

# REPORT OF MEASUREMENT

## CERTIFICATION

Product : Communications Receiver (Pager Receiver)

---

Applicant : Hantel Co., Ltd.

---

Grantee Name : Hantel Co., Ltd.

---

FCC ID. : ODGBFX7ECL1

---

Trade Name : Oh! Happy Day

---

Model No. : BFX7ECL1

---

Report No. : 341-003

---

Date : January 20, 1999

---

KOREA ACADEMY OF INDUSTRIAL TECHNOLOGY(KAITECH)

Address : 222-13, Guro-Dong, Guro-Gu, Seoul 152-053, Korea  
Tel. : (02)860-1462~4. Telefax : (02)860~1468

## TABLE OF CONTENTS

|                                                          |     |
|----------------------------------------------------------|-----|
| I. GENERAL INFORMATION .....                             | 1   |
| 1. Applicant's Name and Mailing Address                  |     |
| 2. Manufacturer's Name and Mailing Address               |     |
| 3. Equipment Descriptions                                |     |
| 4. Rules and Regulations                                 |     |
| 5. Measuring Procedure                                   |     |
| 6. Date of Measurement                                   |     |
| 7. Statement of Compliance                               |     |
| II. GENERAL REQUIREMENTS OF THE EUT .....                | 2   |
| 1. Labelling Requirement (Section 15.19)                 |     |
| 2. Information to User (Sections 15.21)                  |     |
| 3. Special Accessories (Section 15.27)                   |     |
| III. RADIATED EMISSION MEASUREMENT (Section 15.109)..... | 3-7 |
| 1. Test Procedure                                        |     |
| 2. Photograph for the worst case configuration           |     |
| 3. Sample Calculation                                    |     |
| 4. Measurement Data                                      |     |
| IV. TEST EQUIPMENTS USED FOR MEASUREMENT.....            | 8   |

## ATTACHMENTS

1. Statement for Section 15.37 of the Rules
2. Proposed FCC ID, Label and Marking
3. Manual for Installation and Operating Instruction
4. Block Diagram & Schematic Diagram
5. Description of Circuit Function
6. Photographs: See the illustration of photographs attached

I. GENERAL INFORMATION

1. Applicant's Name and Mailing Address : Hantel Co., Ltd.  
#321-1, Shin Sung B/D 2F, Yangjae-dong Seocho-ku, Seoul, Korea  
137-130
2. Manufacturer's Name and Mailing Address : Hantel Co., Ltd.  
#321-1, Shin Sung B/D 2F, Yangjae-dong Seocho-ku, Seoul, Korea  
137-130
3. Equipment Descriptions
- 3.1 Tuning Frequency : 929.0125MHz ~ 931.9875MHz (25kHz Spacing)
- 3.2 Detect Method : Superheterodyne Detector
- 3.3 Local Oscillator : 1st Local Osc. Frequency = Tuning Frequency - 21.4MHz(1st IF)  
2nd Local Osc. Frequency = 20.945MHz (2nd IF : 455kHz)
- 3.4 Used Crystal : 1st Local Crystal = 1st Local Osc. Frequency/12  
2nd Local Crystal = 20.945MHz
- 3.5 Power Supply : DC 1.5V (Battery)
4. Rules and Regulations : FCC Part 15, Subpart B
5. Measuring Procedure : ANSI C63.4-1992
6. Date of Measurement
- 6.1 Line Conducted : Not Applicable
- 6.2 Radiated Emission : January 18, 1999
7. Statement of Compliance

**We, KAITECH, HEREBY STATE THAT the measurements shown in this report were made in accordance with the procedures indicated and the emission emitted by this equipment was found to be within the limits applicable.**

Measured by ;

S. K. SOOL 

Soun-Kweon Seol  
Engineer

Review by ;

S. J. Kim 

Seok-Jin Kim  
Team Leader  
EMC Team

## II. GENERAL REQUIREMENTS OF THE EUT

### 1. Labelling Requirement (Section 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

1.1 Location on Enclosure : Manual for Installation and Operating Instruction

1.2 How Applied : Printing

### 2. Information to User (Section 15.21)

The following or similar statements were provided in the manual for user instruction.  
Please refer page 1 of the attached manual for details.

CAUTION : Any changes or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### 3. Special Accessories (Section 15.27)

3.1 Were the special Accessories provided? [ ] yes, [ x ] no

3.2 If yes, details for the special accessories are as follows :

3.3 If yes, were the appropriate instructions provided on the first page of the text concerned with the device?

[ ] yes, [ ] no

3.4 Are these accessories provided of the type which can be readily obtained from multiple retail outlets?

[ ] yes, [ ] no

And therefore does the manual specify what additional components or accessories are required to used in order to comply with the Rules?

[ ] yes, [ ] no

### III. RADIATED EMISSION MEASUREMENT (Section 15.109)

#### 1. Test Procedure

##### 1.1 Preliminary Testing for Reference

This pager receiver(EUT) is designed to operate in the band 929.0125MHz to 931.9875MHz by changing a local oscillator installed in internal PCB. According to section 15.31(m), the measurements were performed with three equipments which were selected as bottom, middle, and top frequency in the operating band.

Preliminary testing was performed in a KAITECH absorber-lined room to determine the emission characteristics of the EUT. The EUT was placed on the wooden table which has dimensions of 0.8 meters in height, 1 meter in length and 1.5 meters in width. Receiving antenna(Biconical antenna : 30 to 300MHz, Log-periodic antenna : 200 to 1000MHz or Horn Antenna : 1 to 18GHz) was placed at the distance of 1 meter from the EUT.

An attempt was made to maximize the emission level with the various configurations of the EUT while rotating the table and varying antenna height.

Emissions level from the EUT with various configurations were examined on a Spectrum Analyzer connected with a RF amplifier and graphed by a plotter.

##### 1.2 Final Radiated Emission Test at a Absorber-Lined Room

The final measurement of radiated field strength was carried out in a KAITECH Absorber-Lined Room that was listed up at FCC according to the "Radiated Emissions Testing" procedure specified by ANSI C63.4.

Based on the test results in preliminary test, measurement was made in same test set up and configuration which produced maximum emission level. Receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer(for above 1GHz) with a RF amplifier.

Turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

If necessary, the radiated emission measurements could be performed at a closer distance than specified distance to ensure higher accuracy and their results were extrapolated to the specified distance using an inverse linear distance extrapolation factor(20dB/decade) as per Section 15.31(f).

The maximum emission level from the EUT occurred in such configuration as shown in the following photograph.

## 4. Measurement Data

## 4.1 Operating Frequency (Bottom : 929.0125MHz Tuning)

- Resolution Bandwidth :   x   CISPR Quasi-Peak (6dB Bandwidth : 120kHz)  
           Peak (3dB Bandwidth : 300kHz)
- Measurement Distance : 3 Meter

| Frequency<br>(MHz) | *<br>D.M. | *<br>A.P. | Measured<br>Value<br>(dB $\mu$ V) | *<br>A.F.<br>+<br>C.L<br>(dB) | *<br>A.G.<br>(dB) | *<br>D.C.F.<br>(dB) | Emission<br>Level |              | Limit<br>( $\mu$ V/m) | **<br>Margin<br>(dB) |
|--------------------|-----------|-----------|-----------------------------------|-------------------------------|-------------------|---------------------|-------------------|--------------|-----------------------|----------------------|
|                    |           |           |                                   |                               |                   |                     | (dB $\mu$ V/m)    | ( $\mu$ V/m) |                       |                      |
| ***<br>75.63       | Q         | V         | 4.2                               | 7.2                           | -                 | -                   | 11.4              | 3.7          | 100                   | -28.6                |
| 907.61             | Q         | V         | 2.0                               | 38.0                          | -                 | -                   | 40.0              | 100.0        | 150                   | -6.0                 |
| -                  | -         | -         | -                                 | -                             | -                 | -                   | -                 | -            | -                     | -                    |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |
|                    |           |           |                                   |                               |                   |                     |                   |              |                       |                      |

## Note

The observed EMI receiver(ESVS30) noise floor level was 2.0dB $\mu$ V. And all other emissions not reported on data were more than 25dB below the permitted level.

- \* D.M. : Detect Mode (P : Peak, Q : Quasi-Peak, A : Average)
- A.P. : Antenna Polarization (H : Horizontal, V : Vertical)
- A.F. : Antenna Factor
- C.L. : Cable Loss
- A.G. : Amplifier Gain
- D.C.F. : Distance Correction Factor

\*\* Margin (dB) = Emission Level (dB) - Limit (dB)

\*\*\* Reference Data





IV. TEST EQUIPMENT USED FOR MEASUREMENTS

| <u>Equipment</u>                         | <u>Model No.</u> | <u>Manufacturer</u> | <u>Serial No.</u> | <u>Effective Cal. Duration</u> |
|------------------------------------------|------------------|---------------------|-------------------|--------------------------------|
| [x] EMI Receiver<br>(20MHz-1GHz)         | ESVS30           | R & S               | 830516/002        | 06/29/98-06/29/99              |
| [x] Spectrum Analyzer<br>(9kHz-26.5GHz)  | 8563A            | H. P.               | 3222A02069        | 01/30/98-01/30/99              |
| [ ] Spectrum Analyzer<br>(100Hz-22GHz)   | 8566B            | H. P.               | 3014A07057        | 05/29/98-05/29/99              |
| [ ] Quasi-Peak Adapter<br>(10kHz-1GHz)   | 85650A           | H. P.               | 3107A01511        | 05/29/98-05/29/99              |
| [ ] RF-Preselector<br>(20Hz-2GHz)        | 85685A           | H. P.               | 3010A01181        | 05/29/98-05/29/99              |
| [ ] Test Receiver<br>(9kHz-30MHz)        | ESH3             | R & S               | 860905/001        | 06/29/98-06/29/99              |
| [x] Pre-Amplifier<br>(0.1-3000MHz, 30dB) | 8347A            | H. P.               | 2834A00543        | 05/29/98-05/29/99              |
| [ ] Pre-Amplifier<br>(1-26.5GHz, 35dB)   | 8449B            | H. P.               | 3008A00302        | 06/29/98-06/29/99              |
| [ ] LISN(50Ω, 50μH)<br>(10kHz-100MHz)    | 3825/2           | EMCO                | 9010-1710         | -                              |
| [ ] LISN(50Ω, 50μH)<br>(10kHz-100MHz)    | 3825/2           | EMCO                | 9011-1720         | -                              |
| [x] Plotter                              | 7470A            | H. P.               | 3104A21292        | -                              |
| [ ] Tuned Dipole Ant.<br>(30MHz-300MHz)  | VHA 9103         | Schwarzbeck         | -                 | *                              |
| [x] Tuned Dipole Ant.<br>(300MHz-1GHz)   | UHA 9105         | Schwarzbeck         | -                 | *                              |
| [x] Biconical Ant.<br>(30MHz-300MHz)     | BBA 9106         | Schwarzbeck         | -                 | *                              |
| [x] Log Periodic Ant.<br>(200MHz-1GHz)   | 3146             | EMCO                | -                 | *                              |
| [x] Horn Ant.<br>(1GHz-18GHz)            | 3115             | EMCO                | -                 | *                              |
| [ ] DC Power Supply                      | 6260B            | H.P.                | 1145A04822        | -                              |
| [ ] Shielded Room<br>(5.0m x 4.5m)       | SIN-MYUNG        | -                   | -                 | -                              |

\* Each set of antennas has been calibrated to ensure correlation with ANSI C63.5 standard.  
The calibration of antennas is traceable to Korea Standard Research Institute(KSRI).

**Hantel Co., Ltd.**

#321-1, Shin Sung B/D 2F, Yangjae-dong, Seocho-ku, Seoul, Korea

Tel : (02) 571-4653 Fax : (02) 571-4654

Date : January 20, 1999

**Statement for Section 15.37 of the Rules**

- Equipment : Pager Receiver
- FCC ID. : ODGBFX7ECL1

Concerning the FCC Part 15, section 15.37 transition provision, we, Hantel Co., Ltd hereby confirm above referenced device as follows.

This device(Pager Receiver) subject to the regulations in FCC Part 15 that are manufactured on or after June 23, 1999 complies with new rules adopted under Docket 87-389.

This Device is not associated with a transmitter that could not have been authorized under regulations in effect prior to June 23, 1989. e.g., a transmitter operating under the provisions of section 15.209 or section 15.249 (below 960MHz).

This device is not scanning receivers or frequency converters designed or marketed for use with scanning receivers.

Best Regards

Hoe-Bum Kim, General Manager  
Hantel Co., Ltd.

*H. Kim* 20 Jan '99