Korea Technology Institute Co., Ltd.

Test Report

Test Report No.:	**KTI02EF0156**		
Registration No.:	**99058**		
Applicant:	**SHINIL Industrial Co., Ltd.**		
Applicant Address:	**119-1,SASA-DONG,ANSAN-SHI,KYUNGI-DO,425-220,KOREA**		
Product:	**Paging Receiver**	**Frequency Range:**	**929.0125-931.9875**
FCC ID:	**05ZIFA-930**	**Model No.**	**IFA-930**
Receipt No.:	**KTI20020122**	**Date of receipt:**	**January 22, 2002**
Date of Issue:	**February 7, 2002**		
Testing location	**Korea Technology Institute Co., Ltd. 51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeungki-Do, Korea**		
Test Standards:	**ANSI. C63.4 : 1992**		
Rule Parts:	**FCC Part 15, Subpart B**		
Equipment Class:	**Numeric Radio Paging Receiver(CYY)**		
Test Result:	**The above mentioned product has been tested and passed.**		

Tested by: S. B. Kim/ Engineer

Signature Date

Approved by: G. C. Min/ President

Signature Date

Other Aspects :	
Abbreviations :	**• OK, Pass=passed • Fail=failed • N/A=not applicable**

This test report is not permitted to copy partly without our permission.
This test result is dependent on only equipment to be used.
This test result is based on a single evaluation of one sample of the above mentioned.
This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.
We certify this test report has been based on the measurement standards that is traceable to the national or international standards.

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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by Korea Technology Institute 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.

2. Test Site

Korea Technology Institute Co., LTD

2.1 Location

51-19, Sanglim3-Ri, Docheok-Myeun, Gwangju-Shi, Gyeungki-Do, Korea

The Test Site is in compliance with ANSI C63.4/1992 for measurement of radio Interference.

2.2 List of Test and Measurement Instruments

Table 1 : List of Test and Measurement Equipment

- **Conducted Emissions**

Kind of Equipment	Type	S/N	Calibrated until
Spectrum Analyzer	R3261C	61720417	11.2002
Field Strength Meter	ESPC	832827/011	9.2002
LISN	KNW407	8-1157-2	10.2002
LISN	ESH2-Z5	8254601019	6.2002
Conducted Cable	N/A	N/A	11.2002

- **Radiated Emissions**

Kind of Equipment	Type	S/N	Calibrated until
Field Strength Meter	ESPC	832827/011	9.2002
Spectrum Analyzer	R3261C	61720417	11.2002
Pre Amplifier	HP 8447D	2944A06874	11.2002
BiconiLog Antenna	EMCO 3142B	1705	12.2002
Bilog Antenna			

3. Description of the tested samples

The EUT is Paging Receiver(CYY).

3.1 Rating and Physical Characteristics

- **Frequency range : 929.0125 931.9875MHz**
- **Using battery:1.5VDC(AAA size Alkaline)**
- **Bit Rate(s): 1600 2level bps**
- **Crystal/Oscillator(s): 75.634 75.8823MHz**
- **Antenna: Loop**
- **Receiving System: Double superheterodyne, Crystal**
- **Signal System: FLEX**
- **Dimensions: 56 43 18 mm**
- **Weight: 38g(including battery)**

3.2 Submitted Documents

- **User's Guide**
- **Block Diagram**

4. Measurement Conditions

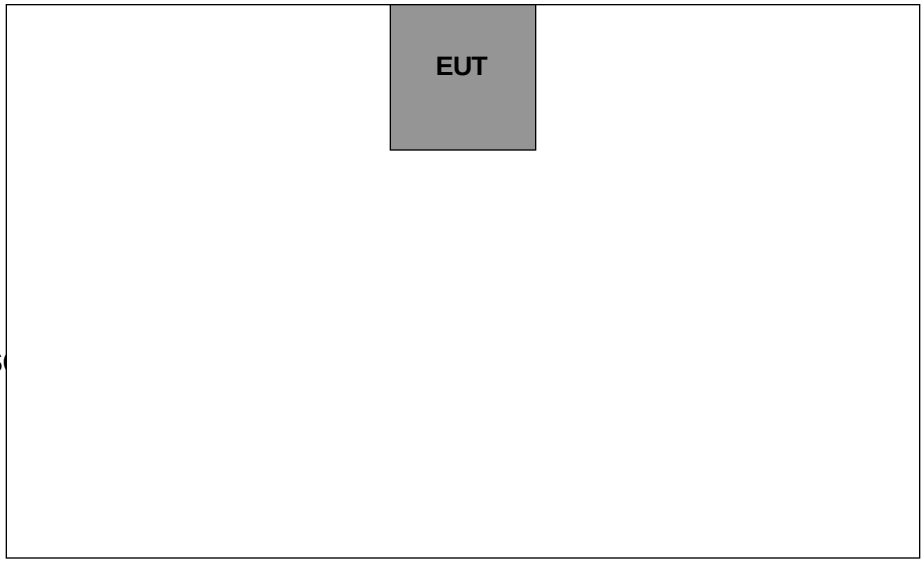
Testing Input Voltage : DC 1.5V(AAA size)

4.1 Modes of Operation

The EUT was in the following normal mode during all testing;
Prior to a measurement, the Pager shall be operated until stabilization has been reached.

4.2 Uncertainty

1) Radiated disturbance
UC (Combined standard Uncertainty) = ± 1.8dB
Expanded uncertainty U=KUc
K = 2
U = ± 3.6dB
2) Conducted disturbance
UC = ± 0.88dB
U = KUc=2xUc = ± 1.8dB



4.3 Test s

5.EMISSION Test

5.1Conducted Emissions

Result: (n/a Battery Operated Only)

The line-conducted facility is located inside a 2.3M x 3.5M x 5.5M shielded closure.
The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 605-05. A 1m x 1.5m wooden table 80cm high is placed 80cm away from the conducting ground plane and 40cm away from the sidewall of the shielded room. Rohde & Schwarz Model ESH2-Z5 (9kHz-30MHz)50ohm/50 uH Line-Impedance Stabilization Networks (LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Rohde & Schwarz LISN. Power to the LISN are filtered by a high-current high-insertion loss shield enclosures power line filters (100dB 14kHz-1GHz).
The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.
All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2".
If the EUT is a DC-Powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Rohde & Schwarz LISN.
All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.
Sufficient time for the EUT, Support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 450kHz to 30MHz with 100msec. Sweep time.
The frequency producing the maximum level was reexamined using EMI field Intensity meter (ESPC) and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode.
The bandwidth of the receiver was set to 10kHZ. The EUT, support equipment, and interconnecting Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of conducted test.
Each EME reported was calibrated using self-calibrating mode.

Table 2 : Test Data, Conducted Emissions

Not applicable. The EUT is only a battery operated device.

5.2Radiated Emissions

Result: Pass

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband Amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and Investigated. The system configurations, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.
The spectrum was scanned from 30 to 1000 MHz using BiconiLog Antenna . Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 10-meter test range using EMCO antennas. The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with Polyethylene film. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter (ESPC) R & S. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1 MHz depending on the frequency or type or signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated Measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8meter high non-metallic 1 x 1.5 meter table.
The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of radiated emission test.
Each EME reported was calibrated using self-calibrating mode.

Table 3 : Test Data, Radiated Emissions (Test Frequency : 929.0125MHz)

FREQ. (MHz)	POL	Height [m]	Azimuth [°]	(1) Reading (dB V)	(2) AFCL (dB/m)	(3) Actual (dB V/m)	(4) Limit (dB V/m)	(5) Margin (dB)
176.67	H	2.58	123	15.4	15.5	30.9	43.5	-12.6
353.34	H	2.64	251	14.9	22	36.9	46	-9.1
530.01	H	3.15	156	8.2	27.3	35.5		-10.5

Table. Radiated Measurements at 3-meters

Notes:

1. The antenna is manipulated through typical positions and/or three orthogonal positions during the tests.
2. The emissions are maximized by changing polarity of the antenna.
3. The EUT is supplied with a new/fully charged battery.
4. AFCL = Antenna factor and cable loss
5. H = Horizontal, V = Vertical Polarization
6. HA=Horn Antenna used above 1GHz Limit 54.0 dB V above 1GHz

Table 3-1 : Test Data, Radiated Emissions (Test Frequency : 931.9875MHz)

FREQ. (MHz)	POL	Height [m]	Azimuth [°]	(1) Reading (dB V)	(2) AFCL (dB/m)	(3) Actual (dB V/m)	(4) Limit (dB V/m)	(5) Margin (dB)
177.16	H	2.54	321	14.2	15.5	29.7	43.5	-13.8
354.32	H	1.85	159	12.5	22	34.5	46	-11.5
531.48	H	1.46	124	6.2	27.3	33.5		-12.5

Table. Radiated Measurements at 3-meters

Notes:

1. The antenna is manipulated through typical positions and/or three orthogonal positions during the tests.
2. The emissions are maximized by changing polarity of the antenna.
3. The EUT is supplied with a new/fully charged battery.
4. AFCL = Antenna factor and cable loss
5. H = Horizontal, V = Vertical Polarization
6. HA=Horn Antenna used above 1GHz Limit 54.0 dB V above 1GHz