# FCC TEST REPORT

| | |
|---|---|
| **Test report No.:** | **EMC- FCC- 0457** |
| **Type of equipment:** | **NAVIGATION SYSTEM** |
| **Model Name:** | **BD-200** |
| **Variant Model:** | **COOLNAVI730** |
| **FCC ID :** | **UO7BD-200** |
| **Applicant:** | **3SOFT, INC** |
| **Test standards:** | **FCC part 15 subpart B (Class B)**<br>**FCC part 15 subpart C** |
| **Test Standard :** | **FCC Part 15, Subpart B**<br>**FCC Part 15, Subpart C** |
| **Test Procedure :** | **ANSI C63.4:2003** |

**Test result : Complied**

The above equipment was tested at EMC compliance Testing Laboratory in compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system tested only. Other similar equipments will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Date of test: 2006. 11. 09~10** **Issued date: 2006 . 11. 13**

**Tested by:** PARK, SEUNG-SOO

**Approved by:** CHUNG, MIN-SEOK

**EMC Compliance Ltd.**
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* The tuning controls were manually adjusted to verify maximum tuning range on 4.1 and 6.2 section.

# 1. Client information

| | |
|---|---|
| **Applicant :** | 3SOFT, INC |
| **Address :** | EunSung Bldg13F #53-8 Chungdam-dong<br>Gangnam-Gu Seoul Korea 135-763 |
| **Telephone number :** | + 82-2-541-0453 |
| **Facsimile number :** | + 82-2-541-1429 |
| **Contact Person:** | Je Hwan Lee |

| | |
|---|---|
| **Manufacturer :** | 3SOFT, INC |
| **Address :** | EunSung Bldg13F #53-8 Chungdam-dong<br>Gangnam-Gu Seoul Korea 135-763 |
| **Telephone number :** | + 82-2-541-0453 |
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| **Contact Person:** | Je Hwan Lee |

# 2. Laboratory information

**Address**

**EMC compliance Ltd.**

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

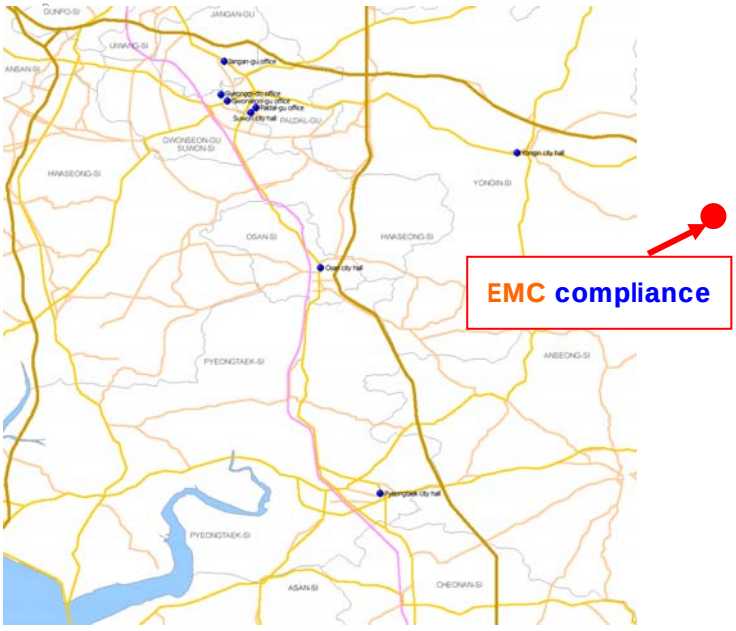
FCC Registration No. : 793334

VCCI Registration No. : C-1713, R-1606,T-258

KOLAS NO.:231

CBTL Testing Laboratory

SITE MAP

# 3. Test system configuration

## 3.1 Operation Environment

| | | Temperature | Humidity | Pressure |
|---|---|---|---|---|
| OATS | : | 15 °C | 48 % | 1007 hPa |
| Shielded room | : | 20 °C | 50 % | 1006 hPa |

**Test site**

These tests were performed at following locations;

**Shielded Room** : N/A

**3m Semi-anechoic chamber & OATS** :

- Radiated Emission
- Occupied bandwidth

## 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are test receiver, Cable Loss, antenna factor calibration, Antenna directivity, antenna factor Variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, Site imperfection, mismatching, and system repeatability.
Based on NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

## 3.3 Sample calculation

Radiated emission

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follow:

FS = MR + AF + CL + AT –AG

MR = Meter Reading / AF = Antenna Factor / CL = Cable Loss

AP = Antenna Pad / AG=Amplifier Gain /

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

30 + 12 + 5 + 10 –35 = 22dBuV/m

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss to the measured reading.

The sample calculation is as follow :

FS = MR + LF + CL

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (FS) is

30 + 1 + 1 = 32dBuV

# 4. Description of EUT

## 4.1 Product description

This BD-200 is a Multifunction device with FM transmitter.

The device has following functions.

- MP3, Navigation, FM transmitter

| | |
|---|---|
| Power requirement | DC 12V |
| Tx Frequency range | 88.1MHz ~ 107.9MHz (100KHz step) |
| Type of Chassis | Metal |
| ANT type | Pattern of PCB |
| External Connector | DC In,AV output, AV input,USB,GPS |

*"Firmware upgrade" is the only function that USB port has.

**The tuning controls were manually adjusted to verify maximum tuning range.**

## 4.2 Peripherals

| Description | Model / Part # | Serial number | Manufacturer |
|---|---|---|---|
| USB Memory | - | - | - |

## 4.3 Mode of Operation

During FCC Part 15 Subpart B
Conducted emission was not performed because of 12V dc.
Radiated emission was tested with following testing mode.

Mode 1. MP3 play
2. Navigation

During FCC Part 15 Subpart C (15.239)

Mode 1. Normal mp3 music file transmitting mode

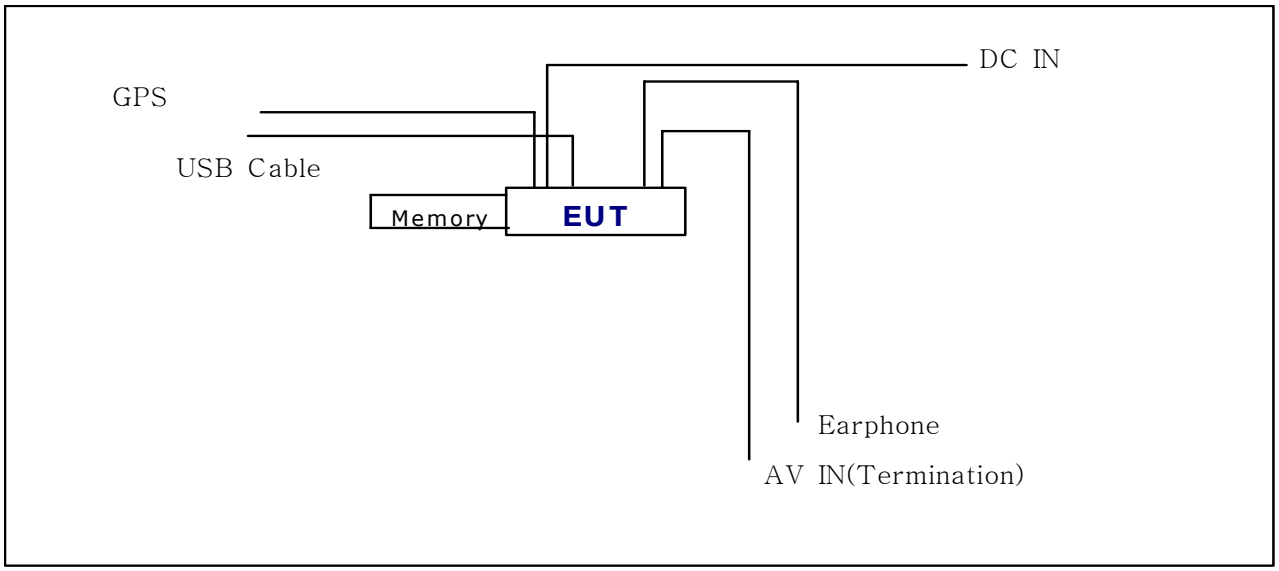
## 4.4 Used cables

| Start | | END | | Cable Spec. | |
|---|---|---|---|---|---|
| Name | I/O Port | Name | I/O Port | Length | Shield |
| EUT | COM1 cable | - | - | 1.3 | Unshielded |
| | USB | USB Memory | DRIECT | - | Shielded |
| | AV IN cable | 75ΩTermination | - | 1.2 | Shielded |
| | Earphone | - | - | 1.2 | Unshielded |
| | DC Power | - | - | 1.3 | Unshielded |

*"Firmware upgrade" is the only function that USB port has.

## 4.5 E.U.T. test configuration

Mode ; MP3 Play, Navigation. FM transmitter



# 5. Summary of test results

## 5.1 Modification to the E.U.T.

- None

## 5.2 Standards & results

| FCC part 15 subpart B (Class B) | | |
|---|---|---|
| **Description of test** | **Result** | **Margin** |
| Conducted Emission | N/A | DC 12V |
| Radiated Emission | Complied | 1.97dB |

| FCC part 15 subpart C (15.239) | | |
|---|---|---|
| **Description of test** | **Result** | **Margin** |
| Conducted Emission | N/A | DC 12V |
| Radiated Emission | Complied | 2.56dB |
| Occupied bandwidth | Complied | N/A |
| Antenna requirement | Complied | N/A |

# 6. Test results

## 6.1 Conducted Emission test

### 6.1.1 Limit

| Frequency | Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 150KHz ~ 500KHz | 66 ~ 56 * | 66 ~ 56 * |
| 500KHz ~ 5MHz | 56 | 46 |
| 5MHz ~ 30MHz | 60 | 50 |

- Decreasing linearly with logarithm of the frequency
- The lower limit shall apply at the transition frequency

### 6.1.2 Measurement procedure

Mains

The measurements were performed in a shielded room.
EUT was placed on a non-metallic table height of 0.8 m above the reference ground plane.
The rear of table was located 0.4 m to the vertical conducted plane.
Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.
Both lines of power cord, hot and neutral, were measured.

### 6.1.3 Used equipments

| Equipment | Model | Serial No. | Makers | Next Cal. Date | Used |
|---|---|---|---|---|---|
| Test receiver | ESHS10 | 843276/003 | R&S | 07.05.09 | ☐ |
| L.I.S.N. | ESH3-Z5 | 100267 | R&S | 07.06.17 | ☐ |
| | L2-16A | 0000J10705 | PMM | 06.11.30 | ☐ |
| Test site | Shield room | - | - | - | ☐ |

### 6.1.4 Measurement uncertainty

Conducted emission measurement : (k=2, 95%)
9kHz-150 kHz : ±3.47 [dB]
150kHz-30 MHz : ±3.01 [dB]

### 6.1.5 Test data

N/A

### 6.1.6 Result

Not required.
Power of EUT is being supplied by a car battery.

## 6.2 Radiated emission

### 6.2.1 Limit

| FREQUENCY (MHz) | Class A (at 10m)* | Class B (at 10m)* |
|---|---|---|
| | dBuV/m | dBuV/m |
| 30-230 | 40 | 30 |
| 230-1000 | 47 | 37 |

* Detector Function : Quasi - Peak

**Deviation from the Standards**

This British Standard is of English language version of EN55022 : 1998.

It was derived by CENELEC from CISPR 22 : 1997.

The section 15.107 and 15.109 of FCC Part 15. As an alternative to the FCC Rules are acceptable for the CISPR 22 (EN55022).

**FCC part 15 subpart C (15.239)**

| Frequency band (MHz) | Fundamental limits 3m measurement distance (dBuV/m) | |
|---|---|---|
| | Peak | AV |
| 88 ~ 108 | 68 | 48 |

The field strength of any emissions which appear outside of this band shall not exceed the radiated emissions (15.209(a)).

| Frequency(MHz) | Distance (meters) | Limits(dBuV/m) |
|---|---|---|
| 30 ~ 88 | 3 | 40 |
| 88 ~ 216 | 3 | 43.5 |
| 216 ~ 960 | 3 | 46 |
| above 960 | 3 | 54 |

***The tuning controls were manually adjusted to verify maximum tuning range.**

### 6.2.2 Measurement procedure

**FCC part 15, subpart B**

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency. The final test was done at a 10m open area test site with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

**FCC part 15 subpart C (15.239)**

The radiation tests were performed at 3-meter open area test site, using the setup accordance with ANSI C63.4-2003.
The EUT was placed on the center of the test table. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The turntable was rotated to find maximum value.(360 degrees).

### 6.2.3 Used equipments

| Equipment | Model no. | Serial no. | Makers | Next cal. date | Used |
|---|---|---|---|---|---|
| Test receiver | ESVD | 841729/010 | R&S | 07.06.02 | ☒ |
| TRILOG SUPER Broadband ANT | VULB 9160 | 3138 | SCHWAREBECK | 07.10.31 | ☒ |
| Antenna Mast | A109 | N/A | DEAIL | - | ☒ |
| Turn Table | TS14 | N/A | DEAIL | - | ☒ |
| 3m OATS | - | - | EMC Compliance | - | ☒ |

### 6.2.4 Measurement uncertainty

Radiated Emission measurement : (k=2, 95%)
30-300 MHz ; 3 m: ±3.69 [dB], 10 m: ±3.67 [dB]
300-1000 MHz ; 3 m: ±4.07 [dB], 10 m: ±3.41 [dB]

### 6.2.5 Test data

**FCC part 15 subpart B (Class B)**

| Frequency [MHz] | Reading [dBuV/m] | Pol. | Height [m] | angle | Correction Factor | | Limits [dBuV/m] | Result [dBuV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Antenna | Cable | | | |
| **MP3 Play mode** | | | | | | | | | |
| 31.01 | 20.4 | V | 1.0 | 360 | 11.10 | 1.30 | 40.0 | 32.80 | 7.20 |
| 85.81 | 27.6 | H | 3.9 | 112 | 7.83 | 1.60 | 40.0 | 37.03 | 2.98 |
| 204.51 | 26.1 | H | 3.8 | 17 | 9.31 | 2.60 | 43.5 | 38.01 | 5.49 |
| 209.00 | 29.4 | H | 4.0 | 320 | 9.52 | 2.60 | 43.5 | 41.53 | 1.97 |
| **Navigation mode** | | | | | | | | | |
| 31.01 | 20.1 | V | 1.0 | 95 | 11.10 | 1.30 | 40.0 | 32.50 | 7.50 |
| 209.04 | 28.7 | H | 4.0 | 200 | 9.52 | 2.60 | 43.5 | 40.82 | 2.68 |
| 221.03 | 27.8 | H | 4.0 | 354 | 10.03 | 2.60 | 46.0 | 40.47 | 5.53 |
| 225.01 | 27.4 | H | 3.3 | 187 | 10.20 | 2.80 | 46.0 | 40.40 | 5.60 |

* Receiving Antenna Mode : *Horizontal, Vertical*

* 3 m OATS

* *Note : Reading = Test Receiver meter,*

*P= Polarization → POL H = Horizontal, POL V = Vertical*

* *Result = Field Strength (Antenna factor + Cable factor + Reading)*

**FCC part 15 subpart C (15.239)**

Detection mode ; Peak

| Frequency | Reading | Pol. | Height | angle | Correction Factor | | Limits | Result | Margin |
|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBuV/m] | | [m] | | Antenna | Cable | [dBuV/m] | [dBuV/m] | [dB] |
| 88.10 | 36.1 | H | 2.1 | 83 | 7.88 | 1.60 | 68.0 | 45.58 | 22.42 |
| 98.00 | 36.8 | H | 1.7 | 255 | 9.07 | 1.80 | 68.0 | 47.67 | 20.33 |
| 107.90 | 38.5 | H | 1.6 | 240 | 10.04 | 1.80 | 68.0 | 50.34 | 17.66 |

Detection mode ; AV

| Frequency | Reading | Pol. | Height | angle | Correction Factor | | Limits | Result | Margin |
|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBuV/m] | | [m] | | Antenna | Cable | [dBuV/m] | [dBuV/m] | [dB] |
| 88.10 | 35.3 | H | 2.1 | 83 | 7.88 | 1.60 | 48.0 | 44.78 | 3.22 |
| 98.00 | 34.2 | H | 1.7 | 255 | 9.07 | 1.80 | 48.0 | 45.07 | 2.93 |
| 107.90 | 33.6 | H | 1.6 | 240 | 10.04 | 1.80 | 48.0 | 45.44 | 2.56 |

Detection mode ; Quasi-Peak

| Frequency | Reading | Pol. | Height | angle | Correction Factor | | Limits | Result | Margin |
|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBuV/m] | | [m] | | Antenna | Cable | [dBuV/m] | [dBuV/m] | [dB] |
| **88.1MHz** | | | | | | | | | |
| 176.20 | 20.2 | H | 1.9 | 59 | 11.48 | 2.40 | 43.5 | 34.08 | 9.42 |
| 393.80 | 11.8 | H | 1.6 | 214 | 14.99 | 3.70 | 46.0 | 30.49 | 15.51 |
| 602.12 | 10.3 | H | 1.4 | 173 | 19.58 | 4.80 | 46.0 | 34.68 | 11.32 |
| 700.42 | 9.2 | H | 1.9 | 110 | 20.69 | 5.40 | 46.0 | 35.29 | 10.71 |
| 726.30 | 12.5 | H | 2.0 | 122 | 21.36 | 5.50 | 46.0 | 39.36 | 6.64 |
| **98.0MHz** | | | | | | | | | |
| 102.80 | 21.0 | H | 2.3 | 126 | 9.55 | 1.80 | 43.5 | 32.35 | 11.15 |
| 196.00 | 22.4 | H | 1.7 | 54 | 9.43 | 2.40 | 43.5 | 34.23 | 9.27 |
| 233.30 | 26.6 | H | 3.6 | 126 | 10.55 | 2.80 | 46.0 | 39.95 | 6.05 |
| 258.50 | 20.6 | H | 4.0 | 265 | 11.59 | 3.00 | 46.0 | 35.19 | 10.81 |
| 700.42 | 9.0 | H | 1.3 | 195 | 20.69 | 5.40 | 46.0 | 35.09 | 10.91 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **107.9MHz** | | | | | | | | | |
| 172.03 | 15.1 | H | 1.6 | 209 | 11.86 | 2.20 | 43.5 | 29.16 | 14.34 |
| 215.80 | 12.3 | H | 1.6 | 54 | 9.71 | 2.60 | 43.5 | 24.61 | 18.89 |
| 233.30 | 26.5 | H | 3.6 | 125 | 10.55 | 2.80 | 46.0 | 39.85 | 6.15 |
| 240.30 | 18.8 | H | 3.2 | 144 | 10.87 | 2.80 | 46.0 | 32.47 | 13.53 |
| 258.50 | 20.4 | H | 4.0 | 255 | 11.59 | 3.00 | 46.0 | 34.99 | 11.01 |

* Receiving Antenna Mode : P= Polarization → POL H = Horizontal, POL V =Vertical

* 3m OATS

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

* Result = Field Strength (Antenna factor + Cable factor + Reading)

### 6.2.6 Result

Complied

## 6.3 Occupied Bandwidth

### 6.3.1 Limit

Emissions from the intentional radiator shall be confined within a band of 200kHz Wide centered on the operating frequency.

### 6.3.2 Used equipments

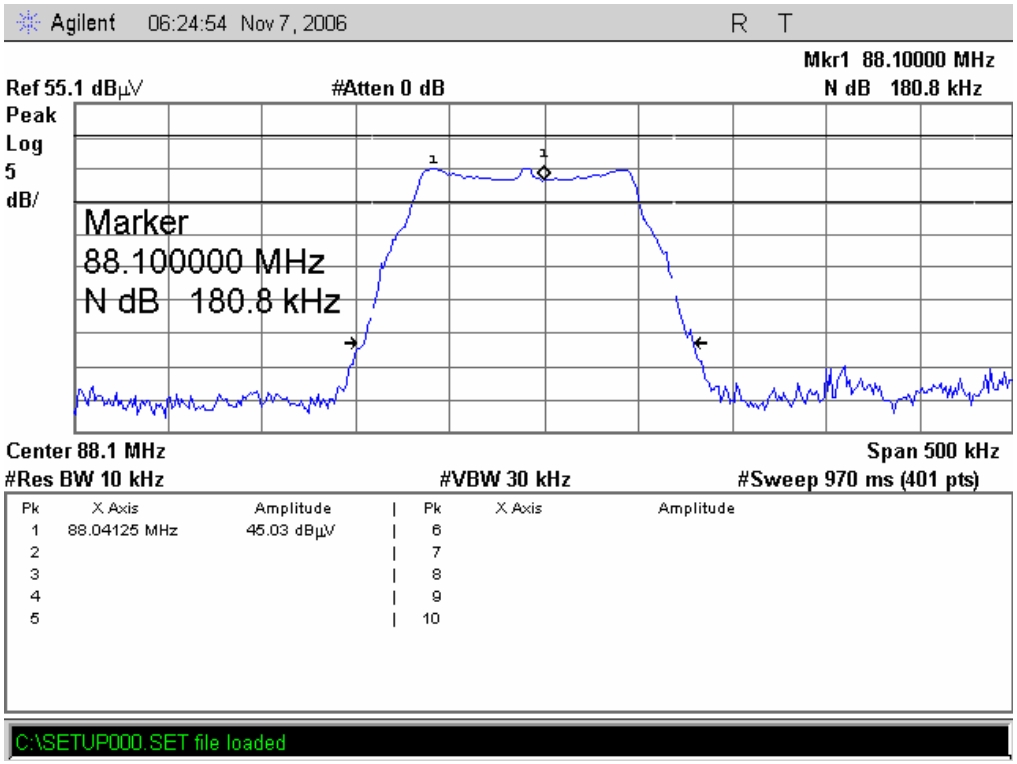
| Equipment | Model no. | Serial no. | Makers | Next cal. date | Used |
|---|---|---|---|---|---|
| EMC Analyzer | E7401A | US38460066 | Agilent | 07.04.07 | ☒ |

### 6.3.3 Measurement procedure

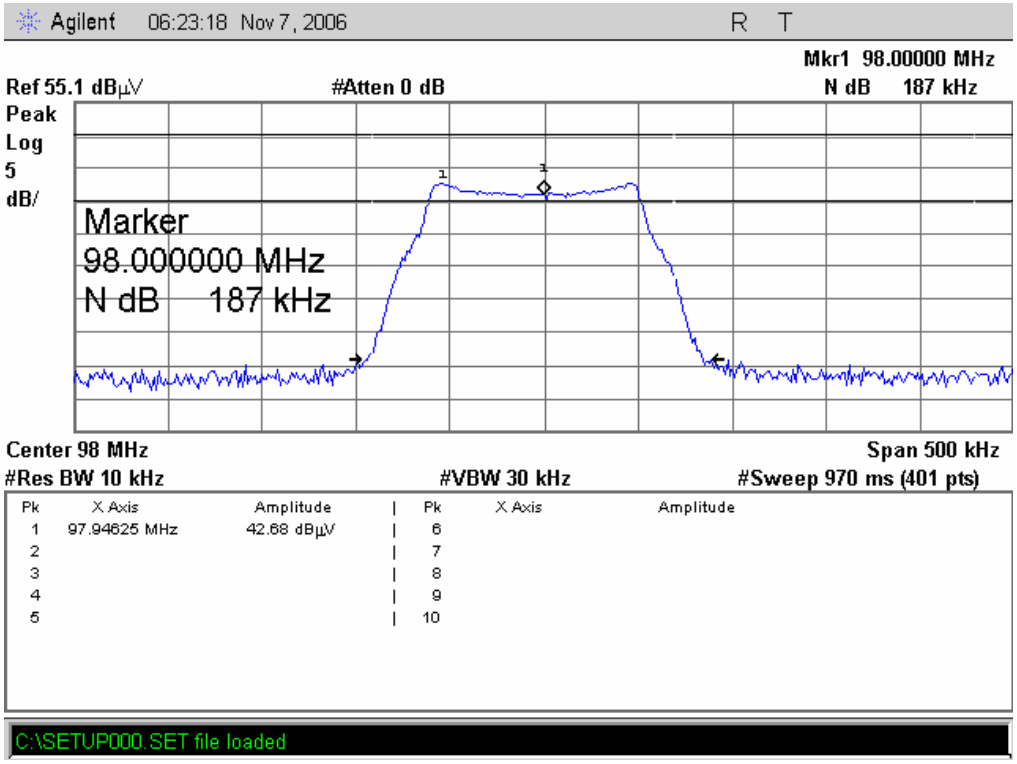
The EUT was placed on a turn table which is 0.8m above ground plane.
Set the spectrum analyzer as follow.
R.B.W : 10 kHz
V.B.W : 30 kHz
Measured the spectrum width with Maximum power.

6.3.4 Test data

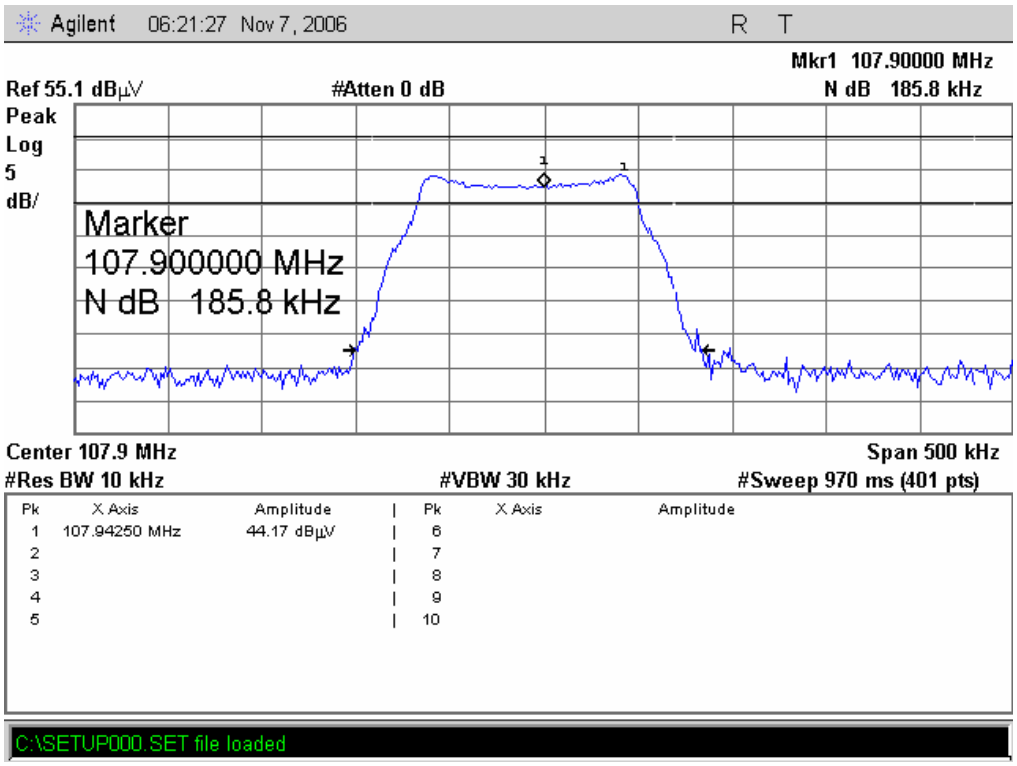
**88.1MHz**




**98.0MHz**



**107.9MHz**




## 6.3.5 Result

Complied

*Measurements have been done with typical audio file.
(Normal mp3 music file)

*Measurements have been done with maximum output level on the audio device.

## 6.4 Antenna requirement

6.4.1 Requirement

According to section 15.203, an international 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 ; Complied**

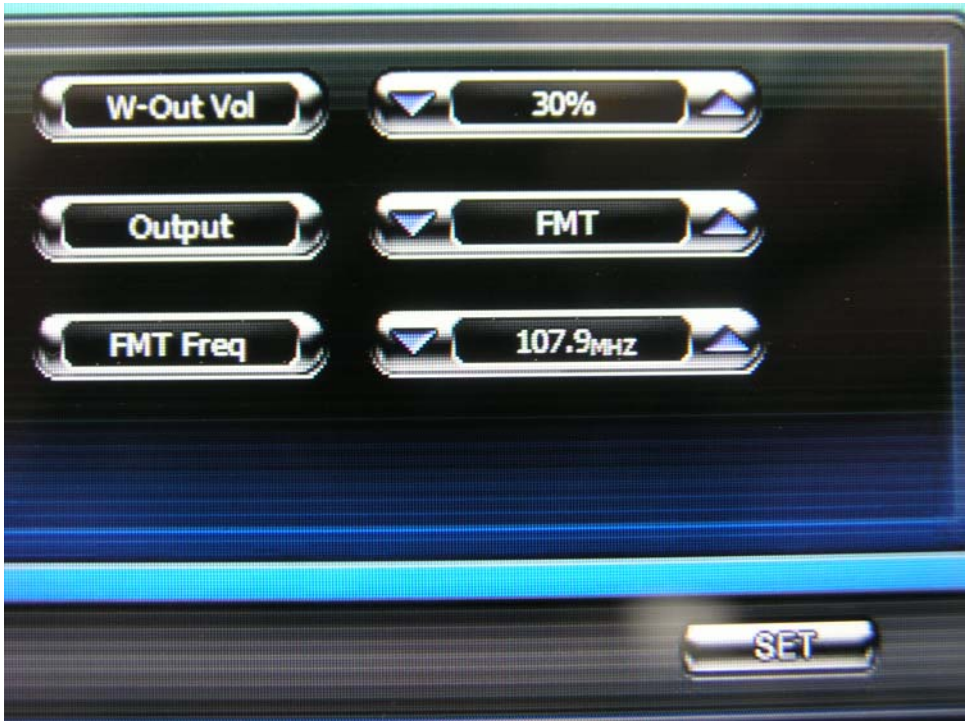
Antenna of the EUT is not replaceable by the user. Antenna is pattern of the printed circuit board.

## 6.5 Tuning controls

*MIN(88.1MHz)

*STEP(100KHz)


*MAX(107.9MHz)




* The tuning range is 88.1 ~ 107.9MHz, (100KHz step)
setting as program firmware
the frequency can be controlled manually.
the frequency range is 88.1~107.9