

# TEST REPORT

Report No: KST-FCR-100002

|                      |                                       |   |
|----------------------|---------------------------------------|---|
| <b>Applicant</b>     | Name                                  | CNAPS   |
|                      | Address                               | A203 Techno Park Korea Polytechnic2 colleges, 34-1, Gusan-dong, Bupyeong-gu, Incheon, Korea |
| <b>Manufacturer</b>  | Name                                  | UbiMate   |
|                      | Address                               | 363-7 Songnae-dong, Sosa-gu, Bucheon-si, Gyeonggi-do, Korea                                 |
| <b>Equipment</b>     | Name                                  | FM Transmitter  |
|                      | Model No                              | F4H   |
|                      | Brand Name                            | ppyppe  |
|                      | FCC ID                                | X80F4H  |
|                      |                                       |   |
| <b>Test Standard</b> | FCC CFR 47, Part 15. Subpart C-15.239 |   |
| <b>Test Date(s)</b>  | 2010. 04.26 ~ 2009. 04. 29            |   |
| <b>Issue Date</b>    | 2010. 04. 30                          |   |
| <b>Test Result</b>   | Compliance                            |   |

## Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C 63.4-2003.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by Mi Young, Lee

Approved by Gyeong Hyeon, Park

Signature



Signature



## **Table of Contents**

|  |          |
|--|----------|
| <b>1. GENERAL INFORMATION .....</b>                  | <b>3</b> |
| 1.1 Test Facility .....                              | 3        |
| 1.2 Location .....                                   | 3        |
| <b>2. EQUIPMENT DESCRIPTION .....</b>                | <b>4</b> |
| <b>3. SYSTEM CONFIGURATION FOR TEST .....</b>        | <b>5</b> |
| 3.1 Characteristics of equipment .....               | 5        |
| 3.2 Configuration of EUT .....                       | 5        |
| 3.3 Support Equipment Used .....                     | 5        |
| 3.4 Type of Cables Used .....                        | 5        |
| 3.5 Product Modification .....                       | 5        |
| 3.6 Operating Mode .....                             | 5        |
| 3.7 Test Configuration .....                         | 5        |
| 3.8 EUT Operation Table for Total tuning range ..... | 6        |
| 3.9 Used Test Equipment List .....                   | 7        |
| <b>4. SUMMARY TEST RESULTS .....</b>                 | <b>8</b> |
| <b>5. MEASUREMENT RESULTS .....</b>                  | <b>9</b> |
| 5.1 Occupied bandwidth Measurement .....             | 9        |
| 5.2 Radiate emission of Field strength .....         | 11       |
| 5.3 Out of band Radiated emissions .....             | 14       |
| 5.4 General requirement .....                        | 17       |

## 1. GENERAL INFORMATION

### 1.1 Test Facility

#### Test laboratory and address

KOSTEC Co., Ltd.

180-254, Annyeong-dong, Hwaseong-si, Gyeonggi-do, South Korea

The open area field test site and conducted measurement facility are used for these testing. This site at was fully described in a reports submitted to the Federal Communications Commission (FCC).

The details of these reports have been found to be in complies with the requirements of Section 2.948 of the FCC Rules on November 14, 2002. The facility also complies with the radiated and conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission (FCC) has the reports on file and KOSTEC Co., Ltd. is listed under FCC Registration No.525762. The test site has been approved by the FCC for public use and is list in the FCC Public Access Link CORES (Commission Registration System) and Industry Canada office (Industry Canada Site No.: 8305A)

#### Registration information

KCC (Korea Communications Commission) Number : KR0041

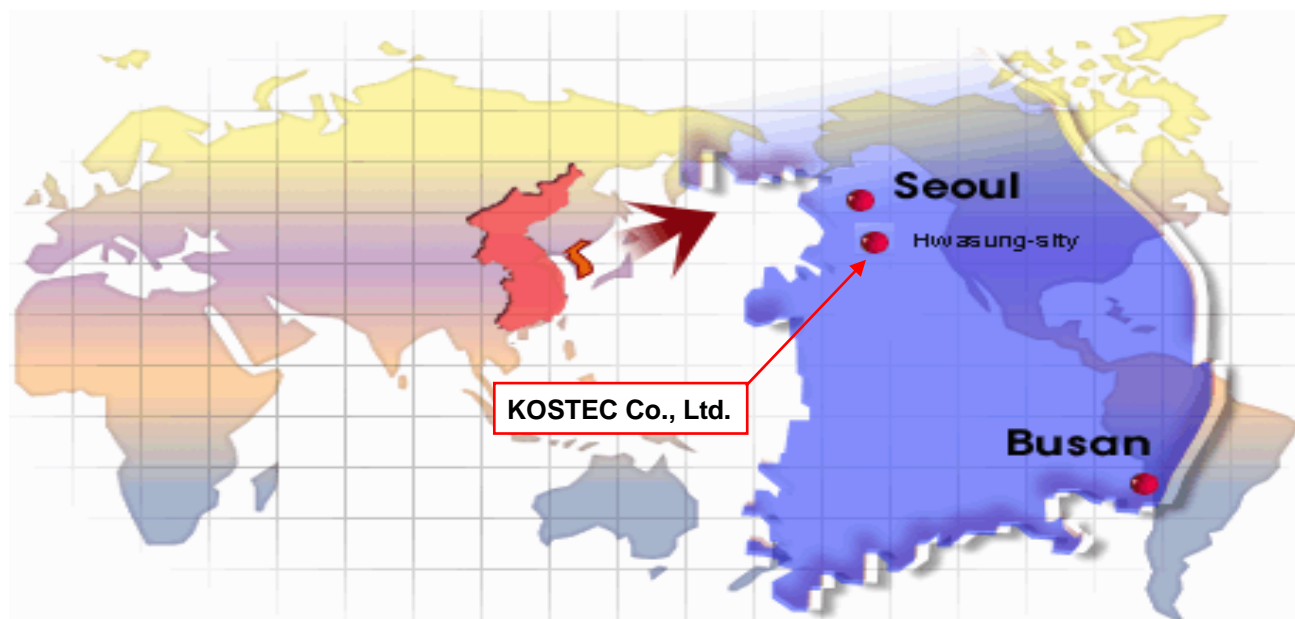
KOLAS(Korea Laboratory Accreditation Scheme) Number : 232

FCC Registration Number(FRN) : 525762

IC Company Number(C,N) : 8305A

VCCI Registration Number : R-1657 / C –1763

### 1.2 Location



## 2. EQUIPMENT DESCRIPTION

The product operation described herein was declared by manufacturer. and refer to user's manual for the details.

|                           |  |
|---------------------------|--|
| 1) Equipment Name         | FM Transmitter   |
| 2) Model No               | F4H  |
| 3) Brand Name             | ppyp!e   |
| 4) Serial Number          | Prototype  |
| 5) Emission Type          | F3E  |
| 6) Oscillation Type       | PLL (Phase Local Loop)   |
| 7) Modulation Type        | Frequency Modulation   |
| 8) Operated Frequency     | TX/RX : 88.1 MHz ~ 107.9 MHz   |
| 9) Field Strength         | 33.97 dB $\mu$ V/m (@ 3meter)*   |
| 10) Channel spacing       | 199 Ch   |
| 11) Communication Type    | Half duplex  |
| 12) Micro Processor       | U1(S3F84i9)  |
| 13) Weight / Dimension    | 60g / 50(L) mm x 22(W) mm x 22(D) mm                                     |
| 14) Operation temperature | - 40 °C ~ + 60 °C  |
| 15) Power Source          | Voltage: 5V <sub>DC</sub> , 1.5 V <sub>DC</sub> (AAA Type Cell Battery), |
|                           | Current: 100 mA (Operation), 5 mA (Stand by)                             |
| 16) Antenna Description   | Class : Cable ANT, Connect type: fixed , Length : 100 mm                 |
| 17) FCC ID                | X80F4H   |

\* This field strength is maximum average value among operation frequency band according to required standard

### 3. SYSTEM CONFIGURATION FOR TEST

#### 3.1 Characteristics of equipment

This equipment is the CNAPS FM Transmitter(Model:F4H) and it's power 1.5 Vdc from cell battery and 5 Vdc from MP3, PMP, small Notebook PC etc.

FM Transmitter is designed to operate on frequency in the 88.1 MHz ~ 107.9 MHz.

The amplified RF is transmitted cable antenna

This EUT is used with PMP, MP3, the other Audio device, etc.

#### 3.2 Configuration of EUT

| Description    | Model Name | Serial No. | Manufacture | Remark               |
|----------------|------------|------------|-------------|----------------------|
| FM Transmitter | F4H        | None       | UbiMate     | EUT<br>(Stand alone) |

#### 3.3 Support Equipment Used

| Description       | Model Name | Serial No.     | Manufacture     | Remark |
|-------------------|------------|----------------|-----------------|--------|
| Notebook Computer | LS40-2AD3  | 402K1AW2-15672 | IBM Corporation |        |

#### 3.4 Type of Cables Used

| Device from | Device to         | Type of I/O port  | Length [m] | Type of shield |
|-------------|-------------------|-------------------|------------|----------------|
| EUT         | Notebook Computer | Stereo audio jack | 100 mm     | Unshield       |

#### 3.5 Product Modification

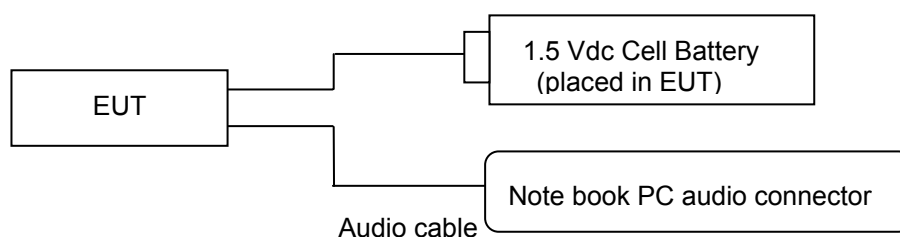
The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement

#### 3.6 Operating Mode

The transmitter was operated in a continuous modulation transmit mode and all measurements were intended to emit maximum RF signal

#### 3.7 Test Configuration

The below test setup configuration from EUT is a same as in this clause 5.1 to 5.4



### 3.8 EUT Operation Table for Total tuning range

The tuning controls were manually adjusted to verify the maximum tuning range

Accordingly it was found to maximum tuning range ( 88.1 MHz ~ 107.9 MHz) declaration by applicant

and also confirmed to as a selected 0.1 MHz step by manually adjusting left/right push up/down button on the EUT

Per FCC Rule, In the case of EUTs that can operate on more than one frequency, unless otherwise specified in the individual tests, measurements shall be made with the

EUT set to a frequency as provided in Table :

| Frequency range over which device operates | Number of frequencies | Location in the range of operation           |
|--|-----------------------|--|
| 1  | Low channel           | 1 near middle                                |
| 2  | Middle channel        | 1 near top, 1 near bottom                    |
| 3  | High channel          | 1 near top, 1 near middle, and 1 near bottom |

※ Note: above channel is describe according to the FCC Part 15 subpart A 15.31(m)

So, above channel is set by according to operating frequency of tested EUT

According to required standard this equipment is set as following table

■ Table for Channel setting number

| Frequency (MHz) | 88.1        | 98.0           | 107.9        |
|-----------------|-------------|----------------|--------------|
| Channel Number  | Ch 1        | Ch 100         | Ch 199       |
|                 | Low channel | Middle channel | High channel |

※ When Occupied bandwidth measurement is selected only middle channel and Radiated emission of field strength the other Out of band Radiated emissions is selected 3 channel (Low, Middle, High channel) by required standard

### 3.9 Used Test Equipment List

| No. | Instrument                     | Model            | Serial No. | Manufacturer                     | Due to Cal. Date | Used                                |
|-----|--------------------------------|------------------|------------|----------------------------------|------------------|-------------------------------------|
| 1   | Spectrum Analyzer              | 8563E            | 3846A10662 | Agilent Technology               | 2010.05.20       | <input checked="" type="checkbox"/> |
| 2   | Test Receiver                  | ESCS30           | 100111     | Rohde & Schwarz                  | 2010.03.07       | <input checked="" type="checkbox"/> |
| 3   | Test Receiver                  | ESPI3            | 100109     | Rohde & Schwarz                  | 2010.03.03       | <input type="checkbox"/>            |
| 4   | LISN                           | ESH2-Z5          | 100044     | Rohde & Schwarz                  | 2010.03.16       | <input type="checkbox"/>            |
| 5   | LISN                           | ESH3-Z5          | 100147     | Rohde & Schwarz                  | 2010.06.25       | <input type="checkbox"/>            |
| 6   | Ultra broadband Antenna        | HL562            | 100075     | Rohde & Schwarz                  | 2010.03.20       | <input checked="" type="checkbox"/> |
| 7   | Ultra broadband Antenna        | HL562            | 100076     | Rohde & Schwarz                  | 2010.04.14       | <input type="checkbox"/>            |
| 8   | Dipole Antenna                 | HZ-12            | 100005     | Rohde & Schwarz                  | 2010.04.03       | <input type="checkbox"/>            |
| 9   | Dipole Antenna                 | HZ-13            | 100007     | Rohde & Schwarz                  | 2010.04.03       | <input type="checkbox"/>            |
| 10  | Horn Antenna                   | 3115             | 2996       | EMCO                             | 2010.06.13       | <input checked="" type="checkbox"/> |
| 11  | Loop Antenna                   | 6502             | 9203-0493  | EMCO                             | 2011.06.11       | <input type="checkbox"/>            |
| 12  | Digital Signal Generator       | E4436B           | US39260458 | H.P                              | 2010.05.20       | <input checked="" type="checkbox"/> |
| 13  | Tracking CW Signal Source      | 85645A           | 070521-A1  | H.P                              | 2010.05.20       | <input checked="" type="checkbox"/> |
| 14  | RF Power Amplifier             | 8347A            | 3307A01571 | H.P                              | 2010.05.20       | <input checked="" type="checkbox"/> |
| 15  | Microwave Amplifier            | 8349B            | 2627A01037 | H.P                              | 2010.05.20       | <input checked="" type="checkbox"/> |
| 16  | Attenuator                     | 8498A            | 3318A09485 | H.P                              | 2010.05.20       | <input checked="" type="checkbox"/> |
| 17  | Temperature & Humidity Chamber | EY-101           | 90E14260   | TABAI ESPEC                      | 2010.03.16       | <input type="checkbox"/>            |
| 18  | EPM Series Power meter         | E4418B           | GB39512547 | Agilent Technology               | 2010.05.20       | <input type="checkbox"/>            |
| 19  | RF Power Sensor                | ECP-E18A         | US37181768 | Agilent Technology               | 2010.05.20       | <input type="checkbox"/>            |
| 20  | Microwave Frequency Counter    | 5352B            | 2908A00480 | Agilent Technology               | 2010.05.20       | <input type="checkbox"/>            |
| 20  | Band rejection filter          | WTR-BRF2442-84NM | 09020001   | WAVE TECH Co.,Ltd.               | 2010.03.03       | <input type="checkbox"/>            |
| 21  | SLIDAC                         | None             | 0207-4     | Myoung-Sung Electronic Co., Ltd. | 2010.05.20       | <input type="checkbox"/>            |
| 22  | DC Power supply                | DRP-5030         | 9028029    | Digital Electronic Co.,Ltd       | 2010.06.04       | <input type="checkbox"/>            |
| 23  | DC Power supply                | UP-3005T         | 68         | Unicon Co.,Ltd                   | 2010.05.20       | <input type="checkbox"/>            |
| 24  | DC Power supply                | E3610A           | KR24104505 | Agilent Technology               | 2010.05.20       | <input type="checkbox"/>            |
| 25  | Antenna Master                 | -                | -          | Daeil EMC                        | -                | <input checked="" type="checkbox"/> |
| 26  | Turn Table                     | -                | -          | Daeil EMC                        | -                | <input checked="" type="checkbox"/> |

## 4. SUMMARY TEST RESULTS

The measurement results were obtained with the EUT tested in the conditions described in this report.  
 Detailed measurement data and plots showing the maximum emission of the EUT are reported.

| Description of Test   | Standard Section | Reference Section | Test result | Remark |
|---|------------------|-------------------|-------------|--------|
| Occupied bandwidth Measurement  | 15.239(a)        | Clause 5.1        | Compliance  |        |
| Radiated emission of Field strength   | 15.239(b)        | Clause 5.2        | Compliance  |        |
| Out of band Radiated emissions  | 15.239(c)        | Clause 5.3        | Compliance  |        |
| General requirement   | 15.203, 15.19    | Clause 5.4        | Compliance  |        |
| Compliance : The EUT complies with the essential requirements in the standard.<br>Not Compliance : The EUT does not comply with the essential requirements in the standard.<br>N/A : The test was not applicable in the standard. |                  |                   |             |        |

※ The data collected shows that the CNAPS FM Transmitter complied with technical requirements of the Part 15.239 of the FCC Rules.



## 5. MEASUREMENT RESULTS

### 5.1 Occupied bandwidth Measurement

#### 5.1.1 Standard Applicable [FCC §15.239(a)]

Emissions from the intentional radiator shall be confined within a band 200 KHz wide centered on the Operating frequency. The 200 KHz band shall lie wholly within the frequency range of 88-108 MHz

#### 5.1.2 Test Environment conditions

- Ambient temperature : 21 °C,
- Relative Humidity : (46 ~ 47) % R.H.

#### 5.1.3 Measurement Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peak of the adjacent channels using the marker-Delta function was recorded as the measurement results.

The spectrum analyzer is set to the as follows :

- Span : approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
- RBW :  $\geq 1\%$  of the 20 dB bandwidth
- VBW :  $\geq$  RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

#### 5.1.4 Measurement Result

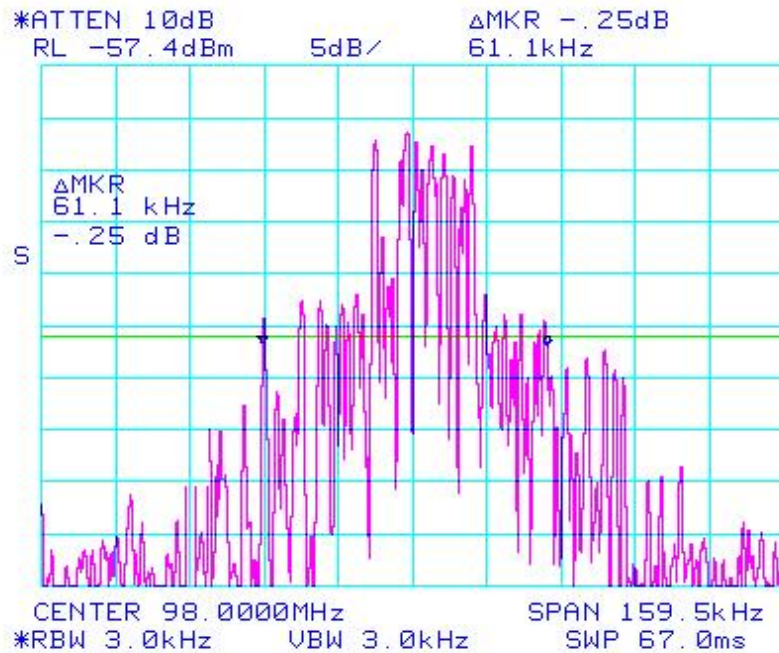
| Channel No. | Frequency (MHz) | Test Results         |        |                       |
|-------------|-----------------|----------------------|--------|-----------------------|
|             |                 | Measured Value [KHz] | Result | Limit [KHz]           |
| 100         | 98.0 MHz        | 61.1                 | Pass   | Within a band 200 kHz |

\* please see plot in this next page 5.1.5



### 5.1.5 Test Plot (20 dB Occupied bandwidth)

Channel 99 ( 98.0 MHz )



## 5.2 Radiate emission of Field strength

### 5.2.1 Standard Applicable [FCC §15.239 (b)]

The field strength of any emissions within the permitted 200 KHz band shall not exceed 250  $\mu\text{V}/\text{m}$  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.

### 5.2.2 Test Environment conditions

- Ambient temperature : 19 °C,
- Relative Humidity : (47 ~ 48) % R.H.
- Pressure : 100.5 kPa

### 5.2.3 Measurement Procedure

- ① As below test setup figure, for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is test mode function. Also was placed on a non-metallic table height of 0.8 m above the reference ground plane. If EUT is connected to cables, that were fixed to cause maximum emission. Horn antenna was used to for above 1 GHz and Broadband antenna below 1 GHz. it made with the antenna positioned in both the horizontal and vertical planes of polarization.
- ② For emission frequencies measured each below and above 1 GHz, a pre-scan is performed in a Shield chamber to determine the accurate frequencies before final test, after maximum emissions level will be checked on a open test site and measuring distance is 3 m from EUT to receiver antenna.
- ③ For emission frequencies measured below 1 GHz, set the Test Receiver on a 120 KHz resolution bandwidth using measurement instrumentation employing a CISPR average detector in accordance with in this required section. and for above 1 GHz set the spectrum analyzer on a 1 MHz resolution bandwidth with average and peak detector for each frequency measured in step② Required standard FCC Rule 15.35 and then EUT is located Position X,Y,Z on turn table
- ④ The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.
- ⑤ Repeat step④ until all frequencies to be measured were complete.
- ⑥ Repeat step⑤ with search antenna in vertical polarized orientations.
- ⑦ Check the frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worst case and record the result.

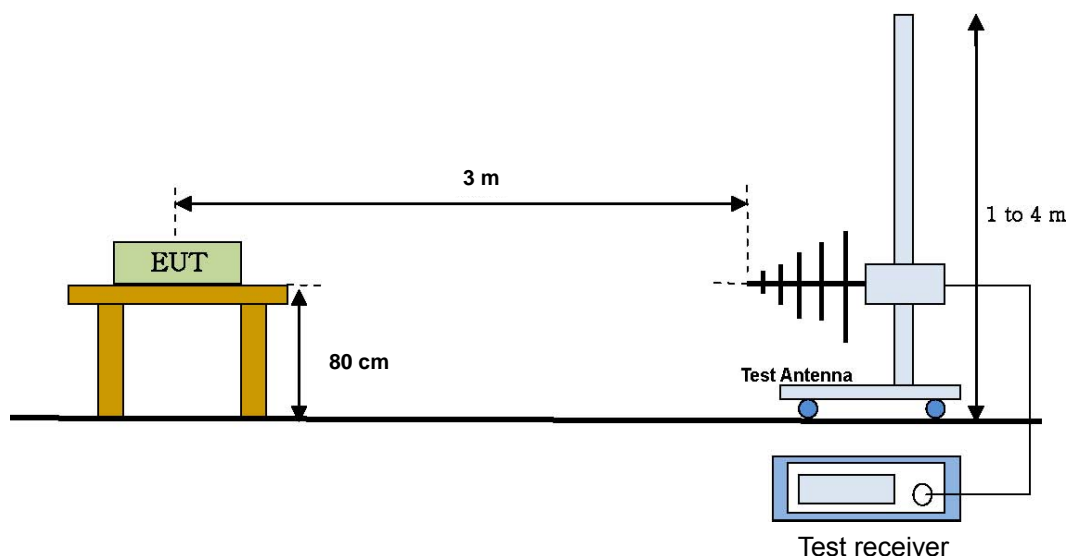
The measurement results are obtained as described below:

$$\text{Result}(\text{dB}\mu\text{V}/\text{m}) = \text{Reading}(\text{dB}\mu\text{V}/\text{m}) + \text{Antenna factor}(\text{dB}/\text{m}) + \text{CL}(\text{dB}) + \text{other applicable factor}(\text{dB})$$

#### 5.2.4 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. 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, mismatch, and system repeatability based on NIS 80,81, The measurement uncertainty level with a 95 % confidence level were apply to Uncertainty of a radiation emissions measurement at OATS(Open Area Test Site) of KOSTEC is  $\pm 4.0$  dB

#### 5.2.5 Test Configuration



※ In case of above 1 GHz is using the Horn antenna instead of Broadband Antennal

[ Radiated emission setup ]

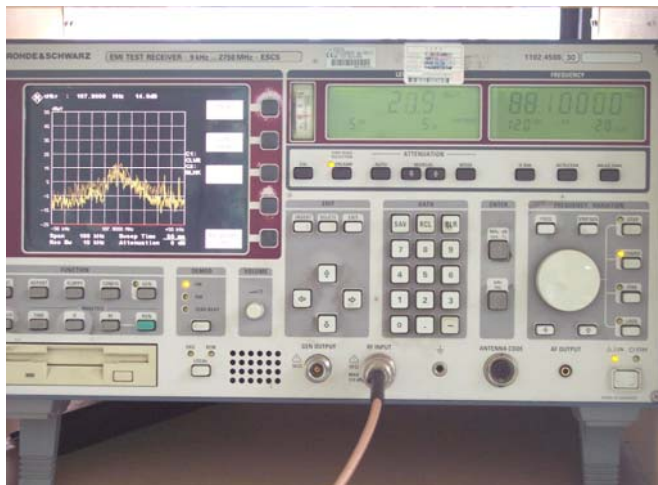
#### 5.2.6 Test Result

| Freq.<br>(MHz) | Reading<br>(dB $\mu\text{V}/\text{m}$ ) | Axis | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Meas<br>Result<br>(dB $\mu\text{V}/\text{m}$ ) | Limit<br>(dB $\mu\text{V}/\text{m}$ ) | Mgn<br>(dB) | Result |
|----------------|---|------|----------------|---------------|---------------|-----------------|------------|--|---------------------------------------|-------------|--------|
|                |   |      |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |  |                                       |             |        |
| 88.1           | 21.5                                    | Y    | 105            | 1.9           | H             | 7.89            | 3.44       | 32.83  | 47.96                                 | 15.13       | Pass   |
| 98.0           | 20.0                                    | Y    | 95             | 1.7           | H             | 9.37            | 3.60       | 32.97  | 47.96                                 | 14.99       | Pass   |
| 107.9          | 21.0                                    | Y    | 126            | 1.8           | H             | 9.37            | 3.60       | 33.97  | 47.96                                 | 13.99       | Pass   |

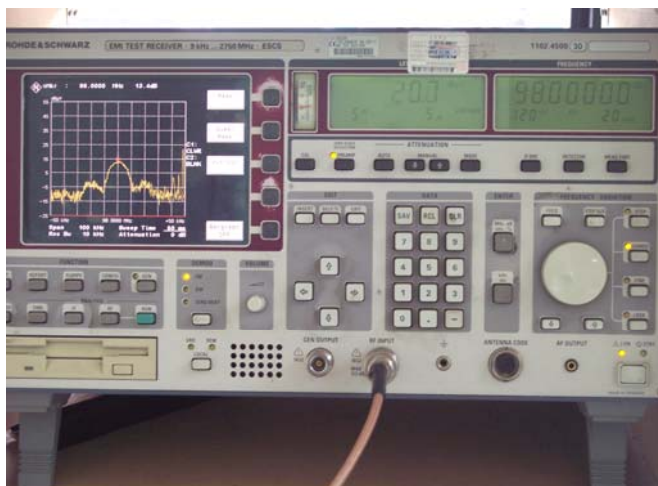
※ Above Measured fundamental frequency is Less than 1 GHz. So, it is set by average detector mode on Field strength Receiver as see a next page test plot 5.2.7 in accordance with in this Section 15.239 and when above 1 GHz emission level is measurement, it is set by average and peak detector mode on Field strength required standard FCC Rule 15.35

## 5.2.7 Test Plot

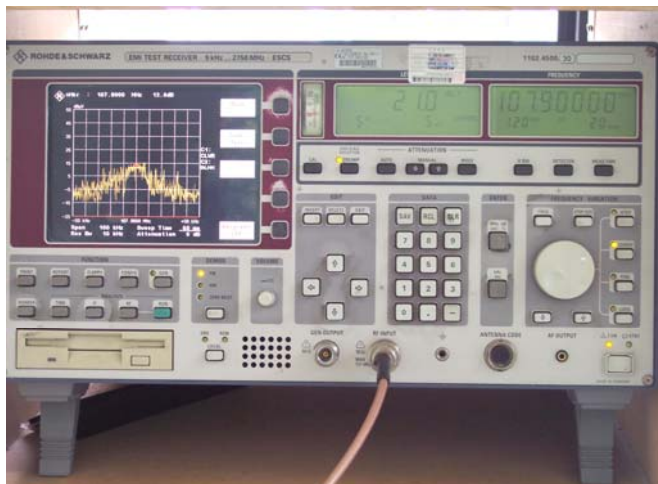
Channel 1 ( 88.1 MHz )



Channel 100 ( 98.0 MHz )



Channel 199 (107.9 MHz)



## 5.3 Out of band Radiated emissions

### 5.3.1 Standard Applicable [ FCC §15.239(c) ]

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

§15.209. limits for radiated emissions measurements (distance at 3m)

| Frequency Band [MHz] | Limit [ $\mu\text{V/m}$ ] | Limit [dB $\mu\text{V/m}$ ] | Detector   |
|----------------------|---------------------------|-----------------------------|------------|
| 30 - 88              | 100 **                    | 40.00                       | Quasi peak |
| 88 - 216             | 150 **                    | 43.52                       | Quasi peak |
| 216 - 960            | 200 **                    | 46.02                       | Quasi peak |
| Above 960            | 500                       | 54.00                       | Average    |

\*\* fundamental emissions from intentional radiators operation under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, or 470-806 MHz. However, operation within these Frequency bands is permitted under other sections of this Part Section 15.231 and 15.241

§15.205. [Table 1] : Restrict Band of Operation

| Only spurious emissions are permitted in any of the frequency bands listed below ; |                         |                   |               |
|--|-------------------------|-------------------|---------------|
| [MHz]  | [MHz]                   | [MHz]             | [GHz]         |
| 0.090 - 0.110  | 16.42 - 16.423          | 399.9 - 410       | 4.5 - 5.15    |
| 0.495 - 0.505**  | 16.694 75 - 16.695 25   | 608 - 614         | 5.35 - 5.46   |
| 2.173 5 - 2.190 5  | 16.804 25 - 16.804 75   | 960 - 1 240       | 7.25 - 7.75   |
| 4.125 - 4.128  | 25.5 - 25.67            | 1 300 - 1 427     | 8.025 - 8.    |
| 4.177 25 - 4.177 75  | 37.5 - 38.25            | 1 435 - 1 626.5   | 9.0 - 9.2     |
| 4.207 25 - 4.207 75  | 73 - 74.6               | 1 645.5 - 1 646.5 | 9.3 - 9.5     |
| 6.215 - 6.218  | 74.8 - 75.2             | 1 660 - 1 710     | 10.6 - 12.7   |
| 6.267 75 - 6.268 25  | 108 - 121.94            | 1 718.8 - 1 722.2 | 13.25 - 13.   |
| 6.311 75 - 6.312 25  | 123 - 138               | 2 200 - 2 300     | 14.47 - 14.5  |
| 8.291 - 8.294  | 149.9 - 150.05          | 2 310 - 2 390     | 15.35 - 16.2  |
| 8.362 - 8.366  | 156.524 75 - 156.525 25 | 2 483.5 - 2 500   | 17.7 - 21.4   |
| 8.376 25 - 8.38 6 75   | 156.7 - 156.9           | 2 690 - 2 900     | 22.01 - 23.12 |
| 8.414 25 - 8.414 75  | 162.012 5 - 167.17      | 3 260 - 3 267     | 23.6 - 24.0   |
| 12.29 - 12.293   | 167.72 - 173.2          | 3 332 - 3 339     | 31.2 - 31.8   |
| 12.519 75 - 12.520 25  | 240 - 285               | 3 345.8 - 3 358   | 36.43 - 36.5  |
| 12.576 75 - 12.577 25  | 322 - 335.4             | 3 600 - 4 400     | Above 38.6    |

\*\* Until February 1, 1999, this restricted band shall be 0.490-0.510

### 5.3.2 Test Environment conditions

- Ambient temperature : 19 °C,
- Relative Humidity : (47 ~ 48) % R.H.
- Pressure : 100.5 kPa

### 5.3.3 Measurement Procedure and Test Configuration

Please see refer to the 5.2.2 & 5.2.3

### 5.3.4 Measurement Result

#### ■ Lowe Channel 1 (88.1 MHz)

Below 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Mgn<br>(dB) | Result |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|----------------------------------|-------------------------|-------------|--------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                  |                         |             |        |
| 176.2          | 35.96                     | 105            | 1.9           | H             | 7.97            | 4.90       | 25                 | 23.83                            | 43.52                   | 19.69       | Pass   |
| Above<br>176.2 | Nil emission              |                |               |               |                 |            |                    |                                  |                         |             |        |

Above 1 GHz

| Freq.          | Reading<br>(dB $\mu$ /m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ /m) | Limit<br>(dB $\mu$ /m ) | Mgn.<br>(dB) | Result |
|----------------|--------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|---------------------------------|-------------------------|--------------|--------|
|                |                          |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                 |                         |              |        |
| Above<br>1 GHz | Signal is not detected   |                |               |               |                 |            |                    |                                 | 54                      | -            | Pass   |
|                | “                        |                |               |               |                 |            |                    |                                 | 74                      | -            | Pass   |

※ Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule15.35

※ Limit: 54dB $\mu$ V/m(Average), 74dB $\mu$ V/m(Peak)

Freq.(MHz) : Measurement frequency, Reading(dB $\mu$ V/m) : Indicated value for test receiver,  
Table (Deg) : Directional degree of Turn table,  
Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor  
Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplifier gain(dB)  
Meas Result (dB $\mu$ V/m) : Reading(dB $\mu$ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)  
Limit(dB $\mu$ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB $\mu$ V/m) – Meas Result(dB $\mu$ V/m),



■ Middle Channel 100 (98.0 MHz)

Below 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Mgn<br>(dB) | Result |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|----------------------------------|-------------------------|-------------|--------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                  |                         |             |        |
| 196            | 35.84                     | 95             | 1.7           | H             | 7.54            | 5.20       | 25                 | 23.58                            | 43.52                   | 19.94       | Pass   |
| Above<br>196   | Nil emission              |                |               |               |                 |            |                    |                                  |                         |             |        |

Above 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m ) | Mgn.<br>(dB) | Result |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|----------------------------------|--------------------------|--------------|--------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                  |                          |              |        |
| Above<br>1 GHz | Signal is not detected    |                |               |               |                 |            |                    |                                  | 54                       | -            | Pass   |
|                | "                         |                |               |               |                 |            |                    |                                  | 74                       | -            | Pass   |

※ Above 1 GHz is measured average and peak detector mode on Spectrum analyzer in accordance with FCC Rule 15.35

※ Limit: 54dB $\mu$ V/m(Average), 74dB $\mu$ V/m(Peak)

■ High Channel 199 (107.9 MHz)

Below 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Mgn<br>(dB) | Result |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|----------------------------------|-------------------------|-------------|--------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                  |                         |             |        |
| 215.8          | 34.79                     | 126            | 1.8           | H             | 7.54            | 5.20       | 25                 | 22.53                            | 43.52                   | 20.99       | Pass   |
| Above<br>215.8 | Nil emission              |                |               |               |                 |            |                    |                                  |                         |             |        |

Above 1 GHz

| Freq.<br>(MHz) | Reading<br>(dB $\mu$ V/m) | Table<br>(Deg) | Antenna       |               |                 | CL<br>(dB) | Pre<br>AMP<br>(dB) | Meas<br>Result<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m ) | Mgn.<br>(dB) | Result |
|----------------|---------------------------|----------------|---------------|---------------|-----------------|------------|--------------------|----------------------------------|--------------------------|--------------|--------|
|                |                           |                | Height<br>(m) | Pol.<br>(H/V) | Fctr.<br>(dB/m) |            |                    |                                  |                          |              |        |
| Above<br>1 GHz | Signal is not detected    |                |               |               |                 |            |                    |                                  | 54                       | -            | Pass   |
|                | “                         |                |               |               |                 |            |                    |                                  | 74                       | -            | Pass   |



## 5.4 General requirement

### 5.4.1 Standard applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit so that broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

According to above requirement standard's This product's antenna is designed by above section and it's type is Cable and it's length is 100 mm

### 5.4.2 User information [FCC §15.21]

For intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

According to above requirement standards. this warning statement is described on user manual