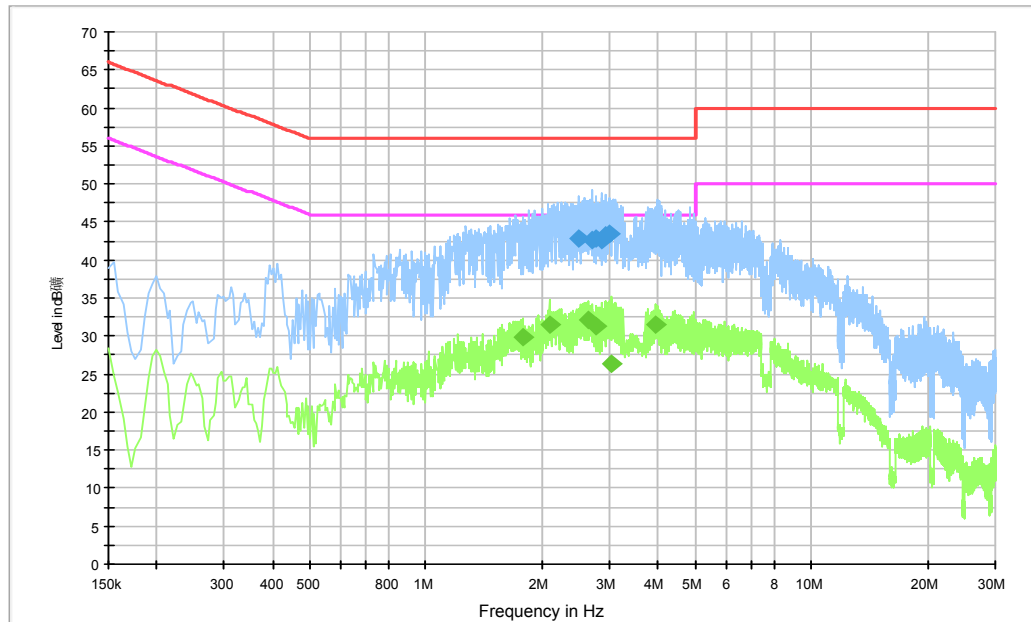
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
2.490000	42.8	GND	L1	10.4	13.2	56.0
2.701500	42.5	GND	L1	10.4	13.5	56.0
2.751000	42.9	GND	L1	10.4	13.1	56.0
2.859000	42.6	GND	L1	10.4	13.4	56.0
2.935500	43.3	GND	L1	10.4	12.7	56.0
2.976000	43.5	GND	L1	10.4	12.5	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.788000	29.9	GND	L1	10.4	16.1	46.0
2.089500	31.5	GND	L1	10.4	14.5	46.0
2.634000	32.1	GND	L1	10.4	13.9	46.0
2.751000	31.2	GND	L1	10.4	14.8	46.0
3.043500	26.4	GND	L1	10.4	19.6	46.0
3.925500	31.6	GND	L1	10.4	14.4	46.0

END OF REPORT