



## FCC RADIO TEST REPORT

**Report Reference No.** ..... : ATS-2011NT09218867F

Compiled by (+ signature) ..... Tom Zhang

Approved by (+ signature) ..... Bovey Yang

**Applicant's name** ..... : Amphony Corp.

Address ..... : 1006 S. Raven Rd.

**Manufacturer's Name** ..... : Amphony Corp.

Address ..... : 1006 S. Raven Rd.

### **Test specification:**

Standard ..... : FCC Part15.247

Test procedure ..... : ANSI C63.4-2003

### **Test item description**

Product name ..... : Audio receiver

FCC ID ..... : PMJRX1

Trademark ..... : Amphony

Model and/or type reference ..... : RX1

Rating(s) ..... : DC 9V from adapter

### **Testing** .....

Date of receipt of test item ..... : 20 Sep. 2011

Date (s) of performance of tests ..... : 21 Sep. 2011 ~9 Oct. 2011

Date of Issue ..... : 10 Oct. 2011

Test Result ..... : **Pass**

**Table of Contents**

	Page
<b>1 . SUMMARY OF TEST RESULTS</b>	<b>5</b>
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
<b>2 . GENERAL INFORMATION</b>	<b>7</b>
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	9
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	9
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	12
<b>3 . EMC EMISSION TEST</b>	<b>13</b>
3.1 CONDUCTED EMISSION MEASUREMENT	13
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	13
3.1.2 TEST PROCEDURE	14
3.1.3 DEVIATION FROM TEST STANDARD	14
3.1.4 TEST SETUP	14
3.1.5 EUT OPERATING CONDITIONS	14
3.1.6 TEST RESULTS	15
3.2 RADIATED EMISSION MEASUREMENT	17
3.2.1 RADIATED EMISSION LIMITS	17
3.2.2 TEST PROCEDURE	18
3.2.3 DEVIATION FROM TEST STANDARD	18
3.2.4 TEST SETUP	19
3.2.5 EUT OPERATING CONDITIONS	20
3.2.6 TEST RESULTS (BELOW 30 MHZ)	21
3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)	22
3.2.8 TEST RESULTS (ABOVE 1000 MHZ)	24
<b>4 . NUMBER OF HOPPING CHANNEL</b>	<b>30</b>
4.1 APPLIED PROCEDURES / LIMIT	30
4.1.1 TEST PROCEDURE	30
4.1.2 DEVIATION FROM STANDARD	30
4.1.3 TEST SETUP	30
4.1.4 EUT OPERATION CONDITIONS	30
4.1.5 TEST RESULTS	31
<b>5 . AVERAGE TIME OF OCCUPANCY</b>	<b>32</b>
5.1 APPLIED PROCEDURES / LIMIT	32

**Table of Contents**

	Page
5.1.1 TEST PROCEDURE	32
5.1.2 DEVIATION FROM STANDARD	32
5.1.3 TEST SETUP	33
5.1.4 EUT OPERATION CONDITIONS	33
5.1.5 TEST RESULTS	34
<b>6 . HOPPING CHANNEL SEPARATION MEASUREMENT</b>	<b>35</b>
6.1 APPLIED PROCEDURES / LIMIT	35
6.1.1 TEST PROCEDURE	35
6.1.2 DEVIATION FROM STANDARD	35
6.1.3 TEST SETUP	35
6.1.4 EUT OPERATION CONDITIONS	35
6.1.5 TEST RESULTS	36
<b>7 . BANDWIDTH TEST</b>	<b>37</b>
7.1 APPLIED PROCEDURES / LIMIT	37
7.1.1 TEST PROCEDURE	37
7.1.2 DEVIATION FROM STANDARD	37
7.1.3 TEST SETUP	37
7.1.4 EUT OPERATION CONDITIONS	37
7.1.5 TEST RESULTS	38
<b>8 . PEAK OUTPUT POWER TEST</b>	<b>40</b>
8.1 APPLIED PROCEDURES / LIMIT	40
8.1.1 TEST PROCEDURE	40
8.1.2 DEVIATION FROM STANDARD	40
8.1.3 TEST SETUP	40
8.1.4 EUT OPERATION CONDITIONS	40
8.1.5 TEST RESULTS	41
<b>9 . ANTENNA CONDUCTED SPURIOUS EMISSION</b>	<b>43</b>
9.1 APPLIED PROCEDURES / LIMIT	43
9.1.1 TEST PROCEDURE	43
9.1.2 DEVIATION FROM STANDARD	43
9.1.3 TEST SETUP	44
9.1.4 EUT OPERATION CONDITIONS	44
9.1.5 TEST RESULTS	45
9.1.6 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)	47
<b>10 . RF EXPOSURE TEST</b>	<b>49</b>
10.1 APPLIED PROCEDURES / LIMIT	49
10.1.1 MPE CALCULATION METHOD	50
10.1.2 TEST RESULTS	50
<b>11 . EUT TEST PHOTO</b>	<b>51</b>

**Table of Contents****Page****APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS**

## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

<b>FCC Part15 (15.247) , Subpart C</b>			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(c)	Antenna conducted Spurious Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(b)(1)	Number of Hopping Frequency	PASS	
15.247(a)(1)	Dwell Time	PASS	
15.205	Restricted Bands	PASS	
15.203	Antenna Requirement	PASS	

**NOTE:**

(1)" N/A" denotes test is not applicable in this Test Report

## 1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC FRN Registration Number:238937; IC Registration Number:9270A-1

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$  , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$  , providing a level of confidence of approximately **95 %** .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	Radiated Emission Test	$\pm 3.17\text{dB}$
3	RF power,conducted	$\pm 0.16\text{dB}$
4	Spurious emissions,conducted	$\pm 0.21\text{dB}$
5	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
6	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Audio receiver																
Trade Name	Amphony																
Model Name	RX1																
OEM Brand/Model Name	N/A																
Model Difference	N/A																
Product Description	<p>The EUT is a Audio receiver</p> <table border="1"><tr><td>Operation Frequency:</td><td>2405.75.~2477.75 MHz</td></tr><tr><td>Modulation Type:</td><td>FHSS</td></tr><tr><td>Bit Rate of Transmitter</td><td>FSK</td></tr><tr><td>Number Of Channel</td><td>18 CH</td></tr><tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr><tr><td>Antenna Gain(Peak)</td><td>1dBi</td></tr><tr><td>Output Power(Conducted):</td><td>13.22 dBm (Max.)</td></tr><tr><td>EIRP:</td><td>14.22 dBm (Max.)</td></tr></table> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</p>	Operation Frequency:	2405.75.~2477.75 MHz	Modulation Type:	FHSS	Bit Rate of Transmitter	FSK	Number Of Channel	18 CH	Antenna Designation:	Please see Note 3.	Antenna Gain(Peak)	1dBi	Output Power(Conducted):	13.22 dBm (Max.)	EIRP:	14.22 dBm (Max.)
Operation Frequency:	2405.75.~2477.75 MHz																
Modulation Type:	FHSS																
Bit Rate of Transmitter	FSK																
Number Of Channel	18 CH																
Antenna Designation:	Please see Note 3.																
Antenna Gain(Peak)	1dBi																
Output Power(Conducted):	13.22 dBm (Max.)																
EIRP:	14.22 dBm (Max.)																
Channel List	Please refer to the Note 2.																
Power Source	DC Voltage supplied																
Power Rating	DC 9V																
Connecting I/O Port(s)	Please refer to the User's Manual																
Products Covered	N/A																

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.

3.

## Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Printed Antenna	NA	1.0	

## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH1
Mode 2	CH9
Mode 3	CH18

For Conducted Emission	
Final Test Mode	Description
Mode 1	CH1

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH1
Mode 2	CH9
Mode 3	CH18

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT use new battery.

## 2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: N/A		
Frequency	2405.75 MHz	2441.75 MHz	2477.75 MHz
Parameters	DEF	DEF	DEF

**2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**

Mode 1:



## 2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Audio receiver	Amphony	RX1	N/A	EUT
E-2	Adapter	N/A	LK-DC 090025	N/A	
E-3	Sound box	N/A	AS508	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	150cm	
C-2	NO	NO	100cm	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

## 2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

### Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	160400005	Jul. 06. 2012
2	Test Receiver	R&S	ESPI	101318	Jul. 06. 2012
3	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06. 2012
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	Jul. 06. 2012
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	Jul. 06. 2012
6	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06. 2012
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	Jul. 06. 2012
8	Amplifier	EM	EM-30180	060538	Jul. 06. 2012
9	Loop Antenna	ARA	PLA-1030/B	1029	Jul. 06. 2012
10	Power Meter	R&S	NRVS	100696	Jul. 06. 2012

### Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Test Receiver	R&S	ESCI	101160	Jul. 06. 2012
2	LISN	R&S	ENV216	101313	Jul. 06. 2012
3	LISN	EMCO	3816/2	00042990	Jul. 06. 2012
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	Jul. 06. 2012
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	Jul. 06. 2012
6	Absorbing clamp	R&S	MOS-21	100423	Jul. 06. 2012

### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

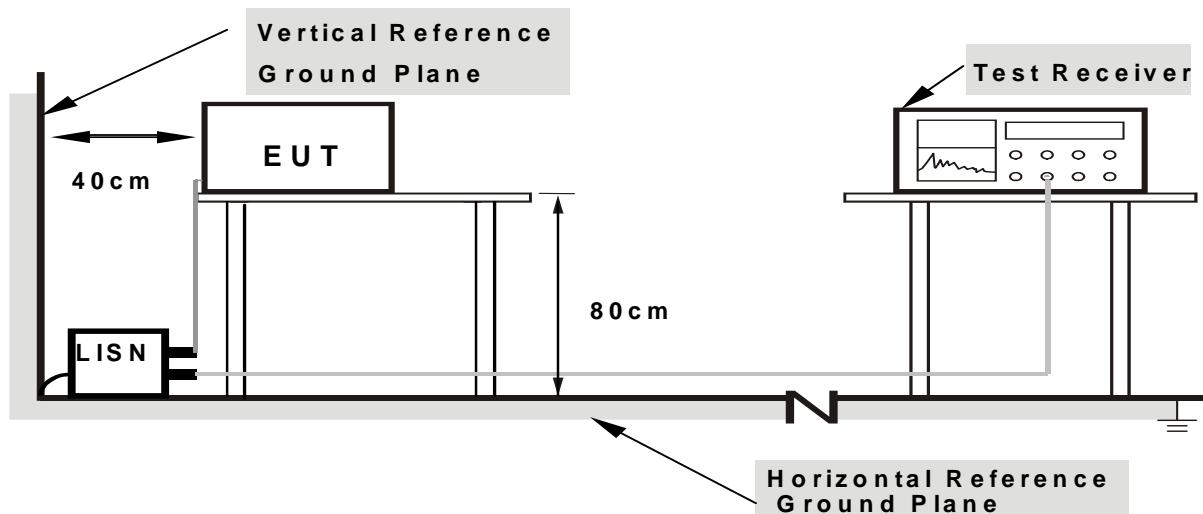
### 3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

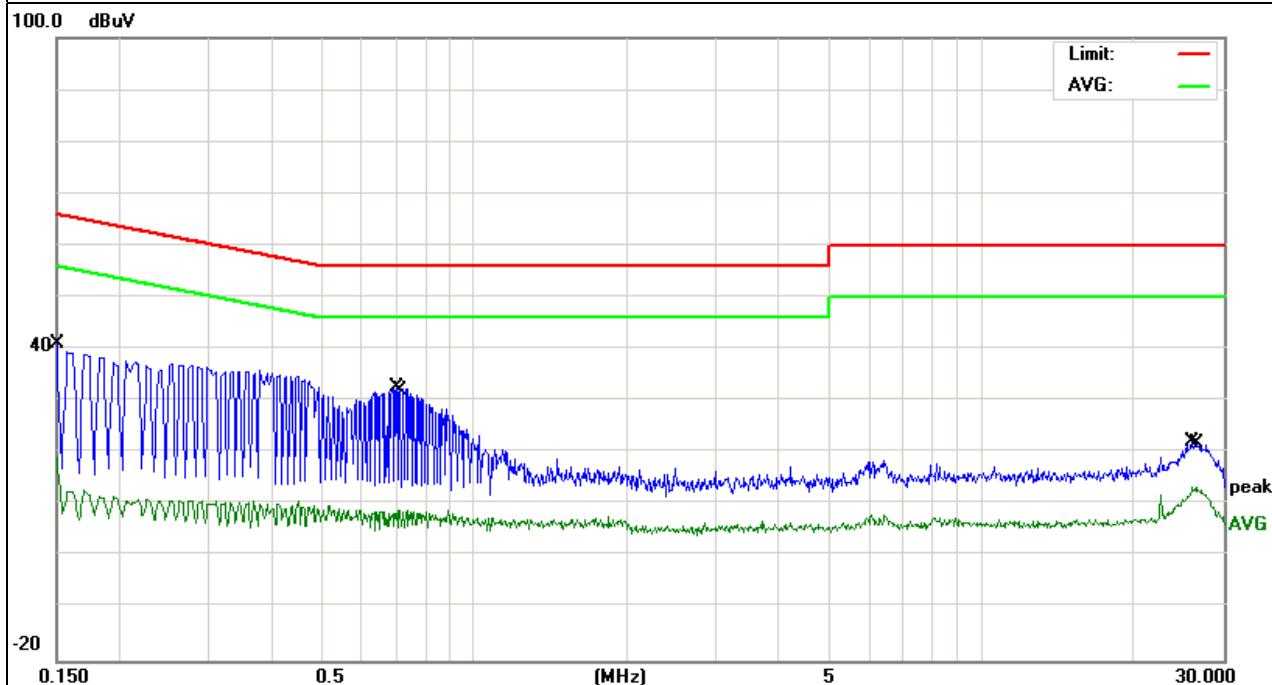
### 3.1.6 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Date :	2011-9-25
Test Mode :	TX	Phase :	Line
Test Voltage :	DC 9V from adapter AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)	
0.1499	29.47	11.5	40.97	66	-25.03	QP
0.1499	7.79	11.5	19.29	56	-36.71	AVG
0.7019	22.2	10.4	32.6	56	-23.4	QP
0.714	1.45	10.4	11.95	46	-35.05	AVG
26.054	11.29	10.78	22.07	60	-37.93	AVG
26.626	2.85	10.73	13.58	50	-36.42	QP

#### Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '\*' means the worst case

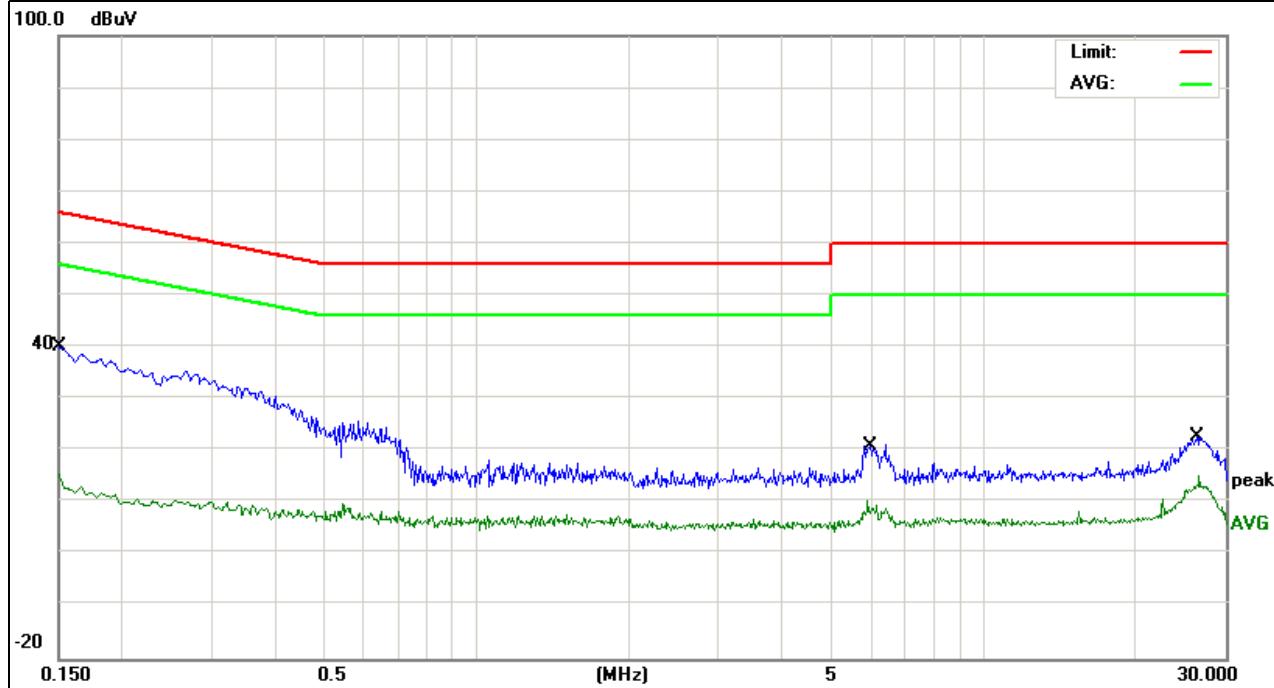


EUT :	Audio receiver	Model Name :	RX1
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Date :	2011-9-25
Test Mode :	TX	Phase :	Neutral
Test Voltage :	DC 9V from adapter AC 120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)	
0.15	28.44	11.64	40.08	65.99	-25.91	AVG
0.15	4.01	11.64	15.65	55.99	-40.34	QP
5.91	0.26	10.66	10.4	50	-39.6	AVG
5.966	10.19	10.66	20.85	60	-39.15	QP
26.374	12.08	10.68	22.76	60	-37.24	QP
26.626	4.61	10.65	15.26	50	-34.74	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '\*' means the worst case



### 3.2 RADIATED EMISSION MEASUREMENT

#### 3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

#### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

### 3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

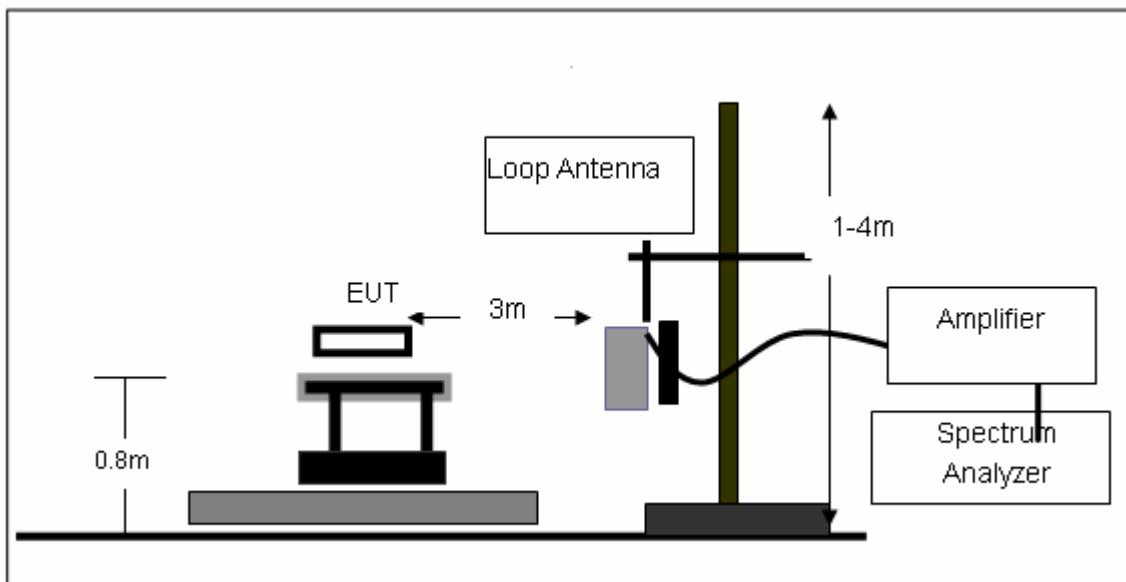
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

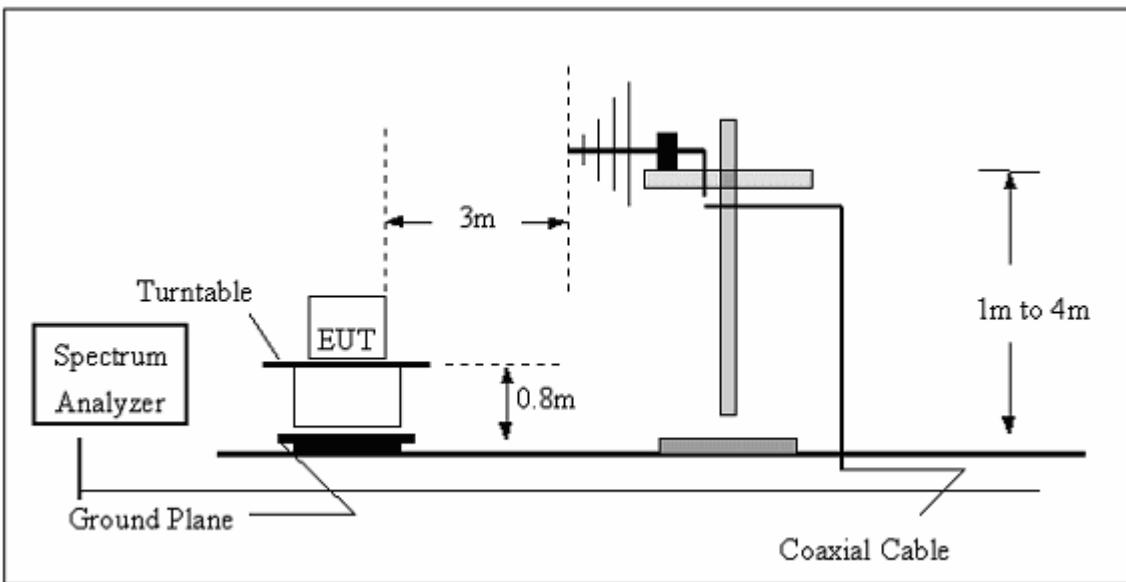
No deviation

### 3.2.4 TEST SETUP

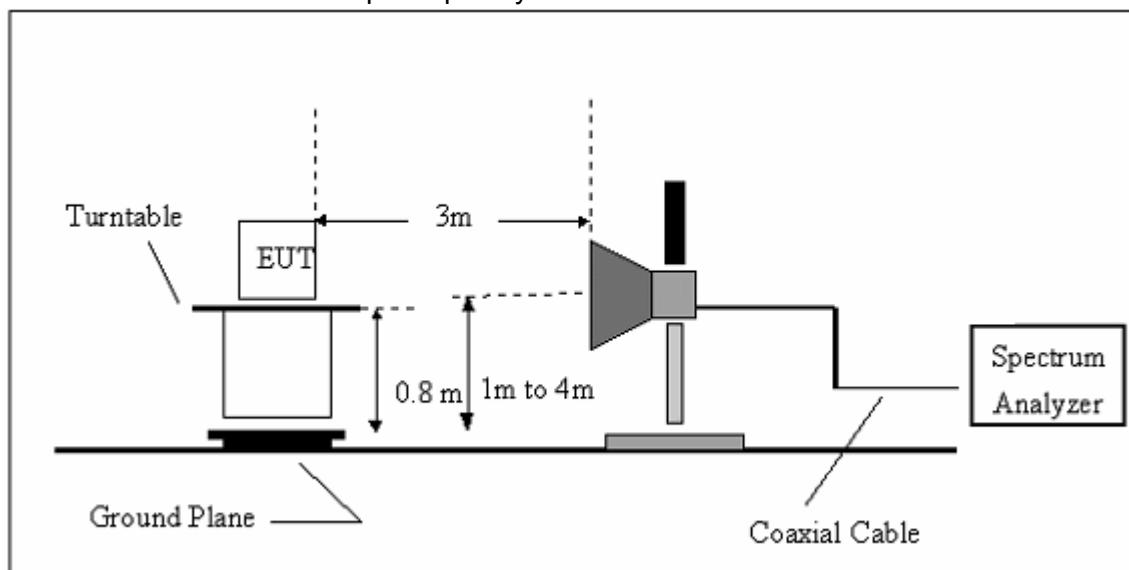
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



## (C) Radiated Emission Test-Up Frequency Above 1GHz

**3.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX	Polarization :	Horizontal

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

**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 = $20 \log \left( \frac{\text{specific distance}}{\text{test distance}} \right) \text{dB}$ ;  
Limit line = specific limits(dBuV) + distance extrapolation factor.

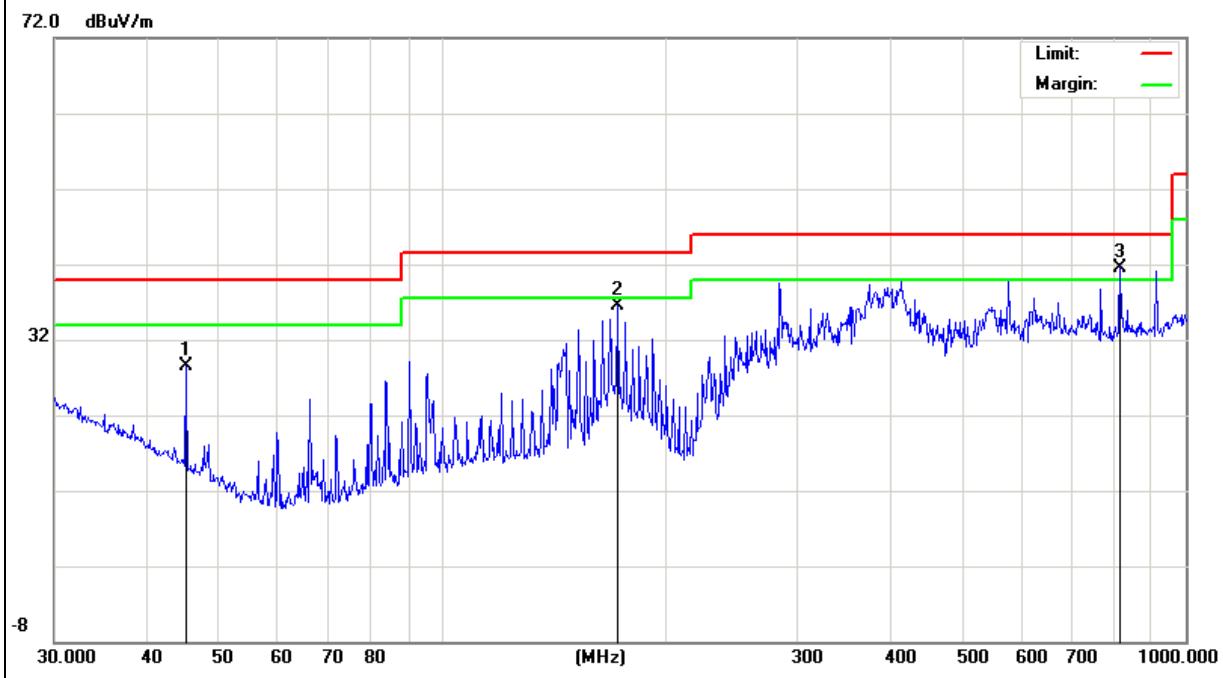
### 3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX		

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
45.0583	17.93	10.58	28.51	40	-11.49	QP
171.9944	26.55	9.89	36.44	43.5	-7.06	QP
815.9678	17.24	24.36	41.6	46	-4.4	QP

Remark:

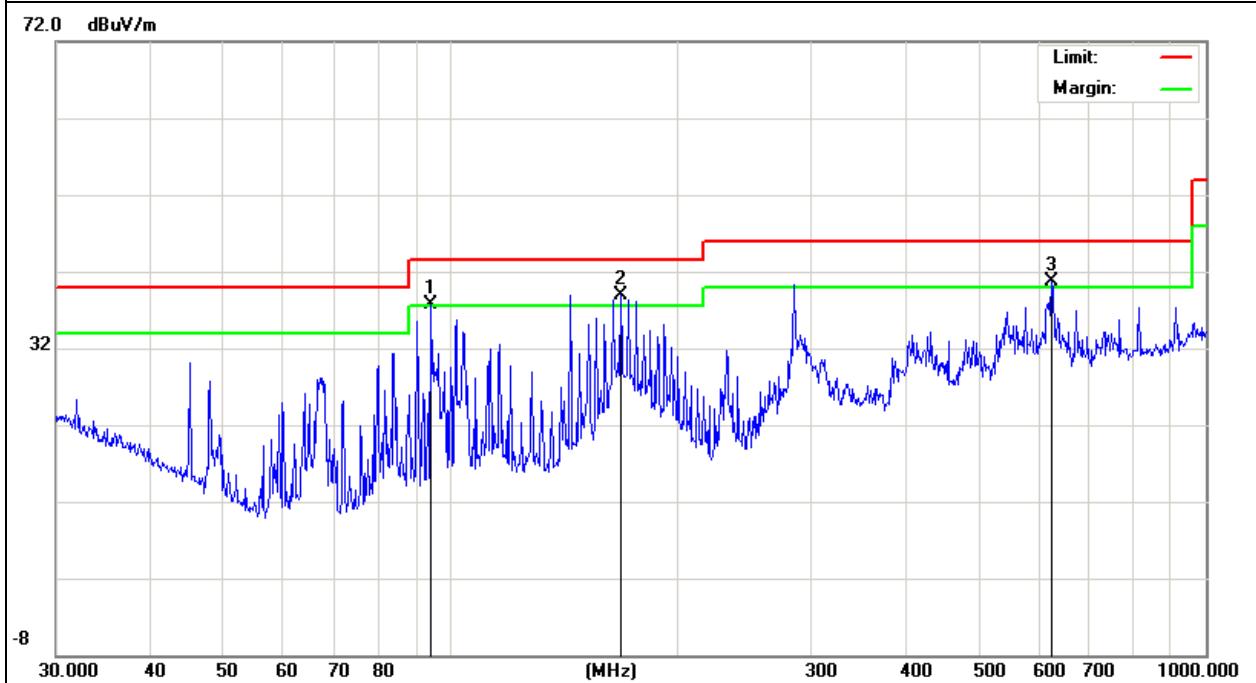
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX		

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
94.0978	27.91	9.89	37.8	43.5	-5.7	QP
167.824	28.67	10.21	38.88	43.5	-4.62	QP
625.0778	18.7	22	40.7	46	-5.3	QP

**Remark:**

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.


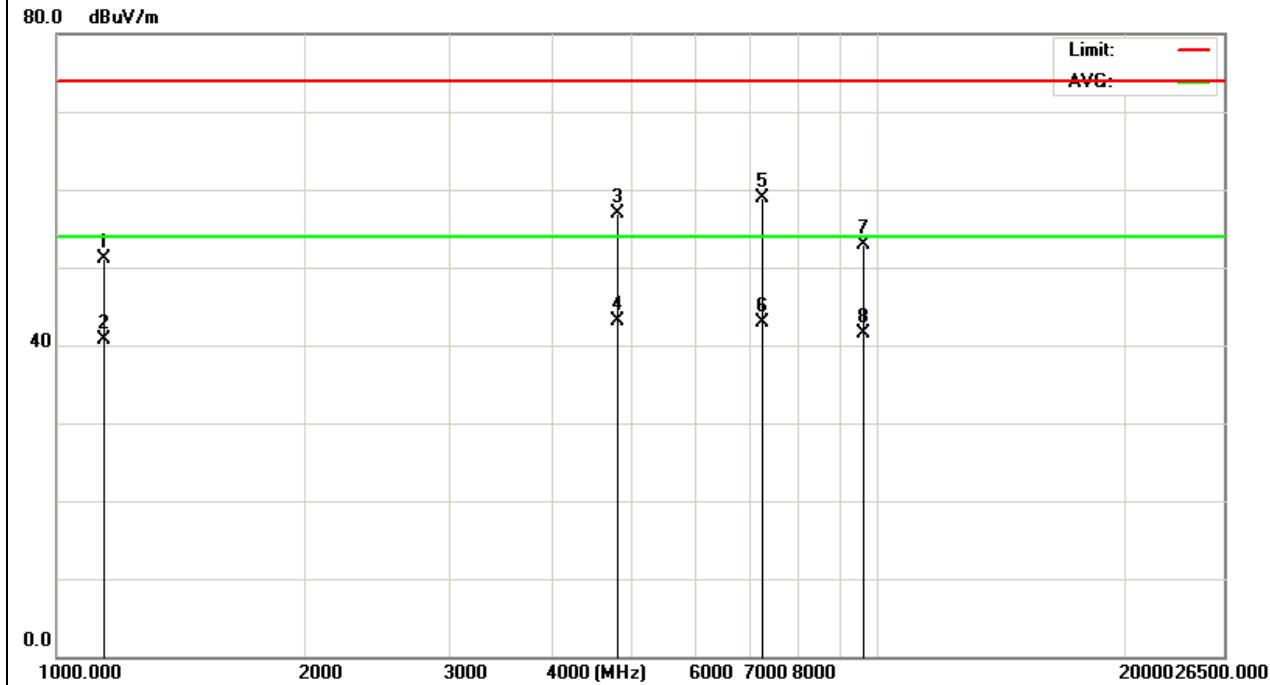
### 3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2405.75MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1143.2	55.85	-4.69	51.16	74	-22.84	peak
1143.2	45.33	-4.69	40.64	54	-13.36	AVG
4810.62	46.52	10.41	56.93	74	-17.07	peak
4810.62	32.74	10.41	43.15	54	-10.85	AVG
7215.94	46.52	12.39	58.91	74	-15.09	peak
7215.94	30.48	12.39	42.87	54	-11.13	AVG
9623.14	36.88	16.06	52.94	74	-21.06	peak
9623.14	25.45	16.06	41.51	54	-12.49	AVG

#### Remark:

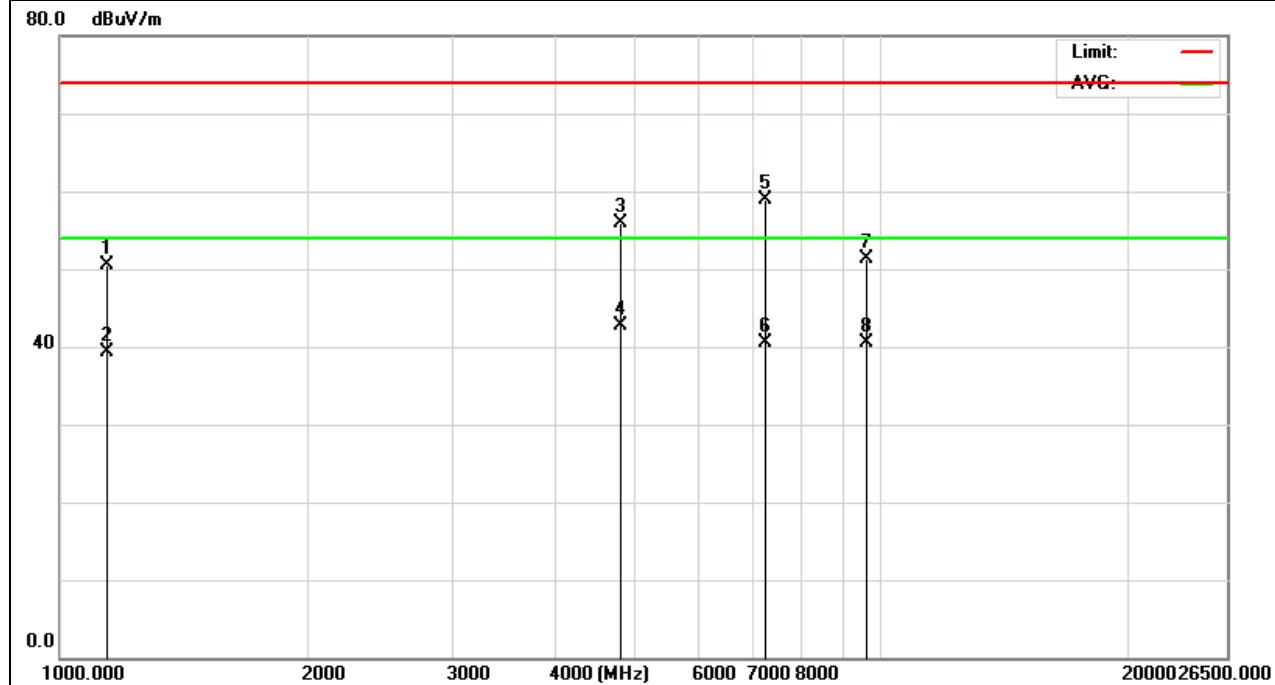
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2405.75MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1143.2	55.1	-4.69	50.41	74	-23.59	peak
1143.2	44.03	-4.69	39.34	54	-14.66	AVG
4810.62	45.53	10.41	55.94	74	-18.06	peak
4810.62	32.23	10.41	42.64	54	-11.36	AVG
7215.94	46.52	12.39	58.91	74	-15.09	peak
7215.94	28.09	12.39	40.48	54	-13.52	AVG
9623.14	35.33	16.06	51.39	74	-22.61	peak
9623.14	24.48	16.06	40.54	54	-13.46	AVG

**Remark:**

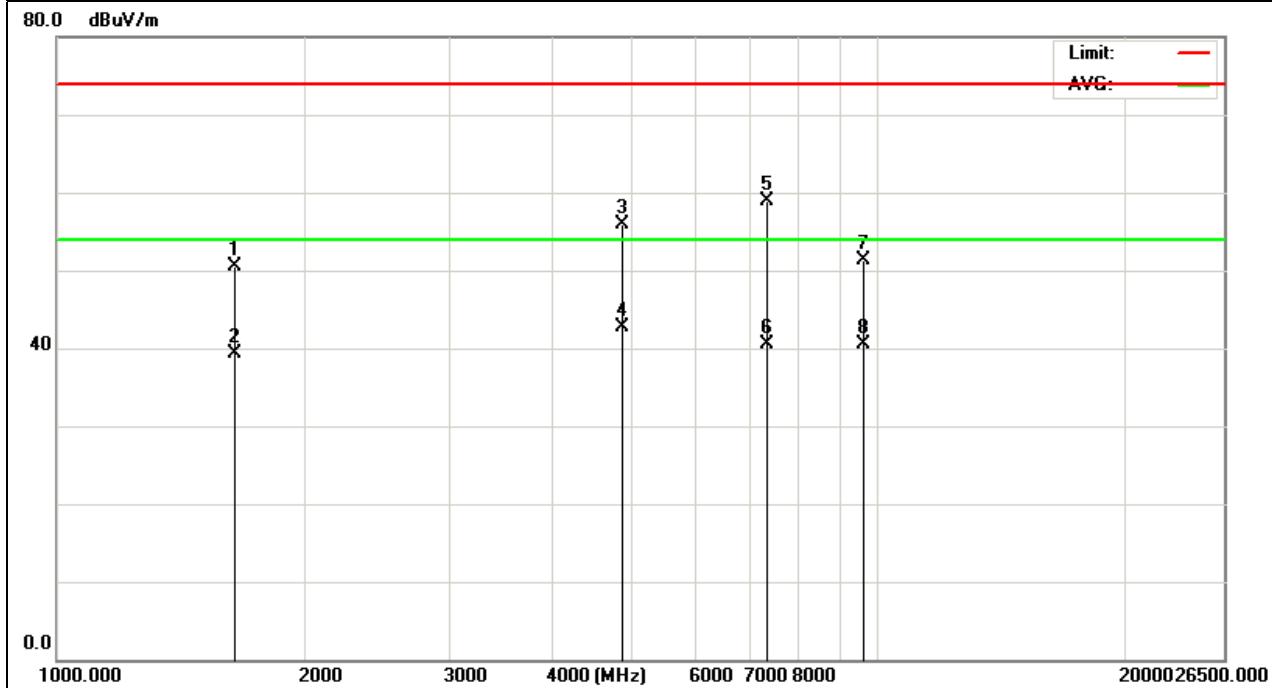
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.


EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2441.75MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1645.32	53.46	-3.05	50.41	74	-23.59	peak
1645.32	42.39	-3.05	39.34	54	-14.66	AVG
4882.16	45.58	10.36	55.94	74	-18.06	peak
4882.16	32.28	10.36	42.64	54	-11.36	AVG
7323.45	46.14	12.77	58.91	74	-15.09	peak
7323.45	27.71	12.77	40.48	54	-13.52	AVG
9623.14	35.33	16.06	51.39	74	-22.61	peak
9623.14	24.48	16.06	40.54	54	-13.46	AVG

**Remark:**

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

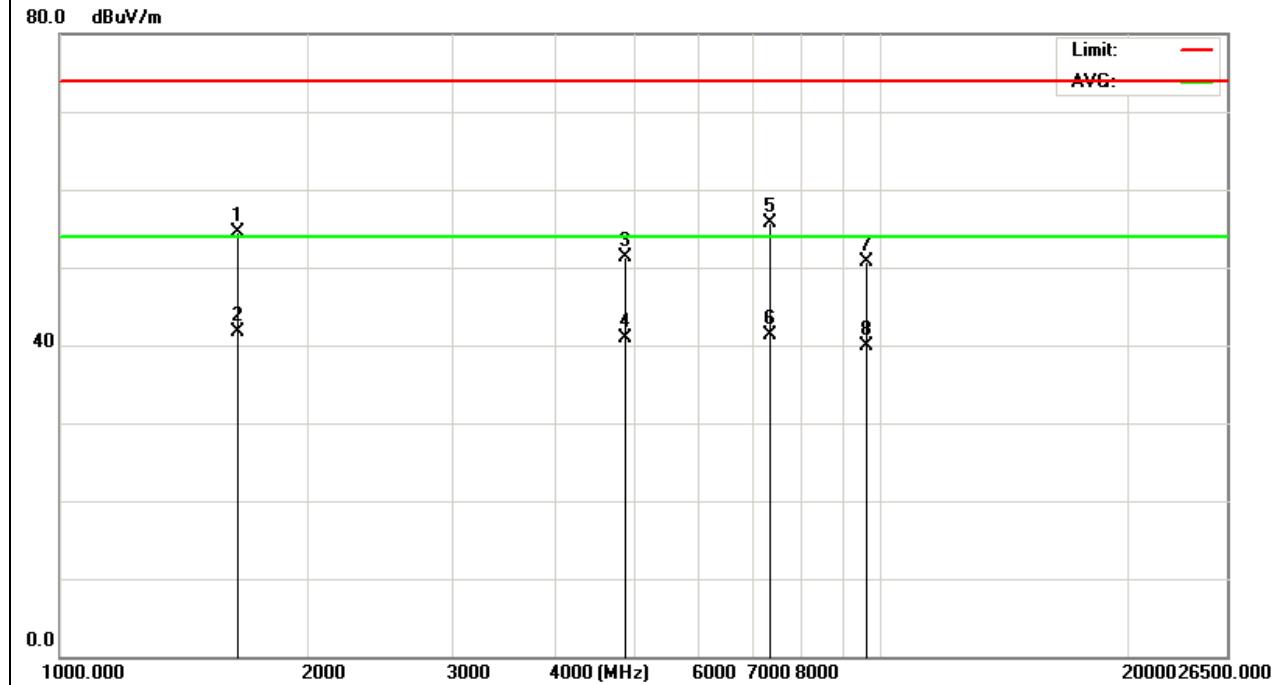


EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2441.75MHz	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1645.32	57.61	-3.05	54.56	74	-19.44	peak
1645.32	44.83	-3.05	41.78	54	-12.22	AVG
4882.16	40.88	10.36	51.24	74	-22.76	peak
4882.16	30.61	10.36	40.97	54	-13.03	AVG
7323.45	42.97	12.77	55.74	74	-18.26	peak
7323.45	28.51	12.77	41.28	54	-12.72	AVG
9623.14	34.58	16.06	50.64	74	-23.36	peak
9623.14	23.81	16.06	39.87	54	-14.13	AVG

**Remark:**

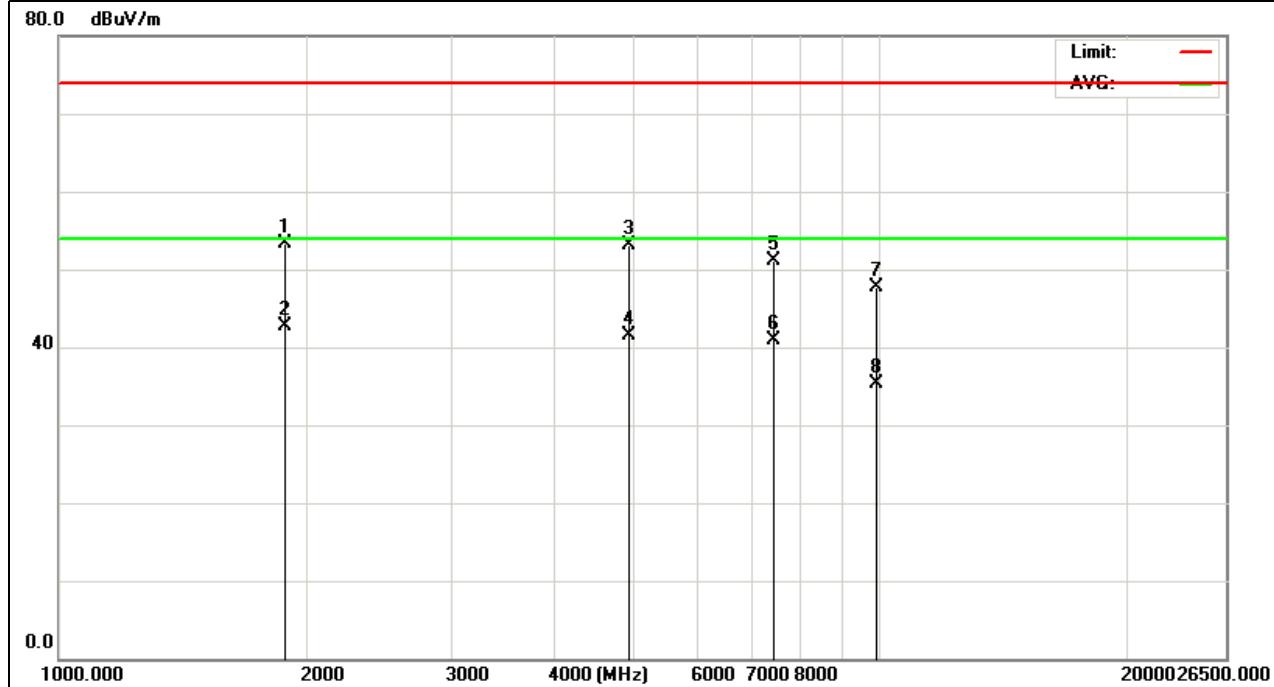
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2477.75MHz	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
1884.32	55.17	-1.89	53.28	74	-20.72	peak
1884.32	44.5	-1.89	42.61	54	-11.39	AVG
4954.81	42.67	10.49	53.16	74	-20.84	peak
4954.81	30.92	10.49	41.41	54	-12.59	AVG
7431.66	37.99	13.03	51.02	74	-22.98	peak
7431.66	27.94	13.03	40.97	54	-13.03	AVG
9911.54	31.44	16.2	47.64	74	-26.36	peak
9911.54	19.14	16.2	35.34	54	-18.66	AVG

**Remark:**

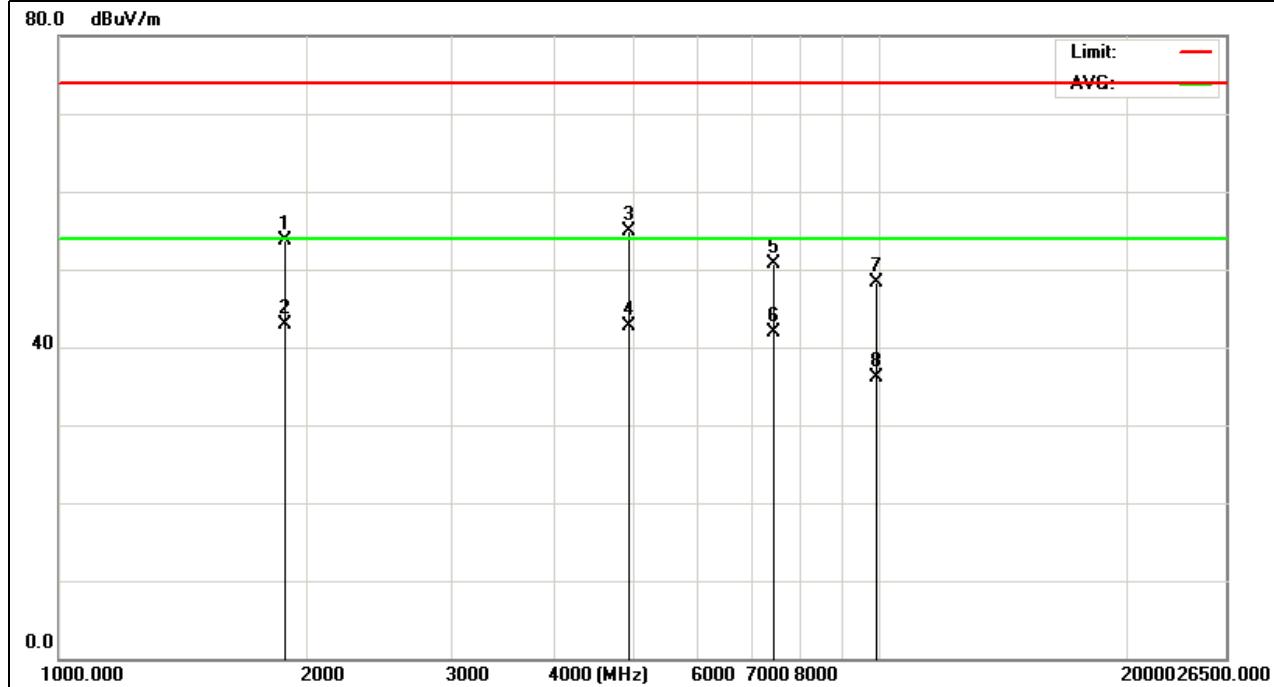
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.


EUT :	Audio receiver	Model Name :	RX1
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	TX 2477.75MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
1884.32	55.55	-1.89	53.66	74	-20.34	peak
1884.32	44.86	-1.89	42.97	54	-11.03	AVG
4954.81	44.48	10.49	54.97	74	-19.03	peak
4954.81	32.26	10.49	42.75	54	-11.25	AVG
7431.66	37.63	13.03	50.66	74	-23.34	peak
7431.66	28.88	13.03	41.91	54	-12.09	AVG
9911.54	32.08	16.2	48.28	74	-25.72	peak
9911.54	19.91	16.2	36.11	54	-17.89	AVG

**Remark:**

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



## 4. NUMBER OF HOPPING CHANNEL

### 4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Number of Hopping Channel	2400-2483.5	PASS

According to §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. According to §15.247(b)(1), 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.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 4.1.1 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= 100KHz, VBW=100KHz, Sweep time = Auto.

#### 4.1.2 DEVIATION FROM STANDARD

No deviation.

#### 4.1.3 TEST SETUP



#### 4.1.4 EUT OPERATION CONDITIONS

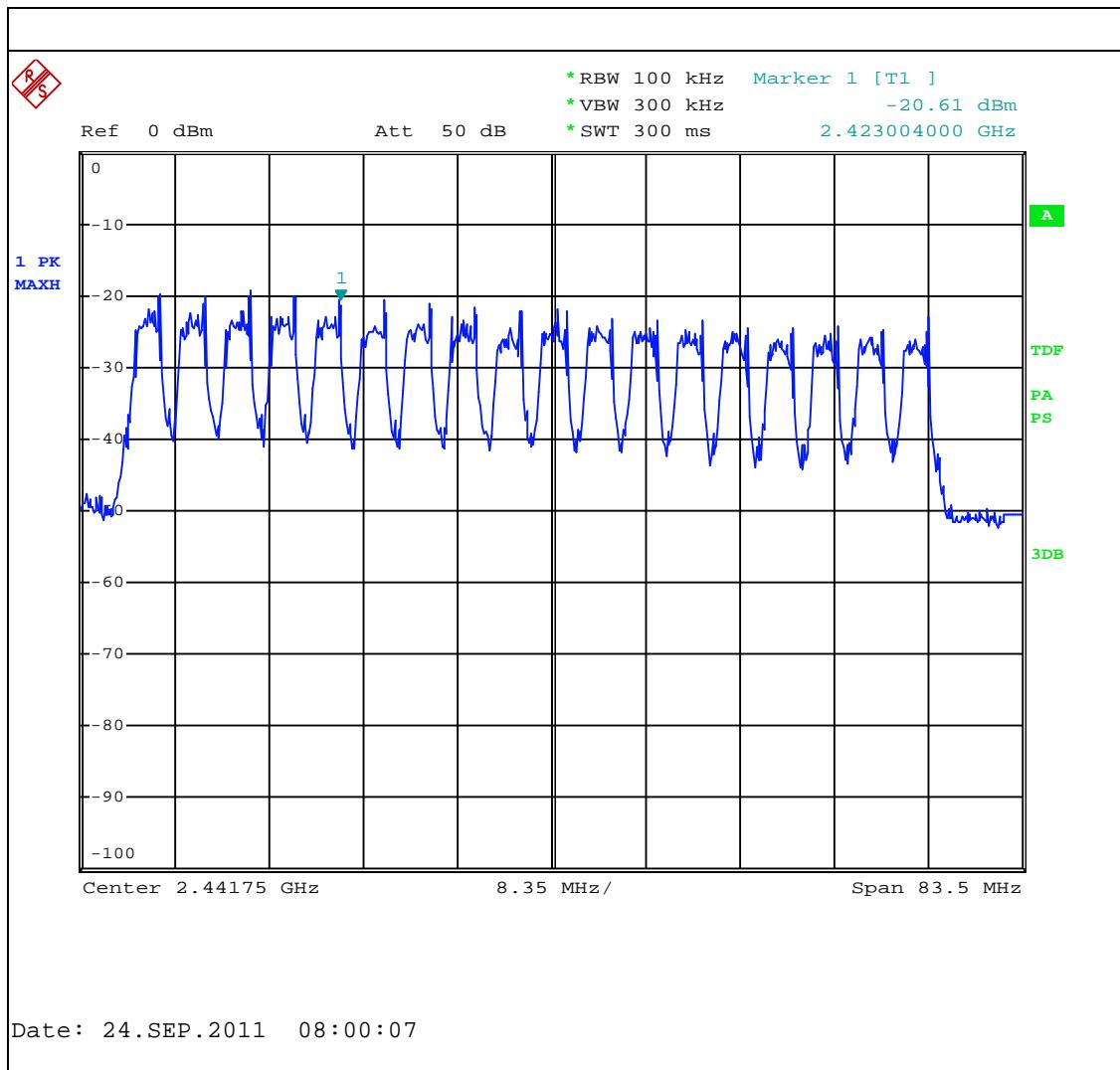
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

#### 4.1.5 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	Hopping Mode		

-Complied

Frequency (MHz)	Number of hopping channel	Limit
2405.75~2477.75	18	≥15



## 5. AVERAGE TIME OF OCCUPANCY

### 5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C

Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

#### 5.1.1 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

### 5.1.3 TEST SETUP



### 5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

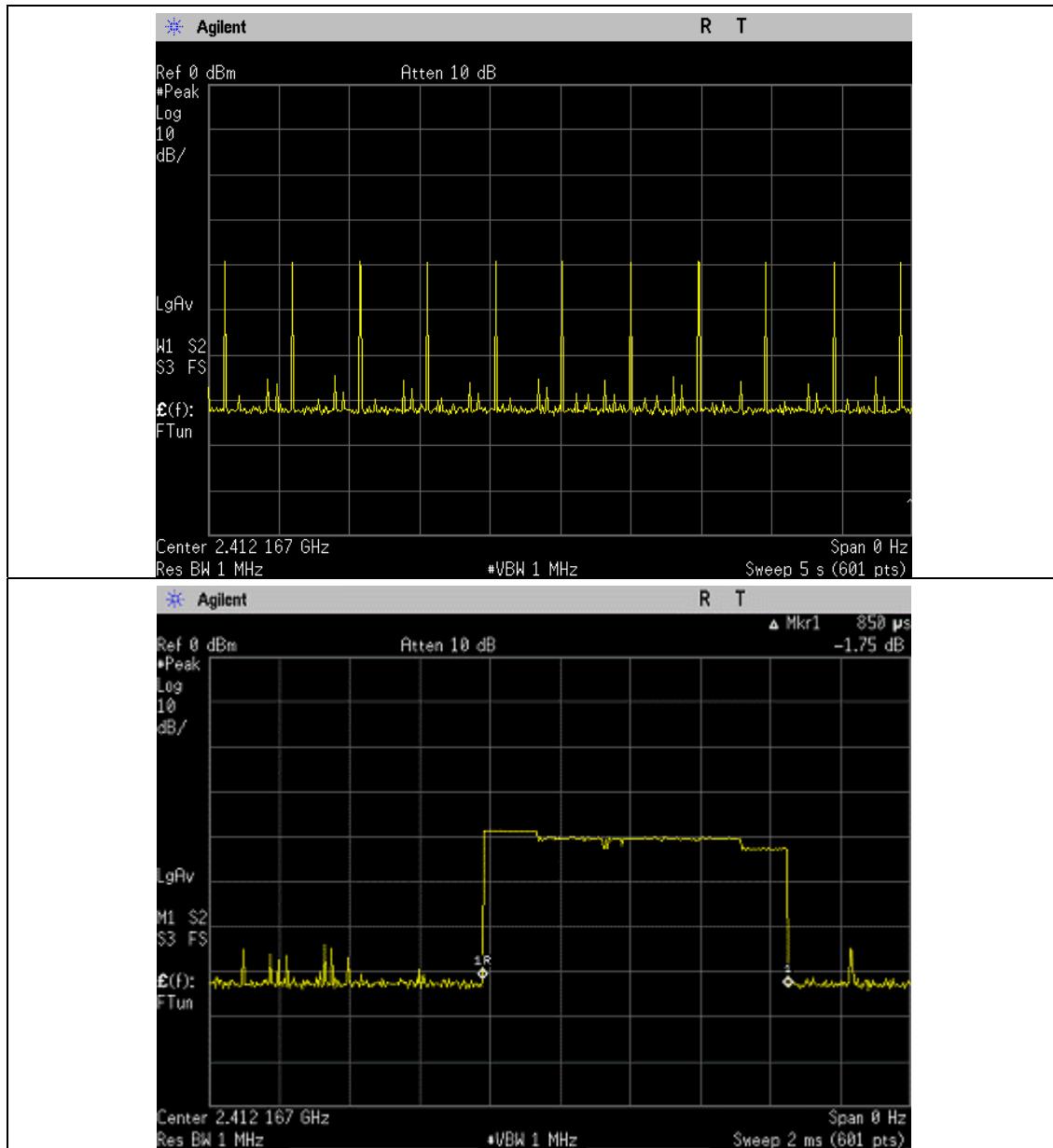
### 5.1.5 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz

This system hopping 11 hops in any 5s, and for each hop it transmit 1 pulses, the pulse dwell are 0.850ms, so the dwell times are:

$$11/5*18*0.4*0.850=13.46ms$$

dwell time	Limit	Conclusion
13.46ms	<400ms	PASS



## 6. HOPPING CHANNEL SEPARATION MEASUREMENT

### 6.1 APPLIED PROCEDURES / LIMIT

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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

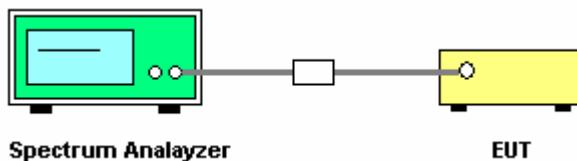
#### 6.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



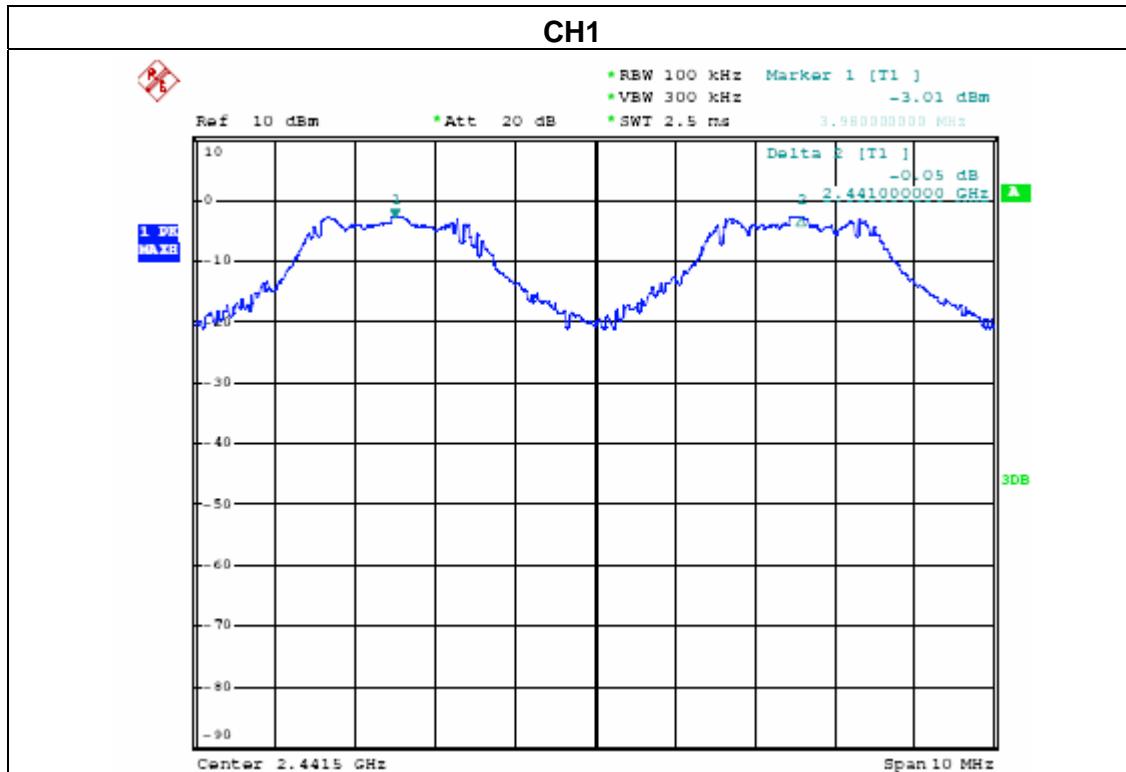
#### 6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

### 6.1.5 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1		

Frequency	Ch. Separation (MHz)	Result
2405.75 MHz	3980	Complies



## 7. BANDWIDTH TEST

### 7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(2)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 7.1.1 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= 100KHz, VBW=300KHz, Sweep time = Auto.

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

#### 7.1.3 TEST SETUP



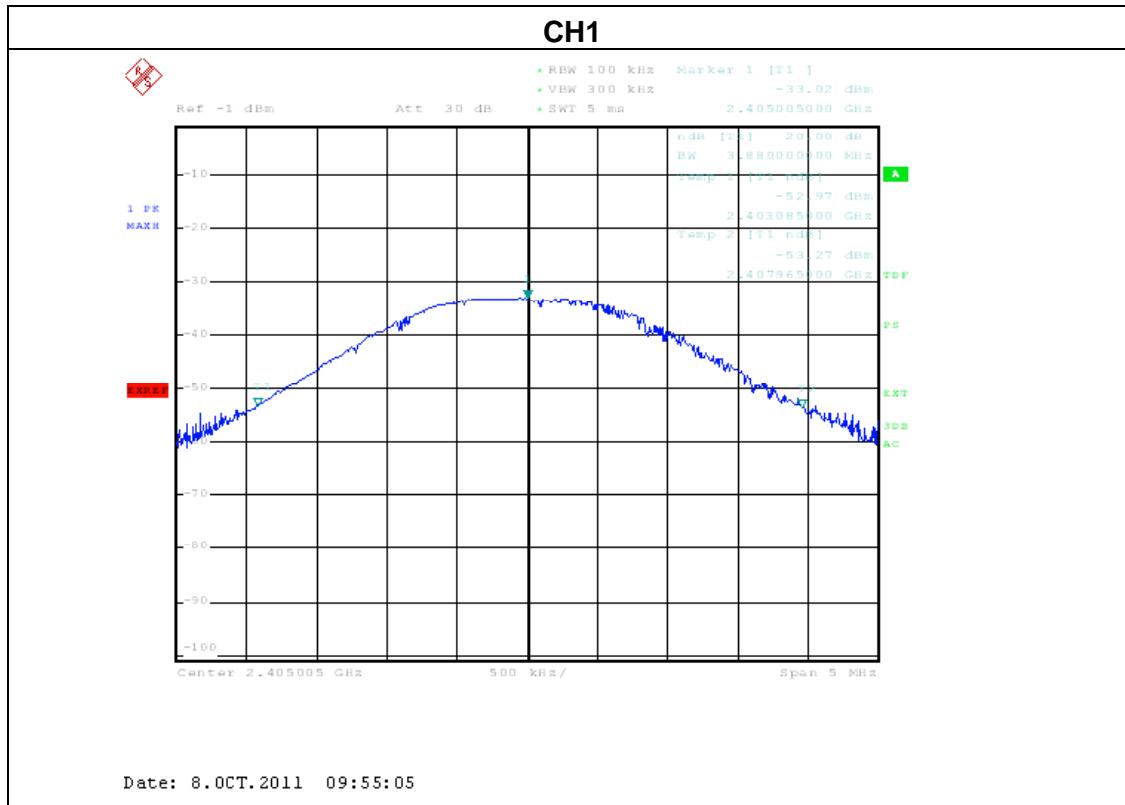
#### 7.1.4 EUT OPERATION CONDITIONS

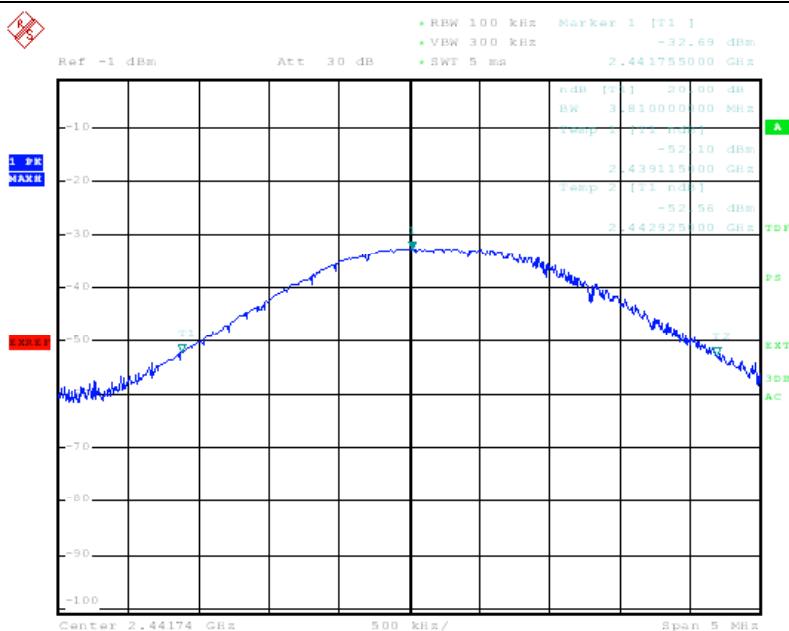
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 7.1.5 TEST RESULTS

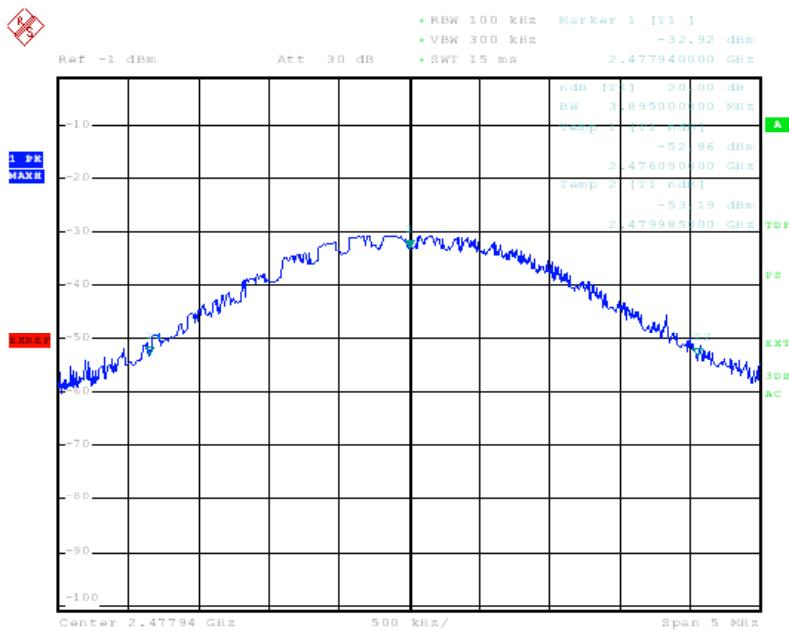
EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH9 /CH18		

Frequency	20dB Bandwidth (MHz)	Result
2405.75 MHz	3.88	PASS
2441.75 MHz	3.81	PASS
2477.75 MHz	3.89	PASS



**CH9**


Date: 8.OCT.2011 10:00:28

**CH18**


Date: 8.OCT.2011 10:03:56

## 8. PEAK OUTPUT POWER TEST

### 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C

Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(1)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

#### 8.1.1 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= 4MHz, VBW= 4MHz, Sweep time = Auto.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP



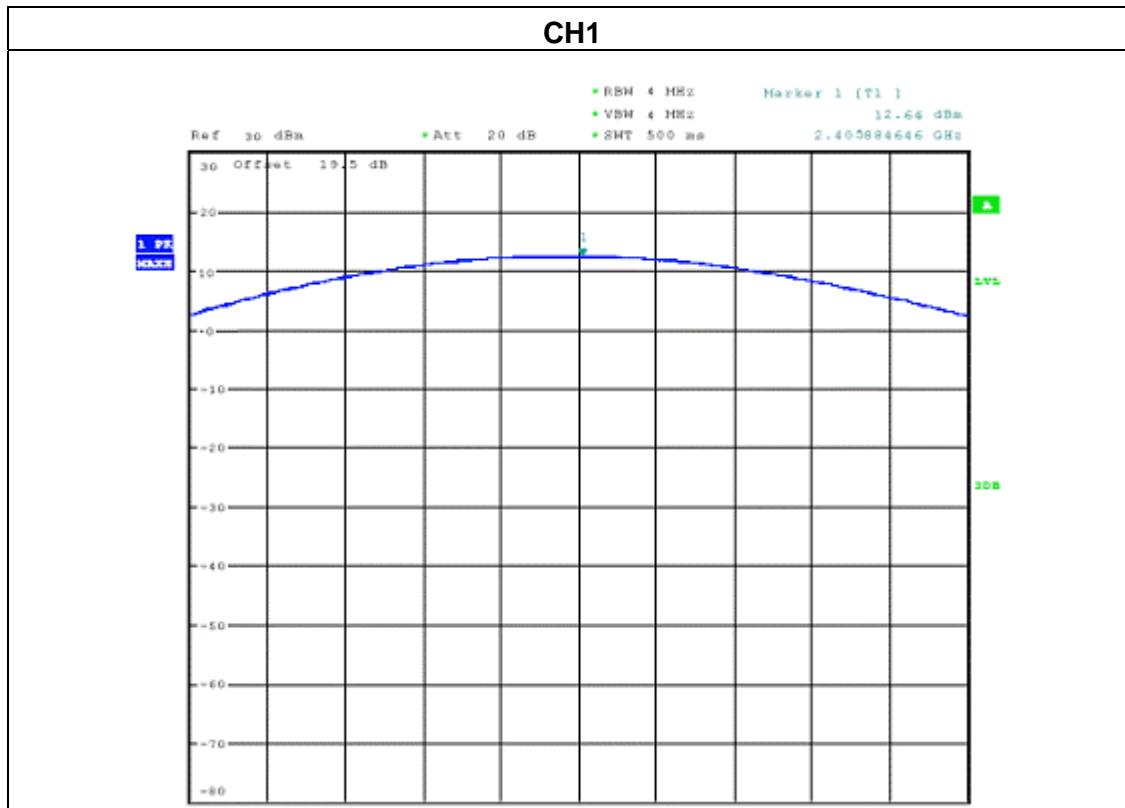
#### 8.1.4 EUT OPERATION CONDITIONS

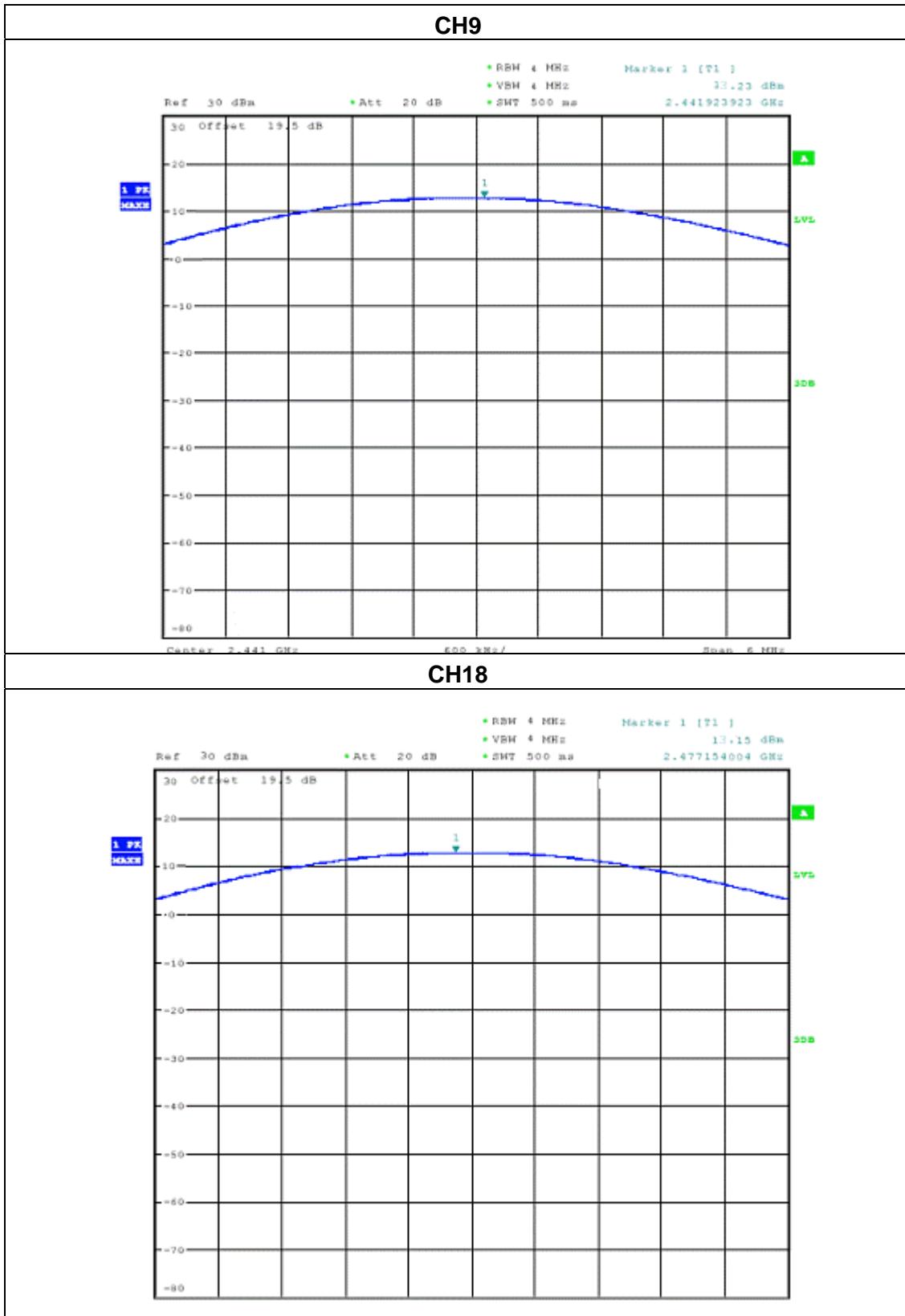
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 8.1.5 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH9 /CH18		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH1	2405.75	12.64	30	1
CH9	2441.75	13.22	30	1
CH18	2477.75	13.15	30	1





## 9. ANTENNA CONDUCTED SPURIOUS EMISSION

### 9.1 APPLIED PROCEDURES / LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100 KHz /100 KHz for Peak

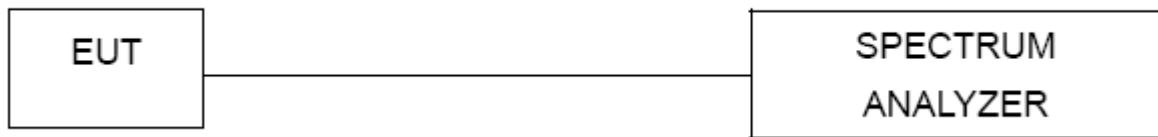
#### 9.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

#### 9.1.2 DEVIATION FROM STANDARD

No deviation.

### 9.1.3 TEST SETUP

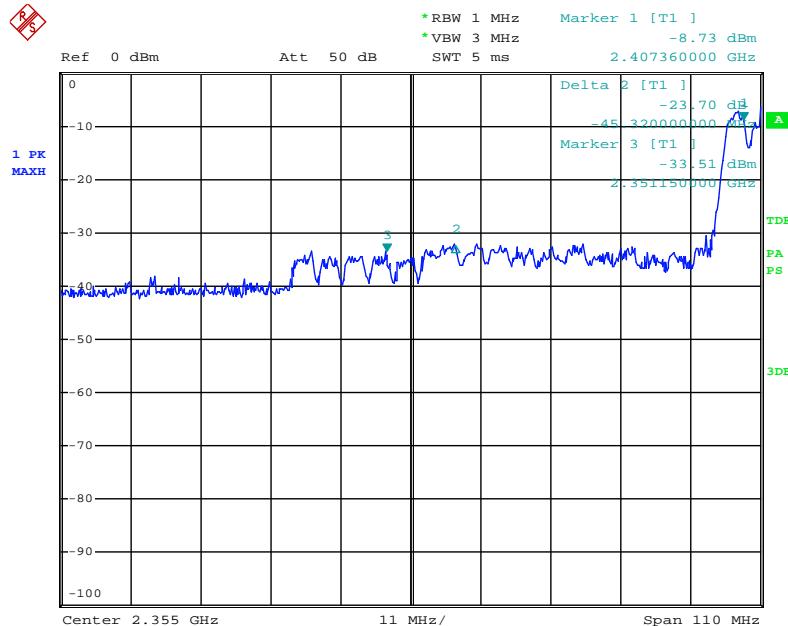


### 9.1.4 EUT OPERATION CONDITIONS

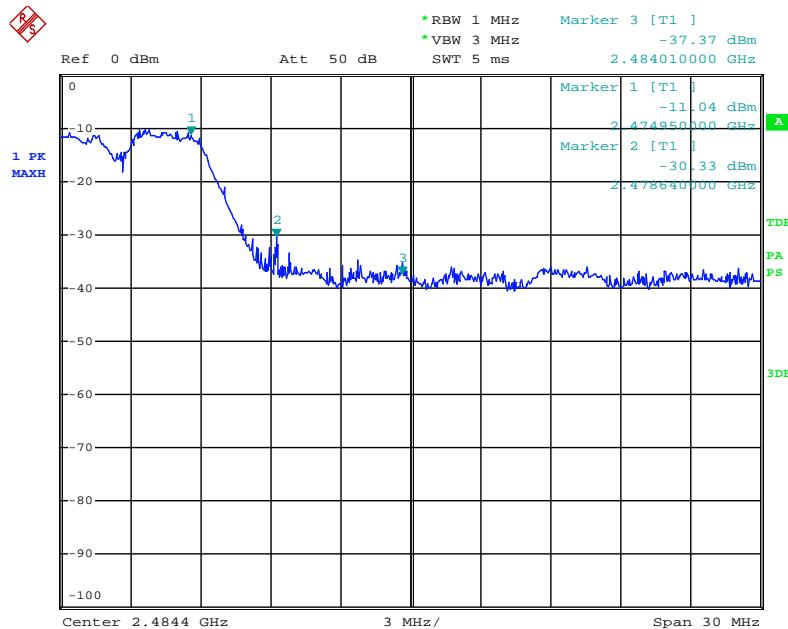
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 9.1.5 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH18		

**CH1(Lower)**


Date: 24.SEP.2011 08:41:53

**CH 78 (Upper)**


Date: 24.SEP.2011 08:48:36

### 9.1.6 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH18		
Note :	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz.		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	H	42.86	35.72	7.51	50.37	43.23	74.00	54.00	
2483.50	H	40.22	31.3	7.65	47.87	38.95	74.00	54.00	

#### Remark :

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode
- (2) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (3) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (4) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH18		
Note :	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz.		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	V	44.6	37.94	7.51	52.11	45.45	74.00	54.00	
2483.50	V	37.78	34.22	7.65	45.43	41.87	74.00	54.00	

Remark :

- (1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode
- (2) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (3) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna
- (4) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## 10. RF EXPOSURE TEST

### 10.1 APPLIED PROCEDURES / LIMIT

These devices are not exempted from compliance does not exceed the Commission's RF exposure guidelines. Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirement (see Section 2.1091), the following information is typically needed:

Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.

Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement. Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits. Any other RF exposure related issues that may affect MPE compliance.

FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

#### (A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

#### (B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 10.1.1 MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

P :power input to the antenna in Mw

EIRP :Equivalent(effective) isotropic radiated power.

S :power density mW/ cm<sup>2</sup>

G :numeric gain of antenna relative to isotropic radiator

R :distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{EIRP}{4\pi S}}$$

EIRP=10<sup>(Antenna Gain+Peak Output Power/10)</sup>

Note:

1. s=1.0 mW /cm<sup>2</sup> for limits for General Population/Uncontrolled Exposures.
2. The time averaged power over 30 minutes will be equaled Output Power.
3. Minimum calculated separation distance between antenna and persons required:0.53 cm
4. The Power Density at a distance of 20cm calculated from the formula is far below the limit of 1MW/ cm<sup>2</sup>
5. For portable device, the power limit is 60/f(in GHz) mW

### 10.1.2 TEST RESULTS

EUT :	Audio receiver	Model Name :	RX1
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter AC 120V/60Hz
Test Mode :	CH1/ CH18		

Channal (MHz)	output peak power (dBm)	Output peak power to antenna (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm <sup>2</sup> )	Limit of Power Density (S) (mW/ cm <sup>2</sup> )	Result
2405.75	12.64	18.37	1.2589	0.0046	1	Pass
2441.75	13.22	20.99	1.2589	0.0053	1	Pass
2477.75	13.15	20.65	1.2589	0.0052	1	Pass