FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Ultrathin Backlit keyboard for iPad

ISSUED TO
Shenzhen Huichuangda Technology Co., Ltd

Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District, Shenzhen

Prepared by: Cao Shaodong
(Reporting Specialist)
Date 2014.6.16

Approved by: Wei Yanquan
(Chief Engineer)
Date 2014.6.16

Report No.:	BL-SZ1440086-601
EUT Type:	Ultrathin Backlit keyboard for iPad
Model Name:	HCD-008, HCD-006
Brand Name:	N/A
Test Standard:	47 CFR Part 15 Subpart C
FCC ID:	2ACDJ-HCD008
Test conclusion:	PASS
Test Date:	May 10, 2014 ~ Jun 16, 2014
Date of Issue:	Jun 16, 2014

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Revision History

Version	Issue Date	Revisions
Rev. 01	Jun 12, 2014	Initial Issue
Rev. 02	Jun 16, 2014	The Second Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6683 3402
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	15 to 35℃
Ambient Relative Humidity	30 to 60%
Ambient Pressure	86 to106kPa

1.4 Announce

(1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(2) The test report is invalid if there is any evidence and/or falsification.

(3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	Shenzhen Huichuangda Technology Co., Ltd
Address	Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District, Shenzhen

2.2 Manufacturer

Manufacturer	Shenzhen Huichuangda Technology Co., Ltd
Address	Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District, Shenzhen

2.3 General Description for Equipment under Test (EUT)

EUT Type	Ultrathin Backlit keyboard for iPad
Tested Model Name	HCD-008
Series Model Name	HCD-008, HCD-006
Description of Model name differentiation	The equipment model HCD-008 and HCD-006 are Ultrathin Backlit keyboard for iPad, the electrical parameters and internal structure of RF module circuit are same..
Hardware Version	V2.1
Software Version	V3.0
Network and Wireless connectivity	BT 3.0
About the Product	The equipment is Ultrathin Backlit keyboard for iPad, it contains BT Module operating at 2.4GHz ISM band.

2.4 Technical Information

TX/ RX Operating Range	2400~2483.5MHz band f_c = 2402 MHz + N*1 MHz, where - f_c = “Operating Frequency” in MHz, - N = “Channel Number” with the range from 0 to 78.	
Modulation Type	Carrier	Frequency Hopping Spread Spectrum
	Digital	GFSK, π/4-DQPSK, 8DPSK
Antenna Type	PCB Antenna	
Antenna Gain	2dBi	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No	253080-001
	Serial No	N/A
	Capacitance	450 mAh
	Rated Voltage	3.7V
	Extreme Voltage	Low: 3.0V / High:4.2V

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C (12-30-13 Edition)	Miscellaneous Wireless Communications Services
2	FCC PUBLIC NOTICE DA 00-705 (Mar. 30, 2000)	Filling and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
3	ANSI C63.4-2009	American National Standard for Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

3.2 Verdict

No.	Description	FCC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	Pass Note 1
2	Number of Hopping Frequency	15.247(a)	ANNEX A.1	Pass
3	Peak Output Power	15.247(b)	ANNEX A.2	Pass
4	Occupied Bandwidth	15.247(a)	ANNEX A.3	Pass
5	Carrier Frequency Separation	15.247(a)	ANNEX A.4	Pass
6	Time of Occupancy (Dwell time)	15.247(a)	ANNEX A.5	Pass
7	Conducted Spurious Emission	15.247(d)	ANNEX A.7	Pass
8	Conducted Emission	15.207	ANNEX A.8	Pass
9	Radiated Spurious Emission	15.209 15.247(c)	ANNEX A.9	Pass
10	Band Edge	15.247(d)	ANNEX A.10	Pass
Note 1: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.				

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity (%)	30 -60	
Atmospheric Pressure (kPa)	86-106	
Temperature	NT (Normal Temperature)	+20℃ to +25℃
	LT (Low Temperature)	-20℃
	HT (High Temperature)	+55℃
Working Voltage of the EUT	NV (Normal Voltage)	3.70V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2014.05.10	2015.05.09
Spectrum Analyzer	ROHDE&SCHWARZ	FSL3	103640/003	2014.05.02	2015.05.01
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2014.05.14	2015.05.13
Power Splitter	KMW	DCPD-LDC	1305003215	2014.05.14	2015.05.13
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2014.05.08	2015.05.07
Attenuator (20dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2013.07.06	2014.07.07
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2013.07.06	2014.07.07
Test Antenna-Loop(9kHz-30MHz)	SCHWARZBECK	FMZB 1519	1519-037	2013.07.02	2014.07.01
Test Antenna-Bi-Log(30MHz-3GHz)	SCHWARZBECK	VULB 9163	9163-624	2013.07.03	2014.07.02
Test Antenna-Horn(1-18GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2014.07.01
Test Antenna-Horn(15-26.5GHz)	SCHWARZBECK	BBHA 9170	9170-305	2013.07.02	2014.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2013.10.07	2014.10.06

4.3 Test Configurations

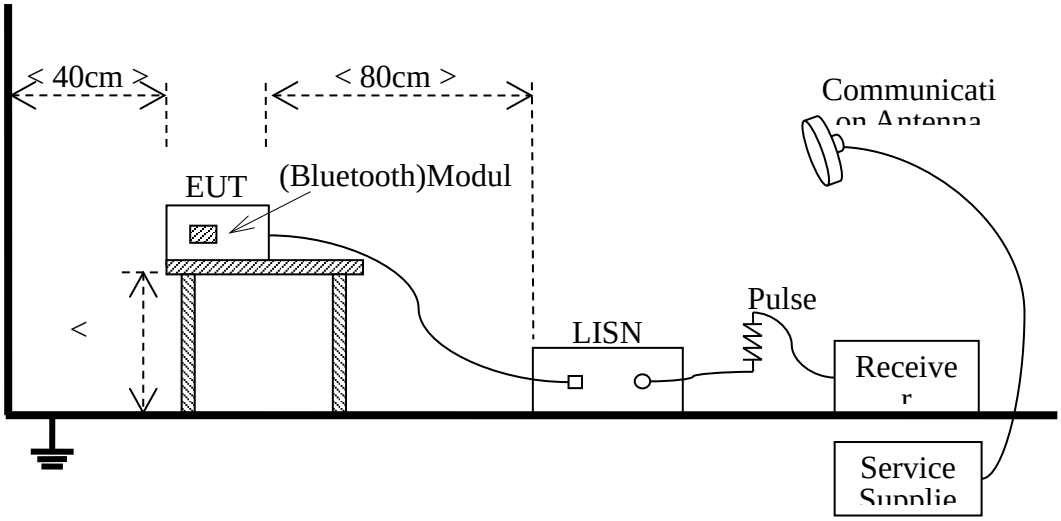
Test Configurations (TC) NO.	Description	
	Signal Description	Operating Frequency
Transmitter		
TC01	GFSK modulation, package type DH5, hopping on	--
TC02	GFSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC03	GFSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC04	GFSK modulation, package type DH5, hopping off	Ch No. 78/ 2480MHz
TC05	π/4-DQPSK modulation, package type DH5, hopping on	--
TC06	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC07	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC08	π/4-DQPSK modulation, package type DH5, hopping off	Ch No. 78/ 2480MHz
TC09	8DPSK modulation, package type DH5, hopping on	--
TC10	8DPSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC11	8DPSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC12	8DPSK modulation, package type DH5, hopping off	Ch No. 78/ 2480MHz

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

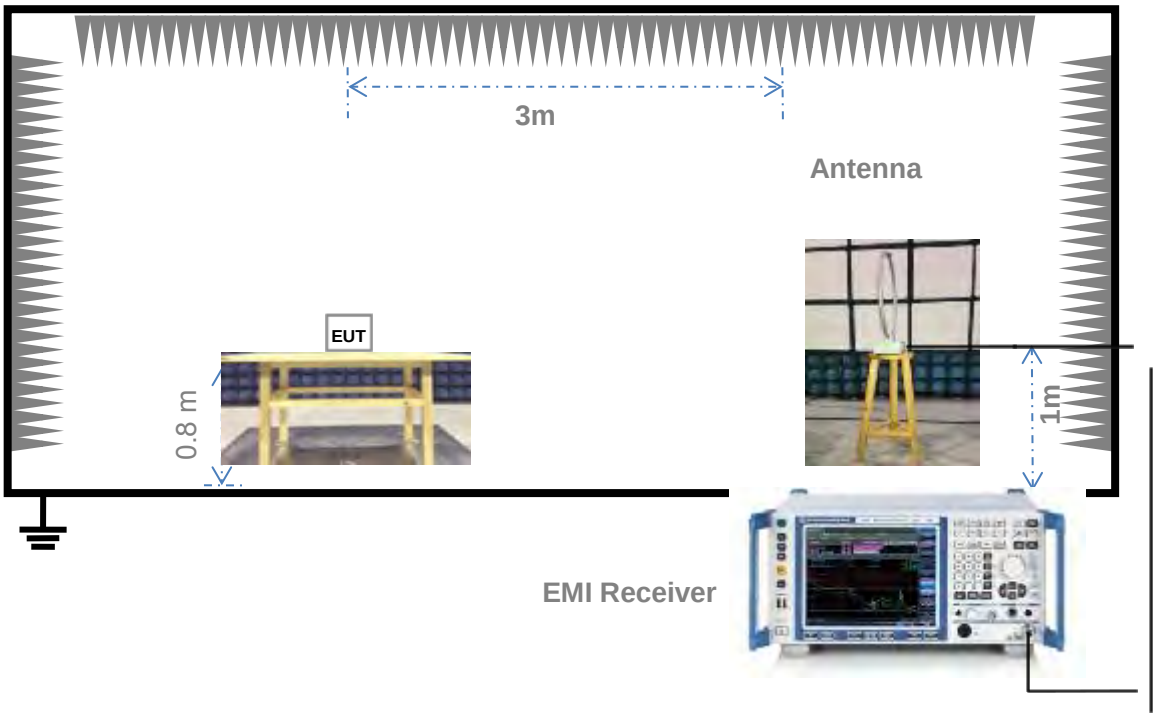
(Diagram 1)

4.4.2 For AC Power Supply Port Test



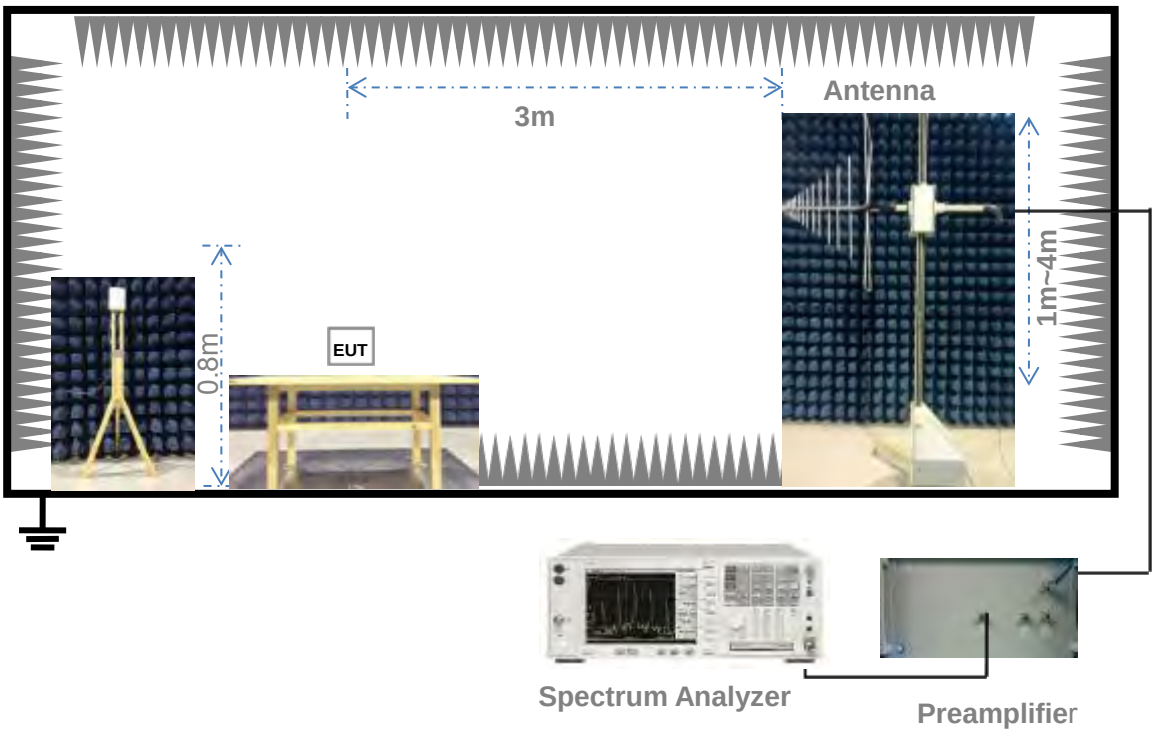
(Diagram 2)

4.4.3 For Radiated Test (Below 30MHz)



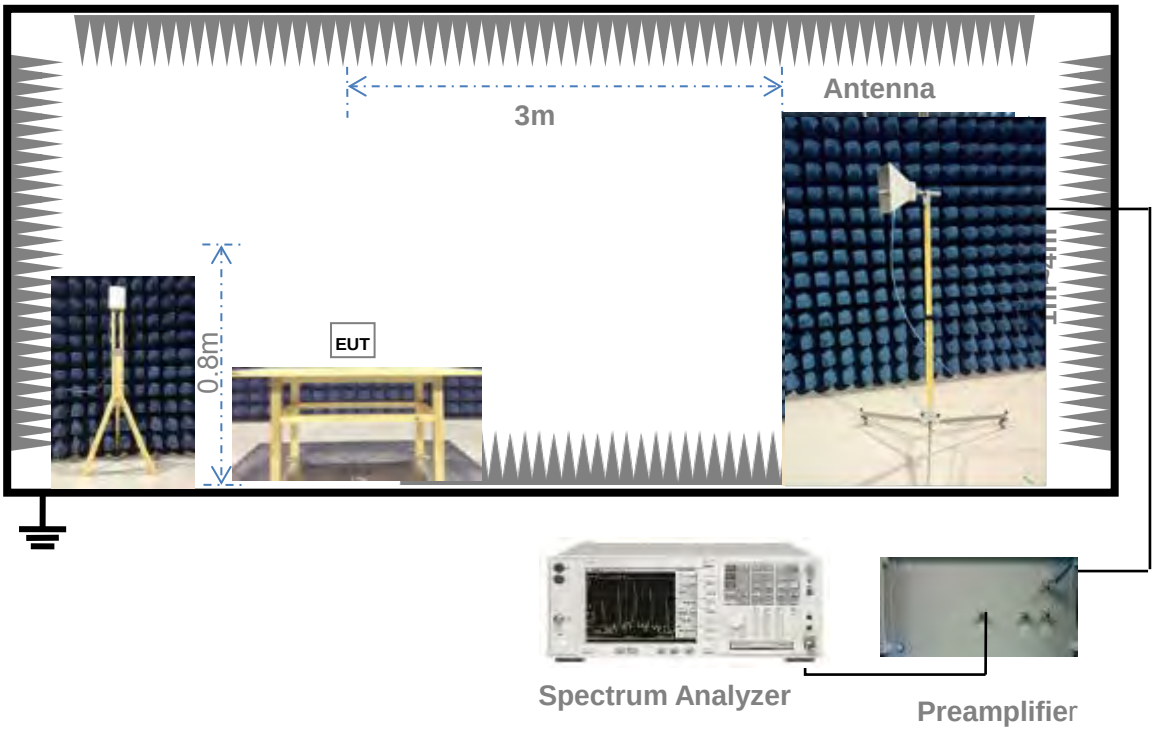
(Diagram 3)

4.4.4 For Radiated Test (30MHz-1GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1GHz)



(Diagram 5)

4.5 Test Conditions

Test Case	Test Conditions		
	Test Env.	Test Setup Note 1	Test Configuration Note 2
Number of Hopping Frequency	NTNV	Test Setup 1	TC01, TC05, TC09
Peak Output Power	NTNV	Test Setup 1	TC02, TC03, TC04, TC06,TC07,TC08, TC10, TC11, TC12
Occupied Bandwidth	NTNV	Test Setup 1	TC03, TC07, TC011
Carrier Frequency Separation	NTNV	Test Setup 1	TC01, TC05, TC09
Time of Occupancy (Dwell time)	NTNV	Test Setup 1	TC01, TC05, TC09
Conducted Spurious Emission	NTNV	Test Setup 1	TC02, TC03, TC04, TC06,TC07,TC08, TC10, TC11, TC12
Conducted Emission	NTNV	Test Setup 2	TC02, TC03, TC04, TC06,TC07,TC08, TC10, TC11, TC12
Radiated Emission	NTNV	Test Setup 3 Test Setup 4 Test Setup 5	TC02, TC03, TC04, TC06,TC07,TC08, TC10, TC11, TC12
Band Edge	NTNV	Test Setup 5	TC02, TC04, TC06,TC08, TC10, TC12
Note: 1. Please refer to section 4.4 for test setup details. 2. Please refer to section 4.3 for test setup details.			

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Standard Applicable

FCC §15.203 & 15.247(b)

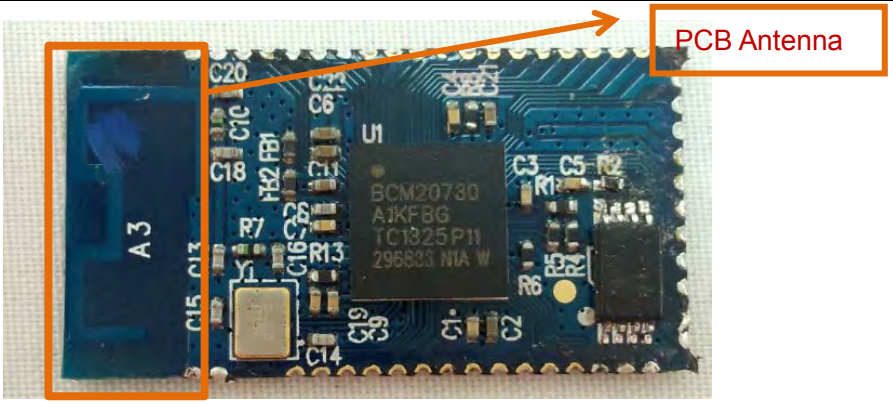
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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.

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is An embedded-in	An embedded-in antenna design is used.

Reference Documents	Item
Photo	

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Number of Hopping Frequency

5.2.1 Limit

FCC §15.247(a)(1)(iii)

Frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

5.2.2 Test Procedure

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

Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

5.3 Peak Output Power

5.3.1 Test Limit

FCC § 15.247(b)

For frequency hopping systems that operates in the 2400MHz to 2483.5MHz band employing at least 75 hopping channels, the maximum peak output power of the intentional radiator shall not exceed 1Watt.

5.3.2 Test Procedure

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.4 Occupied Bandwidth

5.4.1 Limit

FCC §15.247(a)

The 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1%=20dB) taking the total RF output power.

5.4.2 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW ≥ 1% of the 20 dB bandwidth

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.5 Carrier Frequency Separation

5.5.1 Limit

FCC §15.247(a)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

5.5.2 Test Procedure

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

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span

Video (or Average) Bandwidth (VBW) ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

5.6 Time of Occupancy (Dwell time)

5.6.1 Limit

FCC §15.247(a)

Frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

5.6.2 Test Procedure

The average time of occupancy on any channel within the Period can be calculated with formulas:

For DH1 package type

{Total of Dwell} = {Pulse Time} * (1600 / 2) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4s * {Number of Hopping Frequency}

For DH3 package type

{Total of Dwell} = {Pulse Time} * (1600 / 4) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4s * {Number of Hopping Frequency}

For DH5 package type

{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

5.7 Conducted Spurious Emission

5.7.1 Limit

FCC §15.247(d)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.7.2 Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

5.8 Conducted Emission

5.8.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.8.2 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

5.9 Radiated Spurious Emission

5.9.1 Limit

FCC §15.209&15.247(c)

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Note:

1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.9.2 Test Procedure

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.10 Band Edge

5.10.1 Limit

FCC §15.209&15.247(d)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.10.2 Test Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak /AV

Trace = max hold

Allow the trace to stabilize.

E [dBμV/m] =UR + AT + AFactor [dB]; AT =LCable loss [dB]-Gpreamp [dB]

AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

AFactor: Antenna Factor at 3m

ANNEX A TEST RESULT

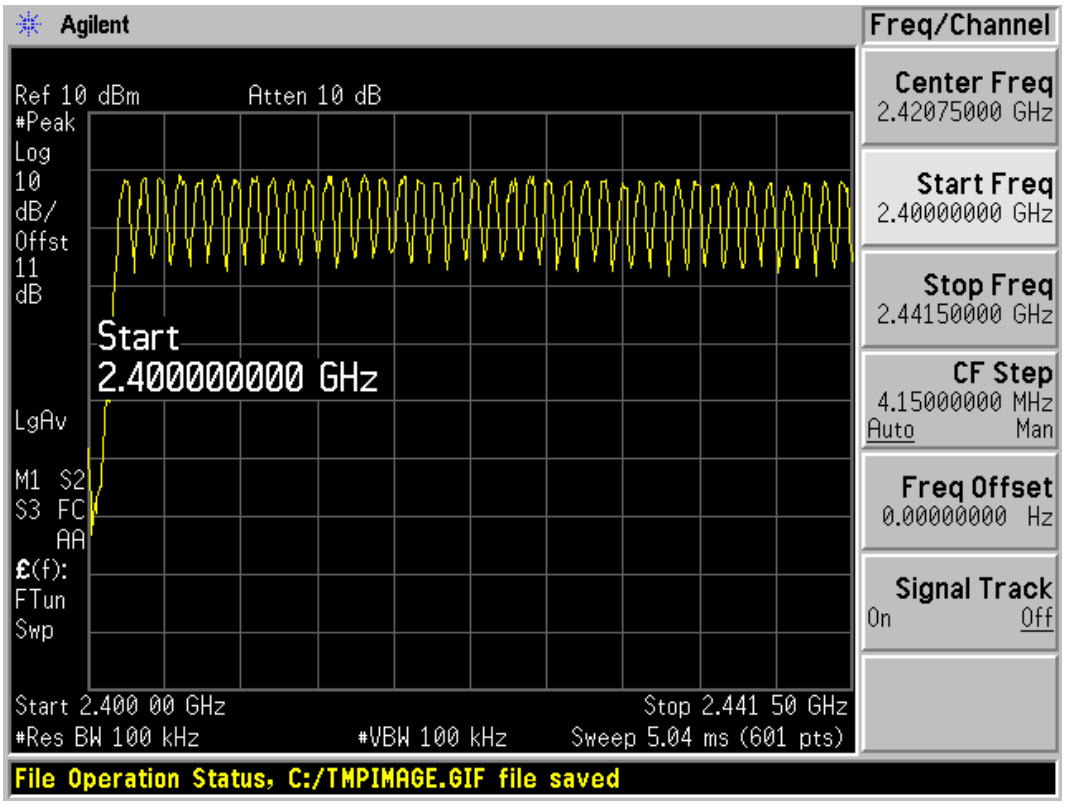
A.1 Number of Hopping Frequency

Test Data

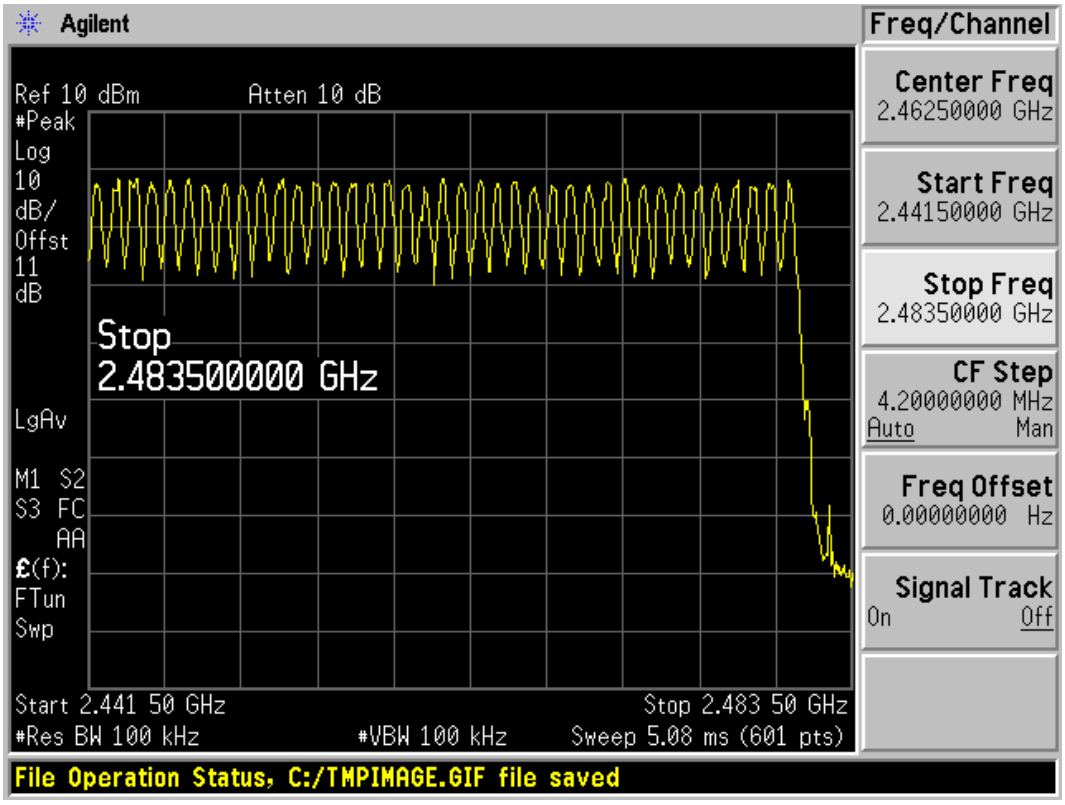
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	PASS
∏/4-DQPSK	2400 - 2483.5	79	15	PASS
8-DPSK	2400 - 2483.5	79	15	PASS

Test plots

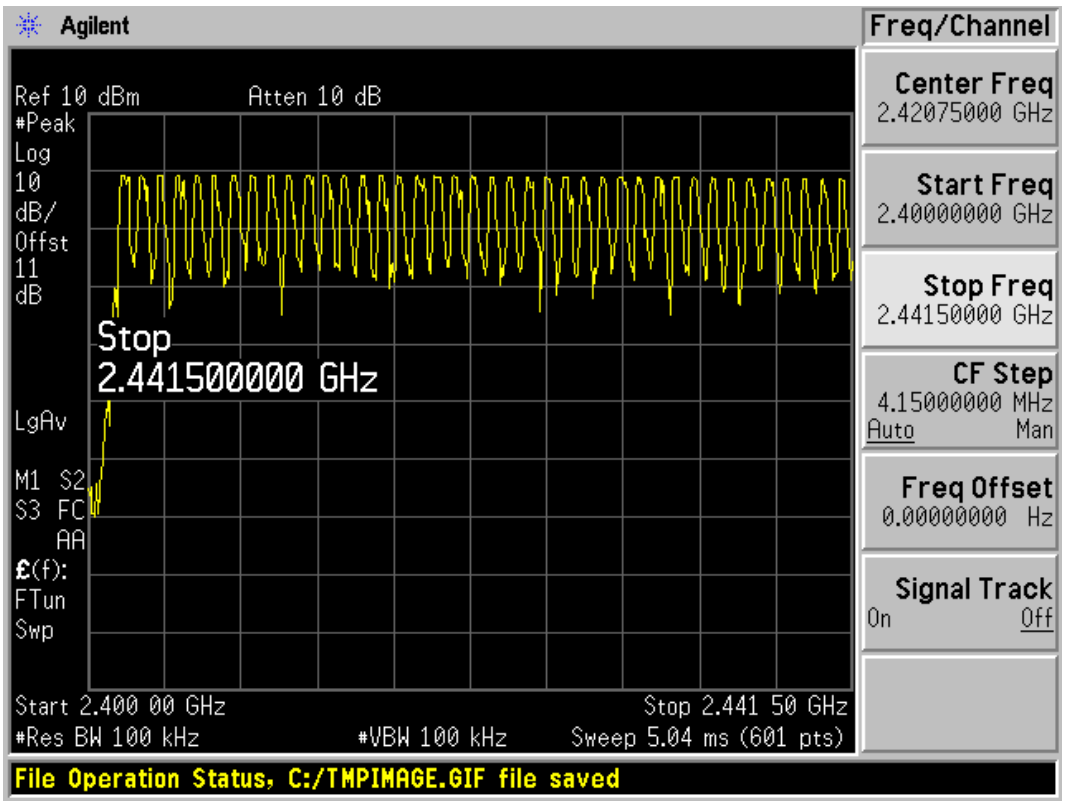
A.1.1, GFSK 2.4GHz~2.4415GHz



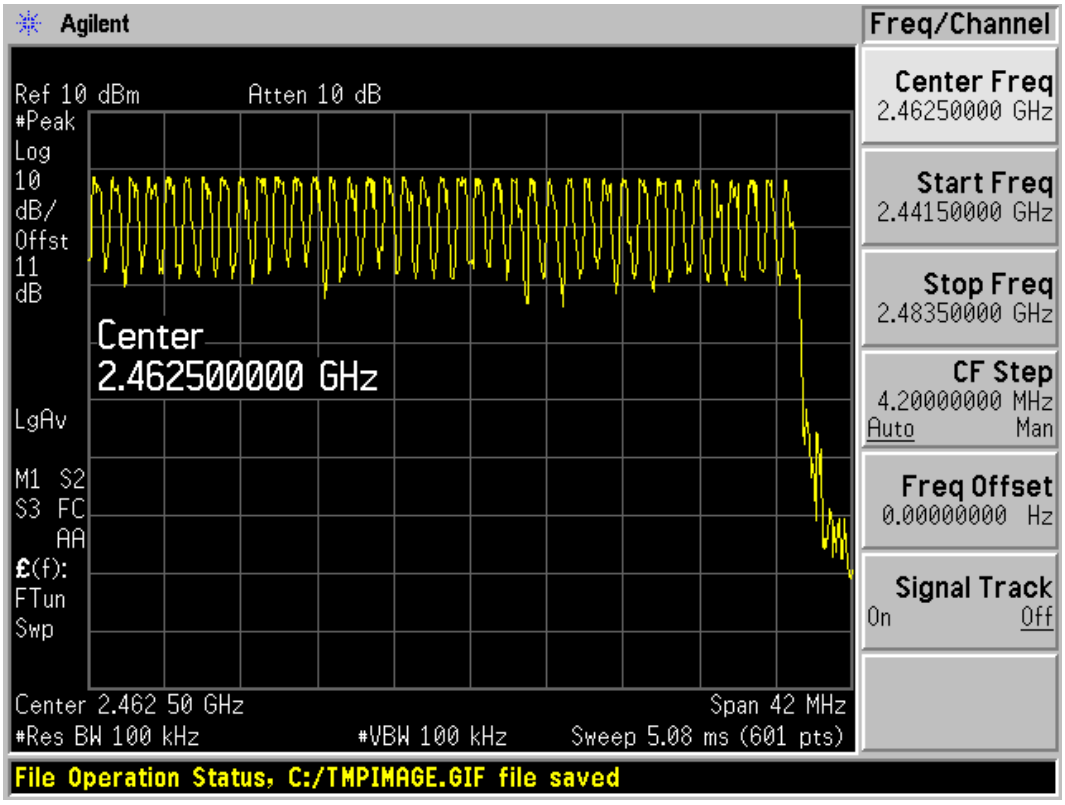
A.1.2, GFSK 2.4415GHz~2.4835GHz



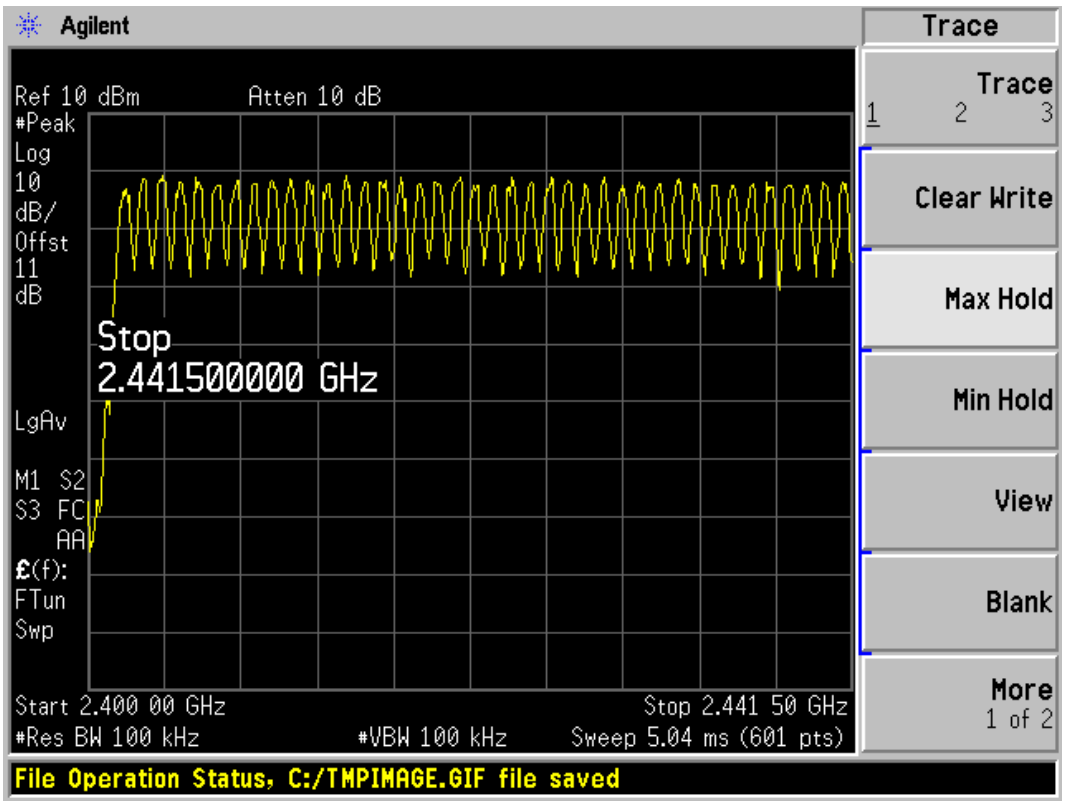
A.1.3, Π/4-DQPSK 2.4GHz~2.4415GHz



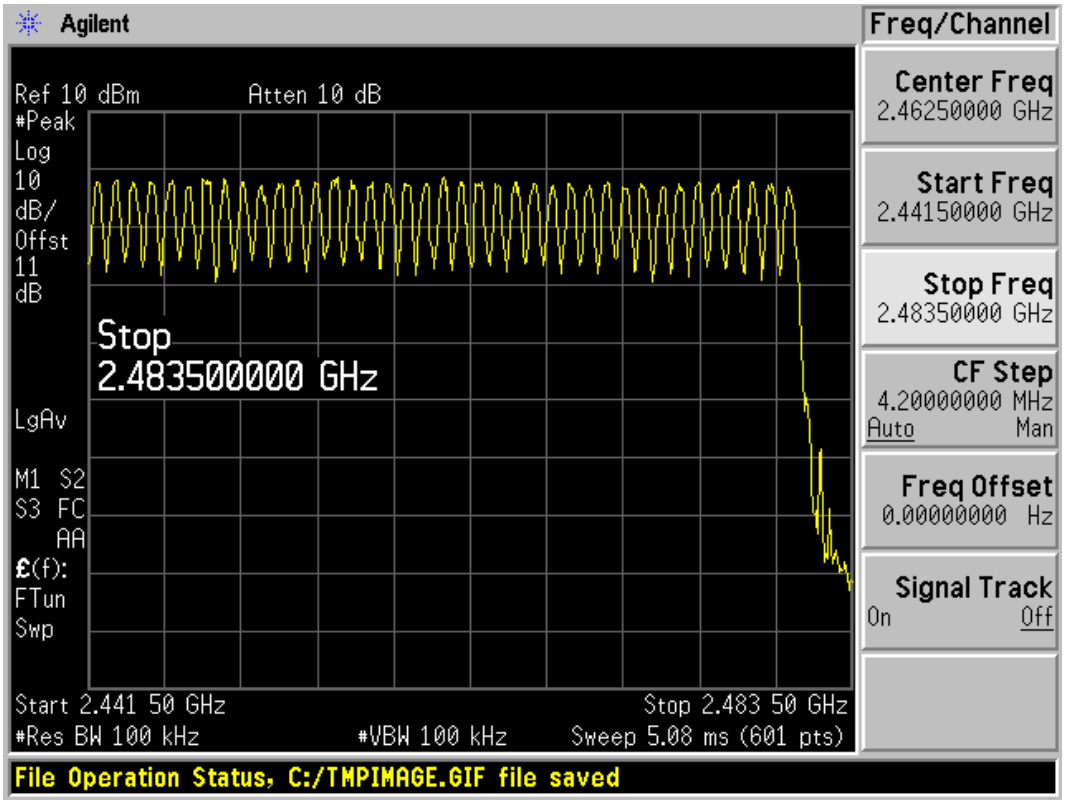
A.1.4, Π/4-DQPSK 2.4415GHz~2.4835GHz



A.1.5, 8-DPSK 2.4GHz~2.4415GHz



A.1.6, 8-DPSK 2.4415GHz~2.4835GHz



A.2 Peak Output Power

Test Data

GFSK Mode:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
0	2402	-0.77	0.84	30	1000	PASS
39	2441	-1.33	0.74			PASS
78	2480	-1.70	0.68			PASS

∏/4-DQPSK Mode:

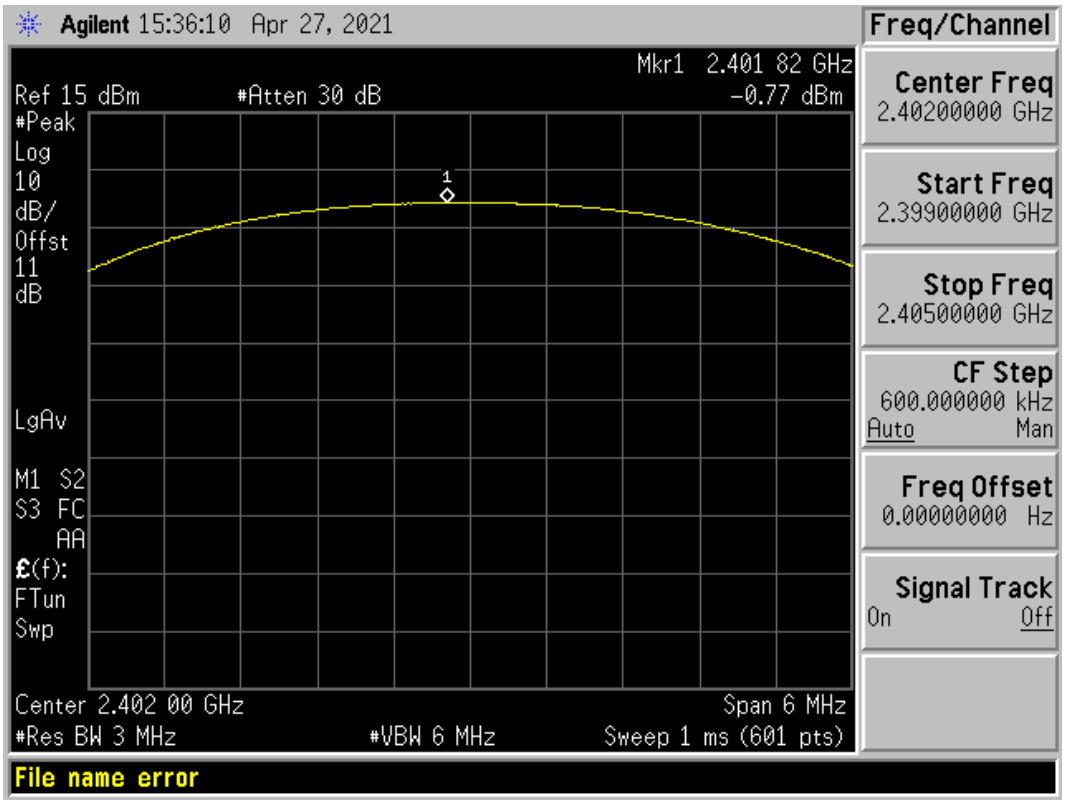
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
0	2402	-0.74	0.84	30	1000	PASS
39	2441	-1.31	0.74			PASS
78	2480	-1.65	0.68			PASS

8-DPSK Mode:

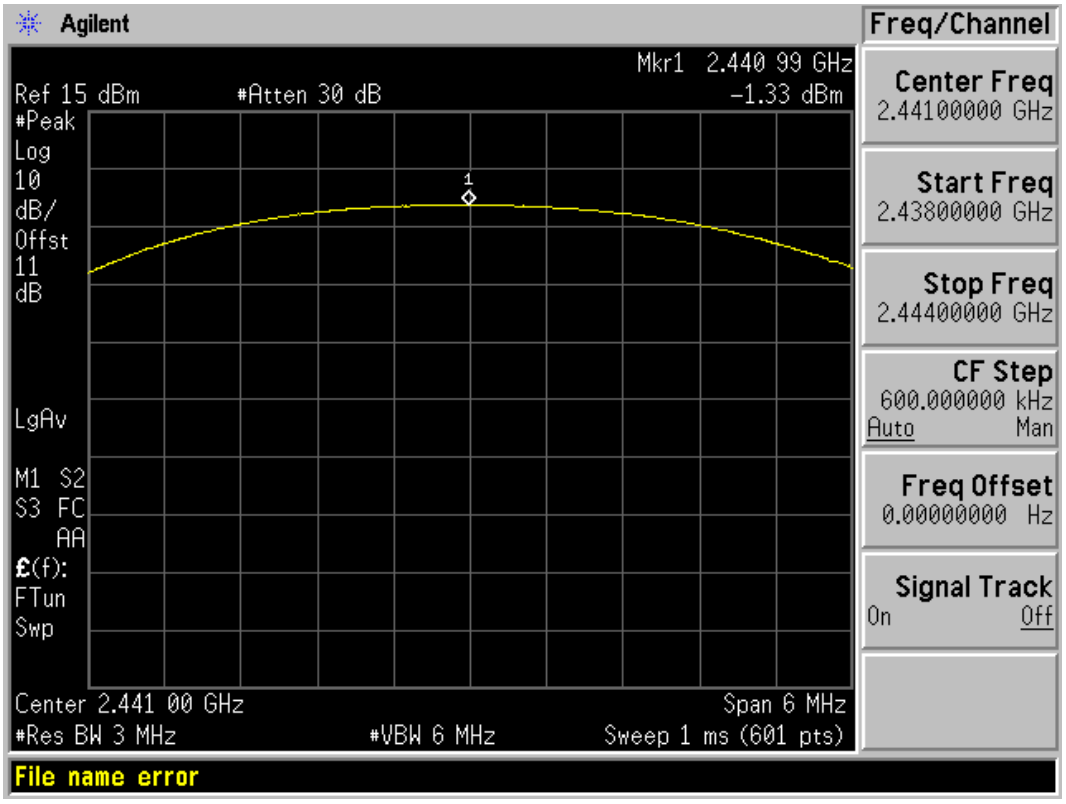
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
0	2402	-0.80	0.83	30	1000	PASS
39	2441	-1.35	0.73			PASS
78	2480	-1.72	0.67			PASS

Test plots

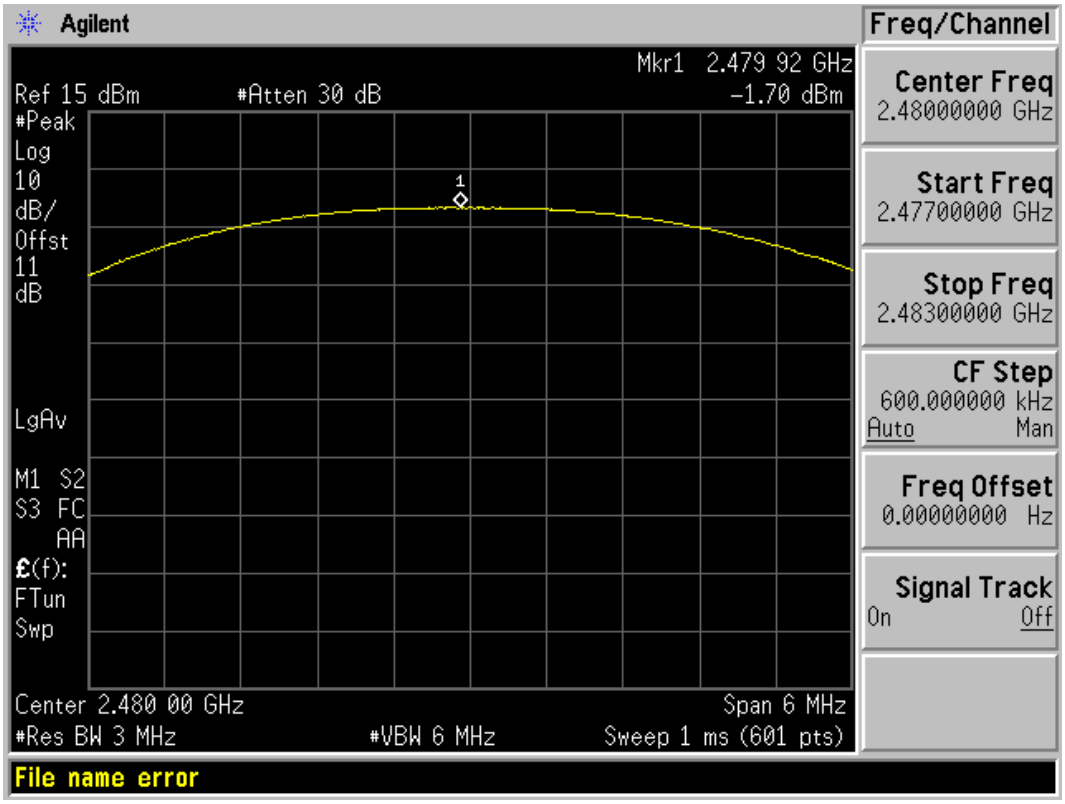
A.2.1, GFSK LOW CHANNEL



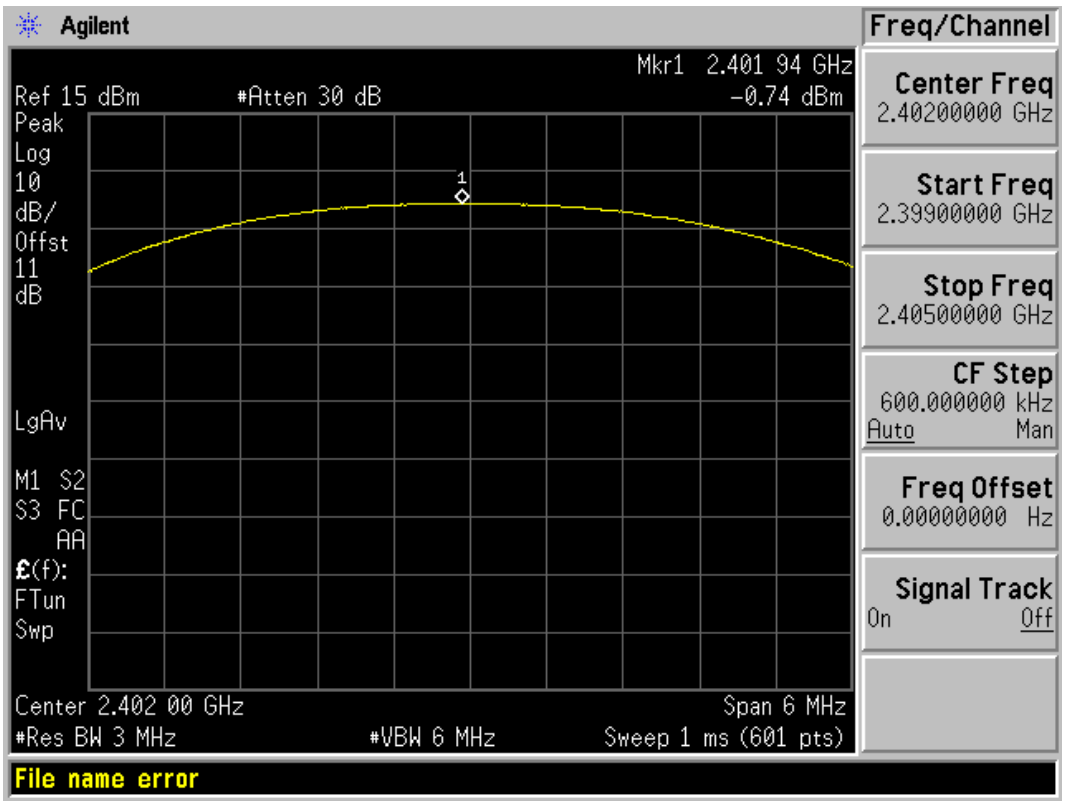
A.2.2, GFSK MID CHANAEL



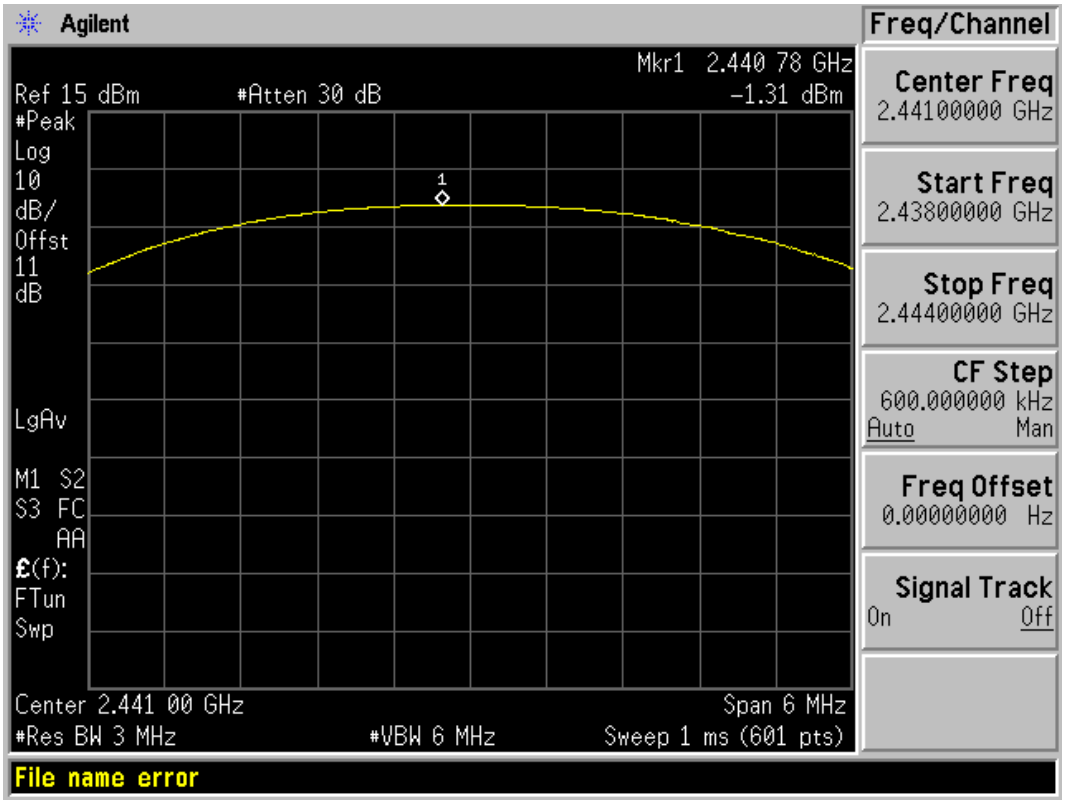
A.2.3, GFSK HIGH CHANNEL



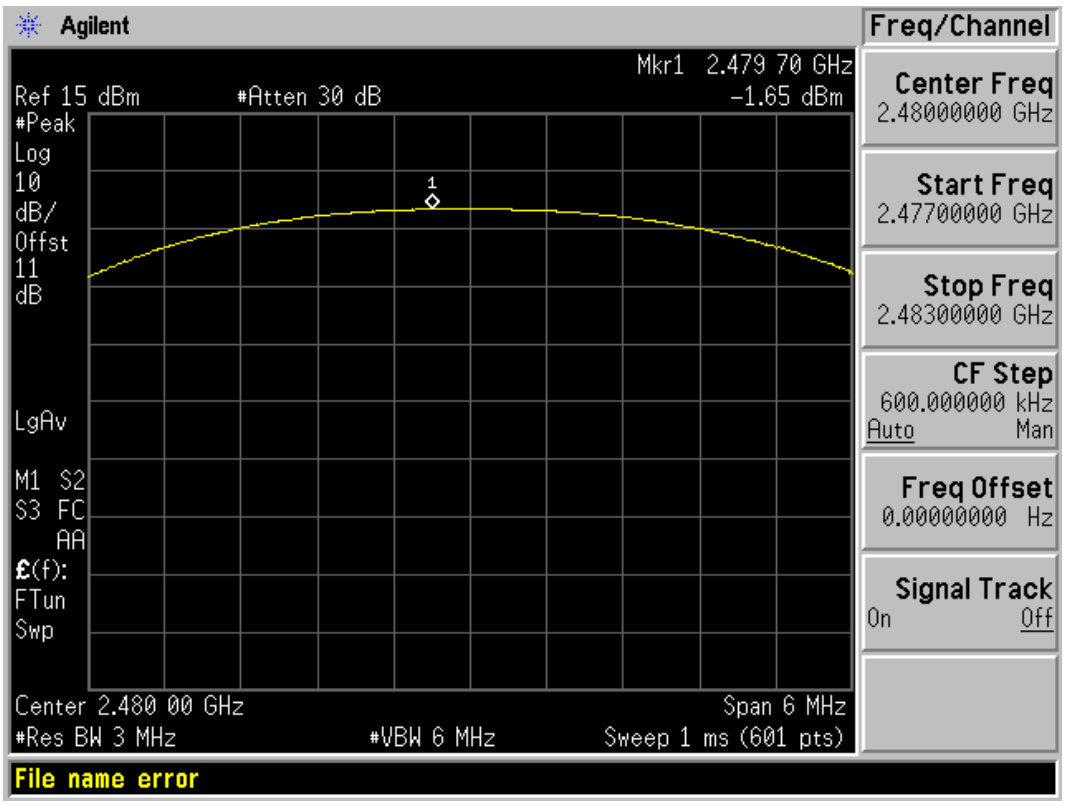
A.2.4, Π/4-DQPSK LOW CHANNEL



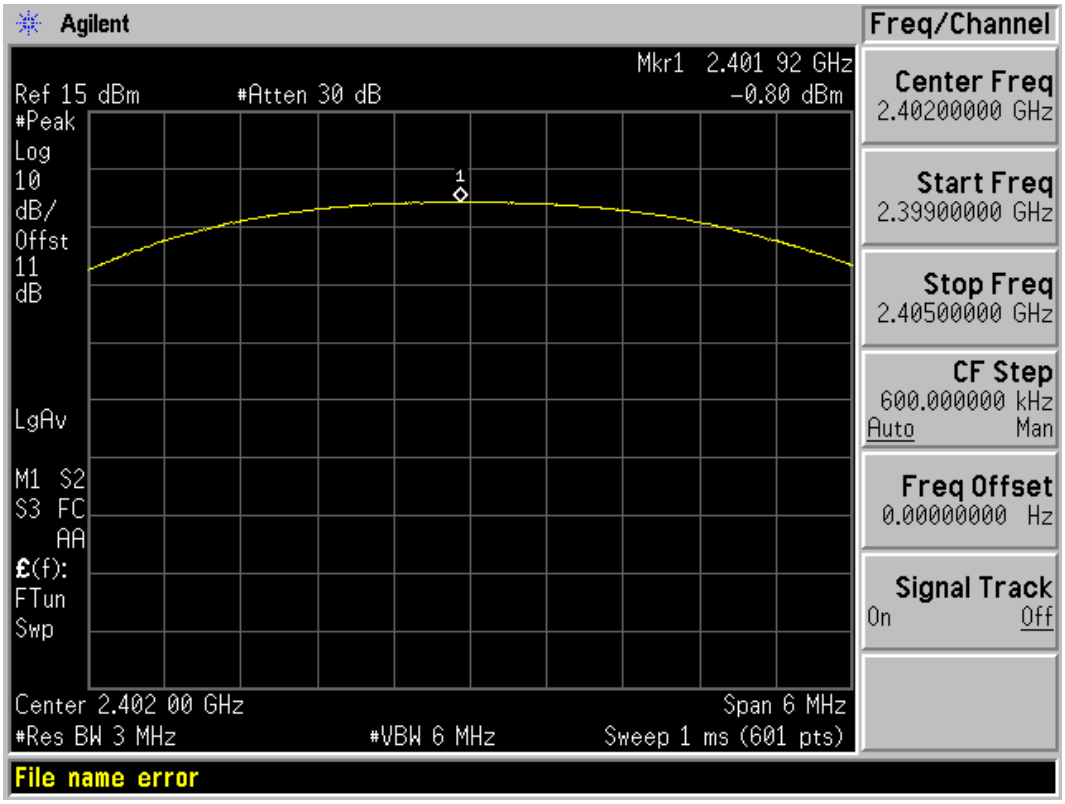
A.2.5, Π/4-DQPSK MID CHANAEL



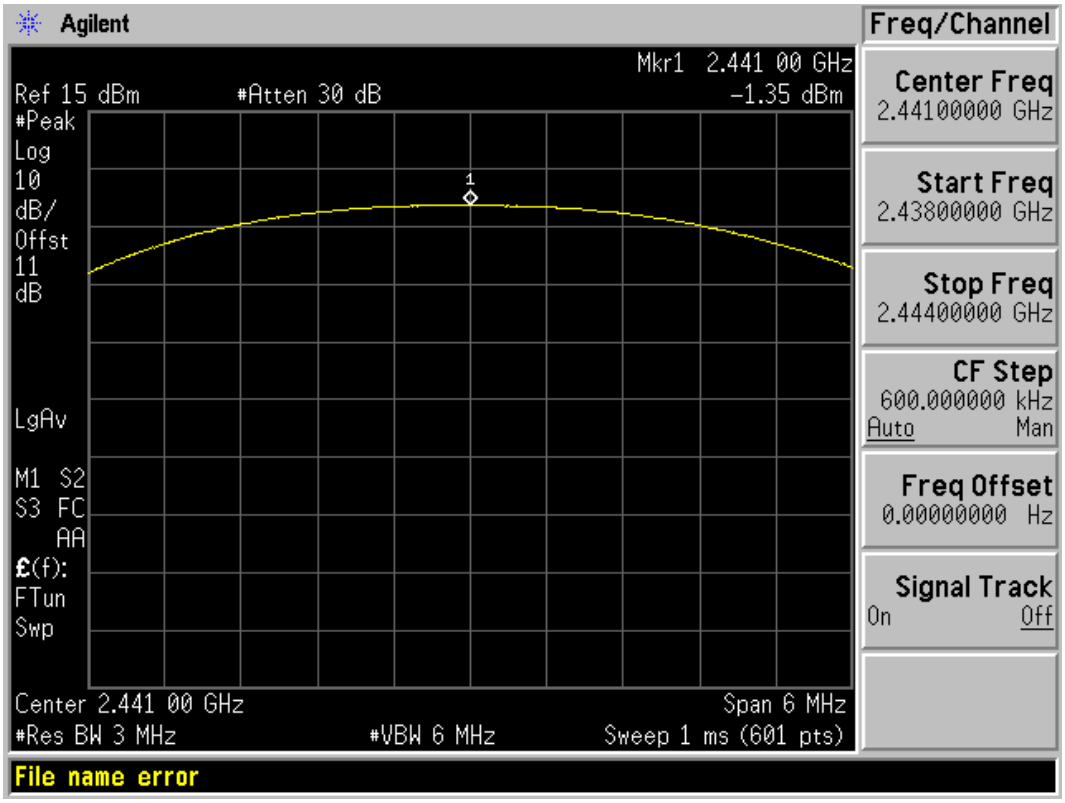
A.2.6, Π/4-DQPSK HIGH CHANNEL



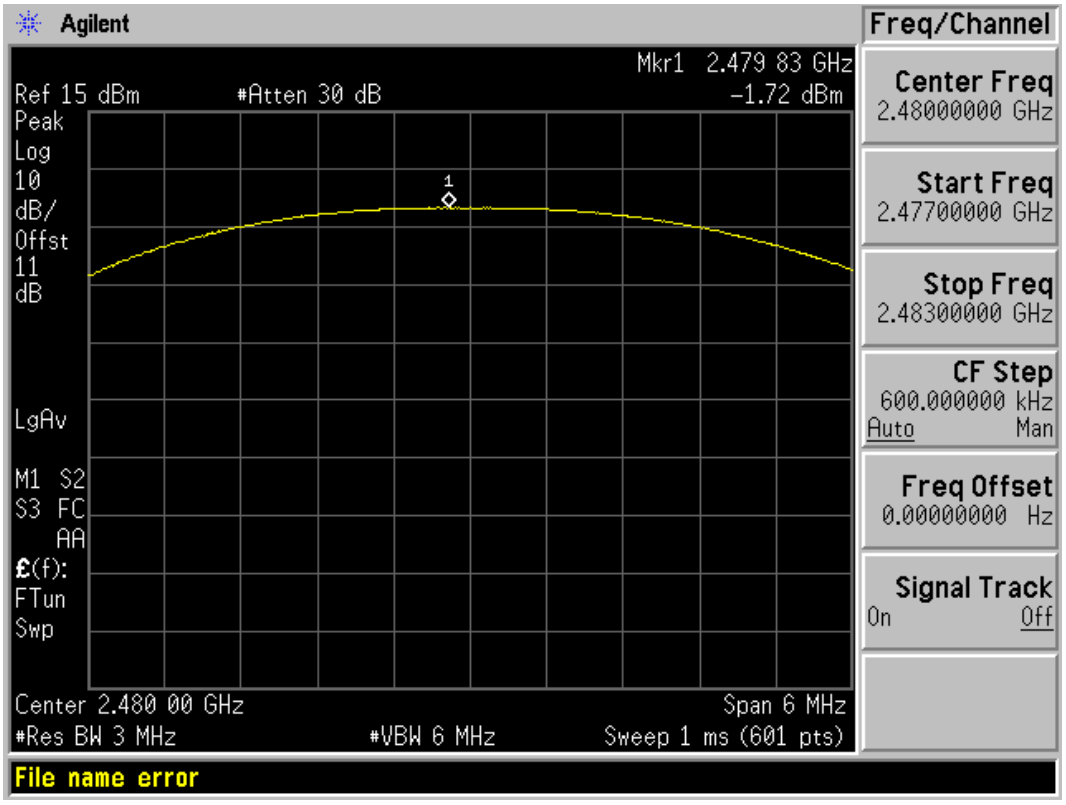
A.2.7, 8-DPSK LOW CHANNEL



A.2.8, 8-DPSK MID CHANAEL



A.2.9, 8-DPSK HIGH CHANNEL



A.3 20dB and 99% bandwidth

Test Data

GFSK Mode:

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (kHz)
Low	2402	1.129	997.1556
Middle	2441	1.134	993.5714
High	2480	1.124	975.6173

∏/4-DQPSK Mode:

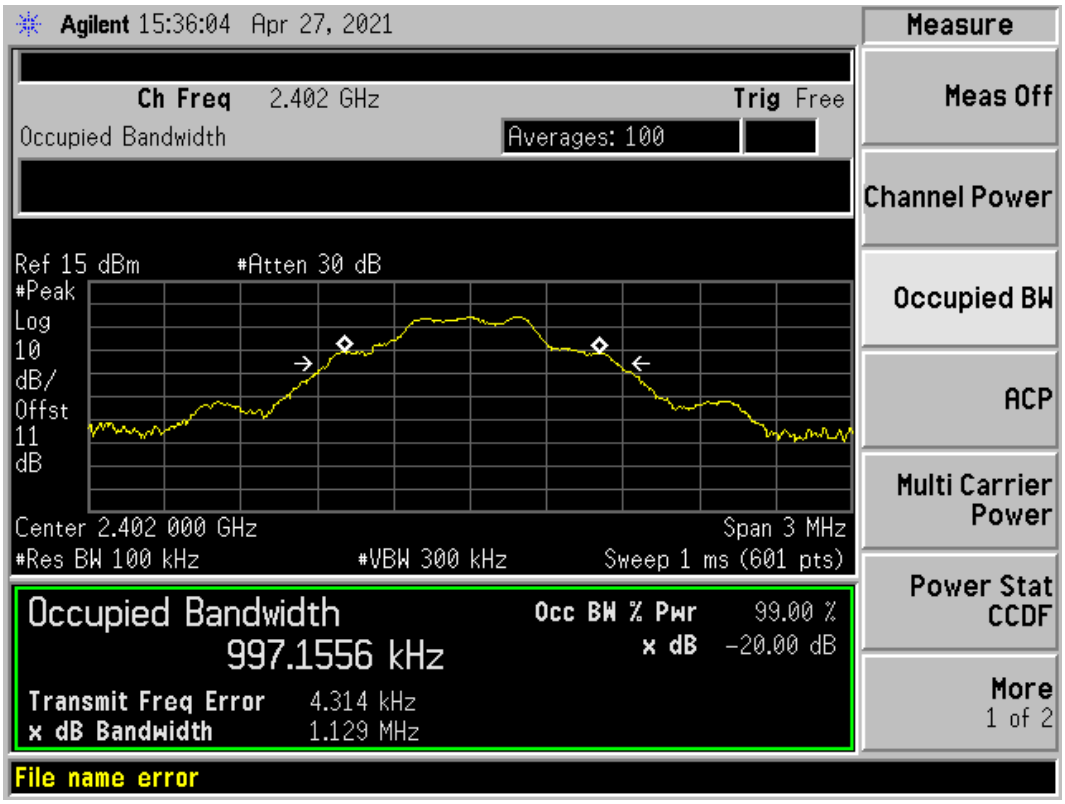
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (kHz)
Low	2402	1.136	974.3739
Middle	2441	1.135	975.8803
High	2480	1.134	984.8333

8-DPSK Mode:

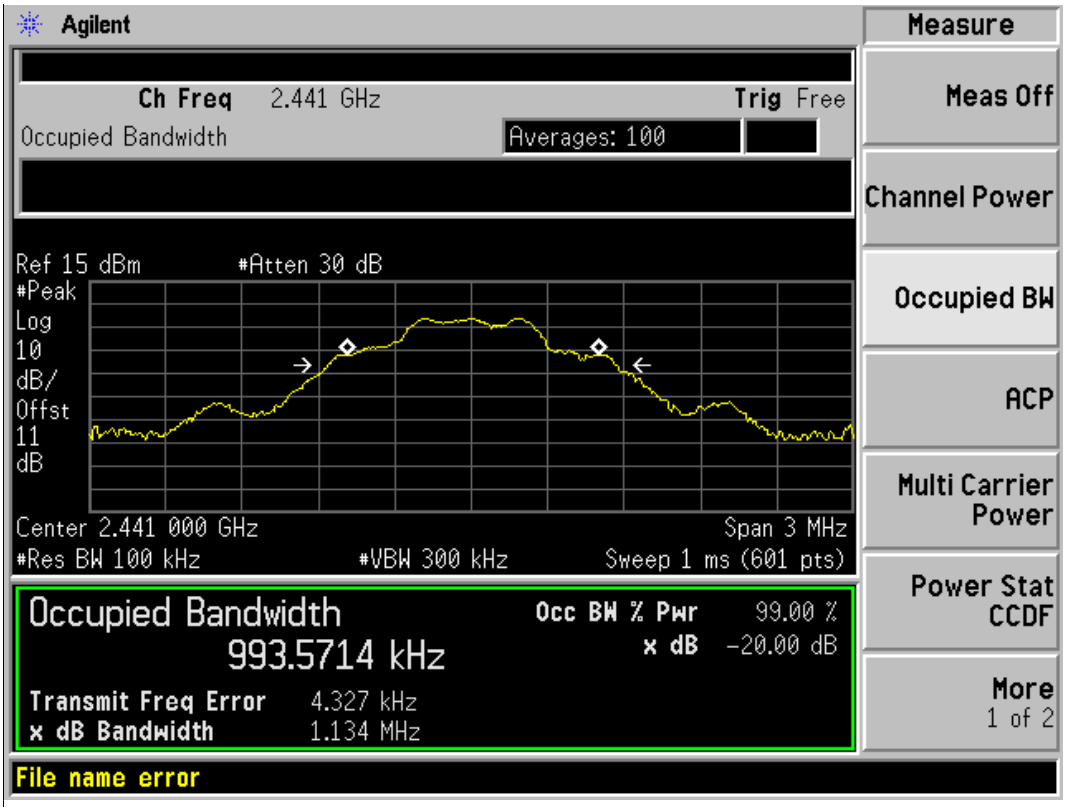
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.121	0.9661
Middle	2441	1.139	1.0145
High	2480	1.135	0.9857

Test plots

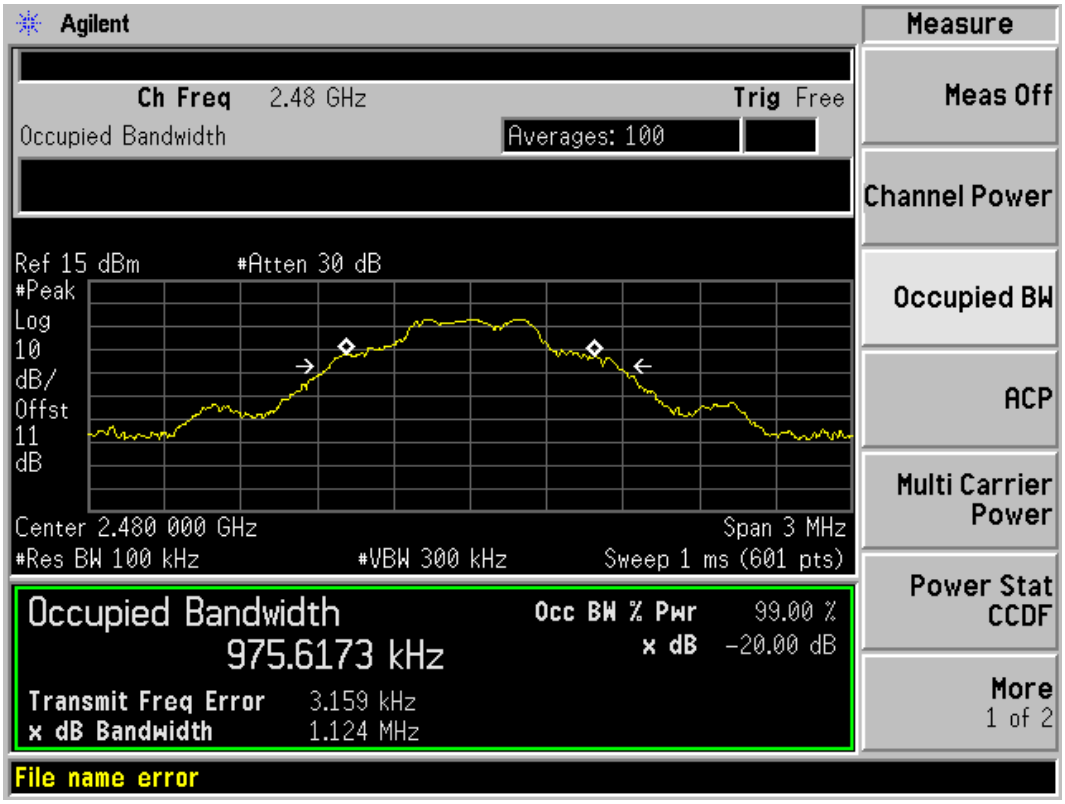
A.3.1, GFSK LOW CHANNEL



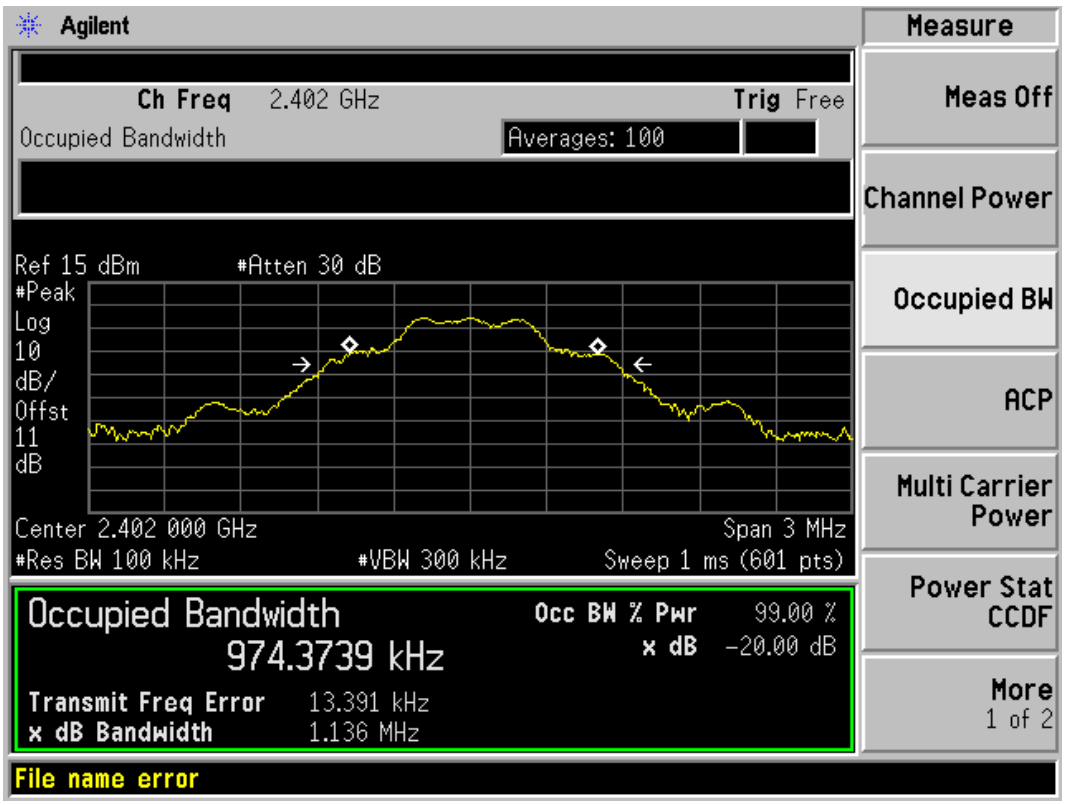
A.3.2, GFSK MID CHANAEL



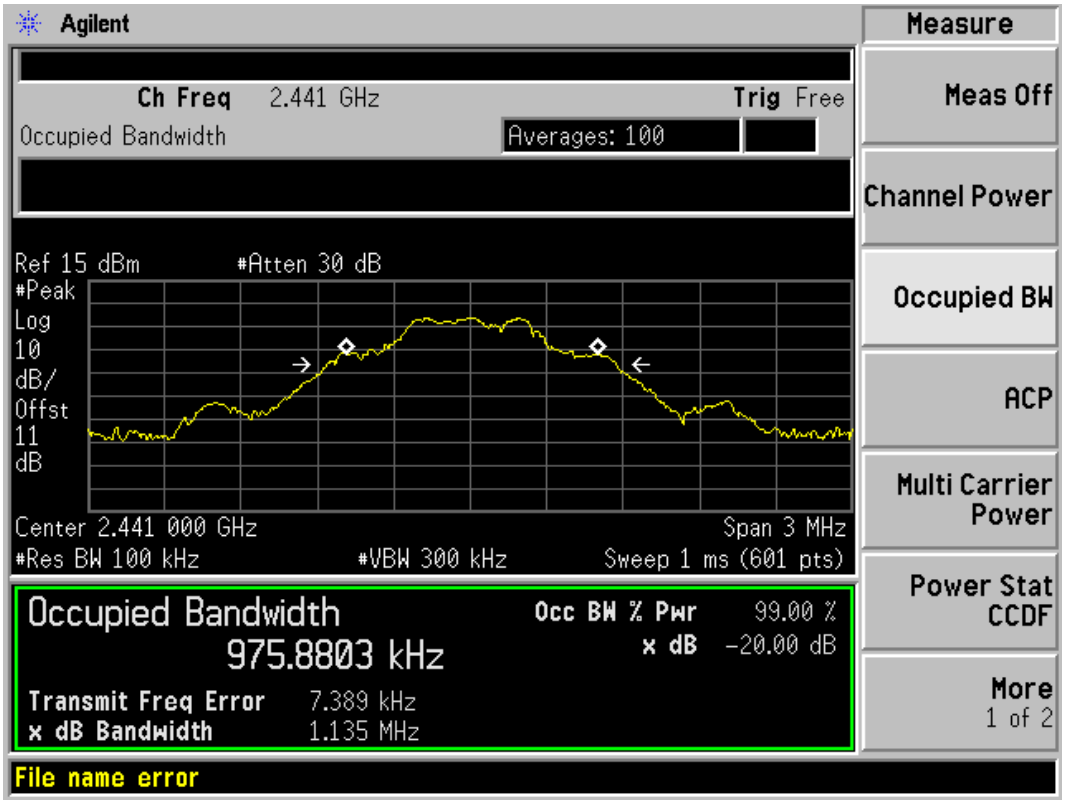
A.3.3, GFSK HIGH CHANNEL



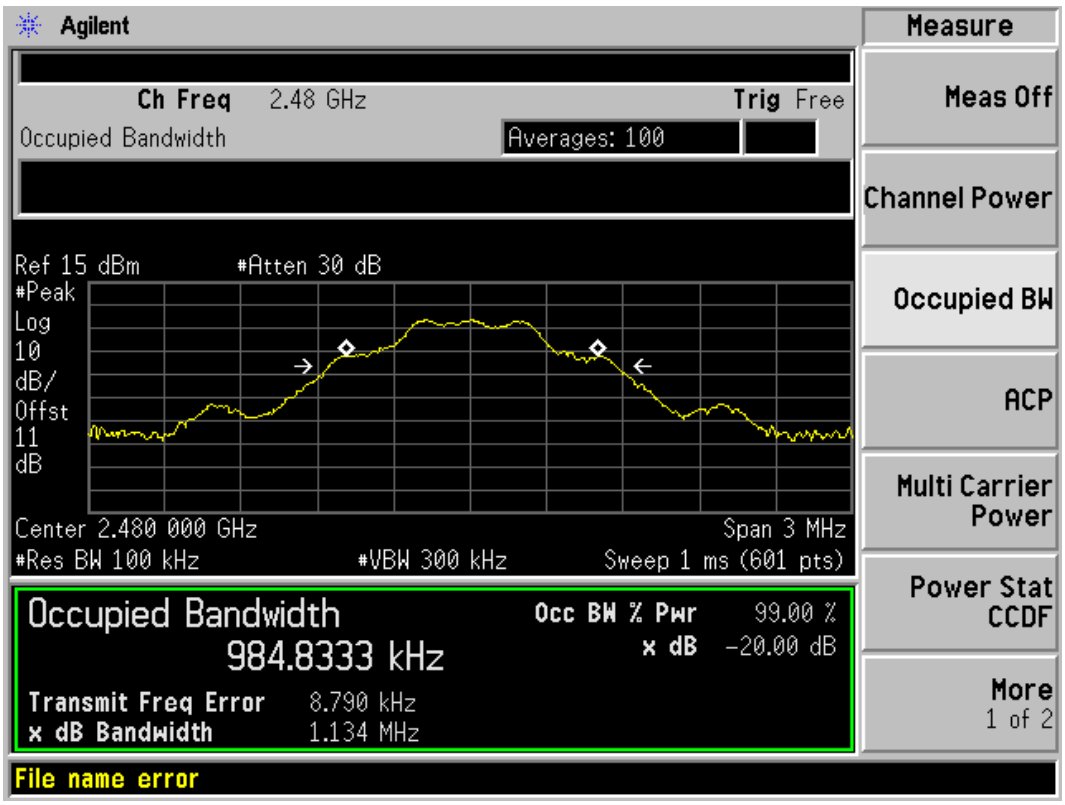
A.3.4, Π/4-DQPSK LOW CHANNEL



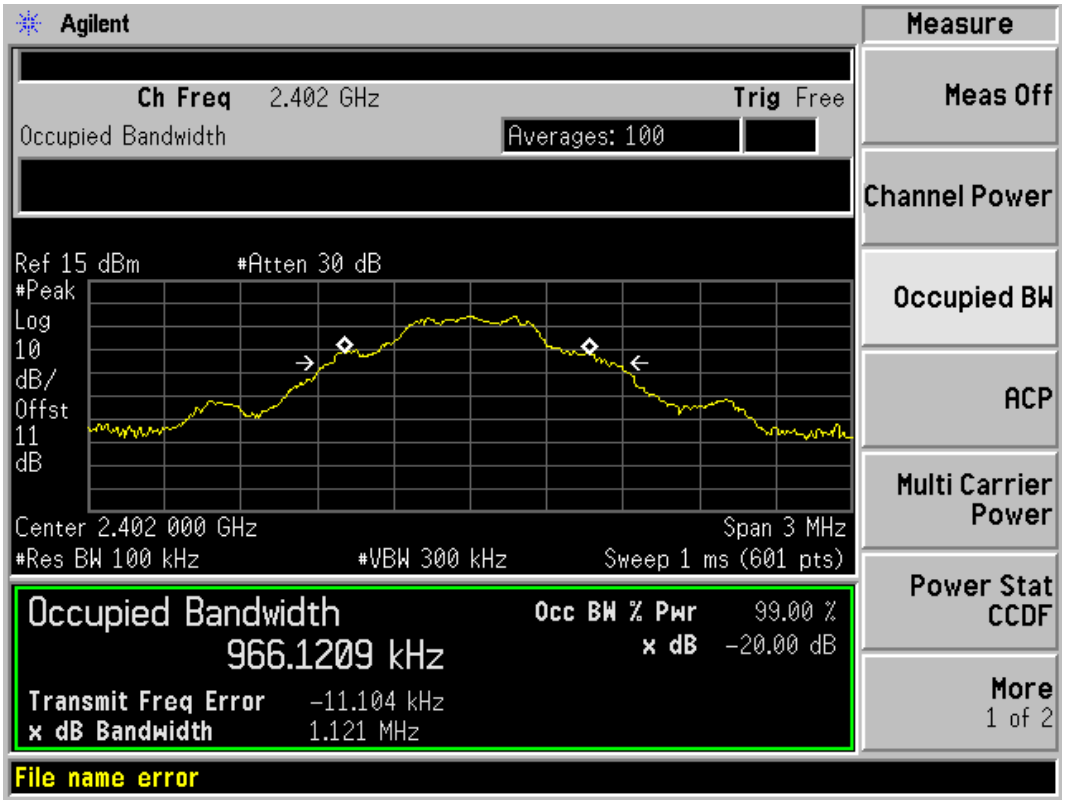
A.3.5, Π/4-DQPSK MID CHANAEL



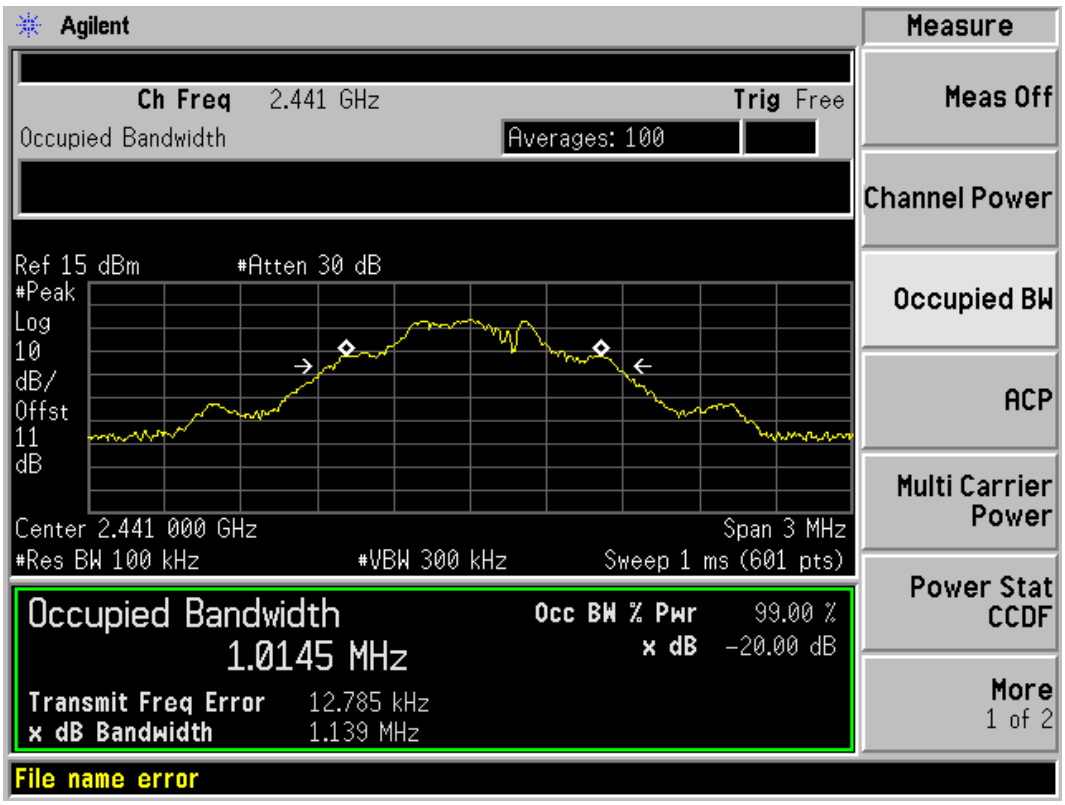
A.3.6, Π/4-DQPSK HIGH CHANNEL



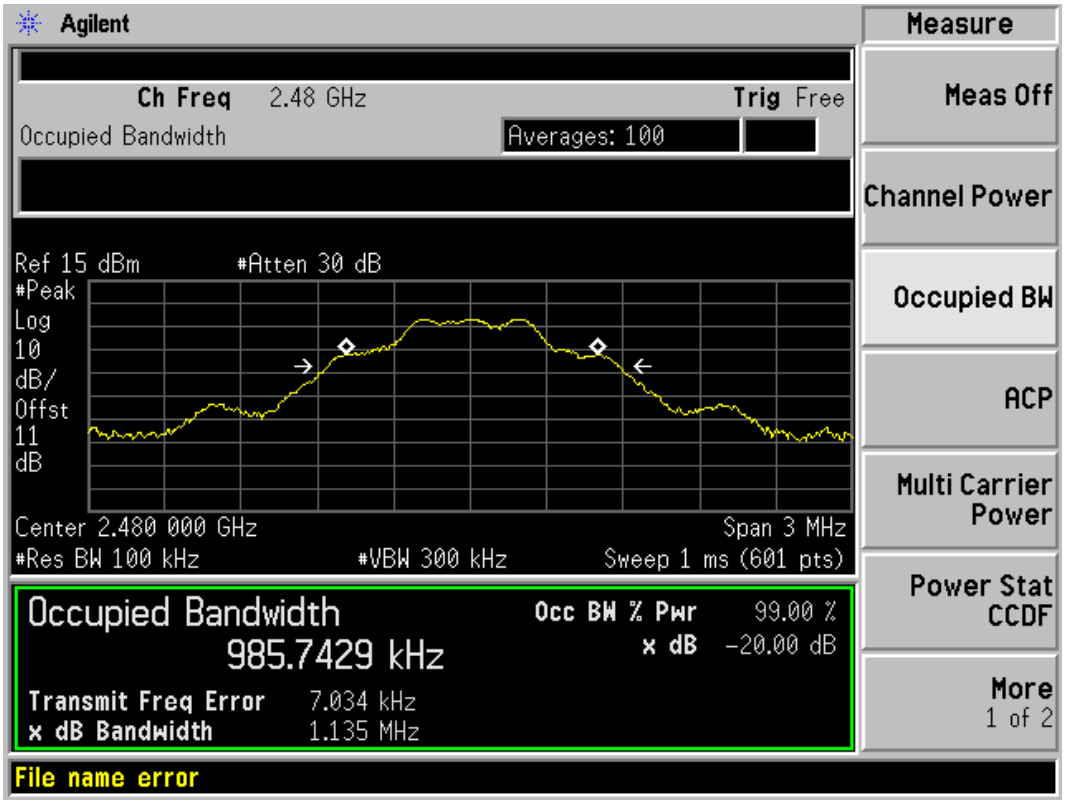
A.3.7, 8-DPSK LOW CHANNEL



A.3.8, 8-DPSK MID CHANAEL



A.3.9, 8-DPSK HIGH CHANNEL



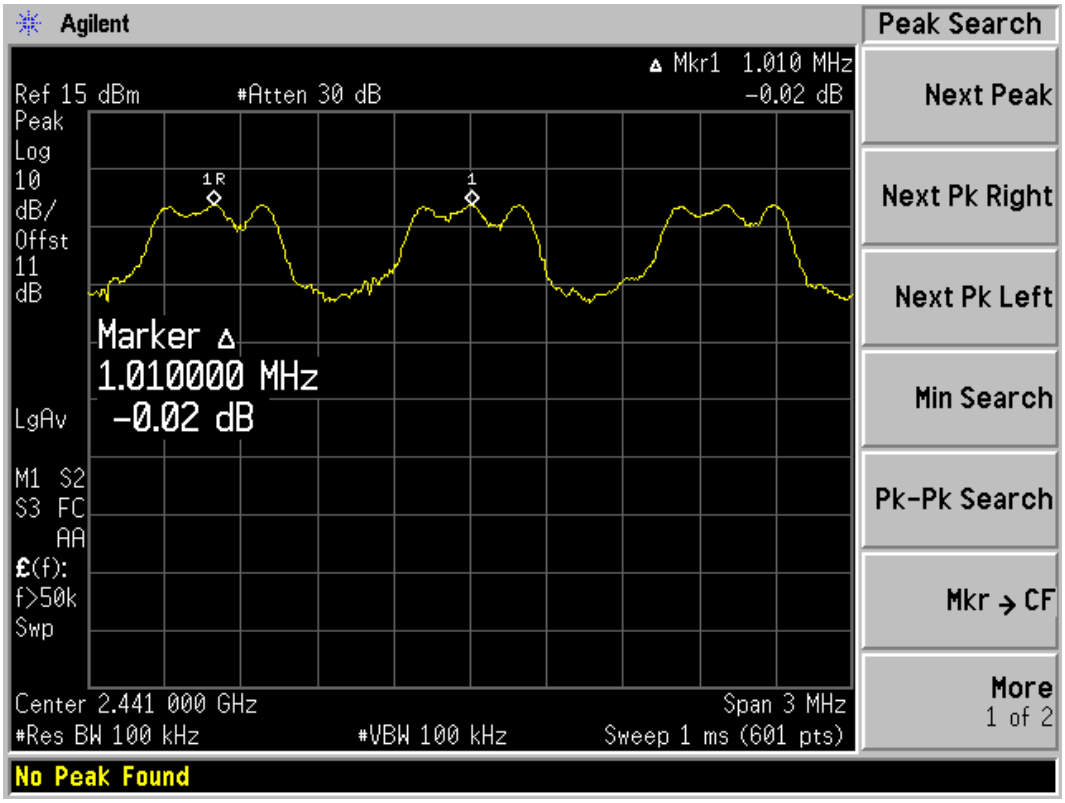
A.4 Hopping Frequency Separation

Test Data

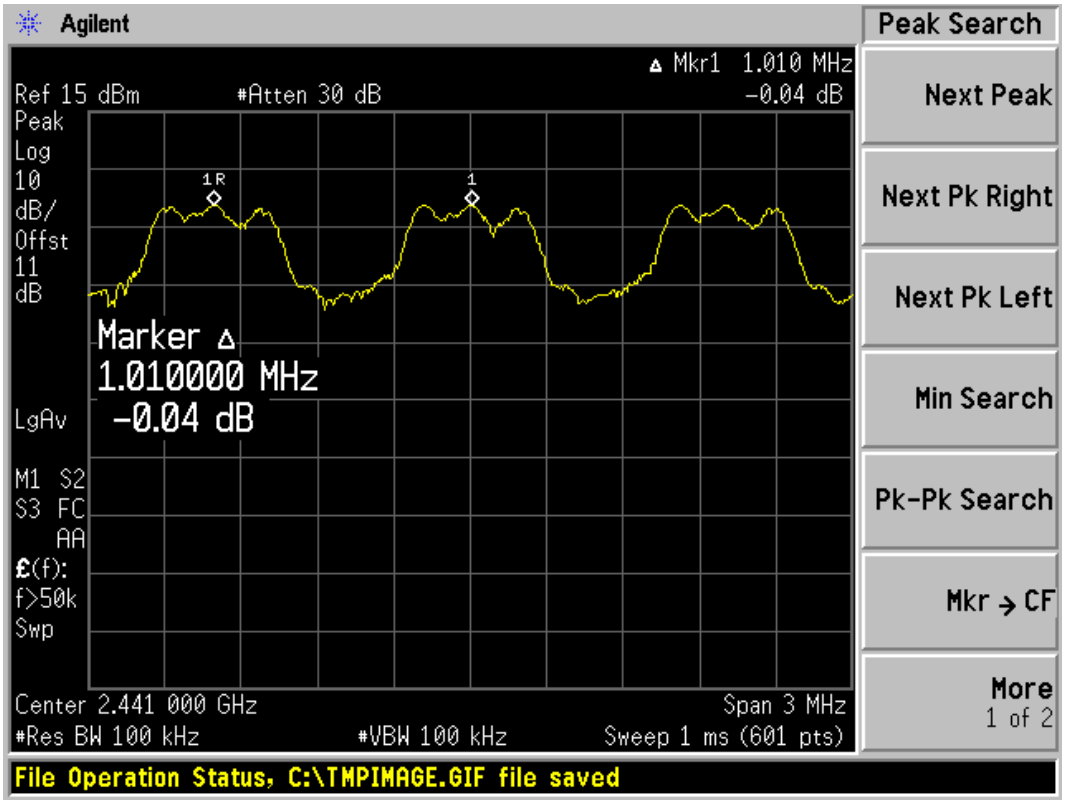
Mode	Frequency separation (MHz)	Max 20 dB Bandwidth (MHz)	Two-thirds of the 20dB bandwidth (MHz)	Verdict
GFSK	1.010	1.134	0.756	PASS
Π/4-DQPSK Mode	1.010	1.136	0.757	PASS
8-DPSK Mode	1.010	1.139	0.759	PASS

Test plots

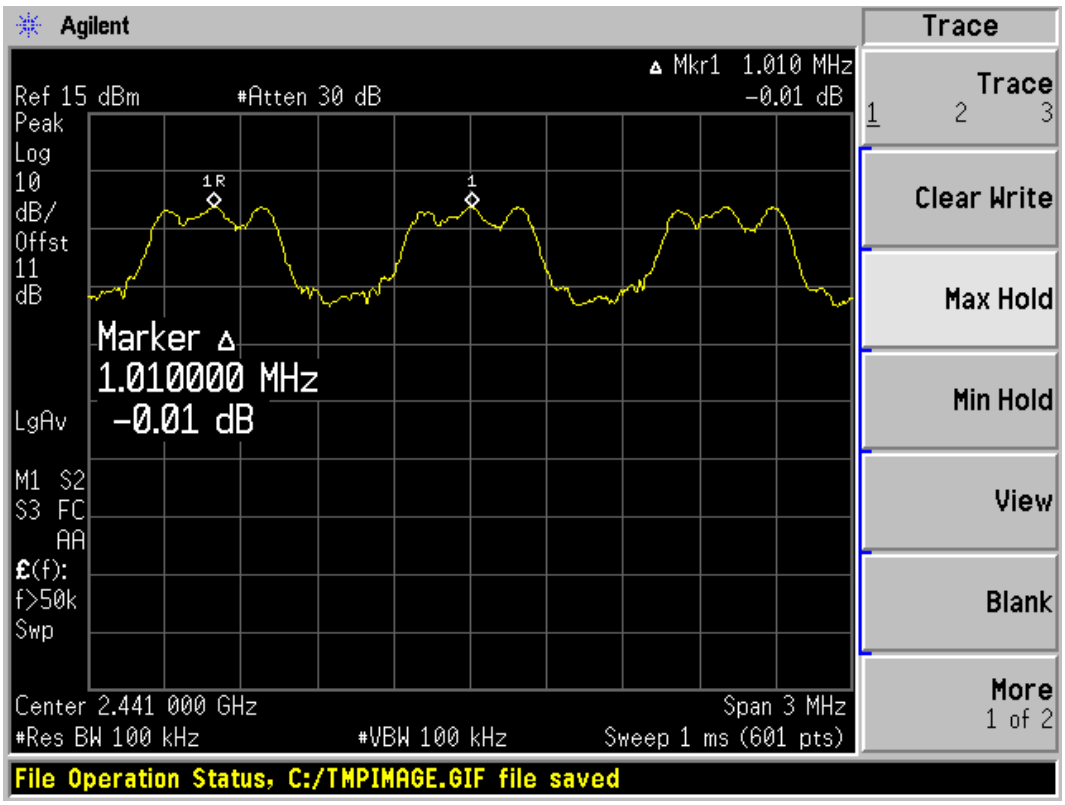
A.4.1, GFSK



A.4.2, Π/4-DQPSK



A.4.3, 8-DPSK



A.5 Average Time of Occupancy

Test Data

GFSK Mode:

DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.600	192.006	0.4	PASS
DH 3	1.860	297.609	0.4	PASS
DH 5	3.100	330.677	0.4	PASS

∏/4-DQPSK Mode:

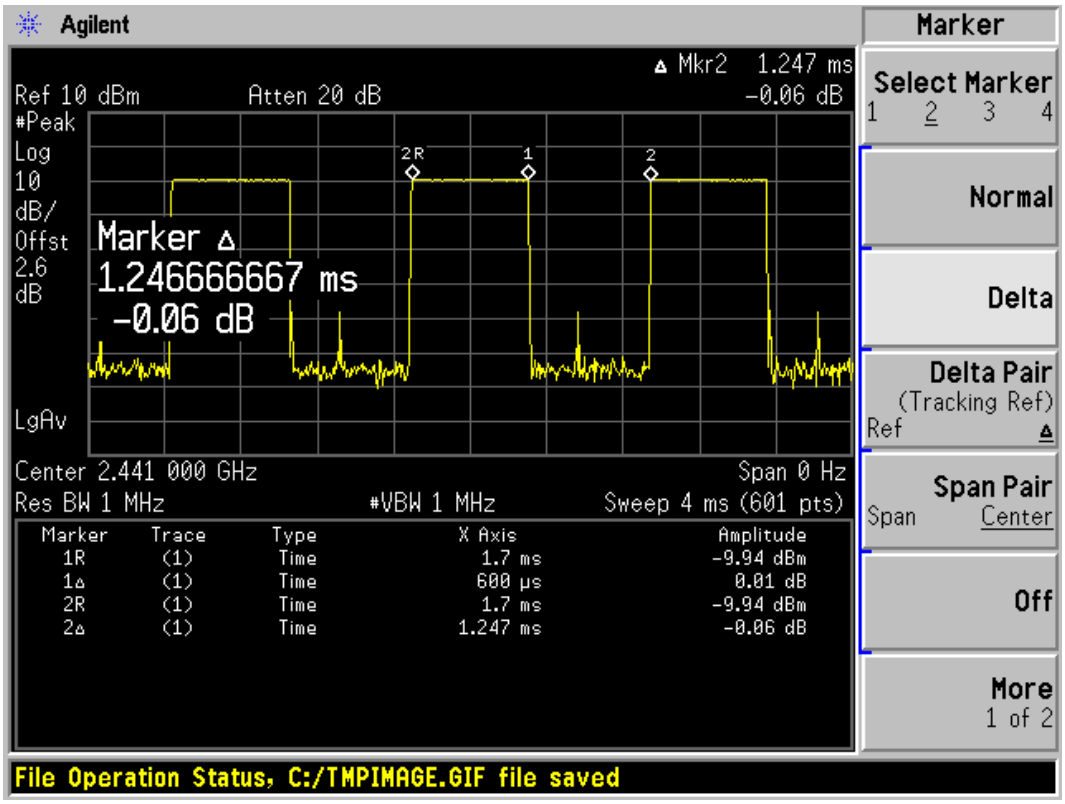
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.593	189.766	0.4	PASS
DH 3	1.840	294.409	0.4	PASS
DH 5	3.100	330.677	0.4	PASS

8-DPSK Mode:

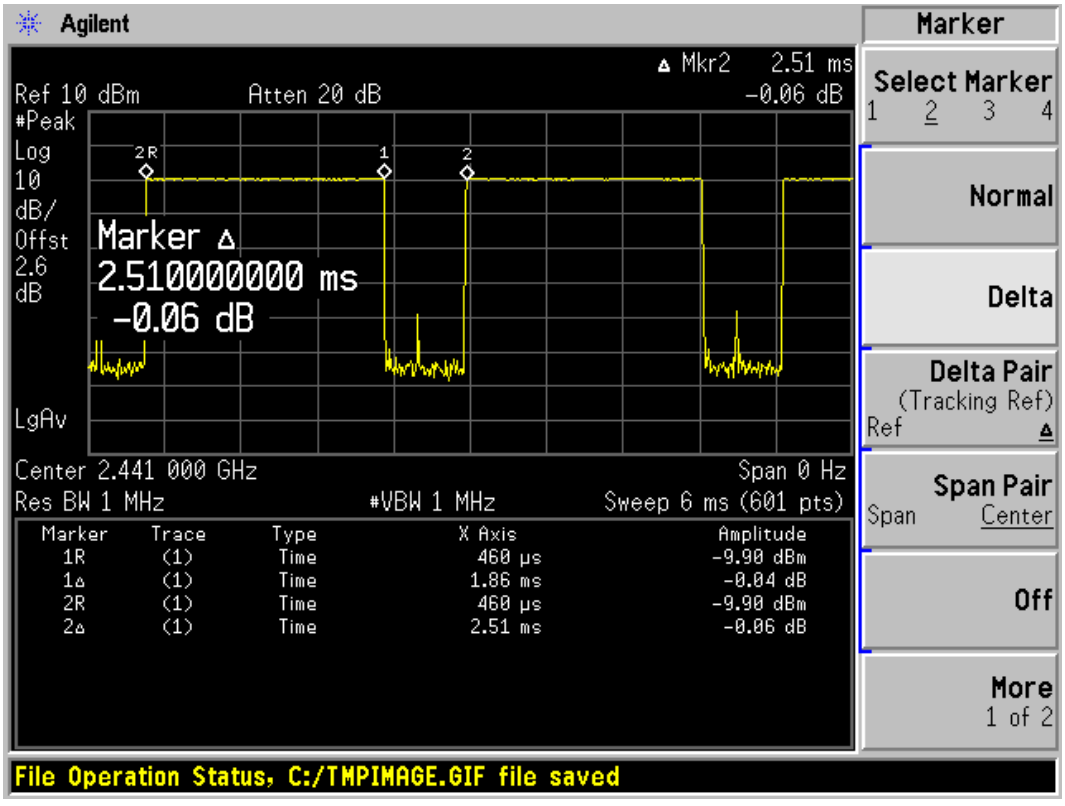
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.607	194.246	0.4	PASS
DH 3	1.860	297.609	0.4	PASS
DH 5	3.100	330.677	0.4	PASS

Test Plots

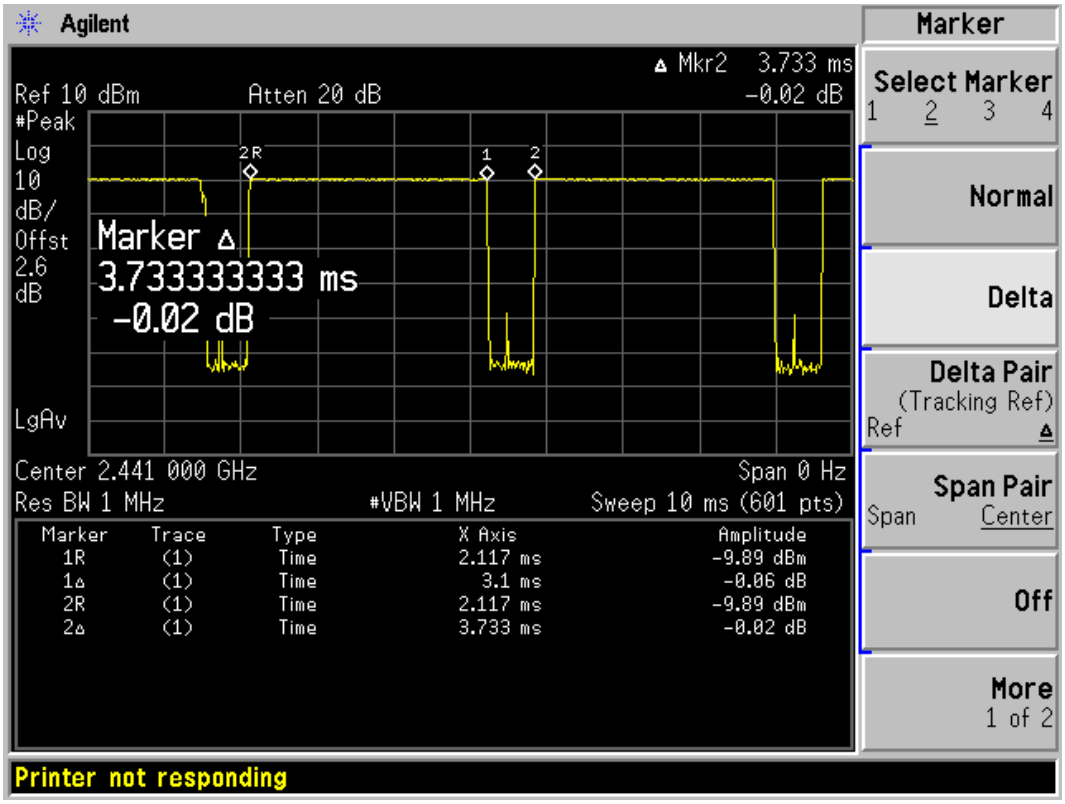
A.5.1, GFSK DH1



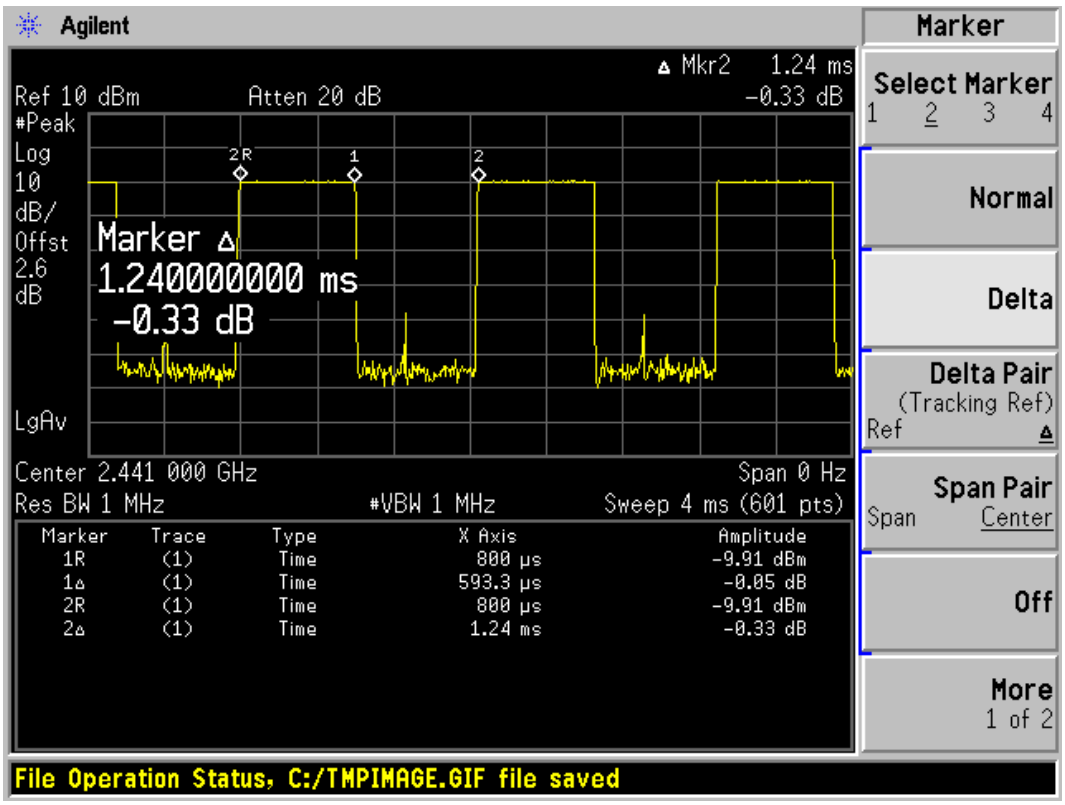
A.5.2, GFSK DH3



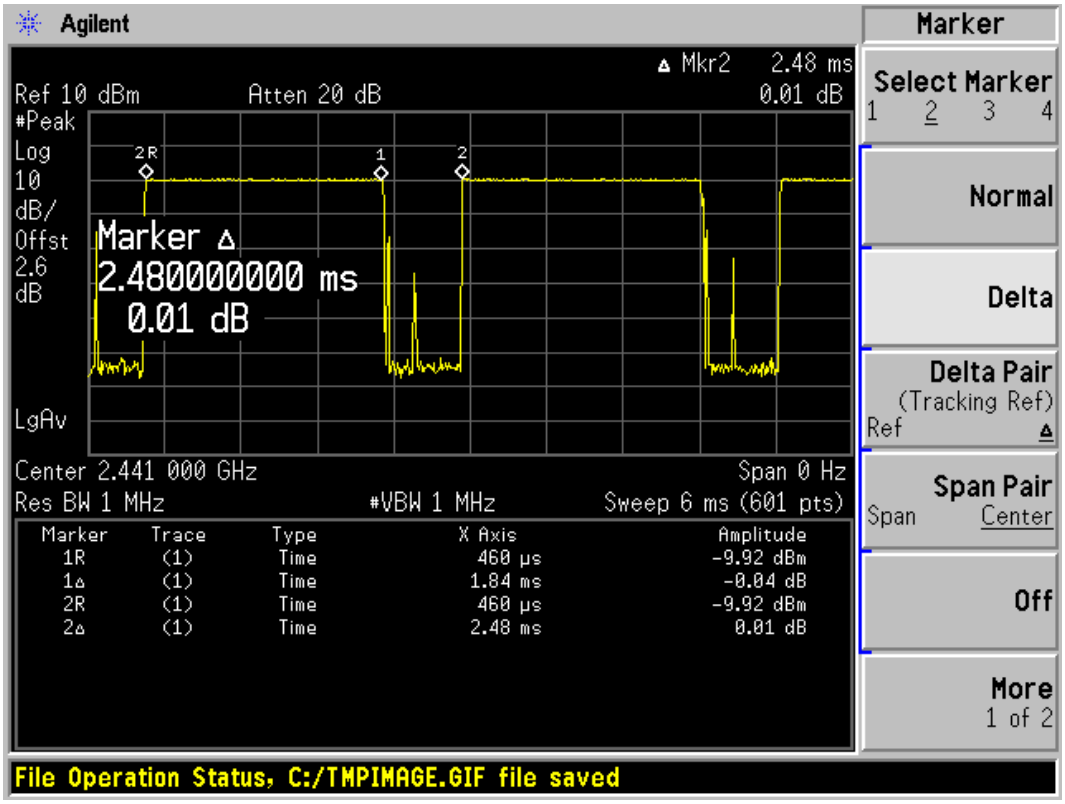
A.5.3, GFSK DH5



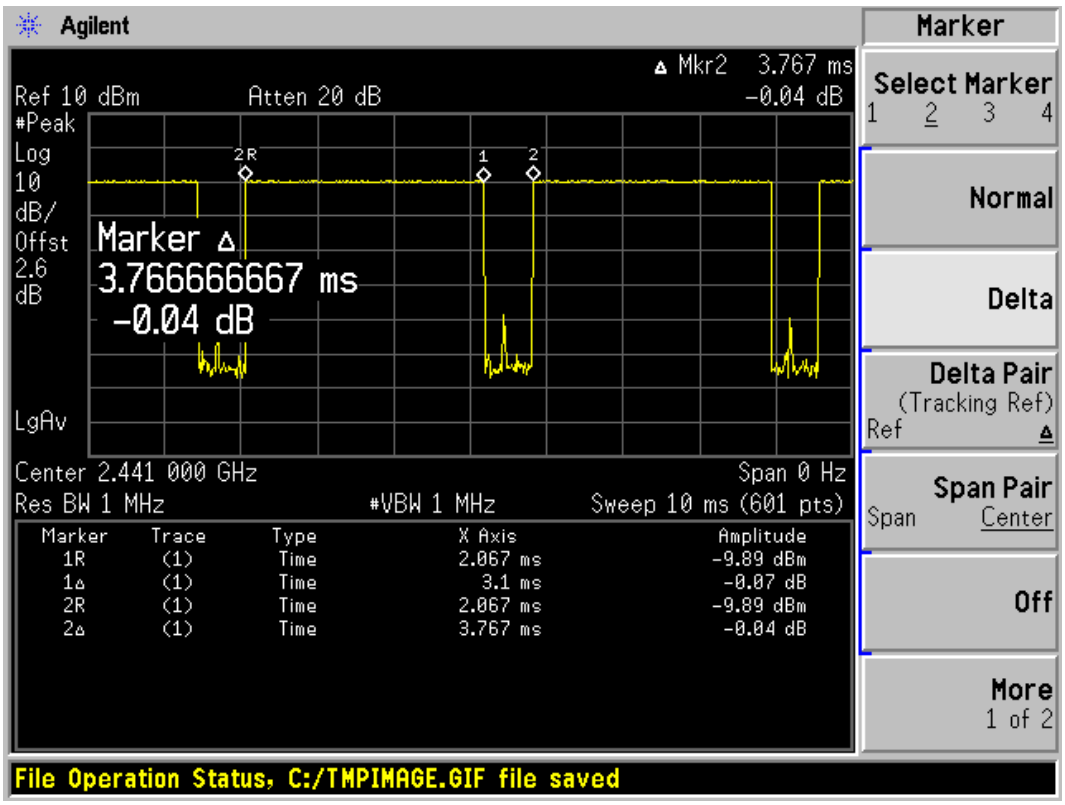
A.5.4, Π/4-DQPSK DH1



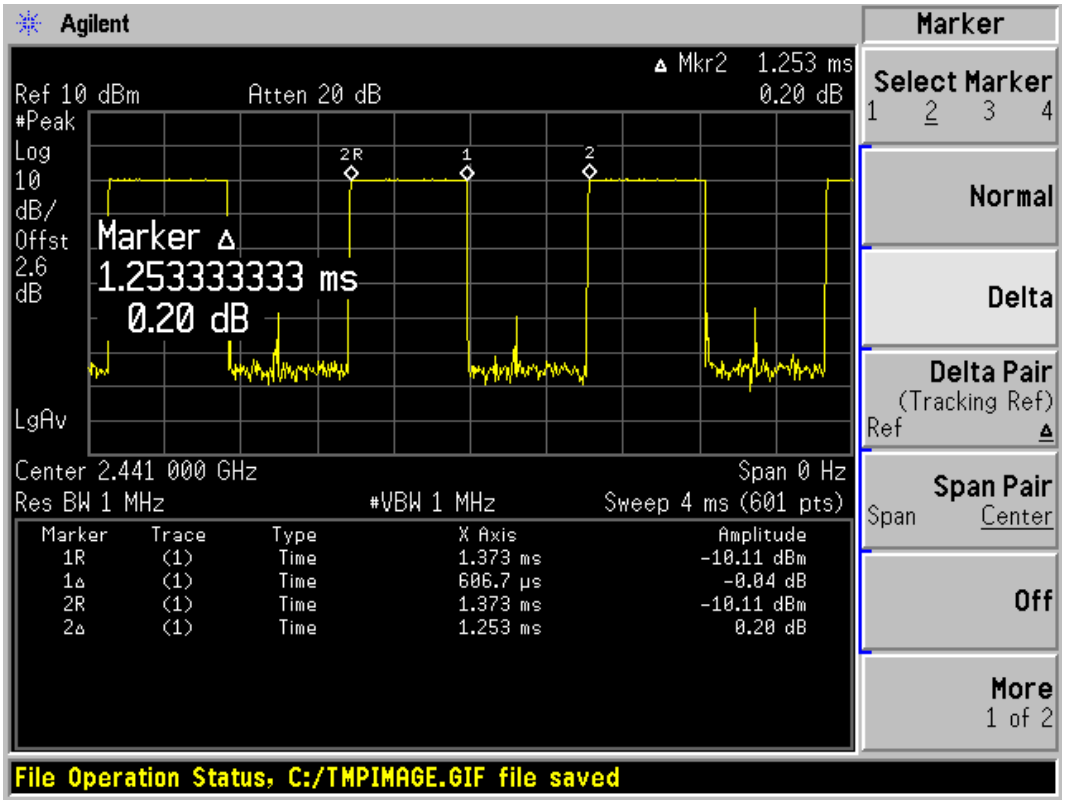
A.5.5, Π/4-DQPSK DH3



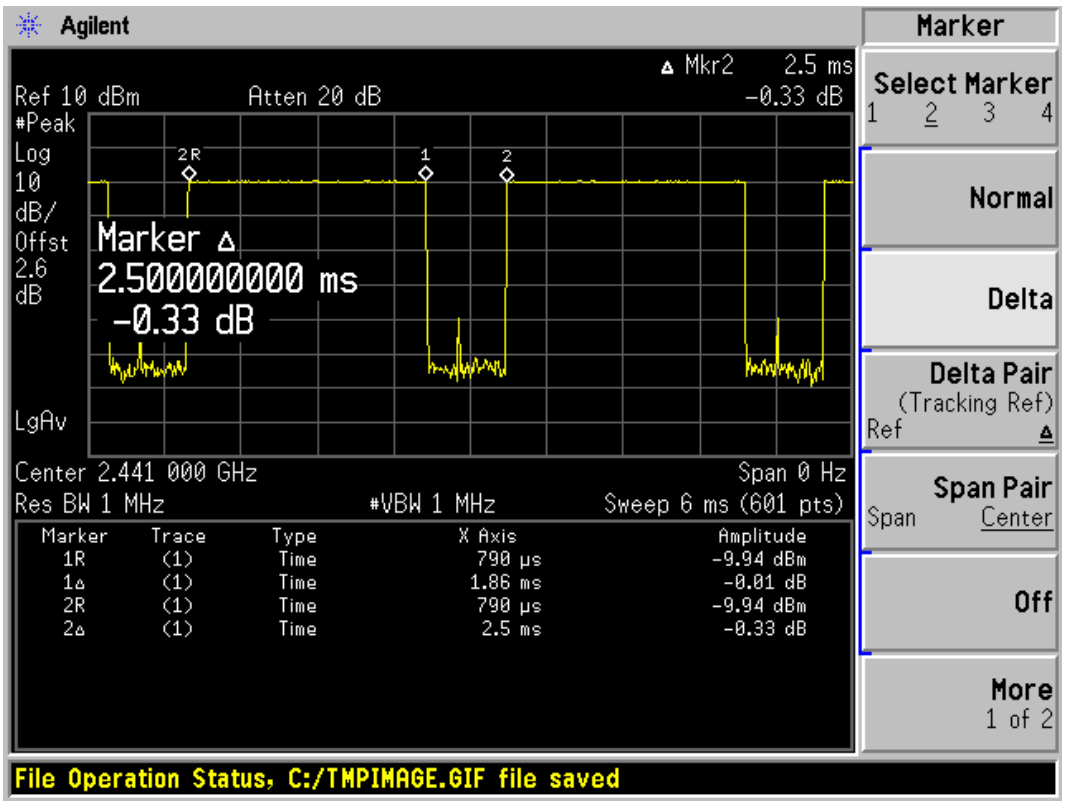
A.5.6, Π/4-DQPSK DH5



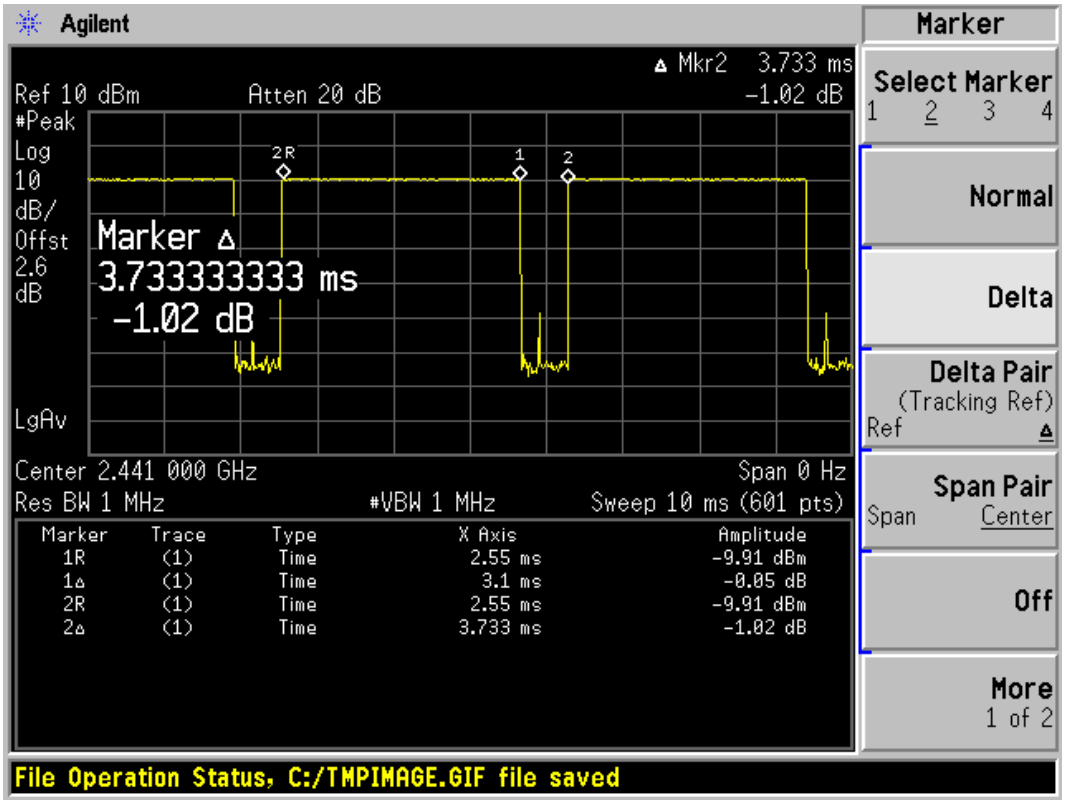
A.5.7, 8-DPSK DH1



A.5.8, 8-DPSK DH3



A.5.9, 8-DPSK DH5



A.6 Conducted Spurious Emissions

Test Data

GFSK Mode:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
0	2402	-45.01	-1.93	-21.9	PASS
39	2441	-44.56	-1.52	-21.5	PASS
78	2480	-45.05	-2.65	-22.6	PASS

∏/4-DQPSK Mode:

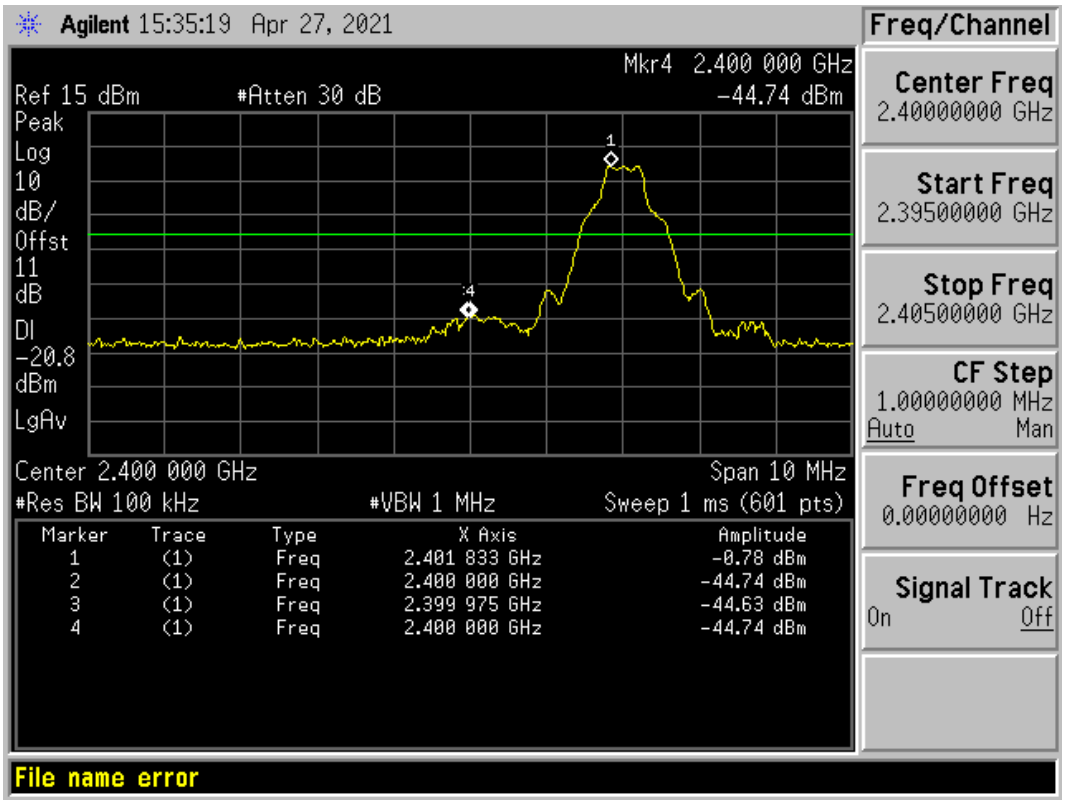
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
0	2402	-44.49	-6.11	-26.1	PASS
39	2441	-43.56	-6.03	-26.0	PASS
78	2480	-44.33	-4.10	-24.1	PASS

8-DPSK Mode:

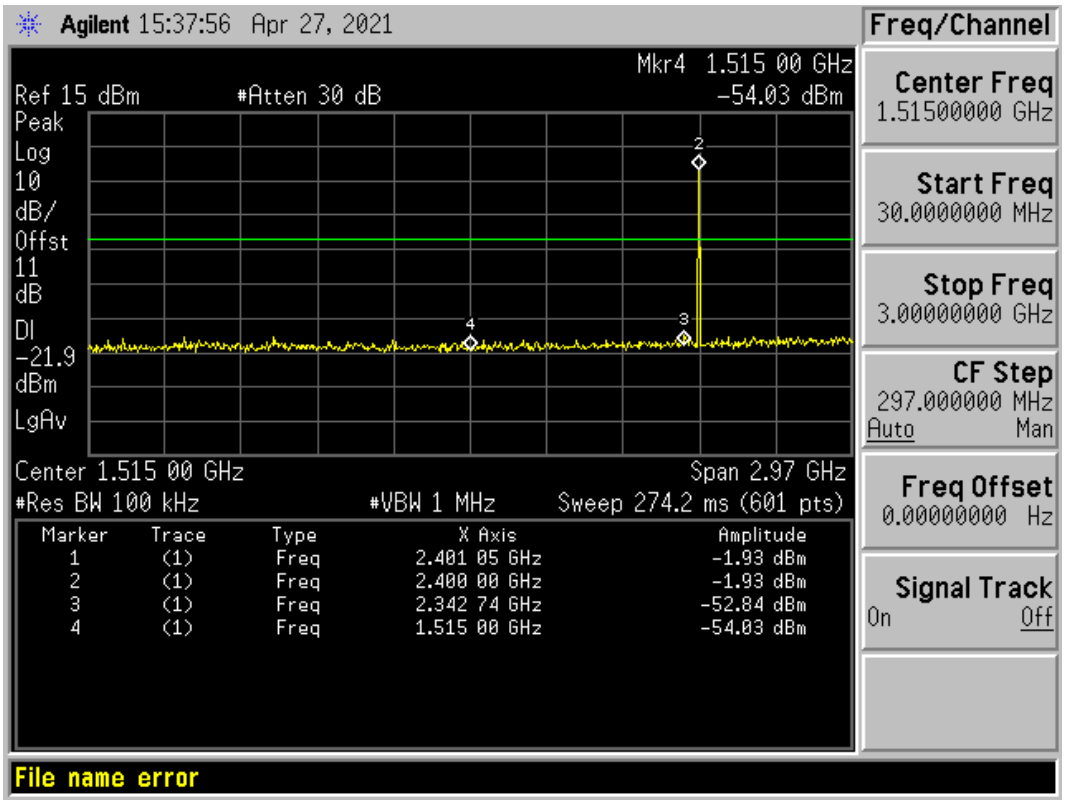
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
0	2402	-43.86	-1.00	-21.0	PASS
39	2441	-44.03	-1.72	-21.7	PASS
78	2480	-44.12	-5.64	-25.6	PASS

Test Plots

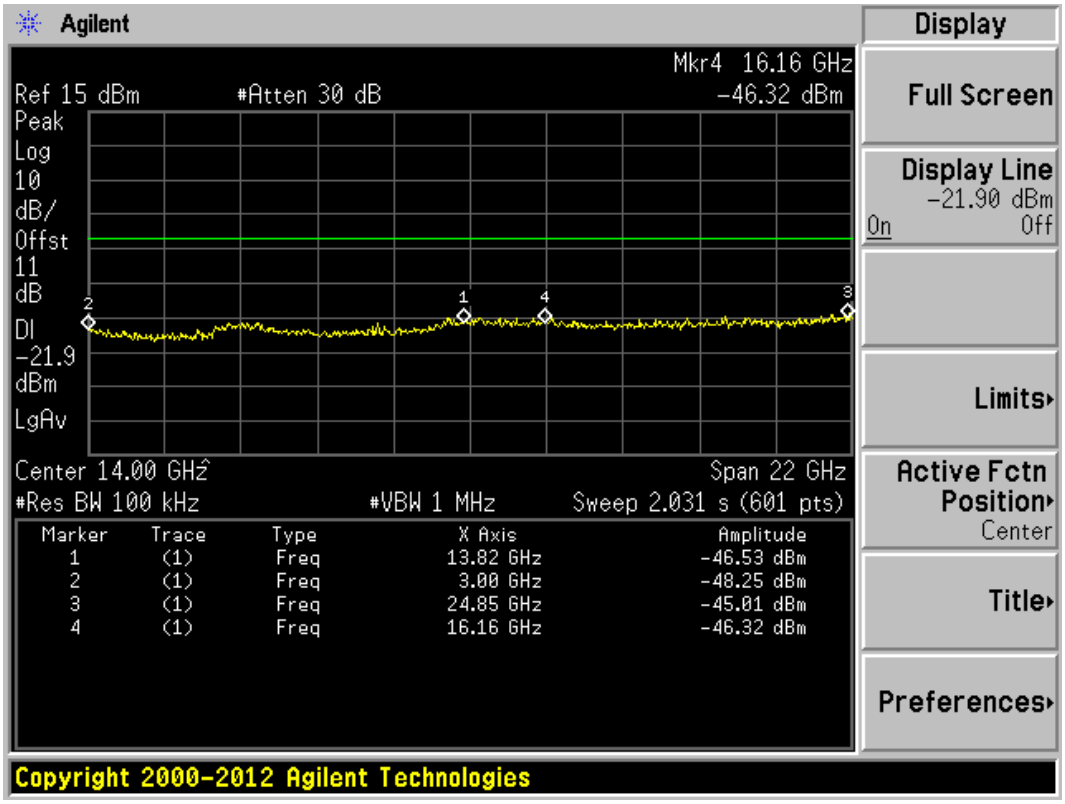
A.6.1, GFSK LOW CHANNEL , BANDEDGE



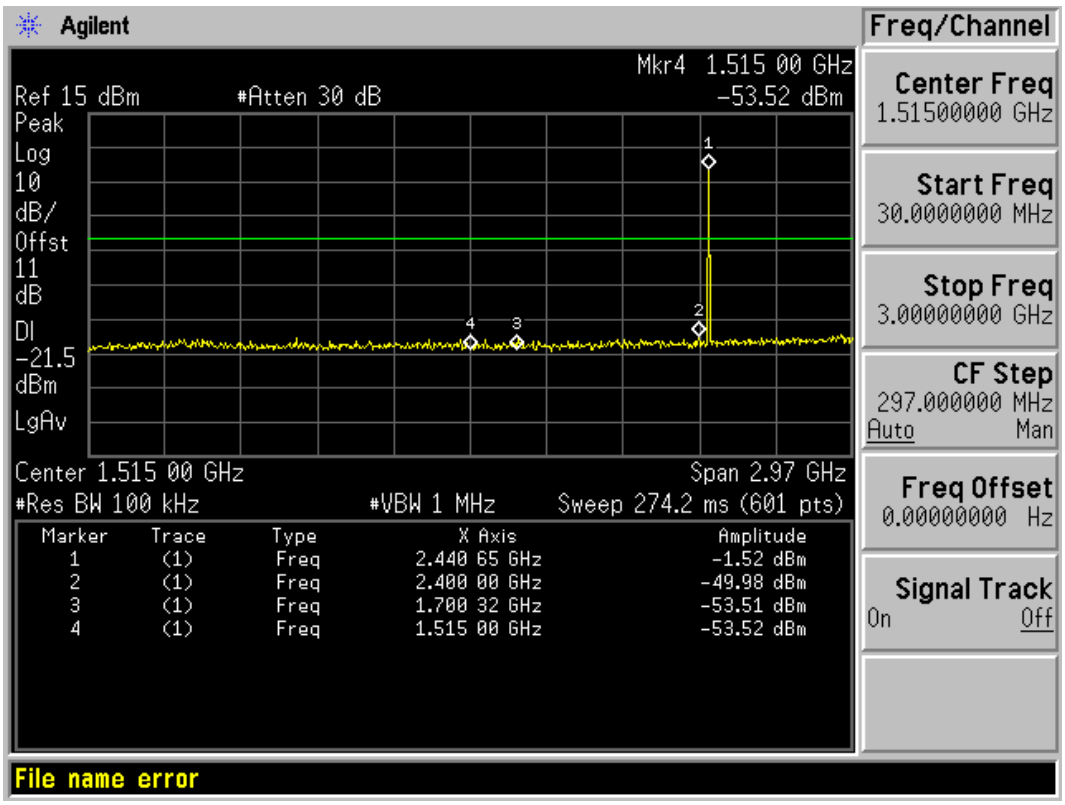
A.6.2, GFSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



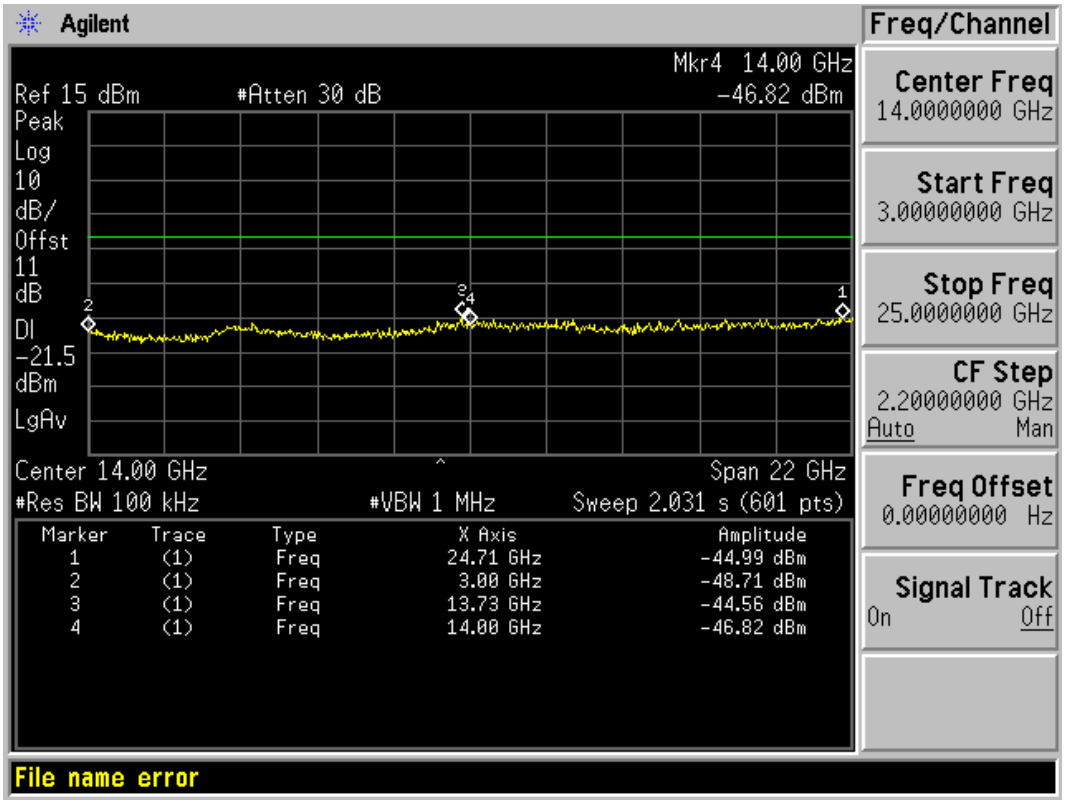
A.6.3, GFSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



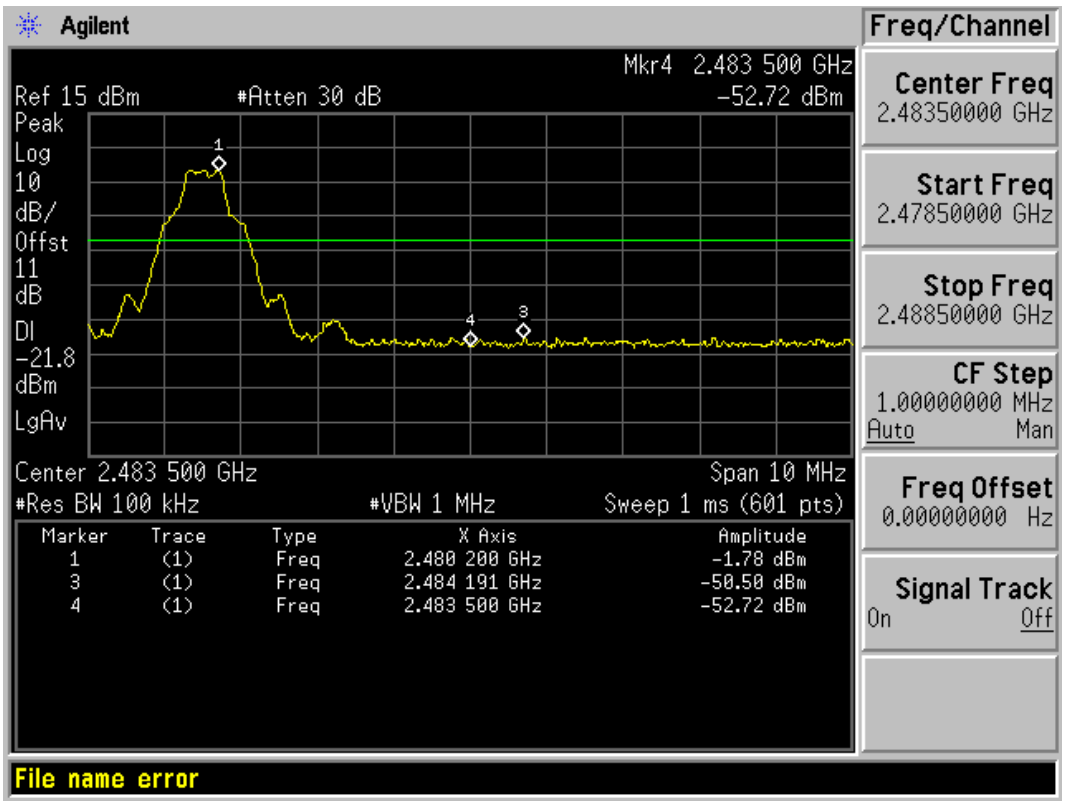
A.6.4, GFSK MID CHANNEL , SPURIOUS 30MHz~3GHz



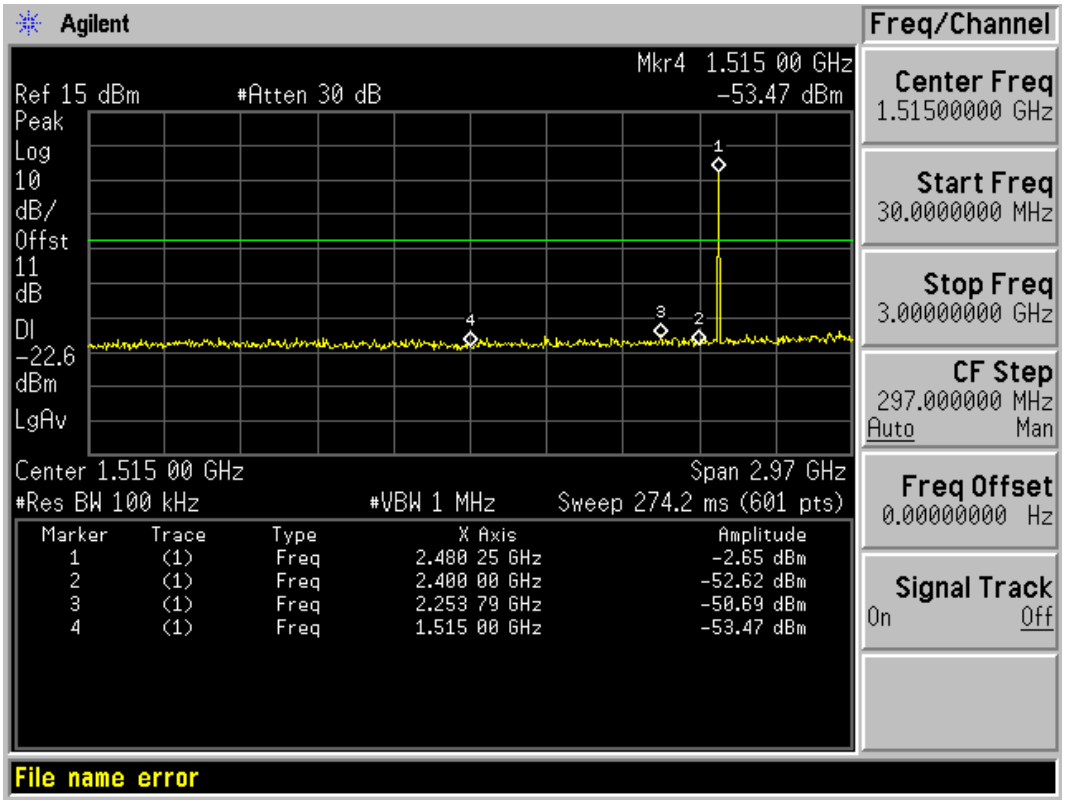
A.6.5, GFSK MID CHANNEL , SPURIOUS 3GHz~25GHz



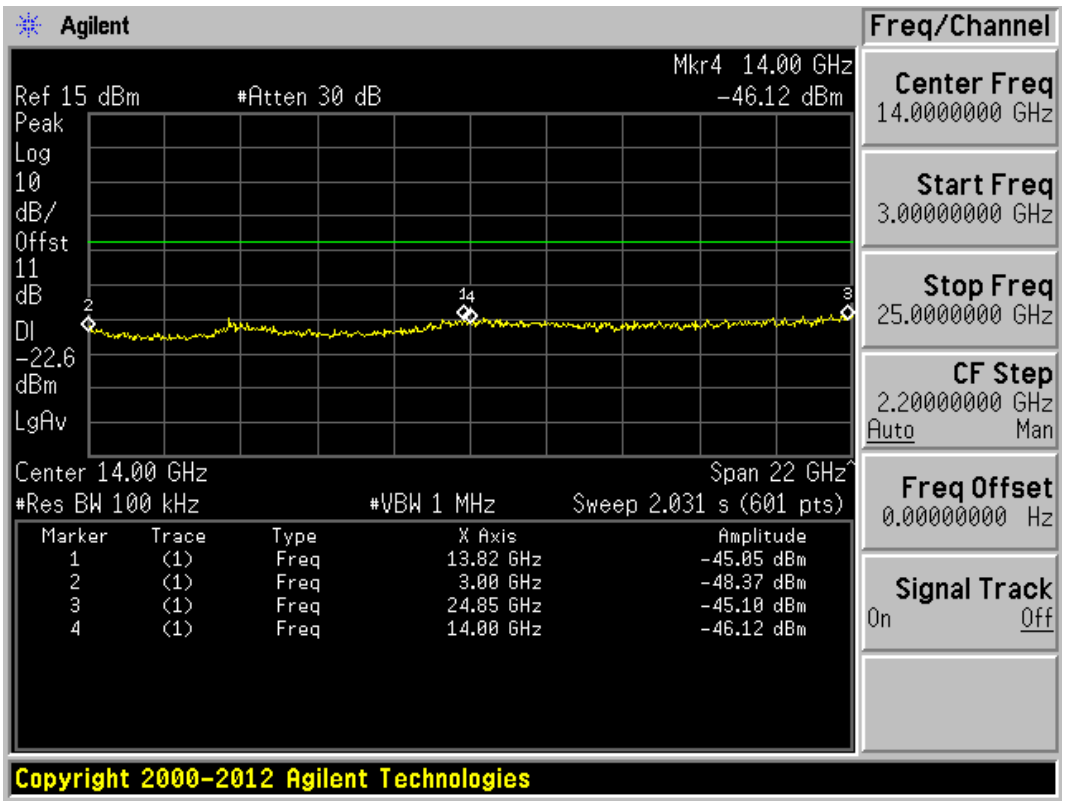
A.6.6, GFSK HIGH CHANNEL , BANDEDGE



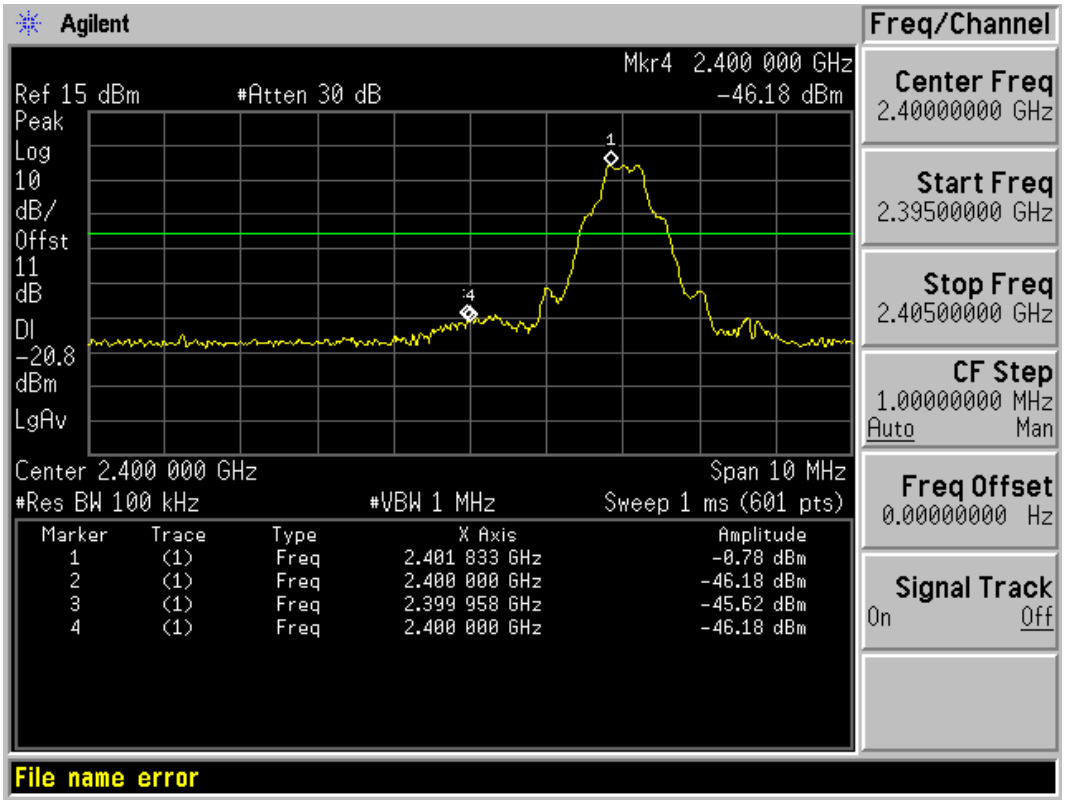
A.6.7, GFSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



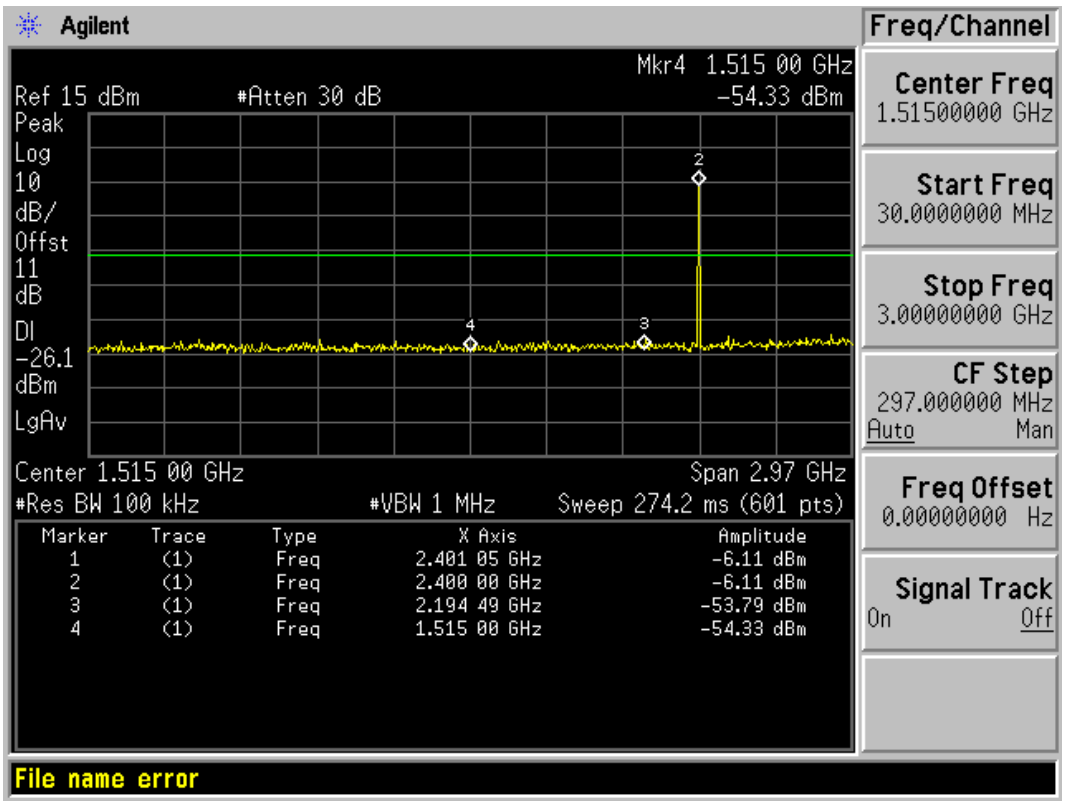
A.6.8, GFSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



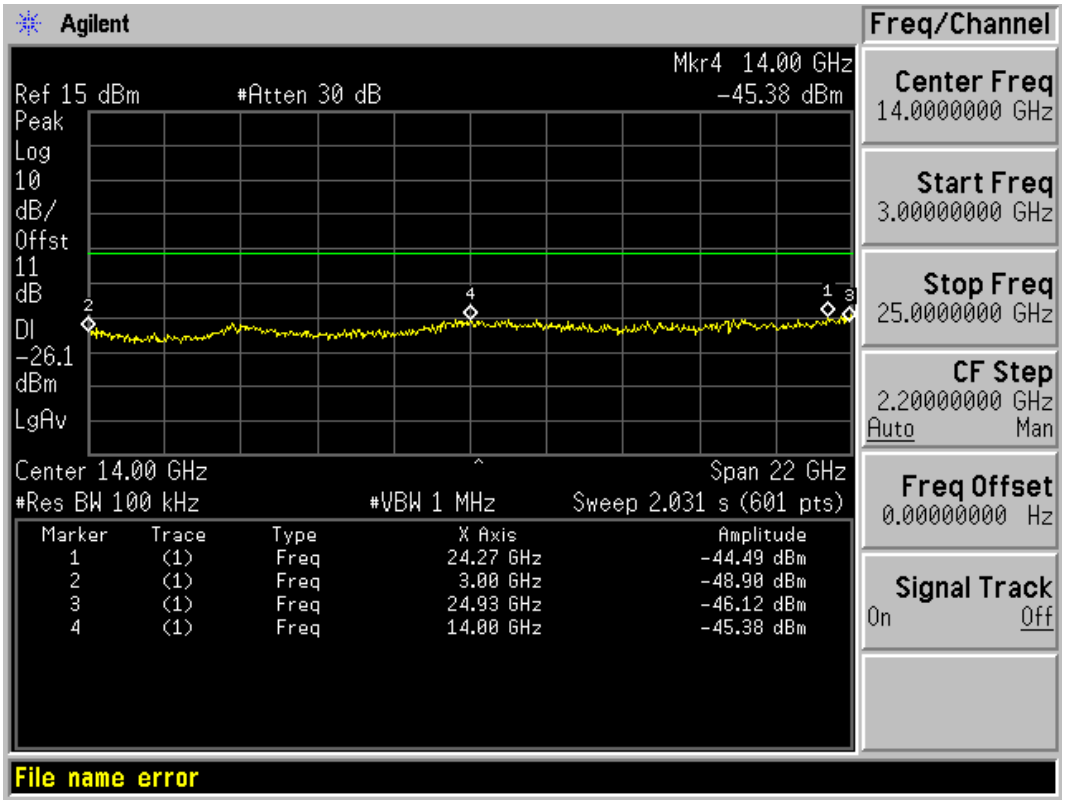
A.6.9, Π/4-DQPSK LOW CHANNEL , BANDEDGE



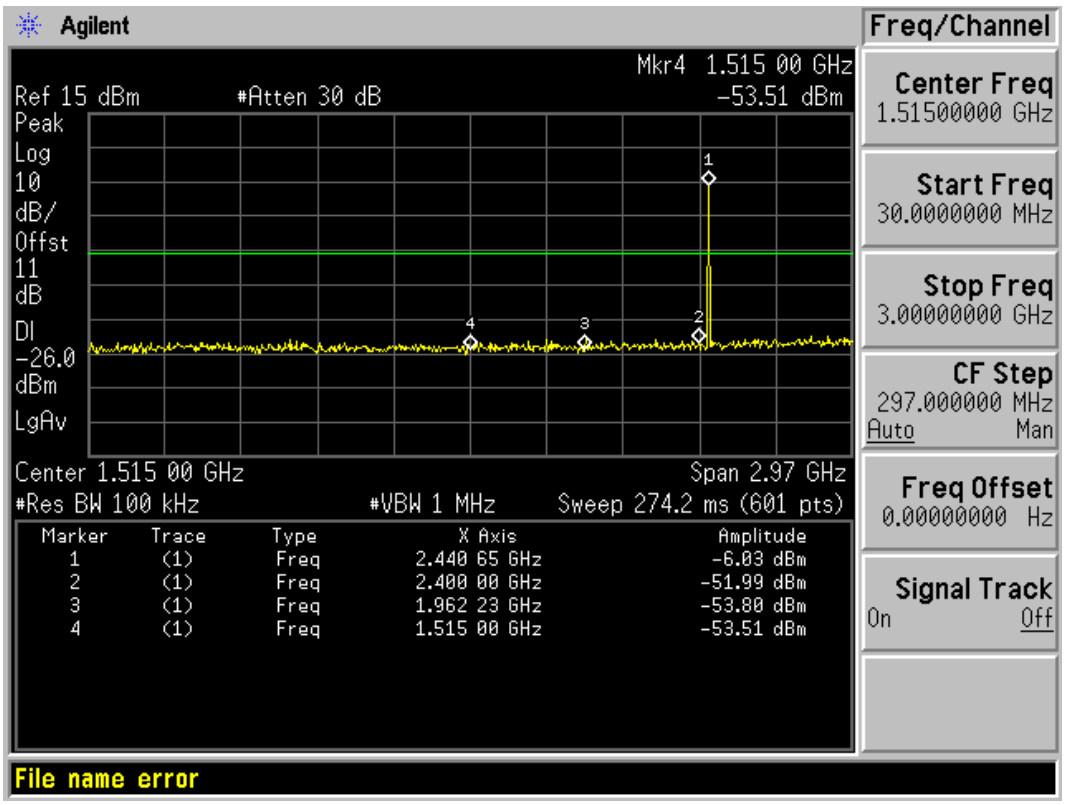
A.6.10, Π/4-DQPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



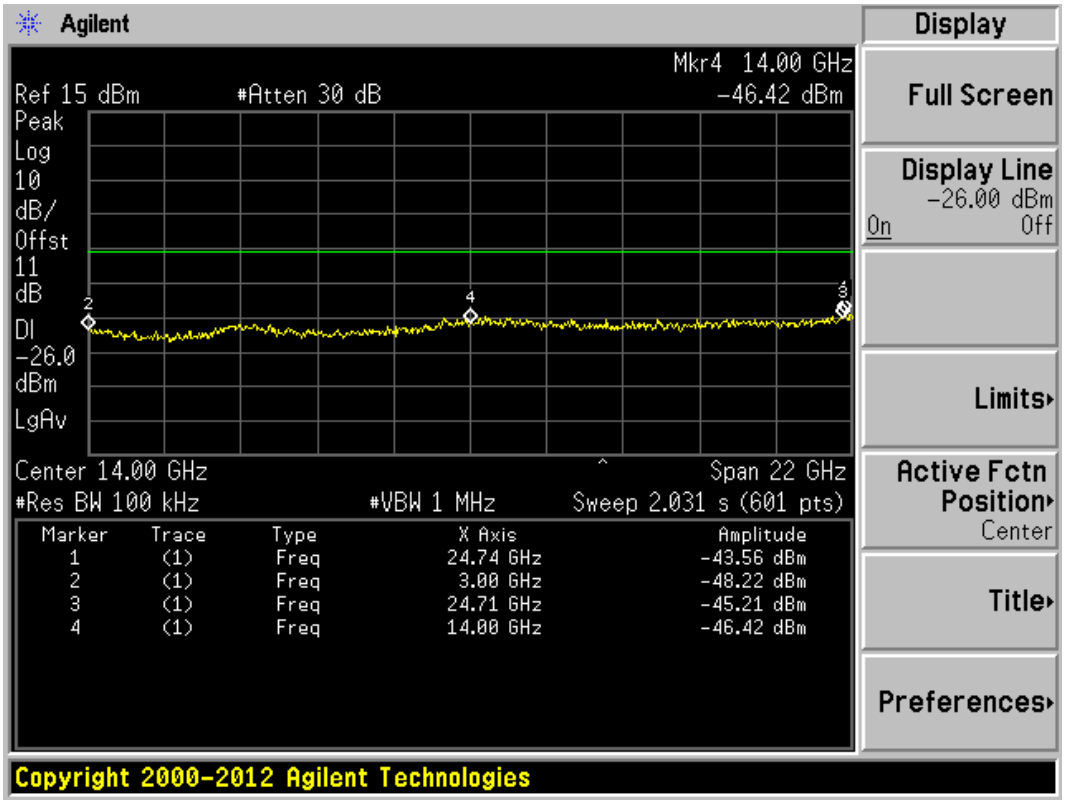
A.6.11, Π/4-DQPSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



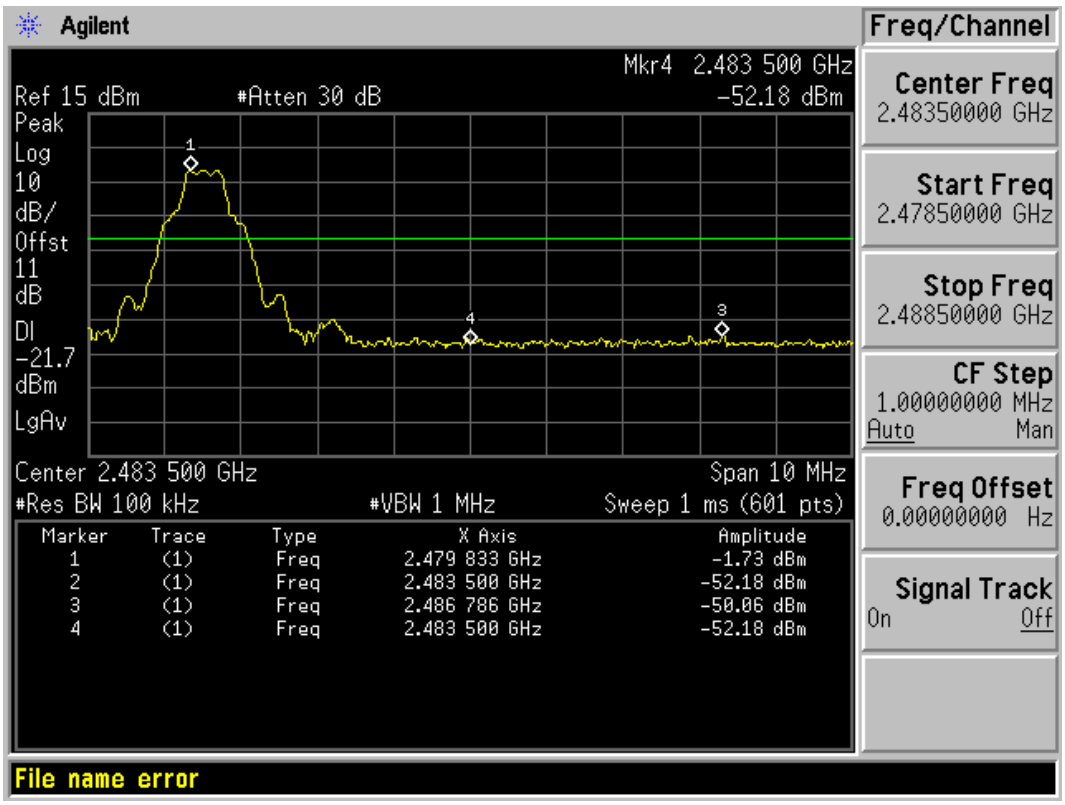
A.6.12, Π/4-DQPSK MID CHANNEL , SPURIOUS 30MHz~3GHz



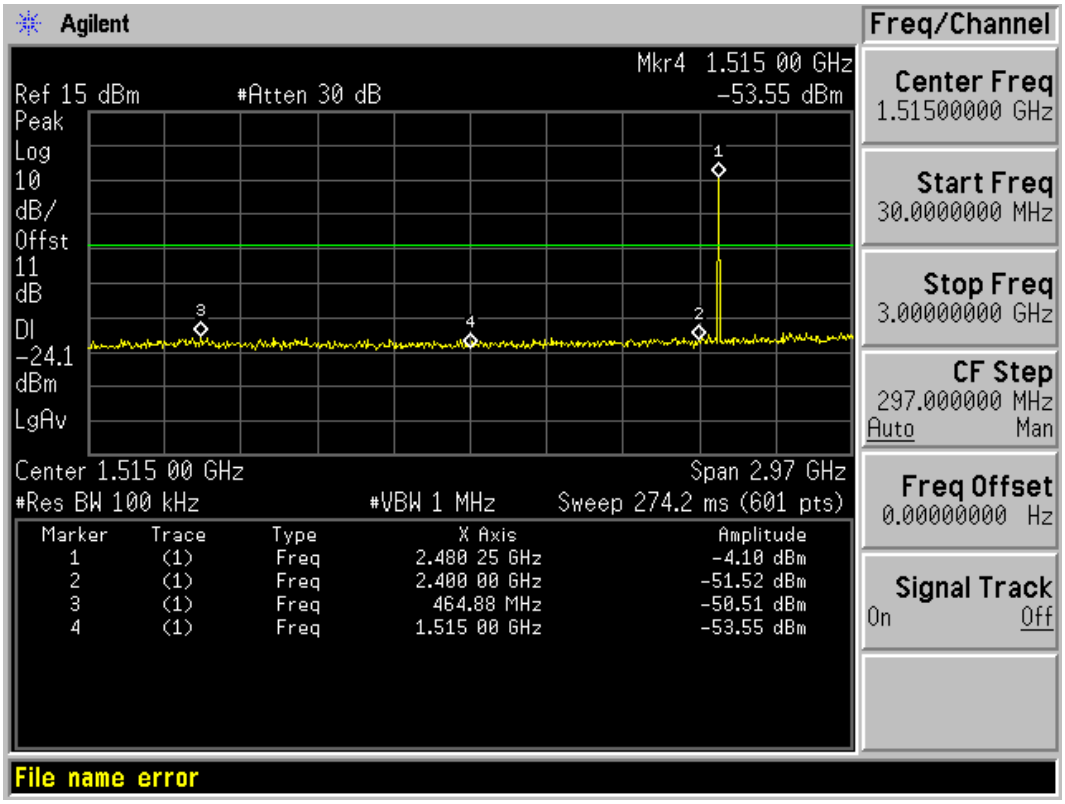
A.6.13, Π/4-DQPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



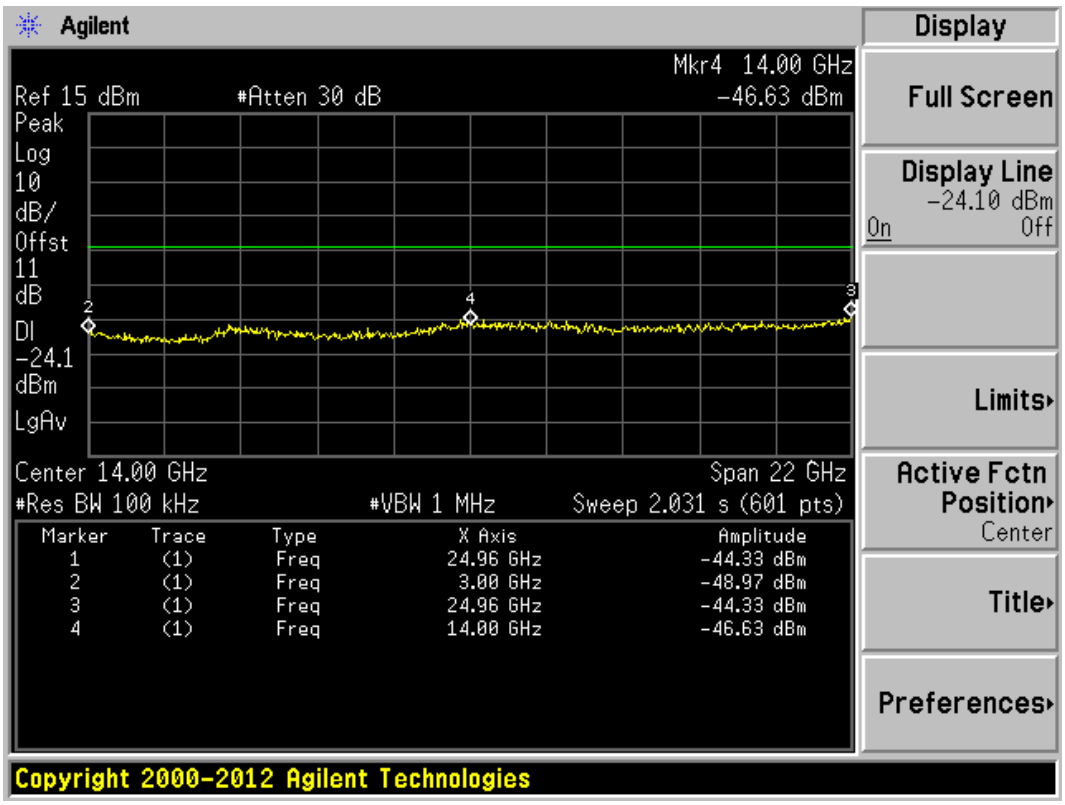
A.6.14, Π/4-DQPSK HIGH CHANNEL , BANDEDGE



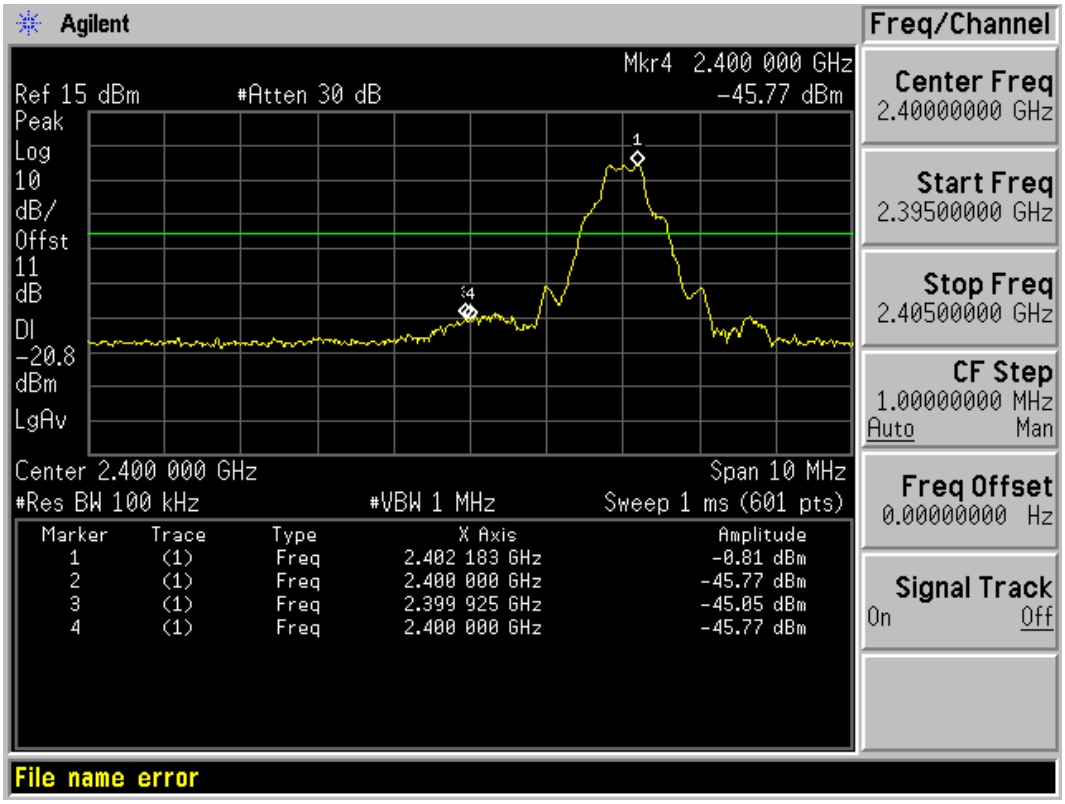
A.6.15, Π/4-DQPSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



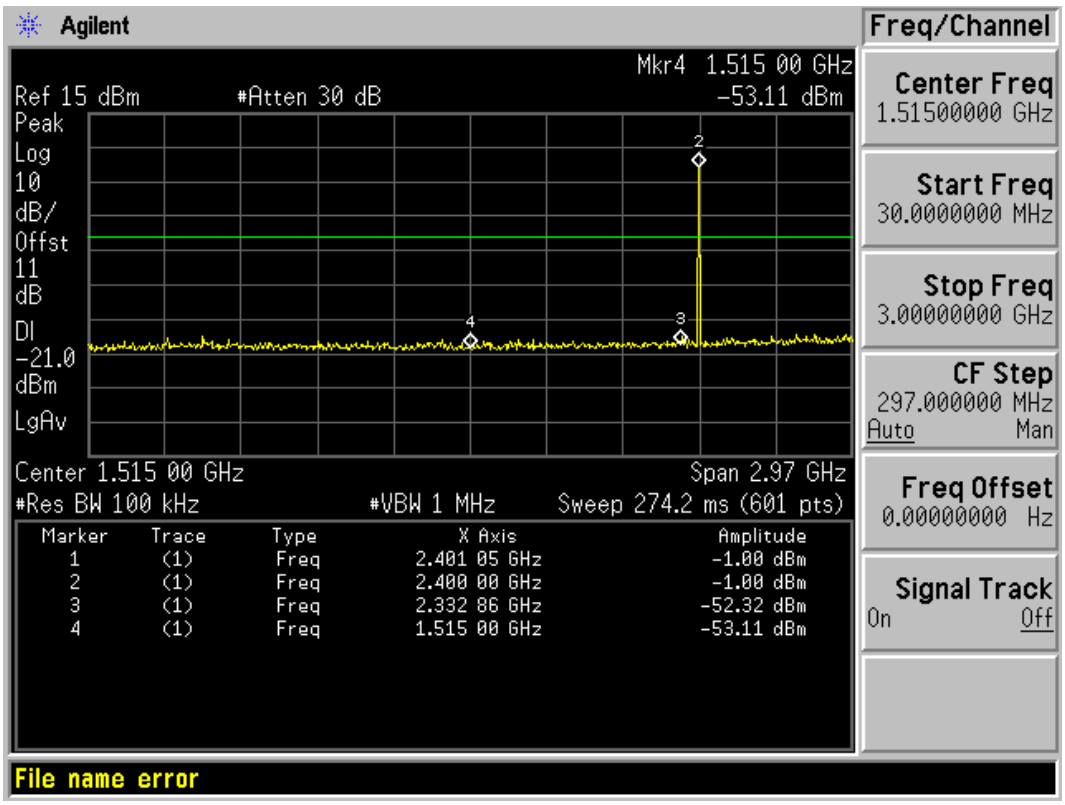
A.6.16, Π/4-DQPSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



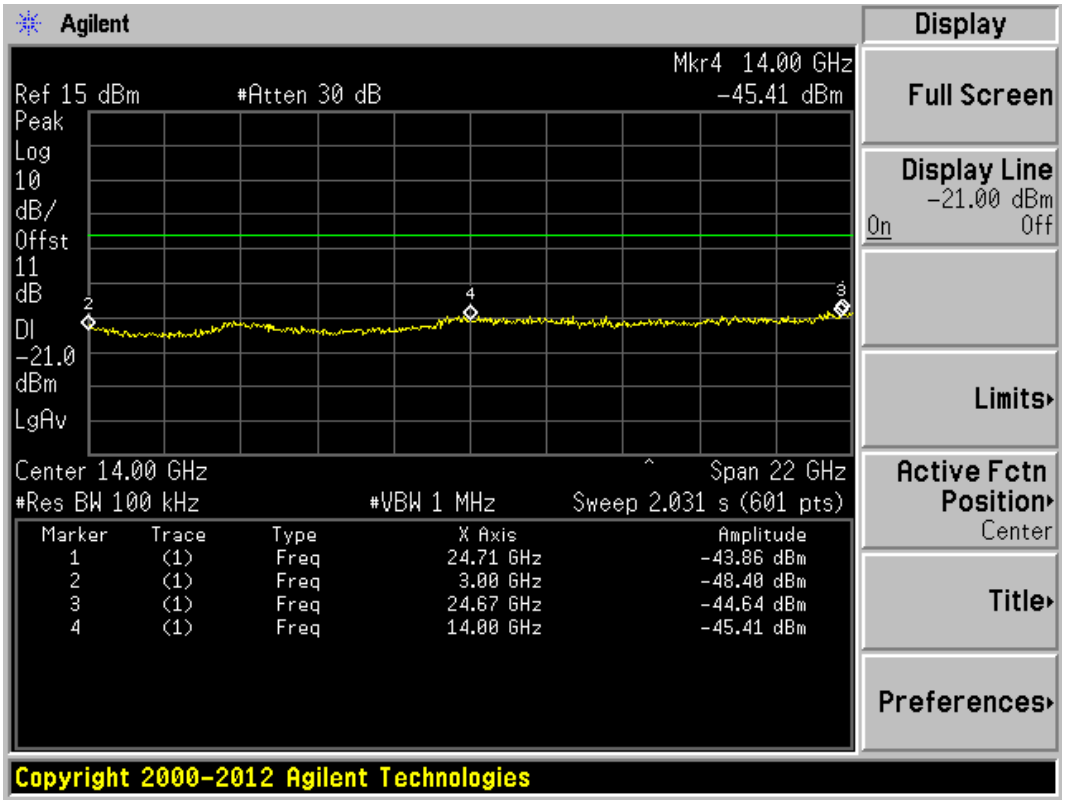
A.6.17, 8-DPSK LOW CHANNEL , BANDEDGE



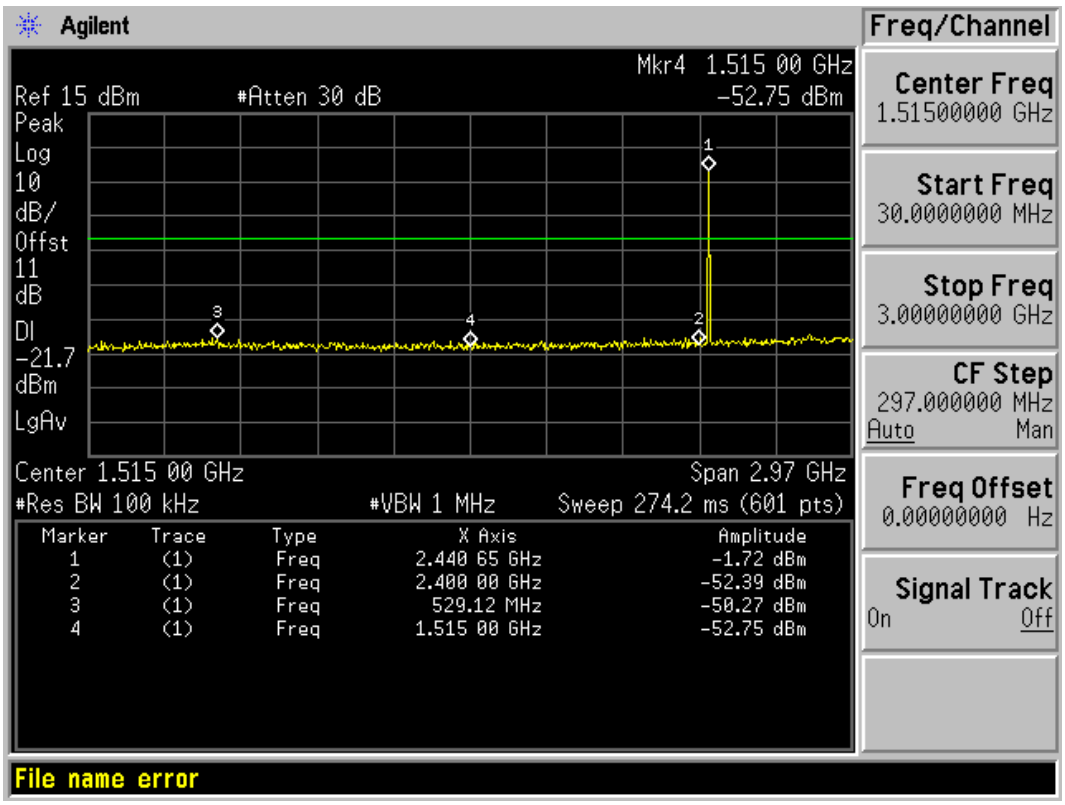
A.6.18, 8-DPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



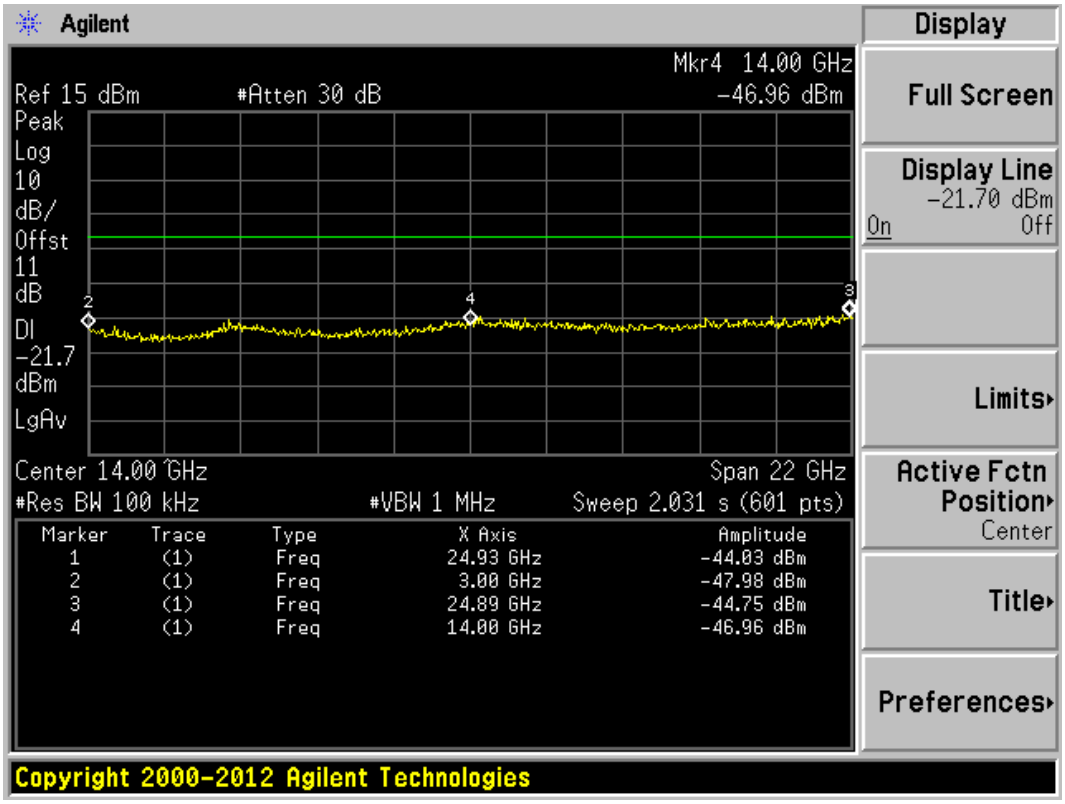
A.6.19, 8-DPSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



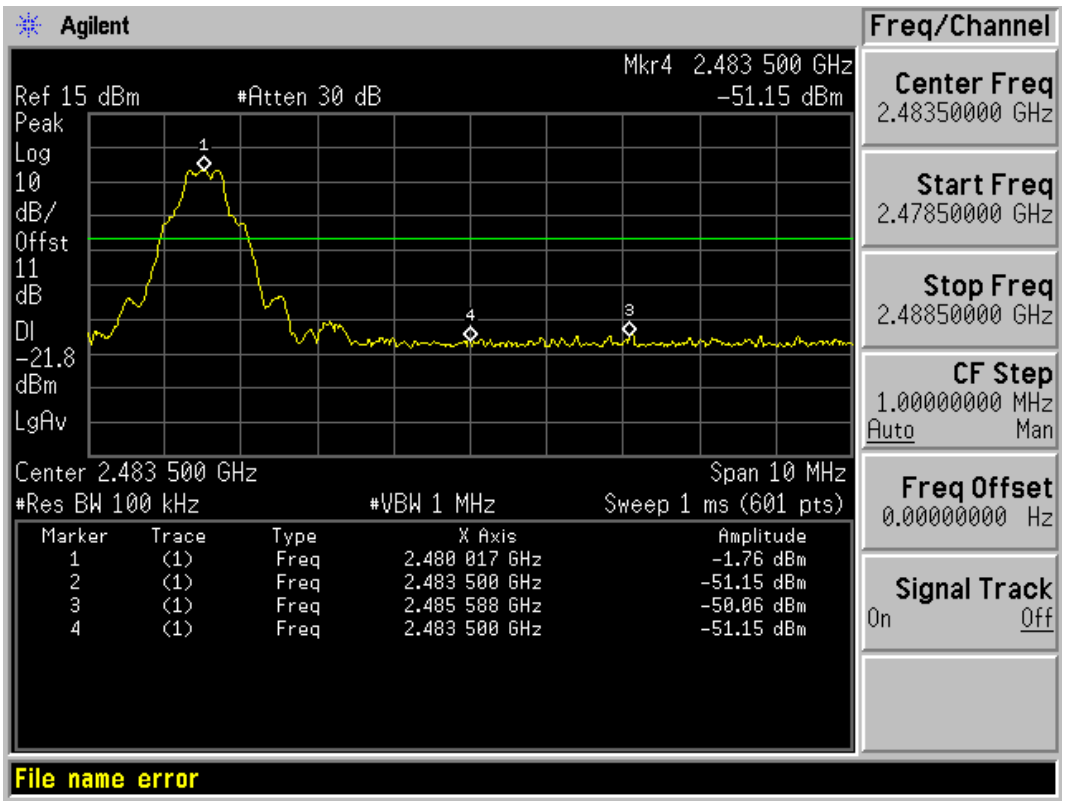
A.6.20, 8-DPSK MID CHANNEL , SPURIOUS 30MHz~3GHz



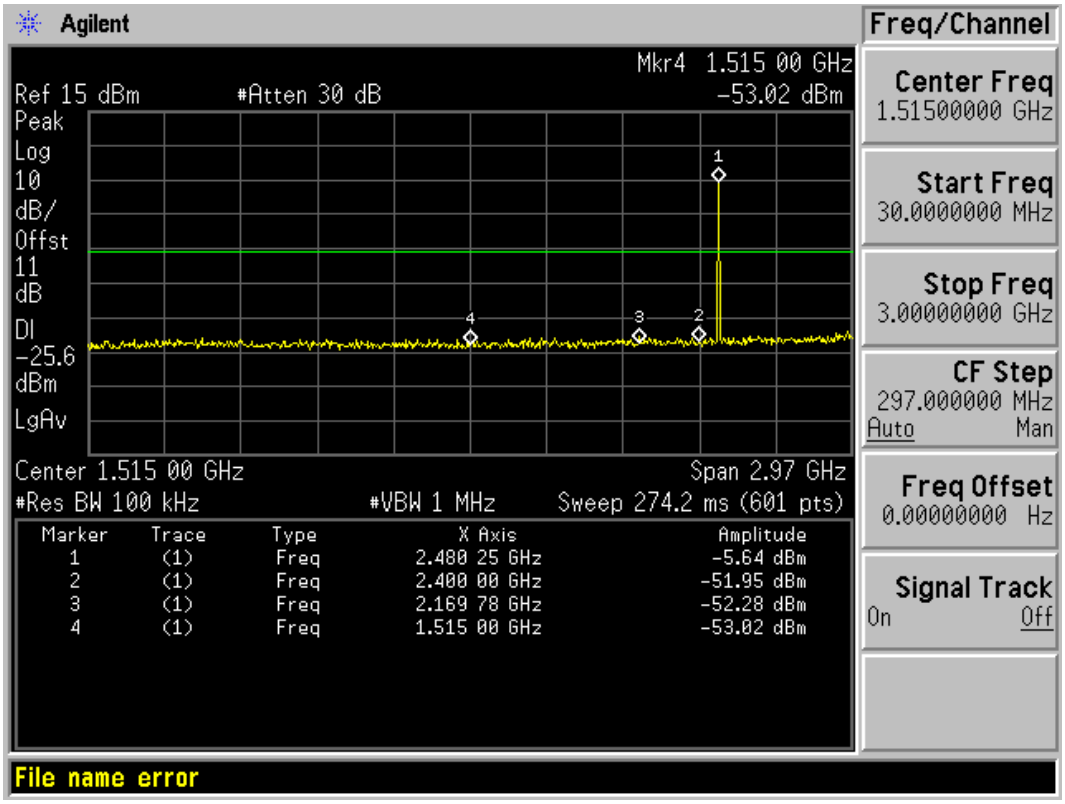
A.6.21, 8-DPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



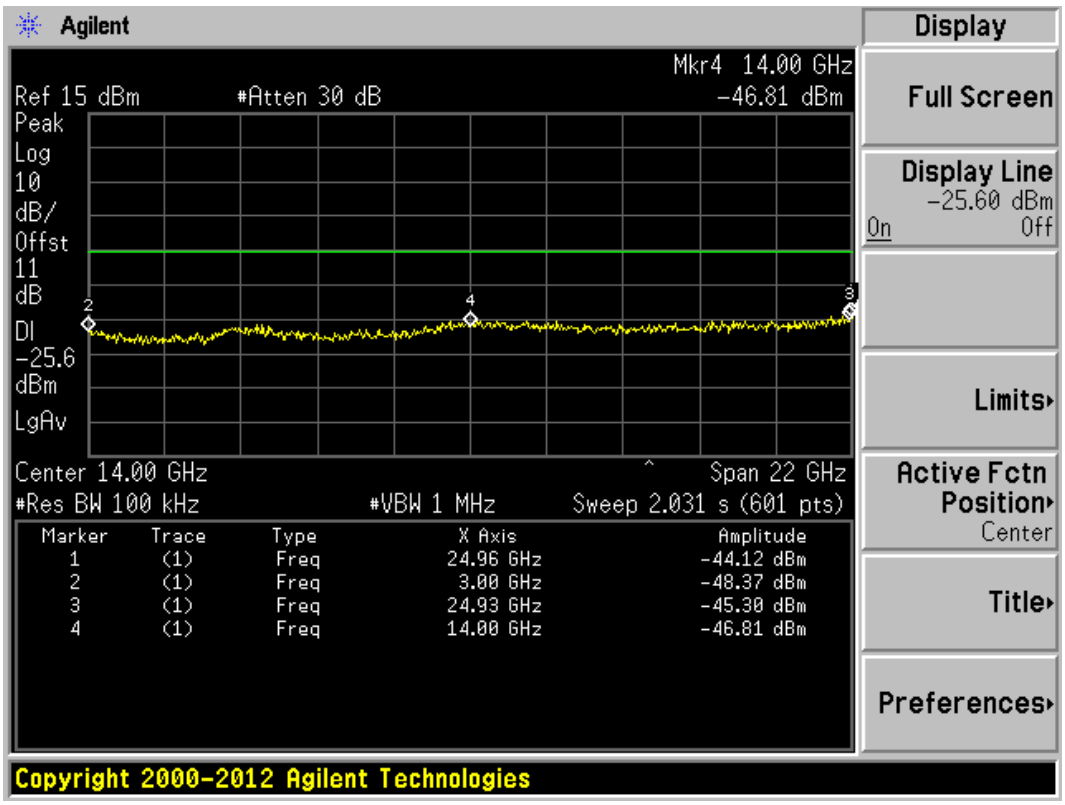
A.6.22, 8-DPSK HIGH CHANNEL , BANDEDGE



A.6.23, 8-DPSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



A.6.24, 8-DPSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



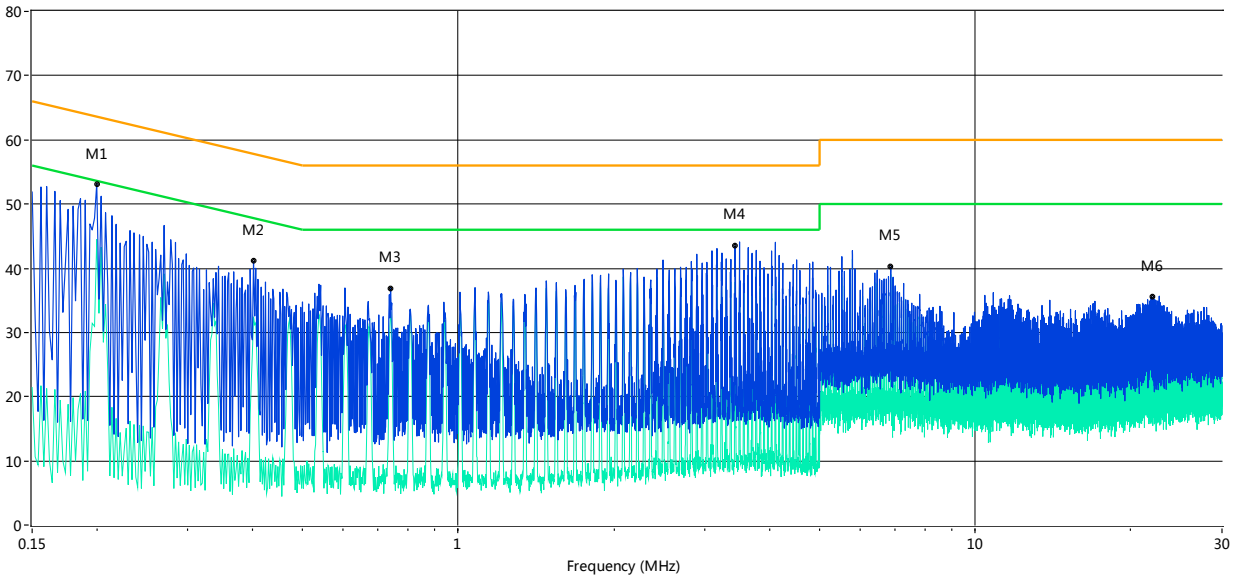
A.7 Conducted Emissions

Test Data

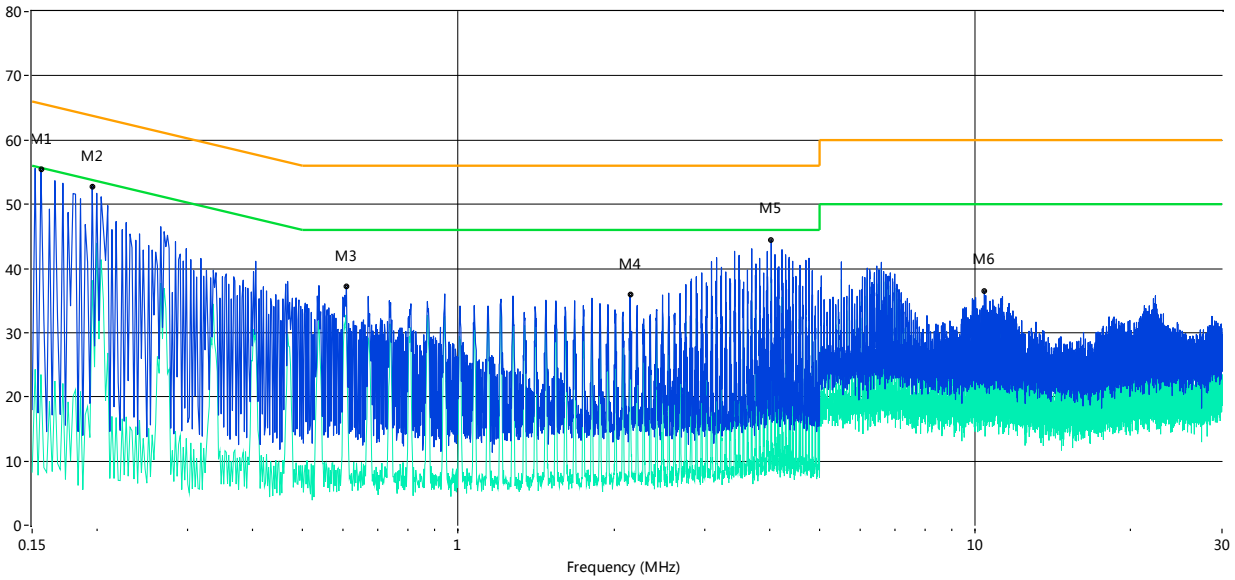
No.	Frequency (MHz)	Peak (dBuV)	Q-peak (dBuV)	Average (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
1	0.20	54.46	50.22	39.61	10.00	64.6	54.6	14.38	L Line	PASS
2	0.40	41.1	--	32.4	10.00	58.8	48.8	16.40	L Line	PASS
3	0.74	36.8	--	33.2	10.00	56.0	46.0	12.80	L Line	PASS
4	3.43	43.5	--	36.5	10.00	56.0	46.0	9.50	L Line	PASS
5	6.86	40.2	--	39.0	10.00	60.0	50.0	11.00	L Line	PASS
6	22.02	35.5	--	29.9	10.00	60.0	50.0	20.10	L Line	PASS
7	0.16	55.4	--	23.5	10.00	65.8	55.8	32.30	N Line	PASS
8	0.20	52.8	--	38.1	10.00	64.7	54.7	16.60	N Line	PASS
9	0.61	37.1	--	31.0	10.00	56.0	46.0	15.00	N Line	PASS
10	2.15	35.8	--	34.0	10.00	56.0	46.0	12.00	N Line	PASS
11	4.03	44.4	--	38.6	10.00	56.0	46.0	7.40	N Line	PASS
12	10.41	36.4	--	33.0	10.00	60.0	50.0	17.00	N Line	PASS

Test Plots

A.2.1 L Phase



A.2.2 N Phase

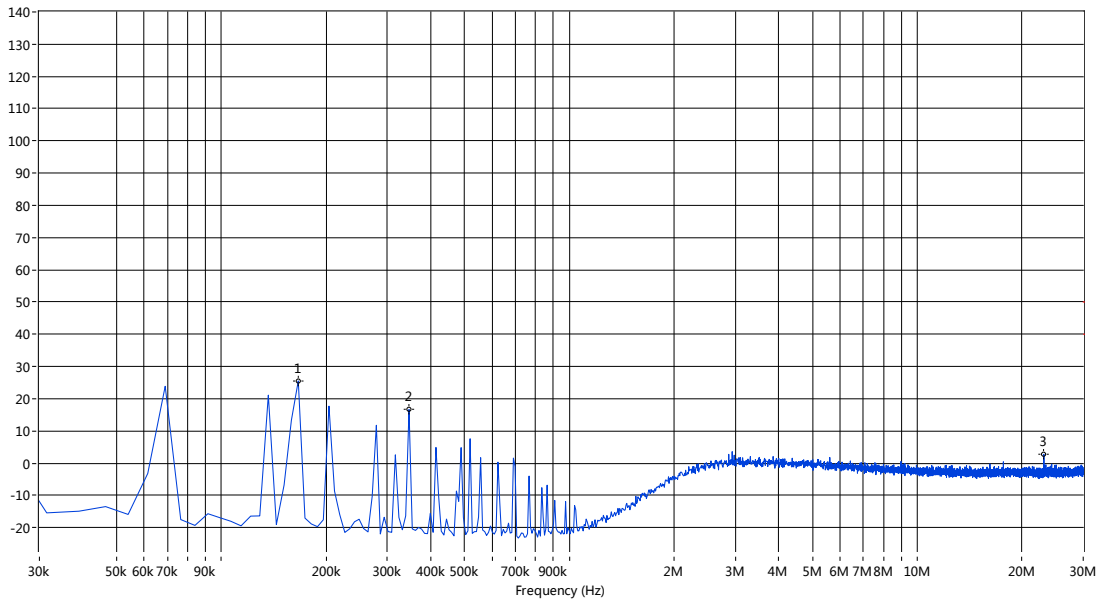


A.8 Radiated Emission

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst data of 9 kHz to 30MHz

Below 30MHz

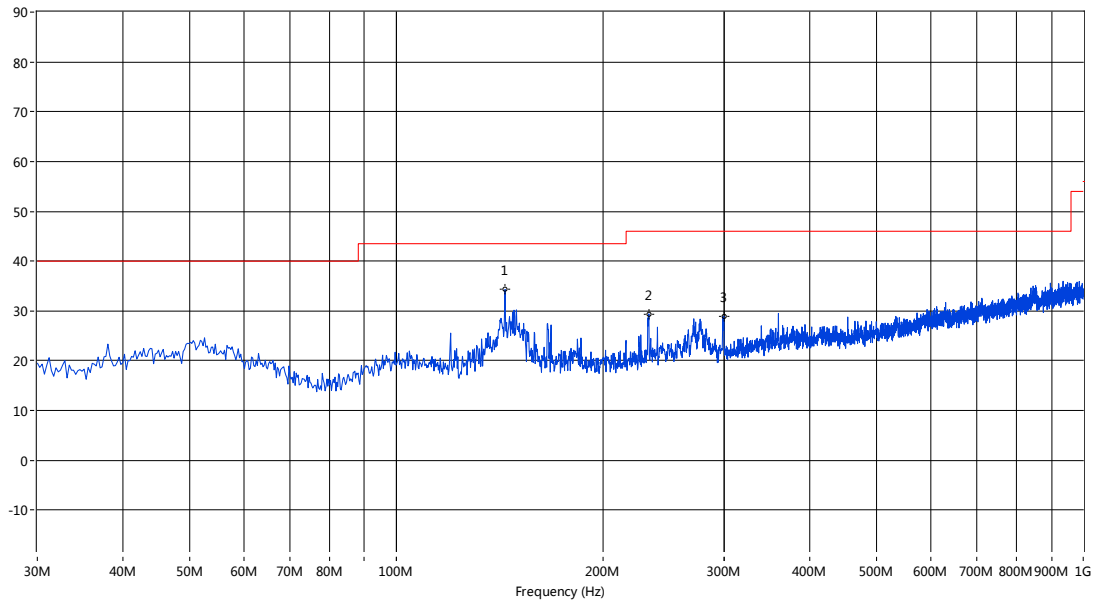


Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Verdict
0.166	25.52	--	--	--	40.0	--	360.0	Pass
0.346	16.67	--	--	--	40.0	--	360.0	Pass
23.126	2.73	--	--	--	40.0	--	356.5	Pass

Note: The marked spikes near 2400MHz with circle should be ignored because they are Fundamental signal.

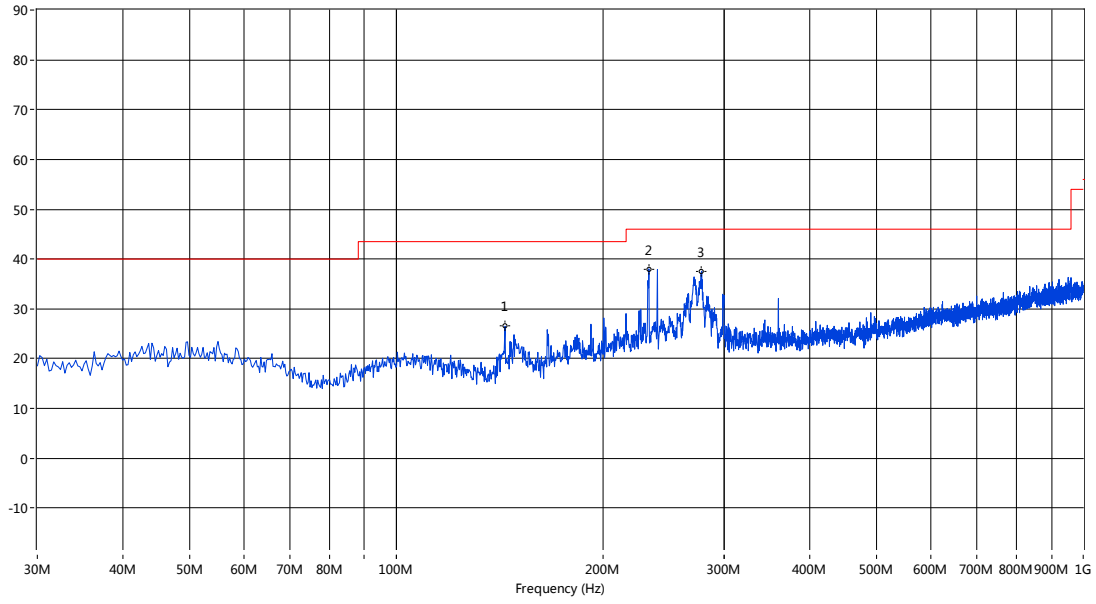
Test Data and Plots(30MHz ~ 10th Harmonic)

GFSK LOW CHANNEL 30MHz to 1GHz, ANT V



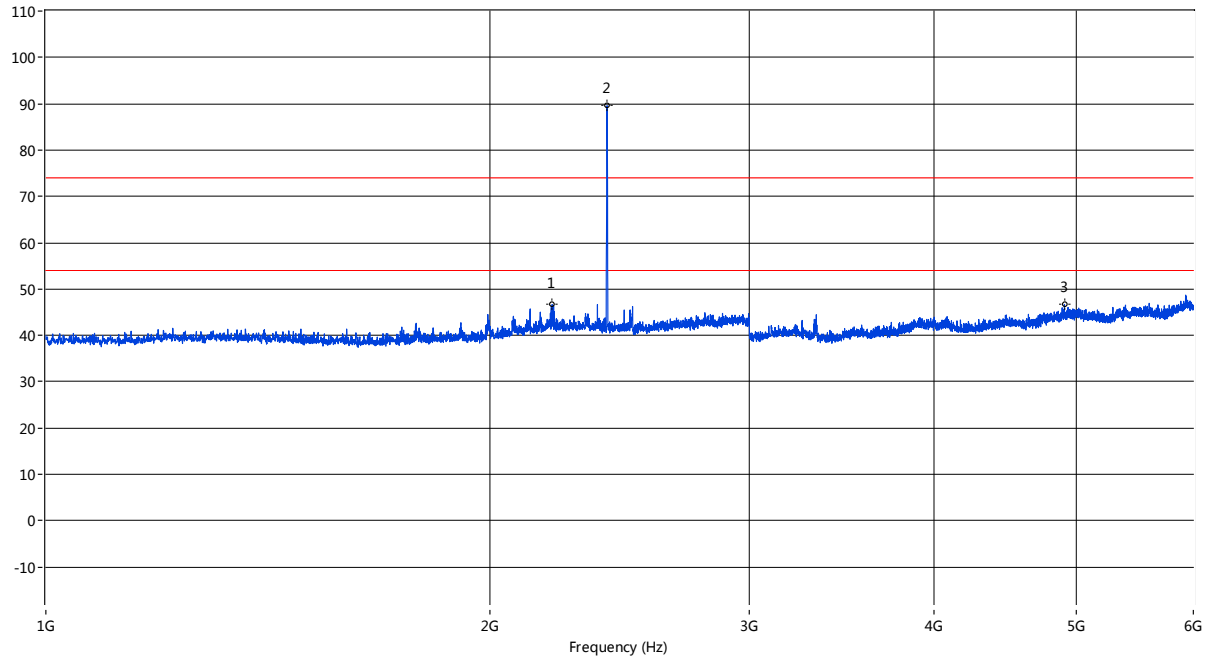
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	34.32	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	29.41	--	--	--	46.0	--	-0.0	Vertical	Pass
299.593	28.91	--	--	--	46.0	--	-0.0	Vertical	Pass

GFSK LOW CHANNEL 30MHz to 1GHz, ANT H



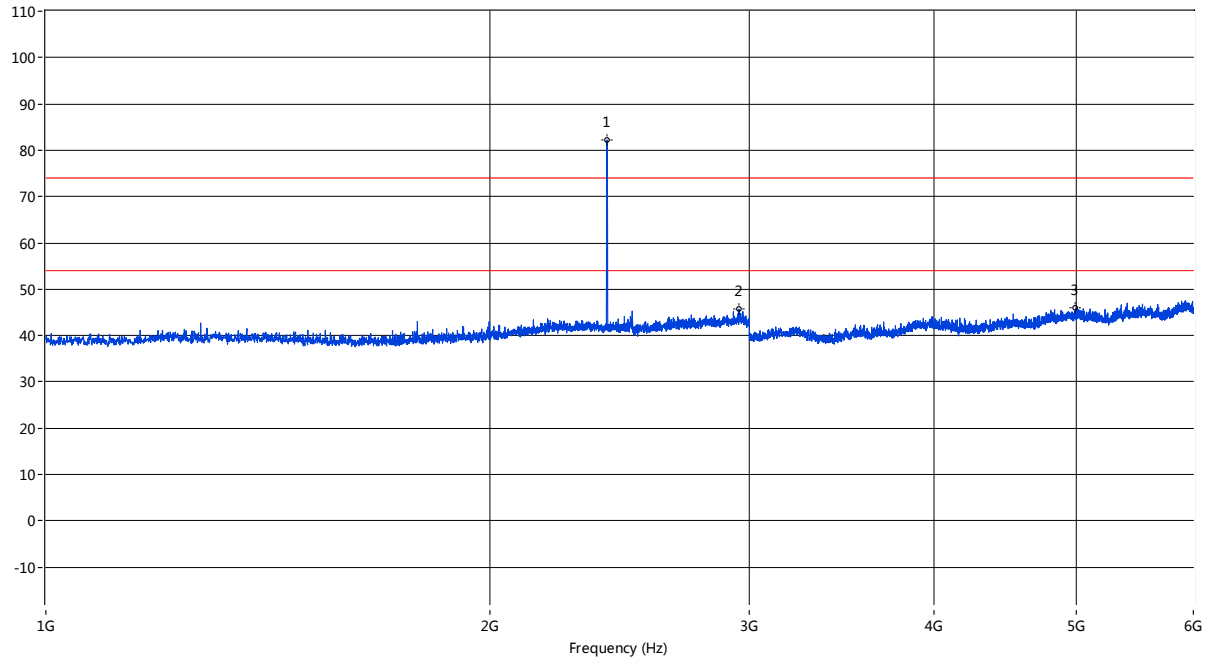
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.51	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	38.04	--	--	--	46.0	--	-0.0	Horizontal	Pass
278.258	37.58	--	--	--	46.0	--	340.4	Horizontal	Pass

GFSK LOW CHANNEL 1GHz to 6GHz, ANT V



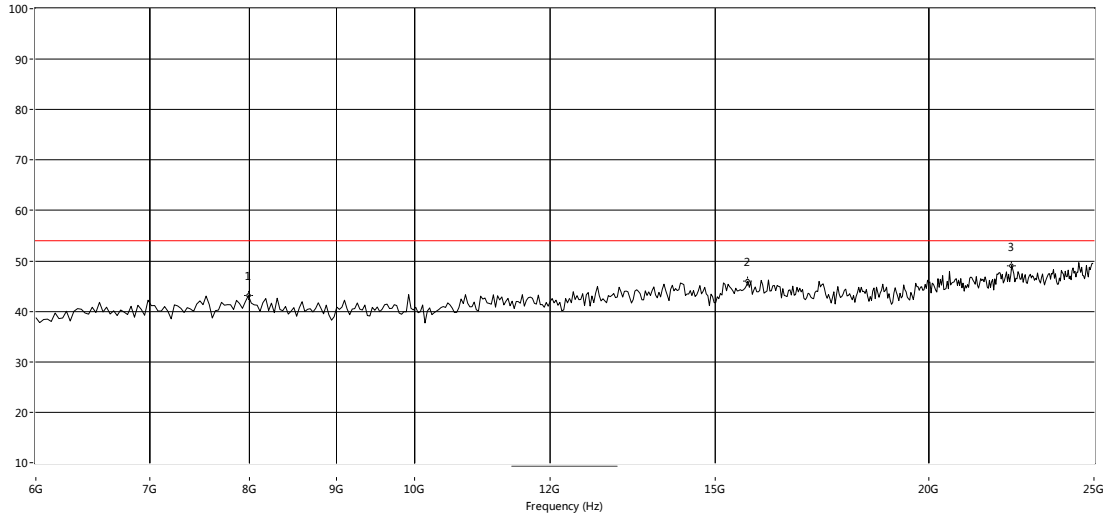
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2204.699	46.66	--	--	74.0	--	54.0	161.2	Vertical	Pass
2402.149	89.57	--	--	--	--	--	12.3	Vertical	--
4906.023	46.65	--	--	74.0	--	54.0	115.7	Vertical	Pass

GFSK LOW CHANNEL 1GHz to 6GHz, ANT H



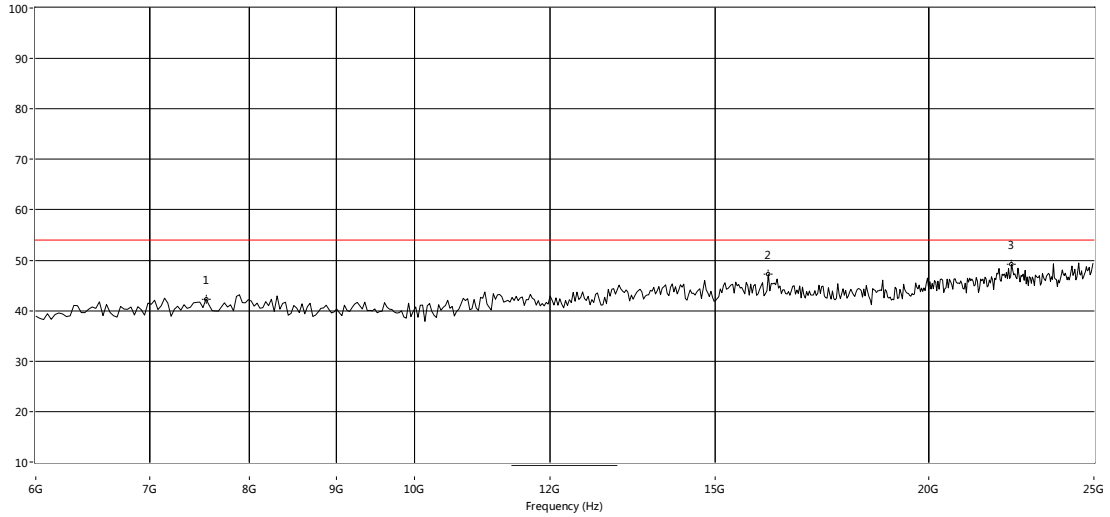
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2401.650	82.12	--	--	--	--	--	223.9	Horizontal	--
2951.012	45.70	--	--	74.0	--	54.0	360.6	Horizontal	Pass
4992.252	45.93	--	--	74.0	--	54.0	304.2	Horizontal	Pass

GFSK LOW CHANNEL 6GHz to 25GHz, ANT V



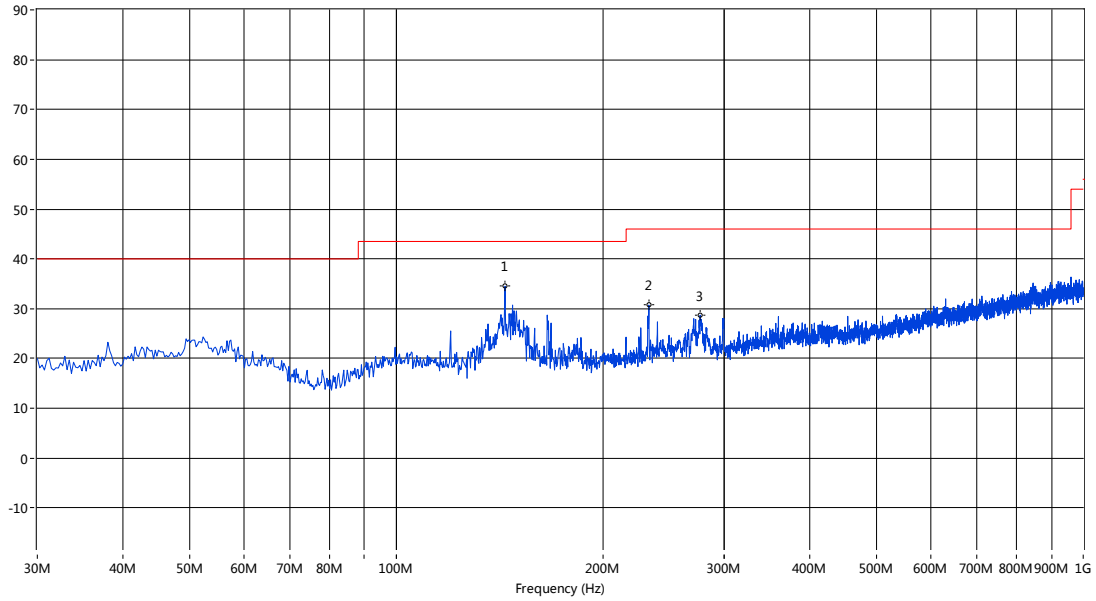
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.13	54.0	10.9	0.0	Vertical	PASS
15673.877	45.98	54.0	8.0	0.0	Vertical	PASS
22376.040	49.10	54.0	4.9	0.0	Vertical	PASS

GFSK LOW CHANNEL 6GHz to 25GHz, ANT H



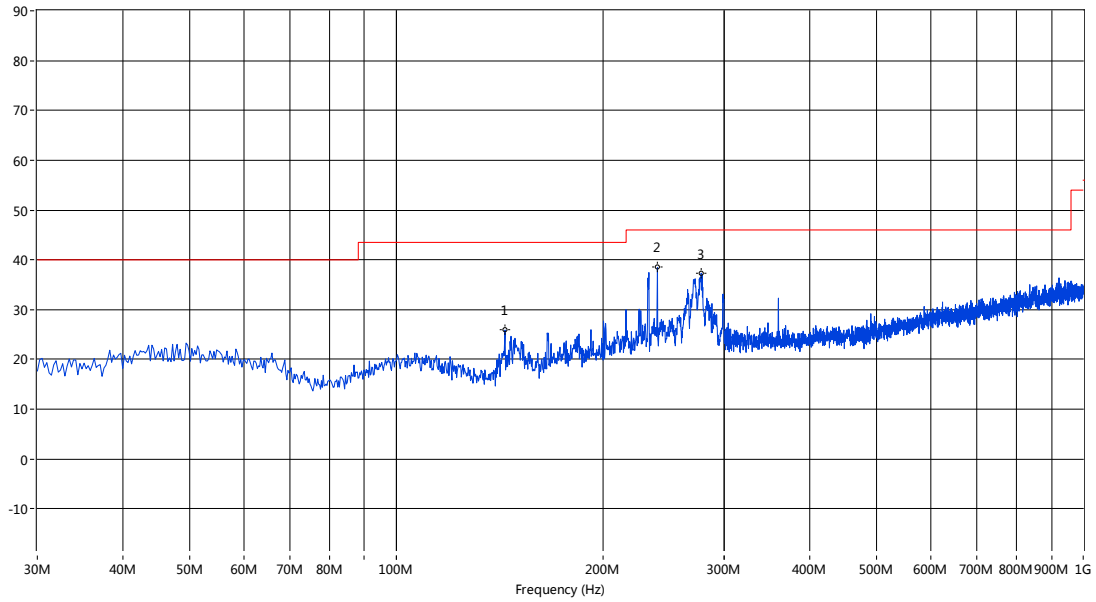
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7549.085	42.34	54.0	11.7	0.0	Horizontal	PASS
16116.473	47.27	54.0	6.7	0.0	Horizontal	PASS
22376.040	49.21	54.0	4.8	0.0	Horizontal	PASS

GFSK MID CHANNEL 30MHz to 1GHz, ANT V



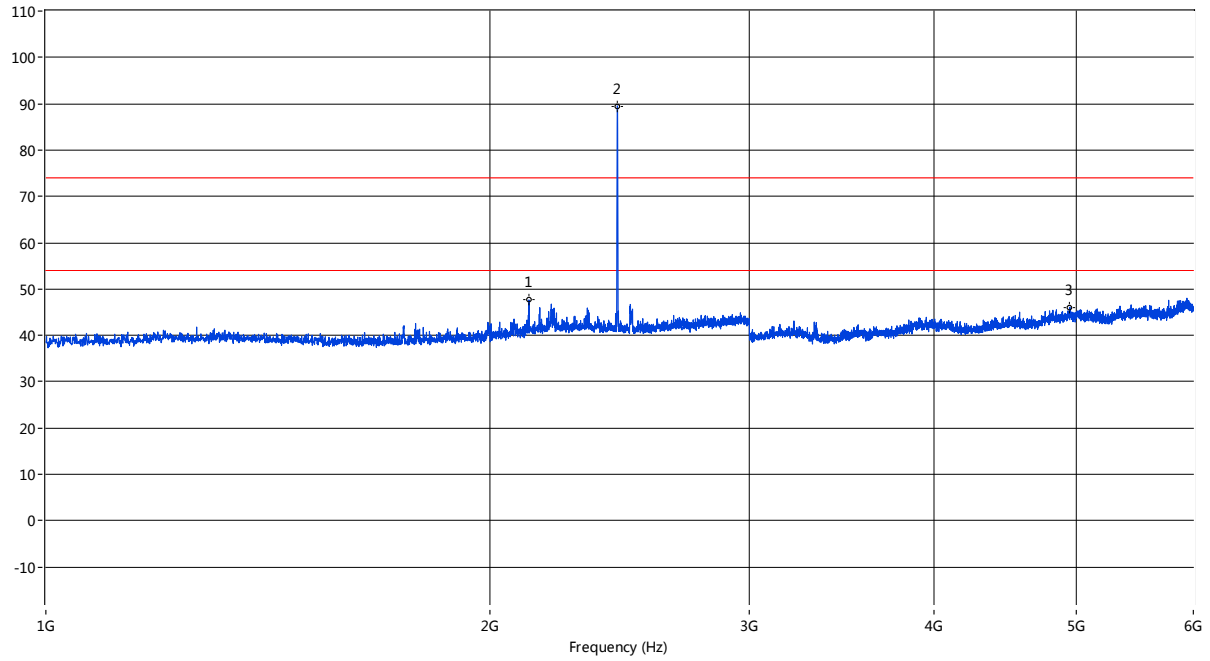
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	34.52	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	30.73	--	--	--	46.0	--	-0.0	Vertical	Pass
276.803	28.70	--	--	--	46.0	--	-0.0	Vertical	Pass

GFSK MID CHANNEL 30MHz to 1GHz, ANT H



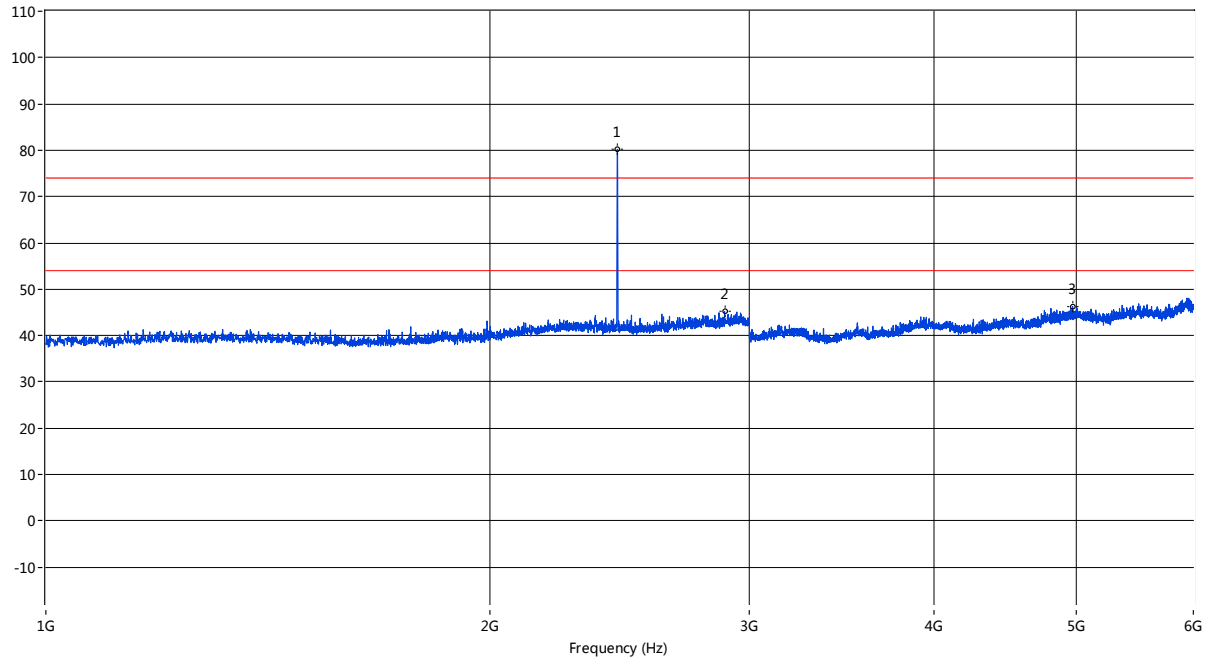
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	25.91	--	--	--	43.5	--	349.7	Horizontal	Pass
239.953	38.47	--	--	--	46.0	--	45.9	Horizontal	Pass
277.773	37.33	--	--	--	46.0	--	334.5	Horizontal	Pass

GFSK MID CHANNEL 1GHz to 6GHz, ANT V



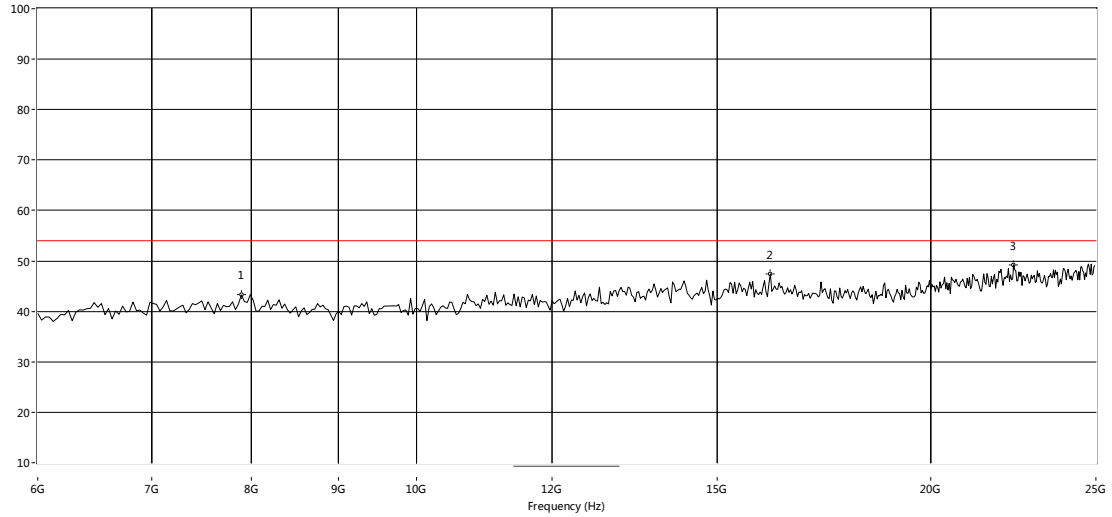
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2126.218	47.65	--	--	74.0	--	54.0	159.8	Vertical	Pass
2440.640	89.29	--	--	--	--	--	334.9	Vertical	--
4948.013	46.10	--	--	74.0	--	54.0	253.5	Vertical	Pass

GFSK MID CHANNEL 1GHz to 6GHz, ANT H



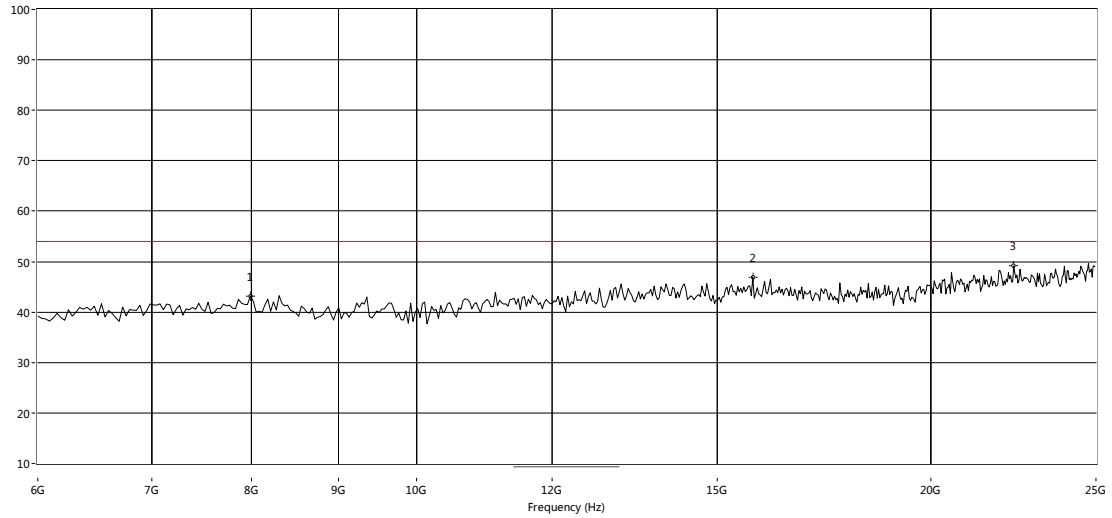
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2441.140	80.20	--	--	--	--	--	221.7	Horizontal	--
2886.028	45.20	--	--	74.0	--	54.0	119.5	Horizontal	Pass
4969.008	46.29	--	--	74.0	--	54.0	215.8	Horizontal	Pass

GFSK MID CHANNEL 6GHz to 25GHz, ANT V



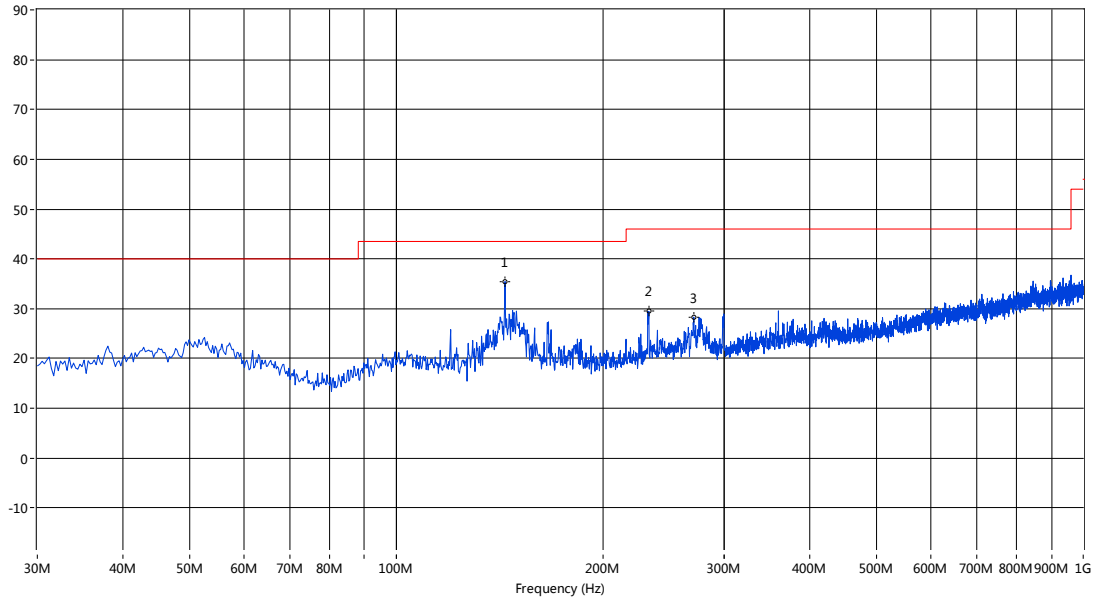
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.27	54.0	10.7	0.0	Vertical	PASS
16116.473	47.44	54.0	6.6	0.0	Vertical	PASS
22376.040	49.25	54.0	4.8	0.0	Vertical	PASS

GFSK MID CHANNEL 6GHz to 25GHz, ANT H



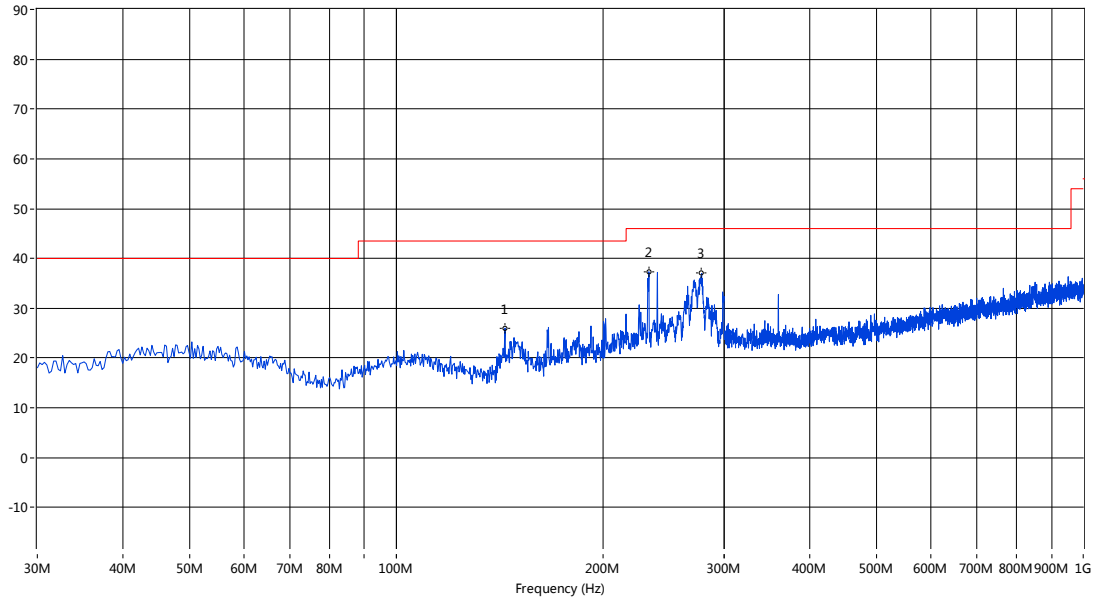
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.19	54.0	10.8	0.0	Horizontal	PASS
15737.105	46.96	54.0	7.0	0.0	Horizontal	PASS
22376.040	49.18	54.0	4.8	0.0	Horizontal	PASS

GFSK HIGH CHANNEL 30MHz to 1GHz, ANT V



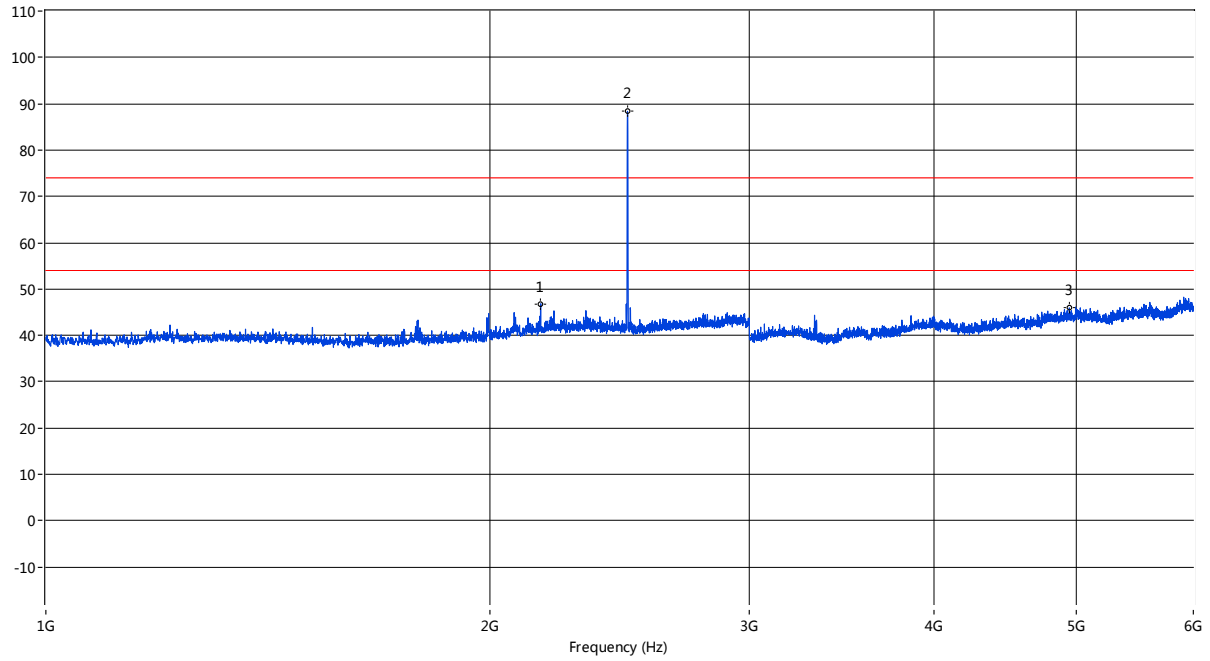
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.47	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	29.45	--	--	--	46.0	--	-0.0	Vertical	Pass
270.985	28.33	--	--	--	46.0	--	59.3	Vertical	Pass

GFSK HIGH CHANNEL 30MHz to 1GHz, ANT H



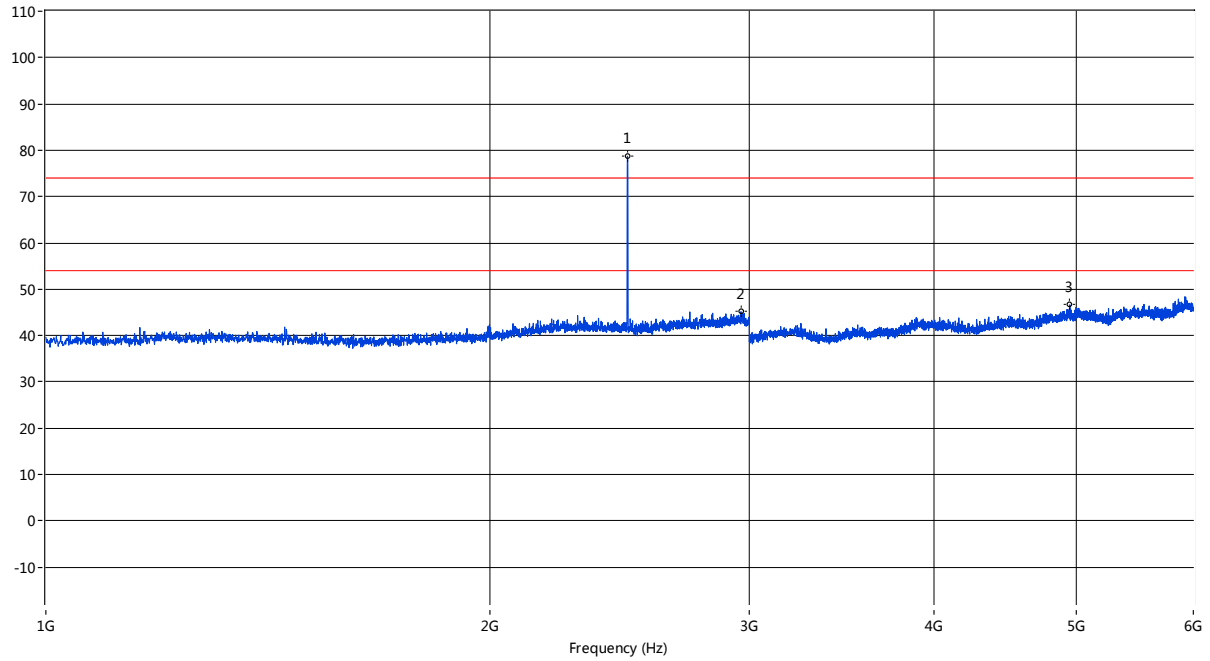
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.03	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	37.33	--	--	--	46.0	--	-0.0	Horizontal	Pass
278.258	37.00	--	--	--	46.0	--	340.4	Horizontal	Pass

GFSK HIGH CHANNEL 1GHz to 6GHz, ANT V



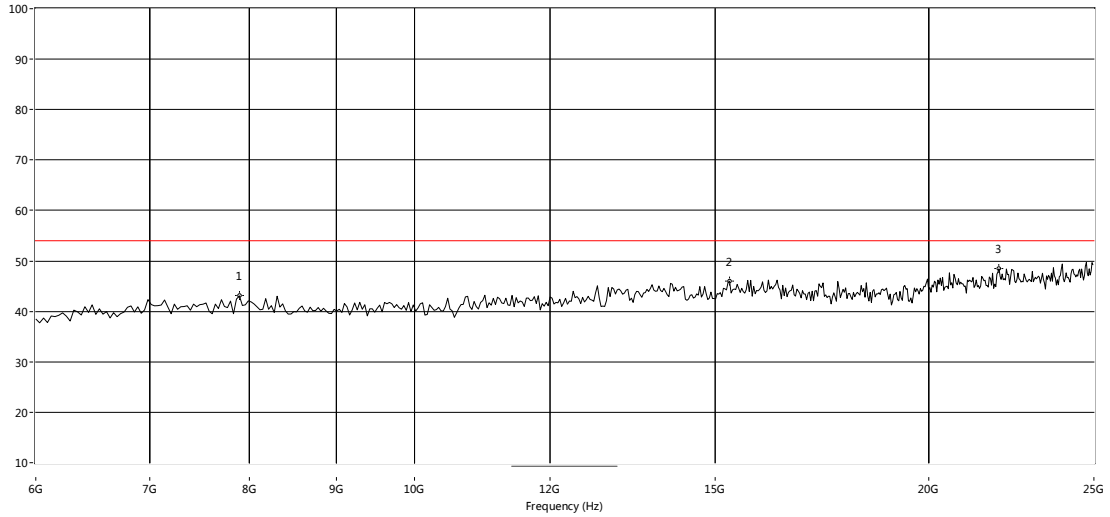
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2165.709	46.84	--	--	74.0	--	54.0	159.9	Vertical	Pass
2480.130	88.36	--	--	--	--	--	356.6	Vertical	--
4943.514	45.94	--	--	74.0	--	54.0	0.4	Vertical	Pass

GFSK HIGH CHANNEL 1GHz to 6GHz, ANT H



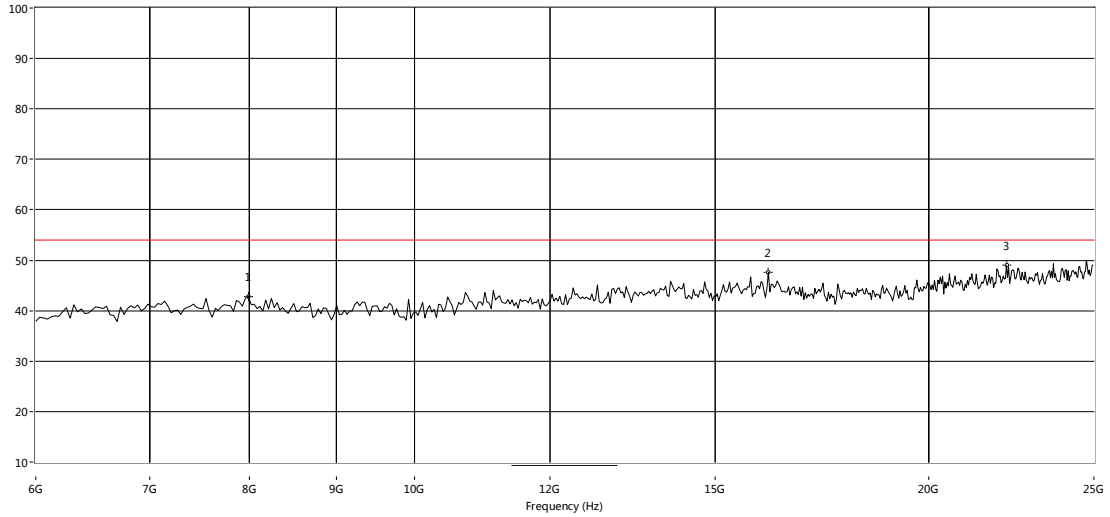
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2479.630	78.70	--	--	--	--	--	309.7	Horizontal	--
2960.510	45.15	--	--	74.0	--	54.0	60.2	Horizontal	Pass
4948.013	46.63	--	--	74.0	--	54.0	142.6	Horizontal	Pass

GFSK HIGH CHANNEL 6GHz to 25GHz, ANT V



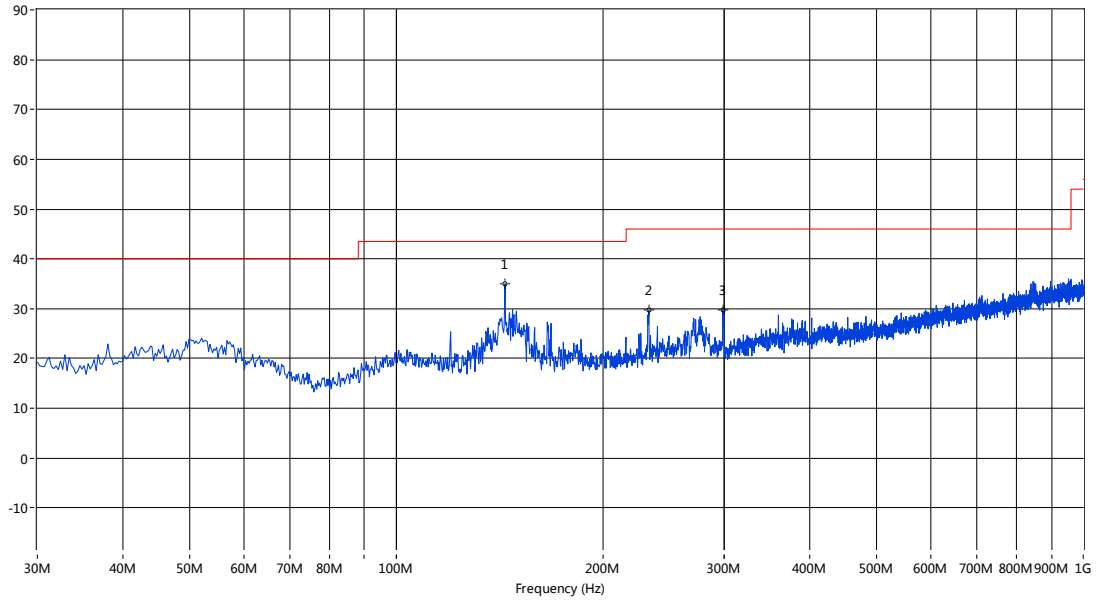
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.07	54.0	10.9	0.0	Vertical	PASS
15294.509	46.00	54.0	8.0	0.0	Vertical	PASS
21996.672	48.44	54.0	5.6	0.0	Vertical	PASS

GFSK HIGH CHANNEL 6GHz to 25GHz, ANT H



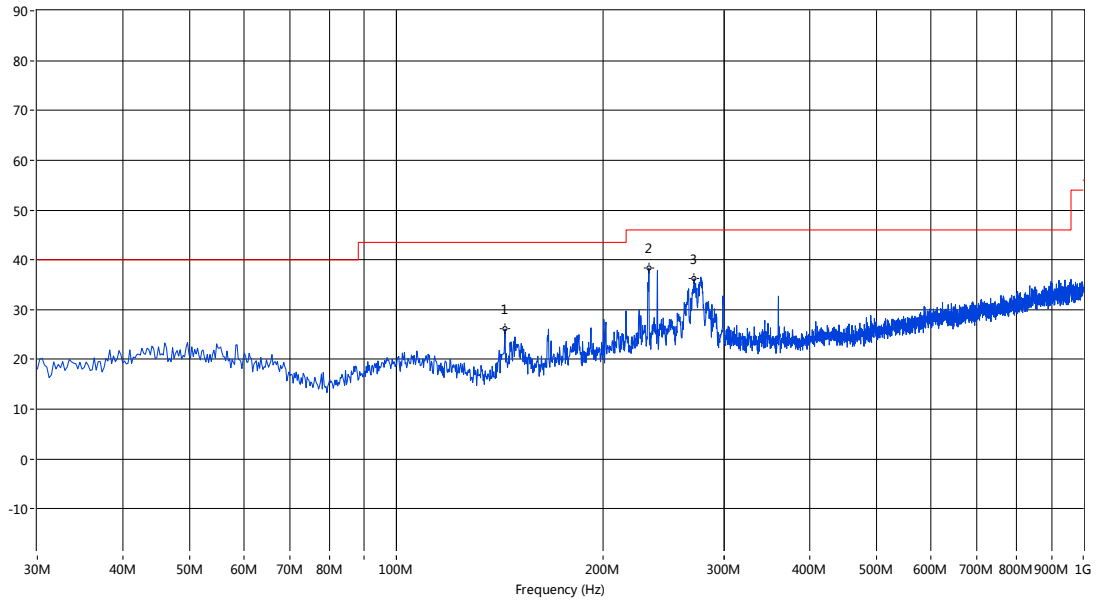
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	42.87	54.0	11.1	0.0	Horizontal	PASS
16116.473	47.55	54.0	6.5	0.0	Horizontal	PASS
22217.970	48.98	54.0	5.0	0.0	Horizontal	PASS

Π/4-DQPSK LOW CHANNEL 30MHz to 1GHz, ANT V



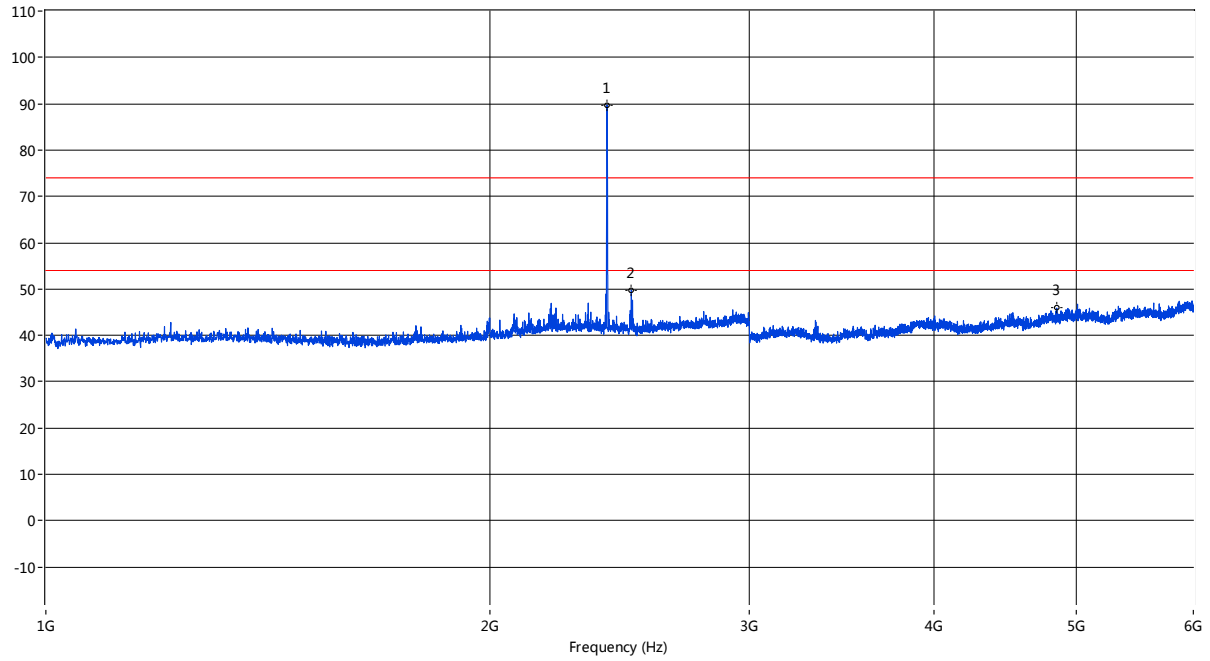
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.05	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	29.70	--	--	--	46.0	--	-0.0	Vertical	Pass
298.623	29.81	--	--	--	46.0	--	-0.0	Vertical	Pass

Π/4-DQPSK LOW CHANNEL 30MHz to 1GHz, ANT H



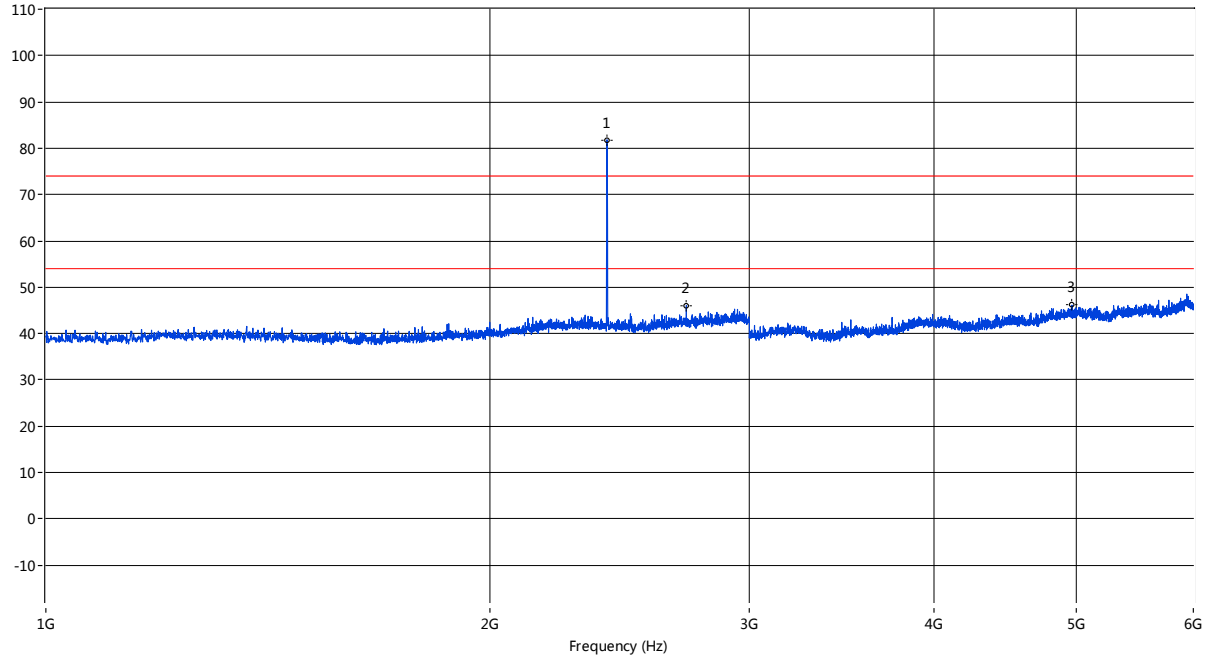
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.12	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	38.36	--	--	--	46.0	--	-0.0	Horizontal	Pass
271.227	36.24	--	--	--	46.0	--	358.2	Horizontal	Pass

Π/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT V



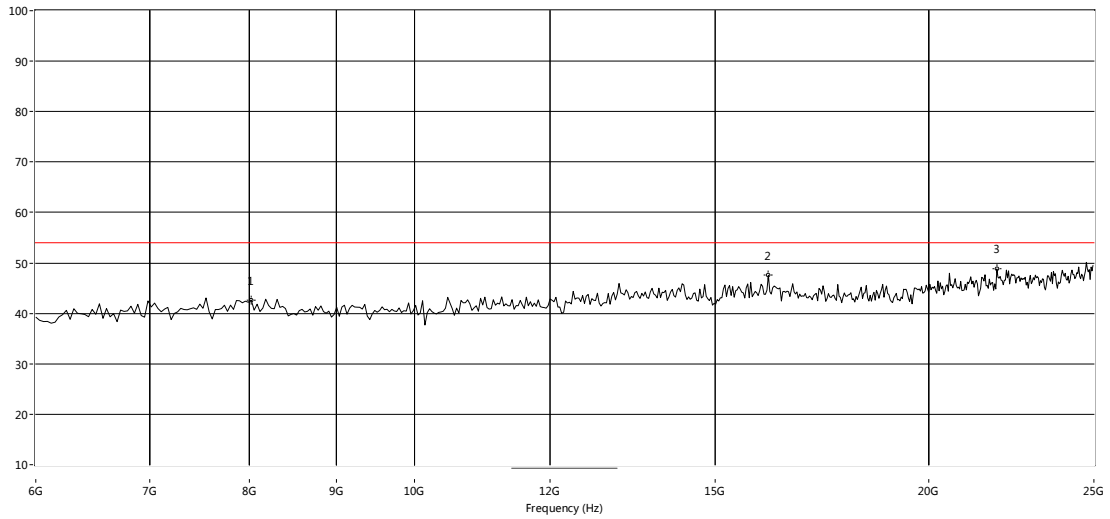
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2401.650	89.60	--	--	--	--	--	12.8	Vertical	--
2494.626	49.75	--	--	74.0	--	54.0	170.8	Vertical	Pass
4848.288	45.90	--	--	74.0	--	54.0	258.0	Vertical	Pass

Π/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT H



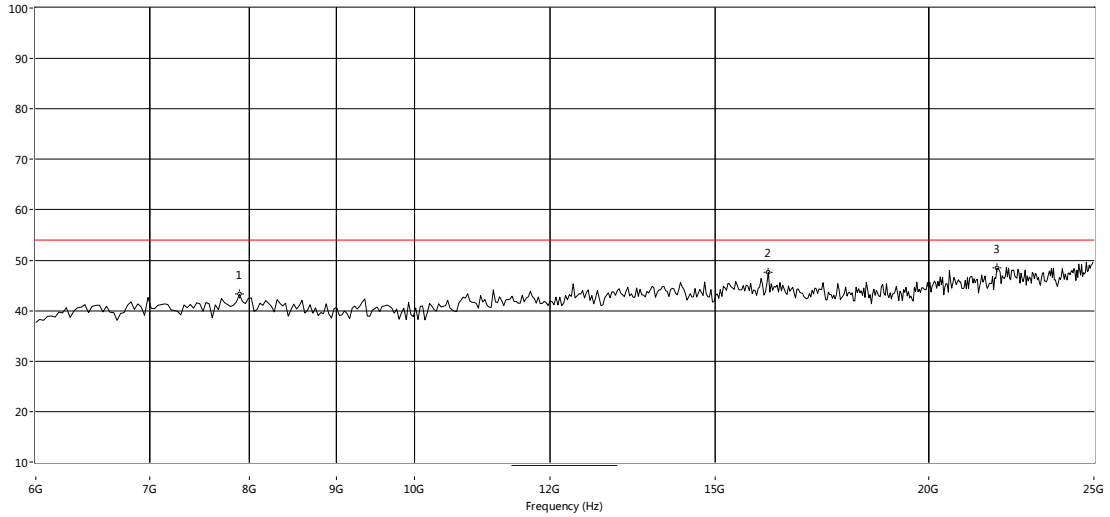
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2401.650	81.78	--	--	--	--	--	1.9	Horizontal	--
2718.570	46.06	--	--	74.0	--	54.0	8.9	Horizontal	Pass
4963.759	46.14	--	--	74.0	--	54.0	240.5	Horizontal	Pass

Π/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT V



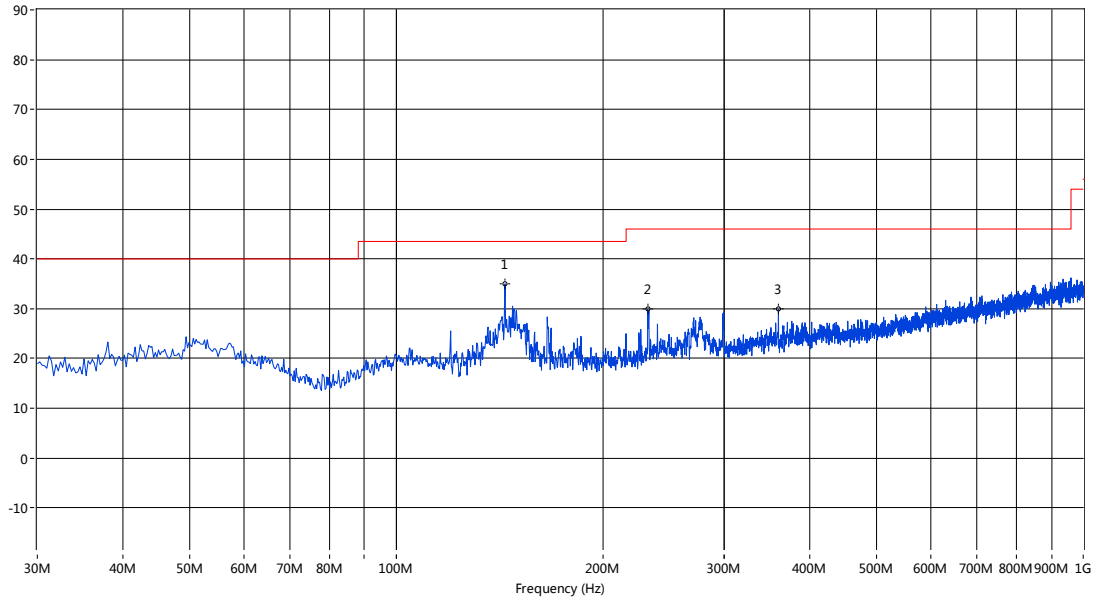
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
8023.295	42.63	54.0	11.4	0.0	Vertical	PASS
16116.473	47.57	54.0	6.4	0.0	Vertical	PASS
21933.444	48.82	54.0	5.2	0.0	Vertical	PASS

Π/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT H



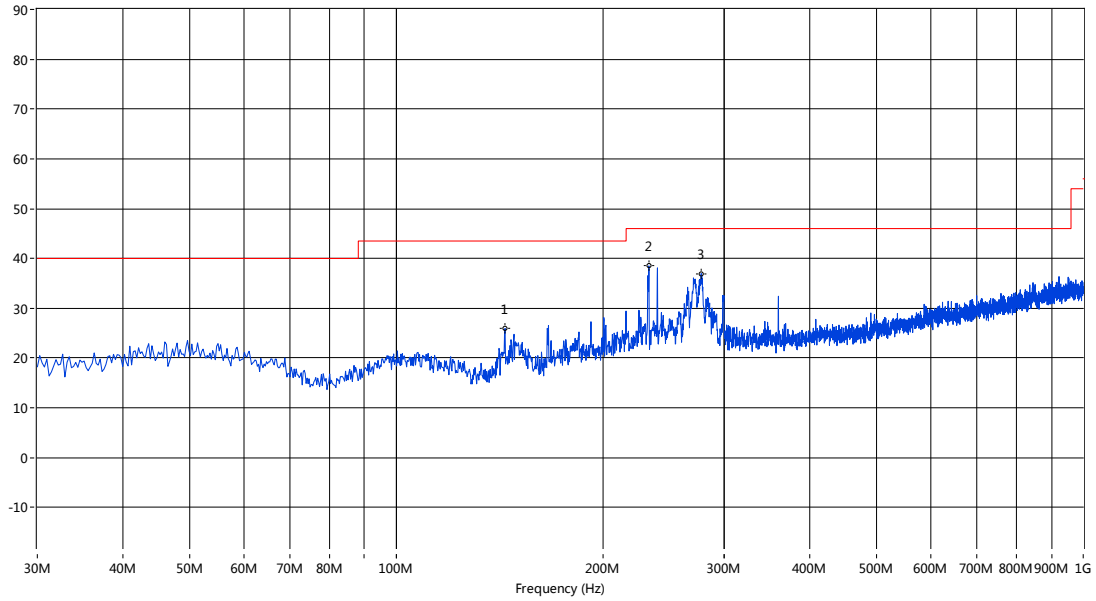
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.24	54.0	10.8	0.0	Horizontal	PASS
16116.473	47.65	54.0	6.4	0.0	Horizontal	PASS
21933.444	48.46	54.0	5.5	0.0	Horizontal	PASS

Π/4-DQPSK MID CHANNEL 30MHz to 1GHz, ANT V



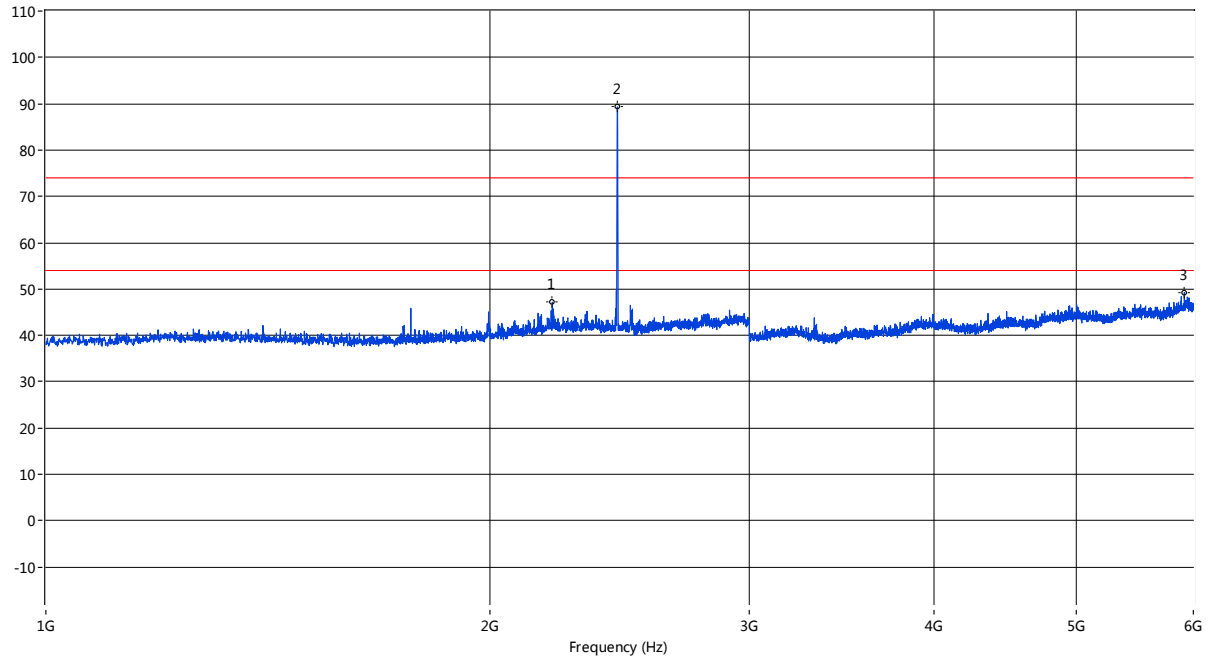
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.01	--	--	--	43.5	--	349.7	Vertical	Pass
232.194	29.87	--	--	--	46.0	--	64.7	Vertical	Pass
359.960	29.86	--	--	--	46.0	--	43.3	Vertical	Pass

Π/4-DQPSK MID CHANNEL 30MHz to 1GHz, ANT H



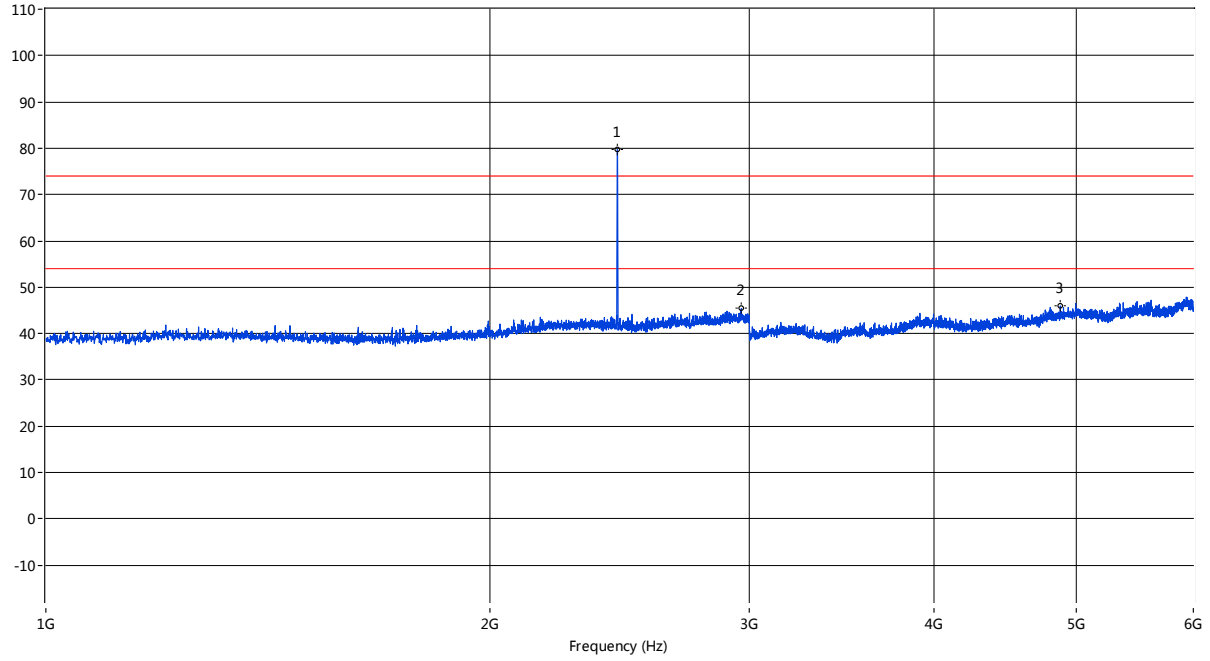
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	25.96	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	38.50	--	--	--	46.0	--	-0.0	Horizontal	Pass
277.773	36.97	--	--	--	46.0	--	334.5	Horizontal	Pass

Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT V



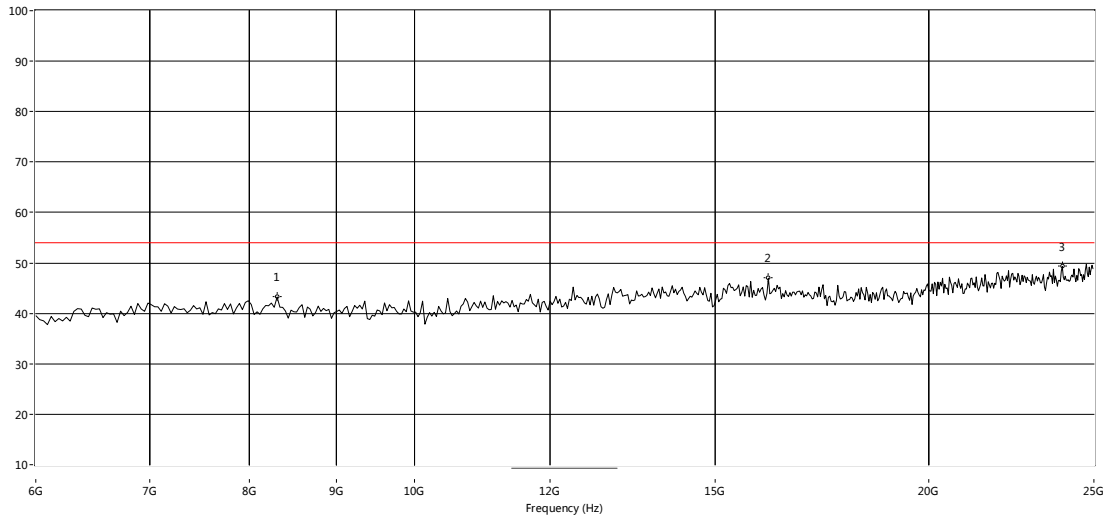
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2205.199	47.15	--	--	74.0	--	54.0	160.8	Vertical	Pass
2441.140	89.33	--	--	--	--	--	360.0	Vertical	--
5916.771	49.28	-	--	74.0	--	54.0	1.2	Vertical	Pass

Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT H



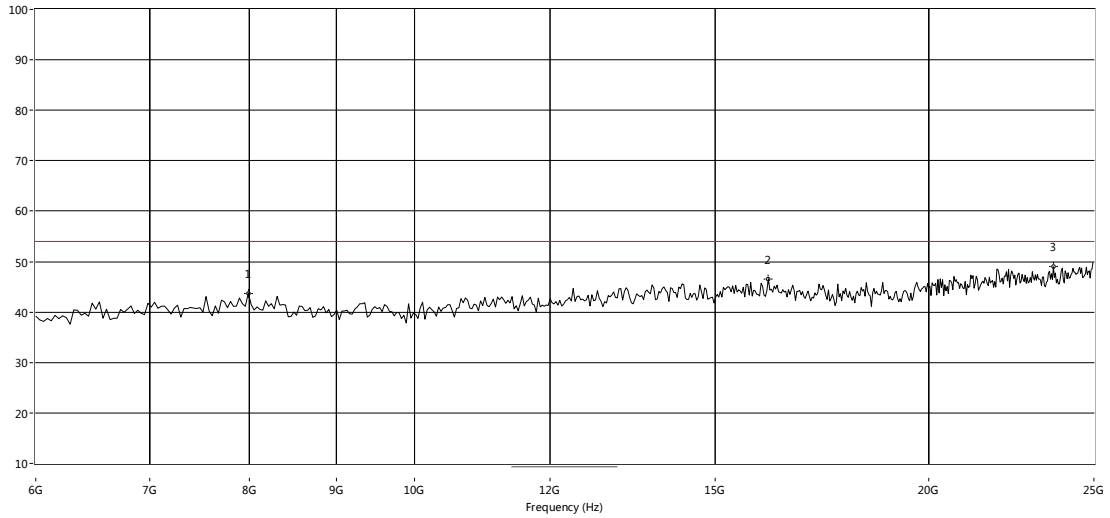
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2440.640	79.70	--	--	--	--	--	270.3	Horizontal	--
2962.509	45.39	--	--	74.0	--	54.0	230.4	Horizontal	Pass
4875.281	45.97	--	--	74.0	--	54.0	91.1	Horizontal	Pass

Π/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT V



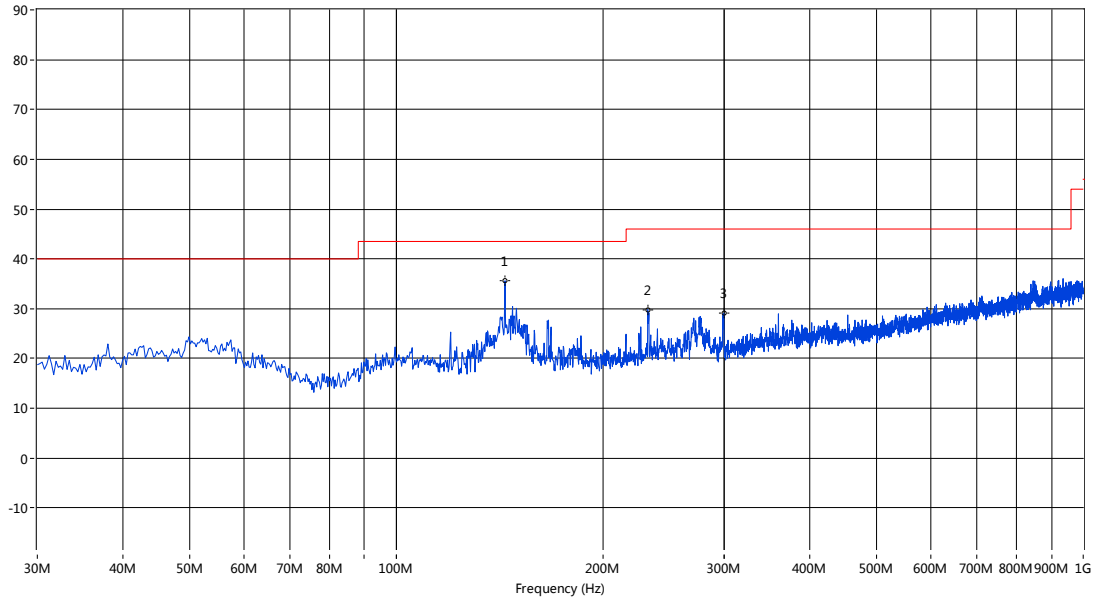
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
8307.820	43.26	54.0	10.7	0.0	Vertical	PASS
16116.473	46.99	54.0	7.0	0.0	Vertical	PASS
23956.739	49.31	54.0	4.7	0.0	Vertical	PASS

Π/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT H



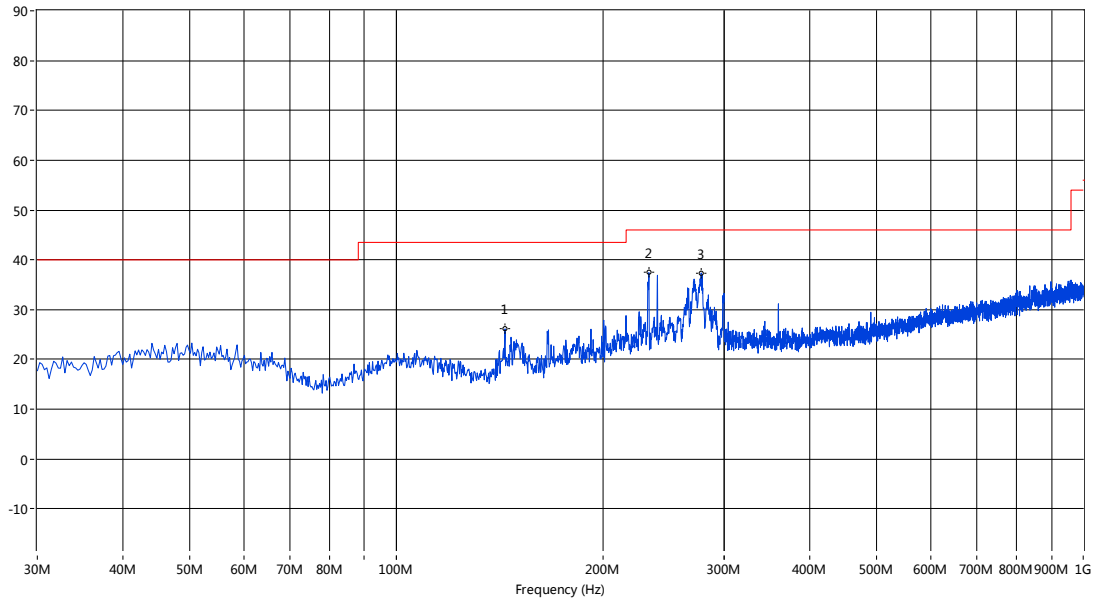
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.77	54.0	10.2	0.0	Horizontal	PASS
16116.473	46.61	54.0	7.4	0.0	Horizontal	PASS
23672.213	48.97	54.0	5.0	0.0	Horizontal	PASS

Π/4-DQPSK HIGH CHANNEL 30MHz to 1GHz, ANT V



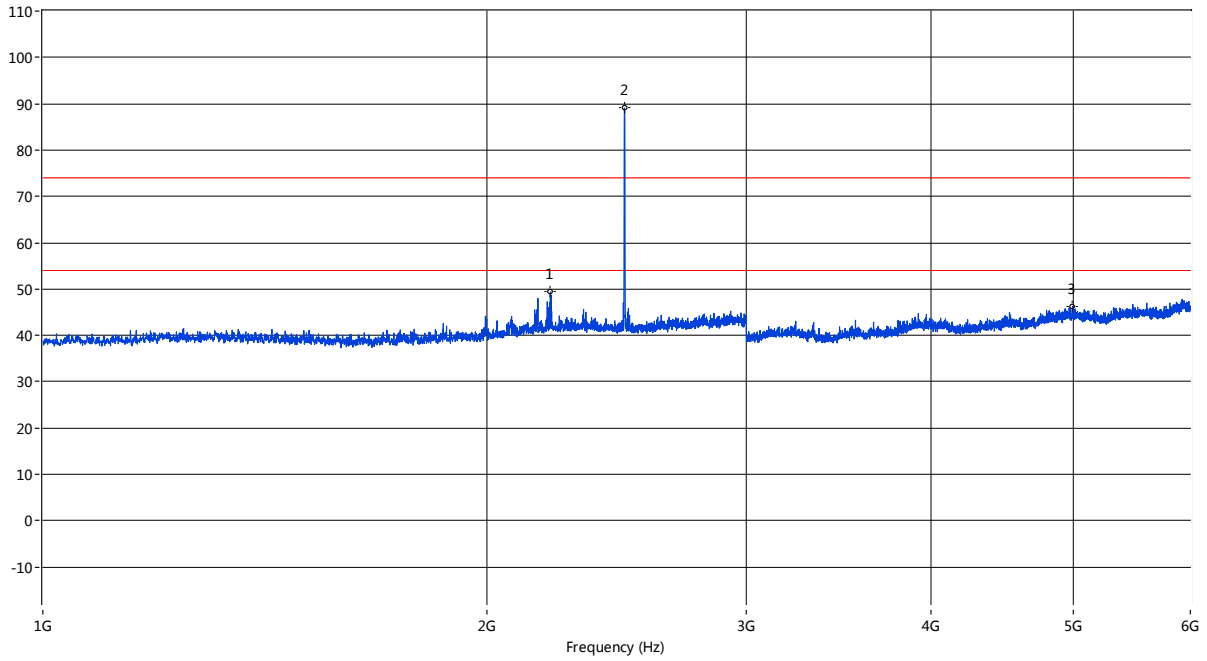
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.62	--	--	--	43.5	--	349.7	Vertical	Pass
232.194	29.81	--	--	--	46.0	--	64.7	Vertical	Pass
299.593	29.02	--	--	--	46.0	--	-0.0	Vertical	Pass

Π/4-DQPSK HIGH CHANNEL 30MHz to 1GHz, ANT H



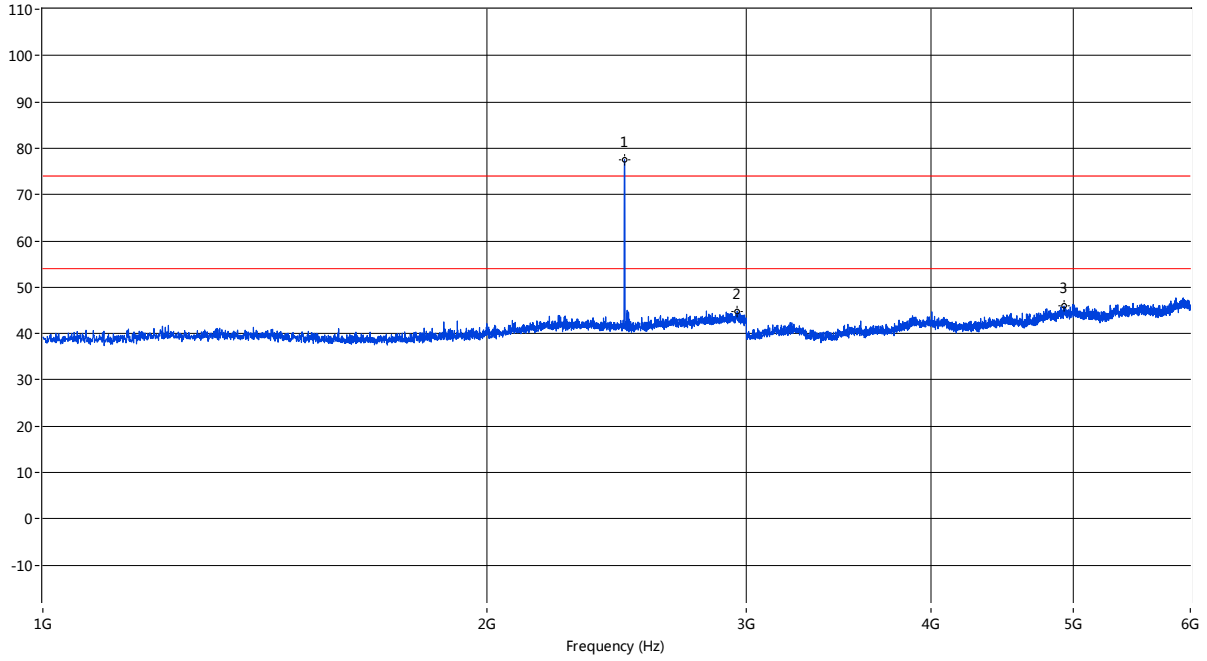
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.15	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	37.44	--	--	--	46.0	--	-0.0	Horizontal	Pass
277.773	37.37	--	--	--	46.0	--	334.5	Horizontal	Pass

Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT V



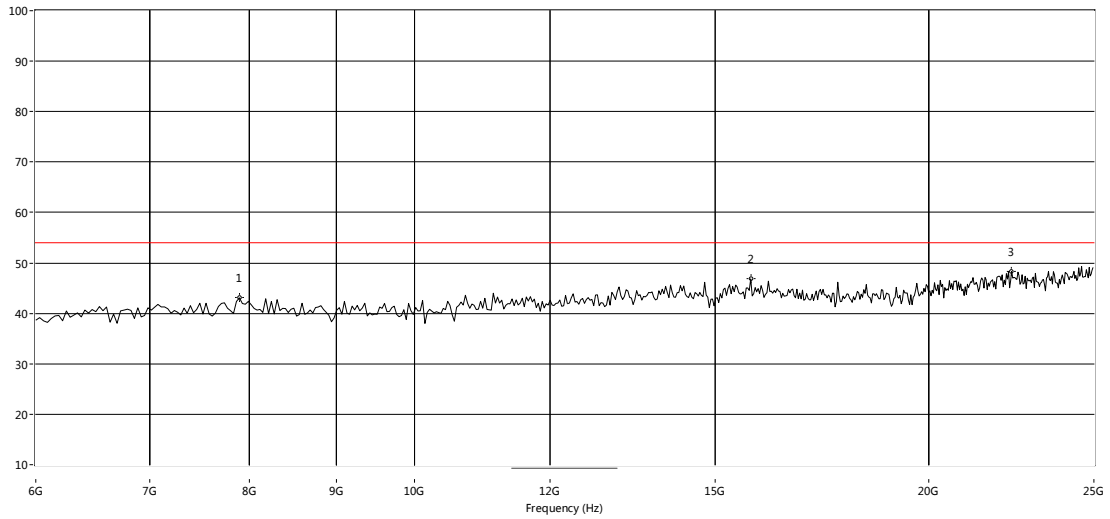
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2209.198	49.37	--	--	74.0	--	54.0	164.6	Vertical	Pass
2479.630	89.06	--	--	--	--	--	3.3	Vertical	--
4991.502	46.19	--	--	74.0	--	54.0	291.9	Vertical	Pass

Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT H



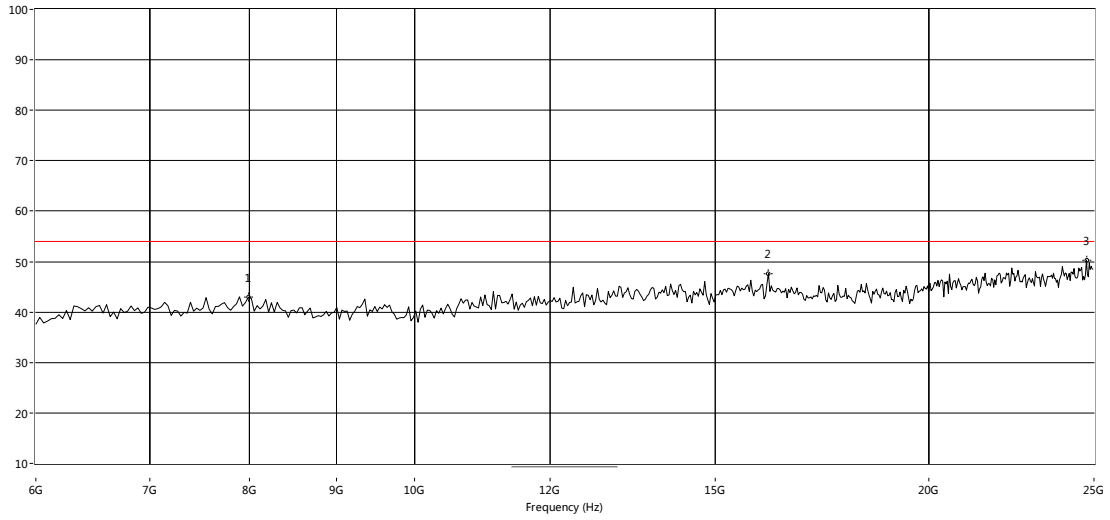
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2480.130	77.61	--	--	--	--	--	2 2.0	Horizontal	--
2957.011	44.85	--	--	74.0	--	54.0	314.5	Horizontal	Pass
4927.018	45.93	--	--	74.0	--	54.0	90.8	Horizontal	Pass

Π/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT V



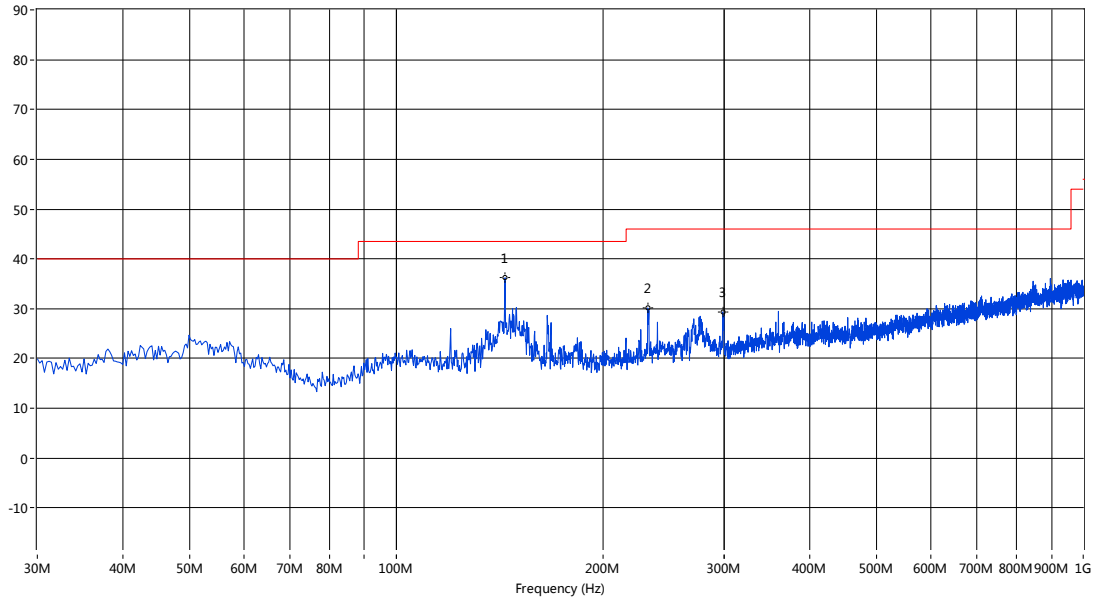
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.08	54.0	10.9	0.0	Vertical	PASS
15737.105	46.85	54.0	7.2	0.0	Vertical	PASS
22376.040	48.32	54.0	5.7	0.0	Vertical	PASS

Π/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT H



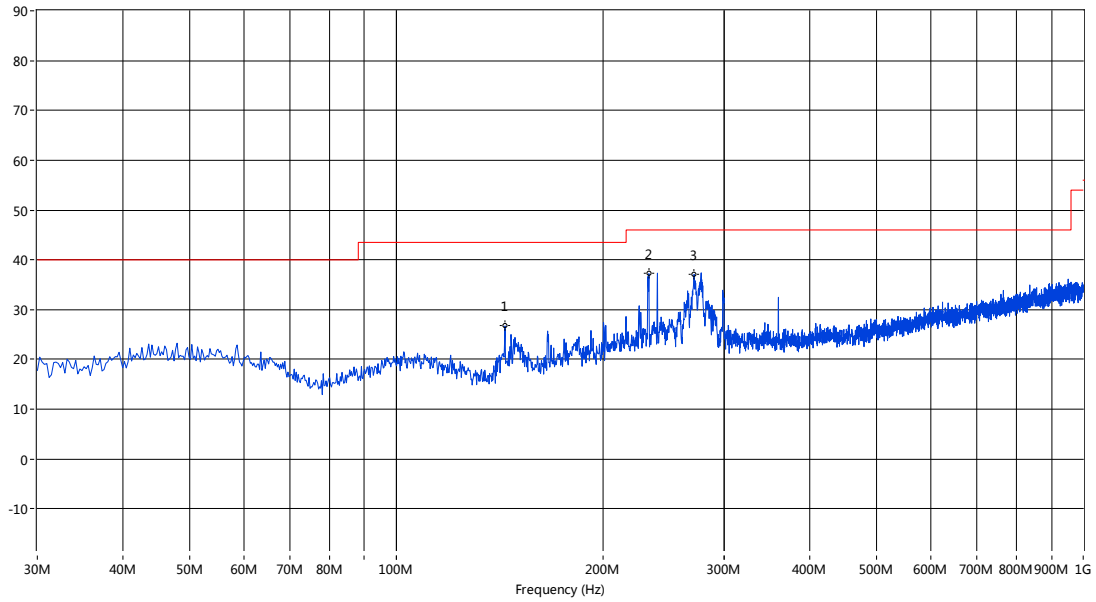
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	42.94	54.0	11.1	0.0	Horizontal	PASS
16116.473	47.64	54.0	6.4	0.0	Horizontal	PASS
24747.088	50.32	54.0	3.7	0.0	Horizontal	PASS

8-DPSK LOW CHANNEL 30MHz to 1GHz, ANT V



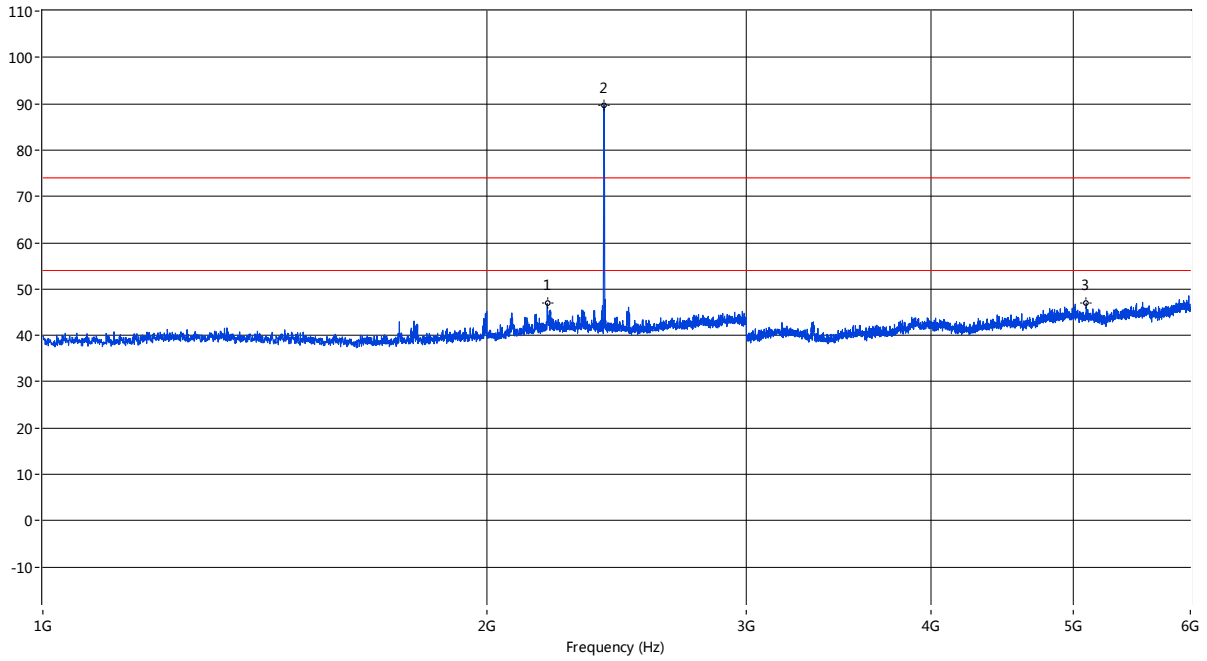
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	36.21	--	--	--	43.5	--	349.7	Vertical	Pass
232.194	30.16	--	--	--	46.0	--	64.7	Vertical	Pass
298.623	29.35	--	--	--	46.0	--	-0.0	Vertical	Pass

8-DPSK LOW CHANNEL 30MHz to 1GHz, ANT H



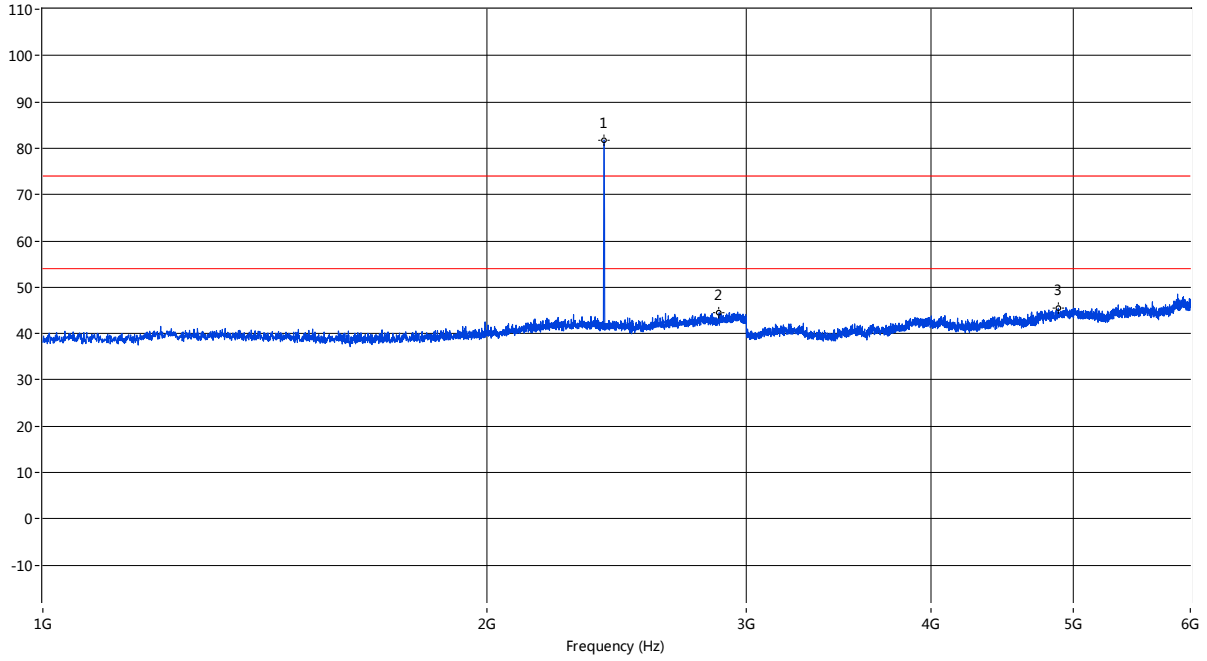
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.72	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	37.23	--	--	--	46.0	--	-0.0	Horizontal	Pass
271.227	37.08	--	--	--	46.0	--	358.2	Horizontal	Pass

8-DPSK LOW CHANNEL 1GHz to 6GHz, ANT V



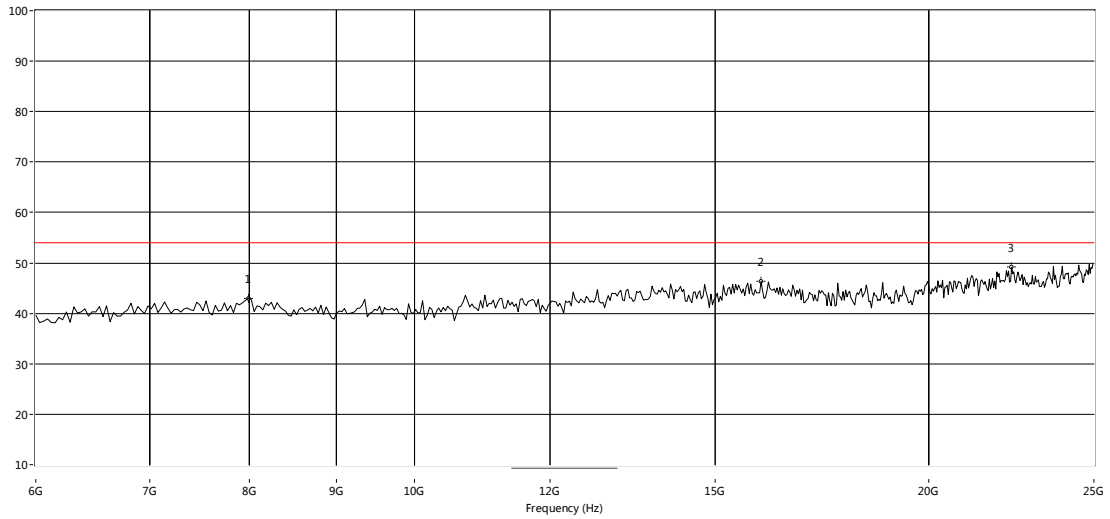
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2198.200	46.86	--	--	74.0	--	54.0	162.2	Vertical	Pass
2401.650	89.66	--	--	--	--	--	13.7	Vertical	--
5100.975	46.98	--	--	74.0	--	54.0	81.4	Vertical	Pass

8-DPSK LOW CHANNEL 1GHz to 6GHz, ANT H



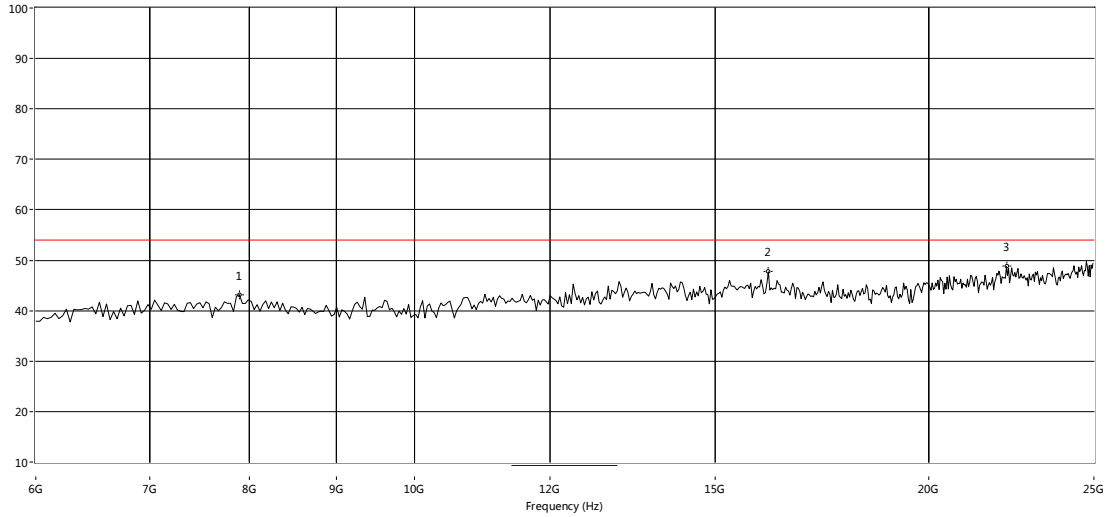
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2401.650	81.72	--	--	--	--	--	1.3	Horizontal	--
2875.031	44.50	--	--	74.0	--	54.0	172.3	Horizontal	Pass
4882.779	45.48	--	--	74.0	--	54.0	179.9	Horizontal	Pass

8-DPSK LOW CHANNEL 6GHz to 25GHz, ANT V



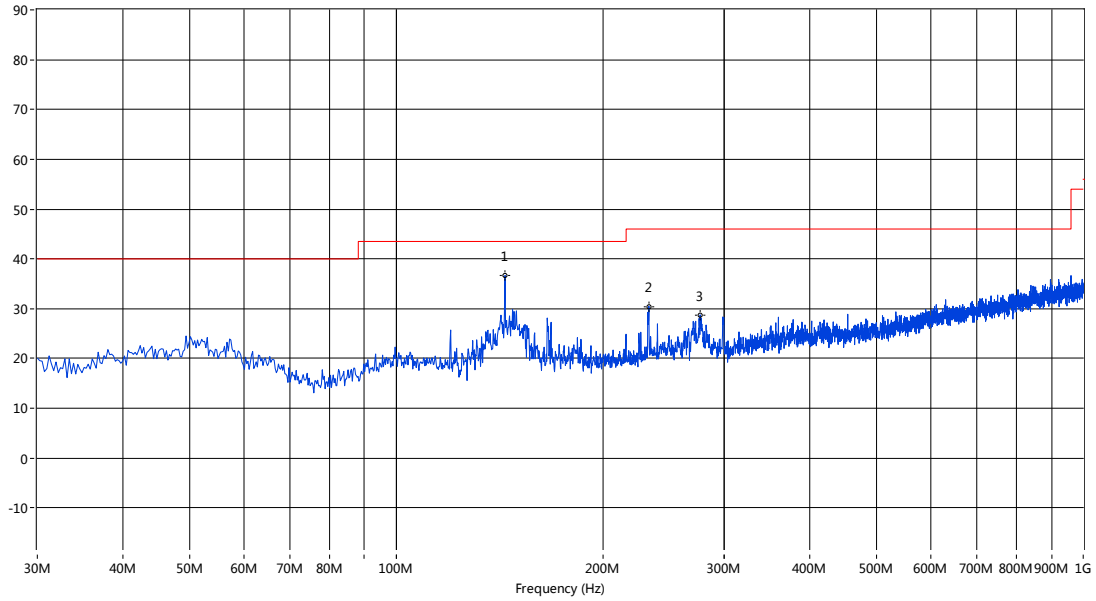
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.01	54.0	11.0	0.0	Vertical	PASS
15958.403	46.31	54.0	7.7	0.0	Vertical	PASS
22376.040	49.14	54.0	4.9	0.0	Vertical	PASS

8-DPSK LOW CHANNEL 6GHz to 25GHz, ANT H



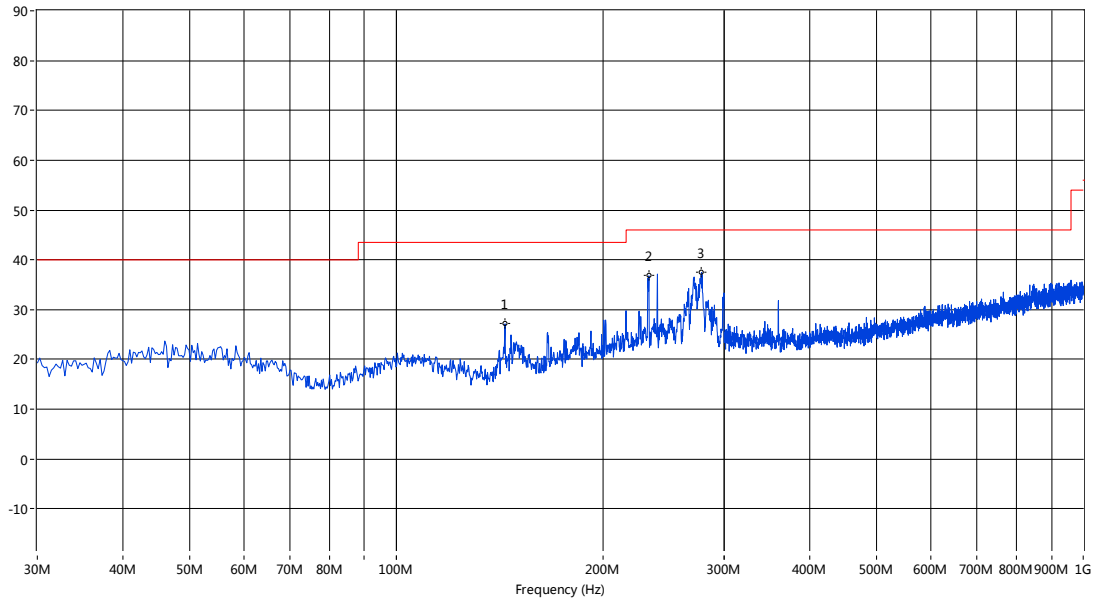
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.19	54.0	10.8	0.0	Horizontal	PASS
16116.473	47.70	54.0	6.3	0.0	Horizontal	PASS
22217.970	48.79	54.0	5.2	0.0	Horizontal	PASS

8-DPSK MID CHANNEL 30MHz to 1GHz, ANT V



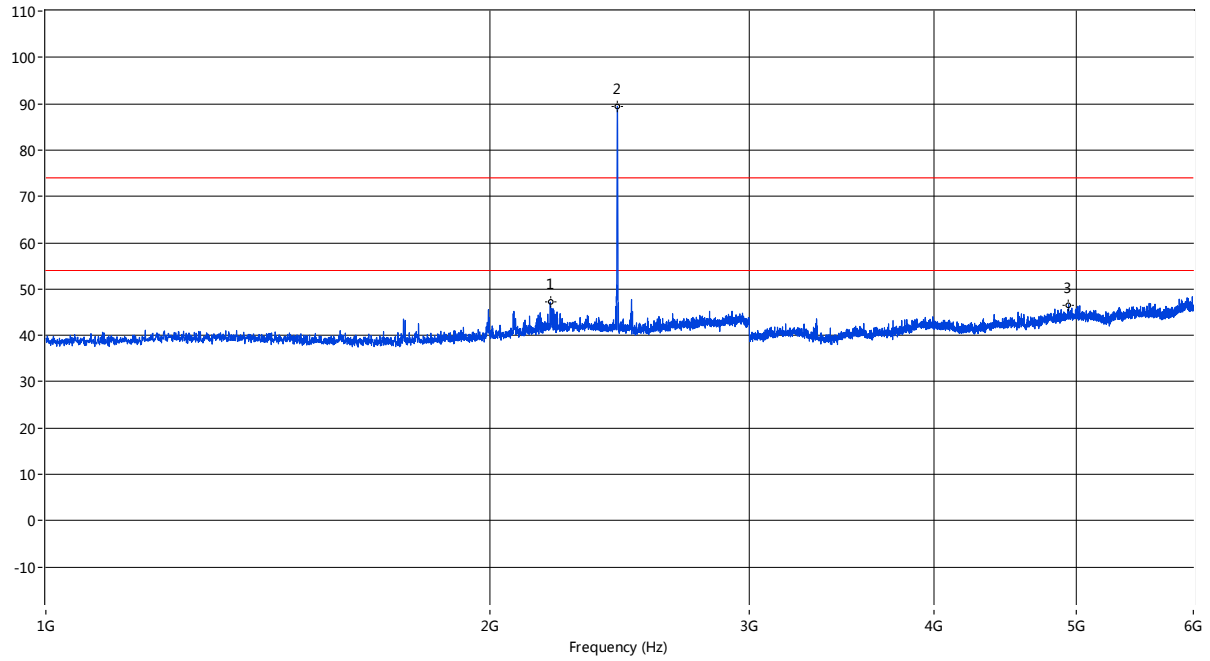
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	36.68	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	30.48	--	--	--	46.0	--	-0.0	Vertical	Pass
276.803	28.77	--	--	--	46.0	--	-0.0	Vertical	Pass

8-DPSK MID CHANNEL 30MHz to 1GHz, ANT H



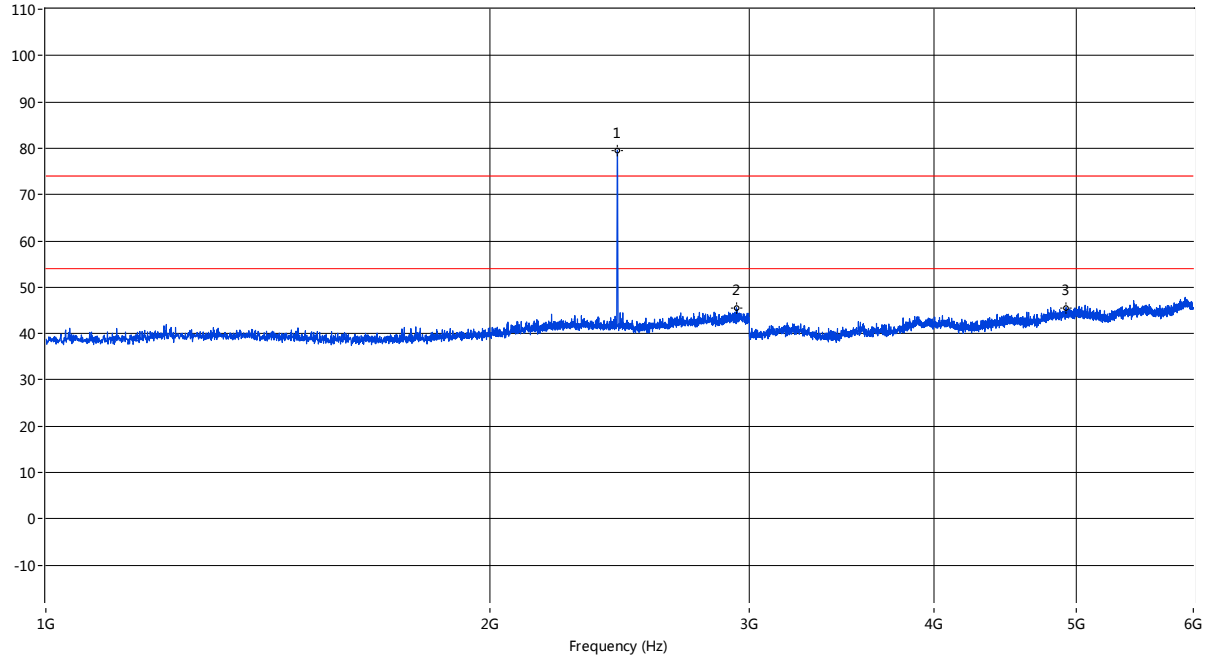
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	27.15	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	36.79	--	--	--	46.0	--	-0.0	Horizontal	Pass
278.258	37.45	--	--	--	46.0	--	340.4	Horizontal	Pass

8-DPSK MID CHANNEL 1GHz to 6GHz, ANT V



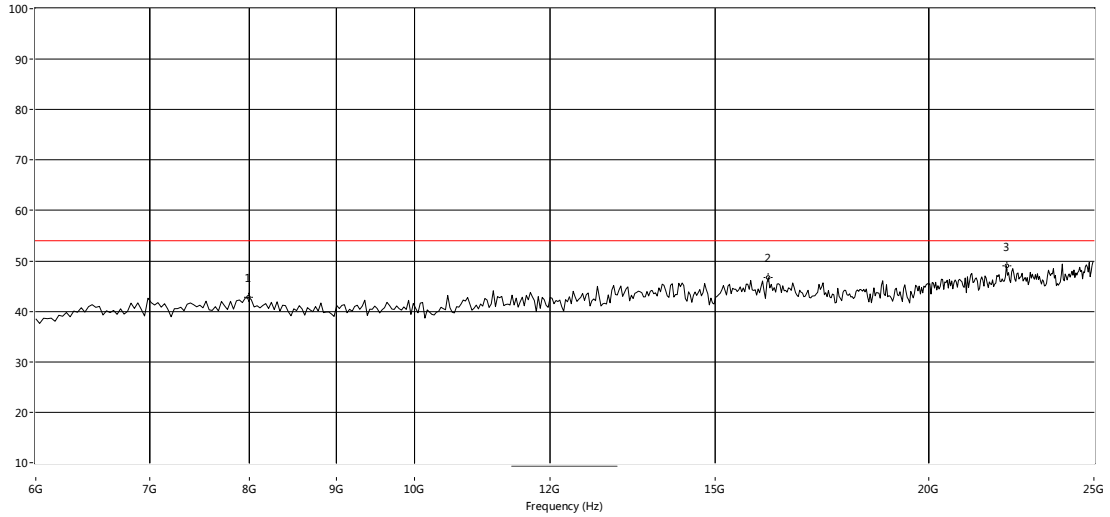
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2198.200	47.19	--	--	74.0	--	54.0	158.6	Vertical	Pass
2441.140	89.46	--	--	--	--	--	17.1	Vertical	--
4938.265	46.60	--	--	74.0	--	54.0	329.6	Vertical	Pass

8-DPSK MID CHANNEL 1GHz to 6GHz, ANT H



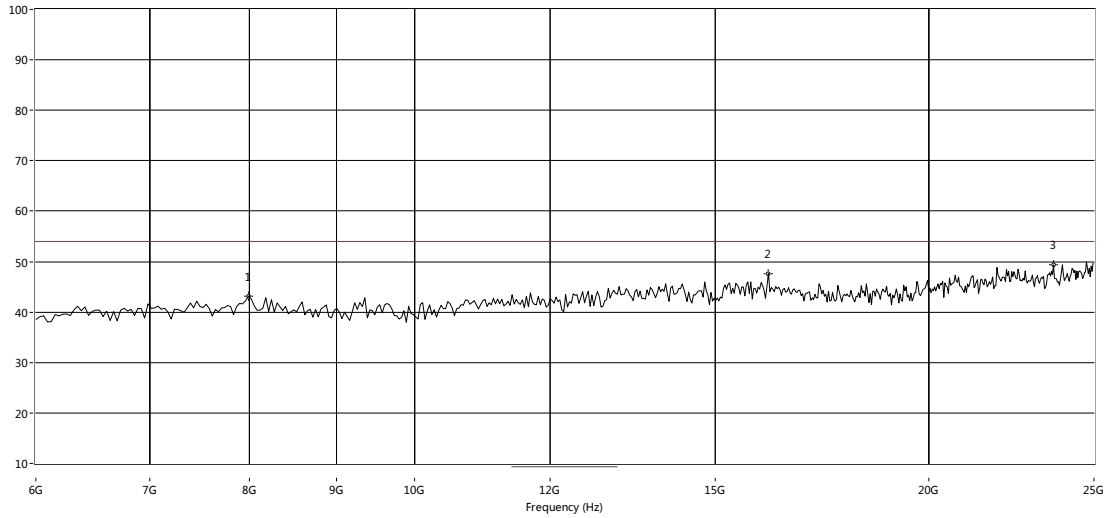
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2440.640	79.59	--	--	--	--	--	360.6	Horizontal	--
2939.515	45.57	--	--	74.0	--	54.0	216.7	Horizontal	Pass
4918.770	45.62	--	--	74.0	--	54.0	359.4	Horizontal	Pass

8-DPSK MID CHANNEL 6GHz to 25GHz, ANT V



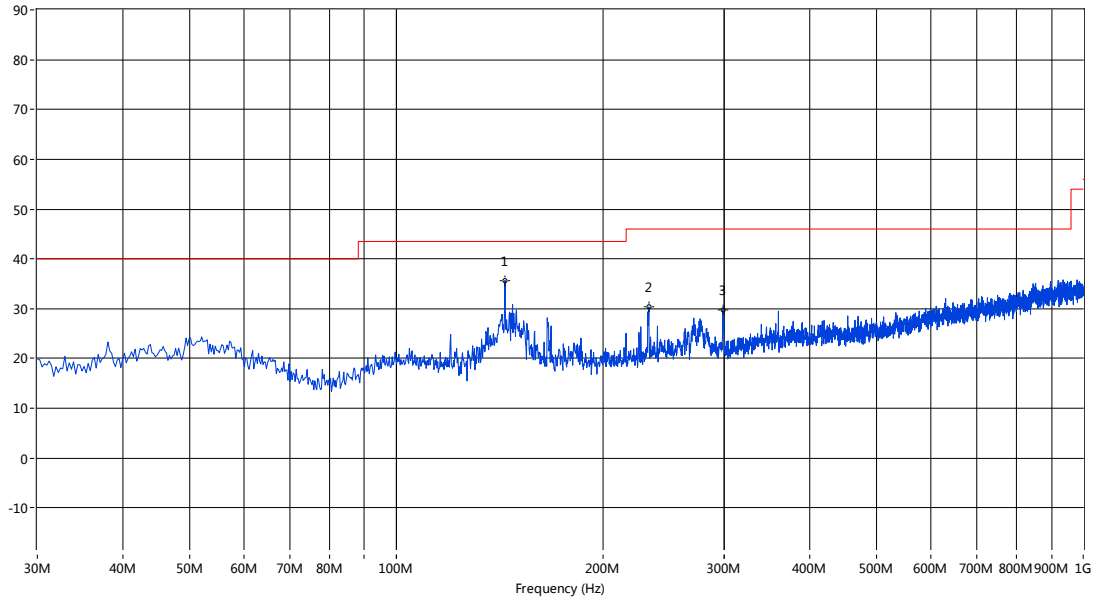
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	42.81	54.0	11.2	0.0	Vertical	PASS
16116.473	46.69	54.0	7.3	0.0	Vertical	PASS
22217.970	49.04	54.0	5.0	0.0	Vertical	PASS

8-DPSK MID CHANNEL 6GHz to 25GHz, ANT H



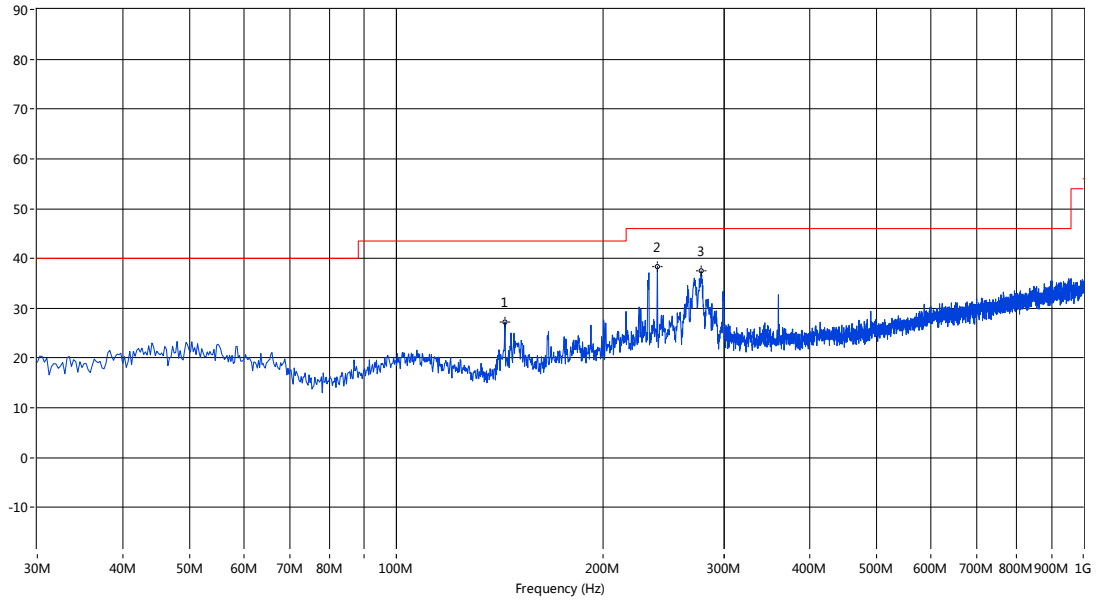
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.12	54.0	10.9	0.0	Horizontal	PASS
16116.473	47.63	54.0	6.4	0.0	Horizontal	PASS
23672.213	49.35	54.0	4.7	0.0	Horizontal	PASS

8-DPSK HIGH CHANNEL 30MHz to 1GHz, ANT V



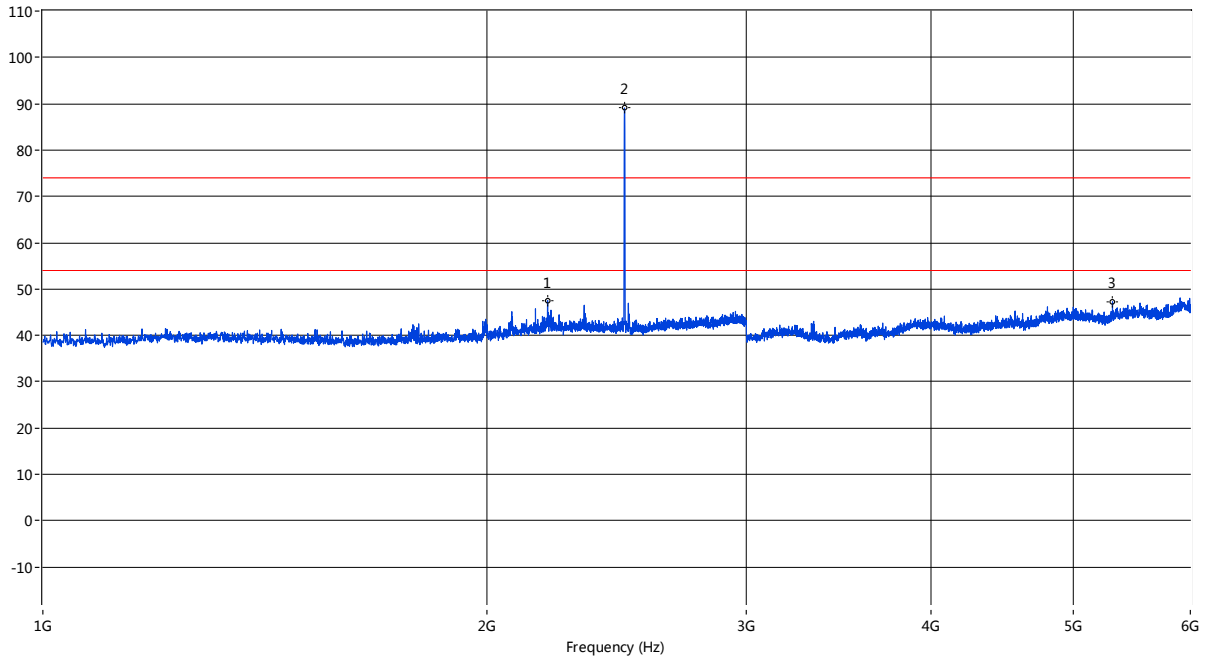
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.70	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	30.36	--	--	--	46.0	--	-0.0	Vertical	Pass
298.623	29.79	--	--	--	46.0	--	-0.0	Vertical	Pass

8-DPSK HIGH CHANNEL 30MHz to 1GHz, ANT H



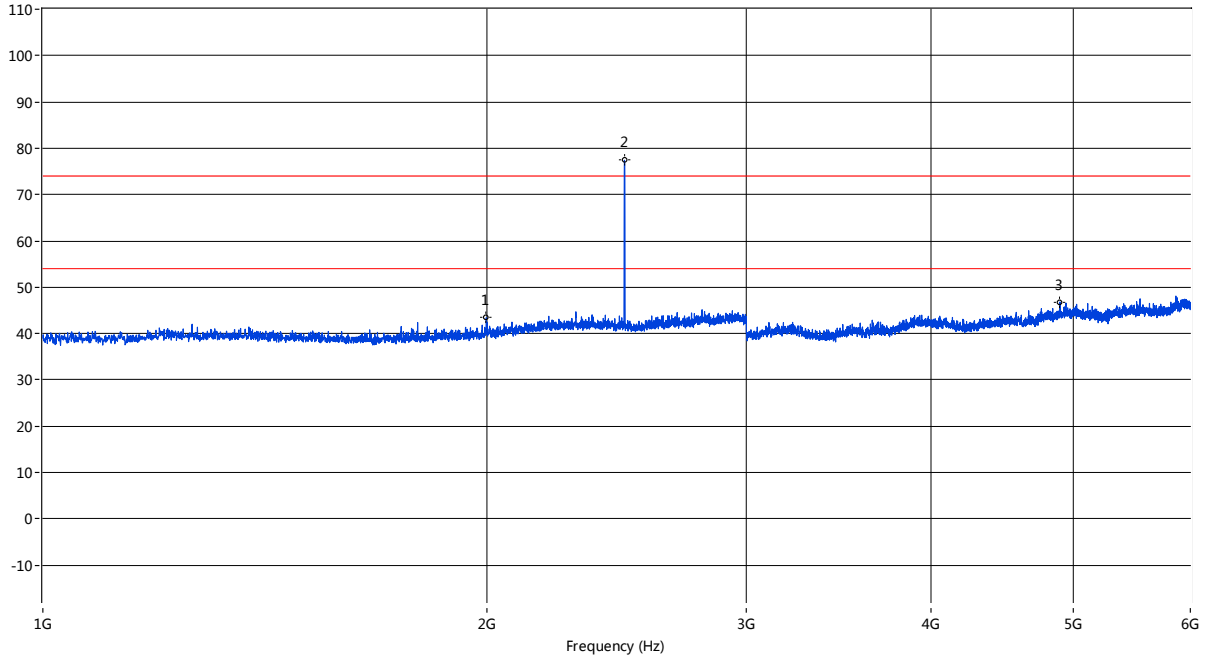
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	27.27	--	--	--	43.5	--	349.7	Horizontal	Pass
239.953	38.36	--	--	--	46.0	--	45.9	Horizontal	Pass
277.773	37.51	--	--	--	46.0	--	334.5	Horizontal	Pass

8-DPSK HIGH CHANNEL 1GHz to 6GHz, ANT V



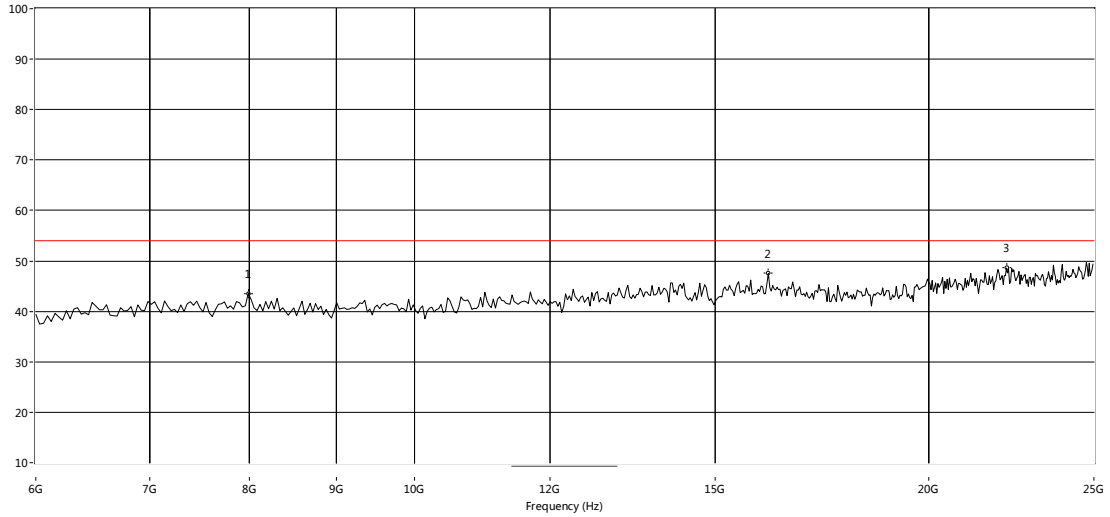
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2199.200	47.57	--	--	74.0	--	54.0	161.6	Vertical	Pass
2479.630	89.08	--	--	--	--	--	3.2	Vertical	--
5313.172	47.27	--	--	74.0	--	54.0	96.5	Vertical	Pass

8-DPSK HIGH CHANNEL 1GHz to 6GHz, ANT H



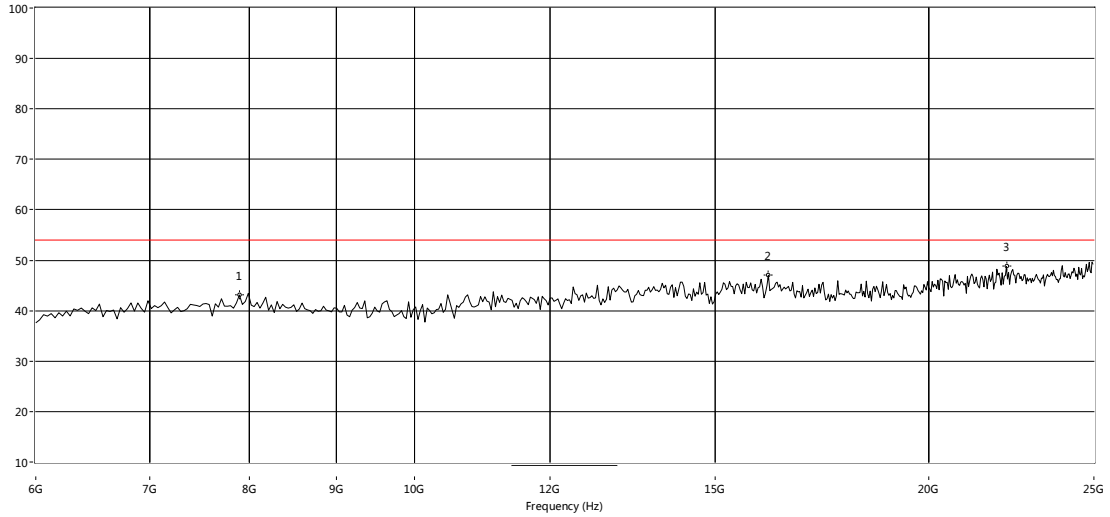
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
1998.250	43.42	--	--	74.0	--	54.0	68.6	Horizontal	Pass
2479.630	77.39	--	--	--	--	--	226.7	Horizontal	--
4894.026	46.80	--	--	74.0	--	54.0	70.1	Horizontal	Pass

8-DPSK HIGH CHANNEL 6GHz to 25GHz, ANT V



Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.58	54.0	10.4	0.0	Vertical	PASS
16116.473	47.54	54.0	6.5	0.0	Vertical	PASS
22217.970	48.59	54.0	5.4	0.0	Vertical	PASS

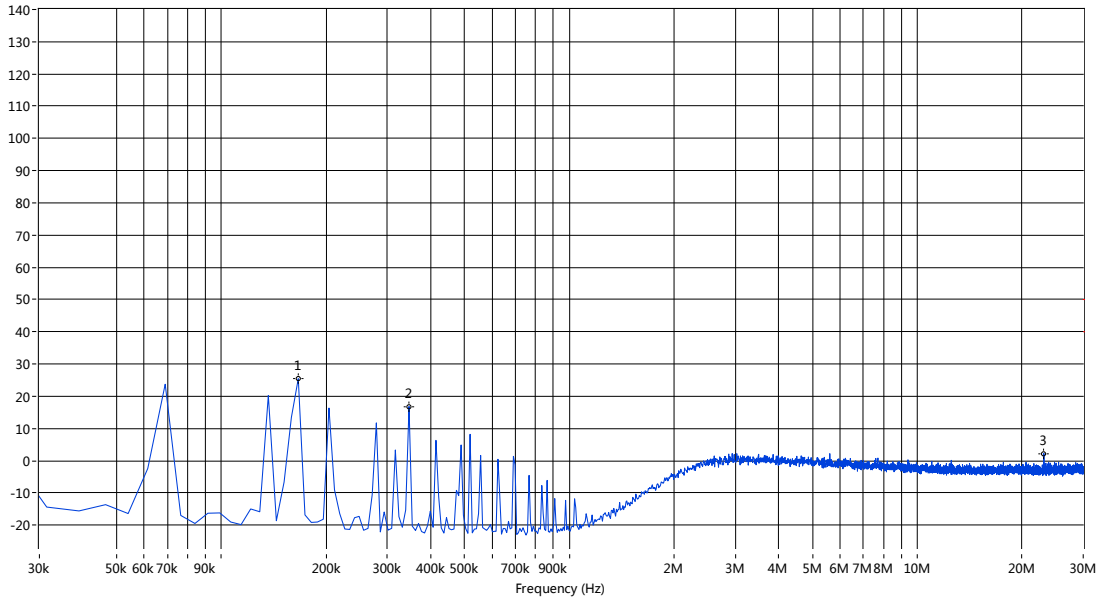
8-DPSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7896.839	43.12	54.0	10.9	0.0	Horizontal	PASS
16116.473	47.04	54.0	7.0	0.0	Horizontal	PASS
22217.970	48.78	54.0	5.2	0.0	Horizontal	PASS

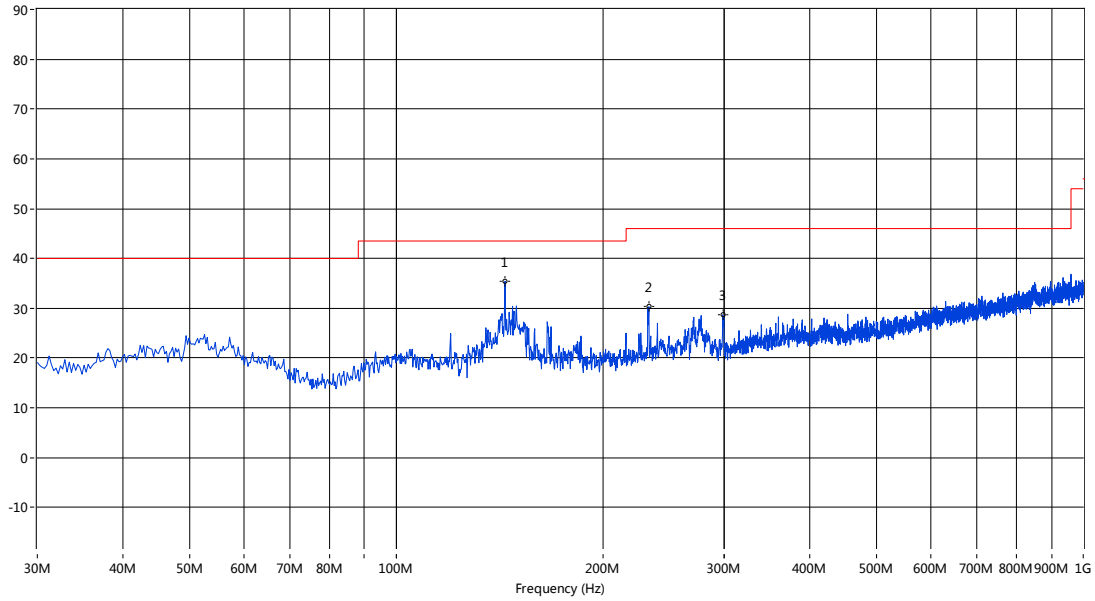
Hopping Mode:

Below 30MHz



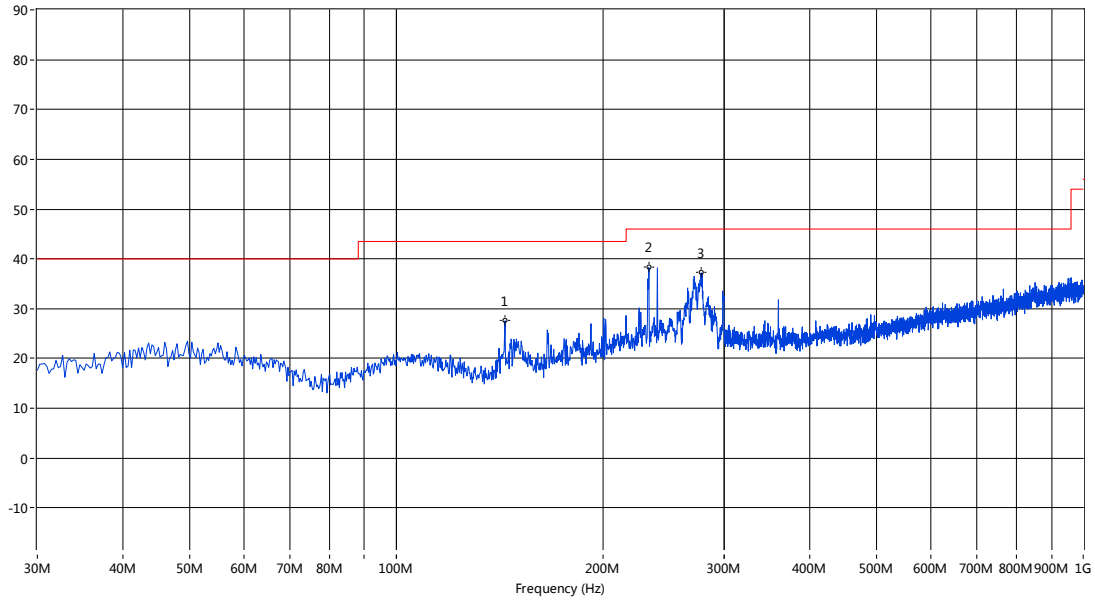
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Verdict
0.166	25.46	--	--	--	40.0	--	360.0	Pass
0.346	16.81	--	--	--	40.0	--	360.0	Pass
23.126	2.25	--	--	--	40.0	--	356.5	Pass

GFSK MODE 30MHz to 1GHz, ANT V



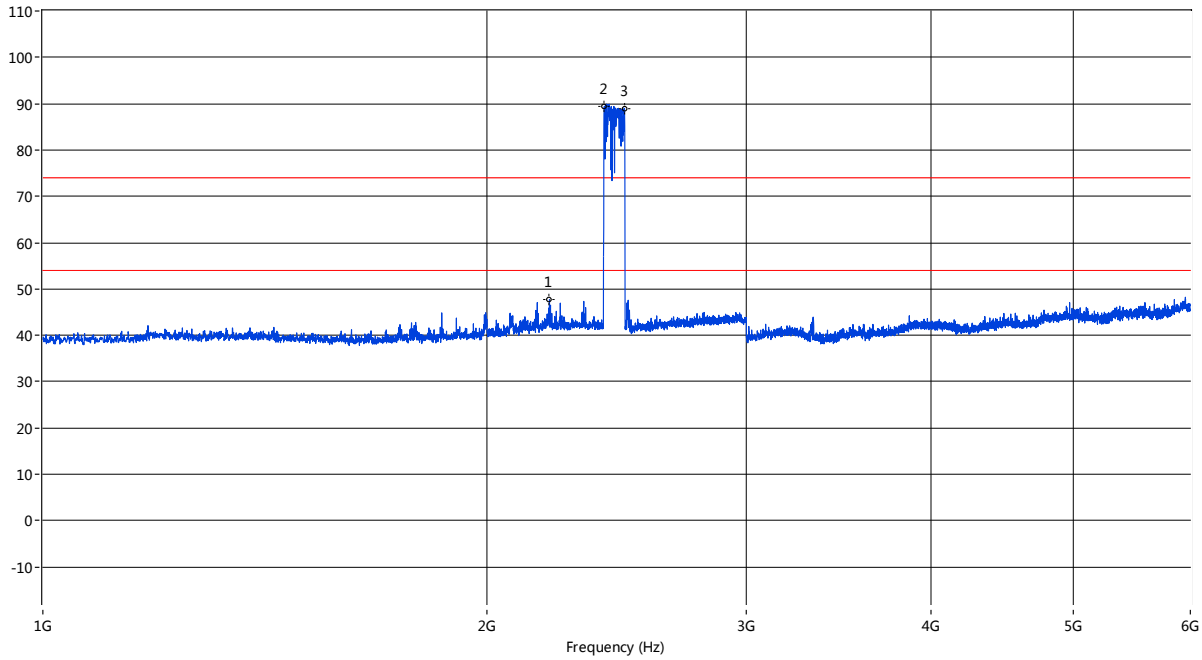
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	35.41	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	30.31	--	--	--	46.0	--	-0.0	Vertical	Pass
298.623	28.68	--	--	--	46.0	--	-0.0	Vertical	Pass

GFSK MODE 30MHz to 1GHz, ANT H



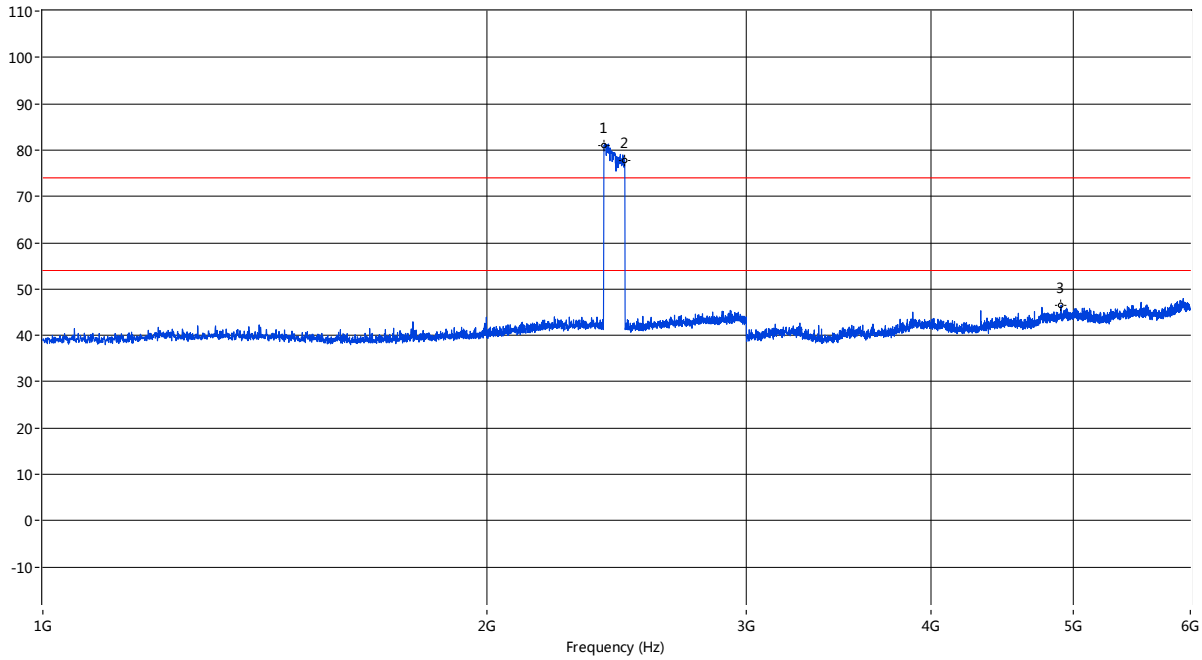
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	27.56	--	--	--	43.5	--	349.7	Horizontal	Pass
233.164	38.27	--	--	--	46.0	--	-0.0	Horizontal	Pass
277.773	37.21	--	--	--	46.0	--	334.5	Horizontal	Pass

GFSK MODE 1GHz to 6GHz, ANT V



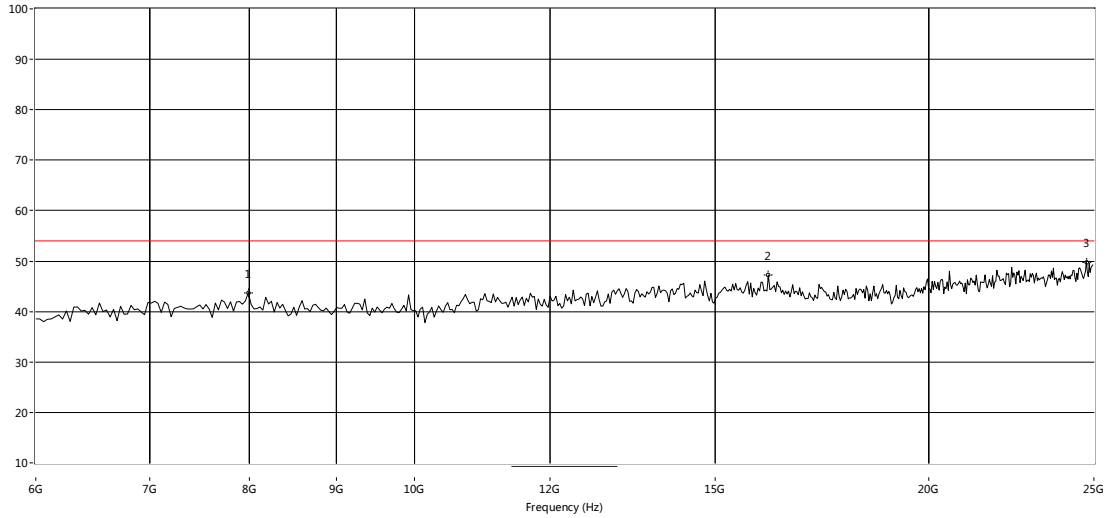
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2205.699	47.68	--	--	74.0	--	54.0	160.1	Vertical	Pass
2402.649	89.38	--	--	--	--	--	1.8	Vertical	--
2479.130	89.02	--	--	--	--	--	360.0	Vertical	--

GFSK MODE 1GHz to 6GHz, ANT H



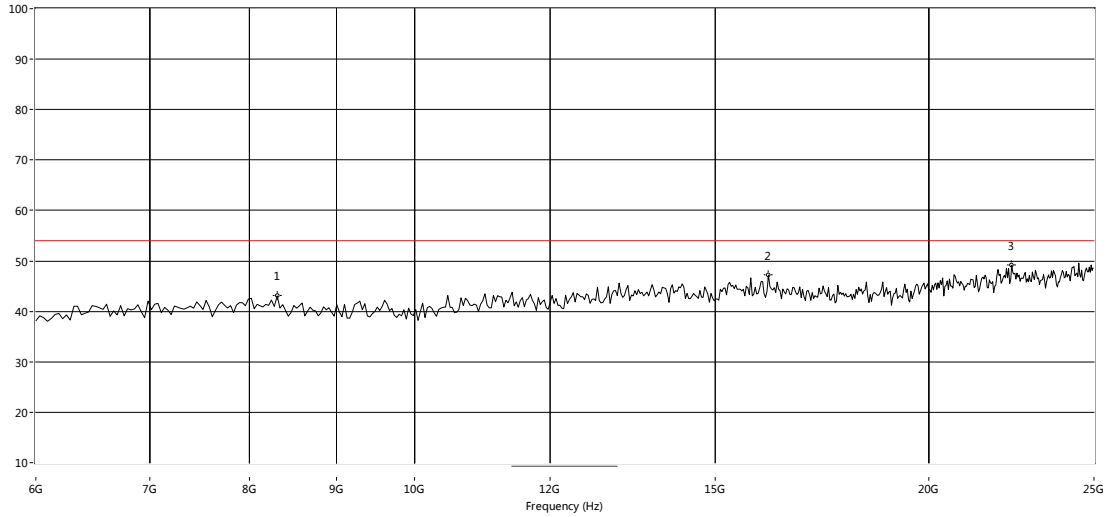
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2401.650	80.96	--	--	--	--	--	4.3	Horizontal	--
2480.130	77.83	--	--	--	--	--	306.3	Horizontal	--
4903.774	46.50	--	--	74.0	--	54.0	27.4	Horizontal	Pass

GFSK MODE 6GHz to 25GHz, ANT V



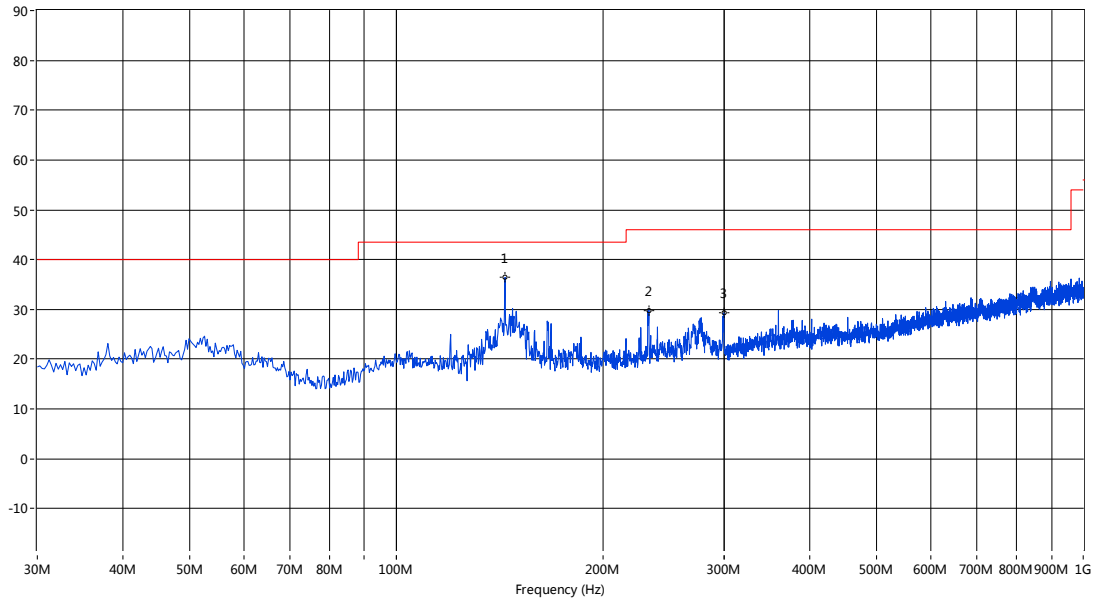
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.75	54.0	10.2	0.0	Vertical	PASS
16116.473	47.25	54.0	6.8	0.0	Vertical	PASS
24747.088	49.80	54.0	4.2	0.0	Vertical	PASS

GFSK MODE 6GHz to 25GHz, ANT H



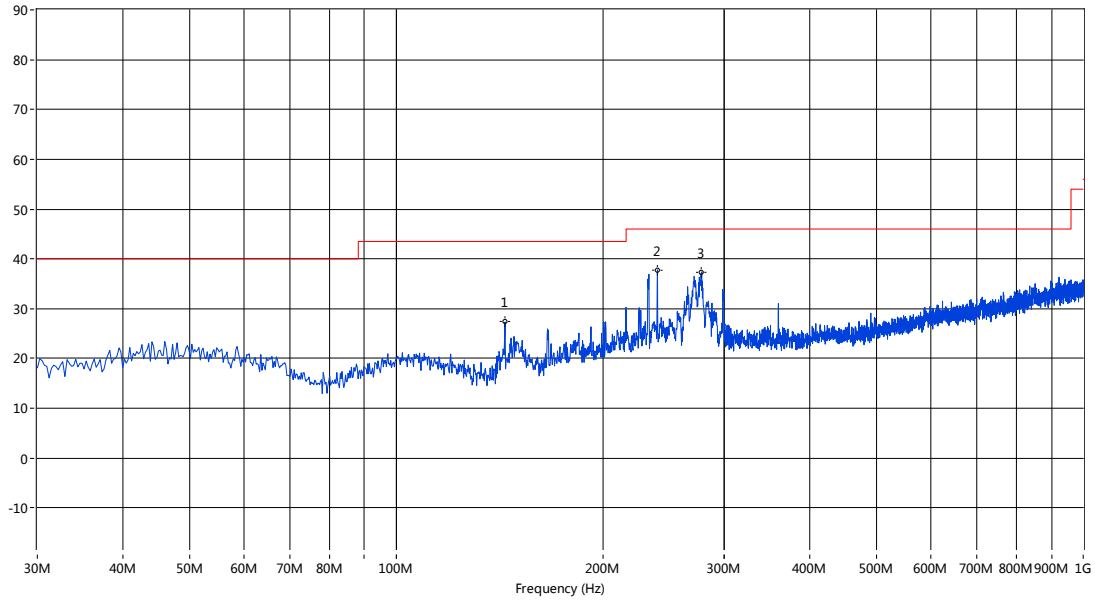
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
8307.820	43.07	54.0	10.9	0.0	Horizontal	PASS
16116.473	47.19	54.0	6.8	0.0	Horizontal	PASS
22376.040	49.12	54.0	4.9	0.0	Horizontal	PASS

Π/4-DQPSK MODE 30MHz to 1GHz, ANT V



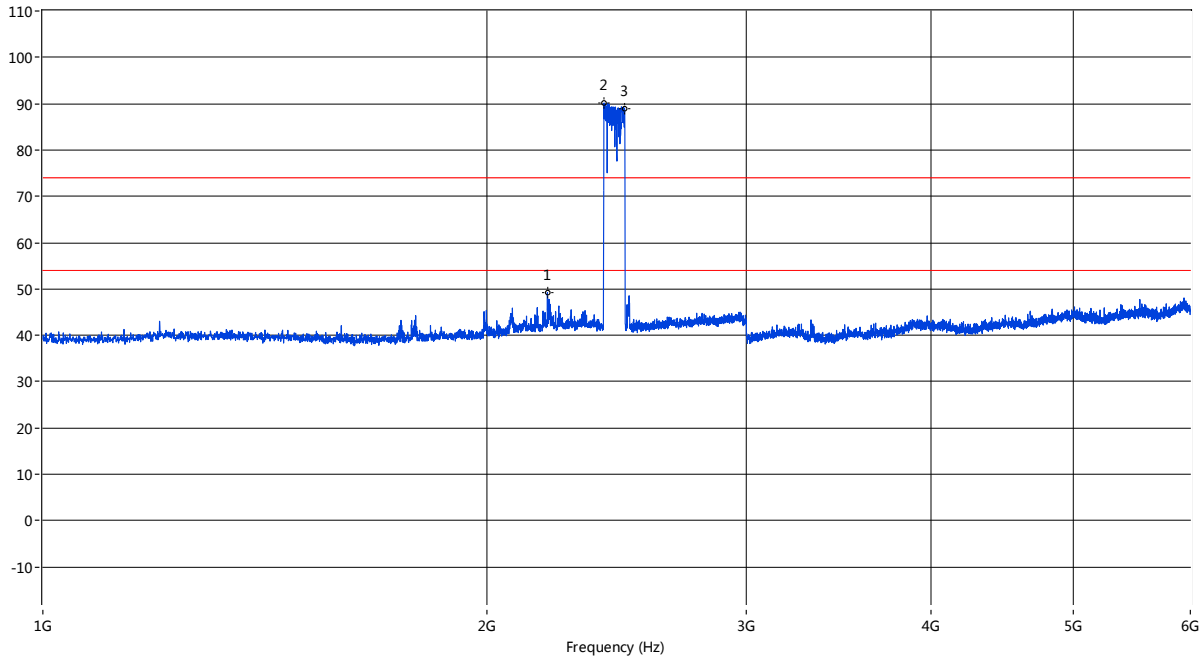
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	36.44	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	29.85	--	--	--	46.0	--	-0.0	Vertical	Pass
299.593	29.28	--	--	--	46.0	--	-0.0	Vertical	Pass

Π/4-DQPSK MODE 30MHz to 1GHz, ANT H



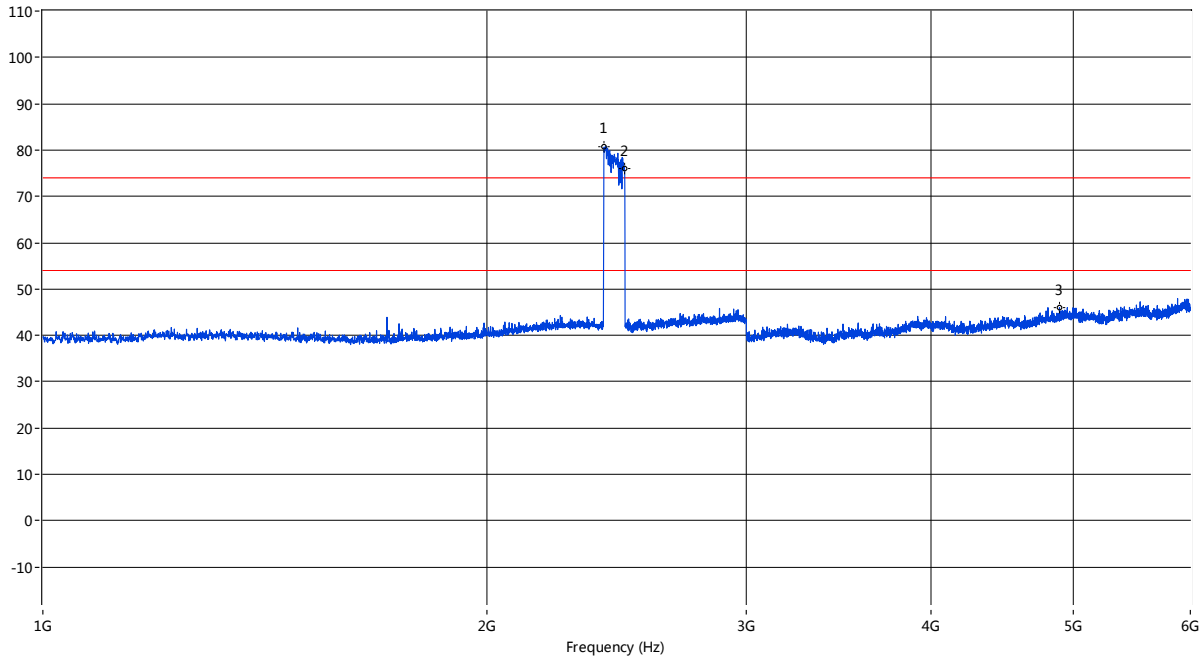
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	27.34	--	--	--	43.5	--	349.7	Horizontal	Pass
239.953	37.79	--	--	--	46.0	--	45.9	Horizontal	Pass
278.258	37.39	--	--	--	46.0	--	340.4	Horizontal	Pass

Π/4-DQPSK MODE 1GHz to 6GHz, ANT V



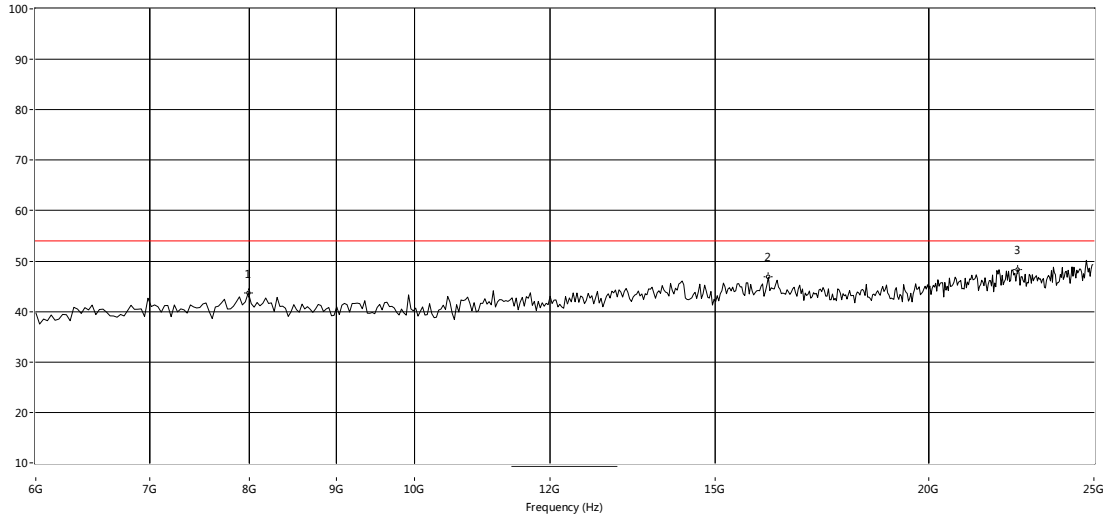
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2198.700	49.23	--	--	74.0	--	54.0	157.8	Vertical	Pass
2402.149	90.16	--	--	--	--	--	14.2	Vertical	--
2478.630	88.91	--	--	--	--	--	0.9	Vertical	--

Π/4-DQPSK MODE 1GHz to 6GHz, ANT H



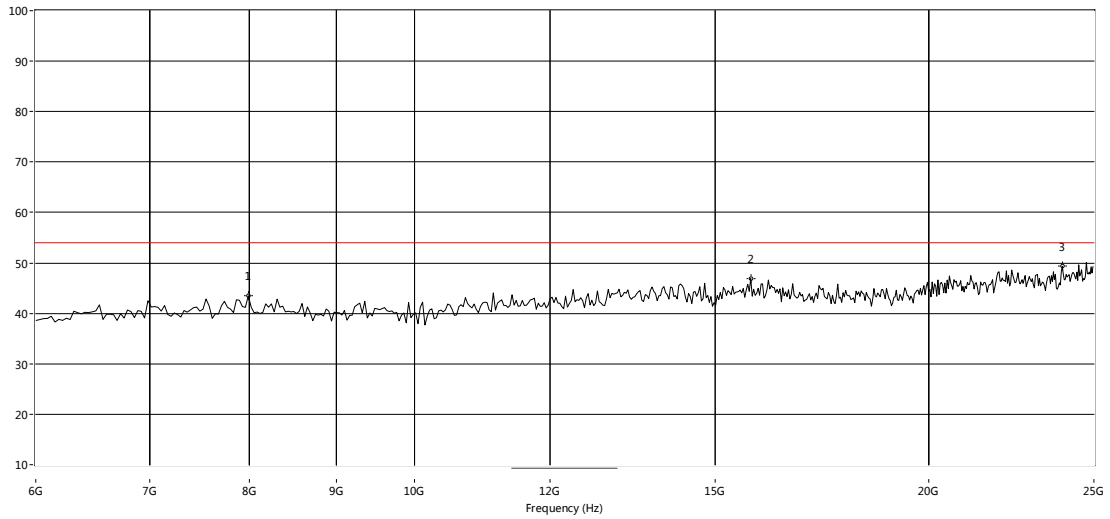
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2402.149	80.67	--	--	74.0	--	54.0	2.3	Horizontal	--
2478.630	75.91	--	--	74.0	--	54.0	360.0	Horizontal	--
4891.777	45.99	--	--	74.0	--	54.0	30.0	Horizontal	Pass

Π/4-DQPSK MODE 6GHz to 25GHz, ANT V



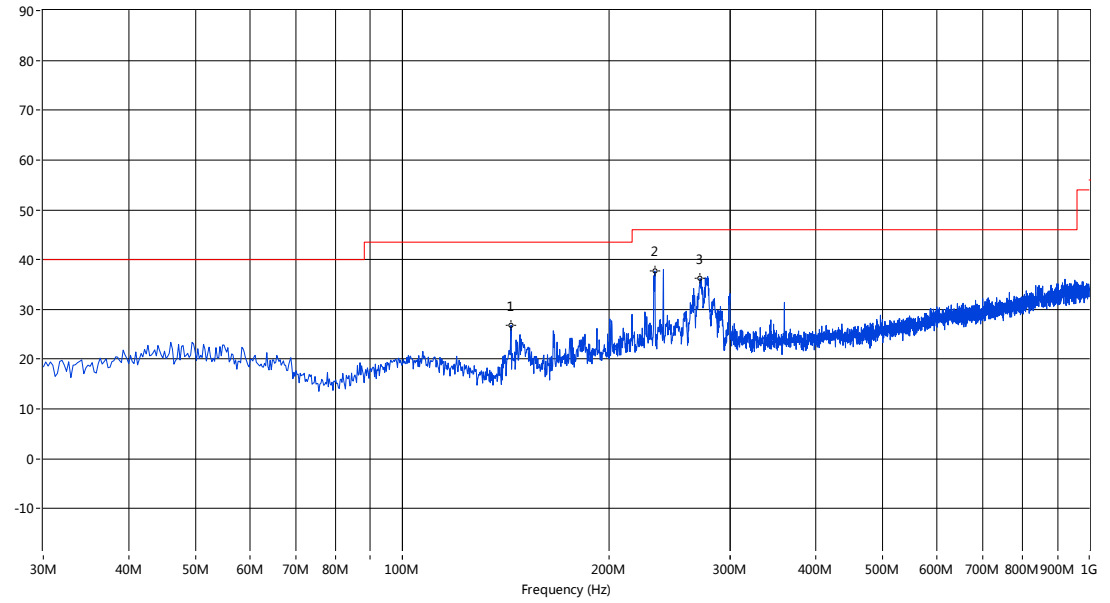
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.74	54.0	10.3	0.0	Vertical	PASS
16116.473	46.82	54.0	7.2	0.0	Vertical	PASS
22565.724	48.31	54.0	5.7	0.0	Vertical	PASS

Π/4-DQPSK MODE 6GHz to 25GHz, ANT H



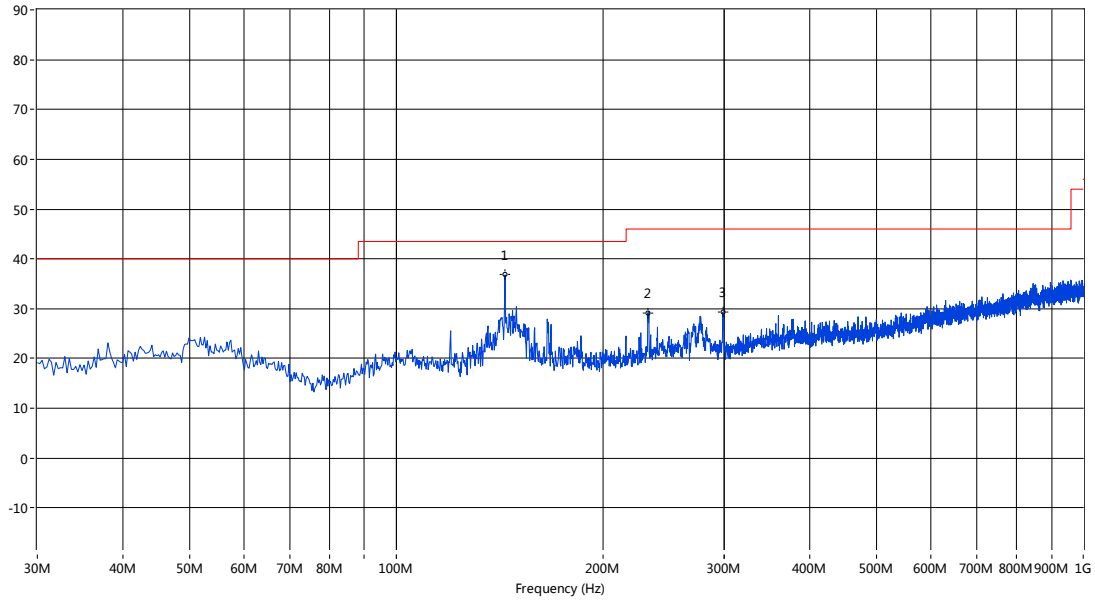
Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.46	54.0	10.5	0.0	Horizontal	PASS
15737.105	46.93	54.0	7.1	0.0	Horizontal	PASS
23956.739	49.35	54.0	4.6	0.0	Horizonta	PASS

8-DPSK MODE 30MHz to 1GHz, ANT V



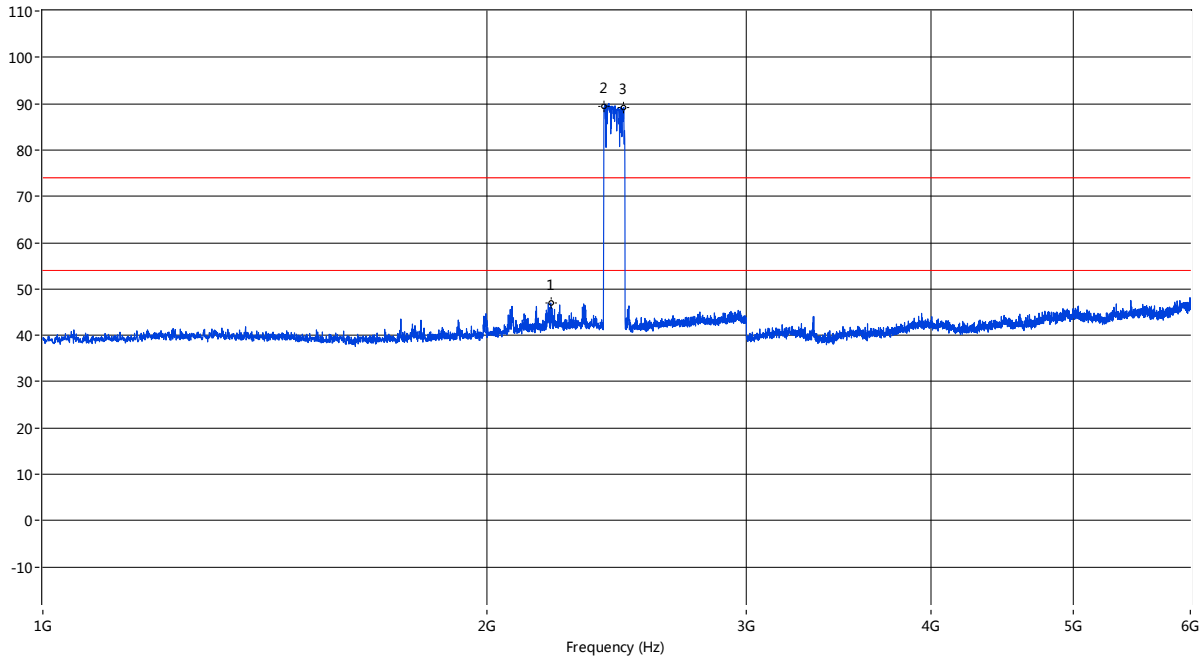
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	26.81	--	--	--	43.5	--	349.7	Vertical	Pass
233.164	37.70	--	--	--	46.0	--	-0.0	Vertical	Pass
271.227	36.29	--	--	--	46.0	--	358.2	Vertical	Pass

8-DPSK MODE 30MHz to 1GHz, ANT H



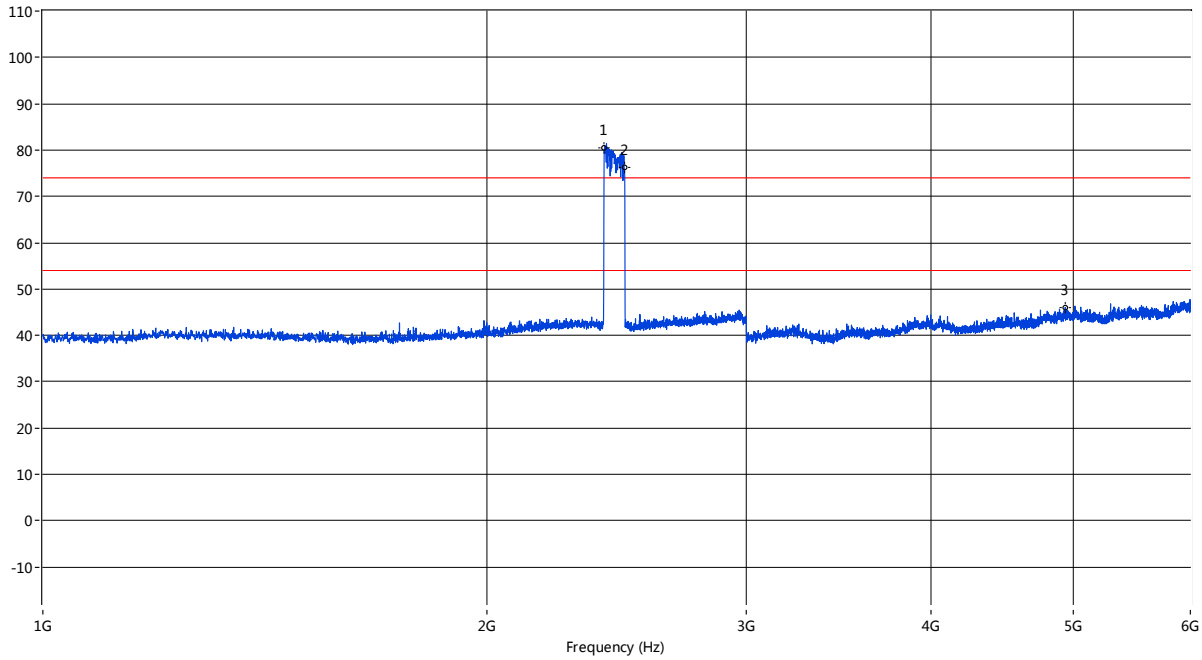
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
143.947	36.79	--	--	--	43.5	--	349.7	Horizontal	Pass
232.194	29.18	--	--	--	46.0	--	64.7	Horizontal	Pass
298.623	29.33	--	--	--	46.0	--	-0.0	Horizontal	Pass

8-DPSK MODE 1GHz to 6GHz, ANT V



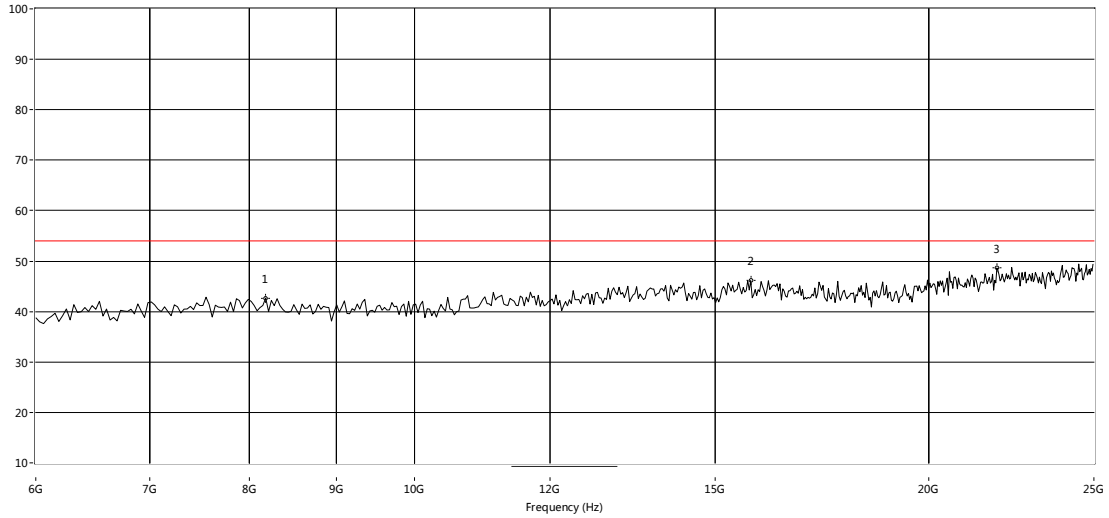
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2210.197	46.98	--	--	--	--	--	167.9	Vertical	Pass
2403.149	89.30	--	--	--	--	--	0.0	Vertical	--
2476.631	89.22	--	--	74.0	--	54.0	2.0	Vertical	--

8-DPSK MODE 1GHz to 6GHz, ANT H



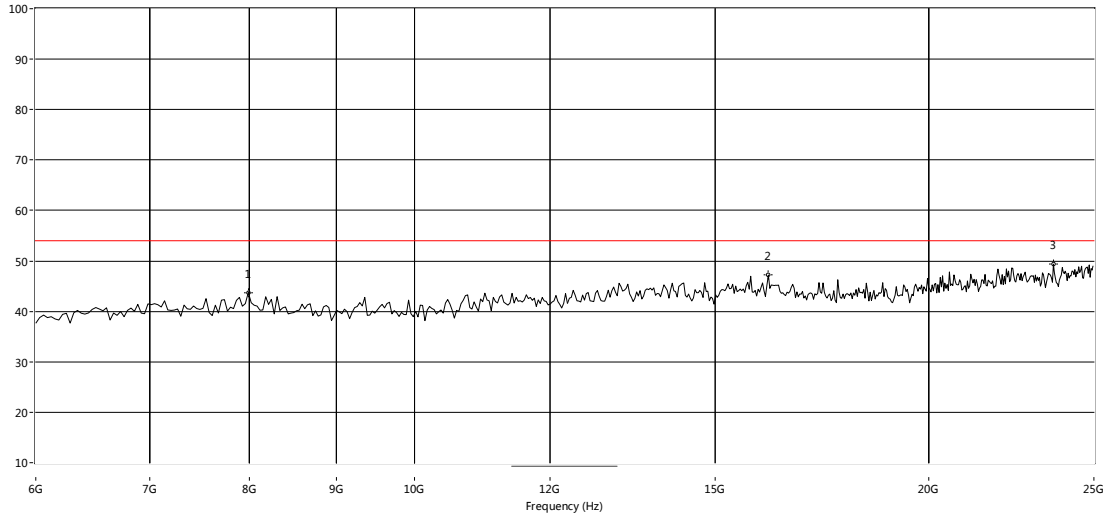
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdict
2403.649	80.42	--	--	--	--	--	359.3	Horizontal	--
2478.630	76.19	--	--	--	--	--	358.0	Horizontal	--
4935.266	46.08	--	--	74.0	--	54.0	51.0	Horizontal	Pass

8-DPSK MODE 6GHz to 25GHz, ANT V



Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
8181.364	42.69	54.0	11.3	0.0	Vertical	PASS
15737.105	46.13	54.0	7.9	0.0	Vertical	PASS
21933.444	48.65	54.0	5.4	0.0	Vertical	PASS

8-DPSK MODE 6GHz to 25GHz, ANT H



Fre. (MHz)	Peak	Limit(PK)	Margin	Degree	Antenna	Verdict
7991.681	43.73	54.0	10.3	0.0	Horizontal	PASS
16116.473	47.22	54.0	6.8	0.0	Horizontal	PASS
23672.213	49.37	54.0	4.6	0.0	Horizontal	PASS

A.9 Band Edge

Test Data

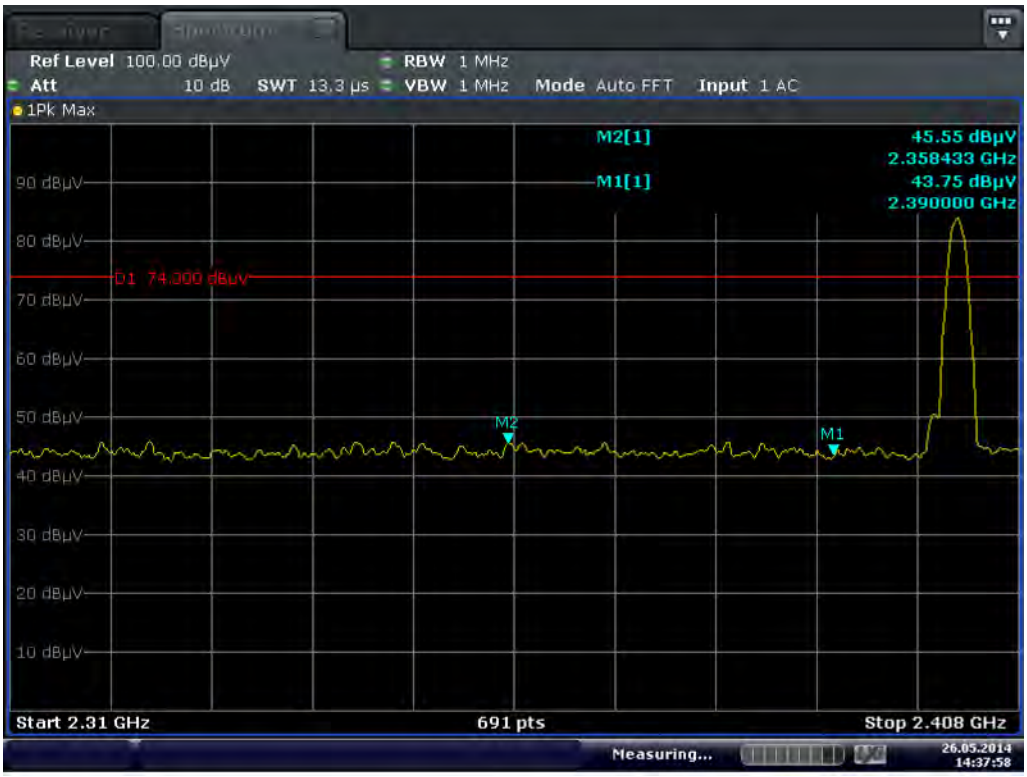
The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

Test Plots

A.9.1, GFSK LOW CHANNEL , ANT V, PEAK

A.9.2, GFSK LOW CHANNEL , ANT V, AVERAGE

A.9.3, GFSK LOW CHANNEL , ANT H, PEAK

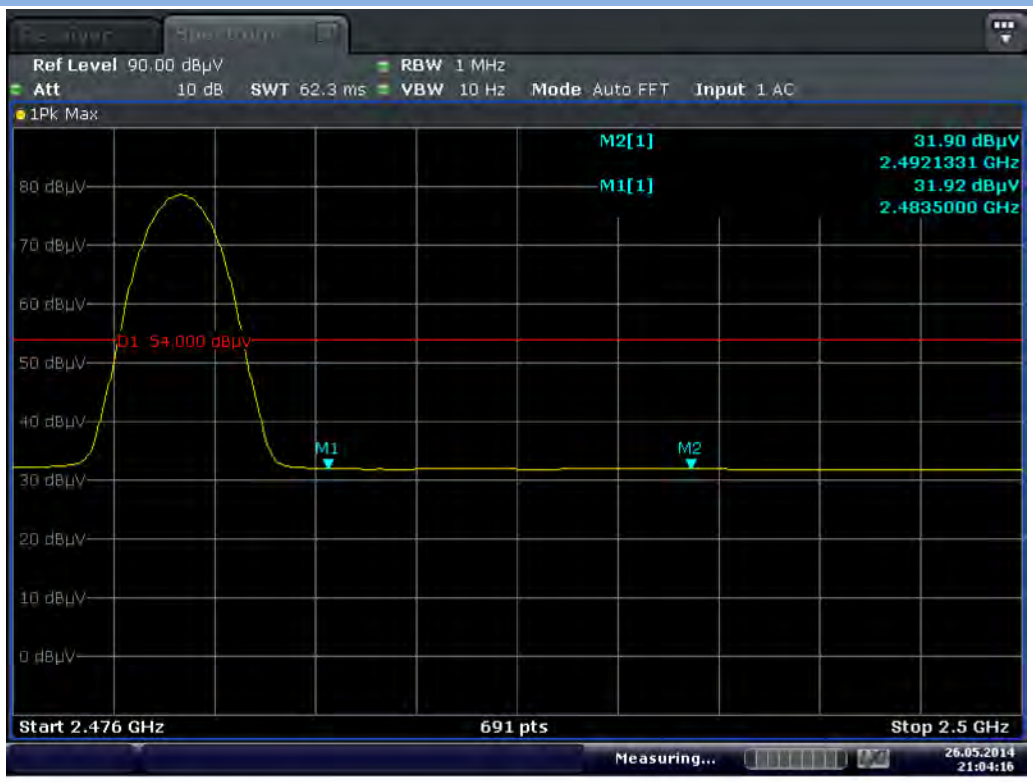


A.9.4, GFSK LOW CHANNEL , ANT H, AVERAGE

A.9.5, GFSK HIGH CHANNEL , ANT V, PEAK

Date: 26.MAY.2014 14:58:17

A.9.6, GFSK HIGH CHANNEL , ANT V, AVERAGE



Date: 26.MAY.2014 21:04:17

A.9.7, GFSK HIGH CHANNEL , ANT H, PEAK

Date: 26.MAY.2014 15:11:39

A.9.8, GFSK HIGH CHANNEL , ANT H, AVERAGE

Date: 26.MAY.2014 21:00:15

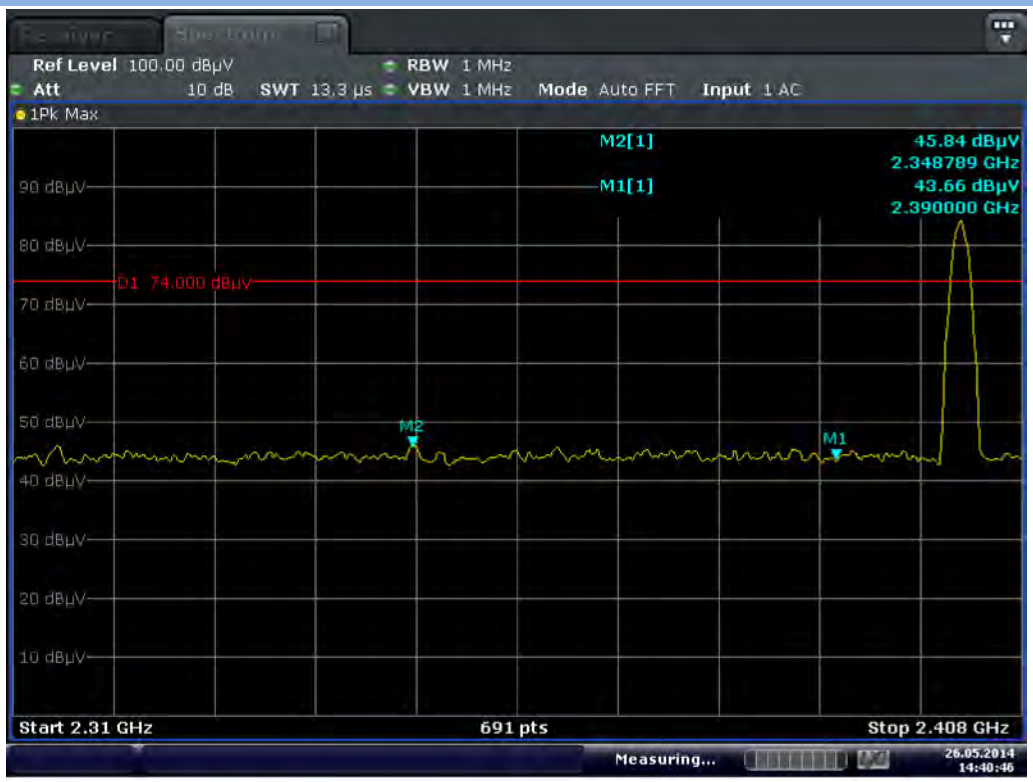
A.9.9, π/4DQPOSK LOW CHANNEL , ANT V, PEAK

Date: 26.MAY.2014 14:45:22

A.9.10, π/4DQPOSK LOW CHANNEL , ANT V, AVERAGE

Date: 26.MAY.2014 21:06:21

A.9.11, π/4DQPOSK LOW CHANNEL , ANT H, PEAK



Date: 26.MAY.2014 14:40:46

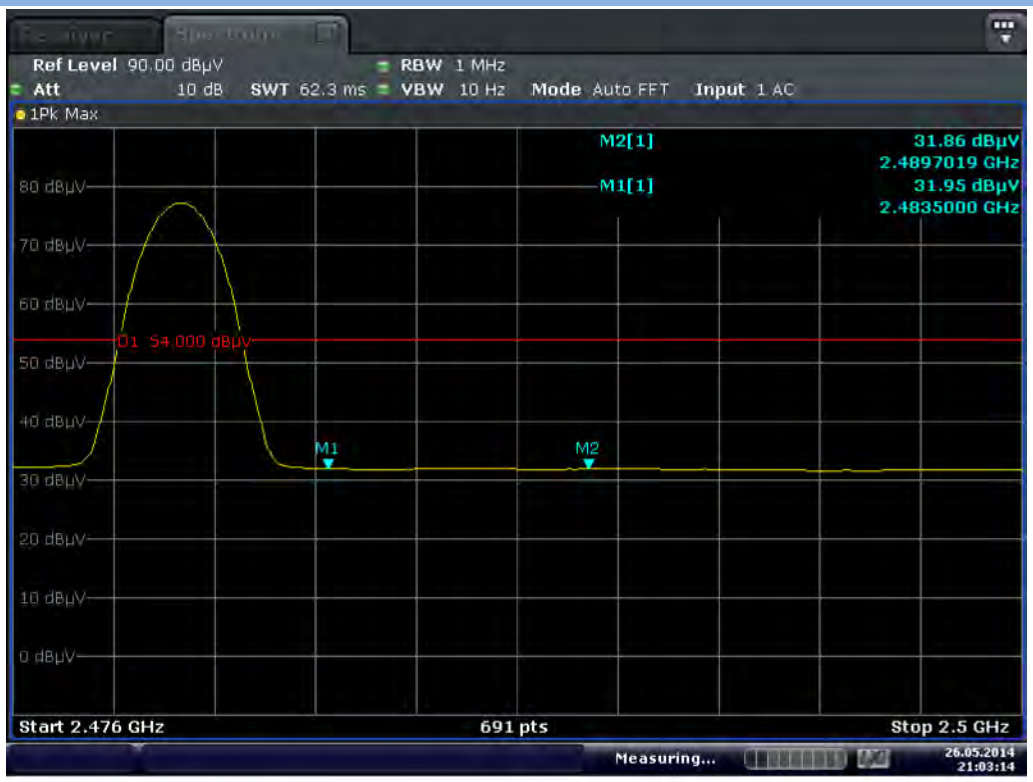
A.9.12, π/4DQPOSK LOW CHANNEL , ANT H, AVERAGE

Date: 26.MAY.2014 20:57:58

A.9.13, π/4DQPOSK HIGH CHANNEL , ANT V, PEAK

Date: 26.MAY.2014 15:01:57

A.9.14, π/4DQPOSK HIGH CHANNEL , ANT V, AVERAGE



Date: 26.MAY.2014 21:03:14

A.9.15, π/4DQPOSK HIGH CHANNEL , ANT H, PEAK

Date: 26.MAY.2014 15:08:08

A.9.16, π/4DQPOSK HIGH CHANNEL , ANT H, AVERAGE

Date: 26.MAY.2014 21:01:01

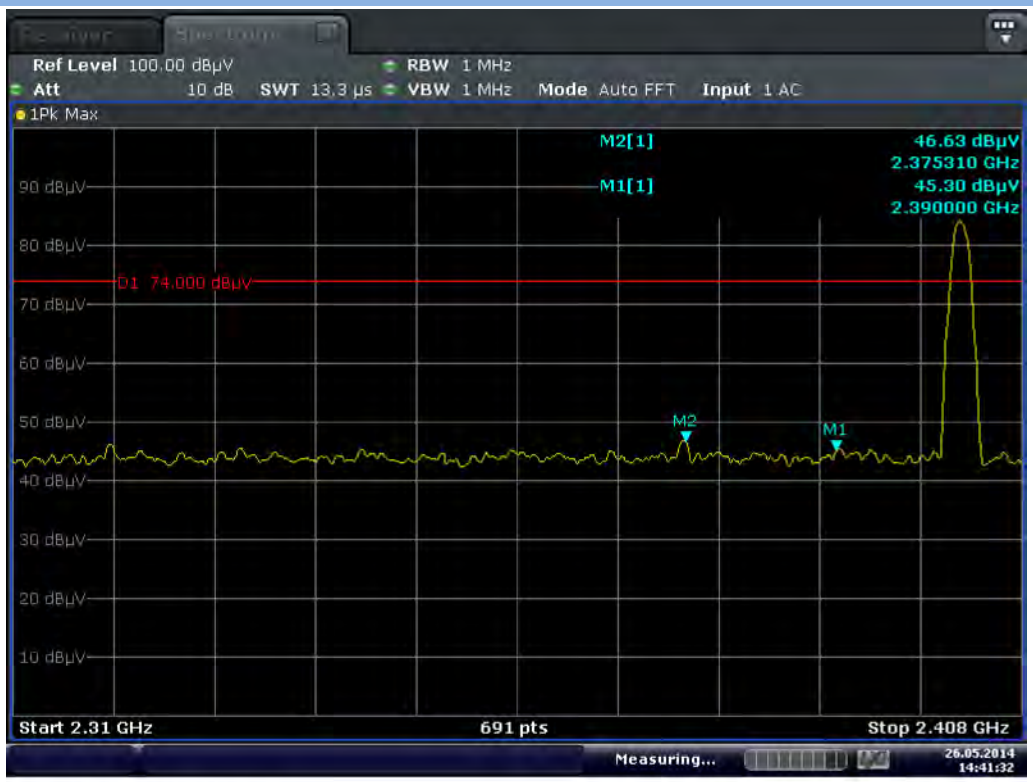
A.9.17, 8-DPSK LOW CHANNEL , ANT V, PEAK

Date: 26.MAY.2014 14:44:34

A.9.18, 8-DPSK LOW CHANNEL , ANT V, AVERAGE

Date: 26.MAY.2014 21:05:48

A.9.19, 8-DPSK LOW CHANNEL , ANT H, PEAK



Date: 26.MAY.2014 14:41:32

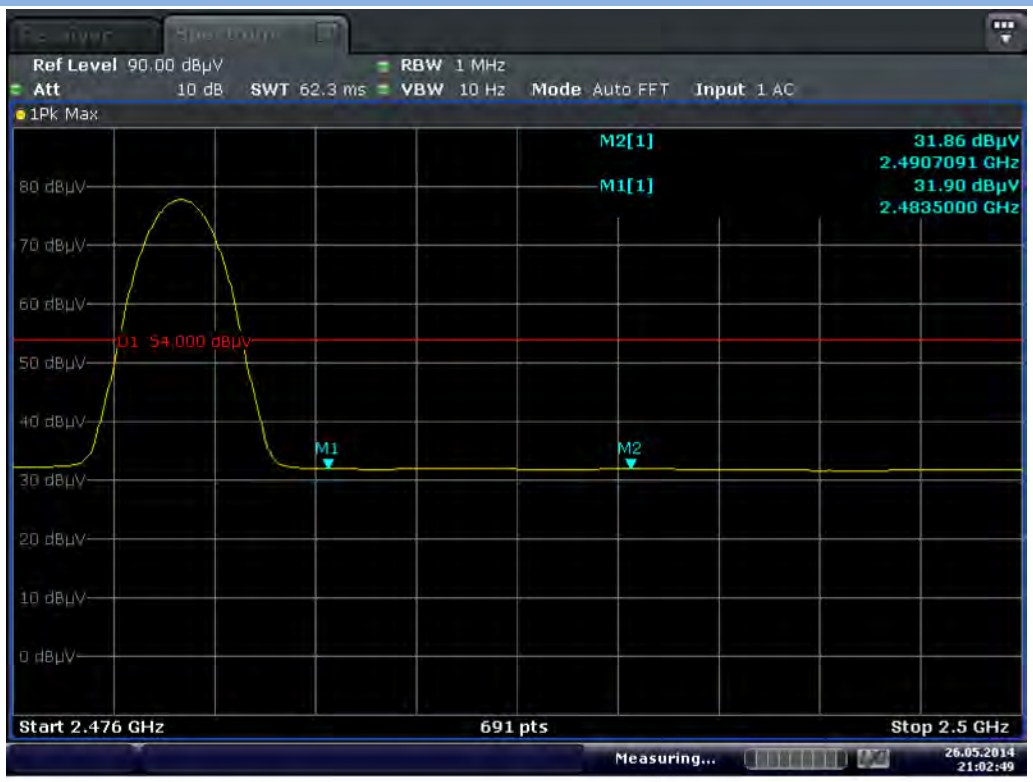
A.9.20, 8-DPSK LOW CHANNEL , ANT H, AVERAGE

Date: 26.MAY.2014 20:58:37

A.9.21, 8-DPSK HIGH CHANNEL , ANT V, PEAK

Date: 26.MAY.2014 15:03:59

A.9.22, 8-DPSK HIGH CHANNEL , ANT V, AVERAGE



Date: 26.MAY.2014 21:02:49

A.9.23, 8-DPSK HIGH CHANNEL , ANT H, PEAK

Date: 26.MAY.2014 15:07:00

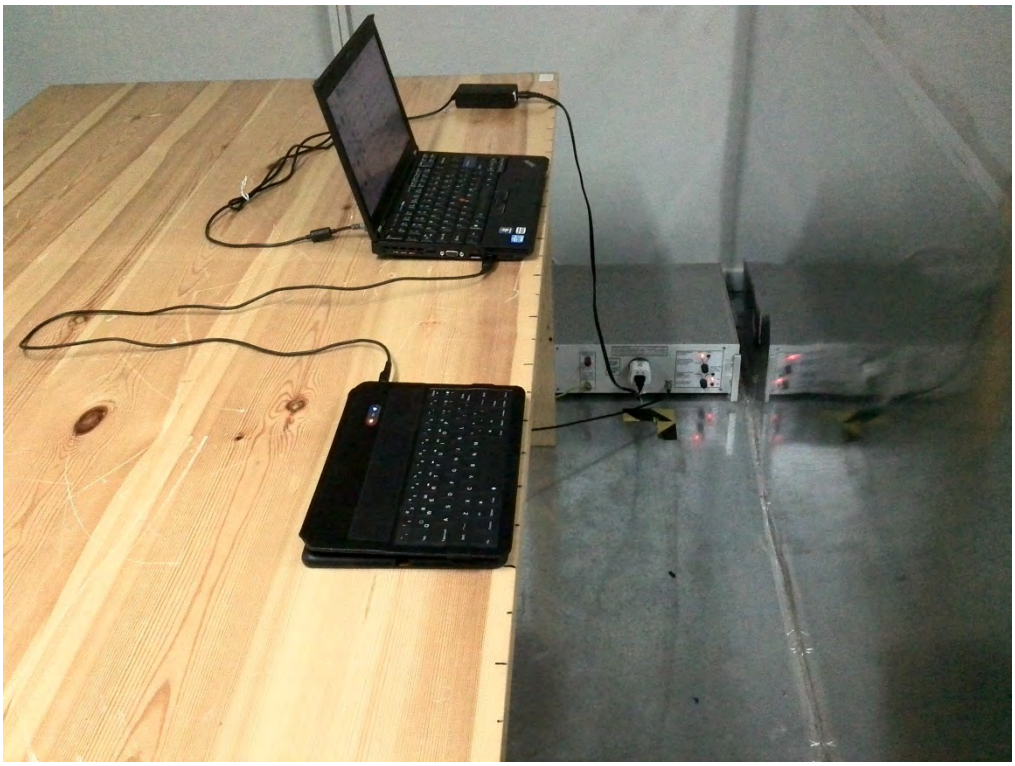
A.9.24, 8-DPSK HIGH CHANNEL , ANT H, AVERAGE

Date: 26.MAY.2014 21:01:24

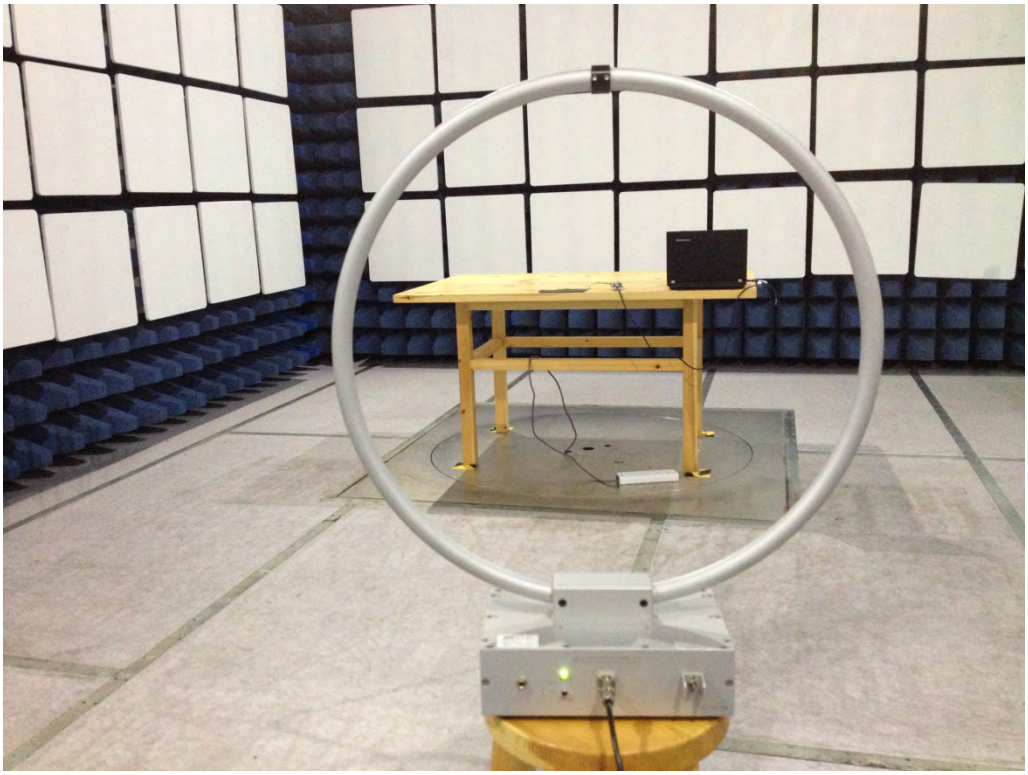
ANNEX B TEST SETUP PHOTOS

B.1 Antenna Port Test

B.2 Conducted Test Photo

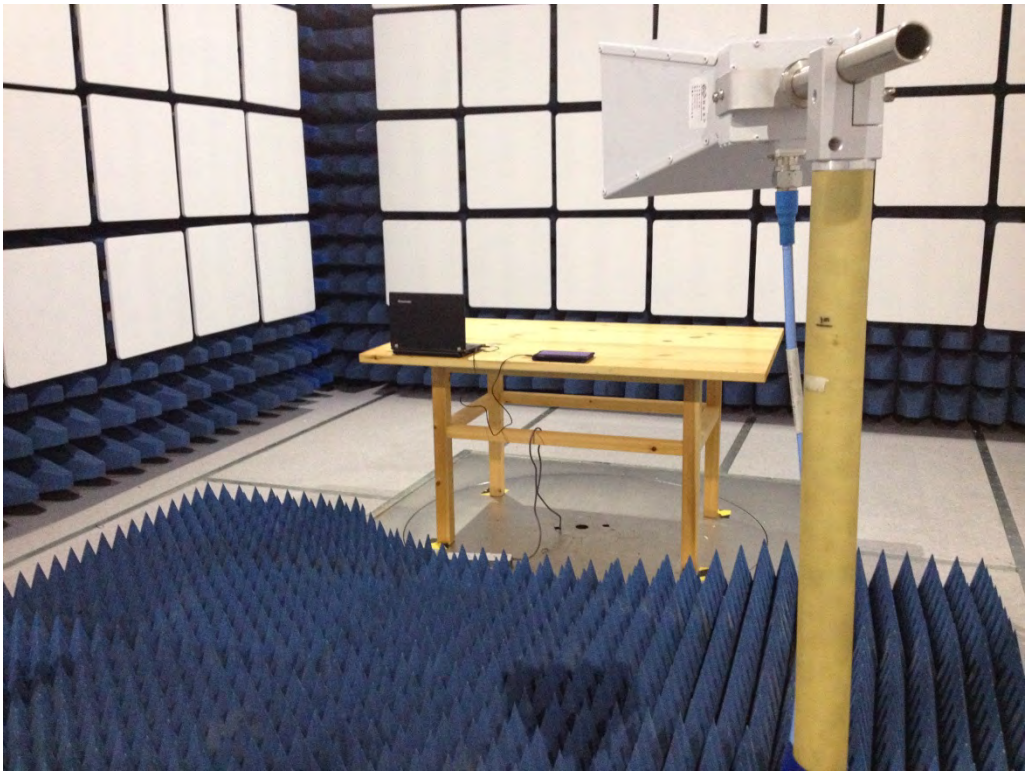


B.3 Radiated Test Photo



Below 30MHz

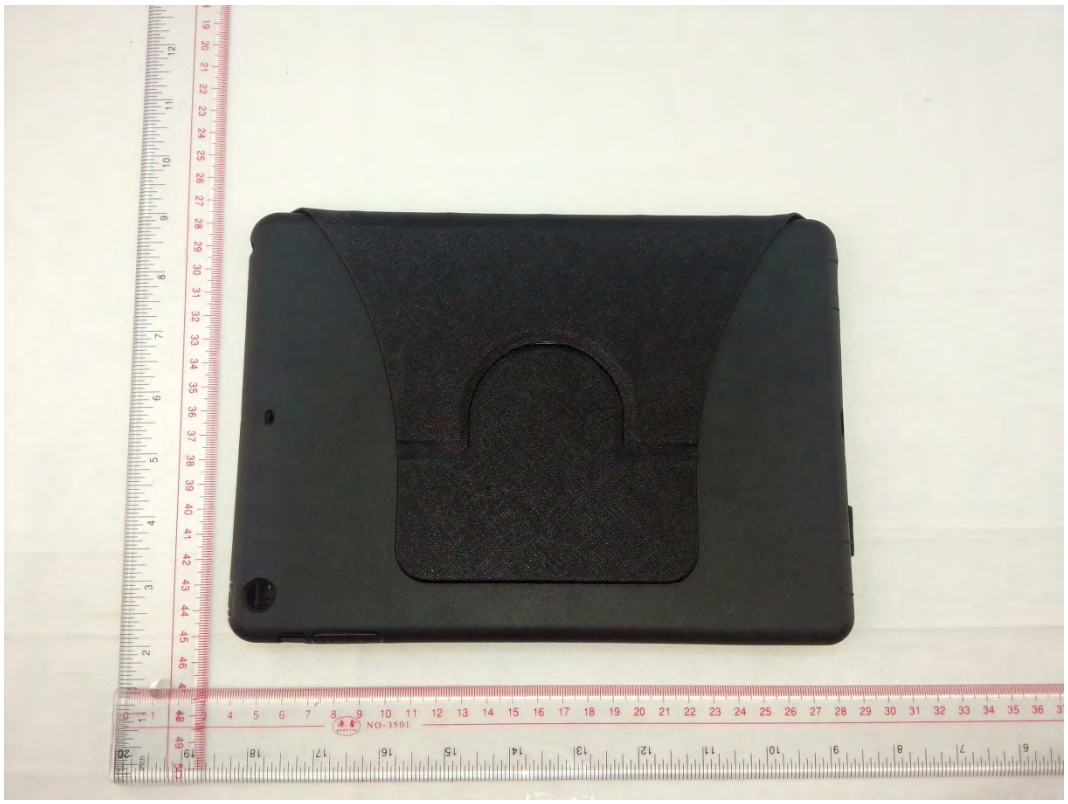
30MHz to 1GHz



Above 1GHz

ANNEX C EUT PHOTOS

C.1 Appearance of the EUT



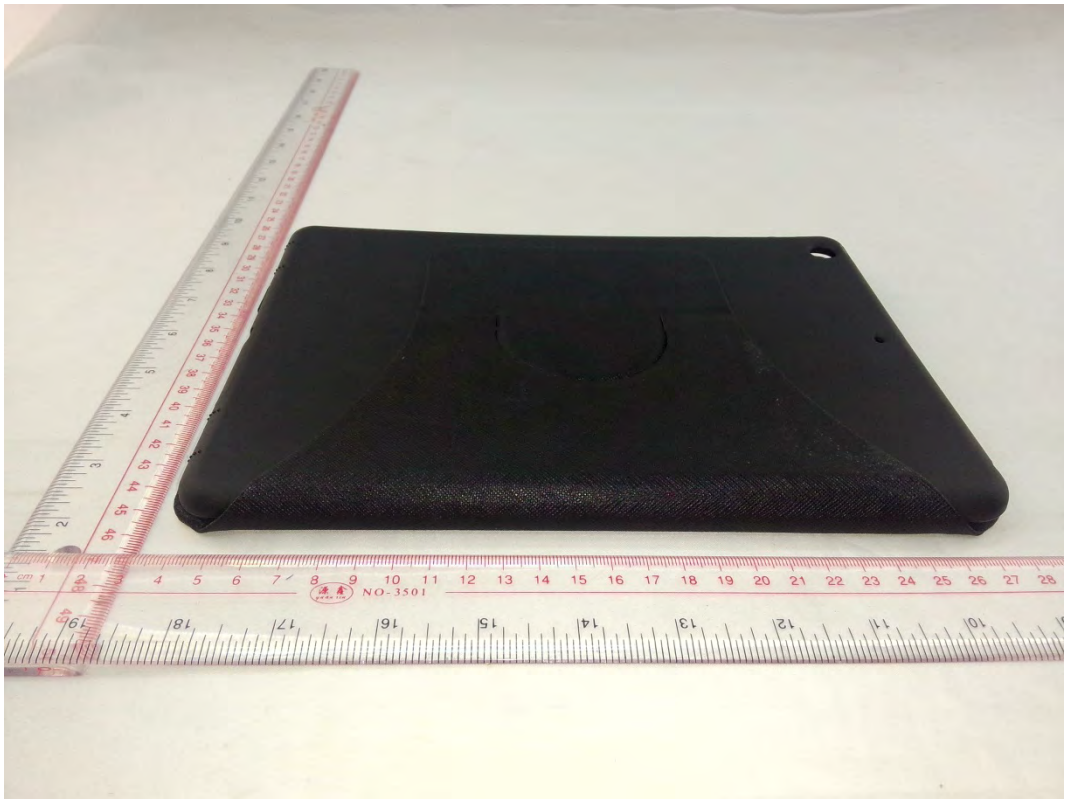
THE FRONT OF EUT (1)

THE FRONT OF EUT (2)

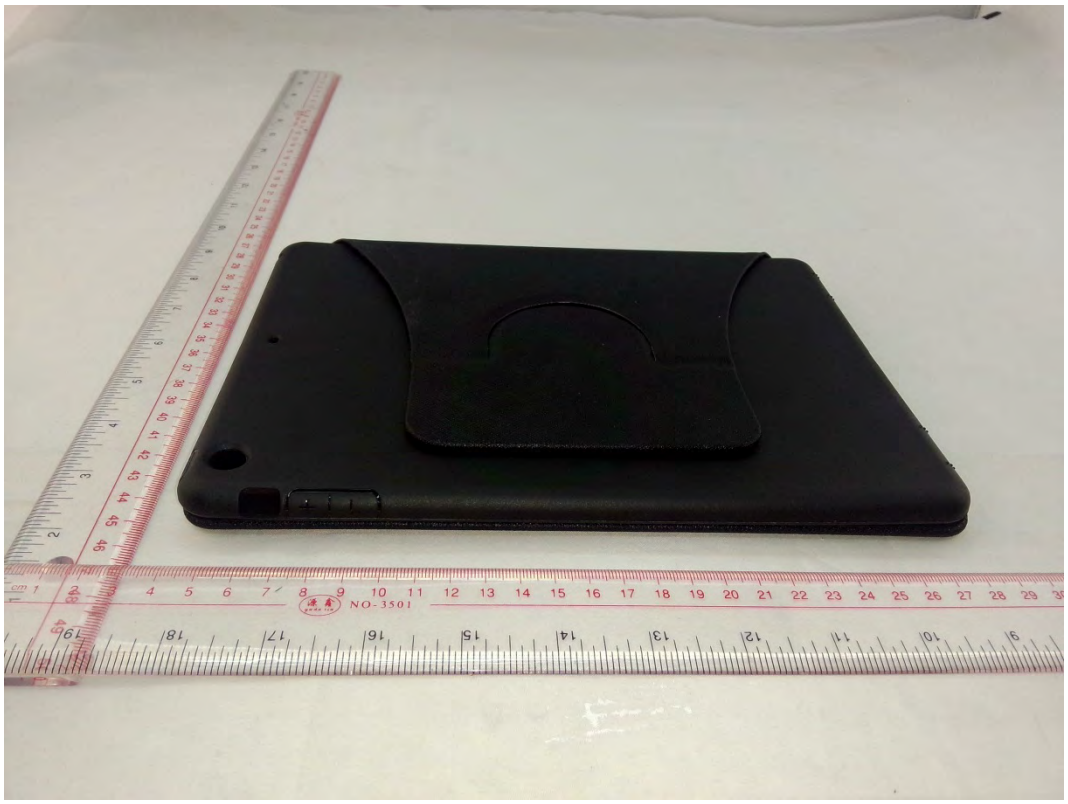
THE BACK OF EUT

THE LEFT OF EUT

THE RIGHT OF EUT

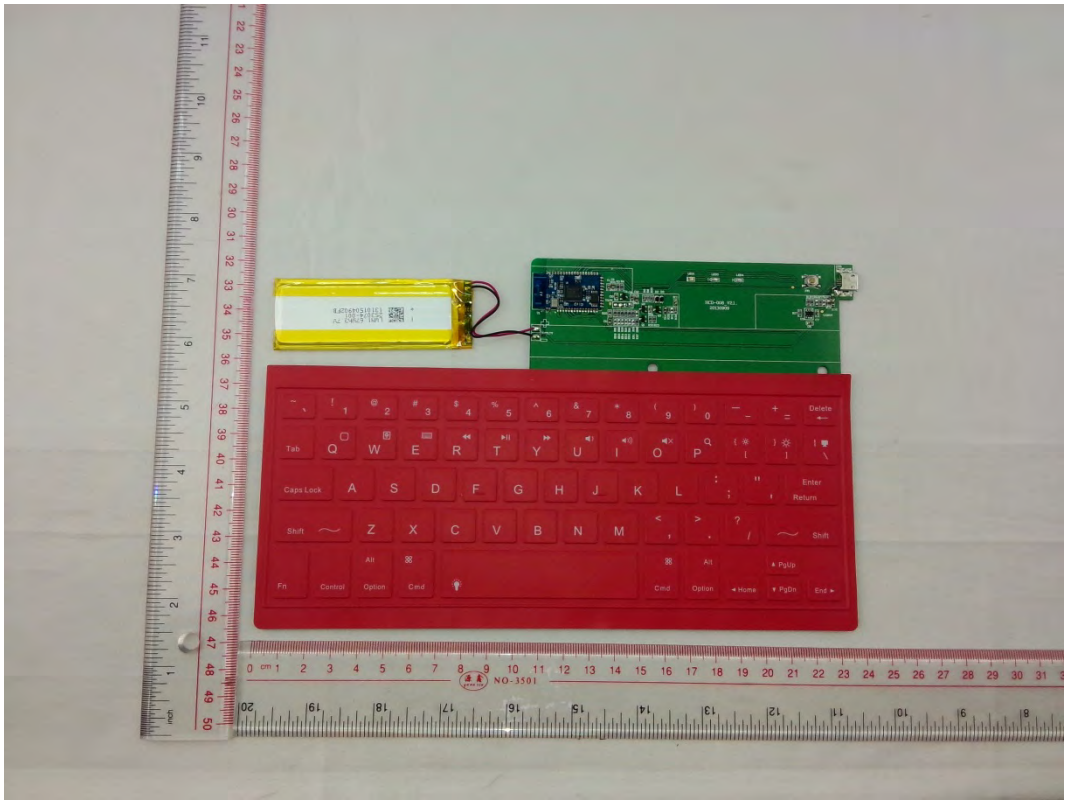


THE UP OF EUT

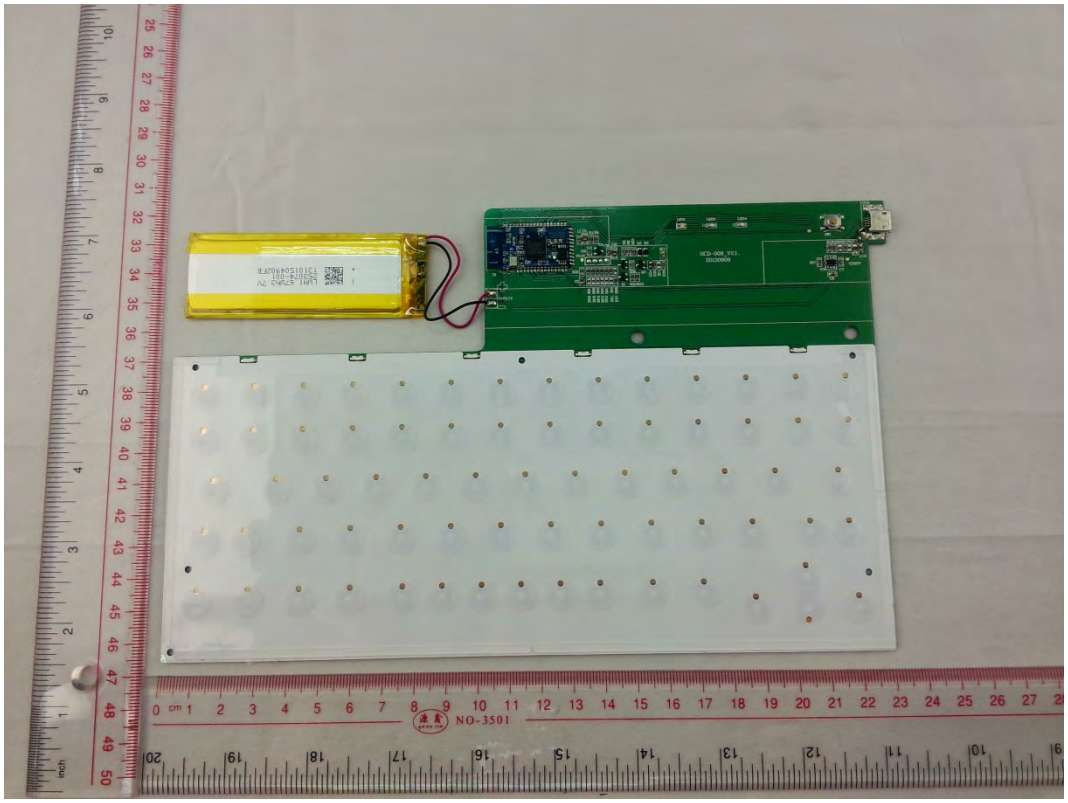


THE DOWN OF EUT

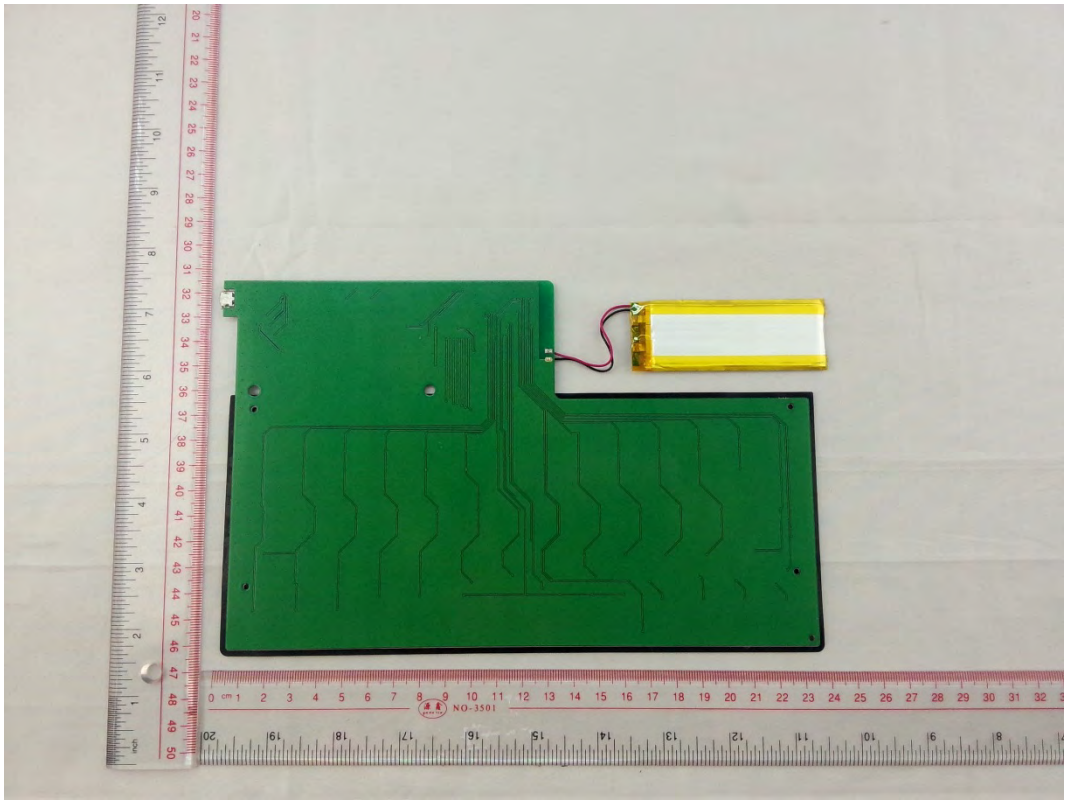
C.2 Inside of the EUT



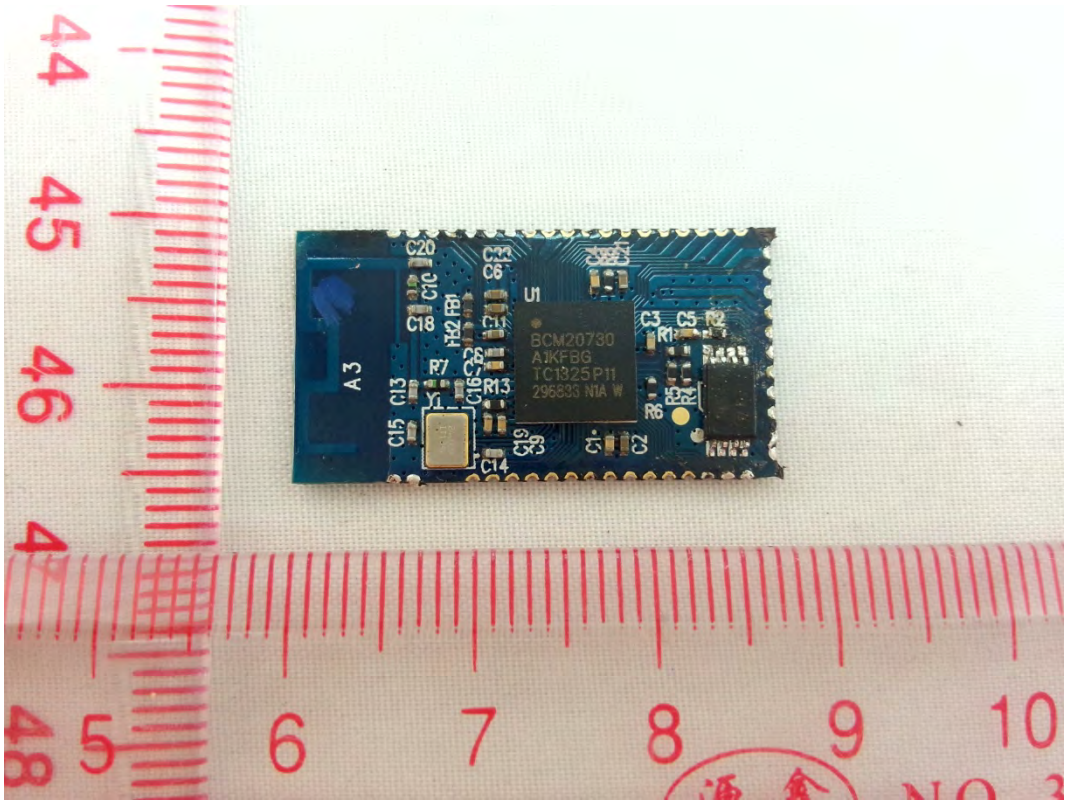
EUT UNCOVER VIEW



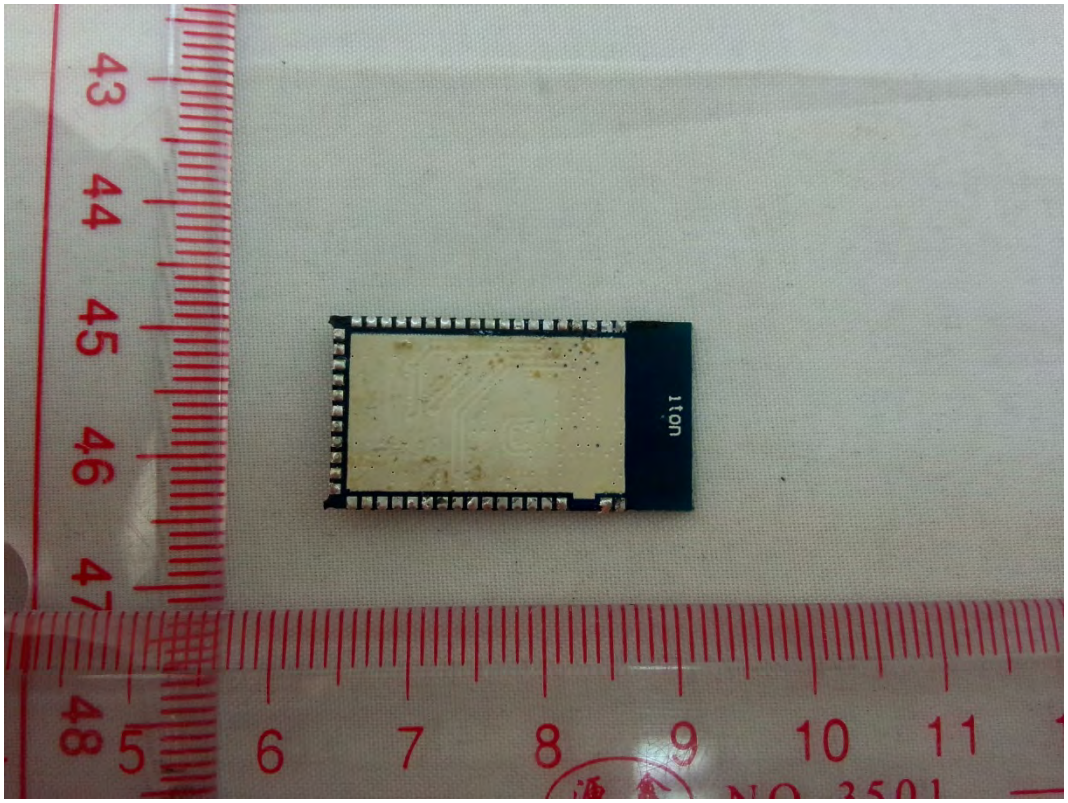
MAIN BOARD TOP VIEW 1



MAIN BOARD BACK VIEW 1



RF BOARD



RF BOARD

--END OF REPORT--