

FCC  
RF  
TEST REPORT

ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



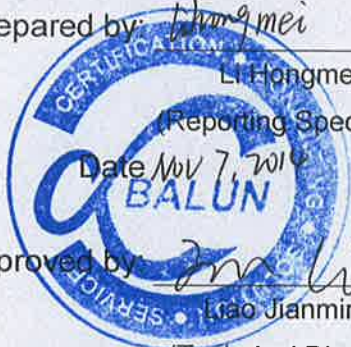
FOR  
**Speaker Module**

ISSUED TO  
Broan Mfg Co. Inc

926 W. State St., Hartford, Wisconsin, USA 53027



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Date *Nov 7, 2014*  
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(Technical Director)  
Date *Nov 7, 2014*



Report No.: BL-SZ14A0007-601  
EUT Type: Speaker Module  
Model Name: 99528551  
Brand Name: Broan, NuTone, Broan-NuTone  
Test Standard: 47 CFR Part 15 Subpart C  
FCC ID: 2ADLL-99528551

Test conclusion: PASS  
Test Date: Oct 12, 2014 ~ Oct 31, 2014  
Date of Issue: Nov 7, 2014

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**Revision History**

<u>Version</u>	<u>Issue Date</u>	<u>Revisions</u>
<u>Rev. 01</u>	<u>Nov 7, 2014</u>	<u>Initial Issue</u>

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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	<p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</p> <p>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.</p> <p>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.</p>
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°C
Ambient Relative Humidity	30 to 60%
Ambient Pressure	86 to 106 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	Broan Mfg Co. Inc
Address	926 W. State St., Hartford, Wisconsin, USA 53027

### 2.2 Manufacturer

Manufacturer	SHENZHEN H&T INTELLIGENT CONTROL CO LTD
Address	D ZONE 10 floors SHENZHEN ACADEMY OF AEROSPACE TECHNOLOGY HI-TECH PARK SOUTH AVENUE 10 NANSHAN SHENZHEN GUANGDONG 518057 CHINA

### 2.3 General Description for Equipment under Test (EUT)

EUT Type	Speaker Module
Model Name	99528551
Hardware Version	V02
Software Version	V02
Network and Wireless connectivity	Bluetooth 3.0, Bluetooth 4.0 Low Energy (BLE)
About the Product	The equipment is Bluetooth Speaker Fan, 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	PCB Antenna	
Antenna Gain	0dBi	

### 2.5 Ancillary Equipment

N/A

### 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/IC Part No.	Test Result	Verdict
1	Antenna Requirement	15.203	--	PASS <sup>Note 1</sup>
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	15.247(e)	ANNEX A.9	PASS
Note 1: Please refer to section 5.1				



## 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)	AC 110V
	LV (Low Voltage)	108V
	HV (High Voltage)	132V

### 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

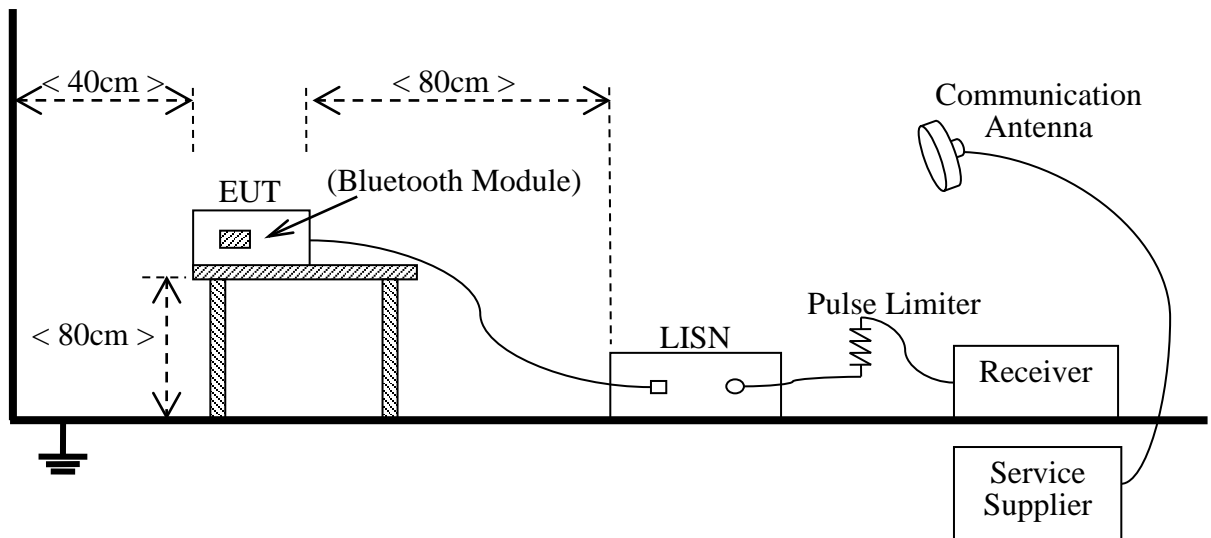
### 4.4 Description of Test Setup

#### 4.4.1 For Antenna Port Test



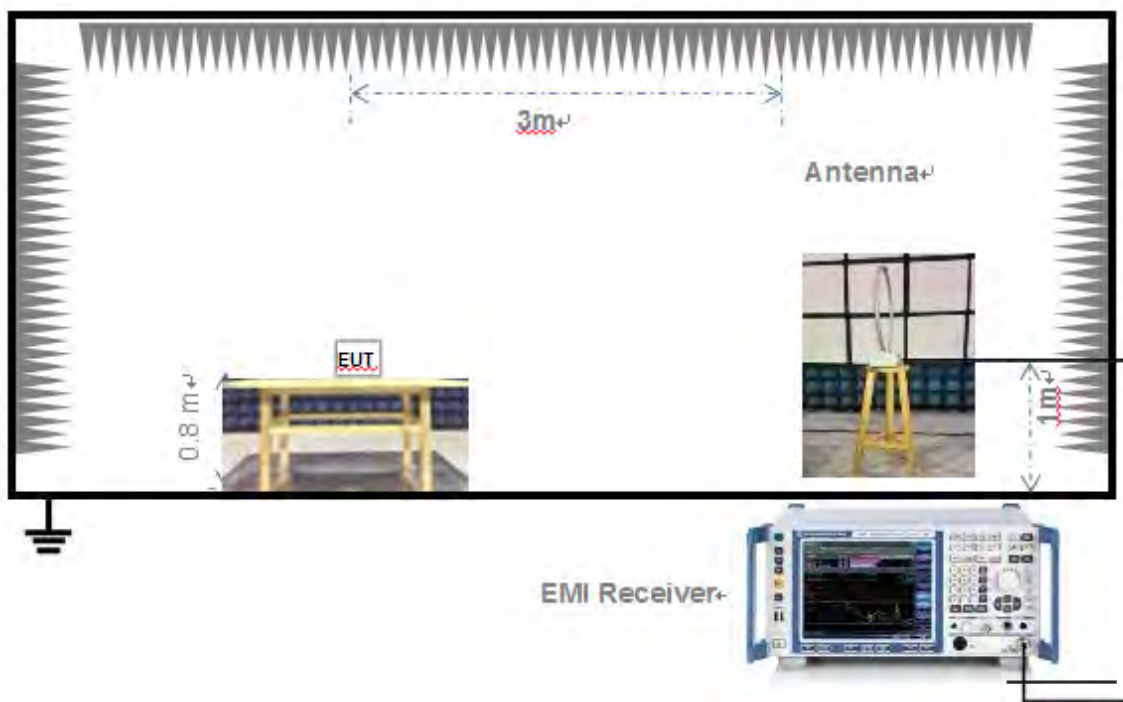
(Diagram 1)

#### 4.4.2 For AC Power Supply Port Test



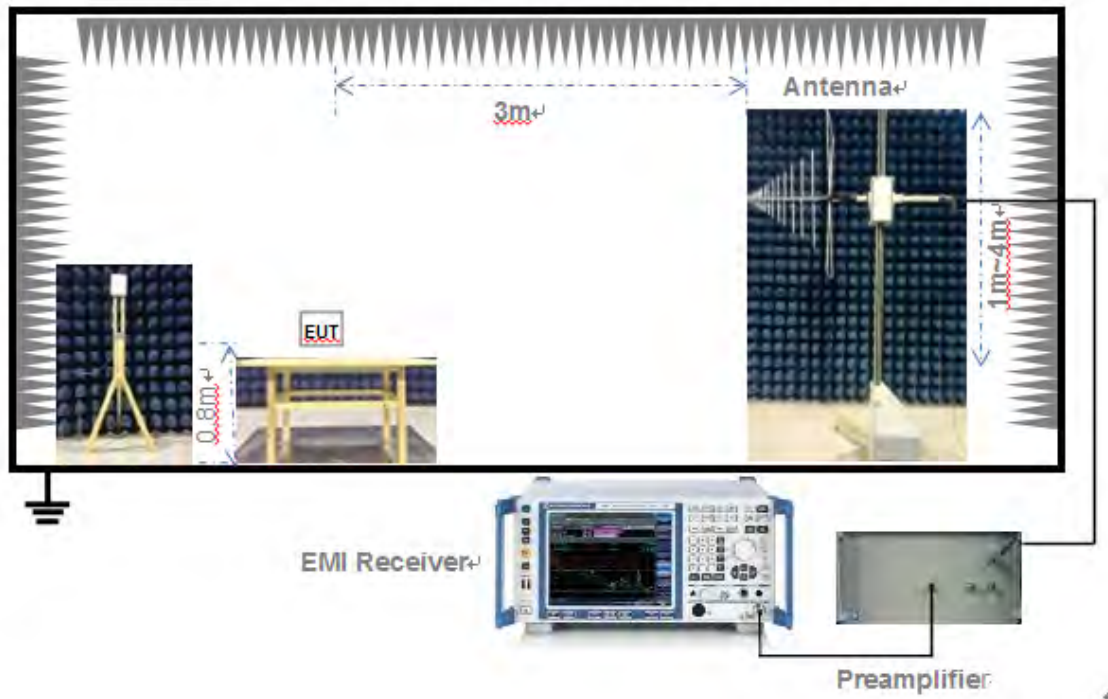
(Diagram 2)

#### 4.4.3 For Radiated Test (Below 30MHz)



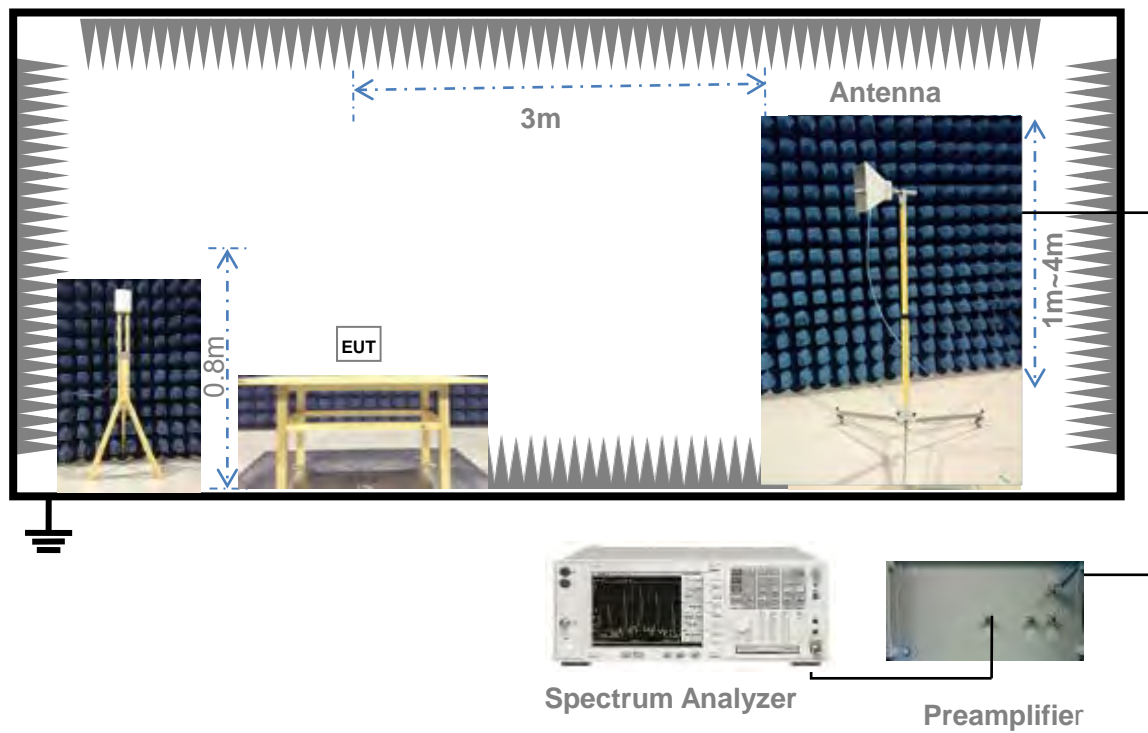
(Diagram 3)

#### 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 <sup>Note 1</sup>	Test Configuration <sup>Note 2</sup>
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:

Following table shows an offset computation example with cable loss 0.5 dB.

### 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 2.897ms and 3 hops in 100 ms, then

Duty cycle correction factor (dB) =  $20 * \log ((2.897 * 3) / 100) = -21.22 \text{ dB}$

Following shows an average computation example with duty cycle correction factor = -21.22dB, 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)

=  $45.61 + (-21.22) = 24.39 \text{ (dBuV/m)}$

## 5 TEST ITEMS

### 5.1 Antenna Requirements

#### 5.1.1 Standard Applicable

FCC §15.203 & 15.247(b)

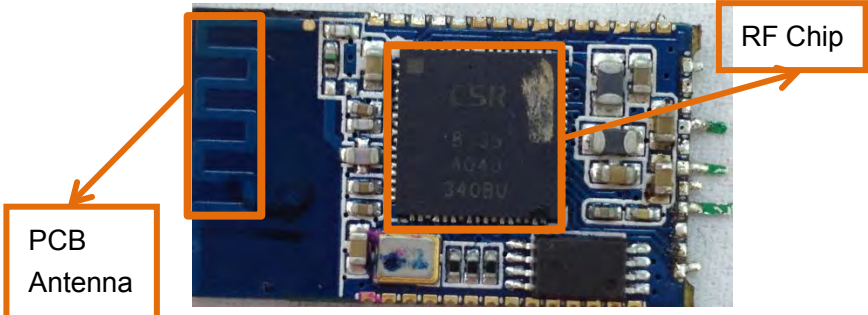
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply 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 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ 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(e)

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

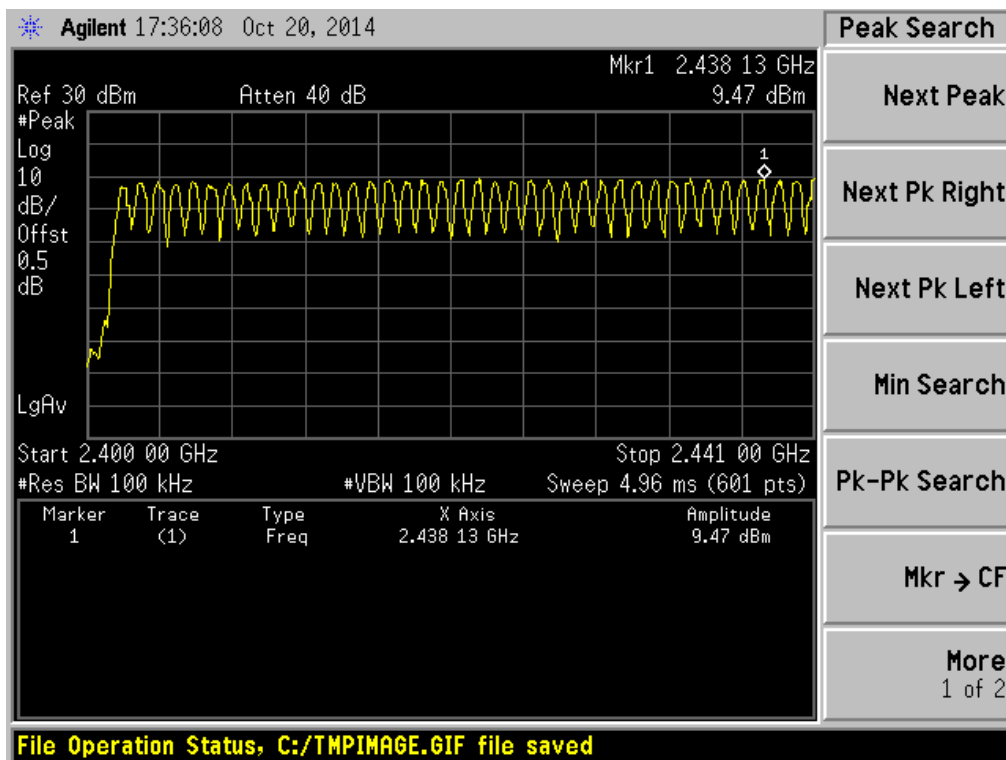
### A.1 Number of Hopping Frequency

#### Test Data

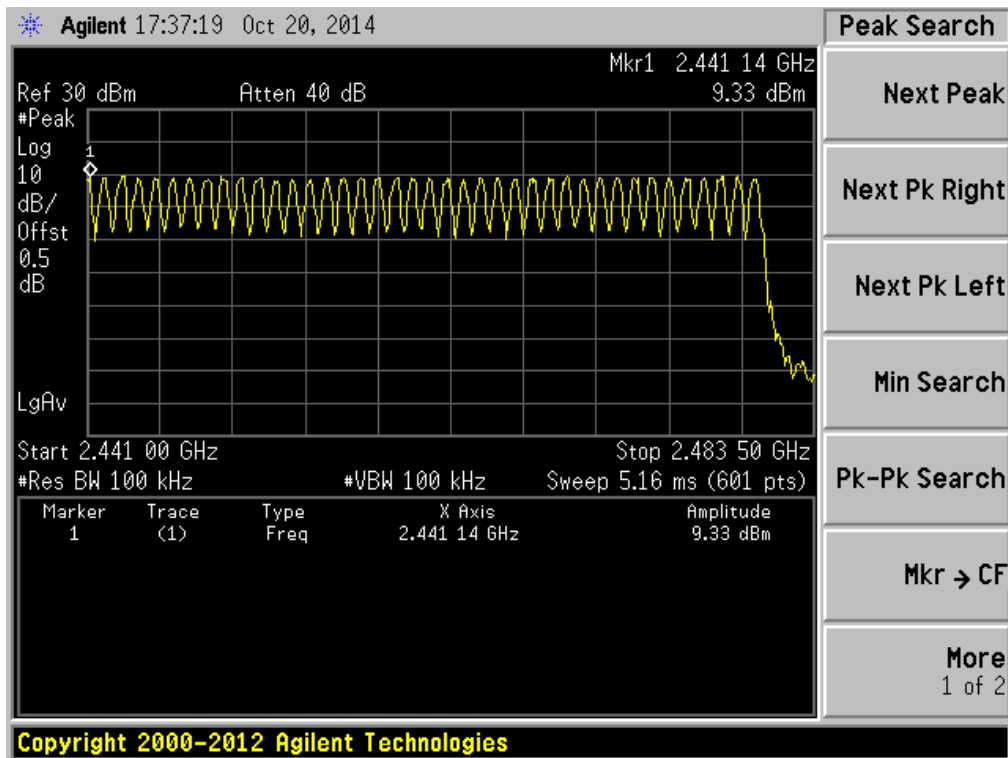
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	PASS
π/4-DQPSK	2400 - 2483.5	79	15	PASS
8-DPSK	2400 - 2483.5	79	15	PASS

#### Test plots

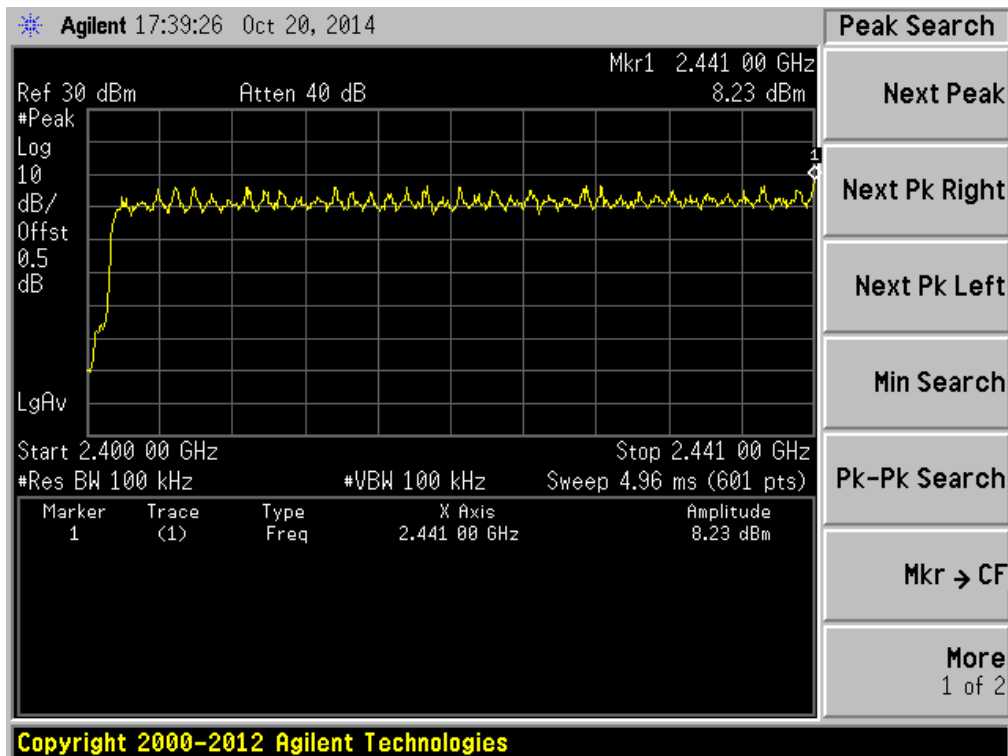
GFSK 2.4GHz~2.4415GHz



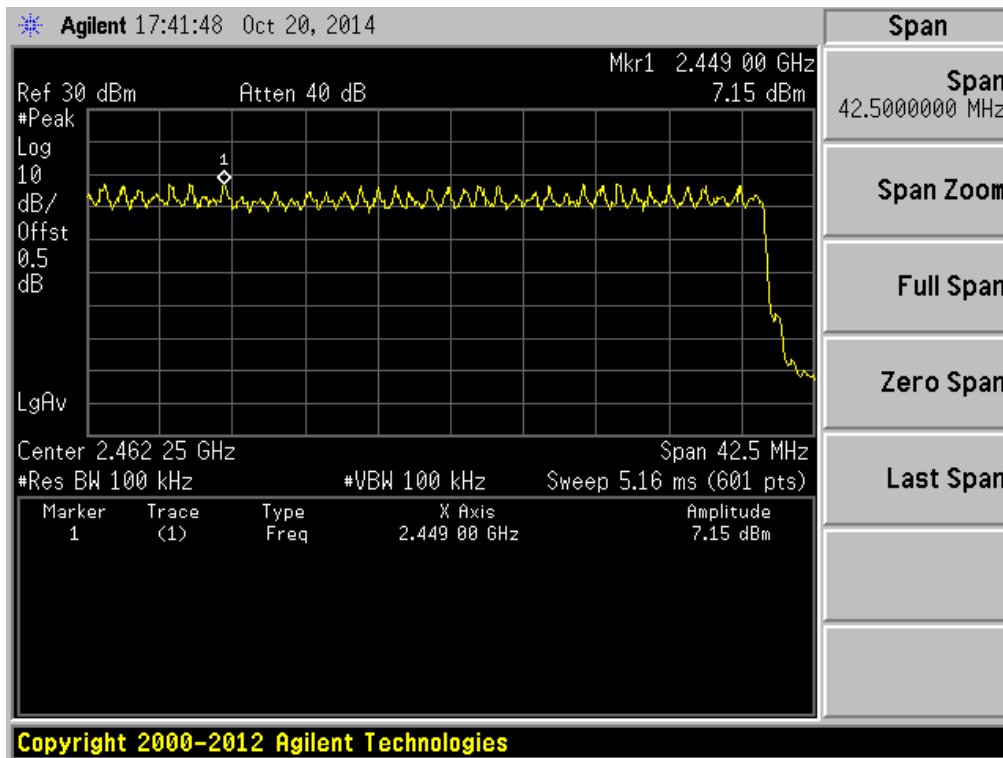
## GFSK 2.4415GHz~2.4835GHz



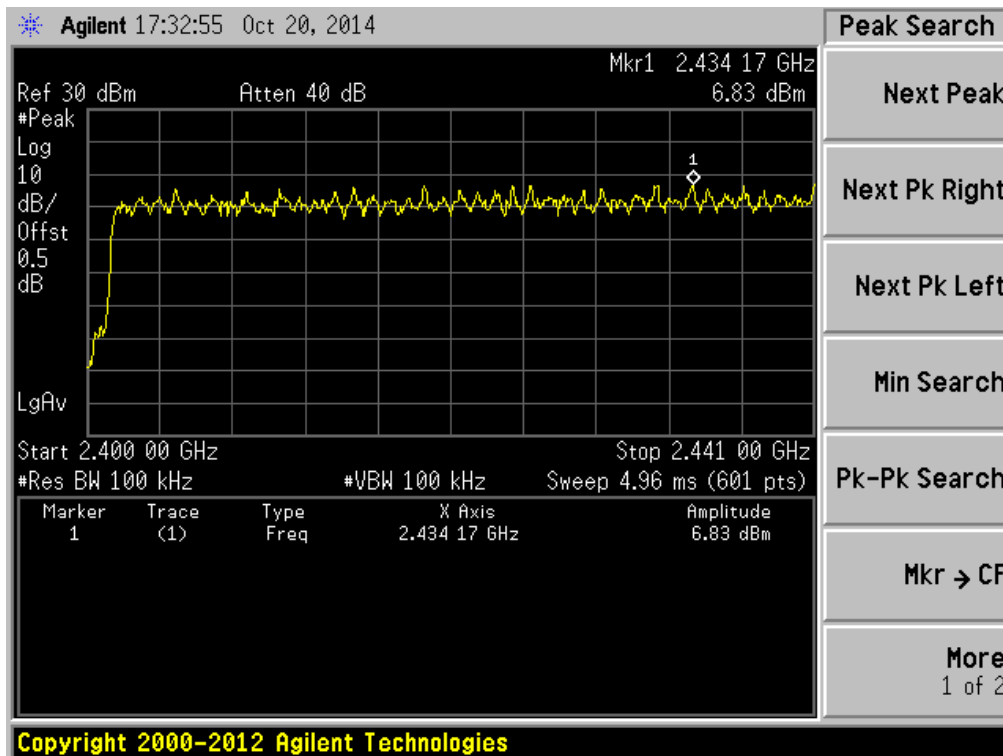
## II/4-DQPSK 2.4GHz~2.4415GHz



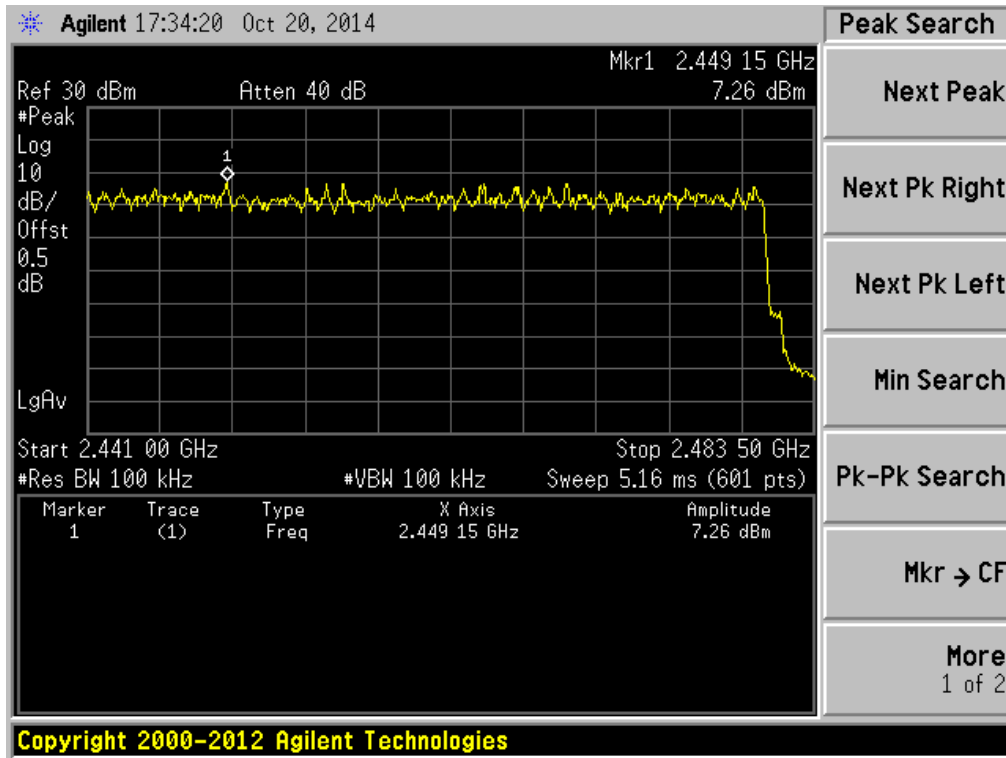
## II/4-DQPSK 2.4415GHz~2.4835GHz



## 8-DPSK 2.4GHz~2.4415GHz



## 8-DPSK 2.4415GHz~2.4835GHz



## A.2 Peak Output Power

### Test Data

GFSK Mode:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
Low	2402	7.41	5.51	30	1000	PASS
Middle	2441	9.00	7.94			PASS
High	2480	9.12	8.17			PASS

π/4-DQPSK Mode:

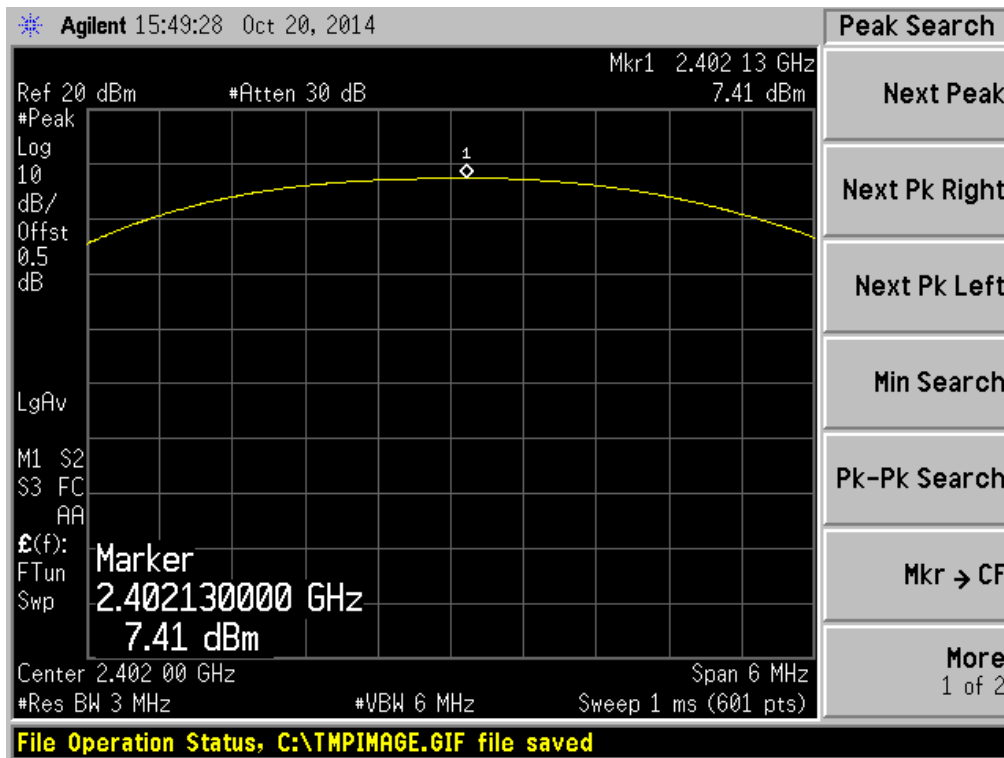
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
Low	2402	5.40	3.47	30	1000	PASS
Middle	2441	7.55	5.69			PASS
High	2480	7.69	5.87			PASS

8-DPSK Mode:

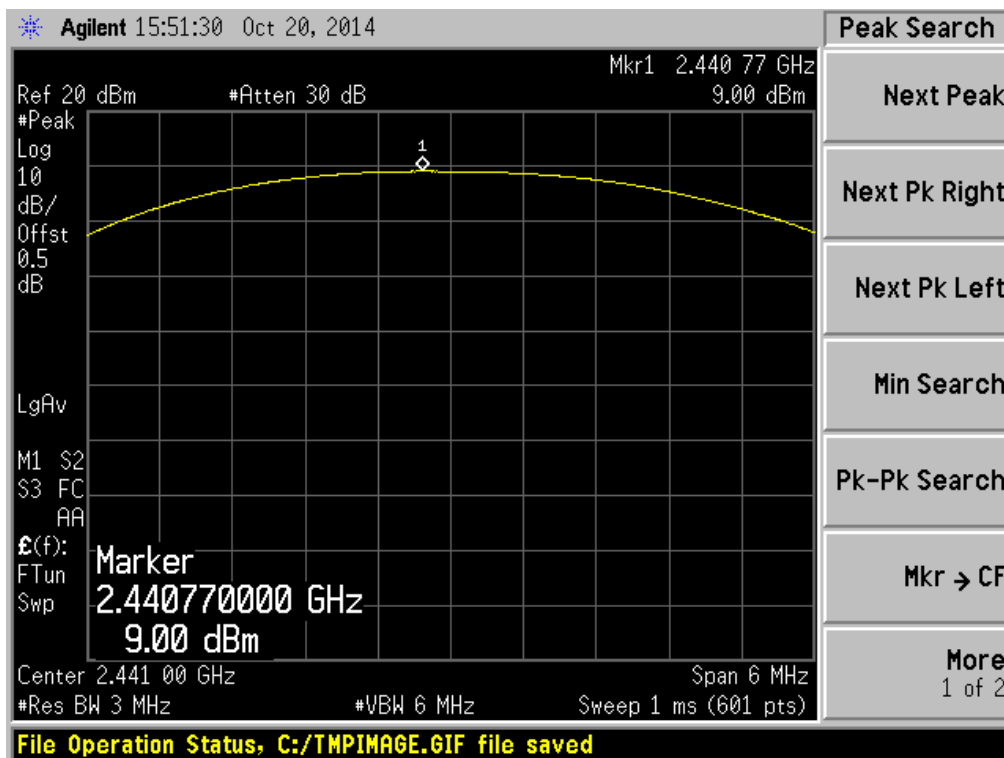
Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	mW	dBm	mW	
Low	2402	5.76	3.77	30	1000	PASS
Middle	2441	7.89	6.15			PASS
High	2480	7.99	6.30			PASS

## Test plots

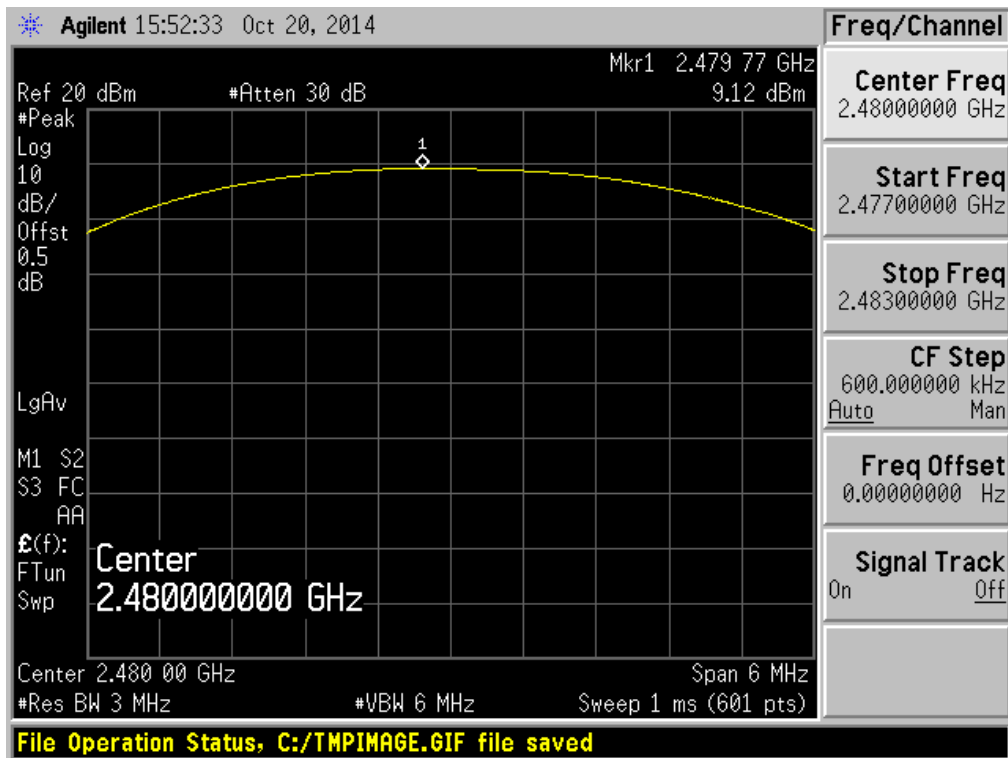
### GFSK LOW CHANNEL



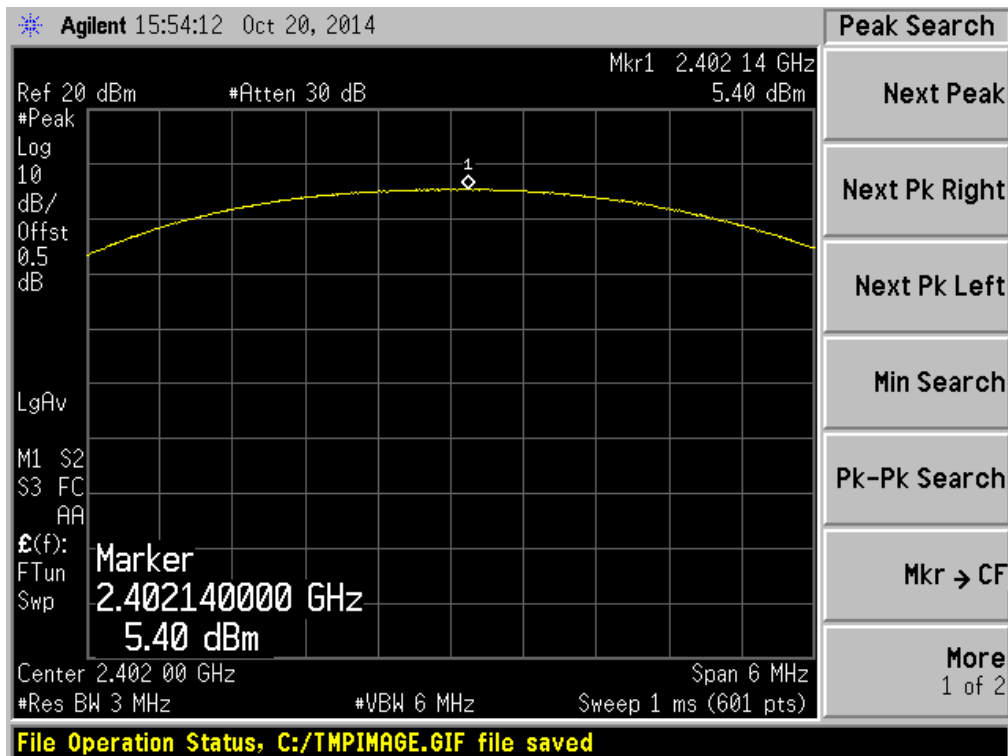
### GFSK MID CHANNEL



### GFSK HIGH CHANNEL

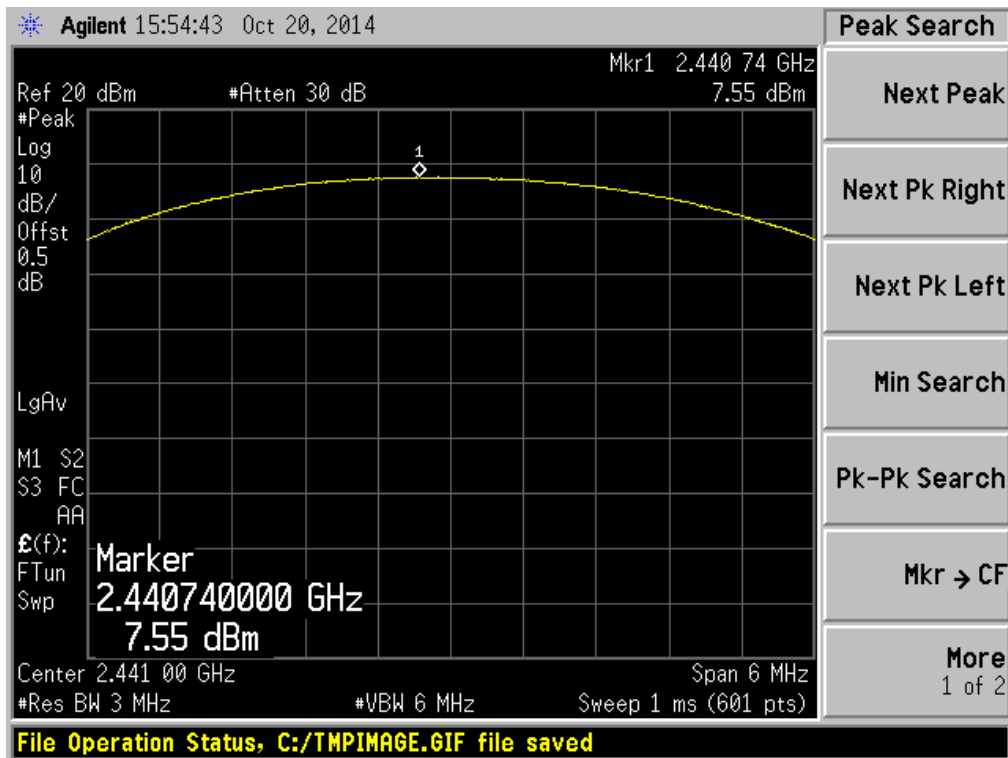


### II/4-DQPSK LOW CHANNEL

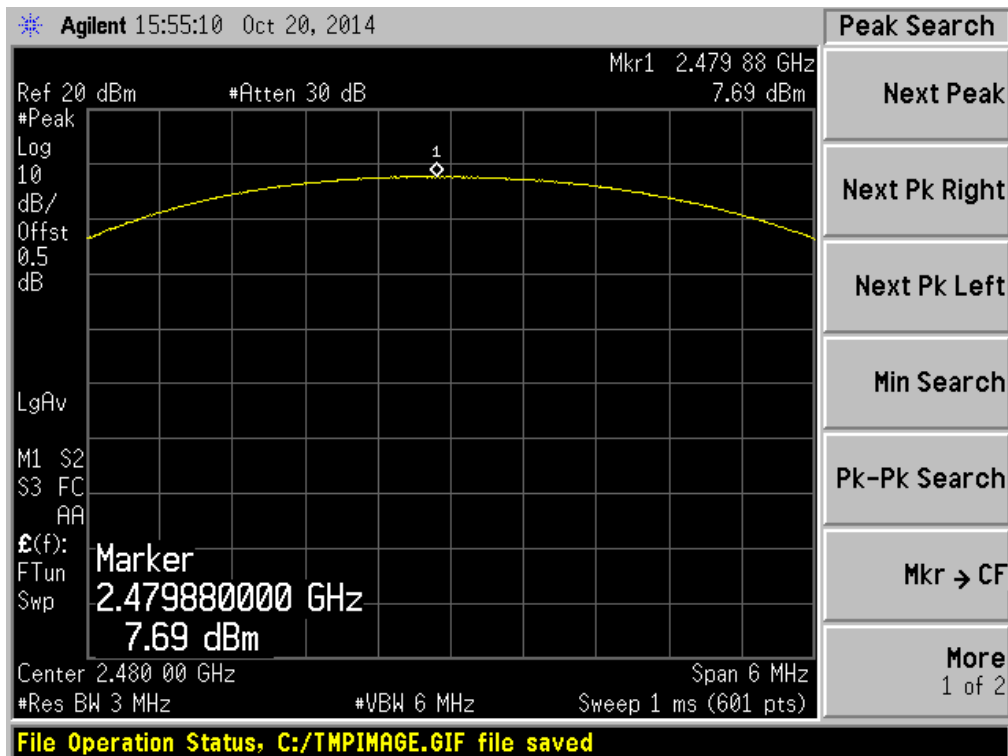




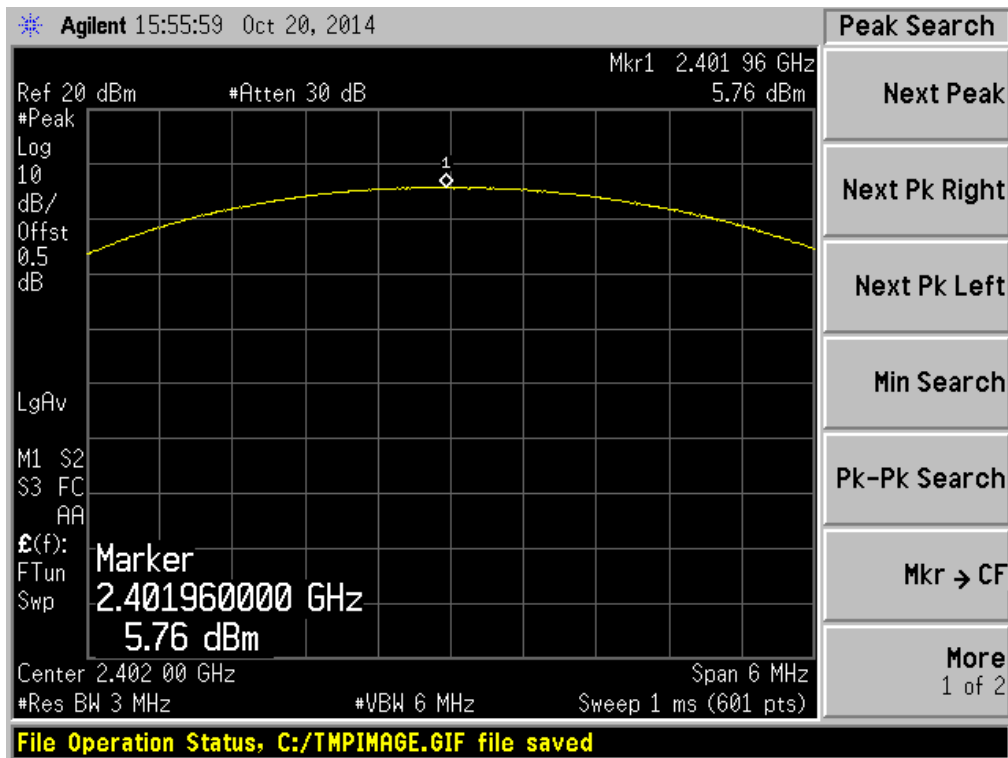
## II/4-DQPSK MID CHANAEL



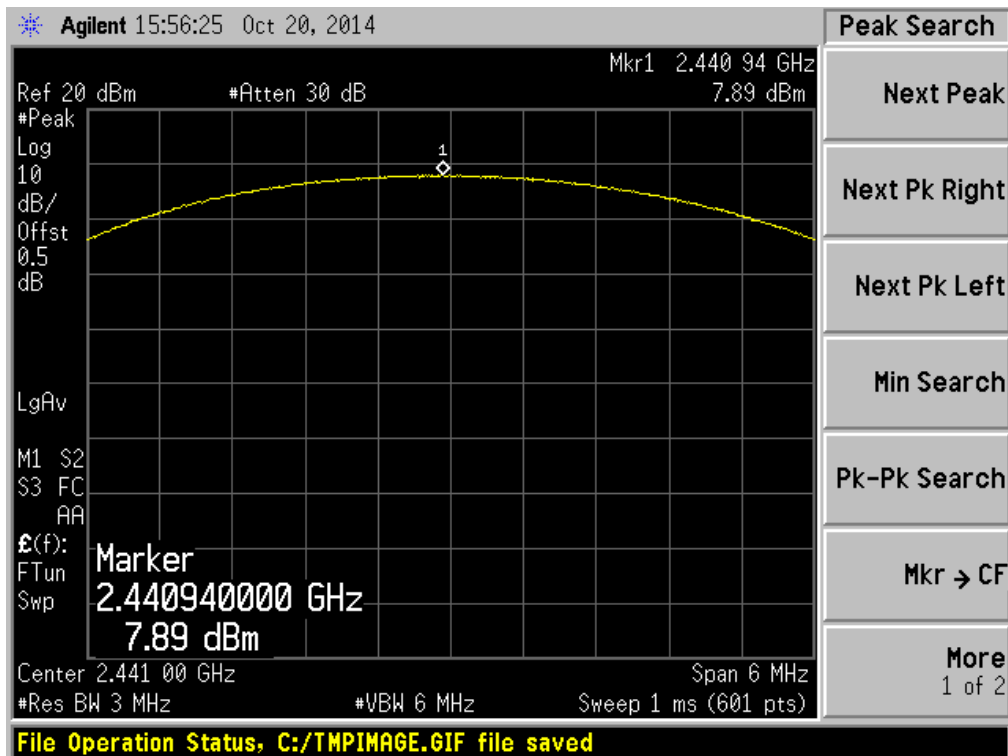
## II/4-DQPSK HIGH CHANNEL



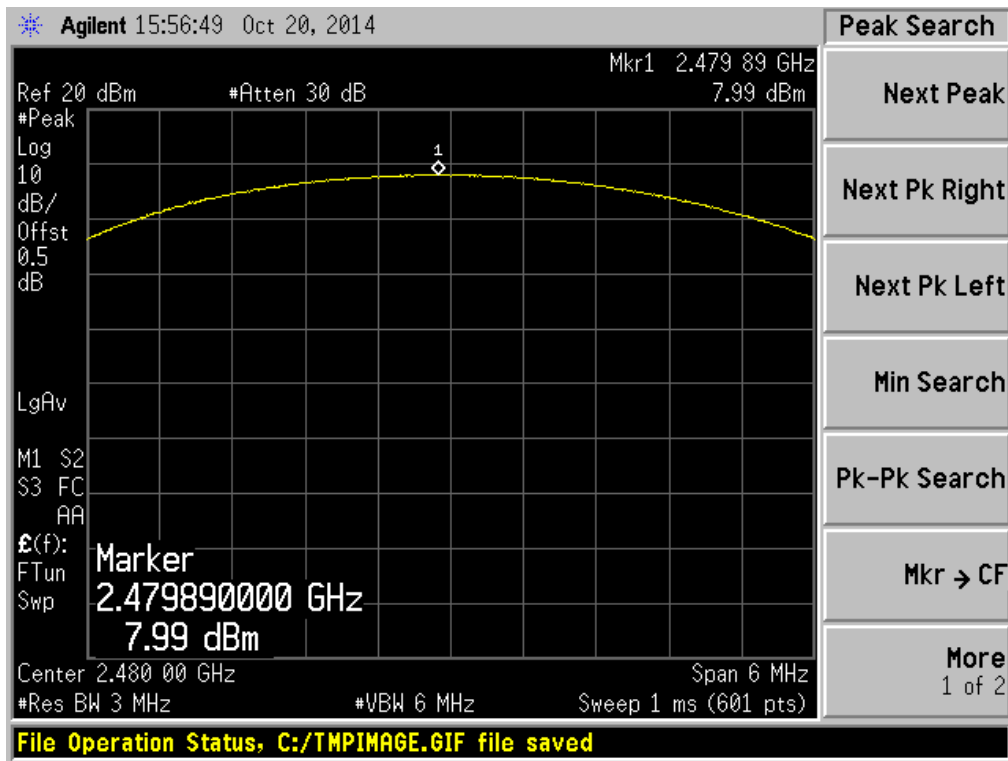
### 8-DPSK LOW CHANNEL



### 8-DPSK MID CHANAEL



## 8-DPSK HIGH CHANNEL



### A.3 20dB and 99% bandwidth

#### Test Data

GFSK Mode:

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (kHz)
Low	2402	1.117	959.2062
Middle	2441	1.116	948.3837
High	2480	1.117	950.2998

π/4-DQPSK Mode:

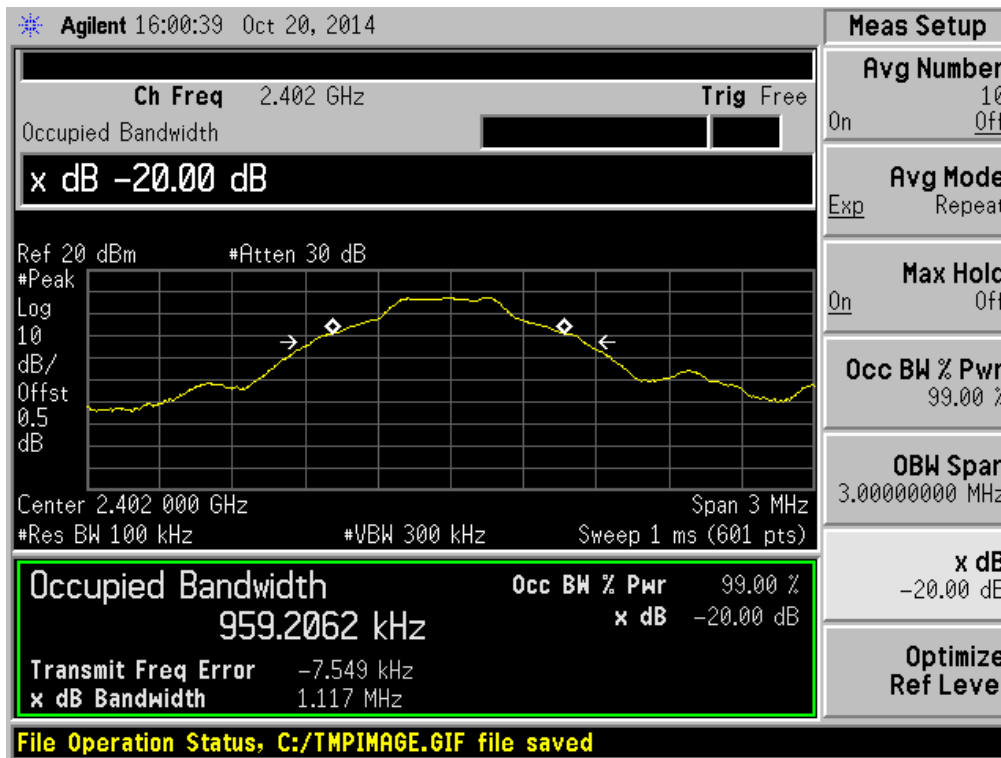
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.377	1.2116
Middle	2441	1.370	1.2068
High	2480	1.371	1.2064

8-DPSK Mode:

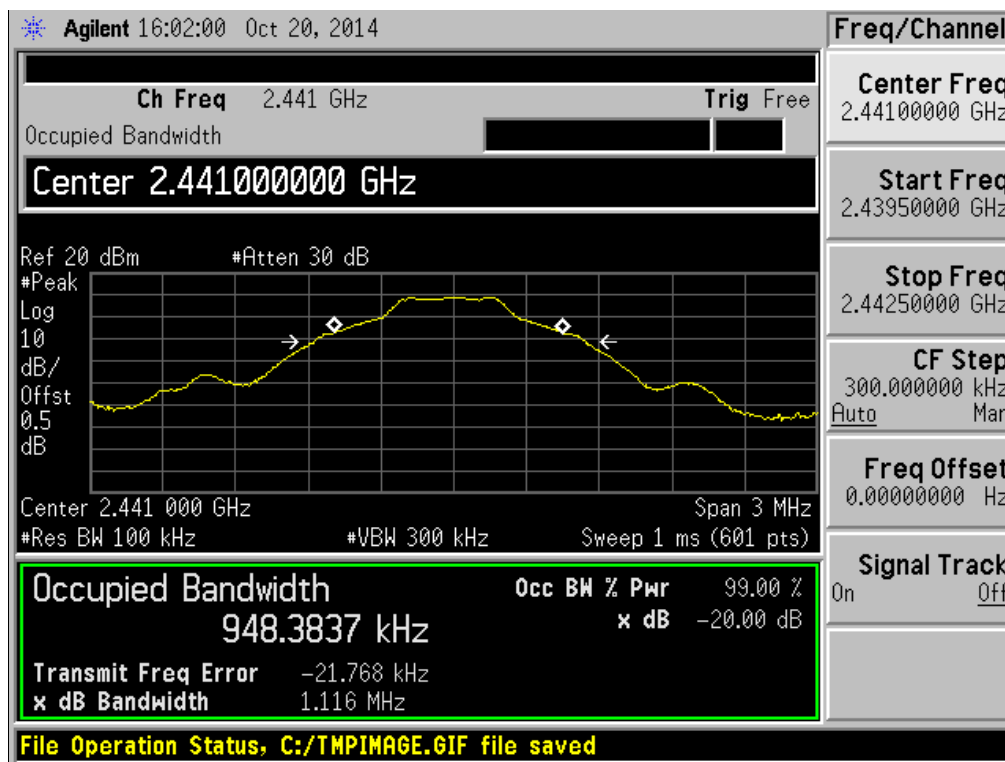
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.379	1.2147
Middle	2441	1.377	1.2076
High	2480	1.379	1.2110

# Test plots

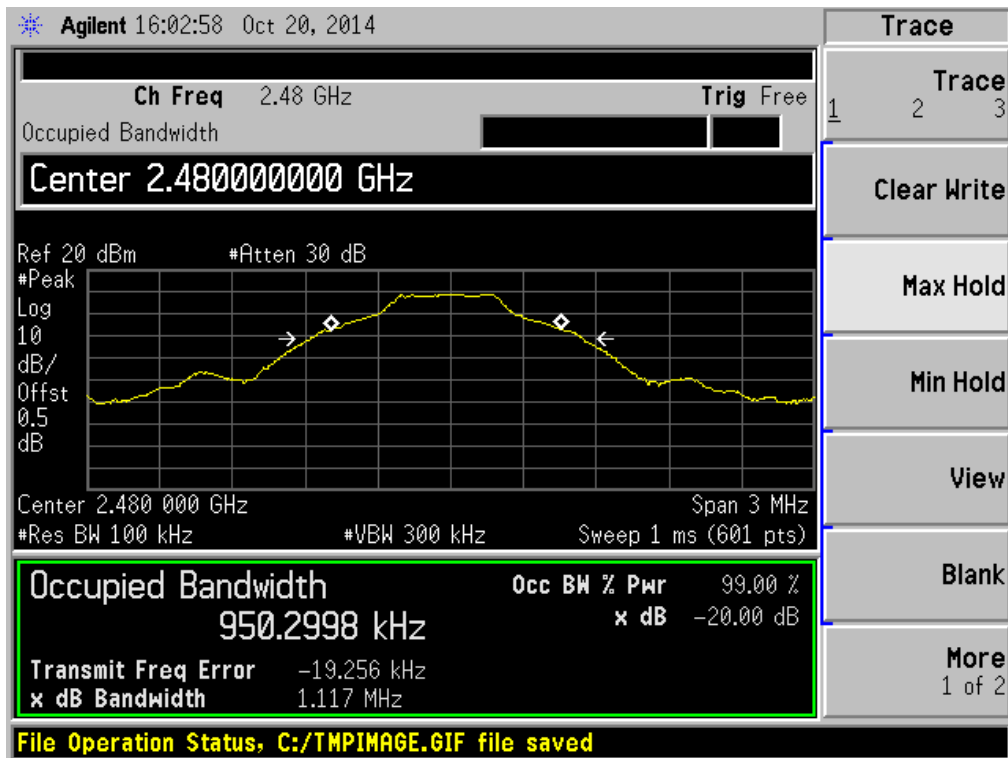
## GFSK LOW CHANNEL



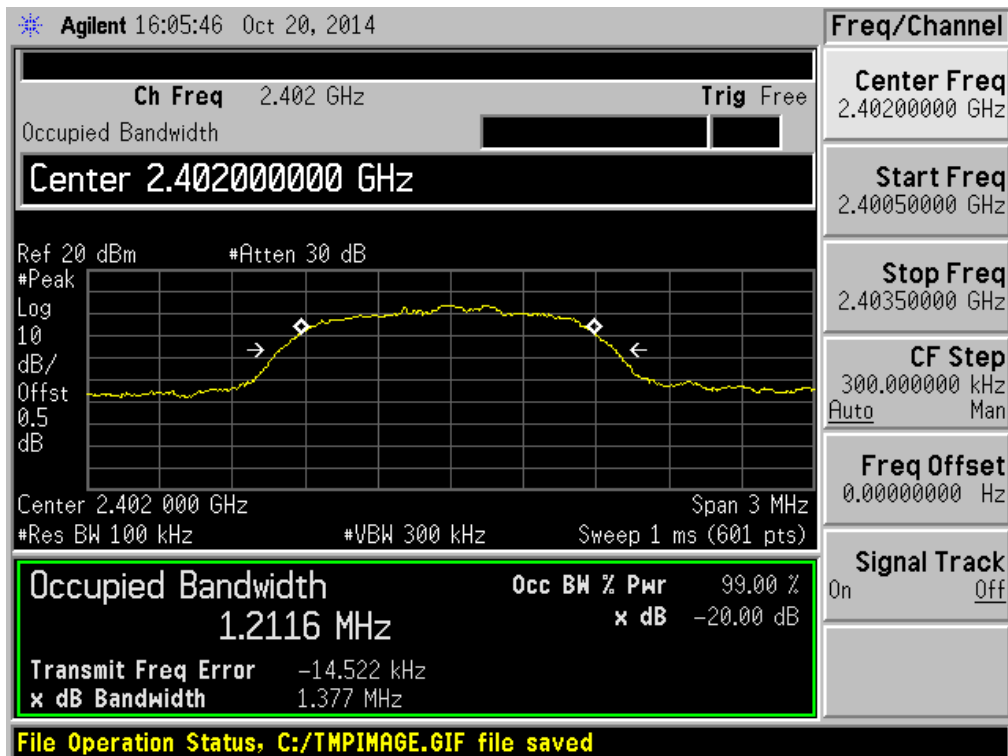
## GFSK MID CHANAEL



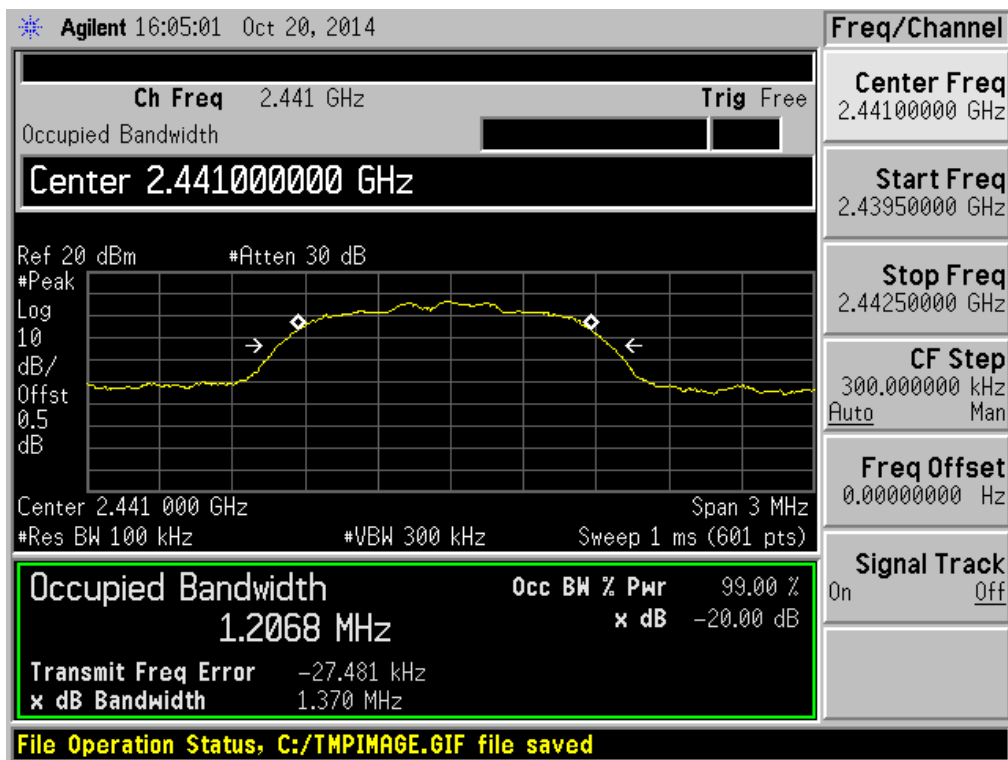
### GFSK HIGH CHANNEL



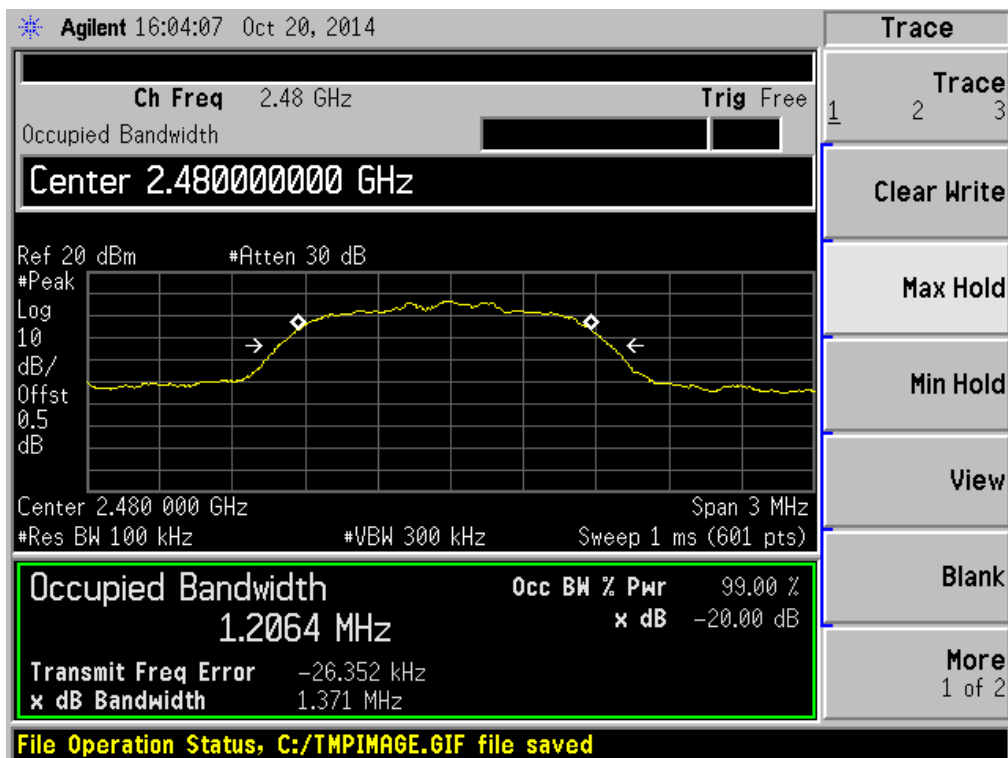
### II/4-DQPSK LOW CHANNEL



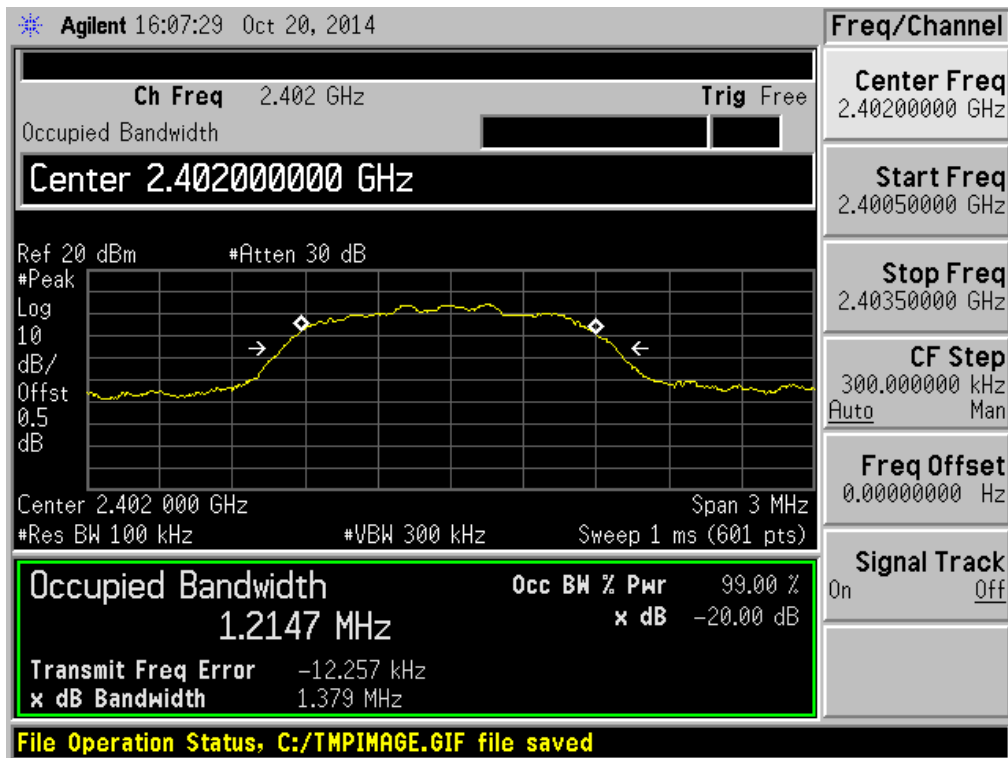
## II/4-DQPSK MID CHANAEL



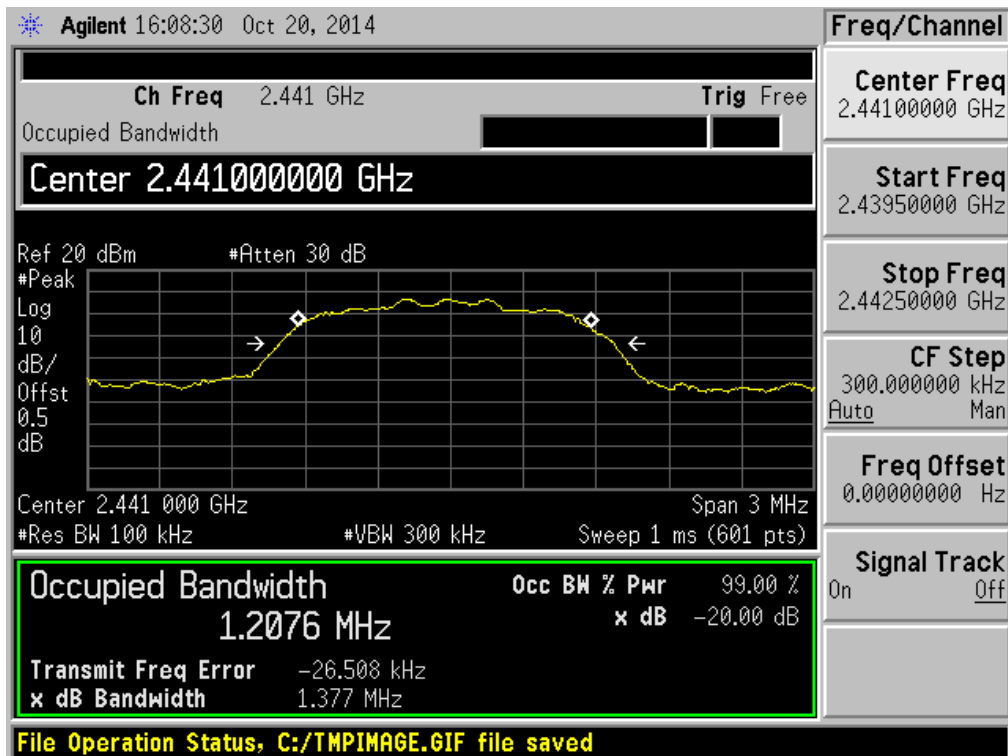
## II/4-DQPSK HIGH CHANNEL



### 8-DPSK LOW CHANNEL

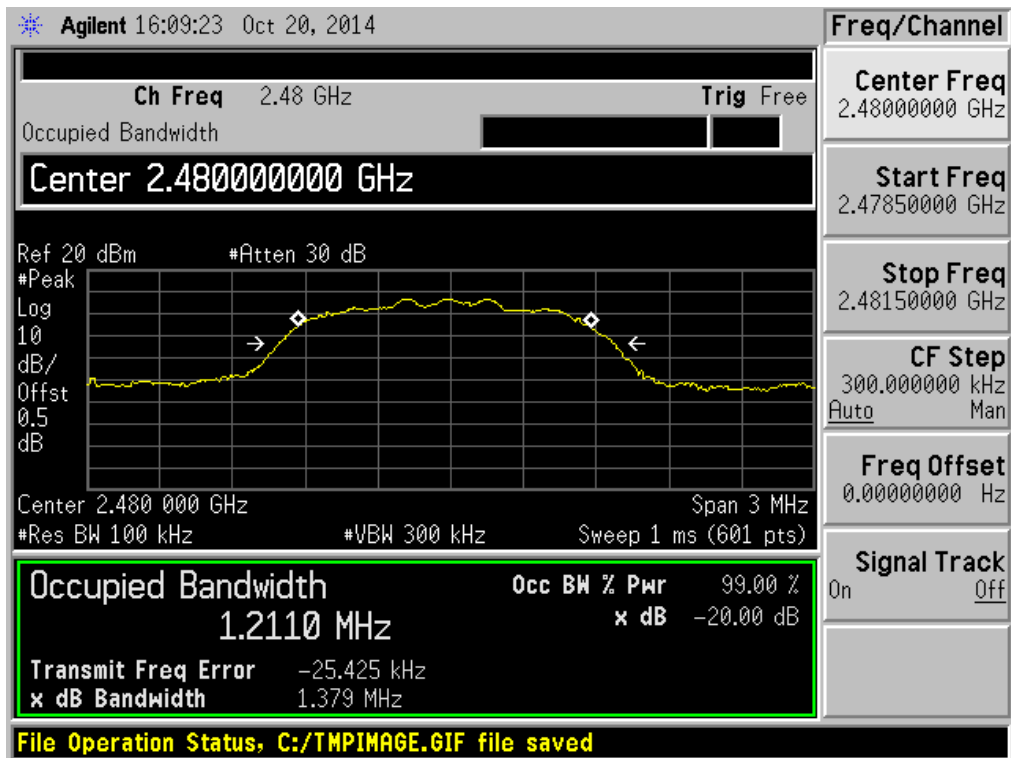


### 8-DPSK MID CHANAEL





## 8-DPSK HIGH CHANNEL



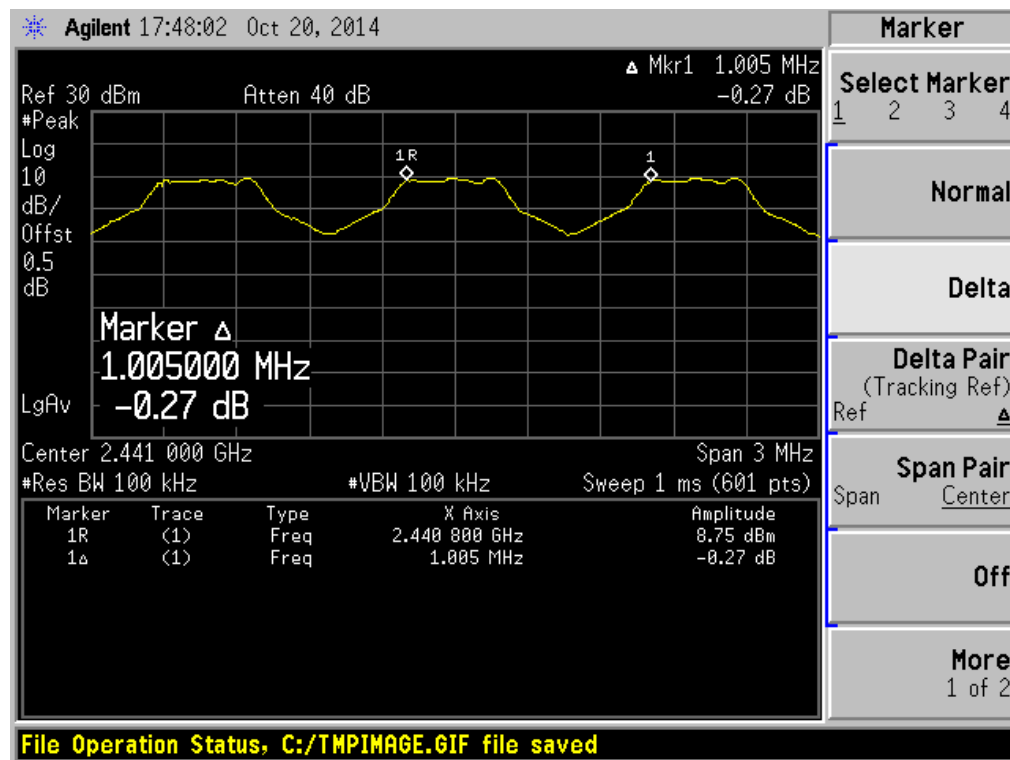
## A.4 Hopping Frequency Separation

### Test Data

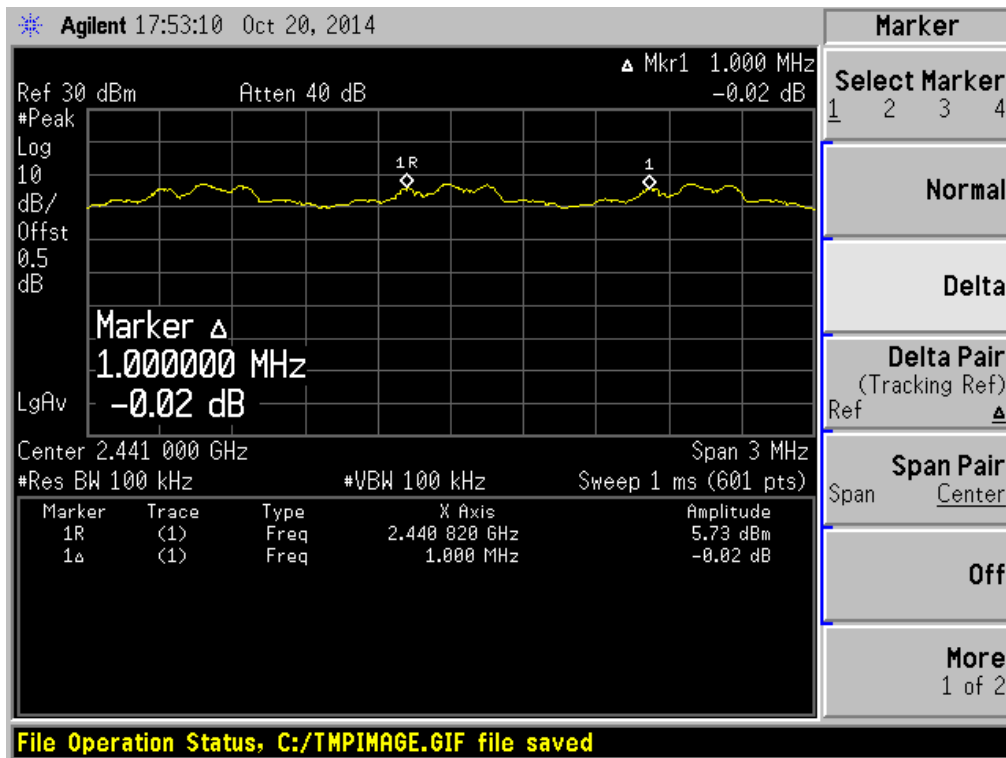
Mode	Frequency separation (MHz)	Max 20 dB Bandwidth (MHz)	Two-thirds of the 20dB bandwidth (MHz)	Verdict
GFSK	1.005	1.117	0.745	PASS
Π/4-DQPSK Mode	1.000	1.377	0.918	PASS
8-DPSK Mode	1.005	1.379	0.919	PASS

### Test plots

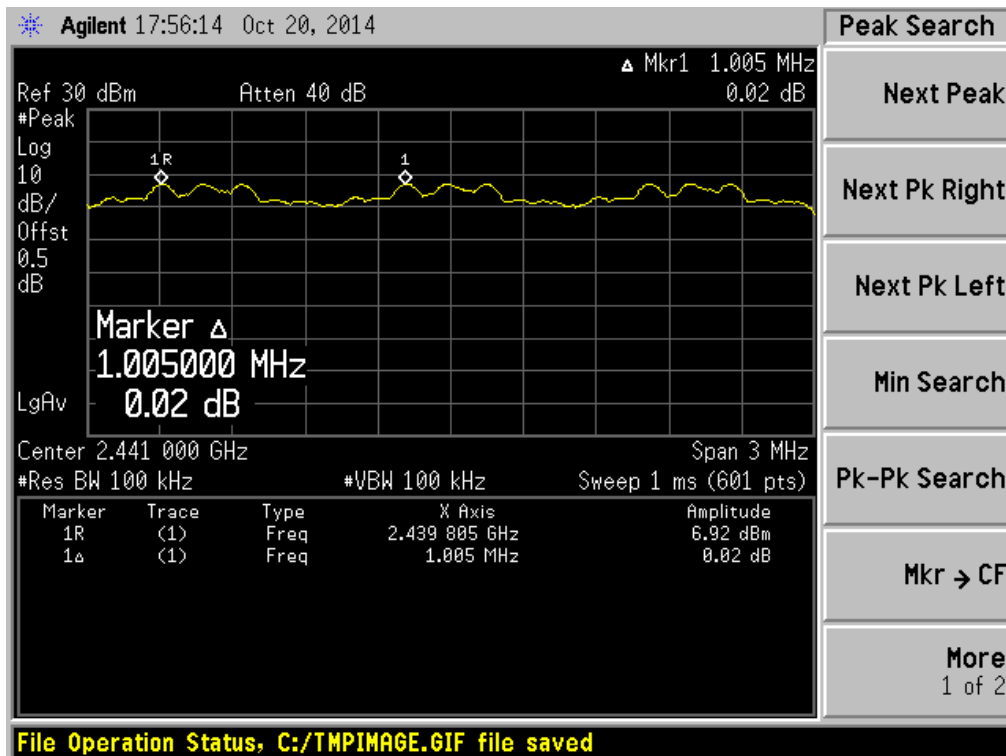
#### GFSK



## 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	0.3781	120.996	0.4	PASS
DH 3	1.607	257.128	0.4	PASS
DH 5	2.887	307.956	0.4	PASS

π/4-DQPSK Mode:

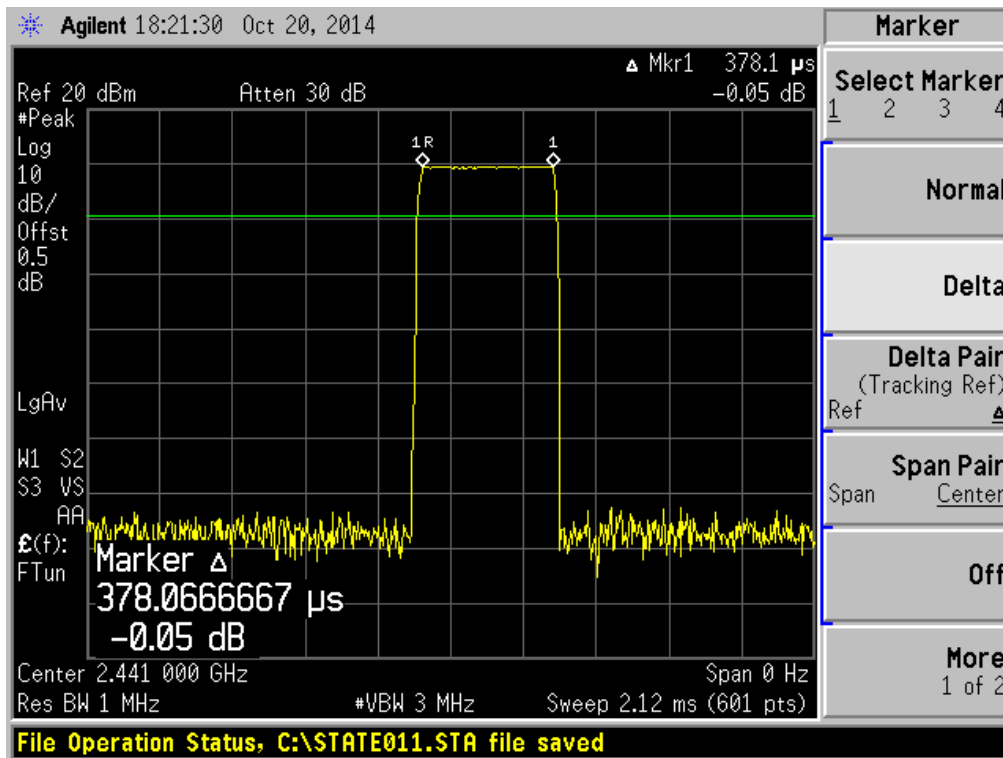
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.3993	127.780	0.4	PASS
DH 3	1.613	258.088	0.4	PASS
DH 5	2.876	306.783	0.4	PASS

8-DPSK Mode:

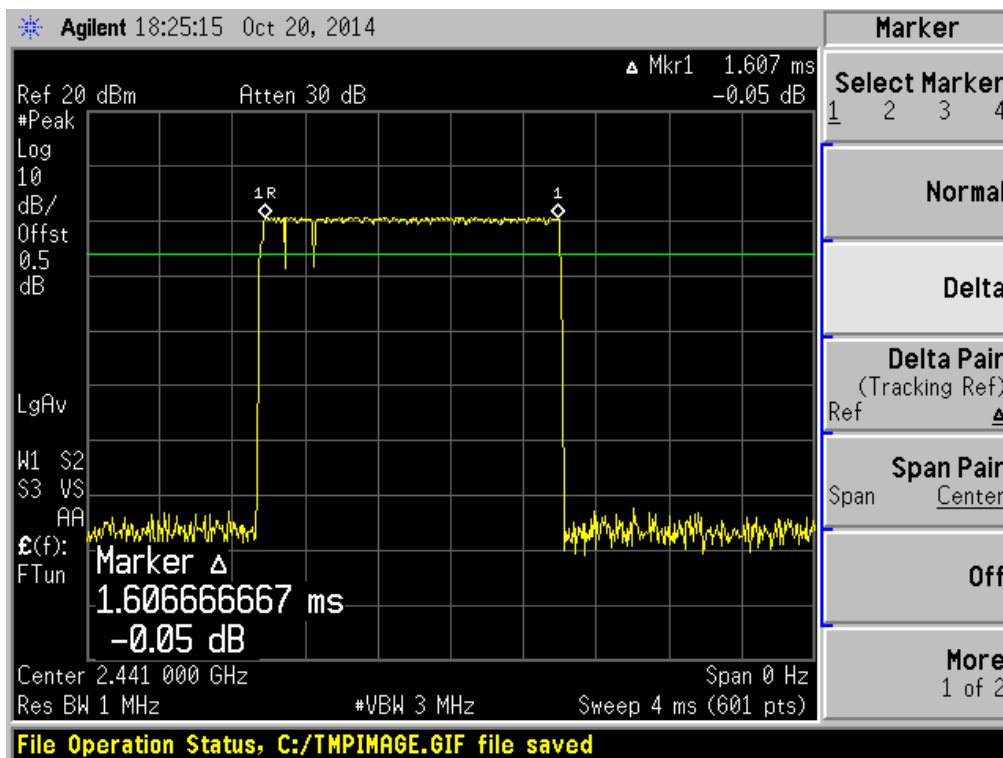
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.3957	126.628	0.4	PASS
DH 3	1.607	257.128	0.4	PASS
DH 5	2.897	309.023	0.4	PASS

## Test Plots

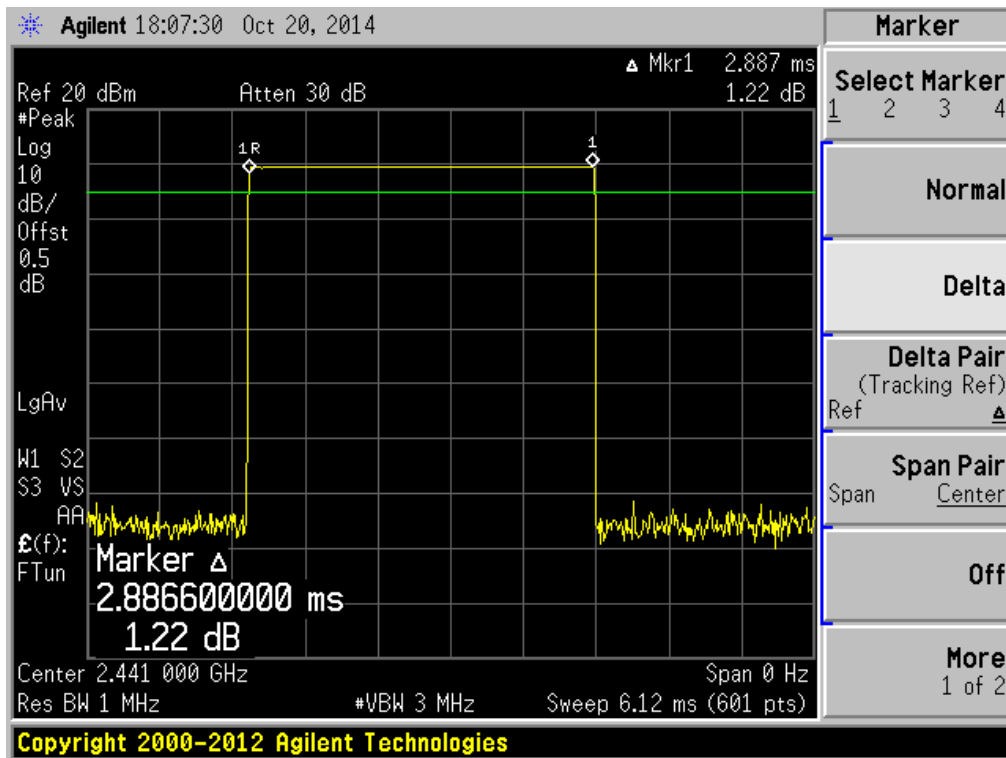
## GFSK DH1



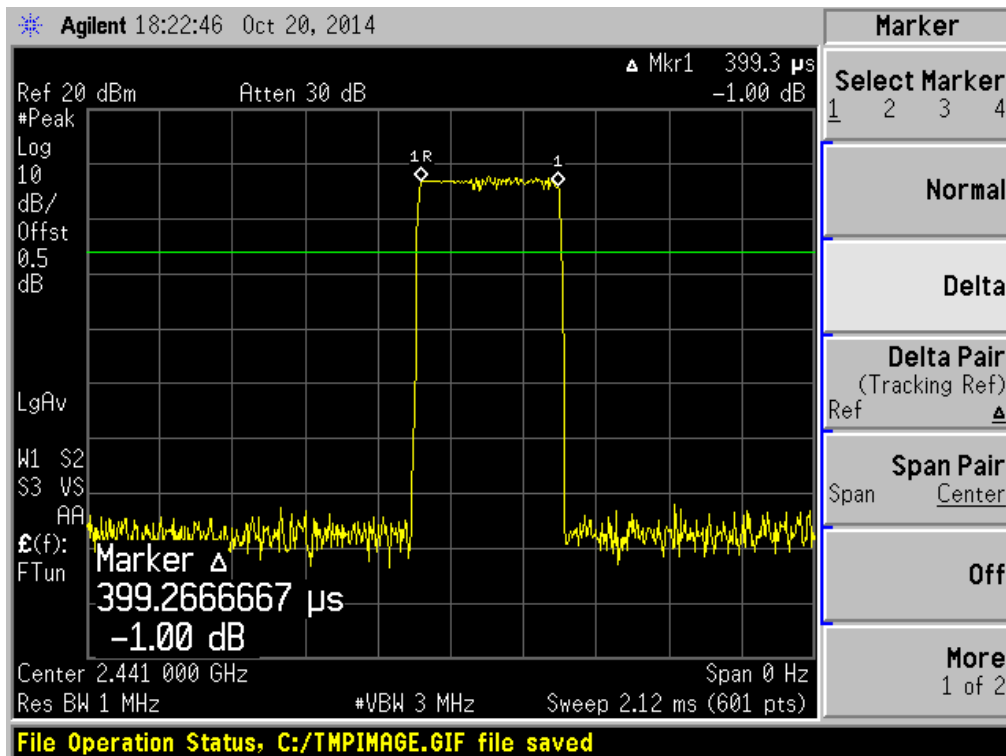
## GFSK DH3



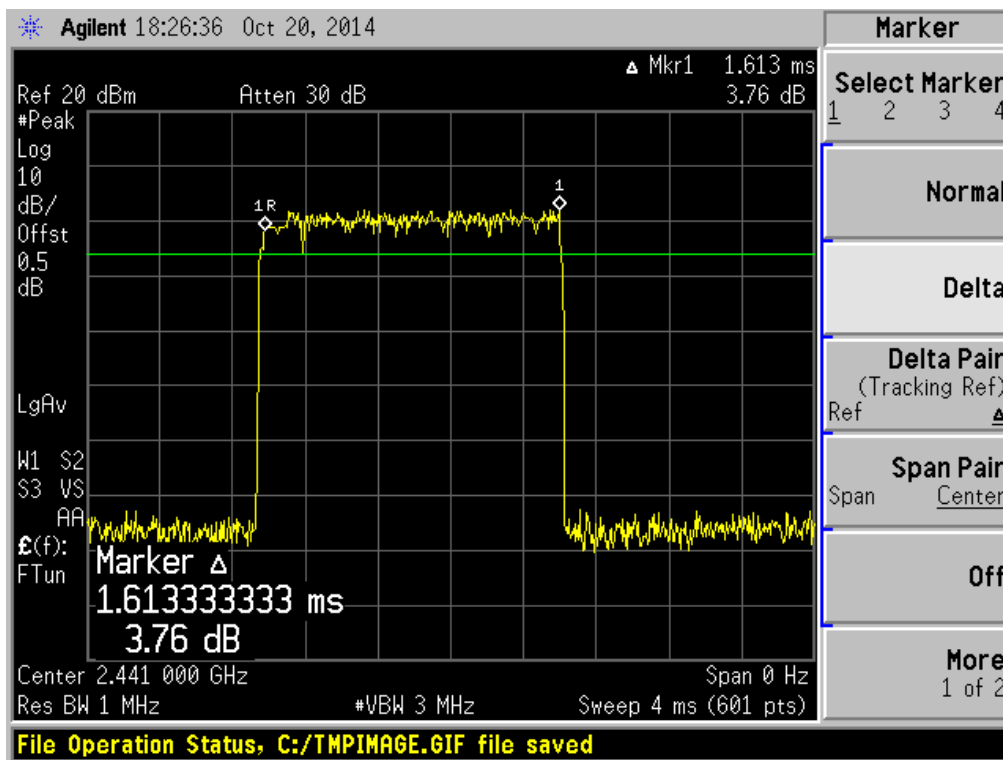
### GFSK DH5



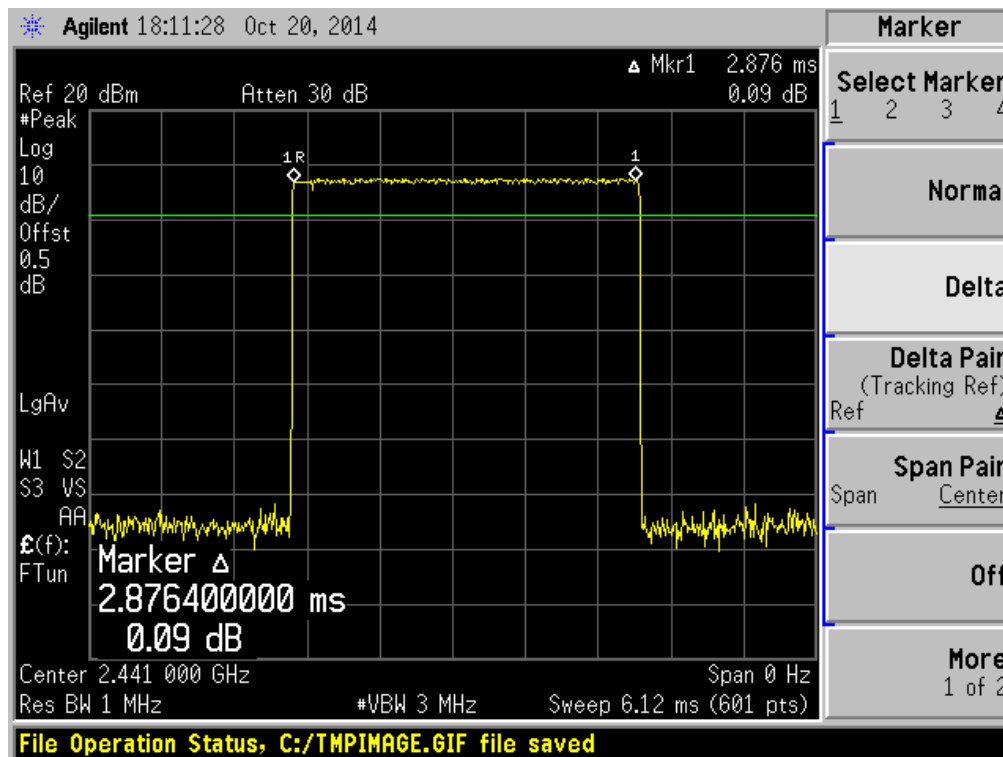
### II/4-DQPSK DH1



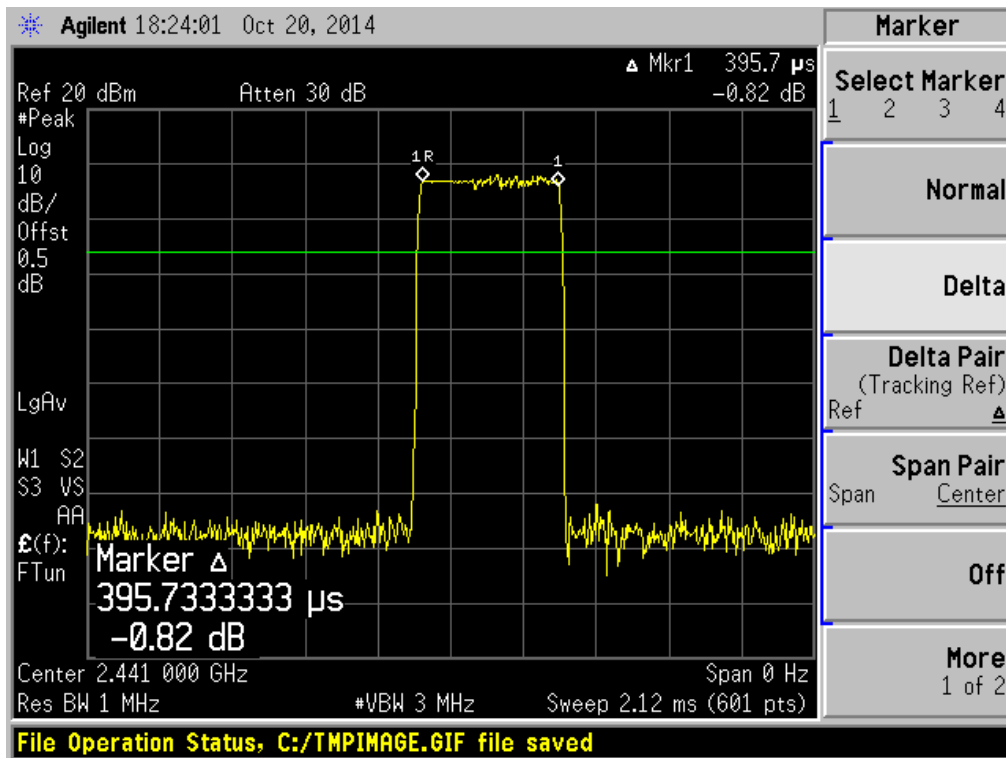
## II/4-DQPSK DH3



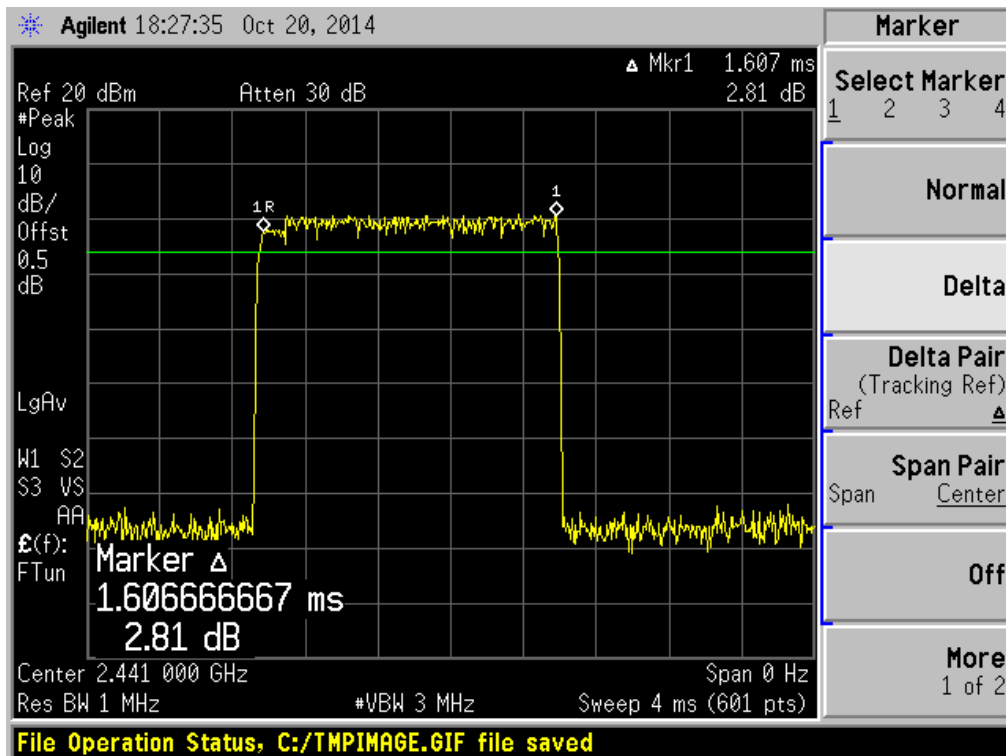
## II/4-DQPSK DH5



### 8-DPSK DH1

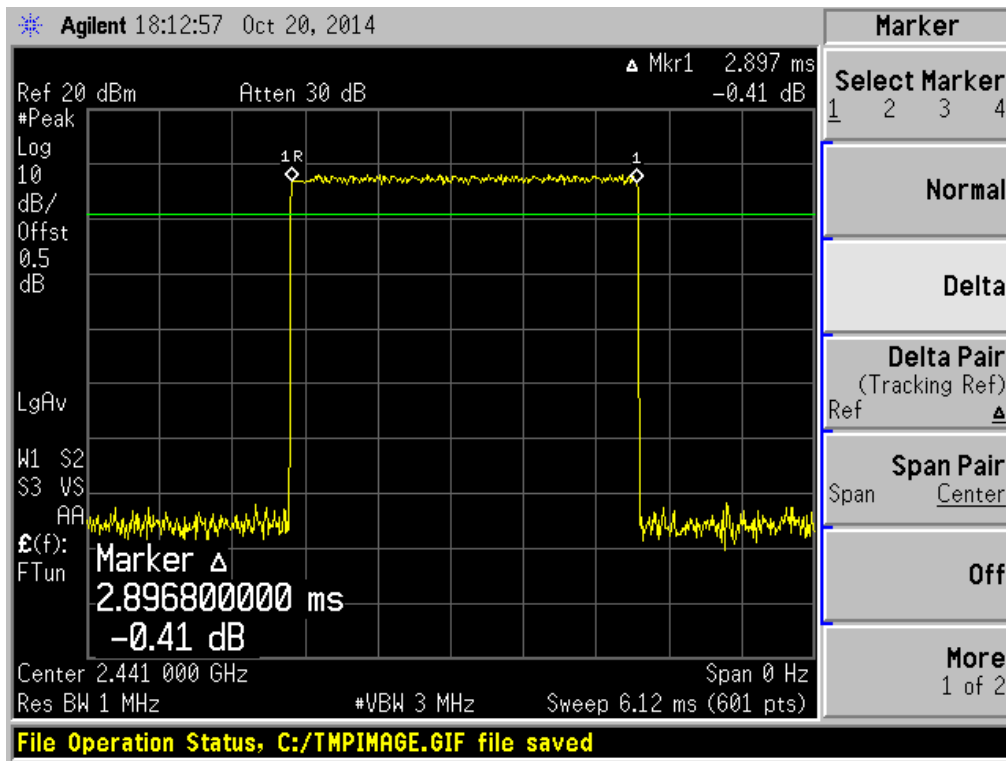


### 8-DPSK DH3





## 8-DPSK DH5



## A.6 Conducted Spurious Emissions

### Test Data

GFSK Mode:

Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
Low	2402	-42.43	7.32	-12.7	PASS
Middle	2441	-43.51	8.67	-11.3	PASS
High	2480	-43.49	8.99	-11.0	PASS

π/4-DQPSK Mode:

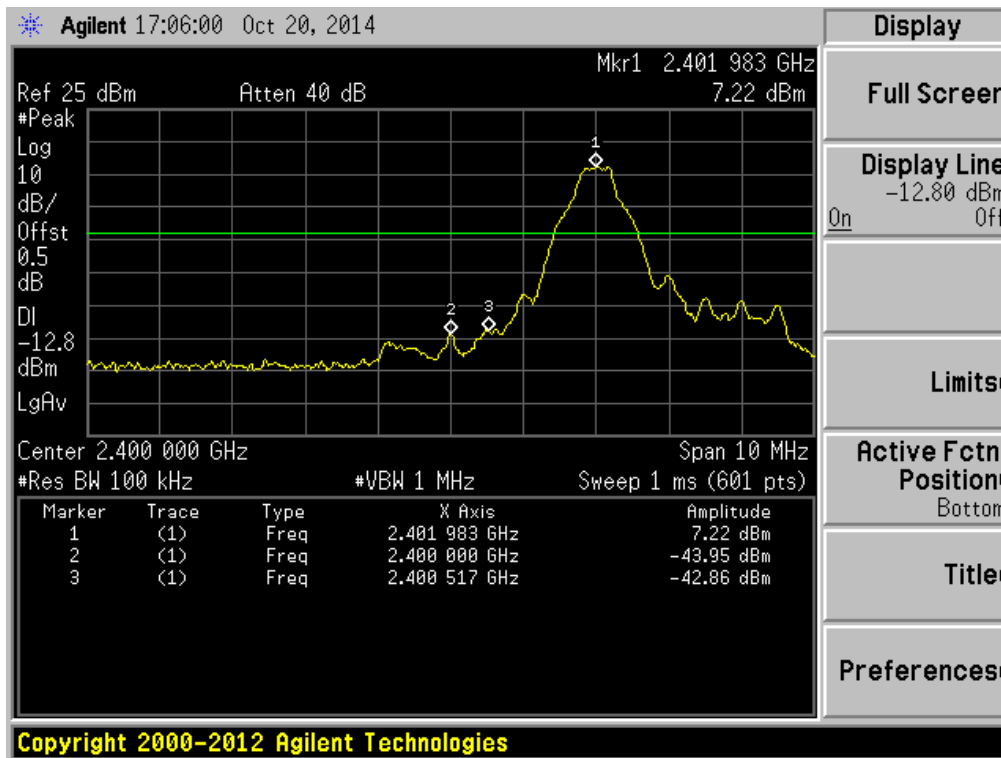
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
Low	2402	-44.80	3.84	-16.2	PASS
Middle	2441	-45.53	6.25	-13.8	PASS
High	2480	-45.72	5.30	-14.7	PASS

8-DPSK Mode:

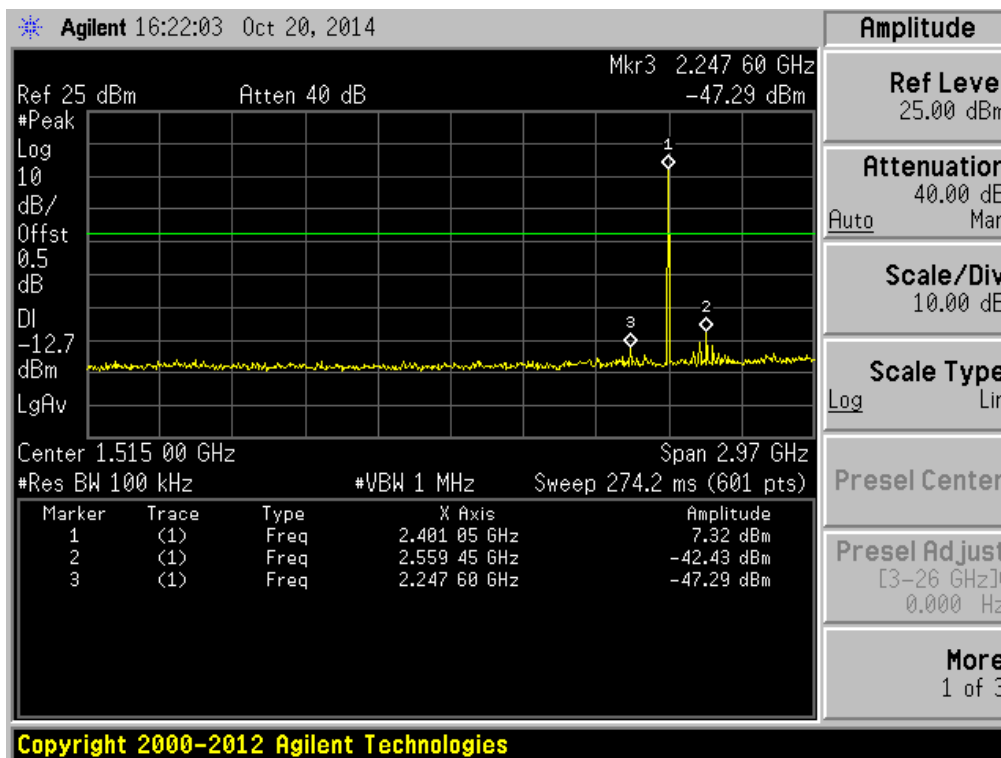
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
			Carrier Level	Calculated 20 dBc Limit	
Low	2402	-44.49	3.79	-16.2	PASS
Middle	2441	-45.27	5.82	-14.2	PASS
High	2480	-44.86	5.19	-14.8	PASS

## Test Plots

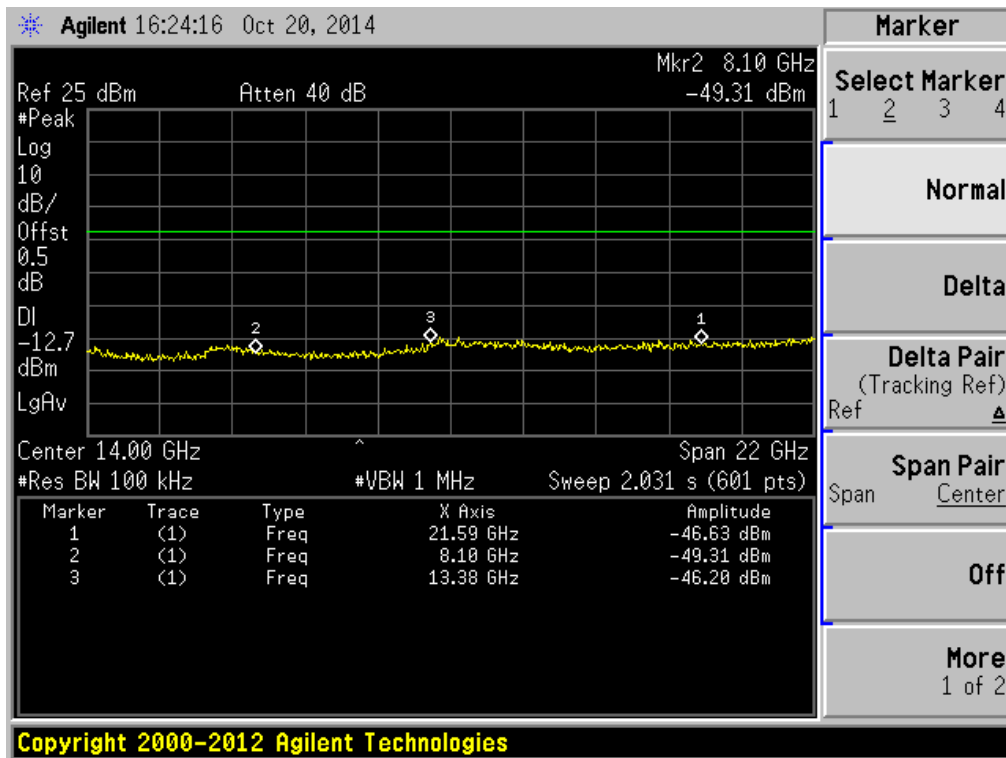
## GFSK LOW CHANNEL , BANDEDGE



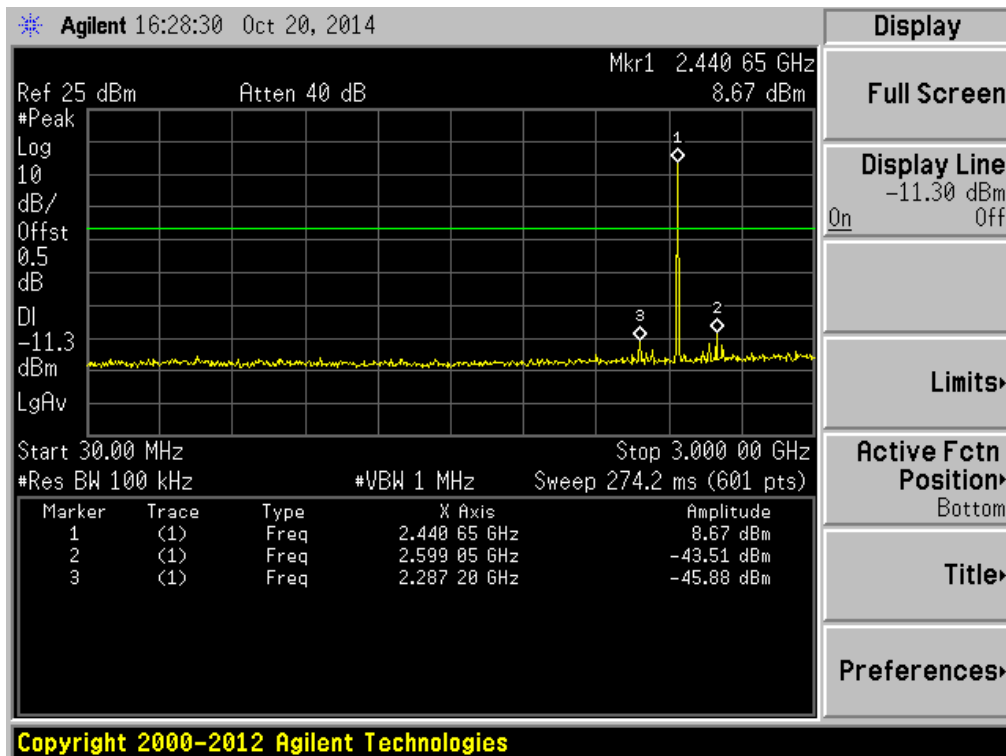
## GFSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



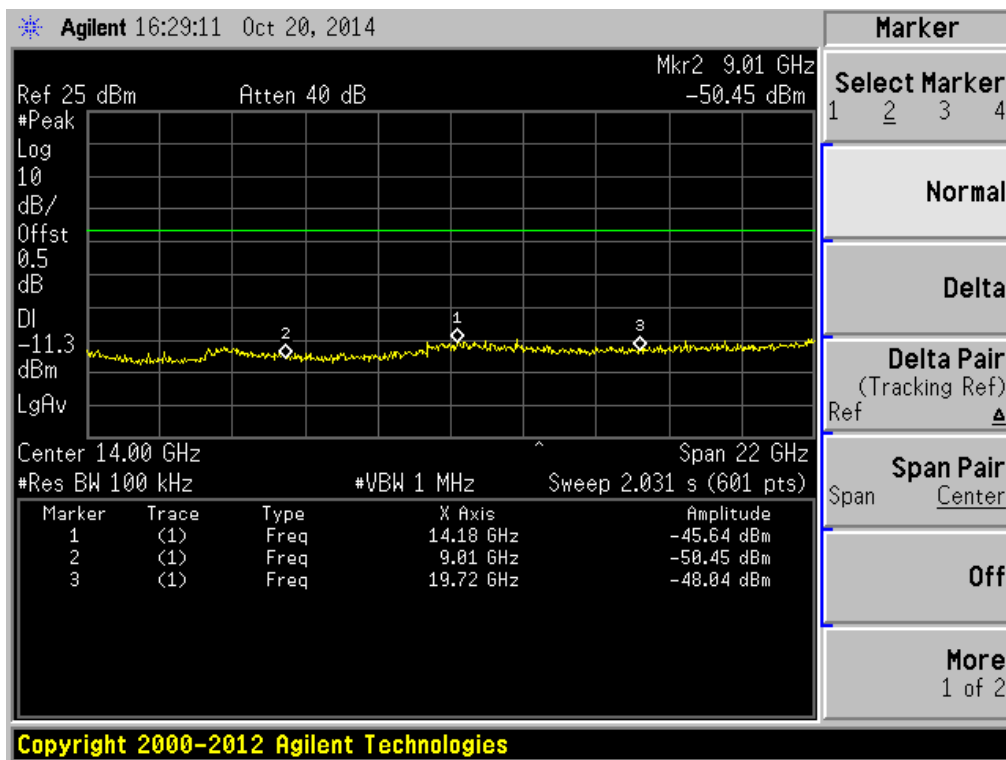
### GFSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



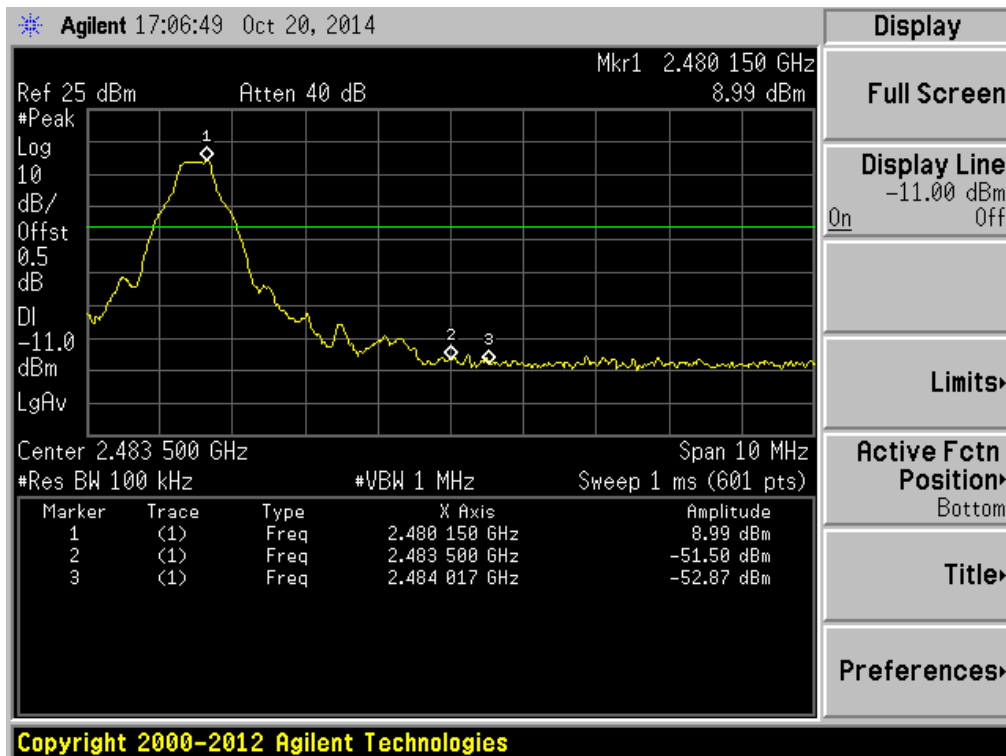
### GFSK MID CHANNEL , SPURIOUS 30MHz~3GHz



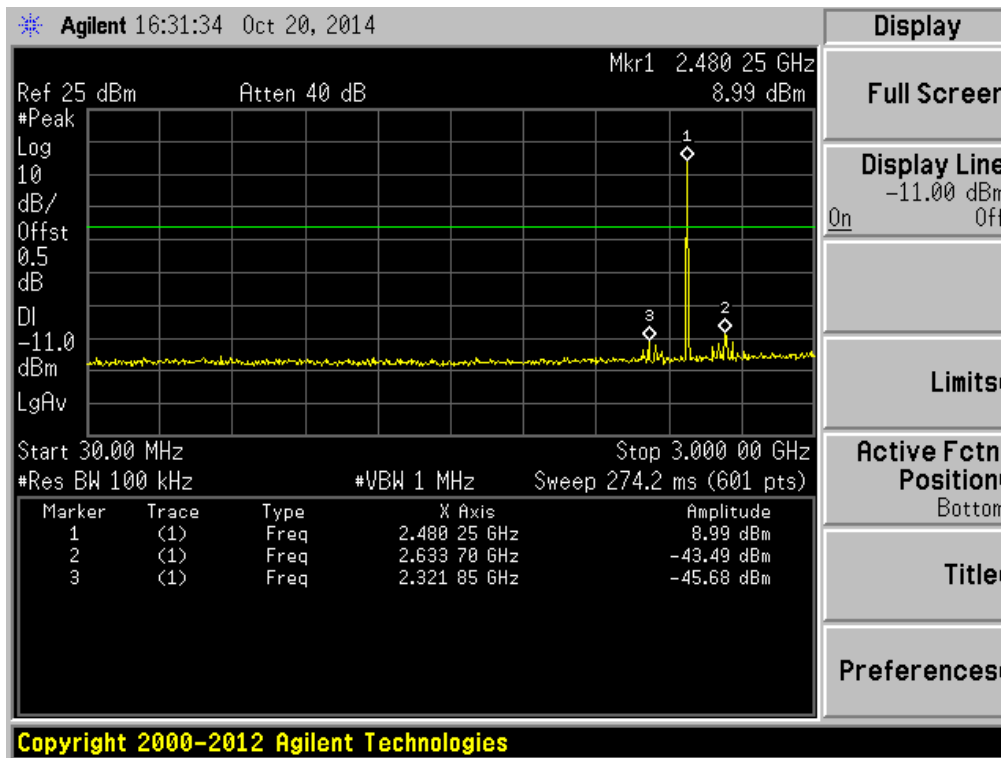
## GFSK MID CHANNEL , SPURIOUS 3GHz~25GHz



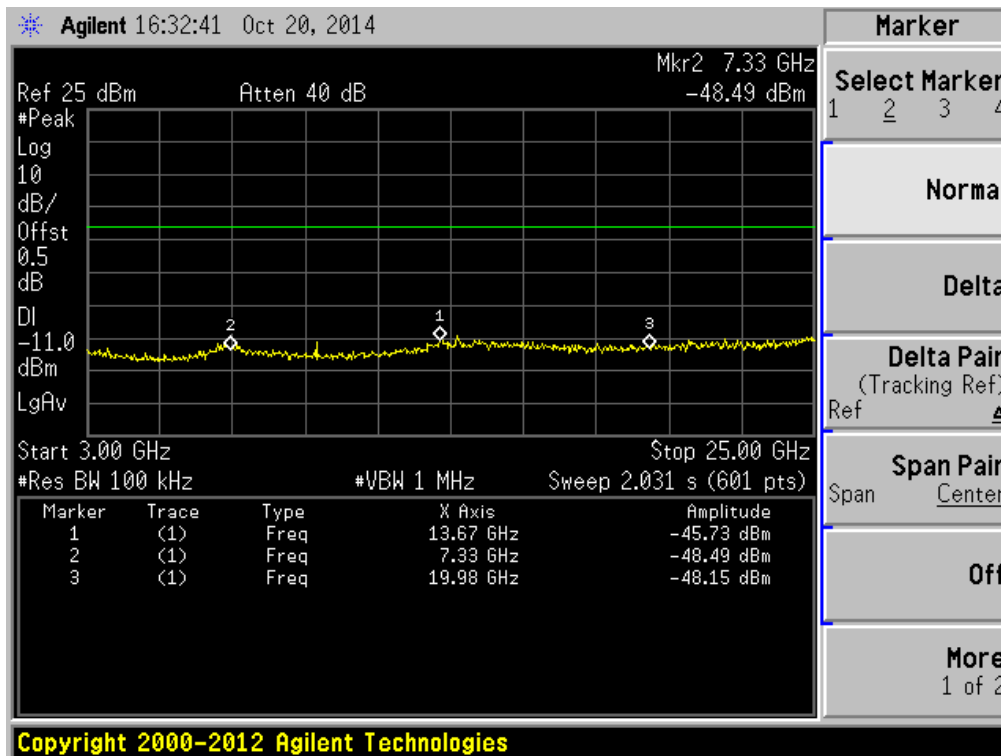
## GFSK HIGH CHANNEL , BANDEDGE



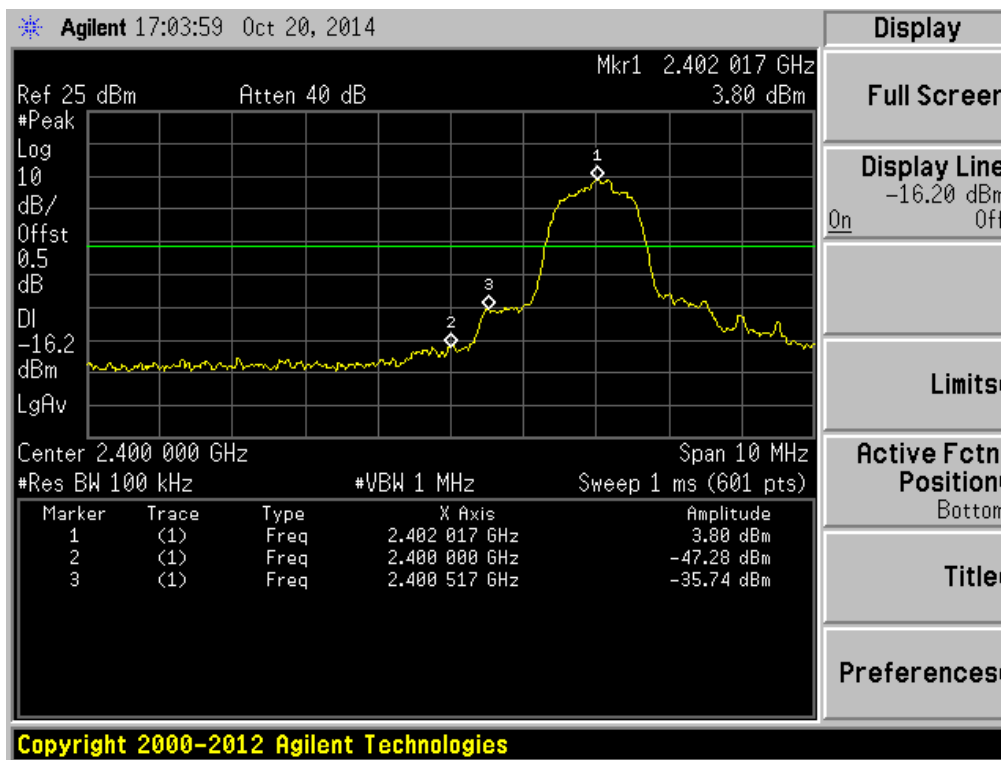
## GFSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



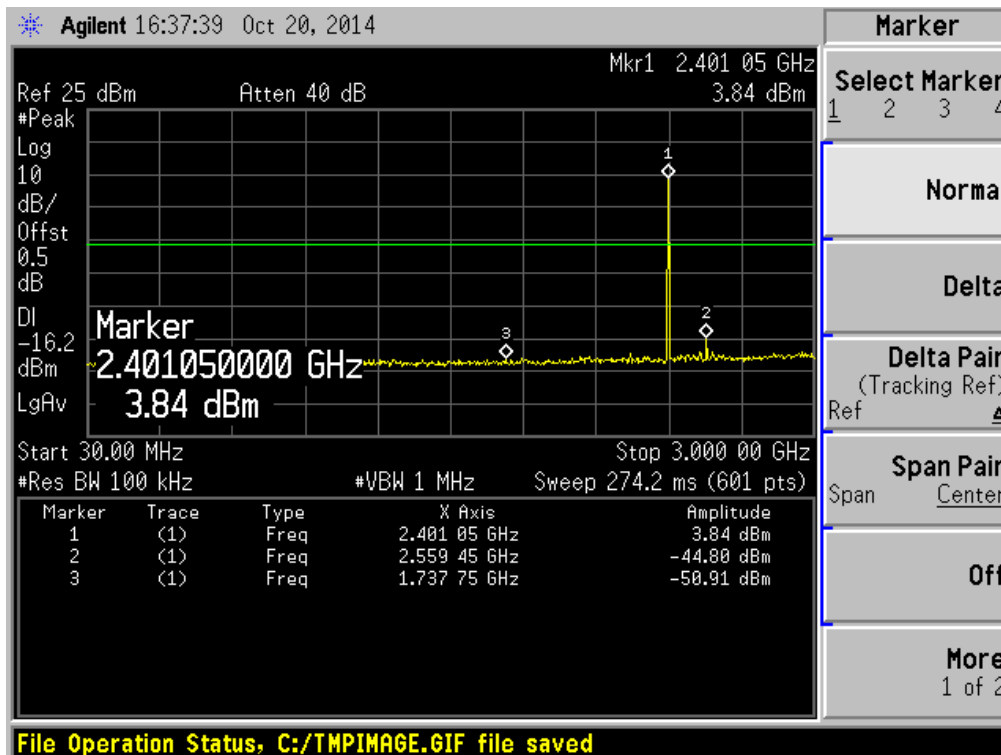
## GFSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



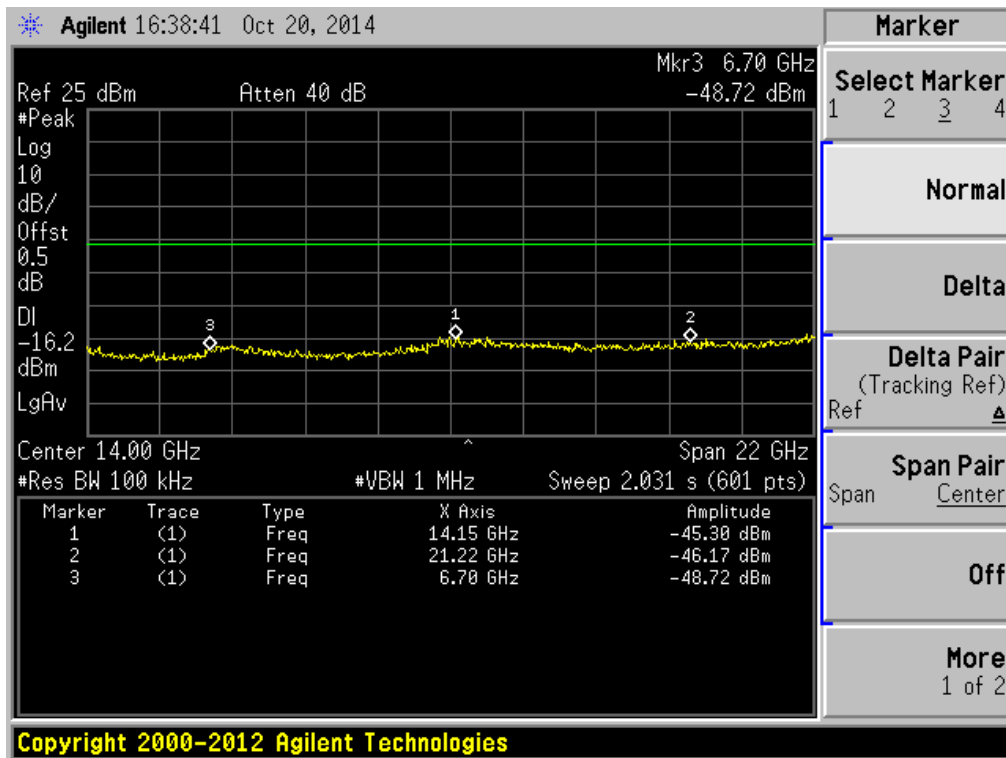
## II/4-DQPSK LOW CHANNEL , BANDEDGE



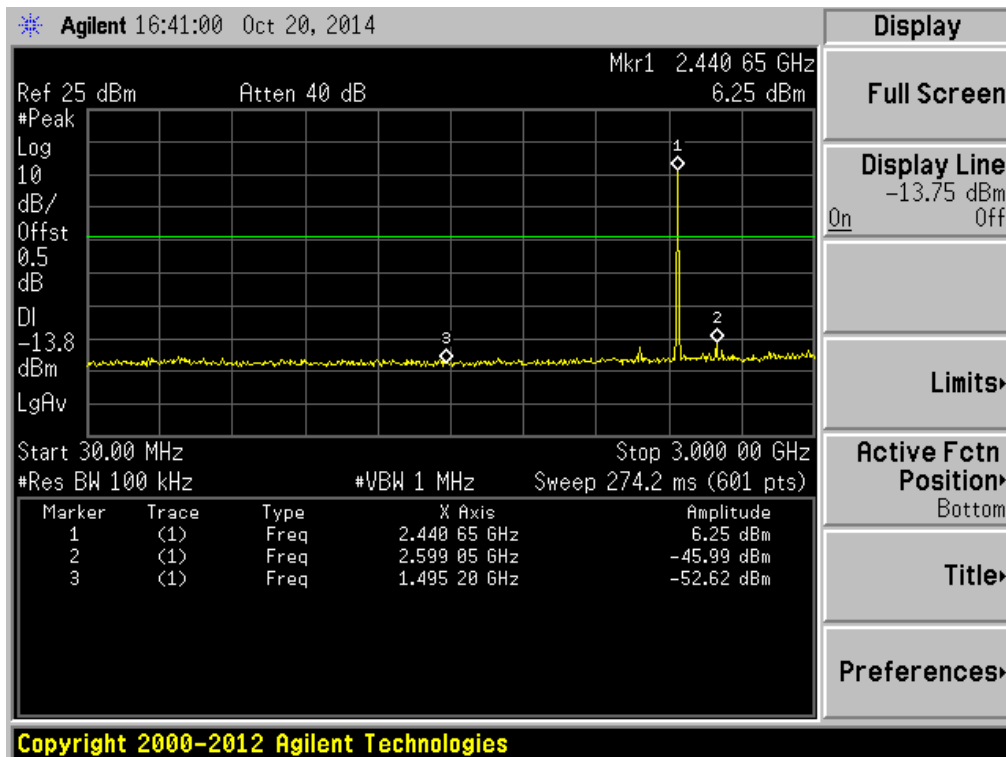
## II/4-DQPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



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

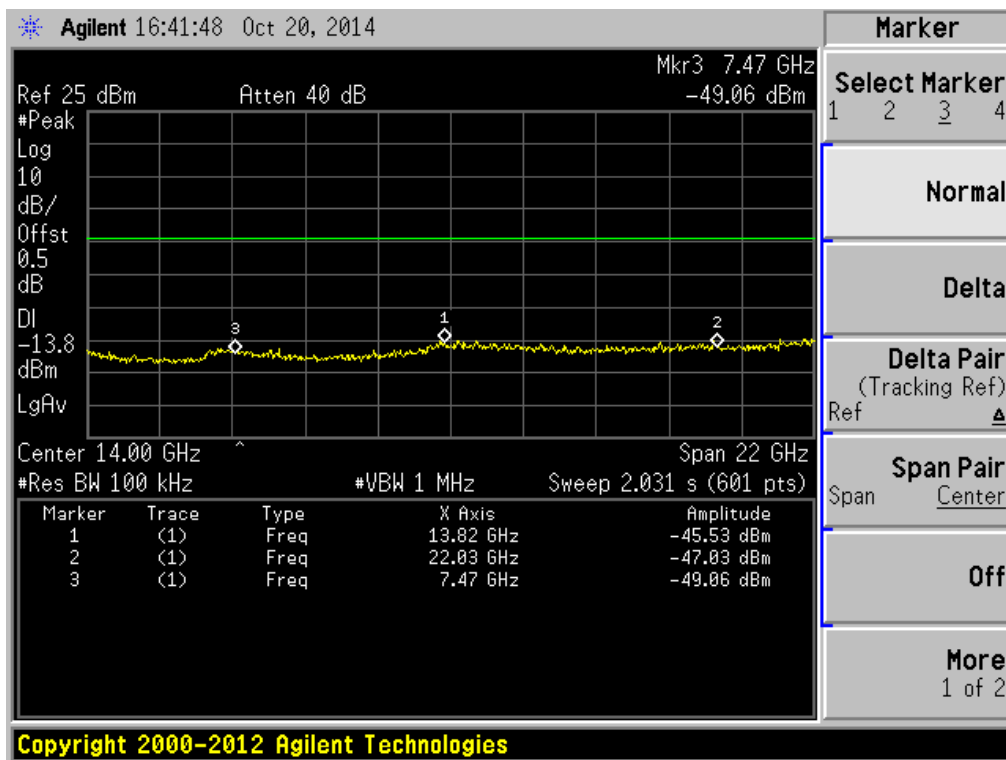


## II/4-DQPSK MID CHANNEL , SPURIOUS 30MHz~3GHz

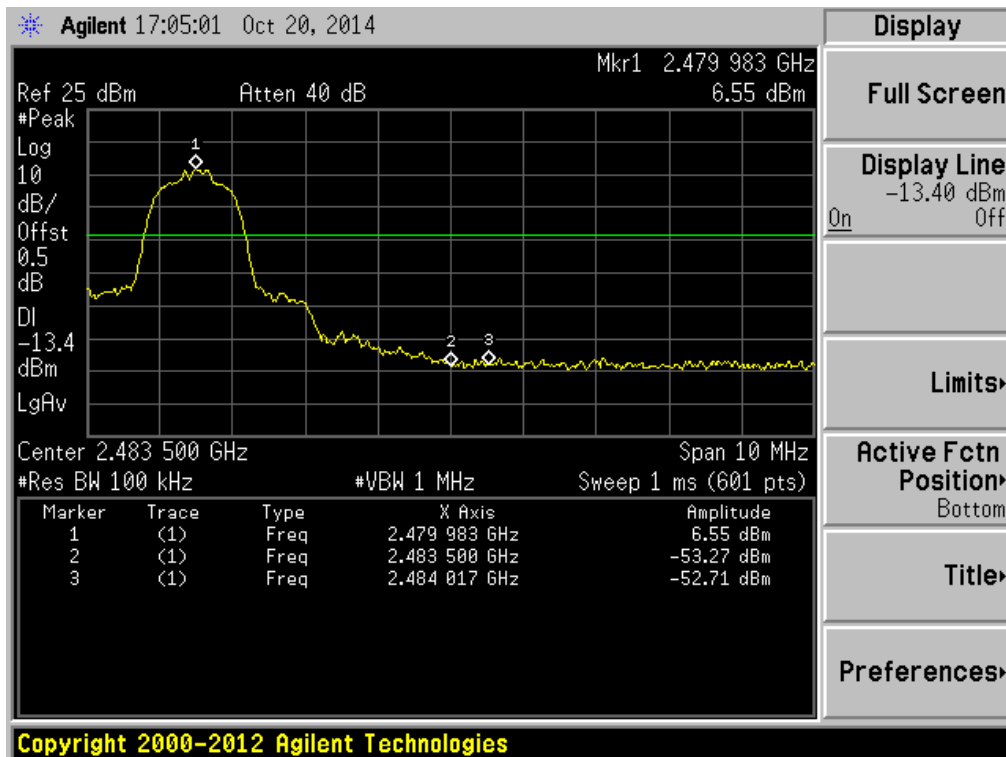




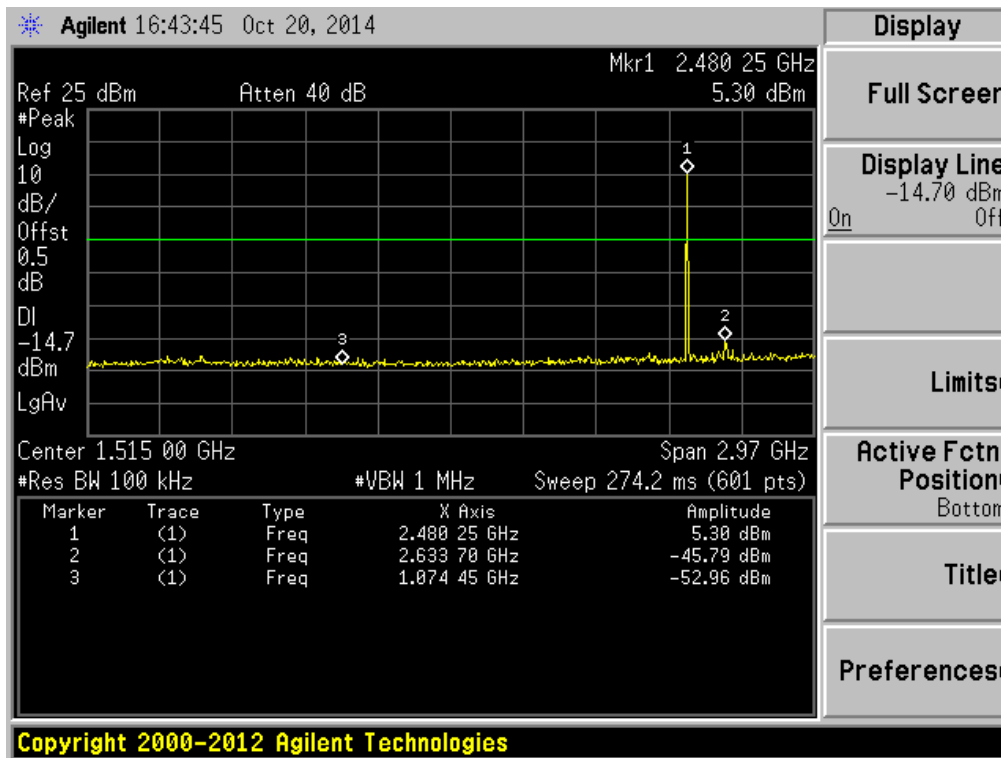
## II/4-DQPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



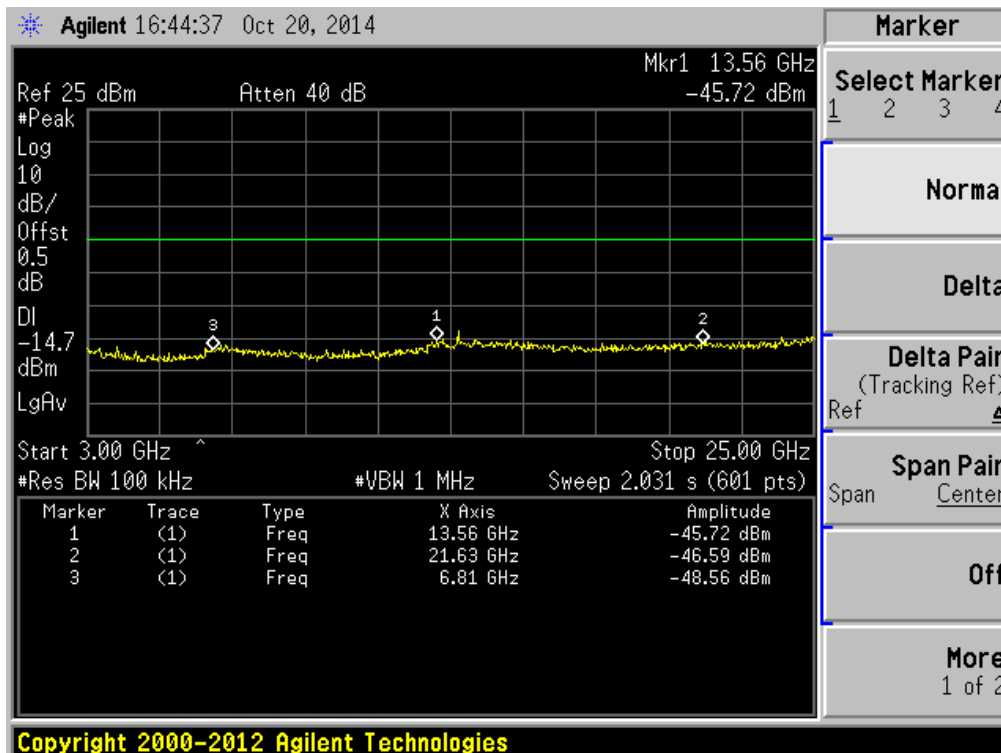
## II/4-DQPSK HIGH CHANNEL , BANDEDGE



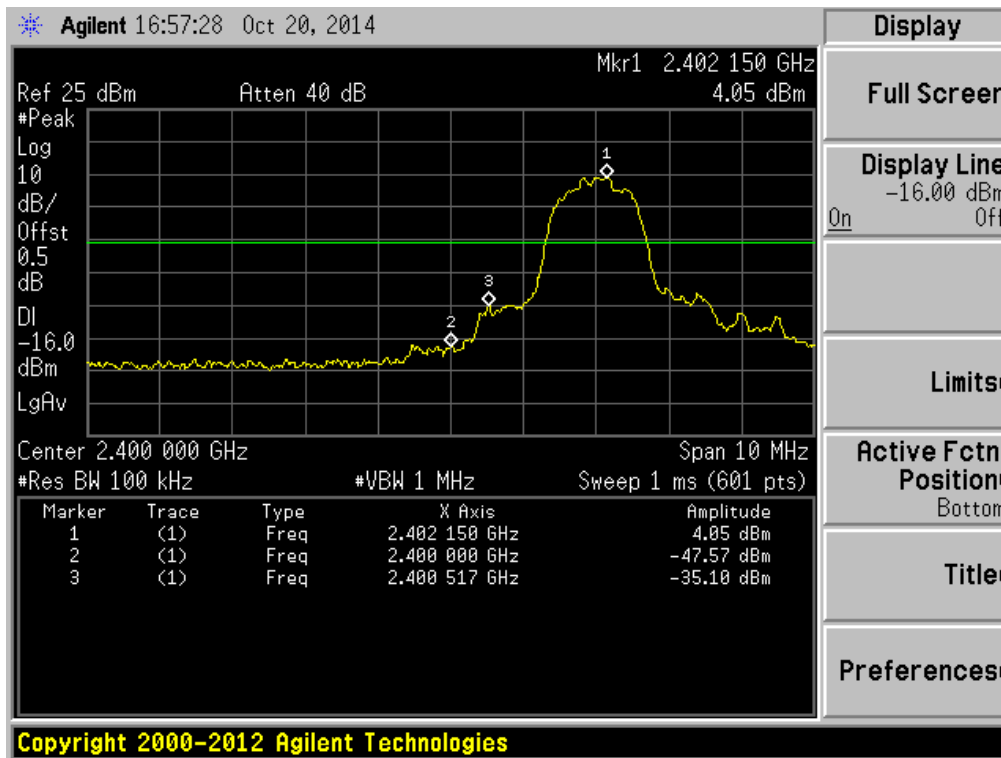
## II/4-DQPSK HIGH CHANNEL , SPURIOUS 30MHz~3GHz



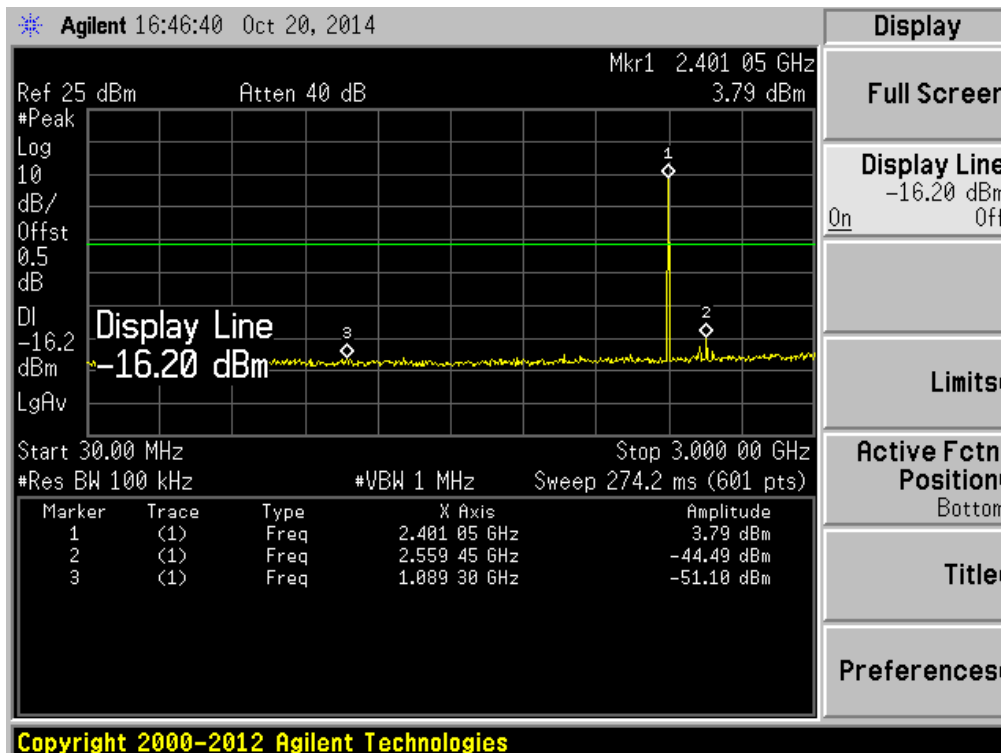
## II/4-DQPSK HIGH CHANNEL , SPURIOUS 3GHz~25GHz



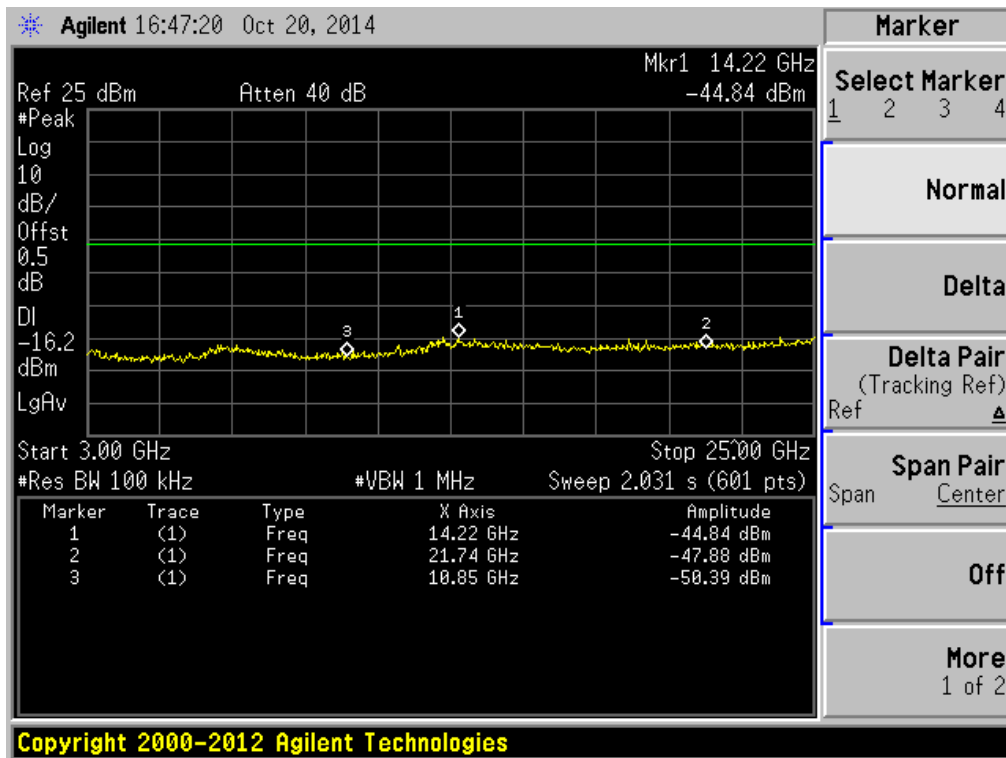
### 8-DPSK LOW CHANNEL , BANDEDGE



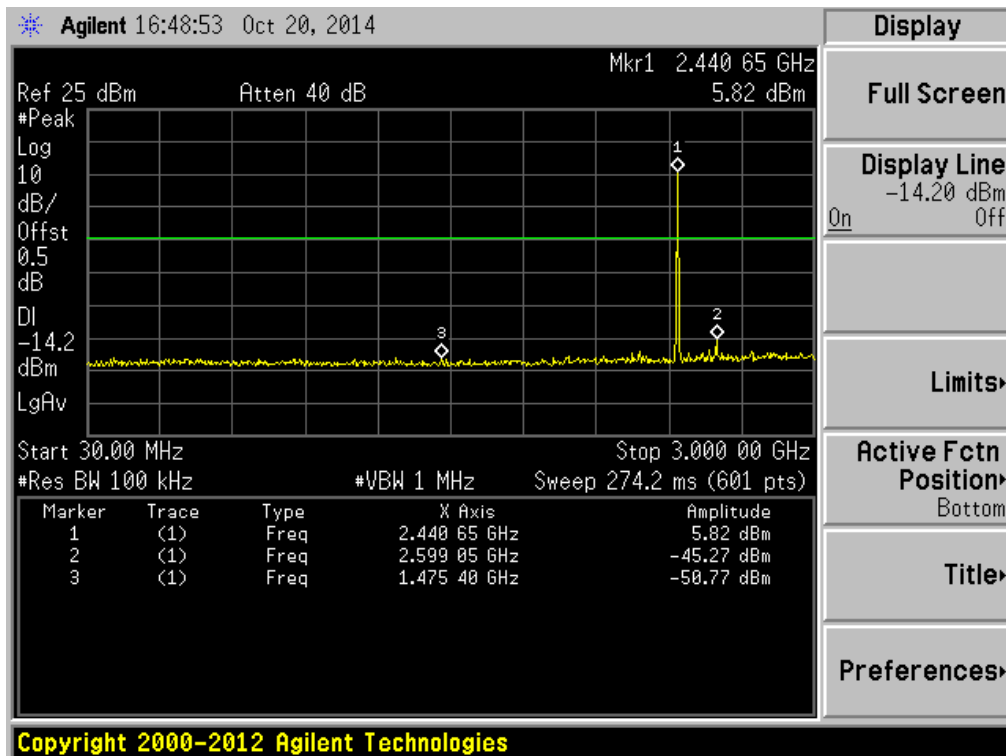
### 8-DPSK LOW CHANNEL , SPURIOUS 30MHz~3GHz



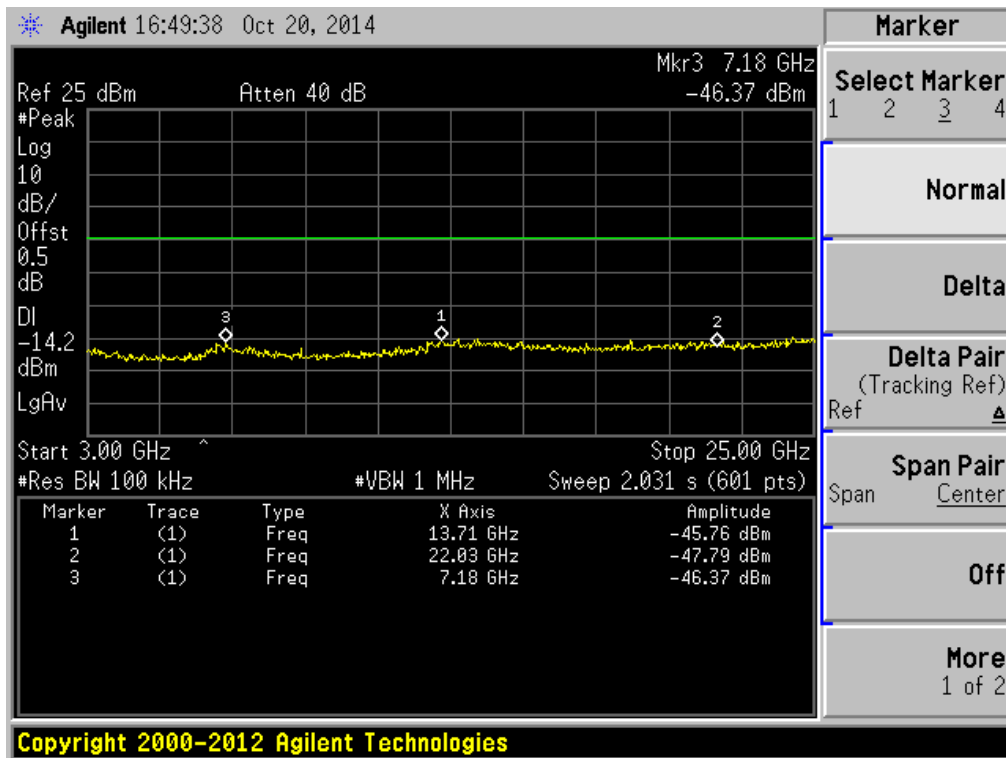
## 8-DPSK LOW CHANNEL , SPURIOUS 3GHz~25GHz



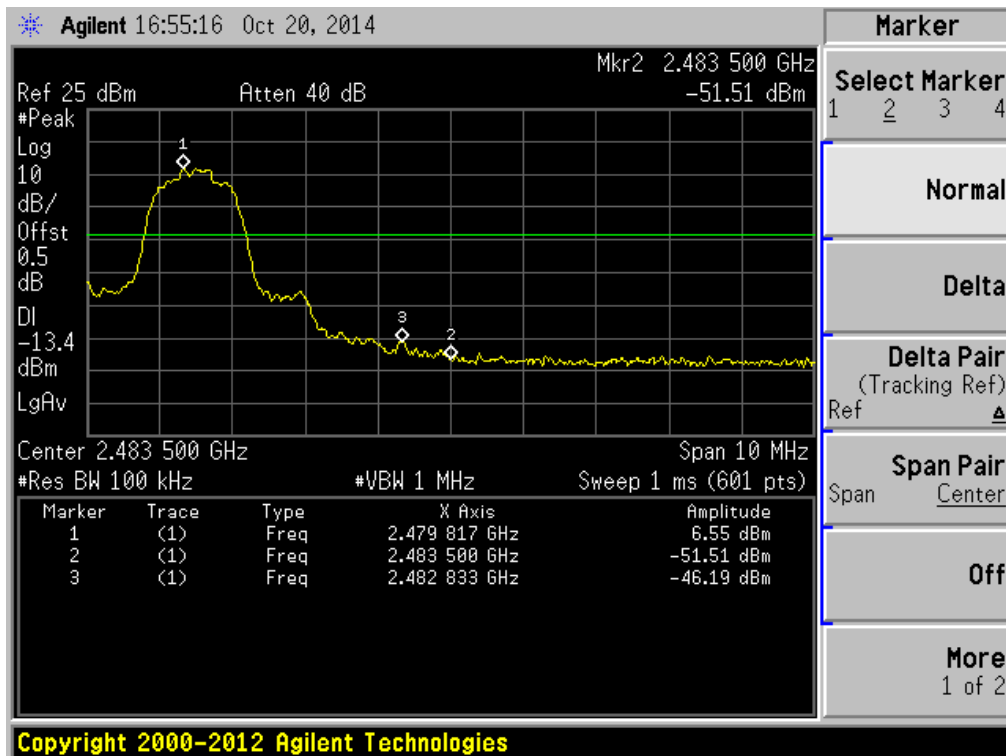
## 8-DPSK MID CHANNEL , SPURIOUS 30MHz~3GHz



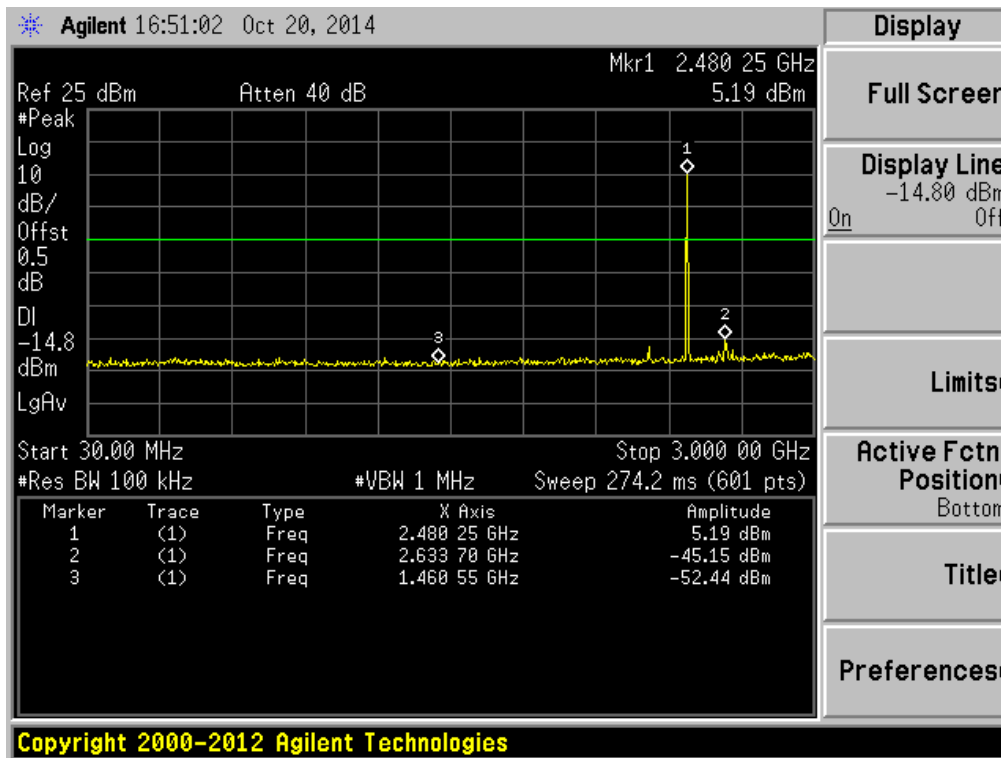
### 8-DPSK MID CHANNEL , SPURIOUS 3GHz~25GHz



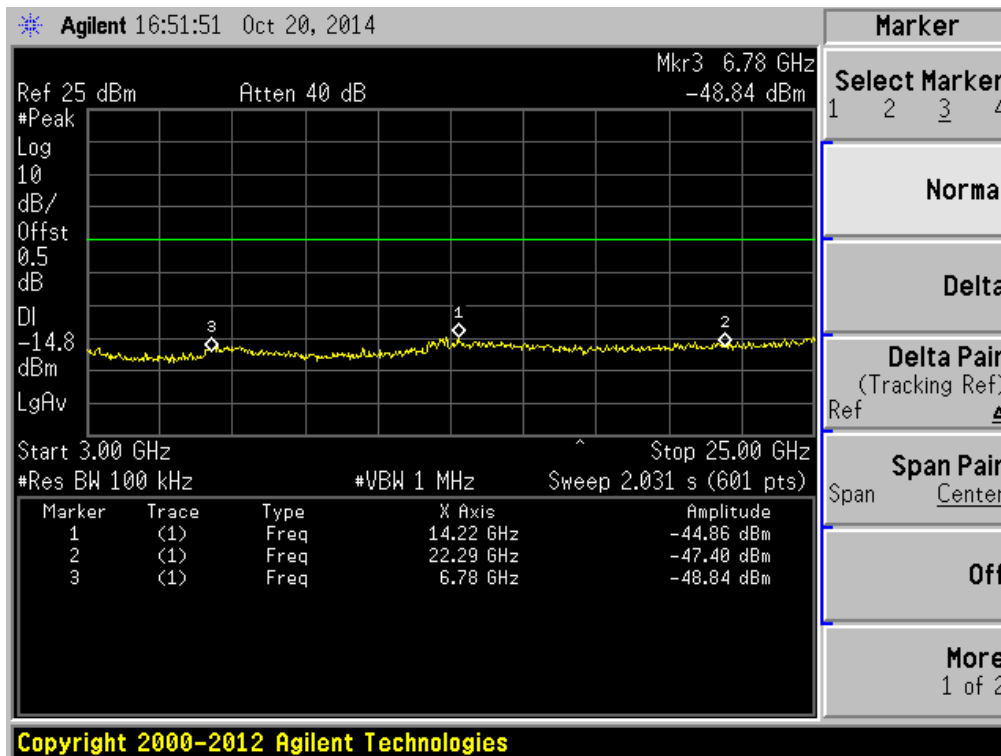
### 8-DPSK HIGH CHANNEL , BANDEDGE



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



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

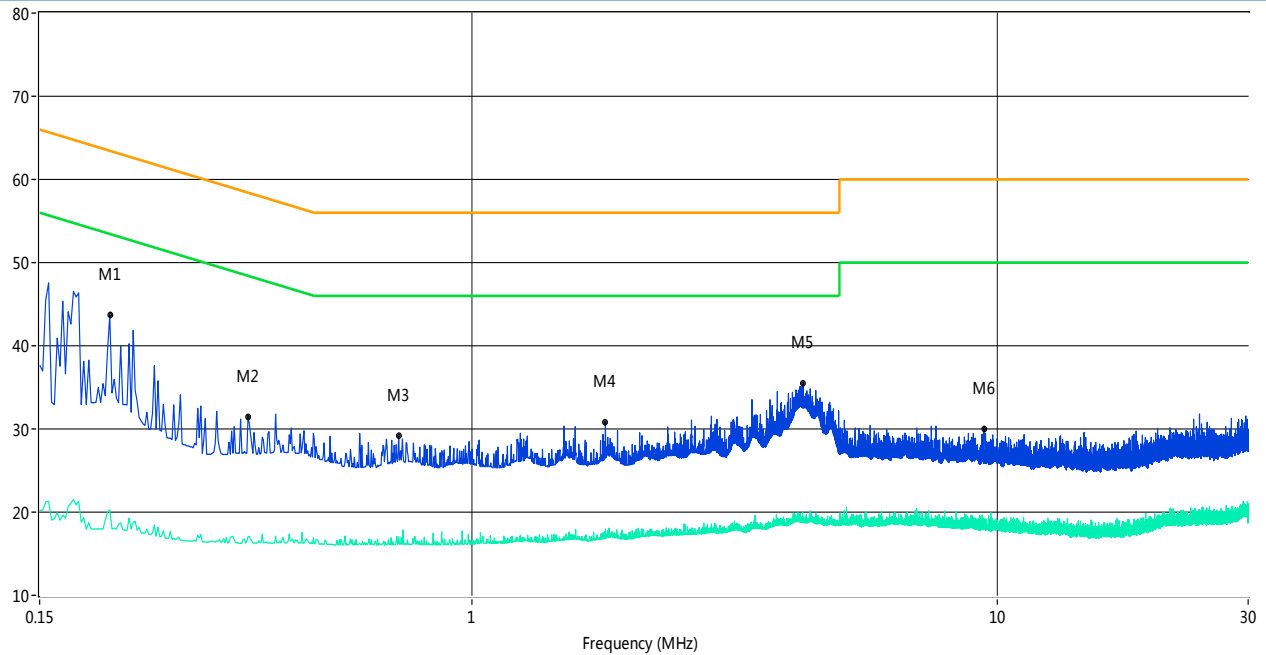


## A.7 Conducted Emissions

### Test Data and Plots

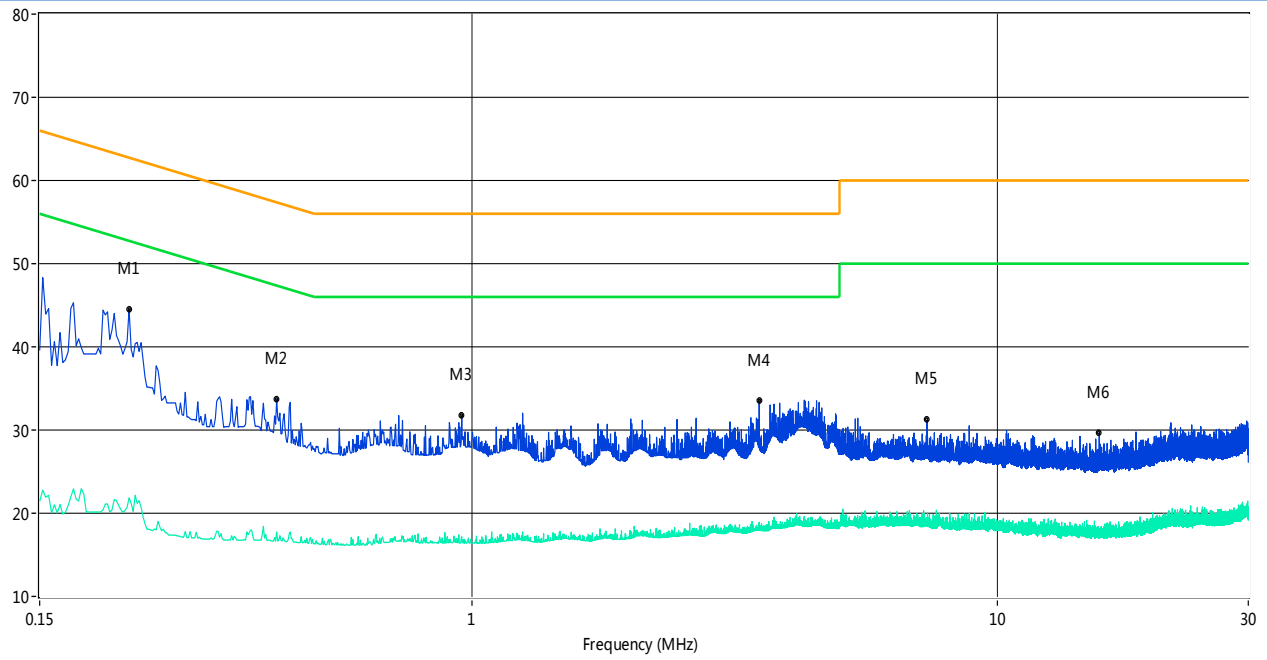
Note: All configurations have been tested, only the worst configuration (GFSK High Channel) shown here.

GFSK HIGH CHANNEL 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
0.20	43.7	--	20.3	10.00	64.5	54.5	34.20	L Line	PASS
0.37	31.5	--	17.1	10.00	59.6	49.6	32.50	L Line	PASS
0.72	29.2	--	17.0	10.00	56.0	46.0	29.00	L Line	PASS
1.79	30.8	--	18.0	10.00	56.0	46.0	28.00	L Line	PASS
4.26	35.5	--	18.7	10.00	56.0	46.0	27.30	L Line	PASS
9.41	30.0	--	18.2	10.00	60.0	50.0	31.80	L Line	PASS

## GFSK HIGH CHANNEL PHASE N



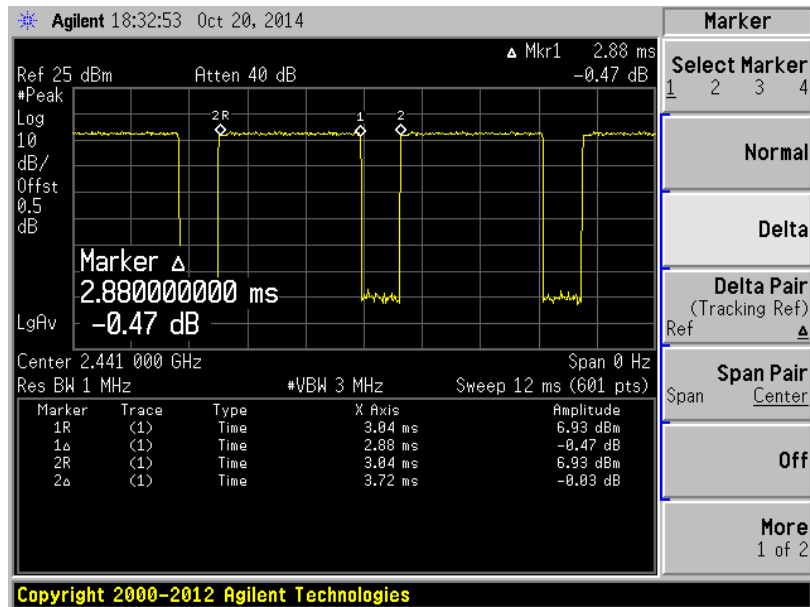
Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.22	44.5	--	21.8	10.00	63.9	53.9	32.10	N Line	PASS
0.42	33.7	--	17.7	10.00	58.2	48.2	30.50	N Line	PASS
0.95	31.8	--	17.2	10.00	56.0	46.0	28.80	N Line	PASS
3.52	33.6	--	18.9	10.00	56.0	46.0	27.10	N Line	PASS
7.34	31.2	--	19.2	10.00	60.0	50.0	30.80	N Line	PASS
15.61	29.7	--	17.7	10.00	60.0	50.0	32.30	N Line	PASS



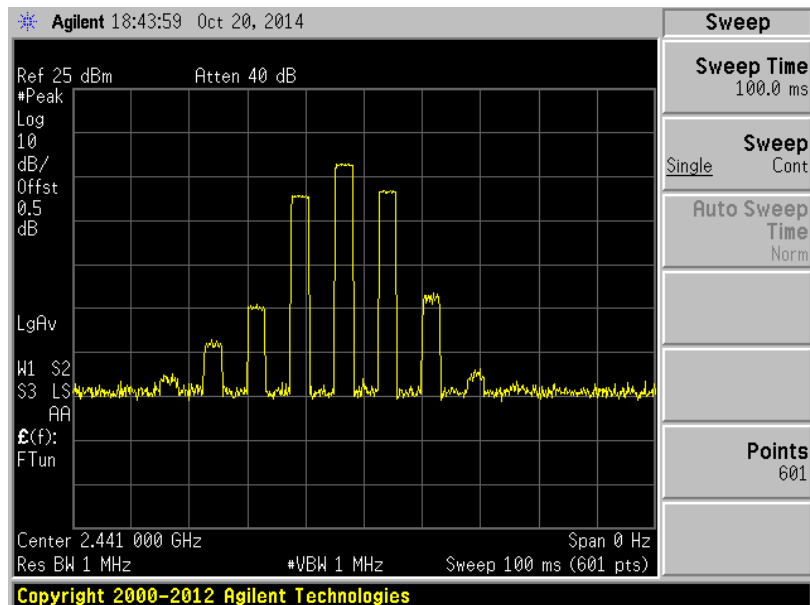
## A.8 Radiated Emission

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.

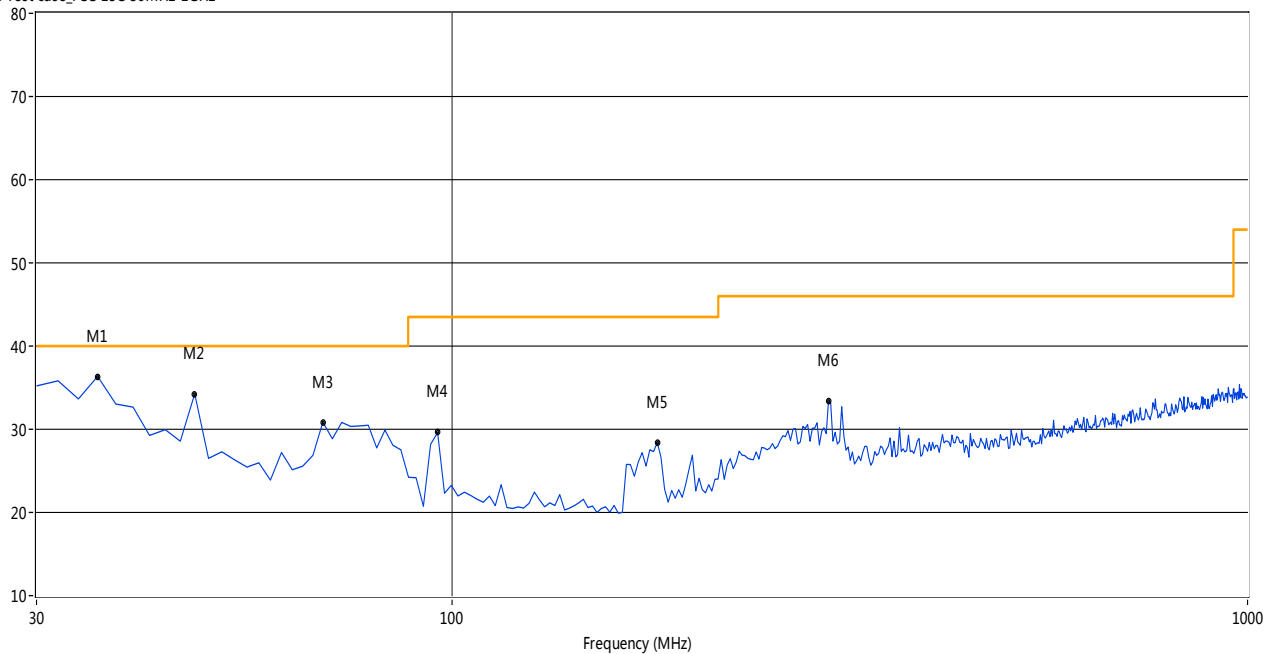
Note 2: For the test data above 1GHz, According the ANSI C63.4-2009, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: 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.

Note 4: All configurations have been tested, only the worst configuration (GFSK High Channel) shown here.

#### GFSK HIGH CHANNEL 30MHz to 1GHz, ANT V

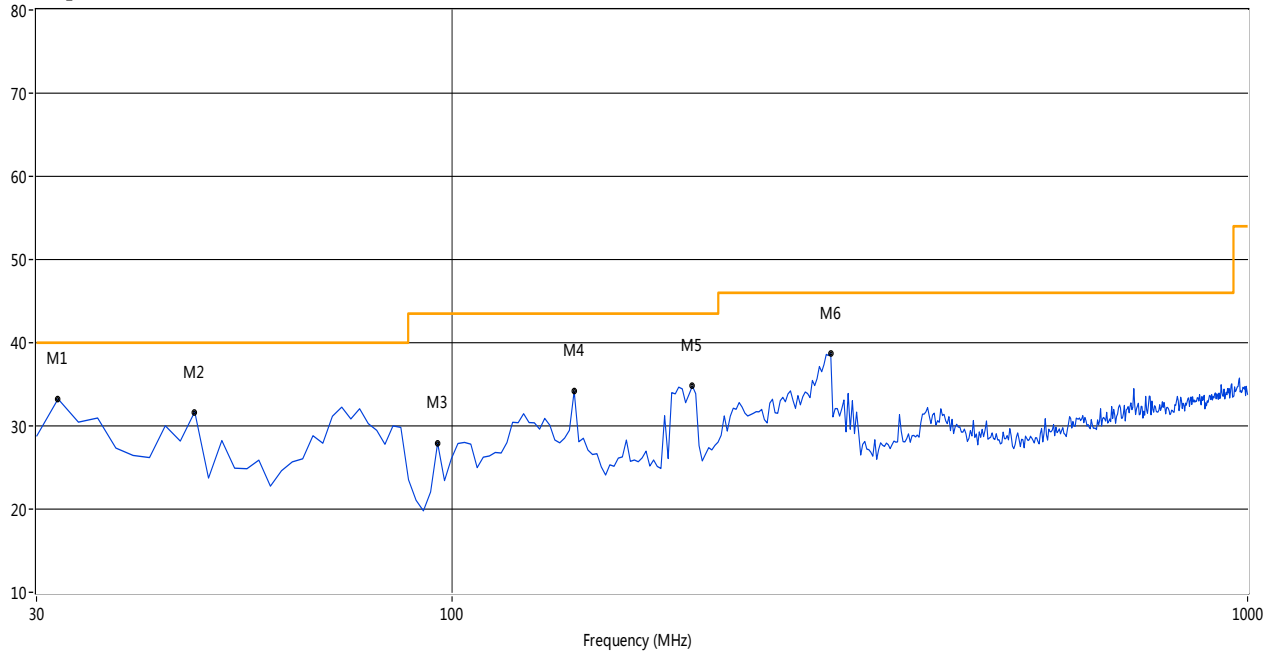
RE Test case\_FCC 15C 30MHz-1GHz



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
35.81	36.36	--	--	-20.45	--	40.0	--	3.64	104.90	100	Vertical	PASS
47.43	34.26	--	--	-17.98	--	40.0	--	5.74	104.90	100	Vertical	PASS
68.72	30.85	--	--	-21.50	--	40.0	--	9.15	3.40	100	Vertical	PASS
95.83	29.60	--	--	-20.25	--	43.5	--	13.90	358.90	100	Vertical	PASS
181.02	28.40	--	--	-21.45	--	43.5	--	15.10	259.30	100	Vertical	PASS
297.19	33.40	--	--	-17.18	--	46.0	--	12.60	119.30	100	Vertical	PASS

# GFSK HIGH CHANNEL 30MHz to 1GHz, ANT H

RE Test case\_FCC 15C 30MHz-1GHz



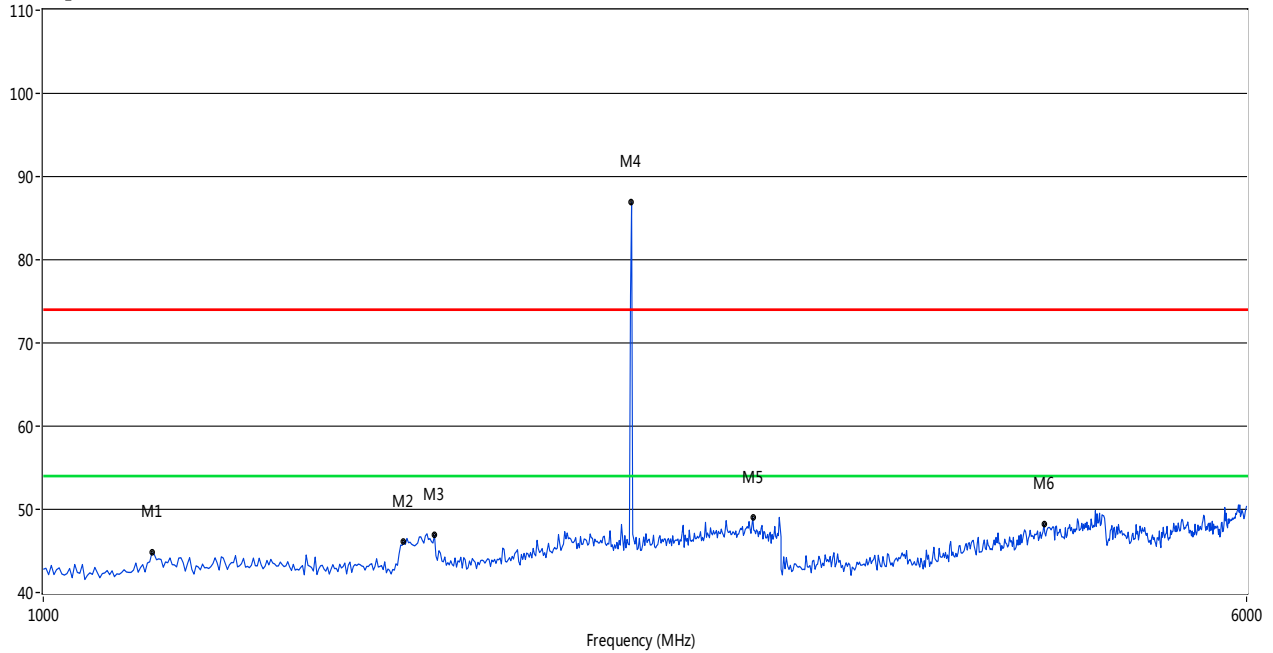
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
31.94	33.24	--	--	-21.38	--	40.0	--	6.76	-0.70	100	Horizontal	PASS
47.43	31.69	--	--	-17.98	--	40.0	--	8.31	-0.30	100	Horizontal	PASS
95.83	27.94	--	--	-20.25	--	43.5	--	15.56	0.10	100	Horizontal	PASS
142.30	34.18	--	--	-23.06	--	43.5	--	9.32	0.70	100	Horizontal	PASS
200.38	34.79	--	--	-19.76	--	43.5	--	8.71	1.20	100	Horizontal	PASS
299.12	38.74	--	--	-17.16	--	46.0	--	7.26	4.70	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

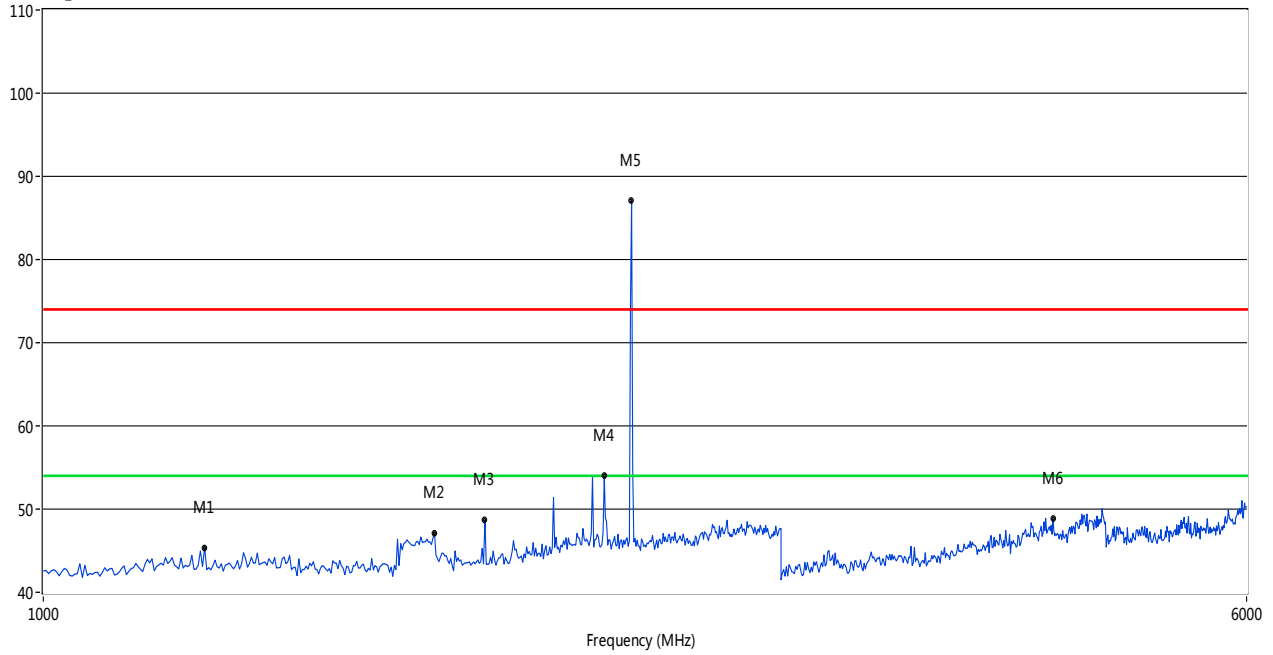
RE Test case\_FCC 15C 1GHz-6GHz



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
1175.65	44.78	--	--	-4.22	74.0	--	54.0	9.22	33.20	100	Vertical	PASS
1710.58	46.11	--	--	-0.36	74.0	--	54.0	7.89	349.60	100	Vertical	PASS
1790.42	46.91	--	--	-0.24	74.0	--	54.0	7.09	255.10	100	Vertical	PASS
2401.20	86.93	--	--	-0.04	74.0	--	54.0	-32.93	353.90	100	Vertical	N/A
2876.25	49.01	--	--	2.46	74.0	--	54.0	4.99	359.90	100	Vertical	PASS
4437.13	48.17	--	--	10.94	74.0	--	54.0	5.83	183.70	100	Vertical	PASS

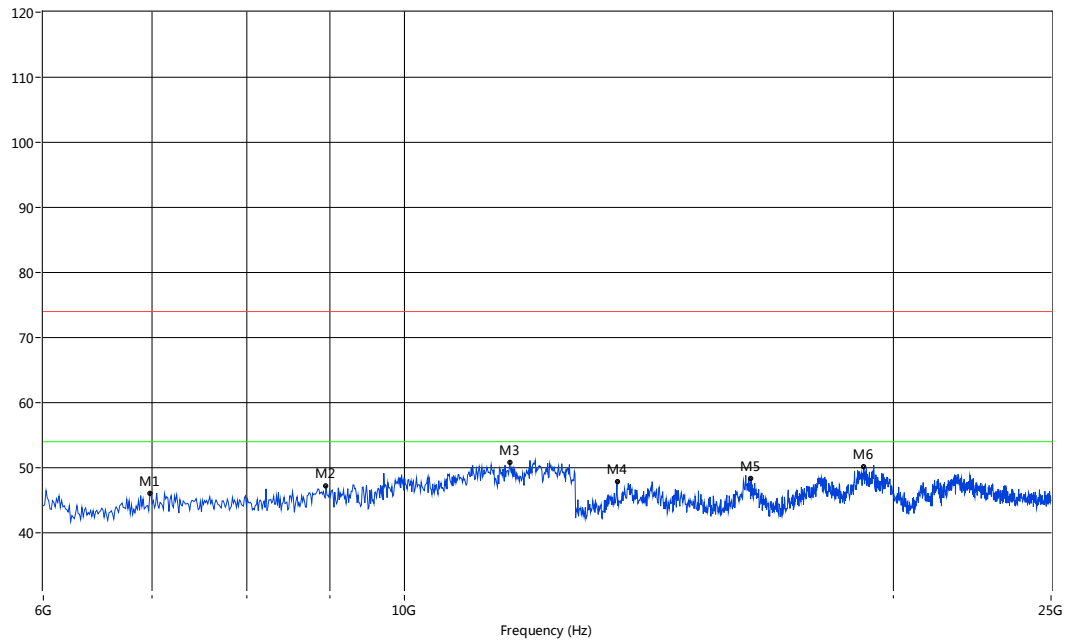
# GFSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



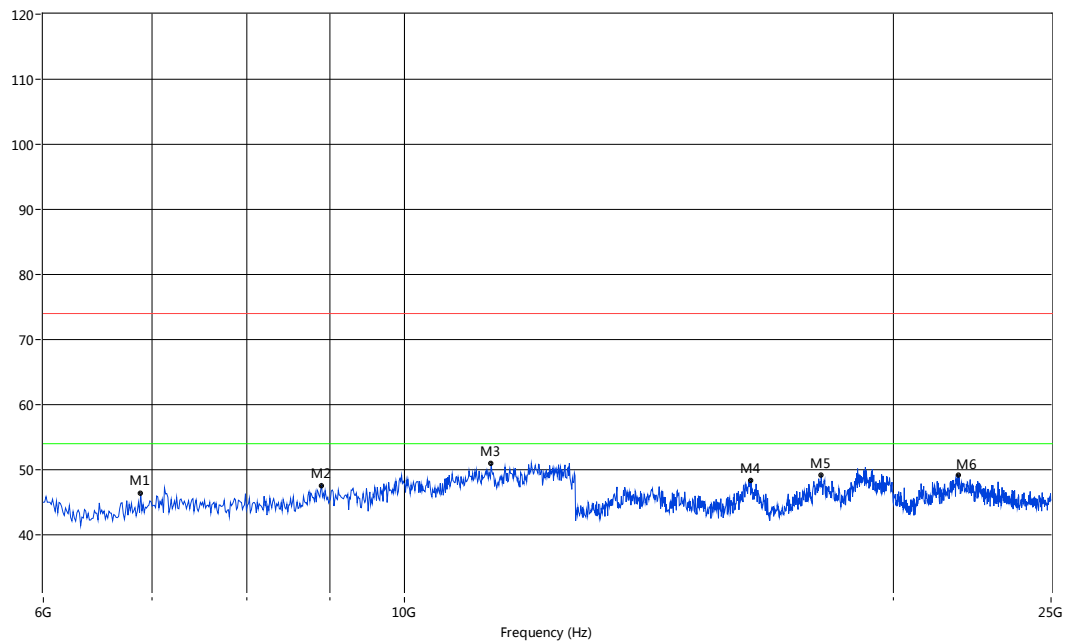
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1271.46	45.34	--	--	-3.69	74.0	--	54.0	8.66	360.00	100	Horizontal	PASS
1790.42	47.10	--	--	-0.24	74.0	--	54.0	6.90	97.10	100	Horizontal	PASS
1930.14	48.71	--	--	-2.58	74.0	--	54.0	5.29	328.50	100	Horizontal	PASS
2305.39	53.97	--	--	-0.15	74.0	--	54.0	0.03	107.80	100	Horizontal	PASS
2401.20	87.13	--	--	-0.04	74.0	--	54.0	-33.13	322.90	100	Horizontal	N/A
4497.01	48.87	--	--	10.97	74.0	--	54.0	5.13	12.20	100	Horizontal	PASS

## GFSK LOW CHANNEL 6GHz to 25GHz, ANT V



Frequency (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)	Height (cm)	ANT
8953.83	47.18	--	--	74.0	--	54.0	26.82	269	Vertical	PASS
11615.64	50.79	--	--	74.0	--	54.0	23.21	288	Vertical	PASS
13519.55	47.91	--	--	74.0	--	54.0	26.09	176	Vertical	PASS
16348.17	48.41	--	--	74.0	--	54.0	25.59	27	Vertical	PASS
19179.70	50.10	--	--	74.0	--	54.0	23.90	242	Vertical	PASS

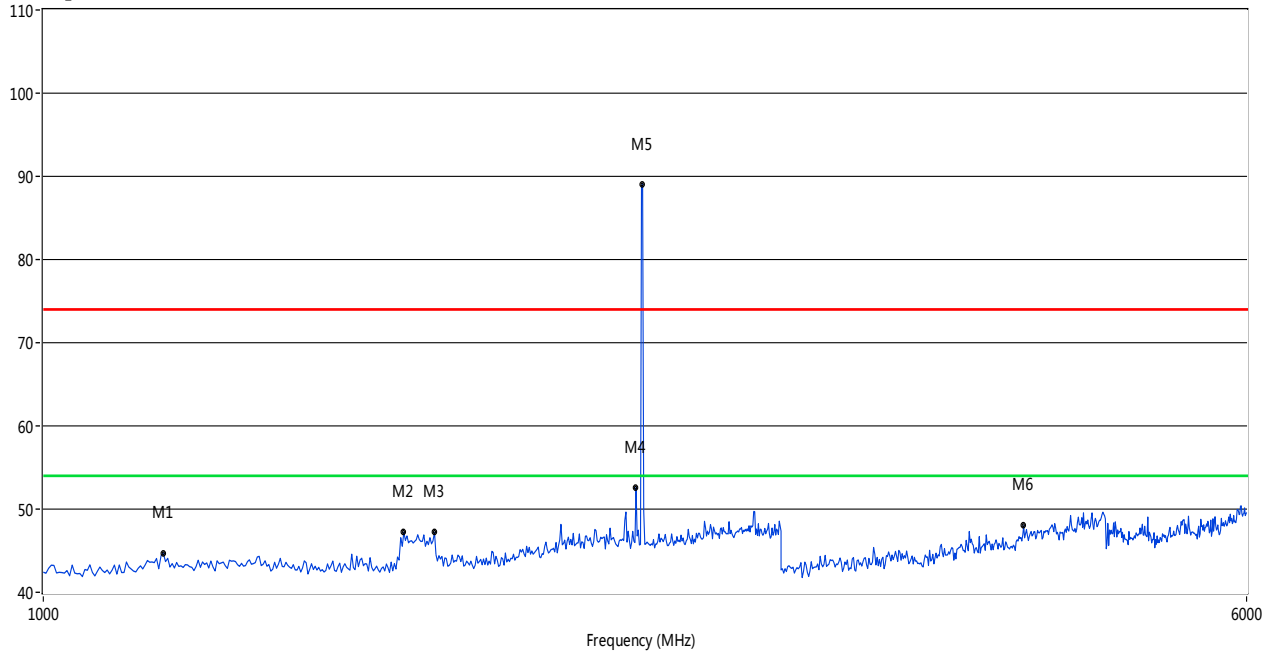
## GFSK LOW CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
8897.67	47.56	--	--	74.0	--	54.0	26.44	322	Horizontal	PASS
11312.40	50.91	--	--	74.0	--	54.0	23.09	264	Horizontal	PASS
16348.17	48.40	--	--	74.0	--	54.0	25.60	34	Horizontal	PASS
18053.66	49.14	--	--	74.0	--	54.0	24.86	110	Horizontal	PASS
21915.14	49.24	--	--	74.0	--	54.0	24.76	140	Horizontal	PASS

## GFSK MID CHANNEL 1GHz to 6GHz, ANT V

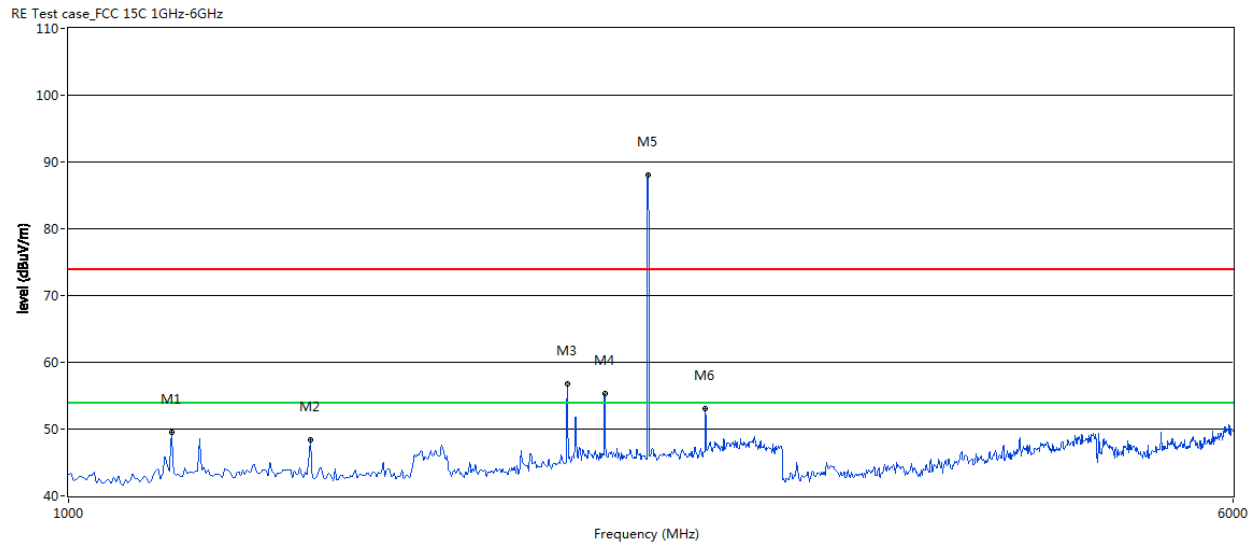
RE Test case\_FCC 15C 1GHz-6GHz



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
1195.61	44.68	--	--	-4.02	74.0	--	54.0	9.32	104.10	100	Vertical	PASS
1710.58	47.21	--	--	-0.36	74.0	--	54.0	6.79	355.80	100	Vertical	PASS
1790.42	47.21	--	--	-0.24	74.0	--	54.0	6.79	66.20	100	Vertical	PASS
2417.17	52.59	--	--	-0.21	74.0	--	54.0	1.41	1.60	100	Vertical	PASS
2441.12	89.11	--	--	0.17	74.0	--	54.0	-35.11	336.70	100	Vertical	N/A
4305.39	48.01	--	--	10.88	74.0	--	54.0	5.99	64.90	100	Vertical	PASS

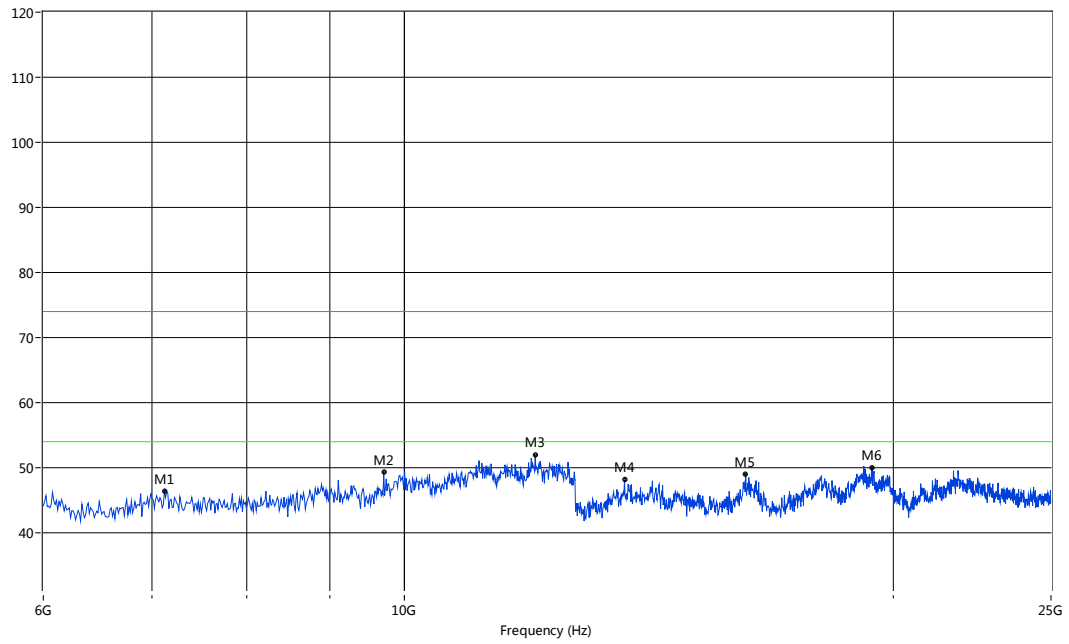


## GFSK MID CHANNEL 1GHz to 6GHz, ANT H



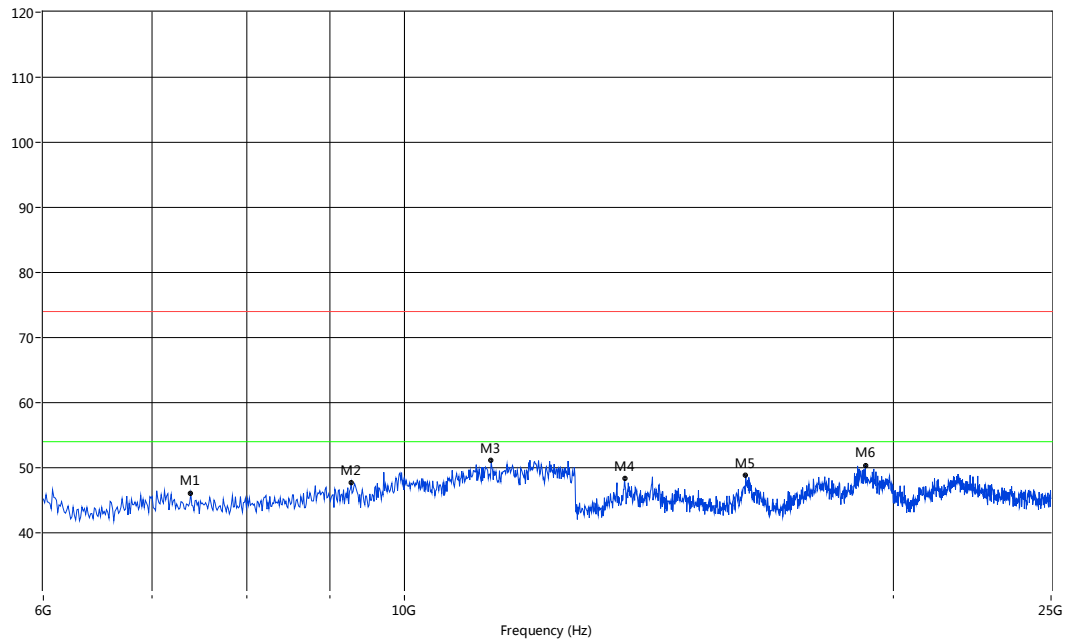
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1171.66	49.54	--	--	-4.25	74.0	--	54.0	4.46	160.30	100	Horizontal	PASS
1451.10	48.38	--	--	-4.11	74.0	--	54.0	5.62	342.70	100	Horizontal	PASS
2153.69	56.72	--	35.50	-0.90	74.0	--	54.0	18.5	49.80	100	Horizontal	PASS
2281.44	55.24	--	34.02	-0.22	74.0	--	54.0	19.98	77.40	100	Horizontal	PASS
2441.12	88.11	--	--	0.17	74.0	--	54.0	-34.11	320.20	100	Horizontal	N/A
2664.67	53.08	--	--	1.34	74.0	--	54.0	0.92	110.60	100	Horizontal	PASS

## GFSK MID CHANNEL 6GHz to 25GHz, ANT V



Frequency (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)	Height (cm)	ANT
7123.13	46.39	--	--	74.0	--	54.0	27.61	55	Vertical	PASS
9717.55	49.30	--	--	74.0	--	54.0	24.70	161	Vertical	PASS
12042.43	51.89	--	--	74.0	--	54.0	22.11	161	Vertical	PASS
13665.14	48.12	--	--	74.0	--	54.0	25.87	291	Vertical	PASS
16223.38	48.98	--	--	74.0	--	54.0	25.02	244	Vertical	PASS
19409.32	50.01	--	--	74.0	--	54.0	23.99	285	Vertical	PASS

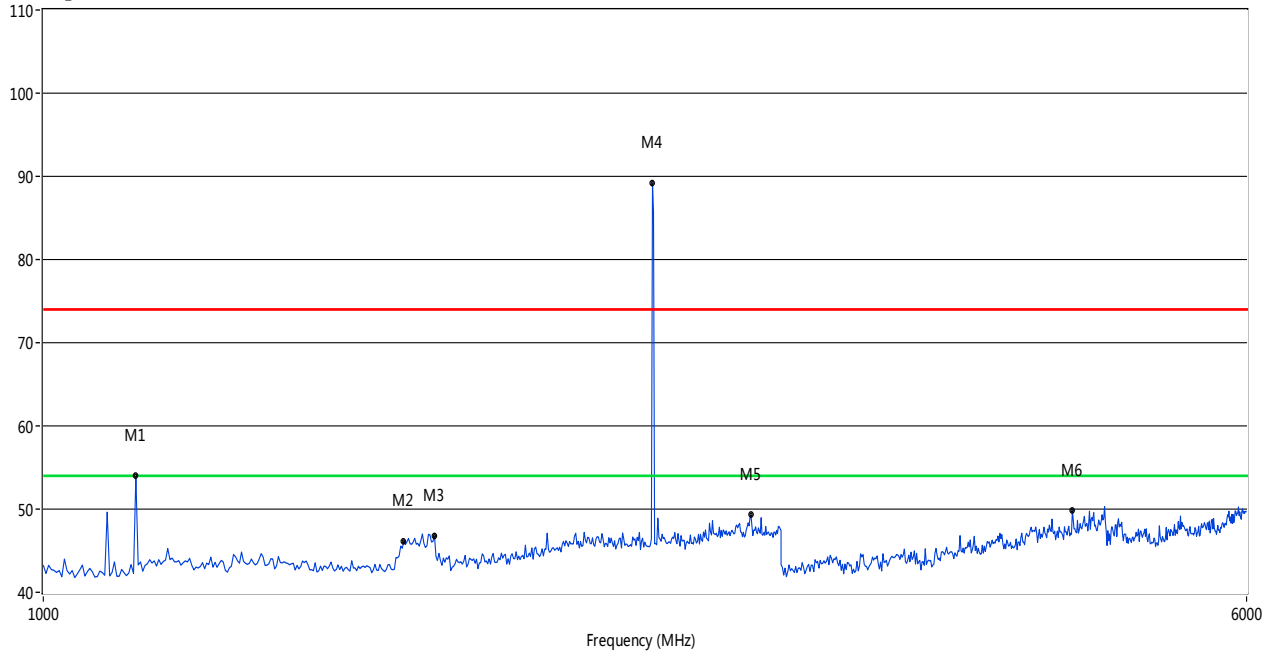
## GFSK MID CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7392.68	46.06	--	--	74.0	--	54.0	27.94	228	Horizontal	PASS
9279.53	47.69	--	--	74.0	--	54.0	26.31	145	Horizontal	PASS
11312.40	51.08	--	--	74.0	--	54.0	22.92	134	Horizontal	PASS
13665.14	48.30	--	--	74.0	--	54.0	25.70	209	Horizontal	PASS
16223.38	48.86	--	--	74.0	--	54.0	25.14	232	Horizontal	PASS
19219.63	50.35	--	--	74.0	--	54.0	23.65	234	Horizontal	PASS

# GFSK HIGH CHANNEL 1GHz to 6GHz, ANT V

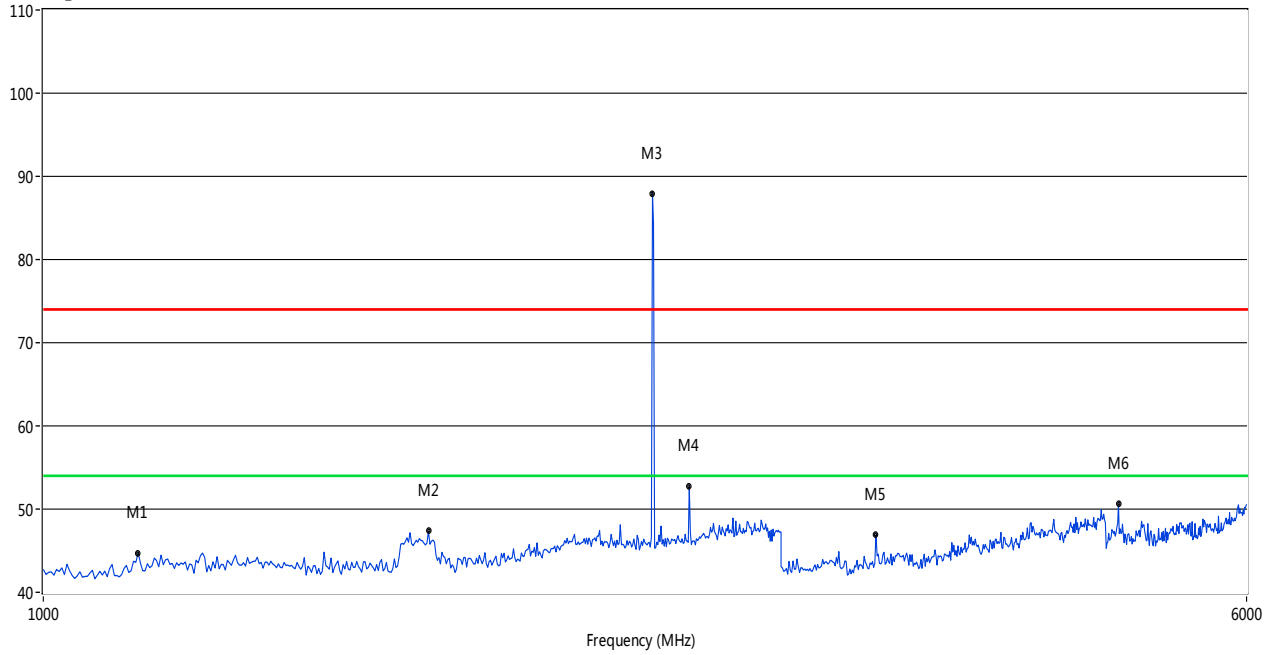
RE Test case\_FCC 15C 1GHz-6GHz



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
1147.70	53.99	--	32.77	-4.36	74.0	--	54.0	21.23	356.40	100	Vertical	PASS
1710.58	46.16	--	--	-0.36	74.0	--	54.0	7.84	305.60	100	Vertical	PASS
1790.42	46.78	--	--	-0.24	74.0	--	54.0	7.22	311.10	100	Vertical	PASS
2477.05	89.14	--	--	-0.25	74.0	--	54.0	-35.14	7.00	100	Vertical	N/A
2868.26	49.32	--	--	2.55	74.0	--	54.0	4.68	322.10	100	Vertical	PASS
4628.74	49.83	--	--	11.34	74.0	--	54.0	4.17	341.50	100	Vertical	PASS

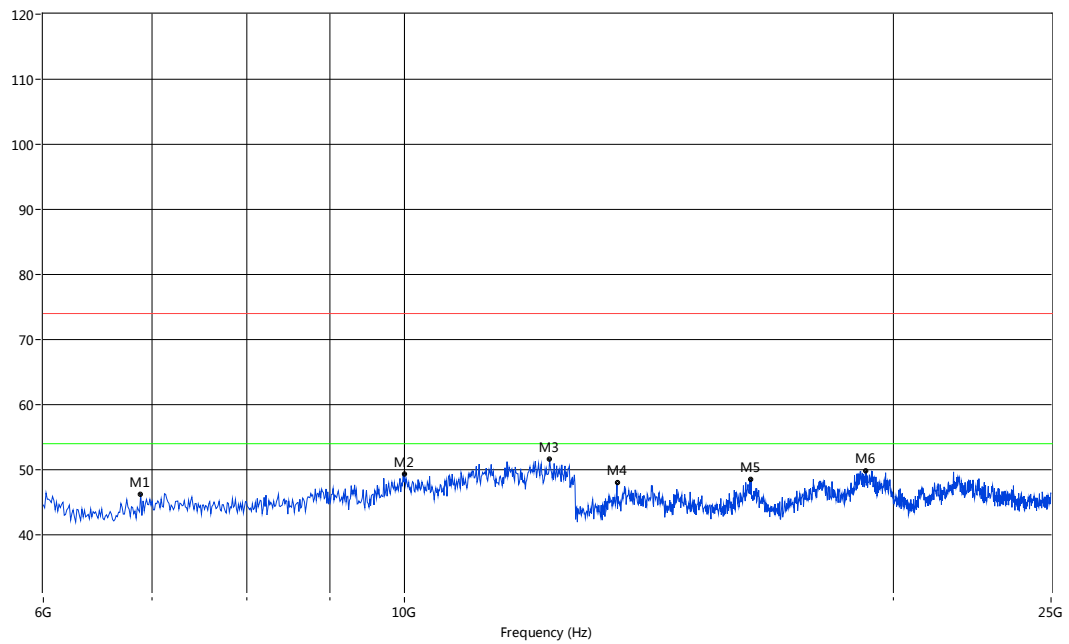
# GFSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



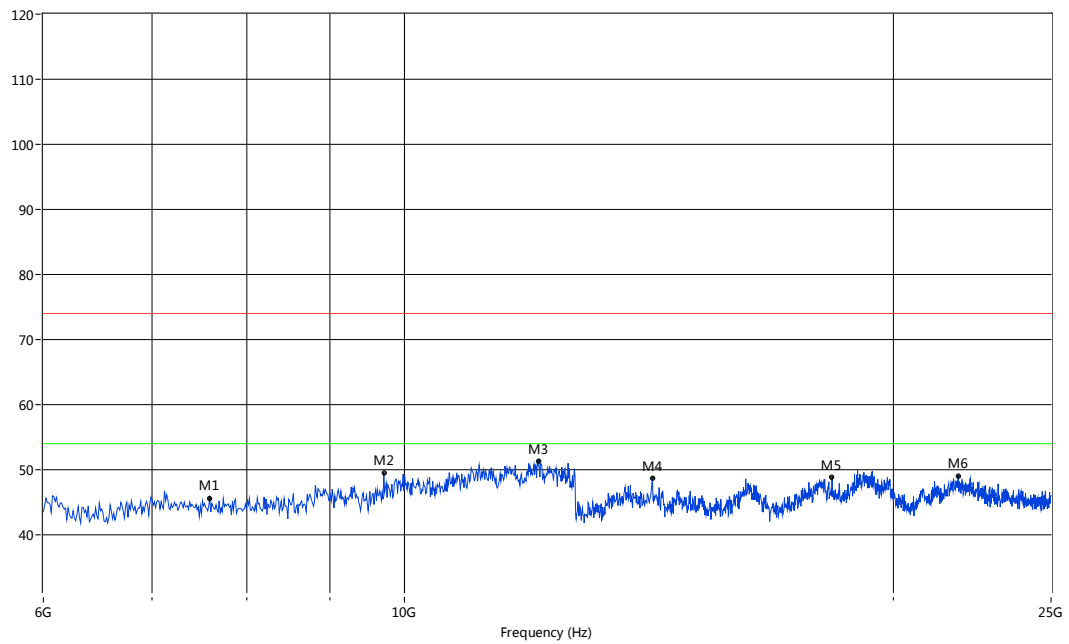
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1151.70	44.75	--	--	-4.41	74.0	--	54.0	9.25	192.40	100	Horizontal	PASS
1774.45	47.37	--	--	-0.23	74.0	--	54.0	6.63	115.70	100	Horizontal	PASS
2477.05	87.94	--	--	-0.25	74.0	--	54.0	-33.94	319.00	100	Horizontal	N/A
2616.77	52.76	--	--	1.07	74.0	--	54.0	1.24	0.40	100	Horizontal	PASS
3455.09	46.92	--	--	9.09	74.0	--	54.0	7.08	53.80	100	Horizontal	PASS
4958.08	50.62	--	--	12.66	74.0	--	54.0	3.38	1.60	100	Horizontal	PASS

## GFSK HIGH CHANNEL 6GHz to 25GHz, ANT V



Frequency (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)	Height (cm)	ANT
6887.27	46.29	--	--	74.0	--	54.0	27.71	60	Vertical	PASS
10009.57	49.33	--	--	74.0	--	54.0	24.67	105	Vertical	PASS
12289.52	51.57	--	--	74.0	--	54.0	22.43	346	Vertical	PASS
13519.55	47.97	--	--	74.0	--	54.0	26.03	217	Vertical	PASS
16348.17	48.52	--	--	74.0	--	54.0	25.48	187	Vertical	PASS
19219.63	49.84	--	--	74.0	--	54.0	24.16	245	Vertical	PASS

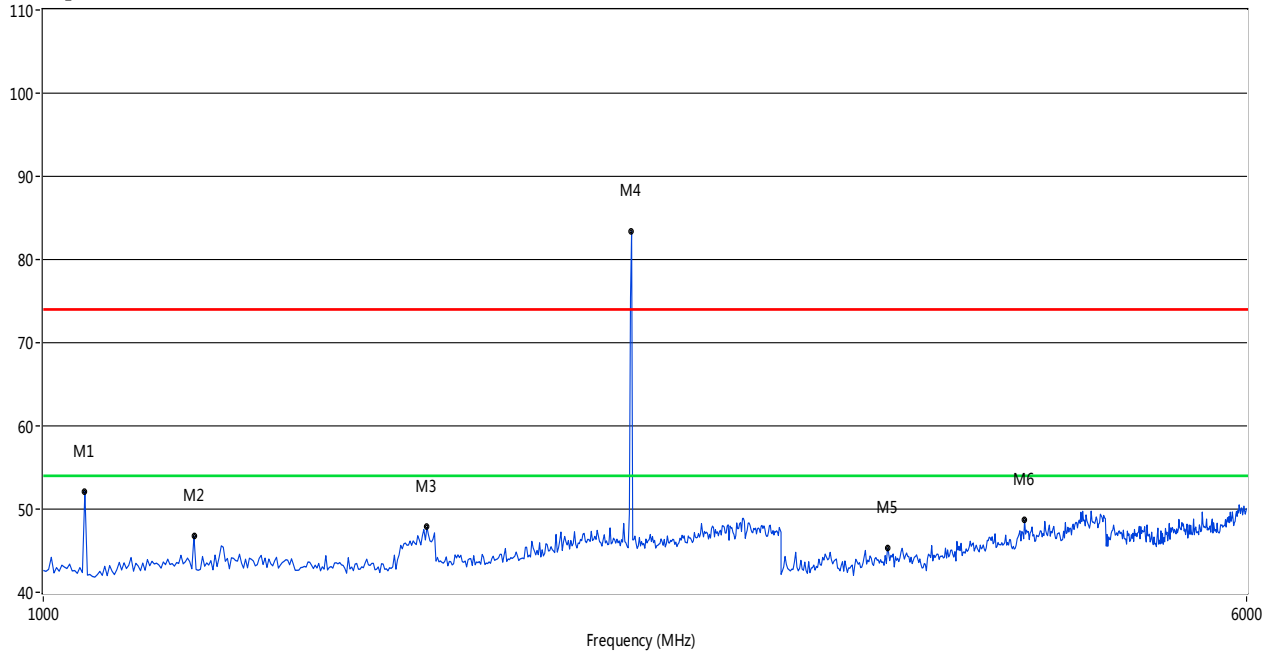
## GFSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7594.84	45.60	--	--	74.0	--	54.0	28.40	204	Horizontal	PASS
9717.55	49.49	--	--	74.0	--	54.0	24.51	62	Horizontal	PASS
12098.59	51.33	--	--	74.0	--	54.0	22.67	210	Horizontal	PASS
14216.31	48.69	--	--	74.0	--	54.0	25.31	346	Horizontal	PASS
18334.44	48.80	--	--	74.0	--	54.0	25.20	186	Horizontal	PASS
21915.14	48.98	--	--	74.0	--	54.0	25.02	325	Horizontal	PASS

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

RE Test case\_FCC 15C 1GHz-6GHz

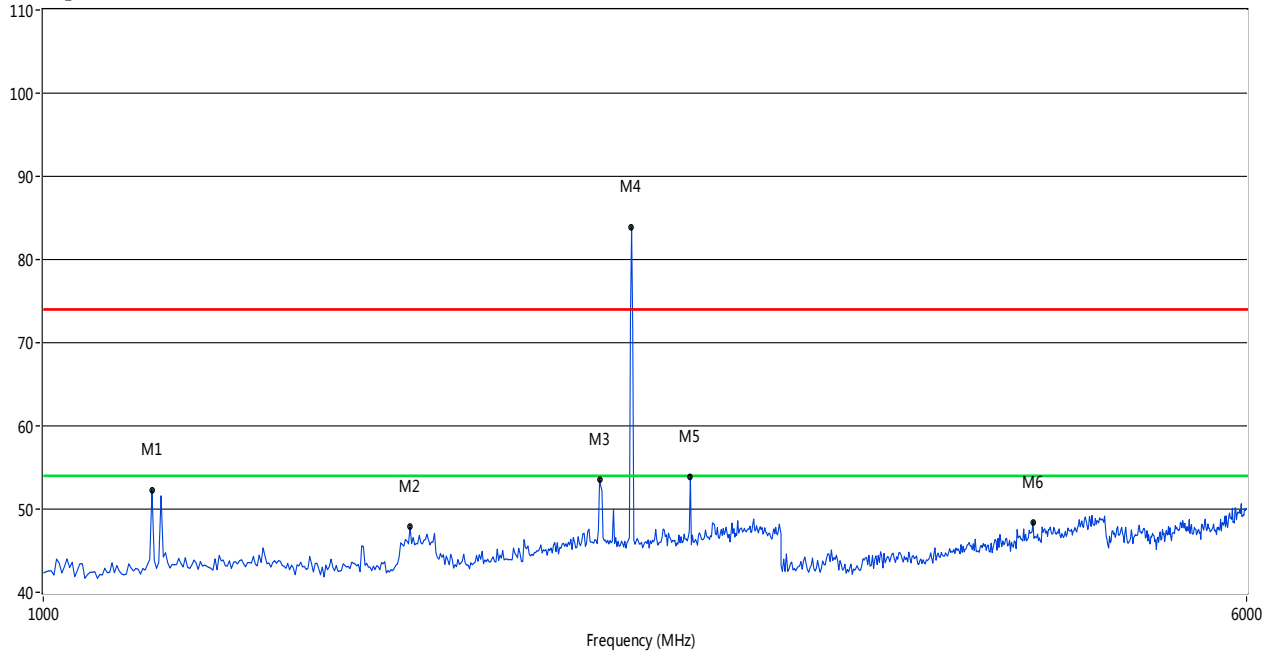


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1063.87	52.17	--	--	-4.95	74.0	--	54.0	1.83	65.20	100	Vertical	PASS
1251.50	46.74	--	--	-4.10	74.0	--	54.0	7.26	356.20	100	Vertical	PASS
1770.46	47.83	--	--	-0.23	74.0	--	54.0	6.17	59.60	100	Vertical	PASS
2401.20	83.41	--	--	-0.04	74.0	--	54.0	-29.41	356.20	100	Vertical	N/A
3514.97	45.30	--	--	8.99	74.0	--	54.0	8.70	256.60	100	Vertical	PASS
4311.38	48.67	--	--	10.82	74.0	--	54.0	5.33	336.30	100	Vertical	PASS



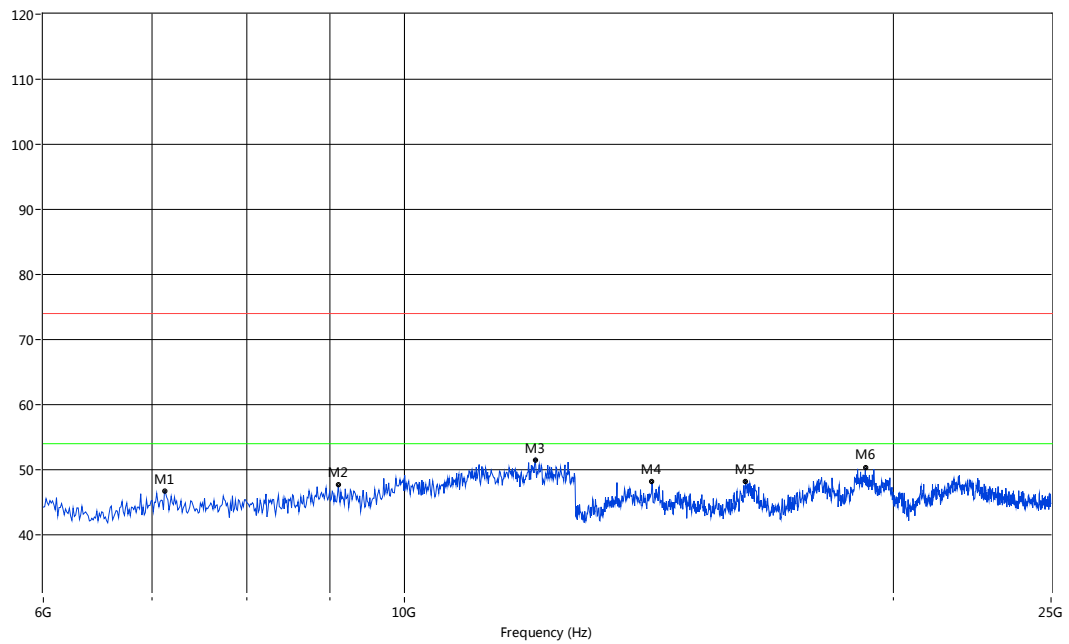
# II/4-DQPSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



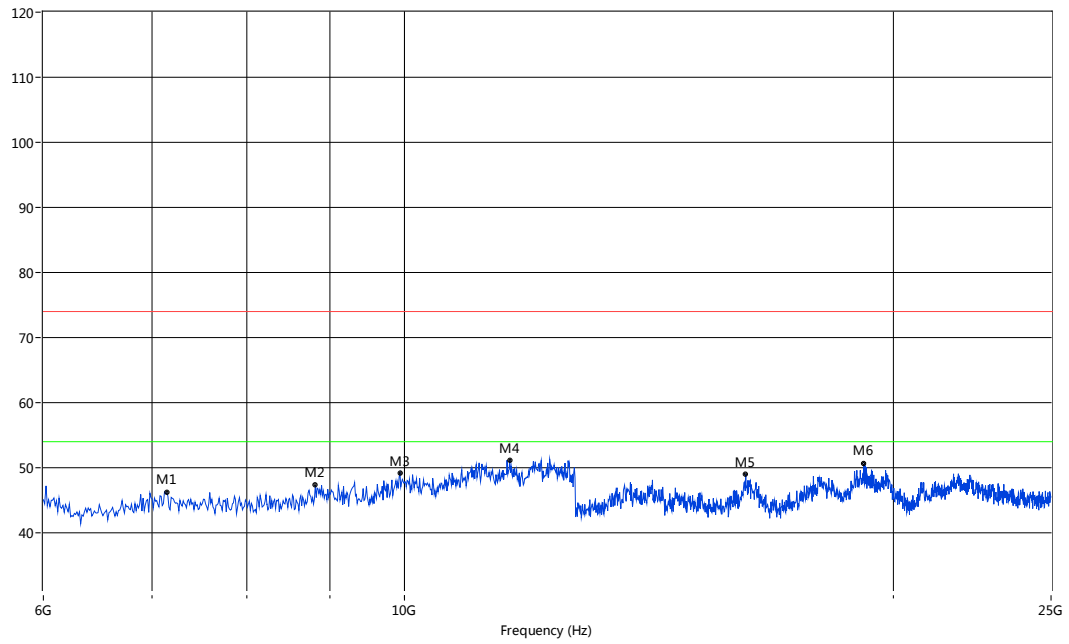
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1175.65	52.23	--	--	-4.22	74.0	--	54.0	1.77	200.10	100	Horizontal	PASS
1726.55	47.85	--	--	-0.31	74.0	--	54.0	6.15	50.00	100	Horizontal	PASS
2289.42	53.55	--	32.33	-0.21	74.0	--	54.0	21.67	239.20	100	Horizontal	PASS
2401.20	83.84	--	--	-0.04	74.0	--	54.0	-29.84	322.60	100	Horizontal	N/A
2620.76	53.89	--	--	1.00	74.0	--	54.0	0.11	239.20	100	Horizontal	PASS
4365.27	48.44	--	--	11.02	74.0	--	54.0	5.56	98.30	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
7123.13	46.65	--	--	74.0	--	54.0	27.35	216	Vertical	PASS
9111.07	47.64	--	--	74.0	--	54.0	26.36	109	Vertical	PASS
12042.43	51.49	--	--	74.0	--	54.0	22.51	189	Vertical	PASS
14205.91	48.14	--	--	74.0	--	54.0	25.86	82	Vertical	PASS
16223.38	48.24	--	--	74.0	--	54.0	25.76	334	Vertical	PASS
19219.63	50.29	--	--	74.0	--	54.0	23.71	194	Vertical	PASS

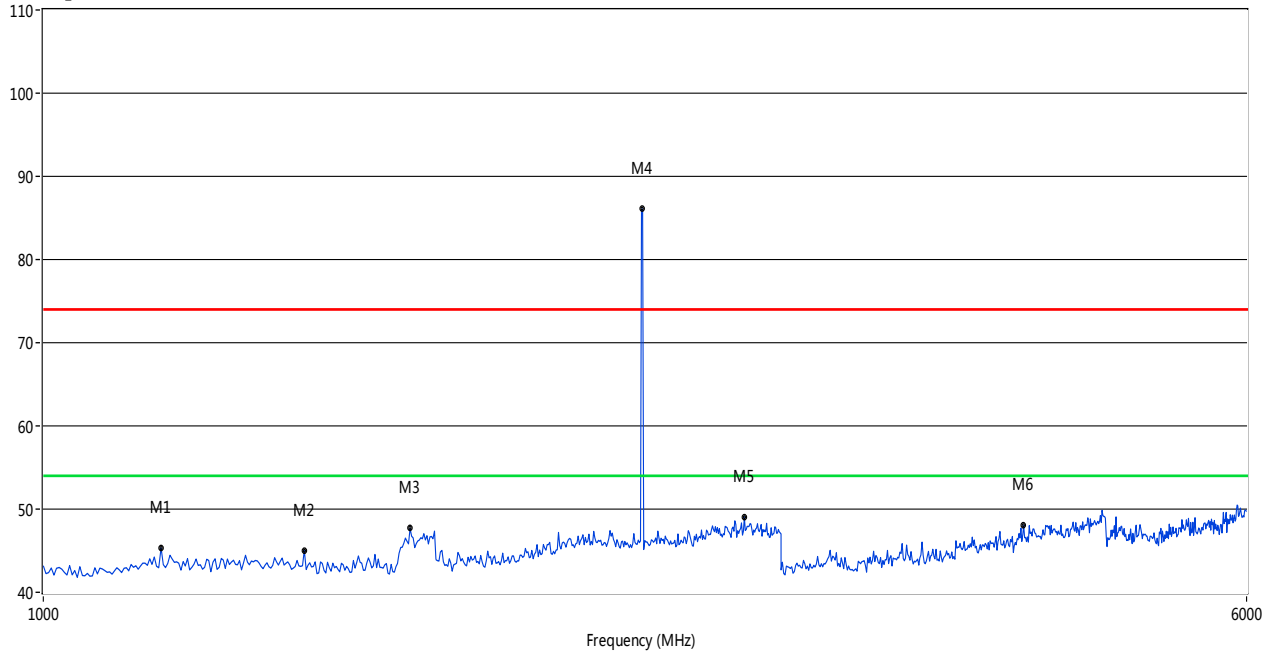
## II/4-DQPSK LOW CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7145.59	46.15	--	--	74.0	--	54.0	27.85	168	Horizontal	PASS
8819.05	47.33	--	--	74.0	--	54.0	26.67	3	Horizontal	PASS
9942.18	49.18	--	--	74.0	--	54.0	24.82	258	Horizontal	PASS
11615.64	51.22	--	--	74.0	--	54.0	22.78	250	Horizontal	PASS
16223.38	48.99	--	--	74.0	--	54.0	25.01	36	Horizontal	PASS
19179.70	50.63	--	--	74.0	--	54.0	23.37	245	Horizontal	PASS

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

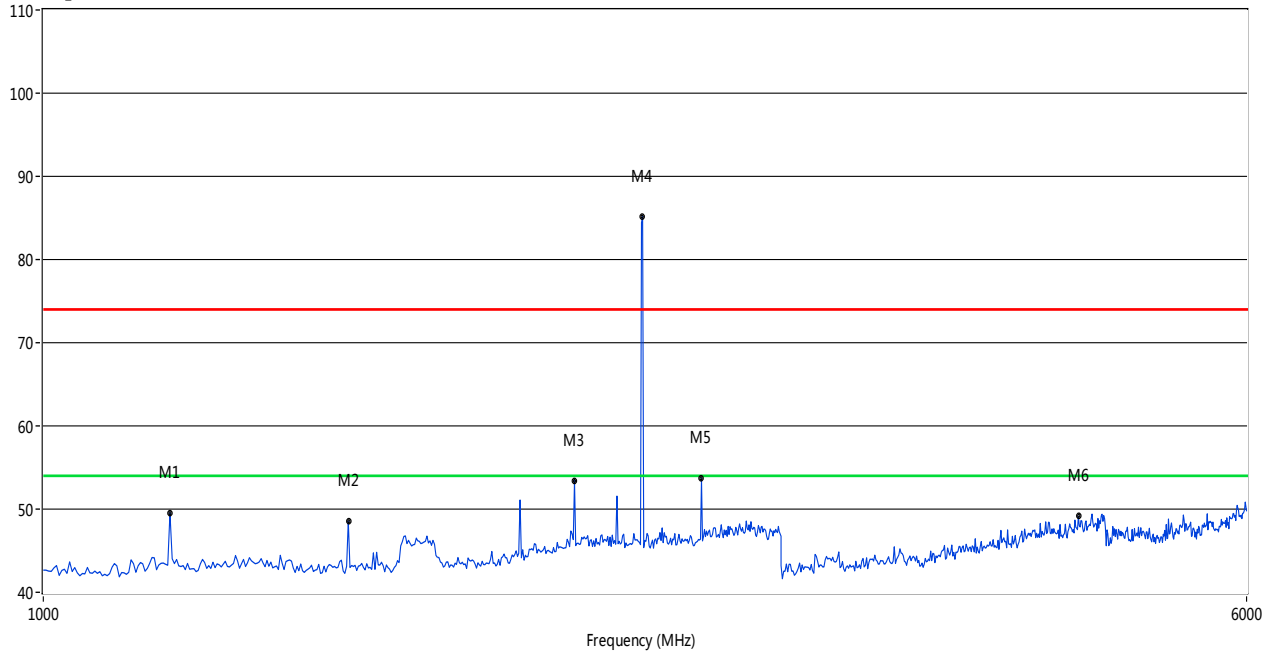
RE Test case\_FCC 15C 1GHz-6GHz



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
1191.62	45.33	--	--	-4.19	74.0	-	54.0	8.67	235.70	100	Vertical	PASS
1475.05	45.05	--	--	-3.92	74.0	--	54.0	8.95	0.30	100	Vertical	PASS
1726.55	47.67	--	--	-0.31	74.0	--	54.0	6.33	0.30	100	Vertical	PASS
2441.12	86.09	--	--	0.17	74.0	--	54.0	-32.09	6.20	100	Vertical	N/A
2840.32	49.06	--	--	2.53	74.0	--	54.0	4.94	120.00	100	Vertical	PASS
4305.39	48.05	--	--	10.88	74.0	--	54.0	5.95	233.30	100	Vertical	PASS

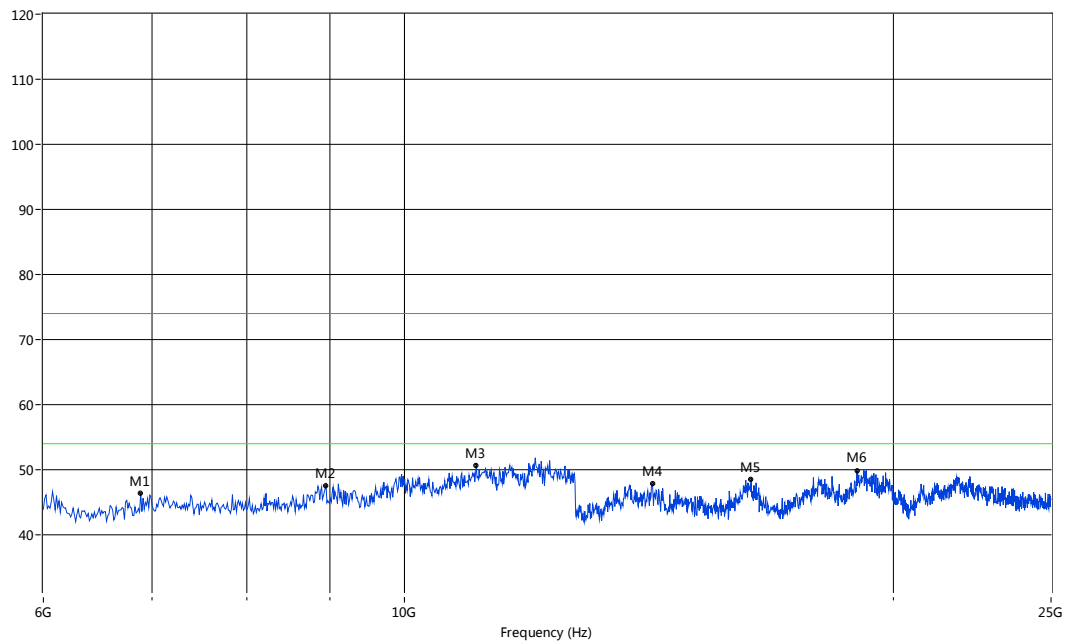
# Π/4-DQPSK MID CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



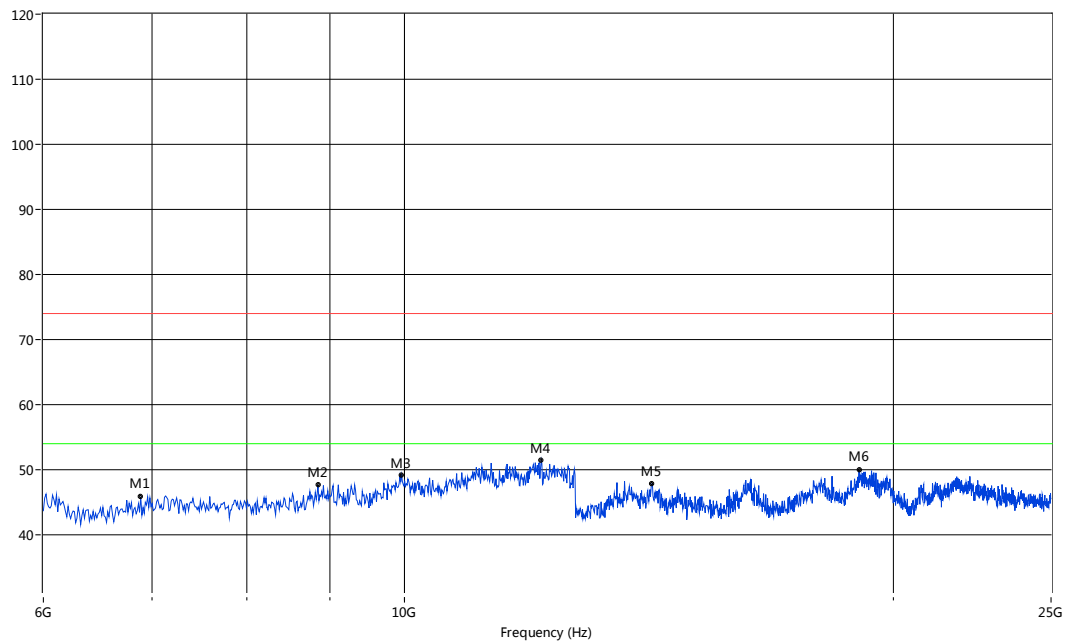
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1207.58	49.55	--	--	-3.74	74.0	--	54.0	4.45	349.30	100	Horizontal	PASS
1574.85	48.57	--	--	-4.05	74.0	--	54.0	5.43	22.20	100	Horizontal	PASS
2205.59	53.44	--	32.22	-0.37	74.0	--	54.0	21.78	82.60	100	Horizontal	PASS
2441.12	85.19	--	--	0.17	74.0	--	54.0	-31.19	321.60	100	Horizontal	N/A
2664.67	53.66	--	--	1.34	74.0	--	54.0	0.34	310.50	100	Horizontal	PASS
4670.66	49.13	--	--	11.35	74.0	--	54.0	4.87	197.90	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
6887.27	46.39	--	--	74.0	--	54.0	27.61	267	Vertical	PASS
8953.83	47.60	--	--	74.0	--	54.0	26.40	104	Vertical	PASS
11076.54	50.63	--	--	74.0	--	54.0	23.37	258	Vertical	PASS
14216.31	47.81	--	--	74.0	--	54.0	26.19	17	Vertical	PASS
16348.17	48.54	--	--	74.0	--	54.0	25.46	141	Vertical	PASS
19009.98	49.81	--	--	74.0	--	54.0	24.19	33	Vertical	PASS

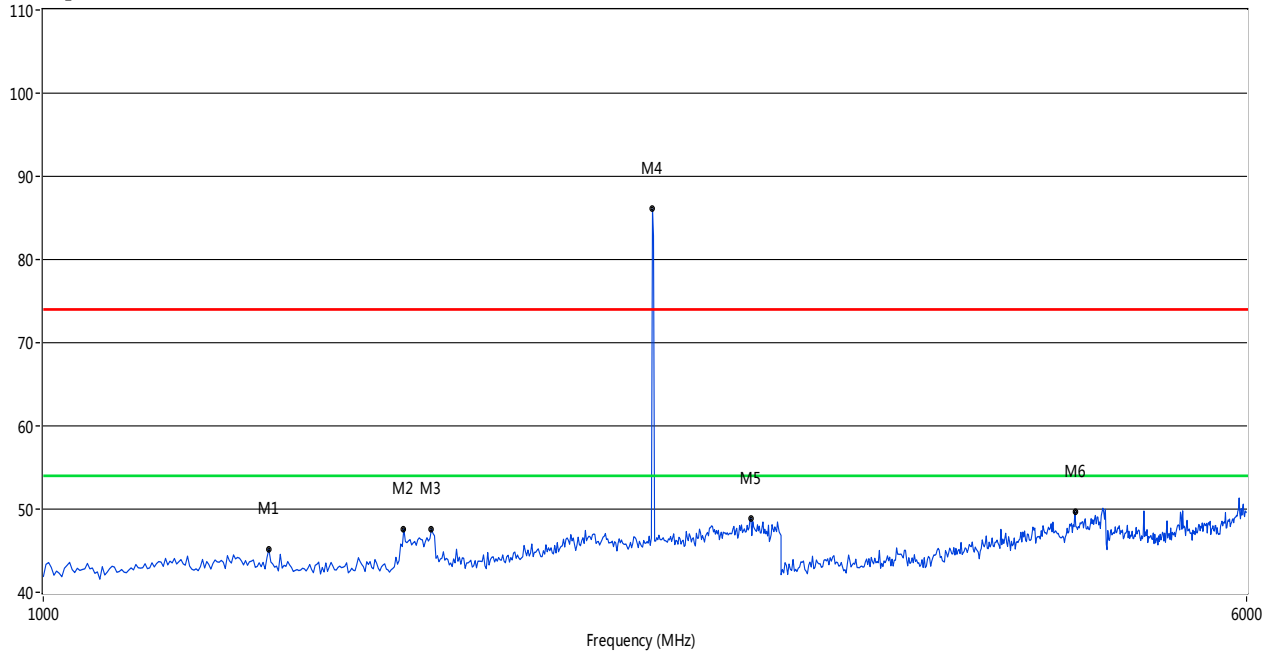
## II/4-DQPSK MID CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
6887.27	45.84	--	--	74.0	--	54.0	28.16	211	Horizontal	PASS
8852.75	47.69	--	--	74.0	--	54.0	26.31	46	Horizontal	PASS
9964.64	49.21	--	--	74.0	--	54.0	24.79	168	Horizontal	PASS
12143.51	51.49	--	--	74.0	--	54.0	22.51	307	Horizontal	PASS
14195.51	47.79	--	--	74.0	--	54.0	26.21	268	Horizontal	PASS
19049.92	49.92	--	--	74.0	--	54.0	24.08	326	Horizontal	PASS

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

RE Test case\_FCC 15C 1GHz-6GHz

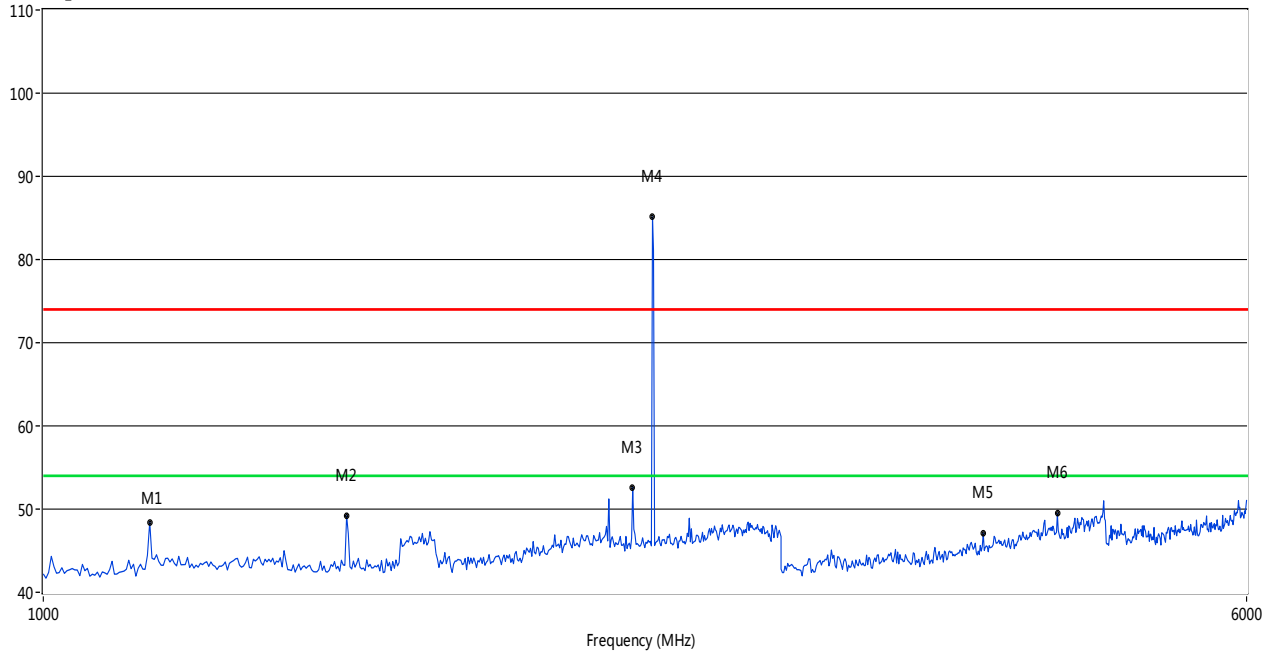


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1399.20	45.17	--	--	-3.91	74.0	-	54.0	8.83	331.20	100	Vertical	PASS
1710.58	47.61	--	--	-0.36	74.0	--	54.0	6.39	355.50	100	Vertical	PASS
1782.44	47.64	--	--	-0.24	74.0	--	54.0	6.36	309.40	100	Vertical	PASS
2477.05	86.08	--	--	-0.25	74.0	--	54.0	-32.08	2.60	100	Vertical	N/A
2868.26	48.93	--	--	2.55	74.0	--	54.0	5.07	281.40	100	Vertical	PASS
4646.71	49.69	--	--	11.26	74.0	--	54.0	4.31	6.00	100	Vertical	PASS



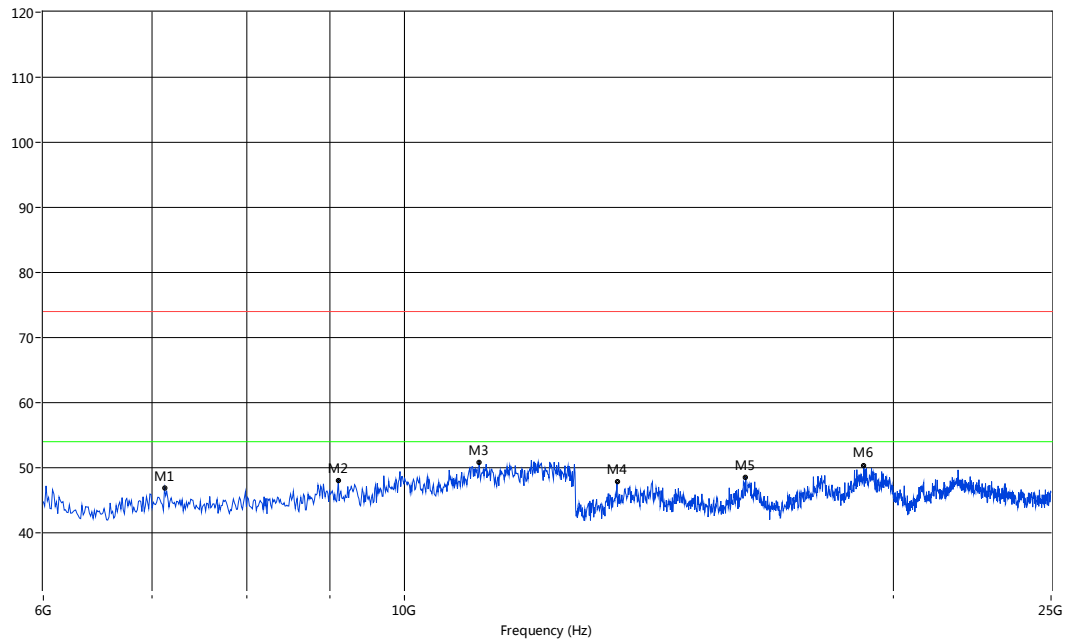
## Π/4-DQPSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



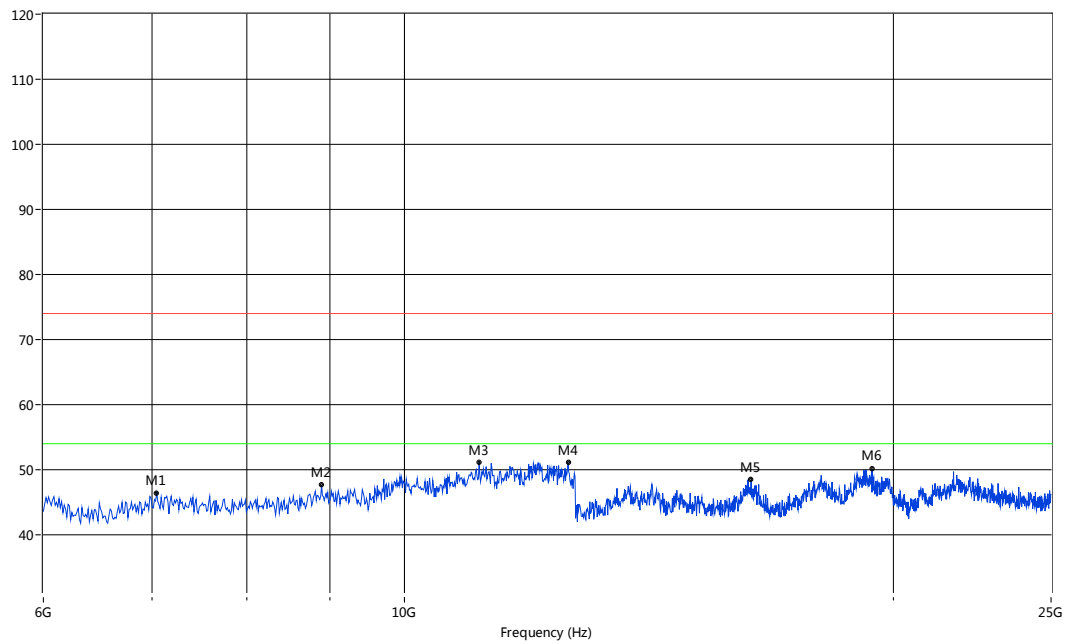
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1171.66	48.45	--	--	-4.25	74.0	--	54.0	5.55	316.50	100	Horizontal	PASS
1570.86	49.19	--	--	-4.09	74.0	--	54.0	4.81	300.00	100	Horizontal	PASS
2405.19	52.63	--	--	0.09	74.0	--	54.0	1.37	249.80	100	Horizontal	PASS
2477.05	85.13	--	--	-0.25	74.0	--	54.0	-31.13	322.00	100	Horizontal	N/A
4053.89	47.10	--	--	10.15	74.0	--	54.0	6.90	27.60	100	Horizontal	PASS
4526.95	49.45	--	--	10.99	74.0	--	54.0	4.55	81.00	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
7123.13	46.86	--	--	74.0	--	54.0	27.14	176	Vertical	PASS
9111.07	48.08	--	--	74.0	--	54.0	25.92	83	Vertical	PASS
11121.46	50.86	--	--	74.0	--	54.0	23.14	343	Vertical	PASS
13519.55	47.80	--	--	74.0	--	54.0	26.20	302	Vertical	PASS
16223.38	48.56	--	--	74.0	--	54.0	25.44	24	Vertical	PASS
19179.70	50.30	--	--	74.0	--	54.0	23.70	270	Vertical	PASS

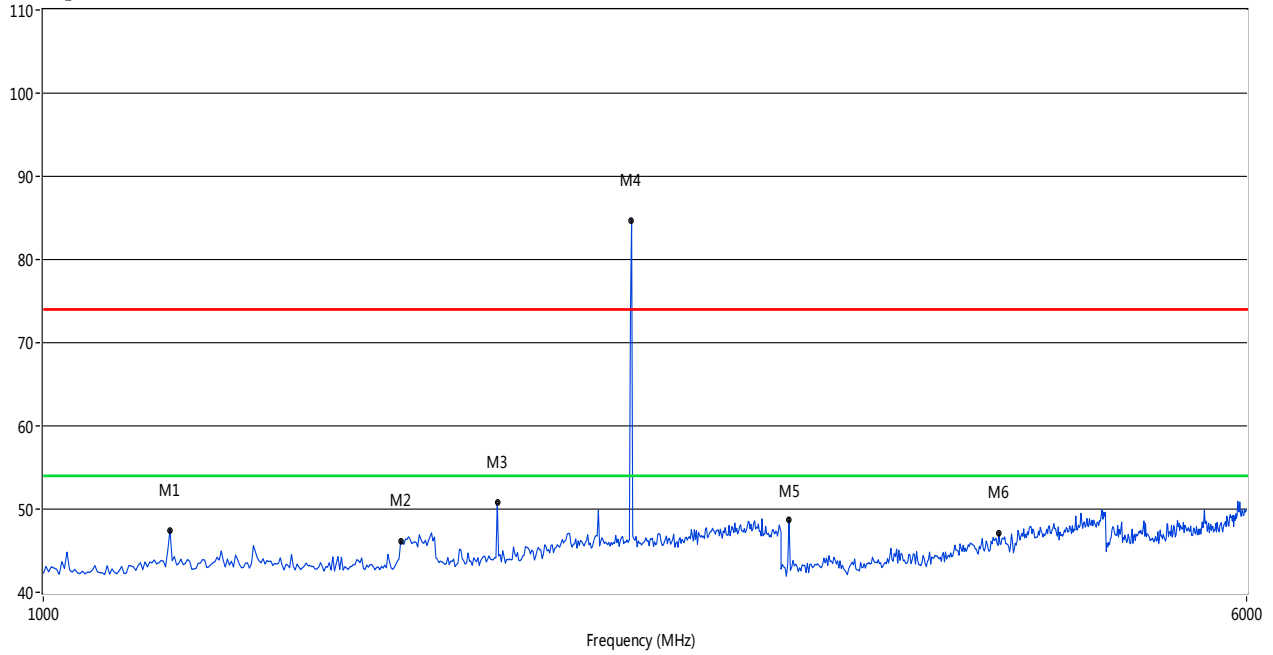
## II/4-DQPSK HIGH CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7044.51	46.44	--	--	74.0	--	54.0	27.56	172	Horizontal	PASS
8897.67	47.67	--	--	74.0	--	54.0	26.33	283	Horizontal	PASS
11121.46	51.22	--	--	74.0	--	54.0	22.78	92	Horizontal	PASS
12615.23	51.11	--	--	74.0	--	54.0	22.89	36	Horizontal	PASS
16348.17	48.46	--	--	74.0	--	54.0	25.54	8	Horizontal	PASS
19409.32	50.11	--	--	74.0	--	54.0	23.89	31	Horizontal	PASS

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

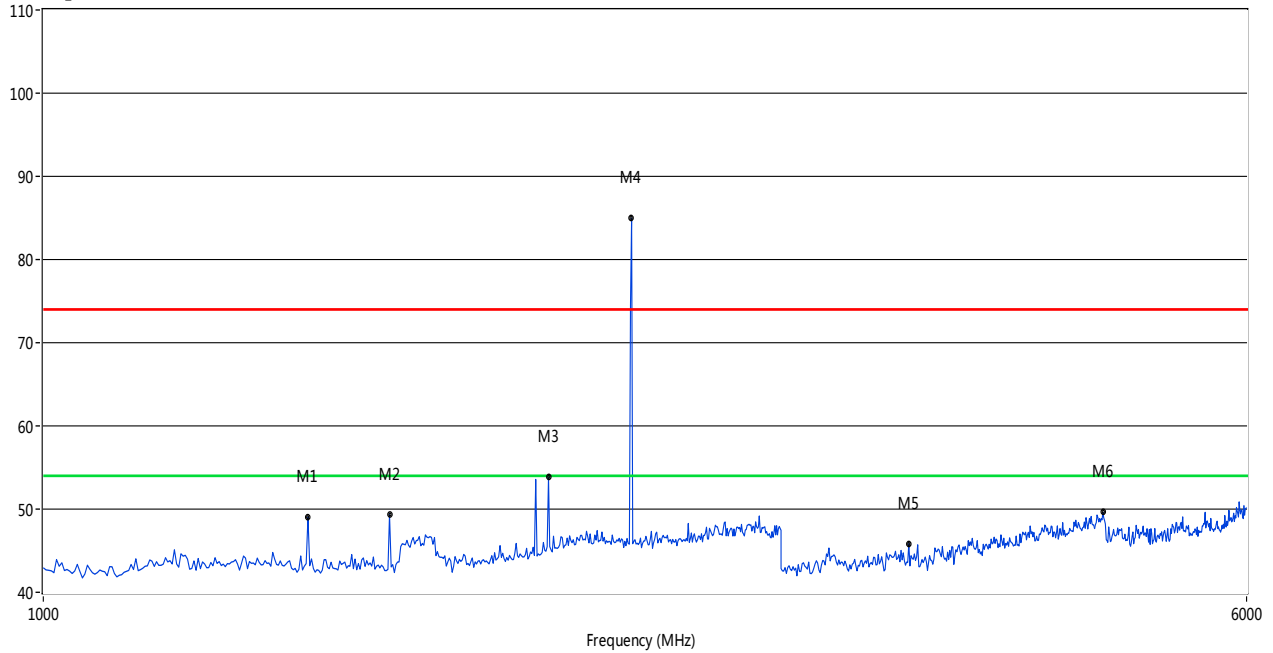
RE Test case\_FCC 15C 1GHz-6GHz



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
1207.58	47.47	--	--	-3.74	74.0	--	54.0	6.53	127.40	100	Vertical	PASS
1702.59	46.15	--	--	-0.38	74.0	--	54.0	7.85	61.10	100	Vertical	PASS
1966.07	50.74	--	--	-2.51	74.0	--	54.0	3.26	116.30	100	Vertical	PASS
2401.20	84.71	--	--	-0.04	74.0	--	54.0	-30.71	353.90	100	Vertical	N/A
3035.93	48.72	--	--	7.74	74.0	--	54.0	5.28	360.00	100	Vertical	PASS
4149.70	47.05	--	--	10.16	74.0	--	54.0	6.95	138.90	100	Vertical	PASS

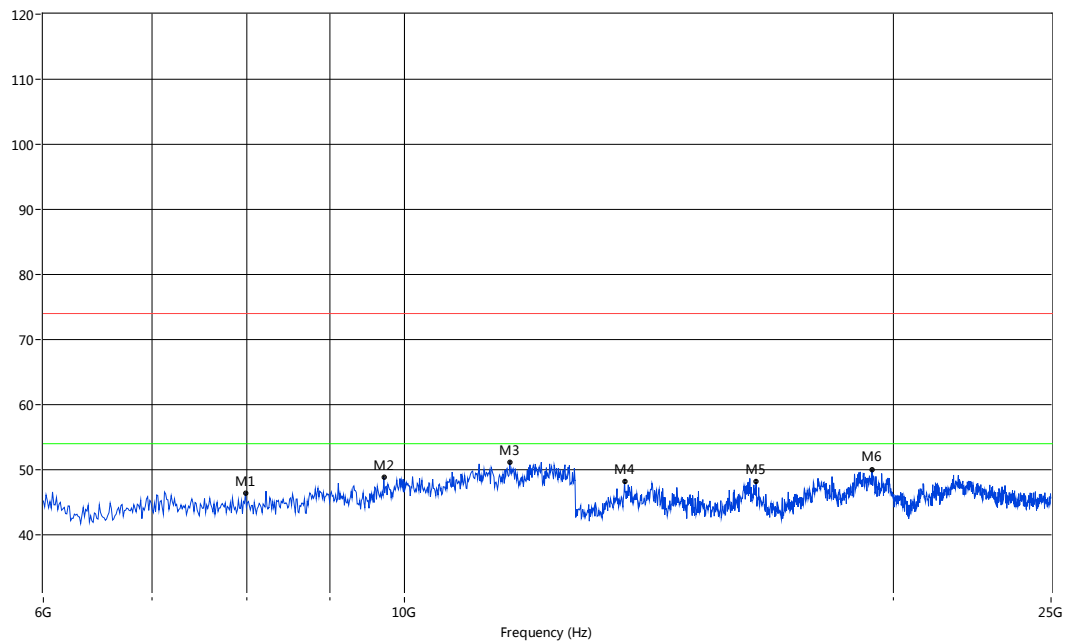
# 8-DPSK LOW CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



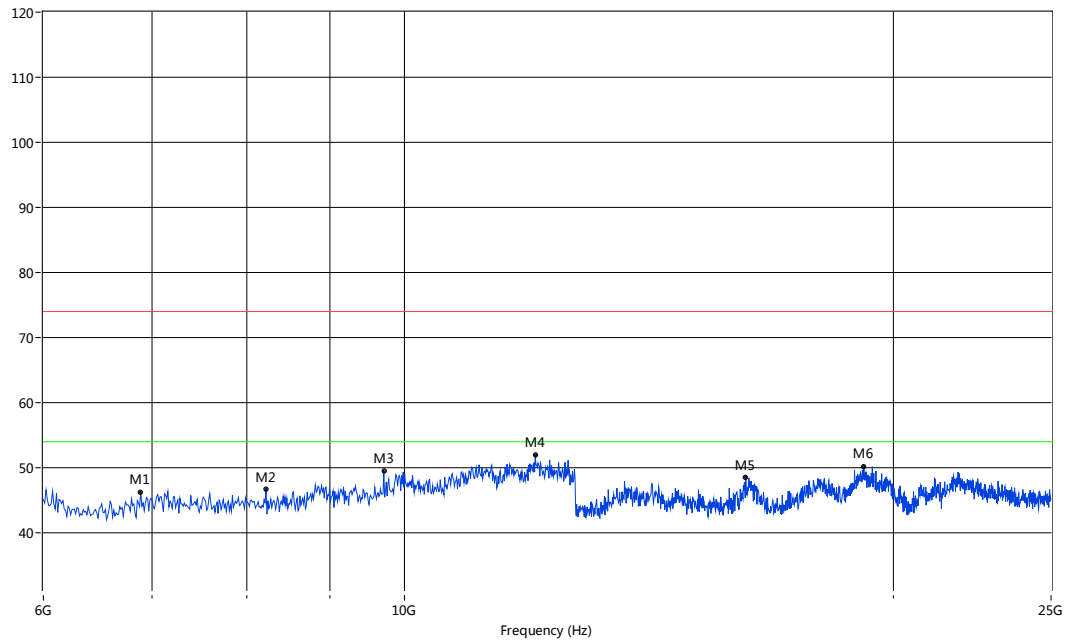
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1483.03	49.03	--	--	-3.75	74.0	--	54.0	4.97	360.00	100	Horizontal	PASS
1674.65	49.35	--	--	-3.82	74.0	--	54.0	4.65	359.40	100	Horizontal	PASS
2121.76	53.81	--	32.59	-1.24	74.0	--	54.0	21.41	331.20	100	Horizontal	PASS
2401.20	84.99	--	--	-0.04	74.0	--	54.0	-30.99	342.30	100	Horizontal	N/A
3628.74	45.83	--	--	8.75	74.0	--	54.0	8.17	188.50	100	Horizontal	PASS
4844.31	49.62	--	--	12.98	74.0	--	54.0	4.38	13.50	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
7987.94	46.35	--	--	74.0	--	54.0	27.65	128	Vertical	PASS
9717.55	48.89	--	--	74.0	--	54.0	25.11	197	Vertical	PASS
11615.64	51.17	--	--	74.0	--	54.0	22.83	17	Vertical	PASS
13665.14	48.23	--	--	74.0	--	54.0	25.77	191	Vertical	PASS
16462.56	48.19	--	--	74.0	--	54.0	25.81	340	Vertical	PASS
19389.35	50.00	--	--	74.0	--	54.0	24.00	150	Vertical	PASS

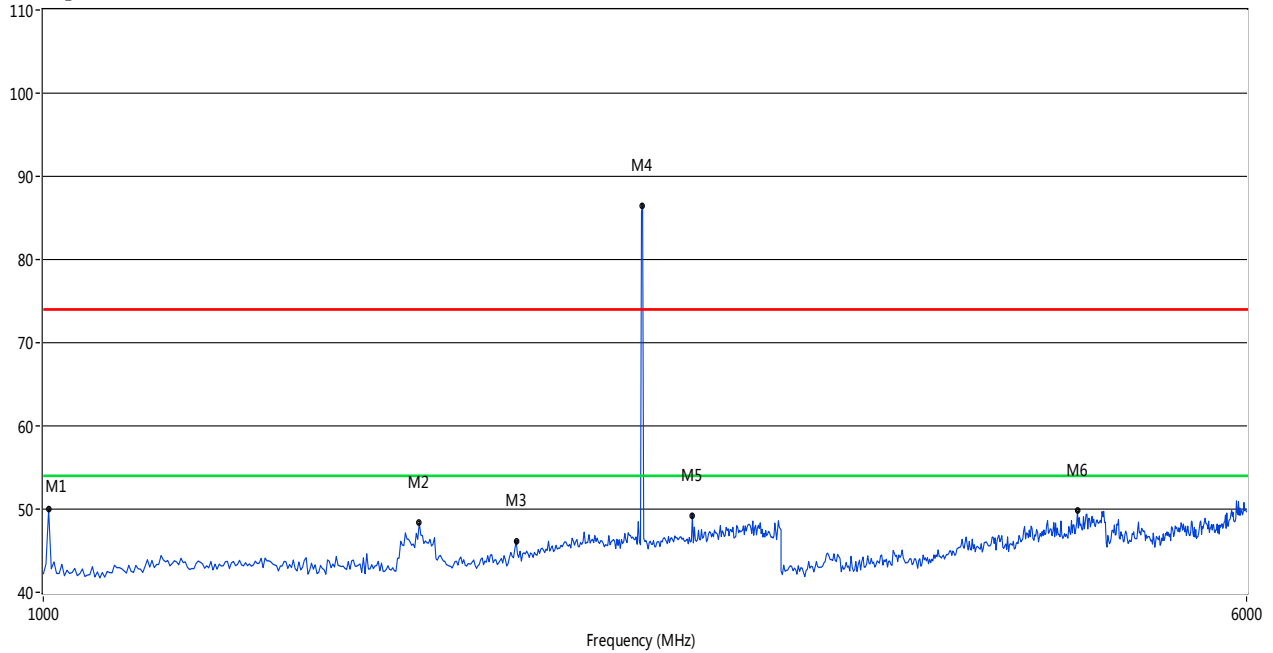
## 8-DPSK LOW CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
6887.27	46.29	--	--	74.0	--	54.0	27.71	315	Horizontal	PASS
8223.79	46.71	--	--	74.0	--	54.0	27.29	279	Horizontal	PASS
9717.55	49.45	--	--	74.0	--	54.0	24.55	331	Horizontal	PASS
12042.43	52.02	--	--	74.0	--	54.0	21.98	255	Horizontal	PASS
16223.38	48.53	--	--	74.0	--	54.0	25.47	128	Horizontal	PASS
19179.70	50.23	--	--	74.0	--	54.0	23.77	335	Horizontal	PASS

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

RE Test case\_FCC 15C 1GHz-6GHz

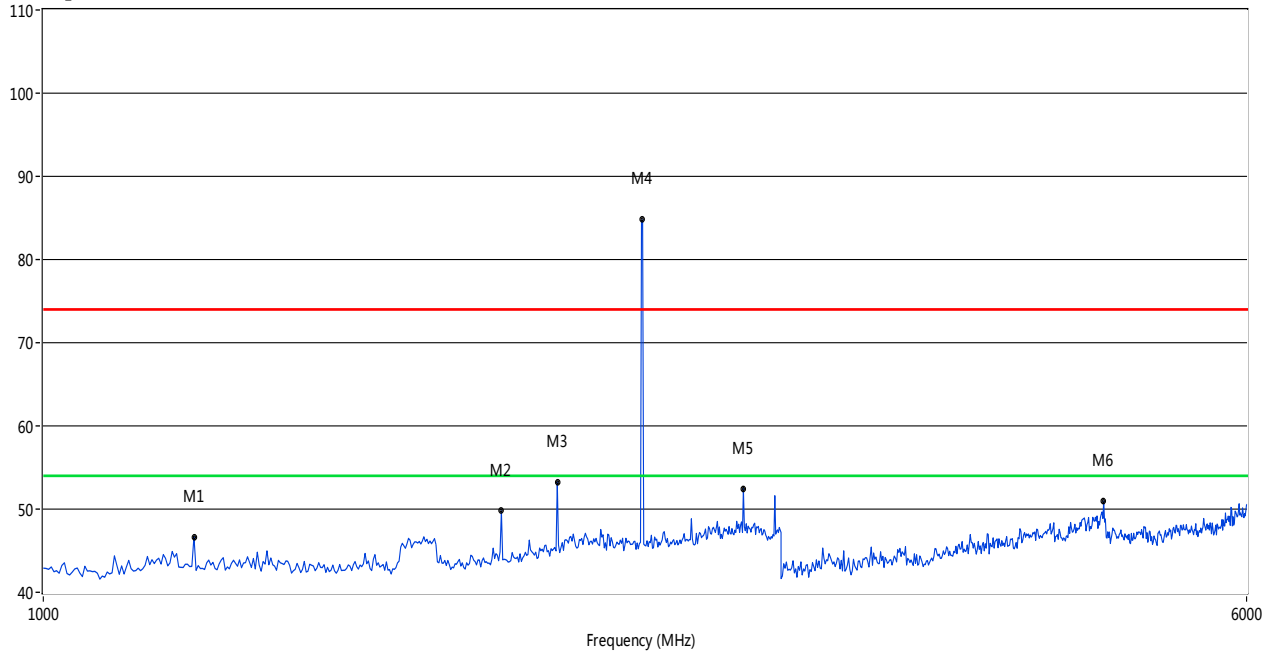


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1007.98	49.92	--	--	-4.97	74.0	--	54.0	4.08	0.70	100	Vertical	PASS
1750.50	48.34	--	--	-0.23	74.0	--	54.0	5.66	165.50	100	Vertical	PASS
2021.96	46.17	--	--	-1.97	74.0	--	54.0	7.83	254.40	100	Vertical	PASS
2441.12	86.48	--	--	0.17	74.0	--	54.0	-32.48	3.80	100	Vertical	N/A
2628.74	49.22	--	--	0.78	74.0	--	54.0	4.78	299.00	100	Vertical	PASS
4664.67	49.78	--	--	11.34	74.0	--	54.0	4.22	1.60	100	Vertical	PASS



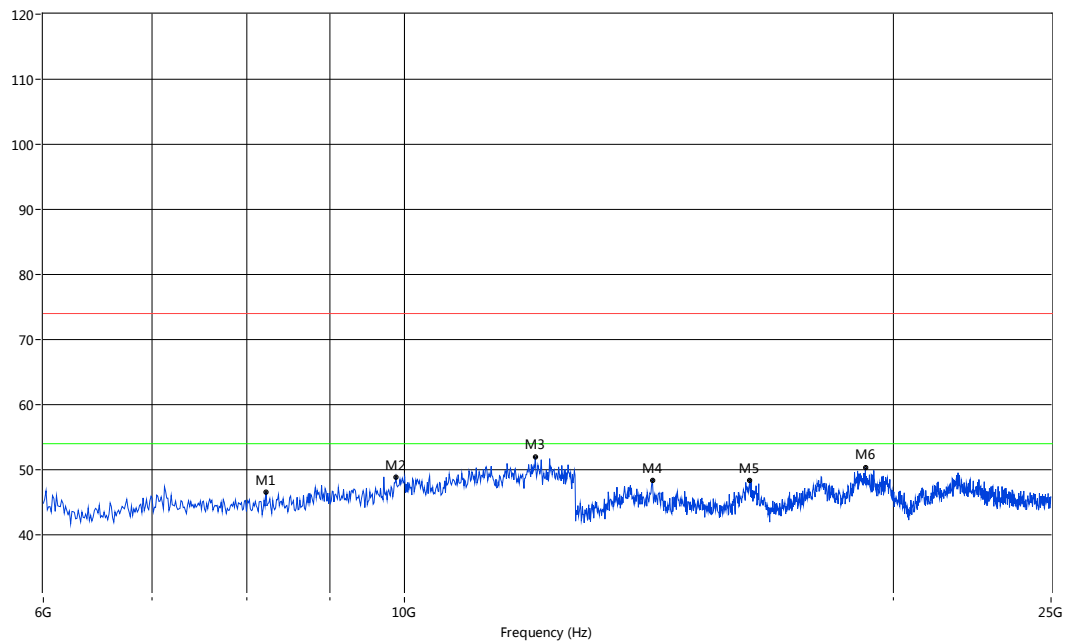
# 8-DPSK MID CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



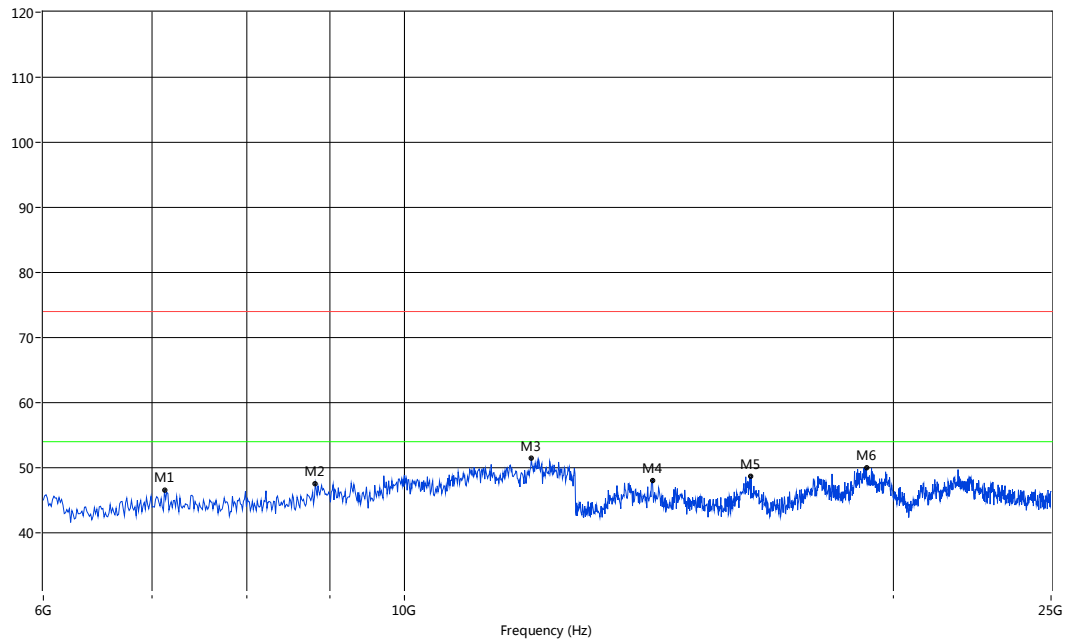
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1251.50	46.69	--	--	-4.10	74.0	--	54.0	7.31	283.30	100	Horizontal	PASS
1978.04	49.79	--	--	-2.36	74.0	--	54.0	4.21	333.30	100	Horizontal	PASS
2149.70	53.27	--	32.05	-0.91	74.0	--	54.0	23.95	333.30	100	Horizontal	PASS
2441.12	84.77	--	--	0.17	74.0	--	54.0	-30.77	322.30	100	Horizontal	N/A
2836.33	52.47	--	--	2.34	74.0	--	54.0	1.53	228.00	100	Horizontal	PASS
4850.30	50.96	--	--	12.79	74.0	--	54.0	3.04	198.20	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
8223.79	46.58	--	--	74.0	--	54.0	27.42	68	Vertical	PASS
9886.02	48.85	--	--	74.0	--	54.0	25.15	21	Vertical	PASS
12042.43	51.99	--	--	74.0	--	54.0	22.01	224	Vertical	PASS
14216.31	48.36	--	--	74.0	--	54.0	25.64	135	Vertical	PASS
16316.97	48.42	--	--	74.0	--	54.0	25.58	300	Vertical	PASS
19219.63	50.32	--	--	74.0	--	54.0	23.68	315	Vertical	PASS

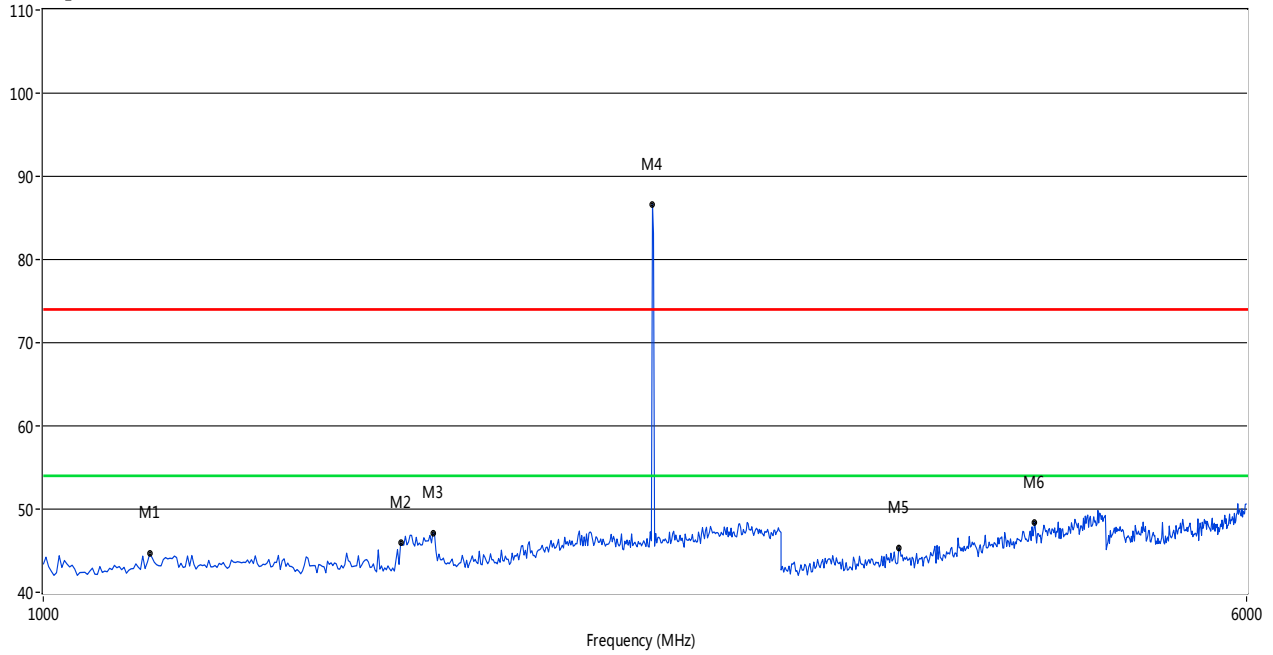
## 8-DPSK MID CHANNEL 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7123.13	46.52	--	--	74.0	--	54.0	27.48	84	Horizontal	PASS
8819.05	47.60	--	--	74.0	--	54.0	26.40	204	Horizontal	PASS
11975.04	51.42	--	--	74.0	--	54.0	22.58	10	Horizontal	PASS
14216.31	48.02	--	--	74.0	--	54.0	25.98	18	Horizontal	PASS
16348.17	48.64	--	--	74.0	--	54.0	25.36	145	Horizontal	PASS
19249.58	49.98	--	--	74.0	--	54.0	24.02	92	Horizontal	PASS

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

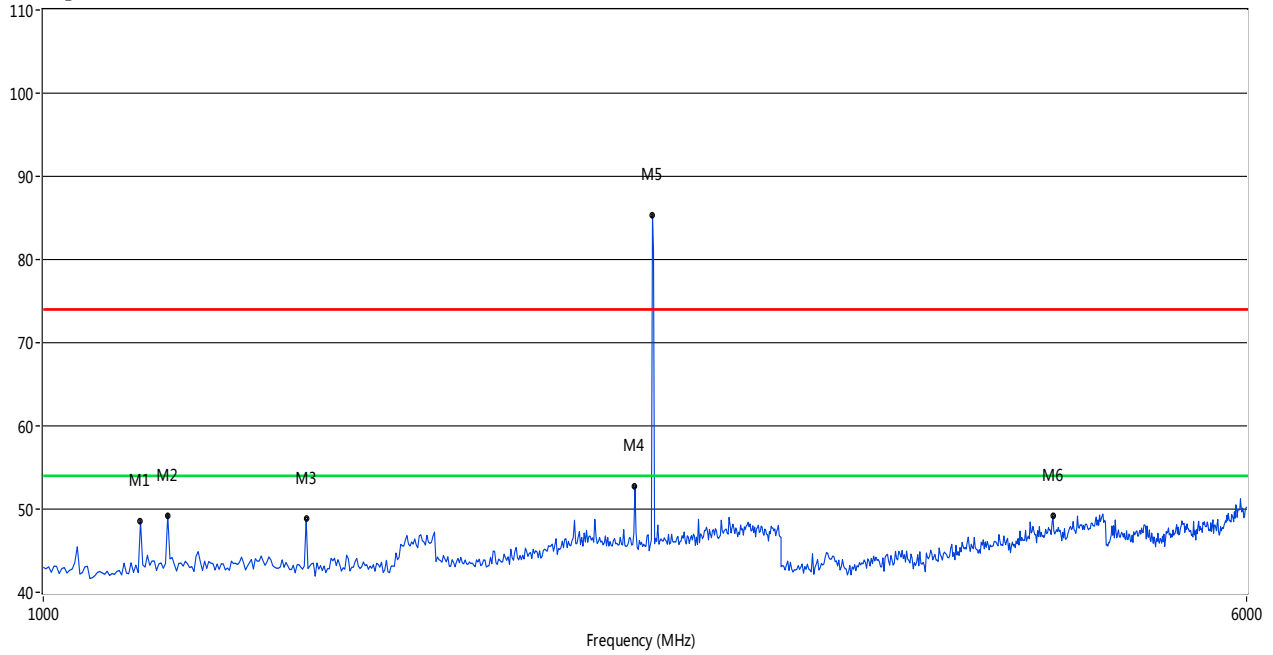
RE Test case\_FCC 15C 1GHz-6GHz



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
1171.66	44.62	--	--	-4.25	74.0	--	54.0	9.38	2.60	100	Vertical	PASS
1702.59	45.97	--	--	-0.38	74.0	--	54.0	8.03	66.30	100	Vertical	PASS
1786.43	47.17	--	--	-0.24	74.0	--	54.0	6.83	110.50	100	Vertical	PASS
2477.05	86.59	--	--	-0.25	74.0	--	54.0	-32.59	6.70	100	Vertical	N/A
3574.85	45.32	--	--	8.84	74.0	--	54.0	8.68	359.60	100	Vertical	PASS
4377.25	48.39	--	--	10.79	74.0	--	54.0	5.61	134.80	100	Vertical	PASS

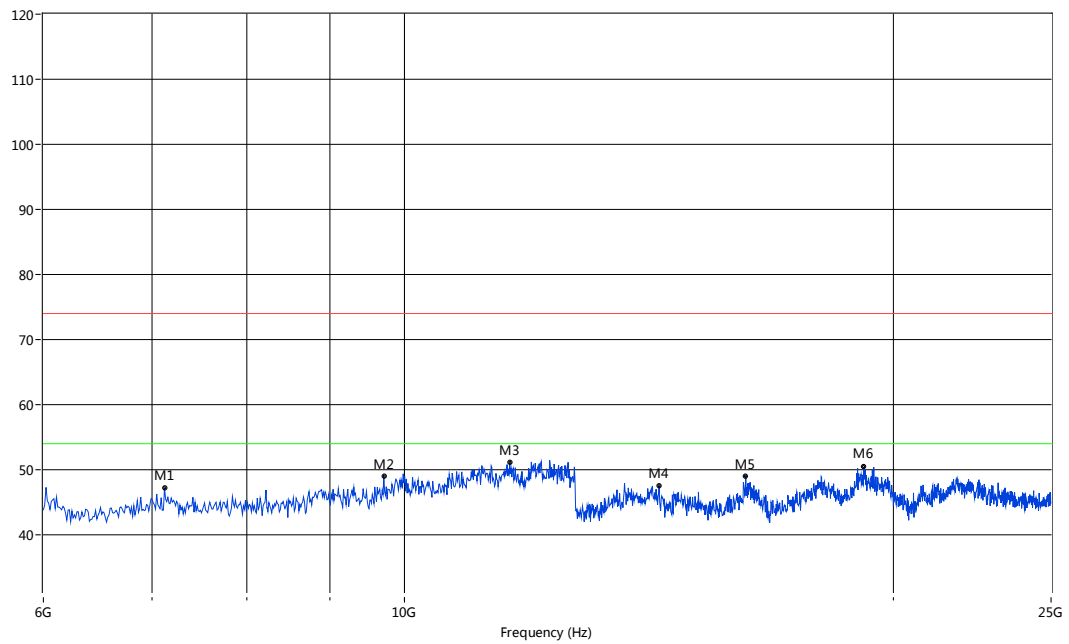
# 8-DPSK HIGH CHANNEL 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



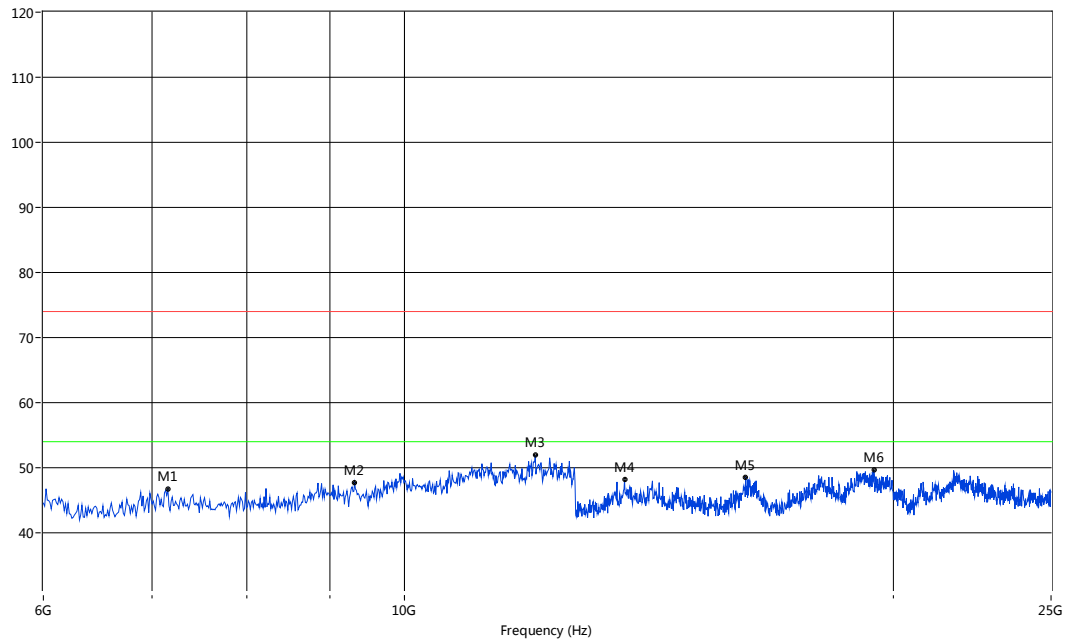
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1155.69	48.53	--	--	-4.40	74.0	--	54.0	5.47	300.60	100	Horizontal	PASS
1203.59	49.25	--	--	-3.79	74.0	--	54.0	4.75	222.10	100	Horizontal	PASS
1479.04	48.79	--	--	-3.81	74.0	--	54.0	5.21	116.70	100	Horizontal	PASS
2413.17	52.70	--	--	0.01	74.0	--	54.0	1.30	116.70	100	Horizontal	PASS
2477.05	85.36	--	--	-0.25	74.0	--	54.0	-31.36	322.80	100	Horizontal	N/A
4497.01	49.17	--	--	10.97	74.0	--	54.0	4.83	296.30	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
7123.13	47.16	--	--	74.0	--	54.0	26.84	219	Vertical	PASS
9717.55	48.97	--	--	74.0	--	54.0	25.03	193	Vertical	PASS
11615.64	51.10	--	--	74.0	--	54.0	22.90	169	Vertical	PASS
14351.50	47.55	--	--	74.0	--	54.0	26.45	313	Vertical	PASS
16223.38	49.02	--	--	74.0	--	54.0	24.98	316	Vertical	PASS
19179.70	50.43	--	--	74.0	--	54.0	23.57	157	Vertical	PASS

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

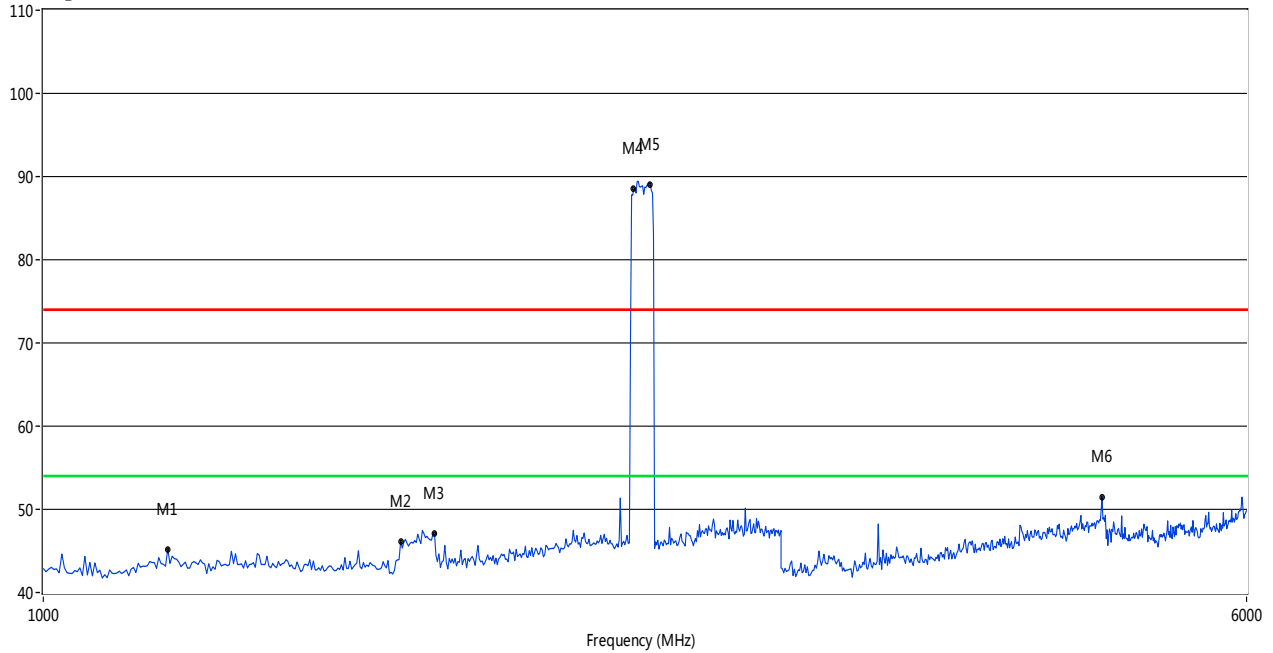


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT
7156.82	46.64	--	--	74.0	--	54.0	27.36	329	Horizontal	PASS
9324.46	47.69	--	--	74.0	--	54.0	26.31	160	Horizontal	PASS
12042.43	51.89	--	--	74.0	--	54.0	22.11	39	Horizontal	PASS
13665.14	48.15	--	--	74.0	--	54.0	25.85	347	Horizontal	PASS
16223.38	48.53	--	--	74.0	--	54.0	25.47	298	Horizontal	PASS
19449.25	49.63	--	--	74.0	--	54.0	24.37	182	Horizontal	PASS

### Hopping Mode:

#### GFSK MODE 1GHz to 6GHz, ANT V

RE Test case\_FCC 15C 1GHz-6GHz

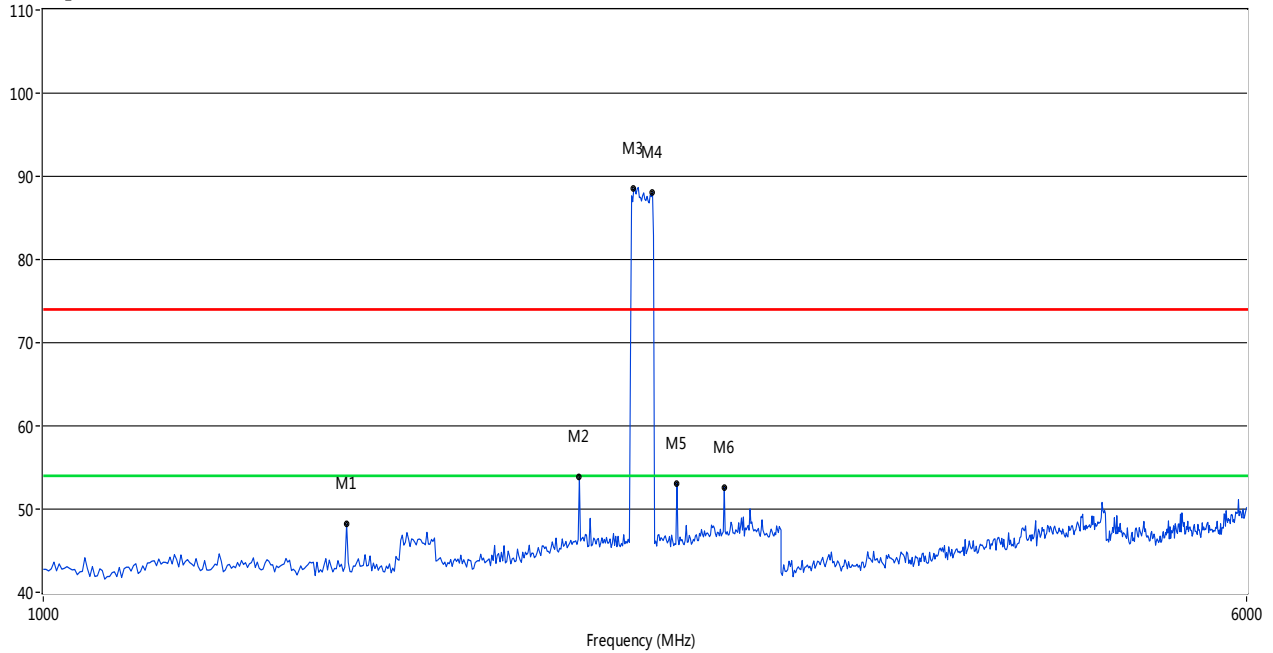


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1203.59	45.21	--	--	-3.79	74.0	--	54.0	8.79	357.30	100	Vertical	PASS
1702.59	46.17	--	--	-0.38	74.0	--	54.0	7.83	347.20	100	Vertical	PASS
1790.42	47.07	--	--	-0.24	74.0	--	54.0	6.93	-0.60	100	Vertical	PASS
2409.18	88.54	--	--	0.11	74.0	--	54.0	-34.54	341.70	100	Vertical	N/A
2469.06	89.08	--	--	-0.15	74.0	--	54.0	-35.08	6.40	100	Vertical	N/A
4838.32	51.45	--	--	13.06	74.0	--	54.0	2.55	36.00	100	Vertical	PASS



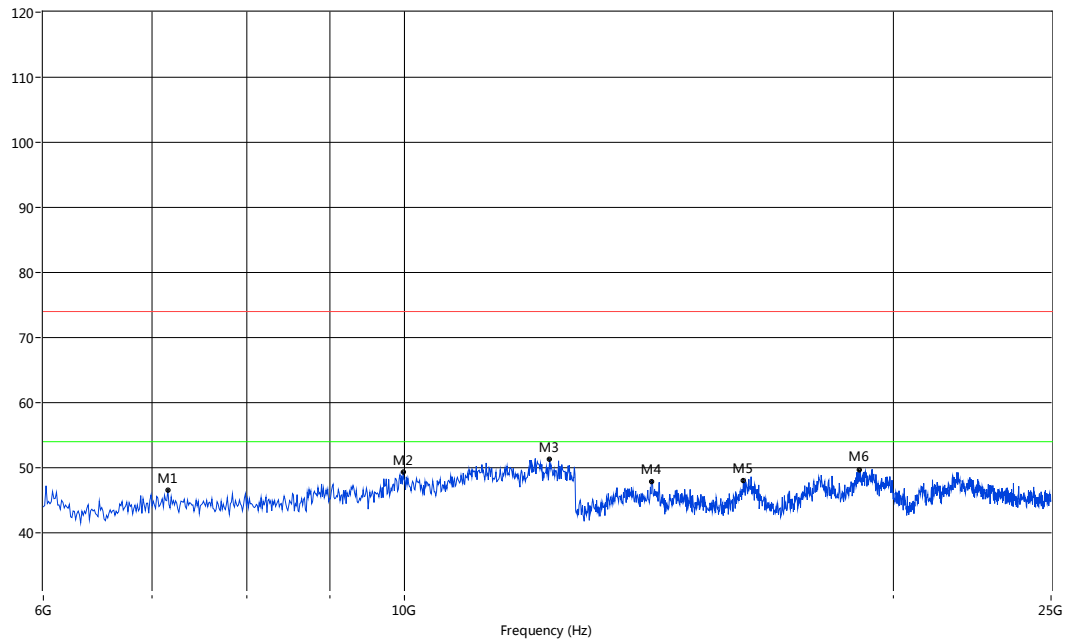
## GFSK MODE 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



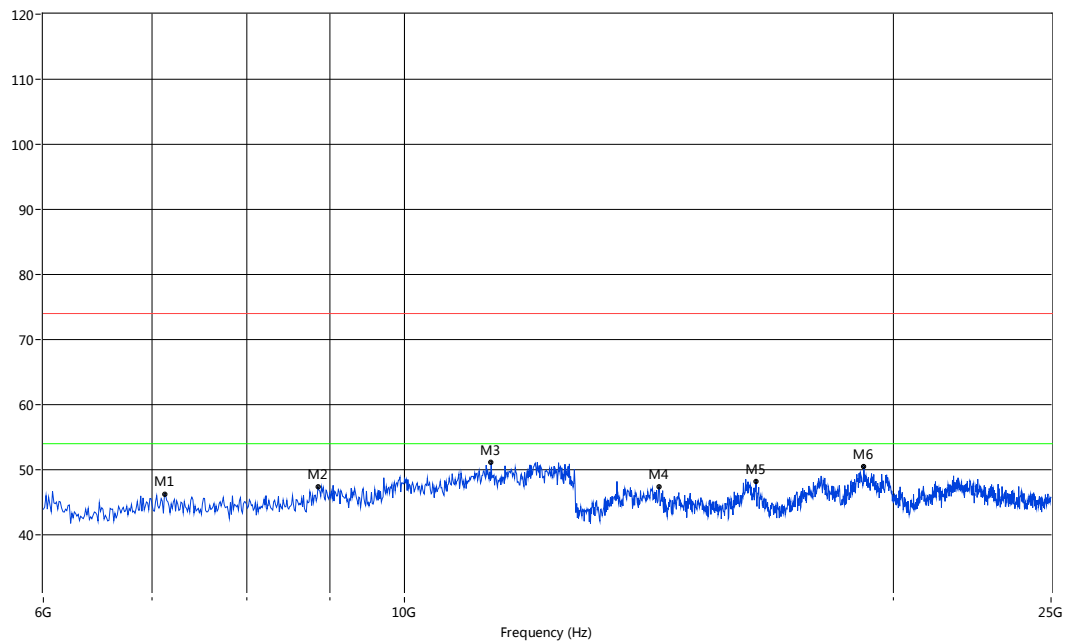
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1570.86	48.21	--	--	-4.09	74.0	--	54.0	5.79	2.40	100	Horizontal	PASS
2221.56	53.92	--	32.7	-0.23	74.0	--	54.0	21.3	227.40	100	Horizontal	PASS
2409.18	88.53	--	--	0.11	74.0	--	54.0	-34.53	327.60	100	Horizontal	N/A
2477.05	88.04	--	--	-0.25	74.0	--	54.0	-34.04	322.10	100	Horizontal	N/A
2568.86	53.11	--	31.89	0.19	74.0	--	54.0	22.11	249.80	100	Horizontal	PASS
2756.49	52.62	--	--	1.98	74.0	--	54.0	1.38	249.80	100	Horizontal	PASS

## GFSK MODE 6GHz to 25GHz, ANT V



Frequency (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)	Height (cm)	ANT
7156.82	46.58	--	--	74.0	--	54.0	27.42	331	Vertical	PASS
9987.10	49.32	--	--	74.0	--	54.0	24.68	144	Vertical	PASS
12289.52	51.28	--	--	74.0	--	54.0	22.72	69	Vertical	PASS
14195.51	47.86	--	--	74.0	--	54.0	26.14	260	Vertical	PASS
16171.38	48.06	--	--	74.0	--	54.0	25.94	23	Vertical	PASS
19049.92	49.61	--	--	74.0	--	54.0	24.39	7	Vertical	PASS

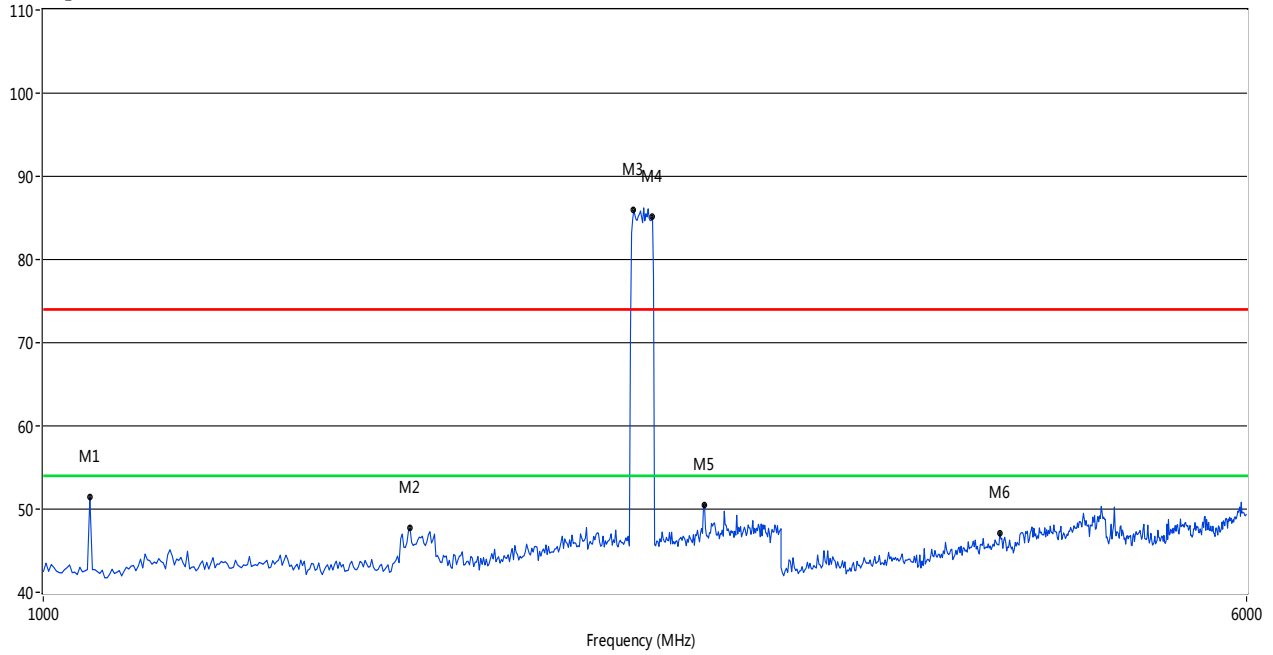
## GFSK MODE 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7123.13	46.24	--	--	74.0	--	54.0	27.76	150	Horizontal	PASS
8852.75	47.34	--	--	74.0	--	54.0	26.66	114	Horizontal	PASS
11312.40	51.10	--	--	74.0	--	54.0	22.90	198	Horizontal	PASS
14351.50	47.37	--	--	74.0	--	54.0	26.63	40	Horizontal	PASS
16462.56	48.27	--	--	74.0	--	54.0	25.73	83	Horizontal	PASS
19179.70	50.53	--	--	74.0	--	54.0	23.47	188	Horizontal	PASS

# II/4-DQPSK MODE 1GHz to 6GHz, ANT V

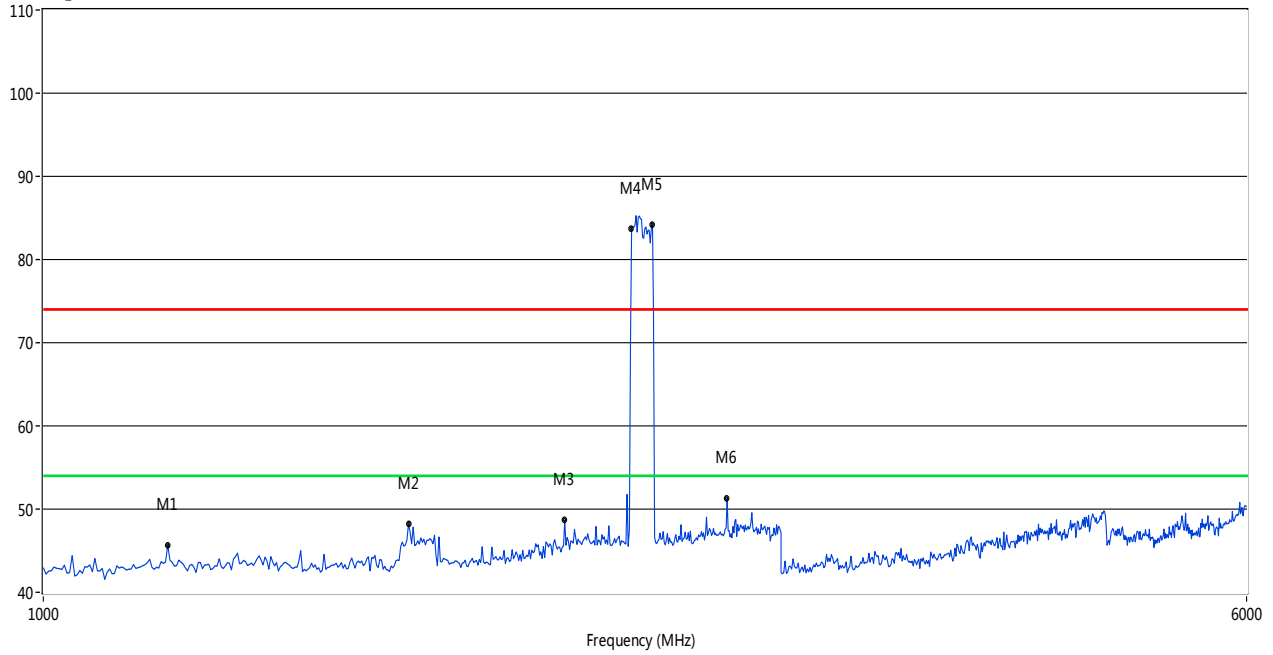
RE Test case\_FCC 15C 1GHz-6GHz



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
1071.86	51.41	--	--	-4.82	74.0	--	54.0	.59	360.00	100	Vertical	PASS
1726.55	47.67	--	--	-0.31	74.0	--	54.0	6.33	154.70	100	Vertical	PASS
2409.18	85.93	--	--	0.11	74.0	--	54.0	-31.93	337.80	100	Vertical	N/A
2477.05	85.18	--	--	-0.25	74.0	--	54.0	-31.18	7.00	100	Vertical	N/A
2676.65	50.53	--	--	1.30	74.0	--	54.0	3.47	249.30	100	Vertical	PASS
4155.69	47.09	--	--	10.17	74.0	--	54.0	6.91	301.10	100	Vertical	PASS

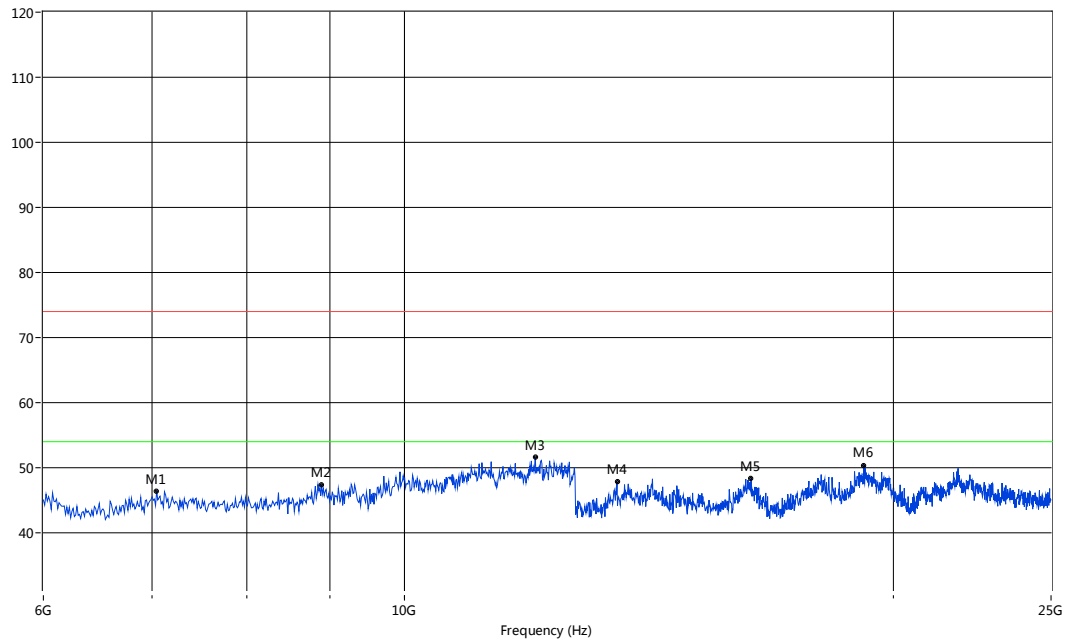
# Π/4-DQPSK MODE 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



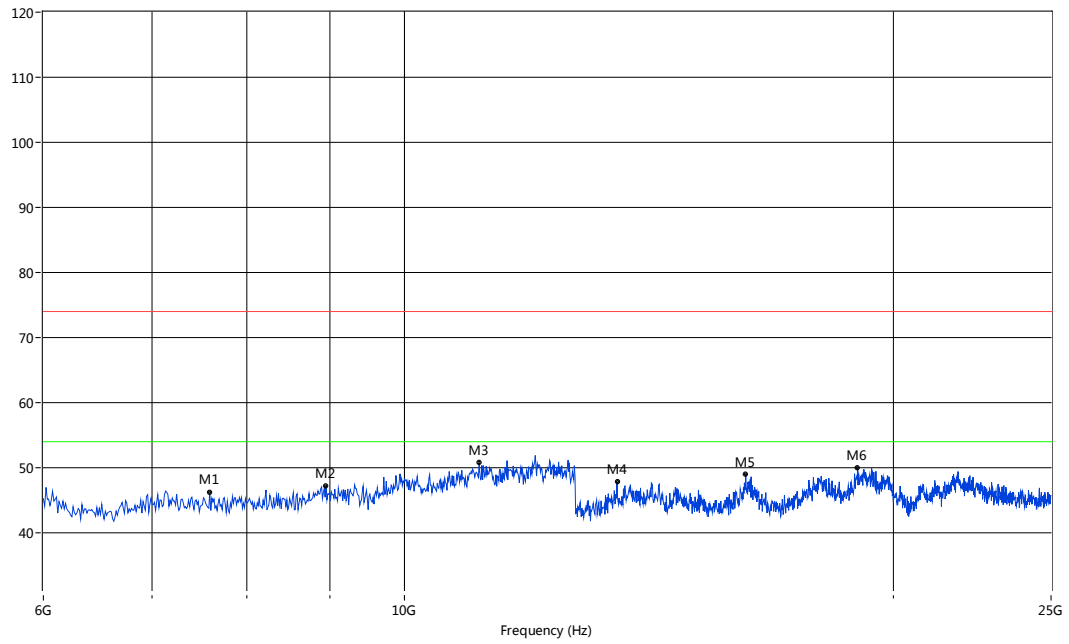
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1203.59	45.66	--	--	-3.79	74.0	--	54.0	.34	304.90	100	Horizontal	PASS
1722.55	48.20	--	--	-0.32	74.0	--	54.0	5.80	304.90	100	Horizontal	PASS
2173.65	48.65	--	--	-0.37	74.0	--	54.0	5.35	315.90	100	Horizontal	PASS
2401.20	83.71	--	--	-0.04	74.0	--	54.0	-29.71	327.00	100	Horizontal	N/A
2477.05	84.24	--	--	-0.25	74.0	--	54.0	-30.24	321.50	100	Horizontal	N/A
2768.46	51.28	--	--	2.12	74.0	--	54.0	2.72	327.00	100	Horizontal	PASS

# Π/4-DQPSK MODE 6GHz to 25GHz, ANT V



Frequency (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)	Height (cm)	ANT
7044.51	46.45	--	--	74.0	--	54.0	27.55	300	Vertical	PASS
8897.67	47.42	--	--	74.0	--	54.0	26.58	185	Vertical	PASS
12042.43	51.68	--	--	74.0	--	54.0	22.32	197	Vertical	PASS
13519.55	47.92	--	--	74.0	--	54.0	26.08	289	Vertical	PASS
16348.17	48.41	--	--	74.0	--	54.0	25.59	185	Vertical	PASS
19179.70	50.39	--	--	74.0	--	54.0	23.61	58	Vertical	PASS

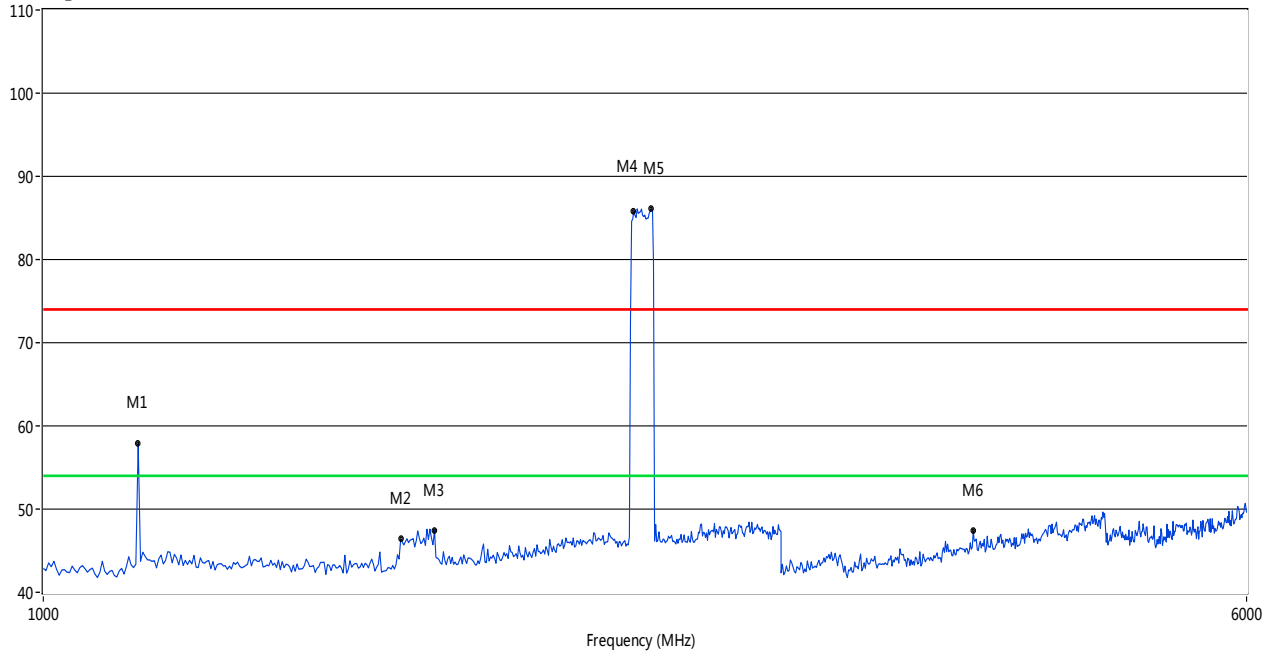
# Π/4-DQPSK MODE 6GHz to 25GHz, ANT H



Frequency (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)	Height (cm)	ANT
7594.84	46.18	--	--	74.0	--	54.0	27.82	353	Horizontal	PASS
8953.83	47.27	--	--	74.0	--	54.0	26.73	127	Horizontal	PASS
11121.46	50.75	--	--	74.0	--	54.0	23.25	225	Horizontal	PASS
13519.55	47.87	--	--	74.0	--	54.0	26.13	353	Horizontal	PASS
16223.38	49.01	--	--	74.0	--	54.0	24.99	30	Horizontal	PASS
19009.98	50.06	--	--	74.0	--	54.0	23.94	42	Horizontal	PASS

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

RE Test case\_FCC 15C 1GHz-6GHz

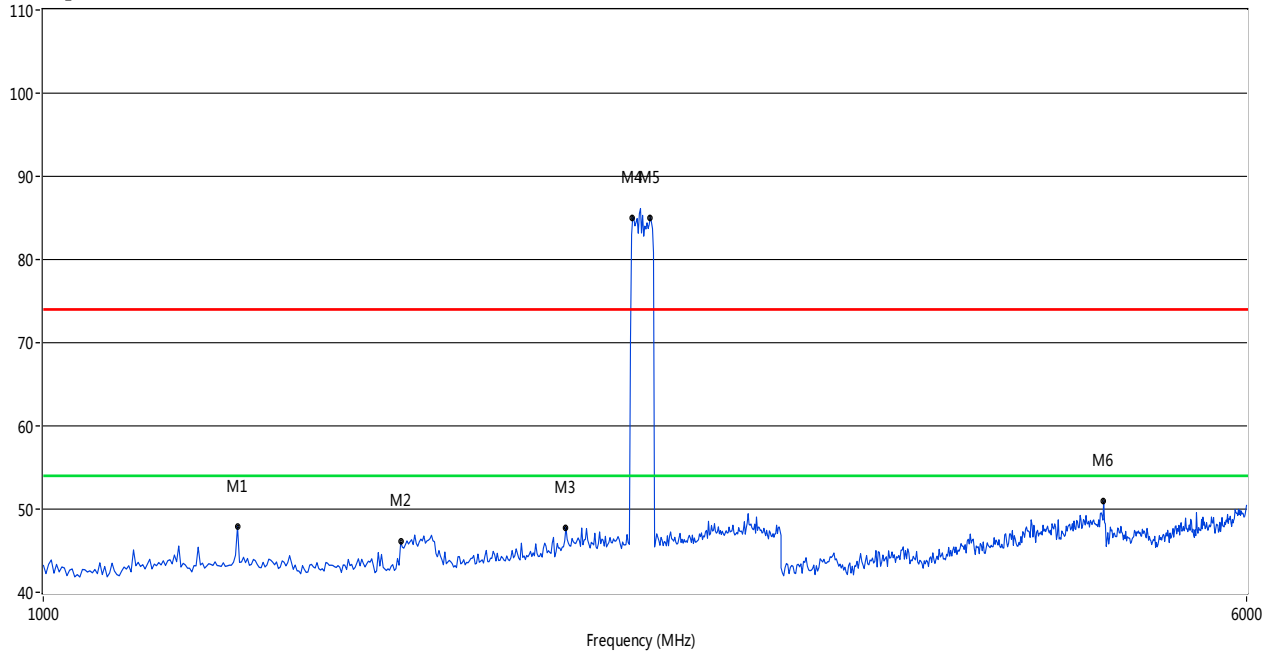


Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1151.70	57.91	--	36.69	-4.41	74.0	--	54.0	17.31	351.60	100	Vertical	PASS
1702.59	46.41	--	--	-0.38	74.0	--	54.0	7.59	72.80	100	Vertical	PASS
1790.42	47.41	--	--	-0.24	74.0	--	54.0	6.59	78.70	100	Vertical	PASS
2409.18	85.80	--	--	0.11	74.0	--	54.0	-31.80	4.30	100	Vertical	N/A
2473.05	86.11	--	--	-0.21	74.0	--	54.0	-32.11	4.30	100	Vertical	N/A
3994.01	47.40	--	--	10.13	74.0	--	54.0	6.60	278.50	100	Vertical	PASS



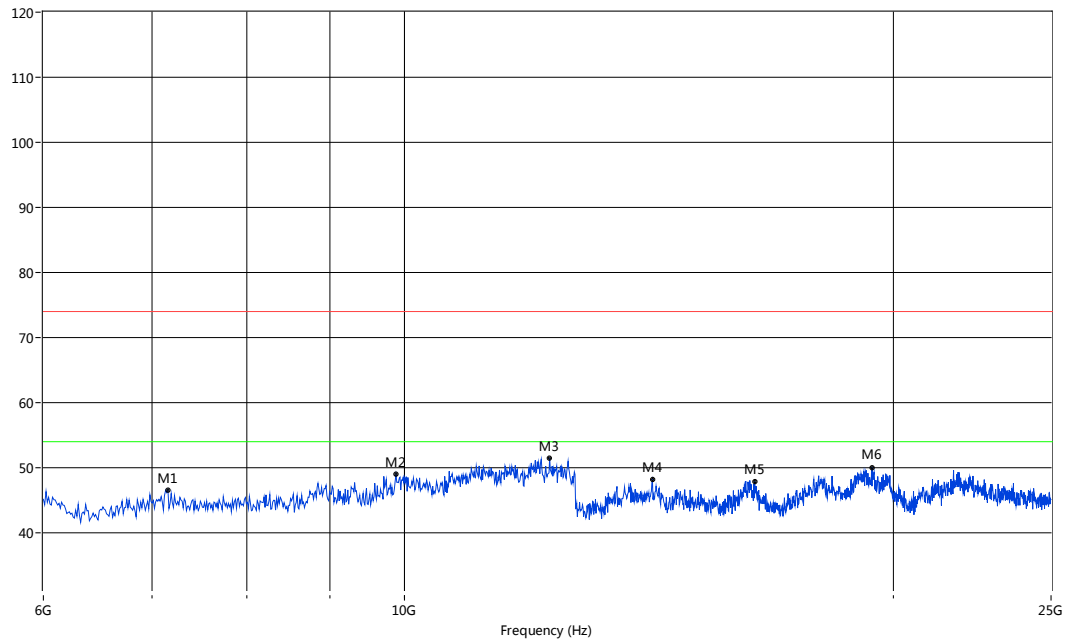
## 8-DPSK MODE 1GHz to 6GHz, ANT H

RE Test case\_FCC 15C 1GHz-6GHz



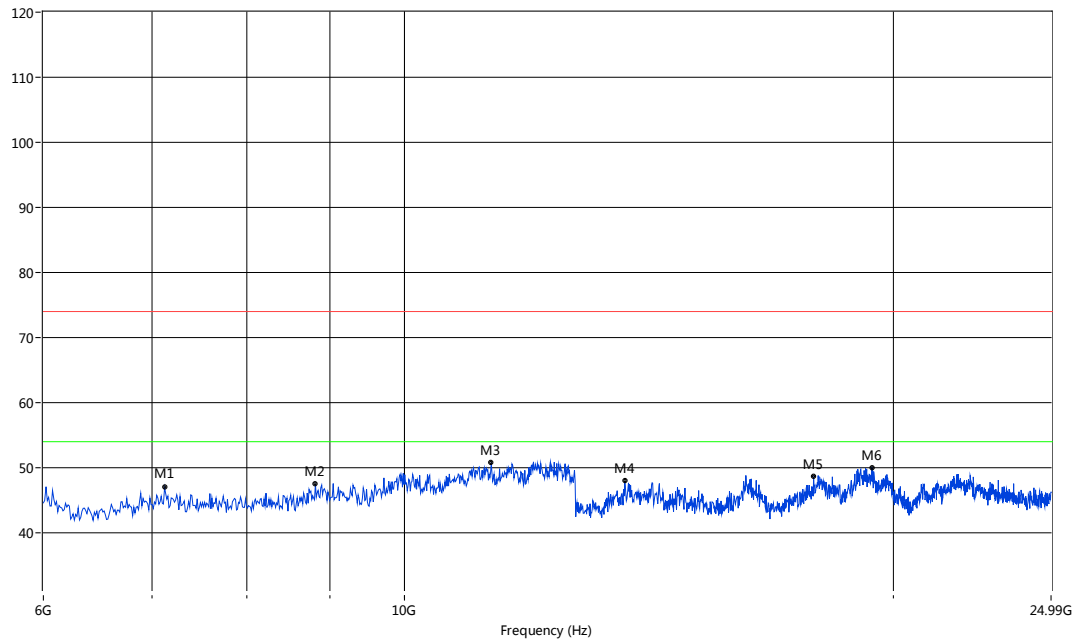
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1335.33	47.92	--	--	-3.86	74.0	--	54.0	6.08	72.00	100	Horizontal	PASS
1702.59	46.05	--	--	-0.38	74.0	--	54.0	7.95	121.80	100	Horizontal	PASS
2177.64	47.80	--	--	-0.23	74.0	--	54.0	6.20	94.50	100	Horizontal	PASS
2405.19	85.06	--	--	0.09	74.0	--	54.0	-31.06	321.70	100	Horizontal	N/A
2469.06	85.05	--	--	-0.15	74.0	--	54.0	-31.05	321.70	100	Horizontal	N/A
4850.30	50.98	--	--	12.79	74.0	--	54.0	3.02	31.90	100	Horizontal	PASS

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



Frequency (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)	Height (cm)	ANT
7156.82	46.63	--	--	74.0	--	54.0	27.37	280	Vertical	PASS
9886.02	48.96	--	--	74.0	--	54.0	25.04	239	Vertical	PASS
12289.52	51.51	--	--	74.0	--	54.0	22.49	4	Vertical	PASS
14216.31	48.14	--	--	74.0	--	54.0	25.86	146	Vertical	PASS
16431.36	47.92	--	--	74.0	--	54.0	26.08	45	Vertical	PASS
19409.32	50.06	--	--	74.0	--	54.0	23.94	29	Vertical	PASS

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



Frequency (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)	Height (cm)	ANT
7123.13	46.99	--	--	74.0	--	54.0	27.01	242	Horizontal	PASS
8819.05	47.52	--	--	74.0	--	54.0	26.48	247	Horizontal	PASS
11312.40	50.81	--	--	74.0	--	54.0	23.19	217	Horizontal	PASS
13665.14	47.97	--	--	74.0	--	54.0	26.03	306	Horizontal	PASS
17856.07	48.64	--	--	74.0	--	54.0	25.36	236	Horizontal	PASS
19389.35	50.06	--	--	74.0	--	54.0	23.94	122	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.

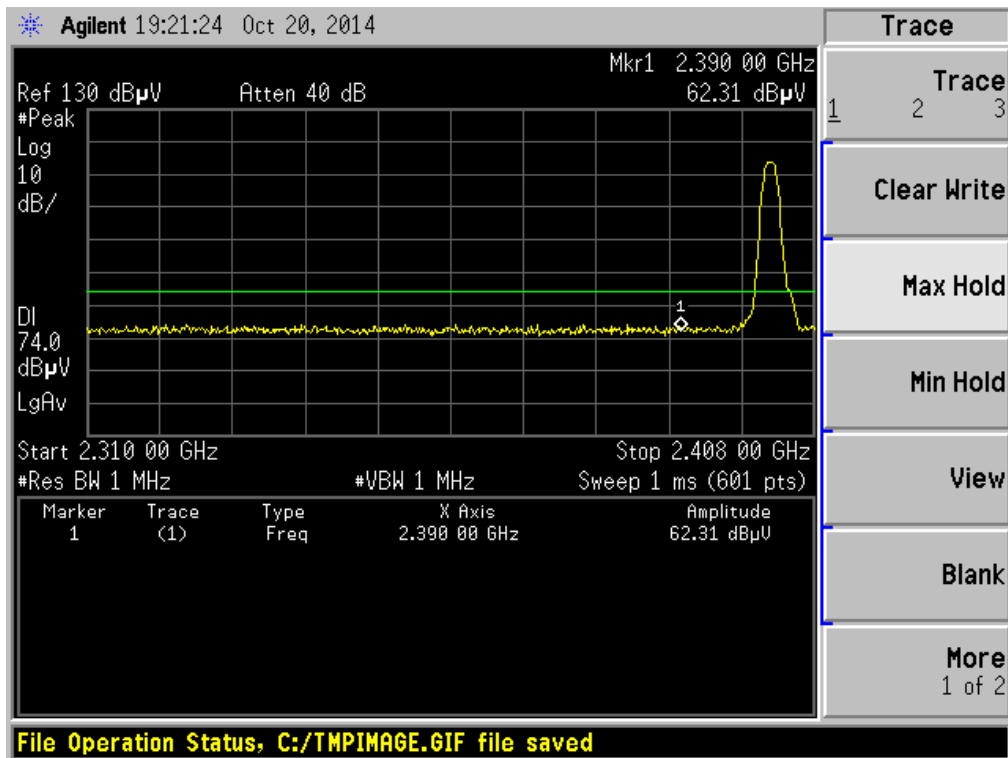
Note 2: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

Note 3: The average levels were calculated from the peak level corrected with duty cycle correction factor (-21.27dB) derived from  $20\log(\text{dwell time}/100\text{ms})$ .

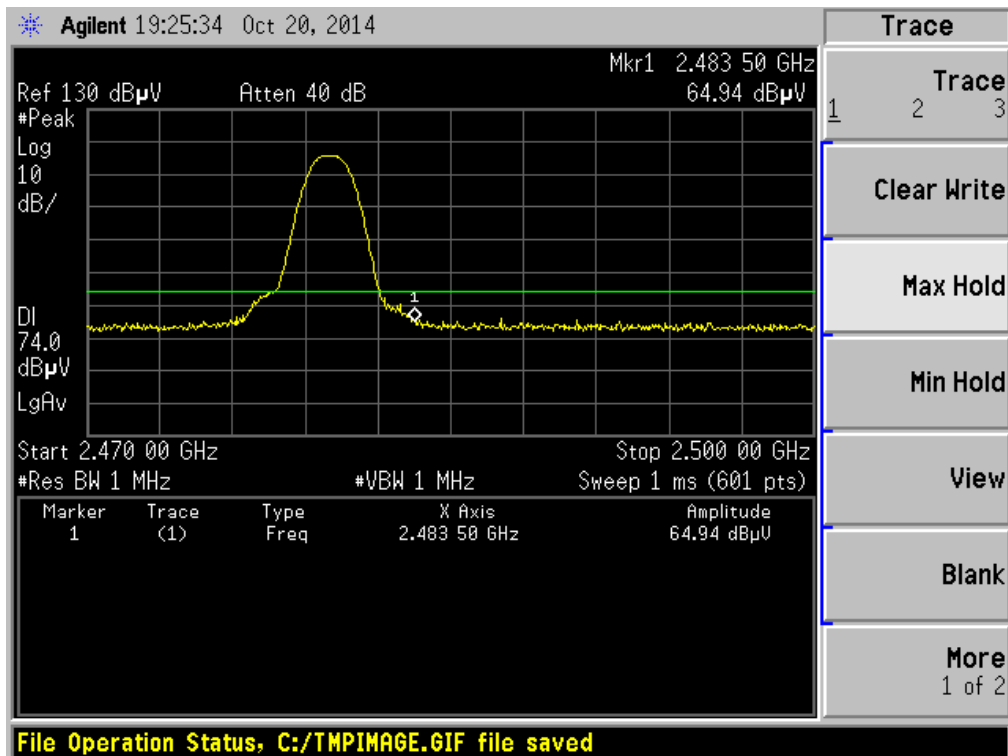
For example: Average level = 50.8dBuV/m – 21.27(dB) = 29.53dBuV/m.

Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	62.31	74	11.69	PEAK	PASS
		2390.00	41.04	54	12.96	AVERAGE	PASS
GFSK	HIGH	2483.50	64.94	74	9.06	PEAK	PASS
		2483.50	43.67	54	10.33	AVERAGE	PASS
$\pi$ /4QPSK	Low	2390.00	62.76	74	11.24	PEAK	PASS
		2390.00	41.49	54	12.51	AVERAGE	PASS
$\pi$ /4QPSK	HIGH	2483.50	64.58	74	9.42	PEAK	PASS
		2483.50	43.31	54	10.69	AVERAGE	PASS
8-DPSK	Low	2390.00	61.58	74	12.42	PEAK	PASS
		2390.00	40.31	54	13.69	AVERAGE	PASS
8-DPSK	HIGH	2483.50	66.79	74	7.21	PEAK	PASS
		2483.50	45.52	54	8.48	AVERAGE	PASS
GFSK(Hopping)	Low	2390.00	63.49	74	10.51	PEAK	PASS
		2390.00	42.22	54	11.78	AVERAGE	PASS
GFSK(Hopping)	HIGH	2483.50	64.79	74	9.21	PEAK	PASS
		2483.50	43.52	54	10.48	AVERAGE	PASS
$\pi$ /4QPSK (Hopping)	Low	2390.00	62.19	74	11.81	PEAK	PASS
		2390.00	40.92	54	13.08	AVERAGE	PASS
$\pi$ /4QPSK (Hopping)	HIGH	2483.50	63.34	74	10.66	PEAK	PASS
		2483.50	42.07	54	11.93	AVERAGE	PASS
8-DPSK (Hopping)	Low	2390.00	62.75	74	11.25	PEAK	PASS
		2390.00	41.48	54	12.52	AVERAGE	PASS
8-DPSK (Hopping)	HIGH	2483.50	65.19	74	8.81	PEAK	PASS
		2483.50	43.92	54	10.08	AVERAGE	PASS

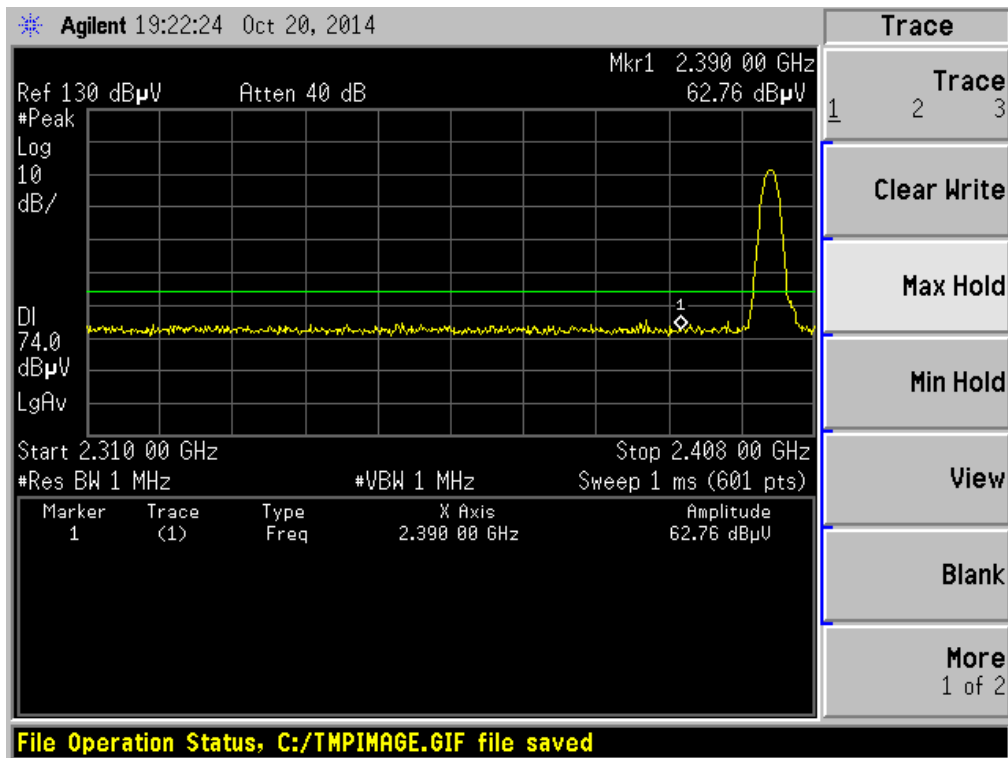
### GFSK LOW CHANNEL , PEAK



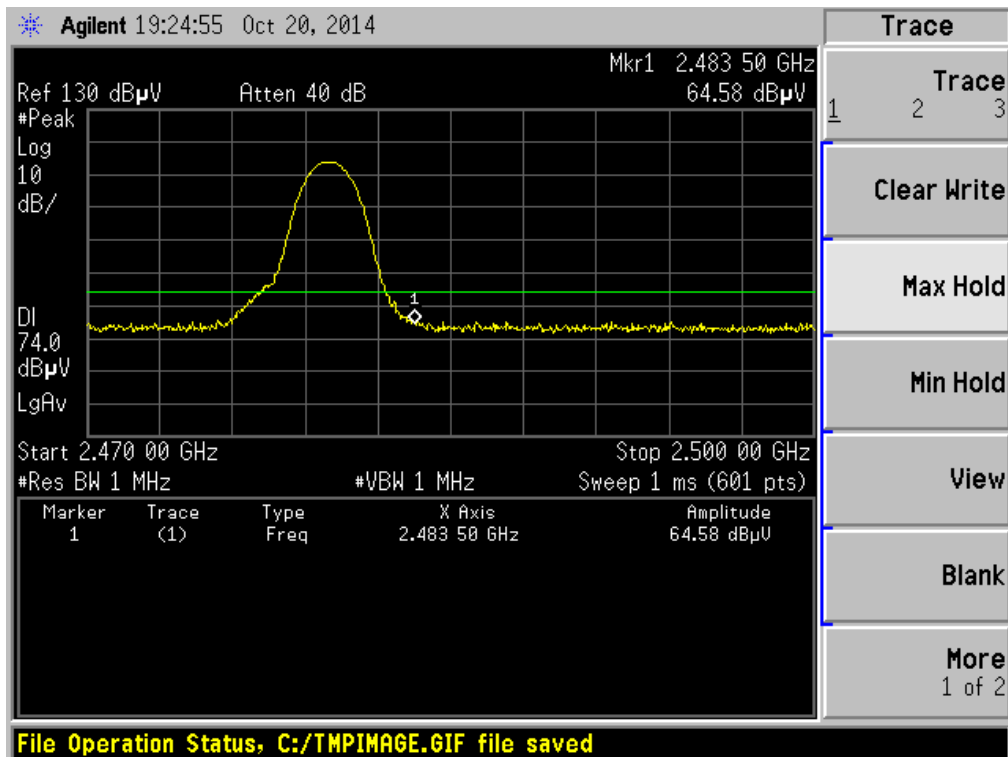
### GFSK HIGH CHANNEL , PEAK



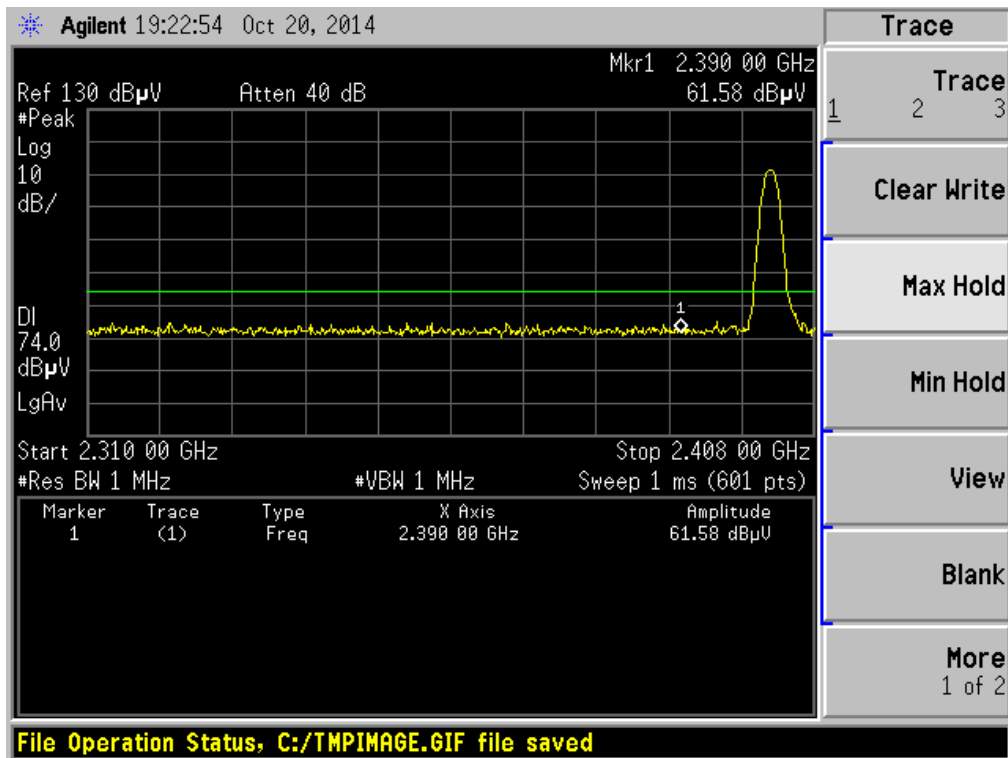
# $\pi$ /4DQPSK LOW CHANNEL , PEAK



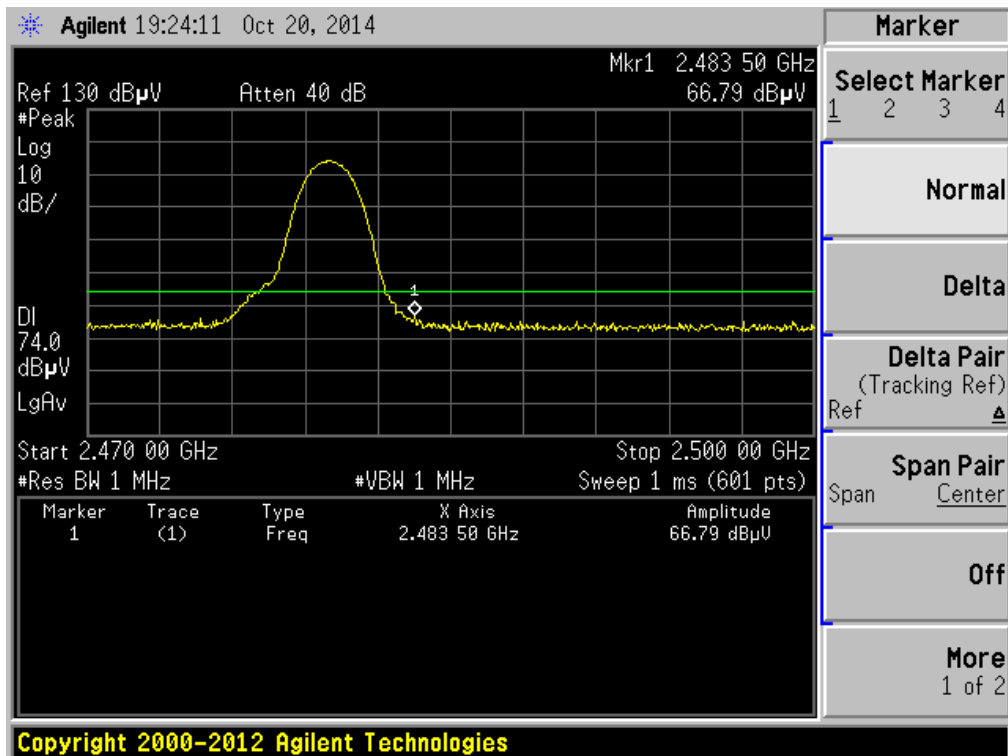
# $\pi$ /4DQPSK HIGH CHANNEL , PEAK



### 8-DPSK LOW CHANNEL , PEAK

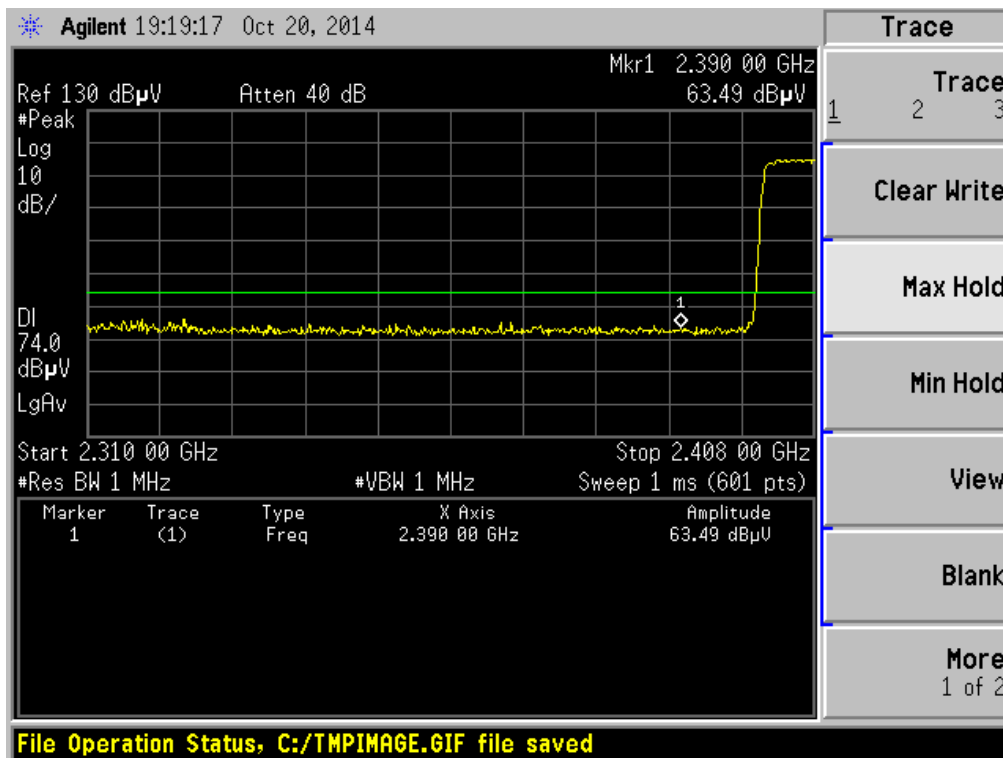


### 8-DPSK HIGH CHANNEL , PEAK

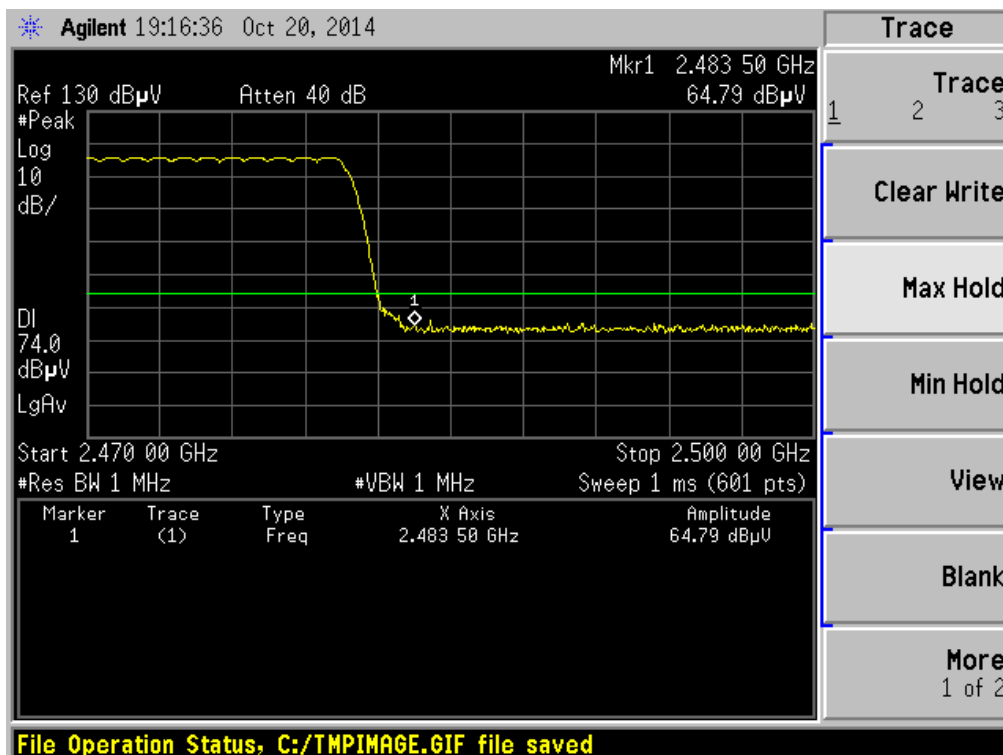


Hopping Mode:

### GFSK LOW FREQUENCY BAND, PEAK

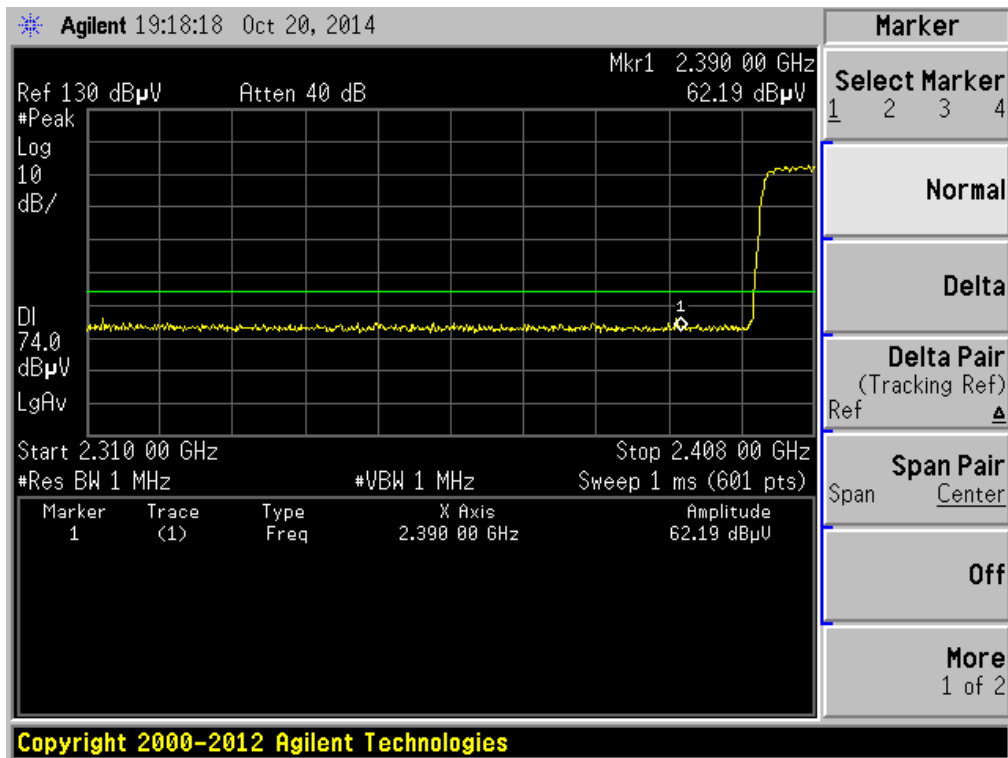


### GFSK HIGH FREQUENCY BAND, PEAK

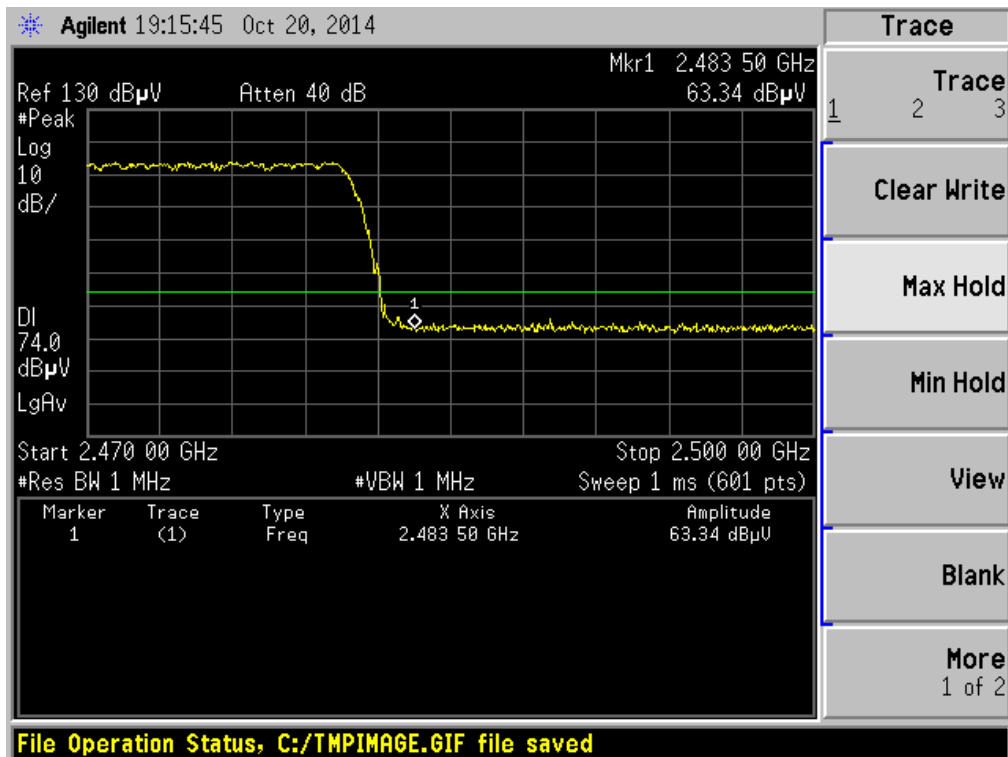




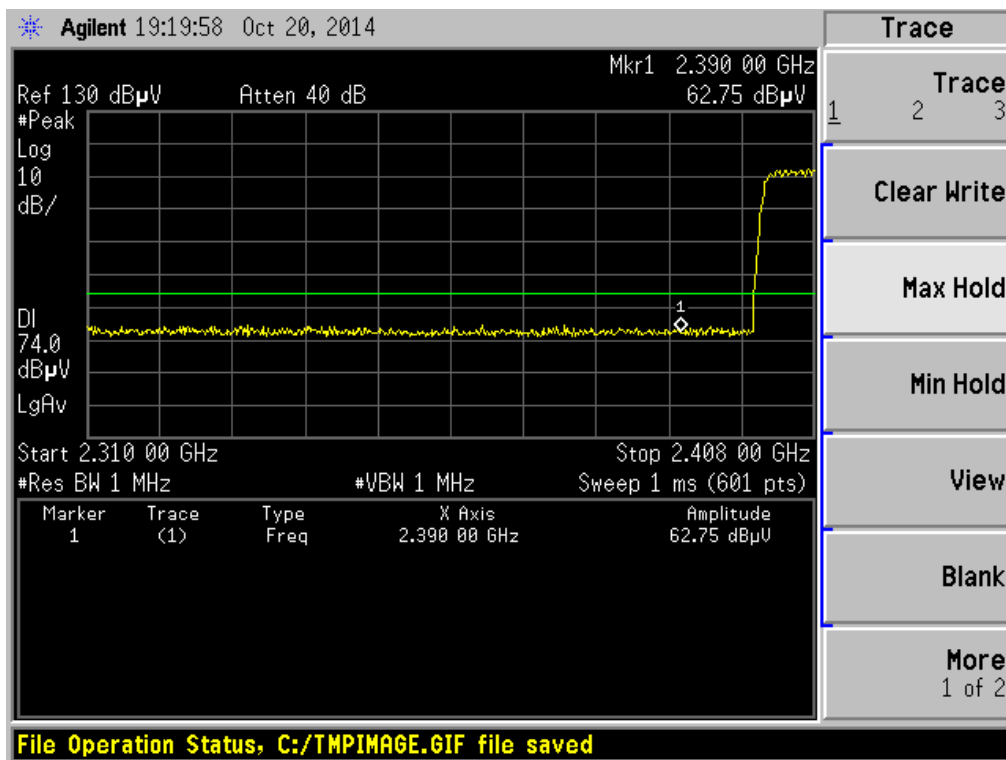
# $\pi$ /4DQPSK LOW FREQUENCY BAND, PEAK



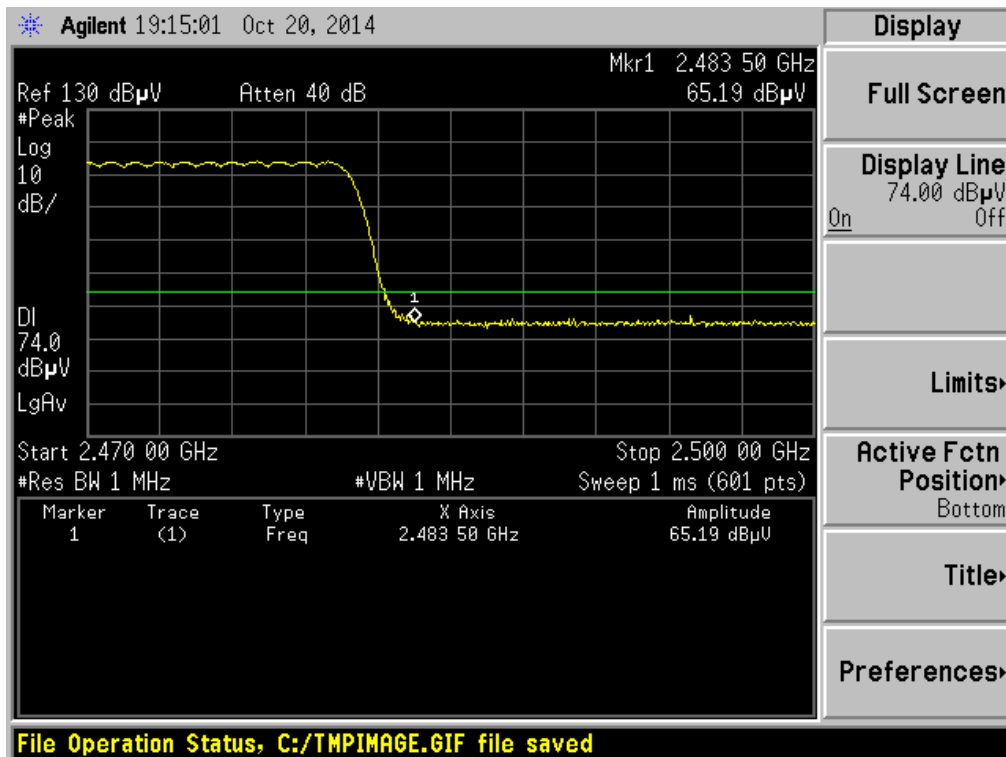
# $\pi$ /4DQPSK HIGH FREQUENCY BAND, PEAK



### 8-DPSK LOW FREQUENCY BAND, PEAK



### 8-DPSK HIGH FREQUENCY BAND, PEAK

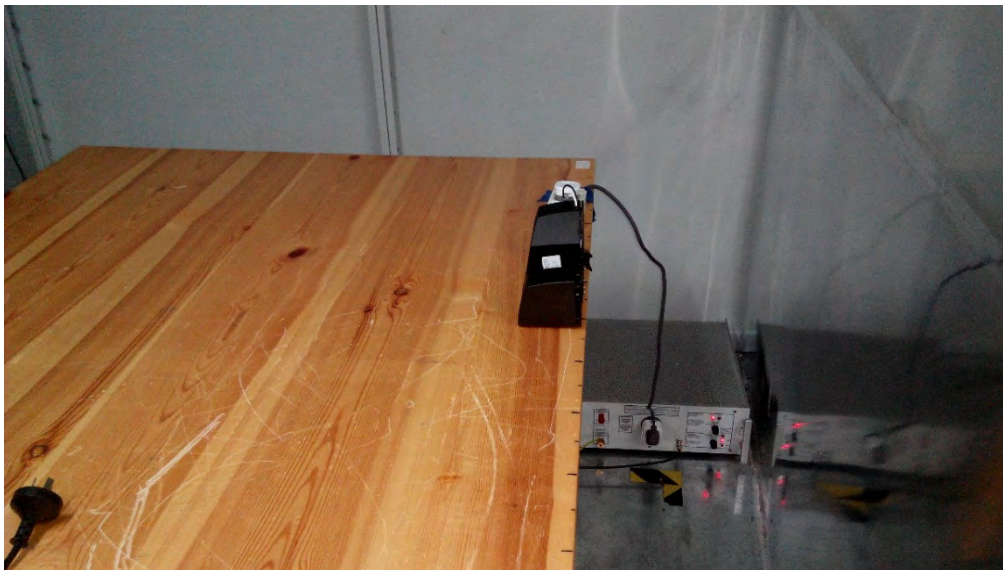


## ANNEX B TEST SETUP PHOTOS

### B.1 Conducted Test Photo

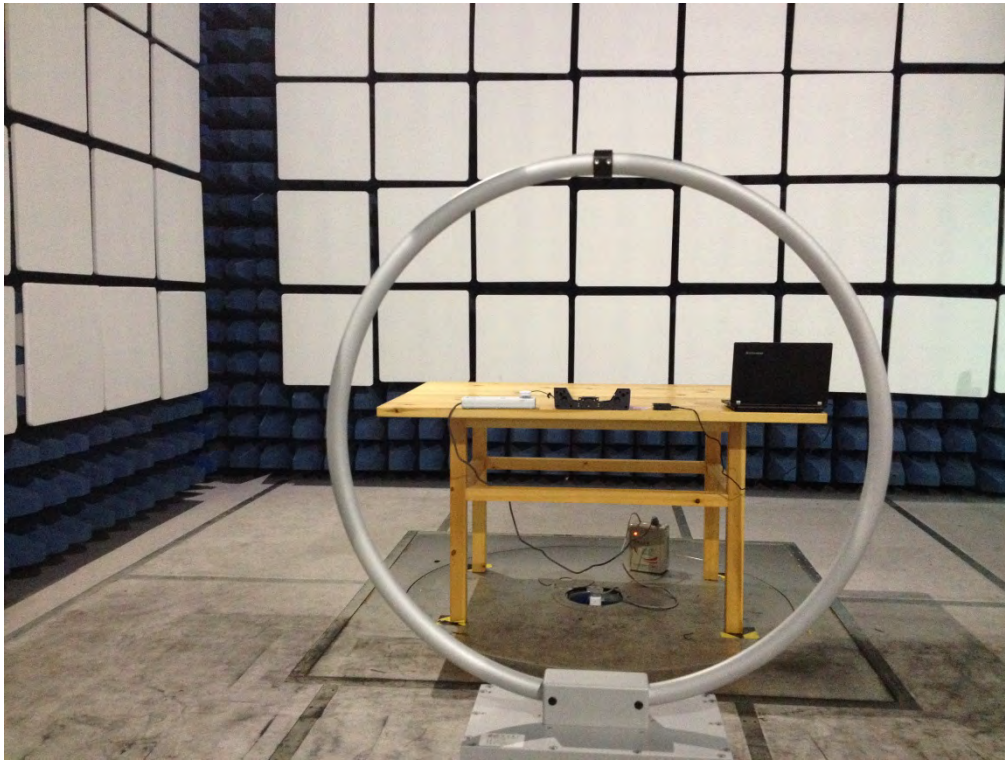


### B.2 Conducted Emissions Test Photo





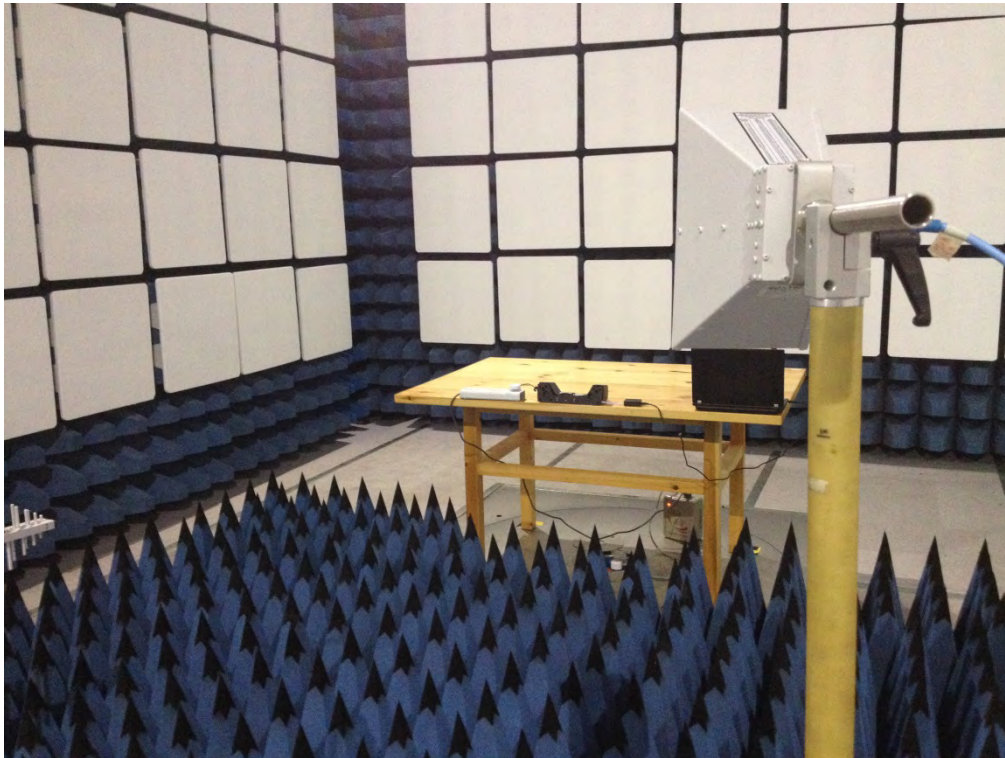
### B.3 Radiated Test Photo



Below 30MHz



30MHz to 1GHz

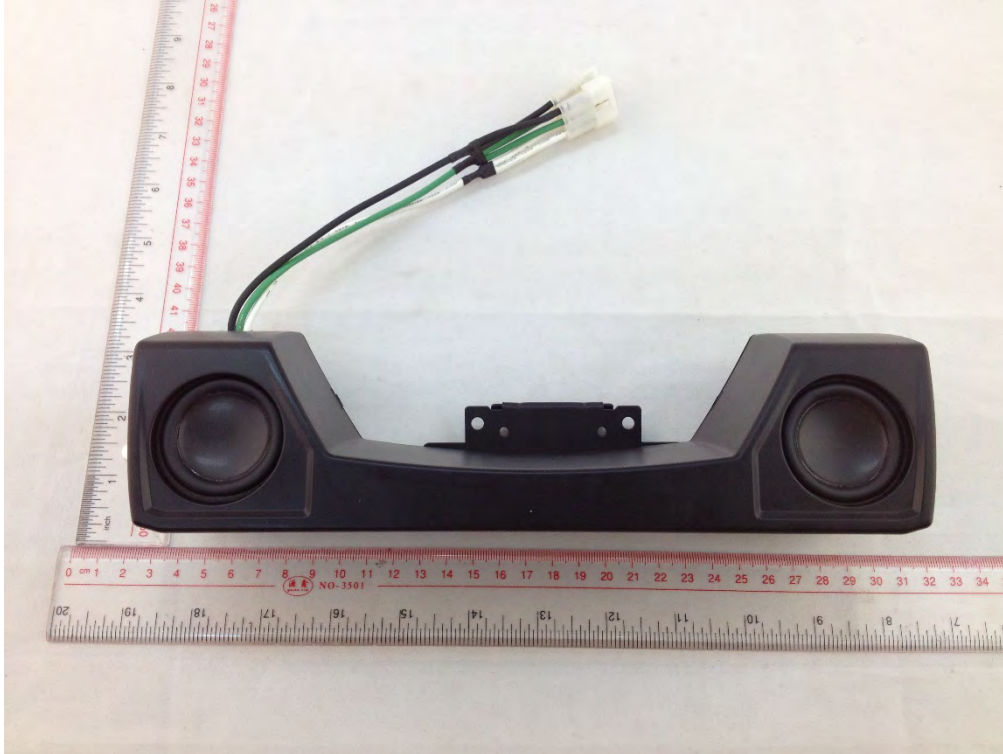


Above 1GHz

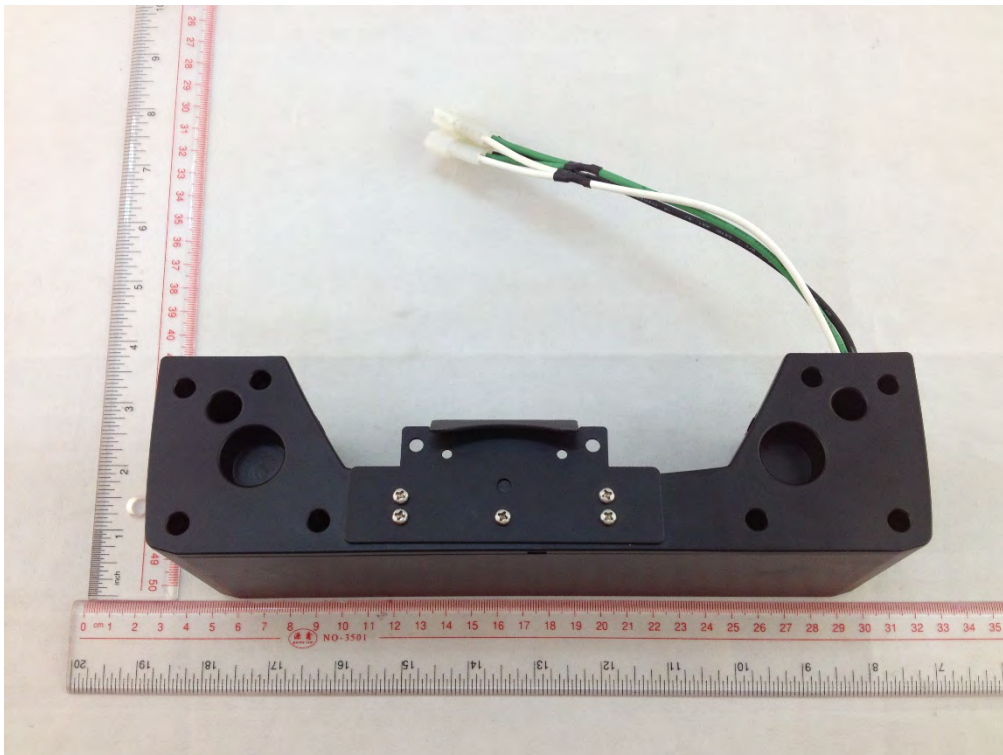


## ANNEX C EUT PHOTOS

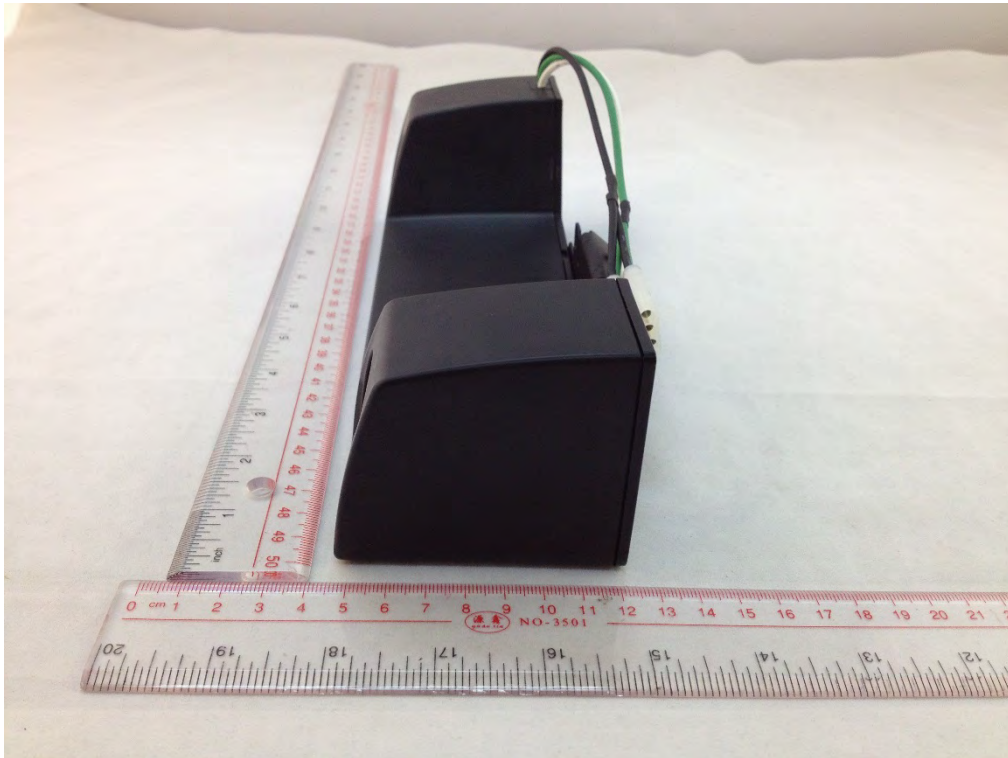
### C.1 Appearance of the EUT



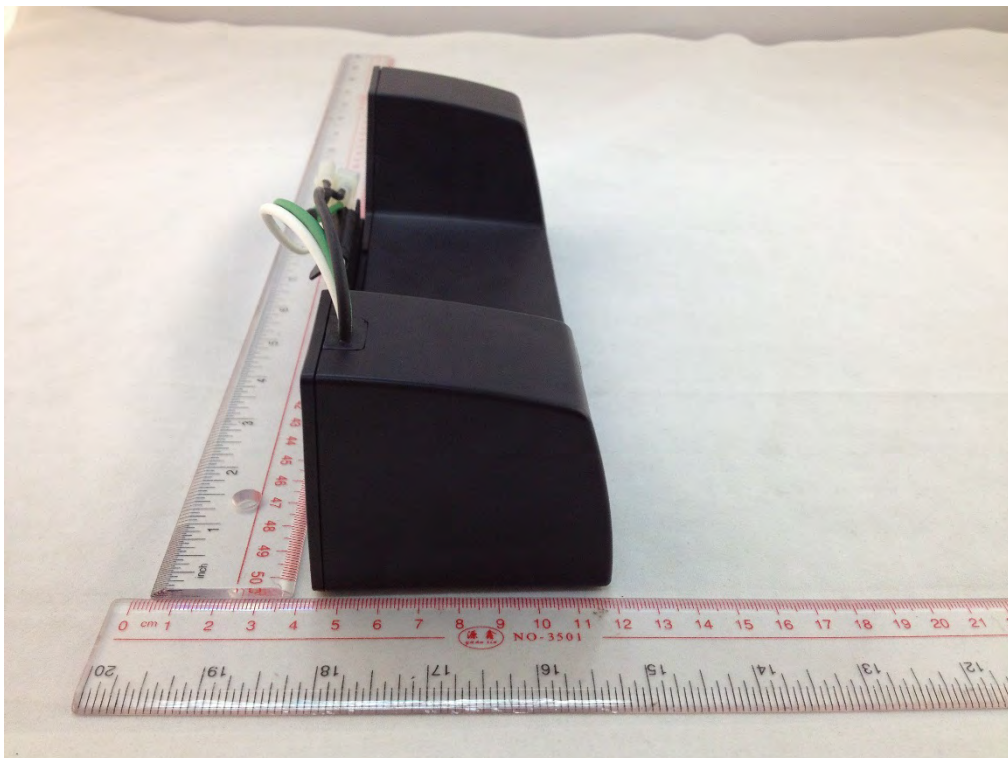
THE FRONT OF EUT



THE BACK OF EUT

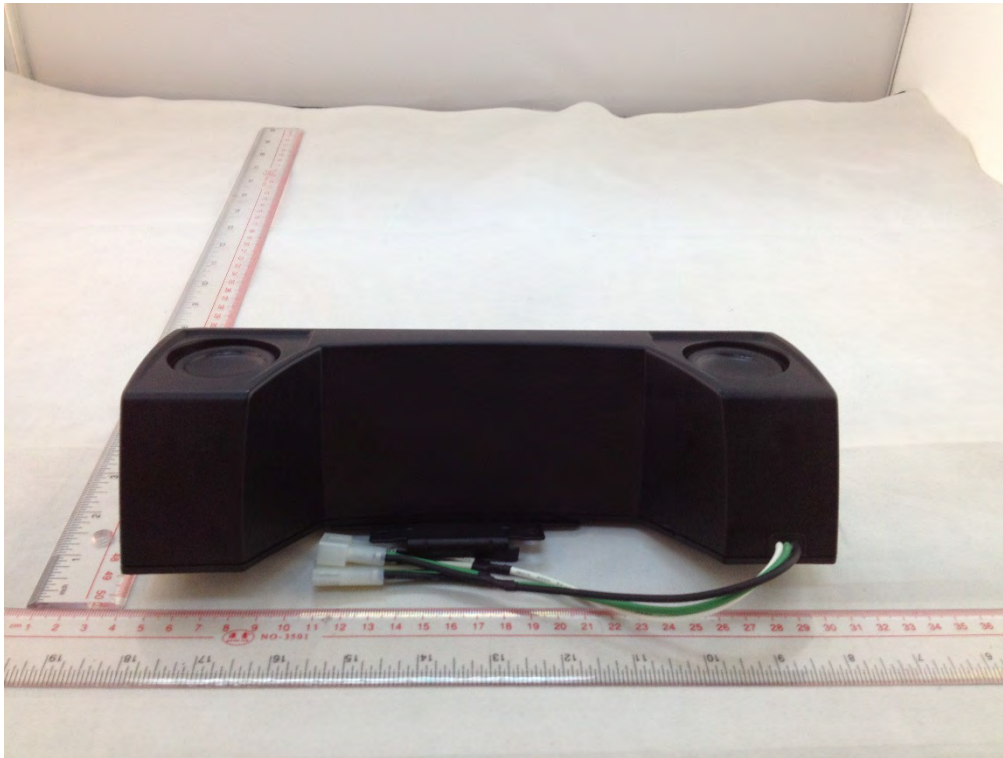


THE LEFT OF EUT

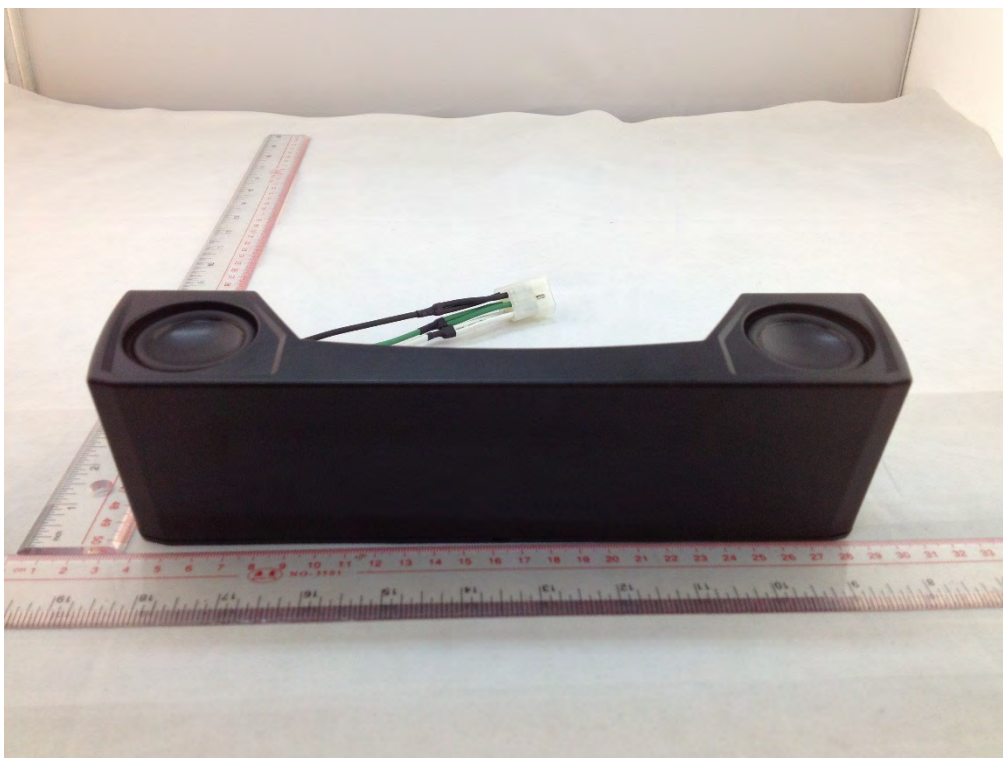


THE RIGHT OF EUT





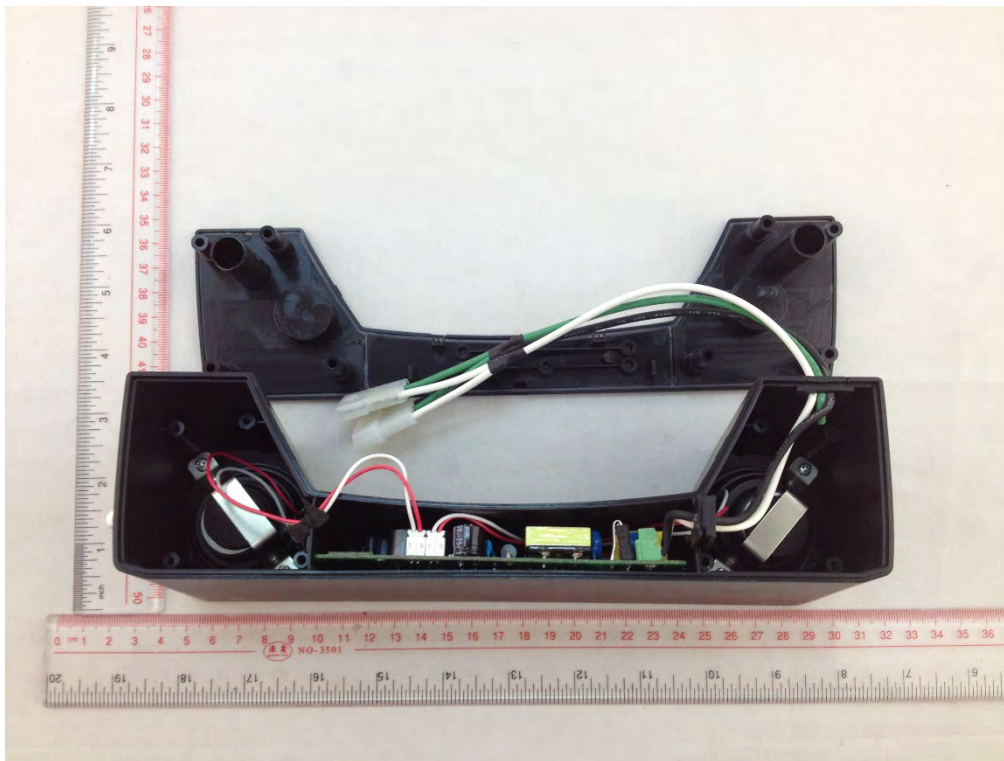
THE UP OF EUT



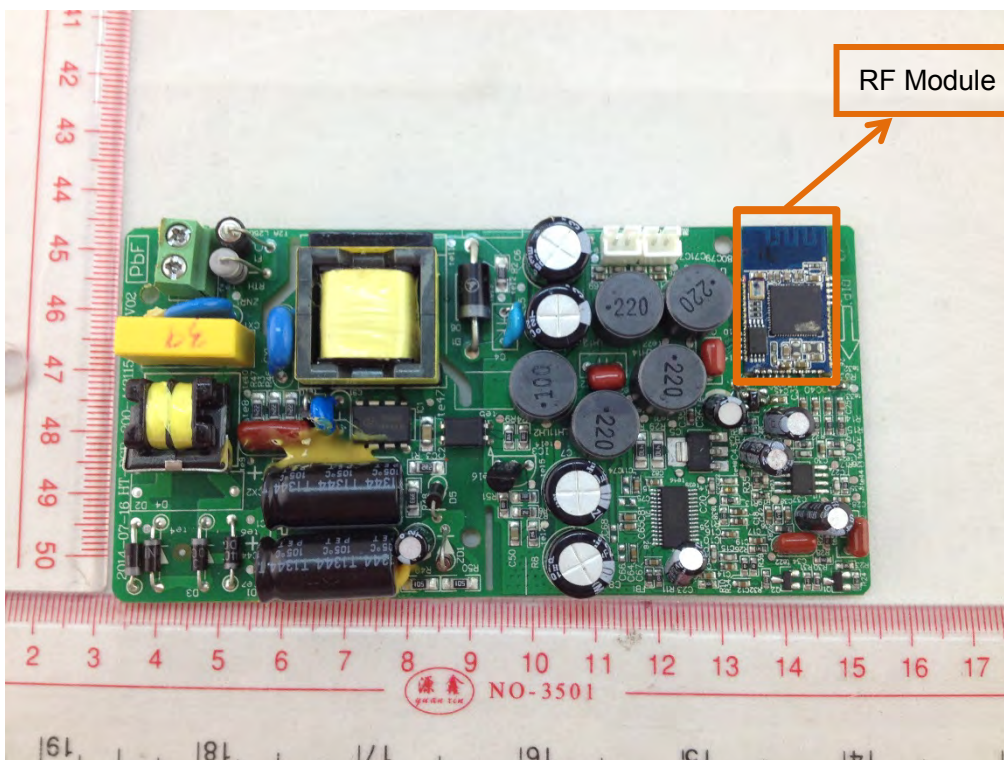
THE DOWN OF EUT



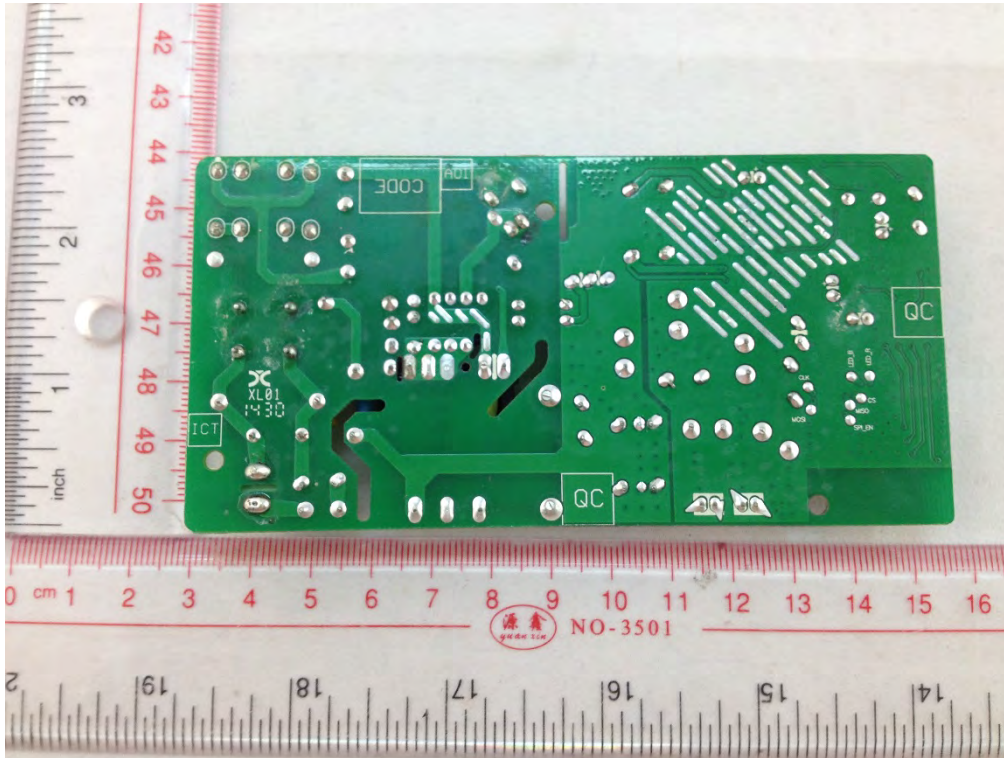
## C.2 Inside of the EUT



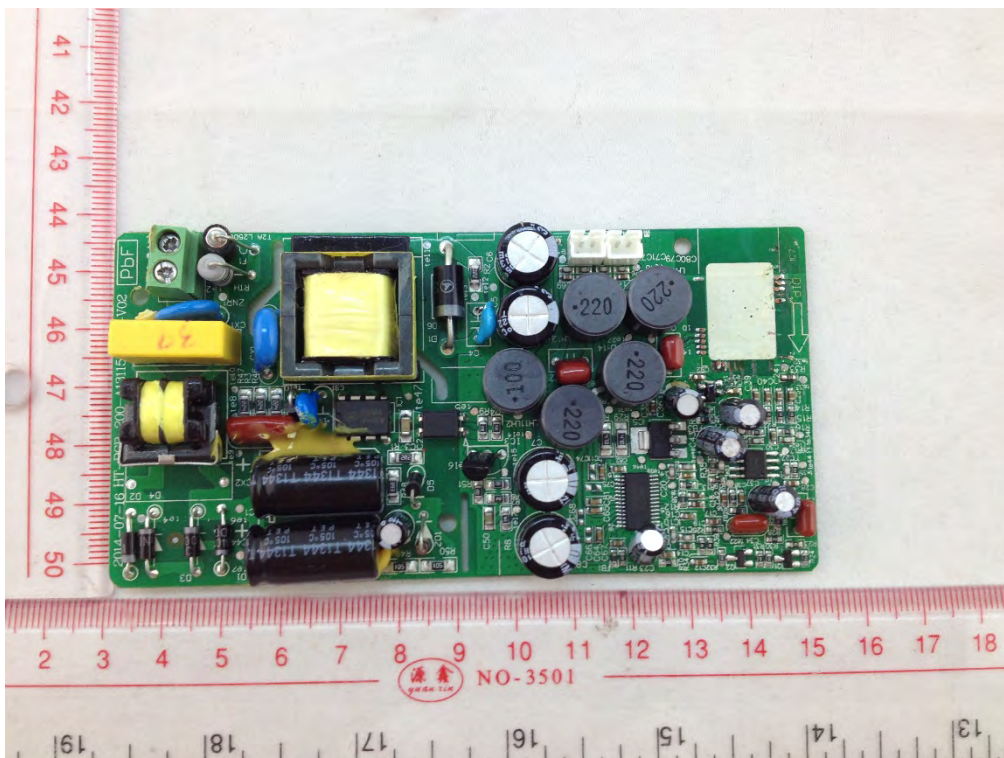
EUT UNCOVER VIEW



MAIN BOARD TOP VIEW 1

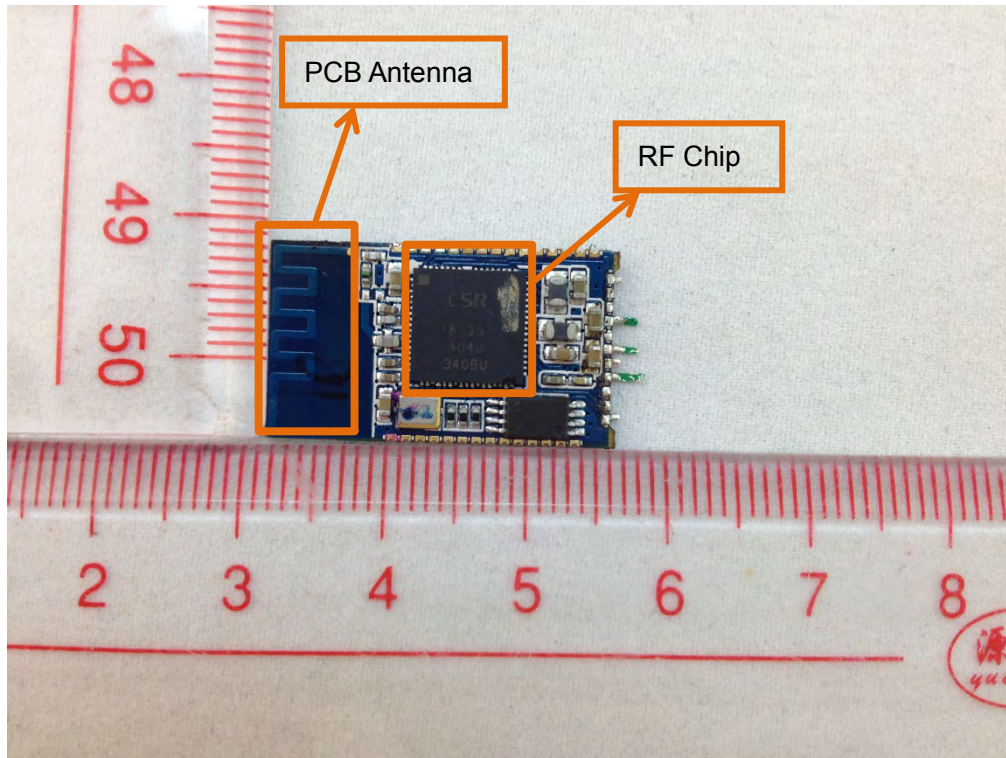


MAIN BOARD BACK VIEW 1

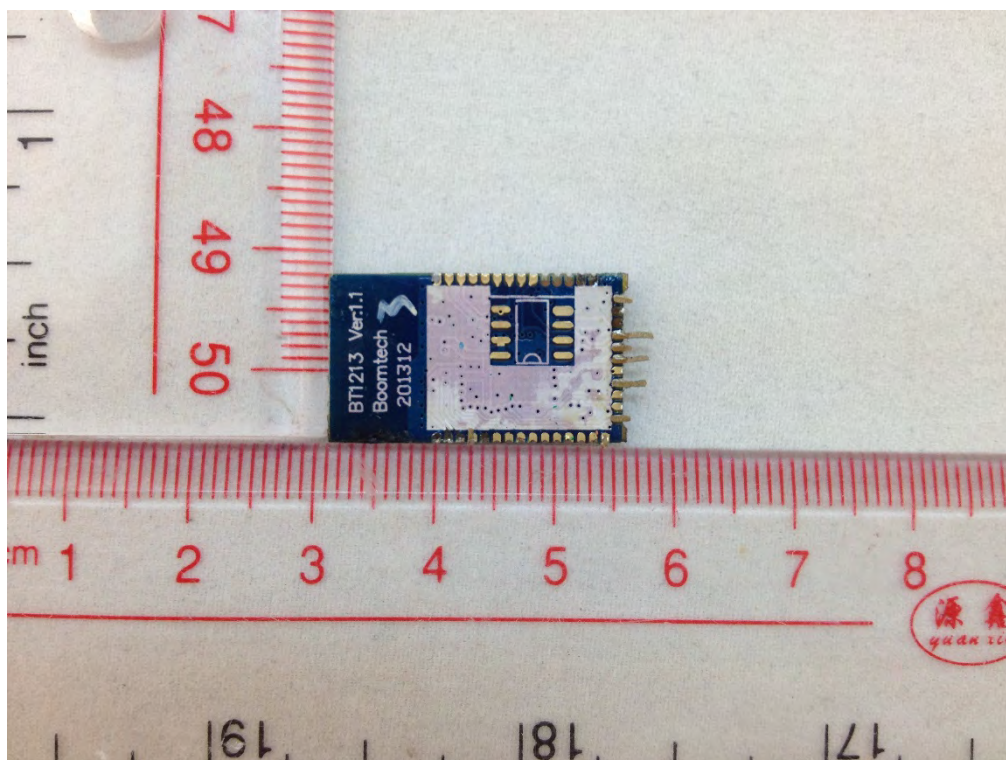


MAIN BOARD TOP VIEW 2





MAIN BOARD TOP VIEW 3



MAIN BOARD BACK VIEW 3

--END OF REPORT--