FCC/ IC RF TEST REPORT

Issued to

Fonegear, LLC

For

Bluetooth music receiver

Model Name:	7559
Trade Name:	Fonegear
Brand Name:	Fuse plus you
FCC ID:	T2I7559
IC Number:	5087A-7559
Standard:	47 CFR Part 15 Subpart C. RSS-GEN RSS-210
Test date:	2014-07-16 to 2014-08-06
Issue date:	2014-08-08

by

Shenzhen Morlab Communications Technology Co., Ltd.

FL.3, Building A, FeiYang Science Park, No.8 LongChang Road,Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101

Tested by	***Approved by***	***Reviewed by***
Nie Quan	Zeng Dexin	Peng Huarui
(Test Engineer)	(Chief Engineer)	(Dept. Manager)
Date 2014.8.8	***Date*** 2014.8.8	***Date*** 2014.8.8

The report refers only to the sample tested and does not apply to the bulk. This report is issued in confidence to the client and it will be strictly treated as such by the Shenzhen MORLAB Communication Technology Co., Ltd. It may not be reproduced rather in its entirety or in part and it may not be used for adverting. The client to whom the report is issued may, however, show or send it . or a certified copy there of prepared by the Shenzhen MORLAB Telecommunication Co., Ltd to his customer. Supplier or others persons directly concerned. Shenzhen MORLAB Telecommunication Co., Ltd will not, without the consent of the client enter into any discussion of correspondence with any third party concerning the contents of the report. In the event of the improper use of the report, Shenzhen MORLAB Telecommunication Co., Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate

TABLE OF CONTENTS

Change History		
Issue	Date	Reason for change
1.0	August 8, 2014	First edition

1. GENERAL INFORMATION

1.1. EUT Description

EUT Type.....:	Bluetooth music receiver
Serial No. .....:	(n.a, marked #1 by test site)
Hardware Version.....:	ISPCB-V2.0
Software Version.....:	ISSC-2.1
Applicant.....:	Fonegear, LLC 269 Executive Drive, Troy Michigan 48083, USA
Manufacturer .....:	Shenzhen yesong Electronic Technolony Co.,Ltd Red Star community, songgang town, Baoan district, Shenzhen City, second floor, Ho Chung new 133th 204 bedrooms (Office space)
Frequency Range.....:	The frequency range used is 2402MHz - 2480MHz (79 channels, at intervals of 1MHz); The frequency block is 2400MHz to 2483.5MHz.
Modulation Type.....:	Bluetooth: FHSS (GFSK(1Mbps), ∏/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps))
Antenna Type .....:	PCB Antenna
Antenna Gain.....:	0dBi

NOTE:

1. The EUT is a Bluetooth music receiver, it contains Bluetooth Module operating at 2.4GHz ISM band; the frequencies allocated for the Bluetooth Module is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).
2. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiators) for the EUT FCC/IC Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-13 Edition)	Radio Frequency Devices
2	RSS-GEN Issue 3, December 2010	General Requirements and Information for the Certification of Radio Apparatus
3	RSS-210 Issue 8, December 2010	Low-power Licence-exempt Apparatus Devices (All Frequency Bands): Category I Equipment

Test detailed items/section required by FCC rules and results are as below:

No.	Section in CFR 47	Section in RSS-GEN, RSS-210	Description	Result
1	15.203	N.A	Antenna Requirement	**PASS**
2	15.247(a)	RSS-210, A8.1 (d)	Number of Hopping Frequency	**PASS**
3	15.247(b)	RSS-210, A8.4 (2)	Peak Output Power	**PASS**
4	15.247(a)	RSS-210, A8.1 (a)	20dB Bandwidth	**PASS**
5	15.247(a)	RSS-210, A8.1 (b)	Carrier Frequency Separation	**PASS**
6	15.247(a)	RSS-210, A8.1 (d)	Time of Occupancy (Dwell time)	**PASS**
7	15.247(d)	RSS-210, A8.1 (d)	Conducted Spurious Emission	**PASS**
8	15.247(d)	RSS-210, A8.5	Restricted Frequency Bands	**PASS**
9	15.207	RSS-GEN, 7.2.4	Conducted Emission	**PASS**
10	15.209 15.247(d)	RSS-GEN, 7.2.5 RSS-210, A8.5	Radiated Emission	**PASS**
11	15.247(i),1.1307& 2.1093	RSS-102	RF exposure evaluation	**PASS**

NOTE:

The tests were performed according to the method of measurements prescribed in DA-00-705.

1.3. Facilities and Accreditations

1.3.1. Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab 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 L3572.

All measurement facilities used to collect the measurement data are located at FL.1, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10 2009, ANSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

The IC registration number is 7183A-2.

1.3.2. Test Environment Conditions

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

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR PART 15C REQUIREMENTS

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

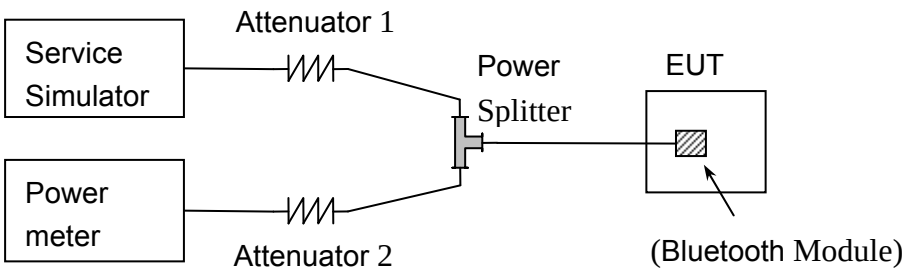
2.2. Number of Hopping Frequency

2.2.1. Requirement

According to FCC §15.247(a)(1)(iii), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

2.2.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

2.2.3. Test Procedure

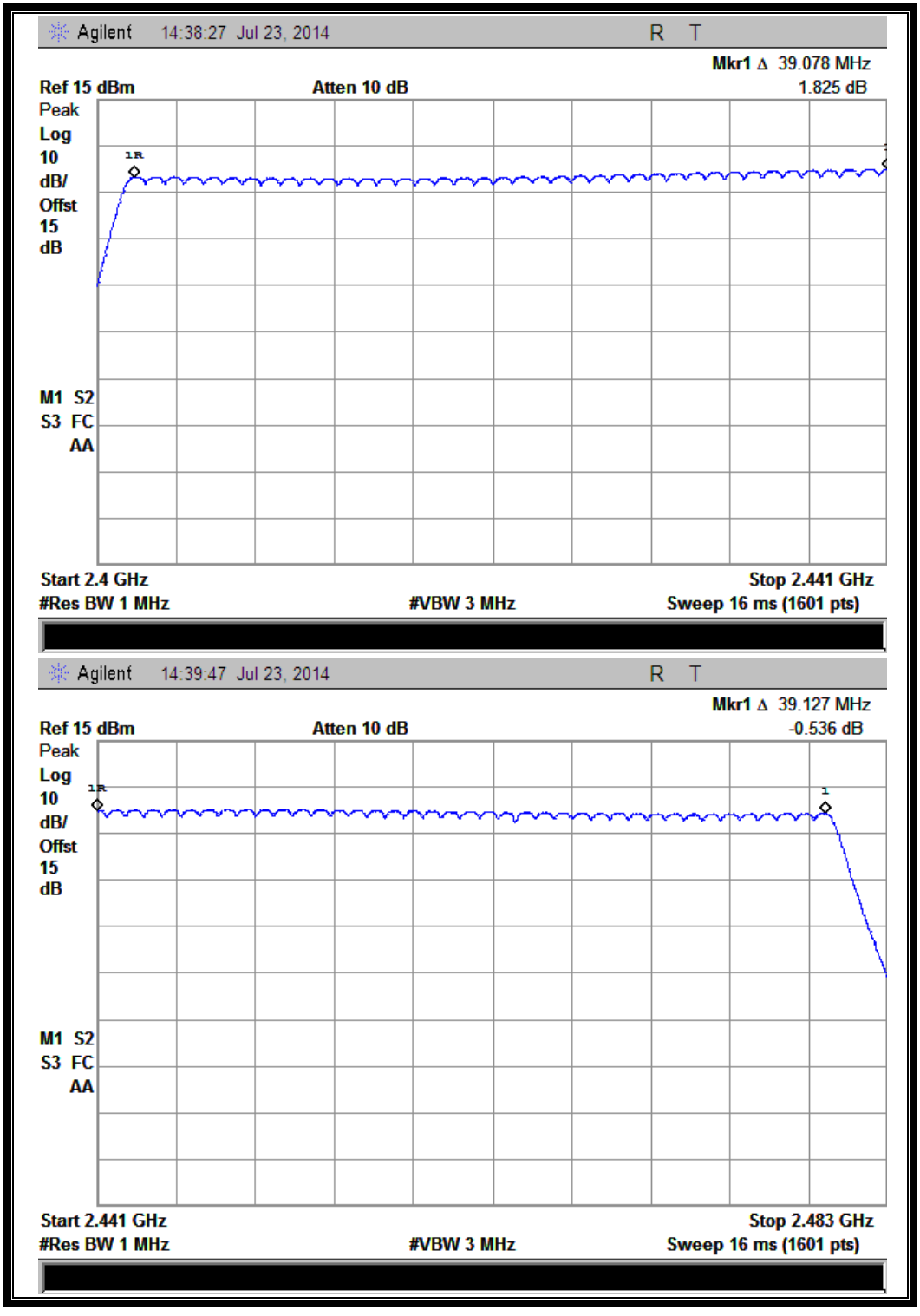
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW ≥ 1% of the span
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

2.2.4. Test Result

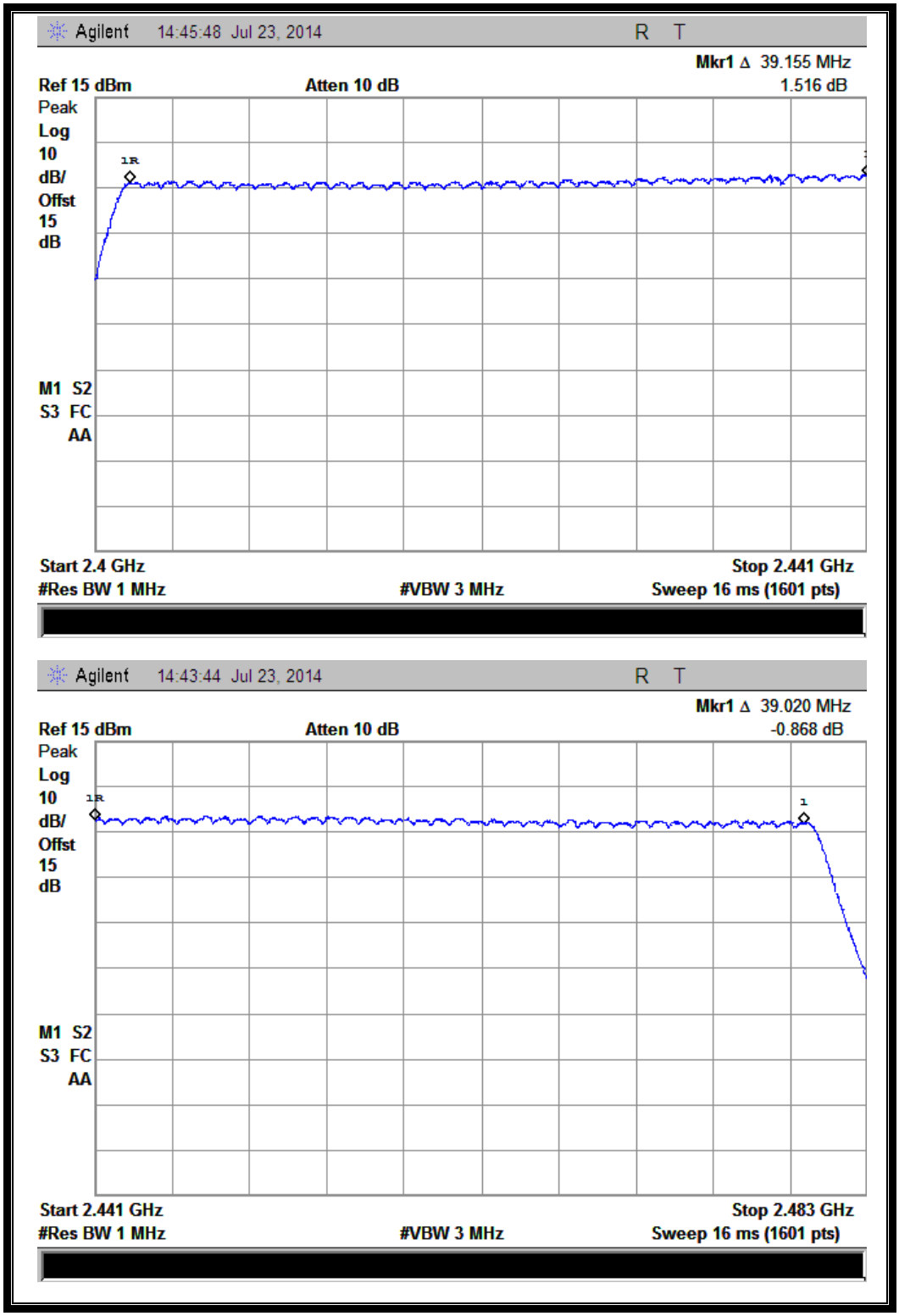
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.
Test Verdict:

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

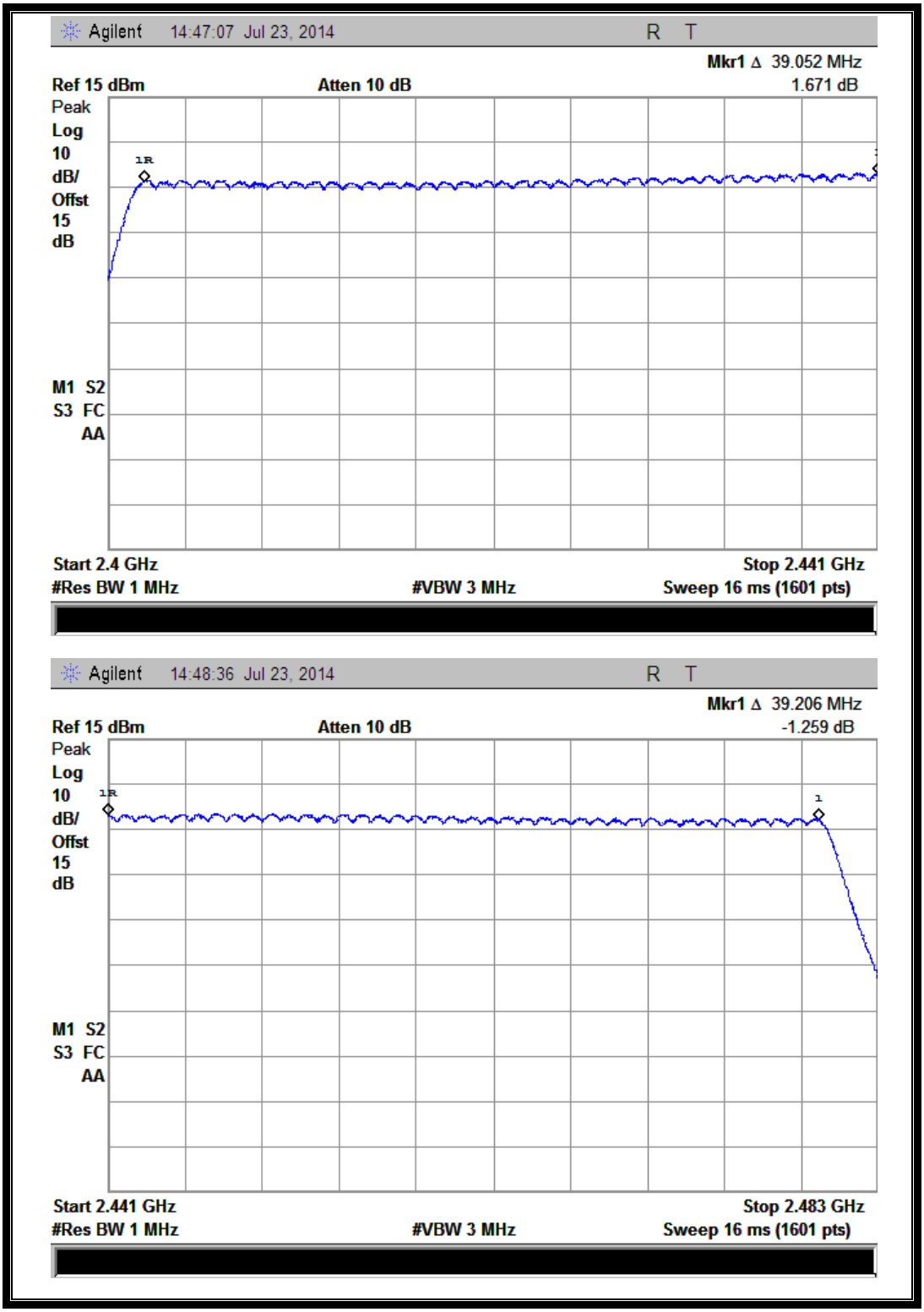
A. Test Plots:


Agilent 14:38:27 Jul 23, 2014
R T
Mkr1 Δ 39.078 MHz
Ref 15 dBm
Atten 10 dB
1.825 dB
Peak
Log
10
dB/
Offst
15
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
Stop 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16 ms (1601 pts)
Agilent 14:39:47 Jul 23, 2014
R T
Mkr1 Δ 39.127 MHz
Ref 15 dBm
Atten 10 dB
-0.536 dB
Peak
Log
10
dB/
Offst
15
dB
1R
1
M1 S2
S3 FC
AA
Start 2.441 GHz
Stop 2.483 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16 ms (1601 pts)

(Plot A: GFSK)



(Plot B: ∏/4-DQPSK)


Agilent 14:47:07 Jul 23, 2014
R T
Mkr1 Δ 39.052 MHz
1.671 dB
Ref 15 dBm
Atten 10 dB
Peak
Log
10
dB/
Offst
15
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.441 GHz
Sweep 16 ms (1601 pts)
Agilent 14:48:36 Jul 23, 2014
R T
Mkr1 Δ 39.206 MHz
-1.259 dB
Ref 15 dBm
Atten 10 dB
Peak
Log
10
dB/
Offst
15
dB
1R
1
M1 S2
S3 FC
AA
Start 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.483 GHz
Sweep 16 ms (1601 pts)

(Plot C: 8- DPSK)

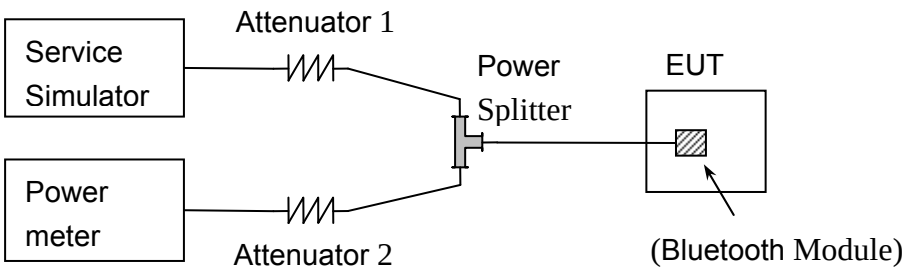
2.3. Peak Output Power

2.3.1. Requirement

According to FCC §15.247(b)(1) and RSS-210 A8.4 (2), 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. For all other frequency hopping systems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.3.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Power meter and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Power meter	Agilent	E4418B	GB44318055	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Power Sensor	Agilent	8482A	MY41091706	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

2.3.3. Test Result

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.The lowest,

middle and highest channel were tested by Power meter.

2.3.3.1. GFSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	-1.487	0.000710	20.97	0.125	PASS
39	2441	0.103	0.001024			PASS
78	2480	-0.476	0.000896			PASS

2.3.3.2. ∏/4-DQPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	-3.489	0.000448	20.97	0.125	PASS
39	2441	-1.920	0.000643			PASS
78	2480	-2.465	0.000567			PASS

2.3.3.3. 8-DPSK Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	-3.465	0.000450	20.97	0.125	PASS
39	2441	-1.841	0.000654			PASS
78	2480	-2.480	0.000565			PASS

Note: The result has the offset with cable loss already.

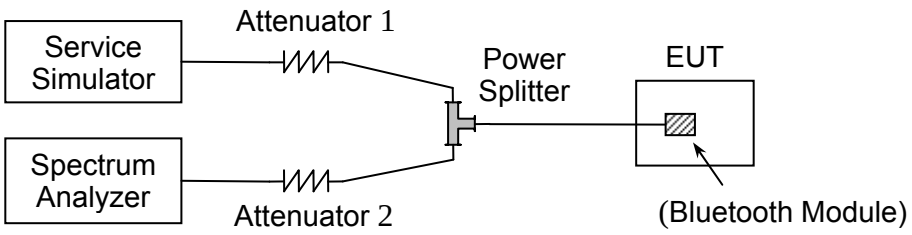
2.4. 20dB & 99% Bandwidth

2.4.1. Definition

According to FCC §15.247(a)(1) and RSS-210 A8.1(a), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

2.4.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading.During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

2.4.3. Test Procedure

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

2.4.4. Test Result

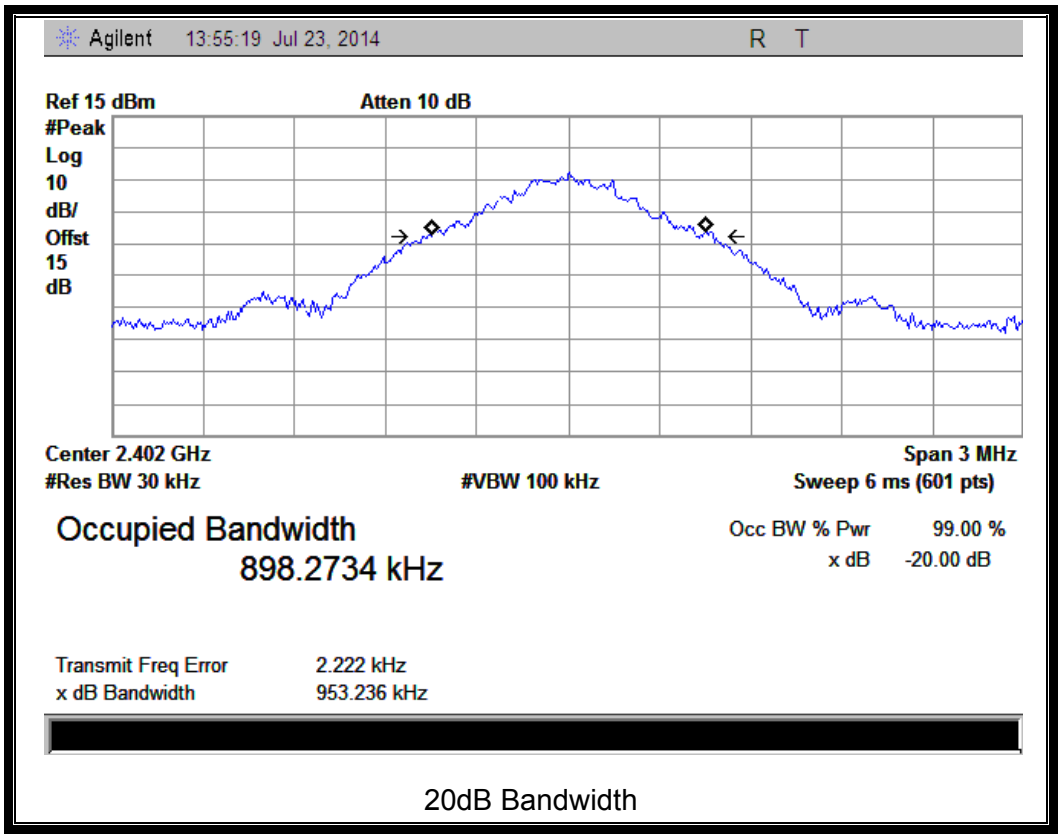
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

2.4.4.1. GFSK Mode

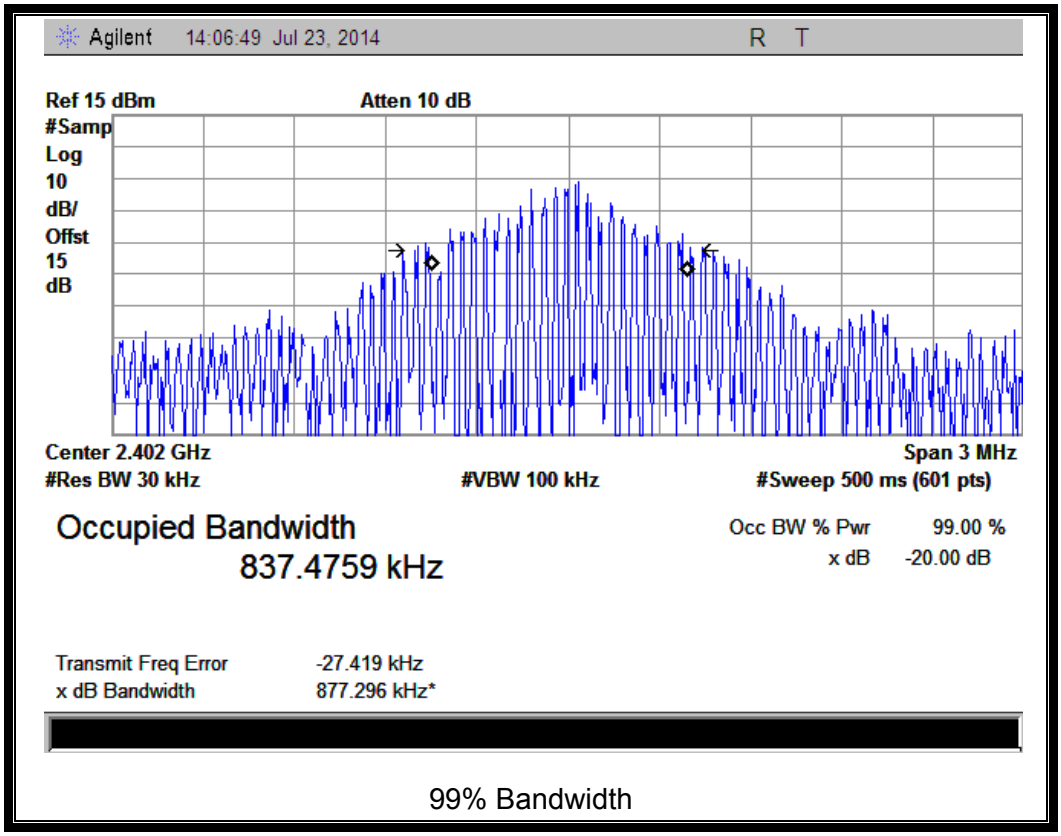
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Refer to Plot
0	2402	0.9532	0.8375	Plot A
39	2441	0.9418	0.9247	Plot B
78	2480	0.9300	0.8946	Plot C

B. Test Plots:

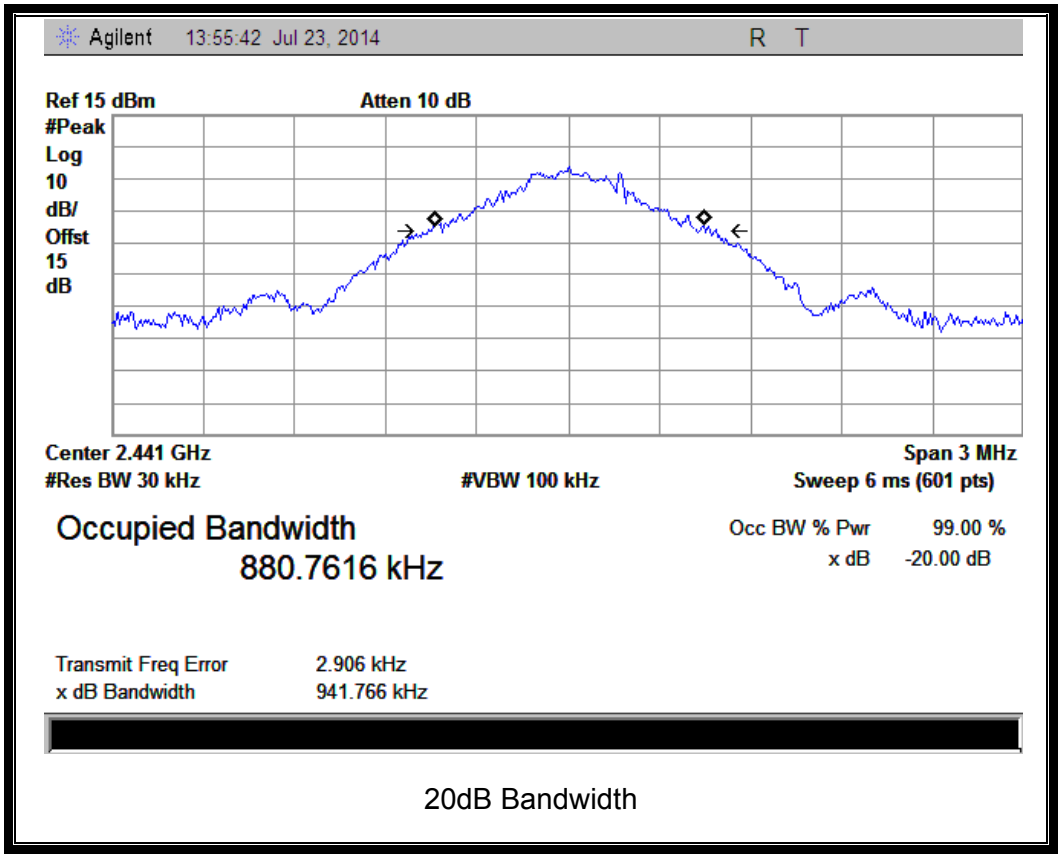


20dB Bandwidth

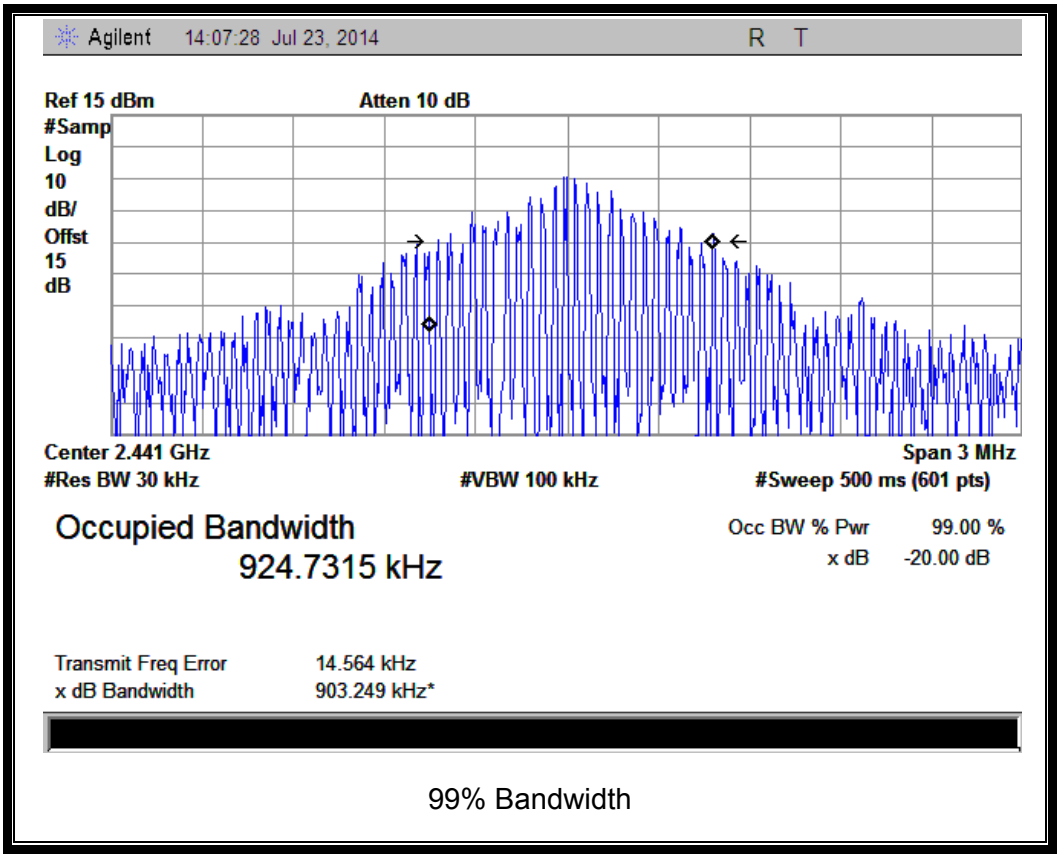


99% Bandwidth

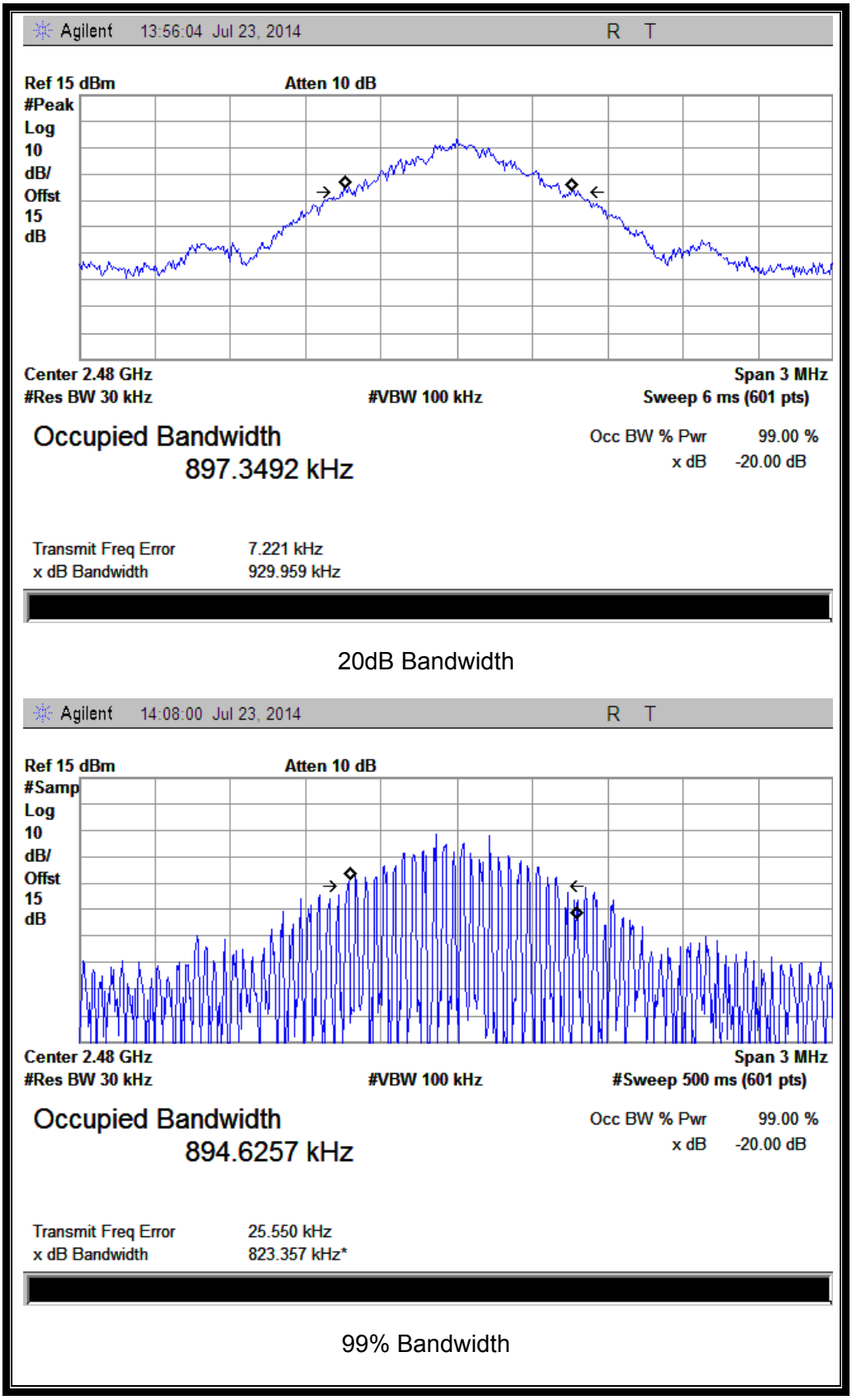
(Plot A: Channel = 2402 @ GFSK)



20dB Bandwidth



(Plot B: Channel = 2441 @ GFSK)



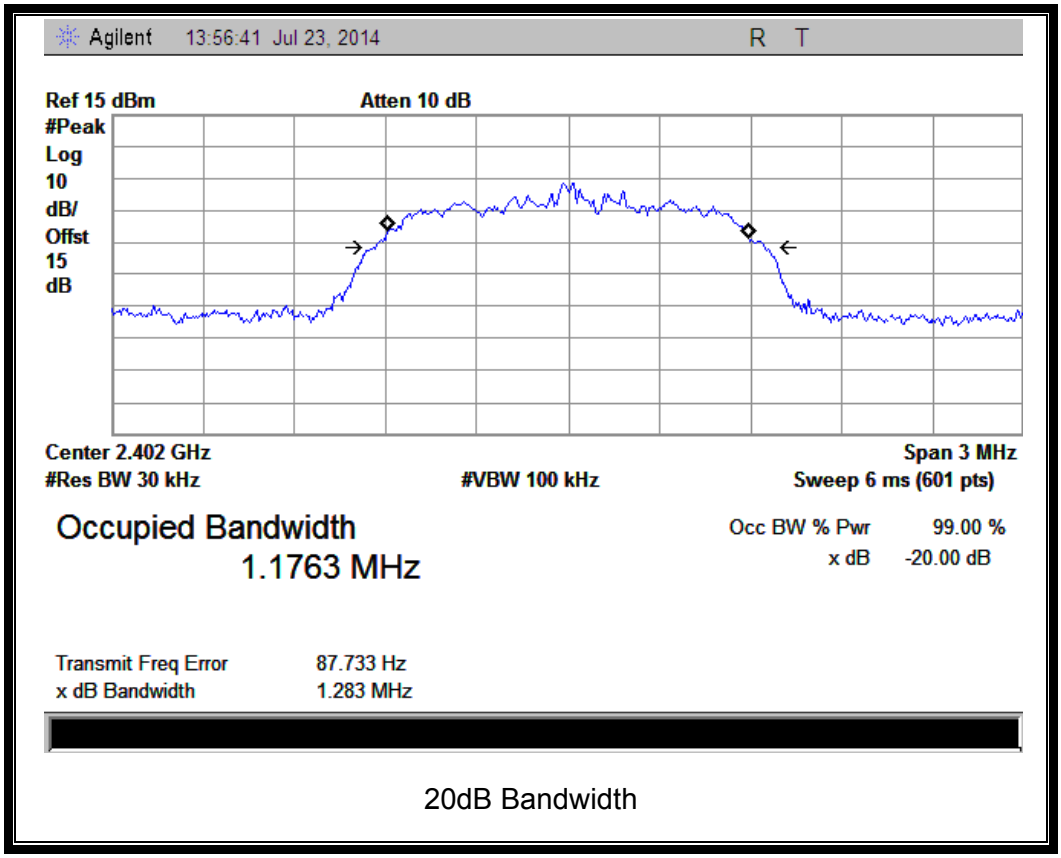
(Plot C: Channel = 2480 @ GFSK)

2.4.4.2. ∏/4-DQPSK Mode

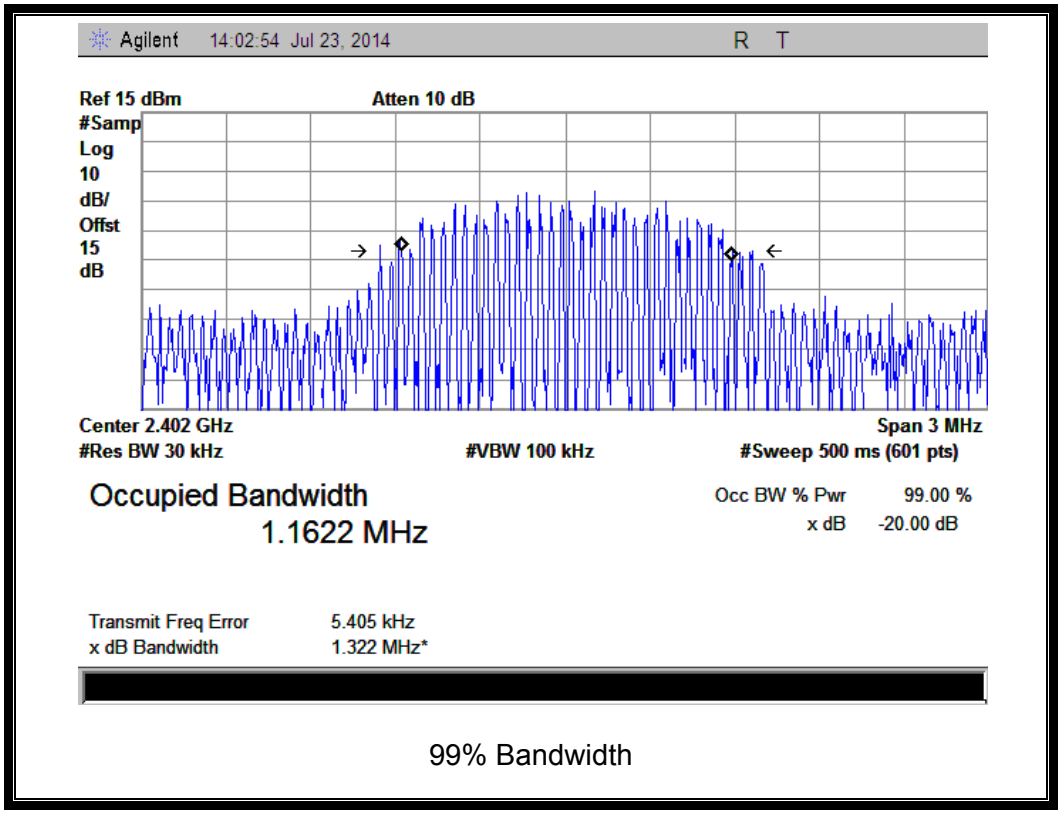
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Refer to Plot
0	2402	1.2830	1.1622	Plot A
39	2441	1.2580	1.1739	Plot B
78	2480	1.2500	1.1620	Plot C

B. Test Plots:

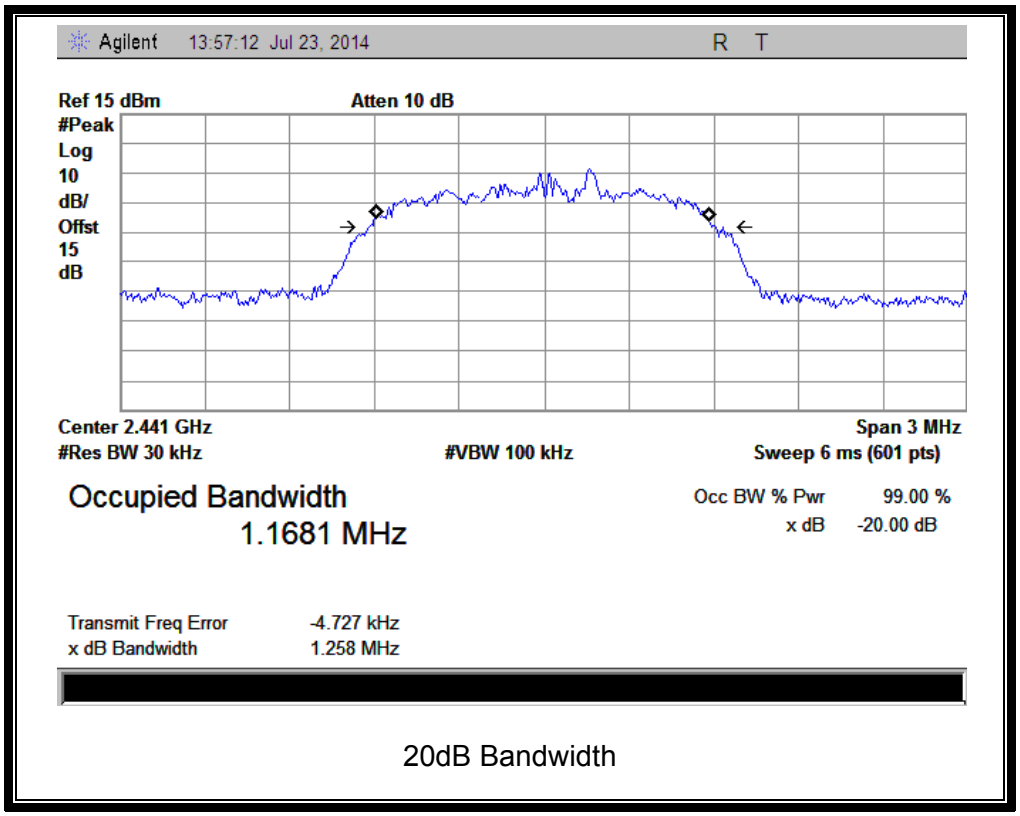


20dB Bandwidth

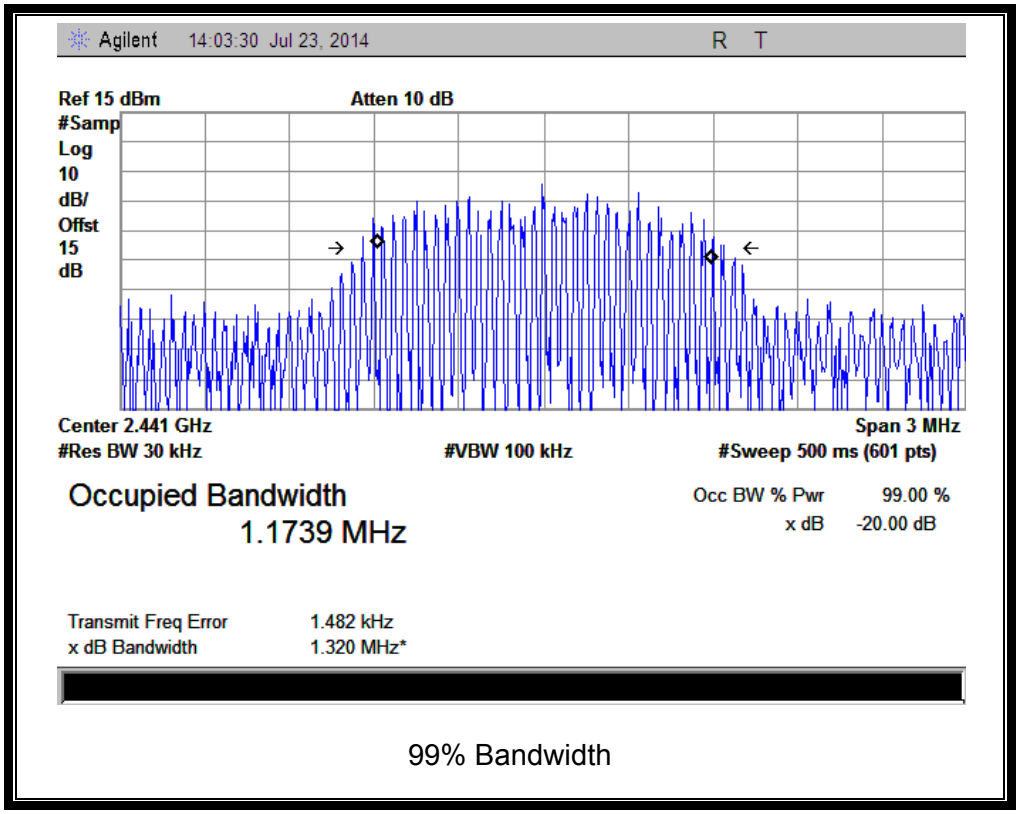


99% Bandwidth

(Plot D: Channel = 2402 @ ∏/4-DQPSK)

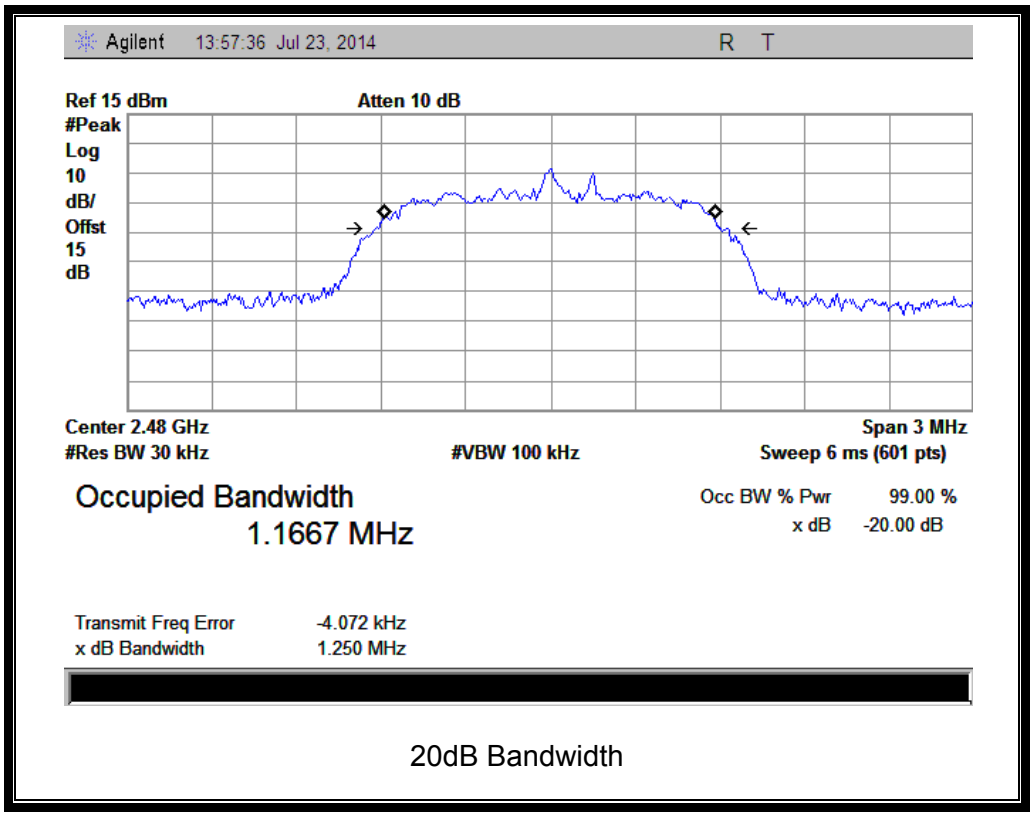


20dB Bandwidth

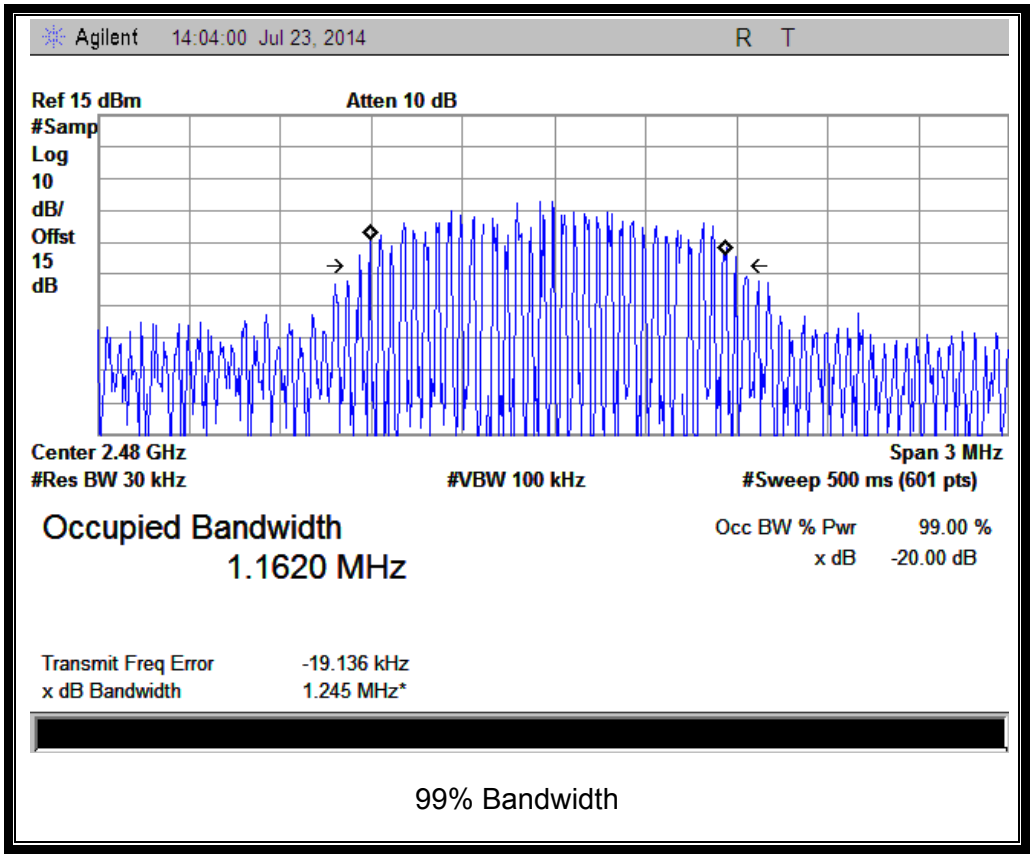


99% Bandwidth

(Plot E: Channel = 2441 @ ∏/4-DQPSK)



20dB Bandwidth



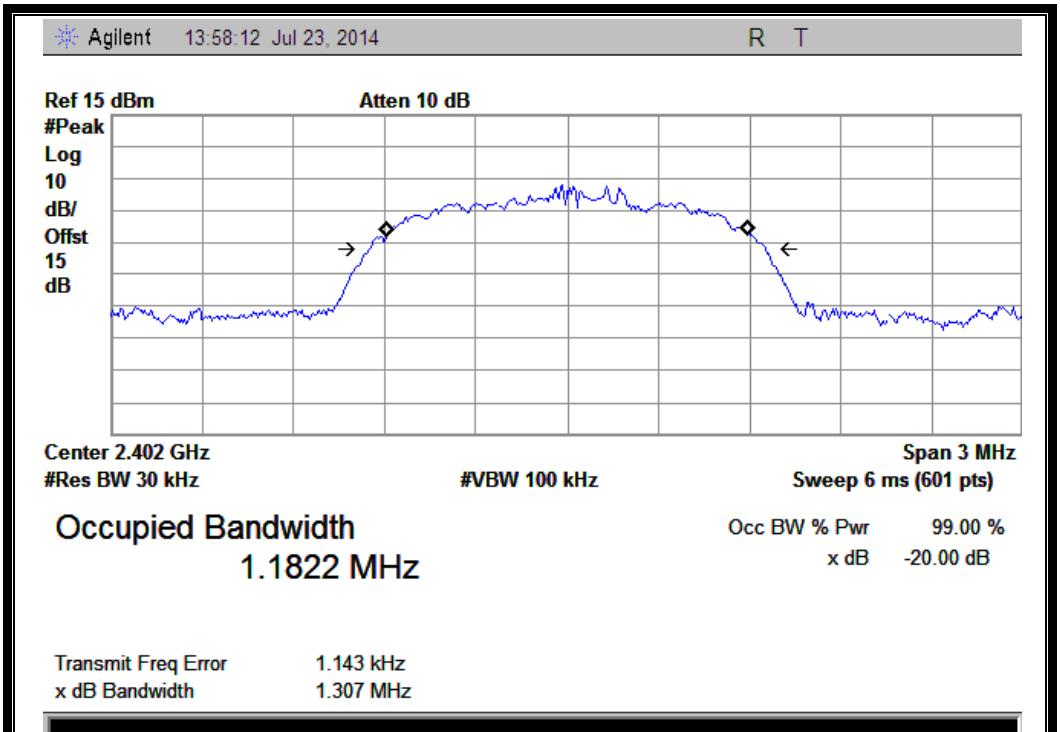
(Plot F: Channel = 2480 @ ∏/4-DQPSK)

2.4.4.3. 8-DPSK Mode

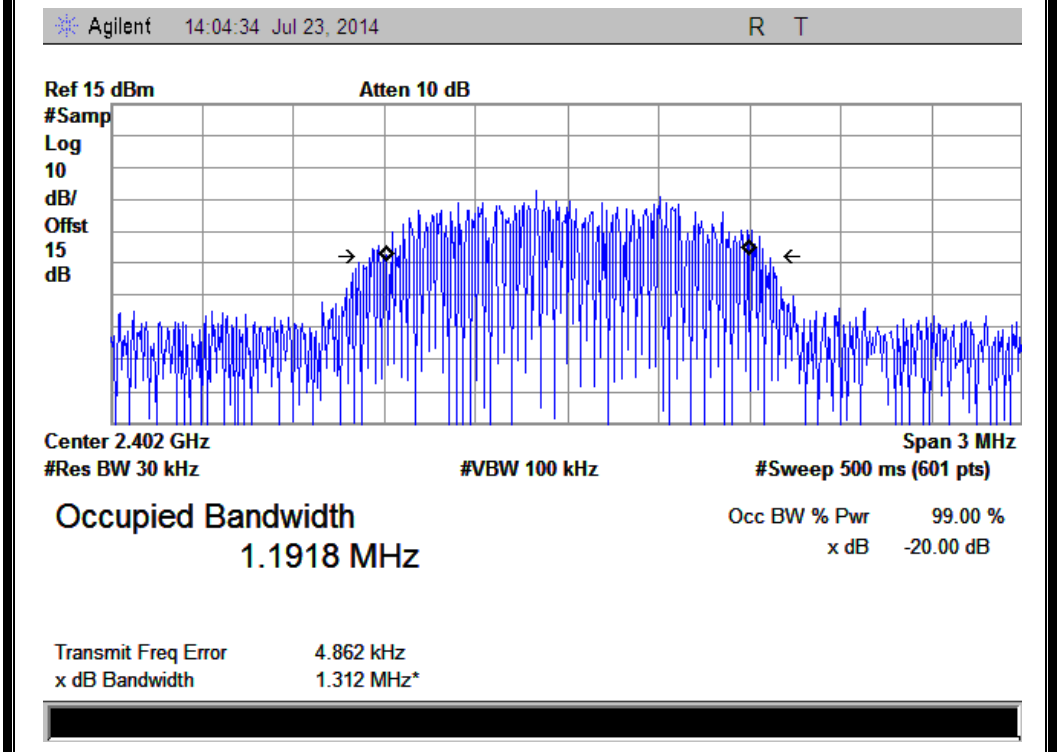
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Refer to Plot
0	2402	1.3070	1.1918	Plot A
39	2441	1.3070	1.1870	Plot B
78	2480	1.2690	1.1773	Plot C

B. Test Plots:

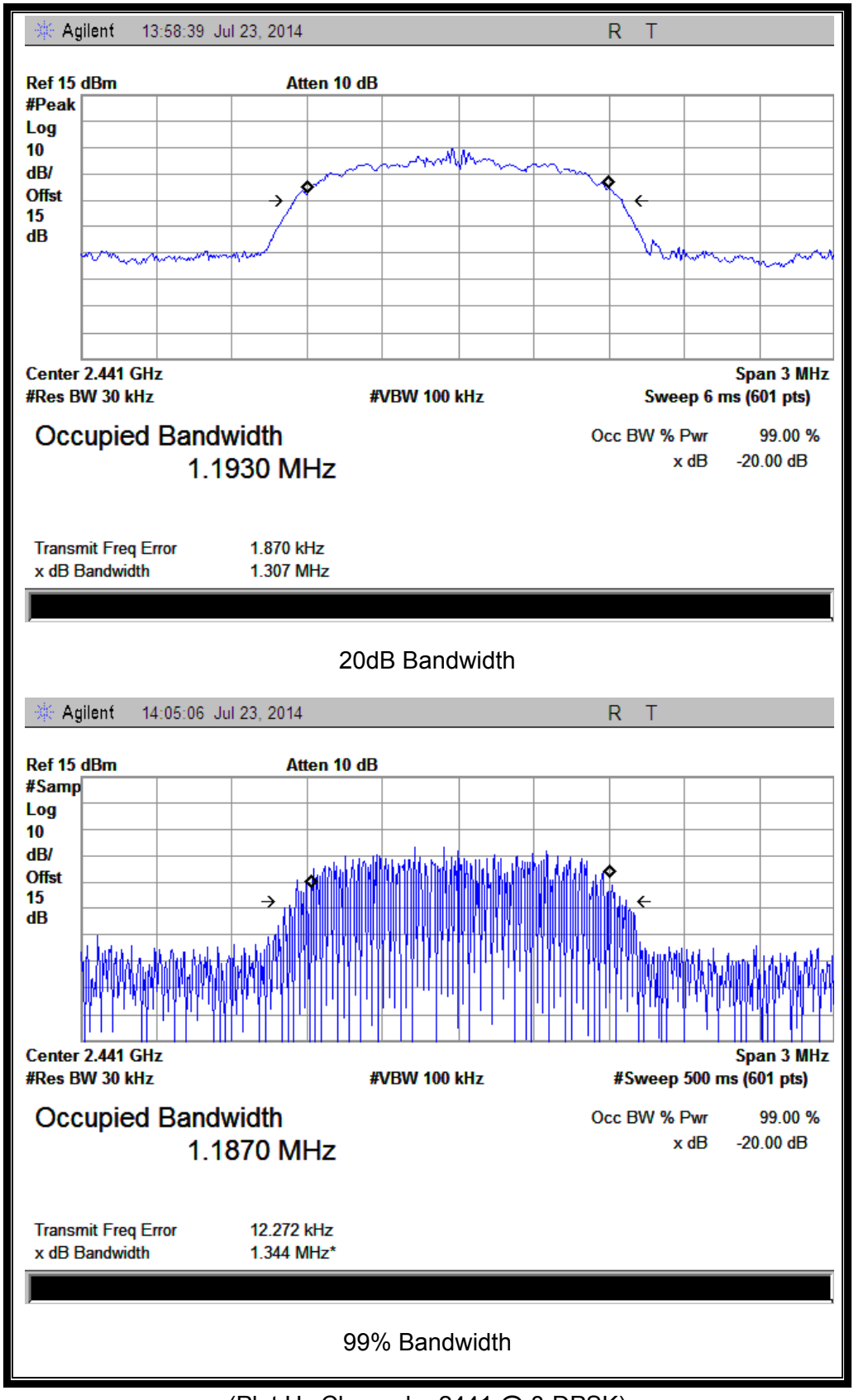


20dB Bandwidth

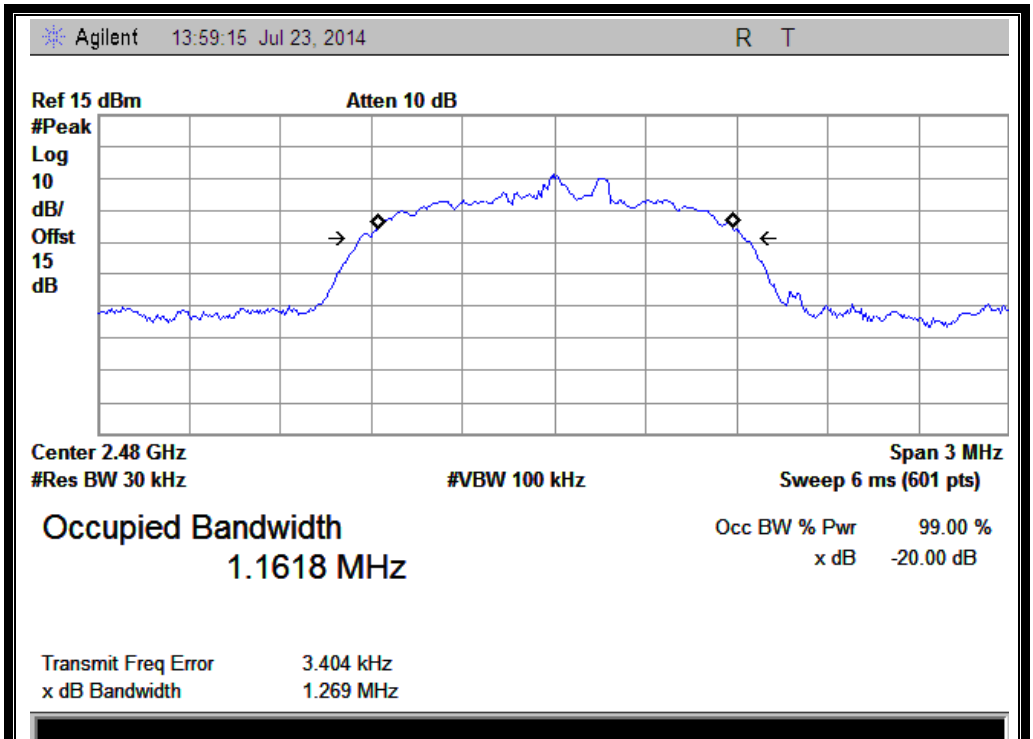


99% Bandwidth

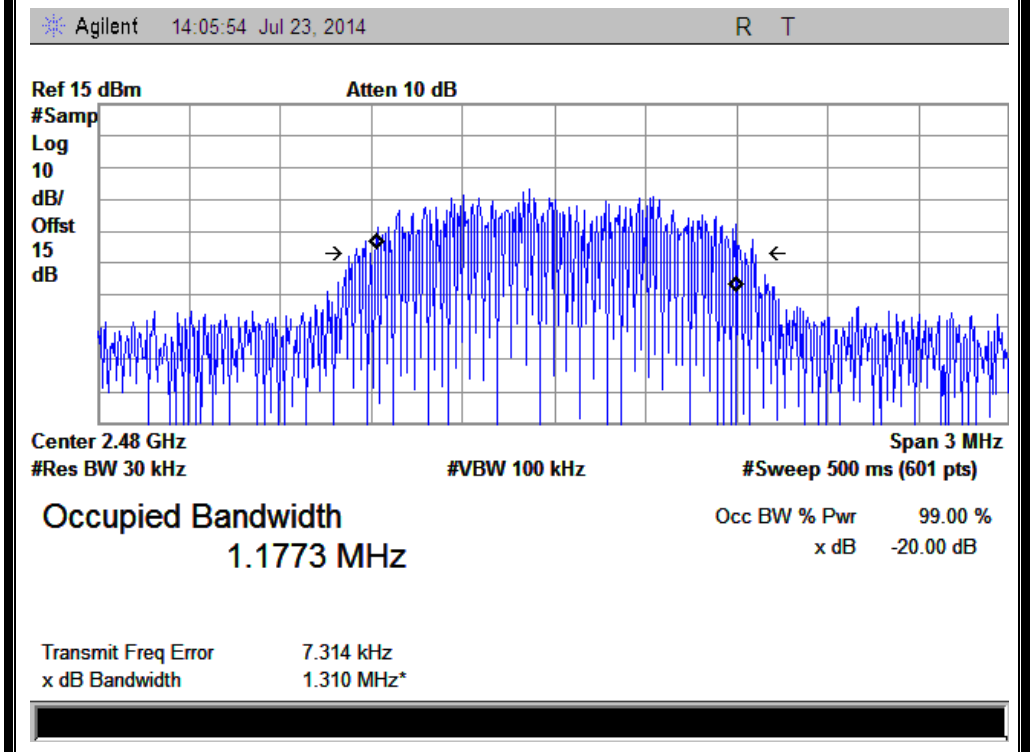
(Plot G: Channel = 2402 @ 8-DPSK)



(Plot H: Channel = 2441 @ 8-DPSK)



20dB Bandwidth



99% Bandwidth

(Plot I: Channel = 2480 @ 8-DPSK)

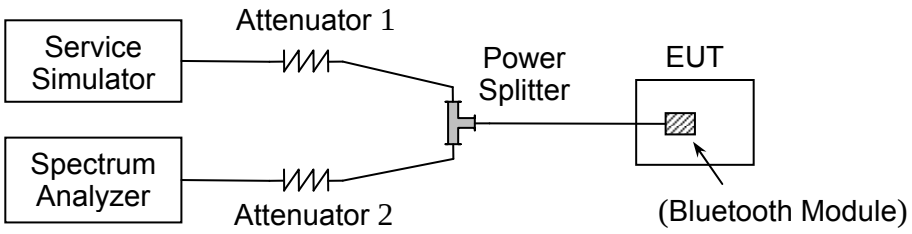
2.5. Carried Frequency Separation

2.5.1. Definition

According to FCC §15.247(a)(1) and RSS-210 A8.1 (b), 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.

2.5.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

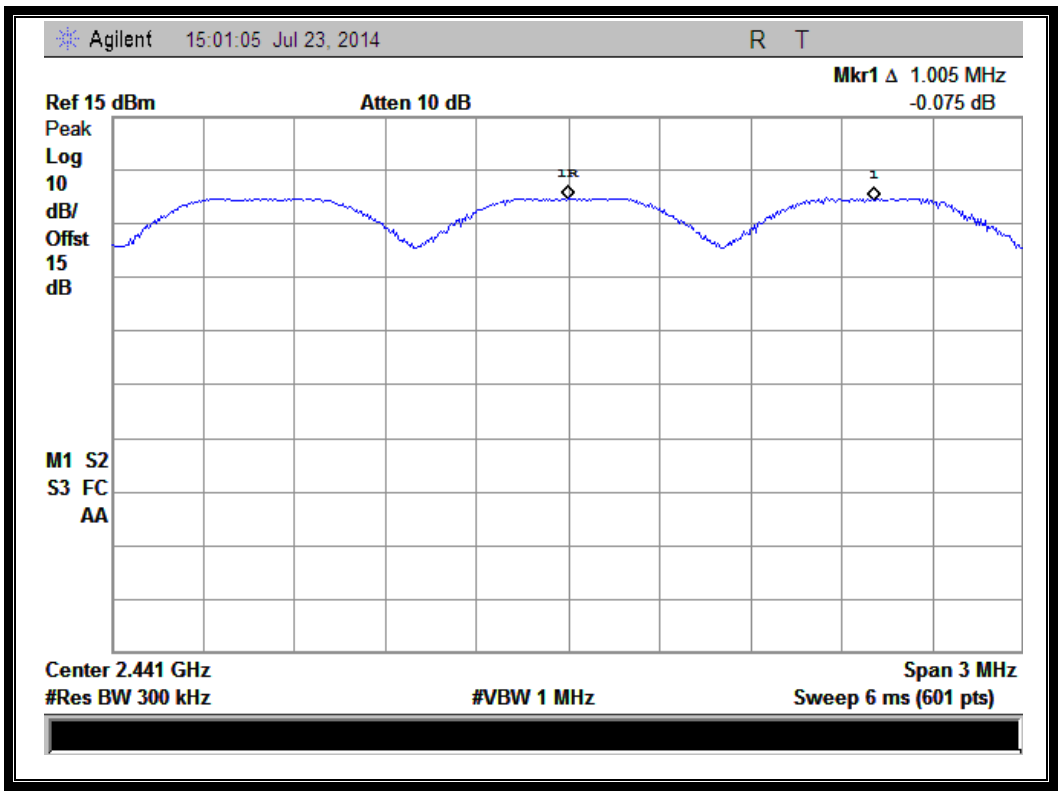
2.5.3. Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
Video (or Average) Bandwidth (VBW) ≥ RBW
Sweep = auto
Detector function = peak

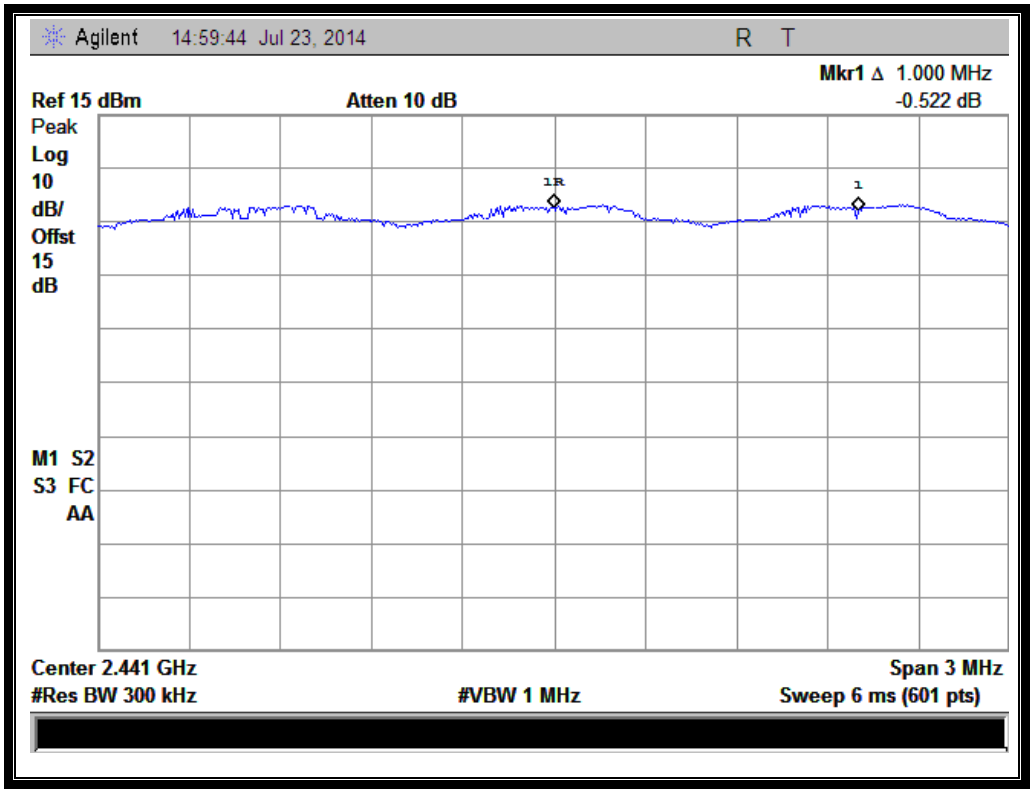
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

2.5.4. Test Result

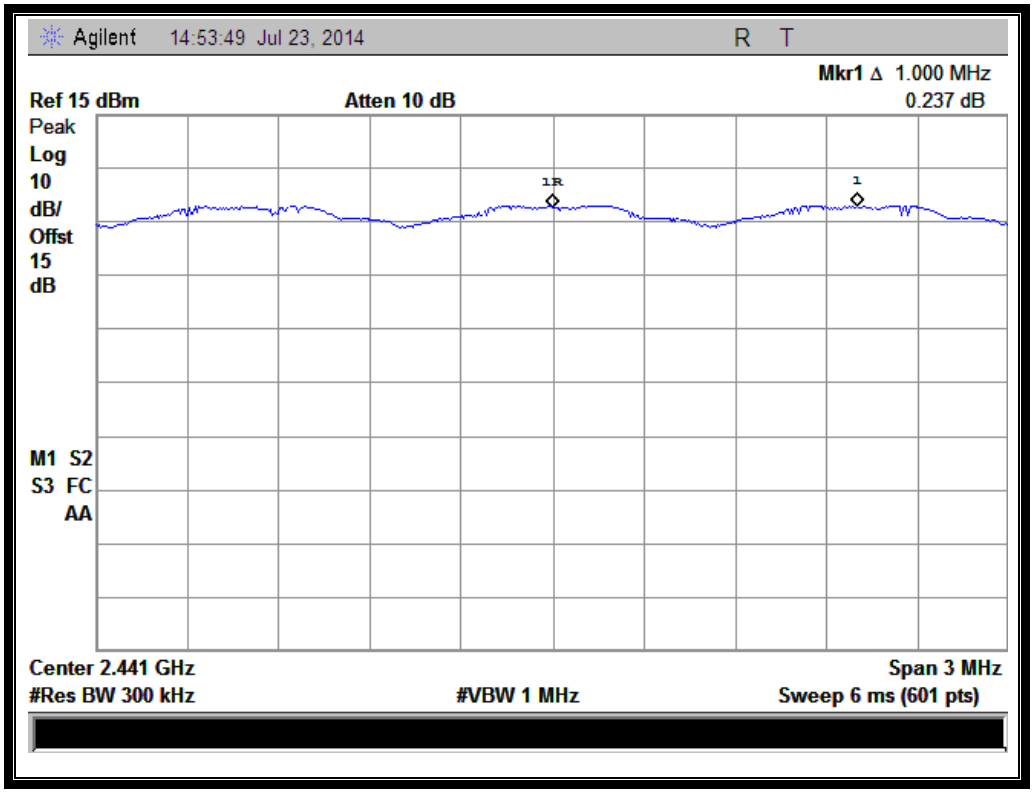
The Bluetooth Module operates at hopping-on test mode.
For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section 2.4.3), whichever is greater. So, the verdict is PASSING



(Plot A: GFSK)



(Plot B: ∏/4-DQPSK)



(Plot C: 8-DPSK)

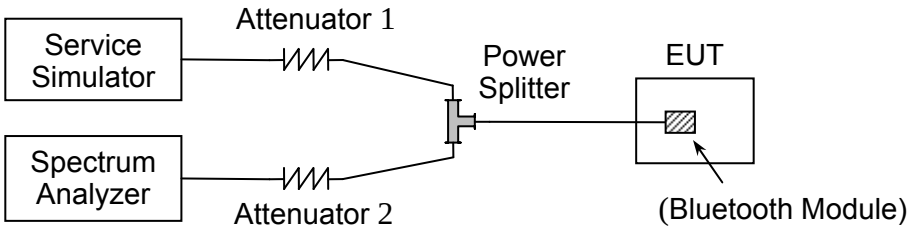
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC §15.247(a) (1) (iii) and RSS-210 A8.1 (d), 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.

2.6.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

2.6.3. Test Procedure

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channel * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

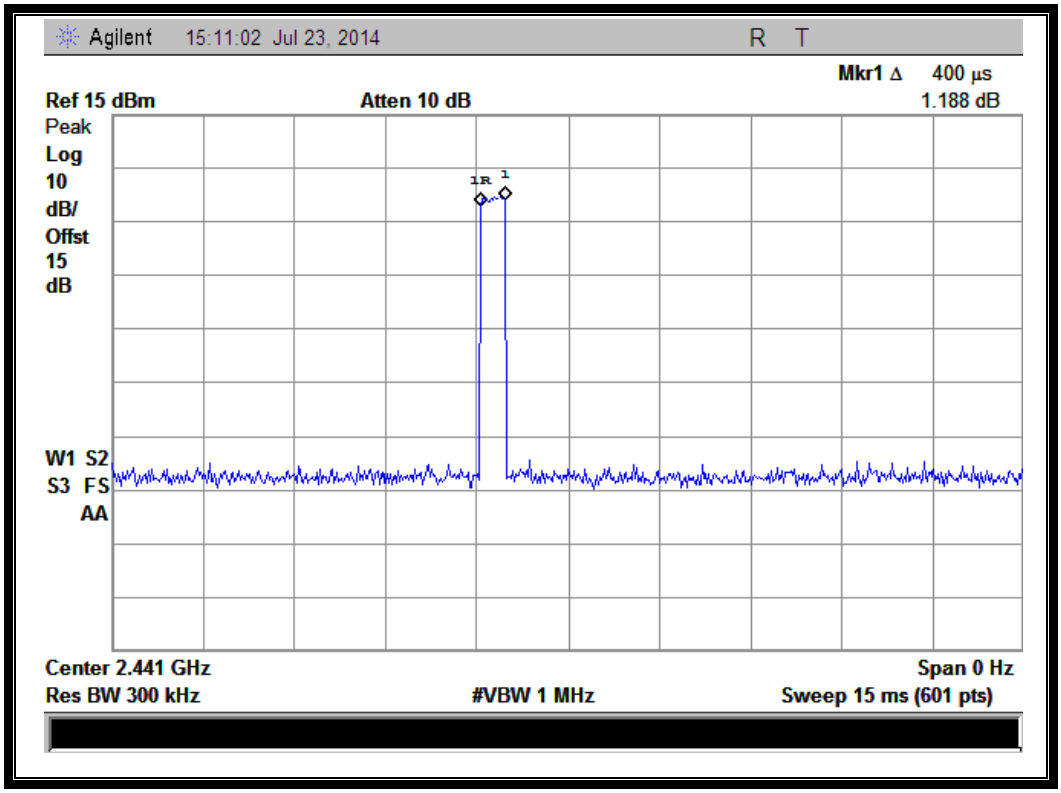
2.6.4. Test Result

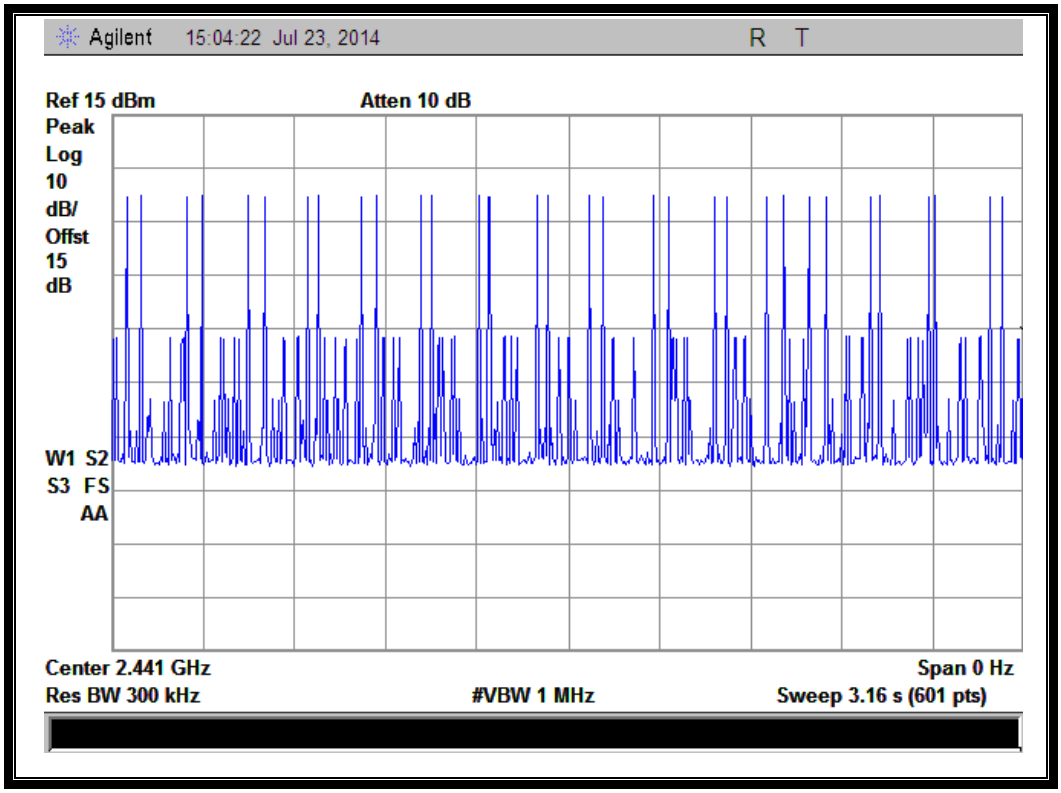
2.6.4.1. GFSK Mode

A. Test Verdict:

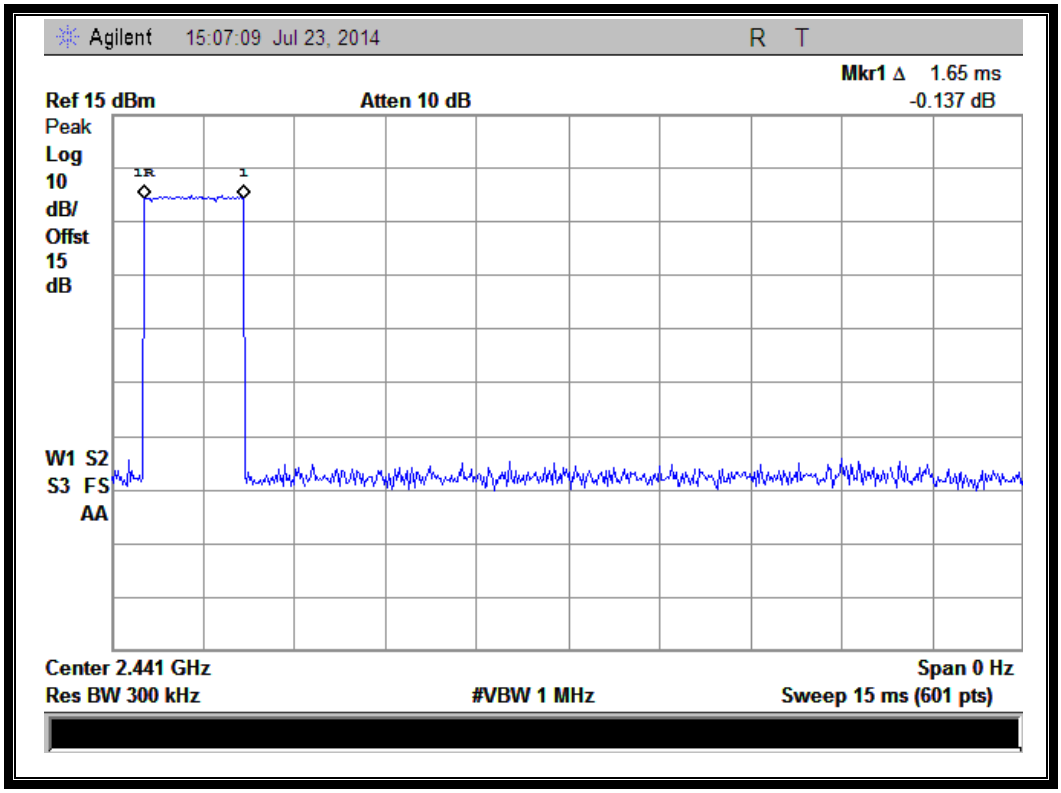
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.400	32	Plot A	0.128	0.4	PASS
DH3	1.650	13	Plot B	0.215		PASS
DH5	2.900	10	Plot C	0.290		PASS

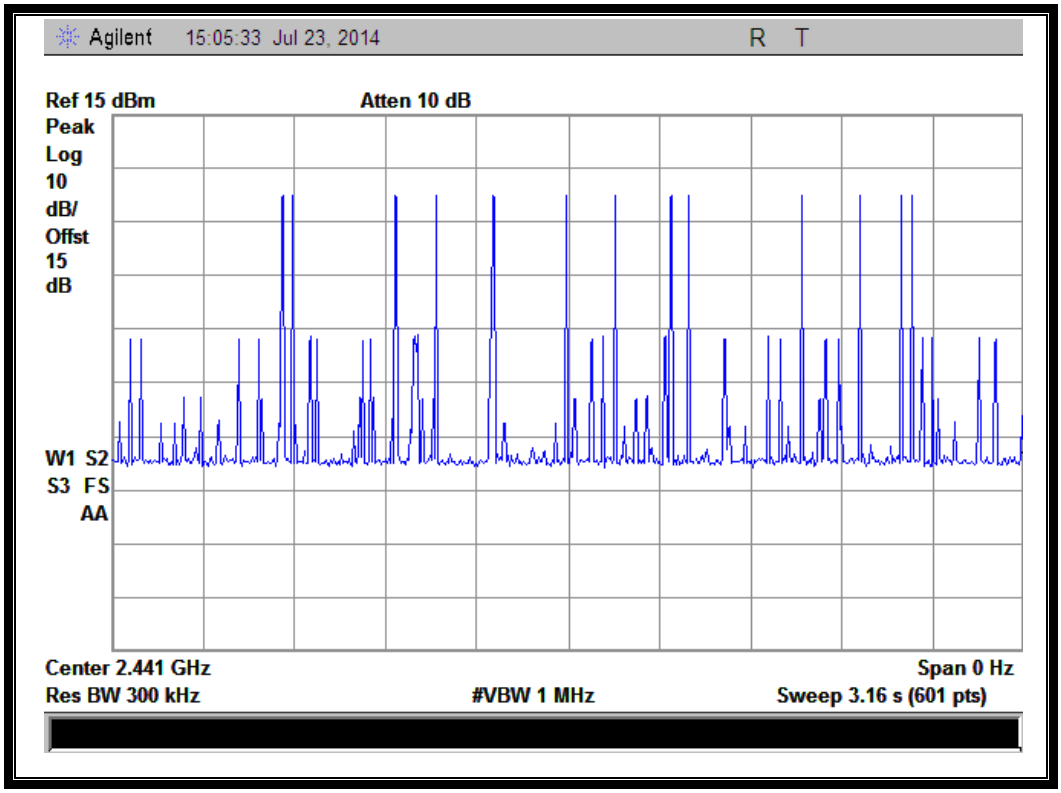
B. Test Plots:



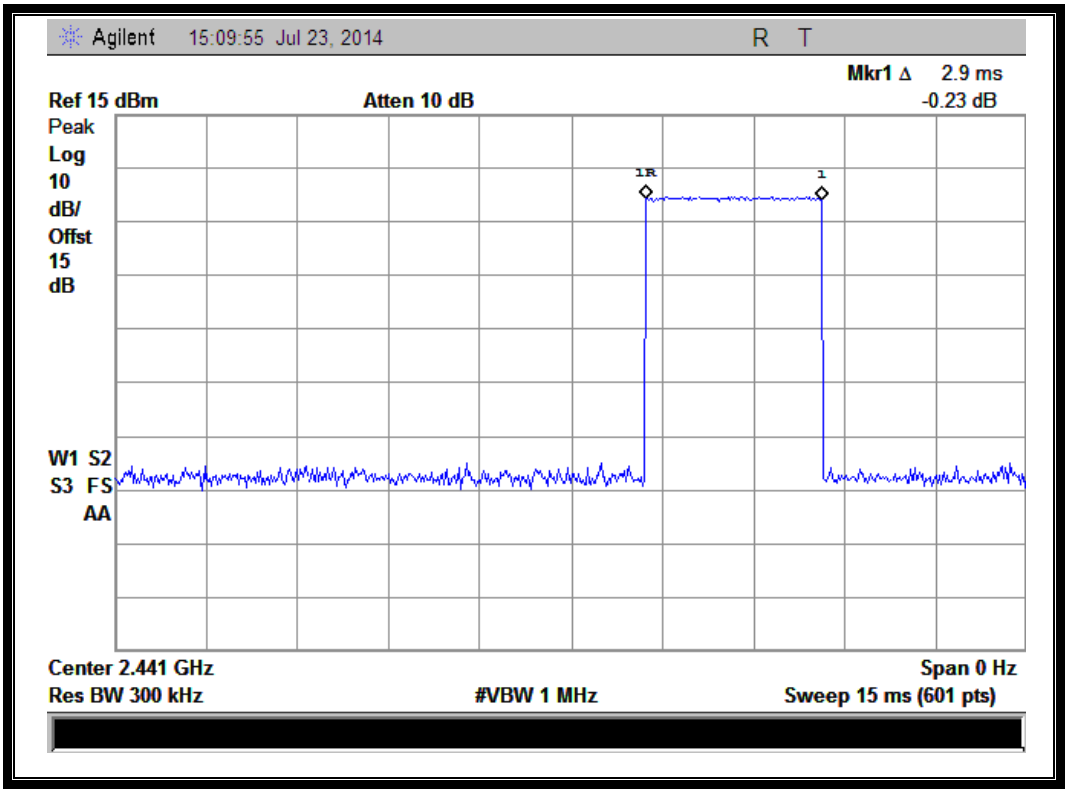


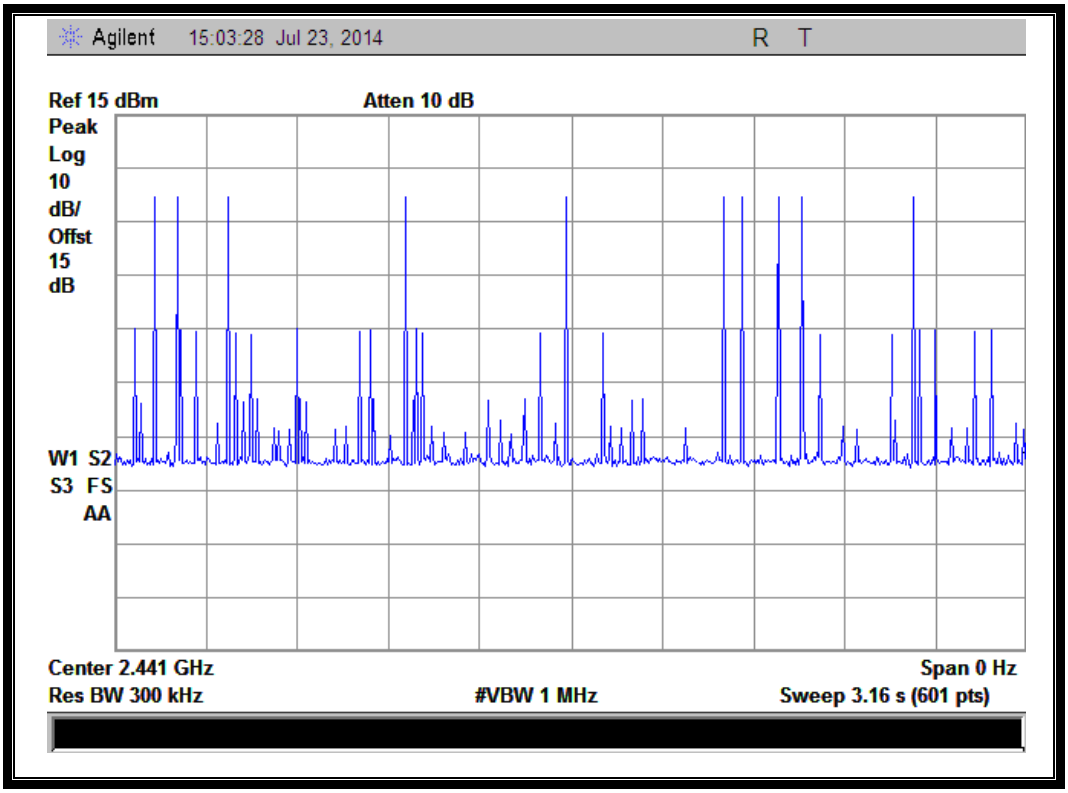
(Plot A: DH1 @ GFSK)





(Plot B: DH3 @ GFSK)





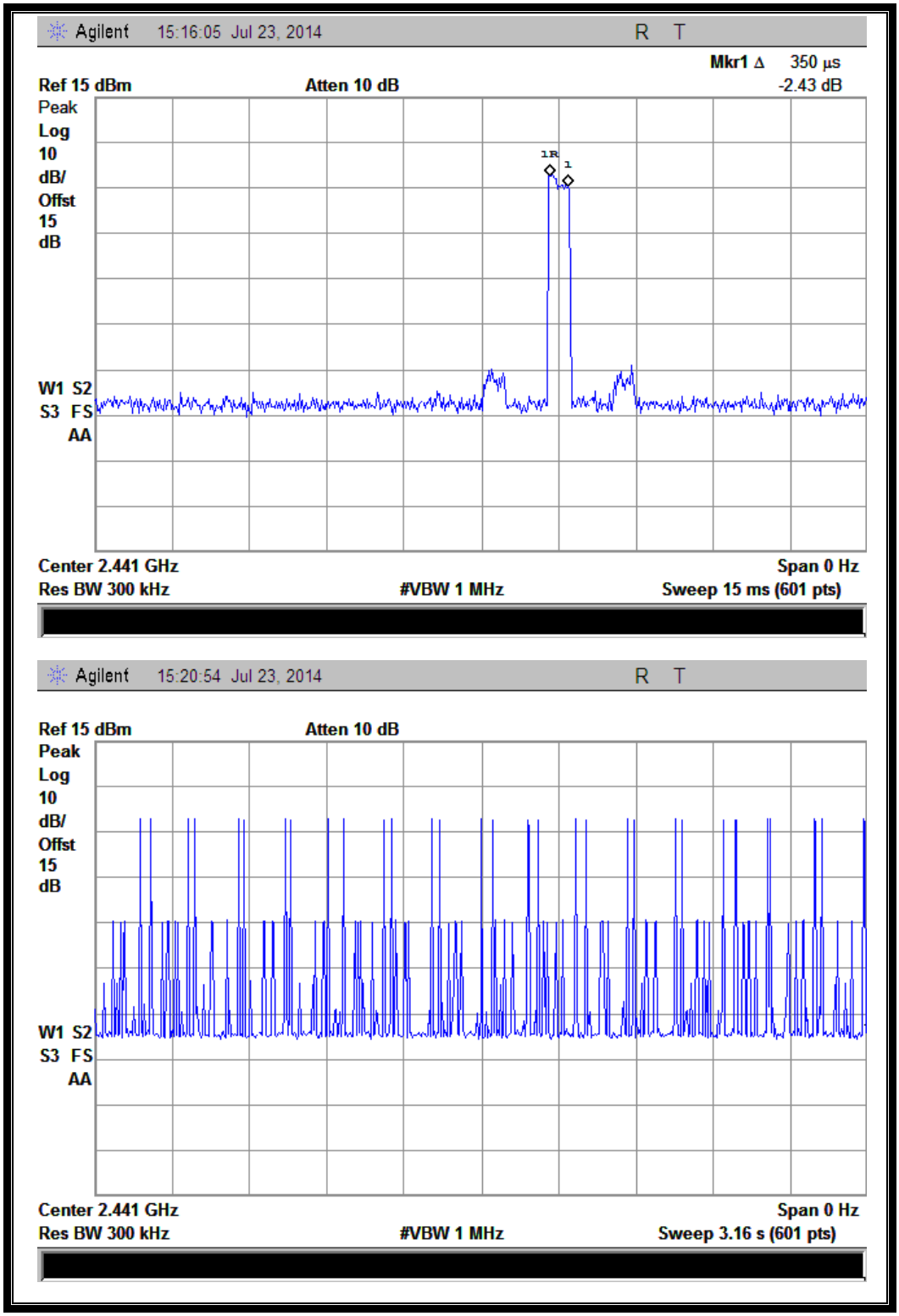
(Plot C: DH5 @ GFSK)

2.6.4.2. ∏/4-DQPSK Mode

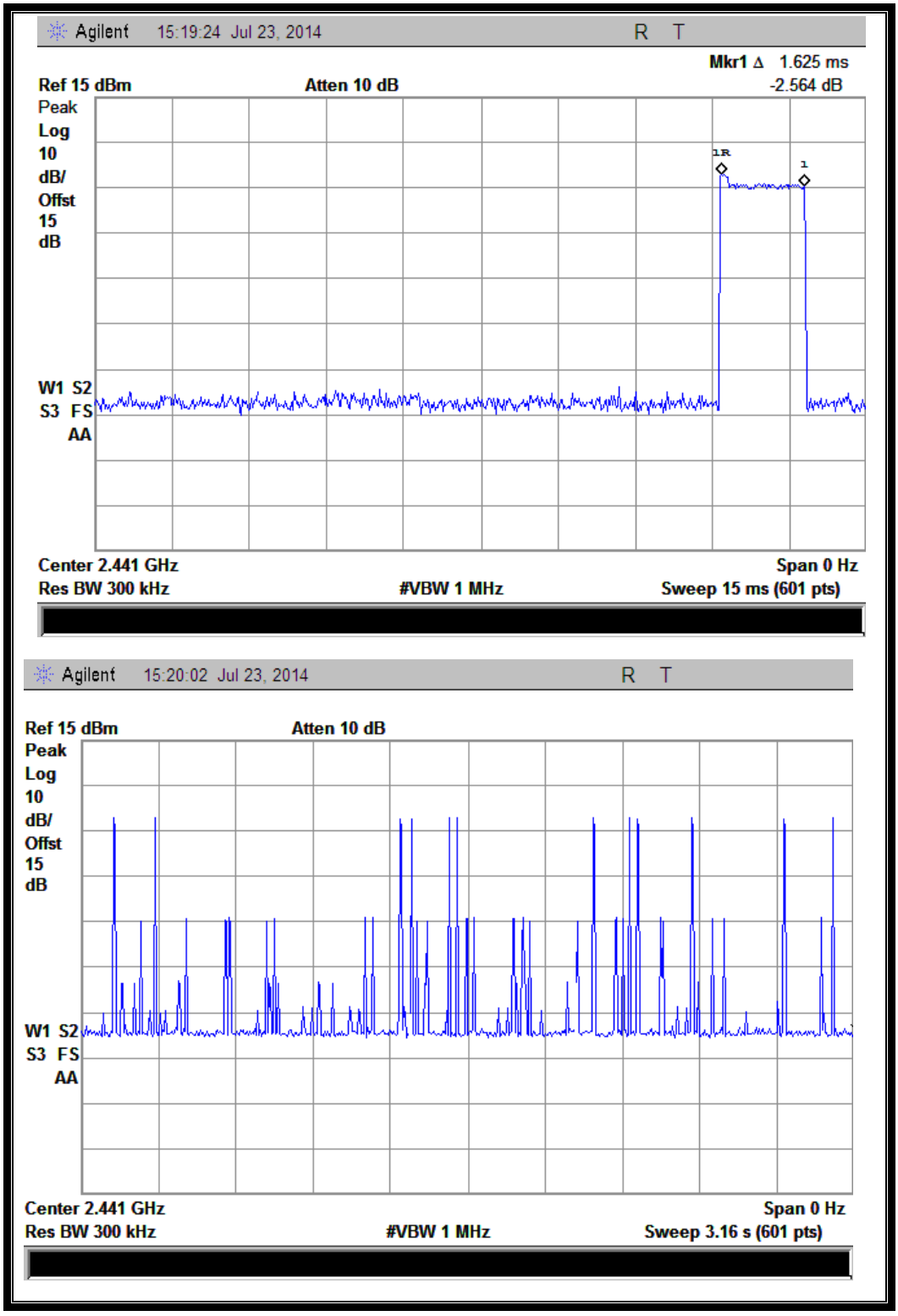
A. Test Verdict:

DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.350	32	Plot A	0.112	0.4	PASS
DH3	1.625	12	Plot B	0.195		PASS
DH5	2.888	8	Plot C	0.231		PASS

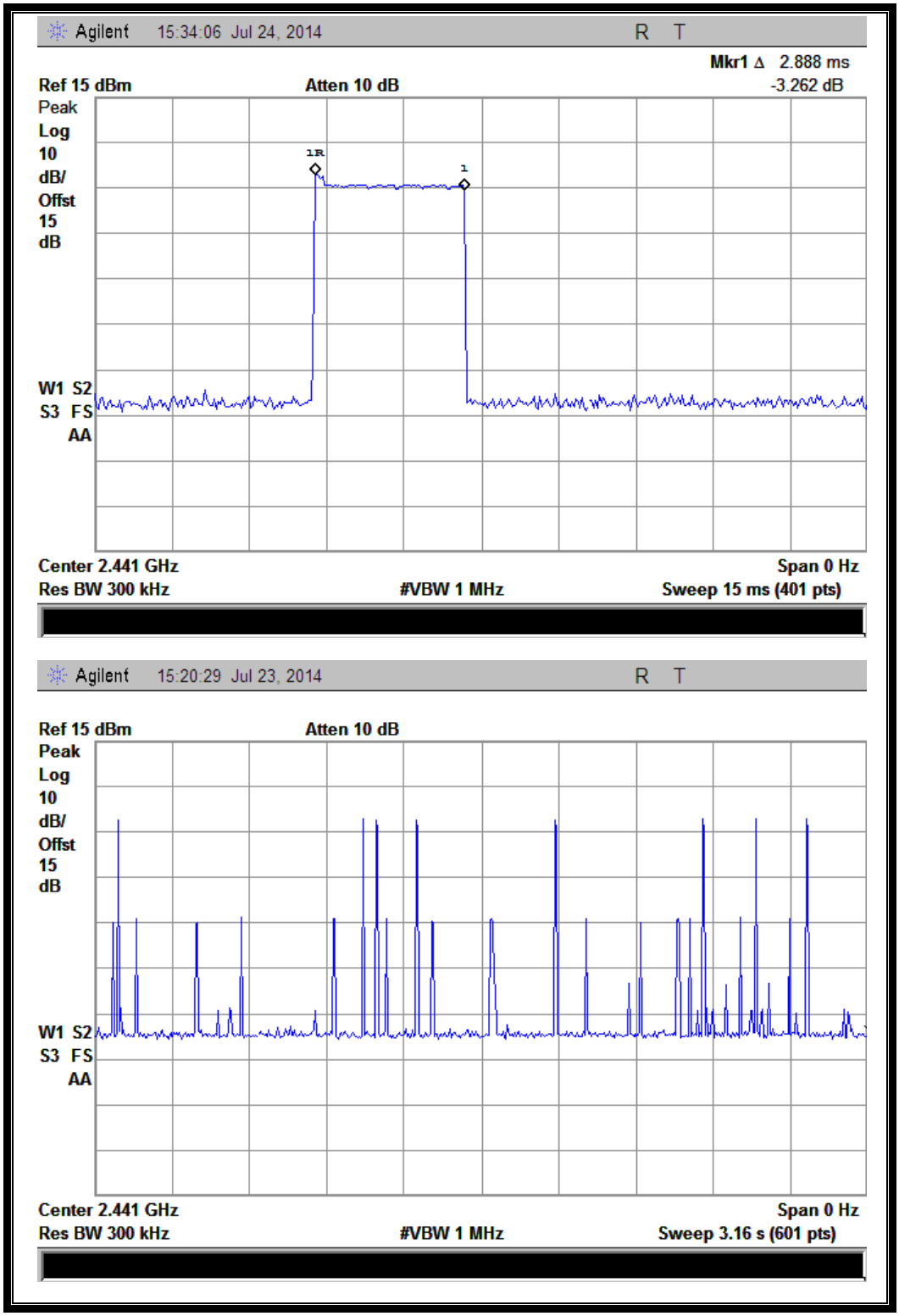
B. Test Plots:



(Plot D: DH1 @ ∏/4-DQPSK)



(Plot E: DH3 @ ∏/4-DQPSK)



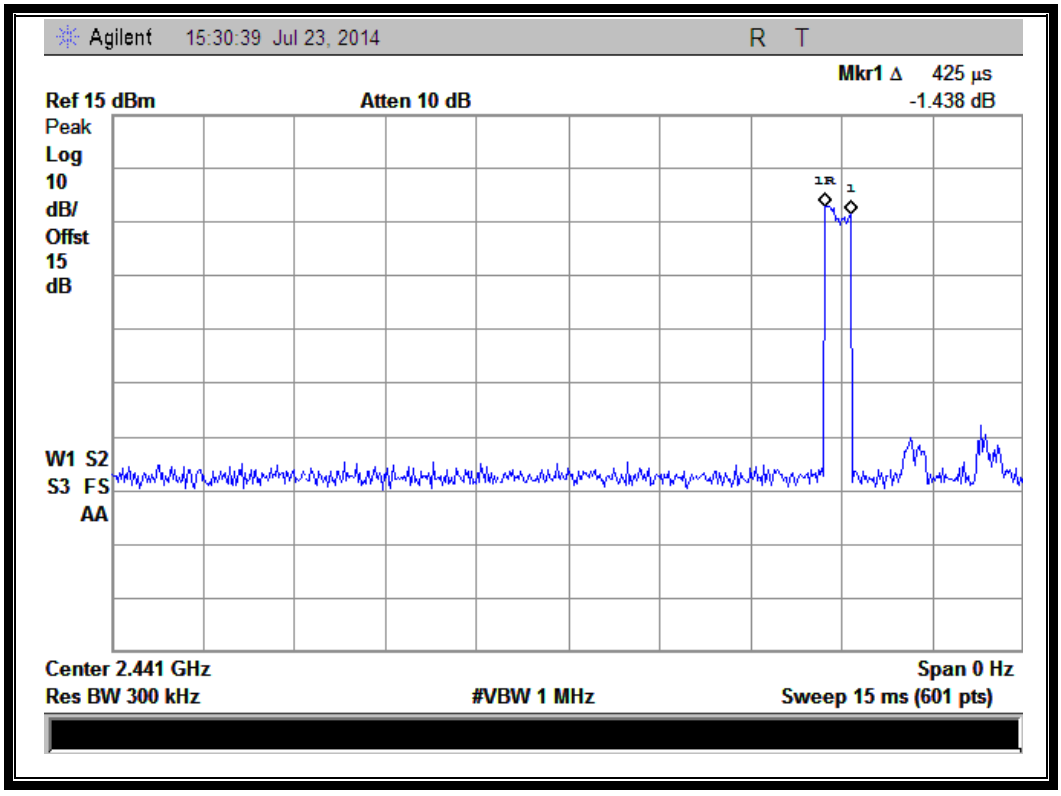
(Plot F: DH5 @ ∏/4-DQPSK)

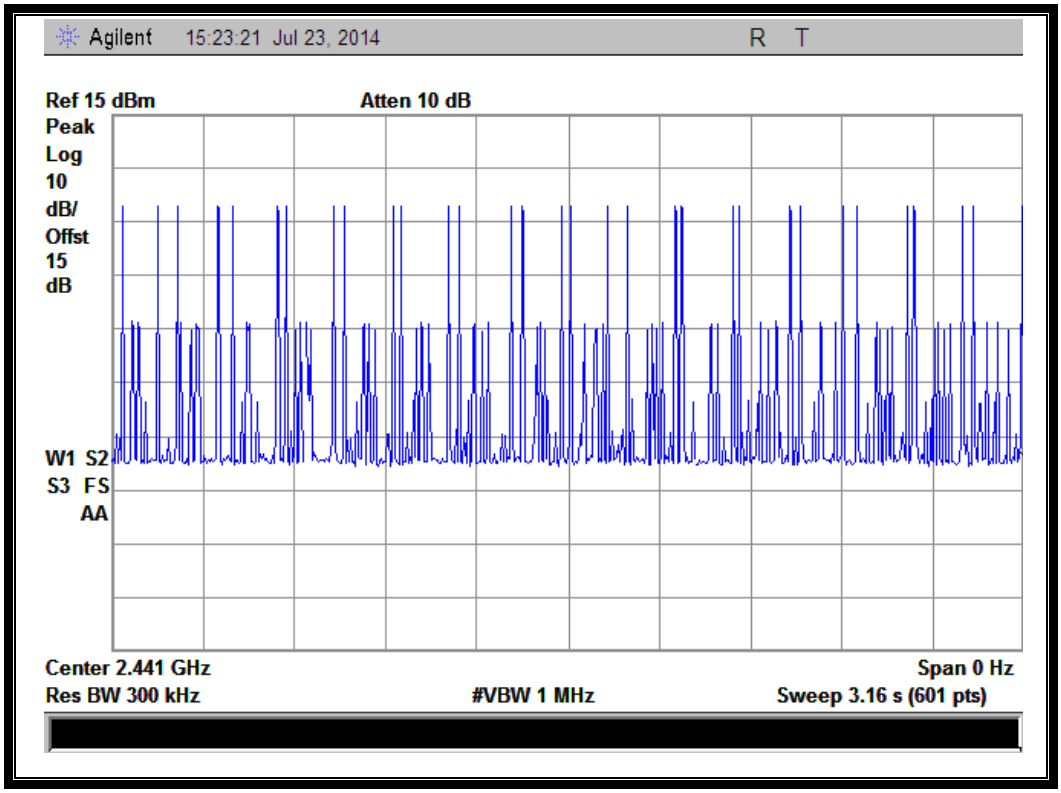
2.6.4.3. 8-DPSK mode

A. Test Verdict:

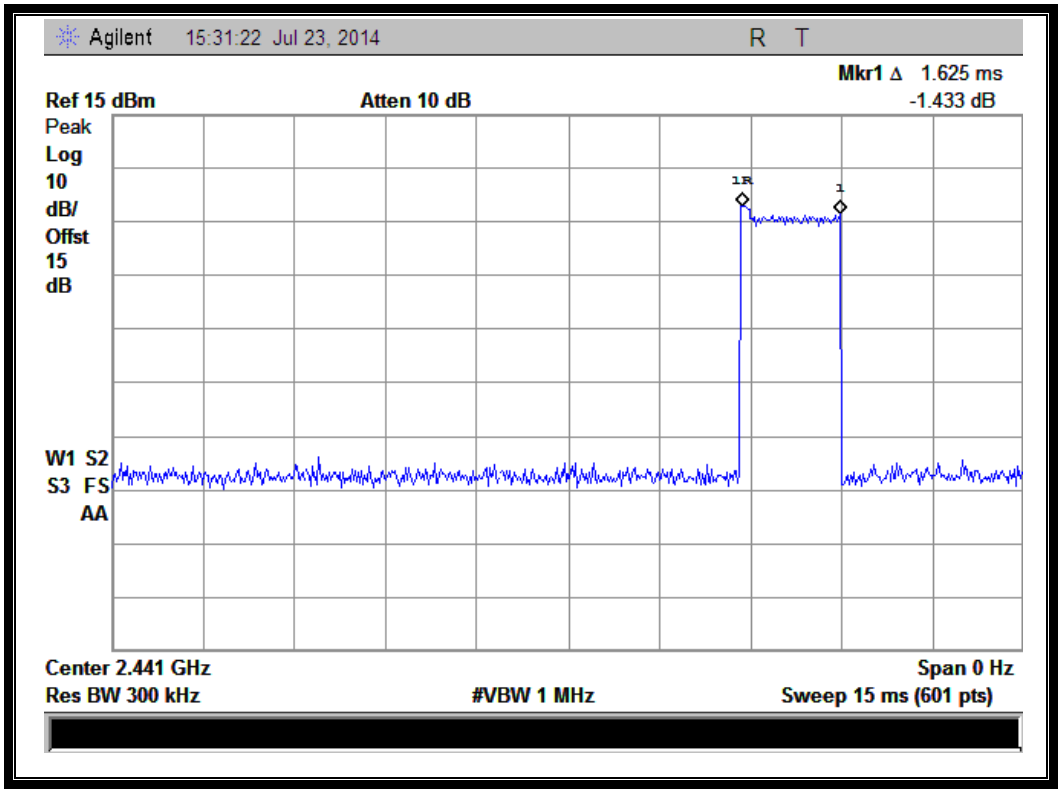
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.425	32	Plot A	0.136	0.4	PASS
DH3	1.625	15	Plot B	0.244		PASS
DH5	2.900	9	Plot C	0.261		PASS

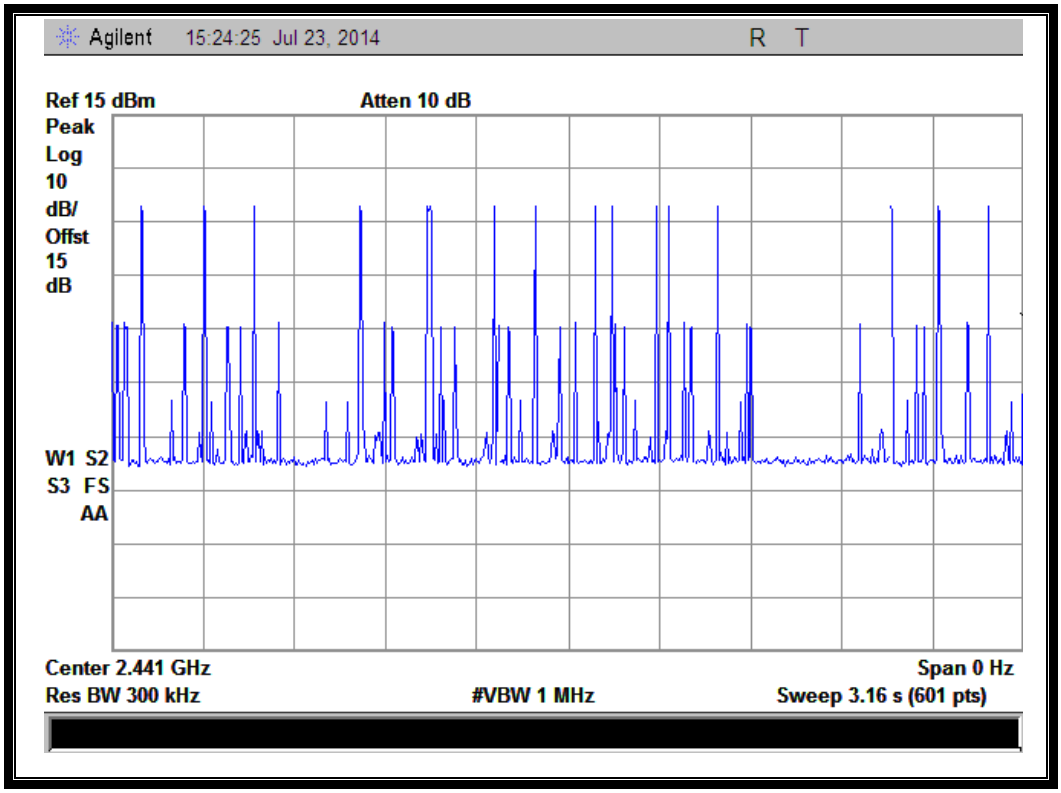
B. Test Plots:



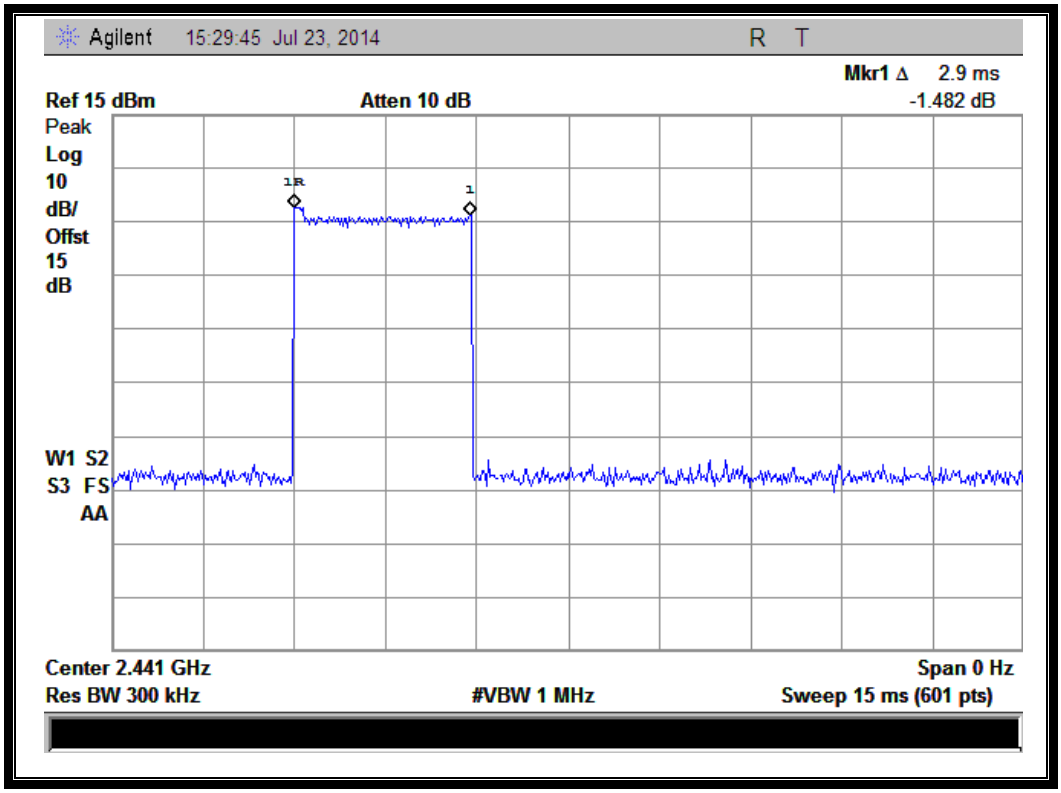


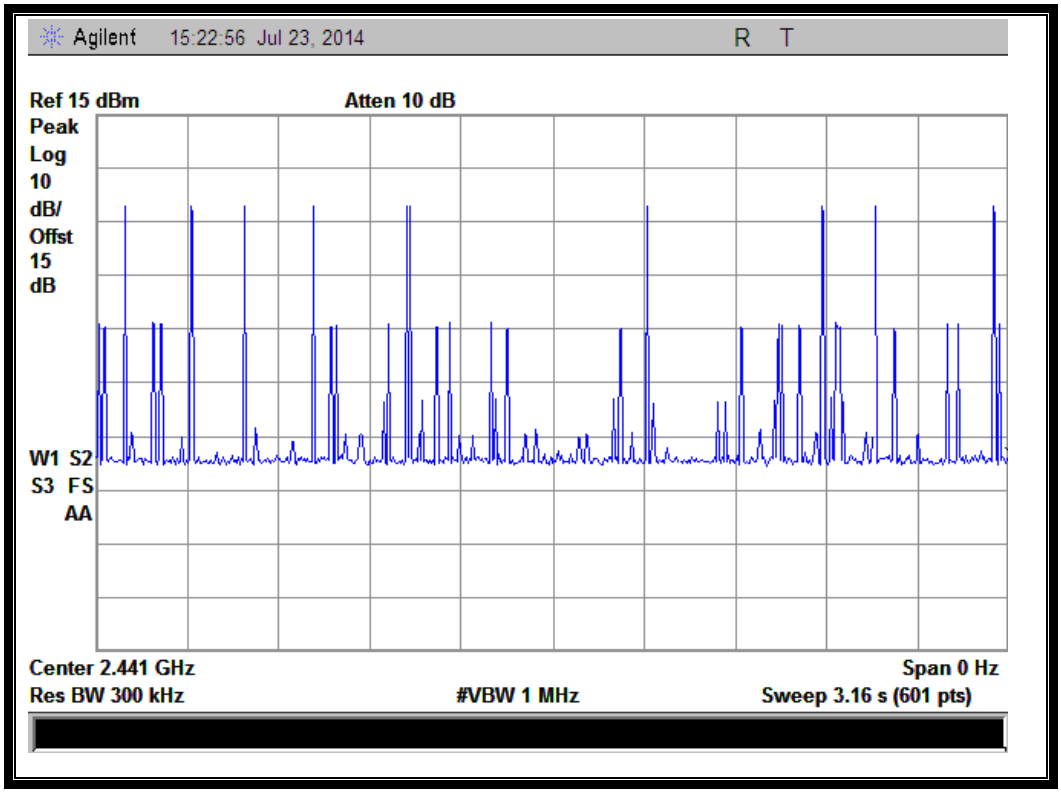
(Plot G: DH1 @ 8-DPSK)





(Plot H: DH3 @ 8-DPSK)





(Plot I: DH5 @ 8-DPSK)

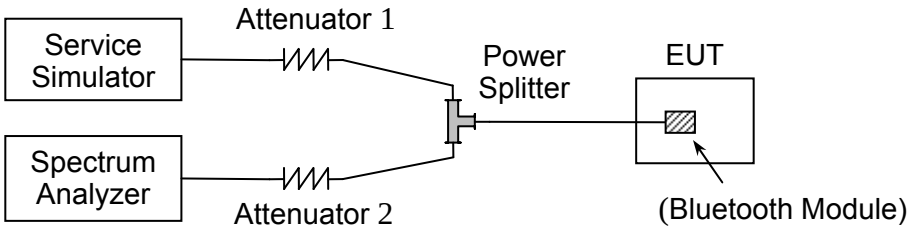
2.7. Conducted Spurious Emissions

2.7.1. Requirement

According to FCC §15.247(d) and RSS-A8.5, 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.

2.7.2. Test Description

A. Test Setup:



The Bluetooth Module of the EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the Bluetooth Service Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm;the path loss as the factor is calibrated to correct the reading. During the measurement, the Bluetooth Module of the EUT is activated and controlled by the SS, and is set to operate under test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Anritsu	MT8852B	6K00006210	2014.02.26	2015.02.25
Spectrum Analyzer	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Power Splitter	Weinschel	1506A	NW521	2014.02.26	2015.02.25
Attenuator 1	Resnet	10dB	(n.a.)	2014.02.26	2015.02.25
Attenuator 2	Resnet	3dB	(n.a.)	2014.02.26	2015.02.25

2.7.3. Test Procedure

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize.

2.7.4. Test Result

The Bluetooth Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.
The result has the offset with cable loss already.

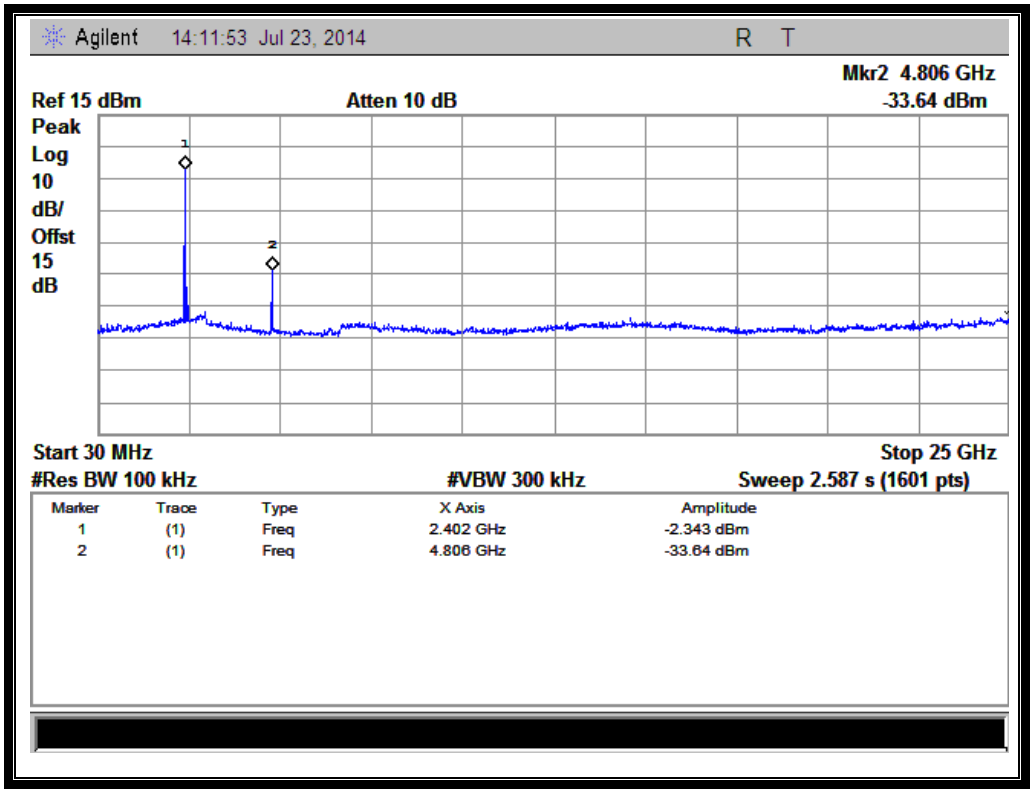
2.7.4.1. GFSK Mode

A. Test Verdict:

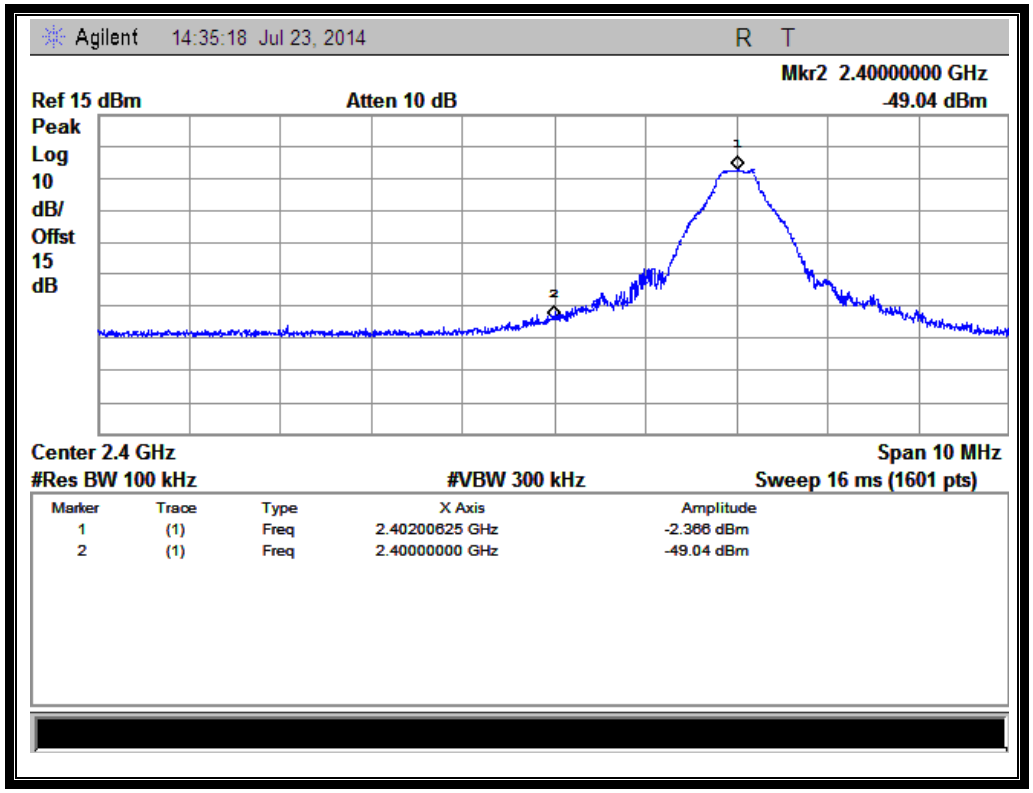
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-33.64	Plot A.1	-2.343	-22.3	PASS
39	2441	-34.58	Plot B.1	-1.055	-21.1	PASS
78	2480	-37.99	Plot C.1	-1.431	-21.4	PASS

B. Test Plots:

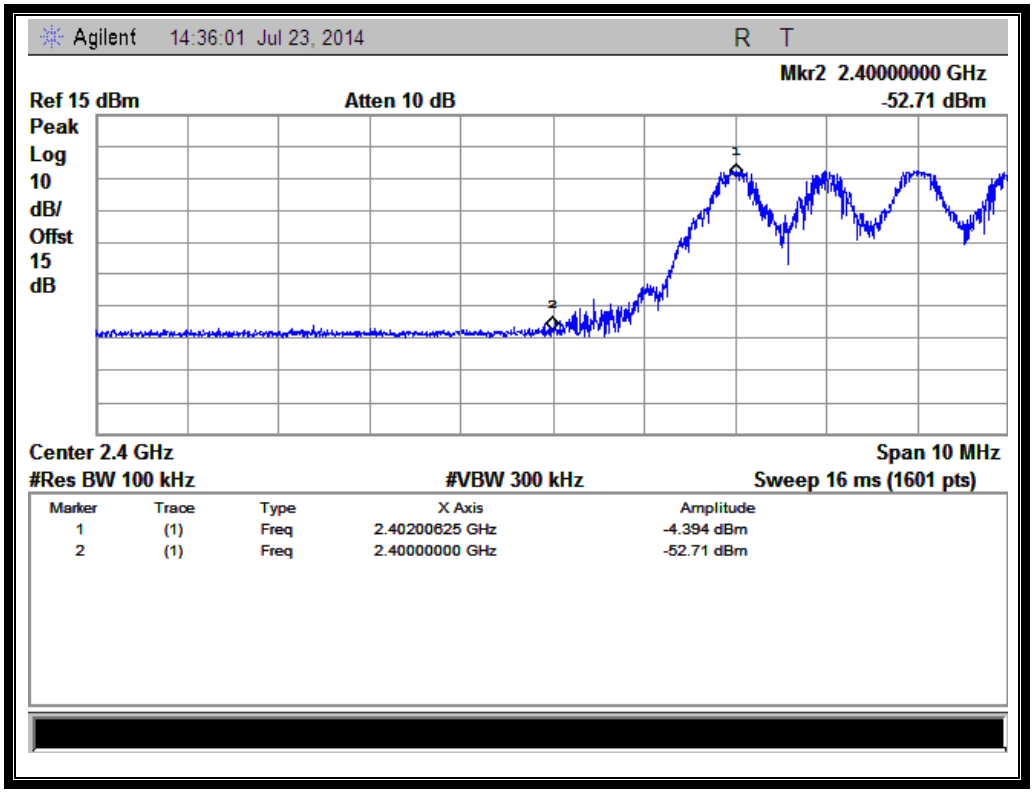
Note: The power of the Module transmitting frequency should be ignored.



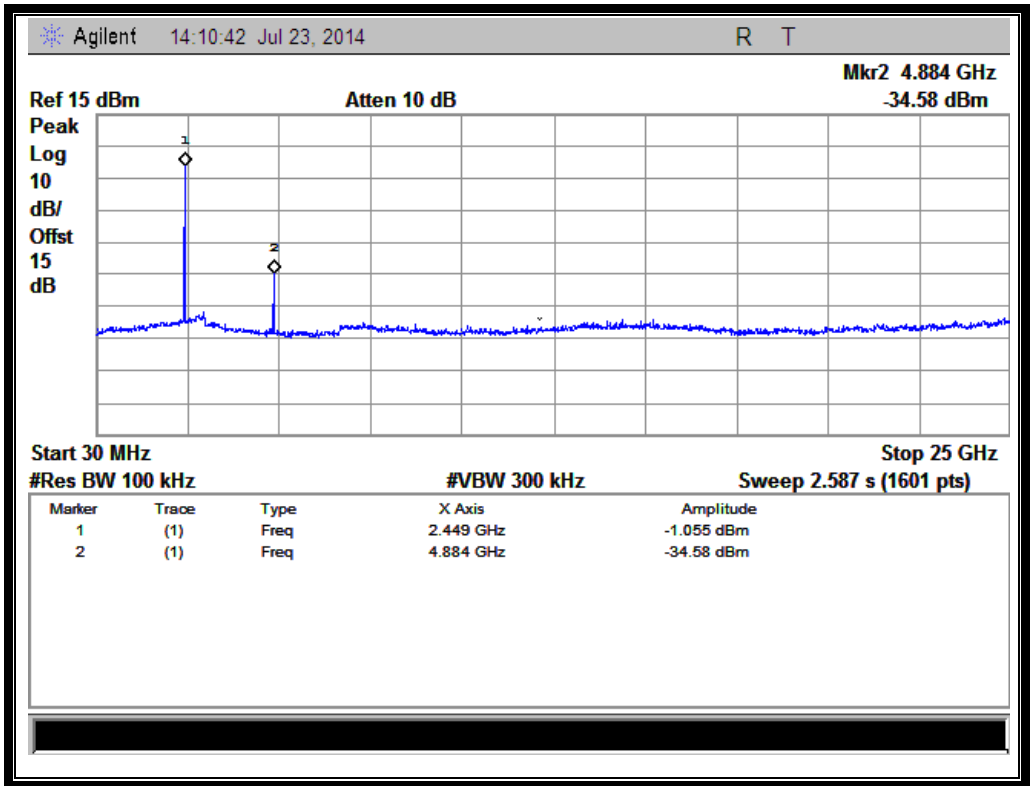
(Plot A.1: Channel = 0, 30MHz to 25GHz @ GFSK Mode)



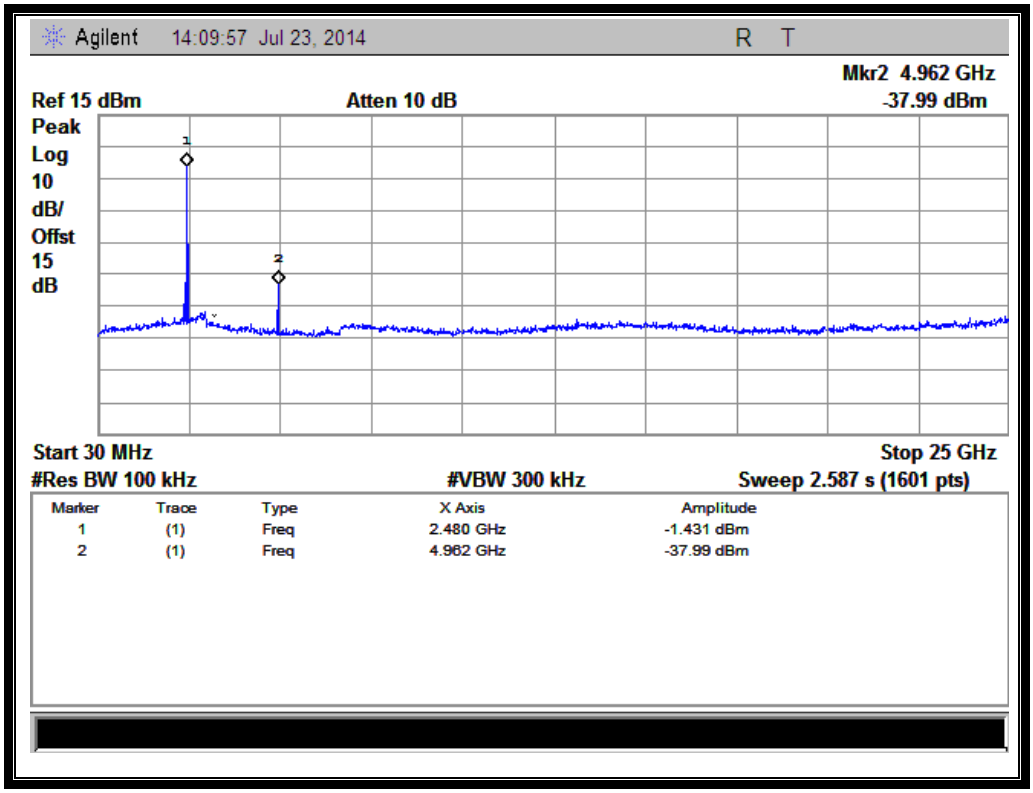
(Channel = 0, Band edge @ GFSK Mode)



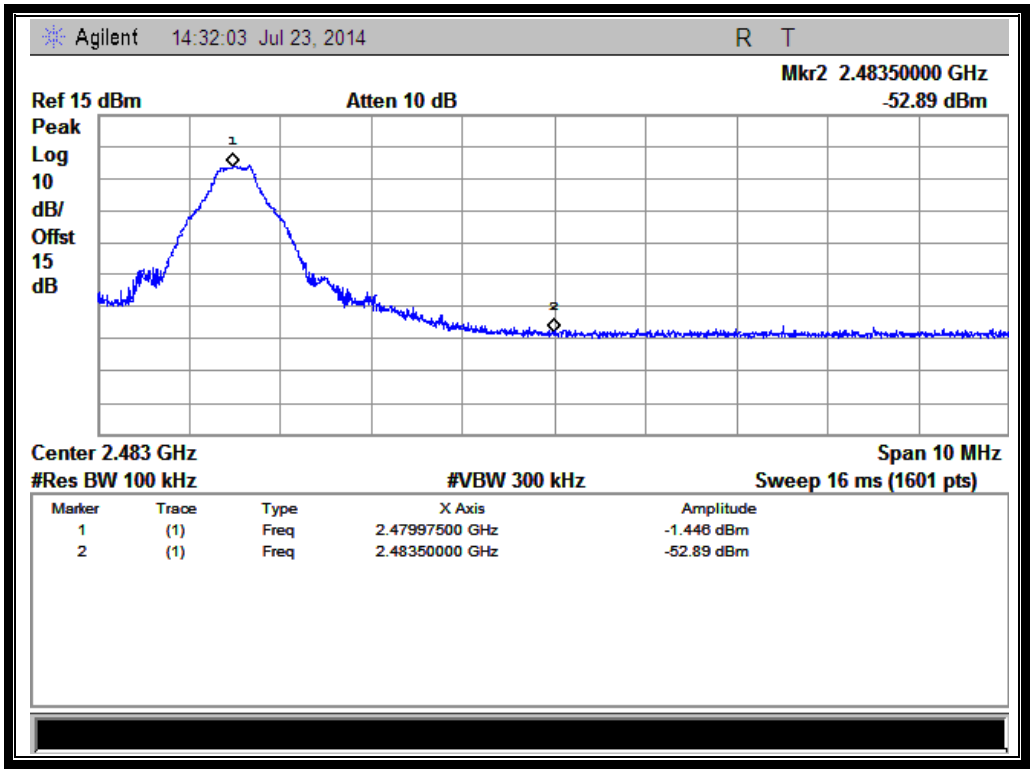
(Channel = 0, Band edge with hopping on @ GFSK Mode)



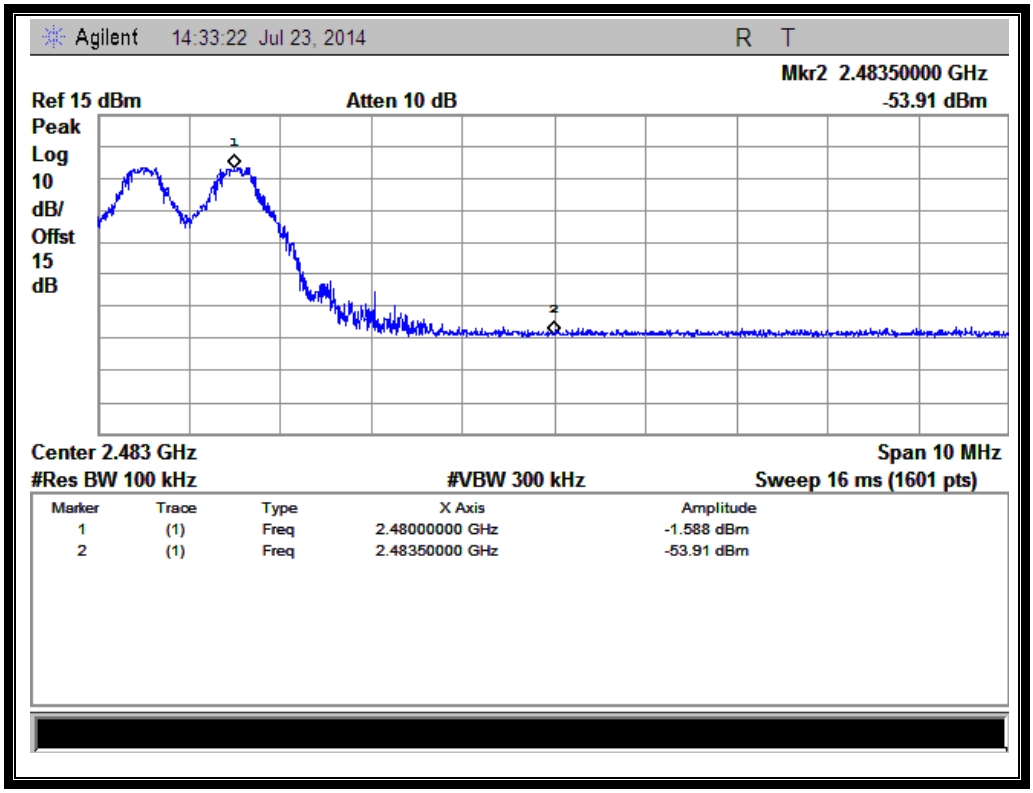
(Plot B.1: Channel = 39, 30MHz to 25GHz @ GFSK Mode)



(Plot C.1: Channel = 78, 30MHz to 25GHz @ GFSK Mode)



(Channel = 78, Band edge @ GFSK Mode)



(Channel = 78, Band edge with hopping on @ GFSK Mode)

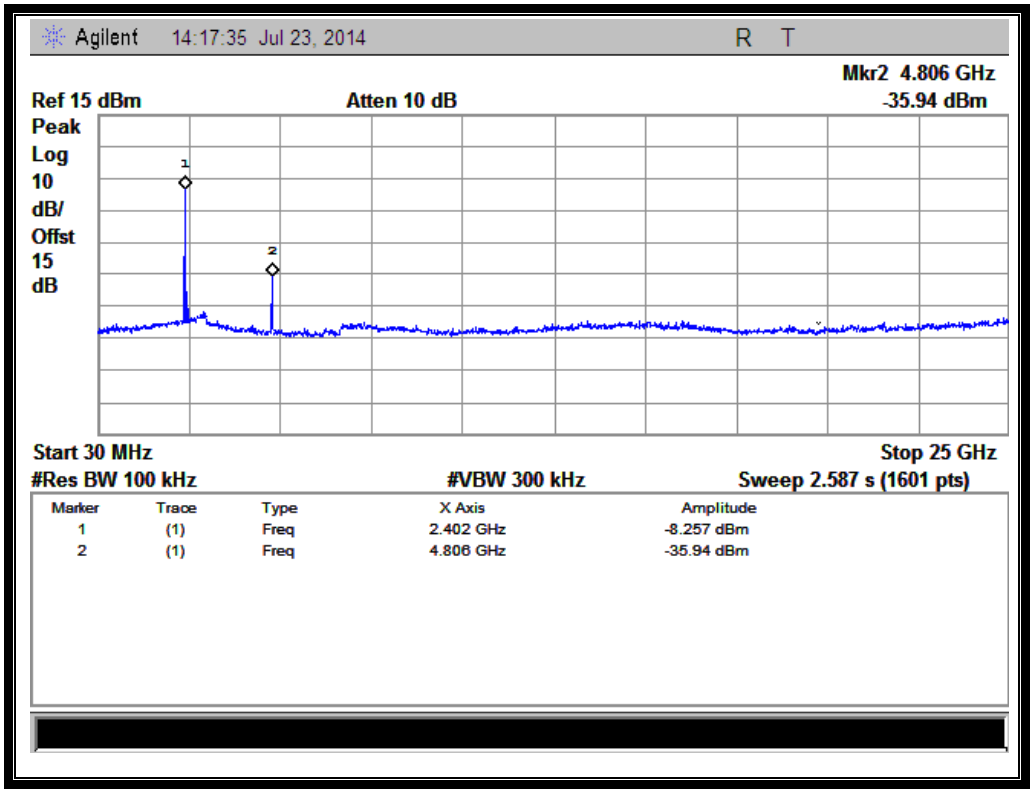
2.7.4.2. ∏/4-DQPSK Mode

A. Test Verdict:

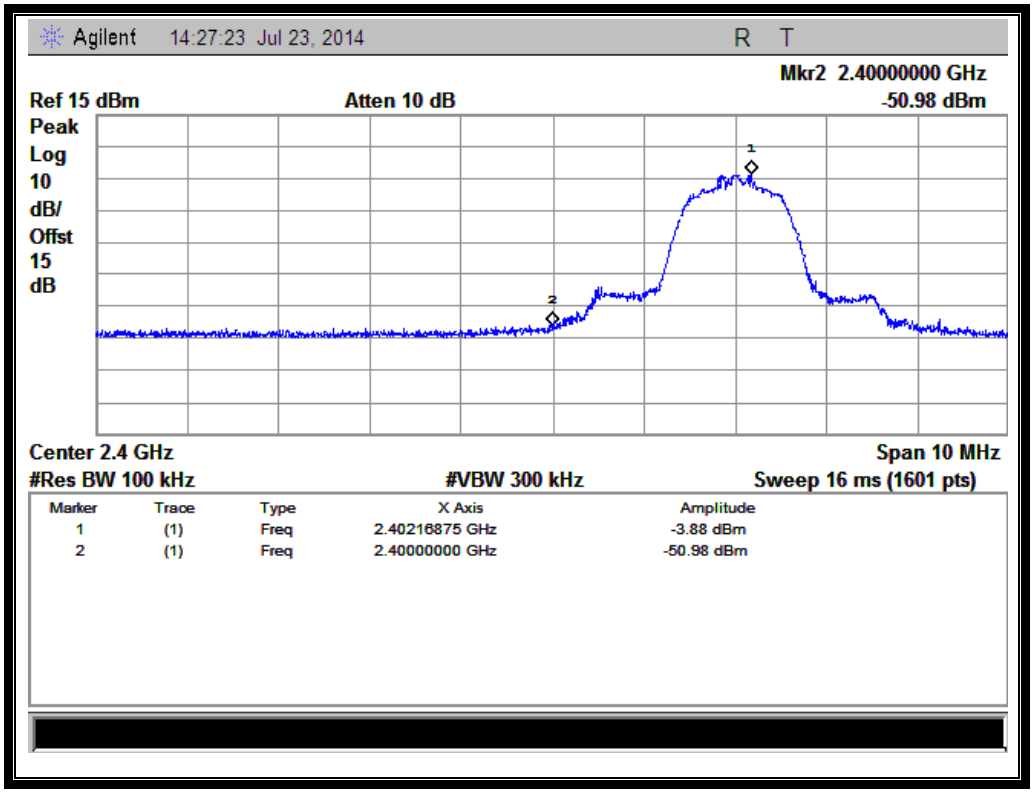
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-35.94	Plot D.1	-8.257	-28.3	PASS
39	2441	-43.19	Plot E.1	-6.431	-26.4	PASS
78	2480	-45.24	Plot F.1	-6.929	-26.9	PASS

B. Test Plots:

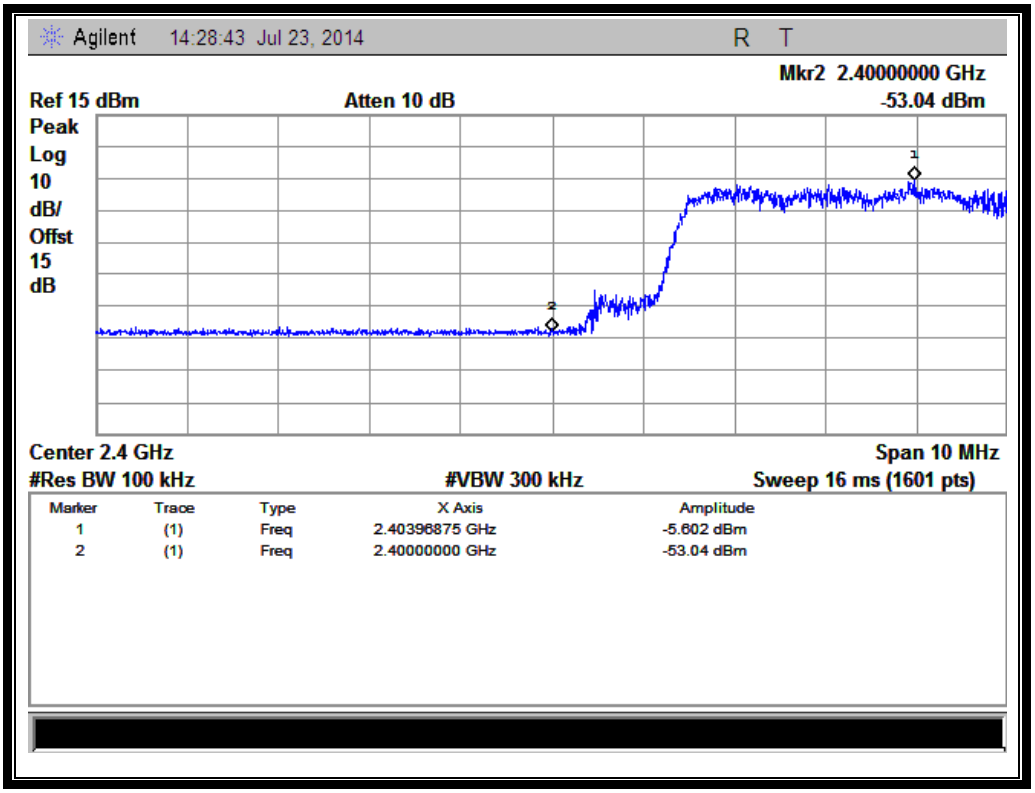
Note: the power of the Module transmitting frequency should be ignored.



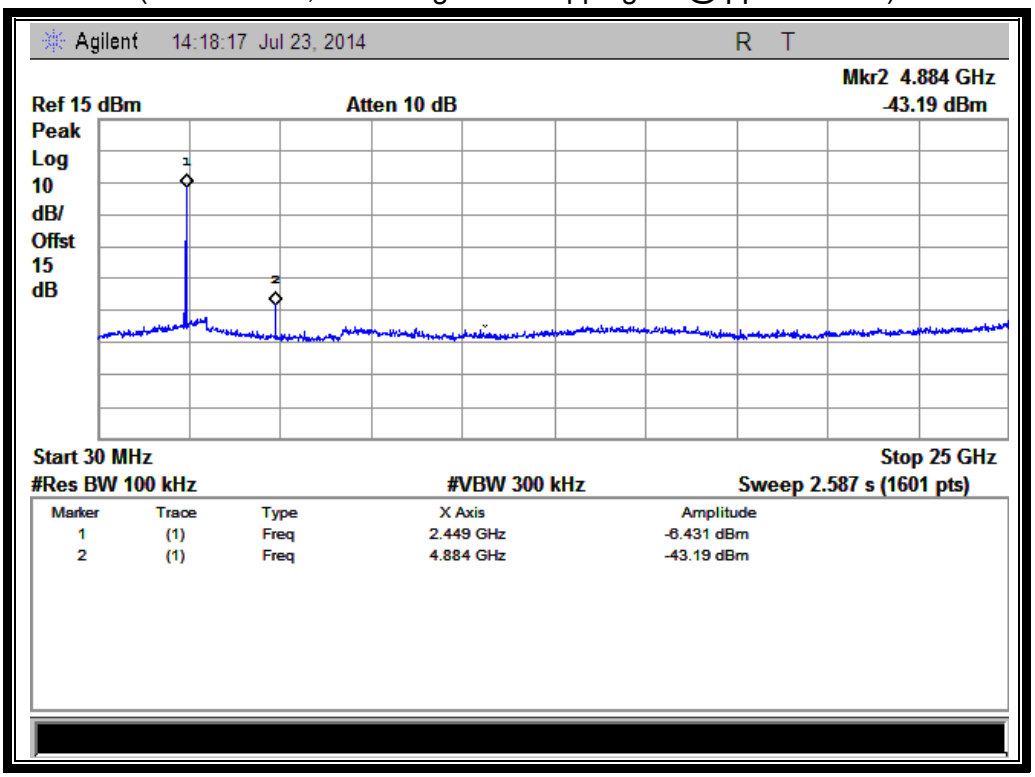
(Plot D.1: Channel = 0, 30MHz to 25GHz @ ∏/4-DQPSK)



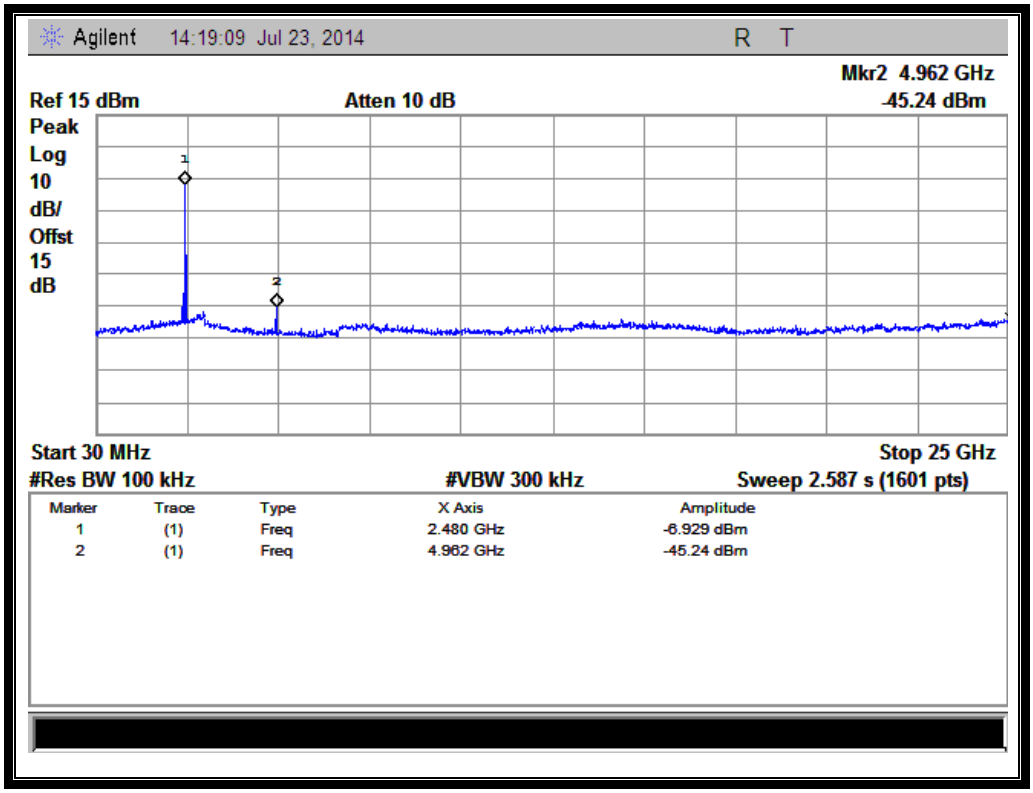
(Channel = 0, Band edge @ ∏/4-DQPSK)



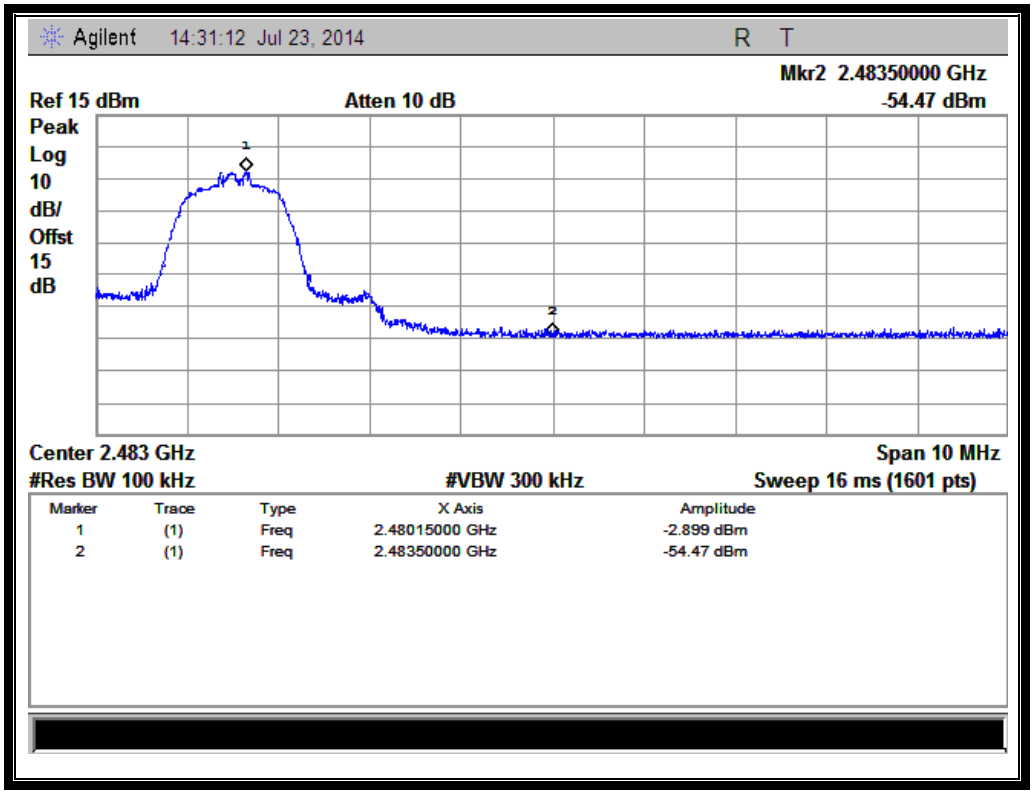
(Channel = 0, Band edge with hopping on @ ∏/4-DQPSK)



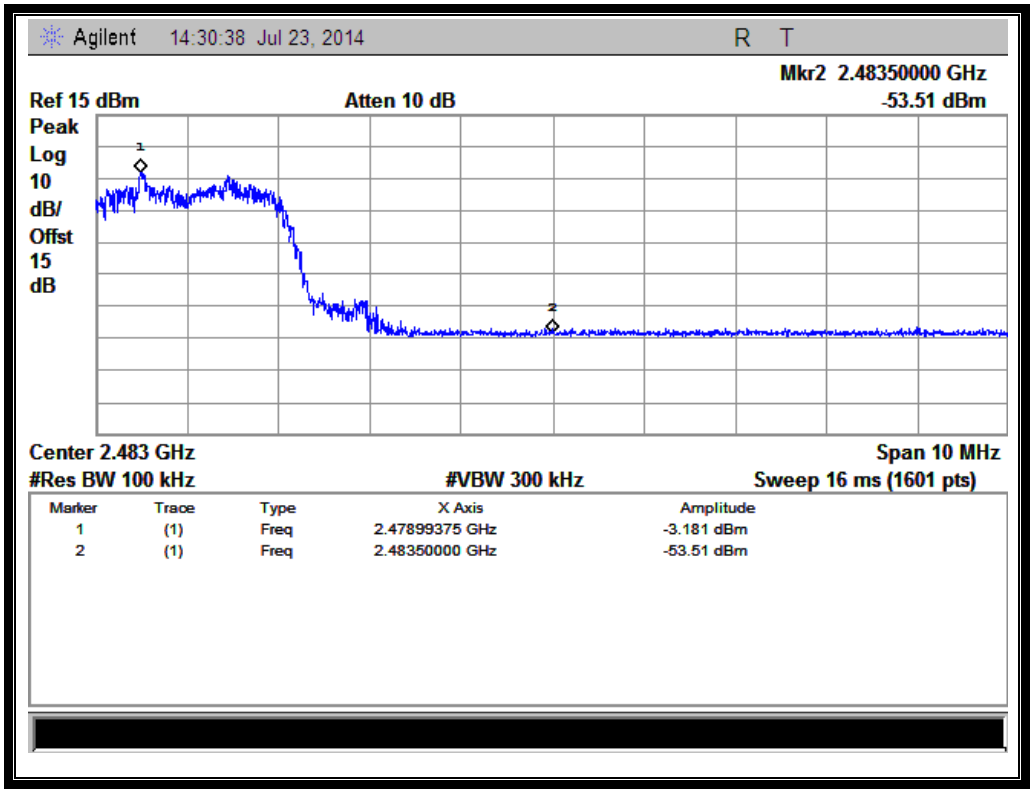
(Plot E.1: Channel = 39, 30MHz to 25GHz @ ∏/4-DQPSK)



(Plot F.1: Channel = 78, 30MHz to 25GHz @ ∏/4-DQPSK)



(Channel = 78, Band edge @ ∏/4-DQPSK)



(Channel = 78, Band edge with hopping on @ ∏/4-DQPSK)

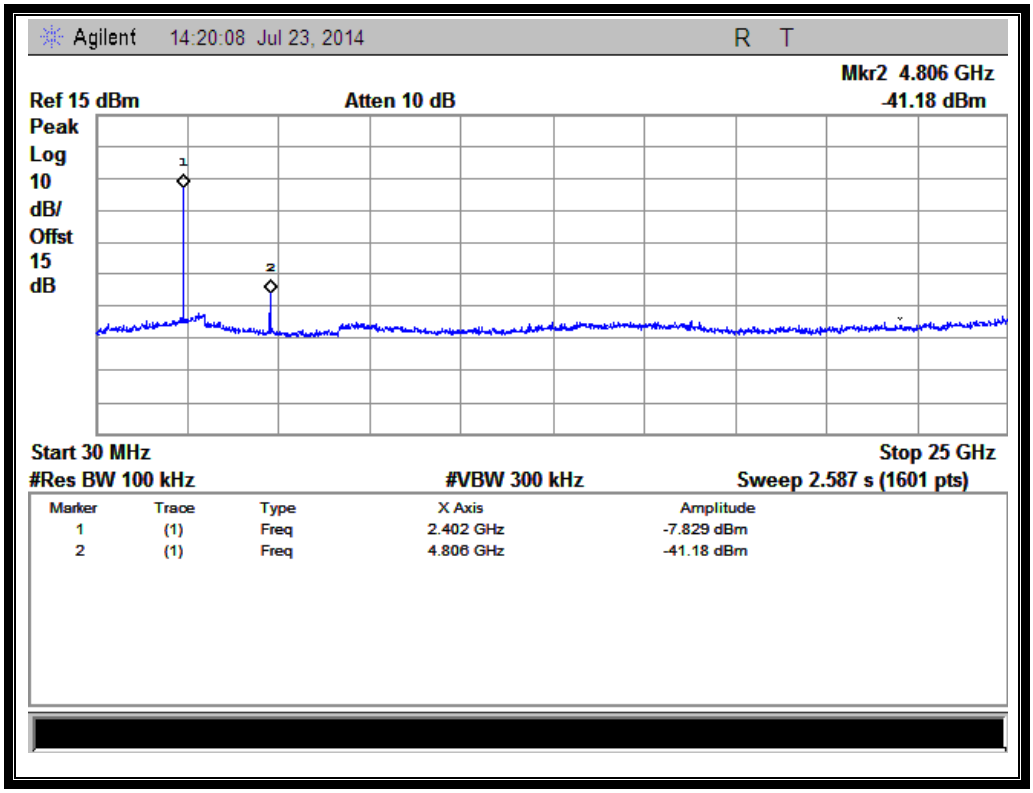
2.7.4.3. 8-DPSK Mode

A. Test Verdict:

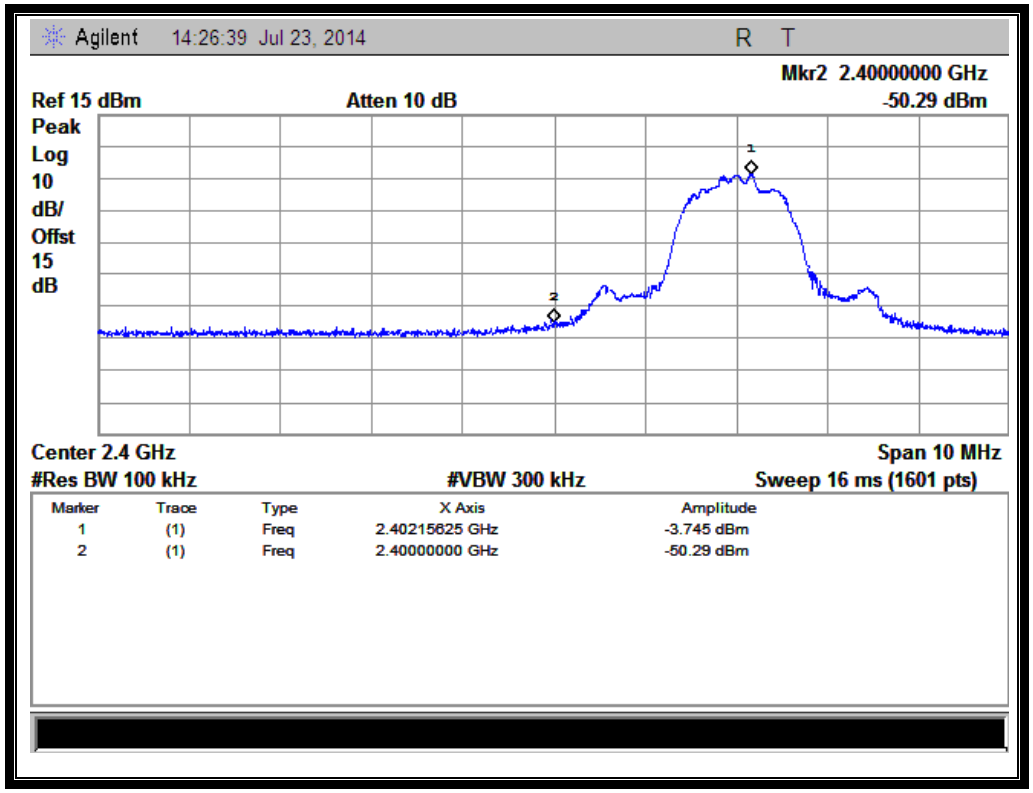
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-41.18	Plot G.1	-7.829	-27.8	PASS
39	2441	-41.92	Plot H.1	-5.862	-25.9	PASS
78	2480	-43.65	Plot I.1	-6.426	-26.4	PASS

B. Test Plots:

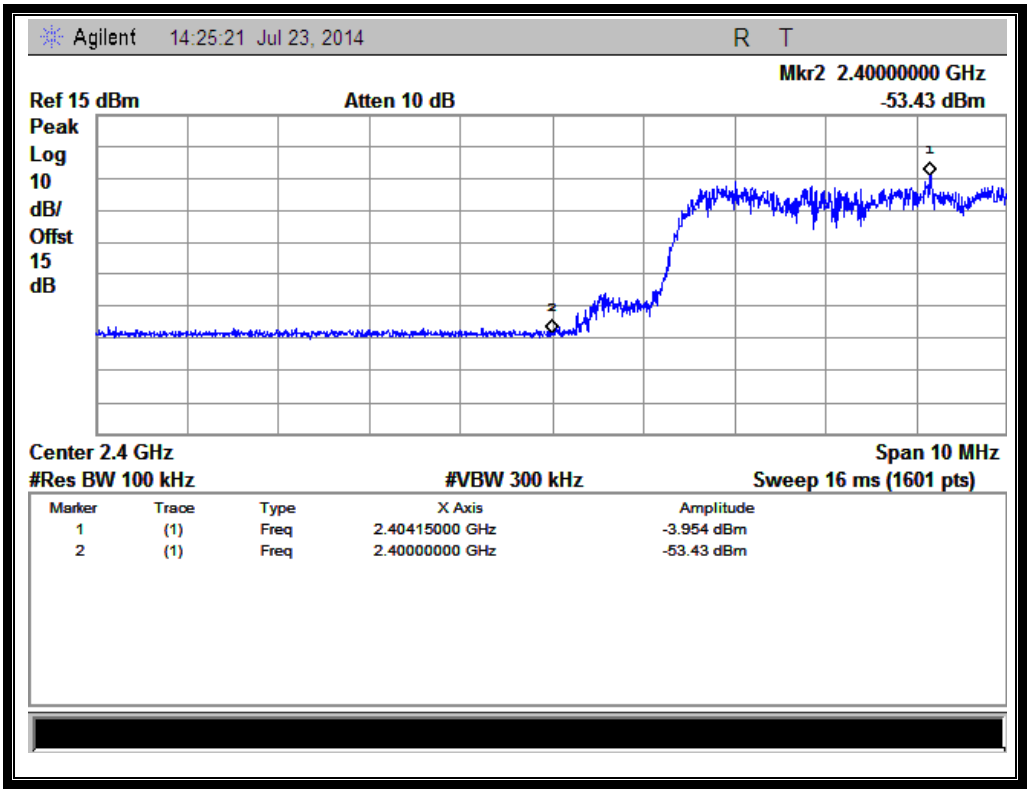
Note: the power of the Module transmitting frequency should be ignored.



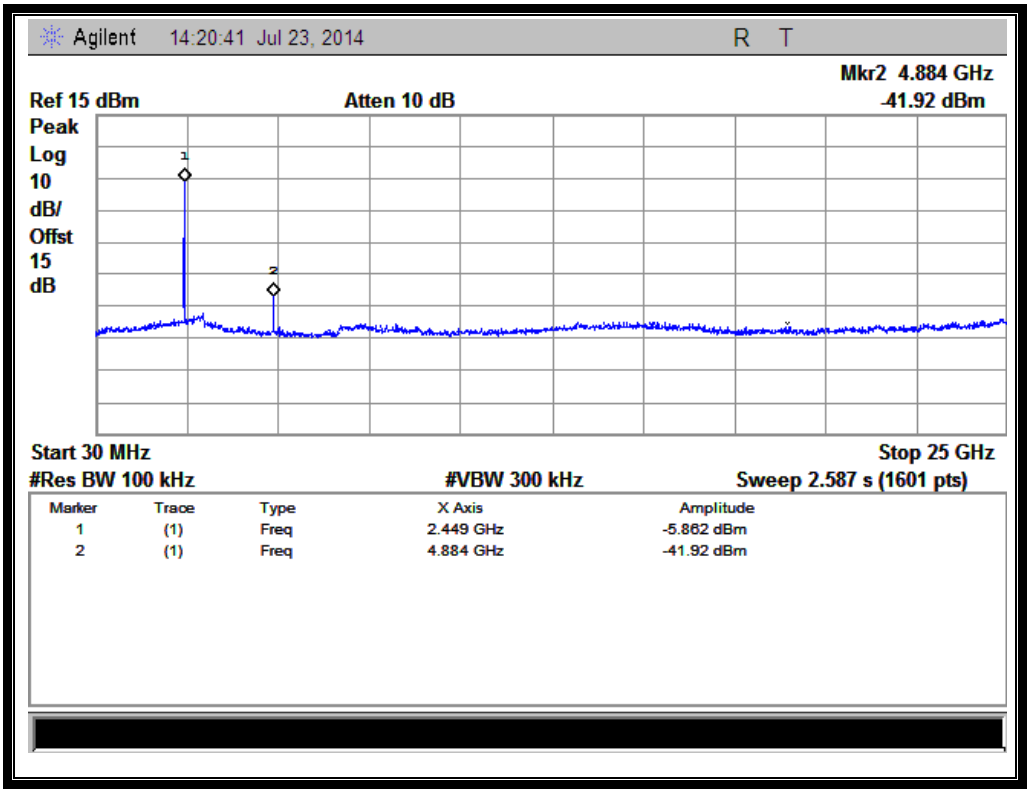
(Plot G.1: Channel = 0, 30MHz to 25GHz @ 8-DPSK)



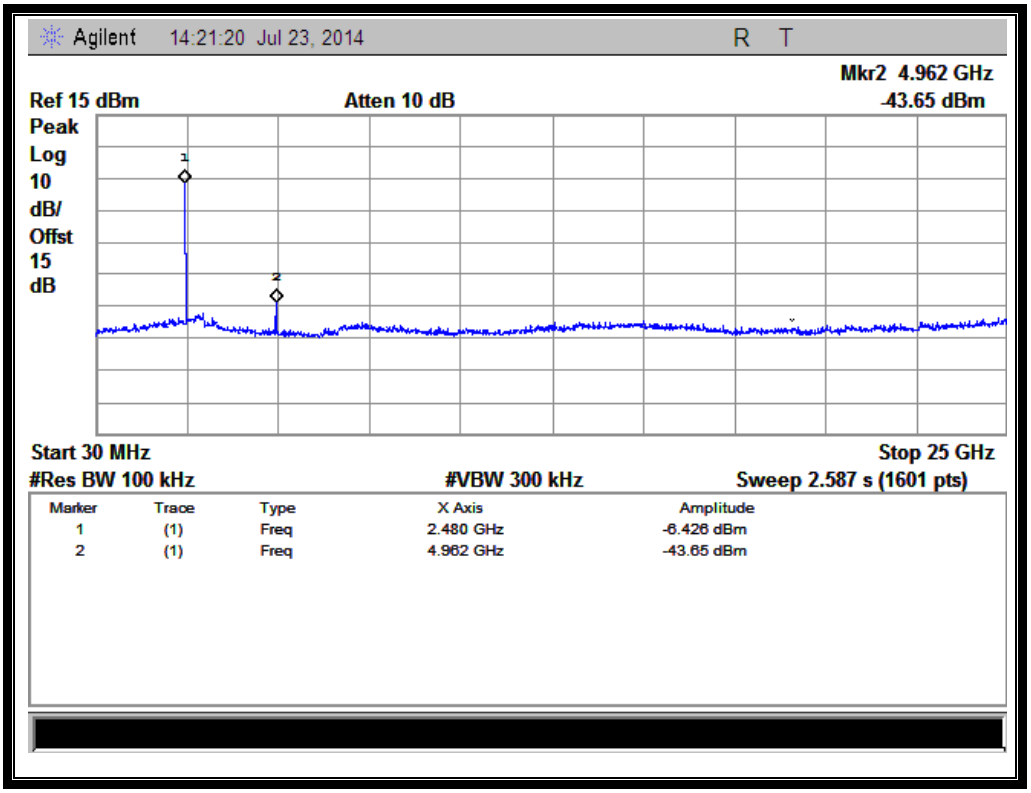
(Channel = 0, Band edge @ 8-DPSK)



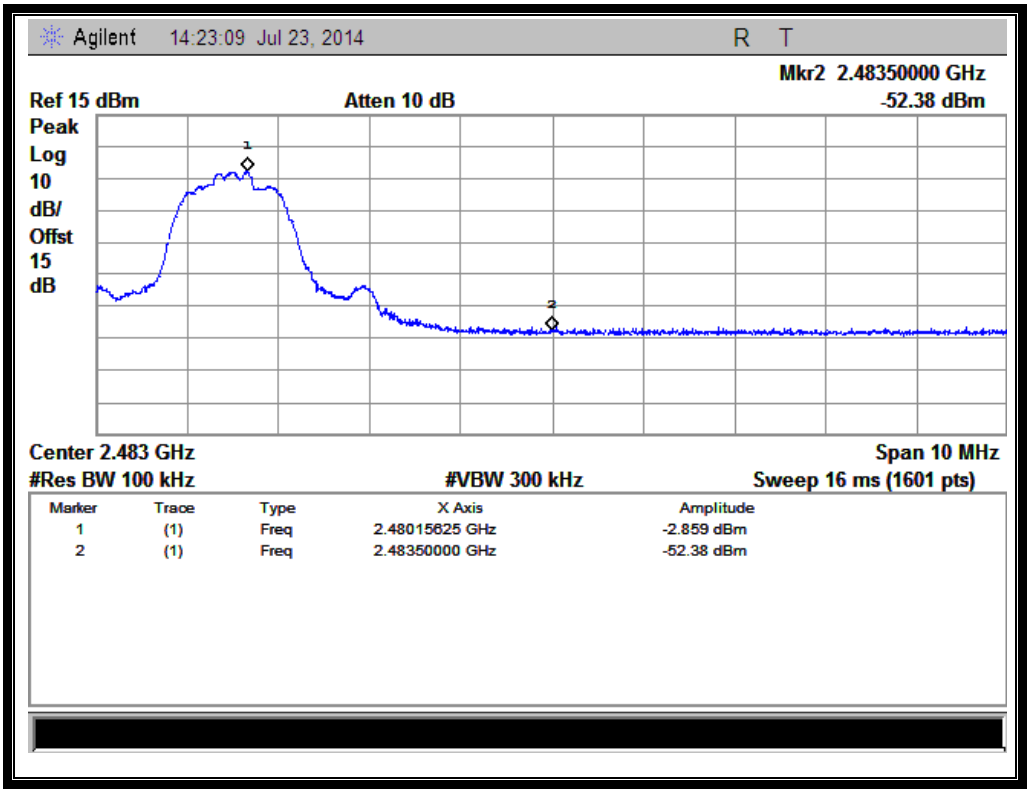
(Channel = 0, Band edge with hopping on @ 8-DPSK)



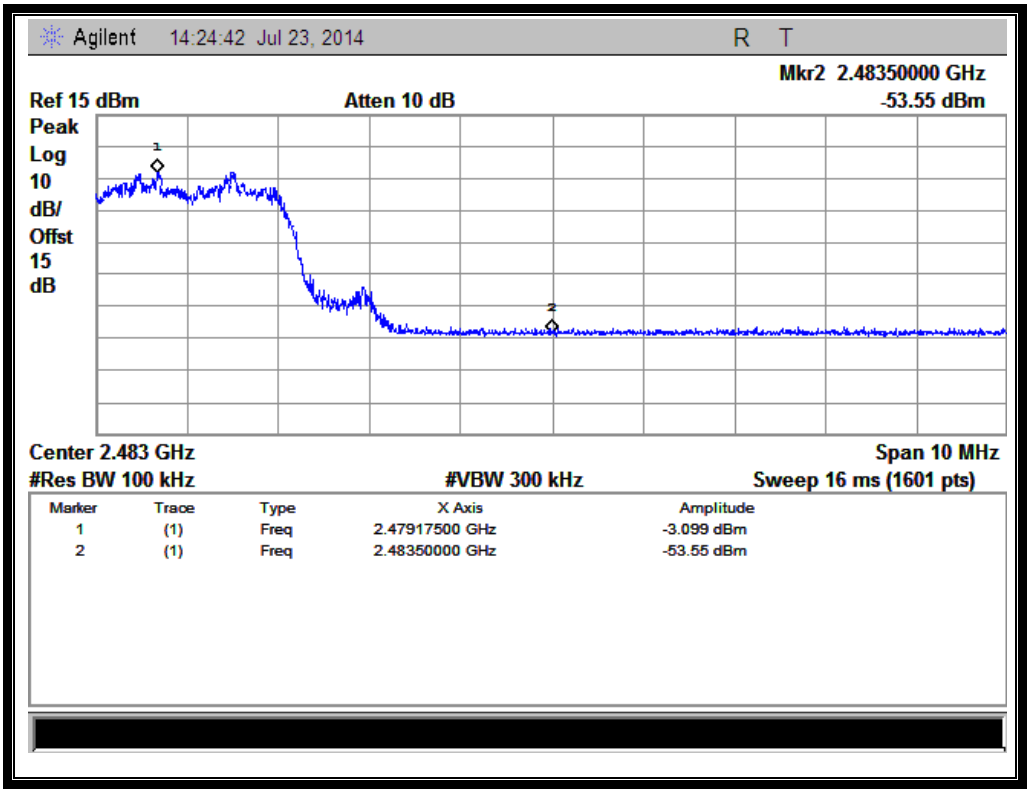
(Plot H.1: Channel = 39, 30MHz to 25GHz @ 8-DPSK)



(Plot I.1:Channel = 78, 30MHz to 25GHz @ 8-DPSK)



(Plot I.1:Channel = 78, Band edge @ 8-DPSK)



(Plot I.1: Channel = 78, Band edge with hopping on @ 8-DPSK)

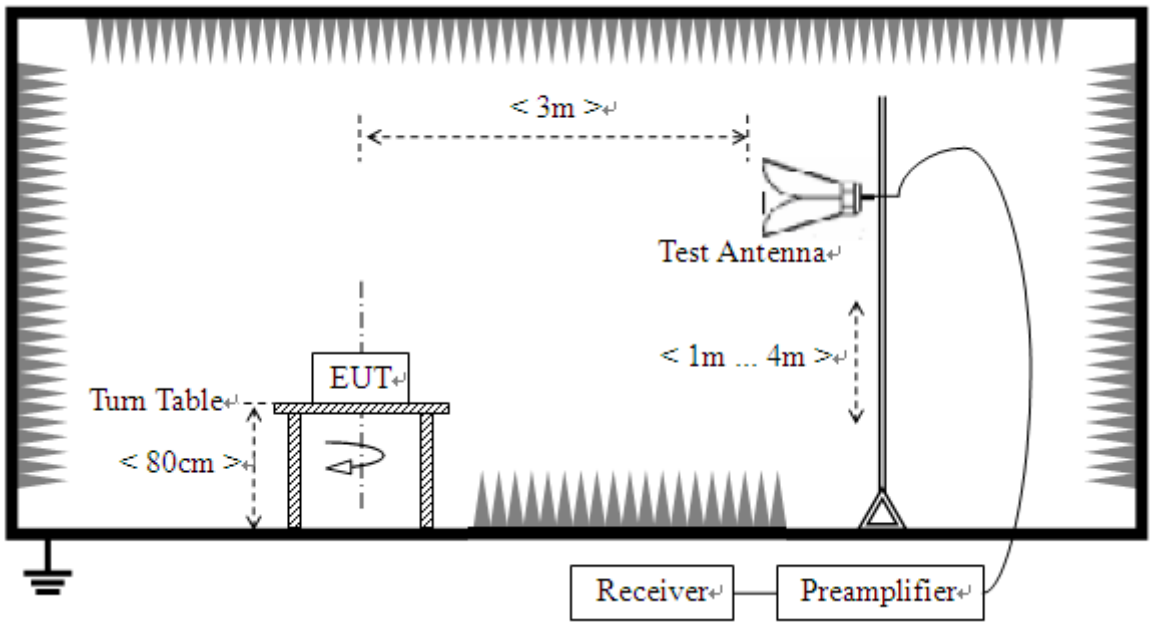
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d) and RSS- A8.5, 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, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

A. Test Setup:



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.
For the Test Antenna:

Horn Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	R&S	CMU200	100448	2014.02.26	2015.02.25
Receiver	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2014.02.26	2015.02.25
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2014.02.26	2015.02.25

2.8.3. Test Procedure

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz, 100 KHz for f < 1GHz
VBW = 3 MHz for peak and 10Hz for average
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize.

2.8.4. Test Result

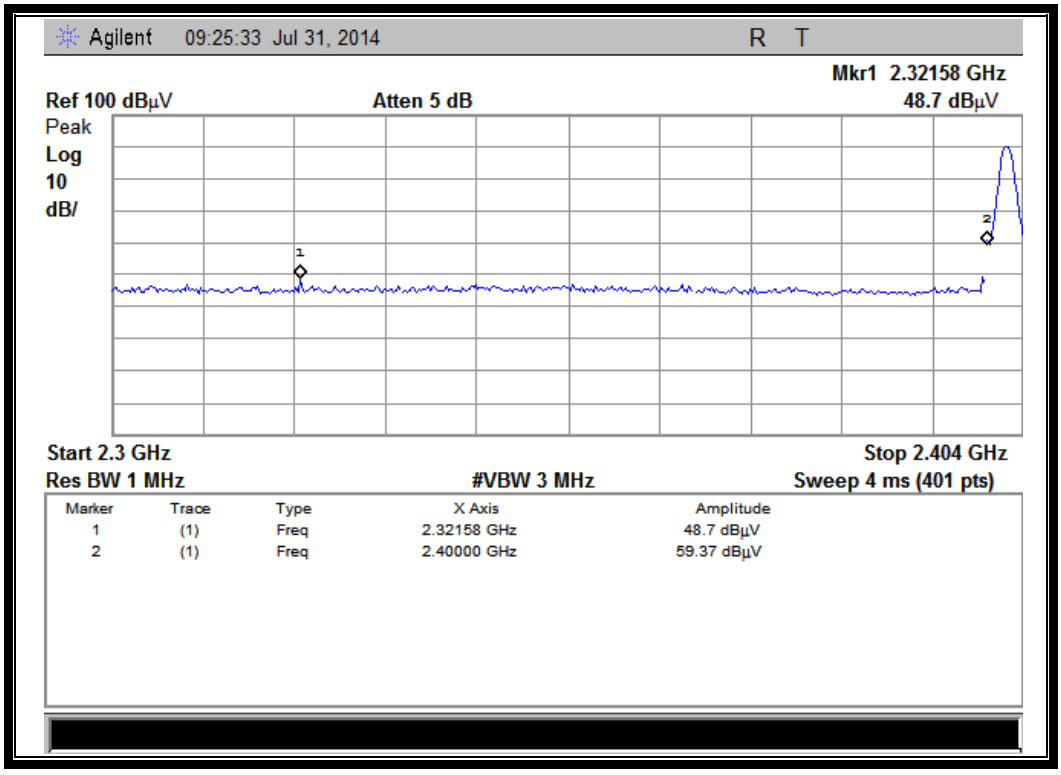
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =UR + AT + AFactor [dB]; AT =LCable loss [dB]-Gpreamp [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain
AFactor: Antenna Factor at 3m
Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

2.8.4.1. GFSK Mode

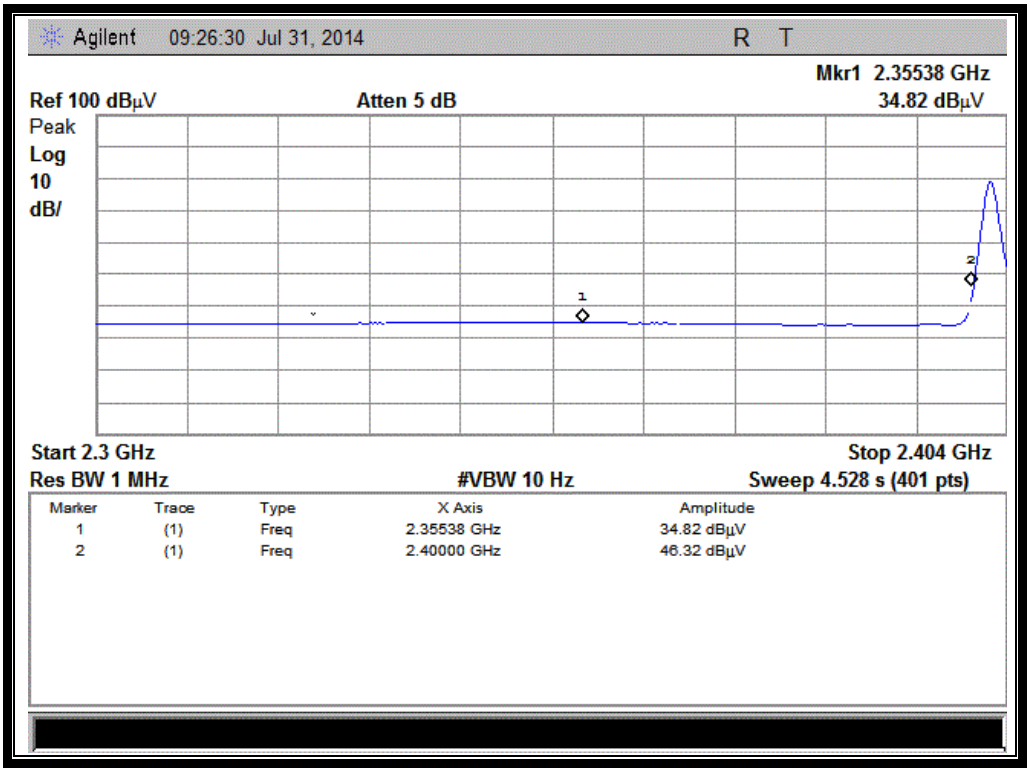
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2321.58	PK	48.70	-30.93	32.56	50.33	74	Pass
0	2355.38	AV	34.82	-30.93	32.56	36.45	54	Pass
78	2480.49	PK	45.55	-29.05	32.50	49.00	74	Pass
78	2483.50	AV	37.37	-29.05	32.50	40.82	54	Pass

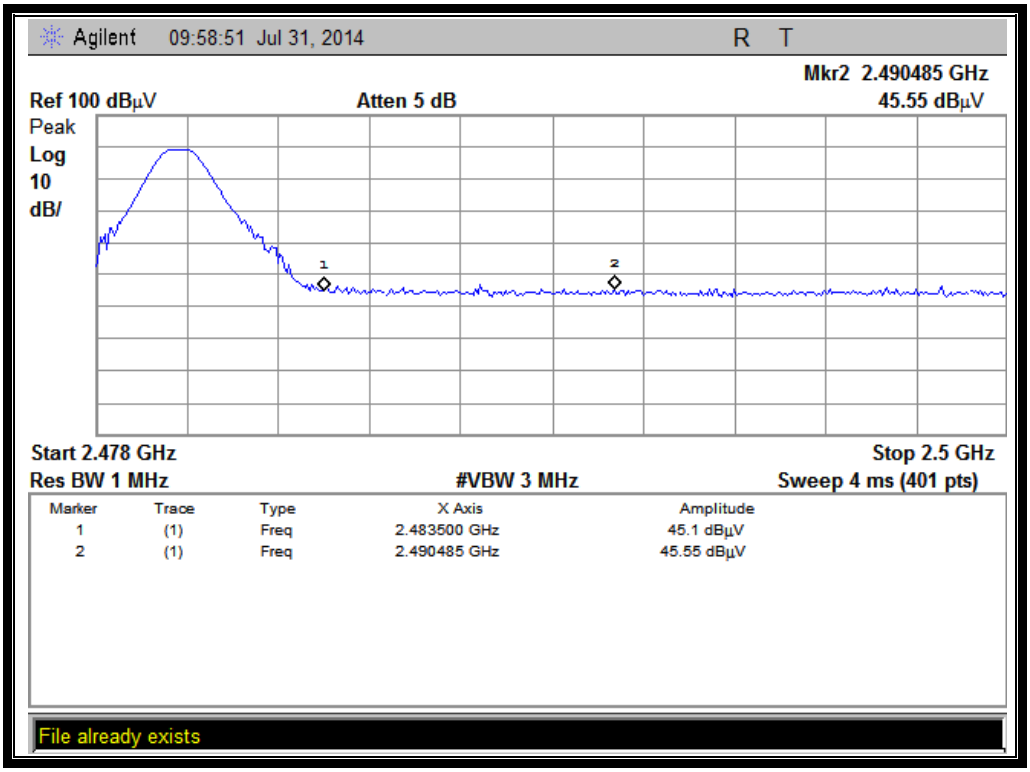
B. Test Plots:



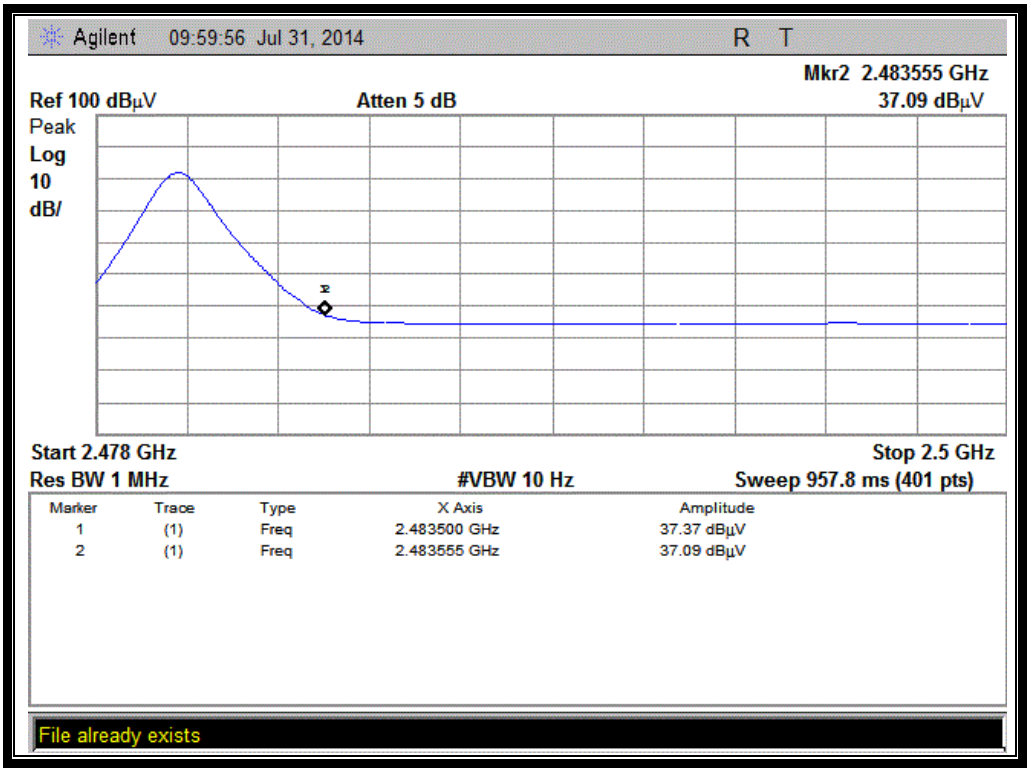
(Plot A1:Channel = 0 PEAK @ GFSK)



(Plot A2:Channel = 0 AVERAGE @ GFSK)



(Plot B1: Channel = 78 PEAK @ GFSK)



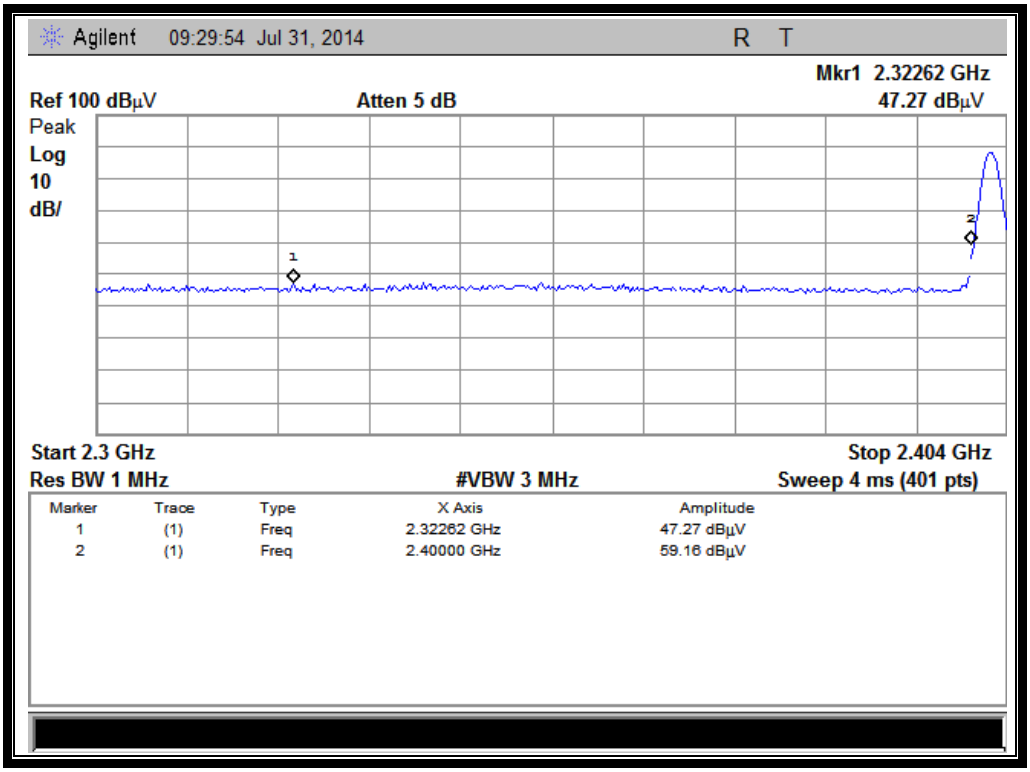
(Plot B2: Channel = 78 AVERAGE @ GFSK)

2.8.4.2. ∏/4-DQPSK Mode

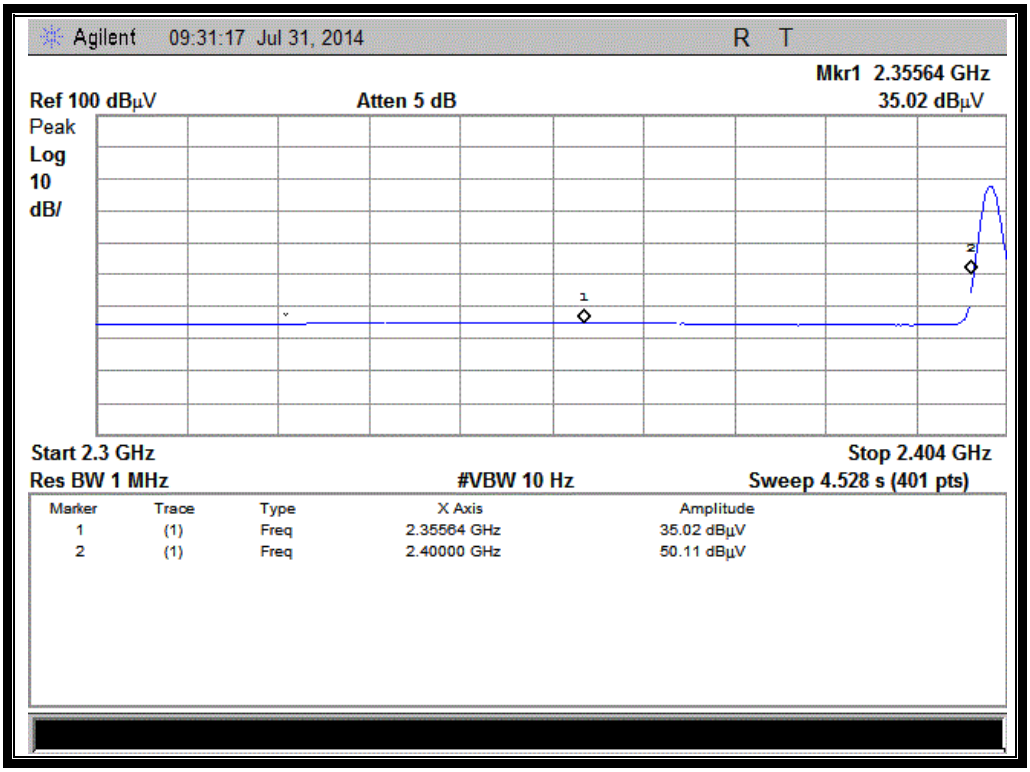
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
0	2322.62	PK	47.27	-30.93	32.56	48.9	74	Pass
0	2355.64	AV	35.02	-30.93	32.56	36.65	54	Pass
78	2498.90	PK	45.85	-29.05	32.50	49.30	74	Pass
78	2483.50	AV	36.77	-29.05	32.50	40.22	54	Pass

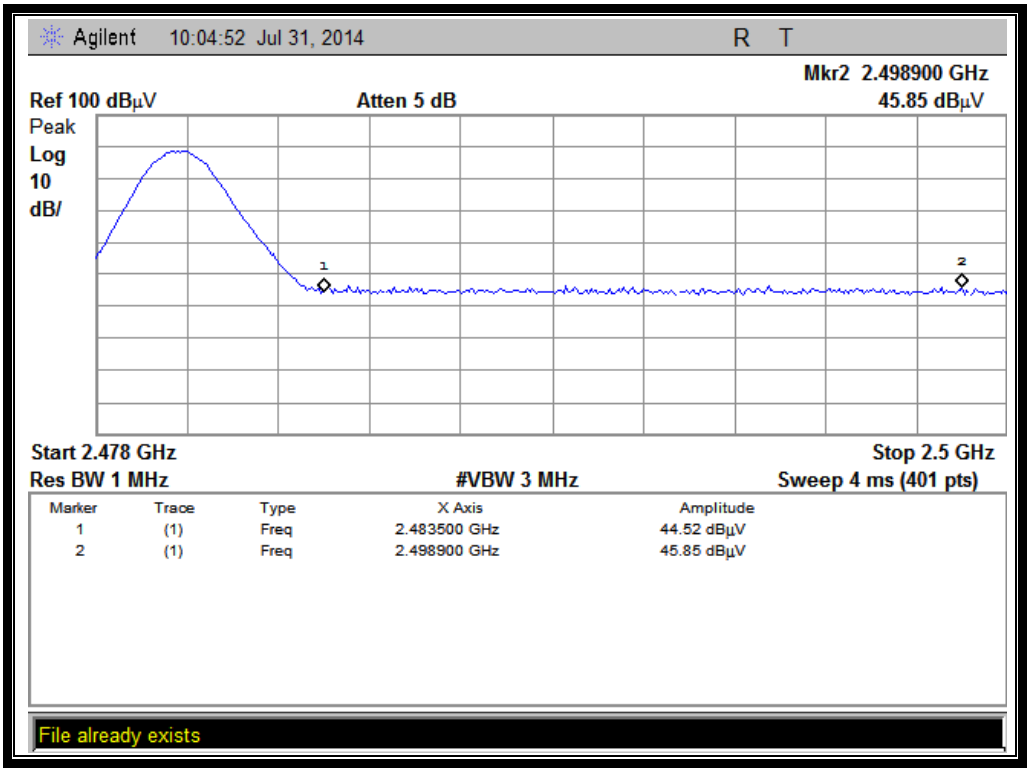
B. Test Plots:



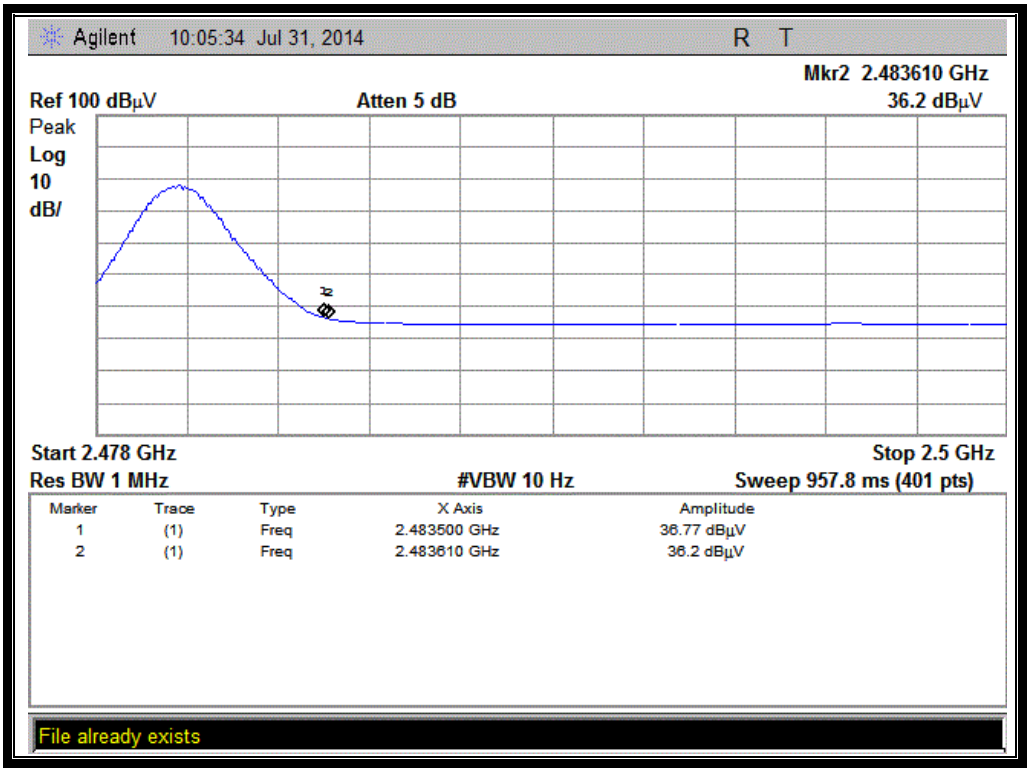
(Plot C1: Channel = 0 PEAK @ ∏/4-DQPSK)



(Plot C2: Channel = 0 AVERAGE @ ∏/4-DQPSK)



(Plot D1: Channel = 78 PEAK @ ∏/4-DQPSK)



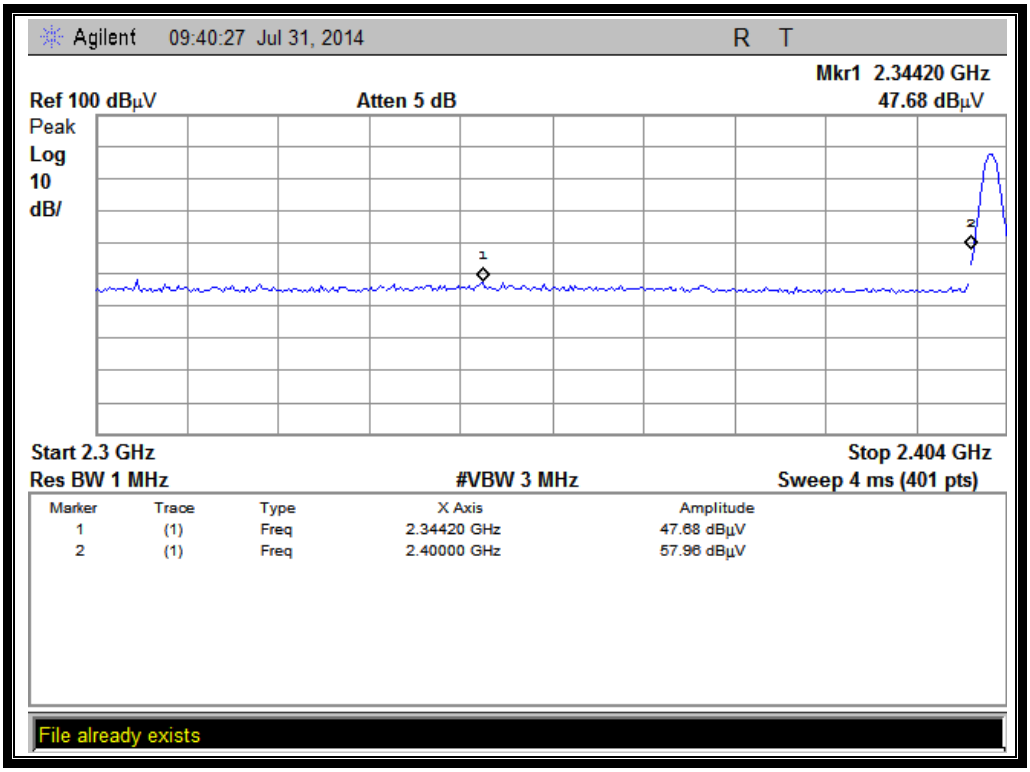
(Plot D2: Channel = 78 AVERAGE@ ∏/4-DQPSK)

2.8.4.3. 8-DPSK Mode

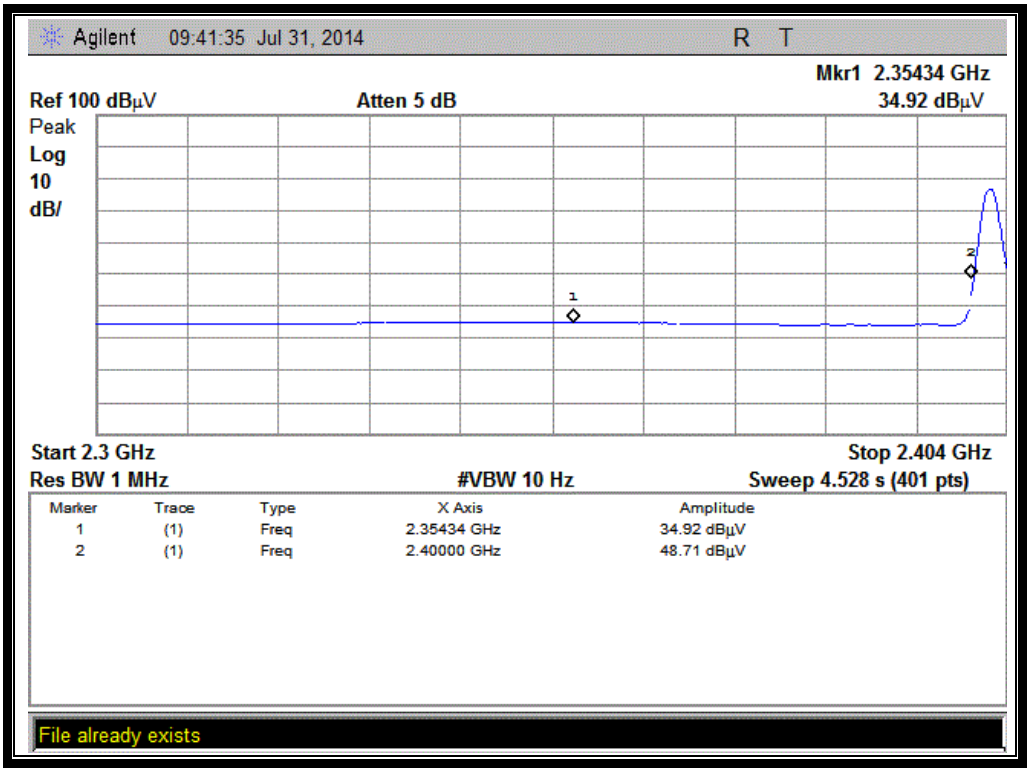
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2344.20	PK	47.68	-30.93	32.56	49.31	74	Pass
0	2354.34	AV	34.92	-30.93	32.56	36.55	54	Pass
78	2494.45	PK	46.89	-29.05	32.50	50.34	74	Pass
78	2483.50	AV	37.13	-29.05	32.50	40.58	54	Pass

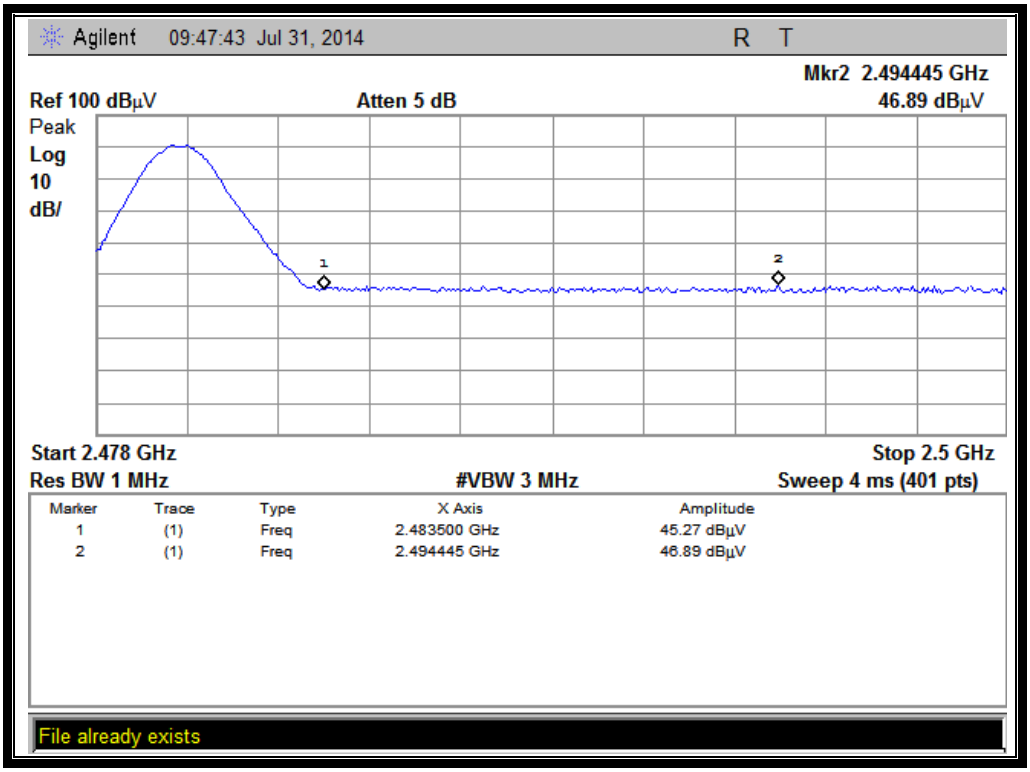
B. Test Plots:



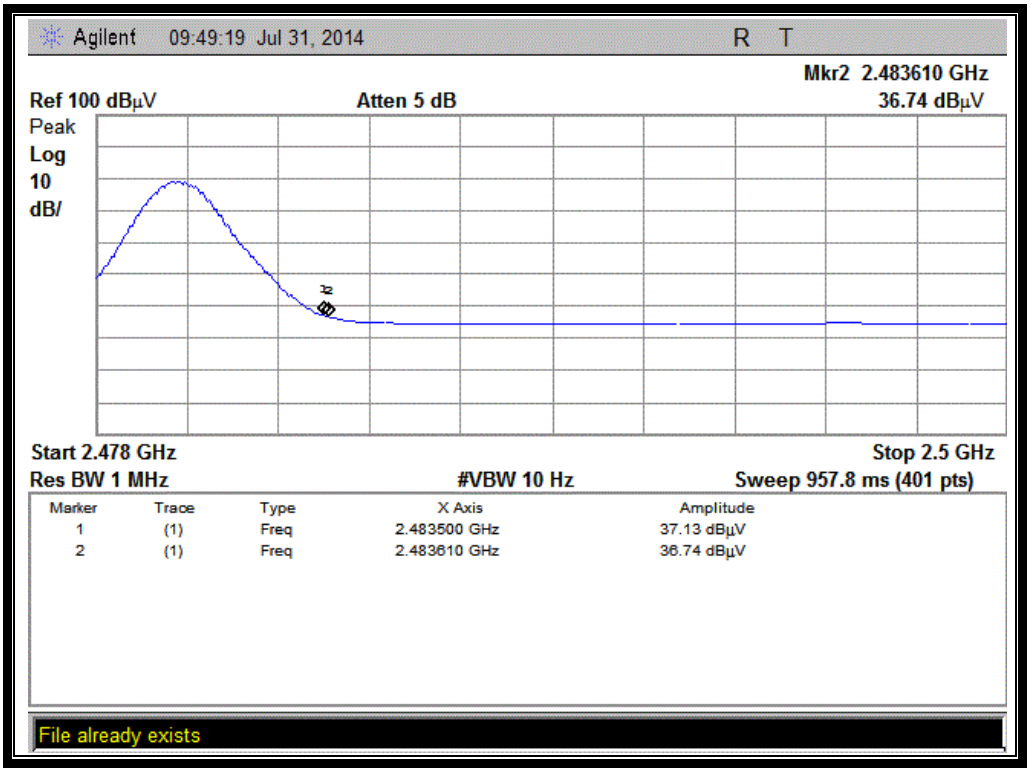
(Plot E1: Channel = 0 PEAK @ 8-DPSK Mode)



(Plot E2: Channel = 0 AVERAGE @ 8-DPSK Mode)



(Plot F1:Channel = 78 PEAK @ 8-DPSK Mode)



(Plot F2:Channel = 78 AVERAGE @ 8-DPSK Mode)

2.9. Conducted Emission

2.9.1. Requirement

According to FCC section 15.207 and RSS-Gen 7.2.4, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

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

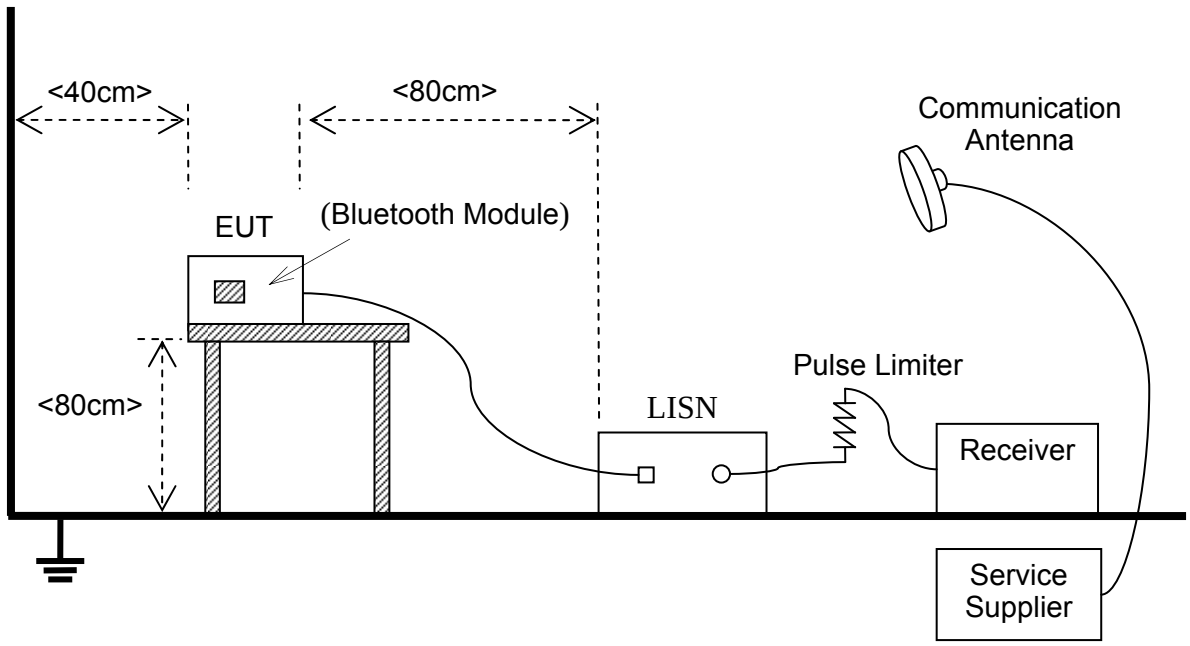
NOTE:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.9.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009

The Bluetooth Module of the EUT is powered by the Battery charged with the AC Adapter which is

powered by 120V, 60Hz AC mains supply. The factors of the site are calibrated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
LISN	Schwarzbeck	NSLK 8127	812744	2014.02.26	2015.02.25
Service Supplier	R&S	CMU200	100448	2014.02.26	2015.02.25
Pulse Limiter (20dB)	Schwarzbeck	VTSD 9561-D	9391	2014.02.26	2015.02.25

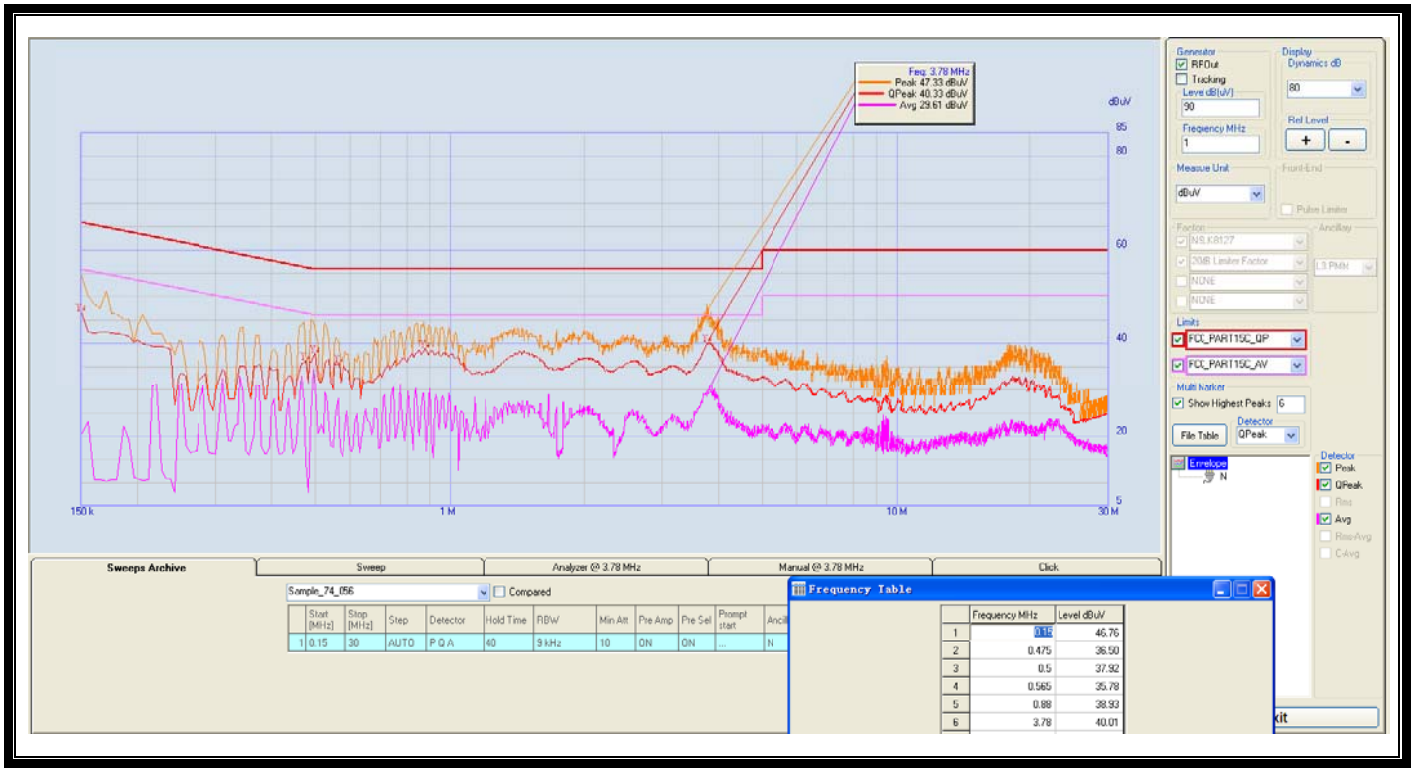
2.9.3. Test Result

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.

A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

B. Test Plots:



(Plot A: L Phase)

(Plot B: N Phase)

2.10. Radiated Emission

2.10.1. Requirement

According to FCC section 15.247(d) and RSS-A8.5, radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

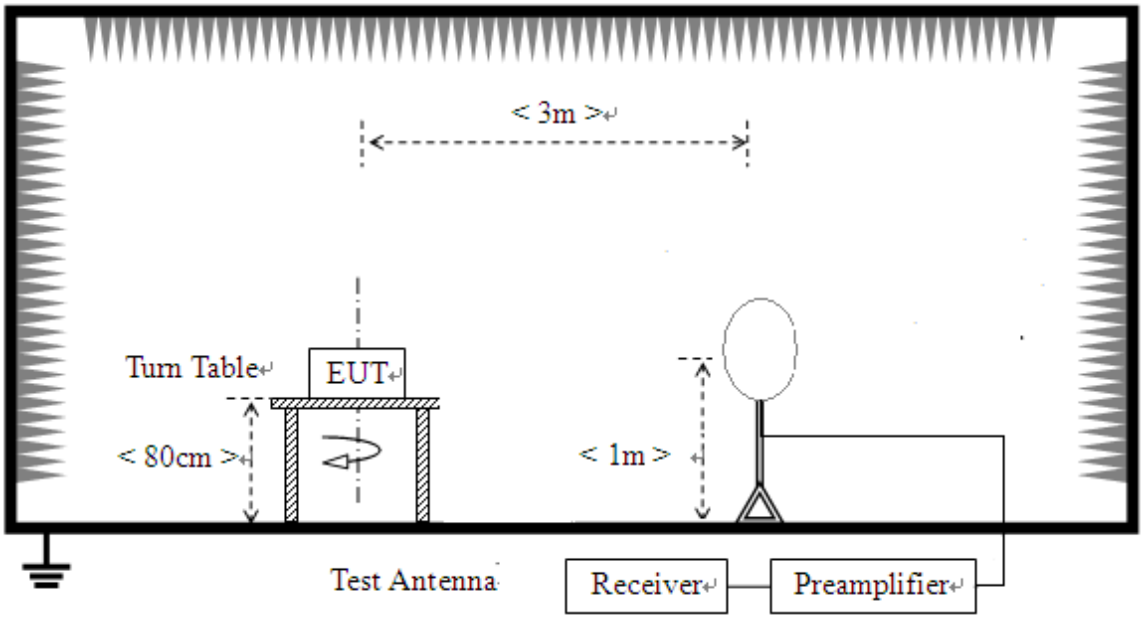
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

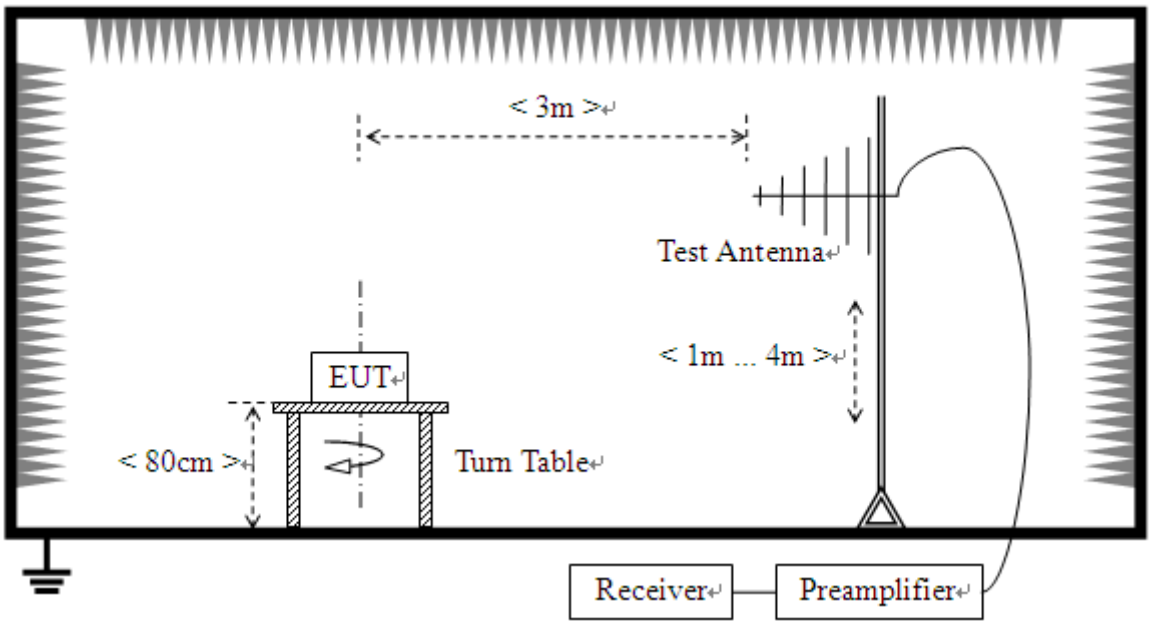
2.10.2. Test Description

A. Test Setup:

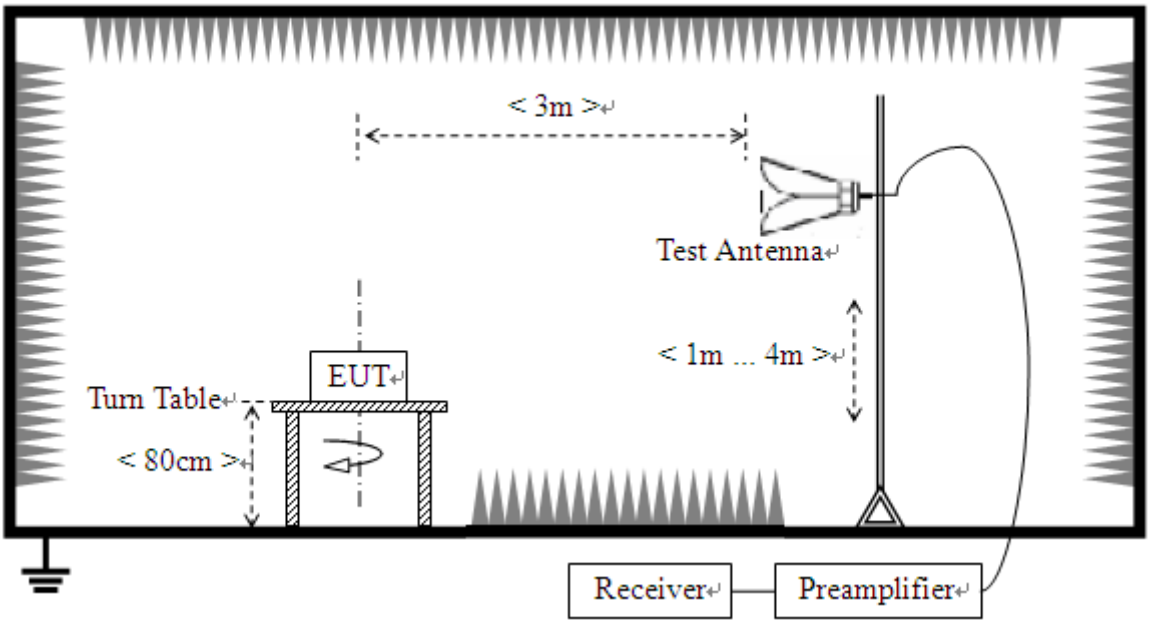
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The Bluetooth Module of the EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Bluetooth Module is activated and controlled by the Bluetooth Service Supplier (SS) via a Common Antenna, and is set to operate under hopping-on test mode transmitting 339 bytes DH5 packages at maximum power.

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 2GHz) and Horn Test Antenna (above 2GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	R&S	CMU200	100448	2014.02.26	2015.02.25
Receiver	Agilent	E7405A	US44210471	2014.02.26	2015.02.25
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2014.02.26	2015.02.25
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-274	2014.02.26	2015.02.25
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2014.02.26	2015.02.25
Test Antenna - Horn	R&S	HL050S7	71688	2014.02.26	2015.02.25
Test Antenna - Loop	Schwarzbeck	FMZB 1519	1519-022	2014.02.26	2015.02.25

2.10.3. Test Procedure

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

2.10.4. Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor AT and A_{Factor} were built in test software.

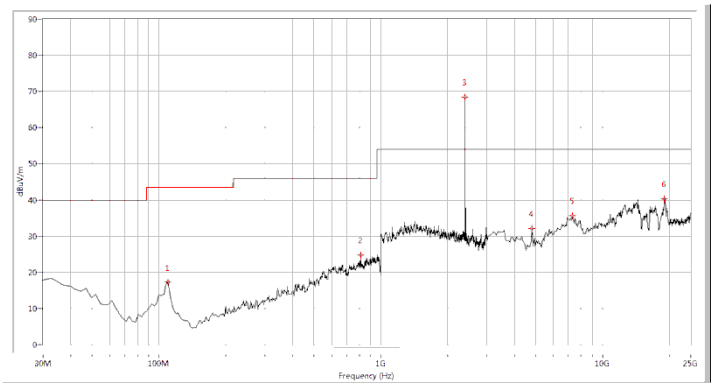
Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

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

2.10.4.1. GFSK Mode

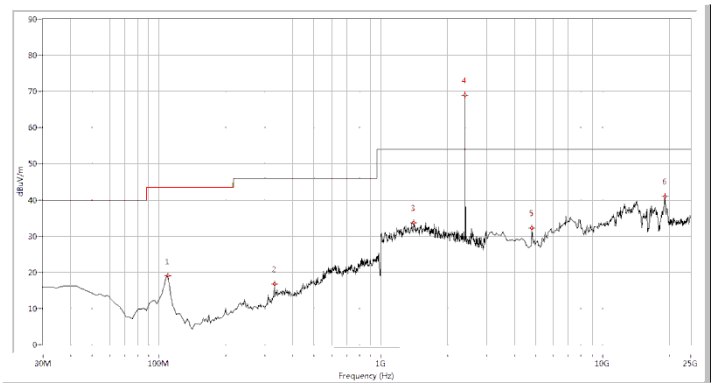
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	17.21	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
811.322	24.72	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2402.000	68.37	N.A	N.A	N.A	N.A	54.0	Horizontal	N.A
4810.474	32.07	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
7334.165	35.68	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
19074.813	40.35	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

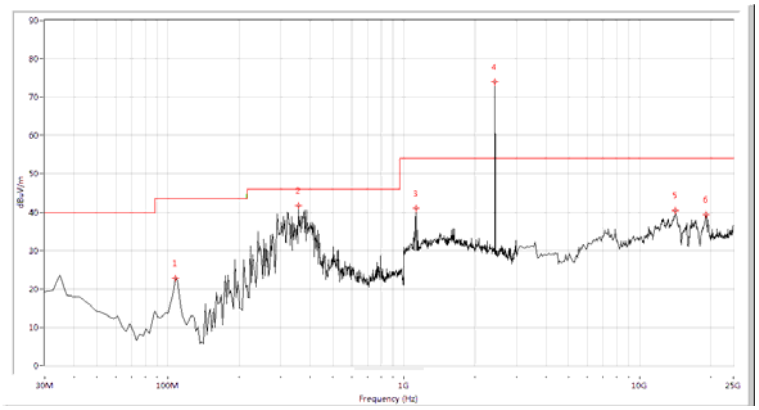
(Plot A.1: 30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	19.09	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
332.369	16.76	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1408.978	33.60	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2402.000	68.99	N.A	N.A	N.A	N.A	54.0	Vertical	N.A
4810.474	32.25	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
19129.676	40.96	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

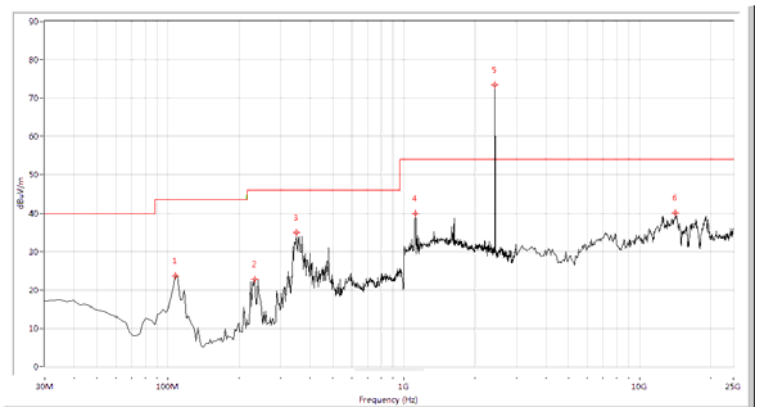
(Plot A.2: 30MHz to 25GHz, Antenna Vertical @ GFSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
107.406	22.77	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
356.559	41.78	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1124.688	41.01	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2441.000	73.94	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
14192.020	40.53	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
19129.676	39.44	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

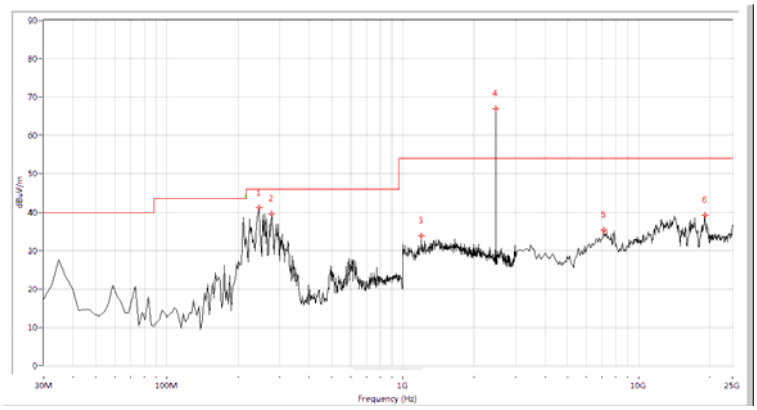
(Plot B.1: 30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
107.406	23.72	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
233.192	22.90	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
349.302	34.95	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1119.701	39.89	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2441.000	73.44	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
14137.157	40.12	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

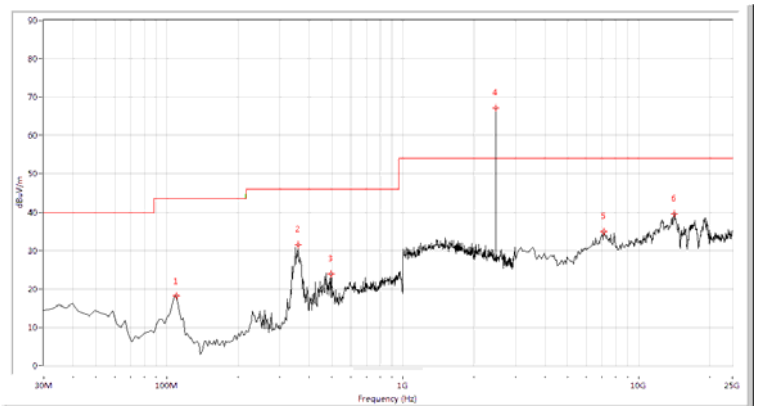
(Plot B.2: 30MHz to 25GHz, Antenna Vertical @ GFSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
245.287	41.16	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
276.733	39.48	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1199.501	33.79	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2480.000	67.06	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
7114.713	35.34	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
19129.676	39.28	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Plot C.1: 30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 78)



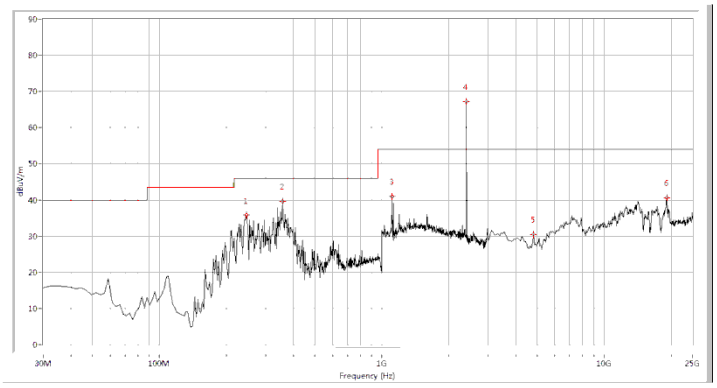
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	18.14	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
358.978	31.58	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
494.439	23.95	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2480.0000	67.14	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
7114.713	34.93	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
14192.020	39.54	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Plot C.2: 30MHz to 25GHz, Antenna Vertical @ GFSK, channel 78)

2.10.4.2. ∏/4-DQPSK Mode

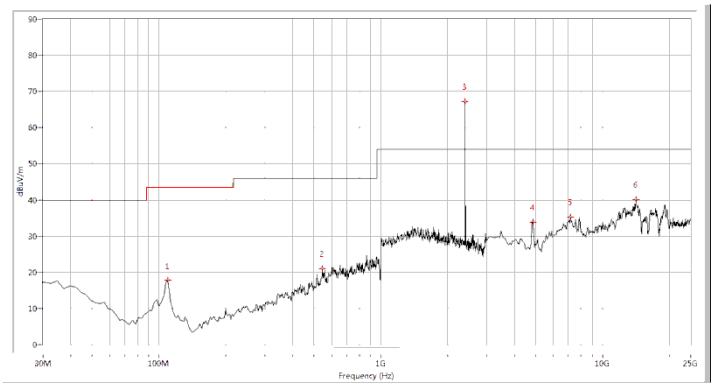
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
245.287	35.91	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
356.559	39.52	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1109.726	40.95	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2402.000	67.26	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
4810.474	30.51	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
19129.676	40.69	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

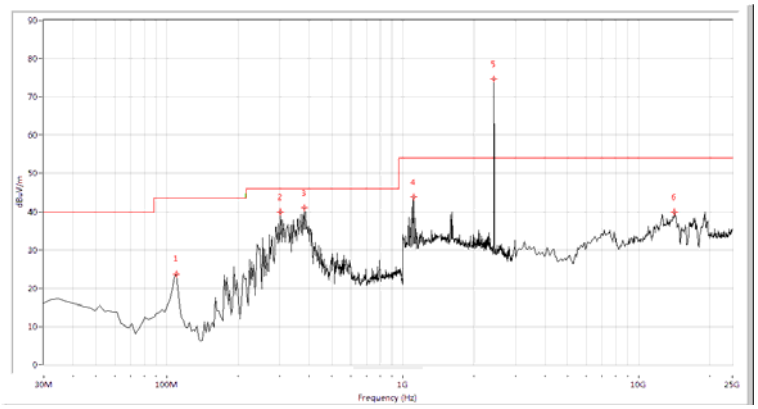
(Plot A.1: 30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	17.77	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
545.237	20.96	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2402.000	67.14	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
4865.337	33.91	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
7169.576	35.34	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
14137.157	40.03	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

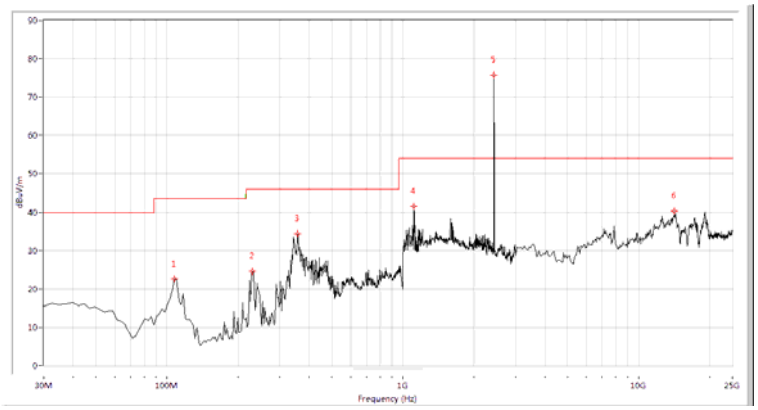
(Plot A.2: 30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	23.75	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
303.342	39.84	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
383.167	40.98	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1109.726	43.76	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2441.000	74.61	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
14192.020	39.91	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

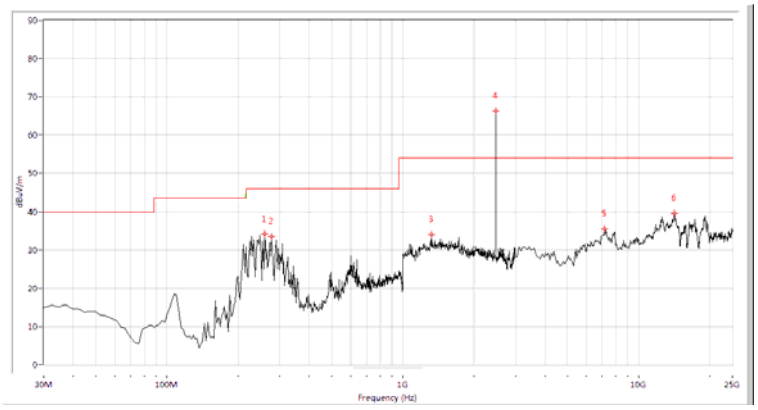
(Plot B.1: 30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
107.406	22.62	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
230.773	24.63	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
356.559	34.48	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1114.713	41.45	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2441.000	75.83	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
14192.020	40.33	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

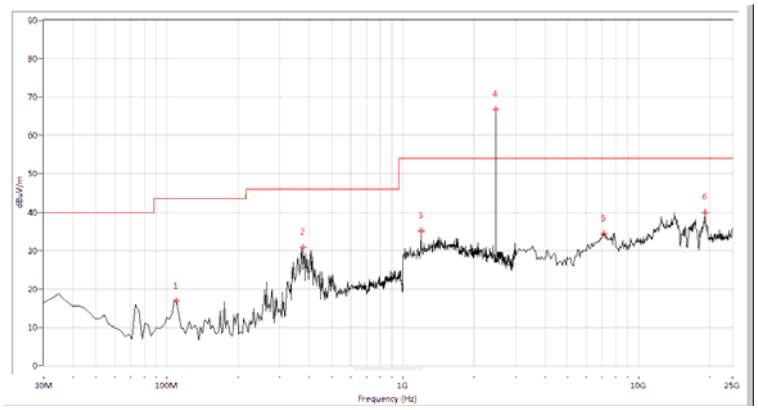
(Plot B.2: 30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
259.800	34.21	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
276.733	33.47	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1319.202	34.01	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2480.000	66.34	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
7169.576	35.44	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
14192.020	39.53	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Plot C.1: 30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 78)



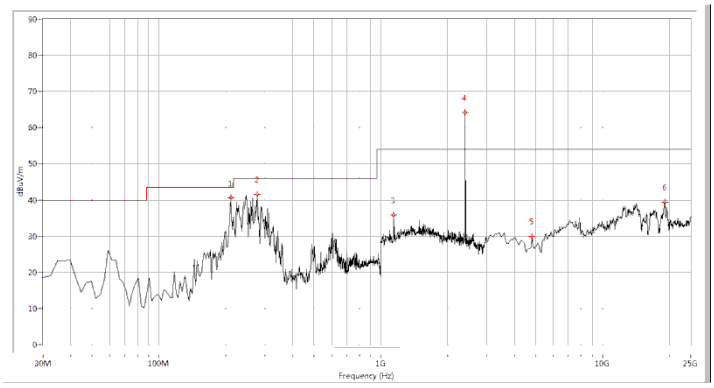
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	16.92	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
375.910	30.89	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1194.514	35.13	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2480.000	66.79	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
7114.713	34.38	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
19184.539	39.88	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Plot C.2: 30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 78)

2.10.4.3. 8-DPSK Mode

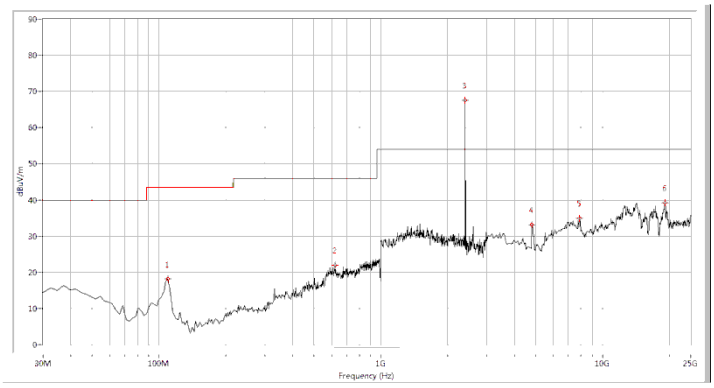
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
211.421	40.67	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
276.733	41.54	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1144.638	35.77	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2402.000	64.09	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
4810.474	30.00	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
19129.676	39.35	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

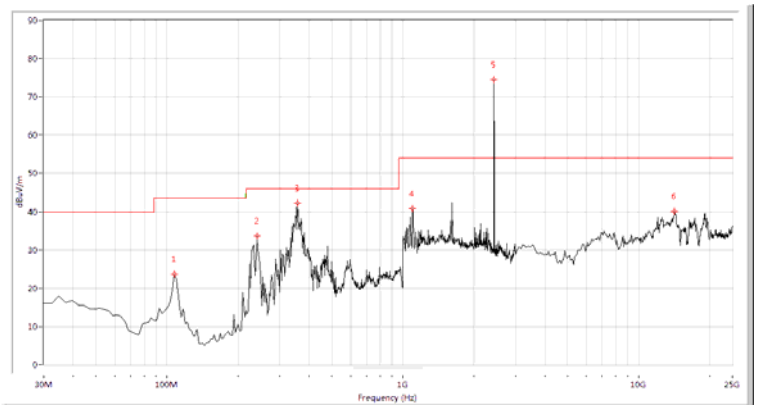
(Plot A.1: 30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	18.16	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
622.643	21.86	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2402.000	67.55	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
4810.474	33.08	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
7882.793	34.95	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
19129.676	39.23	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

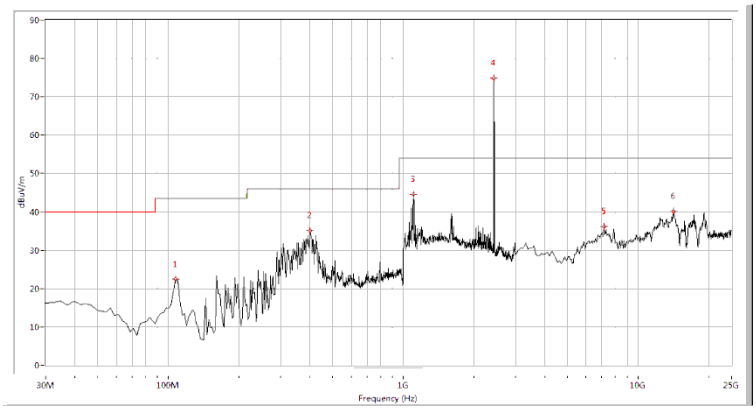
(Plot A.2: 30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
107.406	23.74	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
240.449	33.66	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
356.559	42.16	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1099.751	40.77	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2441.000	74.48	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
14192.020	40.16	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

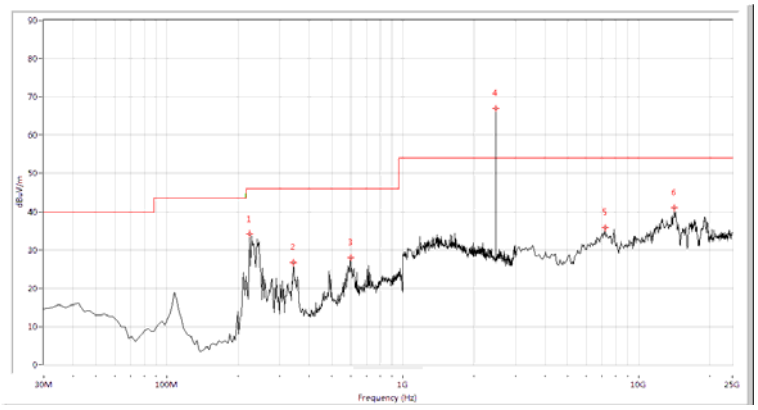
(Plot B.1: 30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
107.406	22.52	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
400.100	35.09	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1104.738	44.57	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2441.000	74.92	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
7169.576	36.20	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
14137.157	40.17	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

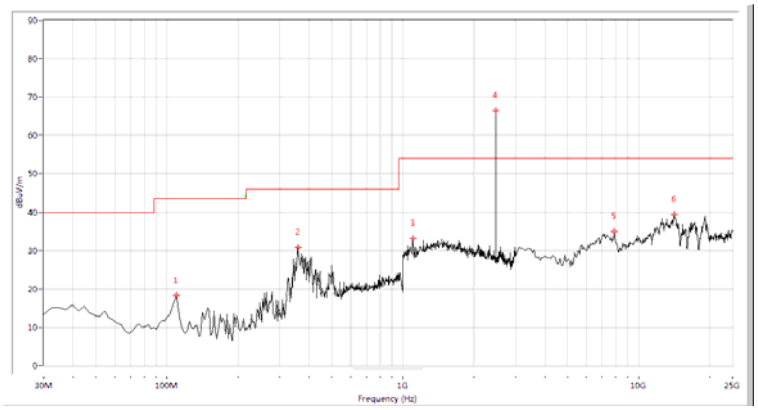
(Plot B.2: 30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
223.516	34.16	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
344.464	26.66	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
600.873	27.98	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2480.000	67.05	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
7224.439	35.74	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
14192.020	41.05	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(Plot C.1: 30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 78)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
109.825	18.37	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
358.978	30.84	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1104.738	33.17	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2480.000	66.52	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
7882.793	34.86	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
14137.157	39.33	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(Plot C.2: 30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 78)

2.11. RF exposure evaluation

According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy lever in excess of Commission's guideline.

According to 447498 D01 General RF Exposure Guidance v05, exclusion threshold values at selected frequencies and distances table as following.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

MHz	30	35	40	45	50	mm
150	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

Routine SAR evaluation refers to the specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evolution is not required, the portable transmitters with output power greater than the applicable low threshold SAR evolution to qualify for TCB approval.

Result:

This is portable device and the Max conducted peak output power is 0.103dBm,which is lower than the exclusion threshold 10mW(10dBm), at frequency 2450MHz, and distance is 5mm.

The SAR measurement is not required.

** END OF REPORT **