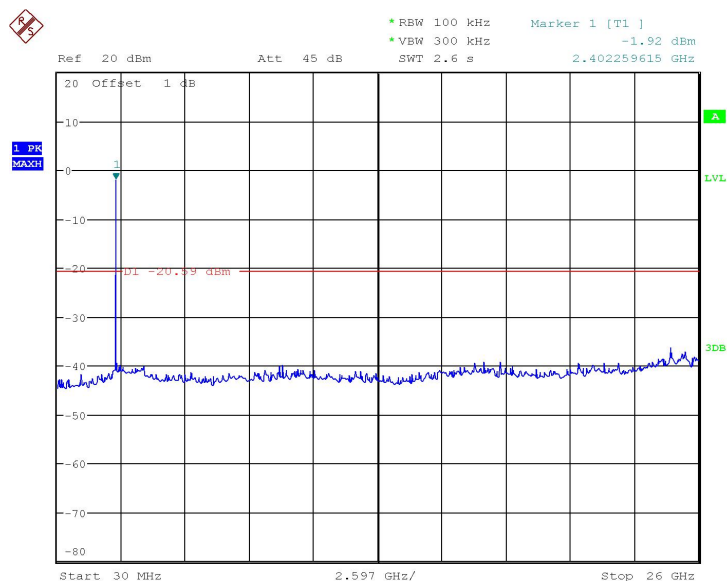
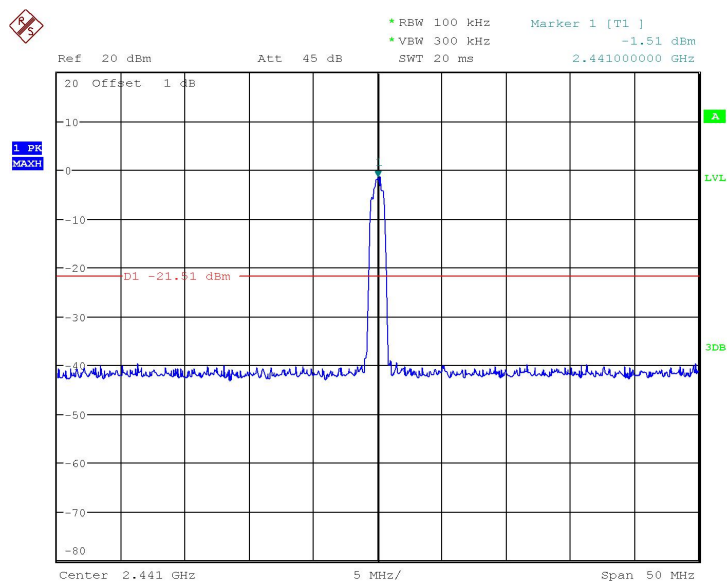




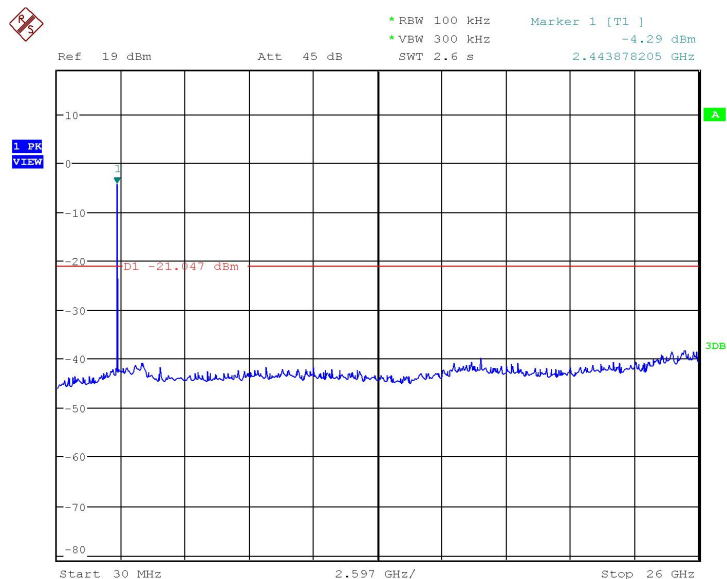
Date: 2.JAN.2019 05:07:34

Fig.35 Conducted spurious emission: 8DPSK, Ch0, 30MHz~26GHz



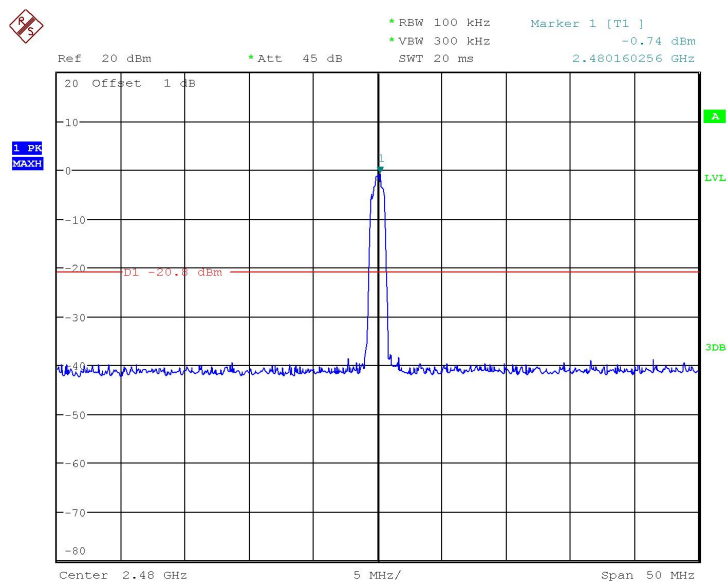
Date: 2.JAN.2019 05:04:40

Fig.36 Conducted spurious emission: 8DPSK, Ch39, 2441MHz



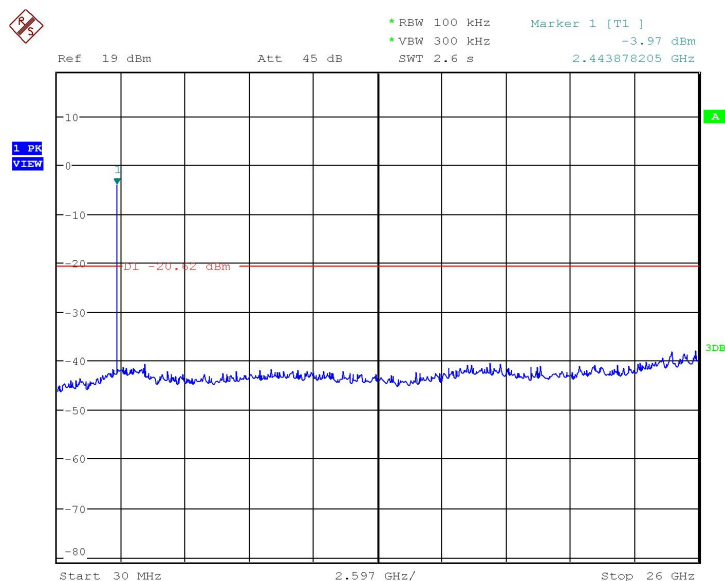
Date: 17.DEC.2018 11:08:52

Fig.37 Conducted spurious emission: 8DPSK, Ch39, 30MHz~26GHz



Date: 19.DEC.2018 08:42:20

Fig.38 Conducted spurious emission: 8DPSK, Ch78, 2480MHz



Date: 17.DEC.2018 11:10:42

Fig.39 Conducted spurious emission: 8DPSK, Ch78, 30MHz~26GHz

6.4. Radiated Emission

6.4.1 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)).

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

Measurement Uncertainty

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	$\pm 5.66\text{db}$

Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	$\pm 4.98\text{db}$
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	$\pm 5.06\text{db}$
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	$\pm 5.20\text{db}$

6.4.2 Test Method

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane.⁴⁵ For emission measurements above 1 GHz, the table height shall be 1.5 m but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/3MHz	15
4000~18000	1MHz/3MHz	40
18000~26500	1MHz/3MHz	20

6.4.3 Measurement Results:

A “reference path loss” is established and A_{Rpi} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

A_{Rpi} = Cable loss + Antenna Gain-Preamplifier gain

Result= P_{Mea} + A_{Rpi}

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.40	P
	1GHz~3GHz	Fig.41	P
	3GHz~18GHz	Fig.42	P
Power(low)	2.31GHz~2.5GHz	Fig.43	P
Power(high)	2.31GHz~2.5GHz	Fig.44	P

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.45	P
	1GHz~3GHz	Fig.46	P
	3GHz~18GHz	Fig.47	P
Power(low)	2.31GHz~2.5GHz	Fig.48	P
Power(high)	2.31GHz~2.5GHz	Fig.49	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.50	P
	1GHz~3GHz	Fig.51	P
	3GHz~18GHz	Fig.52	P
Power(low)	2.31GHz~2.5GHz	Fig.53	P
Power(high)	2.31GHz~2.5GHz	Fig.54	P

GFSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
56.3	24.22	-21.3	45.52	V
100.0	29.31	-23.5	52.81	V
187.2	36.05	-24.8	60.85	H
252.0	39.1	-22.8	61.9	H
396.0	40.15	-19.3	59.45	H

684.0	40.97	-12.9	53.87	H
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GFSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2583.2	53.96	7.3	46.66	H
2685.7	54.49	7.8	46.69	V
2791.6	54.23	7.8	46.43	V
2849.0	54.98	8.3	46.68	H
2911.8	54.88	8.8	46.08	V
2969.8	55.45	8.8	46.65	H

GFSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2685.7	42.42	7.8	34.62	V
2791.6	42.6	7.8	34.8	V
2849.0	42.76	8.3	34.46	H
2911.8	43.33	8.8	34.53	V
2969.8	43.42	8.8	34.62	H

GFSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14298.6	54.78	20.8	33.98	H
14687.6	55.25	21	34.25	H
15305.6	55.39	21.6	33.79	V
16063.0	59.25	25.1	34.15	H
16781.4	59.21	26.9	32.31	H
17421.5	59.53	26.7	32.83	H

GFSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
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14298.6	42.66	20.8	21.86	H
14687.6	43.22	21	22.22	H
15305.6	42.96	21.6	21.36	V
16063.0	47.11	25.1	22.01	H
16781.4	47.23	26.9	20.33	H
17421.5	46.85	26.7	20.15	H

 $\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
44.9	25.03	-20.2	45.23	V
216.0	35.81	-24.2	60.01	H
324.0	38.2	-21.1	59.3	H
372.0	29.63	-19.9	49.53	H
684.0	39.33	-12.9	52.23	H
828.0	37.32	-10.8	48.12	H

 $\pi/4$ DQPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2579.1	53.85	7.3	46.55	V
2655.7	55.49	7.7	47.79	V
2726.7	54.66	7.8	46.86	V
2841.5	54.87	8.2	46.67	H
2894.9	55.1	8.8	46.3	H
2942.2	55.68	8.7	46.98	V

 $\pi/4$ DQPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2655.7	42.62	7.7	34.92	V
2726.7	42.42	7.8	34.62	V

2841.5	42.82	8.2	34.62	H
2894.9	43.47	8.8	34.67	H
2942.2	43.5	8.7	34.8	V

 $\pi/4$ DQPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13768.0	53.43	18.2	35.23	V
14310.0	54.43	20.7	33.73	H
15191.2	55.27	21.1	34.17	H
16000.8	60.09	25.4	34.69	H
16840.2	60.23	27.3	32.93	H
17606.3	59.78	27.7	32.08	H

 $\pi/4$ DQPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14310.0	42.58	20.7	21.88	H
15191.2	42.95	21.1	21.85	H
16000.8	47.43	25.4	22.03	H
16840.2	47.67	27.3	20.37	H
17606.3	48.01	27.7	20.31	H

8DPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
45.0	28.12	-20.2	48.32	V
129.9	29.26	-27.1	56.36	H
252.0	36.9	-22.8	59.7	H
377.7	31.71	-19.7	51.41	H
684.0	39.66	-12.9	52.56	H
816.8	33.52	-10.7	44.22	V

8DPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2651.2	53.78	7.7	46.08	V
2718.1	54.19	7.8	46.39	V
2807.7	55.39	7.9	47.49	V
2855.6	55.85	8.4	47.45	V
2912.4	55.83	8.8	47.03	H
2950.1	55.01	8.6	46.41	H

8DPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2718.1	42.27	7.8	34.47	V
2807.7	42.68	7.9	34.78	V
2855.6	42.94	8.4	34.54	V
2912.4	43.27	8.8	34.47	H
2950.1	43.27	8.6	34.67	H

8DPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14277.5	54.34	20.4	33.94	V
15396.1	55.47	22.7	32.77	H
15942.3	58.05	24.7	33.35	H
16678.5	58.06	25.8	32.26	V
17127.2	59.87	27	32.87	V
17715.4	59.3	27.4	31.9	H

8DPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14277.5	42.15	20.4	21.75	V

15396.1	43.66	22.7	20.96	H
15942.3	46.16	24.7	21.46	H
16678.5	46.2	25.8	20.4	V
17127.2	47.24	27	20.24	V
17715.4	47.19	27.4	19.79	H

Note: Only the worst case is written in the report.

Conclusion: PASS

Test graphs as below:

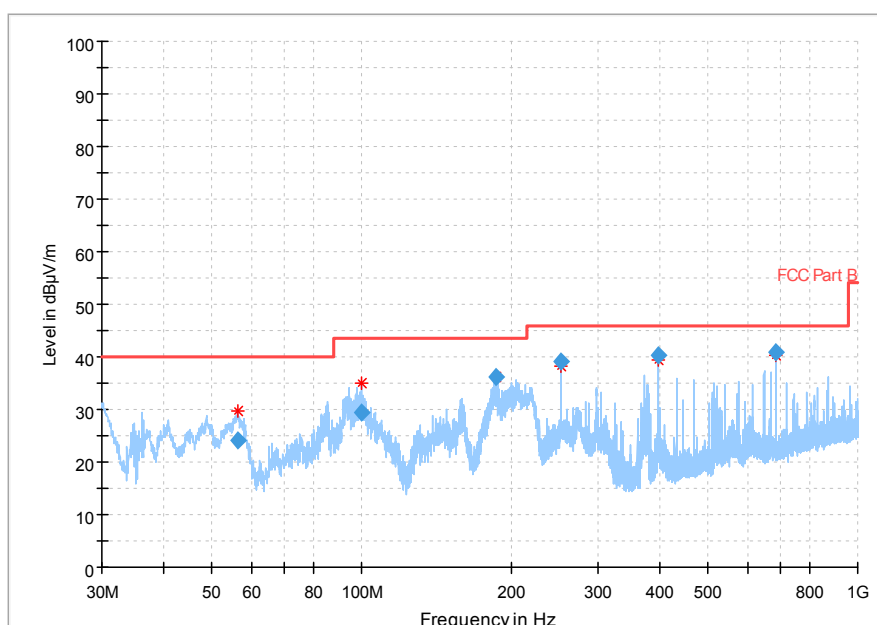


Fig.40 Radiated emission: GFSK, Ch0, 30MHz~1GHz

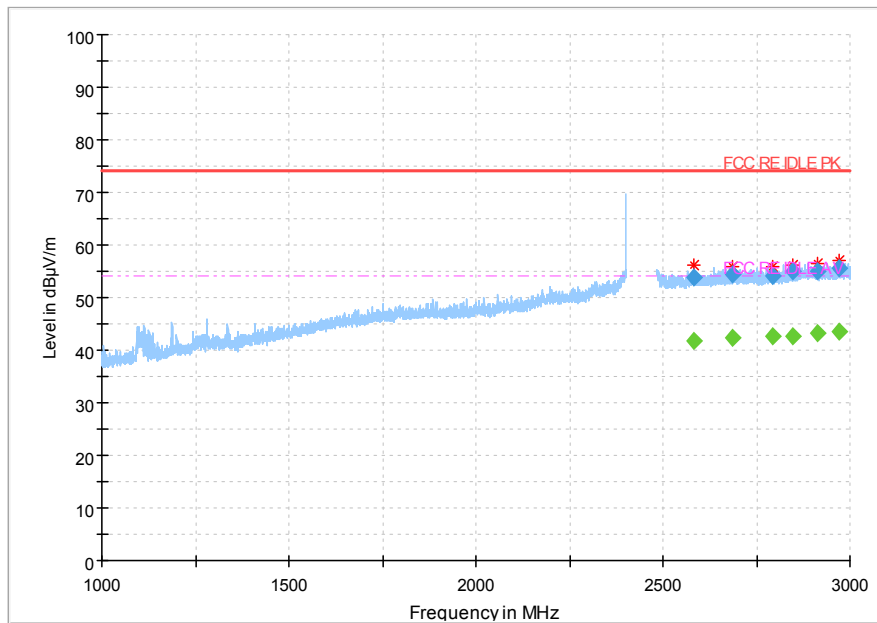


Fig.41 Radiated emission: GFSK, Ch0, 1GHz~3GHz

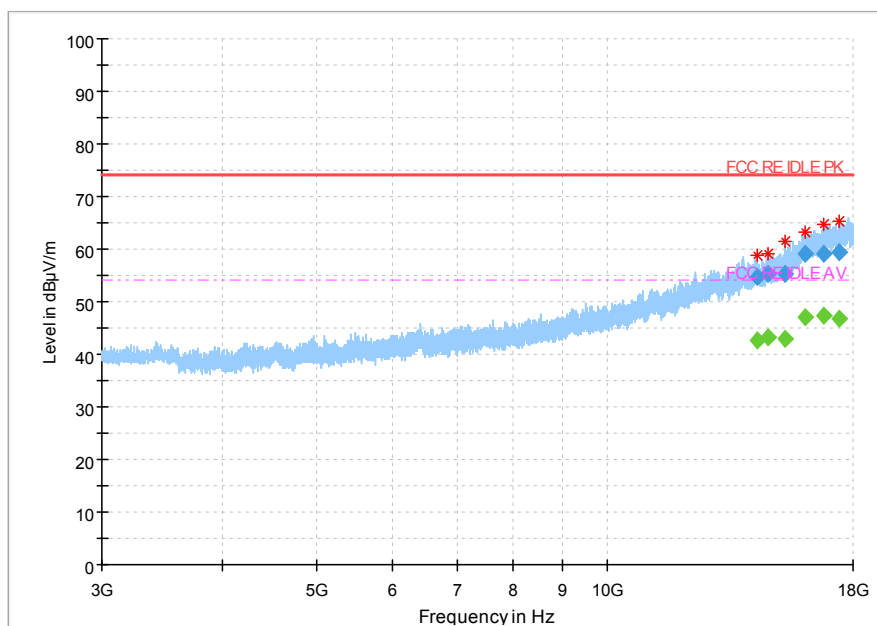
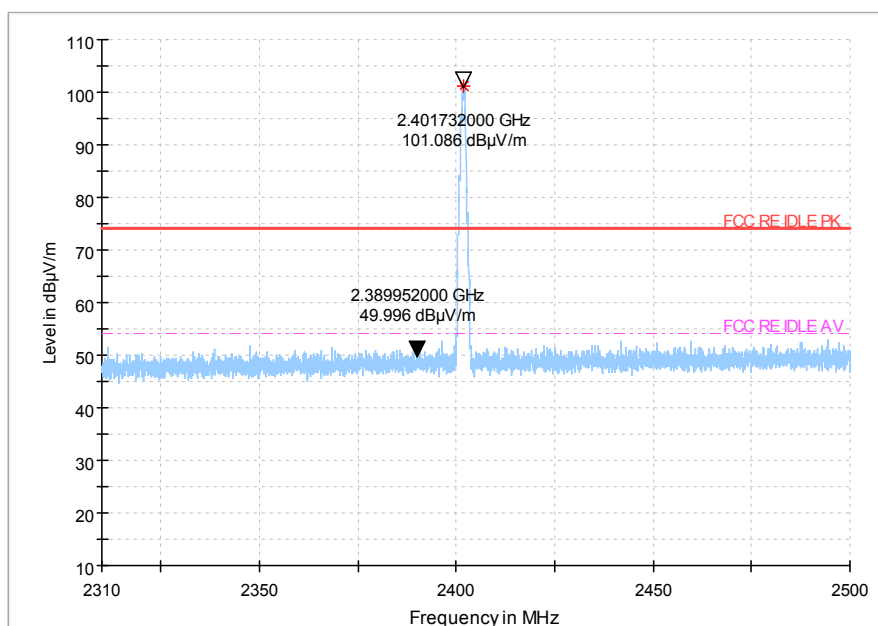
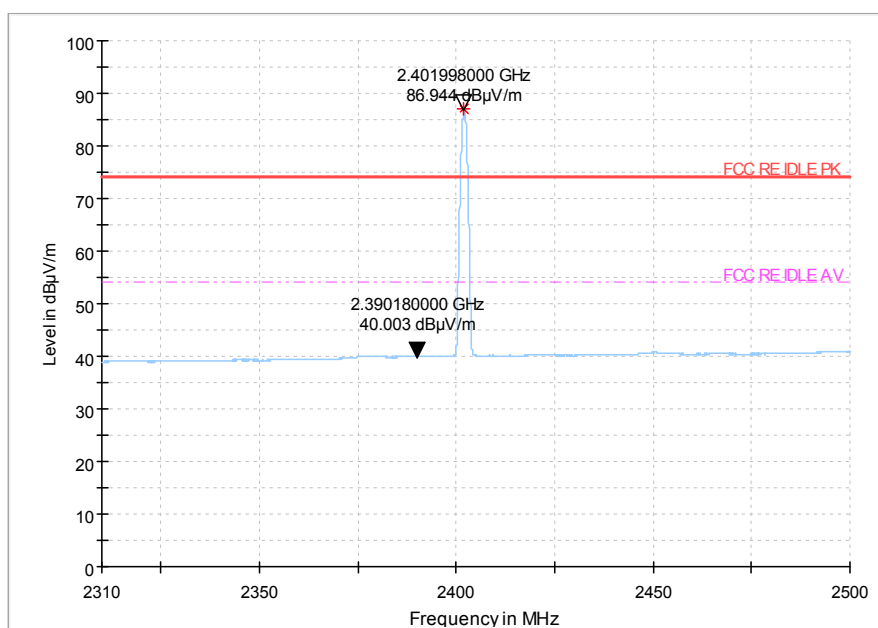


Fig.42 Radiated emission: GFSK, Ch0, 3GHz~18GHz

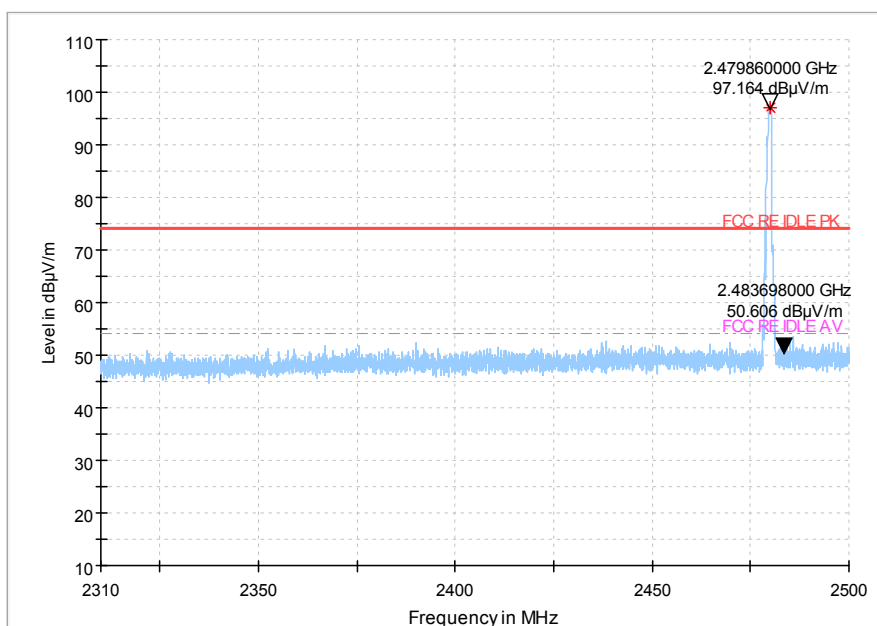


Peak

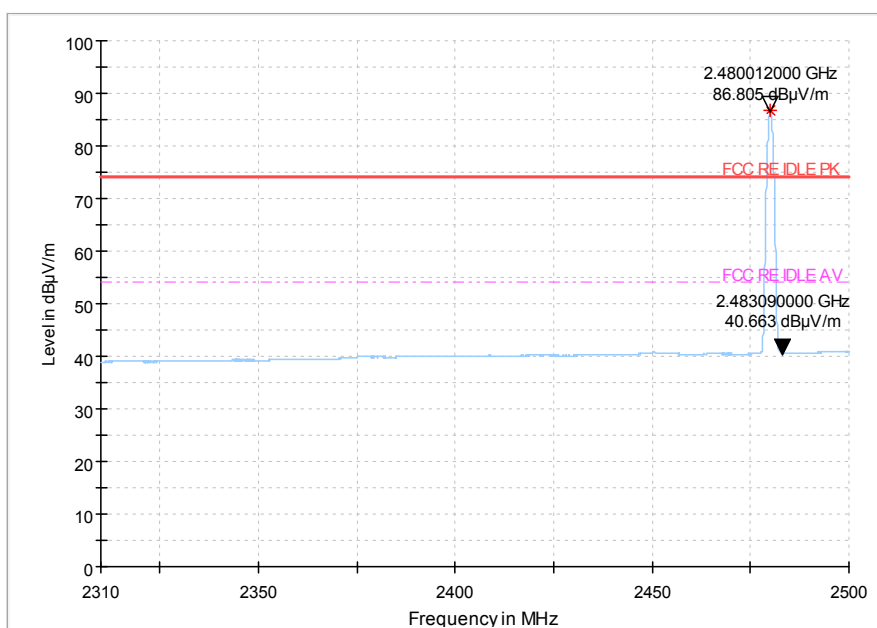


Average

Fig.43 Radiated emission (Power): GFSK, low channel



Peak



Average

Fig.44 Radiated emission (Power): GFSK, high channel

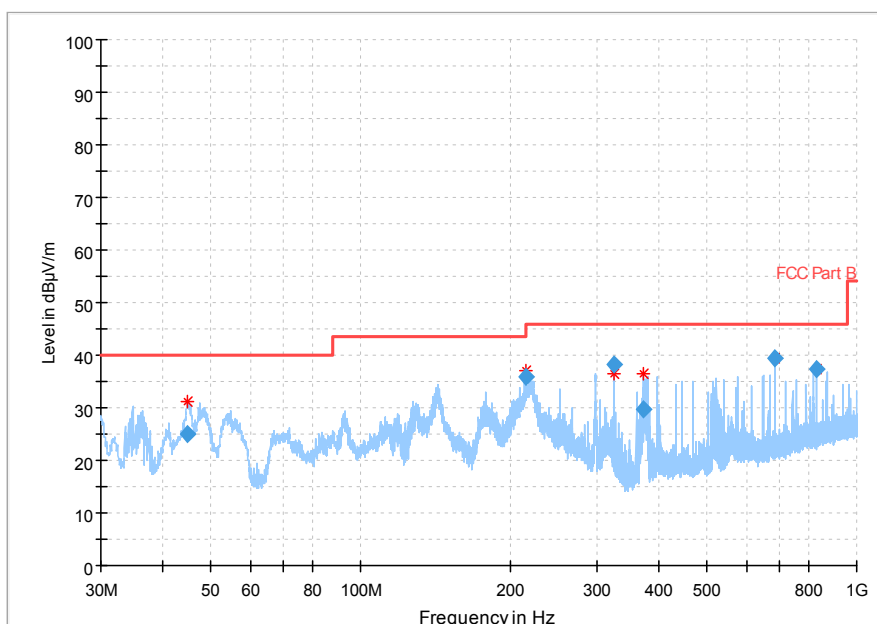


Fig.45 Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz

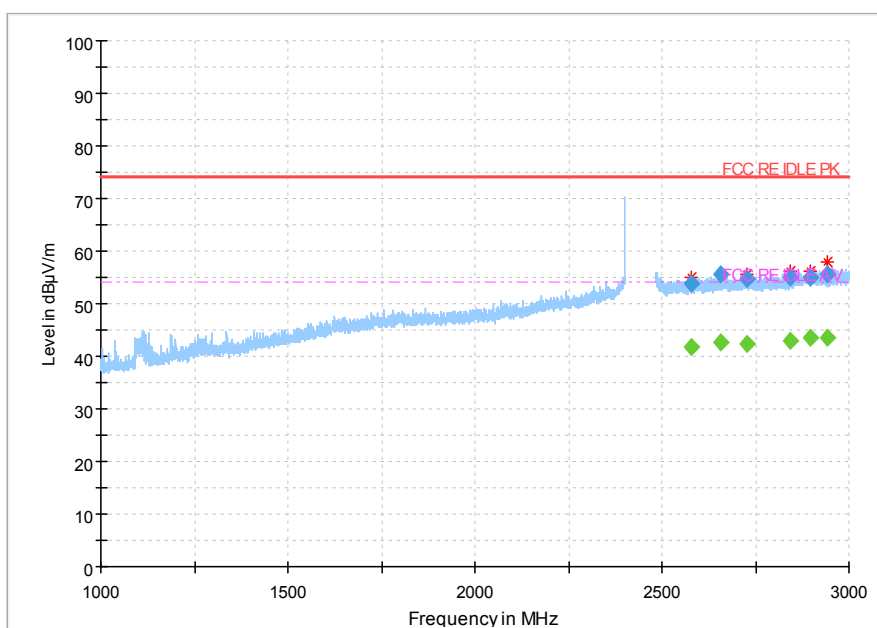


Fig.46 Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz

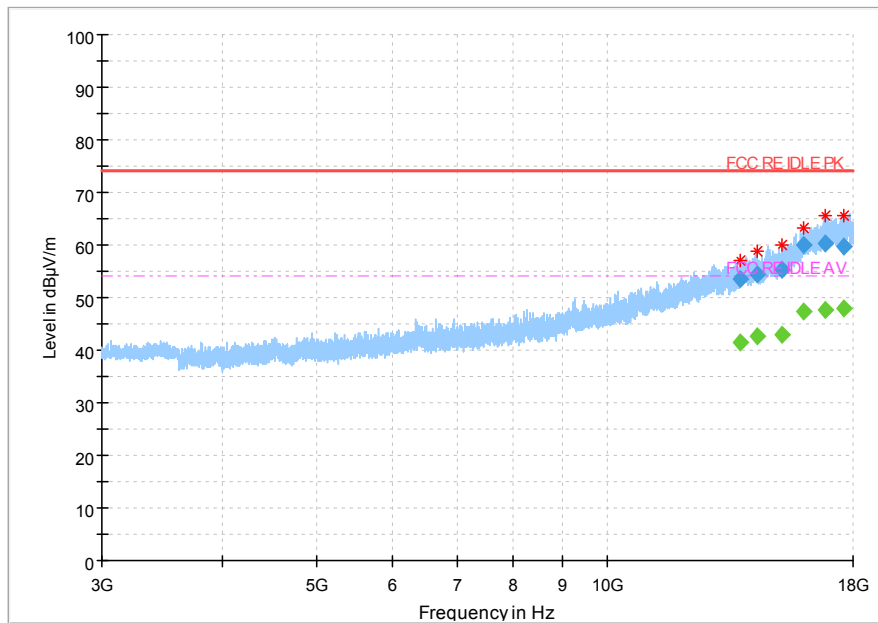
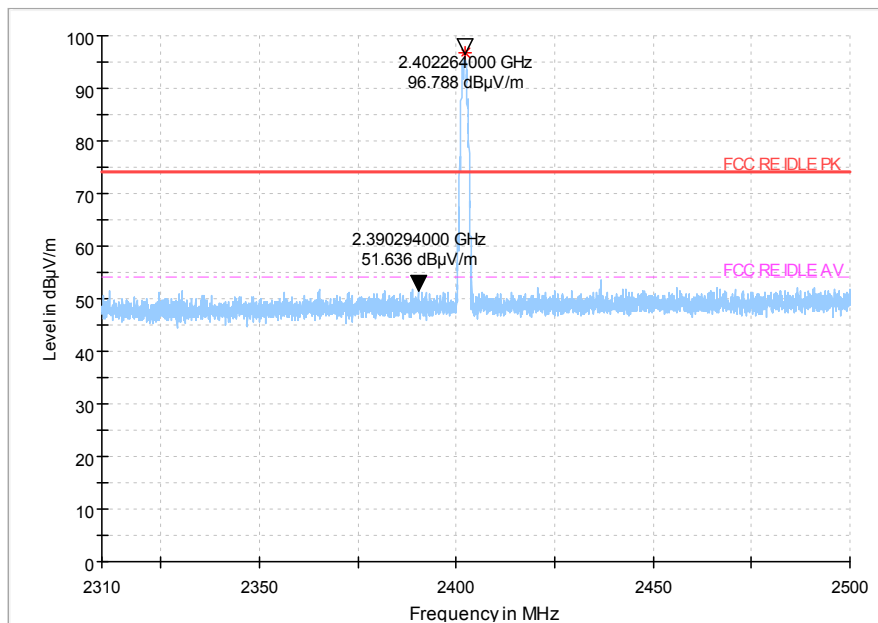
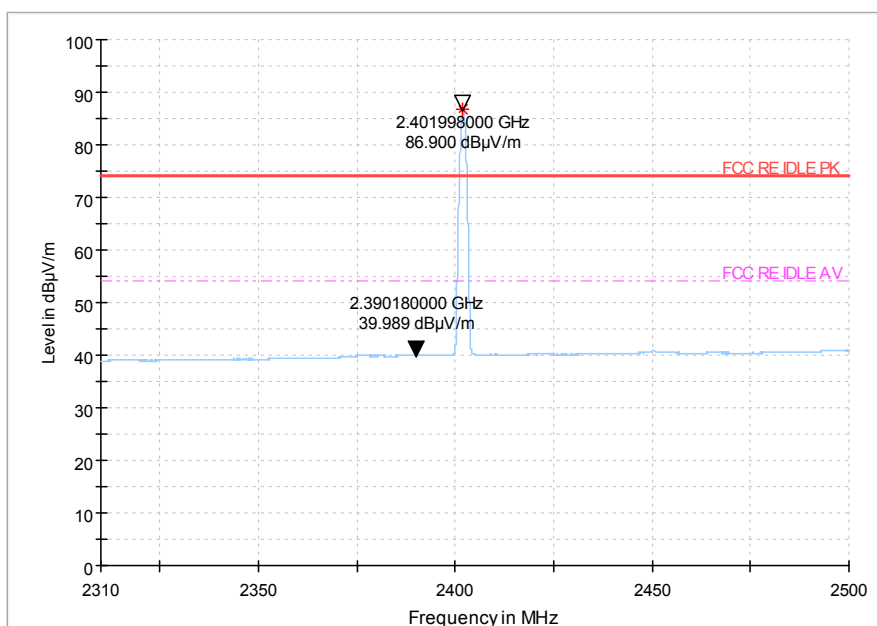


Fig.47 Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz

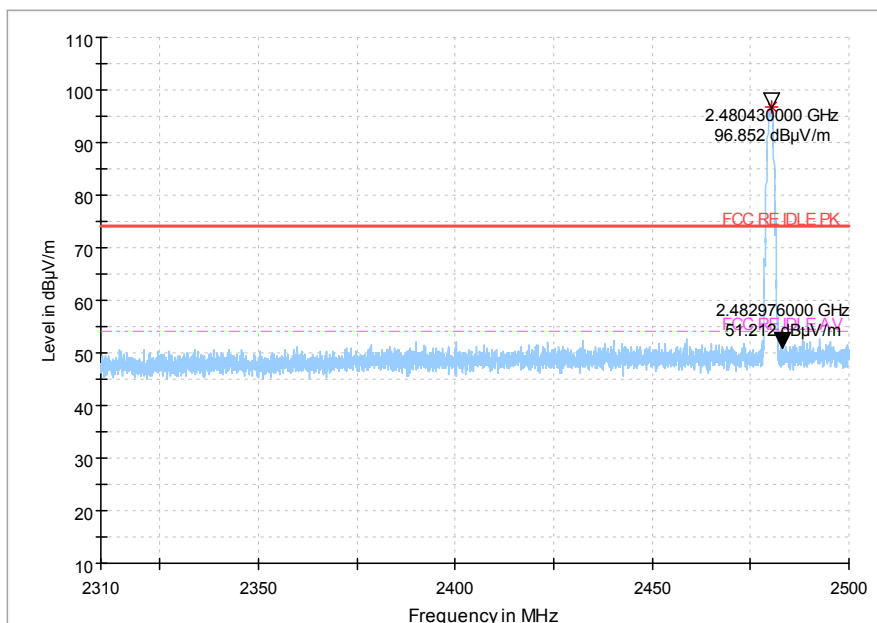


Peak

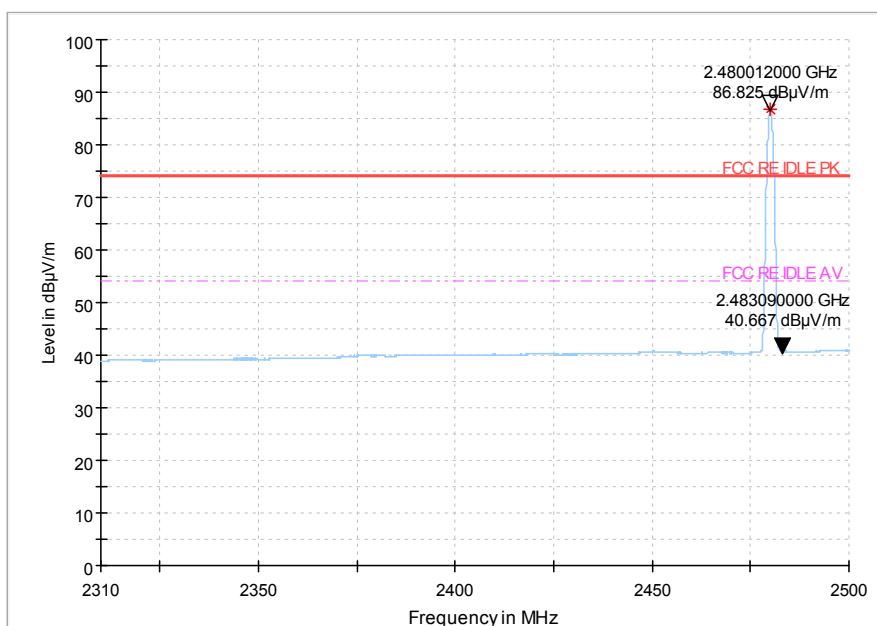


Average

Fig.48 Radiated emission (Power): $\pi/4$ DQPSK, low channel



Peak



Average

Fig.49 Radiated emission (Power): $\pi/4$ DQPSK, high channel

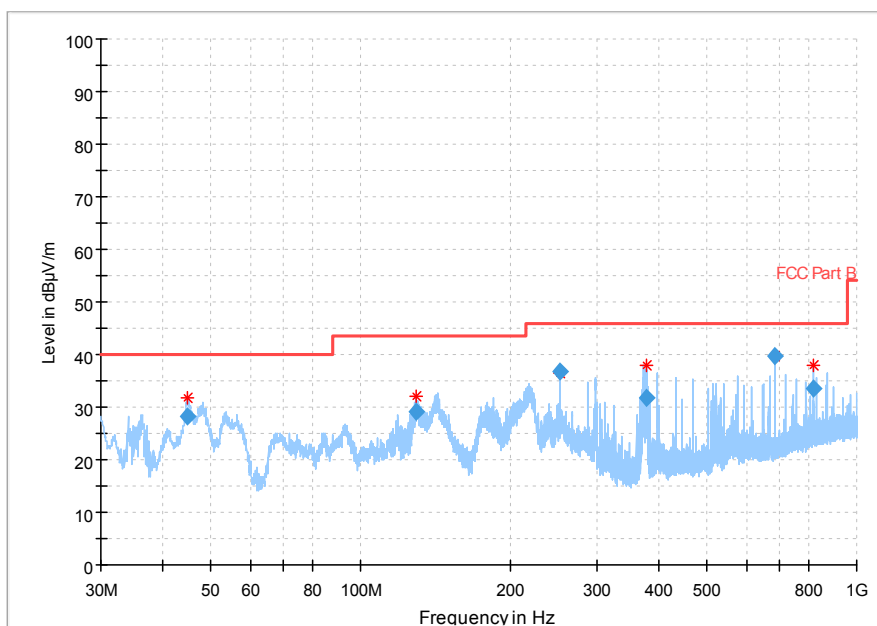


Fig.50 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

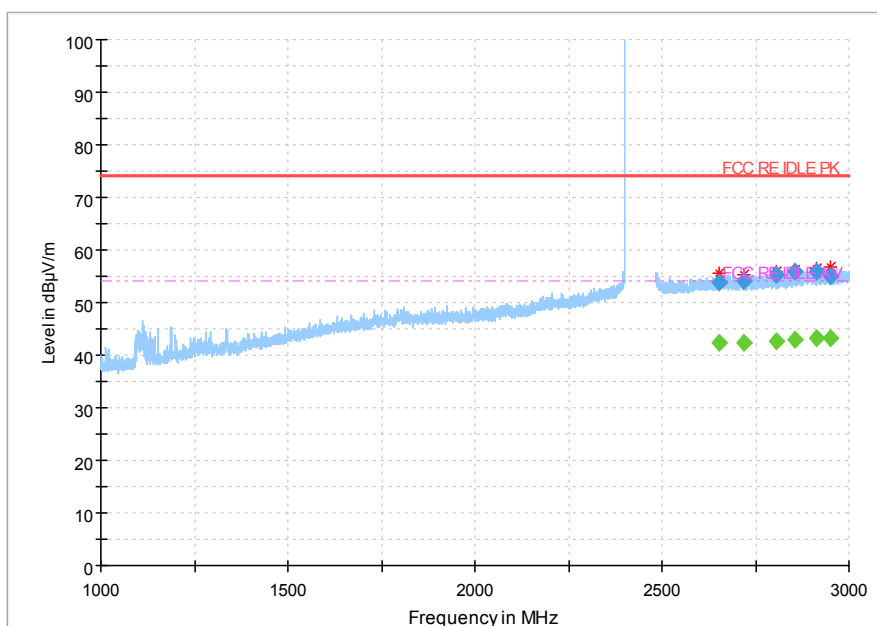


Fig.51 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

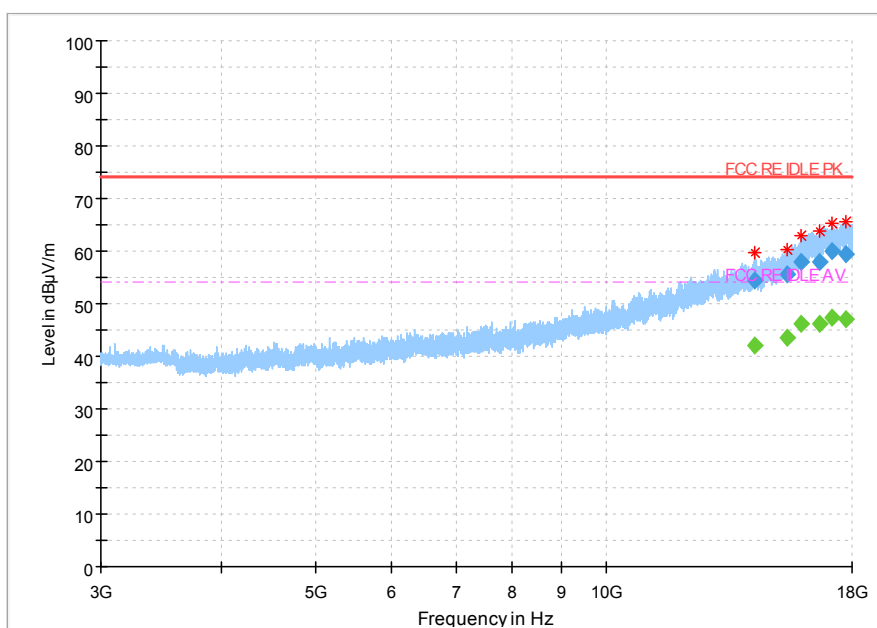
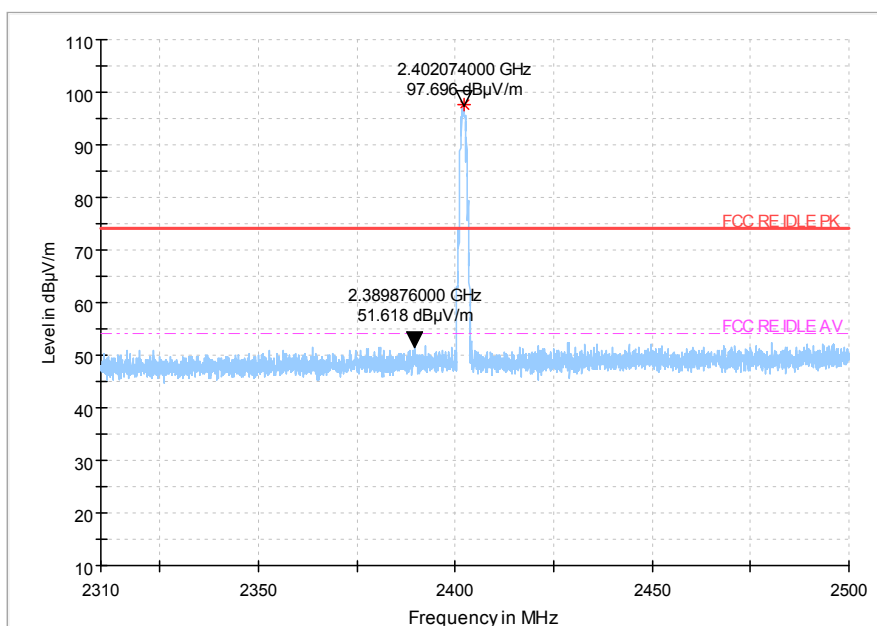
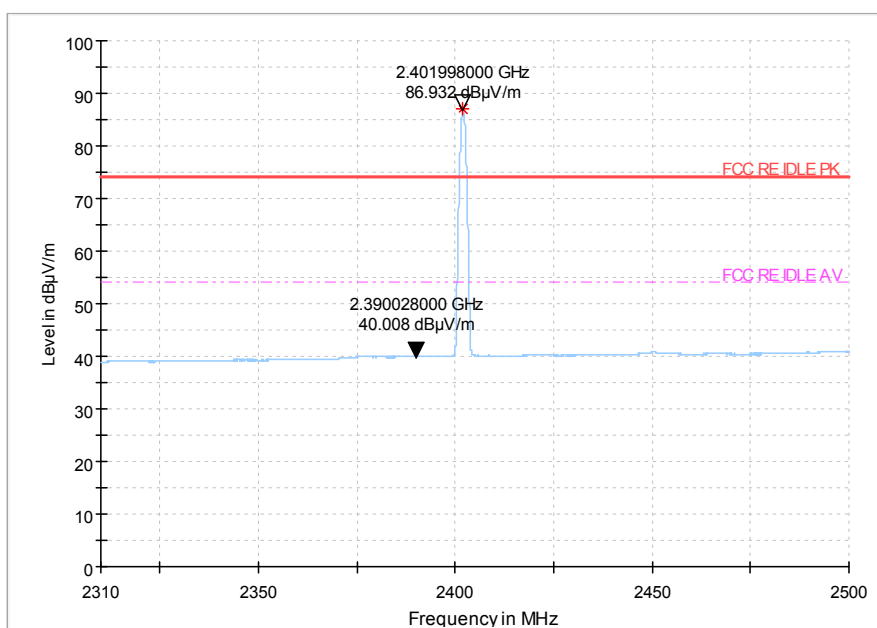


Fig.52 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz

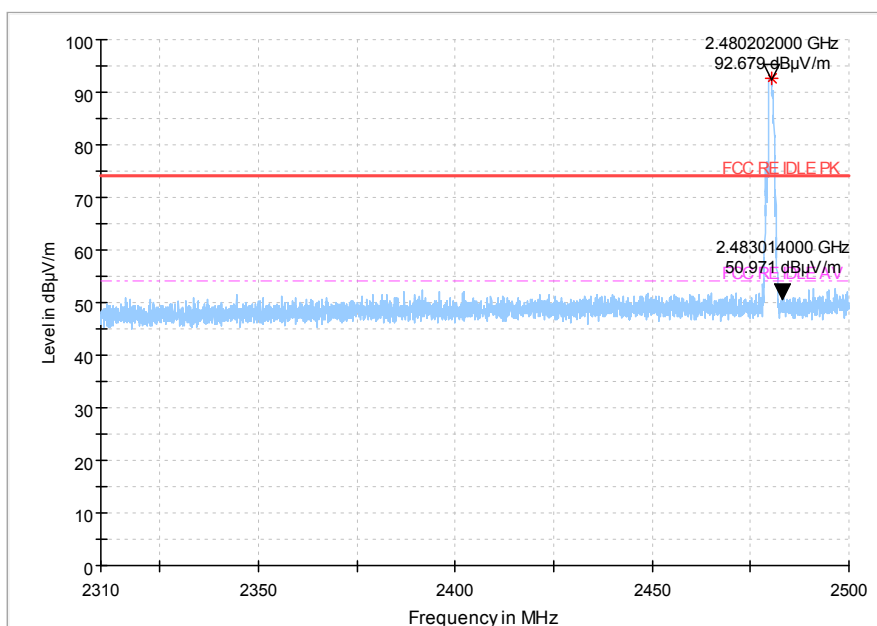


Peak

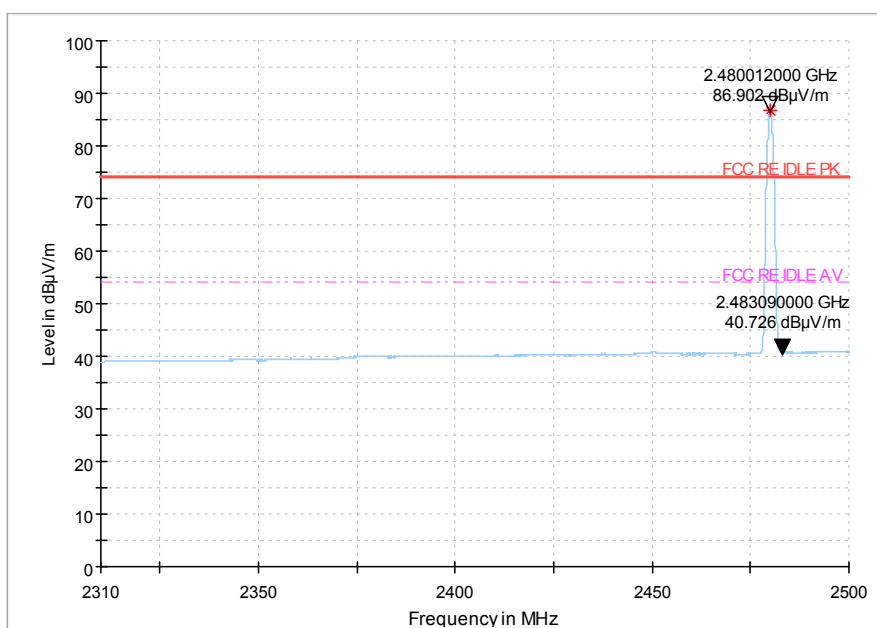


Average

Fig.53 Radiated emission (Power): 8DPSK, low channel

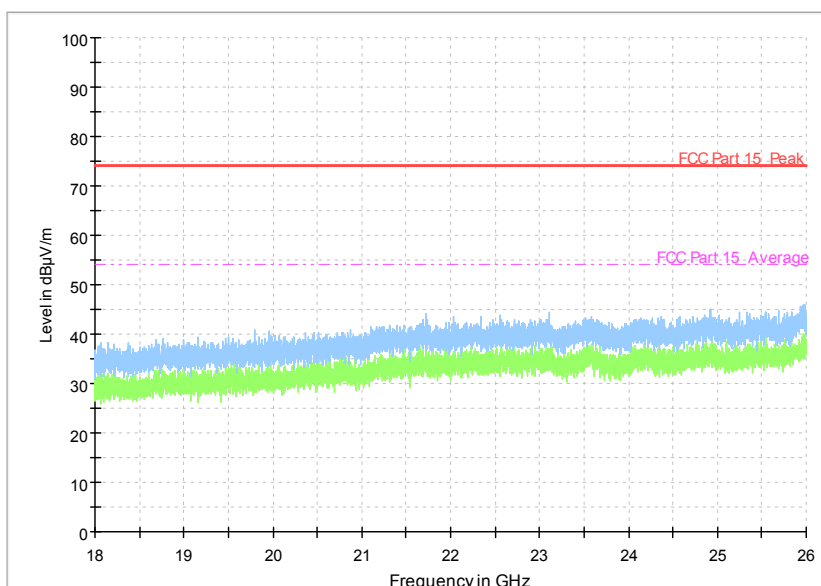


Peak



Average

Fig.54 Radiated emission (Power): 8DPSK, high channel



ALL Channel 18GHz~26GHz

6.5. Time Of Occupancy (Dwell Time)

6.5.1 Measurement Limit:

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

6.5.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.4

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as step 4 to step 8.
4. Span: Zero span, centered on a hopping channel.
5. RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.
6. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot

might be needed with a longer sweep time to show two successive hops on a channel.

7. Detector function: Peak.
8. Trace: Max hold.
9. Use the marker-delta function, and record it.

Note: For AFH mode, Test Period = 0.4 (second/ channel) x 20 Channel = 8 sec,
For FHSS mode, Test Period = 0.4 (second/ channel) x 79 Channel = 31.6 sec,
So the Time of Occupancy (Dwell Time) of AFH mode = Time of Occupancy (Dwell Time) of FHSS mode / 79 Channel x 20 Channel

Modulation type	Frequency(MHz)	Dwell Time (ms)	Limit(ms)	Conclusion
AFH(GFSK DH5)	2402-2421MHz	60.08	400	P
AFH($\pi/4$ DQPSK DH5)	2402-2421MHz	56.45	400	P
AFH(8DPSK DH5)	2402-2421MHz	65.25	400	P

6.5.3 Measurement Result

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.55	46.94	P
		Fig.56		
	DH3	Fig.57	204.35	P
		Fig.58		
	DH5	Fig.59	237.33	P
		Fig.60		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.61	66.8	P
		Fig.62		
	2DH3	Fig.63	206.34	P

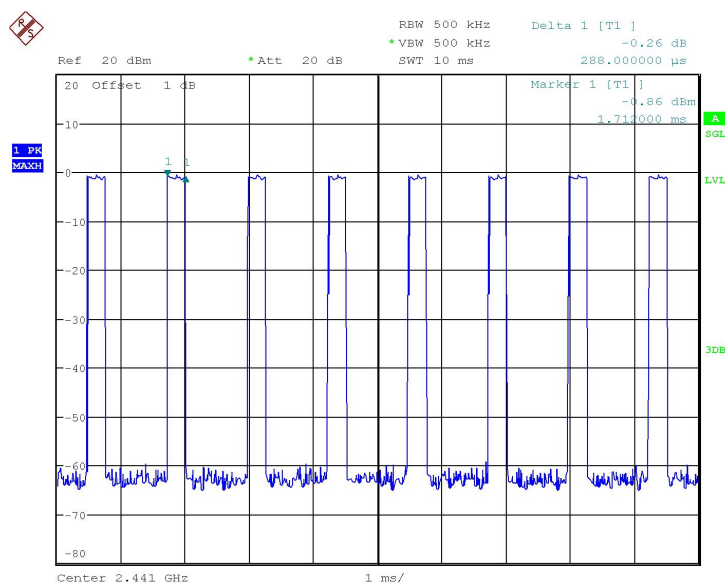
		Fig.64		
	2DH5	Fig.65	222.99	P
		Fig.66		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.67	69.89	P
		Fig.68		
	3DH3	Fig.69	191.17	P
		Fig.70		
	3DH5	Fig.71	257.74	P
		Fig.72		

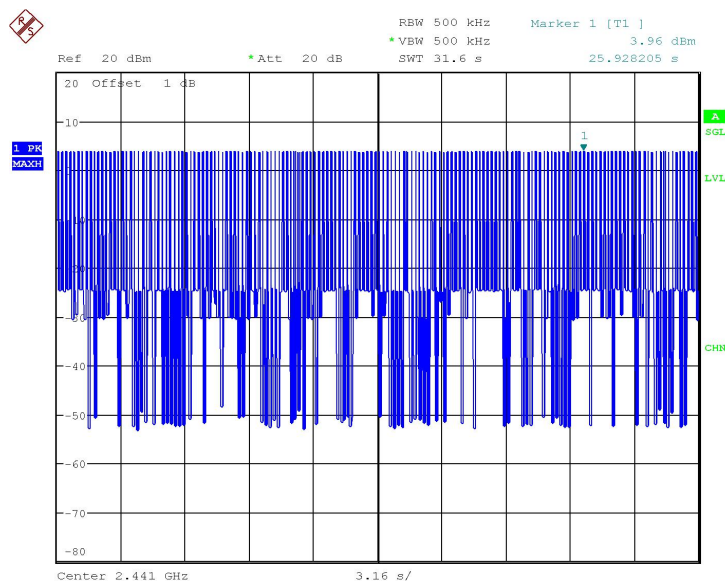
Conclusion: PASS

Test graphs as below:



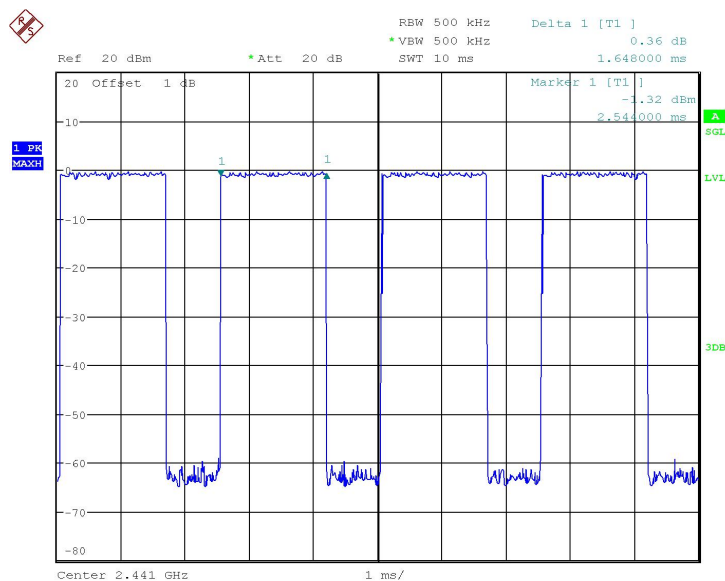
Date: 2.JAN.2019 04:19:27

Fig.55 Time of occupancy (Dwell Time): Ch39, Packet DH1



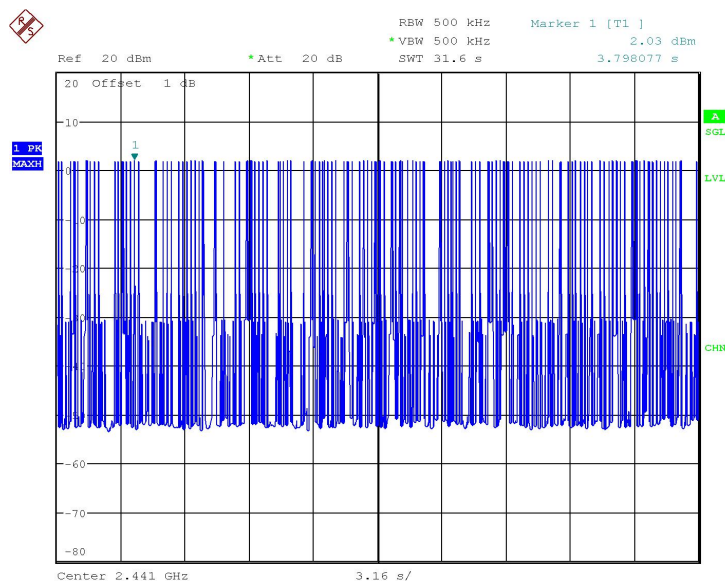
Date: 2.JAN.2019 04:20:28

Fig.56 Number of Transmissions Measurement: Ch39, Packet DH1



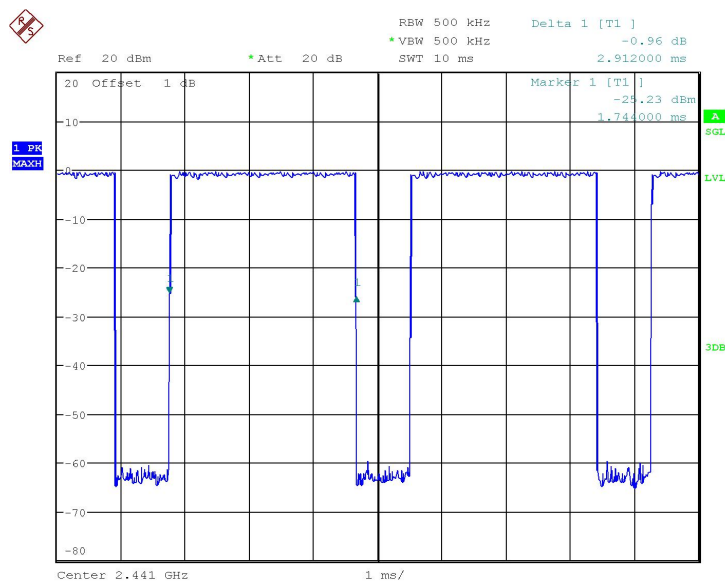
Date: 2.JAN.2019 04:23:07

Fig.57 Time of occupancy (Dwell Time): Ch39, Packet DH3



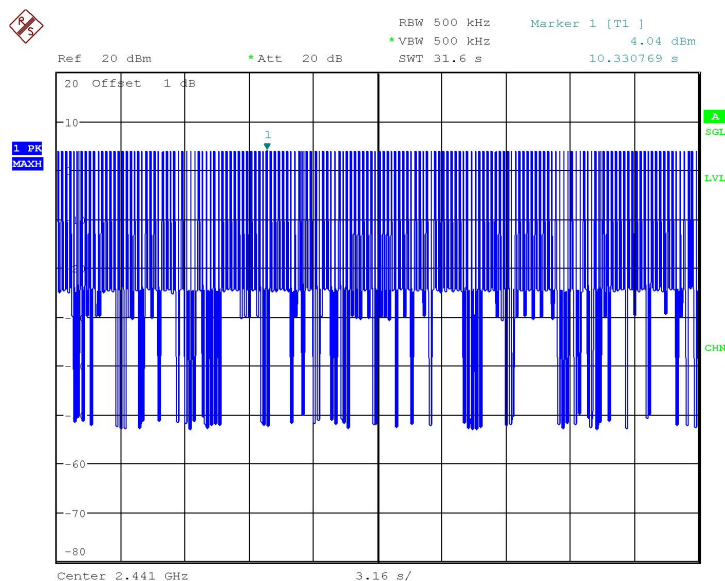
Date: 2.JAN.2019 04:24:09

Fig.58 Number of Transmissions Measurement: Ch39, Packet DH3



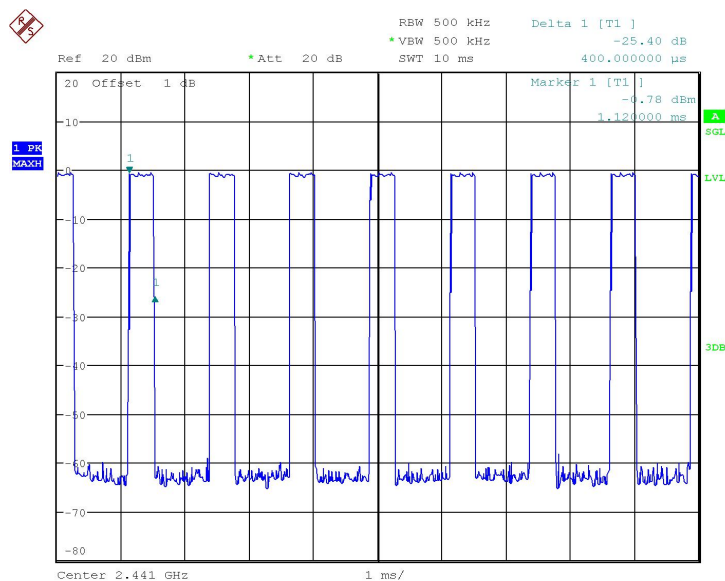
Date: 2.JAN.2019 04:25:48

Fig.59 Time of occupancy (Dwell Time): Ch39,Packet DH5



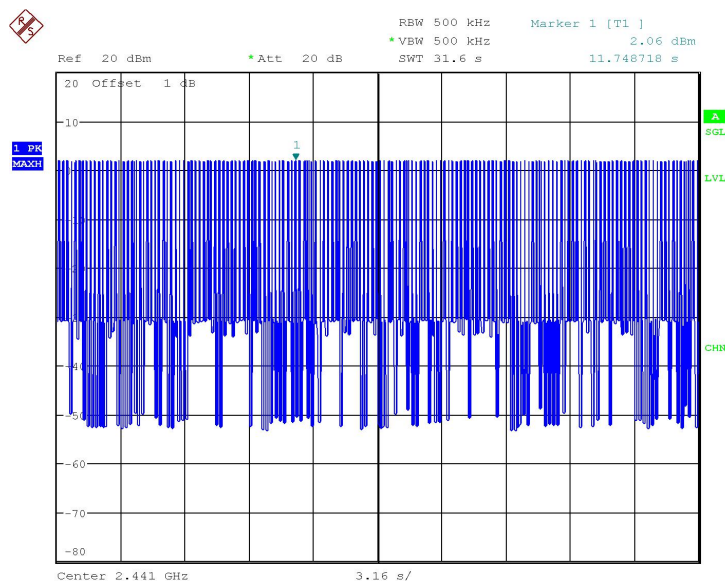
Date: 2.JAN.2019 04:27:27

Fig.60 Number of Transmissions Measurement: Ch39, Packet DH5



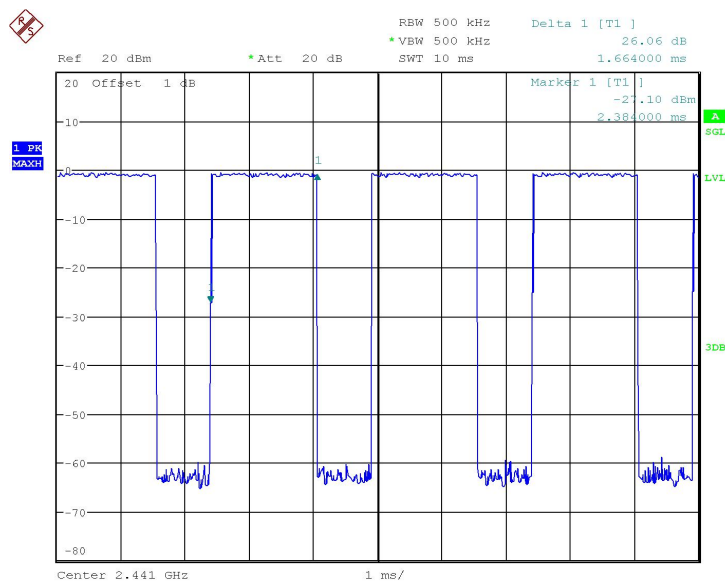
Date: 2.JAN.2019 04:29:57

Fig.61 Time of occupancy (Dwell Time): Ch39, Packet 2-DH1



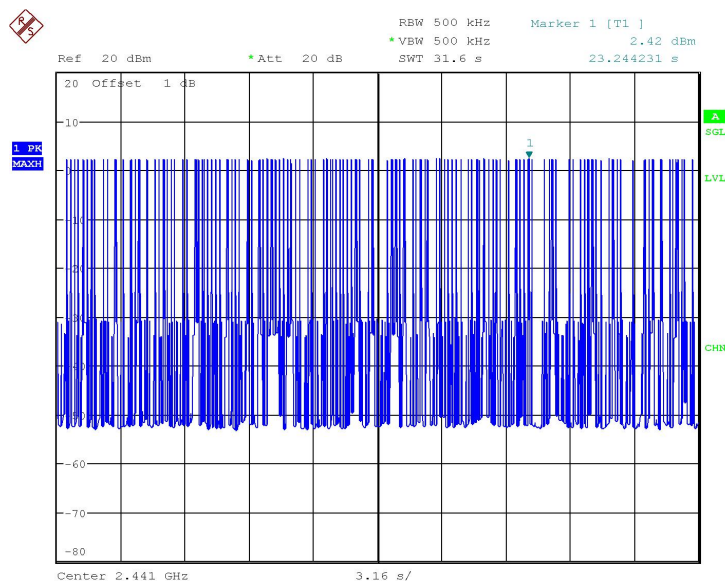
Date: 2.JAN.2019 04:31:07

Fig.62 Number of Transmissions Measurement: Ch39, Packet 2-DH1



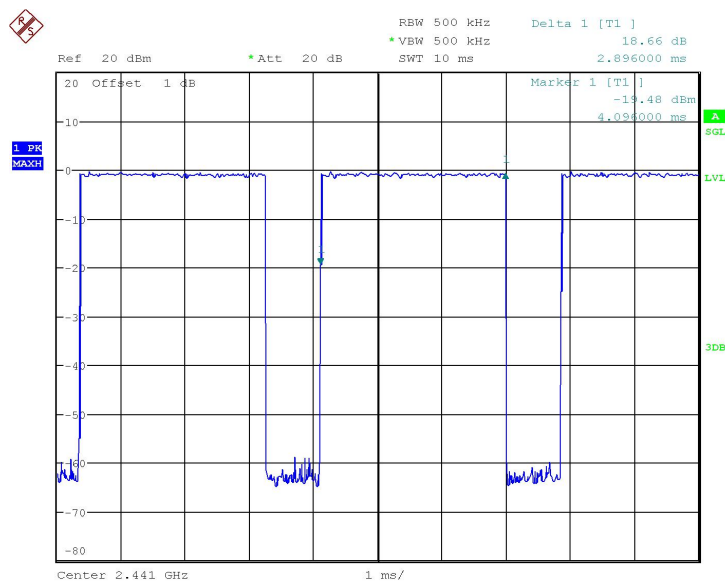
Date: 2.JAN.2019 04:32:21

Fig.63 Time of occupancy (Dwell Time): Ch39,Packet 2-DH3



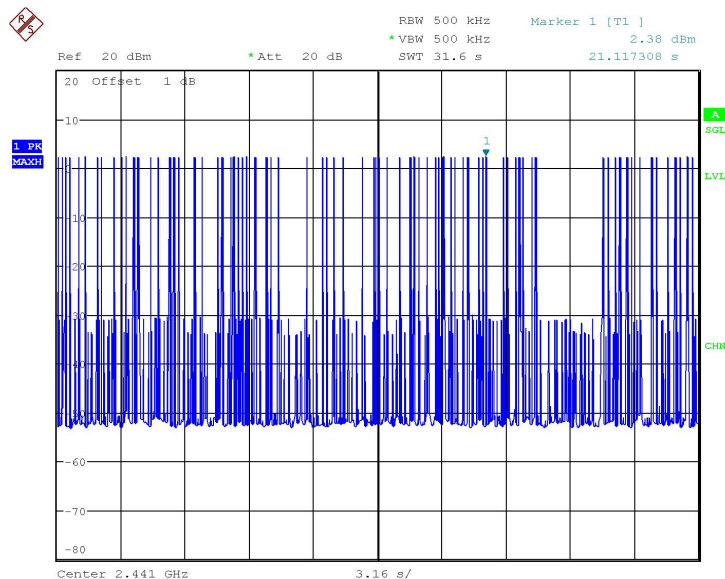
Date: 2.JAN.2019 04:33:21

Fig.64 Number of Transmissions Measurement: Ch39, Packet 2-DH3



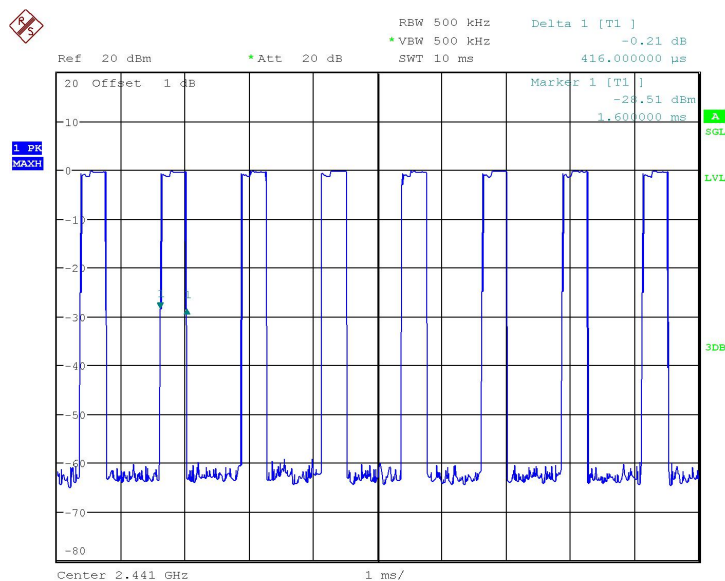
Date: 2.JAN.2019 04:37:53

Fig.65 Time of occupancy (Dwell Time): Ch39, Packet 2-DH5



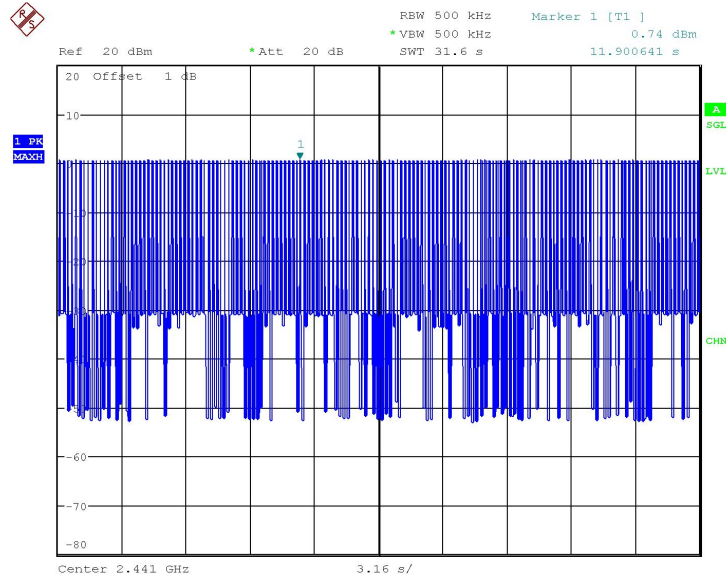
Date: 2.JAN.2019 04:39:04

Fig.66 Number of Transmissions Measurement: Ch39, Packet 2-DH5



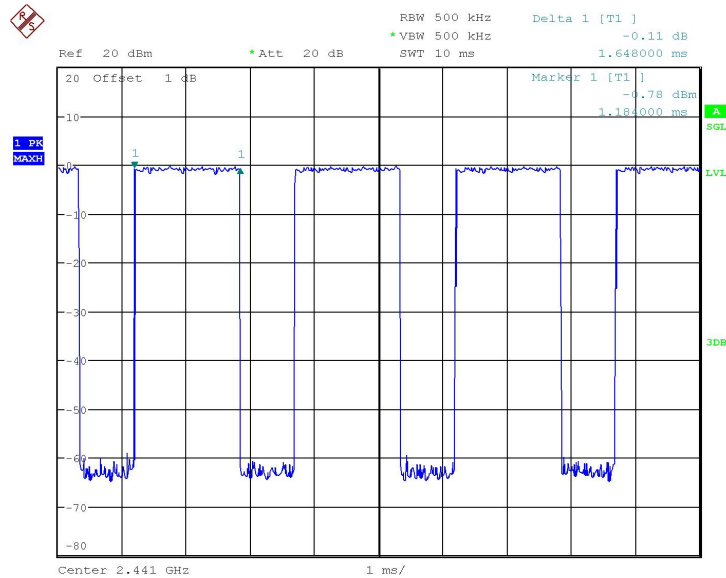
Date: 2.JAN.2019 04:42:28

Fig.67 Time of occupancy (Dwell Time): Ch39,Packet 3-DH1



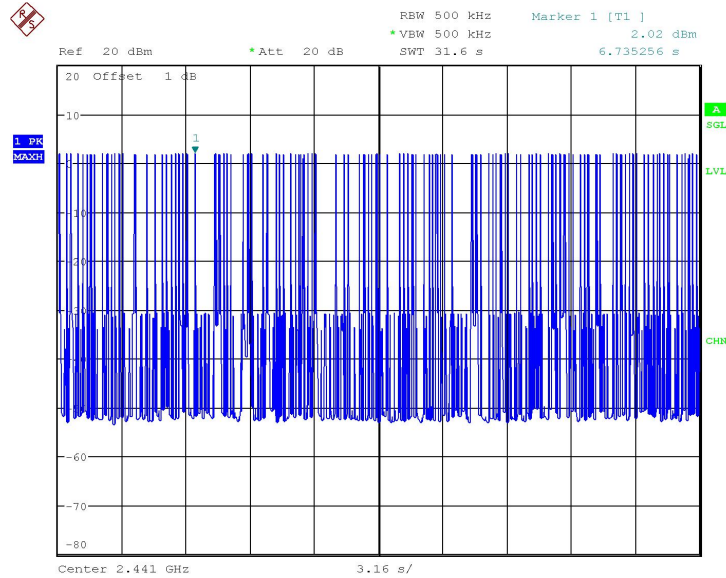
Date: 2.JAN.2019 04:43:38

Fig.68 Number of Transmissions Measurement: Ch39, Packet 3-DH1



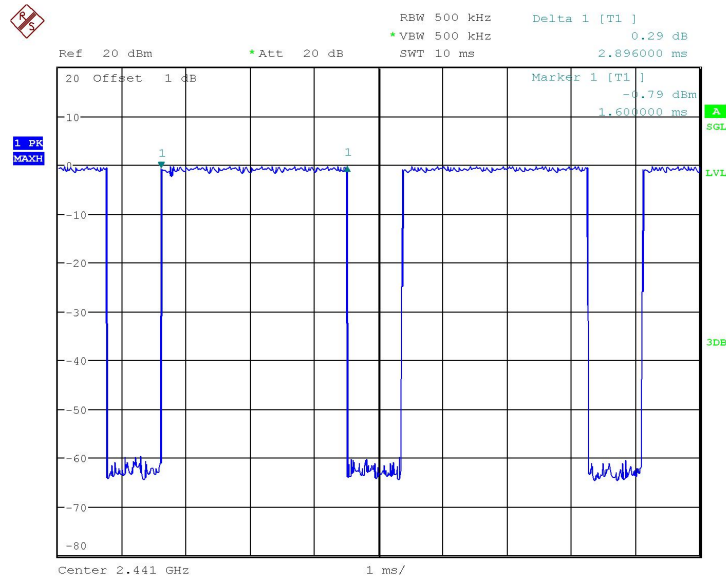
Date: 2.JAN.2019 04:44:55

Fig.69 Time of occupancy (Dwell Time): Ch39,Packet 3-DH3



Date: 2.JAN.2019 04:46:16

Fig.70 Number of Transmissions Measurement: Ch39, Packet 3-DH3



Date: 2.JAN.2019 04:49:34

Fig.71 Time of occupancy (Dwell Time): Ch39,Packet 3-DH5