



TEST REPORT

FCC ID: 2AB3E-ISP59 IC: 10541A-ISP59

Applicant : ION Audio, LLC
Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A

Equipment Under Test (EUT):

Name : Portable waterproof Bluetooth Speaker
Model : Aquaboom
Trademark : ION

Standards : FCC PART 15, SUBPART C : 2015 (Section 15.247)
RSS-247 ISSUE 1 MAY 2015; RSS-GEN ISSUE 4 NOV 2014
ANSI C63.4:2014 ; ANSI C63.10:2013

Report No : T1851998 10
Date of Test : December 24, 2015- January 11, 2016
Date of Issue : January 14, 2016

Test Result : PASS

In the configuration tested, the EUT complied with the standards specified above
Authorized Signature

A handwritten signature in black ink that appears to read "Mark Zhu".

(Mark Zhu)
Manager

The manufacturer should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Alpha Product Testing Co., Ltd. Or test done by Shenzhen Alpha Product Testing Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Alpha Product Testing Co., Ltd. Approvals in writing.

Contents

1. General Information.....	5
1.1. Description of Device (EUT)	5
1.2. Accessories of device (EUT)	6
1.3. Test Lab information	6
2. Summary of test	7
2.1. Summary of test result	7
2.2. Assistant equipment used for test.....	7
2.3. Block Diagram	8
2.4. Test mode	8
2.5. Test Conditions.....	9
2.6. Measurement Uncertainty (95% confidence levels, k=2).....	9
2.7. Test Equipment.....	10
3. Maximum Peak Output power	11
3.1. Limit.....	11
3.2. Test Procedure.....	11
3.3. Test Setup	11
3.4. Test Result.....	11
4. Bandwidth	12
4.1. Limit.....	12
4.2. Test Procedure	12
4.3. Test Result	12
5. Carrier Frequency Separation.....	18
5.1. Limit.....	18
5.2. Test Procedure.....	18
5.3. Test Result	18
6. Number Of Hopping Channel	21
6.1. Limit.....	21
6.2. Test Procedure	21
6.3. Test Result	21
7. Dwell Time.....	24
7.1. Test limit	24
7.2. Test Procedure.....	24
7.3. Test Results	24
8. Radiated emissions.....	31
8.1. Limit.....	31
8.2. Block Diagram of Test setup	32
8.3. Test Procedure	33
8.4. Test Result.....	33
9. Band Edge Compliance	45
9.1. Block Diagram of Test Setup	45
9.2. Limit.....	45
9.3. Test Procedure	45
9.4. Test Result.....	45

10. Power Line Conducted Emissions	64
10.1. Block Diagram of Test Setup	64
10.2. Limit.....	64
10.3. Test Procedure.....	64
10.4. Test Result.....	65
11. Antenna Requirements.....	67
11.1. Limit.....	67
11.2. Result.....	67
12. Test setup photo	68
12.1. Photos of Radiated emission	68
12.2. Photos of Conducted Emission test.....	69
13. Photos of EUT	70

TEST REPORT VERIFICATION

Applicant : ION AUDIO,LLC
Manufacturer : ION AUDIO,LLC
EUT Description : Portable waterproof Bluetooth Speaker

(A) Model No. : Aquaboom
(B) Trademark : ION
(C) Ratings Supply : DC 3.7V from Battery or DC 5V from USB port
(D) Test Voltage : DC 3.7V from Battery or DC 5V from USB port

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C 2015, ANSI C63.4-2014

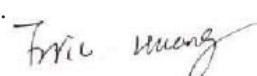
The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Eric Huang
Test Engineer



Approved by (name + signature).....:

Simple Guan
Project Manager



Date of issue.....

January 14, 2016

1. General Information

1.1. Description of Device (EUT)

EUT : Portable waterproof Bluetooth Speaker

Model No. : Aquaboom

Difference : N/A

Trade mark : ION

Power supply : DC 5V From USB port and DC 3.7V from battery

Radio Technology : BT 2.1+EDR

Operation frequency : 2402-2480MHz

Modulation : GFSK, $\pi/4$ DQPSK, 8-DPSK

Antenna Type : Integrated Antenna, max gain 0dBi.

Adapter : N/A

Applicant : ION Audio, LLC

Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A

manufacture : ION Audio, LLC

Address : 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.

1.2. Accessories of device (EUT)

Description	:	N/A
Manufacturer	:	N/A
Model No.	:	N/A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,
Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.4 :2014&RSS-247 5.4(2) & ANSI C63.10 :2013	PASS
Bandwidth	FCC Part 15: 15.215 ANSI C63.4 :2014&RSS-247 5.1(2) & ANSI C63.10 :2013	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.4 :2014& RSS-247 5.1(2) & ANSI C63.10 :2013	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014&RSS-247 5.1(4) & ANSI C63.10 :2013	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.4 :2014&RSS-247 5.1(4) & ANSI C63.10 :2013	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.4 :2014&RSS-247 Section 5.5& ANSI C63.10 :2013	PASS
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.4 :2014&RSS-247 Section 5.5& ANSI C63.10 :2013	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.4 :2014&IC RSS Gen, Section 7.2.4& ANSI C63.10 :2013	PASS
Antenna requirement	FCC Part 15: 15.203 &IC RSS Gen, Section 7.1.4	PASS
Note: Test with the test software		

2.2. Assistant equipment used for test

Description	:	Notebook
Manufacturer	:	ACER
Model No.	:	ZQT
Remark: FCC DOC approved.		

2.3. Block Diagram

1, For radiated emissions test: EUT was placed on a turn table, which is 0.8 meter high above ground. EUT was set into BT test mode by software before test.



2, For Power Line Conducted Emissions Test: EUT was connected to notebook by 1.5m USB line



2.4. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode.

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
$\pi / 4$ DQPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
8- DPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

2.5. Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Cal. Due day	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2016.01.19	1Year
Spectrum analyzer	Agilent	E4407B	MY49510055	2016.01.19	1Year
Receiver	R&S	ESCI	101165	2016.01.19	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2017.01.21	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.21	2Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	2017.01.21	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2016.01.19	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2016.01.19	1 Year
L.I.S.N.#2	ROHDE&SCHWABE RZ	ENV216	101043	2016.01.19	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	2016.01.19	1Year
Power sensor	Anritsu	ML2491A	32516	2016.01.19	1Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	2016.01.19	1 Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	2016.01.19	1 Year

3. Maximum Peak Output power

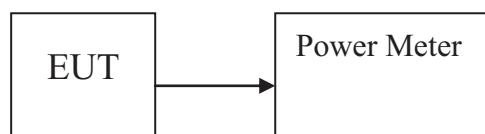
3.1. Limit

Please refer RSS-247 & section 15.247.

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

EUT: Portable waterproof Bluetooth Speaker		M/N: Aquaboom			
Test date: 2016-01-06		Test site: RF site	Tested by: Peter		
Mode	Freq (MHz)	PK Output Power (dBm)	PK Output Power (mW)	Limit (dBm)	Margin (dB)
GFSK	2402	1.125	1.296	21	19.875
	2441	0.587	1.145	21	20.413
	2480	1.334	1.360	21	19.666
$\pi/4$ DQPSK,	2402	0.576	1.142	21	20.424
	2441	0.368	1.088	21	20.632
	2480	0.897	1.229	21	20.103
8- DPSK	2402	0.426	1.103	21	20.574
	2441	0.875	1.223	21	20.125
	2480	0.551	1.135	21	20.449
Conclusion: PASS					

4. Bandwidth

4.1. Limit

Please refer RSS-247 & section15.247.

4.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW, PK detector. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

EUT: Portable waterproof Bluetooth Speaker		M/N: Aquaboom		
Test date: 2016-01-06		Test site: RF site	Tested by: Peter	
Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit	Conclusion
GFSK	2402	862.8	-	PASS
	2441	870.7	-	PASS
	2480	863.5	-	PASS
$\pi / 4$ DQPSK	2402	1231	-	PASS
	2441	1233	-	PASS
	2480	1223	-	PASS
8- DPSK	2402	1209	-	PASS
	2441	1211	-	PASS
	2480	1212	-	PASS

Orginal Test data

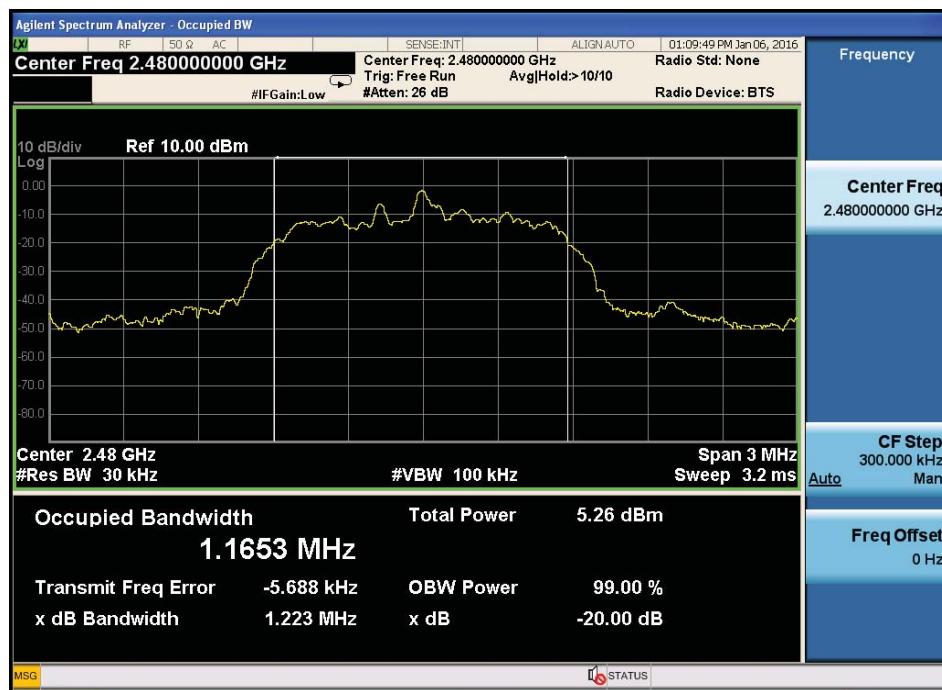
GFSK:



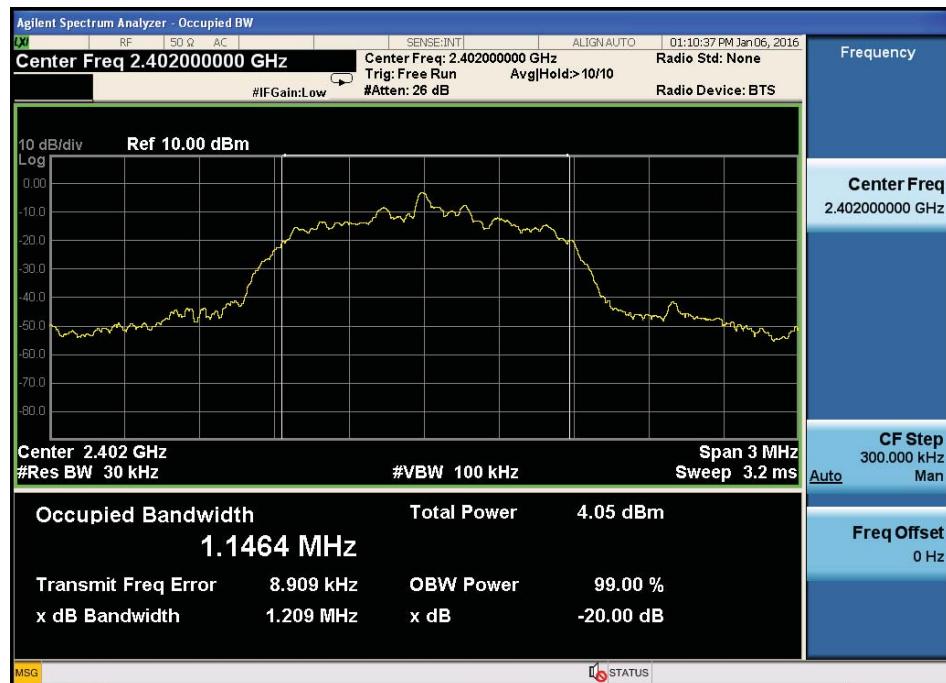


$\pi/4$ DQPSK





8- DPSK





5. Carrier Frequency Separation

5.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW

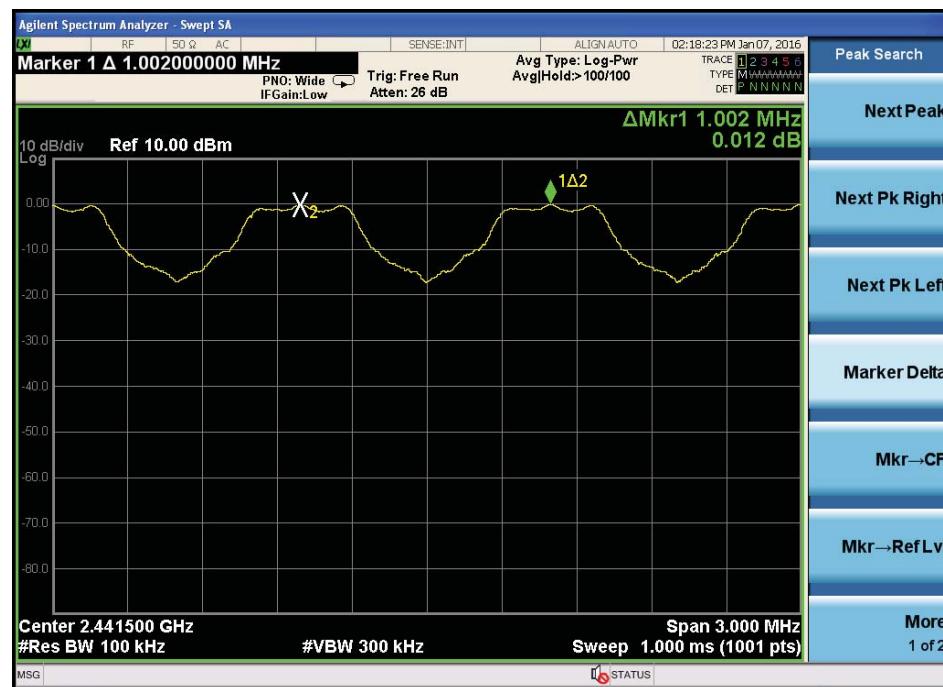
5.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The carrier frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW.

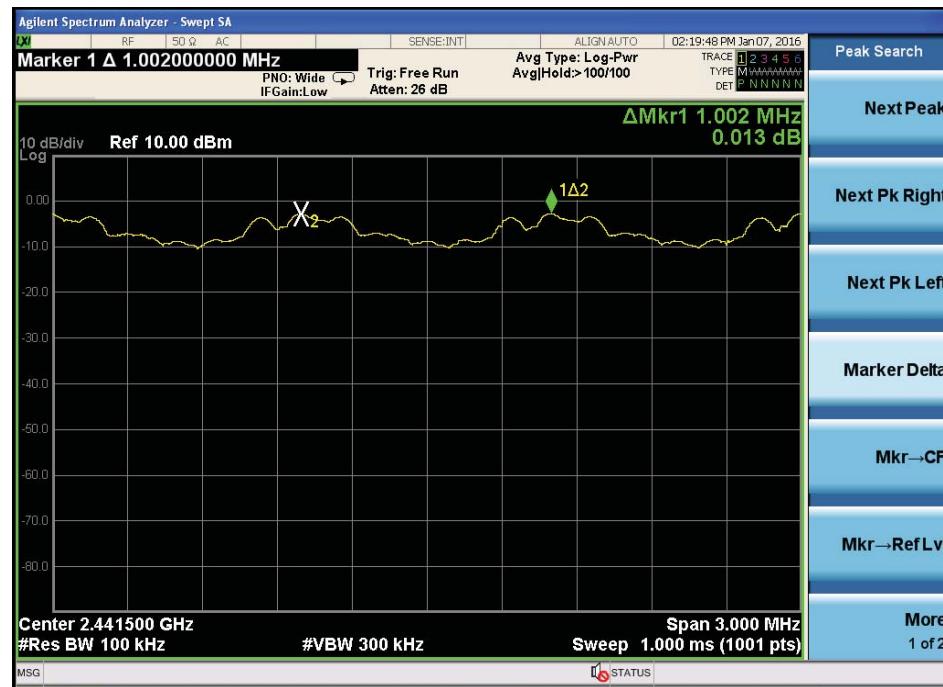
5.3. Test Result

EUT: Portable waterproof Bluetooth Speaker M/N: Aquaboom				
Test date: 2016-01-06		Test site: RF site	Tested by: Peter	
Mode/Channel	Channel separation (KHz)	20dB Bandwidth (KHz)	Limit (KHz) 2/3 20dB bandwidth	Conclusion
GFSK	1002	870.700	580.467	PASS
$\pi/4$ DQPSK	1002	1233.000	822.000	PASS
8- DPSK	1002	1211.000	807.333	PASS

Orginal test data for channel separation
GFSK



$\pi/4$ DQPSK



8- DPSK



6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

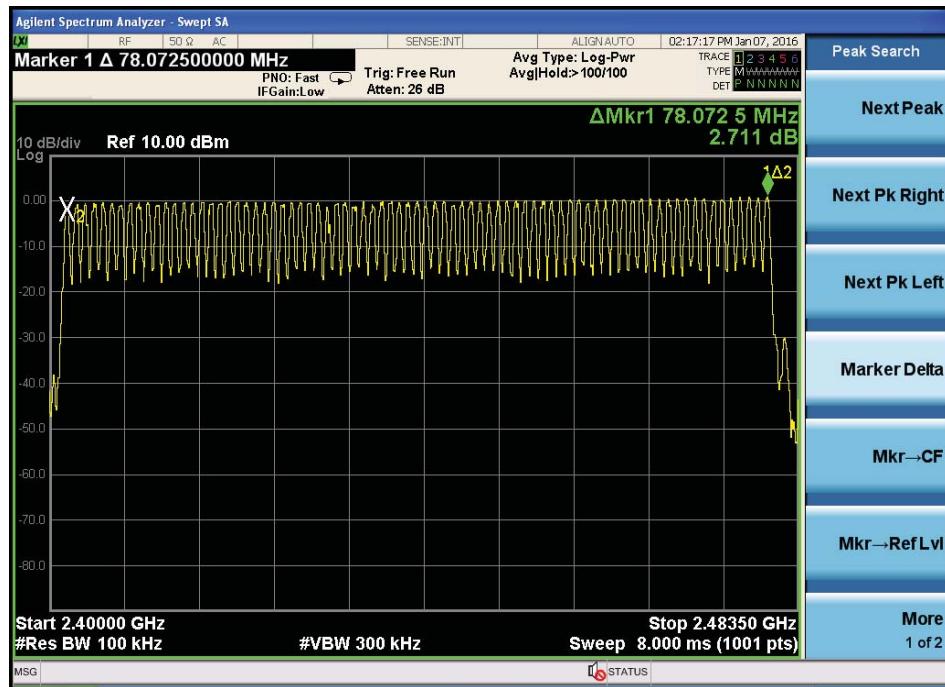
6.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The number of hopping channel was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW.

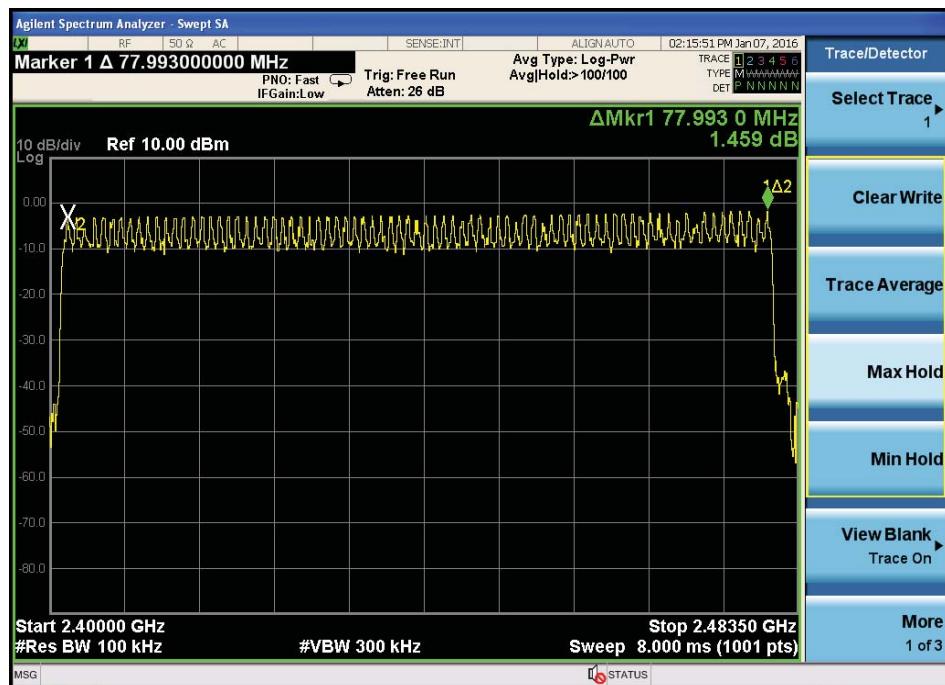
6.3. Test Result

EUT: Portable waterproof Bluetooth Speaker M/N: Aquaboom			
Test date: 2016-01-06		Test site: RF site	Tested by: Peter
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
$\pi/4$ DQPSK	79	>15	PASS
8- DPSK	79	>15	PASS

Original test data for hopping channel number
GFSK



$\pi/4$ DQPSK



8- DPSK



7. Dwell Time

7.1. Test limit

Please refer RSS-247 & section15.247.

7.2. Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

7.3. Test Results

PASS.

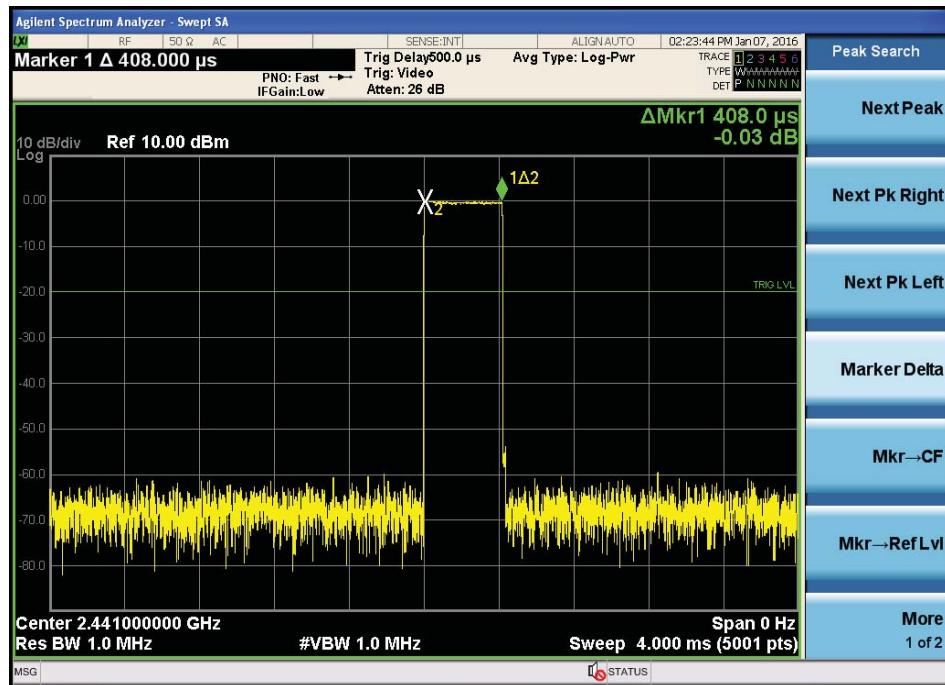
Detailed information please see the following page.

EUT: Portable waterproof Bluetooth Speaker M/N: Aquaboom						
Test date: 2016-01-06		Test site: RF site		Tested by: Peter		
Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Conclusion
GFSK	DH1	2441	0.408	0.261	<0.4	PASS
	DH3	2441	1.669	0.356	<0.4	PASS
	DH5	2441	2.914	0.373	<0.4	PASS
$\pi /4$ DQPSK	DH1	2441	0.4184	0.268	<0.4	PASS
	DH3	2441	1.674	0.357	<0.4	PASS
	DH5	2441	2.921	0.374	<0.4	PASS
8- DPSK	DH1	2441	0.4216	0.270	<0.4	PASS
	DH3	2441	1.674	0.357	<0.4	PASS
	DH5	2441	2.927	0.375	<0.4	PASS

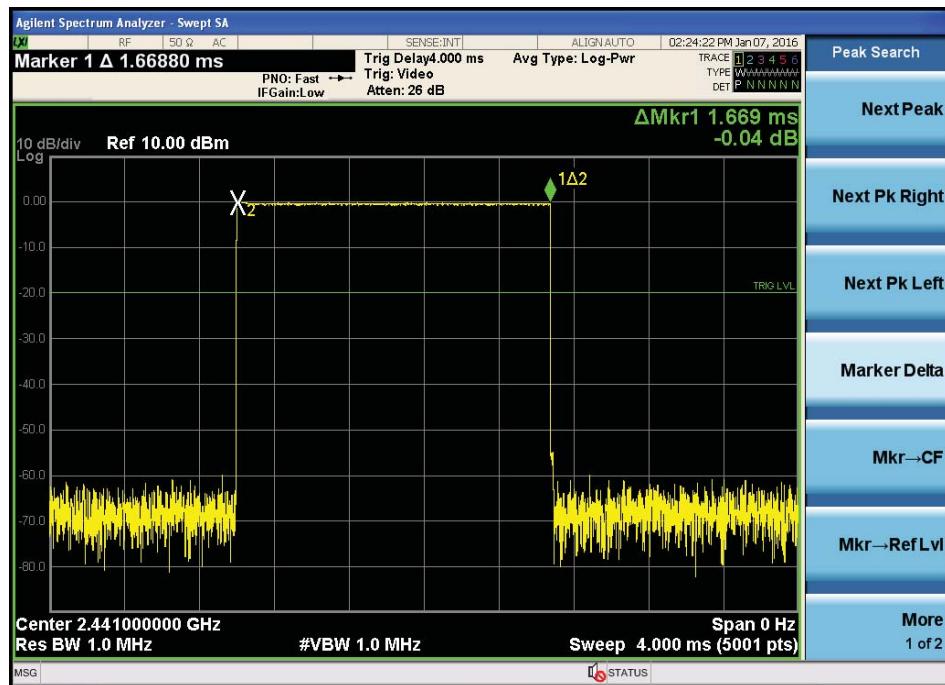
Note: 1 A period time = 0.4 (s) * 79 = 31.6(s)
 2 DH1 time slot = Pulse Duration * (1600/(1*79)) * A period time
 DH3 time slot = Pulse Duration * (1600/(3*79)) * A period time
 DH5 time slot = Pulse Duration * (1600/(5*79)) * A period time

GFSK

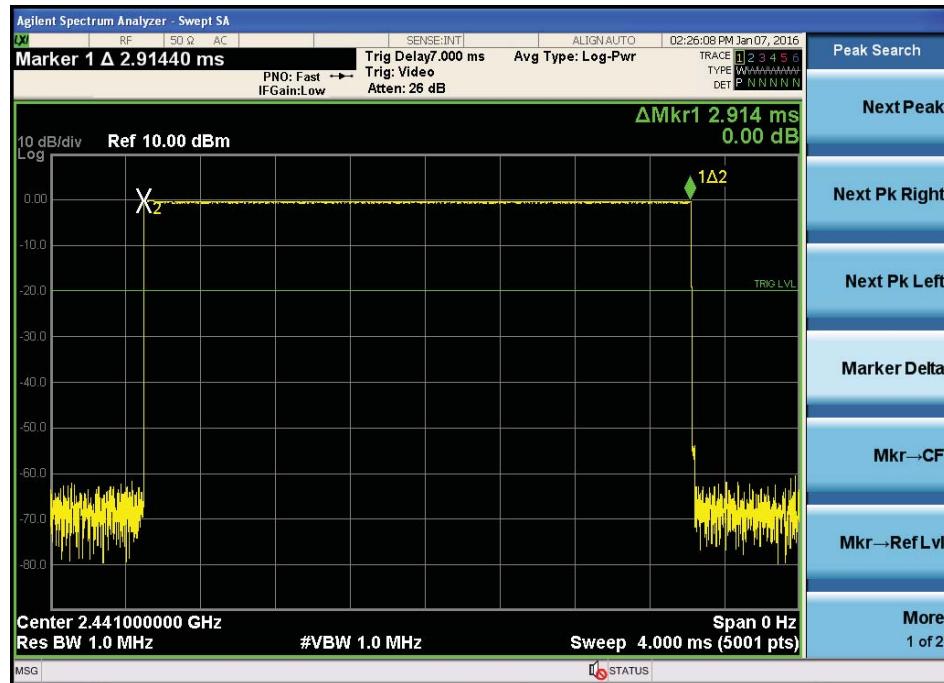
DH1:



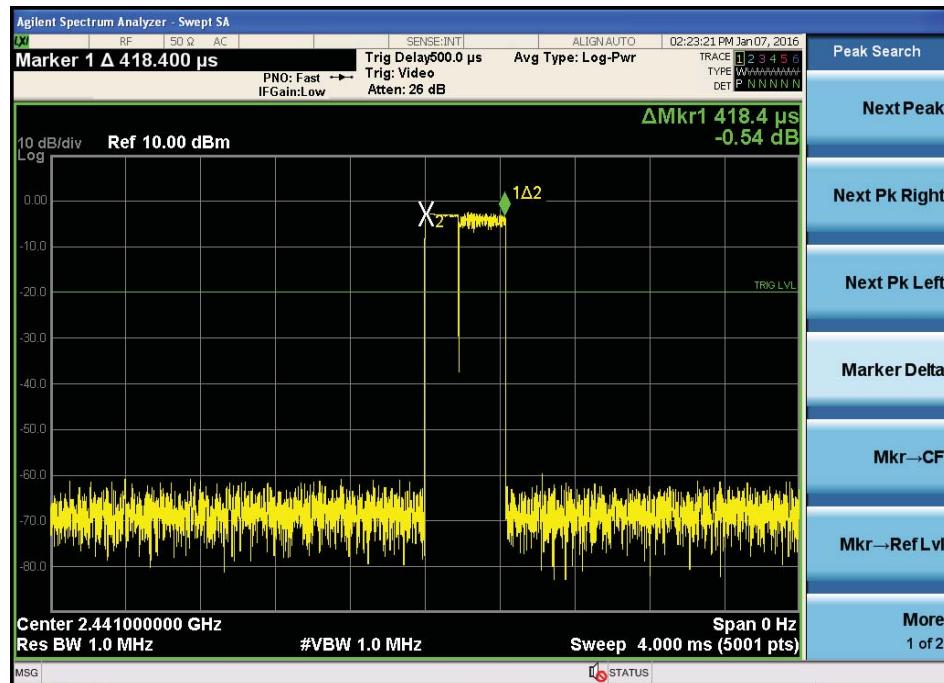
DH3:



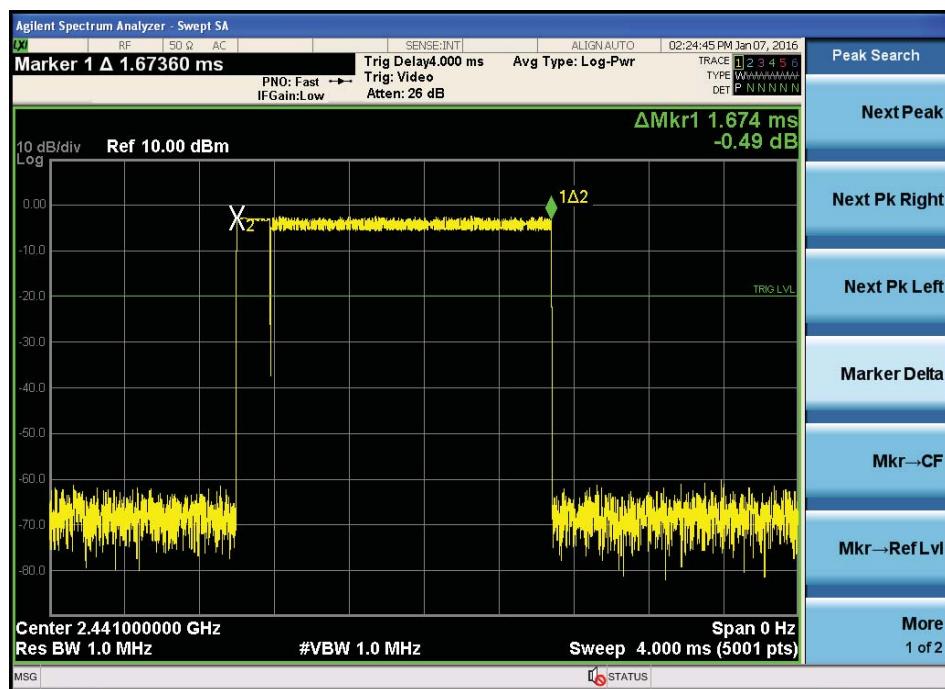
DH5



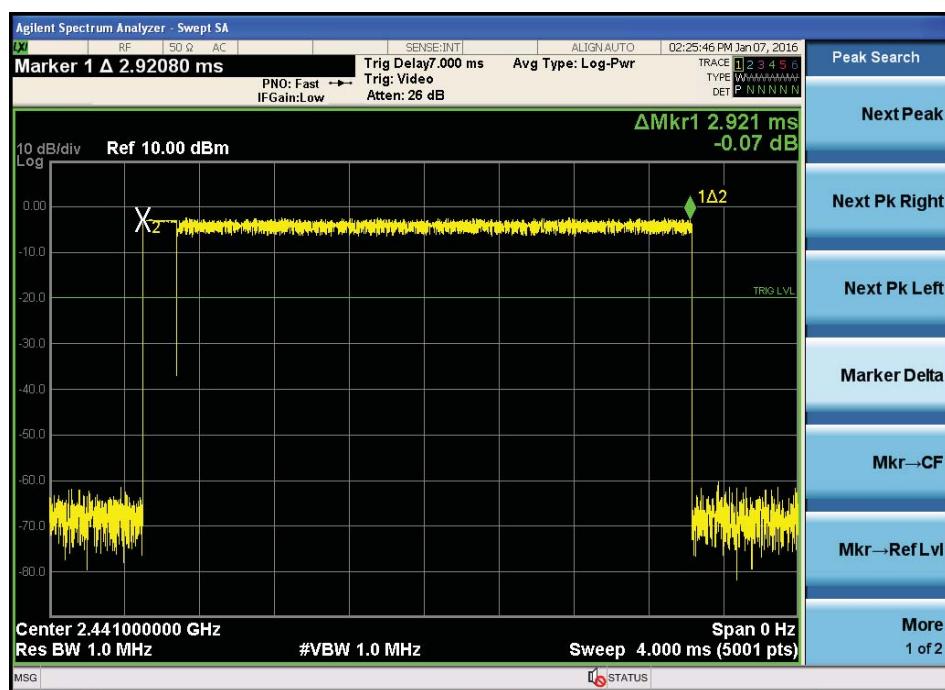
$\pi/4$ DQPSK
DH1



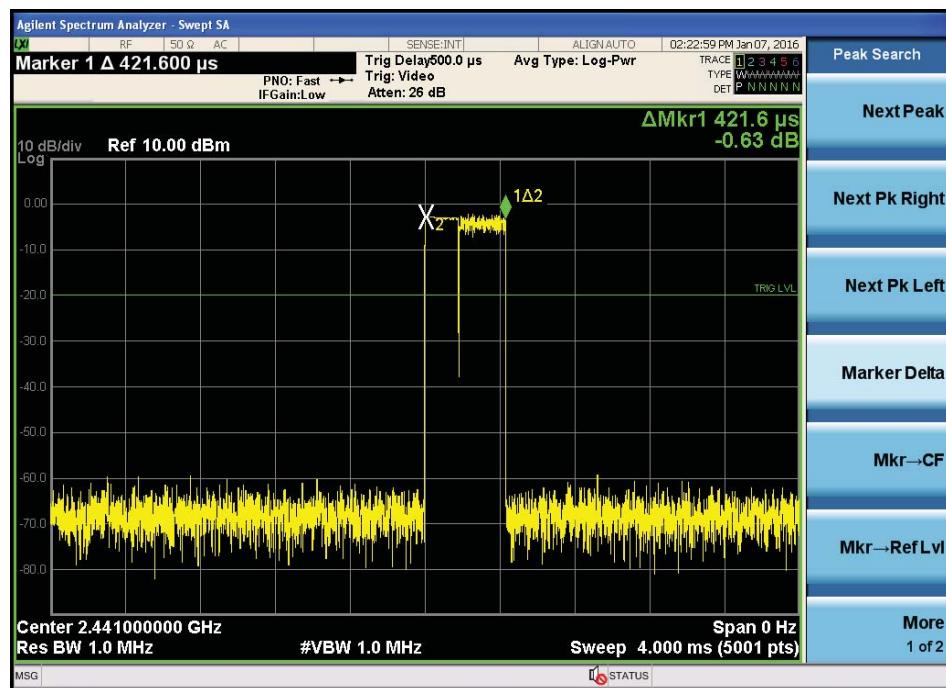
DH3



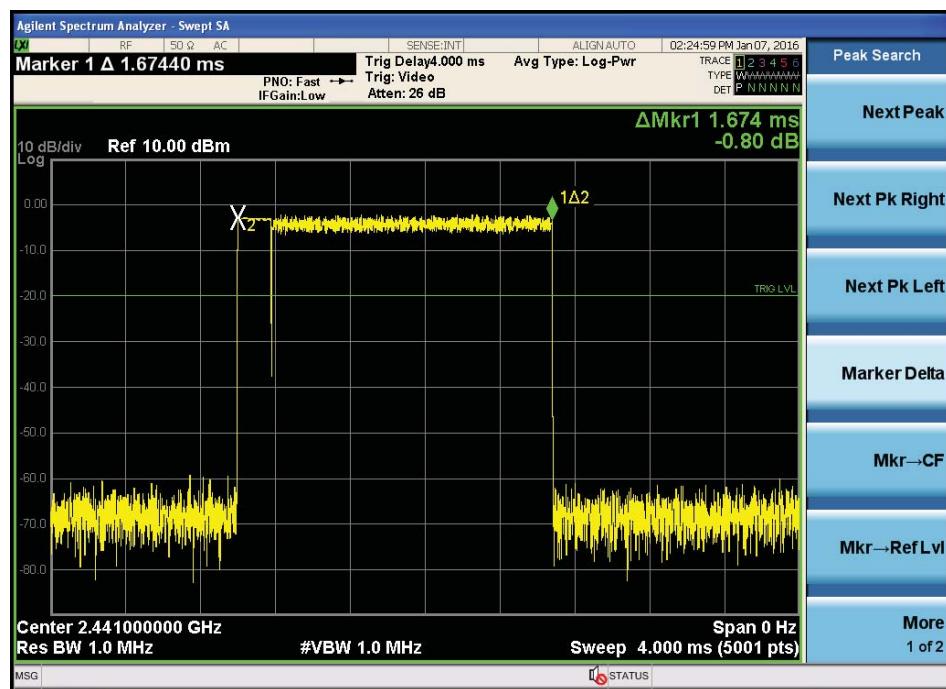
DH5



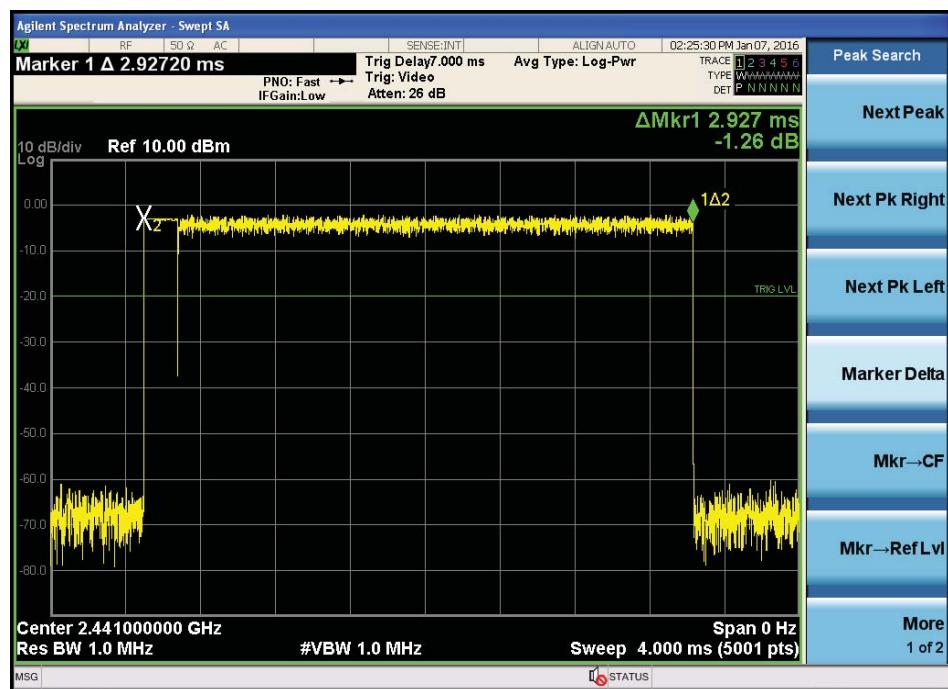
8- DPSK:
DH1



DH3



DH5



8. Radiated emissions

8.1. Limit

All the emissions appearing within RSS-GEN restricted frequency bands shall not exceed the limits shown in RSS-GEN, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with RSS-GEN limits.

RSS-GEN Restricted frequency band

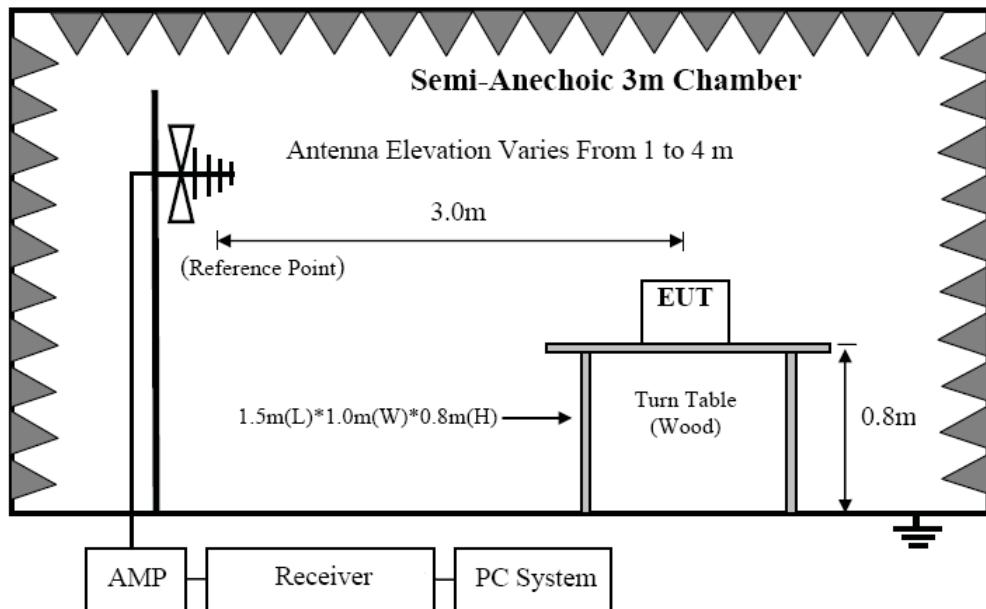
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

RSS-GEN Limit

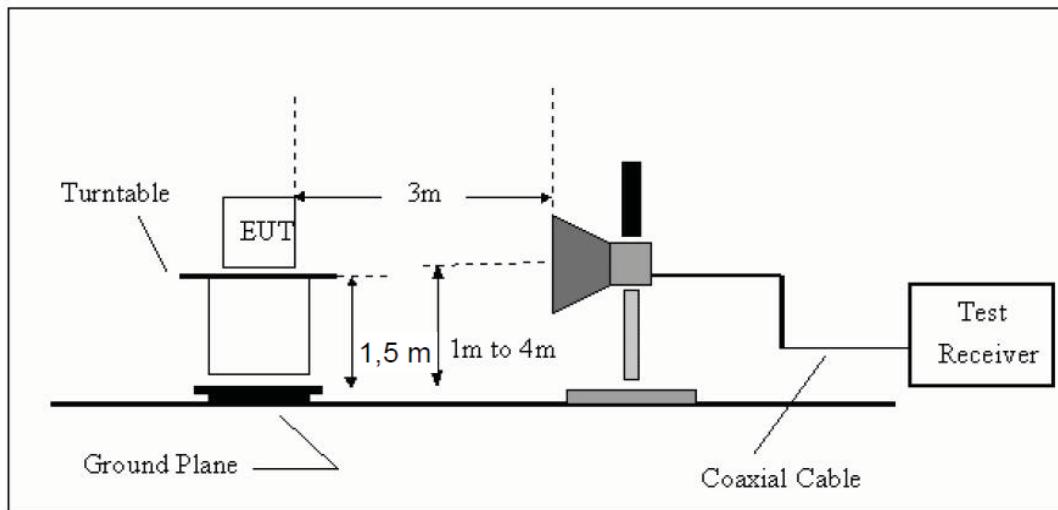
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		µV/m	dB(µV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above	1000	74.0 dB(µV)/m (Peak) 54.0 dB(µV)/m (Average)	

8.2. Block Diagram of Test setup

8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz testing, and 150cm for above 1GHz testing.
- (2) Setup EUT and simulator as shown in section 1.4 and 6.1
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on Radiated Emission test.
- (6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

8.4. Test Result

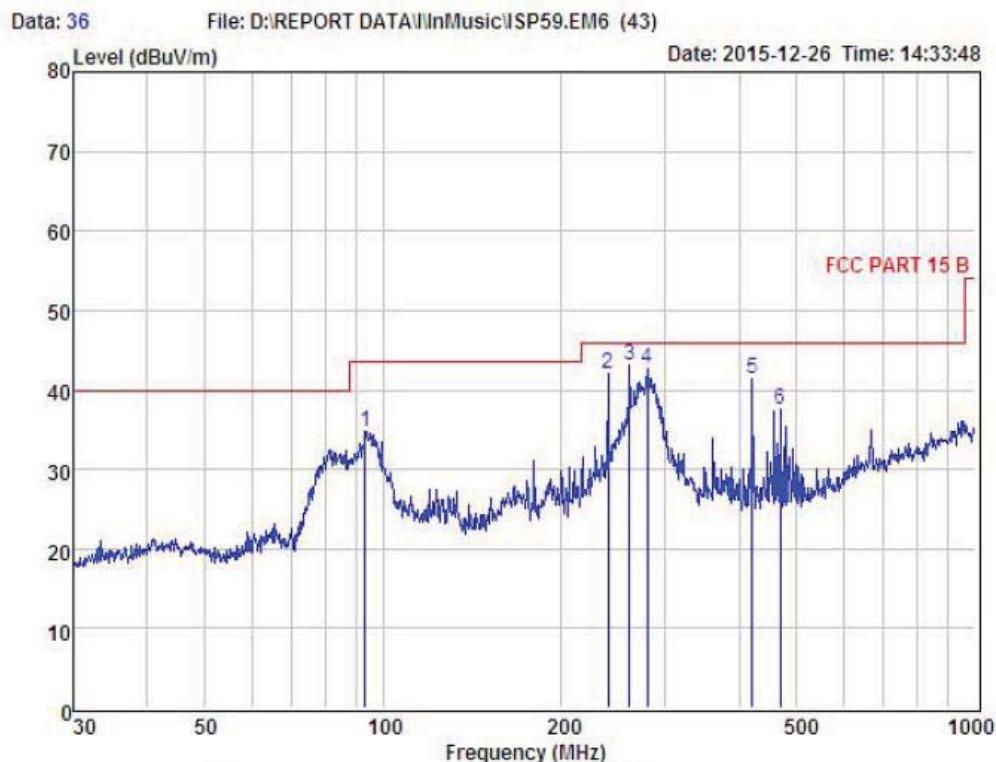
We have scanned the 10th harmonic from 9KHz to the EUT.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

From 30MHz to 1000MHz: Conclusion: PASS



Condition : FCC PART 15 B 3m POL: HORIZONTAL

EUT :

Model No : ISP59

Test Mode : BT mode and charging

Power :

Test Engineer :

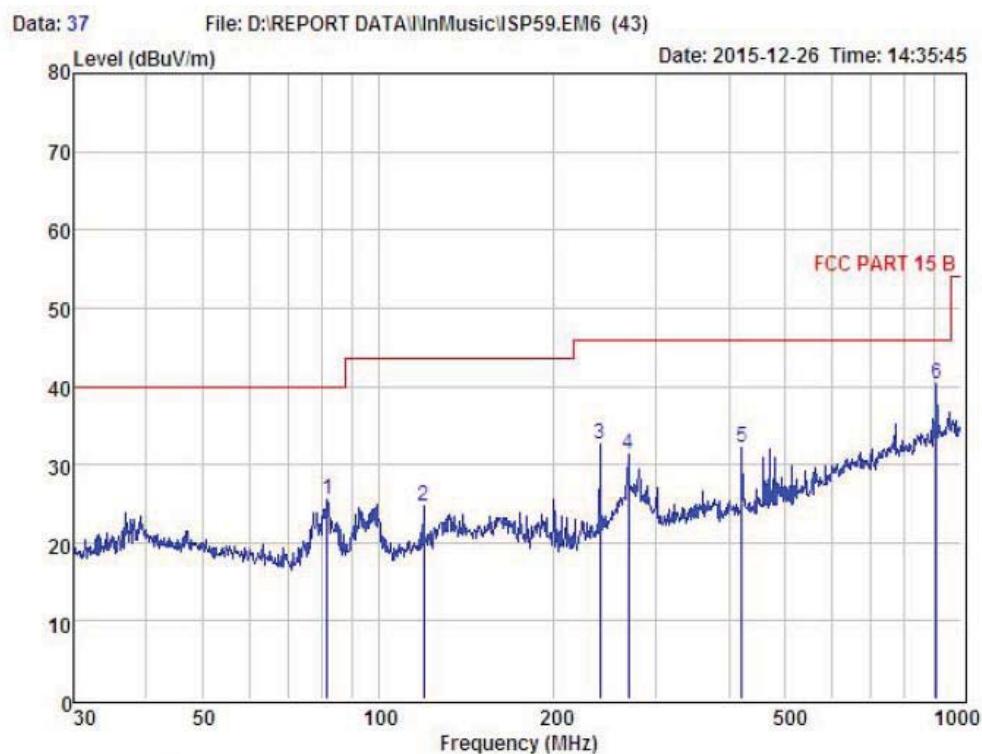
Remark :

Temp : 24.2°C

Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	93.44	54.91	9.72	30.20	0.27	34.70	43.50	-8.80	Peak
2	239.99	58.35	11.45	28.25	0.53	42.08	46.00	-3.92	Peak
3	261.06	58.86	11.83	28.17	0.57	43.09	46.00	-2.91	Peak
4	280.02	57.83	12.37	28.09	0.60	42.71	46.00	-3.29	Peak
5	420.58	52.48	15.23	27.12	0.81	41.40	46.00	-4.60	Peak
6	468.88	47.95	16.15	27.28	0.77	37.59	46.00	-8.41	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



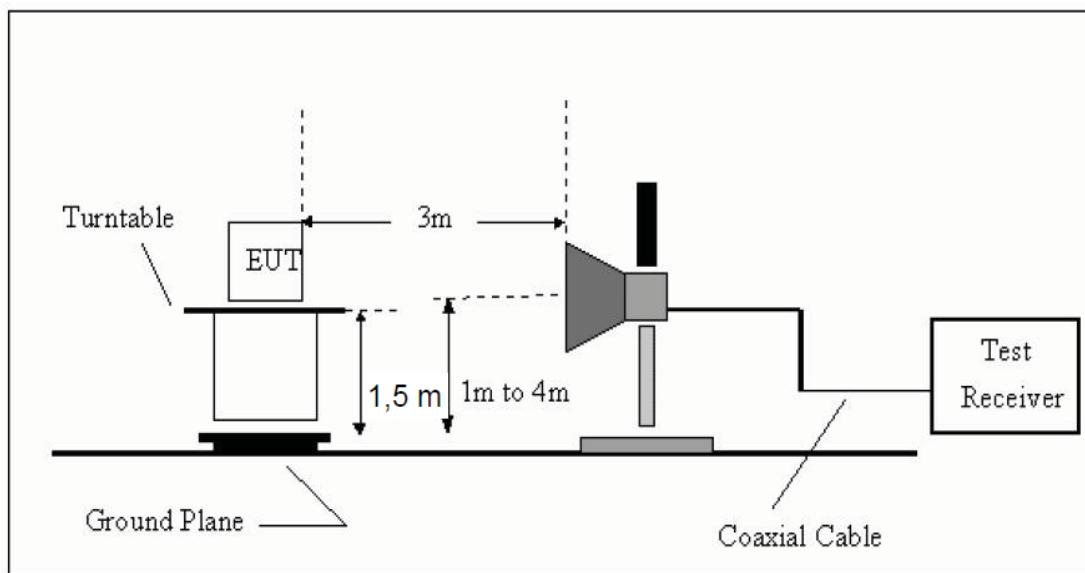
Condition	:	FCC PART 15 B	3m	POL: VERTICAL					
EUT	:								
Model No	:	ISP59							
Test Mode	:	BT mode and charging							
Power	:								
Test Engineer	:								
Remark	:								
Temp	:	24.2°C							
Hum	:	54%							
Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	81.78	46.08	9.32	30.02	0.17	25.55	40.00	-14.45	Peak
2	119.86	41.88	12.06	29.68	0.36	24.62	43.50	-18.88	Peak
3	239.99	48.82	11.45	28.25	0.53	32.55	46.00	-13.45	Peak
4	268.49	46.81	12.03	28.14	0.70	31.40	46.00	-14.60	Peak
5	420.53	43.18	15.23	27.12	0.81	32.10	46.00	-13.90	Peak
6	906.48	42.24	21.74	25.11	1.49	40.36	46.00	-5.64	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

1GHz—25GHz Radiated emission Test result																						
EUT: Portable waterproof Bluetooth Speaker					M/N: Aquaboom																	
Power: DC 5V from USB port																						
Test date: 2016-01-06		Test site: 3m Chamber		Tested by: Peter																		
Test mode: $\pi/4$ DQPSK Tx CH1 2402MHz																						
Antenna polarity: Vertical																						
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark													
1	4804	44.16	33.95	10.18	34.26	54.03	74	19.97	PK													
2	4804	33.65	33.95	10.18	34.26	43.52	54	10.48	AV													
3	7206	/																				
4	9608	/																				
5	12010	/																				
Antenna Polarity: Horizontal																						
1	4804	44.18	33.95	10.18	34.26	54.05	74	19.95	PK													
2	4804	33.93	33.95	10.18	34.26	43.8	54	10.2	AV													
3	7206	/																				
4	9608	/																				
5	12010	/																				

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in RSS-GEN, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with RSS-GEN limits.

9.3. Test Procedure

All restriction band and non-restriction band have been tested, only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

Radiated Method

GFSK (CH Low)

GFSK (CH High)

GFSK (Hopping Low)

GFSK (Hopping High)

$\pi/4$ DQPSK (CH Low)

$\pi/4$ DQPSK (CH High)

$\pi/4$ DQPSK (Hopping Low)

$\pi/4$ DQPSK (Hopping High)

8- DPSK (CH Low)

8- DPSK (CH High)

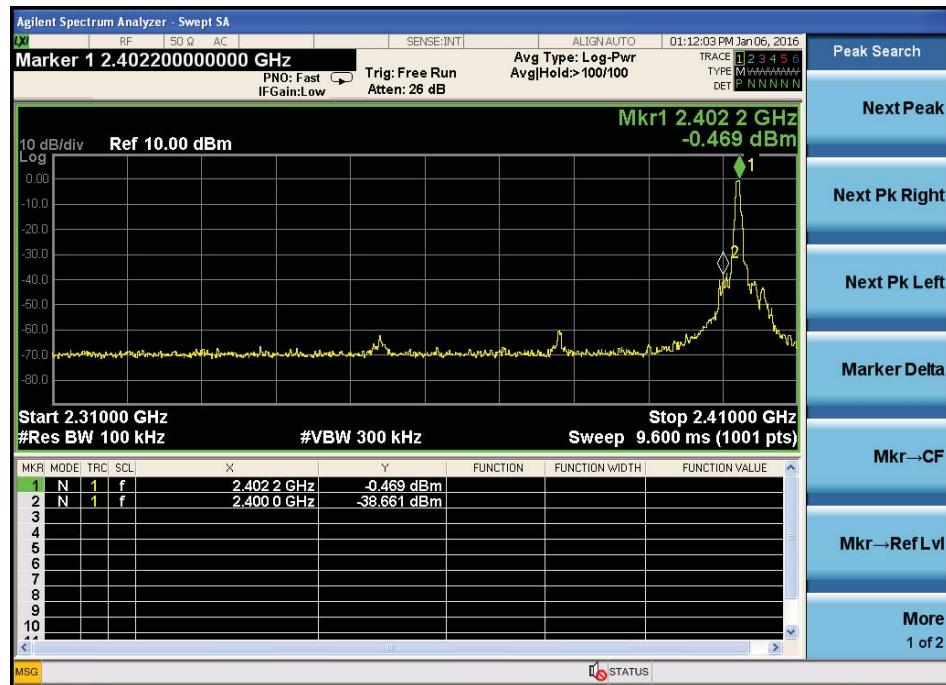
8- DPSK (Hopping Low)

8- DPSK (Hopping High)

Conducted Method

GFSK

CH LOW :

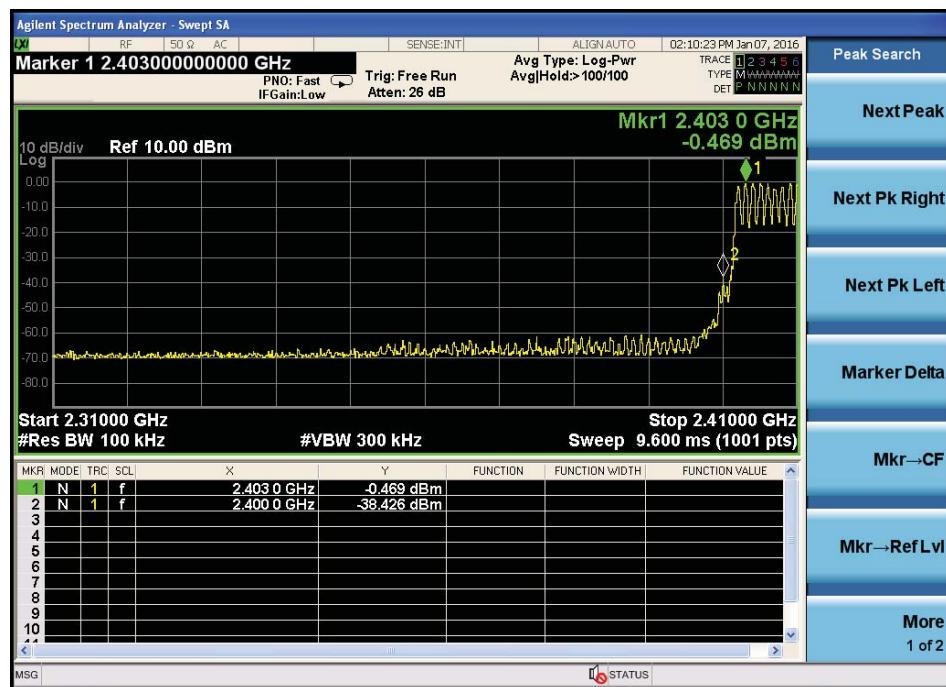


CH High :



Hopping

Low

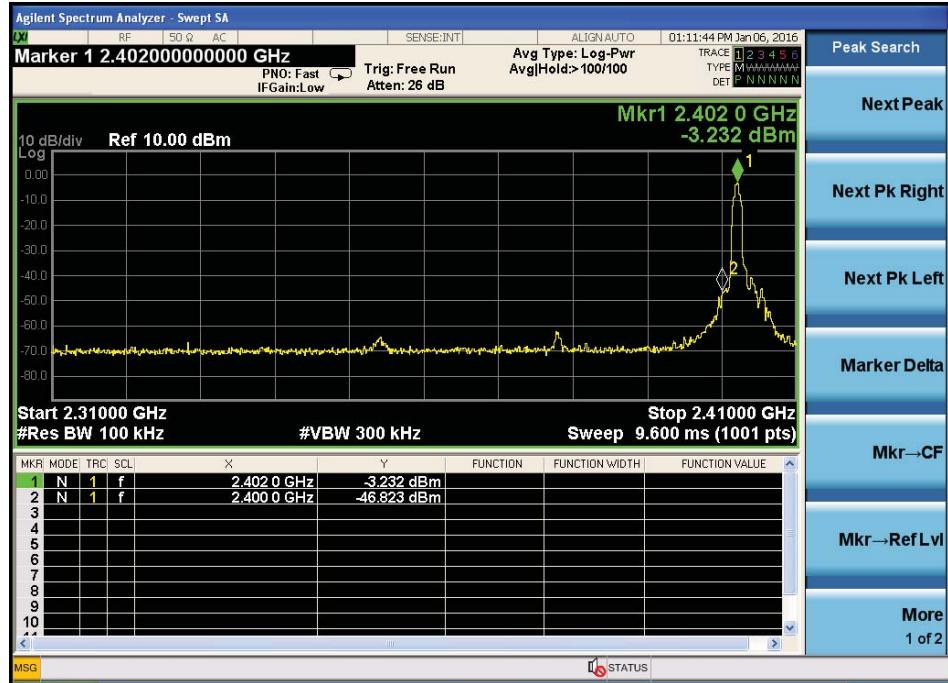


High



$\pi/4$ DQPSK

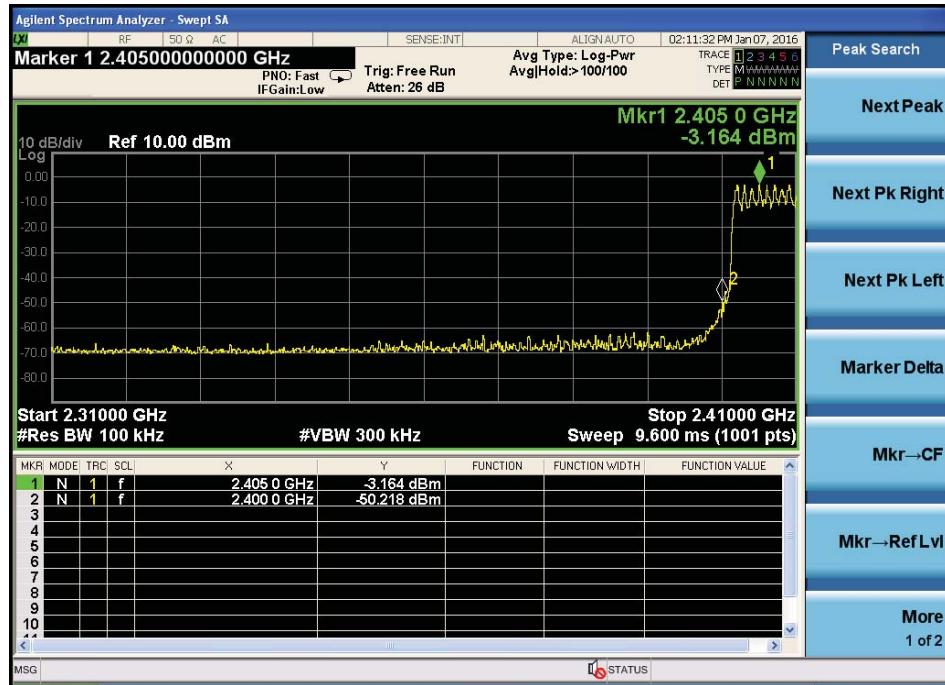
Low



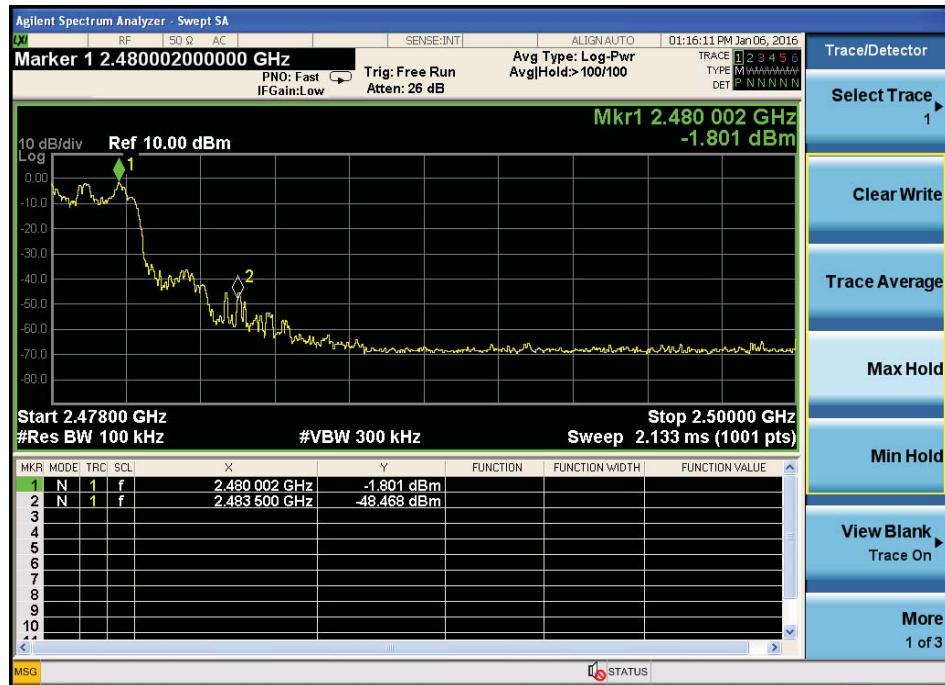
High



Hopping Low

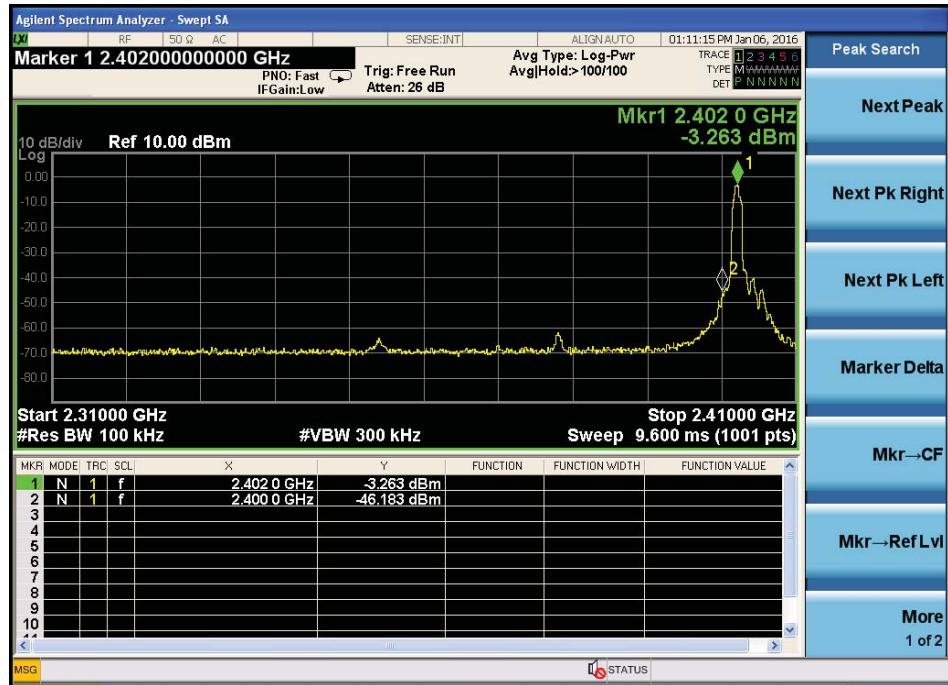


High



8- DPSK:

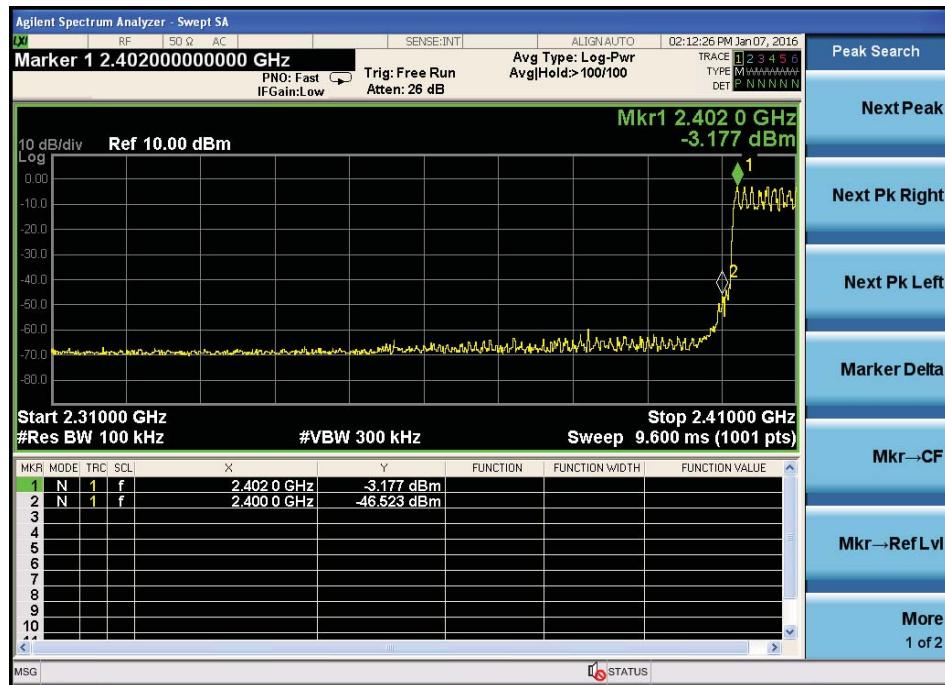
Low



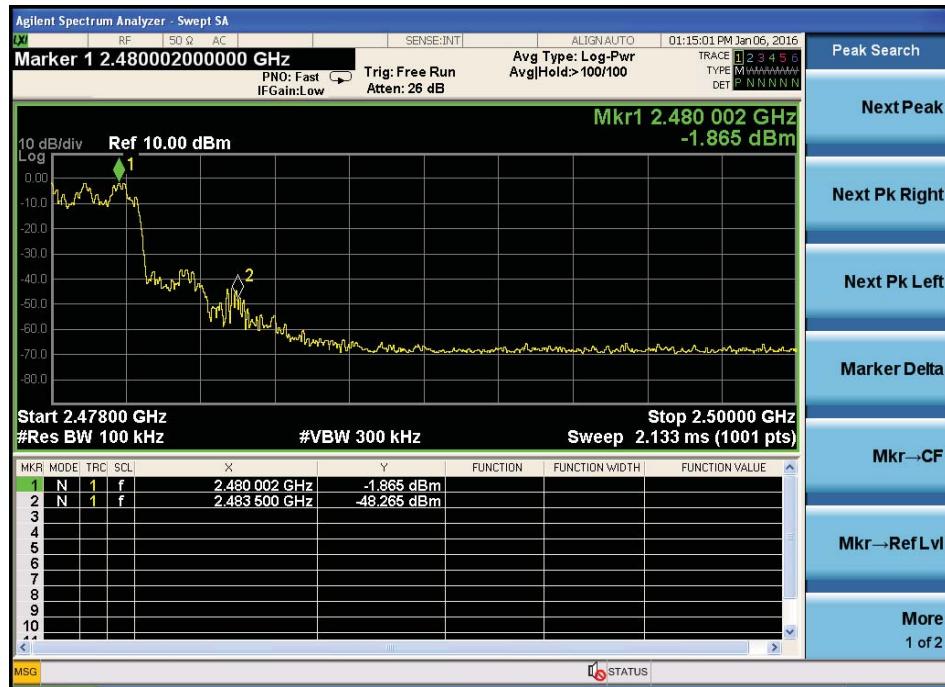
High



Hopping
Low

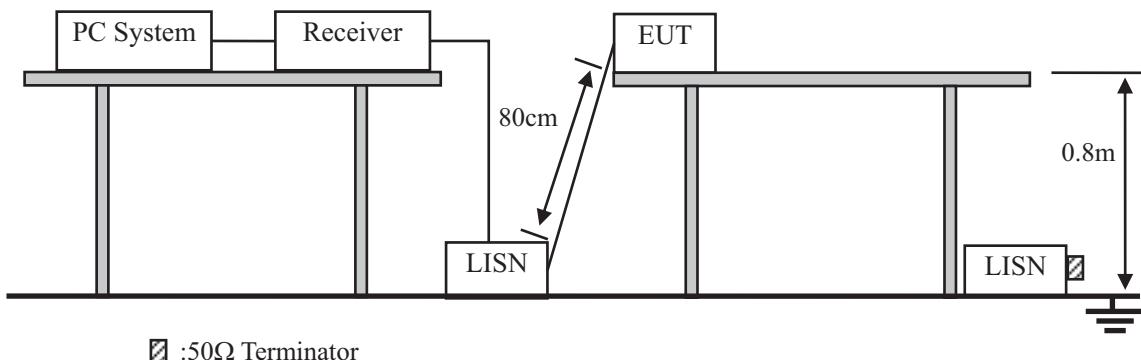


High



10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

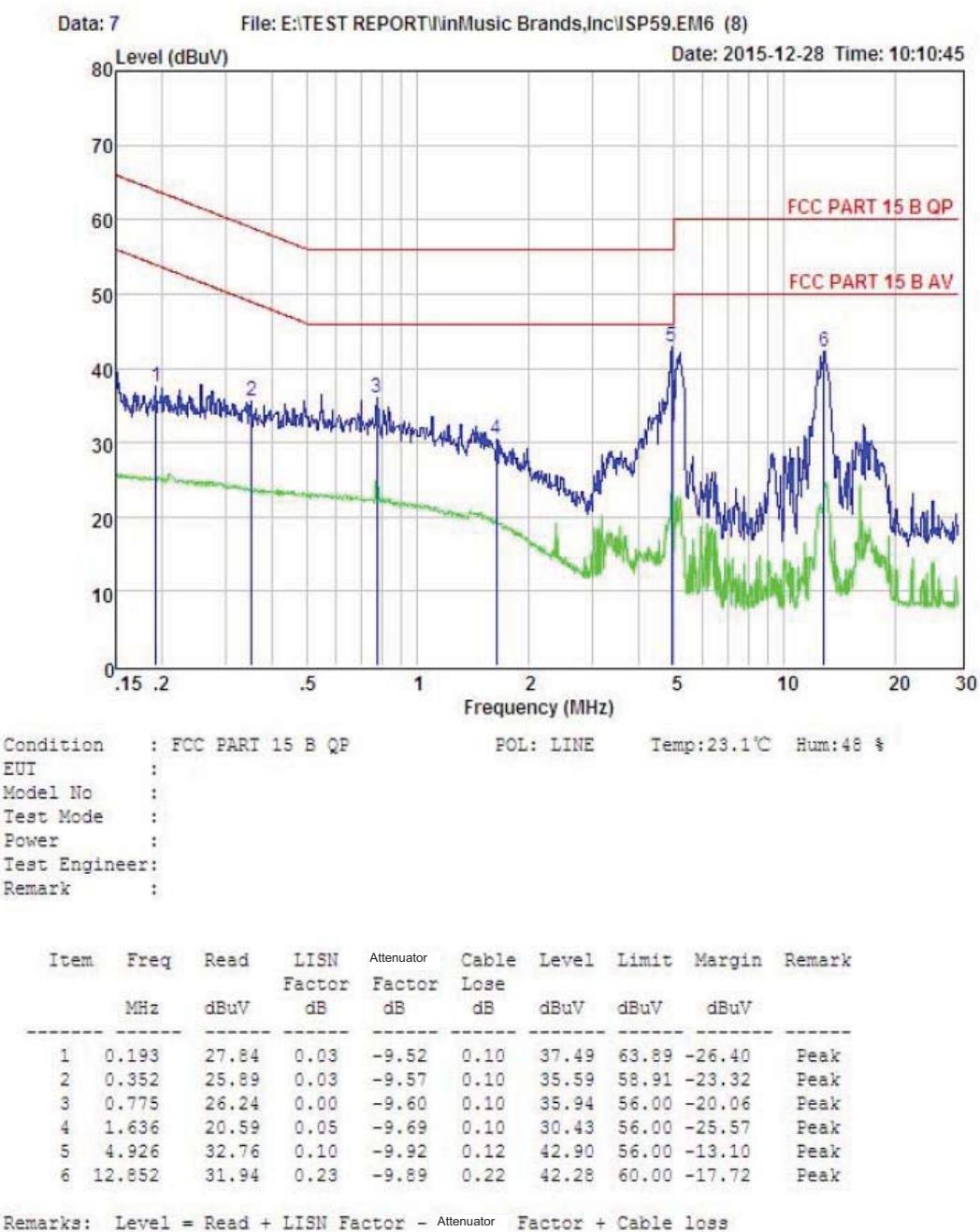
Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

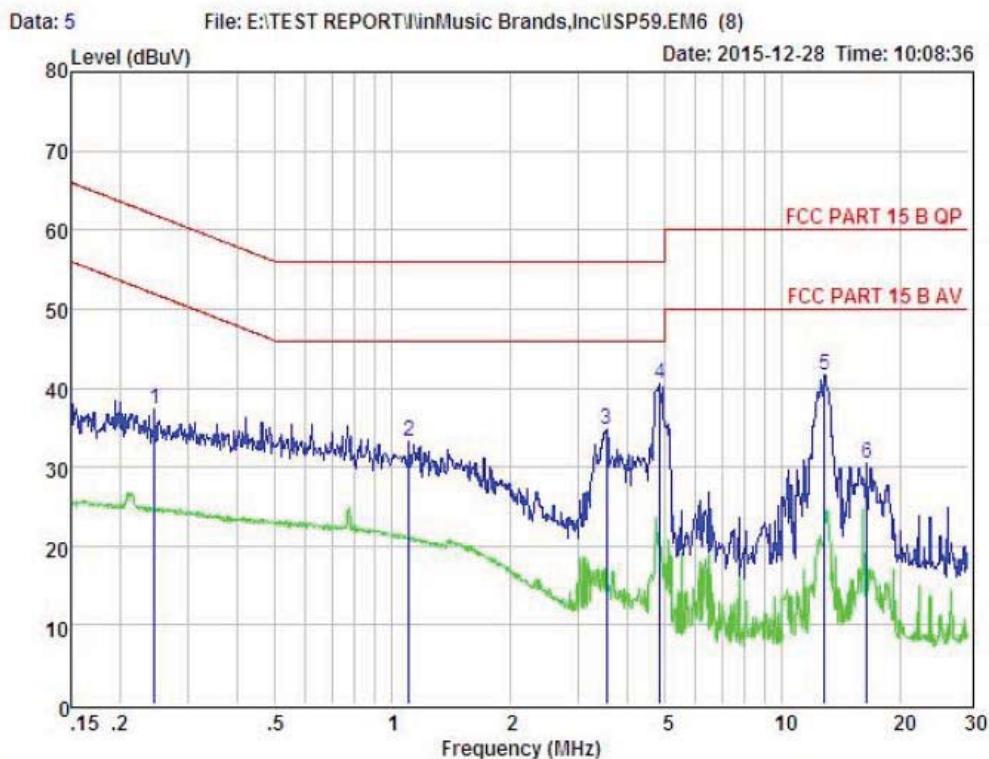
10.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

PASS. (See below detailed test data)





Condition : FCC PART 15 B QP POL: NEUTRAL Temp:23.1°C Hum:48 %
 EUT :
 Model No :
 Test Mode :
 Power :
 Test Engineer:
 Remark :

Item	Freq	Read	LISN	Attenuator Factor	Cable	Level	Limit	Margin	Remark
			Factor						
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	0.246	27.60	0.03	-9.52	0.10	37.25	61.91	-24.66	Peak
2	1.106	23.45	0.04	-9.64	0.10	33.23	56.00	-22.77	Peak
3	3.547	24.64	0.08	-9.85	0.12	34.69	56.00	-21.31	Peak
4	4.848	30.31	0.10	-9.91	0.12	40.44	56.00	-15.56	Peak
5	12.852	31.26	0.23	-9.89	0.22	41.60	60.00	-18.40	Peak
6	16.486	20.15	0.26	-9.83	0.28	30.52	60.00	-29.48	Peak

Remarks: Level = Read + LISN Factor - Attenuator Factor + Cable loss

Note1: If QP Result comply with AV limit, AV Result is deemed to comply with AV limit

11. Antenna Requirements

11.1. Limit

For intentional device, according to RSS-GEN, 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. And according to RSS-GEN, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are PCB Antenna for Bluetooth, no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi .