

FCC
RF
TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Bluetooth Headphone

ISSUED TO
D&M Holdings Inc.

D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa,
210-8569, Japan



Prepared by:



Li Hongmei
(Reporting Specialist)

Date Oct 27, 2014

Approved by:



Wei Yanquan
(Chief Engineer)

Date Oct 27, 2014

Report No.: BL-SZ1490080-601

EUT Type: Bluetooth Headphone

Model Name: AH-GC20

Brand Name: DENON

Test Standard: 47 CFR Part 15 Subpart C

FCC ID: BV2-AHGC20

Test conclusion: PASS

Test Date: Jul 15, 2014 ~ Oct 20, 2014

Date of Issue: Oct 27, 2014

NOTE: This test report can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. BALUN Laboratory. Any objections should be raised within thirty days from the date of issue. To validate the report, please visit BALUN website.

Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions</u>
<u>Rev. 01</u>	<u>Oct 27, 2014</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	ADMINISTRATIVE DATA (GENERAL INFORMATION)	5
1.1	Identification of the Testing Laboratory	5
1.2	Identification of the Responsible Testing Location	5
1.3	Test Environment Condition	5
1.4	Announce	6
2	PRODUCT INFORMATION	7
2.1	Applicant	7
2.2	Manufacturer	7
2.3	General Description for Equipment under Test (EUT)	7
2.4	Technical Information	7
2.5	Ancillary Equipment	8
3	SUMMARY OF TEST RESULTS.....	9
3.1	Test Standards.....	9
3.2	Verdict.....	9
4	GENERAL TEST CONFIGURATIONS.....	10
4.1	Test Environments	10
4.2	Test Equipment List	10
4.3	Test Configurations	11
4.4	Description of Test Setup	11
4.4.1	For Antenna Port Test	11
4.4.2	For AC Power Supply Port Test	12
4.4.3	For Radiated Test (Below 30MHz)	12
4.4.4	For Radiated Test (30MHz-1GHz)	13
4.4.5	For Radiated Test (Above 1GHz).....	13
4.5	Test Conditions	14

4.6	Measurement Results Explanation Example	15
4.6.1	For conducted test items:	15
4.6.2	For radiated band edges and spurious emission test:.....	15
5	TEST ITEMS.....	16
5.1	Antenna Requirements	16
5.1.1	Standard Applicable	16
5.1.2	Antenna Anti-Replacement Construction	16
5.1.3	Antenna Gain	16
5.2	Number of Hopping Frequency	17
5.2.1	Limit.....	17
5.2.2	Test Procedure	17
5.3	Peak Output Power	18
5.3.1	Test Limit.....	18
5.3.2	Test Procedure	18
5.4	Occupied Bandwidth	19
5.4.1	Limit.....	19
5.4.2	Test Procedure	19
5.5	Carrier Frequency Separation.....	20
5.5.1	Limit.....	20
5.5.2	Test Procedure	20
5.6	Time of Occupancy (Dwell time)	21
5.6.1	Limit.....	21
5.6.2	Test Procedure	21
5.7	Conducted Spurious Emission	22
5.7.1	Limit.....	22
5.7.2	Test Procedure	22
5.8	Conducted Emission	23
5.8.1	Limit.....	23
5.8.2	Test Procedure	23
5.9	Radiated Spurious Emission	24
5.9.1	Limit.....	24

5.9.2	Test Procedure	24
5.10	Band Edge	26
5.10.1	Limit	26
5.10.2	Test Procedure	26
ANNEX A	TEST RESULT	27
A.1	Number of Hopping Frequency	27
A.2	Peak Output Power	31
A.3	20dB and 99% bandwidth	37
A.4	Hopping Frequency Separation	43
A.5	Average Time of Occupancy	45
A.6	Conducted Spurious Emissions	51
A.7	Conducted Emissions	64
A.8	Radiated Emission	66
A.9	Band Edge	117
ANNEX B	TEST SETUP PHOTOS	124
B.1	Conducted Test Photo	124
B.2	Conducted Emissions Test Photo	124
B.3	Radiated Test Photo	125
ANNEX C	EUT PHOTOS	127
C.1	Appearance of the EUT	127
C.2	Inside of the EUT	131

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	23 to 26°C
Ambient Relative Humidity	45 to 55%
Ambient Pressure	90 to 92 kPa

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	D&M Holdings Inc.
Address	D&M Building, 2-1 Nisshin-cho, Kawasaki-ku, Kawasaki-shi, Kanagawa, 210-8569, Japan

2.2 Manufacturer

Manufacturer	Zhongshan Wata Electronics co., Ltd
Address	No 142, South Tanshen Road, Tanzhou, Zhongshan, Guangdong, P. R. China

2.3 General Description for Equipment under Test (EUT)

EUT Type	Bluetooth Headphone
Model Name	AH-GC20
Hardware Version	V1.4
Software Version	V2.4
Network and Wireless connectivity	Bluetooth 3.0, Bluetooth 4.0 Low Energy (BLE)
About the Product	The equipment is Bluetooth Headphone, it contains Bluetooth 3.0 and Bluetooth 4.0 Low Energy (BLE) operating at 2.4GHz ISM band. Only the Bluetooth 3.0 was tested in this report.

2.4 Technical Information

TX/ RX Operating Range	2400~2483.5MHz band $f_c = 2402 \text{ MHz} + N \times 1 \text{ MHz}$, 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, $\pi/4$ -DQPSK, 8DPSK
Antenna Type	Ceramic Chip Antenna	
Antenna Gain	1.03dBi	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No	6SP383450
	Serial No	(N/A. marked #1 by test site)
	Capacitance	600mAh
	Rated Voltage	3.7V
	Extreme Voltage	Low: 3.3V / High: 4.2V
Ancillary Equipment 2	Audio Line	
Ancillary Equipment 3	USB Cable	

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 C63.4-2014	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 C63.10-2013	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.6	PASS
8	Conducted Emission	15.207	ANNEX A.7	PASS
9	Radiated Spurious Emission	15.209 15.247(d)	ANNEX A.8	PASS
10	Band Edge	15.209 15.247(d)	ANNEX A.9	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°C to +25°C
	LT (Low Temperature)	-20°C
	HT (High Temperature)	+55°C
Working Voltage of the EUT	NV (Normal Voltage)	3.7V
	LV (Low Voltage)	3.3V
	HV (High Voltage)	4.2V

4.2 Test Equipment List

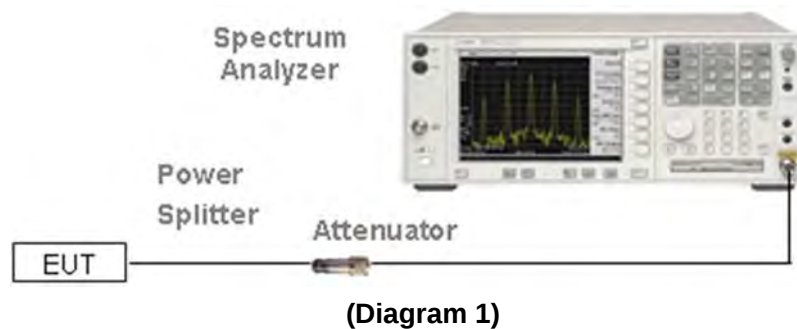
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	AGILENT	E4440A	MY45304434	2014.07.07	2015.07.06
Spectrum Analyzer	ROHDE&SCHWARZ	FSL3	103640/003	2014.07.07	2015.07.06
Bluetooth Tester	ROHDE&SCHWARZ	CBT	101005	2014.07.07	2015.07.06
Power Splitter	KMW	DCPD-LDC	1305003215	2014.07.07	2015.07.06
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2014.07.07	2015.07.06
Attenuator (20dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6dB)	KMW	ZA-S1-61	1305003189	--	--
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2014.07.07	2015.07.06
Temperature Chamber	ANGELANTIONI SCIENCE	NTH64-40A	1310	2014.07.07	2015.07.06
Test Antenna-Loop(9kHz-30MHz)	SCHWARZBECK	FMZB 1519	1519-037	2013.07.03	2015.07.02
Test Antenna-Bi-Log(30MHz-3G Hz)	SCHWARZBECK	VULB 9163	9163-624	2013.07.02	2015.07.01
Test Antenna-Horn(1-18GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2015.07.01
Test Antenna-Horn(15-26.5GHz)	SCHWARZBECK	BBHA 9170	9170-305	2013.07.02	2015.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2014.10.07	2015.10.06

4.3 Test Configurations

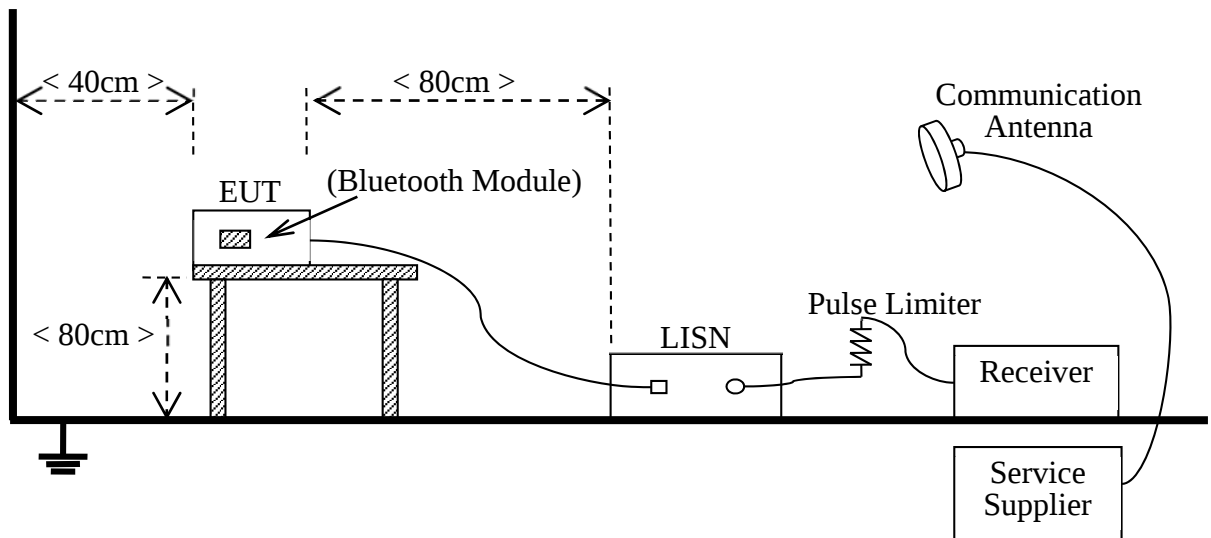
Test Configurations (TC) NO.	Description	
	Signal Description	Operating Frequency
Transmitter		
TC01	GFSK modulation, package type DH5, hopping on	--
TC02	GFSK modulation, package type DH5, hopping off	Ch No. 0/ 2402MHz
TC03	GFSK modulation, package type DH5, hopping off	Ch No. 39/ 2441MHz
TC04	GFSK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

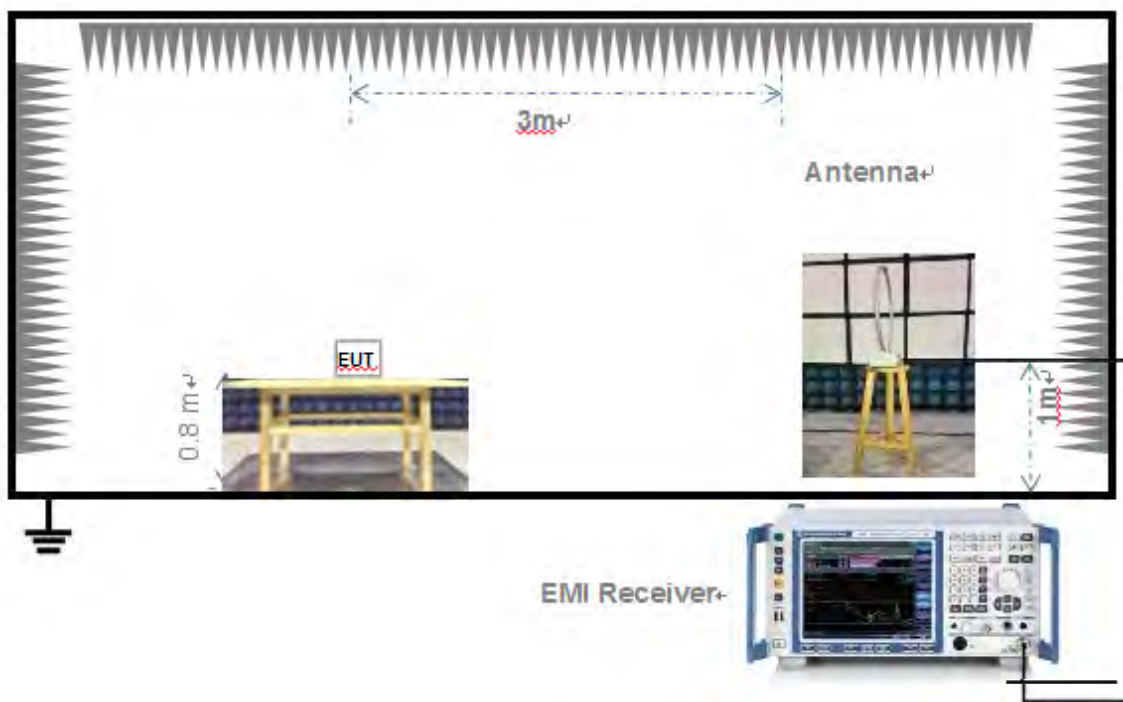


4.4.2 For AC Power Supply Port Test



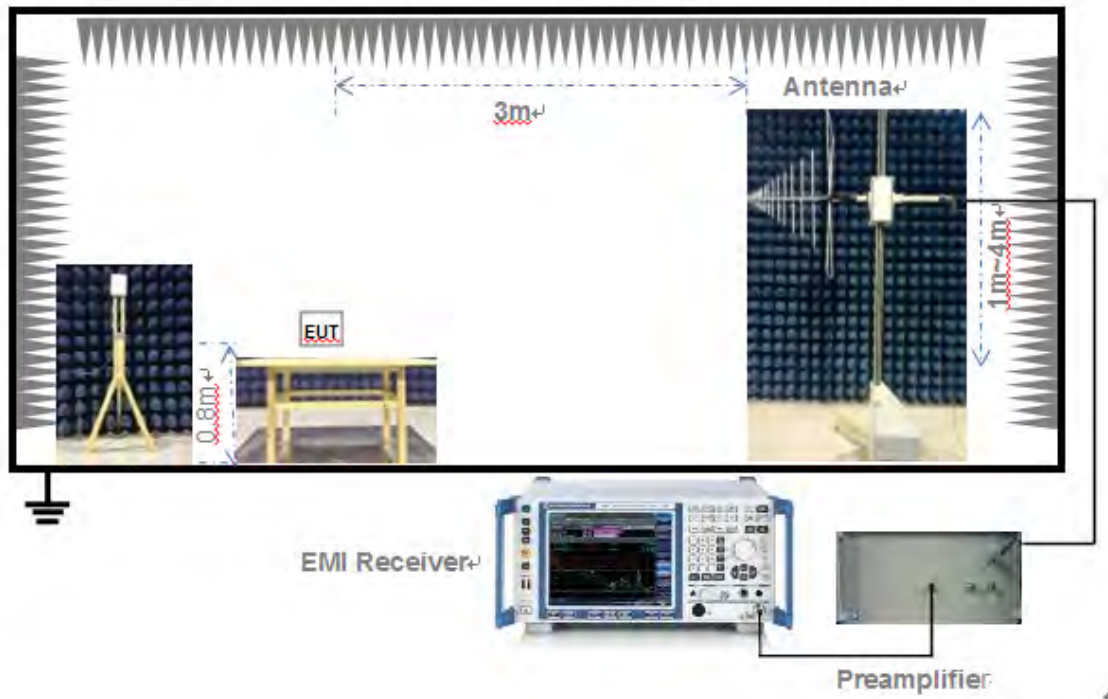
(Diagram 2)

4.4.3 For Radiated Test (Below 30MHz)



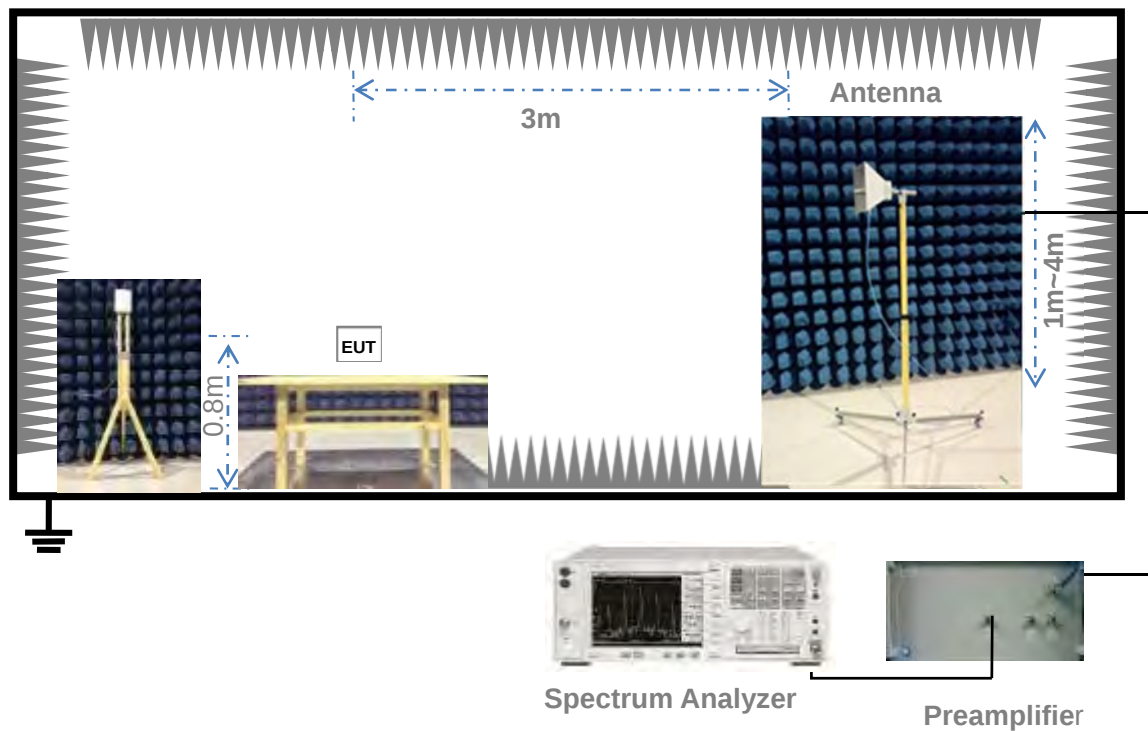
(Diagram 3)

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	TC01, TC02, TC03, TC04, TC05, TC06, TC07, TC08, TC09, TC10, TC11, TC12
Band Edge	NTNV	Test Setup 5	TC01, TC02, TC04, TC05, TC06, TC08, TC09, 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.			

4.6 Measurement Results Explanation Example

4.6.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

4.6.2 For radiated band edges and spurious emission test:

Per part 15.35(c), the EUT Bluetooth average emission level could be determined by the peak emission level applying duty cycle correction factor, to represent averaging over the whole pulse train.

The average level is derived from the peak level corrected with "Duty cycle correction factor".

Average Emission Level (dBuV/m) = Peak Emission Level (dBuV/m) + Duty cycle correction factor (dB)

Duty cycle correction factor (dB) = $20 * \log (\text{Duty cycle})$.

Duty cycle = on time / 100 milliseconds

On time = dwell time * hopping number in 100 ms

For example: bluetooth with dwell time 2.9ms and 3 hops in 100 ms, then

Duty cycle correction factor (dB) = $20 * \log ((2.9 * 3) / 100) = -21.21 \text{ dB}$

Following shows an average computation example with duty cycle correction factor = -21.21dB, and the peak emission level is 45.61 dBuV/m.

Example:

Average Emission Level (dBuV/m) = Peak Emission Level (dBuV/m) + duty cycle correction factor (dB)
= $45.61 + (-21.21) = 24.4(\text{dBuV/m})$

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Standard Applicable

FCC §15.203 & 15.247(b)

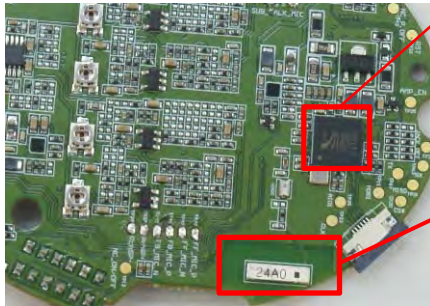
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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	The antenna is welded on the mainboard, can't be replaced by the consumer

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 $\geq$ 1% of the span

VBW $\geq$ 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 $\geq$ 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 ($10 \cdot \log 1\% = 20\text{dB}$) 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 $\geq$ 1% of the 20 dB bandwidth

VBW $\geq$ 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) $\geq 1\%$ of the span

Video (or Average) Bandwidth (VBW) $\geq$ 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

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

$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

For DH3 package type

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

$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

For DH5 package type

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

$$\{\text{Period}\} = 0.4s * \{\text{Number of Hopping Frequency}\}$$

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 $\geq$ 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 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	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(d)

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. Field Strength (dBμV/m) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.
2. In the emission tables above, the tighter limit applies at the band edges.
3. 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.
4. 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 $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported

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 $\geq$ 1% of the span

VBW $\geq$ RBW

Sweep = auto

Detector function = peak /AV

Trace = max hold

Allow the trace to stabilize.

$E \text{ [dB}\mu\text{V/m]} = UR + AT + A\text{Factor [dB]}; AT = LCable \text{ loss [dB]} - G\text{preamp [dB]}$

AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

AFactor: Antenna Factor at 3m

ANNEX A TEST RESULT

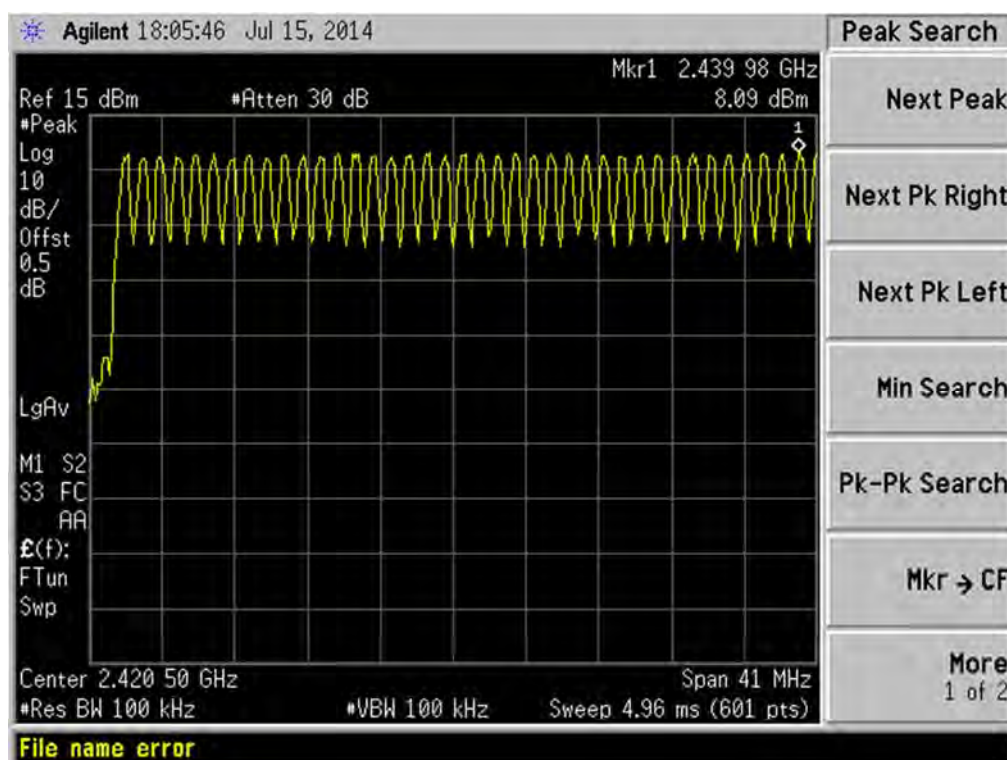
A.1 Number of Hopping Frequency

Test Data

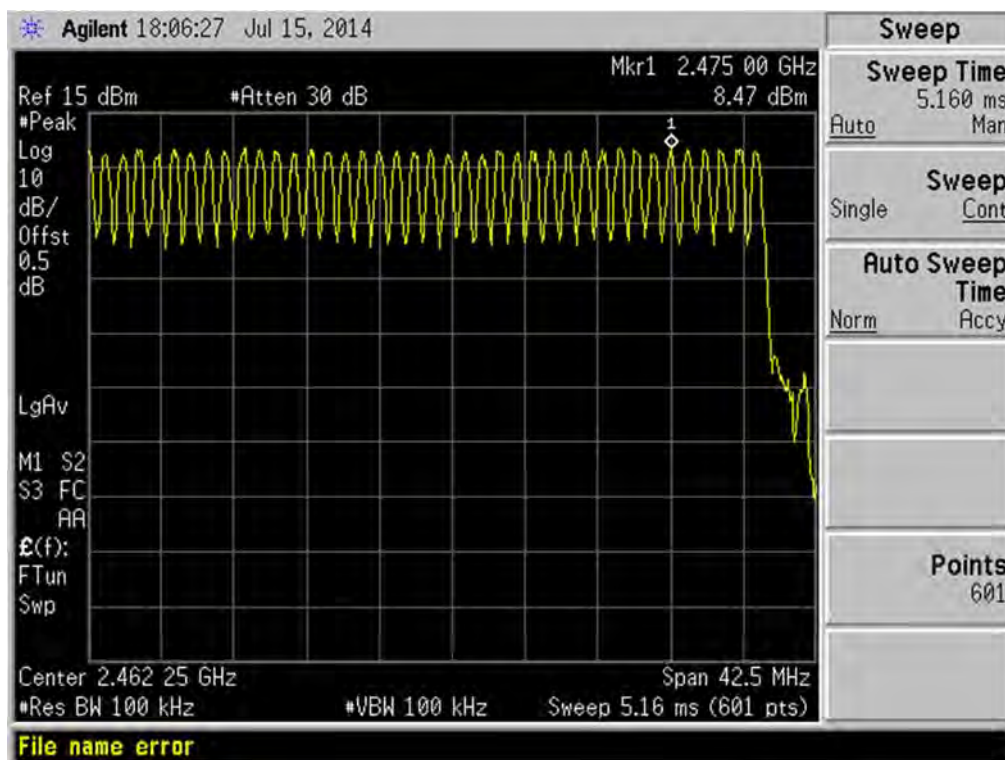
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	PASS
$\pi/4$ -DQPSK	2400 - 2483.5	79	15	PASS
8-DPSK	2400 - 2483.5	79	15	PASS

Test plots

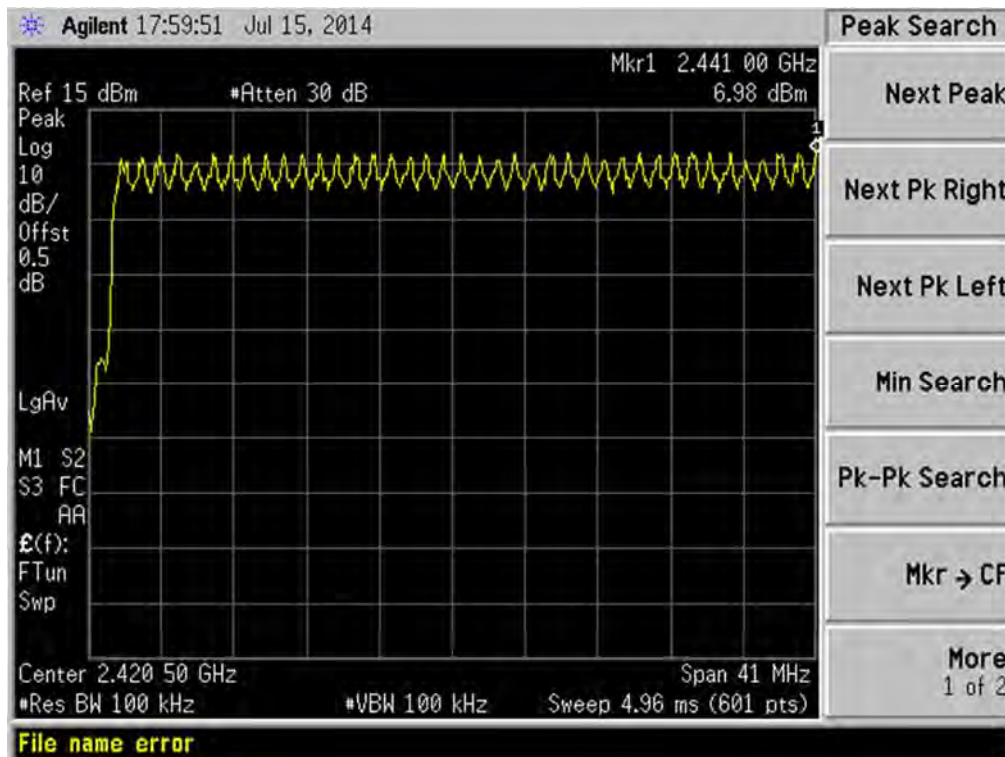
GFSK 2.4GHz~2.4415GHz



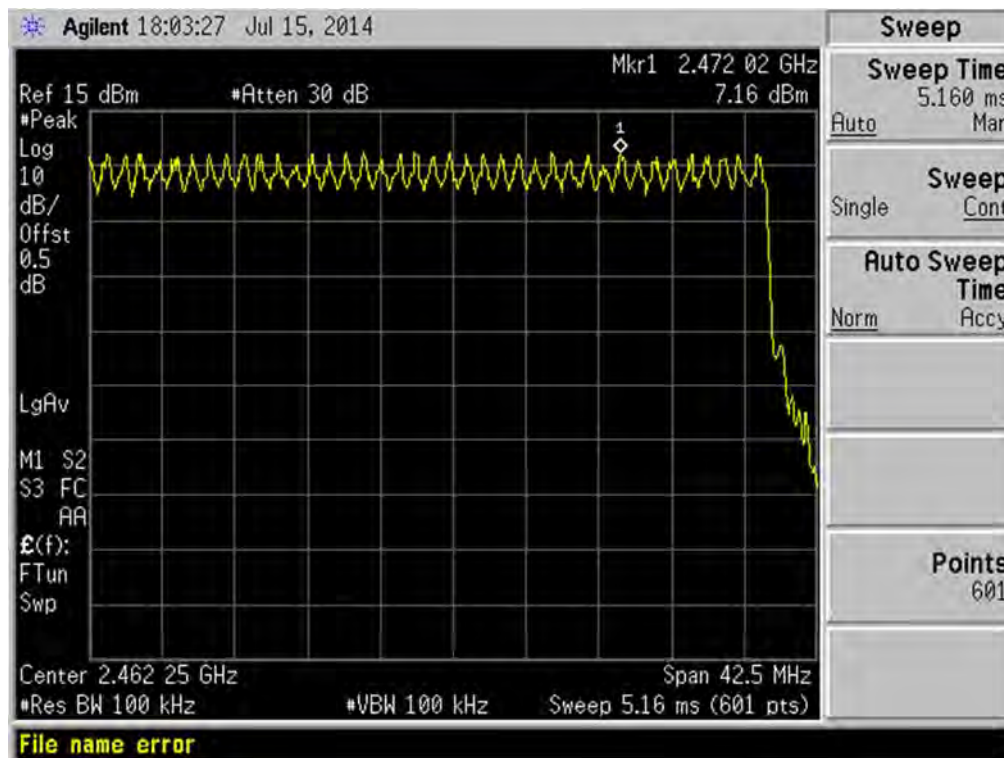
GFSK 2.4415GHz~2.4835GHz



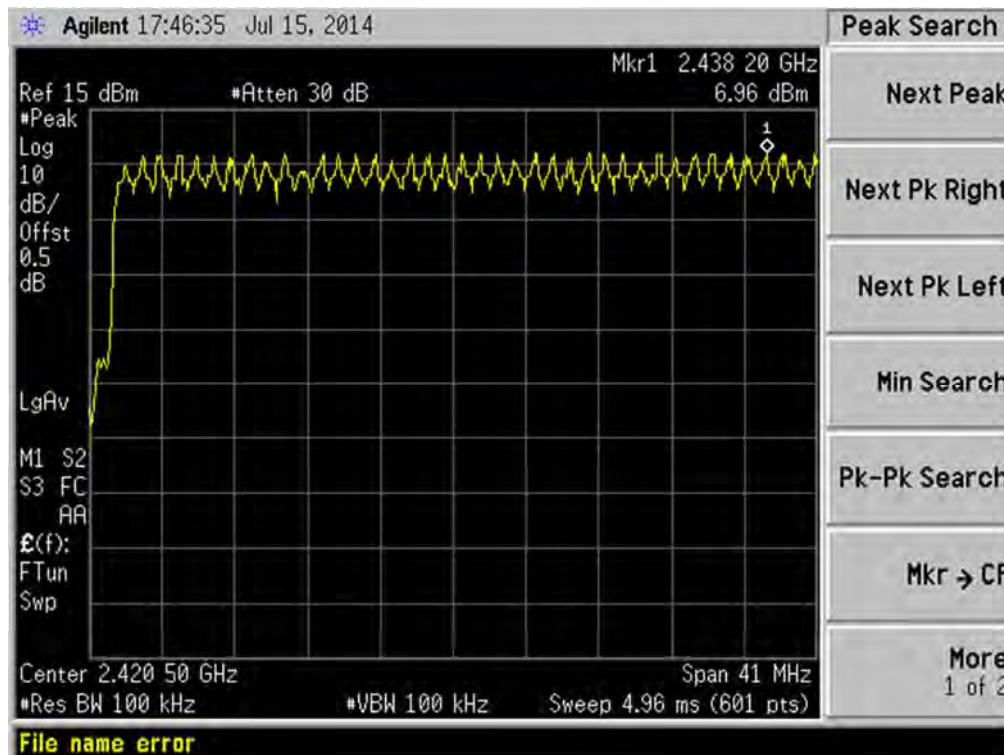
II/4-DQPSK 2.4GHz~2.4415GHz



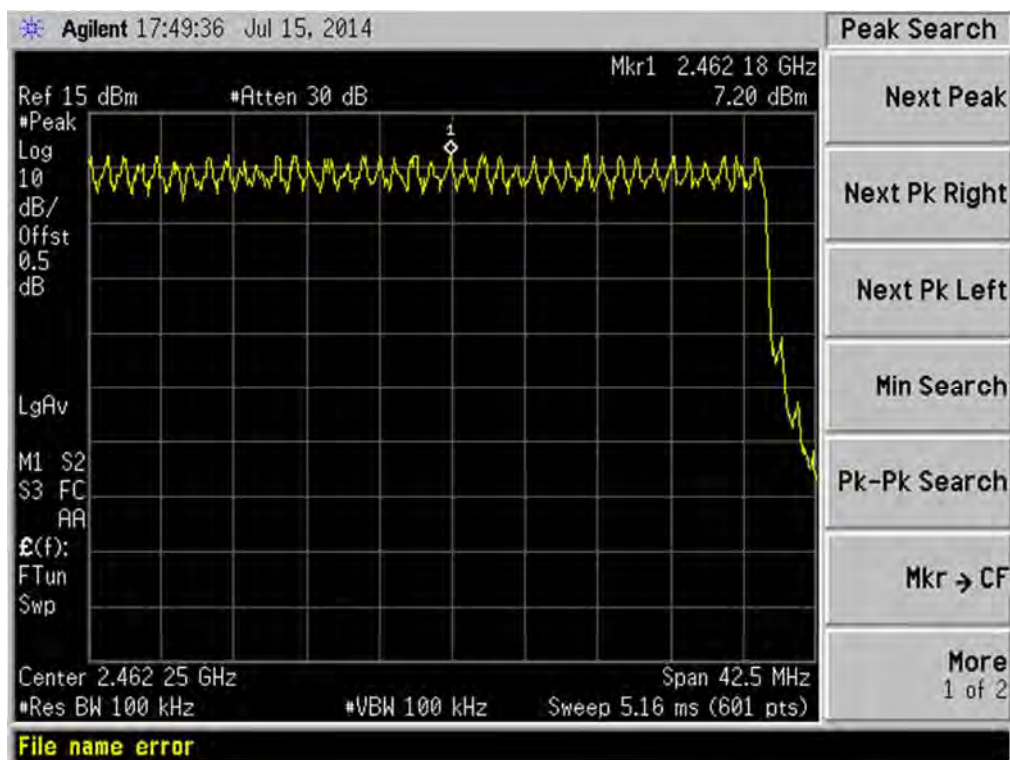
II/4-DQPSK 2.4415GHz~2.4835GHz



8-DPSK 2.4GHz~2.4415GHz



8-DPSK 2.4415GHz~2.4835GHz



A.2 Peak Output Power

Test Data

GFSK Mode:

Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	7.49	5.61	30	1000	PASS
Middle	8.24	6.67			PASS
High	8.09	6.44			PASS

π/4-DQPSK Mode:

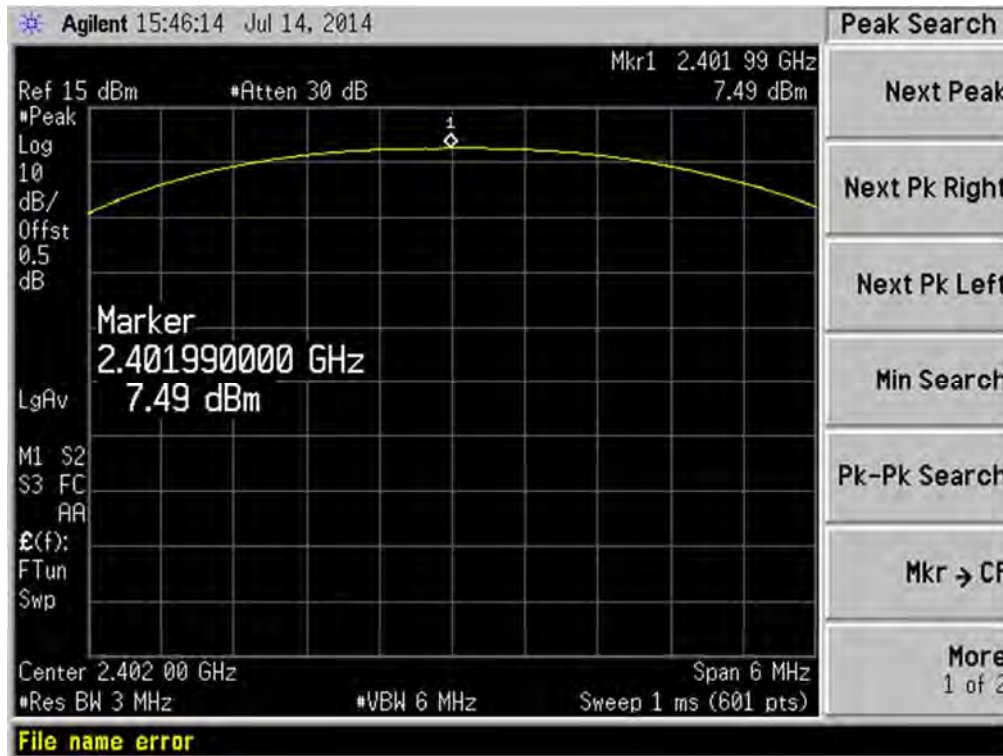
Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	6.64	4.61	30	1000	PASS
Middle	7.58	5.73			PASS
High	7.44	5.55			PASS

8-DPSK Mode:

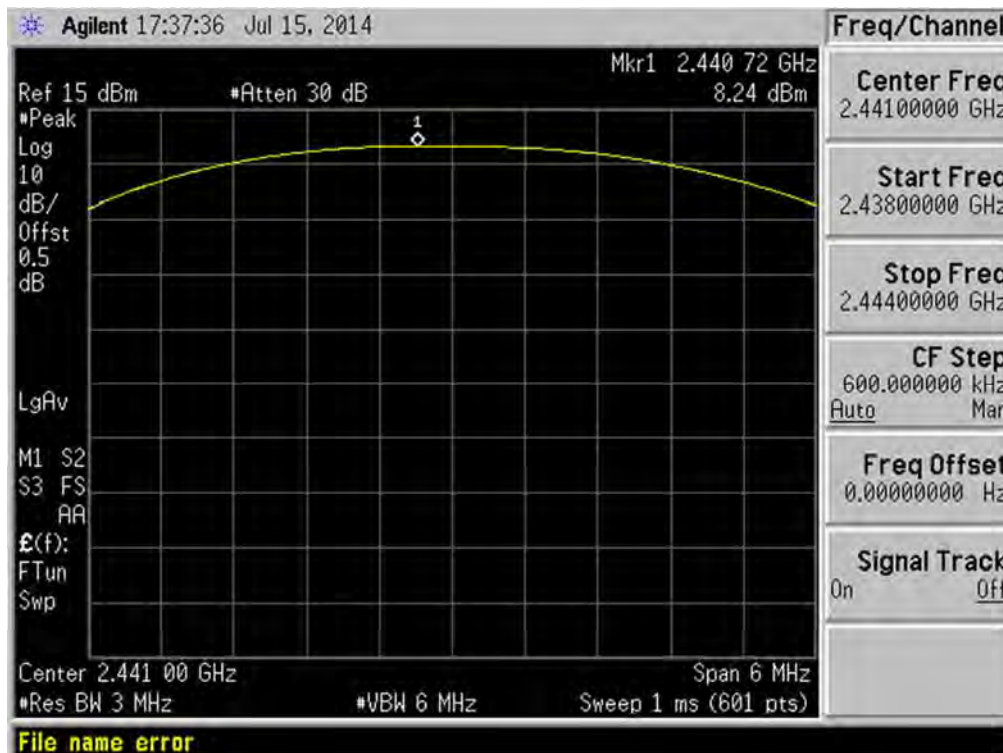
Channel	Measured Output Peak Power		Limit		Verdict
	dBm	mW	dBm	mW	
Low	6.78	4.76	30	1000	PASS
Middle	7.70	5.89			PASS
High	7.59	5.74			PASS

Test plots

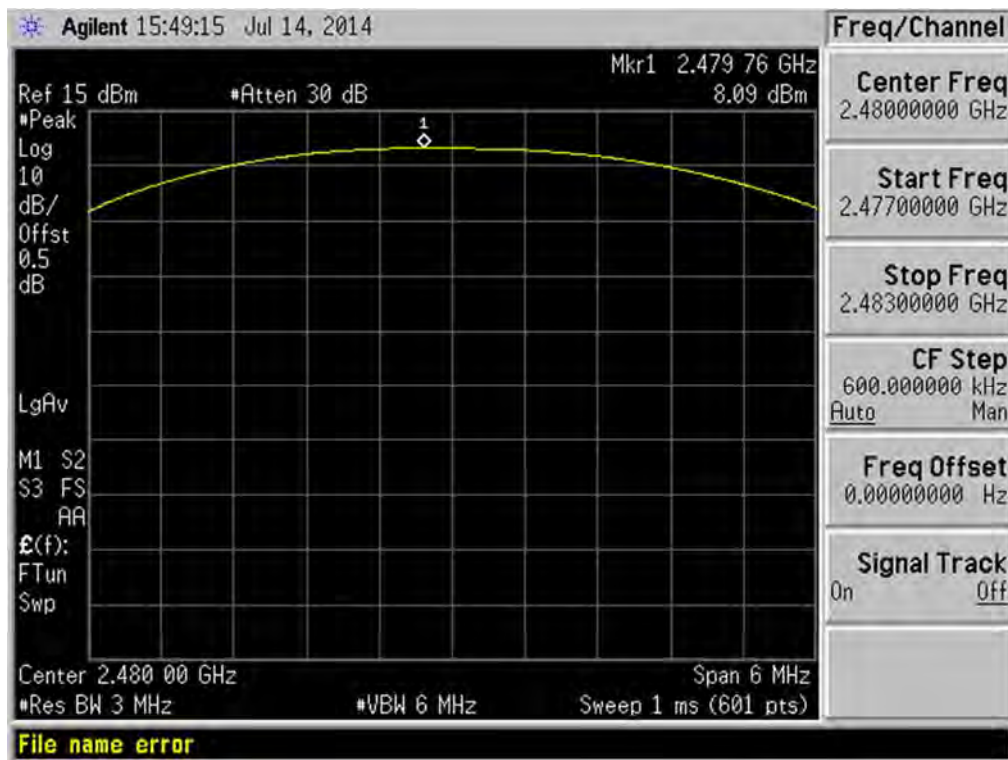
GFSK LOW CHANNEL



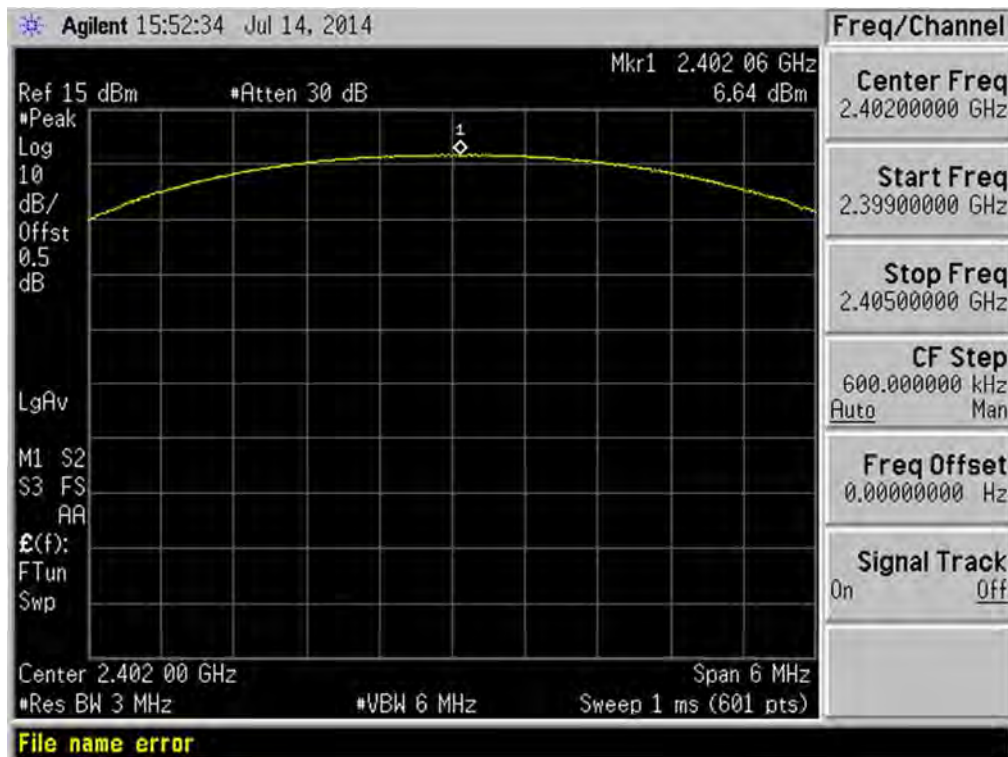
GFSK MID CHANNEL



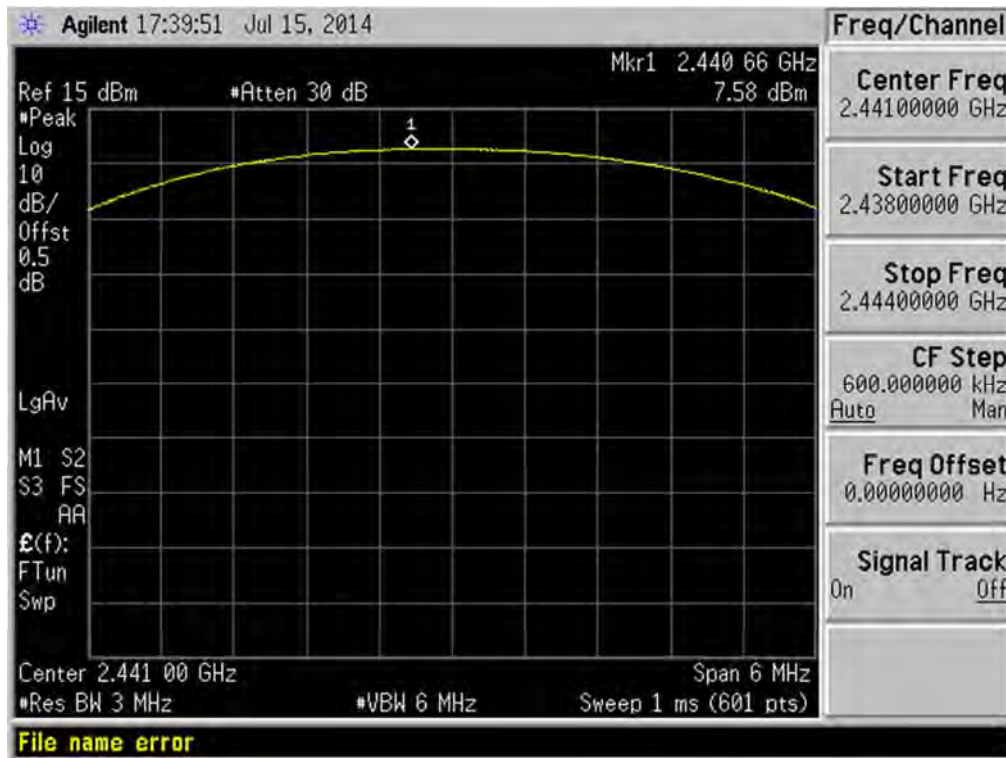
GFSK HIGH CHANNEL



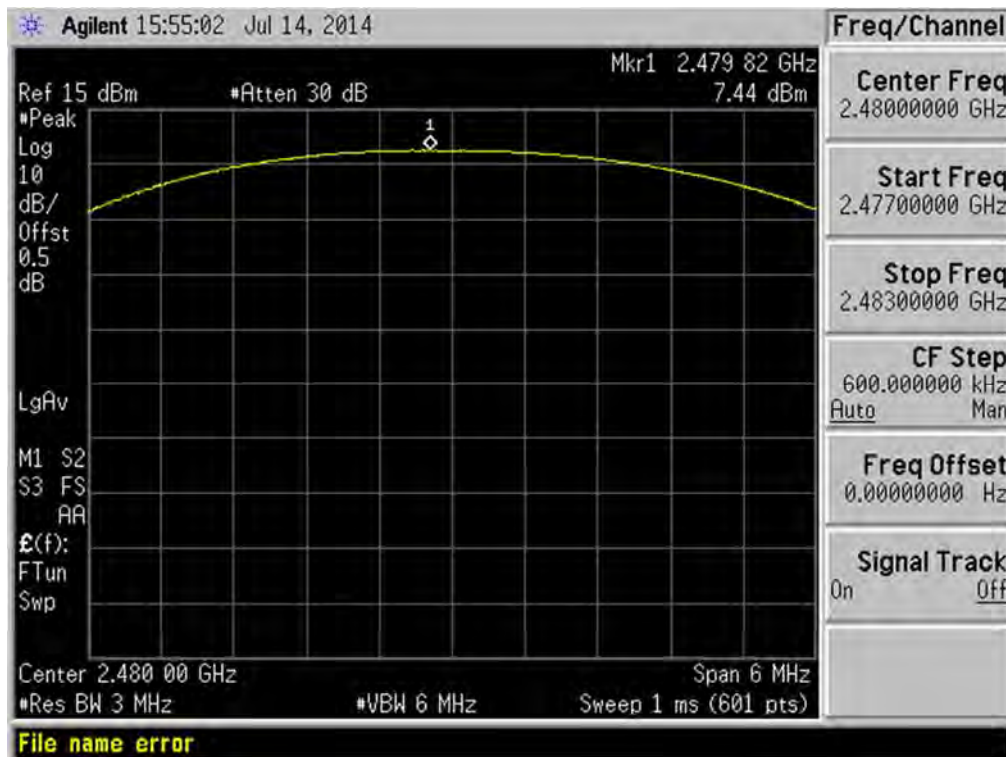
II/4-DQPSK LOW CHANNEL



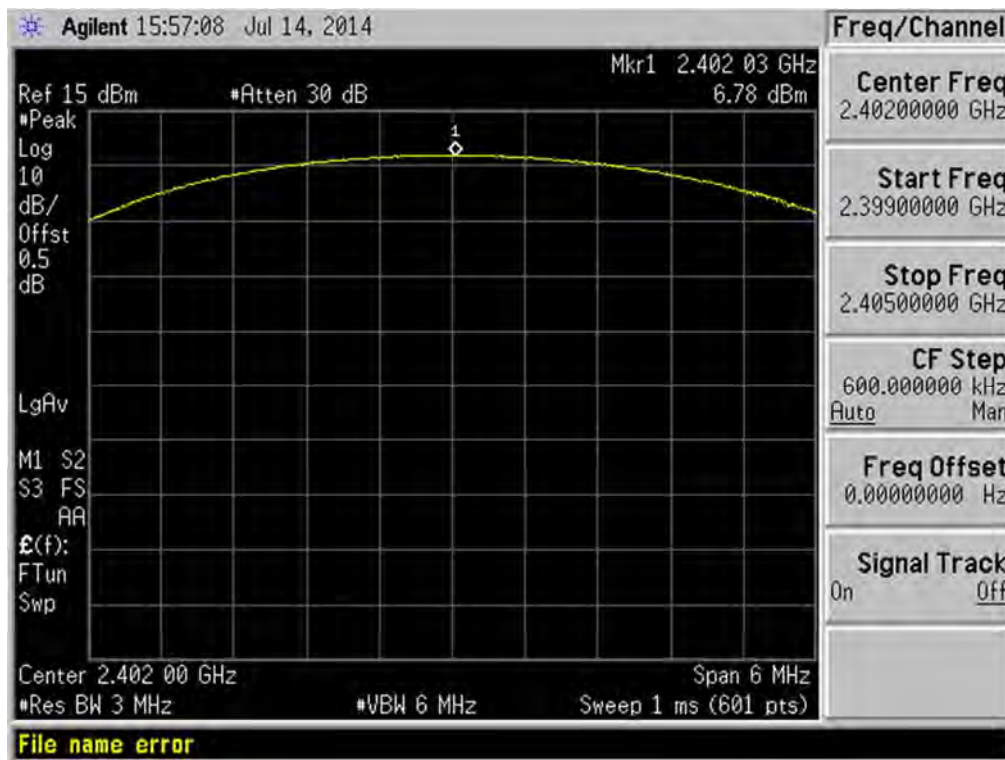
II/4-DQPSK MID CHANAEL



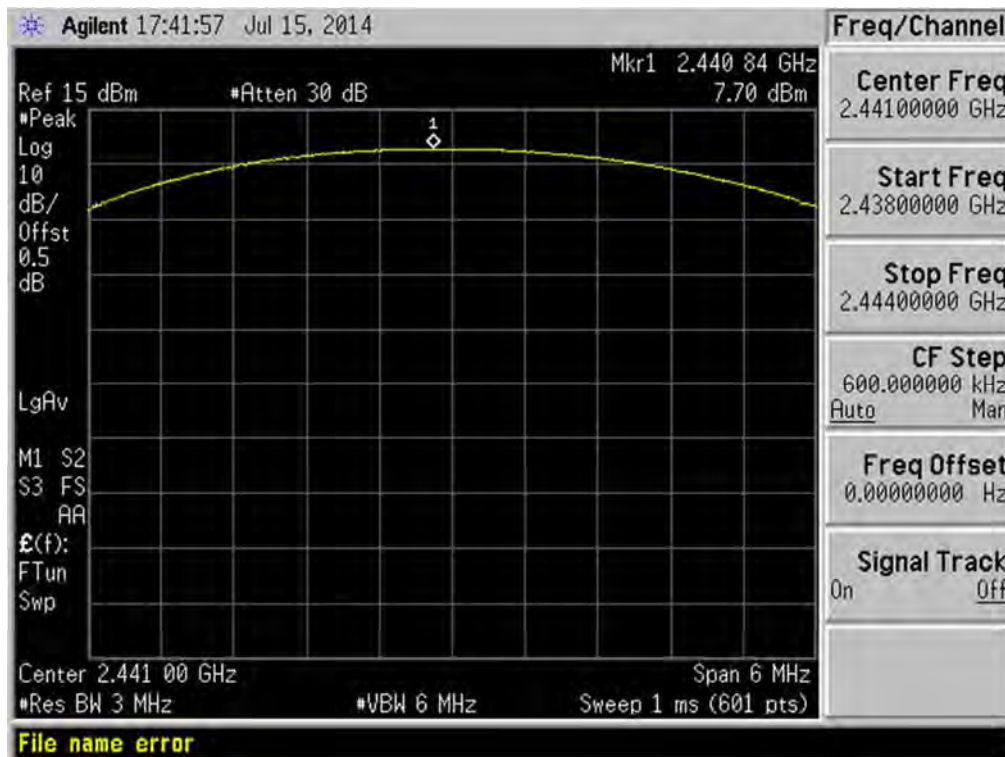
II/4-DQPSK HIGH CHANNEL



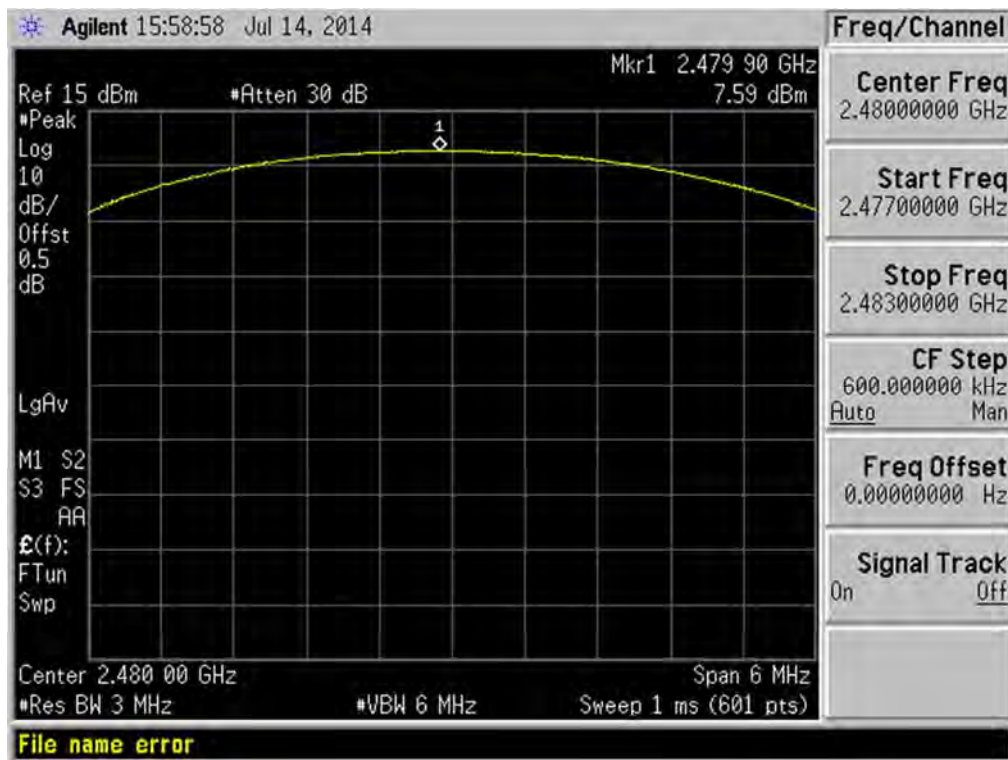
8-DPSK LOW CHANNEL



8-DPSK MID CHANAEL



8-DPSK HIGH CHANNEL



A.3 20dB and 99% bandwidth

Test Data

GFSK Mode:

Channel	20 dB Bandwidth (MHz)	99% Bandwidth (kHz)
Low	1.114	959.5830
Middle	1.124	963.5096
High	1.118	959.4000

π/4-DQPSK Mode:

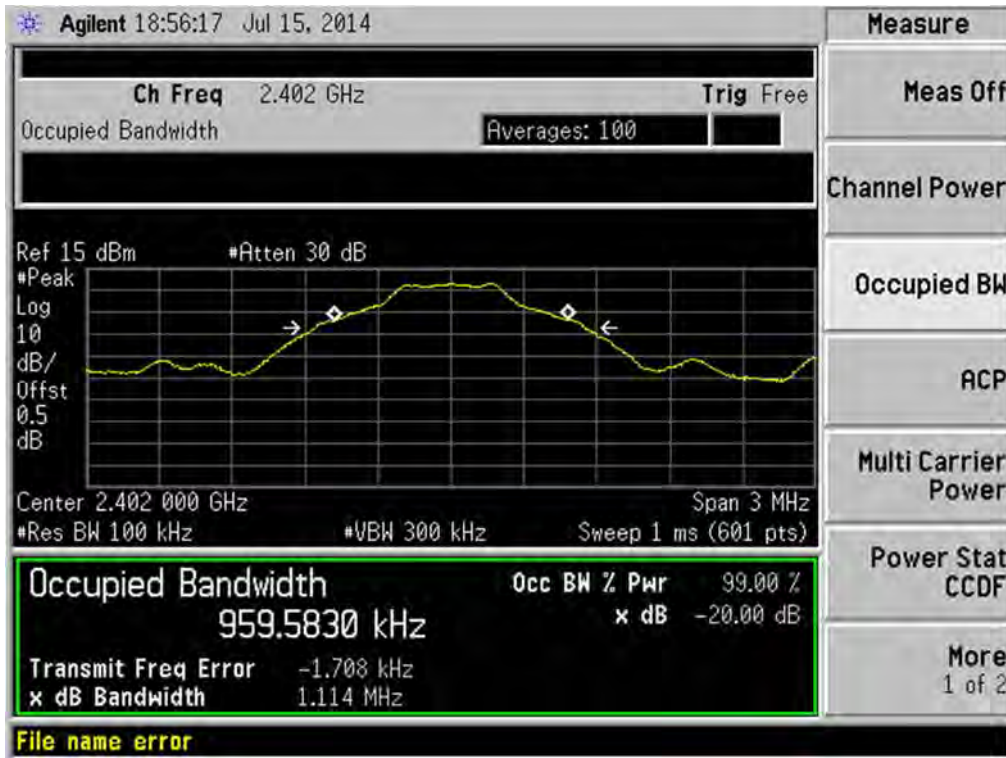
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.386	1.2149
Middle	1.385	1.2371
High	1.384	1.2209

8-DPSK Mode:

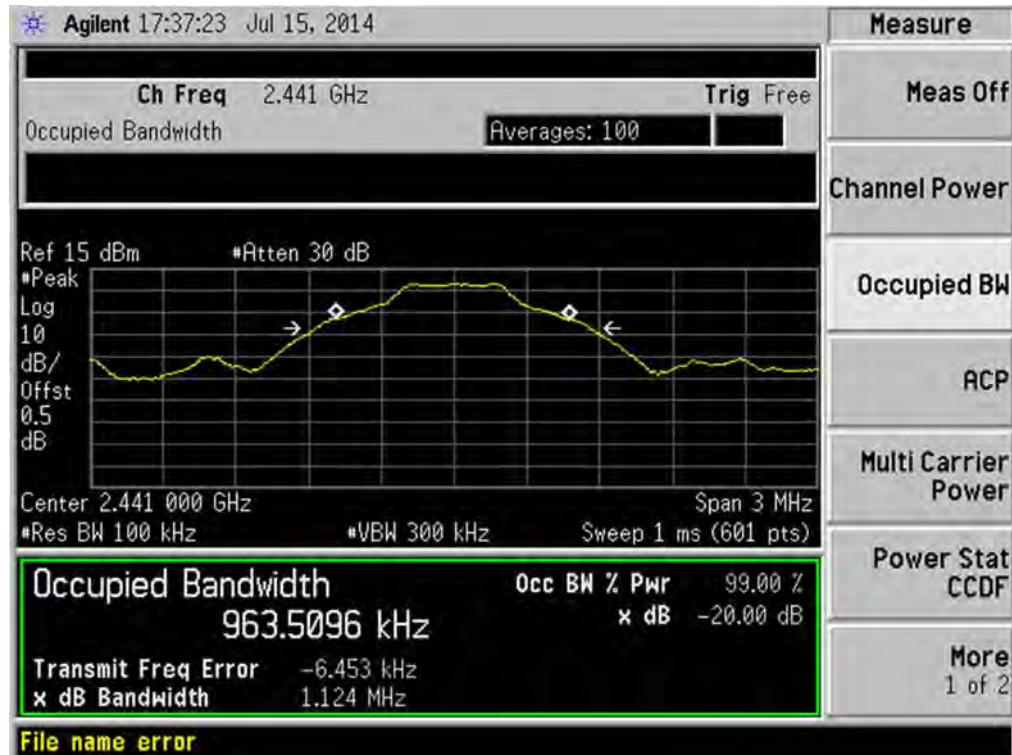
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.381	1.2253
Middle	1.388	1.2330
High	1.391	1.2217

Test plots

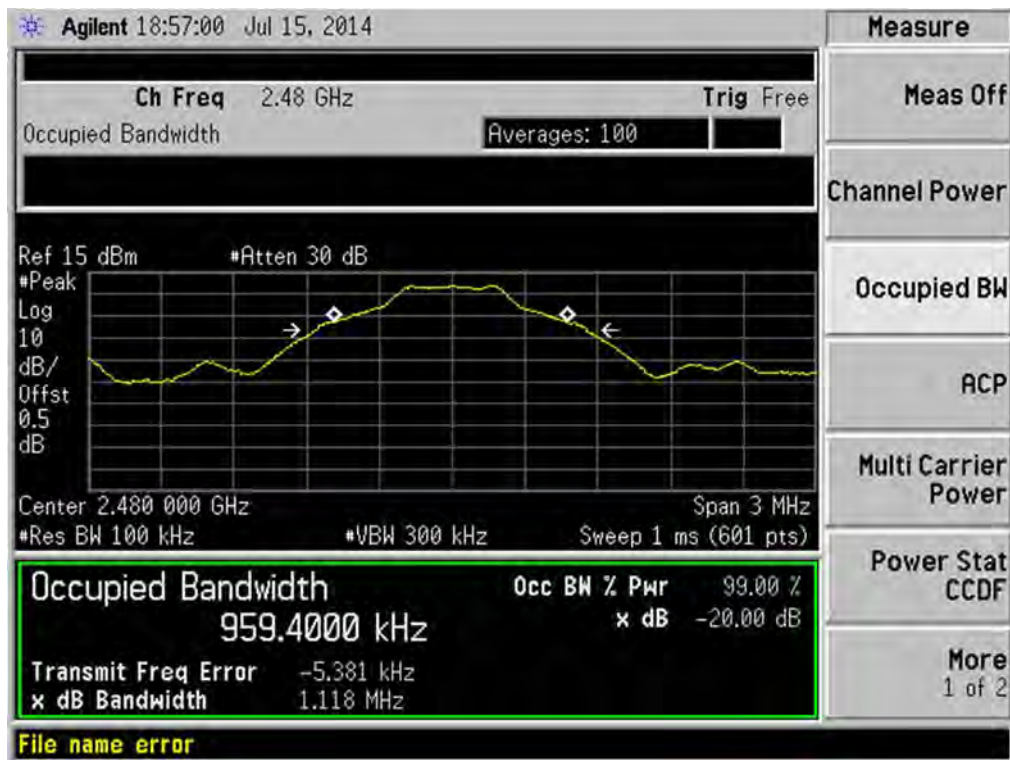
GFSK LOW CHANNEL



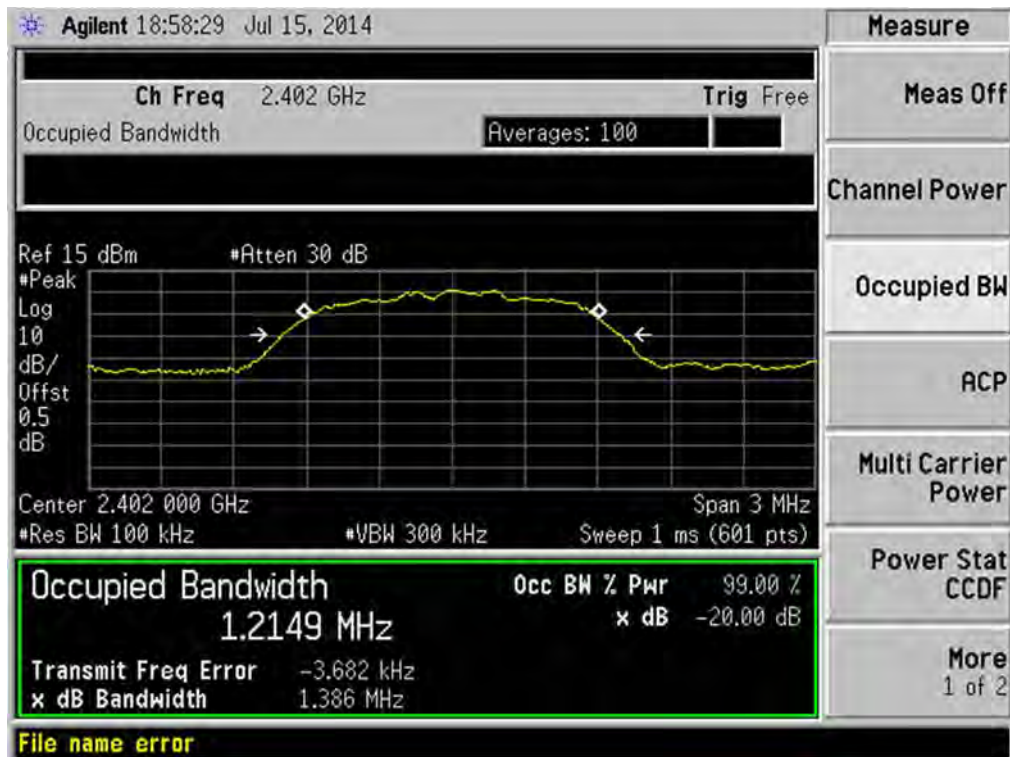
GFSK MID CHANAEL



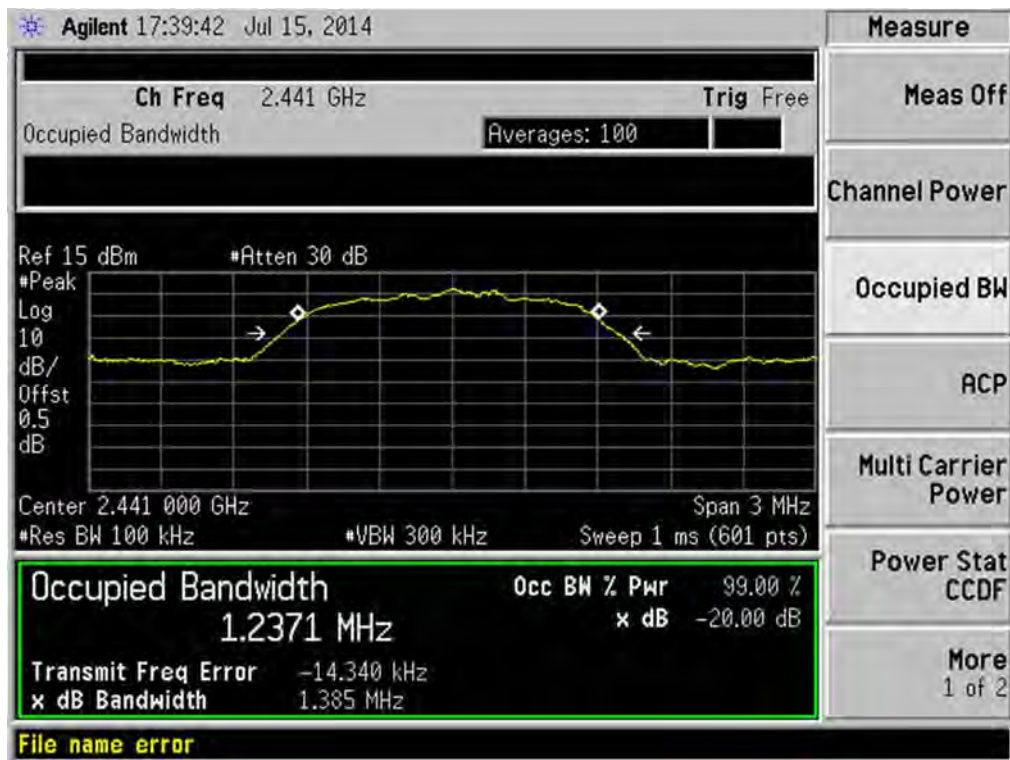
GFSK HIGH CHANNEL



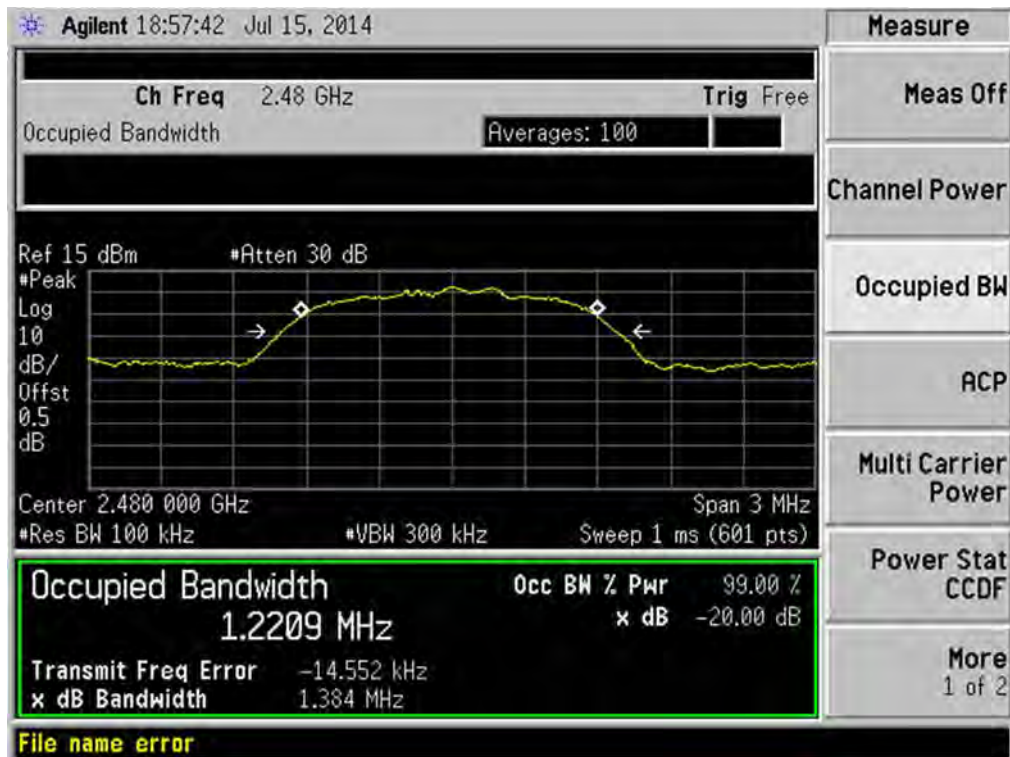
II/4-DQPSK LOW CHANNEL



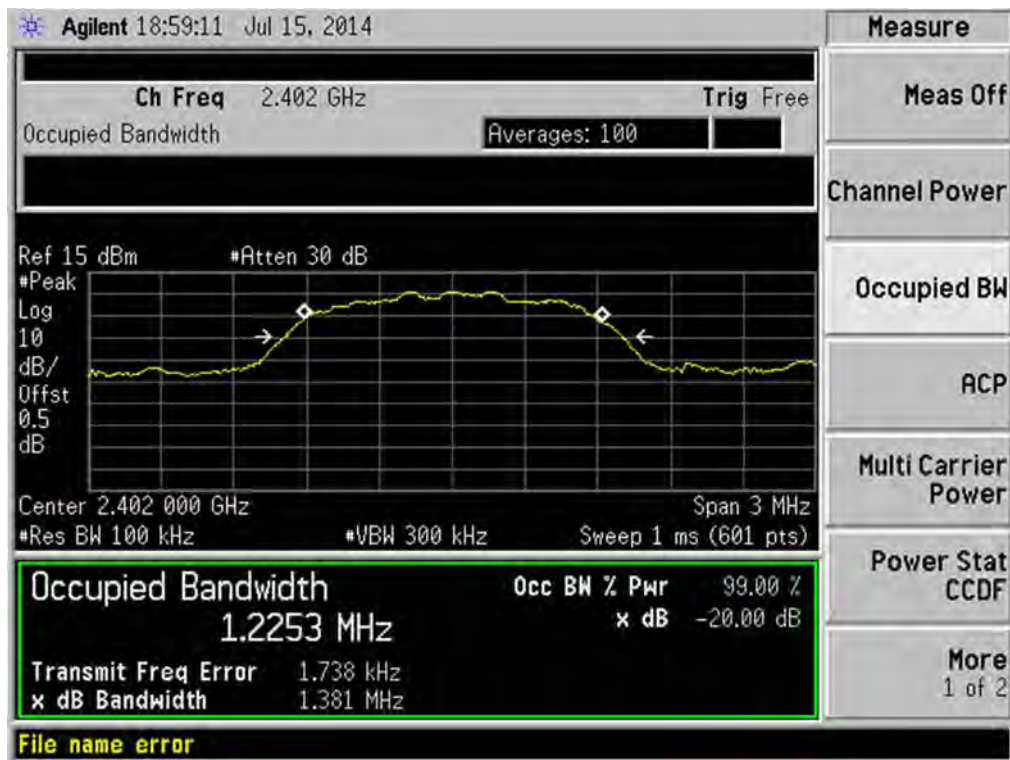
II/4-DQPSK MID CHANAEL



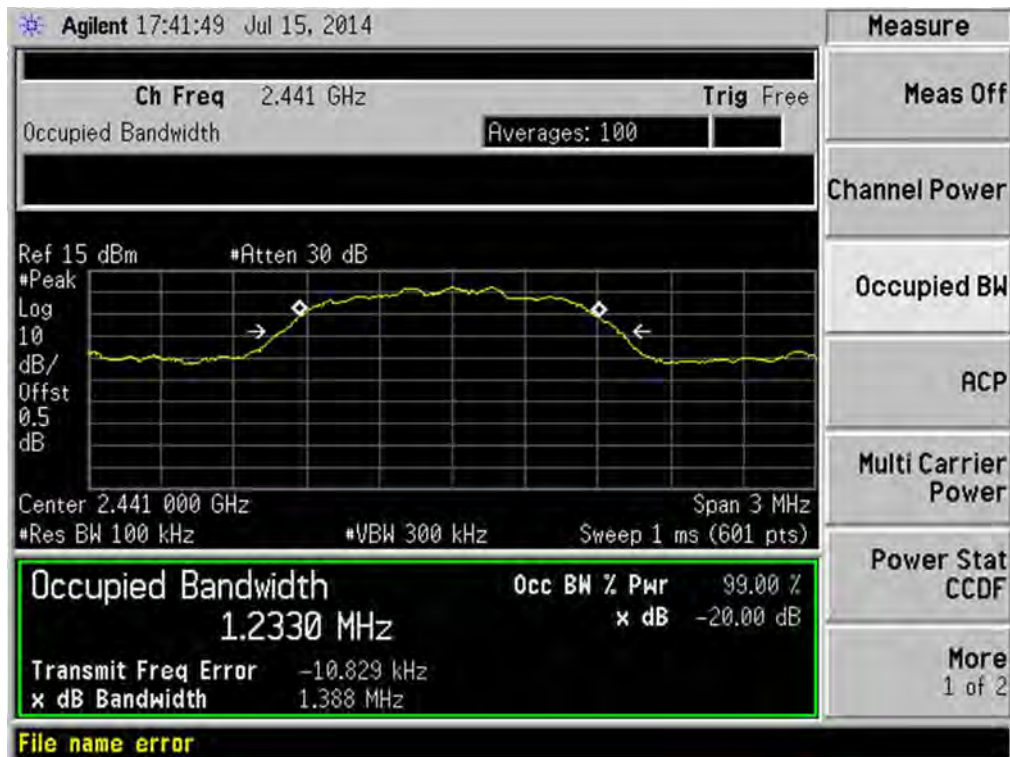
II/4-DQPSK HIGH CHANNEL



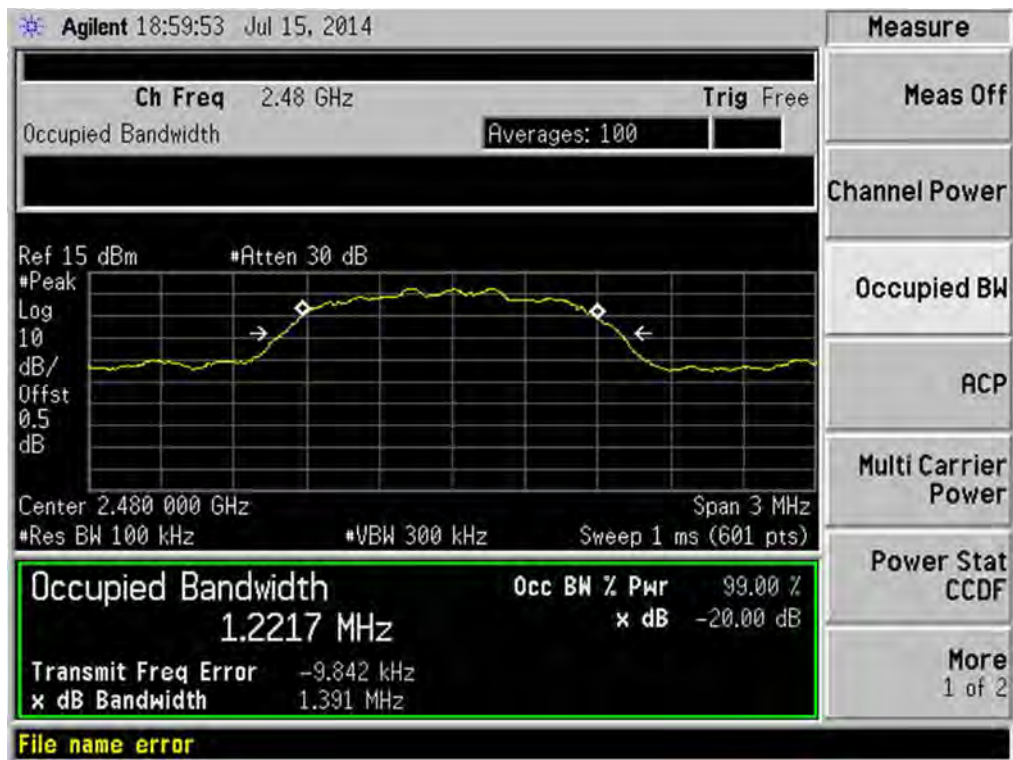
8-DPSK LOW CHANNEL



8-DPSK MID CHANAEL



8-DPSK HIGH CHANNEL



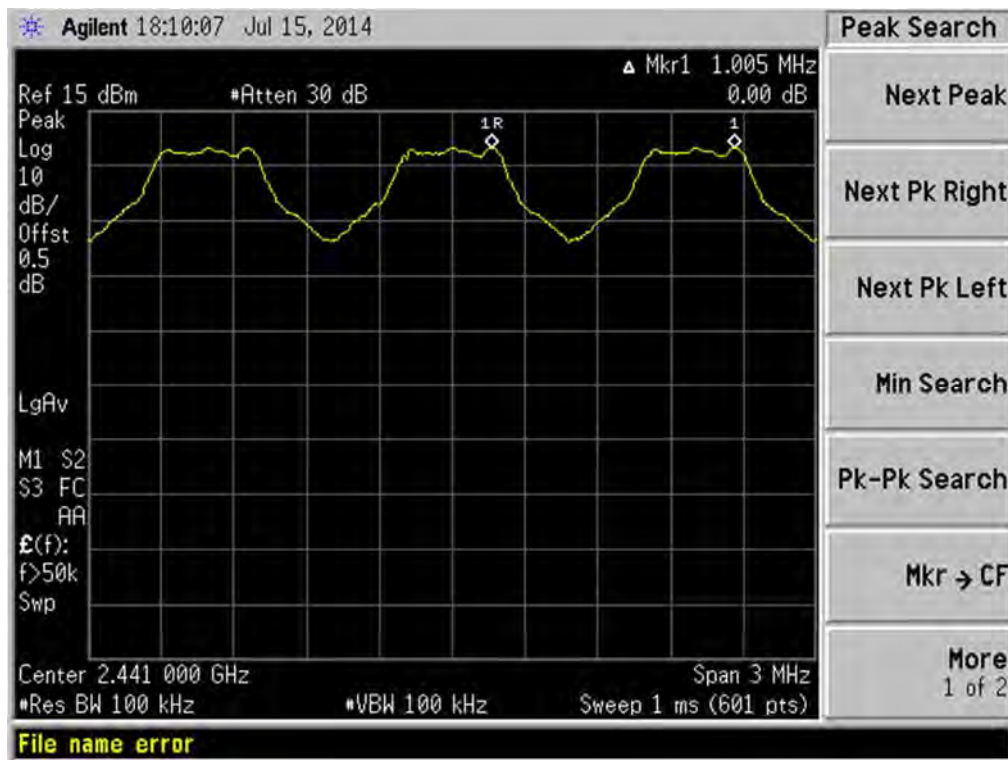
A.4 Hopping Frequency Separation

Test Data

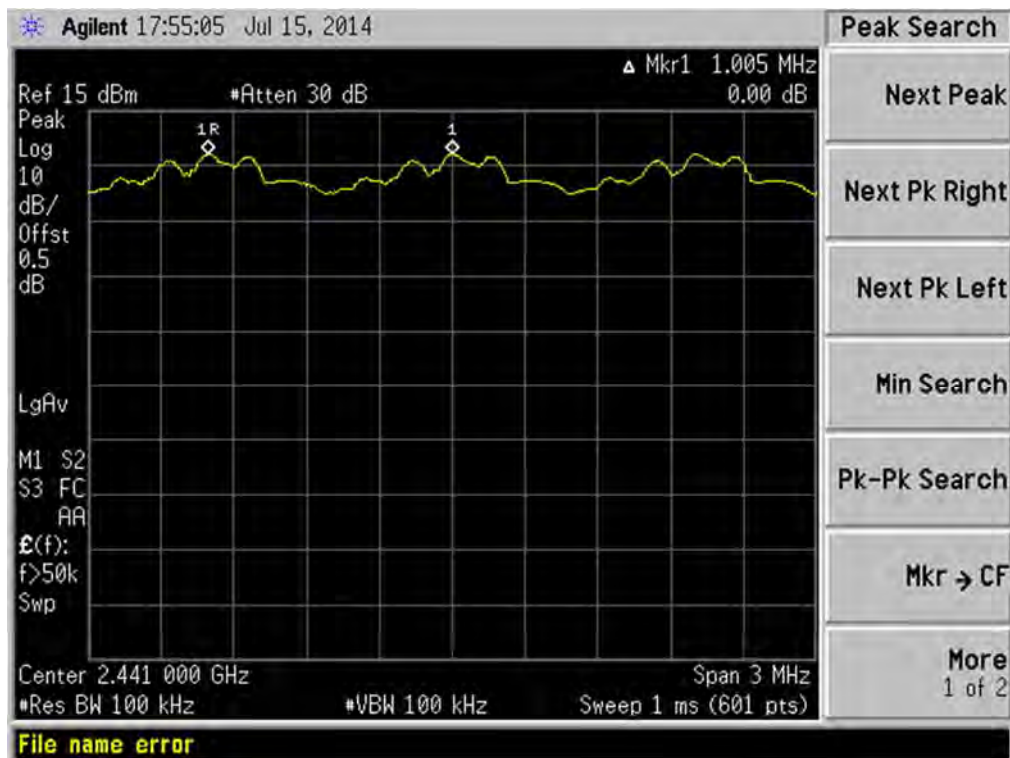
Mode	Frequency separation (MHz)	Max 20 dB Bandwidth (MHz)	Two-thirds of the 20dB bandwidth (MHz)	Verdict
GFSK	1.005	1.124	0.749	PASS
$\Pi/4$ -DQPSK Mode	1.005	1.386	0.924	PASS
8-DPSK Mode	1.010	1.391	0.927	PASS

Test plots

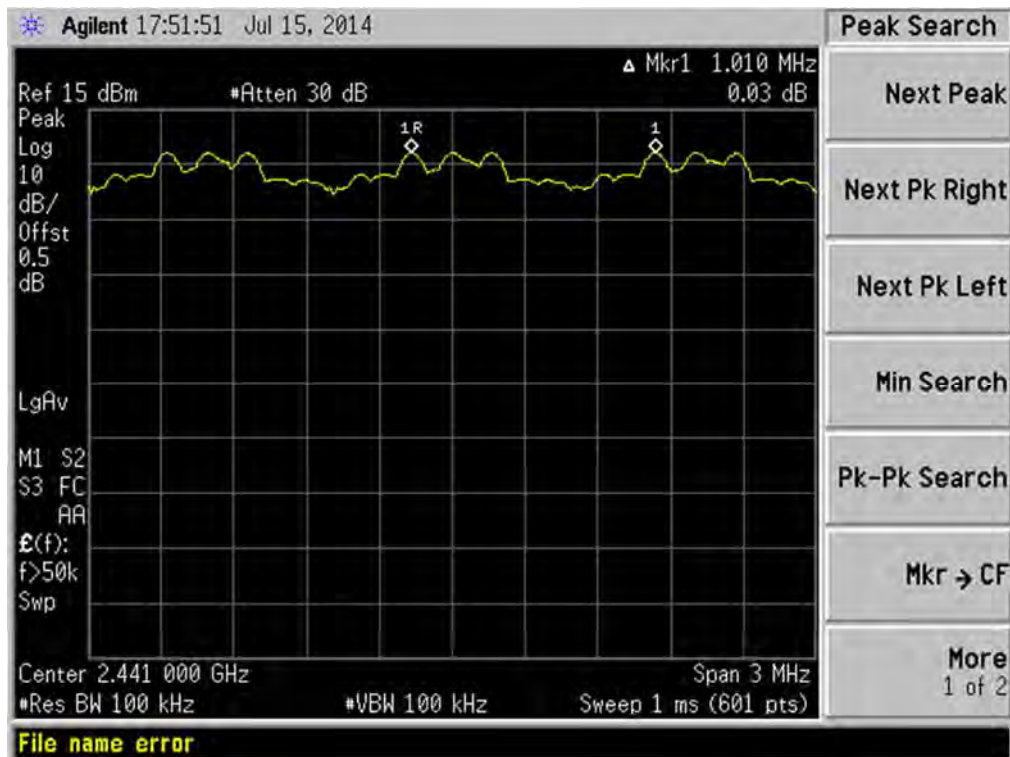
GFSK



II/4-DQPSK



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	0.3867	123.748	0.4	PASS
DH 3	1.653	264.488	0.4	PASS
DH 5	2.9	309.343	0.4	PASS

□/4-DQPSK Mode:

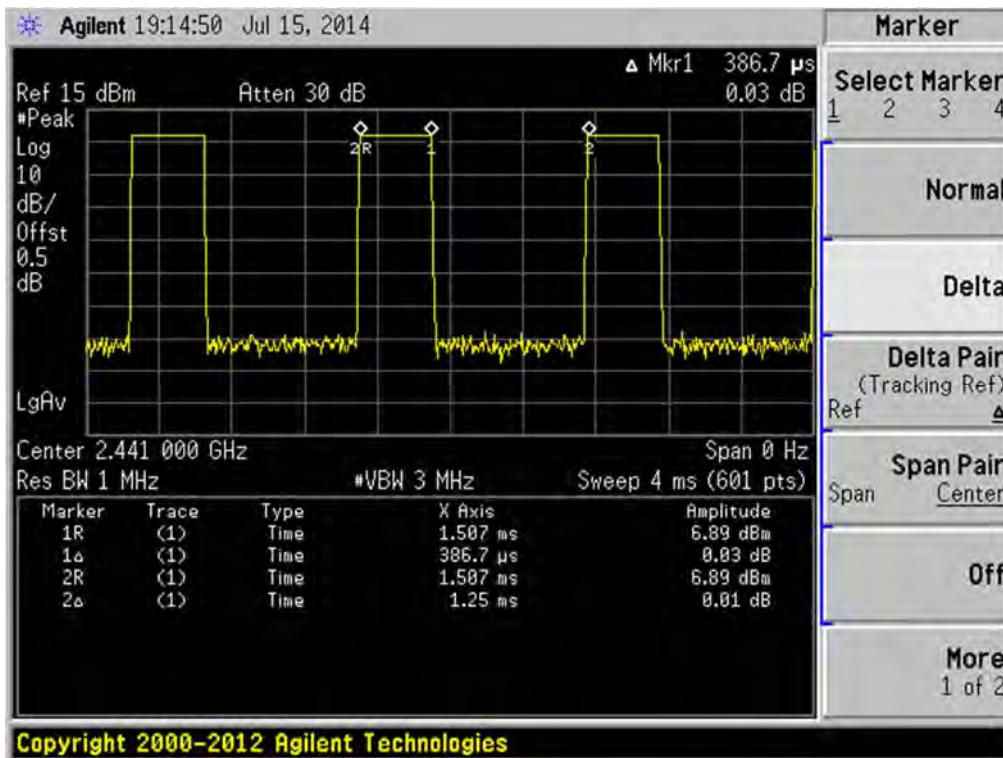
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.3867	123.748	0.4	PASS
DH 3	1.653	264.488	0.4	PASS
DH 5	2.9	309.343	0.4	PASS

8-DPSK Mode:

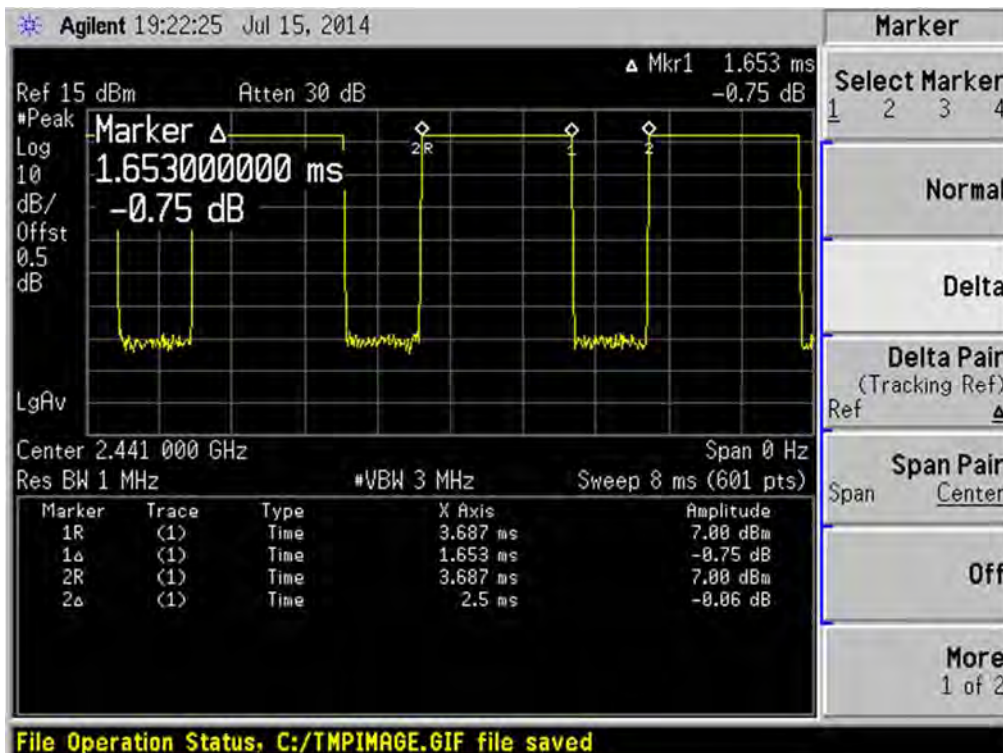
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.3867	123.748	0.4	PASS
DH 3	1.653	264.488	0.4	PASS
DH 5	2.9	309.343	0.4	PASS

Test Plots

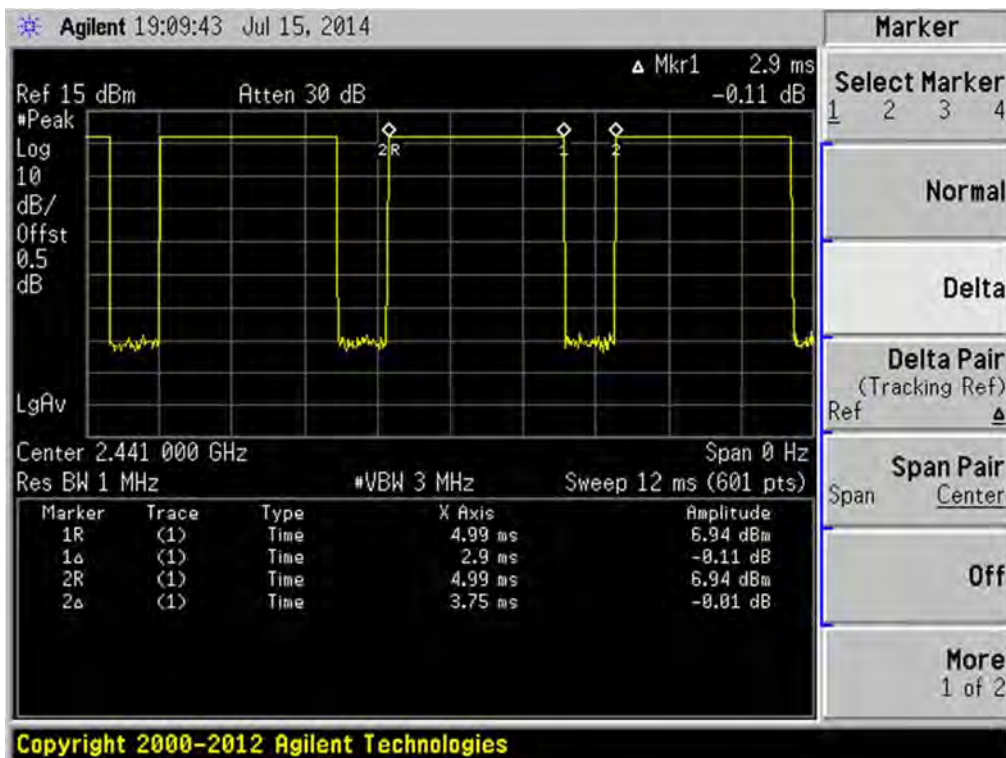
GFSK DH1



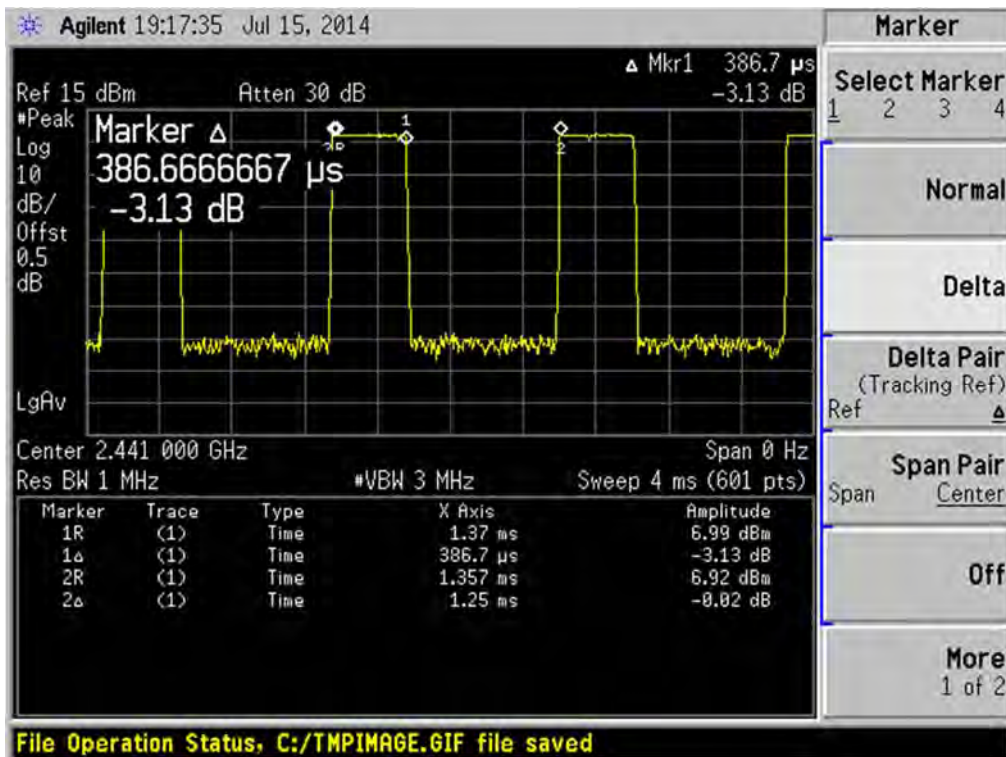
GFSK DH3



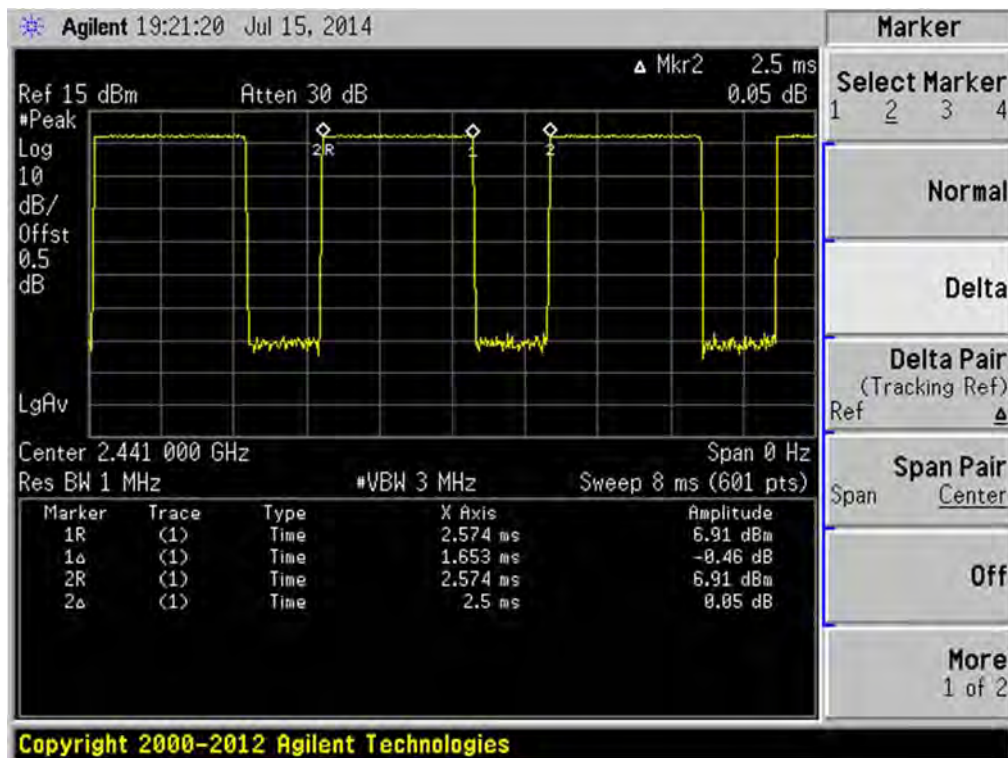
GFSK DH5



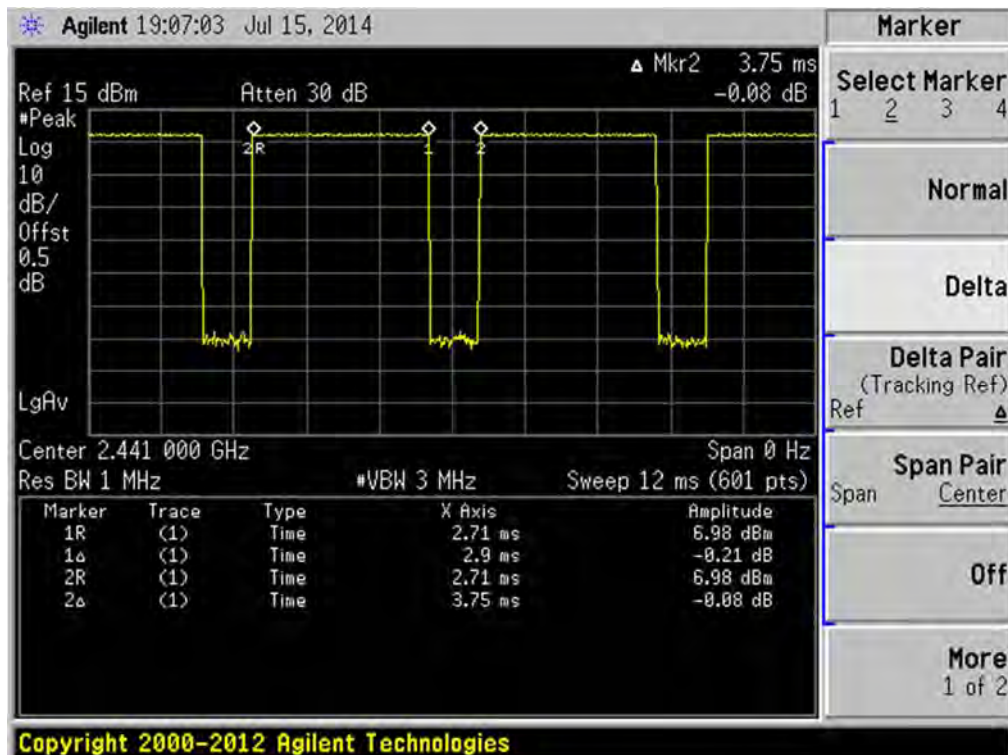
II/4-DQPSK DH1



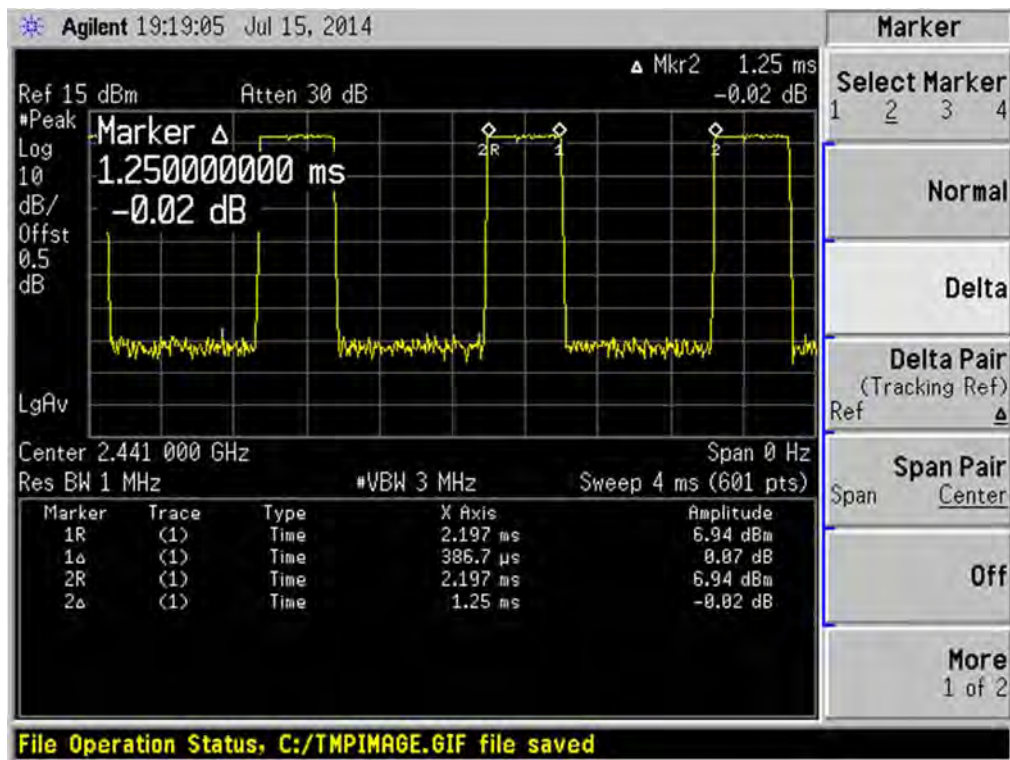
II/4-DQPSK DH3



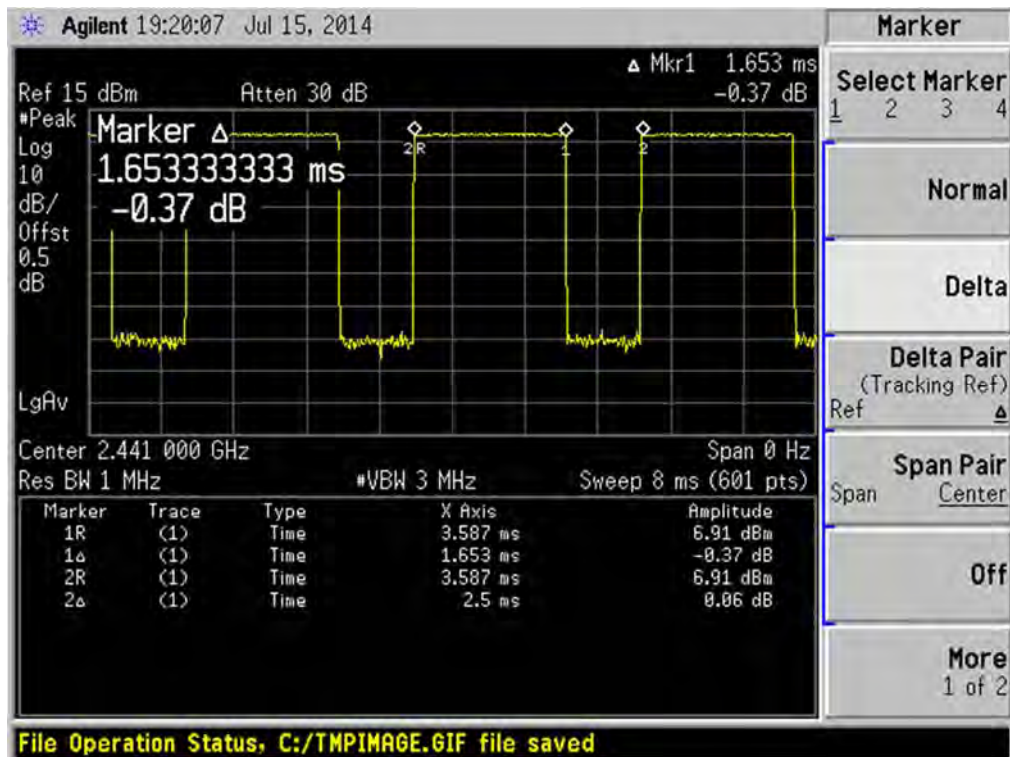
II/4-DQPSK DH5



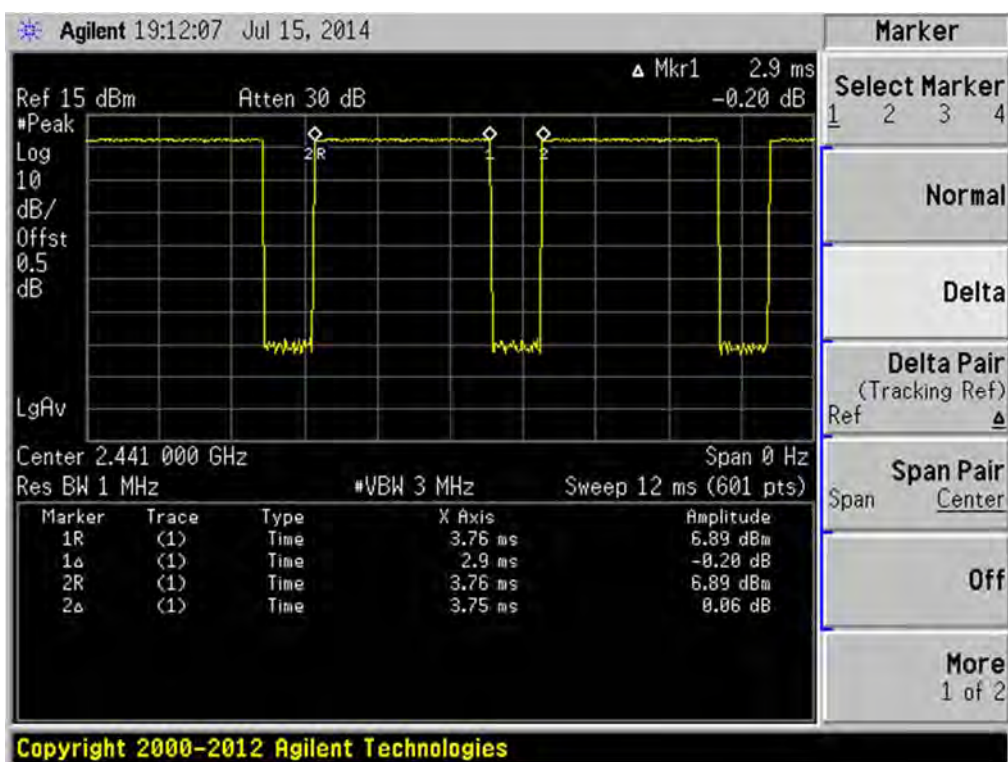
8-DPSK DH1



8-DPSK DH3



8-DPSK DH5



A.6 Conducted Spurious Emissions

Test Data

GFSK Mode:

Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-51.52	7.32	-12.7	PASS
Middle	-50.78	7.98	-12.1	PASS
High	-54.93	7.53	-12.5	PASS

π/4-DQPSK Mode:

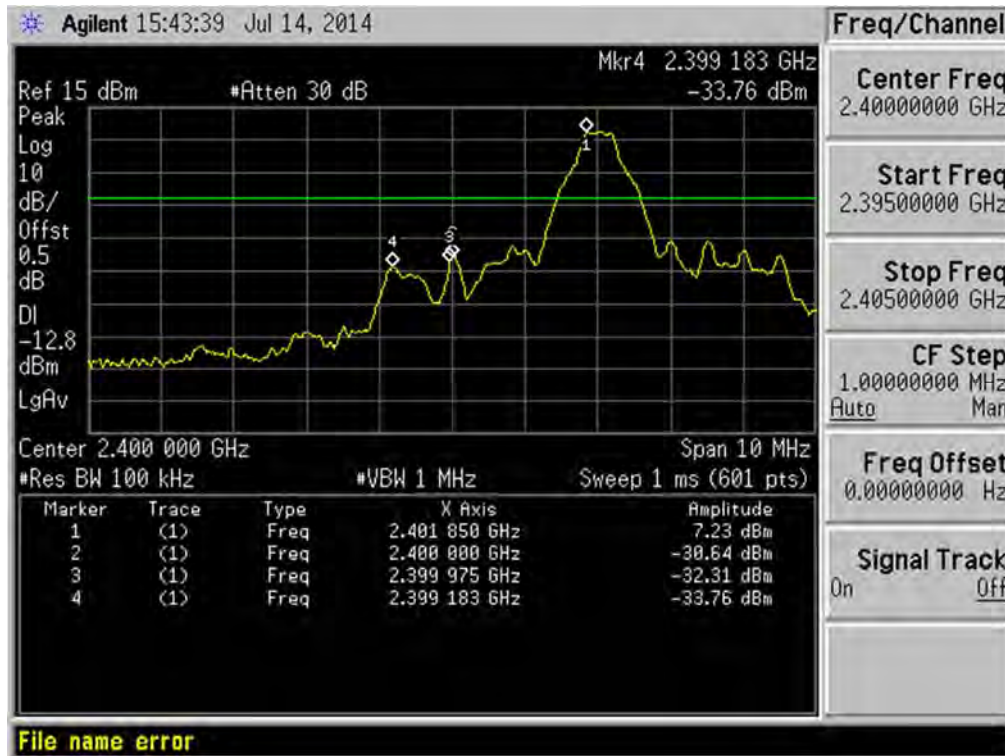
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-54.77	5.44	-14.6	PASS
Middle	-53.44	4.29	-15.7	PASS
High	-54.39	3.69	-16.3	PASS

8-DPSK Mode:

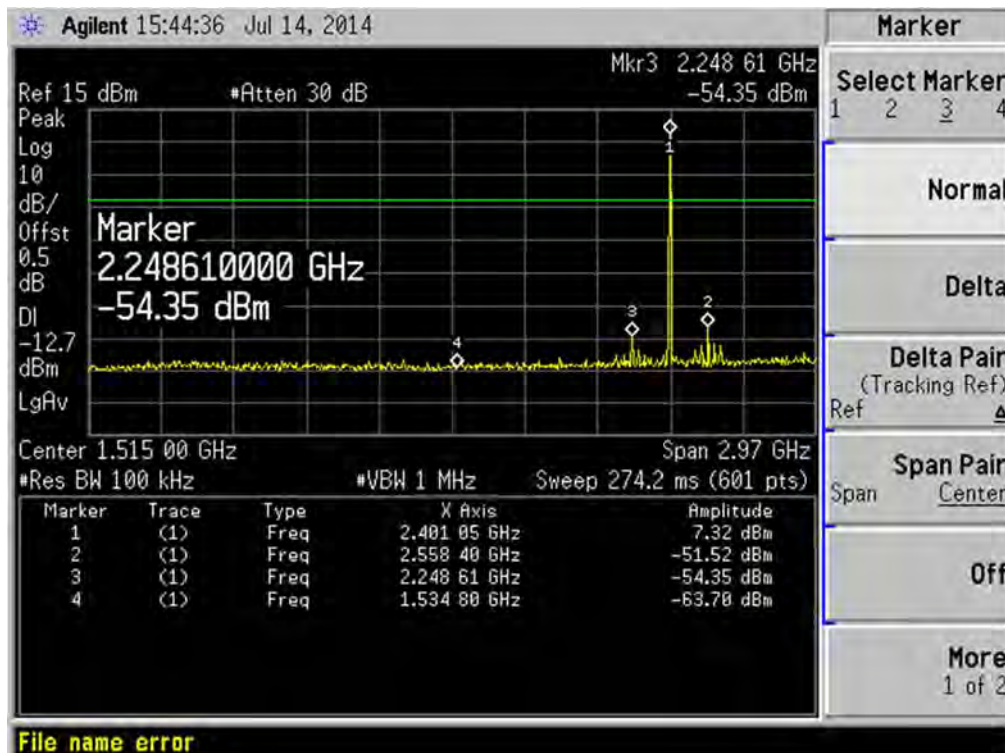
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-55.15	2.74	-17.3	PASS
Middle	-54.97	5.26	-14.7	PASS
High	-54.53	5.09	-14.9	PASS

Test Plots

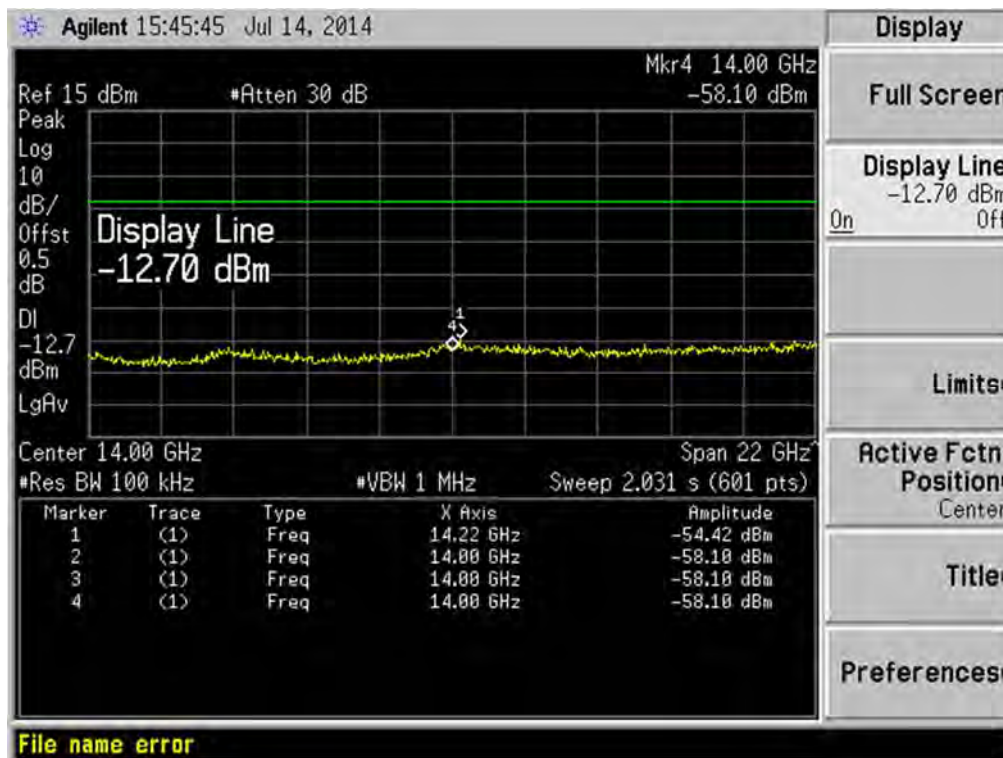
GFSK LOW CHANNEL , BANDEDGE



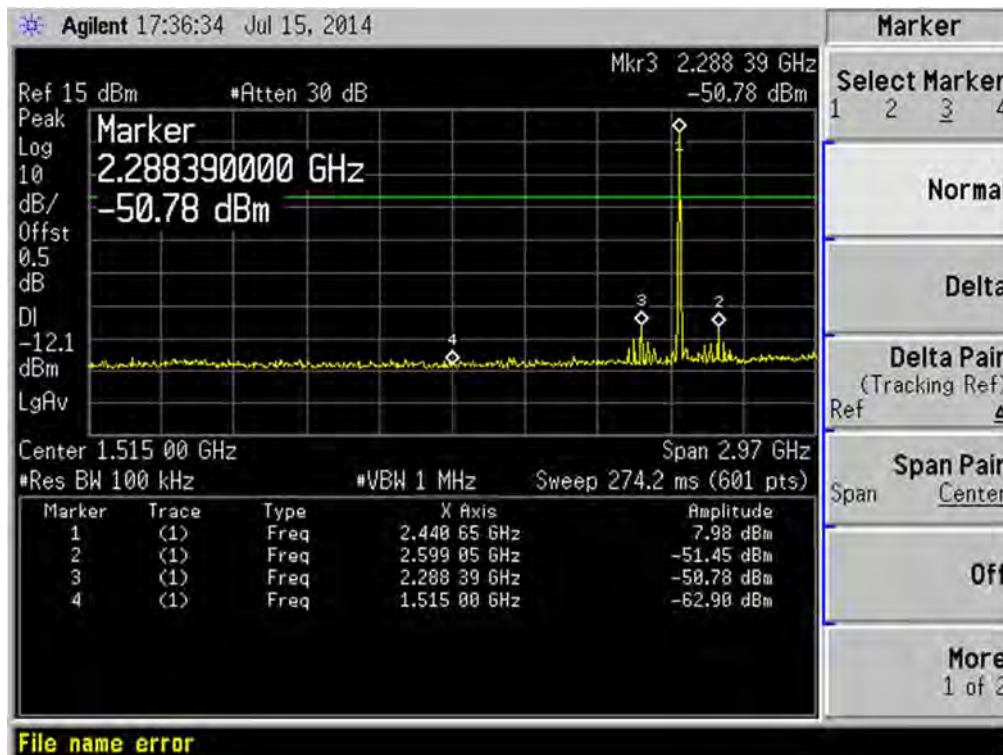
GFSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



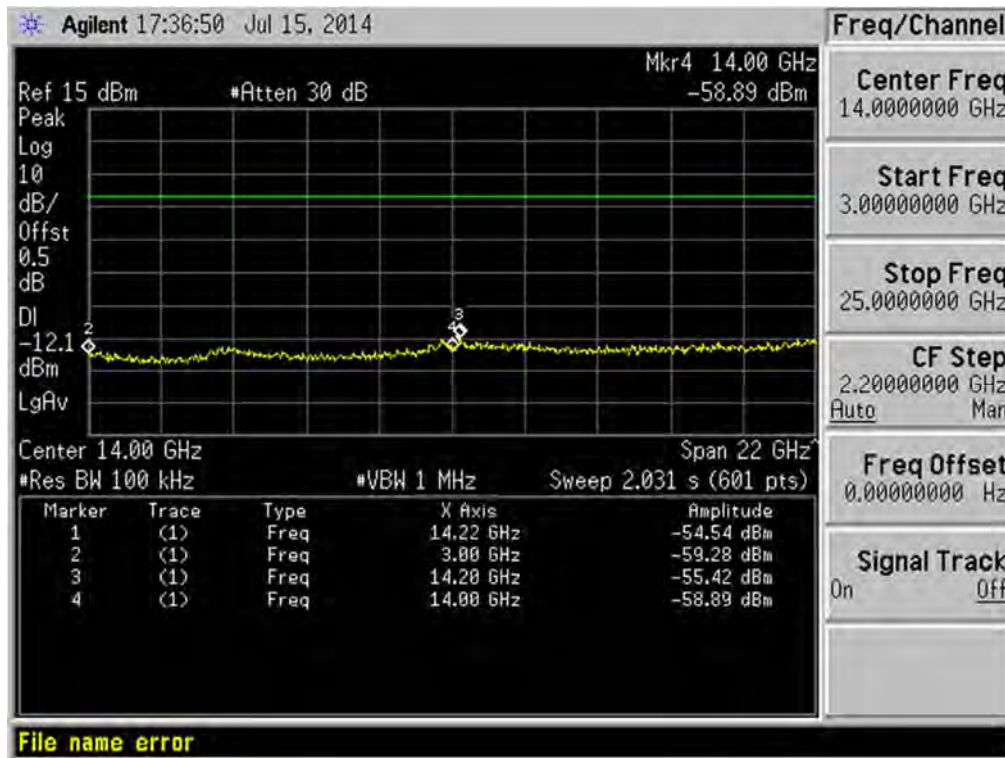
GFSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



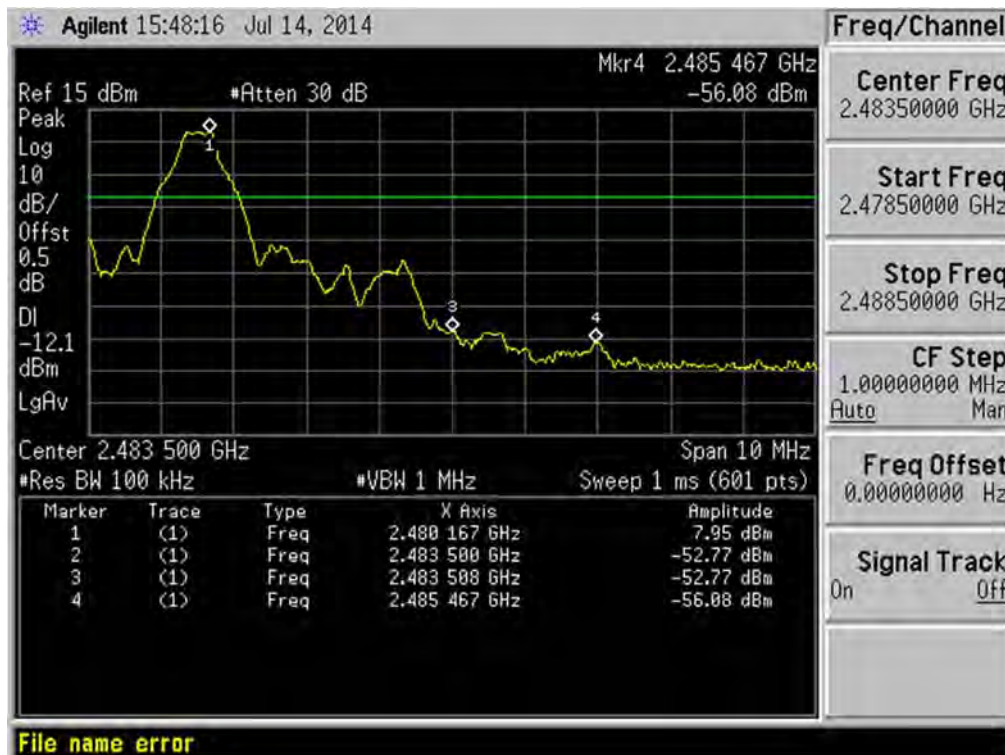
GFSK MID CHANNEL , SPURIOUS 30MHz~3GHz



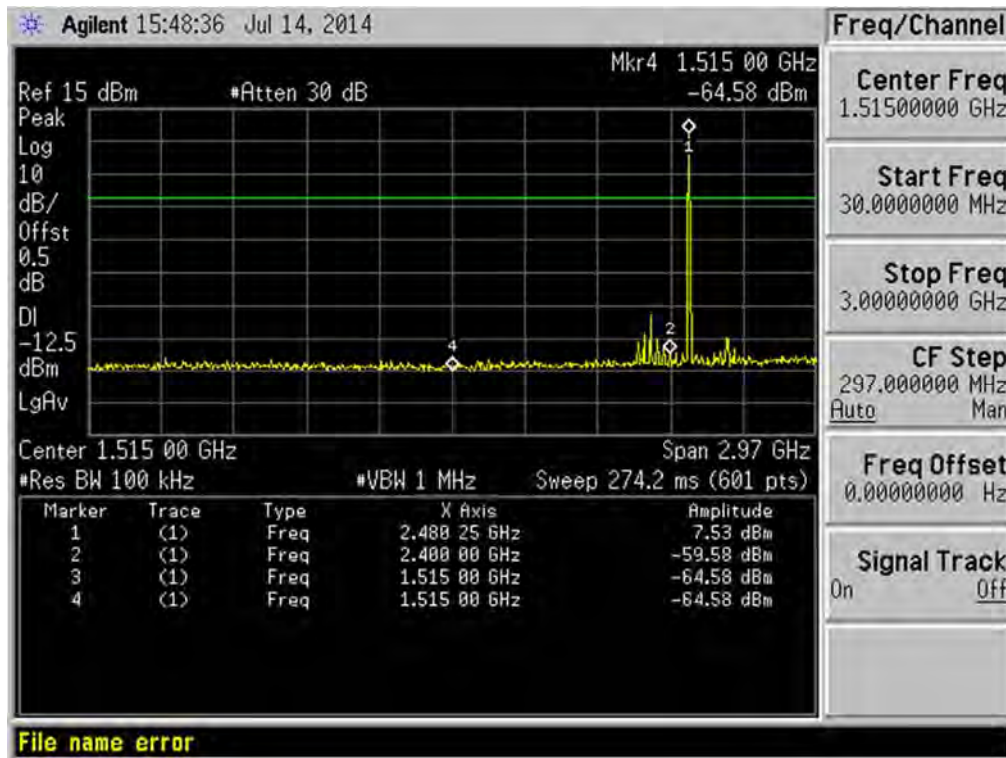
GFSK MID CHANNEL , SPURIOUS 3GHz~25GHz



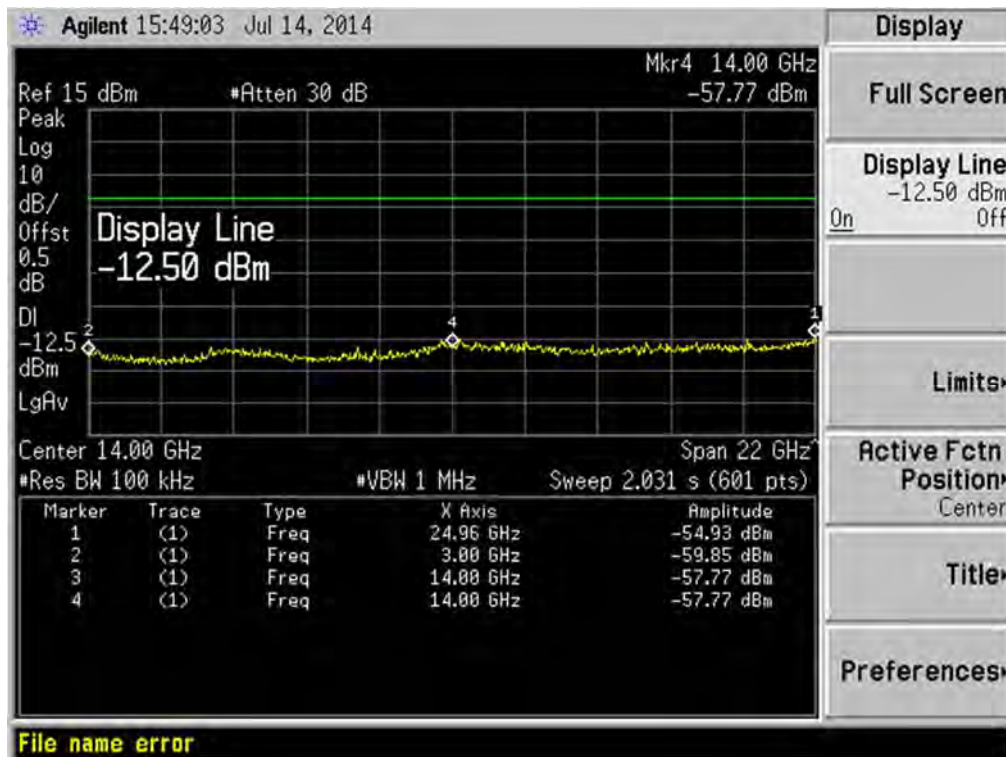
GFSK HIGH CHANNEL , BANDEDGE



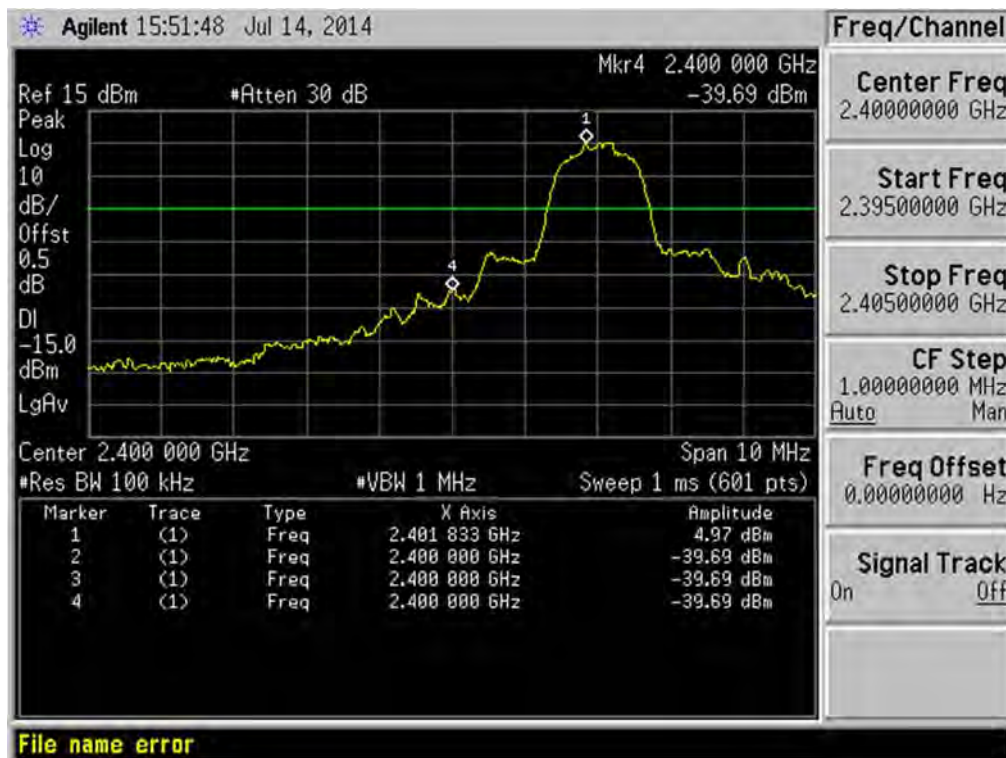
GFSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



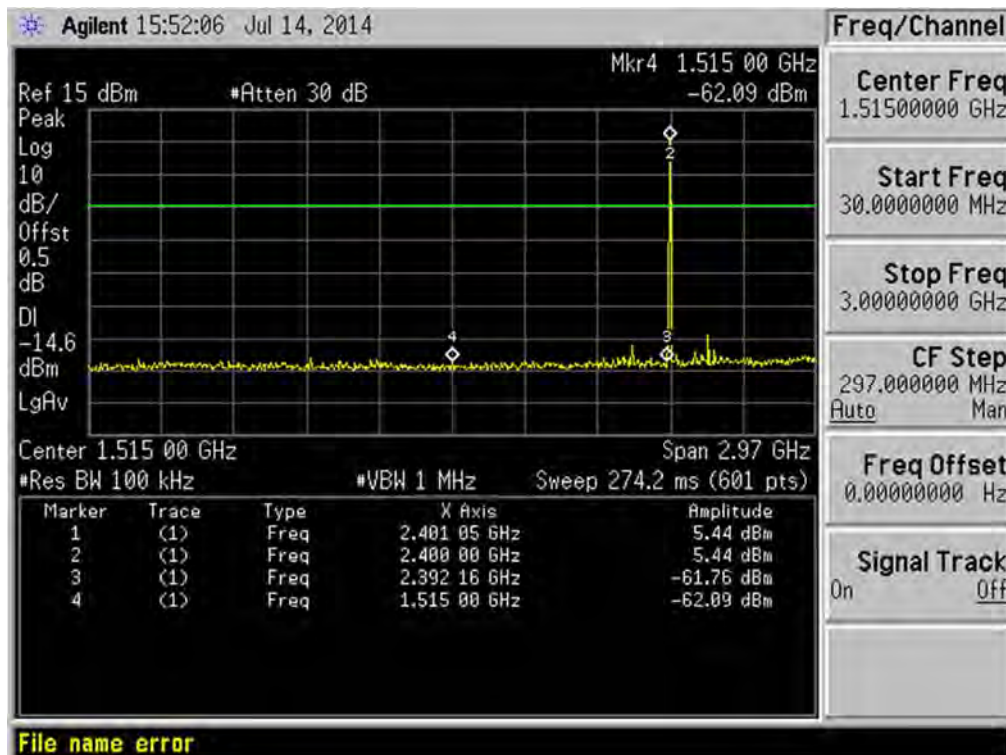
GFSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



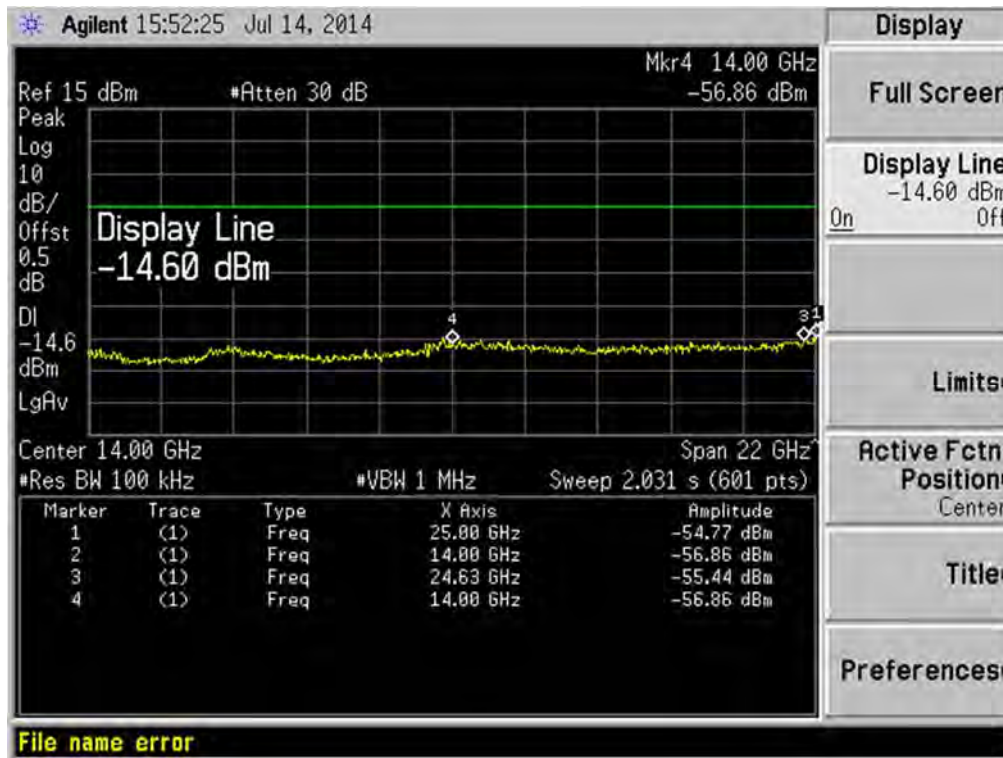
II/4-DQPSK LOW CHANNEL , BANDEDGE



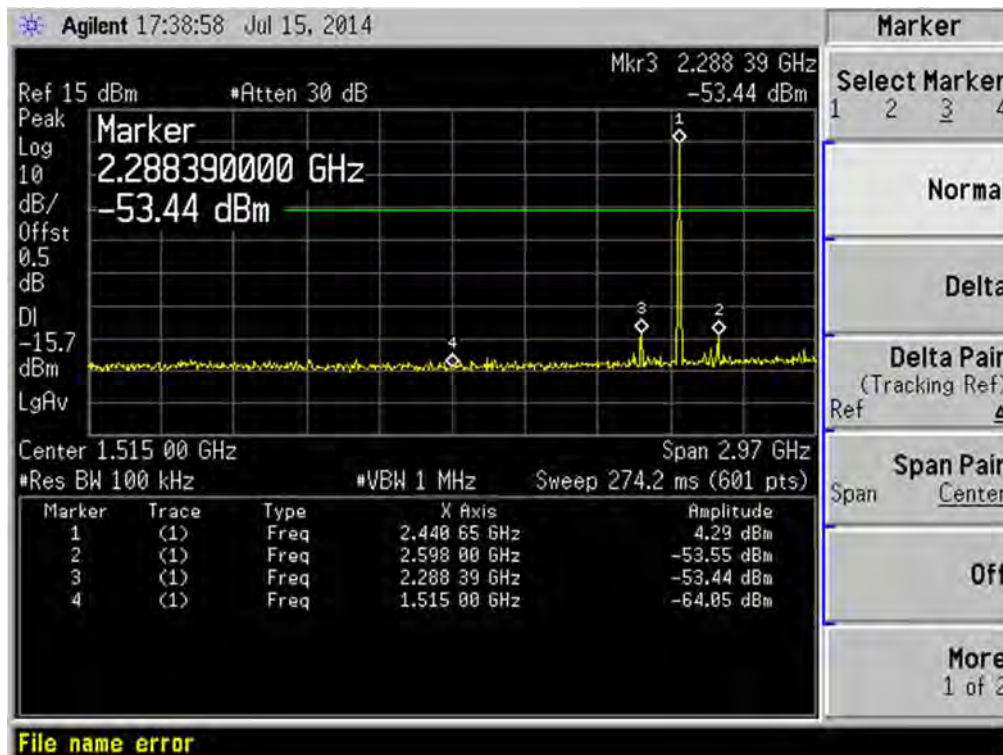
II/4-DQPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



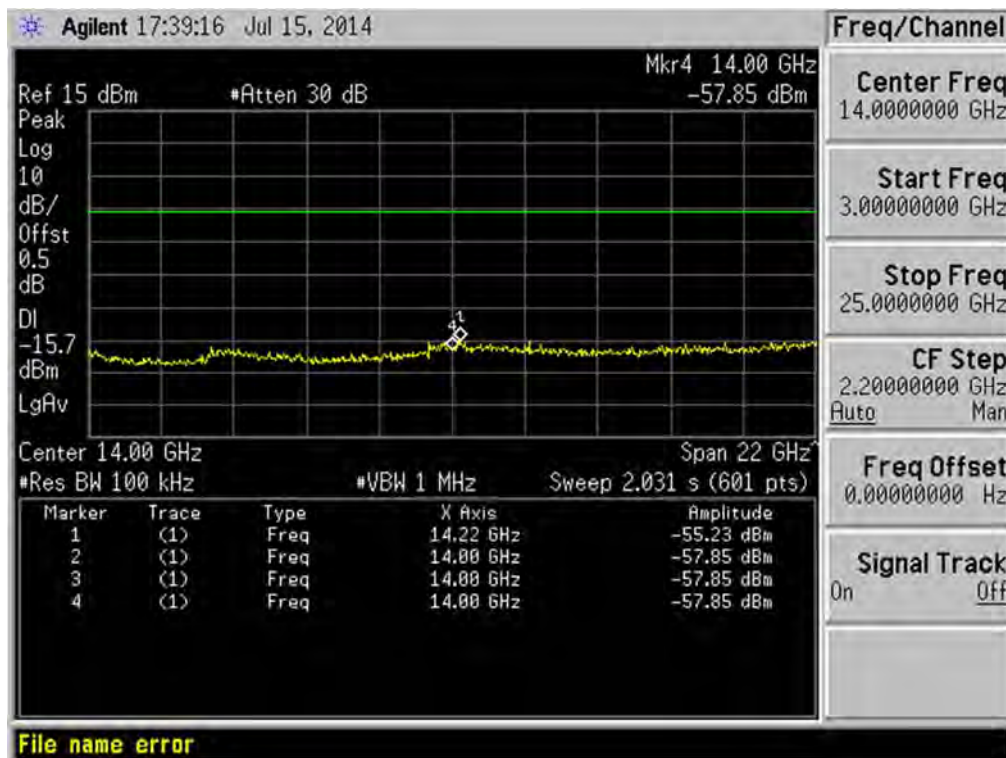
II/4-DQPSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



II/4-DQPSK MID CHANNEL , SPURIOUS 30MHz~3GHz



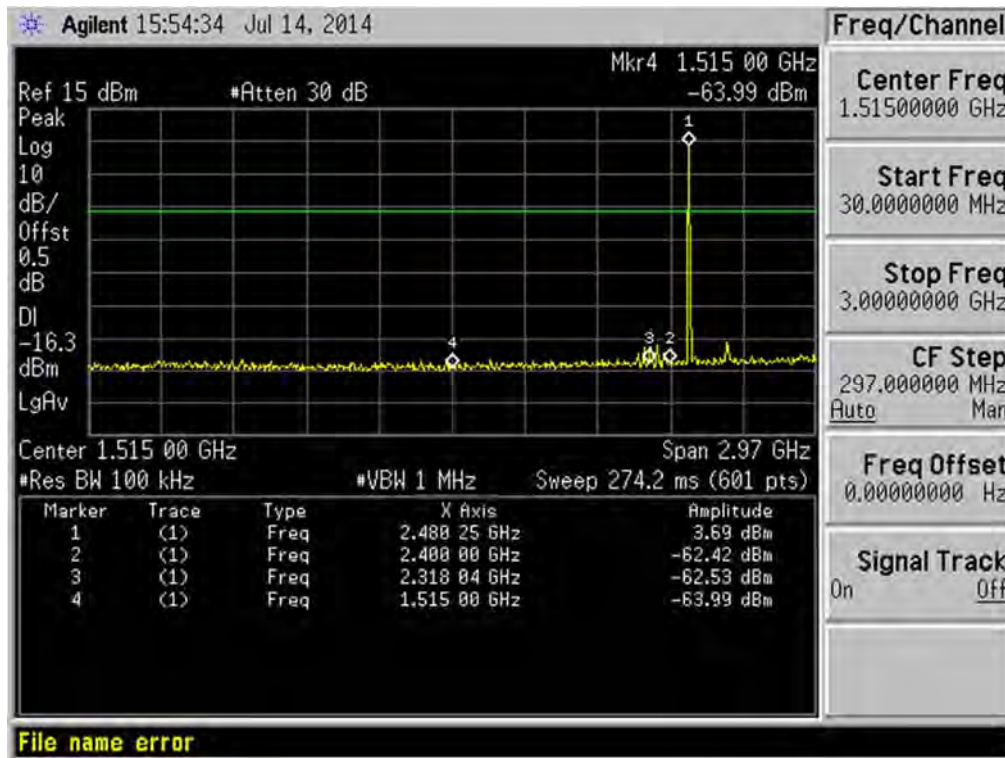
II/4-DQPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



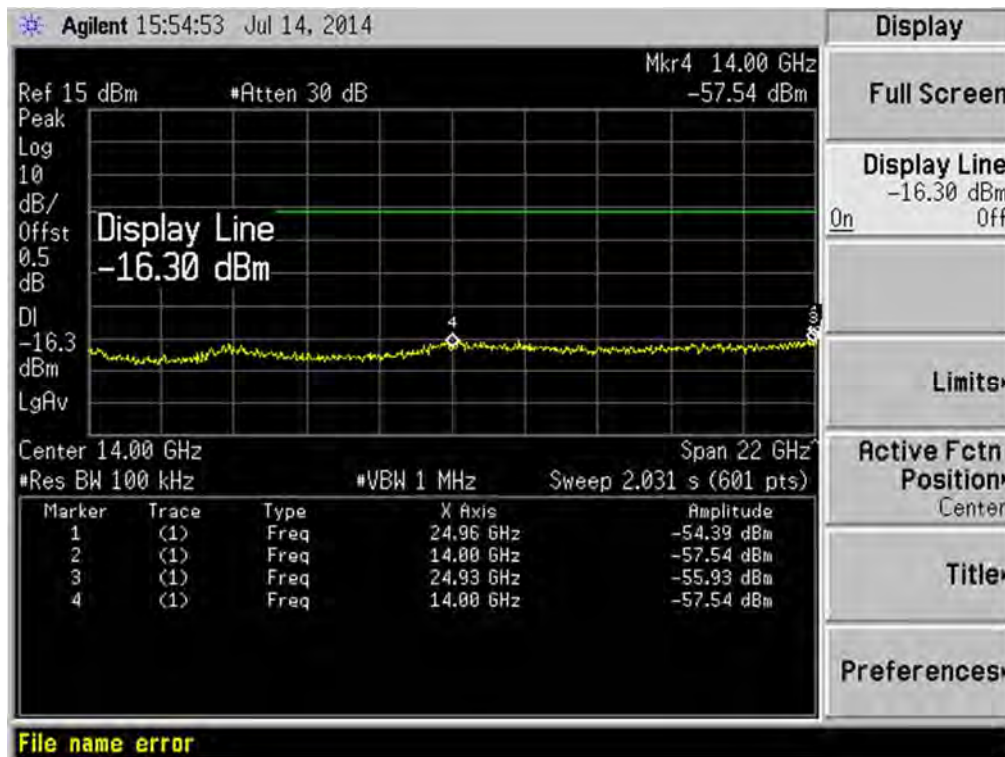
II/4-DQPSK HIGH CHANNEL , BANDEDGE



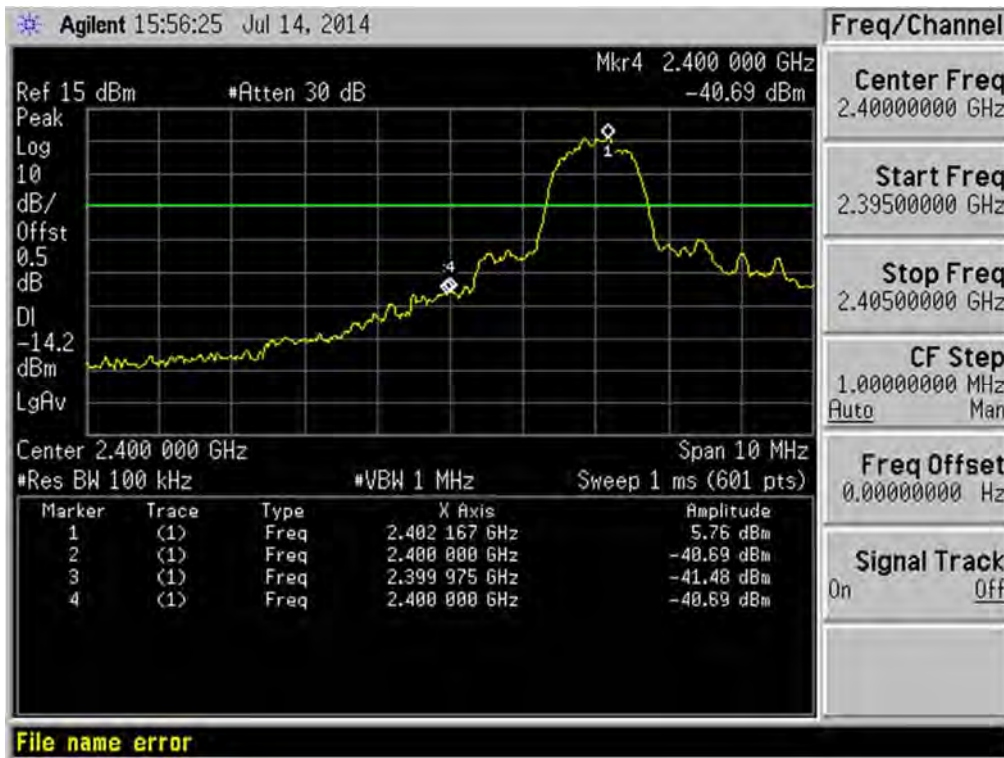
II/4-DQPSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



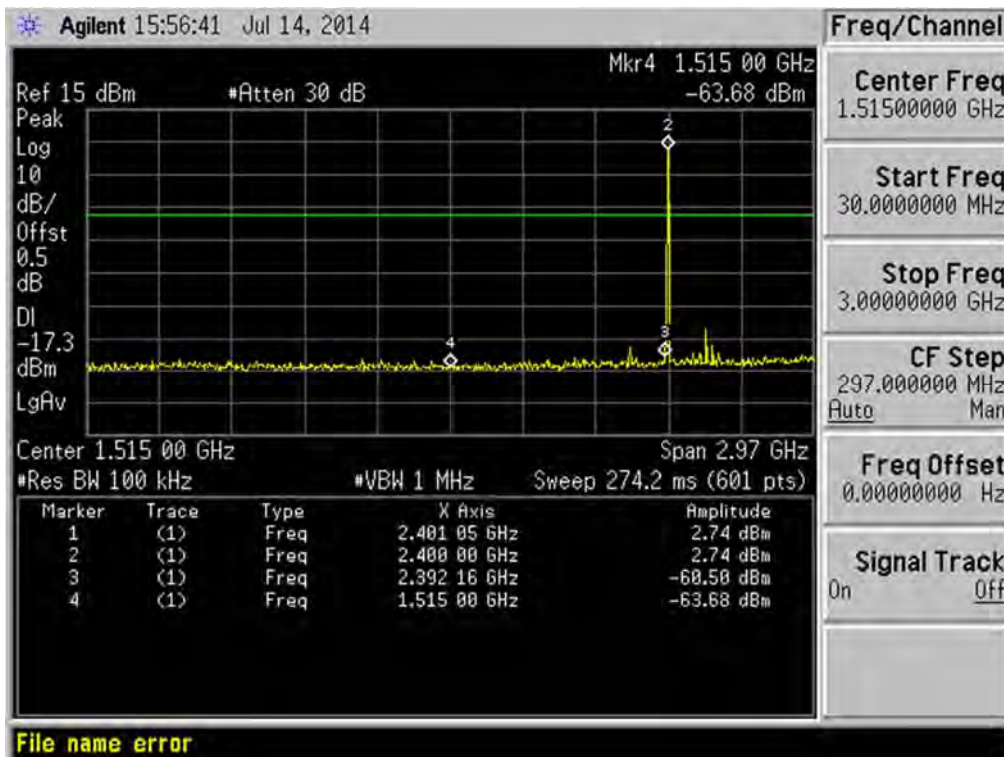
II/4-DQPSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



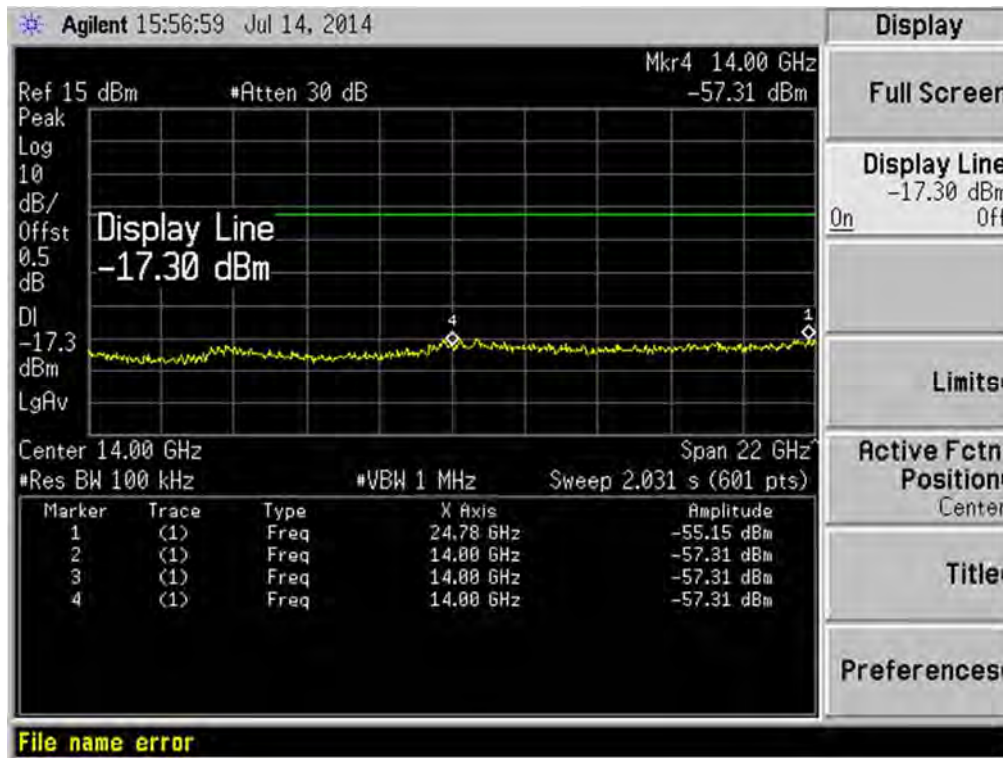
8-DPSK LOW CHANNEL , BANDEDGE



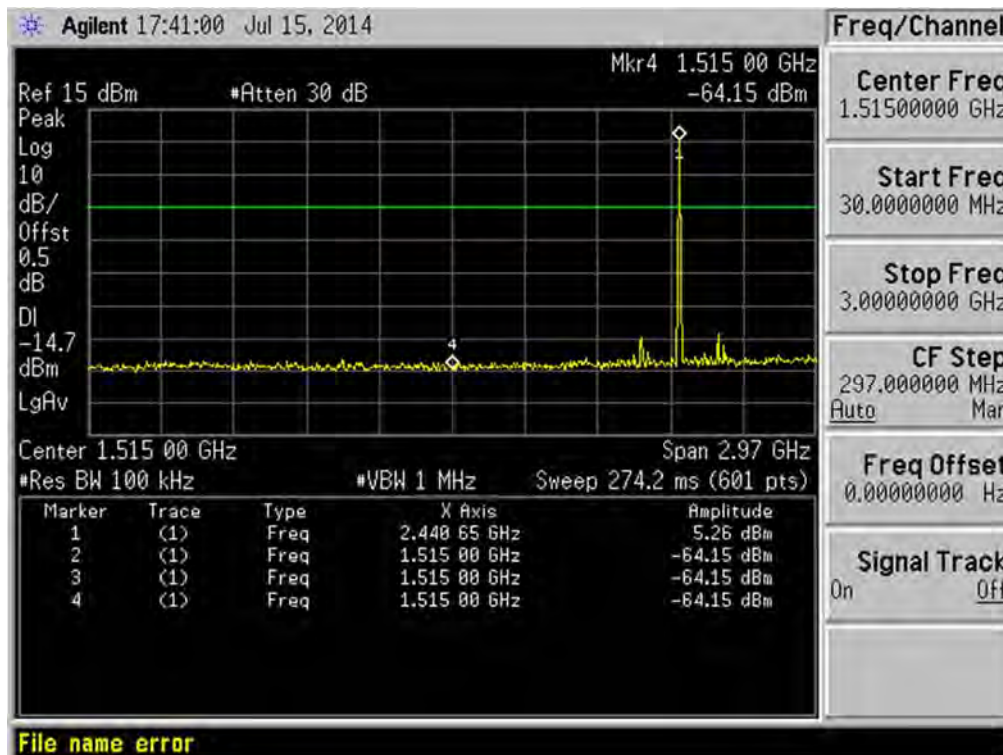
8-DPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



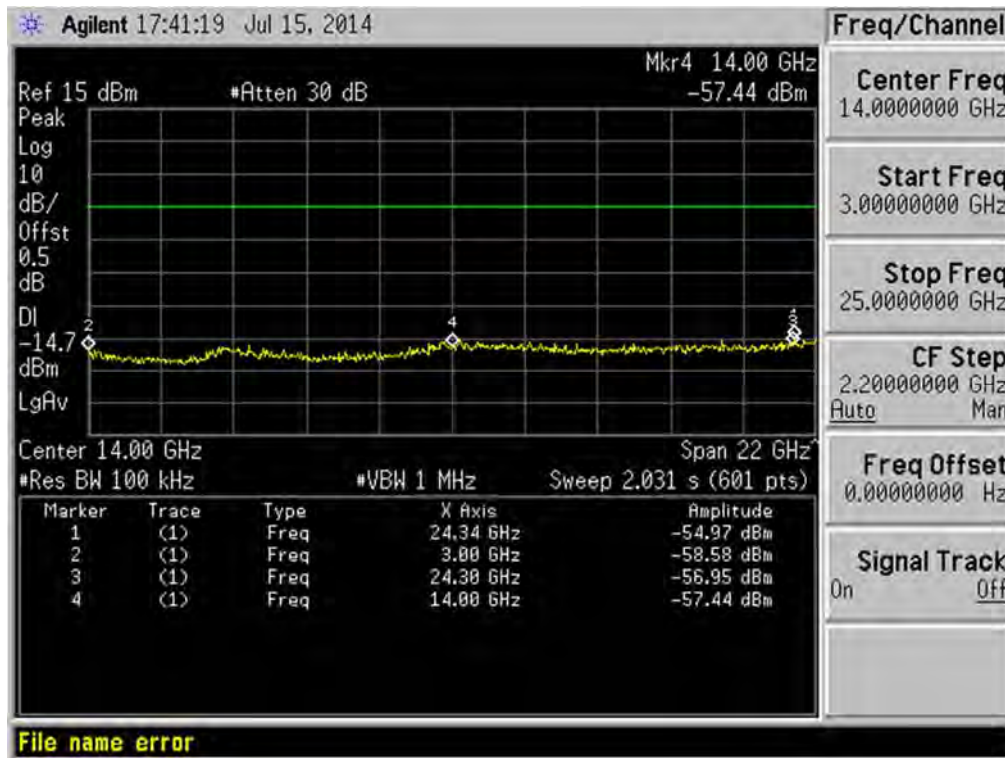
8-DPSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



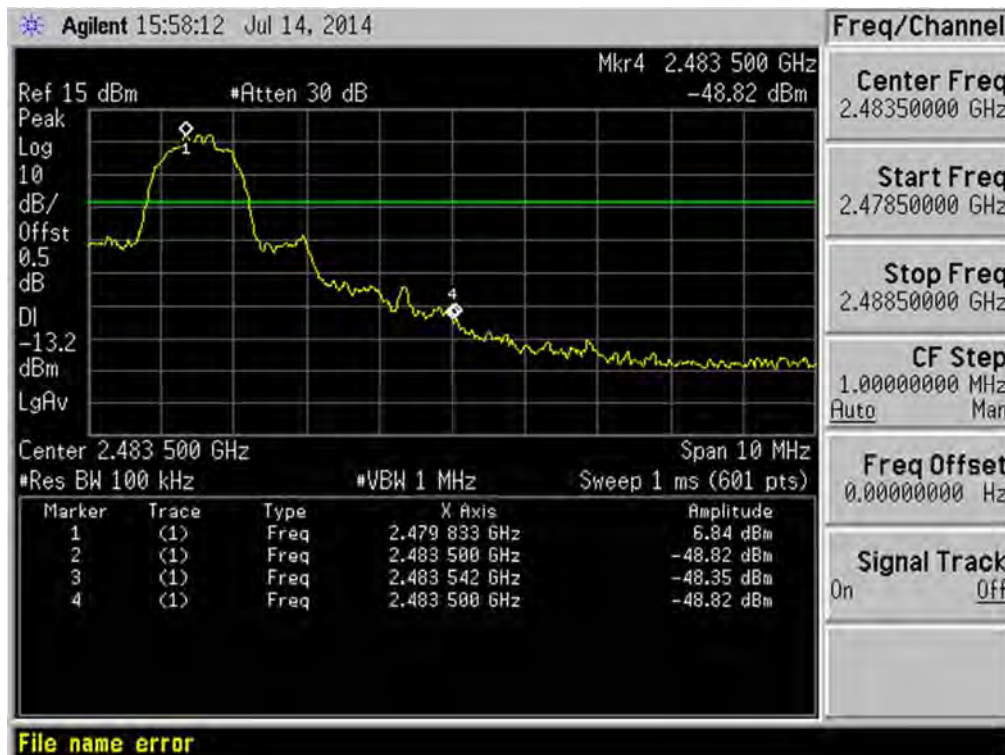
8-DPSK MID CHANNEL , SPURIOUS 30MHz~3GHz



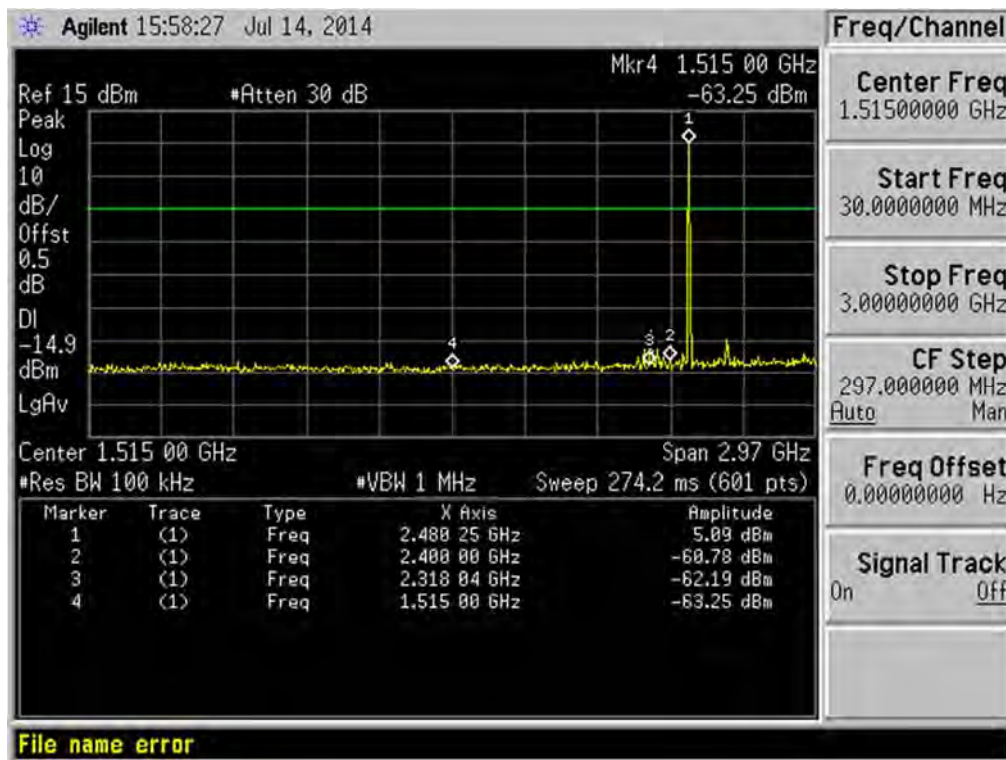
8-DPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



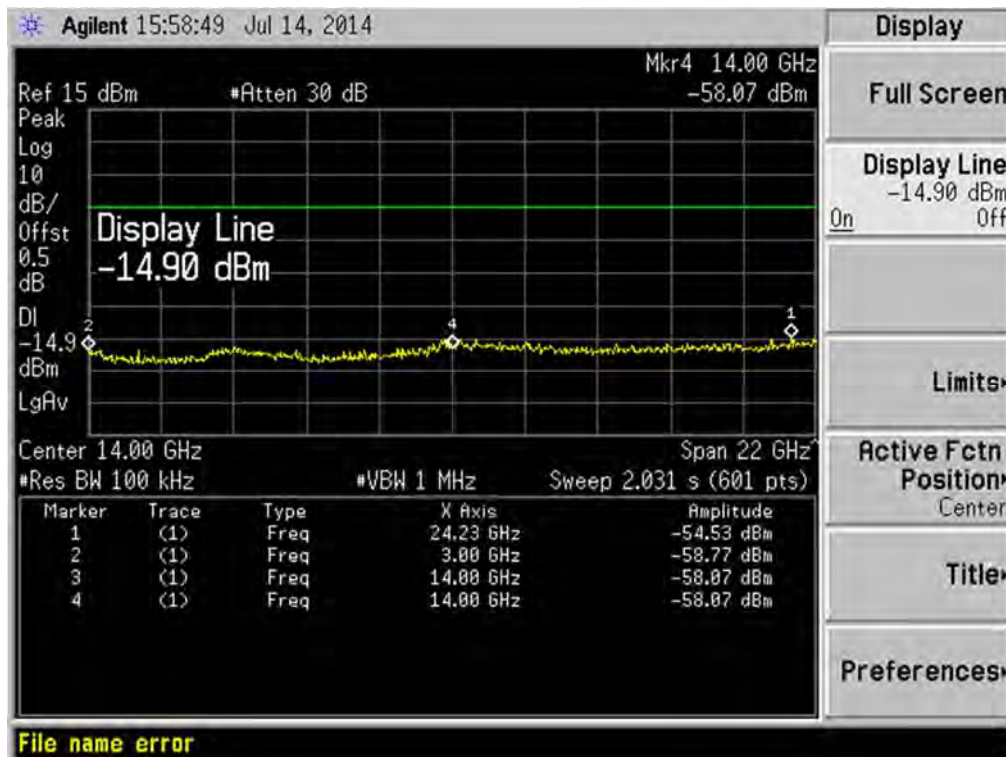
8-DPSK HIGH CHANNEL , BANDEDGE



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



8-DPSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz

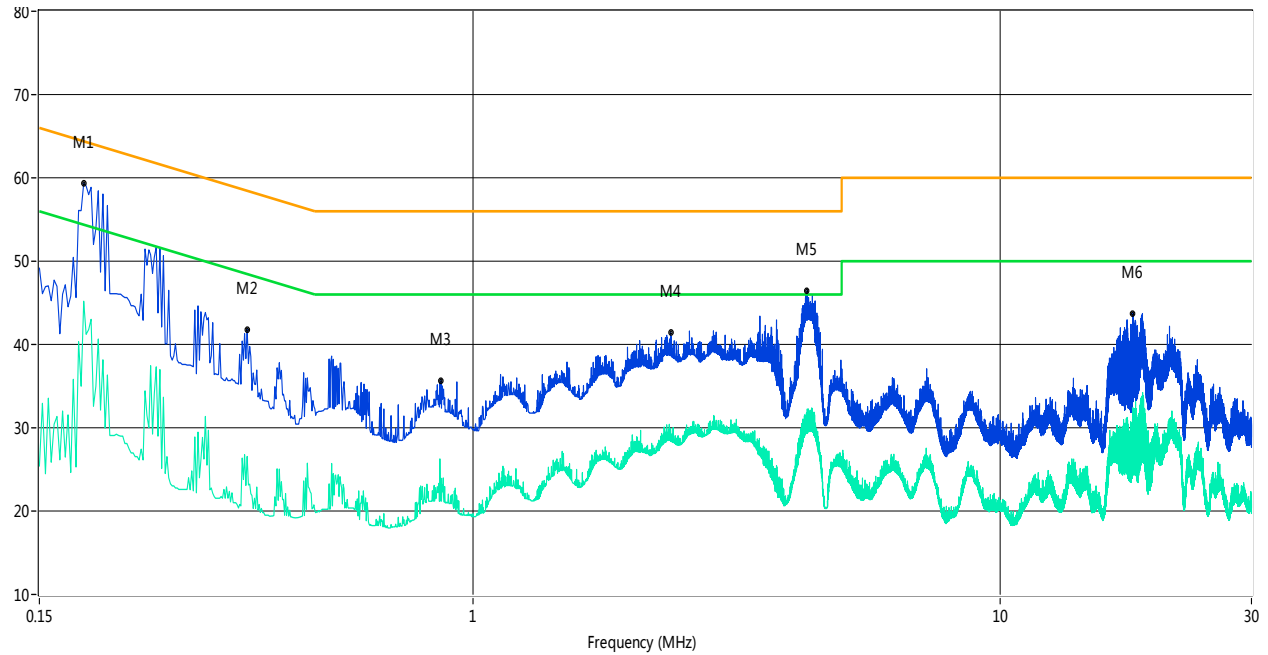


A.7 Conducted Emissions

Note: All configurations have been tested, only the worst configuration (GFSK High Channel) shown here.

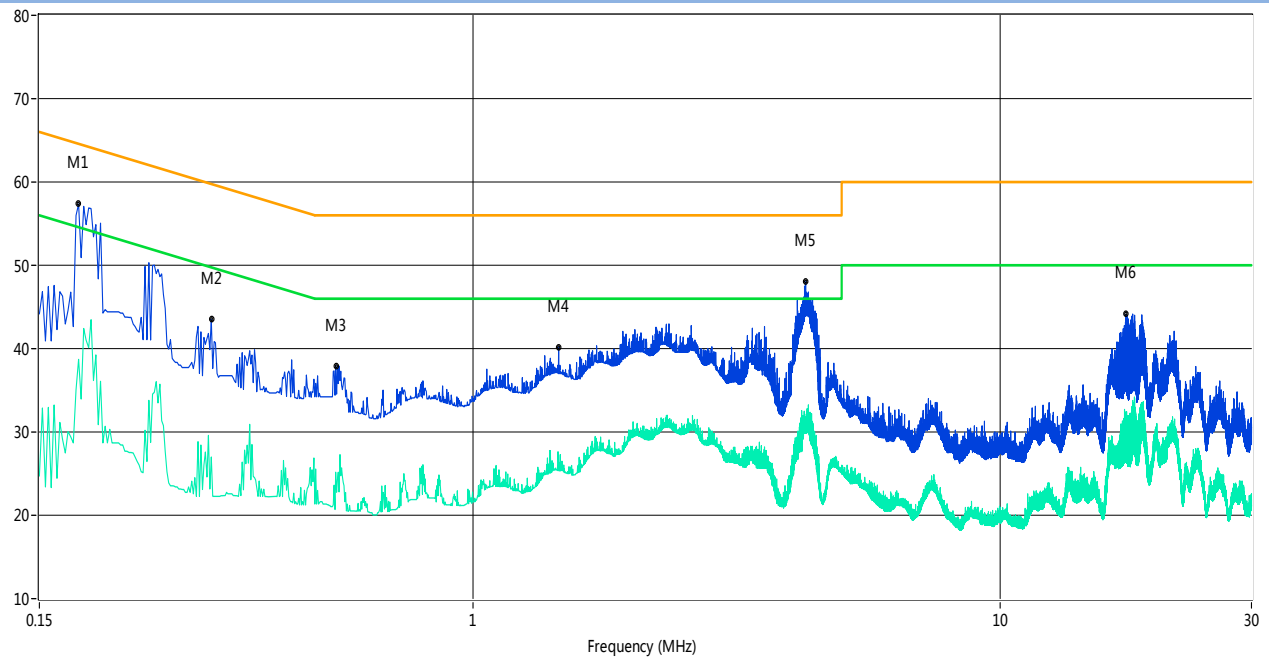
Test Data and Plots

PHASE L



Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.18	59.4	--	45.2	10.00	65.1	55.1	9.90	L Line	PASS
0.37	41.8	--	26.6	10.00	59.7	49.7	23.10	L Line	PASS
0.87	35.7	--	23.9	10.00	56.0	46.0	22.10	L Line	PASS
2.37	41.5	--	29.9	10.00	56.0	46.0	16.10	L Line	PASS
4.30	46.5	--	32.3	10.00	56.0	46.0	13.70	L Line	PASS
17.86	43.8	--	32.4	10.00	60.0	50.0	17.60	L Line	PASS

PHASE N

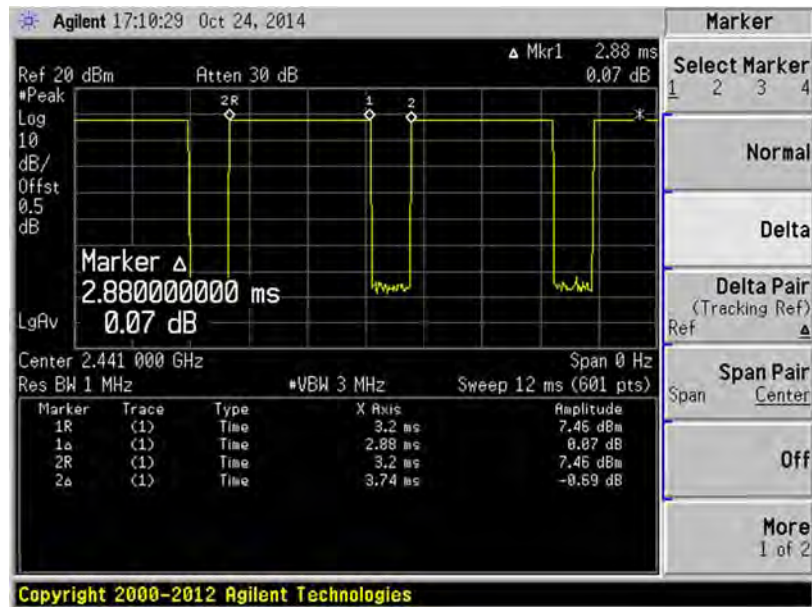


Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.18	57.4	--	38.7	10.00	65.2	55.2	16.50	N Line	PASS
0.32	43.5	--	27.0	10.00	61.2	51.2	24.20	N Line	PASS
0.55	38.0	--	25.2	10.00	56.0	46.0	20.80	N Line	PASS
1.45	40.2	--	26.4	10.00	56.0	46.0	19.60	N Line	PASS
4.27	48.0	--	29.9	10.00	56.0	46.0	16.10	N Line	PASS
17.31	44.1	--	32.4	10.00	60.0	50.0	17.60	N Line	PASS

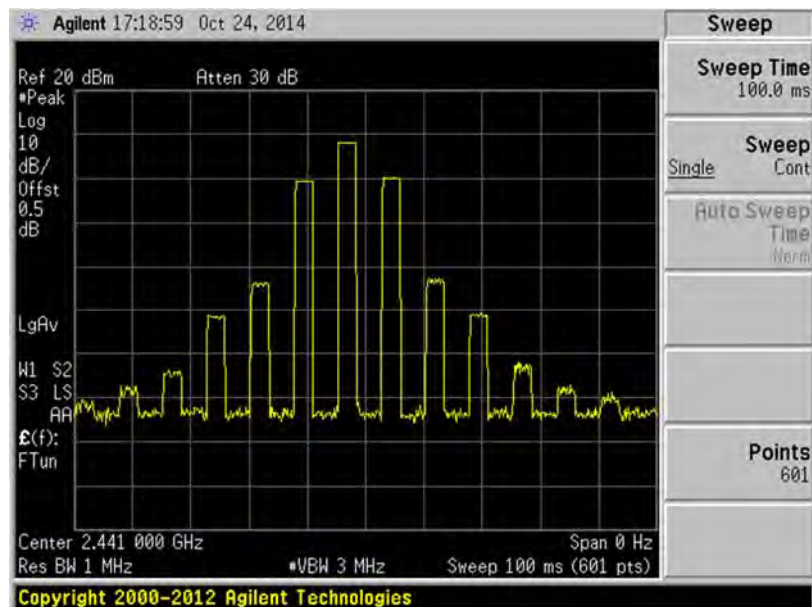
A.8 Radiated Emission

Duty cycle correction factor for average measurement.

DH5 on time/100ms(One Pulse) Plot on Channel 39



DH5 on time/100ms(Count Pulses) Plot on Channel 39



Note:

1. Duty cycle = on time/100 milliseconds = $3 \times 2.88 / 100 = 8.64 \%$
2. Duty cycle correction factor = $20 \times \log(\text{Duty cycle}) = -21.27 \text{ dB}$
3. DH5 has the highest duty cycle and is reported.

Note 1: The symbol of "--" in the table which means not application.

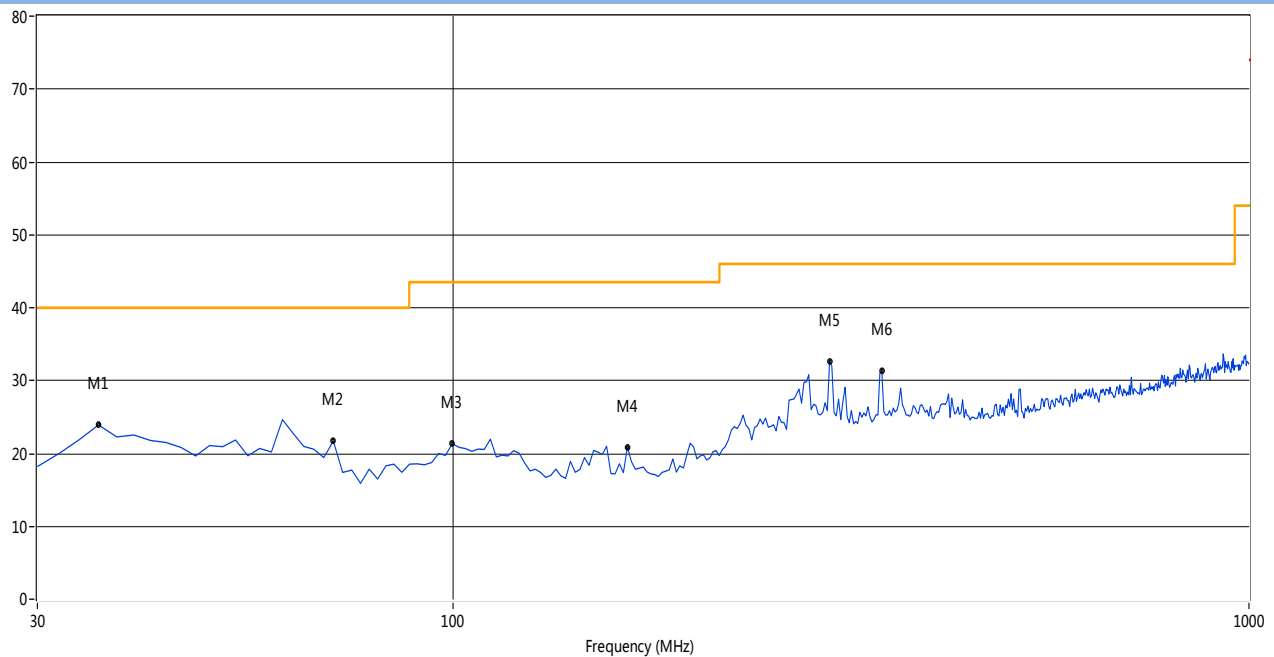
Note 2: For the test data above 1GHz, According the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: All configurations have been tested, only the worst configuration (GFSK High Channel) shown here.

Test Data and Plots

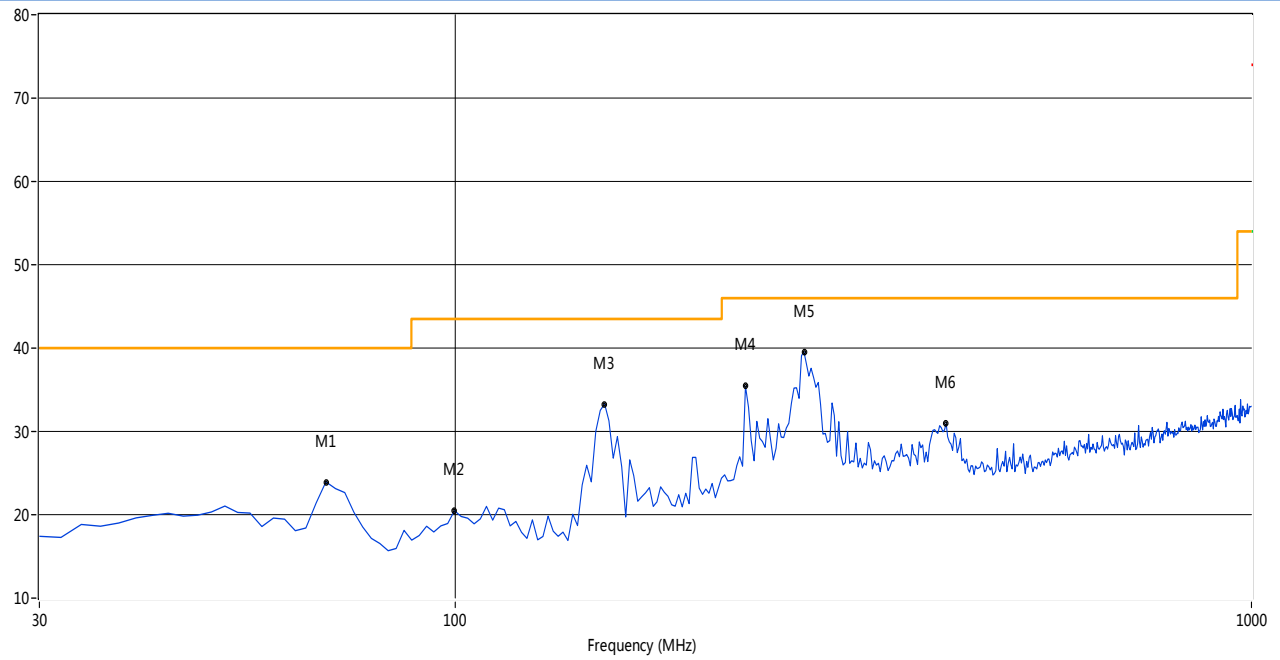
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

30MHz to 1GHz, ANT V



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
35.81	23.92	--	--	-20.45	40.0	--	16.08	256.80	100	Vertical	PASS
70.66	21.69	--	--	-22.30	40.0	--	18.31	261.30	100	Vertical	PASS
99.70	21.35	--	--	-19.60	43.5	--	22.15	99.10	100	Vertical	PASS
165.53	20.91	--	--	-22.21	43.5	--	22.59	188.70	100	Vertical	PASS
297.19	32.61	--	--	-17.18	46.0	--	13.39	8.90	100	Vertical	PASS
345.59	31.38	--	--	-15.74	46.0	--	14.62	0.00	100	Vertical	PASS

30MHz to 1GHz, ANT H

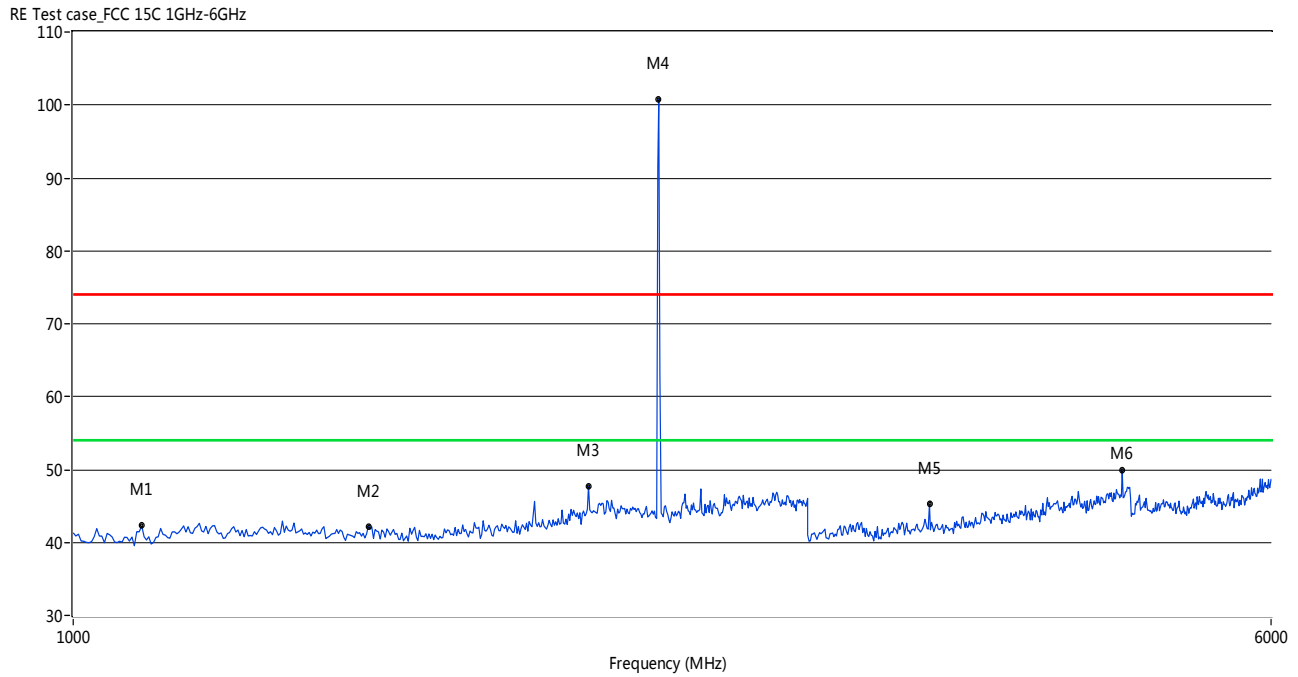


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
68.72	23.93	--	--	-21.50	40.0	--	16.07	358.60	100	Horizontal	PASS
99.70	20.48	--	--	-19.60	43.5	--	23.02	212.10	100	Horizontal	PASS
153.91	33.29	--	--	-22.79	43.5	--	10.21	86.70	100	Horizontal	PASS
231.36	35.43	--	--	-19.02	46.0	--	10.57	248.10	100	Horizontal	PASS
273.95	39.58	--	--	-17.84	46.0	--	6.42	243.60	100	Horizontal	PASS
413.35	30.93	--	--	-14.45	46.0	--	15.07	306.30	100	Horizontal	PASS

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

Test Data and Plots (1GHz ~ 10th Harmonic)

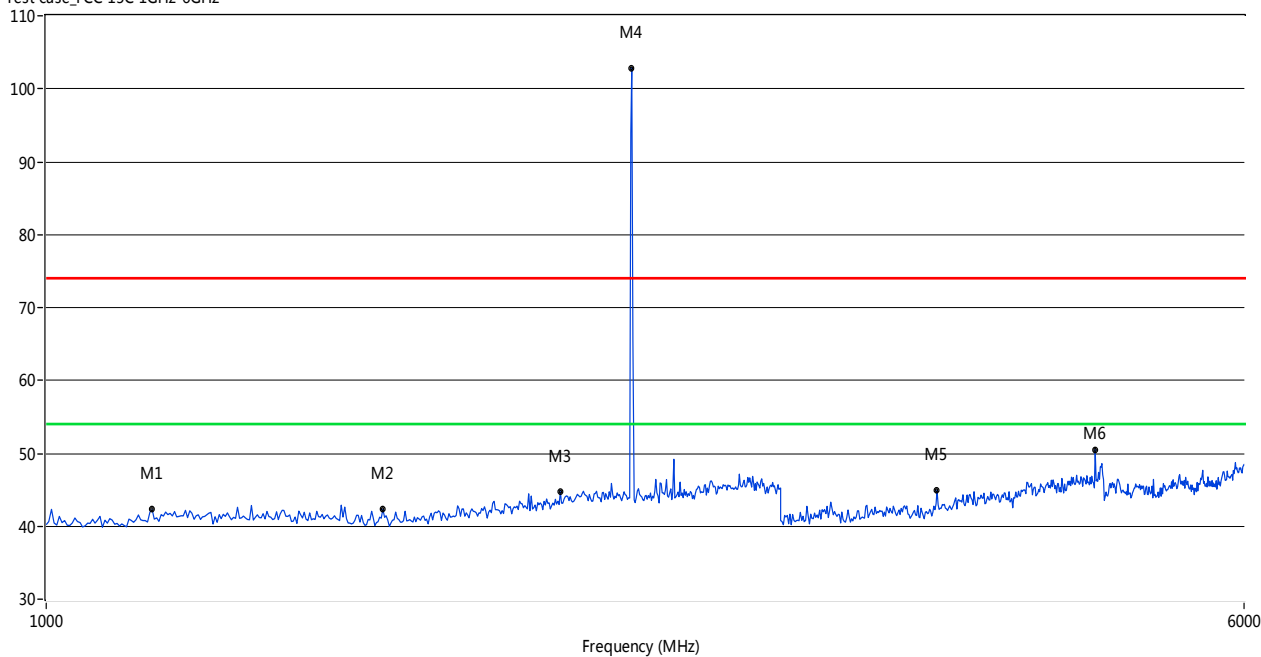
GFSK LOW CHANNEL 1GHz to 6GHz, ANT V



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1107.78	42.28	--	--	-4.28	74.0	--	54.0	11.72	141.10	100	Vertical	PASS
1554.89	42.18	--	--	-3.83	74.0	--	54.0	11.82	135.60	100	Vertical	PASS
2161.68	47.70	--	--	-0.79	74.0	--	54.0	6.30	152.60	100	Vertical	PASS
2401.20	100.79	--	--	0.01	74.0	--	54.0	-46.79	352.70	100	Vertical	N/A
3598.80	45.27	--	--	8.72	74.0	--	54.0	8.73	63.70	100	Vertical	PASS
4802.40	49.93	--	--	12.37	74.0	--	54.0	4.07	360.00	100	Vertical	PASS

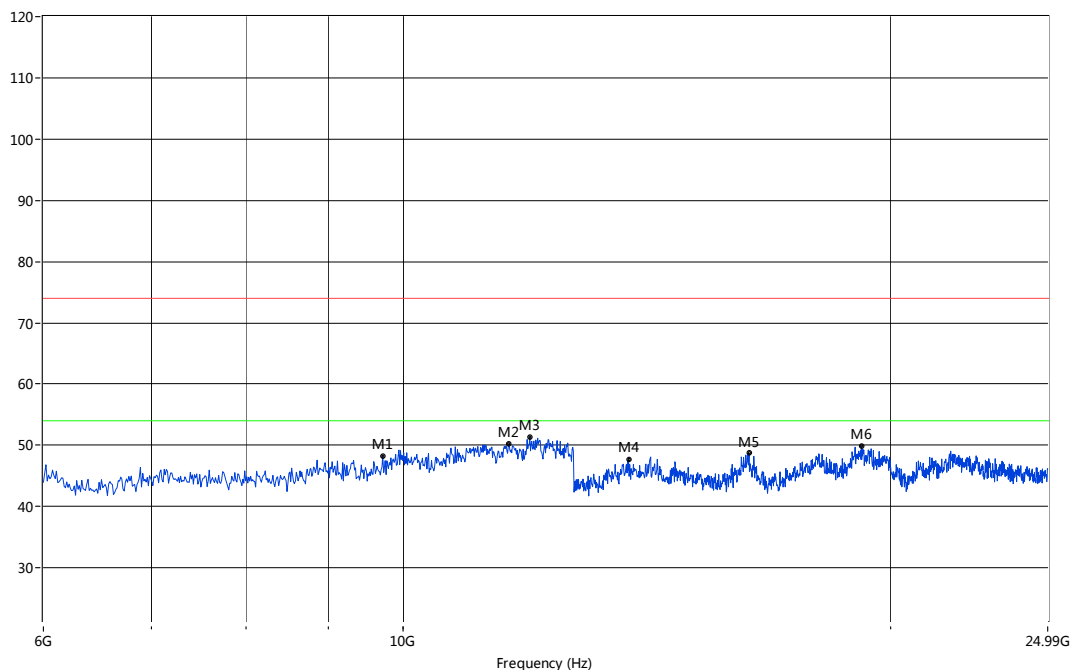
GFSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



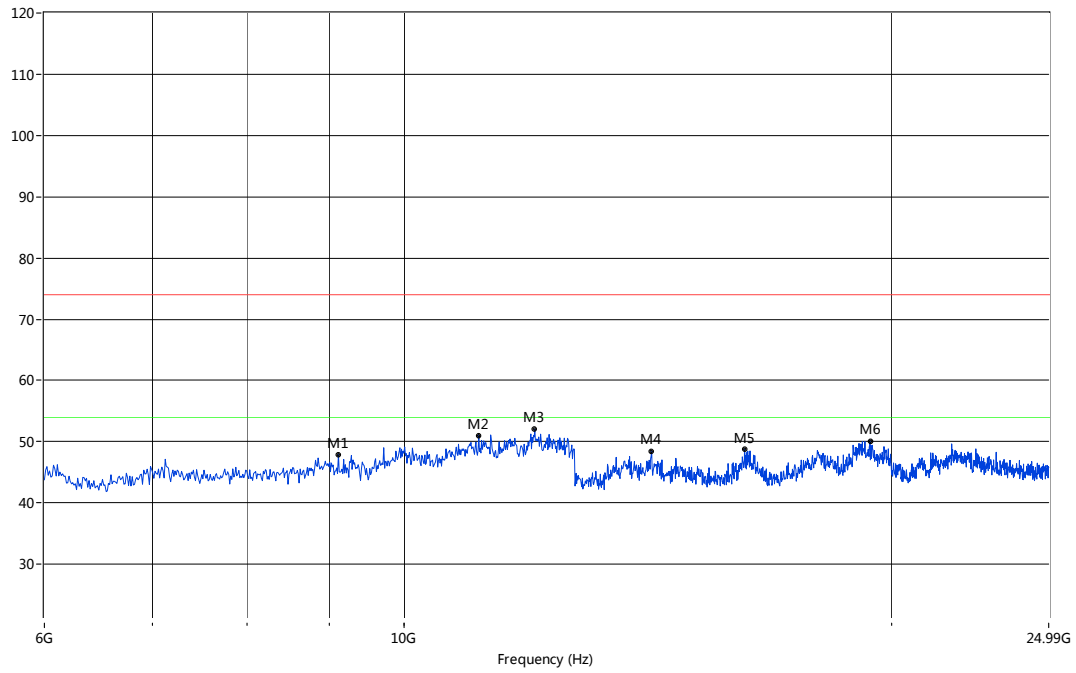
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1171.66	42.27	--	--	-4.10	74.0	--	54.0	11.73	180.60	100	Horizontal	PASS
1654.69	42.31	--	--	-3.88	74.0	--	54.0	11.69	253.50	100	Horizontal	PASS
2157.68	44.72	--	--	-0.99	74.0	--	54.0	9.28	7.80	100	Horizontal	PASS
2401.20	102.87	--	--	0.01	74.0	--	54.0	-48.87	68.60	100	Horizontal	N/A
3790.42	44.92	--	--	9.41	74.0	--	54.0	9.08	104.00	100	Horizontal	PASS
4802.40	50.50	--	--	12.37	74.0	--	54.0	3.50	-0.00	100	Horizontal	PASS

GFSK LOW CHANNEL 6GHz to 25GHz, ANT V



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
9717.55	48.32	--	--	74.0	--	54.0	25.68	272	Vertical	PASS
11626.87	50.30	--	--	74.0	--	54.0	23.70	312	Vertical	PASS
11975.04	51.39	--	--	74.0	--	54.0	22.61	31	Vertical	PASS
13779.53	47.77	--	--	74.0	--	54.0	26.23	210	Vertical	PASS
16348.17	48.69	--	--	74.0	--	54.0	25.31	72	Vertical	PASS
19179.70	49.88	--	--	74.0	--	54.0	24.12	260	Vertical	PASS

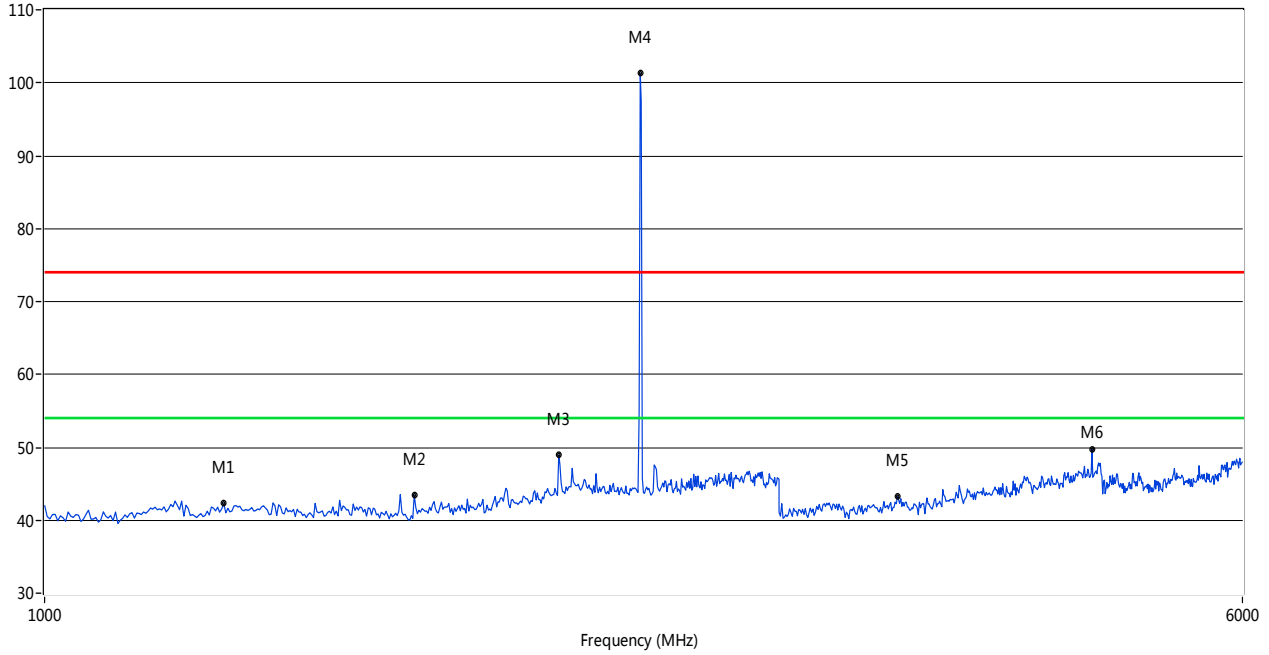
GFSK LOW CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
9111.07	47.90	--	--	74.0	--	54.0	26.10	23	Horizontal	PASS
11121.46	51.02	--	--	74.0	--	54.0	22.98	130	Horizontal	PASS
12042.43	52.07	--	--	74.0	--	54.0	21.93	275	Horizontal	PASS
14216.31	48.42	--	--	74.0	--	54.0	25.58	324	Horizontal	PASS
16223.38	48.82	--	--	74.0	--	54.0	25.18	128	Horizontal	PASS
19389.35	50.02	--	--	74.0	--	54.0	23.98	287	Horizontal	PASS

GFSK MID CHANNEL 1GHz to 6GHz, ANT V

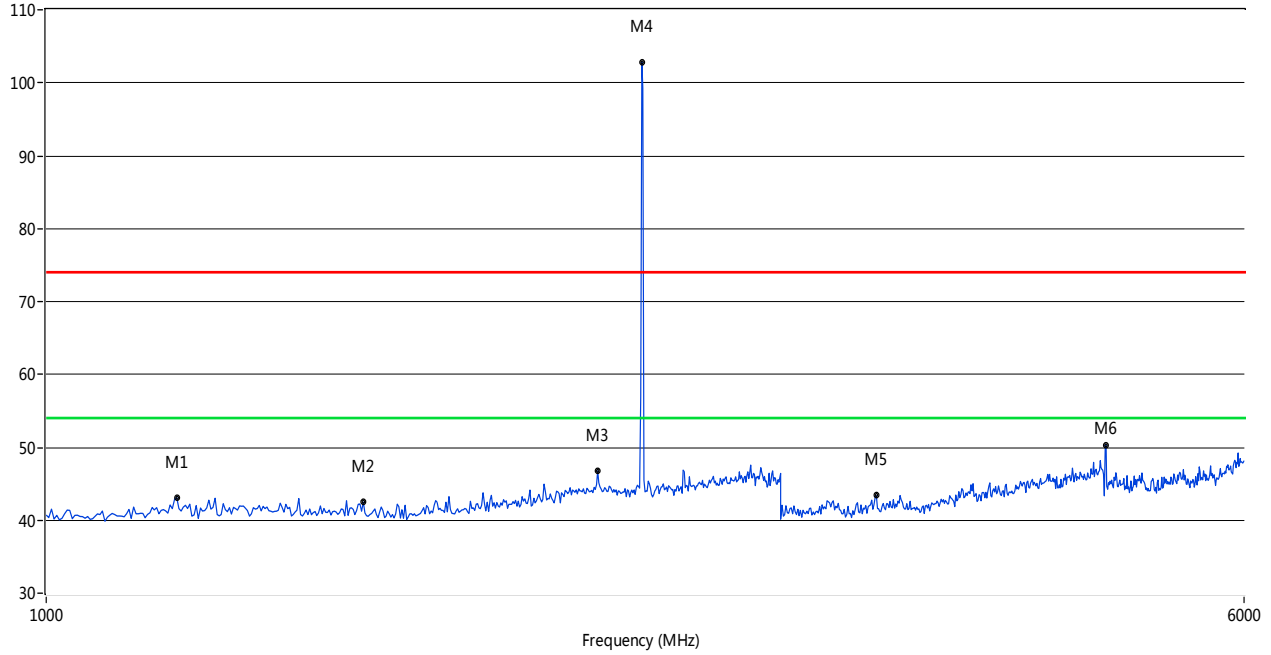
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1307.38	42.28	--	--	-3.62	74.0	--	54.0	11.72	358.50	100	Vertical	PASS
1738.52	43.43	--	--	-3.57	74.0	--	54.0	10.57	35.20	100	Vertical	PASS
2157.68	48.97	--	--	-0.99	74.0	--	54.0	5.03	153.00	100	Vertical	PASS
2437.13	101.26	--	--	-0.08	74.0	--	54.0	-47.26	352.70	100	Vertical	N/A
3580.84	43.30	--	--	8.87	74.0	--	54.0	10.70	359.20	100	Vertical	PASS
4790.42	49.75	--	--	12.34	74.0	--	54.0	4.25	327.70	100	Vertical	PASS

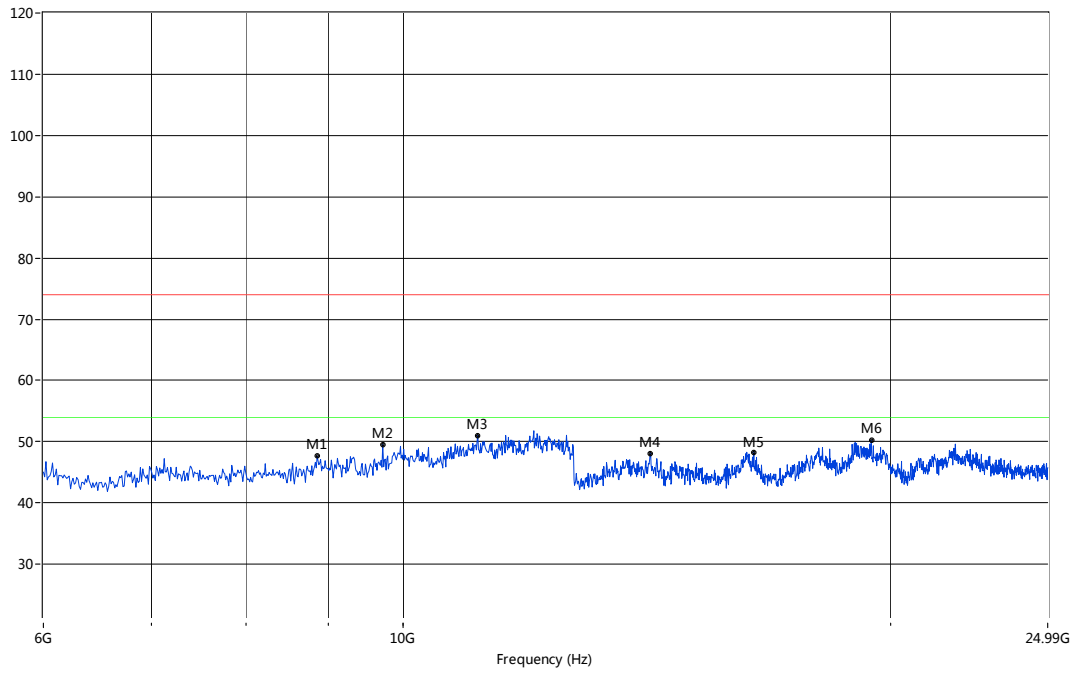
GFSK MID CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



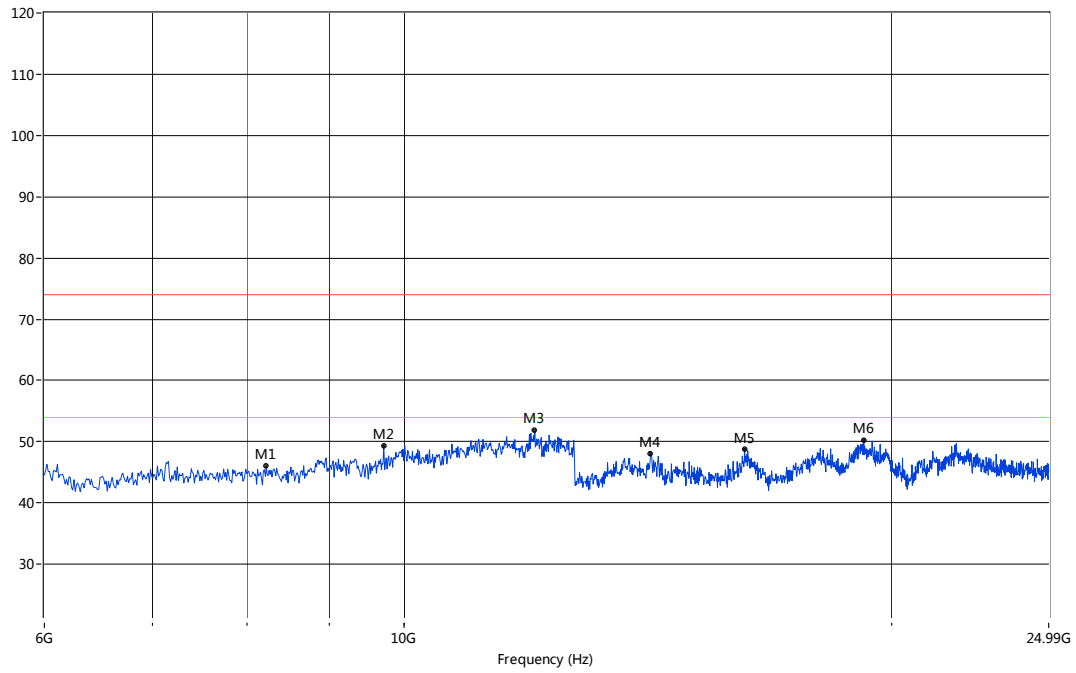
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1215.57	43.13	--	--	-3.79	74.0	--	54.0	10.87	348.60	100	Horizontal	PASS
1606.79	42.47	--	--	-3.98	74.0	--	54.0	11.53	197.50	100	Horizontal	PASS
2281.44	46.78	--	--	-0.05	74.0	--	54.0	7.22	64.30	100	Horizontal	PASS
2437.13	102.86	--	--	-0.08	74.0	--	54.0	-48.86	69.80	100	Horizontal	N/A
3461.08	43.37	--	--	8.99	74.0	--	54.0	10.63	54.80	100	Horizontal	PASS
4880.24	50.35	--	--	12.33	74.0	--	54.0	3.65	358.60	100	Horizontal	PASS

GFSK MID CHANNEL 6GHz to 25GHz, ANT V



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8852.75	47.69	--	--	74.0	--	54.0	26.31	357	Vertical	PASS
9717.55	49.53	--	--	74.0	--	54.0	24.47	237	Vertical	PASS
11121.46	51.02	--	--	74.0	--	54.0	22.98	224	Vertical	PASS
14205.91	47.99	--	--	74.0	--	54.0	26.01	278	Vertical	PASS
16462.56	48.24	--	--	74.0	--	54.0	25.76	355	Vertical	PASS
19449.25	50.23	--	--	74.0	--	54.0	23.77	320	Vertical	PASS

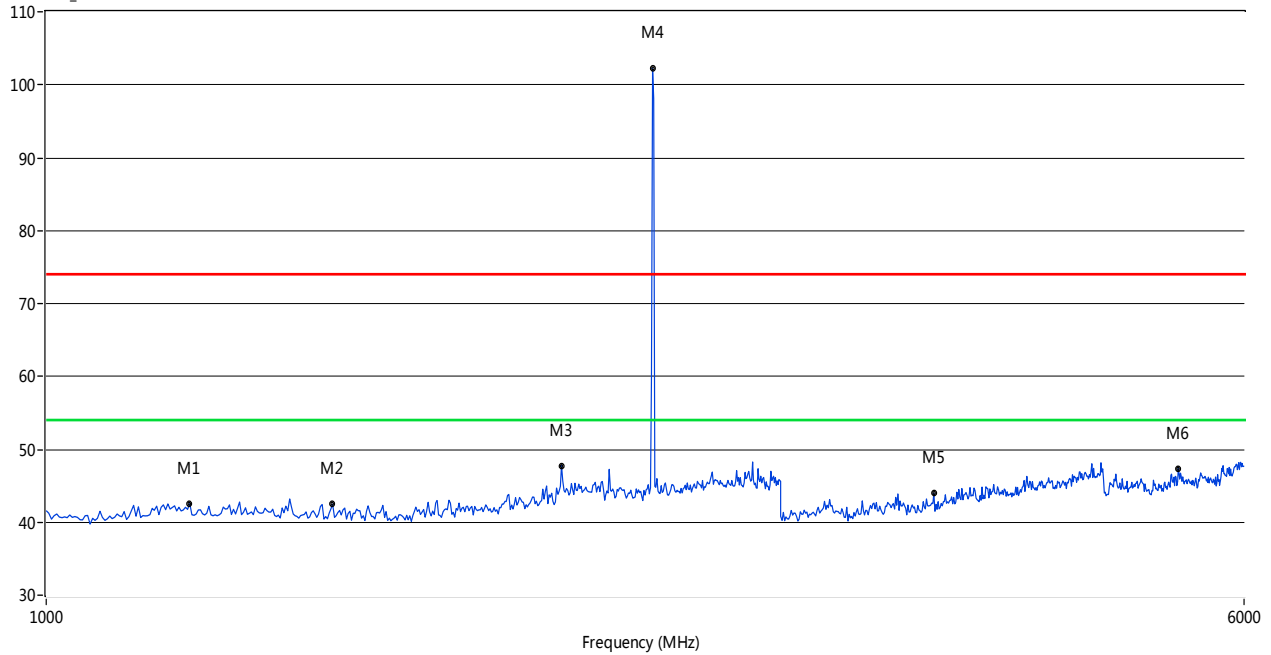
GFSK MID CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8223.79	45.96	--	--	74.0	--	54.0	28.04	67	Horizontal	PASS
9717.55	49.36	--	--	74.0	--	54.0	24.64	97	Horizontal	PASS
12042.43	51.79	--	--	74.0	--	54.0	22.21	37	Horizontal	PASS
14195.51	48.08	--	--	74.0	--	54.0	25.92	323	Horizontal	PASS
16223.38	48.82	--	--	74.0	--	54.0	25.18	10	Horizontal	PASS
19219.63	50.32	--	--	74.0	--	54.0	23.68	89	Horizontal	PASS

GFSK HIGH CHANNEL 1GHz to 6GHz, ANT V

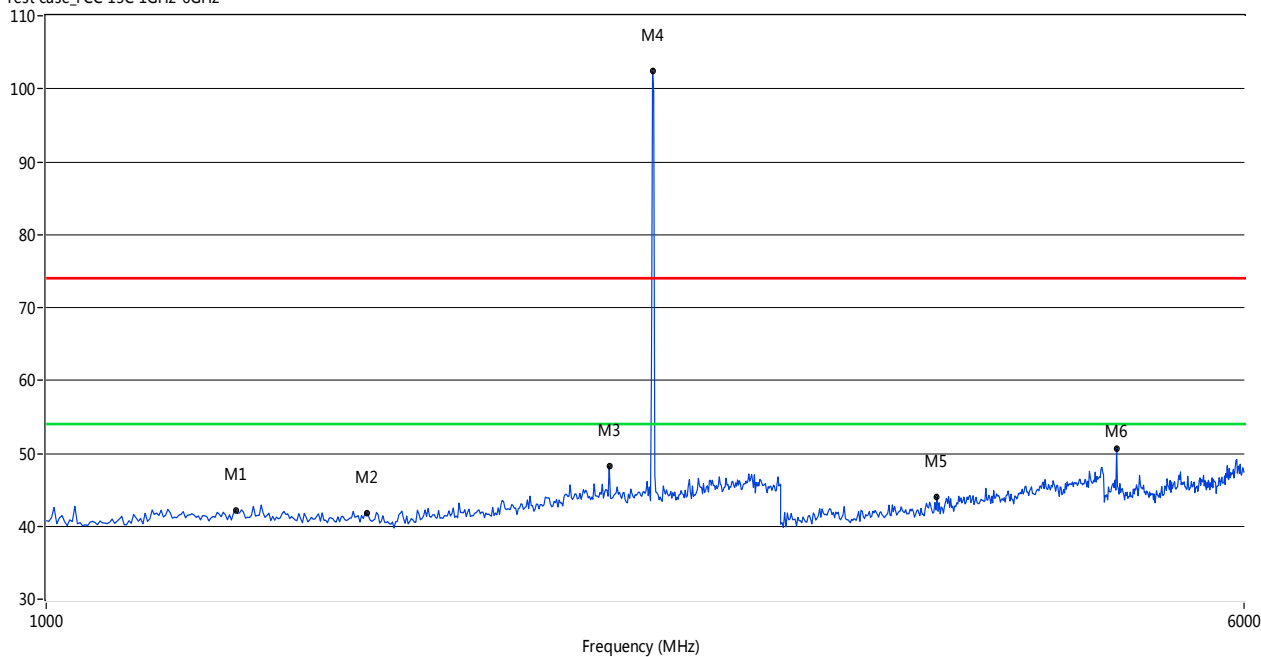
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1239.52	42.56	--	--	-3.82	74.0	--	54.0	11.44	186.80	100	Vertical	PASS
1534.93	42.47	--	--	-3.65	74.0	--	54.0	11.53	215.00	100	Vertical	PASS
2161.68	47.77	--	--	-0.79	74.0	--	54.0	6.23	153.10	100	Vertical	PASS
2477.05	102.19	--	--	-0.14	74.0	--	54.0	-48.19	359.10	100	Vertical	N/A
3772.45	43.95	--	--	9.29	74.0	--	54.0	10.05	258.10	100	Vertical	PASS
5437.13	47.37	--	--	13.40	74.0	--	54.0	6.63	358.20	100	Vertical	PASS

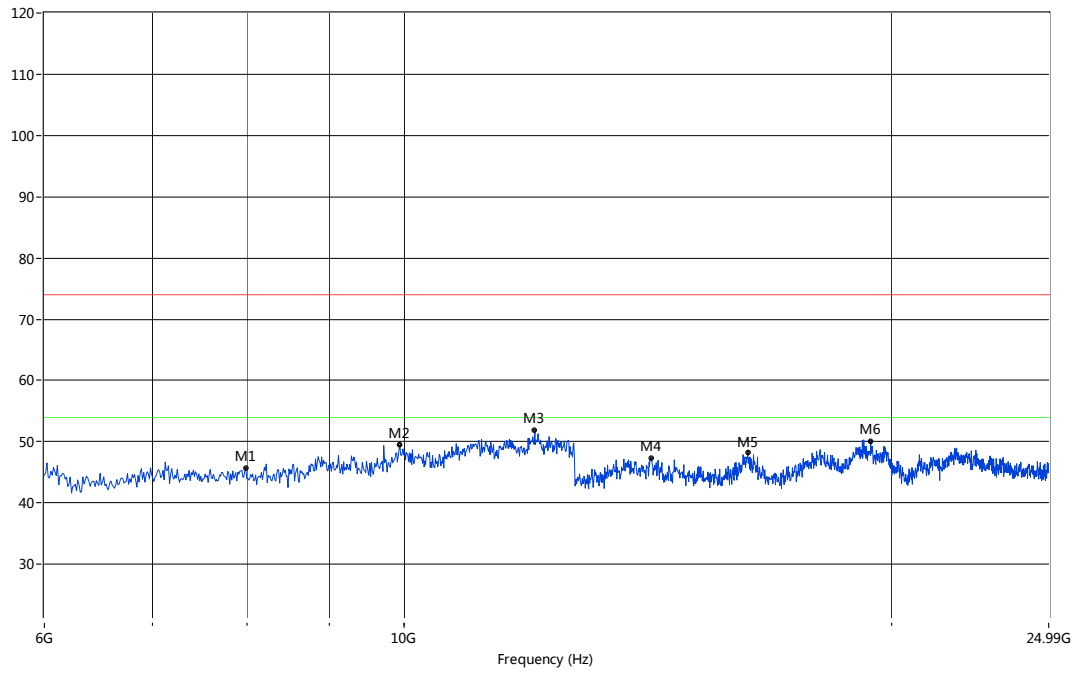
GFSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



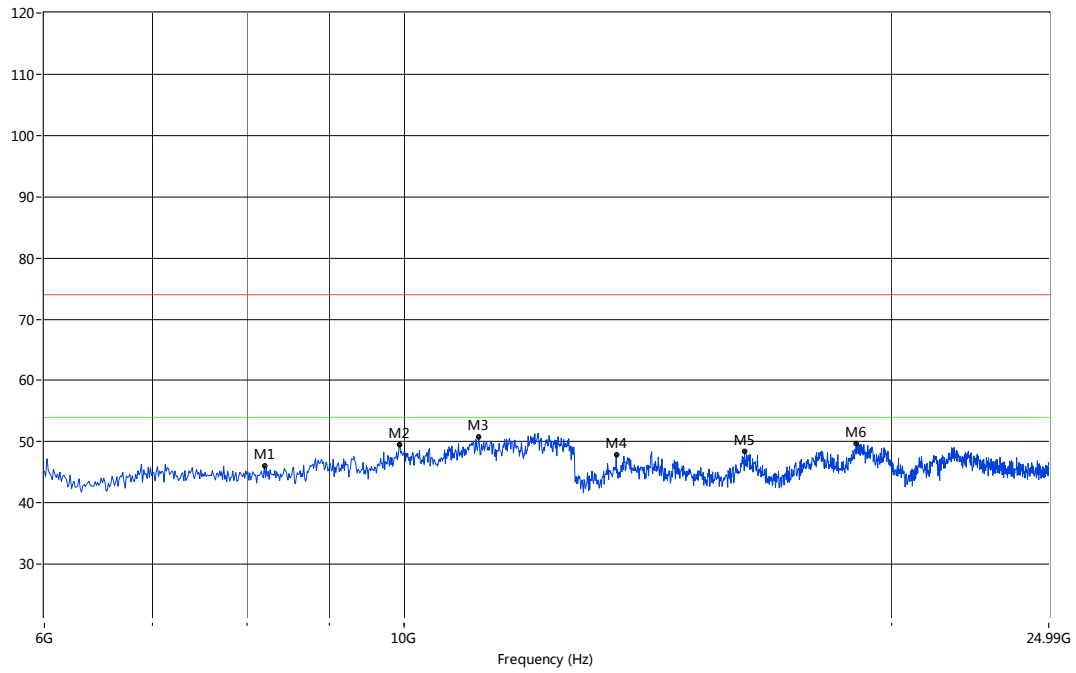
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1327.35	42.15	--	--	-3.77	74.0	--	54.0	11.85	271.50	100	Horizontal	PASS
1614.77	41.82	--	--	-3.98	74.0	--	54.0	12.18	271.50	100	Horizontal	PASS
2321.36	48.19	--	--	0.12	74.0	--	54.0	5.81	69.80	100	Horizontal	PASS
2477.05	102.42	--	--	-0.14	74.0	--	54.0	-48.42	69.80	100	Horizontal	N/A
3790.42	43.98	--	--	9.41	74.0	--	54.0	10.02	275.20	100	Horizontal	PASS
4958.08	50.68	--	--	12.66	74.0	--	54.0	3.32	356.40	100	Horizontal	PASS

GFSK HIGH CHANNEL 6GHz to 25GHz, ANT V



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7987.94	45.71	--	--	74.0	--	54.0	28.29	188	Vertical	PASS
9942.18	49.44	--	--	74.0	--	54.0	24.56	231	Vertical	PASS
12042.43	51.85	--	--	74.0	--	54.0	22.15	267	Vertical	PASS
14216.31	47.28	--	--	74.0	--	54.0	26.72	294	Vertical	PASS
16296.17	48.22	--	--	74.0	--	54.0	25.78	169	Vertical	PASS
19409.32	50.05	--	--	74.0	--	54.0	23.95	236	Vertical	PASS

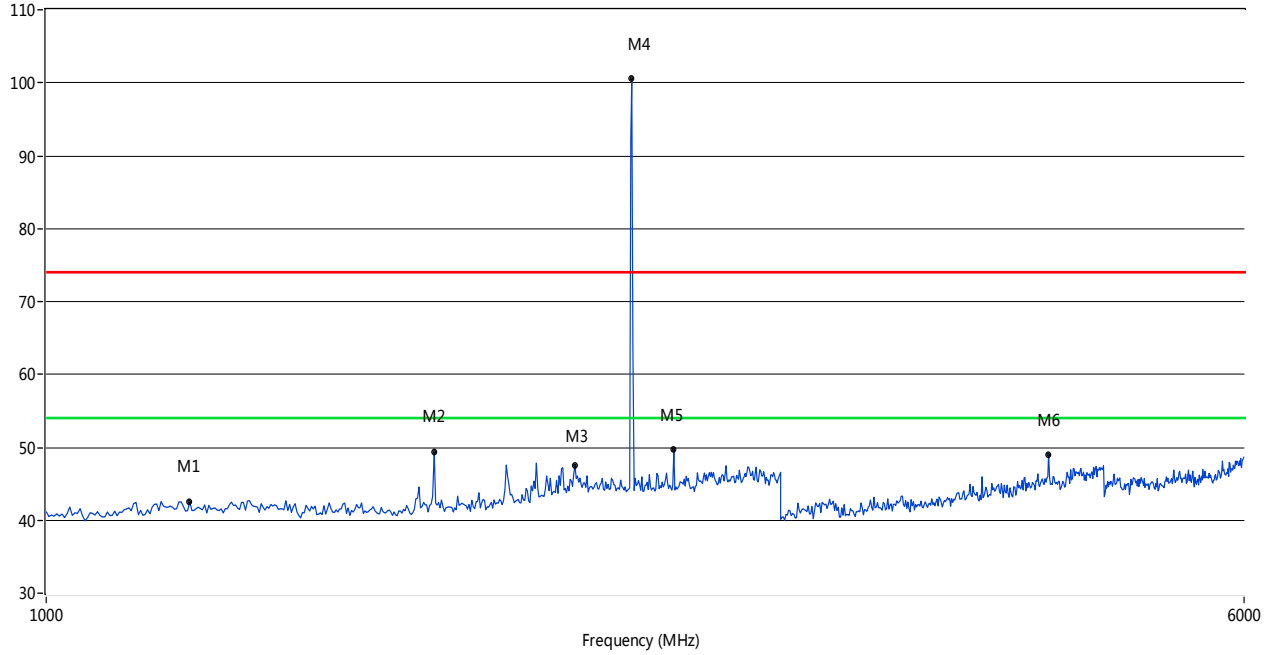
GFSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8201.33	45.96	--	--	74.0	--	54.0	28.04	18	Horizontal	PASS
9942.18	49.51	--	--	74.0	--	54.0	24.49	44	Horizontal	PASS
11121.46	50.70	--	--	74.0	--	54.0	23.30	300	Horizontal	PASS
13519.55	47.82	--	--	74.0	--	54.0	26.18	8	Horizontal	PASS
16223.38	48.35	--	--	74.0	--	54.0	25.65	201	Horizontal	PASS
19009.98	49.72	--	--	74.0	--	54.0	24.28	252	Horizontal	PASS

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

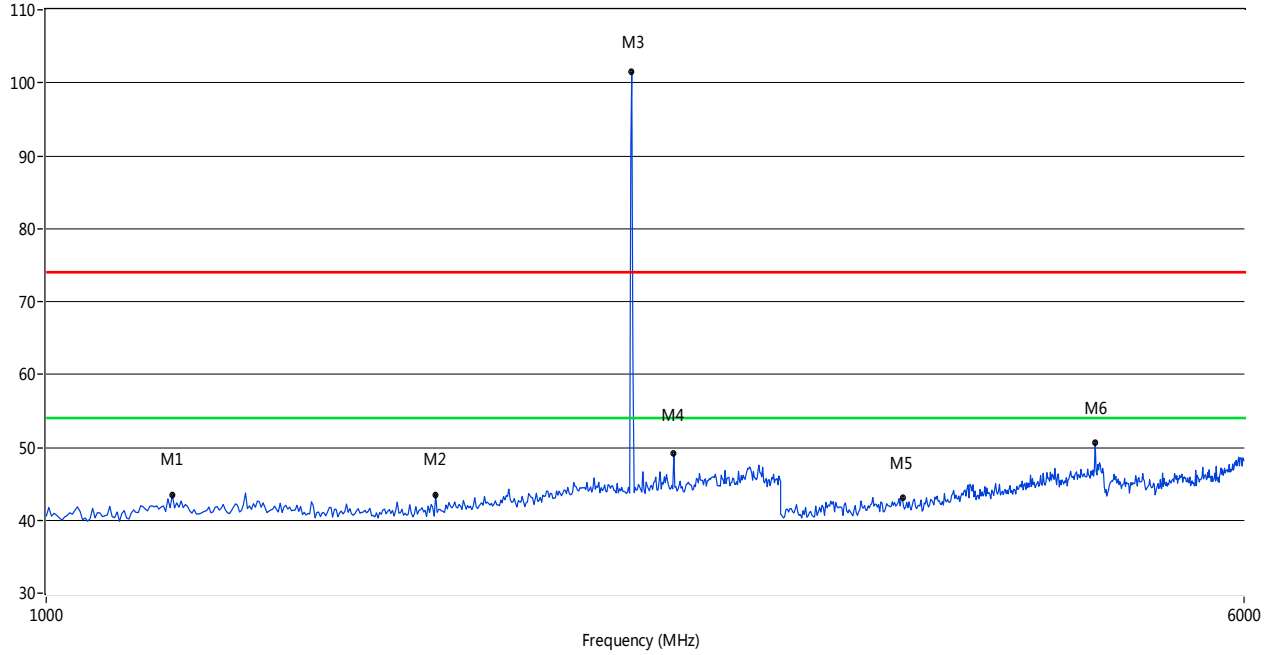
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1239.52	42.53	--	--	-3.82	74.0	--	54.0	11.47	337.00	100	Vertical	PASS
1786.43	49.34	--	--	-3.34	74.0	--	54.0	4.66	30.90	100	Vertical	PASS
2205.59	47.58	--	--	-0.15	74.0	--	54.0	6.42	159.10	100	Vertical	PASS
2401.20	100.57	--	--	0.01	74.0	--	54.0	-46.57	153.50	100	Vertical	N/A
2556.89	49.71	--	--	0.43	74.0	--	54.0	4.29	159.10	100	Vertical	PASS
4479.04	49.00	--	--	11.01	74.0	--	54.0	5.00	107.20	100	Vertical	PASS

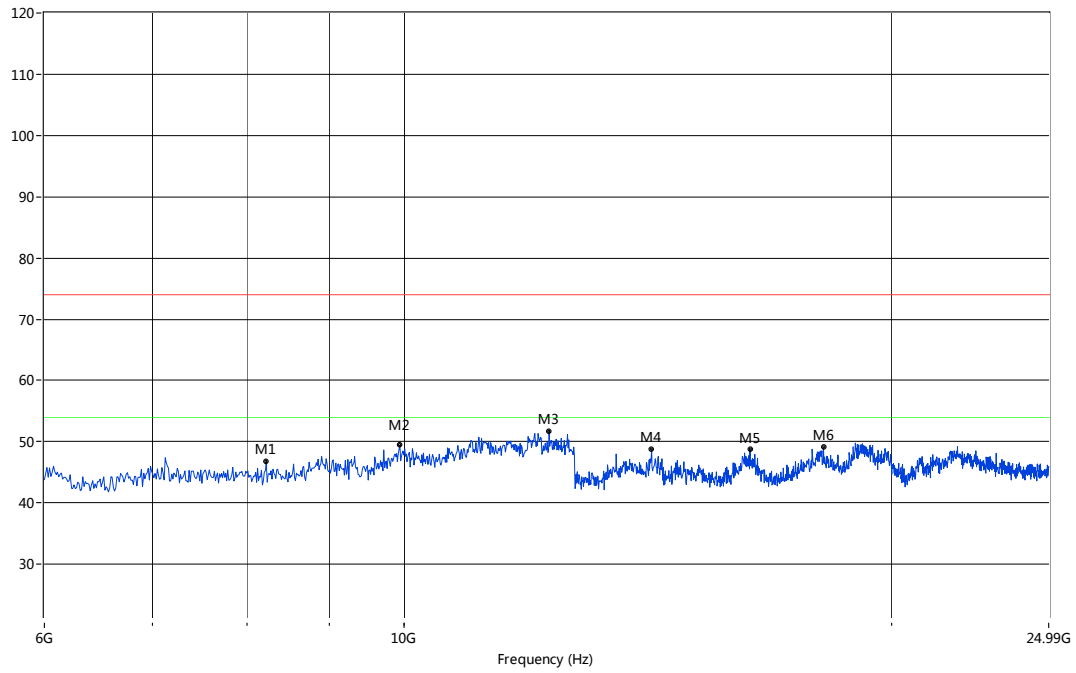
Π/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



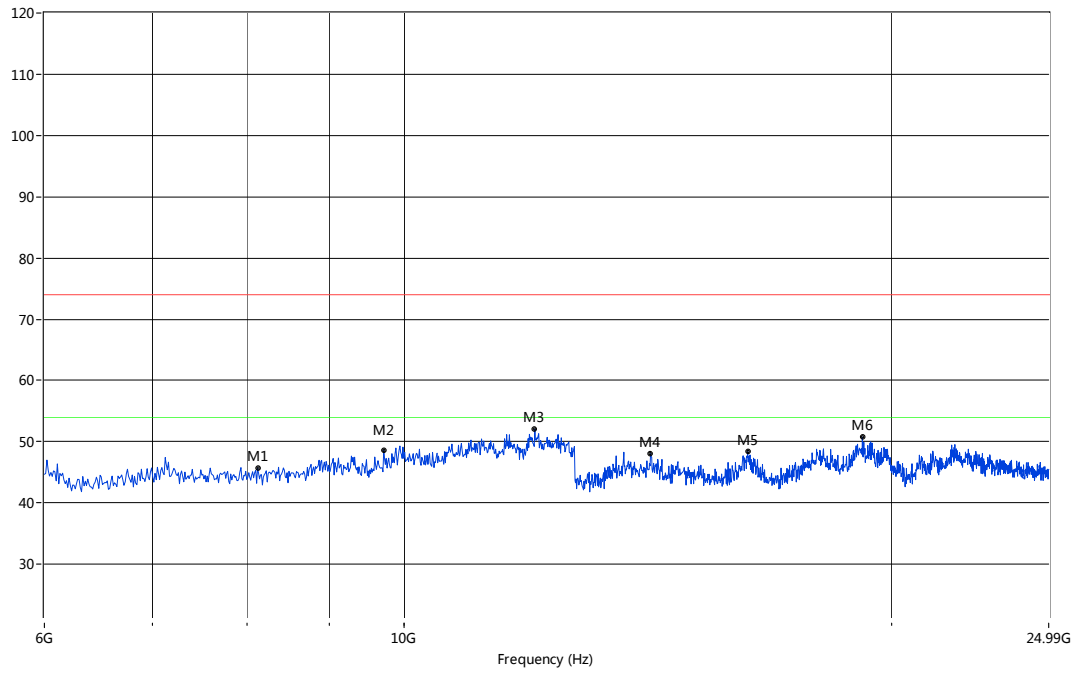
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1207.59	43.42	--	--	-3.68	74.0	--	54.0	10.58	298.80	100	Horizontal	PASS
1790.42	43.49	--	--	-3.33	74.0	--	54.0	10.51	49.30	100	Horizontal	PASS
2401.20	101.49	--	--	0.01	74.0	--	54.0	-47.49	357.70	100	Horizontal	N/A
2556.89	49.09	--	--	0.43	74.0	--	54.0	4.91	6.90	100	Horizontal	PASS
3598.80	43.02	--	--	8.72	74.0	--	54.0	10.98	305.60	100	Horizontal	PASS
4802.40	50.61	--	--	12.37	74.0	--	54.0	3.39	169.00	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8223.79	46.73	--	--	74.0	--	54.0	27.27	127	Vertical	PASS
9942.18	49.42	--	--	74.0	--	54.0	24.58	288	Vertical	PASS
12289.52	51.77	--	--	74.0	--	54.0	22.23	221	Vertical	PASS
14216.31	48.78	--	--	74.0	--	54.0	25.22	189	Vertical	PASS
16348.17	48.78	--	--	74.0	--	54.0	25.22	176	Vertical	PASS
18147.26	49.06	--	--	74.0	--	54.0	24.94	224	Vertical	PASS

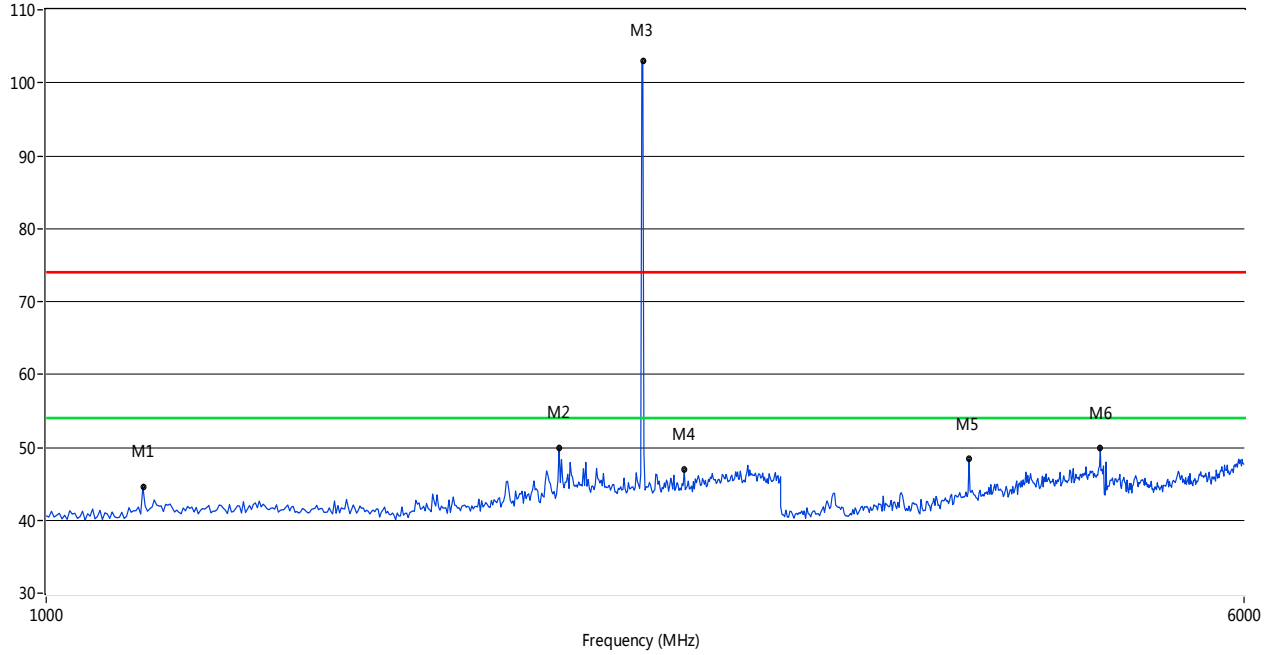
II/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8122.71	45.73	--	--	74.0	--	54.0	28.27	112	Horizontal	PASS
9717.55	48.59	--	--	74.0	--	54.0	25.41	176	Horizontal	PASS
12042.43	52.05	--	--	74.0	--	54.0	21.95	237	Horizontal	PASS
14195.51	48.05	--	--	74.0	--	54.0	25.95	308	Horizontal	PASS
16296.17	48.38	--	--	74.0	--	54.0	25.62	250	Horizontal	PASS
19179.70	50.74	--	--	74.0	--	54.0	23.26	209	Horizontal	PASS

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

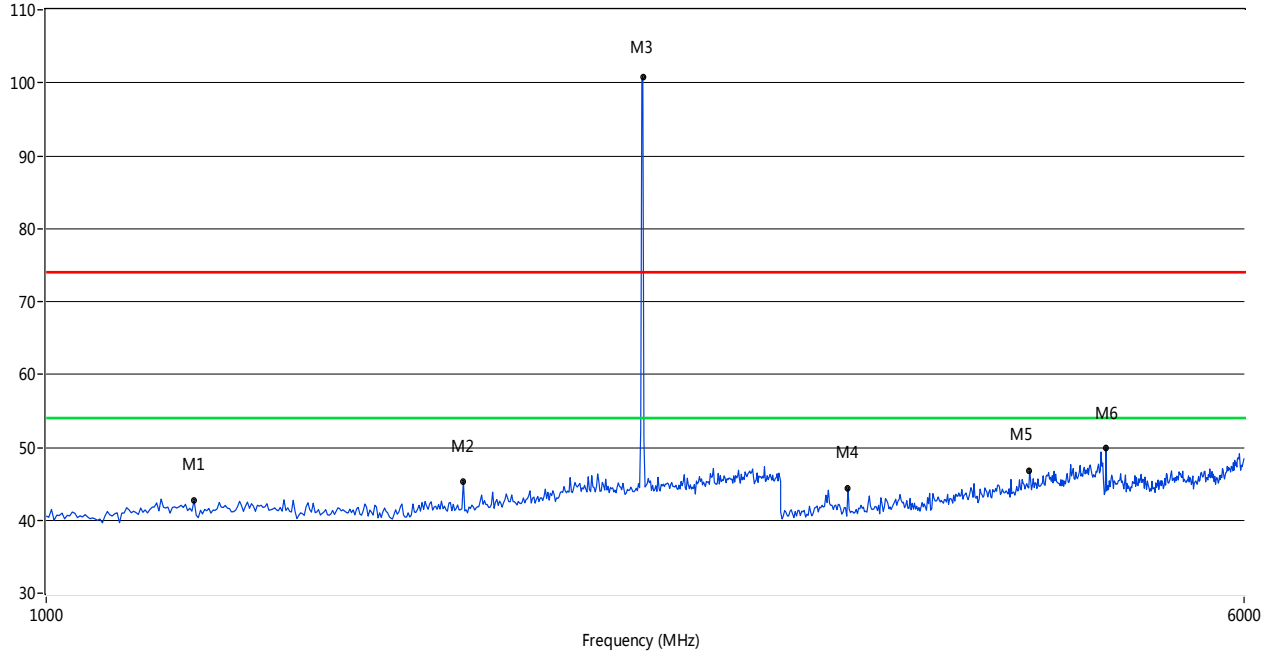
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1155.69	44.56	--	--	-4.26	74.0	--	54.0	9.44	350.30	100	Vertical	PASS
2153.69	49.86	--	--	-0.99	74.0	--	54.0	4.14	155.40	100	Vertical	PASS
2441.12	102.96	--	--	-0.03	74.0	--	54.0	-48.96	144.30	100	Vertical	N/A
2596.81	46.89	--	--	1.16	74.0	--	54.0	7.11	144.30	100	Vertical	PASS
3976.05	48.35	--	--	10.10	74.0	--	54.0	5.65	189.30	100	Vertical	PASS
4838.32	49.89	--	--	13.06	74.0	--	54.0	4.11	153.80	100	Vertical	PASS

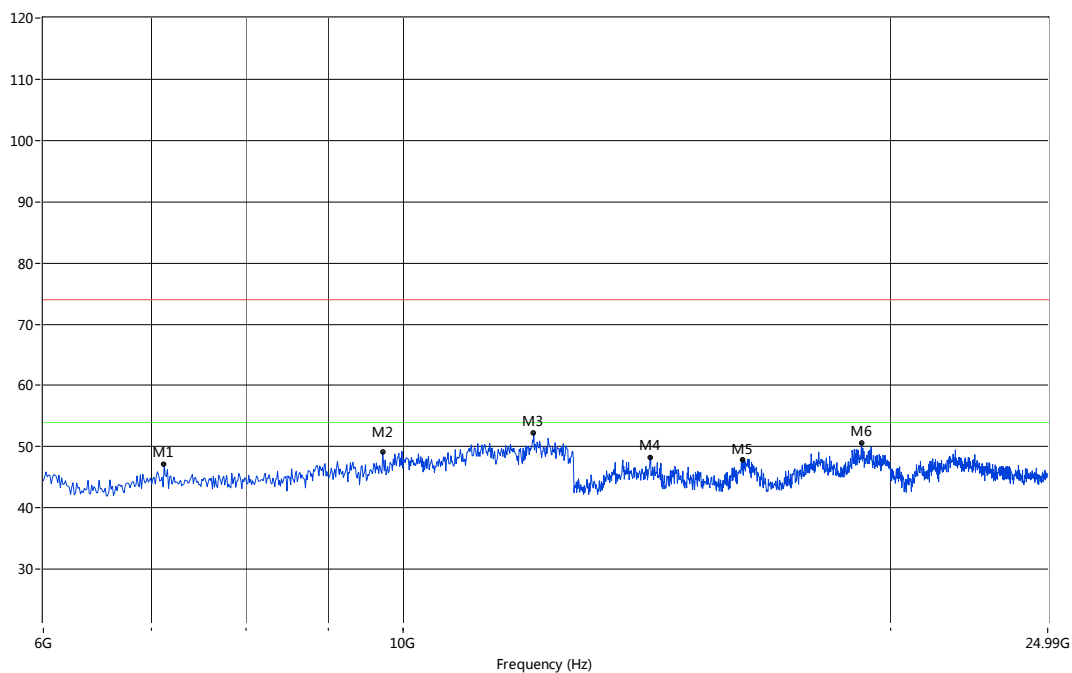
Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



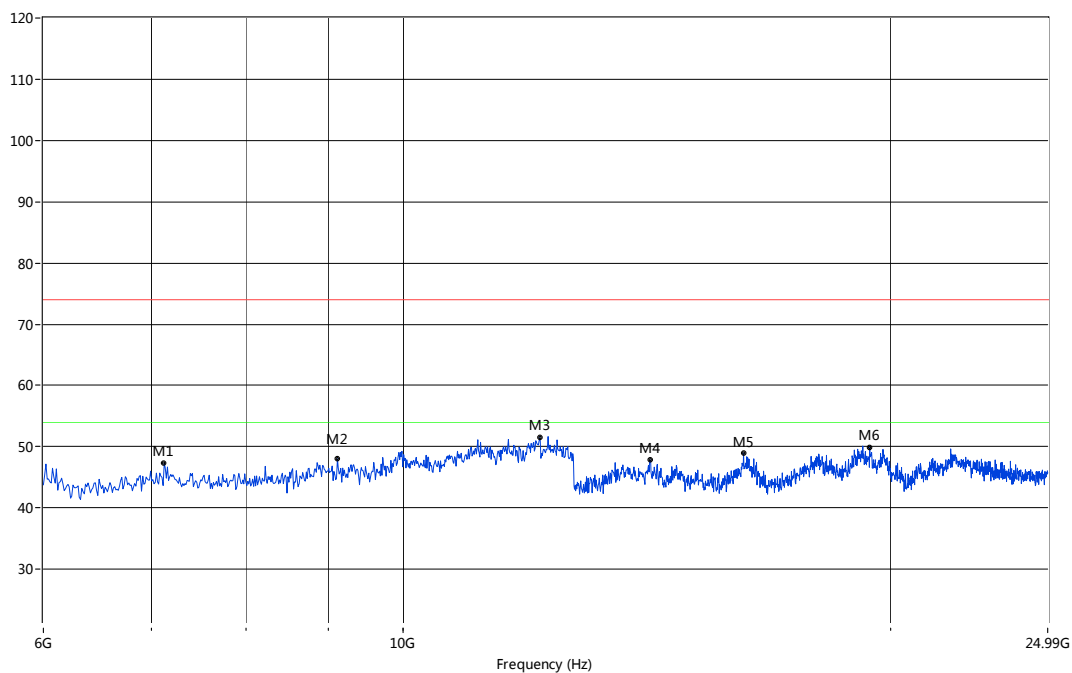
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1247.51	42.69	--	--	-3.98	74.0	--	54.0	11.31	357.30	100	Horizontal	PASS
1866.27	45.38	--	--	-2.77	74.0	--	54.0	8.62	265.60	100	Horizontal	PASS
2441.12	100.86	--	--	-0.03	74.0	--	54.0	-46.86	359.30	100	Horizontal	N/A
3317.36	44.38	--	--	8.04	74.0	--	54.0	9.62	1.10	100	Horizontal	PASS
4353.29	46.78	--	--	10.99	74.0	--	54.0	7.22	314.50	100	Horizontal	PASS
4880.24	49.99	--	--	12.33	74.0	--	54.0	4.01	153.70	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	47.22	--	--	74.0	--	54.0	26.78	3	Vertical	PASS
9717.55	49.12	--	--	74.0	--	54.0	24.88	145	Vertical	PASS
12042.43	52.18	--	--	74.0	--	54.0	21.82	313	Vertical	PASS
14216.31	48.21	--	--	74.0	--	54.0	25.79	8	Vertical	PASS
16192.18	47.88	--	--	74.0	--	54.0	26.12	272	Vertical	PASS
19179.70	50.55	--	--	74.0	--	54.0	23.45	93	Vertical	PASS

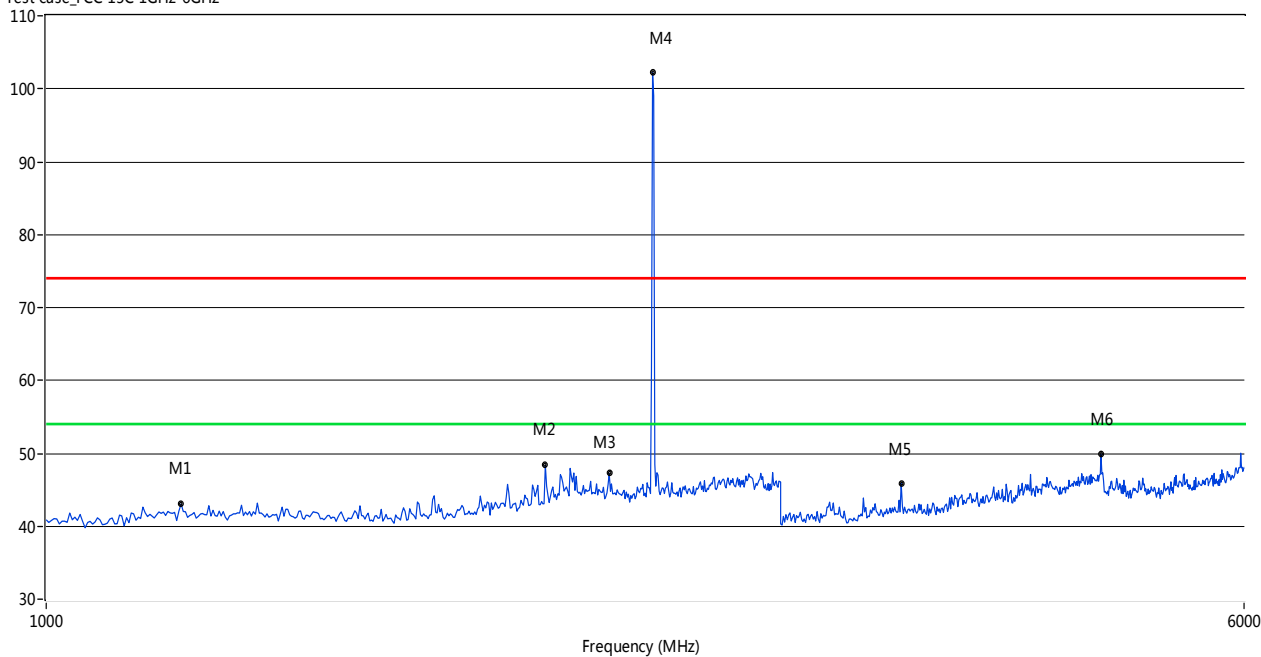
II/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	47.29	--	--	74.0	--	54.0	26.71	308	Horizontal	PASS
9111.07	48.02	--	--	74.0	--	54.0	25.98	167	Horizontal	PASS
12143.51	51.45	--	--	74.0	--	54.0	22.55	332	Horizontal	PASS
14205.91	47.87	--	--	74.0	--	54.0	26.13	2	Horizontal	PASS
16223.38	48.95	--	--	74.0	--	54.0	25.05	165	Horizontal	PASS
19409.32	49.91	--	--	74.0	--	54.0	24.09	130	Horizontal	PASS

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

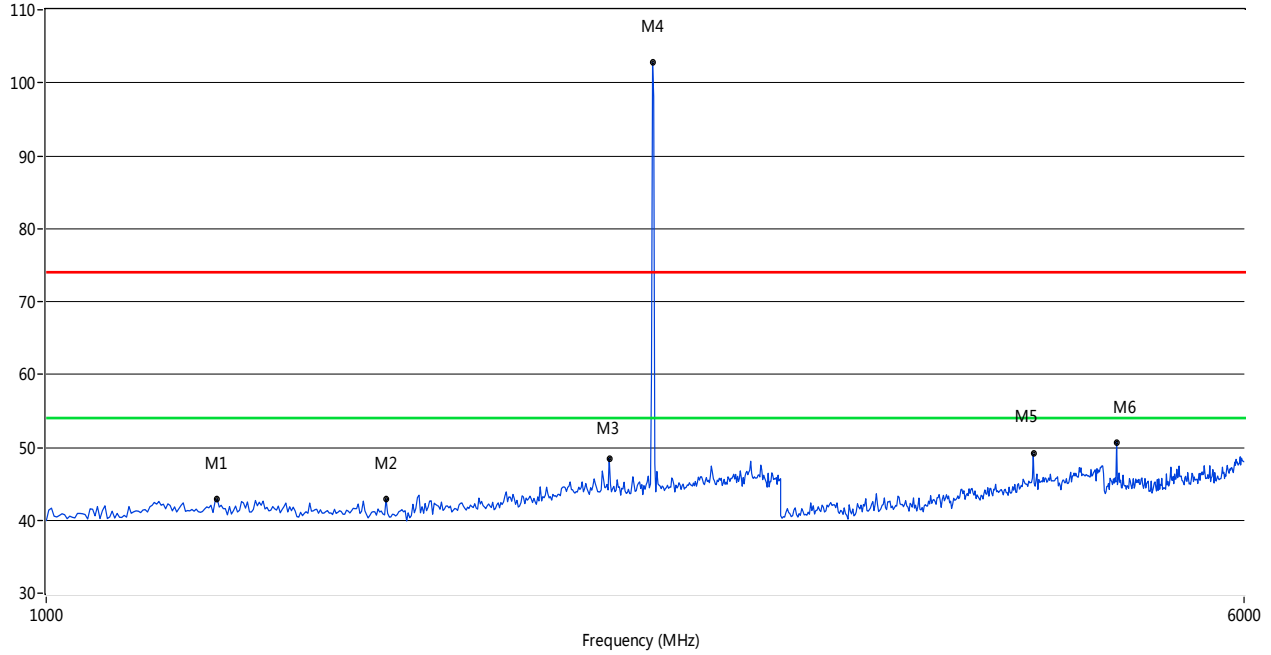
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1223.55	43.05	--	--	-3.87	74.0	--	54.0	10.95	194.20	100	Vertical	PASS
2109.78	48.36	--	--	-1.20	74.0	--	54.0	5.64	160.80	100	Vertical	PASS
2321.36	47.24	--	--	0.12	74.0	--	54.0	6.76	160.80	100	Vertical	PASS
2477.05	102.22	--	--	-0.14	74.0	--	54.0	-48.22	144.10	100	Vertical	N/A
3592.81	45.83	--	--	8.82	74.0	--	54.0	8.17	94.60	100	Vertical	PASS
4844.31	49.86	--	--	12.98	74.0	--	54.0	4.14	341.50	100	Vertical	PASS

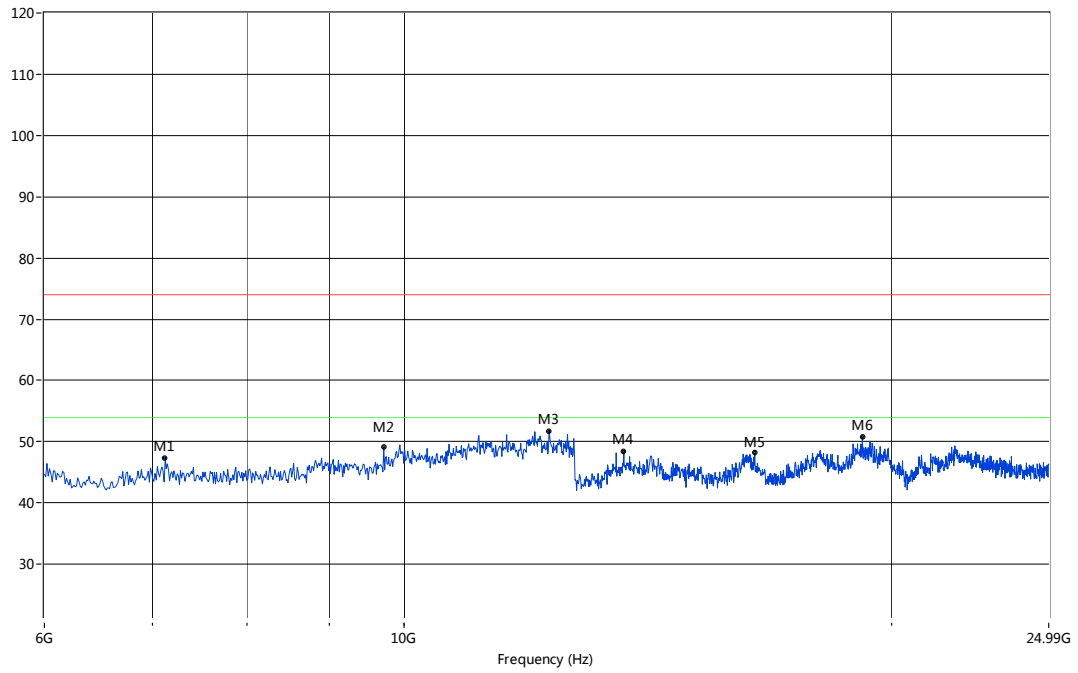
Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



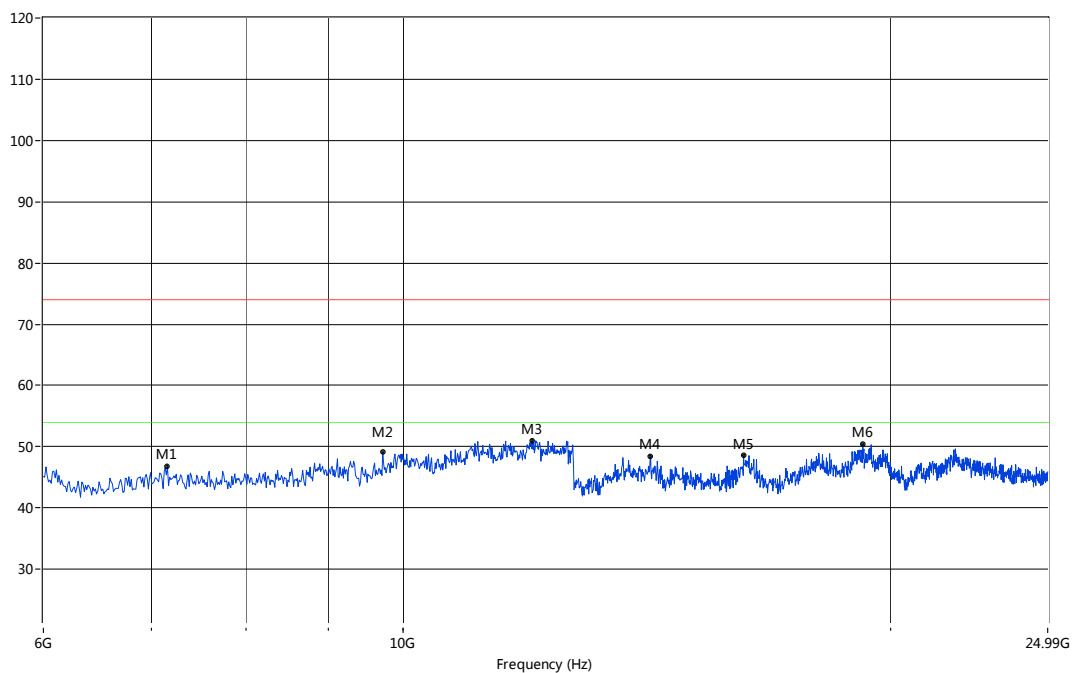
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1291.42	42.89	--	--	-3.91	74.0	--	54.0	11.11	235.10	100	Horizontal	PASS
1662.67	42.91	--	--	-3.81	74.0	--	54.0	11.09	277.80	100	Horizontal	PASS
2321.36	48.49	--	--	0.12	74.0	--	54.0	5.51	187.20	100	Horizontal	PASS
2477.05	102.81	--	--	-0.14	74.0	--	54.0	-48.81	360.00	100	Horizontal	N/A
4377.25	49.10	--	--	10.79	74.0	--	54.0	4.90	279.30	100	Horizontal	PASS
4958.08	50.64	--	--	12.66	74.0	--	54.0	3.36	149.80	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	47.40	--	--	74.0	--	54.0	26.60	56	Vertical	PASS
9717.55	49.07	--	--	74.0	--	54.0	24.93	252	Vertical	PASS
12289.52	51.77	--	--	74.0	--	54.0	22.23	187	Vertical	PASS
13665.14	48.37	--	--	74.0	--	54.0	25.62	26	Vertical	PASS
16462.56	48.15	--	--	74.0	--	54.0	25.85	217	Vertical	PASS
19179.70	50.75	--	--	74.0	--	54.0	23.25	326	Vertical	PASS

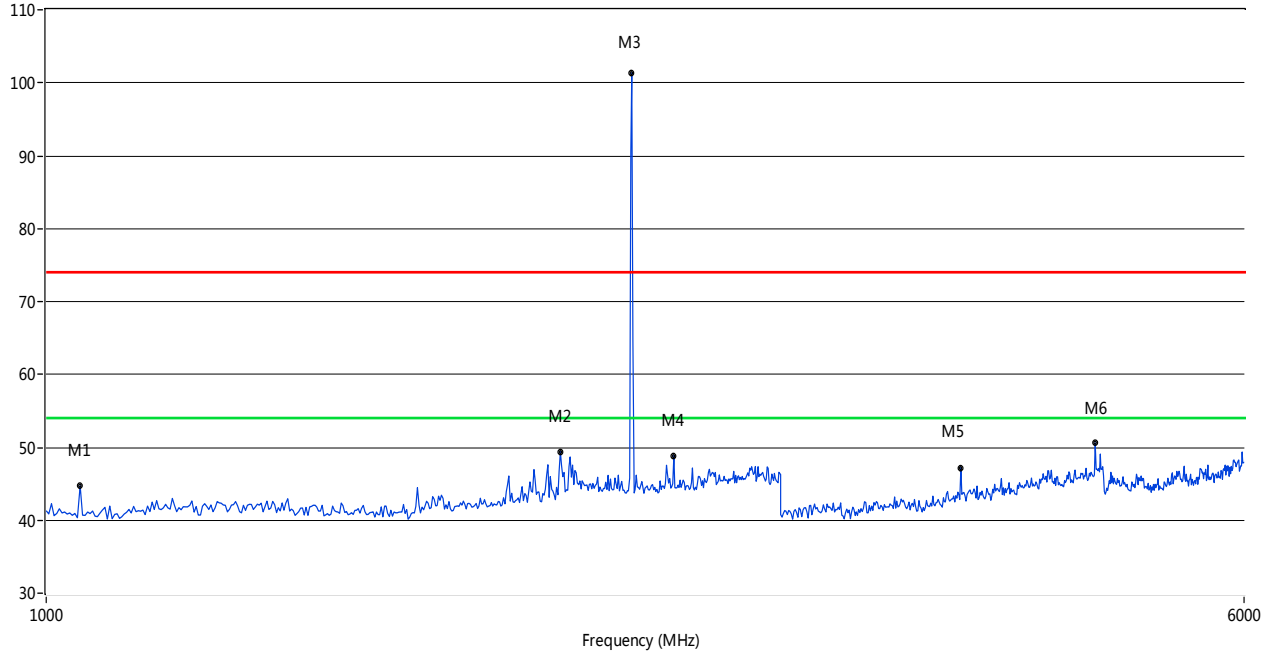
II/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7156.82	46.74	--	--	74.0	--	54.0	27.26	184	Horizontal	PASS
9717.55	49.14	--	--	74.0	--	54.0	24.86	112	Horizontal	PASS
12019.97	50.96	--	--	74.0	--	54.0	23.04	135	Horizontal	PASS
14216.31	48.43	--	--	74.0	--	54.0	25.57	311	Horizontal	PASS
16223.38	48.63	--	--	74.0	--	54.0	25.37	195	Horizontal	PASS
19219.63	50.40	--	--	74.0	--	54.0	23.60	47	Horizontal	PASS

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

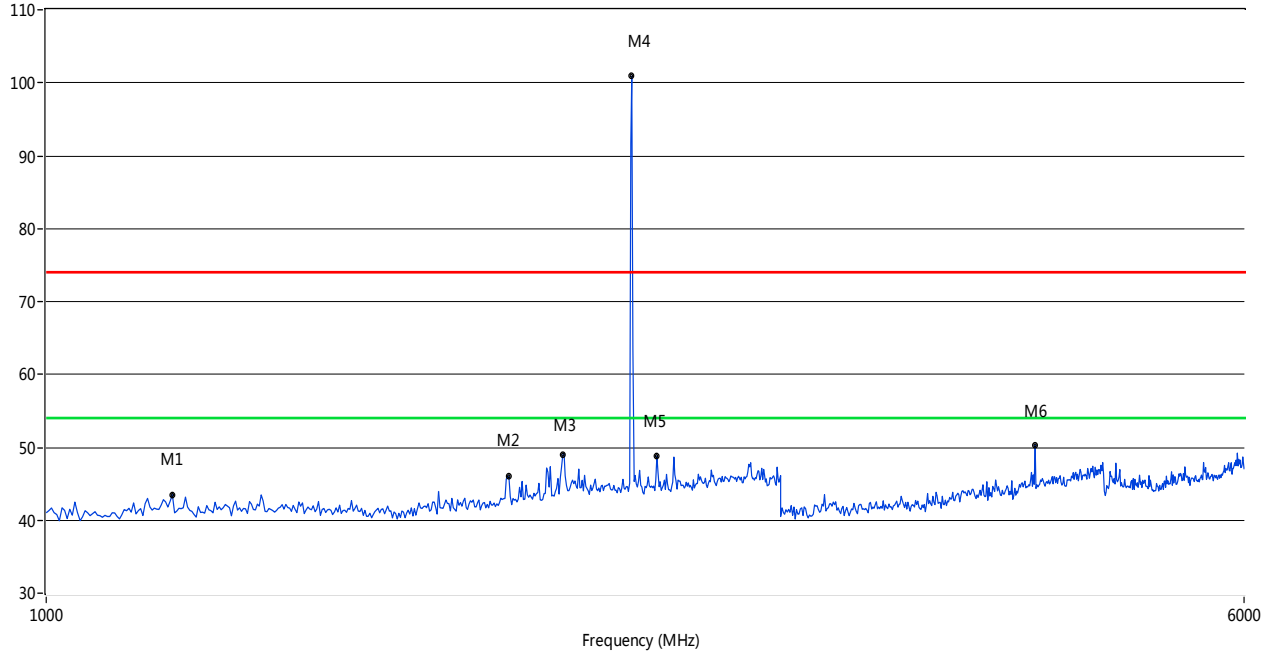
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1051.90	44.72	--	--	-4.76	74.0	--	54.0	9.28	239.50	100	Vertical	PASS
2157.68	49.42	--	--	-0.99	74.0	--	54.0	4.58	156.30	100	Vertical	PASS
2401.20	101.35	--	--	0.01	74.0	--	54.0	-47.35	289.10	100	Vertical	N/A
2556.89	48.85	--	--	0.43	74.0	--	54.0	5.15	305.40	100	Vertical	PASS
3928.14	47.21	--	--	10.01	74.0	--	54.0	6.79	242.40	100	Vertical	PASS
4802.40	50.60	--	--	12.37	74.0	--	54.0	3.40	260.30	100	Vertical	PASS

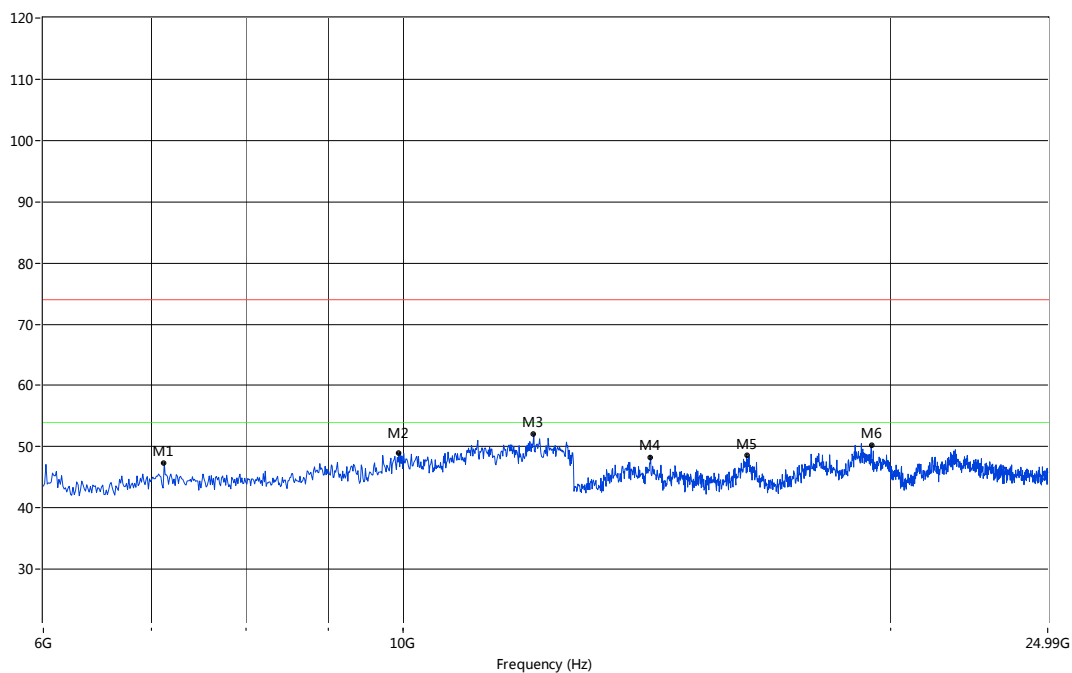
8-DPSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



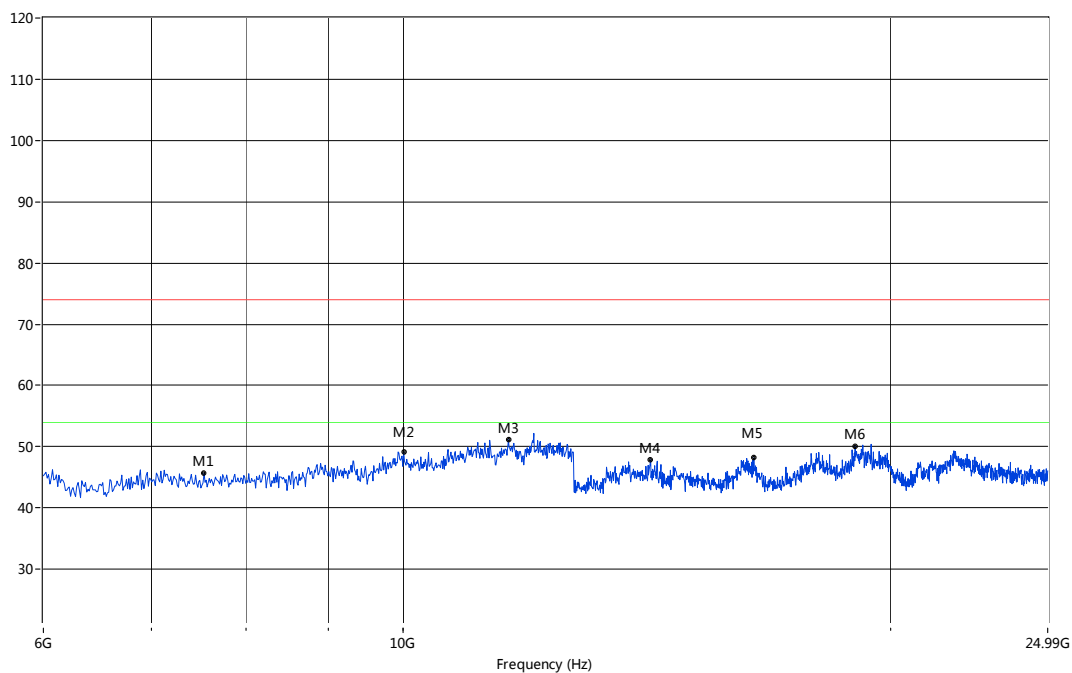
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1207.59	43.48	--	--	-3.68	74.0	--	54.0	10.52	16.60	100	Horizontal	PASS
1998.00	46.07	--	--	-2.19	74.0	--	54.0	7.93	154.50	100	Horizontal	PASS
2165.67	48.95	--	--	-0.53	74.0	--	54.0	5.05	160.80	100	Horizontal	PASS
2401.20	100.90	--	--	0.01	74.0	--	54.0	-46.90	143.70	100	Horizontal	N/A
2493.01	48.78	--	--	-0.00	74.0	--	54.0	5.22	27.30	100	Horizontal	PASS
4389.22	50.35	--	--	10.69	74.0	--	54.0	3.65	360.00	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	47.34	--	--	74.0	--	54.0	26.66	309	Vertical	PASS
9942.18	48.96	--	--	74.0	--	54.0	25.04	88	Vertical	PASS
12042.43	52.12	--	--	74.0	--	54.0	21.88	161	Vertical	PASS
14216.31	48.31	--	--	74.0	--	54.0	25.69	66	Vertical	PASS
16296.17	48.54	--	--	74.0	--	54.0	25.46	251	Vertical	PASS
19449.25	50.27	--	--	74.0	--	54.0	23.73	332	Vertical	PASS

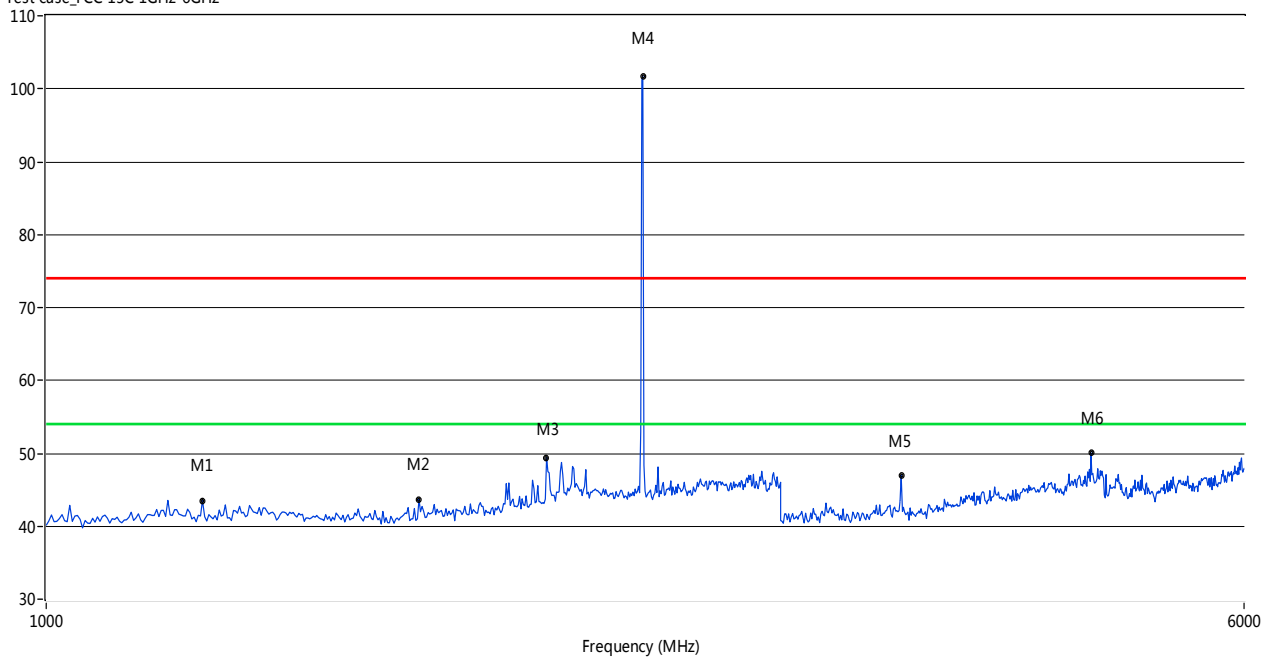
8-DPSK LOW CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7538.69	45.63	--	--	74.0	--	54.0	28.37	147	Horizontal	PASS
10009.57	49.15	--	--	74.0	--	54.0	24.85	60	Horizontal	PASS
11615.64	51.13	--	--	74.0	--	54.0	22.87	91	Horizontal	PASS
14216.31	47.85	--	--	74.0	--	54.0	26.15	197	Horizontal	PASS
16462.56	48.19	--	--	74.0	--	54.0	25.81	258	Horizontal	PASS
19009.98	50.04	--	--	74.0	--	54.0	23.96	287	Horizontal	PASS

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

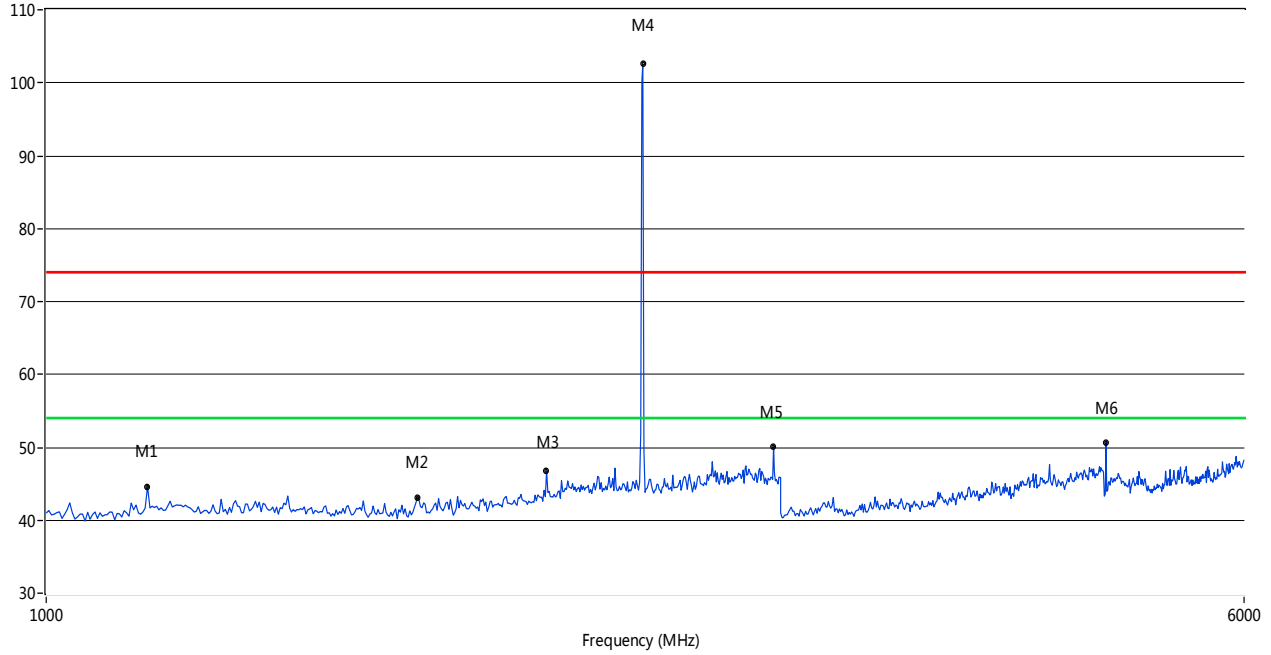
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1263.47	43.55	--	--	-3.71	74.0	--	54.0	10.45	155.40	100	Vertical	PASS
1746.51	43.71	--	--	-3.37	74.0	--	54.0	10.29	38.60	100	Vertical	PASS
2113.77	49.44	--	--	-1.04	74.0	--	54.0	4.56	160.90	100	Vertical	PASS
2441.12	101.68	--	--	-0.03	74.0	--	54.0	-47.68	144.30	100	Vertical	N/A
3592.81	46.94	--	--	8.82	74.0	--	54.0	7.06	152.30	100	Vertical	PASS
4772.45	50.05	--	--	12.36	74.0	--	54.0	3.95	224.10	100	Vertical	PASS

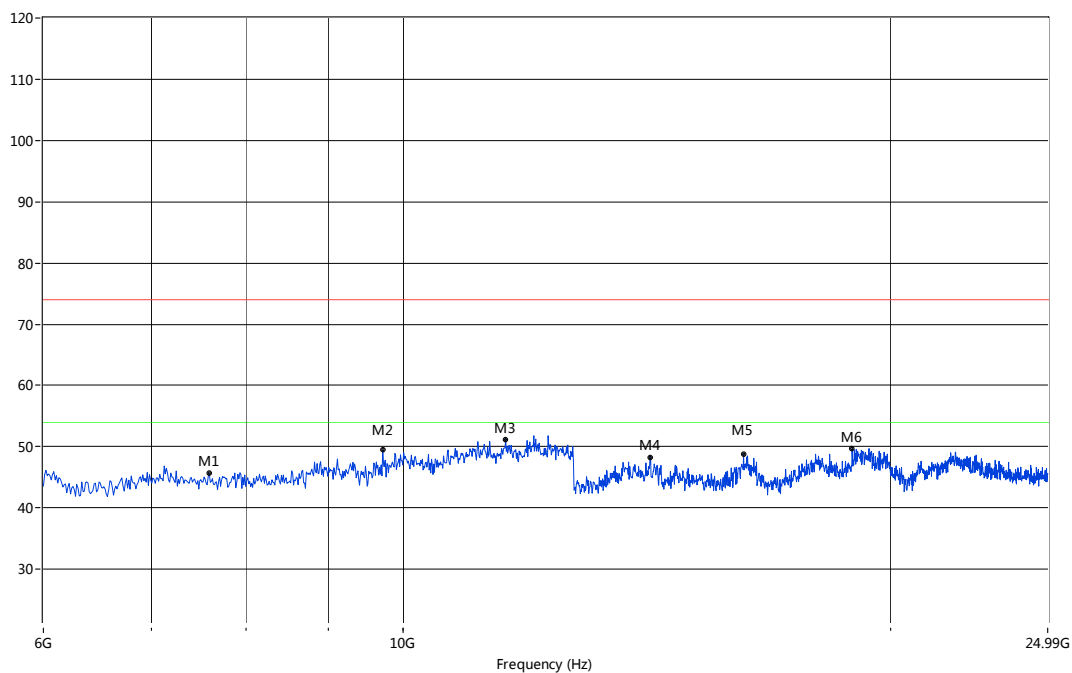
8-DPSK MID CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



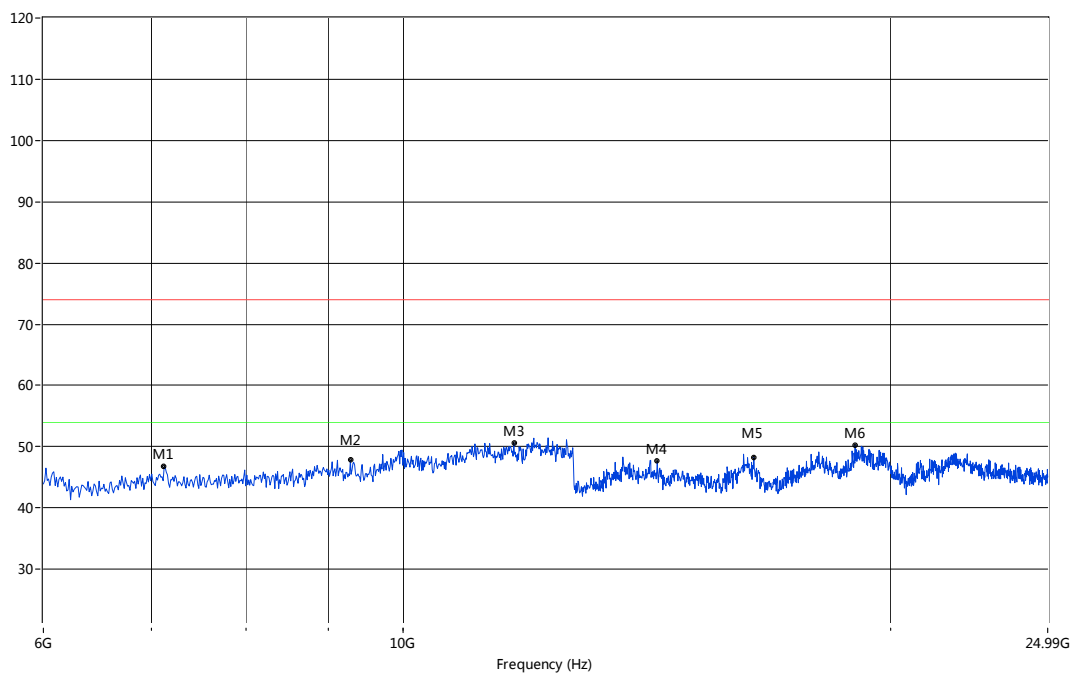
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1163.67	44.62	--	--	-4.19	74.0	--	54.0	9.38	98.70	100	Horizontal	PASS
1742.52	43.16	--	--	-3.45	74.0	--	54.0	10.84	54.10	100	Horizontal	PASS
2113.77	46.73	--	--	-1.04	74.0	--	54.0	7.27	87.50	100	Horizontal	PASS
2441.12	102.59	--	--	-0.03	74.0	--	54.0	-48.59	350.60	100	Horizontal	N/A
2968.06	50.13	--	--	2.79	74.0	--	54.0	3.87	290.80	100	Horizontal	PASS
4880.24	50.68	--	--	12.33	74.0	--	54.0	3.32	159.40	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7594.84	45.63	--	--	74.0	--	54.0	28.37	143	Vertical	PASS
9717.55	49.47	--	--	74.0	--	54.0	24.53	91	Vertical	PASS
11570.72	51.18	--	--	74.0	--	54.0	22.82	199	Vertical	PASS
14205.91	48.29	--	--	74.0	--	54.0	25.71	326	Vertical	PASS
16223.38	48.82	--	--	74.0	--	54.0	25.18	62	Vertical	PASS
18927.21	49.68	--	--	74.0	--	54.0	24.32	52	Vertical	PASS

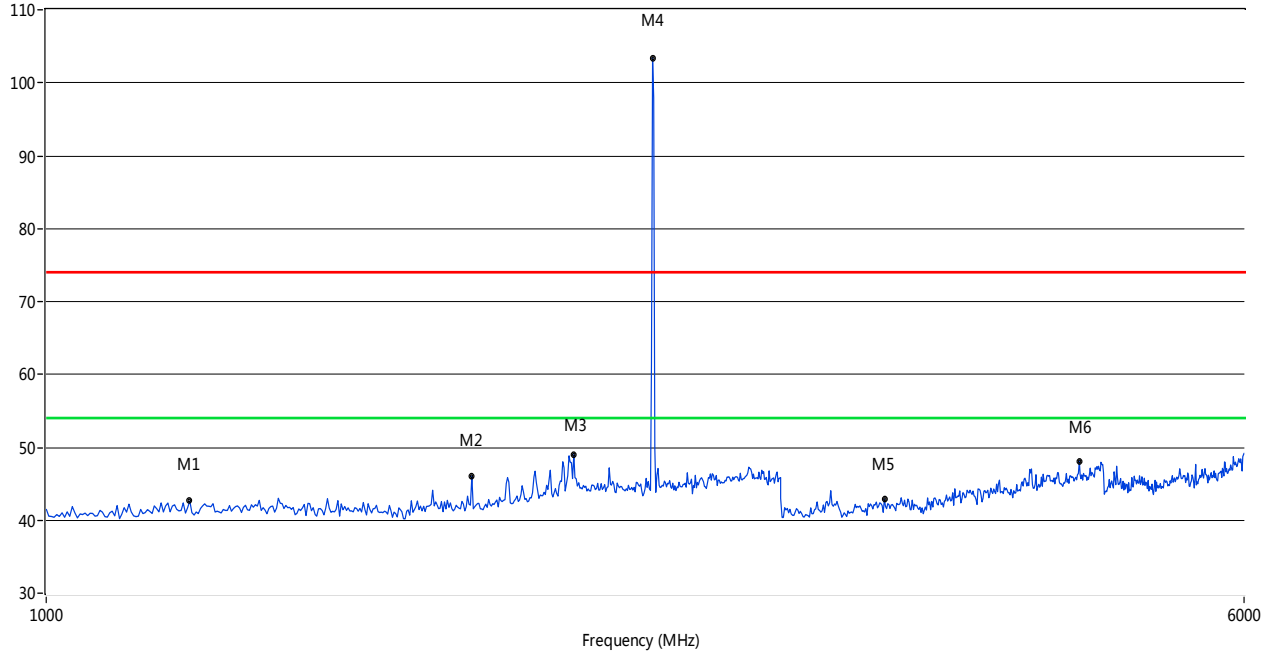
8-DPSK MID CHANNEL 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	46.75	--	--	74.0	--	54.0	27.25	220	Horizontal	PASS
9279.53	47.80	--	--	74.0	--	54.0	26.20	349	Horizontal	PASS
11705.49	50.62	--	--	74.0	--	54.0	23.38	314	Horizontal	PASS
14351.50	47.66	--	--	74.0	--	54.0	26.34	79	Horizontal	PASS
16462.56	48.24	--	--	74.0	--	54.0	25.76	276	Horizontal	PASS
19009.98	50.30	--	--	74.0	--	54.0	23.70	301	Horizontal	PASS

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

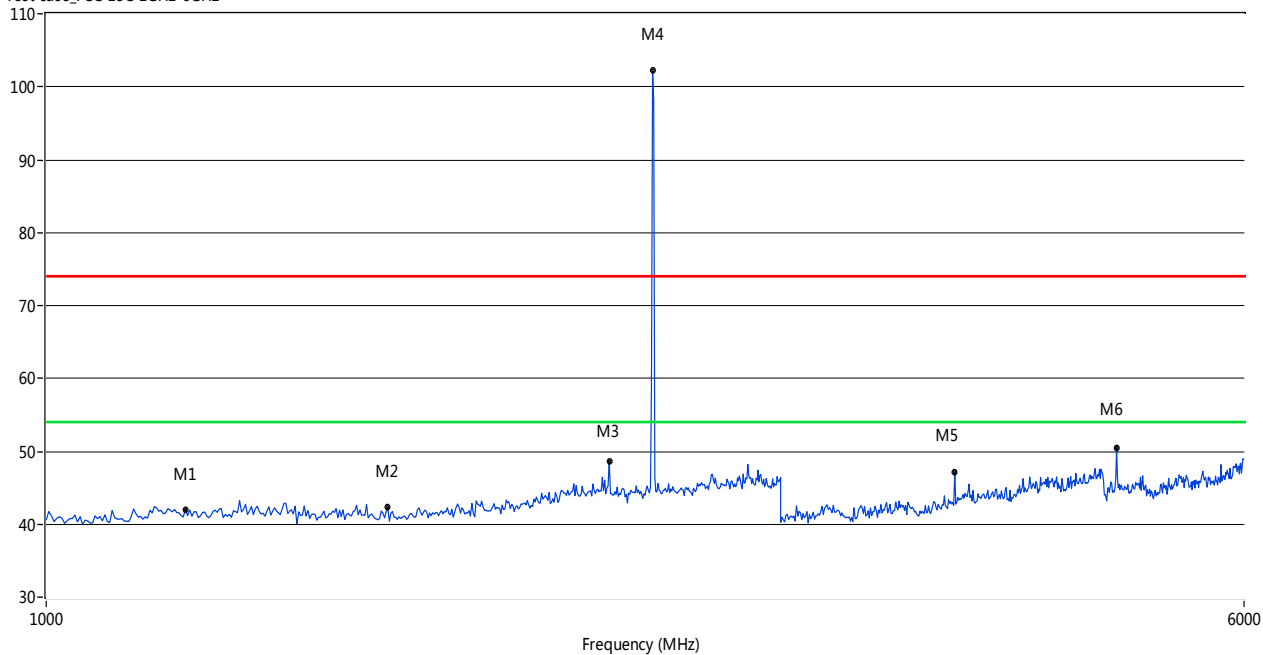
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1239.52	42.65	--	--	-3.82	74.0	--	54.0	11.35	2.50	100	Vertical	PASS
1890.22	46.01	--	--	-2.64	74.0	--	54.0	7.99	1.50	100	Vertical	PASS
2201.60	48.98	--	--	-0.27	74.0	--	54.0	5.02	159.50	100	Vertical	PASS
2477.05	103.42	--	--	-0.14	74.0	--	54.0	-49.42	148.70	100	Vertical	N/A
3502.99	42.90	--	--	8.93	74.0	--	54.0	11.10	5.40	100	Vertical	PASS
4688.62	48.08	--	--	11.70	74.0	--	54.0	5.92	88.00	100	Vertical	PASS

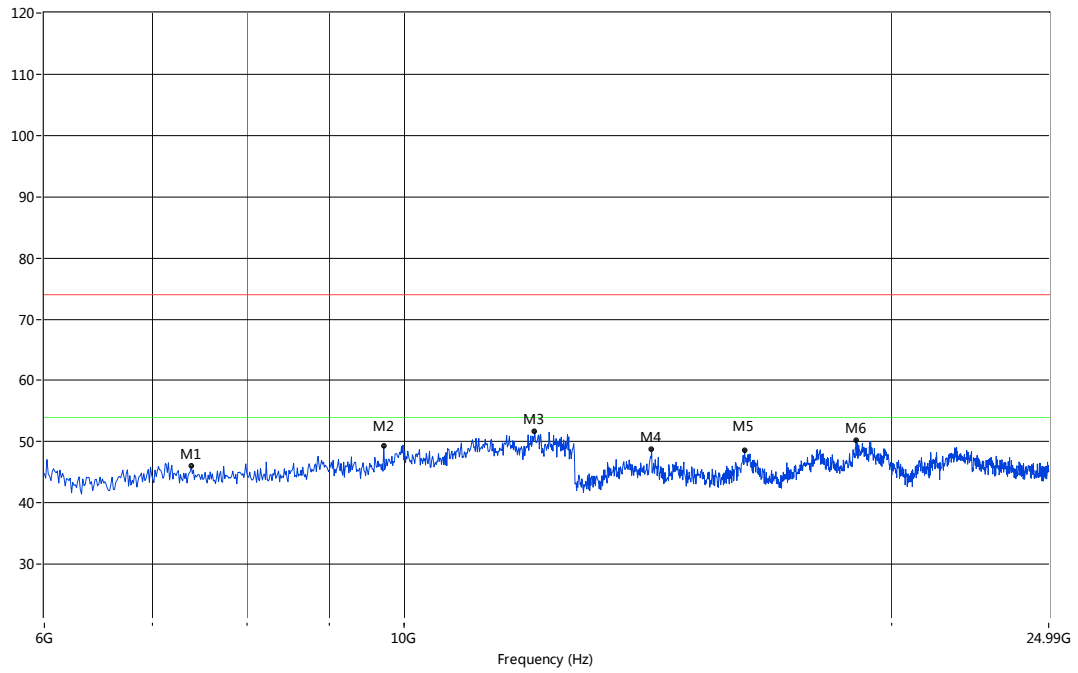
8-DPSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



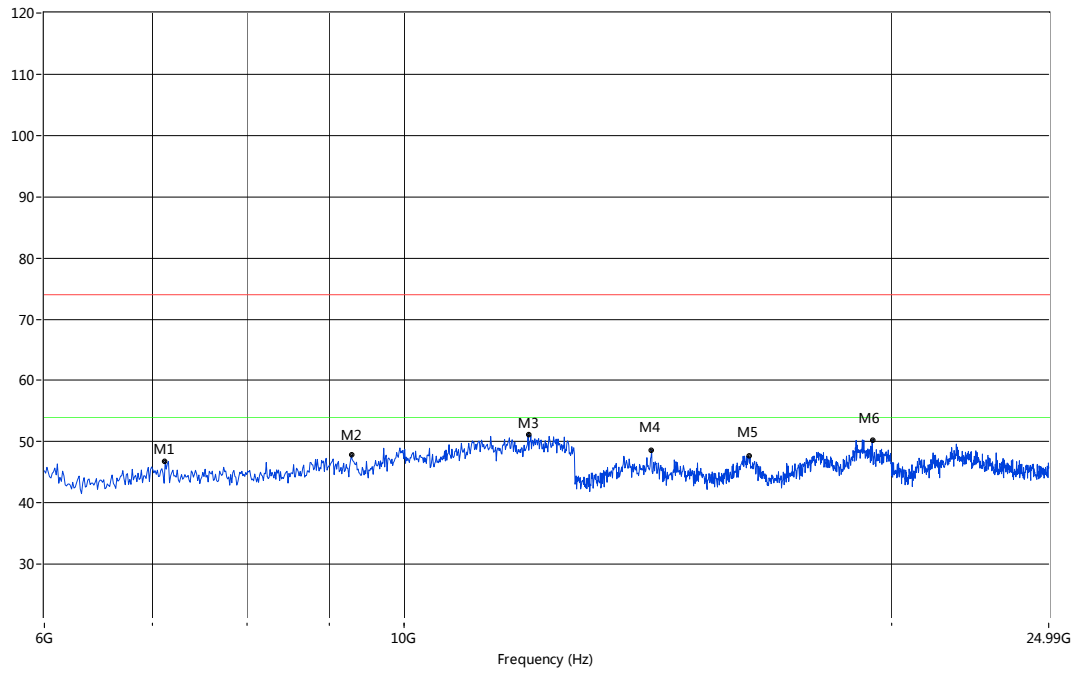
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1231.54	42.03	--	--	-3.84	74.0	--	54.0	11.97	99.40	100	Horizontal	PASS
1666.67	42.31	--	--	-3.85	74.0	--	54.0	11.69	51.10	100	Horizontal	PASS
2321.36	48.68	--	--	0.12	74.0	--	54.0	5.32	3.50	100	Horizontal	PASS
2477.05	102.20	--	--	-0.14	74.0	--	54.0	-48.20	1.20	100	Horizontal	N/A
3892.22	47.10	--	--	9.89	74.0	--	54.0	6.90	52.30	100	Horizontal	PASS
4958.08	50.52	--	--	12.66	74.0	--	54.0	3.48	149.80	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7392.68	45.96	--	--	74.0	--	54.0	28.04	211	Vertical	PASS
9717.55	49.31	--	--	74.0	--	54.0	24.69	179	Vertical	PASS
12042.43	51.64	--	--	74.0	--	54.0	22.36	230	Vertical	PASS
14216.31	48.69	--	--	74.0	--	54.0	25.31	94	Vertical	PASS
16223.38	48.60	--	--	74.0	--	54.0	25.40	172	Vertical	PASS
19009.98	50.29	--	--	74.0	--	54.0	23.71	150	Vertical	PASS

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

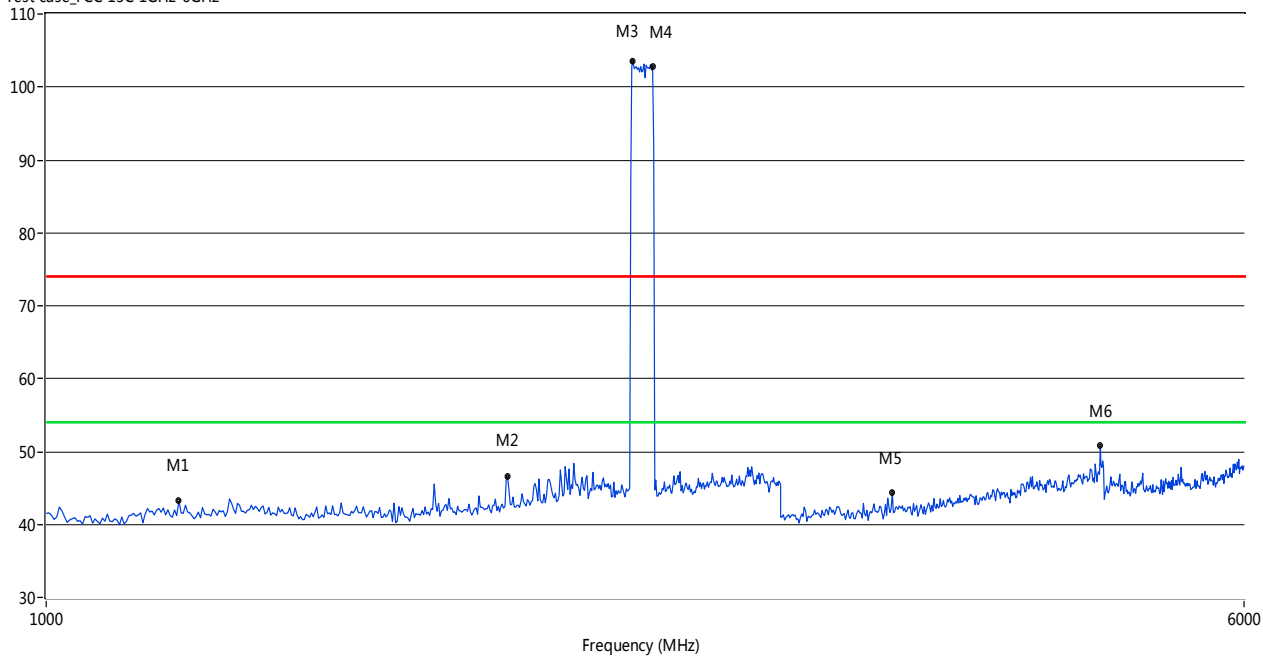


Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	46.83	--	--	74.0	--	54.0	27.17	355	Horizontal	PASS
9279.53	47.79	--	--	74.0	--	54.0	26.21	98	Horizontal	PASS
11930.12	51.23	--	--	74.0	--	54.0	22.77	91	Horizontal	PASS
14216.31	48.56	--	--	74.0	--	54.0	25.44	204	Horizontal	PASS
16316.97	47.64	--	--	74.0	--	54.0	26.36	50	Horizontal	PASS
19449.25	50.27	--	--	74.0	--	54.0	23.73	333	Horizontal	PASS

Hopping Mode:

GFSK MODE 1GHz to 6GHz, ANT V

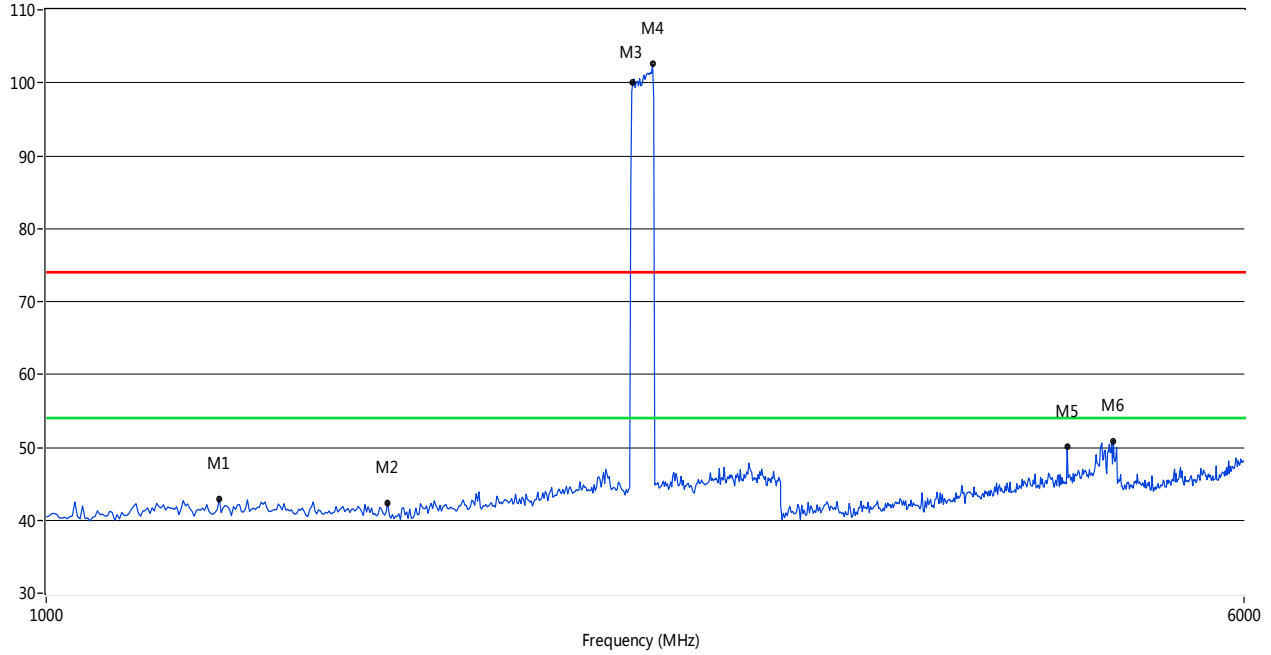
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1219.56	43.19	--	--	-3.87	74.0	--	54.0	10.81	359.20	100	Vertical	PASS
1994.01	46.53	--	--	-2.12	74.0	--	54.0	7.47	156.00	100	Vertical	PASS
2405.19	103.63	--	--	-0.02	74.0	--	54.0	-49.63	150.80	100	Vertical	N/A
2477.05	102.90	--	--	-0.14	74.0	--	54.0	-48.90	144.80	100	Vertical	N/A
3544.91	44.32	--	--	8.55	74.0	--	54.0	9.68	309.60	100	Vertical	PASS
4838.32	50.89	--	--	13.06	74.0	--	54.0	3.11	153.80	100	Vertical	PASS

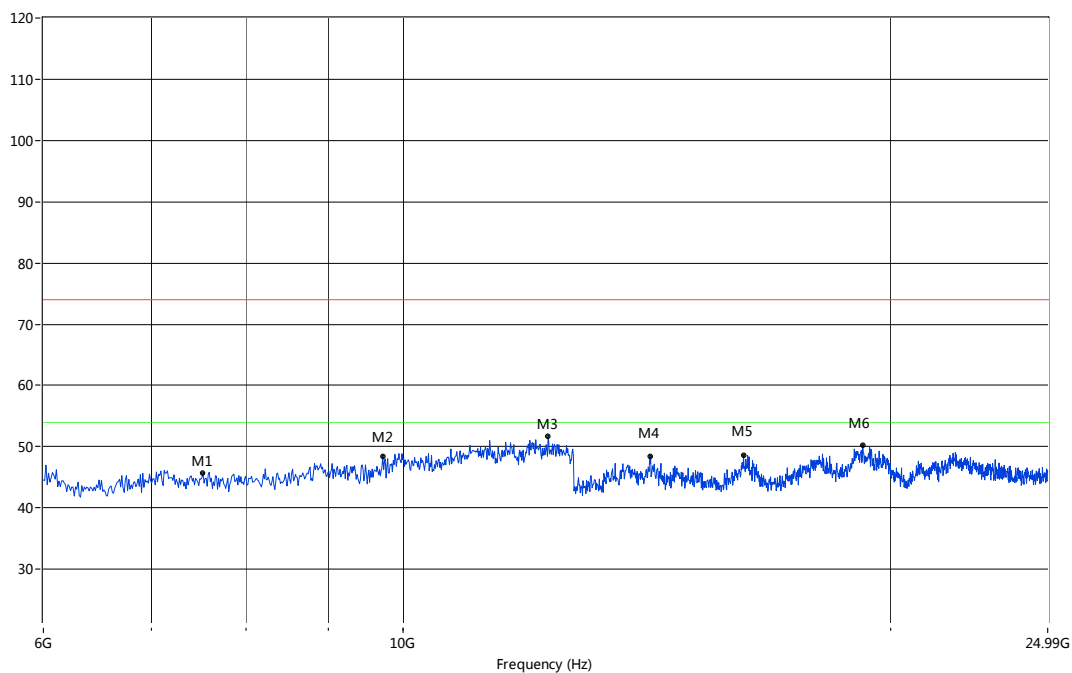
GFSK MODE 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



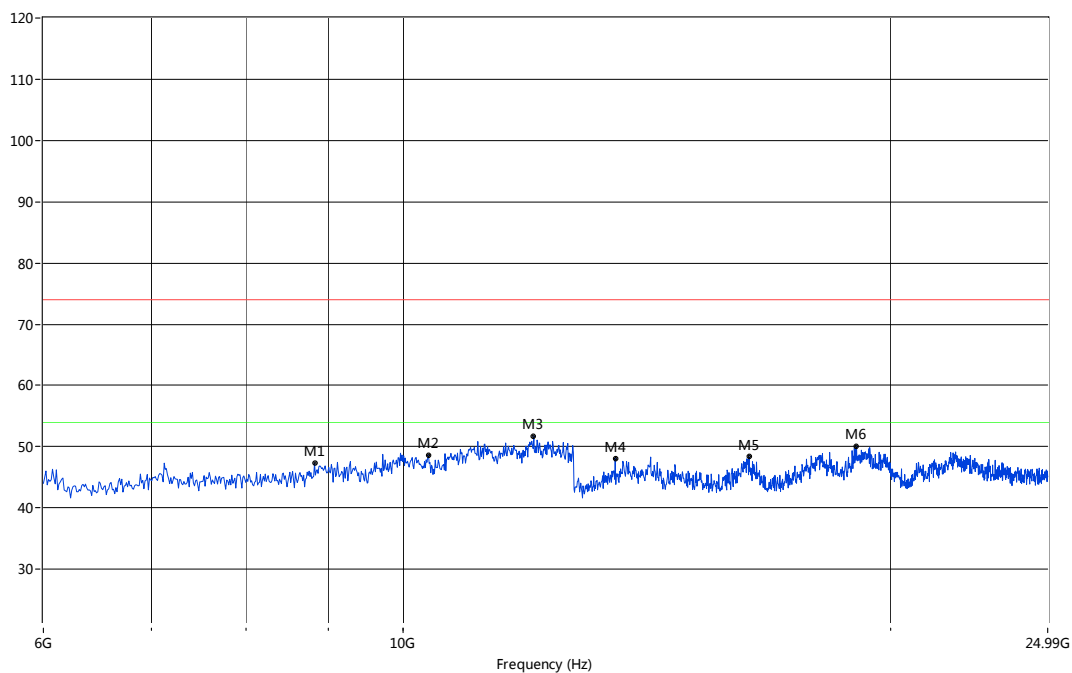
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1295.41	42.92	--	--	-3.79	74.0	--	54.0	11.08	162.70	100	Horizontal	PASS
1666.67	42.35	--	--	-3.85	74.0	--	54.0	11.65	27.00	100	Horizontal	PASS
2405.19	100.05	--	--	-0.02	74.0	--	54.0	-46.05	336.50	100	Horizontal	N/A
2477.05	102.54	--	--	-0.14	74.0	--	54.0	-48.54	359.80	100	Horizontal	N/A
4604.79	50.06	--	--	11.51	74.0	--	54.0	3.94	190.80	100	Horizontal	PASS
4934.13	50.83	--	--	12.50	74.0	--	54.0	3.17	159.30	100	Horizontal	PASS

GFSK MODE 6GHz to 25GHz, ANT V



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7527.45	45.59	--	--	74.0	--	54.0	28.41	74	Vertical	PASS
9717.55	48.42	--	--	74.0	--	54.0	25.58	152	Vertical	PASS
12289.52	51.61	--	--	74.0	--	54.0	22.39	226	Vertical	PASS
14216.31	48.49	--	--	74.0	--	54.0	25.51	57	Vertical	PASS
16223.38	48.58	--	--	74.0	--	54.0	25.42	59	Vertical	PASS
19219.63	50.22	--	--	74.0	--	54.0	23.78	50	Vertical	PASS

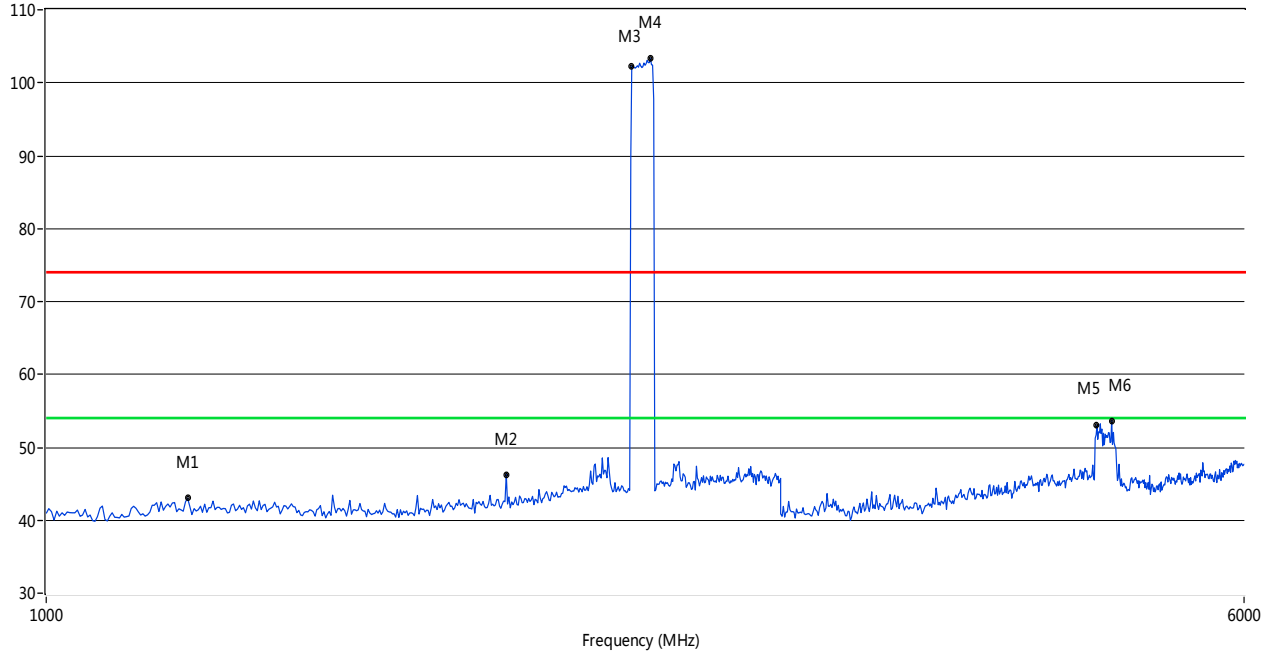
GFSK MODE 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
8819.05	47.24	--	--	74.0	--	54.0	26.76	349	Horizontal	PASS
10368.97	48.58	--	--	74.0	--	54.0	25.42	319	Horizontal	PASS
12042.43	51.73	--	--	74.0	--	54.0	22.27	103	Horizontal	PASS
13519.55	48.10	--	--	74.0	--	54.0	25.90	100	Horizontal	PASS
16348.17	48.39	--	--	74.0	--	54.0	25.61	78	Horizontal	PASS
19049.92	49.99	--	--	74.0	--	54.0	24.01	347	Horizontal	PASS

Π/4-DQPSK MODE 1GHz to 6GHz, ANT V

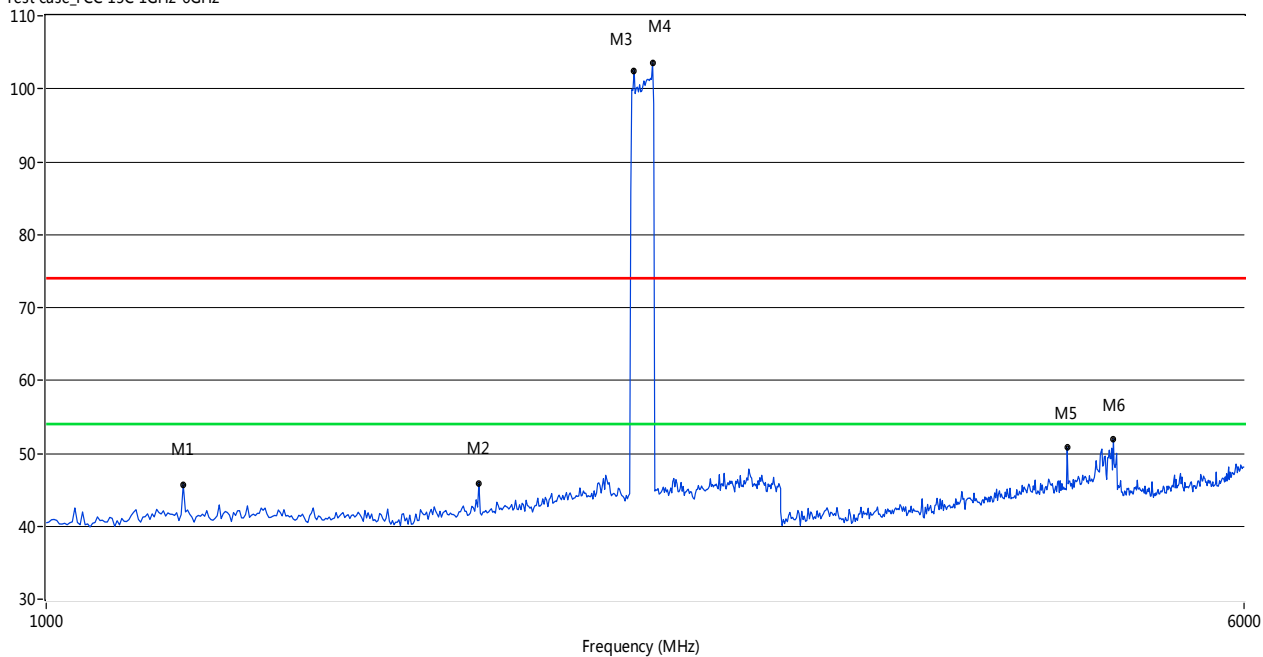
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1235.53	43.04	--	--	-3.81	74.0	--	54.0	10.96	194.90	100	Vertical	PASS
1990.02	46.30	--	--	-2.03	74.0	--	54.0	7.70	62.20	100	Vertical	PASS
2401.20	102.32	--	--	0.01	74.0	--	54.0	-48.32	358.50	100	Vertical	N/A
2469.06	103.31	--	--	0.35	74.0	--	54.0	-49.31	-0.60	100	Vertical	N/A
4814.37	53.01	--	--	12.45	74.0	--	54.0	0.99	152.20	100	Vertical	PASS
4922.16	53.67	--	41.85	12.88	74.0	--	54.0	12.15	148.10	100	Vertical	PASS

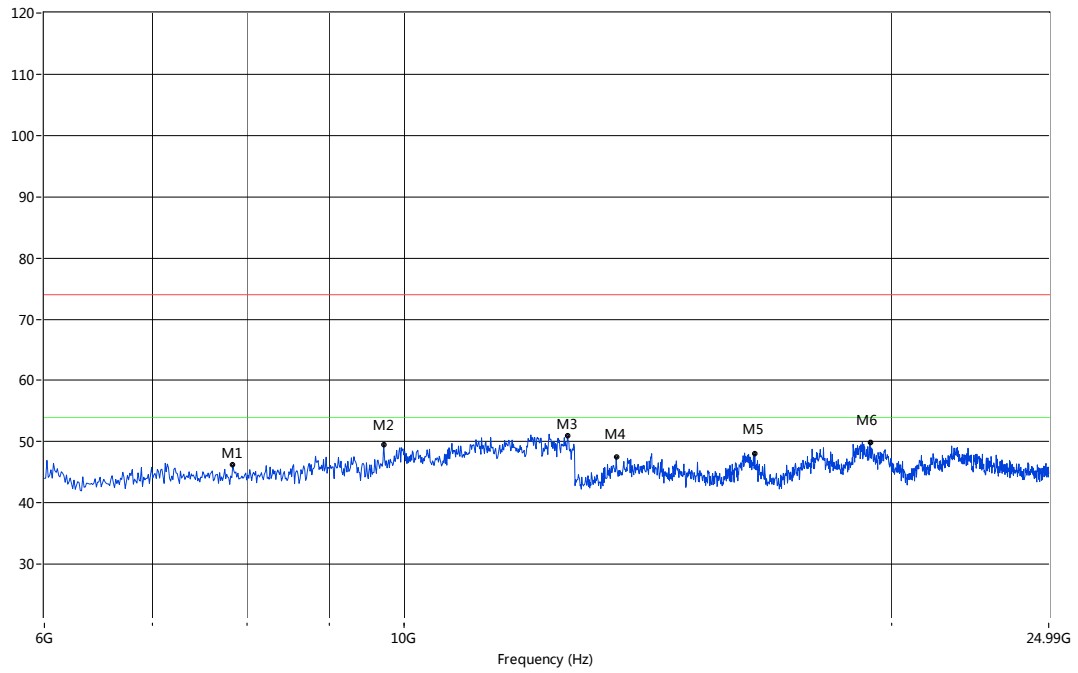
Π/4-DQPSK MODE 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



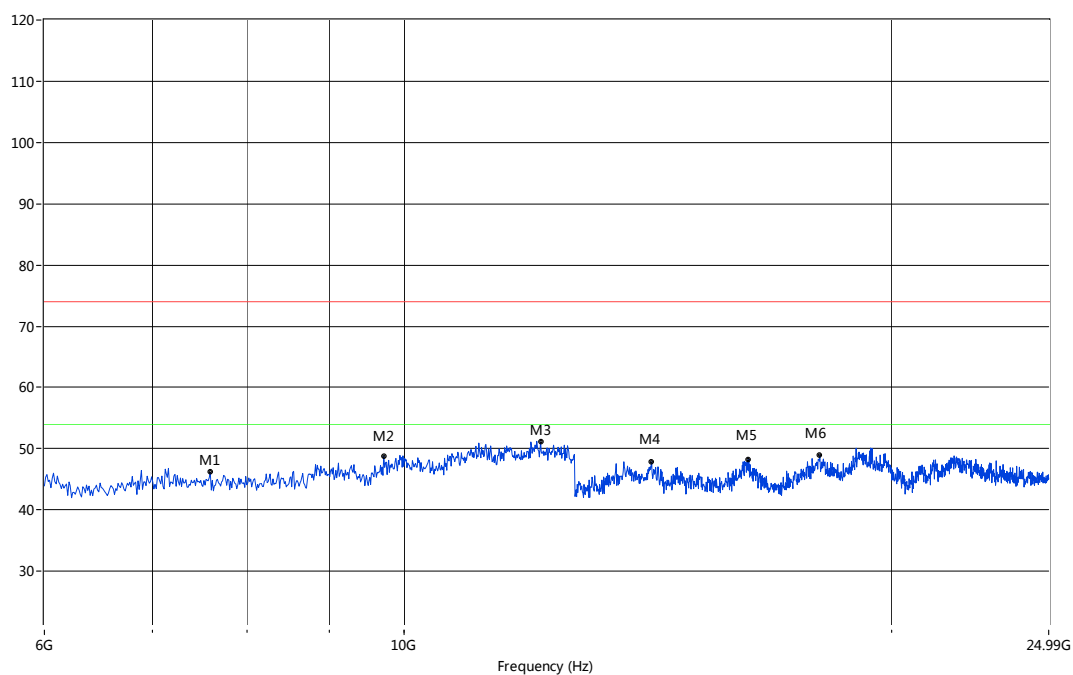
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1227.55	45.69	--	--	-3.84	74.0	--	54.0	8.31	124.10	100	Horizontal	PASS
1910.18	45.89	--	--	-2.43	74.0	--	54.0	8.11	91.90	100	Horizontal	PASS
2409.18	102.52	--	--	0.01	74.0	--	54.0	-48.52	342.00	100	Horizontal	N/A
2477.05	103.54	--	--	-0.14	74.0	--	54.0	-49.54	359.80	100	Horizontal	N/A
4604.79	50.76	--	--	11.51	74.0	--	54.0	3.24	190.80	100	Horizontal	PASS
4934.13	51.95	--	--	12.50	74.0	--	54.0	2.05	159.30	100	Horizontal	PASS

Π/4-DQPSK MODE 6GHz to 25GHz, ANT V



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7841.93	46.18	--	--	74.0	--	54.0	27.82	261	Vertical	PASS
9717.55	49.56	--	--	74.0	--	54.0	24.44	98	Vertical	PASS
12615.23	50.94	--	--	74.0	--	54.0	23.06	209	Vertical	PASS
13519.55	47.44	--	--	74.0	--	54.0	26.56	76	Vertical	PASS
16462.56	48.04	--	--	74.0	--	54.0	25.96	124	Vertical	PASS
19389.35	49.90	--	--	74.0	--	54.0	24.10	141	Vertical	PASS

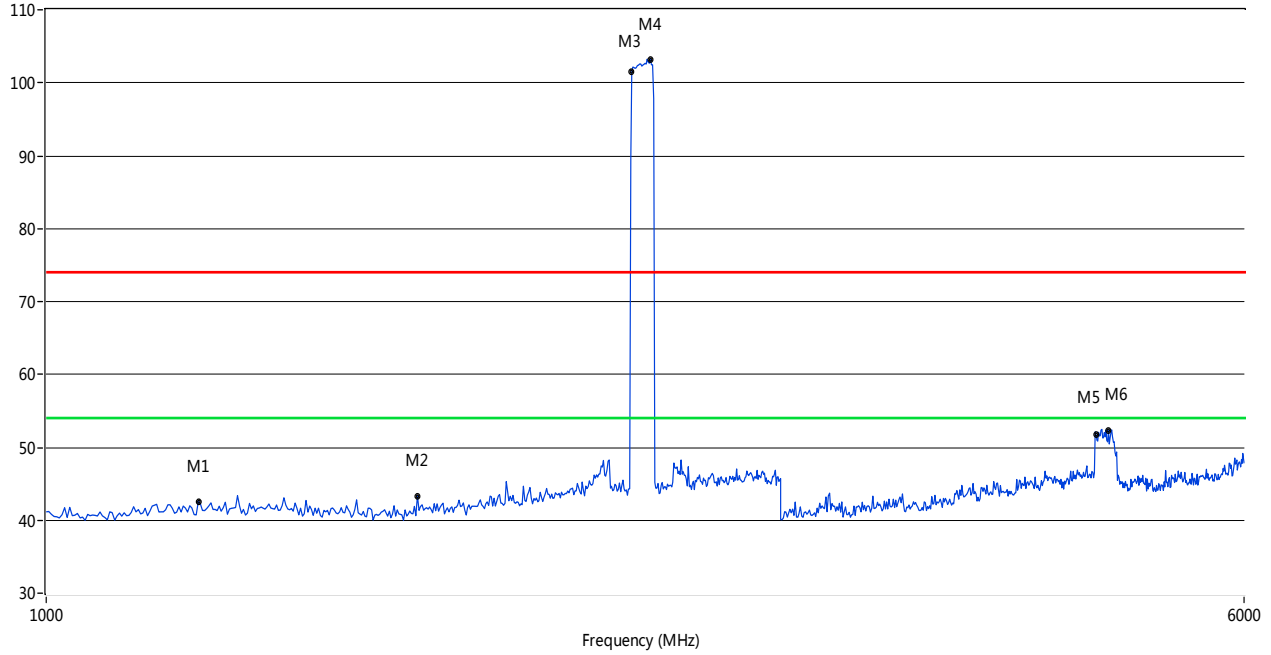
Π/4-DQPSK MODE 6GHz to 25GHz, ANT H



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7594.84	46.14	--	--	74.0	--	54.0	27.86	62	Horizontal	PASS
9717.55	48.78	--	--	74.0	--	54.0	25.22	26	Horizontal	PASS
12143.51	51.08	--	--	74.0	--	54.0	22.92	161	Horizontal	PASS
14216.31	47.84	--	--	74.0	--	54.0	26.16	190	Horizontal	PASS
16296.17	48.15	--	--	74.0	--	54.0	25.85	6	Horizontal	PASS
18053.66	48.99	--	--	74.0	--	54.0	25.01	111	Horizontal	PASS

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

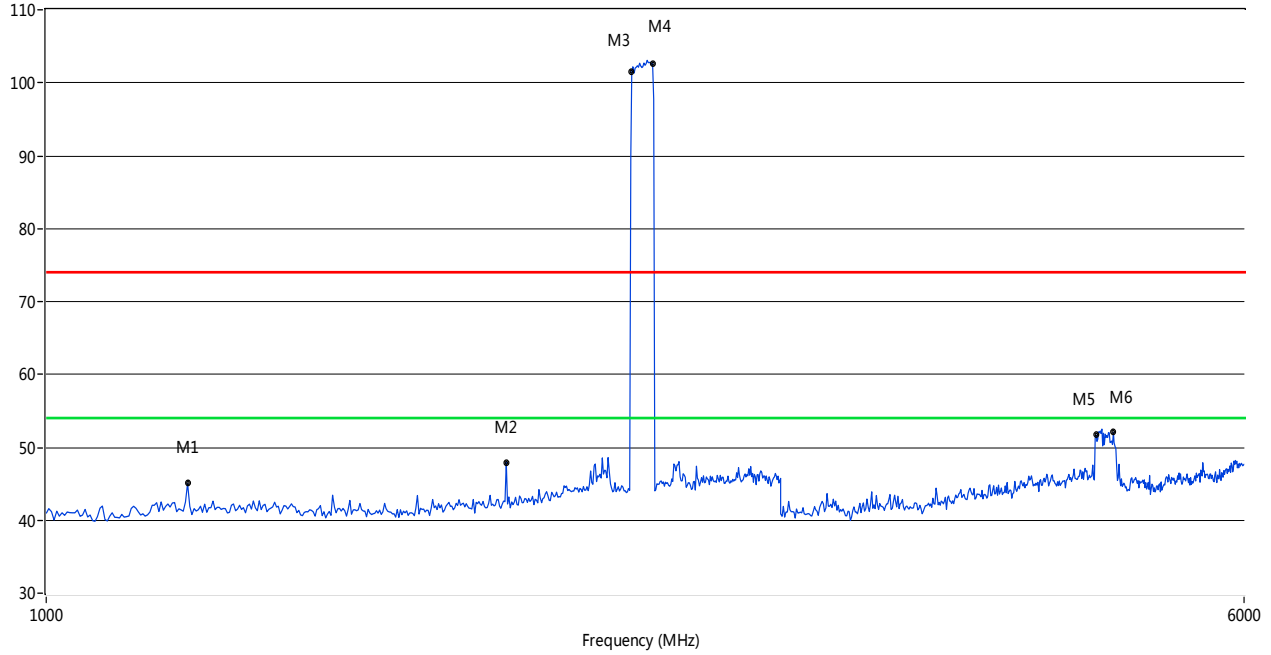
RE Test case_FCC 15C 1GHz-6GHz



Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1255.49	42.55	--	--	-3.92	74.0	--	54.0	11.45	106.00	100	Vertical	PASS
1742.52	43.35	--	--	-3.45	74.0	--	54.0	10.65	57.10	100	Vertical	PASS
2401.20	101.57	--	--	0.01	74.0	--	54.0	-47.57	342.10	100	Vertical	N/A
2469.06	103.24	--	--	0.35	74.0	--	54.0	-49.24	360.00	100	Vertical	N/A
4808.38	51.66	--	--	12.36	74.0	--	54.0	2.34	182.80	100	Vertical	PASS
4898.20	52.30	--	40.50	12.52	74.0	--	54.0	13.50	152.80	100	Vertical	PASS

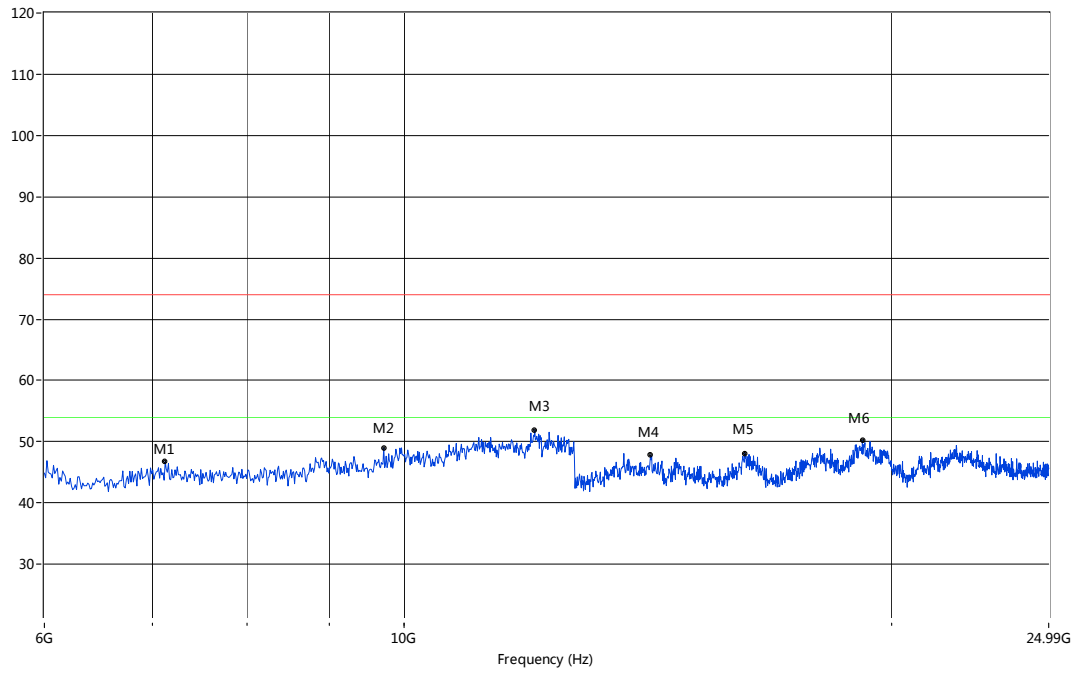
8-DPSK MODE 1GHz to 6GHz, ANT H

RE Test case_FCC 15C 1GHz-6GHz



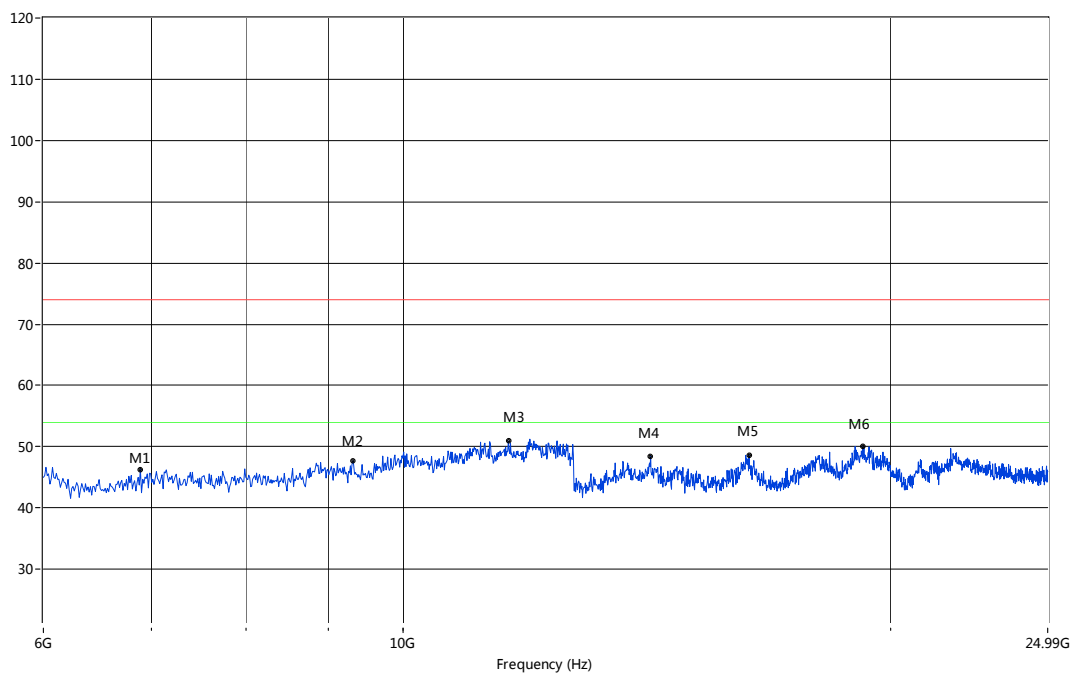
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1235.53	45.04	--	--	-3.81	74.0	--	54.0	8.96	194.90	100	Horizontal	PASS
1990.02	47.95	--	--	-2.03	74.0	--	54.0	6.05	62.20	100	Horizontal	PASS
2401.20	101.57	--	--	0.01	74.0	--	54.0	-47.57	358.50	100	Horizontal	N/A
2477.05	102.63	--	--	-0.14	74.0	--	54.0	-48.63	359.80	100	Horizontal	N/A
4808.38	51.71	--	--	12.36	74.0	--	54.0	2.29	169.20	100	Horizontal	PASS
4934.13	52.03	--	44.06	12.50	74.0	--	54.0	9.94	220.70	100	Horizontal	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
7123.13	46.81	--	--	74.0	--	54.0	27.19	150	Vertical	PASS
9717.55	48.98	--	--	74.0	--	54.0	25.02	268	Vertical	PASS
12042.43	51.96	--	--	74.0	--	54.0	22.04	13	Vertical	PASS
14195.51	47.84	--	--	74.0	--	54.0	26.16	320	Vertical	PASS
16223.38	48.10	--	--	74.0	--	54.0	25.90	266	Vertical	PASS
19179.70	50.19	--	--	74.0	--	54.0	23.81	152	Vertical	PASS

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



Fre.(MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Polarization	Verdict
6887.27	46.31	--	--	74.0	--	54.0	27.69	232	Horizontal	PASS
9313.23	47.71	--	--	74.0	--	54.0	26.29	263	Horizontal	PASS
11615.64	50.94	--	--	74.0	--	54.0	23.06	294	Horizontal	PASS
14216.31	48.40	--	--	74.0	--	54.0	25.60	13	Horizontal	PASS
16348.17	48.68	--	--	74.0	--	54.0	25.32	127	Horizontal	PASS
19219.63	49.98	--	--	74.0	--	54.0	24.02	191	Horizontal	PASS

A.9 Band Edge

Test Data

Note 1: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

Note 2: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have show the worst case.

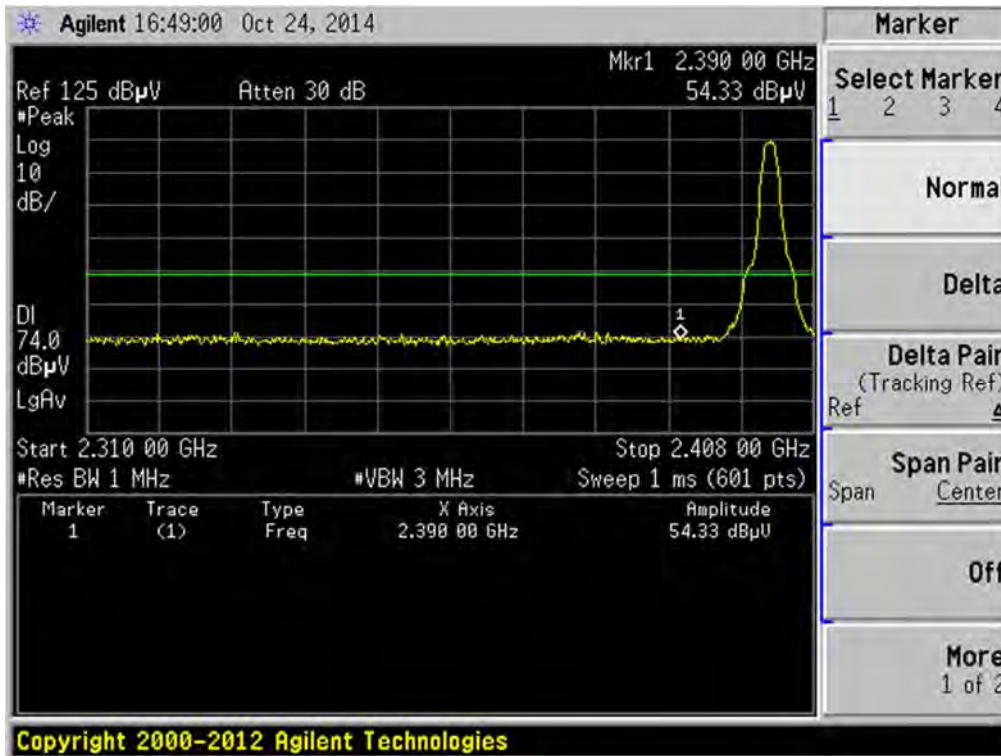
Note 3: The average levels were calculated from the peak level corrected with duty cycle correction factor (21.21dB) derived from $20\log(\text{dwell time}/100\text{ms})$.

For example: Average level = 50.8dBuV/m – 21.21 (dB) = 37.59dBuV/m.

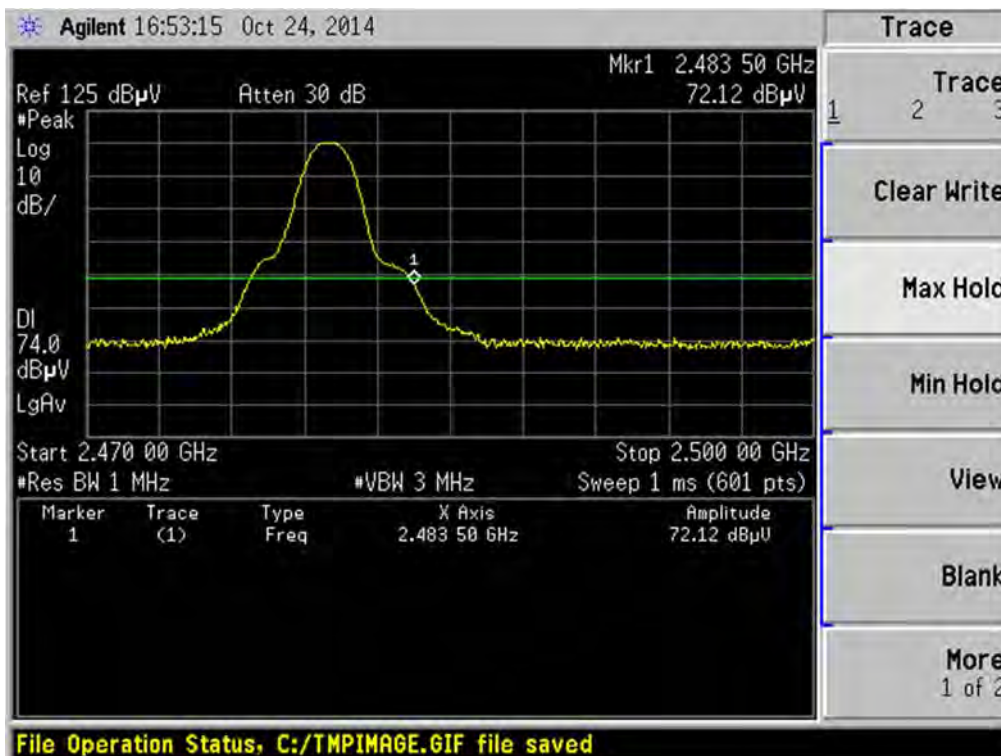
Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	54.33	74	19.67	PEAK	PASS
		2390.00	33.06	54	20.88	AVERAGE	PASS
GFSK	HIGH	2483.50	72.12	74	1.88	PEAK	PASS
		2483.50	50.85	54	3.09	AVERAGE	PASS
$\pi/4$ QPSK	Low	2390.00	53.72	74	20.28	PEAK	PASS
		2390.00	32.45	54	21.49	AVERAGE	PASS
$\pi/4$ QPSK	HIGH	2483.50	67.54	74	6.46	PEAK	PASS
		2483.50	46.27	54	7.67	AVERAGE	PASS
8-DPSK	Low	2390.00	53.20	74	20.80	PEAK	PASS
		2390.00	31.93	54	22.01	AVERAGE	PASS
8-DPSK	HIGH	2483.50	68.81	74	5.19	PEAK	PASS
		2483.50	47.54	54	6.40	AVERAGE	PASS
GFSK(Hopping)	Low	2390.00	53.17	74	20.83	PEAK	PASS
		2390.00	31.90	54	22.04	AVERAGE	PASS
GFSK(Hopping)	HIGH	2483.50	71.43	74	2.57	PEAK	PASS
		2483.50	50.16	54	3.78	AVERAGE	PASS
$\pi/4$ QPSK (Hopping)	Low	2390.00	53.94	74	20.06	PEAK	PASS
		2390.00	32.67	54	21.27	AVERAGE	PASS
$\pi/4$ QPSK (Hopping)	HIGH	2483.50	65.52	74	8.48	PEAK	PASS
		2483.50	44.25	54	9.69	AVERAGE	PASS
8-DPSK (Hopping)	Low	2390.00	53.56	74	20.44	PEAK	PASS
		2390.00	32.29	54	21.65	AVERAGE	PASS
8-DPSK (Hopping)	HIGH	2483.50	65.22	74	8.78	PEAK	PASS
		2483.50	43.95	54	9.99	AVERAGE	PASS

Test Plots

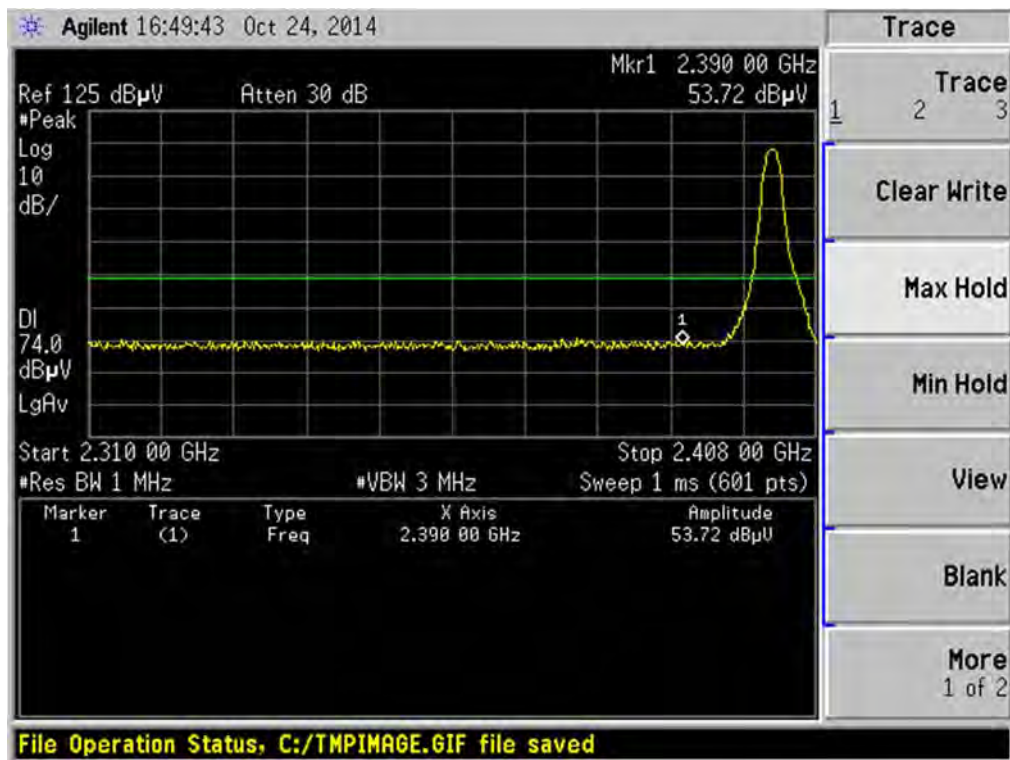
GFSK LOW CHANNEL , PEAK



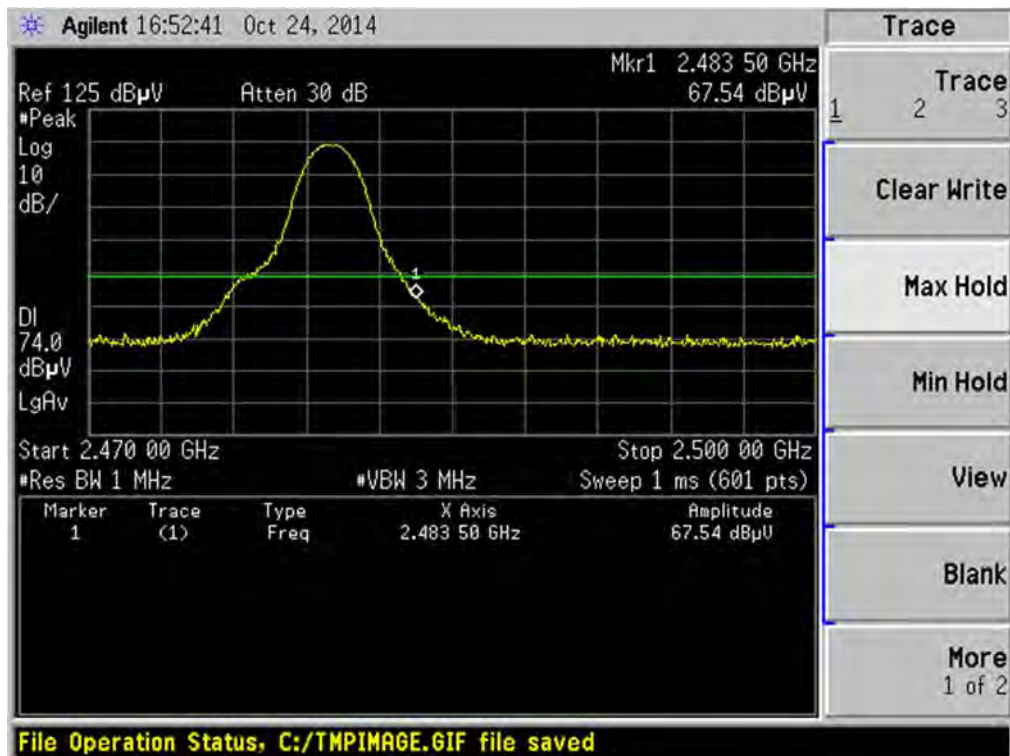
GFSK HIGH CHANNEL , PEAK



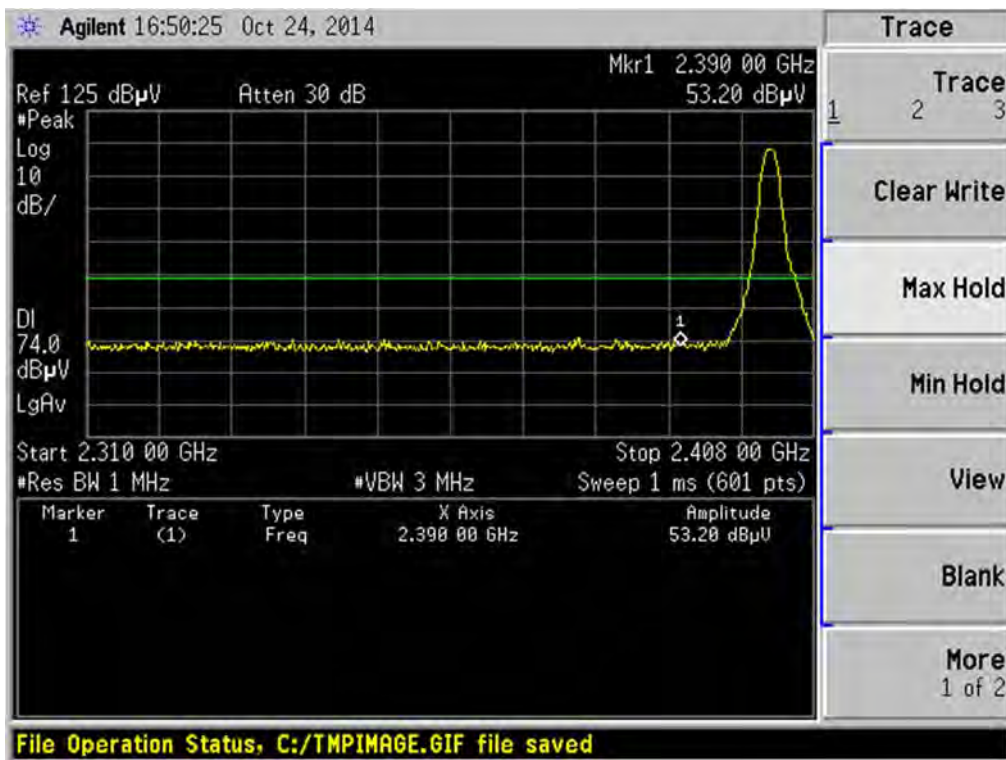
π /4DQPSK LOW CHANNEL , PEAK



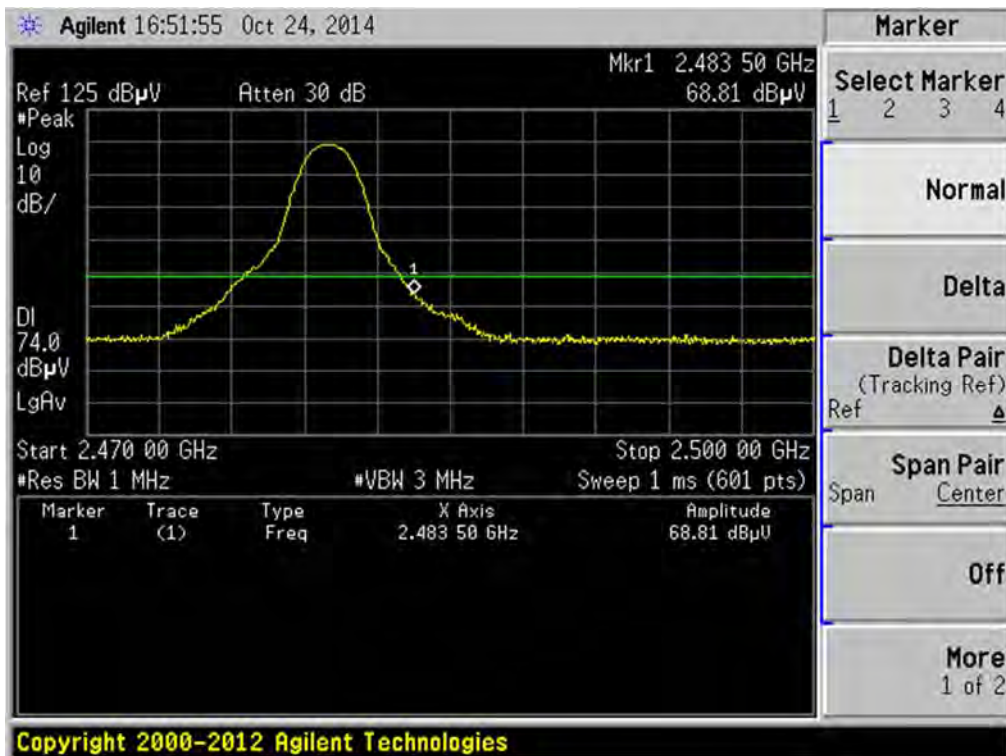
π /4DQPSK HIGH CHANNEL , PEAK



8-DPSK LOW CHANNEL , PEAK

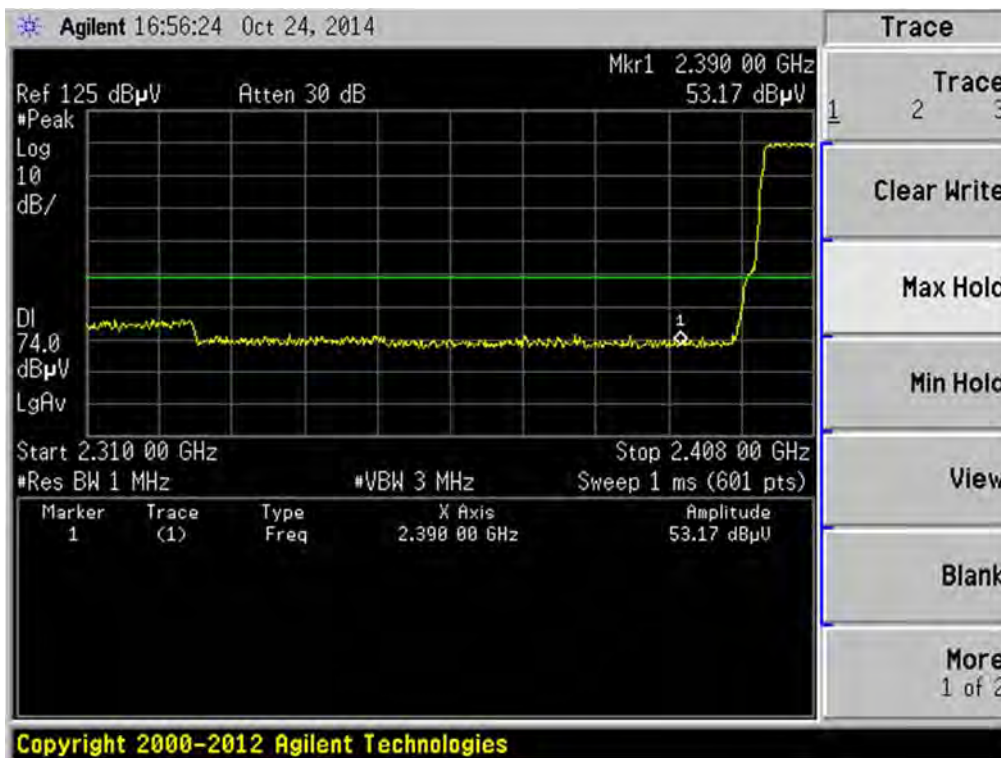


8-DPSK HIGH CHANNEL , PEAK

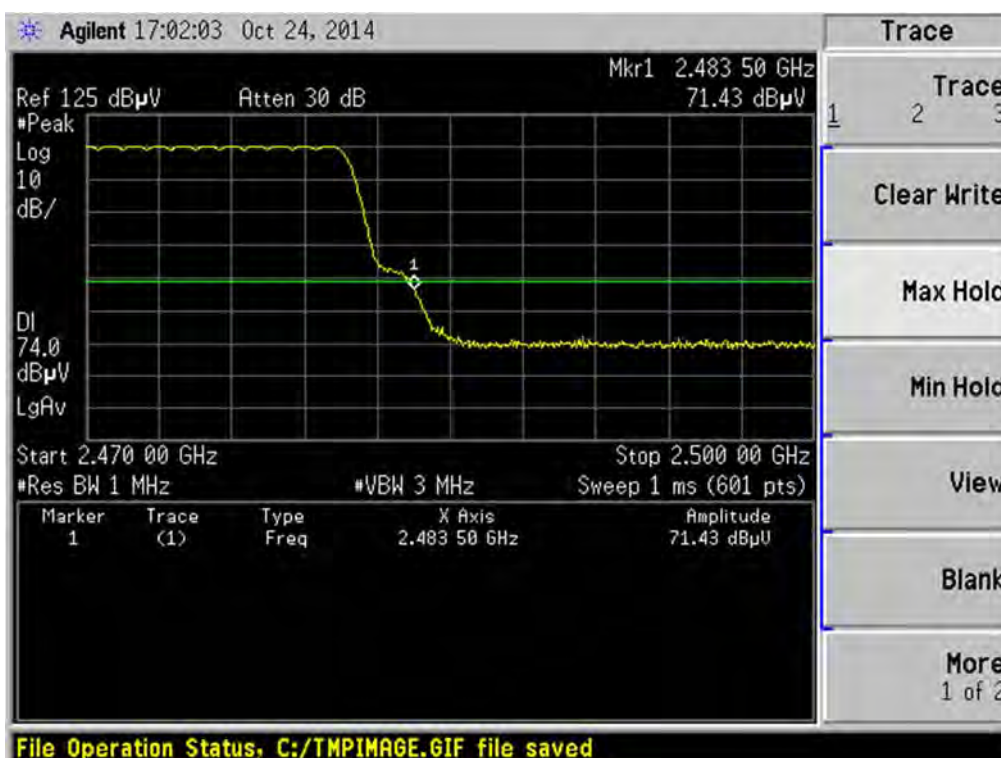


Hopping Mode:

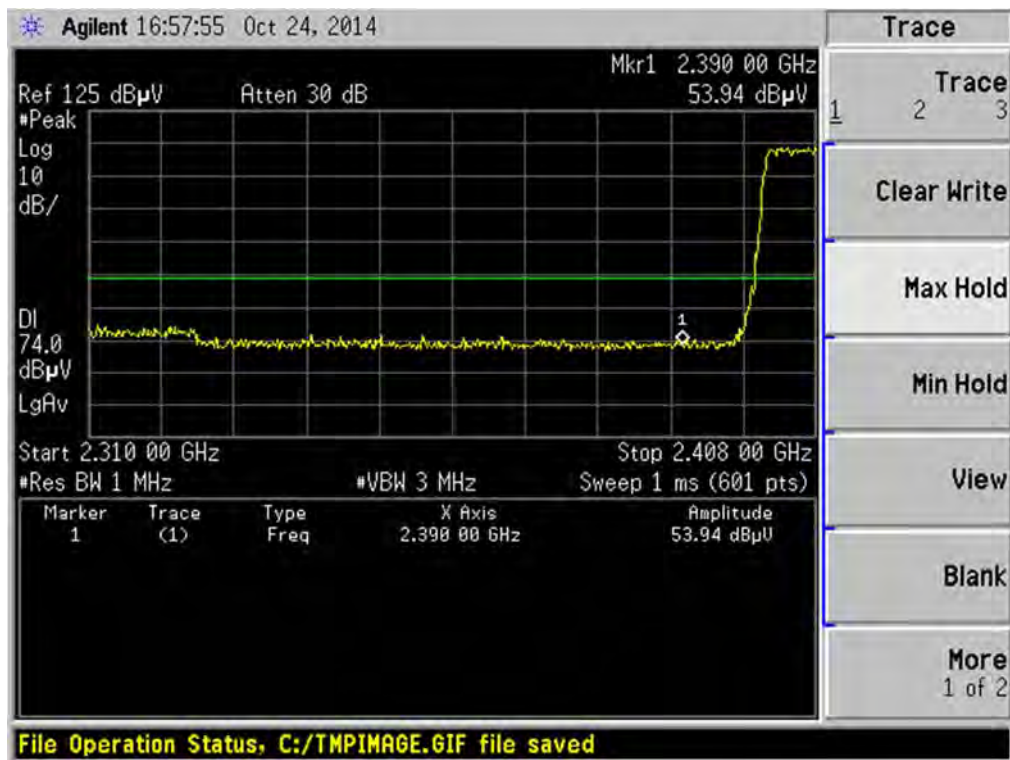
GFSK LOW FREQUENCY BAND, PEAK



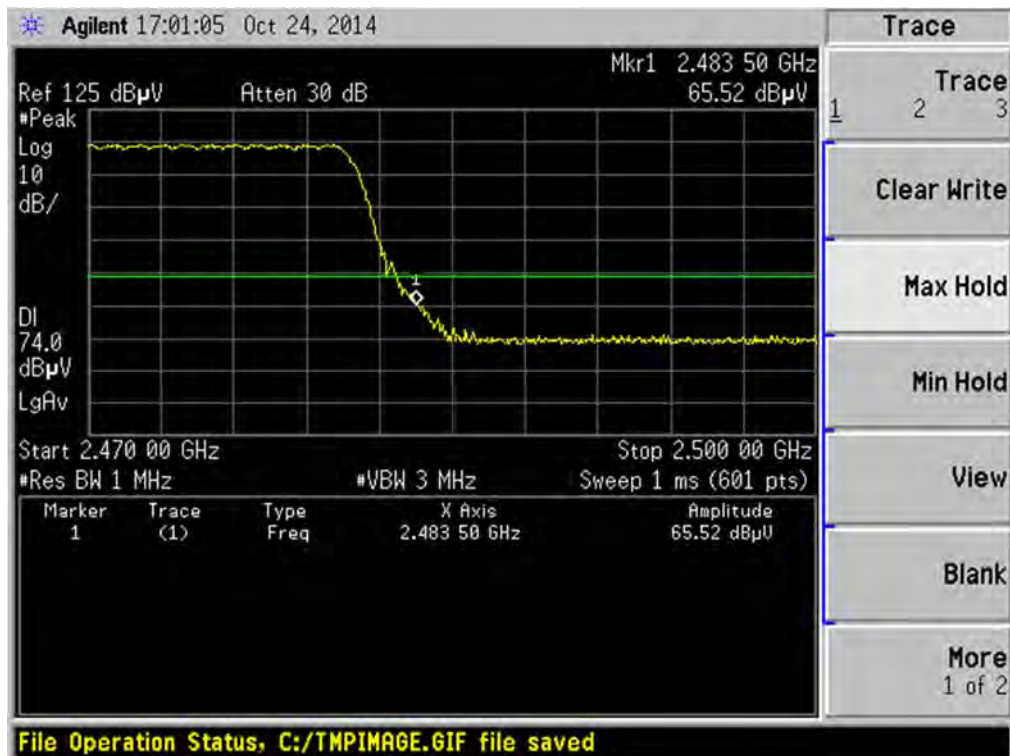
GFSK HIGH FREQUENCY BAND, PEAK



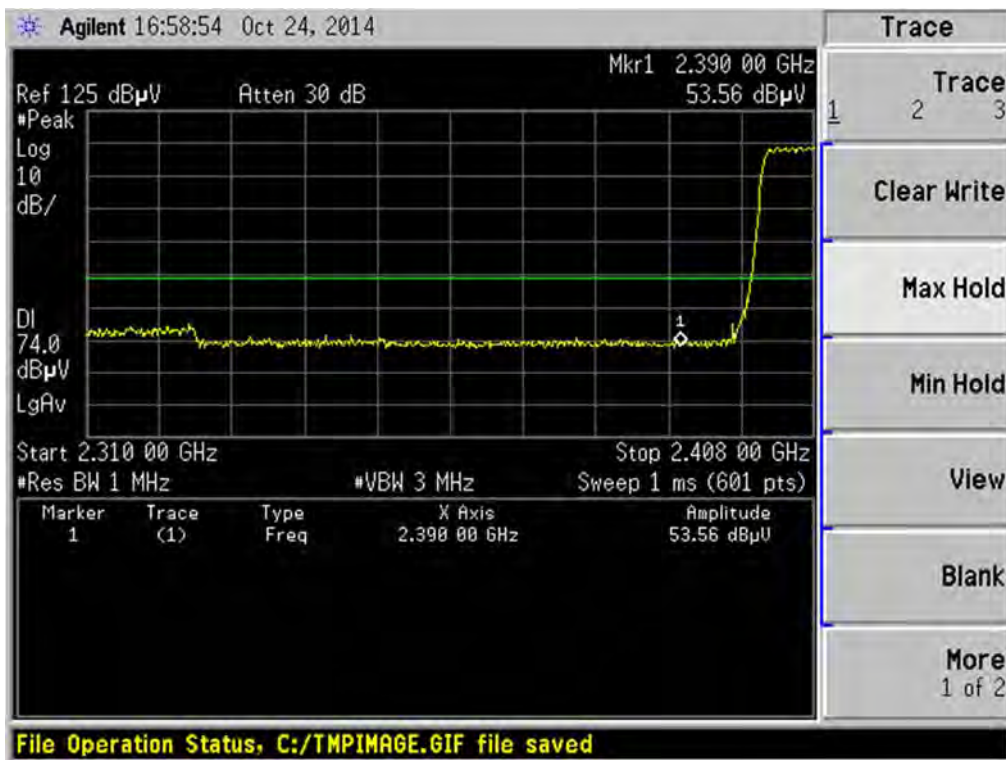
π /4DQPSK LOW FREQUENCY BAND, PEAK



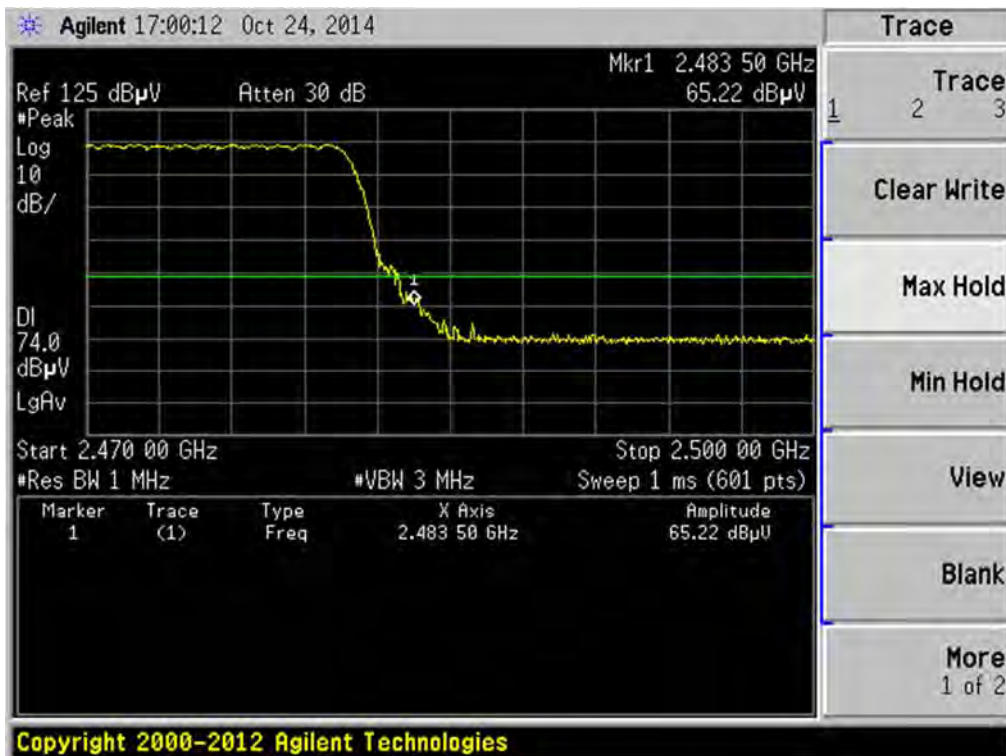
π /4DQPSK HIGH FREQUENCY BAND, PEAK



8-DPSK LOW FREQUENCY BAND, PEAK

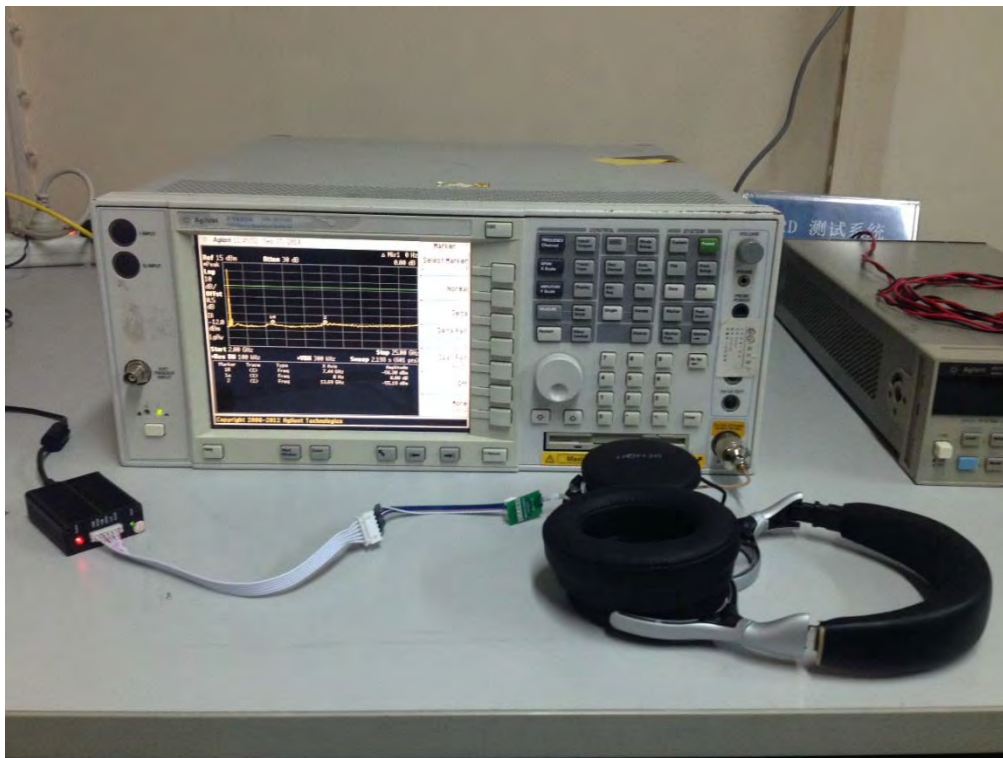


8-DPSK HIGH FREQUENCY BAND, PEAK



ANNEX B TEST SETUP PHOTOS

B.1 Conducted Test Photo



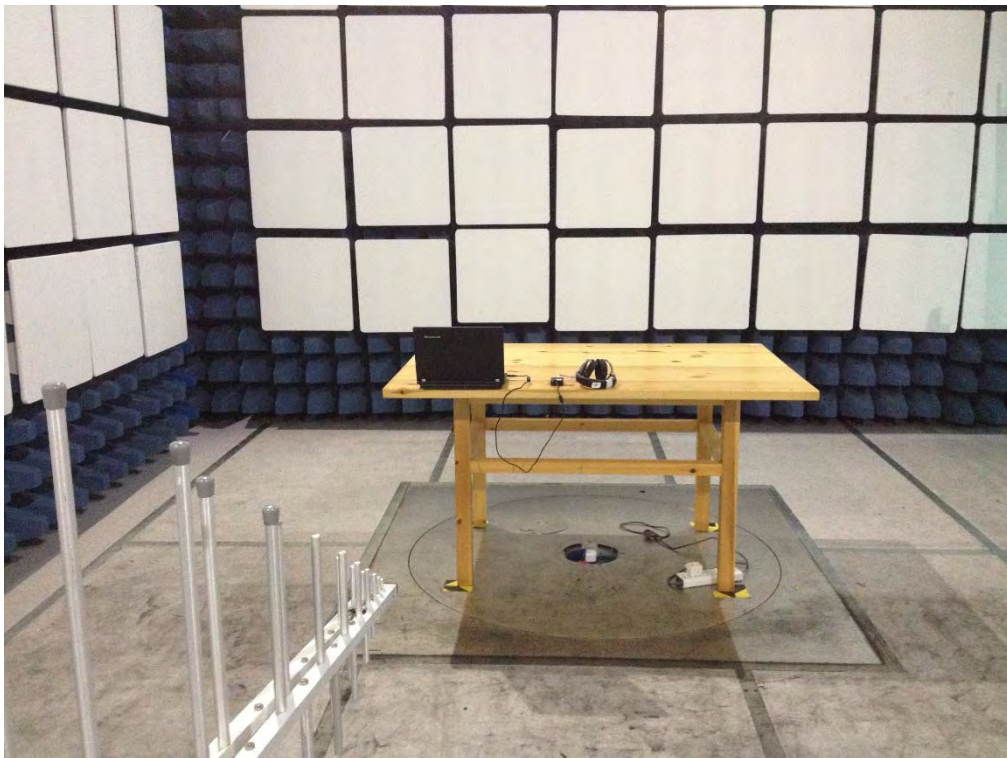
B.2 Conducted Emissions Test Photo



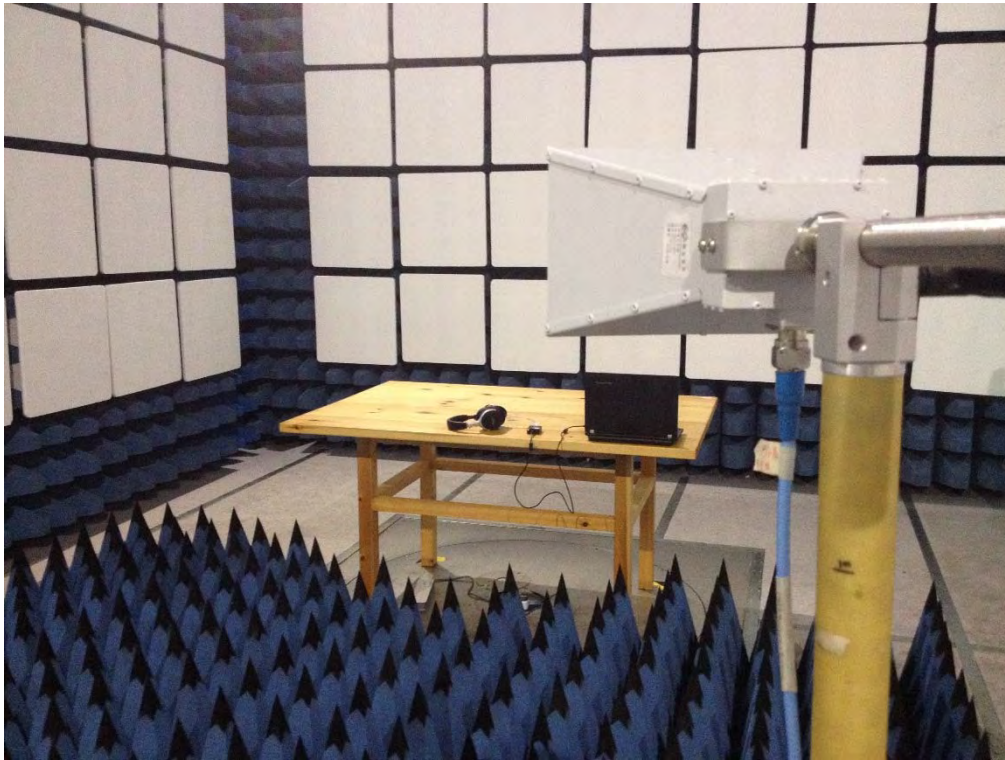
B.3 Radiated Test Photo



Below 30MHz



30MHz to 1GHz



Above 1GHz

ANNEX C EUT PHOTOS

C.1 Appearance of the EUT



THE FRONT OF EUT



THE BACK OF EUT



THE LEFT OF EUT



THE RIGHT OF EUT



THE UP OF EUT



THE DOWN OF EUT



THE AUDIO LINE



THE USB CABLE

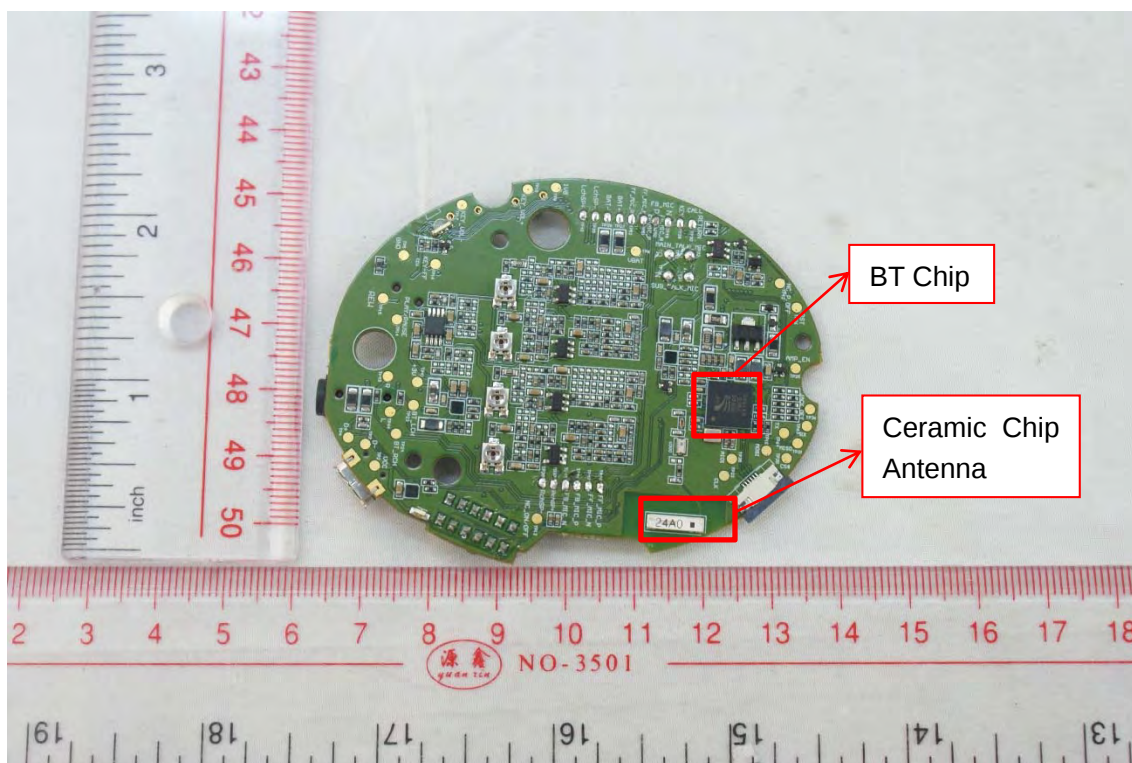
C.2 Inside of the EUT



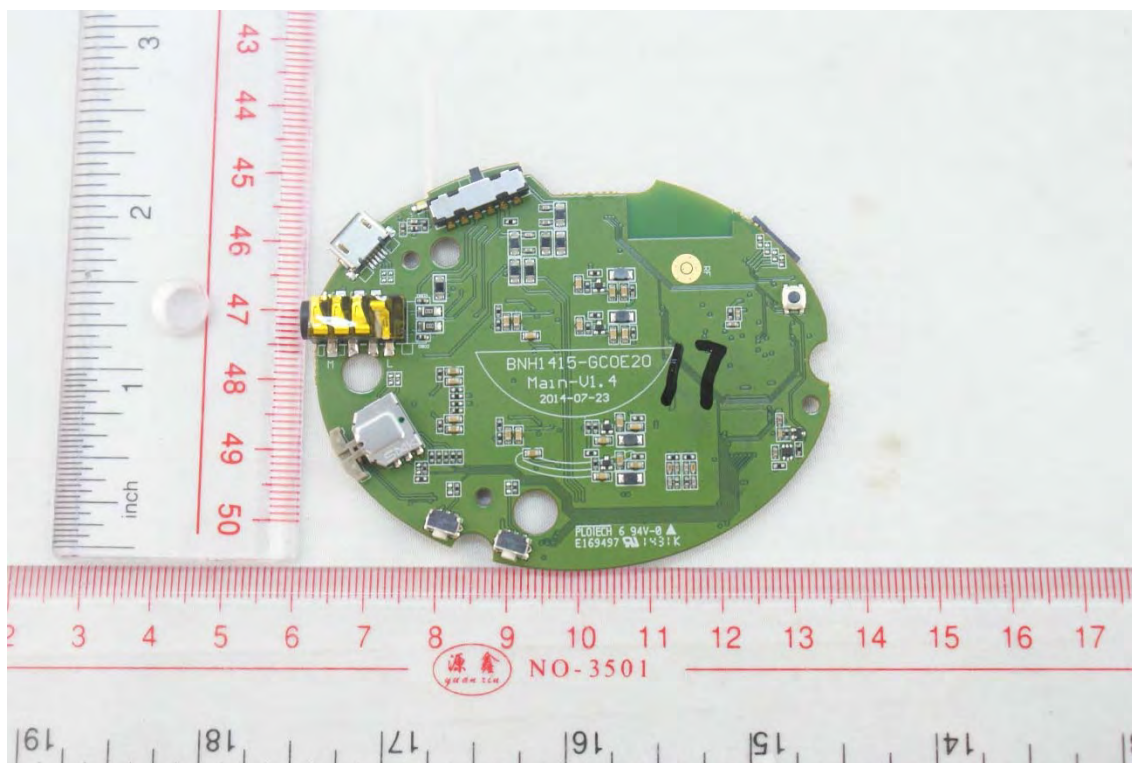
OPEN THE EUT PHOTO 1



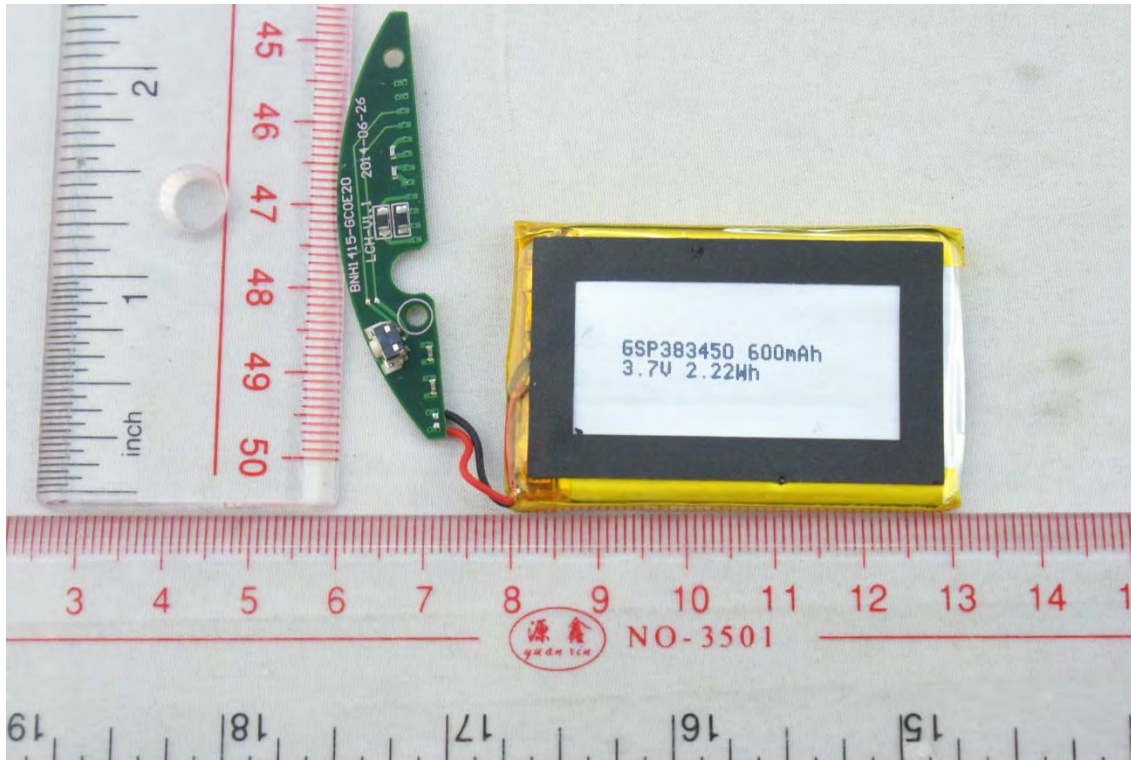
OPEN THE EUT PHOTO 2



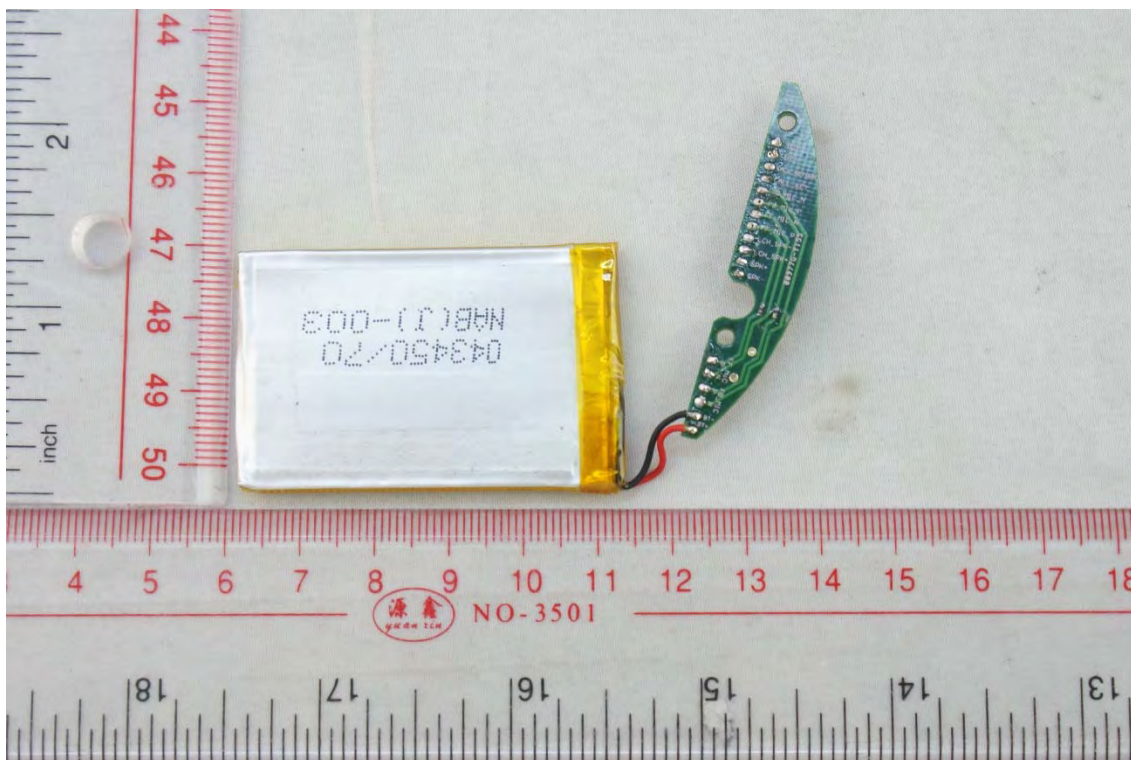
EUT INTERNAL BOARD 1



EUT INTERNAL BOARD 2



THE INTERNAL BATTERY 1



THE INTERNAL BATTERY 2

--END OF REPORT--