ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test Report No.	**: E069R-010**
AGR No.	**: A069A-028**
Applicant	**: KI RYUNG ELECTRONICS CO., LTD.**
Address	**: 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea**
Manufacturer	**: KI RYUNG ELECTRONICS CO., LTD.**
Address	**: 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea**
Type of Equipment	**: Digital Satellite Radio (FM Transmitter)**
FCC ID.	**: P3HNSPH4**
Model Name	**: SP4**
Serial number	**: N/A**
Total page of Report	**: 15 pages (including this page)**
Date of Incoming	**: August 21, 2006**
Date of Issuing	**: September 06, 2006**

SUMMARY

The equipment complies with the regulation of ***FCC CRF 47 PART 15, SUBPART C, SECTION 15.239***.

This test report contains only the results 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: Young-Min, Choi / Project Engineer
EMC Div.
ONETECH Corp.

Reviewed by: Y. K. Kwon / Director
EMC Div.
ONETECH Corp.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

CONTENTS

PAGE

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

1. VERIFICATION OF COMPLIANCE

-. APPLICANT : KI RYUNG ELECTRONICS CO., LTD.

-. ADDRESS : 219-6, Gasan-Dong, Kumchun-Ku, Seoul, 153-023, Korea

-. CONTACT PERSON : Mr. Won-Kyu, Choi / Q.C. Assistant Manager

-. TELEPHONE NO : +82-2-3282-2264

-. BRAND NAME : SIRIUS

-. FCC ID : P3HNSPH4

-. MODEL NO/NAME : SP4

-. SERIAL NUMBER : N/A

-. DATE : September 06, 2006

EQUIPMENT CLASS	DXX – Part 15 Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Digital Satellite Radio (FM Transmitter)
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	Charter 7 and 13 of ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.239
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.

-. The above equipment has external transmitting antenna, so the EUT shall be installed into at small, medium and large size vehicles and the cars were tested at in situ testing for getting compliance with the requirement, section 15.239, but the test was performed by another test lab.

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

2. GENERAL INFORMATION

2.1 Product Description

The KI RYUNG ELECTRONICS CO., LTD., Model SP4 (referred to as the EUT in this report) is a Digital Satellite Radio that has the FM transmitter from 88.1 MHz to 107.9 MHz for audio signal of FM radio receiver. And EUT has an external FM antenna. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
LIST OF EACH OSC. or CRY. FREQ.(FREQ.>=1MHz)	7.3728 MHz, 7.6 MHz and 17 MHz
POWER REQUIREMENT	DC 5.2V from a Car Adaptor
TX FREQUENCY RANGE	88.1 MHz ~ 107.9 MHz (range into 200 kHz Step)
USED ANTENNA for TX	External FM Antenna
NUMBER OF LAYERS	6 Layers: Main Board, 4 Layers: Key Board, 2 layers: Cradle Board
EXTERNAL CONNECTOR	DC In, Antenna In, Audio Out, FM Out

2.2 Model Differences

-. The difference(s) compared to the EUT is as follows: None

2.3 Related Submittal(s) / Grant(s)

-. Original submittal only

2.4 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
SP4	KI RYUNG ELECTRONICS CO., LTD.	P3HNSPH4	Digital Satellite Radio (EUT)	-
ISGSRA733	SIRIUS	N/A	GPS Antenna	EUT
N/A	N/A	N/A	External FM Antenna	EUT

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on August 31, 2005. (Registration Number: 340658)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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	KI RYUNG ELECTRONICS CO., LTD.	SP4 MAIN REV.2 GDF	N/A
Function Key Board	KI RYUNG ELECTRONICS CO., LTD.	SP4 KEY REV.2 GDF	N/A
Cradle Board	KI RYUNG ELECTRONICS CO., LTD.	SP4 CAR CRADLE REV.A	N/A

3.2 EUT exercise Software

The Model, SP4 is included a FM transmitter designed to operate on function in the 88.1 ~ 107.9 MHz. The EUT does not have an audio input port, so the internal 1 kHz modulation signal was transmitted with maximum audio level. The external FM antenna and GPS antenna were maximized for setting the worst emission level. Also, the EUT shall be installed in small, medium and large size vehicle for in situ testing by another test lab.

3.3 Cable Description for the EUT

Ports Name	Shielded	Ferrite Bead	Metal Hood	Length (m)	Connected to
Audio Out	N	N	BOTH END	1.5	Terminator Resistor (10 Kohm)
DC In	N	EUT END	EUT END	1.2	Car Adaptor
FM Out	N	N	EUT END	1.2	External FM Antenna
Antenna In	N	N	EUT END	1.2	GPS Antenna

3.4 Equipment Modifications

-. None

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

3.5 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by car battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter open area test site.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The EUT does not have audio input port, so internal 1 kHz modulation signal was transmitted with maximum audio volume level on the EUT.

In situ Radiated Emission Test:

According to the FCC Policy, the EUT shall be installed in small, medium, and large size vehicles because of external antenna on the EUT.

3.6 Antenna Requirement

According to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The external FM antenna which shall be supplied by the responsible party shall be used according to user's guide.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the EUT shall be operated by car battery.	

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmit the RF Signal continuously	X

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

5. FINAL RESULT OF MEASURMENT

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

5.1 Radiated Emission Test (Within the permitted 200 kHz band)

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

Humidity Level : 50 % Temperature: 24 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (b)
Type of Test : Low Power Communication Device Transmitter
Result : PASSED BY –6.04 dB at 97.90 MHz

EUT : Digital Satellite Radio Date: August 30, 2006
Operating Condition : Transmit the RF signal.
Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit	Margin
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	(dBuV/m)	(dB)
88.1	22.10	Quasi-Peak	H	7.89	1.74	31.73	48.00	-16.27
88.1	29.10	Quasi-Peak	V	7.89	1.74	38.73	48.00	-9.27
97.9	26.70	Quasi-Peak	H	9.66	1.90	38.26	48.00	-9.74
97.9	30.40	Quasi-Peak	V	9.66	1.90	41.96	48.00	-6.04
107.9	23.70	Quasi-Peak	H	11.07	1.90	36.67	48.00	-11.33
107.9	23.00	Quasi-Peak	V	11.07	1.90	35.97	48.00	-12.03

Radiated Emission Tabulated Data

Remark: The peak values at each frequency were investigated under average limit, so the average mode was not performed.

Tested by: Sue-Young, Lee/ Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

5.2 Radiated Emission Test (Outside of the specified 200 kHz band)

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

Humidity Level : 50 % Temperature: 24 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY –16.12 dB at 81.23 MHz

EUT : Digital Satellite Radio Date: August 30, 2006

Operating Condition : Transmit the RF signal.

Frequency range : 30MHz – 1000MHz

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Remark : Other emissions

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dB/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
81.23	15.20	V	6.96	1.72	23.88	40.00	-16.12
132.60	8.60	V	14.09	2.25	24.94	43.52	-18.58
182.10	8.10	H	15.96	2.80	26.86	43.52	-16.66
204.30	7.10	V	16.00	2.83	25.93	43.52	-17.59
233.90	7.30	V	16.72	3.14	27.16	46.02	-18.86

Tested by: Sue-Young, Lee/ Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

5.3 Bandwidth of the operating frequency

Humidity Level : 41 % Temperature: 17 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)

Result : PASSED

EUT : Digital Satellite Radio Date: August 30, 2006

Operating Condition : Transmit the RF signal with maximum audio volume level.
Please refer to clause 3.5 in this report for more detail operating and test procedure.

Minimum Resolution Bandwidth : 10 kHz

Remark : Refer to test data in next page.

Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
88.1	185.4	200	-14.6
97.9	189.9		-10.1
107.9	174.0		-26.0

Tested by: Sue-Young, Lee/ Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

Bottom Frequency (88.1MHz)

Middle Frequency (97.9MHz)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

Top Frequency(107.9 MHz)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

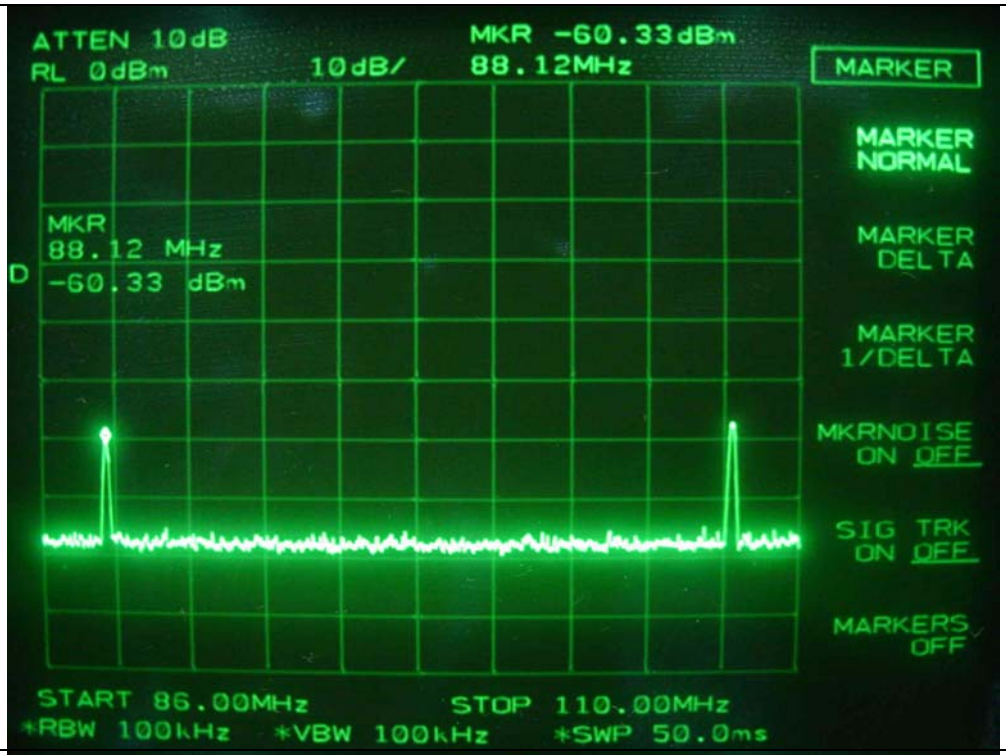
5.4 Tuning Range of the operating frequency

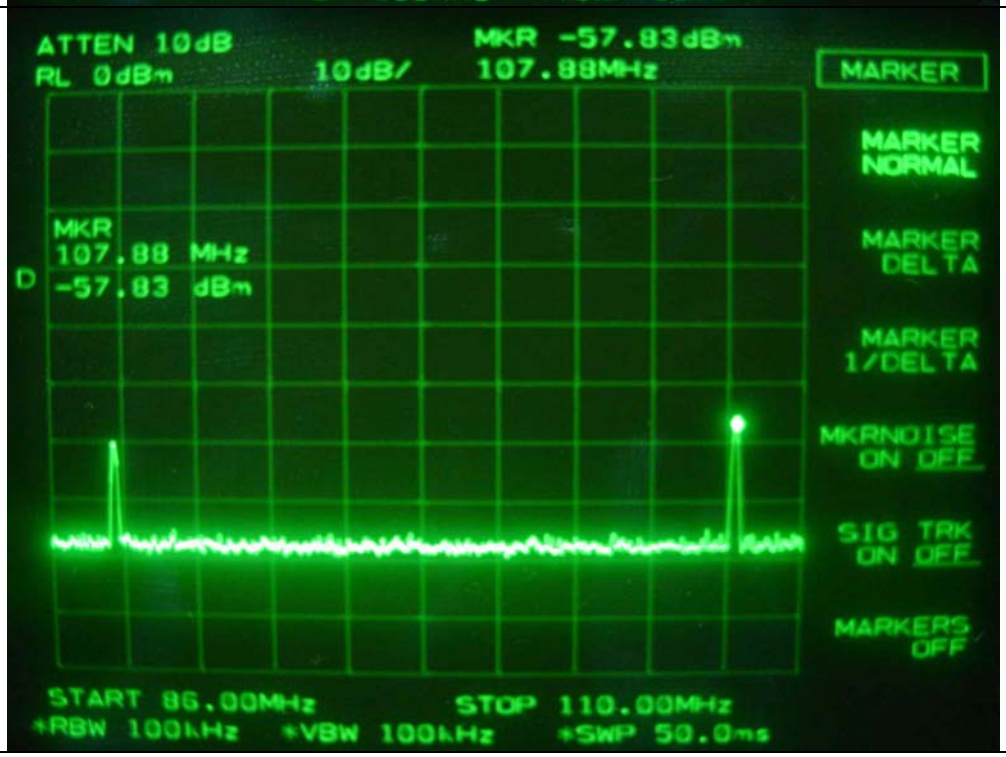
Humidity Level	: 41 %	Temperature: 17 °C
Limits apply to	: FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)	
Result	: PASSED	

EUT	: Digital Satellite Radio Date: August 30, 2006
Operating Condition	: The lowest and highest frequency was adjusted by manual using knob on the EUT and the spectrum was in max hold mode for capturing the spectrum.
Test Result	: Met the requirement. Refer to test data in next page.

Tested by: Sue-Young, Lee/ Test Engineer

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)





HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/05	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/06	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUN/06	12MONTH	■
4.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	MAY/06	12MONTH	
5.	Biconical antenna	EMCO	3110	9003-1121	FEB/06	12MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/06		■
6.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/06	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/06		■
7.	LISN	EMCO	3825/2	9109-1867	JUN/06	12MONTH	■
				9109-1869	JUN/06		
		Schwarzbeck	NSLK 8126	8126-404	JUL/06		■
8.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
9.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
10.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea (TEL: +82-31-746-8500, FAX: +82-31-746-8700)
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)