



Full

TEST REPORT

No. I18D00119-SRD01

For

Client : Shanghai Sunmi Technology

Production : POS System

Model Name : L1521, L1522, L1523

FCC ID : 2AH25T2

Hardware Version: V1.02

Software Version: 1.0.16, 1.0.17

Issued date: 2018-08-20

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I18D00119-SRD01	00	2018-08-15	Initial creation of test report
I18D00119-SRD01	01	2018-08-20	Second creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Yu Anlu
Testing Start Date:	2018-07-13
Testing End Date:	2018-08-07

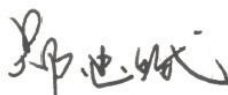
1.4. Signature



Yang Dejun
(Prepared this test report)



Shi Hongqi
(Reviewed this test report)



Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Shanghai Sunmi Technology Co.,Ltd.
Address: Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai,
China
Postcode: 200433
Telephone: 18721736693

2.2. Manufacturer Information

Company Name: Shanghai Sunmi Technology Co.,Ltd.
Address: Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai,
China
Postcode: 200433
Telephone: 18721736693

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	POS System
Model name	L1521, L1522, L1523
BT Frequency	2402MHz-2480MHz
BT Channel	Channel0-Channel78
BT type of modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Extreme Temperature	-10/+55°C
Nominal Voltage	24V
Extreme High Voltage	25V
Extreme Low Voltage	23V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	Model Name	SN or IMEI	HW Version	SW Version	Date of receipt
N02	L1523	N/A	V1.02	1.0.16	2018-06-28
N04	L1523	N/A	V1.02	1.0.16	2018-06-28
N03	L1522	N/A	V1.02	1.0.17	2018-06-28
N05	L1521	N/A	V1.02	1.0.16	2018-06-28

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	---	---

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	Jun,2016 Edition
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(b)	/	P
Peak Power Spectral Density	15.247(d)	/	NA
20dB Occupied Bandwidth	15.247(a)	/	P
Band Edges Compliance	15.247(b)	/	P
Transmitter Spurious Emission-Conducted	15.247	/	P
Transmitter Spurious Emission-Radiated	15.247,15.209,	/	P
AC Powerline Conducted Emission	15.107,15.207	/	P

Please refer to part 5 for detail.

The measurements are according to ANSI C63.10.

Terms used in Verdict column

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	25°C
Voltage	Vnom	24
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

Note:

- a. All the test data for each data were verified, but only the worst case was reported.
- b. The GFSK, $\pi/4$ DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for $\pi/4$ DQPSK, 3-DH1 for 8DPSK.
- c. The DC and low frequency voltages' measurement uncertainty is $\pm 2\%$.

5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

5.2. Statements

The L1521, L1522, L1523, supporting BT/BLE/ WIFI, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

Note: The project has three prototypes, L1521, L1522, L1523. The L1523 we tested all the test items. The other two we only tested worse case.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Peak Output Power-Conducted

6.1.1 Measurement Limit

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

6.1.2 Test Condition:

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	10MHz	9MHz	Auto

6.1.3 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.5.

1. The output power of EUT was connected to the spectrum analyzer and CBT32 by cable and divide. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Measure the conducted output power and record the results it.

6.1.4 Measurement Results:

For GFSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	4.503	5.739	4.435	P
	Fig.1	Fig.2	Fig.3	

For $\pi/4$ DQPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	4.061	5.274	3.962	P
	Fig.4	Fig.5	Fig.6	

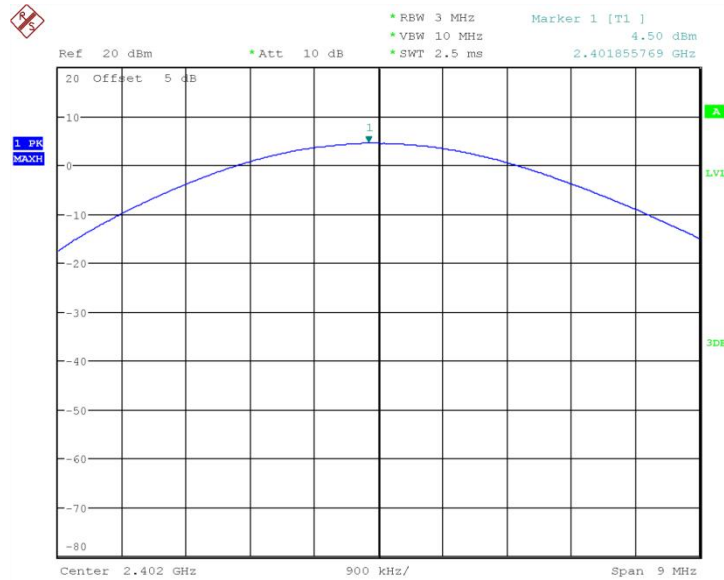
For 8DPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
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Peak Conducted Output Power (dBm)	4.076	5.327	3.977	P
	Fig.7	Fig.8	Fig.9	

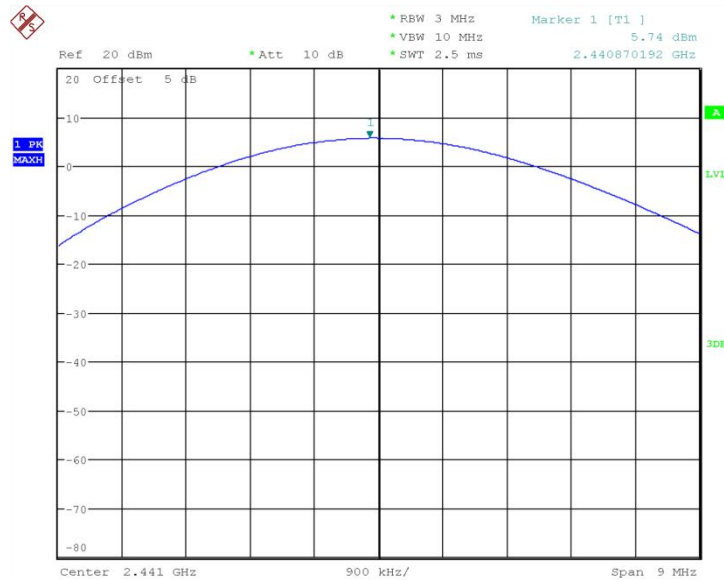
Conclusion: PASS

Test graphs an below



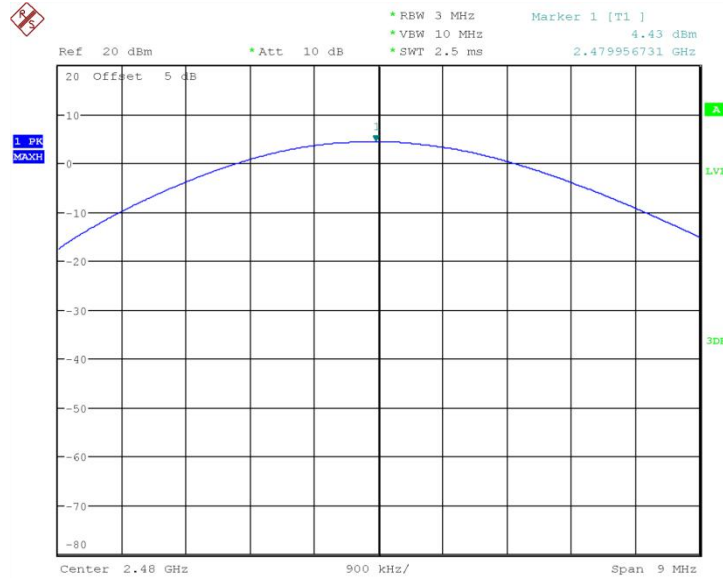
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Fig.1 Peak Conducted Output Power CH0, DH1



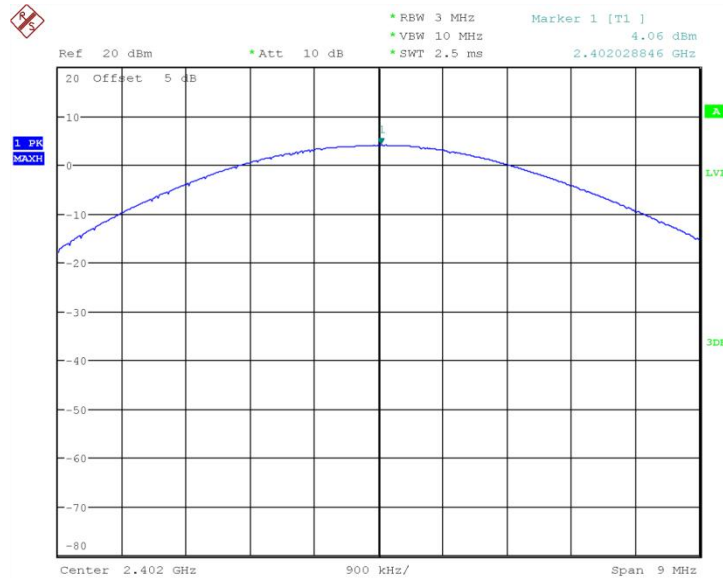
Date: 17.JUL.2018 05:20:56

Fig.2 Peak Conducted Output Power CH39, DH1



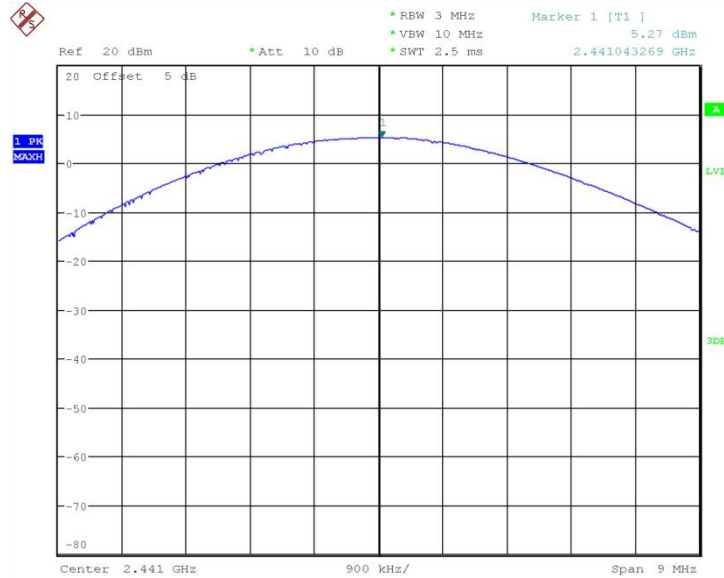
Date: 17.JUL.2018 05:21:11

Fig.3 Peak Conducted Output Power CH78, DH1



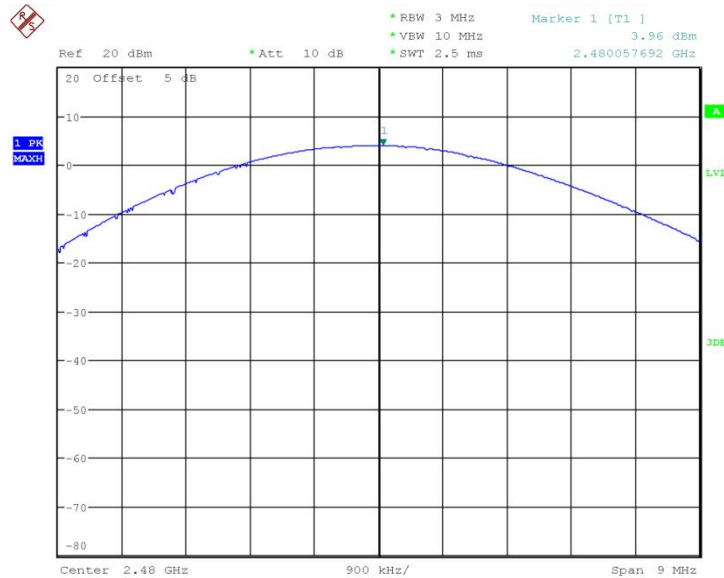
Date: 17.JUL.2018 05:21:25

Fig.4 Peak Conducted Output Power CH0, 2DH1



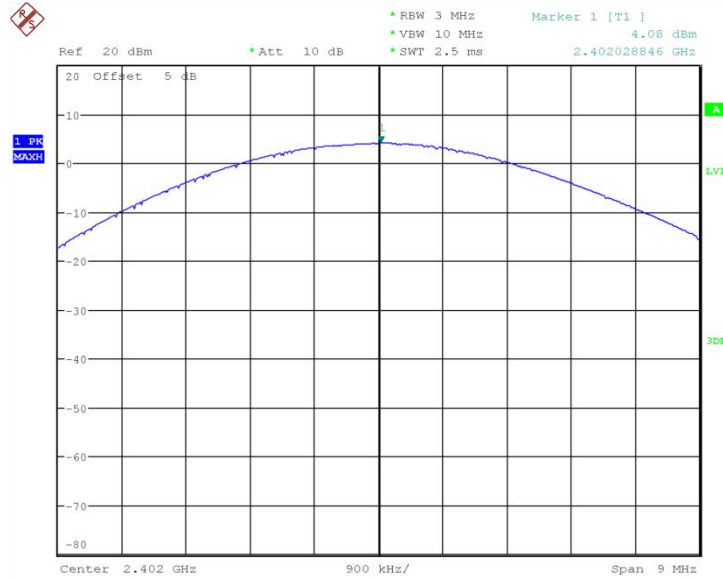
Date: 17.JUL.2018 05:21:40

Fig.5 Peak Conducted Output Power CH39, 2DH1



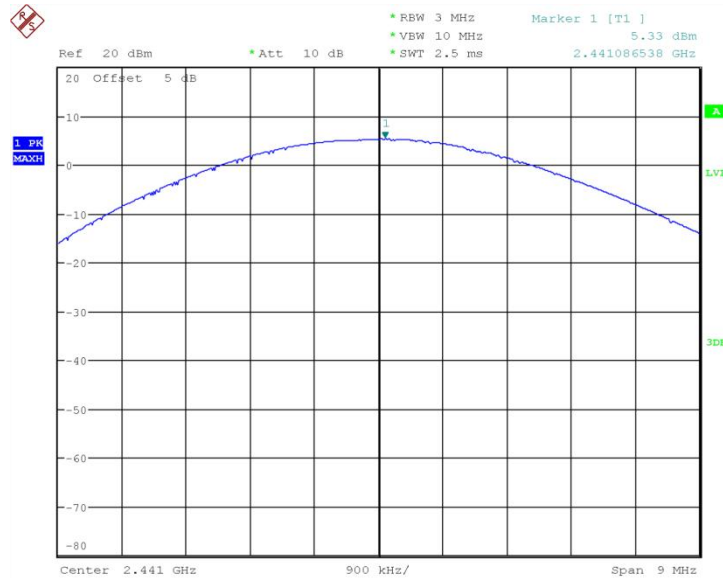
Date: 17.JUL.2018 05:21:55

Fig.6 Peak Conducted Output Power CH78, 2DH1



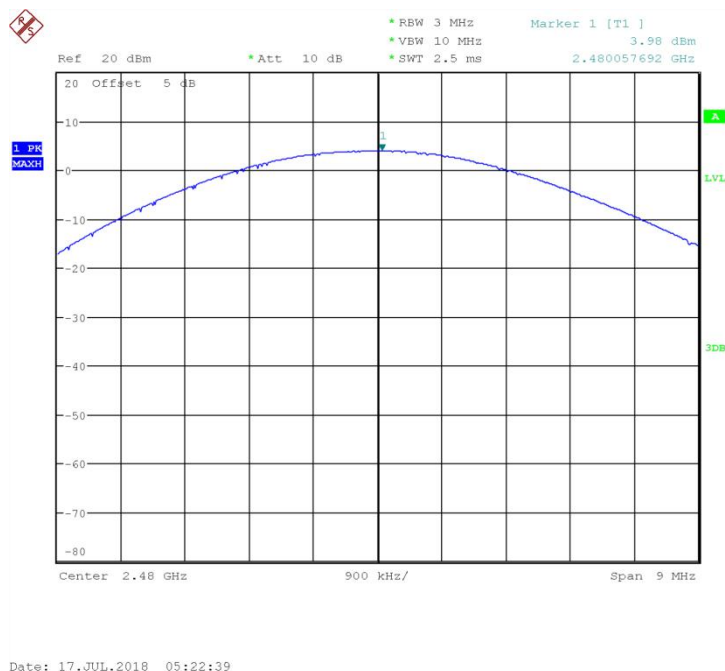
Date: 17.JUL.2018 05:22:09

Fig.7 Peak Conducted Output Power CH0, 3DH1



Date: 17.JUL.2018 05:22:24

Fig.8 Peak Conducted Output Power CH39, 3DH1



Date: 17.JUL.2018 05:22:39

Fig.9 Peak Conducted Output Power CH78, 3DH1

6.2. Frequency Band Edges-Conducted

6.2.1 Measurement Limit:

Standard	Limited(dBc)
FCC 47 CFR Part 15.247(d)	>20

6.2.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.6.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz, span more than 1.5 times channel bandwidth (2MHz).
3. Detector =peak, sweep time=auto couple, trace mode=max hold.
4. Allow sweep to continue until the trace stabilizes.

6.2.3 Measurement results

For GFSK

Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.10	P
	Hopping ON	Fig.11	P

78	Hopping OFF	Fig.12	P
	Hopping ON	Fig.13	P

For $\pi/4$ DQPSK

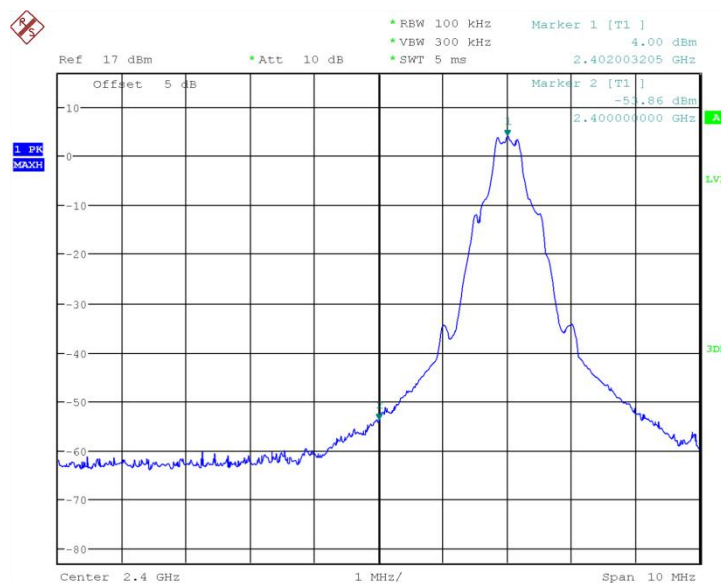
Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.14	P
	Hopping ON	Fig.15	P
78	Hopping OFF	Fig.16	P
	Hopping ON	Fig.17	P

For 8DPSK

Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.18	P
	Hopping ON	Fig.19	P
78	Hopping OFF	Fig.20	P
	Hopping ON	Fig.21	P

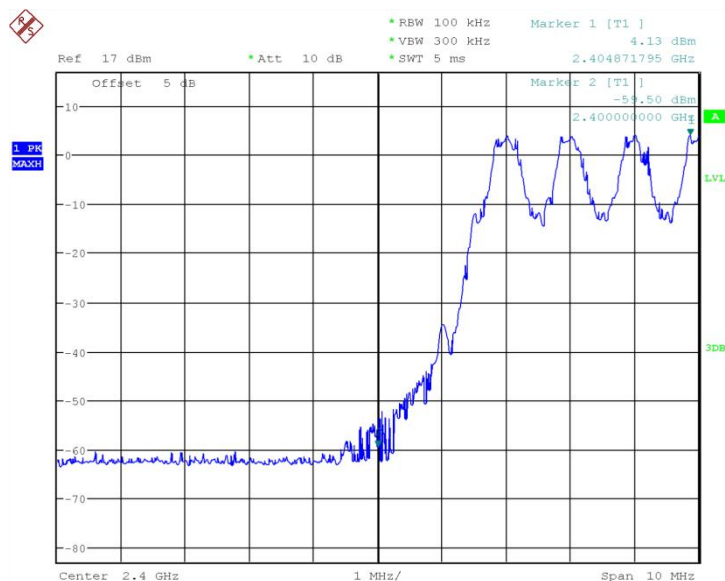
Conclusion: PASS

Test graphs an below



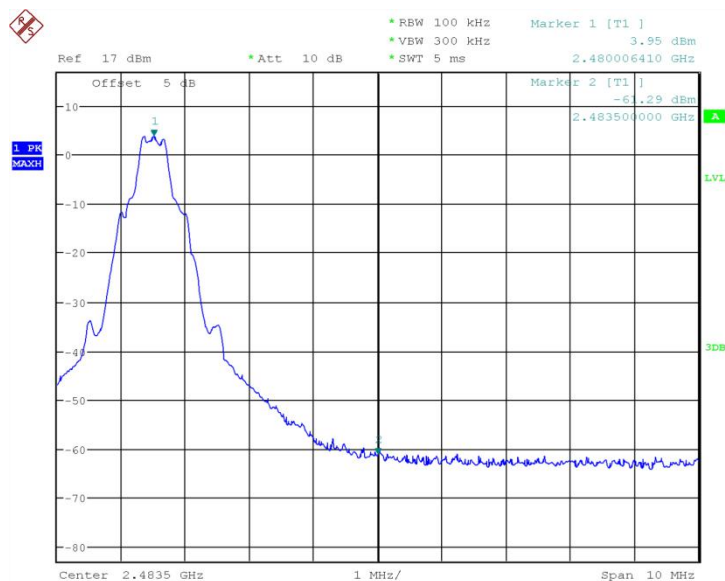
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Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF



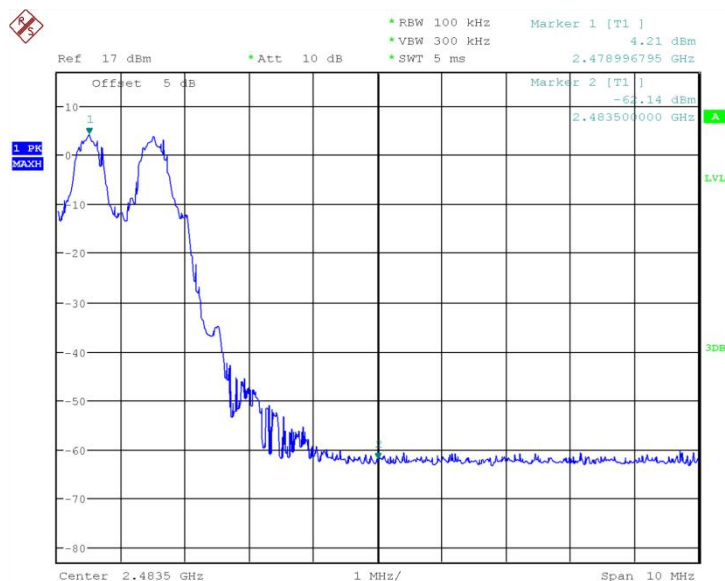
Date: 17.JUL.2018 05:26:39

Fig.11 Frequency Band Edge: GFSK, Ch0, Hopping ON



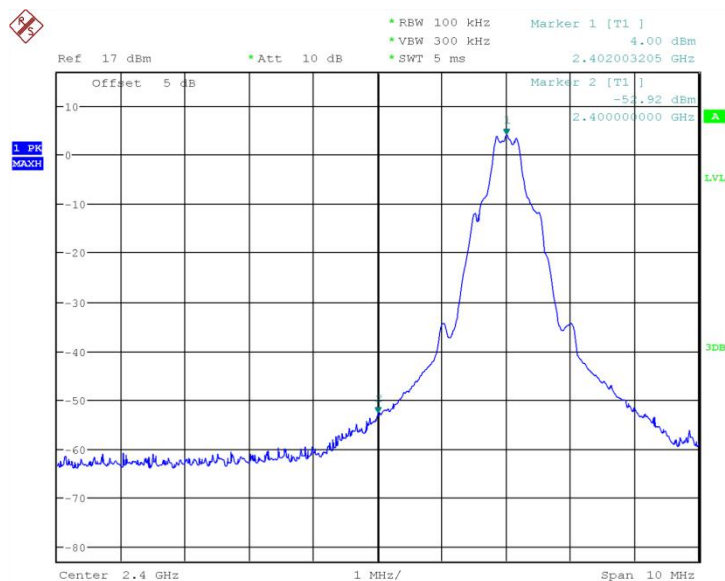
Date: 17.JUL.2018 05:32:46

Fig.12 Frequency Band Edge: GFSK, Ch78, Hopping OFF



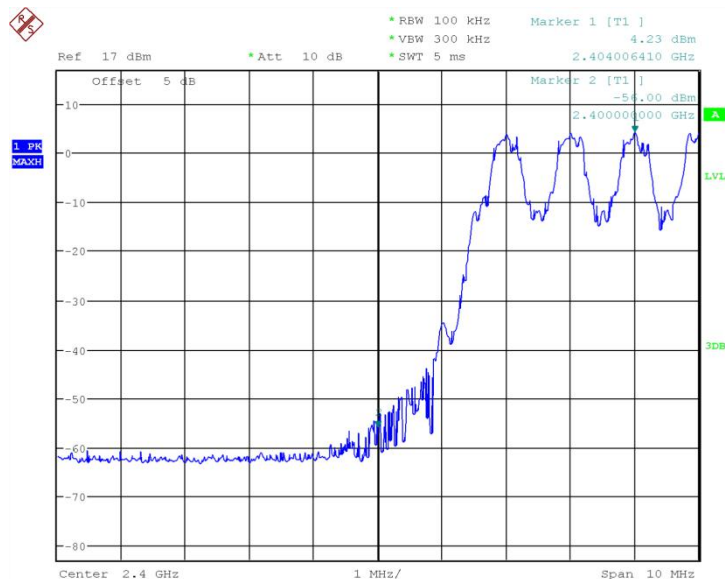
Date: 17.JUL.2018 05:34:53

Fig.13 Frequency Band Edge: GFSK, Ch78, Hopping ON



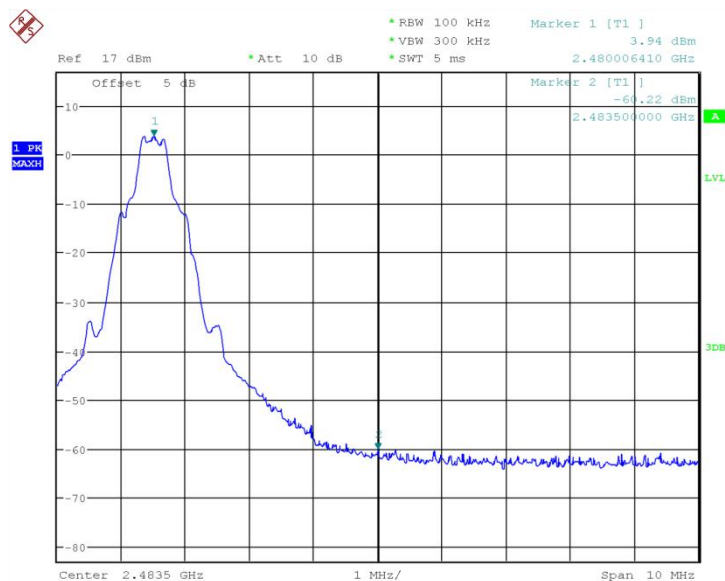
Date: 17.JUL.2018 05:27:16

Fig.14 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping OFF



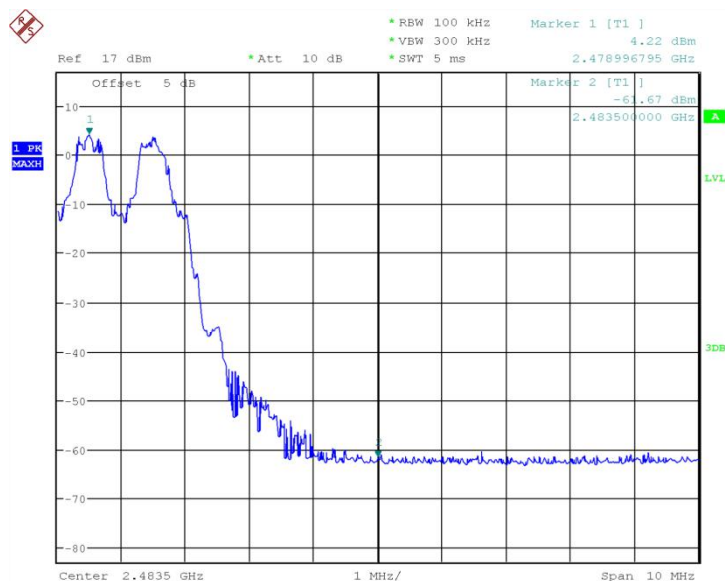
Date: 17.JUL.2018 05:29:23

Fig.15 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping ON



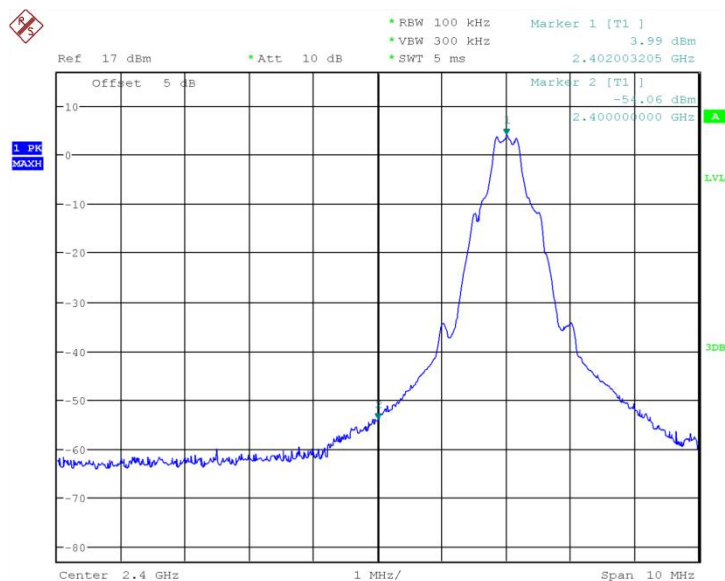
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Fig.16 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping OFF



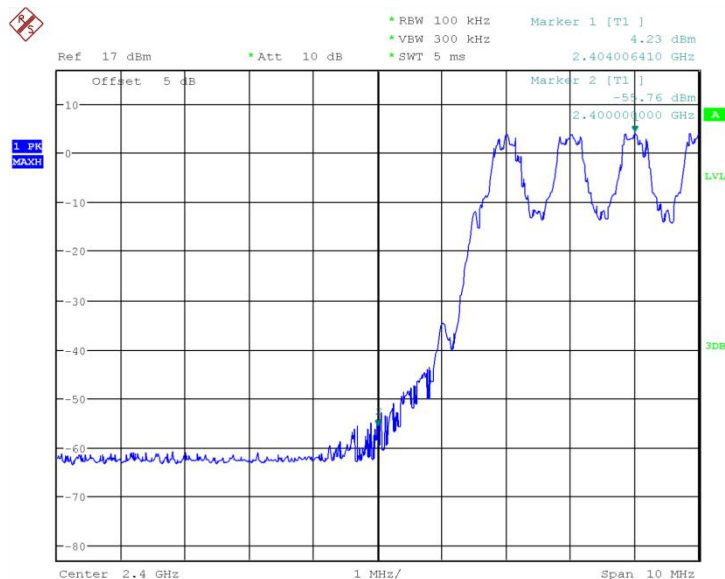
Date: 17.JUL.2018 05:37:37

Fig.17 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping ON



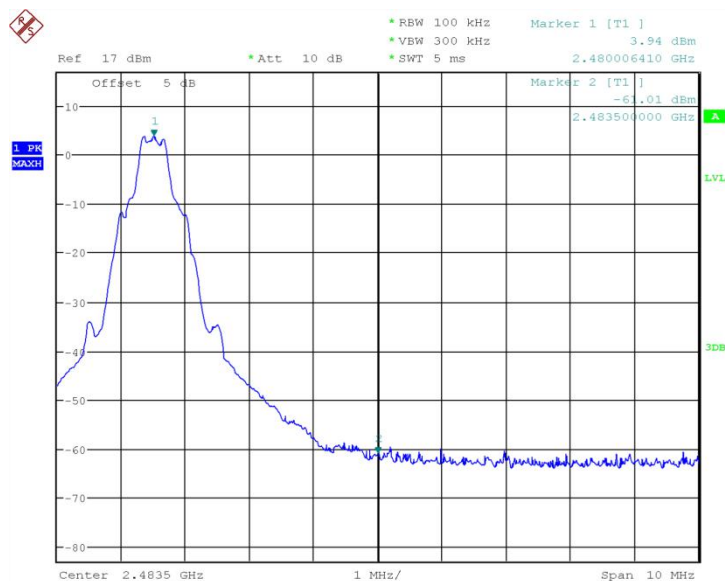
Date: 17.JUL.2018 05:30:00

Fig.18 Frequency Band Edge: 8DPSK, Ch0, Hopping OFF



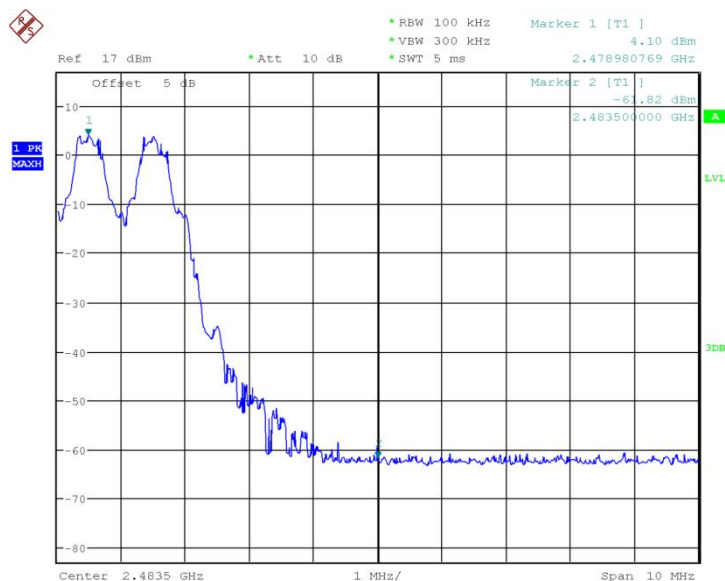
Date: 17.JUL.2018 05:32:07

Fig.19 Frequency Band Edge: 8DPSK, Ch0, Hopping ON



Date: 17.JUL.2018 05:38:14

Fig.20 Frequency Band Edge: 8DPSK, Ch78, Hopping OFF



Date: 17.JUL.2018 05:40:21

Fig.21 Frequency Band Edge: 8DPSK, Ch78, Hopping ON

6.3. Conducted Emission

6.3.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part15.247 (d)	20dB below peak output power in 100KHz bandwidth

6.3.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.8.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz.
3. Detector =peak, sweep time=auto couple, trace mode=max hold.

6.3.3 Measurement Results:

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.22	P
	30MHz~26GHz	Fig.23	P
Ch39 2441MHz	Center Freq.	Fig.24	P
	30MHz~26GHz	Fig.25	P

Ch78 2480MHz	Center Freq.	Fig.26	P
	30MHz~26GHz	Fig.27	P

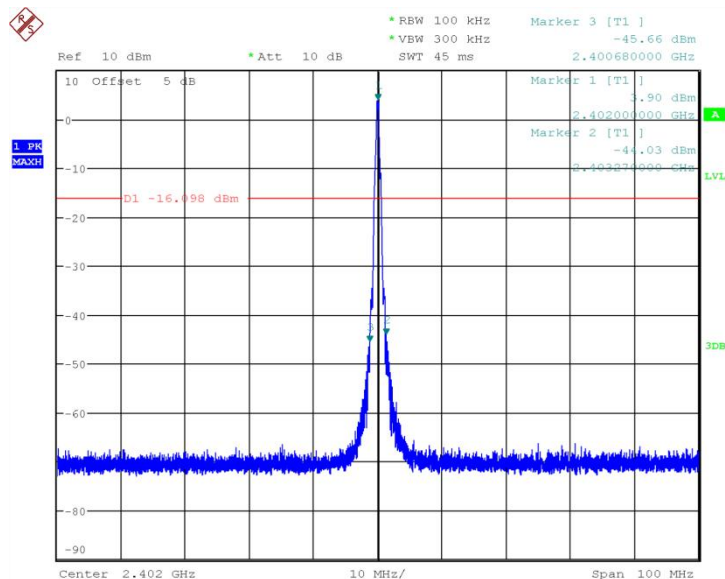
For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.28	P
	30MHz~26GHz	Fig.29	P
Ch39 2441MHz	Center Freq.	Fig.30	P
	30MHz~26GHz	Fig.31	P
Ch78 2480MHz	Center Freq.	Fig.32	P
	30MHz~26GHz	Fig.33	P

For 8DPSK

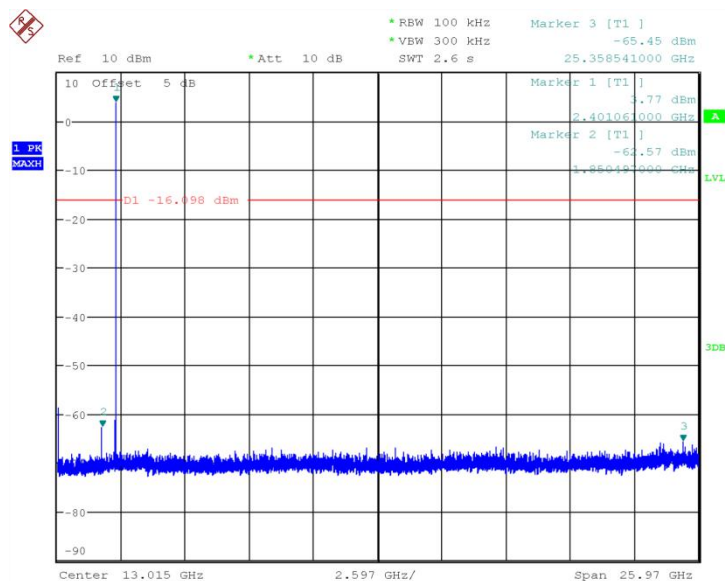
Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.34	P
	30MHz~26GHz	Fig.35	P
Ch39 2441MHz	Center Freq.	Fig.36	P
	30MHz~26GHz	Fig.37	P
Ch78 2480MHz	Center Freq.	Fig.38	P
	30MHz~26GHz	Fig.39	P

Conclusion: PASS
Test graphs as below



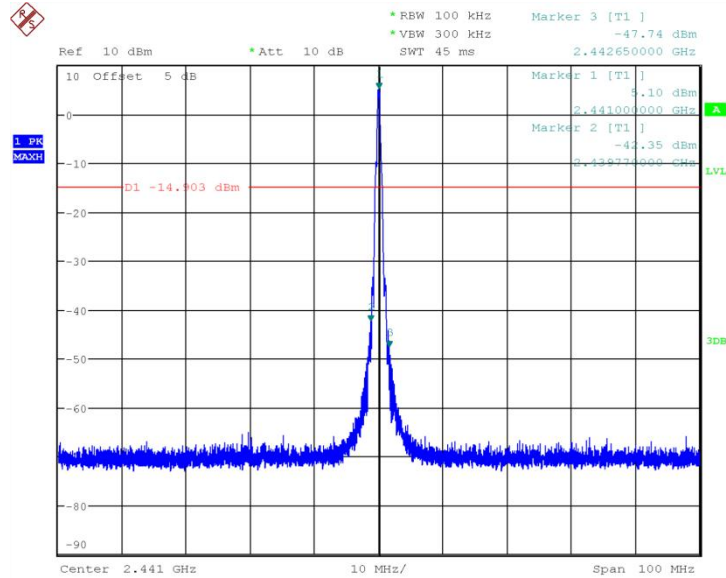
Date: 17.JUL.2018 05:41:19

Fig.22 Conducted spurious emission: GFSK, Ch0, 2402MHz



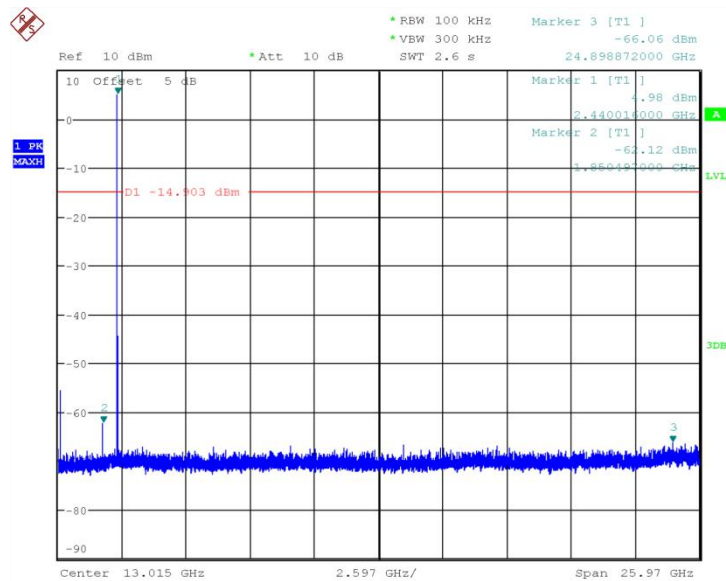
Date: 17.JUL.2018 05:41:45

Fig.23 Conducted spurious emission: GFSK, Ch0, 30MHz~26GHz



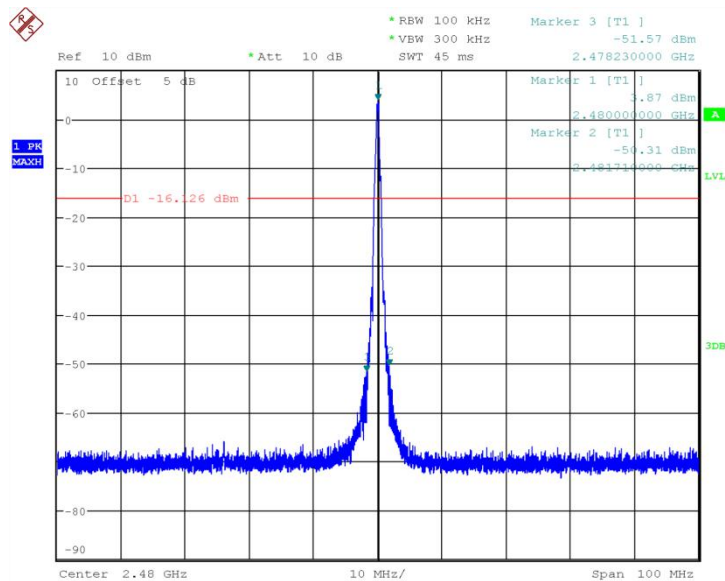
Date: 17.JUL.2018 05:42:12

Fig.24 Conducted spurious emission: GFSK, Ch39, 2441MHz



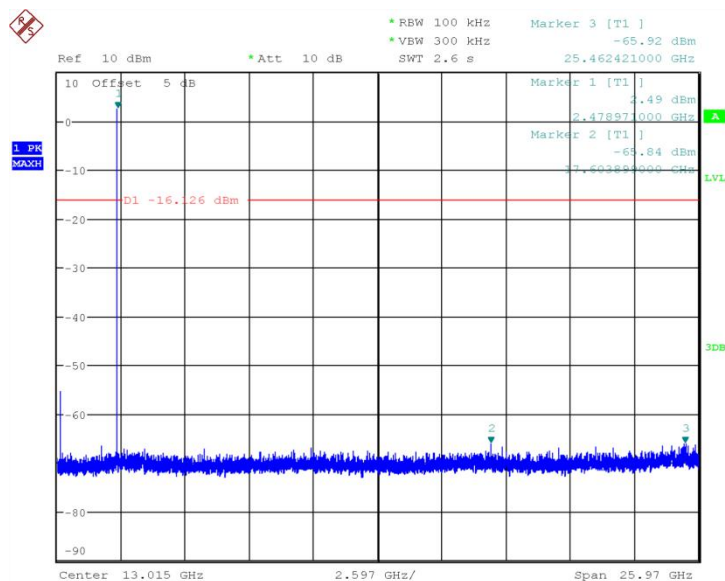
Date: 17.JUL.2018 05:42:37

Fig.25 Conducted spurious emission: GFSK, Ch39, 30MHz~26GHz



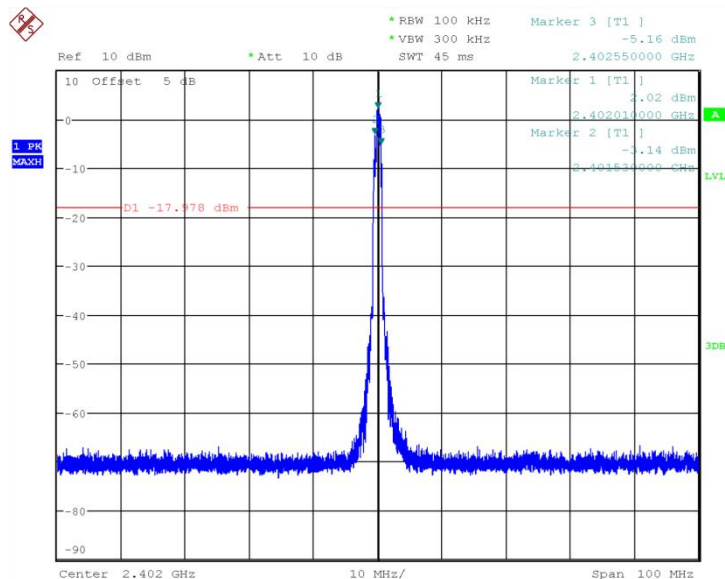
Date: 17.JUL.2018 05:43:04

Fig.26 Conducted spurious emission: GFSK, Ch78, 2480MHz



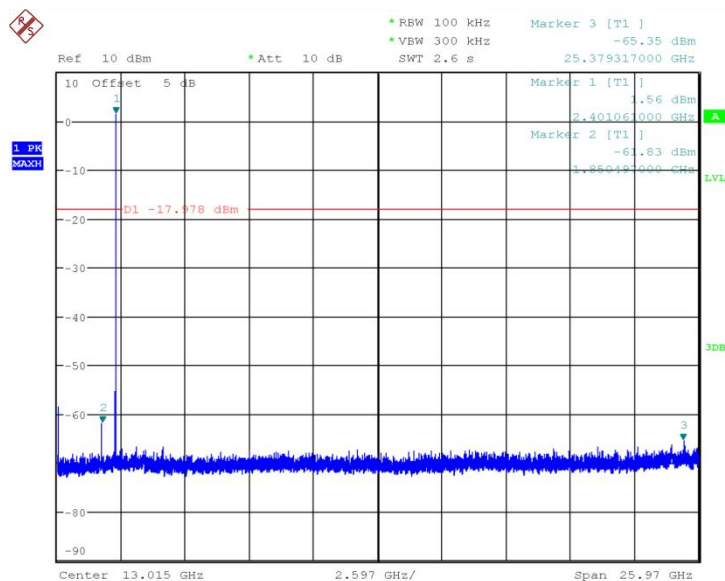
Date: 17.JUL.2018 05:43:29

Fig.27 Conducted spurious emission: GFSK, Ch78, 30MHz~26GHz



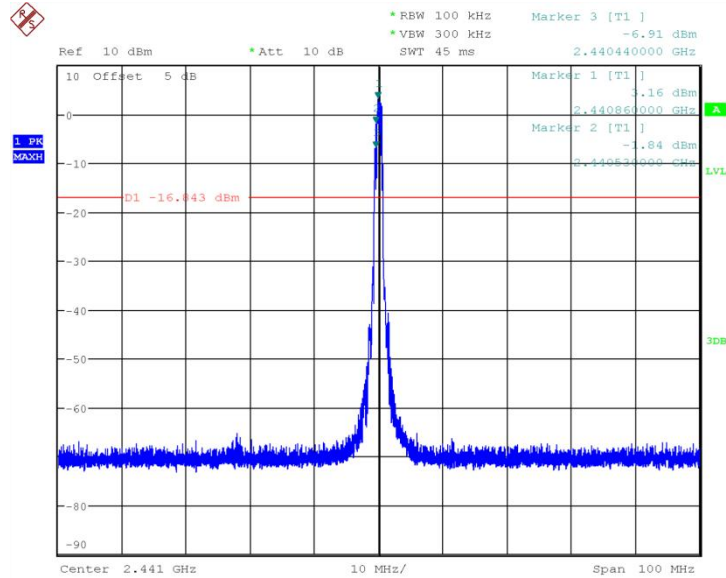
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Fig.28 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 2402MHz



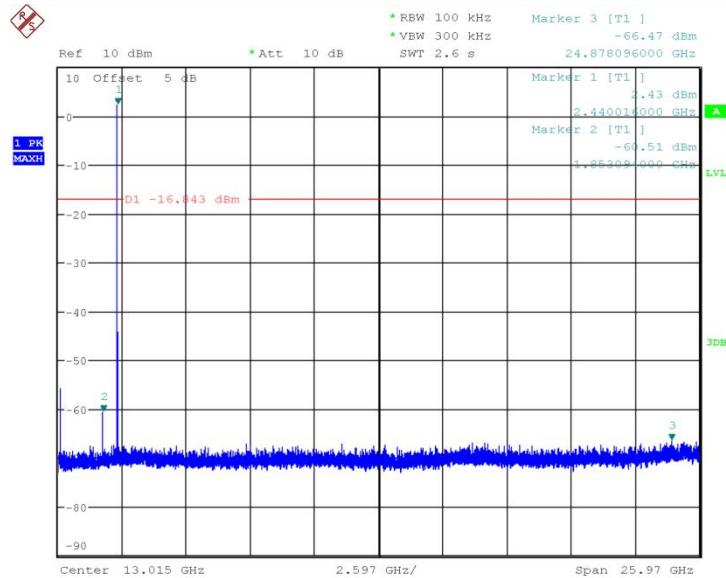
Date: 17.JUL.2018 05:44:22

Fig.29 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 30MHz~26GHz



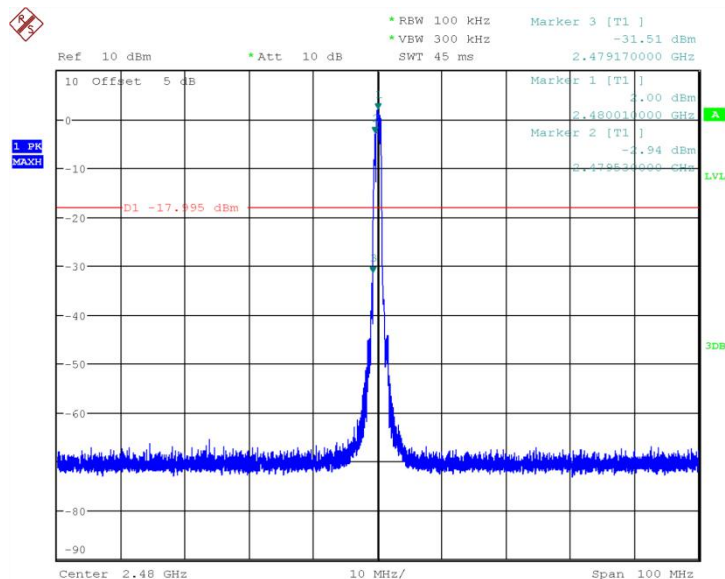
Date: 17.JUL.2018 05:44:49

Fig.30 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 2441MHz



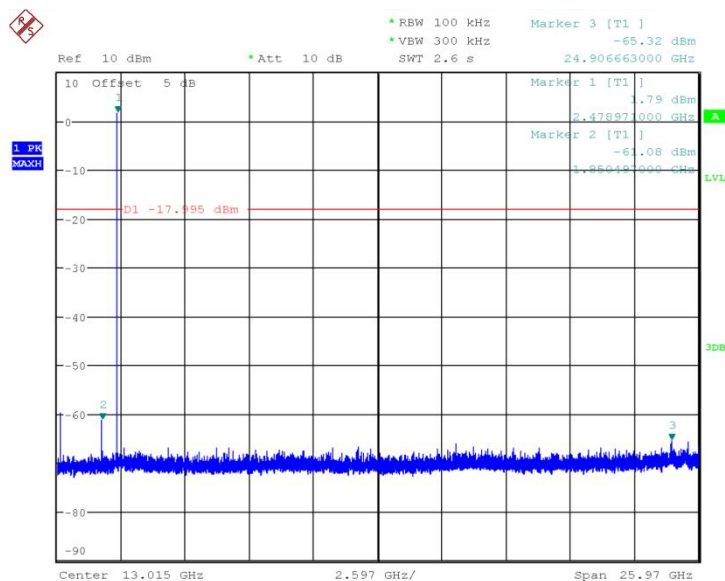
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Fig.31 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 30MHz~26GHz



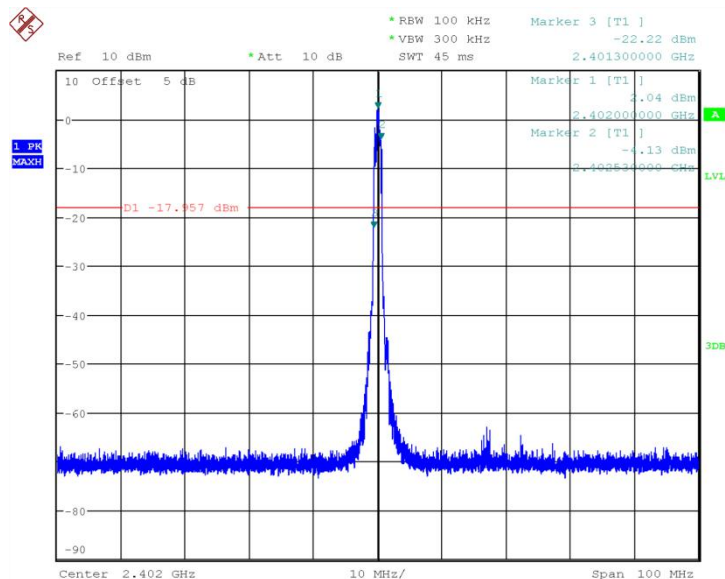
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Fig.32 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 2480MHz



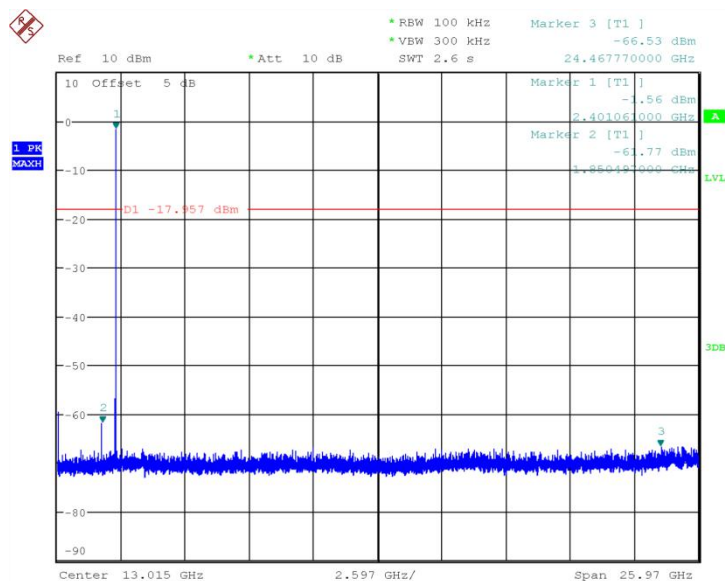
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Fig.33 Conducted spurious emission: $\pi/4$ DQPSK, Ch78, 30MHz~26GHz



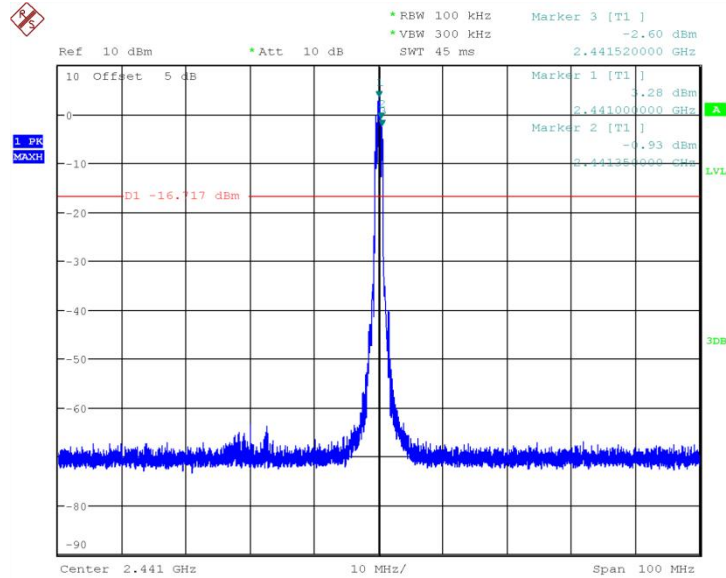
Date: 17.JUL.2018 05:46:34

Fig.34 Conducted spurious emission: 8DPSK, Ch0, 2402MHz



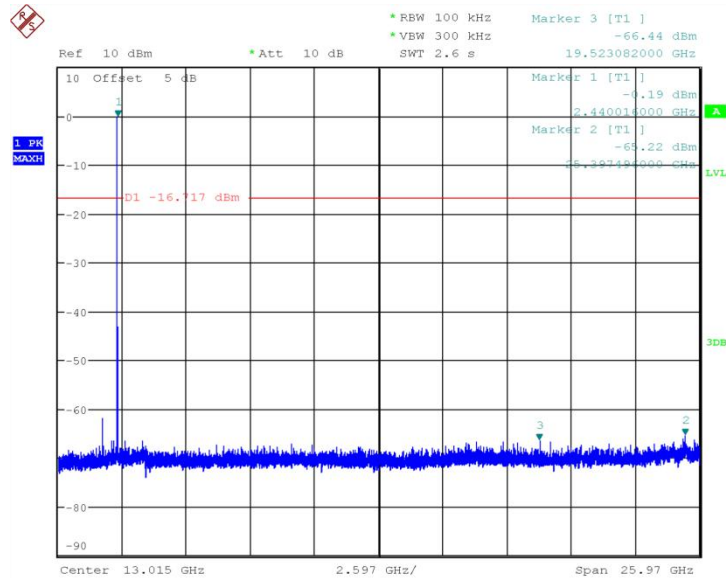
Date: 17.JUL.2018 05:47:00

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



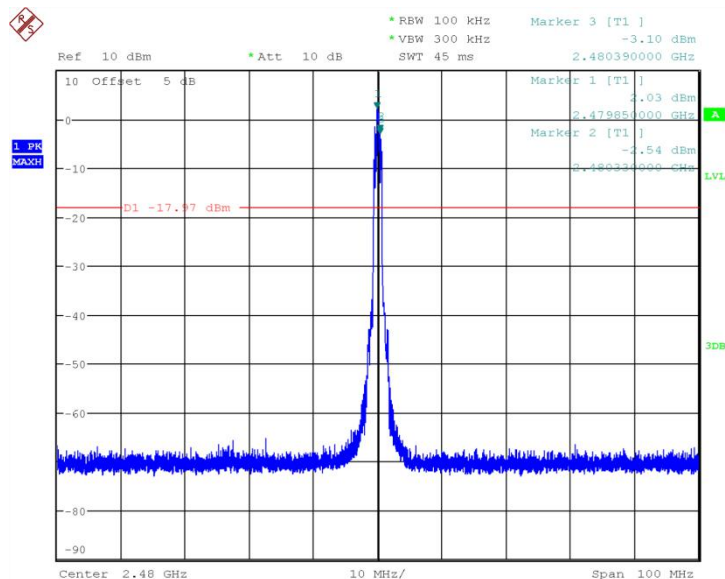
Date: 17.JUL.2018 05:47:27

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



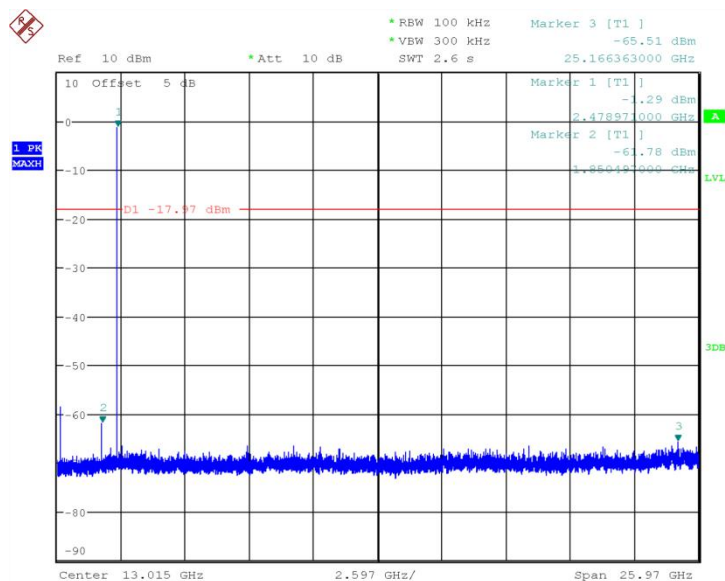
Date: 17.JUL.2018 05:47:52

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



Date: 17.JUL.2018 05:48:19

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



Date: 17.JUL.2018 05:48:45

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

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, 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/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	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:

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

Result = $P_{Mea} + A_{Rpi}$

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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	2.38GHz~2.4GHz	Fig.43	P
Power	2.45GHz~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	2.38GHz~2.4GHz	Fig.48	P
Power	2.45GHz~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	2.38GHz~2.4GHz	Fig.53	P
Power	2.45GHz~2.5GHz	Fig.54	P

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For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.55	P

	1GHz~3GHz	Fig.56	P
	3GHz~18GHz	Fig.57	P
Power	2.38GHz~2.4GHz	Fig.58	P
Power	2.45GHz~2.5GHz	Fig.59	P

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For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.60	P
	1GHz~3GHz	Fig.61	P
	3GHz~18GHz	Fig.62	P
Power	2.38GHz~2.4GHz	Fig.63	P
Power	2.45GHz~2.5GHz	Fig.64	P

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GFSK Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.6	20.98	-22	42.98	H
35.7	21.82	-21.7	43.52	H
40.5	25.49	-20.6	46.09	H
61.5	23.42	-22.5	45.92	H
132.3	21.1	-27.4	48.5	H
326.6	28.87	-21	49.87	V

GFSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2330.5	51.81	5.6	46.21	V
2351.0	52.56	6.2	46.36	H

2523.2	53.26	6.8	46.46	V
2554.2	53.84	7.2	46.64	V
2593.3	53.67	7.3	46.37	H
2627.7	54.69	7.5	47.19	H

GFSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2627.7	42.02	7.5	34.52	H

GFSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13830.8	54.26	18.5	35.76	V
14289.5	55.12	20.7	34.42	H
14815.6	55.13	20.5	34.63	H
15708.5	56.92	23.2	33.72	V
16241.0	57.76	25.3	32.46	H
16733.2	58.83	26.3	32.53	H

GFSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13830.8	41.86	18.5	23.36	V
14289.5	43.07	20.7	22.37	H
14815.6	42.87	20.5	22.37	H
15708.5	45.01	23.2	21.81	V
16241.0	46.31	25.3	21.01	H
16733.2	47.07	26.3	20.77	H

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

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.8	19.94	-21.9	41.84	H

40.2	25.21	-20.7	45.91	H
104.8	27.09	-23.4	50.49	V
178.2	29.18	-25.3	54.48	V
320.0	27.36	-21.2	48.56	V
698.5	30.33	-12.7	43.03	V

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

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2068.8	48.54	2.3	46.24	H
2291.6	50.75	4.9	45.85	V
2608.4	53.71	7.4	46.31	H
2682.9	54.9	7.8	47.1	H
2809.3	54.56	8	46.56	H
2942.4	55.62	8.7	46.92	H

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

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2682.9	42.36	7.8	34.56	H
2809.3	42.52	8	34.52	H
2942.4	43.32	8.7	34.62	H

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

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9206.2	46.9	9.1	37.8	V
10763.4	48.96	12.2	36.76	H
12366.9	51.37	15.7	35.67	V
13806.3	54	18.6	35.4	V
15178.7	55.66	21.1	34.56	H
16294.6	58.7	25.7	33	H

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

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13806.3	41.99	18.6	23.39	V
15178.7	42.73	21.1	21.63	H
16294.6	46.79	25.7	21.09	H

8DPSK Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.8	21.64	-22	43.64	V
66.7	25.82	-24	49.82	V
105.2	20.62	-23.4	44.02	H
197.2	27.41	-24.4	51.81	H
328.8	31.6	-21	52.6	V
691.1	28.77	-12.8	41.57	H

8DPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2545.5	53.88	7.1	46.78	V
2655.5	56.08	7.7	48.38	H
2718.3	54.19	7.8	46.39	H
2831.9	54.79	8.2	46.59	H
2897.9	55.53	8.9	46.63	H
2995.4	57.86	9	48.86	H

8DPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2655.5	42.46	7.7	34.76	H
2718.3	42.13	7.8	34.33	H
2831.9	42.49	8.2	34.29	H

2897.9	43.21	8.9	34.31	H
2995.4	43.17	9	34.17	H

8DPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13278.7	53.48	17.1	36.38	V
14293.6	56.52	20.7	35.82	H
15421.0	55.73	22.7	33.03	V
16335.8	57.95	25.8	32.15	H
17090.8	60.76	26.9	33.86	H
17649.4	60.04	27.5	32.54	H

8DPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14293.6	43.15	20.7	22.45	H
15421.0	43.83	22.7	21.13	V
16335.8	46.03	25.8	20.23	H
17090.8	47.86	26.9	20.96	H
17649.4	48.11	27.5	20.61	H

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

Conclusion: PASS

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8DPSK Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.6	19.38	-22	41.38	V
114.8	26.36	-24.4	50.76	H
178.9	29.64	-25.3	54.94	V
229.7	34.53	-23.5	58.03	V

340.2	31.29	-20.9	52.19	V
457.5	33.25	-18	51.25	V

8DPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1996.0	55.51	1.8	53.71	H
2549.5	54	7.2	46.8	V
2716.9	54.57	7.8	46.77	H
2864.7	55.06	8.5	46.56	H
2969.4	55.62	8.8	46.82	H
2996.8	58.67	9	49.67	H

8DPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1996.0	36.38	1.8	34.58	H
2549.5	41.76	7.2	34.56	V
2716.9	42.13	7.8	34.33	H
2864.7	42.88	8.5	34.38	H
2969.4	43.11	8.8	34.31	H
2996.8	43.21	9	34.21	H

8DPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11979.0	51.37	15	36.37	H
13791.6	54.14	18.5	35.64	H
14849.8	55.39	20.5	34.89	H
15596.8	55.95	22.8	33.15	H
16304.2	59.05	25.8	33.25	V
17468.7	59.79	27.2	32.59	H

8DPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13791.6	42.3	18.5	23.8	H
14849.8	43.1	20.5	22.6	H
15596.8	44.11	22.8	21.31	H
16304.2	46.64	25.8	20.84	V
17468.7	47.1	27.2	19.9	H

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

Conclusion: PASS

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8DPSK Ch0 30MHz-1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.5	16.11	-22	38.11	V
49.2	25.91	-19.9	45.81	V
98.2	17.73	-23.8	41.53	V
184.2	31.75	-25	56.75	H
261.6	26.7	-22.6	49.3	H
334.9	28.22	-20.9	49.12	V

8DPSK Ch0 1GHz-3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1999.5	54.25	2.1	52.15	H
2067.0	49.02	2.3	46.72	H
2171.6	50.51	3.4	47.11	V
2642.0	54.41	7.6	46.81	H
2696.9	54.04	7.9	46.14	V
2742.4	54.61	7.7	46.91	H

8DPSK Ch0 1GHz-3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1999.5	36.38	2.1	34.28	H
2642.0	42.19	7.6	34.59	H
2696.9	42.3	7.9	34.4	V
2742.4	42.29	7.7	34.59	H

8DPSK Ch0 3GHz-18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4977.9	49.91	0.3	49.61	H
5991.6	51.29	2.3	48.99	H
7562.4	44.76	5.7	39.06	V
10852.0	50.7	12.6	38.1	H
14313.4	55.47	20.6	34.87	V
16283.3	58.88	25.6	33.28	V

8DPSK Ch0 3GHz-18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14313.4	42.89	20.6	22.29	V
16283.3	46.73	25.6	21.13	V

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

Conclusion: PASS

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Test graphs as below:

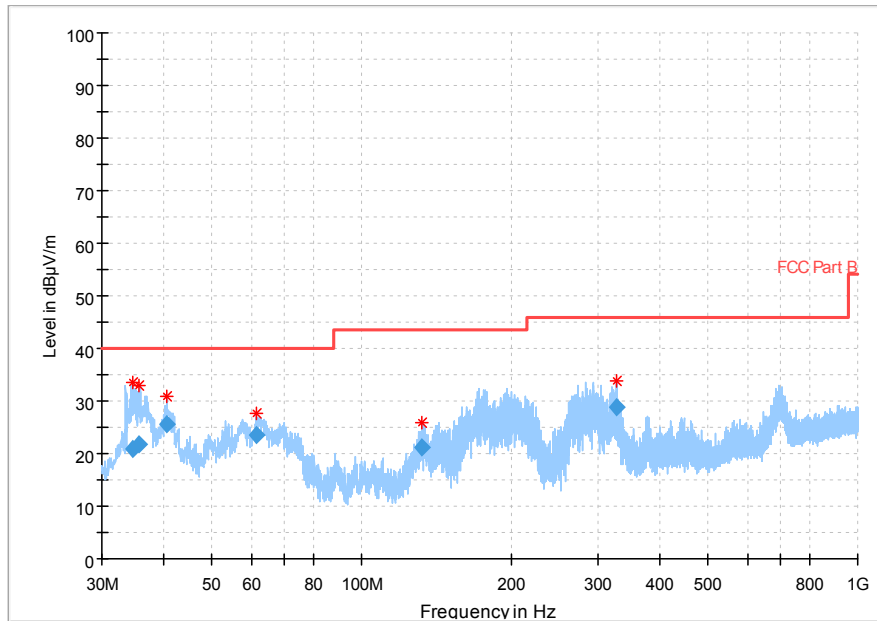


Fig.40 Radiated emission: GFSK, Ch0, 30MHz~1GHz

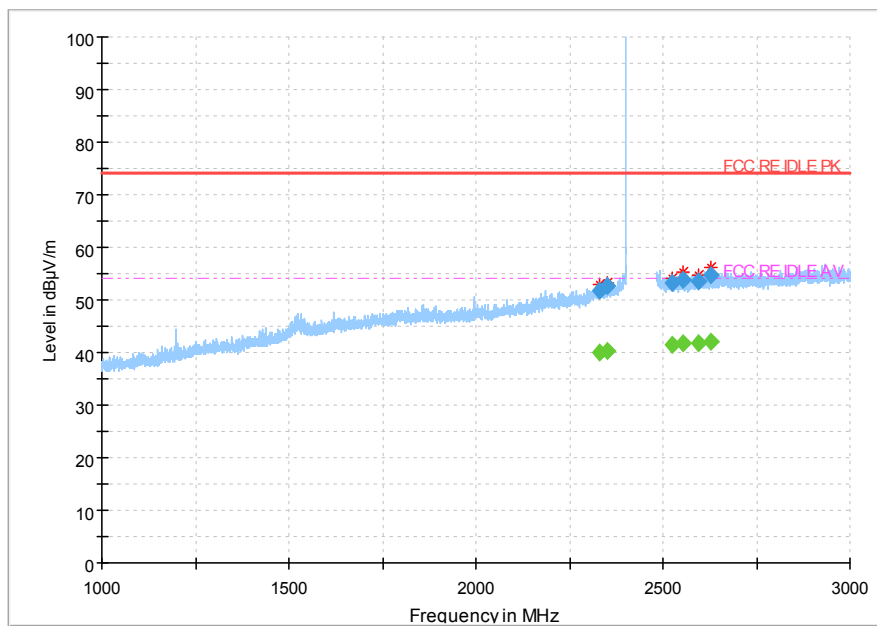


Fig.41 Radiated emission: GFSK, Ch0, 1GHz~3GHz

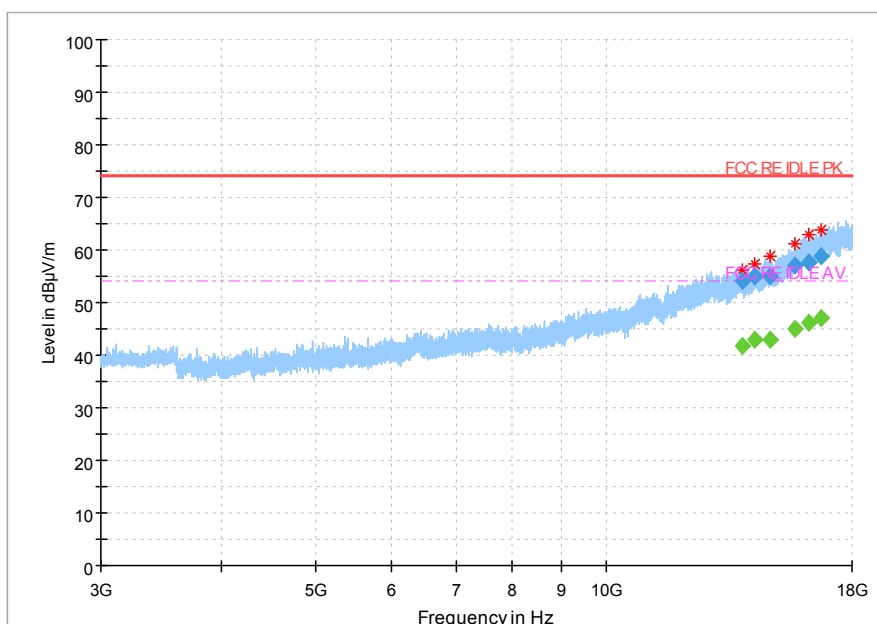
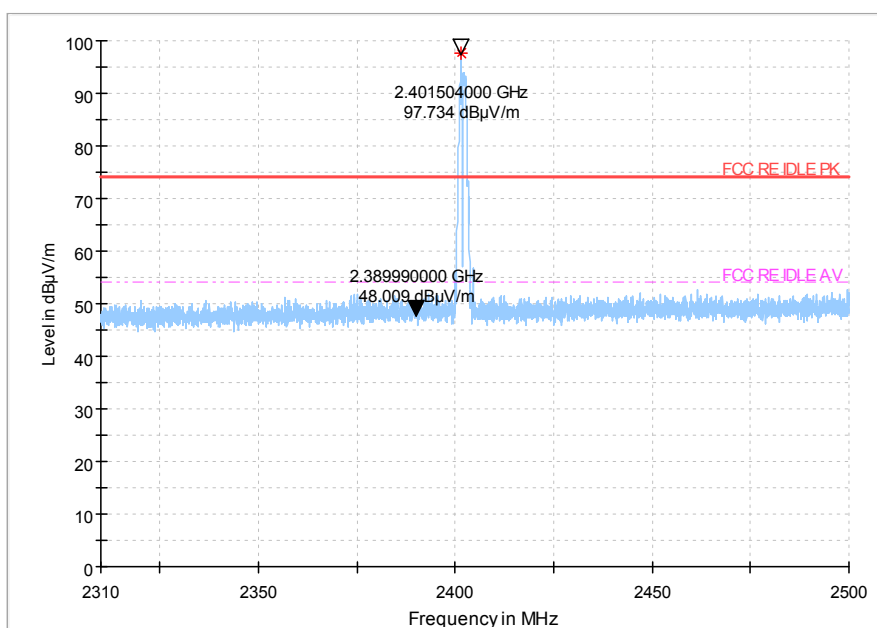


Fig.42 Radiated emission: GFSK, Ch0, 3GHz~18GHz



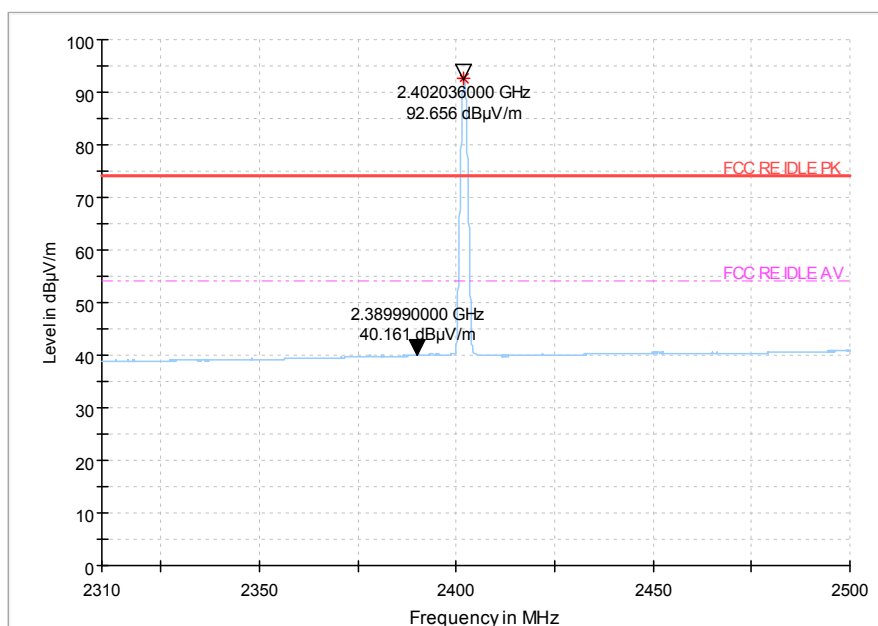
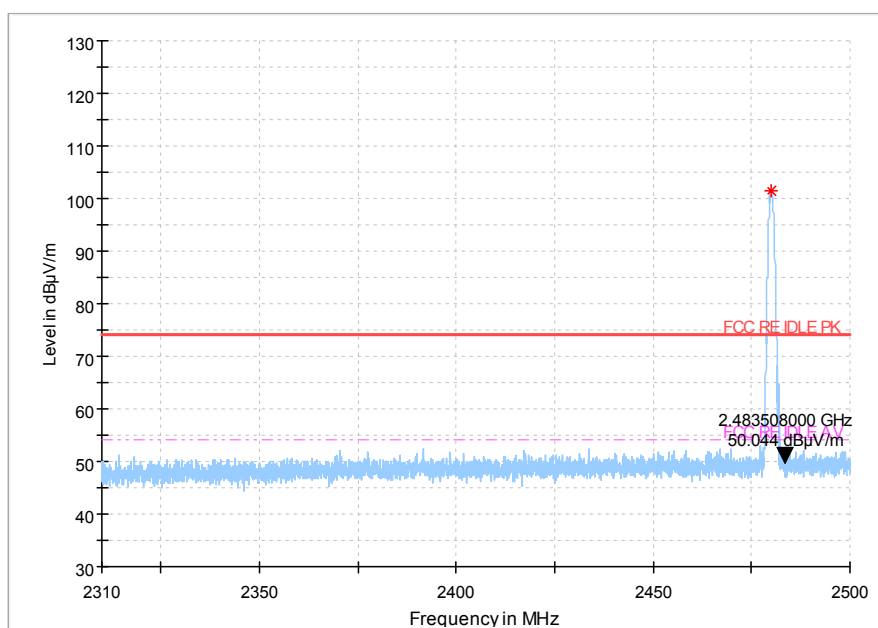


Fig.43 Radiated emission (Power): GFSK, low channel



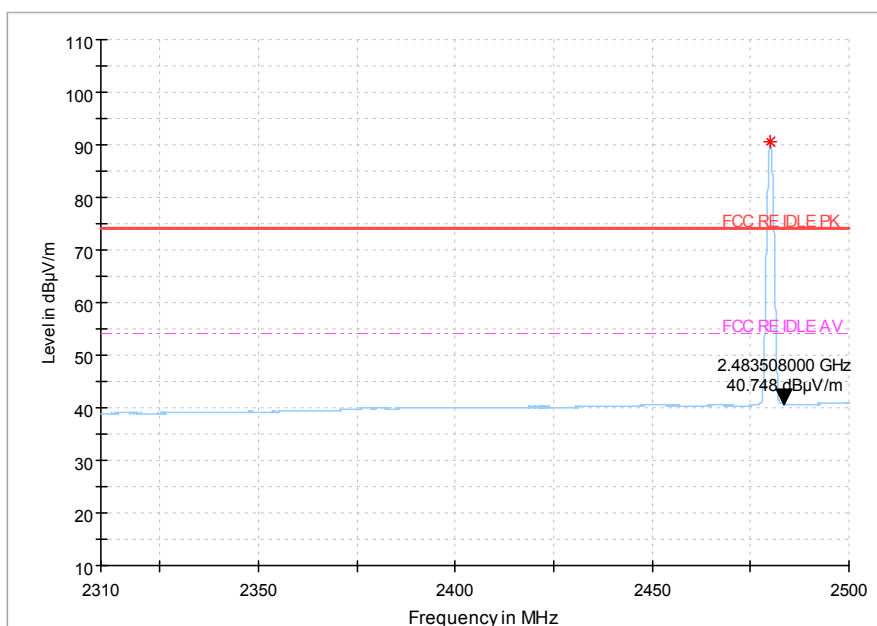


Fig.44 Radiated emission (Power): GFSK, high channel

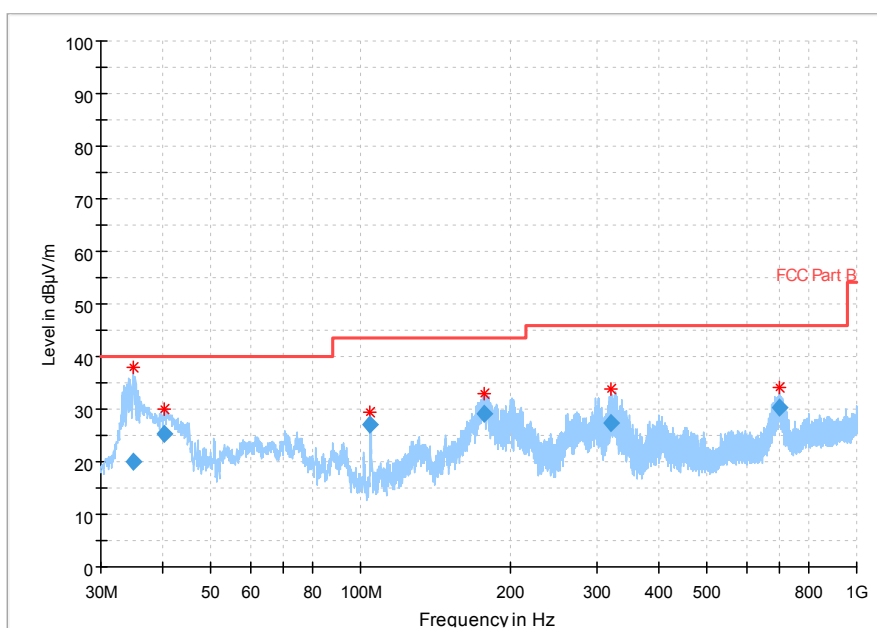


Fig.45 Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz

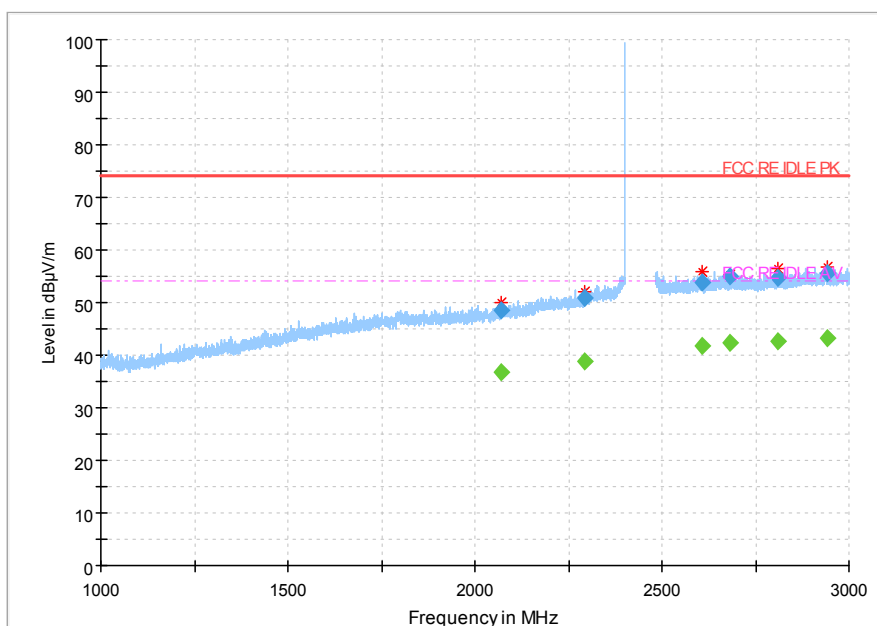


Fig.46 Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz

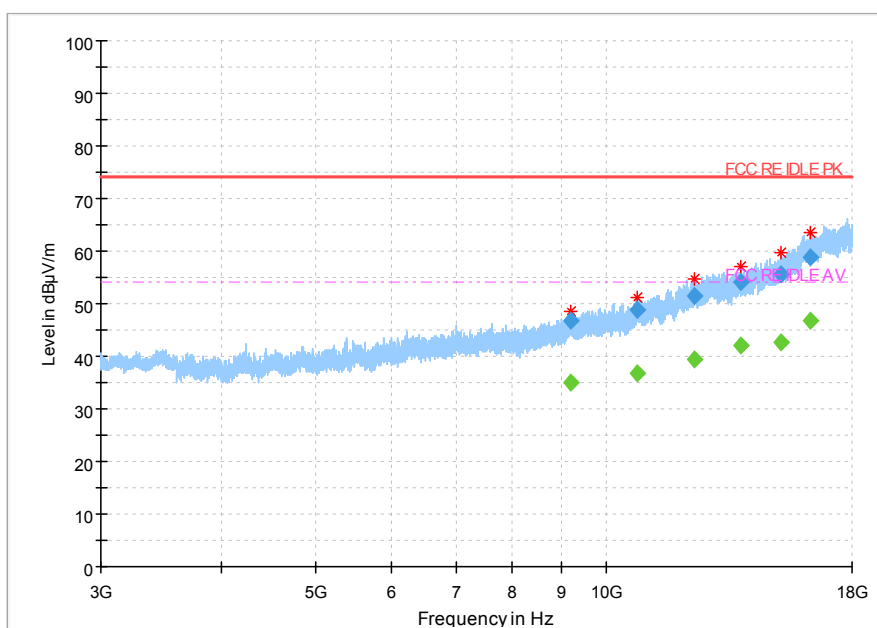


Fig.47 Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz

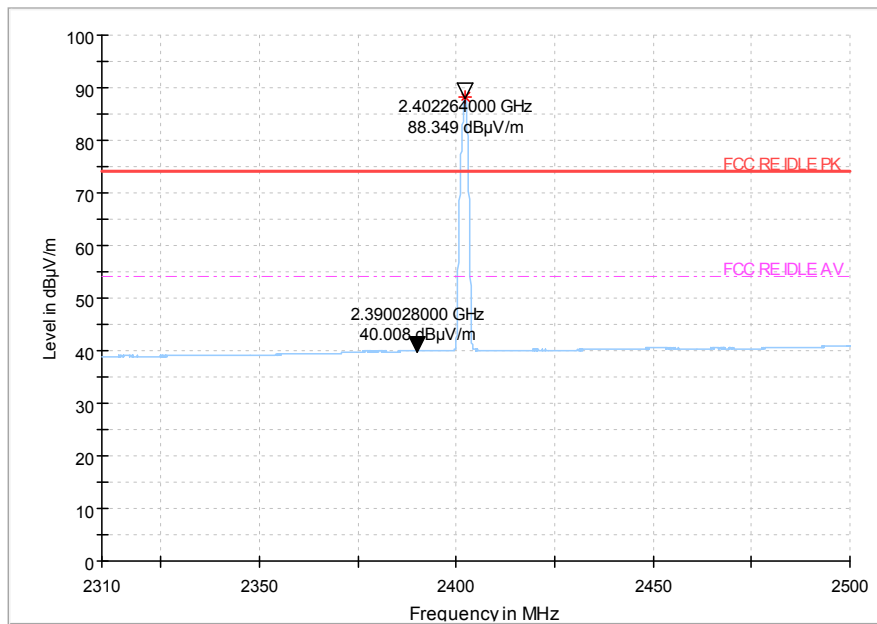
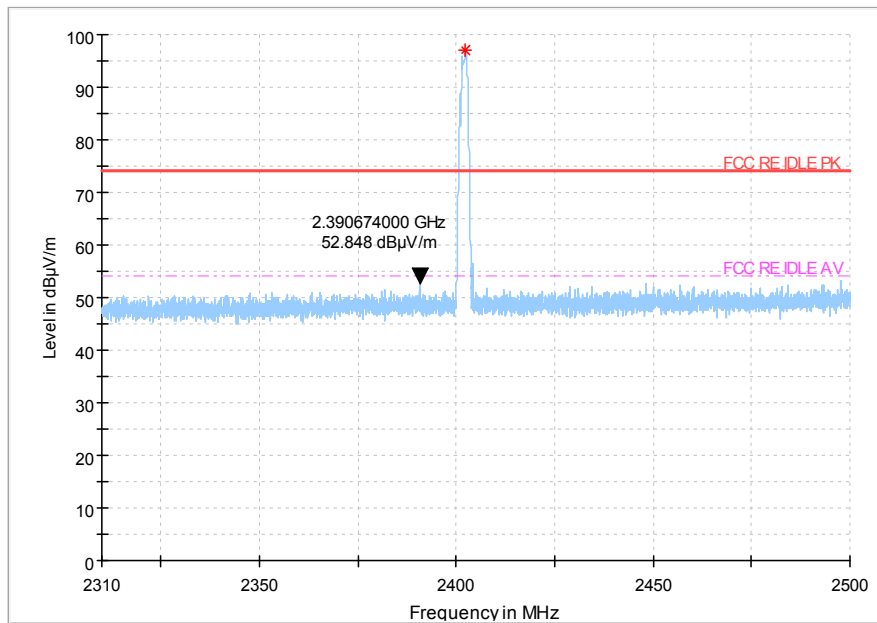


Fig.48 Radiated emission (Power): $\pi/4$ DQPSK, low channel

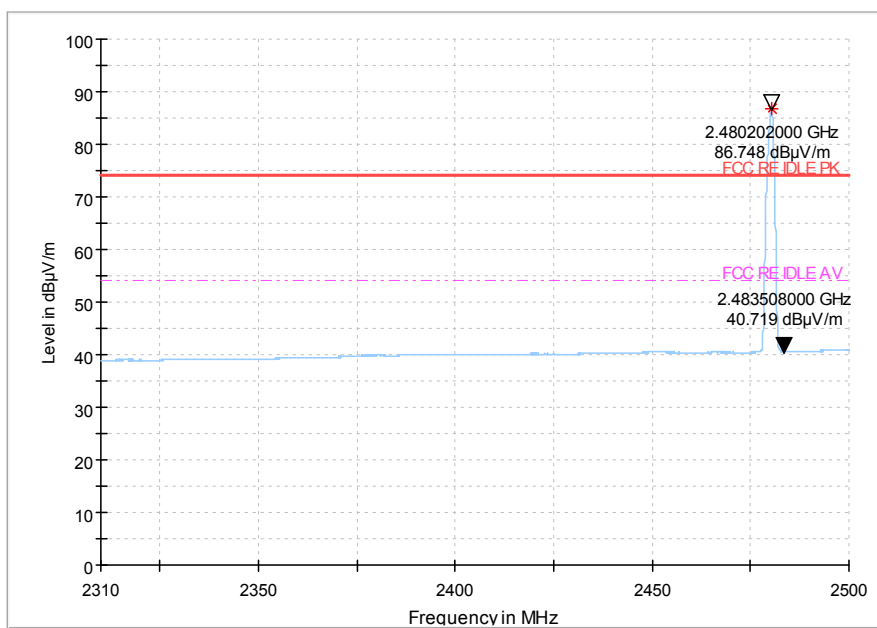
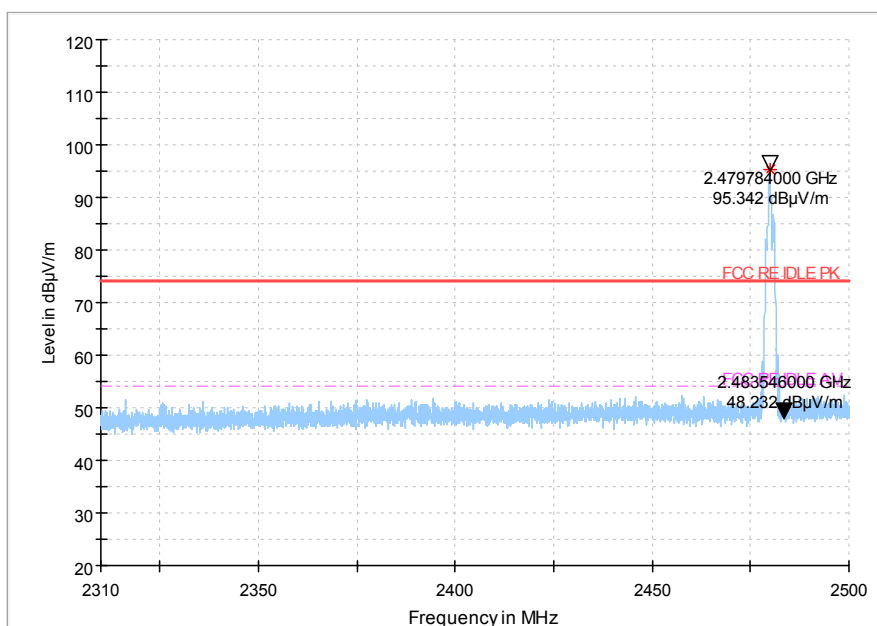


Fig.49 Radiated emission (Power): $\pi/4$ DQPSK, high channel

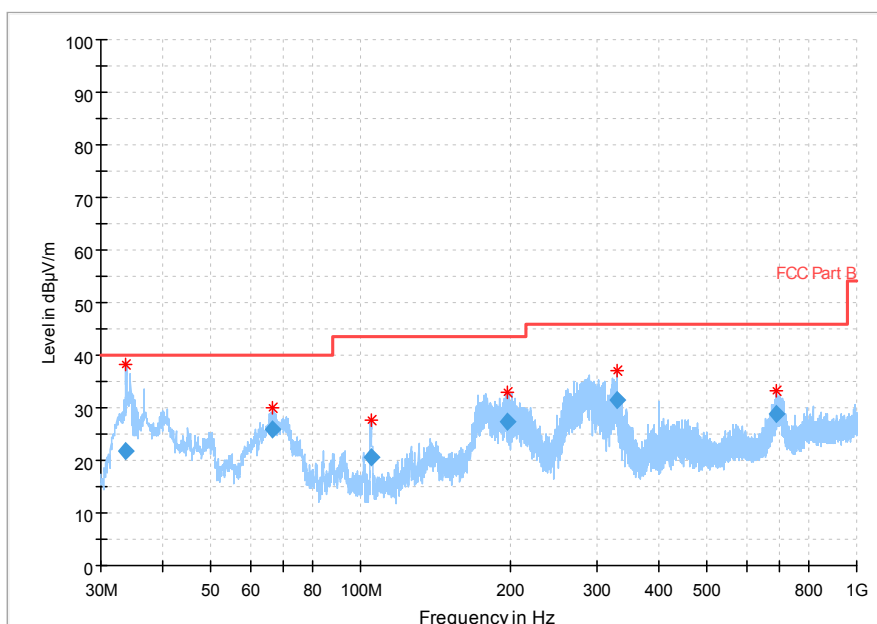


Fig.50 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

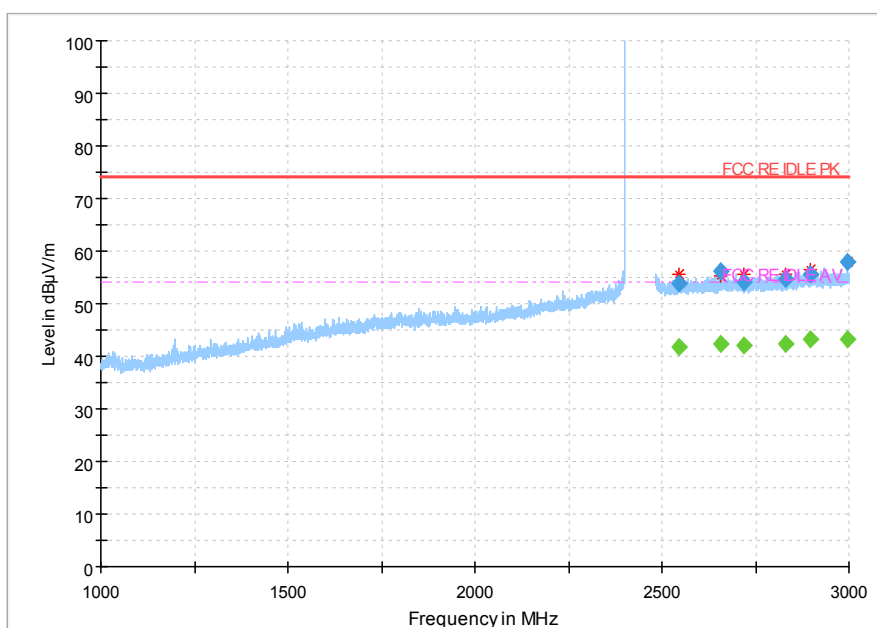


Fig.51 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

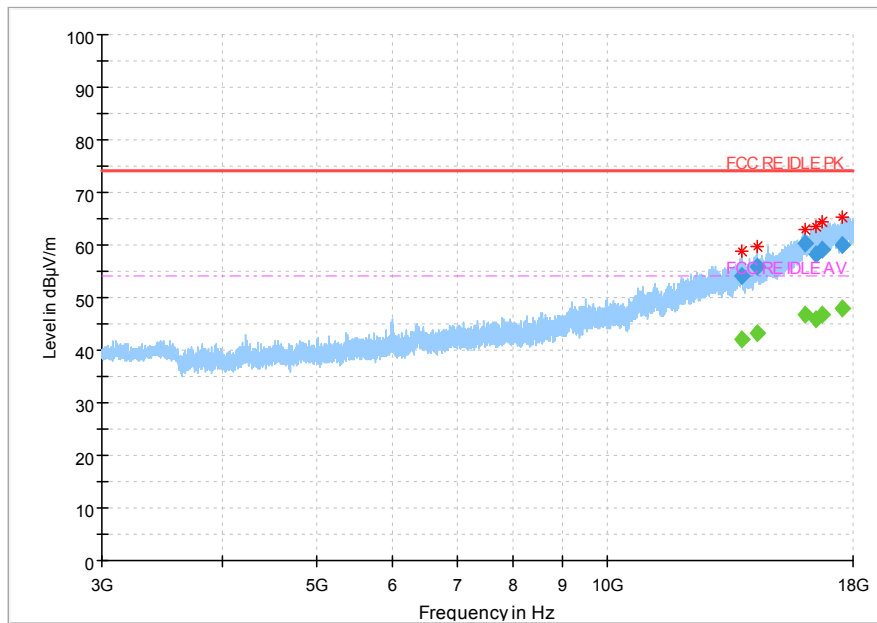
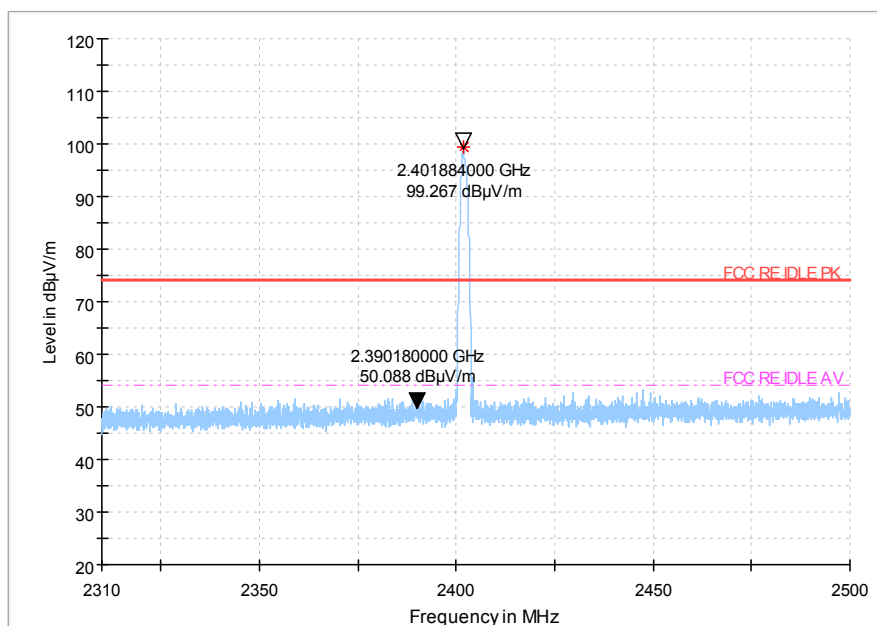


Fig.52 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz



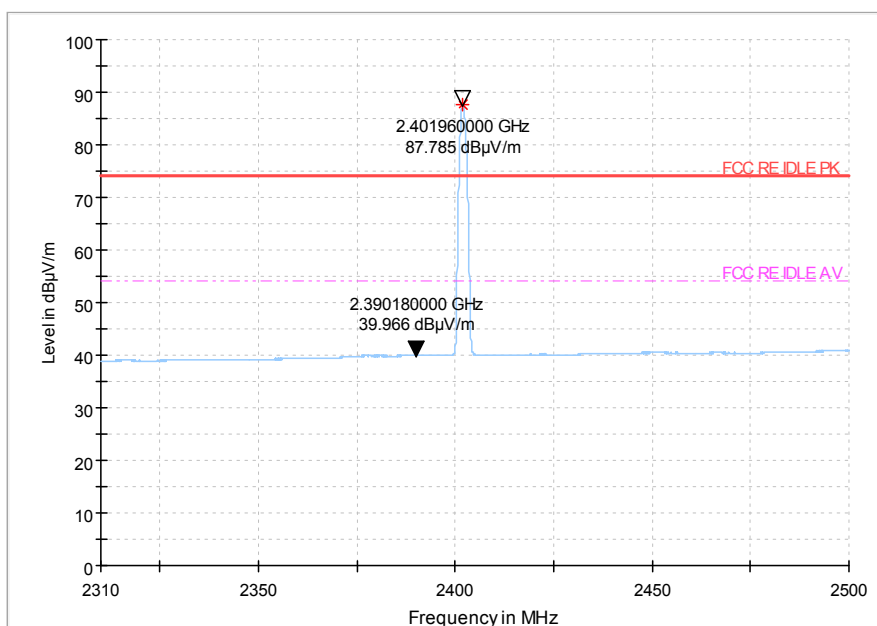
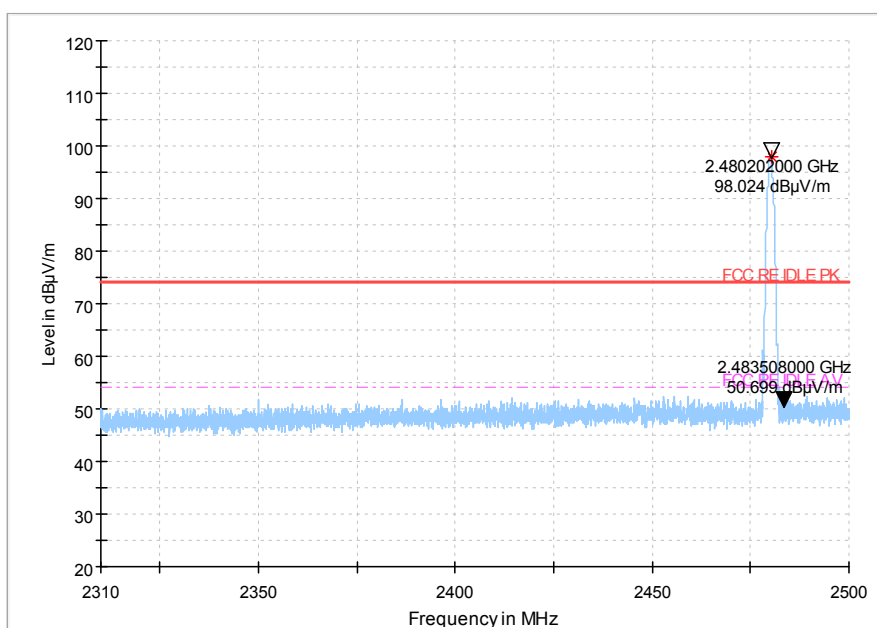


Fig.53 Radiated emission (Power): 8DPSK, low channel



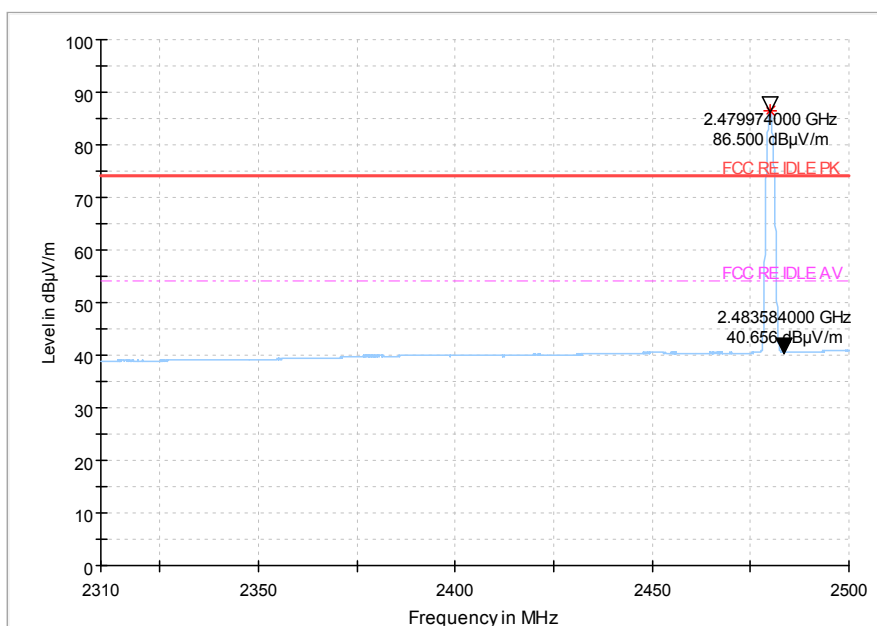


Fig.54 Radiated emission (Power): 8DPSK, high channel

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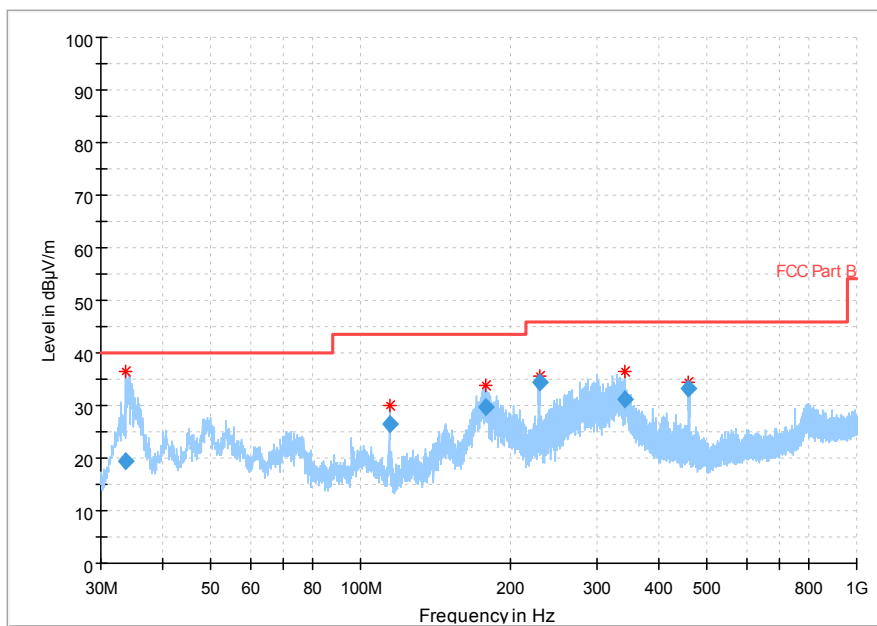


Fig.55 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

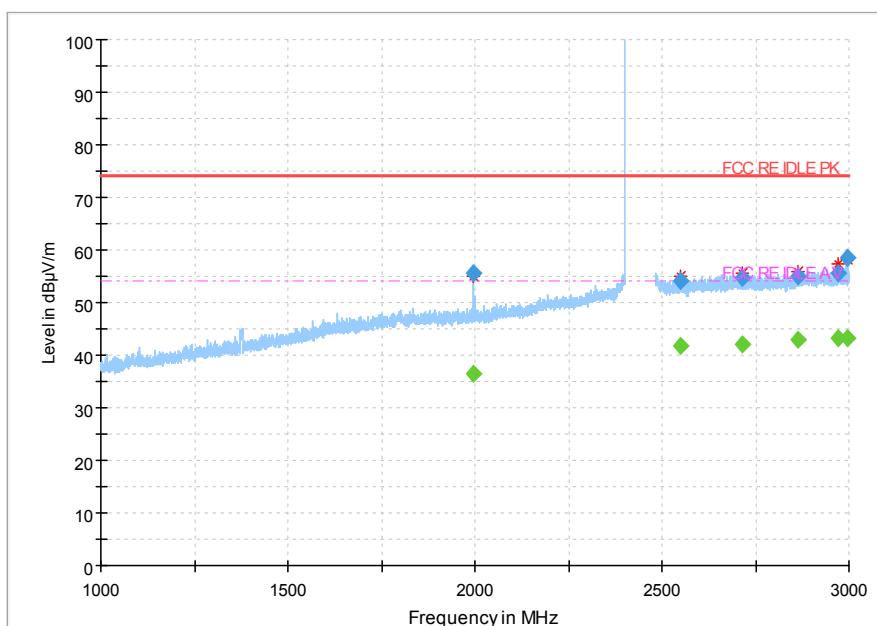


Fig.56 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

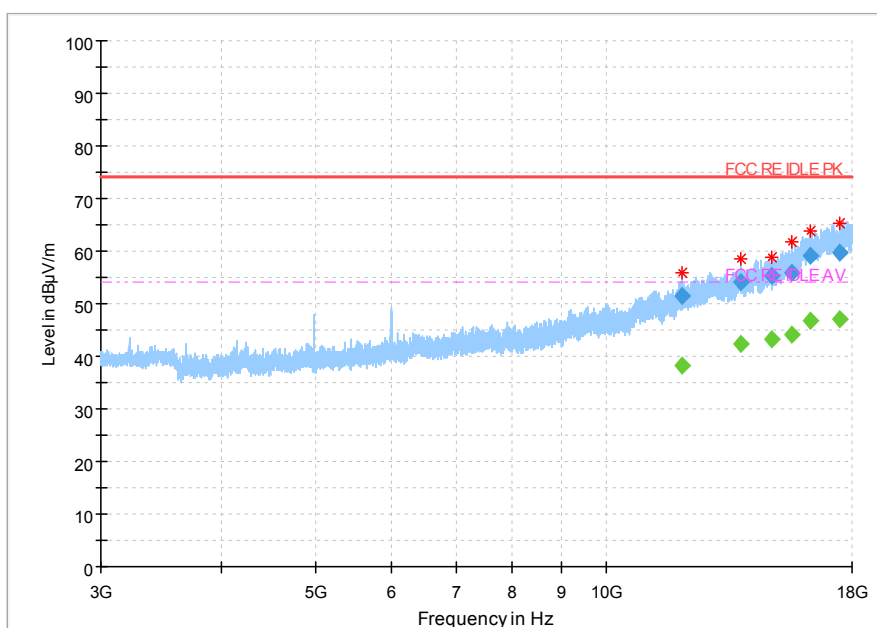


Fig.57 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz

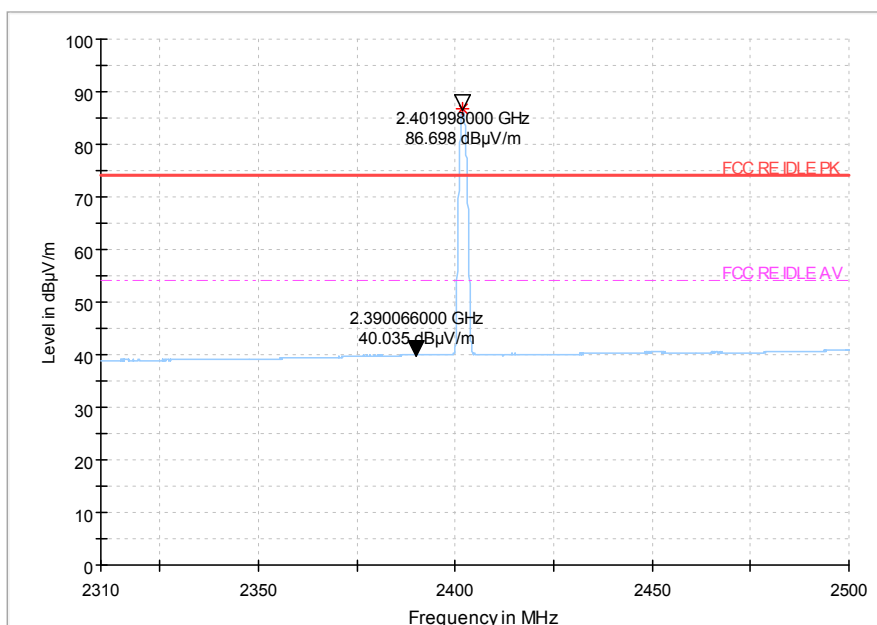
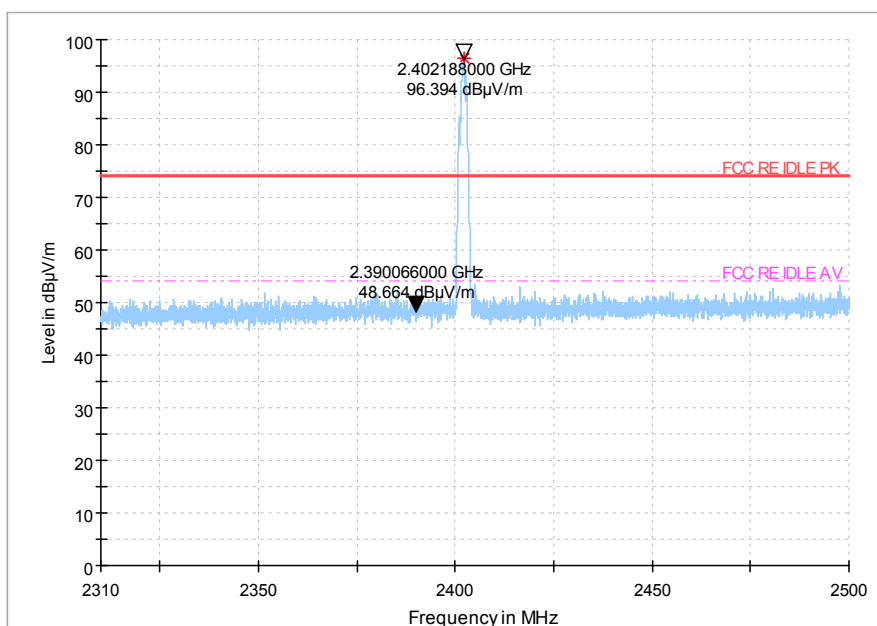


Fig.58 Radiated emission (Power): 8DPSK, low channel

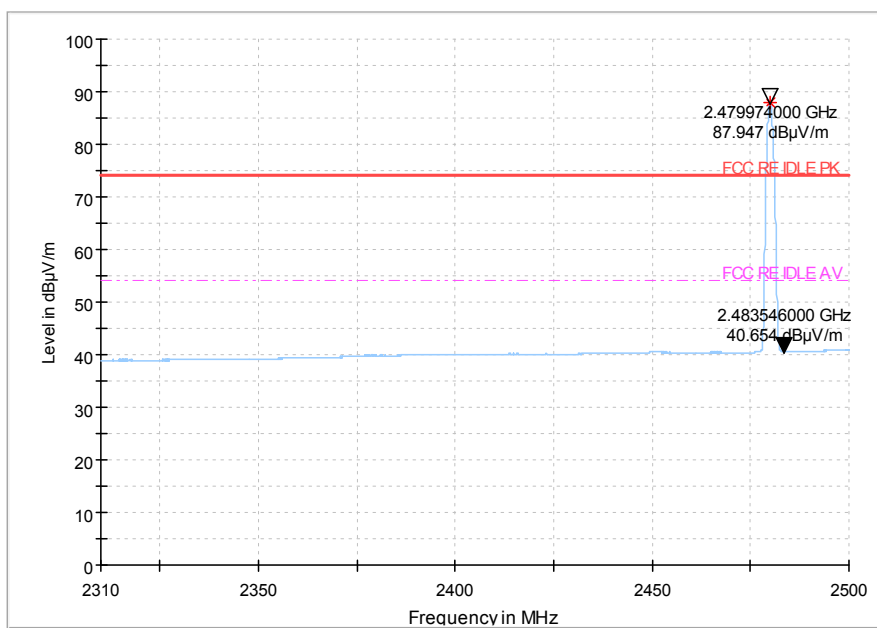
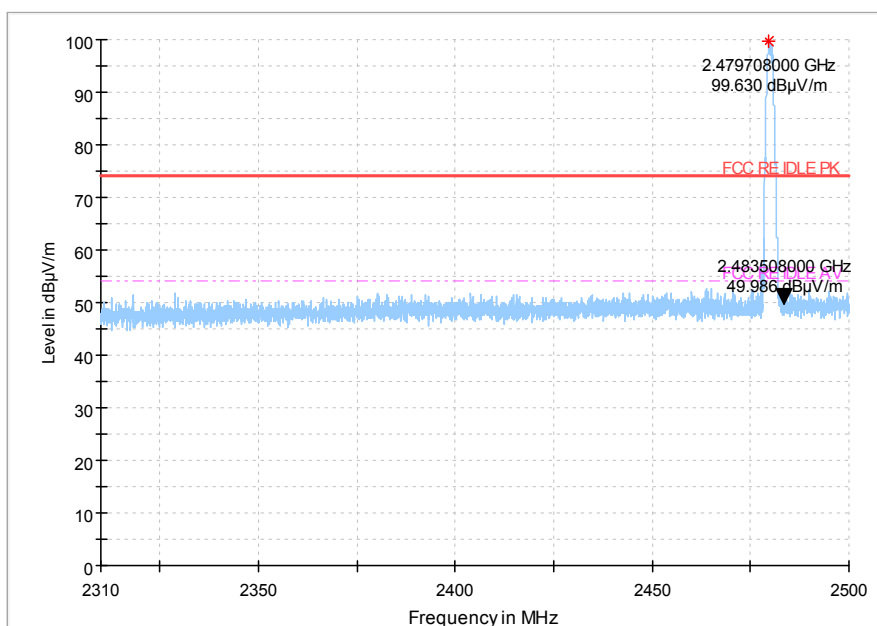


Fig.59 Radiated emission (Power): 8DPSK, high channel

L1521

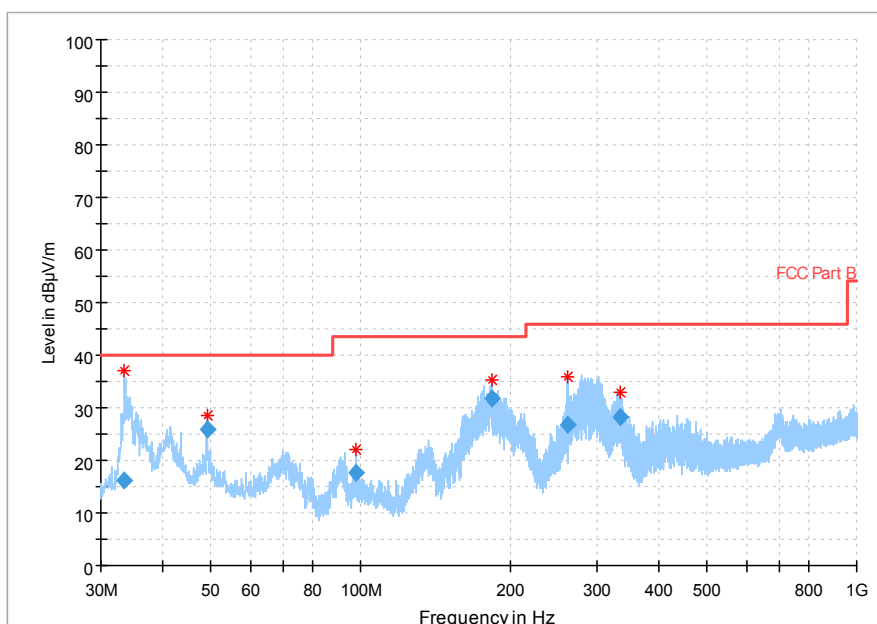


Fig.60 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

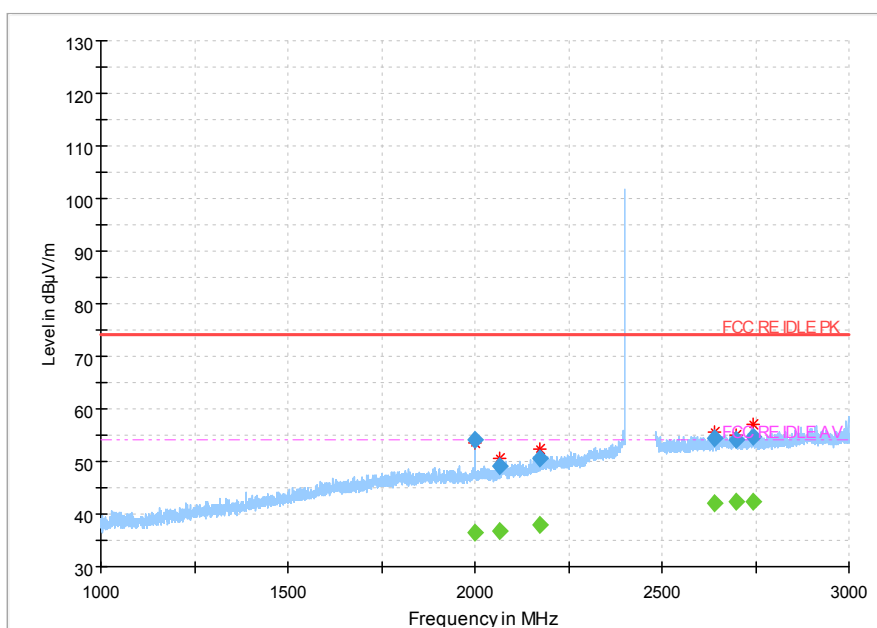


Fig.61 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

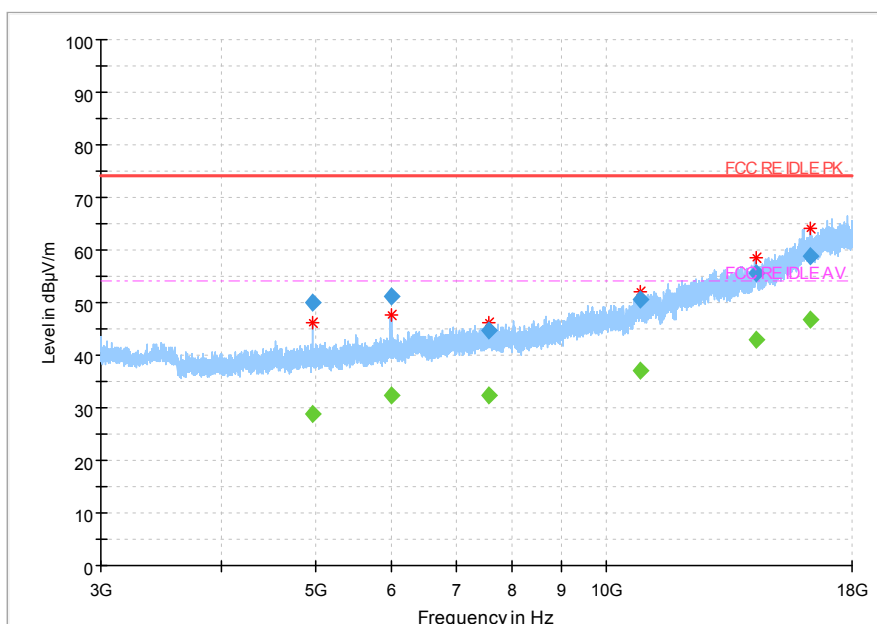
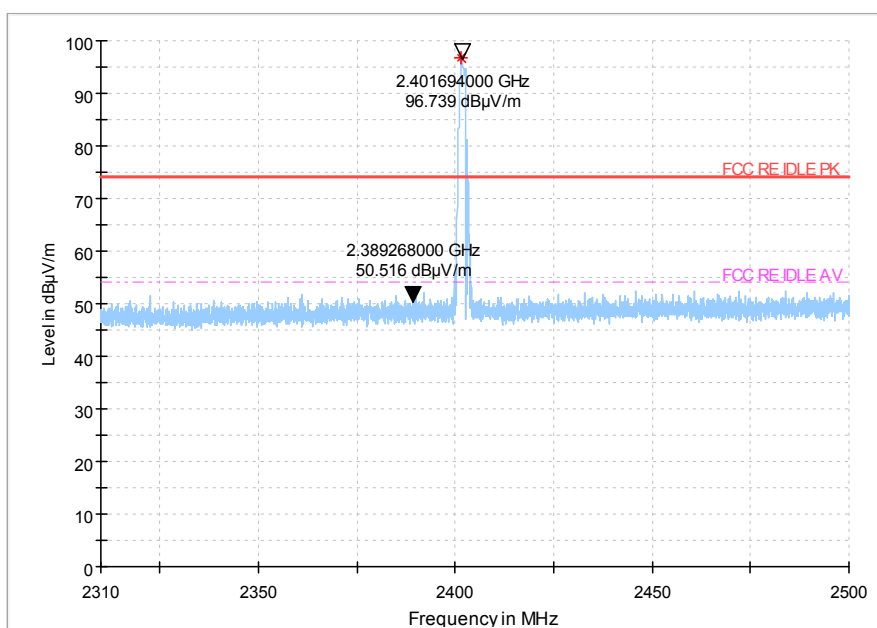


Fig.62 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz



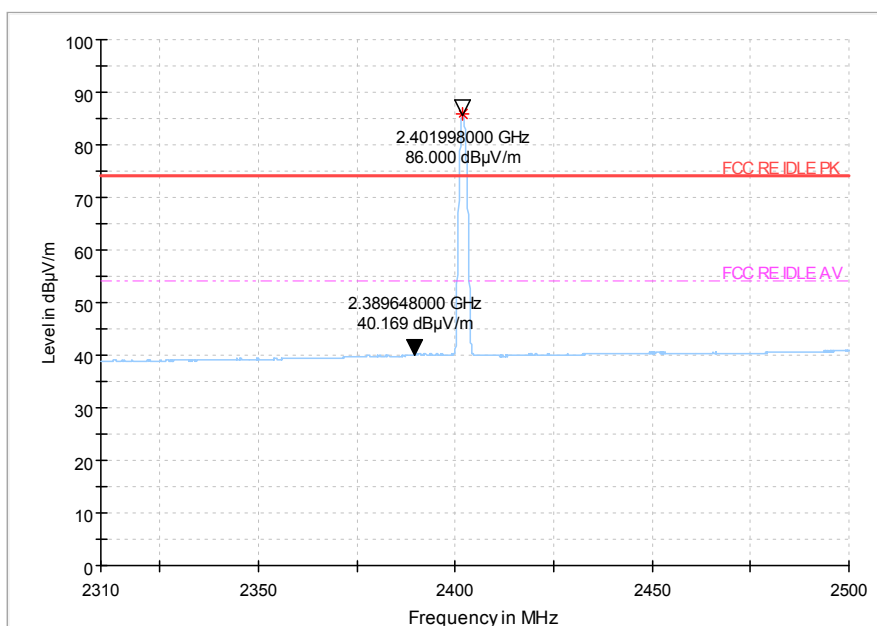
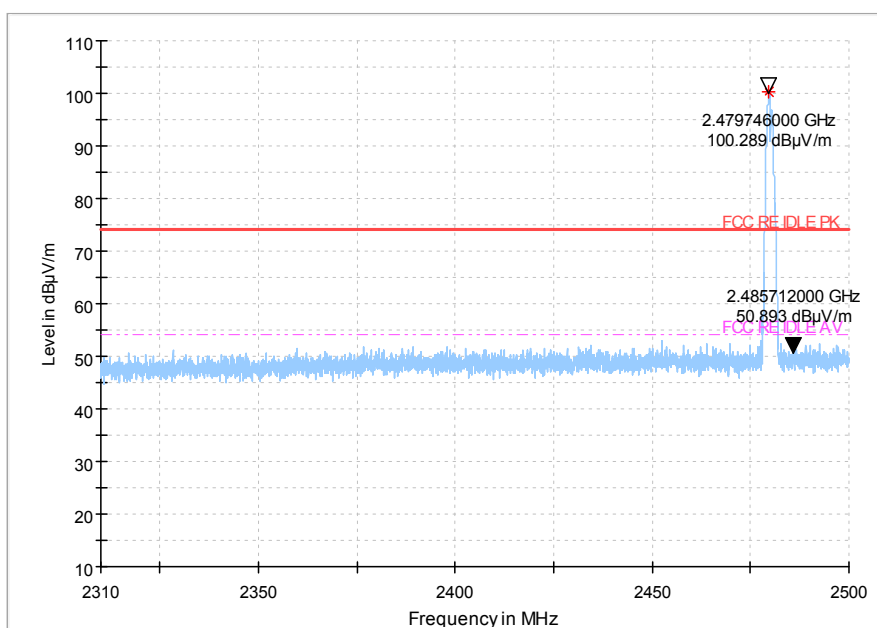


Fig.63 Radiated emission (Power): 8DPSK, low channel



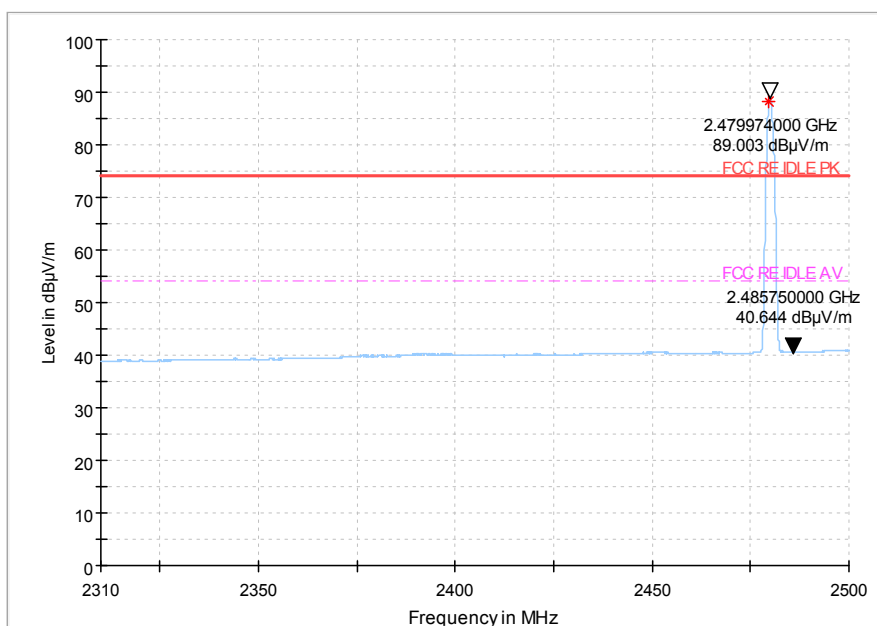
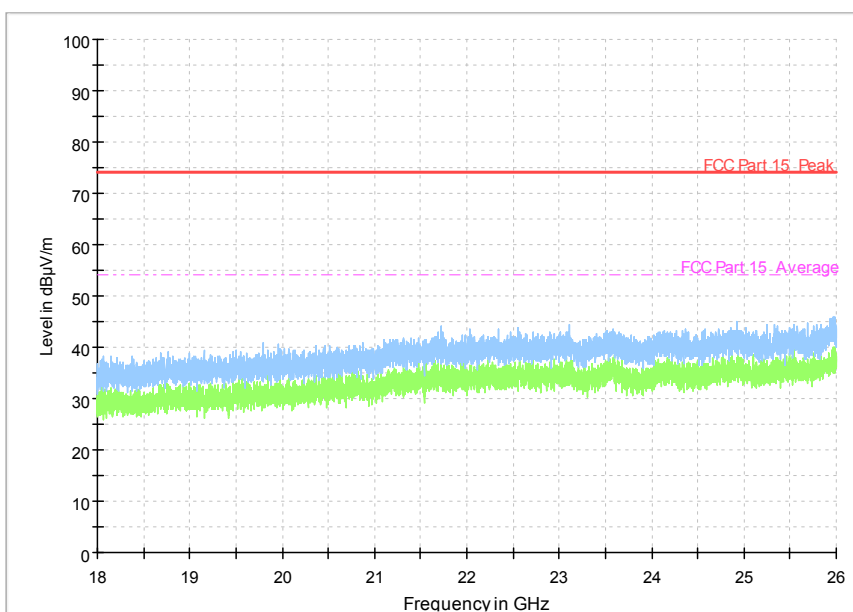


Fig.64 Radiated emission (Power): 8DPSK, high channel



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.

6.5.3 Measurement Result

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.55	64.13	P
		Fig.56		
	DH3	Fig.57	195.84	P
		Fig.58		
	DH5	Fig.59	282.24	P
		Fig.60		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.61	65.66	P
		Fig.62		
	2DH3	Fig.63	198.02	P
		Fig.64		
	2DH5	Fig.65	276.48	P

		Fig.66		
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For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.67	63.74	P
		Fig.68		
	3DH3	Fig.69	195.84	P
		Fig.70		
	3DH5	Fig.71	285.12	P
		Fig.72		

Conclusion: PASS

Test graphs as below:

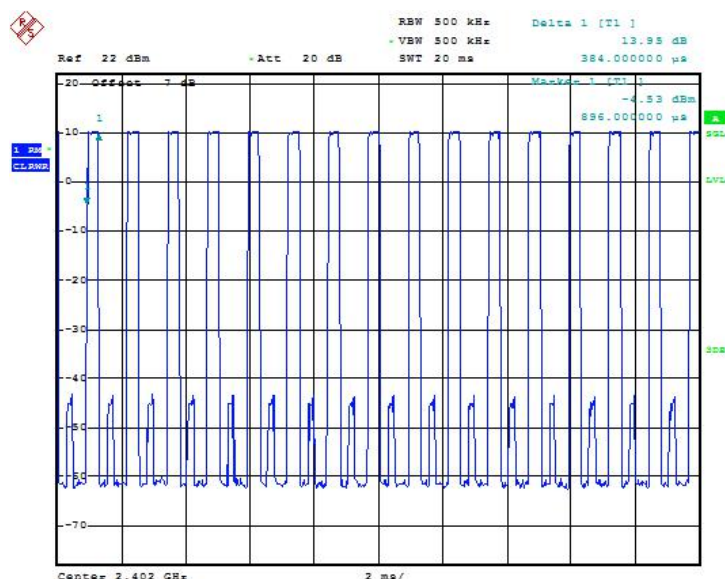


Fig.55 Time of occupancy (Dwell Time): Ch39, Packet DH1

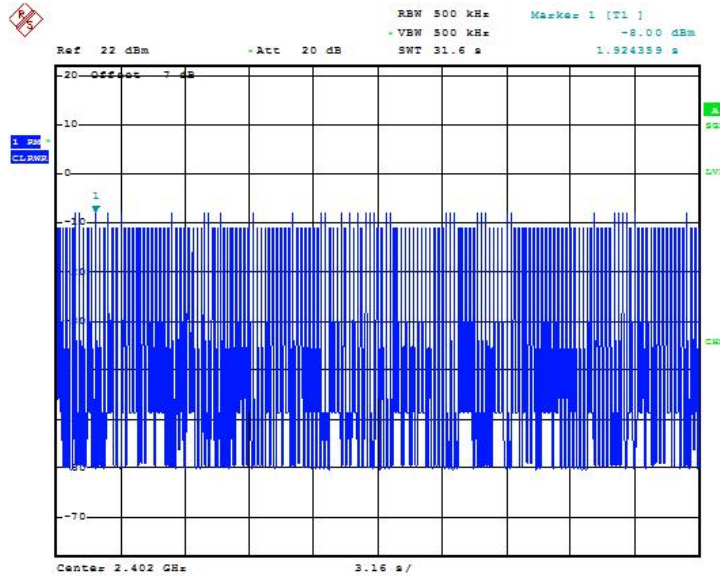


Fig.56 Number of Transmissions Measurement: Ch39, Packet DH1

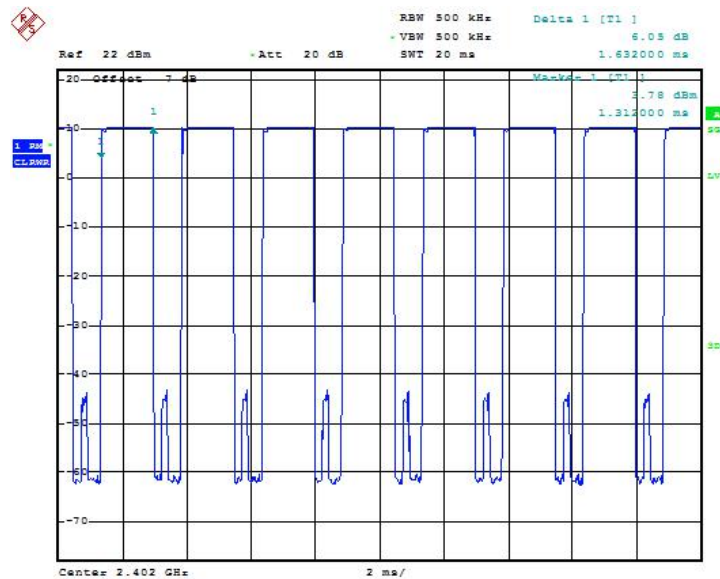


Fig.57 Time of occupancy (Dwell Time): Ch39, Packet DH3

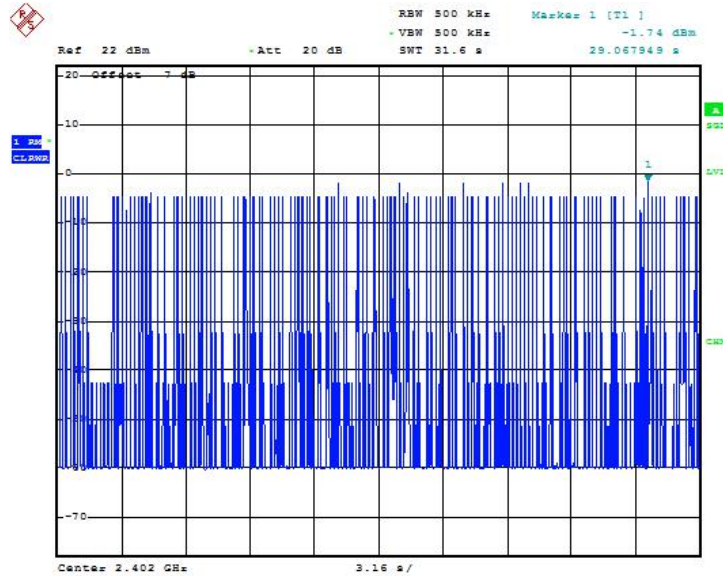


Fig.58 Number of Transmissions Measurement: Ch39, Packet DH3

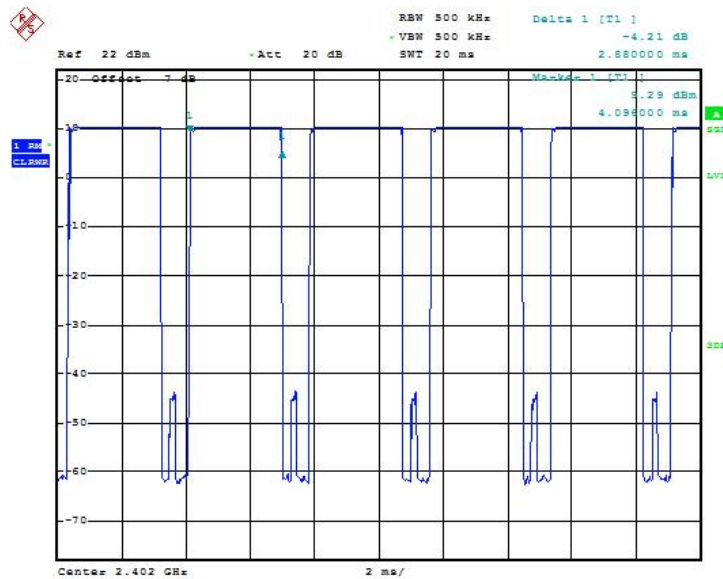


Fig.59 Time of occupancy (Dwell Time): Ch39,Packet DH5