

**FCC PART 15 CLASS B  
EMI MEASUREMENT AND TEST REPORT**

**FOR**

**HANSCOM CO., LTD**  
82 -DO JIN B/D, GURO-DONG, GURO-GU,  
SEOUL KOREA

**FCC ID: NO4HPP-450A**

July 22, 1998

|                                                                                                                                                             |                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report                                                                         | <b>Equipment Type:</b><br>Pager, ITE |
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| <b>Test Date:</b> July 21, 1998                                                                                                                             |                                      |
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## 1 - GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

The *Hanscom Co., Ltd.* model *HPP-450A* or the "EUT" as referred to in this report is a Pager which measures 2.25" L x 1.5" W x 0.625" H.

Features include:

- 20 Messages and 16 digit Memory.
- Date and Time Stamping.
- 4 melodies and 2 Beep Tone.
- LCD displays 16 Characters in 2 Line.
- Memory Back-Up.

### 1.2 Objective

This Class B report is prepared on behalf of *Hanscom Co., Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules and to ICES-003 of the Canadian Interference-Causing Equipment Regulations.

The objective of the manufacturer is to demonstrate compliance with FCC Class B limits for conducted and radiated margin and to ICES-003 requirements for Information Technology Equipment.

### 1.3 Related Submittal(s)/Grant(s):

No Related Submittals

### 1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 -1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Suite 2, Sunnyvale, California, USA.

Test sites at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on

December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-674 and R-657. The test sites has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1993, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167.

### 1.6 Test Equipment List

| Manufacturer      | Description          | Model            | Serial Number | Cal. Due Data |
|-------------------|----------------------|------------------|---------------|---------------|
| HP                | Spectrum Analyzer    | 8568B            | 2610A02165    | 2/6/99        |
| HP                | Spectrum Analyzer    | 8593B            | 2919A00242    | 3/20/99       |
| HP                | Amplifier            | 8349B            | 2644A02662    | 3/20/99       |
| HP                | Quasi-Peak Adapter   | 85650A           | 917059        | 2/6/99        |
| HP                | Amplifier            | 8447E            | 1937A01046    | 2/6/99        |
| A.H. System       | Horn Antenna         | SAS0200/571      | 261           | 2/27/99       |
| Com-Power         | Log Periodic Antenna | AL-100           | 16005         | 1/2/99        |
| Com-Power         | Biconical Antenna    | AB-100           | 14012         | 1/2/99        |
| Solar Electronics | LISN                 | 8012-50-R-24-BNC | 968447        | 3/28/99       |
| Com-Power         | LISN                 | LI-200           | 12208         | 12/20/98      |
| Com-Power         | LISN                 | LI-200           | 12005         | 12/20/98      |
| BACL              | Data Entry Software  | DES1             | 0001          | 12/20/98      |

### 1.7 Equipment Under Test (EUT)

| Manufacturer      | Description | Model    | Serial Number | FCC ID      |
|-------------------|-------------|----------|---------------|-------------|
| Hanscom Co., LTD. | Pager       | HPP-450A | None          | NO4HPP-450A |

### 1.8 Support Equipment

NOT AVAILABLE.

## **1.9 EUT Configuration Details and List**

NOT AVAILABLE.

## **1.10 External I/O Cabling**

NOT AVAILABLE.

## **2 - SYSTEM TEST CONFIGURATION**

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### **2.1 Justification**

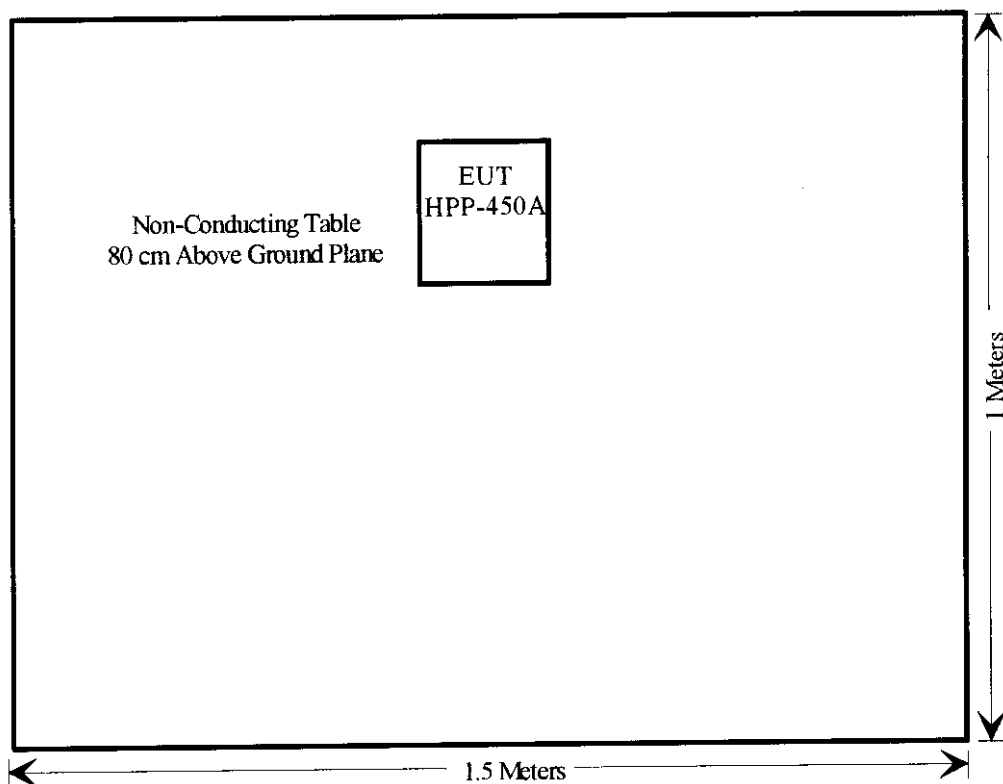
The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode.

### **2.2 Block Diagram**

Appendix A contains a copy of the EUT's block diagram as reference.

## 2.3 Test Setup Block Diagram



## **2.4 Equipment Modifications**

No modifications were necessary for the EUT to comply.

### **3 - CONDUCTED EMISSIONS TEST DATA**

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Not available because of battery operation.

## 4 - RADIATED EMISSION DATA

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### 4.1 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4 - 1992. The specification used was the FCC Class B limits.

The spacing between the peripherals was 10 cm.

External I/O cables are draped over edge of test table or bundled when necessary.

### 4.2 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, since the internal processor speed operates below 108 MHz, the EUT was tested to 1000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

|                                    |          |
|------------------------------------|----------|
| Start Frequency .....              | 30 MHz   |
| Stop Frequency .....               | 1000 MHz |
| Sweep Speed .....                  | Auto     |
| IF Bandwidth .....                 | 100 kHz  |
| Video Bandwidth .....              | 1 MHz    |
| Quasi-Peak Adapter Bandwidth ..... | 120 kHz  |
| Quasi-Peak Adapter Mode .....      | Normal   |
| Resolution Bandwidth .....         | 1MHz     |

### 4.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (less than -4 dBμV), and are distinguished with a "Qp" in the data table.

The EUT was operating at normal to represent worst case results during final qualification test. Therefore, this configuration was used for final test data recorded in the table(s) listed under section 4.7 of this report.

### 4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Class B Limit}$$

#### 4.5 Summary of Test Results

According to the final data in section 4.6, the EUT complied with the FCC Class B standards and these test results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, and had the worst margin of:

-5.0 dB $\mu$ V at 452.25 MHz in the **Horizontal** polarization for Normal operating mode.

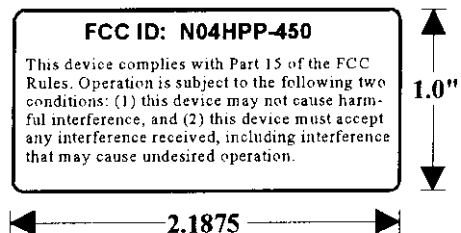
#### 4.6 Radiated Emissions Test Result Data

##### 4.6.1 Final Test Data for Normal Operating Mode, 30 to 1000 MHz.

| INDICATED |              | TABLE  | ANTENNA |       | CORRECTION FACTOR |       |     | CORRECTE<br>AMPLITUDE | FCC<br>CLASS B |        |
|-----------|--------------|--------|---------|-------|-------------------|-------|-----|-----------------------|----------------|--------|
| Frequency | Ampl.        | Angle  | Height  | Polar | Antenna           | Cable | Amp | Corr<br>Ampl.         | Limit          | Margin |
| MHz       | dB $\mu$ V/m | Degree | Meter   | H/ V  | dB $\mu$ V/m      | dB    | dB  | dB $\mu$ V/m          | dB $\mu$ V/m   | dB     |
| 452.25    | 20           | 125    | 1.0     | H     | 17.8              | 3.2   | 0.0 | 41.0                  | 46.0           | -5.0   |
| 122.36    | 23.6         | 90     | 1.0     | V     | 12.1              | 2.2   | 0.0 | 37.9                  | 43.5           | -5.6   |
| 146.62    | 22.6         | 0      | 1.0     | V     | 13.4              | 1.6   | 0.0 | 37.6                  | 43.5           | -5.9   |
| 114.41    | 23.9         | 90     | 1.0     | V     | 11.7              | 1.3   | 0.0 | 36.9                  | 43.5           | -6.6   |
| 75.00     | 20.9         | 45     | 1.0     | V     | 9.5               | 1.6   | 0.0 | 32.0                  | 40.0           | -8.0   |
| 62.84     | 20.9         | 180    | 1.0     | V     | 9.7               | 1.3   | 0.0 | 31.9                  | 40.0           | -8.1   |

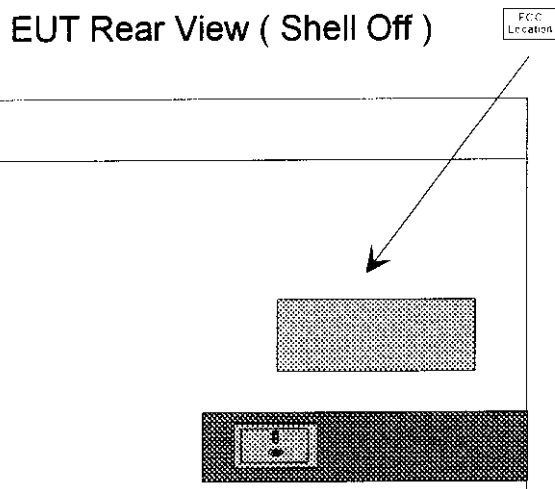
## 5– FCC PRODUCT LABELING AND WARNING STATEMENT

### 7.1 FCC ID Label



**Specifications:** Text is black in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT.

### 5.2 Proposed Label Location on EUT



### 5.3 FCC Warning Statement

The FCC Warning Statement is included in the product manual. A proposed sample of the statement is presented in Appendix C of this report as reference.