

# FCC TEST REPORT(Bluetooth)

for

Dongguan Lidi Electronic Technology Co.,Ltd

Bluetooth Music receiver

Model Number : TS-35A08

FCC ID: 2AJYKTS-35A08

Prepared for : Dongguan Lidi Electronic Technology Co.,Ltd  
Address : 3F,B2 Bldg,Anda industrial Park,Amroad No.6, Youganpu  
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Prepared by : Keyway Testing Technology Co., Ltd.  
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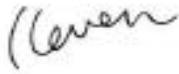
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Report No. : 16KWE114724F  
Date of Test : Nov. 17~24, 2016  
Date of Report : Nov. 25, 2016

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# Keyway Testing Technology Co., Ltd.

<b>Applicant:</b>	Dongguan Lidi Electronic Technology Co.,Ltd 3F,B2 Bldg,Anda industrial Park,Amproad No.6, Youganpu village, Fenggang Town, Dongguan City China		
<b>Manufacturer:</b>	Dongguan Lidi Electronic Technology Co.,Ltd 3F,B2 Bldg,Anda industrial Park,Amproad No.6, Youganpu village, Fenggang Town, Dongguan City China		
<b>E.U.T:</b>	Bluetooth Music receiver		
<b>Model Number:</b>	TS-35A08		
<b>Trade Name:</b>	-----	<b>Serial No.:</b>	-----
<b>Date of Receipt:</b>	Nov. 15, 2016	<b>Date of Test:</b>	Nov. 17~24, 2016
<b>Test Specification:</b>	FCC Part 15, Subpart C Section 15.247: 2016 ANSI C63.10:2013		
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.		
<b>Issue Date: Nov. 25, 2016</b>			
Tested by:	Reviewed by:	Approved by:	
		 Andy Gao / Supervisor	
Keven Wu / Engineer	Mike Xu / Supervisor		
<b>Other Aspects:</b> None.			
Abbreviations: OK/P=passed   fail/F=failed   n.a/N=not applicable   E.U.T=equipment under tested			
This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Keyway Testing Technology Co., Ltd.			

## 1. TEST SUMMARY

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Emissions	15.205(a)/15.209	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Emissions from out of band	15.247(d)	PASS
Antenna Requirement	15.203	PASS

## 2.GENERAL PRODUCT INFORMATION

### 2.1. Product Function

Refer to Technical Construction Form and User Manual.

### 2.2. Description of Device (EUT)

Product Name:	Bluetooth Music receiver
Model No.:	TS-35A08
Operation Frequency:	2402MHz ~2480MHz
Channel numbers:	79 Channels
Channel spacing	1MHz
Modulation technology:	BT(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK
Bit Rate of Transmitter	1Mbps/2Mbps/3Mbps
Antenna Type:	PCB
Antenna gain:	1.2dBi
Power supply:	DC 3.7V or DC 5V from adapter

### 2.3. Difference between Model Numbers

None.

### 2.4. Independent Operation Modes

The basic operation modes are:

2.4.1. EUT work BT mode and Test mode as below:

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	BT link

### 2.5. Test Supporting System

N/A

## 2.6. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA  
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA  
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.  
Registration No.: UA 50207153  
Date of registration: July 13, 2011

Certificated by UL, USA  
Registration No.: 100567-237  
Date of registration: September 1, 2011

Certificated by Intertek  
Registration No.: 2011-RTL-L1-31  
Date of registration: October 11, 2011

Certificated by Industry Canada  
Registration No.: 9868A  
Date of registration: December 8, 2011

Certificated by FCC, USA  
Registration No.: 370994  
Date of registration: February 21, 2012

Certificated by CNAS China  
Registration No.: CNAS L5783  
Date of registration: August 8, 2012

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Building 1, Baishun Industrial Zone, Zhangmutou  
Town, Dongguan, Guangdong, China

## 2.7. List of Test and Measurement Instruments

### 2.7.1. For conducted emission at the mains terminals test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 09,16	Apr. 09,17
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 09,16	Apr. 09,17
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 09,16	Apr. 09,17

### 2.7.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 09,16	Apr. 09,17
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 09,16	Apr. 09,17
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 09,16	Apr. 09,17
Signal Amplifier	SONOMA	310	187016	Apr. 09,16	Apr. 09,17
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 09,16	Apr. 09,17
RF Cable	IMRO	IMRO-400	966 Cable 1#	N/A	N/A
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 09,16	Apr. 09,17
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 09,16	Apr. 09,17
High Pass filter	Micro	HPM50111	324216	Apr. 09,16	Apr. 09,17
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 09,16	Apr. 09,17
Attenuation	MCE	24-10-34	BN9258	Apr. 02,16	Apr. 02,17
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 02,16	Apr. 02,17

### 3. TEST SET-UP AND OPERATION MODES

#### 3.1. Principle of Configuration Selection

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

#### 3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators

Conducted Emission:



Radiated Emission:



(EUT: Bluetooth Music receiver)

#### 3.3. Test Operation Mode and Test Software

None.

#### 3.4. Special Accessories and Auxiliary Equipment

Adapter:	Model:BSY012U050200U U1USB INPUT:AC 100-240V, 50/60Hz, 0.3A OUTPUT:DC 5V/2A
----------	---

#### 3.5. Countermeasures to Achieve EMC Compliance

None.

#### 3.6. Test Environment:

Ambient conditions in the test laboratory:

Items	Actual
Temperature (°C)	21~23
Humidity (%RH)	50~65

## 4. MAXIMUM PEAK OUTPUT POWER

### 4.1. Limits

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

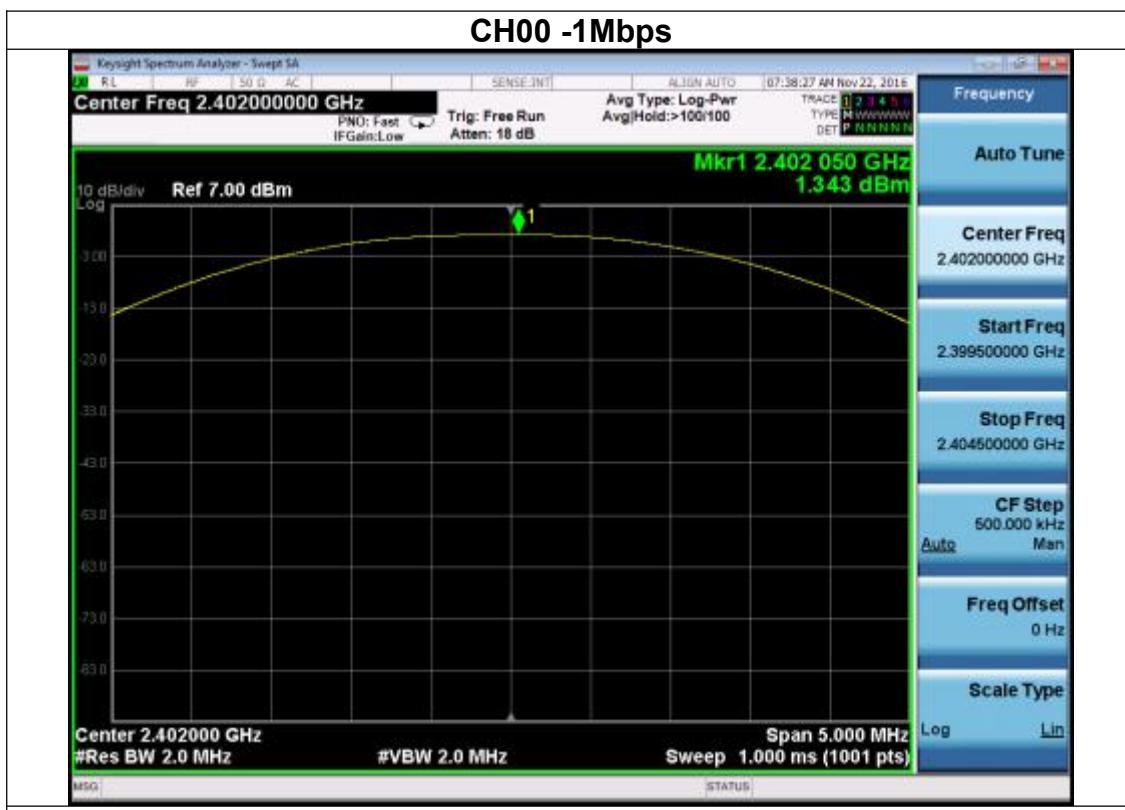
### 4.2. Test Procedure

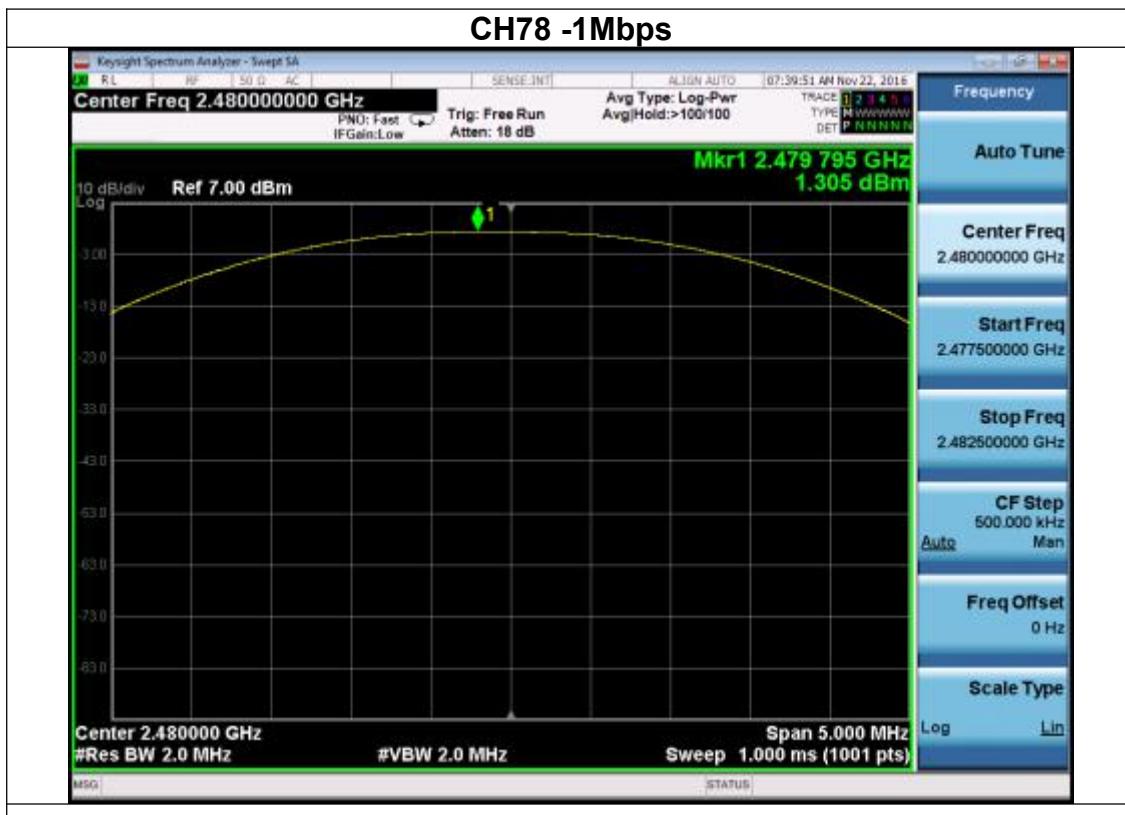
- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below
- Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured  
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel  
 $VBW \geq RBW$   
Sweep = auto  
Detector function = peak  
Trace = max hold

### 4.3. Test setup

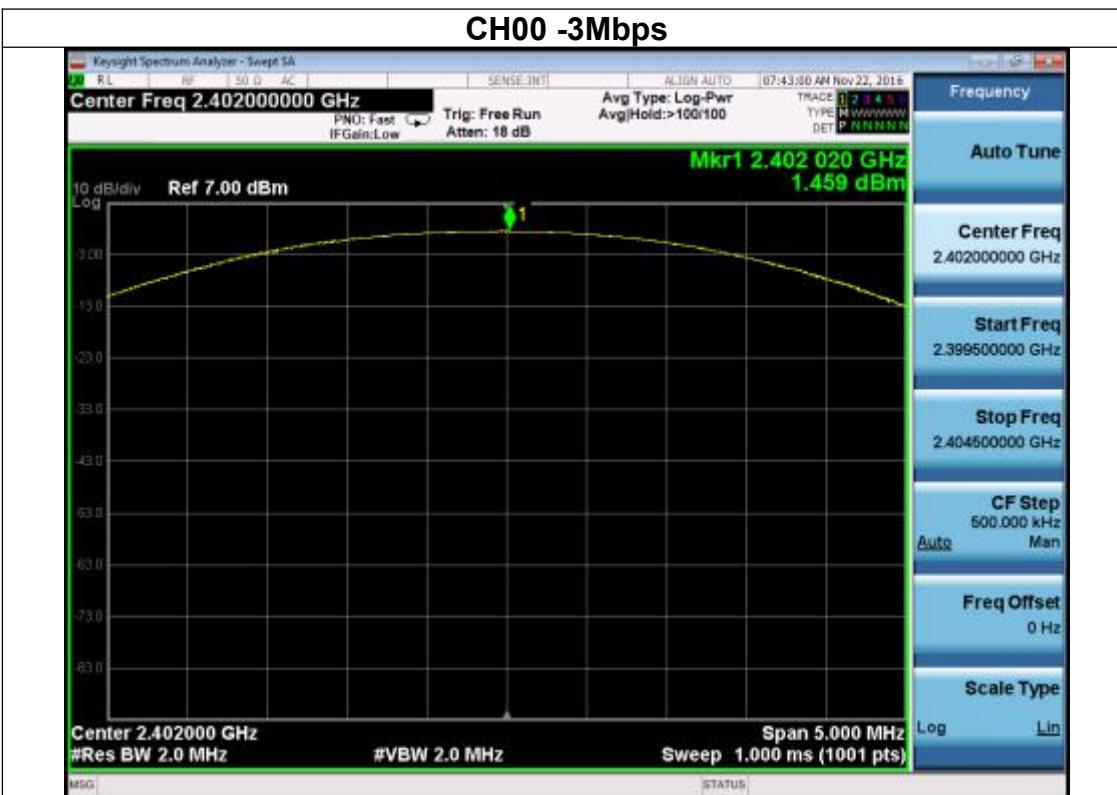
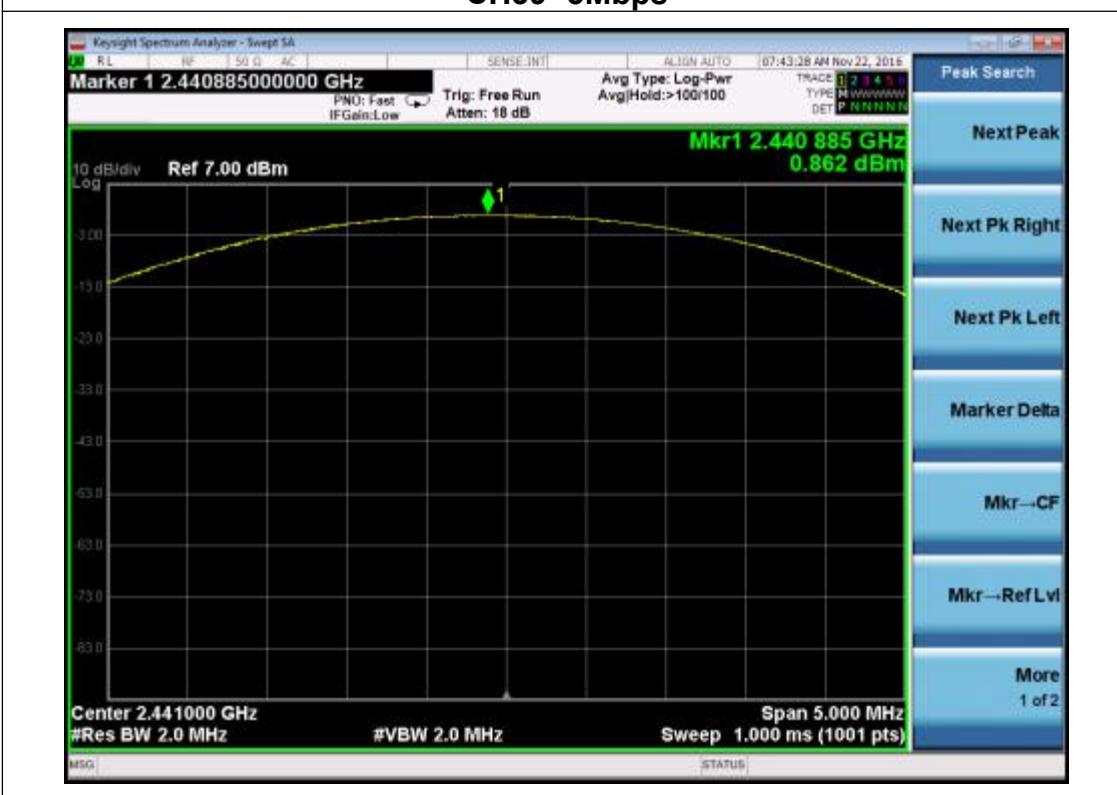


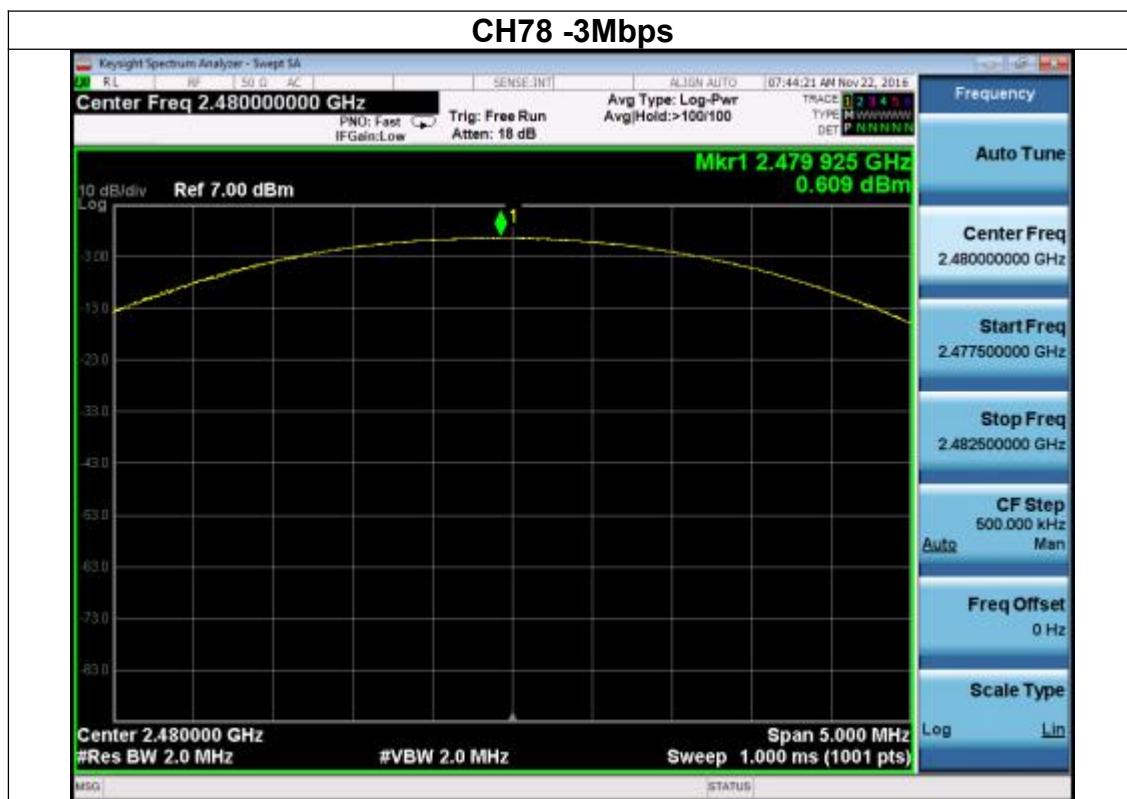
Test data				
Test Channel	Frequency (MHz)	1Mbps		LIMIT (dBm)
CH00	2402	1.343		30
CH39	2441	1.240		30
CH78	2480	1.305		30
2Mbps				
CH00	2402	1.290		20.96
CH39	2441	0.706		20.96
CH78	2480	0.312		20.96
3Mbps				
CH00	2402	1.459		20.96
CH39	2441	0.862		20.96
CH78	2480	0.609		20.96

**CH00 -1Mbps****CH39 -1Mbps**

**CH78 -1Mbps****CH00 -2Mbps**

**CH39 -2Mbps****CH78 -2Mbps**

**CH00 -3Mbps****CH39 -3Mbps**



## 5. EMISSION TEST RESULTS

### 5.1. Conducted Emission at the Mains Terminals Test

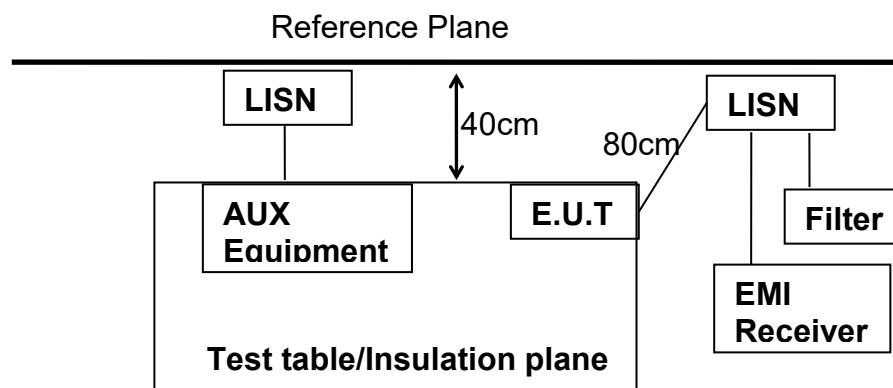
#### 5.1.1. Limit 15.207 limits

Frequency MHz	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.  
2.The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

#### 5.1.2. Test Setup

- 1.The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the AC mains through the Artificial Mains Network (AMN). Where the mains cable supplied by the manufacture was longer than 0.8 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.
- 2.The EUT was kept 0.4 m from any other earthed conducting surface. Both sides of AC line were checked to find out the maximum conducted emission levels according to the test procedure during the conducted emission test.
- 3.The frequency range from 150 kHz to 30 MHz was investigated.
- 4.The bandwidth of the test receiver was set at 9 kHz.
- 5.Pretest for all mode, The test data of the worst case condition(s) was reported on the following page.

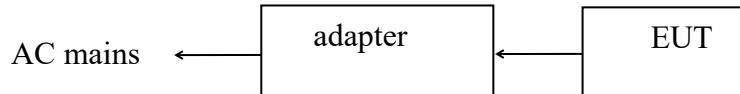


Remark: E.U.T. :Equipment Under Test

LISN: Line Impedance Stabilization Network

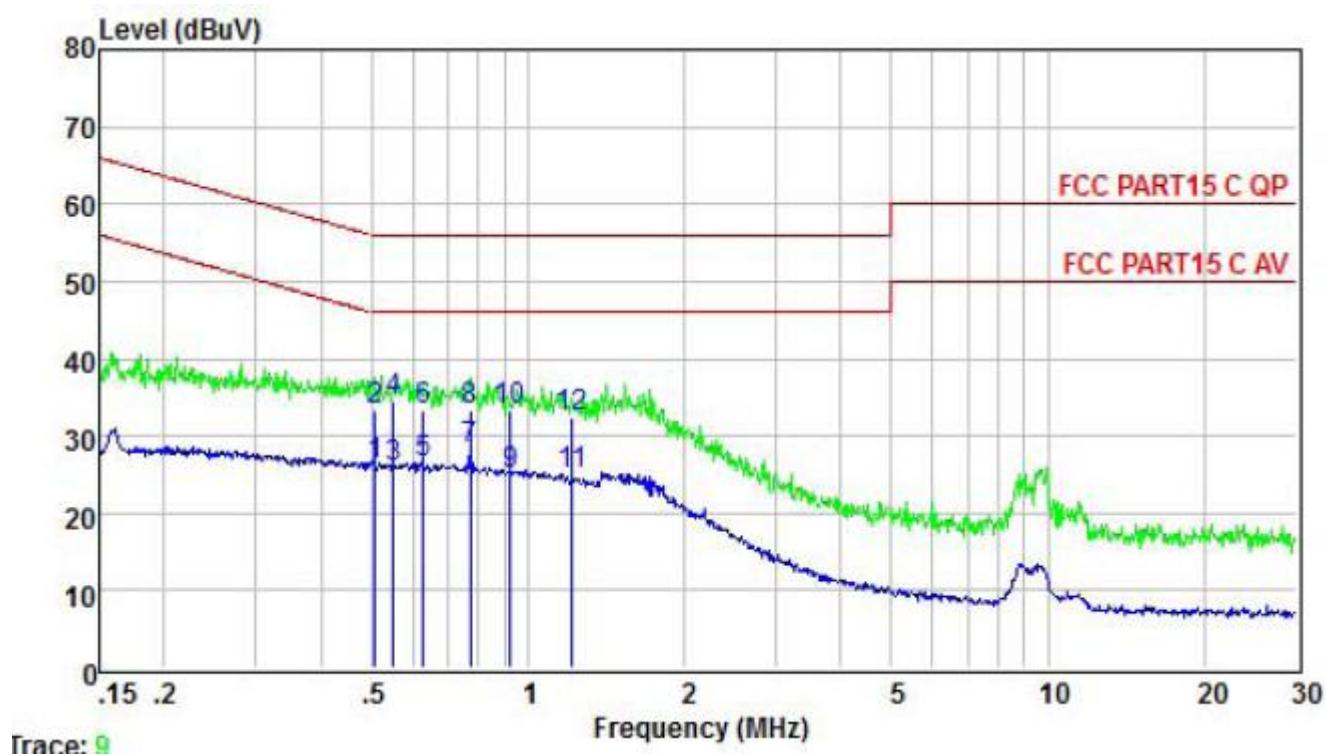
Test table height: 0.8m.

#### Test block



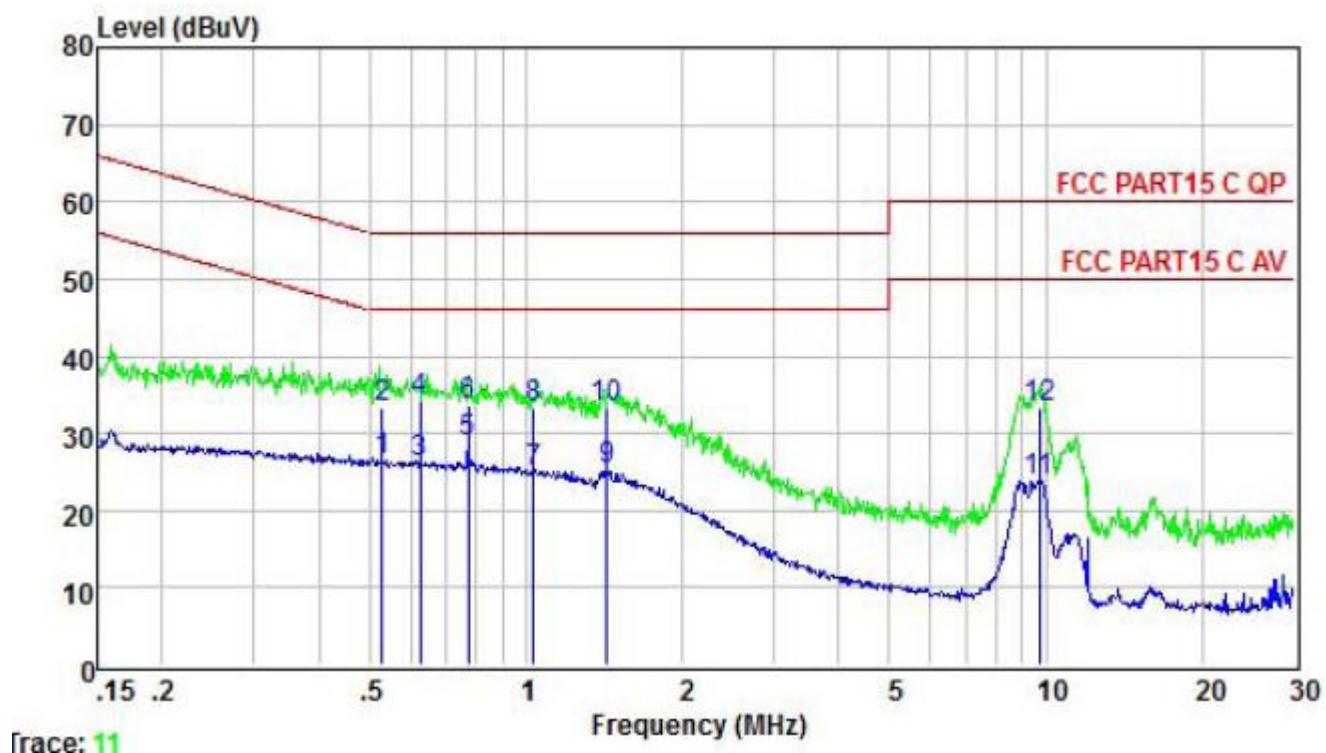
## 5.1.3. Test result

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



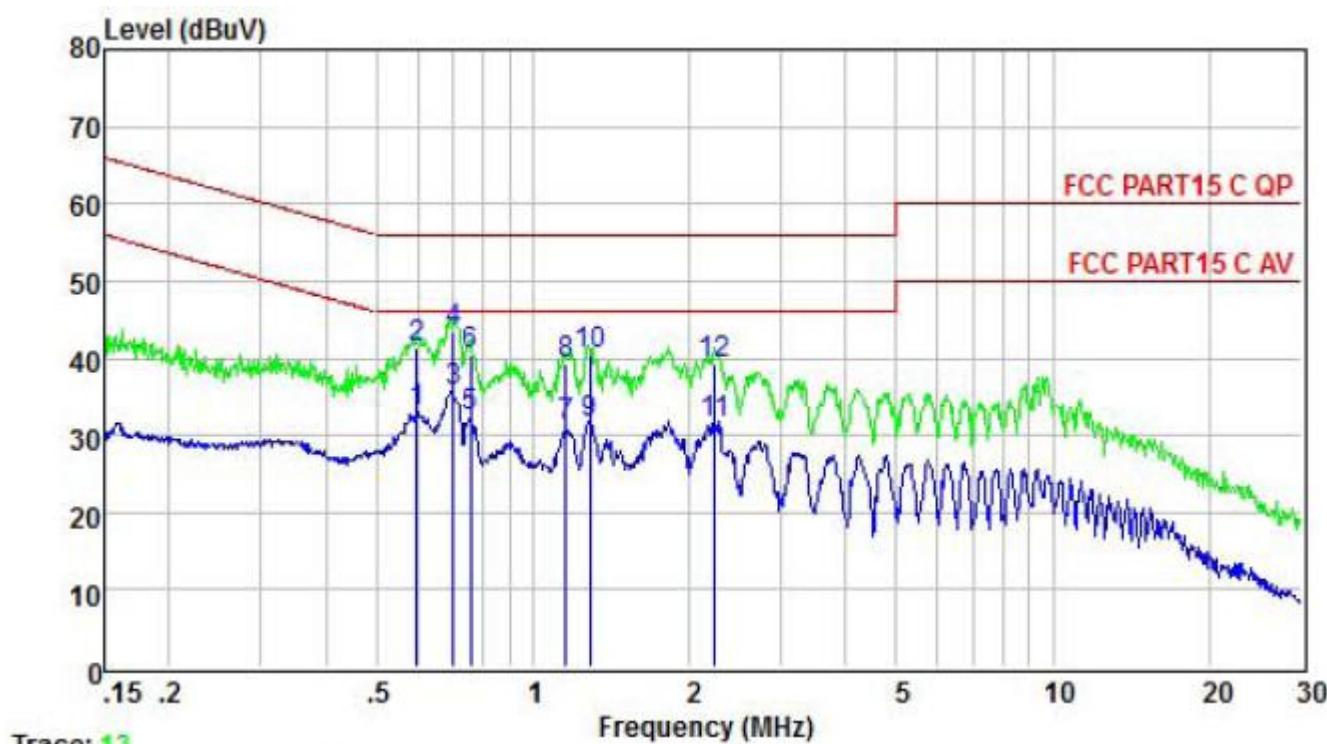
Freq	Level	Limit		Over	Remark
		Line	dBuV		
MHz	dBuV	dBuV			
1	0.507	26.05	46.00	-19.95	Average
2	0.507	33.33	56.00	-22.67	QP
3	0.552	25.86	46.00	-20.14	Average
4	0.552	34.47	56.00	-21.53	QP
5	0.630	26.52	46.00	-19.48	Average
6	0.630	33.33	56.00	-22.67	QP
7	0.775	28.16	46.00	-17.84	Average
8	0.775	33.33	56.00	-22.67	QP
9	0.923	24.87	46.00	-21.13	Average
10	0.923	33.33	56.00	-22.67	QP
11	1.216	24.90	46.00	-21.10	Average
12	1.216	32.33	56.00	-23.67	QP

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



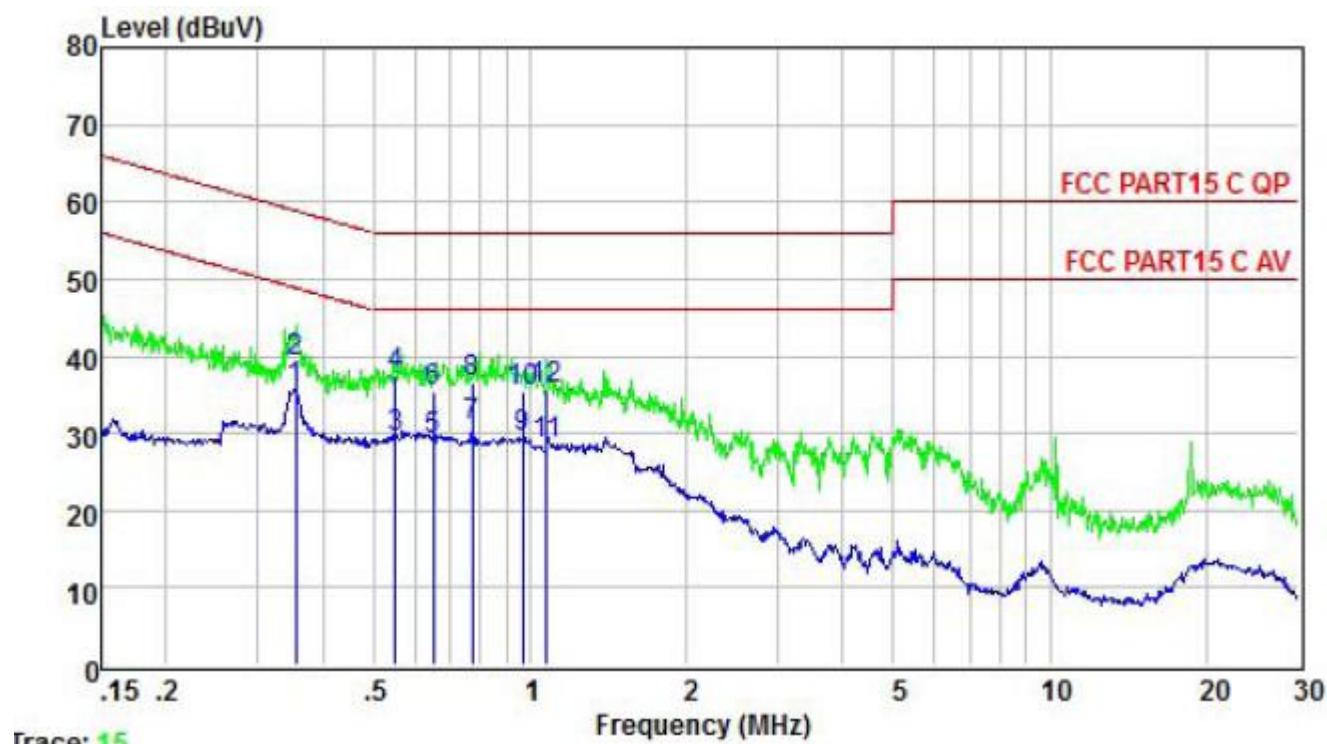
Freq	Level	Limit		Over Line Limit	Remark
		MHz	dBuV		
1	0.529	26.48	46.00	-19.52	Average
2	0.529	33.33	56.00	-22.67	QP
3	0.627	26.29	46.00	-19.71	Average
4	0.627	34.33	56.00	-21.67	QP
5	0.775	28.79	46.00	-17.21	Average
6	0.775	33.47	56.00	-22.53	QP
7	1.032	24.86	46.00	-21.14	Average
8	1.032	33.33	56.00	-22.67	QP
9	1.433	25.14	46.00	-20.86	Average
10	1.433	33.33	56.00	-22.67	QP
11	9.705	23.68	50.00	-26.32	Average
12	9.705	33.33	60.00	-26.67	QP

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5.0V form Adapter AC 240V/60Hz	Test Mode :	Mode 4



Freq	Level	Limit	Over	Remark
		Line	Limit	
MHz	dBuV	dBuV	dB	
1	0.598	33.13	46.00	-12.87 Average
2	0.598	41.33	56.00	-14.67 QP
3	0.705	35.62	46.00	-10.38 Average
4	0.705	43.47	56.00	-12.53 QP
5	0.759	32.46	46.00	-13.54 Average
6	0.759	40.33	56.00	-15.67 QP
7	1.160	31.24	46.00	-14.76 Average
8	1.160	39.33	56.00	-16.67 QP
9	1.289	31.48	46.00	-14.52 Average
10	1.289	40.33	56.00	-15.67 QP
11	2.237	31.38	46.00	-14.62 Average
12	2.237	39.33	56.00	-16.67 QP

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V form Adapter AC 240V/60Hz	Test Mode :	Mode 4



Freq	Level	Limit		Over	Remark
		Line	Limit		
MHz	dBuV	dBuV	dB		
1	0.354	35.54	48.87	-13.33	Average
2	0.354	39.26	58.87	-19.61	QP
3	0.552	29.39	56.00	-26.61	Average
4	0.552	37.55	56.00	-18.45	QP
5	0.651	29.04	56.00	-26.96	Average
6	0.651	35.25	56.00	-20.75	QP
7	0.775	30.89	56.00	-25.11	Average
8	0.775	36.55	56.00	-19.45	QP
9	0.968	29.55	56.00	-26.45	Average
10	0.968	35.25	56.00	-20.75	QP
11	1.077	28.63	56.00	-27.37	Average
12	1.077	35.58	56.00	-20.42	QP

## 5.2. Radiated Emission Test

### 5.2.1. Limit 15.209 limits

Frequency MHz	Distance Meters	Filed Strengths Limit	
		μV/m	dB(μV)/m
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	3	74.0dB(μV)/m(Peak) 54.0dB(μV)/m(Average)	

### 5.2.2. Restricted bands of operation

MHz	MHz	MHz	GHz
0.009-0.110	16.42-16.423	399.9-410	4.5-5.15
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	

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 5.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m above the ground blow 1G and 1.5m above 1G. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

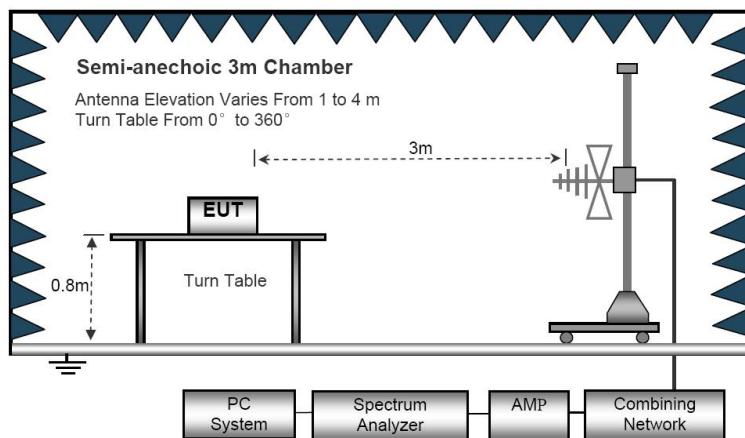
The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz, the EUT was placed on a turn table which was 1.5 m above the ground, for all test, used peak detector.

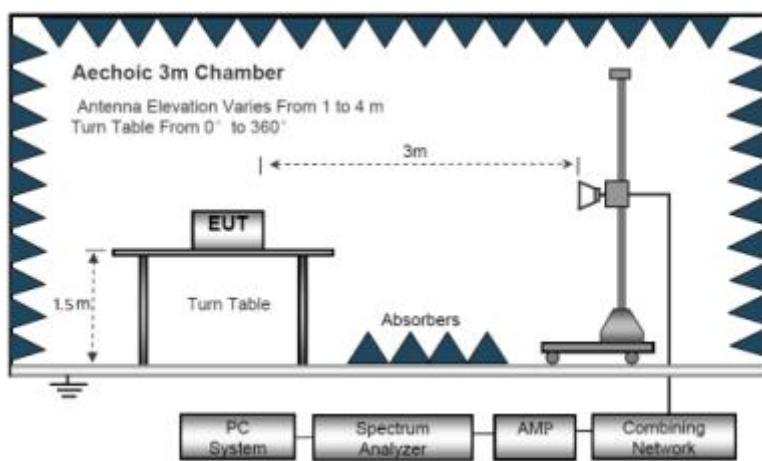
The frequency range from 30MHz to 10<sup>th</sup> harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

- Notes:
1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.
  2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.
  3. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.
  4. For emissions below 1GHz, pretest for all mode, The test data of the worst case condition(s) was reported on the following pages.
  5. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation).
  6. We pretest all modulation, The worst was GFSK, the worst data was show in the report.

## Radiated Emission Test-Up Frequency 30MHz- 1GHz



## Above 1GHz



EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	DC 3.7V		

**Below 30MHz**

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State
--	--	--	--	P
--	--	--	--	P

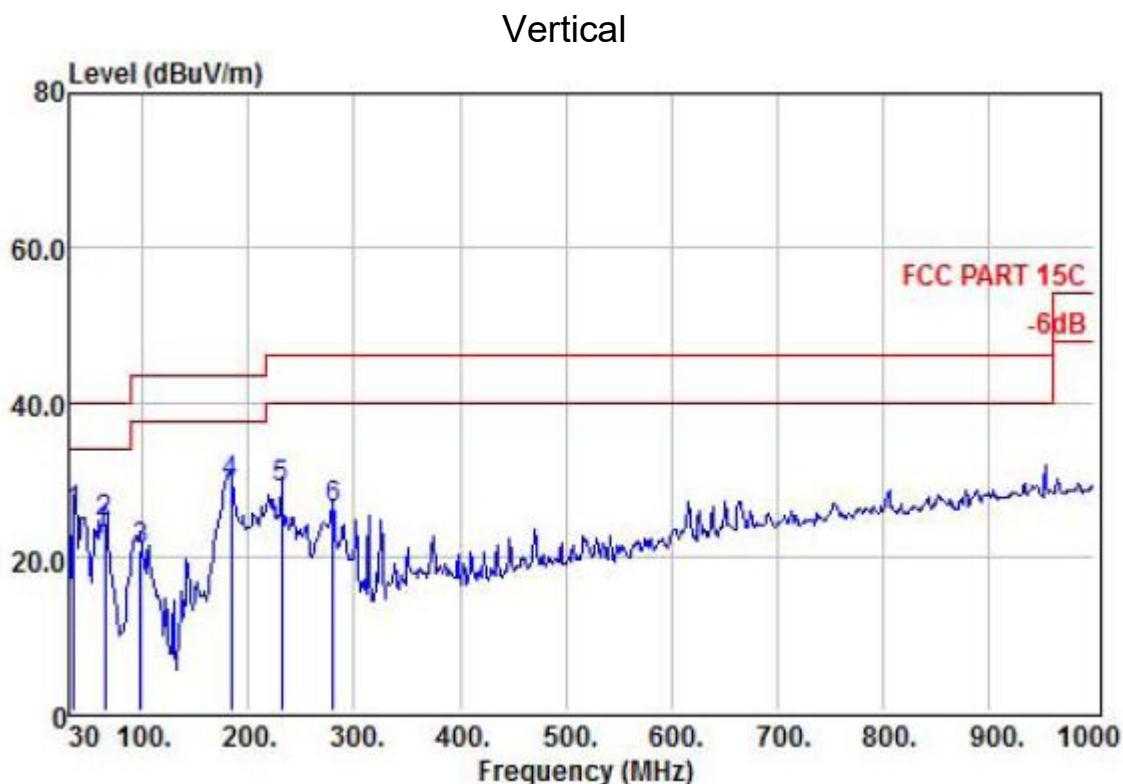
**Note:**

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

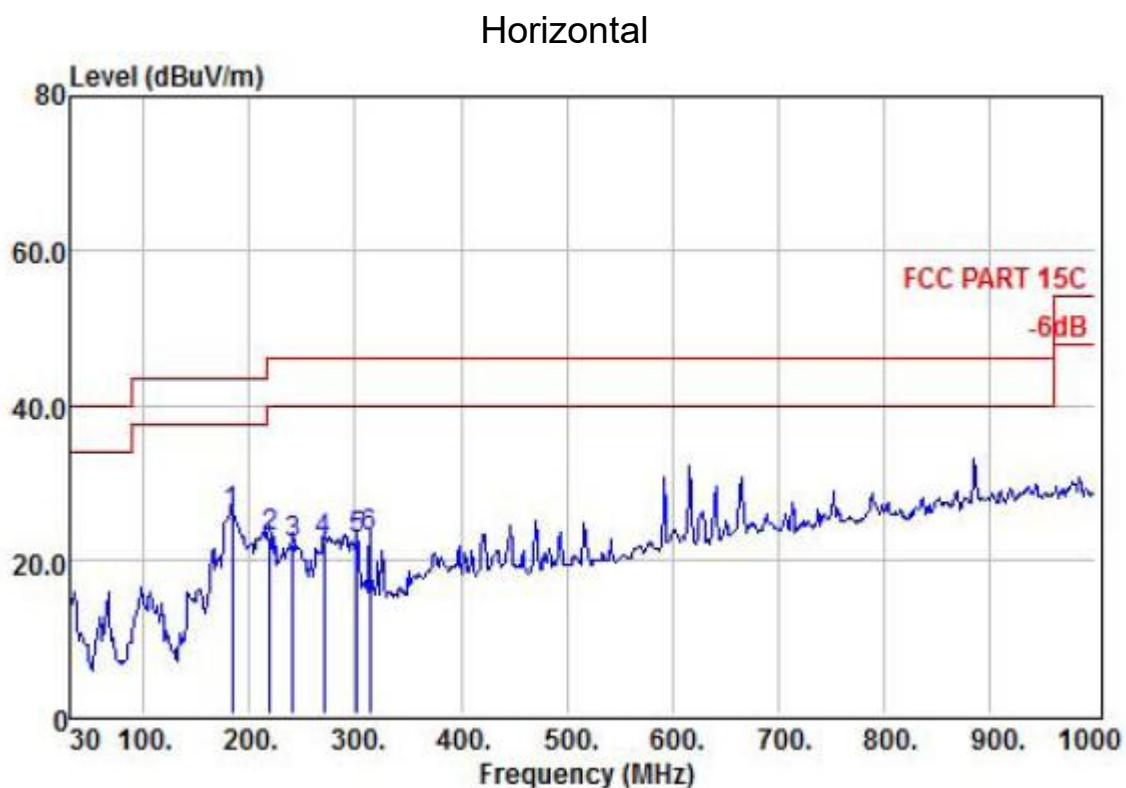
Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

30MHz - 1GHz			
EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	TX
Test Voltage :	DC 3.7V		



Freq	Preamp Factor	Read Level		Cable Antenna Loss Factor		Limit Level	Line Limit	Over Limit	Remark
		MHz	dB	dBuV	dB				
1	34.85	31.38	40.46	0.56	15.94	25.58	40.00	-14.42	QP
2	63.95	31.32	47.65	0.75	7.38	24.46	40.00	-15.54	QP
3	97.90	31.35	41.77	0.94	9.50	20.86	43.50	-22.64	QP
4	183.26	31.15	48.79	1.39	10.30	29.33	43.50	-14.17	QP
5	231.76	30.93	45.82	1.61	12.39	28.89	46.00	-17.11	QP
6	280.26	30.94	42.24	1.78	13.17	26.25	46.00	-19.75	QP



	Preamp Freq	Read Factor	Cable Level	Antenna Loss Factor	Limit Level	Line Level	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	183.26	31.15	45.46	1.39	10.30	26.00	43.50	-17.50 QP
2	219.15	30.99	40.56	1.53	11.92	23.02	46.00	-22.98 QP
3	241.46	30.95	38.83	1.61	12.66	22.15	46.00	-23.85 QP
4	270.56	30.95	38.51	1.78	12.98	22.32	46.00	-23.68 QP
5	301.60	30.92	37.78	1.94	13.84	22.64	46.00	-23.36 QP
6	313.24	30.89	37.57	1.94	14.17	22.79	46.00	-23.21 QP

NOTE: 1. Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2. Over Limit= Absolute Level – Limit.

3. 1Mbps (High channel) is the worst mode, only worst data is presented in the report.

Above 1GHz									
EUT :	Bluetooth Music receiver				Model Name :	TS-35A08			
Temperature :	20 °C				Relative Humidity :	48%			
Pressure :	1010hPa				Test Mode :				
Test Voltage :	DC 3.7V								

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type	Comment
TX-2402									
4804	30.13	32.94	11.94	27.49	47.52	54	-6.48	Average	Vertical
4804	40.54	32.94	11.94	27.49	57.93	74	-16.07	peak	Vertical
7206	31.46	25.28	18.04	27.94	46.84	54	-7.16	Average	Vertical
7206	41.89	25.28	18.04	27.94	57.27	74	-16.73	peak	Vertical
4804	30.19	32.94	11.94	27.49	47.58	54	-6.42	Average	Horizontal
4804	41.14	32.94	11.94	27.49	58.53	74	-15.47	peak	Horizontal
7206	30.27	25.28	18.04	27.94	45.65	54	-8.35	Average	Horizontal
7206	42.74	25.28	18.04	27.94	58.12	74	-15.88	peak	Horizontal
TX-2441									
4882	30.16	32.11	12.15	27.53	46.89	54	-7.11	Average	Vertical
4882	40.17	32.11	12.15	27.53	56.90	74	-17.10	peak	Vertical
7323	30.01	24.33	18.09	27.96	44.47	54	-9.53	Average	Vertical
7323	41.39	24.33	18.09	27.96	55.85	74	-18.15	peak	Vertical
4882	30.29	32.11	12.15	27.53	47.02	54	-6.98	Average	Horizontal
4882	40.54	32.11	12.15	27.53	57.27	74	-16.73	peak	Horizontal
7323	30.82	24.33	18.09	27.96	45.28	54	-8.72	Average	Horizontal
7323	39.25	24.33	18.09	27.96	53.71	74	-20.29	peak	Horizontal
TX-2480									
4960	30.19	31.32	12.31	27.58	46.24	54	-7.76	Average	Vertical
4960	40.74	31.32	12.31	27.58	56.79	74	-17.21	peak	Vertical
7440	30.33	24.38	18.16	27.99	44.88	54	-9.12	Average	Vertical
7440	40.61	24.38	18.16	27.99	55.16	74	-18.84	peak	Vertical
4960	30.25	31.32	12.31	27.58	46.30	54	-7.70	Average	Horizontal
4960	41.57	31.32	12.31	27.58	57.62	74	-16.38	peak	Horizontal
7440	31.29	24.38	18.16	27.99	45.84	54	-8.16	Average	Horizontal
7440	41.58	24.38	18.16	27.99	56.13	74	-17.87	peak	Horizontal

NOTE:1 Absolute Level= ReadingLevel+antenna Factor+cable loss-preamp factor.

2.Over Limit= Absolute Level – Limit.

3.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has not to be reported.

4.1Mbps is the worst mode.

For radiated test as follows:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Antenna Factor (dB)	Cable loss (dB)	Preamp factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type	Comment
1Mbps Non-hopping									
2390	36.68	30.44	8.94	26.32	49.74	74	-24.26	peak	Vertical
2390	36.21	30.44	8.94	26.32	49.27	74	-24.73	peak	Horizontal
2483.5	37.89	30.05	9.07	26.34	50.67	74	-23.33	peak	Vertical
2483.5	37.21	30.05	9.07	26.34	49.99	74	-24.01	peak	Horizontal
1Mbps hopping									
2390	36.89	30.44	8.94	26.32	49.95	74	-24.05	peak	Vertical
2390	36.75	30.44	8.94	26.32	49.81	74	-24.19	peak	Horizontal
2483.5	37.76	30.05	9.07	26.34	50.54	74	-23.46	peak	Vertical
2483.5	37.54	30.05	9.07	26.34	50.32	74	-23.68	peak	Horizontal
2Mbps Non-hopping									
2390	37.24	30.44	8.94	26.32	50.30	74	-23.7	peak	Vertical
2390	36.89	30.44	8.94	26.32	49.95	74	-24.05	peak	Horizontal
2483.5	38.11	30.05	9.07	26.34	50.89	74	-23.11	peak	Vertical
2483.5	37.76	30.05	9.07	26.34	50.54	74	-23.46	peak	Horizontal
2Mbps hopping									
2390	36.69	30.44	8.94	26.32	49.75	74	-24.25	peak	Vertical
2390	35.92	30.44	8.94	26.32	48.98	74	-25.02	peak	Horizontal
2483.5	36.87	30.05	9.07	26.34	49.65	74	-24.35	peak	Vertical
2483.5	37.11	30.05	9.07	26.34	49.89	74	-24.11	peak	Horizontal
3Mbps Non-hopping									
2390	36.69	30.44	8.94	26.32	49.75	74	-24.25	peak	Vertical
2390	35.66	30.44	8.94	26.32	48.72	74	-25.28	peak	Horizontal
2483.5	35.78	30.05	9.07	26.34	48.56	74	-25.44	peak	Vertical
2483.5	36.32	30.05	9.07	26.34	49.10	74	-24.9	peak	Horizontal
3Mbps hopping									
2390	37.34	30.44	8.94	26.32	50.40	74	-23.6	peak	Vertical
2390	36.41	30.44	8.94	26.32	49.47	74	-24.53	peak	Horizontal
2483.5	35.29	30.05	9.07	26.34	48.07	74	-25.93	peak	Vertical
2483.5	36.51	30.05	9.07	26.34	49.29	74	-24.71	peak	Horizontal

If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

**Spurious Emission in Restricted Band:(1-25G)**

**All the modulation modes have been tested and all other emissions more than 20dB below the limit, the worst result was report as below:**

Polar (H/V)	Frequency	Meter Reading	Antenna Factor	Cable loss	Preamp factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1Mbps Non-hopping									
Vertical	3262	36.89	30.26	10.68	26.63	51.20	74	-22.80	Pk
Horizontal	3262	37.21	30.26	10.68	26.63	51.52	74	-22.48	PK
Vertical	4032	36.21	31.55	10.52	27.02	51.26	74	-22.74	Pk
Horizontal	4032	34.27	31.55	10.52	27.02	49.32	74	-24.68	PK
1Mbps hopping									
Vertical	3351	34.19	30.34	10.78	26.67	48.64	74	-25.36	Pk
Horizontal	3351	35.43	30.34	10.78	26.67	49.88	74	-24.12	PK
Vertical	4130	36.27	30.69	10.95	27.08	50.83	74	-23.17	Pk
Horizontal	4130	35.62	30.69	10.95	27.08	50.18	74	-23.82	PK

## 6. 20DB BANDWIDTH

### 6.1. Limits

According to FCC Section 15.247(a)(1), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth( $10 \times \log 1\% = 20\text{dB}$ )taking the RF output power

### 6.2. Test setup

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum, During the measurement, the Bluetooth module of the EUT is activated and controlled by the software, and is set to operate under test mode transmitting.

2. Set the spectrum analyzer:

Span: approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel

RBW  $\geq 1\%$  of the 20dB bandwidth

VBW  $\geq$  RBW

Sweep=auto

Detector function=peak

Trace=max hold



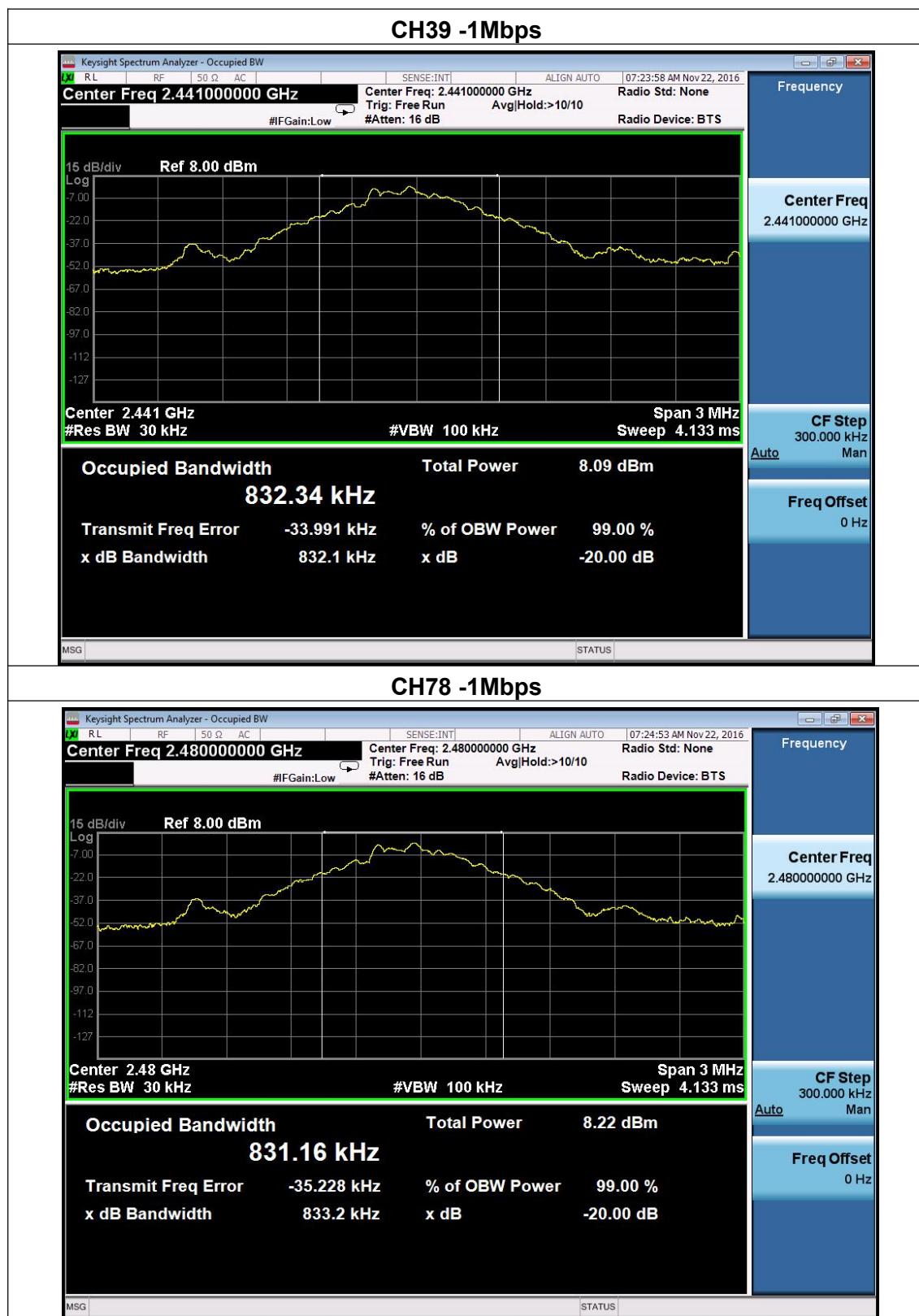
## Test data:

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /C78( <b>1Mbps</b> )		

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	830.6	PASS
2441 MHz	832.1	PASS
2480 MHz	833.2	PASS

Test plot as follows:

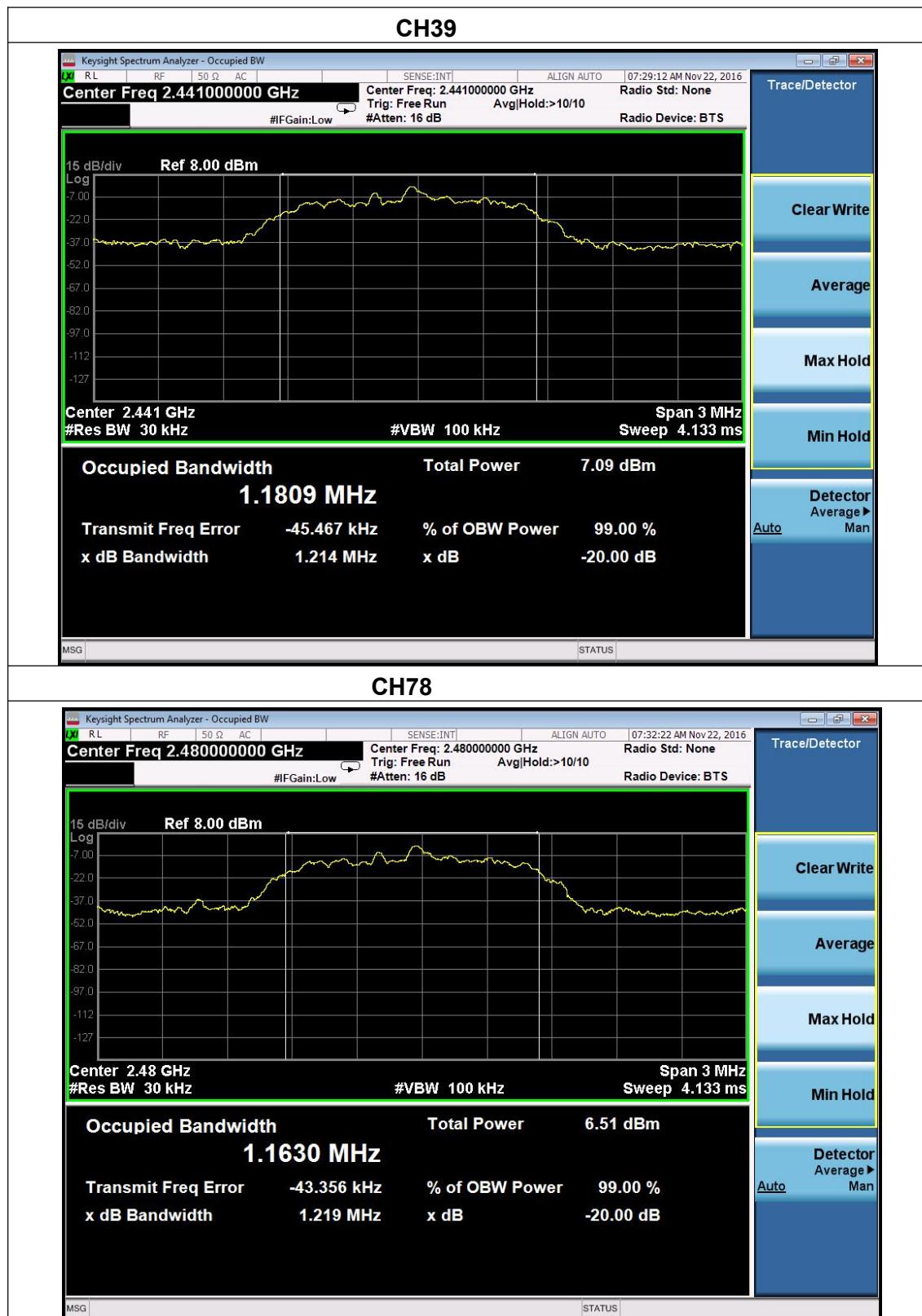




EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /C78( <b>2Mbps</b> )		

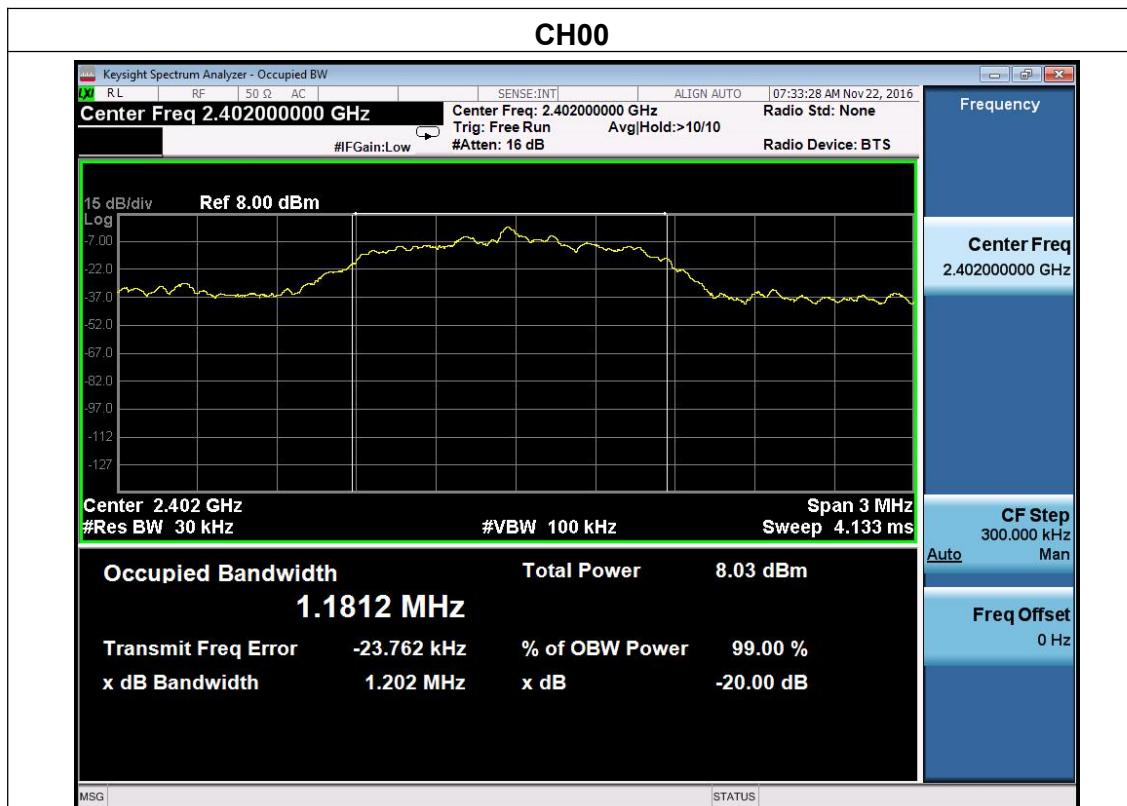
Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.214	<b>PASS</b>
2441 MHz	1.214	<b>PASS</b>
2480 MHz	1.219	<b>PASS</b>

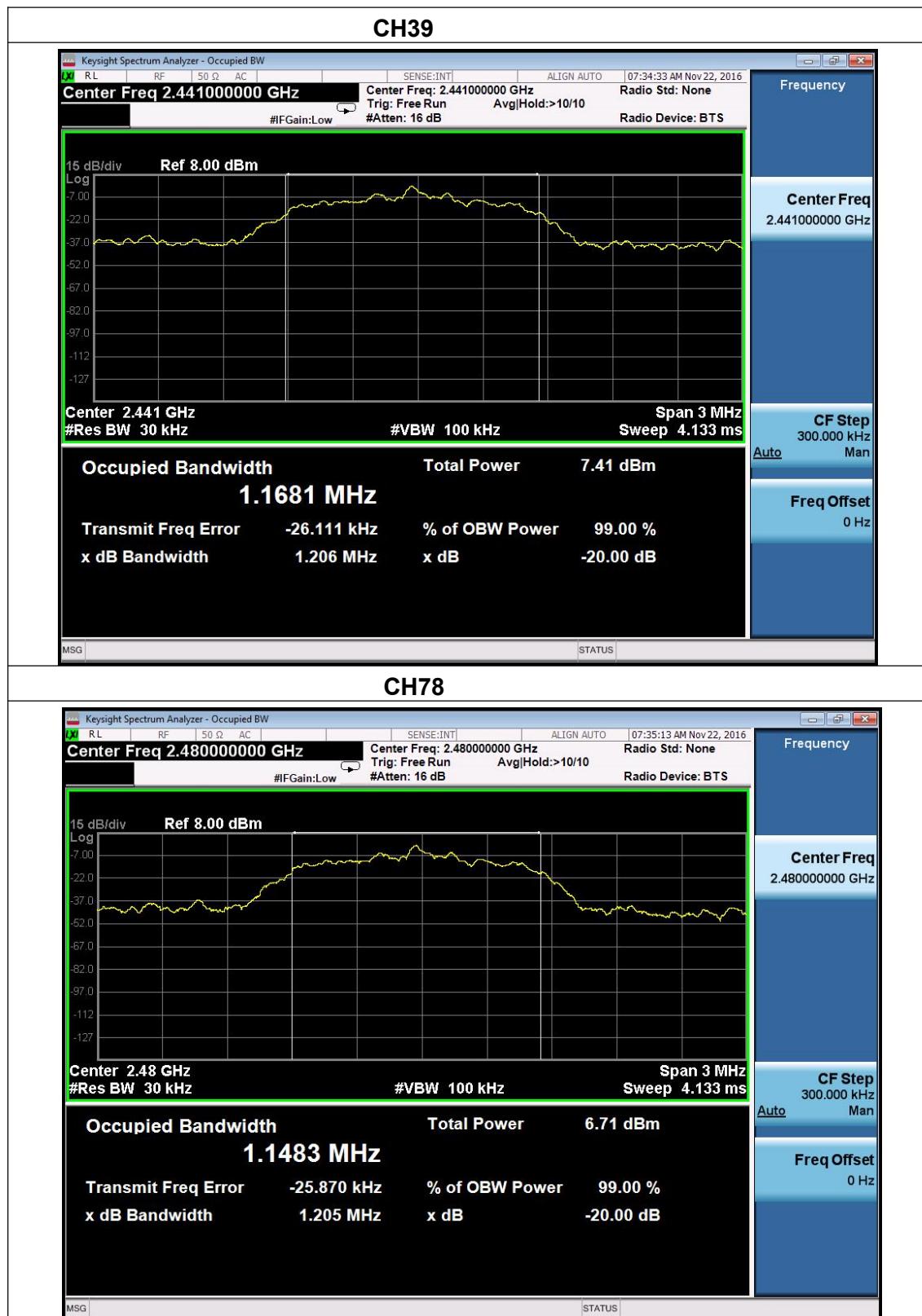




EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78(3Mbps)		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.202	PASS
2441 MHz	1.206	PASS
2480 MHz	1.205	PASS





## 7. FREQUENCY SEPARATION

### 7.1. Limits

According to FCC Section 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 7.2. Test setup

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. During the measurement, the Bluetooth module of the EUT is activated and controlled by the software, and is set to operate under test mode .

2. Set the spectrum analyzer:

Span: wide enough to capture the peaks of two adjacent channels

RBW  $\geq$  1% of the span(30KHz)

VBW  $\geq$  RBW(100KHz)

Sweep=auto

Detector function=peak

Trace=max hold



Test data:

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	24 °C	Relative Humidity :	58%
Pressure :	1010hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78(1Mbps)		

Frequency	Ch. Separation (MHz)	Limit (KHz)	Result
2402 MHz	1.002	830.6	Complies
2441 MHz	1.006	832.1	Complies
2480 MHz	1.000	833.2	Complies

### Ch. Separation Limits: > 20dB bandwidth

Test plot as follows:



## CH39



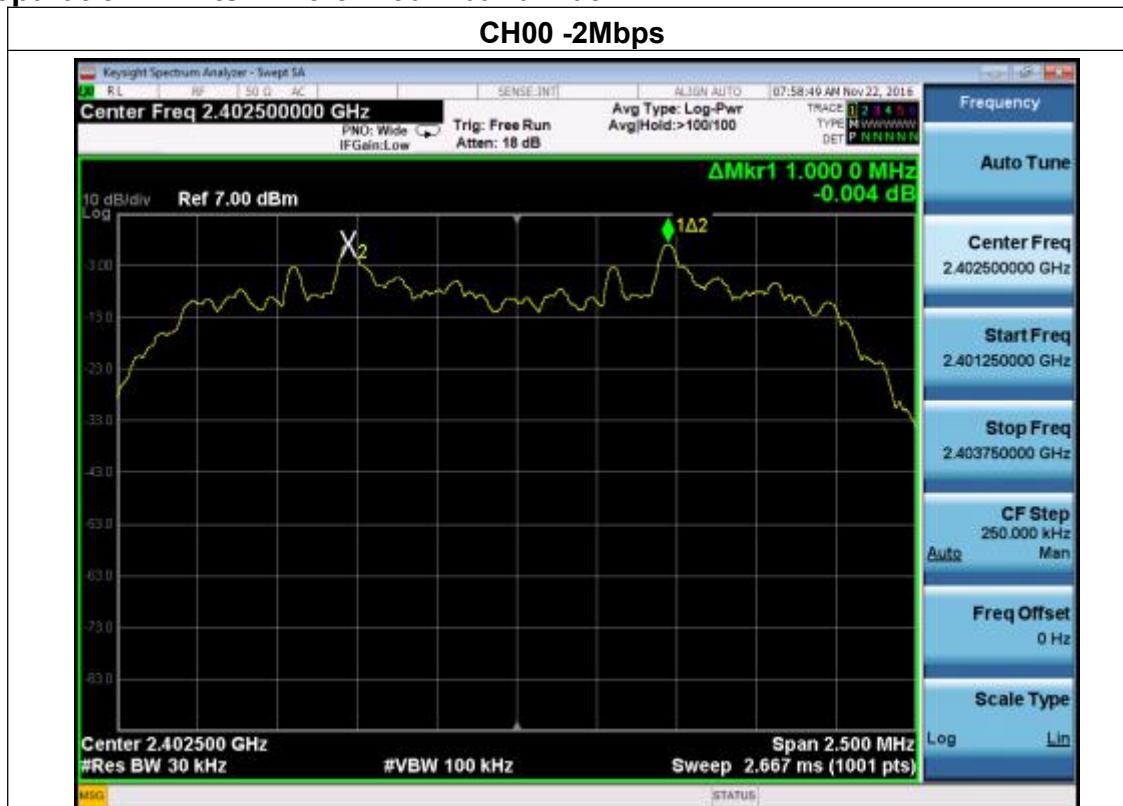
## CH78



EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	24 °C	Relative Humidity :	58%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78(2Mbps)		

Frequency	Ch. Separation (MHz)	Limit (KHz)	Result
2402 MHz	1.000	809.333	Complies
2441 MHz	0.998	809.333	Complies
2480 MHz	0.995	812.667	Complies

### Ch. Separation Limits: >2/3 of 20dB bandwidth



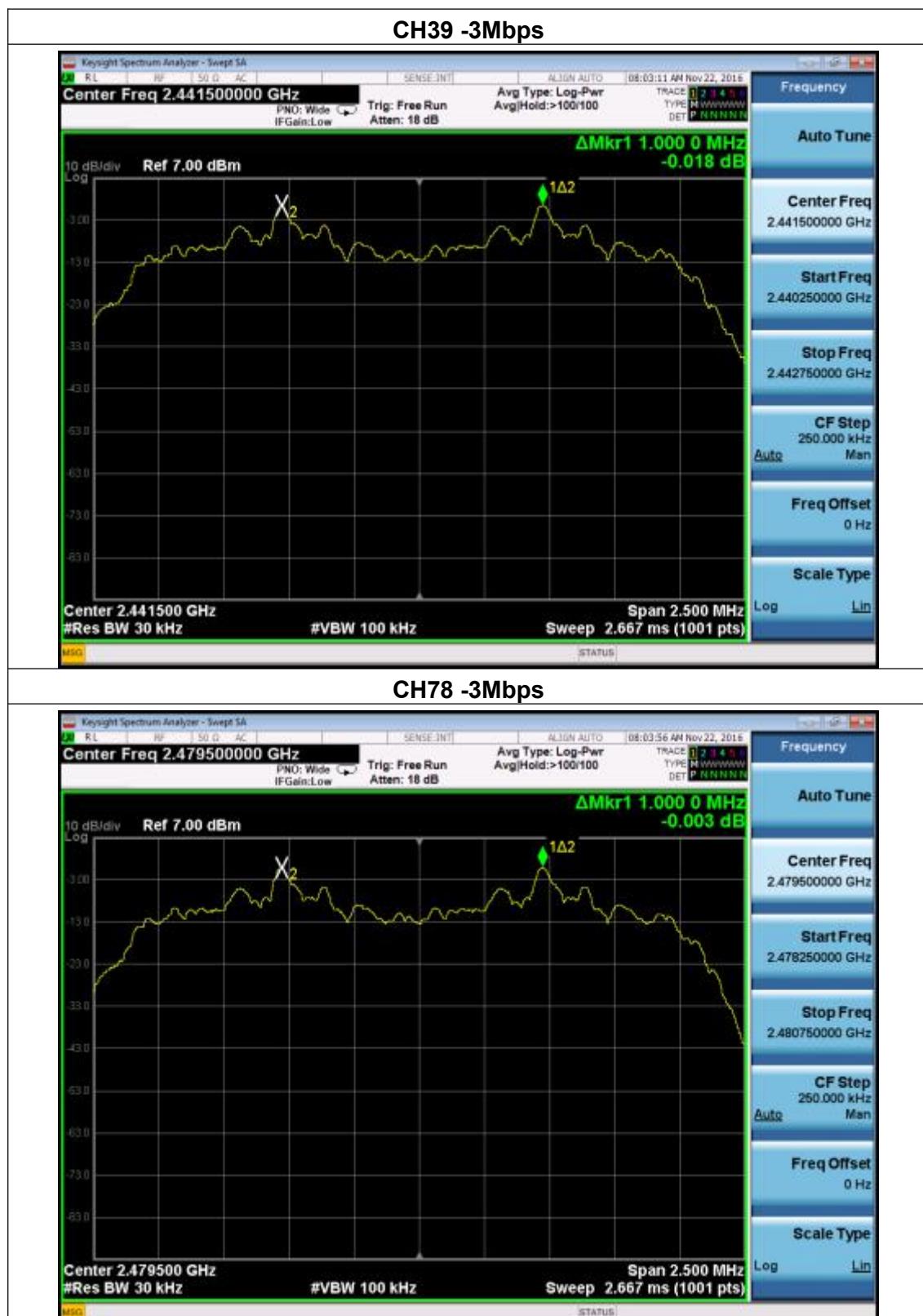
**CH39 -2Mbps****CH78 -2Mbps**

EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	24 °C	Relative Humidity :	58%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78(3Mbps)		

Frequency	Ch. Separation (MHz)	Limit (KHz)	Result
2402 MHz	1.003	801.333	Complies
2441 MHz	1.000	804.000	Complies
2480 MHz	1.000	803.333	Complies

### Ch. Separation Limits: >2/3 of 20dB bandwidth





## 8. NUMBER OF HOPPING FREQUENCY

### 8.1. Limits

According to FCC Section 15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

### 8.2. Test setup

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum. During the measurement, the Bluetooth module of the EUT is activated and controlled by the software, and is set to operate under test mode .

2. Set the spectrum analyzer:

Span: the frequency band of operation

RBW =100KHz

VBW=300KHz

Sweep=auto

Detector function=peak

Trace=max hold

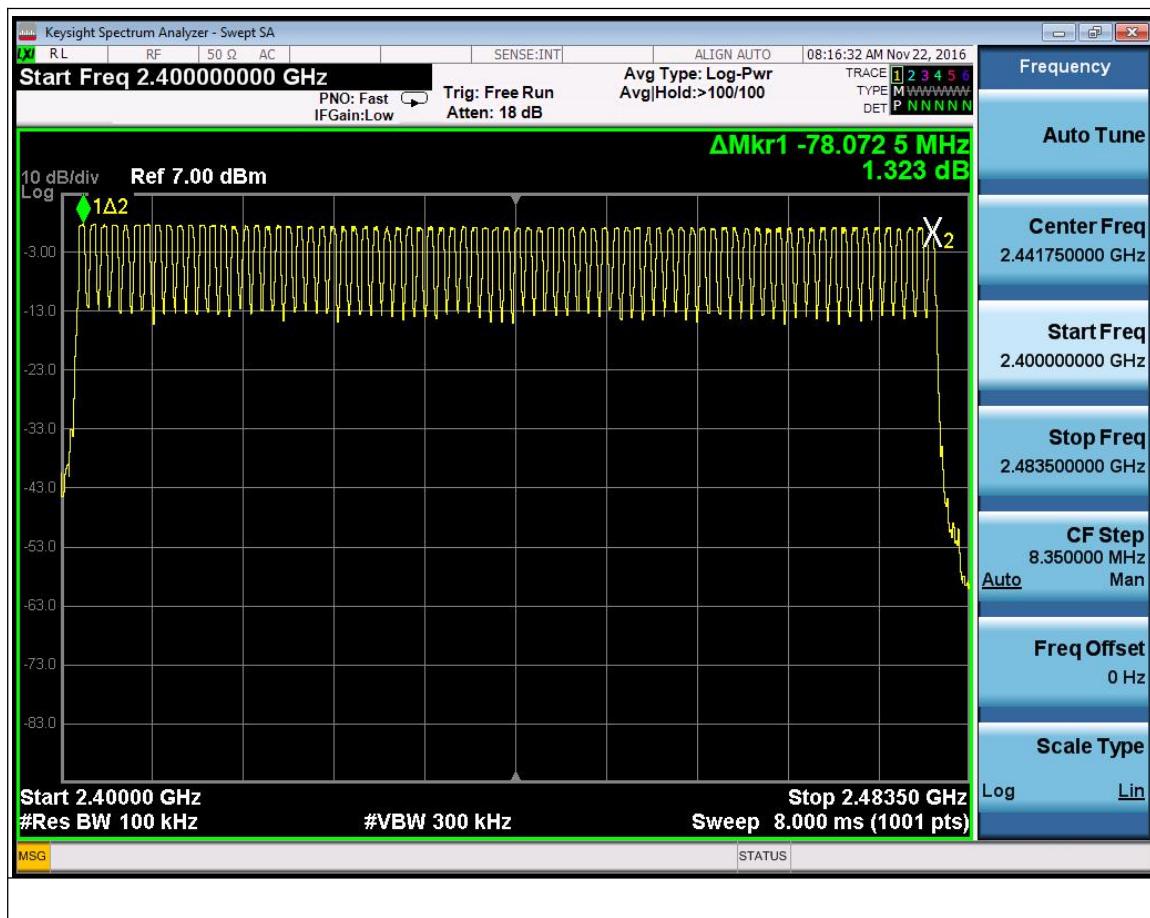


EUT :	Bluetooth Music receiver	Model Name :	TS-35A08
Temperature :	24 °C	Relative Humidity :	58%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	1M		

Test data:

Measured channel numbers	Limit	Result
79	≥15	PASS

Test plot as follows:



## 9. DWELL TIME

### 9.1. Limits

According to FCC Section 15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 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.

### 9.2. Test setup

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum, During the measurement, the Bluetooth module of the EUT is activated and controlled by the software, and is set to operate under test mode power.

2. Set the spectrum analyzer:

Span= 0Hz, RBW =1000 kHz, VBW = 3000 kHz

Use a video trigger with the trigger level set to enable triggering only on full pulses.

Detector function=peak, Sweep Time is more than once pulse time.

Set the EUT for DH5, DH3 and DH1 packet transmitting

Measure the maximum time duration of one single pulse.

A Period Time = (channel number)\*0.4

DH1 Time Slot: Reading \* (1600/2)\*31.6/(channel number)

DH3 Time Slot: Reading \* (1600/4)\*31.6/(channel number)

DH5 Time Slot: Reading \* (1600/6)\*31.6/(channel number)

For Example:

BT hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.

With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),

Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.

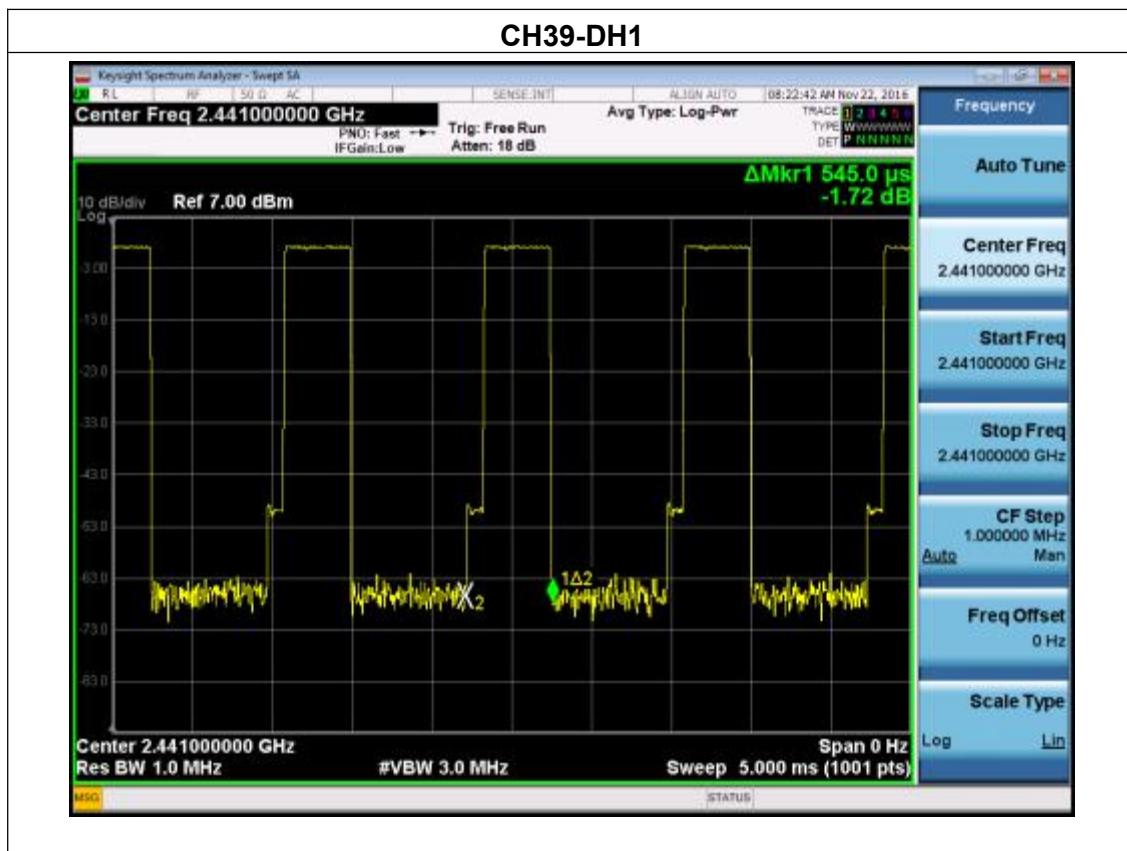
Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

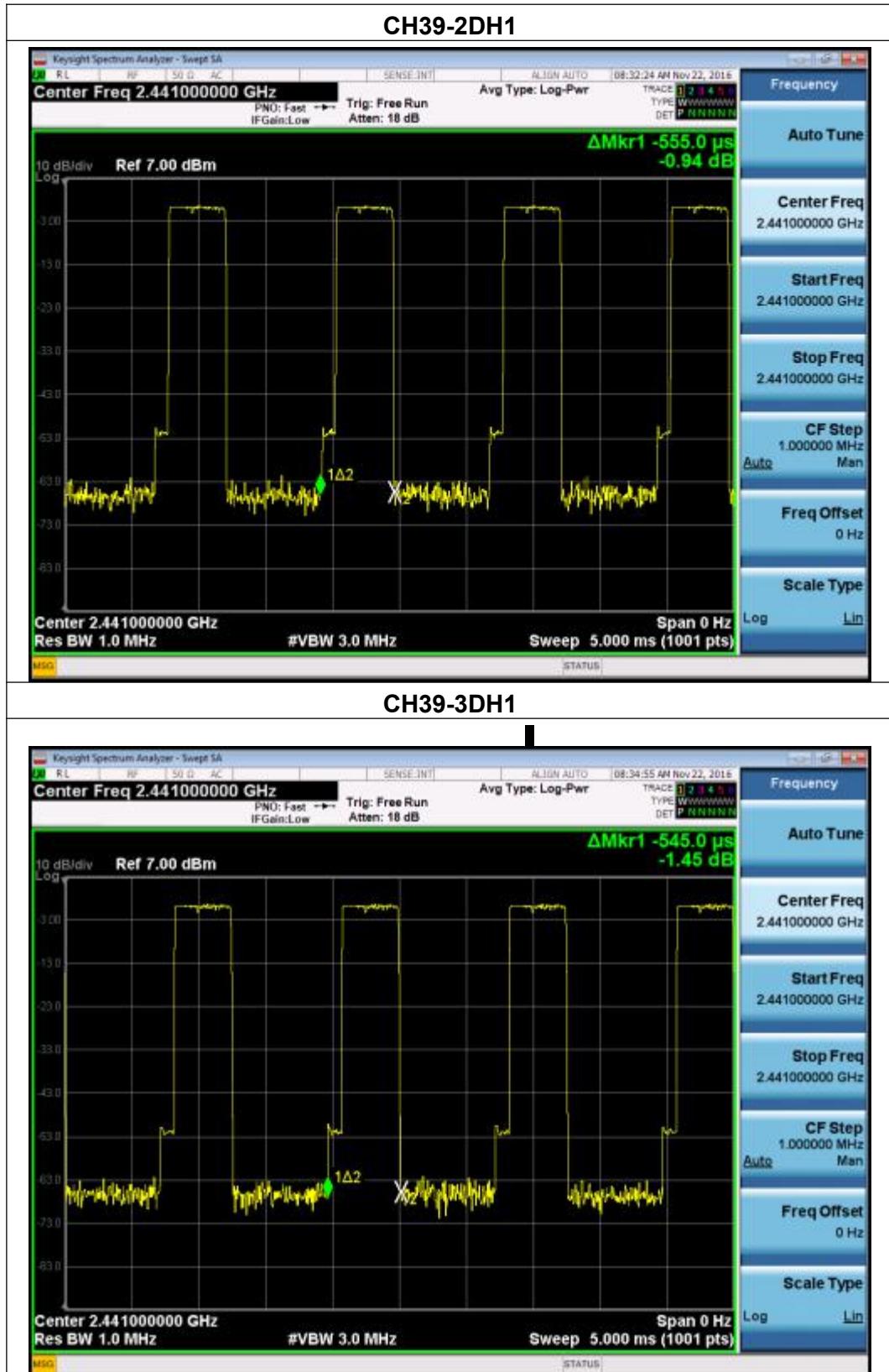


Test data:

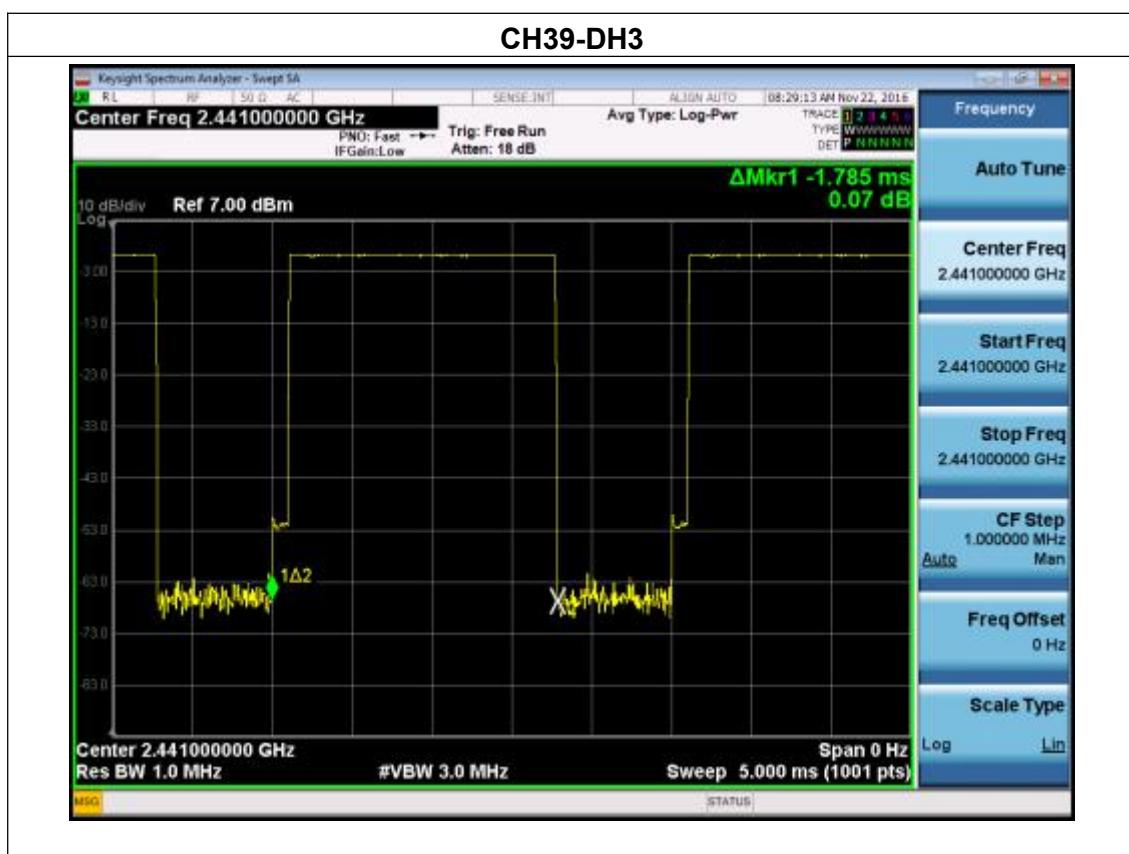
<b>Data Packet</b>	<b>Frequency</b>	<b>Pulse Duration</b>	<b>Dwell Time</b>	<b>Limits</b>
		(ms)	(s)	(s)
DH1	2441 MHz	0.545	0.17	0.4
2DH1	2441 MHz	0.555	0.18	0.4
3DH1	2441 MHz	0.545	0.17	0.4

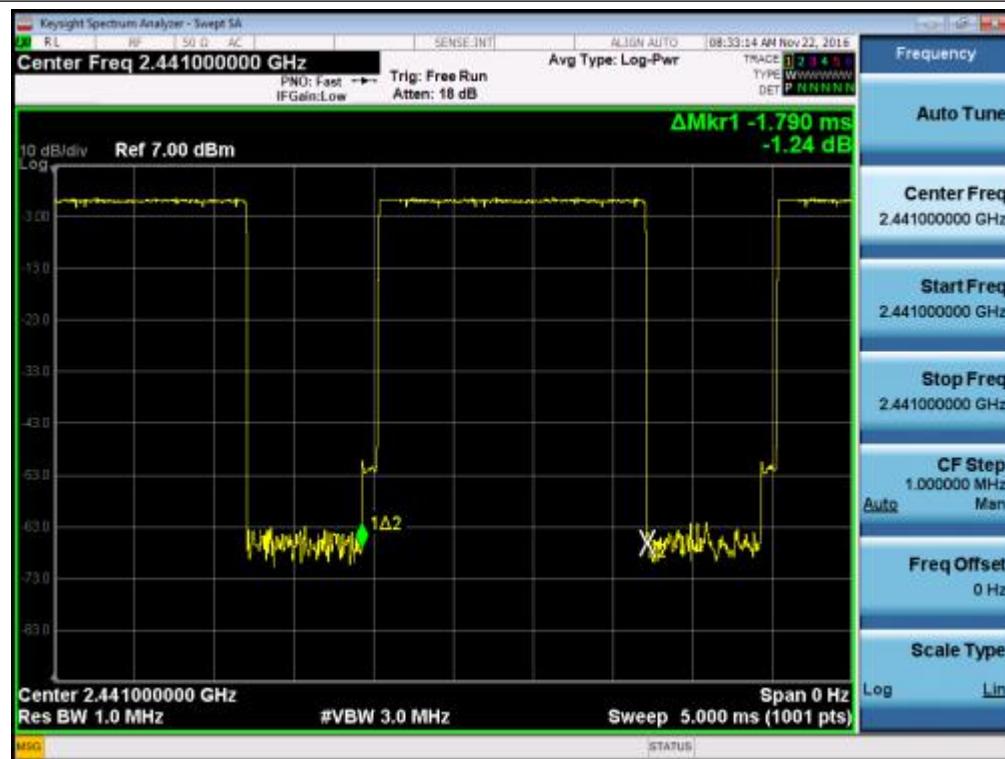
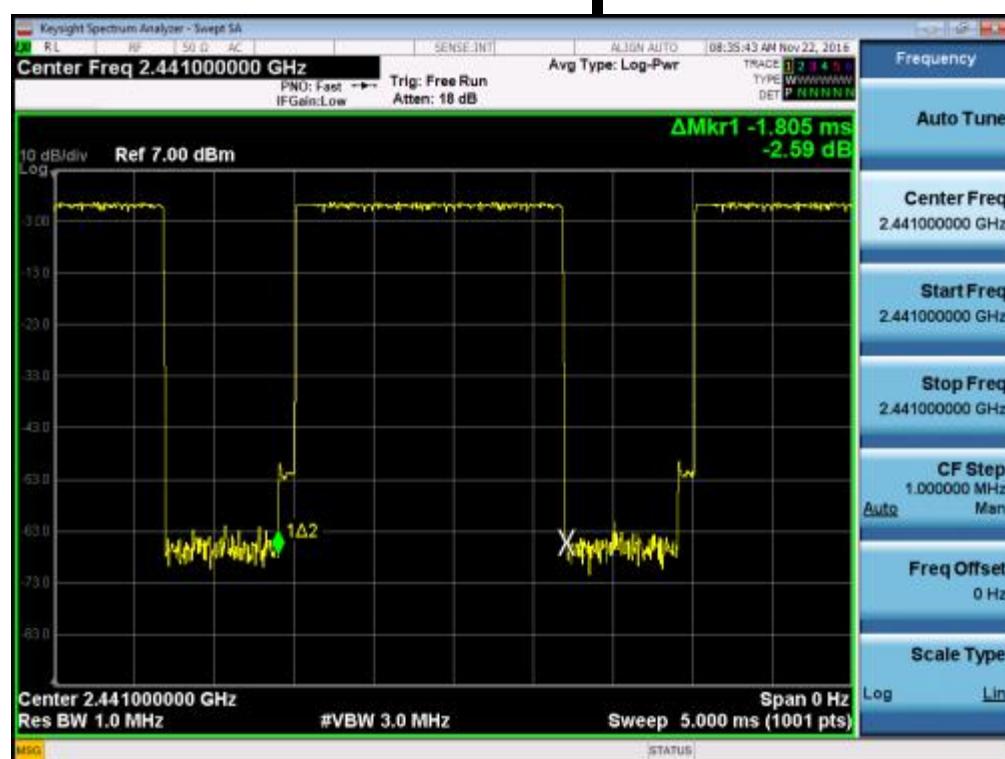
Test plot as follows as below:



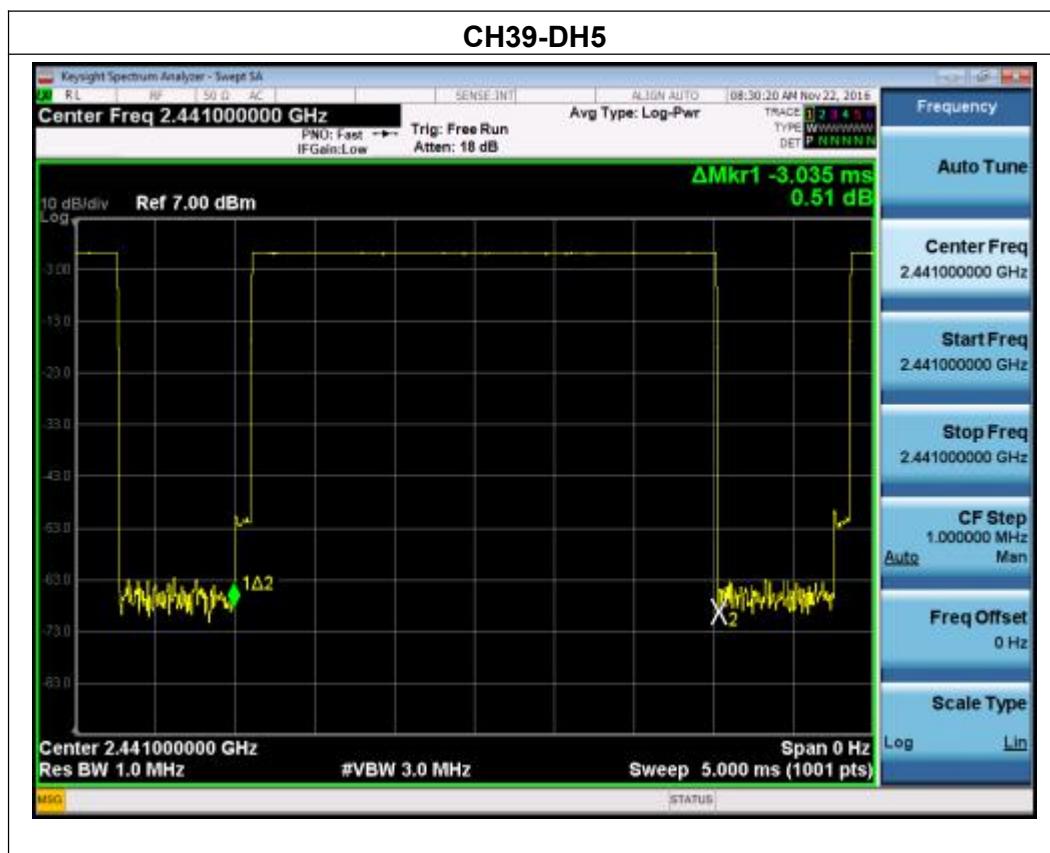


Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
		(ms)	(s)	(s)
DH3	2441 MHz	1.79	0.29	0.4
2DH3	2441 MHz	1.79	0.29	0.4
3DH3	2441 MHz	1.81	0.29	0.4



**CH39-2DH3****CH39-3DH3**

<b>Data Packet</b>	<b>Frequency</b>	<b>Pulse Duration</b>	<b>Dwell Time</b>	<b>Limits</b>
		(ms)	(s)	(s)
DH5	2441 MHz	3.04	0.32	0.4
2DH5	2441 MHz	3.05	0.33	0.4
3DH5	2441 MHz	3.05	0.33	0.4



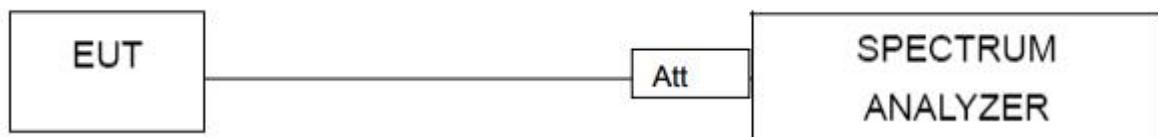
**CH39-2DH5****CH39-3DH5**

## 10. BAND EDGE COMPLIANCE TEST

### 10.1. Limits

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. 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) (see §15.205(c)).

### 10.2. Test setup



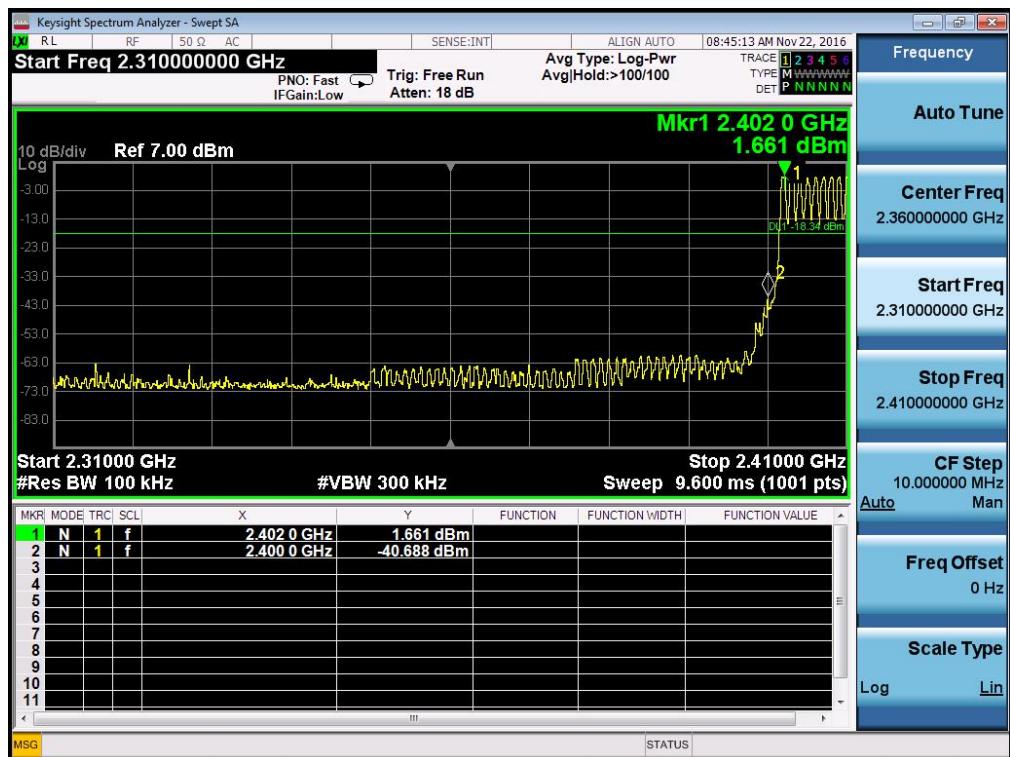
### 10.3. TEST Procedure

- a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- e) Repeat above procedures until all measured frequencies were complete.

For conducted test:

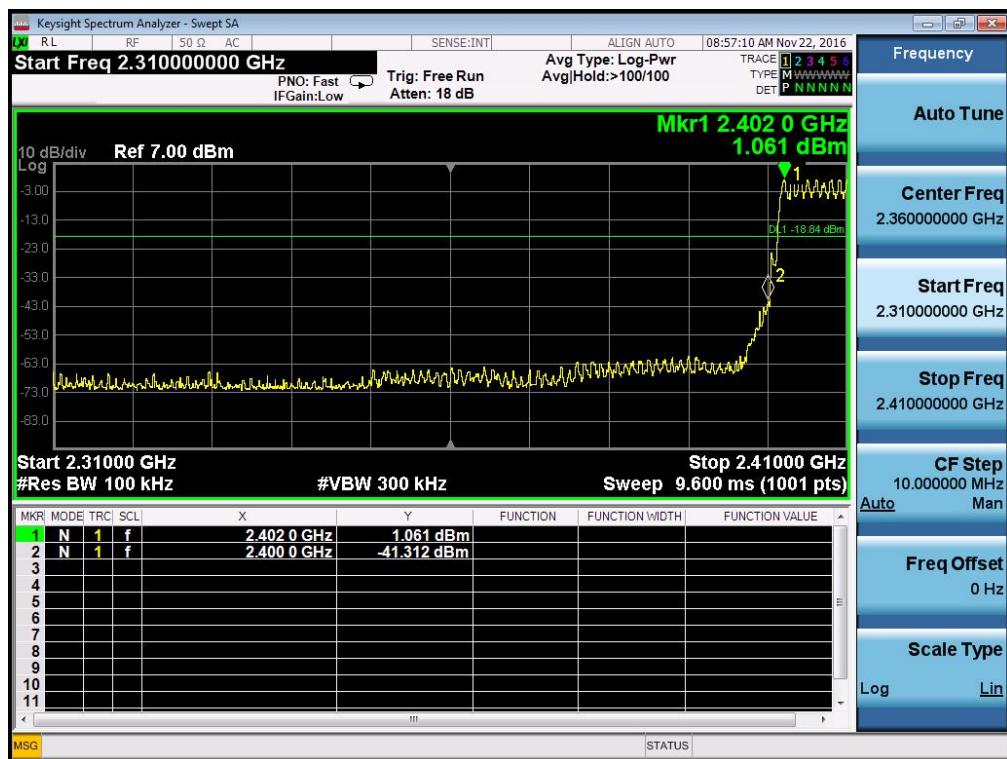
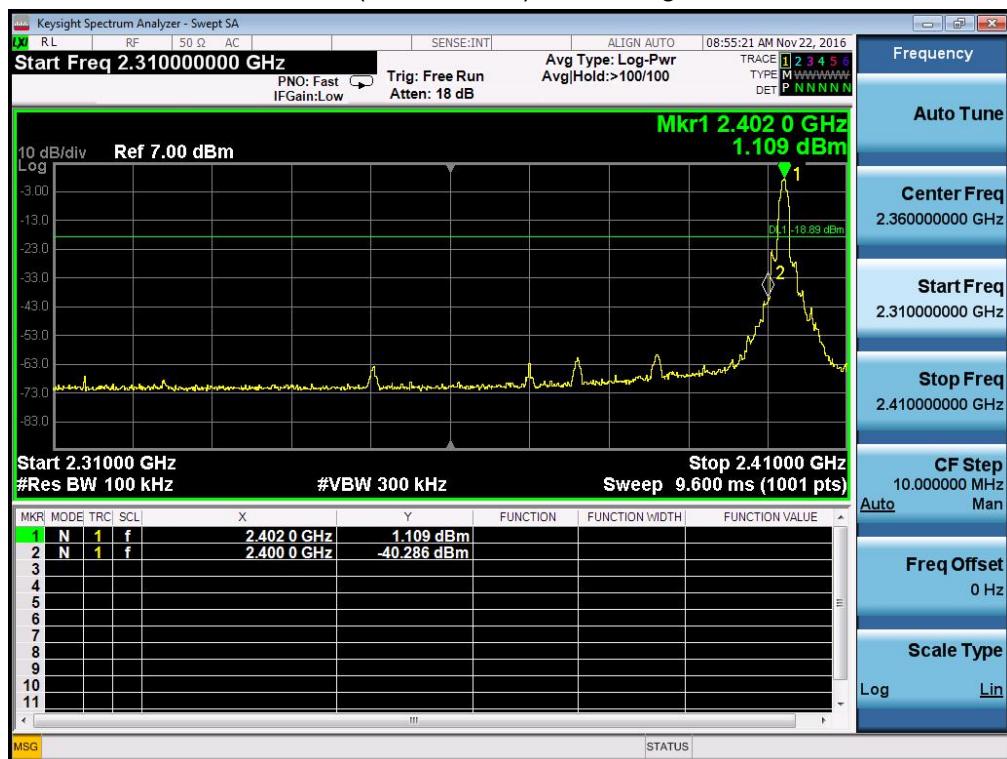
Frequency Band	Delta Peak to band emission (dBc)	> Limit (dBc)	Result
GFSK Non-hopping			
Left Band	40.89	20	Pass
Right Band	58.99	20	Pass
$\pi/4$ -DQPSK Non-hopping			
Left Band	41.40	20	Pass
Right Band	55.90	20	Pass
8DPSK Non-hopping			
Left Band	42.82	20	Pass
Right Band	57.30	20	Pass
GFSK hopping			
Left Band	42.35	20	Pass
Right Band	59.53	20	Pass
$\pi/4$ -DQPSK hopping			
Left Band	42.37	20	Pass
Right Band	60.57	20	Pass
8DPSK hopping			
Left Band	43.89	20	Pass
Right Band	60.01	20	Pass

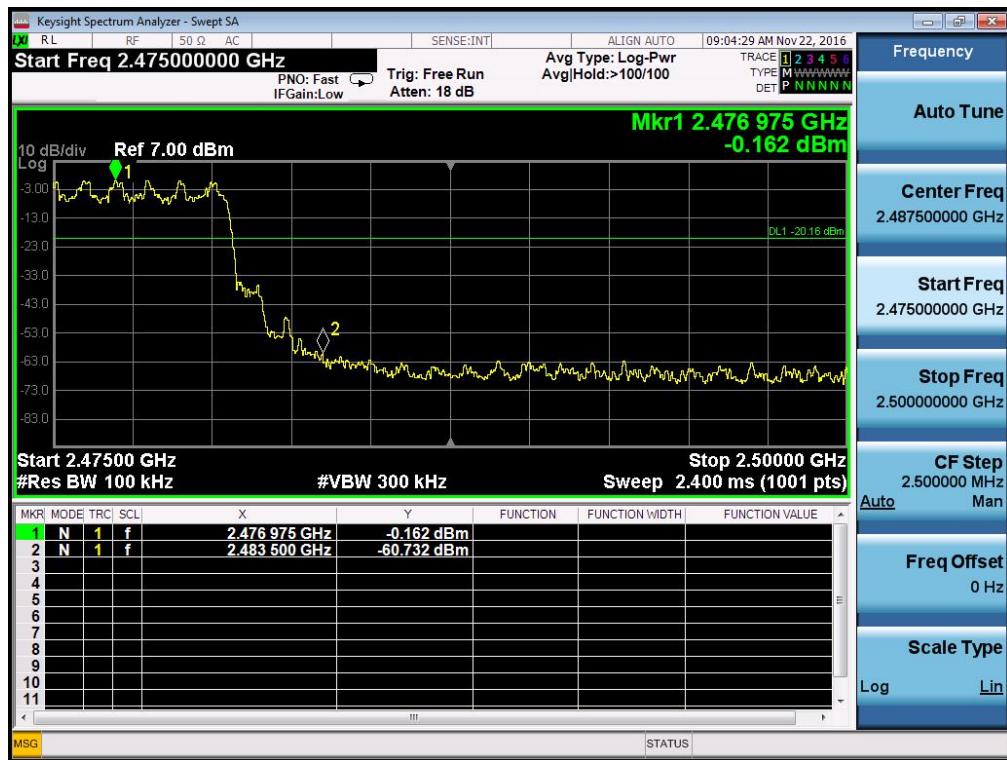
## BDR mode (GFSK): Band Edge-Left Side



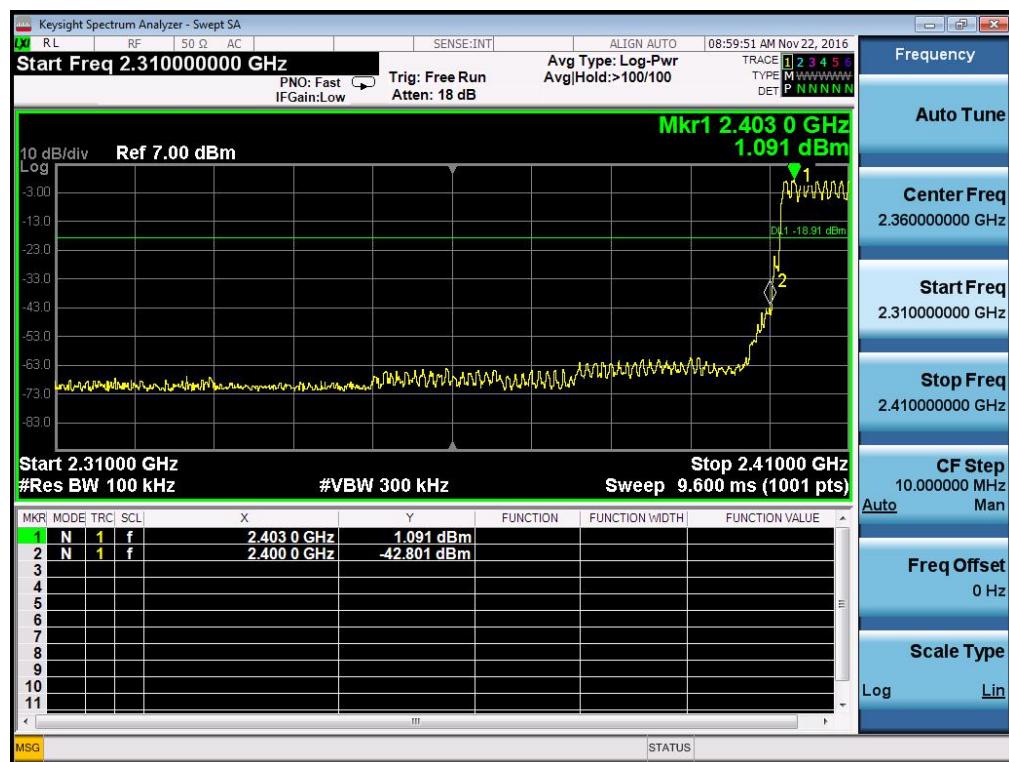
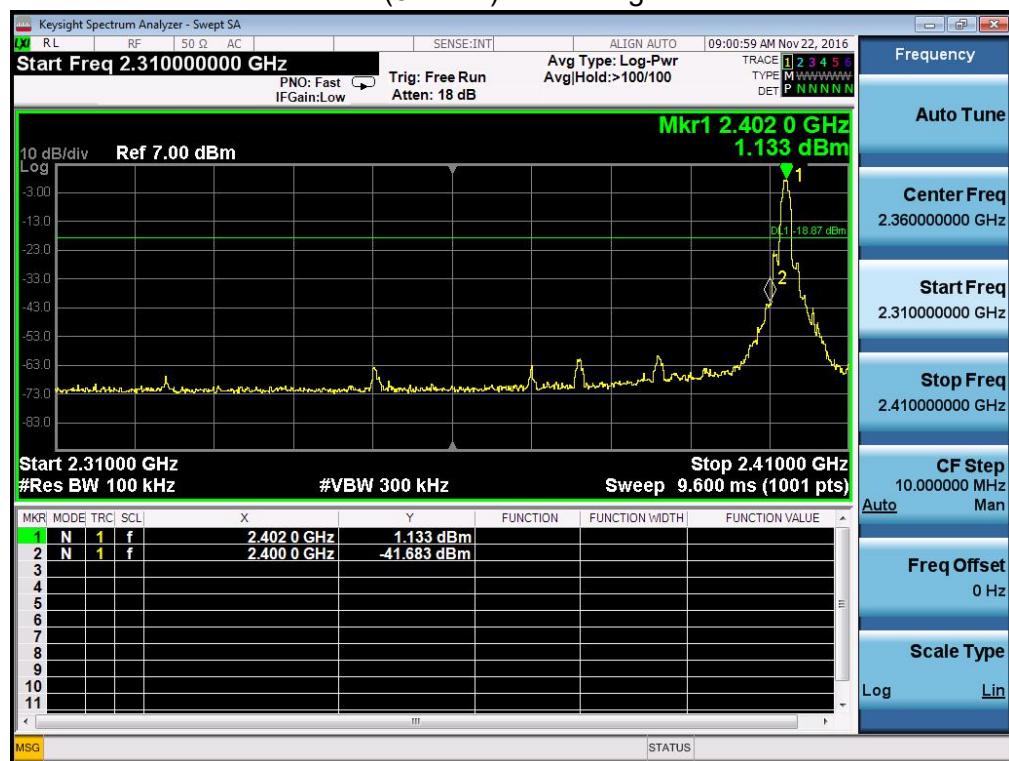
## BDR mode (GFSK): Band Edge-Right Side



EDR mode ( $\pi/4$ -DQPSK): Band Edge-Left Side

EDR mode ( $\pi/4$ -DQPSK): Band Edge- Right Side

## EDR mode(8DPSK): Band Edge-Left Side



## EDR mode(8DPSK): Band Edge-Right Side



NOTE: Hopping enabled and disabled have evaluated, and the worst data was reported.

## 11. ANTENNA REQUIREMENTS

### 11.1. Limits

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), 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 is PCB antenna and that 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 1.2dBi.

## 12. PHOTOGRAPHS OF TEST SET-UP

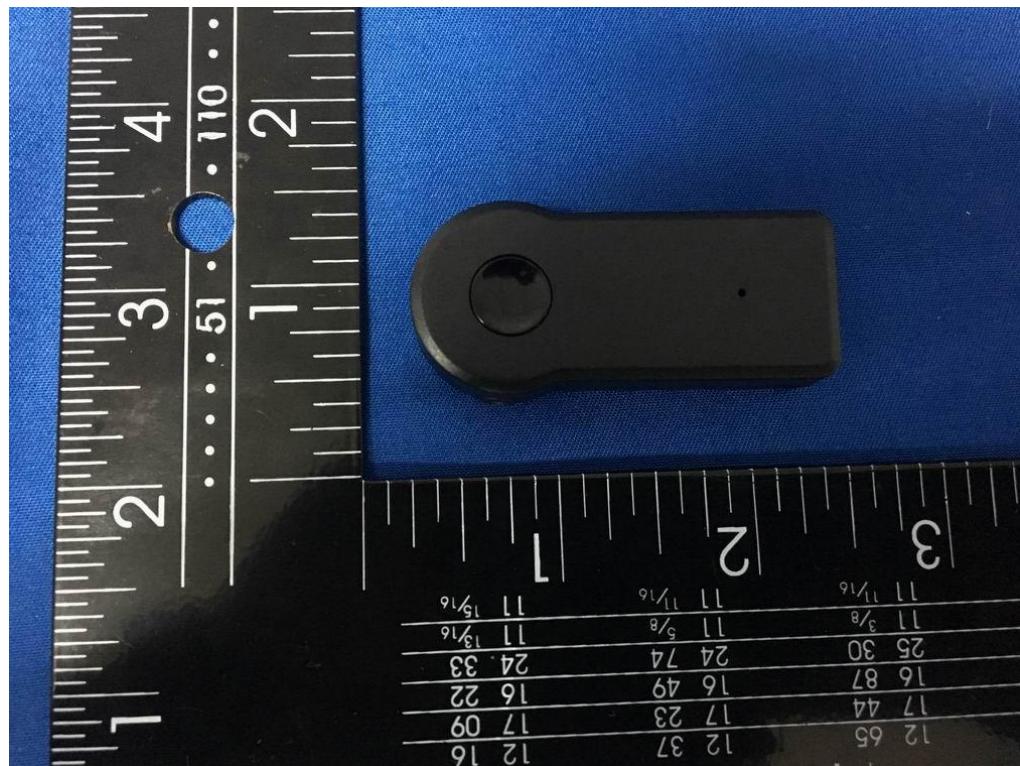
### Radiated Emission Test



Conducted Emission



### 13. PHOTOGRAPHS OF THE EUT



-----End-----