Full

TEST REPORT

No. I17D00008-RFB

For

Client : Hisense International Co., Ltd

Production : Smartphone

Model Name : Hisense T963

FCC ID: 2ADOBT963

Hardware Version: V1.00

Software Version: L1348.6.01.01.MX06

Issued date: 2017-02-07

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
I17D00008-RFB	00	2017-02-07	Initial 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

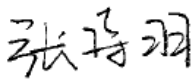
1.2. Testing Environment

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

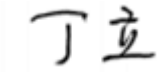
1.3. Project data

Project Leader:	Wang Yaqiong
Testing Start Date:	2016-12-21
Testing End Date:	2017-01-24

1.4. Signature



Zhang Shiyu
(Prepared this test report)



Ding Li
(Reviewed this test report)

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

2. Client Information

2.1. Applicant Information

Company Name:	Hisense International Co., Ltd
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
Postcode:	266010
Email:	zhangkelin@hisense.com

2.2. Manufacturer Information

Company Name:	Hisense Communications Co., Ltd.
Address:	218 Qianwangang Road, Economic & Technological Development Zone, Qingdao, Shandong Province, P.R. China
Postcode:	266510
Email:	zhangmingyd@hisense.com

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

3.1. About EUT

EUT Description	Smartphone
Model name	Hisense T963
GSM Frequency Band	GSM850/900/1800/1900
WLAN Frequency	2412MHz-2472MHz
WLAN Channel	Channel1-Channel13
WLAN type of modulation	802.11b:DSSS 802.11g/n: OFDM
Extreme Temperature	-10/+55℃
Nominal Voltage	3.8V
Extreme High Voltage	4.3V
Extreme Low Voltage	3.6 V

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*	SN or IMEI	HW Version	SW Version	Date of receipt
N03	002101541395046	V1.00	L1348.6.01.01.MX06	2016-12-20

*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.

3.4. Main Supply of EUT

Part Name	Model Name	Supplier
LCD	TXDY500DFWPC-174	TONGXINGDA
Flash	KMFNX0012M-B214	Samsung

3.5. Secondary Supply of EUT

AE ID*	Description	SN
LCD	KBF8630-5.0	HOLITECH
Flash	H9TQ64A8GTCCUR-KUM	SK Hynix

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)	/	N/A
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	/	N/A

Please refer to part 5 for detail.

The measurements are according to and 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	22℃
Voltage	Vnom	3.7V
Humidity	Hnom	32%
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, π/4 DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for π/4 DQPSK, 3-DH1 for 8DPSK.

c.The DC and low frequency voltages' measurement uncertainty is ±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.

The following deviation from, additions to, or exclusions from the test specifications have been made. See section 3.

5.2. Statements

The product name Hisense T963, supporting GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/WLAN/BT/BLE, manufactured by Hisense International Co., Ltd. According to the variant description, there is no case to be retested except RSE. The other test results please refer to I16D00265-RFB.

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)	6.037	7.479	8.486	P
	Fig.1	Fig.2	Fig.3	

For π/4 DQPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.082	8.395	9.15	P
	Fig.4	Fig.5	Fig.6	

For 8DPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion

Peak Conducted Output Power (dBm)	7.227	8.486	9.249	P
	Fig.7	Fig.8	Fig.9	

Conclusion: PASS

Test graphs an below

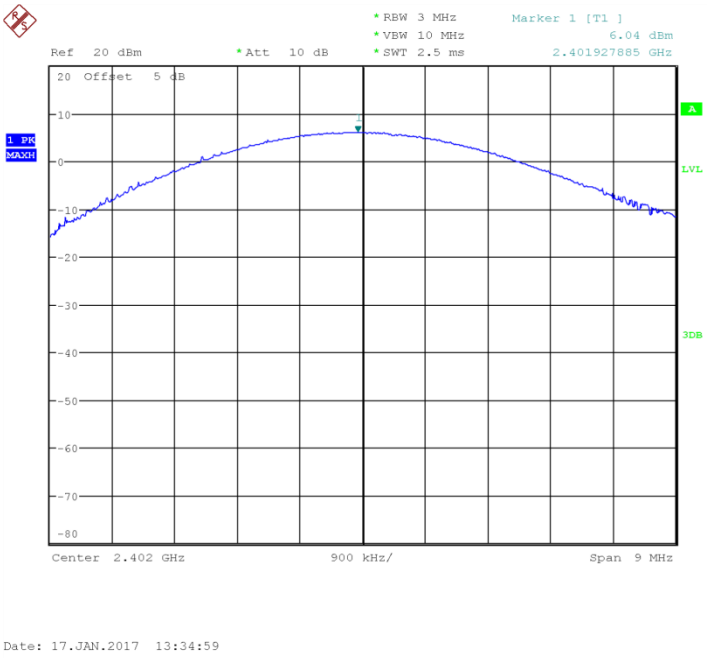


Fig.1 Peak Conducted Output Power CH0, DH1

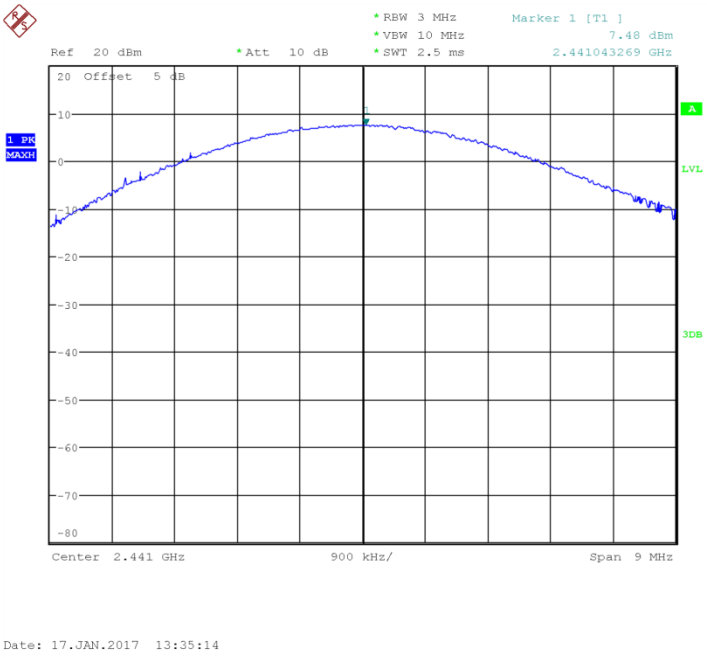


Fig.2 Peak Conducted Output Power CH39, DH1

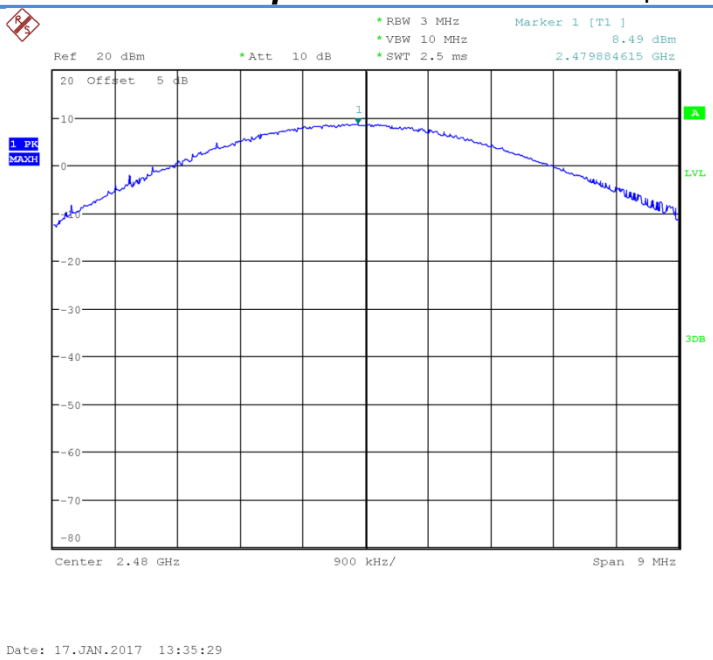


Fig.3 Peak Conducted Output Power CH78, DH1

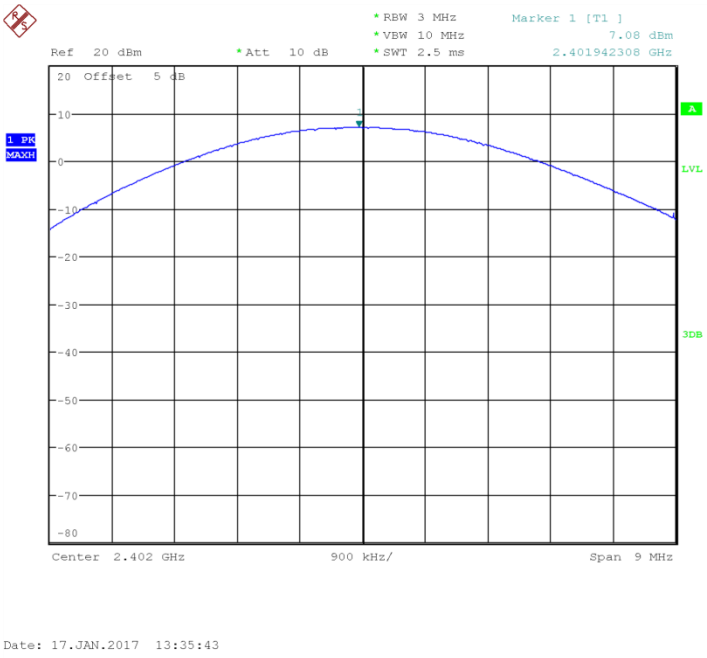


Fig.4 Peak Conducted Output Power CH0, 2DH1

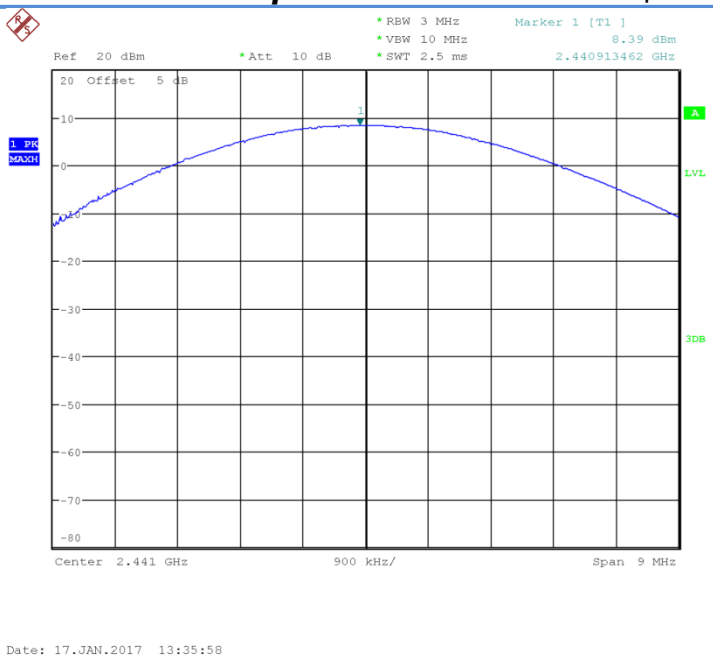


Fig.5 Peak Conducted Output Power CH39, 2DH1

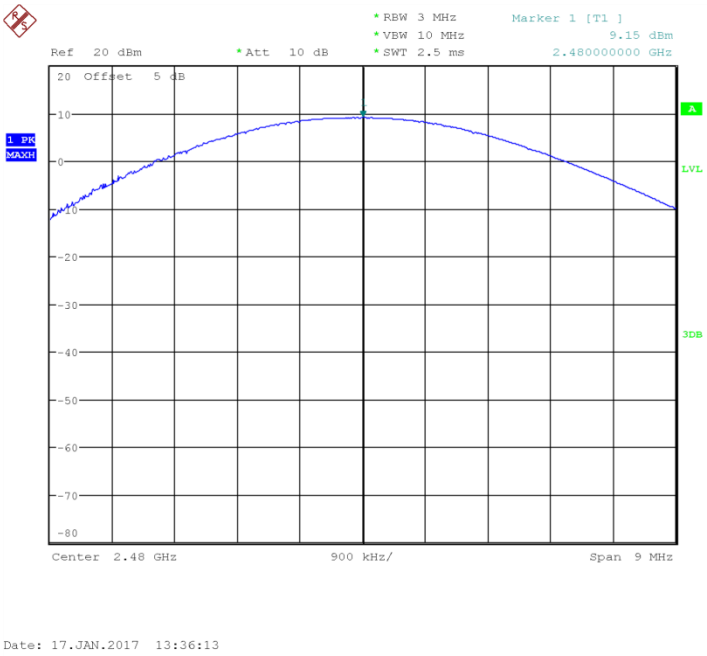


Fig.6 Peak Conducted Output Power CH78, 2DH1

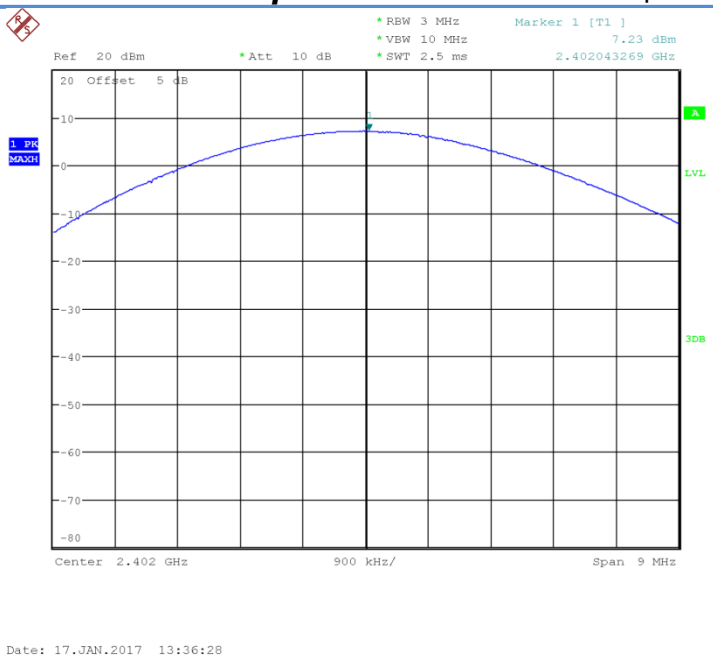


Fig.7 Peak Conducted Output Power CH0, 3DH1

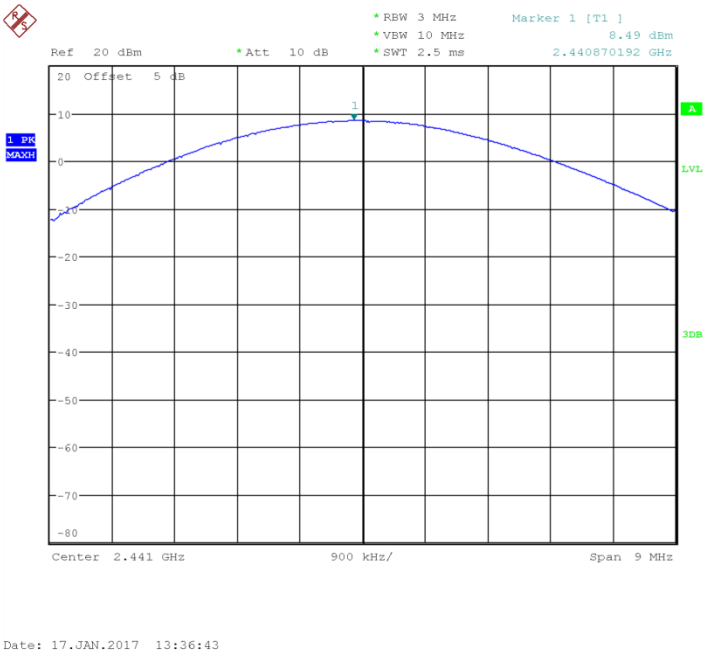


Fig.8 Peak Conducted Output Power CH39, 3DH1

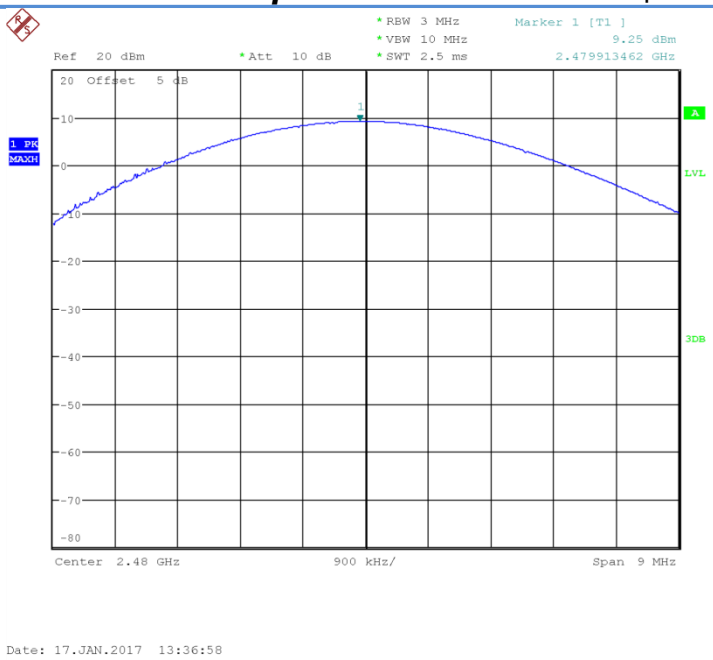


Fig.9 Peak Conducted Output Power CH78, 3DH1

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 π/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

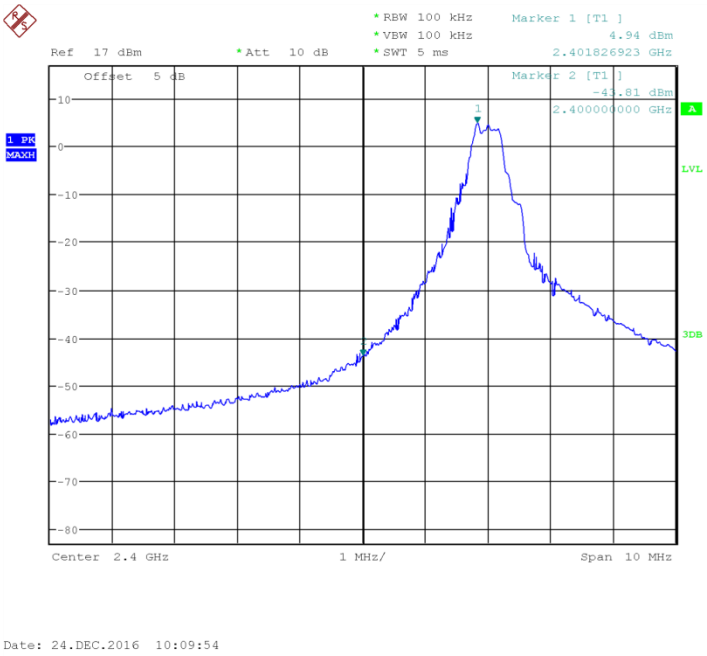


Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF

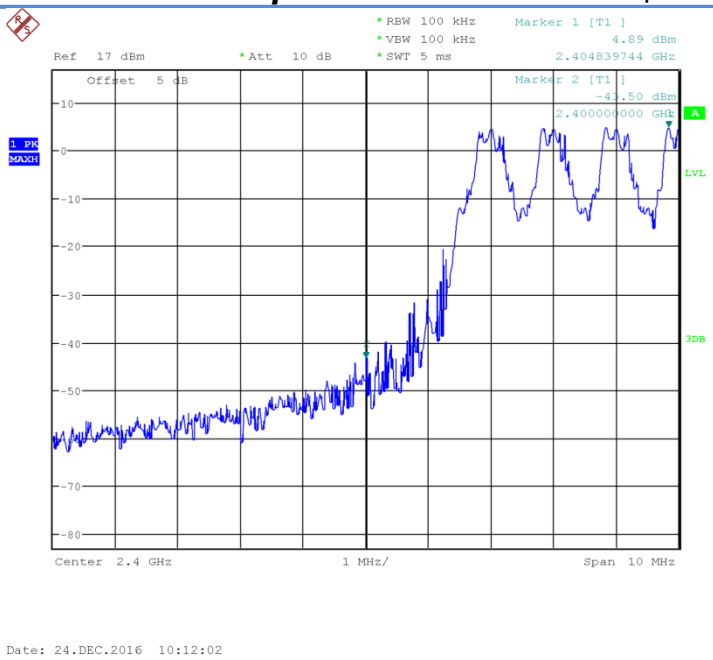


Fig.11 Frequency Band Edge: GFSK, Ch0, Hopping ON

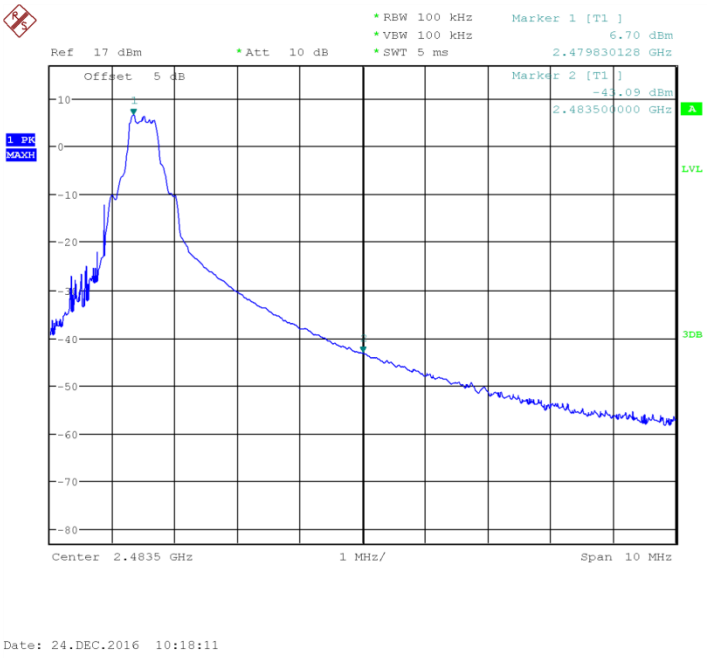


Fig.12 Frequency Band Edge: GFSK, Ch78, Hopping OFF

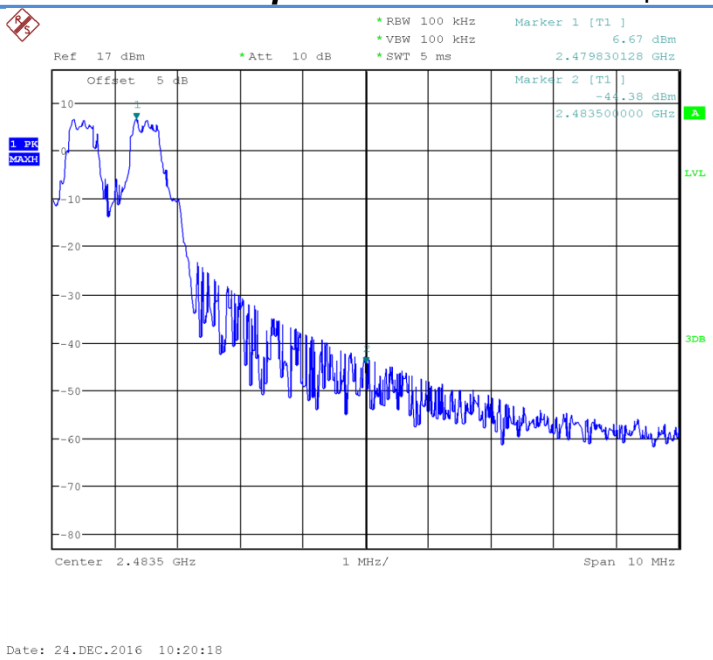


Fig.13 Frequency Band Edge: GFSK, Ch78, Hopping ON

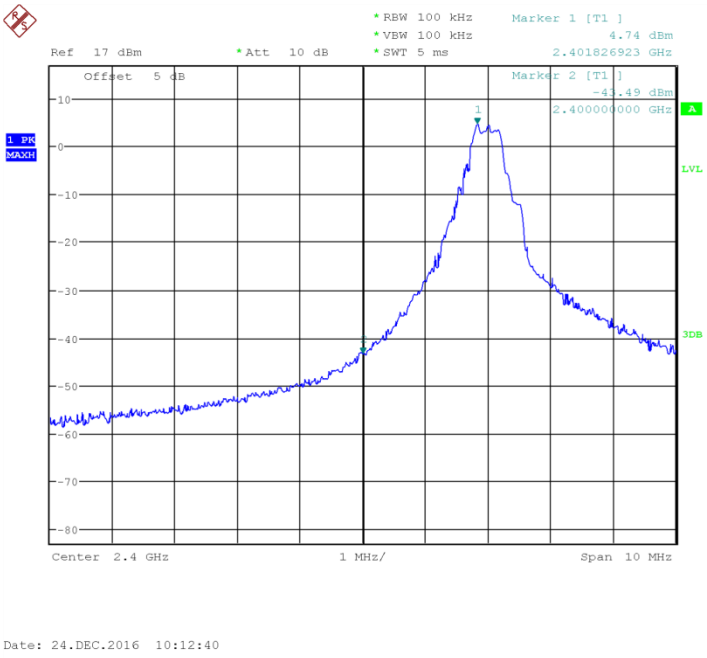


Fig.14 Frequency Band Edge: π/4 DQPSK, Ch0, Hopping OFF

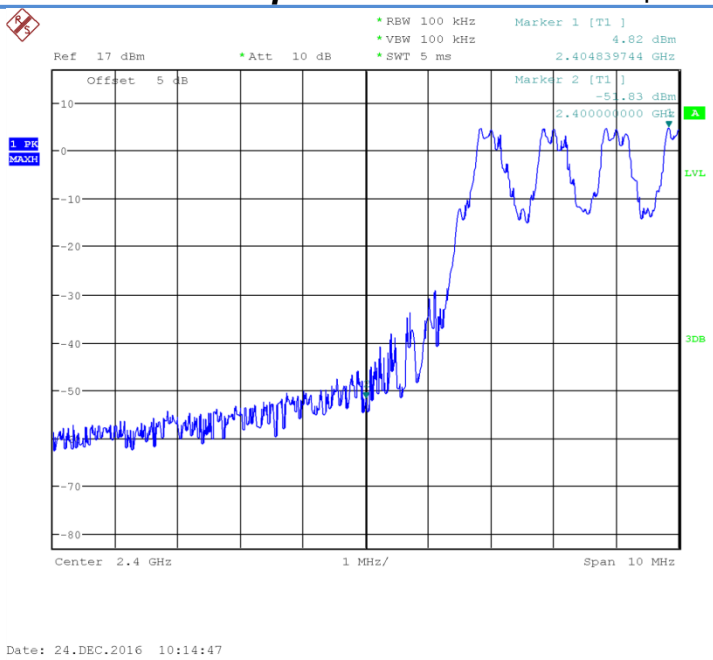


Fig.15 Frequency Band Edge: π/4 DQPSK, Ch0, Hopping ON

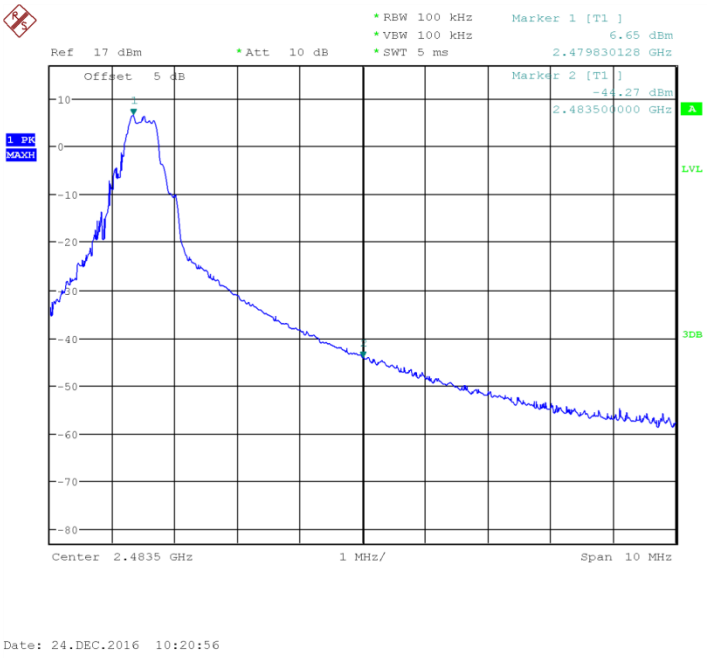


Fig.16 Frequency Band Edge: π/4 DQPSK, Ch78, Hopping OFF

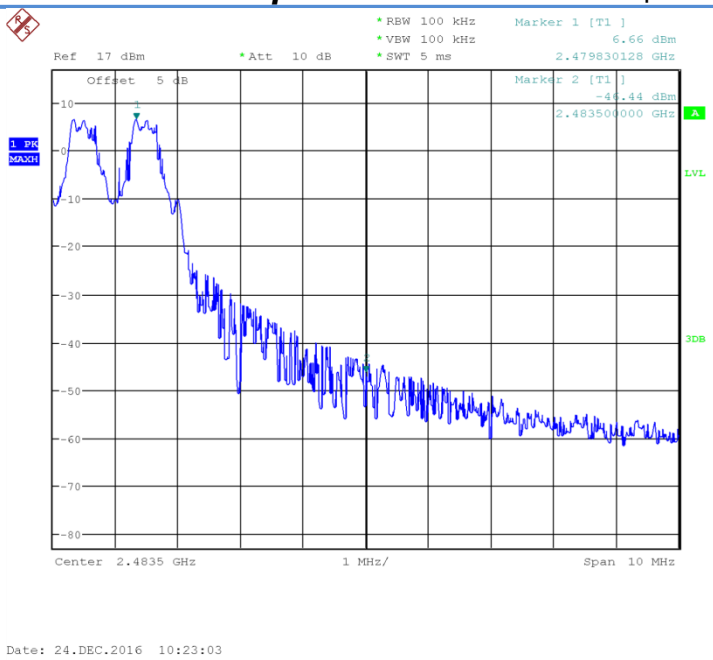


Fig.17 Frequency Band Edge: π/4 DQPSK, Ch78, Hopping ON

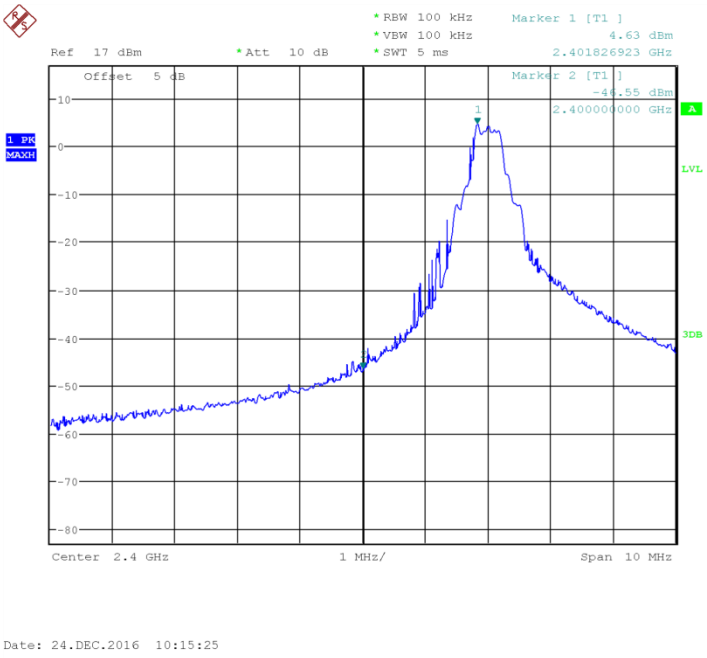


Fig.18 Frequency Band Edge: 8DPSK, Ch0, Hopping OFF

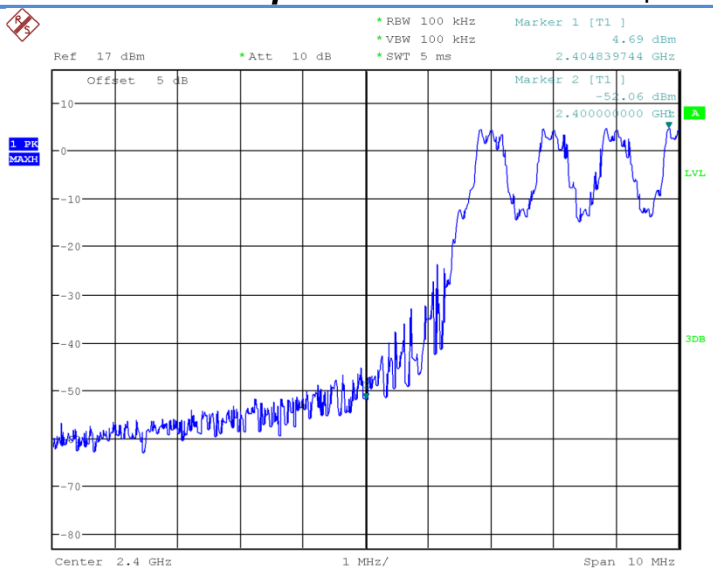


Fig.19 Frequency Band Edge: 8DPSK, Ch0, Hopping ON

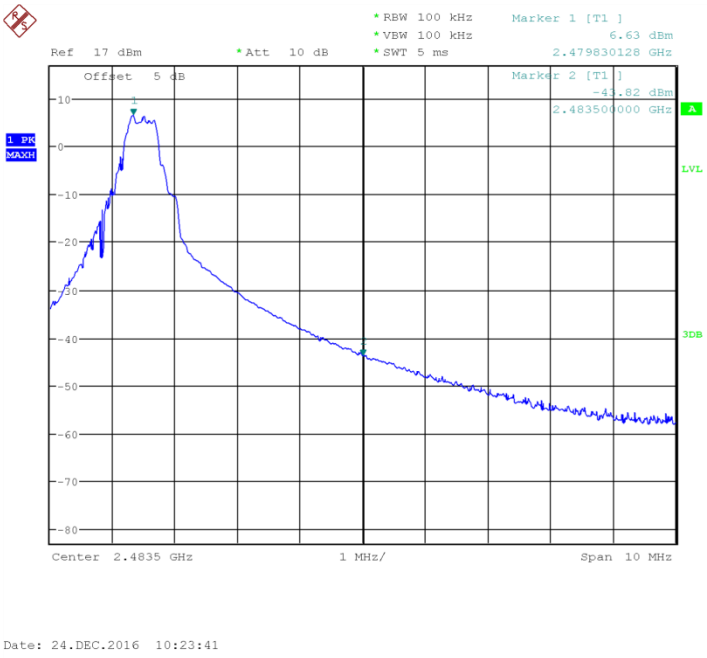


Fig.20 Frequency Band Edge: 8DPSK, Ch78, Hopping OFF

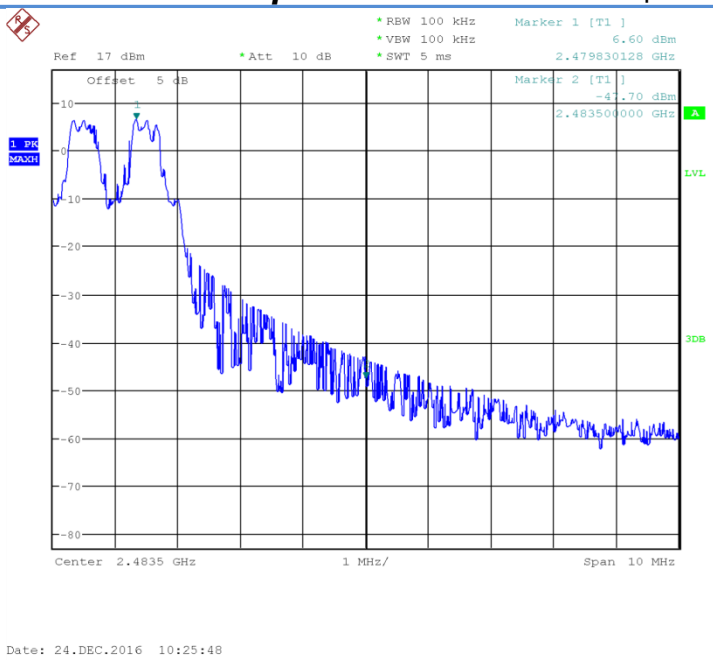


Fig.21 Frequency Band Edge: 8DPSK, Ch78, Hopping ON

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 π/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

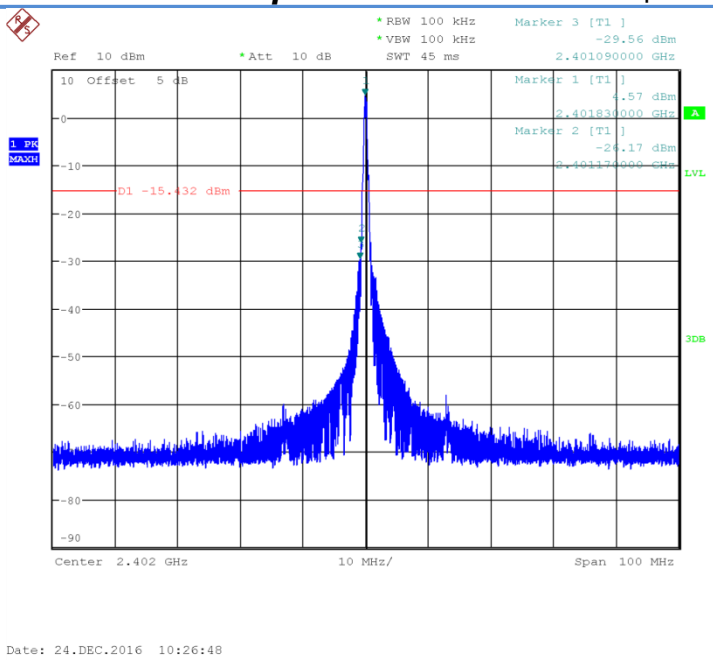


Fig.22 Conducted spurious emission: GFSK, Ch0, 2402MHz

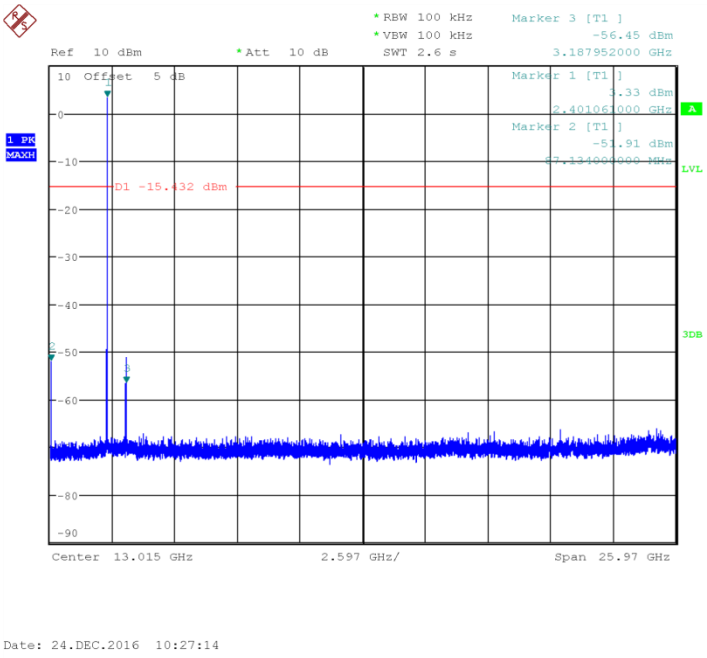


Fig.23 Conducted spurious emission: GFSK, Ch0, 30MHz~26GHz

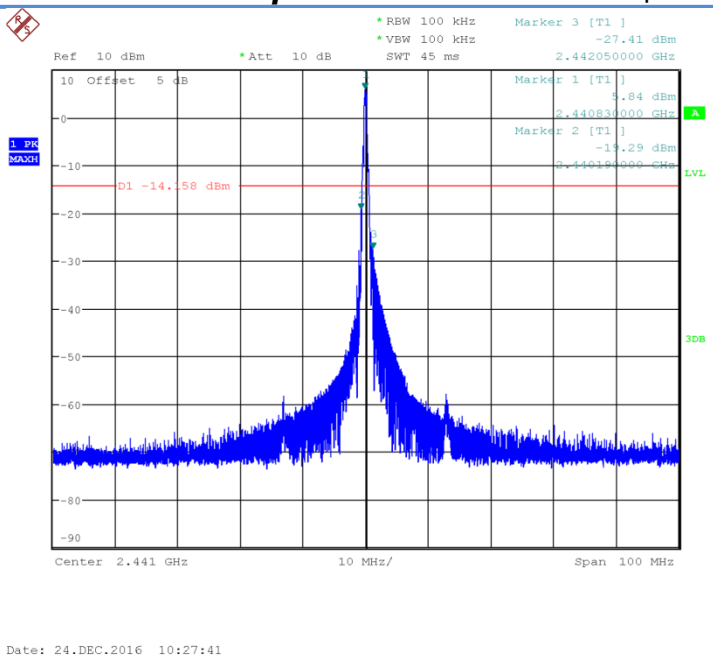


Fig.24 Conducted spurious emission: GFSK, Ch39, 2441MHz

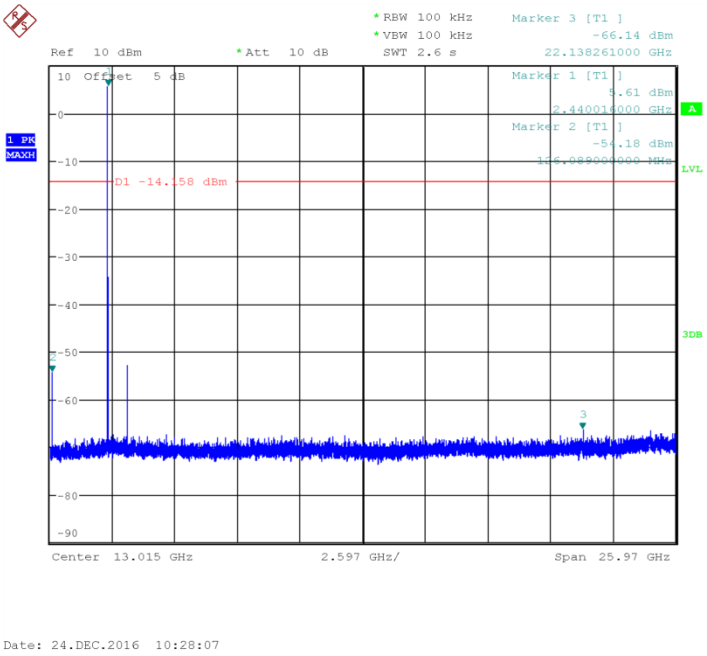


Fig.25 Conducted spurious emission: GFSK, Ch39, 30MHz~26GHz

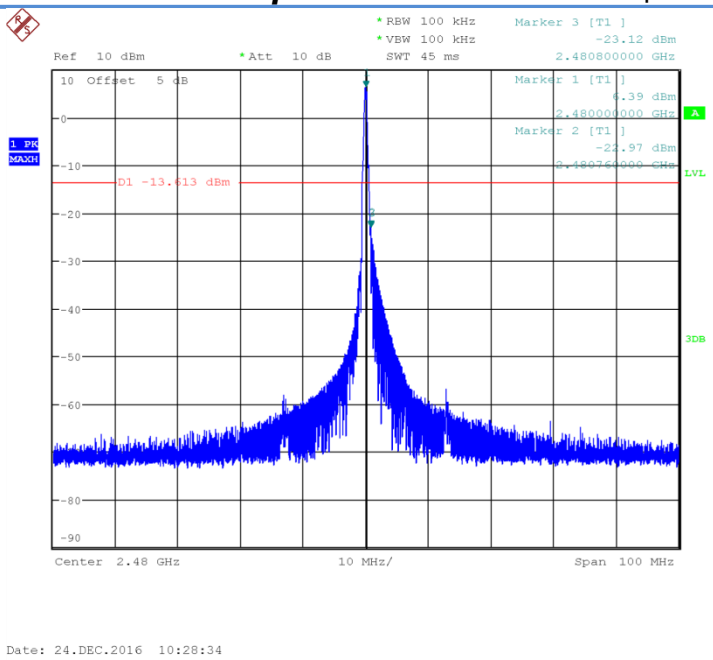


Fig.26 Conducted spurious emission: GFSK, Ch78, 2480MHz

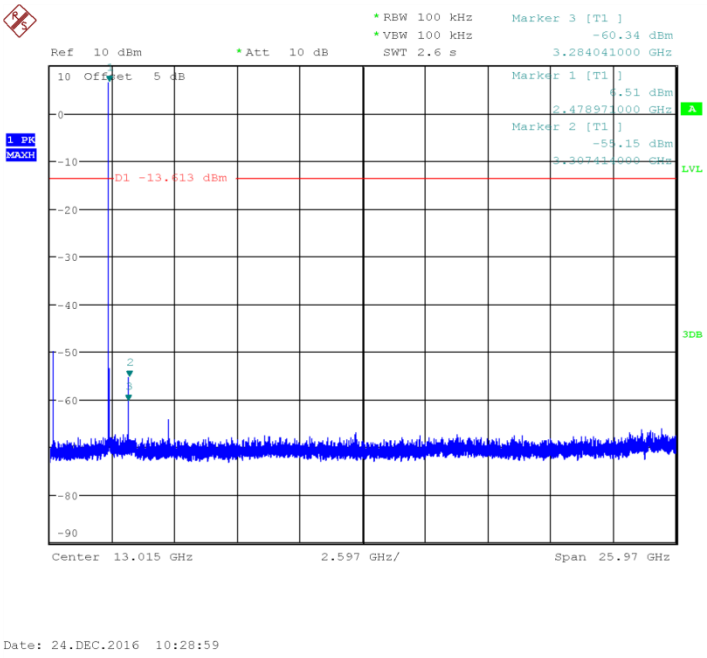


Fig.27 Conducted spurious emission: GFSK, Ch78, 30MHz~26GHz

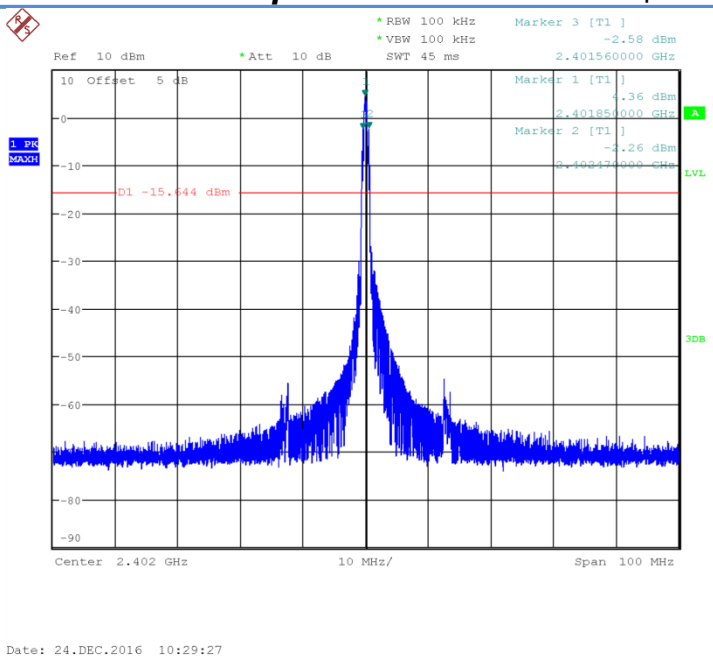


Fig.28 Conducted spurious emission: π/4 DQPSK, Ch0, 2402MHz

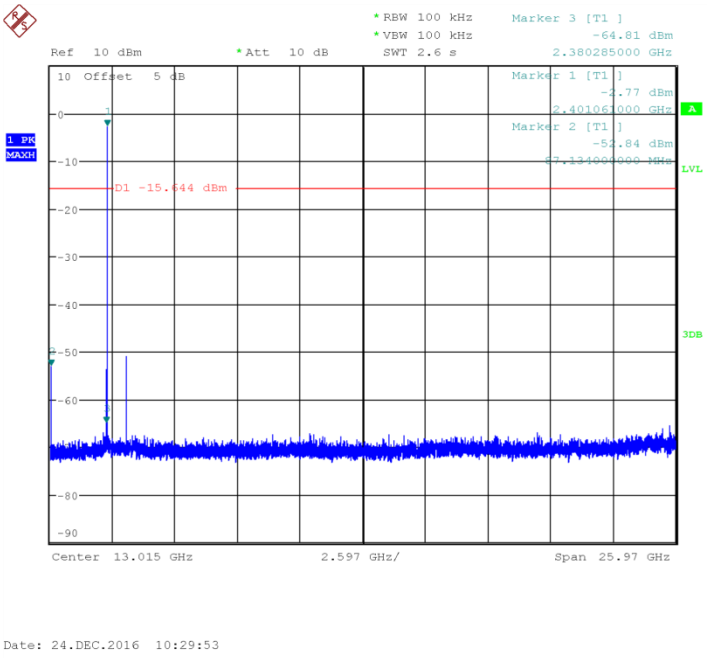


Fig.29 Conducted spurious emission: π/4 DQPSK, Ch0, 30MHz~26GHz

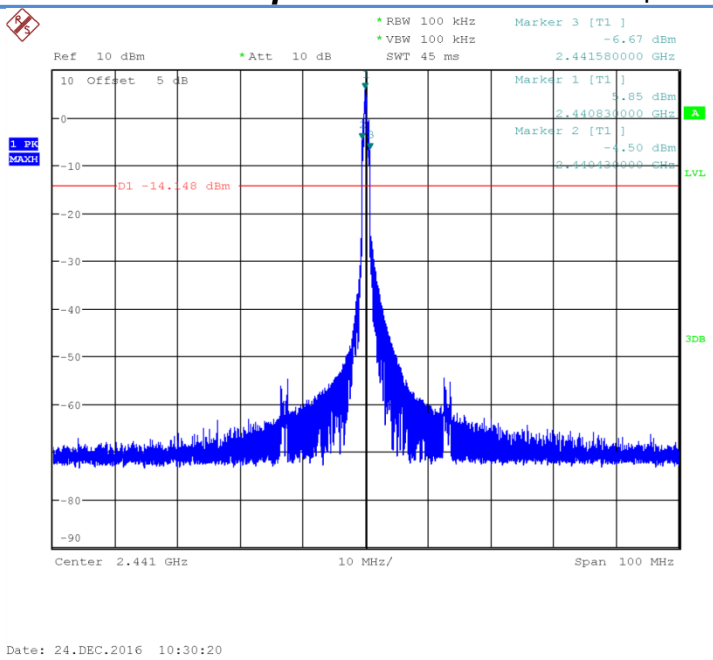


Fig.30 Conducted spurious emission: π/4 DQPSK, Ch39, 2441MHz

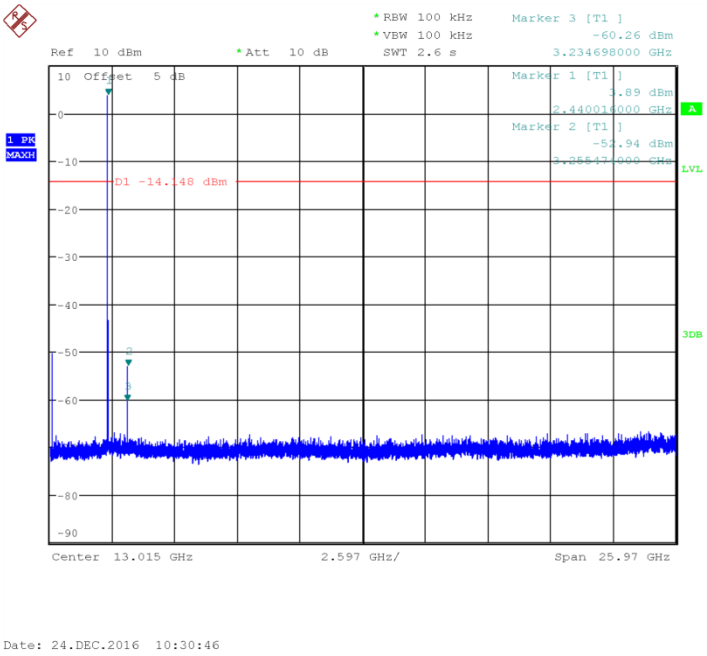


Fig.31 Conducted spurious emission: π/4 DQPSK, Ch39, 30MHz~26GHz

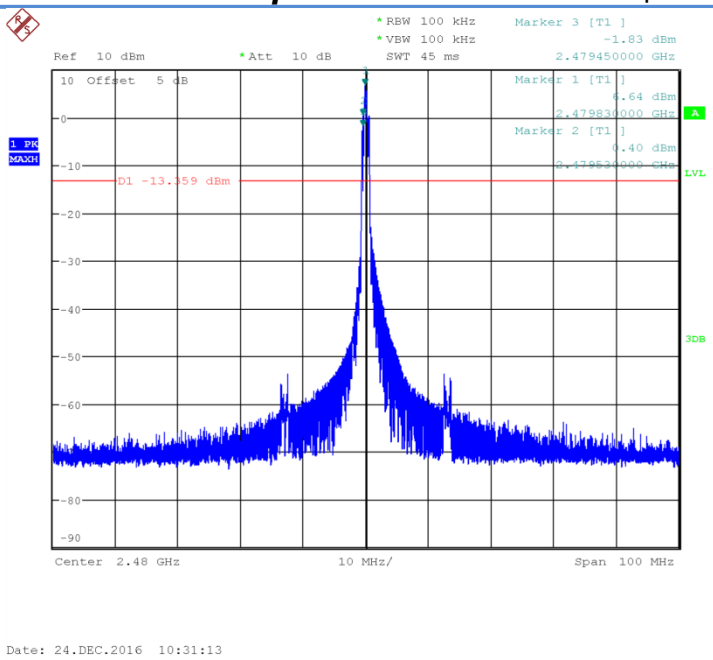


Fig.32 Conducted spurious emission: π/4 DQPSK, Ch78, 2480MHz

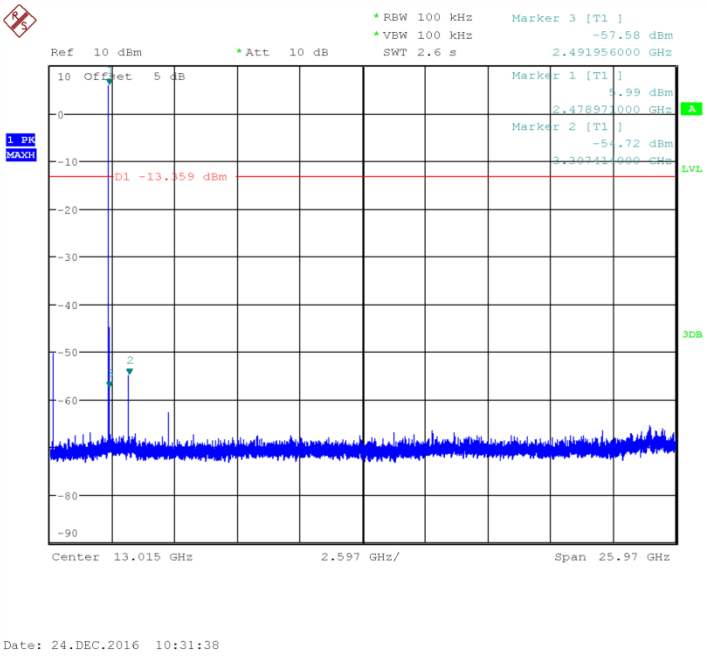


Fig.33 Conducted spurious emission: π/4 DQPSK, Ch78, 30MHz~26GHz

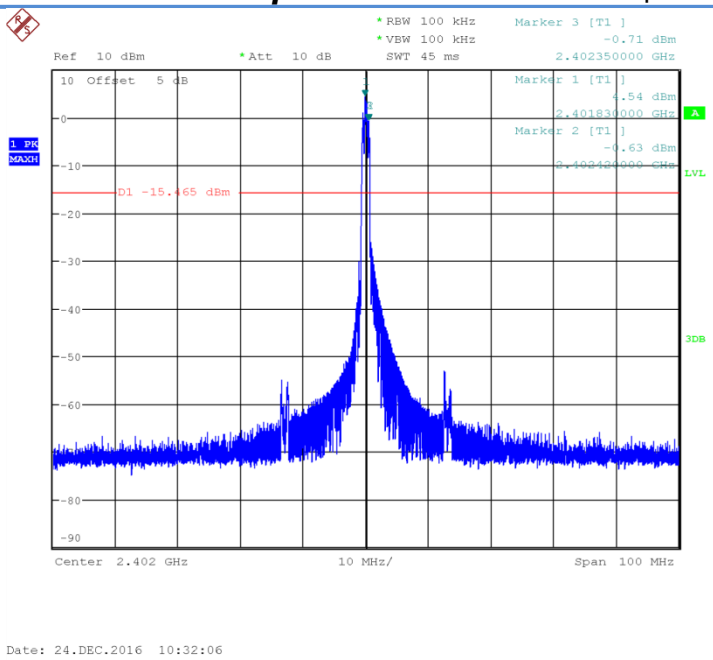


Fig.34 Conducted spurious emission: 8DPSK, Ch0, 2402MHz

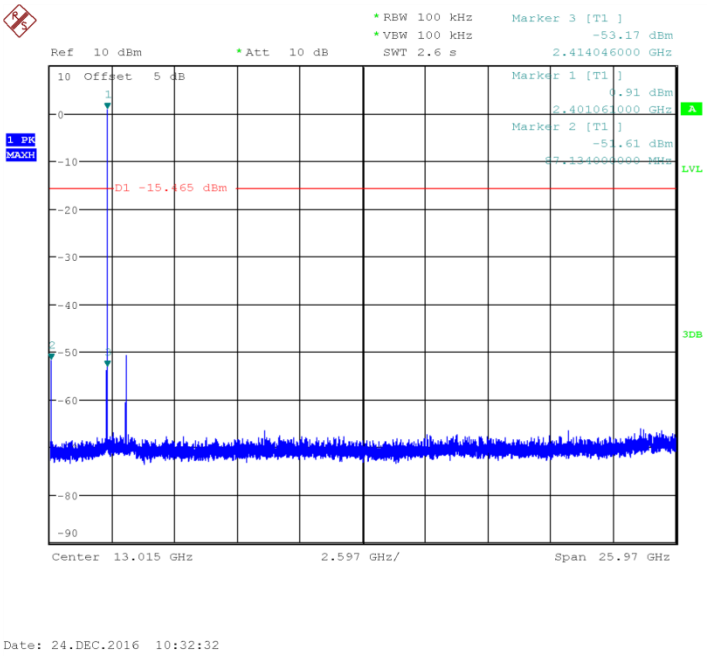


Fig.35 Conducted spurious emission: 8DPSK, Ch0, 30MHz~26GHz

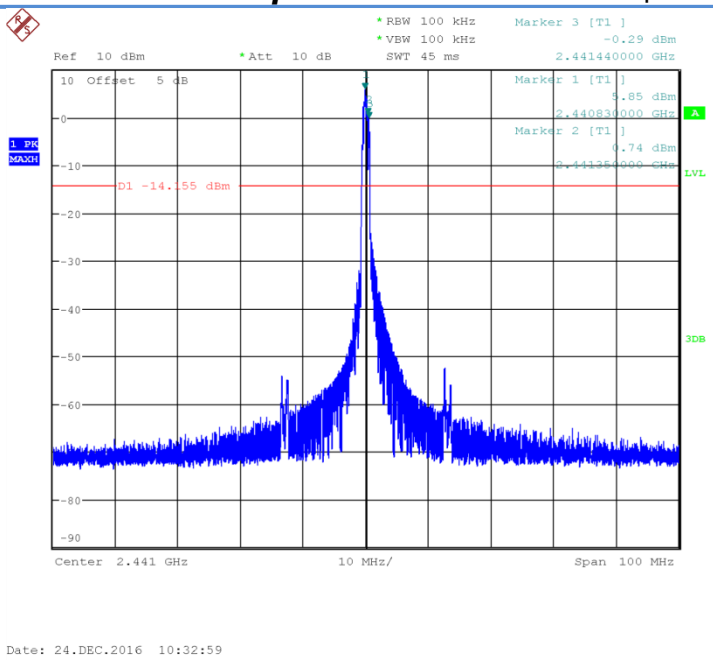


Fig.36 Conducted spurious emission: 8DPSK, Ch39, 2441MHz

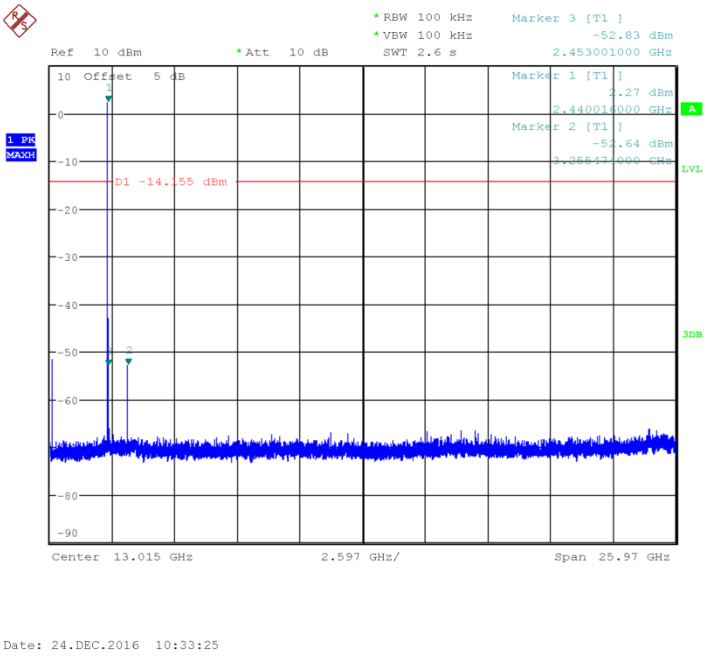


Fig.37 Conducted spurious emission: 8DPSK, Ch39, 30MHz~26GHz

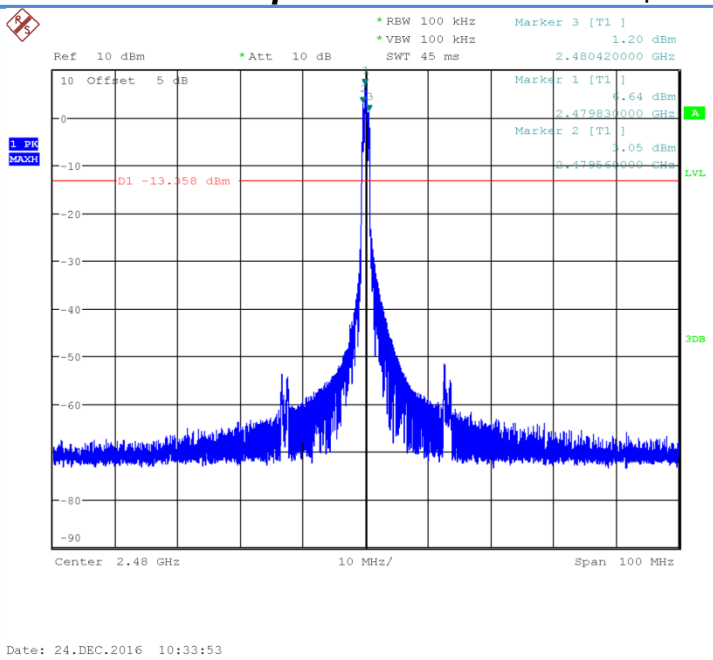


Fig.38 Conducted spurious emission: 8DPSK, Ch78, 2480MHz

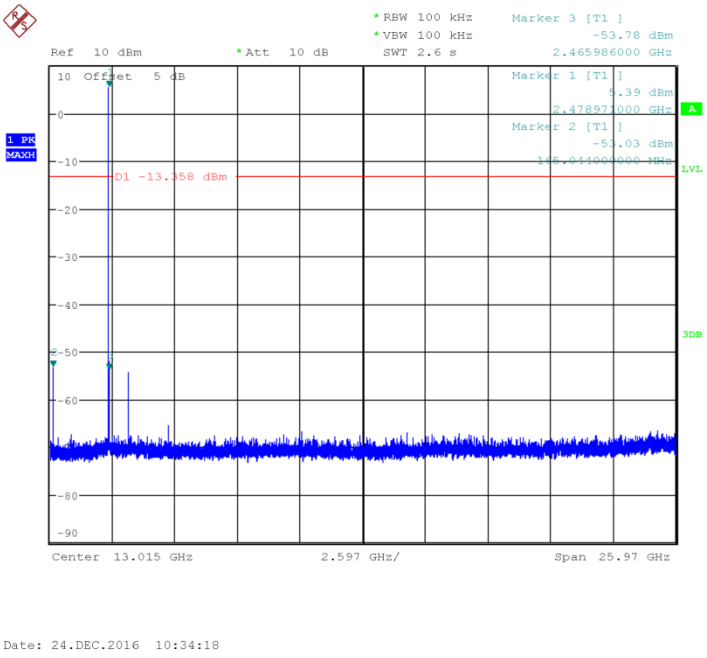


Fig.39 Conducted spurious emission: 8DPSK, Ch78, 30MHz~26GHz

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 C63.10-2009 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} = 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

For π/4 DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.43	P
	1GHz~3GHz	Fig.44	P
	3GHz~18GHz	Fig.45	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.46	P
	1GHz~3GHz	Fig.47	P
	3GHz~18GHz	Fig.48	P

First Supply

GFSK Ch78 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.987492	14.15	-26.8	40.95	V
116.874752	4.11	-25.8	29.91	V
220.936604	12.46	-24.5	36.96	V
357.404508	10.18	-19.0	29.18	V
606.352144	16.33	-12.9	29.23	H

918.304960	21.28	-7.8	29.08	H

GFSK Ch78 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2642.640961	52.10	9.3	42.8	H
2742.726346	52.22	9.4	42.82	V
2829.184423	53.60	10.4	43.2	V
2924.533270	53.39	10.7	42.69	H
2953.846731	53.71	10.7	43.01	V
2994.361346	54.72	11.3	43.42	V

GFSK Ch78 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13365.050133	54.21	17.5	36.71	H
14846.434400	55.57	21.1	34.47	H
15644.787867	57.21	23.3	33.91	H
15933.601333	58.53	24.9	33.63	H
16794.769733	59.84	27.3	32.54	V
17654.408133	61.55	29.0	32.55	V

π/4 DQPSK Ch78 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.944372	17.17	-26.8	43.97	V
51.101116	3.72	-25.9	29.62	V
220.894656	13.51	-24.5	38.01	V
491.952348	13.62	-15.6	29.22	V
604.926948	16.26	-12.9	29.16	H
912.061236	20.98	-7.9	28.88	H

π/4 DQPSK Ch78 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2626.538654	52.58	9.1	43.48	H
2666.929616	53.18	9.4	43.78	H
2752.460192	53.29	9.4	43.89	H
2842.763269	53.34	10.7	42.64	H
2934.687308	54.69	10.7	43.99	H
2998.429616	53.73	11.4	42.33	V

π/4 DQPSK Ch78 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13364.833600	54.37	17.5	36.87	H
14350.113667	54.05	20.2	33.85	V
15803.920333	58.93	24.7	34.23	H
16496.600800	59.14	26.9	32.24	H
16970.935800	60.35	27.1	33.25	H
17612.682467	62.06	29.4	32.66	H

8DPSK Ch78 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.341668	14.34	-26.8	41.14	V
34.927564	13.32	-26.8	40.12	V
50.273848	5.63	-25.8	31.43	V
102.538832	6.2	-24.9	31.1	V
171.81762	4.55	-26.6	31.15	V
942.155392	21.15	-7.8	28.95	H

8DPSK Ch78 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2807.887692	53.27	9.9	43.37	H
2839.057116	53.37	10.6	42.77	H
2872.030193	55.09	10.8	44.29	H
2903.576346	53.37	10.8	42.57	V
2976.910962	53.63	11.1	42.53	V
2987.260193	54.49	11.2	43.29	H

8DPSK Ch78 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15411.74267	56.44	23.2	33.24	V
15809.75773	58.25	24.7	33.55	H
16071.4372	59.17	24.9	34.27	H
16527.1296	58.93	26.6	32.33	V
17094.02093	60.42	27.1	33.32	V
17601.752	63.1	29.5	33.6	V

Second Supply

8DPSK Ch78 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.619096	8.78	-26.9	35.68	V
34.558868	14.28	-26.8	41.08	V
35.636172	11.7	-26.7	38.4	V
52.865796	7.06	-25.9	32.96	V
843.34796	19.49	-9.6	29.09	H
915.8194	21.14	-7.9	29.04	V

8DPSK Ch78 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2793.228653	52.7	9.7	43	H
2847.84173	53.4	10.8	42.6	V
2879.737692	53.76	10.8	42.96	V
2941.922116	53.67	10.7	42.97	V
2952.14173	53.78	10.7	43.08	H
2996.487307	54.09	11.4	42.69	V

8DPSK Ch78 3GHz-18GHz

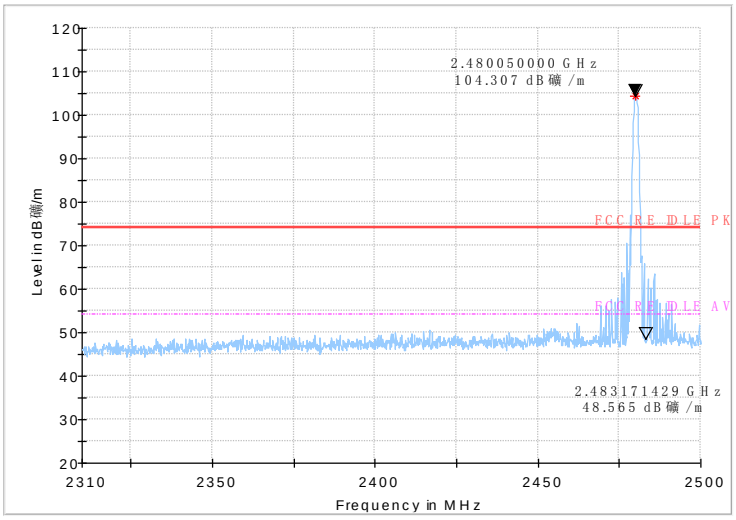
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15904.15973	58.44	24.7	33.74	V
16226.2262	59.43	25.6	33.83	H
16796.628	59.62	27.3	32.32	H
17303.9924	61.03	28.4	32.63	V
17617.30773	61.9	29.4	32.5	H
17952.43053	64.07	30	34.07	H

Note: all the test data shown was peak detected.

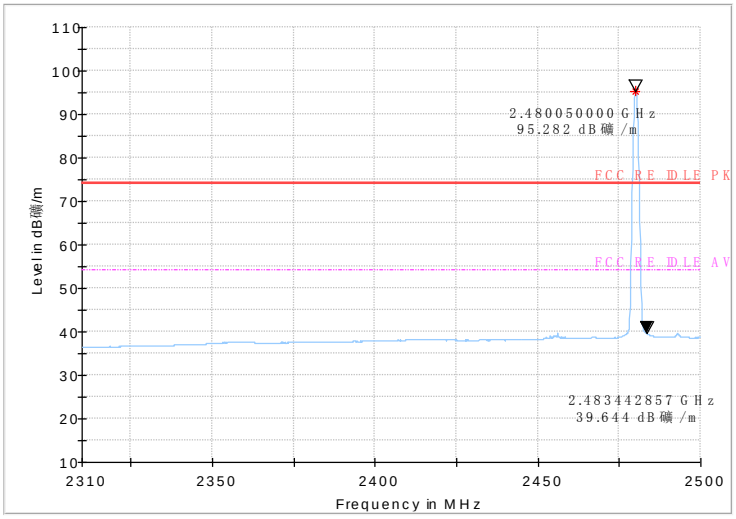
Conclusion: PASS

Test graphs as below:

First Supply



BANDEDGE: GFSK, Ch78,PK



BANDEDGE: GFSK, Ch78,AVG

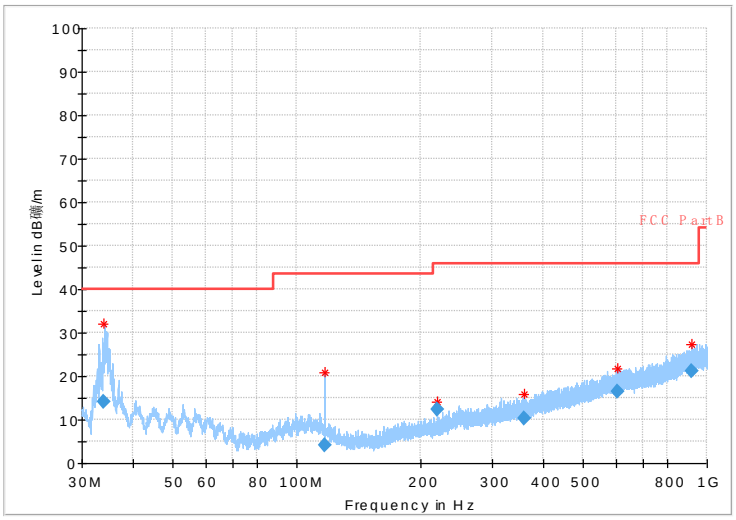


Fig.40 Radiated emission: GFSK, Ch78, 30MHz~1GHz

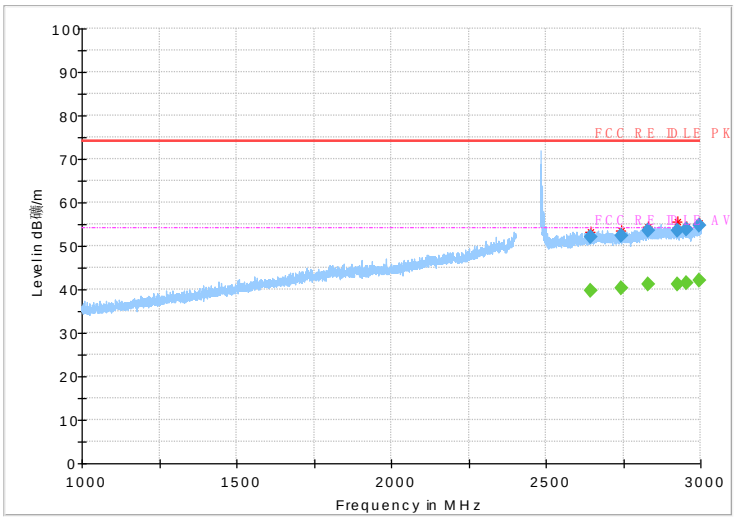


Fig.41 Radiated emission: GFSK, Ch78, 1GHz~3GHz

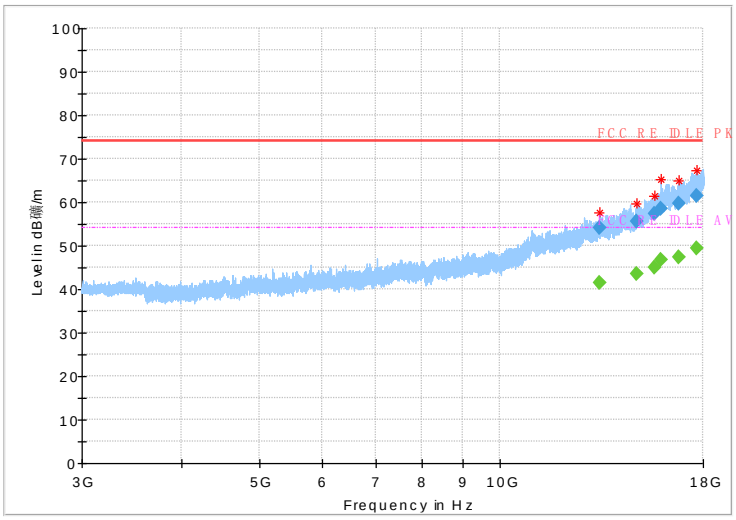
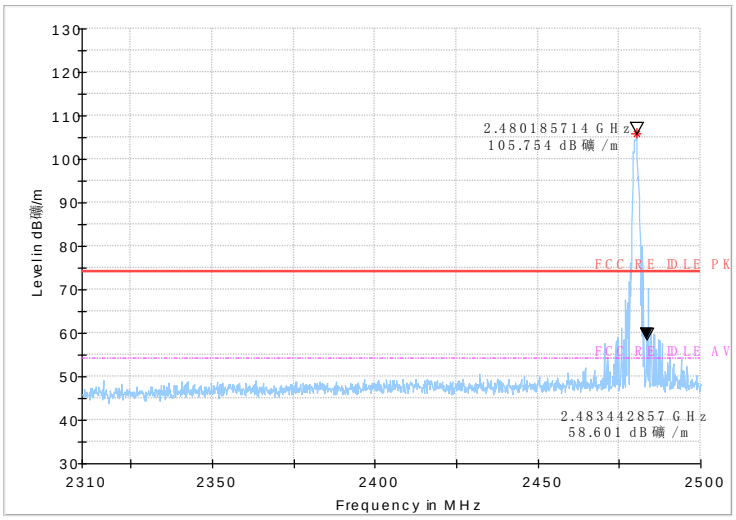
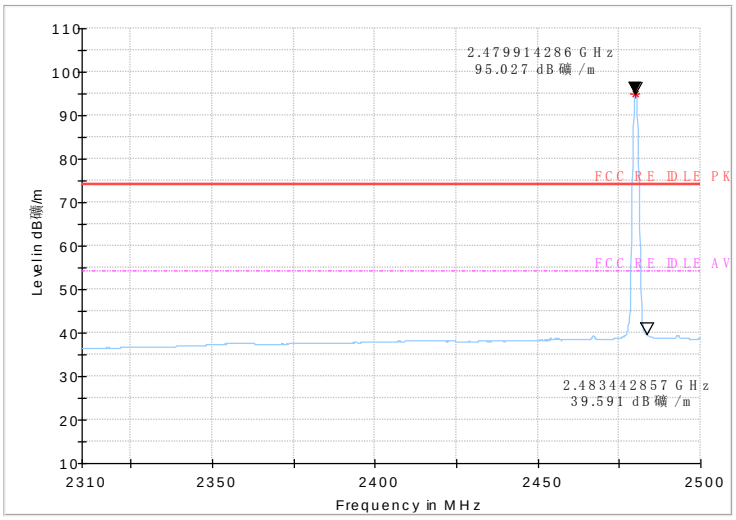


Fig.42 Radiated emission: GFSK, Ch78, 3GHz~18GHz



BANDEDGE: π/4 DQPSK, Ch78,PK



BANDEDGE: π/4 DQPSK, Ch78,AVG

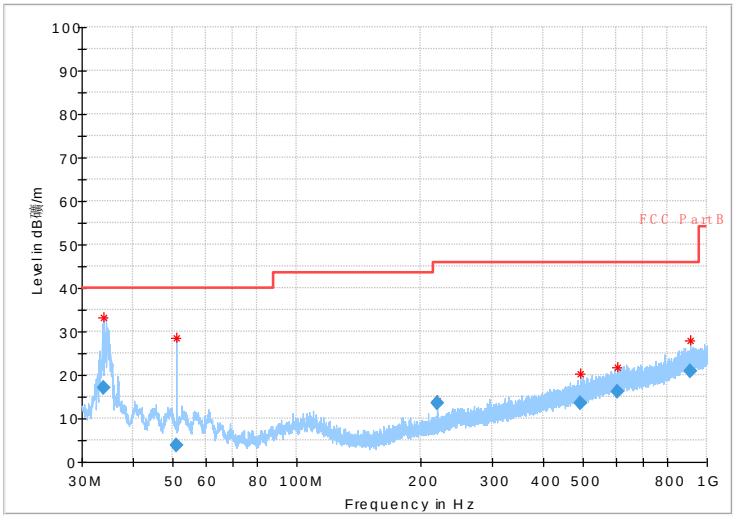


Fig.43 Radiated emission: π/4 DQPSK, Ch78, 30MHz~1GHz

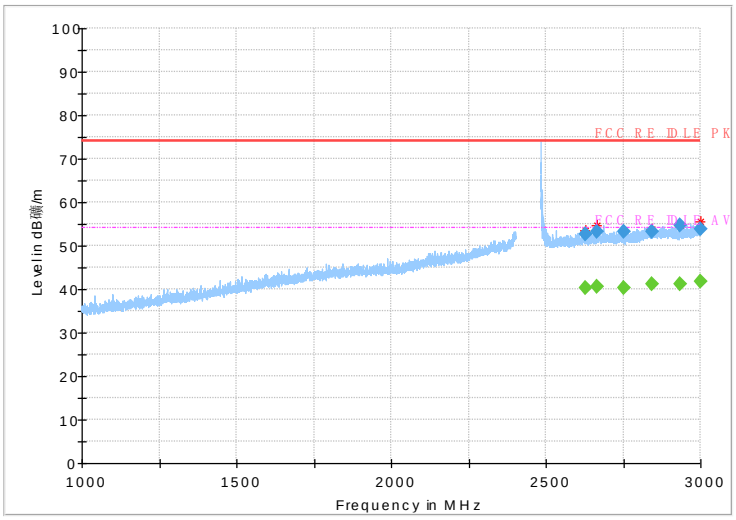


Fig.44 Radiated emission: π/4 DQPSK, Ch78, 1GHz~3GHz

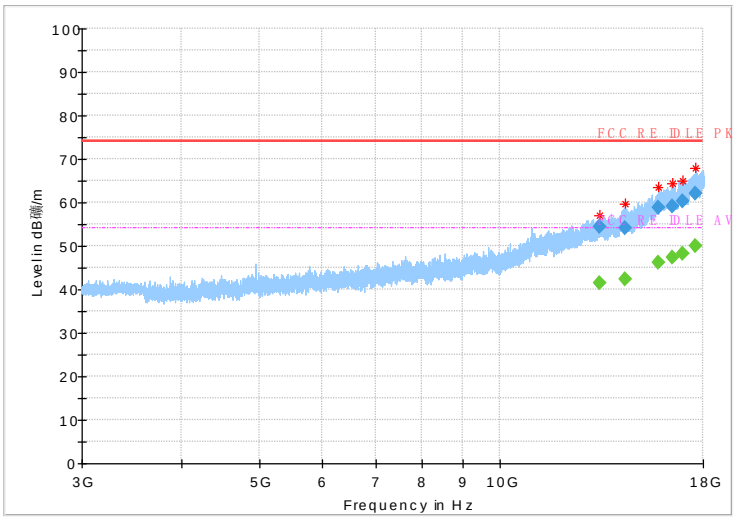
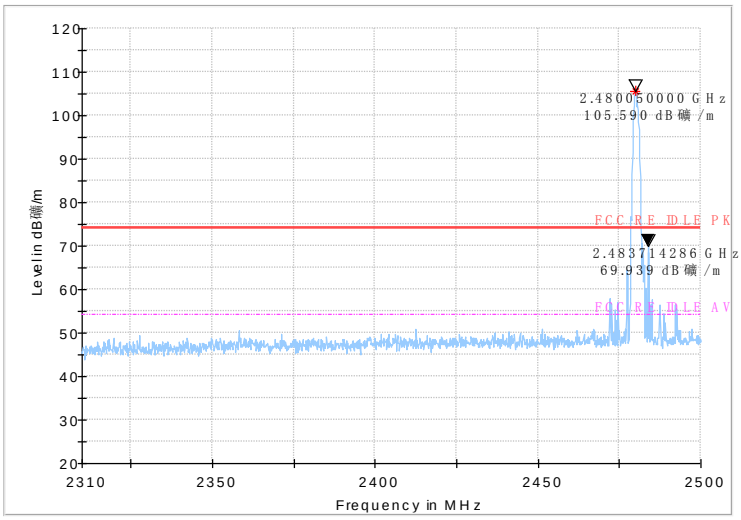
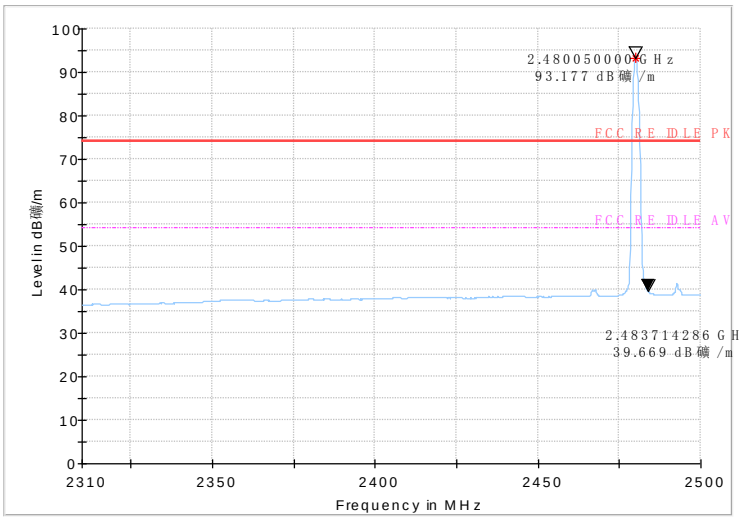


Fig.45 Radiated emission: π/4 DQPSK, Ch0, 3GHz~18GHz



BANDEDGE: 8DPSK, Ch78,PK



BANDEDGE: 8DPSK, Ch78,AVG

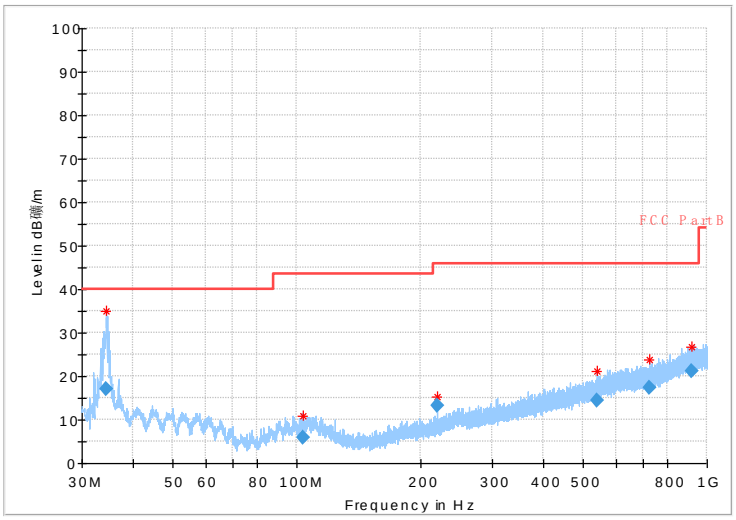


Fig.46 Radiated emission: 8DPSK, Ch78, 30MHz~1GHz

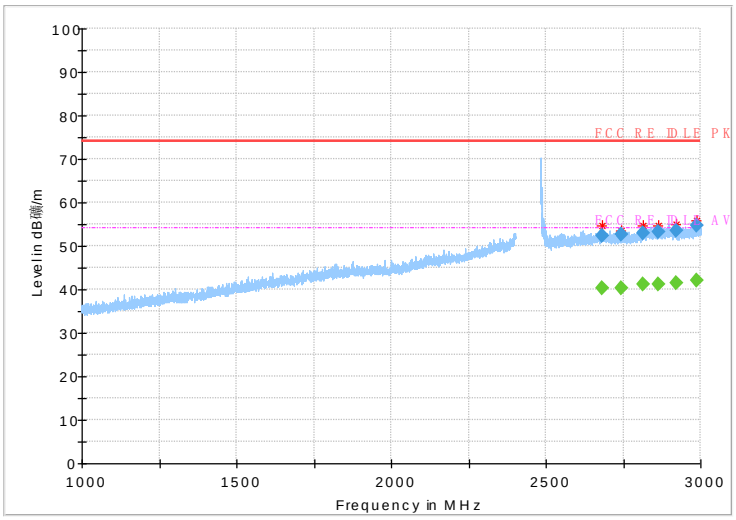


Fig.47 Radiated emission: 8DPSK, Ch78, 1GHz~3GHz

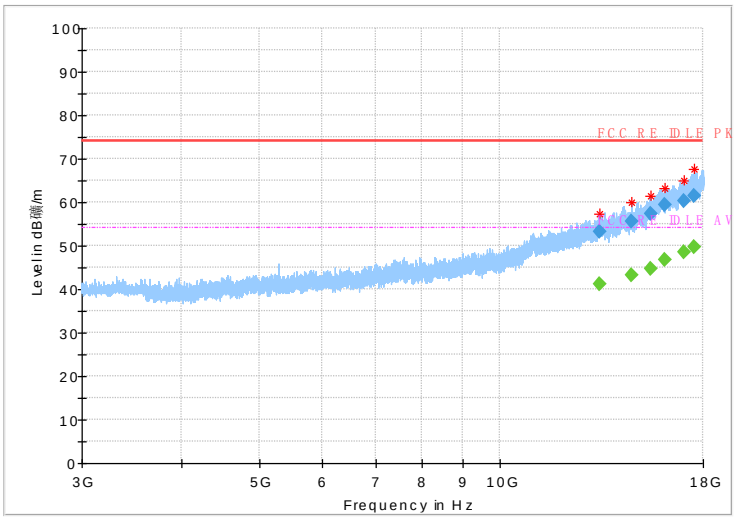
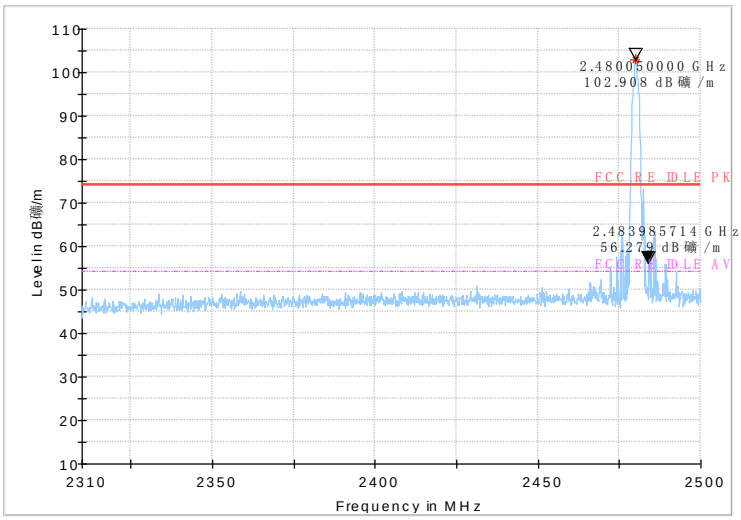
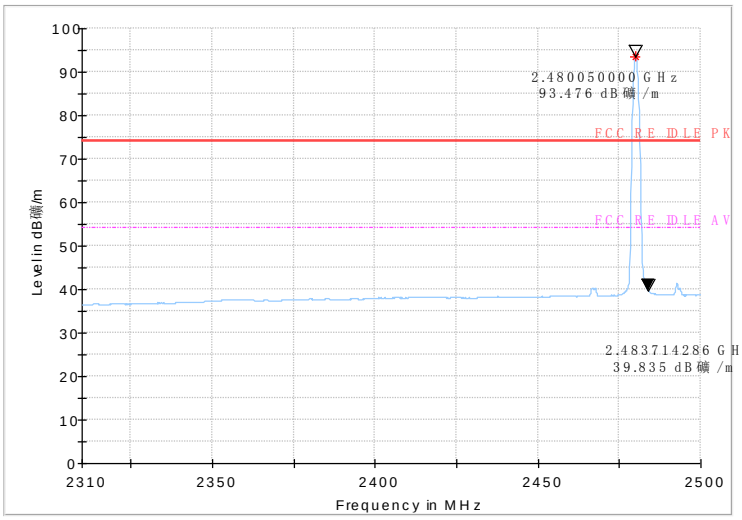


Fig.48 Radiated emission: 8DPSK, Ch78, 3GHz~18GHz

Second Supply



BANDEDGE: 8DPSK, Ch78,PK



BANDEDGE: 8DPSK, Ch78,AVG

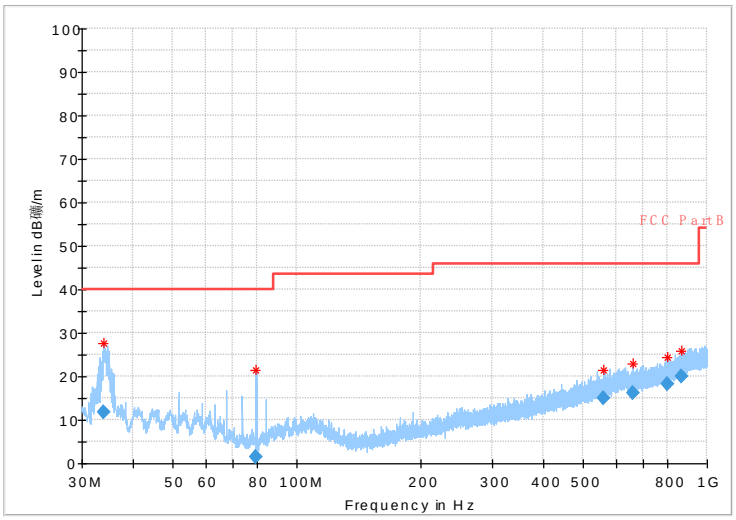


Fig.49 Radiated emission: 8DPSK, Ch78, 30MHz~1GHz

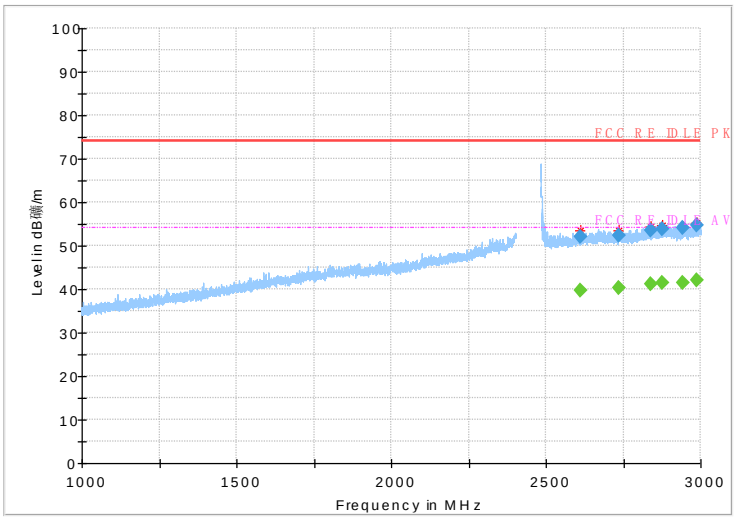


Fig.50 Radiated emission: 8DPSK, Ch78, 1GHz~3GHz

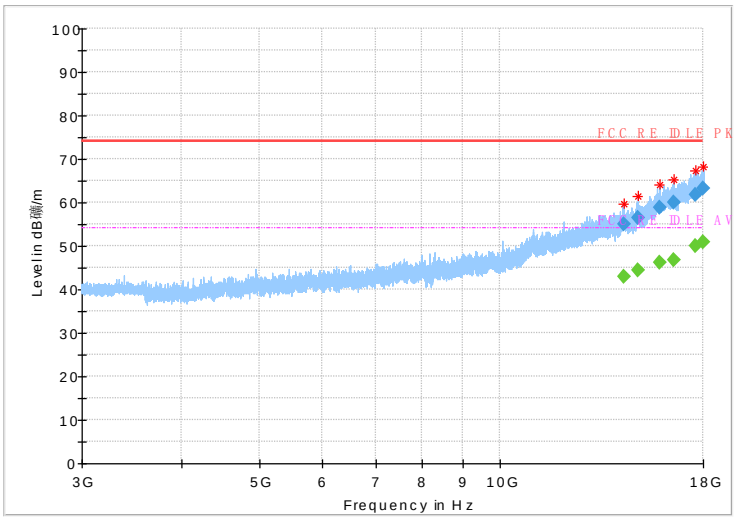


Fig.51 Radiated emission: 8DPSK, Ch78, 3GHz~18GHz

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 ⩽ channel spacing and where possible RBW should be set >> 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 showtwo 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.52	146.86	P
		Fig.53		
	DH3	Fig.54	283.08	P
		Fig.55		
	DH5	Fig.56	318.53	P
		Fig.57		

For π/4 DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.58	150.1	P
		Fig.59		
	2DH3	Fig.60	314.28	P
		Fig.61		
	2DH5	Fig.62	224.85	P
		Fig.63		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.64	144.333	P

		Fig.65		
	3DH3	Fig.66	270.93	P
		Fig.67		
	3DH5	Fig.68	281.06	P
		Fig.69		

Conclusion: PASS

Test graphs as below:

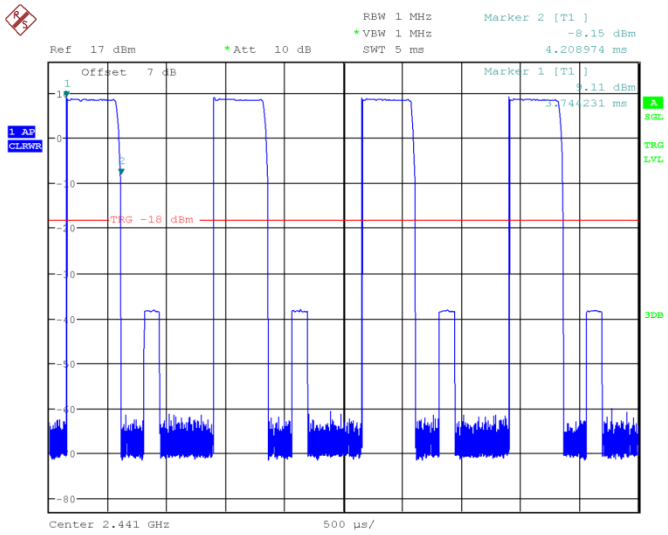


Fig.52 Time of occupancy (Dwell Time): Ch39, Packet DH1

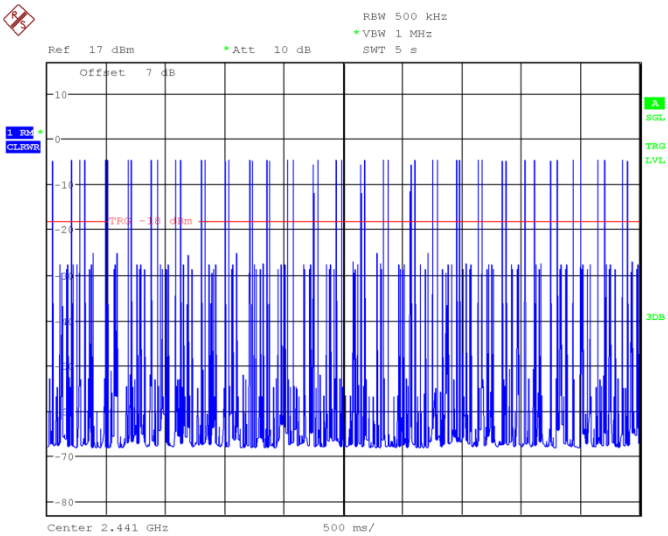


Fig.53 Number of Transmissions Measurement: Ch39, Packet DH1

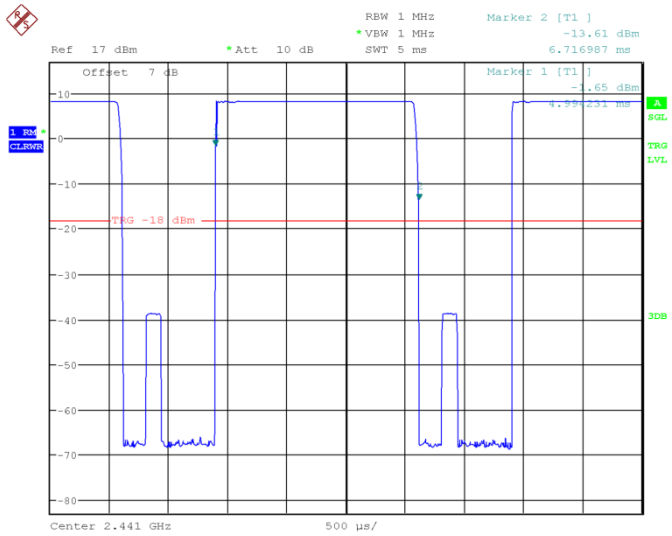


Fig.54 Time of occupancy (Dwell Time): Ch39, Packet DH3

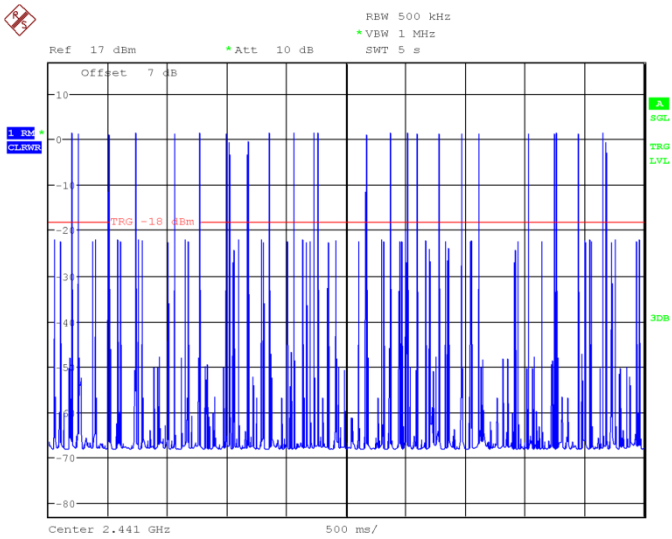


Fig.55 Number of Transmissions Measurement: Ch39, Packet DH3

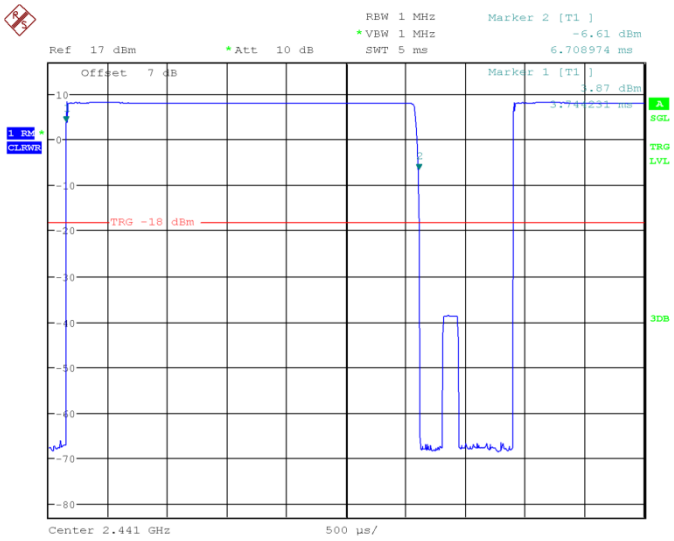


Fig.56 Time of occupancy (Dwell Time): Ch39,Packet DH5

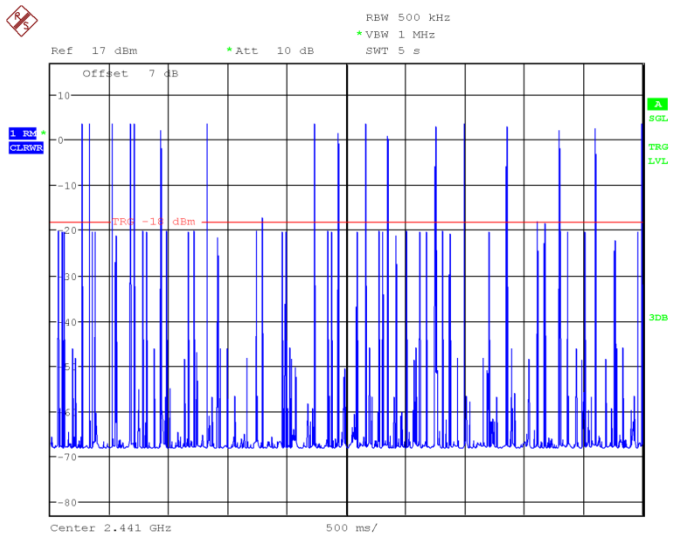


Fig.57 Number of Transmissions Measurement: Ch39, Packet DH5

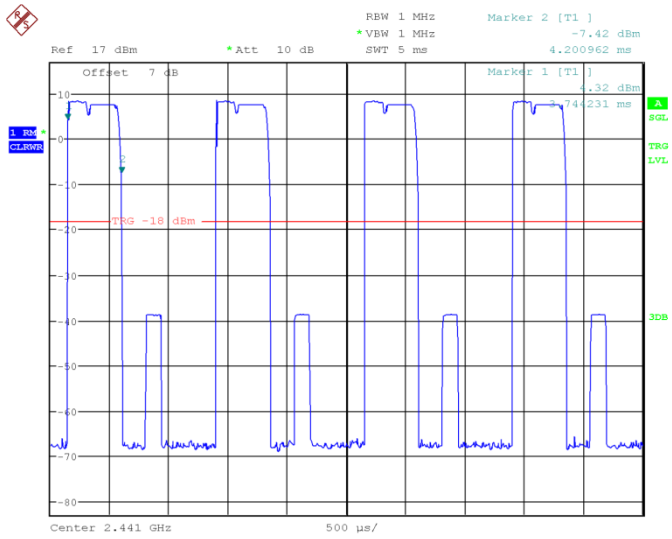


Fig.58 Time of occupancy (Dwell Time): Ch39, Packet 2-DH1

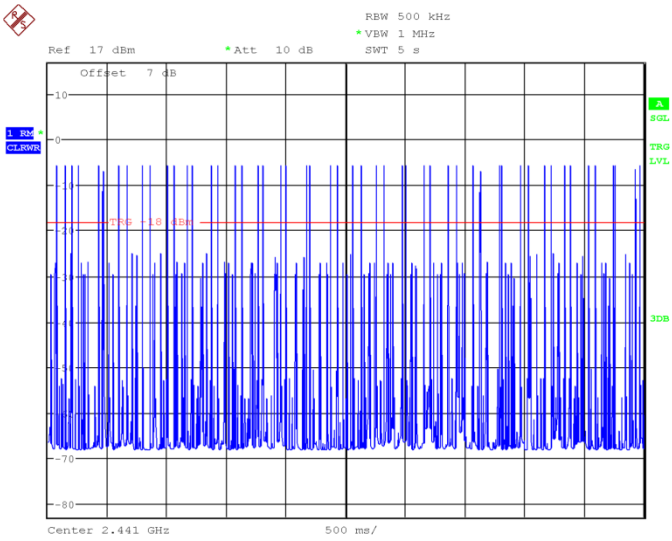


Fig.59 Number of Transmissions Measurement: Ch39, Packet 2-DH1

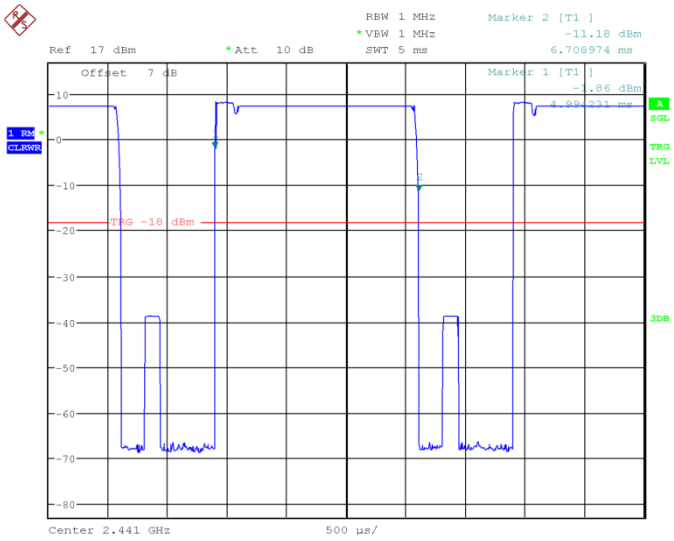


Fig.60 Time of occupancy (Dwell Time): Ch39,Packet 2-DH3

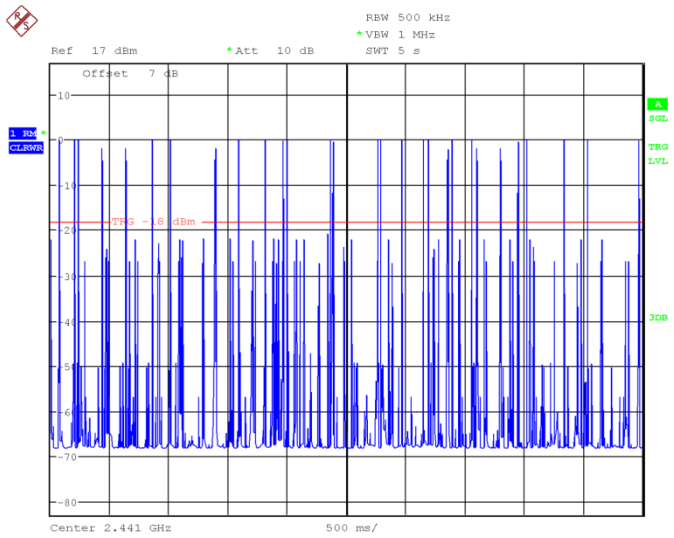


Fig.61 Number of Transmissions Measurement: Ch39, Packet 2-DH3

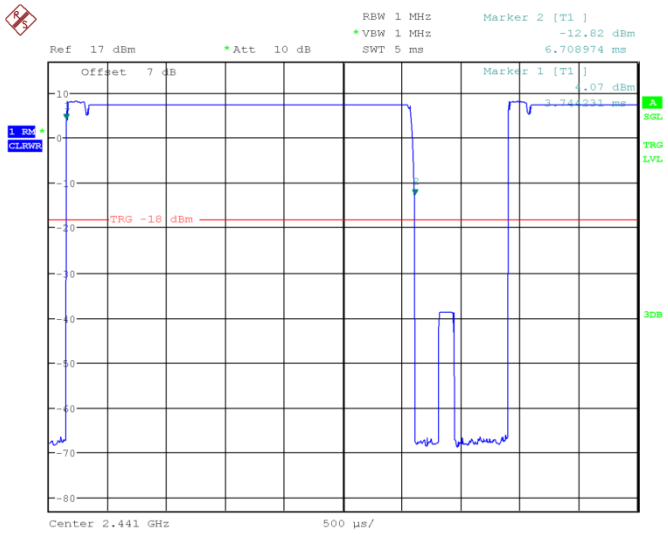


Fig.62 Time of occupancy (Dwell Time): Ch39, Packet 2-DH5

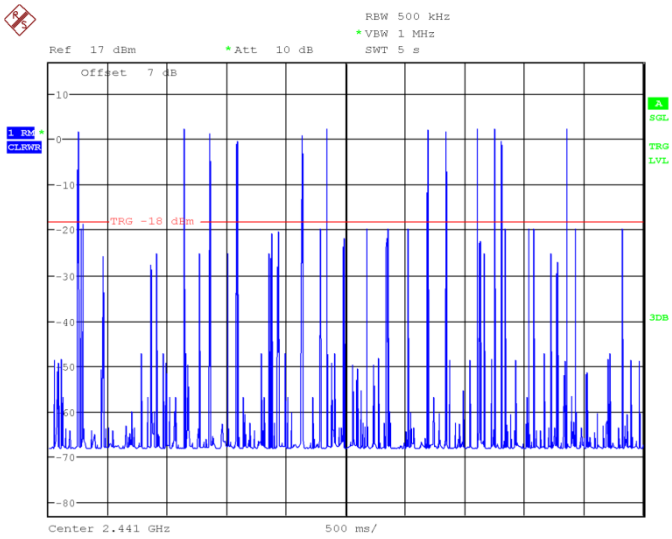


Fig.63 Number of Transmissions Measurement: Ch39, Packet 2-DH5

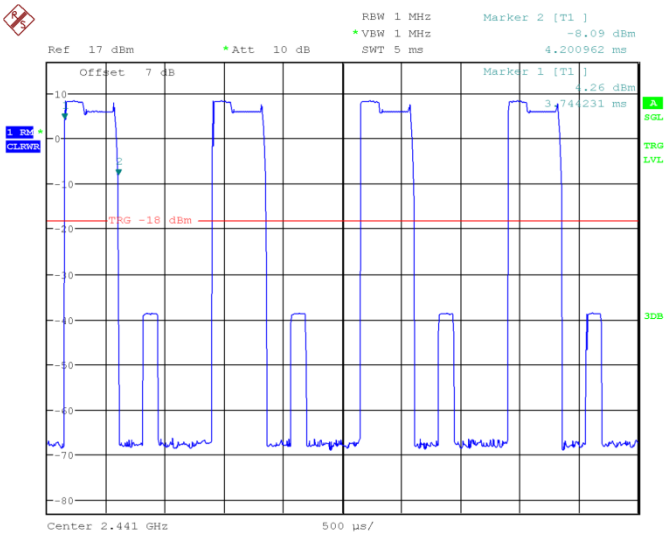


Fig.64 Time of occupancy (Dwell Time): Ch39,Packet 3-DH1

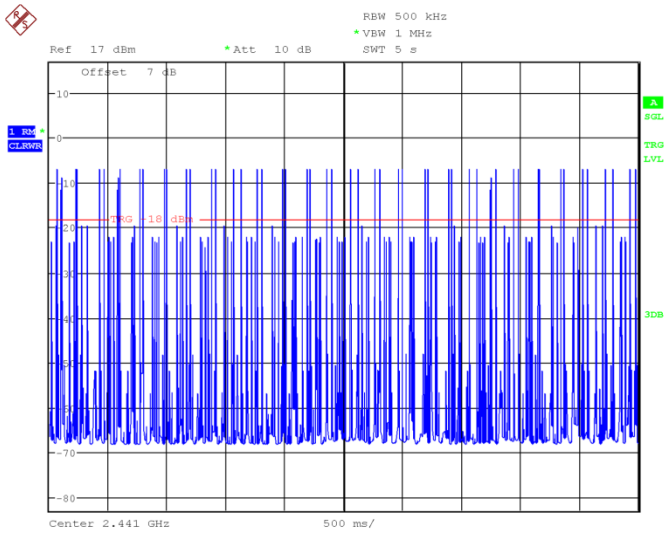


Fig.65 Number of Transmissions Measurement: Ch39, Packet 3-DH1

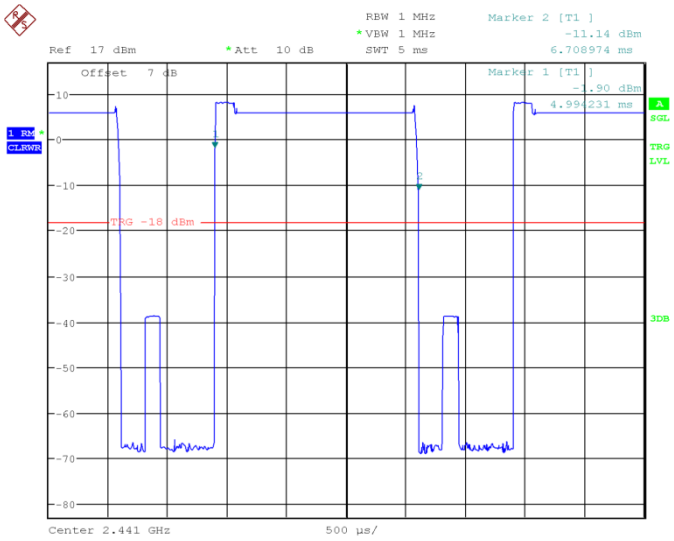


Fig.66 Time of occupancy (Dwell Time): Ch39,Packet 3-DH3

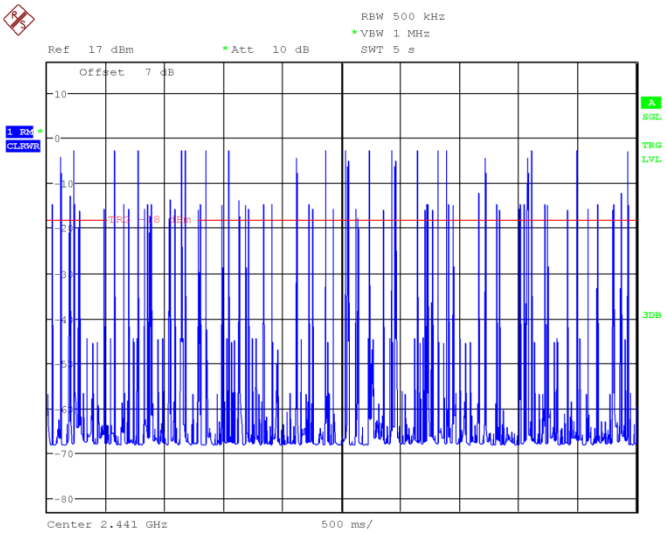


Fig.67 Number of Transmissions Measurement: Ch39, Packet 3-DH3

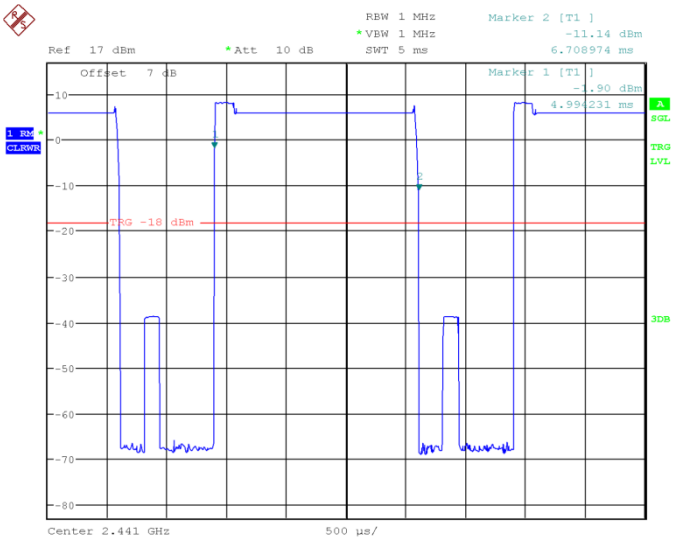


Fig.68 Time of occupancy (Dwell Time): Ch39,Packet 3-DH5

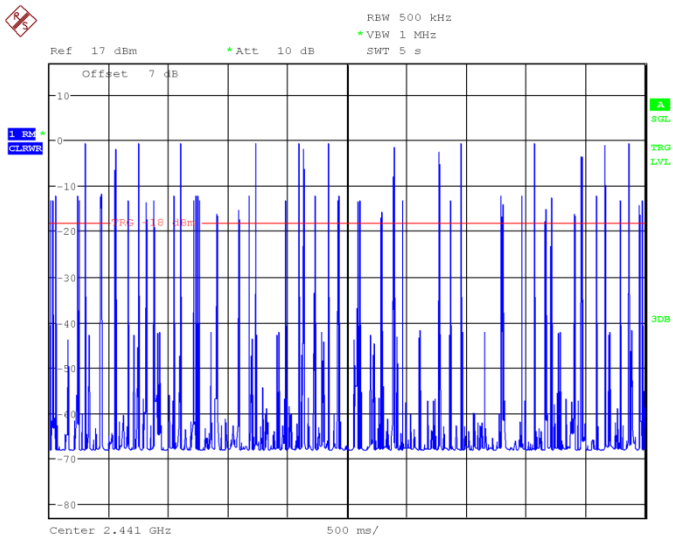


Fig.69 Number of Transmissions Measurement: Ch39, Packet 3-DH5

6.6. 20dB Bandwidth

6.6.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a) (1)	N/A

6.6.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.7

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 7.
4. Span: two or five times of OBW
5. RBW= 1% to 5% of the OBW; VBW≥3RBW; Max Hold.
6. Select the max peak, and N DB DOWN=20dB.
7. Record the results.

Measurement Result:

For GFSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.70	1.029	P
39	Fig.71	1.029	P
78	Fig.72	1.029	P

For π/4 DQPSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.73	1.091	P
39	Fig.74	1.096	P
78	Fig.75	1.091	P

For 8DPSK

Channel	20dB Bandwidth (KHz)		Conclusion
0	Fig.76	1.178	P
39	Fig.77	1.173	P
78	Fig.78	1.173	P

Conclusion: PASS

Test graphs as below:

Fig.70 20dB Bandwidth: GFSK, Ch0

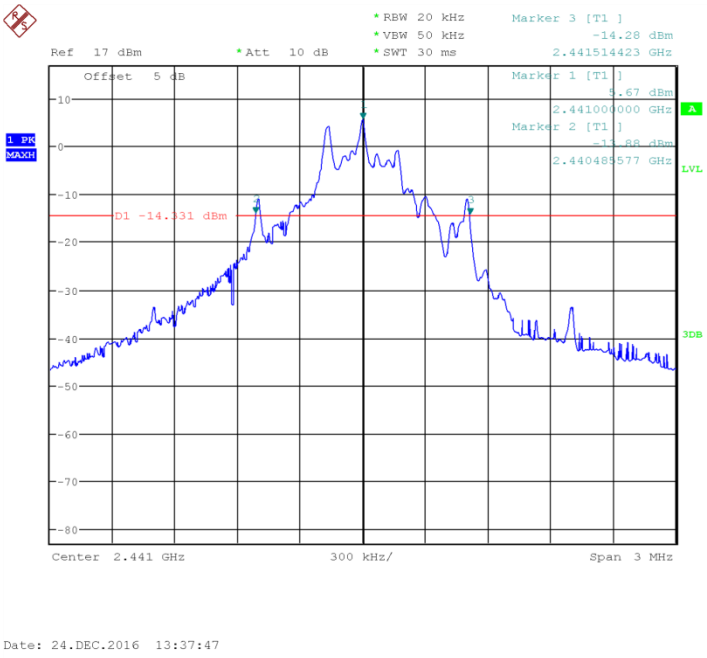


Fig.71 20dB Bandwidth: GFSK, Ch39

Fig.72 20dB Bandwidth: GFSK, Ch78

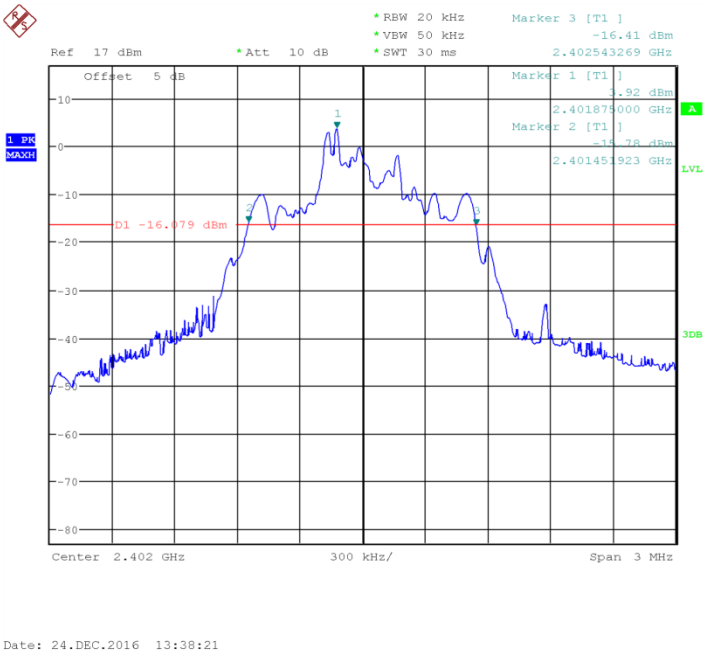


Fig.73 20dB Bandwidth: π/4 DQPSK, Ch0

Fig.74 20dB Bandwidth: π/4 DQPSK, Ch39

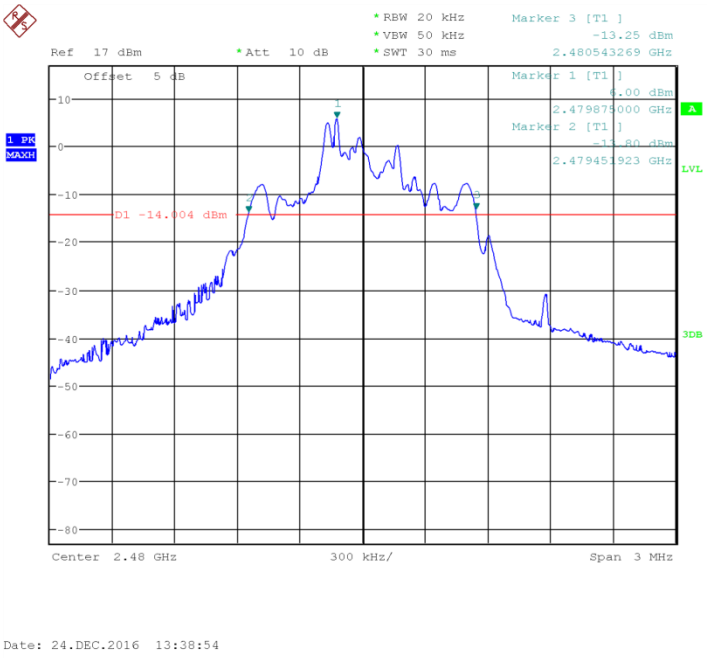


Fig.75 20dB Bandwidth: π/4 DQPSK, Ch78

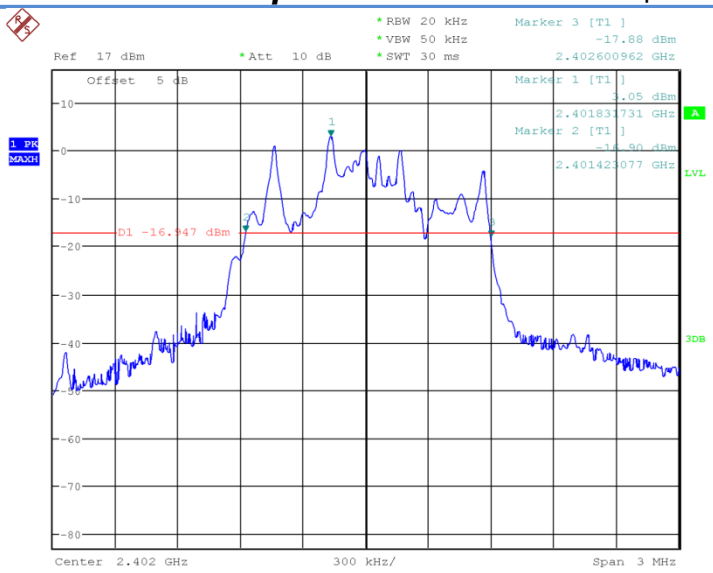


Fig.76 20dB Bandwidth: 8DPSK, Ch0

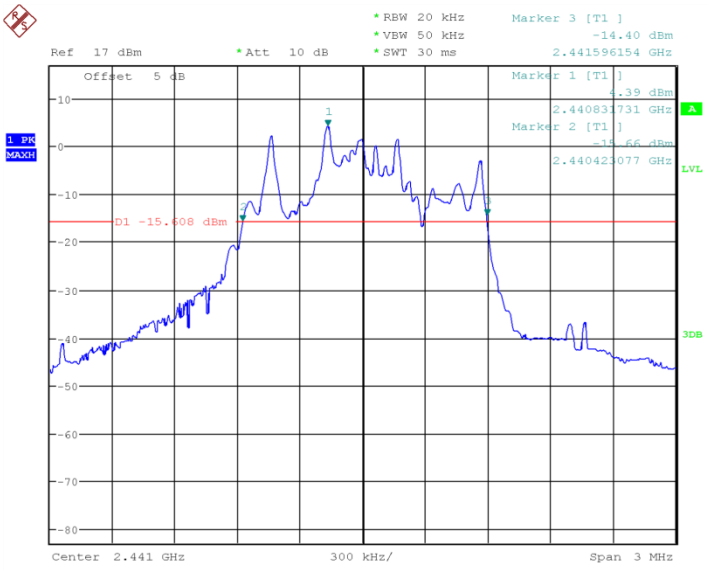


Fig.77 20dB Bandwidth: 8DPSK, Ch39

Fig.78 20dB Bandwidth: 8DPSK, Ch78

6.7. Carrier Frequency Separation

6.7.1 Measurement Limit:

Standard	Limit (KHz)
FCC 47 CFR Part 15.247 (a) (1)	Over 25KHz or (2/3)*20dB bandwidth

6.7.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.2.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. Span: Wide enough to capture the peaks of two adjacent channels.
4. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
5. Video (or average) bandwidth (VBW) ≥ RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.

6.7.3 Measurement Result:

For GFSK

Channel	Carrier separation (KHz)	Conclusion

39	Fig.79	990.384	P

For π/4 DQPSK

Channel	Carrier separation (KHz)		Conclusion
39	Fig.80	1024.038	P

For 8DPSK

Channel	Carrier separation (KHz)		Conclusion
39	Fig.81	985.576	P

Conclusion: PASS

Test graphs as below:

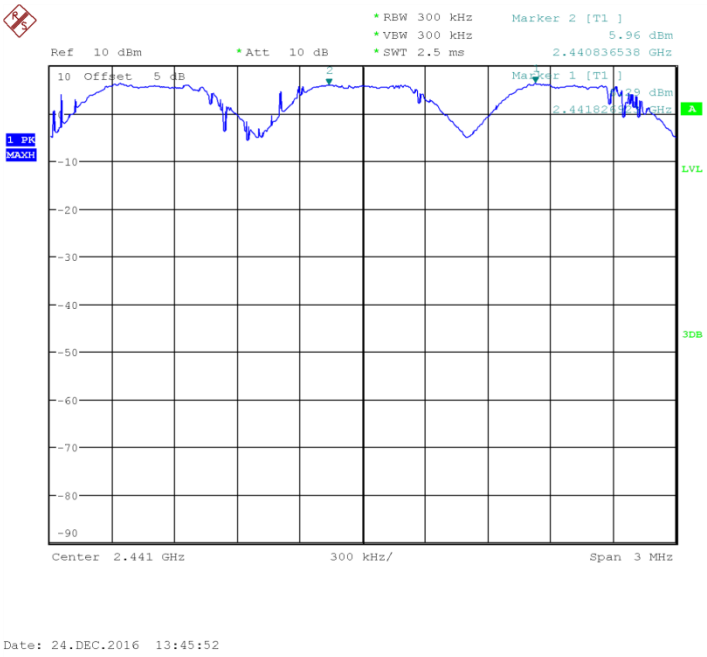


Fig.79 Carrier separation measurement: GFSK, Ch39

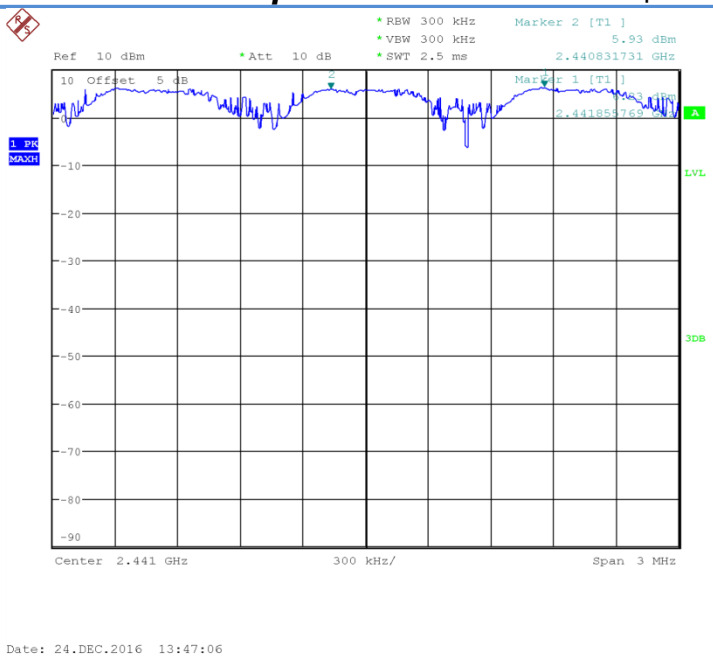


Fig.80 Carrier separation measurement: π/4 DQPSK, Ch39

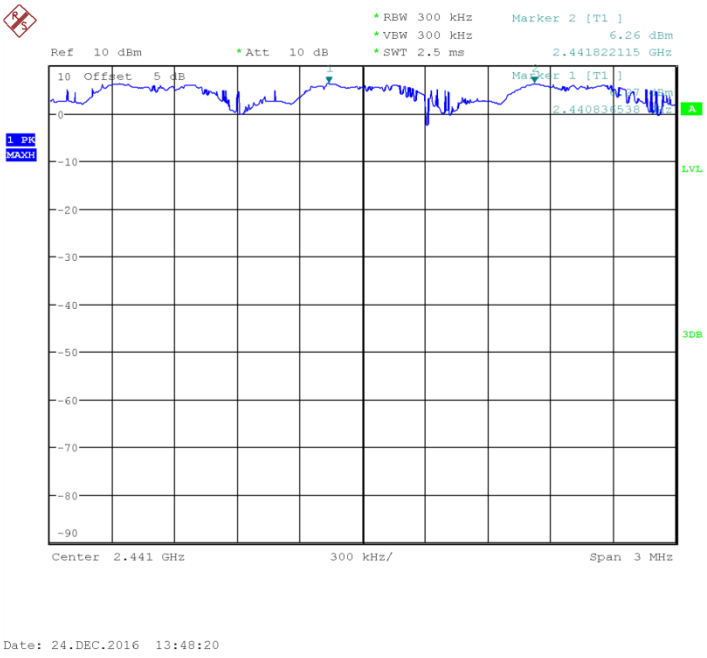


Fig.81 Carrier separation measurement: 8DPSK, Ch39

6.8. Number Of Hopping Channels

6.8.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a)(1)(iii)	At least 15 non-overlapping channels

6.8.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.3.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
4. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
5. VBW ⩾ RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.
10. Record the test rsults.

6.8.3 Measurement Result:

For GFSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.82	79	P
40~78	Fig.83		P

For π/4 DQPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.84	79	P
40~78	Fig.85		P

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.86	79	P
40~78	Fig.87		P

Conclusion: PASS

Test graphs as below:

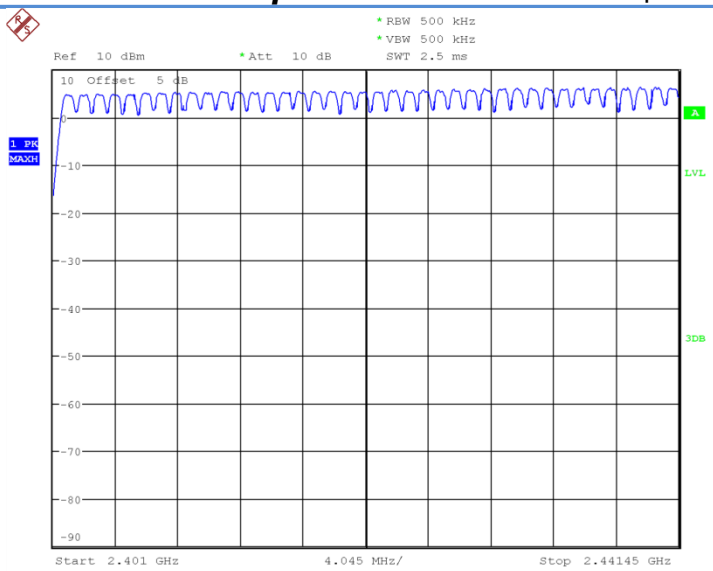


Fig.82 Number of hopping frequency: GFSK, Ch0~39

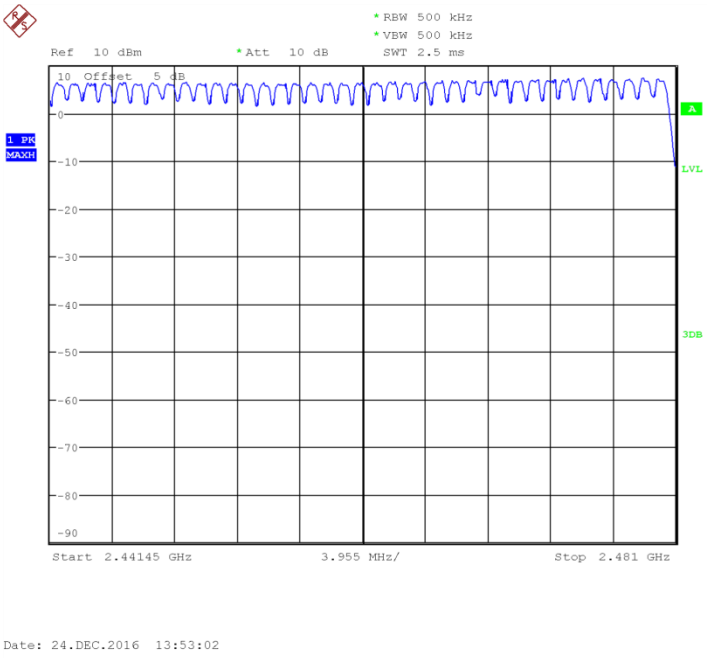


Fig.83 Number of hopping frequency: GFSK, Ch40~78

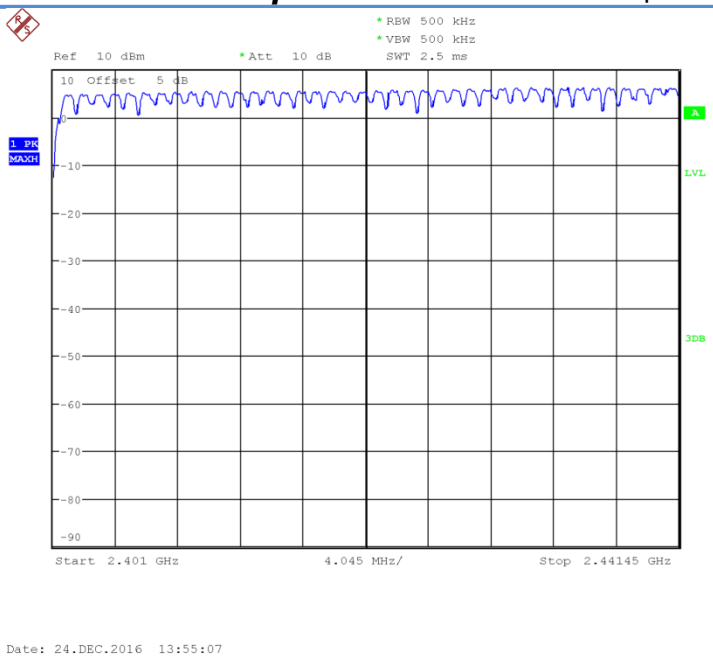


Fig.84 Number of hopping frequency: π/4 DQPSK, Ch0~39

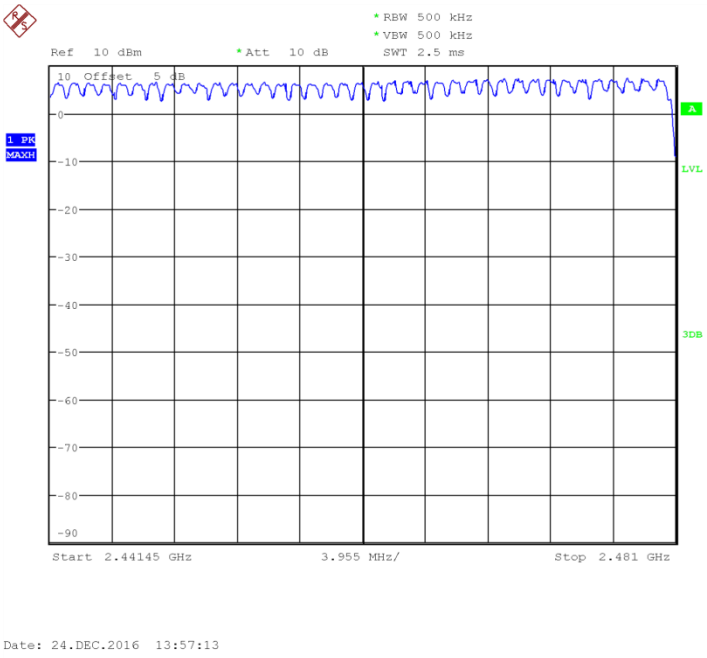


Fig.85 Number of hopping frequency: π/4 DQPSK, Ch40~78

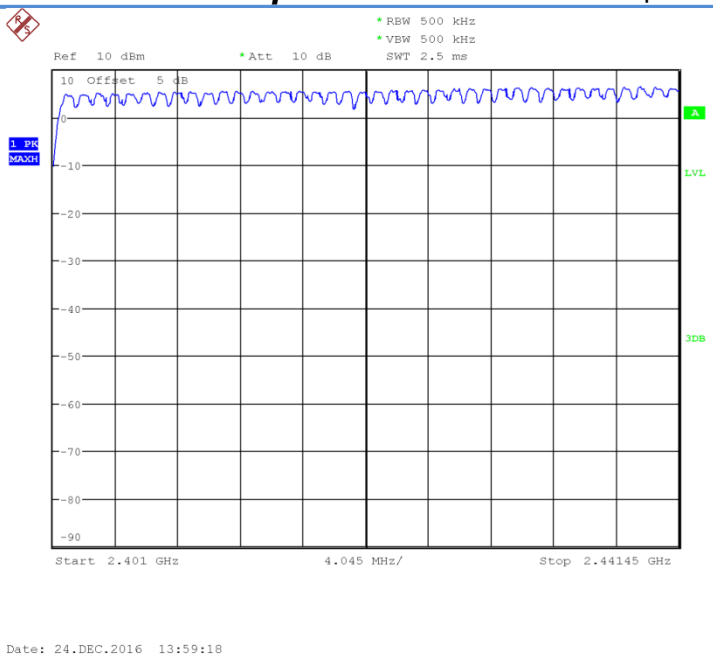


Fig.86 Number of hopping frequency: 8DPSK, Ch0~39

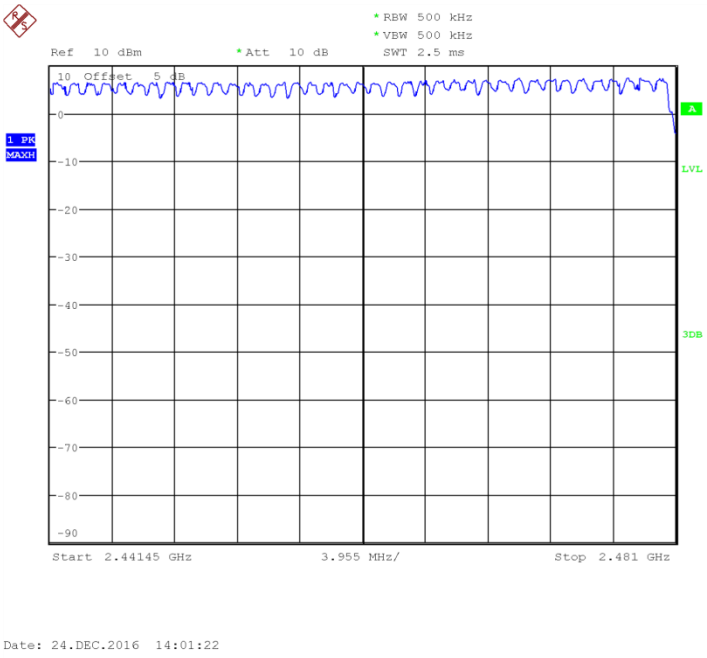


Fig.87 Number of hopping frequency: 8DPSK, Ch40~78

7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Vector Signal Analyzer	FSQ26	101096	Rohde&Schwarz	2017-05-11
2	DC Power Supply	ZUP60-14	LOC-220Z006	TDL-Lambda	2017-05-11
3	Bluetooth Tester	CBT32	100785	Rohde&Schwarz	2017-05-11

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date
1	Universal Radio Communication Tester	CMU200	123101	R&S	2017-05-11
3	Test Receiver	ESU40	100307	R&S	2017-05-11
4	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-11-04
5	Double Ridged Guide Antenna	ETS-3117	135885	ETS	2017-05-05
8	2-Line V-Network	ENV216	101380	R&S	2017-05-11

Anechoic chamber

Fully anechoic chamber by Frankonia German.

8. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

ANNEX B. Accreditation Certificate

Accredited Laboratory

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of any additional program requirements in the field of Electrical. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 10th day of December 2014.

President & CEO
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2017

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

************End The Report************