FCC PART 15C
TEST REPORT
No. I15Z41179-SRD02

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

Smart Phone

Model Name: Coolpad 3320A

With

Hardware Version: P2

Software Version: 5.1.155.00.T2.150617.3320A

FCC ID: R38YL3320A

IC number: 10367A-YL3320A

Issued Date: July 17th, 2015

TESTING
CNAS L0570

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 CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

No.52, HuayuanNorth Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512,Fax:+86(0)10-62304633-2504

Email:cttl_terminals@catr.cn, website:www.chinattl.com

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I15Z41179-SRD02	Rev.0	1st edition	2015-07-17

CONTENTS

1. Test Laboratory

1.1. Testing Location

Location 1:CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Location 2:CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2. Testing Environment

Normal Temperature: 15-35℃

Extreme Temperature: -20/+55℃

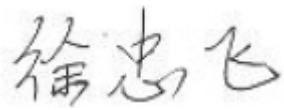
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2015-06-08

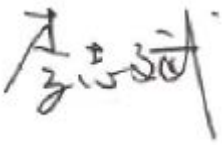
Testing End Date: 2015-07-08

1.4. Signature



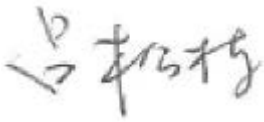
Xu Zhongfei

(Prepared this test report)



Li Zhibin

(Reviewed this test report)



Lv Songdong

(Approvedthis test report)

2. Client Information

2.1. Applicant Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial Park(North), Nanshan district, Shenzhen, P.R.C
City:	Shenzhen
Postal Code:	/
Country:	China
Telephone:	+86 13410415799
Fax:	/

2.2. Manufacturer Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Coolpad Information Harbor, 2nd Mengxi Road, Hi-Tech Industrial Park(North), Nanshan district, Shenzhen, P.R.C
City:	Shenzhen
Postal Code:	/
Country:	China
Telephone:	+86 13410415799
Fax:	/

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

3.1. About EUT

Description	Smart Phone
Model Name	Coolpad 3320A
Market Name	Coolpad Rogue
Frequency Band	2402MHz~2480MHz
Type of Modulation	GFSK/ π /4 DQPSK/8DPSK
Number of Channels	79
FCC ID	R38YL3320A
IC Number	10367A-YL3320A

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

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version
EUT1	/	P2	5.1.155.00.T2.150617.3320A

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

3.3. Internal Identification of AE

AE ID*	Description	Type	SN
AE1	ADAPTOR	CYSK05-050100	/

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

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. 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, 2400–2483.5 MHz, and 5725–5850 MHz.	Oct, 2014
ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	Jun,2013
IC RSS-247	Digital Transmission Systems(DTSs),Frequency Hopping Systems(FHSs) and Licence-Exempt Local Area Network(LE-LAN) Devices	Issue 1 May,2015
IC RSS-Gen	General Requirements for Compliance of Radio Apparatus	Issue 4 Nov,2014

5. Test Results

5.1. Summary of Test Results

No	Test cases	Sub-clause of Part15C	Sub-clause of IC	Verdict
0	Antenna Requirement	15.203	/	**P**
1	Maximum Peak Output Power	15.247 (b)	RSS-247 Issue1 5.4	**P**
2	Band Edges Compliance	15.247 (d)	RSS-247 Issue1 5.4	**P**
3	Conducted Spurious Emission	15.247 (d)	RSS-247 Issue1 5.5	**P**
4	Radiated Spurious Emission	15.247,15.205,15.209	RSS-247 Issue1 5.5	**P**
5	Occupied 20dB bandwidth	15.247(a)	RSS-247 Issue1 5.1	**/**
6	Time of Occupancy(Dwell Time)	15.247(a)	RSS-247 Issue1 5.1	**P**
7	Number of Hopping Channel	15.247(a)	RSS-247 Issue1 5.1	**P**
8	Carrier Frequency Separation	15.247(a)	RSS-247 Issue1 5.1	**P**
9	AC Powerline Conducted Emission	15.107,15.207	RSS-Gen Issue3 7.2.4	**P**
10	Occupied Bandwidth	/	RSS-Gen Issue3 4.6.1	

See **ANNEX B and ANNEX C** for details.

5.2. Statements

CTTL has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2

5.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
AFH	Adaptive Frequency Hopping

BW	Band Width
E.I.R.P.	equivalent isotropical radiated power
ISM	Industrial, Scientific and Medical
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

5.4. Laboratory Environment

Semi-anechoic chamber (23 meters×17 meters×10 meters) did not exceed following limits:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 M
Ground system resistance	< 4
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 M
Ground system resistance	< 4

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ26	200136	Rohde & Schwarz	1 year	2016-01-06
2	Bluetooth Tester	CBT32	100649	Rohde & Schwarz	1 year	2016-02-09
3	Shielding Room	S81	/	ETS-Lindgren	/	/
4	LISN	ENV216	101200	Rohde & Schwarz	1 year	2016-07-07
5	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2016-03-03

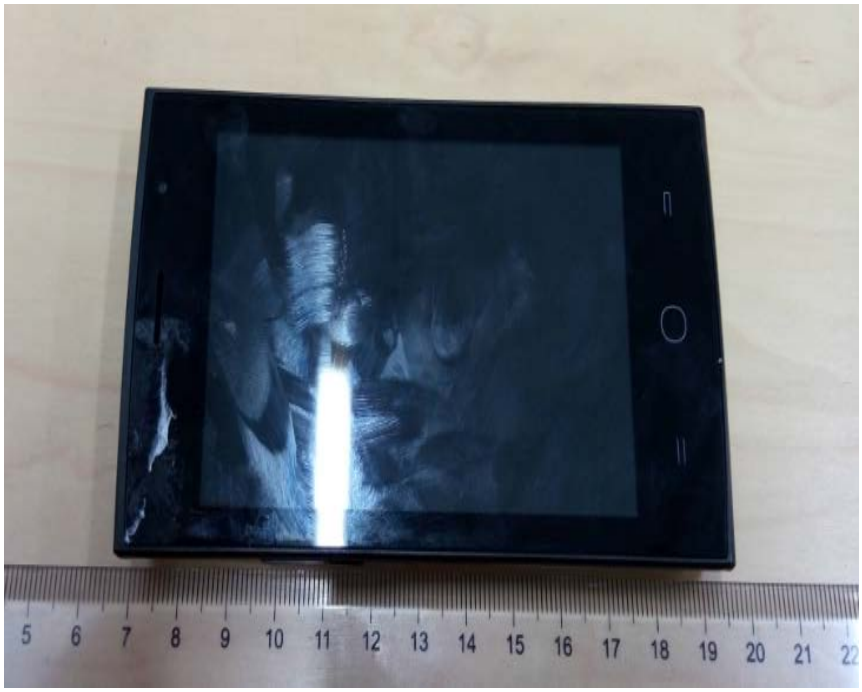
Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESCI 7	100948	Rohde & Schwarz	1 year	2016-07-16
2	Loop antenna	HFH2-Z2	829324/007	Rohde & Schwarz	3 year	2017-12-16
3	BiLog Antenna	VULB9163	234	Schwarzbeck	3 year	2016-09-15
4	Dual-Ridge Waveguide Horn Antenna	3115	6914	EMCO	3 year	2017-12-15
5	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	3 year	2017-06-30
6	Vector Signal Analyzer	FSV	101047	Rohde & Schwarz	1 year	2016-07-03
7	Semi-anechoic chamber	/	CT000332-1074	Frankonia German	/	/
8	Bluetooth Tester	CBT	100153	Rohde & Schwarz	1 year	2016-09-18

Anechoic chamber

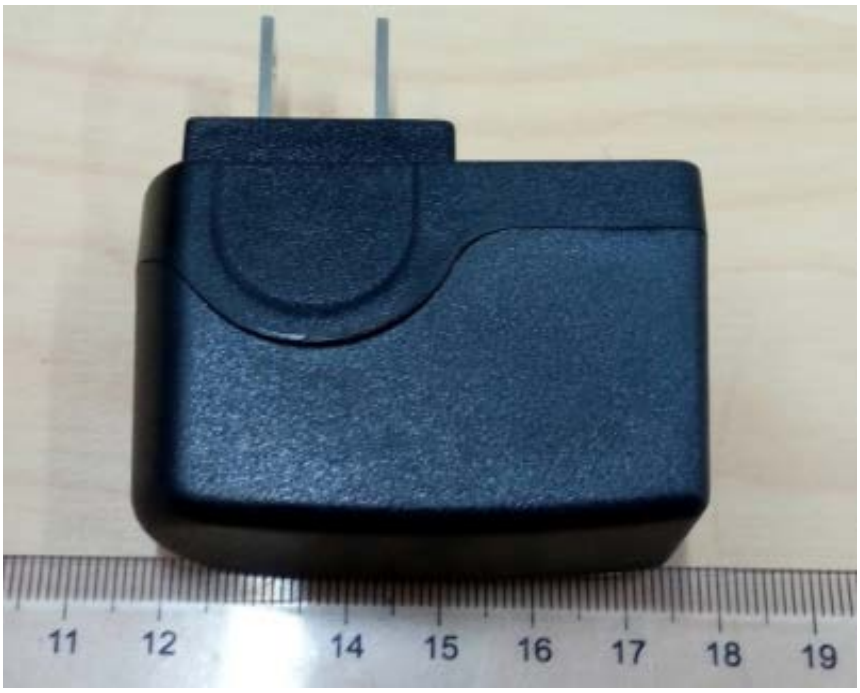
Fully anechoic chamber by ETS-Lindgren.

ANNEX A: EUT photograph



Picture A-1: Mobile Phone

Picture A-2: Mobile Phone



Picture A-3: Charger(AE1)

Picture A-4: Charger(AE1)

ANNEX B: MEASUREMENT RESULTS FOR RECEIVER

B.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, § 15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion: The Directional gains of antenna used for transmitting is -0.5 dBi.
The RF transmitter uses an integrate antenna without connector.

B.1 Maximum Peak Output Power

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)(1) RSS-247 Issue1 5.4	< 30

Measurement Results:

Mode	Test Result (dBm)					
	2402MHz (Ch0)		2441MHz (Ch39)		2480 MHz (Ch78)	
GFSK	Fig.1	0.51	Fig.2	1.65	Fig.3	0.16
π /4 DQPSK	Fig.4	0.64	Fig.5	1.64	Fig.6	0.92
8DPSK	Fig.7	1.36	Fig.8	2.63	Fig.9	1.56

Conclusion: Pass

B.2 Band Edges Compliance

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d) RSS-247 Issue1 5.4	> 20

Measurement Result:

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	ON	Fig.10	P
	78	ON	Fig.11	P
π /4 DQPSK	0	ON	Fig.12	P
	78	ON	Fig.13	P
8DPSK	0	ON	Fig.14	P
	78	ON	Fig.15	P

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	OFF	Fig.16	P
	78	OFF	Fig.17	P
π /4 DQPSK	0	OFF	Fig.18	P
	78	OFF	Fig.19	P
8DPSK	0	OFF	Fig.20	P
	78	OFF	Fig.21	P

See ANNEX C for test graphs.

Conclusion: Pass

B.3 Conducted Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d) RSS-247 Issue1 5.5	20dB below peak output power in 100 kHz bandwidth

Measurement Results:

MODE	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.402 GHz	Fig.22	P
		30 MHz-3GHz	Fig.23	P
		3GHz-18GHz	Fig.24	P
	39	2.441 GHz	Fig.25	P
		30 MHz-3 GHz	Fig.26	P
		3GHz-18GHz	Fig.27	P
	78	2.480 GHz	Fig.28	P
		30 MHz-3GHz	Fig.29	P
		3GHz-18GHz	Fig.30	P
π /4 DQPSK	0	2.402 GHz	Fig.31	P
		30 MHz-3 GHz	Fig.32	P
		3GHz-18GHz	Fig.33	P
	39	2.441 GHz	Fig.34	P
		30 MHz-3GHz	Fig.35	P
		3GHz-18Ghz	Fig.36	P
	78	2.480 GHz	Fig.37	P
		30 MHz-3GHz	Fig.38	P
		3GHz-18Ghz	Fig.39	P
8DPSK	0	2.402 GHz	Fig.40	P
		30 MHz-3GHz	Fig.41	P
		3GHz-18GHz	Fig.42	P
	39	2.441 GHz	Fig.43	P
		30 MHz-3GHz	Fig.44	P
		3GHz-18GHz	Fig.45	P
	78	2.480 GHz	Fig.46	P
		30 MHz-3GHz	Fig.47	P
		3GHz-18GHz	Fig.48	P
/	All channel	18GHz-26GHz	Fig.49	P

See ANNEX C for test graphs.

Conclusion: Pass

B.4 Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209 RSS-247 Issue1 5.5	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(μV/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition

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	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

Measurement Results:

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	1 GHz ~3 GHz	Fig.50	P
		3 GHz ~ 18 GHz	Fig.51	P
	39	30 MHz ~1 GHz	Fig.52	P
		1 GHz ~3 GHz	Fig.53	P
		3 GHz ~ 18 GHz	Fig.54	P
	78	1 GHz ~3 GHz	Fig.55	P
		3 GHz ~ 18 GHz	Fig.56	P
	Power(CH0)	2.38 GHz ~ 2.45 GHz	Fig.57	P
	Power(CH78)	2.45 GHz ~ 2.5 GHz	Fig.58	P
π /4 DQPSK	0	1 GHz ~3 GHz	Fig.59	P
		3 GHz ~ 18 GHz	Fig.60	P
	39	30 MHz ~1 GHz	Fig.61	P
		1 GHz ~3 GHz	Fig.62	P
		3 GHz ~ 18 GHz	Fig.63	P
	78	1 GHz ~3 GHz	Fig.64	P
		3 GHz ~ 18 GHz	Fig.65	P
	Power(CH0)	2.38 GHz ~ 2.45 GHz	Fig.66	P
	Power(CH78)	2.45 GHz ~ 2.5 GHz	Fig.67	P
8DPSK	0	1 GHz ~3 GHz	Fig.68	P
		3 GHz ~ 18 GHz	Fig.69	P
	39	30 MHz ~1 GHz	Fig.70	P
		1 GHz ~3 GHz	Fig.71	P
		3 GHz ~ 18 GHz	Fig.72	P
	78	1 GHz ~3 GHz	Fig.73	P
		3 GHz ~ 18 GHz	Fig.74	P
	Power(CH0)	2.38 GHz ~ 2.45 GHz	Fig.75	P
	Power(CH78)	2.45 GHz ~ 2.5 GHz	Fig.76	P
/	All channels	18 GHz~ 26.5 GHz	Fig.77	P

GFSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2388.940	56.2	-38.8	27.7	67.3	H	74.0
17943.000	57.7	-17.7	45.6	29.8	V	74.0
17981.250	57.5	-17.7	45.6	29.6	V	74.0
17934.750	57.5	-17.7	45.6	29.6	H	74.0
17914.500	57.2	-17.7	45.6	29.3	H	74.0
17978.250	57.2	-17.7	45.6	29.3	V	74.0

GFSK CH0 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2389.715	44.9	-38.8	27.7	56.0	V	54.0
17957.250	46.8	-17.7	45.6	18.9	V	54.0
17992.500	46.8	-17.7	45.6	18.9	V	54.0
17956.500	46.7	-17.7	45.6	18.8	H	54.0
17953.500	46.7	-17.7	45.6	18.8	H	54.0
17994.750	46.6	-17.7	45.6	18.7	V	54.0

GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
17998.500	57.5	-17.7	45.6	29.6	V	74.0
17867.250	57.4	-18.5	45.6	30.3	H	74.0
17990.250	57.2	-17.7	45.6	29.3	H	74.0
17950.500	57.1	-17.7	45.6	29.2	V	74.0
17946.000	57.1	-17.7	45.6	29.2	H	74.0
17993.250	56.8	-17.7	45.6	28.9	V	74.0

GFSK CH39 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
17940.000	46.7	-17.7	45.6	18.8	H	54.0
17942.250	46.7	-17.7	45.6	18.8	V	54.0
17936.250	46.6	-17.7	45.6	18.7	H	54.0
17989.500	46.6	-17.7	45.6	18.7	H	54.0
17956.500	46.6	-17.7	45.6	18.7	H	54.0
17993.250	46.6	-17.7	45.6	18.7	V	54.0

GFSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2485.900	56.3	-38.9	27.7	67.5	V	74.0
17997.750	57.6	-17.7	45.6	29.7	V	74.0
17960.250	57.5	-17.7	45.6	29.6	V	74.0
17963.250	57.4	-17.7	45.6	29.5	V	74.0
17993.250	57.3	-17.7	45.6	29.4	H	74.0
17964.000	57.3	-17.7	45.6	29.4	V	74.0

GFSK CH78 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2483.500	50.4	-38.9	27.7	61.6	H	54.0
17999.250	46.8	-17.7	45.6	18.9	H	54.0
17989.500	46.8	-17.7	45.6	18.9	H	54.0
17940.750	46.7	-17.7	45.6	18.8	V	54.0
17964.750	46.6	-17.7	45.6	18.7	V	54.0
17994.000	46.5	-17.7	45.6	18.6	V	54.0

π /4 DQPSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
2386.630	56.1	-38.8	27.7	67.2	V	74.0
17976.000	57.9	-17.7	45.6	30.0	H	74.0
17985.750	57.5	-17.7	45.6	29.6	V	74.0
17989.500	57.3	-17.7	45.6	29.4	V	74.0
17967.000	57.2	-17.7	45.6	29.3	V	74.0
17875.500	57.2	-18.5	45.6	30.1	V	74.0

π /4 DQPSK CH0 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
2389.675	44.5	-38.8	27.7	55.6	V	54.0
17981.250	46.9	-17.7	45.6	19.0	H	54.0
17977.500	46.8	-17.7	45.6	18.9	V	54.0
17951.250	46.8	-17.7	45.6	18.9	V	54.0
17962.500	46.8	-17.7	45.6	18.9	V	54.0
17964.750	46.7	-17.7	45.6	18.8	V	54.0

π /4 DQPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
17962.500	57.6	-17.7	45.6	29.7	V	74.0
17959.500	57.3	-17.7	45.6	29.4	V	74.0
17947.500	57.0	-17.7	45.6	29.1	H	74.0
17974.500	57.0	-17.7	45.6	29.1	V	74.0
17913.000	56.9	-18.5	45.6	29.8	H	74.0
17954.250	56.8	-17.7	45.6	28.9	V	74.0

π /4 DQPSK CH39 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
17989.500	47.0	-17.7	45.6	19.1	H	54.0
17962.500	47.0	-17.7	45.6	19.1	V	54.0
17999.250	46.9	-17.7	45.6	19.0	V	54.0
17955.000	46.9	-17.7	45.6	19.0	V	54.0
17976.000	46.8	-17.7	45.6	18.9	H	54.0
17954.250	46.8	-17.7	45.6	18.9	V	54.0

π /4 DQPSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
2483.910	56.6	-38.9	27.7	67.8	H	74.0
17880.750	57.6	-18.5	45.6	30.5	V	74.0
17986.500	57.3	-17.7	45.6	29.4	H	74.0
17946.750	57.2	-17.7	45.6	29.3	H	74.0
17997.750	57.1	-17.7	45.6	29.2	H	74.0
17944.500	56.9	-17.7	45.6	29.0	V	74.0

π /4 DQPSK CH78 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polariz ation	Limit (dBμV/m)
2495.710	44.4	-38.9	27.7	55.6	H	54.0
17989.500	47.1	-17.7	45.6	19.2	H	54.0
17985.750	47.0	-17.7	45.6	19.1	V	54.0
17940.750	46.8	-17.7	45.6	18.9	H	54.0
17973.000	46.8	-17.7	45.6	18.9	V	54.0
17987.250	46.8	-17.7	45.6	18.9	V	54.0

8DPSK CH0 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2388.740	56.1	-38.8	27.7	67.2	V	74.0
17749.500	57.7	-18.5	45.6	30.6	H	74.0
17946.750	57.7	-17.7	45.6	29.8	V	74.0
17997.750	57.5	-17.7	45.6	29.6	V	74.0
17919.750	57.5	-17.7	45.6	29.6	H	74.0
17950.500	57.3	-17.7	45.6	29.4	V	74.0

8DPSK CH0 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2388.505	44.8	-38.8	27.7	55.9	H	54.0
17983.500	46.9	-17.7	45.6	19.0	H	54.0
17986.500	46.9	-17.7	45.6	19.0	V	54.0
17895.000	46.8	-18.5	45.6	19.7	H	54.0
17911.500	46.8	-18.5	45.6	19.7	H	54.0
17972.250	46.6	-17.7	45.6	18.7	V	54.0

8DPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
17925.750	57.9	-17.7	45.6	30.0	H	74.0
17970.750	57.6	-17.7	45.6	29.7	V	74.0
17962.500	57.5	-17.7	45.6	29.6	H	74.0
18000.000	57.2	-45.6	44.5	58.3	V	74.0
17967.000	57.1	-17.7	45.6	29.2	H	74.0
17907.000	57.0	-18.5	45.6	29.9	V	74.0

8DPSK CH39 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
17986.500	46.9	-17.7	45.6	19.0	H	54.0
17968.500	46.9	-17.7	45.6	19.0	V	54.0
17989.500	46.8	-17.7	45.6	18.9	H	54.0
17993.250	46.8	-17.7	45.6	18.9	V	54.0
17982.750	46.7	-17.7	45.6	18.8	V	54.0
17972.250	46.6	-17.7	45.6	18.7	V	54.0

8DPSK CH78 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2494.120	56.4	-38.9	27.7	67.6	H	74.0
17924.250	57.8	-17.7	45.6	29.9	V	74.0
17856.000	57.5	-18.5	45.6	30.4	V	74.0
17877.000	57.4	-18.5	45.6	30.3	V	74.0
17982.000	57.3	-17.7	45.6	29.4	H	74.0
17971.500	57.3	-17.7	45.6	29.4	V	74.0

8DPSK CH78 (1-18GHz)

Frequency (MHz)	Average (dBμV/m)	Pathloss. (dB)	antenna factor	Receiver (dBm)	Polarization	Limit (dBμV/m)
2486.950	45.0	-38.9	27.7	56.2	H	54.0
17989.500	46.9	-17.7	45.6	19.0	V	54.0
17991.000	46.9	-17.7	45.6	19.0	V	54.0
17941.500	46.8	-17.7	45.6	18.9	V	54.0
17992.500	46.7	-17.7	45.6	18.8	H	54.0
17983.500	46.6	-17.7	45.6	18.7	V	54.0

See ANNEX C for test graphs.

Conclusion: Pass

B.5 Occupied 20dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a) RSS-247 Issue1 5.1	/

Measurement Result:

Mode	Channel	Occupied 20dB Bandwidth (MHz)		conclusion
GFSK	0	Fig.78	1.165	/
	39	Fig.79	1.151	
	78	Fig.80	1.165	
π /4 DQPSK	0	Fig.81	1.403	/
	39	Fig.82	1.389	
	78	Fig.83	1.389	
8DPSK	0	Fig.84	1.389	/
	39	Fig.85	1.389	
	78	Fig.86	1.389	

See ANNEX C for test graphs.

Conclusion: PASS

B.6 Time of Occupancy (Dwell Time)

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a) RSS-247Issue1 5.1	< 400 ms

Measurement Results:

Mode	Channel	Packet	Dwell Time(ms)		Conclusion
GFSK	39	DH5	Fig.87	187.9	**P**
			Fig.88		
π /4 DQPSK	39	2-DH5	Fig.89	193.2	**P**
			Fig.90		
8DPSK	39	3-DH5	Fig.91	152.9	**P**
			Fig.92		

See ANNEX C for test graphs.

Conclusion: Pass

B.7 Number of Hopping Channels

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a) RSS-247 Issue1 5.1	At least 15 non-overlapping channels

Measurement Results:

Mode	Channel	Packet	Number of hopping channels		Test result	Conclusion
GFSK	39	DH5	Fig.93	Fig.94	79	**P**
π /4 DQPSK	39	2-DH5	Fig.95	Fig.96	79	**P**
8DPSK	39	3-DH5	Fig.97	Fig.98	79	**P**

See ANNEX C for test graphs.

Conclusion: Pass

B.8 Carrier Frequency Separation

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(a) RSS-247 Issue1 5.1	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

Measurement Results:

Mode	Channel	Packet	Separation of hopping channels	Test result (MHz)	Conclusion
GFSK	39	DH5	Fig.99	1.006	P
π /4 DQPSK	39	2-DH5	Fig.100	1.006	P
8DPSK	39	3-DH5	Fig.101	1.006	P

See ANNEX C for test graphs.

Conclusion: Pass

B.9 AC Power line Conducted Emission

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement Result and limit:

BT (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	66 to 56	Fig.102	P
0.5 to 5	56		
5 to 30	60		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.			

BT (Average Limit)-AE1

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV) Traffic	Conclusion
0.15 to 0.5	56 to 46	Fig.102	P
0.5 to 5	46		
5 to 30	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.			

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

See ANNEX C for test graphs.

Conclusion: Pass

B.10 Occupied Bandwidth

Measurement Limit:

Standard	Limit
RSS-Gen Issue3 4.6.1	/

Measurement Result:

Mode	Channel	Test Results (kHz)		conclusion
GFSK	0	Fig.103	1309.7	P
	39	Fig.104	1237.3	P
	78	Fig.105	1288.0	P
π /4 DQPSK	0	Fig.106	1526.8	P
	39	Fig.107	1505.1	P
	78	Fig.108	1519.5	P
8DPSK	0	Fig.109	1519.5	P
	39	Fig.110	1505.1	P
	78	Fig.111	1526.8	P

See ANNEX C for test graphs.

Conclusion: PASS

ANNEX C: TEST FIGURE LIST

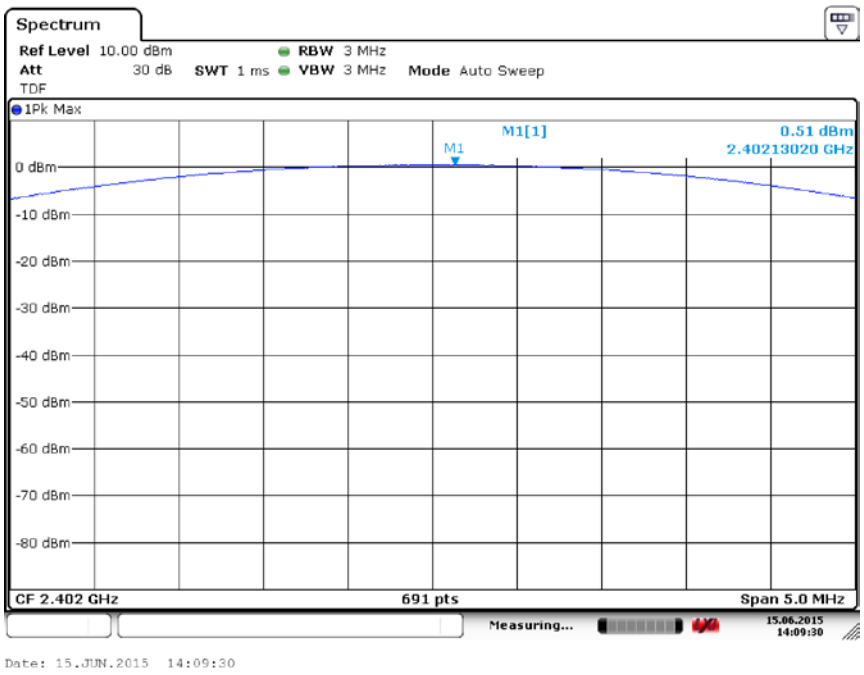


Fig. 1 Maximum Peak Output Power(GFSK, Ch 0)

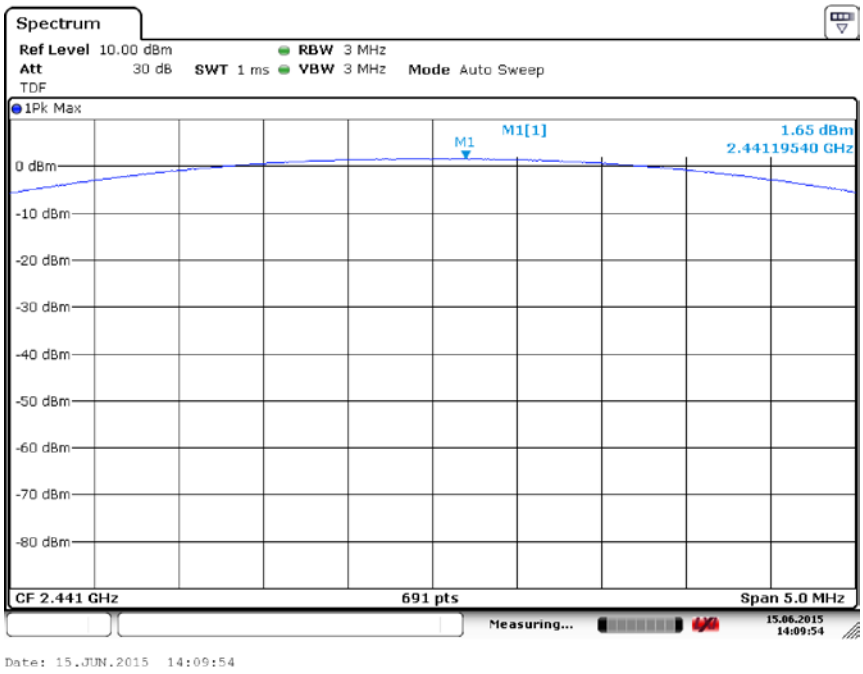


Fig. 2 Maximum Peak Output Power(GFSK, Ch 39)

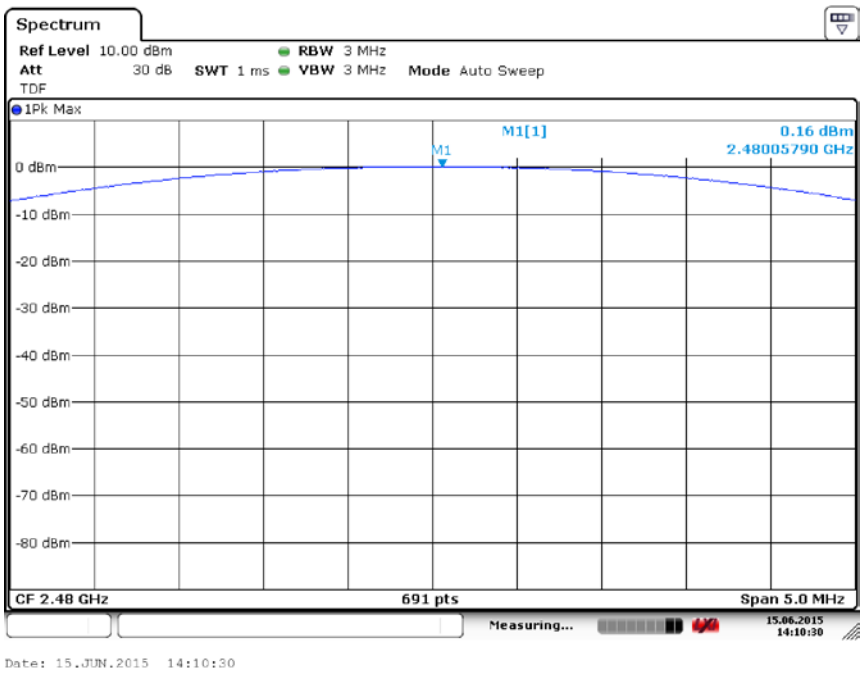


Fig. 3 Maximum Peak Output Power(GFSK, Ch 78)

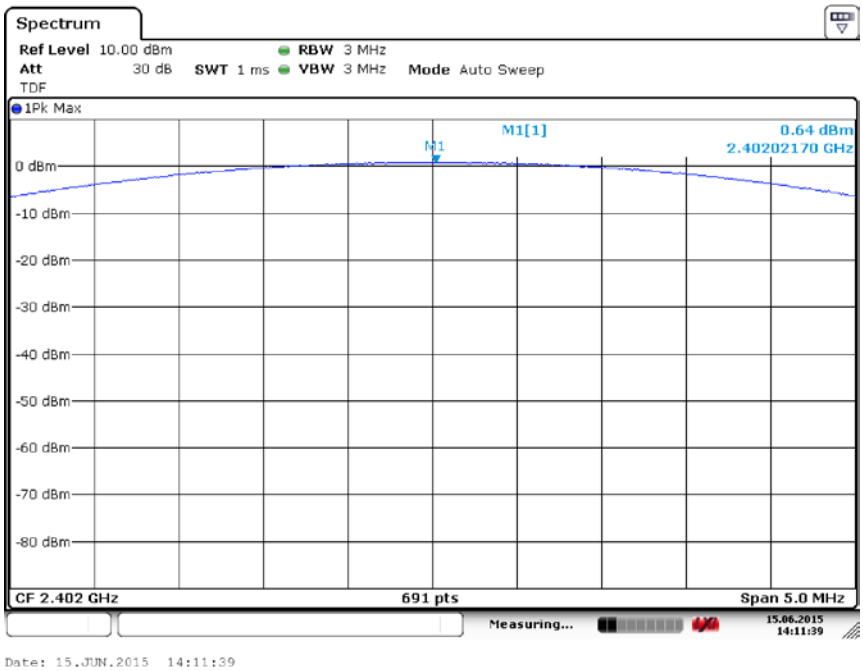


Fig. 4 Maximum Peak Output Power(π /4 DQPSK, Ch 0)

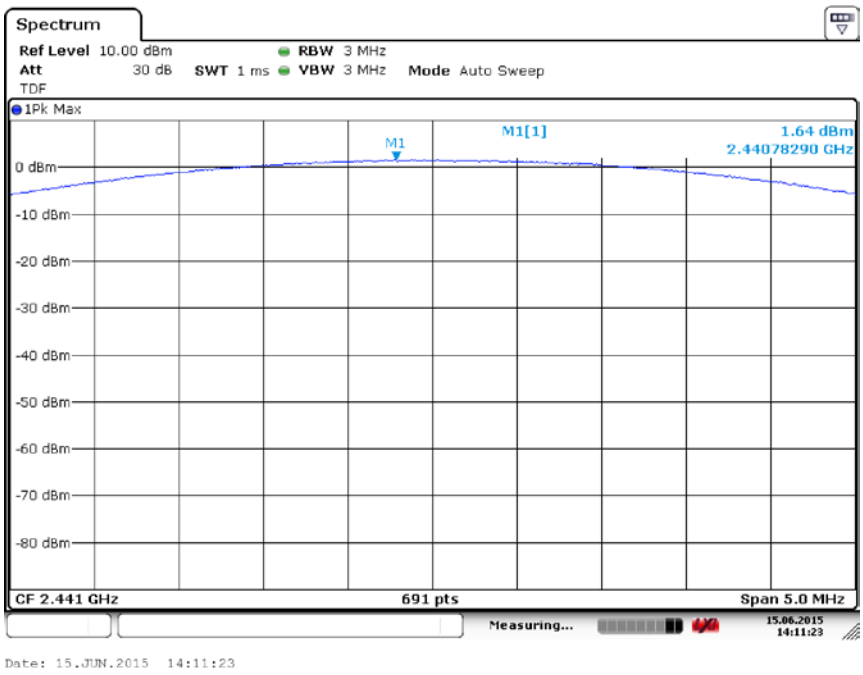


Fig. 5 Maximum Peak Output Power(π/4 DQPSK, Ch 39)

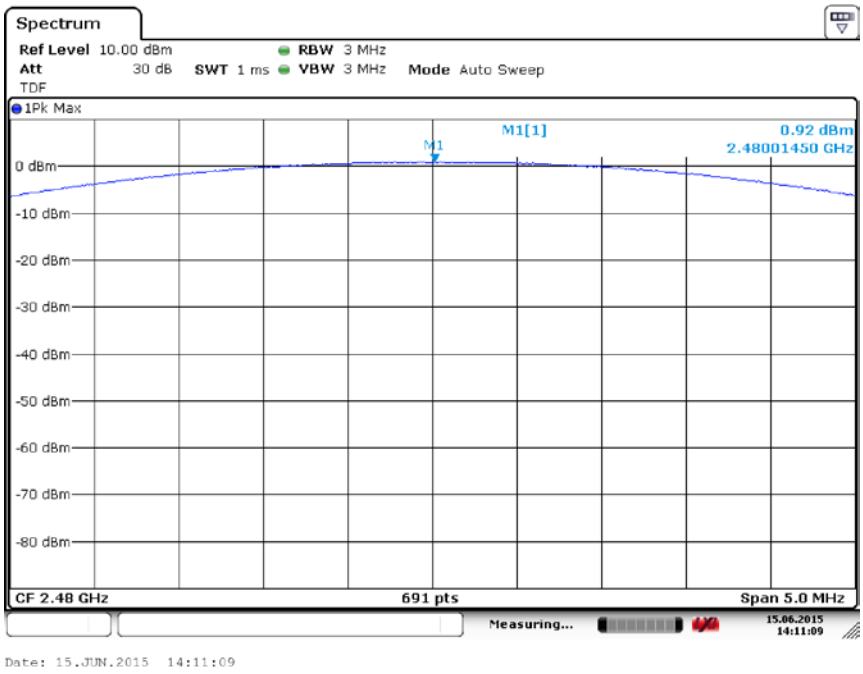


Fig. 6 Maximum Peak Output Power(π/4 DQPSK, Ch 78)

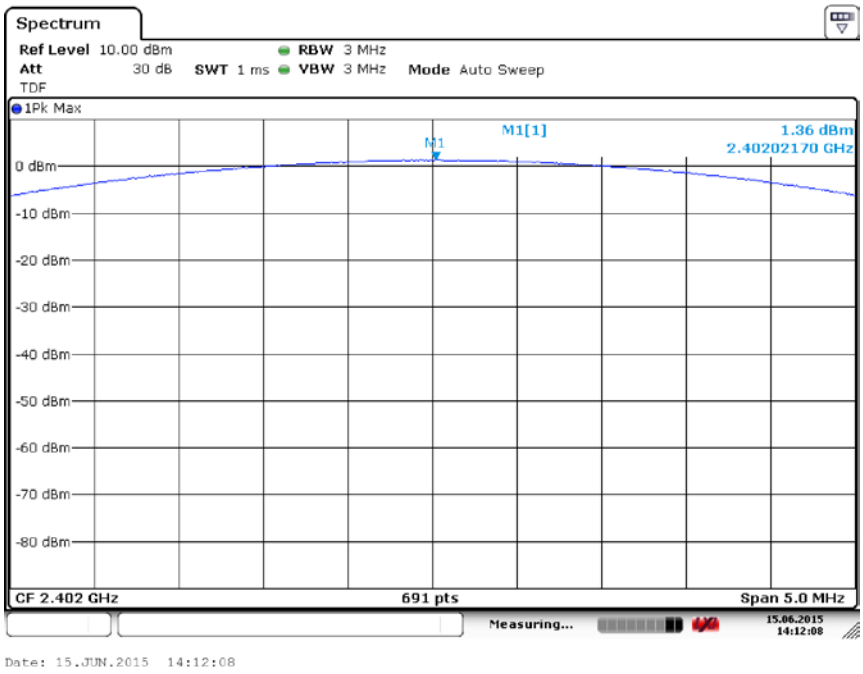


Fig. 7 Maximum Peak Output Power(8DPSK, Ch 0)

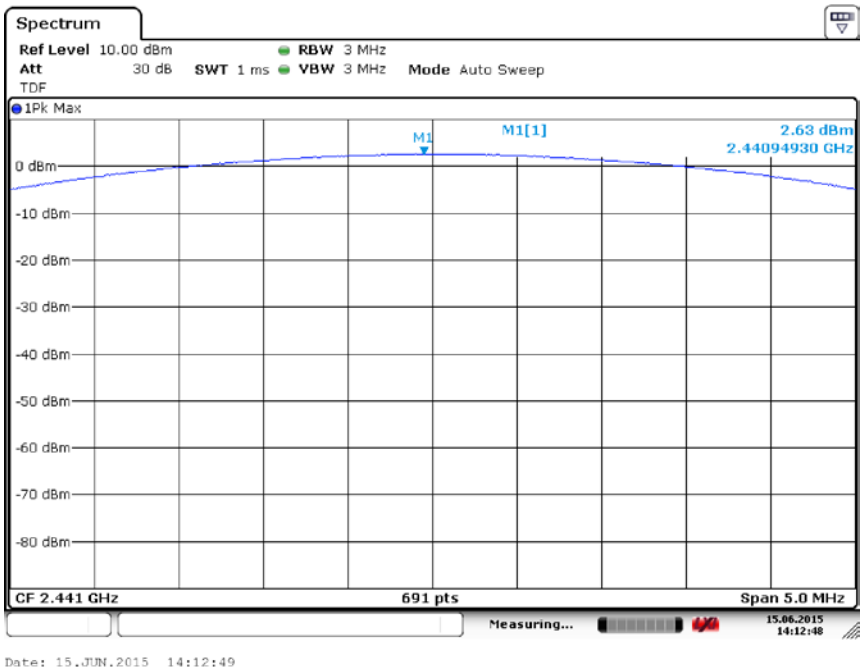


Fig. 8 Maximum Peak Output Power(8DPSK, Ch 39)

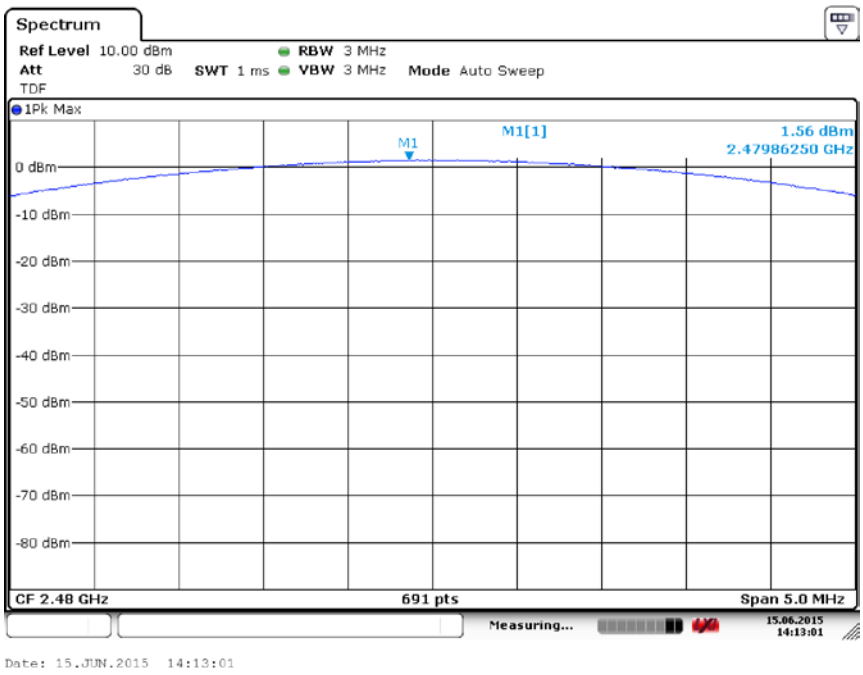


Fig. 9 Maximum Peak Output Power(8DPSK, Ch 78)

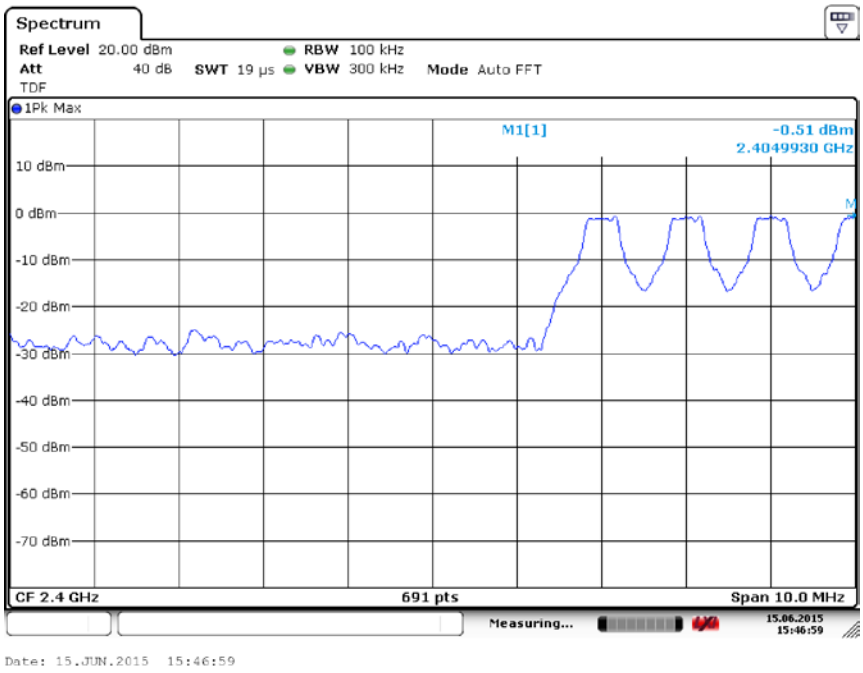


Fig. 10 Band Edges (GFSK, Ch 0, Hopping ON)

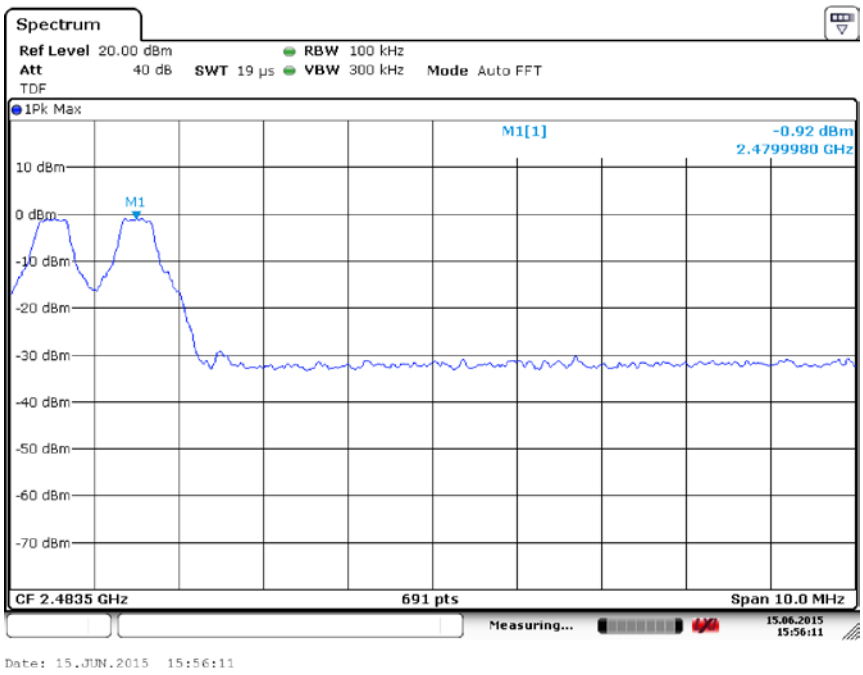


Fig. 11 Band Edges (GFSK, Ch 78, Hopping ON)

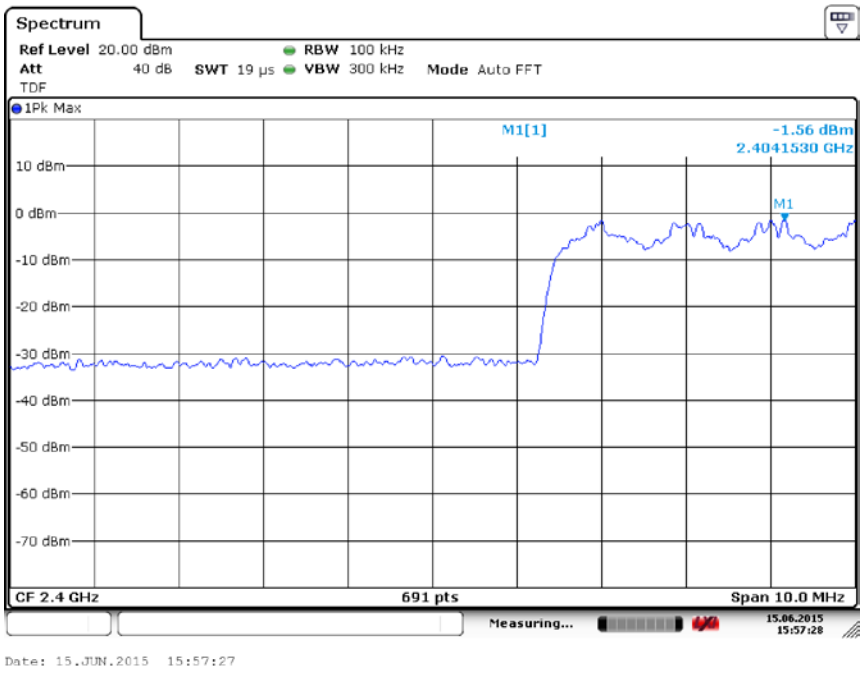


Fig. 12 Band Edges (π /4 DQPSK, Ch 0, Hopping ON)

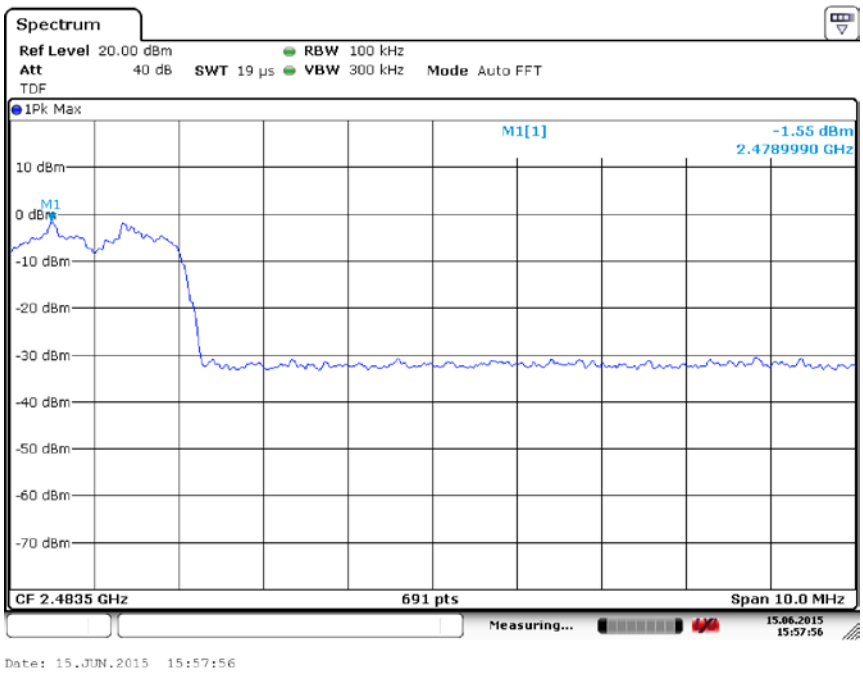


Fig. 13 Band Edges (π /4 DQPSK, Ch 78, Hopping ON)

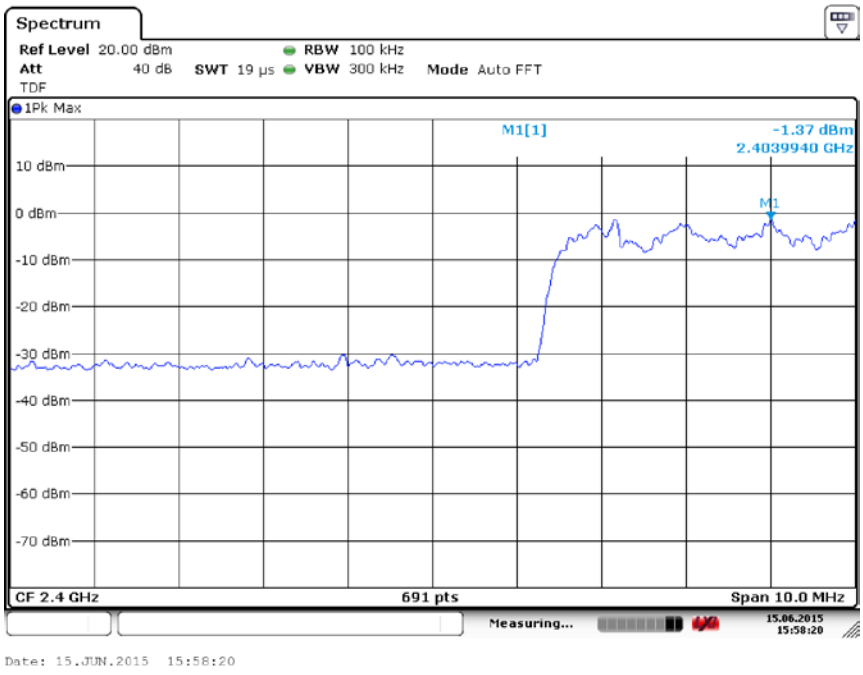


Fig. 14 Band Edges (8DPSK, Ch 0, Hopping ON)

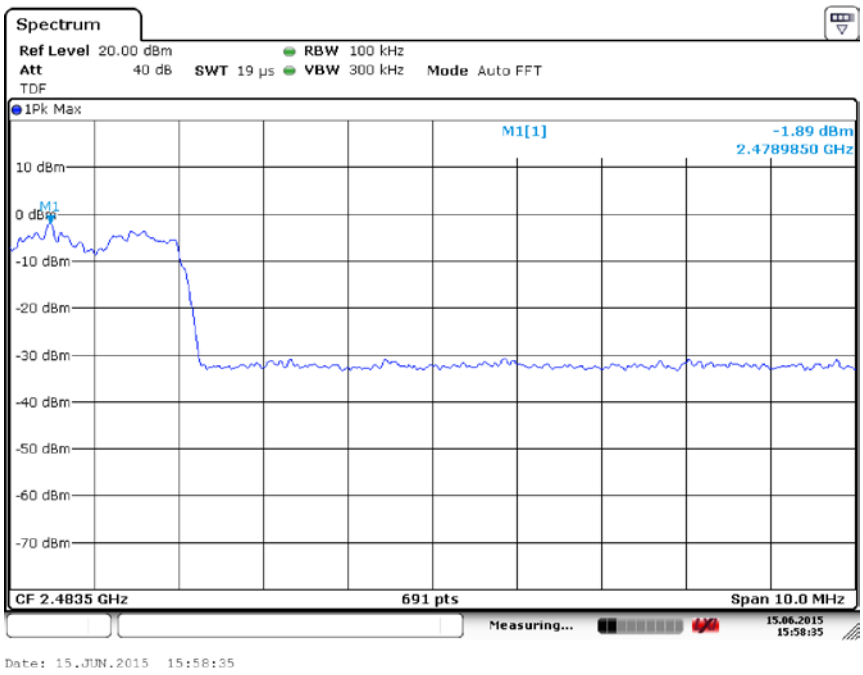


Fig. 15 Band Edges (8DPSK, Ch 78, Hopping ON)

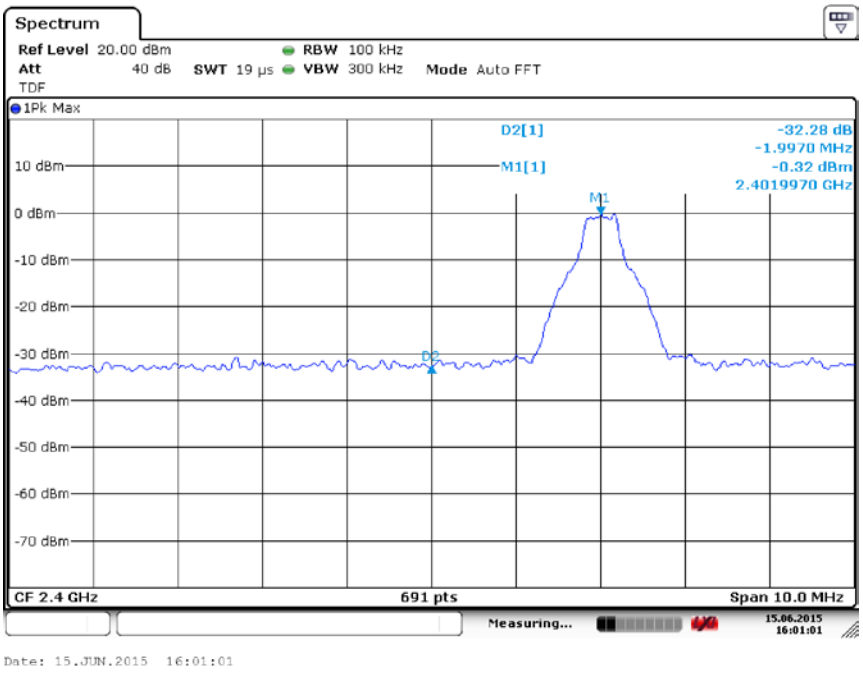


Fig. 16 Band Edges (GFSK, Ch 0, Hopping OFF)

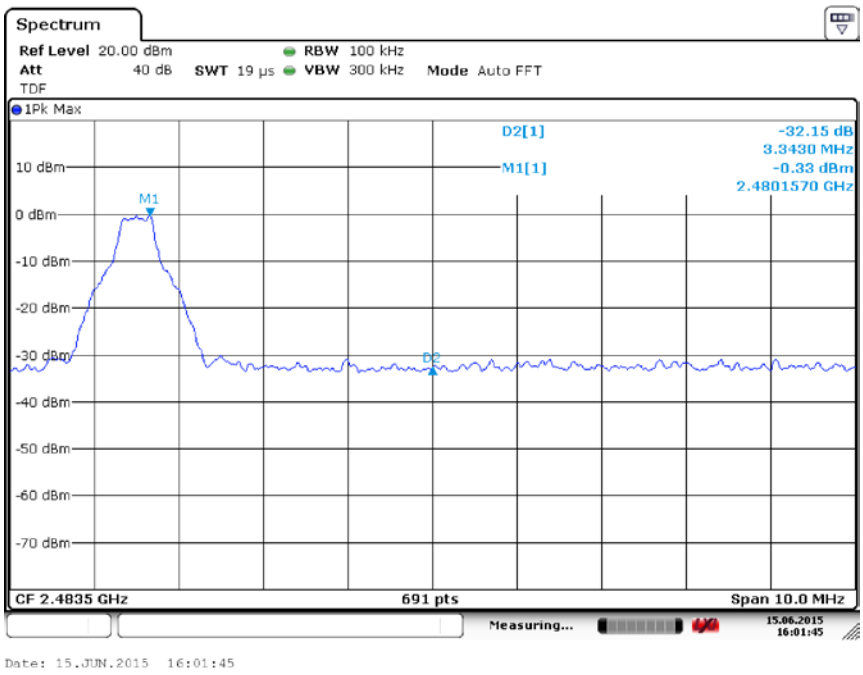


Fig. 17 Band Edges (GFSK, Ch 78, Hopping OFF)

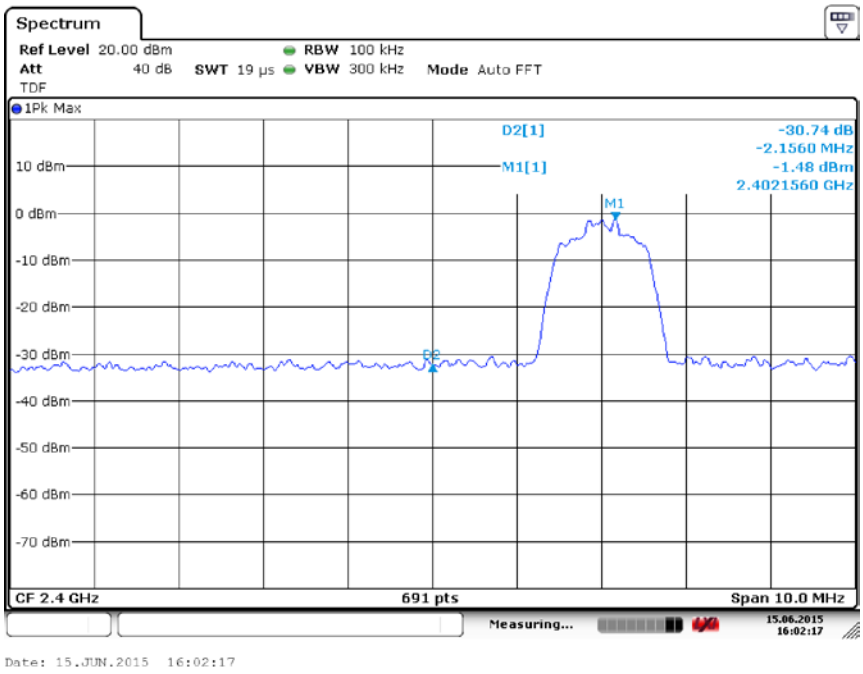


Fig. 18 Band Edges (π /4 DQPSK, Ch 0, Hopping OFF)

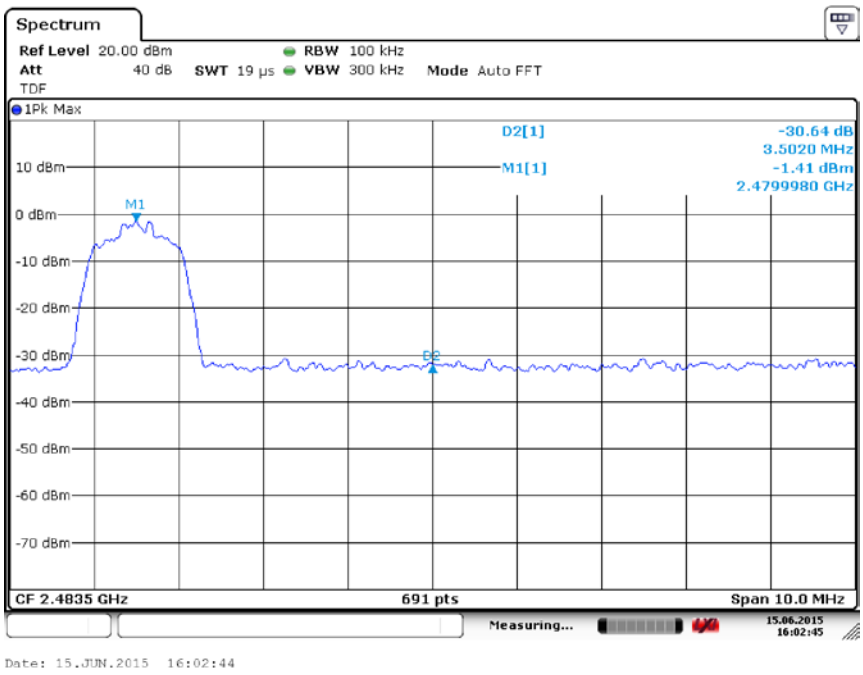


Fig. 19 Band Edges (π/4 DQPSK, Ch 78, Hopping OFF)

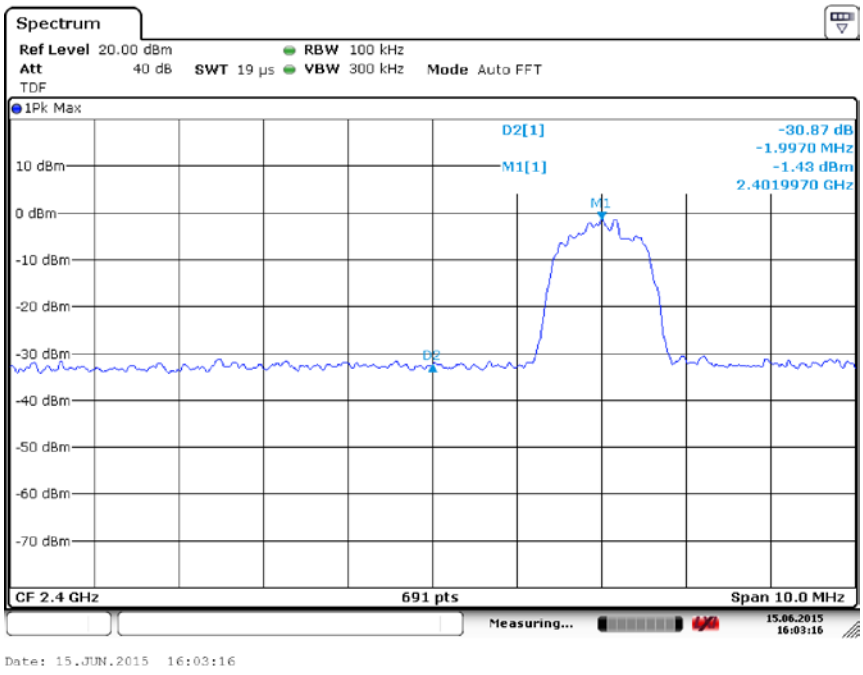


Fig. 20 Band Edges (8DPSK, Ch 0, Hopping OFF)

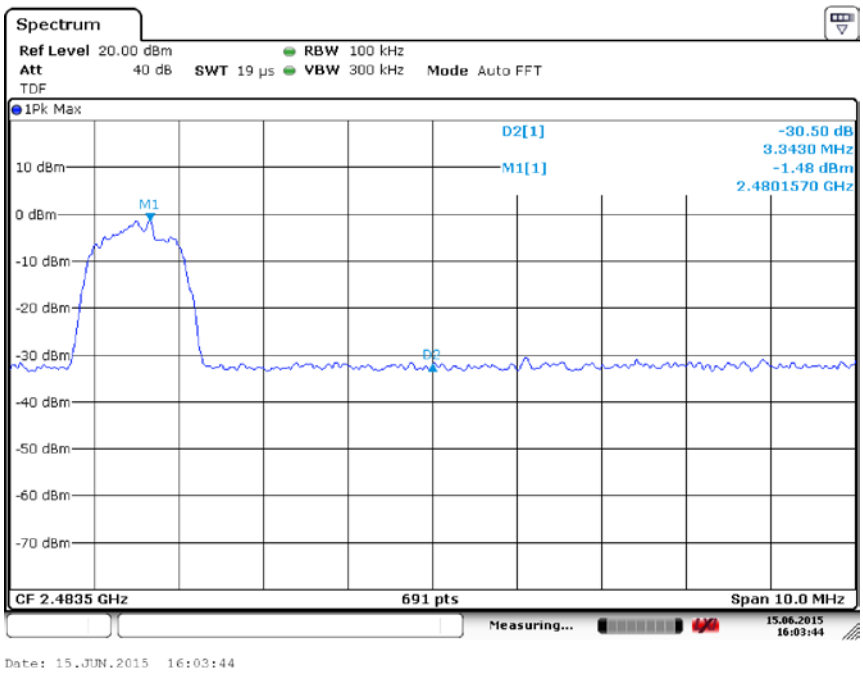


Fig. 21 Band Edges (8DPSK, Ch 78, Hopping OFF)

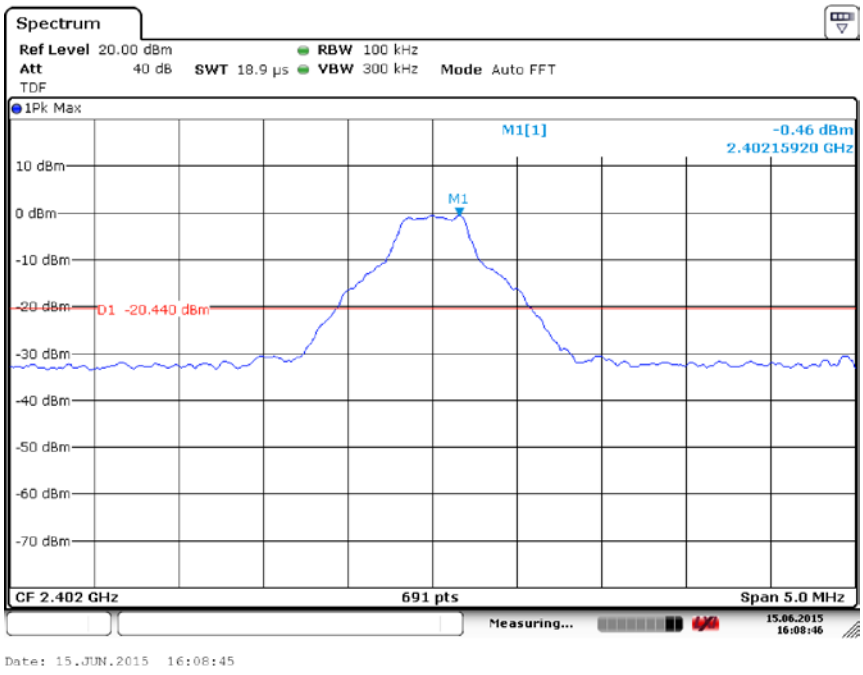


Fig. 22 Conducted Spurious Emission (GFSK, Ch0, 2.402GHz)

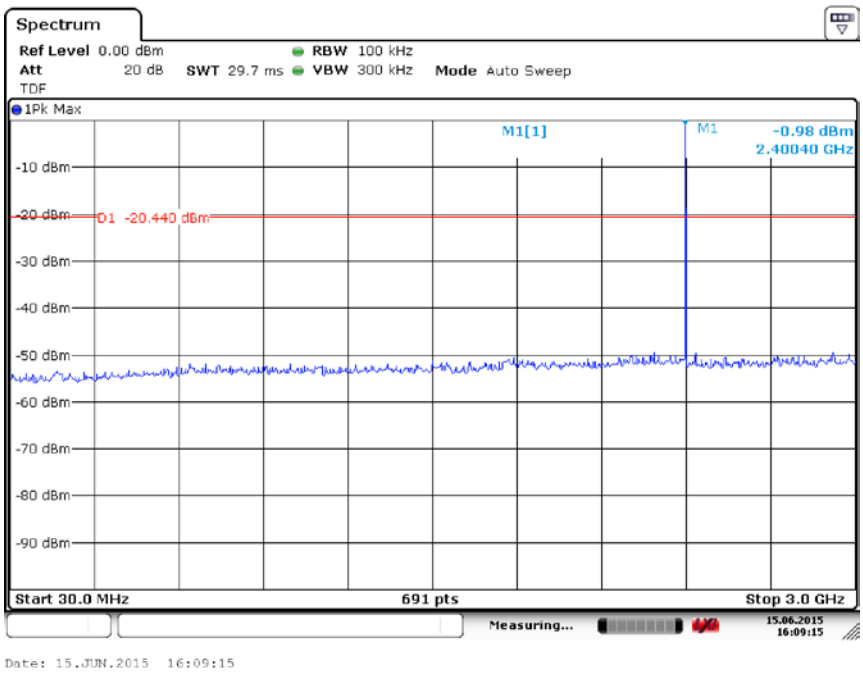


Fig. 23 Conducted Spurious Emission (GFSK, Ch0, 30 MHz-3 GHz)

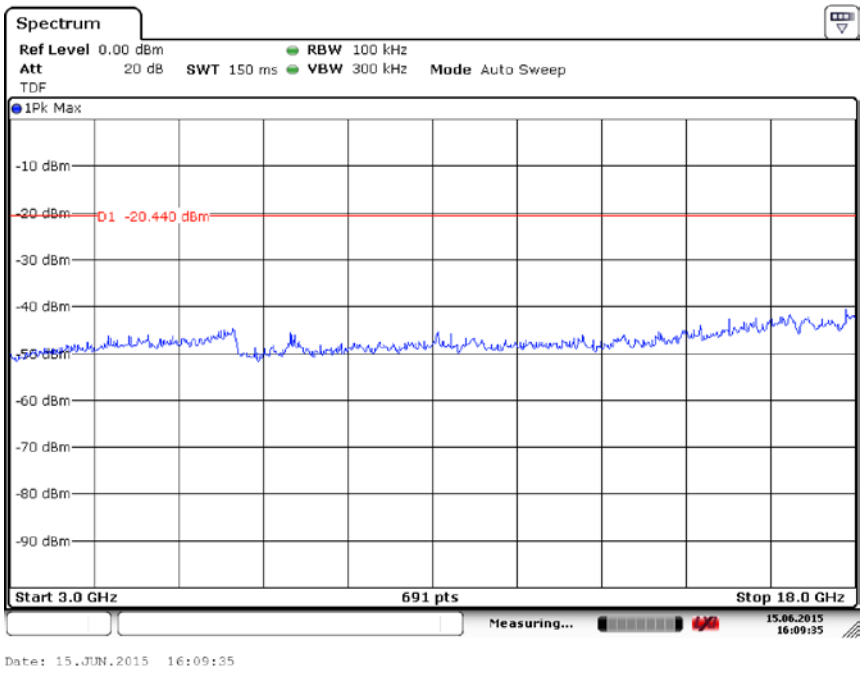


Fig. 24 Conducted Spurious Emission (GFSK, Ch0, 3GHz-18 GHz)

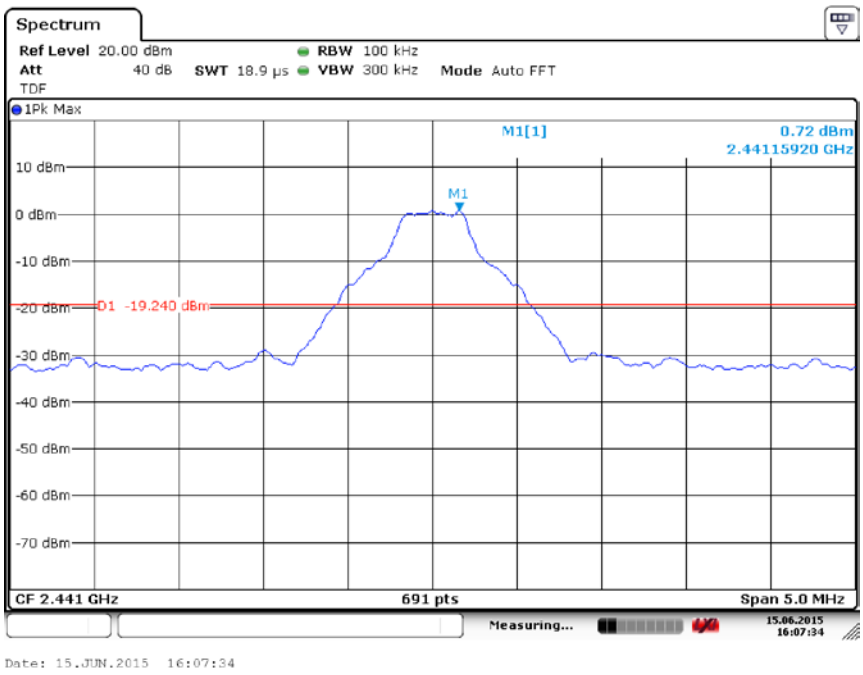


Fig. 25 Conducted Spurious Emission (GFSK, Ch39, 2.441GHz)

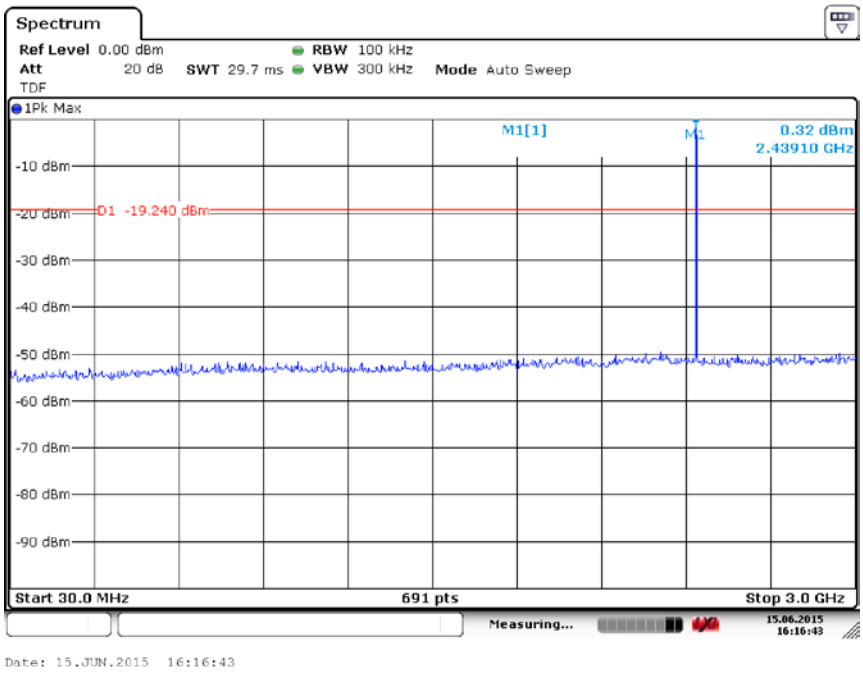


Fig. 26 Conducted Spurious Emission (GFSK, Ch39, 30 MHz-3 GHz)

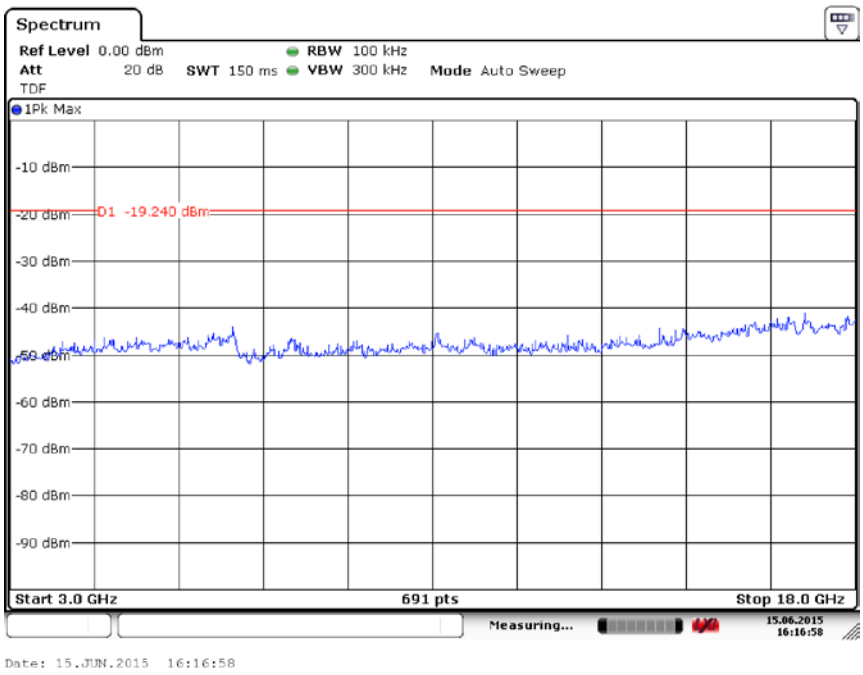


Fig. 27 Conducted Spurious Emission (GFSK, Ch39, 3GHz-18 GHz)

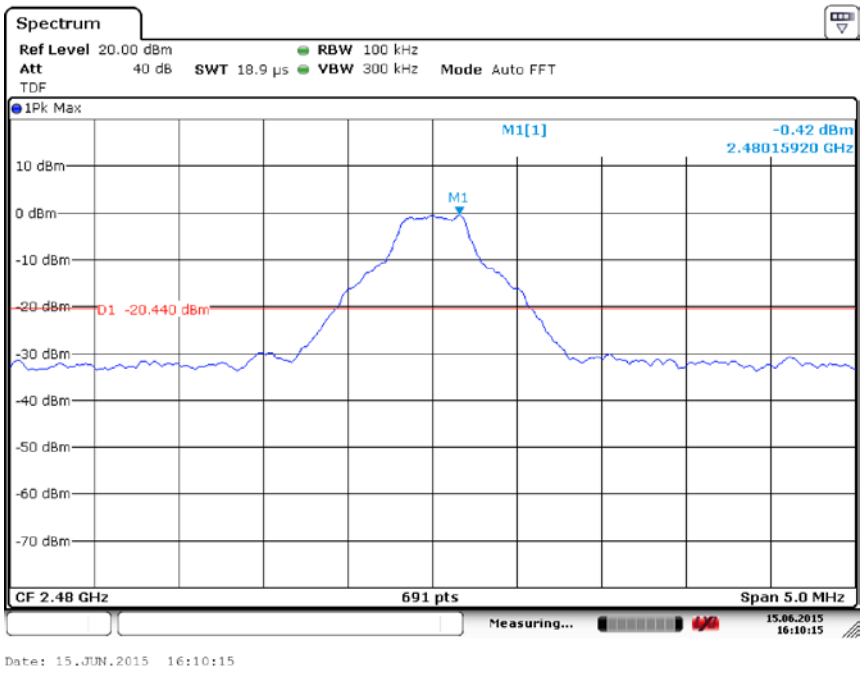


Fig. 28 Conducted Spurious Emission (GFSK, Ch78, 2.480GHz)

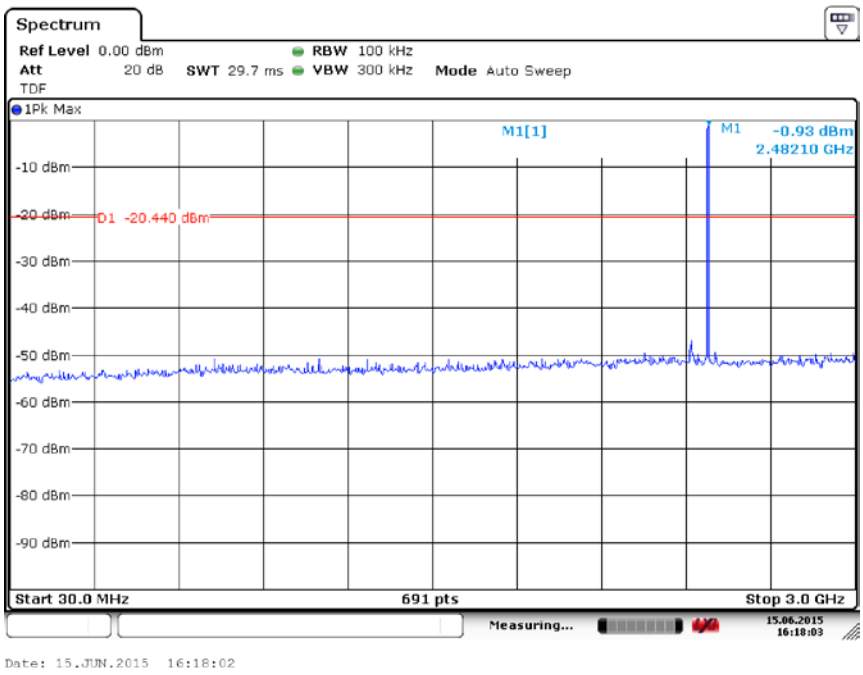


Fig. 29 Conducted Spurious Emission (GFSK, Ch78, 30 MHz-3 GHz)

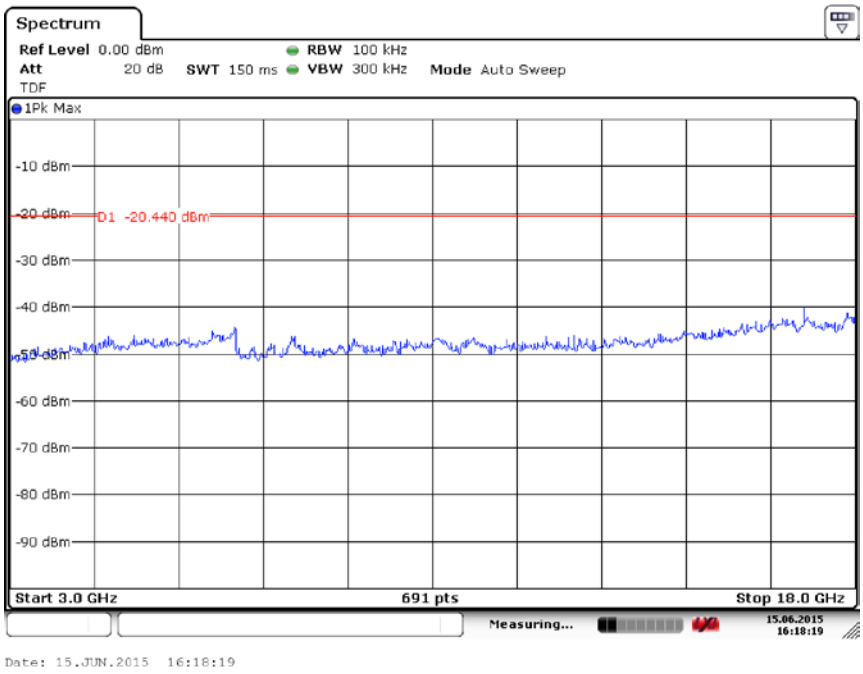


Fig. 30 Conducted Spurious Emission (GFSK, Ch78, 3GHz-18 GHz)

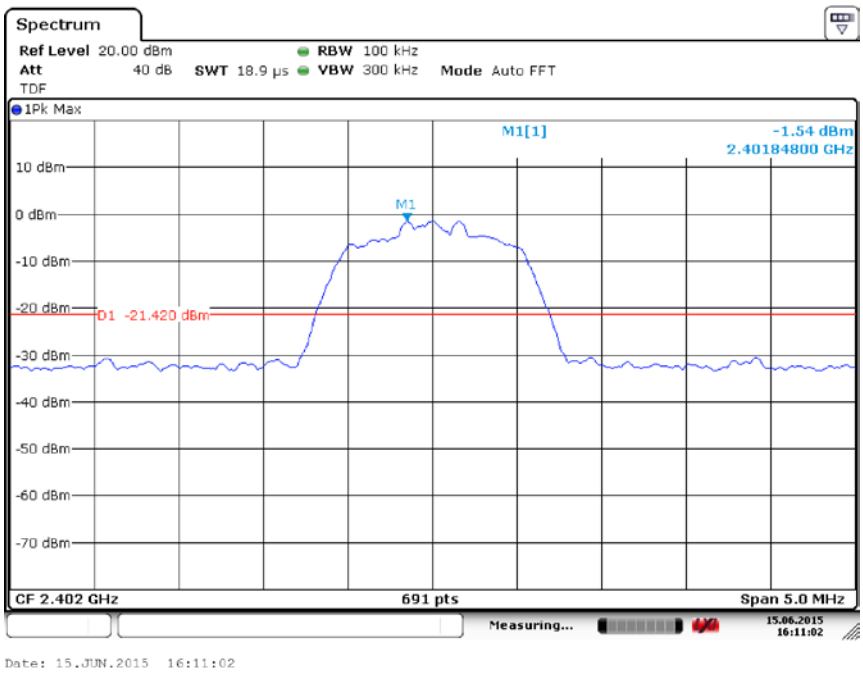


Fig. 31 Conducted Spurious Emission (π /4 DQPSK, Ch0, 2.402GHz)

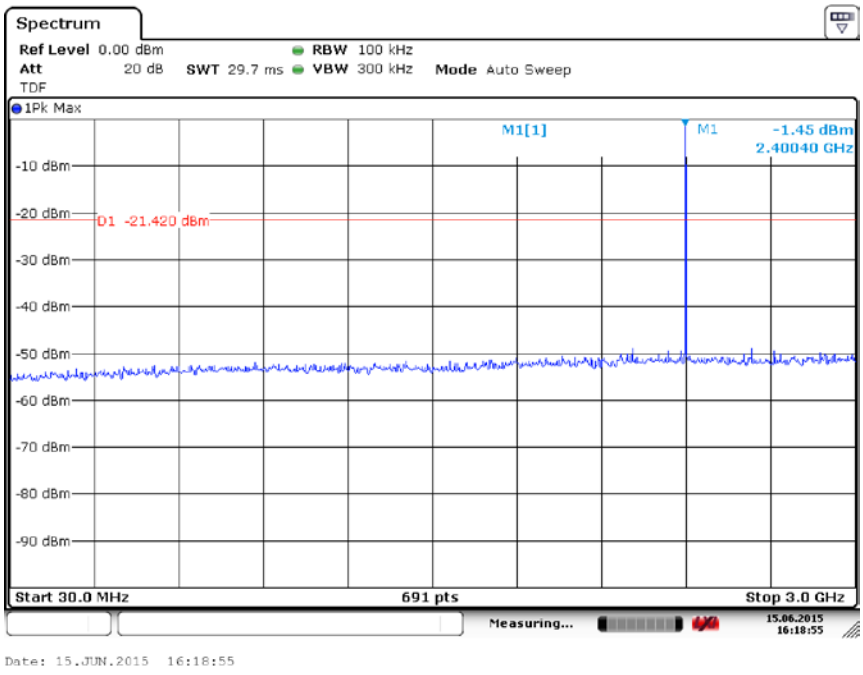


Fig. 32 Conducted Spurious Emission (π /4 DQPSK, Ch0, 30 MHz-3 GHz)

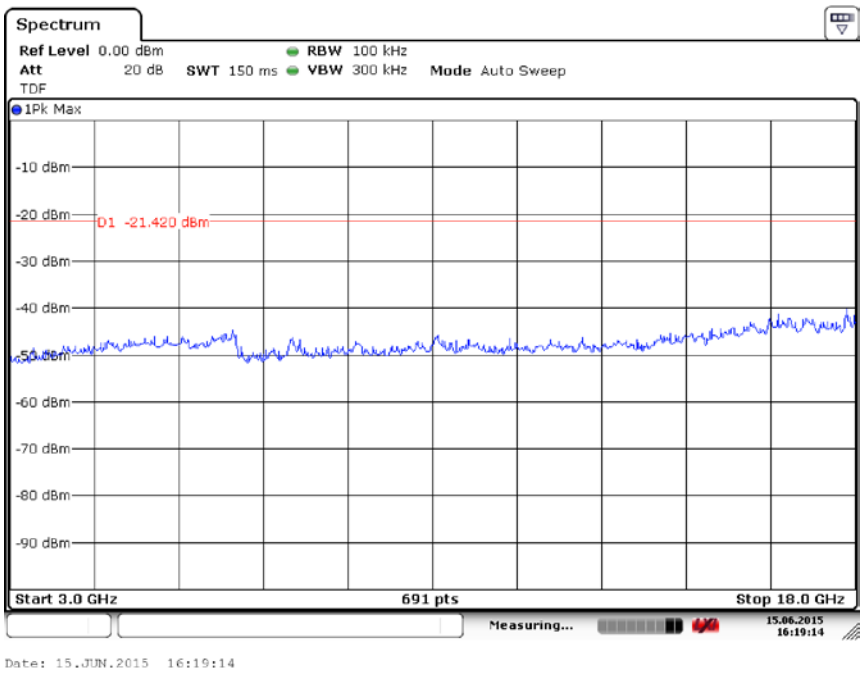


Fig. 33 Conducted Spurious Emission (π/4 DQPSK, Ch0, 3GHz-18 GHz)

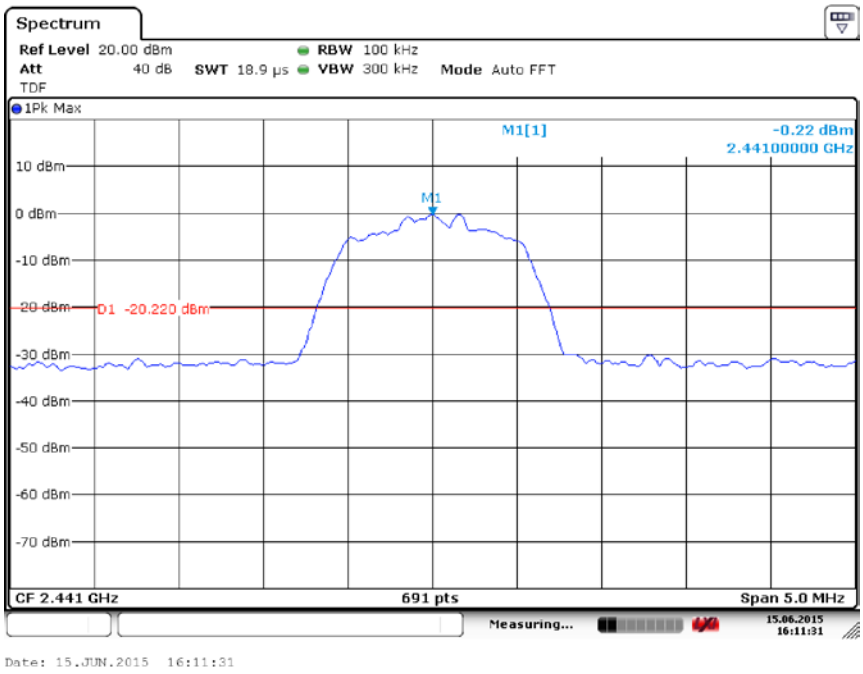


Fig. 34 Conducted Spurious Emission (π/4 DQPSK, Ch39, 2.441GHz)

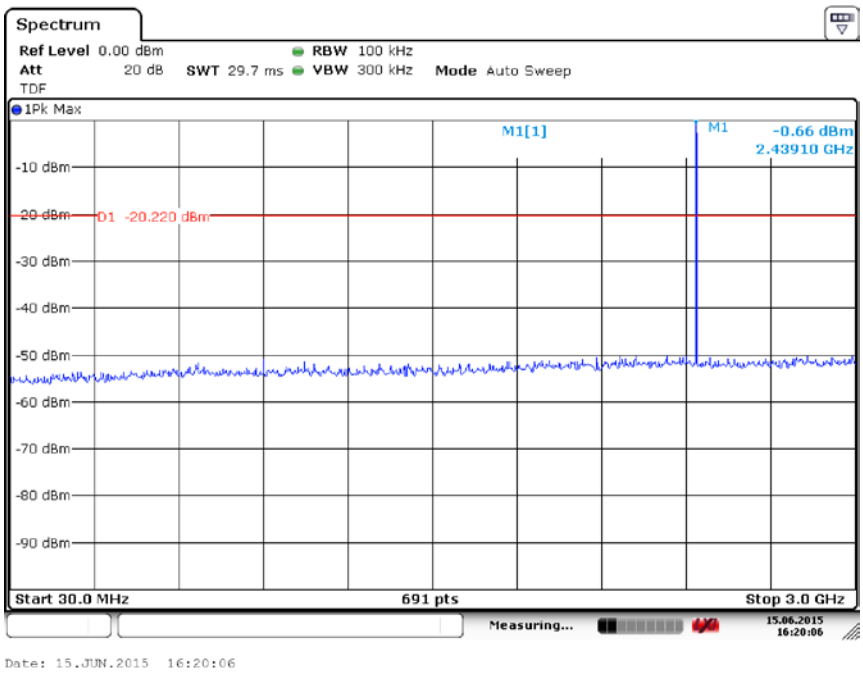


Fig. 35 Conducted Spurious Emission (π /4 DQPSK, Ch39, 30 MHz-3 GHz)

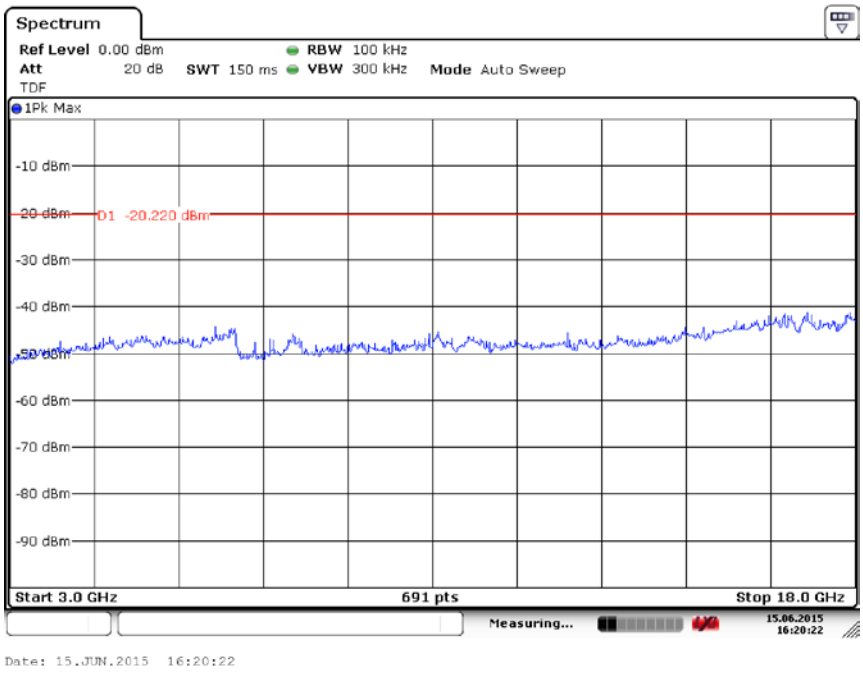


Fig. 36 Conducted Spurious Emission (π /4 DQPSK, Ch39, 3GHz-18 GHz)

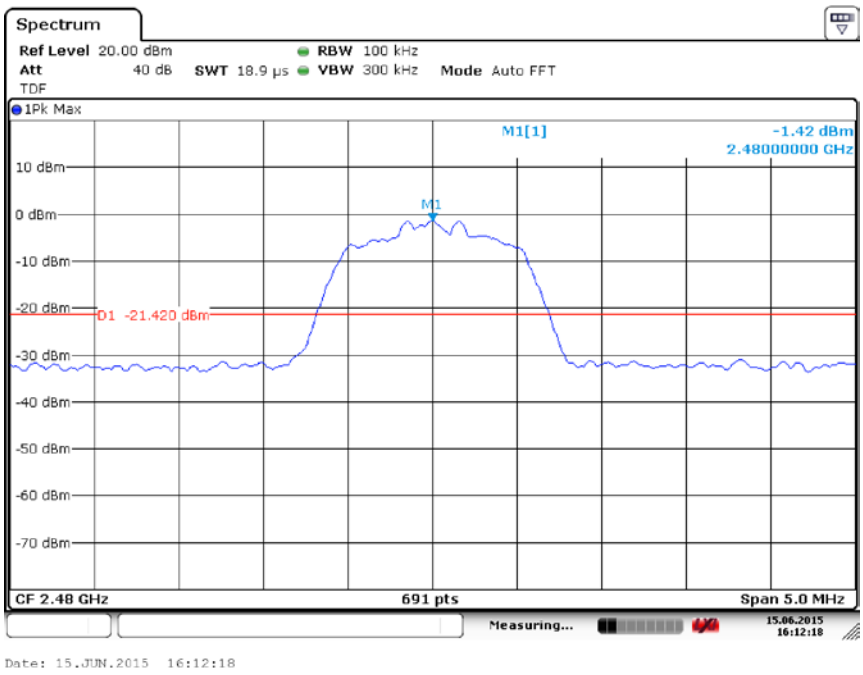


Fig. 37 Conducted Spurious Emission (π /4 DQPSK, Ch78, 2.480GHz)

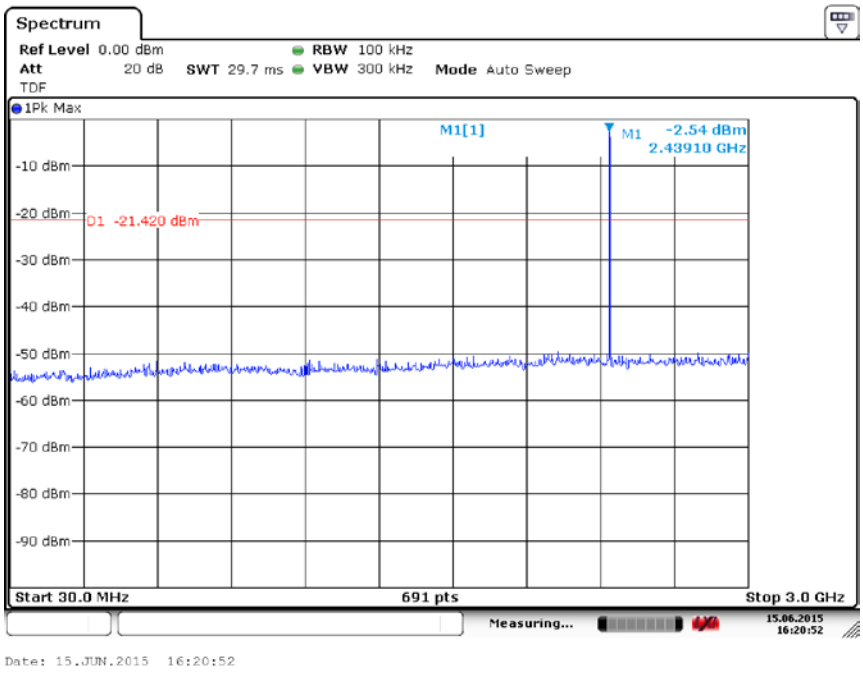


Fig. 38 Conducted Spurious Emission (π /4 DQPSK, Ch78, 30 MHz-3 GHz)

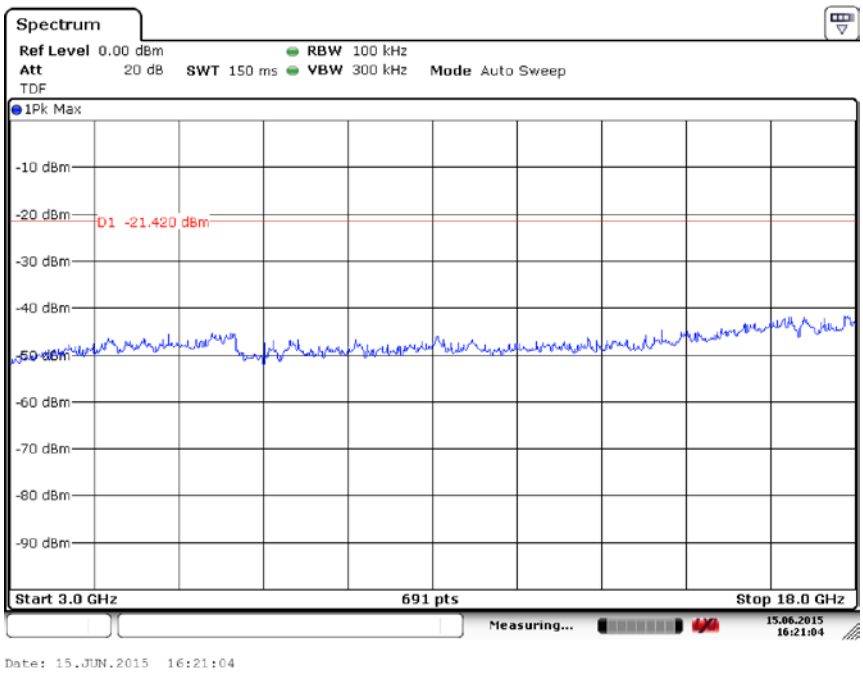


Fig. 39 Conducted Spurious Emission (π /4 DQPSK, Ch78, 3GHz-18 GHz)

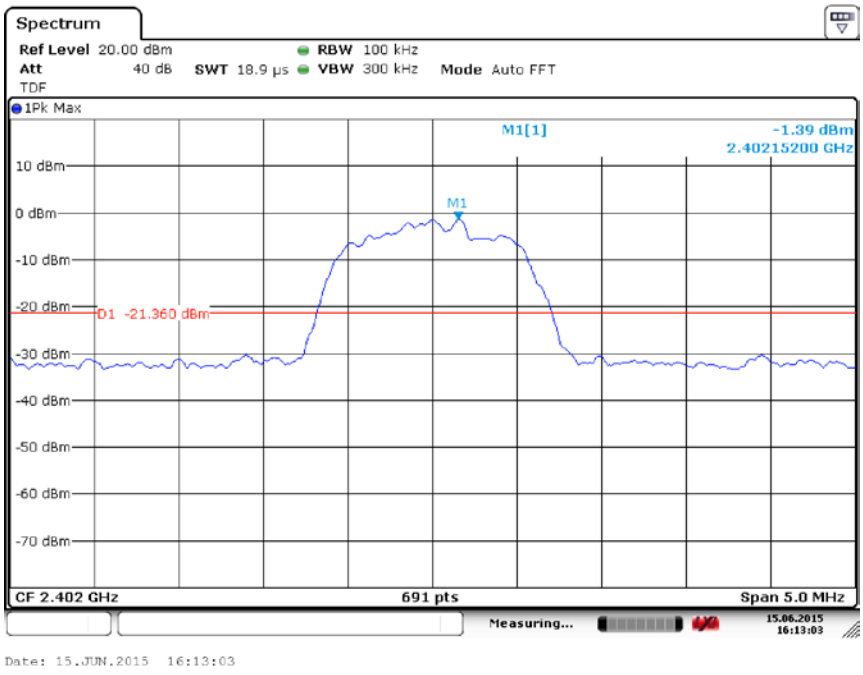


Fig. 40 Conducted Spurious Emission (8DPSK, Ch0, 2.402GHz)

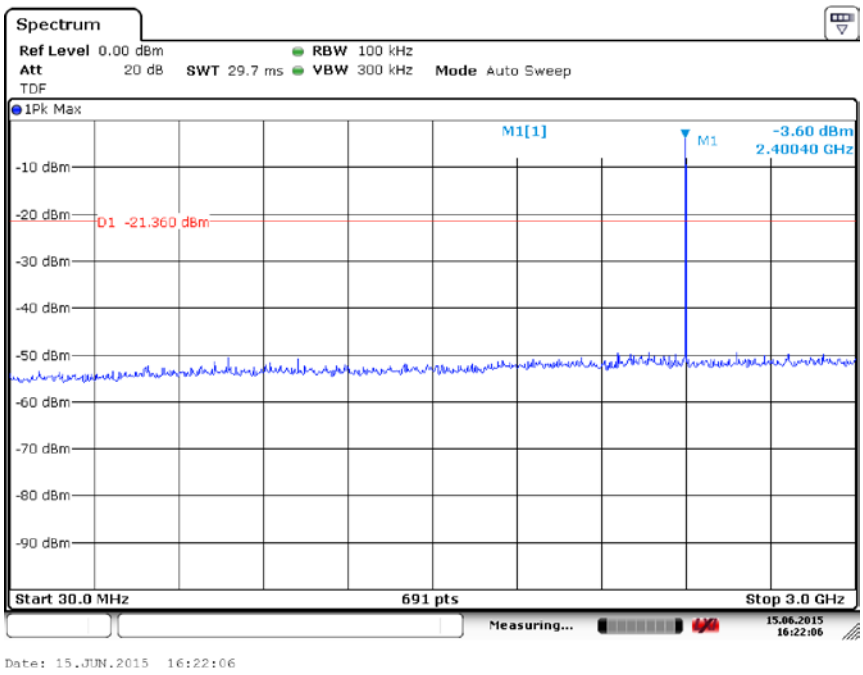


Fig. 41 Conducted Spurious Emission (8DPSK, Ch0, 30 MHz-3 GHz)

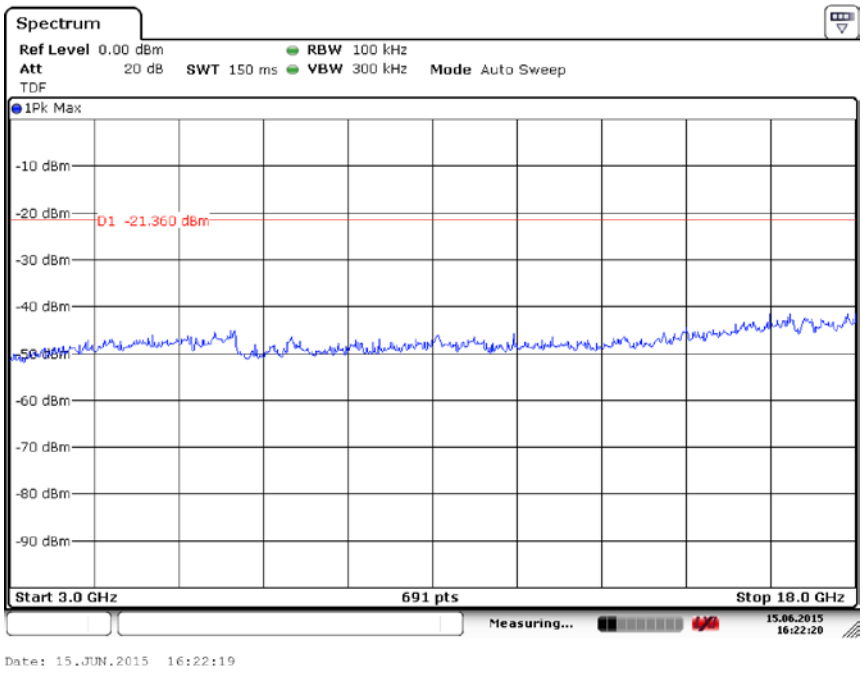


Fig. 42 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-18 GHz)

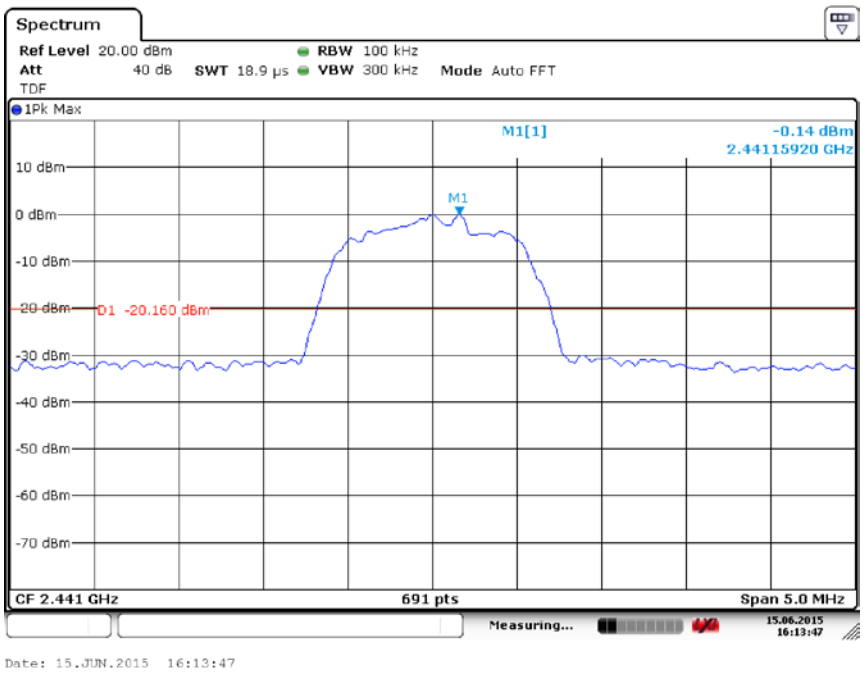


Fig. 43 Conducted Spurious Emission (8DPSK, Ch39, 2.441GHz)

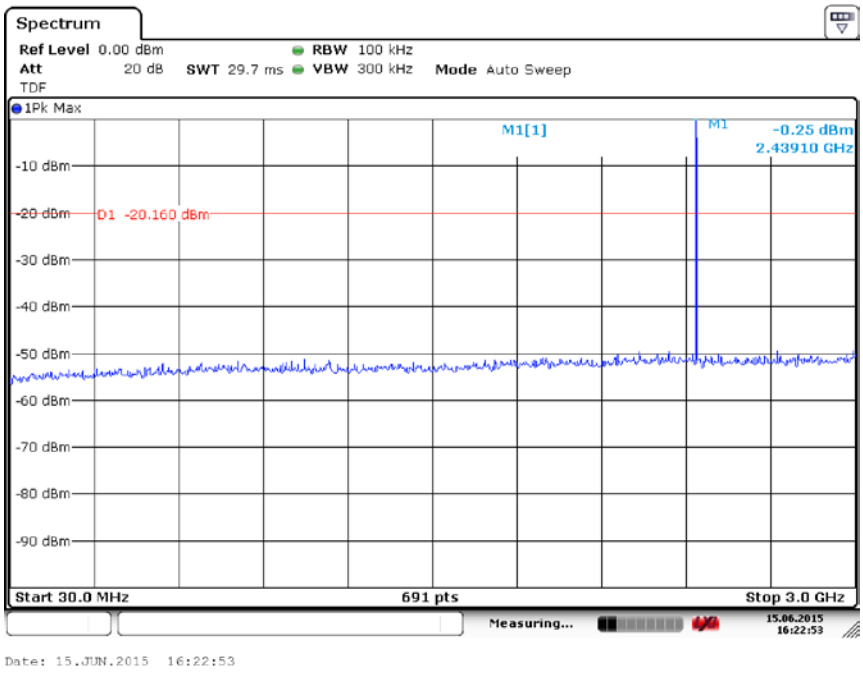


Fig. 44 Conducted Spurious Emission (8DPSK, Ch39, 30 MHz-3 GHz)

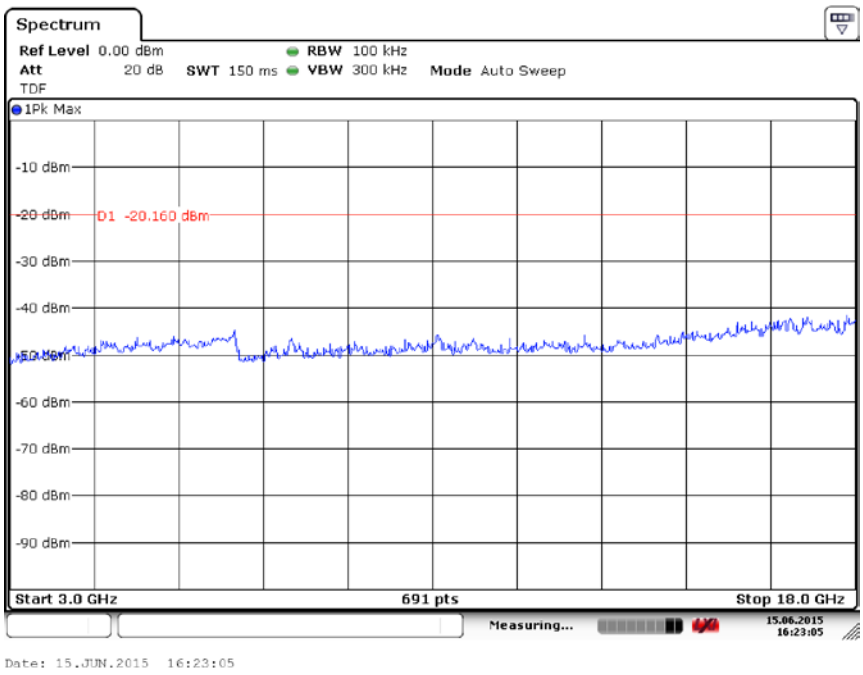


Fig. 45 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-18 GHz)

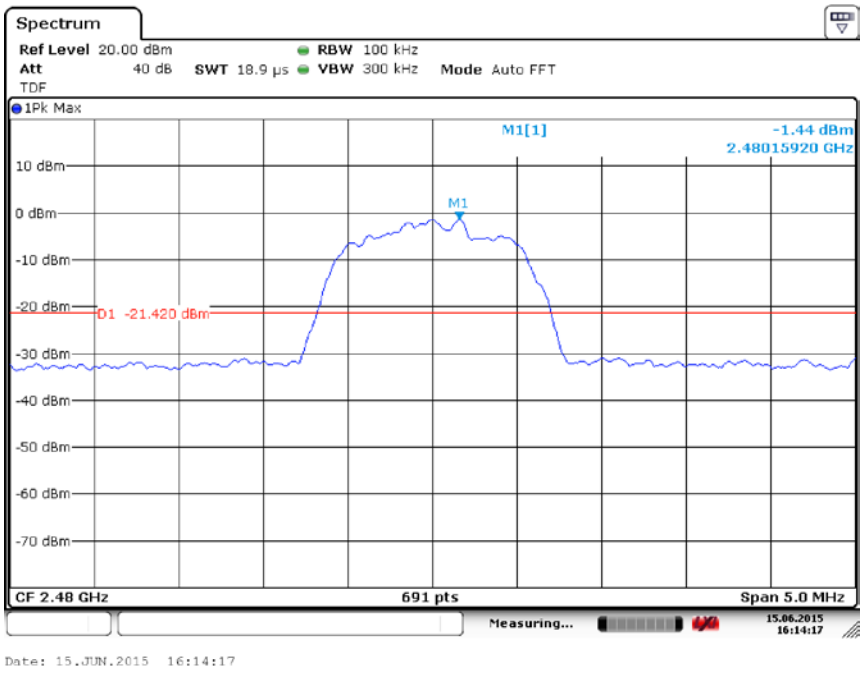


Fig. 46 Conducted Spurious Emission (8DPSK, Ch78, 2.480GHz)

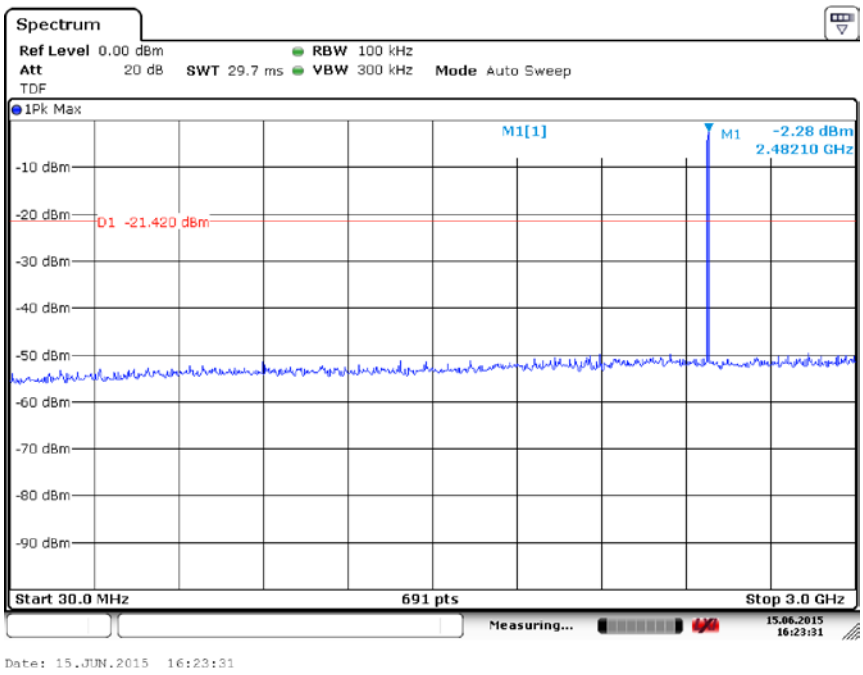


Fig. 47 Conducted Spurious Emission (8DPSK, Ch78, 30 MHz-3 GHz)

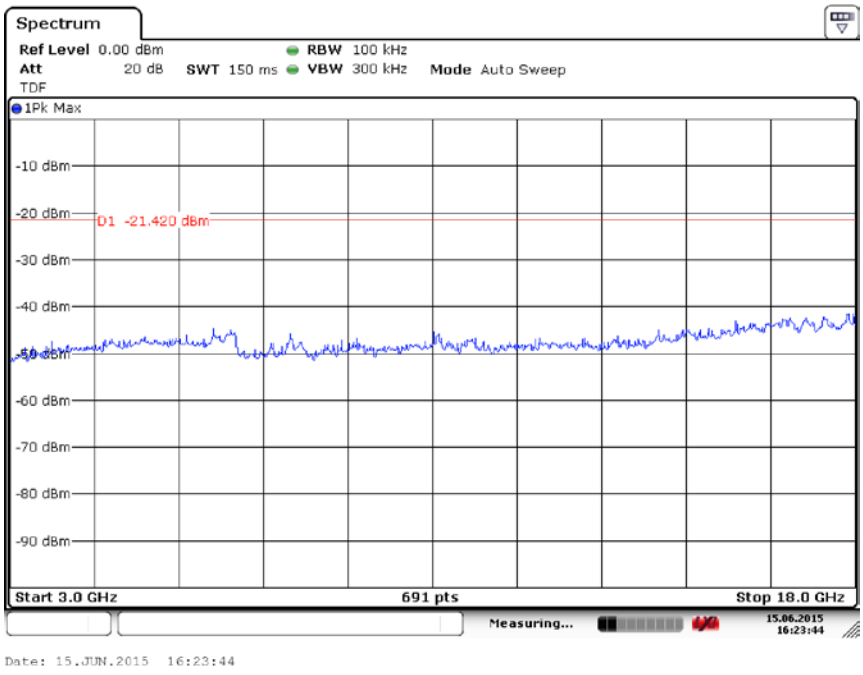


Fig. 48 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-18 GHz)

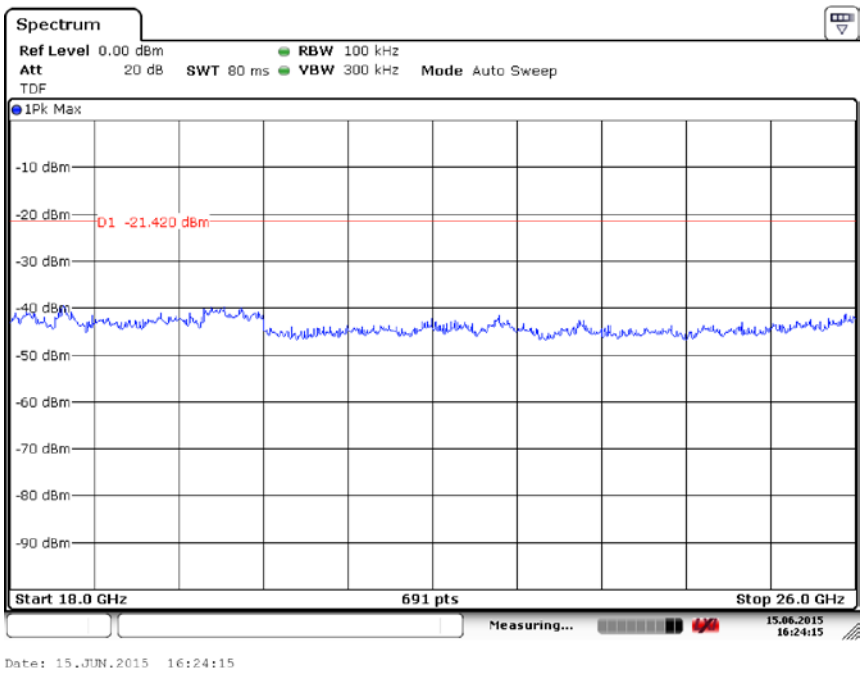


Fig. 49 Conducted Spurious Emission (All channel, 18 GHz-26 GHz)

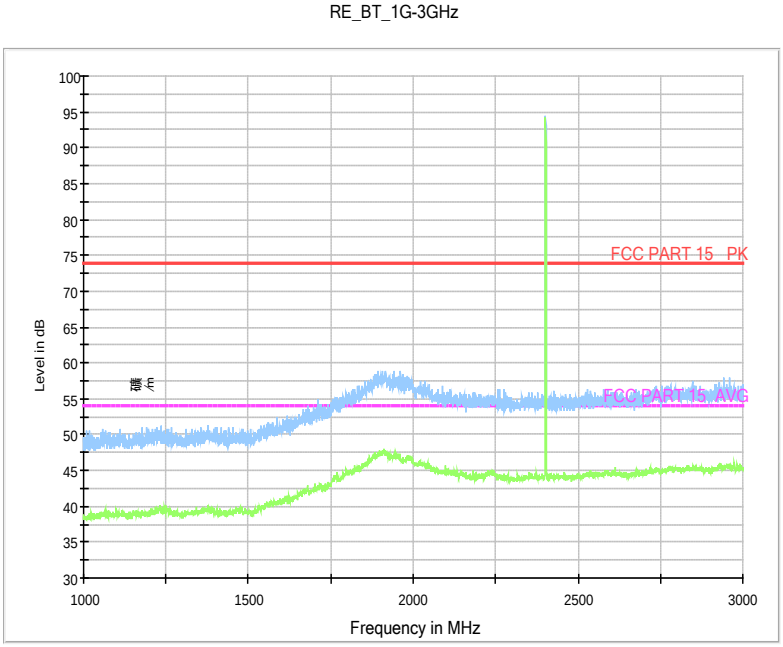


Fig. 50 Radiated Spurious Emission (GFSK, Ch0, 1 GHz ~3 GHz)

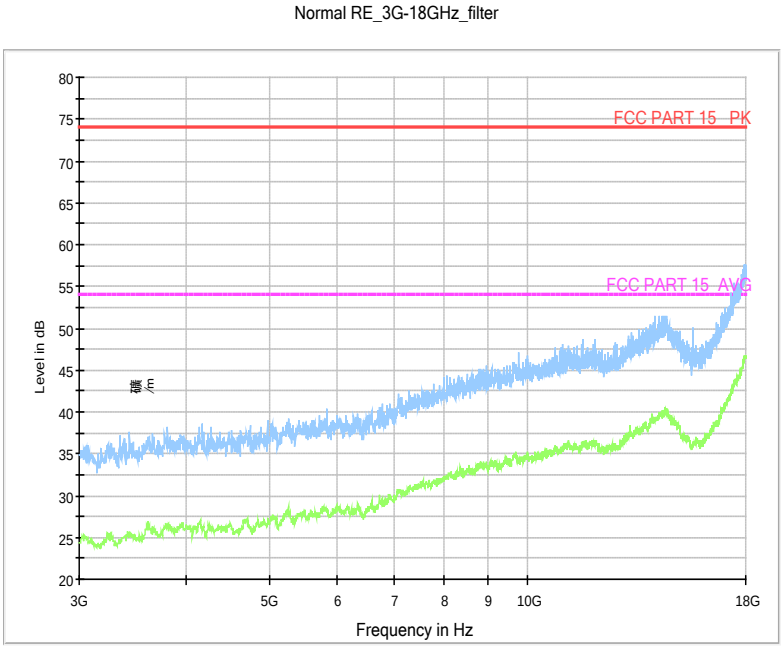


Fig. 51 Radiated Spurious Emission (GFSK, Ch39, 3 GHz ~18 GHz)

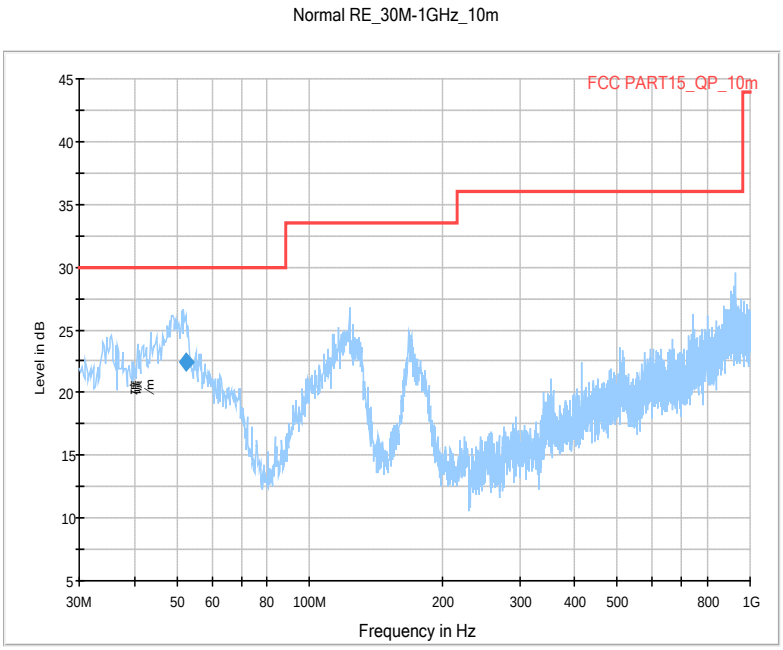


Fig. 52 Radiated Spurious Emission (GFSK, Ch0, 30 MHz ~1 GHz,AE1)

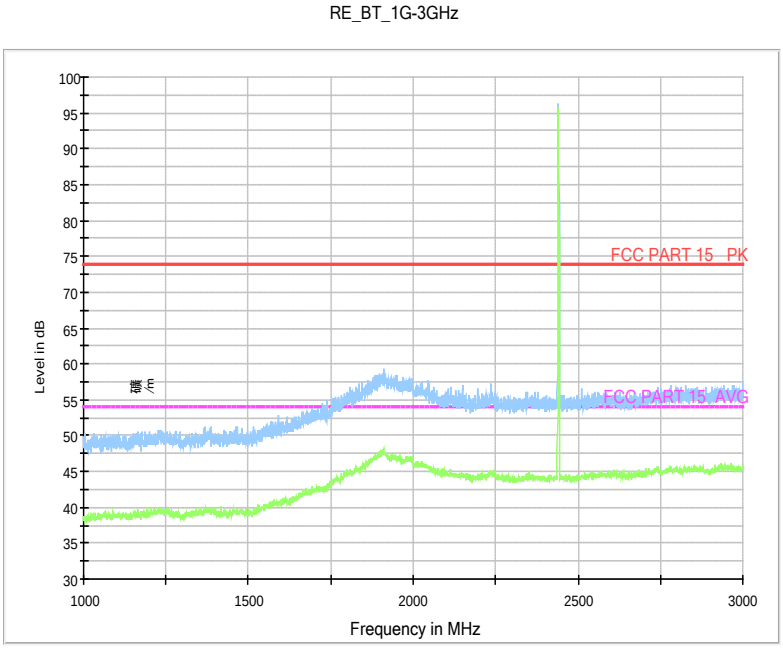


Fig. 53 Radiated Spurious Emission (GFSK, Ch39, 1 GHz ~3 GHz)

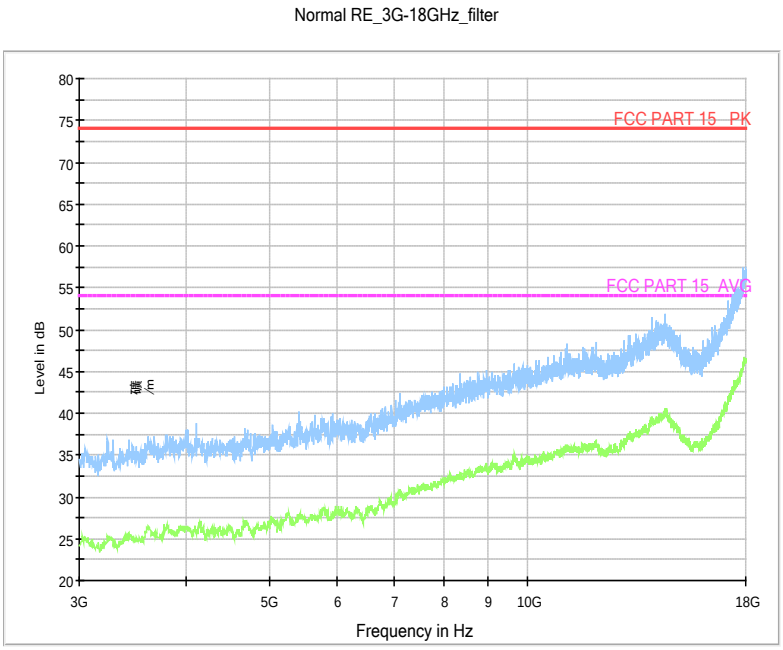


Fig. 54 Radiated Spurious Emission (GFSK, Ch39, 3 GHz ~18 GHz)

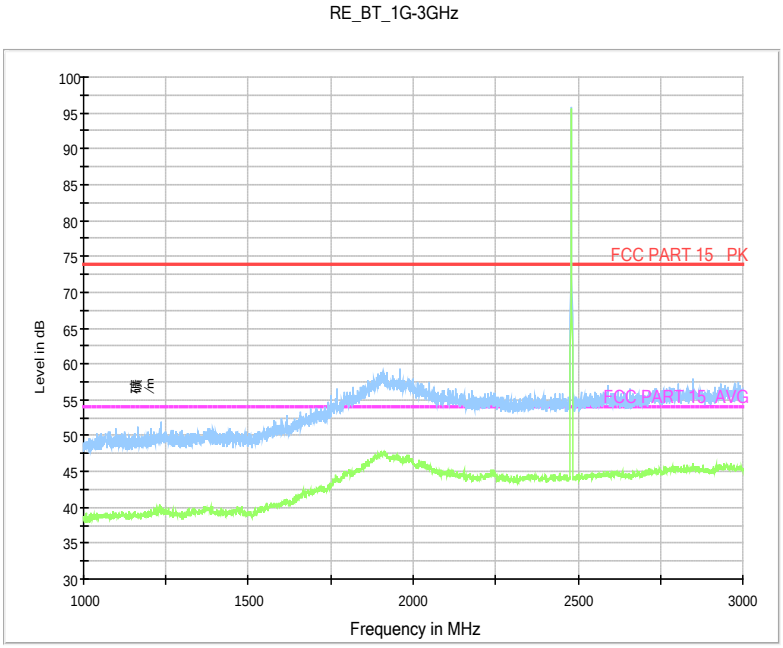


Fig. 55 Radiated Spurious Emission (GFSK, Ch78, 1 GHz ~3 GHz)

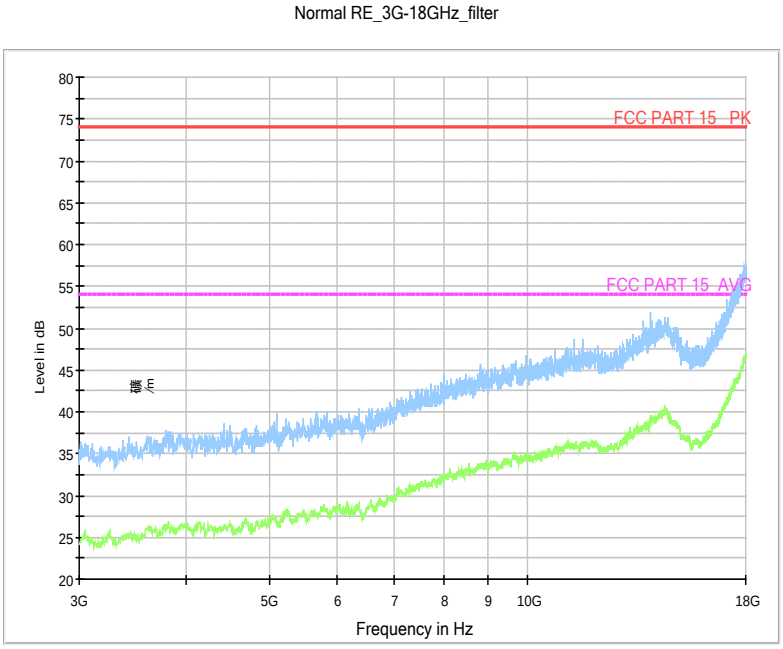


Fig. 56 Radiated Spurious Emission (GFSK, Ch78, 3 GHz ~18 GHz)

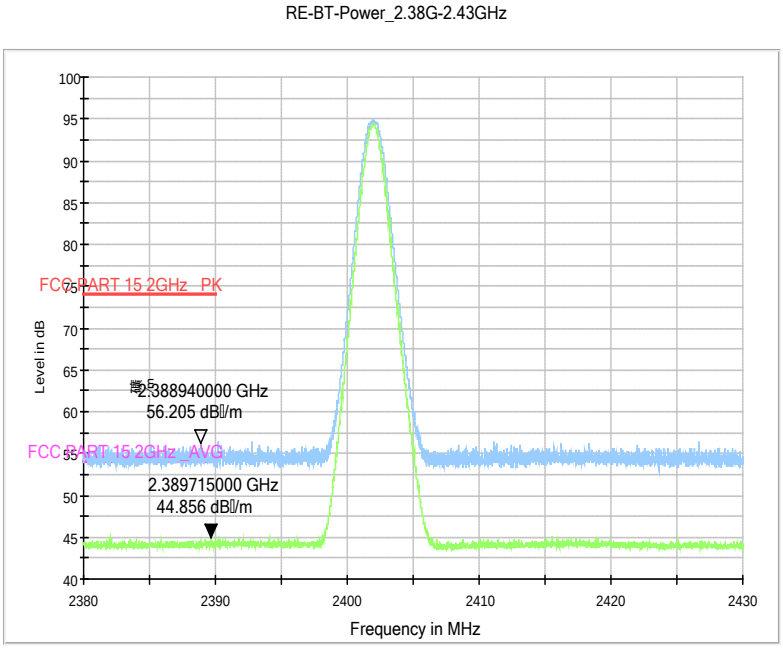


Fig. 57 Radiated Emission Power (GFSK, Ch0, 2380GHz~2450GHz)

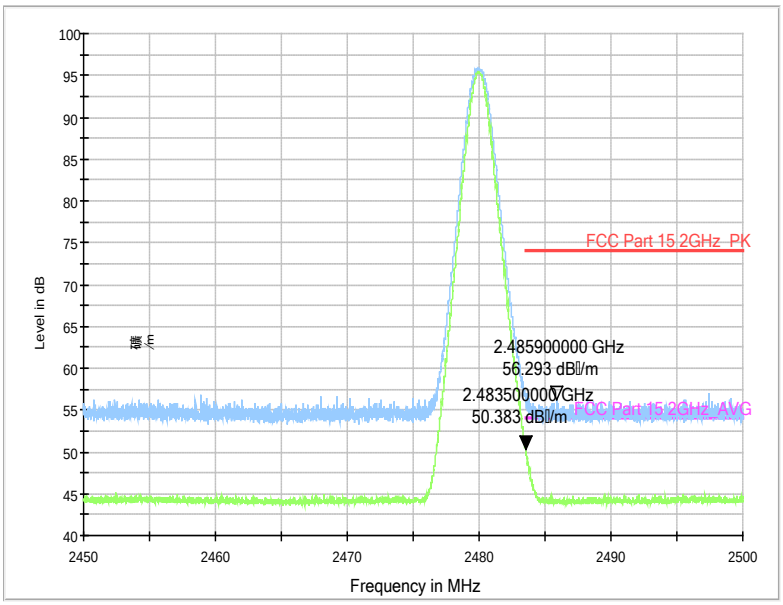


Fig. 58 Radiated Emission Power (GFSK, Ch78, 2450GHz~2500GHz)

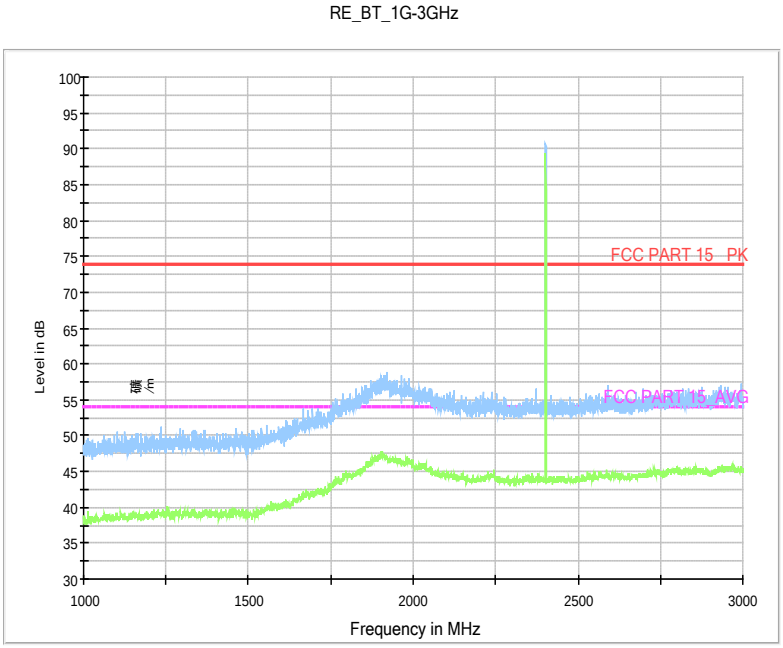


Fig. 59 Radiated Spurious Emission (π /4 DQPSK, Ch0, 1 GHz ~3 GHz)

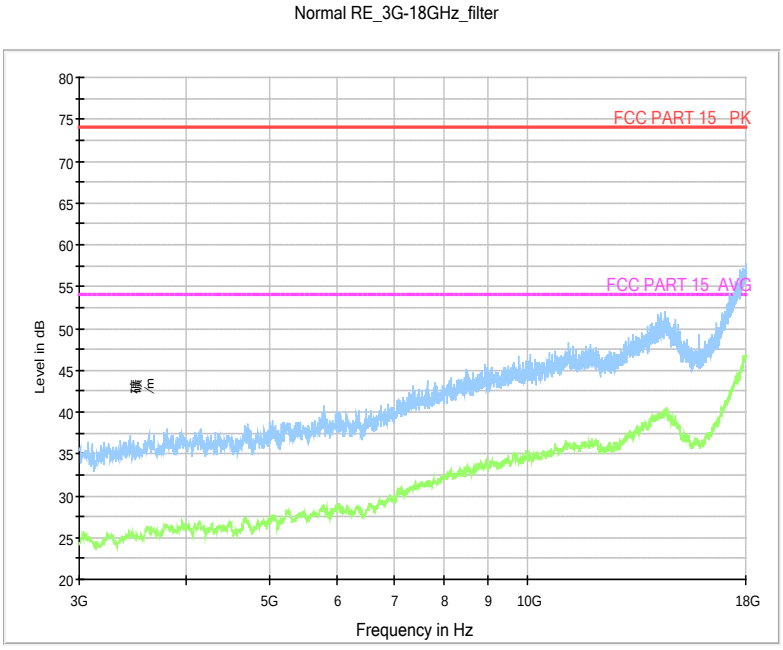


Fig. 60 Radiated Spurious Emission (π /4 DQPSK, Ch0, 3 GHz ~18 GHz)

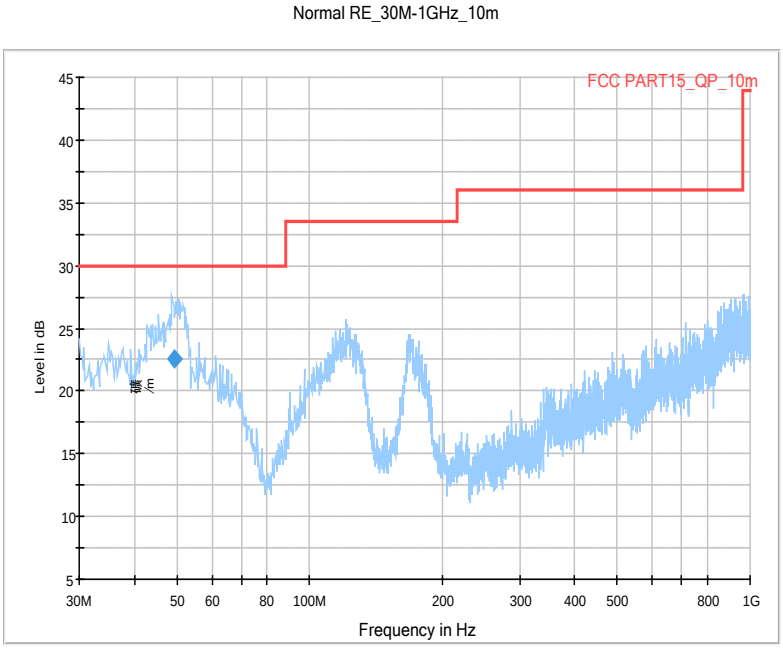


Fig. 61 Radiated Spurious Emission (π /4 DQPSK, Ch39, 30 MHz ~1 GHz)

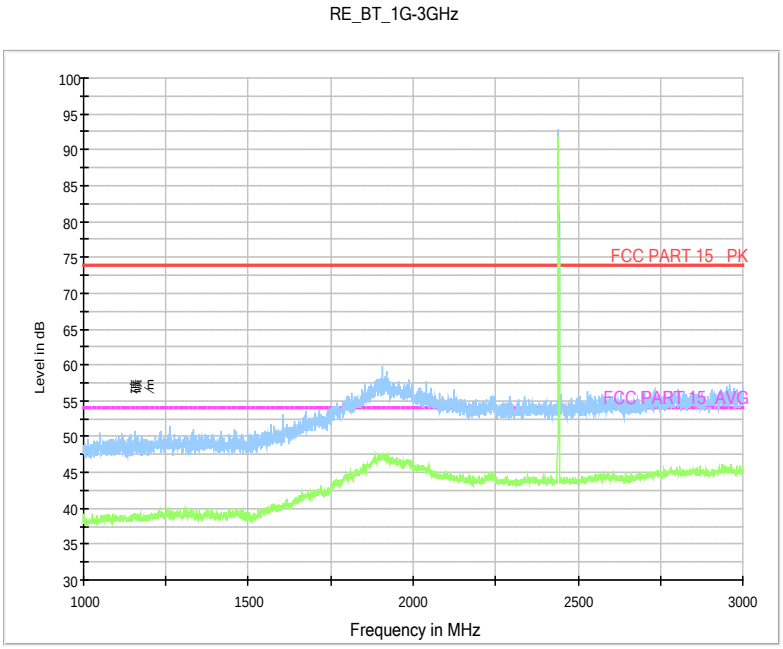


Fig. 62 Radiated Spurious Emission (π /4 DQPSK, Ch39, 1 GHz ~3 GHz)

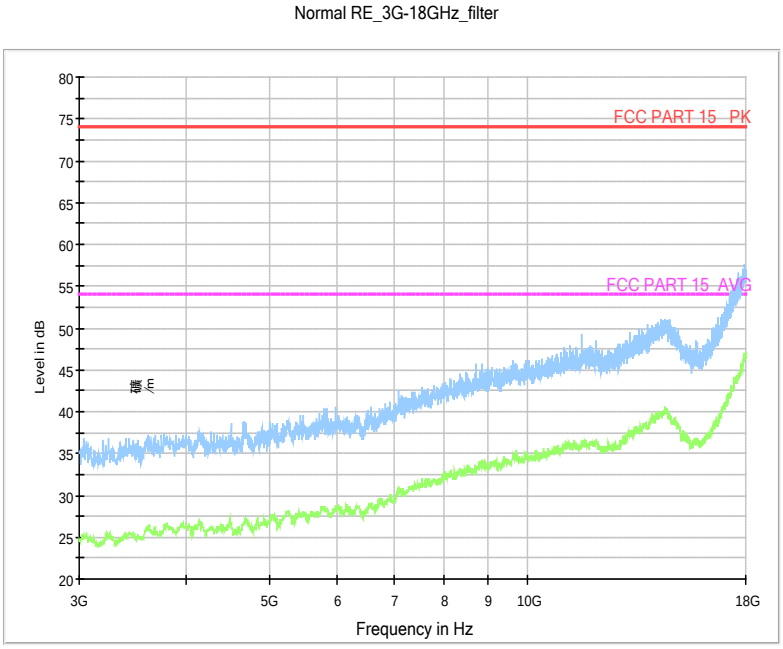


Fig. 63 Radiated Spurious Emission (π /4 DQPSK, Ch39, 3 GHz ~18 GHz)

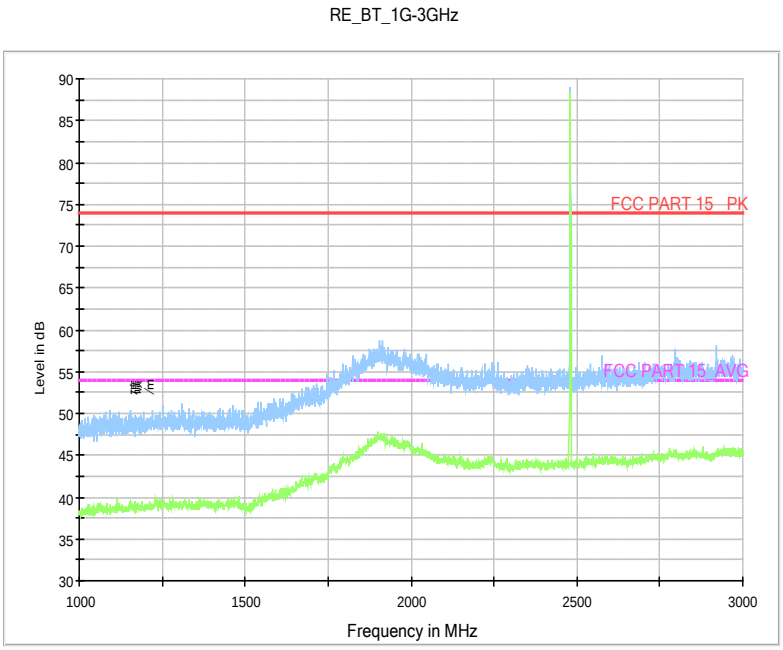


Fig. 64 Radiated Spurious Emission (π /4 DQPSK, Ch78, 1 GHz ~3 GHz)

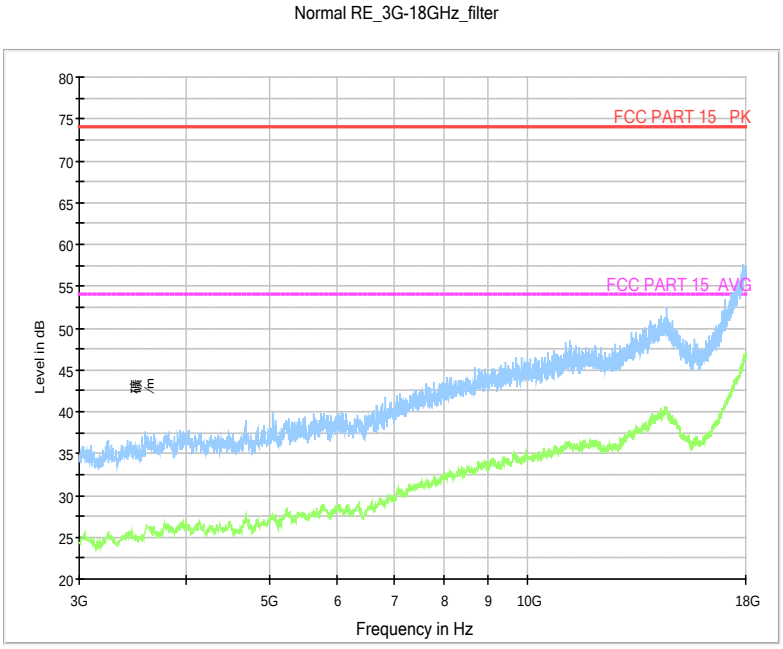


Fig. 65 Radiated Spurious Emission (π /4 DQPSK, Ch78, 3 GHz ~18 GHz)

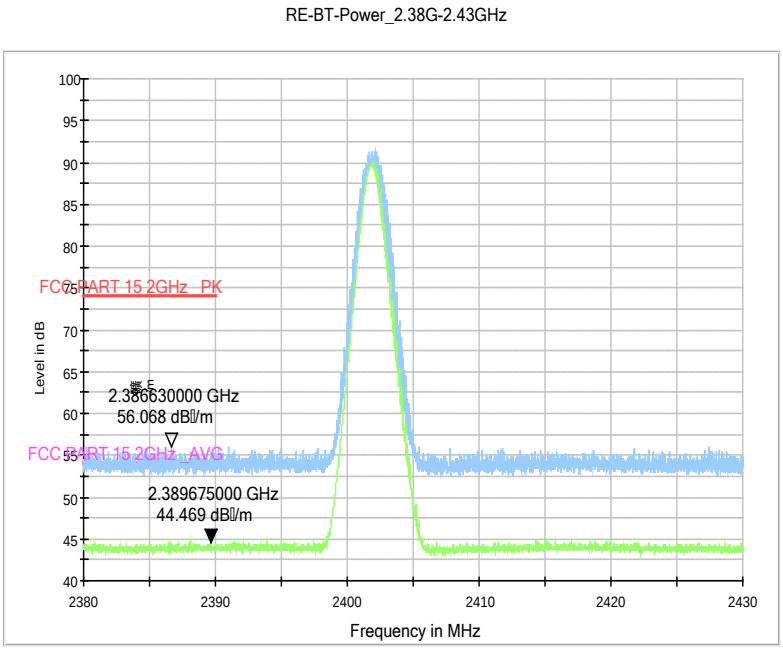


Fig. 66 Radiated Emission Power (π /4 DQPSK, Ch0, 2380GHz~2450GHz)

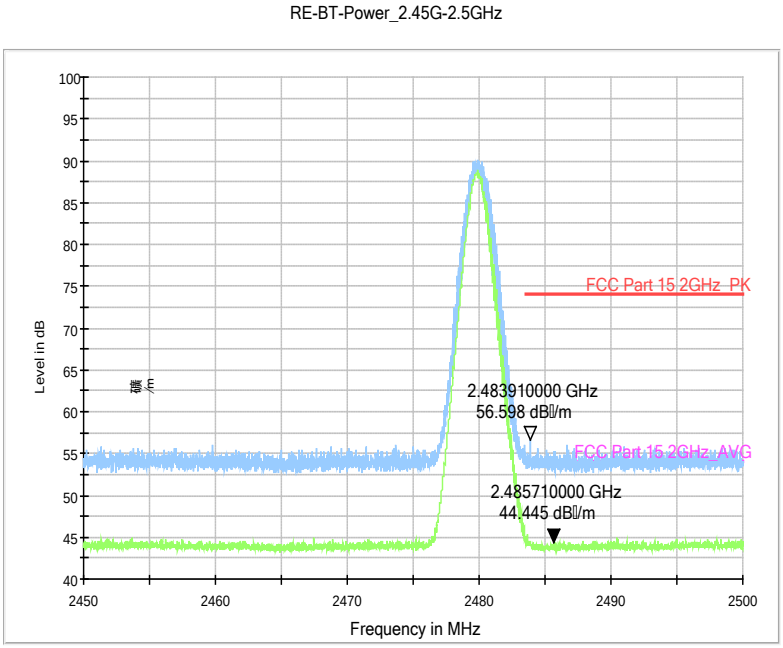


Fig. 67 Radiated Emission Power (π /4 DQPSK, Ch78, 2450GHz~2500GHz)

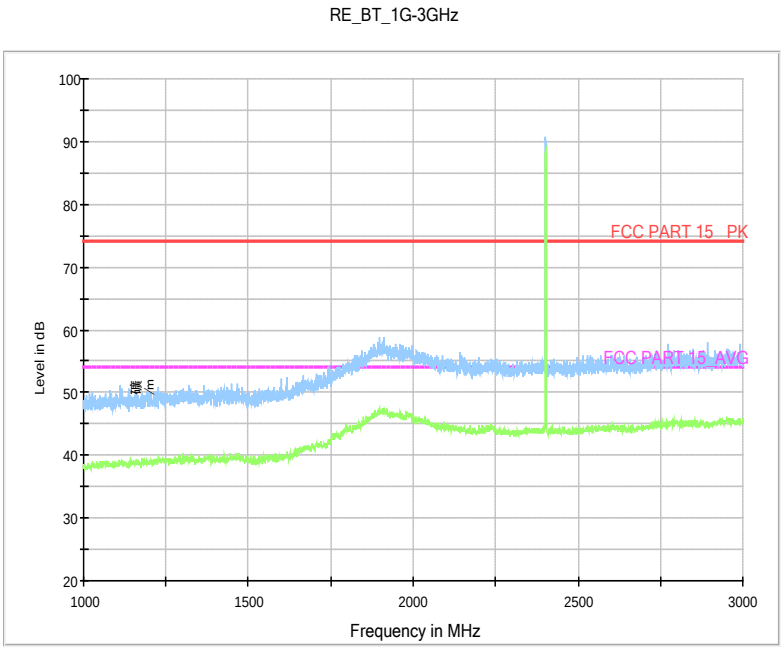


Fig. 68 Radiated Spurious Emission (8DPSK, Ch0, 1 MHz ~3 GHz)

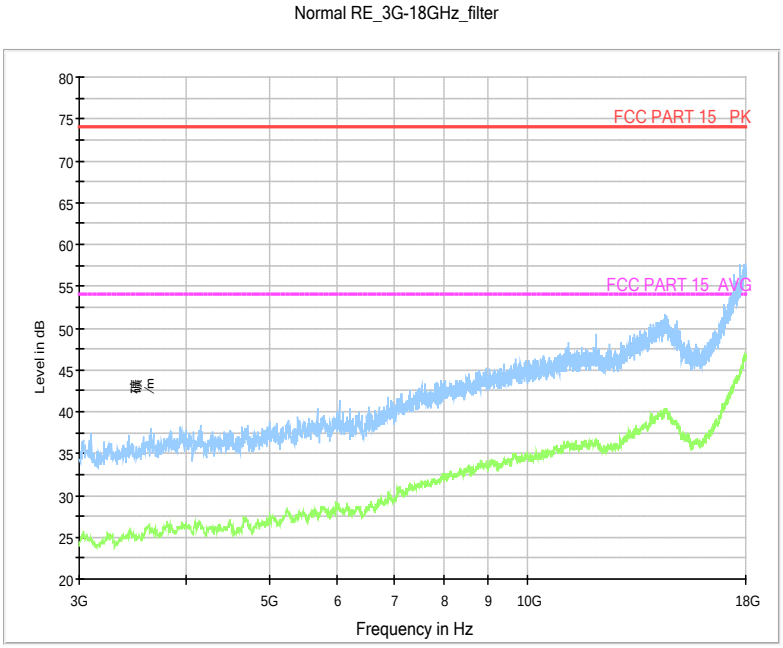


Fig. 69 Radiated Spurious Emission (8DPSK, Ch0, 3 GHz ~18 GHz)

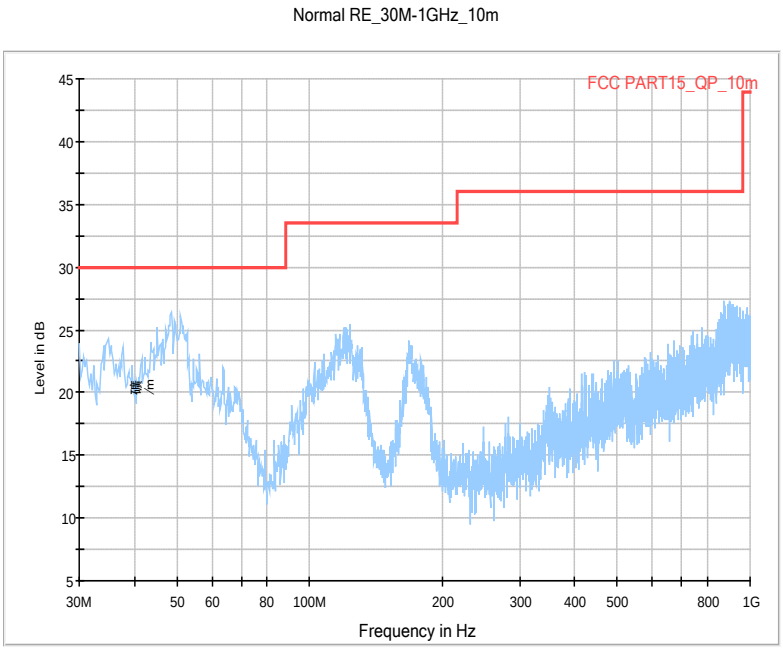


Fig. 70 Radiated Spurious Emission (8DPSK, Ch39, 30 MHz ~1 GHz)

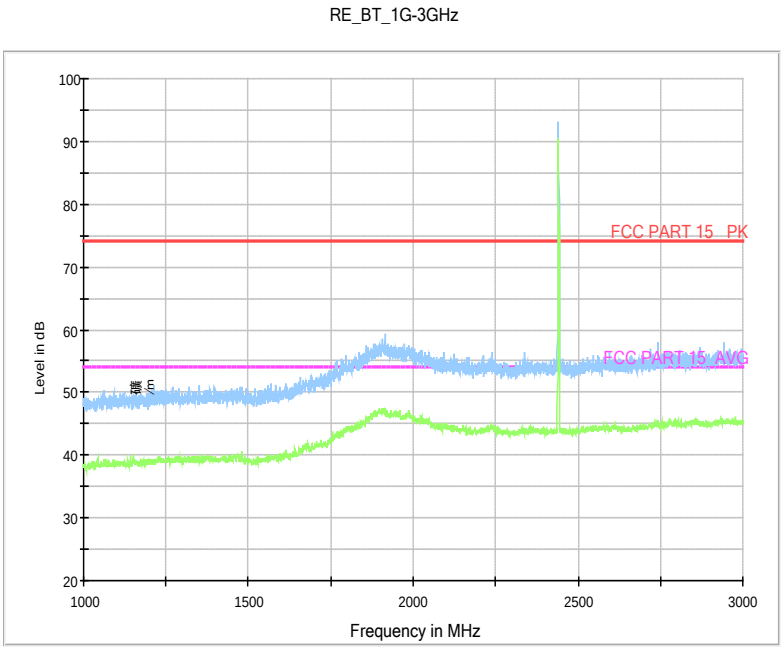


Fig. 71 Radiated Spurious Emission (8DPSK, Ch39, 1 GHz ~3 GHz)

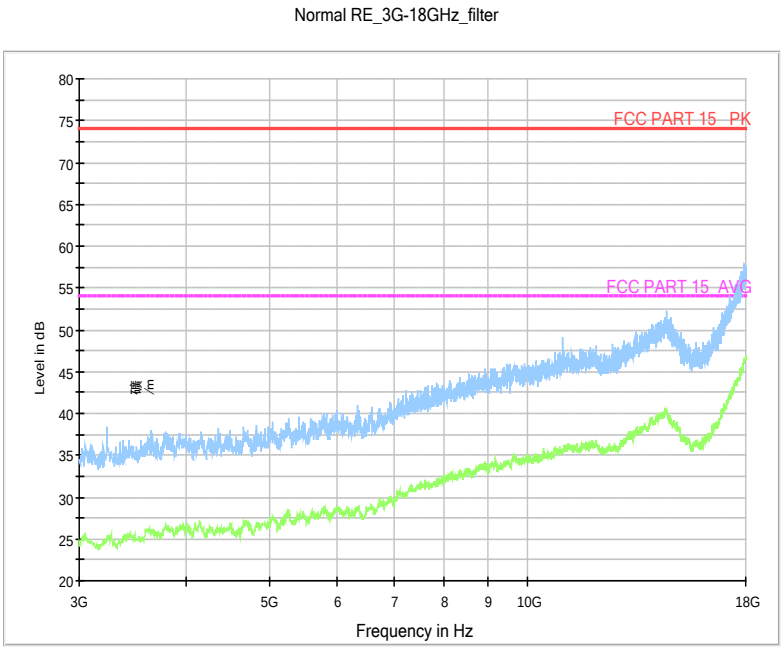


Fig. 72 Radiated Spurious Emission (8DPSK, Ch39, 3 MHz ~18 GHz)

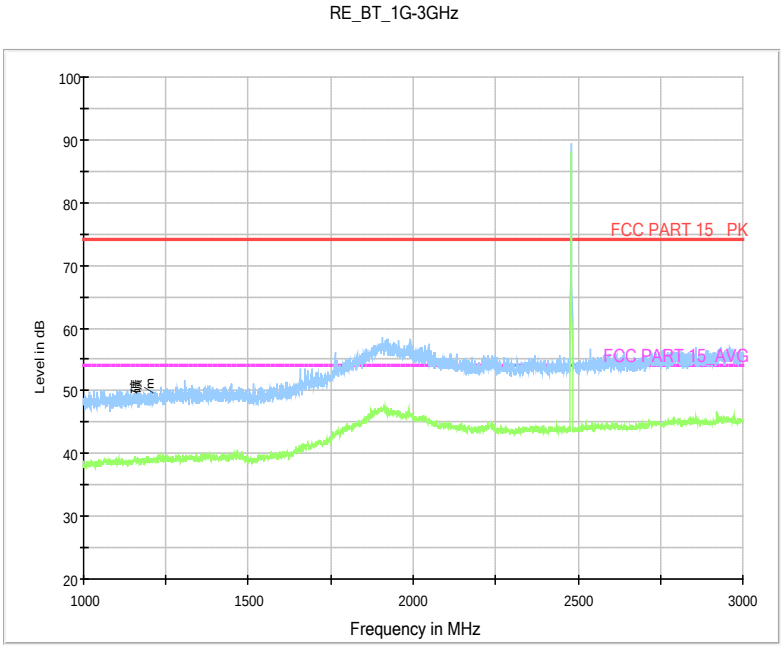


Fig. 73 Radiated Spurious Emission (8DPSK, Ch78, 1 GHz ~3 GHz)

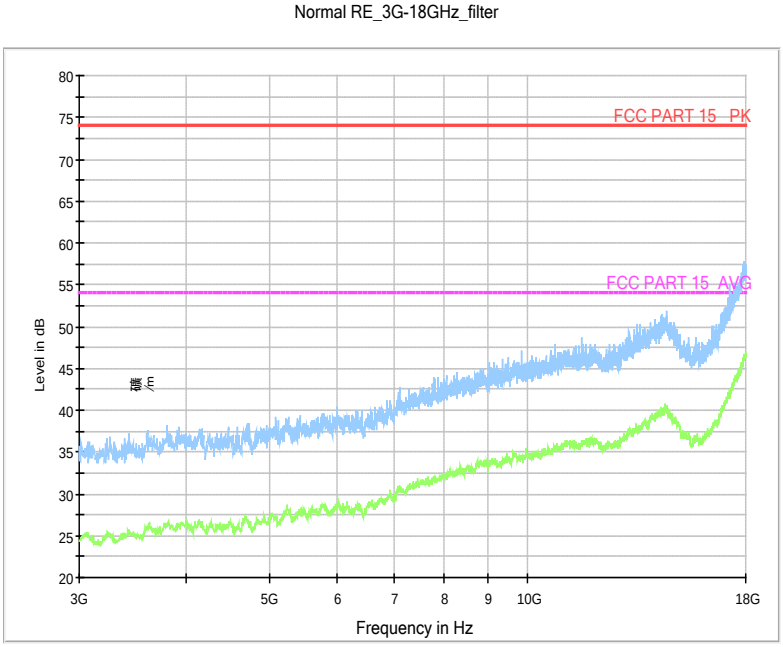


Fig. 74 Radiated Spurious Emission (8DPSK, Ch78, 3 GHz ~18 GHz)

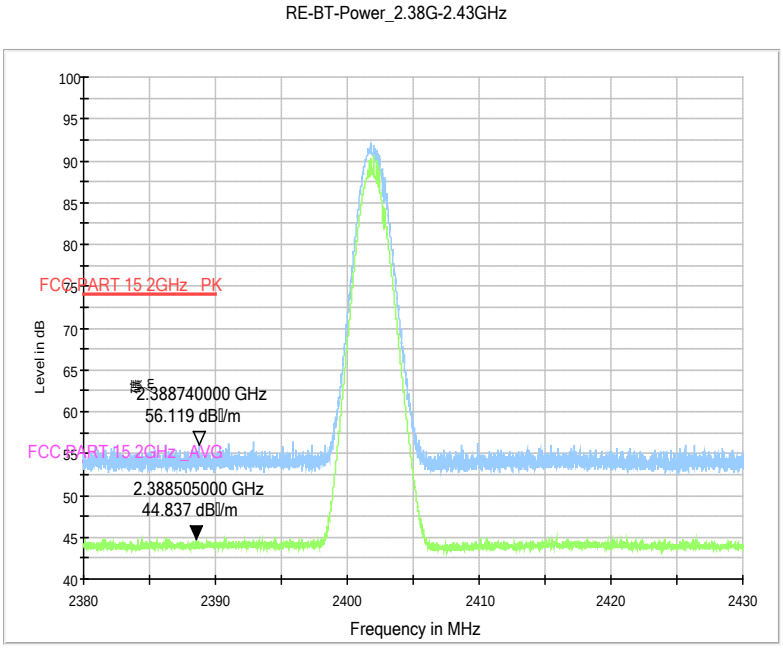


Fig. 75 Radiated Emission Power (8DPSK, Ch0, 2380GHz~2450GHz)

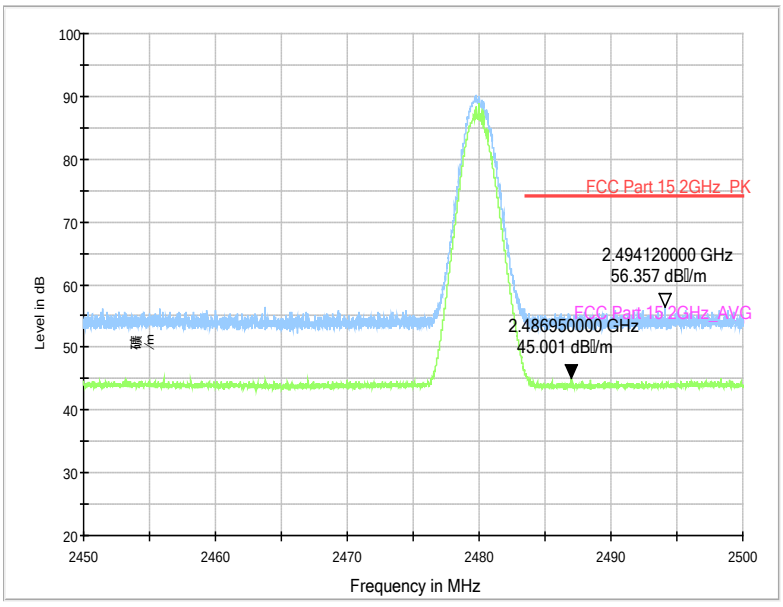


Fig. 76 Radiated Emission Power (8DPSK, Ch78, 2450GHz~2500GHz)

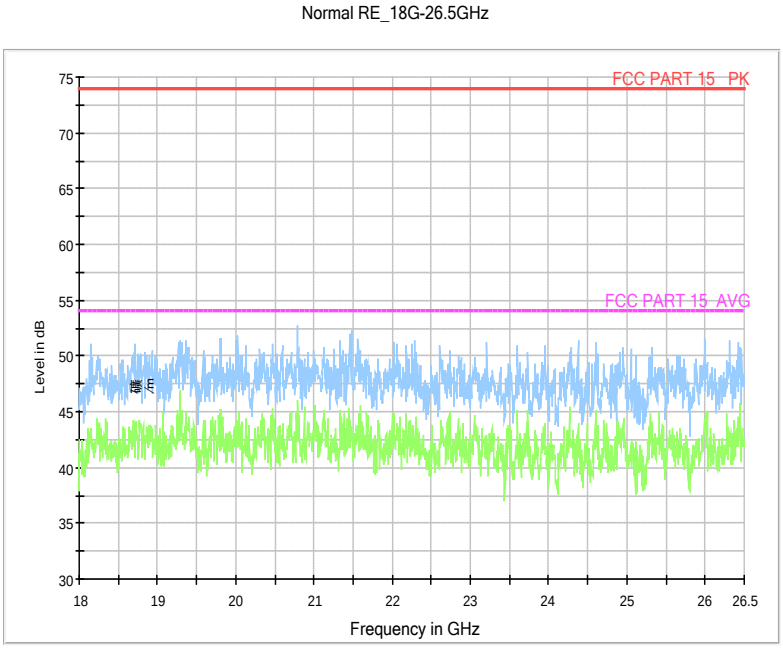


Fig. 77 Radiated Spurious Emission (All channel, 18 GHz ~26.5 GHz)

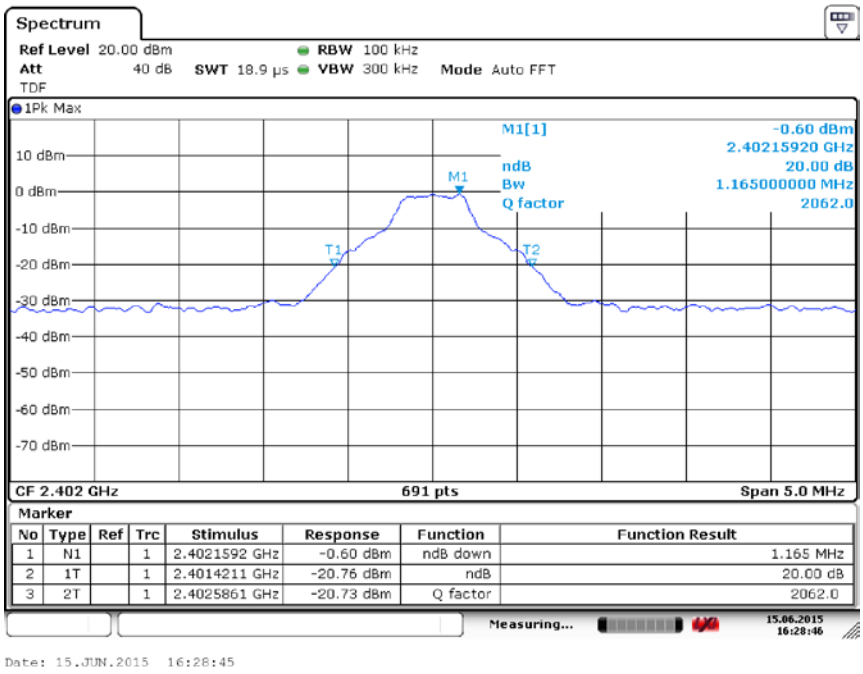


Fig. 78 Occupied 20dB Bandwidth (GFSK, Ch 0)

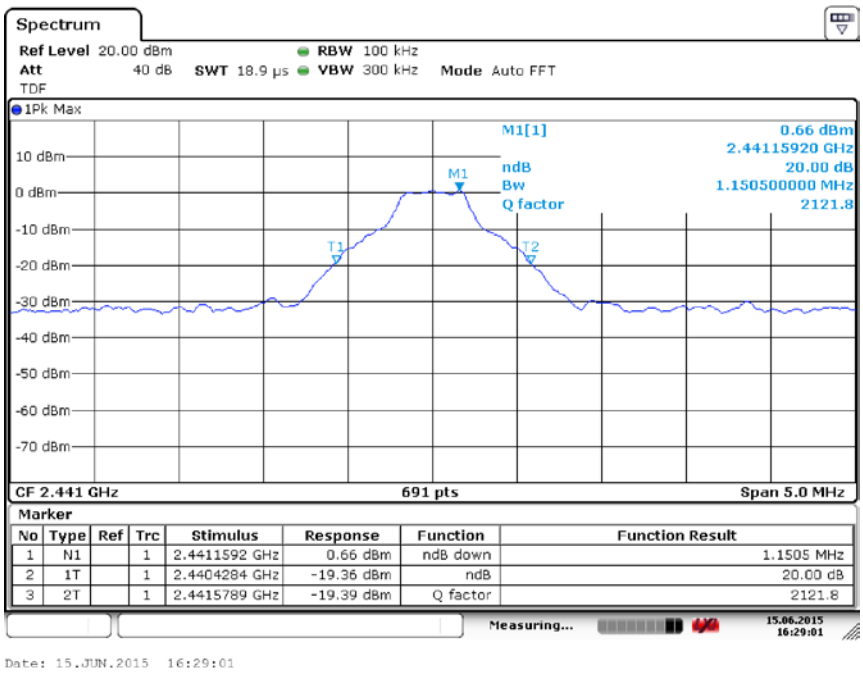


Fig. 79 Occupied 20dB Bandwidth (GFSK, Ch 39)

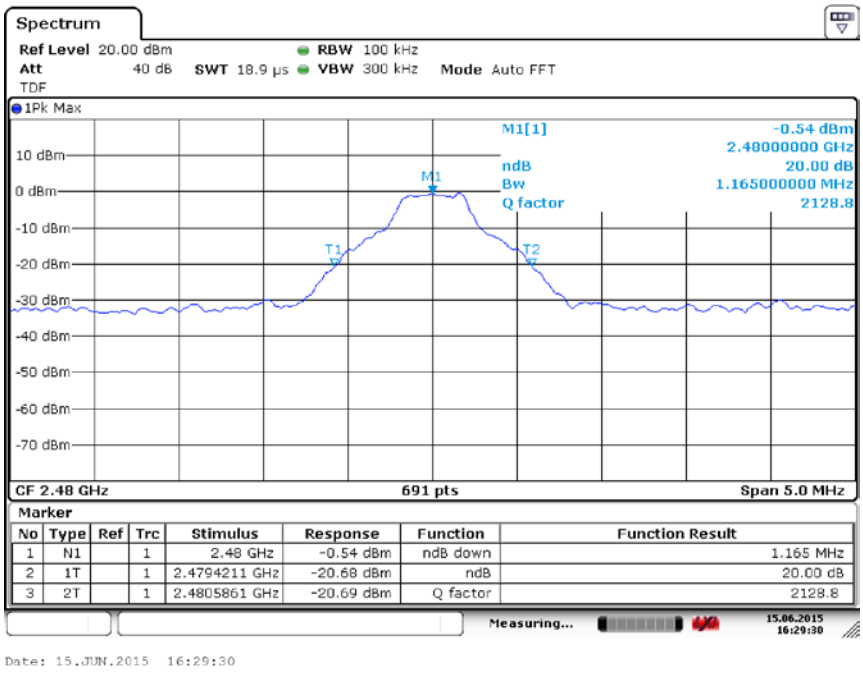


Fig. 80 Occupied 20dB Bandwidth (GFSK, Ch 78)

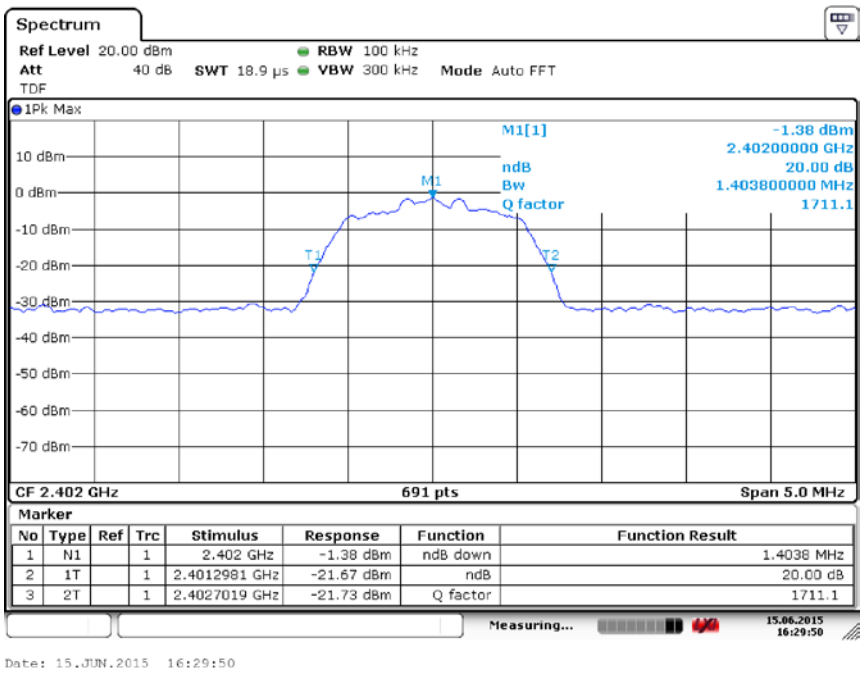


Fig. 81 Occupied 20dB Bandwidth (π /4 DQPSK, Ch 0)

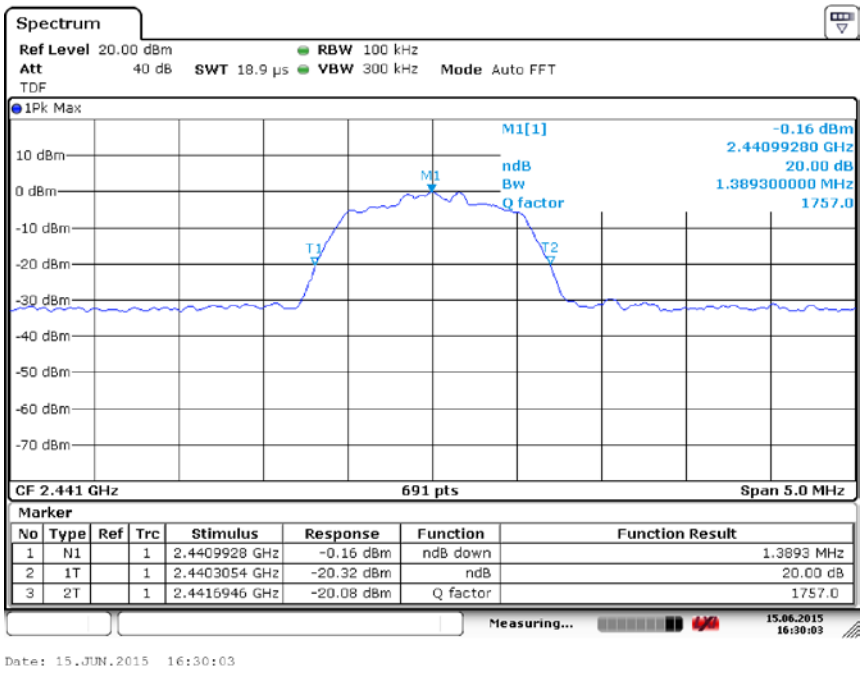


Fig. 82 Occupied 20dB Bandwidth (π /4 DQPSK, Ch 39)

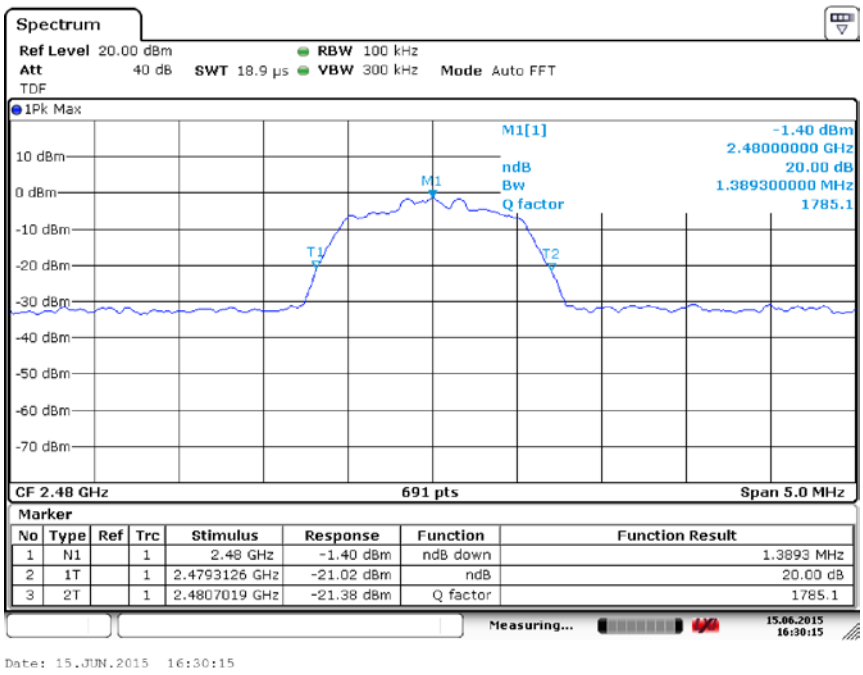


Fig. 83 Occupied 20dB Bandwidth (π /4 DQPSK, Ch 78)

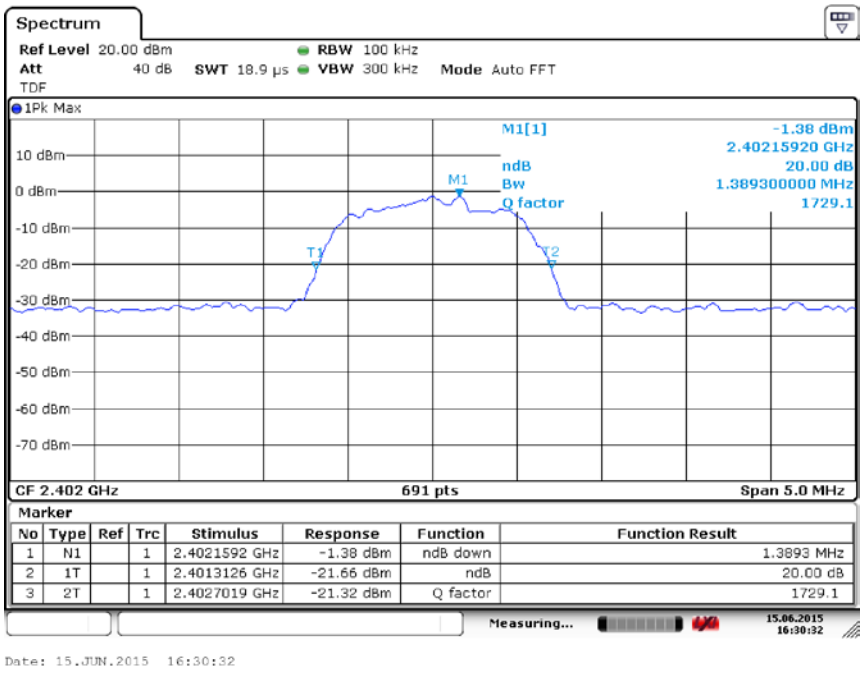


Fig. 84 Occupied 20dB Bandwidth (8DPSK, Ch 0)

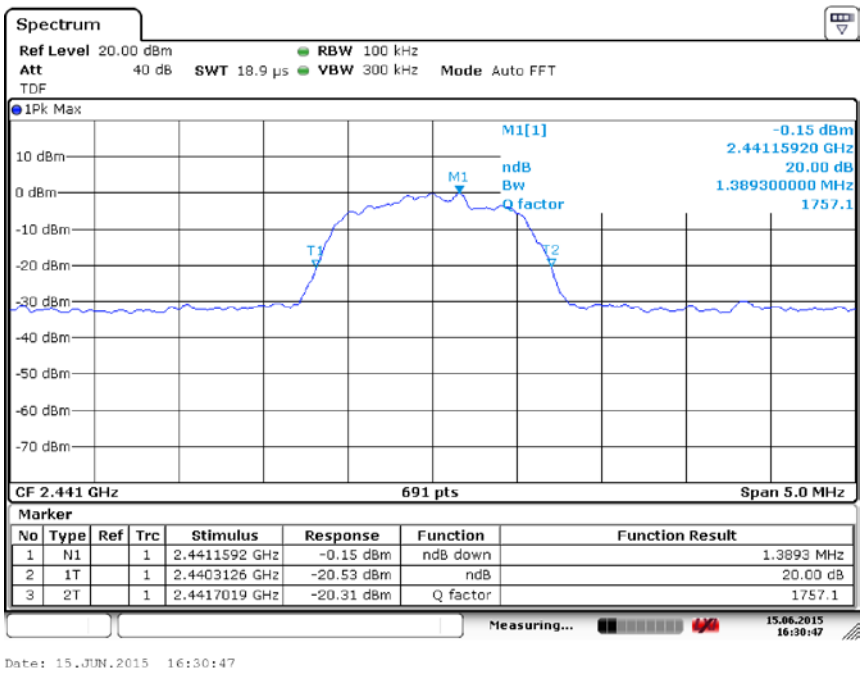


Fig. 85 Occupied 20dB Bandwidth (8DPSK, Ch 39)

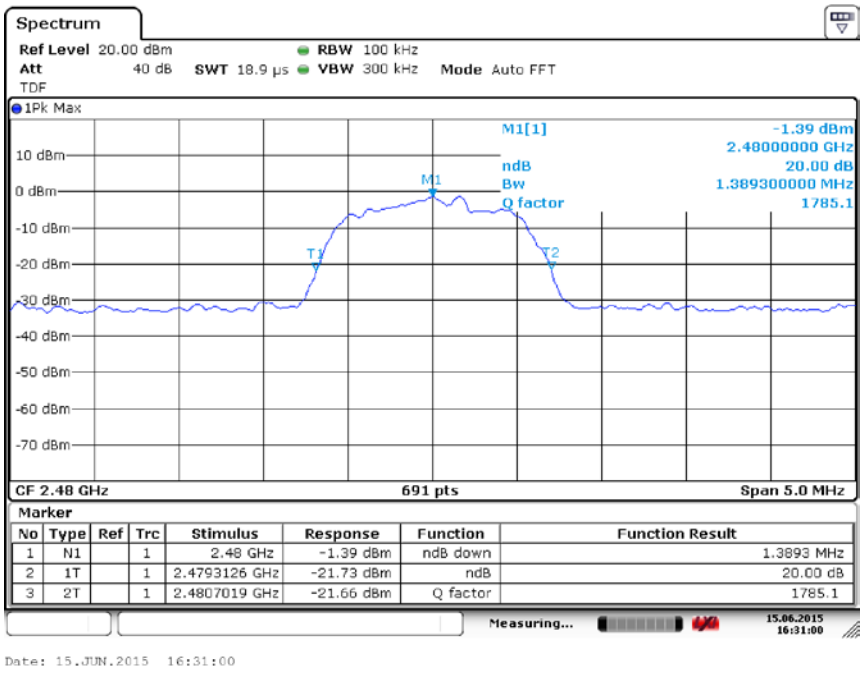


Fig. 86 Occupied 20dB Bandwidth (8DPSK, Ch 78)

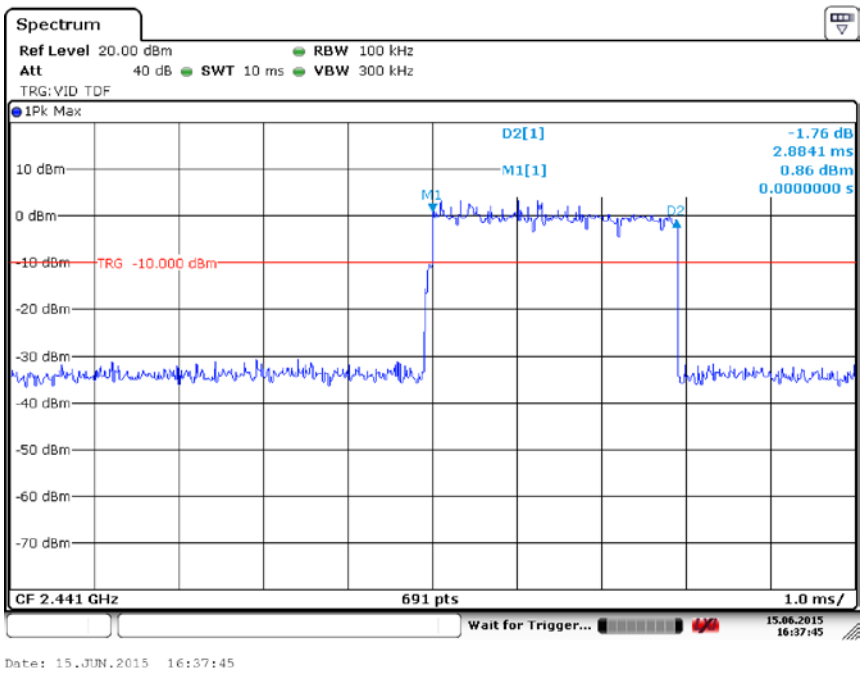


Fig. 87 Time of Occupancy(Dwell Time) (GFSK, Ch39)

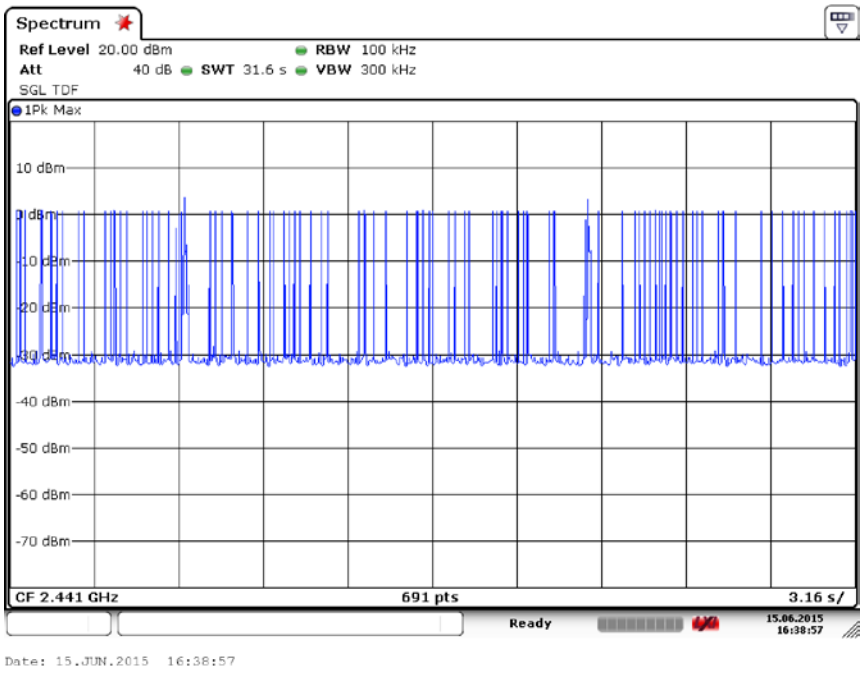


Fig. 88 Number of Transmissions (GFSK, Ch39)

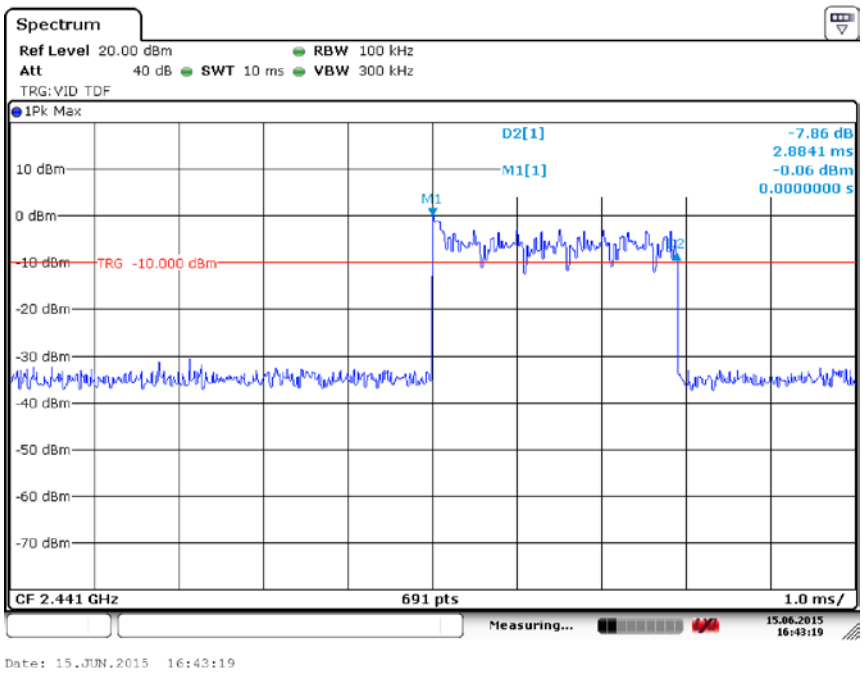


Fig. 89 Time of Occupancy(Dwell Time) (π /4 DQPSK, Ch39)

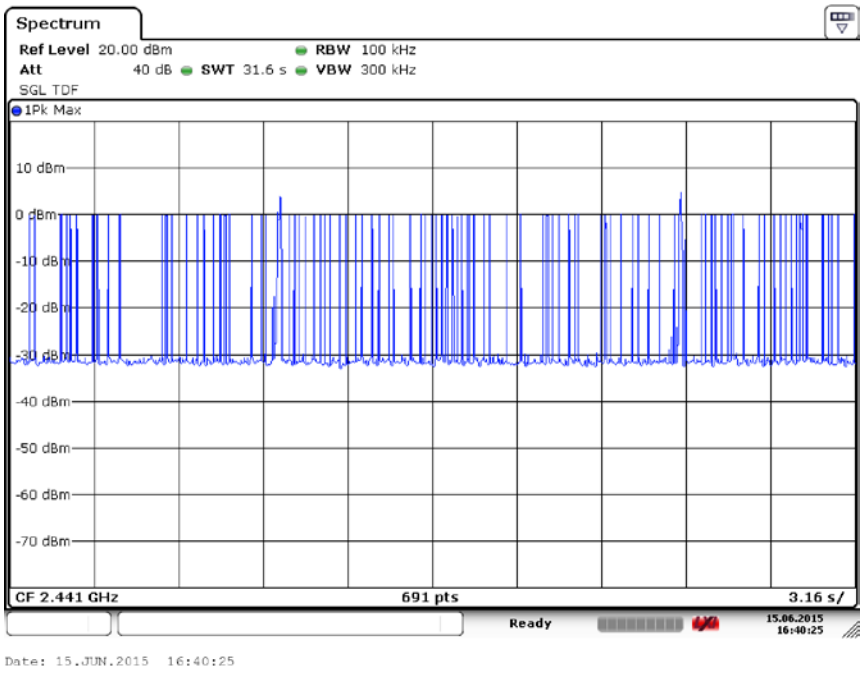


Fig. 90 Number of Transmissions (π /4 DQPSK, Ch39)

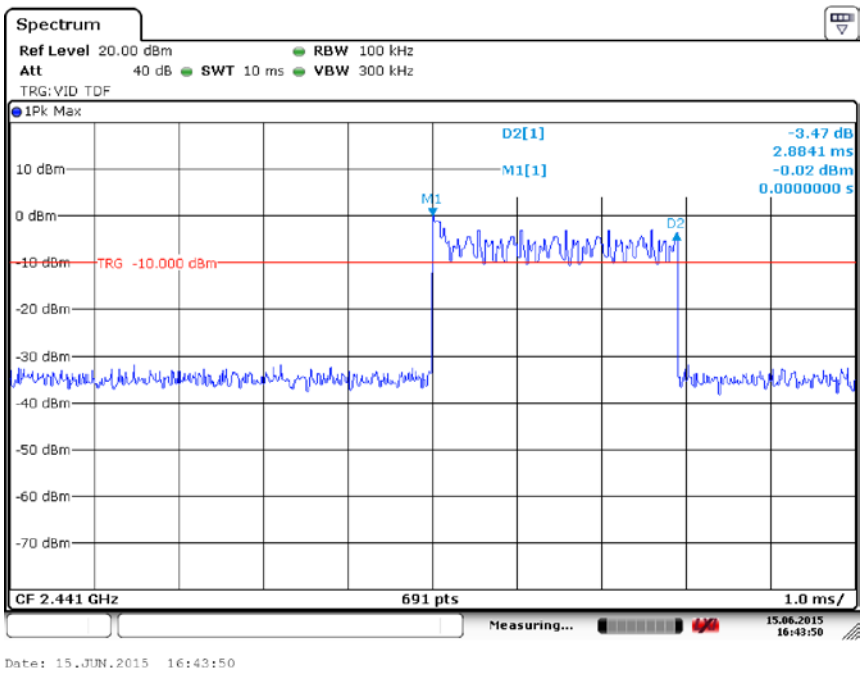


Fig. 91 Time of Occupancy(Dwell Time) (8DPSK, Ch39)

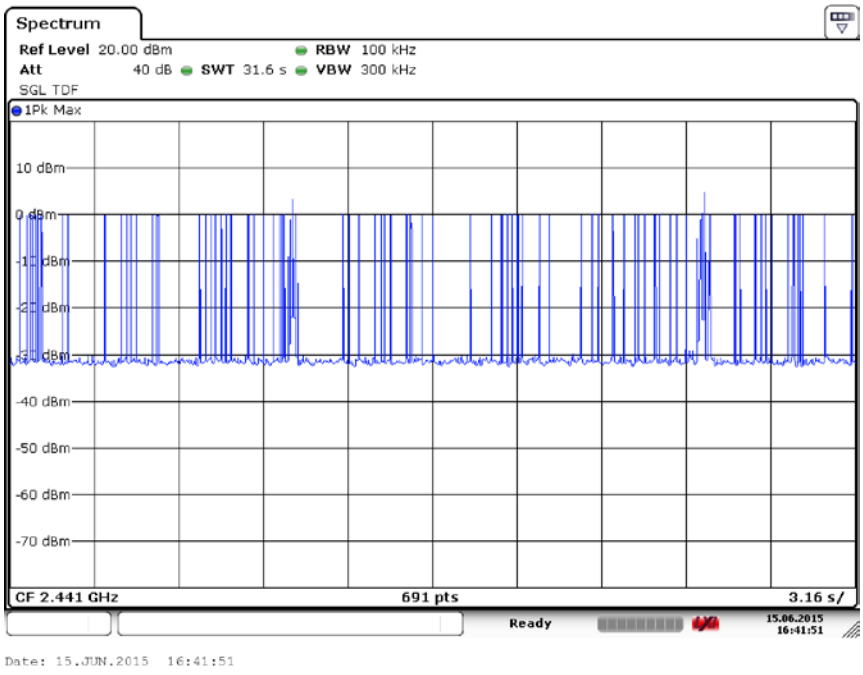


Fig. 92 Number of Transmissions (8DPSK, Ch39)

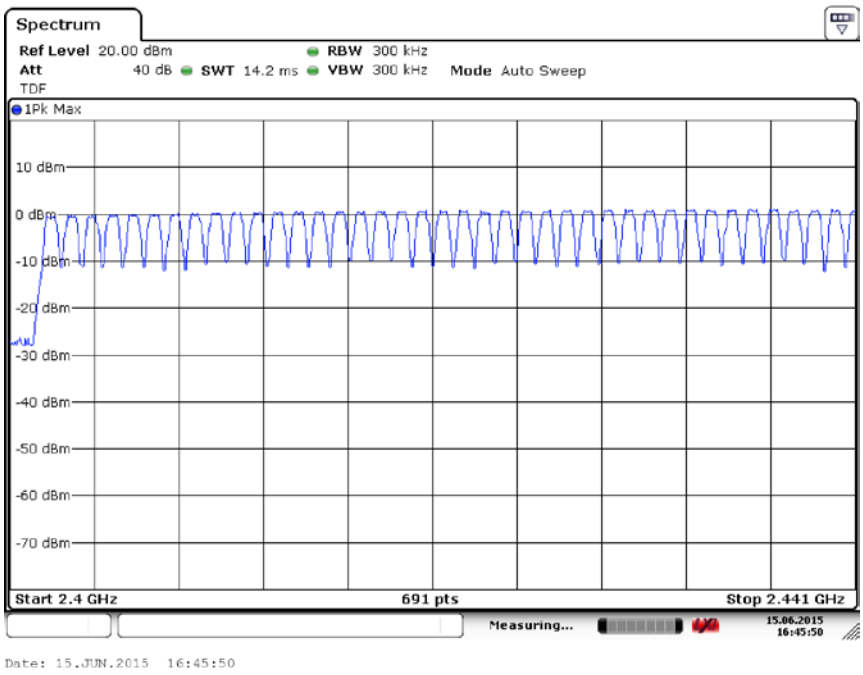


Fig. 93 Hopping channel ch0~39 (GFSK, Ch39)

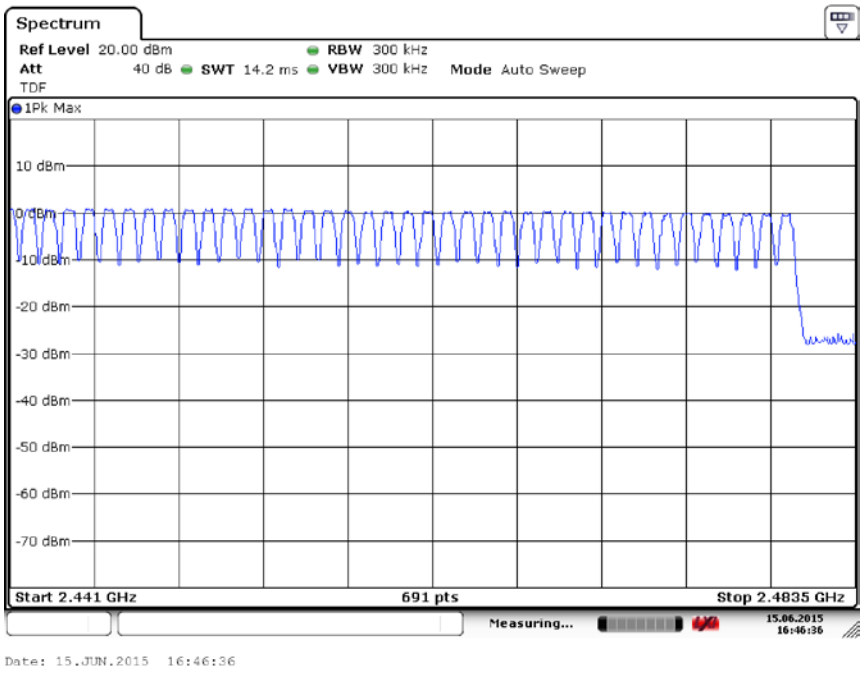


Fig. 94 Hopping channel ch39~78 (GFSK, Ch39)

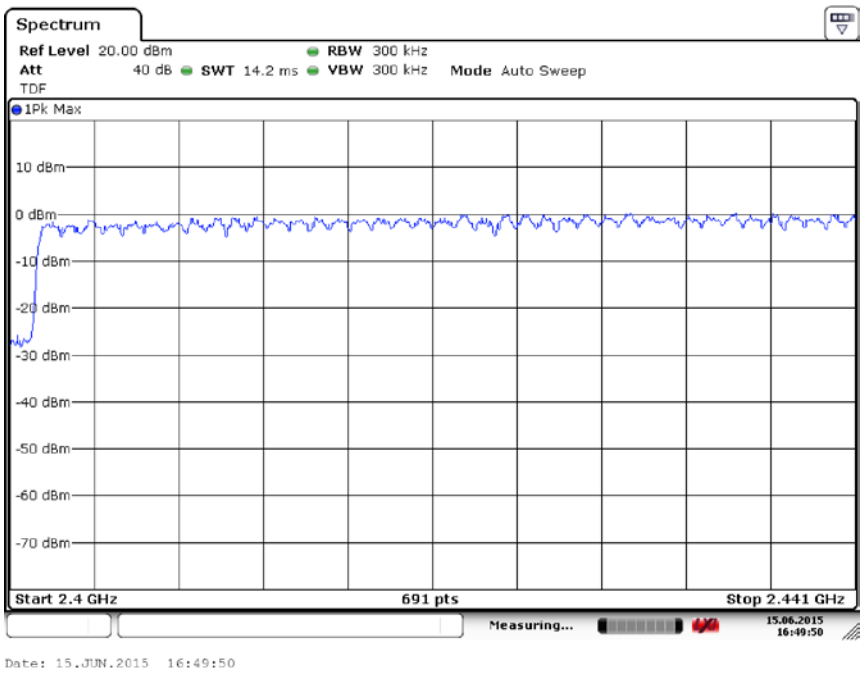


Fig. 95 Hopping channel ch0~39 (π /4 DQPSK, Ch39)

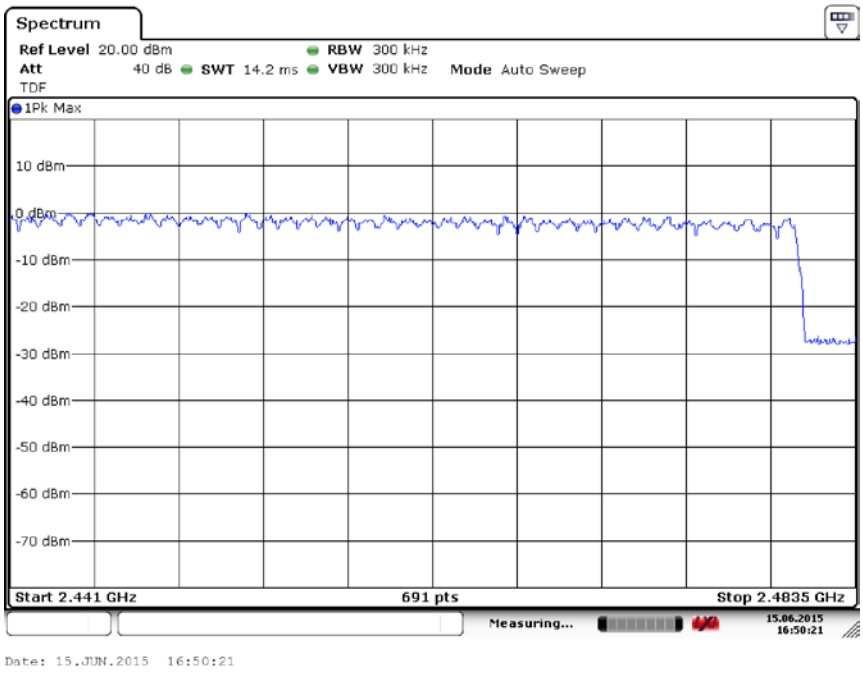


Fig. 96 Hopping channel ch39~78 (π /4 DQPSK, Ch39)

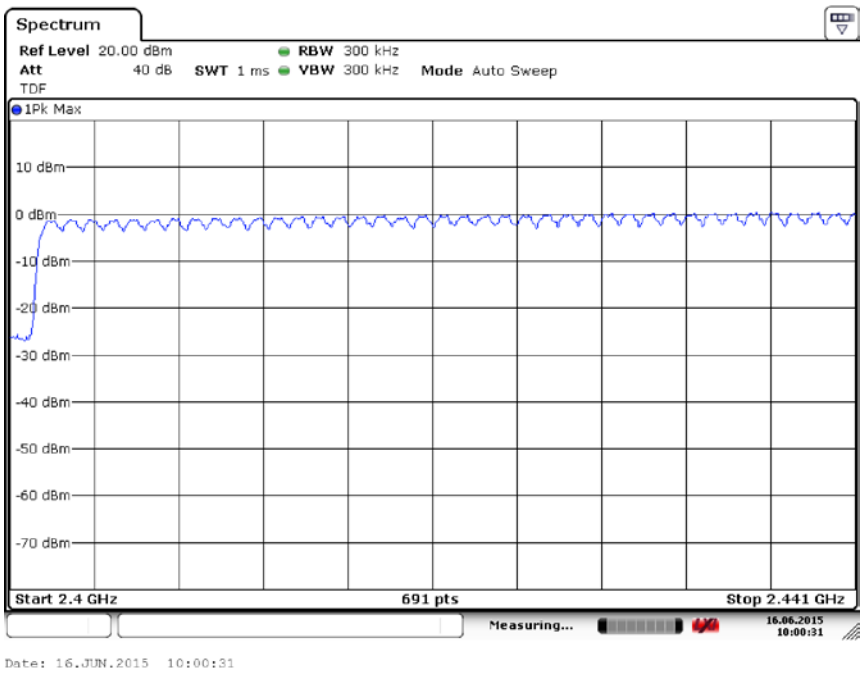


Fig. 97 Hopping channel ch0~39 (8DPSK, Ch39)

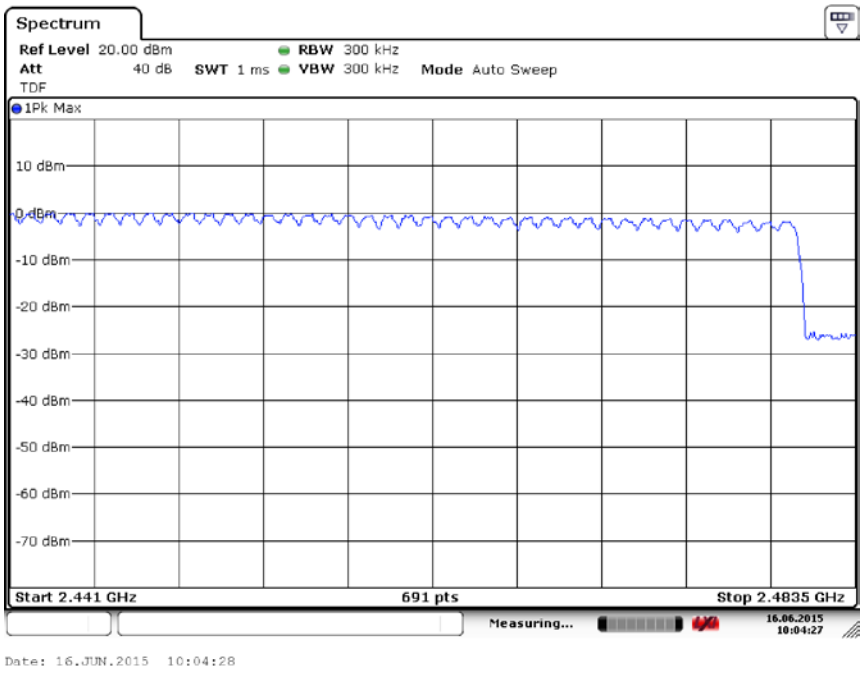


Fig. 98 Hopping channel ch39~78 (8DPSK, Ch39)

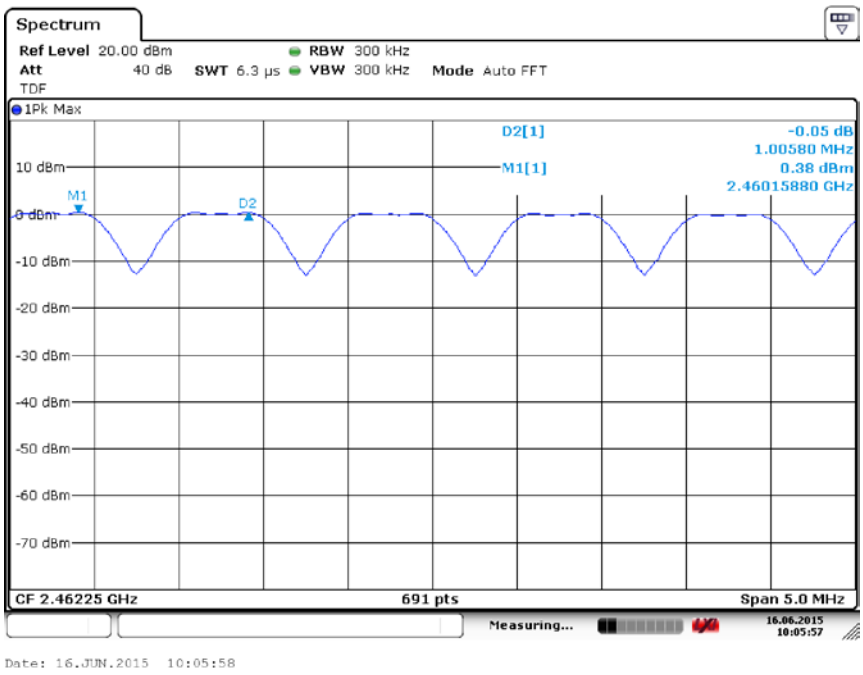


Fig. 99 Carrier Frequency Separation (GFSK, Ch39)

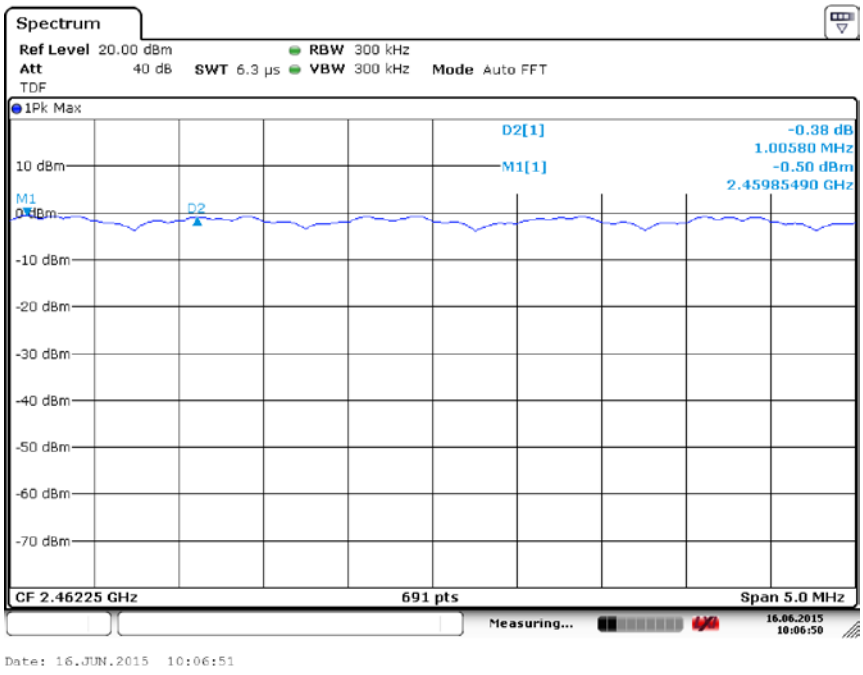


Fig. 100 Carrier Frequency Separation (π /4 DQPSK, Ch39)

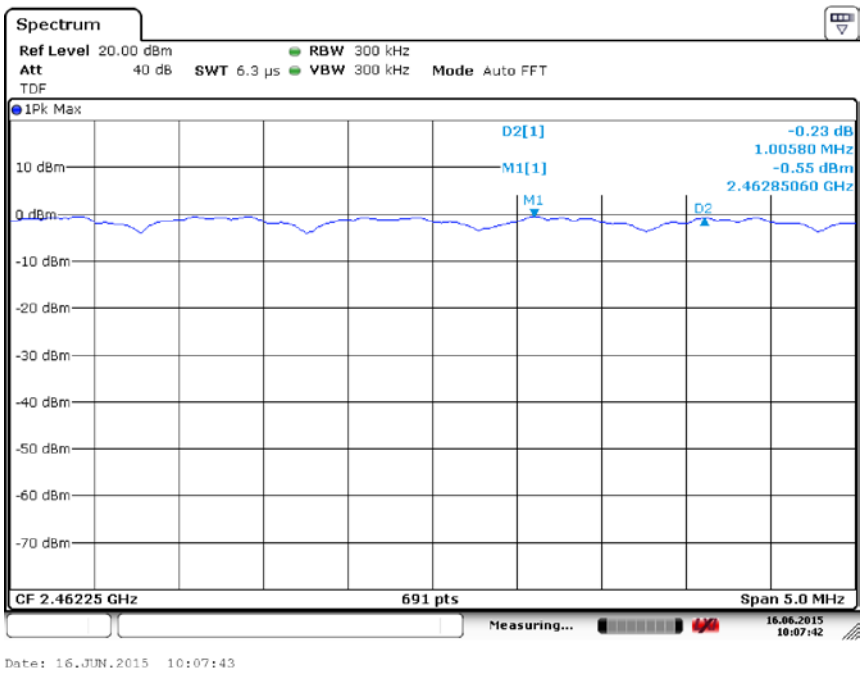


Fig. 101 Carrier Frequency Separation (8DPSK, Ch39)

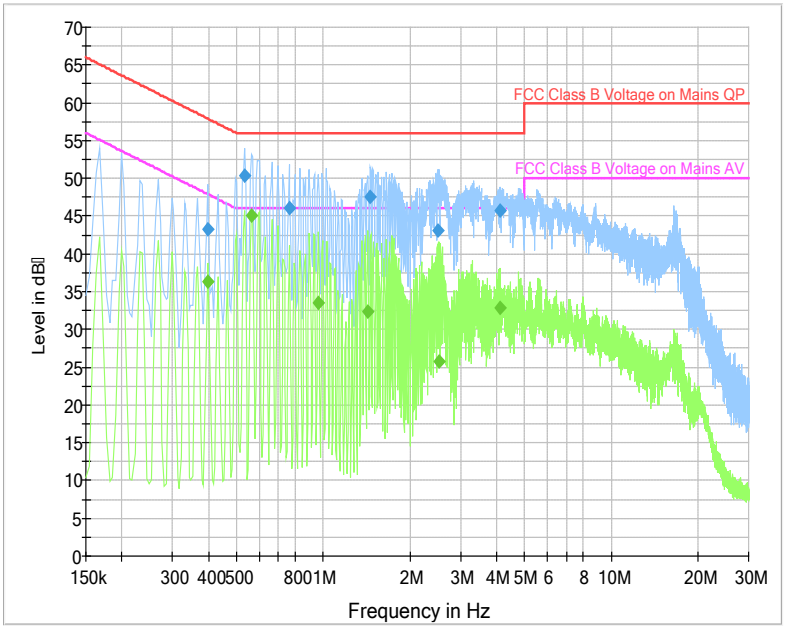


Fig. 102 AC Power line Conducted Emission (Traffic, AE1)

MEASUREMENT RESULT: " QuasiPeak "

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.397500	43.3	2000.0	9.000	On	N	19.8	14.6	57.9
0.532500	50.3	2000.0	9.000	On	L1	19.8	5.7	56.0
0.762000	46.1	2000.0	9.000	On	N	19.8	9.9	56.0
1.459500	47.6	2000.0	9.000	On	N	19.7	8.4	56.0
2.494500	43.2	2000.0	9.000	On	L1	19.6	12.8	56.0
4.123500	45.7	2000.0	9.000	On	L1	19.7	10.3	56.0

MEASUREMENT RESULT: " Average "

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.397500	36.3	2000.0	9.000	On	N	19.8	11.6	47.9
0.564000	45.1	2000.0	9.000	On	L1	19.8	0.9	46.0
0.964500	33.6	2000.0	9.000	On	L1	19.7	12.4	46.0
1.428000	32.3	2000.0	9.000	On	L1	19.7	13.7	46.0
2.526000	25.7	2000.0	9.000	On	L1	19.6	20.3	46.0
4.123500	32.9	2000.0	9.000	On	L1	19.7	13.1	46.0

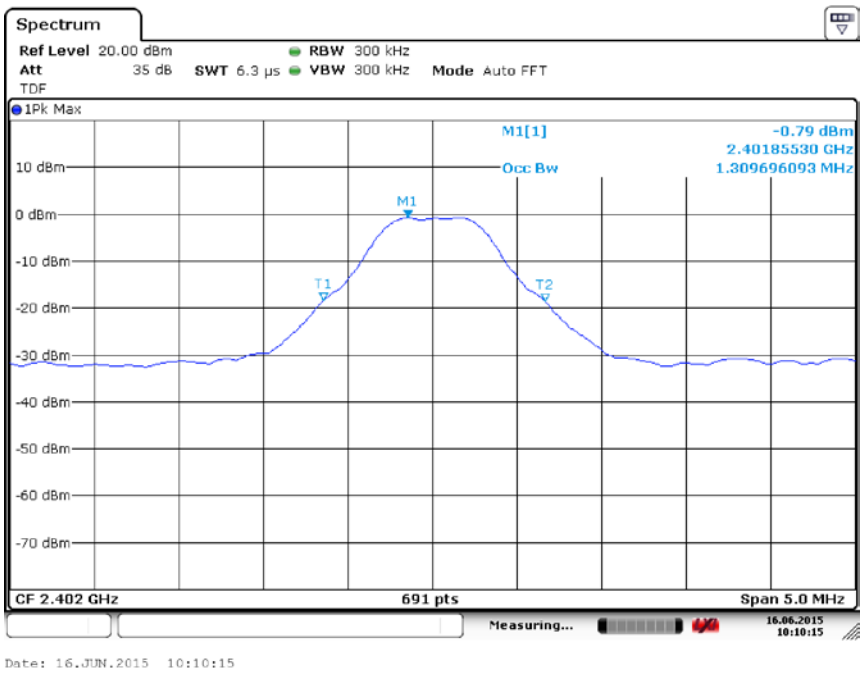


Fig.103 Occupied Bandwidth (GFSK, Ch 0)

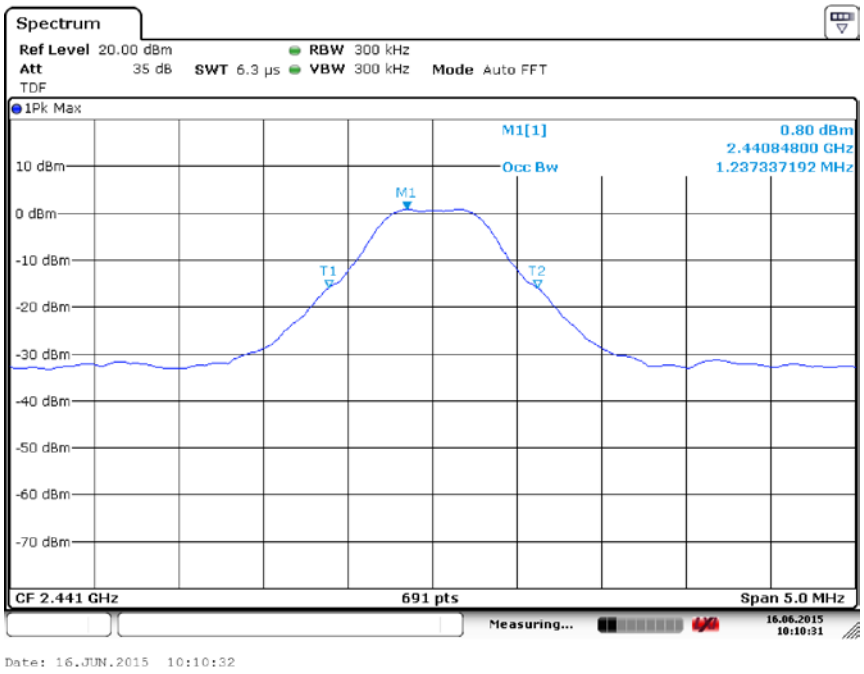


Fig.104 Occupied Bandwidth (GFSK, Ch 39)

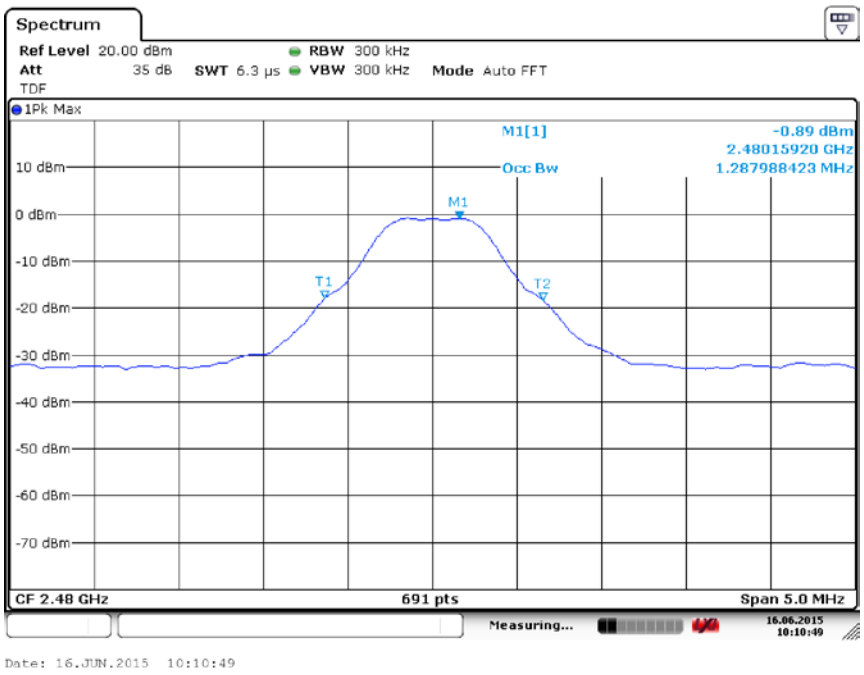


Fig.105 Occupied Bandwidth (GFSK, Ch 78)

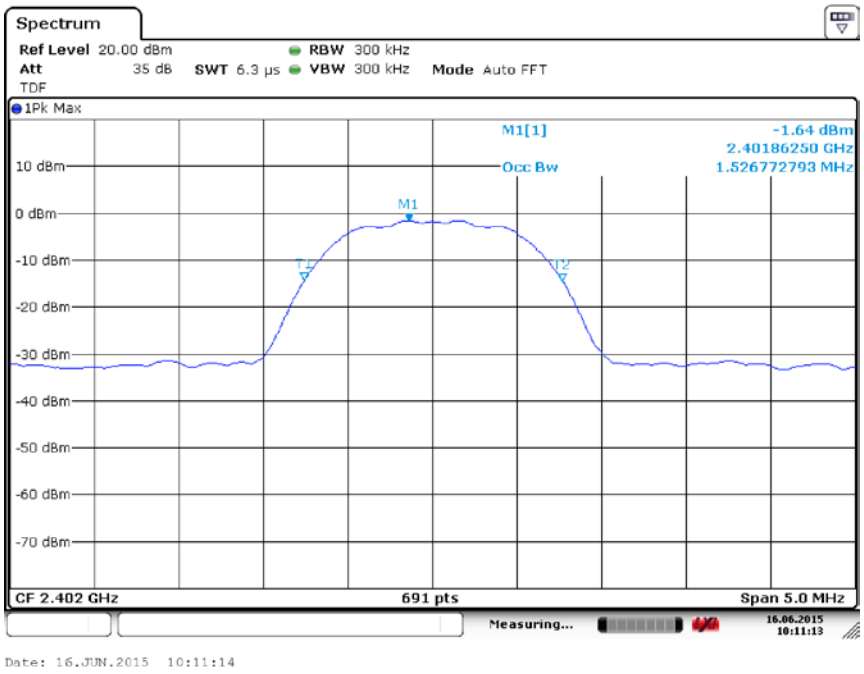


Fig.106 Occupied Bandwidth (π /4 DQPSK, Ch 0)

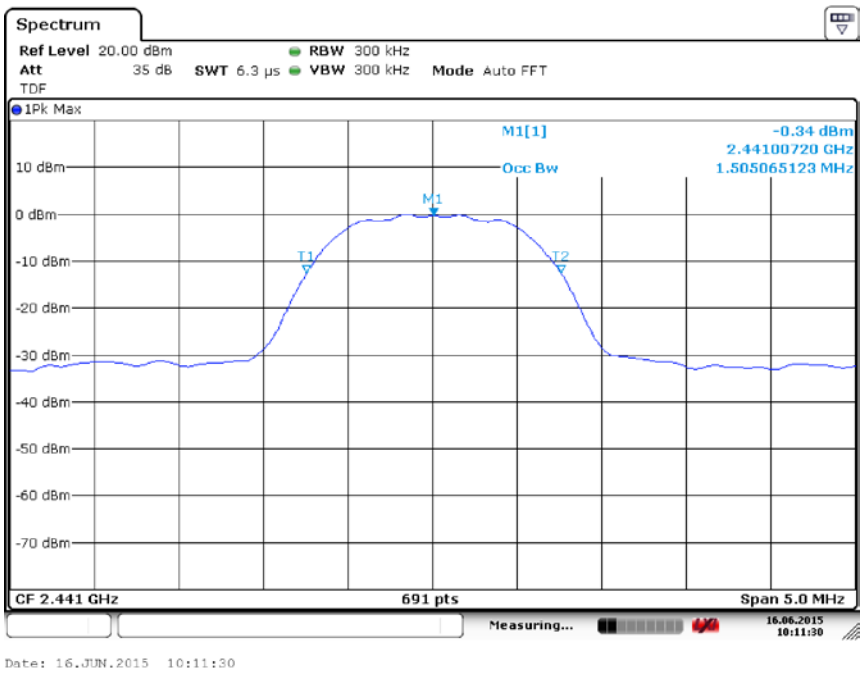


Fig.107 Occupied Bandwidth (π /4 DQPSK, Ch 39)

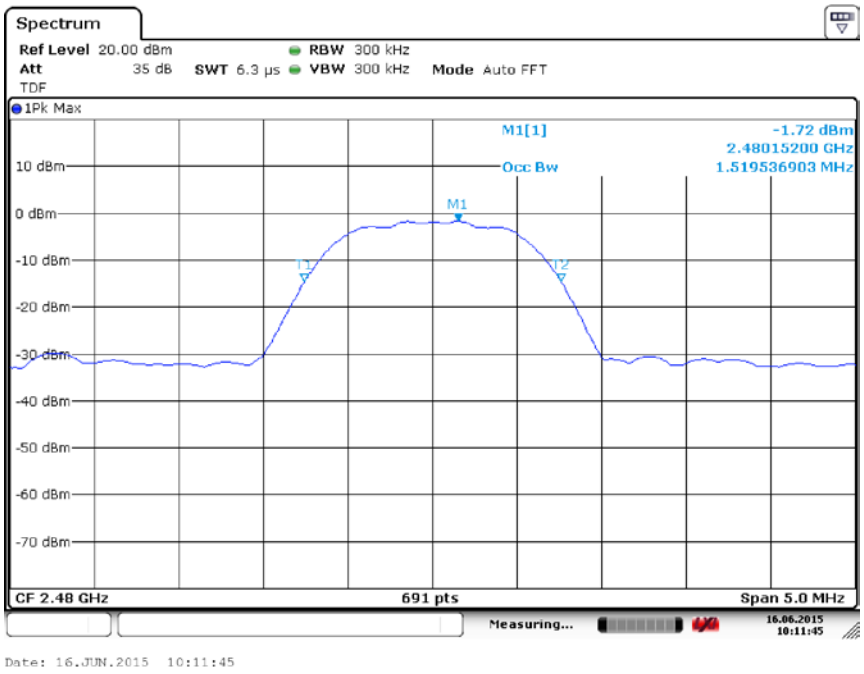


Fig.108 Occupied Bandwidth (π /4 DQPSK, Ch 78)

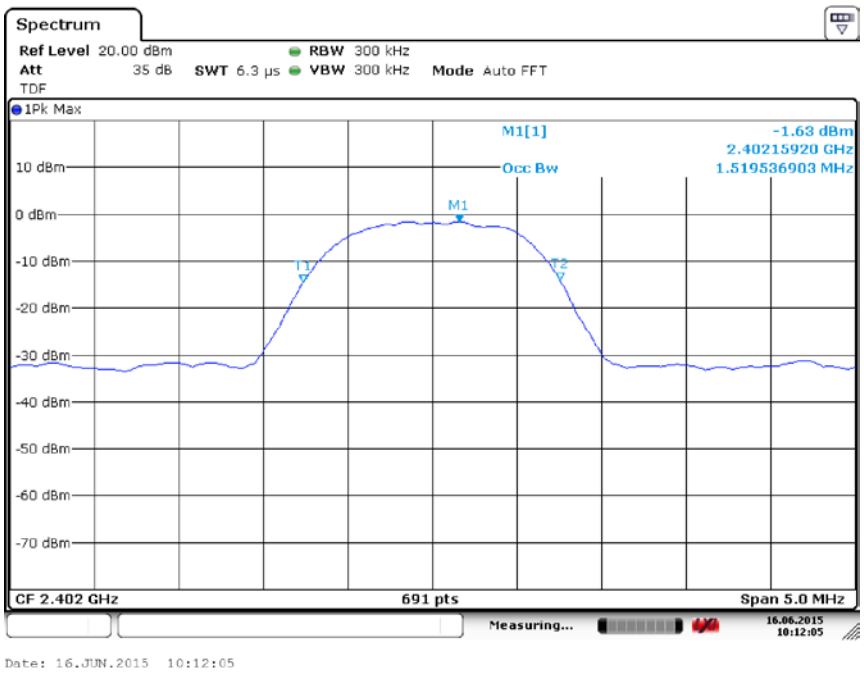


Fig.109 Occupied Bandwidth (8DPSK, Ch 0)

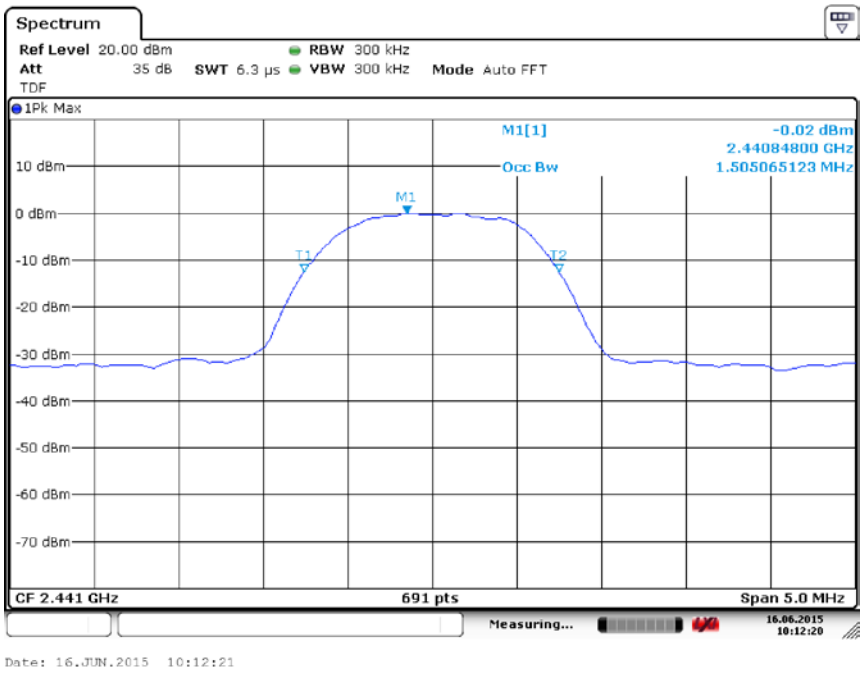


Fig.110 Occupied Bandwidth (8DPSK, Ch 39)

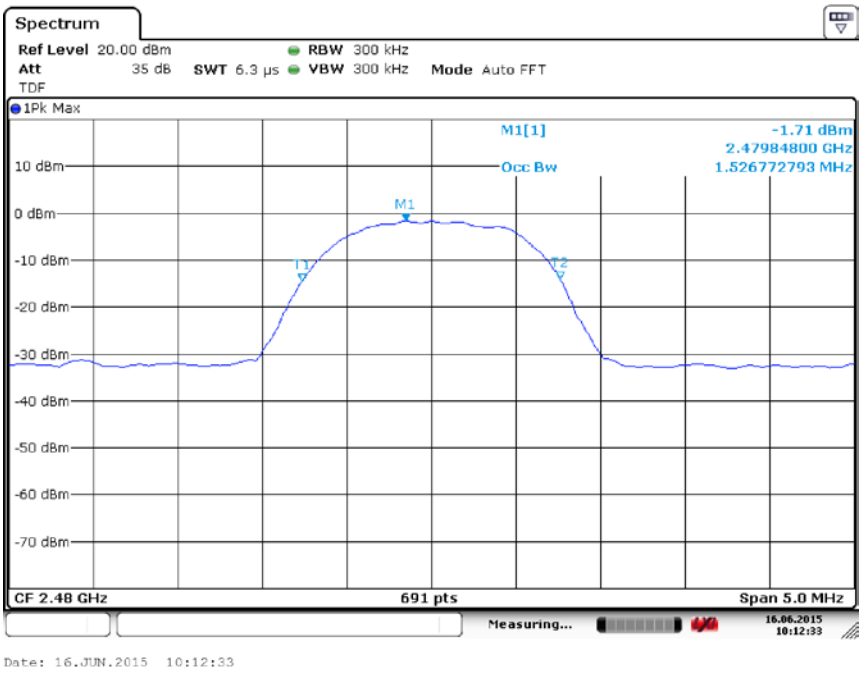


Fig.111 Occupied Bandwidth (8DPSK, Ch 78)

ANNEX D: Persons involved in this testing

Test Name	Tester
Maximum Peak Output Power	Xu Zhongfei, Li Zhibin
Band Edges Compliance	Xu Zhongfei, Li Zhibin
Conducted Spurious Emission	Xu Zhongfei, Li Zhibin
Radiated Spurious Emission	Xu Zhongfei, Li Zhibin
Occupied 20dB bandwidth	Xu Zhongfei, Li Zhibin
Time of Occupancy(Dwell Time)	Xu Zhongfei, Li Zhibin
Number of Hopping Channel	Xu Zhongfei, Li Zhibin
Carrier Frequency Separation	Xu Zhongfei, Li Zhibin
AC Powerline Conducted Emission	Xu Zhongfei, Li Zhibin
Occupied Bandwidth	Xu Zhongfei, Li Zhibin

ANNEX E: Accreditation Certificate

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L0570)

China Academy of Telecommunication Research of MIIT

No.52, Huayuan North Road, Haidian District, Beijing, China

is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) *for the competence of testing and calibration.*

The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.

Date of Issue: 2014-06-20

Date of Expiry: 2017-06-19

Date of Initial Accreditation: 1998-07-03

Date of Update: 2014-06-20

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).

No.CNAS AL 2

0010037

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