REPORT No. : SZ14070140W01

FCC RF TEST REPORT

APPLICANT	:	Homewerks Worldwide, LLC
PRODUCT NAME	:	Bluetooth speaker bath fan
MODEL NAME	:	7130-02-BT
TRADE NAME	:	N/A
BRAND NAME	:	Home Netwerks
FCC ID	:	SYJHOMEWERKS2
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2014-10-20

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

MORLAB GROUP FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555 Http://www.morlab.com Fax: 86-755-36698525 E-mail: service@morlab.cn

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	2014-10-20	First edition

Test Report Declaration

Applicant	Homewerks Worldwide, LLC
Applicant Address	500 Bond Street | Lincolnshire, IL 60069
Manufacturer	ZHONGSHAN AIRZONE VENTILATED TECHNOLOGY CO.,LTD
Manufacturer Address	The fifth donghai road ,dongfeng town, zhongshan city, Guangdong,China
Product Name	Bluetooth speaker bath fan
Model Name	7130-02-BT
Brand Name	Home Netwerks
HW Version	APB8202V2P
SW Version	N/A
Test Standards	47 CFR Part 15 Subpart C
Test Date	2014-09-29 to 2014-10-20
Test Result	PASS

Tested by : Nie Quan
Nie Quan

Reviewed by : Qiu Xiaojun
Qiu Xiaojun

Approved by : Zeng Dexin
Zeng Dexin

1. Technical Information

Note： Provide by applicant.

1.1. Applicant Information

Company：	Homewerks Worldwide, LLC
Address：	500 Bond Street	Lincolns hire, IL 60069

1.2. Equipment under Test (EUT) Description

Brand Name:	Home Netwerks
Trade Name:	N/A
Model Name:	7130-02-BT
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))
Bluetooth Version:	2.1+EDR
Antenna Type:	PCB Antenna
Antenna Gain：	1.0dBi

NOTE:

The EUT is Bluetooth speaker bath fan, 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).
For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.2.1. Identification of all used EUTs

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
A01	APB8202V2P	N/A

1.3. 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 ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-13 Edition)	Radio Frequency Devices

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

No.	Section in CFR 47	Description	Result
1	15.203	Antenna Requirement	**PASS**
2	15.247(a)	Number of Hopping Frequency	**PASS**
3	15.247(b)	Peak Output Power	**PASS**
4	15.247(a)	20dB Bandwidth	**PASS**
5	15.247(a)	Carrier Frequency Separation	**PASS**
6	15.247(a)	Time of Occupancy (Dwell time)	**PASS**
7	15.247(d)	Conducted Spurious Emission	**PASS**
8	15.247(d)	Restricted Frequency Bands	**PASS**
9	15.207	Conducted Emission	**PASS**
10	15.209 15.247(d)	Radiated Emission	**PASS**
11	15.247(i),1.1307& 2.1091	RF exposure evaluation	**PASS**

NOTE: The tests were performed according to the method of measurements prescribed in DA-00-705, ANSI C63.4-2003 and ANSI C63.10-2009.

1.3.1. 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.

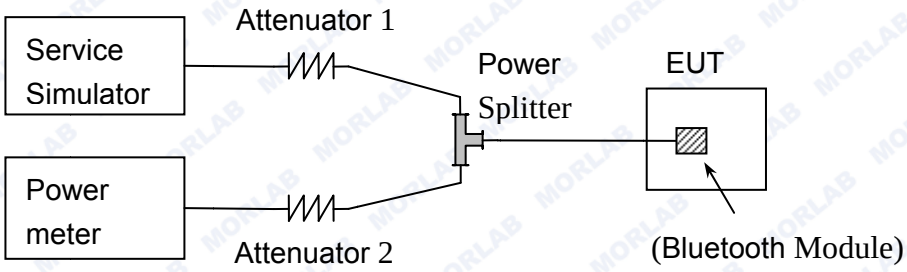
2.2. Number of Hopping Frequency

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 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:

Please reference ANNEX A(1.4).

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

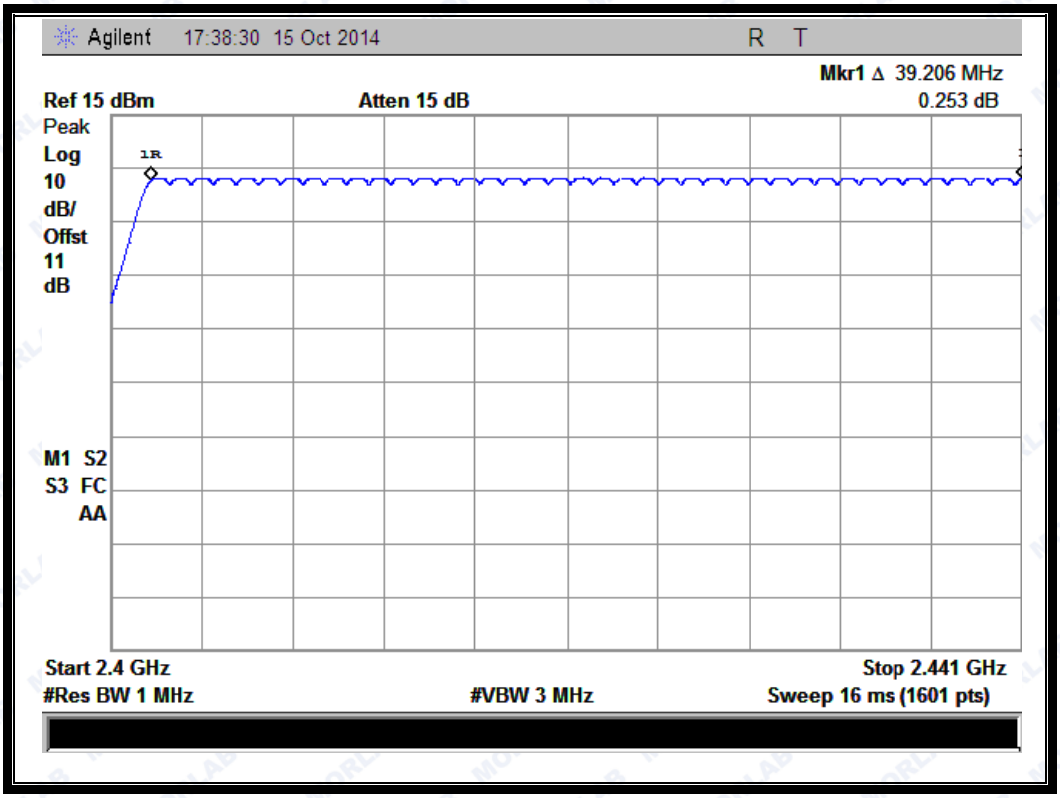
2.2.4. Test Result

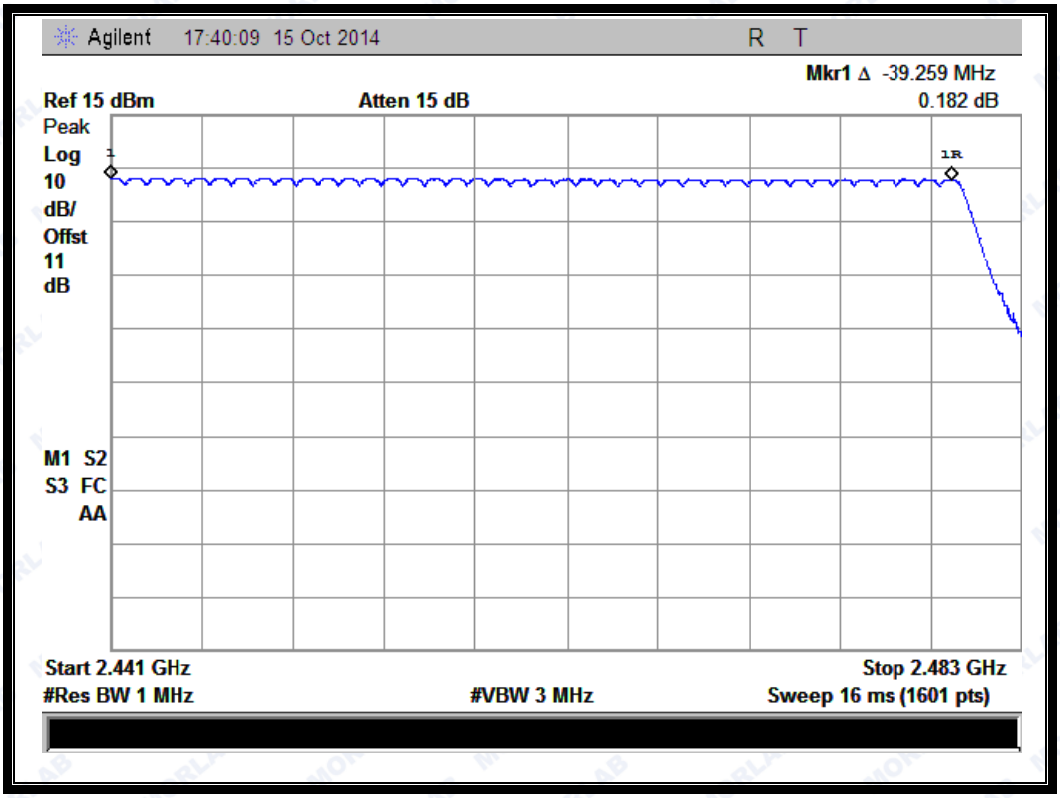
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

A. Test Verdict:

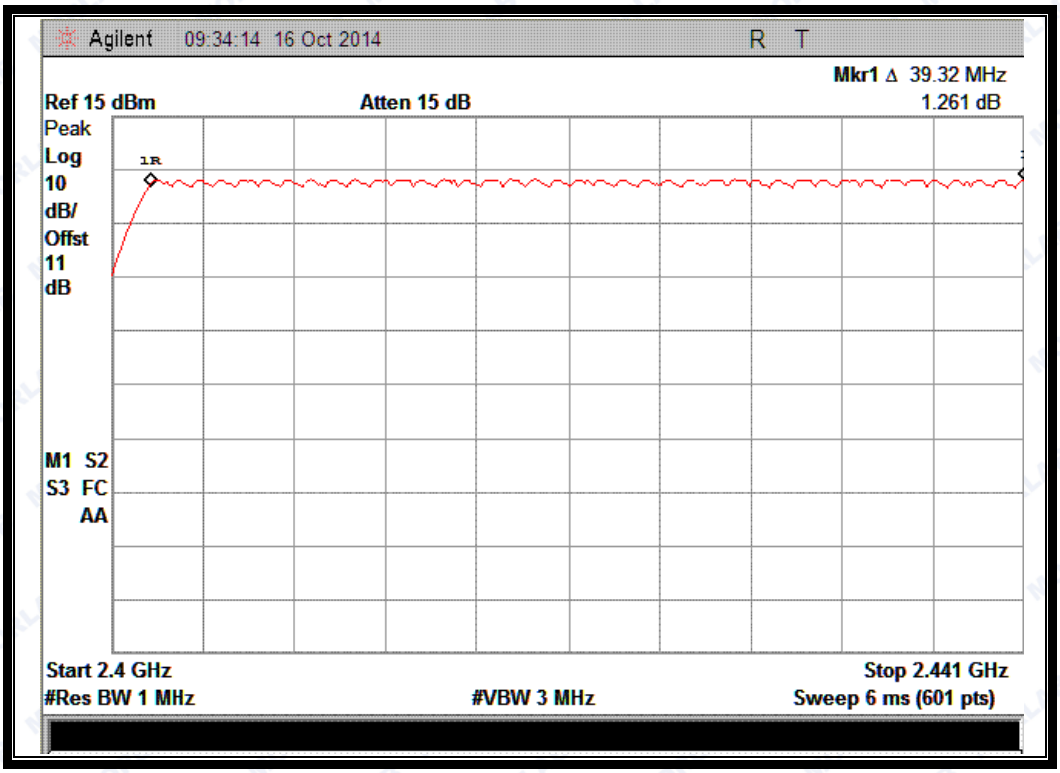
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	15	Plot A	PASS
∏/4-DQPSK	2400 - 2483.5	79	15	Plot B	PASS
8-DPSK	2400 - 2483.5	79	15	Plot C	PASS

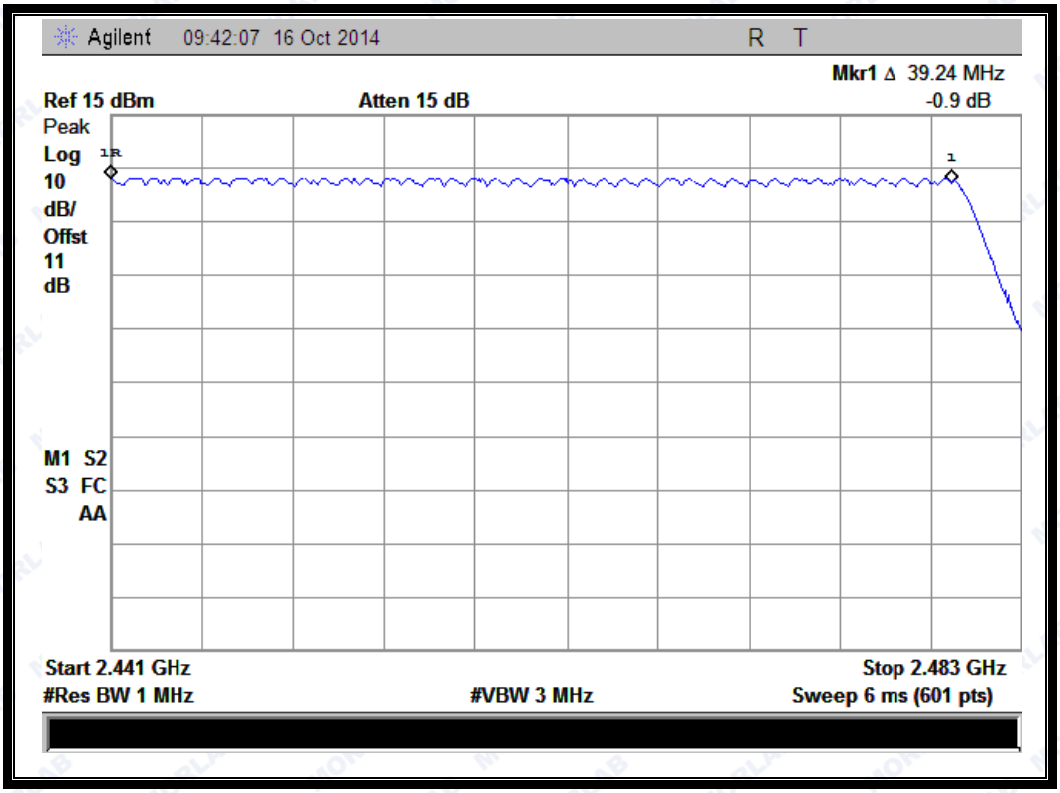
B. Test Plots:



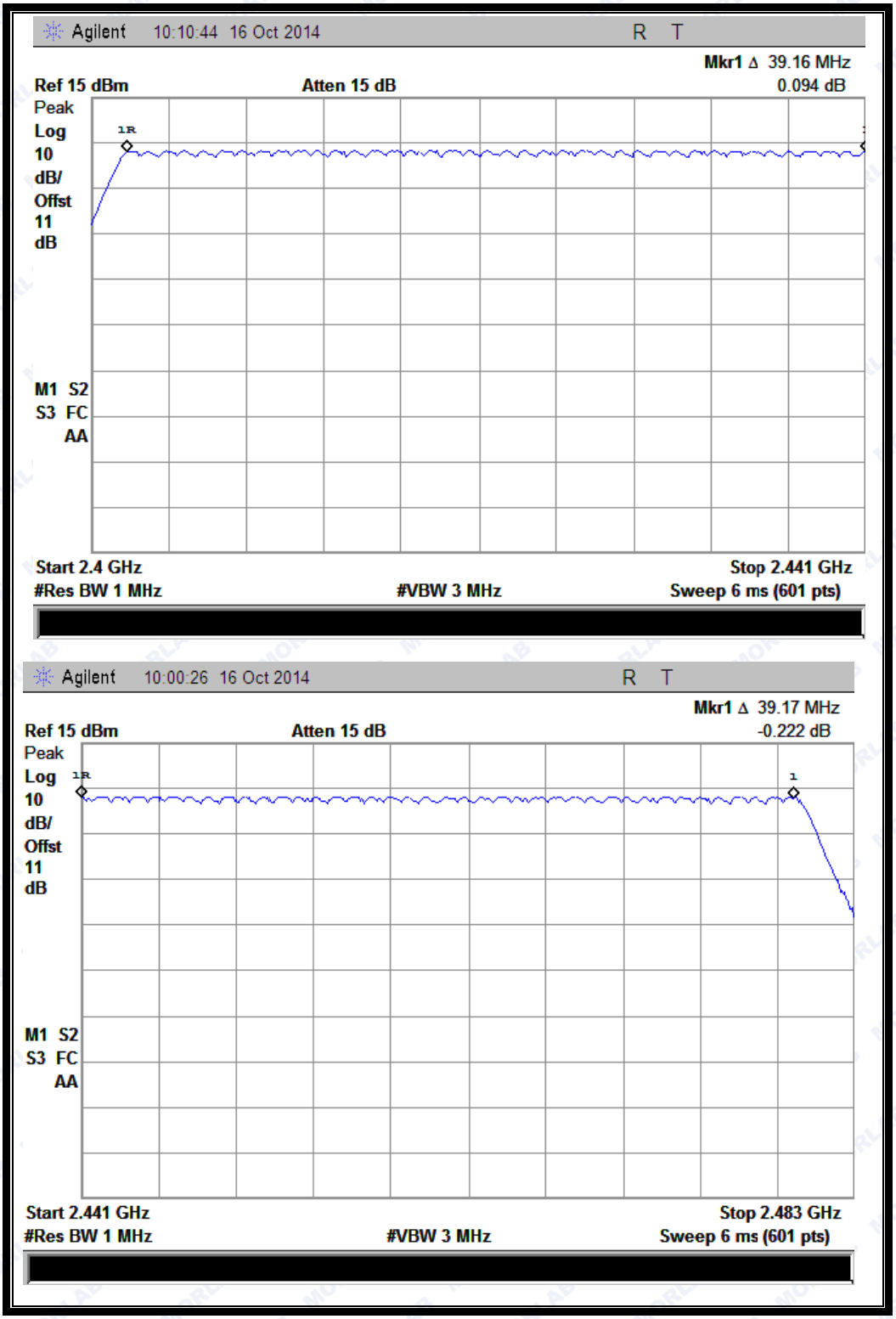

Agilent 17:40:09 15 Oct 2014
R T
Mkr1 Δ -39.259 MHz
0.182 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
M1 S2
S3 FC
AA
Start 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.483 GHz
Sweep 16 ms (1601 pts)

(Plot A: GFSK)


Agilent 09:34:14 16 Oct 2014
R T
Mkr1 Δ 39.32 MHz
1.261 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.441 GHz
Sweep 6 ms (601 pts)



(Plot B: ∏/4-DQPSK)


Agilent 10:10:44 16 Oct 2014
R T
Mkr1 Δ 39.16 MHz
0.094 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.441 GHz
Sweep 6 ms (601 pts)
Agilent 10:00:26 16 Oct 2014
R T
Mkr1 Δ 39.17 MHz
-0.222 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
1
M1 S2
S3 FC
AA
Start 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2.483 GHz
Sweep 6 ms (601 pts)

(Plot C: 8- DPSK)

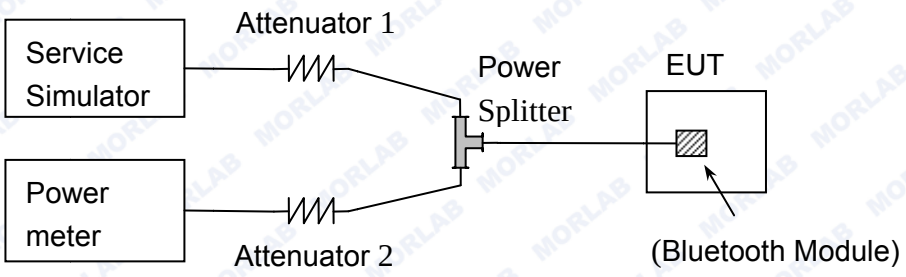
2.3. Peak Output Power

2.3.1. Requirement

According to FCC §15.247(b)(1), 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 s hall not e xceed 1W att. For all other freq uency hop ping sy stems in the 2400MHz to 2483.5MHz band, it is 0.125Watts.

2.3.2. Test Description

A. Test Setup:



The Bluet ooth Modul e of the E UT is cou pled to the Power m eter and the Bluetoot h Service Simulator (SS) with Attenuators through t he 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:

Please reference ANNEX A(1.4).

2.3.3. Test Result

The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perfor m testing t o verify the conducted RF output peak power of th e 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	2.746	0.001882	20.97	0.125	PASS
39	2441	2.728	0.001874			PASS
78	2480	2.643	0.001840			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	2.989	0.001990	20.97	0.125	PASS
39	2441	2.902	0.001951			PASS
78	2480	2.705	0.001860			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	2.869	0.001936	20.97	0.125	PASS
39	2441	2.983	0.001987			PASS
78	2480	2.873	0.001940			PASS

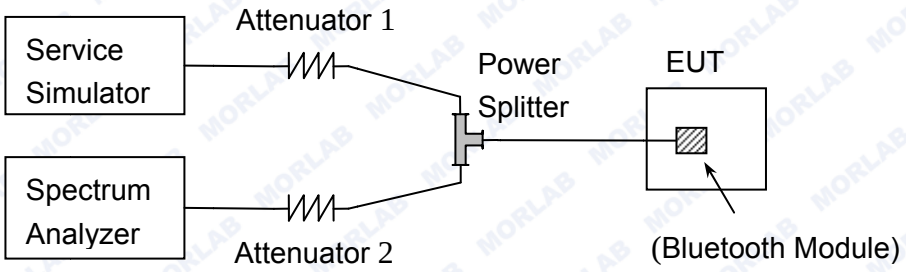
2.4. 20dB Bandwidth

2.4.1. Definition

According to FCC §15.247(a)(1), 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 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:

Please reference ANNEX A(1.4).

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

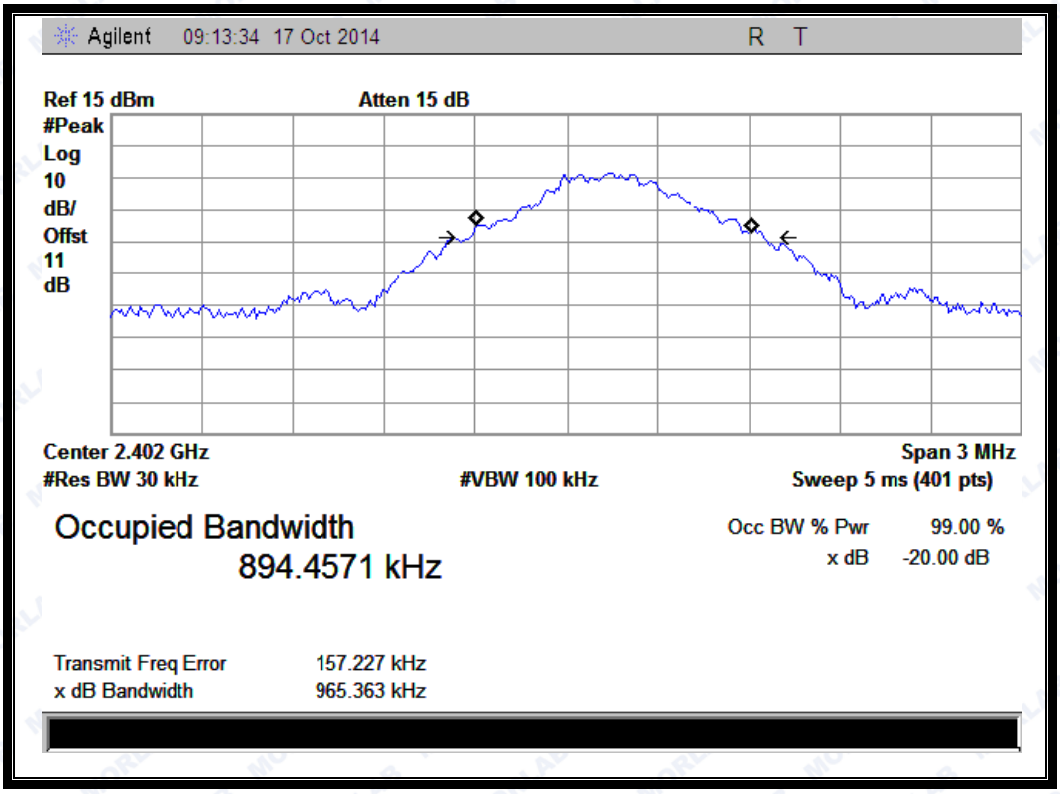
The Bluetooth Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to record the 20dB bandwidth of the Module.

2.4.4.1. GFSK Mode

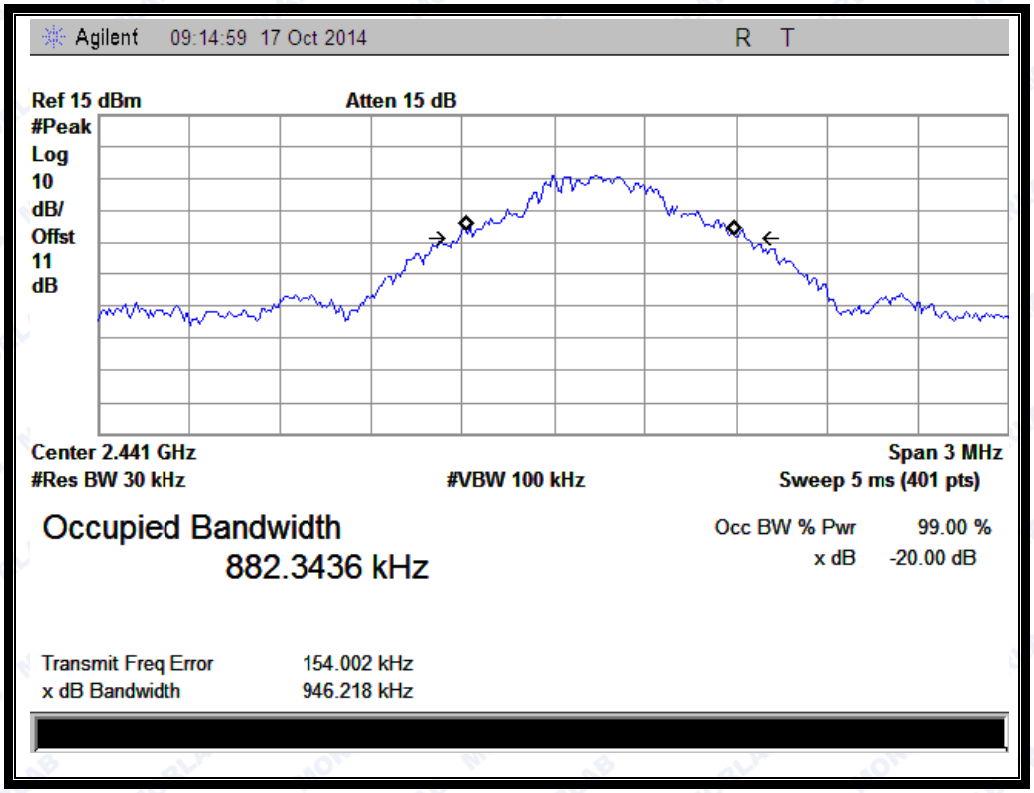
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	0.9654	Plot A
39	2441	0.9462	Plot B
78	2480	0.9615	Plot C

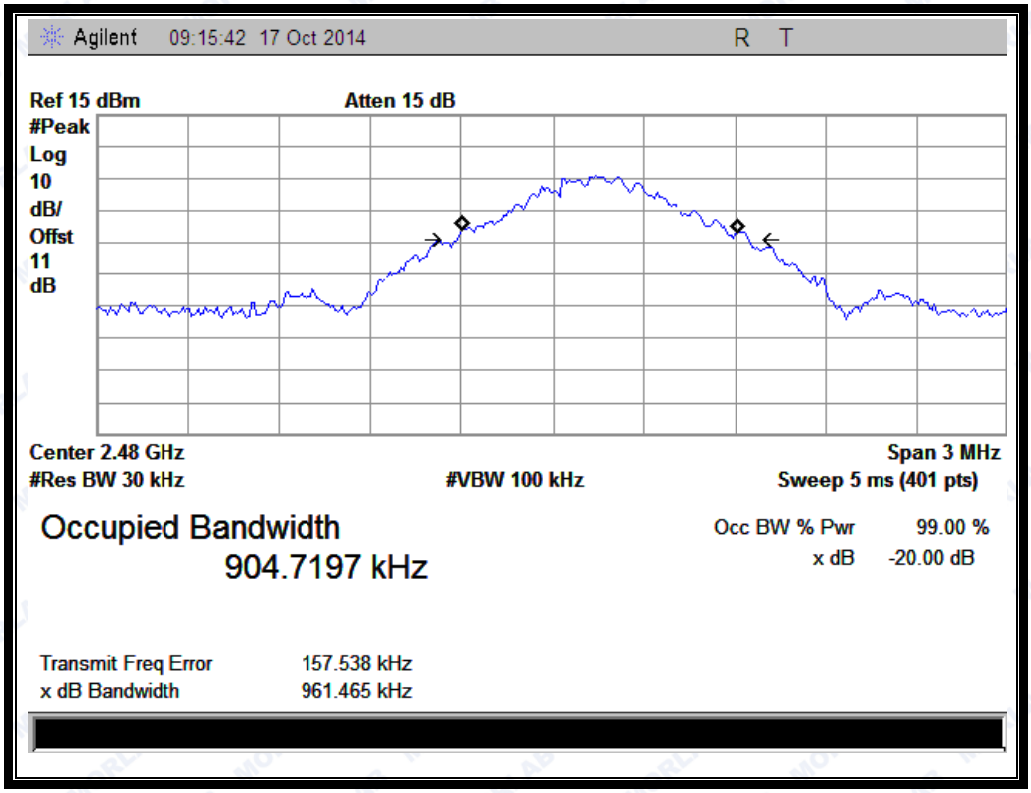
B. Test Plots:



(Plot A: Channel = 2402 @ GFSK)



(Plot B: Channel = 2441 @ GFSK)



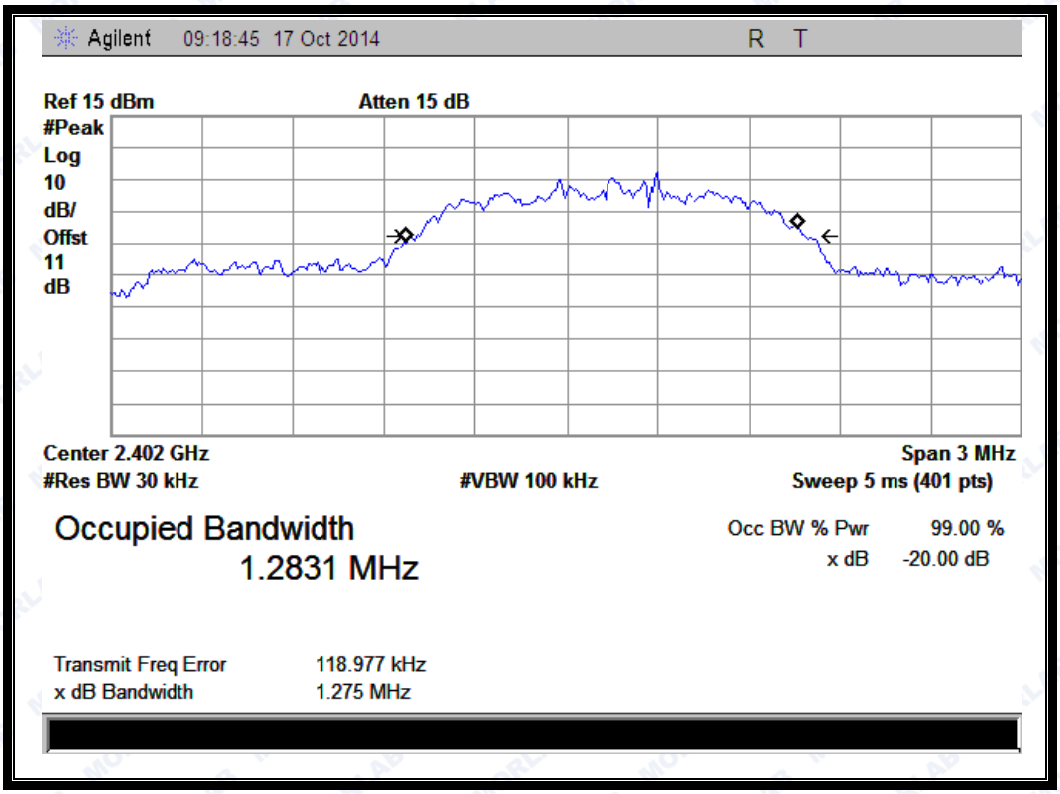
(Plot C: Channel = 2480 @ GFSK)

2.4.4.2. ∏/4-DQPSK Mode

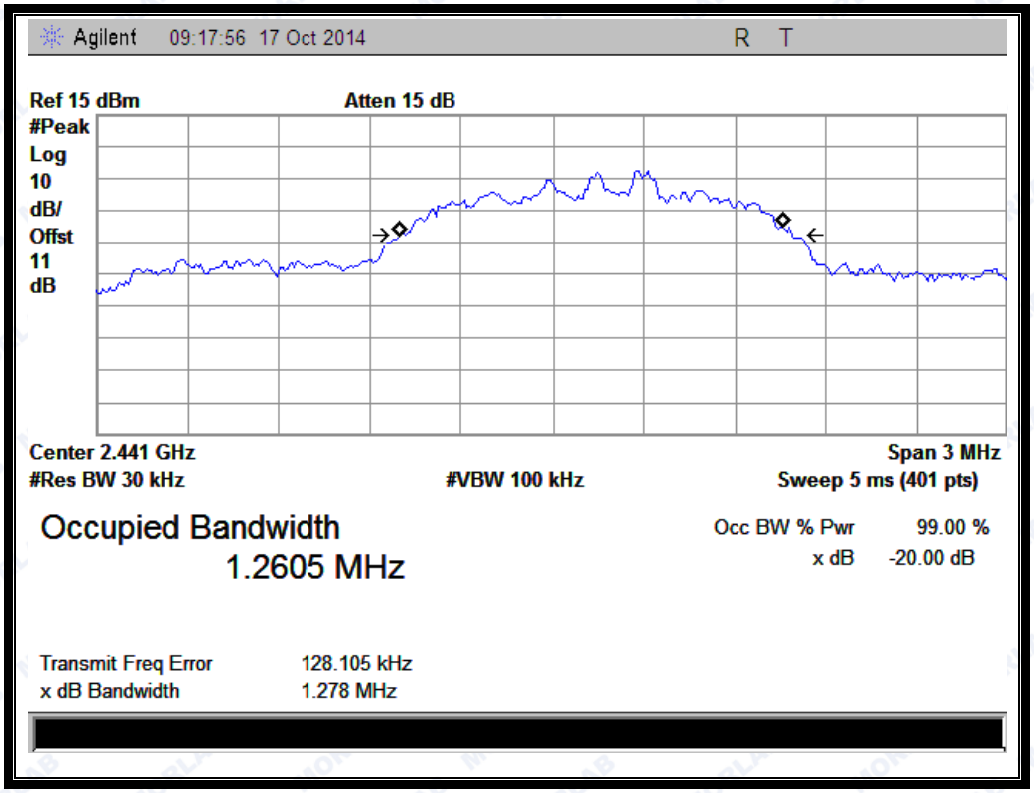
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.2750	Plot D
39	2441	1.2780	Plot E
78	2480	1.3150	Plot F

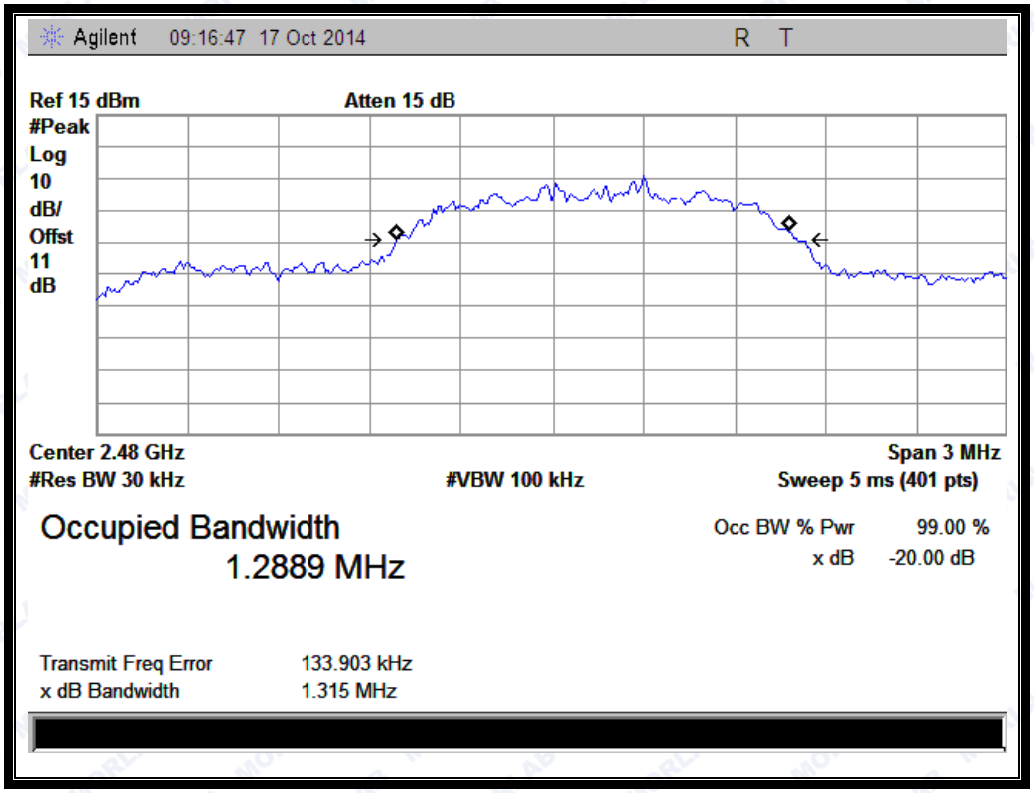
B. Test Plots:



(Plot D: Channel = 2402 @ ∏/4-DQPSK)



(Plot E: Channel = 2441 @ ∏/4-DQPSK)



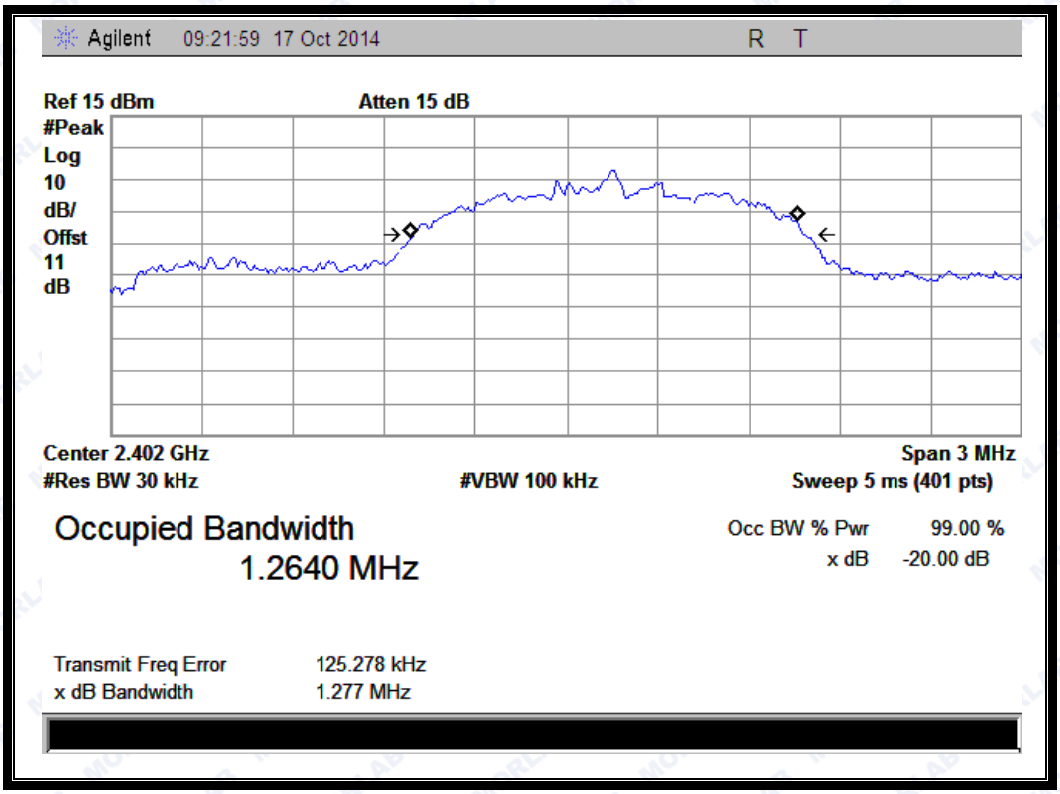
(Plot F: Channel = 2480 @ ∏/4-DQPSK)

2.4.4.3. 8-DPSK Mode

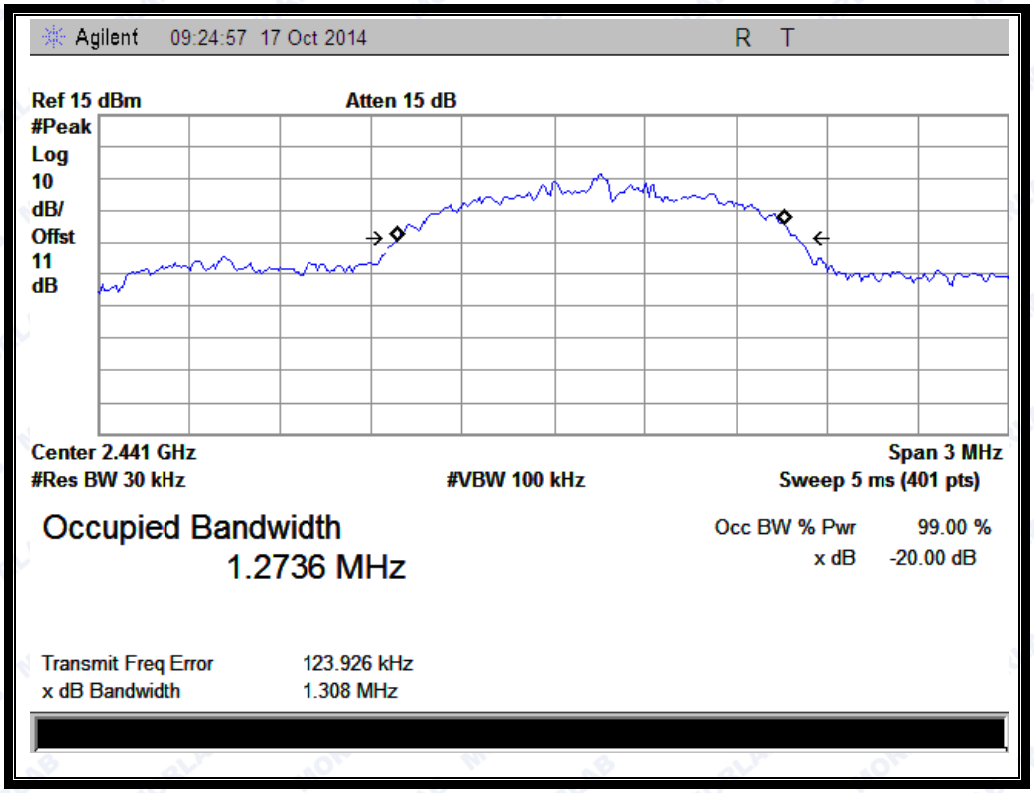
A. Test Verdict:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.277	Plot G
39	2441	1.308	Plot H
78	2480	1.316	Plot I

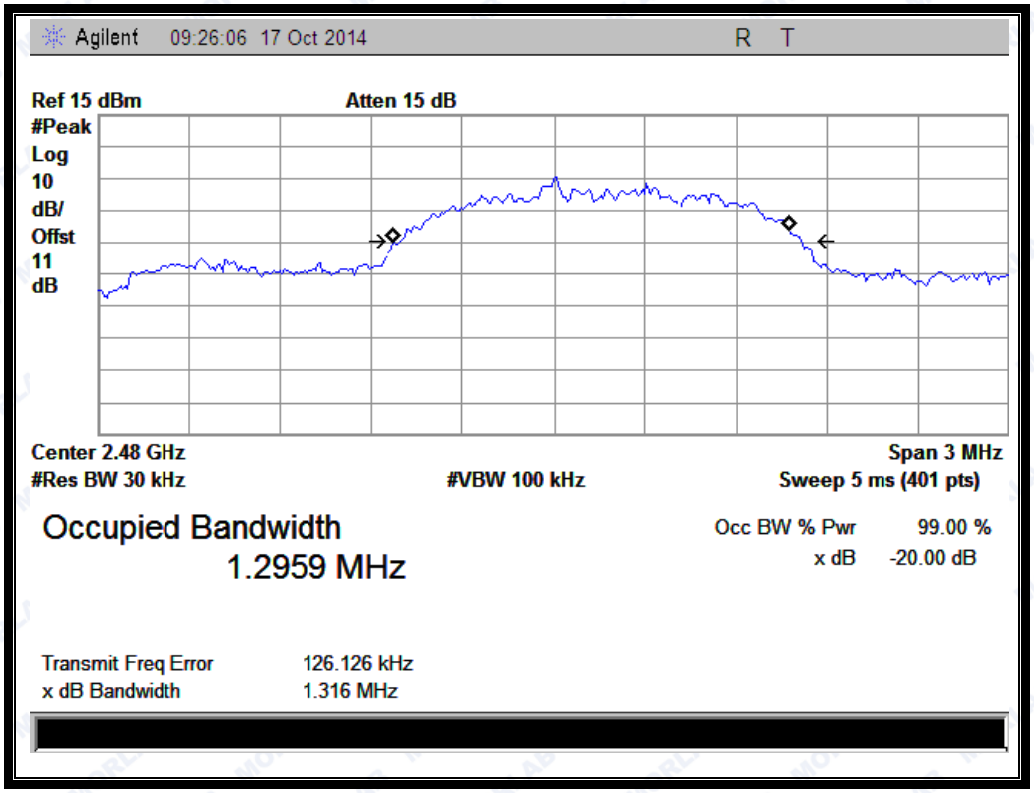
B. Test Plots:



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



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



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

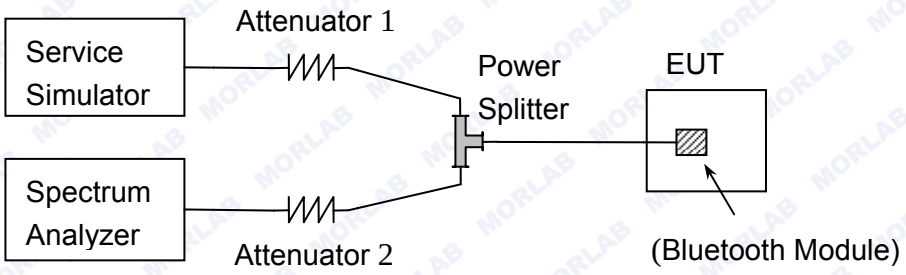
2.5. Carried Frequency Separation

2.5.1. Definition

According to FCC §15.247(a)(1), 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 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:

Please reference ANNEX A(1.4).

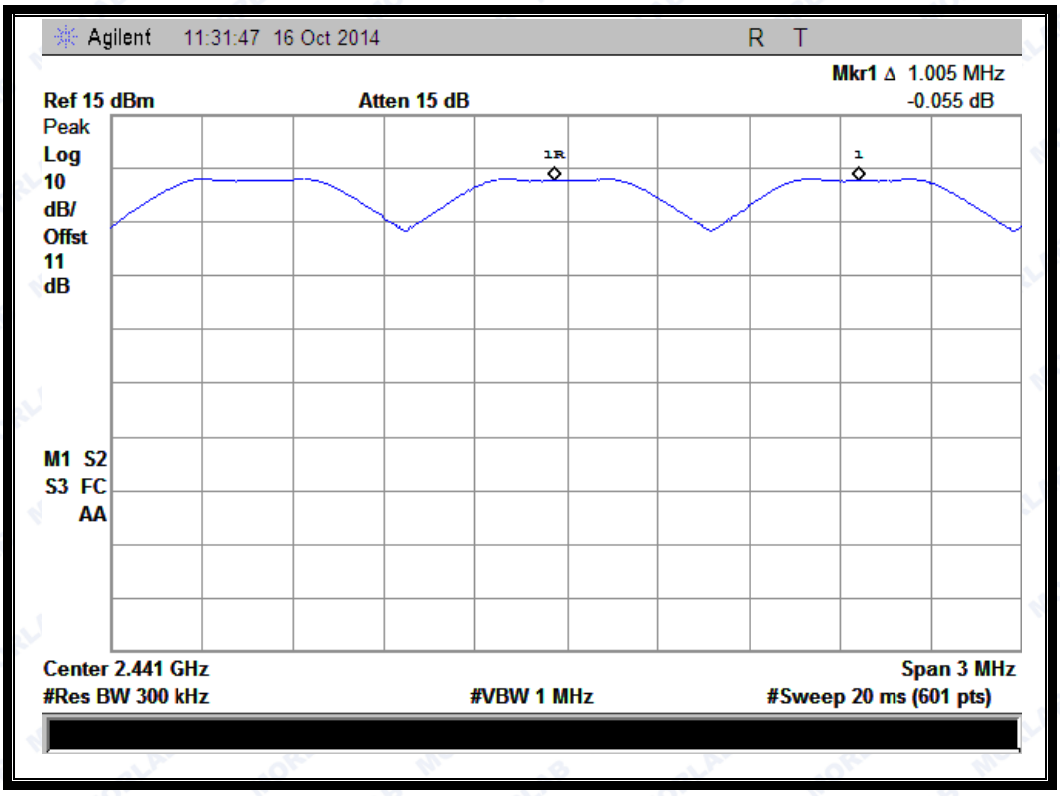
2.5.3. Test Procedure

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

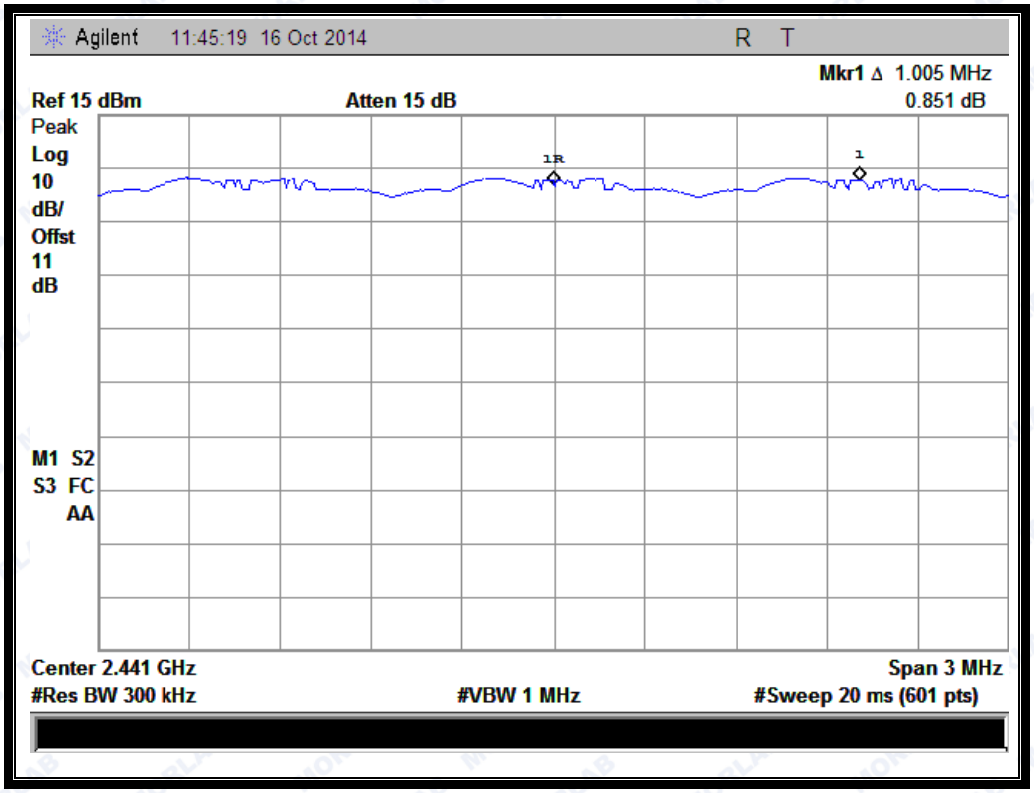
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

2.5.4. Test Result

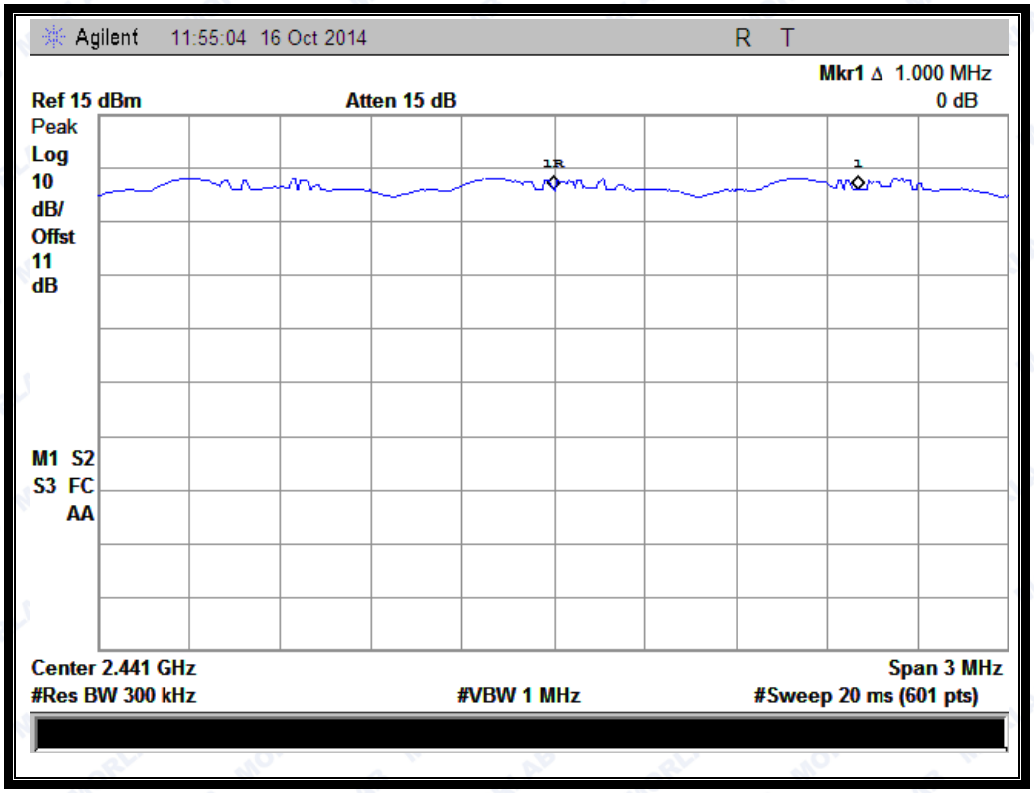
The Bluetooth Module operates at hopping-on test mode.
For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section 0), whichever is greater. So, the verdict is PASSING



(Plot A: GFSK)



(Plot B: ∏/4-DQPSK)



(Plot C: 8-DPSK)

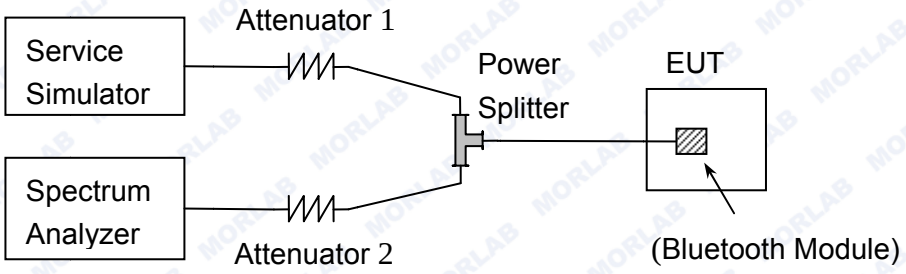
2.6. Time of Occupancy (Dwell time)

2.6.1. Requirement

According to FCC §15.247(a) (1) (iii), 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 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:

Please reference ANNEX A(1.4).

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.

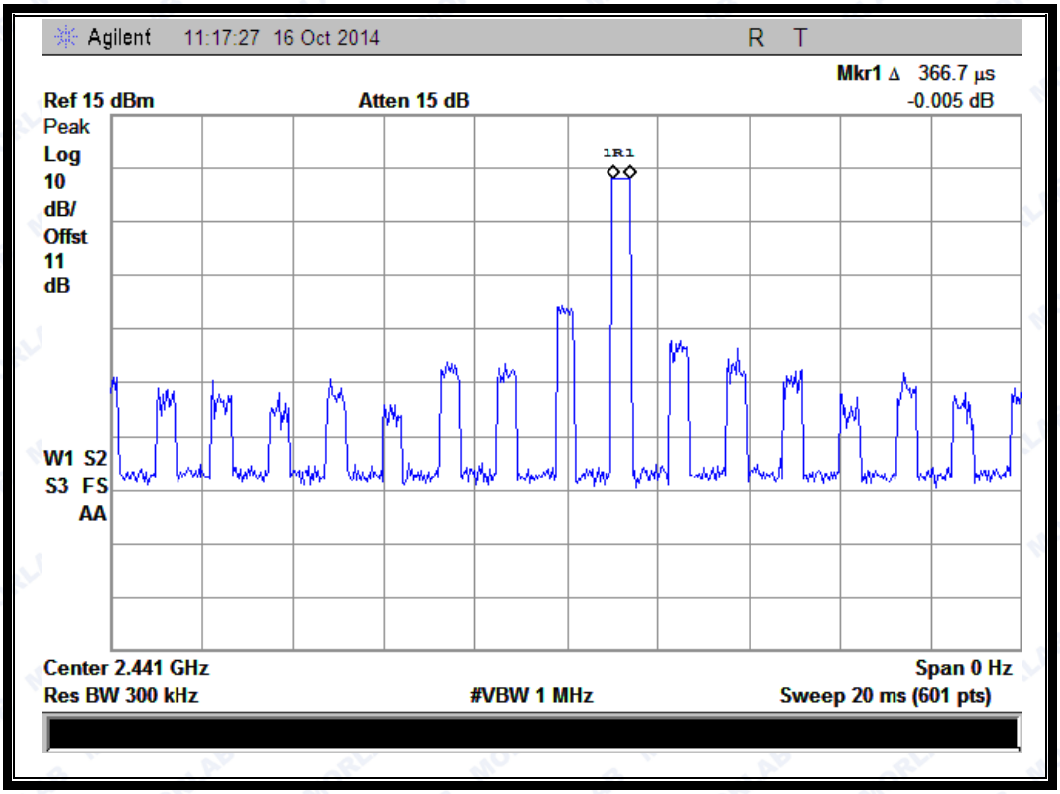
2.6.4. Test Result

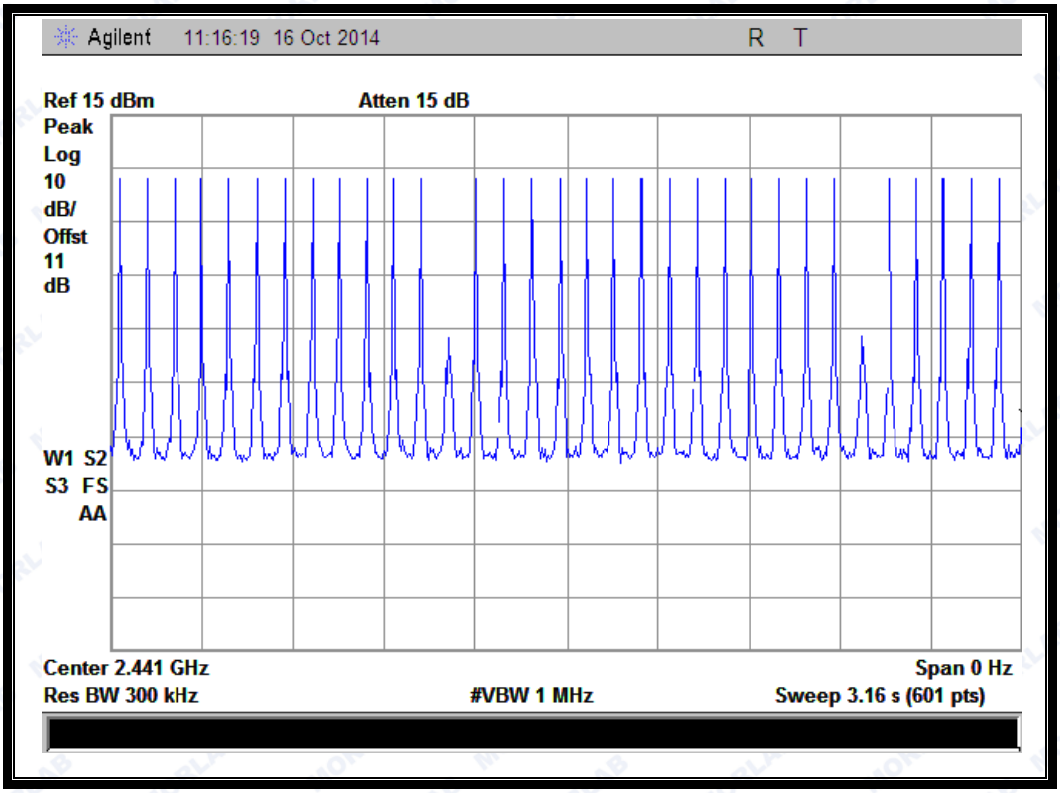
2.6.4.1. GFSK Mode

A. Test Verdict:

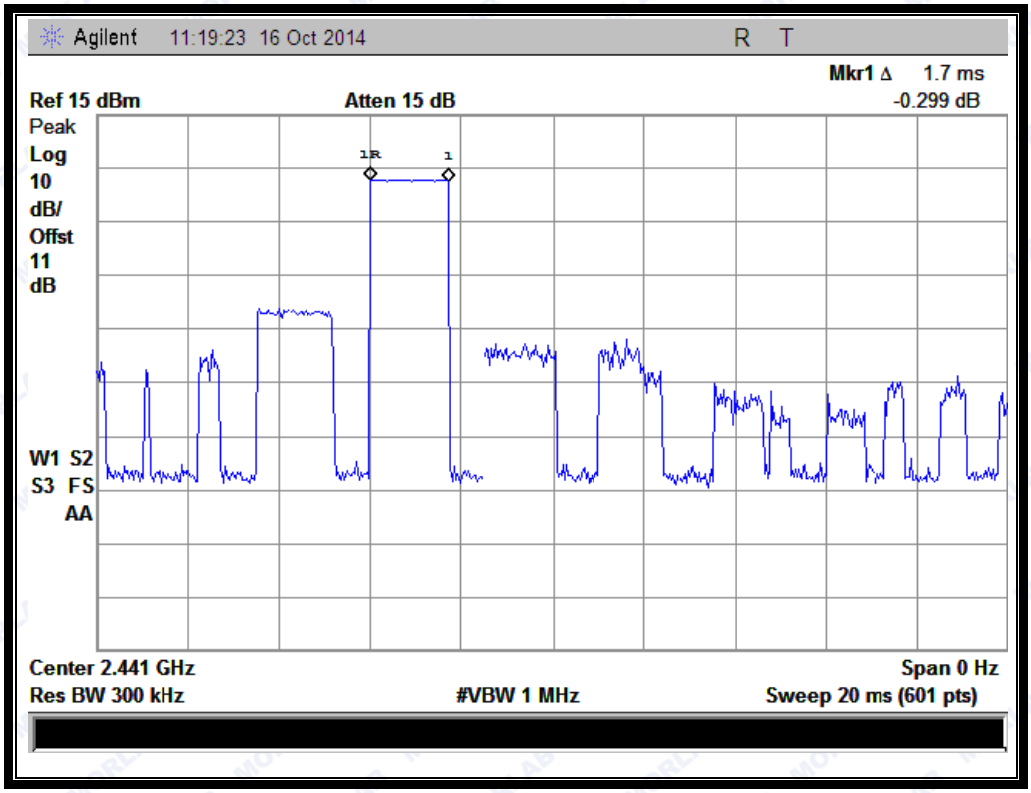
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.368	31	Plot A	0.114	0.4	PASS
DH3	1.700	18	Plot B	0.306		PASS
DH5	2.633	12	Plot C	0.316		PASS

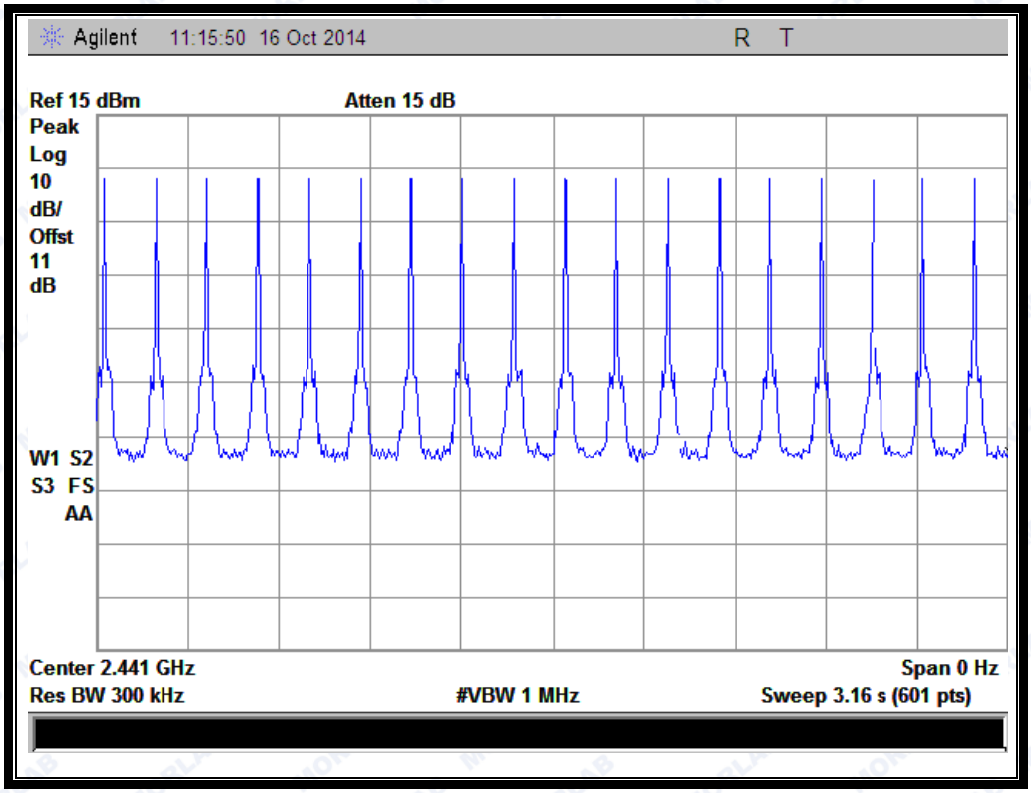
B. Test Plots:



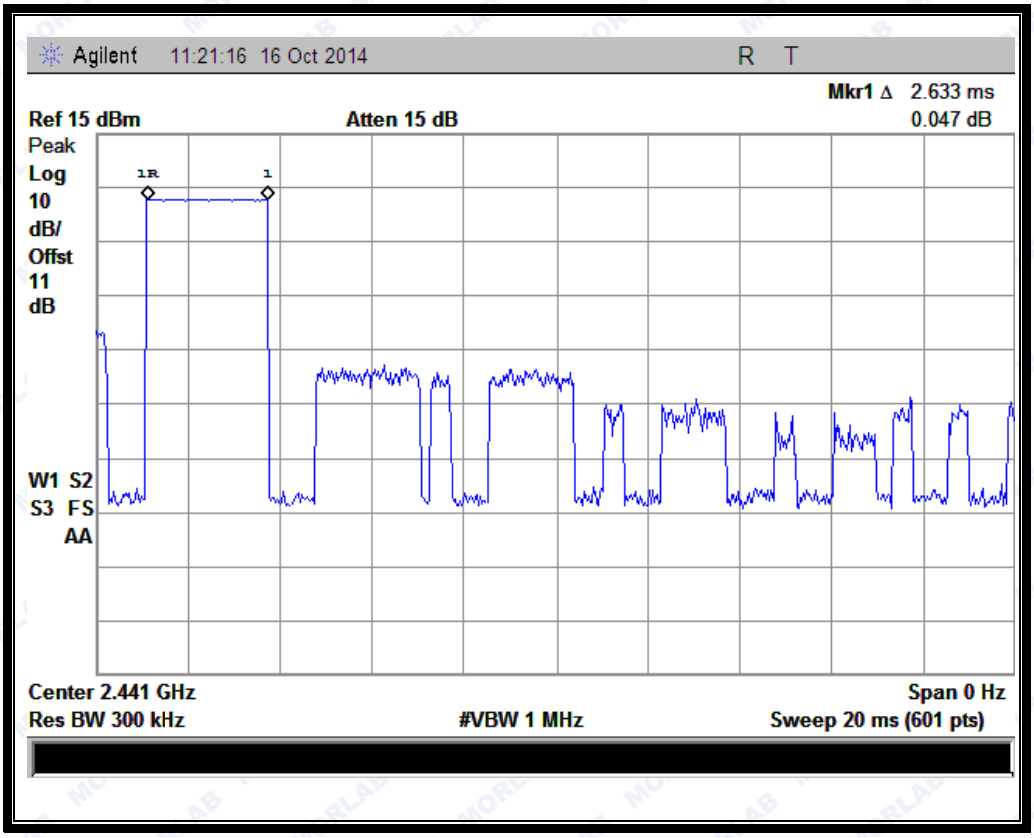


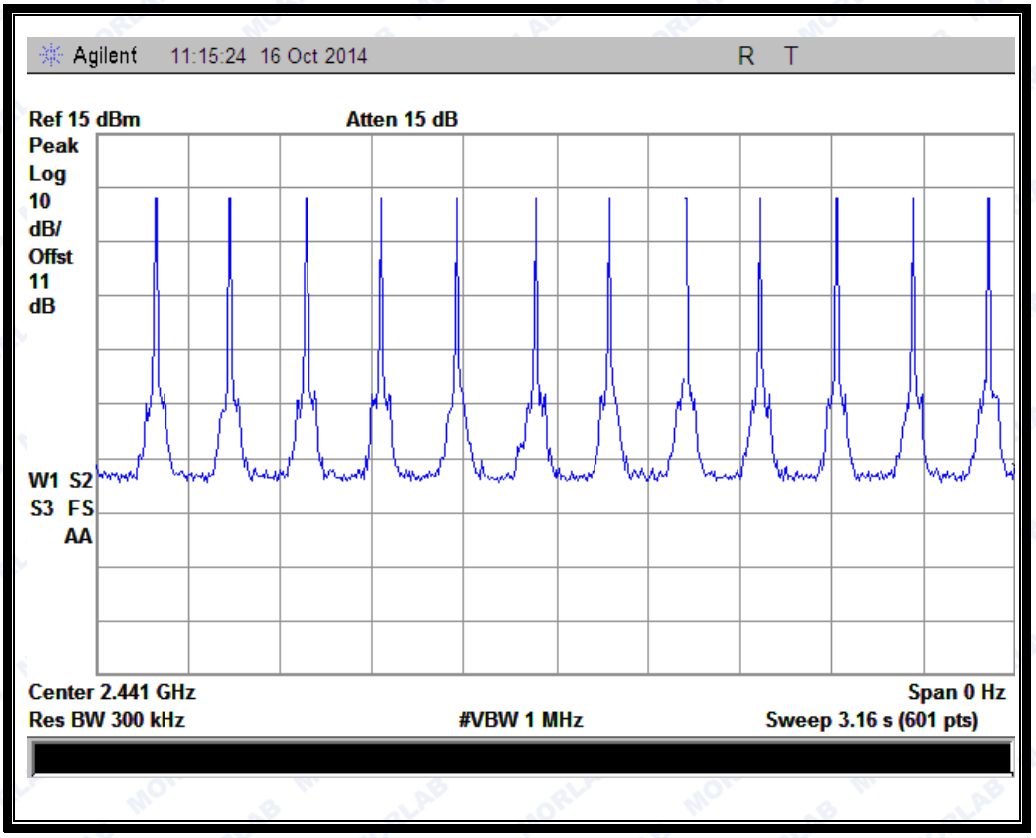
(Plot A: DH1 @ GFSK)





(Plot B: DH3 @ GFSK)





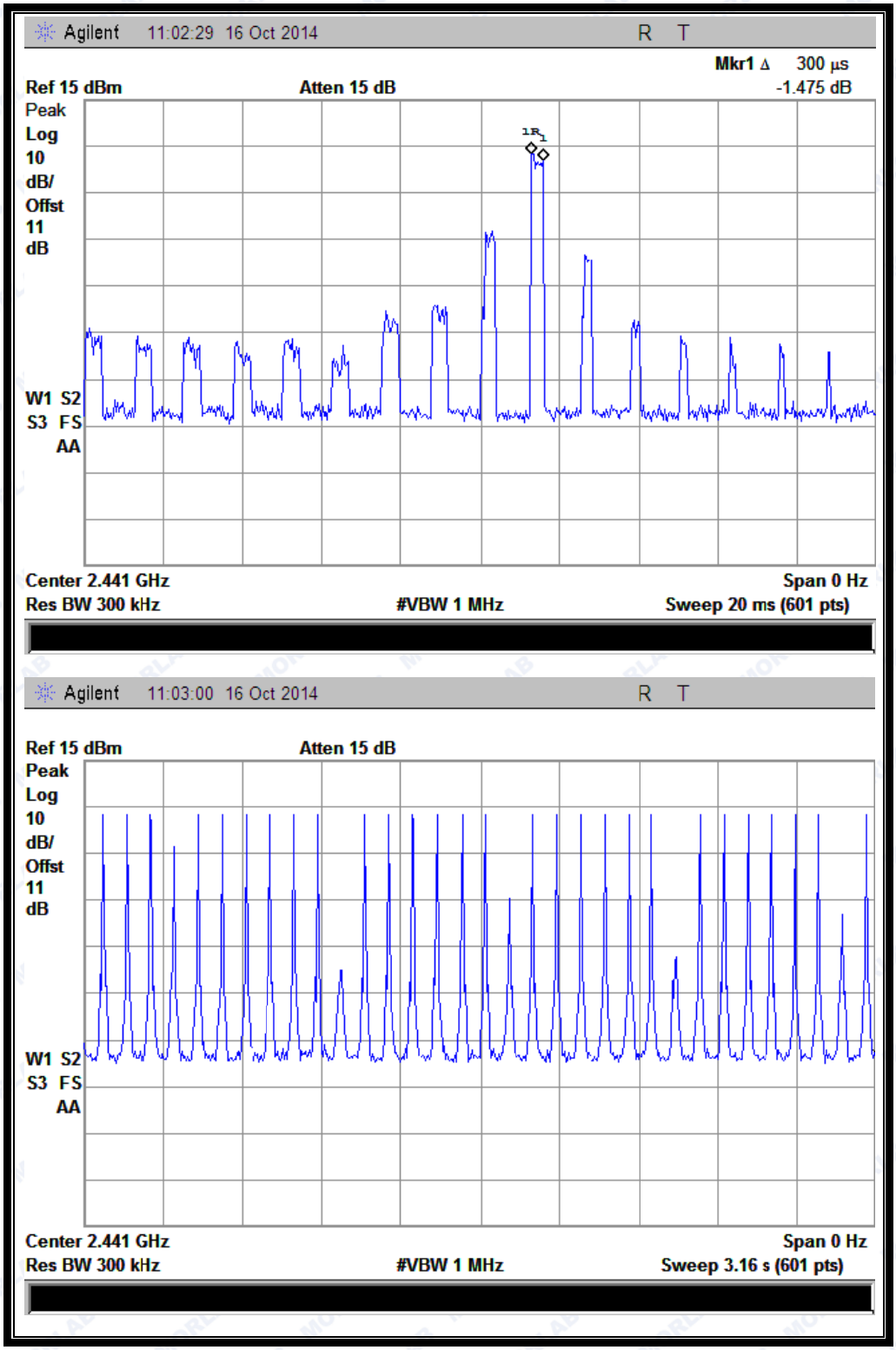
(Plot C: DH5 @ GFSK)

2.6.4.2. ∏/4-DQPSK Mode

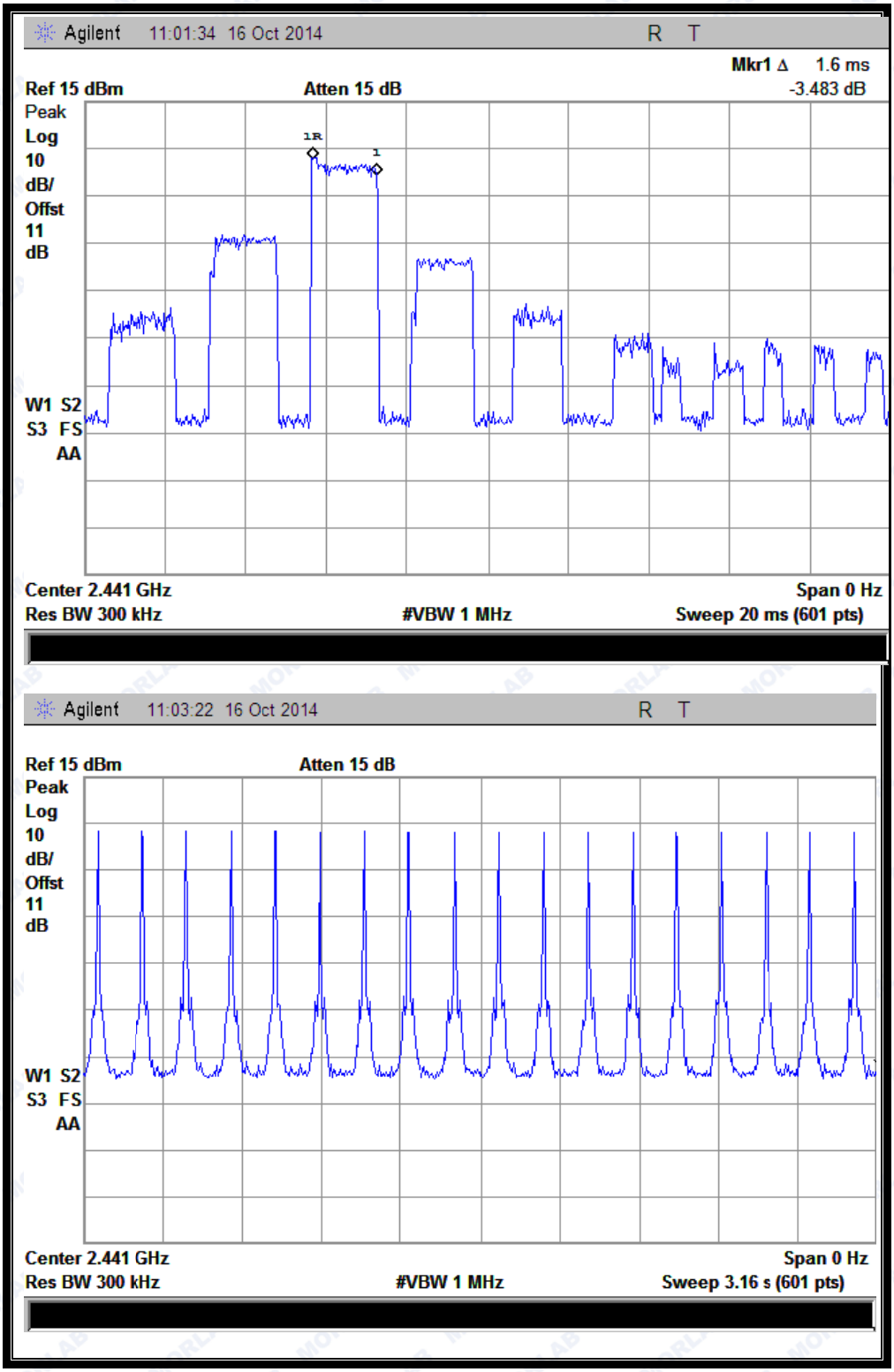
A. Test Verdict:

DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.300	29	Plot A	0.087	0.4	PASS
DH3	1.600	18	Plot B	0.288		PASS
DH5	2.633	13	Plot C	0.346		PASS

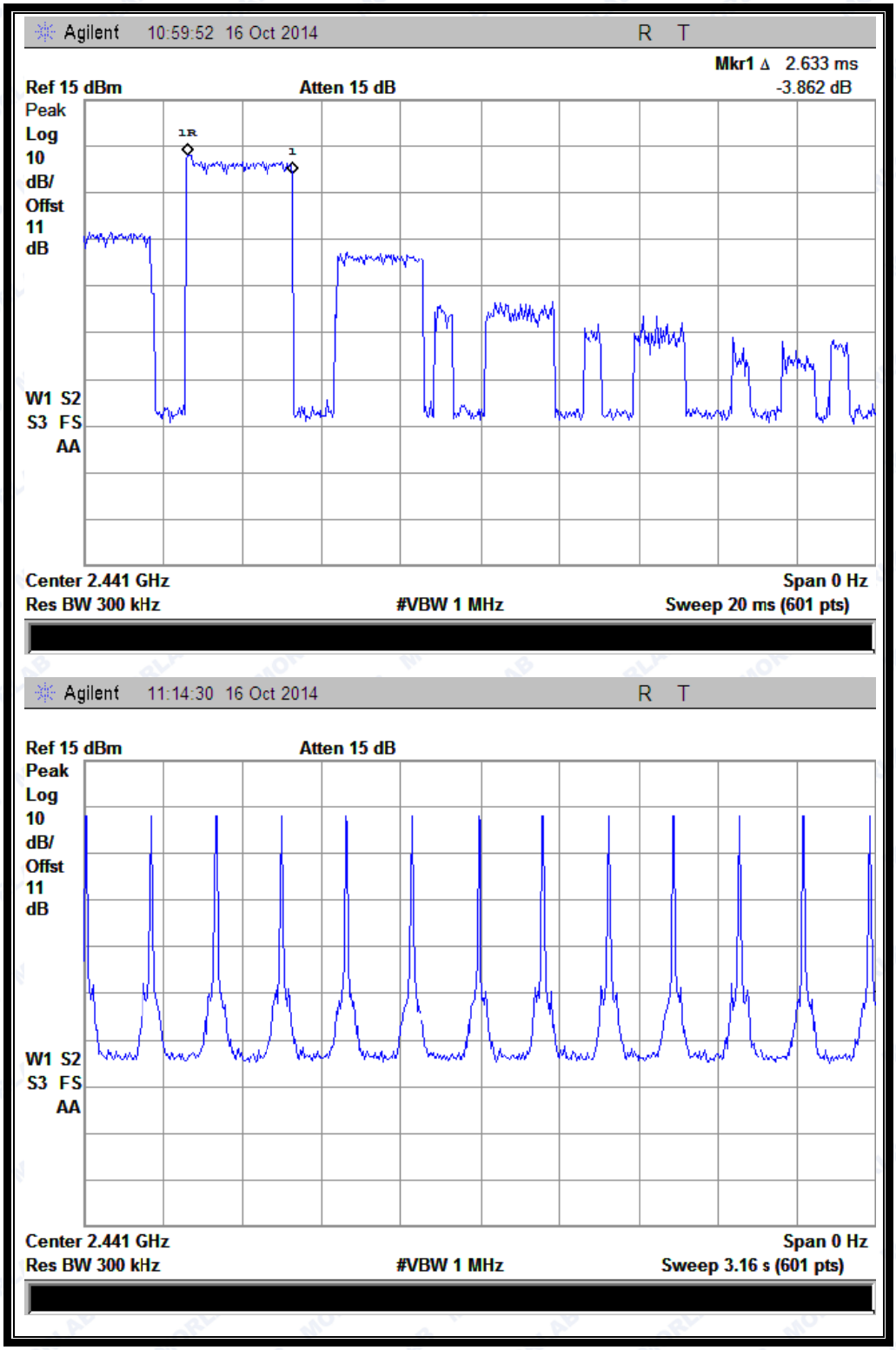
B. Test Plots:



(Plot D: DH1 @ ∏/4-DQPSK)



(Plot E: DH3 @ ∏/4-DQPSK)



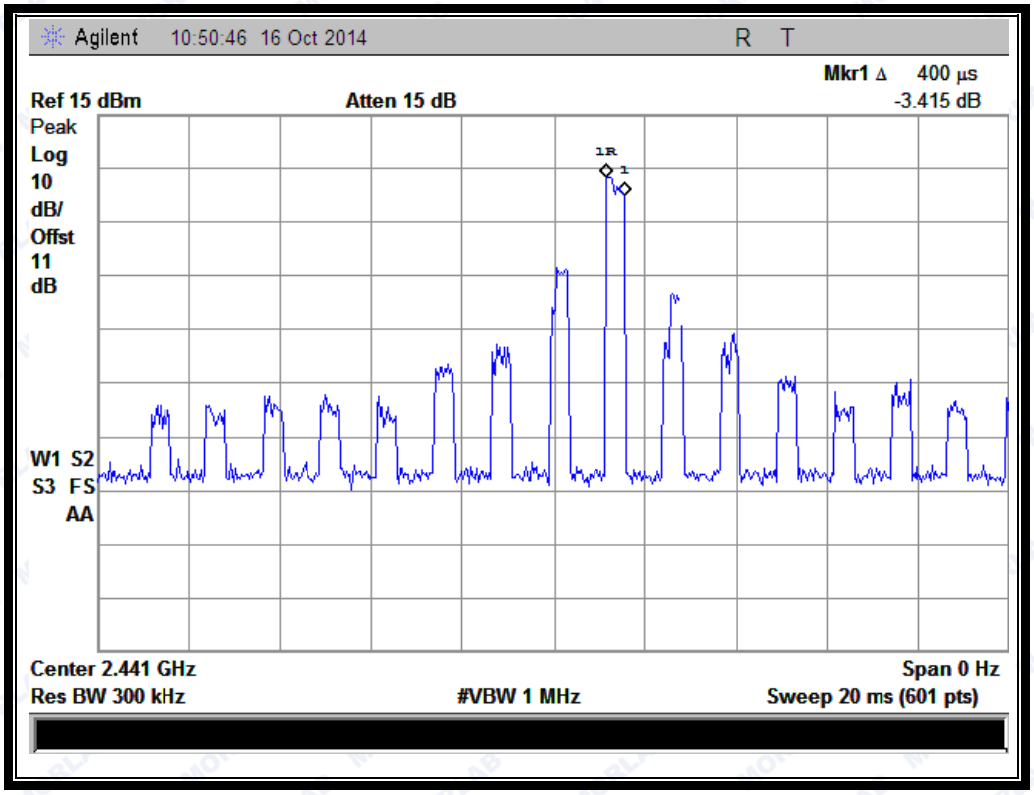
(Plot F: DH5 @ ∏/4-DQPSK)

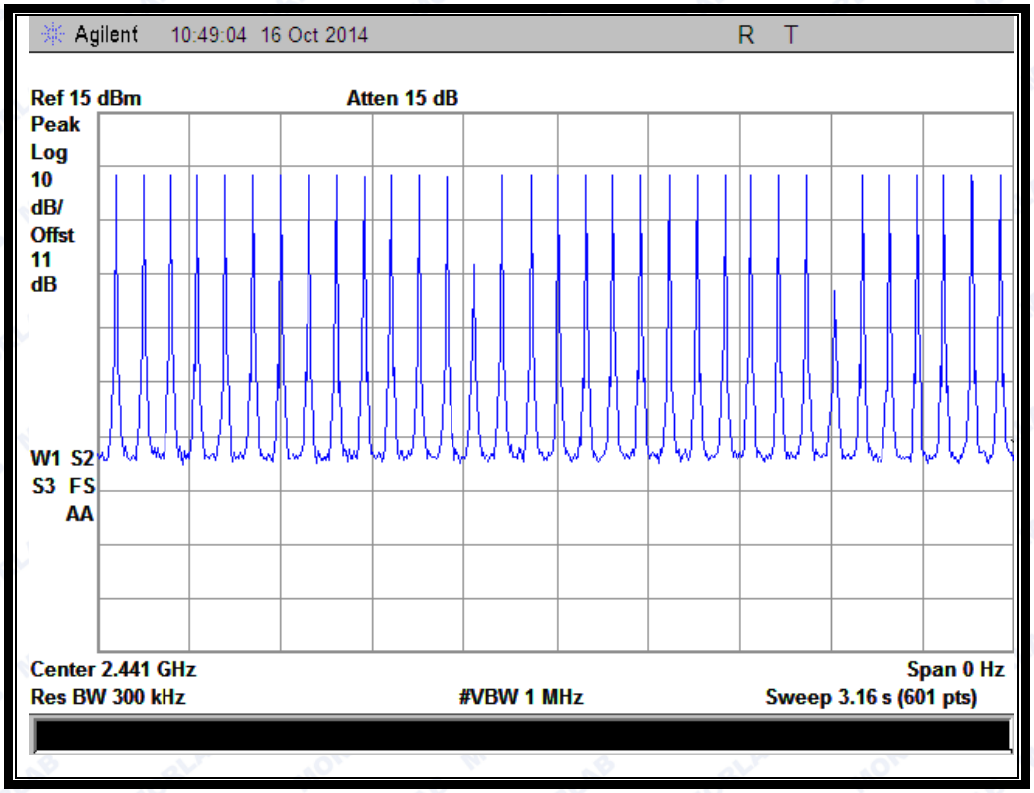
2.6.4.3. 8-DPSK mode

A. Test Verdict:

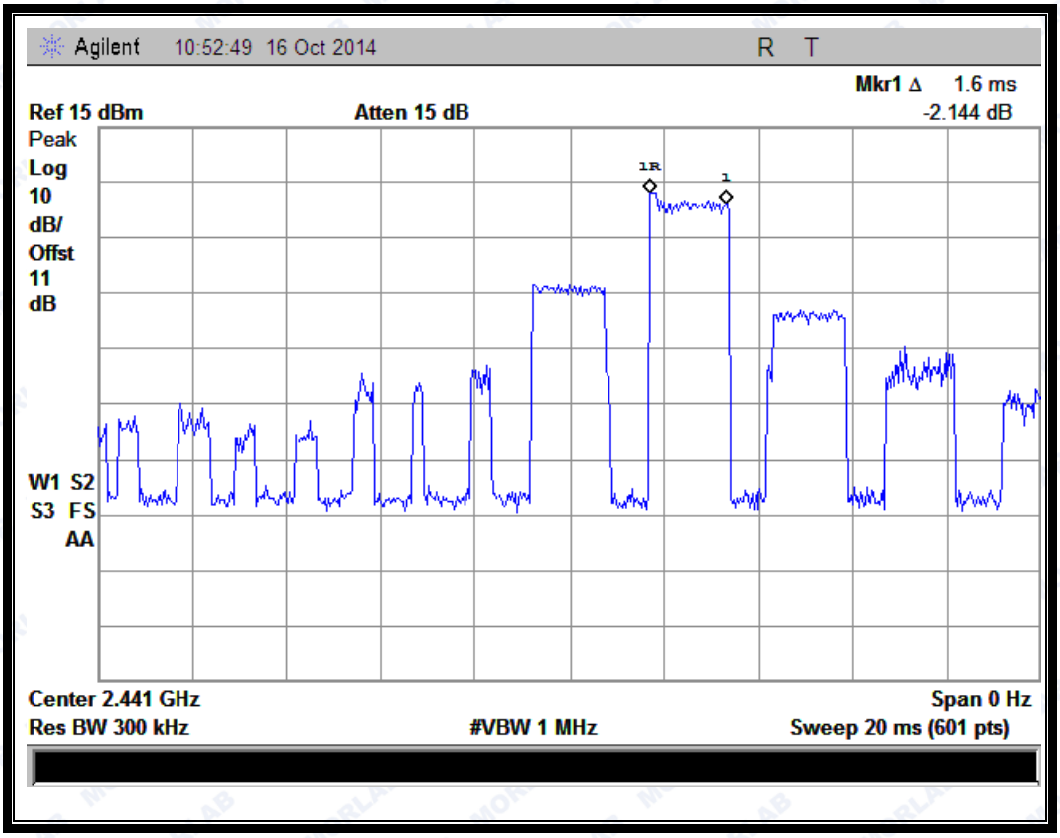
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Refer to Plot	Average Time of Occupancy (sec)	Limit (sec)	Verdict
DH1	0.400	31	Plot A	0.124	0.4	PASS
DH3	1.600	18	Plot B	0.288		PASS
DH5	2.400	12	Plot C	0.288		PASS

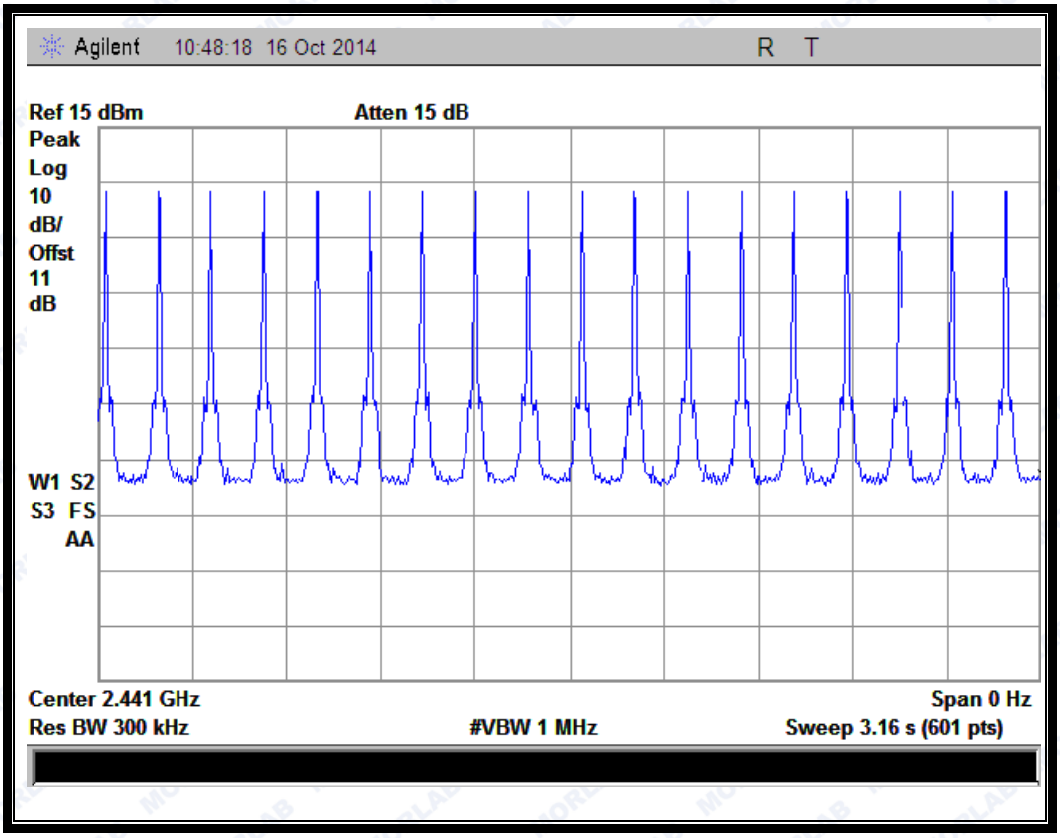
B. Test Plots:



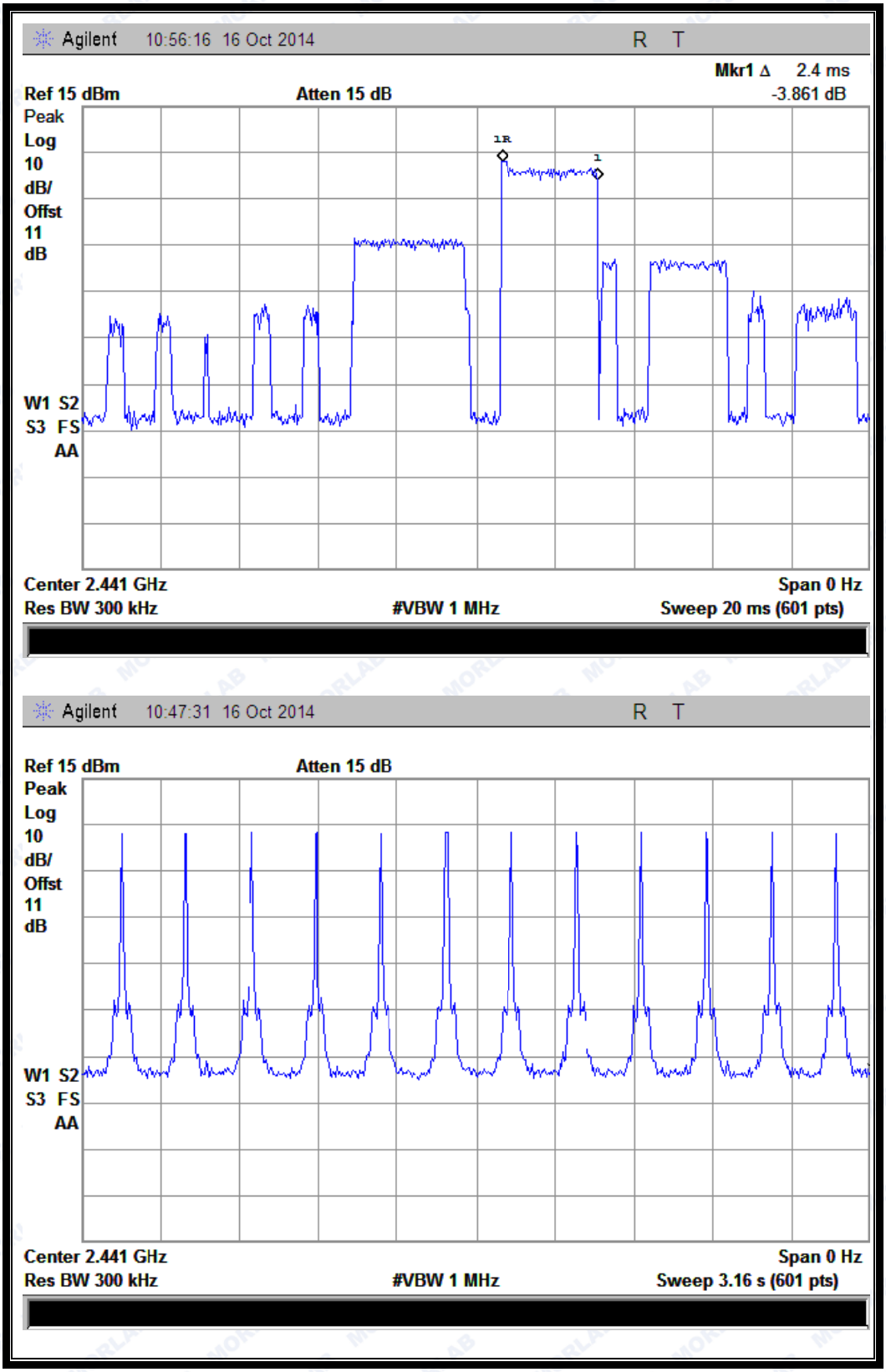


(Plot G: DH1 @ 8-DPSK)





(Plot H: DH3 @ 8-DPSK)



(Plot I: DH5 @ 8-DPSK)

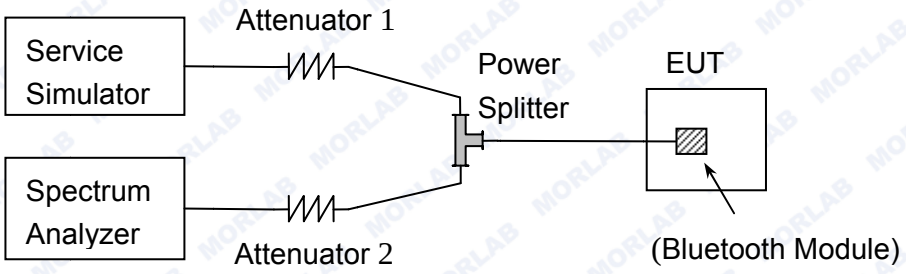
2.7. Conducted Spurious Emissions

2.7.1. Requirement

According to FCC §15.247(d), 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 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:

Please reference ANNEX A(1.4).

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.

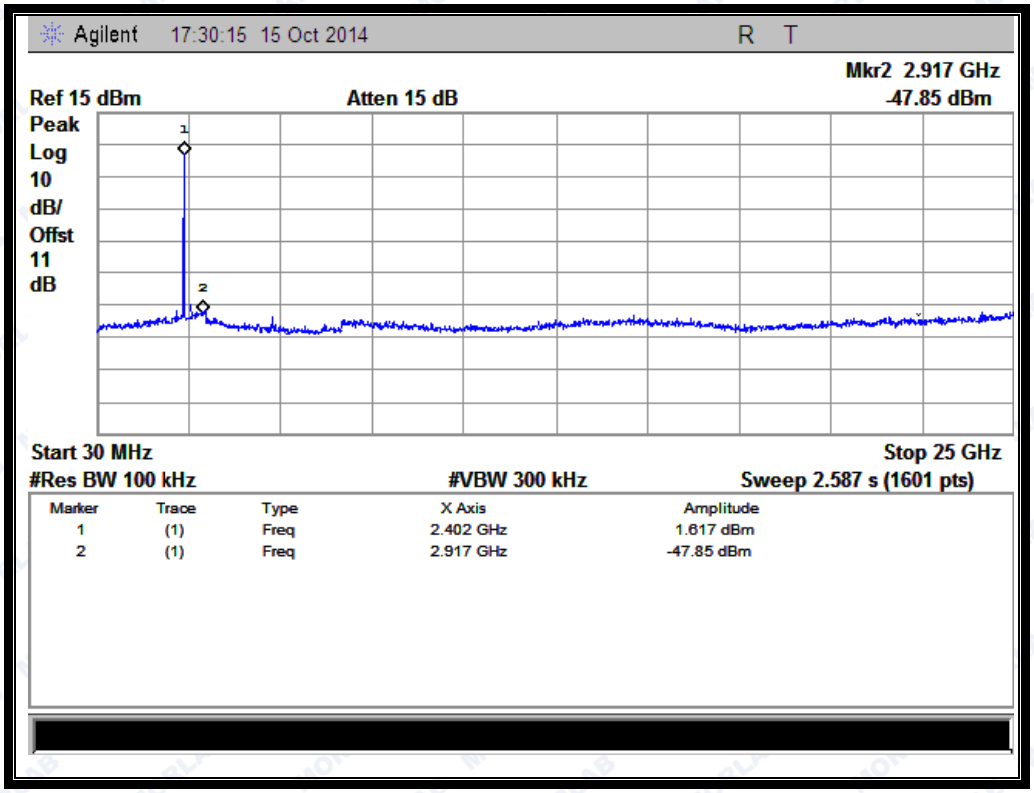
2.7.4.1. GFSK Mode

A. Test Verdict:

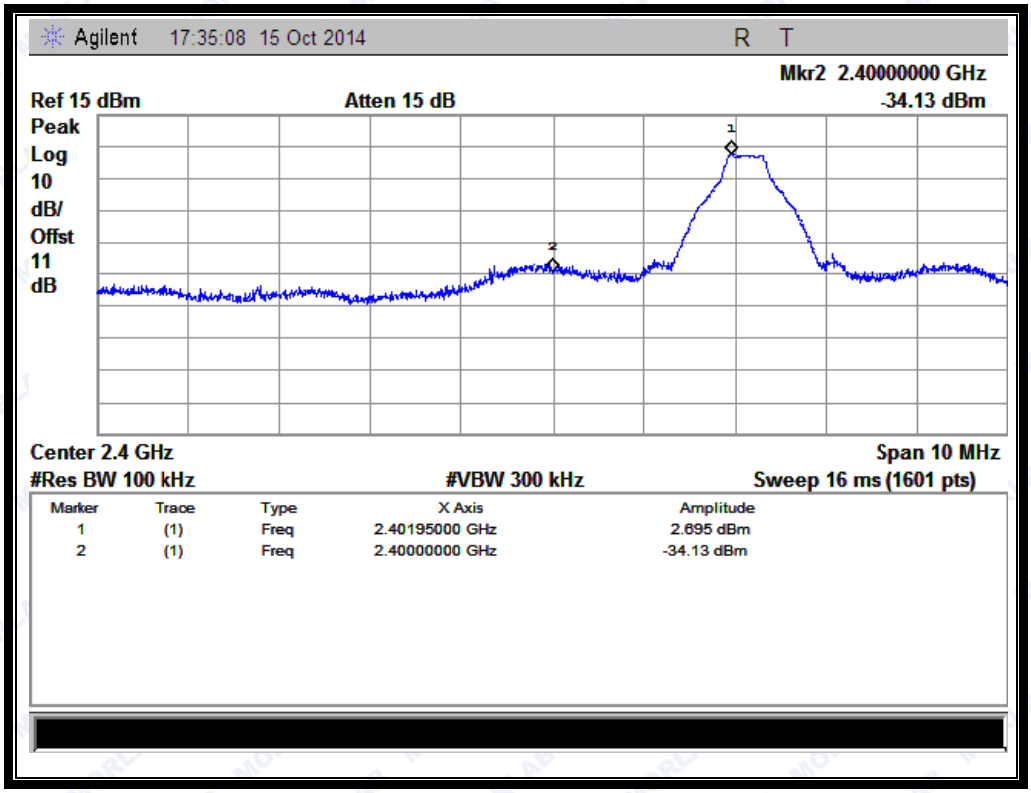
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-47.85	Plot A.1	1.617	-18.4	PASS
39	2441	-48.06	Plot B.1	2.370	-17.6	PASS
78	2480	-47.22	Plot C.1	1.960	-18.0	PASS

B. Test Plots:

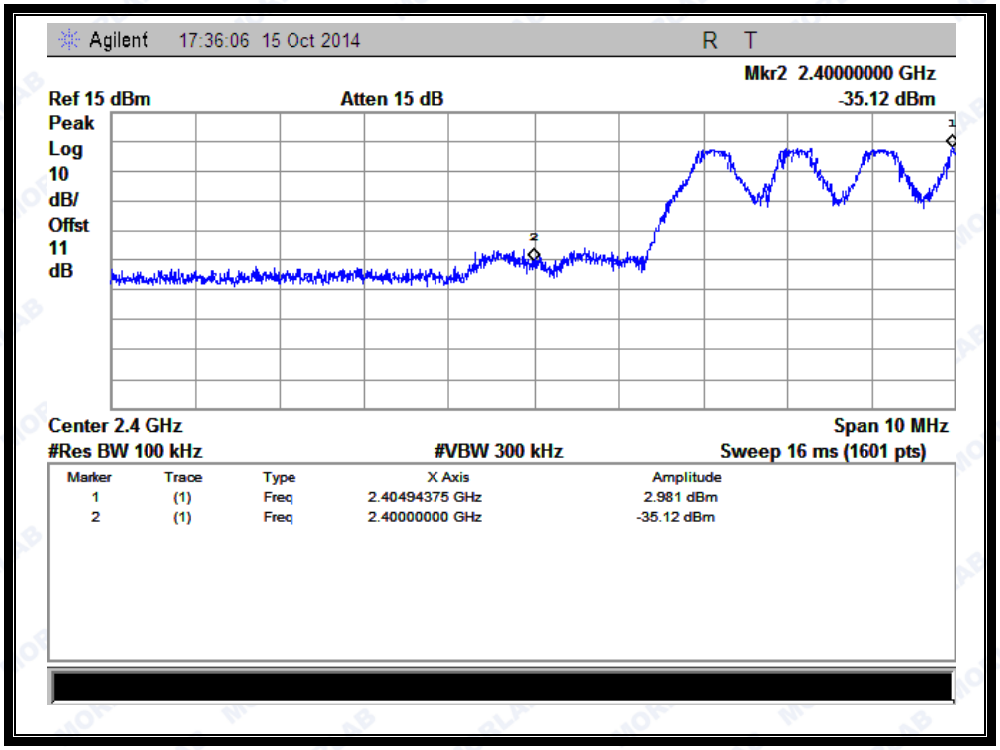
Note: the power of the Module transmitting frequency should be ignored.



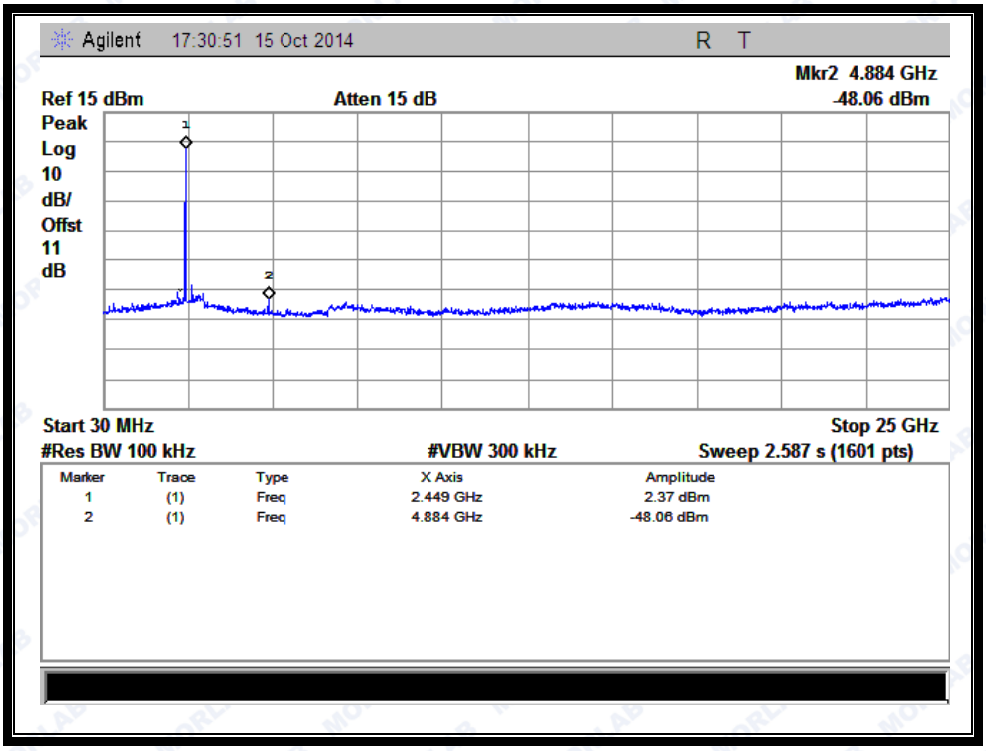
(Plot A.1: Channel = 0, 30MHz to 25GHz @ GFSK Mode)



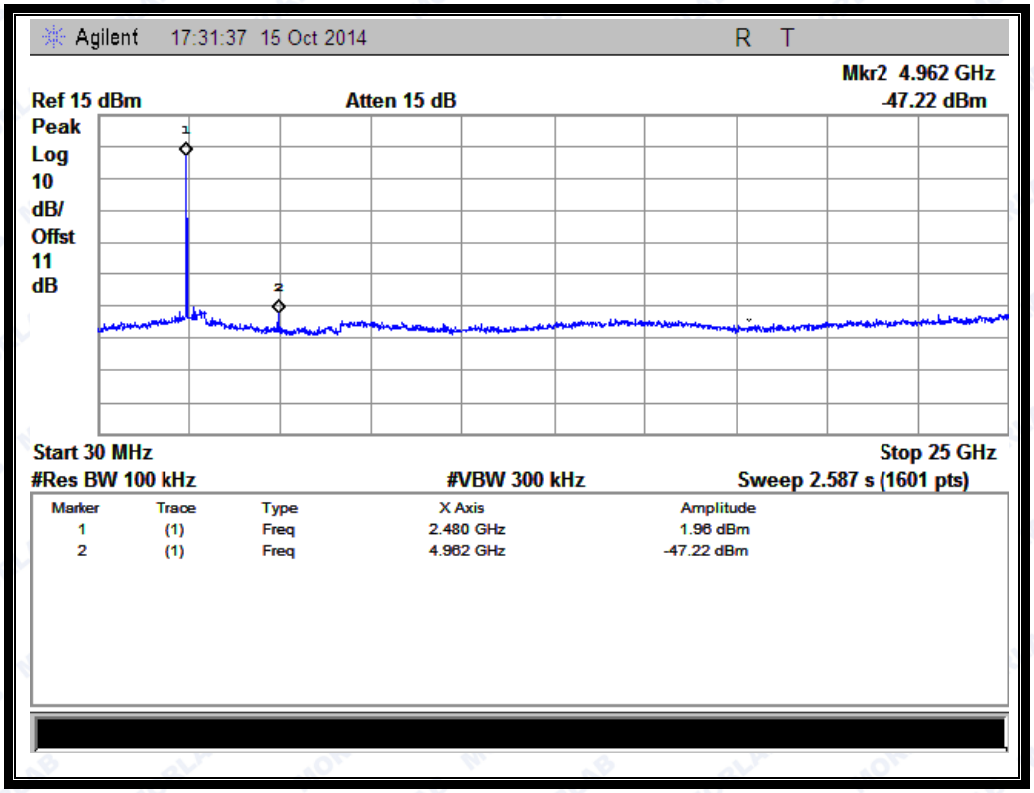
(Channel = 0, Band edge @ GFSK Mode)



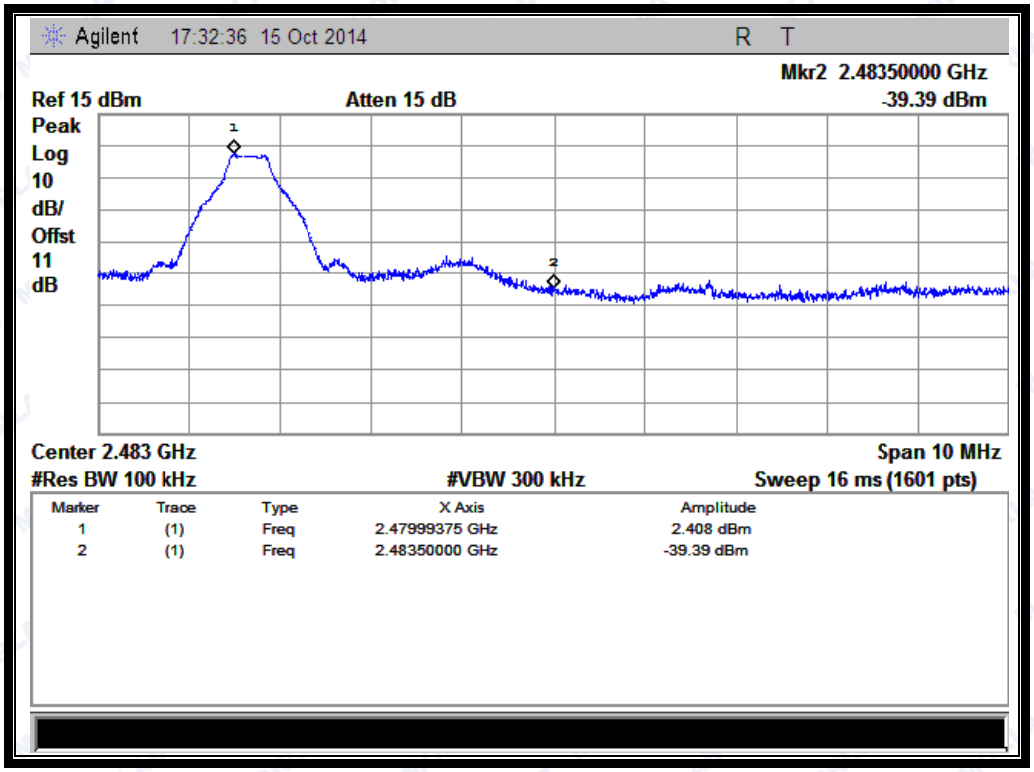
(Channel = 0, Band edge with hopping on @ GFSK Mode)



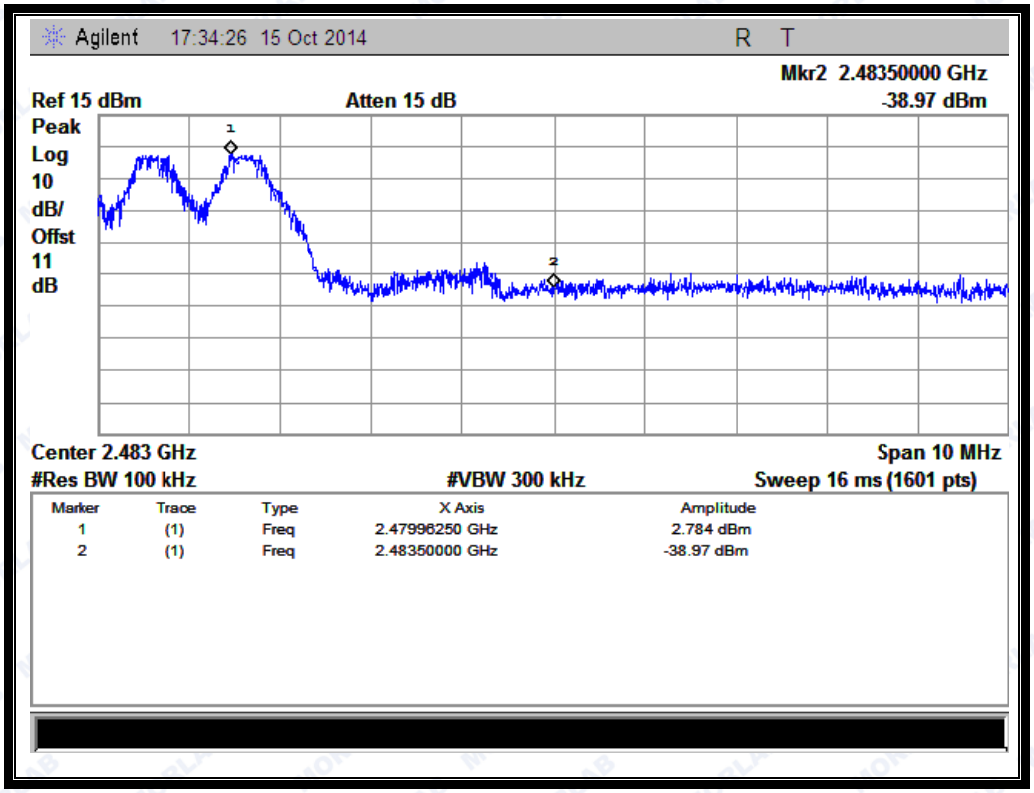
(Plot B.1: Channel = 39, 30MHz to 25GHz @ GFSK Mode)



(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)

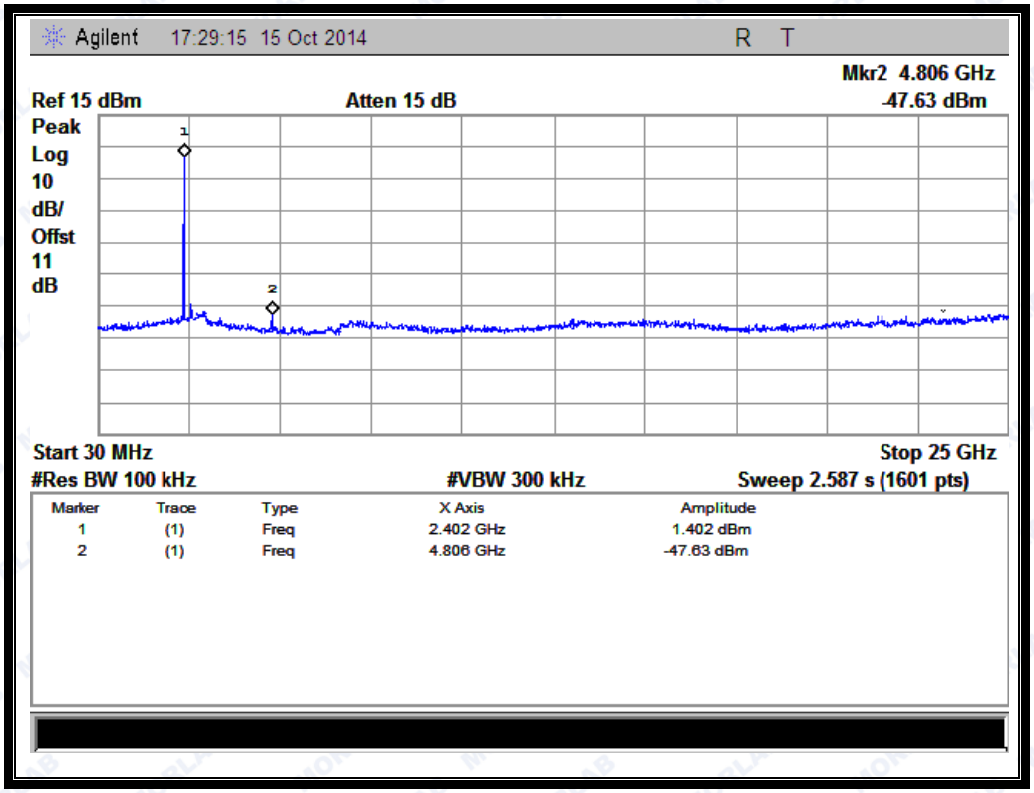
2.7.4.2. ∏/4-DQPSK Mode

A. Test Verdict:

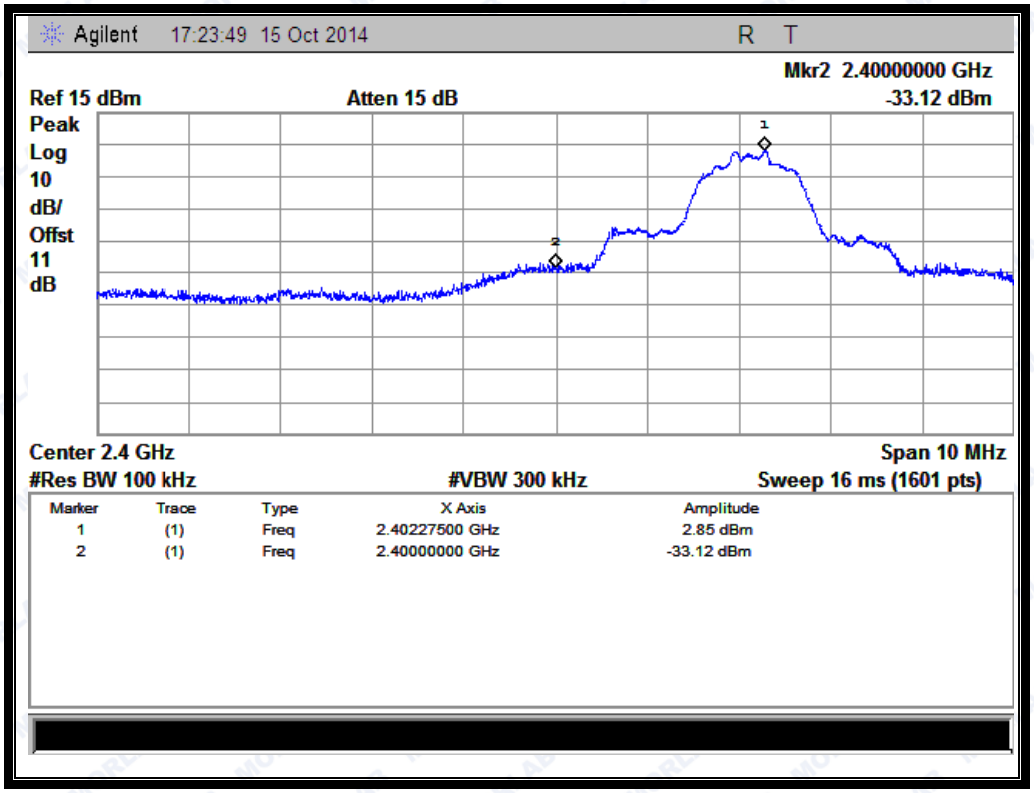
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-47.63	Plot D.1	1.402	-18.6	PASS
39	2441	-47.78	Plot E.1	2.051	-18.0	PASS
78	2480	-47.57	Plot F.1	-1.754	-21.8	PASS

B. Test Plots:

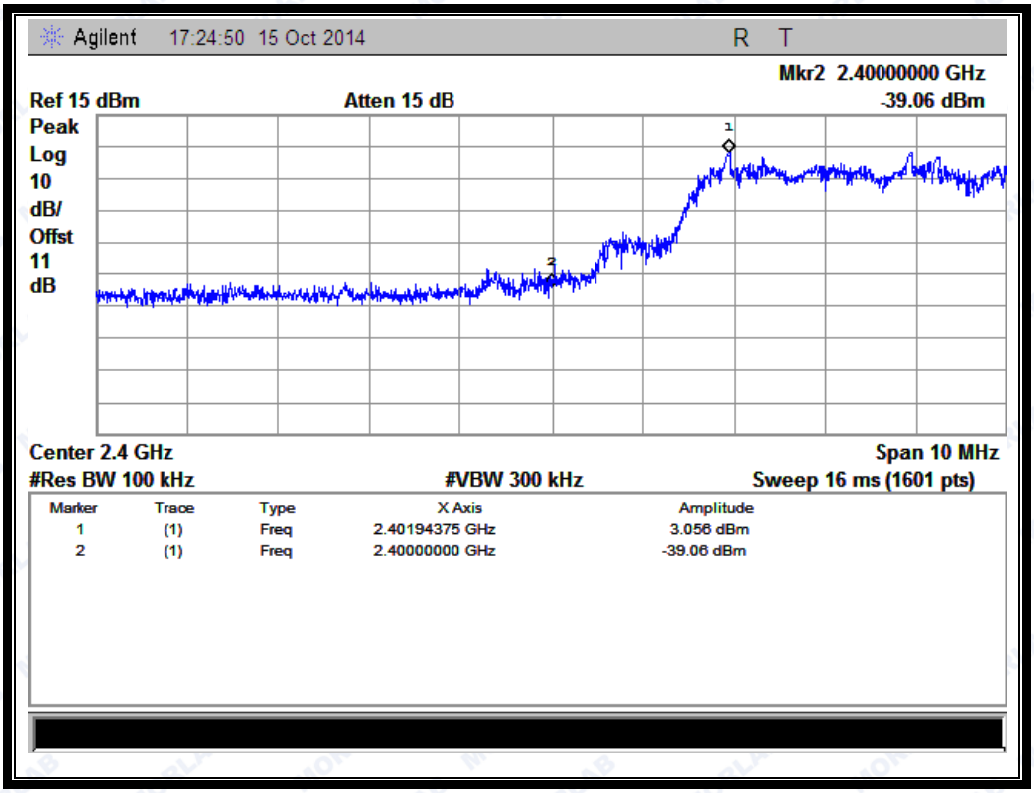
Note: the power of the Module transmitting frequency should be ignored.



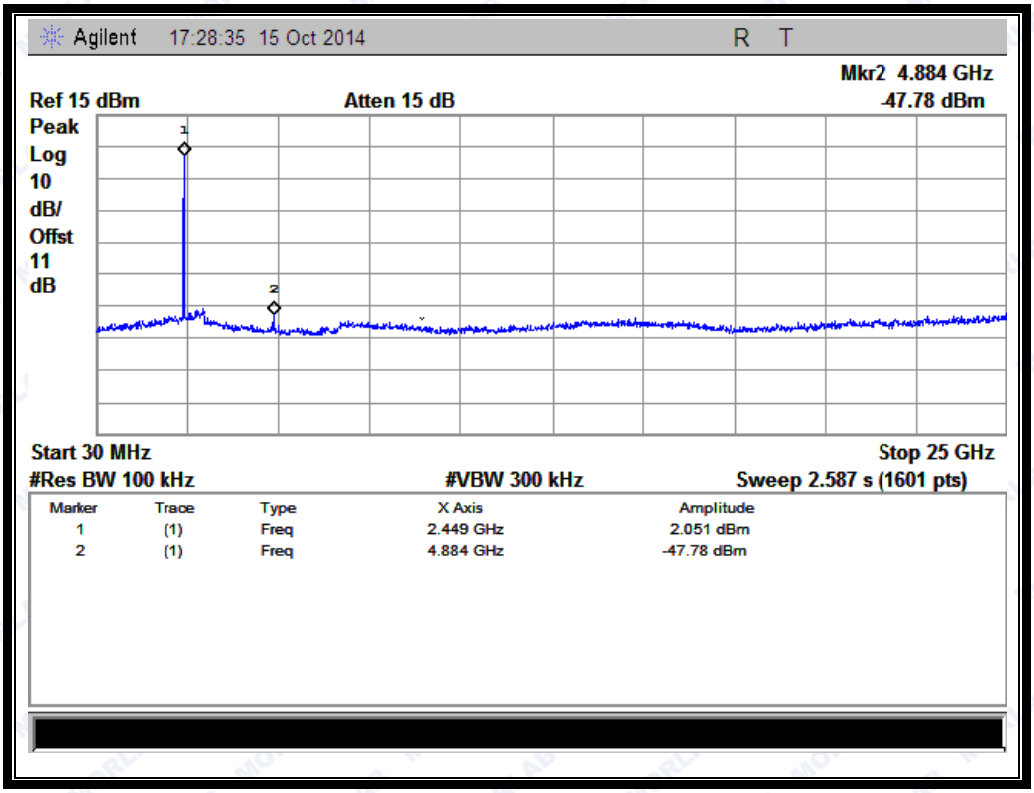
(Plot D.1: Channel = 0, 30MHz to 25GHz @ ∏/4-DQPSK)



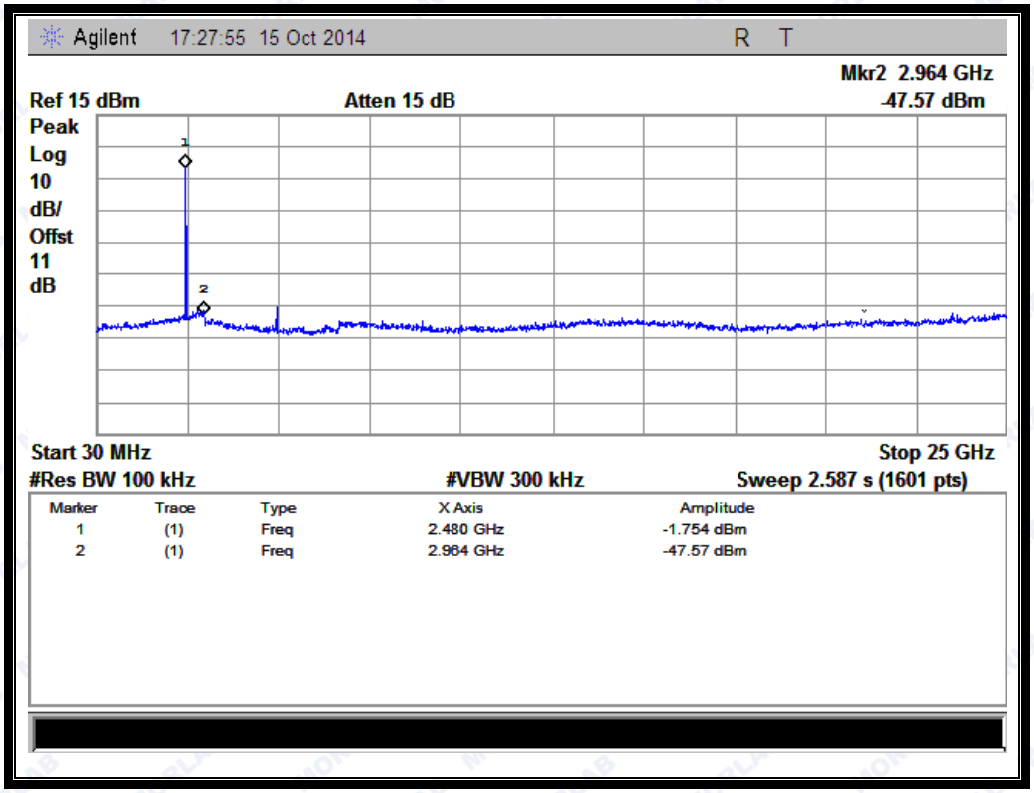
(Channel = 0, Band edge @ ∏/4-DQPSK)



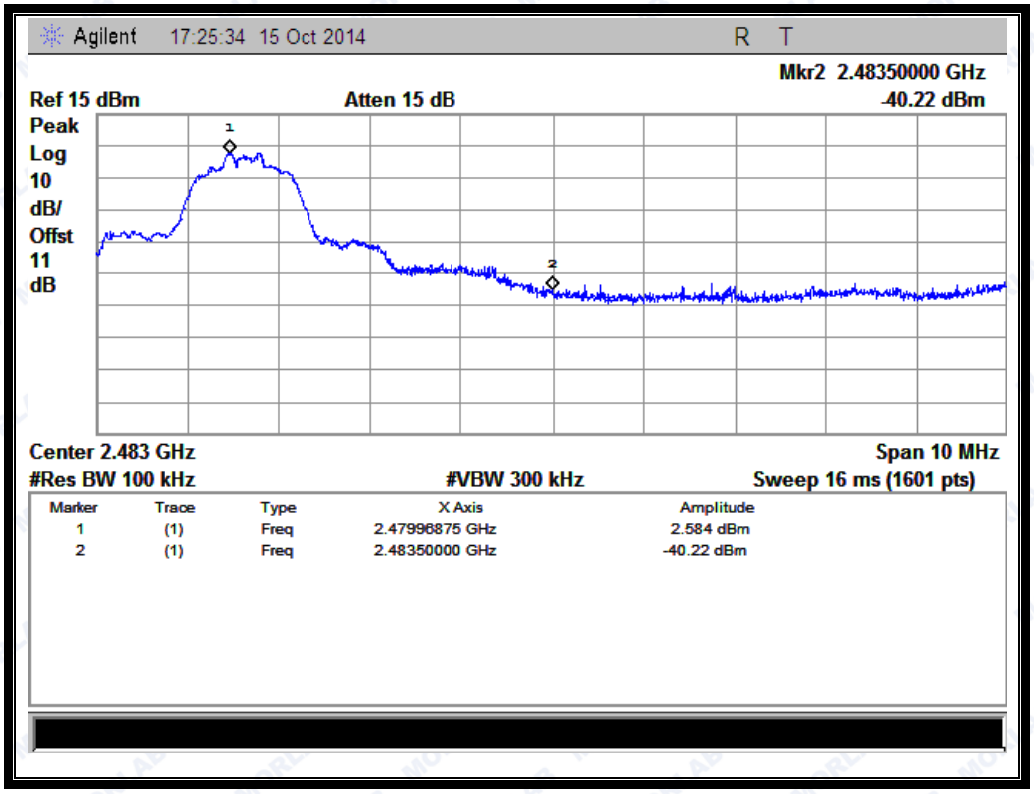
(Channel = 0, Band edge with hopping on @ ∏/4-DQPSK)



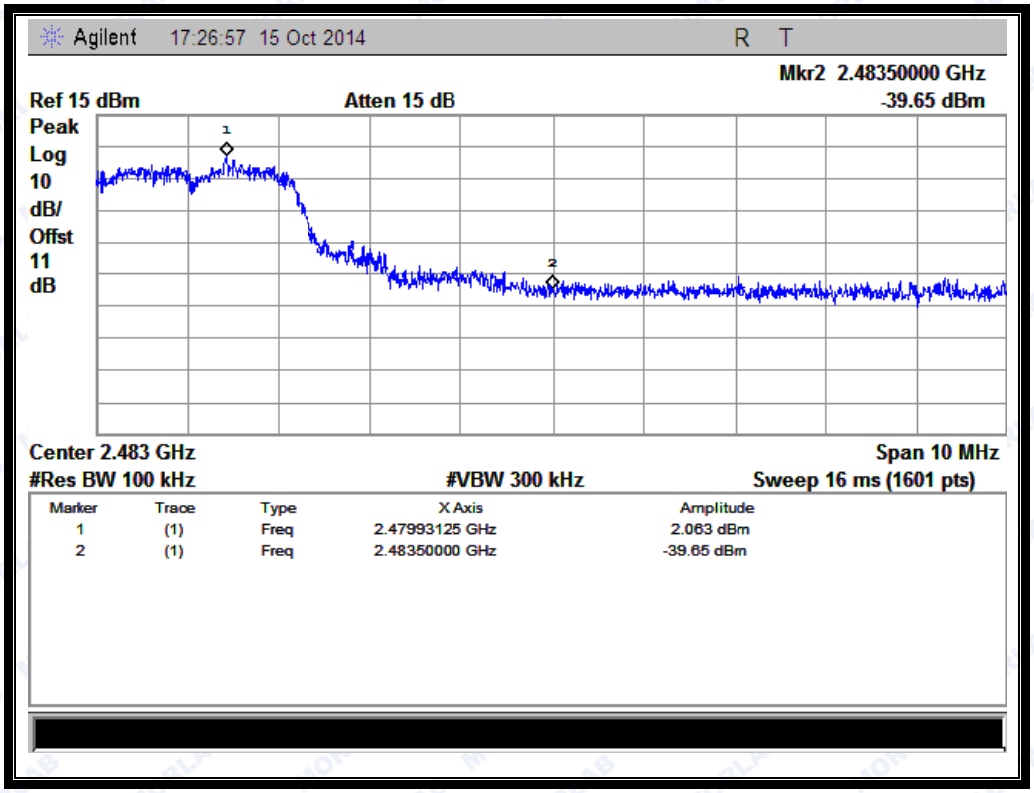
(Plot E.1: Channel = 39, 30MHz to 25GHz @ ∏/4-DQPSK)



(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)

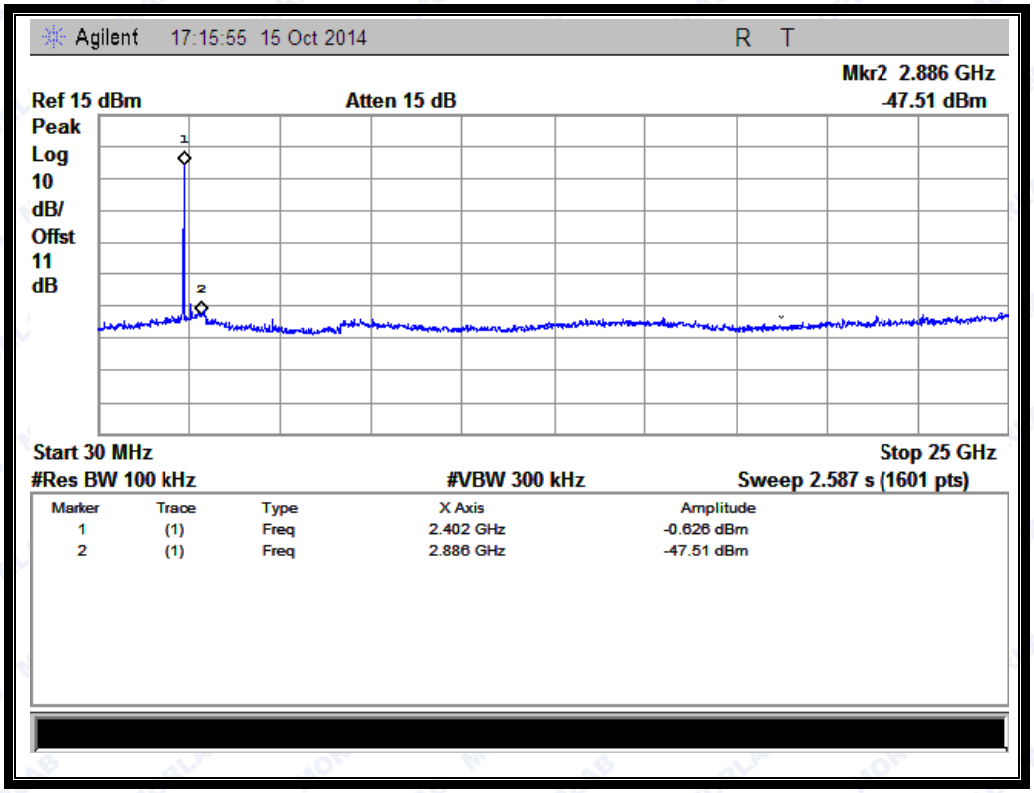
2.7.4.3. 8-DPSK Mode

A. Test Verdict:

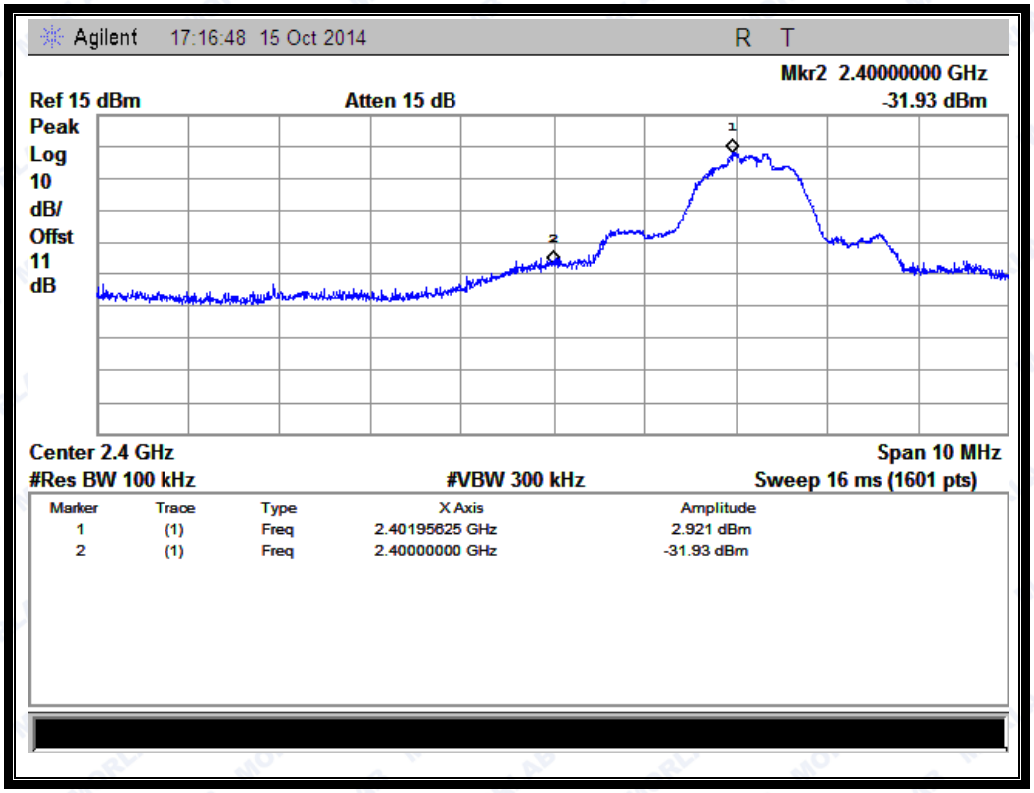
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-47.51	Plot G.1	-0.626	-20.6	PASS
39	2441	-45.10	Plot H.1	-0.873	-20.9	PASS
78	2480	-45.73	Plot I.1	1.207	-18.8	PASS

B. Test Plots:

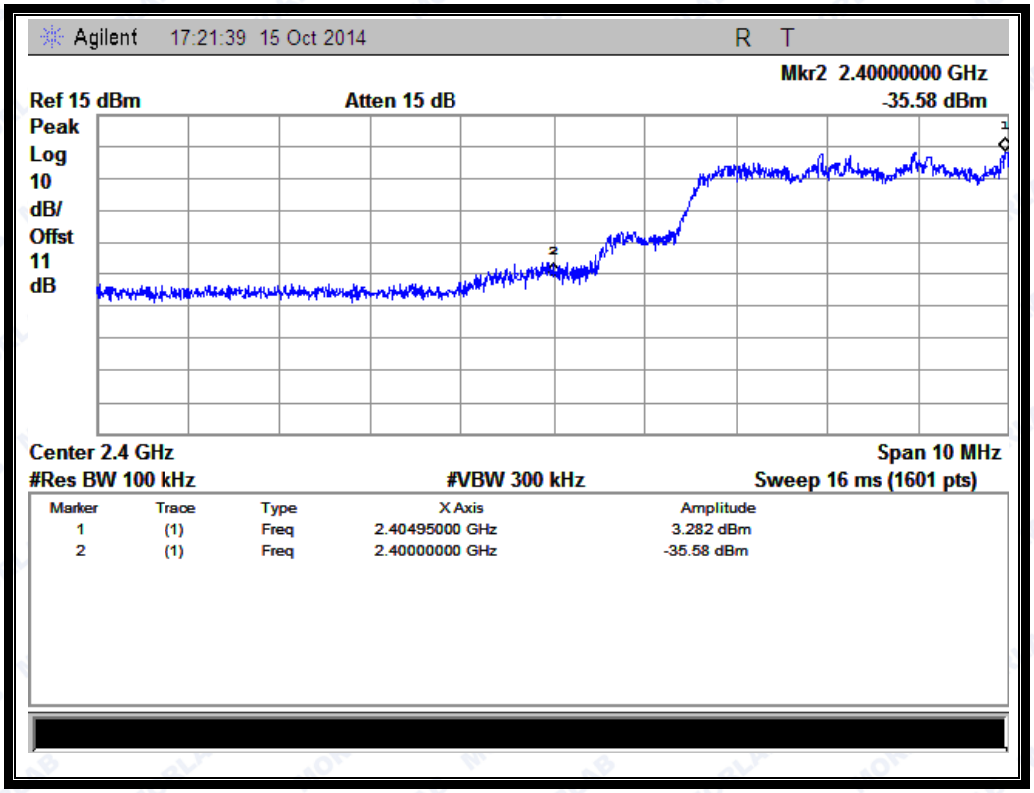
Note: the power of the Module transmitting frequency should be ignored.



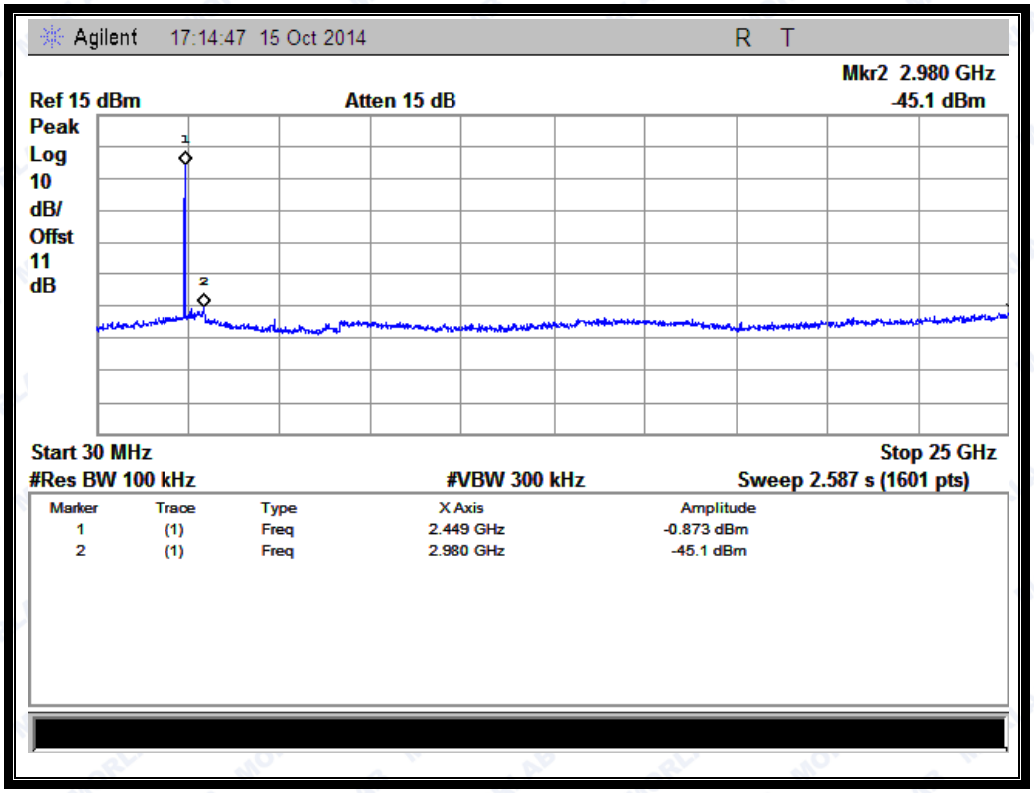
(Plot G.1: Channel = 0, 30MHz to 25GHz @ 8-DPSK)



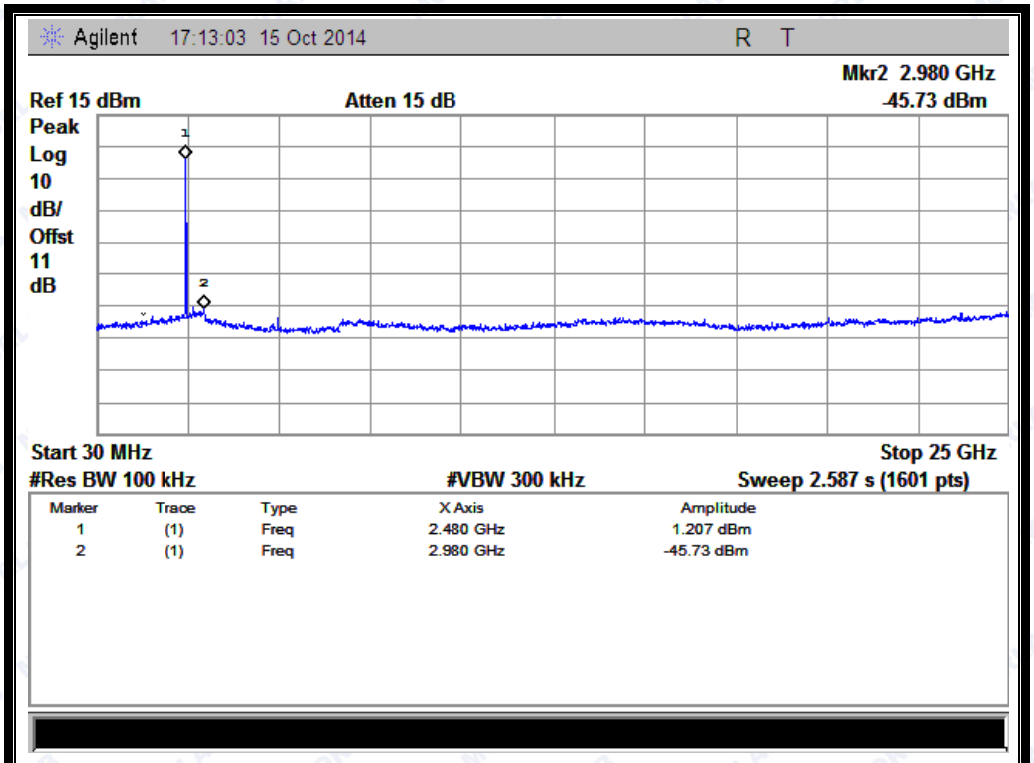
(Channel = 0, Band edge @ 8-DPSK)



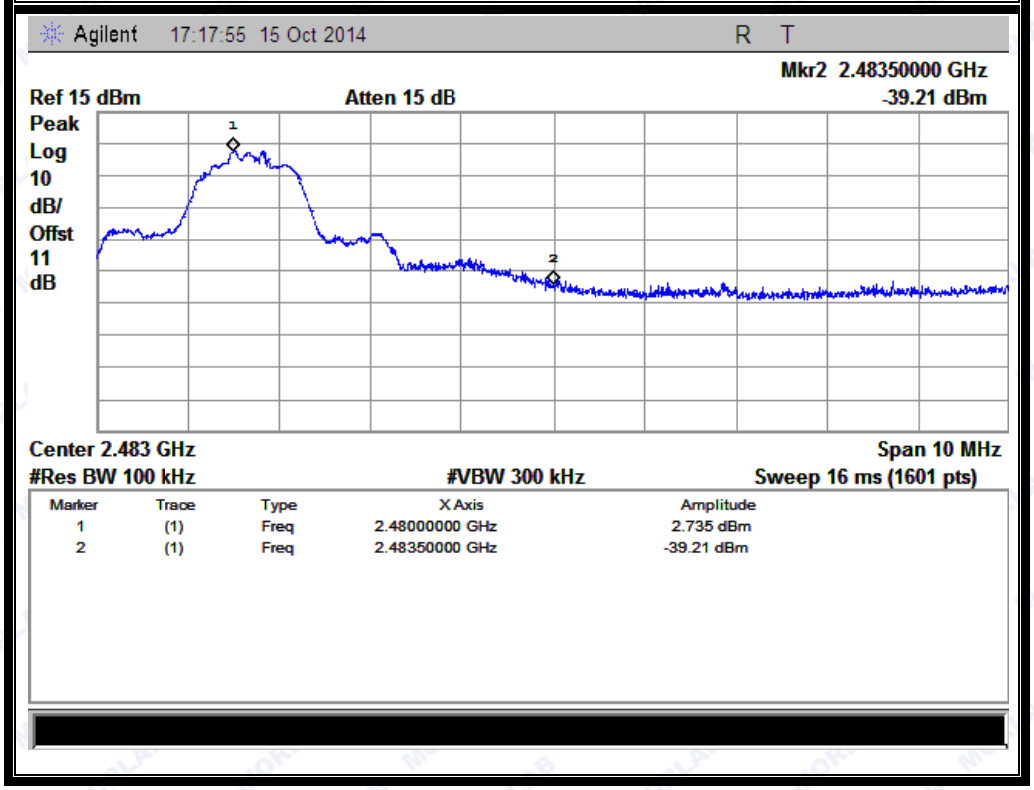
(Channel = 0, Band edge with hopping on @ 8-DPSK)



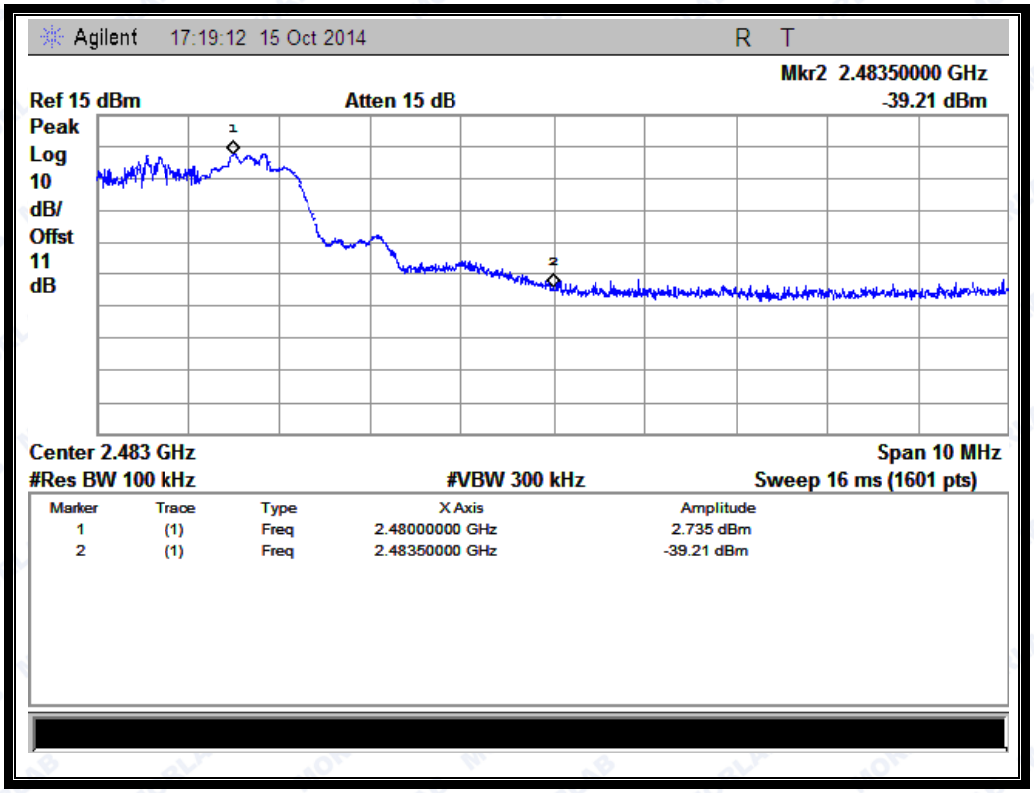
(Plot H.1: Channel = 39, 30MHz to 25GHz @ 8-DPSK)



(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)

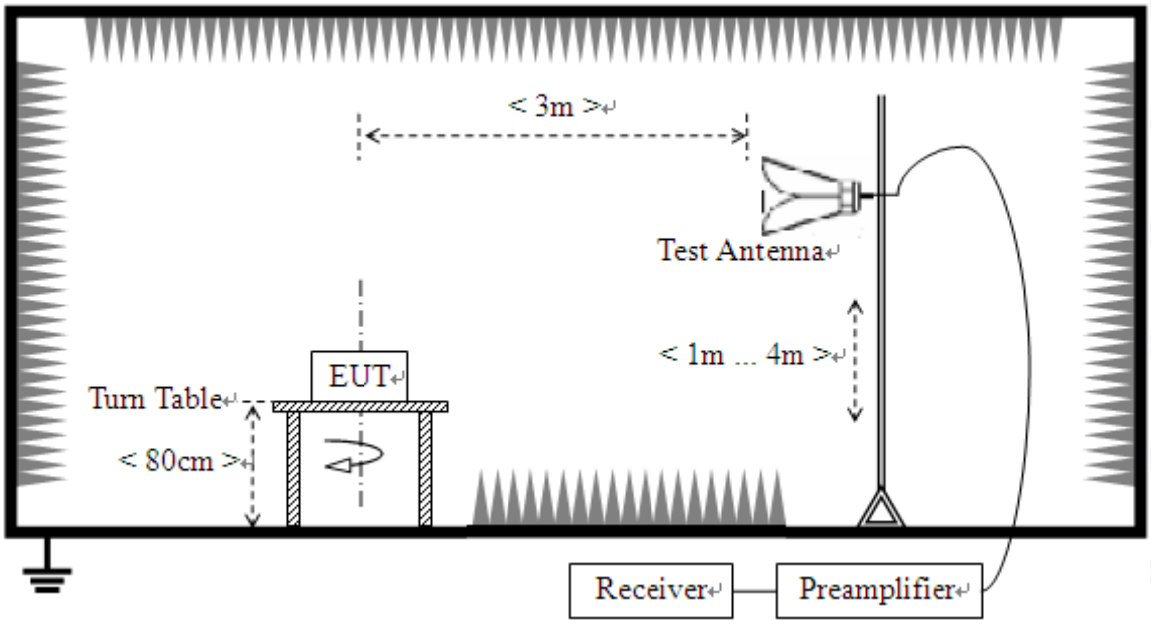
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), 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 byte s 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:

Please reference ANNEX A(1.4).

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

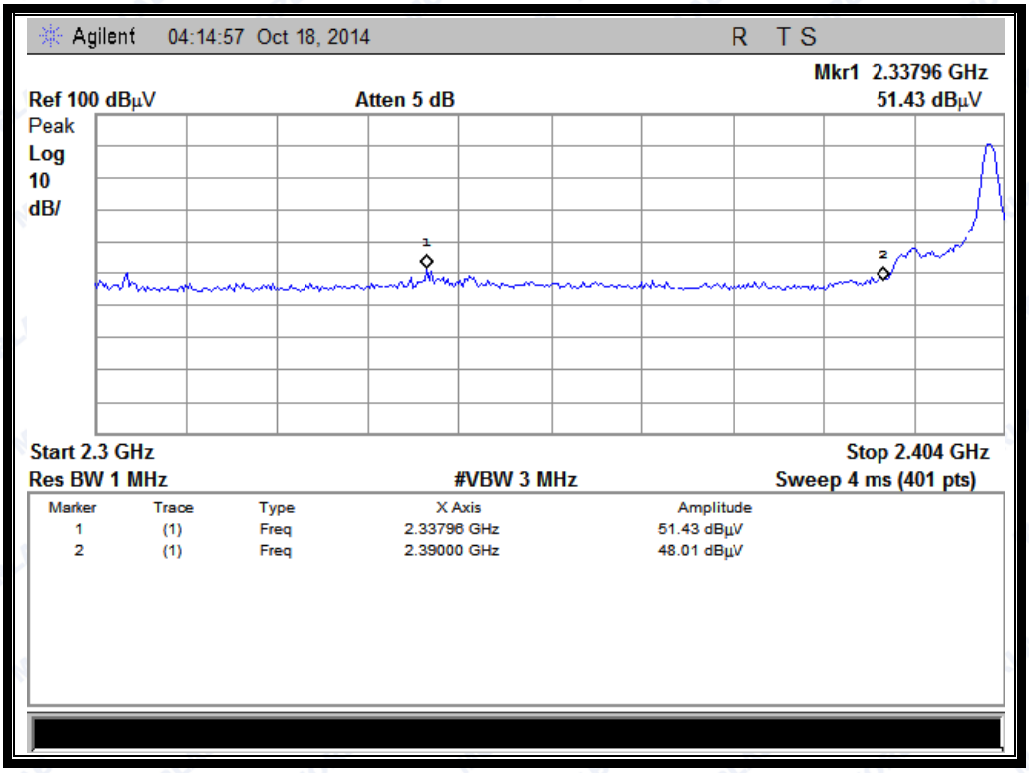
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =UR + AT + AFactor [dB]; AT =LCable loss [dB]-Gpreamp [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain
AFactor: Antenna 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

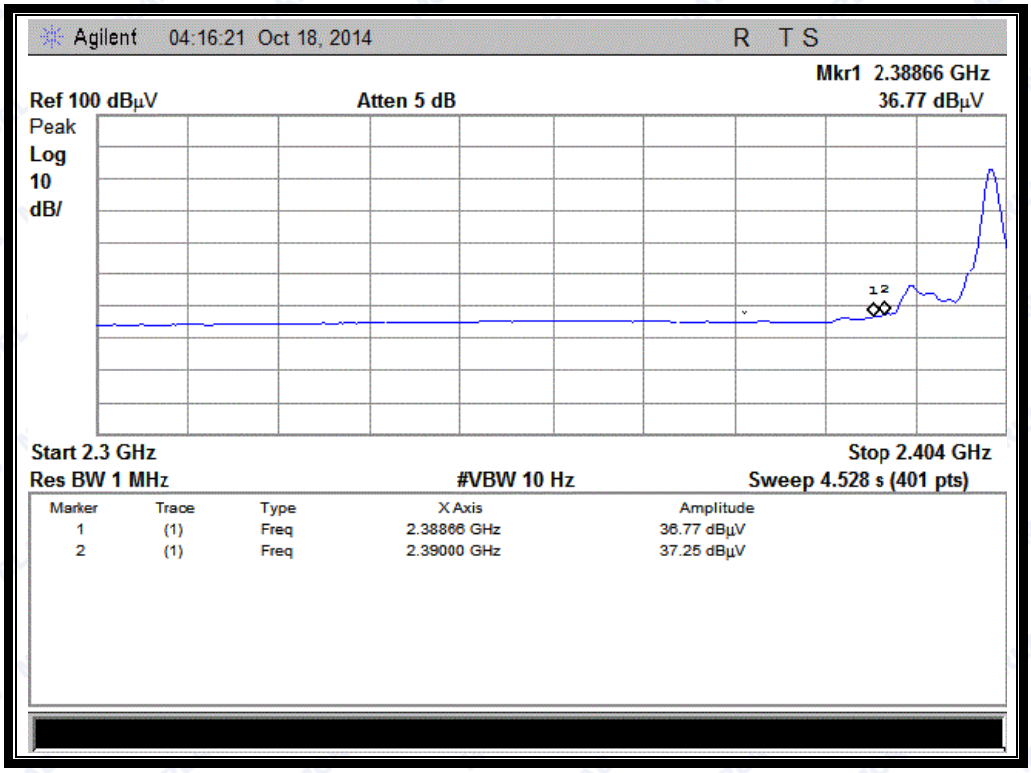
A. Test Verdict:

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	2337.96	PK	51.43	-33.63	32.56	50.36	74	Pass
0	2388.66	AV	36.77	-33.63	32.56	35.70	54	Pass
78	2488.51	PK	59.14	-33.18	32.5	58.46	74	Pass
78	2489.06	AV	47.57	-33.18	32.5	46.89	54	Pass

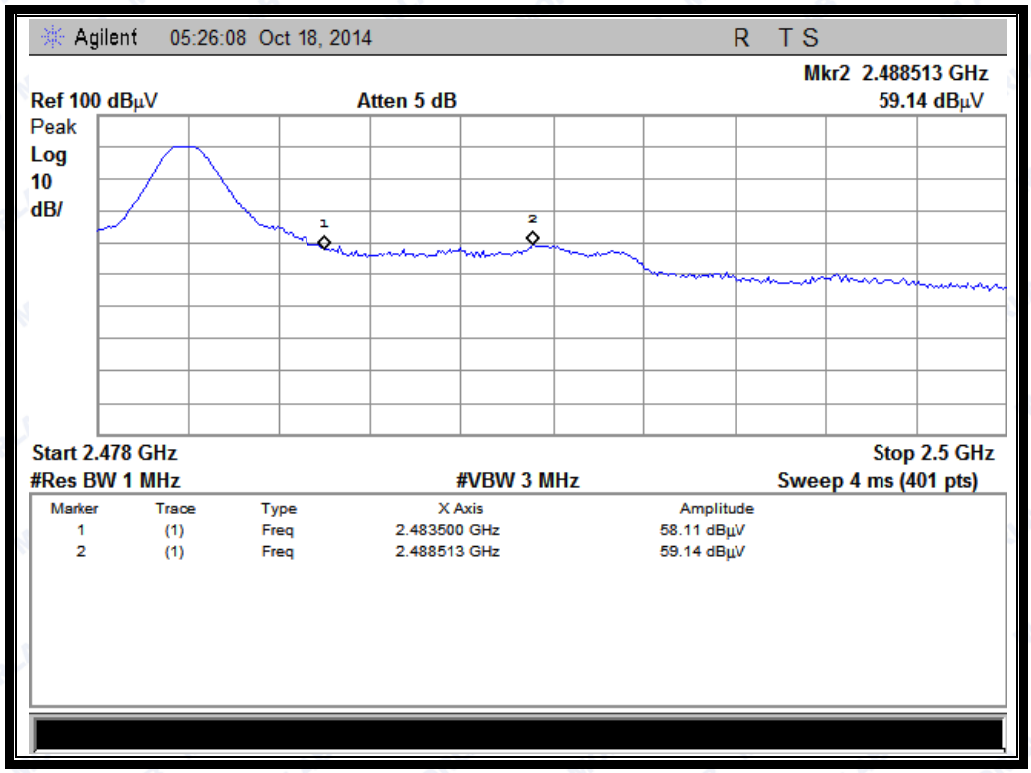
B. Test Plots:



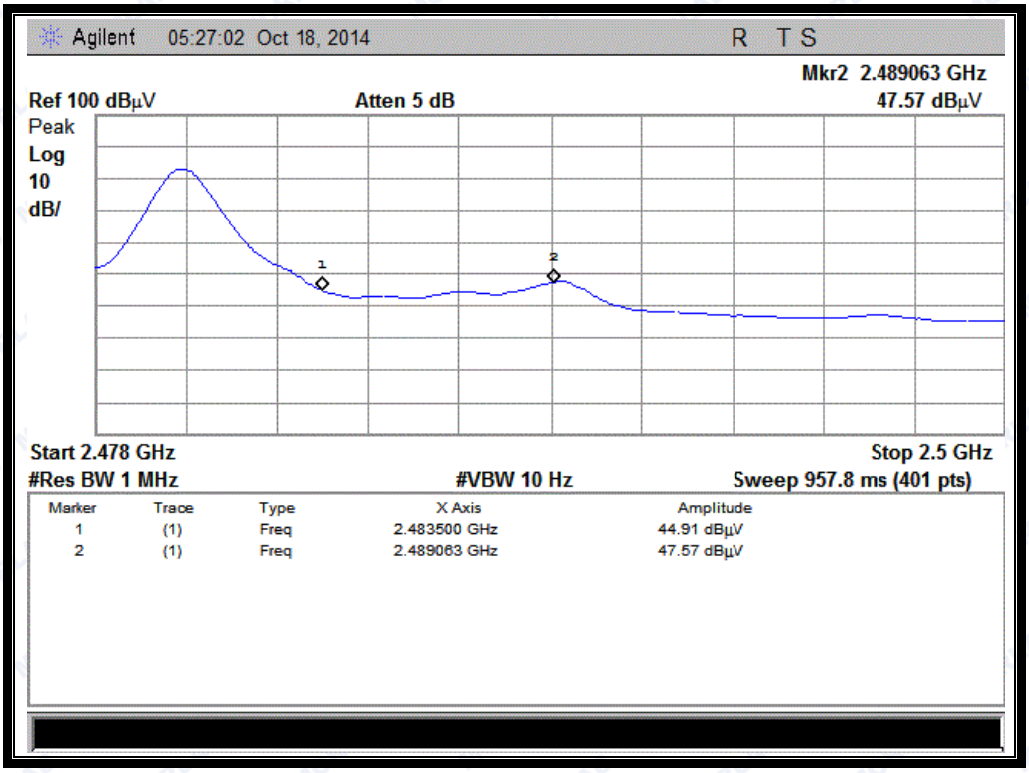
(Plot A1:Channel = 0 PEAK @ GFSK)



(Plot A2:Channel = 0 AVERAGE @ GFSK)



(Plot B1:Channel = 78 PEAK @ GFSK)



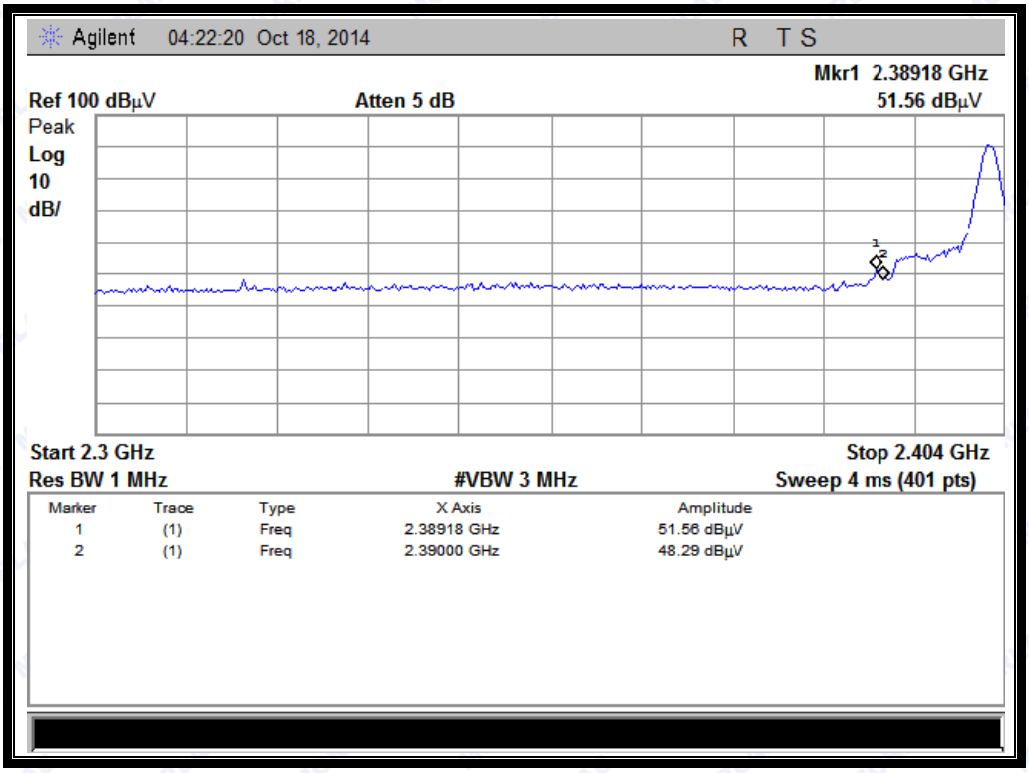
(Plot B2: Channel = 78 AVERAGE @ GFSK)

2.8.4.2. ∏/4-DQPSK Mode

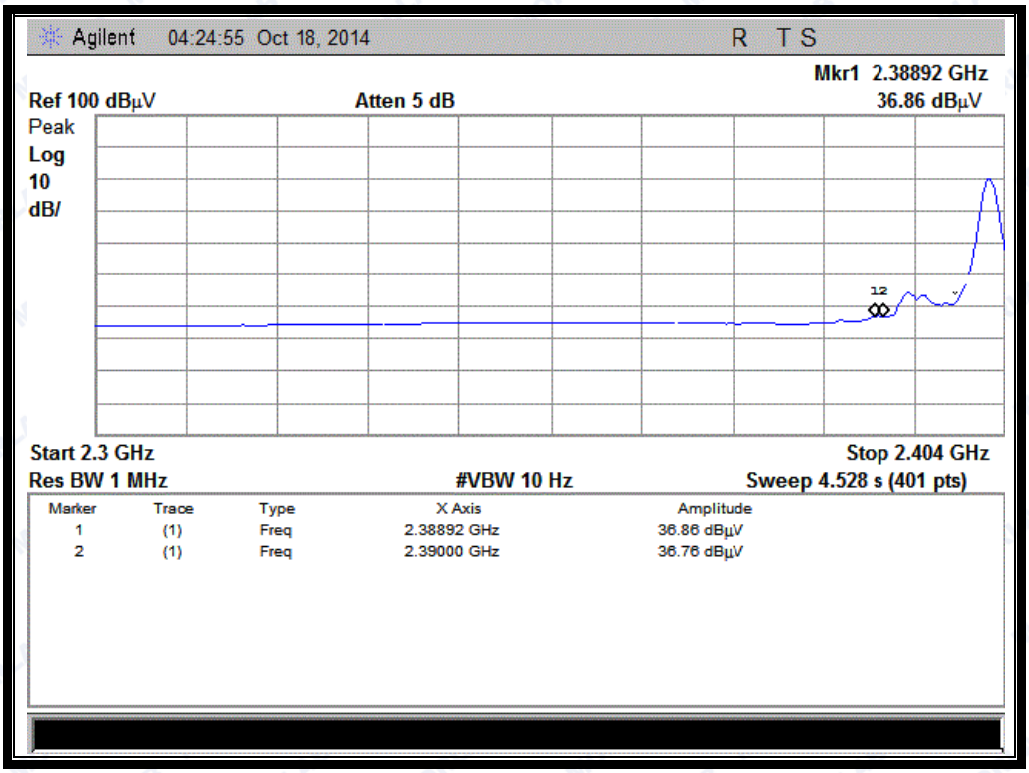
A. Test Verdict:

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	2389.18	PK	51.56	-33.63	32.56	50.49	74	Pass
0	2388.92	AV	36.86	-33.63	32.56	35.79	54	Pass
78	2483.50	PK	58.38	-33.18	32.5	57.70	74	Pass
78	2489.06	AV	45.53	-33.18	32.5	44.85	54	Pass

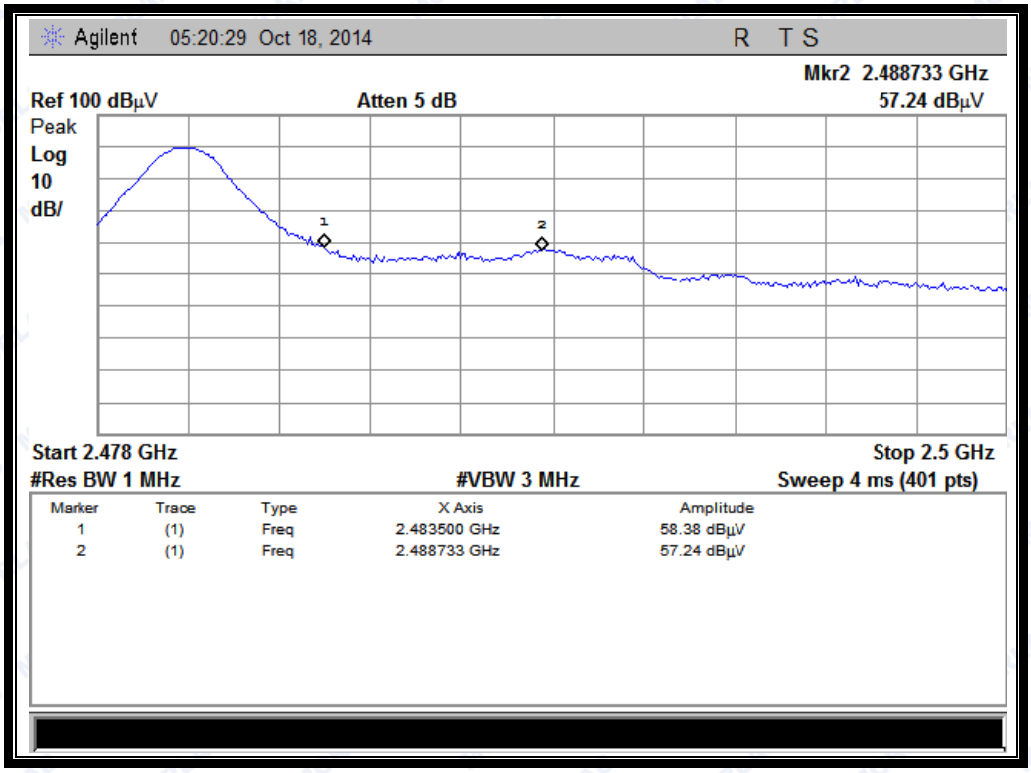
B. Test Plots:



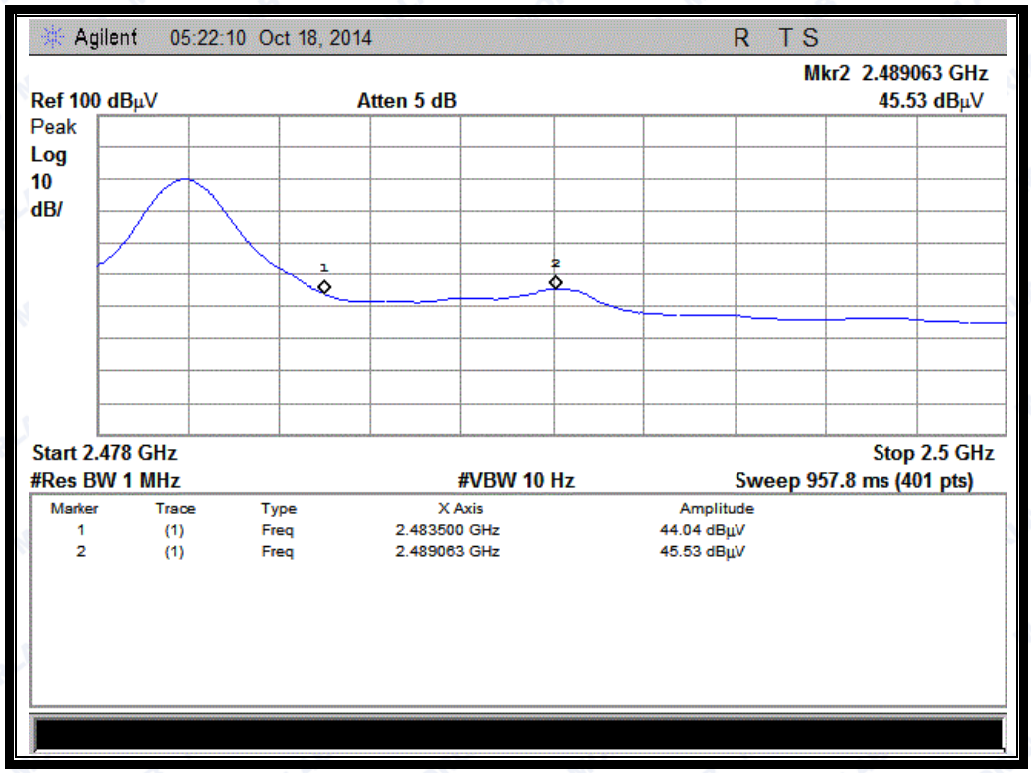
(Plot C1: Channel = 0 PEAK @ ∏/4-DQPSK)



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



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



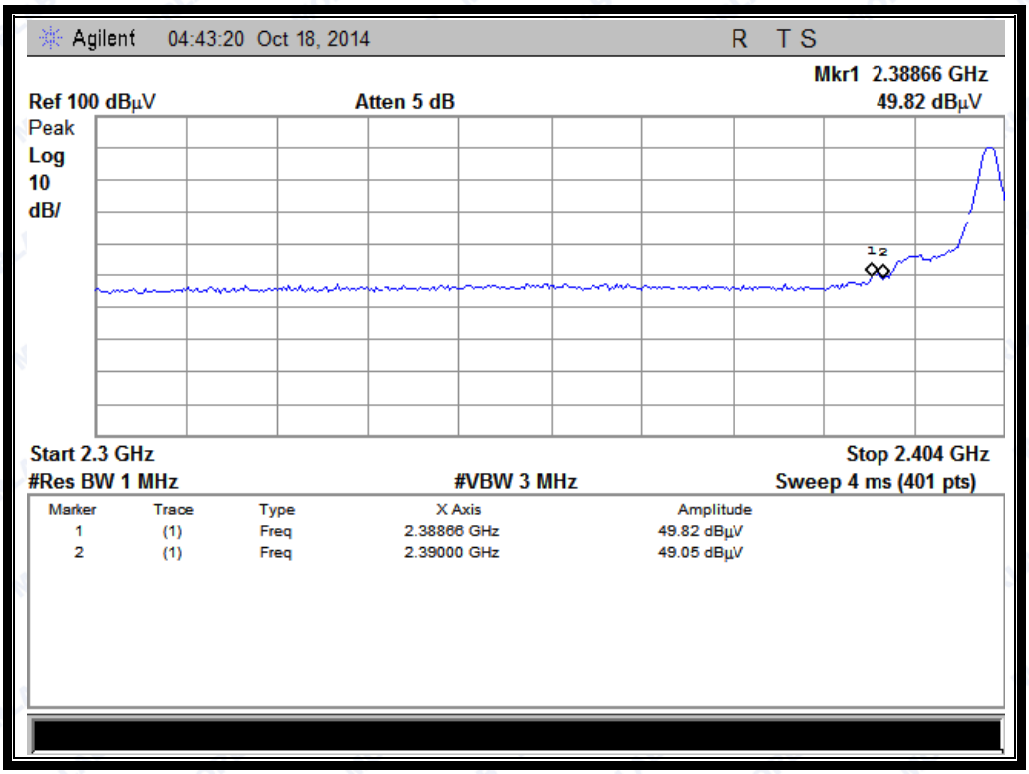
(Plot D2: Channel = 78 AVERAGE@ ∏/4-DQPSK)

2.8.4.3. 8-DPSK Mode

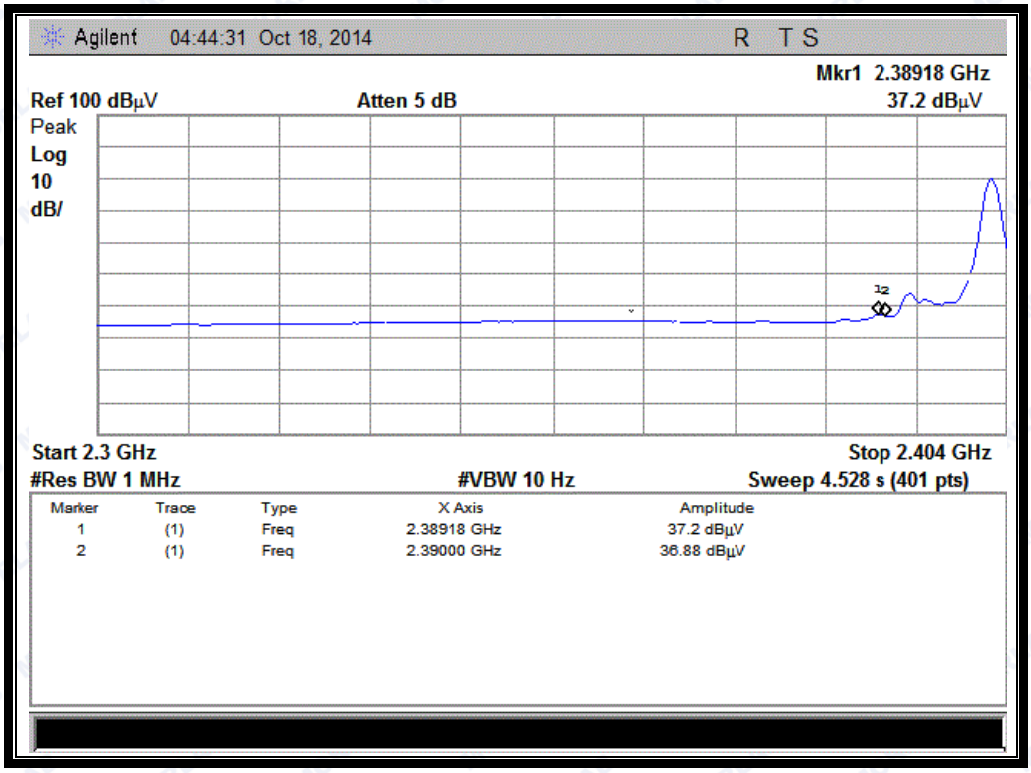
A. Test Verdict:

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	2388.66	PK	49.82	-33.63	32.56	48.75	74	Pass
0	2389.18	AV	37.20	-33.63	32.56	36.13	54	Pass
78	2483.50	PK	61.60	-33.18	32.5	60.92	74	Pass
78	2489.67	AV	40.84	-33.18	32.5	40.16	54	Pass

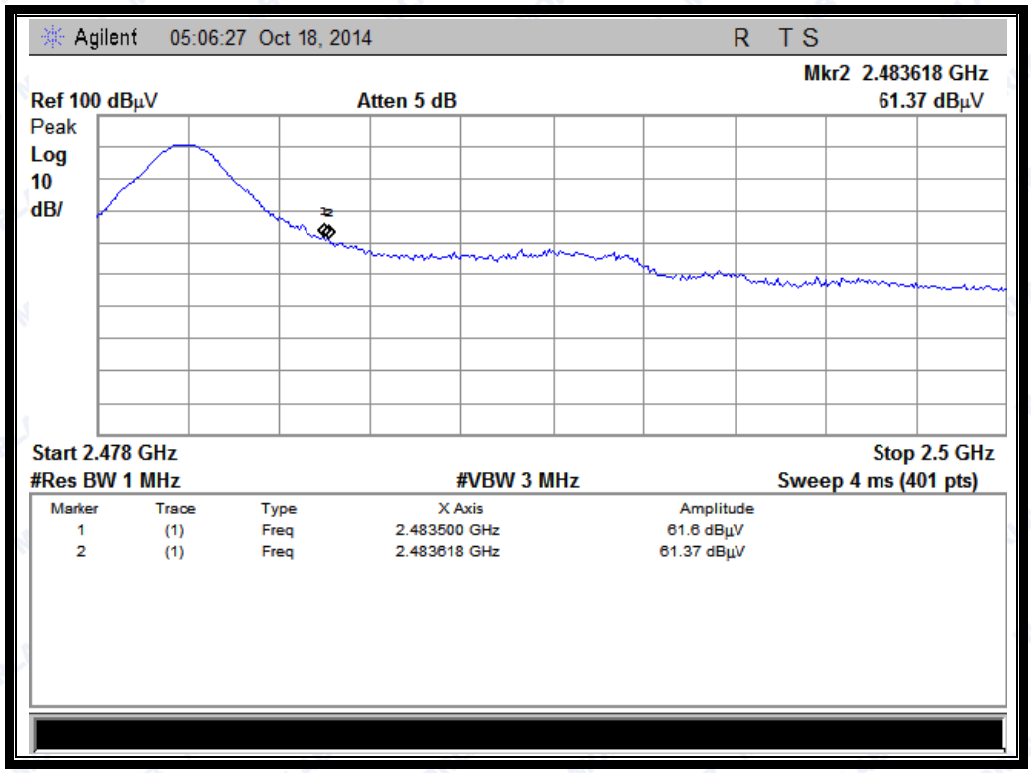
B. Test Plots:



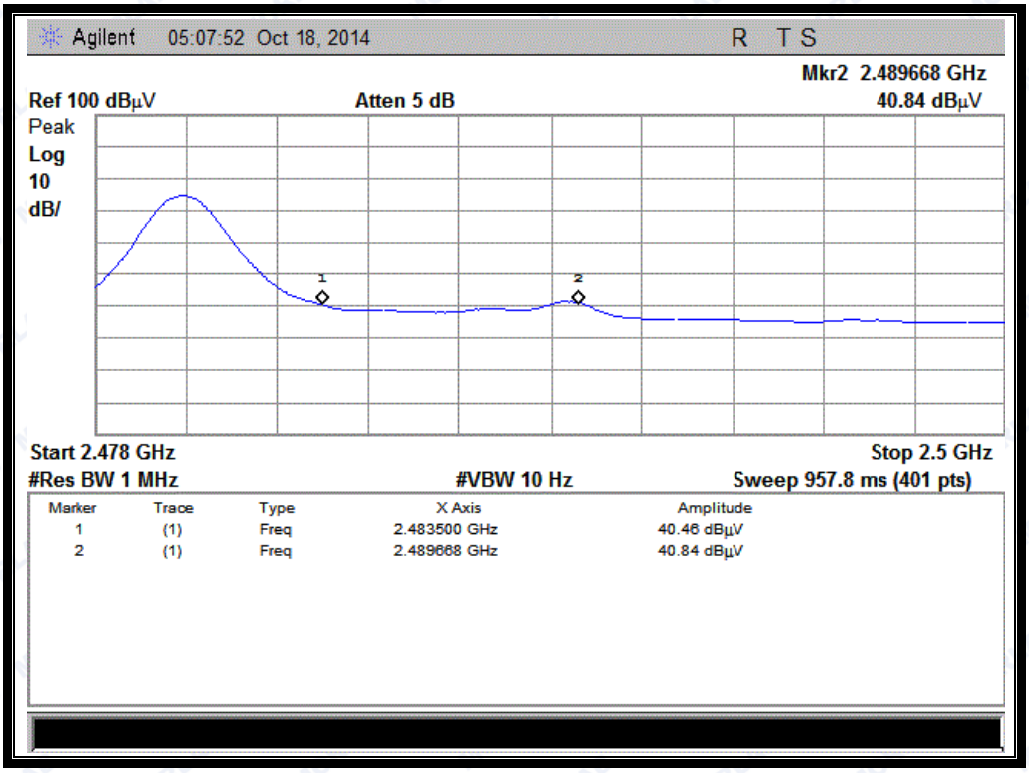
(Plot E1: Channel = 0 PEAK @ 8-DPSK Mode)



(Plot E2: Channel = 0 AVERAGE @ 8DPSK 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, 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

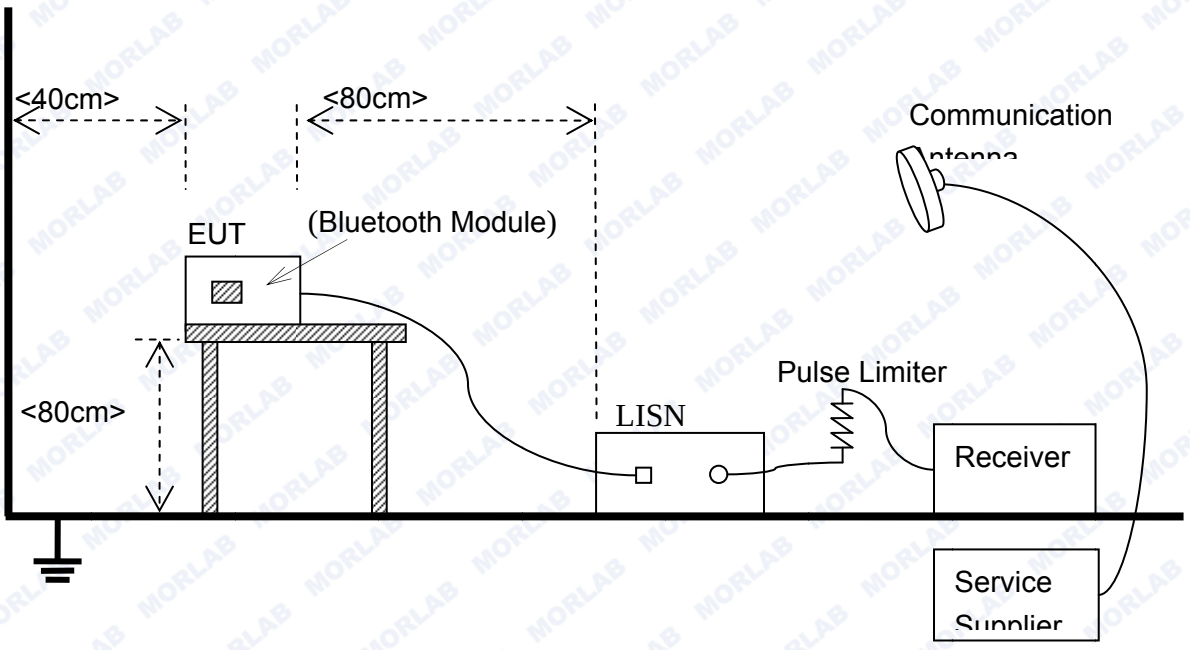
NOTE:

(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 EUT 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:

Please reference ANNEX A(1.4).

2.9.3. Test Result

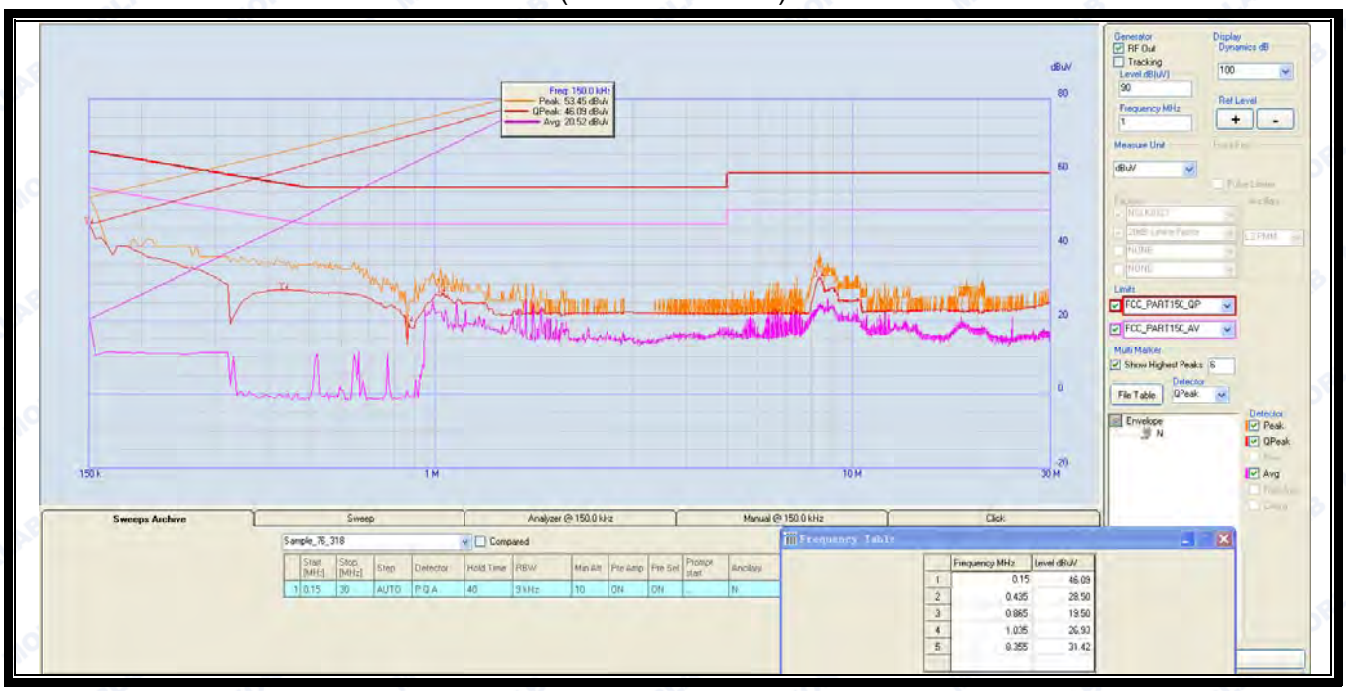
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT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

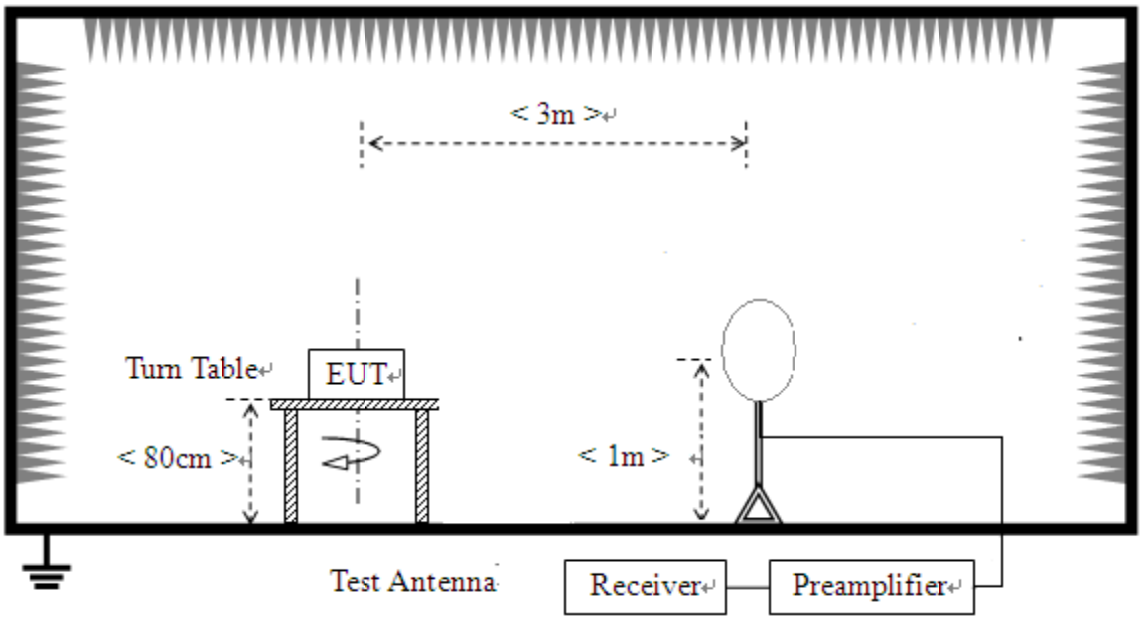
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

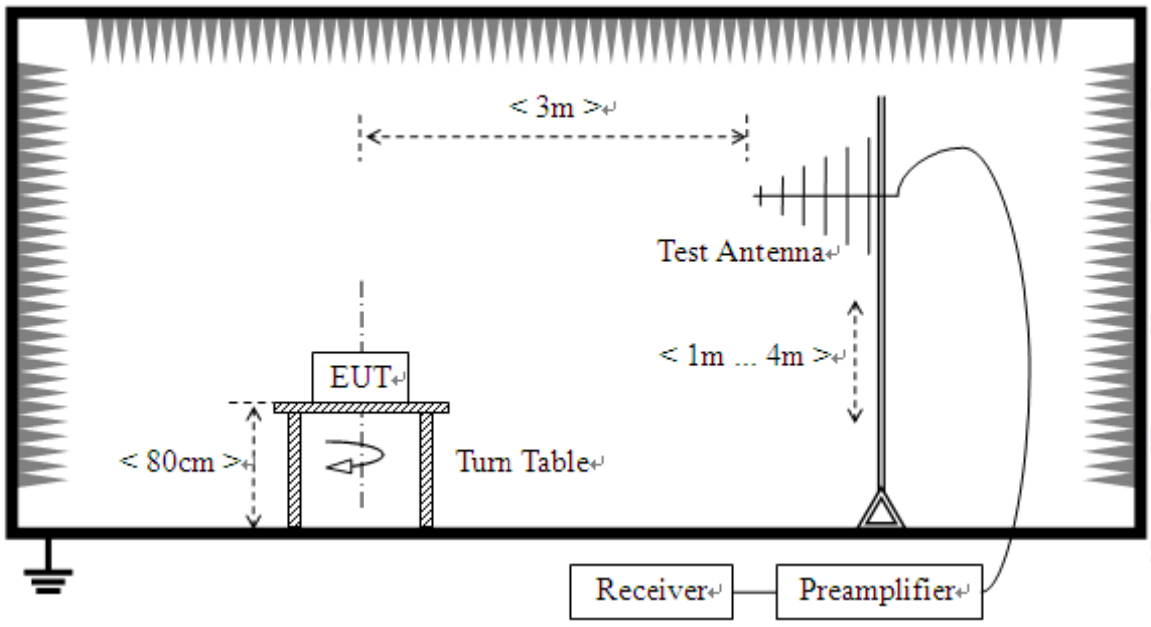
2.10.2. Test Description

A. Test Setup:

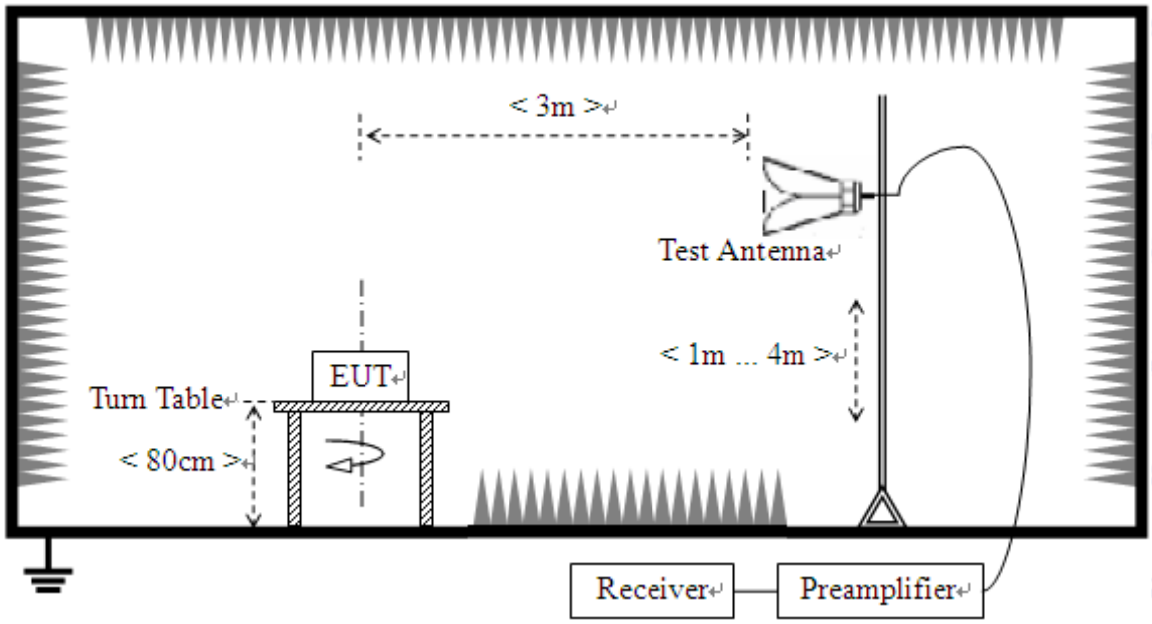
1) For radiated emissions from 9kHz to 30MHz



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 EUT 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:

Please reference ANNEX A(1.4).

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.

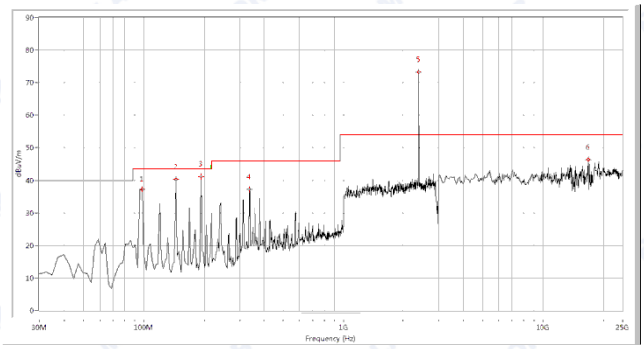
Note: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

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:

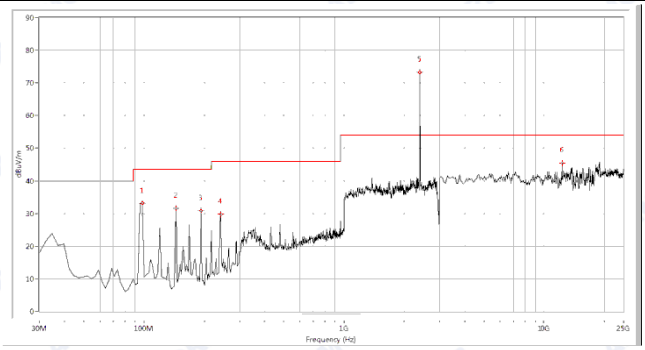
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	37.31	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.19	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	41.24	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
334.788	37.25	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2402.000	73.24	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
16825.436	46.38	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

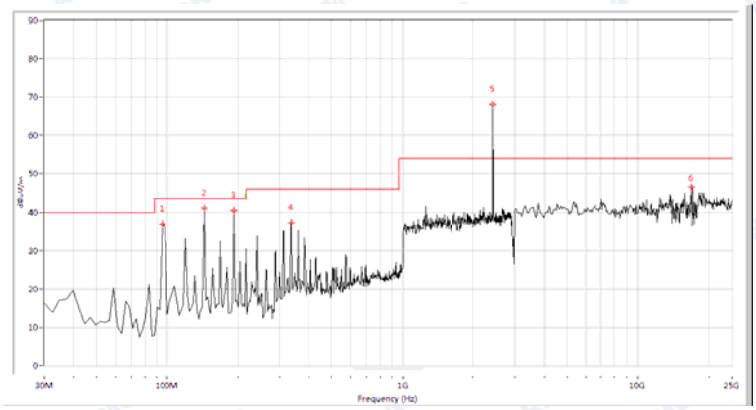
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	33.22	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	31.59	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
192.070	30.78	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	29.84	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2402.000	73.23	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
12381.546	45.45	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

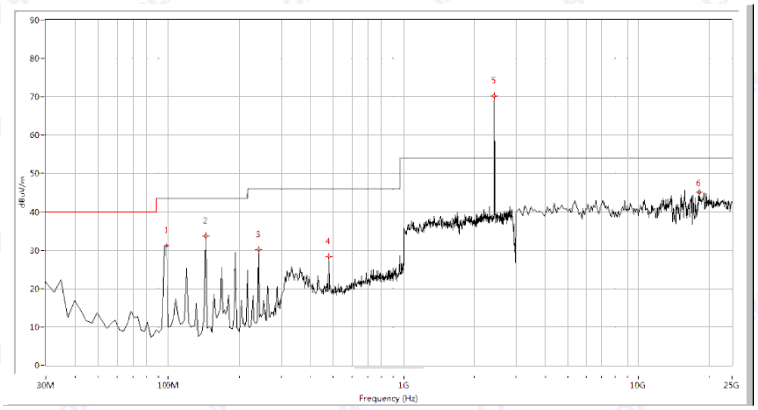
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	36.85	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.92	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.44	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	37.26	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2441.000	68.07	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
16825.436	46.44	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

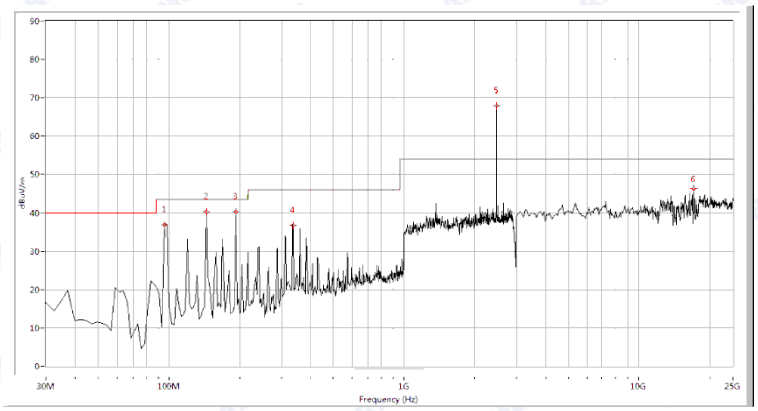
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	31.17	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	33.76	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	30.04	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
479.925	28.37	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2441.000	70.19	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
18142.145	45.08	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

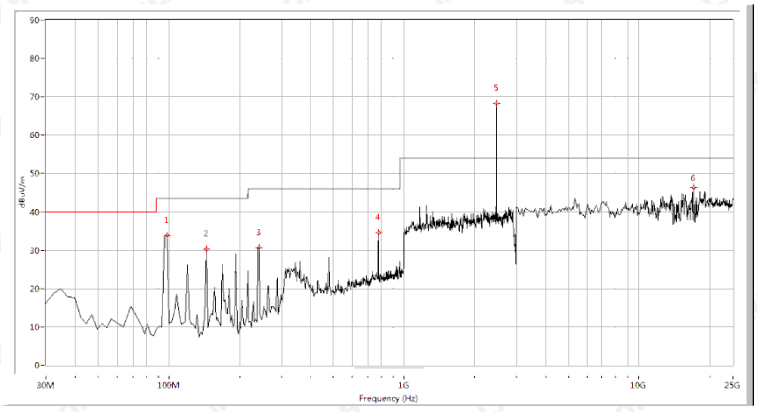
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	36.83	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.30	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.34	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	36.70	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2480.000	67.87	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	46.33	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 78)



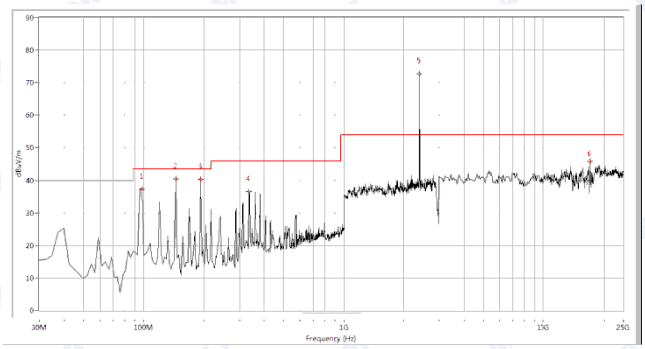
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	33.79	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	30.21	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	30.71	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
779.875	34.65	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2480.000	68.19	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	46.39	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 78)

2.10.4.2. ∏/4-DQPSK Mode：

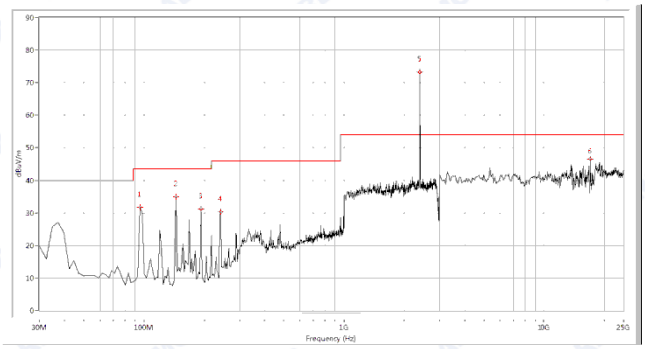
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	37.33	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.47	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.31	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
334.788	36.60	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2402.000	72.69	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	45.77	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

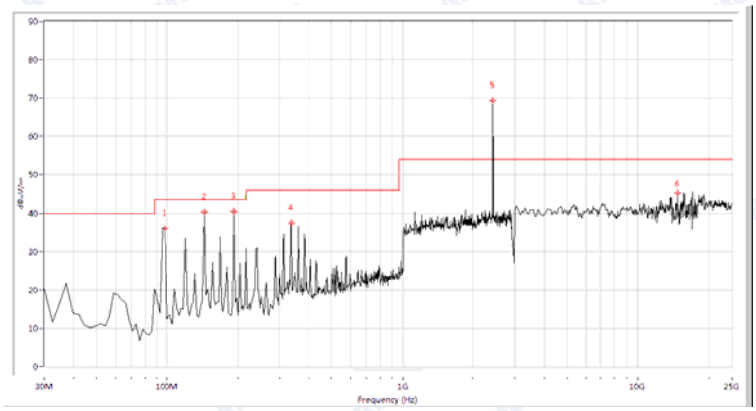
(30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	31.67	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	34.88	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
192.070	31.18	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	30.32	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2402.000	73.32	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	46.56	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

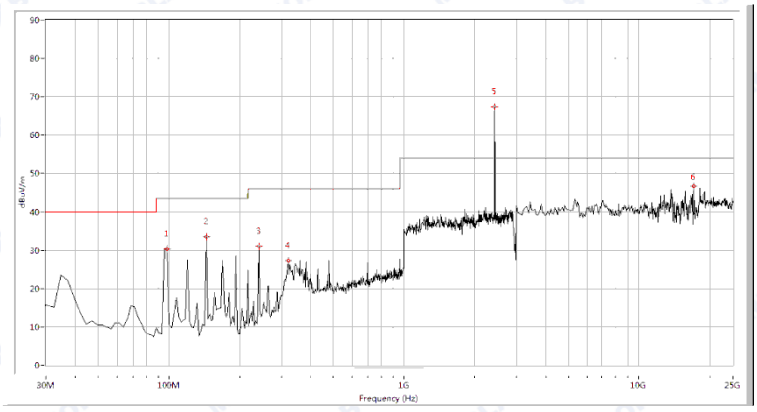
(30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	36.01	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.22	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.45	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	37.49	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2441.000	69.30	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
14795.511	45.27	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

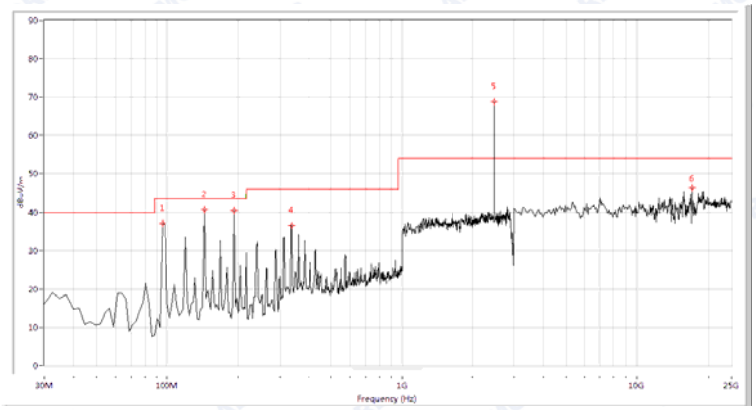
(30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	30.36	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	33.49	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	30.98	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
320.274	27.19	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2441.000	67.35	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	46.70	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

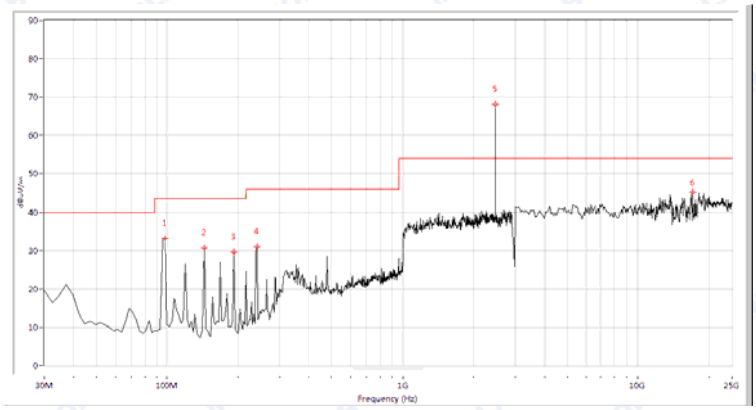
(30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	36.99	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.62	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.50	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	36.47	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2480.000	68.72	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	46.28	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal @ ∏/4-DQPSK, channel 78)



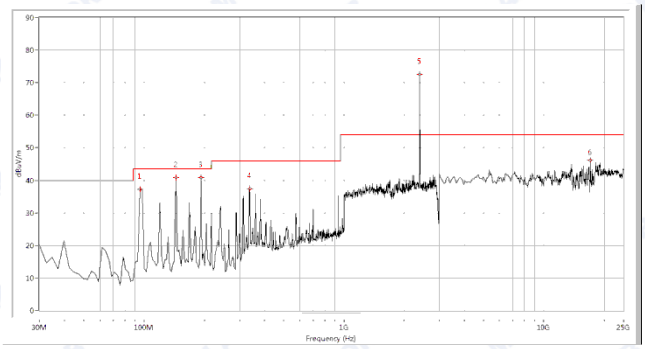
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	33.11	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	30.62	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
192.070	29.52	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	31.02	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2480.000	68.08	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	45.27	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical @ ∏/4-DQPSK, channel 78)

2.10.4.3. 8-DPSK Mode:

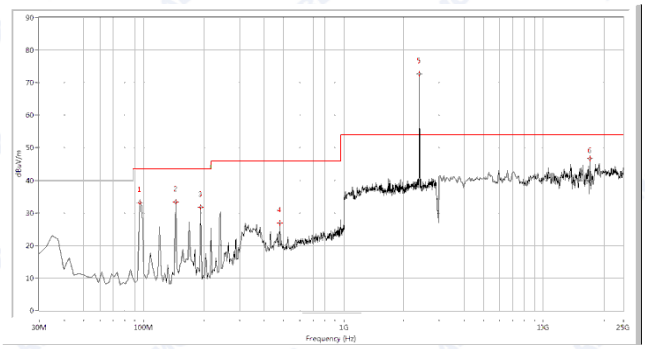
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	37.23	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.83	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.83	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	37.40	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2402.000	72.50	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	46.10	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

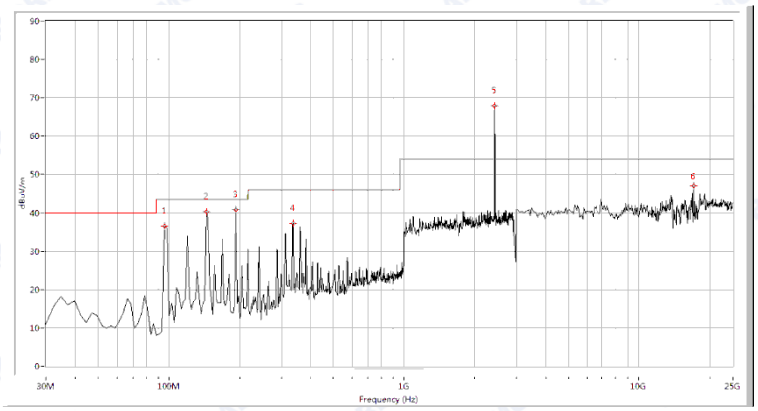
(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 0)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	33.18	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	33.38	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
192.070	31.79	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
479.925	26.93	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2402.000	72.68	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	46.75	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

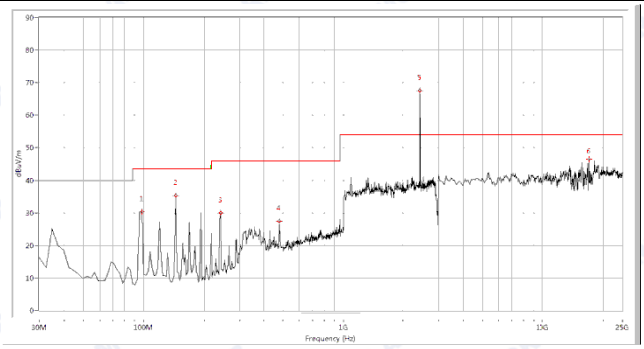
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	36.51	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.22	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.73	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	37.19	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2441.000	67.93	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	47.00	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

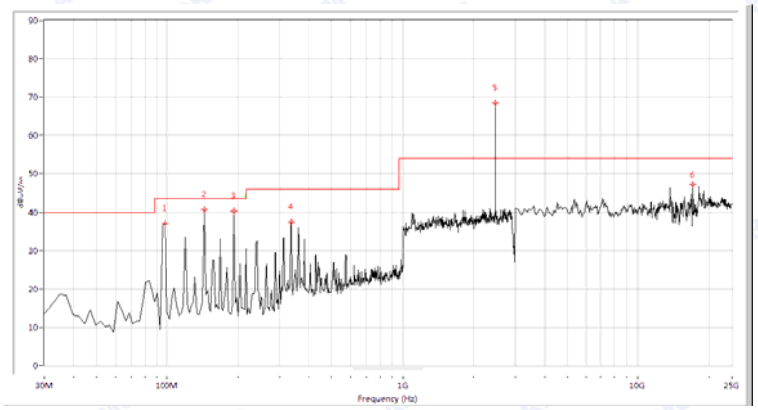
(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	30.27	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	35.30	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	30.02	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
479.925	27.47	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2441.000	67.61	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
17099.751	46.55	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

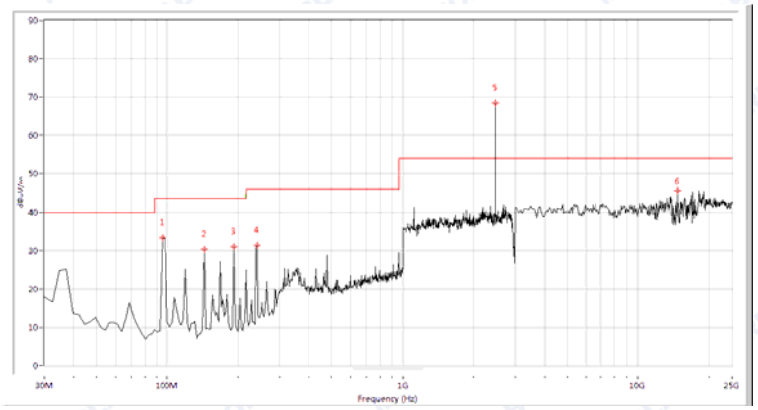
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 39)

Plot for Channel = 78



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
97.731	37.01	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
143.691	40.61	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
192.070	40.34	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
337.207	37.45	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2480.000	68.48	N.A	N.A	N.A	N.A	N.A	Horizontal	N.A
17099.751	47.16	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 78)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.312	33.40	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
143.691	30.29	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
192.070	30.95	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
240.449	31.45	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2480.000	68.42	N.A	N.A	N.A	N.A	N.A	Vertical	N.A
14795.511	45.70	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 78)

2.11. RF exposure evaluation

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

2.11.1. Limits for Maximum Permissible Exposure

According to FCC Part 1.1307, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

According to FCC Part 1.1310 RF exposure is calculated.

Limits for General Population/ Uncontrolled Exposure			
Frequency Range (MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength (H)(A/m)	Power Density (S)(mW/cm2)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f2)*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

2.11.1.1. Test result

Maximum peak output power at antenna input terminal(dBm):	2.989
Maximum peak output power at antenna input terminal(mW):	1.990
Source-based time-averaged output power:	--
Prediction distance(cm):	20
Predication frequency(MHz):	
Antenna Gain (typical) (dBi):	1.0
Power density at predication frequency at 20 cm(mW/cm^2):	0.000498
MPE limit for RF exposure at prediction frequency(mW/cm^2):	1.0

2.11.2. Conclusion

Since the test result is passed, the SAR measurement is not required.

Annex A General Information

1.1 Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, Shen Zhen, Gu angDong Province, P. R. China
Responsible Test Lab Manager:	Mr. u Rong
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 Identification of the Responsible Testing Location

Name:	Shenzhen Morla b Commun ications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn Di strict, Shen Zhen, Gua ngDong Province, P. R. China

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Tech nology C o., L td. Morlab Lab oratory is a testing organization accredit ed b y Ch ina Nation al Accredit ation Servi ce for Co nformity A ssessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect t he 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, A NSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

The IC registration number is 7183A-2.

1.4 Test Equipments Utilized

1.4.1Conducted Test Equipments

Conducted Test Equipment						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
1	System Simulator	6K00006210	MT8852B	Anritsu	2014.02.26	2015.02.25
2	Spectrum Analyzer	US44210471	E7405A	Agilent	2014.02.26	2015.02.25
3	Power Splitter	NW521	1506A	Weinschel	2014.02.26	2015.02.25
4	Attenuator 1	(n.a.)	10dB	Resnet	2014.02.26	2015.02.25
5	Attenuator 2	(n.a.)	3dB	Resnet	2014.02.26	2015.02.25
6	EXA Signal Analzyer	MY51440152	N9010A	Agilent	2014.02.26	2015.02.25
5	USB Wideband Power Sensor	MY52280010	U2021XA	Agilent	2014.02.26	2015.02.25

1.4.2Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
1	Receiver	US44210471	E7405A	Agilent	2014.02.26	2015.02.25
2	LISN	812744	NSLK 8127	Schwarzbeck	2014.02.26	2015.02.25
3	Service Supplier	100448	CMU200	R&S	2014.02.26	2015.02.25
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2014.02.26	2015.02.25

1.4.3Radiated Test Equipments

Radiated Test Equipments						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due Date
1	System Simulator	100448	CMU200	R&S	2014.02.26	2015.02.25
2	Receiver	US44210471	E7405A	Agilent	2014.02.26	2015.02.25

3	Test Antenna - Bi-Log	9163-274	9m*6m*6m	Albatross	2014.02.26	2015.02.25
4	Test Antenna - Horn	9120D-963	VULB 9163	Schwarzbeck	2014.02.26	2015.02.25
5	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2014.02.26	2015.02.25
6	Test Antenna - Loop	1519-022	HL050S7	R&S	2014.02.26	2015.02.25
7	Reject Filter	(n.a.)	BRM50702	Micro-Tronics	2014.02.26	2015.02.25

1.4.4Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2014.02.26	2015.02.25

1.4.5Vibration Table

Vibration Table						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2014.02.26	2015.02.25

1.4.6Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Albatross	2014.02.26	2015.02.25

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