

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test Report No. : E06NR-008

AGR No. : A06OA-073

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. : P3HSP4C

Model Name : SP4

Serial number : N/A

Total page of Report : 20 pages (including this page)

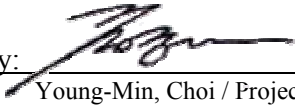
Date of Incoming : October 10, 2006

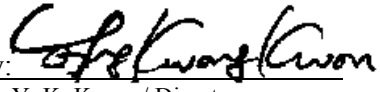
Date of Issuing : November 02, 2006

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.

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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. Staff
- TELEPHONE NO : +82-2-3282-2264
- BRAND NAME : SIRIUS
- FCC ID : P3HSP4C
- MODEL NAME : SP4
- SERIAL NUMBER : N/A
- DATE : November 02, 2006

DEVICE TYPE	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.

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 and internal 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. $\geq$ 1MHz)	7.3728 MHz 7.6 MHz and 17 MHz
POWER REQUIREMENT	DC 12V from a car battery
TX FREQUENCY RANGE	88.1 MHz ~ 107.9 MHz (range into 200 kHz Step)
USED ANTENNA for TX	External and internal 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

-. 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.	P3HSP4C	Digital Satellite Radio (EUT)	-
N/A	N/A	N/A	DC/DC Adaptor	EUT
N/A	N/A	N/A	GPS Antenna	EUT
N/A	N/A	N/A	External FM Antenna	EUT

2.5 Test Methodology

The radiated testing was performed according to the procedures in chapter 7, 13 of ANSI C63.4: 2003 and 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 30, 2005. (Registration Number: 340658)

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-KR	N/A
Key Board	KI RYUNG ELECTRONICS CO., LTD.	SP4 SUB KEY REV.2	N/A
Cradle Board	KI RYUNG ELECTRONICS CO., LTD.	SP4-CRADLE	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 EUT transmitted signal that was received from the GPS signal generator with maximum audio level. The external, internal 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

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	N	EUT END	1.2	Car Adaptor
FM Out	N	Y	EUT END	4.8	External FM Antenna
Antenna In	N	N	EUT END	2.0	GPS Antenna

3.4 Equipment Modifications

-. None

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

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 (Within the permitted 200 kHz band)

5.1.1 Operating Condition: External antenna mode

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

Humidity Level : 48% Temperature: 22°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 -4.34 dB at 97.90 MHz under average detect mode

EUT : Digital Satellite Radio Date: October 11, 2006
 Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit (dBuV/m)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)		
88.10	31.30	Peak	H	7.89	2.36	41.55	68.00	-26.45
	24.90	Peak	V	7.89	2.36	35.15	68.00	-32.85
	26.90	Average	H	7.89	2.36	37.15	48.00	-10.85
	20.70	Average	V	7.89	2.36	30.95	48.00	-17.05
97.90	34.50	Peak	H	9.66	2.40	46.56	68.00	-21.44
	29.50	Peak	V	9.66	2.40	41.56	68.00	-26.44
	31.60	Average	H	9.66	2.40	43.66	48.00	-4.34
	25.10	Average	V	9.66	2.40	37.16	48.00	-10.84
107.90	28.60	Peak	H	11.07	2.48	42.15	68.00	-25.85
	23.30	Peak	V	11.07	2.48	36.85	68.00	-31.15
	22.90	Average	H	11.07	2.48	36.45	48.00	-11.55
	14.00	Average	V	11.07	2.48	27.55	48.00	-20.45

Radiated Emission Tabulated Data

Tested by: Sue-Young, Lee/ Test Engineer

5.1.2 Operating Condition: Internal antenna mode

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

Humidity Level : 48% Temperature: 22°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 -1.84 dB at 97.90 MHz under average detect mode

EUT : Digital Satellite Radio Date: October 11, 2006

Distance : 3 Meter

Radiated Emission			Ant	Correction Factors		Total	Limit (dBuV/m)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)		
88.10	29.10	Peak	H	7.89	2.36	39.35	68.00	-28.65
	34.30	Peak	V	7.89	2.36	44.55	68.00	-23.45
	24.70	Average	H	7.89	2.36	34.95	48.00	-13.05
	29.60	Average	V	7.89	2.36	39.85	48.00	-8.15
97.90	38.10	Peak	H	9.66	2.40	50.16	68.00	-17.84
	31.50	Peak	V	9.66	2.40	43.56	68.00	-24.44
	34.10	Average	H	9.66	2.40	46.16	48.00	-1.84
	27.70	Average	V	9.66	2.40	39.76	48.00	-8.24
107.90	26.40	Peak	H	11.07	2.48	39.95	68.00	-28.05
	24.30	Peak	V	11.07	2.48	37.85	68.00	-30.15
	16.70	Average	H	11.07	2.48	30.25	48.00	-17.75
	18.20	Average	V	11.07	2.48	31.75	48.00	-16.25

Radiated Emission Tabulated Data

Tested by: Sue-Young, Lee/ Test Engineer

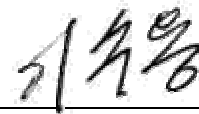
5.2 Radiated Emission Test (Outside of the specified 200 kHz band)**5.2.1 Operating Condition: External antenna mode**

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

Humidity Level : 48 % Temperature: 22 °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 -6.53 dB at 32.10MHz

EUT : Digital Satellite Radio Date: October 11, 2006
 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)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.10	14.30	Peak	V	17.78	1.39	33.47	40.00	-6.53
72.00	15.40	Peak	V	6.21	1.80	23.41	40.00	-16.59
115.40	14.20	Peak	V	12.70	2.70	29.60	43.52	-13.92
120.40	11.40	Peak	V	13.66	2.60	27.66	43.52	-15.86
301.90	10.40	Peak	H	15.58	2.90	28.88	46.02	-17.14



Tested by: Sue-Young, Lee/ Test Engineer

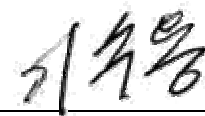
5.2.2 Operating Condition: Internal antenna mode

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

Humidity Level : 48 % Temperature: 22 °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 -5.73 dB at 32.32MHz

EUT : Digital Satellite Radio Date: October 11, 2006
 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)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.32	15.10	Peak	V	17.78	1.39	34.27	40.00	-5.73
66.40	13.20	Peak	V	6.21	1.80	21.21	40.00	-18.79
120.40	17.30	Peak	V	12.70	2.70	32.70	43.52	-10.82
132.50	15.40	Peak	H	13.66	2.60	31.66	43.52	-11.86
181.40	12.30	Peak	V	15.58	2.90	30.78	43.52	-12.74
301.40	10.30	Peak	H	14.77	3.62	28.69	46.02	-17.33



Tested by: Sue-Young, Lee/ Test Engineer

5.3 Bandwidth of the operating frequency**5.3.1 Operating Condition: External antenna mode**Humidity Level : 48 %Temperature: 22 °CLimits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)Result : PASSED

EUT : Digital Satellite Radio

Date: October 11, 2006

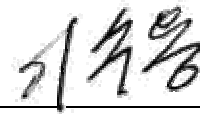
Operating Condition : Transmit the RF signal.

Minimum Resolution

Bandwidth : 10 kHz

Remark : Refer to test data in next page.

Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
88.1	183.0	200	-17.0
97.9	180.0		-20.0
107.9	169.5		-30.5



Tested by: Sue-Young, Lee/ Test Engineer



Bottom Frequency (88.1MHz)



Middle Frequency (97.9MHz)



Top Frequency(107.9 MHz)

5.3.2 Operating Condition: Internal antenna modeHumidity Level : 48 % Temperature: 22 °CLimits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)Result : PASSED

EUT : Digital Satellite Radio Date: October 11, 2006

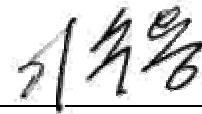
Operating Condition : Transmit the RF signal.

Minimum Resolution

Bandwidth : 10 kHz

Remark : Refer to test data in next page.

Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
88.1	181.5	200	-18.5
97.9	180.0		-20.0
107.9	168.3		-31.7



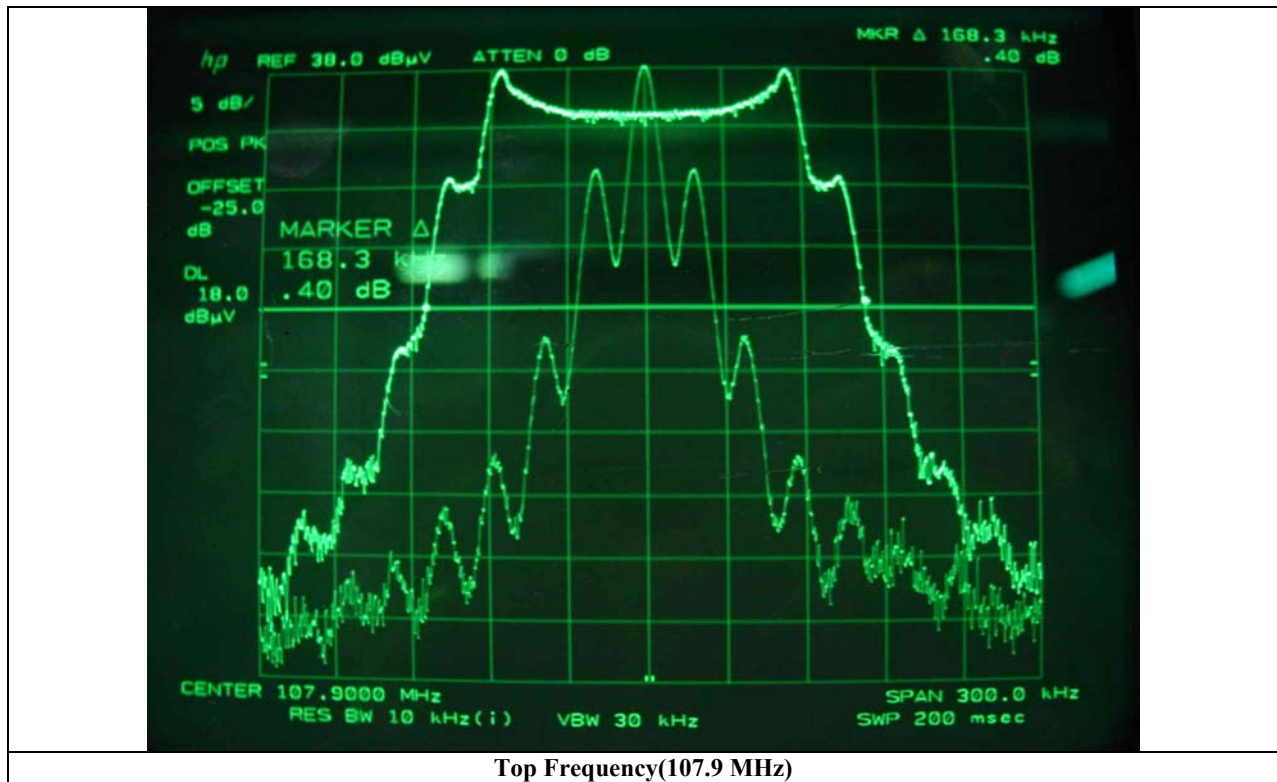
Tested by: Sue-Young, Lee/ Test Engineer



Bottom Frequency (88.1MHz)



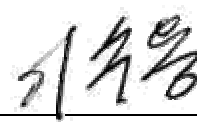
Middle Frequency (97.9MHz)



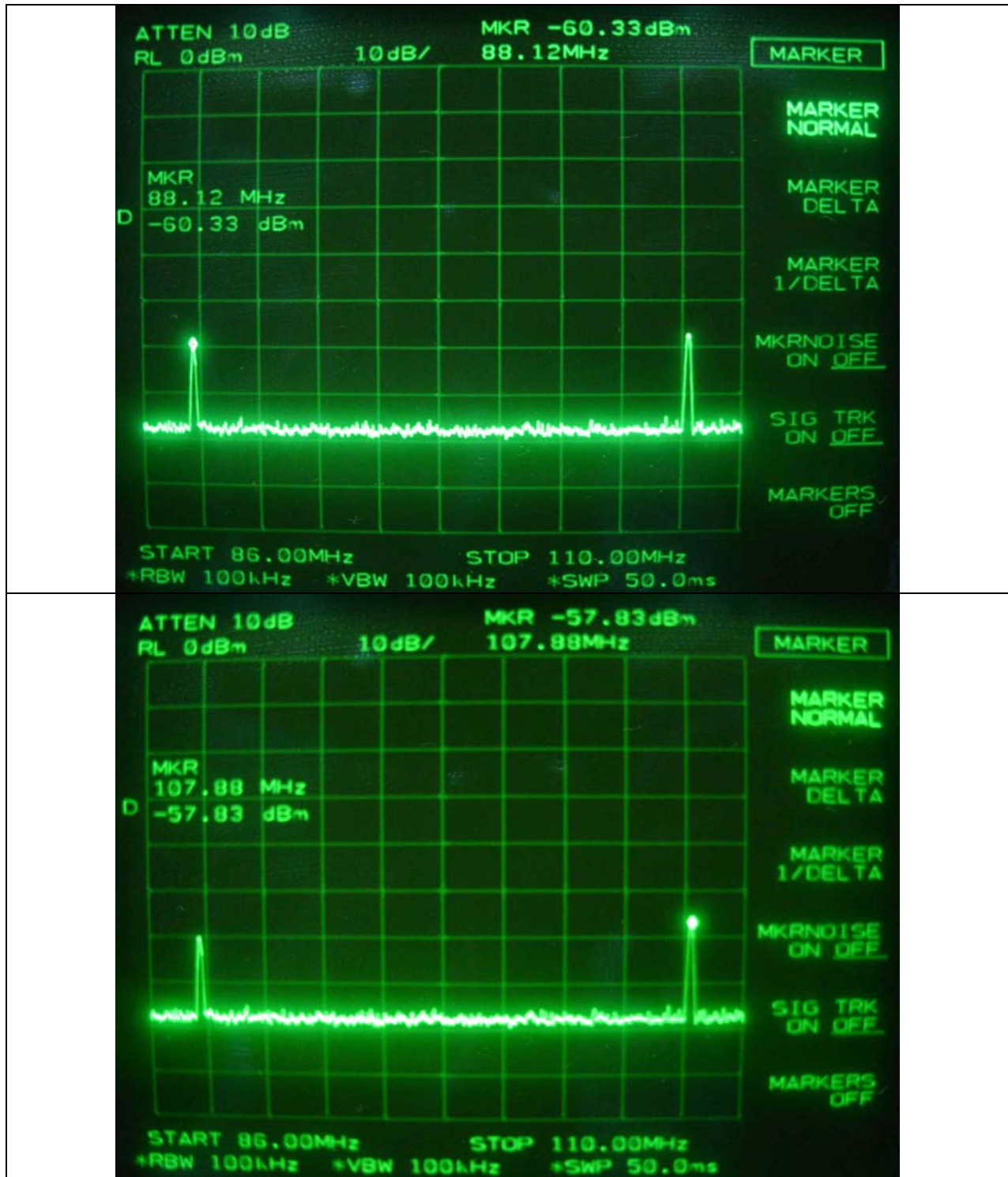
5.4 Tuning Range of the operating frequency

Humidity Level : 48 % Temperature: 22 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.239 (a)
Result : PASSED

EUT : Digital Satellite Radio Date: October 11, 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



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	ESVS10	827864/005	DEC/05	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/06	12MONTH	■
3.	Spectrum analyzer	R/S	FSP	100017	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	■