

FCC CERTIFICATION  
On Behalf of  
Shenzhen Hexing Electronics Factory

FM Sound Frequency Commutator  
Model No.: H101

FCC ID: T83FM88

Prepared for : Shenzhen Hexing Electronics Factory  
Address : 2/F.,Building 1, Industry Area, Dongzhijia Lezhujiao,  
Xixiang, Baoan District, Shenzhen City, Guangdong,  
P.R.China  
Prepared by : ACCURATE TECHNOLOGY CO. LTD  
Address : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.  
Science & Industry Park, Nanshan, Shenzhen, Guangdong  
P.R. China  
Tel: (0755) 26503290  
Fax: (0755) 26503396

Report Number : ATE20060738  
Date of Test : May 05, 2006  
Date of Report : May 10, 2006

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APPENDIX I ( TEST CURVES) (9pages)

## Test Report Certification

Applicant : Shenzhen Hexing Electronics Factory  
 Manufacturer : Shenzhen Hexing Electronics Factory  
 EUT Description : FM Sound Frequency Commutator  
                   (A) MODEL NO.: H101  
                   (B) SERIAL NO.: N/A  
                   (C) POWER SUPPLY: 12V DC

Measurement Procedure Used:

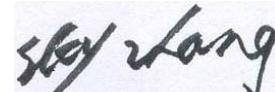
FCC Rules and Regulations Part 15 Subpart C Section 15.239: 2004  
 & ANSI C63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.239 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : May 05, 2006

Prepared by :



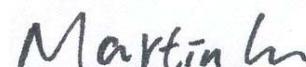
(Engineer)

Reviewer :



(Quality Manager)

Approved & Authorized Signer :



(Manager)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT : FM Sound Frequency Commutator  
 Model Number : H101  
 Power Supply : 12V DC  
 Applicant : Shenzhen Hexing Electronics Factory  
 Address : 2/F.,Building 1, Industry Area, Dongzhijia Lezhujiao, Xixiang, Baoan District, Shenzhen City, Guangdong, P.R.China  
 Manufacturer : Shenzhen Hexing Electronics Factory  
 Address : 2/F.,Building 1, Industry Area, Dongzhijia Lezhujiao, Xixiang, Baoan District, Shenzhen City, Guangdong, P.R.China  
 Date of sample received : May 02, 2006  
 Date of Test : May 05, 2006

### 1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen, May 10, 2004  
 Accredited by FCC, May 10, 2004  
 The Certificate Registration Number is 253065  
 Accredited by Industry Canada, May 18, 2004  
 The Certificate Registration Number is IC 5077  
 Name of Firm : ACCURATE TECHNOLOGY CO. LTD  
 Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

### 1.3. Measurement Uncertainty

Conducted Emission Uncertainty = ±2.66dB

Radiated Emission Uncertainty = ±4.26dB

## 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment**

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	04.01.2007
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	04.01.2007
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	04.01.2007
Bilog Antenna	Chase	CBL6112B	2591	04.01.2007
Horn Antenna	Rohde&Schwarz	HF906	100013	04.01.2007
Spectrum Analyzer	Anritsu	MS2651B	6200238856	04.01.2007
Pre-Amplifier	Agilent	8447D	2944A10619	04.01.2007
Signal Generator	GW	GAG-810	0913317	01.02.2007

### 3. RADIATED EMISSION FOR FCC PART 15 SECTION 15.239(C)

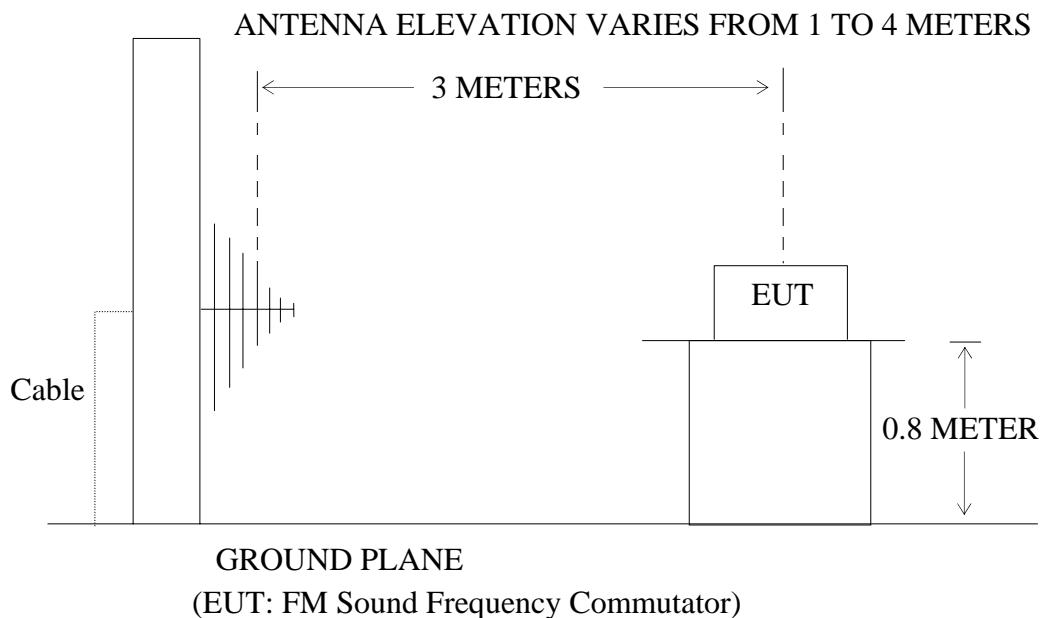
#### 3.1. Block Diagram of Test Setup

##### 3.1.1. Block diagram of connection between the EUT and simulators



(EUT: FM Sound Frequency Commutator)

##### 3.1.2. Anechoic Chamber Test Setup Diagram



#### 3.2. The Emission Limit for section 15.239(c)

3.2.1 The field strength of any emissions radiated on any frequency outside of the specified 200kHz band shall not exceed the general radiated emission limits in section 15.209

Radiation Emission Measurement Limits According to Section 15.209

Frequency (MHz)	Limit,		The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands
	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dB $\mu$ V/m)	
30 - 88	100	40	
88 - 216	150	43.5	

216 - 960	200	46	mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
Above 960	500	54	

### 3.3.Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 3.3.1.FM Sound Frequency Commutator (EUT)

Model Number : H101  
 Serial Number : N/A  
 Manufacturer : Shenzhen Hexing Electronics Factory

### 3.4.Operating Condition of EUT

3.4.1.Setup the EUT and simulator as shown as Section 3.1.

3.4.2.Turn on the power of all equipment.

Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

### 3.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120KHz in 30-1000MHz; Set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 1100MHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

### 3.6.The Field Strength of Radiation Emission Measurement Results

**PASS.**

The frequency range 30MHz to 1100MHz is investigated.

Date of Test:	May 05, 2006	Temperature:	22°C
EUT:	FM Sound Frequency Commutator	Humidity:	50%
Model No.:	H101	Power Supply:	12V DC
Test Mode:	TX 88.1MHz	Test Engineer:	Andy

Polarization	Frequency (MHz)	Reading(dB $\mu$ V/m) QP	Factor Corr.( dB)	Result(dB $\mu$ V/m) QP	Limits(dB $\mu$ V/m) QP	Margin(dB $\mu$ V/m) QP
Horizontal	143.166	17.2	16.5	33.7	43.5	9.8
Horizontal	176.208	24.4	14.1	38.5	43.5	5.0
Horizontal	220.249	16.0	20.0	36.0	43.5	7.5
Horizontal	231.258	12.4	20.4	32.8	46.0	13.2
Horizontal	242.300	11.0	20.4	31.4	46.0	14.6
Horizontal	264.304	16.1	20.0	36.1	46.0	9.9
Horizontal	358.490	9.4	22.0	31.4	46.0	14.6
Horizontal	440.716	10.6	23.0	33.6	46.0	12.4
Vertical	143.180	13.8	19.5	33.3	43.5	10.2
Vertical	176.215	18.6	19.3	37.9	43.5	5.6
Vertical	264.316	11.2	22.8	34.0	46.0	12.0
Vertical	440.780	8.5	26.4	34.9	46.0	11.1
Vertical	491.041	10.1	27.0	37.1	46.0	8.9

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Date of Test:	May 05, 2006	Temperature:	22°C
EUT:	FM Sound Frequency Commutator	Humidity:	50%
Model No.:	H101	Power Supply:	12V DC
Test Mode:	TX 98.1MHz	Test Engineer:	Andy

Polarization	Frequency (MHz)	Reading(dB $\mu$ V/m) QP	Factor Corr.( dB)	Result(dB $\mu$ V/m) QP	Limits(dB $\mu$ V/m) QP	Margin(dB $\mu$ V/m) QP
Horizontal	196.349	21.7	18.8	40.5	43.5	3.0
Horizontal	245.424	14.7	20.3	35.0	46.0	11.0
Horizontal	294.510	19.3	20.2	39.5	46.0	6.5
Horizontal	392.684	14.1	23.2	37.3	46.0	8.7
Horizontal	490.985	14.0	23.6	37.6	46.0	8.4
Vertical	134.983	12.4	20.2	32.6	43.5	10.9
Vertical	196.345	18.1	19.5	37.6	43.5	5.9
Vertical	299.640	15.2	22.3	37.5	46.0	8.5
Vertical	392.690	8.6	24.4	33.0	46.0	13.0
Vertical	490.938	12.8	27.0	39.8	46.0	6.2

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Date of Test:	May 05, 2006	Temperature:	22°C
EUT:	FM Sound Frequency Commutator	Humidity:	50%
Model No.:	H101	Power Supply:	12V DC
Test Mode:	TX 107.9MHz	Test Engineer:	Andy

Polarization	Frequency (MHz)	Reading(dB $\mu$ V/m) QP	Factor Corr.( dB)	Result(dB $\mu$ V/m) QP	Limits(dB $\mu$ V/m) QP	Margin(dB $\mu$ V/m) QP
Horizontal	216.500	21.9	19.8	41.7	46.0	4.3
Horizontal	324.732	17.5	21.6	39.1	46.0	6.9
Horizontal	432.982	14.4	23.3	37.7	46.0	8.3
Horizontal	541.230	10.4	25.6	36.0	46.0	10.0
Vertical	216.490	19.6	20.2	39.8	46.0	6.2
Vertical	324.744	11.1	24.2	35.3	46.0	10.7
Vertical	433.002	10.9	26.1	37.0	46.0	9.0
Vertical	541.248	9.8	26.6	36.4	46.0	9.6

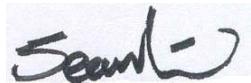
The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Reviewer :



## 4. FUNDAMENTAL RADIATED EMISSION FOR FCC PART 15

### SECTION 15.239(B)

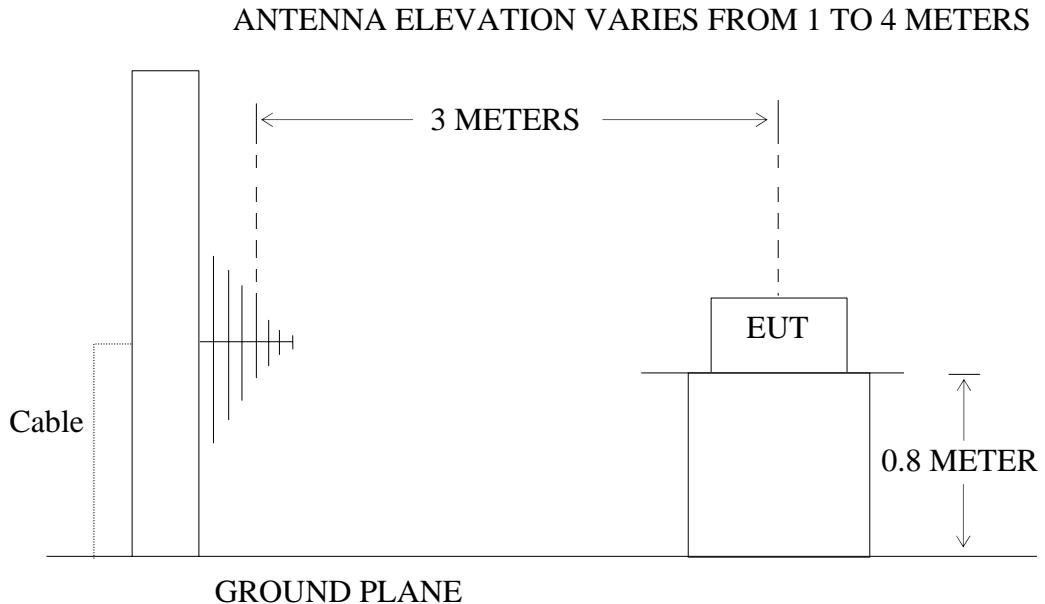
#### 4.1. Block Diagram of Test Setup

##### 4.1.1. Block diagram of connection between the EUT and simulators



(EUT: FM Sound Frequency Commutator)

##### 4.1.2. Anechoic Chamber Test Setup Diagram



(EUT: FM Sound Frequency Commutator)

#### 4.2. The Emission Limit For Section 15.239(b)

4.2.1 The field strength of any emission within the permitted 200kHz band shall not exceed 250microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

### 4.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 4.3.1.FM Sound Frequency Commutator (EUT)

Model Number : H101  
 Serial Number : N/A  
 Manufacturer : Shenzhen Hexing Electronics Factory

### 4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

### 4.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

## 4.6.The Emission Measurement Result

**PASS.**

Date of Test:	May 05, 2006	Temperature:	22°C
EUT:	FM Sound Frequency Commutator	Humidity:	50%
Model No.:	H101	Power Supply:	12V DC
Test Mode:	TX	Test Engineer:	Andy

### Fundamental Radiated Emissions

Test conditions		Fundamental Frequency	
		88.1MHz	
$T_{nom}(22^{\circ}C)$	Unit	(dB $\mu$ V/m)/ ( $\mu$ V/m) AV	(dB $\mu$ V/m)/ ( $\mu$ V/m) PEAK
	Horizontal	42.9/140	47.4/234
	Vertical	42.7/136	47.3/232
limit		48/250	68/2500

Note: Measurement was performed with modulated signal with average detector and peak detector.

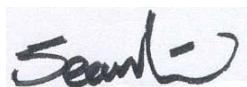
Test conditions		Fundamental Frequency	
		98.1MHz	
$T_{nom}(22^{\circ}C)$	Unit	(dB $\mu$ V/m)/ ( $\mu$ V/m) AV	(dB $\mu$ V/m)/ ( $\mu$ V/m) PEAK
	Horizontal	42.4/132	46.9/221
	Vertical	41.7/122	46.2/204
limit		48/250	68/2500

Note: Measurement was performed with modulated signal with average detector and peak detector.

Test conditions		Fundamental Frequency	
		107.9MHz	
$T_{nom}(22^{\circ}C)$	Unit	(dB $\mu$ V/m)/ ( $\mu$ V/m) AV	(dB $\mu$ V/m)/ ( $\mu$ V/m) PEAK
	Horizontal	42.5/133	47.1/226
	Vertical	42.1/127	47.0/229
limit		48/250	68/2500

Note: Measurement was performed with modulated signal with average detector and peak detector.

Reviewer :



## 5. OCCUPIED BANDWIDTH FOR FCC PART 15 SECTION

### 15.239(A)

#### 5.1. The Requirement For Section 15.239(a)

5.1.1. Emission from the device shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108MHz.

#### 5.2. EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

##### 5.2.1. FM Sound Frequency Commutator (EUT)

Model Number : H101  
 Serial Number : N/A  
 Manufacturer : Shenzhen Hexing Electronics Factory

#### 5.3. Operating Condition of EUT

5.3.1. Setup the EUT and simulator as shown as Section 4.1.

5.3.2. Turn on the power of all equipment.

Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz. We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

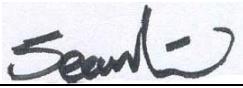
#### 5.4. Test Procedure

The zero level was set without modulation. A small sample of the transmitter output was fed into the spectrum analyzer and above photo was taken. The vertical scale is set to 10dB per division; the horizontal scale is set to 20kHz per division.

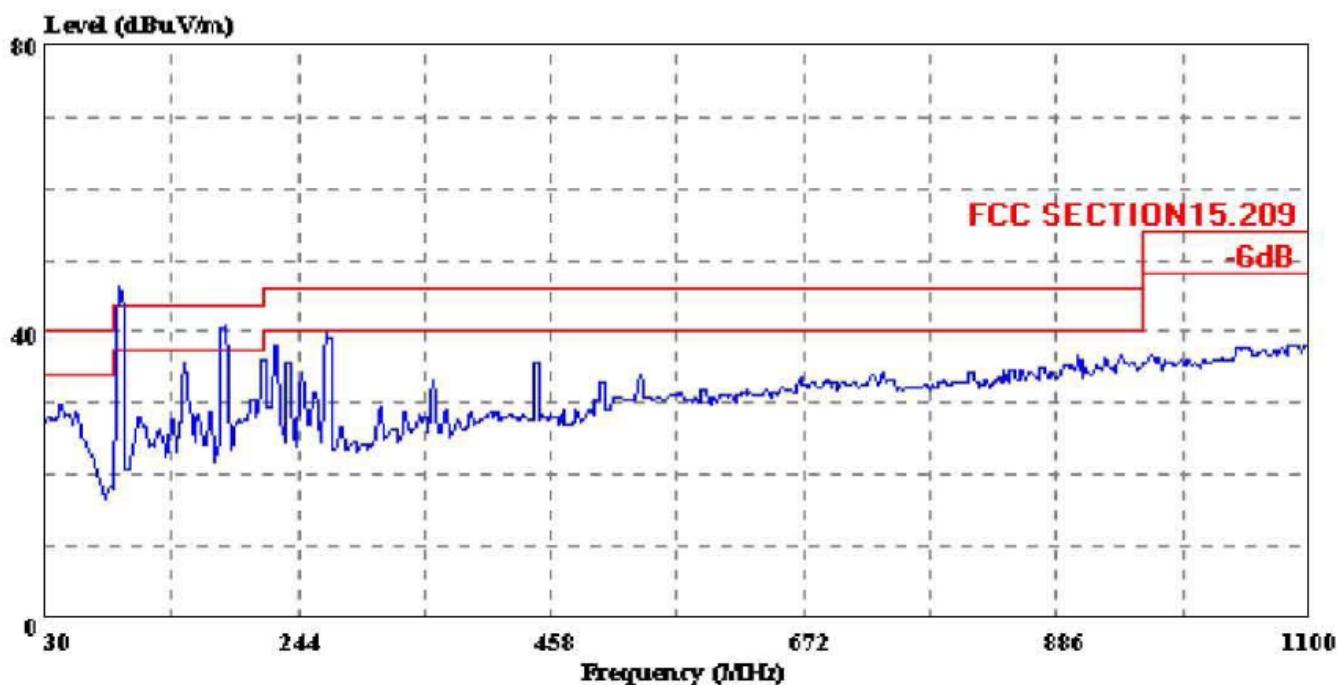
## 5.5. Test Result

**The EUT does meet the FCC requirement.**

Reviewer :



## APPENDIX I (Test Curves)

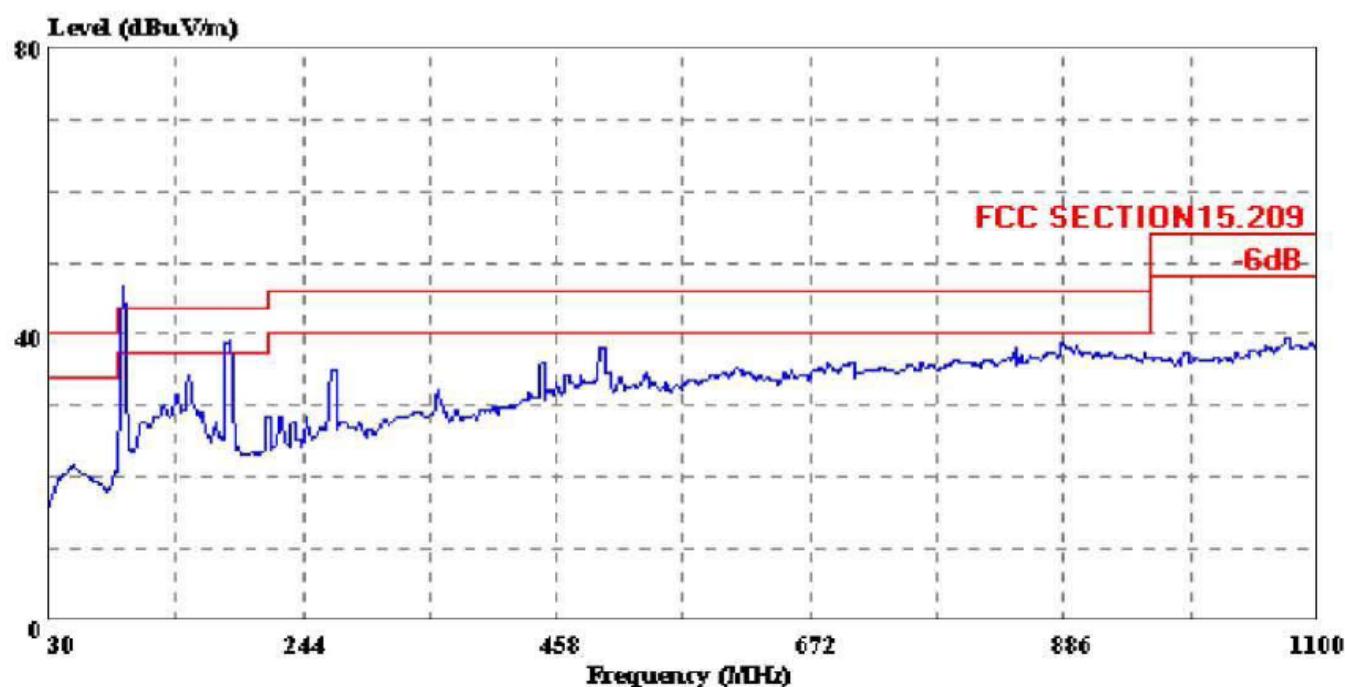


Trace:

Condition: FCC SECTION15.209 3m  
eut : FM Sound Frequency Commutator m/n:H101  
power: DC 12.0V  
memo : TX(88.1MHz)  
manuf: HEXING

Ref Trace:

HORIZONTAL

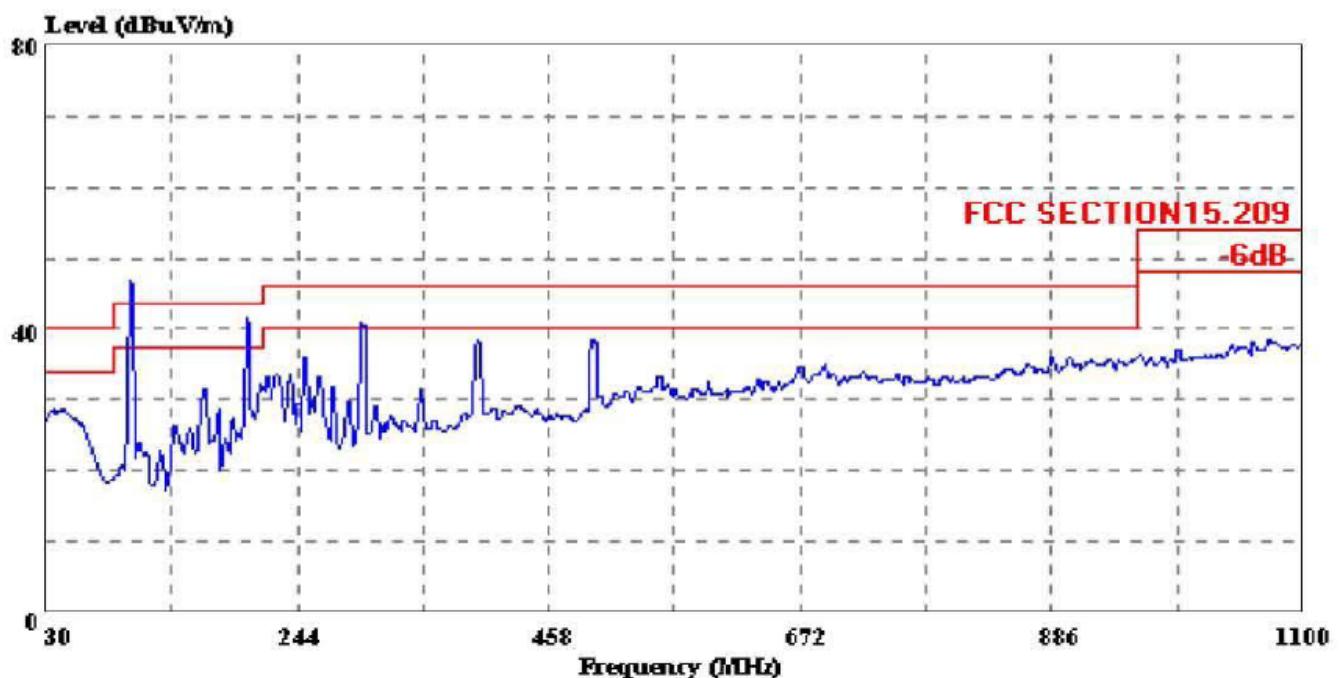


Trace:

Ref Trace:

Condition: FCC SECTION15.209 3m  
 eut : FM Sound Frequency Commutator m/n:H101  
 power: DC 12.0V  
 memo : TX(88.1MHz)  
 manuf: HEXING

VERTICAL

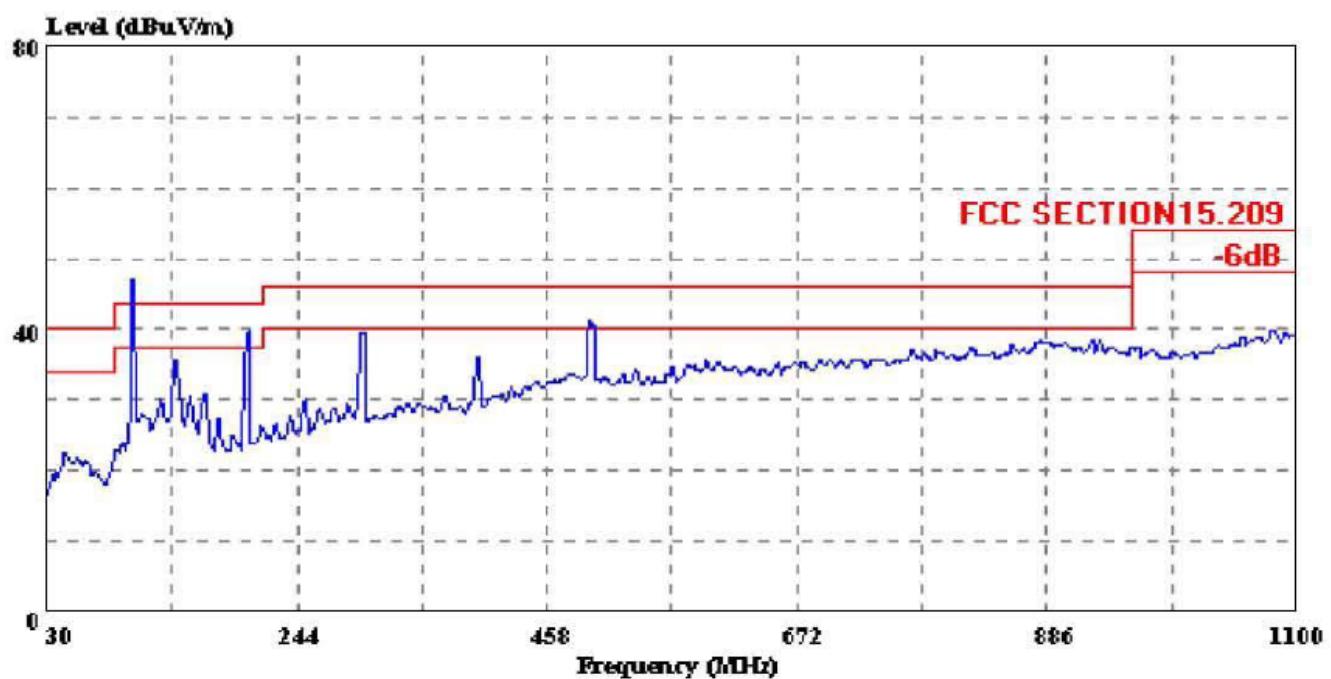


Trace:

Condition: FCC SECTION15.209 3m  
eut : FM Sound Frequency Commutator m/n:H101  
power: DC 12.0V  
memo : TX(98.1MHz)  
manuf: HEXING

Ref Trace:

HORIZONTAL

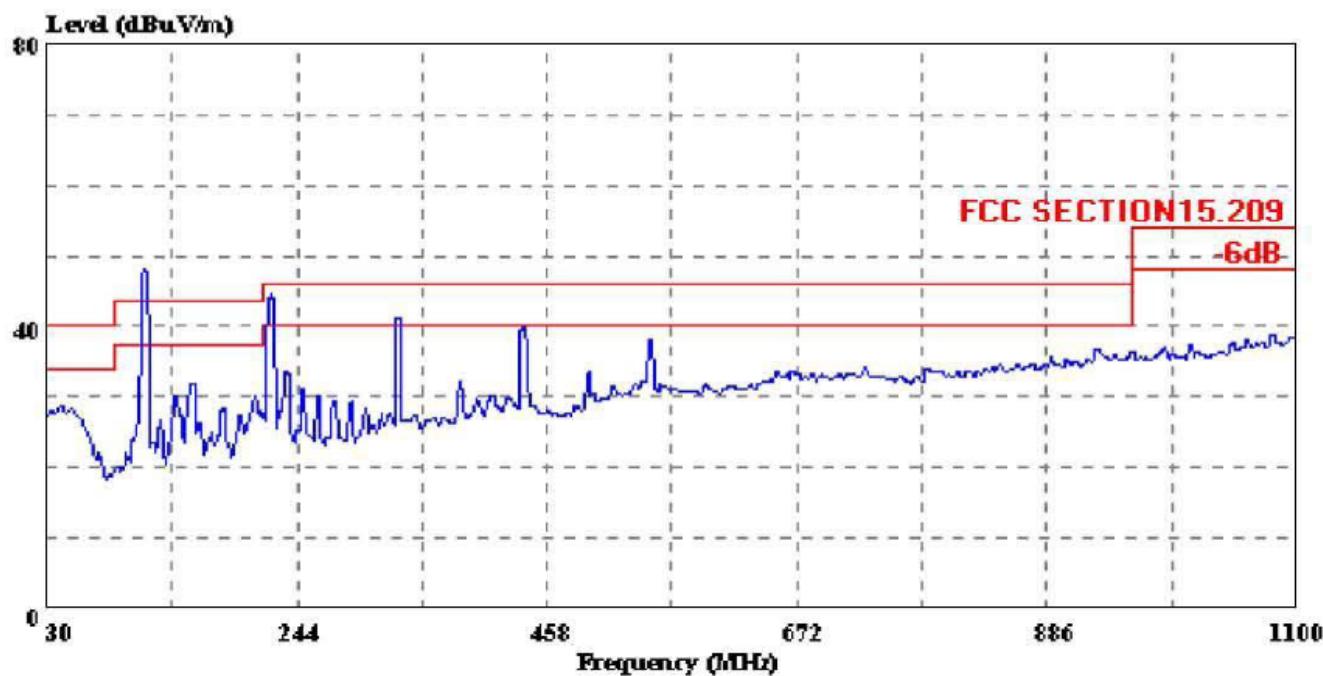


Trace:

Ref Trace:

Condition: FCC SECTION15.209 3m  
eut : FM Sound Frequency Commutator m/n:H101  
power: DC 12.0V  
memo : TX(98.1MHz)  
manuf: HEXING

VERTICAL

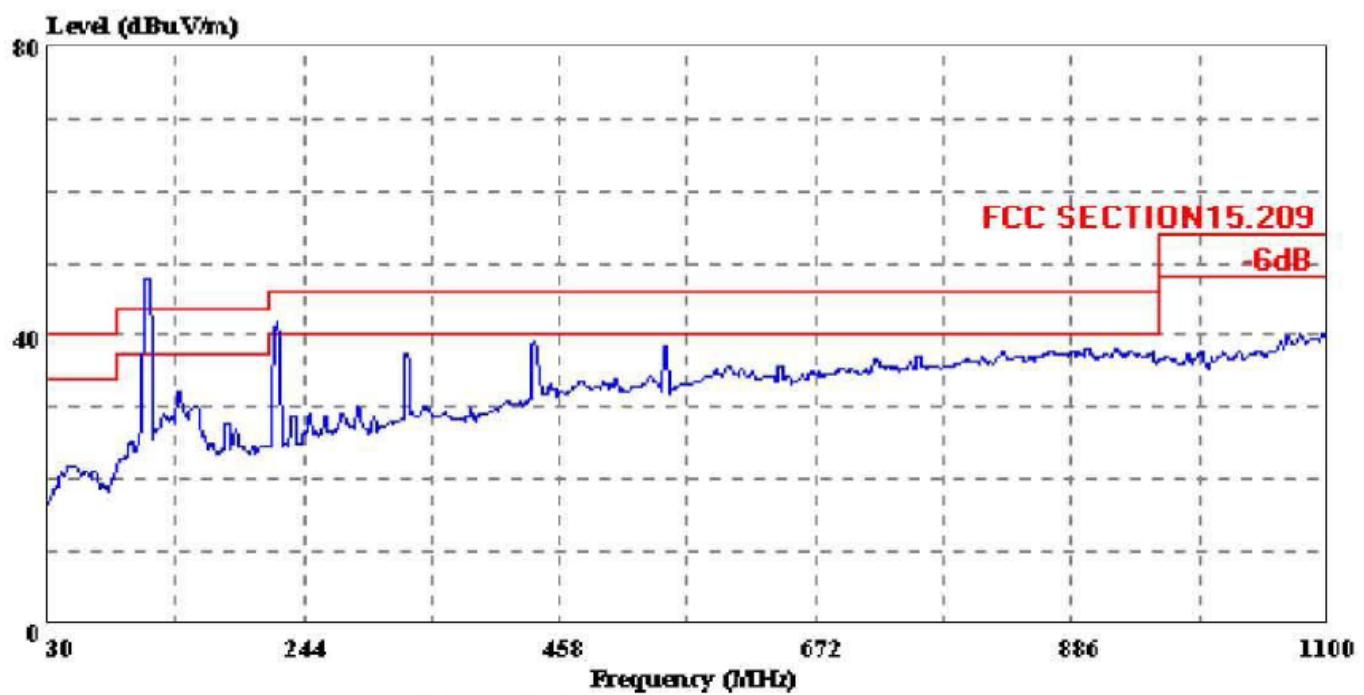


Trace:

Ref Trace:

Condition: FCC SECTION15.209 3m  
 eut : FM Sound Frequency Commutator m/n:H101  
 power: DC 12.0V  
 memo : TX(107.9MHz)  
 manuf: HEXING

HORIZONTAL



Trace:

Ref Trace:

Condition: FCC SECTION15.209 3m  
 eut : FM Sound Frequency Commutator m/n:H101  
 power: DC 12.0V  
 memo : TX(107.9MHz)  
 manuf: HEXING

VERTICAL

