

EMI TEST REPORT

FCC PART 15 CLASS B

for

NEXTEL
403 Dojung B/D, #548-6 Anyang-8dong,
Manan-gu, Anyang-city,
Kyungki-do, Korea

on the

STORM FLEX Receiver
FCC ID: RAMSTORMSHELTER

Issued Date : Jun 24, 2003
Report Number : KSQ-FCC030601

Prepared By:

Test Date: Jun 23, 2003

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Signature



Korea Standard Quality Laboratories

Testing Laboratories for EMC and Safety Compliance

#102, Jangduk-Dong, Hwasung-Shi, Kyunggi-Do, KOREA

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1 General Information

1.1 Introduction

The EMI Test Report of Information Technology Equipment is prepared on behalf of named applicant in accordance with the ANSI C63.4-1992. The test results reported in this document relate only to the item that was tested.

The detailed description of the measurement facility was found to be in compliance with the requirement of Section 2.948 of the FCC Rules. The Federal Communications Commission has the reports on file and is listed under Registration Number 100384. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

All measurements contained in this report were conducted in accordance with ANSI C63.4-1992. The instrumentation utilized for the measurements conforms with CISPR16 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed yearly on the instruments by a local calibration laboratories.

All radiated and conducted emission measurements are performed manually at Korea Standard Quality Laboratories (hereinafter referred to as "KSQLab"), #102, Jangduk-Dong, Hwasung-Shi, Kyunggi-Do, KOREA. The radiated emission measurements required by the FCC Rules were performed on 3 meter or 10 meter, Open Area Test Site, test range maintained by KSQLab. Complete ANSI 63.4-1992 description and site attenuation measurement data records are maintained at the test facility and have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the same facility. The KSQLab EMC test facility in Hwasung-Shi are designated testing laboratory according to ISO/IEC 17025 by Radio Research Laboratory (RRL), Ministry of Information and Communication.

1.2 Product Description for Equipment Under Test (EUT)

McKinley Korea Co Ltd's STORM FLEX Receiver, Model: STORMSHELTER, or the "EUT" as referred to in this report is a flex pager.

Main Features of EUT are:

- Frequency Range : 929~932MHz
- Power : +3V
- Signaling Modulation : 2 or 4 Level FSK

1.3 Equipment Under Test

| Description | Model Number | Serial Number | Manufacturer | FCC ID |
|---------------------|--------------|---------------|-----------------------|------------------|
| STORM FLEX Receiver | STORMSHELTER | Prototype | McKinley Korea Co Ltd | RAMSTORM SHELTER |

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2 Test Performed

2.1 Conducted Emission Measurements

2.1.1 Test Description

The power line conducted emission measurements were performed in a shielded enclosure, using the setup in accordance with ANSI C63.4-1992 conducted emission measurement procedure.

2.1.2 Test Equipments

| Description | Manufacturer | Model Number | Serial Number | Cal. Due |
|-------------------|-----------------|--------------|---------------|----------|
| Spectrum Analyzer | Advantest | 3261A | 21720240 | 10, 2003 |
| LISN1 | Electro Metrics | ANS-25/2 | 2535 | 10, 2003 |
| LISN2 | Kyoritsu | KNW-407 | 8-1010-14 | 10, 2003 |
| Plotter | Hewlett Packard | 7550B | 3050A14513 | n/a |

2.1.3 Test Environments

| Ambient Temperatures | Relative Humidity |
|----------------------|-------------------|
| 15~35 °C | 30~60 % |

2.1.4 Test Limits

| Frequency (MHz) | FCC Part 15 Limit | | | |
|--------------------|-------------------|------|---------|------|
| | Class B | | Class A | |
| | (dBuV) | (uV) | (dBuV) | (uV) |
| 0.45 to 1.705 | 48.0 | 250 | 60.0 | 1000 |
| 1.705 to 30.00 | 48.0 | 250 | 69.5 | 3000 |

2.1.5 Test Procedure

Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6dB bandwidth was set to 9kHz. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 450kHz to 30MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the EUT exercise program loaded, and the emissions were scanned between 450kHz to 30MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively.

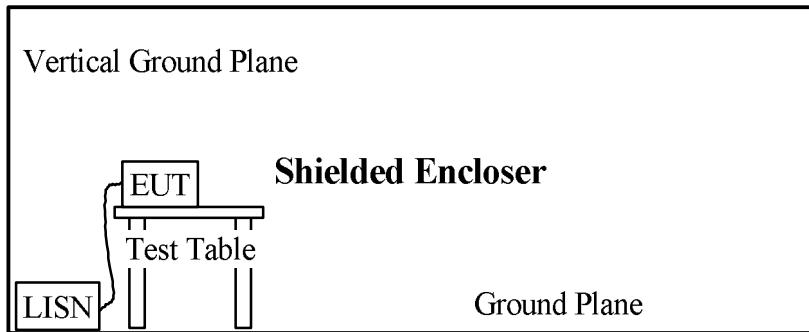
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2.1.6 Test Configuration



2.1.7 Test Results

Not Applicable

2.1.8 Test Data

PK = Peak; QP = Quasi-peak; AV = Average

Temperature: 23 °C Humidity: 45 % Test Date: Jun 23, 2003 Tested by: Y. Choi

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2.1.9 Plots of Test Data

Polarization: HOT (LIVE)

Not Applicable

Polarization: NEUTRAL

Not Applicable

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2.2 Radiated Emission Measurements

2.2.1 Test Description

The radiated emission measurements were performed in a Open Area Test Site (OATS), using the setup in accordance with ANSI C63.4-1992 radiated emission measurement procedure.

2.2.2 Test Equipments

| Description | Manufacturer | Model Number | Serial Number | Cal. Due |
|----------------------|-----------------|--------------|---------------|----------|
| Spectrum Analyzer | Hewlett Packard | 8568B | 3217A05629 | 08, 2003 |
| Spectrum Display | Hewlett Packard | 85682A | 3144A20886 | 08, 2003 |
| RF Preselector | Hewlett Packard | 85685A | 3221A01366 | 08, 2003 |
| Quasi-Peak Adapter | Hewlett Packard | 85650A | 3145A01652 | 08, 2003 |
| Biconical Antenna | Electro Metrics | BIA-30S | 164 | 10, 2003 |
| Log Periodic Antenna | Electro Metrics | LPA-30 | 387 | 10, 2003 |
| Turn Table | KSQ | KSQ-T10 | KSQ98121 | n/a |
| Antenna Mast | KSQ | KSQ-A10 | KSQ98122 | n/a |

2.2.3 Test Environments

| Ambient Temperatures | Relative Humidity |
|----------------------|-------------------|
| 15~35 °C | 30~60 % |

2.2.4 Test Limits

| Frequency (MHz) | FCC Part 15 Limit | | | |
|--------------------|-------------------|--------|--------------|--------|
| | Class B @3m | | Class A @10m | |
| | (dBuV/m) | (uV/m) | (dBuV/m) | (uV/m) |
| 30 to 88 | 40.0 | 100 | 39.5 | 90 |
| 88 to 216 | 43.5 | 150 | 43.5 | 150 |
| 216 to 960 | 46.0 | 200 | 46.5 | 210 |
| above 960 | 54.0 | 500 | 49.5 | 300 |

2.2.5 Test Procedure

Before final measurements of radiated emission were made on the OATS, the EUT was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

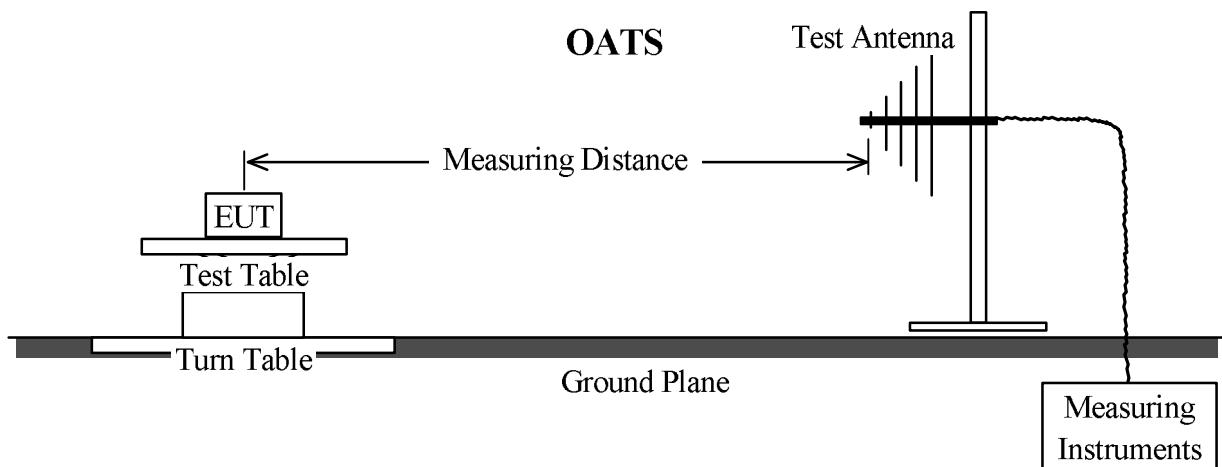
The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30MHz to 1000MHz using a HP 8568B spectrum analyzer. The spectrum analyzer's 6dB bandwidth was set to 120kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

2.2.6 Field Strength Calculation

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor (CF) from the Measured Reading (MR). The basic equation with a sample calculation is as follows:

$$FS(\text{dBuV/m}) = MR(\text{dBuV}) + [AF(\text{dB/m}) + CF(\text{dB})]$$

2.2.7 Test Configuration



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2.2.8 Test Results

According to the data in section 2.2.9, the EUT complied with the FCC Part 15 standards, and had the worst margin reading of:

-5.5dB at 682.94MHz in the VERTICAL antenna polarization.

2.2.9 Test Data

(Test Frequency : 929.000MHz)

| Indicated | | Antenna | | Correction Factor | | Corrected Amplitude | FCC Part15 Class B | | |
|-----------------|---|--------------|------------|-------------------|------------|---------------------|---------------------------|--------------------|-------|
| Frequency (MHz) | Amplitude (dBuV/m) | Polar. (H/V) | Height (m) | Ant. (dB) | Cable (dB) | (dBuV/m) | Applicable Limit (dBuV/m) | Margin (dB) (uV/m) | |
| 226.88 | 11.2 | H | 3.2 | 16.1 | 2.8 | 30.1 | 46.0 | 100 | -15.9 |
| 453.77 | 14.6 | H | 3.0 | 16.2 | 4.3 | 35.1 | 46.0 | 100 | -10.9 |
| 680.71 | 13.4 | V | 2.2 | 20.6 | 5.5 | 39.5 | 46.0 | 100 | -6.5 |
| 907.60 | 11.2 | H | 2.5 | 22.8 | 6.3 | 40.3 | 46.0 | 100 | -5.7 |
| above 960 | Test results were under the required limit with 20dB margin or more using Agilent 7405A EMC Analyzer and AH SAS-571 Horn Antenna. | | | | | | | | |

All other emissions were less than 20 dB below the margin.

(Test Frequency : 932.000MHz)

| Indicated | | Antenna | | Correction Factor | | Corrected Amplitude | FCC Part15 Class B | | |
|-----------------|---|--------------|------------|-------------------|------------|---------------------|---------------------------|--------------------|-------|
| Frequency (MHz) | Amplitude (dBuV/m) | Polar. (H/V) | Height (m) | Ant. (dB) | Cable (dB) | (dBuV/m) | Applicable Limit (dBuV/m) | Margin (dB) (uV/m) | |
| 227.63 | 10.4 | H | 3.2 | 16.1 | 2.8 | 29.3 | 46.0 | 100 | -16.7 |
| 455.29 | 14.1 | H | 3.0 | 16.3 | 4.3 | 34.7 | 46.0 | 100 | -11.3 |
| 682.94 | 14.3 | V | 2.2 | 20.7 | 5.5 | 40.5 | 46.0 | 100 | -5.5 |
| 910.59 | 10.0 | H | 2.4 | 22.9 | 6.3 | 39.2 | 46.0 | 100 | -6.8 |
| above 960 | Test results were under the required limit with 20dB margin or more using Agilent 7405A EMC Analyzer and AH SAS-571 Horn Antenna. | | | | | | | | |

All other emissions were less than 20 dB below the margin.

Temperature: 23 °C Humidity: 45 % Test Date: Jun 23, 2003 Tested by: Y. Choi