# 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<br><br>Tel: (0755) 26503290<br>Fax: (0755) 26503396 |

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

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# 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 Section15.239 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<br><br>Accredited by FCC, May 10, 2004<br>The Certificate Registration Number is 253065<br><br>Accredited by Industry Canada, May 18, 2004<br>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)

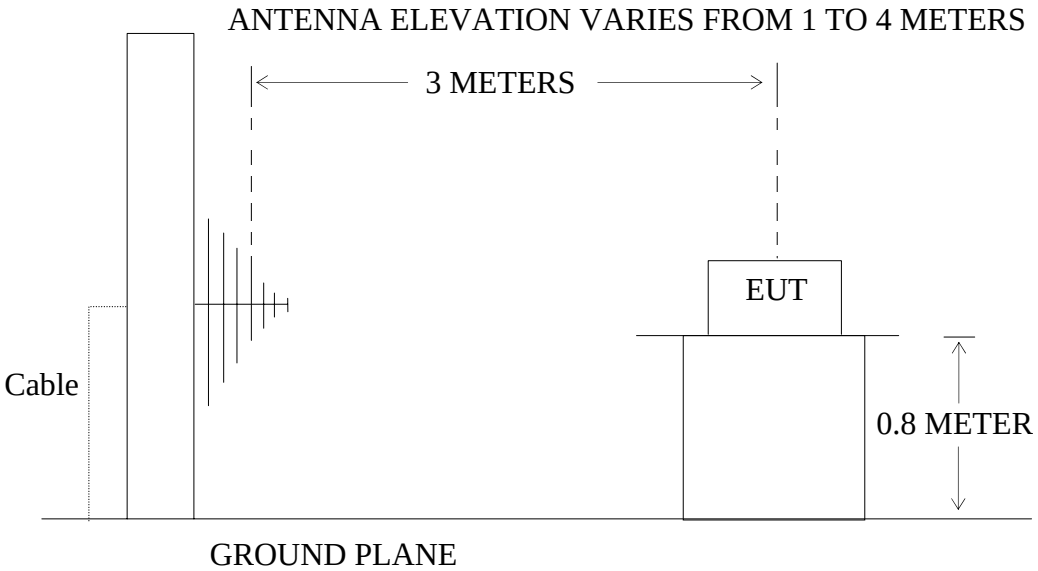
## 3.1.Block Diagram of Test Setup

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

EUT

(EUT: FM Sound Frequency Commutator)

### 3.1.2.Anechoic Chamber Test Setup Diagram




(EUT: FM Sound Frequency Commutator)

## 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, | | |
|---|---|---|---|
| | Field Strength of Quasi-peak Value (microvolts/m) | Field Strength of Quasi-peak Value (dBμV/m) | The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands |
| 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(dBμV/m) QP | Factor Corr.( dB) | Result(dBμV/m) QP | Limits(dBμV/m) QP | Margin(dBμV/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:

Result = Reading + 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(dBμV/m) QP | Factor Corr.( dB) | Result(dBμV/m) QP | Limits(dBμV/m) QP | Margin(dBμV/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:

Result = Reading + 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 |

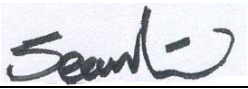
| Polarization | Frequency (MHz) | Reading(dBμV/m) QP | Factor Corr.( dB) | Result(dBμV/m) QP | Limits(dBμV/m) QP | Margin(dBμV/m) QP |
|---|---|---|---|---|---|---|
| Horizontal | 216.500 | 21.9 | 19.8 | 41.7 | 46.0 | 4.3 |
| Horizontal | 324.732 | 17.5 | 21.6 | 39.1 | 46.0 | 6.9 |
| Horizontal | 432.982 | 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:

Result = Reading + 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)

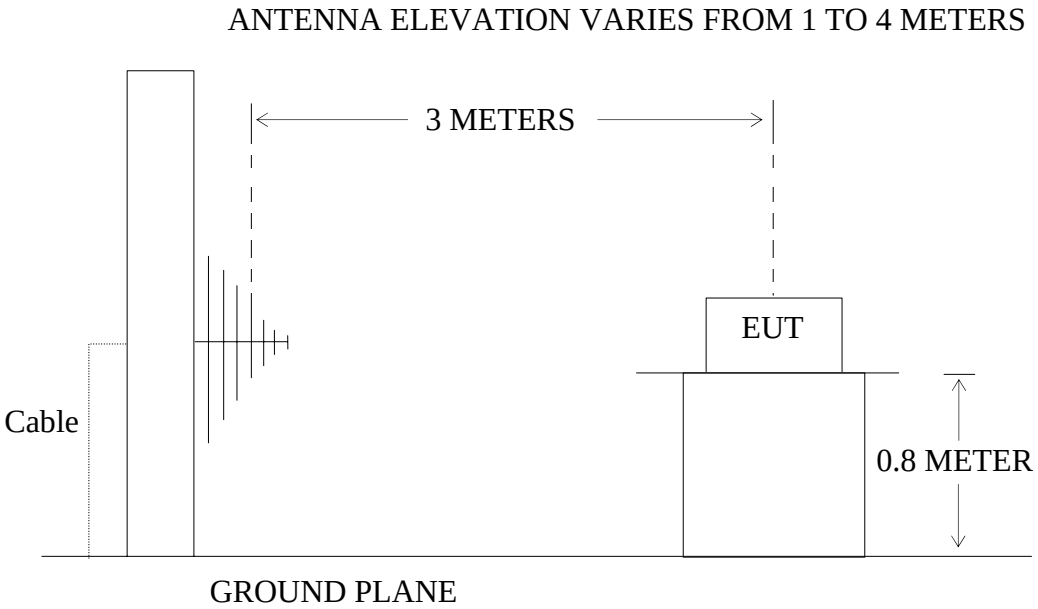
## 4.1.Block Diagram of Test Setup

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

EUT

(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.**

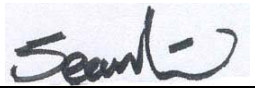
| | | | |
|---|---|---|---|
| Date of Test: | May 05, 2006 | Temperature: | 22°C |
| EUT: | FM Sound Frequency Commutator | Humidity: | 50% |
| Model No.: | H101 | Power Supply: | 12V DC |
| Test Mode: | TX | Test Engineer: | Andy |

**Fundamental Radiated Emissions**

| Test conditions | | Fundamental Frequency | |
|---|---|---|---|
| | | 88.1MHz | |
| $T_{nom}$(22°C) | Unit | (dBμV/m)/ ( μ V/m) AV | (dBμV/m)/( μ 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°C) | Unit | (dBμV/m)/ ( μ V/m) AV | (dBμV/m)/( μ 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°C) | Unit | (dBμV/m)/ ( μ V/m) AV | (dBμV/m)/( μ 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.

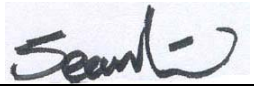
Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

## 5.4. Test Procedure

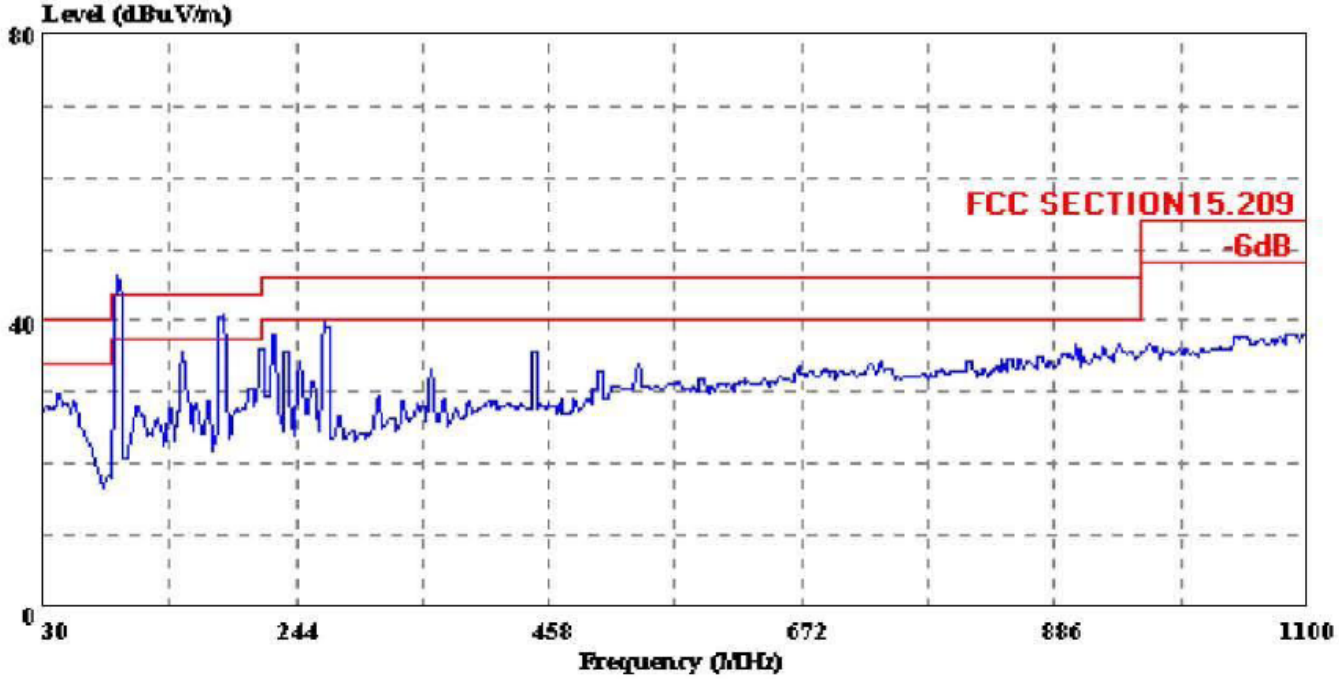
The zero level was set without modulation. A small sample of the transmitter output was fed into the spectrum analyzer and above photo was taken. The vertical scale is set to 10dB per division; the horizontal scale is set to 20kHz per division.

## 5.5.Test Result

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

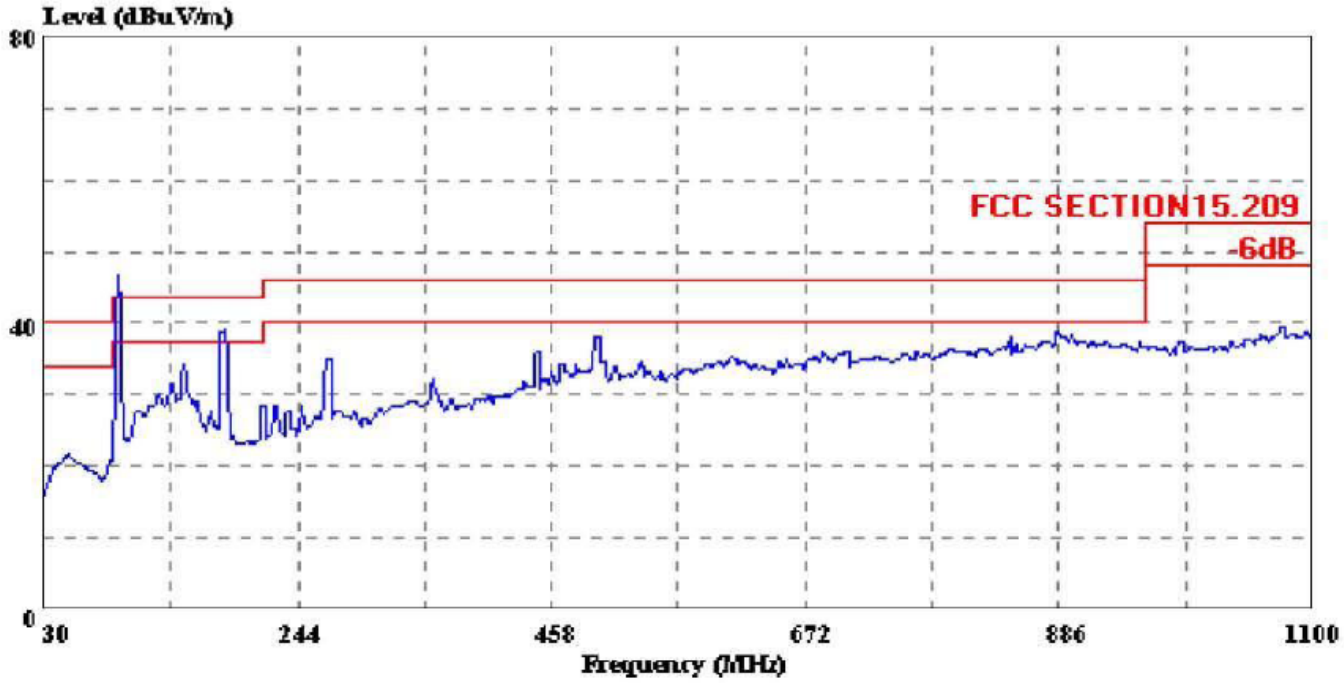
Reviewer **:** 

# APPENDIX I
# (Test Curves)



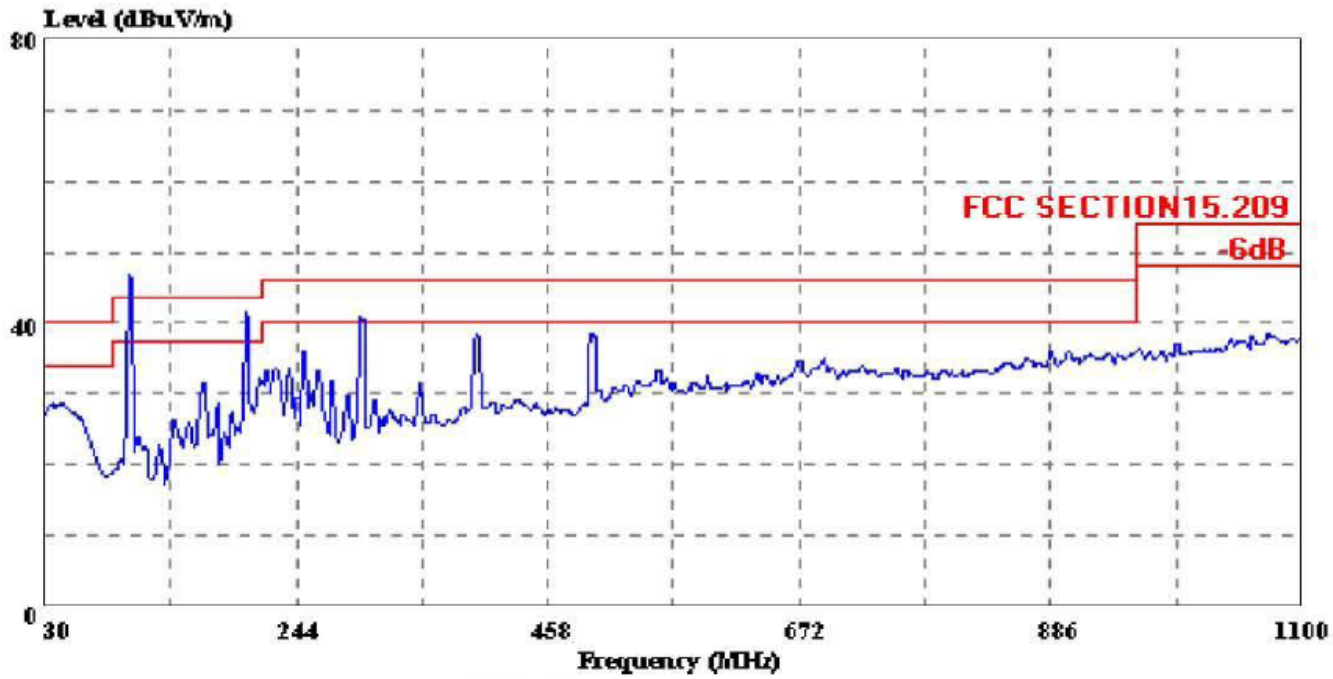

Trace: Ref Trace:

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



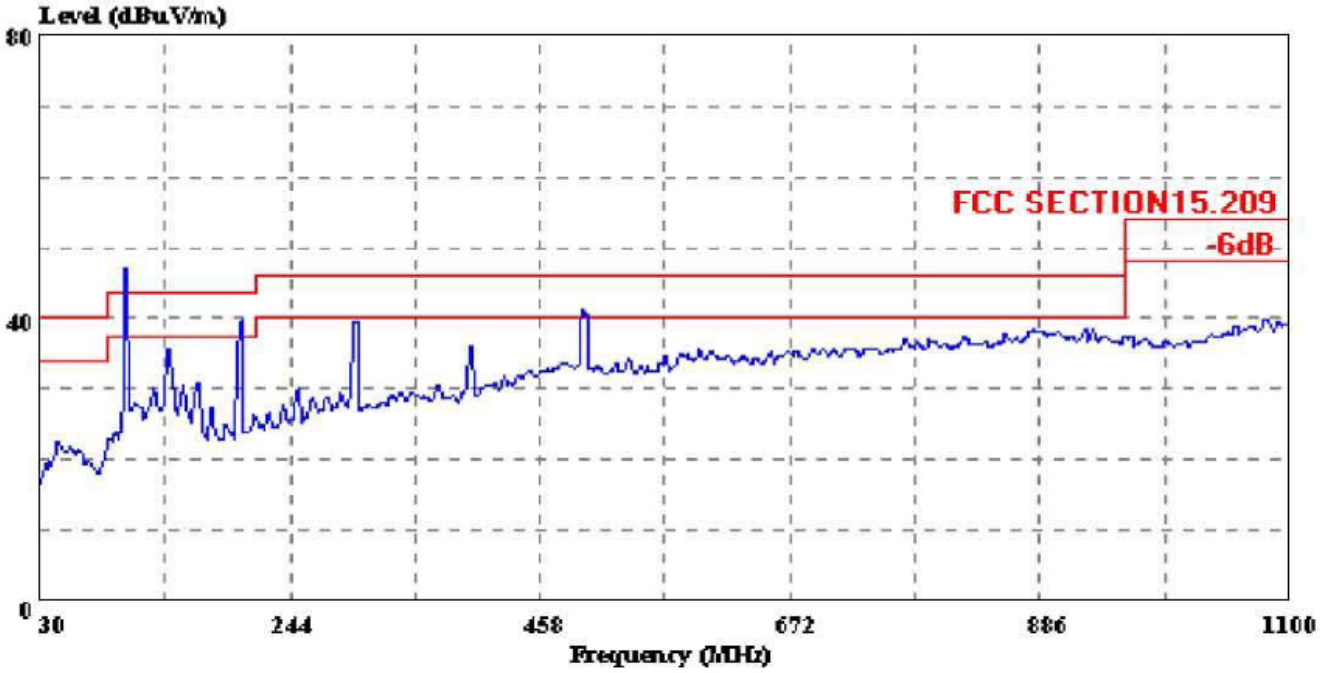

Trace: Ref Trace:

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



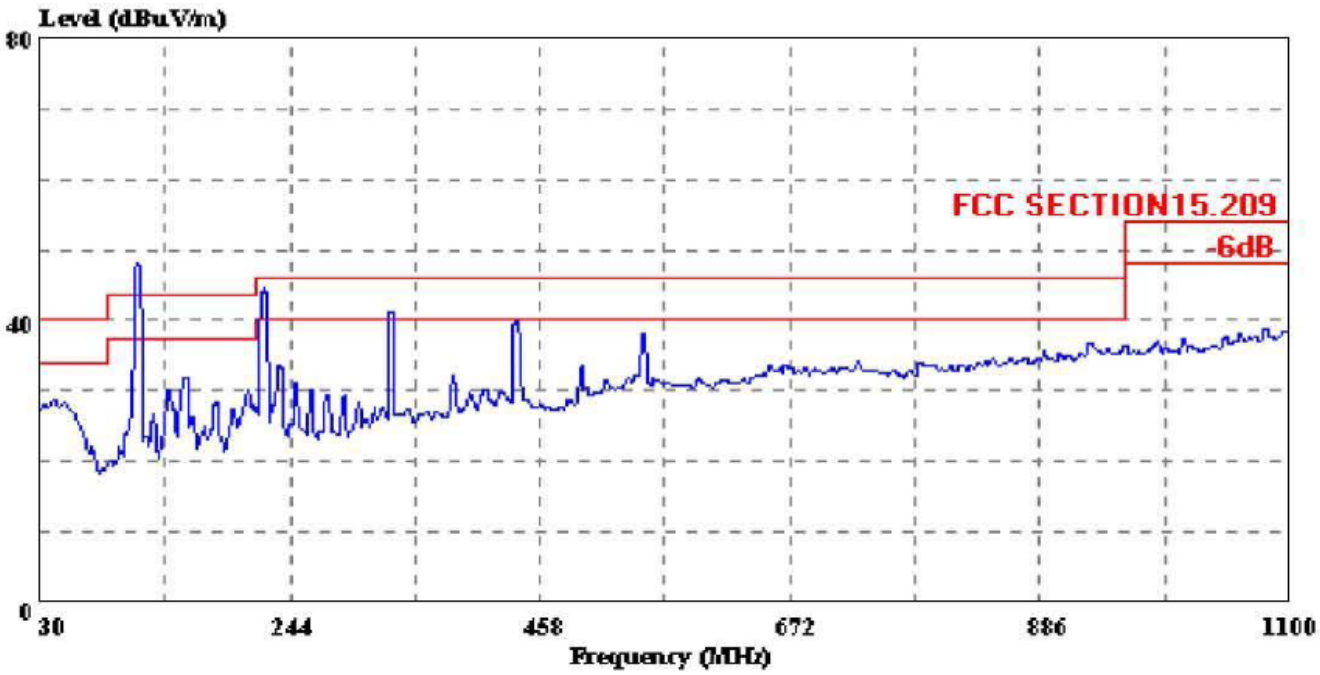

Trace: Ref Trace:

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



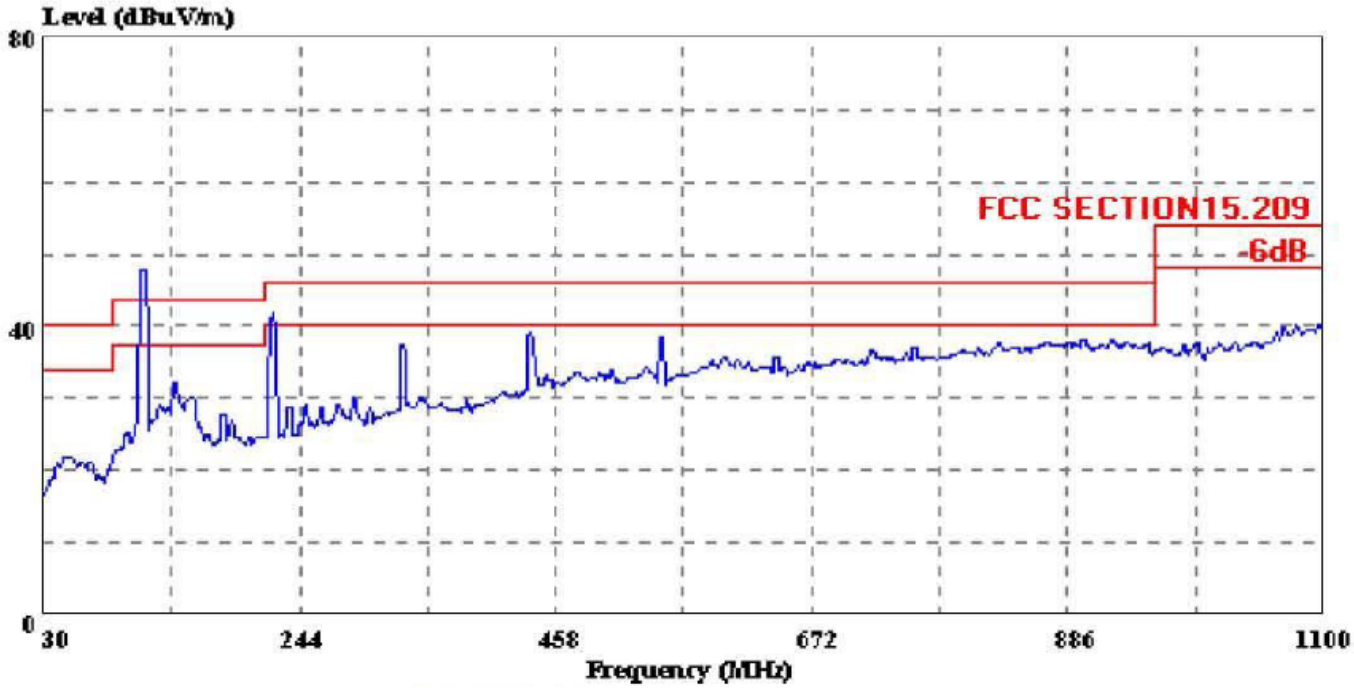

Trace: Ref Trace:

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



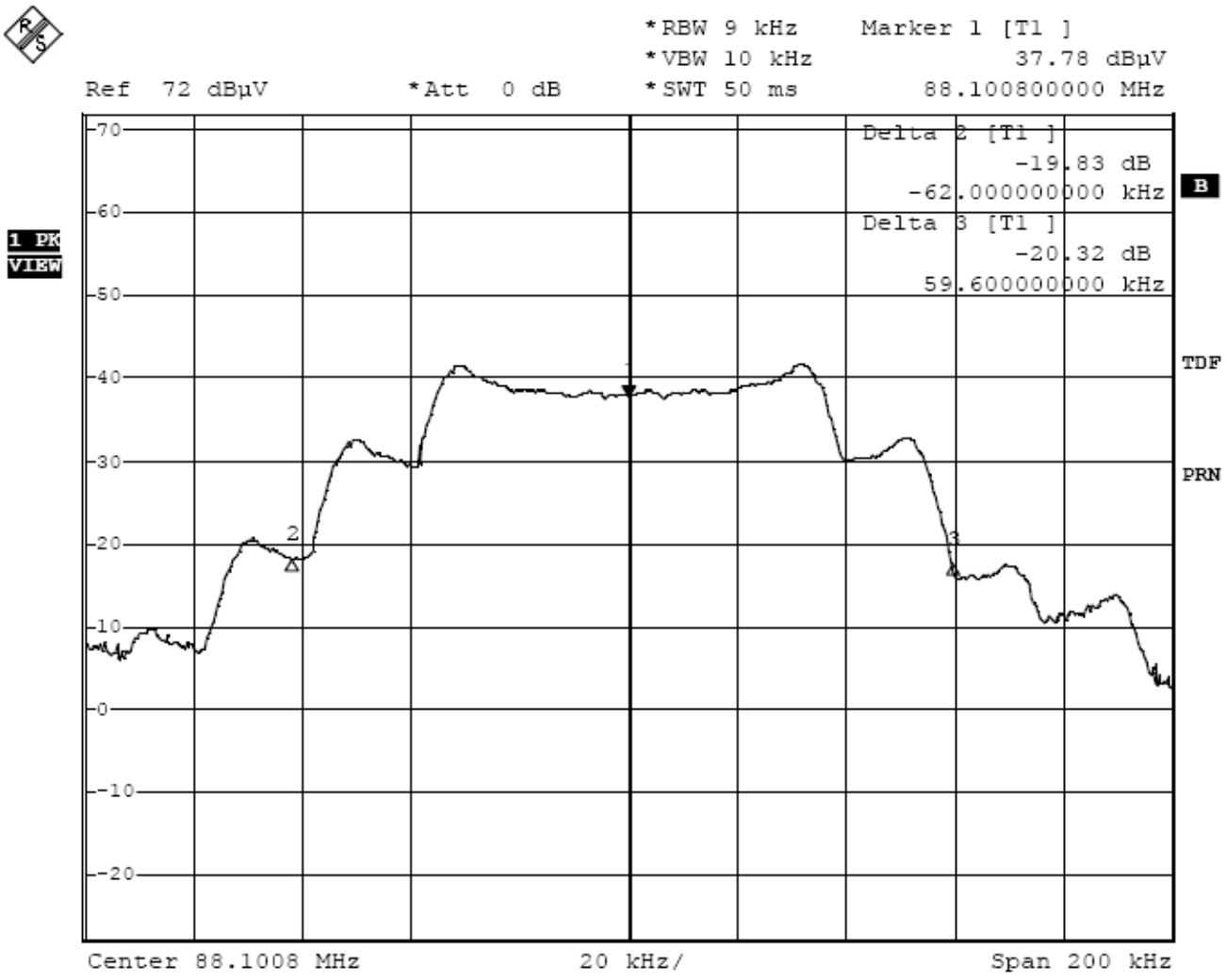

Trace: Ref Trace:

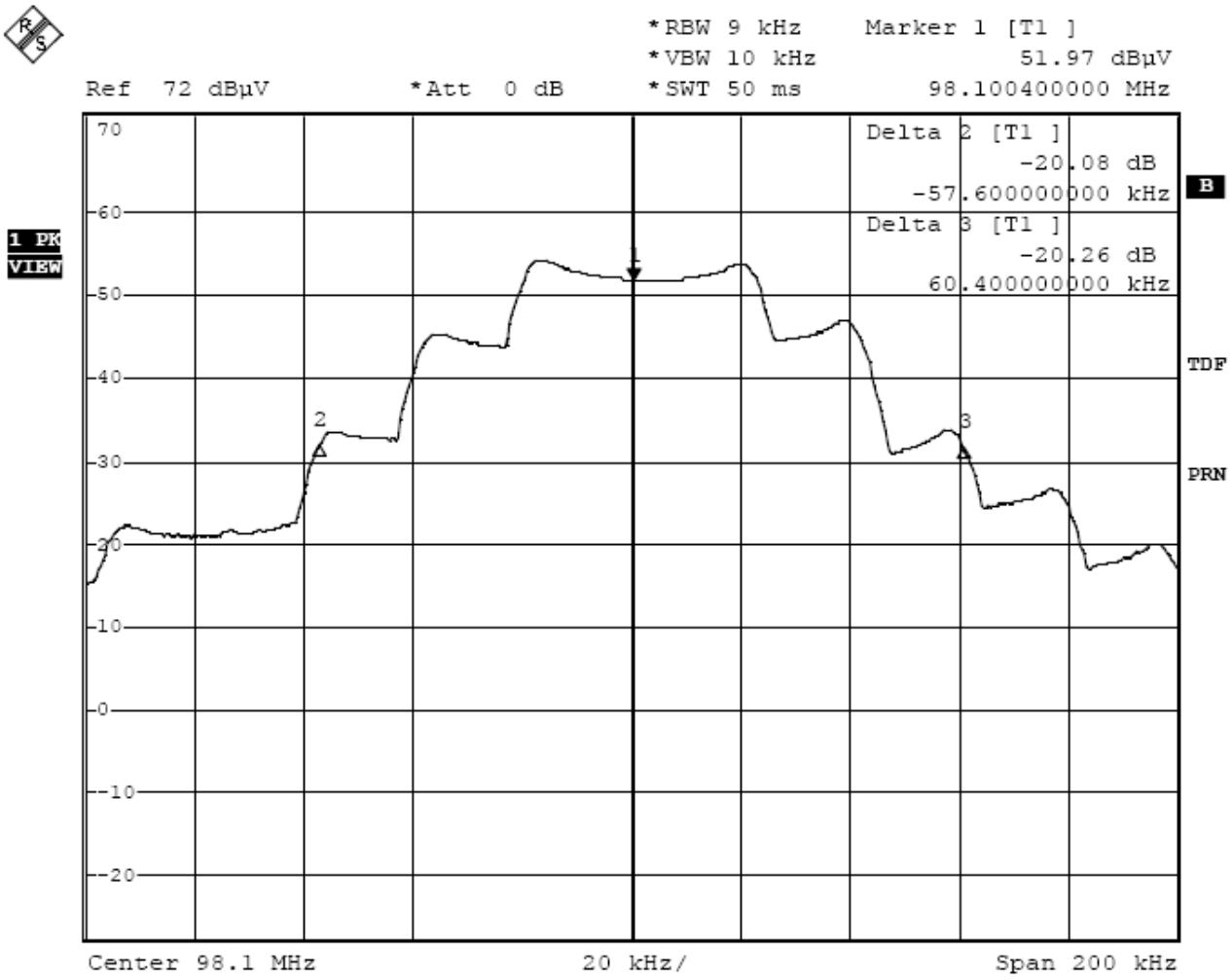
Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Sound Frequency Commutator m/n:H101
power: DC 12.0V
memo : TX(107.9MHz)
manuf: HEXING

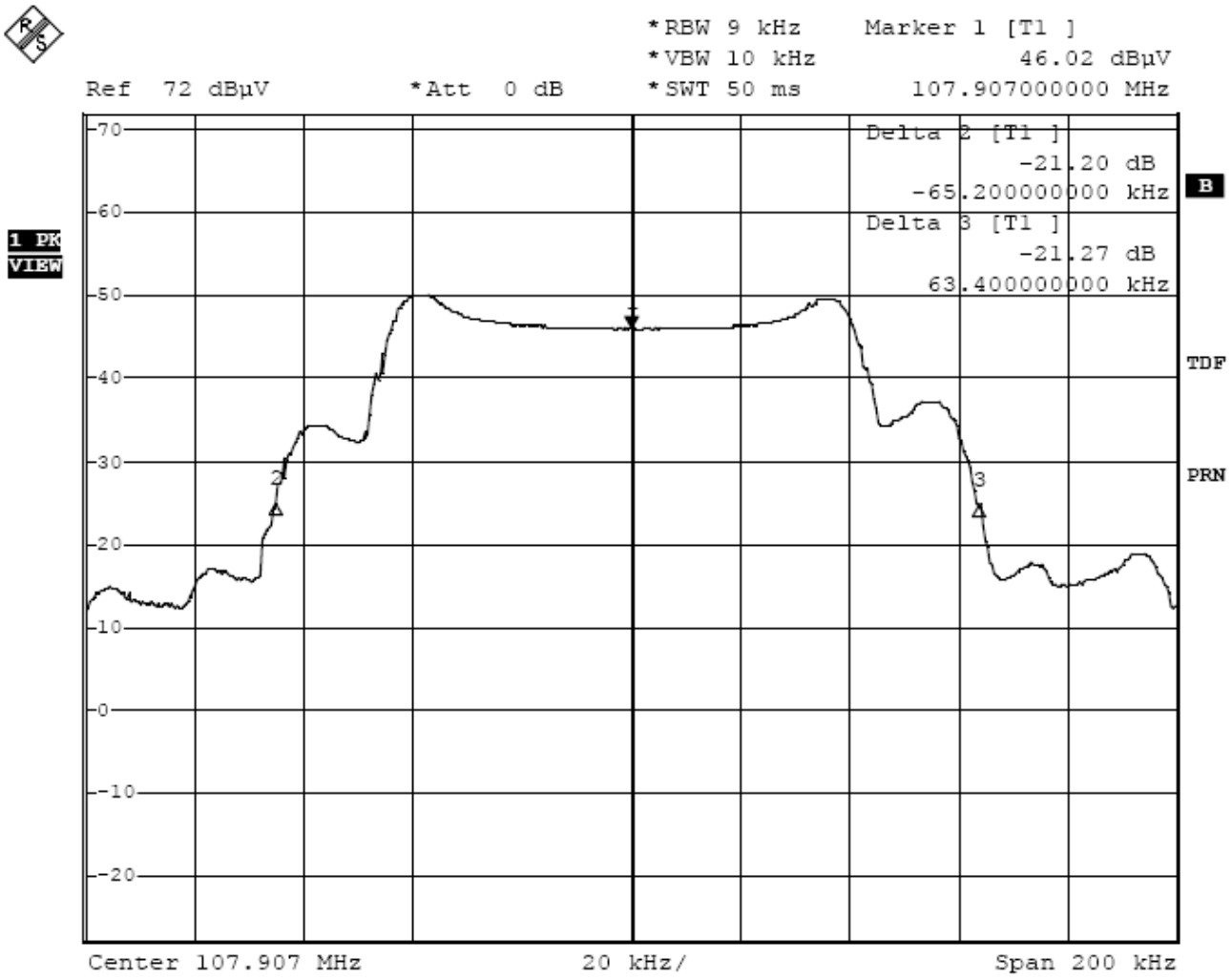



Trace: Ref Trace:

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


*RBW 9 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1 ]
37.78 dBµV
88.100800000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1 ]
-19.83 dB
-62.000000000 kHz
Delta 3 [T1 ]
-20.32 dB
59.600000000 kHz
1 PK
VIEW
B
TDF
PRN
70
60
50
40
30
20
10
0
-10
-20
Center 88.1008 MHz
20 kHz/
Span 200 kHz


*RBW 9 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1 ]
51.97 dBµV
98.100400000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1 ]
-20.08 dB
-57.600000000 kHz
Delta 3 [T1 ]
-20.26 dB
60.400000000 kHz
1 PK
VIEW
B
TDF
PRN
70
60
50
40
30
20
10
0
-10
-20
Center 98.1 MHz
20 kHz/
Span 200 kHz


*RBW 9 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1 ]
46.02 dBµV
107.907000000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1 ]
-21.20 dB
-65.200000000 kHz
Delta 3 [T1 ]
-21.27 dB
63.400000000 kHz
1 PK
VIEW
B
TDF
PRN
70
60
50
40
30
20
10
0
-10
-20
Center 107.907 MHz
20 kHz/
Span 200 kHz