



# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR SUPERHETRODYNE RECEIVER

Test report file number : E02DR-018

Applicant : SHINCHANG ELECTRICS CO., LTD.

Address : 734-2, Wonshi-Dong, Ansan-Si, Gyungki-Do, 425-090, Korea

Manufacturer : SHINCHANG ELECTRICS CO., LTD.

Address : 734-2, Wonshi-Dong, Ansan-Si, Gyungki-Do, 425-090, Korea

Type of Equipment : REMOTE KEYLESS ENTRY & ATAS SYSTEM

FCC ID : NYOSAKS-01RX

Model / Type No. : SAKS-01Rx

Serial number : N/A

Total page of Report : 9 pages (including this page)

Date of Incoming : November 13, 2002


Date of issuing : December 10, 2002

## SUMMARY


The equipment complies with the regulation; **FCC PART 15 SUBPART B §15.101**

This test report contains only the result of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by:

  
G. W. Lee/ Chief Engineer  
EMC Div.  
ONETECH Corp.

Reviewed by:

  
Y. K. Kwon/ Director  
EMC Div.  
ONETECH Corp.



## CONTENTS

	Page
<b>1. VERIFICATION OF COMPLIANCE.....</b>	<b>3</b>
<b>2. GENERAL INFORMATION .....</b>	<b>4</b>
<b>2.1 PRODUCT DESCRIPTION .....</b>	<b>4</b>
<b>2.2 RELATED SUBMITTAL(S) / GRANT(S).....</b>	<b>4</b>
<b>2.3 TEST SYSTEM DETAILS.....</b>	<b>5</b>
<b>2.4 TEST METHODOLOGY.....</b>	<b>5</b>
<b>2.5 TEST FACILITY .....</b>	<b>5</b>
<b>3. SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
<b>3.1 JUSTIFICATION .....</b>	<b>5</b>
<b>3.2 EUT EXERCISE SOFTWARE.....</b>	<b>5</b>
<b>3.3 EQUIPMENT MODIFICATIONS.....</b>	<b>5</b>
<b>3.4 CONFIGURATION OF TEST SYSTEM.....</b>	<b>6</b>
<b>4. PRELIMINARY TEST .....</b>	<b>6</b>
<b>4.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....</b>	<b>6</b>
<b>4.2 RADIATED EMISSIONS TESTS .....</b>	<b>6</b>
<b>5. FINAL RESULT OF MEASUREMENT .....</b>	<b>7</b>
<b>5.1 RADIATED EMISSION TEST .....</b>	<b>7</b>
<b>6. FIELD STRENGTH CALCULATION .....</b>	<b>8</b>
<b>7. LIST OF TEST EQUIPMENT.....</b>	<b>9</b>

**1. VERIFICATION OF COMPLIANCE**

APPLICANT : SHINCHANG ELECTRICS CO., LTD.  
ADDRESS : 734-2, Wonshi-Dong, Ansan-Si, Gyungki-Do, 425-090, Korea  
CONTACT PERSON : Ms.Yusun, Ham / Research Engineer  
TELEPHONE NO : 82-2-6230-5553  
FCC ID : NYOSAKS-01RX  
MODEL NO/NAME : SAKS-01Rx  
SERIAL NUMBER : N/A  
DATE : December 10, 2002

DEVICE TYPE	UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	REMOTE KEYLESS ENTRY & ATAS SYSTEM -SUPERHETRODYNE RECEIVER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 §15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



## 2. GENERAL INFORMATION

### 2.1 Product Description

The SHINCHANG ELECTRICS CO., LTD., Model SAKS-01Rx (referred to as the EUT in this report) is a receiver that is fixed inside the vehicle and receives the signal from the transmitter, Model: SAKS-01Tx, FCC ID: NYOSAKS-01TX which was manufactured by Shinchang and then decide locking and unlocking the door of the vehicle. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
RECEIVING FREQUENCY	315.00 MHz
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	4.8970 MHz and 315.0MHz (SAW Resonator)
RATED SUPPLY VOLTAGE	DC 12V
OPERATING VOLTAGE	DC 9 ~ 16V
NUMBER OF LAYERS	2 LAYERS

Model Differences:

-. No other model differences have been mentioned.

### 2.2 Related Submittal(s) / Grant(s)

Original submittal only.



## 2.3 Test System Details

The EUT was tested with the following all equipment used in the tested systems are:

Model	Manufacturer	FCC ID	Description	Connected to
SAKS-01Rx	SHINCHANG ELECTRICS CO., LTD.	NYOSAKS-01RX	RECEIVER	BATTERY
N/A	N/A	N/A	BATTERY	EUT
8657A	HP	N/A	Signal Generator	N/A

## 2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

## 2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

# 3. SYSTEM TEST CONFIGURATION

## 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	SHINCHANG ELECTRICS CO., LTD.	521800-1300	N/A

## 3.2 EUT exercise Software

Set the signal generator to transmit at 315MHz and then the EUT receives the signal.

Used battery for the EUT was fully charged.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

## 3.3 Equipment Modifications

None



### 3.4 Configuration of Test System

#### Line Conducted Emission Test:

It is not need to test this requirement, because the power of the EUT supplies from a car battery.

#### Radiated Emission Test:

Preliminary radiated emissions tests were conducted using the procedure in ANSI C63.4/1992, 8.3.1.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meters open area test site.

#### Coherent Test:

During Radiated Emission Tests, H.P. signal generator model no: 8657A was used to radiate an unmodulated CW signal to EUT at 315.00 MHz in order to cohere the individual components of the characteristic broadband emissions from EUT.

#### Antenna Power Conduction Test:

This equipment was only with a permanently attached antenna, so the radiated emission measurement was performed with the antenna attached.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
N/A	N/A
It is not need to test this requirement, because the power of the EUT is supplied from a car battery.	

### 4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
RX mode	X



## 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

### 5.1 Radiated Emission Test


The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 47 % Temperature :  
18 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART B (Section: 15.109)  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)  
 Type of Test : Unintentional Radiator  
 Result : PASSED BY -19.68 dB at 510.00 MHz

EUT : REMOTE KEYLESS ENTRY & ATAS SYSTEM Date: November 21, 2002  
 Operating Condition : RX mode  
 Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC LIMIT	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (Db)
318.20	6.60	H	14.89	1.97	23.46	46.00	-22.54
335.70	4.70	H	15.06	2.00	21.76	46.00	-24.24
344.10	5.50	H	15.14	2.00	22.64	46.00	-23.36
348.30	6.30	H	15.17	2.00	23.47	46.00	-22.53
400.10	6.60	V	15.72	2.10	24.42	46.00	-21.58
510.00	5.90	H	17.82	2.60	26.32	46.00	-19.68
Other frequencies are more than 30dB below the limit up to 2GHz.							

Radiated Emission Tabulated Data

  
 Tested by: Young-Min, Choi / Project Engineer

This report shall not be reproduced except in full without our written approval.

FCC-004 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea  
 (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-



## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

---

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)





## 7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	NOV/02	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/02	12MONTH	
3.	Spectrum analyzer	HP	8568B	3109A05456	APR/02	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/02	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/02	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/02	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	JUL/02	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUL/02	12MONTH	■
10.	Horn Antenna	SCHWARZBEC K	BBHA9120D	BBHA9120D294	JUN/02	12MONTH	■
11.	LISN	EMCO	3825/2	9109-1867 9109-1869	OCT/02	12MONTH	
12.	RF Amplifier	HP	8447F	3113A04554	JUN/02	N/A	
13.	Spectrum Analyzer	HP	8564E	3650A00756	JUL/02	12MONTH	■
14.	Spectrum Analyzer	HP	8566B	3407A08547	AUG/02	12MONTH	
15.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
16.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
17.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
18.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

This report shall not be reproduced except in full without our written approval.

FCC-004 (Rev.0)

**HEAD OFFICE** : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea  
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)

**EMC Testing Dept** : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-