

FCC TEST REPORT(Bluetooth)  
for  
SHENZHEN AUKEY E-BUSINESS CO., LTD.  
Speaker  
Model Number : SK-A6

FCC ID: 2AFHPSK-A6

Prepared for : SHENZHEN AUKEY E-BUSINESS CO., LTD.  
Address : Room 102, Bld P09, Huanan International Zone, No.1  
Huanan Rd., PinghuTown Longgang District, Shenzhen,China.

Prepared by : Keyway Testing Technology Co., Ltd.  
Address : Building 1, Baishun Industrial Zone, Zhangmutou Town,  
Dongguan, Guangdong, China

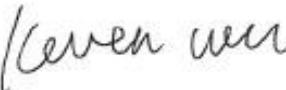
Tel: 86-769-8718 2258  
Fax: 86-769-8718 1058

Report No. : 17KWE055431F  
Date of Test : Apr.22 ~29, 2017  
Date of Report : May . 3, 2017

## TABLE OF CONTENTS

	Page
<b>Test Report Declaration</b>	1
<b>1. TEST SUMMARY.....</b>	4
<b>2. GENERAL PRODUCT INFORMATION.....</b>	5
2.1. Product Function.....	5
2.2. Description of Device (EUT).....	5
2.3. Independent Operation Modes.....	6
2.4. TEST SITES.....	6
2.5. List of Test and Measurement Instruments.....	7
<b>3. TEST SET-UP AND OPERATION MODES.....</b>	8
3.1. Principle of Configuration Selection.....	8
3.2. Block Diagram of Test Set-up.....	8
3.3. Test Operation Mode and Test Software.....	8
3.4. Special Accessories and Auxiliary Equipment.....	8
3.5. Countermeasures to Achieve EMC Compliance.....	8
<b>4. EMISSION TEST RESULTS.....</b>	9
4.1. Conducted Emission at the Mains Terminals Test.....	9
4.2. Radiated Emission Test.....	14
<b>5. BAND EDGE COMPLIANCE TEST.....</b>	21
5.1. Limits.....	21
5.2. Test setup.....	21
5.3. TEST Procedure.....	22
<b>6. 6DB OCCUPY BANDWIDTH.....</b>	26
6.1. Limits.....	26
6.2. TEST PROCEDURE.....	26
<b>7. OUTPUT POWER TEST.....</b>	29
7.1. Limits.....	29
7.2. Test setup.....	29
7.3. Test result.....	29
<b>8. POWER SPECTRAL DENSITY TEST.....</b>	30
8.1. Limits.....	30
8.2. Test setup.....	30
8.3. Test result.....	30
<b>9. ANTENNA REQUIREMENTS.....</b>	32
9.1. Limits.....	32
9.2. Result.....	32
<b>10.PHOTOGRAPHS OF TEST SET-UP.....</b>	33
<b>11. PHOTOGRAPHS OF THE EUT.....</b>	35

# Keyway Testing Technology Co., Ltd.

<b>Applicant:</b>	SHENZHEN AUKEY E-BUSINESS CO., LTD.		
<b>Address:</b>	Room 102, Bld P09, Huanan International Zone, No.1 Huanan Rd., Pinghu Town Longgang District, Shenzhen, China.		
<b>Manufacturer:</b>	Musilab Electronic Co., Ltd		
<b>Address:</b>	No.5 Huanwei Street, Fugang, Qingxi Town, Dongguan, Guandong, China		
<b>E.U.T:</b>	Speaker		
<b>Model Number:</b>	SK-A6		
<b>Trade Name:</b>	AUKEY	Serial No.:	-----
<b>Date of Receipt:</b>	Apr.21, 2017	<b>Date of Test:</b>	Apr.22 ~29, 2017
<b>Test Specification:</b>	FCC Part 15, Subpart C Section 15.247: 2016 ANSI C63.10:2013 KDB558074 D01 DTS Meas Guidance v03r05		
<b>Test Result:</b>	The equipment under test was found to be compliance with the requirements of the standards applied.		
<b>Issue Date: May. 3, 2017</b>			
Tested by:	Reviewed by:	Approved by:	
			
Keven Wu / Engineer	Mark Li / Supervisor	Andy Gao / 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 15.247(d)	PASS
6dB&99% Bandwidth	15.247(a)(2)	PASS
Power density	15.247(e)	PASS
Maximum Peak Output Power	15.247(b)(3)	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:	Speaker
Model No.:	SK-A6
Operation Frequency:	BT: 2402MHz~2480MHz
Channel numbers:	BT: 40 Channels
Modulation technology:	BT: GFSK
Antenna Type:	PCB antenna
Antenna gain:	1.0dBi
Power supply:	DC 3.7V2600mA (Battery); DC 5V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

## 2.3. Independent Operation Modes

The basic operation modes are:

2.3.1. EUT work BT mode, and Test Mode as below:

Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

Remark: According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup"

## 2.4. TEST SITES

### 2.4.1. Test Facilities

Lab Qualifications : 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

## 2.5. List of Test and Measurement Instruments

### 2.5.1. 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. 8,17	Apr. 8,18
Artificial Mains Network	Rohde&Schwarz	ENV216	101315	Apr. 8,17	Apr. 8,18
Artificial Mains Network (AUX)	Rohde&Schwarz	ENV216	101314	Apr. 8,17	Apr. 8,18
RF Cable	FUJIKURA	3D-2W	944 Cable	Apr. 8,17	Apr. 8,18

### 2.5.2. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr. 8,17	Apr. 8,18
System Simulator	Agilent	E5515C	GB43130245	Apr. 8,17	Apr. 8,18
Power Splitter	Weinschel	1506A	NW425	Apr. 8,17	Apr. 8,18
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Apr. 8,17	Apr. 8,18
Spectrum Analyzer	Agilent	E4411B	MY4511304	Apr. 8,17	Apr. 8,18
Spectrum Analyzer	R&S	FSV40	132.1.3008K39 -100967	Apr. 8,17	Apr. 8,18
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Apr. 22,17	Apr. 22,18
Signal Amplifier	SONOMA	310	187016	Apr. 8,17	Apr. 8,18
Signal Amplifier	Agilent	8449B	3008A00251	Apr. 8,17	Apr. 8,18
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	DAZE	ZN30701	11003	Apr. 8,17	Apr. 8,18
Horn Antenna	SCHWARZBECK	BBHA9170	9170-068	Apr. 8,17	Apr. 8,18
Spectrum Analyzer	Agilent	8593E	3911A04271	Apr. 8,17	Apr. 8,18
Spectrum Analyzer	Agilent	E4408B	MY44211125	Apr. 8,17	Apr. 8,18
Signal Amplifier	DAZE	ZN3380C	11001	Apr. 8,17	Apr. 8,18
High Pass filter	Micro	HPM50111	324216	Apr. 8,17	Apr. 8,18
Filter	COM-MW	ZBSF-C836.5-25-X	KW032	Apr. 8,17	Apr. 8,18
Filter	COM-MW	ZBSF-C1747.5-75-X2	KW035	Apr. 8,17	Apr. 8,18
Filter	COM-MW	ZBSF-C1880-60-X2	KW037	Apr. 8,17	Apr. 8,18
DC Power Supply	LongWei	PS-305D	010964729	Apr. 8,17	Apr. 8,18
Constant temperature and humidity box	GF	GTH-800-40-1P	MAA9906-005	Apr. 8,17	Apr. 8,18
Splitter	Agilent	11636B	0025164	Apr. 8,17	Apr. 8,18
Loop Antenna	ARA	PLA-1030/B	1029	Apr. 8,17	Apr. 8,18
Power Meter	Anritsu	ML2495A	1204003	Apr. 8,17	Apr. 8,18
Power Sensor	Anritsu	MA2411B	1126150	Apr. 8,17	Apr. 8,18

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

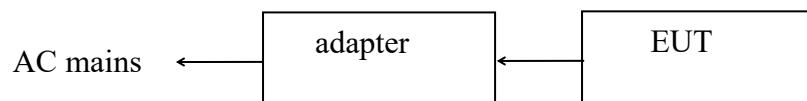
#### 3.1. Principle of Configuration Selection

**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:



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

Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode
Test Software	Bluetooth MP Tool

#### 3.4. Special Accessories and Auxiliary Equipment

Adapter:	Manufacturer: Cenique Infotainment Group Limited I/P:AC 100~240V 50/60Hz 0.15A O/P:DC 5V /2.1A
----------	--

#### 3.5. Countermeasures to Achieve EMC Compliance

N/A.

## 4. EMISSION TEST RESULTS

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

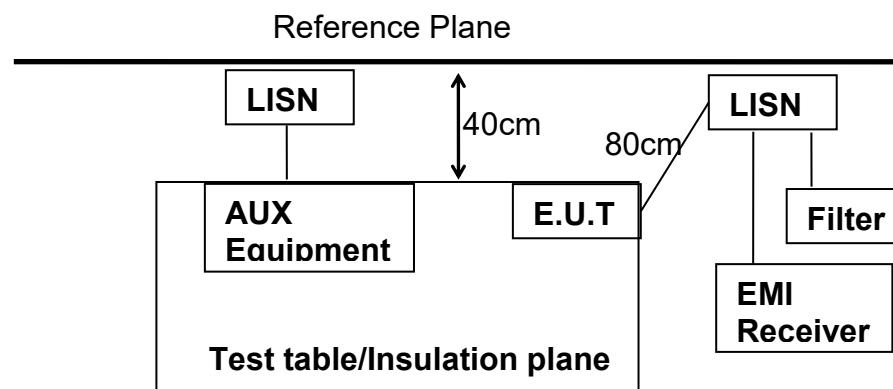
#### 4.1.1. Limit 15.207 limits

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.

#### 4.1.2. 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.

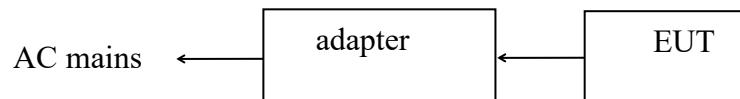


Remark: E.U.T. :Equipment Under Test

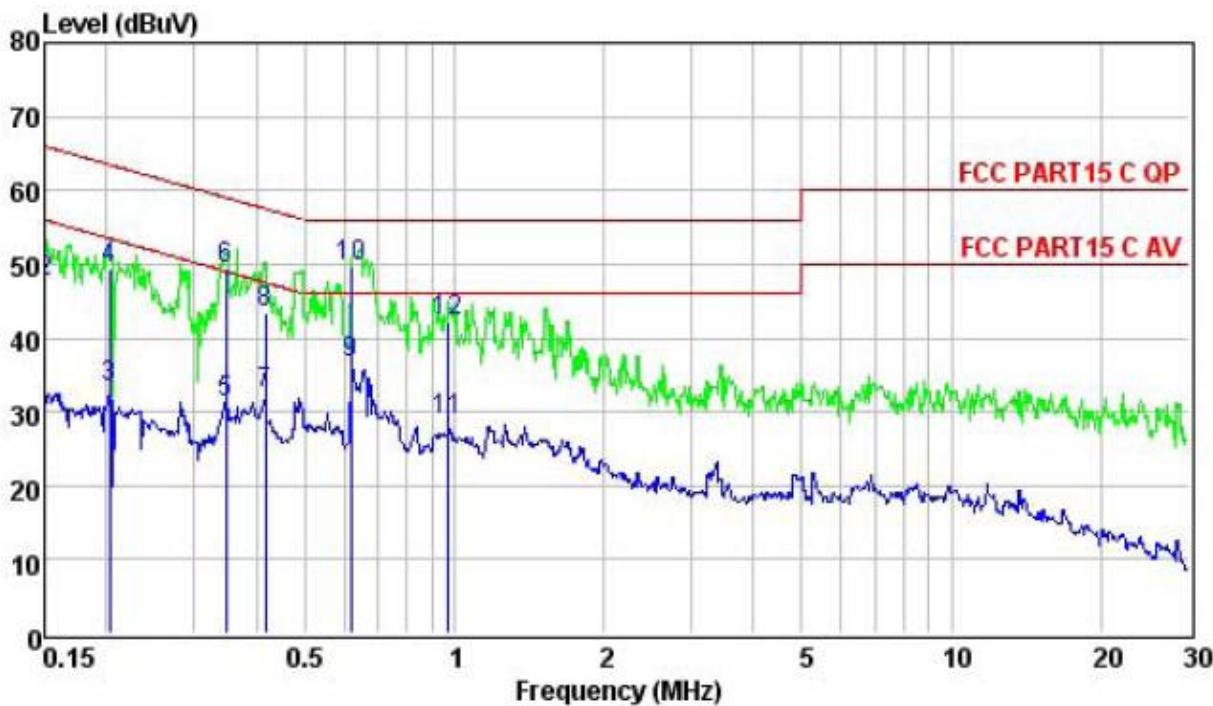
LISN: Line Impedance Stabilization Network

Test table height: 0.8m.

#### Test block

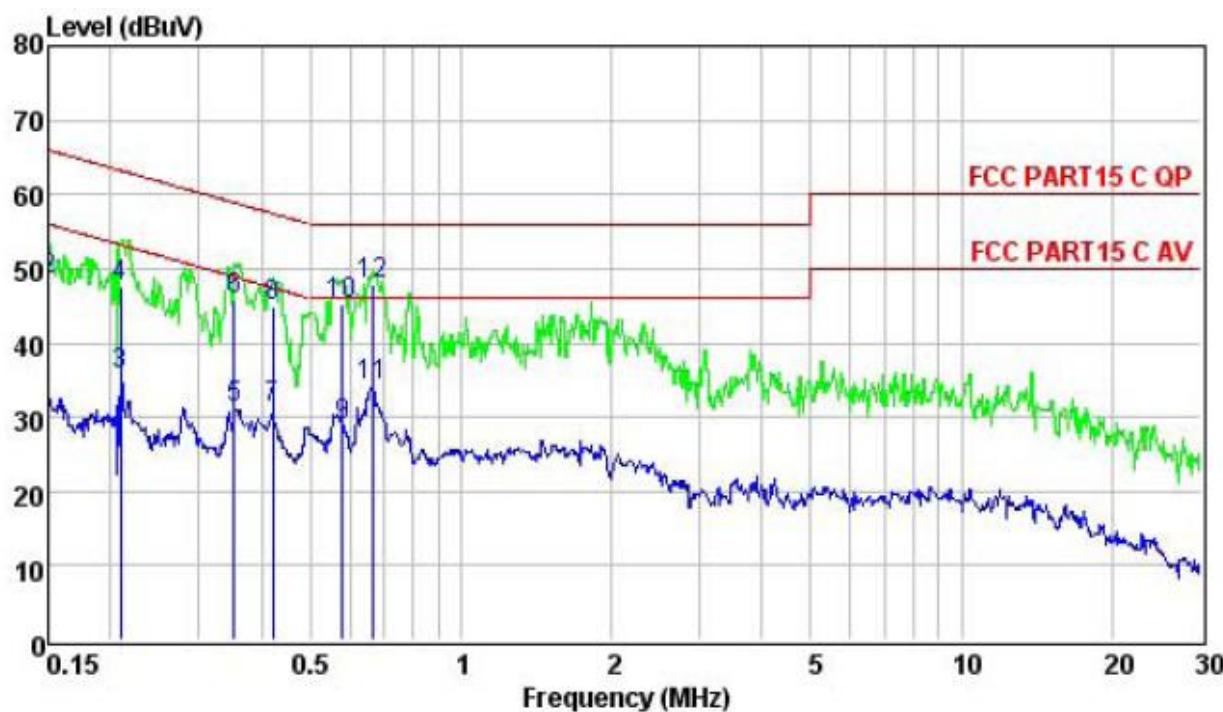


EUT :	Speaker	Model Name :	SK-A6
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



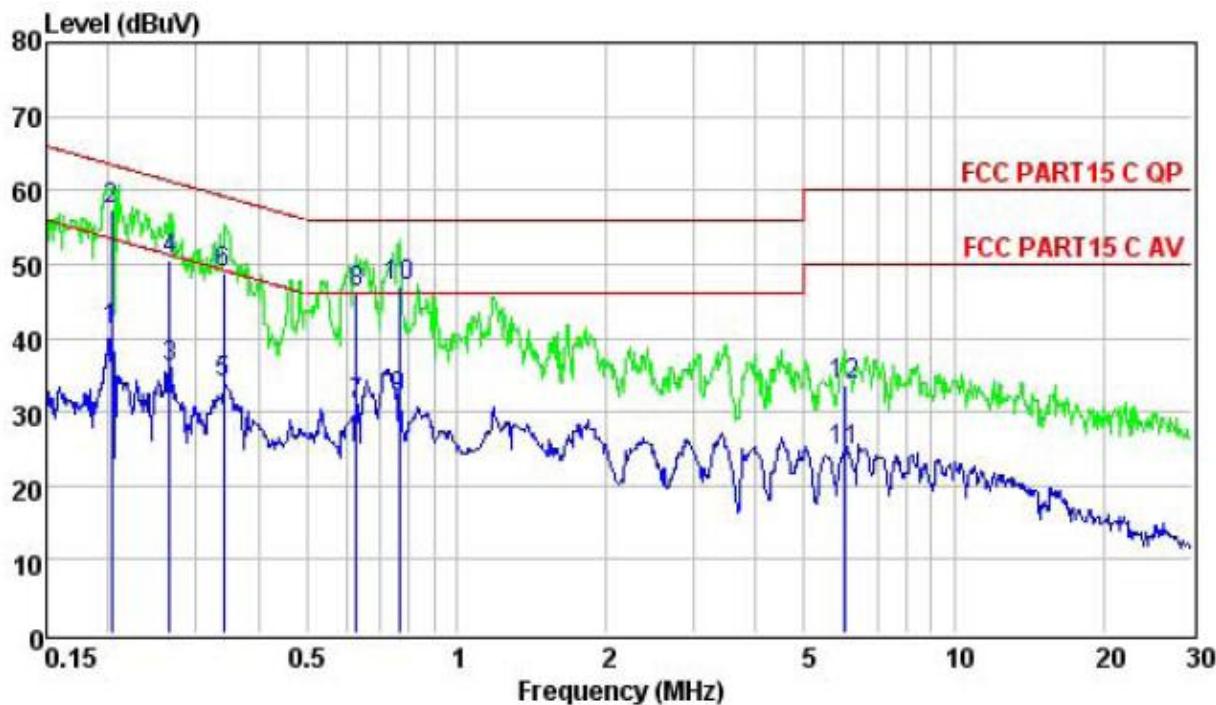
Freq	Level	Limit		Over	Remark
		Line	dBuV	dB	
1	0.150	32.67	56.00	-23.33	Average
2	0.150	47.60	66.00	-18.40	QP
3	0.203	33.29	53.49	-20.20	Average
4	0.203	49.45	63.49	-14.04	QP
5	0.348	31.29	49.00	-17.71	Average
6	0.348	49.32	59.00	-9.68	QP
7	0.417	32.56	47.51	-14.95	Average
8	0.417	43.50	57.51	-14.01	QP
9	0.621	36.49	46.00	-9.51	Average
10	0.621	49.63	56.00	-6.37	QP
11	0.974	28.83	46.00	-17.17	Average
12	0.974	42.30	56.00	-13.70	QP

EUT :	Speaker	Model Name :	SK-A6
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5.0V form Adapter AC 120V/60Hz	Test Mode :	Mode 4



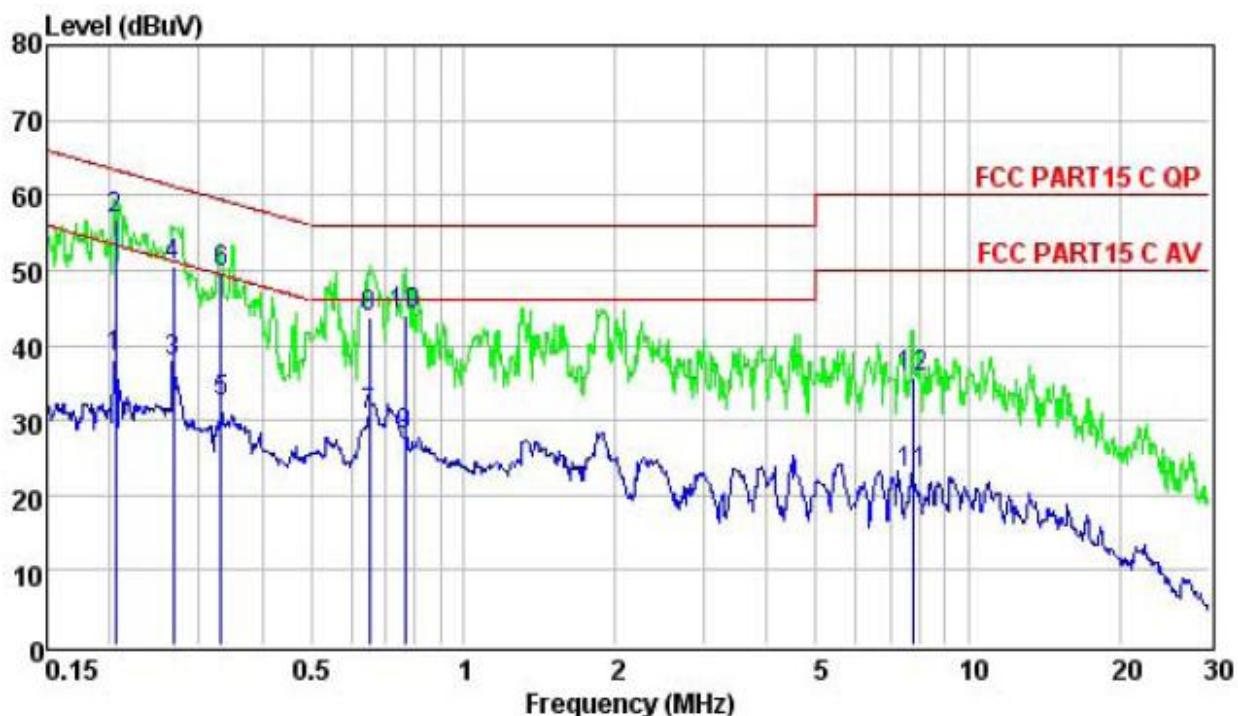
Freq	Level	Limit		Over	Remark
		Line	Limit		
MHz	dBuV	dBuV	dB		
1	0.150	33.29	56.00	-22.71	Average
2	0.150	48.60	66.00	-17.40	QP
3	0.209	35.84	53.23	-17.39	Average
4	0.209	47.60	63.23	-15.63	QP
5	0.352	31.13	48.91	-17.78	Average
6	0.352	45.70	58.91	-13.21	QP
7	0.421	31.31	47.42	-16.11	Average
8	0.421	44.90	57.42	-12.52	QP
9	0.579	28.85	46.00	-17.15	Average
10	0.579	45.10	56.00	-10.90	QP
11	0.665	34.10	46.00	-11.90	Average
12	0.665	47.84	56.00	-8.16	QP

EUT :	Speaker	Model Name :	SK-A6
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
		MHz	dBuV	Line	Limit
				dB	
1	0.203	41.16	53.49	-12.33	Average
2	0.203	57.45	63.49	-6.04	QP
3	0.266	36.01	51.25	-15.24	Average
4	0.266	50.60	61.25	-10.65	QP
5	0.341	33.86	49.18	-15.32	Average
6	0.341	48.90	59.18	-10.28	QP
7	0.630	30.84	46.00	-15.16	Average
8	0.630	46.20	56.00	-9.80	QP
9	0.767	31.76	46.00	-14.24	Average
10	0.767	46.90	56.00	-9.10	QP
11	6.056	24.63	50.00	-25.37	Average
12	6.056	33.70	60.00	-26.30	QP

EUT :	Speaker	Model Name :	SK-A6
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	0.205	38.22	53.40	-15.18 Average
2	0.205	56.74	63.40	-6.66 QP
3	0.267	37.63	51.20	-13.57 Average
4	0.267	50.60	61.20	-10.60 QP
5	0.332	32.48	49.40	-16.92 Average
6	0.332	49.80	59.40	-9.60 QP
7	0.651	30.53	46.00	-15.47 Average
8	0.651	43.80	56.00	-12.20 QP
9	0.767	27.91	46.00	-18.09 Average
10	0.767	43.90	56.00	-12.10 QP
11	7.769	22.98	50.00	-27.02 Average
12	7.769	35.80	60.00	-24.20 QP

## 4.2. Radiated Emission Test

### 4.2.1. 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)	

### 4.2.2. 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.

#### 4.2.3. Test setup

The EUT was placed on a turn table which was 0.8 m(above 1GHz, the table was 1.5m) above the ground. 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.

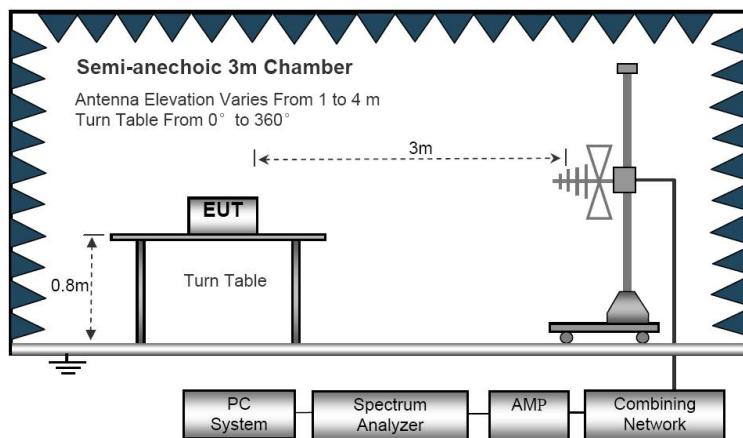
The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

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, Both PK and AV measure, PK detector is used.

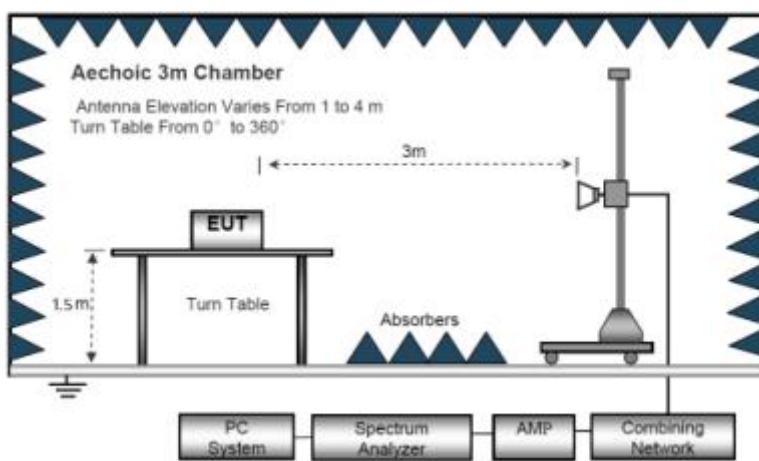
The frequency range from 30MHz to 10<sup>th</sup> harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

- Notes:
1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.
  2. Measurement Uncertainty:  $\pm 3.2$  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. For Both PK and AV value above 1GHz, PK detector is used.
  6. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation).

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



## Above 1GHz



**Below 30MHz**

<b>Freq.</b>	<b>Reading</b>	<b>Limit</b>	<b>Margin</b>	<b>State</b>
<b>(MHz)</b>	<b>(dBuV/m)</b>	<b>(dBuV/m)</b>	<b>(dB)</b>	<b>P/F</b>
--	--	--	--	<b>P</b>
--	--	--	--	<b>P</b>

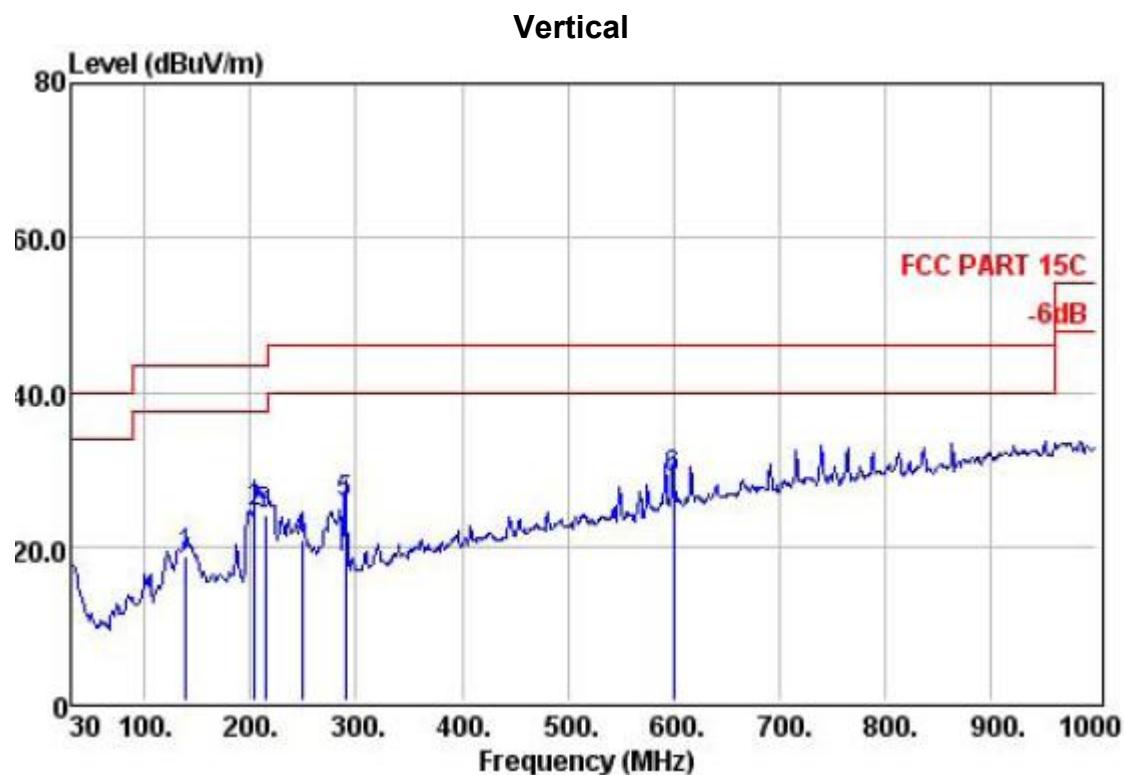
**Note:**

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

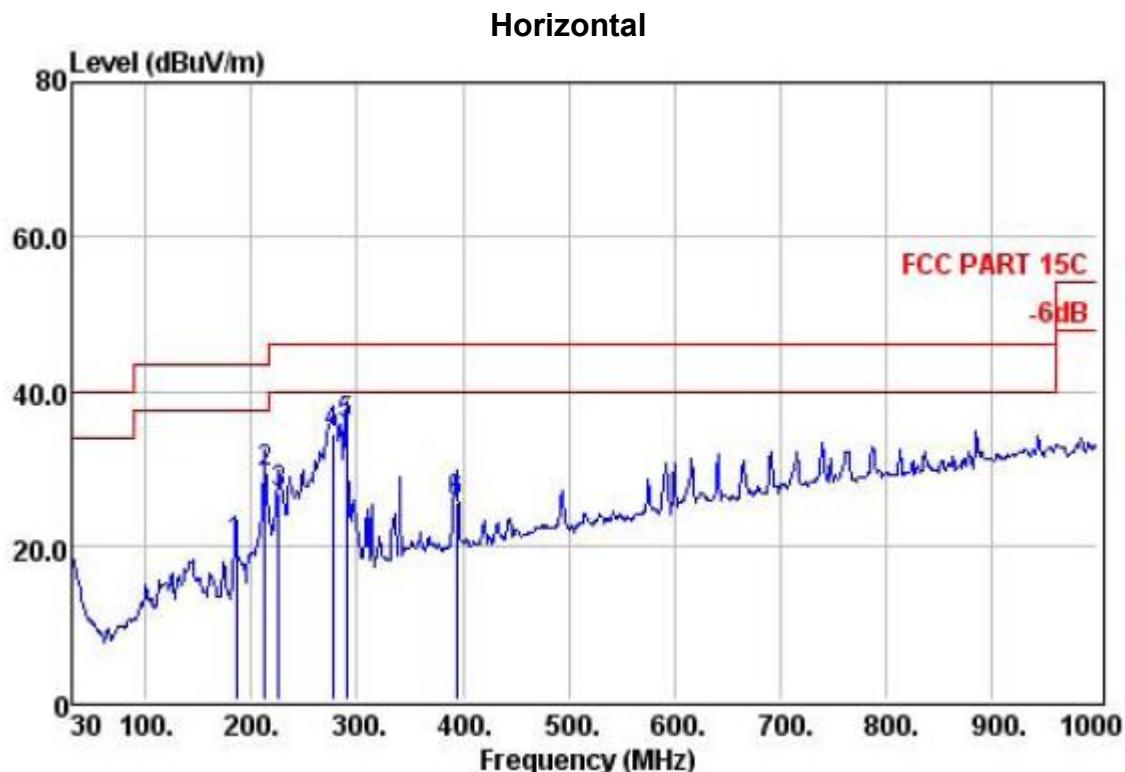
Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})(\text{dB})$ ;

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

Below 1GHz			
EUT :	Speaker	Model Name :	SK-A6
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010hPa	Test Mode :	Mode 4-GFSK
Test Voltage :	DC 3.7V		



Freq	Preamp Factor	Read Level	Cable Antenna		Limit Level	Line Limit	Over Remark	
			MHz	dB	dBuV	dB	dBuV/m	dBuV/m
1	138.64	31.21	40.26	1.22	8.39	18.66	43.50	-24.84 QP
2	204.60	31.09	42.90	1.46	11.22	24.49	43.50	-19.01 QP
3	214.30	31.04	41.88	1.53	11.69	24.06	43.50	-19.44 QP
4	248.25	30.96	37.32	1.70	12.85	20.91	46.00	-25.09 QP
5	289.96	30.93	41.23	1.87	13.48	25.65	46.00	-20.35 QP
6	600.36	30.62	35.61	3.29	20.61	28.89	46.00	-17.11 QP



	Preamp	Read	Cable	Antenna	Limit	Over	Over		
	Freq	Factor	Level	Loss	Factor	Level	Line	Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	185.20	31.14	39.79	1.39	10.24	20.28	43.50	-23.22	QP
2	212.36	31.06	47.26	1.53	11.59	29.32	43.50	-14.18	QP
3	225.94	30.94	43.81	1.53	12.23	26.63	46.00	-19.37	QP
4	277.35	30.94	50.61	1.78	13.08	34.53	46.00	-11.47	QP
5	289.96	30.93	51.25	1.87	13.48	35.67	46.00	-10.33	QP
6	393.75	30.63	37.61	2.37	16.27	25.62	46.00	-20.38	QP

NOTE: Absolute Level= Reading Level+antenna Factor+cable loss - Preamp factor,

Over Limit= Absolute Level – Limit;

Mode 4 is the worst mode. Only worst case is presented in the report .

Above 1GHz					
EUT :	Speaker		Model Name :		SK-A6
Temperature :	20 °C		Relative Humidity :		48%
Pressure :	1010hPa		Test Mode :		1Mbps
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	28.75	32.94	11.94	27.49	46.14	54	-7.86	Average	Vertical
4804	38.09	32.94	11.94	27.49	55.48	74	-18.52	peak	Vertical
7206	30.54	25.28	18.04	27.94	45.92	54	-8.08	Average	Vertical
7206	41.12	25.28	18.04	27.94	56.50	74	-17.50	peak	Vertical
4804	29.55	32.94	11.94	27.49	46.94	54	-7.06	Average	Horizontal
4804	40.34	32.94	11.94	27.49	57.73	74	-16.27	peak	Horizontal
7206	29.75	25.28	18.04	27.94	45.13	54	-8.87	Average	Horizontal
7206	41.25	25.28	18.04	27.94	56.63	74	-17.37	peak	Horizontal
TX-2440									
4880	29.65	32.11	12.15	27.53	46.38	54	-7.62	Average	Vertical
4880	39.64	32.11	12.15	27.53	56.37	74	-17.63	peak	Vertical
7320	30.54	24.33	18.09	27.96	45.00	54	-9.00	Average	Vertical
7320	41.38	24.33	18.09	27.96	55.84	74	-18.16	peak	Vertical
4880	30.32	32.11	12.15	27.53	47.05	54	-6.95	Average	Horizontal
4880	39.98	32.11	12.15	27.53	56.71	74	-17.29	peak	Horizontal
7320	30.06	24.33	18.09	27.96	44.52	54	-9.48	Average	Horizontal
7320	40.51	24.33	18.09	27.96	54.97	74	-19.03	peak	Horizontal
TX-2480									
4960	30.47	31.32	12.31	27.58	46.52	54	-7.48	Average	Vertical
4960	40.62	31.32	12.31	27.58	56.67	74	-17.33	peak	Vertical
7440	30.48	24.38	18.16	27.99	45.03	54	-8.97	Average	Vertical
7440	40.53	24.38	18.16	27.99	55.08	74	-18.92	peak	Vertical
4960	29.75	31.32	12.31	27.58	45.80	54	-8.20	Average	Horizontal
4960	40.21	31.32	12.31	27.58	56.26	74	-17.74	peak	Horizontal
7440	30.78	24.38	18.16	27.99	45.33	54	-8.67	Average	Horizontal
7440	40.32	24.38	18.16	27.99	54.87	74	-19.13	peak	Horizontal
NOTE: 1. Absolute Level= Reading Level+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. EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report (Z orientation)									

## 5. BAND EDGE COMPLIANCE TEST

### 5.1. Limits

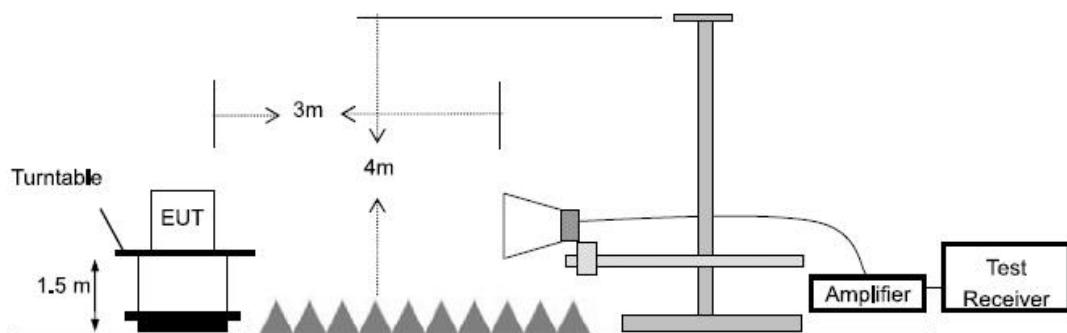
All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 30dB below the fundamental emissions, or comply with 15.209 limits.

### 5.2. Test setup

For Conducted Test



For Radiated emission Test

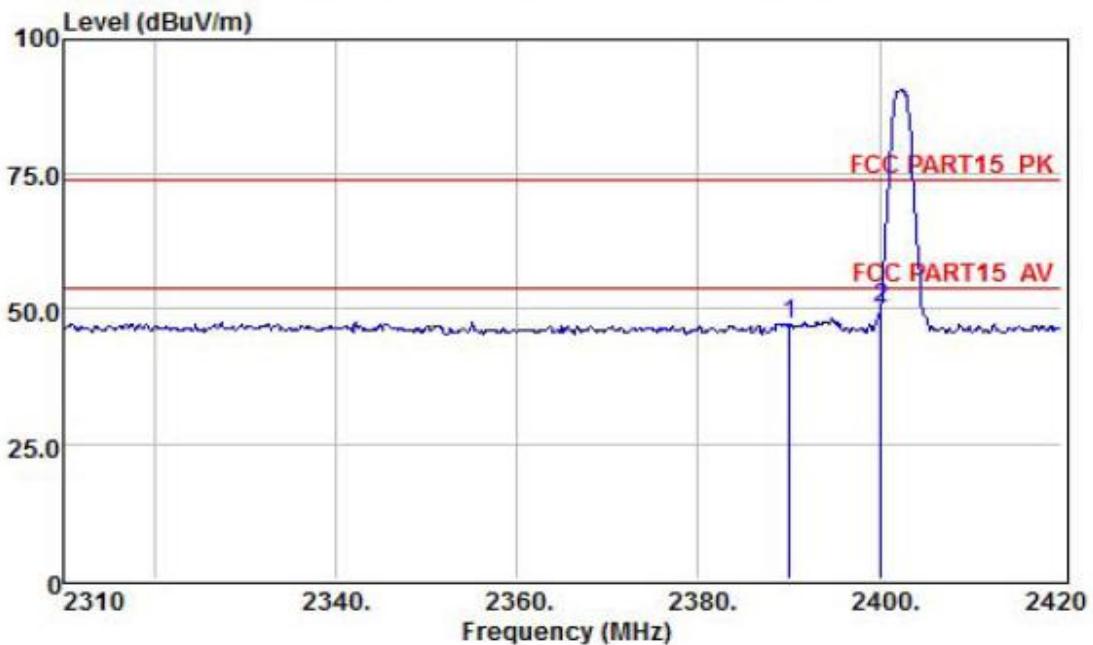


### 5.3. TEST Procedure

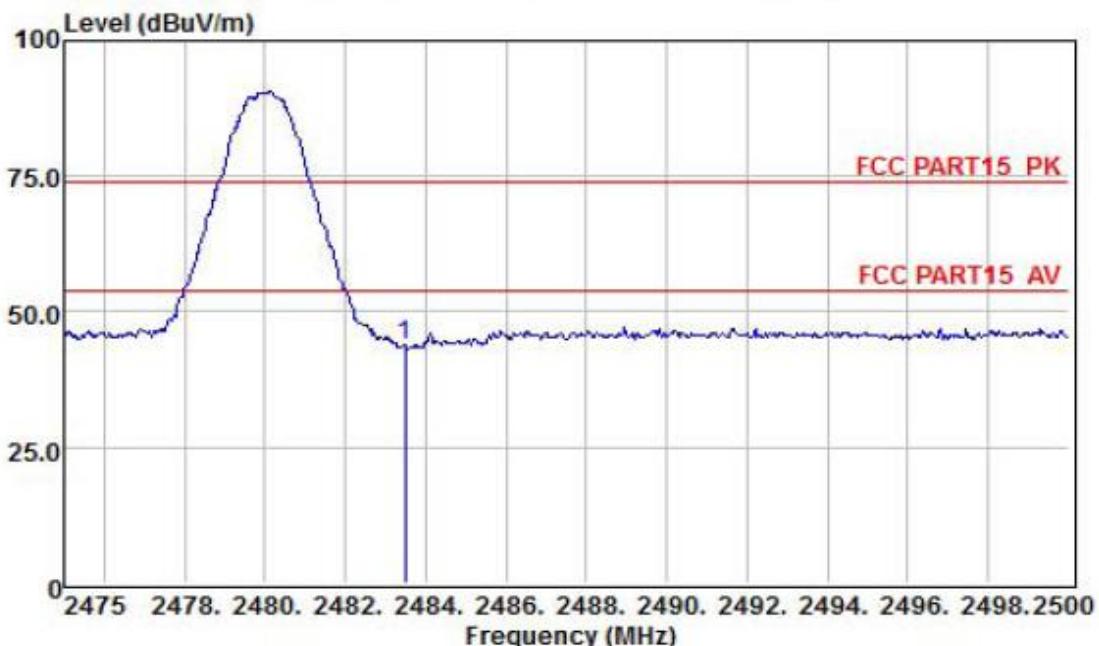
For Conducted Test	
1.	The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100KHz. The video bandwidth is set to 300KHz.
2.	The spectrum from 30MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.
EMI Test receiver	Setting
Attenuation	Auto
RBW	100KHz
VBW	300KHz
Detector	Peak
trace	Max hold
For Radiated emission Test	
1.	The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2.	The measurement procedure at the ban edges was simplified by performing the measurement in just one plot. Both, the in-band-emission and the unwanted emission were be encompassed by the span. After trace stabilization, the maximum peak was be determined by a peak detector and the value was marked by an appropriate limit line. The second limit line, which is 20dB below the first, marks the limits for the emissions in the unrestricted band next to the band edge.
3.	The measurements were performed at the lower end of the 2.4GHz band.
4.	Use the following spectrum analyzer settings
EMI Test receiver	Setting
Attenuation	Auto
RBW	1MHz
VBW	3MHz
Detector	Peak
trace	Max hold

For radiated test as follows:

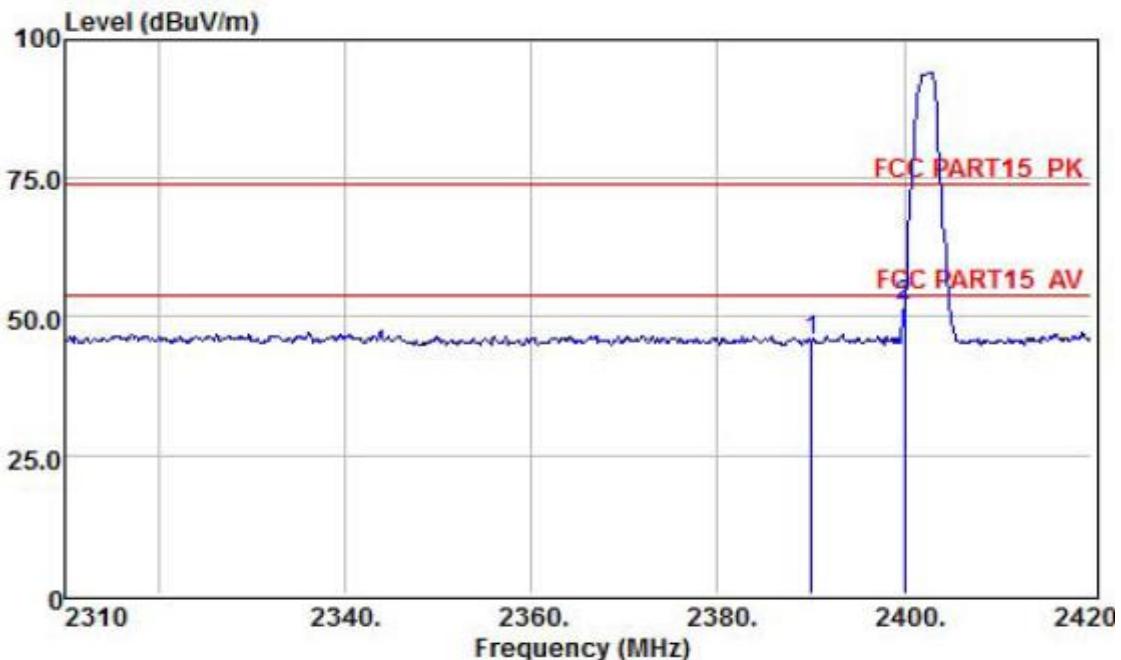
### Horizontal



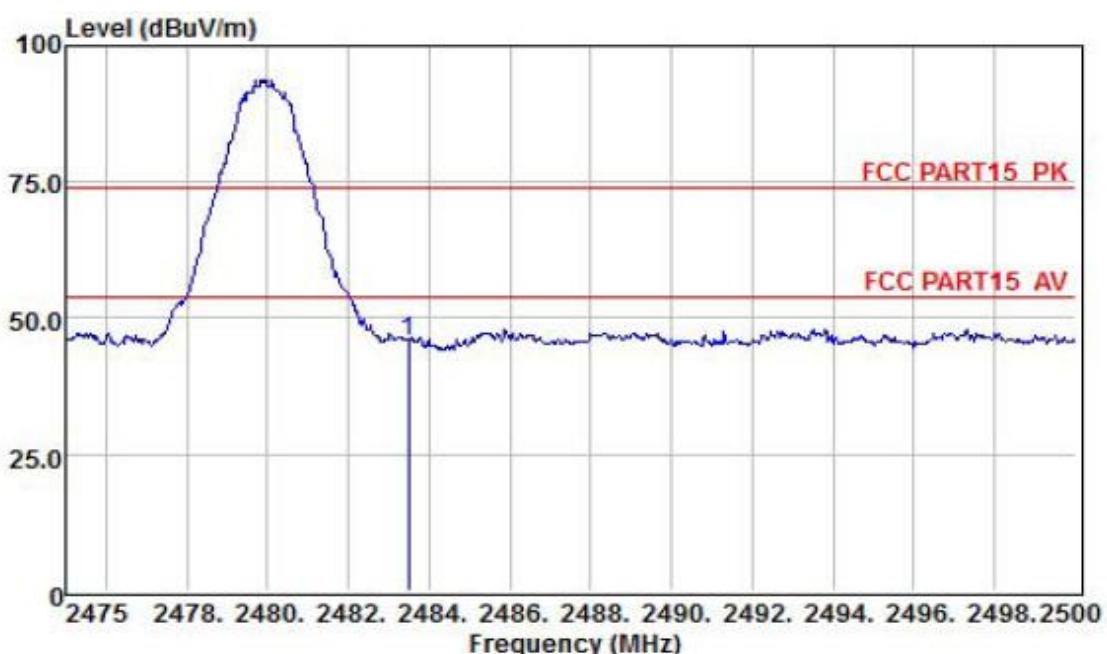
	Preamp Freq	Read Factor	Cable Loss	Antenna Factor	Limit Level	Line Level	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2390.00	26.32	37.40	7.34	28.72	47.14	74.00	-26.86 Peak
2	2400.09	26.32	40.54	7.34	28.72	50.28	74.00	-23.72 Peak



	Preamp Freq	Read Factor	Cable Loss	Antenna Factor	Limit Level	Line Level	Over Limit	Remark
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB
1	2483.50	26.34	33.74	7.57	28.79	43.76	74.00	-30.24 Peak

**Vertical**

Freq	Preamp	Read	Cable	Antenna	Limit	Over	Remark
	Factor	Level	Loss	Factor	Level	Line	
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dB
1	2390.00	26.32	36.12	7.34	28.72	45.86	74.00 -28.14 Peak
2	2400.00	26.32	42.18	7.34	28.72	51.92	74.00 -22.08 Peak

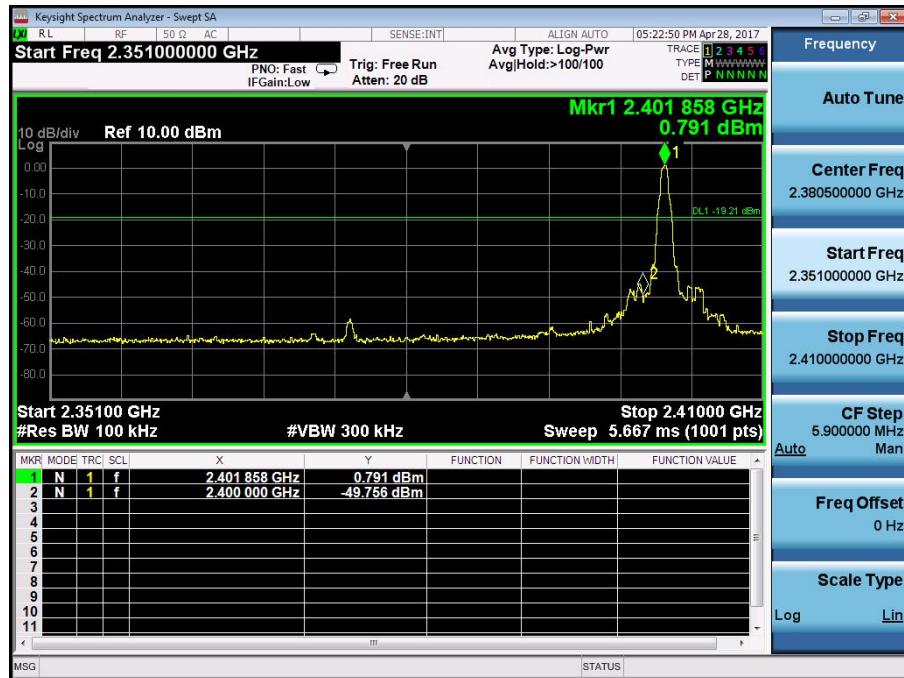


Freq	Preamp	Read	Cable	Antenna	Limit	Over	Remark
	Factor	Level	Loss	Factor	Level	Line	
	MHz	dB	dBuV	dB	dB/m	dBuV/m	dB
1	2483.50	26.34	35.63	7.57	28.79	45.65	74.00 -28.35 Peak

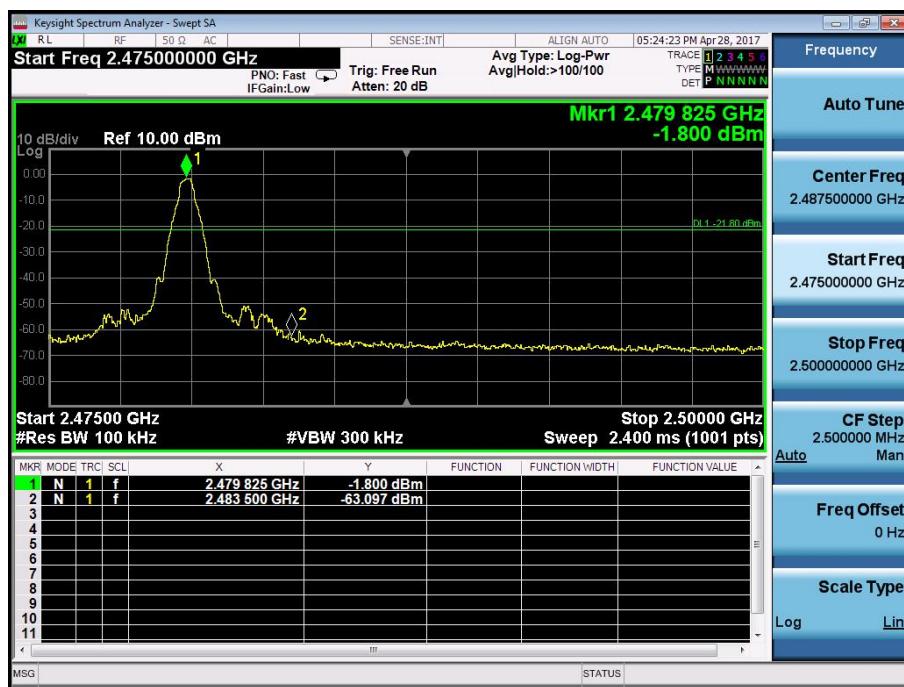
## conduction band-edge

Frequency Band	Delta Peak to band emission (dBc)	>Limit (dBc)	Result
Left-band	50.55	20	Pass
Right-band	61.30	20	Pass

## Left Side



## Right Side



## 6. 6DB OCCUPY BANDWIDTH

### 6.1. Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

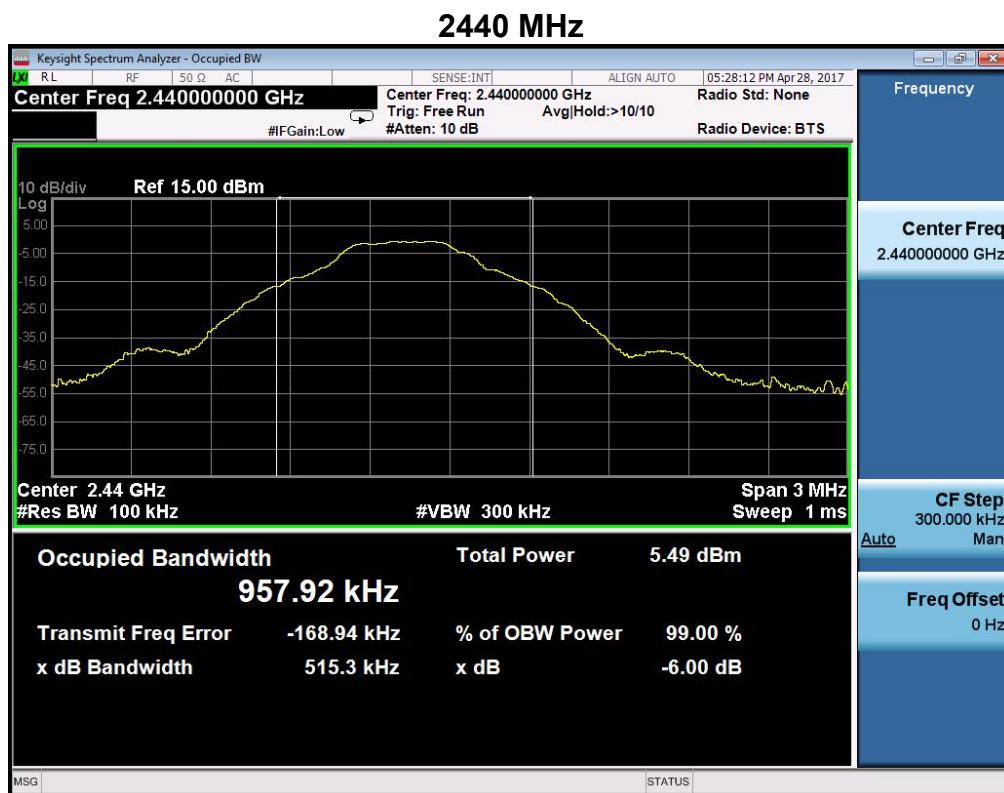
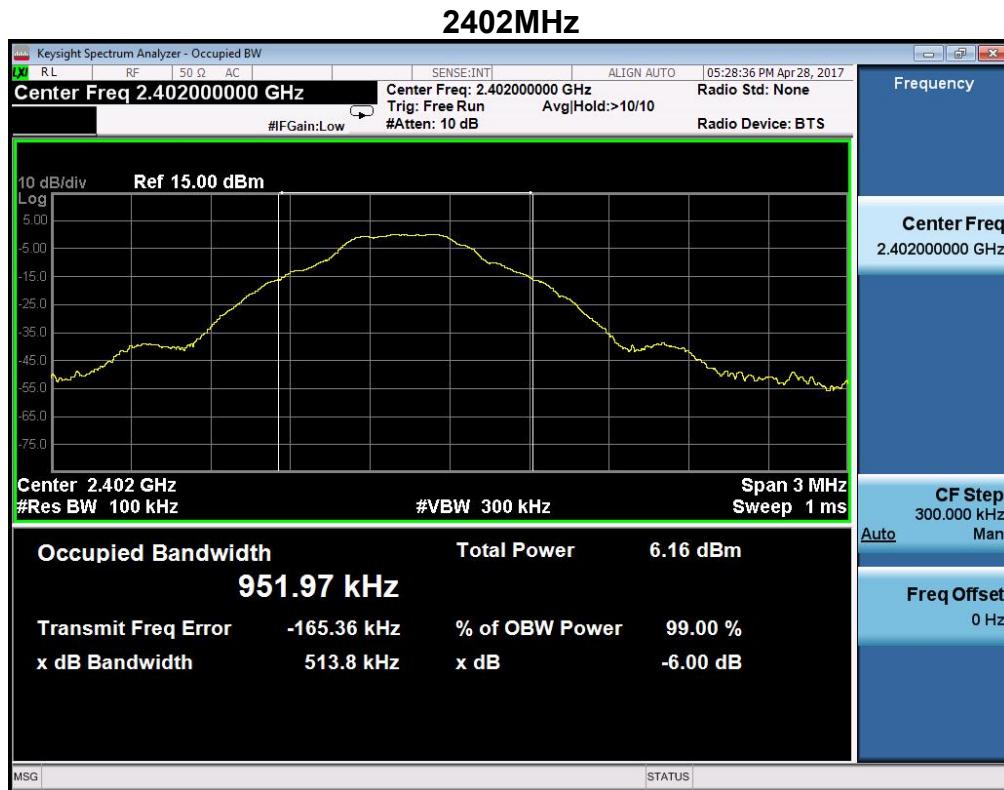
### 6.2. TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

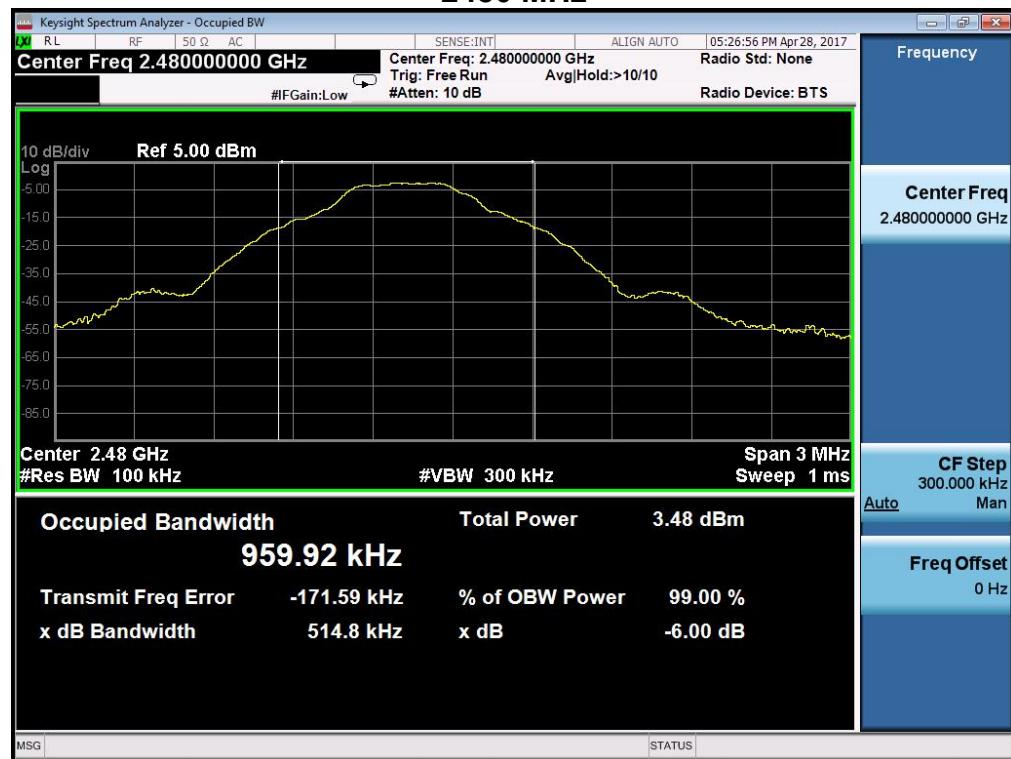
Test data:

Channel Frequency (MHz)	6dB Bandwidth (MHz)	Limit (KHz)	Result
2402	0.514	500	Pass
2440	0.515	500	Pass
2480	0.515	500	Pass

Test plot as follows:



## 2480 MHz



## 7. OUTPUT POWER TEST

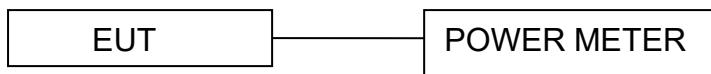
### 7.1. Limits

For systems using digital modulation in the 2400~2483.5MHz, The output Power shall not exceed 1W (30dBm)

### 7.2. Test setup

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.



### 7.3. Test result

Frequency (MHz)	Maximum Conducted Output Power (dBm)	Limit (dBm)
2402	1.923	30
2440	2.231	30
2480	2.756	30

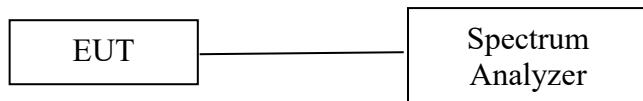
## 8. POWER SPECTRAL DENSITY TEST

### 8.1. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

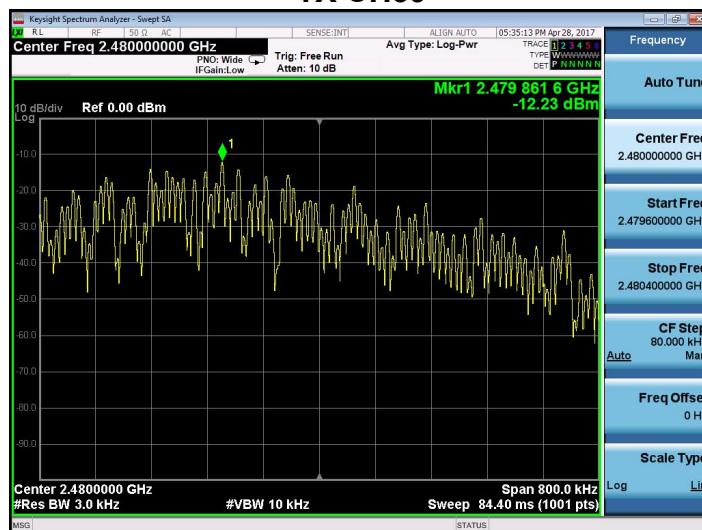
### 8.2. Test setup

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
4. Set the VBW  $\geq 3 \text{ RBW}$
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



### 8.3. Test result

Channel Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402	-9.37	8	Pass
2440	-10.15	8	Pass
2480	-12.23	8	Pass

**TX CH00****TX CH 19****TX CH39**

## 9. ANTENNA REQUIREMENTS

### 9.1. Limits

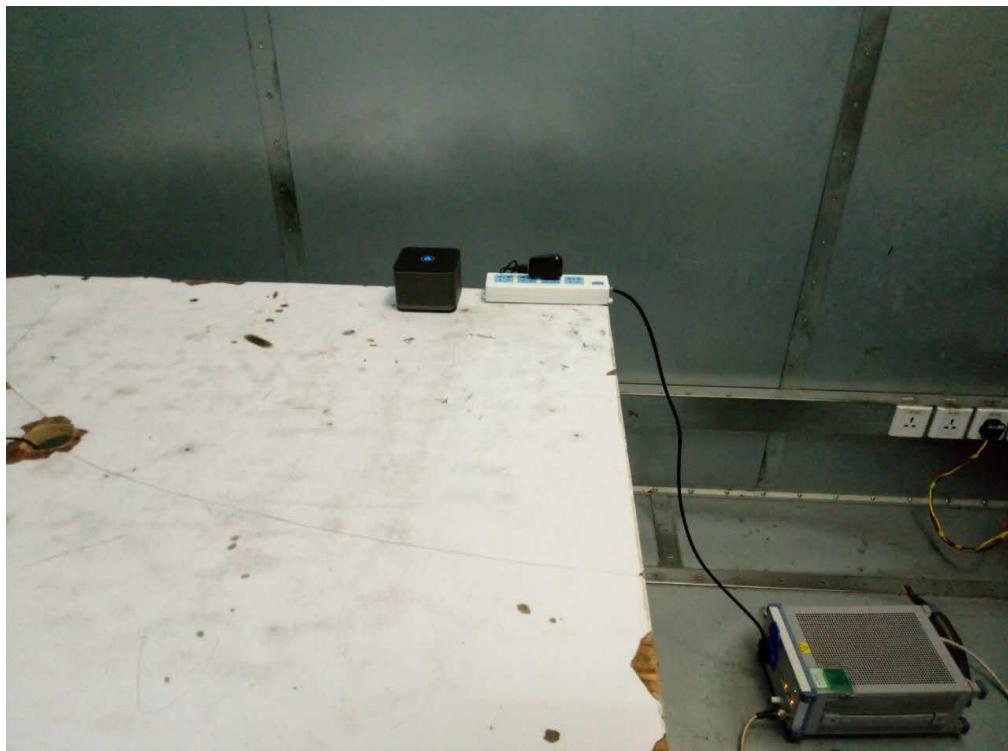
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

### 9.2. 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 1.0dBi.

## 10.PHOTOGRAPHS OF TEST SET-UP

Conducted Emission



Radiated Emission Test



## 11. PHOTOGRAPHS OF THE EUT



\*\*\* the end of report \*\*\*