REPORT No.: SZ15080041W02

FCC RF TEST REPORT

APPLICANT	:	TCL Communication Ltd.
PRODUCT NAME	:	Tablet PC
MODEL NAME	:	8080
TRADE NAME	:	ONETOUCH PIXI 3 (10)
BRAND NAME	:	ALCATEL ONETOUCH
FCC ID	:	2ACCJB024
STANDARD(S)	:	47 CFR Part 15 Subpart C
ISSUE DATE	:	2015-8-20

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

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

TEST REPORT DECLARATION 5

1. TECHNICAL INFORMATION 6

1.1 APPLICANT INFORMATION 6
1.2 EQUIPMENT UNDER TEST (EUT) DESCRIPTION 6
1.2.1 IDENTIFICATION OF ALL USED EUTS 7
1.3 AC ADAPTER DESCRIPTION 7
1.4 TEST STANDARDS AND RESULTS 7
1.4.1 TEST ENVIRONMENT CONDITIONS 8

2. 47 CFR PART 15C REQUIREMENTS 9

2.1 ANTENNA REQUIREMENT 9
2.1.1 APPLICABLE STANDARD 9
2.1.2 RESULT: COMPLIANT 9
2.2 NUMBER OF HOPPING FREQUENCY 9
2.2.1 REQUIREMENT 9
2.2.2 TEST DESCRIPTION 9
2.2.3 TEST PROCEDURE 10
2.2.4 TEST RESULT 10
2.3 PEAK OUTPUT POWER 14
2.3.1 REQUIREMENT 14
2.3.2 TEST DESCRIPTION 14
2.3.3 TEST RESULT 14
2.4 20DB BANDWIDTH 16
2.4.1 DEFINITION 16
2.4.2 TEST DESCRIPTION 16
2.4.3 TEST PROCEDURE 16
2.4.4 TEST RESULT 16
2.5 CARRIED FREQUENCY SEPARATION 23
2.5.1 DEFINITION 23
2.5.2 TEST DESCRIPTION 23
2.5.3 TEST PROCEDURE 23
2.5.4 TEST RESULT 24

2.6 TIME OF OCCUPANCY (DWELL TIME) 26
2.6.1 REQUIREMENT 26
2.6.2 TEST DESCRIPTION 26
2.6.3 TEST PROCEDURE 26
2.6.4 TEST RESULT 27
2.7 CONDUCTED SPURIOUS EMISSIONS 38
2.7.1 REQUIREMENT 38
2.7.2 TEST DESCRIPTION 38
2.7.3 TEST PROCEDURE 38
2.7.4 TEST RESULT 39
2.8 RESTRICTED FREQUENCY BANDS 51
2.8.1 REQUIREMENT 51
2.8.2 TEST DESCRIPTION 51
2.8.3 TEST PROCEDURE 52
2.8.4 TEST RESULT 52
2.9 CONDUCTED EMISSION 60
2.9.1 REQUIREMENT 60
2.9.2 TEST DESCRIPTION 60
2.9.3 TEST RESULT 61
2.10 RADIATED EMISSION 64
2.10.1 REQUIREMENT 64
2.10.2 TEST DESCRIPTION 65
2.10.3 TEST PROCEDURE 67
2.10.4 TEST RESULT 67
2.11 RF EXPOSURE EVALUATION 86
2.11.1 REQUIREMENT 86
2.11.2 RESULT 86

ANNEX A PHOTOS OF EUT TEST SETUP 87

ANNEX B PHOTOS OF THE EUT 90

ANNEX C GENERAL INFORMATION 99

Change History		
Issue	Date	Reason for change
1.0	2015-8-18	First edition
2.0	2015-8-20	Update the setup for radiation above 1GHz test

TEST REPORT DECLARATION

Applicant	TCL Communication Ltd.
Applicant Address	5F, C-Tower, No. 232, Liang Jing Road, ZhangJiang High-Tech Park, Pudong Area, Shanghai, 201203, P.R.China
Manufacturer	TCL Communication Ltd.
Manufacturer Address	5F, C-Tower, No. 232, Liang Jing Road, ZhangJiang High-Tech Park, Pudong Area, Shanghai, 201203, P.R.China
Product Name	Tablet PC
Model Name	8080
Brand Name	ALCATEL ONETOUCH
HW Version	V04
SW Version	5E21
Test Standards	47 CFR Part 15 Subpart C
Test Date	2015-7-9 to 2015-8-14
Test Result	PASS

Tested by : Zou Jian
Zou Jian(Test Engineer)

Reviewed by : Qiu Xiaojun
Qiu Xiaojun(RF Manager)

Approved by : Zeng Dexin
Zeng Dexin(Chief Engineer)

1. TECHNICAL INFORMATION

Note: Provide by applicant.

1.1 Applicant Information

Company:	TCL Communication Ltd.
Address:	5F, C-Tower, No. 232, Liang Jing Road, ZhangJiang High-Tech Park, Pudong Area, Shanghai, 201203, P.R.China

1.2 Equipment under Test (EUT) Description

Brand Name:	ALCATEL ONETOUCH	
Trade Name:	ONETOUCH PIXI 3 (10)	
Model Name:	8080	
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), π/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps))	
Bluetooth Version:	2.1+EDR	
Antenna Type:	monopole	
Antenna Gain:	2.01dBi	
USB Cable	Length:	80cm
	Type:	Shielded cable

NOTE:

The EUT is a Tablet PC, 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.

A RF cable was used by the EUT conducted output port to connect the spectrum analyzer, and the RF cable was provided by client. The offset level would set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer.

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	V04	5E21

1.3 AC Adapter Description

AC adapter 1	
Brand Name:	ALCATEL onetouch
Model No.:	UC13 US
Rated Input:	~ 100-240V, 50/60Hz, 350mA
Rated Output:	⎓ 5V, 2000mA
Manufacturer:	AOHAI
AC adapter 2	
Brand Name:	ALCATEL onetouch
Model No.:	UC13US
Rated Input:	~ 100-240V, 50/60Hz, 500mA
Rated Output:	⎓ 5V, 2000mA
Manufacturer:	BYD
Note: The AC Adapter is equipped with a USB port which can be connected to the Micro-B port of the EUT by a USB cable.	

1.4 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	Test Date	Result
1	15.203	Antenna Requirement	N.A	**PASS**
2	15.247(a)	Number of Hopping Frequency	July 16, 2015	**PASS**
3	15.247(b)	Peak Output Power	July 16, 2015	**PASS**
4	15.247(a)	20dB Bandwidth	July 16, 2015	**PASS**
5	15.247(a)	Carrier Frequency Separation	July 16, 2015	**PASS**
6	15.247(a)	Time of Occupancy (Dwell time)	July 16, 2015	**PASS**
7	15.247(d)	Conducted Spurious Emission	August 12, 2015	**PASS**
8	15.247(d)	Restricted Frequency Bands	July 9, 2015	**PASS**
9	15.207	Conducted Emission	July 10, 2015	**PASS**
10	15.209 15.247(d)	Radiated Emission	August 14, 2015	**PASS**
11	15.247(i),1.1307& 2.1093	RF exposure evaluation	N.A	**PASS**

NOTE: The tests were performed according to the method of measurements prescribed in DA-00-705, ANSI C63.4: 2009 and ANSI C63.10: 2013.

1.4.1 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.

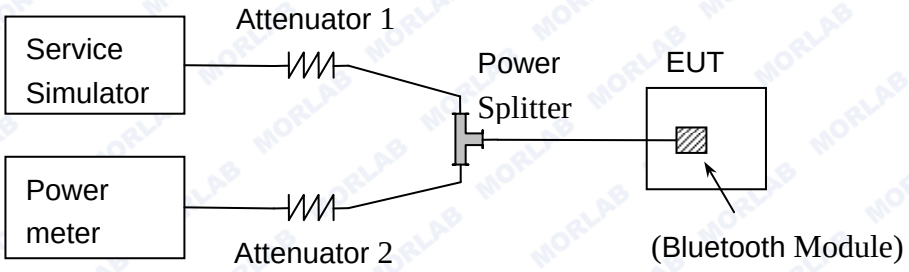
2.2 Number of Hopping Frequency

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

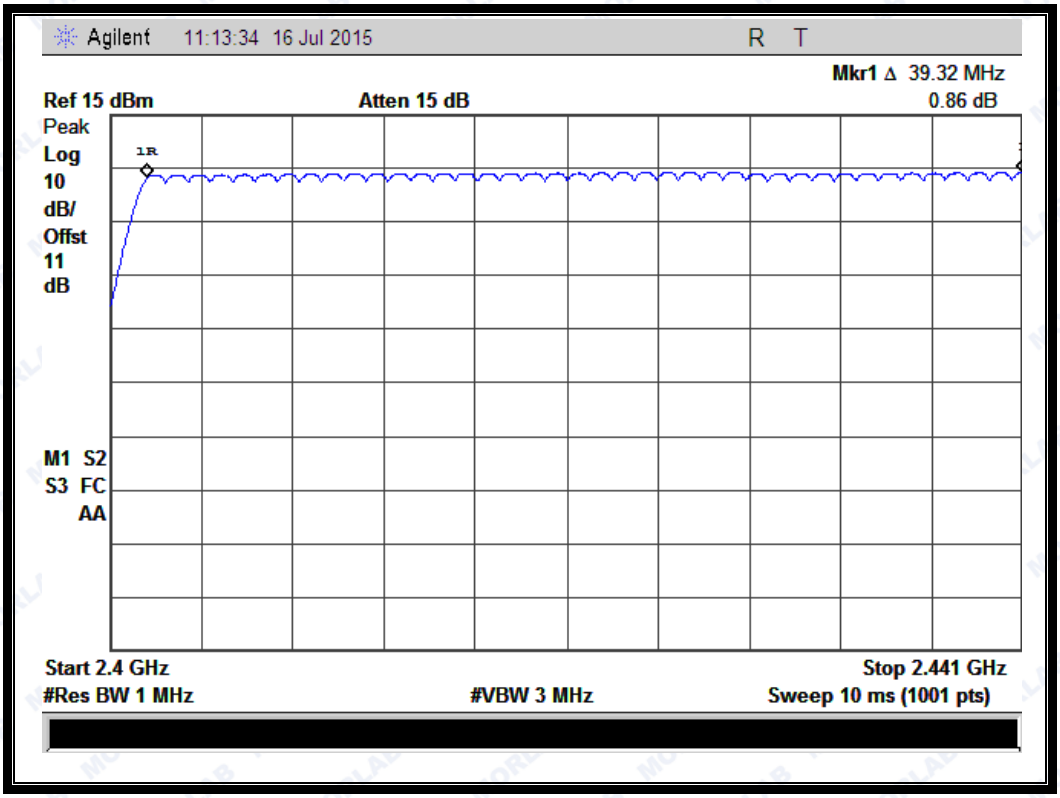
2.2.4 Test Result

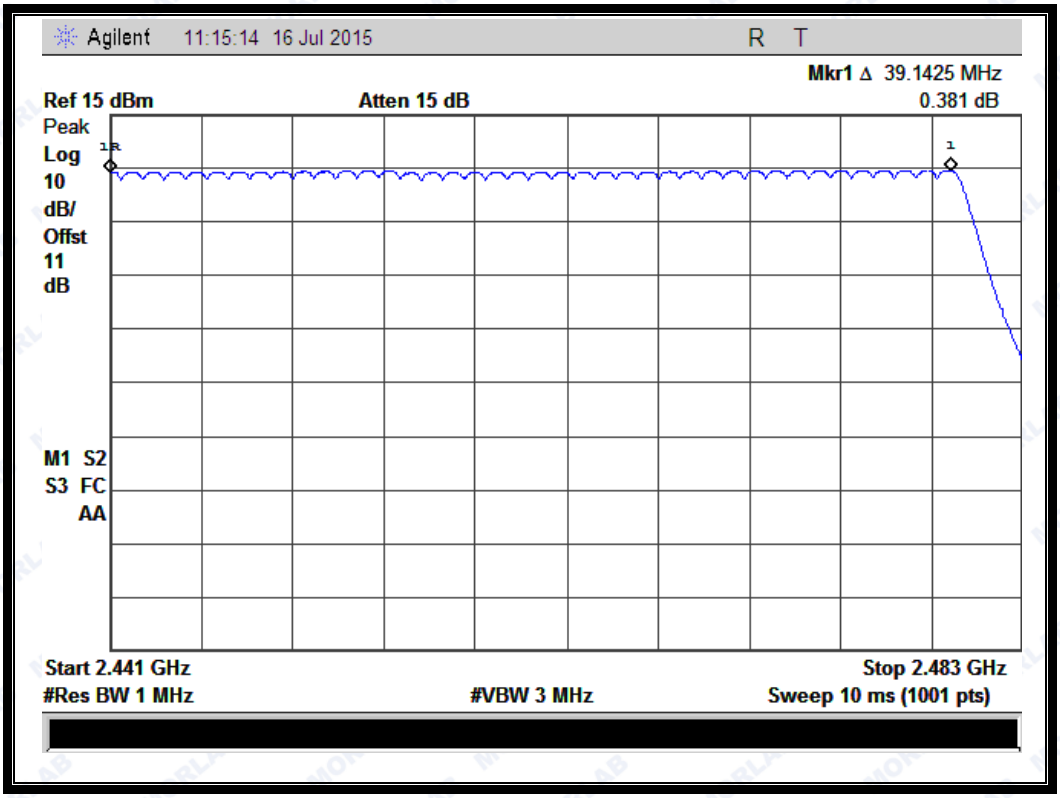
The Bluetooth Module operates at hopping-on test mode; the frequencies number employed is counted to verify the Module's using the number of hopping frequency.

A. Test Verdict:

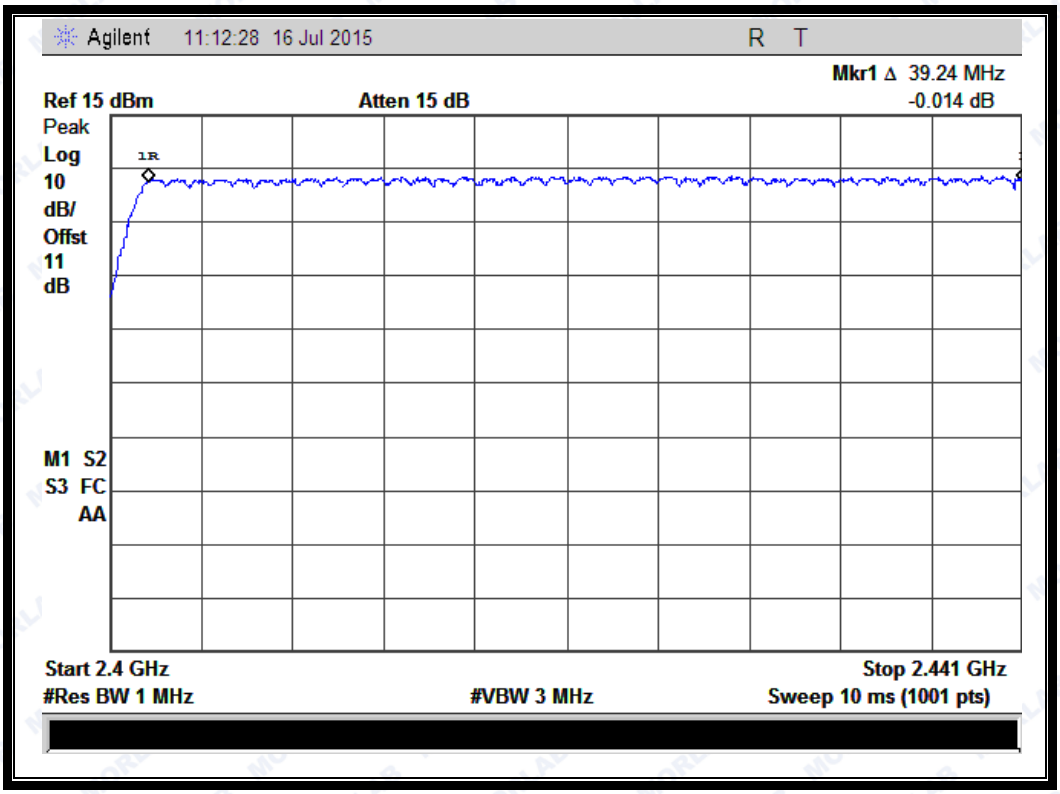
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Refer to Plot	Verdict
GFSK	2400 - 2483.5	79	15	Plot A	PASS
π/4-DQPSK	2400 - 2483.5	79	15	Plot B	PASS
8-DPSK	2400 - 2483.5	79	15	Plot C	PASS

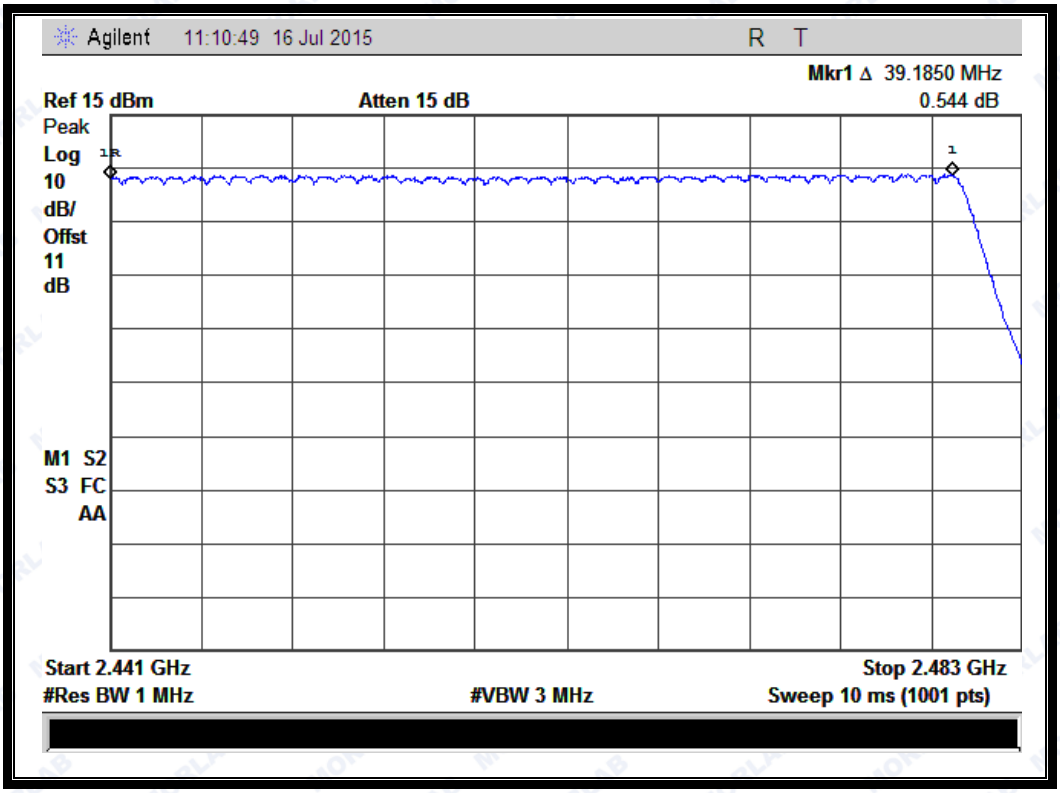
B. Test Plots:



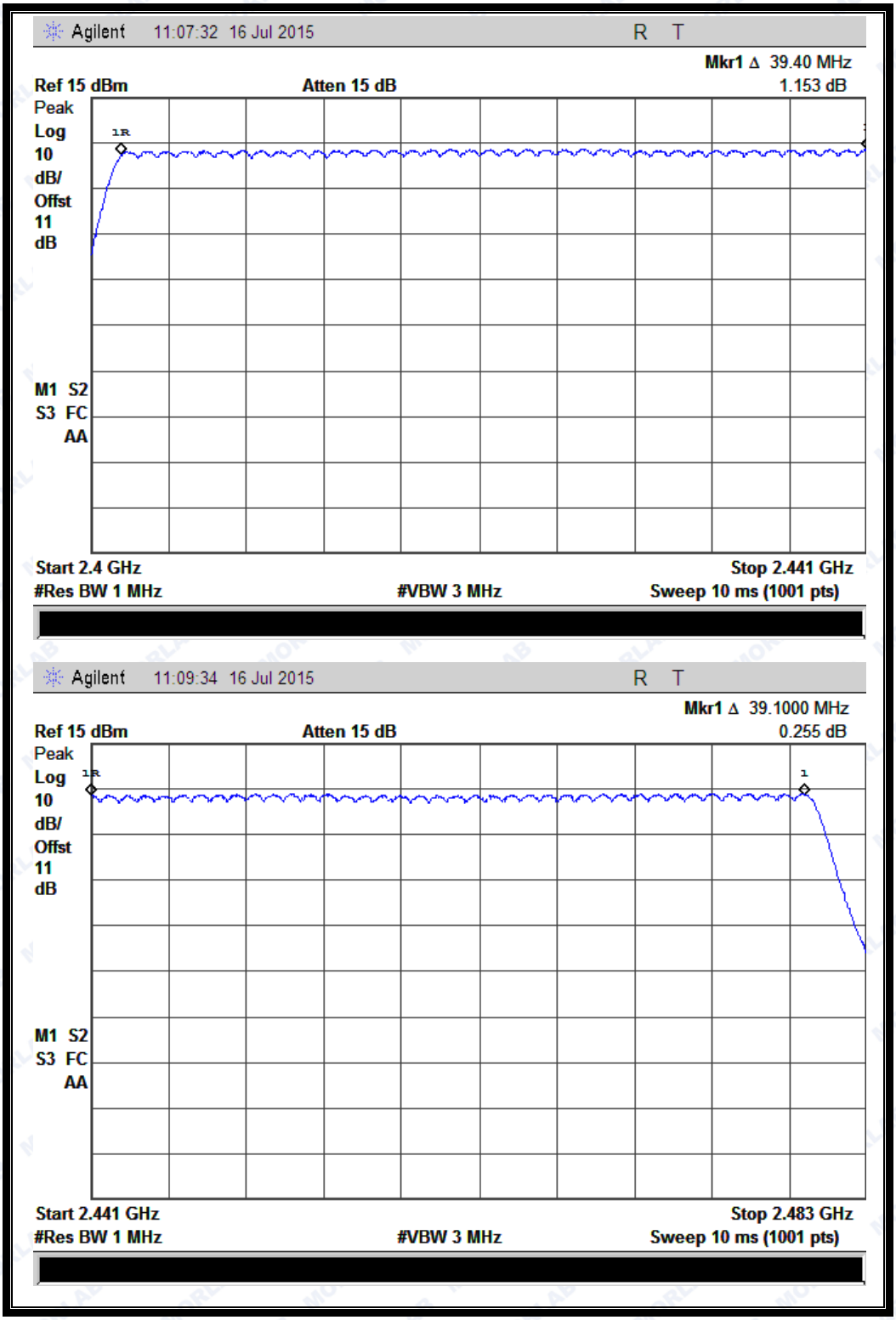

Agilent 11:15:14 16 Jul 2015
R T
Mkr1 Δ 39.1425 MHz
0.381 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
1
M1 S2
S3 FC
AA
Start 2.441 GHz
Stop 2.483 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)

(Plot A: GFSK)


Agilent 11:12:28 16 Jul 2015
R T
Mkr1 Δ 39.24 MHz
-0.014 dB
Ref 15 dBm
Atten 15 dB
Peak
Log
10
dB/
Offst
11
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
Stop 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)



(Plot B: π/4-DQPSK)


Agilent 11:07:32 16 Jul 2015
R T
Mkr1 Δ 39.40 MHz
Ref 15 dBm
Atten 15 dB
1.153 dB
Peak
Log
10
dB/
Offst
11
dB
1R
M1 S2
S3 FC
AA
Start 2.4 GHz
Stop 2.441 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)
Agilent 11:09:34 16 Jul 2015
R T
Mkr1 Δ 39.1000 MHz
Ref 15 dBm
Atten 15 dB
0.255 dB
Peak
Log
10
dB/
Offst
11
dB
1R
1
M1 S2
S3 FC
AA
Start 2.441 GHz
Stop 2.483 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)

(Plot C: 8- DPSK)

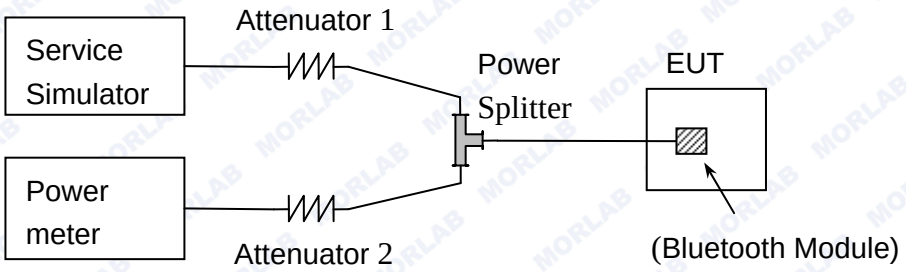
2.3 Peak Output Power

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 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 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:

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 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	3.789	0.002393	20.97	0.125	PASS
39	2441	4.215	0.002639			PASS
78	2480	4.589	0.002877			PASS

2.3.3.2 π/4-DQPSK Mode

B. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	3.725	0.002358	20.97	0.125	PASS
39	2441	3.524	0.002251			PASS
78	2480	3.921	0.002467			PASS

2.3.3.3 8-DPSK Mode

C. Test Verdict:

Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
		dBm	W	dBm	W	
0	2402	3.179	0.002079	20.97	0.125	PASS
39	2441	3.620	0.002301			PASS
78	2480	3.986	0.002504			PASS

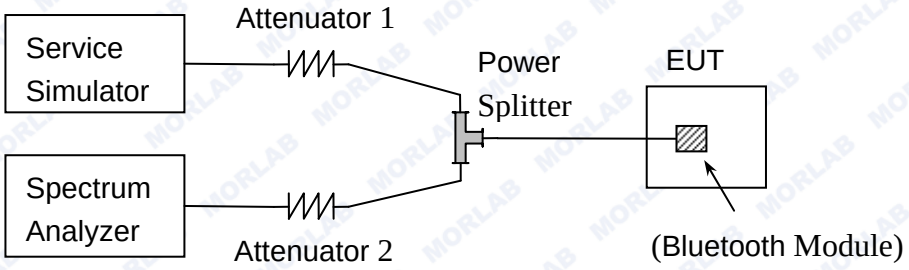
2.4 20dB Bandwidth

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.

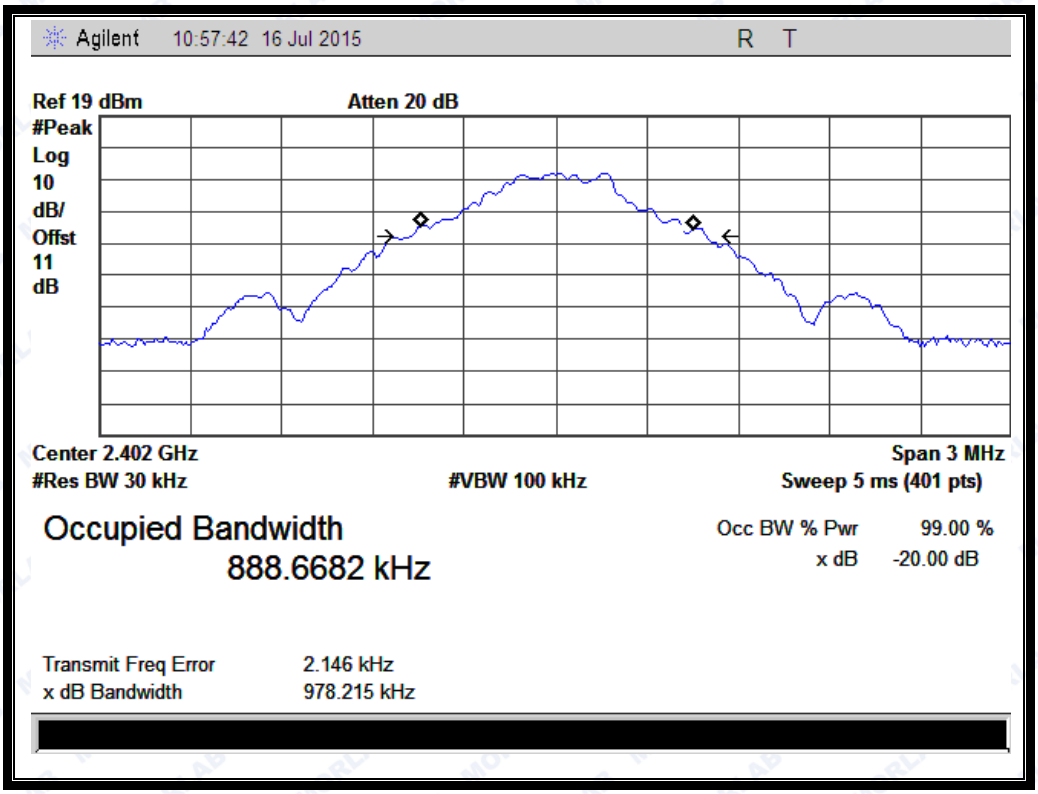
2.4.4.1 GFSK Mode

A. Test Verdict:

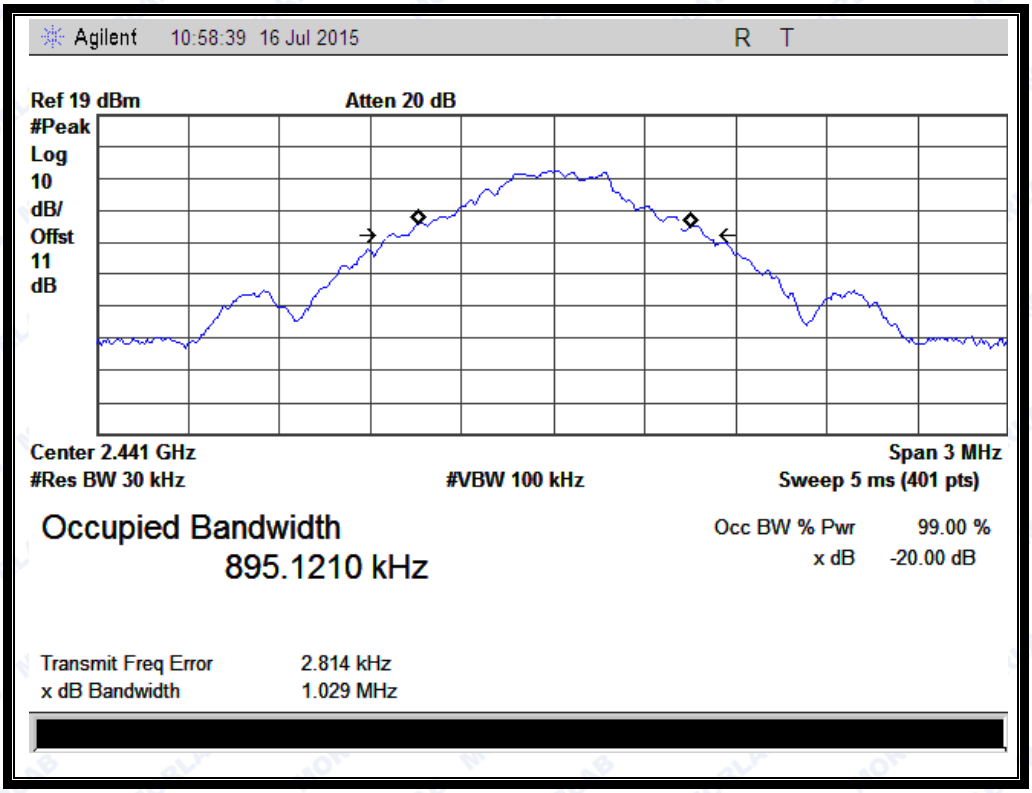
The maximum 20dB bandwidth measured is 1.0290MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	0.9782	Plot A
39	2441	1.0290	Plot B
78	2480	0.9712	Plot C

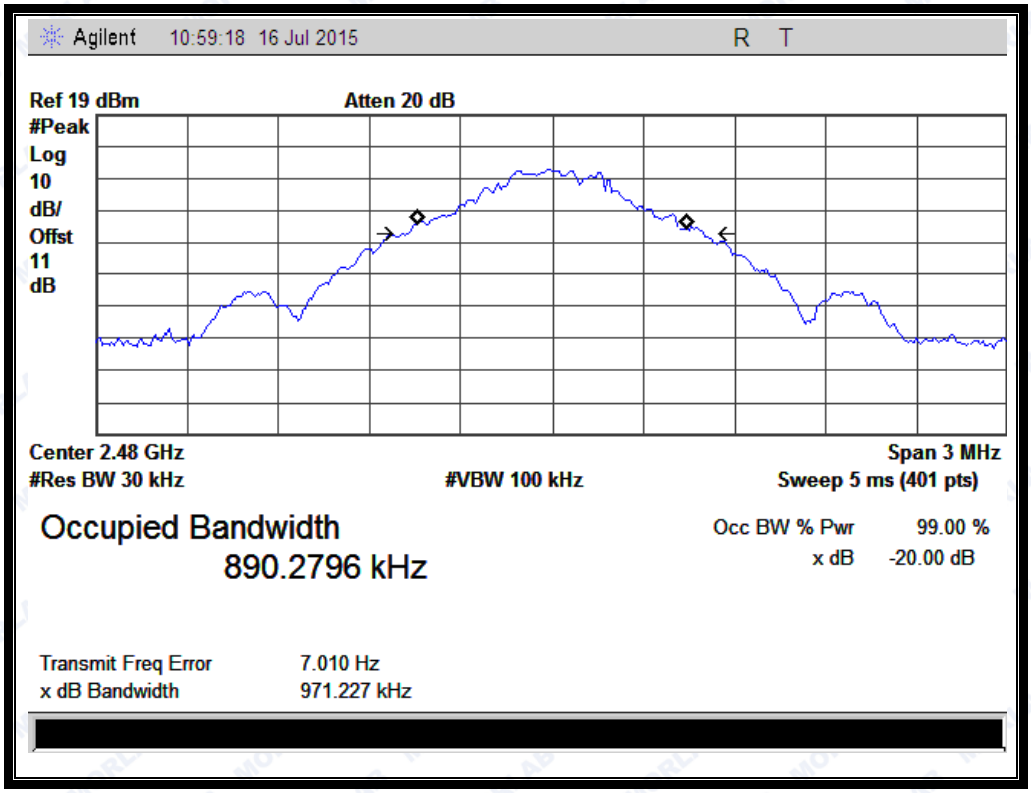
B. Test Plots:



(Plot A: Channel = 2402 @ GFSK)



(Plot B: Channel = 2441 @ GFSK)



(Plot C: Channel = 2480 @ GFSK)

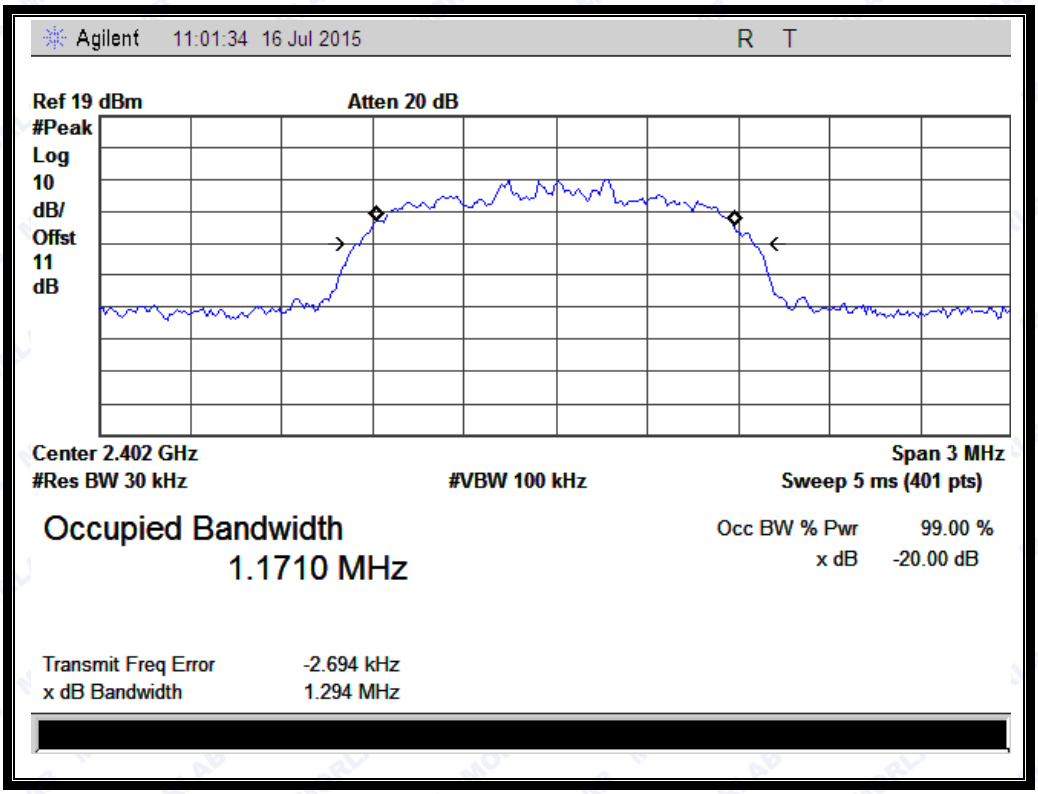
2.4.4.2 π/4-DQPSK Mode

A. Test Verdict:

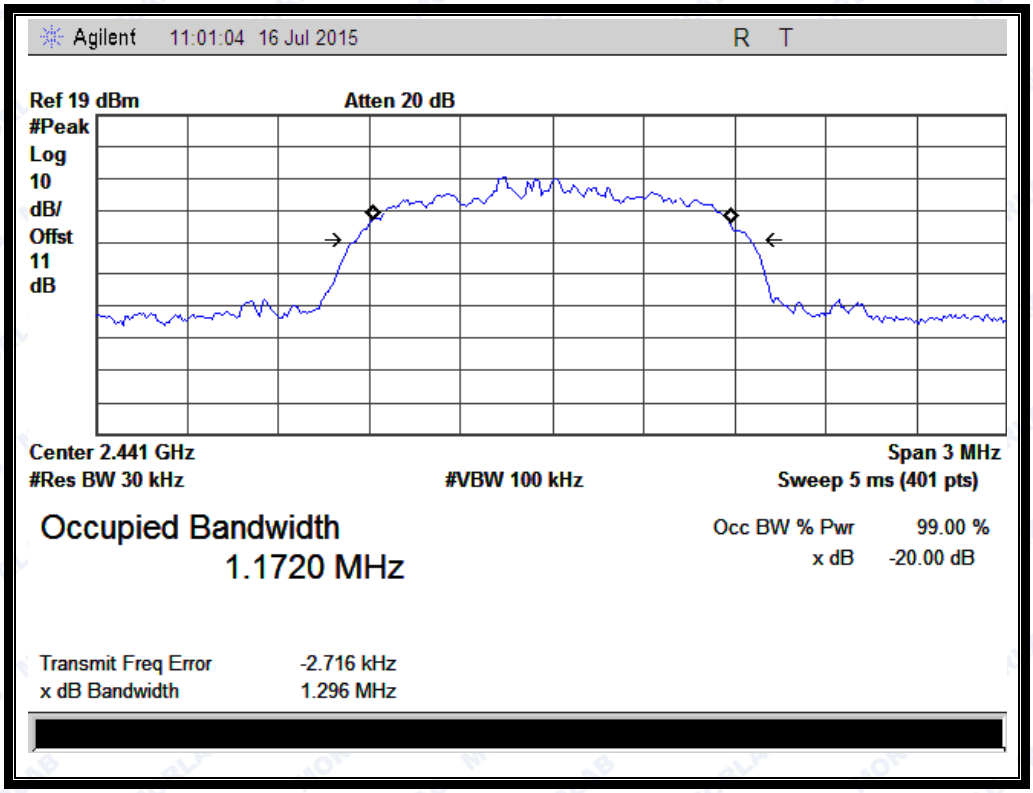
The maximum 20dB bandwidth measured is 1.296MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.294	Plot D
39	2441	1.296	Plot E
78	2480	1.292	Plot F

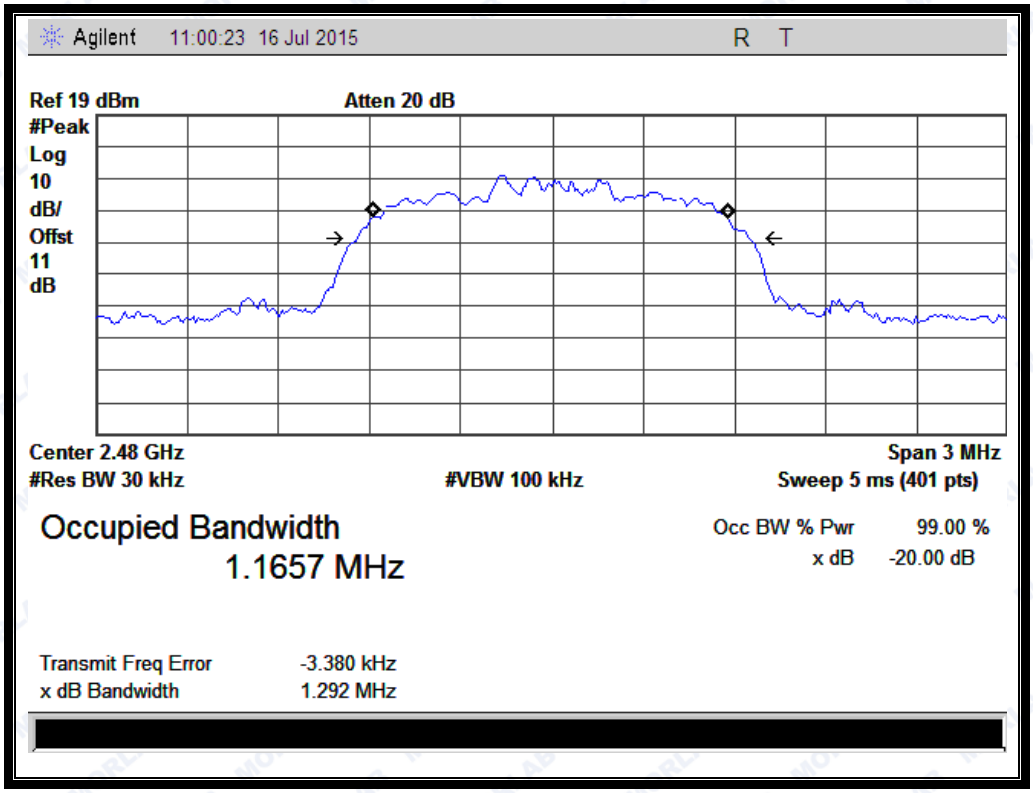
B. Test Plots:



(Plot D: Channel = 2402 @ π/4-DQPSK)



(Plot E: Channel = 2441 @ π/4-DQPSK)



(Plot F: Channel = 2480 @ π/4-DQPSK)

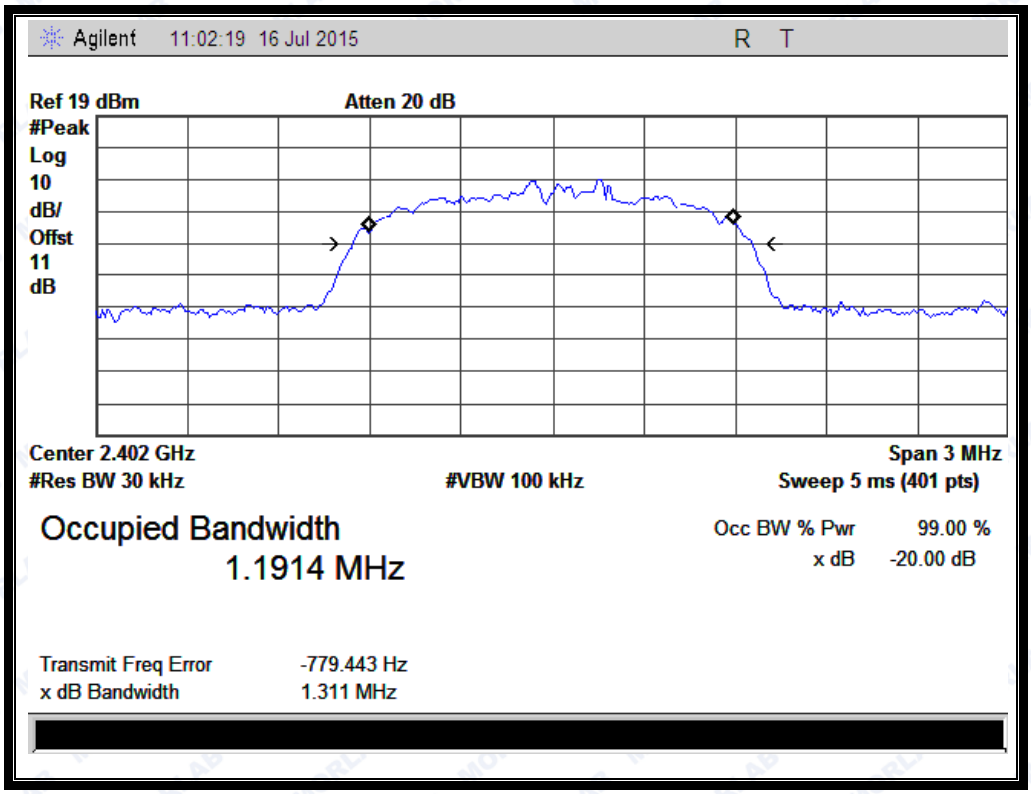
2.4.4.3 8-DPSK Mode

A. Test Verdict:

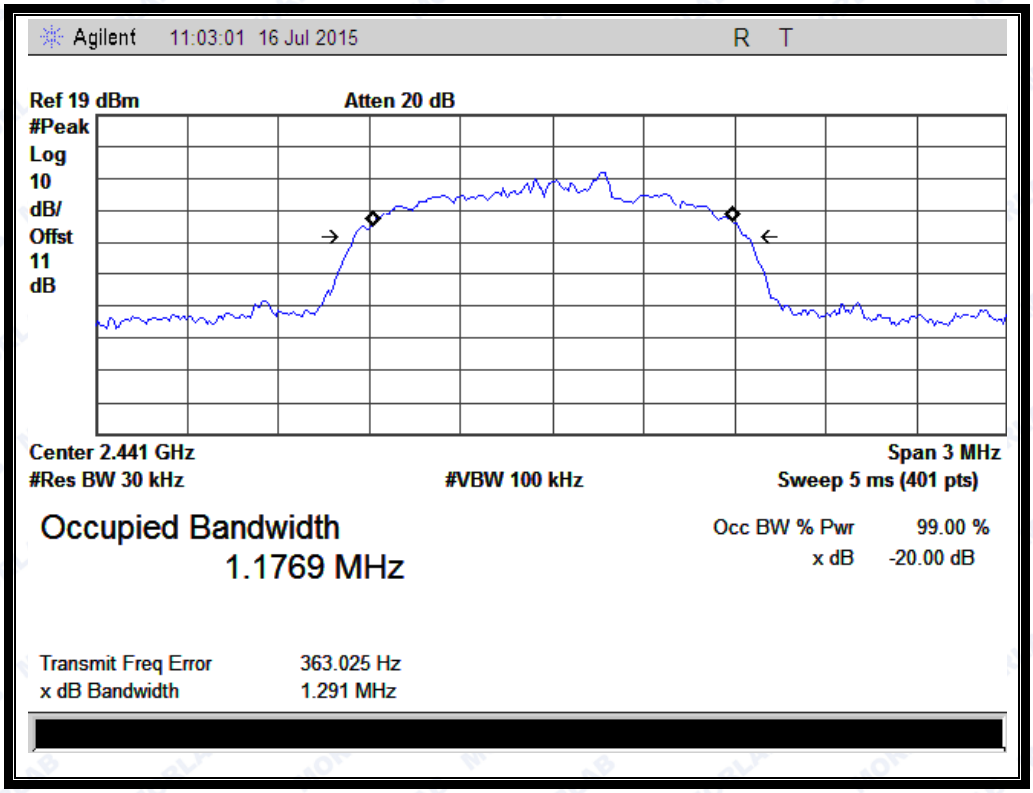
The maximum 20dB bandwidth measured is 1.311MHz according to the table below.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Refer to Plot
0	2402	1.311	Plot G
39	2441	1.291	Plot H
78	2480	1.282	Plot I

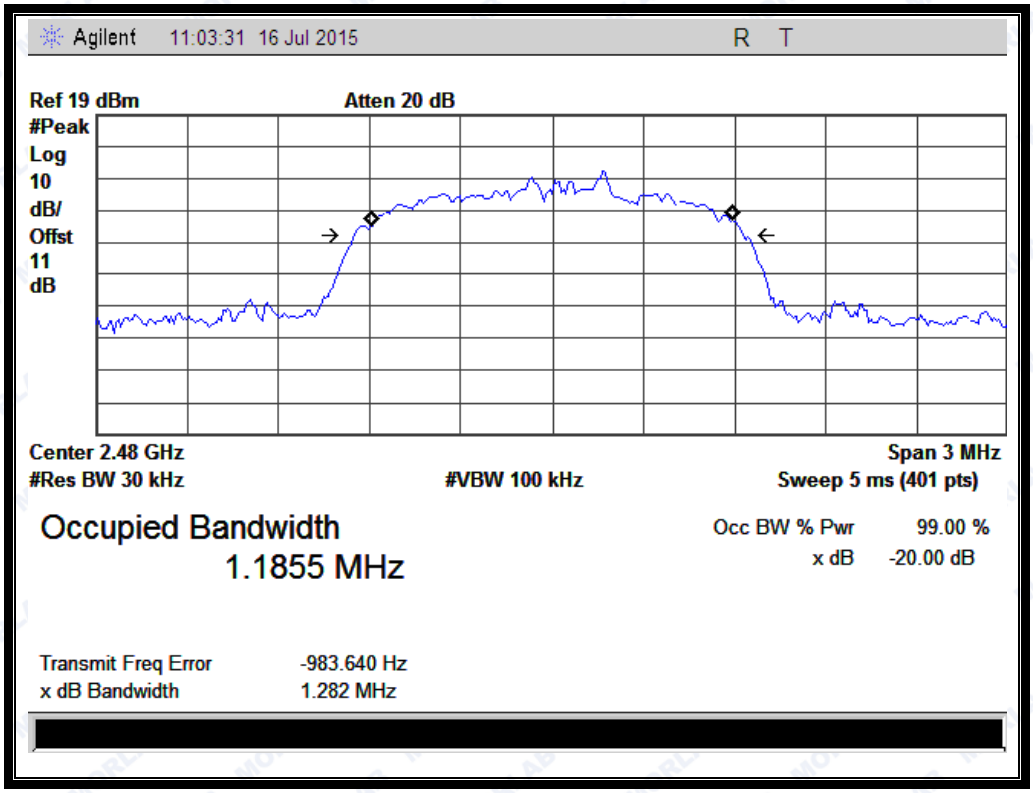
B. Test Plots:



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



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



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

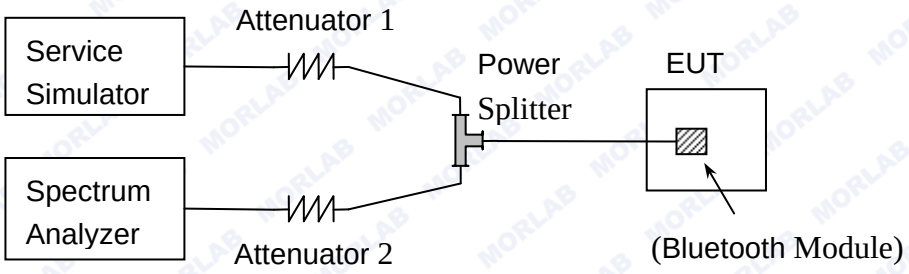
2.5 Carried Frequency Separation

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

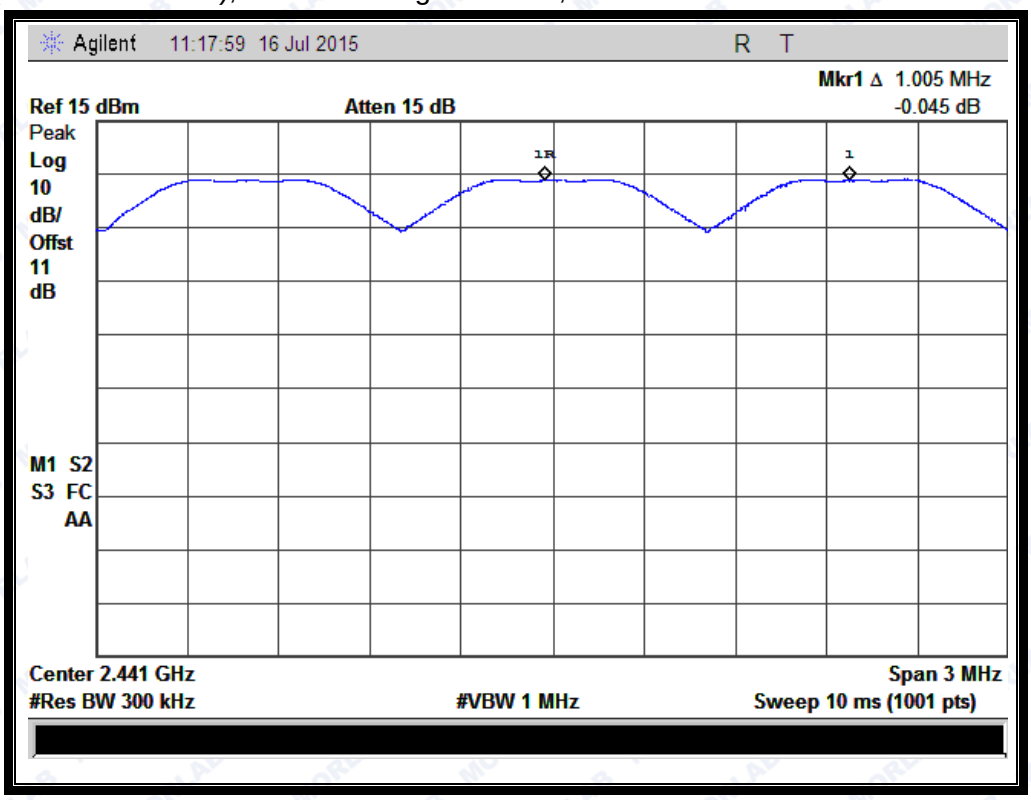
Detector function = peak

Trace = max hold

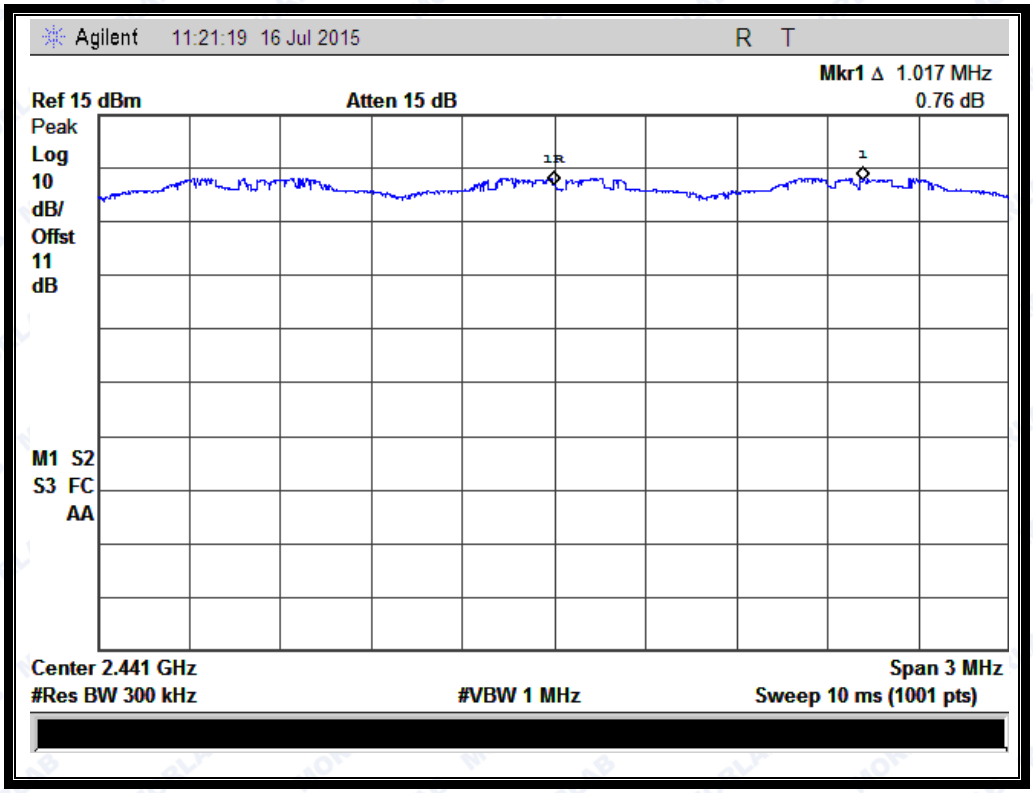
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

2.5.4 Test Result

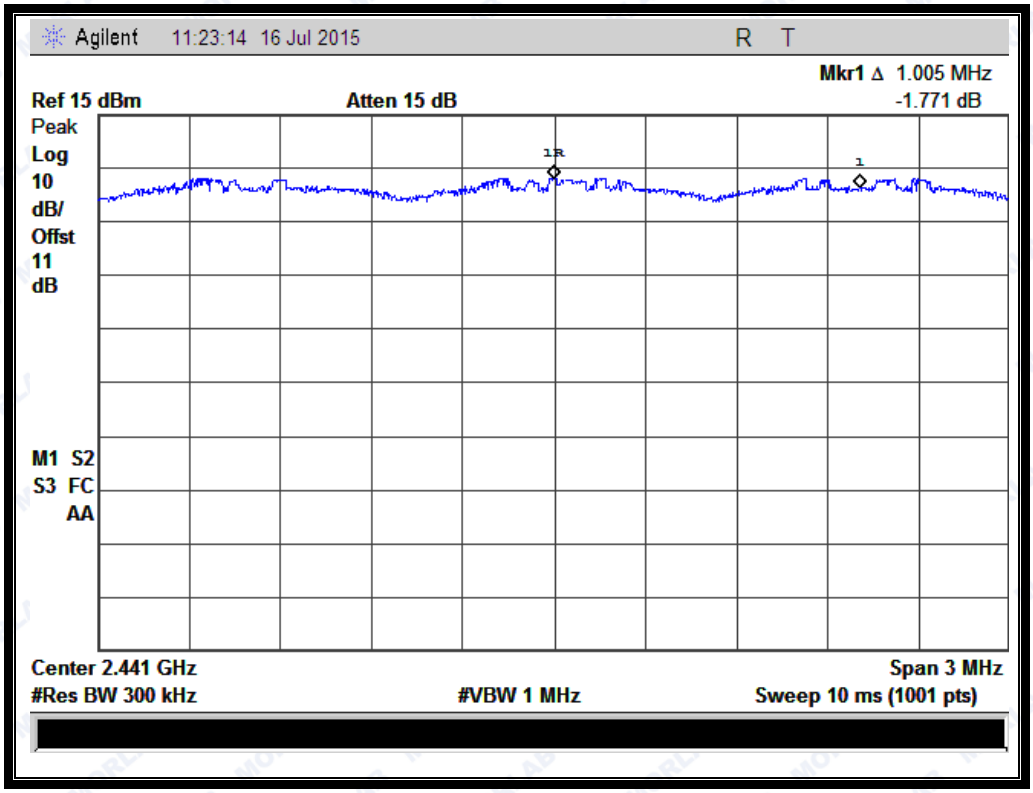
The Bluetooth Module operates at hopping-on test mode. For any adjacent channels (e.g. the channel 39 and 40 as showed in the Plot A), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (refer to section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



(Plot A: GFSK)



(Plot B: π/4-DQPSK)



(Plot C: 8-DPSK)

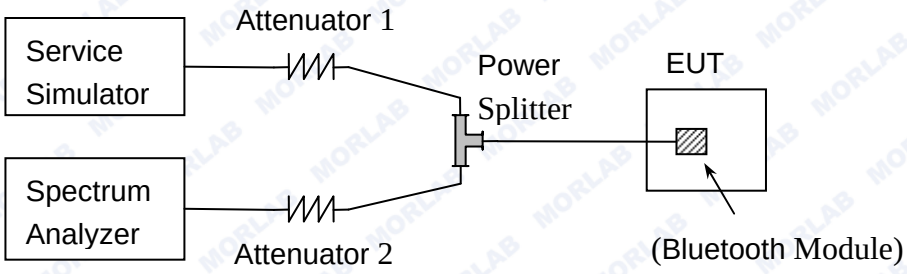
2.6 Time of Occupancy (Dwell time)

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.

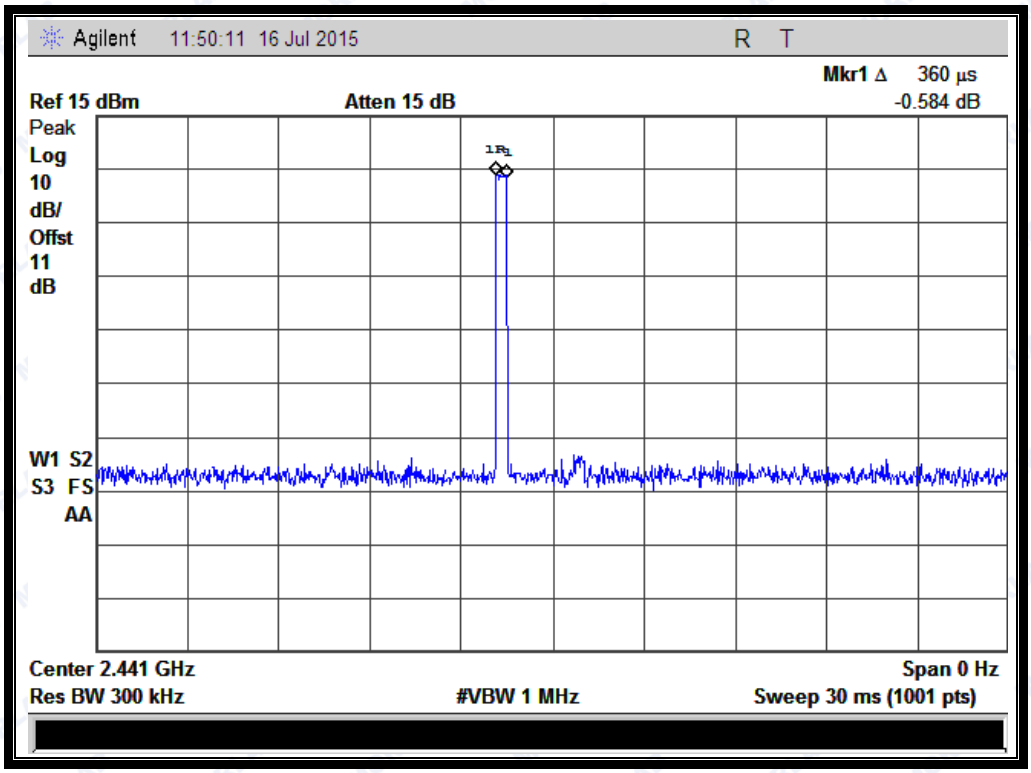
2.6.4 Test Result

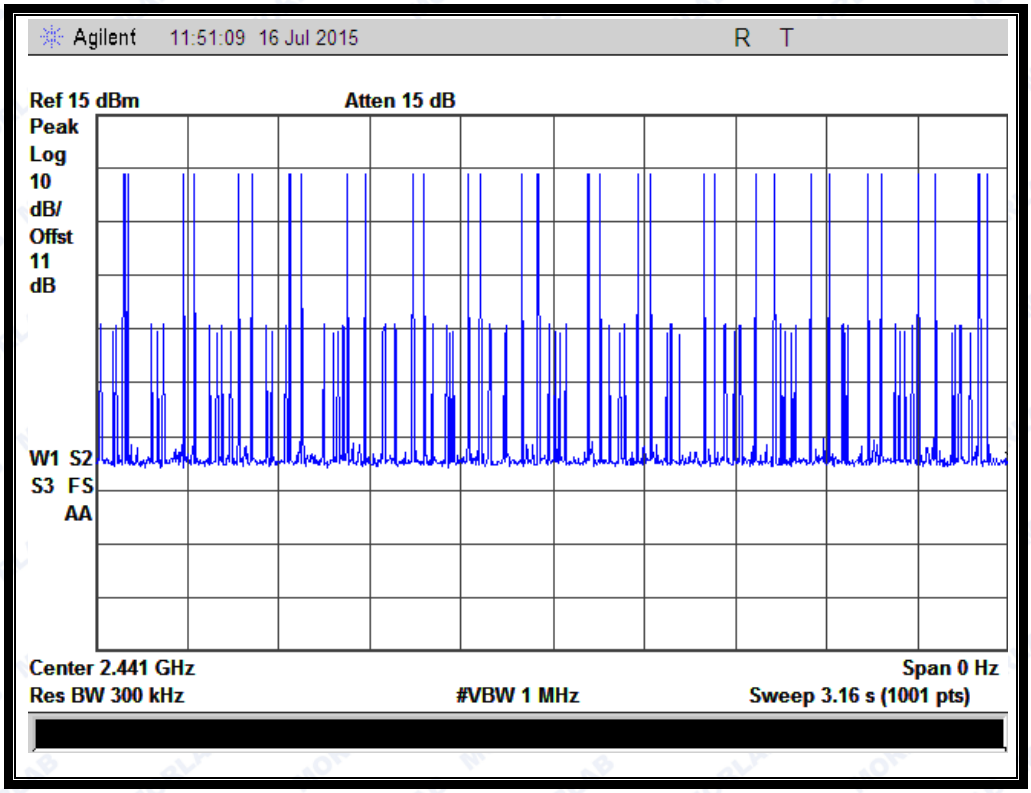
2.6.4.1 GFSK Mode

A. Test Verdict:

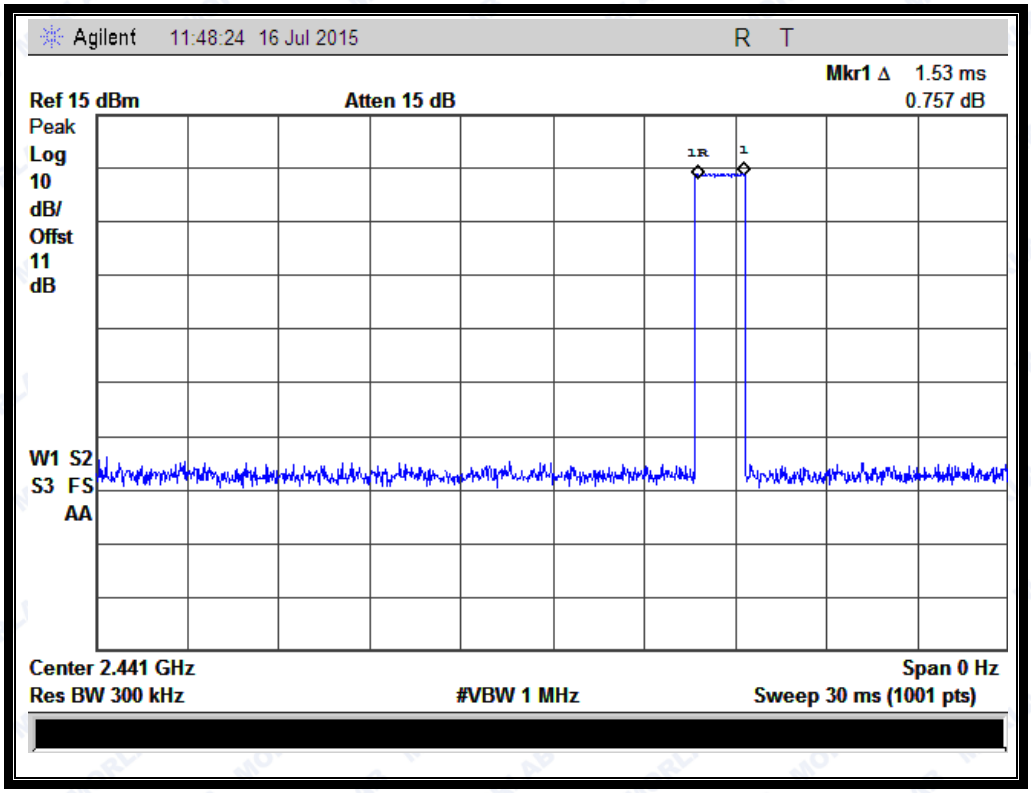
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
DH1	0.36	32	0.01152	0.1152	0.4	PASS
DH3	1.53	13	0.01989	0.1898		PASS
DH5	2.88	10	0.02880	0.2880		PASS

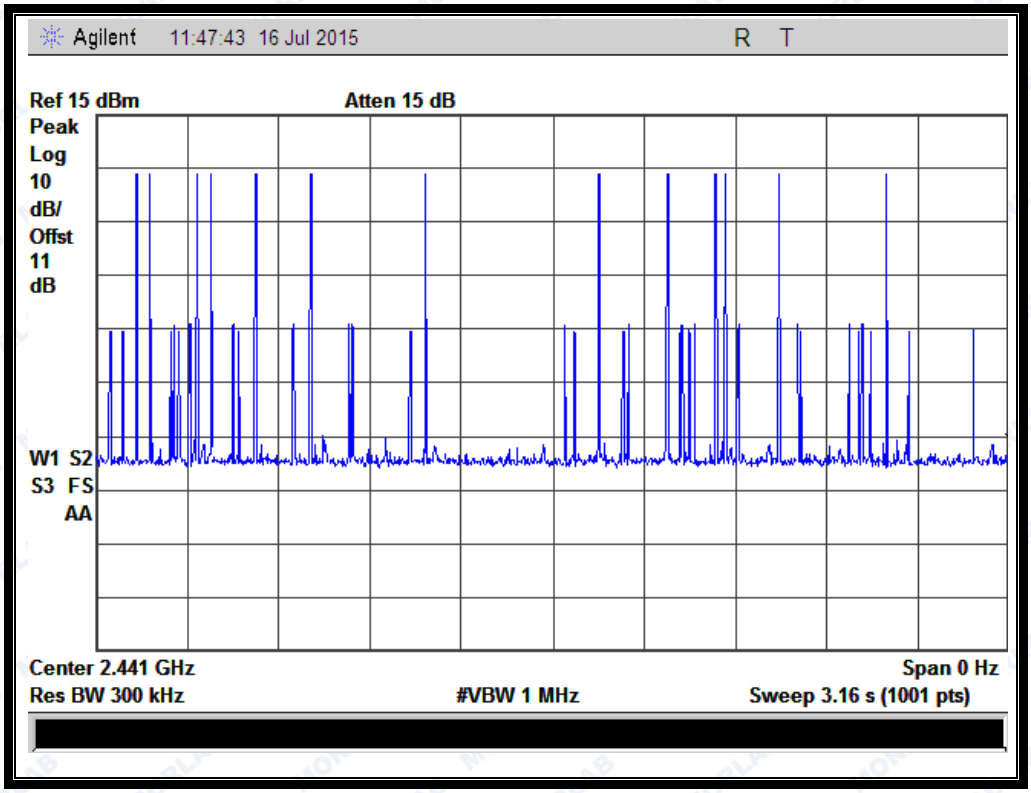
B. Test Plots:



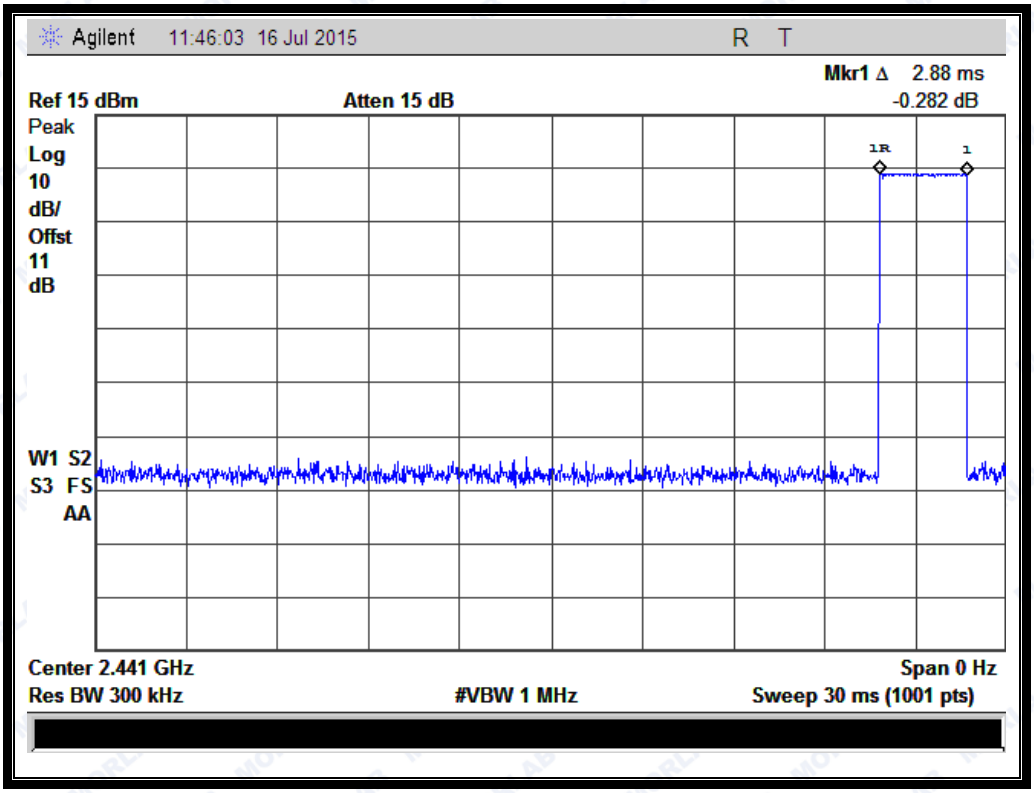


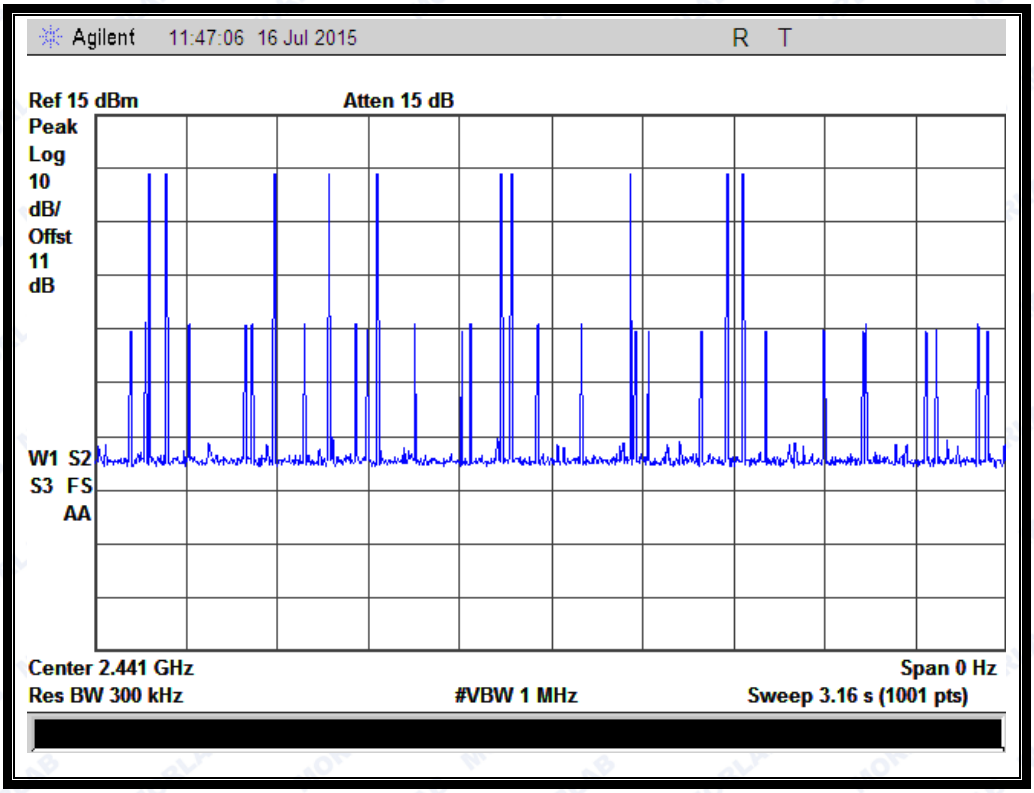
(Plot A: DH1 @ GFSK)





(Plot B: DH3 @ GFSK)





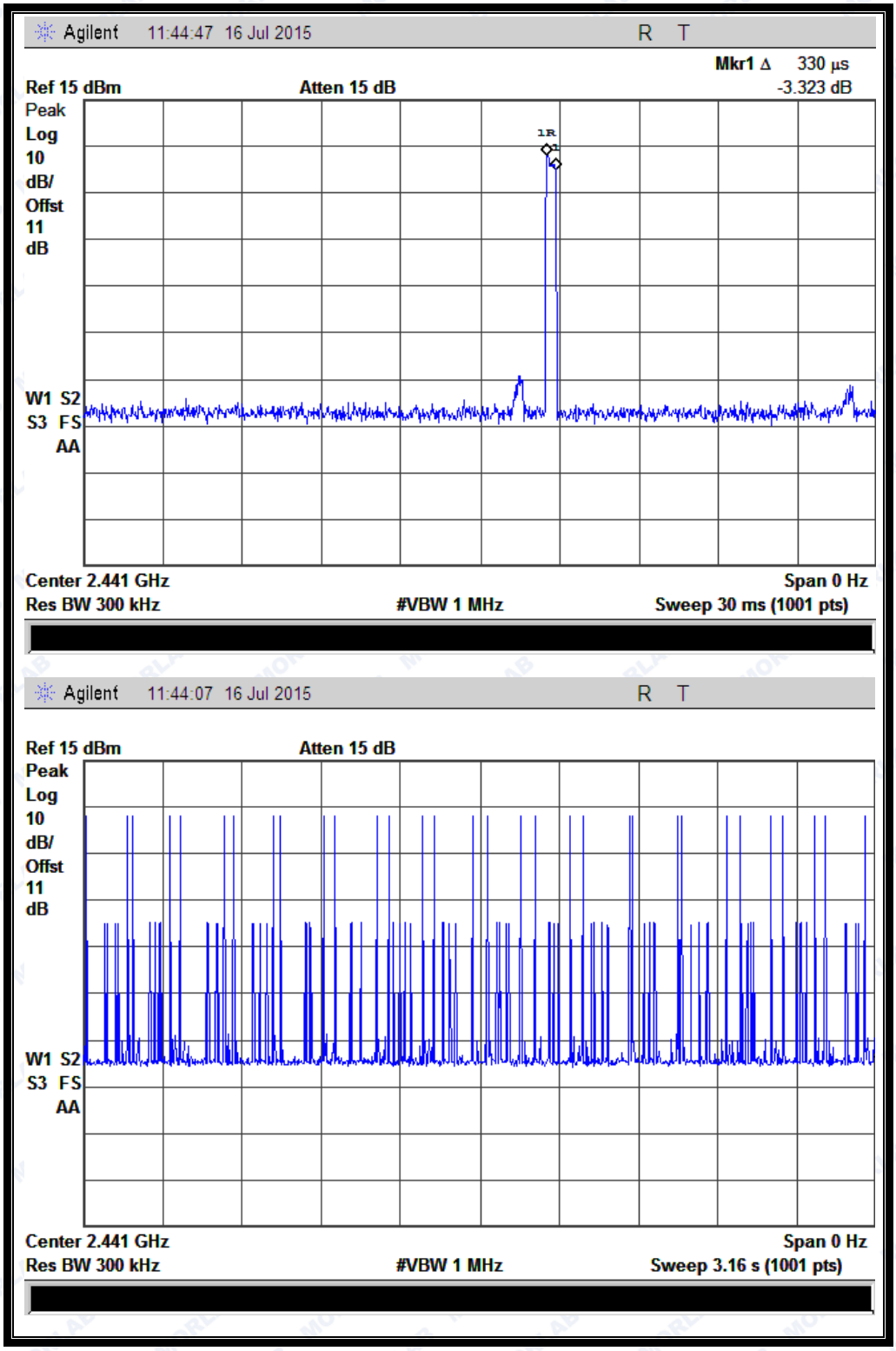
(Plot C: DH5 @ GFSK)

2.6.4.2 π/4-DQPSK Mode

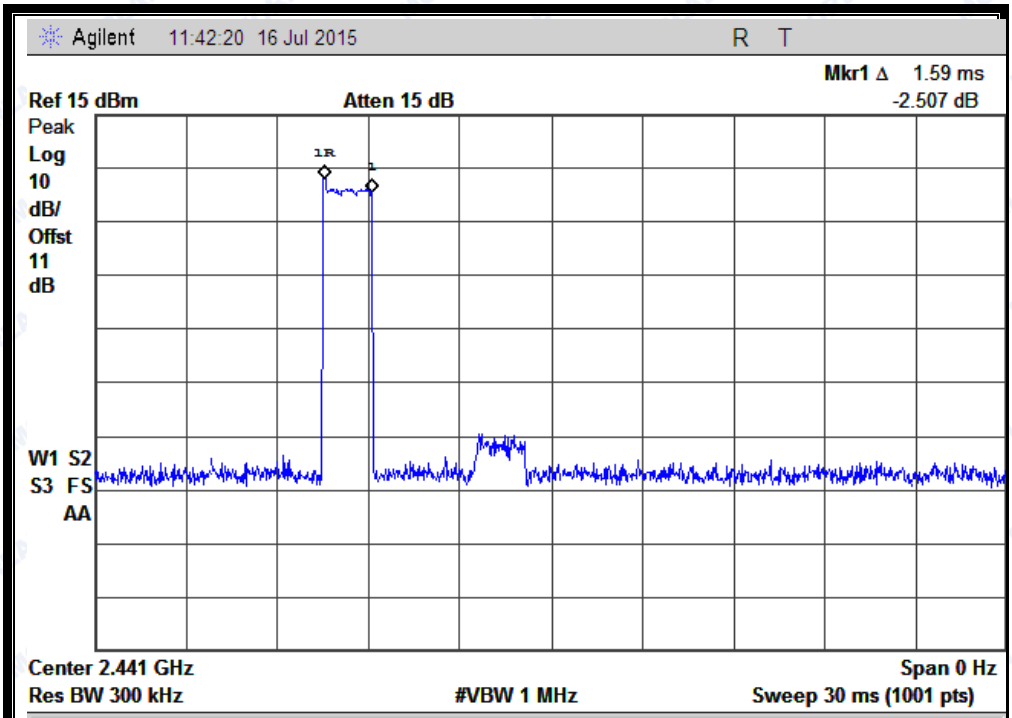
A. Test Verdict:

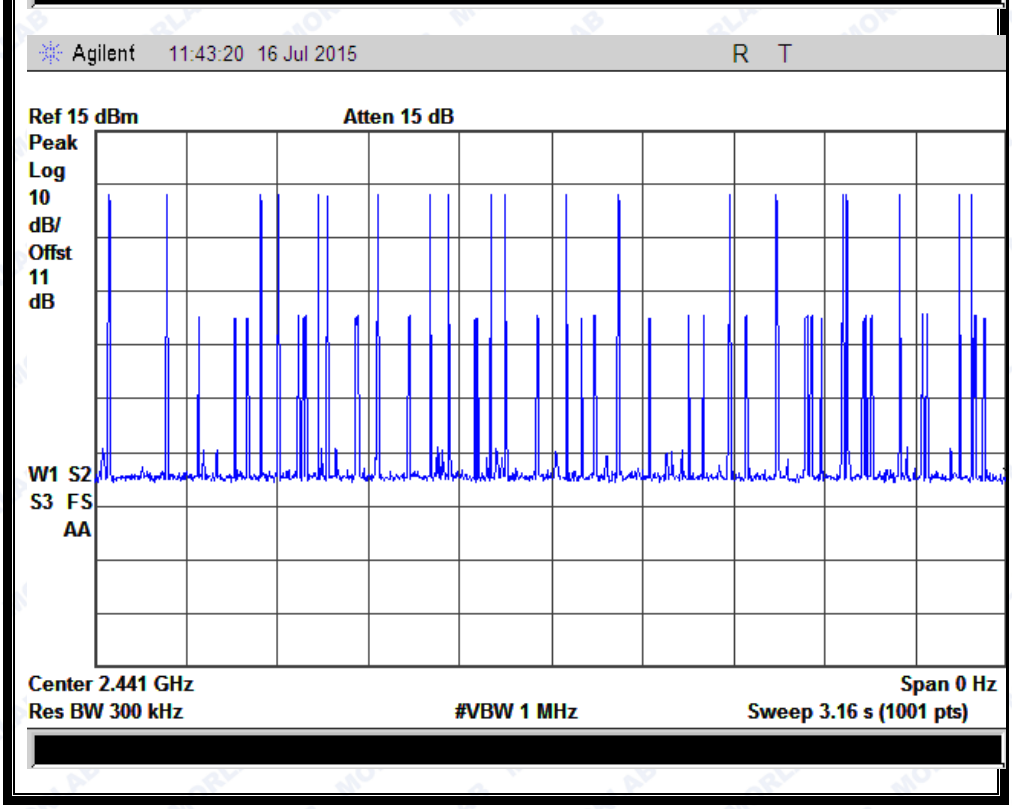
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
DH1	0.33	32	0.01056	0.1056	0.4	PASS
DH3	1.59	20	0.03180	0.3180		PASS
DH5	2.82	12	0.03384	0.3384		PASS

B. Test Plots:

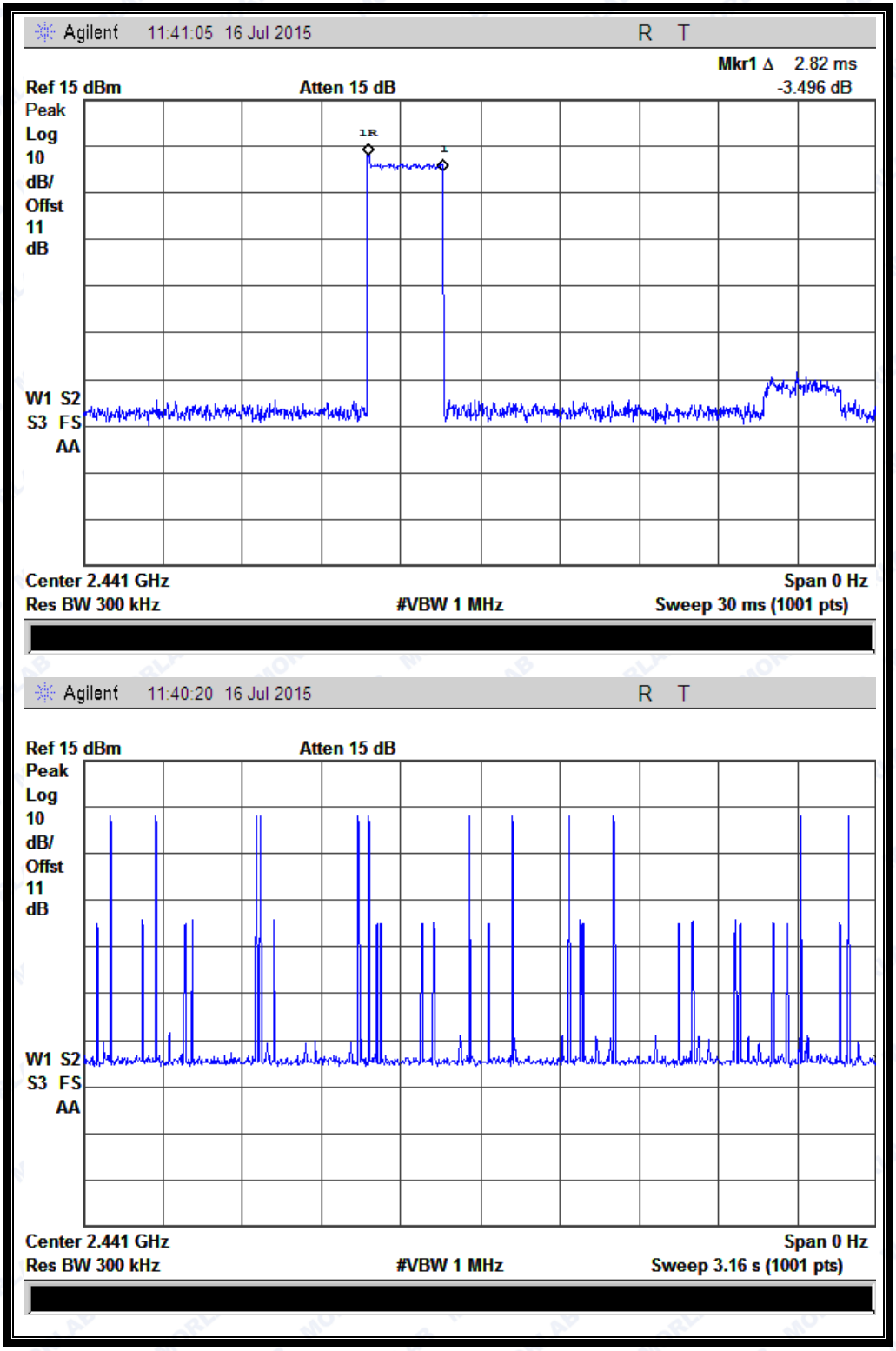


(Plot D: DH1 @ π/4-DQPSK)





(Plot E: DH3 @ π/4-DQPSK)



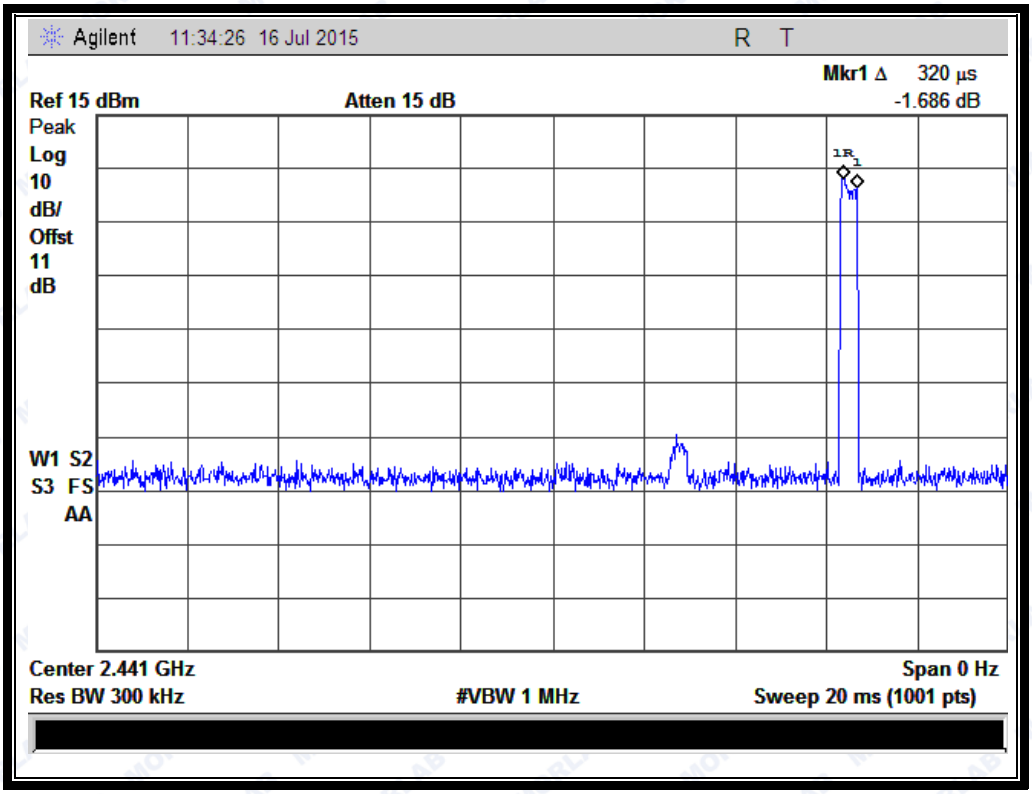
(Plot F: DH5 @ π/4-DQPSK)

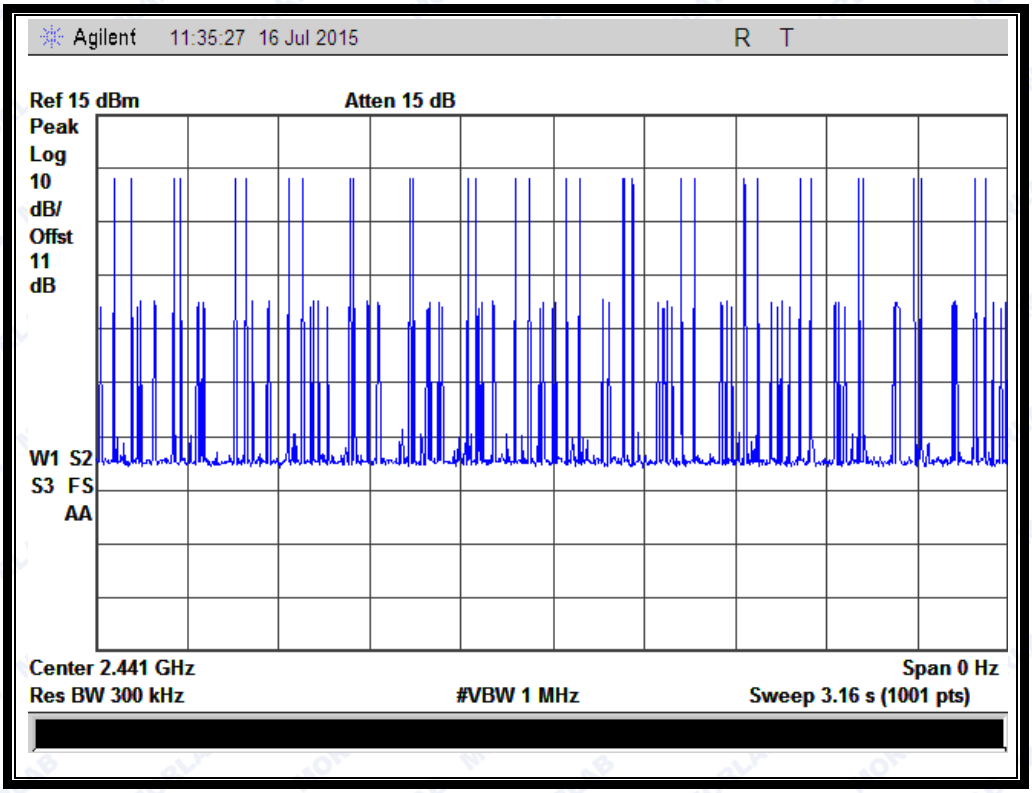
2.6.4.3 8-DPSK mode

A. Test Verdict:

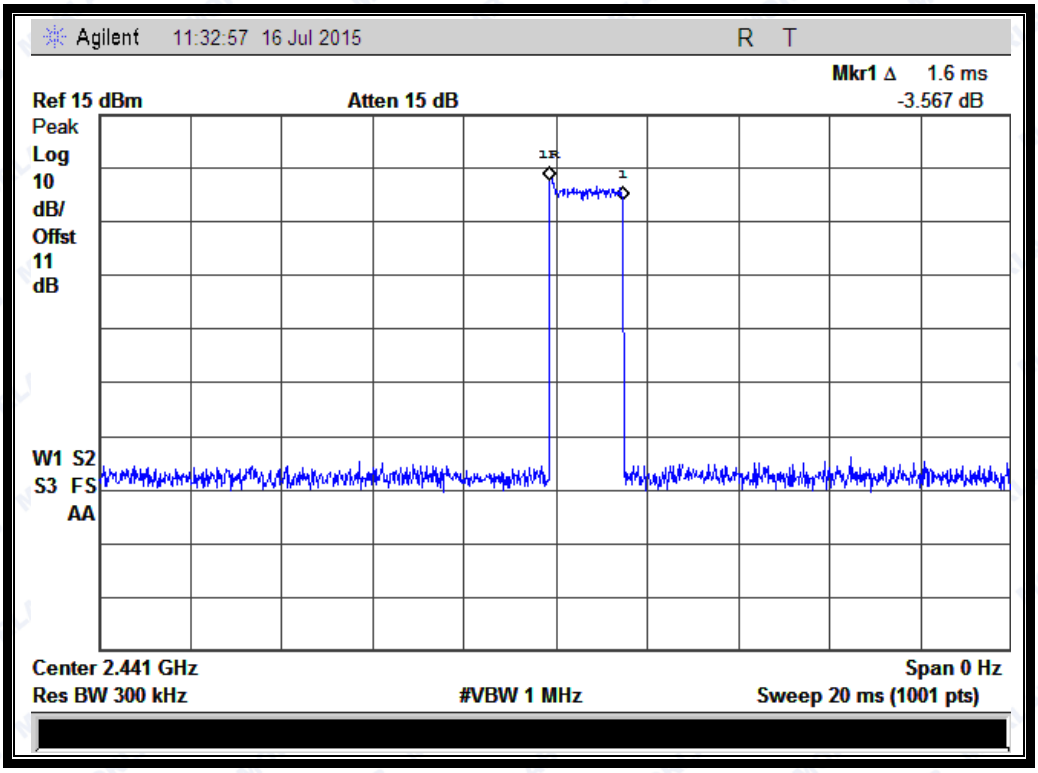
DH Packet	Pulse Width (msec)	Number of pulse in 3.16 seconds	Average Time of Occupancy in 3.16 seconds (sec)	Average Time of Occupancy in 31.6 seconds (sec)	Limit (sec)	Verdict
DH1	0.32	32	0.01024	0.1024	0.4	PASS
DH3	1.60	15	0.02400	0.2400		PASS
DH5	2.85	11	0.03135	0.3135		PASS

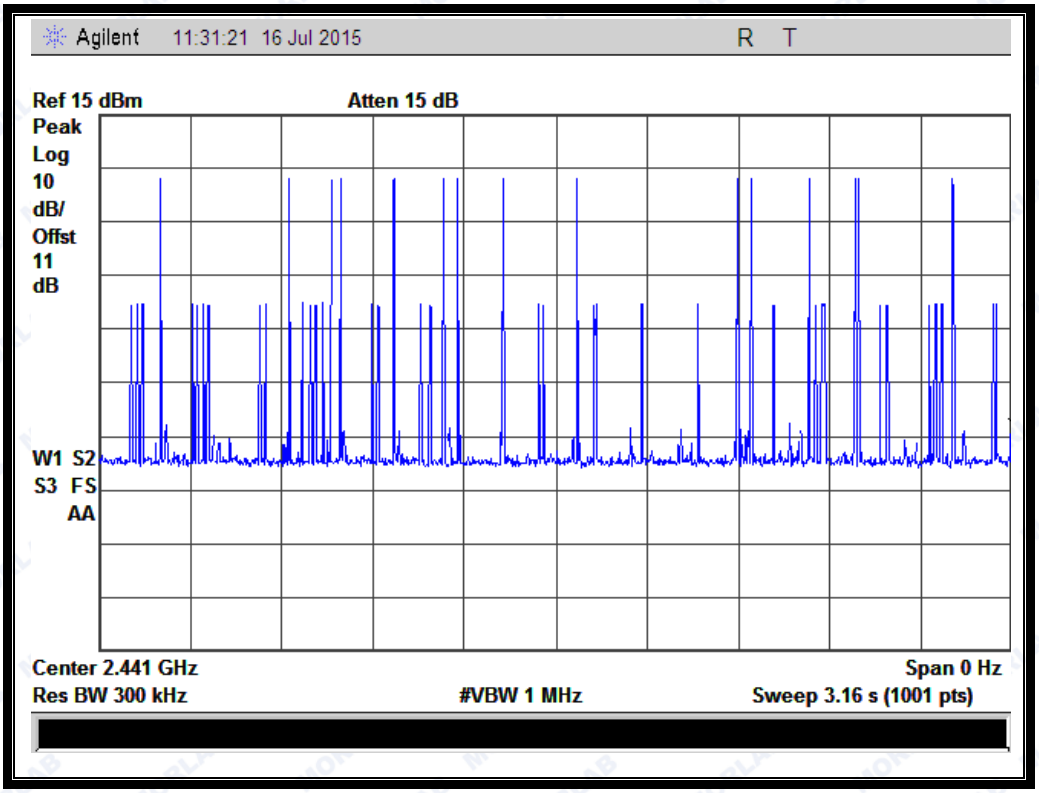
B. Test Plots:



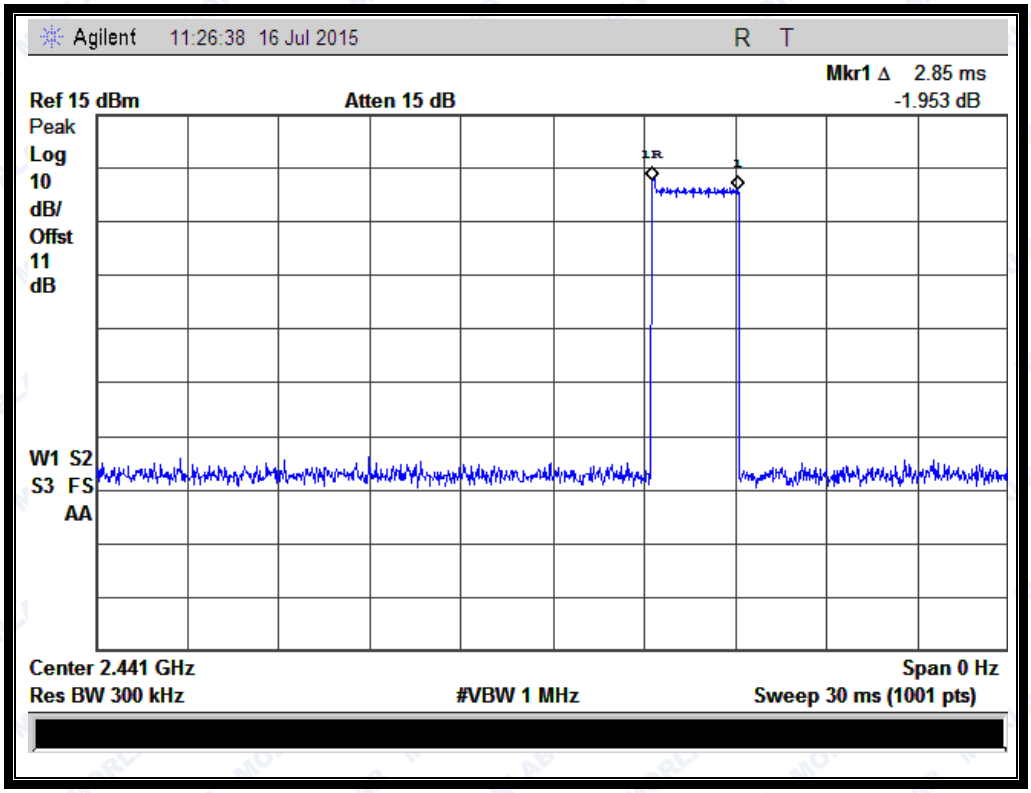


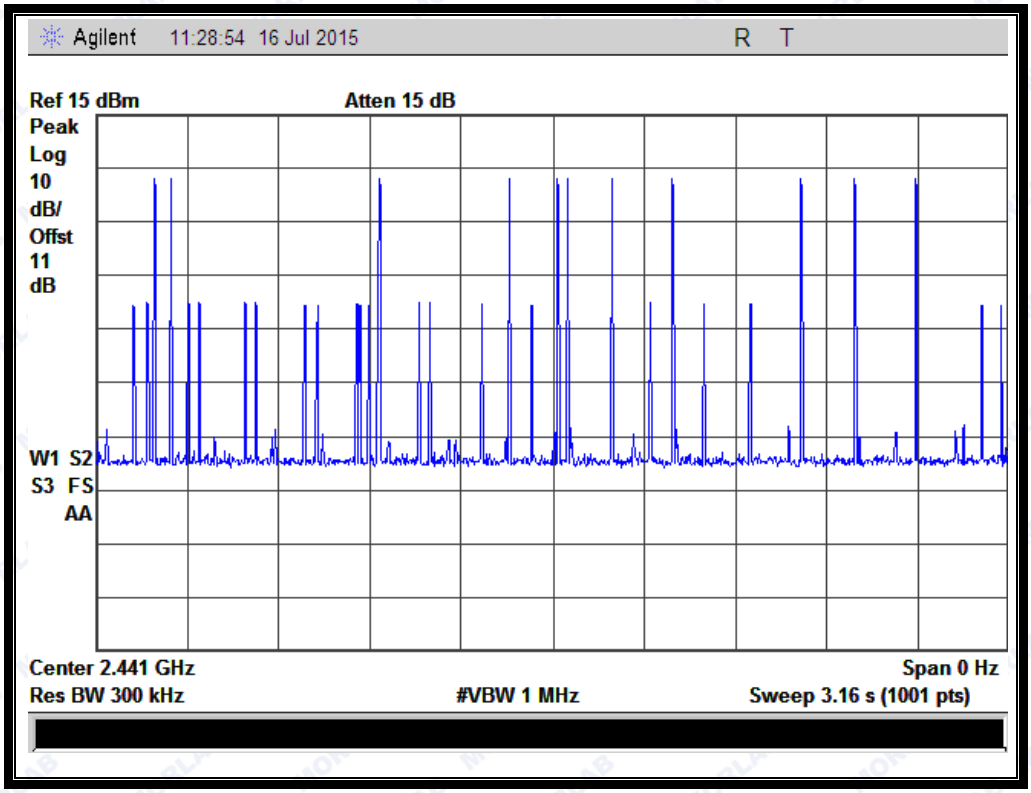
(Plot G: DH1 @ 8-DPSK)





(Plot H: DH3 @ 8-DPSK)





(Plot I: DH5 @ 8-DPSK)

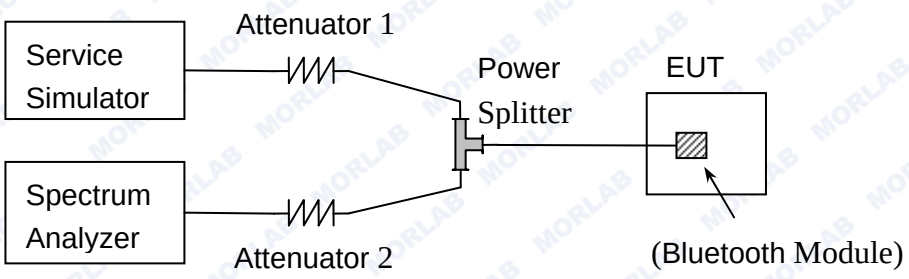
2.7 Conducted Spurious Emissions

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.

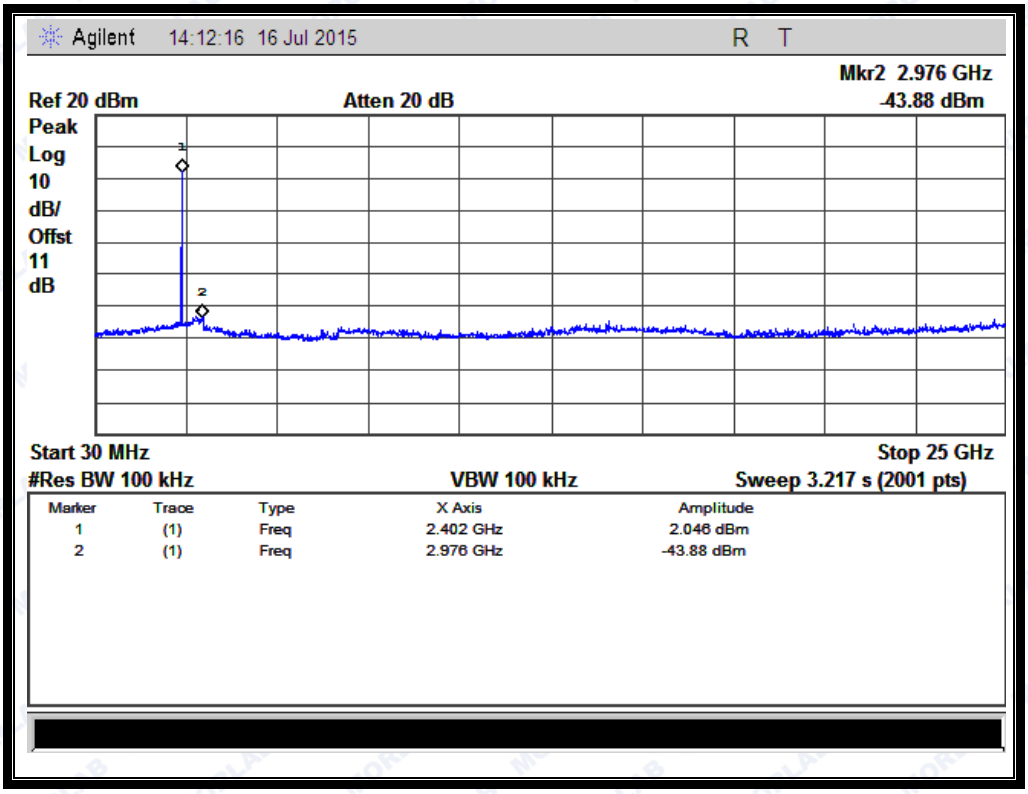
2.7.4.1 GFSK Mode

A. Test Verdict:

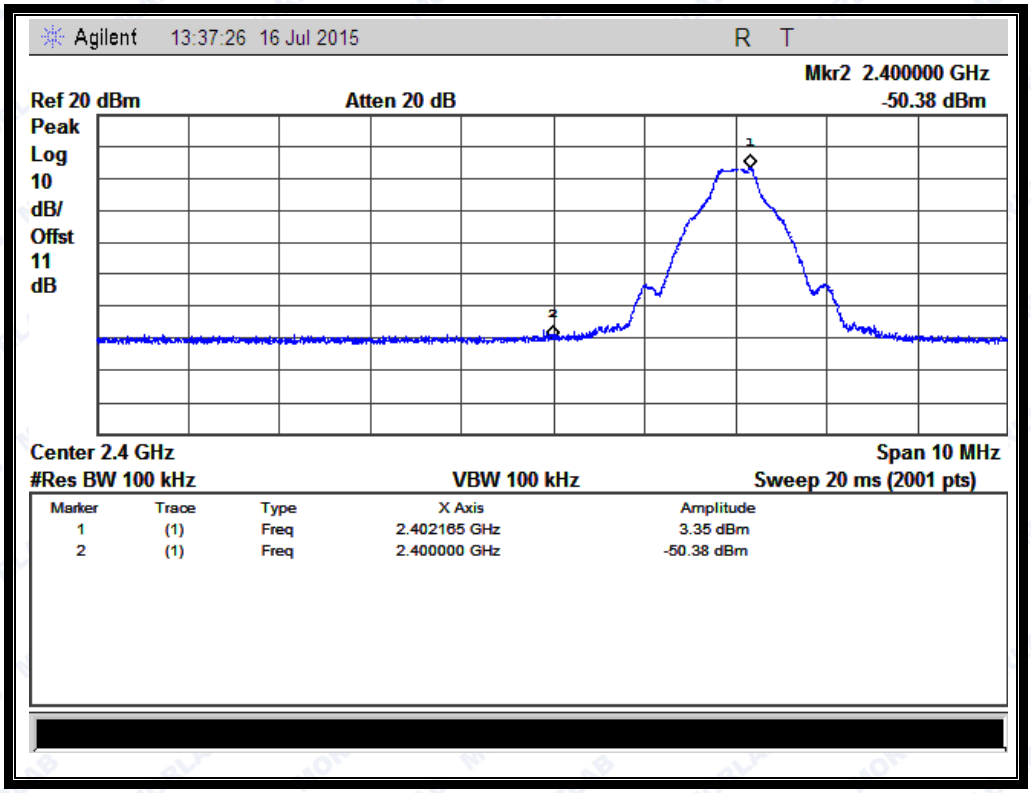
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-43.88	Plot A.1	2.046	-17.954	PASS
39	2441	-43.71	Plot B.1	2.893	-17.107	PASS
78	2480	-42.02	Plot C.1	4.144	-15.856	PASS

B. Test Plots:

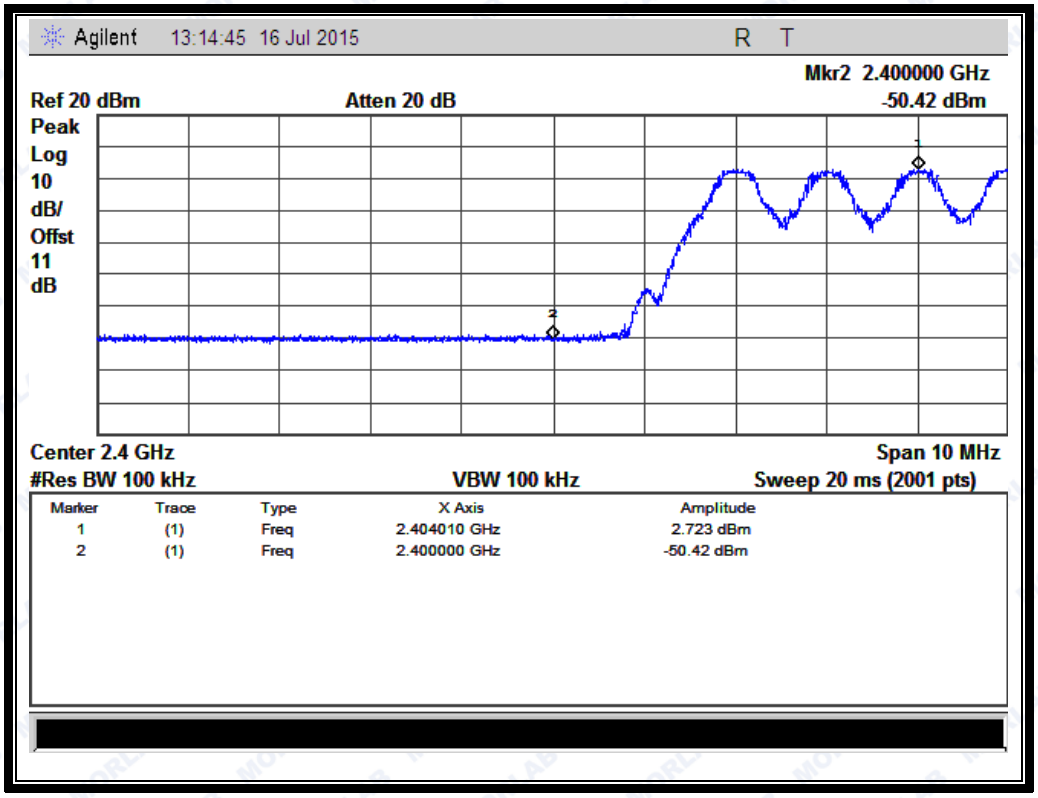
Note: the power of the Module transmitting frequency should be ignored.



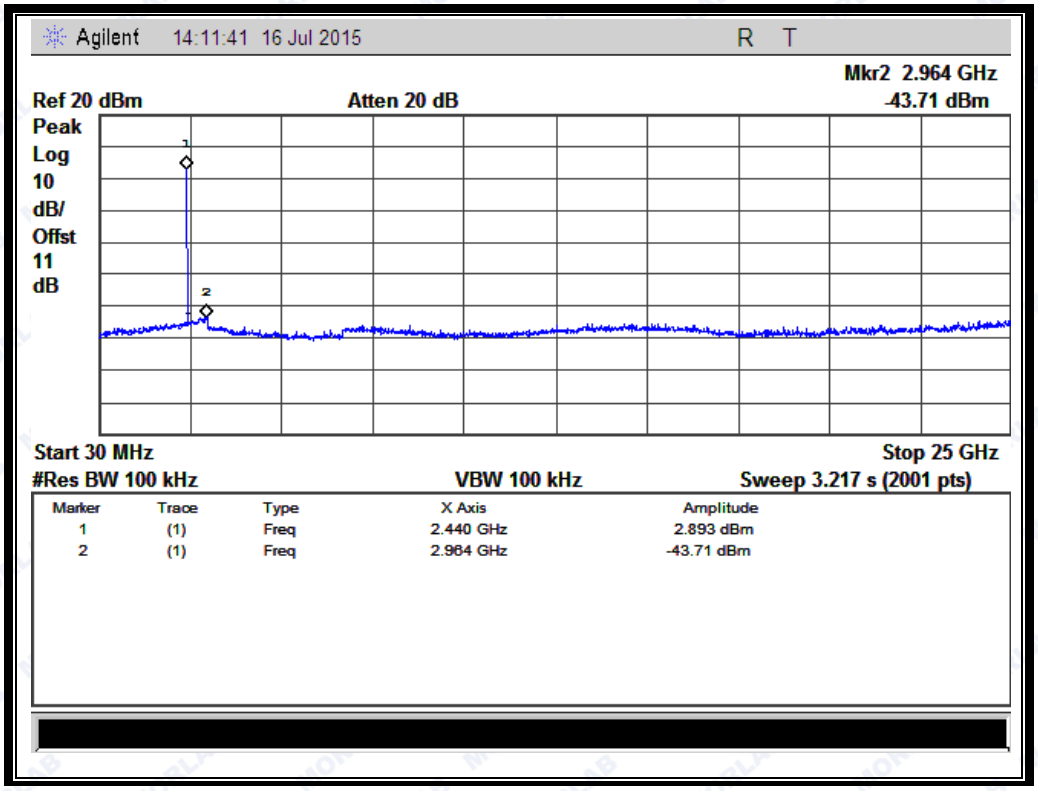
(Plot A.1: Channel = 0, 30MHz to 25GHz @ GFSK Mode)



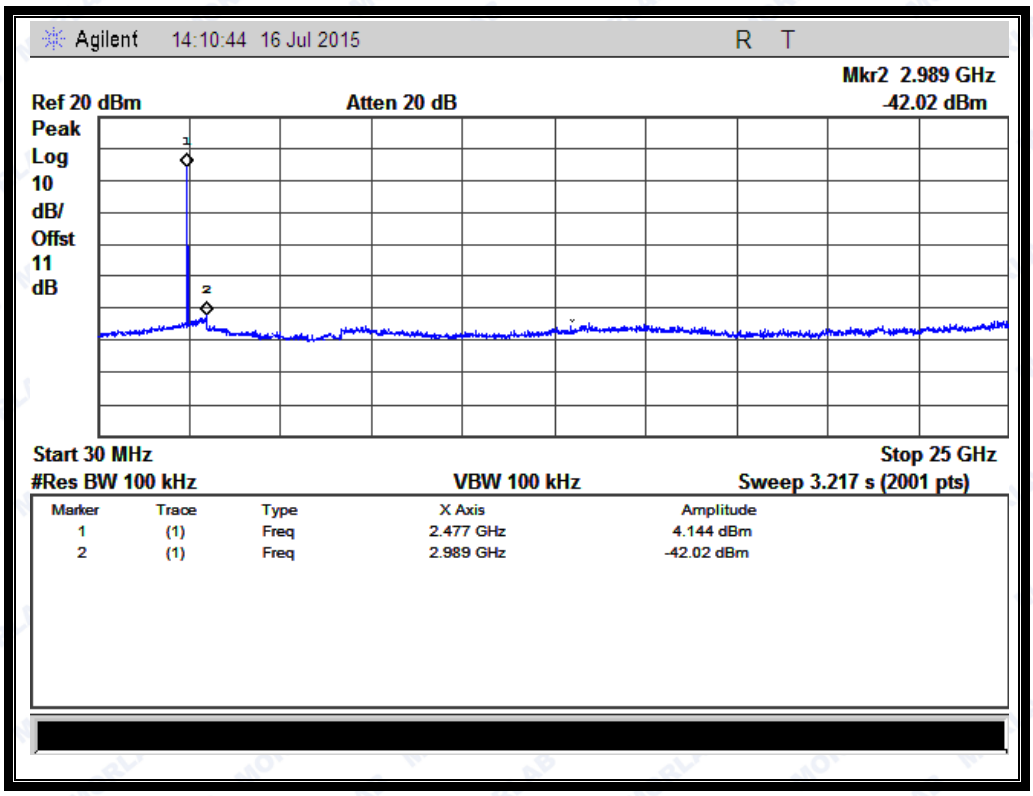
(Channel = 0, Band edge @ GFSK Mode)



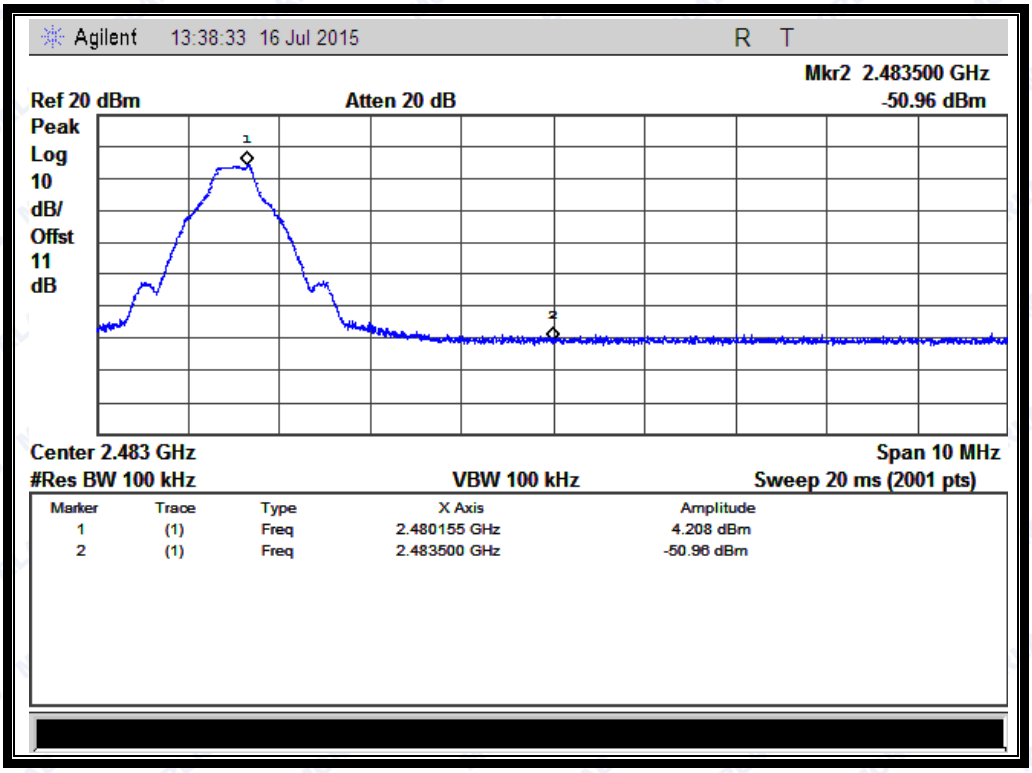
(Channel = 0, Band edge with hopping on @ GFSK Mode)



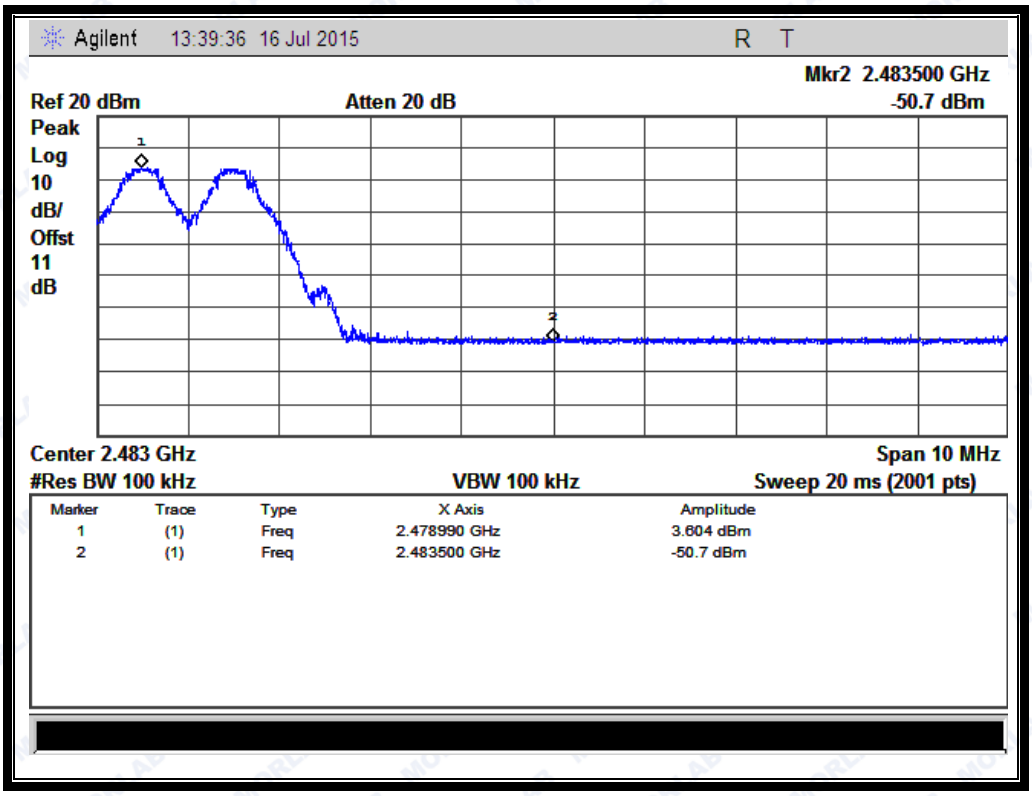
(Plot B.1: Channel = 39, 30MHz to 25GHz @ GFSK Mode)



(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)

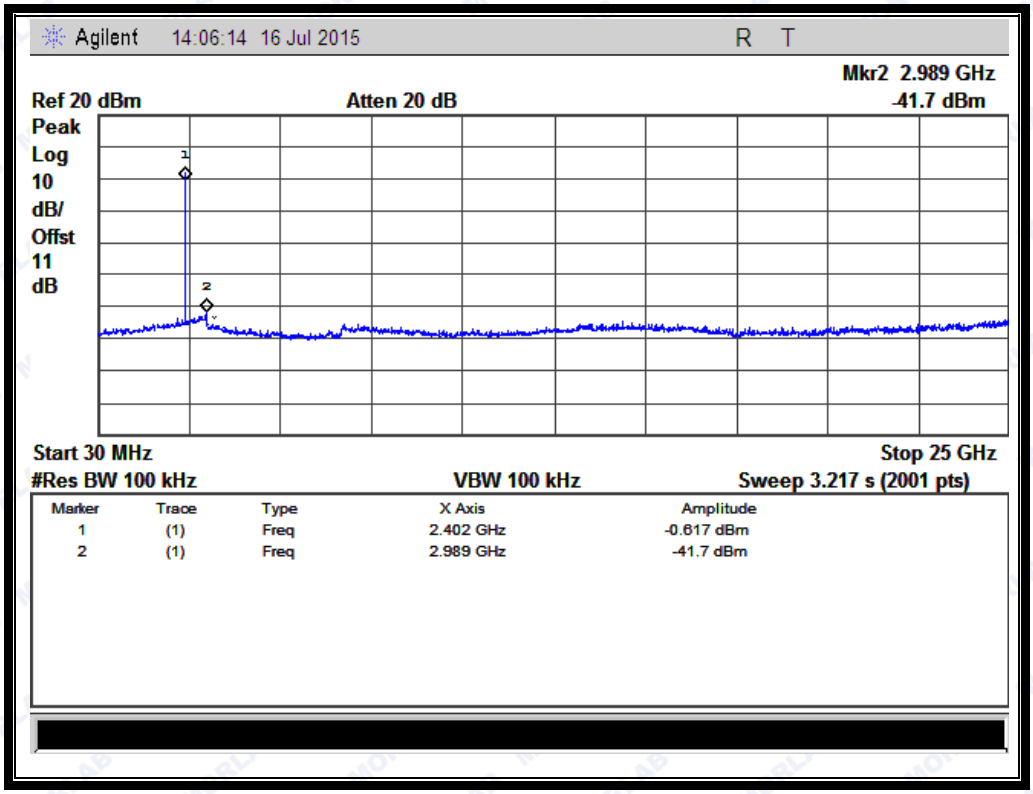
2.7.4.2 π/4-DQPSK Mode

A. Test Verdict:

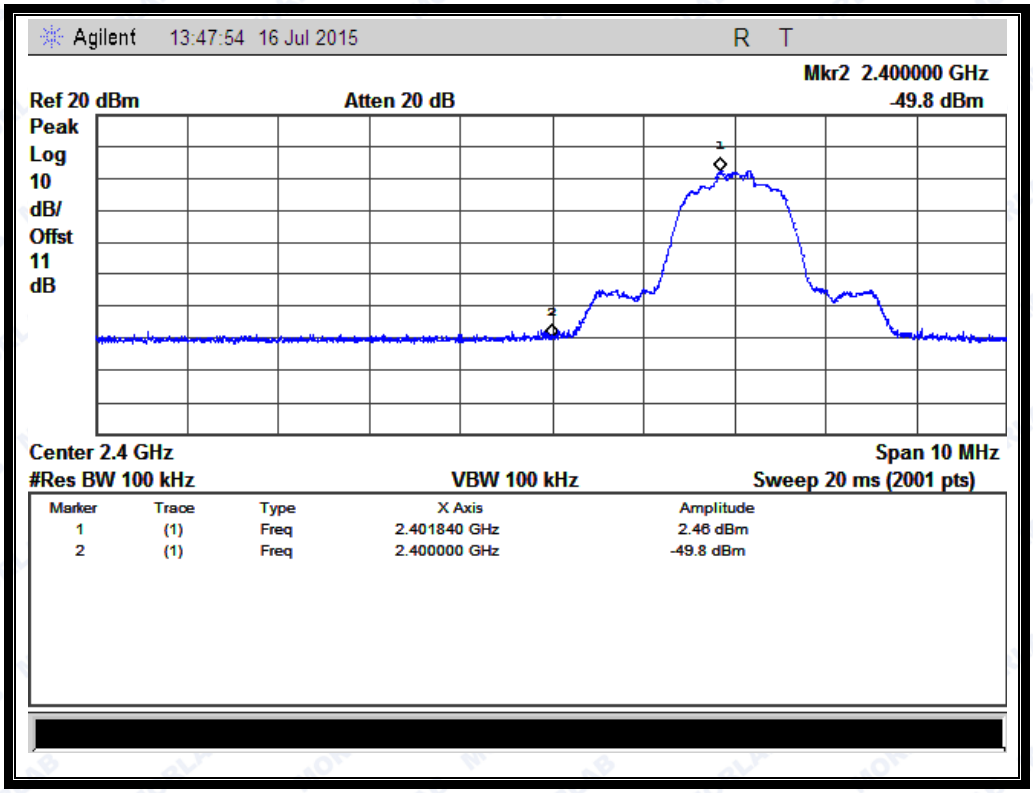
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-41.7	Plot D.1	-0.617	-20.617	PASS
39	2441	-43.3	Plot E.1	-0.933	-20.933	PASS
78	2480	-44.23	Plot F.1	-1.434	-21.434	PASS

B. Test Plots:

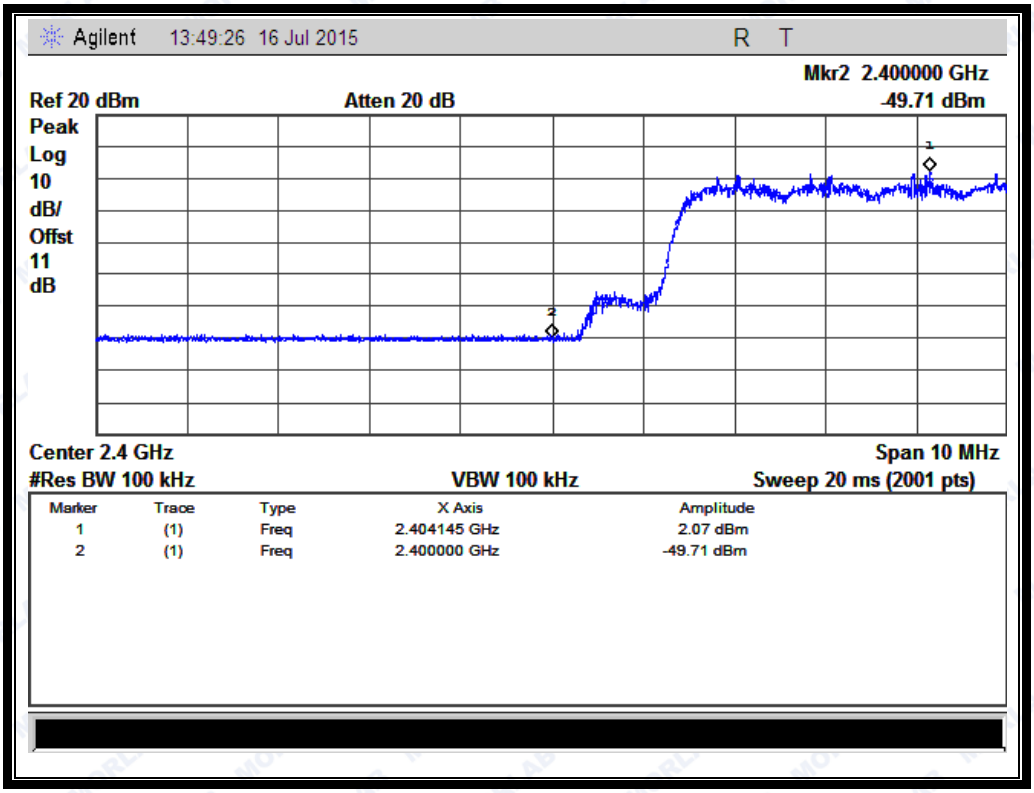
Note: the power of the Module transmitting frequency should be ignored.



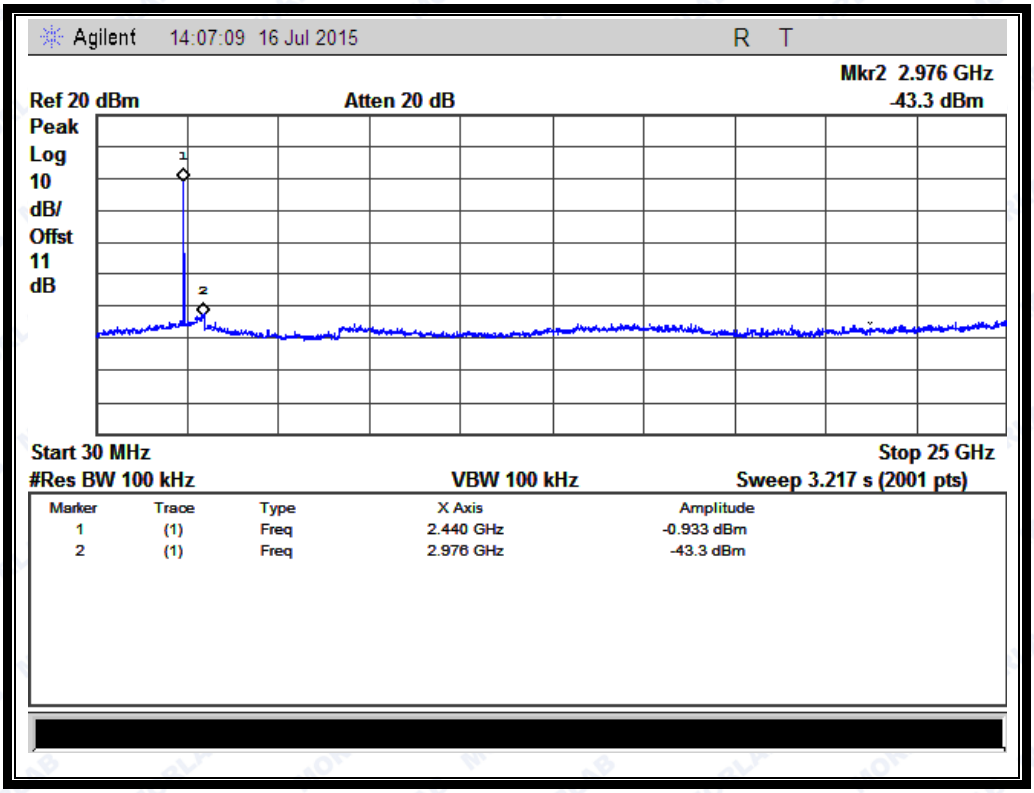
(Plot D.1: Channel = 0, 30MHz to 25GHz @π/4-DQPSK)



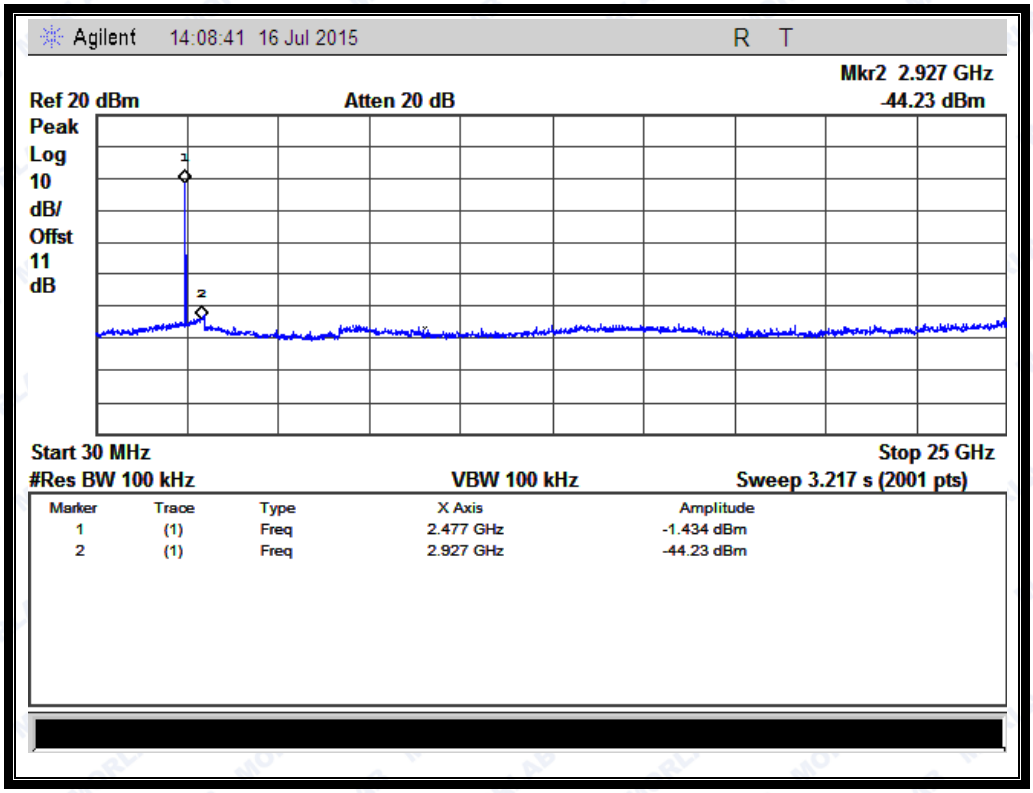
(Channel = 0, Band edge @π/4-DQPSK)



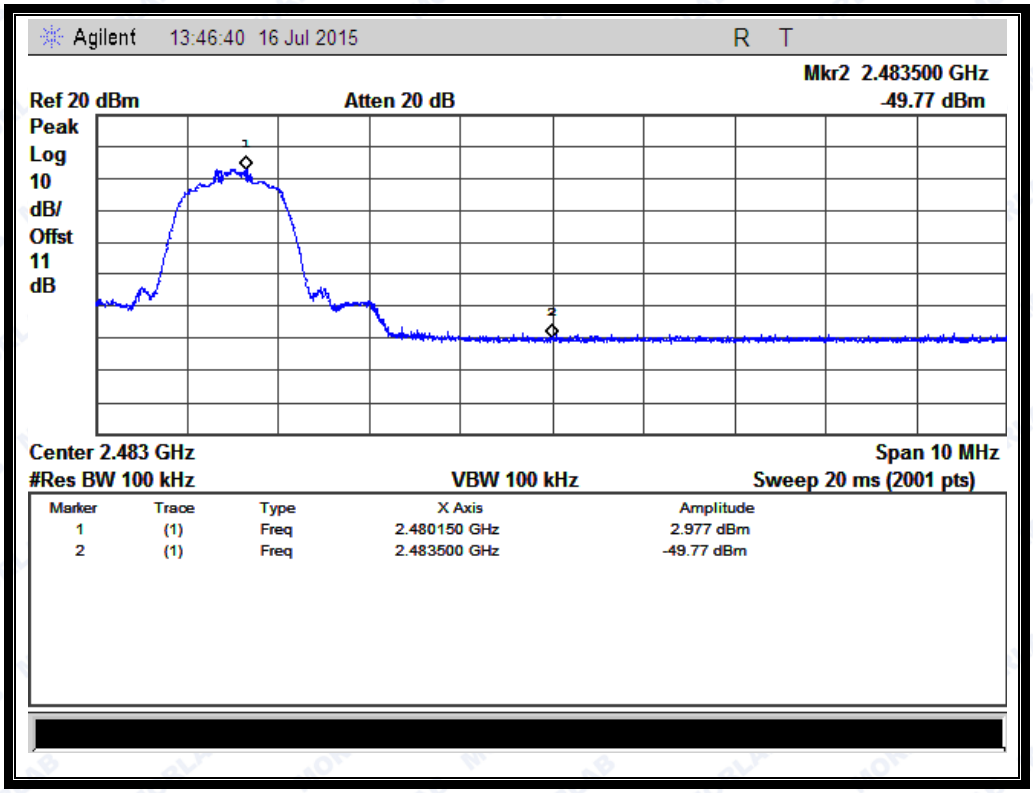
(Channel = 0, Band edge with hopping on @π/4-DQPSK)



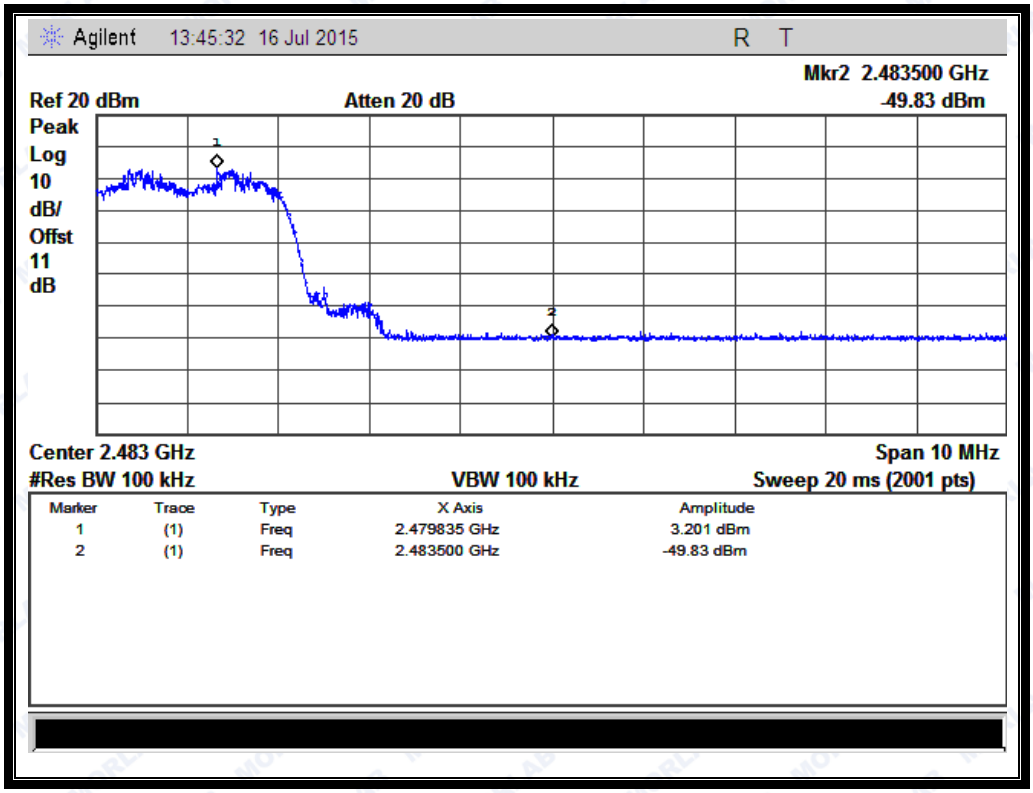
(Plot E.1: Channel = 39, 30MHz to 25GHz @ π/4-DQPSK)



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



(Channel = 78, Band edge @π/4-DQPSK)



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

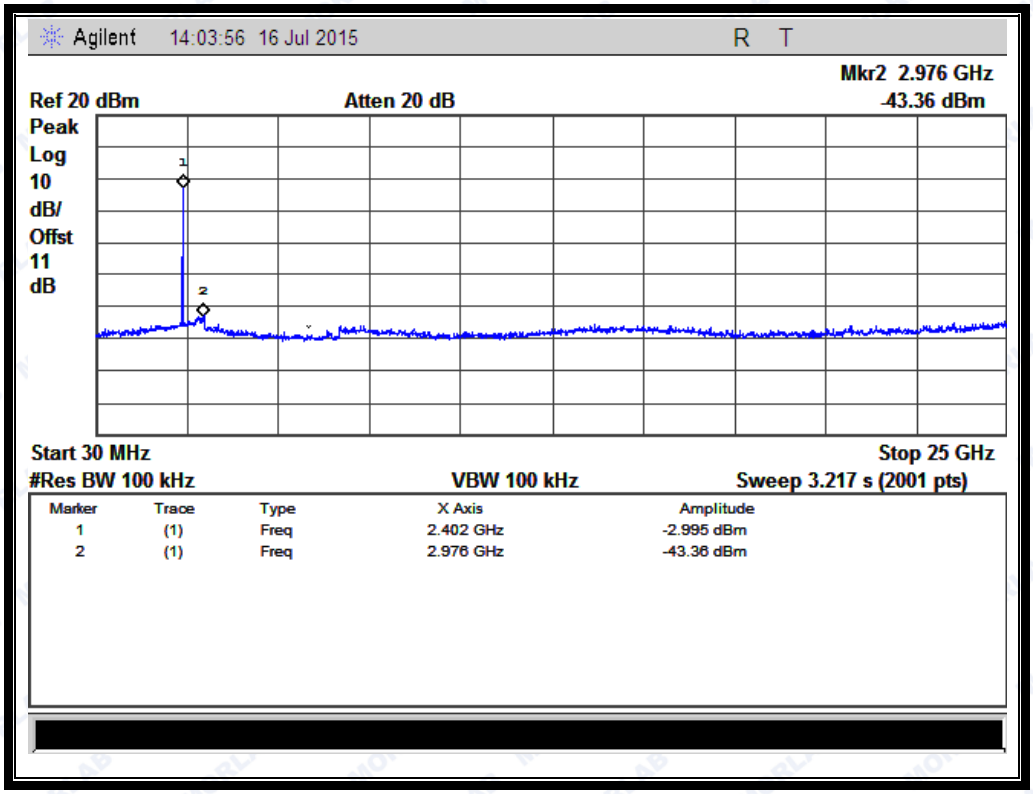
2.7.4.3 8-DPSK Mode

A. Test Verdict:

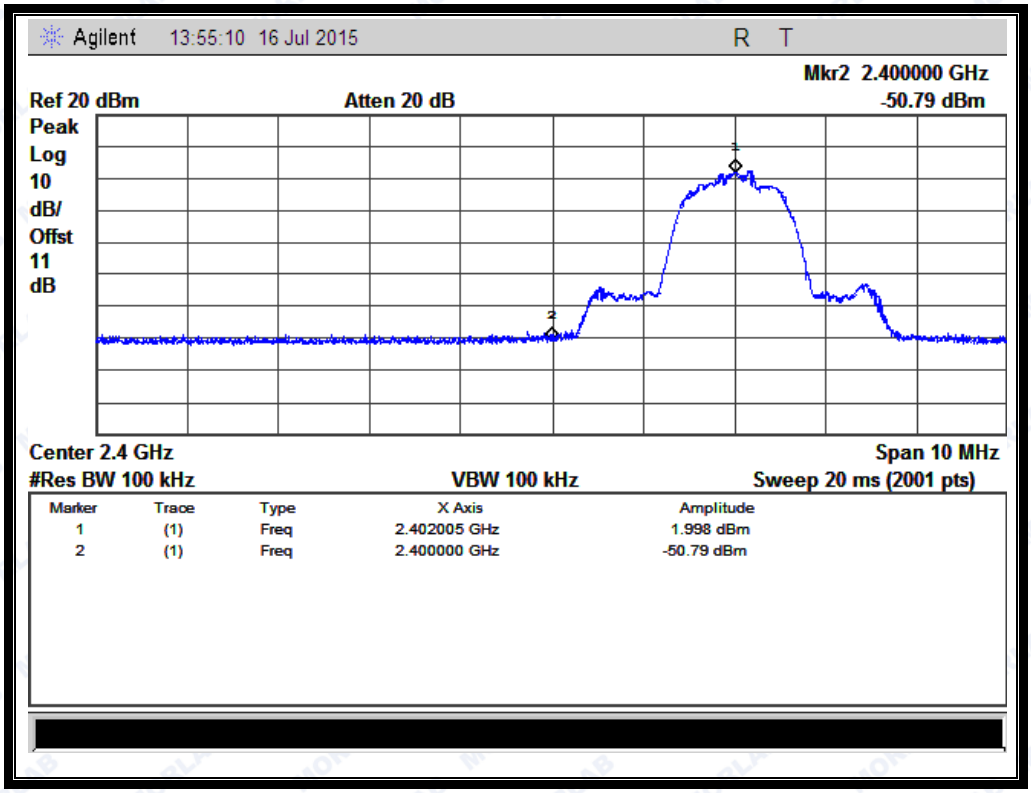
Channel	Frequency (MHz)	Measured Max. Out of Band Emission (dBm)	Refer to Plot	Limit (dBm)		Verdict
				Carrier Level	Calculated -20dBc Limit	
0	2402	-43.36	Plot G.1	-2.995	-22.995	PASS
39	2441	-43.32	Plot H.1	-1.053	-21.053	PASS
78	2480	-43.74	Plot I.1	0.098	-19.002	PASS

B. Test Plots:

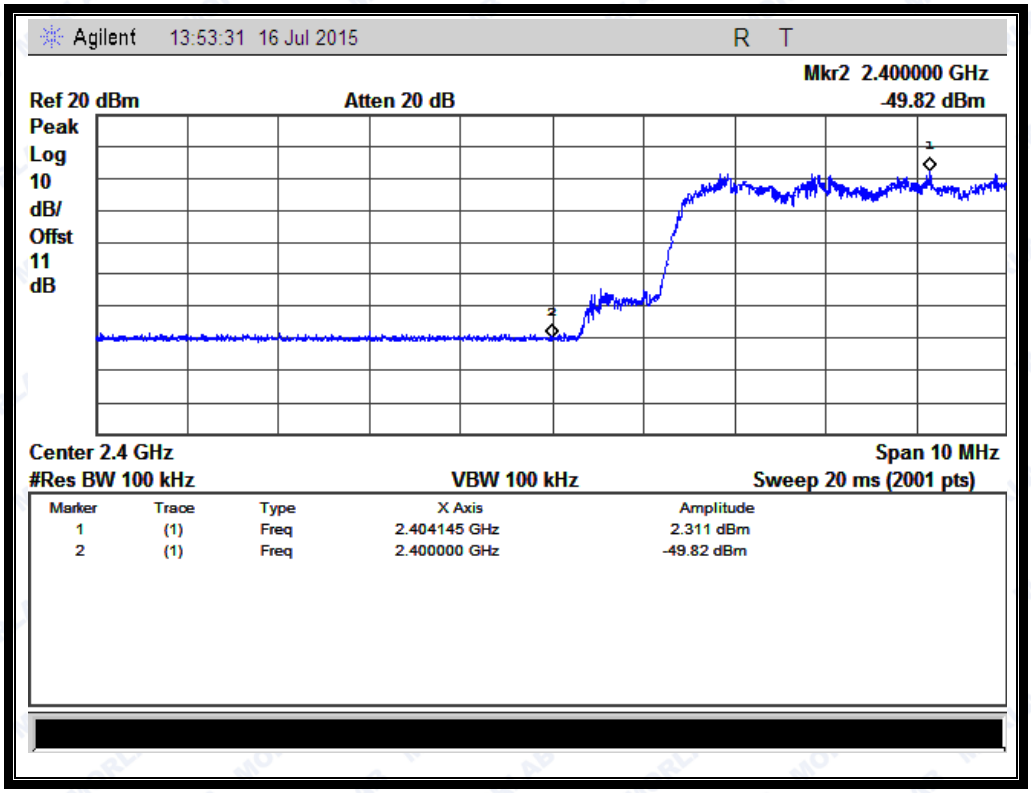
Note: the power of the Module transmitting frequency should be ignored.



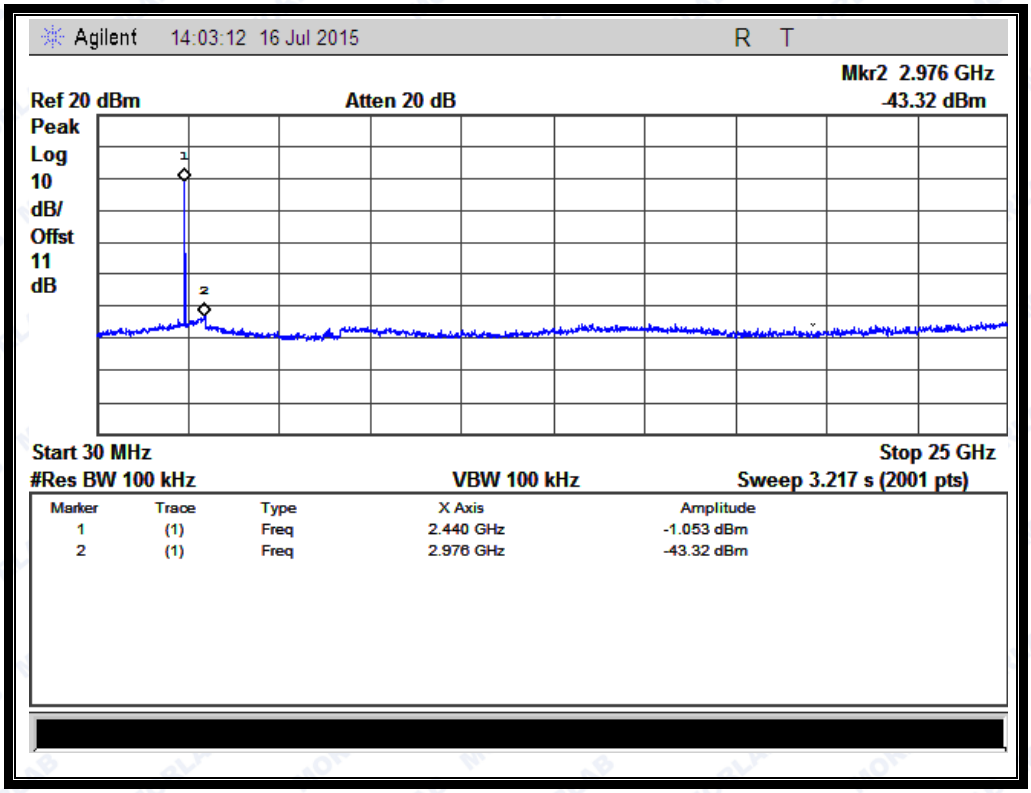
(Plot G.1: Channel = 0, 30MHz to 25GHz @ 8-DPSK)



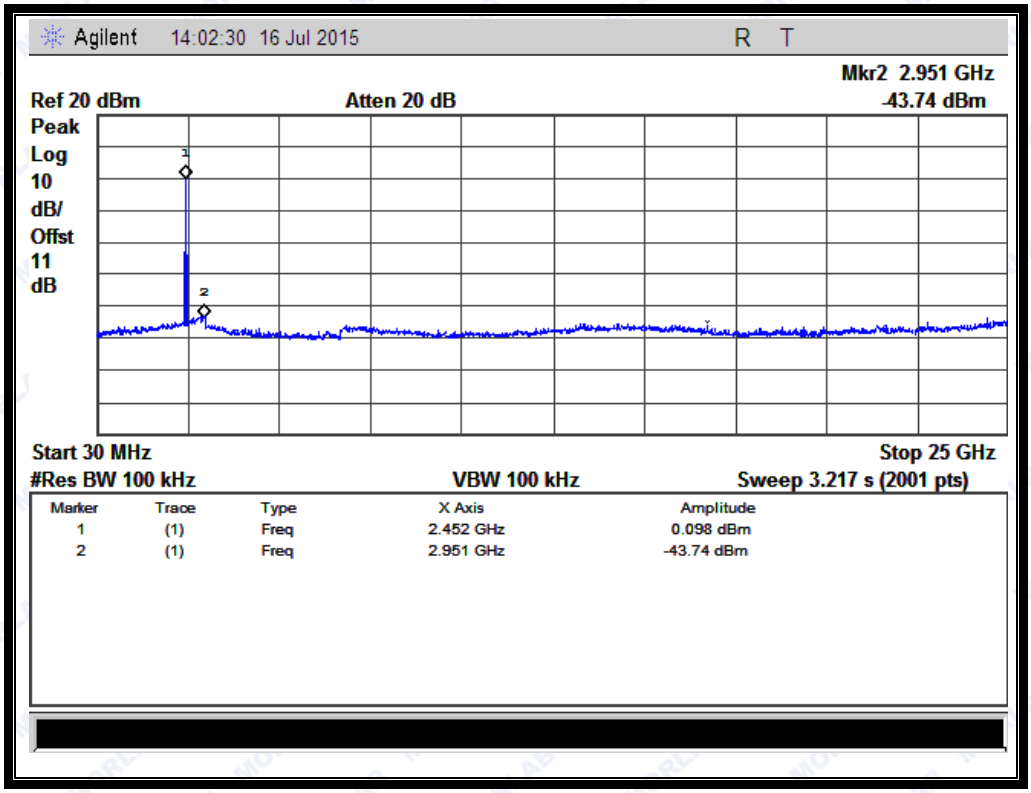
(Channel = 0, Band edge @ 8-DPSK)



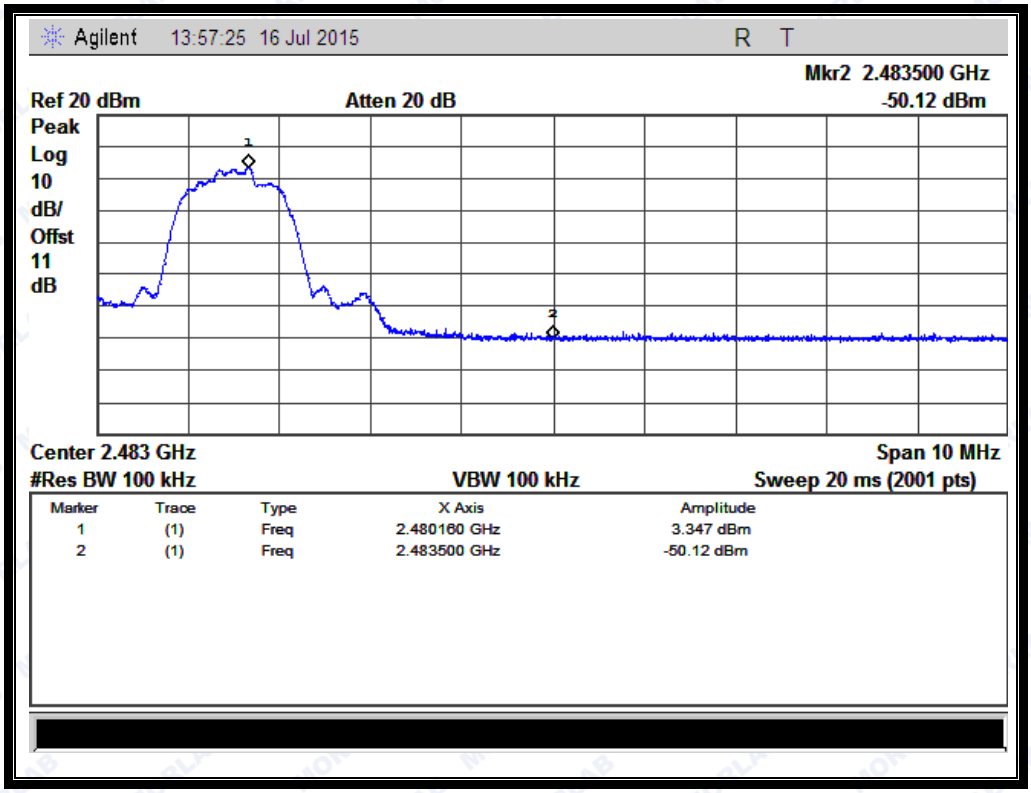
(Channel = 0, Band edge with hopping on @ 8-DPSK)



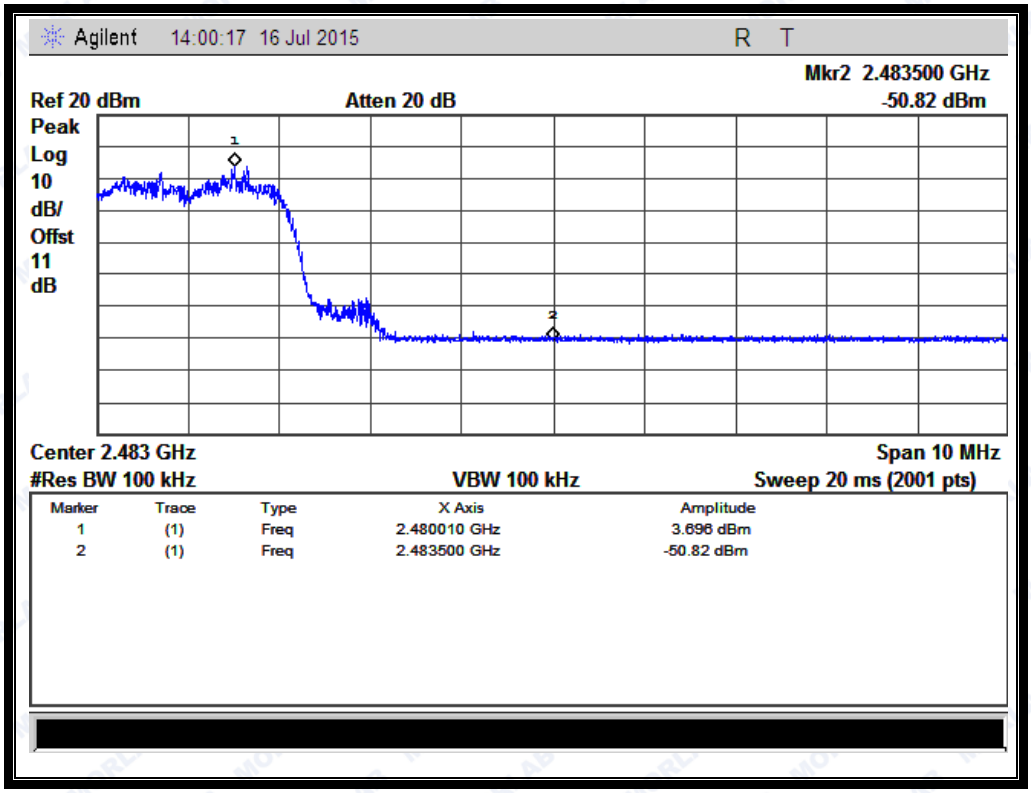
(Plot H.1: Channel = 39, 30MHz to 25GHz @ 8-DPSK)



(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)

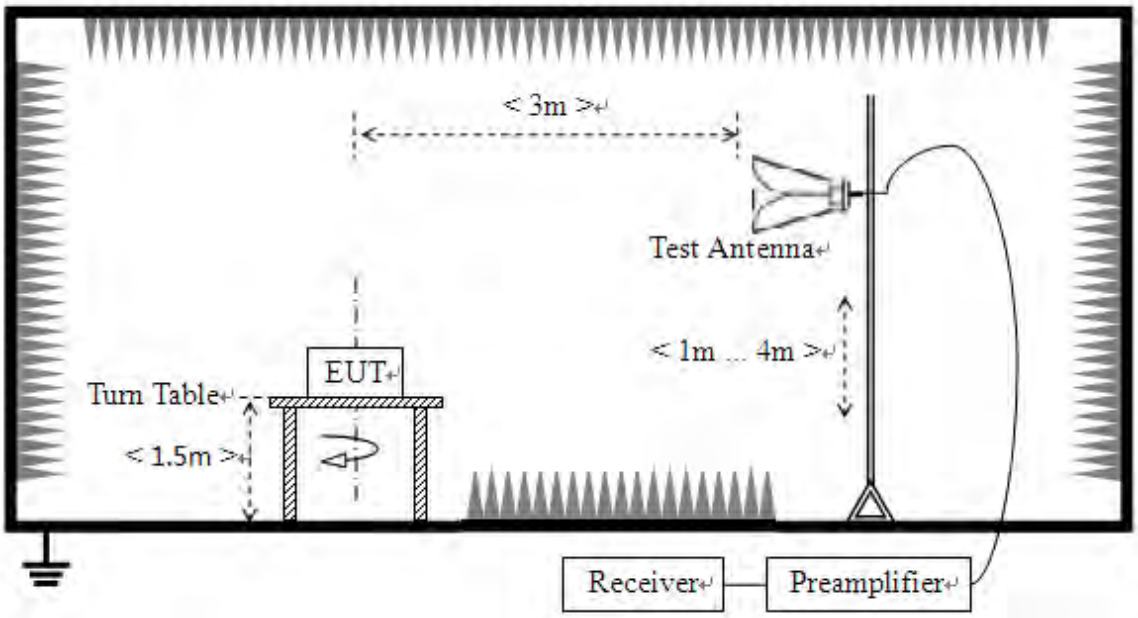
2.8 Restricted Frequency Bands

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 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:

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

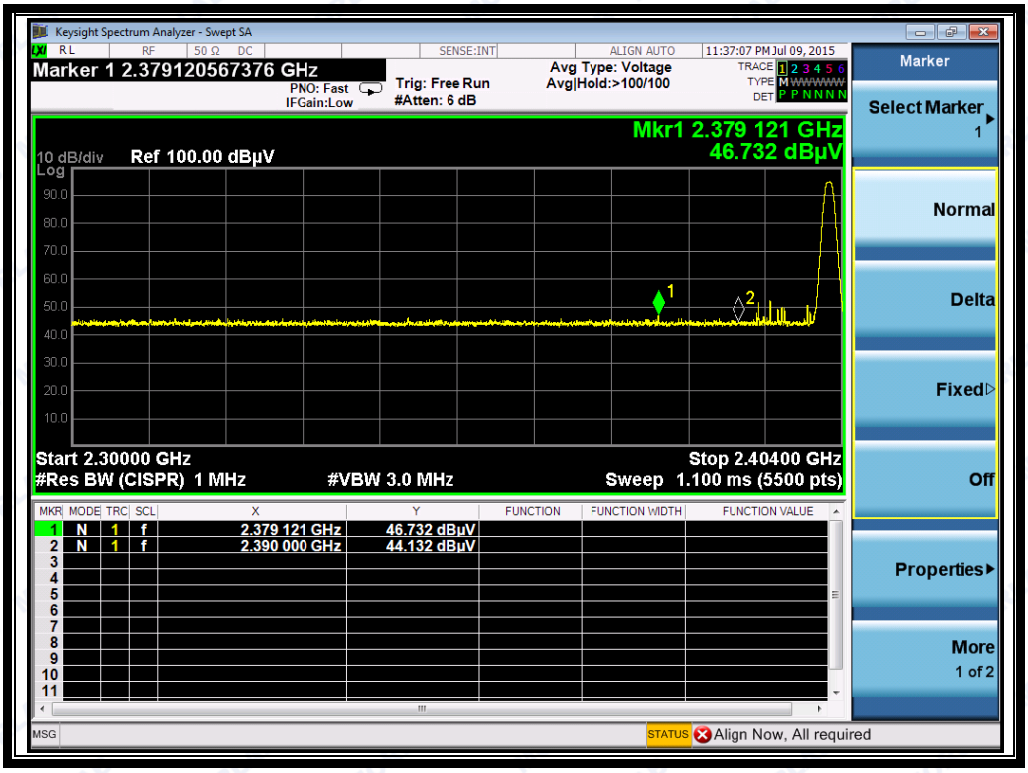
The lowest and highest channels are tested to verify Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] $=U_R + A_T + A_{Factor}$ [dB]; AT $=L_{Cable\ loss}$ [dB]-G_{preamp} [dB]
AT: Total correction Factor except Antenna
UR: Receiver Reading
Gpreamp: Preamplifier Gain
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

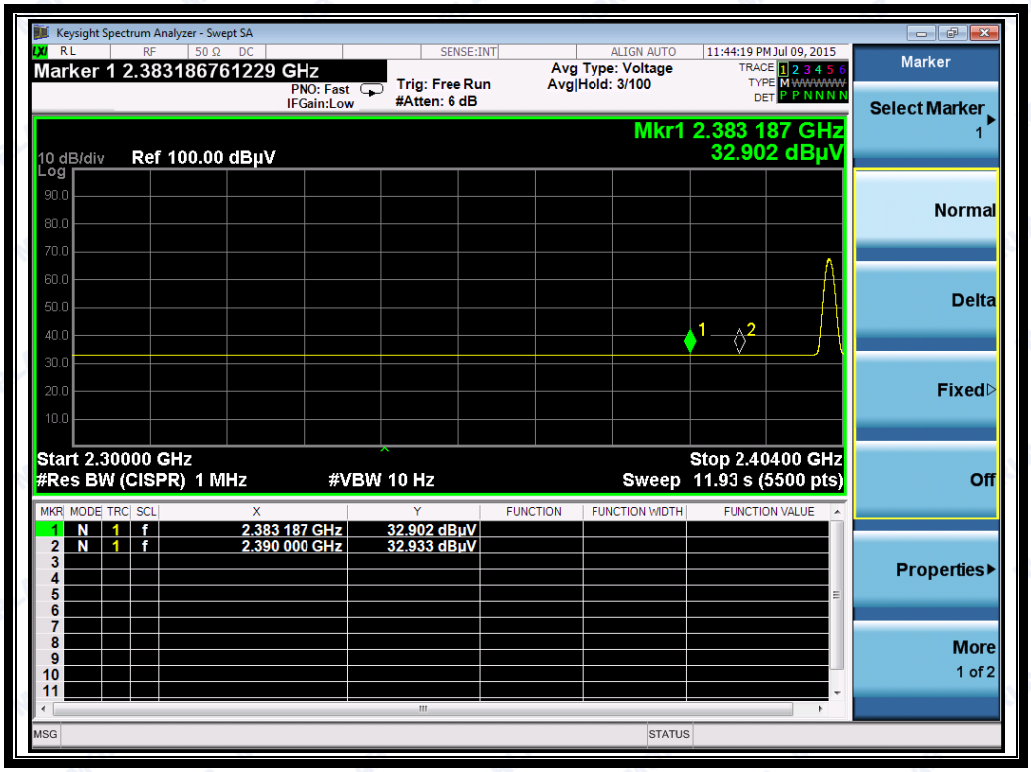
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2379.12	PK	46.73	-33.63	32.56	45.66	74	Pass
0	2383.19	AV	32.90	-33.63	32.56	31.83	54	Pass
78	2495.13	PK	54.46	-33.18	32.5	53.78	74	Pass
78	2495.13	AV	32.86	-33.18	32.5	32.18	54	Pass

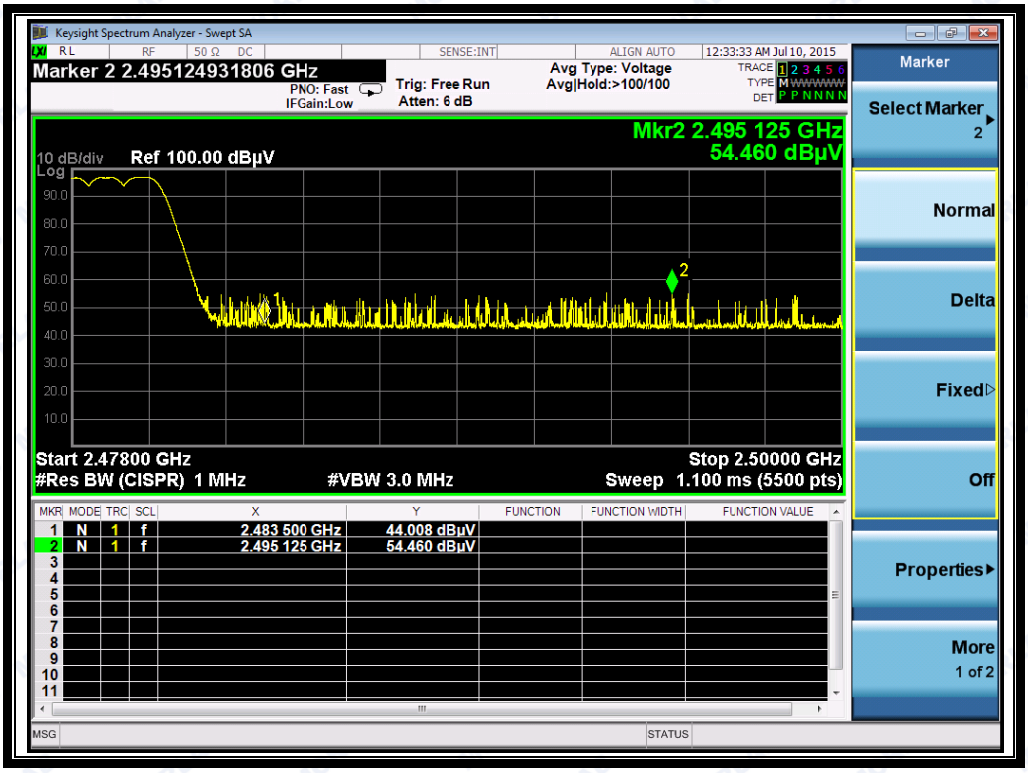
B. Test Plots:



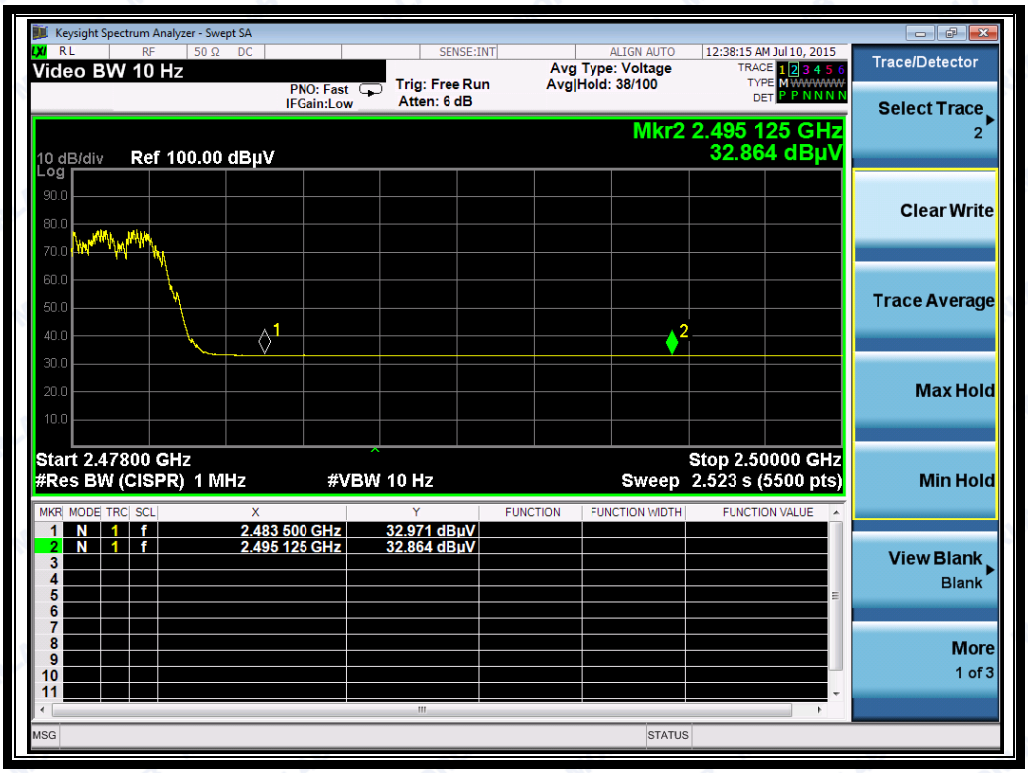
(Plot A1:Channel = 0 PEAK @ GFSK)



(Plot A2:Channel = 0 AVERAGE @ GFSK)



(Plot B1: Channel = 78 PEAK @ GFSK)



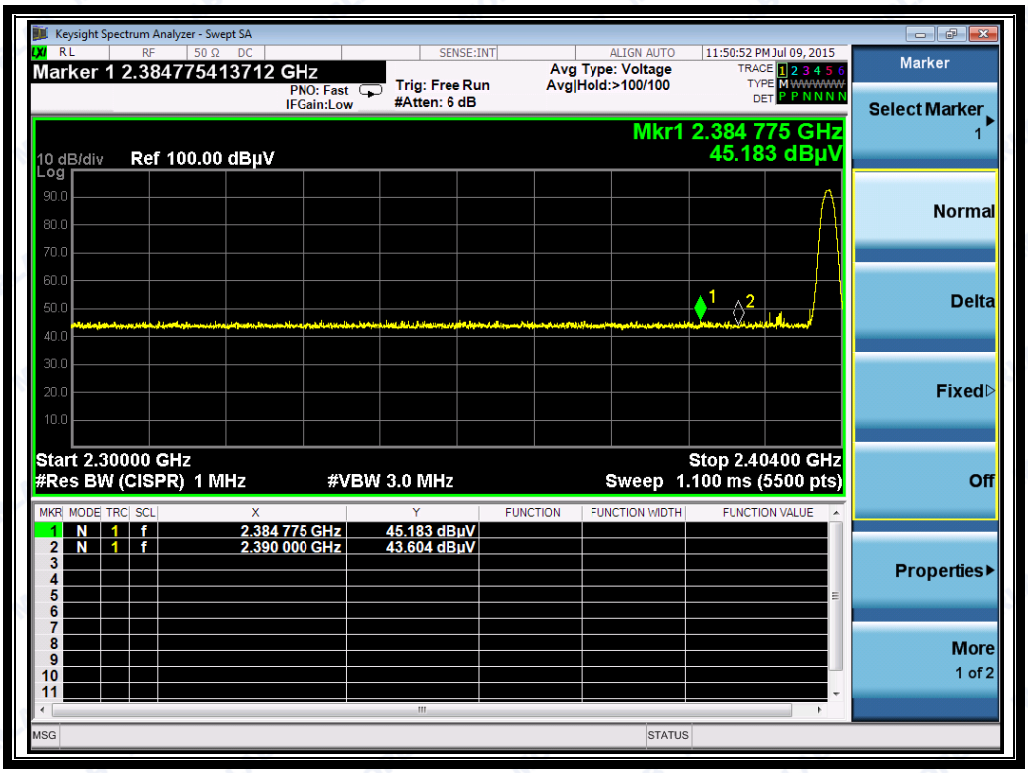
(Plot B2: Channel = 78 AVERAGE @ GFSK)

2.8.4.2 π/4-DQPSK Mode

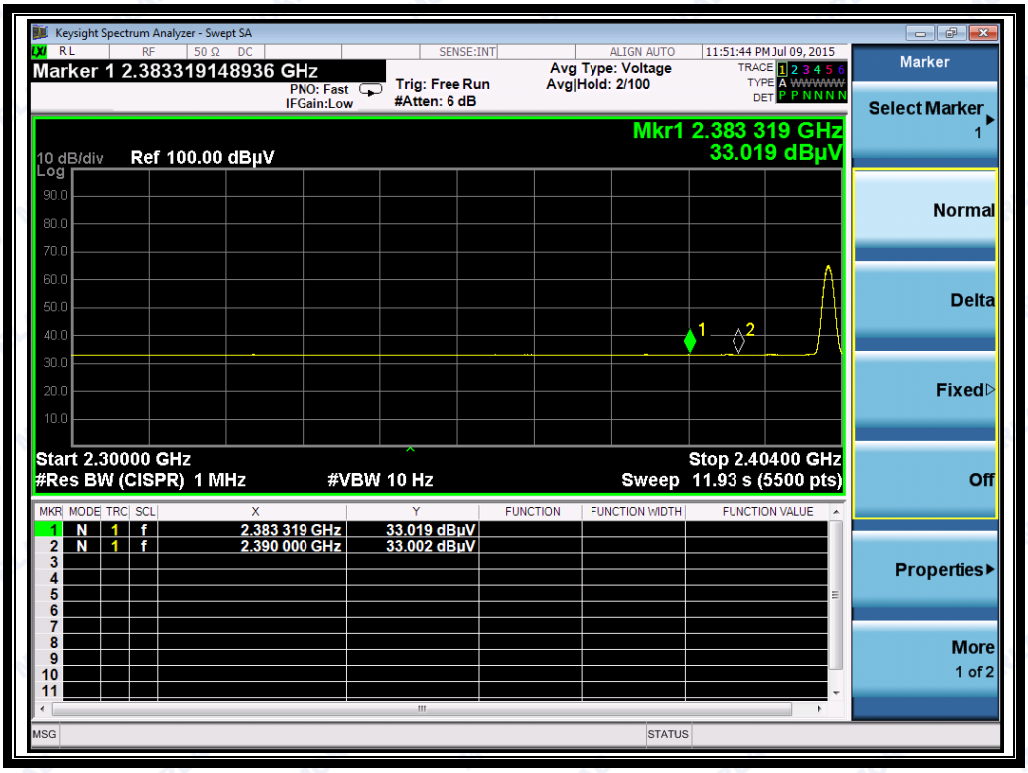
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
0	2384.78	PK	45.18	-33.63	32.56	44.11	74	Pass
0	2383.32	AV	33.02	-33.63	32.56	31.95	54	Pass
78	2487.67	PK	52.33	-33.18	32.5	51.65	74	Pass
78	2486.63	AV	33.07	-33.18	32.5	32.39	54	Pass

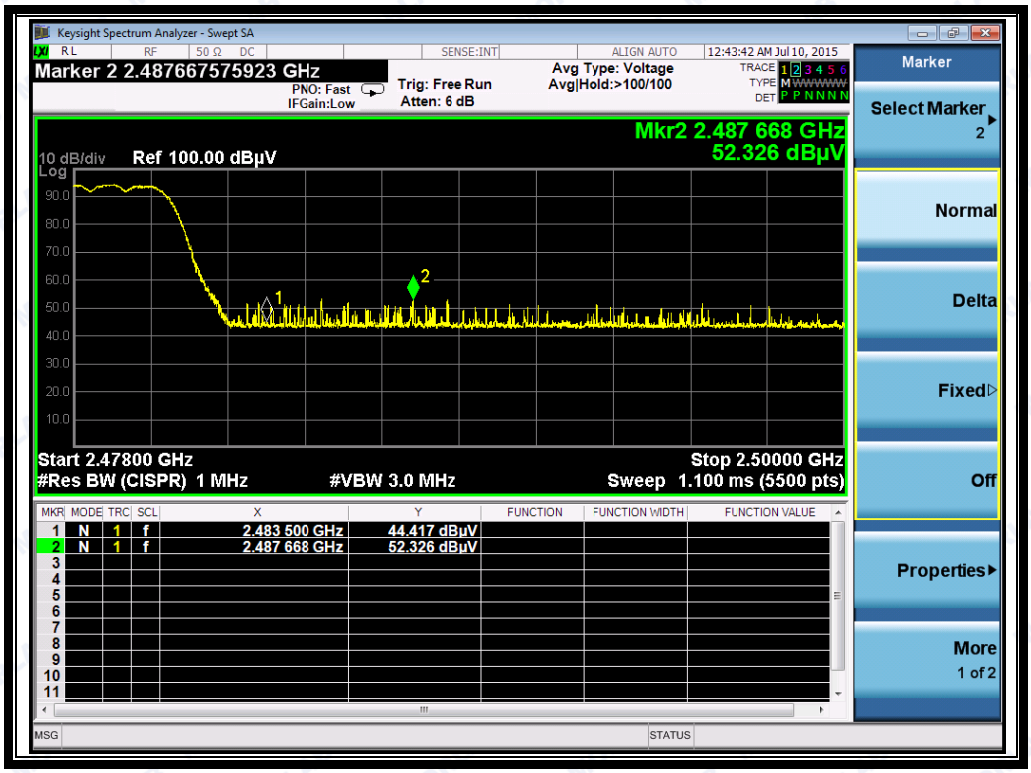
B. Test Plots:



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



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



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

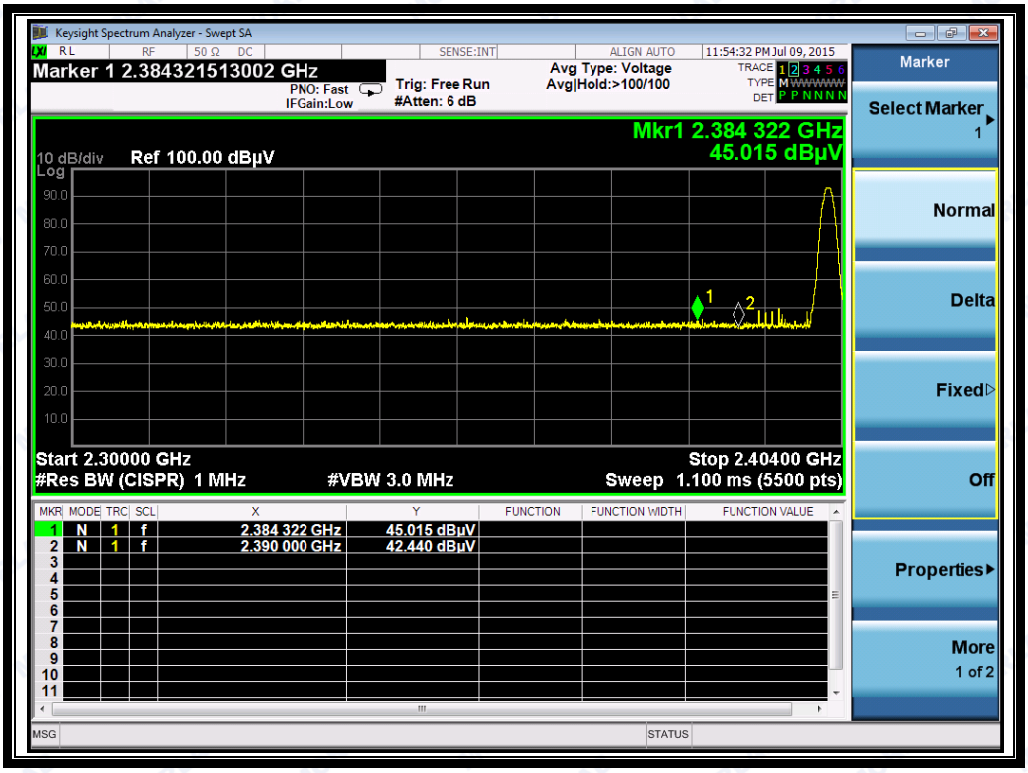
(Plot D2: Channel = 78 AVERAGE@ π/4-DQPSK)

2.8.4.3 8-DPSK Mode

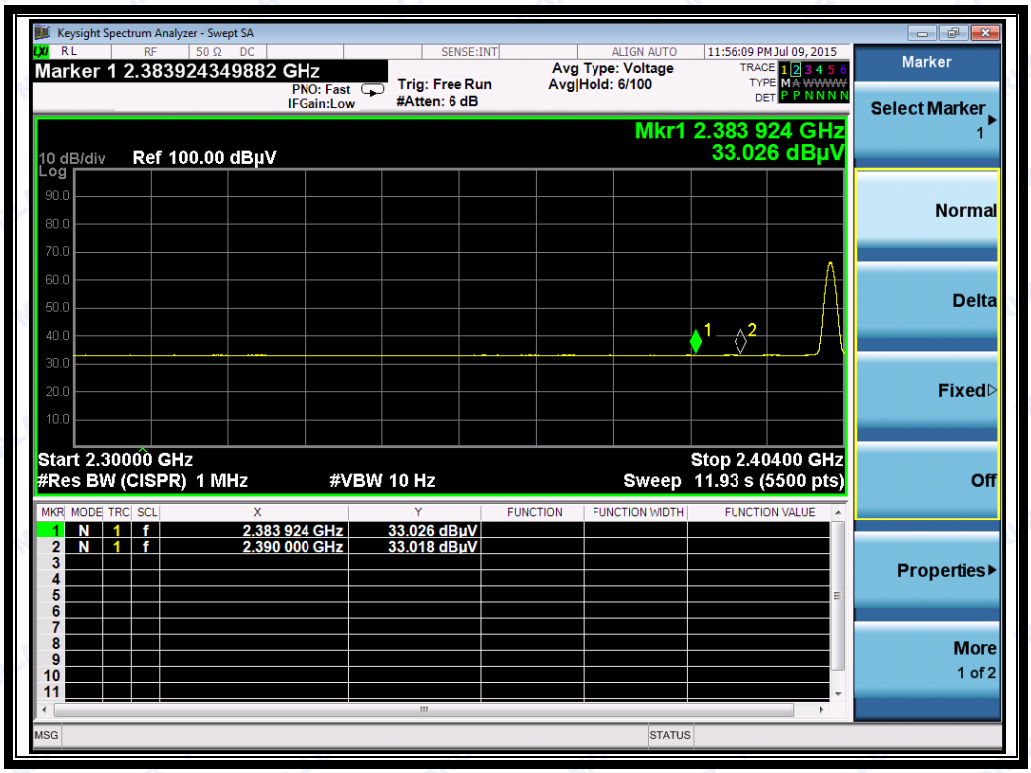
A. Test Verdict:

Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
0	2384.32	PK	45.02	-33.63	32.56	43.95	74	Pass
0	2383.92	AV	33.03	-33.63	32.56	31.96	54	Pass
78	2485.92	PK	52.86	-33.18	32.5	52.18	74	Pass
78	2485.49	AV	33.12	-33.18	32.5	32.44	54	Pass

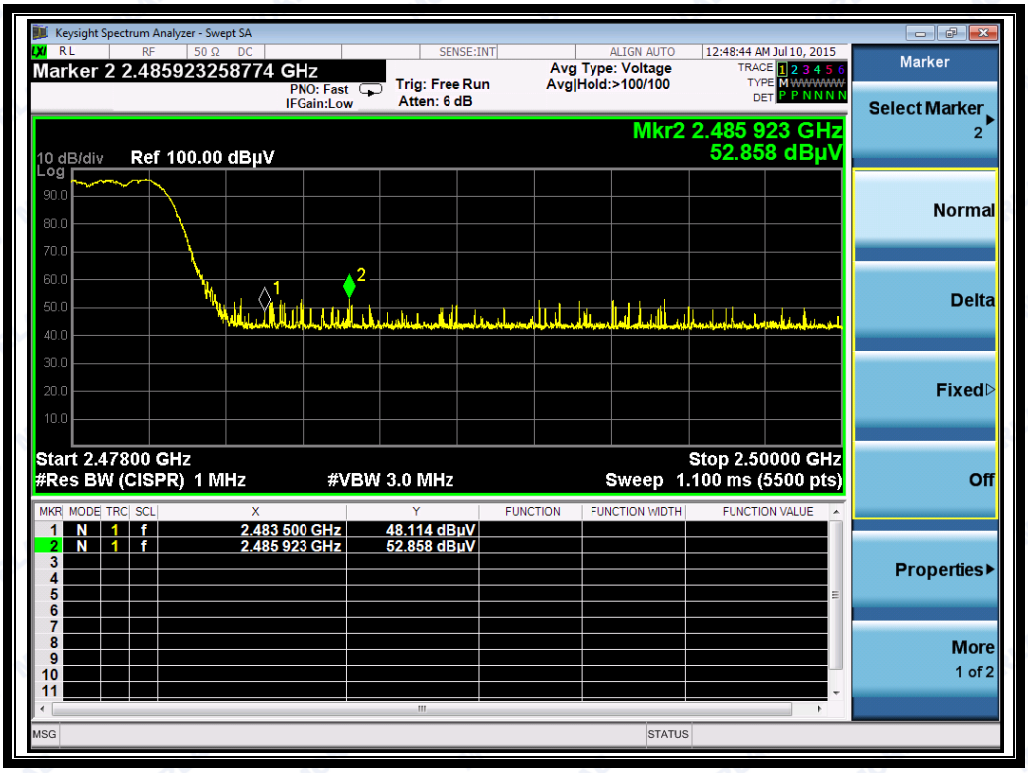
B. Test Plots:



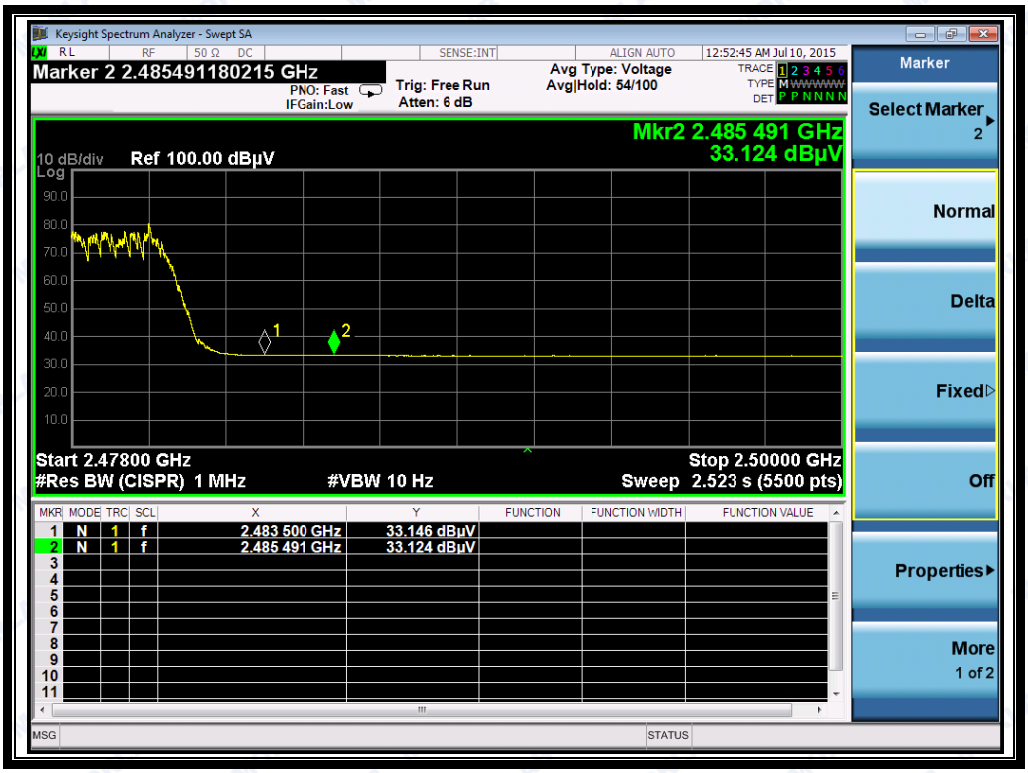
(Plot E1: Channel = 0 PEAK @ 8-DPSK Mode)



(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, 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

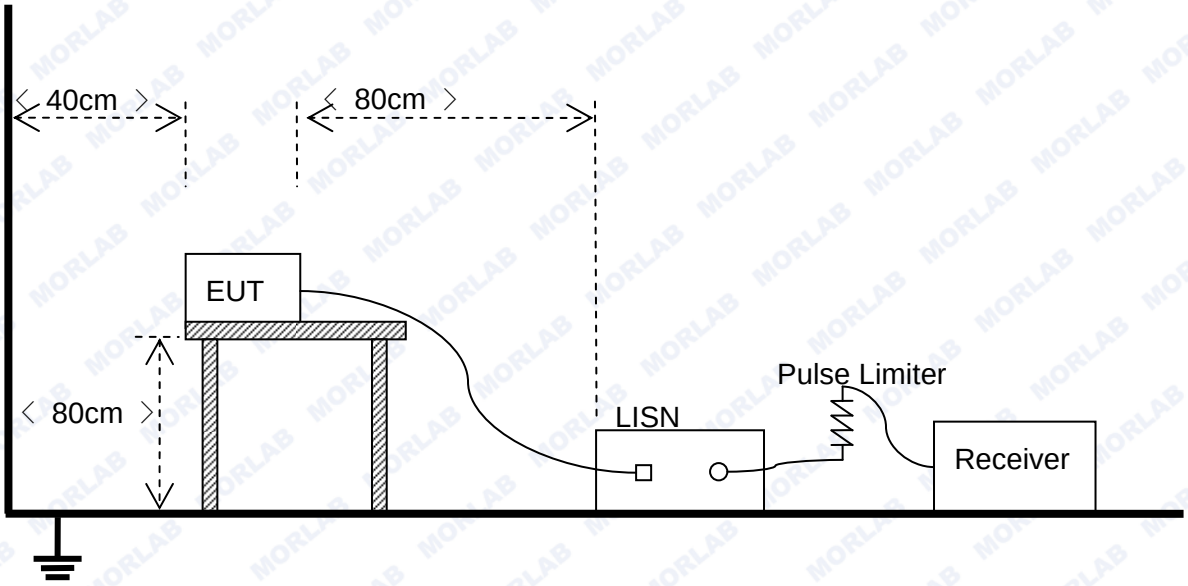
NOTE:

(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 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).

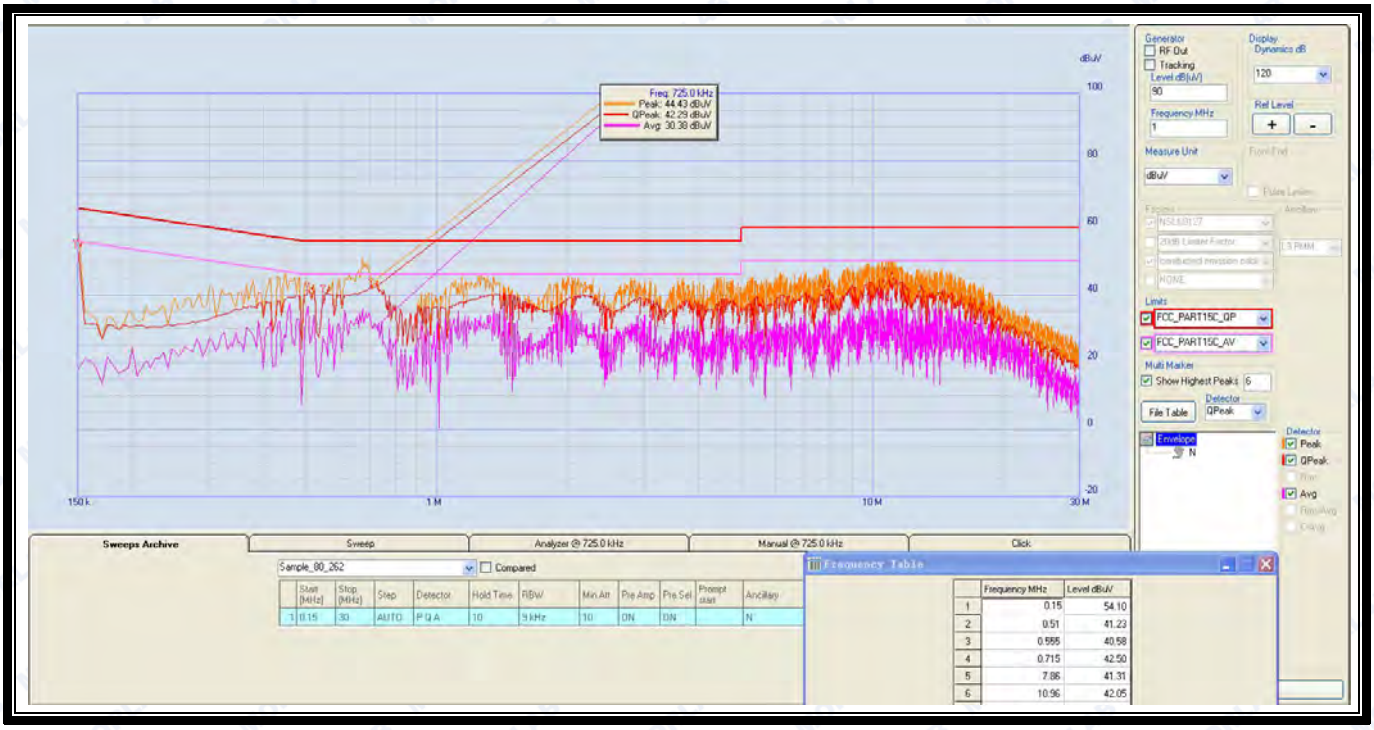
2.9.3 Test Result

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.

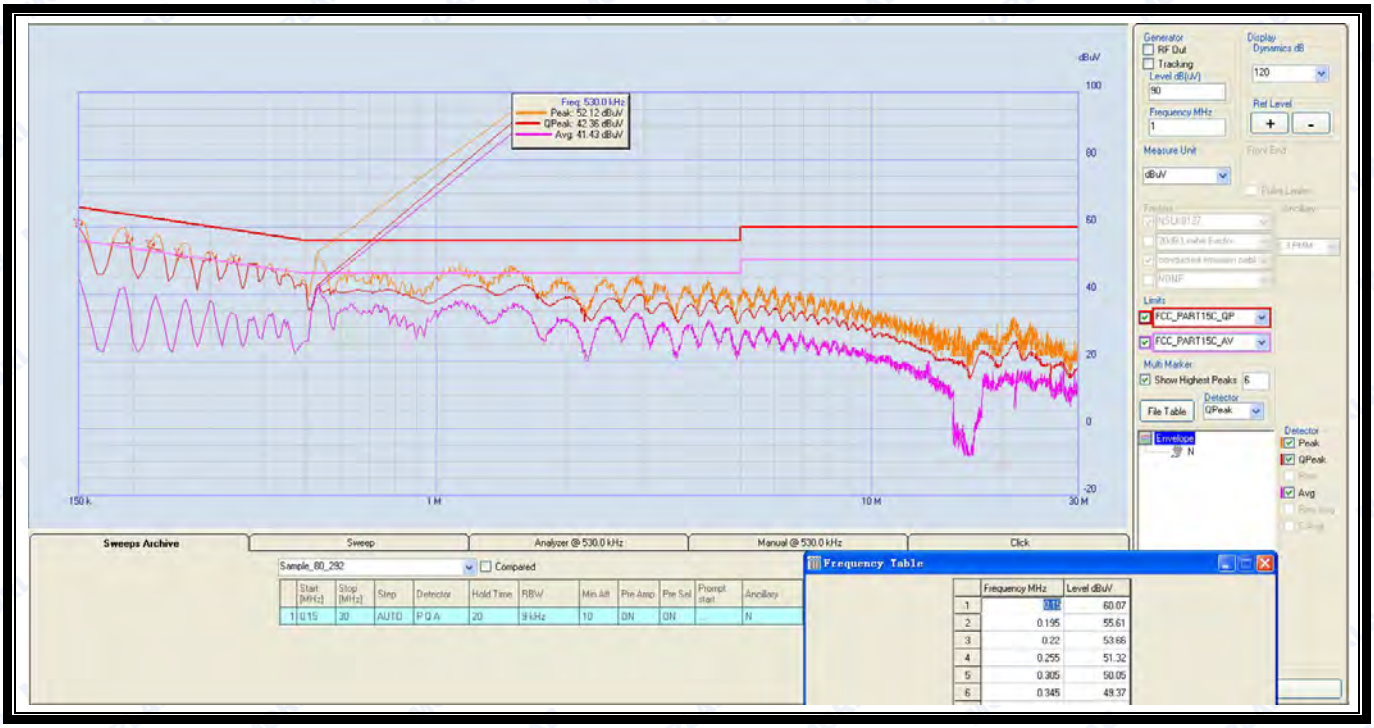
A. Test setup:

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

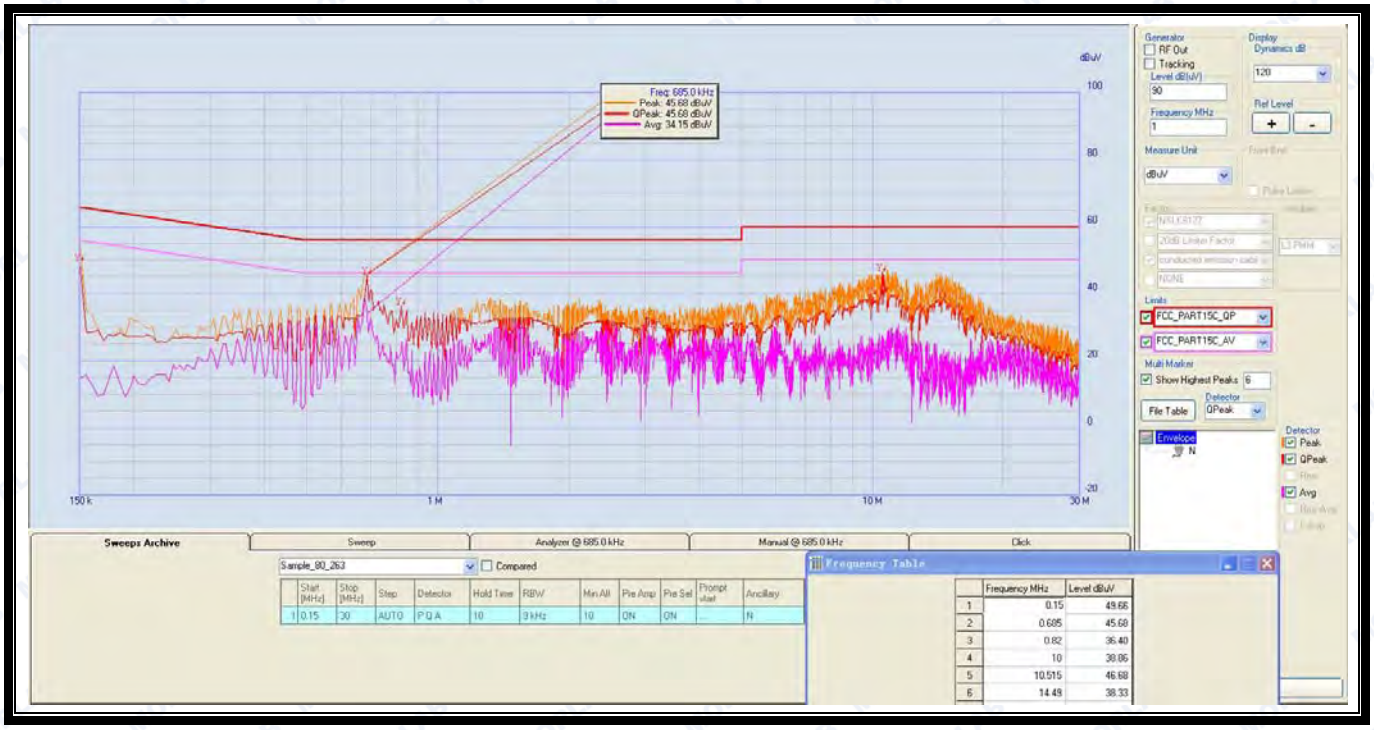
B. Test Plots:



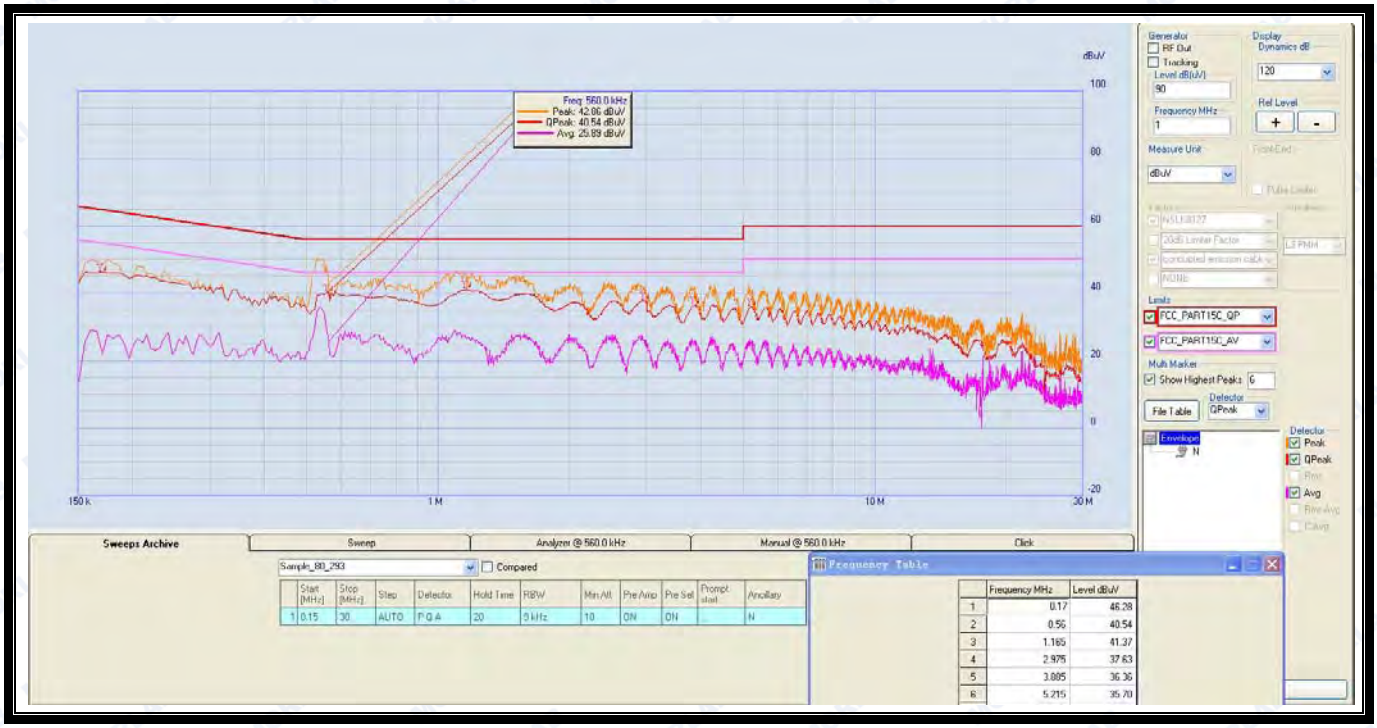
(Plot A: L Phase) AC adapter 1 made by AOHAI



(Plot B: L Phase) AC adapter 2 made by BYD



(Plot C: N Phase) AC adapter 1 made by AOHAI



(Plot D: N Phase) AC adapter 2 made by BYD

2.10 Radiated Emission

2.10.1 Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

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

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

Note:

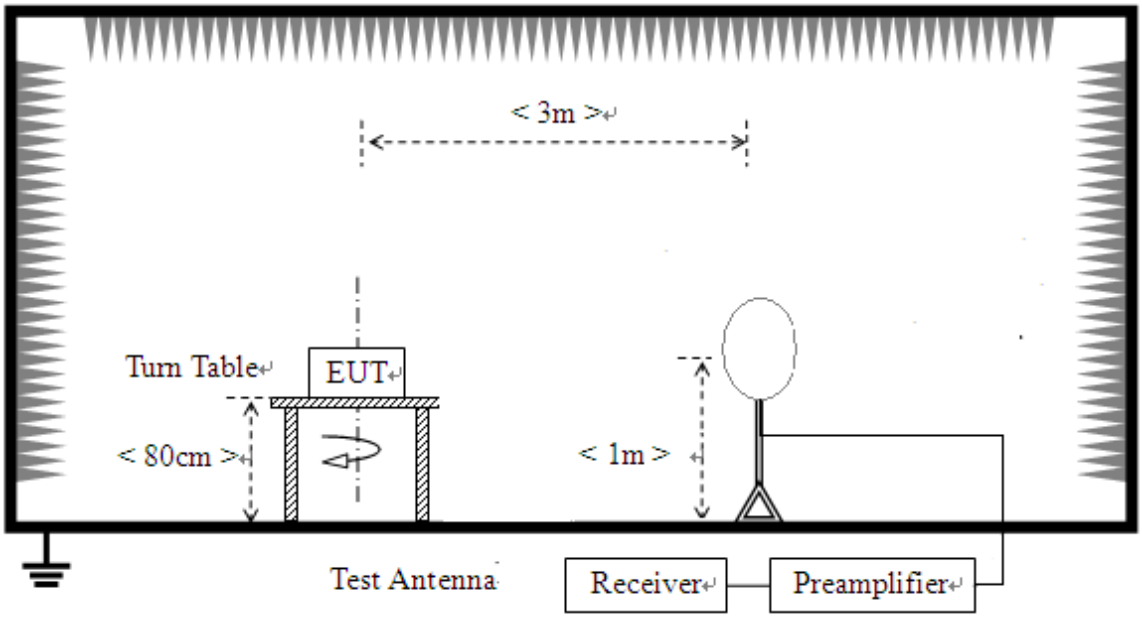
1. For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
2. For above 1000MHz, limit field strength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

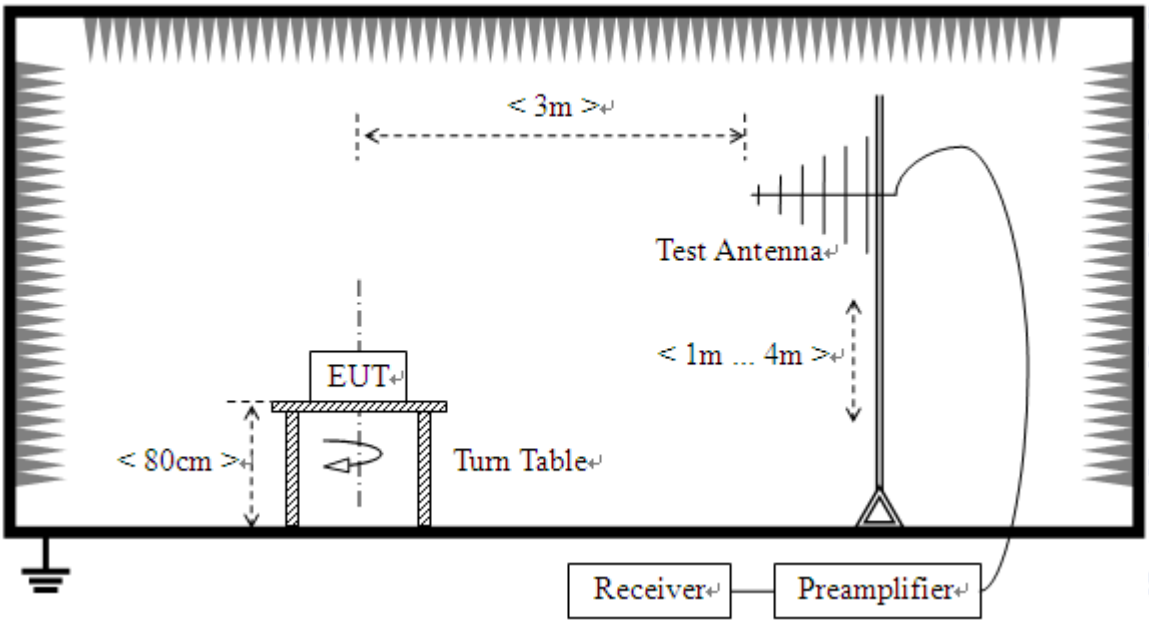
2.10.2 Test Description

A. Test Setup:

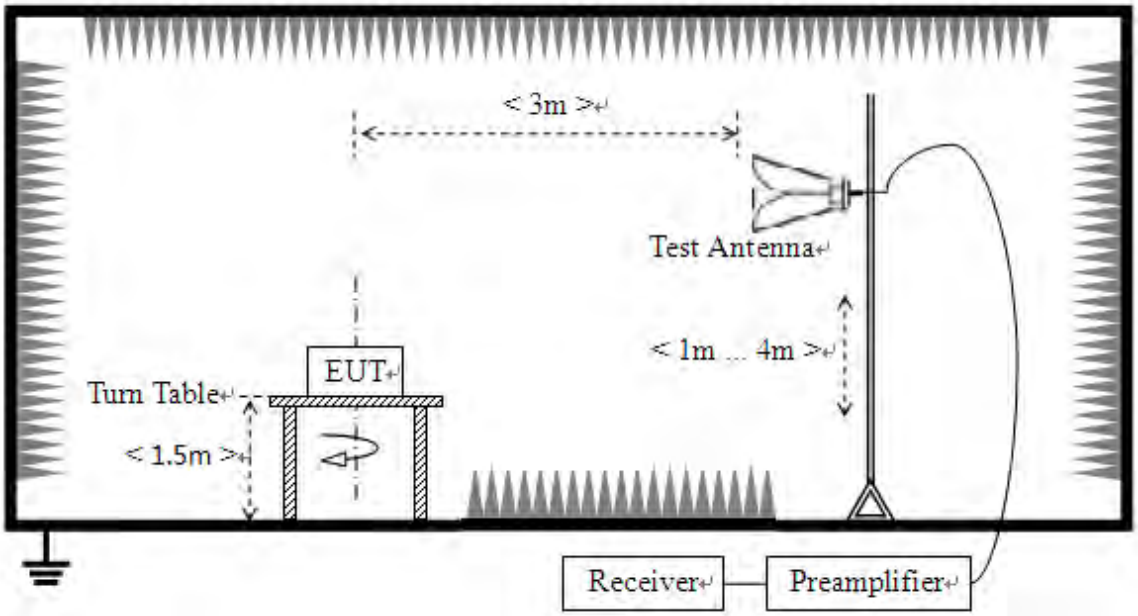
1. For radiated emissions from 9kHz to 30MHz



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.

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 1GHz) and Horn Test Antenna (above 1GHz) 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 [dBμV/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.

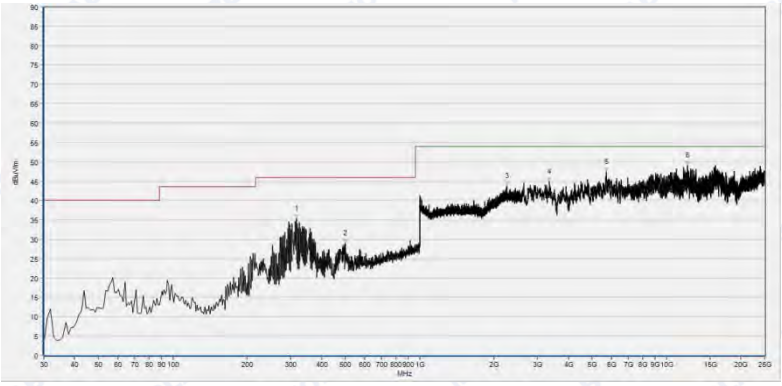
The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

2.10.4.1 Test with AC adapter 1 made by AOHAI

2.10.4.1.1 GFSK Mode:

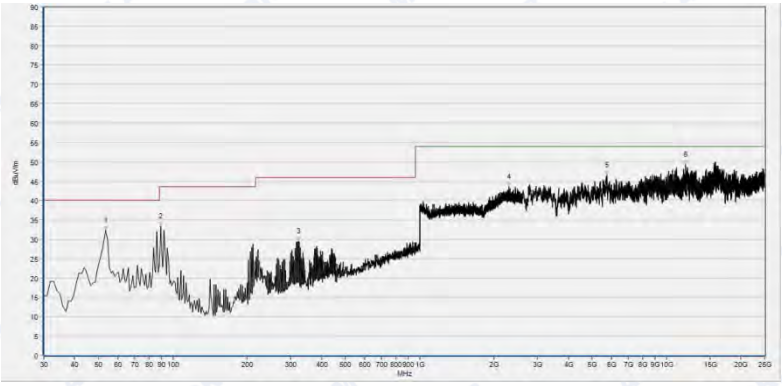
A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
316.150	35.38	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
500.450	29.05	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2254.262	43.67	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
3353.592	44.85	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5687.689	47.50	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12131.915	49.07	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

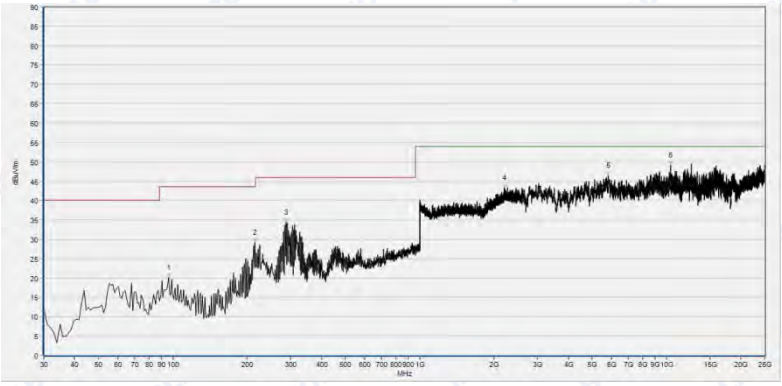
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 0)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
53.280	32.32	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
89.170	33.38	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
321.970	29.48	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2297.799	43.55	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5740.644	46.58	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
11973.050	49.27	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

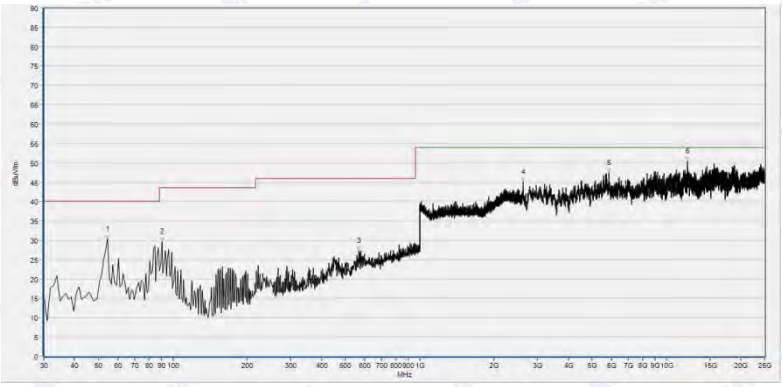
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.960	20.06	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
215.270	29.08	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
287.050	34.42	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2197.919	43.23	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5822.113	46.41	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10368.103	49.08	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

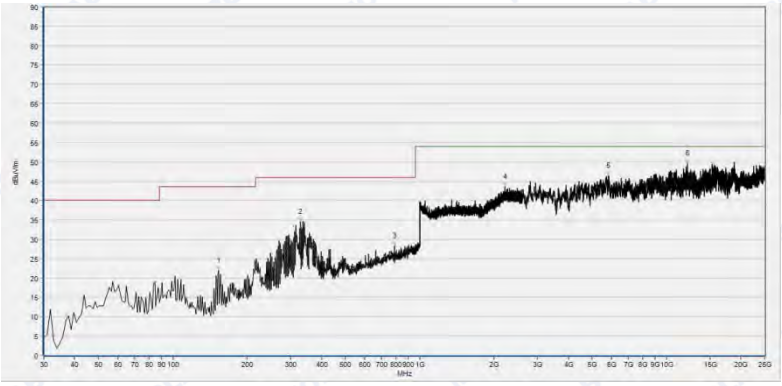
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
54.250	30.31	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
90.140	29.70	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
566.410	27.39	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2628.514	45.16	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5834.334	47.45	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12160.429	50.37	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

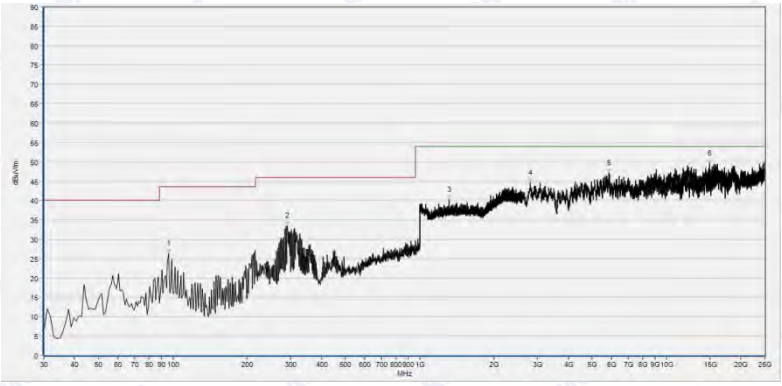
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 39)

Plot for Channel = 78



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
153.190	21.99	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
328.760	34.59	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
788.540	28.35	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2218.407	43.50	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5822.113	46.36	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12176.723	49.68	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



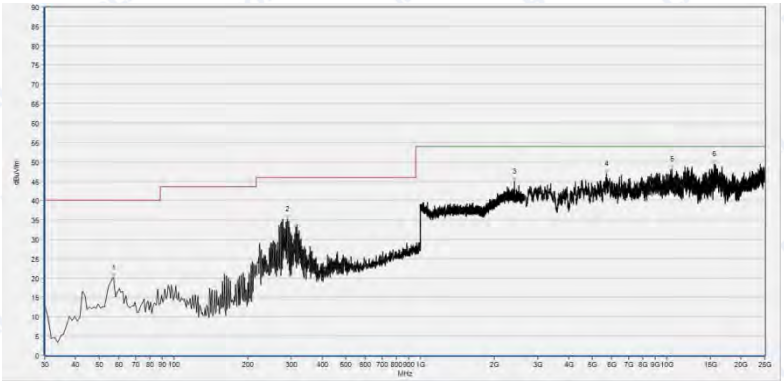
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.960	26.39	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
290.930	33.59	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1311.805	40.28	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2799.600	44.56	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5838.407	47.01	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
14910.020	49.54	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.10.4.1.2 π/4-DQPSK Mode:

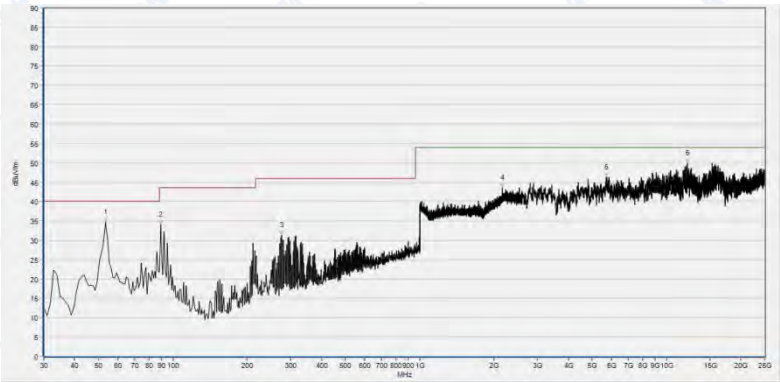
B. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
57.160	20.11	N.A	N.A	N.A	40.0	N.A	Horizontal	PASS
288.990	35.17	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2409.844	44.84	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5691.762	46.85	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10531.042	48.13	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15618.803	49.47	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

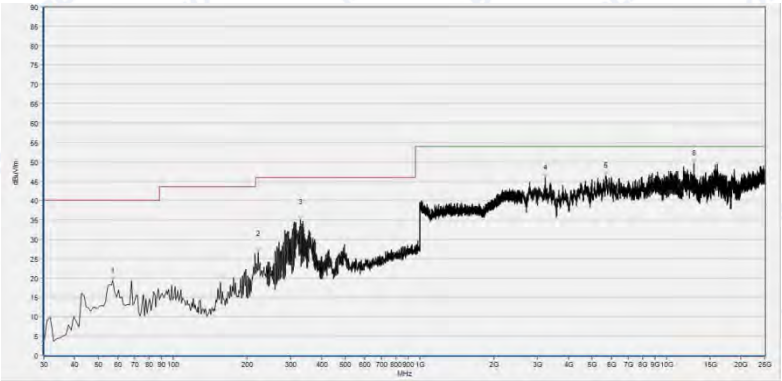
(30MHz to 25GHz, Antenna Horizontal @ π/4-DQPSK, channel 0)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
53.280	34.71	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
89.170	34.03	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
276.380	31.37	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2167.187	43.50	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5699.909	46.28	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12144.135	49.97	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

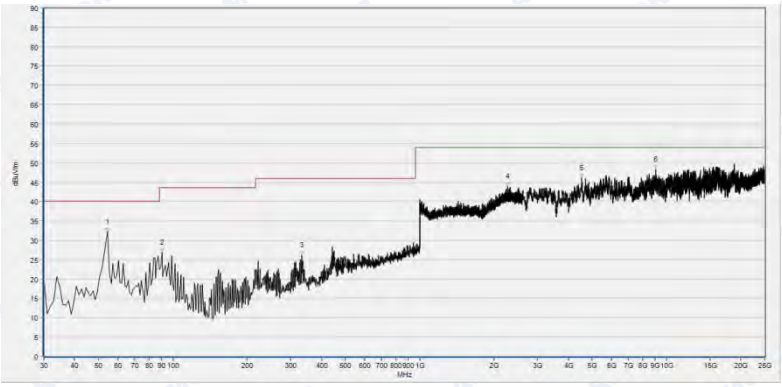
(30MHz to 25GHz, Antenna Vertical @ π/4-DQPSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
57.160	19.23	N.A	N.A	N.A	40.0	N.A	Horizontal	PASS
221.090	26.60	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
328.760	35.03	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
3231.388	45.88	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5675.468	46.40	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12885.506	49.61	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



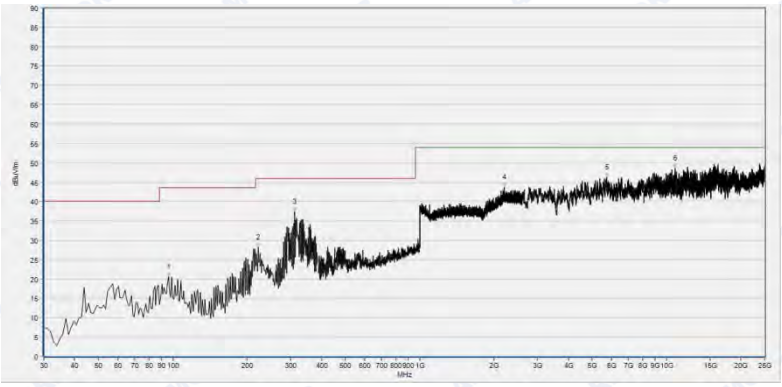
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
54.250	32.23	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
90.140	26.82	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
332.640	26.11	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2267.707	43.95	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4530.824	46.06	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
9056.447	48.30	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 78

Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
156.100	25.37	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
222.060	30.86	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
289.960	35.41	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2265.146	43.03	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4514.530	45.92	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10368.103	48.56	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
95.960	20.60	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
222.060	28.12	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
311.300	37.31	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2195.358	43.82	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5720.276	46.27	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
10812.111	48.68	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

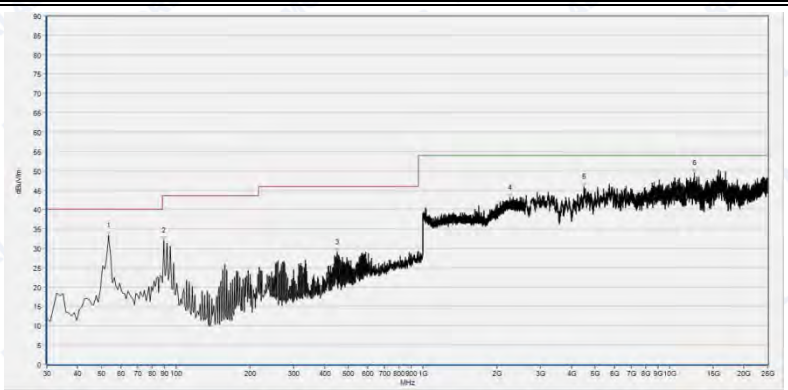
2.10.4.1.3 8-DPSK Mode:

C. 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
92.080	21.88	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
330.700	40.27	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2779.233	44.71	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5671.395	47.35	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10372.177	49.12	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
18844.990	48.57	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



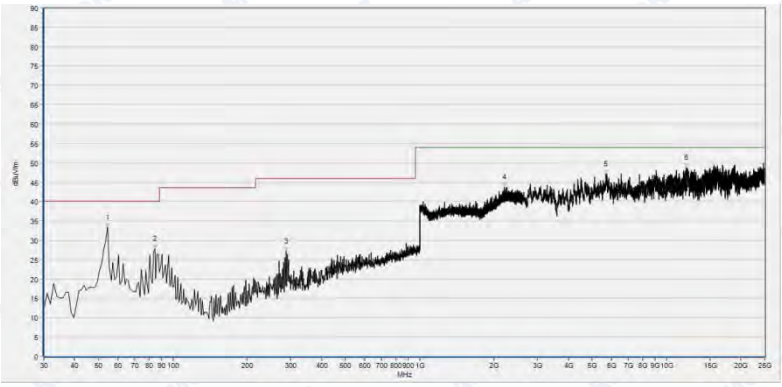
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
53.280	33.37	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
89.170	31.93	N.A	N.A	N.A	43.5	N.A	Vertical	PASS
449.040	29.06	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2252.981	43.06	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4510.456	45.89	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12575.923	49.46	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
94.990	23.69	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
284.140	33.13	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
666.320	28.60	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2153.101	43.34	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5703.983	47.25	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15622.877	50.81	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

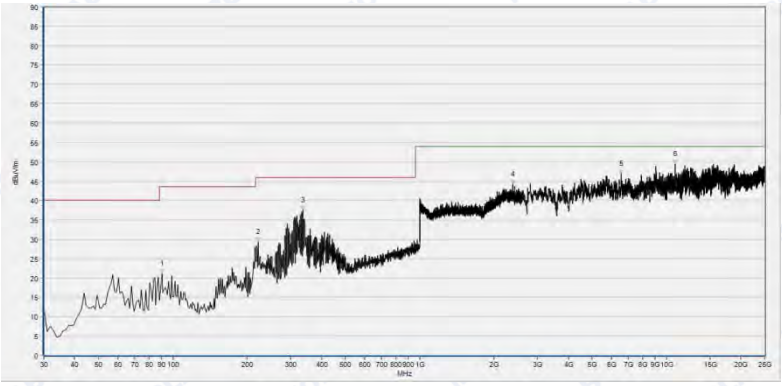
(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 39)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
54.250	33.39	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
84.320	27.85	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
287.050	27.16	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2202.401	43.76	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5675.468	47.02	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12001.564	48.71	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

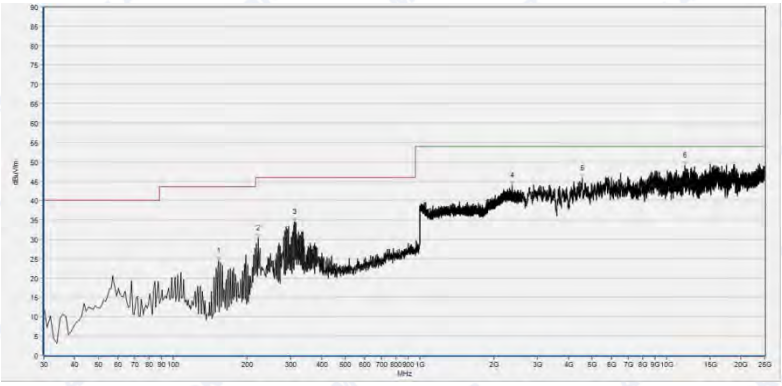
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 39)

Plot for Channel = 78



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
90.140	21.14	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
222.060	29.30	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
335.550	37.59	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2377.831	44.22	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
6555.337	46.90	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10820.258	49.38	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
153.190	24.47	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
222.060	30.40	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
311.300	34.60	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2367.587	43.91	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4547.118	45.78	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
11863.066	49.12	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

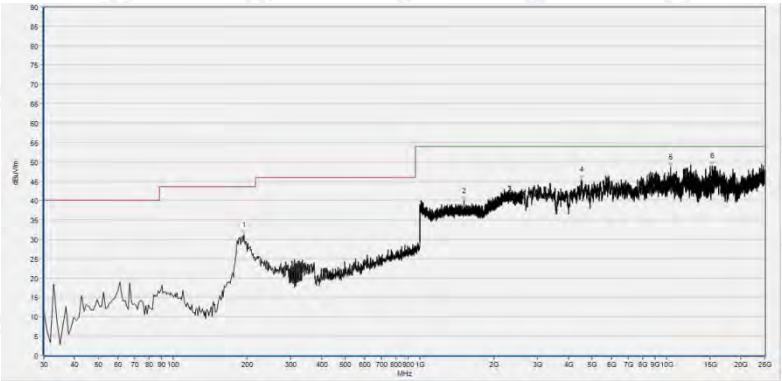
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 78)

2.10.4.2 Test with AC adapter 2 made by BYD

2.10.4.2.1 GFSK Mode:

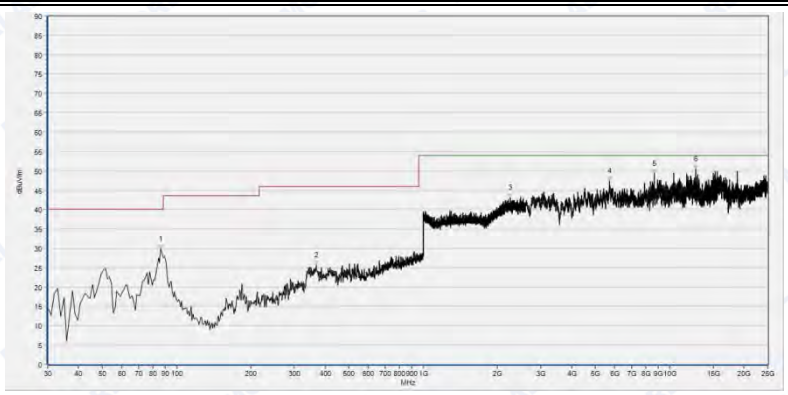
D. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
193.930	31.21	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
1507.723	39.87	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2314.446	42.84	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4526.750	45.44	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10392.544	48.59	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15305.146	48.92	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

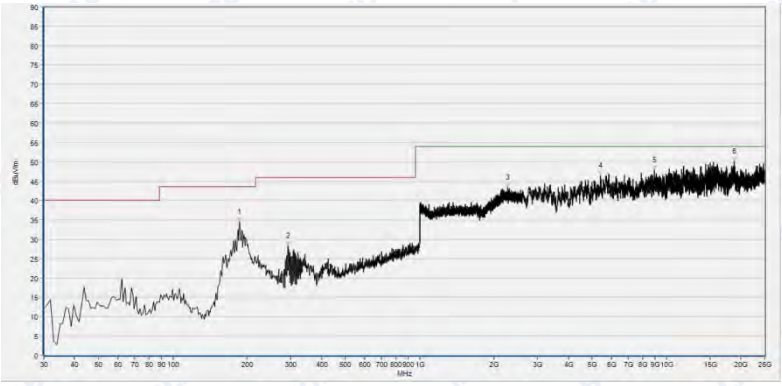
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 0)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
86.260	29.85	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
367.560	25.66	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2255.542	43.07	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5703.983	47.43	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
8645.026	49.19	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
12726.641	50.49	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

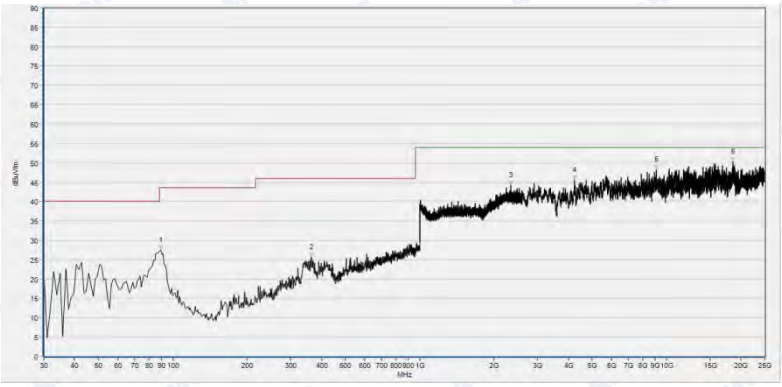
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 0)

Plot for Channel = 39



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
186.170	34.48	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
291.900	28.34	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2265.786	43.32	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5398.472	46.37	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
8922.022	47.91	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
18816.476	50.13	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

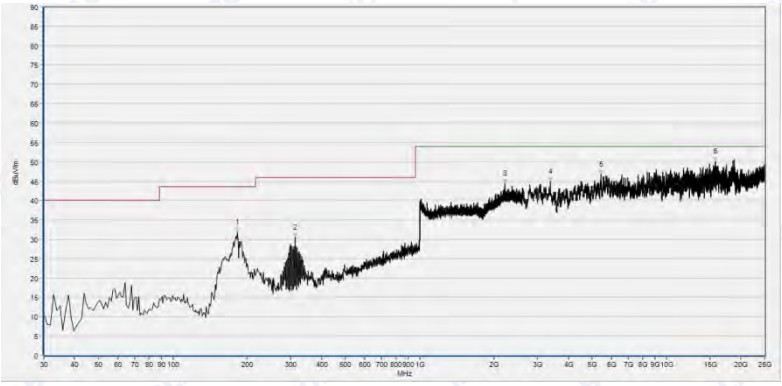
(30MHz to 25GHz, Antenna Horizontal @ GFSK, channel 39)



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
89.170	27.47	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
363.680	25.69	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2333.653	44.19	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4233.461	45.58	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
9068.667	48.21	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
18543.553	50.30	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

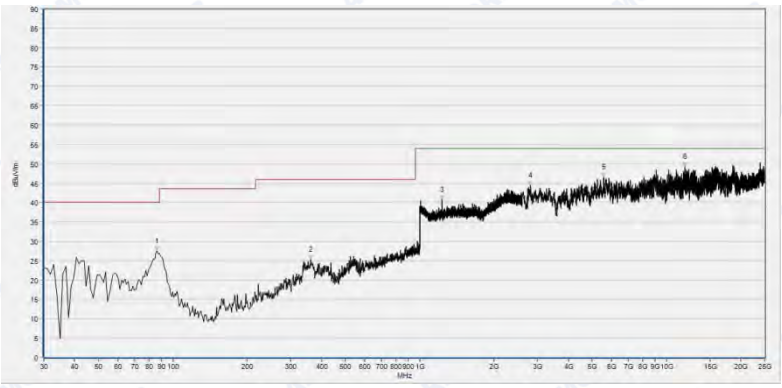
(30MHz to 25GHz, Antenna Vertical @ GFSK, channel 39)

Plot for Channel = 78



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
182.290	31.86	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
312.270	30.58	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2215.206	44.40	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
3378.032	44.99	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5414.766	46.69	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15765.448	50.19	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



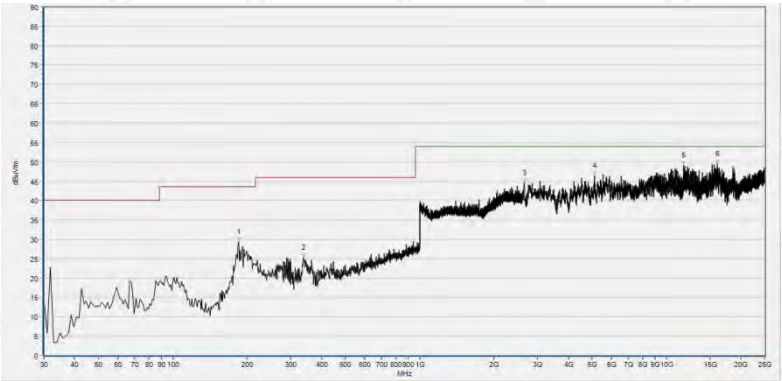
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
86.260	27.43	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
361.740	25.25	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
1234.334	40.65	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
2811.820	44.39	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5553.264	46.58	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
11858.993	49.20	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.10.4.2.2 π/4-DQPSK Mode:

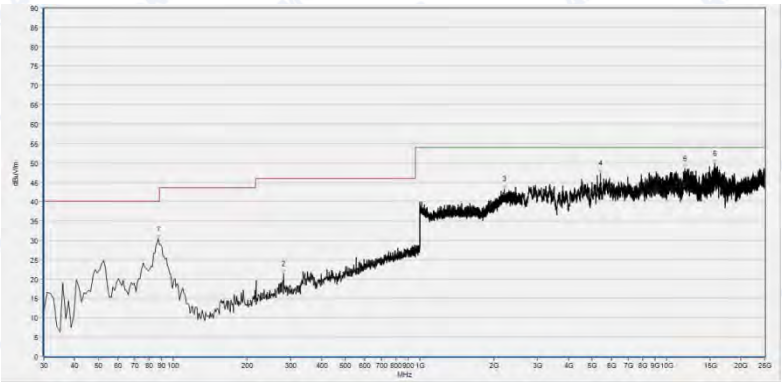
E. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
184.230	29.38	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
338.460	25.24	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2648.882	44.55	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5121.477	46.46	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
11700.127	49.16	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
16034.297	49.47	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



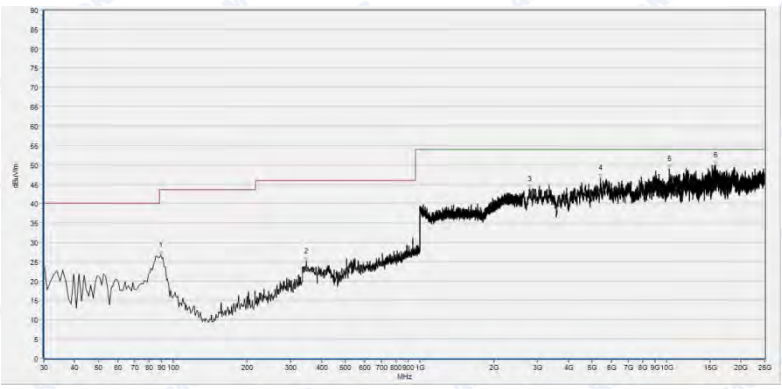
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
87.230	30.31	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
281.230	21.20	N.A	N.A	N.A	46.0	N.A	Vertical	PASS
2195.998	43.32	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5398.472	47.28	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
11871.213	48.38	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15647.318	49.72	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

Plot for Channel = 39

Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
183.260	34.75	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
291.900	28.29	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2791.453	44.80	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5687.689	46.74	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
11720.495	49.67	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
15447.718	50.07	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

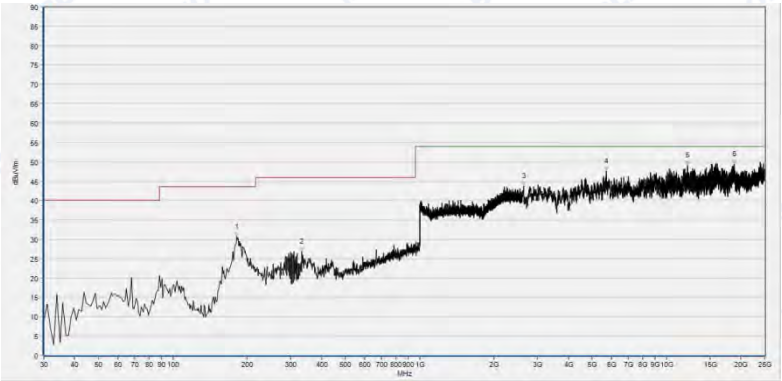
(30MHz to 25GHz, Antenna Horizontal @ π/4-DQPSK, channel 39)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
89.170	26.60	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
347.190	25.22	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2791.453	43.72	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5406.619	46.55	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
10237.752	48.94	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15765.448	50.01	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

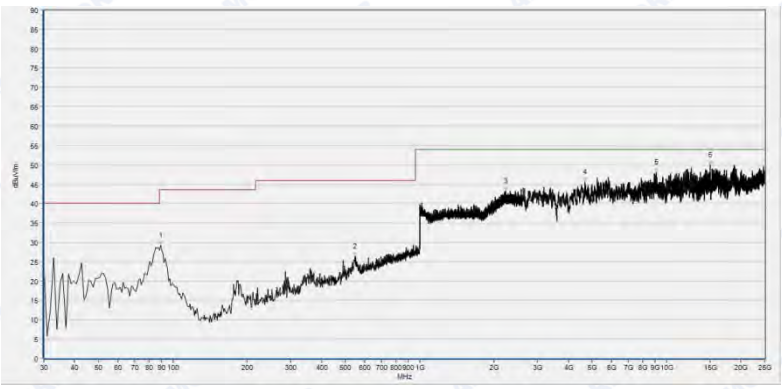
(30MHz to 25GHz, Antenna Vertical @ π/4-DQPSK, channel 39)

Plot for Channel = 78



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
181.320	30.65	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
332.640	26.86	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2636.661	43.68	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5708.056	47.54	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12140.062	49.13	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
18849.063	49.42	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

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



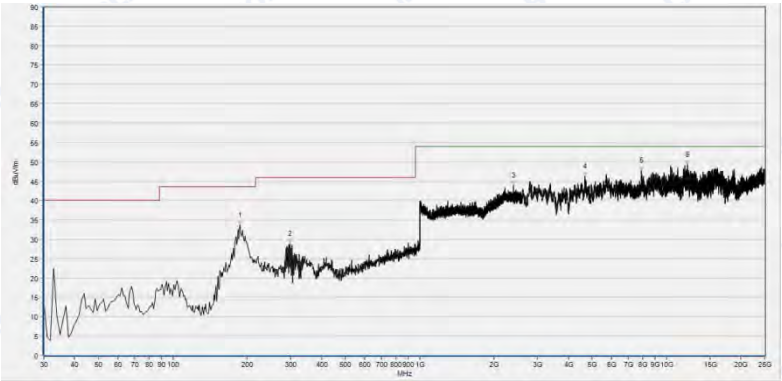
Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
89.170	29.22	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
547.010	26.30	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2235.054	43.16	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
4669.322	45.59	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
9089.034	48.04	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15015.930	49.95	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

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

2.10.4.2.3 8-DPSK Mode:

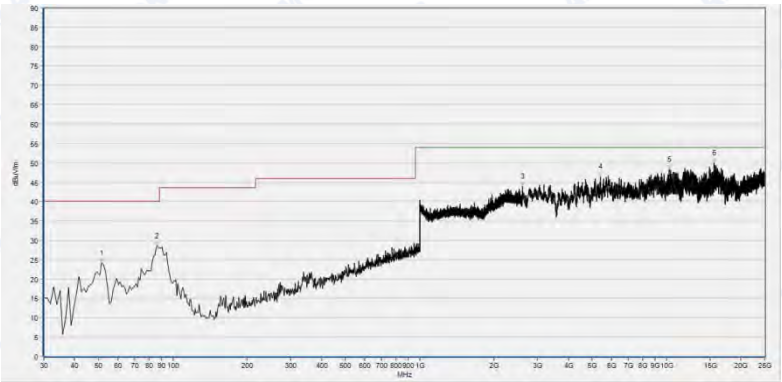
F. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 0



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
187.140	33.72	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
298.690	28.76	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
2396.399	43.83	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4661.175	46.23	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
7911.802	47.78	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12135.988	49.26	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

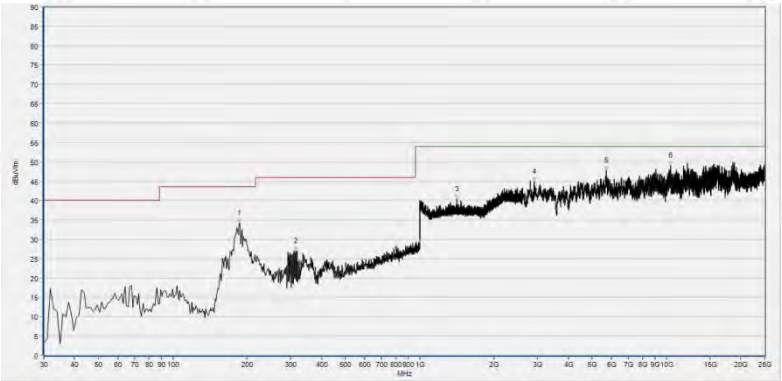
(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 0)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
51.340	24.20	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
86.260	28.50	N.A	N.A	N.A	40.0	N.A	Vertical	PASS
2604.073	43.84	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5402.546	46.42	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
10229.605	48.35	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
15606.583	49.92	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

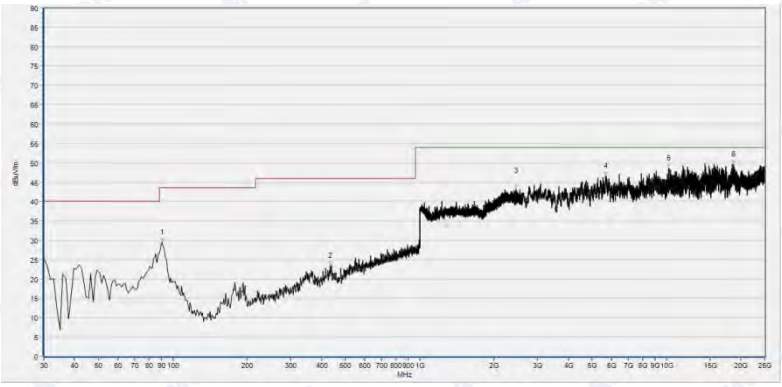
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 0)

Plot for Channel = 39



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
186.170	34.17	N.A	N.A	N.A	43.5	N.A	Horizontal	PASS
315.180	27.04	N.A	N.A	N.A	46.0	N.A	Horizontal	PASS
1418.087	40.33	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
2901.437	44.87	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
5691.762	47.74	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
10372.177	49.06	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS

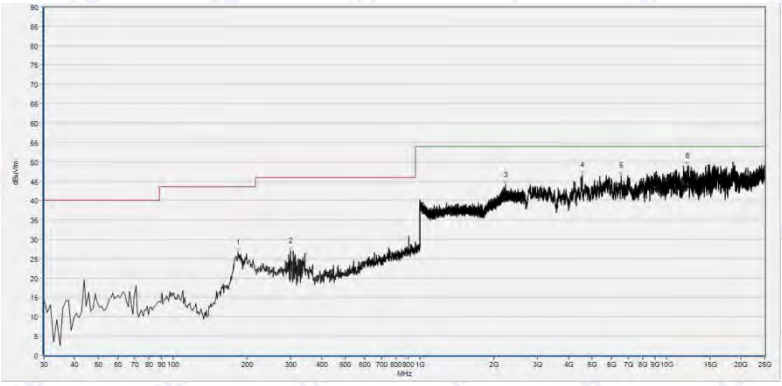
(30MHz to 25GHz, Antenna Horizontal @8-DPSK, channel 39)



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
90.140	29.54	N.A	N.A	N.A	43.50	N.A	Vertical	PASS
434.490	23.41	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2453.381	43.21	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5675.468	46.65	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
10221.458	48.62	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
18686.125	49.55	N.A	N.A	74.0	N.A	54.0	Vertical	PASS

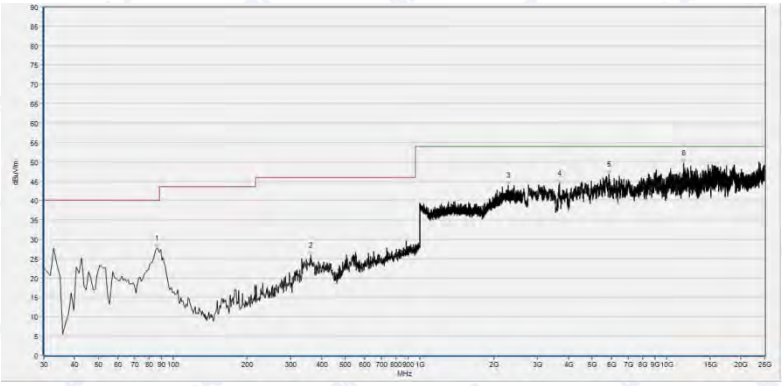
(30MHz to 25GHz, Antenna Vertical @8-DPSK, channel 39)

Plot for Channel = 78



Fre.(MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Antenna	Verdict
183.260	26.61	N.A	N.A	N.A	43.50	N.A	Horizontal	PASS
300.630	27.00	N.A	N.A	N.A	46.00	N.A	Horizontal	PASS
2222.249	44.00	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
4563.412	46.56	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
6539.043	46.44	N.A	N.A	74.0	N.A	54.0	Horizontal	PASS
12168.576	48.91	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
86.260	27.68	N.A	N.A	N.A	40.00	N.A	Vertical	PASS
362.710	25.74	N.A	N.A	N.A	46.00	N.A	Vertical	PASS
2285.634	43.90	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
3683.542	44.43	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
5850.627	46.77	N.A	N.A	74.0	N.A	54.0	Vertical	PASS
11712.348	49.56	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

2.11.1 Requirement

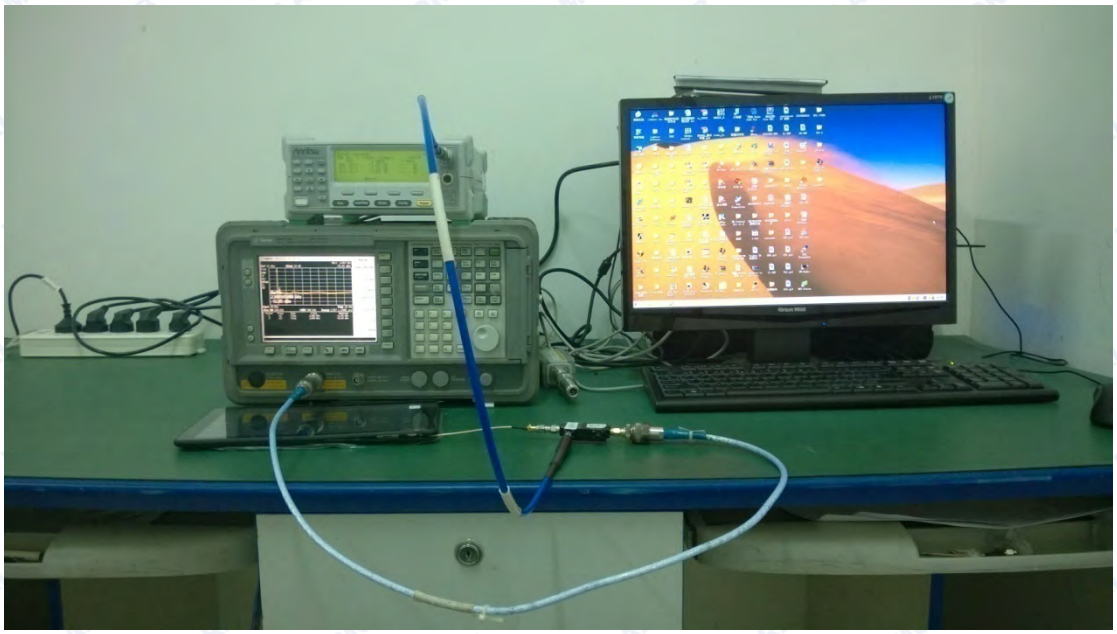
According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy lever in excess of Commission's guideline.

2.11.2 Result

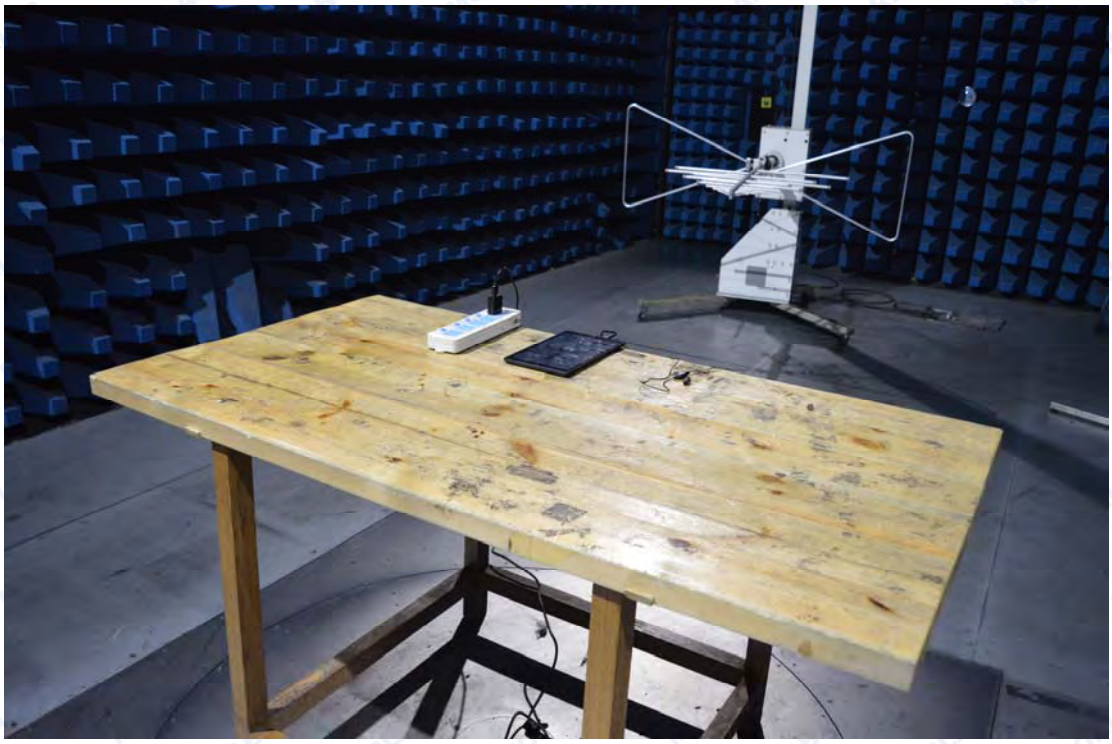
Please refer to SAR report.

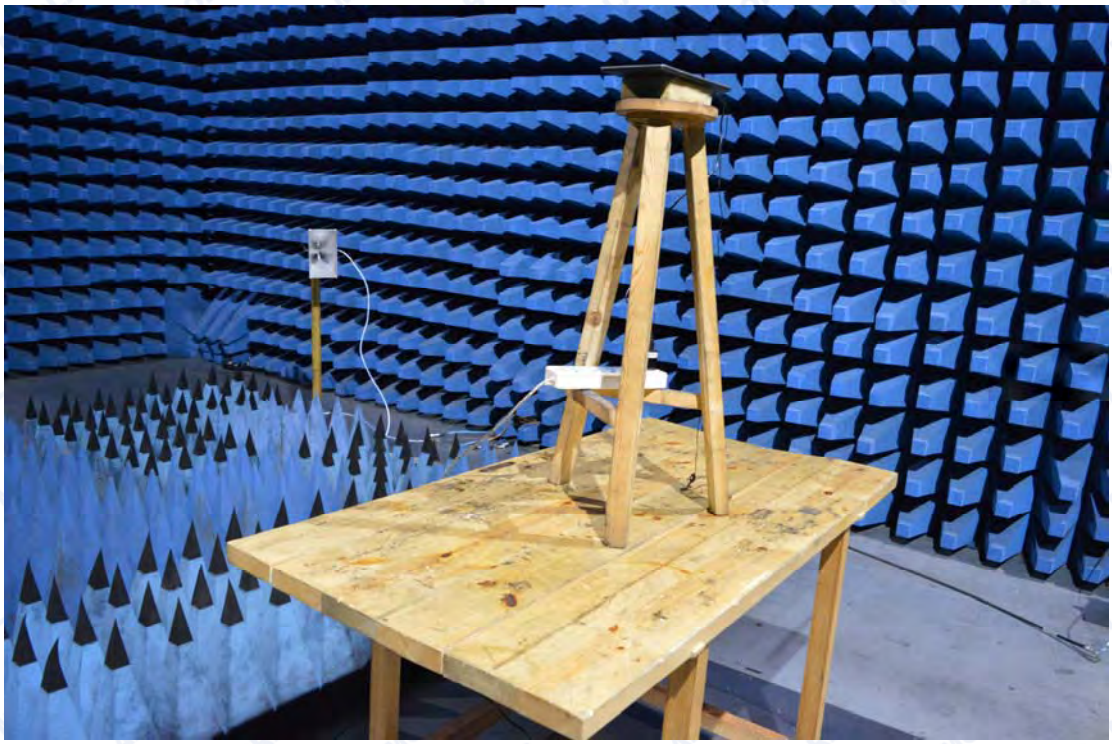
ANNEX A PHOTOS OF EUT TEST SETUP

1. Conducted measurement Setup

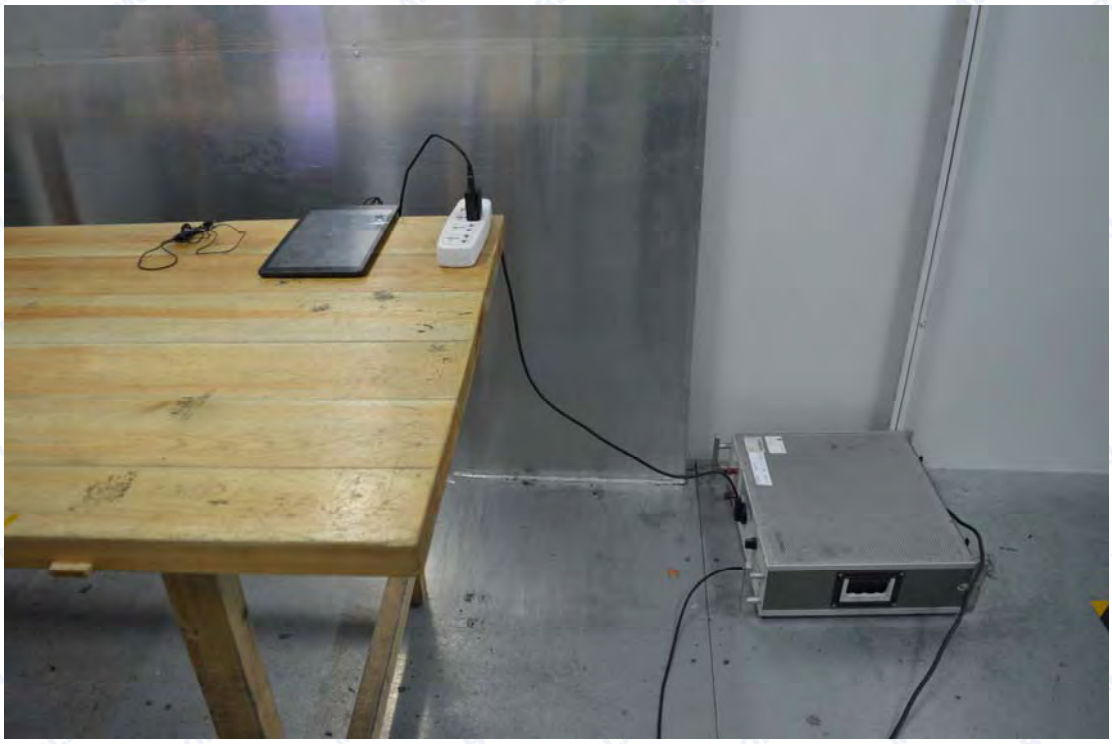


2. Radiated Measurement Setup





3. Conducted Emission Measurement Setup



ANNEX B PHOTOS OF THE EUT

A. External Photos

1. EUT front view

2. EUT rear view

3. EUT left side view

4. EUT right side view

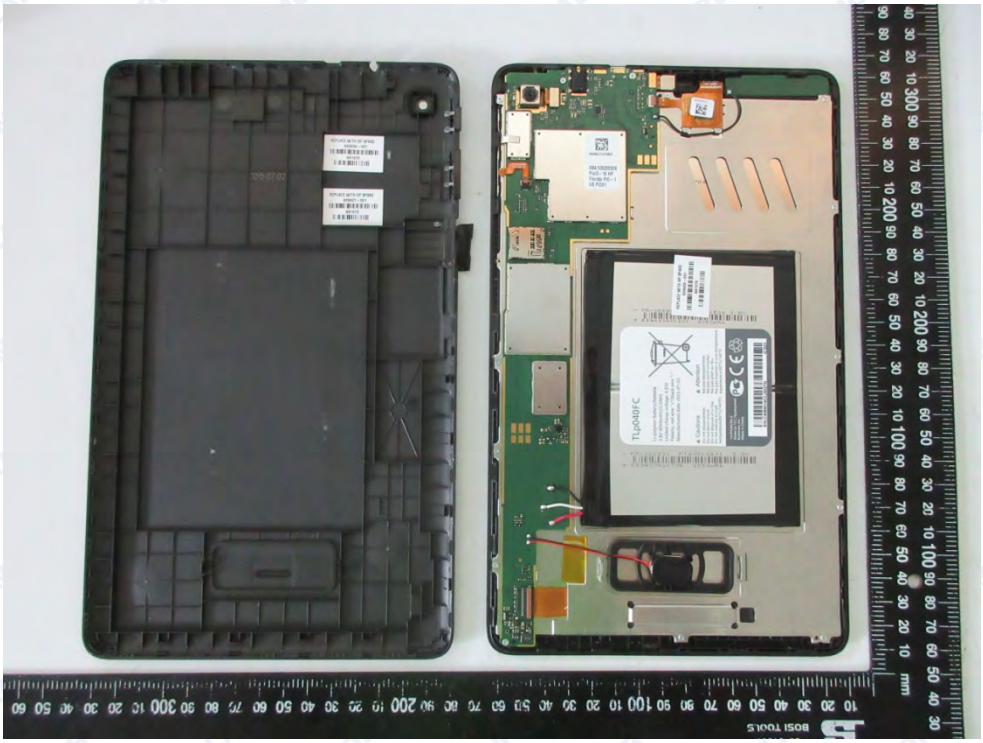
5. EUT top view

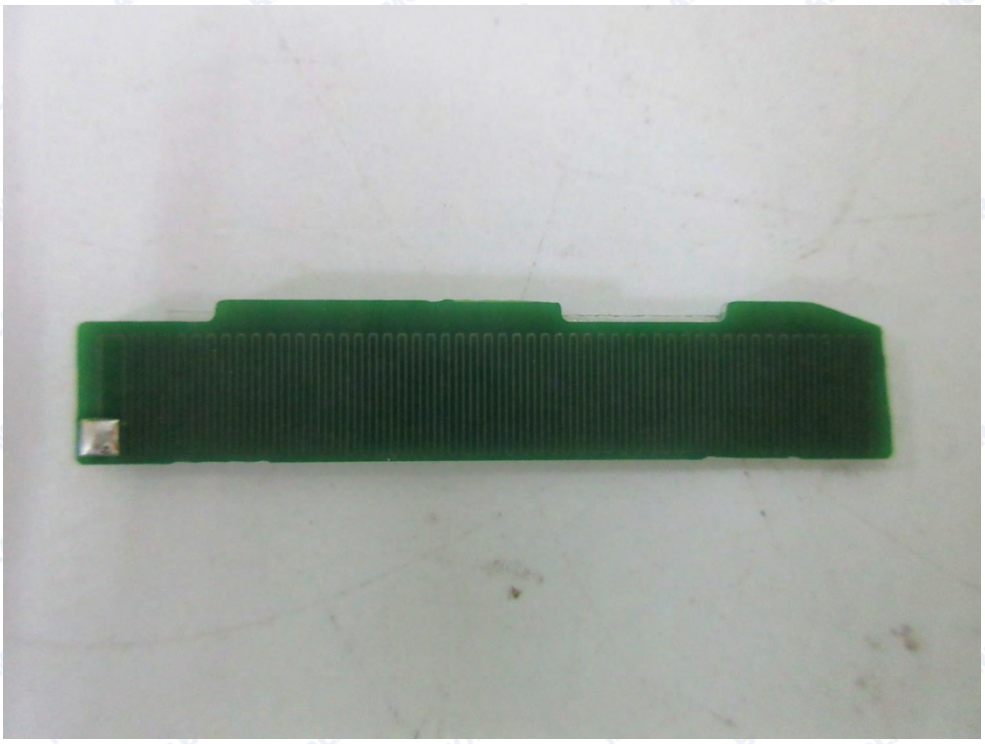
6. EUT bottom view

7. Accessories

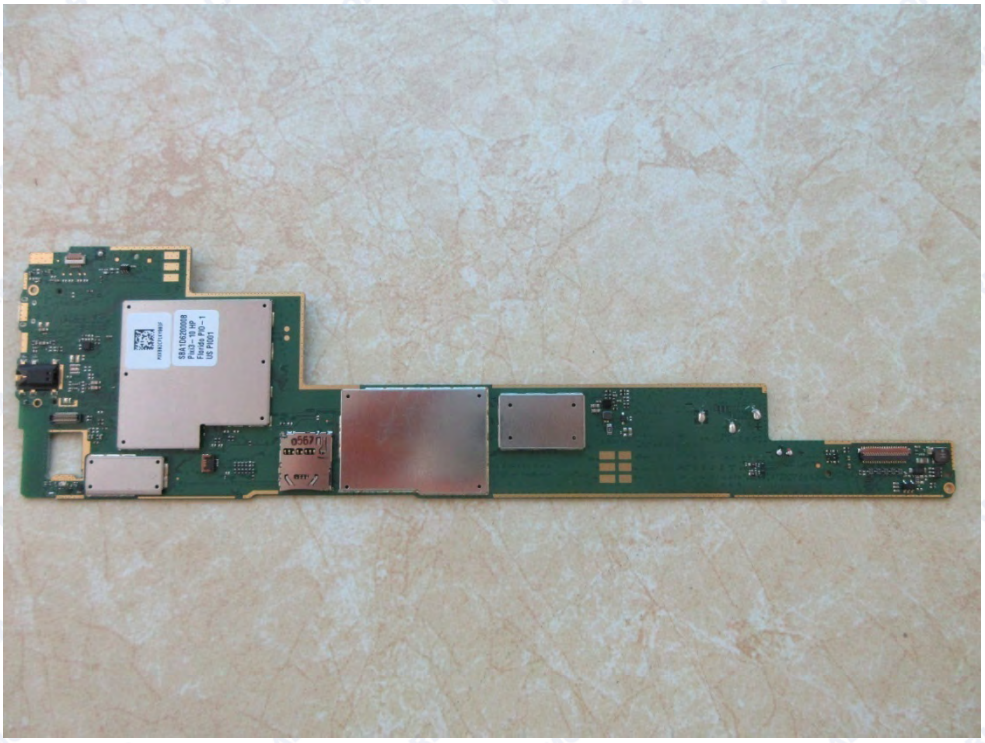
B. Internal Photos

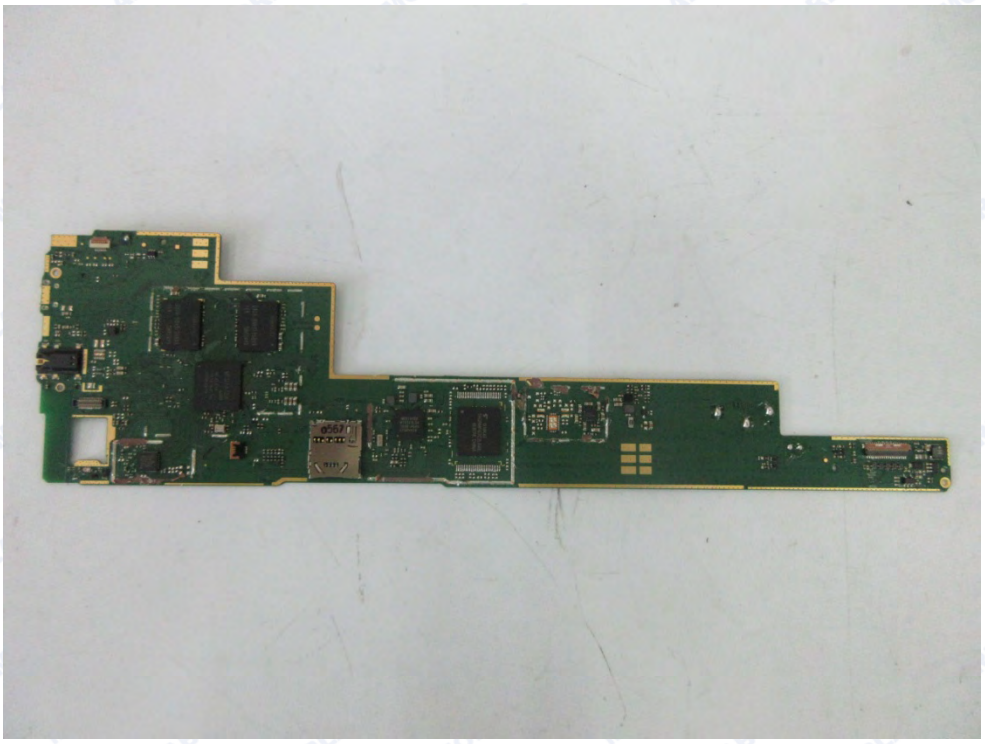
1. EUT uncover view



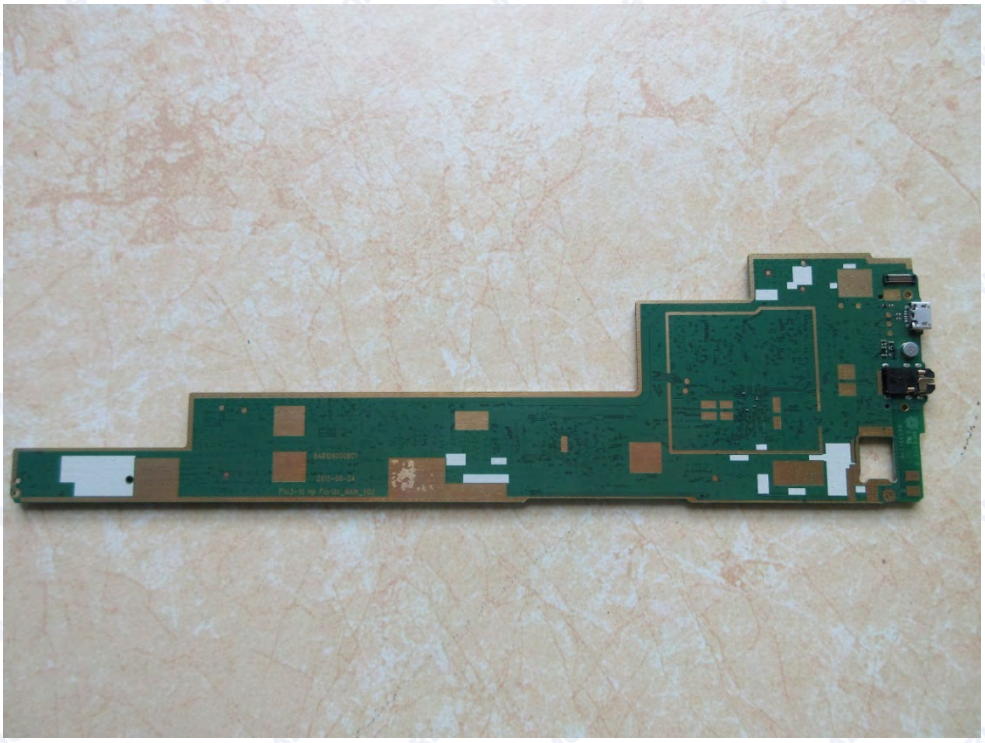


2. Mainboard front view

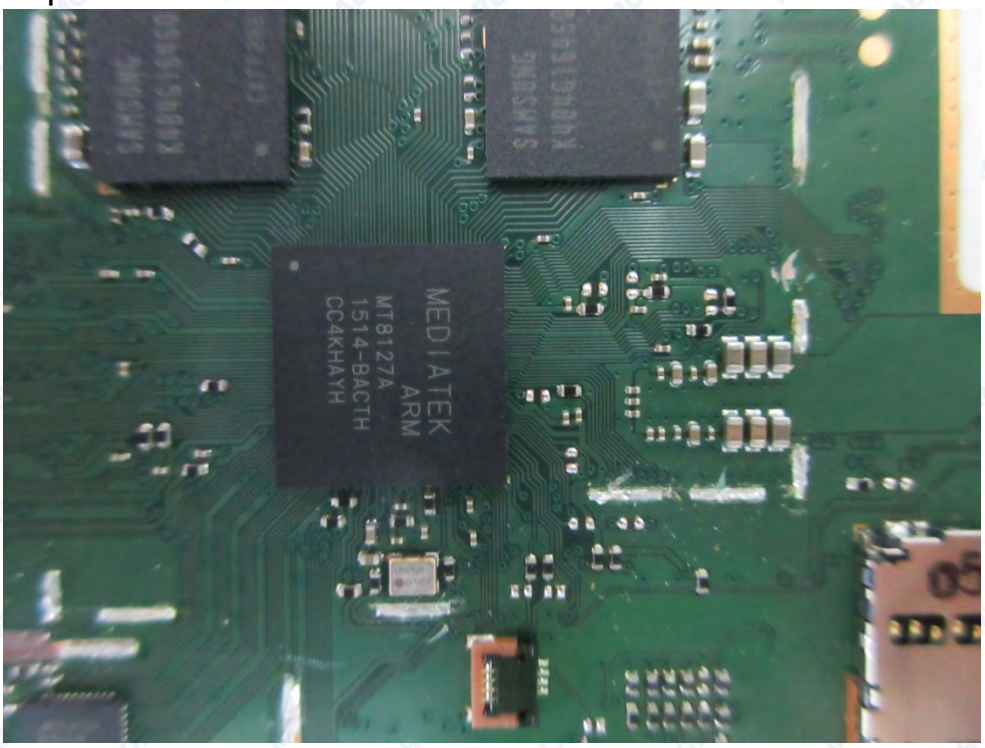




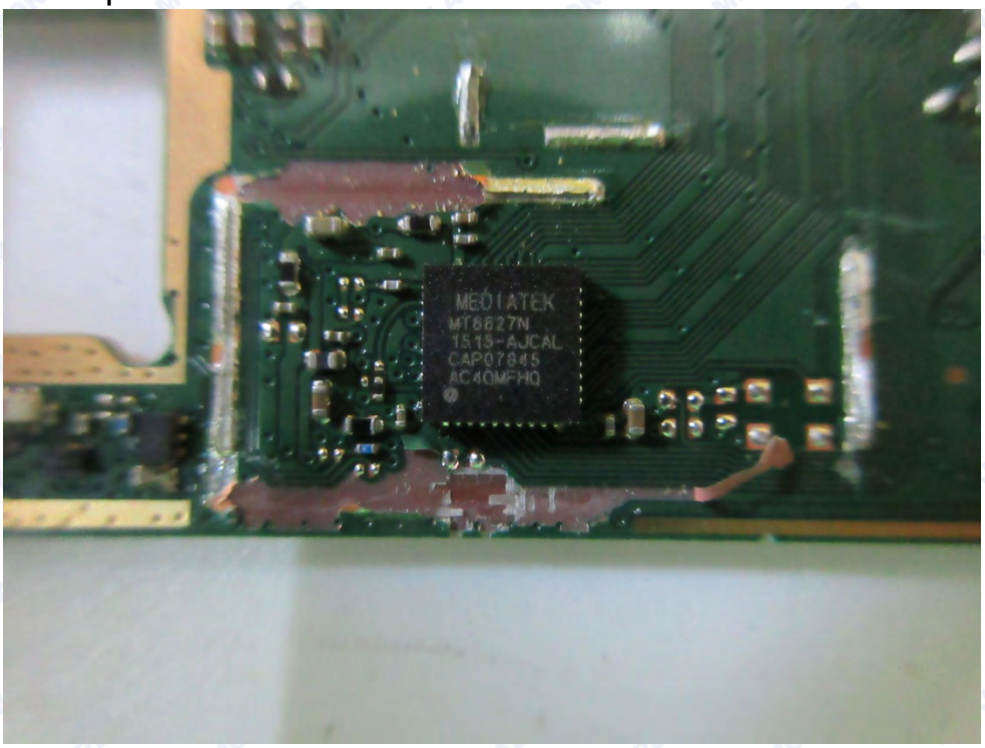
3. Mainboard rear view



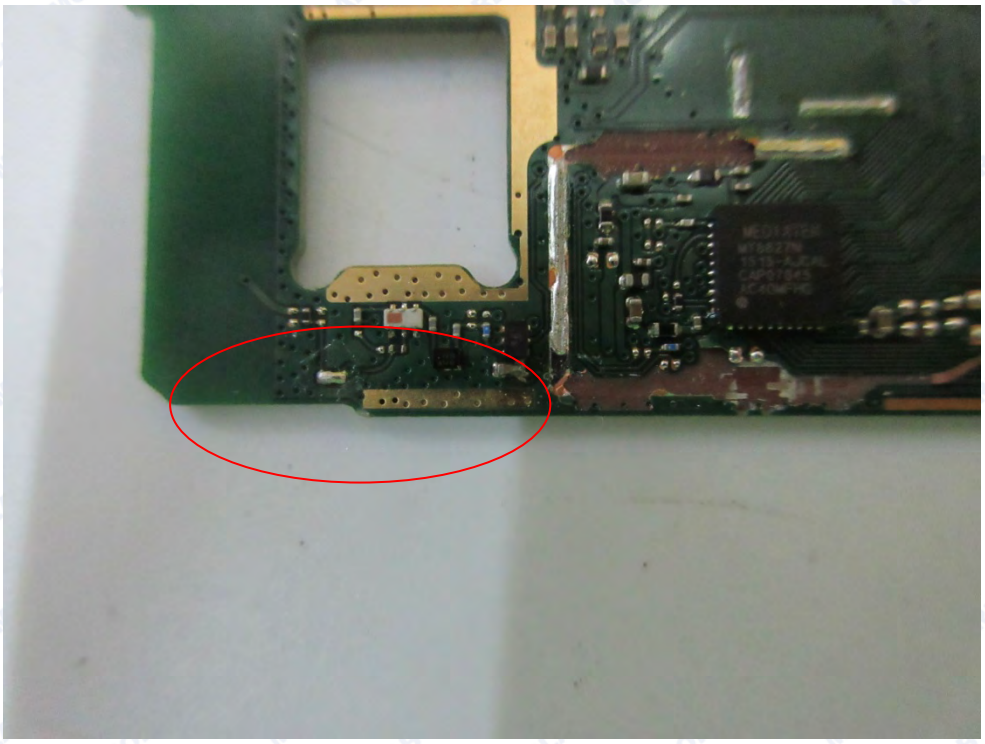
4. CPU chip view



5. BT/WIFI chip view



6. BT/WIFI antenna view



ANNEX C 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, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

1.3 Facilities and Accreditations

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: 2013, ANSI C63.4: 2009 and CISPR Publication 22; the FCC registration number is 695796.

1.4 Test Equipments Utilized

1.4.1 Conducted Test Equipments

Conducted Test Equipment						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	System Simulator	6K00006210	MT8852B	Anritsu	2015.02.26	2016.02.25
2	Spectrum Analyzer	MY45101810	E4407B	Agilent	2015.02.26	2016.02.25
3	Power Splitter	NW521	1506A	Weinschel	2015.02.26	2016.02.25
4	Attenuator 1	(n.a.)	10dB	Resnet	2015.02.26	2016.02.25
5	Attenuator 2	(n.a.)	3dB	Resnet	2015.02.26	2016.02.25
6	EXA Signal Analzyer	MY51440152	N9010A	Agilent	2015.02.26	2016.02.25
7	RF cable	CB01	RF01	Morlab	N/A	N/A
8	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
9	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.4.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal. Due**
1	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25
2	LISN	812744	NSLK 8127	Schwarzbeck	2015.02.26	2016.02.25
3	Service Supplier	100448	CMU200	R&S	2015.02.26	2016.02.25
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2015.02.26	2016.02.25
5	Coaxial cable(BNC)	CB01	EMC01	Morlab	N/A	N/A

1.4.3 Radiated Test Equipments

Radiated Test Equipments						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal. Date**	**Cal.Due Date**
1	System Simulator	100448	CMU200	R&S	2015.02.26	2016.02.25
2	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25
3	Test Antenna - Bi-Log	9163-274	9m*6m*6m	Albatross	2015.02.26	2016.02.25
4	Test Antenna - Horn	9120D-963	VULB 9163	Schwarzbeck	2015.02.26	2016.02.25
5	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2015.02.26	2016.02.25
6	Test Antenna - Loop	1519-022	HL050S7	R&S	2015.02.26	2016.02.25
7	Reject Filter	(n.a.)	BRM50702	Micro-Tronics	2015.02.26	2016.02.25
8	Coaxial cable (N male)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable (N male)	CB03	EMC03	Morlab	N/A	N/A

1.4.4 Climate Chamber

Climate Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Climate Chamber	2004012	HL4003T	Yinhe	2015.02.26	2016.02.25

1.4.5 Vibration Table

Vibration Table						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2015.02.26	2016.02.25

1.4.6 Anechoic Chamber

Anechoic Chamber						
No.	**Equipment Name**	**Serial No.**	**Type**	**Manufacturer**	**Cal.Date**	**Cal.Due Date**
1	Anechoic Chamber	N/A	9m*6m*6m	Albatross	2015.02.26	2016.02.25

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