



# **ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER**

**Test report file number : E052R-009**

**Applicant : Seoby Electronics Co, Ltd.**

**Address : 38-2 Anyang2-dong, Manan-gu, Anayang-city Gyeonggi-Do, Korea**

**Manufacturer : Seoby Electronics Co, Ltd.**

**Address : 632-7, Seonggok-Dong, Ansan-Si, Gyungki-Do, 425-110 Korea**

**Type of Equipment : Juke Box Remote Controller**

**FCC ID : SCBRCJB3**

**Model / Type No. : RC-JB-3**

**Serial number : N/A**

**Total page of Report : 14 pages (including this page)**

**Date of Incoming : December 30, 2004**

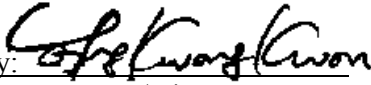
**Date of issuing : February 3, 2005**

## **SUMMARY**

The equipment complies with the regulation; **FCC PART 15 SUBPART C §15.231**

This test report contains only the result of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

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**1. VERIFICATION OF COMPLIANCE**

APPLICANT : Seoby Electronics Co, Ltd.  
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FCC ID : SCBRCJB3  
MODEL NO/NAME : RC-JB-3  
SERIAL NUMBER : N/A  
DATE : February 3, 2005

|                                                         |                                                      |
|---------------------------------------------------------|------------------------------------------------------|
| DEVICE TYPE                                             | Juke Box Remote Controller<br>- INTENTIONAL RADIATOR |
| THIS REPORT CONCERNS                                    | ORIGINAL GRANT                                       |
| MEASUREMENT PROCEDURES                                  | ANSI C63.4/2001                                      |
| TYPE OF EQUIPMENT TESTED                                | PRE-PRODUCTION                                       |
| KIND OF EQUIPMENT<br>AUTHORIZATION REQUESTED            | CERTIFICATION                                        |
| EQUIPMENT WILL BE OPERATED<br>UNDER FCC RULES PART(S)   | FCC PART 15 SUBPART C §15.227 and §15.231            |
| MODIFICATIONS ON THE EQUIPMENT<br>TO ACHIEVE COMPLIANCE | No                                                   |
| FINAL TEST WAS CONDUCTED ON                             | 3 METER OPEN AREA TEST SITE                          |

This device is composite device, so the other report covers the requirement of section 15.227.

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



## 2. GENERAL INFORMATION

### 2.1 Product Description

The Seoby Electronics Co, Ltd., Model RC-JB-3 (referred to as the EUT in this report) is a Juke Box Remote Controller that has 2 carrier frequencies, 27.145 MHz and 433.92MHz, but the EUT will not transmit simultaneously. The default carrier frequencies are 433.92 MHz and if user wants to change carrier frequency 433.92MHz to 27.145MHz, the user shall be pressing a combination key. The product specification described herein was obtained from product data sheet or user's manual.

|                                                 |                                                                                   |
|-------------------------------------------------|-----------------------------------------------------------------------------------|
| CHASSIS TYPE                                    | Plastic                                                                           |
| TX FREQUENCY                                    | 27.145 MHz and 433.92 MHz                                                         |
| MODULATION                                      | AM for 27.145 MHz and FSK for 433.92MHz                                           |
| LIST OF EACH OSC. OR<br>CRY. FREQ.(FREQ.>=1MHz) | 27.145, 6.78 and 4.0 MHz                                                          |
| ANTENNA TYPE                                    | Built-in on the PCB in the EUT                                                    |
| TRANSMISSION TIME                               | Not longer than 5 sec                                                             |
| RATED SUPPLY VOLTAGE                            | DC 3V (2 X AAA 1.5 V Alkaline Battery)                                            |
| OPERATING VOLTAGE RANGE                         | DC 2.5 ~ 3.2V                                                                     |
| NUMBER OF LAYERS                                | 1 Layer for PCB Board, SBDB-6100-10006<br>2 Layers for PCB Board, SBDB-6011-10007 |
| FUNCTION OF BUTTON                              | Total 29 keys with Indicator LED                                                  |

Remark: This equipment automatically deactivates the transmitter within not more than 5 second of being released.

### 2.2 Model Differences:

No other model differences have been mentioned

### 2.3 Related Submittal(s) / Grant(s)

None



## 2.4 Test System Details

The EUT was tested with the following all equipment used in the tested systems are: None.

## 2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4/2001. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

## 2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on October 02, 2002. (Registration Number: 529838)

# 3. SYSTEM TEST CONFIGURATION

## 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

| DEVICE TYPE   | MANUFACTURER               | MODEL/PART NUMBER | FCC ID |
|---------------|----------------------------|-------------------|--------|
| Digital Board | Seoby Electronics Co., Ltd | SBDB-6100-10006   | N/A    |
| RF Board      | Seoby Electronics Co., Ltd | SBDB-6100-10007   | N/A    |

## 3.2 EUT exercise Software

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal. To activate continuous transmission, place a small plastic block between rubber band and the push button on the EUT.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

## 3.3 Equipment Modifications

None



### 3.4 Configuration of Test System

**Line Conducted Test:** It needs not to test this requirement, because the EUT supplies from a DC battery.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4/2001 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

**Occupied Bandwidth Measurement:**

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The plot is taken at 50 kHz/division frequency span, 10 kHz resolution bandwidth and 10dB/division logarithmic display from an 8568B spectrum analyzer.

### 3.5 Antenna Requirement

For intentional device, according to §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.

**Antenna Construction:**

The transmitter antenna of the EUT is built-in on the PCB in the EUT, no consideration of replacement by the user.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

| Operation Mode                                                                                       | The Worse operating condition (Please check one only) |
|------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| N/A                                                                                                  | N/A                                                   |
| It is not need to test this requirement, because the power of the EUT is supplied from a DC battery. |                                                       |

### 4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

| Operation Mode | The Worse operating condition (Please check one only) |
|----------------|-------------------------------------------------------|
| TX mode        | X                                                     |



## 5. FINAL RESULT OF MEASUREMENT

### 5.1 Field Strength of the Carrier Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 43 % Temperature: 17°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
 Type of Test : Intentional Radiator  
 Result : PASSED BY -13.96 dB with Peak detector

EUT : Juke Box Remote Controller Date: January 10, 2005  
 Operating Condition : TX mode  
 Distance : 3 Meter

| Radiated Emissions     |                     |                  | Ant  | Correction Factors |               |                         | Total            | FCC Limit         |                |
|------------------------|---------------------|------------------|------|--------------------|---------------|-------------------------|------------------|-------------------|----------------|
| Carrier Freq.<br>(MHz) | Amplitude<br>(dBuV) | Detector<br>Mode | Pol. | Ant.<br>(dB/m)     | Cable<br>(dB) | Average<br>Level Factor | Amp.<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
| 433.92                 | 59.50               | Peak             | H    | 16.61              | 3.47          | 12.69                   | 66.89            | 80.83             | -13.94         |
| 433.92                 | 45.80               | Peak             | V    | 16.61              | 3.47          | 12.69                   | 53.19            | 80.83             | -27.64         |

\*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

“Q.P.” : Quasi-Peak, “H”: Horizontal Polarization, “V”: Vertical Polarization

### 5.2 Maximum Modulation Percentage (MMP)

In order to determine possible Maximum Modulation Percentage from the EUT, we measured the duty cycle according to the clause I4.(10) in ANSI C63.4/1992.

The pulse train from the EUT was consisting of long and short pulse. The measured values are as follows.

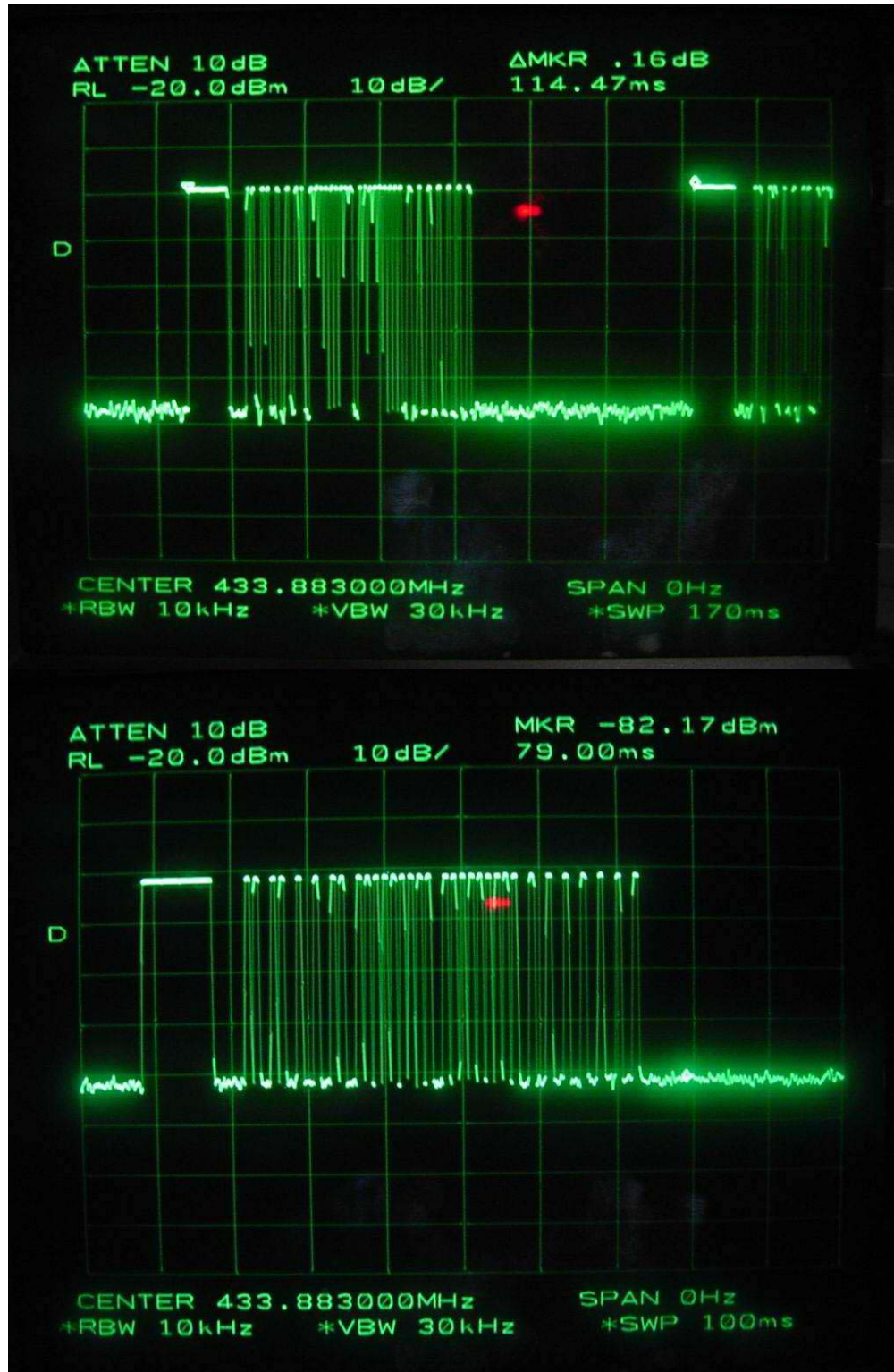
| Long Pulse (LP)                    | Short Pulse (SP) | Total sum of LP                           | Total sum of SP | Pulse Width |
|------------------------------------|------------------|-------------------------------------------|-----------------|-------------|
| 8.867ms                            | 0.433ms          | 1                                         | 33              | 114.47ms    |
| Duty Cycle                         |                  | $(8.867 + 33 \times 0.433) / 100 = 0.232$ |                 |             |
| Maximum Modulation Percentage(MMP) |                  | Duty Cycle X 100 % = 23.2 %               |                 |             |
| Average Level Factor               |                  | -12.69 dB                                 |                 |             |

Remark: Please refer to Plotted Data #1.

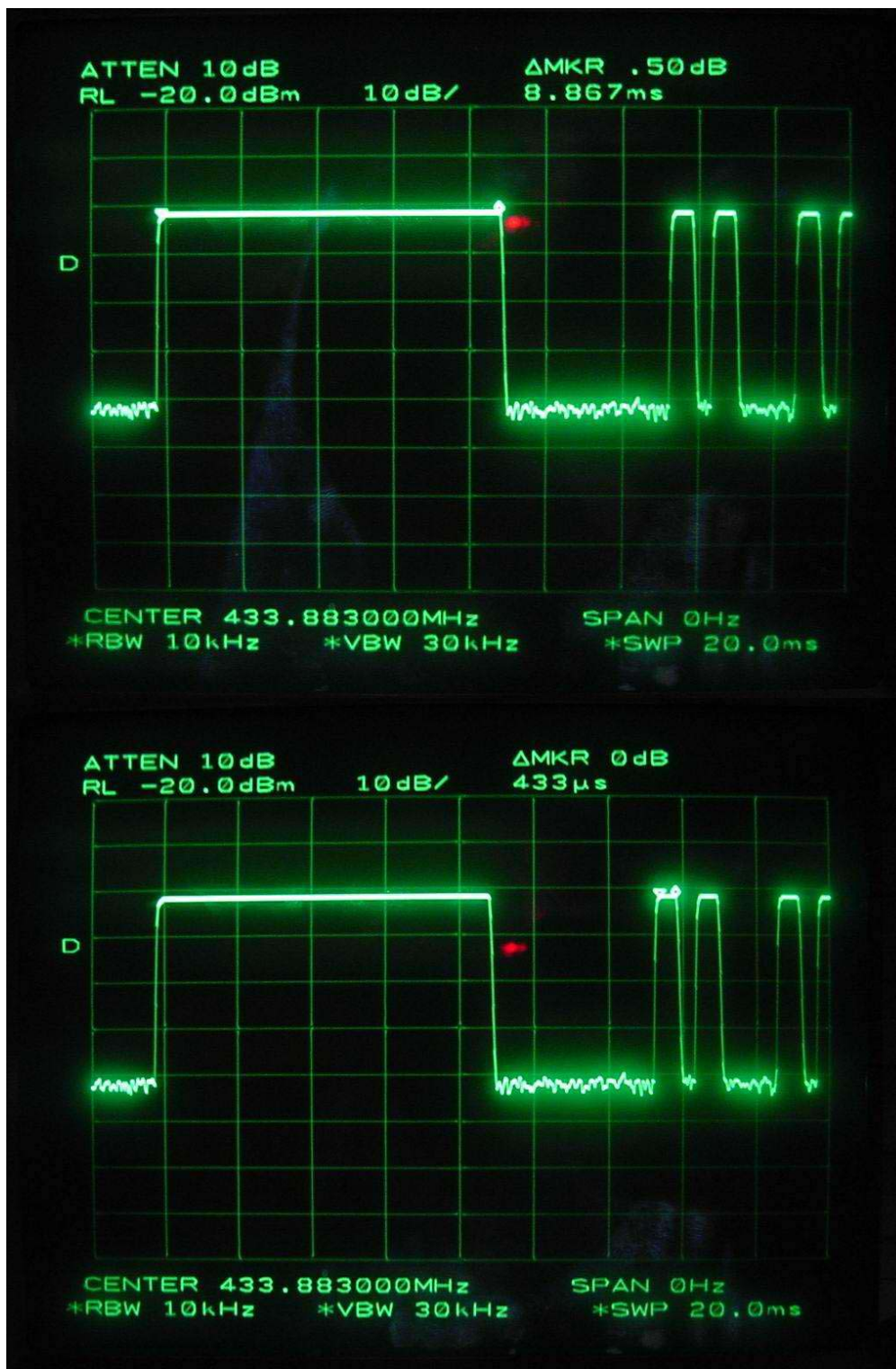
Tested by: Young-Min, Choi / Senior Engineer



## Plotted Data #1.







**5.3 Spurious and Harmonic Emission Test according to 15.231**

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

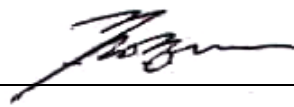
Humidity Level : 43 % Temperature: 17°C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b)  
 Type of Test : Intentional Radiator  
 Result : PASSED BY -6.56dB at 871.0 MHz

EUT : Juke Box Remote Controller Date: January 10, 2005  
 Operating Condition : TX mode  
 Distance : 3 Meter

| Radiated Emissions                                        |                     |                  | Ant  | Correction Factors |               |                         | Total            | FCC Limit         |                |
|-----------------------------------------------------------|---------------------|------------------|------|--------------------|---------------|-------------------------|------------------|-------------------|----------------|
| Carrier Freq.<br>(MHz)                                    | Amplitude<br>(dBuV) | Detector<br>Mode | Pol. | Ant.<br>(dB/m)     | Cable<br>(dB) | Average<br>Level Factor | Amp.<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
| 210.00                                                    | 15.40               | Peak             | H    | 16.43              | 2.32          |                         | 34.15            | 43.52             | -9.37          |
| 285.00                                                    | 13.80               | Peak             | H    | 20.04              | 2.78          |                         | 36.62            | 46.02             | -9.40          |
| 375.10                                                    | 15.95               | Peak             | H    | 15.16              | 3.28          |                         | 34.39            | 46.02             | -11.63         |
| 407.00                                                    | 12.10               | Peak             | H    | 15.98              | 3.49          |                         | 31.57            | 46.02             | -14.45         |
| 490.00                                                    | 10.80               | Peak             | H    | 17.52              | 3.65          |                         | 31.97            | 46.02             | -14.05         |
| 584.00                                                    | 10.18               | Peak             | H    | 18.44              | 4.04          |                         | 32.66            | 46.02             | -13.36         |
| 871.00*                                                   | 39.00               | Peak             | H    | 22.96              | 5.00          | 12.69                   | 54.27            | 60.83             | -6.56          |
| Other spurious frequencies were not found up to 4400 MHz. |                     |                  |      |                    |               |                         |                  |                   |                |

Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Mark "\*" means harmonic frequency of carrier frequency.

  
 Tested by: Young-Min, Choi / Senior Engineer



## 5.4 Bandwidth of the operating frequency

Humidity Level : 43 % Temperature: 17°C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231 (c)  
Type of Test : Intentional Radiator  
Result : PASSED

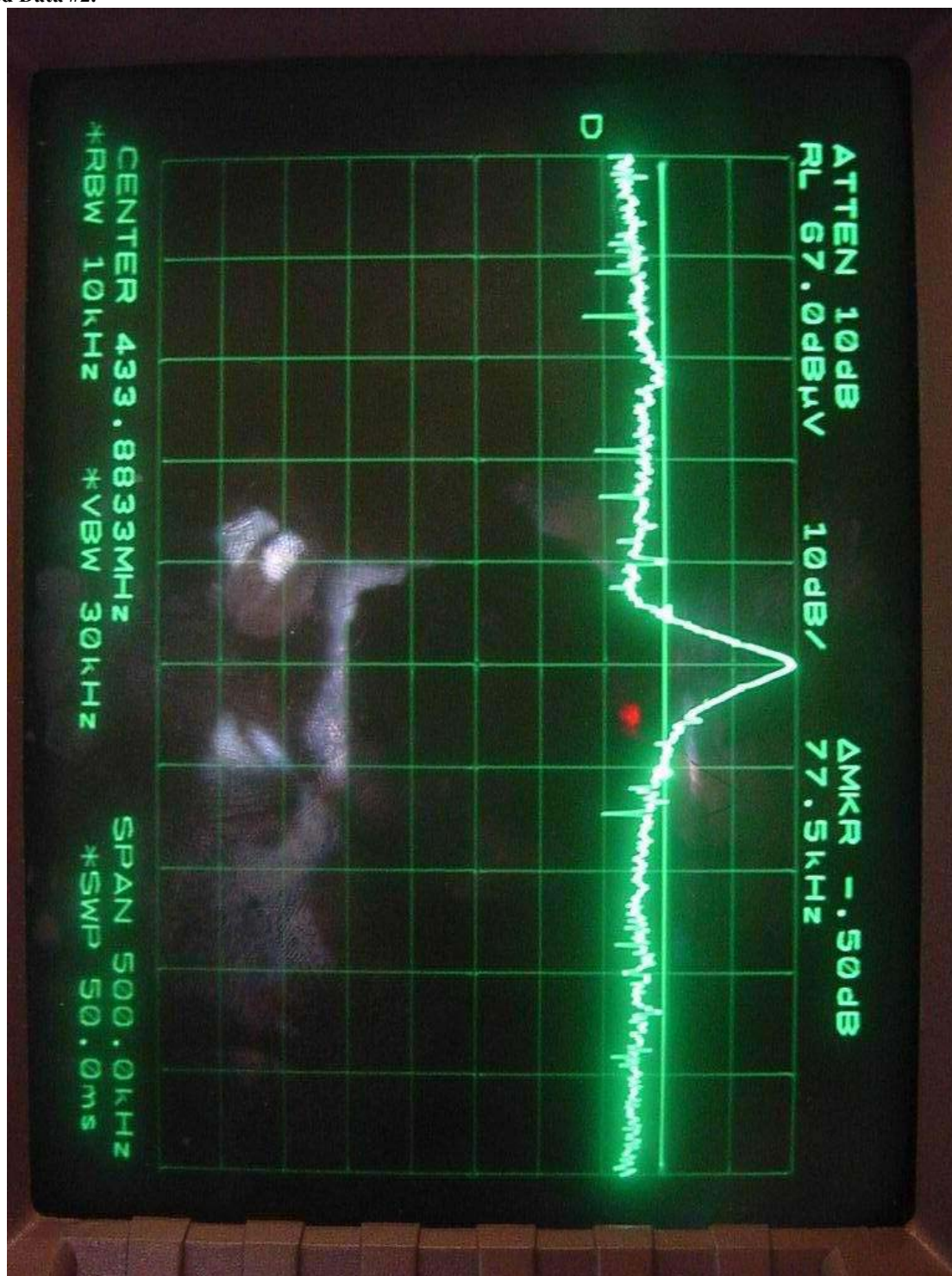
EUT : Juke Box Remote Controller Date: January 10, 2005  
Operating Condition : TX mode  
Minimum Resolution  
Bandwidth : 10 kHz

| Carrier Freq.<br>(MHz) | Bandwidth of the emission.<br>(kHz) | Limit<br>(kHz) | Remark                                                    |
|------------------------|-------------------------------------|----------------|-----------------------------------------------------------|
| 433.92                 | 77.5                                | 1084.8         | <u>The point 20dB down from<br/>the modulated carrier</u> |

Remark: Please refer to Plotted Data #1 for test data.

Tested by: Young-Min, Choi / Senior Engineer

## Plotted Data #2.







## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

---

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

**7. LIST OF TEST EQUIPMENT**

| No. | EQUIPMENTS            | MFR.          | MODEL     | SER. NO.                            | LAST CAL | DUE CAL | USE |
|-----|-----------------------|---------------|-----------|-------------------------------------|----------|---------|-----|
| 1.  | Test receiver         | R/S           | ESVS 10   | 827864/005                          | NOV/04   | 12MONTH | ■   |
| 2.  | Test receiver         | R/S           | ESHS10    | 834467/007                          | APR/04   | 12MONTH |     |
| 3.  | Spectrum analyzer     | HP            | 8567A     | 3021A00773                          | JUL/04   | 12MONTH | ■   |
| 4.  | RF preselector        | HP            | 85685A    | 3107A01268                          | JUL/04   | 12MONTH | ■   |
| 5.  | Quasi-Peak Adapter    | HP            | 85650A    | 3107A01550                          | JUL/04   | 12MONTH | ■   |
| 6.  | Biconical antenna     | EMCO          | 3104C     | 9109-4441<br>9109-4443<br>9109-4444 | JUL/04   | 12MONTH | ■   |
| 7.  | Log Periodic antenna  | EMCO          | 3146      | 9109-3213<br>9109-3214<br>9109-3217 | JUL/04   | 12MONTH | ■   |
| 8.  | Horn Antenna          | SCHWARZBECK   | BBHA9120D | BBHA9120D294                        | JUN/04   | 12MONTH | ■   |
| 9.  | LISN                  | EMCO          | 3825/2    | 9109-1867<br>9109-1869              | AUG/04   | 12MONTH |     |
| 10. | RF Amplifier          | HP            | 8347F     | 3307A01354                          | JUN/04   | N/A     |     |
| 11. | Spectrum Analyzer     | HP            | 8564E     | 3650A00756                          | JUL/04   | 12MONTH | ■   |
| 12. | Spectrum Analyzer     | HP            | 8566B     | 3407A08547                          | AUG/04   | 12MONTH |     |
| 13. | Plotter               | HP            | 7475A     | 30052 22986                         | N/A      | N/A     | ■   |
| 14. | Position Controller   | HD            | HD100     | 100/788                             | N/A      | N/A     | ■   |
| 15. | Turn Table            | HD            | DS420S    | N/A                                 | N/A      | N/A     | ■   |
| 16. | Antenna Master        | HD            | HD240     | N/A                                 | N/A      | N/A     | ■   |
| 17. | Isolation Transformer | Digitek Power | DPT       | DPF-22027                           | N/A      | N/A     | ■   |
| 18. | Isolation Transformer | Digitek Power | DPT       | DPF-22028                           | N/A      | N/A     | ■   |
| 19. | Frequency Converter   | Digitek Power | VFS/DEFC  | N/A                                 | N/A      | N/A     | ■   |