

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

**Test Report No.** : E062R-024

**AGR No.** : A061A-098

**Applicant** : KI RYUNG ELECTRONICS CO., LTD.  
**Address** : 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea

**Manufacturer** : KI RYUNG ELECTRONICS CO., LTD.  
**Address** : 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea

**Type of Equipment** : Navigation (FM Transmitter)

**FCC ID.** : P3HXNS701

**Model Name** : XNS701

**Serial number** : N/A

**Total page of Report** : 15 pages (including this page)

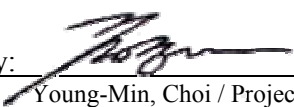
**Date of Incoming** : February 01, 2006

**Date of Issuing** : February 23, 2006

## SUMMARY

The equipment complies with the regulation of *FCC CRF 47 PART 15, SUBPART C, SECTION 15.239*.

This test report contains only the results 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.

Prepared by:   
Young-Min, Choi / Project Engineer  
EMC Div.  
ONETECH Corp.

Reviewed by:   
Y. K. Kwon / Director  
EMC Div.  
ONETECH Corp.

## ***CONTENTS***

|                                                                         | PAGE      |
|-------------------------------------------------------------------------|-----------|
| <b>1. VERIFICATION OF COMPLIANCE.....</b>                               | <b>3</b>  |
| <b>2. GENERAL INFORMATION.....</b>                                      | <b>4</b>  |
| 2.1 PRODUCT DESCRIPTION.....                                            | 4         |
| 2.2 MODEL DIFFERENCES.....                                              | 4         |
| 2.3 RELATED SUBMITTAL(S) / GRANT(S) .....                               | 4         |
| 2.4 TEST SYSTEM DETAILS .....                                           | 4         |
| 2.5 TEST METHODOLOGY .....                                              | 4         |
| 2.6 TEST FACILITY .....                                                 | 4         |
| <b>3. SYSTEM TEST CONFIGURATION.....</b>                                | <b>5</b>  |
| 3.1 JUSTIFICATION .....                                                 | 5         |
| 3.2 EUT EXERCISE SOFTWARE.....                                          | 5         |
| 3.3 CABLE DESCRIPTION .....                                             | 5         |
| 3.4 EQUIPMENT MODIFICATIONS .....                                       | 5         |
| 3.5 CONFIGURATION OF TEST SYSTEM .....                                  | 6         |
| 3.6 ANTENNA REQUIREMENT .....                                           | 6         |
| <b>4. PRELIMINARY TEST.....</b>                                         | <b>6</b>  |
| 4.1 AC POWER LINE CONDUCTED EMISSION TEST .....                         | 6         |
| 4.2 RADIATED EMISSION TEST .....                                        | 6         |
| <b>5. FINAL RESULT OF MEASUREMENT .....</b>                             | <b>7</b>  |
| 5.1 CONDUCTED EMISSION TEST .....                                       | 7         |
| 5.2 RADIATED EMISSION TEST (WITHIN THE PERMITTED 200 KHz BAND) .....    | 9         |
| 5.3 RADIATED EMISSION TEST (OUTSIDE OF THE SPECIFIED 200 KHz BAND)..... | 10        |
| 5.4 BANDWIDTH OF THE OPERATING FREQUENCY .....                          | 11        |
| <b>6. FIELD STRENGTH CALCULATION .....</b>                              | <b>14</b> |
| <b>7. LIST OF TEST EQUIPMENT.....</b>                                   | <b>15</b> |

**1. VERIFICATION OF COMPLIANCE**

- APPLICANT : KI RYUNG ELECTRONICS CO., LTD.
- ADDRESS : 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea
- CONTACT PERSON : Mr. Won-Kyu, Choi / Q.C. Assistant Manager
- TELEPHONE NO : +82-2-3282-2261
- FCC ID : P3HXNS701
- MODEL NO/NAME : XNS701
- SERIAL NUMBER : N/A
- DATE : February 23, 2006

|                                                         |                                                          |
|---------------------------------------------------------|----------------------------------------------------------|
| EQUIPMENT CLASS                                         | DXX – Part 15 Low Power Communication Device Transmitter |
| E.U.T. DESCRIPTION                                      | Navigation (FM Transmitter)                              |
| THIS REPORT CONCERNS                                    | ORIGINAL GRANT                                           |
| MEASUREMENT PROCEDURES                                  | Charter 7 and 13 of ANSI C63.4: 2003                     |
| 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 SECTION 15.239                               |
| MODIFICATIONS ON THE EQUIPMENT<br>TO ACHIEVE COMPLIANCE | No                                                       |
| FINAL TEST WAS CONDUCTED ON                             | 3 METER OPEN AREA TEST SITE                              |

- 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 KI RYUNG ELECTRONICS CO., LTD., Model XNS701 (referred to as the EUT in this report) is a Navigation that has a function for transmitting of FM broadcasting frequency range and PC peripheral. This report covers the FM transmitter from 88.1 MHz to 107.9 MHz for audio signal of FM radio receiver. Product specification described herein was obtained from product data sheet or user's manual.

|                                                 |                                                 |
|-------------------------------------------------|-------------------------------------------------|
| CHASSIS TYPE                                    | Plastic                                         |
| LIST OF EACH OSC. or CRY.<br>FREQ.(FREQ.>=1MHz) | 7.3728 MHz, 7.6 MHz, 24.5535 MHz and 32.768 MHz |
| NUMBER OF LAYERS                                | 8 Layers                                        |
| POWER REQUIREMENT                               | DC 12~24V from an AC/DC Adaptor                 |
| EXTERNAL CONNECTOR                              | Audio In/Out, FM Out, GPS, SIRIUS, DC In        |

### 2.2 Model Differences

-. The difference(s) compared to the EUT is as follows: None

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

-. Original submittal only

### 2.4 Test System Details

The model numbers for all the equipments which were used in the tested system is:

| Model    | Manufacturer                   | FCC ID    | Description       | Connected to |
|----------|--------------------------------|-----------|-------------------|--------------|
| XNS701   | KI RYUNG ELECTRONICS CO., LTD. | P3HXNS701 | Navigation (EUT)  | -            |
| LT 416   | LEADER                         | N/A       | Pattern Generator | EUT          |
| SMS-015N | SUNGIL PRECISION               | N/A       | Speaker           | EUT          |

### 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003. 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 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on April 04, 2003. (Registration Number: 340658)

### 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 |
|-------------|--------------------------------|-------------------|--------|
| MAIN BOARD  | KI RYUNG ELECTRONICS CO., LTD. | USE NAVI Rev.D    | N/A    |
| SUB BOARD   | KI RYUNG ELECTRONICS CO., LTD. | USE_Sub Rev.D     | N/A    |
| GPS BOARD   | KI RYUNG ELECTRONICS CO., LTD. | SNA-300 Rev.D     | N/A    |
| LCD         | N/A                            | LTP400WQ-F01-00R  | N/A    |
| HDD         | SEAGATE                        | ST64022 FX        | N/A    |

#### 3.2 EUT exercise Software

The EUT is included a FM transmitter designed to transmit function in the 88.1 ~ 107.9 MHz with 200 kHz step. During the testing, the EUT was set on audio setup with FM transmission and the transmitter function is activated. The audio input port on the EUT was connected to the audio generator and then the generator supplied audio signal with 1 kHz modulation to the EUT. The EUT transmitted the signal with maximum volume control.

#### 3.3 Cable Description for the EUT

| Ports Name   | Shielded | Ferrite Bead | Metal Hood | Length (m) | Connected to      |
|--------------|----------|--------------|------------|------------|-------------------|
| Audio In/Out | N        | N            | BOTH END   | 1.5        | Pattern Generator |
| DC In        | N        | EUT END      | EUT END    | 1.2        | AC/DC Adaptor     |
| FM Out       | N        | N            | EUT END    | 1.2        | -                 |

#### 3.4 Equipment Modifications

- None

### 3.5 Configuration of Test System

**Line Conducted Test:** The EUT was connected to AC/DC adaptor and AC/DC adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

**Radiated Emission Test:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

#### 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.

### 3.6 Antenna Requirement

For intentional device, according to section 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:

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode                      | The Worse operating condition (Please check one only) |
|-------------------------------------|-------------------------------------------------------|
| Transmit the RF Signal continuously | X                                                     |

### 4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

| Operation Mode                      | The Worse operating condition (Please check one only) |
|-------------------------------------|-------------------------------------------------------|
| Transmit the RF Signal continuously | X                                                     |

## 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

### 5.1 Conducted Emission Test

Humidity Level : 42 %

Temperature: 21 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY -5.67 dB at 0.17 MHz under average mode

EUT : Navigation

Date: February 15, 2006

Operating Condition : Transmit RF signal.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

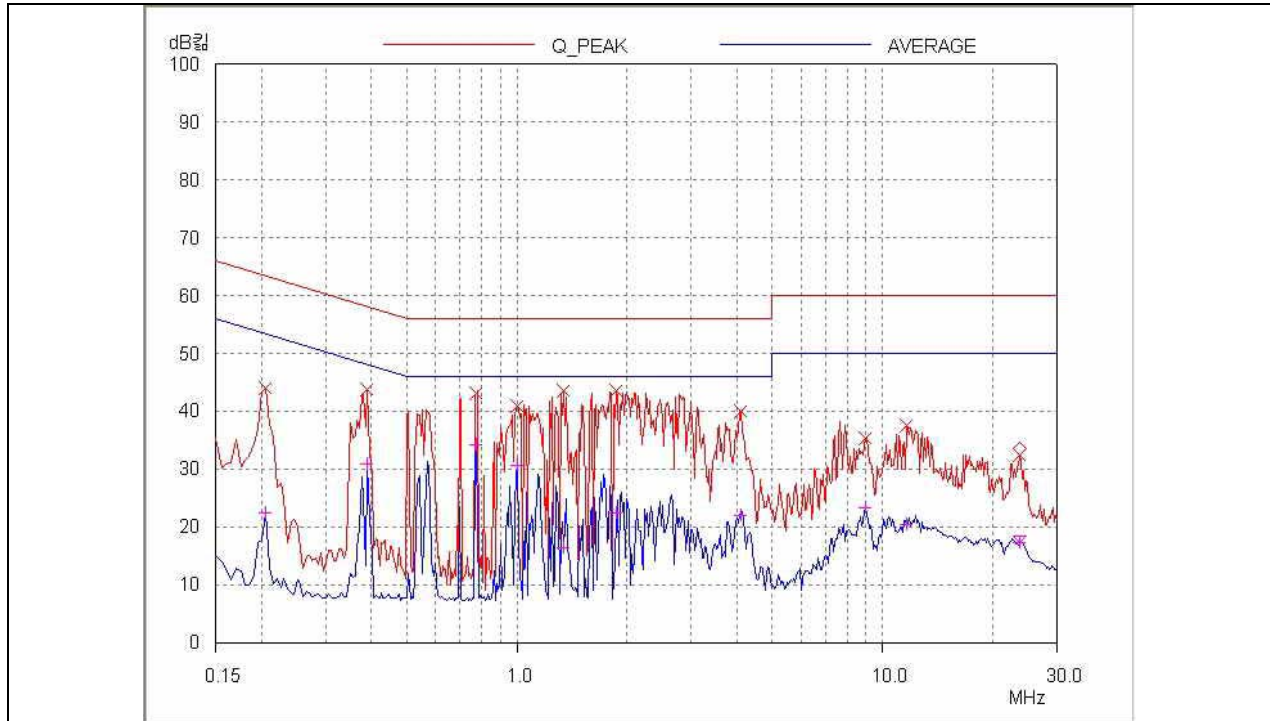
| Frequency<br>(MHz) | Line | Peak (dBuV)    |            | Margin<br>(dB) |
|--------------------|------|----------------|------------|----------------|
|                    |      | Emission level | Q.P Limits |                |
| 0.17               | N    | 56.89          | 64.72      | -7.83          |
| 0.39               | H    | 43.88          | 58.06      | -14.18         |
| 0.70               | N    | 42.77          | 56.00      | -13.23         |
| 0.77               | H    | 43.09          | 56.00      | -12.91         |
| 1.34               | H    | 43.49          | 56.00      | -12.51         |
| 1.86               | H    | 43.65          | 56.00      | -12.35         |
| Frequency<br>(MHz) | Line | Average (dBuV) |            | Margin<br>(dB) |
|                    |      | Emission level | Limits     |                |
| 0.17               | N    | 49.05          | 54.72      | -5.67          |
| 0.77               | H    | 34.21          | 46.00      | -11.79         |
| 1.34               | H    | 16.32          | 46.00      | -29.68         |
| 1.86               | H    | 22.35          | 46.00      | -23.65         |

Line Conducted Emission Tabulated Data

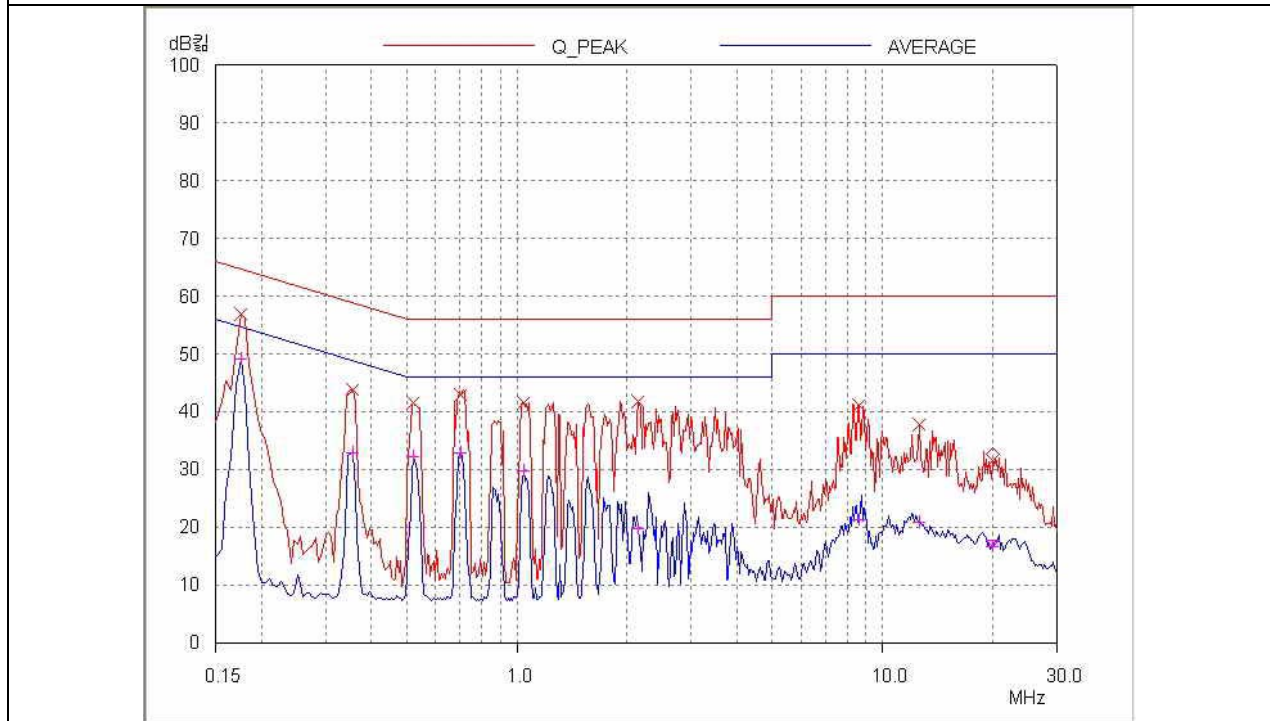
Remark : "H": Hot Line, "N": Neutral line

See next page for an overview sweep performed with peak and average detector.

Tested by: Sue-Young, Lee/ Test Engineer



## HOT LINE



## NEUTRAL LINE

It should not be reproduced except in full, without the written approval of ONETECH.

EMC-002 (Rev.0)

**HEAD OFFICE** : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea  
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)

**EMC Testing Dept** : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

**5.2 Radiated Emission Test (Within the permitted 200 kHz band)**

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

Humidity Level : 45 % Temperature: 18 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (b)  
 Type of Test : Low Power Communication Device Transmitter  
 Result : PASSED BY – 3.77 dB at 88.90 MHz

EUT : Navigation Date: February 13, 2006  
 Operating Condition : Transmit the RF signal.  
 Distance : 3 Meter

| Radiated Emission |                |                | Ant  | Correction Factors |               | Total            | Limit<br>(dBuV/m) | Margin<br>(dB) |
|-------------------|----------------|----------------|------|--------------------|---------------|------------------|-------------------|----------------|
| Freq.<br>(MHz)    | Amp.<br>(dBuV) | Detect<br>Mode | Pol. | Ant.<br>(dBuV/m)   | Cable<br>(dB) | Amp.<br>(dBuV/m) |                   |                |
| 88.10             | 33.80          | Peak           | H    | 7.96               | 1.74          | 43.50            | 48.00             | -4.50          |
| 88.10             | 30.80          | Peak           | V    | 7.96               | 1.74          | 40.50            | 48.00             | -7.50          |
| 97.90             | 27.30          | Peak           | H    | 9.82               | 1.90          | 39.02            | 48.00             | -8.98          |
| 97.90             | 26.80          | Peak           | V    | 9.82               | 1.90          | 38.52            | 48.00             | -9.48          |
| 107.90            | 27.60          | Peak           | H    | 11.43              | 1.90          | 40.93            | 48.00             | -7.07          |
| 107.90            | 26.30          | Peak           | V    | 11.43              | 1.90          | 39.63            | 48.00             | -8.37          |

Radiated Emission Tabulated Data

Remark: Per 15.31(m), three channels (near top, near middle and near bottom) were tested because the EUT's frequency range is more than 10 MHz.



Tested by: Sue-Young, Lee/ Test Engineer

**5.3 Radiated Emission Test (Outside of the specified 200 kHz band)**

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

Humidity Level : 45 % Temperature: 18 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)  
 Type of Test : Low Power Communication Device Transmitter  
 Result : PASSED BY -7.13 dB at 302.29 MHz

EUT : Navigation Date: February 13, 2006  
 Operating Condition : Transmit the RF signal.  
 Frequency range : 30MHz – 1000MHz  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)  
 Distance : 3 Meter  
 Remark : Other emissions

| Radiated Emission |                | Ant  | Correction Factors |               | Total            | FCC               |                |
|-------------------|----------------|------|--------------------|---------------|------------------|-------------------|----------------|
| Freq.<br>(MHz)    | Amp.<br>(dBuV) | Pol. | Ant.<br>(dB/m)     | Cable<br>(dB) | Amp.<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
| 76.51             | 20.30          | V    | 6.26               | 1.63          | 28.19            | 40.00             | -11.81         |
| 126.90            | 17.66          | V    | 13.90              | 2.14          | 33.70            | 43.52             | -9.82          |
| 154.65            | 14.50          | H    | 15.49              | 2.35          | 32.34            | 43.52             | -11.18         |
| 202.48            | 15.36          | H    | 16.70              | 2.82          | 34.88            | 43.52             | -8.64          |
| 302.29            | 20.11          | V    | 14.96              | 3.82          | 38.89            | 46.02             | -7.13          |
| 325.63            | 14.50          | H    | 14.72              | 4.01          | 33.23            | 46.02             | -12.79         |



Tested by: Sue-Young, Lee/ Test Engineer

**5.4 Bandwidth of the operating frequency**

Humidity Level : 45 % Temperature: 18 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)  
Result : PASSED

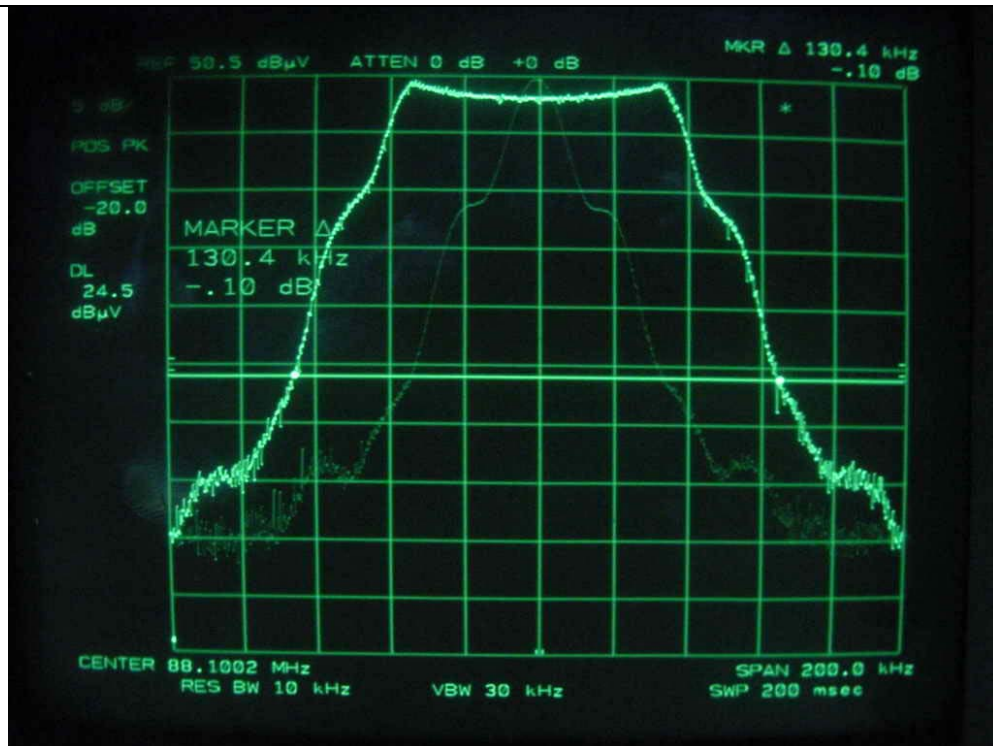
---

EUT : Navigation Date: February 13, 2006  
Operating Condition : Transmit the RF signal.  
Minimum Resolution  
Bandwidth : 10 kHz  
Remark : Refer to test data in next page.

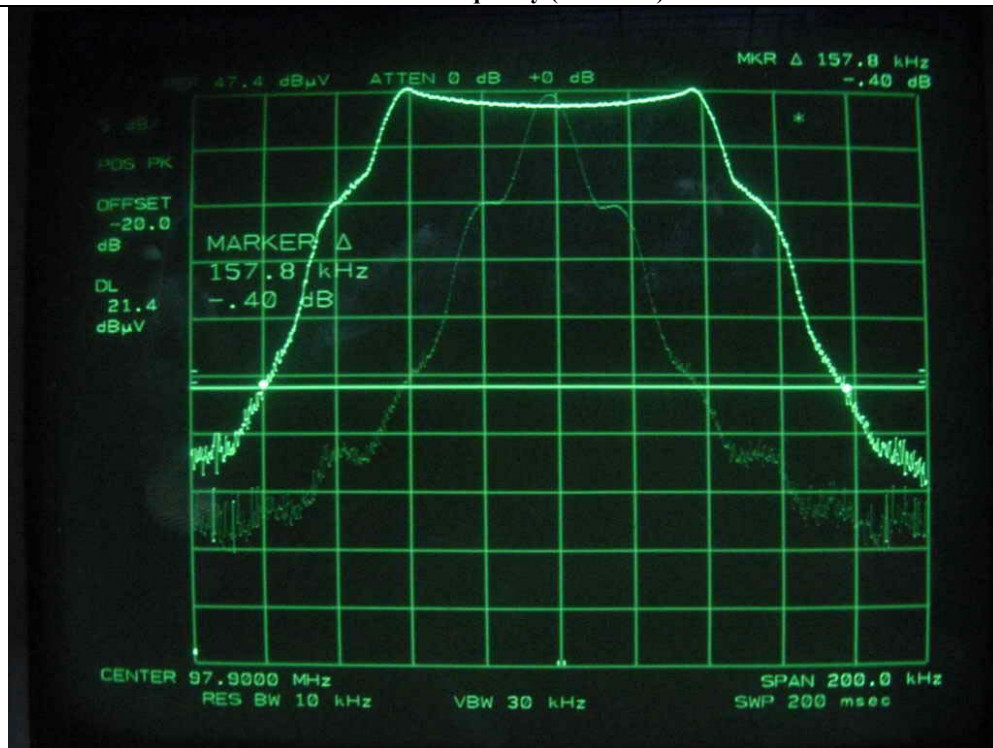


---

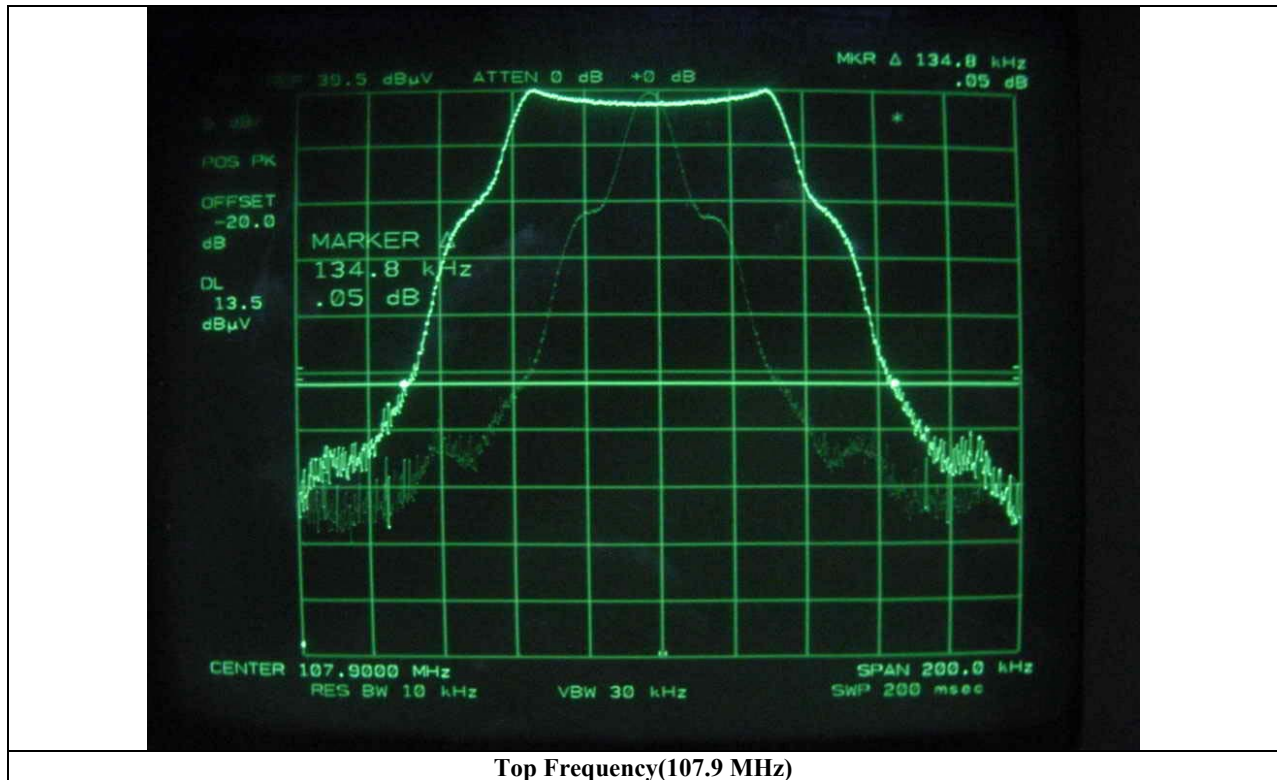
Tested by: Sue-Young, Lee/ Test Engineer



Bottom Frequency (88.1MHz)



Middle Frequency (97.9MHz)



## 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         | ESVS10      | 827864/005   | DEC/05   | 12MONTH | ■   |
| 2.  | Test receiver            | R/S         | ESHS 10     | 834467/007   | MAY/05   | 12MONTH | ■   |
| 3.  | Spectrum analyzer        | HP          | 8566B       | 3407A08547   | JUL/05   | 12MONTH |     |
| 4.  | Spectrum analyzer        | HP          | 8568B       | 3109A05456   | APR/05   | 12MONTH | ■   |
| 5.  | RF preselector           | HP          | 85685A      | 3107A01264   | APR/05   | 12MONTH | ■   |
| 6.  | Quasi-Peak Adapter       | HP          | 8574B       | 2811A01432   | APR/05   | 12MONTH | ■   |
| 7.  | TRILOG Broadband Antenna | Schwarzbeck | VULB9163    | VULB9163 166 | APR/05   | 12MONTH |     |
| 8.  | Biconical antenna        | EMCO        | 3110        | 9003-1121    | FEB/05   | 12MONTH |     |
|     |                          | Schwarzbeck | VHA9103     | 91031852     | FEB/06   |         | ■   |
| 9.  | Log Periodic antenna     | EMCO        | 3146        | 9001-2614    | FEB/05   | 12MONTH |     |
|     |                          | Schwarzbeck | 9108-A(494) | 62281001     | FEB/06   |         | ■   |
| 10. | LISN                     | EMCO        | 3825/2      | 9109-1867    | JUL/05   | 12MONTH | ■   |
|     |                          |             |             | 9109-1869    | JUL/05   |         |     |
|     |                          | Schwarzbeck | NSLK 8126   | 8126-404     | AUG/05   |         | ■   |
| 11. | Position Controller      | HD GmbH     | HD100       | N/A          | N/A      | N/A     | ■   |
| 12. | Turn Table               | HD GmbH     | DS420S      | N/A          | N/A      | N/A     | ■   |
| 13. | Antenna Master           | HD GmbH     | MA240       | N/A          | N/A      | N/A     | ■   |